12/8/2021

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	C 809-2-270		1
STATE	DISTRICT	COUNTY	
TEXAS	LFK	SHELBY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96

FUNCTIONAL CLASS.: ARTERIAL

DESIGN SPEED = 40MPH
ADT (2018) = 4944
ADT (2038) = 6922

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT NO. C809-2-70

US HIGHWAY 96
SHELBY COUNTY

NET LENGTH OF ROADWAY = 20,634.72 FT = 3.908 MI
NET LENGTH OF BRIDGE = 295.28 FT = 0.055 MI
NET LENGTH OF PROJECT = 20,930.00 FT = 3.963 MI

LIMITS: FROM 1.06 MILES S OF SL 500 TO 0.35 MILES S OF FM 417

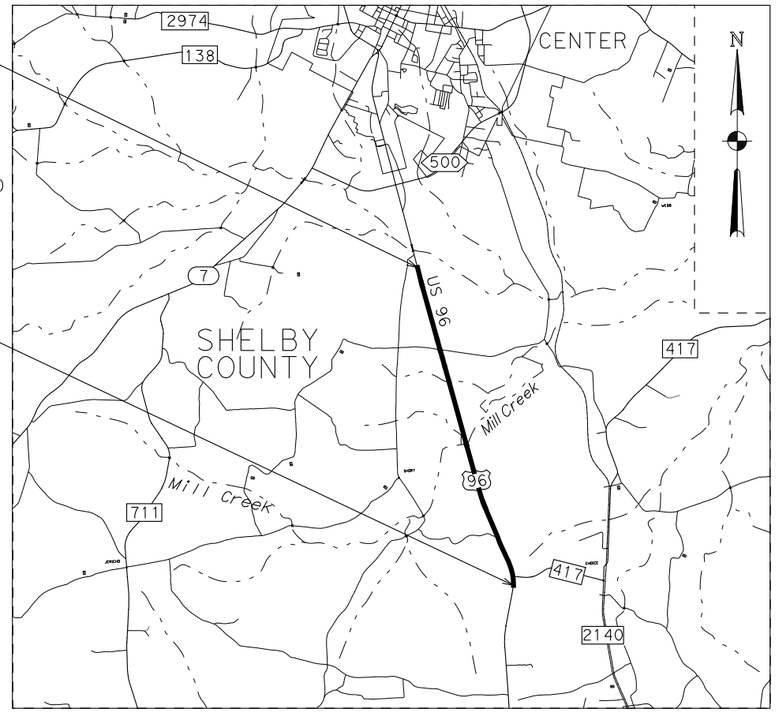
FOR THE CONSTRUCTION OF SUPER-2 HIGHWAY
CONSISTING OF ADD PASSING LANES AND OVERLAY EXISTING PAVEMENT

BEGIN PROJECT
STA: 2771+95
CSJ: 0809-02-070
REF MRK 330+0.169
LAT +31.75111100°
LONG -94.17823300°

PREVIOUS PROJECT TIE
PROJECT NO. BR 2001 (497)
CSJ: 0809-02-048, ETC.
TIE-IN STA. 2372+70.34

END PROJECT
STA: 2562+65
CSJ: 0809-02-070
REF MRK 334+0.077
LAT +31.69997000°
LONG -94.16342700°

PREVIOUS PROJECT TIE
PROJECT NO. NH 93(5) R
CSJ: 0809-02-041
TIE-IN STA. 2563+91.68



N.T.S.

"NO EXCEPTIONS, NO RAILROAD CROSSINGS"
EQUATION: STA 2771+95.00 BK =
STA 2372+68.78 AHEAD = -39,926.22 FT

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER

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

Robert D. Austin° P.E. — 12/08/2021
LOCKWOOD, ANDREWS & NEWNAM, INC. — DATE

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

FINAL PLANS

LETTING DATE: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED: _____
DATE WORK WAS ACCEPTED: _____
FINAL CONTRACT COST: $ _____
CONTRACTOR: _____

CONSTRUCTION WORK ON THIS PROJECT WAS PERFORMED IN ACCORDANCE WITH PLANS, CONTRACT AND APPROVED CHANGE ORDERS.

BARRICADES AND WARNING SIGNS

PROVIDE AND ERECT BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH THE BARRICADE & CONSTRUCTION STANDARDS, TCP STANDARDS, THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND AS DIRECTED.

RECOMMENDED FOR LETTING: _____

DocuSigned by:
Jennifer Adams
CE1DDBE07C00426...
7/7/2022
FOR DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: _____

DocuSigned by:
Kelly O. Morris, P.E.
F044211639424B4...
7/7/2022
DISTRICT ENGINEER

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DATE: 12/8/2021 12:21:59 PM

	SHEET		DESCRIPTION
			GENERAL
	1		TITLE SHEET
	2		INDEX OF SHEETS
	3 - 5		PROJECT LAYOUT
	6 - 14		TYPICAL SECTIONS
	15 - 15A-15H		GENERAL NOTES
	16 - 16B		ESTIMATE & QUANTITY SHEET
	17 - 29		QUANTITY SUMMARIES
	30 - 31		SUMMARY OF SMALL SIGNS
			TRAFFIC CONTROL PLAN
	32 - 35		TRAFFIC CONTROL PLAN TYPICAL SECTIONS
#	36 - 47		BC(1)-21 THRU BC(12)-21
#	48 - 51		TCP(2-1)-18 THRU TCP(2-4)-18
#	52		TCP(3-1)-13
#	53		TCP(3-3)-14
#	54		TCP(S-1)-08A
#	55		TCP(S-2)-08A
#	56		TCP(S-2c)-10
#	57		TCP(S-3)-08
#	58		WZ(STPM)-13
#	59		WZ(RS)-22
#	60		WZ(BRK)-13
			ROADWAY DETAILS
	61 - 66		SURVEY CONTROL INDEX SHEET
	67 - 72		HORIZONTAL ALIGNMENT DATA
	73 - 90		PLAN & PROFILE
	91		INTERSECTION DETAILS
	92		MISCELLANEOUS ROADWAY DETAILS
	93		T202TR
	94		DRIVEWAY & SIDE ROAD DETAILS
#	95		CONCRETE RIPRAP DETAILS (LUFKIN DISTRICT STANDARD)
	96		MAILBOX TURNOUT DETAILS
#	97		NON-MOW STRIP DETAILS (LUFKIN DISTRICT STANDARD)
	98		OMIT
#	99		BED-14
#	100		TE(HMAC)-11
#	101		RS(2)-13
#	102		RS(3)-13
#	103		RS(4)-13
#	104		GF(31)-19
#	105		OMIT
#	106 - 107		GF(31)TR TL3-20
#	108		OMIT
#	109		OMIT
#	110		SGT(11S)31-18
#	111		SGT(12S)31-18
#	112		SGT(15)31-20
#	113		CCCG-21
			DRAINAGE DETAILS
	114		EXTERNAL ENLARGED DRAINAGE AREA MAP
	115 - 127		CULVERT LAYOUT
	128 - 129		MISCELLANEOUS DRAINAGE DETA
#	130		PSET-SP
	131 - 132		SETB-PD
#	133		CH-PW-0
#	134		CH-FW-0

	SHEET		DESCRIPTION
			TRAFFIC ITEMS
	135 - 143		SIGNING & PAVEMENT MARKING LAYOUT
	144 - 145		SIGN DETAILS
#	146 - 148		PM(1)-20 THRU PM(3)-20
#	149		TSR(3)-13
#	150		TSR(4)-13
#	151		SMD(GEN)-08
#	152		SMD(SLIP-1)-08
#	153		SMD(SLIP-2)-08
#	154		SMD(SLIP-3)-08
#	155		SMD(TWT)-08
#	156		D & OM(1)-20
#	157		D & OM(2)-20
#	158		D & OM(3)-20
#	159		D & OM(4)-20
#	160		D & OM(5)-20
#	161		D & OM(6)-20
#	162		D & OM(VIA)-20
#	163		TS2(PL-1)-18
#	164		RS(2)-13
#	165		RS(3)-13
#	166		RS(4)-13
			ILLUMINATION ITEMS
	167		ILLUMINATION LAYOUT
##	168		ED(1)-14
##	169		ED(3)-14
##	170		ED(4)-14
##	171		ED(5)-14
##	172		ED(6)-14
##	173		ED(7)-14
##	174		RID(1)-20
##	175		RID(2)-20
##	176		RIP(1)-19
##	177		RIP(2)-19
##	178		RIP(3)-19
##	179		RIP(4)-19
			ENVIRONMENTAL ISSUES
	180		TXDOT SWP3 INDEX
	181 - 189		SWP3 LAYOUT
	190 - 191		EPIC
	192		BLOCK SOD DETAILS
#	193		EC(1)-16
#	194		EC(2)-16
#	195		EC(3)-16
			MISCELLANEOUS ITEMS
#	196 - 199		MB(1)-21 THRU MB(4)-21

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

Robert D. Austin 12/08/2021

ROBERT D. AUSTIN, P.E. DATE
TEXAS LICENSE NO.: 67596

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

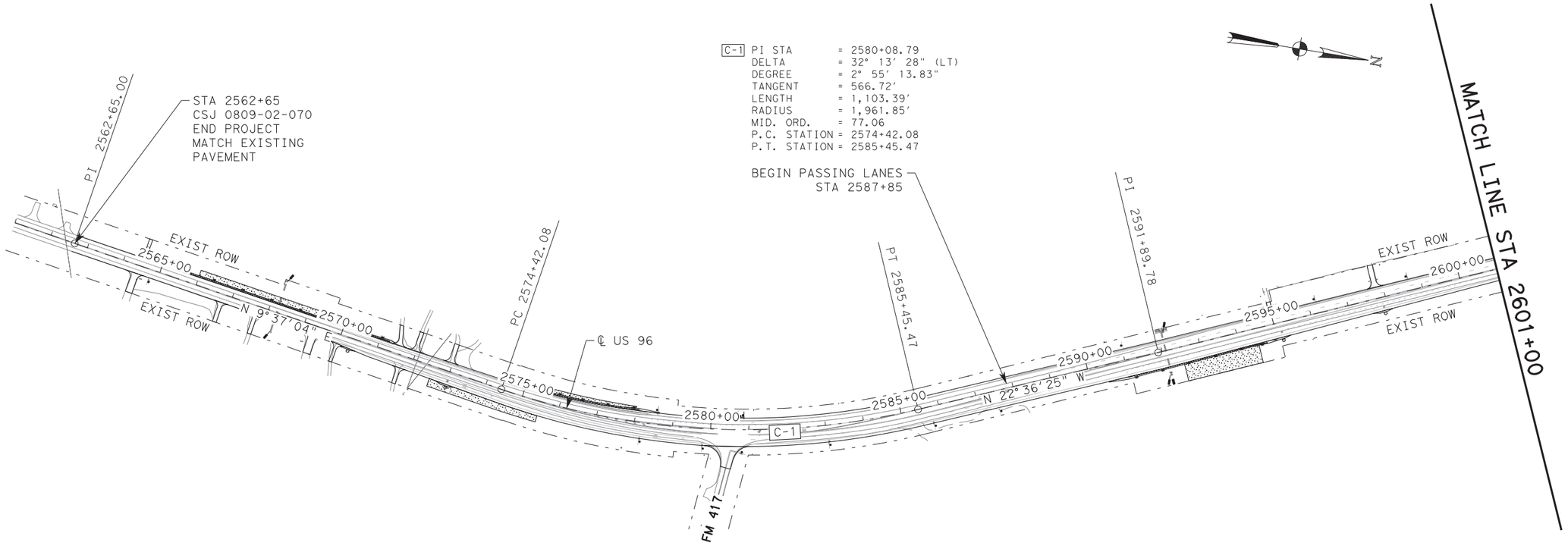
12/08/2021

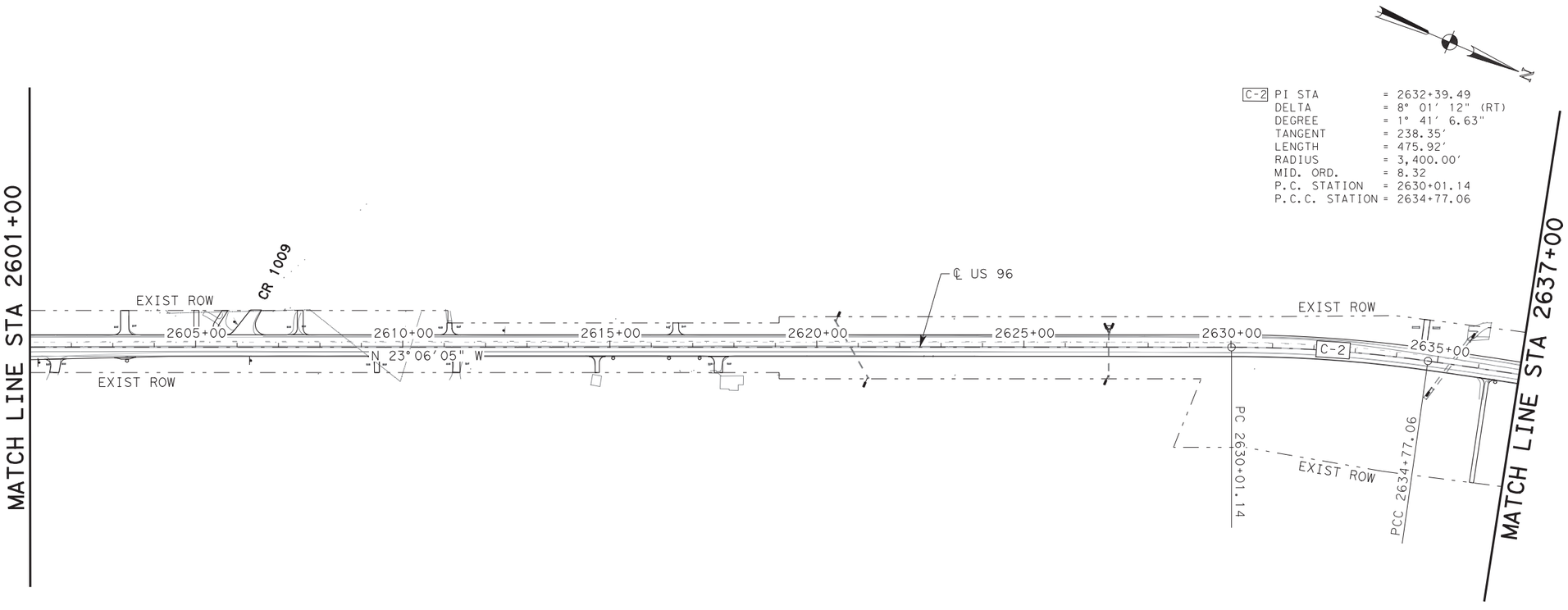
DAVID A. NUFER, P.E. DATE
TEXAS LICENSE NO.: 68818

INDEX OF SHEETS

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			2
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96





STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PROJECT LAYOUT

(STA 2562+65 TO STA 2637+00)

SHEET 1 OF 3

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			3
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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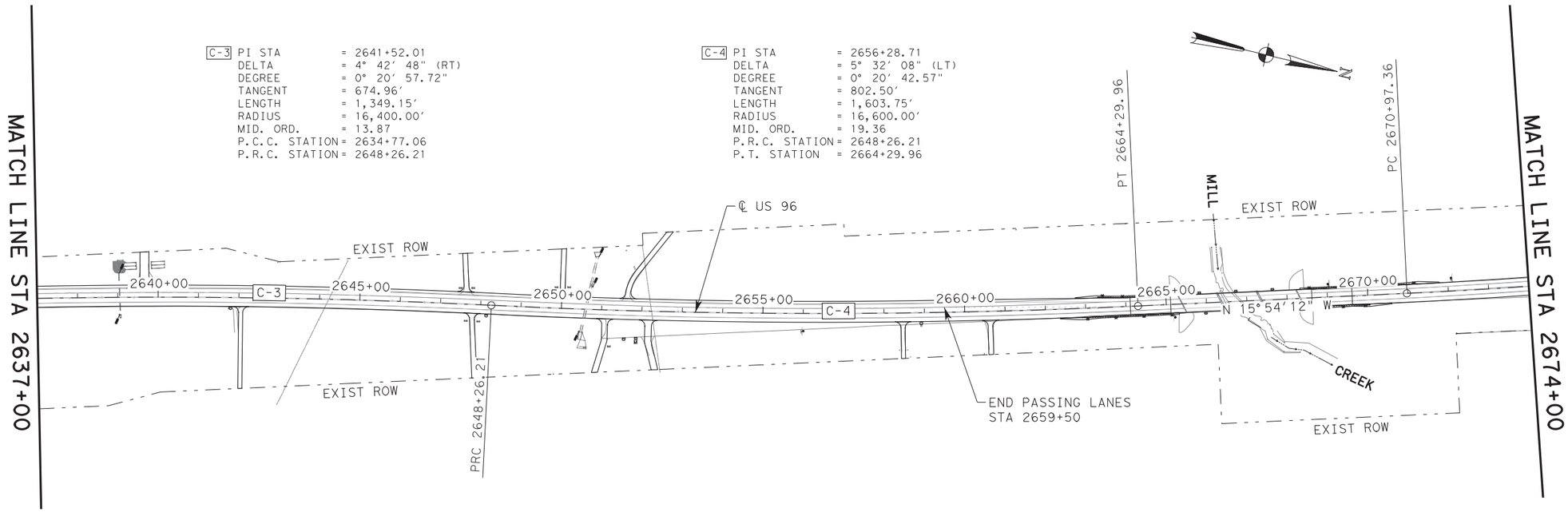

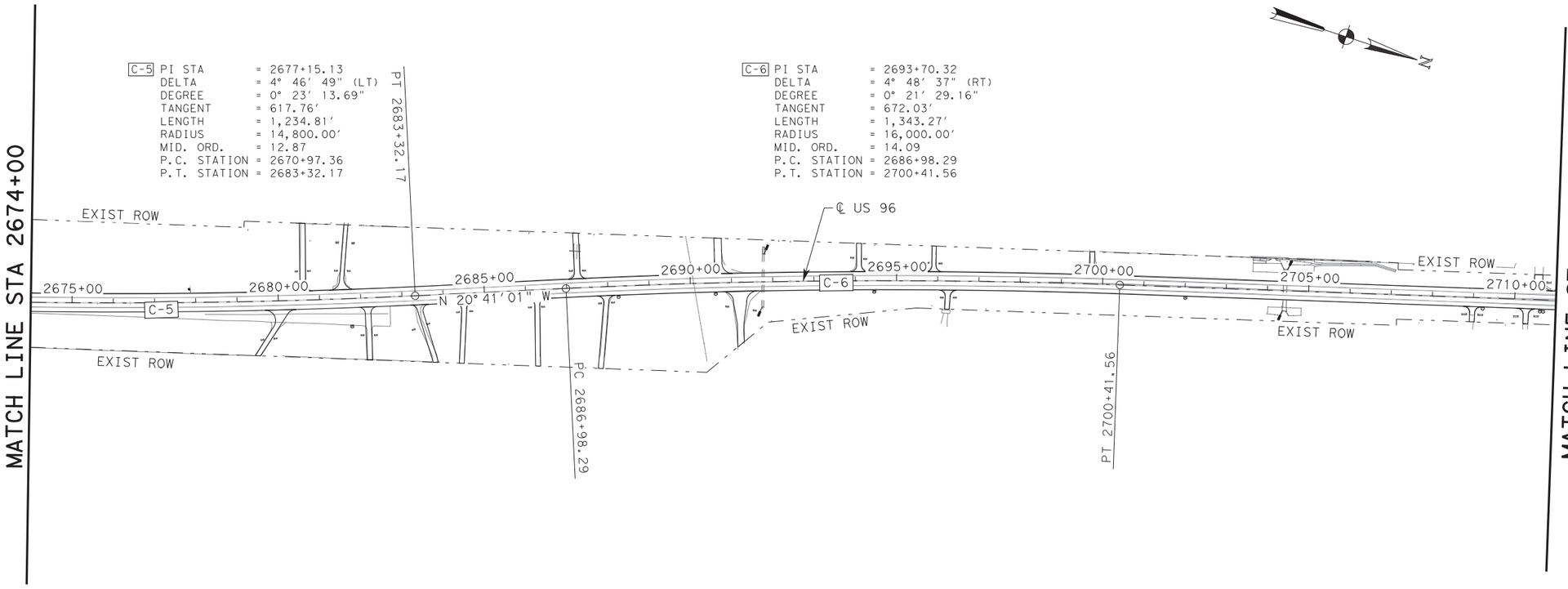

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SCALE: 1"=300′

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PROJECT LAYOUT

(STA 2637+00 TO STA 2711+00)

SHEET 2 OF 3

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
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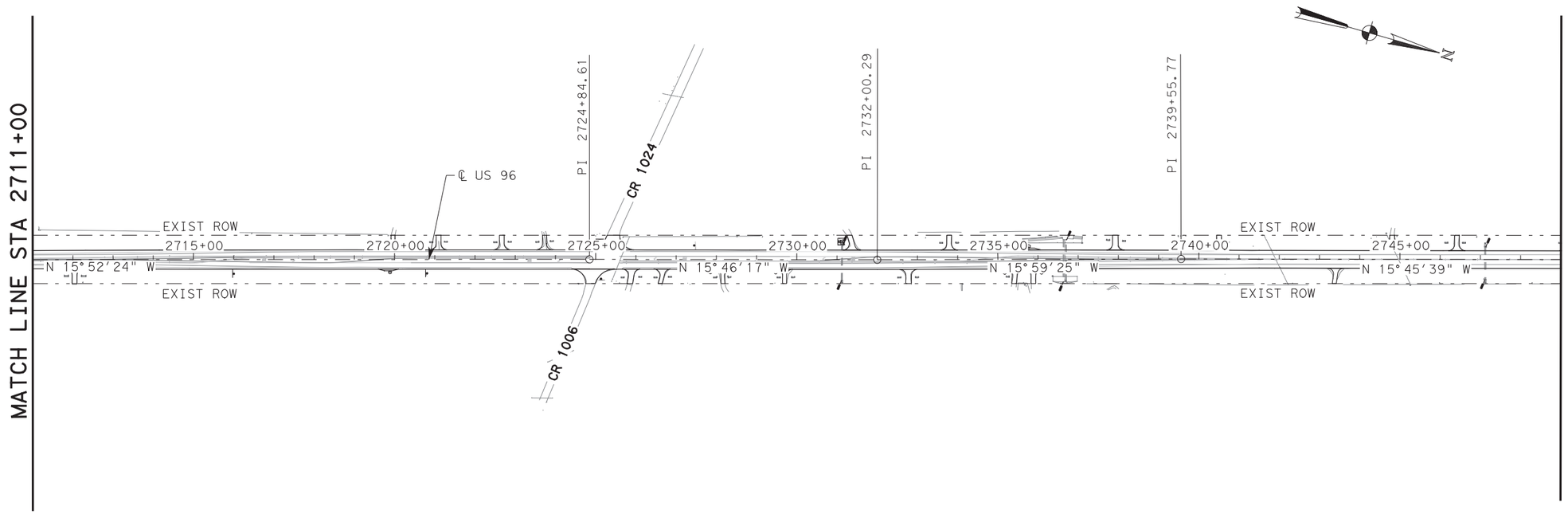

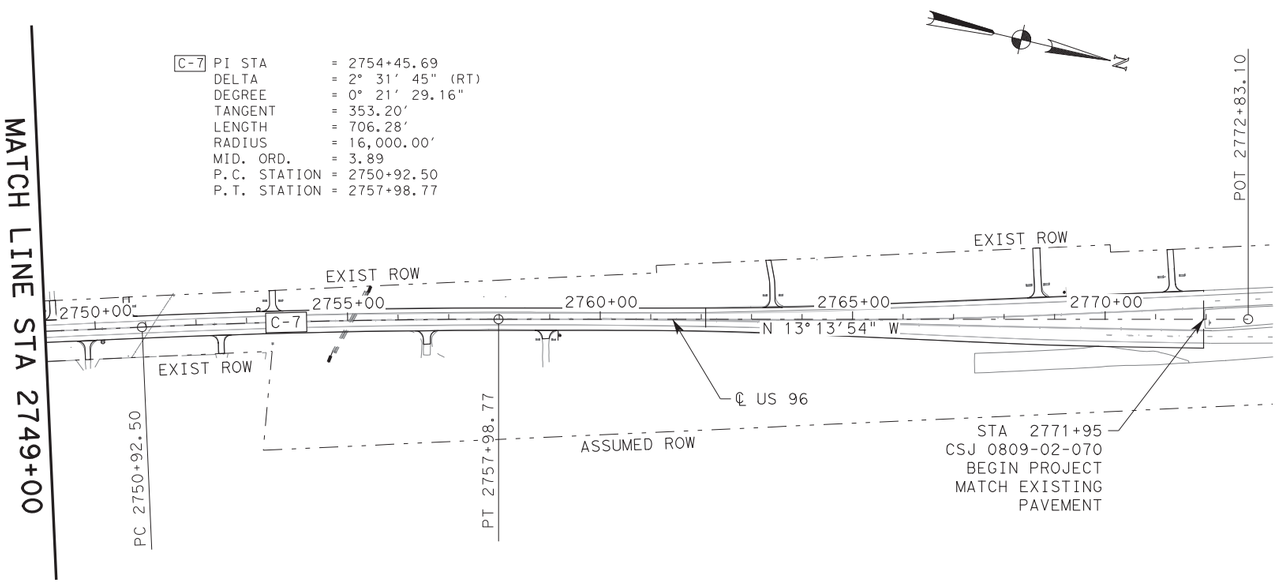

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PROJECT LAYOUT

(STA 2711+00 TO STA 2771+95)

SHEET 3 OF 3

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			5
STATE	STATE DIST. NO.	COUNTY	
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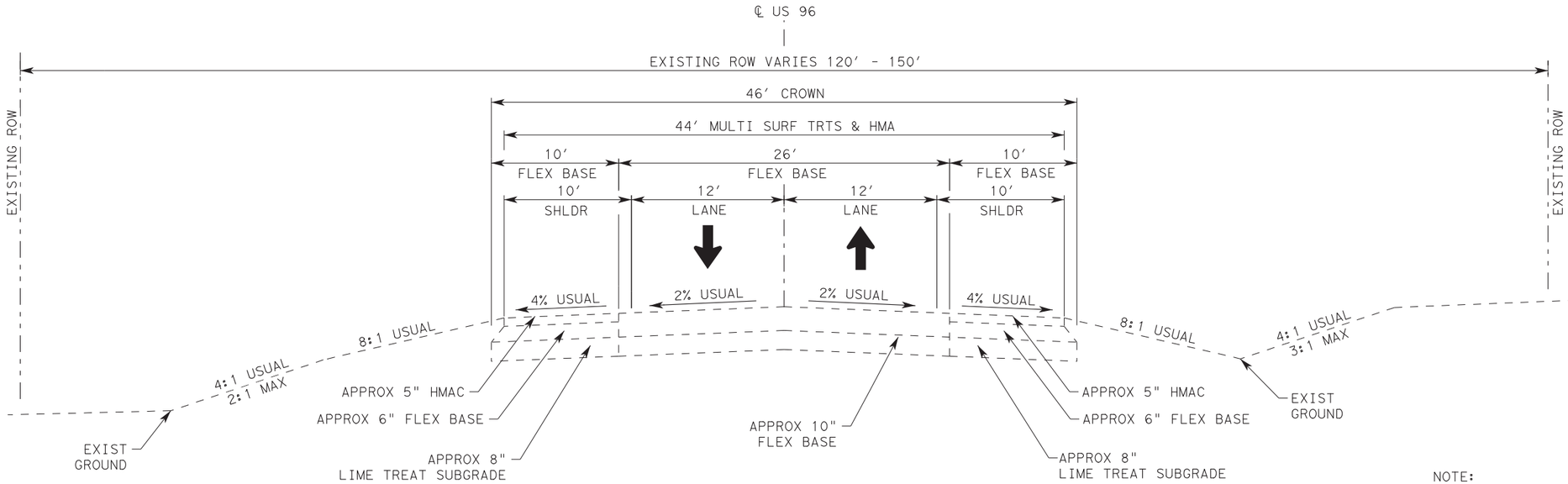

EXISTING TYPICAL SECTION

STA 2562+65 TO STA 2574+42 (APPROX 5"-8" SEAL COAT & HMAC)
STA 2700+85 TO STA 2712+66 (APPROX 10"-12" SEAL COAT & HMAC)
STA 2737+61 TO STA 2760+00 (APPROX 10"-12" SEAL COAT & HMAC)

NOTE:

THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED BASE FAILURES. THESE LOCATIONS WERE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.

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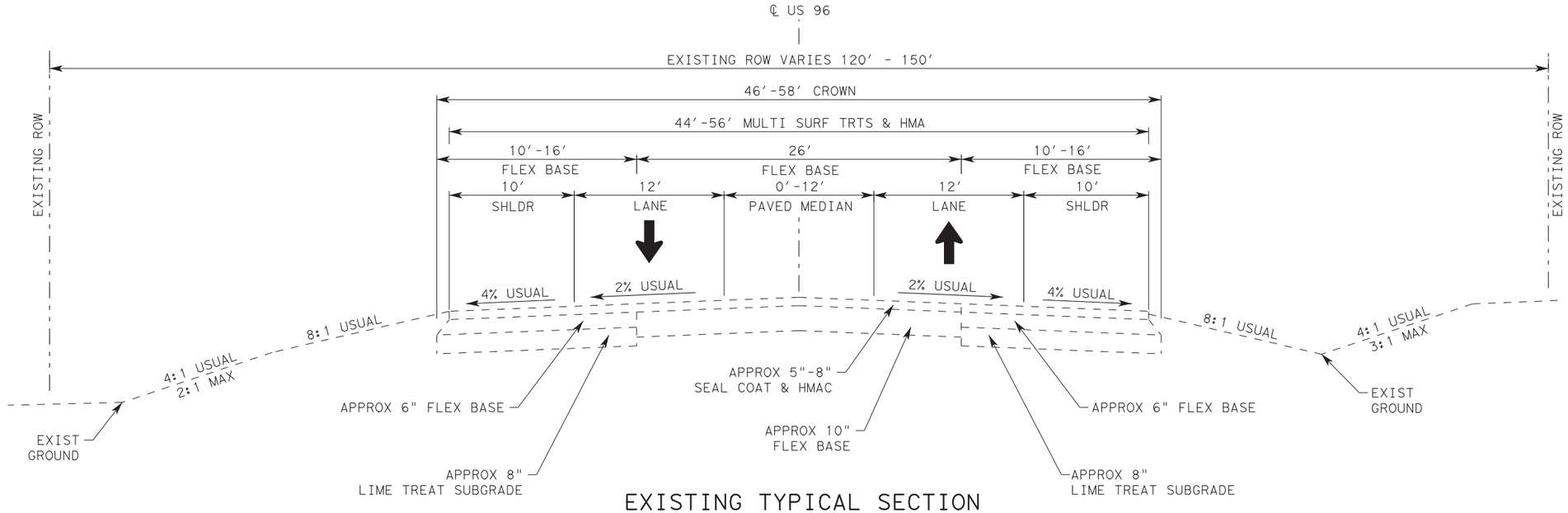

EXISTING TYPICAL SECTION

STA 2574+42 TO STA 2591+96

TRANSITION FROM STA 2574+42 TO STA 2580+00
TRANSITION FROM STA 2585+46 TO STA 2591+96

ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 1 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			6
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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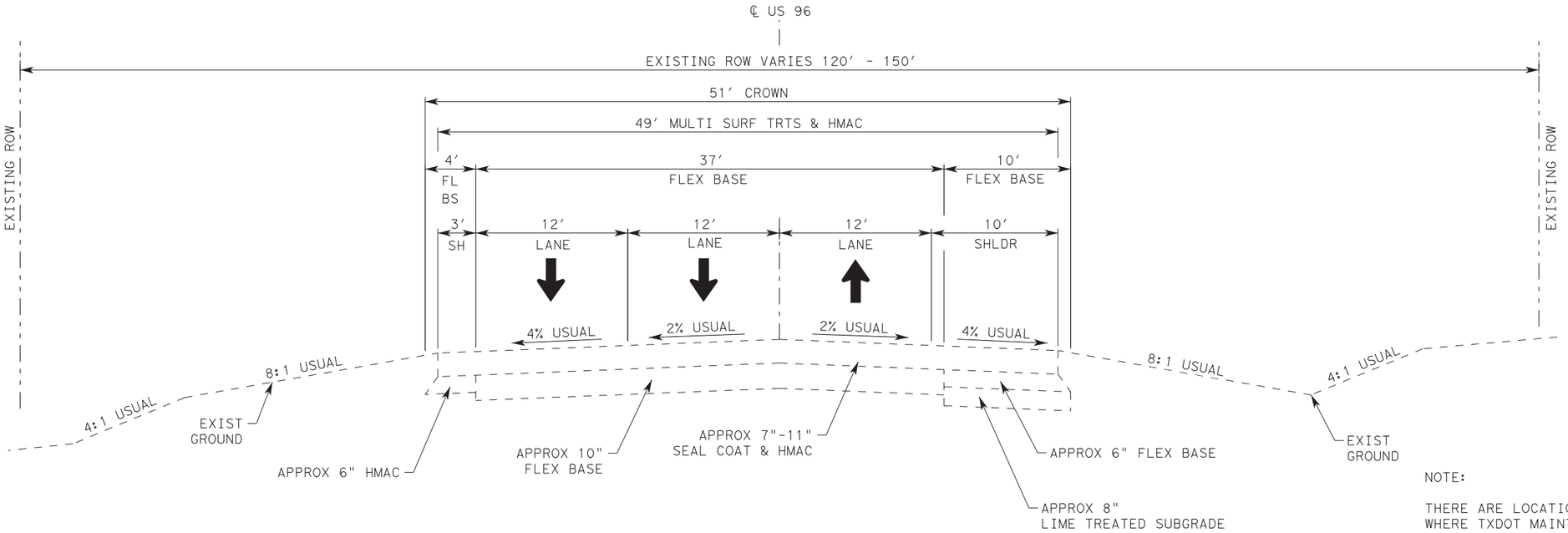

EXISTING TYPICAL SECTIONS

STA 2591+96 TO STA 2637+00

TRANSITION FROM STA 2632+00 TO STA 2637+00

NOTE:

THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED BASE FAILURES. THESE LOCATIONS WERE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.

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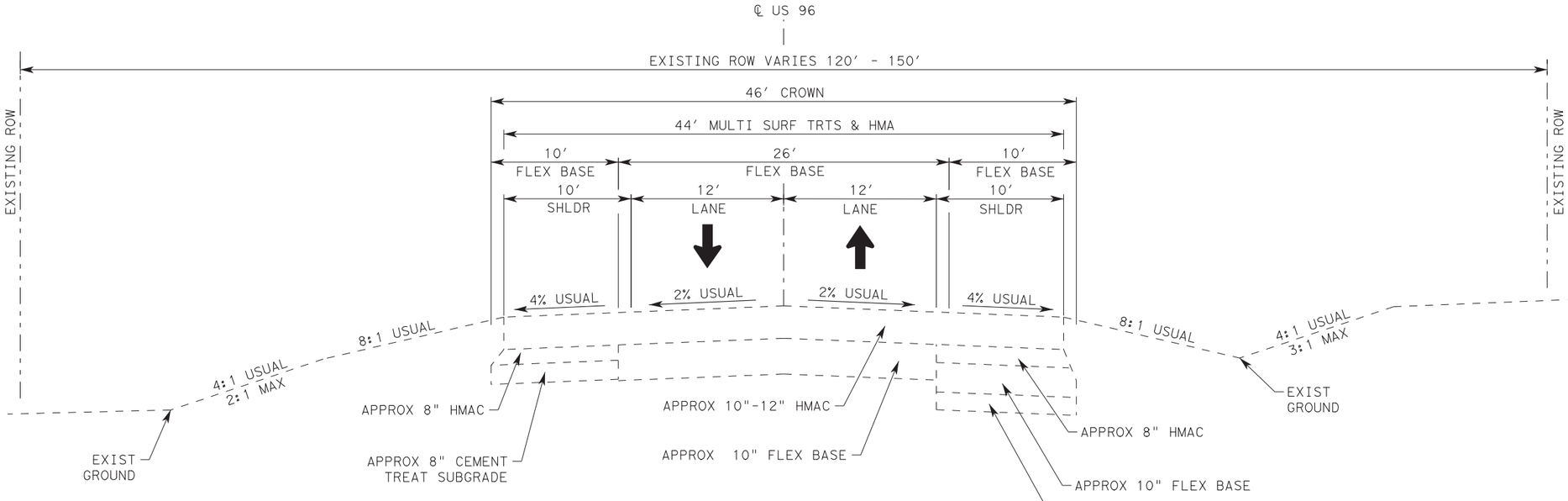

EXISTING TYPICAL SECTION

STA 2695+22 TO STA 2700+85

ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 2 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			7
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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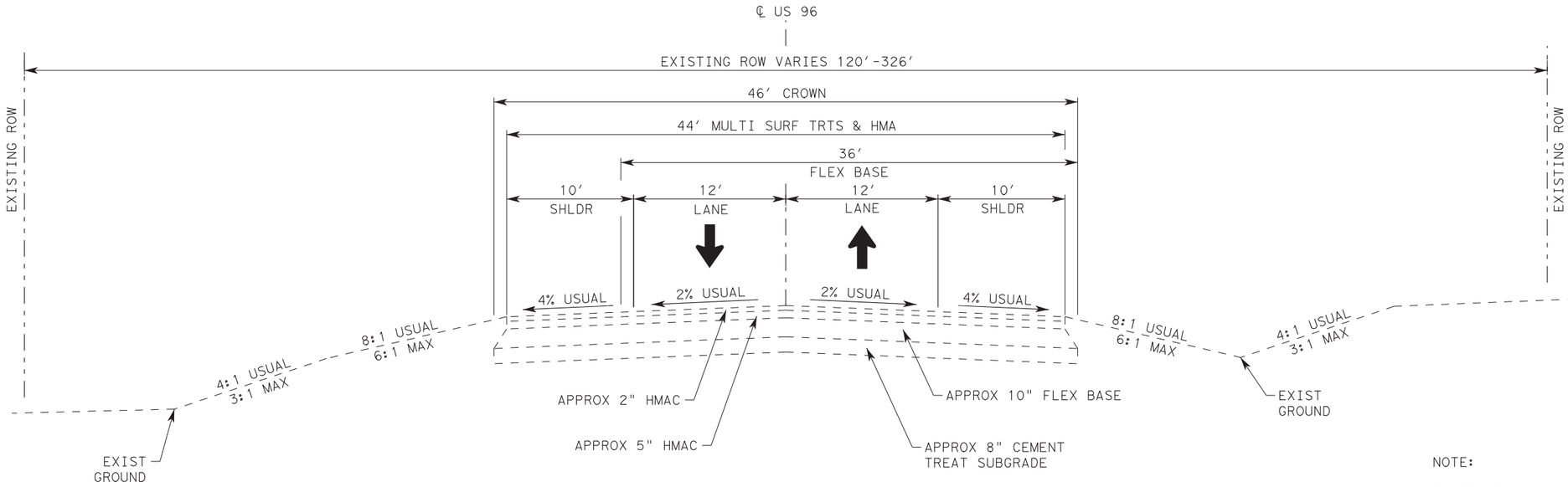

EXISTING TYPICAL SECTION

STA 2637+00 TO STA 2643+62
STA 2690+34 TO STA 2695+22

NOTE:

THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED BASE FAILURES. THESE LOCATIONS WERE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.

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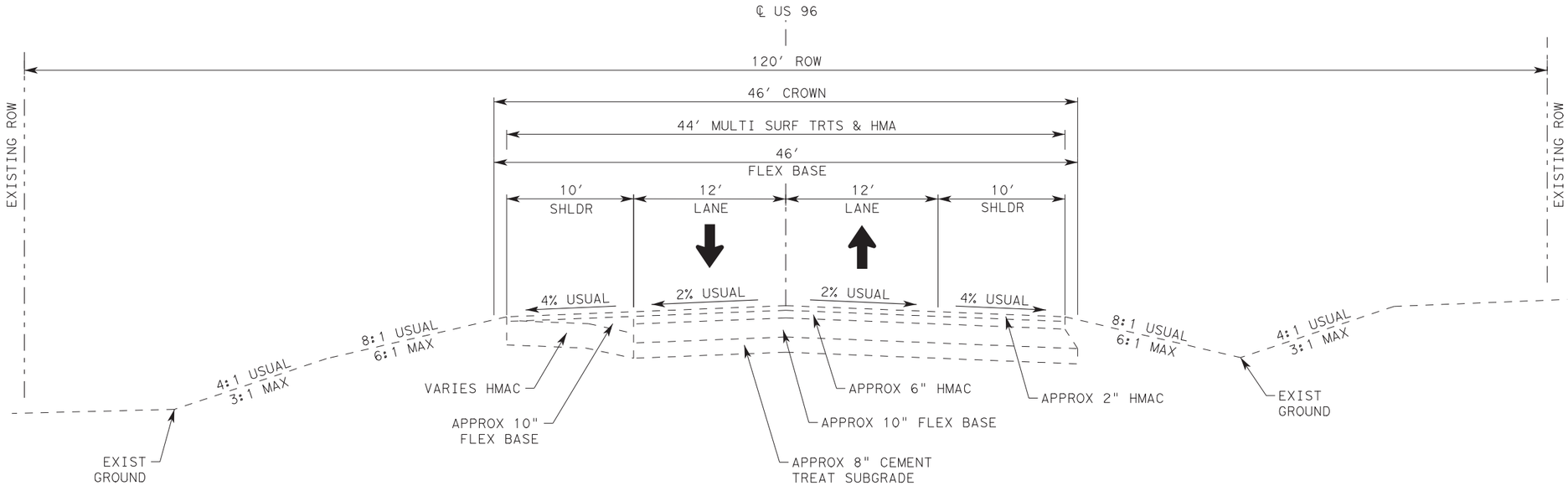

EXISTING TYPICAL SECTION

STA 2643+62 TO STA 2665+17
STA 2668+71 TO STA 2690+34

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 3 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			8
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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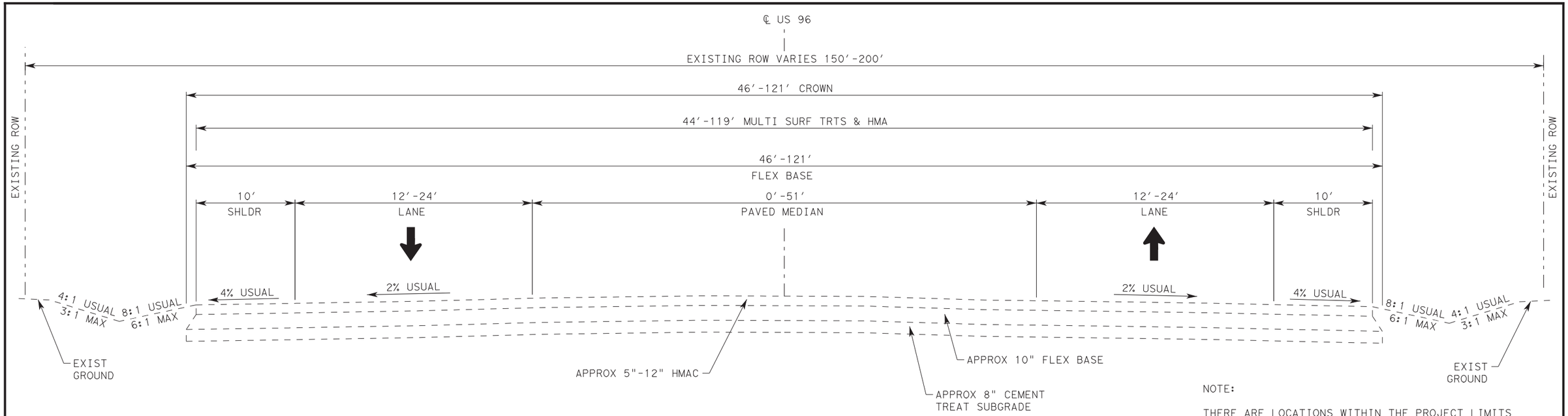

EXISTING TYPICAL SECTION

STA 2760+00 TO STA 2771+95

TRANSITION FROM STA 2760+00 TO STA 2771+95

NOTE:

THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED BASE FAILURES. THESE LOCATIONS WERE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.

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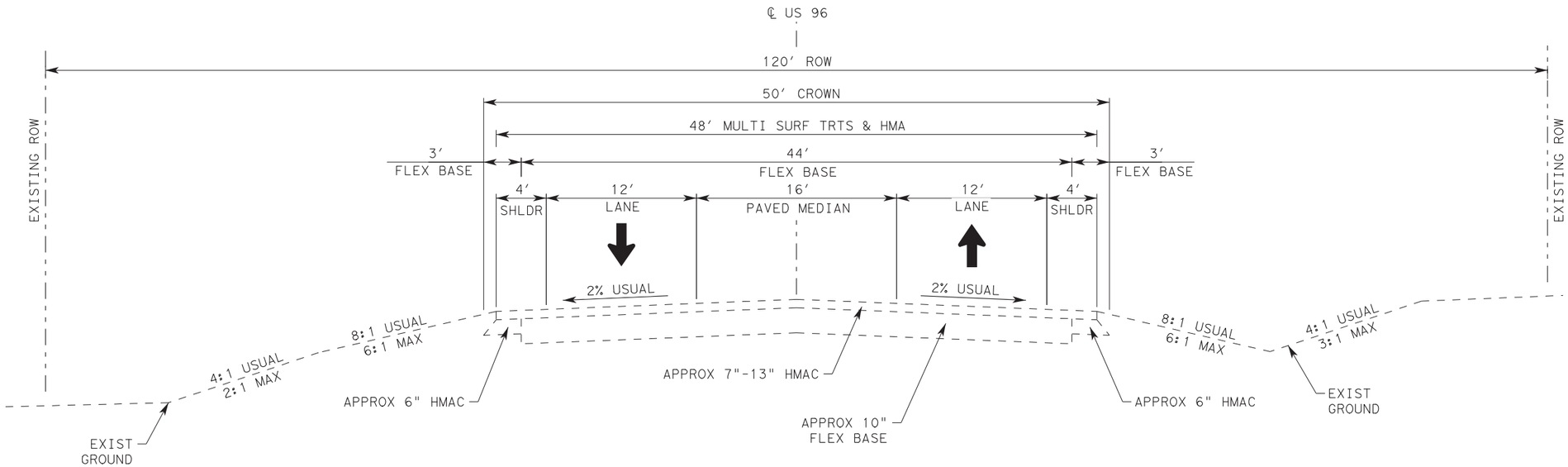

EXISTING TYPICAL SECTION

STA 2712+66 TO STA 2737+61

TRANSITION FROM STA 2712+66 TO STA 2718+26
TRANSITION FROM STA 2732+01 TO STA 2737+61

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 4 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			9
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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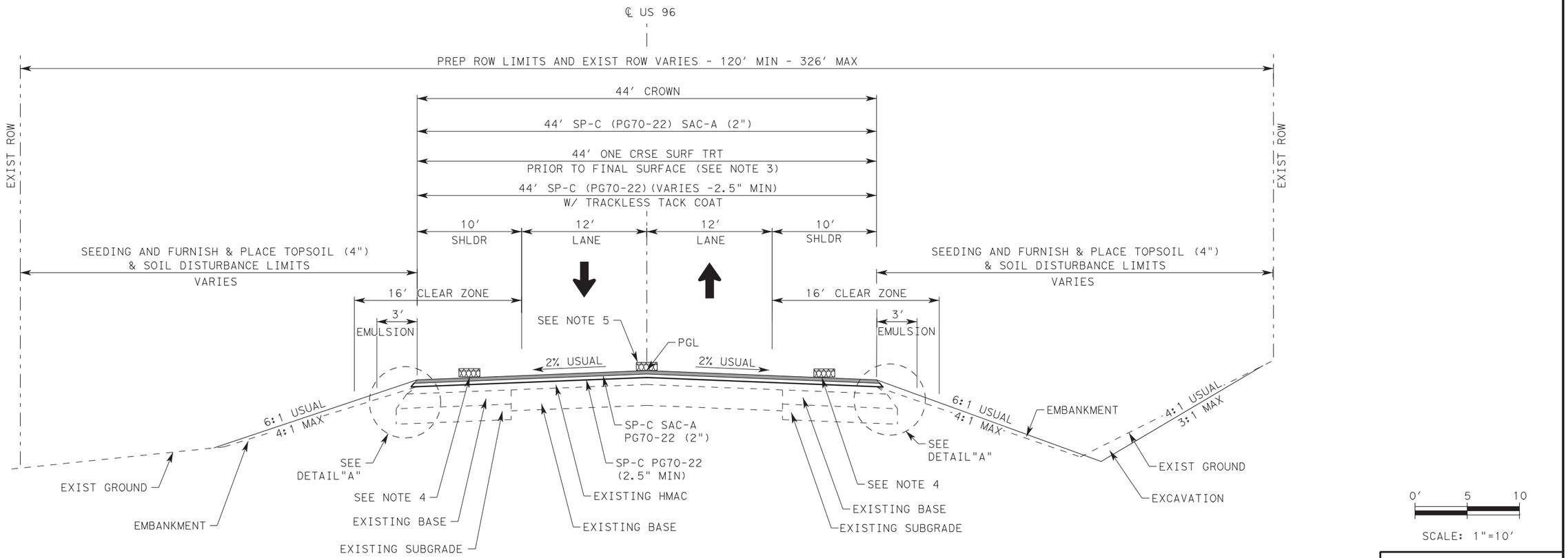

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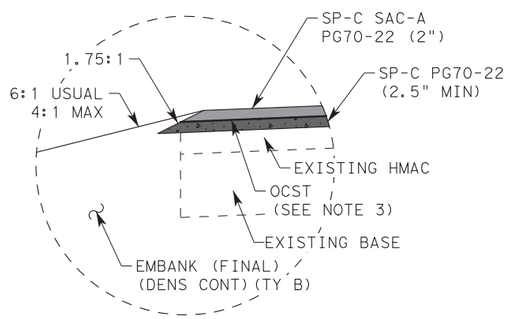
PROPOSED TYPICAL SECTION

STA 2562+65.00 TO STA 2569+35.00
STA 2664+00.00 TO STA 2665+38.76
STA 2668+34.04 TO STA 2708+90.00
STA 2741+50.00 TO STA 2762+09.20



DETAIL "A"

N.T.S.

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION INFORMATION.
2. SEE TXDOT STANDARD DRAWING TE(HMAC)-11 FOR DETAILS NOT SHOWN HERE.
3. OCST

   ASPHALT: (AC15P OR CRS-2P) (0.50 GAL/SY)
   AGGREGATE: (TY-PE, E, L, OR PL GR3) (1 CY/120 SY)

   COVERED PRIME: (ALT. BID)
   ASPHALT: RC 250 @ 0.25 GAL/SY)
   AGGREGATE: GR 5 TY E OR L (1CY/140SY)

4. RUMBLE STRIP

   48" O/S FROM TRAVEL LANE FOR 10′ SHLDRS
   28" O/S FROM TRAVEL LANE FOR 6′ SHLDRS

   SEE TXDOT STANDARD RS(4)-13 FOR DETAILS NOT SHOWN HERE.
5. SEE TXDOT STANDARD DRAWINGS RS(2)-13 AND RS(3)-13 FOR CENTERLINE RUMBLE STRIP DETAILS.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 5 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			10
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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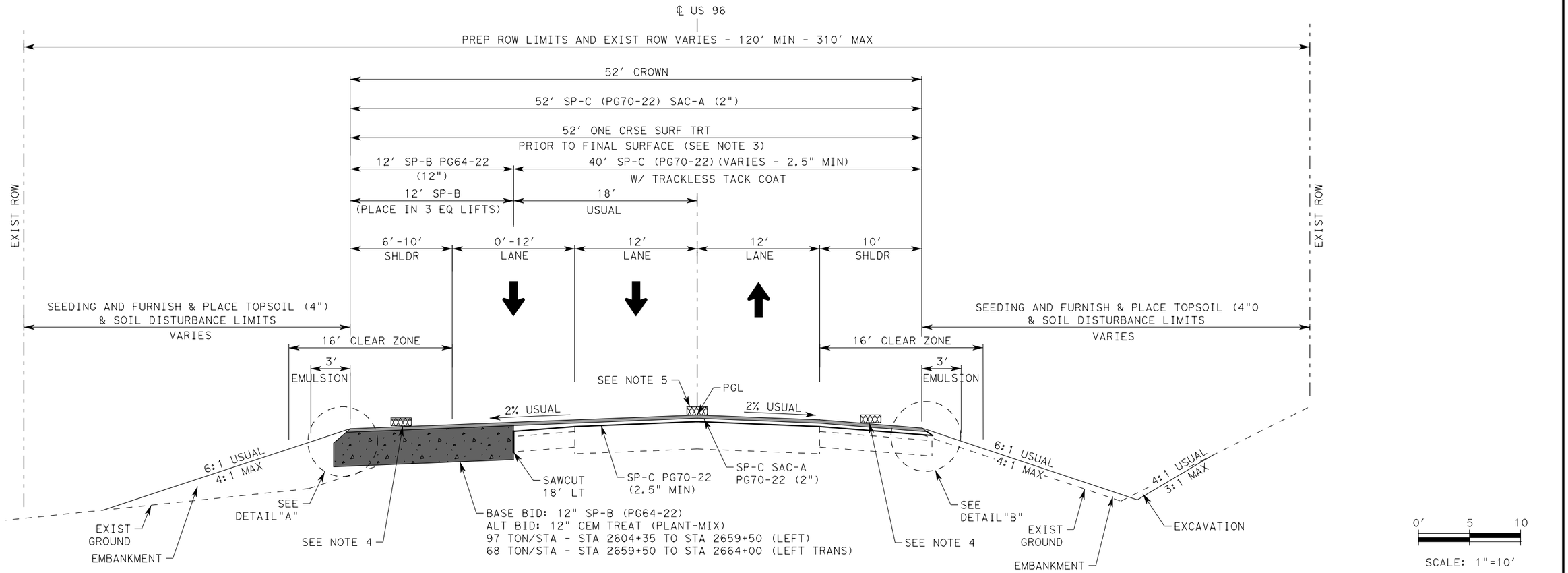


0′ 5 10

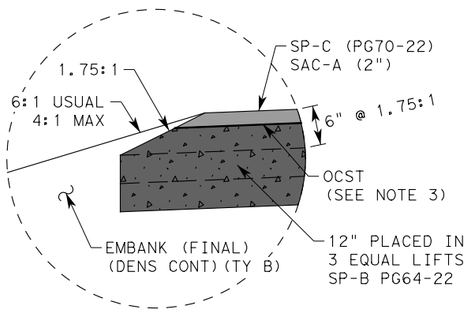
SCALE: 1"=10′

PROPOSED TYPICAL SECTION

STA 2604+35.00 TO STA 2664+00.00

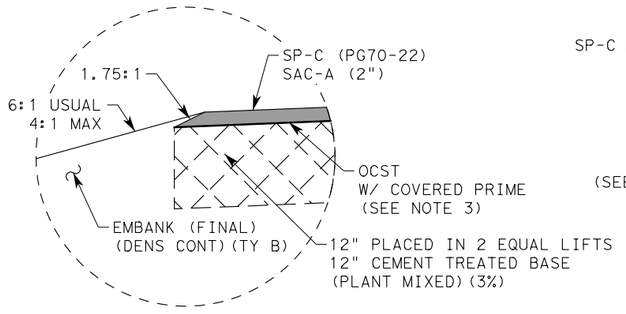
STRIPING TRANSITIONS

6′-10′ : (LT SHLDR) STA 2659+50 TO STA 2664+00
24′-12′ : (LT LANE) STA 2659+50 TO STA 2664+00



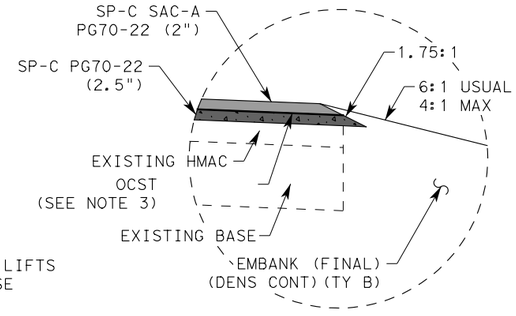
DETAIL "A" (BASE BID)

N.T.S.



DETAIL "A" (ALTERNATE BID)

N.T.S.



DETAIL "B"

N.T.S.

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION INFORMATION.
2. SEE TXDOT STANDARD DRAWING TE(HMAC)-11 FOR DETAILS NOT SHOWN HERE.
3. OCST

   ASPHALT: (AC15P OR CRS-2P)
   (0.50 GAL/SY)
   AGGREGATE: (TY-PE, E, L, OR PL GR3)
   (1 CY/120 SY)

   COVERED PRIME: (ALT. BID)
   ASPHALT: RC 250 @ 0.25 GAL/SY)
   AGGREGATE: GR 5 TY E OR L (1CY/140SY)
4. RUMBLE STRIP

   48" O/S FROM TRAVEL LANE FOR 10′ SHLDRS
   28" O/S FROM TRAVEL LANE FOR 6′ SHLDRS

   SEE TXDOT STANDARD RS(4)-13 FOR DETAILS NOT SHOWN HERE.
5. SEE TXDOT STANDARD DRAWINGS RS(2)-13 AND RS(3)-13 FOR CENTERLINE RUMBLE STRIP DETAILS.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
12/08/2021

Robert D. Austin

TYPICAL SECTIONS

SHEET 6 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			11
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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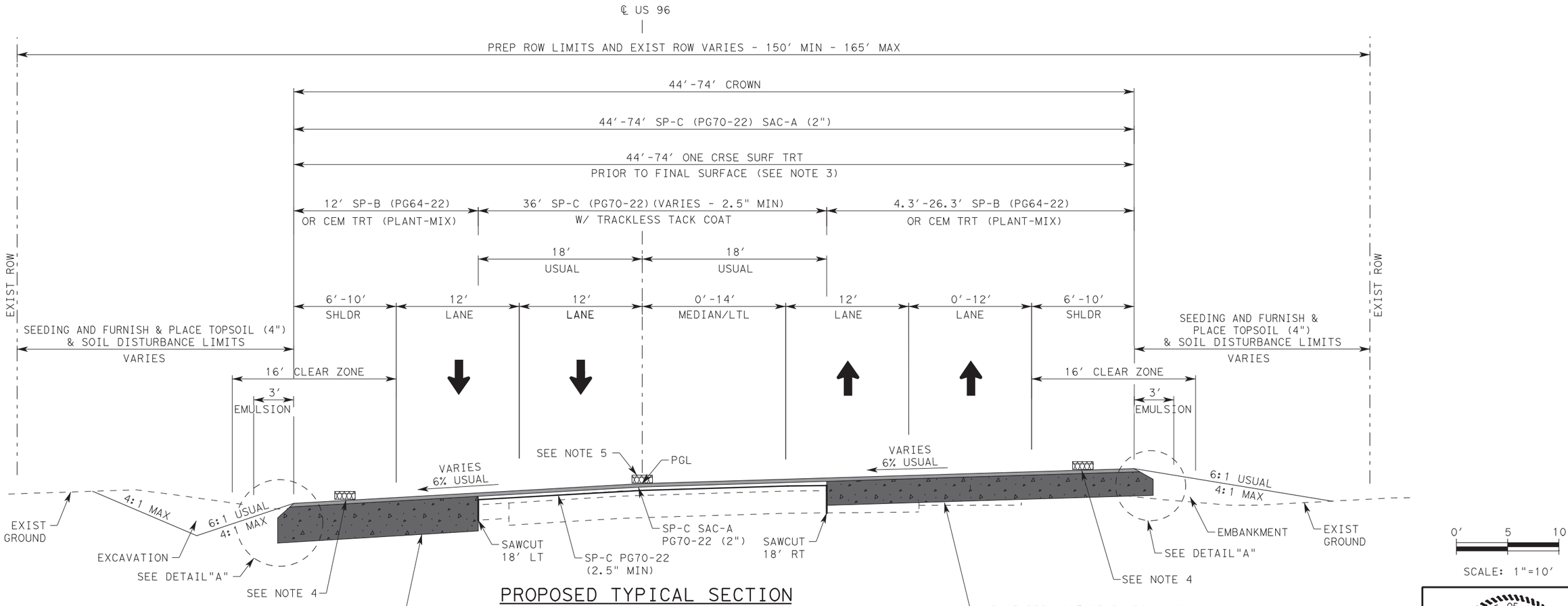


PROPOSED TYPICAL SECTION

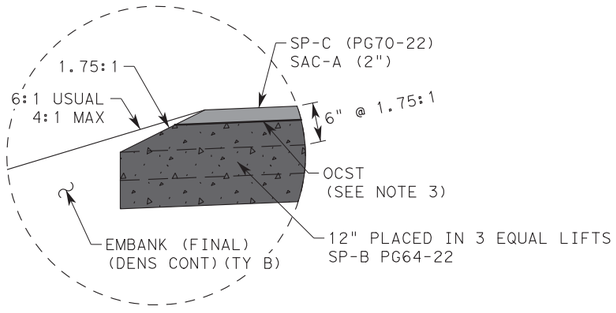
STA 2569+35.00 TO STA 2604+35.00 = 3500.00 FT

BASE BID: 12" SP-B (PG64-22)
ALT BID: 12" CEM TREAT (PLANT-MIX)
38 TON/STA - STA 2569+35 TO STA 2571+60 (LEFT)
68 TON/STA - STA 2571+60 TO STA 2578+35 (LEFT TRANS)
97 TON/STA - STA 2578+35 TO STA 2604+35 (LEFT)

BASE BID: 12" SP-B (PG64-22)
ALT BID: 12" CEM TREAT (PLANT-MIX)
75 TON/STA - STA 2569+35 TO STA 2570+85 (RIGHT TRANS)
156 TON/STA - STA 2570+85 TO STA 2579+78 (RIGHT TRANS)
200 TON/STA - STA 2579+78 TO STA 2591+90 (RIGHT)
148 TON/STA - STA 2591+90 TO STA 2601+05 (RIGHT TRANS)
67 TON/STA - STA 2601+05 TO STA 2604+35 (RIGHT TRANS)

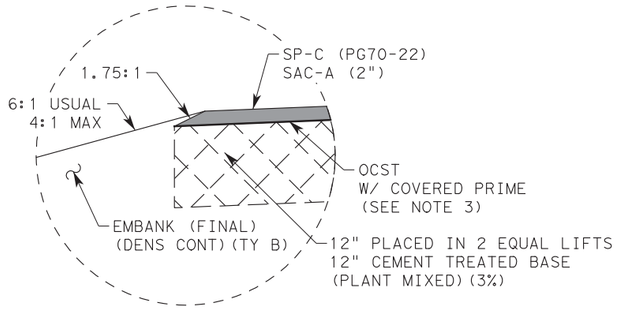
STRIPING TRANSITIONS

0′-14′ :	(MEDIAN)	STA 2569+35 TO STA 2579+78
12′-24′ :	(RT LANE)	STA 2569+35 TO STA 2570+85
10′- 6′ :	(RT SHLDR)	STA 2569+35 TO STA 2570+85
10′- 6′ :	(LT SHLDR)	STA 2569+35 TO STA 2571+60
12′-24′ :	(LT LANE)	STA 2571+60 TO STA 2578+35
14′- 0′ :	(MEDIAN)	STA 2591+90 TO STA 2601+05
6′-10′ :	(RT SHLDR)	STA 2601+05 TO STA 2604+35



DETAIL "A" (BASE BID)

N.T.S.



DETAIL "A" (ALTERNATE BID)

N.T.S.

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION INFORMATION.
2. SEE TXDOT STANDARD DRAWING TE(HMAC)-11 FOR DETAILS NOT SHOWN HERE.
3. OCST
   ASPHALT: (AC15P OR CRS-2P) (0.50 GAL/SY)
   AGGREGATE: (TY-PE, E, L, OR PL GR3) (1 CY/120 SY)
   COVERED PRIME: (ALT. BID)
   ASPHALT: RC 250 @ 0.25 GAL/SY)
   AGGREGATE: GR 5 TY E OR L (1CY/140SY)
4. RUMBLE STRIP
   48" O/S FROM TRAVEL LANE FOR 10′ SHLDRS
   28" O/S FROM TRAVEL LANE FOR 6′ SHLDRS
   SEE TXDOT STANDARD RS(4)-13 FOR DETAILS NOT SHOWN HERE.
5. SEE TXDOT STANDARD DRAWINGS RS(2)-13 AND RS(3)-13 FOR CENTERLINE RUMBLE STRIP DETAILS.

0′ 5 10

SCALE: 1"=10′

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

TYPICAL SECTIONS

SHEET 7 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			12
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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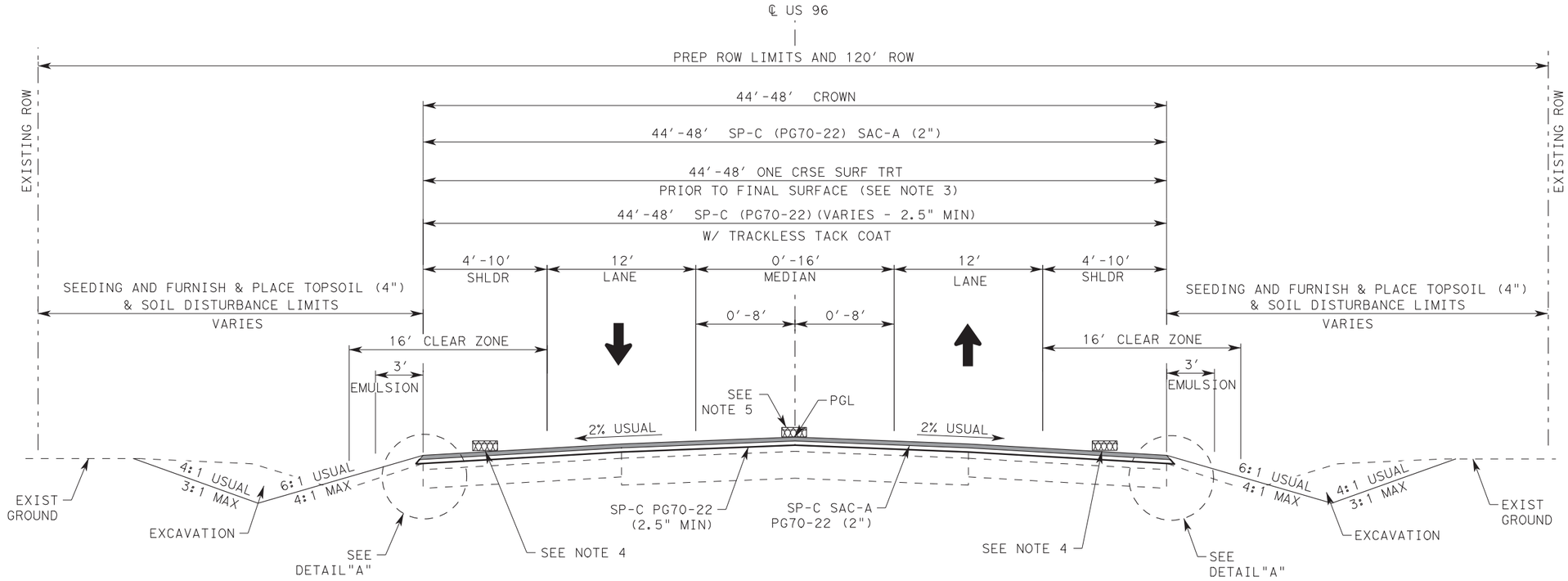
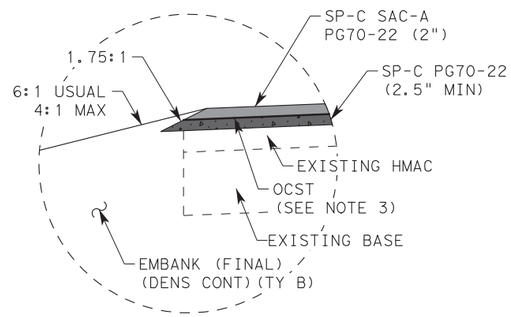


PROPOSED TYPICAL SECTION

STA 2708+90.00 TO STA 2741+50.00 = 3260.00 FT

STRIPING TRANSITIONS

0′- 8′ :	(LT MEDIAN)	STA 2708+90 TO STA 2714+90
0′- 8′ :	(RT MEDIAN)	STA 2708+90 TO STA 2714+90
10′- 4′ :	(LT SHLDR)	STA 2708+90 TO STA 2714+90
10′- 4′ :	(RT SHLDR)	STA 2708+90 TO STA 2714+90
4′-10′ :	(LT SHLDR)	STA 2735+50 TO STA 2741+50
4′-10′ :	(RT SHLDR)	STA 2735+50 TO STA 2741+50
8′- 0′ :	(LT MEDIAN)	STA 2735+50 TO STA 2741+50
8′- 0′ :	(RT MEDIAN)	STA 2736+25 TO STA 2741+50



DETAIL "A"

N.T.S.

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION INFORMATION.
2. SEE TXDOT STANDARD DRAWING TE(HMAC)-11 FOR DETAILS NOT SHOWN HERE.
3. OCST

   ASPHALT: (AC15P OR CRS-2P) (0.50 GAL/SY)
   AGGREGATE: (TY-PE, E, L, OR PL GR3) (1 CY/120 SY)

   COVERED PRIME: (ALT. BID)
   ASPHALT: RC 250 @ 0.25 GAL/SY)
   AGGREGATE: GR 5 TY E OR L (1CY/140SY)

4. RUMBLE STRIP

   48" O/S FROM TRAVEL LANE FOR 10′ SHLDRS
   28" O/S FROM TRAVEL LANE FOR 6′ SHLDRS

   SEE TXDOT STANDARD RS(4)-13 FOR DETAILS NOT SHOWN HERE.
5. SEE TXDOT STANDARD DRAWINGS RS(2)-13 AND RS(3)-13 FOR CENTERLINE RUMBLE STRIP DETAILS.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 8 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			13
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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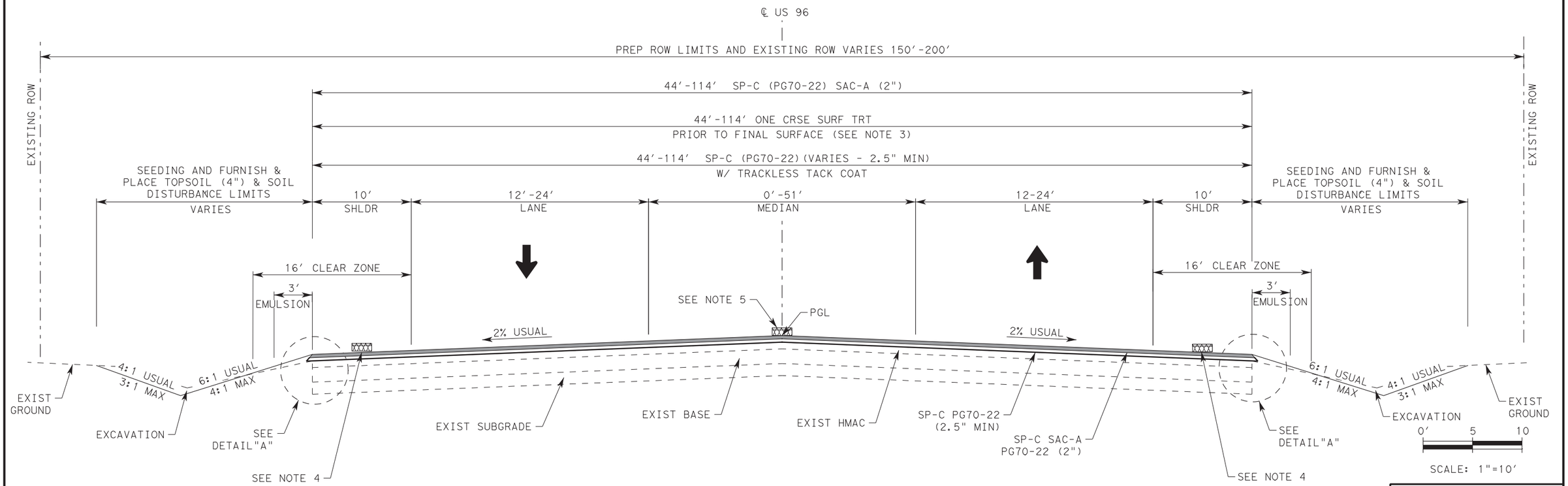
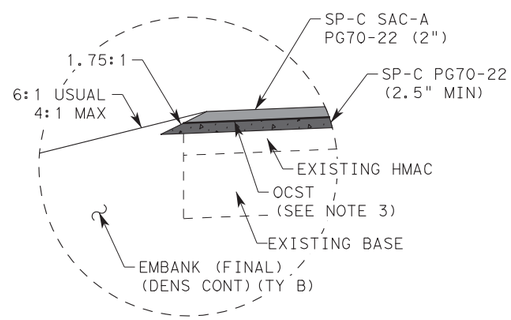


PROPOSED TYPICAL SECTION

STA 2762+09.20 TO STA 2771+95.00 = 985.80 FT



DETAIL "A"

N.T.S.

STRIPING TRANSITIONS

0′- 22.0′ : (LT MEDIAN) STA 2760+70 TO STA 2771+95.00
0′- 22.3′ : (RT MEDIAN) STA 2760+70 TO STA 2771+95.00

NOTES:

1. SEE ROADWAY PLAN & PROFILE SHEETS FOR SUPERELEVATION INFORMATION.
2. SEE TXDOT STANDARD DRAWING TE(HMAC)-11 FOR DETAILS NOT SHOWN HERE.
3. OCST

   ASPHALT: (AC15P OR CRS-2P) (0.50 GAL/SY)
   AGGREGATE: (TY-PE, E, L, OR PL GR3) (1 CY/120 SY)

   COVERED PRIME: (ALT. BID)
   ASPHALT: RC 250 @ 0.25 GAL/SY)
   AGGREGATE: GR 5 TY E OR L (1CY/140SY)

4. RUMBLE STRIP

   48" O/S FROM TRAVEL LANE FOR 10′ SHLDRS
   28" O/S FROM TRAVEL LANE FOR 6′ SHLDRS

   SEE TXDOT STANDARD RS(4)-13 FOR DETAILS NOT SHOWN HERE.
5. SEE TXDOT STANDARD DRAWINGS RS(2)-13 AND RS(3)-13 FOR CENTERLINE RUMBLE STRIP DETAILS.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

TYPICAL SECTIONS

SHEET 9 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			14
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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GENERAL NOTES:

The following standard detail sheets have been modified: None.

Existing regulatory, warning and guide signs within project limits are to remain visible to the traveling public at all times. If a sign must be repositioned during construction operations, move and install the sign to an approved location. Use care when working near existing signs and repair or replace signs damaged by work operations. All work involved repositioning existing signs will be subsidiary to various bid items.

Furnish materials and make repairs to the existing roadway at any location damaged by construction operations. This work shall be done in an approved manner and will be subsidiary to various bid items.

Ensure drainage structures and outfall channels constructed on this project are free of silt and debris at the time of project acceptance. Final clean out work will be subsidiary to various bid items.

Maintain adequate surface drainage throughout the project limits during all phases of construction.

Roadway cross slopes shall conform approximately to the existing surface, unless otherwise directed.

Provide suitable access at all times to adjacent businesses, private property and side roads.

When construction work necessitates the moving of mailboxes, temporarily relocate them as necessary to keep them clear of construction operations and convenient for the mail carrier. Mounts for temporarily relocating mailboxes shall conform to the Department's "Compliant Work Zone Traffic Control Device List" or the mailbox standard. Temporary relocation of mailboxes will be subsidiary to various bid items.

Remove dirt, silt, rocks, debris and other foreign matter that accumulates in structures due to the Contractor's operations as directed. Keep stream channels open at all times. This work will not be paid for directly, but will be subsidiary to pertinent Items.

Contractor questions on this project are to be addressed to the following individual(s):
Randal Cooper, Area Engineer Randal.Cooper@txdot.gov
Cleo Blanton, Asst. Area Engineer Cleopha.Blanton@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals. All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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.

The contractor's attention is directed to the EPIC sheet(s) included in this plan set for additional information regarding environmental permits, issues, and commitments.

Project Mowing

Mow the highway right of way within the project limits a maximum of 3 cycles per year as directed. Mowing will not be measured or paid for directly, but will be subsidiary to various bid items.

Mow at locations where contract work, equipment or stockpiles conflict with TxDOT's mowing operations. Mowing will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for mowing shall consist of approved mowing units capable of mowing on slopes without marring finished slope surfaces or injuring existing growth. The minimum cutting width shall not be less than 5 ft., unless otherwise approved.

Mow all areas of existing vegetation and vegetation placed during the project as directed. The mowing height shall be 5 in. unless otherwise directed. Repair portions of sod or grass that are injured during mowing operations as directed.

Mow as close as possible to all fixed objects, exercising extreme care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are part of the facility. Hand trim around such objects, unless otherwise specified.

Use safety chains or other manufacturer's safety device to prevent damage to people or property caused by flying debris propelled out from under rotary mowers. Chains shall be a minimum size of 5/16 in. and links spaced side by side around the mower's front, sides and rear. When mowing at the specified cutting height, the chains shall be long enough to drag the ground. If at any time, it is determined mowing or trimming equipment is defective to the point that it may affect the quality of work or create an unsafe condition, then that equipment shall be immediately repaired or replaced.

Litter Pickup

Remove litter from the right of way in the limits of this project a maximum of 3 cycles per year as directed. Litter pickup will not be measured or paid for directly, but will be subsidiary to various bid items.

In addition to the requirements in Item 5, Section 11, Final Cleanup; remove litter from the right of way at locations where the Contractor may be required to mow. Litter pickup will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for litter pickup shall be approved.

Collect and dispose of all litter deposited by construction operations or the traveling public including cans, bottles, paper, plastic items, metal scraps, lumber, etc. from within the project right of way or as directed. Properly dispose of all collected litter. Do not dump or stockpile collected litter on State property.

For removal of large dead animals, contact nearest TxDOT maintenance section for disposal instructions. Do not bury animal carcasses on State property.

Item 5: Control of the Work

There are several existing sewer manholes within the right of way. Work around them with care to prevent damage to the sewer system.

In the event utility lines needing unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others. An extension of working time may be granted for any delays caused by the utility adjustments if deemed necessary.

Electronic files (pdf only) containing cross-sections will be available upon request.

Texas Department of Licensing and Regulation (TDLR) will perform an inspection of sidewalks, pedestrian ramps and other pedestrian facilities upon completion of the project to verify conformance with Texas Accessibility Standards. Deficiencies found by TDLR shall be corrected as directed.

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

Item 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

This project has a soil disturbance of 5 acres or more.

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activities in the right of way. The Department will post a large site notice, file a notice of intent (NOI), notice of change (NOC), if applicable, and a notice of termination (NOT) along with other requirements per

TPDES GP TXR 150000 as the entity having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a primary operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activities in the right of way. In addition to the Department's actions, the Contractor shall file a NOI, NOC, if applicable, and NOT and post a large site notice along with other requirements as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans.

Dispose of all vegetative matter and any other materials removed from State Right of Way in accordance with applicable environmental laws, rules, regulations and requirements.

Burning locations must be approved by the Engineer prior to beginning. Burning activities must be conducted in compliance with Texas Commission on Environmental Quality (TCEQ) regulations. Notify the Engineer when burning activities will take place.

In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA), construction activities that may affect nests (i.e. tree removal, tree limbing, bridge work) shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.

Item 8: Prosecution and Progress

For this project, working days will be computed and charged in accordance with Item 8, Section 3.1.4, "Standard Workweek".

Submit monthly progress schedules no later than the 20th calendar day of the month. Failure to comply with this deadline may result in the Engineer withholding progress (monthly) payments.

Provide a Critical Path Method (CPM) Construction Schedule unless otherwise approved.

Item 100: Preparing Right of Way

The equipment used to trim limbs shall be approved. A boom axe will not be allowed.

For areas requiring Preparing ROW, remove all trees within the ROW and limbs overhanging within the ROW to a minimum of 60' vertically.

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

Material removed by this operation will become the property of the Contractor.

Item 132: Embankment

Hauling materials with scrapers across or along existing roadways will not be permitted without written permission.

Drying of material deeper than 6 inches below subgrade elevations will not be permitted without written permission.

Grading required for shaping driveways and side road turnouts for pipe culverts at all access locations, will be subsidiary to various bid items.

All blading, rolling, and scraper work to construct and remove temporary slopes adjacent to pavement drop-offs, will be subsidiary to various bid items.

Compact embankment material used to reshape existing slopes to a density comparable with adjacent undisturbed material to the satisfaction of the Engineer.

Item 162: Sodding for Erosion Control

Provide Bermuda block sod unless St. Augustine is the prevailing grass cover at particular placement locations. Provide St. Augustine block sod at those locations.

Item 166: Fertilizer

Fertilize all seeded or sodded areas.

Item 168: Vegetative Watering

Equip water trucks with sprinkler systems capable of watering all of the entire seeded or sodded areas from the roadway.

Water all newly placed sodded or seeded areas at the time of installation. Thereafter, maintain the sodded or seeded areas in a well-watered condition, at no time allow the areas to dry to a condition where water stress is evident.

Item 169: Soil Retention Blankets

In areas designated for soil retention blankets (SRB) in the plans, furnish only spray-on products listed on the Approved Product List for Erosion Control Products based upon the Class and Type specified in the plans. Any substitution to spray –on products must be approved in writing, be listed on the Approved Product List for Erosion Control Products based upon Class and Type, and shall not contain UV degradable, photodegradable or polypropylene materials.

Item 247: Flexible Base

Provide flexible base with a minimum plasticity index of 2.

Provide flexible base material with a minimum Bar Linear Shrinkage of 2% as determined by Test Method Tex-107-E, Part II.

Stockpiling of base material will not be required if testing has been performed and the material has been approved at the source. Deliver approved specified materials to the project.

Compaction requirements for flexible base are ordinary compaction.

Item 276: Cement Treatment (Plant-Mixed)

Cure with a mixture of emulsified asphalt and water as approved.

Cement treated material shall be placed in lifts no greater than 6 inches, unless otherwise approved.

No strength requirement is specified. The target cement content is 3%.

Item 302: Aggregates for Surface Treatments

When using Type E, furnish Type E aggregate consisting of crushed stone or natural limestone rock asphalt.

When using Type PE aggregate, furnish Type PE aggregate consisting of precoated crushed stone or natural limestone rock asphalt.

Aggregate stockpile locations shall be approved prior to stockpiling.

Locate aggregate stockpiles off the highway right of way unless otherwise approved.

When directed, flush aggregate stockpiled for surface treatment with water to remove excessive dust particles, in such sequence that will permit free water to drain from the stockpiled aggregate prior to surfacing operations. This work will be subsidiary to various bid items.

Furnish aggregates for the final surfaces of travel lanes with a minimum class A surface aggregate classification.

The target asphalt content for pre-coating will be 1.0%.

Item 316: Seal Coat

Apply the covered prime weekly unless otherwise approved.

Open season for asphalt placement is from May 1 thru August 31. Do not place asphalt outside the open season without written approval.

The uniformity and rate of distribution of asphaltic material will be checked periodically during construction. Apply the seal coat in lane widths unless otherwise directed. Where extra width of surfacing has been provided in transitions and climbing lanes, seal the entire surface width.

Resurface county road turnouts and intersection areas as directed.

Place surface on driveways and other road turnouts prior to placing the final roadway surface.

Cease application of asphalt 2 hr. before sunset unless otherwise directed.

Cure the first course of the surface treatment as directed prior to placing the second course.

Cure the surface treatment as directed prior to placement of the overlay.

Cure the covered prime a minimum of 14 days prior to placement of the surface treatment.

Use precoated aggregate with AC-15P and use non-precoated aggregate with CRS-2P.

Furnish medium pneumatic tire rollers in accordance Item 210, "Rolling". Provide enough rollers to perform the work as directed.

Blade the existing paved shoulders prior to surface treatment operations to remove existing overgrowth. This work will be subsidiary to Item 316.

Item 354: Planing and Texturing Pavement

Complete planing operations in adjacent lanes and shoulders to the same point at the end of each day.

Blade the existing paved shoulders prior to planing operations to remove existing overgrowth. This work will be subsidiary to Item 354.

Cut the existing shoulder pavement to drain water away from planed travel lanes. This work will be subsidiary to various bid items.

Use an approved ski device to control longitudinal grade.

Where the underlying flexible base is exposed during the planing operation, prime exposed area with asphalt at the rate directed and patch with an approved HMA material at the end of the day's operation in which it occurs. These items of work will not be paid for directly but will be subsidiary to Item 354.

Item 400: Excavation and Backfill for Structures

When cutting an existing roadway open to traffic, complete all operations including structural excavation, laying pipe and backfilling within daylight hours the day they are initiated.

Replace excavated material deemed unsuitable for backfilling with material approved by the Engineer, paid for under the pertinent bid items or as extra work. This provision does not apply to excavated materials that are too wet and are replaced for the contractor's convenience to expedite the work.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use. Additional material will be subsidiary to various bid items.

Item 420: Concrete Substructures

Limit work on structures crossing the roadway to one side of the roadway at a time. No work shall begin on the opposite side of the roadway until backfilling of the initially extended portion of the structure is completed.

Item 421: Hydraulic Cement Concrete

The Engineer will provide curing facilities and strength testing equipment for acceptance testing.

Item 427: Surface Finishes for Concrete

Provide a rub finish for Surface Area I.

Provide the following surface finish for the listed elements: Ordinary surface finish for all concrete surfaces.

Item 432: Riprap

Stone riprap will require the placement of filter fabric prior to placement of stones.

Welded wire fabric will not be allowed for reinforcing concrete riprap. Reinforcing shall consist of No. 3 or 4 bars meeting the requirements of grade 60 reinforcing steel. Place bars on 12 in. centers in each direction, supported on reinforcing chairs.

Item 464: Reinforced Concrete Pipe

Lay each private entrance or side road pipe culvert to the line and grade as directed.

At locations where existing driveway pipes are to be removed and replaced, replace the top 6 in. of the existing driveway with material equal to or better than the existing driveway material. This work will be subsidiary to various bid items.

Limit work on pipe culverts crossing the road to one side of the roadway at a time. No work shall begin on the opposite side of the roadway until backfilling the first side of the pipe culvert being extended is complete.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use and will be paid for under Item 132.

Item 466: Headwalls and Wingwalls

Provide cast-in-place headwalls and wingwalls.

Item 467: Safety End Treatment

Use Type II precast concrete units of the same style and design.

Provide 12 in. deep toewalls on Type II precast safety end treatments.

To improve drainage, grade existing ditch within ten feet of proposed safety end treatment. This work shall be subsidiary to Item 467.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use. Additional material will be subsidiary to various bid items.

Check each location where safety end treatments are to be installed to verify pipe lengths shown will produce the desired slope. Extra pipe will be paid for, but removing and replacing safety end treatment units previously installed under this Contract will not be paid for.

Place safety end treatments along the same slope as the pipe.

Item 480: Cleaning Existing Culverts

Certain box culverts will require cleaning to remove silt and other debris. Waters carried by these box culverts have been determined to be waters of the United States and are under jurisdiction of the U.S. Army Corps of Engineers. Silt and other debris removal shall be immediately hauled to an upland location for dumping. Material will not be side cast into either the water channel or its banks. Removal of the sediment is limited to the minimum necessary to restore the waterway to its configuration when the structure was built. No work will be allowed outside of the right-of-way. This work shall also be restricted to a distance of no more than 25 ft. from the end of the structure.

Item 502: Barricades, Signs, and Traffic Handling

Traffic Control Plan (TCP):

Ensure the Contractor's Responsible Person (CRP) or their alternate for Barricades, Signs and Traffic Handling is available at all times and able to receive instructions from the Engineer or authorized Department representative. The CRP shall be a person that is usually at the project site during normal working hours.

For protection of the traveling public, direct traffic through the work area using signs, flaggers and other devices. Required signs are shown in the plans on the Barricade and Construction Standards and Traffic Control Plan Sheets. The latest edition of the "Texas Manual on Uniform Traffic Control Devices" shall also be used as a guide for handling traffic on this project.

Use "Do Not Pass" (R4-1) signs to mark the beginnings of roadway sections where passing is prohibited and use "Pass With Care" (R4-2) signs to mark the beginnings of roadway sections where passing is permitted. Install signs at the time signing for project limits are erected. Sign placement shall be verified and approved.

This project requires speed reduction signs during construction. Fabricate, provide and maintain speed limit signs (XX mph) as shown on the applicable BC standards. Remove or cover regulatory (black and white) speed limit signs, when not applicable.

Furnishing, erecting, relocating and removing temporary speed zone signs is subsidiary to Item 502.

When pavement work begins, use flashing arrow panels and flaggers 24 hr. per day during inclement weather or as directed.

Install "No Center Line" (CW8-12) signs at 2-mile intervals. Install "Loose Gravel" (CW8-7) and "Next XX Miles" (CW7-3aP) signs as directed prior to the start of surface treatment operations.

In general, restrict construction work to single lane widths. Control traffic in accordance with standard drawings WZ(BTS-1) "Traffic Signal Installation Typical Details"; WZ(BTS-2) "Traffic Signal Installation Barricades and Signs"; and, Part VI of the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways". Unless otherwise approved, use an advance warning, flashing arrow panel in addition to the necessary signs, barricades, or other traffic control devices at the work area.

Restrict construction work to single lane widths with only minor disruptions in traffic flow. Lane closures shall conform to the Traffic Control Plan for lane closures as shown in the plans. No overnight closures will be permitted.

Limit lane closures for multilane roads (4 or more lanes) to 2 mi. in length, unless otherwise approved.

Limit lane closures for 2 lane roads to 1 mi. in length, unless otherwise approved.

Lane closure lengths can exclude the end tapers.

Plan the sequence of work to minimize the time lane closures are in place. Install lane closures only where construction operations are anticipated to start within 1 hr. and limited to the amount of lane that can be reached by the construction activity within 2 hr. unless otherwise approved.

Provide flashing arrow panels to supplement required signs and devices for lane closures.

Provide temporary rumble strips as shown on work zone rumble strip standards.

Provide a pilot car to lead traffic through the work area. The pilot car will not be paid for directly, but will be subsidiary to various bid items.

Halt traffic during the time asphalt is being applied to the roadway. No vehicles will be allowed to pass the asphalt distributor during asphalt application.

Provide adequate flaggers to protect the traveling public when working on or near a roadway carrying traffic. All flaggers shall wear hardhats and reflective vests.

Install “Be Prepared to Stop” (CW3-4) and “Flagger Ahead” (CW20-7aD) signs when flaggers are present. Position the signs where good visibility and traffic control can be maintained.

Use a flashing arrow board in addition to the required signs to warn motorists of flaggers.

Use additional flaggers at roadway intersections to direct traffic entering the work area, when deemed necessary by the Engineer.

Open all traffic lanes to traffic at the close of work each day.

Install "Pavement Ends" (CW8-3) and "30 mph" (CW13-1P) signs where the paved surface of the road ends. Use flashing arrow panels to supplement these signs during nighttime hours.

Provide one high-intensity yellow, rotating dome-light on all equipment such as distributors, spreader boxes, lay-down machines, dump trucks, rollers, backhoes, road graders, loaders, etc. within the work zone. Mount lights high enough to be visible from all directions and operating when the equipment is in the work zone. On all other equipment such as automobiles, trailers, etc. use emergency flashers while within the work zone.

Install "Shoulder Drop-Off" (CW8-17) and “Uneven Lanes” (CW8-11) signs at one-half mile spacings as the hot mix asphalt is placed, unless otherwise directed. Maintain signs until the condition is eliminated.

Install vertical panels or drums at 100-ft. spacings where drop-offs or construction work occurs along edges of existing pavement. Unless otherwise authorized, these shall remain in place until final striping.

Install "Slow Down on Wet Road" (CW8-5aT), "Shoulder Drop-Off" (CW8-17), “Uneven Lanes” (CW8-11), “Bump” (CW8-1) and "Soft Shoulder" (CW8-4) signs during construction as directed.

Restrict construction operations so that no drop off along the edge of pavement will remain overnight.

All blading, rolling and scraper work to construct and remove temporary slopes adjacent to pavement drop-offs, will be considered subsidiary to various bid items.

Notify the Engineer prior to placing any materials or equipment on the right of way. Locate equipment, stockpiles or other materials not in use as far as possible from the driving lanes and in no case closer than 30 ft. unless otherwise authorized. Any equipment, stockpiles, or materials placed within 30 ft. of the driving lane must have adequate signs, barricades or other warning devices as approved. As a minimum place an 8 ft. wide TY III Barricade or barrels on the approach side of each site that is within 30 ft. of the driving lane. Use TY III Barricade or

barrels for the site similarly on the departure side if the location is within 30 ft. of the opposing traffic lane.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Complete the weekly tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

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

Texas Transportation Code 547.105 authorizes the use of warning lights to promote safety and provides an effective means of gaining the travelling public’s attention as they drive in areas where construction crews are present. In order to influence the public to move over when high risk construction activities are taking place, minimize the utilization of blue warning lights. These lights must be used only while performing work on or near the travel lanes or shoulder where the travelling public encounters construction crews that are not protected by a standard work zone set up such as a lane closure, shoulder closure, or one-way traffic control. Refrain from leaving the warning lights engaged while travelling from one work location to another or while parked on the right of way away from the pavement or a work zone.

Temporary stop lines as shown on TCP (2-2)-18 should be omitted.

Provide an illuminated flagger station when nighttime work is performed.

Install "Stay Alert" (G20-10T) and "OBEY" (R20-3T) signs at the beginning of the construction zone at “T” intersections as directed.

All workers on TxDOT right-of-way shall wear reflective clothing meeting ANSI Class II requirements during the day and ANSI Class III requirements during the night.

Item 504: Field Office and Laboratory

Provide a Type D Structure. Asphalt content will be determined by the ignition method.

Provide a lockable file cabinet, desk and chair in a contractor’s field office for TxDOT use.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

Locations and types of BMPs may require adjustments prior to or after placement as directed by the Engineer. Adjustments should be made to ensure BMPs are working effectively and maintain

compliance with the Construction General Permit. Notify the Engineer prior to making adjustments.

Item 530: Intersections, Driveways, and Turnouts

Welded wire fabric will not be allowed for reinforcing concrete driveways. Use reinforcing steel consisting of No. 3 or 4 bars meeting the requirements of grade 60 reinforcing steel. Place bars on 12 in. centers in each direction, supported on reinforcing chairs.

Unless otherwise directed, install 1/2 in. pre-molded expansion joint material between existing concrete and new concrete.

Item 540: Metal Beam Guard Fence

Use round timber posts.

Use timber post on all metal beam guard fence installations except where steel posts are required. Determine length of steel posts for low fill culvert post mounting in the field to insure proper metal beam guard fence height.

At the close of work each day, protect the ends of metal beam guard fence in an approved manner, so that no blunt ends are exposed to approaching traffic. Plastic drums will be required at these locations.

For existing non-mow strip to remain in place, backfill top 4” in an existing abandoned post hole with HMA and backfill below 4” with suitable earth material. This work will be subsidiary to Item 540.

The removal of existing HMA/Base to place MBGF posts is subsidiary to the various bid items. Form or core holes and recesses. Percussion drilling is not permitted.

Item 560: Mailbox Assemblies

Repair and, if necessary, replace mailboxes damaged by construction operations.

The number and type of mailbox assemblies shown in the plans are for estimating purposes; actual quantities may vary.

Use 1 size 3 reflector mounted on the upstream and downstream sides of the post as directed for single and double mailbox assemblies.

Use 1 strip of reflective sheeting on the upstream and downstream sides of post for multiple mailbox assemblies in lieu of the Type 2 object marker shown on the mailbox standards. Each strip shall be approximately 12 in. wide. Use reflective sheeting conforming to DMS-8600.

Item 585: Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule 2.

Item 618: Conduit

When conduit is laid in a trench or bored, minimum depth to the top of the conduit shall be 3 ft. Where obstructions prevent laying conduit at this depth, place conduit at the maximum depth possible.

Where a trench for laying conduit is cut through pavement, surfaced shoulder, median or driveway, replace the base and surfacing with similar materials equal in appearance and quality to the original construction. Replacing base and surfacing will be subsidiary to Item 618.

Place conduit under existing pavement by boring unless otherwise directed. Pits for boring shall not be closer than 2 ft. from edge of pavement unless otherwise approved. Water jetting will not be permitted. At the close of work each day, cover all open pits and barricade for safety.

When boring is used for under-pavement conduit installations, maximum allowable overcut shall be 1 in. diameter.

Use of a pneumatically driven device for punching holes beneath pavement (commonly known as a "missile") will not be permitted on this project.

All underground conduit bends of 45° or more in PVC conduit systems, including bends into ground boxes, shall be made with rigid metal conduit. Where rigid metal conduit is exposed at any point and where rigid metal conduit extends into ground boxes, bond the metal conduit to the grounding conduction with grounding type bushings or by other approved UL listed grounding connectors. Rigid metal bends will not be paid for separately but will be incidental to the PVC conduit system.

The location of conduits is diagrammatic only and may be shifted to accommodate field conditions as directed.

Item 624: Ground Boxes

Location and estimated number of ground boxes are diagrammatic only. The location and number of ground boxes may vary to accommodate field conditions as directed.

Item 644: Small Roadside Sign Assemblies

Install adjacent signs with bottom edges at equal heights.

Sign placement shall be in accordance with the “Sign Crew Field Book” and 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. Stake all sign support locations for verification and approval.

Existing supports shall not be reused, and shall become the property of the Contractor.

Salvage all sign blanks to be removed and deliver the same day to TxDOT's facility at Shelby County Maintenance Facility, 638 SH 7 East, Center, TX 75935.

Place relocated signs as close as feasible to existing signs, unless placement conflicts with the Sign Crew Field Book.

Prior to ordering signs, advisory speeds at horizontal curves shall be verified by the department.

Wrap red retroreflective tape (NGIP Code 801-49-87-1008) around the support post of all STOP, YIELD, and DO NOT ENTER signs. Tape shall be placed approximately 4 feet above the surface of the edge of the roadway adjacent to the sign and shall be wrapped to a height of 12 inches. The tape and the placement of the tape on the sign posts shall be subsidiary to the sign assembly.

Item 656: Foundations for Traffic Control Devices

Note and heed all utility warnings before digging in the vicinity of underground utilities.

Before excavating for foundations, take adequate precautions, by probing or uncovering by hand, to prevent damage to storm sewers and public or private utilities. Locations of utility lines and cables shown in the plans are approximate. Other lines and cables may have been installed since completion of these plans.

Item 658: Delineator and Object Marker Assemblies

Install delineators on the departure side of the posts when mounting to metal beam guard fence and guardrail end treatments.

Install CTB barrier reflectors on top of concrete bridge rail and concrete barriers.

Install D-SW delineators on the departure side of steel bridge rail posts.

Item 662: Work Zone Pavement Markings

Place standard work zone pavement markings before traffic is routed over detours.

Install standard work zone pavement markings on the level-up course of the overlay.

Standard work zone pavement markings shall be paint and glass beads or thermoplastic.

Install short term pavement markings (removable) on the hot mix asphalt immediately following final rolling.

Install short term pavement markings (removable) on the finish course of the overlay immediately following final rolling, offset from lane lines so there will be no conflict with permanent stripes.

Place short term pavement markings on the level-up course of the hot mix asphalt and the existing pavement after planing.

Place short term pavement markings on the surface treatment and level-up course immediately following final rolling.

After placement of permanent striping on the finish course, remove all short term pavement markings.

Furnish Type II glass beads conforming to DMS-8290, "Glass Traffic Beads", for hot applied thermoplastic and traffic paint markings.

Item 666: Reflectorized Pavement Markings

Remove loose aggregate immediately prior to placing pavement markings.

Place reflectorized pavement markings no sooner than 3 days nor later than 14 days after placement of the surface treatment.

Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application.

Before construction operations begin, observe and mark existing passing/no passing zones. Passing/no passing zones shall be verified prior to placement of permanent pavement markings.

Furnish Type II glass beads conforming to DMS-8290, "Glass Traffic Beads", for Type I and II Markings.

Use Type II pavement markings as a sealer for Type I pavement markings.

Place a minimum of 500 ft. of 4 in. double yellow no passing lines on the approach to all stop condition intersections for two lane roads unless otherwise shown in the plans or directed.

Item 672: Raised Pavement Markers

Place permanent raised pavement markers after permanent striping has been completed.

Item 3076: Dense-Graded Hot-Mix Asphalt

Trial batches may be required whenever the design has not been produced in the previous 12 months. Trial batches will be subsidiary to the bid item.

TX-203 Will be ran on the complete mix and a requires minimum of 45%

No Department-owned RAP is available.

RAP produced from this project may be used in the HMA mixtures. All RAP not utilized in the HMA shall become the property of the contractor.

Provide a tack that meets the requirements of Item 300, Table 3A or Table 10A, unless otherwise approved by the engineer.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result in a continuous operation. The speed shall be slow enough so that stopping between trucks is not ordinarily required. If, in the opinion of the Engineer, sporadic delivery of material is adversely affecting the HMA placement, the Engineer may require paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

A material transfer vehicle (MTV) will be required for all courses of HMA on this project. An MTV is defined as a self-propelled, wheel-mounted vehicle capable of receiving HMA from the haul trucks separate from the paver. The MTV shall have a minimum storage capacity of approximately 25 tons and shall be equipped with a pivoting discharge conveyor and a means of completely remixing the HMA prior to placement.

Add hydrated lime to all HMA mixtures at a minimum rate of 1.0% by weight of the total aggregate, except for those mixtures containing RAP and/or RAS. Mixtures that contain RAP and/or RAS shall be designed at a rate of minimum 0.5 % of lime by weight and the test results will be evaluated by the engineer to determine if lime or a liquid anti-strip additive will be used. The hydrated lime shall meet the requirements of DMS-6350, “Lime and Lime Slurry”. The hydrated lime shall be added in accordance with the construction method in Item 301, “Asphalt Antistripping Agents”. This lime will be subsidiary to this item.

Cover each load of mixture with waterproof tarpaulins.

Limit uneven pavement to 2 days production.

For HMA placements greater than 2 inches, construct longitudinal joints adjacent to travel ways with a maximum 1 inch vertical edge and an adjacent 3:1 maximum taper.

Along outside pavement edges construct a 3:1 maximum taper or backfill the same day as shown on the plans or as directed.

Remove and properly dispose of any piles of asphaltic concrete and all other debris left on the right of way daily.

Item 3077: Superpave Mixtures

Shoulders and ramps are not subject to in-place air void determination and pay adjustment.

No Department-owned RAP is available.

TX-203 Will be ran on the complete mix and a requires minimum of 45%

Add hydrated lime to all HMA mixtures at a minimum rate of 1.0% by weight of the total aggregate, except for those mixtures containing RAP and/or RAS. Mixtures that contain RAP

and/or RAS shall be designed at a minimum rate of 0.5 % of lime by weight and the test results will be evaluated by the engineer to determine if lime or a liquid anti-strip additive will be used. The hydrated lime shall meet the requirements of DMS-6350, "Lime and Lime Slurry". The hydrated lime shall be added in accordance with the construction method in Item 301, "Asphalt Antistripping Agents". This lime will be subsidiary to this item.

Trial batches may be required whenever the design has not been produced in the previous 12 months. Trial batches will be subsidiary to the bid item.

Provide a tack that meets the requirements of Item 300, Table 3A or Table 10A, unless otherwise approved by the engineer.

Cover each load of mixture with waterproof tarpaulins.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result in a continuous operation. The speed shall be slow enough so that stopping between trucks is not ordinarily required. If, in the opinion of the Engineer, sporadic delivery of material is adversely affecting the HMA placement, the Engineer may require paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

A material transfer vehicle (MTV) will be required for all courses of HMA on this project. An MTV is defined as a self-propelled, wheel-mounted vehicle capable of receiving HMA from the haul trucks separate from the paver. The MTV shall have a minimum storage capacity of approximately 25 tons and shall be equipped with a pivoting discharge conveyor and a means of completely remixing the HMA prior to placement.

Remove and properly dispose of any piles of asphaltic concrete and all other debris left on the right of way daily.

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

Two (2) TMAs (stationary) will be required for this project. The contractor will be responsible for determining if multiple operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Two (2) TMAs will be required on all other roadways for each mobile operation. Quantities were estimated based on one mobile working operation, as per the number of working days. If multiple crews are utilized, additional TMAs will be required.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0809-02-070 **DISTRICT** Lufkin **COUNTY** Shelby
HIGHWAY US 96

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0809-02-070**			
		PROJECT ID		**A00059670**			
		COUNTY		**Shelby**			
		HIGHWAY		**US 96**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	206.340		206.340	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	1,191.000		1,191.000	
	105-6014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	22,321.000		22,321.000	
	105-6088	REMOVING STAB BASE AND ASPH PAV(0"-5")	SY	1,178.000		1,178.000	
	110-6001	EXCAVATION (ROADWAY)	CY	3,134.000		3,134.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	4,555.000		4,555.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	216,464.000		216,464.000	
	162-6002	BLOCK SODDING	SY	1,396.000		1,396.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	216,464.000		216,464.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	108,232.000		108,232.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)	SY	108,232.000		108,232.000	
	168-6001	VEGETATIVE WATERING	MG	4,355.600		4,355.600	
	169-6003	SOIL RETENTION BLANKETS (CL 1) (TY C)	SY	6,275.000		6,275.000	
	314-6014	EMULS ASPH (EROSN CONT)(MS-2)	GAL	2,065.000		2,065.000	
	316-6402	AGGR (TY-PE, E, L OR PL GR 3)	CY	876.000		876.000	
	316-6530	ASPH (AC-15P OR CRS-2P)	TON	260.000		260.000	
	354-6147	PLANE ASPH CONC PAV (0" TO 4 1/2")	SY	978.000		978.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	16.000		16.000	
	420-6071	CL C CONC (COLLAR)	EA	2.000		2.000	
	432-6009	RIPRAP (CONC) (CL B) (4")	CY	419.000		419.000	
	432-6016	RIPRAP (STONE TY R)(DRY)(12 IN)	CY	6.300		6.300	
	464-6003	RC PIPE (CL III)(18 IN)	LF	1,544.000		1,544.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	325.000		325.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	36.000		36.000	
	466-6005	HEADWALL (CH - FW - 0) (DIA= 24 IN)	EA	1.000		1.000	
	466-6095	HEADWALL (CH - PW - 0) (DIA= 18 IN)	EA	1.000		1.000	
	466-6097	HEADWALL (CH - PW - 0) (DIA= 24 IN)	EA	1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	116.000		116.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	20.000		20.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	1.000		1.000	
	496-6016	REMOV STR (PIPE)	EA	21.000		21.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	15.000		15.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	1,054.000		1,054.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	1,054.000		1,054.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	234.000		234.000	

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CONTROLLING PROJECT ID 0809-02-070 **DISTRICT** Lufkin **COUNTY** Shelby
HIGHWAY US 96

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0809-02-070**			
		PROJECT ID		**A00059670**			
		COUNTY		**Shelby**			
		HIGHWAY		**US 96**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	234.000		234.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	5,307.000		5,307.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	5,307.000		5,307.000	
	530-6002	INTERSECTIONS (ACP)	SY	663.000		663.000	
	530-6004	DRIVEWAYS (CONC)	SY	1,556.000		1,556.000	
	530-6005	DRIVEWAYS (ACP)	SY	8,381.000		8,381.000	
	530-6007	TURNOUTS (CONC)	SY	16.000		16.000	
	530-6008	TURNOUTS (ACP)	SY	134.000		134.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	40,970.000		40,970.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	24,564.000		24,564.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,525.000		1,525.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	10.000		10.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,450.000		1,450.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	10.000		10.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	8.000		8.000	
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA	1.000		1.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3	EA	35.000		35.000	
	560-6008	MAILBOX INSTALL-D (WC-POST) TY 3	EA	1.000		1.000	
	610-6254	IN RD IL (TY ST) 40T-8 (250W EQ) LED	EA	2.000		2.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	377.000		377.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	206.000		206.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	618.000		618.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	1,236.000		1,236.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	5.000		5.000	
	628-6009	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)	EA	1.000		1.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	4.000		4.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	4.000		4.000	
	644-6037	IN SM RD SN SUP&AM TYS80(1)SA(U-WC)	EA	1.000		1.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	27.000		27.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	30.000		30.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		6.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	34.000		34.000	
	658-6101	INSTL OM ASSM (OM-2Z)(WFLX)SRF)SRF	EA	28.000		28.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	992.000		992.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	2,290.000		2,290.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0809-02-070 **DISTRICT** Lufkin **COUNTY** Shelby
HIGHWAY US 96

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0809-02-070**			
		PROJECT ID		**A00059670**			
		COUNTY		**Shelby**			
		HIGHWAY		**US 96**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	28,915.000		28,915.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	884.000		884.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	2,056.000		2,056.000	
	662-6112	WK ZN PAV MRK SHT TERM RMV (W)(4")	LF	1,684.000		1,684.000	
	662-6113	WK ZN PAV MRK SHT TERM RMV (Y)(4")	LF	16,840.000		16,840.000	
	666-6008	REFL PAV MRK TY I (W)4"(LNDP)(090MIL)	LF	588.000		588.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	3,378.000		3,378.000	
	666-6299	RE PM W/RET REQ TY I (W)4"(BRK)(090MIL)	LF	2,230.000		2,230.000	
	666-6302	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	LF	42,240.000		42,240.000	
	666-6314	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)	LF	54,526.000		54,526.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	14.000		14.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	8.000		8.000	
	668-6083	PREFAB PAV MRK TY C (W) (LNDP ARROW)	EA	4.000		4.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	8.000		8.000	
	672-6007	REFL PAV MRKR TY I-C	EA	326.000		326.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	1,770.000		1,770.000	
	3076-6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	416.000		416.000	
	3077-6021	SP MIXESSP-CPG70-22	TON	14,009.000		14,009.000	
	3077-6022	SP MIXESSP-CSAC-A PG70-22	TON	13,278.000		13,278.000	
	3077-6075	TACK COAT	GAL	14,187.000		14,187.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	278.000		278.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	21.000		21.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
1A	276-6232	CEM TRT(PLNT MX) (CLN)(TYA)(GR1-2)(12")	SY	18,633.000		18,633.000	
	316-6060	ASPH (RC-250)	TON	19.000		19.000	
	316-6417	AGGR (TY E OR L GR 5)	CY	134.000		134.000	
1	3077-6001	SP MIXESSP-BPG64-22	TON	12,754.000		12,754.000	

TRAFFIC CONTROL QUANTITY SUMMARY

BID ITEM	662							6001	6185	
LOCATION	WK ZN PAV MRK NON-REMOV (W)4" (SLD)	WK ZN PAV MRK NON-REMOV (Y)4" (BRK)	WK ZN PAV MRK NON-REMOV (Y)4" (SLD)	WK ZN PAV MRK SHT TERM (TAB)TY W	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	WK ZN PAV MRK SHT TERM RMV (W)(4")	WK ZN PAV MRK SHT TERM RMV (Y)(4")	(1) PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	EA	EA	LF	LF	EA	DAY	DAY
2562+65.00 TO 2569+35.00			1,340		68		612	1		2
2569+35.00 TO 2604+35.00	124		6,848	362	342	685	3,101			5
2604+35.00 TO 2664+00.00		890	7,437	438	600	621	4,518			6
2664+00.00 TO 2665+38.76		40	108		14		221			
MILL CREEK BRIDGE		70					36			
2668+34.04 TO 2708+90.00		760	3,326		406		3,051			2
2708+90.00 TO 2741+50.00	868	60	6,165	84	320	378	2,853			2
2741+50.00 TO 2762+09.20		470	1,440		194		1,413			2
2762+09.20 TO 2771+95.00			2,251		112		1,035	1		2
PROJECT TOTALS	**992**	**2,290**	**28,915**	**884**	**2,056**	**1,684**	**16,840**	**2**	**278**	**21**

(1) PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE PLACED AS DIRECTED BY THE ENGINEER AND ARE TO REMAIN IN PLACE FOR THE DURATION OF THE PROJECT

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

QUANTITY SUMMARIES

SHEET 1 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			17
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

EARTHWORK QUANTITY SUMMARY

BID ITEM	110	132
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
	CY	CY
2562+00 R1		
2563+00 R1		6
2564+00 R1		7
2565+00 R1		7
2566+00 R1	1	10
2567+00 R1	1	11
2568+00 R1	2	10.5
2569+00 R1	2	7
2570+00 R1	12	12
2571+00 R1	29	69
2572+00 R1	51	69
2573+00 R1	109	11
2574+00 R1	145	10
2575+00 R1	114	36
2576+00 R1	75	39
2577+00 R1	37	32
2578+00 R1	23	41
2579+00 R1	19	52
2580+00 R1	4	75
2581+00 R1	86	69
2582+00 R1	213	36
2583+00 R1	237	38
2584+00 R1	143	112
2585+00 R1	65	148
2586+00 R1	85	125
2587+00 R1	79	114
2588+00 R1	53	95
2589+00 R1	42	67
2590+00 R1	20	69
2591+00 R1	12	109
2592+00 R1	12	162
2593+00 R1	11	129
2594+00 R1	13	73
2595+00 R1	18	105
2596+00 R1	27	98
2597+00 R1	46	62
2598+00 R1	39	47
2599+00 R1	21	37
2600+00 R1	25	30
2601+00 R1	27	23
2602+00 R1	31	22
2603+00 R1	37	19
2604+00 R1	39	21
2605+00 R1	29	21
2606+00 R1	17	18
2607+00 R1	16	15
2608+00 R1	17	11
2609+00 R1	20	11
2610+00 R1	20	13
2611+00 R1	20	18
2612+00 R1	20	18
2613+00 R1	19	18
2614+00 R1	18	17
2615+00 R1	19	12
2616+00 R1	21	14
SUBTOTAL	2,237	2,498

EARTHWORK QUANTITY SUMMARY

BID ITEM	110	132
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
	CY	CY
2617+00 R1	21	15
2618+00 R1	21	13
2619+00 R1	19	13
2620+00 R1	17	15
2621+00 R1	17	15
2622+00 R1	18	17
2623+00 R1	14	23
2624+00 R1	14	24
2625+00 R1	17	20
2626+00 R1	20	14
2627+00 R1	22	19
2628+00 R1	22	25
2629+00 R1	19	27
2630+00 R1	11	27
2631+00 R1	8	26
2632+00 R1	16	25
2633+00 R1	21	21
2634+00 R1	12	23
2635+00 R1	3	30
2636+00 R1	7	27
2637+00 R1	19	10
2638+00 R1	24	6
2639+00 R1	17	13
2640+00 R1	11	17
2641+00 R1	9	18
2642+00 R1	7	17
2643+00 R1	9	19
2644+00 R1	11	20
2645+00 R1	14	18
2646+00 R1	12	21
2647+00 R1	9	25
2648+00 R1	10	20
2649+00 R1	13	19
2650+00 R1	17	18
2651+00 R1	19	14
2652+00 R1	17	23
2653+00 R1	15	25
2654+00 R1	14	19
2655+00 R1	17	16
2656+00 R1	21	13
2657+00 R1	22	12
2658+00 R1	19	14
2659+00 R1	16	15
2660+00 R1	17	14
2661+00 R1	17	16
2662+00 R1	23	12
2663+00 R1	29	23
2664+00 R1	14	24
2665+00 R1		12
2666+00 R1		
2667+00 R1		
2668+00 R1		
2669+00 R1		
2670+00 R1		22
2671+00 R1		23
SUBTOTAL	756	953

QUANTITY SUMMARIES

SHEET 2 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		18

STATE	STATE DIST. NO.	COUNTY
TEXAS	LFK	SHELBY

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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EARTHWORK QUANTITY SUMMARY

BID ITEM	110	132
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
	CY	CY
2672+00 R1	1	20
2673+00 R1	1	10
2674+00 R1		7
2675+00 R1	1	6
2676+00 R1	1	8
2677+00 R1		8
2678+00 R1		7
2679+00 R1		9
2680+00 R1		9
2681+00 R1		10
2682+00 R1		12
2683+00 R1		12
2684+00 R1		11
2685+00 R1		10
2686+00 R1		8
2687+00 R1	1	7
2688+00 R1		8
2689+00 R1		9
2690+00 R1		12
2691+00 R1		10
2692+00 R1	1	7
2693+00 R1	1	8
2694+00 R1	1	9
2695+00 R1	1	8
2696+00 R1		8
2697+00 R1		9
2698+00 R1		18.7
2699+00 R1		25
2700+00 R1	1	16
2701+00 R1	2	6
2702+00 R1	2	4
2703+00 R1	3	7
2704+00 R1	15	9
2705+00 R1	18	9
2706+00 R1	6	12.4
2707+00 R1	1	13
2708+00 R1		10
2709+00 R1		12
2710+00 R1		11
2711+00 R1	1	8.5
2712+00 R1	1.4	9
2713+00 R1		10
2714+00 R1		10
2715+00 R1		11
2716+00 R1		14
2717+00 R1		15
2718+00 R1		14.4
2719+00 R1		15
2720+00 R1		17
2721+00 R1		15
2722+00 R1	1	11
2723+00 R1	1	12
2724+00 R1		13
2725+00 R1	1	5
2726+00 R1	1	6
SUBTOTAL	62	582

EARTHWORK QUANTITY SUMMARY

BID ITEM	110	132
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)
	CY	CY
2727+00 R1		12
2728+00 R1		12
2729+00 R1		11
2730+00 R1	1	10
2731+00 R1	2	11
2732+00 R1	1	13
2733+00 R1	1	11.9
2734+00 R1	3	9
2735+00 R1	2	16
2736+00 R1		25
2737+00 R1		41
2738+00 R1		36
2739+00 R1	1	14
2740+00 R1	1	11
2741+00 R1	1	9
2742+00 R1	2	4
2743+00 R1	1	6
2744+00 R1		10
2745+00 R1		12
2746+00 R1	2	9.8
2747+00 R1	3	5
2748+00 R1	3	6.3
2749+00 R1	2	9
2750+00 R1		12
2751+00 R1		12
2752+00 R1		10
2753+00 R1		9
2754+00 R1		10
2755+00 R1		9
2756+00 R1		8
2757+00 R1		10
2758+00 R1		9
2759+00 R1		10
2760+00 R1		11
2761+00 R1		11
2762+00 R1		11
2763+00 R1		11
2764+00 R1		9
2765+00 R1		10
2766+00 R1		15
2767+00 R1		14
2768+00 R1	2	10
2769+00 R1	15	7.4
2770+00 R1	20	5.3
2771+00 R1	11	5
2772+00 R1	4	3
SUBTOTAL	79	522
PROJECT TOTAL	3,134	4,555

QUANTITY SUMMARIES

SHEET 3 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		19

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

ROADWAY QUANTITY SUMMARY

BID ITEM	100	104	105		**					ONE COURSE SURFACE TREATMENT			
					276	316				316			
LOCATION	PREPARING ROW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE & ASPH PAV (7"-12")	REMOVING STAB BASE AND ASPH PAV(0"-5")	CEM TRT(PLNT MX) (CLN)(TYA)(GR 1-2)(12")	CEM TRT FLX BASE SURF AREA	ASPH (RC-250)	ASPH (RC-250)	AGGR (TY E OR L GR 5)	ROADWAY SURF AREA	ASPH (AC-15P OR CRS-2P)	ASPH (AC-15P OR CRS-2P)	AGGR (TY-PE,E,L OR PL GR 3)
					ALTERNATE BID	ALTERNATE BID	ALTERNATE BID	ALTERNATE BID	ALTERNATE BID				
						*	* 0.25 GAL/SY	0.0011 TON/SY	1 CY/140 SY	*	* 0.50 GAL/SY	0.0021 TON/SY	1 CY/140 SY
	STA	SY	SY	SY	SY	SY	GAL	TON	CY	SY	GAL	TON	CY
2562+65.00 TO 2569+35.00	6.67		416							3,319	1,660	7	24
2569+35.00 TO 2604+35.00	35.00		12,469		10,681	10,681	2,670	11	77	26,261	13,131	56	188
2604+35.00 TO 2664+00.00	59.65	297	9,436		7,952	7,952	1,988	8	57	34,662	17,331	74	248
2664+00.00 TO 2665+38.76	1.39			588						6,200	3,100	13	45
MILL CREEK BRIDGE													
2668+34.04 TO 2708+90.00	40.56	443		590						20,100	10,050	43	144
2708+90.00 TO 2741+50.00	32.60	219								17,345	8,673	37	124
2741+50.00 TO 2762+09.20	20.59	50								4,821	2,411	10	35
2762+09.20 TO 2771+96.82	9.88	182								9,410	4,705	20	68
PROJECT TOTALS	**206.34**	**1,191**	**22,321**	**1,178**	**18,633**	*** 18,633**	*** 4,658**	**19**	**134**	*** 122,118**	*** 61,061**	**260**	**876**

ROADWAY QUANTITY SUMMARY (CONT)

BID ITEM	3077								354	432	530
LOCATION	SP MIXES SP-B PG64-22	SP MIXES SP-B PG64-22	SP MIXES SP-C SAC-A PG70-22	SP MIXES SP-C SAC-A PG70-22	SP MIXES SP-C PG70-22	SP MIXES SP-C PG70-22	TACK COAT	TACK COAT	PLANE ASPH CONC PAV (0" TO 4 1/2")	RIPRAP (CONC) (CL B) (4")	INTERSECTIONS (ACP)
	BASE BID	BASE BID									
	*	(12") 1320 LBS/SY	*	(2") 220 LBS/SY	*	(2.5") 275 LBS/SY	*	0.16 GAL/SY			(10") 1100 LBS/SY
	SY	TON	SY	TON	SY	TON	SY	GAL	SY	CY	SY
2562+65.00 TO 2569+35.00			3,300	363	3,345	460	3,275	524		75	
2569+35.00 TO 2604+35.00	10,987	7,252	26,045	2,865	14,007	1,926	14,006	2,241		334	
2604+35.00 TO 2664+00.00	8,335	5,502	34,263	3,769	26,647	3,664	26,362	4,218			307
2664+00.00 TO 2665+38.76			6,118	673	6,203	853	637	102	489		
MILL CREEK BRIDGE											
2668+34.04 TO 2708+90.00			19,827	2,181	20,101	2,764	19,831	3,173	489		
2708+90.00 TO 2741+50.00			17,127	1,884	17,345	2,385	5,793	927			356
2741+50.00 TO 2762+09.20			4,690	516	4,821	663	10,075	1,612			
2762+09.20 TO 2771+96.82			9,336	1,027	9,410	1,294	8,687	1,390			
PROJECT TOTALS	*** 19,322**	**12,754**	*** 120,706**	**13,278**	*** 101,879**	**14,009**	*** 88,666**	**14,187**	**978**	**409**	**663**

ROADWAY QUANTITY SUMMARY (CONT)

BID ITEM	540		542		544		3076	
LOCATION	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	D-GR HMA TY-B PG64-22 (EXEMPT)	D-GR HMA TY-B PG64-22 (EXEMPT)
							*	(4") 440 LBS/SY
	LF	EA	LF	EA	EA	EA	SY	TON
2562+65.00 TO 2569+35.00	355		400		1	1	189	42
2569+35.00 TO 2604+35.00	620		450		5	3	481	106
2604+35.00 TO 2664+00.00	101				2		263	58
2664+00.00 TO 2665+38.76	224	2	300	2		2	94	21
MILL CREEK BRIDGE								
2668+34.04 TO 2708+90.00	225	2	300	2	2	2	620	137
2708+90.00 TO 2741+50.00							236	52
2741+50.00 TO 2762+09.20								
2762+09.20 TO 2771+96.82								
PROJECT TOTALS	**1,525**	**4**	**1,450**	**4**	**10**	**8**	*** 1,883**	**416**

* FOR CONTRACTOR'S INFORMATION ONLY.

** ALTERNATE BID

NOTE: PLANE ONLY WHAT ASPHALT CAN BE REPLACED IN ONE DAY'S PRODUCTION

SGA (ASPHALT) = 1.02 x 8.3268 =8.4933

$$\text{ASPHALT (TON)} = \frac{\text{RATE (GAL/SY)} \times \text{SGA} \times \text{SY}}{2000}$$

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
12/08/2021

Robert D. Austin

QUANTITY SUMMARIES

SHEET 4 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			20
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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MAILBOX SUMMARY

BID ITEM		530		560		
STATION	LT/RT	TURNOUTS (CONC)	TURNOUTS (ACP)	MAILBOX INSTALL-M (TWG-POST) TY1	MAILBOX INSTALL-S (WC-POST) TY3	MAILBOX INSTALL-D (WC-POST) TY3
		SY	SY	EA	EA	EA
2566+16	RT				1	
2570+21	RT		8		1	
2573+02	RT	16				1
2595+16	RT		16		1	
2597+91	RT		16		1	
2603+34	RT		16		1	
2611+63	RT				1	
2615+00	RT				1	
2616+43	RT				1	
2617+17	RT				1	
2636+45	RT				1	
2641+69	RT				1	
2648+15	RT				1	
2651+57	RT				1	
2651+90	RT			1		
2658+92	RT				1	
2681+77	RT				1	
2684+77	RT				1	
2686+53	RT				1	
2688+25	RT				1	
2690+61	RT				1	
2694+46	RT				1	
2701+99	RT				1	
2709+21	RT				1	
2710+62	RT				1	
2710+66	RT				1	
2711+70	RT				1	
2719+88	RT		16		1	
2727+85	RT		15		1	
2729+47	RT		13		1	
2735+17	RT		22		1	
2735+77	LT				1	
2736+14	RT		12		1	
2740+21	LT				1	
2745+07	LT				1	
2750+14	RT				1	
2750+37	LT				1	
TOTALS		**16**	**134**	**1**	**35**	**1**

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

QUANTITY SUMMARIES

SHEET 5 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			21
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DRIVEWAY AND SIDE ROAD SUMMARY

DRWY ID	STA	O/S	EXIST MAT'L	R C S	DESCRIPTION	AVG WIDTH	LENGTH	PROPOSED RADIUS		ITEM 162 (1)	ITEM 168 (2)	ITEM 464 RC PIPE (CL III)			ITEM 467 (3) SET (TY II)			ITEM 496 (5)		ITEM 530 DRIVEWAYS		
								NORTH	SOUTH	BLOCK SODDING	VEGETATIVE WATERING 10 GAL/SY (2 APPL)	(18")	(24")	(36")	(18 IN) (RCP) (6:1) (P)	(24 IN) (RCP) (6:1) (P)	(36 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE)	(CONC)	(ACP) 6" 660 LBS/SY	(ACP) 6" (4)
										SY	MG	LF	LF	LF	EA	EA	EA	EA	EA	SY	SY	TONS
DW01	2564+40	RT	GRVL	R	EXIST RCP W/ SETS TO BE REMOVED INSTALL 2-18"X 28' RCP W/ PSET-SP	19	53	15	15	22	0.4	28			2			2	1		118	40
DW02	2564+51	LT	ASPH	R	NO STRUCTURE	8	53	15	15												57	19
DW03	2566+76	RT	GRVL	R	NO STRUCTURE	10	54	15	15												70	24
DW04	2567+71	RT	ASPH	R	NO STRUCTURE	10	54	15	15												71	24
DW05	2569+30	RT	ASPH	R	EXIST RCP W/ SETS	20	54	15	15	22	0.4										132	44
DW06	2569+96	RT	ASPH	R	NO STRUCTURE	8	50	15	15												55	19
DW07	2571+56	LT	ASPH	R	NO STRUCTURE	10	54	15	15												73	25
DW08	2571+70	RT	ASPH	R	NO STRUCTURE	10	43	15	15												59	20
DW09	2571+98	LT	ASPH	R	NO STRUCTURE	10	52	15	15												69	23
DW10	2572+95	LT	ASPH	R	NO STRUCTURE	12	51	15	15												79	27
DW11	2595+00	LT	ASPH	R	EXIST 18" X 30' RCP W/ SETS TO BE REMOVED INSTALL 2-18"X 30' RCP W/ PSET-SP	10	29	15	15	40	0.8	60			4			2	1		43	15
DW12	2597+79	LT	GRVL	R	EX DES 1 X 22' CMP W/ SETS TO BE REMOVED INSTALL 2-18" X 40' RCP W/ PSET-SP	14	59	15	15	40	0.8	80			4			2	1		102	34
DW13	2601+64	RT	ASPH	R	EXIST 18" X 32' RCP W/ SETS TO BE REMOVED INSTALL 18" X 40' RCP W/ PSET-SP	22	33	15	15	22	0.4	40			2			2	1		94	32
DW14	2603+29	LT	ASPH	R	EXIST 18" X 38' RCP W/ SETS TO BE REMOVED INSTALL 18" X 40' RCP W/ PSET-SP	20	59	15	15	22	0.4	40			2			2	1		141	47
DW15	2605+02	LT	ASPH	R	NO STRUCTURE	12	59	15	15												89	30
DW16	2605+49	LT	ASPH	R	INSTALL 18" X 28' RCP W/ PSET-SP	12	65	15	15	22	0.4	28			2						97	33
DW17	2606+24	LT	ASPH	S	INSTALL 18" X 60' RCP W/ PSET-SP	41	64	25	25	22	0.4	60			2						277	93
DW18	2607+53	LT	ASPH	R	EXIST 18" X 30' RCP W/ SETS TO BE REMOVED INSTALL 18" X 40' RCP W/ PSET-SP	14	59	15	15	22	0.4	40			2			2	1		102	34
DW19	2609+38	RT	ASPH	R	EXIST 18" X 34' RCP W/ SETS TO BE REMOVED INSTALL 18" X 36' RCP W/ PSET-SP	12	39	15	15	22	0.4	36			2			2	1		63	21
DW20	2611+13	LT	ASPH	R	EXIST 18" X 38' RCP W/ SETS TO BE REMOVED INSTALL 18" X 40' RCP W/ PSET-SP	12	29	15	15	22	0.4	40			2			2	1		49	17
DW21	2611+29	RT	ASPH	R	EXIST 18" X 40' RCP W/ SETS TO BE REMOVED INSTALL 18" X 40' RCP W/ PSET-SP	18	40	15	15	22	0.4	40			2			2	1		89	30
DW22	2614+70	RT	ASPH	R	NO STRUCTURE	10	39	15	15												54	18
DW23	2616+59	LT	ASPH	R	EXIST 18" X 38' RCP W/ SETS	14	29	15	15												56	19
DW24	2617+62	RT	CONC	R	EXIST 18" X 39' RCP W/ SETS TO BE REMOVED INSTALL 2-18" X 40' RCP W/ PSET-SP	20	39	15	15	40	0.8	80			4			2	1	98		
DW25	2634+62	LT	ASPH	R	EXIST 36" X 34' RCP W/ SETS INSTALL 36" X 36' RCP W/ PSET-SP	14	68	15	15	40	0.8			36			2	2	2		117	39
DW26	2636+25	RT	ASPH	R	NO STRUCTURE	10	254	15	15												293	98
DW27	2639+66	LT	ASPH	R	EXIST 2-7'X7.5'X39' MBC W/ SETS	22	82	25	25												230	77
									SUBTOTAL	**380**	**7.2**	**572**		**36**	**30**		**2**	**22**	**10**	**98**	**2,679**	**902**

R - RESIDENTIAL
C - COMMERCIAL
S - SIDEROAD

(1) PLACE UPON COMPLETION OF BACKFILLING OPERATIONS. (SEE TABLE "A")
(2) 2 APPLICATIONS AT 10 GAL/SY PER APPLICATION.
(3) PROVIDE 12" DEEP TOEWALL FOR ALL SET'S.
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(6) THE STRUCTURES ON THE PROJECT ARE OPERATING AT AN ESTIMATED MINIMUM 5 YEAR FREQUENCY. THE OPERATION OF THESE STRUCTURES WILL NOT BE SIGNIFICANTLY ALTERED BY THIS PROJECT. DUE CONSIDERATION HAS BEEN GIVEN TO THE EFFECTS OF HEADWATERS AND VELOCITIES ASSOCIATED WITH THE STRUCTURES. ADDITIONAL STUDIES ARE NOT REQUIRED. CAUTION TO BE USED WHEN WORKING OVER CULVERTS.

TABLE "A"

REQUIRED BLOCK SODDING AT EACH SET END

CULVERT SIZE	SY
18"	11
24"	13
36"	20

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

QUANTITY SUMMARIES

SHEET 6 OF 13

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		22

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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DRIVEWAY AND SIDE ROAD SUMMARY (CONT)

DRWY ID	STA	O/S	EXIST MAT'L	R C S	DESCRIPTION	AVG WIDTH	LENGTH	PROPOSED RADIUS		ITEM 162 (1)	ITEM 168 (2)	ITEM 464 RC PIPE (CL III)			ITEM 467 (3) SET (TY II)			ITEM 496 (5)		ITEM 530 DRIVEWAYS		
								NORTH	SOUTH	BLOCK SODDING	VEGETATIVE WATERING 10 GAL/SY (2 APPL)	(18")	(24")	(36")	(18 IN) (RCP) (6:1) (P)	(24 IN) (RCP) (6:1) (P)	(36 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE)	(CONC)	(ACP) 6" 660 LBS/SY	(ACP) 6" (4)
										SY	MG	LF	LF	LF	EA	EA	EA	EA	EA	SY	SY	TONS
DW28	2642+05	RT	ASPH	R	NO STRUCTURE	10	202	15	15												237	79
DW29	2647+63	LT	CONC	R	EXIST 18" X 26' RCP W/ SETS	12	96	15	15											139		
DW30	2647+80	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED EXTEND 18" RCP 3' US AND 3' DS W/ PSET-SP & INSTALL 18" X 30' RCP W/ PSET-SP	12	160	15	15	22	0.4	36			4			2	1		225	75
DW31	2650+02	LT	CONC	R	EXIST 18" X 26' RCP W/ SETS	12	118	15	15											168		
DW32	2651+09	RT	ASPH	R	NO STRUCTURE	14	137	15	15												223	75
DW33	2651+64	LT	ASPH	R	NO STRUCTURE	12	199	15	15												277	93
DW34	2652+16	RT	ASPH	R	NO STRUCTURE	16	125	15	15												233	78
DW35	2658+47	RT	ASPH	R	EXIST 18" X 20' PVC TO BE REMOVED INSTALL 2-18" X 20' RCP W/ PSET-SP	10	91	15	15	40	0.8	40			4				1		112	38
DW36	2660+64	RT	ASPH	R	INSTALL 2-18" X 20' RCP W/ PSET-SP	12	85	15	15	40	0.8	40			4						124	42
DW37	2680+03	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS	12	126	25	25												236	79
DW38	2680+61	LT	ASPH	R	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED INSTALL 2-18" X 28' RCP W/ PSET-SP	14	164	15	15	40	0.8	56			4			2	1	266		
DW39	2681+55	LT	CONC	R	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED INSTALL 2-18" X 28' RCP W/ PSET-SP	10	158	25	25	40	0.8	56			4			2	1	207		
DW40	2682+17	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS	14	128	15	15												210	70
DW41	2683+39	RT	ASPH	R	EXIST 18" X 32' RCP W/ SETS	12	146	15	15												207	69
DW42	2684+51	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS	12	148	15	15												208	70
DW43	2686+27	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS	12	163	15	15												228	76
DW44	2687+27	LT	ASPH	C	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED INSTALL 2-18" X 28' RCP W/ PSET-SP	14	111	15	15	40	0.8	56			4			2	1		184	62
DW45	2687+96	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS	12	177	15	15												247	83
DW46	2690+69	LT	ASPH	C	NO STRUCTURE	18	86	25	25												202	68
DW47	2691+20	RT	ASPH	C	EXIST 18" X 62' RCP W/ SETS TO BE REMOVED INSTALL 18" X 62' RCP W/ PSET-SP US & DS	32	128	25	25	22	0.4	62			2			2	1		352	118
DW48	2694+09	LT	CONC	R	EXIST 18" X 26' RCP W/ SETS EXT 18" RCP 5' US AND 5' DS W/ PSET-SP	12	69	15	15	22	0.4	10			2			2		103		
DW49	2695+91	LT	ASPH	R	EXIST 18" X 26' RCP W/ SETS EXT 18" RCP 5' US AND 5' DS W/ PSET-SP	10	69	15	15	22	0.4	10			2			2			80	27
DW50	2696+25	RT	ASPH	R	EXIST 18" X 26' RCP W/ SETS EXT 18" RCP 5' US AND 5' DS W/ PSET-SP	12	46	15	15	22	0.4	10			2			2			72	24
DW51	2699+73	LT	CONC	C	EXIST 18" X 34' RCP W/ SETS EXT 18" RCP 5' US AND 5' DS W/ PSET-SP & INST 18" X 44' RCP W/ PSET-SP US & DS	12	56	25	25	22	0.4	54			4			2		105		
DW52	2708+98	RT	ASPH	R	EXIST 24" X 30' RCP W/ SETS EXT 24" RCP 5' US AND 5' DS W/ PSET-SP	12	37	15	15	26	0.5		10			2		2			60	20
DW53	2710+28	RT	ASPH	R	EXIST 24" X 40' RCP W/ SETS EXT 24" RCP 6' US AND 6' DS W/ PSET-SP	12	37	15	15	26	0.5		12			2		2			60	20
									SUBTOTAL	**384**	**7.4**	**430**	**22**		**36**	**4**		**22**	**6**	**988**	**3,777**	**1,266**

R - RESIDENTIAL
C - COMMERCIAL
S - SIDEROAD

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(2) 2 APPLICATIONS AT 10 GAL/SY PER APPLICATION.
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TABLE "A"	
REQUIRED BLOCK SODDING AT EACH SET END	
CULVERT SIZE	SY
18"	11
24"	13
36"	20

STATE OF TEXAS
ROBERT D. AUSTIN
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Robert D. Austin

QUANTITY SUMMARIES

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
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TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		23

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DRIVEWAY AND SIDE ROAD SUMMARY (CONT)

DRWY ID	STA	O/S	EXIST MAT'L	R C S	DESCRIPTION	AVG WIDTH	LENGTH	PROPOSED RADIUS		ITEM 162 (1)	ITEM 168 (2)	ITEM 464 RC PIPE (CL III)			ITEM 467 (3) SET (TY II)			ITEM 496 (5)		ITEM 530 DRIVEWAYS		
								NORTH	SOUTH	BLOCK SODDING	VEGETATIVE WATERING 10 GAL/SY (2 APPL)	(18")	(24")	(36")	(18 IN) (RCP) (6:1) (P)	(24 IN) (RCP) (6:1) (P)	(36 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE)	(CONC)	(ACP) 6" 660 LBS/SY	(ACP) 6" (4)
										SY	MG	LF	LF	LF	EA	EA	EA	EA	EA	SY	SY	TONS
DW54	2710+56	LT	CONC	C	EXIST 24" X 40' CMP W/ SETS TO BE REMOVED INSTALL 2-24" X 52' RCP W/ PSET-SP	20	38	25	25	52	1.0		104			4		2	1	114		
DW55	2712+04	RT	ASPH	R	EXIST 24" X 34' RCP W/ SETS EXTEND 24" RCP 5' US AND 5' DS W/ PSET-SP	12	36	15	15	26	0.5		10			2		2			59	20
DW56	2719+96	LT	ASPH	R	EXIST 18" X 34' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 44' RCP W/ PSET-SP	10	36	15	15	22	0.4	54			4			2			51	17
DW57	2721+09	LT	ASPH	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 40' RCP W/ PSET-SP	12	36	15	15	22	0.4	50			4			2			59	20
DW58	2722+67	LT	CONC	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 40' RCP W/ PSET-SP	12	36	15	15	22	0.4	50			4			2		59		
DW59	2723+73	LT	ASPH	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	10	36	15	15	22	0.4	10			2			2			51	17
DW60	2724+89	RT	ASPH	S	NO STRUCTURE	42	36	50	35												177	59
DW61	2725+44	LT	ASPH	S	NO STRUCTURE	49	36	35	35												197	66
DW62	2725+91	RT	ASPH	R	EXIST 18" X 38' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	14	36	15	15	22	0.4	10			2			2			68	23
DW63	2726+70	RT	ASPH	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	10	37	15	15	22	0.4	10			2			2			54	18
DW64	2728+16	RT	CONC	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	10	36	15	15	22	0.4	10			2			2			51	17
DW65	2729+69	RT	ASPH	R	EXIST 18" X 30' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	10	35	15	15	22	0.4	10			2			2			50	17
DW66	2731+40	LT	ASPH	R	NO STRUCTURE	12	38	15	15												64	22
DW67	2732+79	RT	ASPH	R	EXIST 18" X 38' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	14	35	15	15	22	0.4	10			2			2			66	22
DW68	2733+79	LT	ASPH	R	EXIST 18" X 34' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	12	37	15	15	22	0.4	10			2			2			60	20
DW69	2735+43	RT	ASPH	R	EXIST 12" X 38' RCP W/ SET UPSTREAM	12	36	15	15												59	20
DW70	2735+89	RT	ASPH	R	EXIST 12" X 98' RCP	12	36	15	15												59	20
DW71	2737+92	LT	ASPH	R	EXIST 12" X 34' RCP W/ SETS INSTALL 18" X 44' RCP W/ PSET-SP	14	37	15	15	22	0.4	44			2			2			68	23
DW72	2740+50	LT	ASPH	R	EXIST 18" X 38' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 48' RCP W/ PSET-SP	12	37	15	15	22	0.4	58			4			2			60	20
DW73	2743+42	RT	ASPH	R	NO STRUCTURE	10	39	15	15												55	19
DW74	2744+80	LT	ASPH	R	EXIST 18" X 28' PVC W/ SETS TO BE REMOVED INSTALL 2-18" X 40' RCP W/ PSET-SP	12	38	15	15	40	0.8	52			4			2	1		61	21
DW75	2746+42	LT	ASPH	R	EXIST 18" X 38' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 48' RCP W/ PSET-SP	12	38	15	15	22	0.4	58			4			2			61	21
DW76	2749+18	LT	ASPH	R	EXIST 18" X 34' RCP W/ SETS TO BE REMOVED INSTALL 2-24" X 44' RCP W/ PSET-SP	12	38	15	15	52	1.0		88			4		2	1		62	21
									SUBTOTAL	**456**	**8.5**	**436**	**202**		**40**	**10**		**34**	**3**	**173**	**1,492**	**503**

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TABLE "A"

REQUIRED BLOCK SODDING AT EACH SET END

CULVERT SIZE	SY
18"	11
24"	13
36"	20

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

QUANTITY SUMMARIES

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		24

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DRIVEWAY AND SIDE ROAD SUMMARY (CONT)

DRWY ID	STA	O/S	EXIST MAT'L	R C S	DESCRIPTION	AVG WIDTH	LENGTH	PROPOSED RADIUS		ITEM 162 (1)	ITEM 168 (2)	ITEM 464 RC PIPE (CL III)			ITEM 467 (3) SET (TY II)			ITEM 496 (5)		ITEM 530 DRIVEWAYS		
								NORTH	SOUTH	BLOCK SODDING	VEGETATIVE WATERING 10 GAL/SY (2 APPL)	(18")	(24")	(36")	(18 IN) (RCP) (6:1) (P)	(24 IN) (RCP) (6:1) (P)	(36 IN) (RCP) (6:1) (P)	REMOV STR (SET)	REMOV STR (PIPE)	(CONC)	(ACP) 6" 660 LBS/SY	(ACP) 6" (4)
										SY	MG	LF	LF	LF	EA	EA	EA	EA	EA	SY	SY	TONS
DW77	2749+83	RT	ASPH	R	NO STRUCTURE	10	38	15	15												53	18
DW78	2750+63	LT	GRVL	R	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED INSTALL 2-24" X 36' RCP W/ PSET-SP	12	39	15	15	52	1.0		72			4		2	1		62	21
DW79	2752+48	RT	CONC	R	NO STRUCTURE	12	36	15	15											59		
DW80	2753+52	LT	ASPH	R	EXIST 18" X 26' RCP W/ SETS TO BE REMOVED INSTALL 4' X 2' SBC W/ 2 SETB-PD	12	41	15	15	32	0.6							2	1		66	22
DW81	2756+57	RT	ASPH	C	NO STRUCTURE	14	26	15	15												52	18
DW82	2758+92	RT	ASPH	C	EXIST 18" X 26' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP	14	17	15	15	22	0.4	10			2			2			37	13
DW83	2763+42	LT	CONC	R	EXIST 18" X 26' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 36' RCP W/ PSET-SP	10	94	15	15	22	0.4	46			4			2		116		
DW84	2768+68	LT	ASPH	R	EXIST 24" X 26' RCP W/ SETS EXTEND 24" RCP 5' US AND 5' DS W/ PSET-SP	14	98	15	15	26	0.5		10			2		2			163	55
DW85	2771+34	LT	CONC	R	EXIST 18" X 32' RCP W/ SETS EXTEND 18" RCP 5' US AND 5' DS W/ PSET-SP & INSTALL 18" X 32' RCP W/ PSET-SP	12	84	15	15	22	0.4	42			4			2		122		
								SUBTOTAL		**176**	**3.3**	**98**	**82**		**10**	**6**		**12**	**2**	**297**	**433**	**147**
								PROJECT TOTAL		**1,396**	**26.4**	**1,536**	**306**	**36**	**116**	**20**	**2**	**90**	**21**	**1,556**	**8,381**	**2,818**

TABLE "A"	
REQUIRED BLOCK SODDING AT EACH SET END	
CULVERT SIZE	SY
18"	11
24"	13
36"	20

R - RESIDENTIAL
C - COMMERCIAL
S - SIDEROAD

(1) PLACE UPON COMPLETION OF BACKFILLING OPERATIONS. (SEE TABLE "A")
(2) 2 APPLICATIONS AT 10 GAL/SY PER APPLICATION.
(3) PROVIDE 12" DEEP TOEWALL FOR ALL SET'S.
(4) FOR CONTRACTOR'S INFORMATION ONLY.
(5) SET REMOVAL IS SUBSIDIARY TO THE PIPE REMOVAL OR TO THE NEW PSET-SP BEING INSTALLED.

(6) THE STRUCTURES ON THE PROJECT ARE OPERATING AT AN ESTIMATED MINIMUM 5 YEAR FREQUENCY. THE OPERATION OF THESE STRUCTURES WILL NOT BE SIGNIFICANTLY ALTERED BY THIS PROJECT. DUE CONSIDERATION HAS BEEN GIVEN TO THE EFFECTS OF HEADWATERS AND VELOCITIES ASSOCIATED WITH THE STRUCTURES. ADDITIONAL STUDIES ARE NOT REQUIRED. CAUTION TO BE USED WHEN WORKING OVER CULVERTS.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

QUANTITY SUMMARIES

SHEET 9 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			25
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

SUMMARY OF CROSS DRAINAGE ITEMS

BID ITEM	420	432		464		466			480
LOCATION	CL C CONC (COLLAR)	RIPRAP (CONC) (CL B) (4")	RIPRAP (STONE TY R) (DRY) (12 IN)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	HEADWALL (CH - FW - 0) (DIA= 24 IN)	HEADWALL (CH - PW - 0) (DIA= 18 IN)	HEADWALL (CH - PW - 0) (DIA= 24 IN)	CLEAN EXIST CULVERTS
	EA	CY	CY	LF	LF	EA	EA	EA	EA
CULVERT NO. 1 STA. 2568+20.16 EXISTING 24"x136' RCP W/ SET (TY C) (MOD) UPSTRM AND CH-7-B DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 2 STA. 2592+10.23 EXISTING 24"x114' RCP 24"x8' TEE W/ 2-SET (TY II) UPSTRM AND SET (TY II) DNSTRM REMOVE SET DNSTRM AND EXTEND 19' DNSTRM USING CH-PW-0(H=44') (6:1)	1		6.3		19			1	
CULVERT NO. 3 STA. 2620+80.78 EXISTING 18"x155' RCP 30° RT FWD SKEW W/ SET (TY II) UPSTRM AND CH-7-B DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 4 STA. 2627+04.72 EXISTING 18"x106' RCP AND 1-3'x3' JCT BOX W/ SET (TY II) UPSTRM AND DNSTRM REMOVE SET UPSTRM AND EXTEND 8' UPSTRM USING CH-PW-0 (H=36") (6:1)	1	5.0		8			1		
CULVERT NO. 5 STA. 2635+32.78 EXISTING 7'x6'x148' SBC 30° LT FWD SKEW W/ SET (TY I) (SWW(M)) UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 6 STA. 2639+04.77 EXISTING 24"x105' RCP AND MH (TY M) W/ SET (TY II) UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 7 STA. 2650+60.44 EXISTING 7'x5'x193' SBC AND JCT BOX 15° LT FWD SKEW W/ SET (TY I) (SWW(M)) UPSTRM AND FLARED WINGS DNSTRM NO CONSTRUCTION ON STRUCTURE									
SUBTOTAL	**2**	**5.0**	**6.3**	**8**	**19**	**0**	**1**	**1**	**0**

1. THE STRUCTURES ON THE PROJECT ARE OPERATING AT AN ESTIMATED MINIMUM 5 YEAR FREQUENCY. THE OPERATION OF THESE STRUCTURES WILL NOT BE SIGNIFICANTLY ALTERED BY THIS PROJECT. DUE CONSIDERATION HAS BEEN GIVEN TO THE EFFECTS OF HEADWATERS AND VELOCITIES ASSOCIATED WITH THE STRUCTURES. ADDITIONAL STUDIES ARE NOT REQUIRED. CAUTION TO BE USED WHEN WORKING OVER CULVERTS.

STATE OF TEXAS
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11/03/2021

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QUANTITY SUMMARIES

SHEET 10 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			26
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

SUMMARY OF CROSS DRAINAGE ITEMS

BID ITEM	420	432		464		466			480
LOCATION	CL C CONC (COLLAR)	RIPRAP (CONC) (CL B) (4")	RIPRAP (STONE TY R) (DRY) (12 IN)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	HEADWALL (CH - FW - 0) (DIA= 24 IN)	HEADWALL (CH - PW - 0) (DIA= 18 IN)	HEADWALL (CH - PW - 0) (DIA= 24 IN)	CLEAN EXIST CULVERTS
	EA	CY	CY	LF	LF	EA	EA	EA	EA
CULVERT NO. 8 STA. 2691+76.32 EXISTING 48"x132' RCP W/ SET (TY II) UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 9 STA. 2704+42.44 EXISTING 9'x8'x102 SBC WITH FW-N WINGWALL UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 10 STA. 2731+12.37 EXISTING 24"x90' RCP W/ SET (TY II) UPSTRM AND DNSTRM REMOVE SET (TY II) UPSTREAM AND REPLACE USING CH-FW-0 (H=42") (2:1)		5.0				1			
CULVERT NO. 11 STA. 2736+66.71 EXISTING 2-36"x103' RCP W/ CH-7-B HDWL UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 12 STA. 2747+11.93 EXISTING 30"x82' RCP W/ SET (TY II) UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									
CULVERT NO. 13 STA. 2755+09.14 EXISTING 2-36"x121' RCP AND MANHOLE (TY M) W/ 2-SETS (TY II) UPSTRM AND DNSTRM NO CONSTRUCTION ON STRUCTURE									1
SUBTOTAL	**0**	**5.0**	**0.0**	**0**	**0**	**1**	**0**	**0**	**1**
PROJECT TOTALS	**2**	**10.0**	**6.3**	**8**	**19**	**1**	**1**	**1**	**1**

1. THE STRUCTURES ON THE PROJECT ARE OPERATING AT AN ESTIMATED MINIMUM 5 YEAR FREQUENCY. THE OPERATION OF THESE STRUCTURES WILL NOT BE SIGNIFICANTLY ALTERED BY THIS PROJECT. DUE CONSIDERATION HAS BEEN GIVEN TO THE EFFECTS OF HEADWATERS AND VELOCITIES ASSOCIATED WITH THE STRUCTURES. ADDITIONAL STUDIES ARE NOT REQUIRED. CAUTION TO BE USED WHEN WORKING OVER CULVERTS.

STATE OF TEXAS
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11/03/2021

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QUANTITY SUMMARIES

SHEET 11 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		27

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

PAVEMENT MARKING QUANTITY SUMMARY

BID ITEM	533		666				
LOCATION	* RUMBLE STRIPS (SHOULDER)	* RUMBLE STRIPS (CENTERLINE)	REFL PAV MRK TY I (W)4"(LNDP)(090MIL)	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	RE PM W/RET REQ TY I (W)4"(BRK)(090MIL)	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
	LF	LF	LF	LF	LF	LF	LF
2562+65.00 TO 2569+35.00	1,340	670				1,340	1,340
2569+35.00 TO 2604+35.00	6,872	3,216	480	1,698	680	6,948	11,232
2604+35.00 TO 2664+00.00	11,930	5,965	108		1,500	11,930	11,930
2664+00.00 TO 2665+38.76	278	139				278	278
MILL CREEK BRIDGE						590	590
2668+34.04 TO 2708+90.00	8,112	4,056				8,112	8,112
2708+90.00 TO 2741+50.00	6,348	6,348		1,680		6,948	12,696
2741+50.00 TO 2762+09.20	3,840	1,920				3,840	3,840
2762+09.20 TO 2771+95.00	2,250	2,250			50	2,254	4,508
PROJECT TOTALS	**40,970**	**24,564**	**588**	**3,378**	**2,230**	**42,240**	**54,526**

* RUMBLE STRIP OPTION 4

PAVEMENT MARKING QUANTITY SUMMARY (CONT)

BID ITEM	668				672	
LOCATION	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (LNDP ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	EA	EA	EA	EA	EA
2562+65.00 TO 2569+35.00						18
2569+35.00 TO 2604+35.00	14	4	4	4	161	570
2604+35.00 TO 2664+00.00					76	150
2664+00.00 TO 2665+38.76						4
MILL CREEK BRIDGE						8
2668+34.04 TO 2708+90.00						102
2708+90.00 TO 2741+50.00		4		4	86	640
2741+50.00 TO 2762+09.20						50
2762+09.20 TO 2771+95.00					3	228
PROJECT TOTALS	**14**	**8**	**4**	**8**	**326**	**1,770**

SUMMARY OF SMALL SIGNS & OBJECT MARKERS

BID ITEM	644					658		
LOCATION	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(U-WC)	IN SM RD SN SUP&AM TYTWT(1)WS(P)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	INSTL OM ASSM (OM-2Z)(FLX)SRF
	EA	EA	EA	EA	EA	EA	EA	EA
2562+67.94 TO 2569+35.00				1	1		6	2
2569+35.00 TO 2604+35.00	4		1	10	12		13	2
2604+35.00 TO 2664+00.00				6	5		4	12
2664+00.00 TO 2665+38.76		1			1		4	
MILL CREEK BRIDGE						6		
2668+34.04 TO 2708+90.00		1		2	3		7	4
2708+90.00 TO 2741+50.00		1		6	6			4
2741+50.00 TO 2762+09.20				1	2			4
2762+09.20 TO 2771+96.82		1		1				
PROJECT TOTALS	**4**	**4**	**1**	**27**	**30**	**6**	**34**	**28**

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QUANTITY SUMMARIES

SHEET 12 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		28

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

SUMMARY OF SWP3 ITEMS

BID ITEM	161	164			168	169
LOCATION	COMPOST MANUF TOPSOIL (4")	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	CELL FBR MLCH SEED(TEMP)(WARM)	CELL FBR MLCH SEED(TEMP)(COOL)	VEGETATIVE WATERING 10 GAL/SY (2 APPL)	SOIL RETENTION BLANKETS (CL 1) (TY C)
	SY	SY	SY	SY	MG	SY
2562+67.94 TO 2569+35.00	6,926	6,926	3,463	3,463	138.5	2,093
2569+35.00 TO 2604+35.00	25,530	25,530	12,765	12,765	510.6	1,493
2604+35.00 TO 2664+00.00	75,920	75,920	37,960	37,960	1,518.4	1,965
2664+00.00 TO 2665+38.76	2,328	2,328	1,164	1,164	46.6	268
MILL CREEK BRIDGE						
2668+34.04 TO 2708+90.00	54,712	54,712	27,356	27,356	1,094.2	456
2708+90.00 TO 2741+50.00	23,806	23,806	11,903	11,903	476.1	
2741+50.00 TO 2762+09.20	16,022	16,022	8,011	8,011	320.4	
2762+09.20 TO 2771+96.82	11,220	11,220	5,610	5,610	224.4	
PROJECT TOTALS	**216,464**	**216,464**	**108,232**	**108,232**	**4,329.2**	**6,275**

SUMMARY OF SWP3 ITEMS (CONT)

BID ITEM	314	506					
LOCATION	EMULS ASPH (EROSN CONT)(MS-2) 10 GAL/SY	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	GAL	LF	LF	SY	SY	LF	LF
2562+67.94 TO 2569+35.00	67	46	46	78	78	749	749
2569+35.00 TO 2604+35.00	350	254	254			408	408
2604+35.00 TO 2664+00.00	597	203	203	78	78	1,829	1,829
2664+00.00 TO 2665+38.76	14	25	25				
MILL CREEK BRIDGE							
2668+34.04 TO 2708+90.00	406	287	287			1,395	1,395
2708+90.00 TO 2741+50.00	326	159	159			663	663
2741+50.00 TO 2762+09.20	206	37	37	78	78	263	263
2762+09.20 TO 2771+96.82	99	43	43				
PROJECT TOTALS	**2,065**	**1,054**	**1,054**	**234**	**234**	**5,307**	**5,307**

NOTE:

LOCATIONS AND TYPES OF BMPS MAY REQUIRE ADJUSTMENTS PRIOR TO OR AFTER PLACEMENT AS DIRECTED BY THE ENGINEER. ADJUSTMENTS SHOULD BE MADE TO ENSURE BMPS ARE WORKING EFFECTIVELY AND MAINTAIN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT. NOTIFY THE ENGINEER PRIOR TO MAKING ADJUSTMENTS.

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QUANTITY SUMMARIES

SHEET 13 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			29
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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	1	M1-4	US 96	24 x 24	X		TWT	1	WS	P		
		D10-7aT	REF MRKR 334	3 x 10	X							
	2	R2-1	SPEED LIMIT 75	30 x 36	X		TWT	1	WS	P		
	3	D1-1	SHELBYVILLE RIGHT ARROW	96 x 18	X		10BWG	1	SA	T		
	4	M3-3	SOUTH	24 x 12	X		TWT	1	WS	P		
		M1-4	US 96	24 x 24								
	5	M1-6F	FM 417	24 x 24	X		TWT	1	WS	P		
		M6-1	RIGHT ARROW	21 x 15								
	6	W1-7T	RIGHT AND LEFT ARROW	96 x 36	X		S80	1	SA	U	WC	
	7	M1-4	US 96	24 x 24	X		TWT	1	WS	P		
		M6-4	RIGHT AND LEFT ARROW	21 x 15								
	8	M1-6F	FM 417	24 x 24	X		TWT	1	WS	P		
		M6-1	LEFT ARROW	21 x 15								
	9	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	10	M3-1	NORTH	24 x 12	X		TWT	1	WS	P		
		M1-4	US 96	24 x 24								
	11	R2-1	SPEED LIMIT 75	30 x 36	X		TWT	1	WS	P		
2	1	W9-2TL	LANE ENDS MERGE LEFT	48 x 48	X		10BWG	1	SA	T		
	2	W9-2TL	LANE ENDS MERGE LEFT	48 x 48	X		10BWG	1	SA	T		
	3	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	X		10BWG	1	SA	T		
	4	M2-1	JCT	21 x 15	X		TWT	1	WS	P		
		M1-6F	FM 417	24 x 24	X							
	5	D20-1TL	CO RD 1009 LEFT ARROW	24 x 24	X		TWT	1	WS	P		
	6	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	7	S3-1T	SCHOOL BUS STOP AHEAD	36 x 36	X		TWT	1	WS	P		
3	1	D20-1TR	CO RD 1009 RIGHT ARROW	24 x 24	X		TWT	1	WS	P		
	2	W2-2R	T-INTERSECTION	36 x 36	X		TWT	1	WS	P		
4	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		TWT	1	WS	P		

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).

STATE OF TEXAS
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11/03/2021

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SUMMARY OF SMALL SIGNS

SHEET 1 OF 2

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		30

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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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	1	R4-3	SLOWER TRAFFIC KEEP RIGHT	24 x 30	X		TWT	1	WS	P		
	2	I-3	MILL CREEK	48 x 30	X		10BWG	1	SA	U		
	3	I-3	MILL CREEK	48 x 30	X		10BWG	1	SA	U		
	4	M1-4	US 96	24 x 24	X		TWT	1	WS	P		
			REF MRKR 332	3 x 10	X							
	5	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		TWT	1	WS	P		
7	1	W2-1	CROSS ROAD	36 x 36	X		TWT	1	WS	P		
	2	D20-5T	CO RD 1024 LEFT ARROW	24 x 42	X		TWT	1	WS	P		
			CO RD 1006 RIGHT ARROW									
	3	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	4	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	5	D3-3bTR	SHORT CEMETERY RIGHT ARROW	54 x 36	X		10BWG	1	SA	U		
8	1	D20-5T	CO RD 1006 LEFT ARROW	24 x 42	X		TWT	1	WS	P		
			CO RD 1024 RIGHT ARROW									
	2	W2-1	CROSS ROAD	36 x 36	X		TWT	1	WS	P		
9	1	R4-7b	KEEP RIGHT	24 x 30	X		TWT	1	WS	P		
	2	W6-3	TWO-WAY TRAFFIC	36 x 36	X		TWT	1	WS	P		
	3	D15-10T	PASSING LANE 2 MILES	54 x 42	X		10BWG	1	SA	U		

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

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

http://www.txdot.gov/

NOTE:

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

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SUMMARY OF SMALL SIGNS

SHEET 2 OF 2

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			31
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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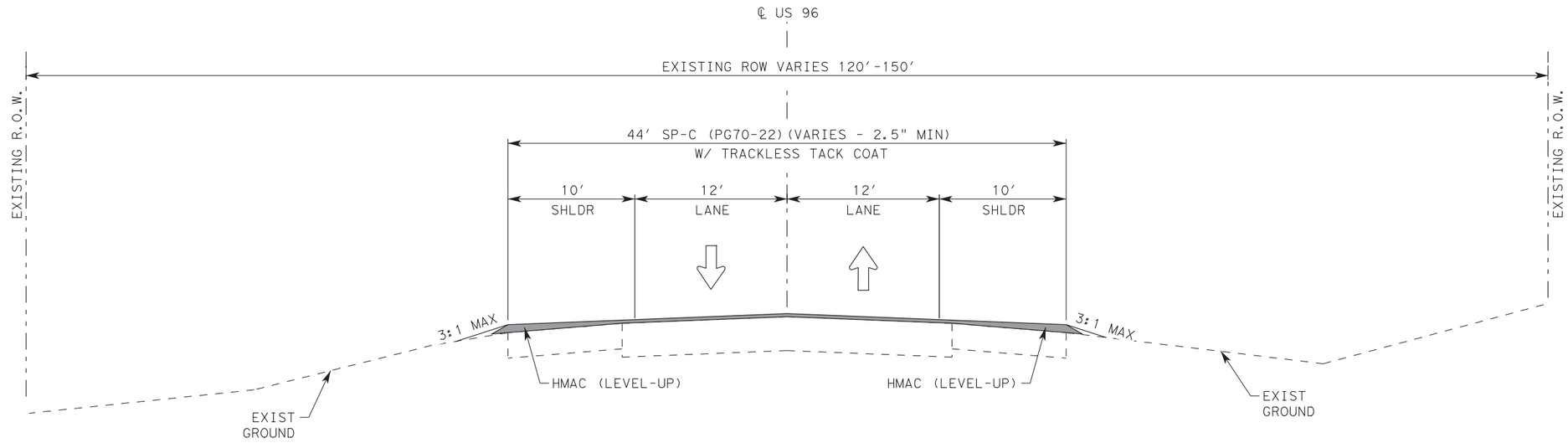
LEGEND:

- OVERLAY / LEVEL-UP
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS



0' 5 10

SCALE: 1"=10'

PHASE 1

LEVEL-UP

STA 2562+65.00 TO STA 2665+38.76
STA 2668+34.04 TO STA 2771+95.00

- PLACE ADVANCE WARNING SIGNS IN ACCORDANCE WITH APPLICABLE TRAFFIC CONTROL STANDARDS.
- PREPARE ROW.
- INSTALL SWP3 FEATURES THROUGHOUT THE PROJECT AS SHOWN OR AS DIRECTED BY THE ENGINEER.
- EXTEND EXISTING CROSS DRAINAGE STRUCTURES AS NOTED IN PLANS.
- PLACE LEVEL-UP ACROSS ROADWAY.
- PLACE EMBANKMENT TO 3:1 SLOPE (MAX).
- PLACE WORK ZONE PAVEMENT MARKINGS.

NOTES:

1. THE LEVEL-UP OPERATIONS SHALL BE CONSTRUCTED WITH DAILY ONE-LANE TWO-WAY TRAFFIC CONTROL. REFER TO APPLICABLE STANDARDS.
2. CONTRACTOR TO LIMIT CONSTRUCTION AREA TO WHAT CAN BE COMPLETED IN ONE DAY'S WORK. (BOTH DIRECTIONS).
3. PROVIDE ACCESS TO DRIVEWAYS AND SIDEROADS AT ALL TIMES.

STATE OF TEXAS
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11/03/2021
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TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 1 OF 4

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			32
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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LEGEND:

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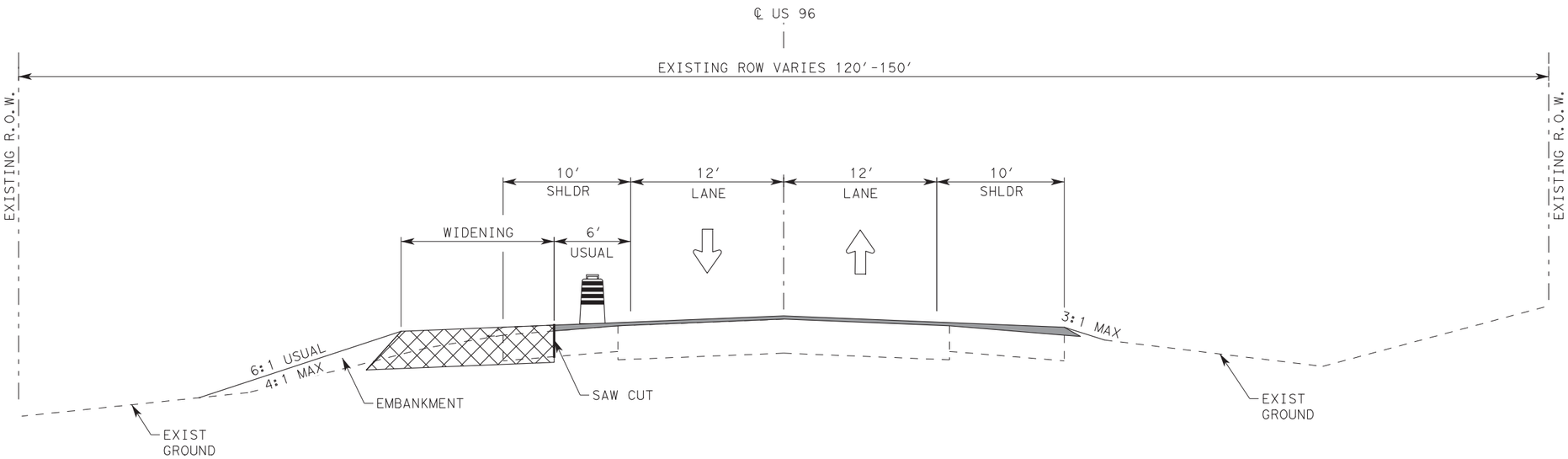
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS



0′ 5 10

SCALE: 1"=10′

PHASE 2

ROADWAY WIDENING (SOUTHBOUND)

STA 2571+60.00 TO STA 2664+00.00

- SAWCUT EXISTING PAVEMENT AT THE LOCATION DESCRIBED IN THE TYPICAL SECTIONS ALONG SB ROADWAY.
- REMOVE OLD PAVEMENT, FILL AND CONSTRUCT PROPOSED WIDENING TO THE FINAL 2" SURFACE COURSE.
- CONSTRUCT SIDE ROADS, MAILBOX TURNOUTS, DRIVEWAYS AND DRIVEWAY CULVERTS ALONG SB ROADWAY.

NOTES:

1. USE PLASTIC DRUMS FOR DELINEATION AND OBJECT MARKERS.
2. PROVIDE ACCESS TO DRIVEWAYS AND SIDEROADS AT ALL TIMES.

STATE OF TEXAS
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 2 OF 4

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			33
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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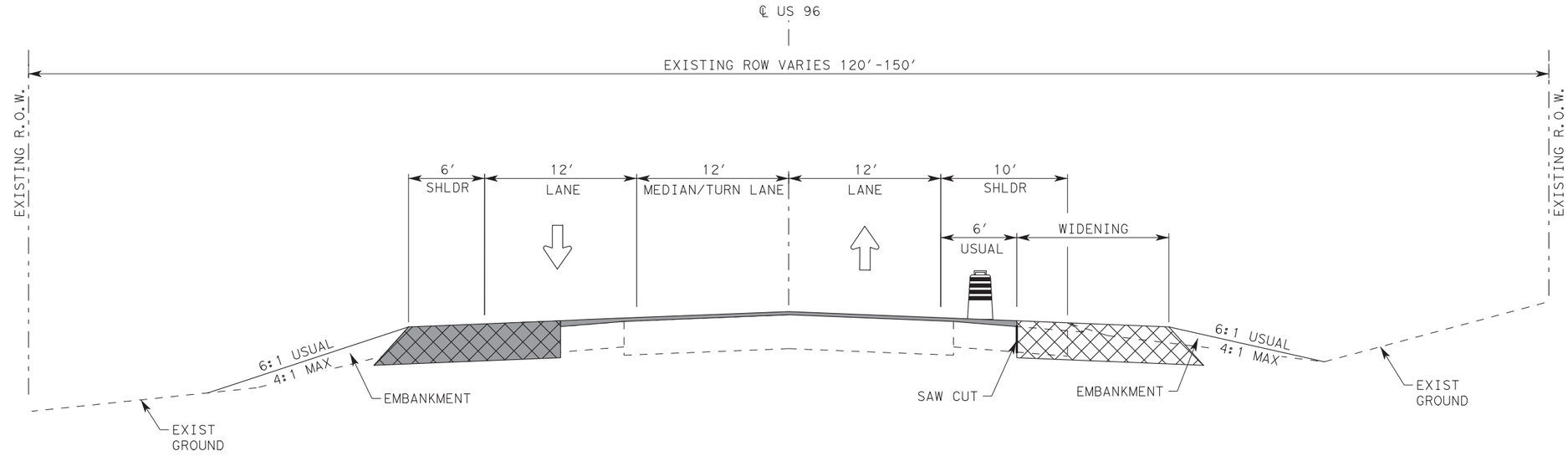
LEGEND:

- OVERLAY / LEVEL-UP
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS



0' 5 10

SCALE: 1"=10'

PHASE 3

ROADWAY WIDENING (NORTHBOUND)

STA 2569+35.00 TO STA 2604+35.00

- SAWCUT EXISTING PAVEMENT AT THE LOCATION DESCRIBED IN THE TYPICAL SECTIONS ALONG NB ROADWAY.
- REMOVE OLD PAVEMENT, FILL AND CONSTRUCT PROPOSED WIDENING TO THE FINAL 2" SURFACE COURSE.
- CONSTRUCT SIDE ROADS, MAILBOX TURNOUTS, DRIVEWAYS AND DRIVEWAY CULVERTS ALONG NB ROADWAY.
- PLACE WORK ZONE PAVEMENT MARKINGS, DELINEATORS AND SIGNS.

NOTES:

1. USE PLASTIC DRUMS FOR DELINEATION AND OBJECT MARKERS.
2. PROVIDE ACCESS TO DRIVEWAYS AND SIDEROADS AT ALL TIMES.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 3 OF 4

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			34
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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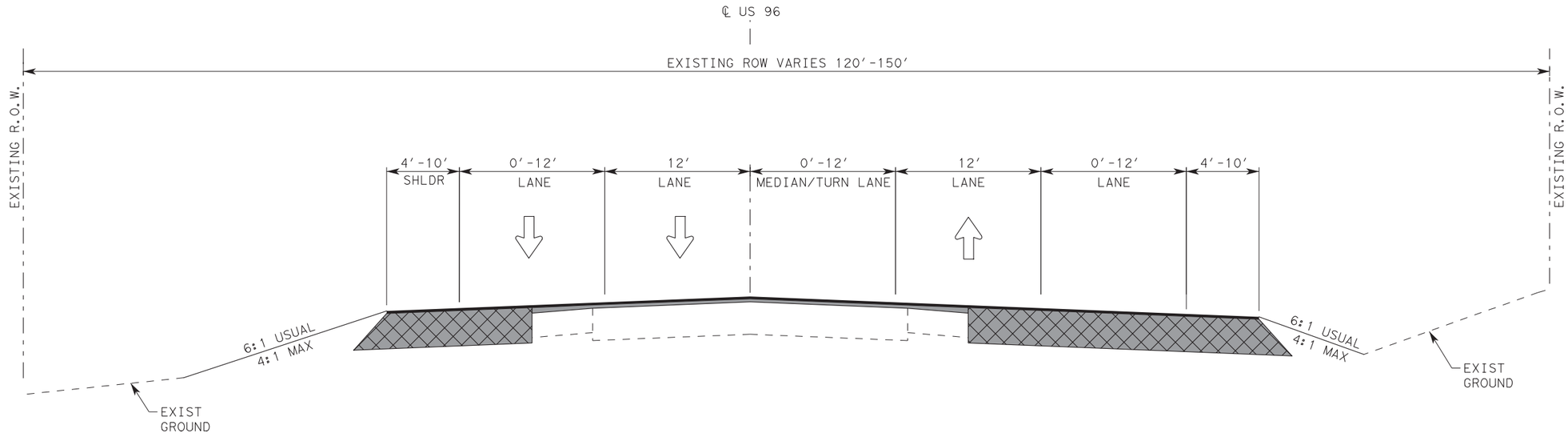
LEGEND:

- OVERLAY / LEVEL-UP
- PERMANENT CONSTRUCTION
- PERMANENT CONSTRUCTION PREVIOUS



0' 5 10

SCALE: 1"=10'

PHASE 4

FINALIZE

STA 2562+65.00 TO STA 2665+38.76
STA 2668+34.04 TO STA 2771+95.00

- PLACE ONE COURSE SURFACE TREATMENT AND FINAL FULL WIDTH 2" HMA OVERLAY.
- PLACE FINAL PAVEMENT MARKINGS AND SIGNS.
- PERFORM FINAL CLEANUP.

STATE OF TEXAS
ROBERT D. AUSTIN
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LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 4 OF 4

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			35
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

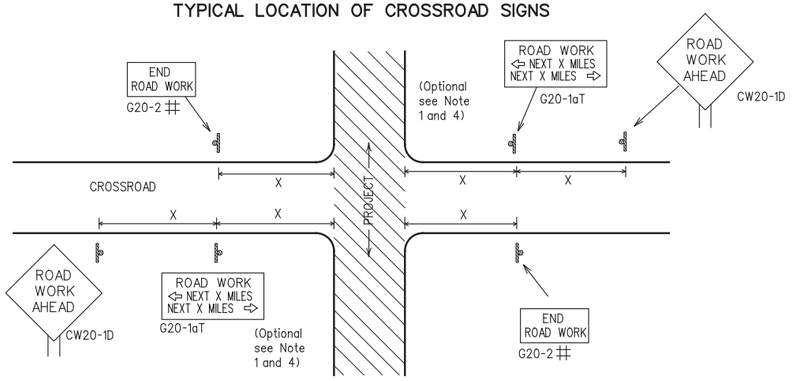
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LFK	SHELBY		36
5-10 5-21				

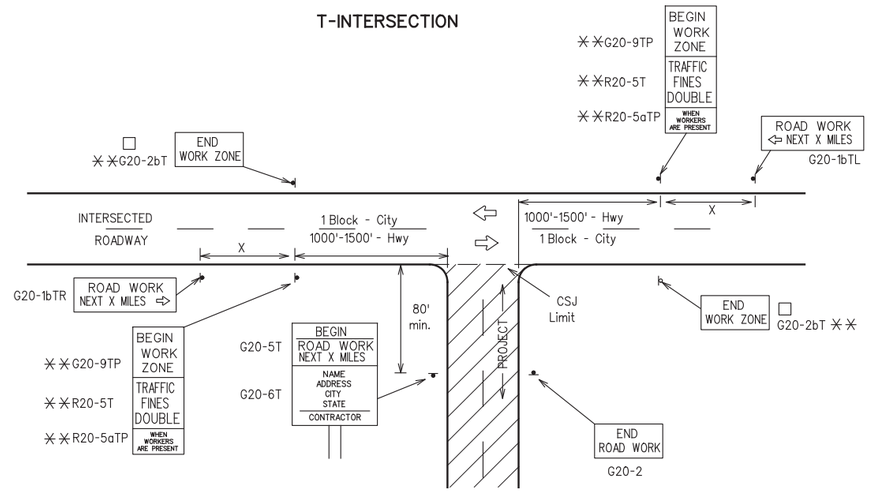
TYPICAL LOCATION OF CROSSROAD SIGNS



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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

1,5,6

SIZE

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

SPACING

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

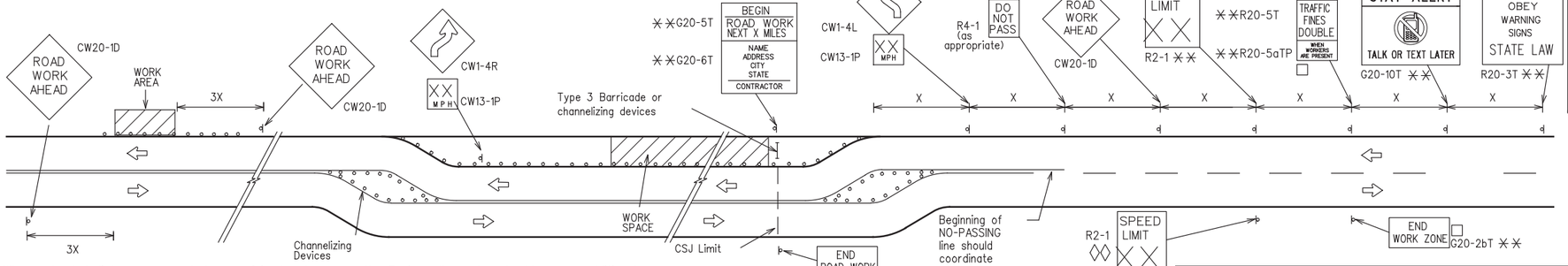
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

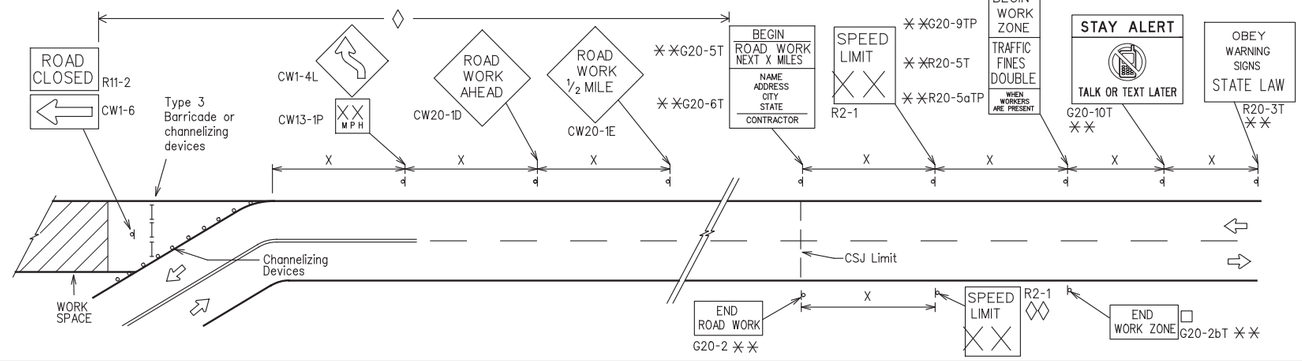
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0809	02	070	US 96
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LFK	SHELBY		37

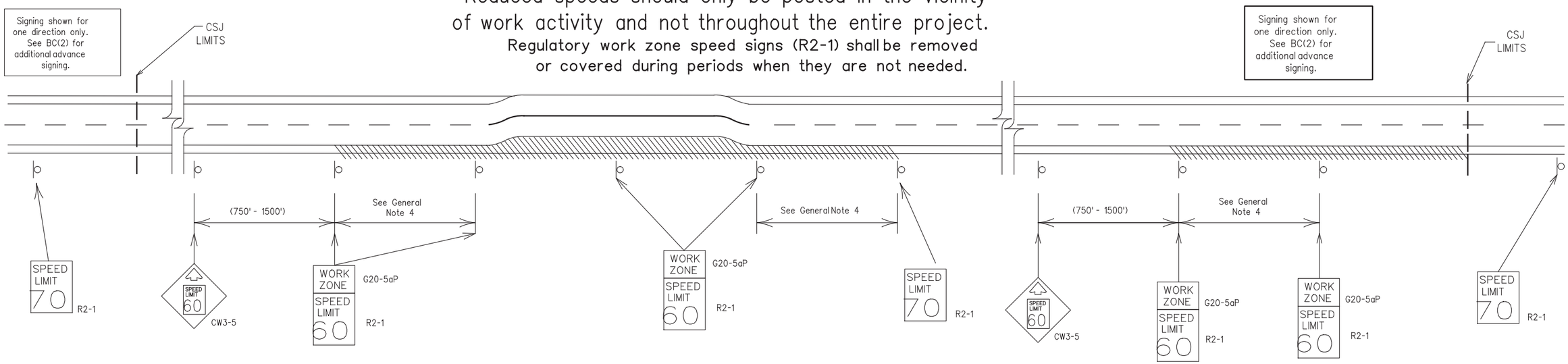
DATE:
FILE:

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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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LFK	SHELBY		38

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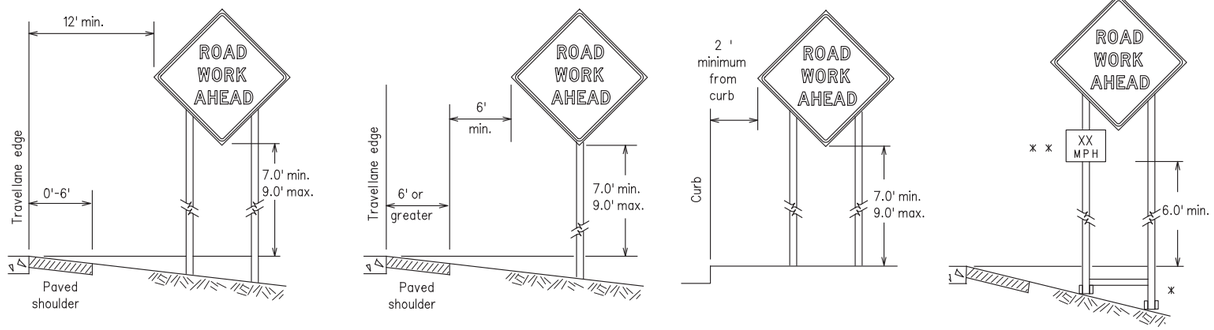
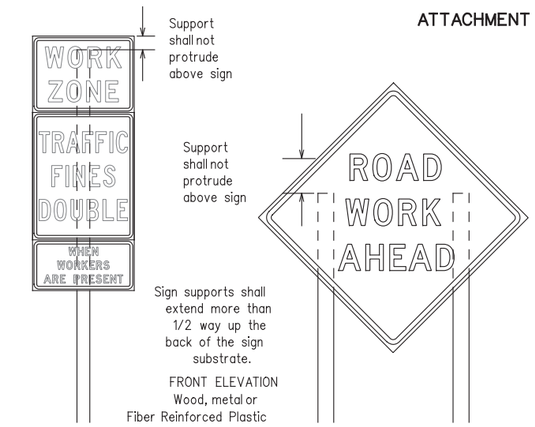
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

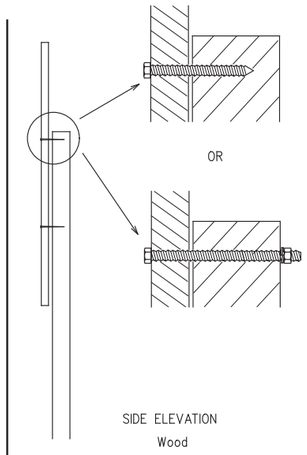


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

* * 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





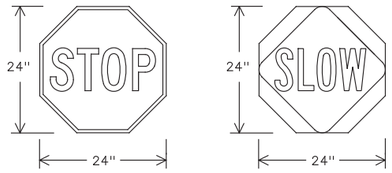
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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 or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
9-07 8-14	DIST	COUNTY		SHEET NO.
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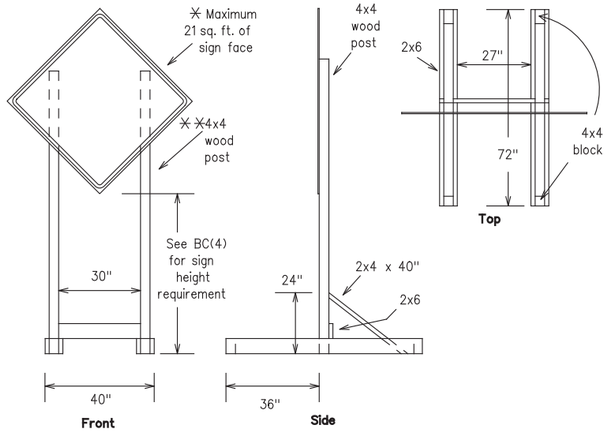
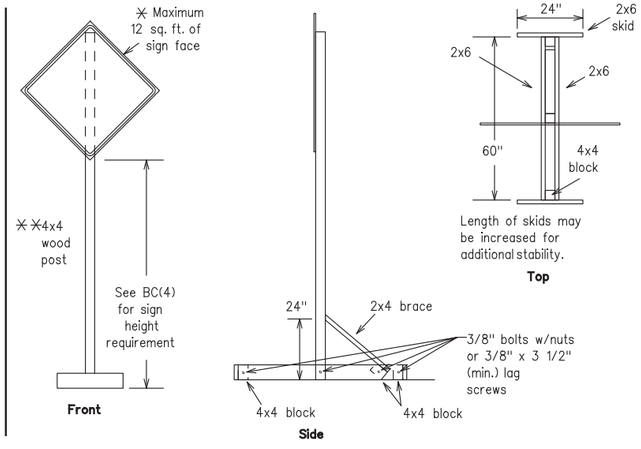
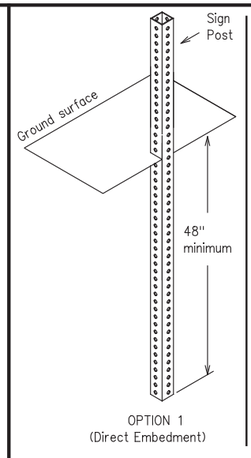
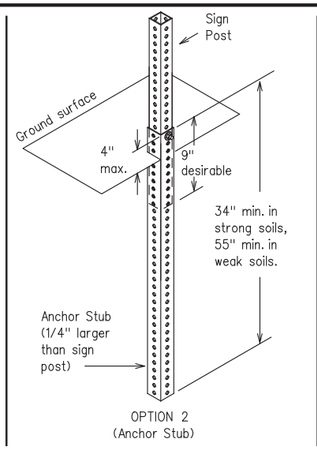


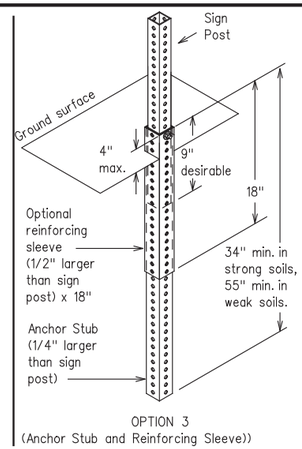


SKID MOUNTED WOOD SIGN SUPPORTS

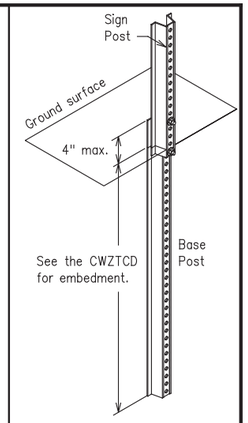
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







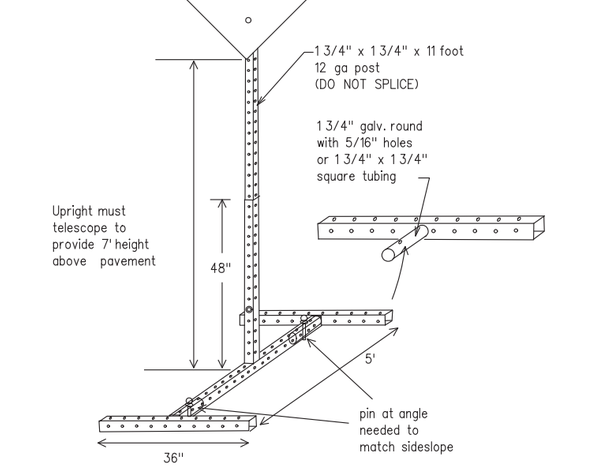
PERFORATED SQUARE METAL TUBING

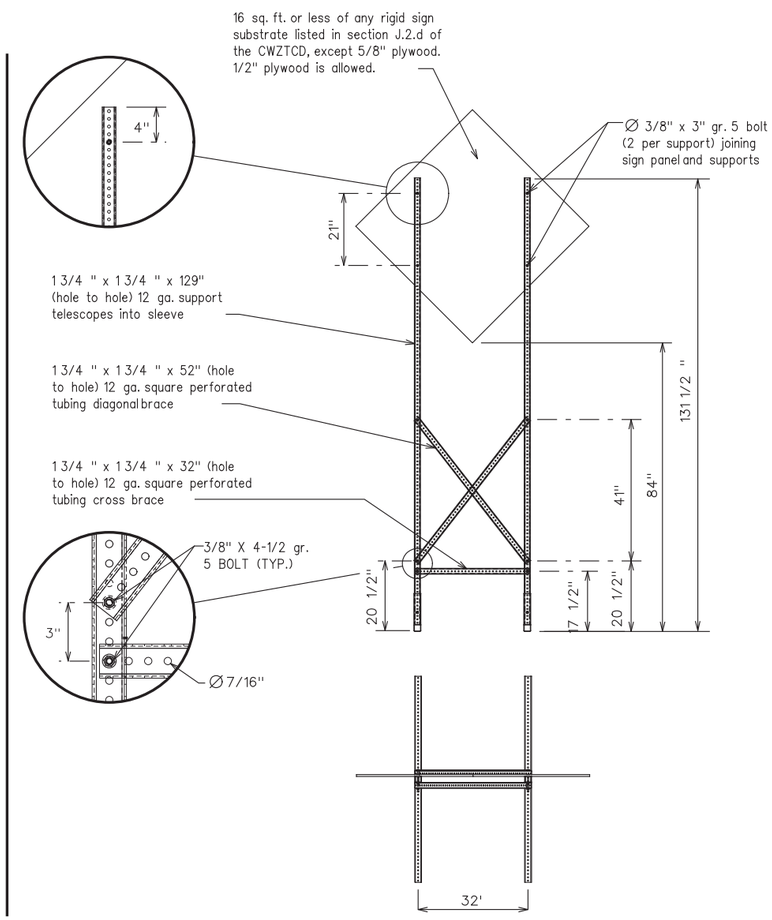


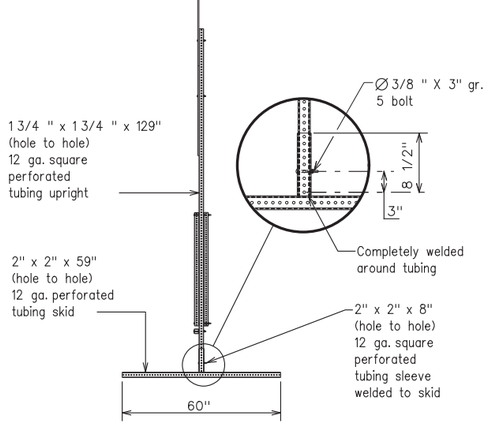
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

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

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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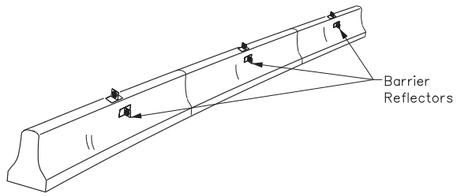
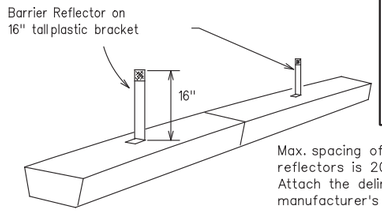
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

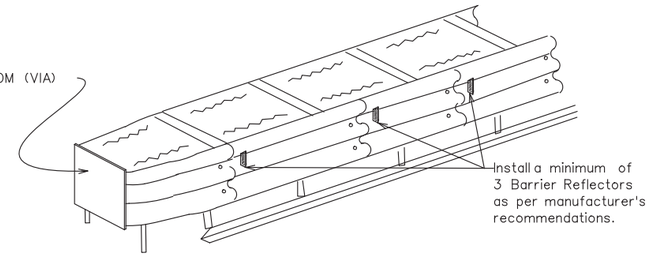


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

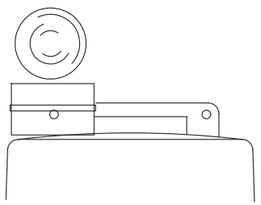


DELINEATION OF END TREATMENTS

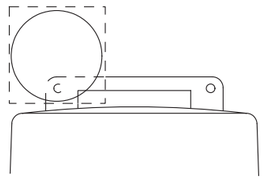
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B or C Sheeting$_{FL}$ 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

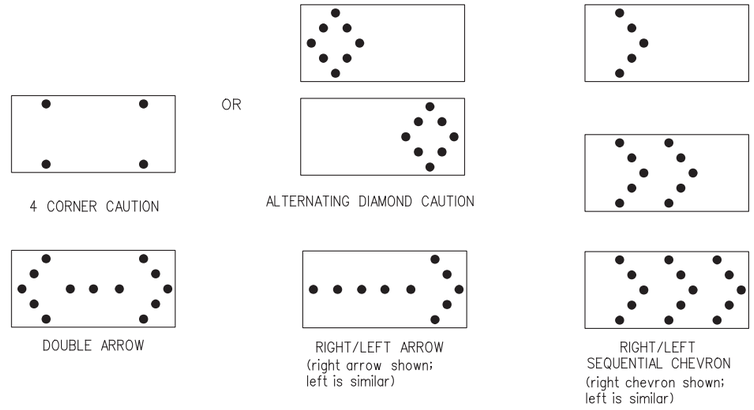
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

BC(7)-21

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

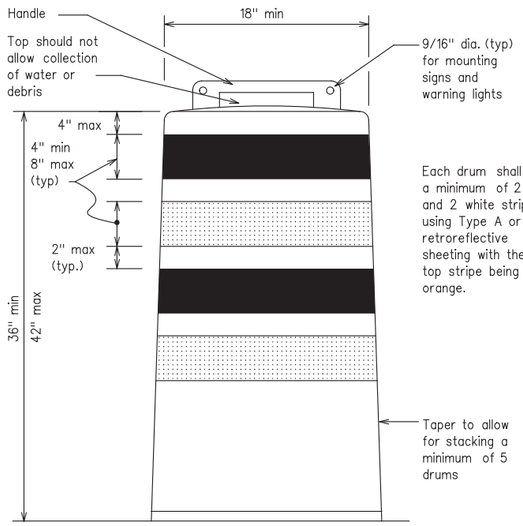
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

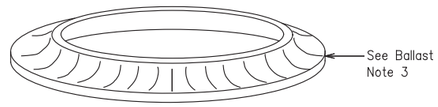
RETROREFLECTIVE SHEETING

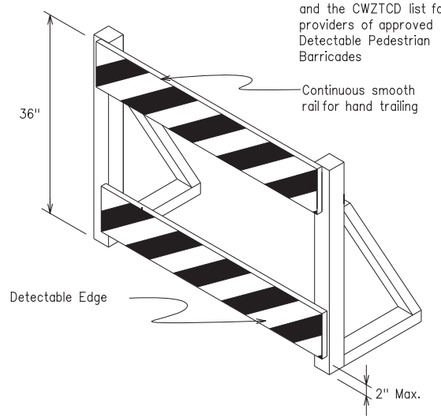
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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



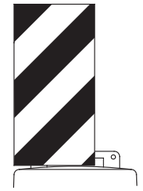




DETECTABLE PEDESTRIAN BARRICADES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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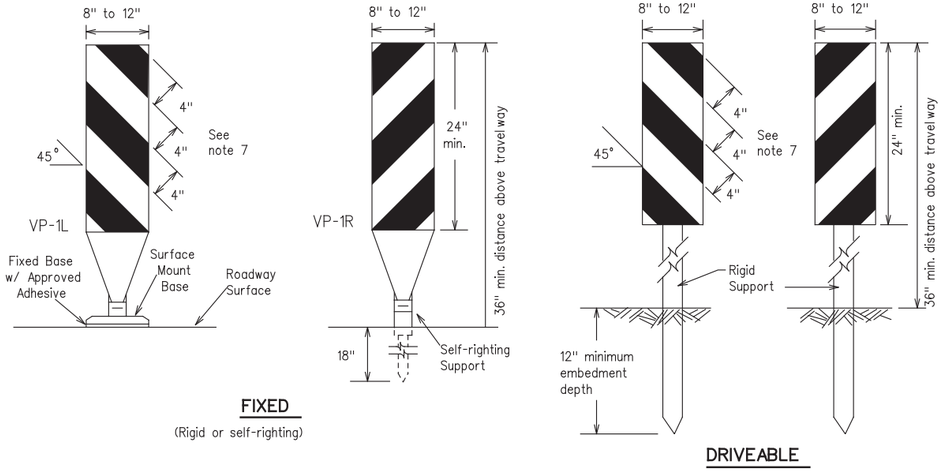
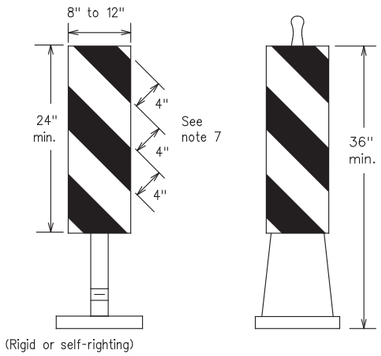


FIXED

(Rigid or self-righting)

DRIVEABLE

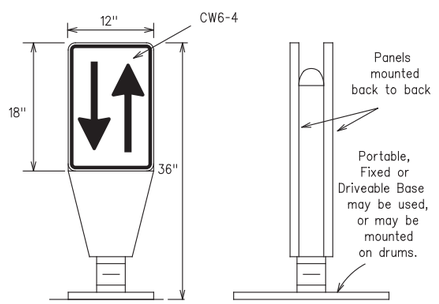


(Rigid or self-righting)

PORTABLE

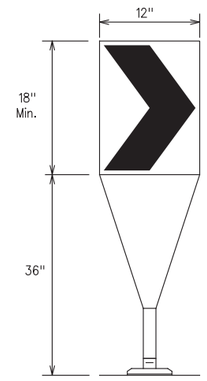
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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 or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



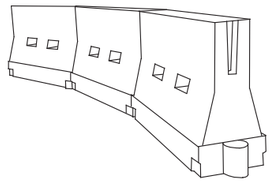
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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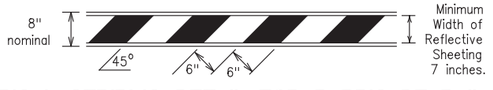
7-13 5-21	LFK	SHELBY		44

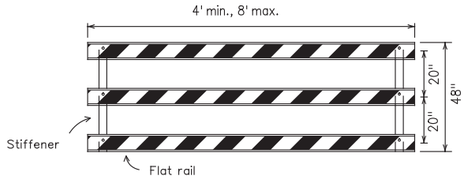
TYPE 3 BARRICADES

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.



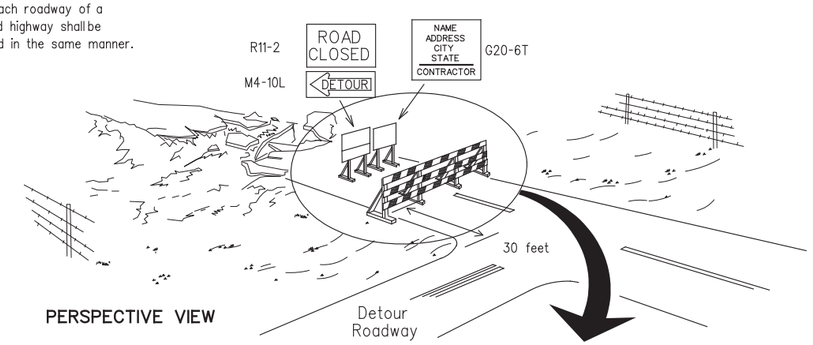
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

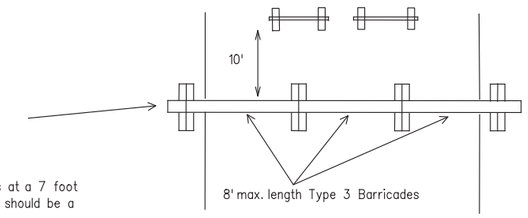
Each roadway of a divided highway shall be barricaded in the same manner.



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.

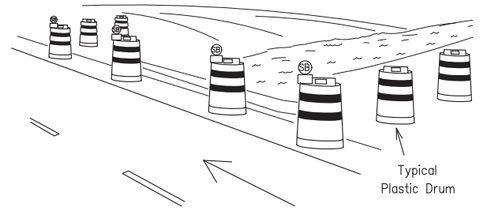
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

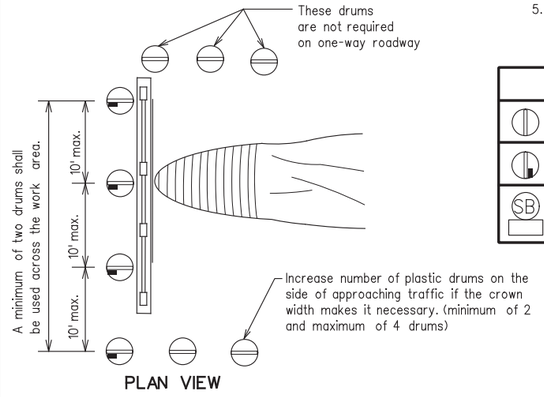
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

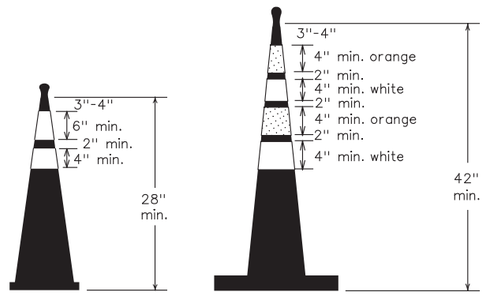
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

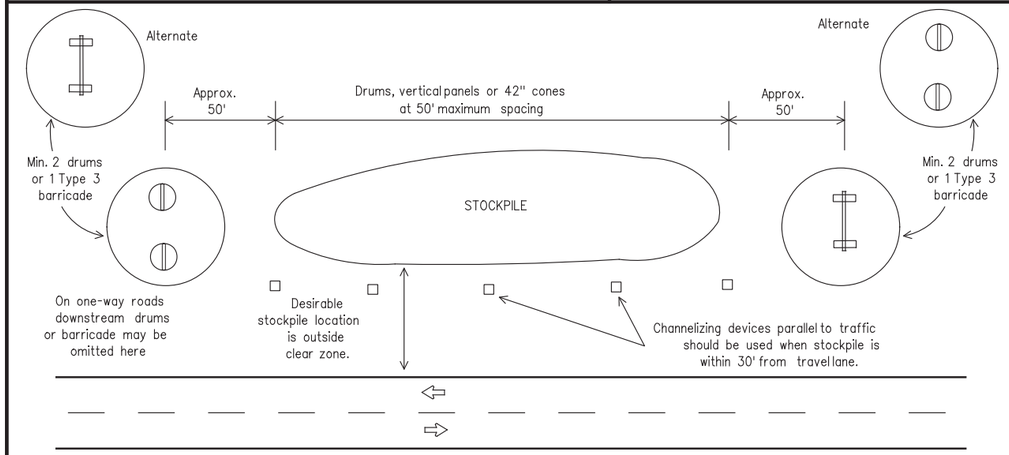
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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.

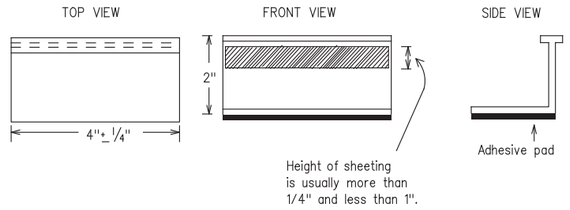
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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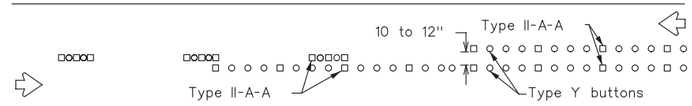
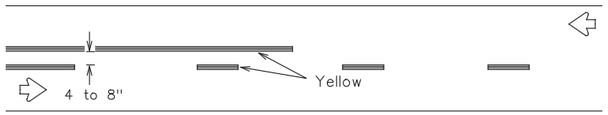
FILE:

PAVEMENT MARKING PATTERNS

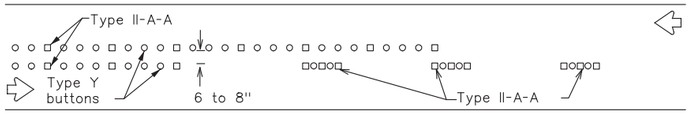
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



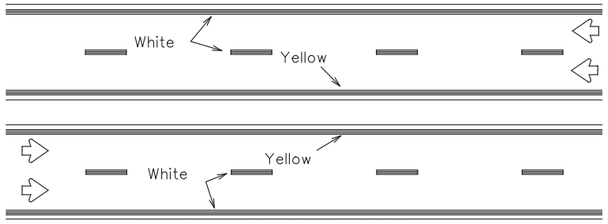
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



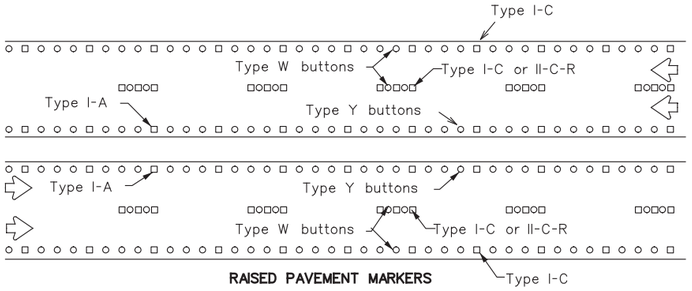
RAISED PAVEMENT MARKERS - PATTERN B

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



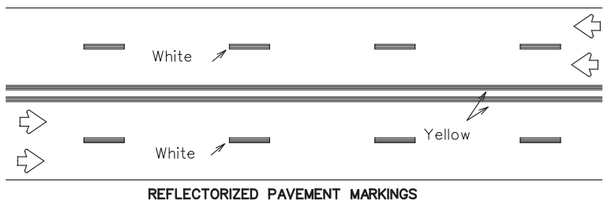
REFLECTORIZED PAVEMENT MARKINGS



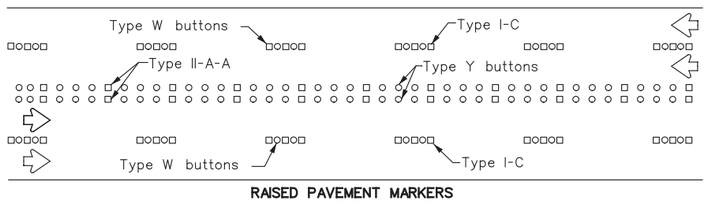
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



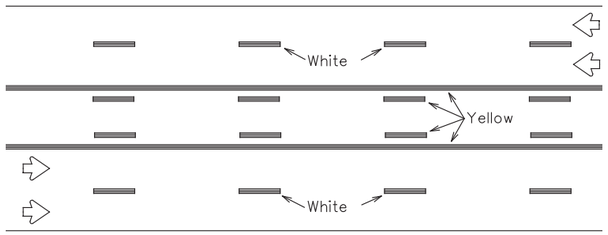
REFLECTORIZED PAVEMENT MARKINGS



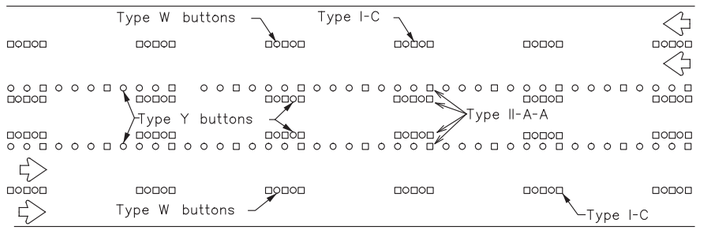
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

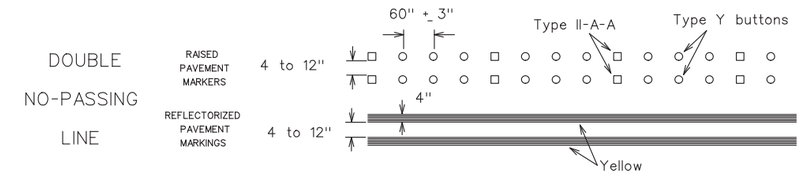
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

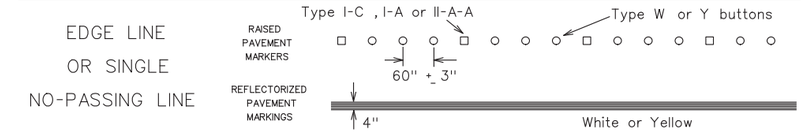
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

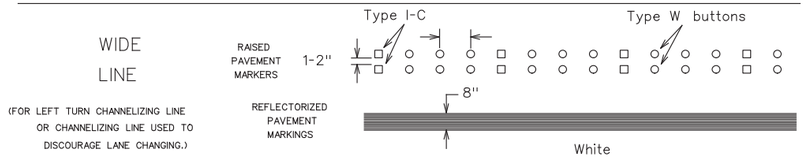


EDGE LINE OR SINGLE NO-PASSING LINE



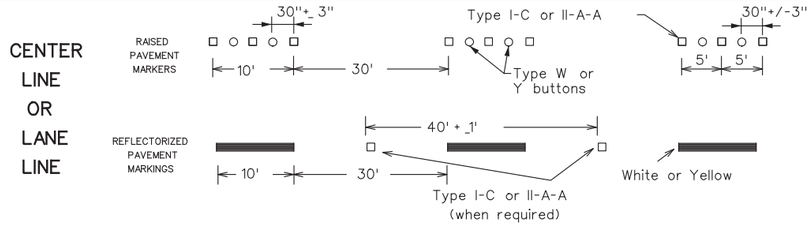
WIDE LINE

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

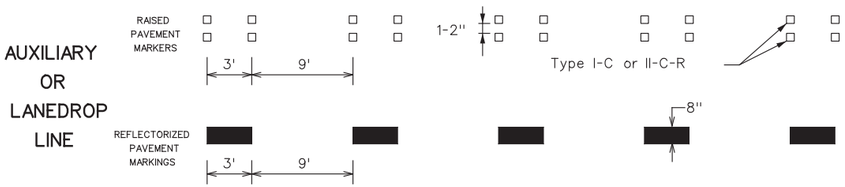


BROKEN LINES

CENTER LINE OR LANE LINE

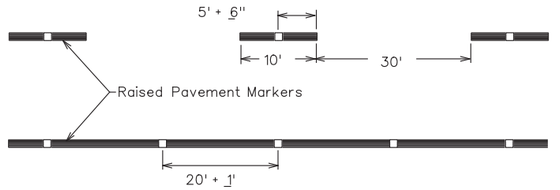


AUXILIARY OR LANEDROP LINE



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	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		47

106

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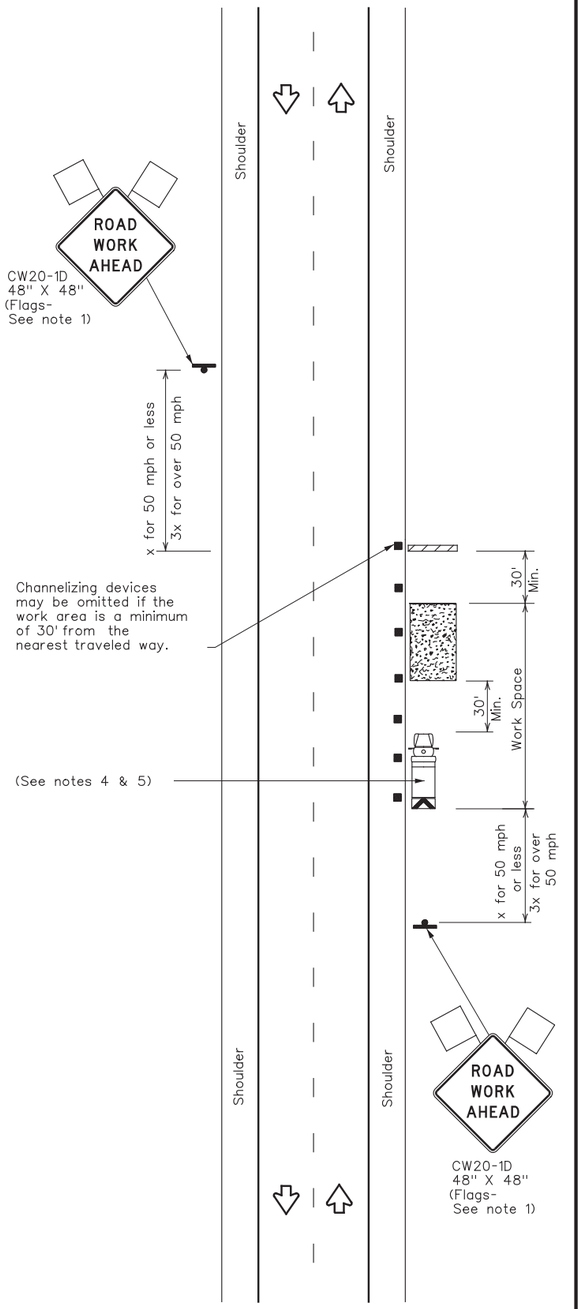
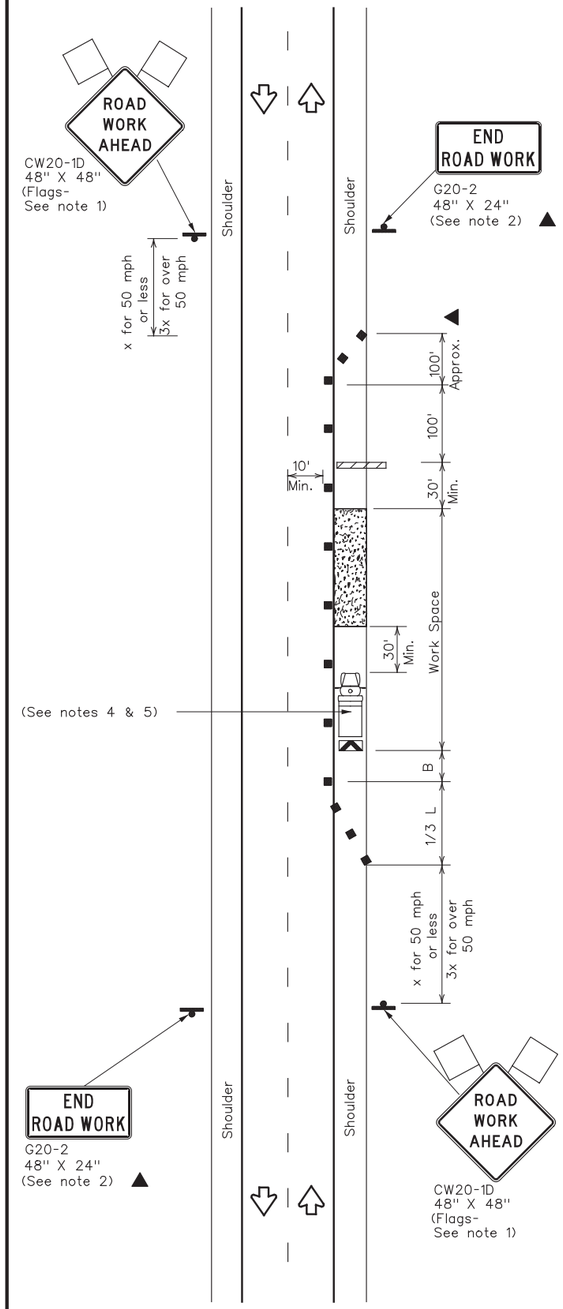


TCP (2-1a)

WORK SPACE NEAR SHOULDER

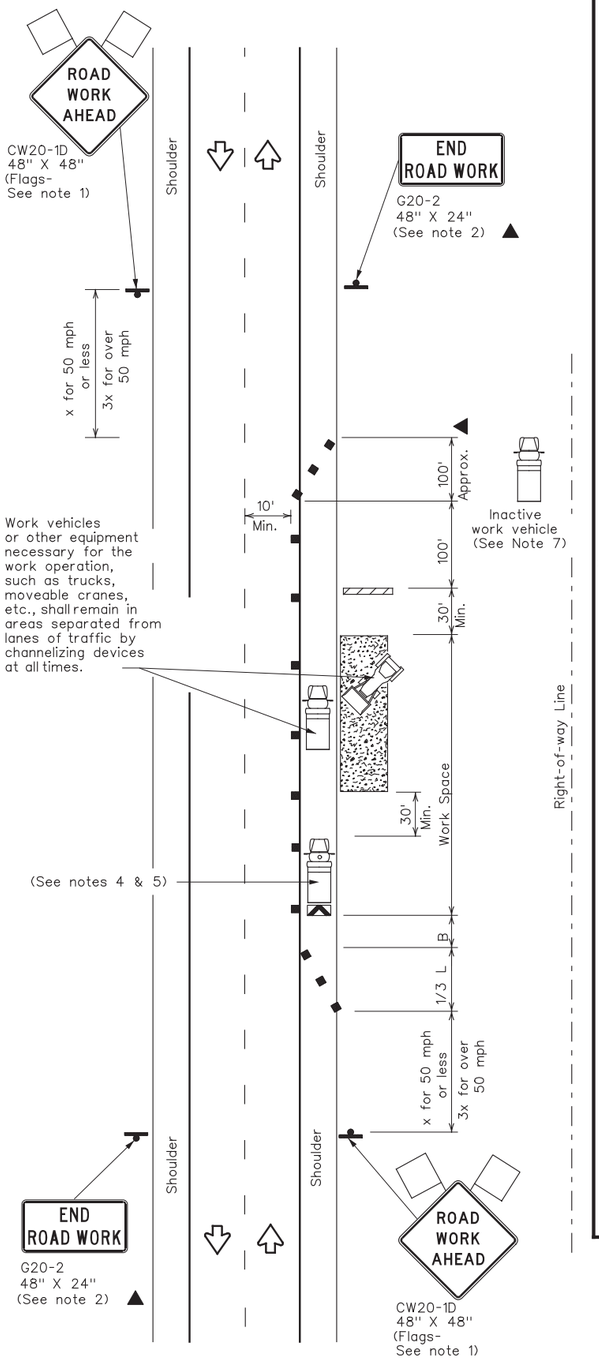
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER

Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER

Conventional Roads

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LFK	SHELBY		48
1-97 2-18				

DATE: 11/3/2021 2:09:03 PM
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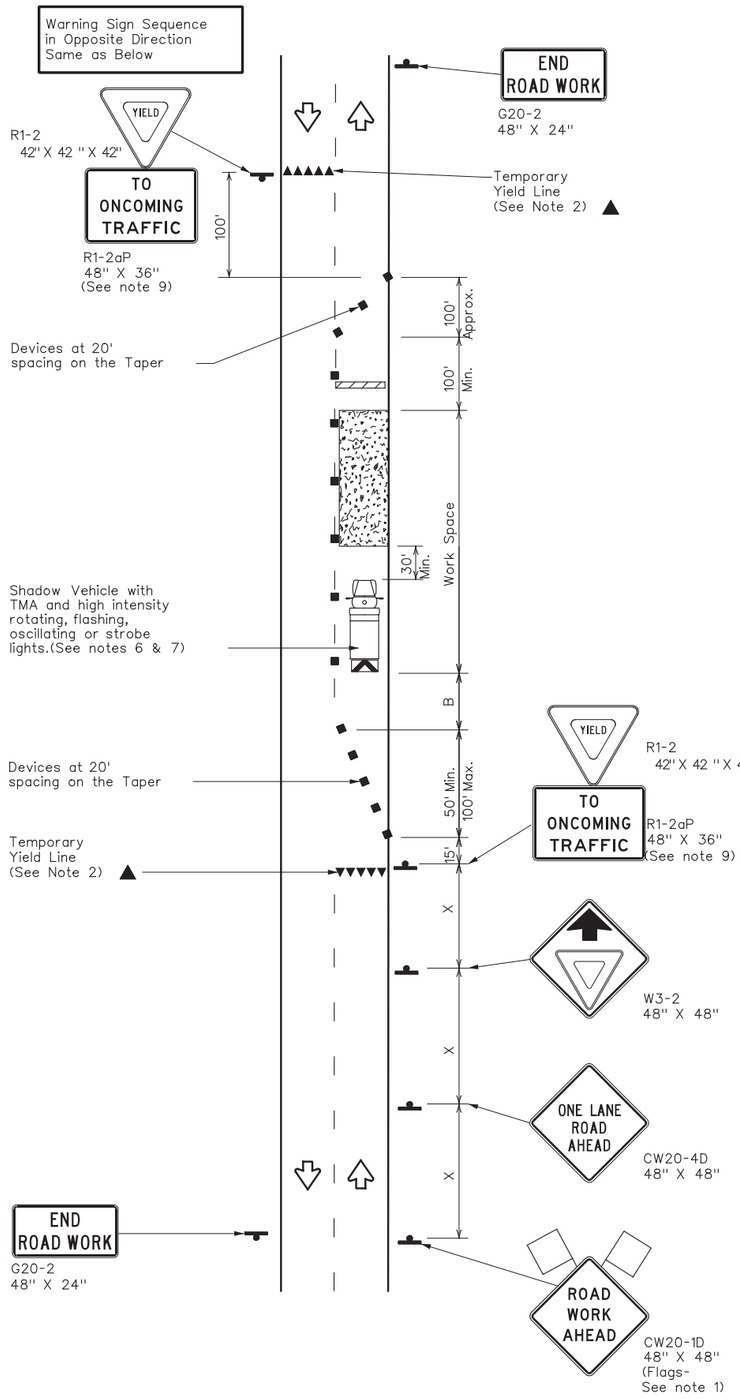
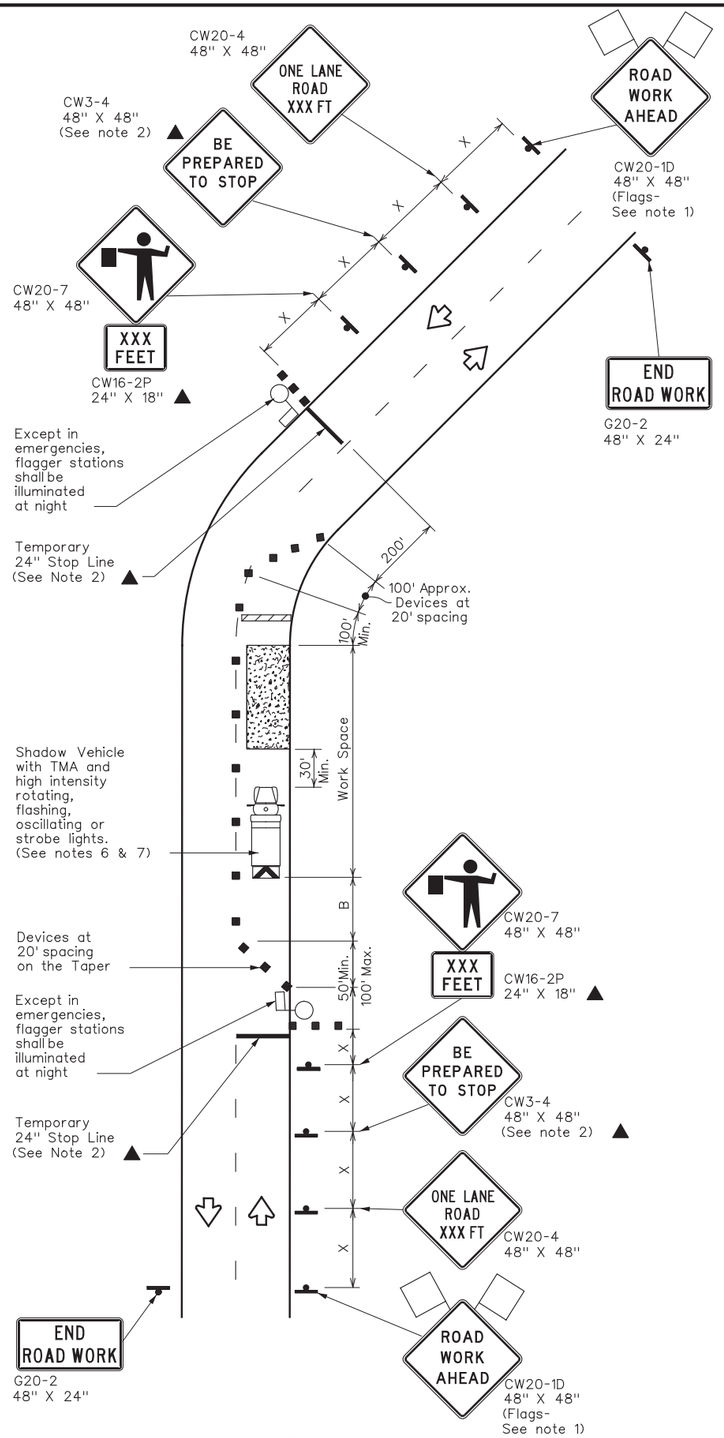


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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)

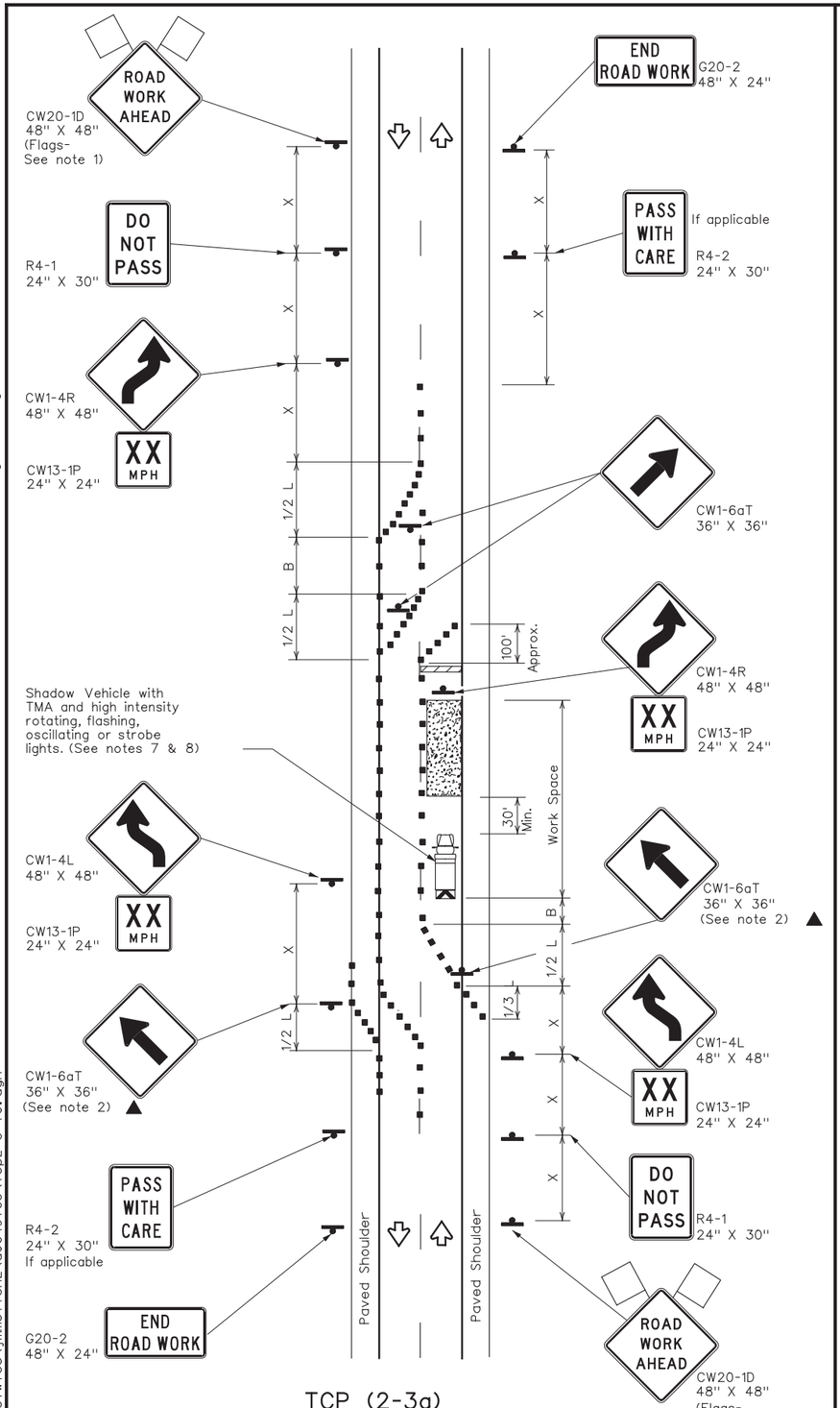
10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a 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

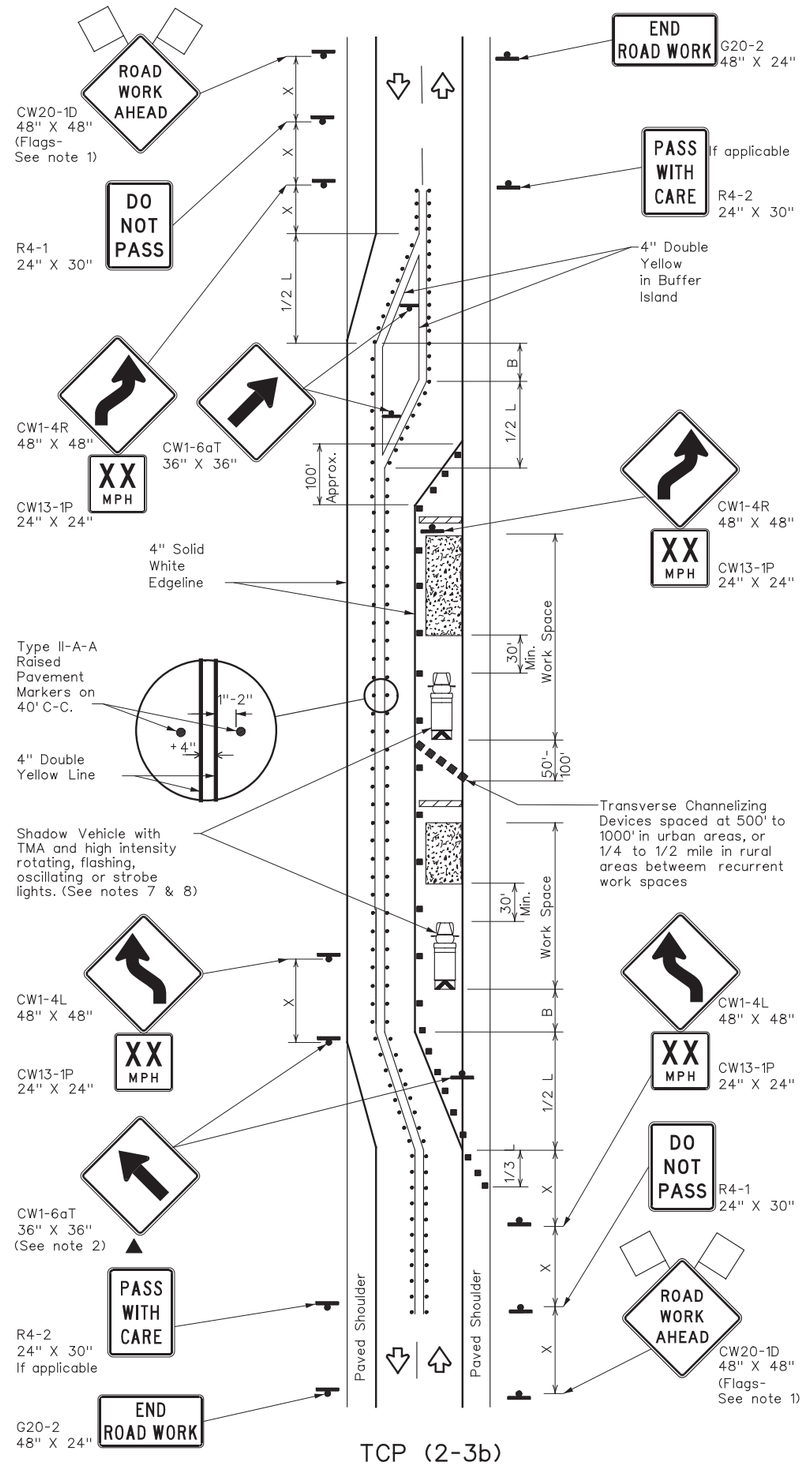
TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0809	02	070	US 96
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	LFK	SHELBY		49



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
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		Raised Pavement Markers Ty II-AA
	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
				TCP(2-3b)ONLY
			✓	✓

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. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. 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 (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. 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 device spacing is intended for the area of the 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(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LFK	SHELBY		50
4-98 2-18				

163

DATE: 11/3/2021 2:09:14 PM
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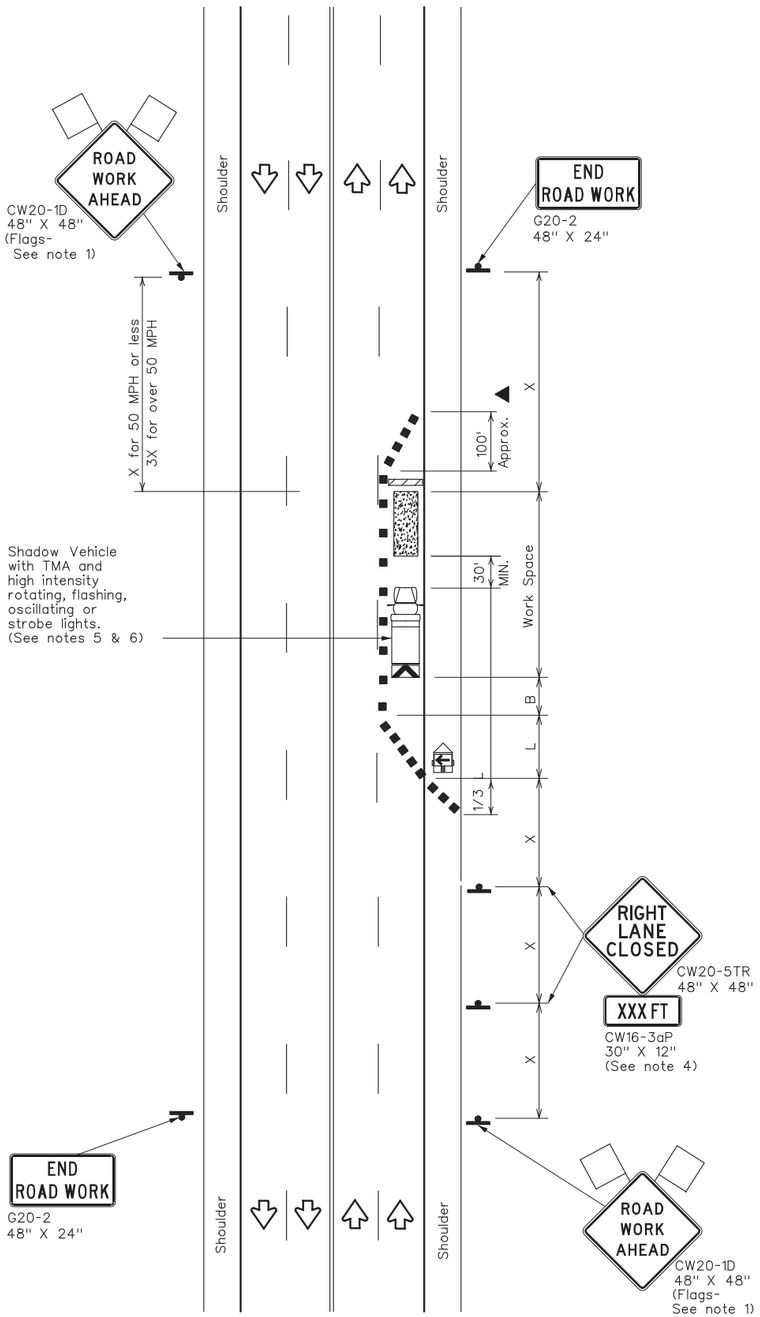
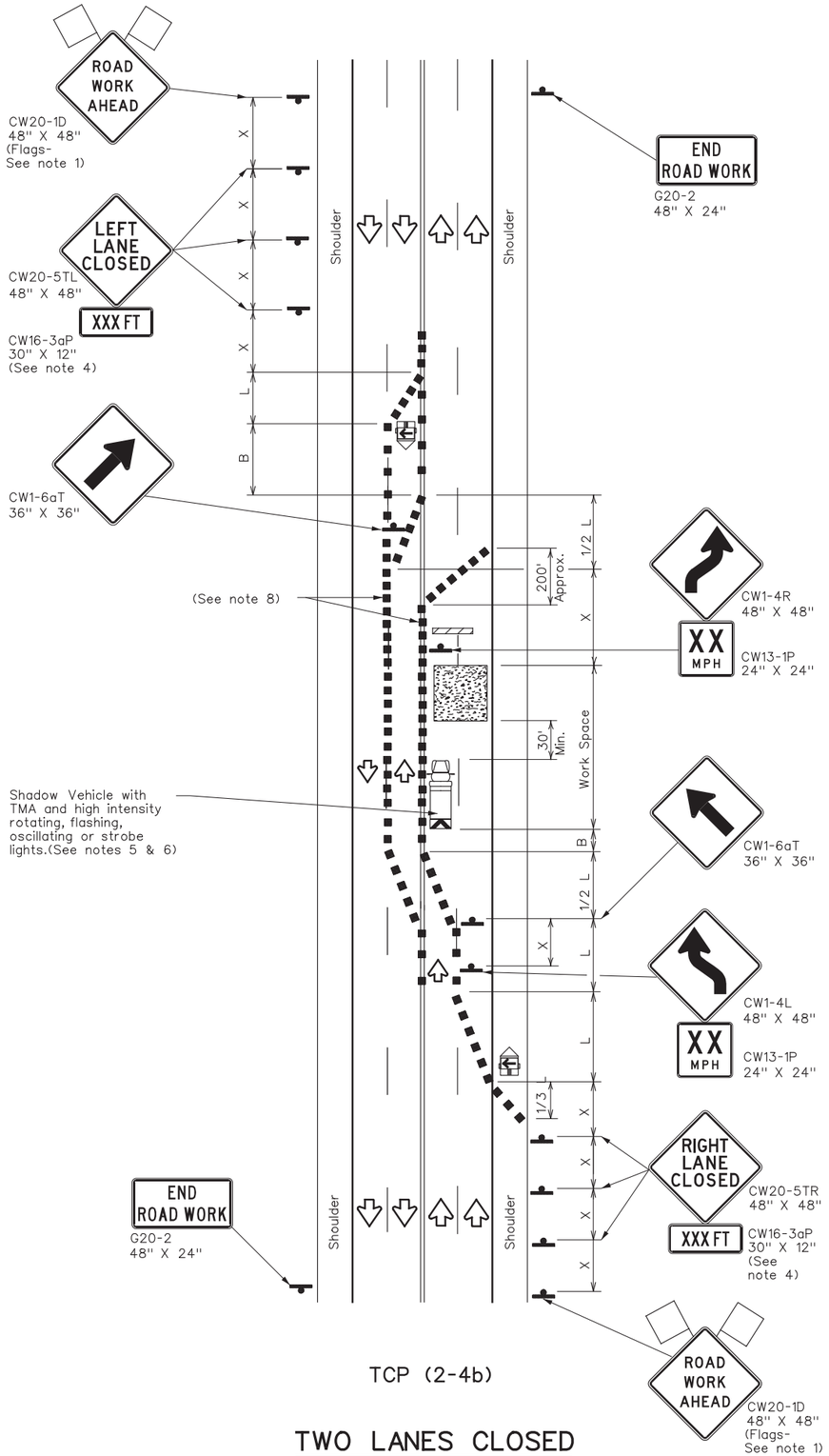


TCP (2-4a)

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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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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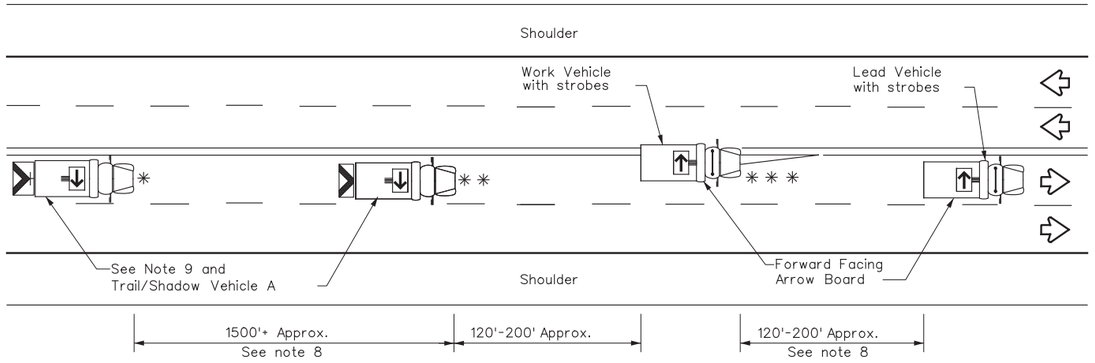
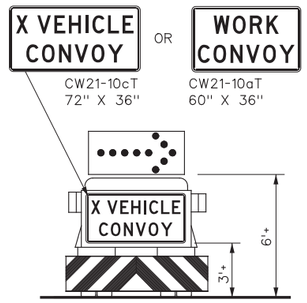
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LFK	SHELBY		51
4-98 2-18				



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

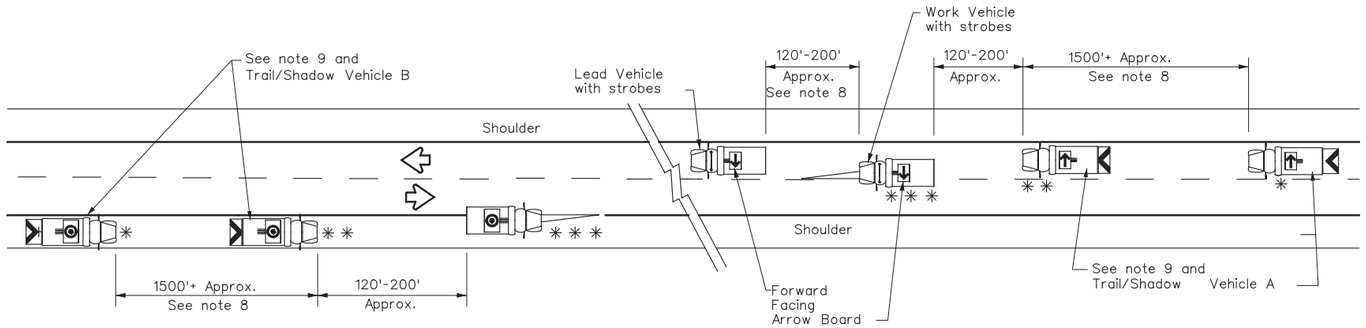
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

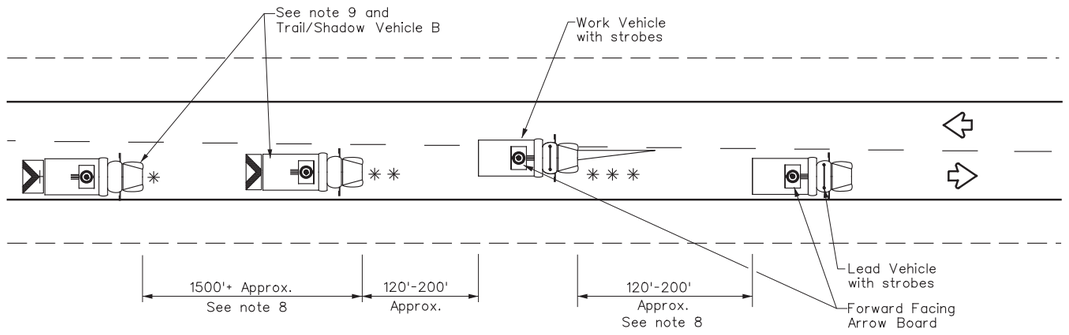


WORK ON SHOULDER

WORK ON TRAVEL LANE

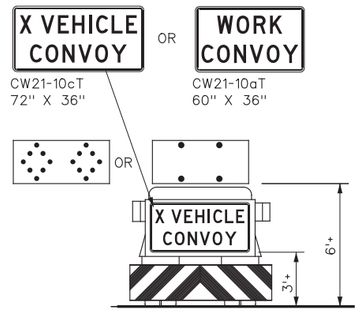
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



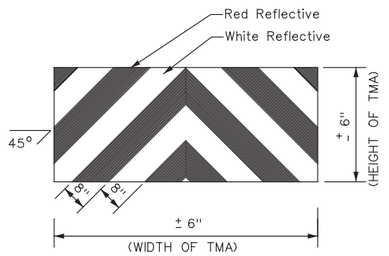
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	LFK	SHELBY		52
1-97				

175

DATE: 11/3/2021 2:09:36 PM
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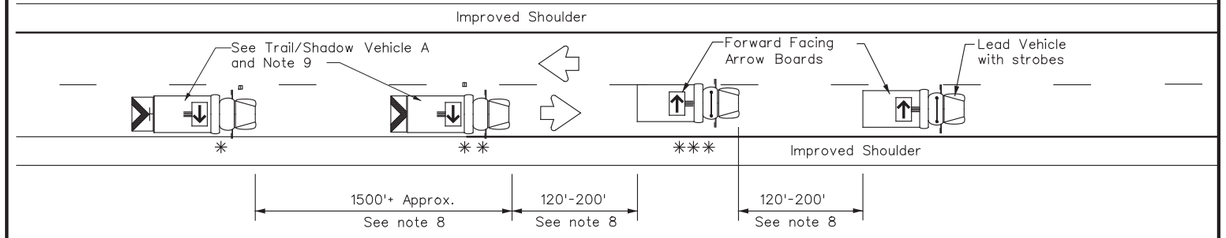
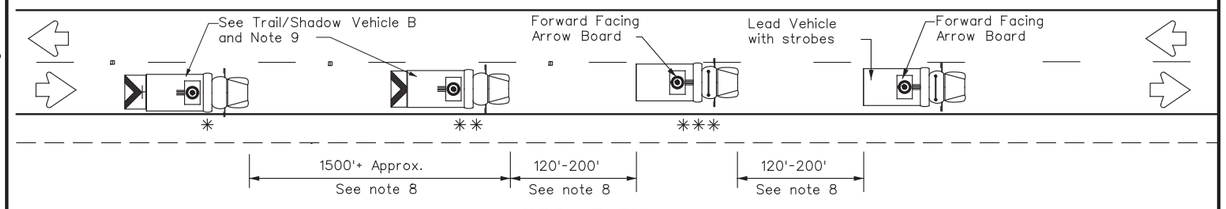


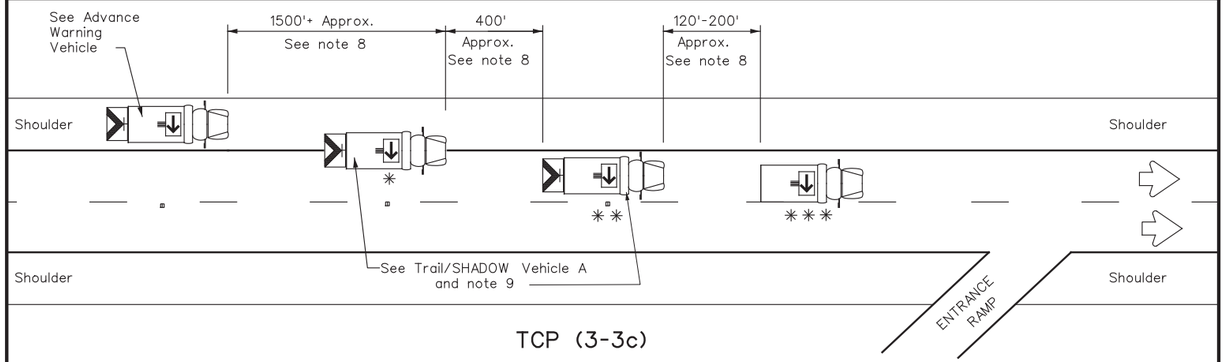
TCP (3-3a)

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



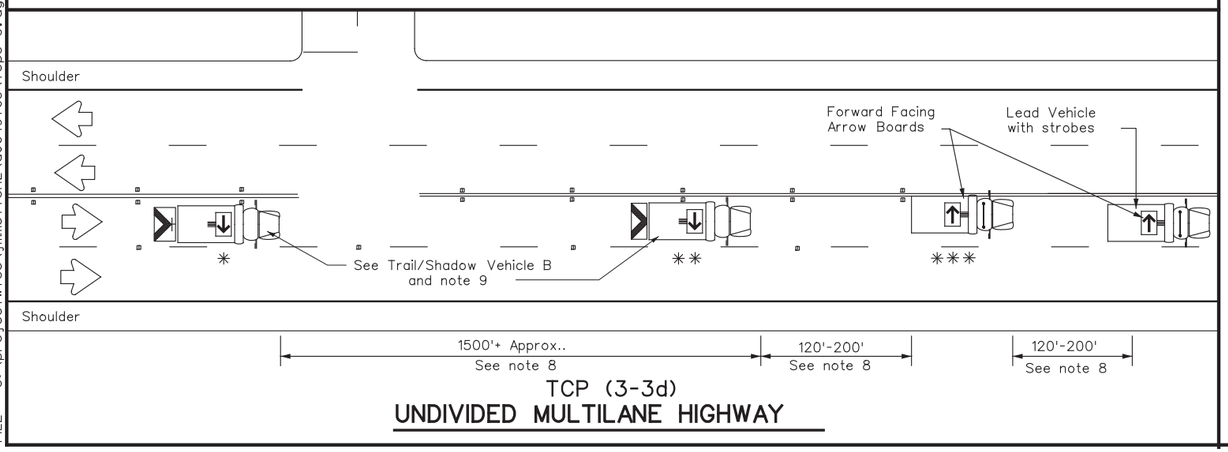
TCP (3-3b)

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



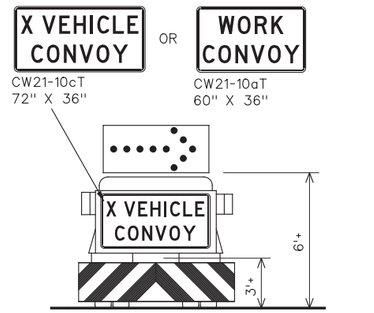
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



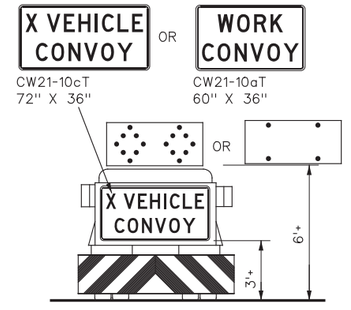
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



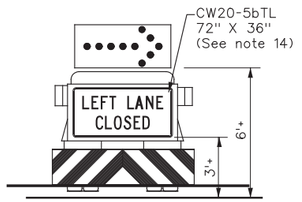
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

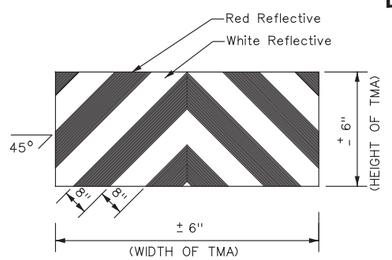


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	LFK	SHELBY		53
1-97 7-14				

177

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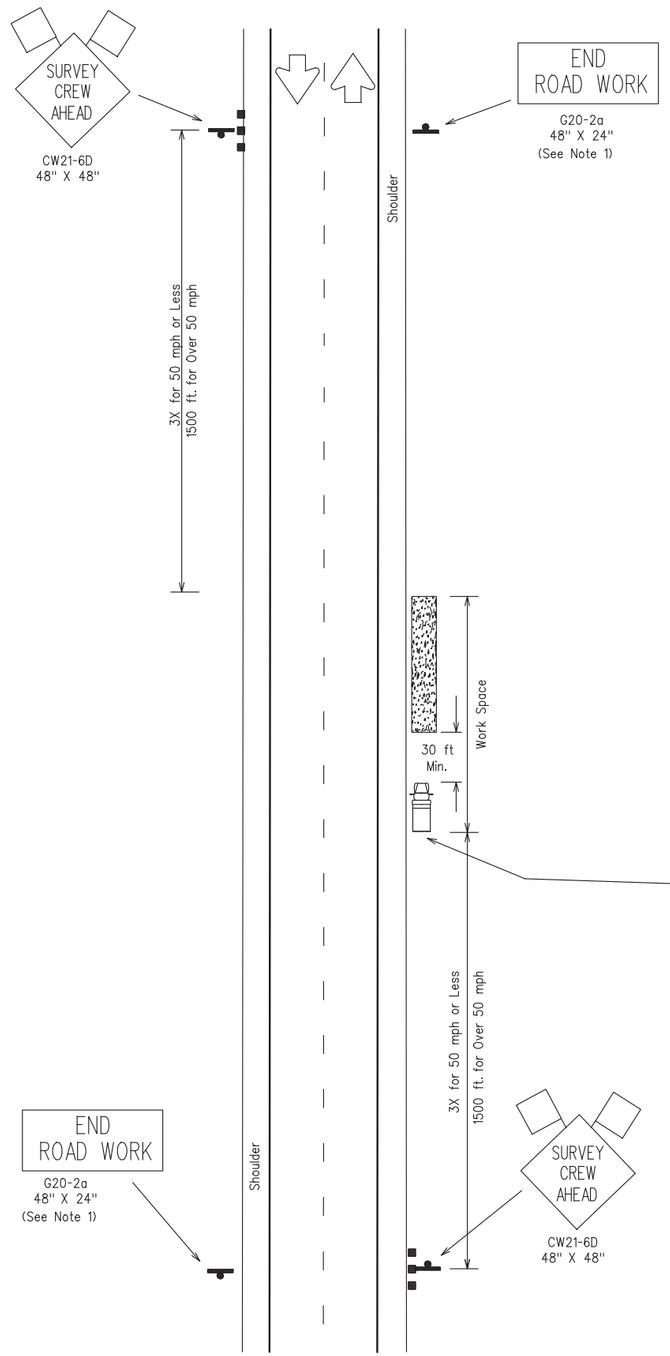
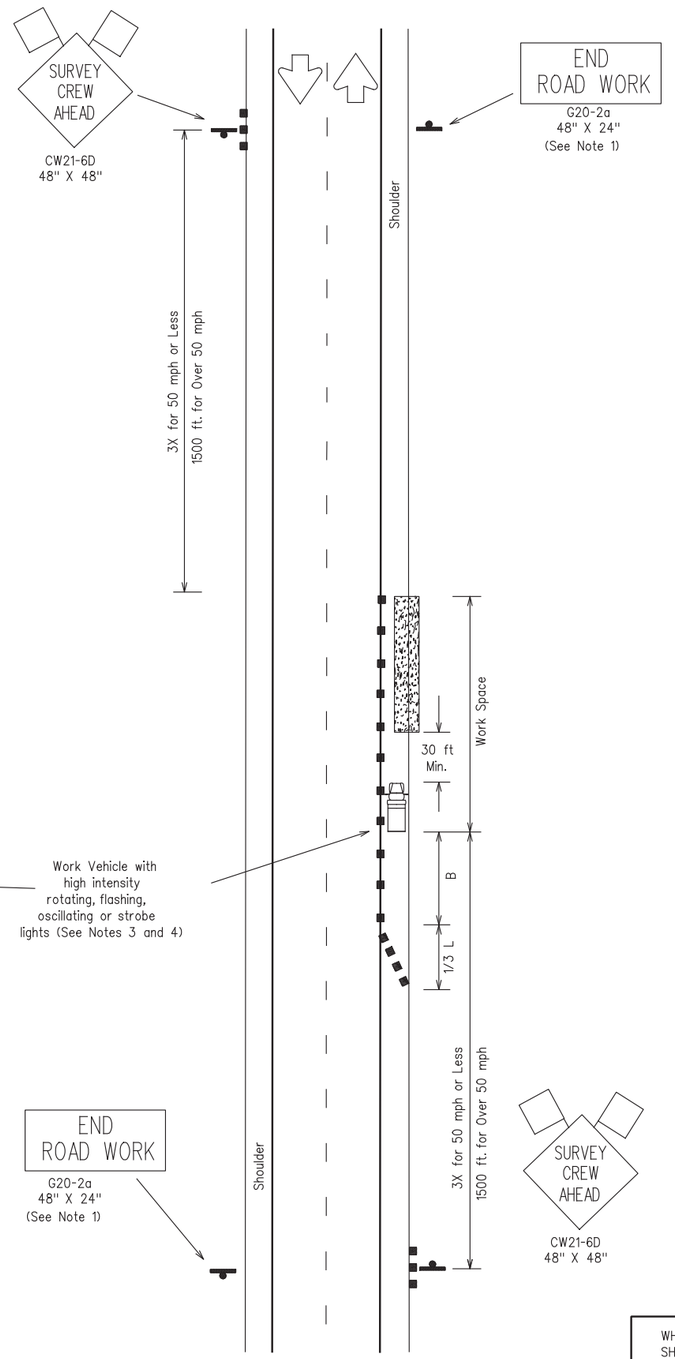


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

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

* Conventional Roads Only

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

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

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

GENERAL NOTES:

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

TCP(S-1a)

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

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

8-18-08 Revision
1 Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		54

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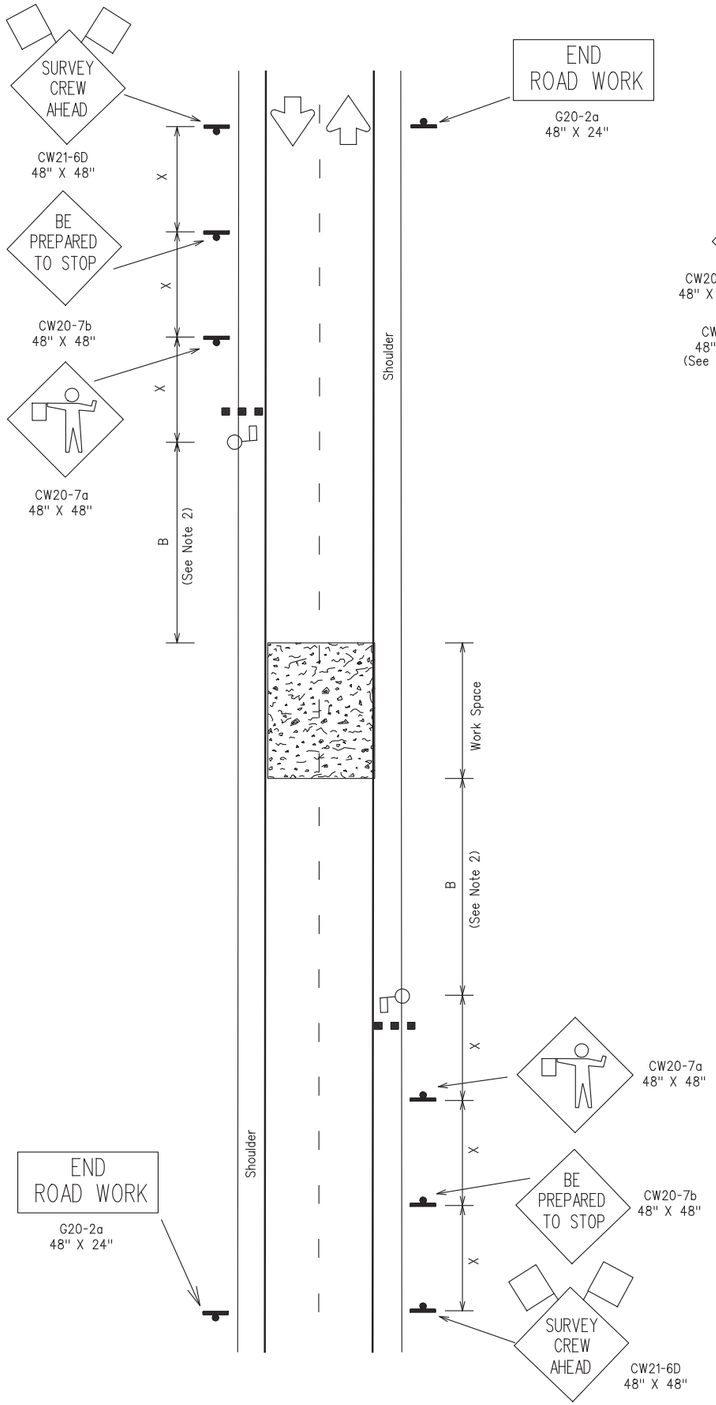
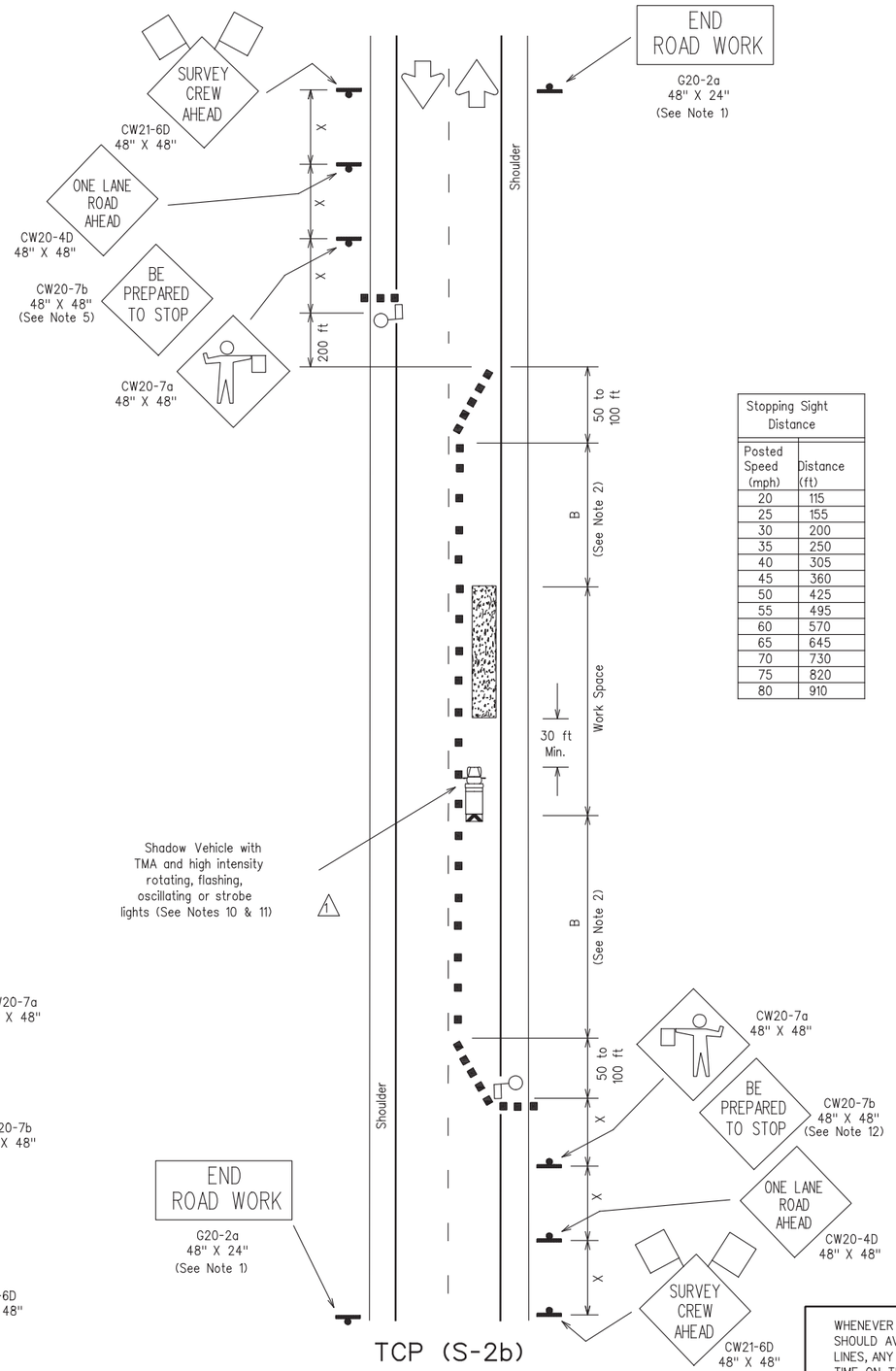


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

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

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

* Conventional Roads Only

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

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

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

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

TCP(S-2a)

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

TCP (S-2B)

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

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

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

Texas Department of Transportation
Traffic Operations Division

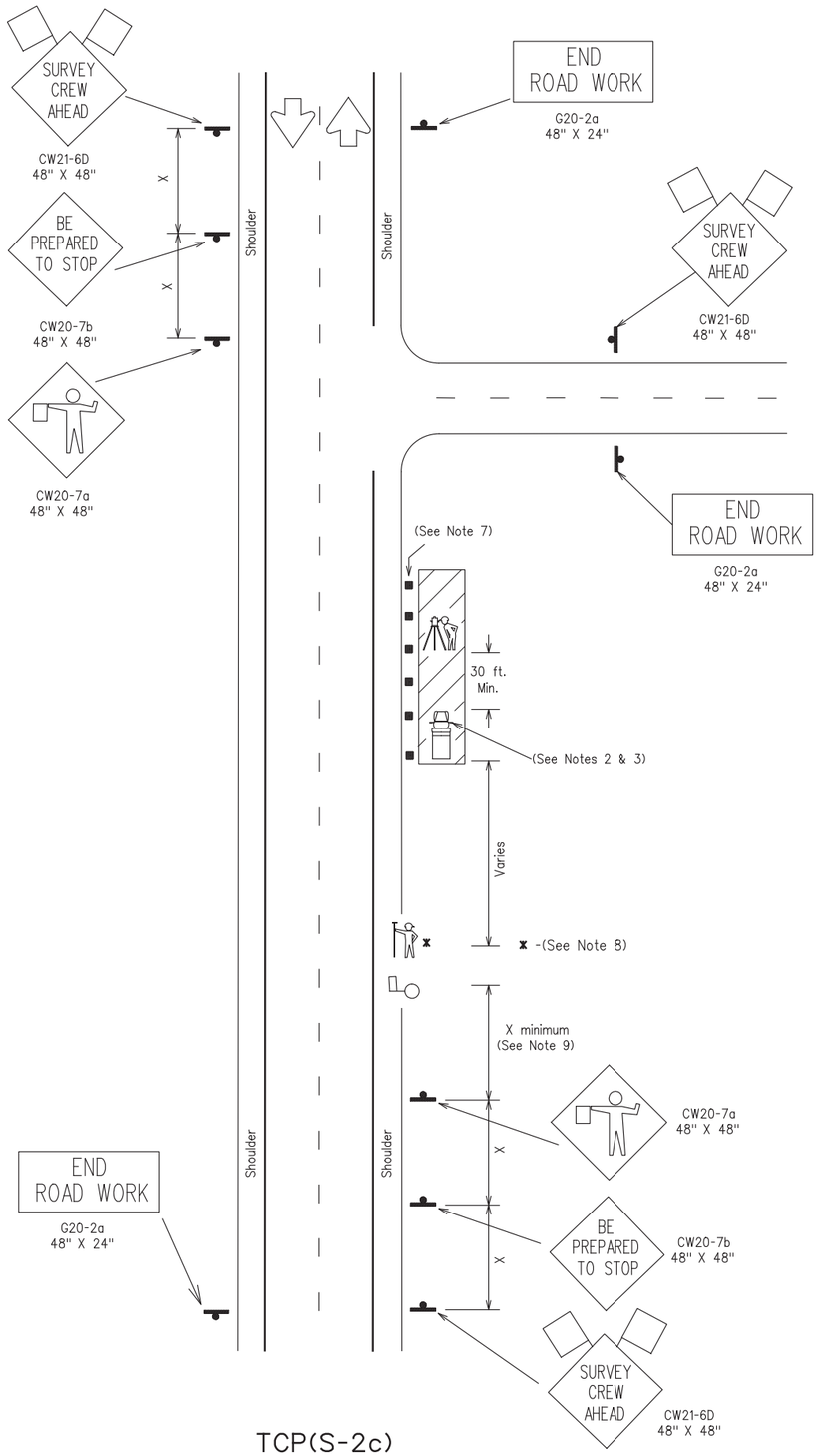
TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		55



TCP(S-2c)

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

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

⁎ Conventional Roads Only

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

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

DEFINITIONS:

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

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

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

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DIST	COUNTY	SHEET NO.
LFK	SHELBY	56

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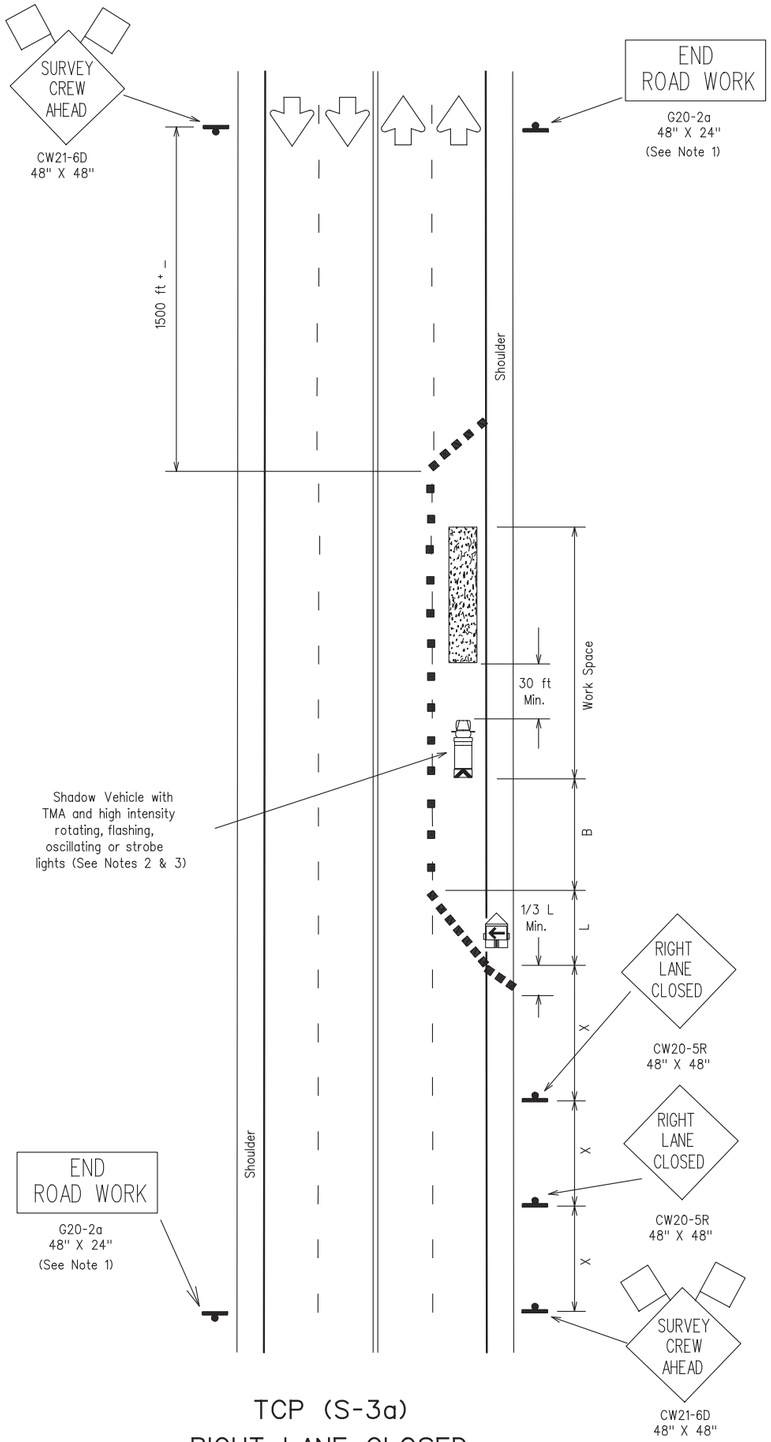
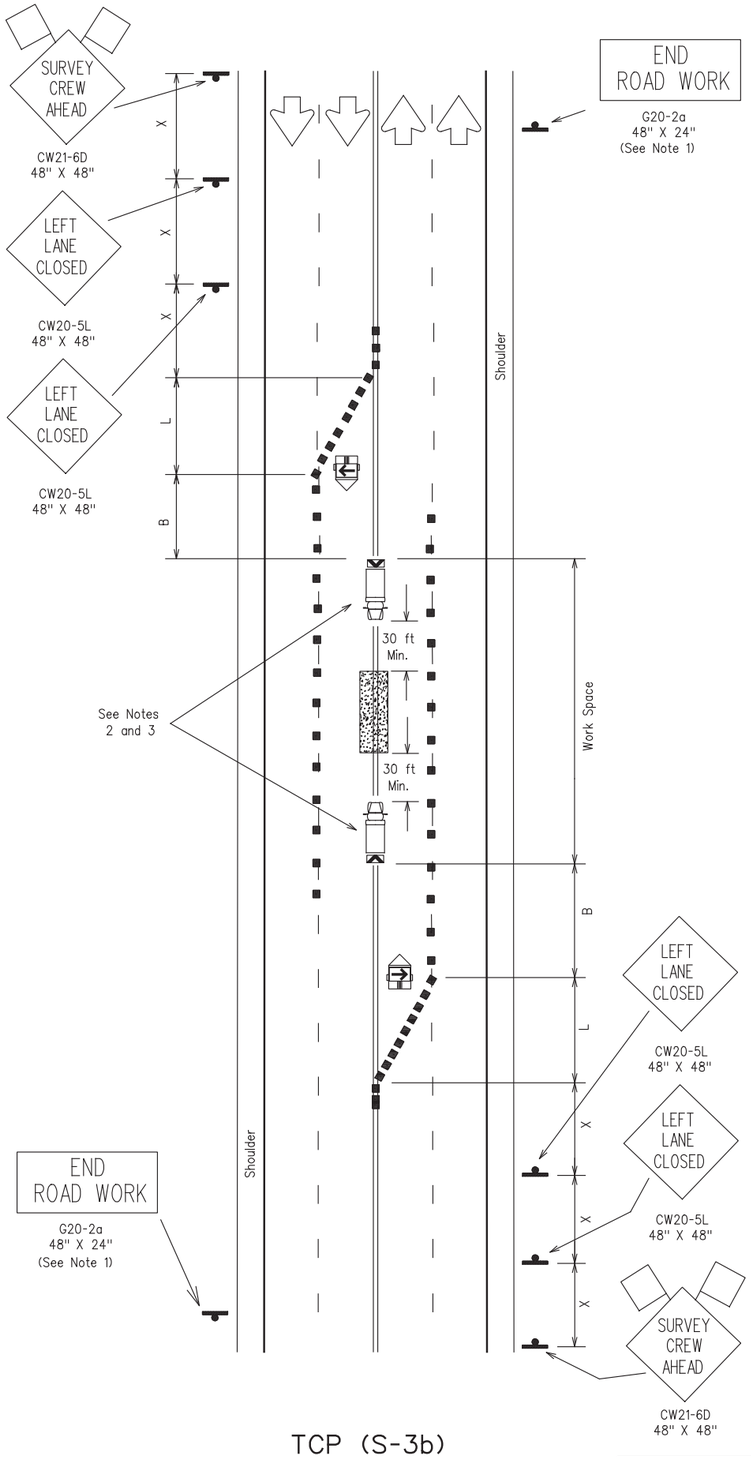


TCP (S-3a)
RIGHT LANE CLOSED
WITH OR WITHOUT SHOULDERS



TCP (S-3b)
WORK ON CENTERLINE

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

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

* Conventional Roads Only

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

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

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

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-3a)
6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP(S-3b)
7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less then 2000 ADT.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-3)-08

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DIST	COUNTY	SHEET NO.
LFK	SHELBY	57

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DATE: 11/3/2021 2:10:41 PM
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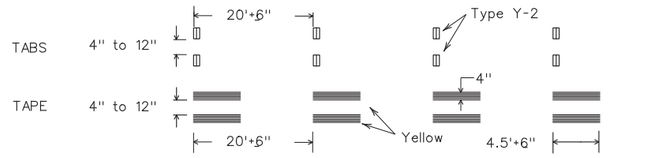
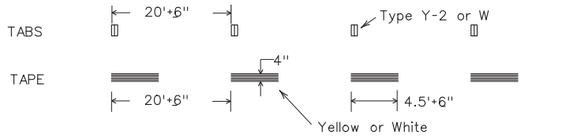
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

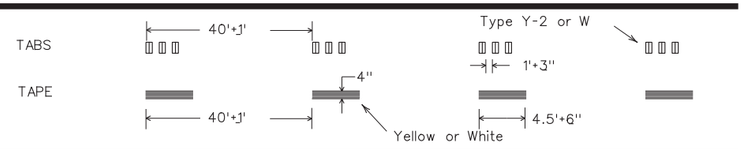


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



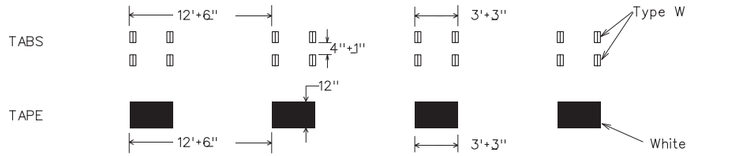
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

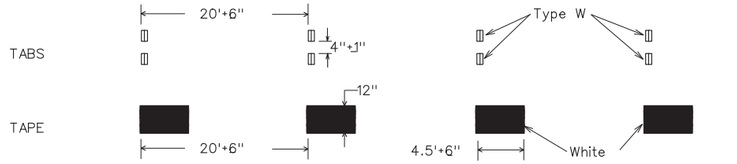


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



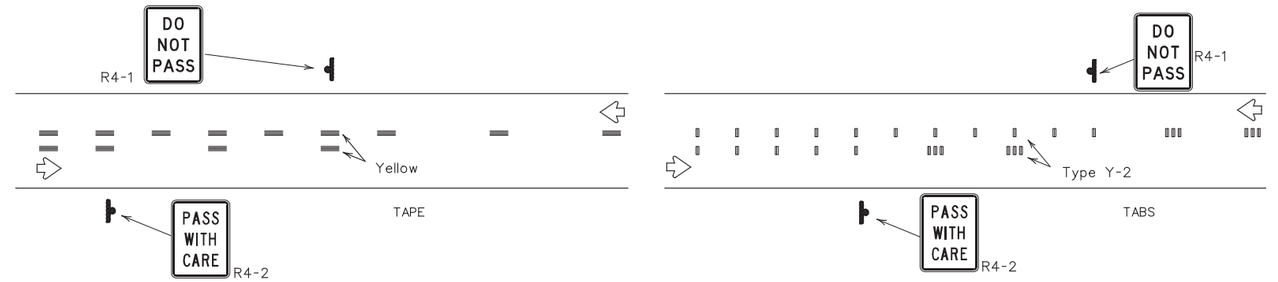
NOTES:

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.

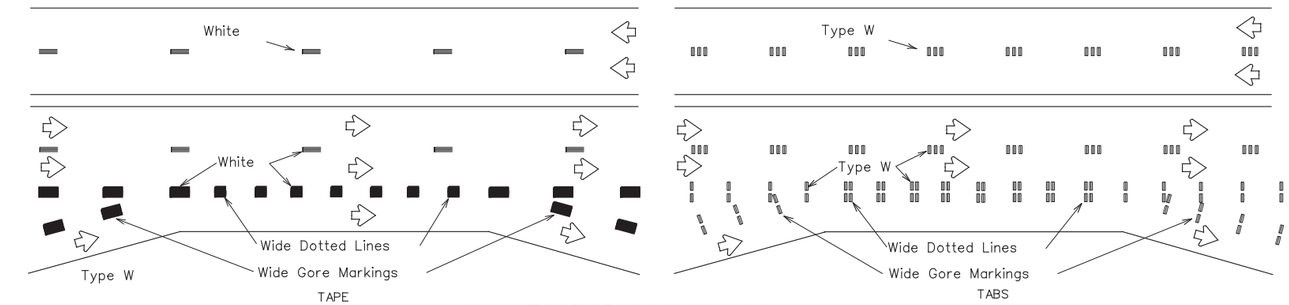
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

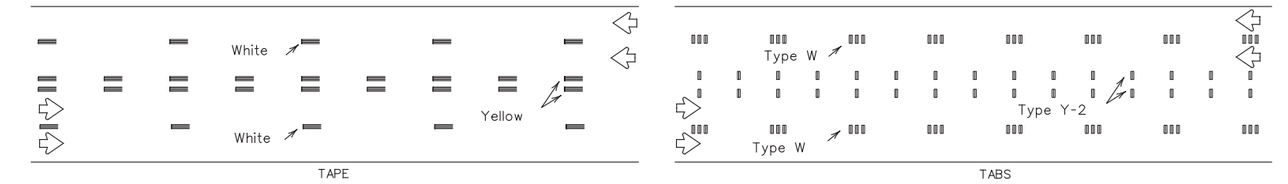
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



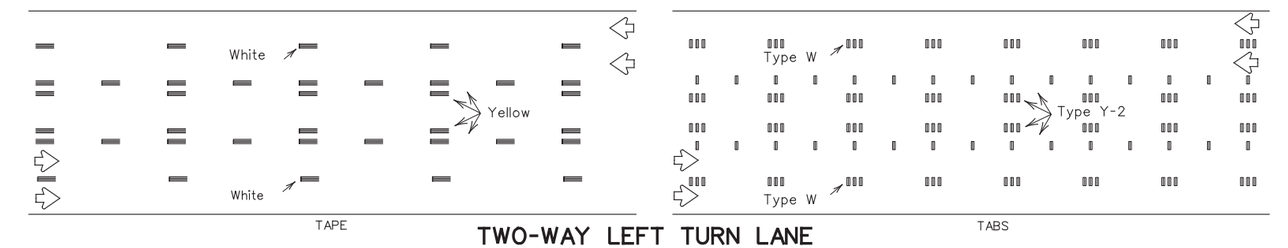
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



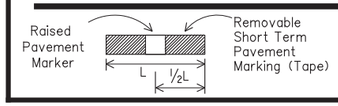
LANE LINES FOR DIVIDED HIGHWAY



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

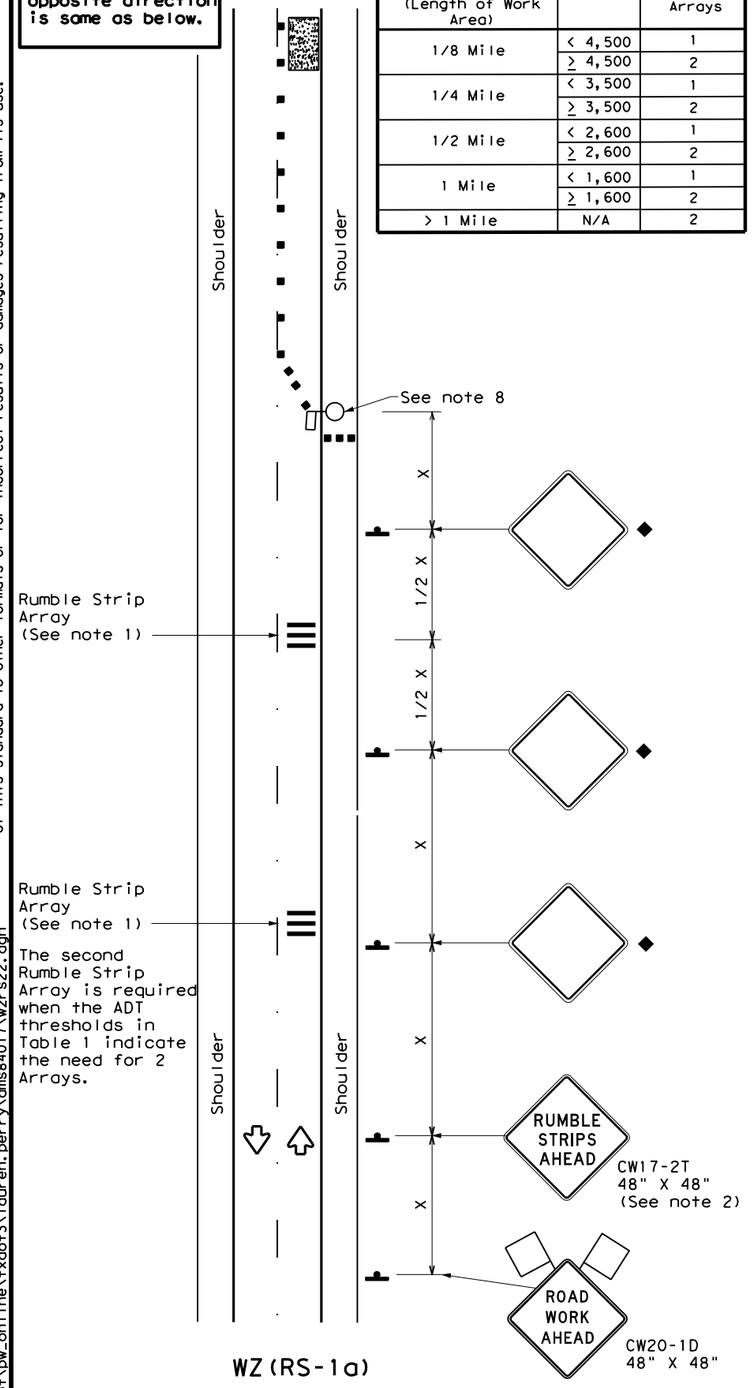
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
1-97	DIST	COUNTY		SHEET NO.
3-03	LFK	SHELBY		58
7-13				

DATE: 7/6/2022 2:52:49 PM
FILE: c:\txdot\pw_online\txdot3\lauren.perry\dms84017\wzrs22.dgn

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

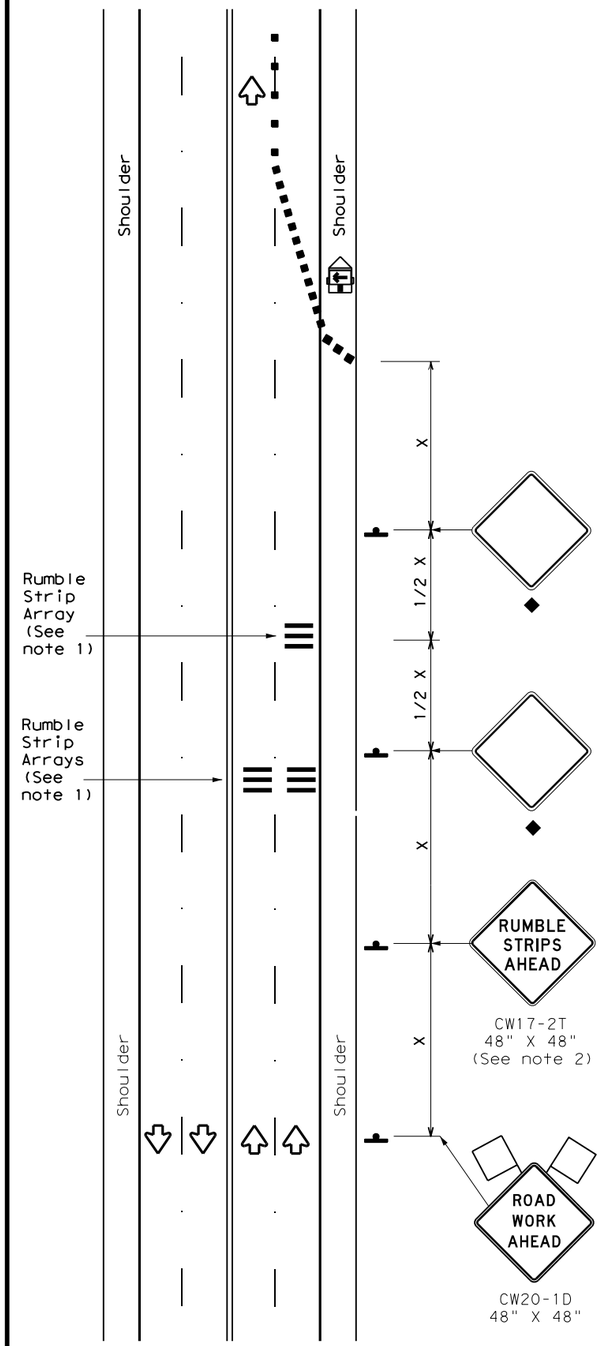


WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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-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' +

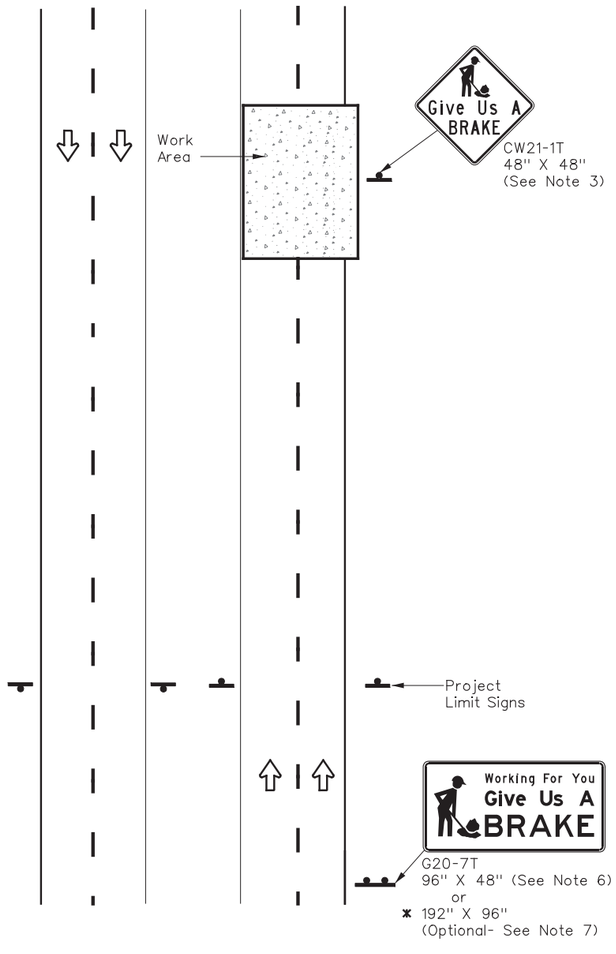
Texas Department of Transportation

Traffic Safety Division Standard

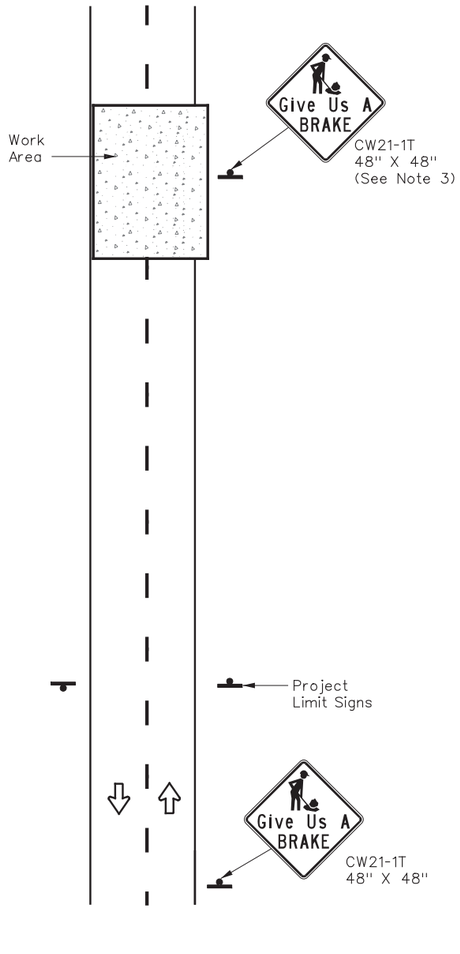
TEMPORARY RUMBLE STRIPS

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	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		59



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

DATE:
FILE:

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.

2. Sign locations shall be approved by the Engineer.

3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.

4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.

5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."

6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.

7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations

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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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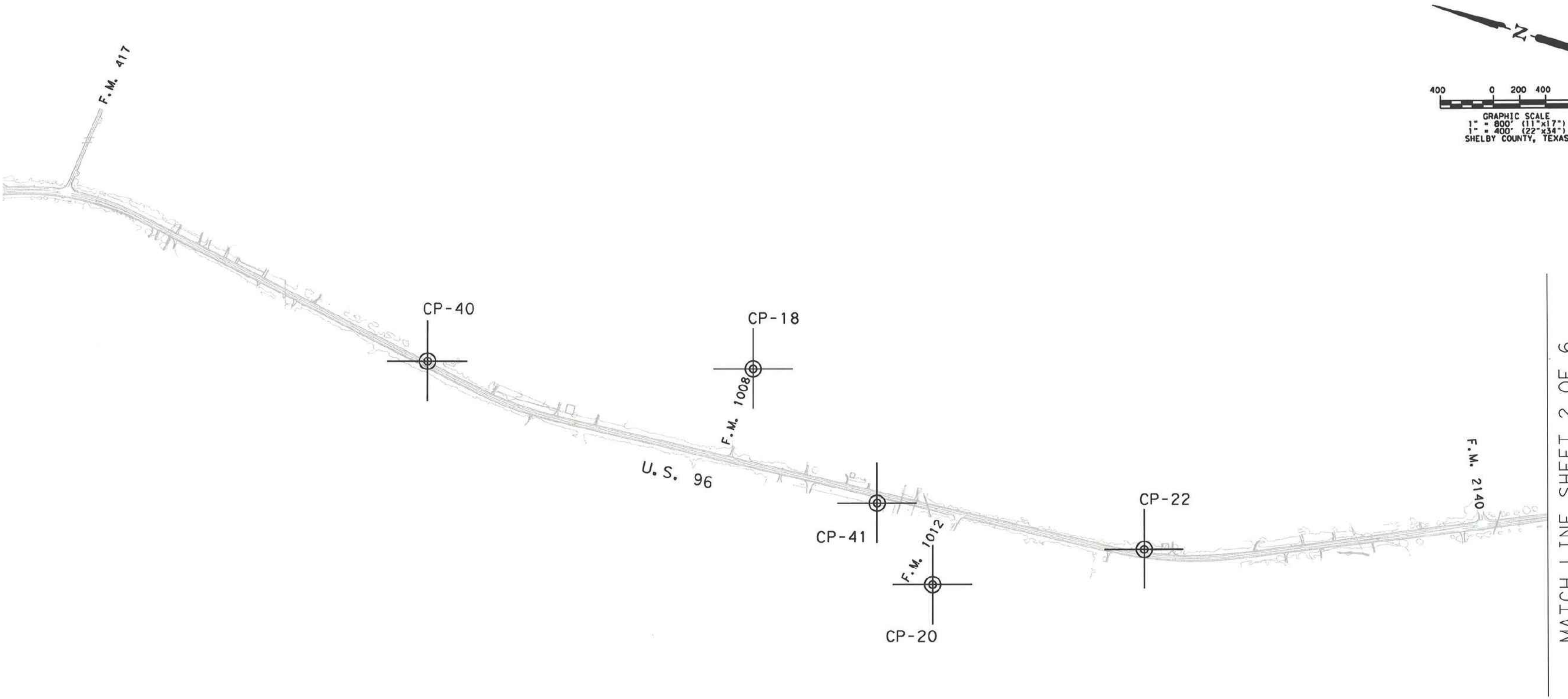
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	LFK	SHELBY		60

116



HORIZONTAL AND VERTICAL CONTROL - SURFACE				
PNT	NORTHING	EASTING	ELEV.	DESCRIPTION
18	10630670.85	4214912.76	473.27'	5/8"IR W/TXDOT ALUMINUM CAP
20	10628888.97	4213757.36	498.72'	5/8"IR W/TXDOT ALUMINUM CAP
22	10627443.46	4214491.84	448.78'	5/8"IR W/TXDOT ALUMINUM CAP
40	10633041.87	4214229.28	449.89'	TXDOT TYPE II MONUMENT STAMPED "2018"
41	10629478.91	4214223.99	482.34'	TXDOT TYPE II MONUMENT STAMPED "2018"

STATE OF TEXAS
REGISTERED
GORDON R. ANDERSON
6617
PROFESSIONAL
LAND SURVEYOR

10 OCT 2018

NOTES:

1) ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203). PROJECT COORDINATES ARE BASED ON GPS OBSERVATIONS UTILIZING TXDOT VRS. COORDINATES AND ELEVATIONS ARE BASED ON NAD83/93, NAVD88, GEOID 12A. ALL COORDINATES SHOWN HEREON ARE SURFACE, AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00003.
UNITS: US SURVEY FEET

2) A SITE CALIBRATION SHOULD BE PERFORMED WHILE UTILIZING THE CONTROL SHOWN HEREON

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

STATE OF TEXAS
JIMMY ROY THOMPSON
106346
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
C8A8E...
11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

Survey Date: October 10, 2018

SAM
SURVEYING · AERIAL MAPPING · ENGINEERING
4801 Southwest Parkway
Building Two, Suite 100
Austin, Texas 78735
(512) 447-0575
Fax: (512) 326-3029

 Texas Department of Transportation

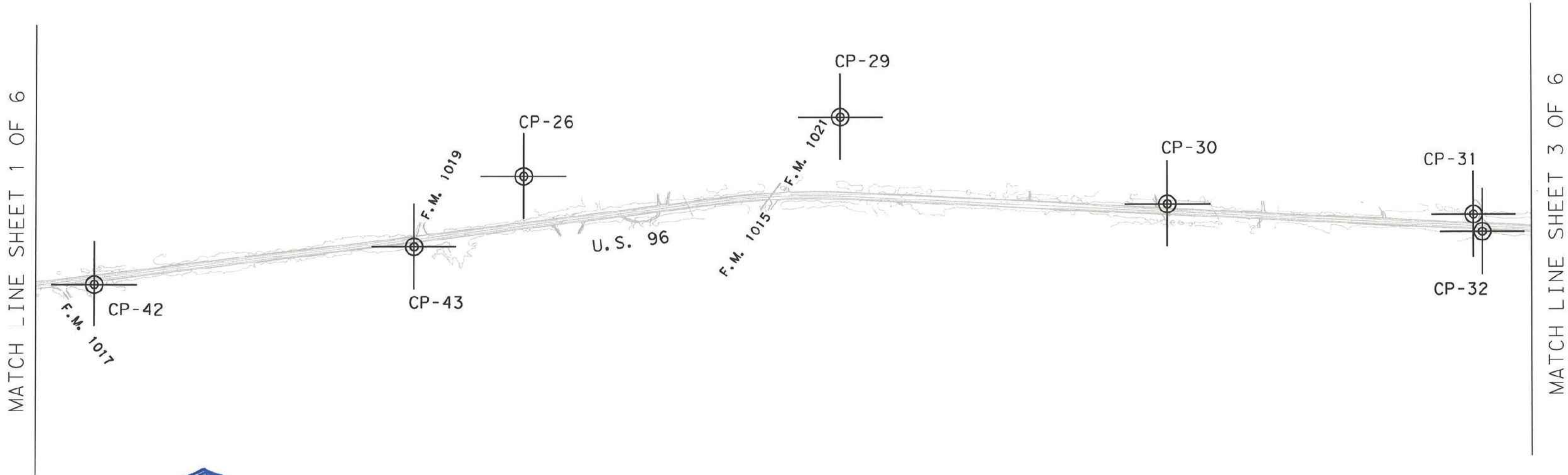
SURVEY CONTROL INDEX SHEET

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.	SHEET NO.
		61

STATE	DISTRICT	COUNTY
TEXAS	11	SHELBY

CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96

400 0 200 400 800
GRAPHIC SCALE
1" = 800' (11"x17")
1" = 400' (22"x34")
SHELBY COUNTY, TEXAS



STATE OF TEXAS
REGISTERED
GORDON R. ANDERSON
6617
PROFESSIONAL LAND SURVEYOR
10 OCT 2018

HORIZONTAL AND VERTICAL CONTROL - SURFACE

PNT	NORTHING	EASTING	ELEV.	DESCRIPTION
26	10621542.67	4217397.02	456.47'	5/8"IR W/TXDOT ALUMINUM CAP
29	10619530.44	4218465.29	475.33'	5/8"IR W/TXDOT ALUMINUM CAP
30	10617138.00	4218570.58	428.79'	5/8"IR W/TXDOT ALUMINUM CAP
31	10615047.56	4219146.68	429.33'	5/8"IR W/TXDOT ALUMINUM CAP
32	10614950.10	4219049.71	417.83'	5/8"IR W/TXDOT ALUMINUM CAP
42	10624210.01	4215757.93	464.84'	TXDOT TYPE II MONUMENT STAMPED "2018"
43	10622130.81	4216692.73	461.54'	TXDOT TYPE II MONUMENT STAMPED "2018"

Survey Date: October 10, 2018

NOTES:

1) ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203). PROJECT COORDINATES ARE BASED ON GPS OBSERVATIONS UTILIZING TXDOT VRS. COORDINATES AND ELEVATIONS ARE BASED ON NAD83/93, NAVD88, GEOID 12A. ALL COORDINATES SHOWN HEREON ARE SURFACE, AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00003. UNITS: US SURVEY FEET

2) A SITE CALIBRATION SHOULD BE PERFORMED WHILE UTILIZING THE CONTROL SHOWN HEREON

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

STATE OF TEXAS
JIMMY ROY THOMPSON
106346
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
C8A8E2...
11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

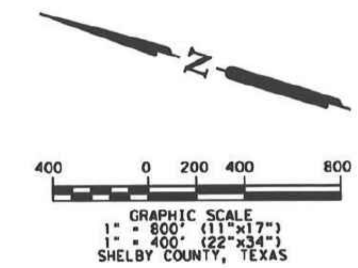
SAM
SURVEYING · AERIAL MAPPING · ENGINEERING
4801 Southwest Parkway
Building Two, Suite 100
Austin, Texas 78735
(512) 447-0575
Fax (512) 326-3029

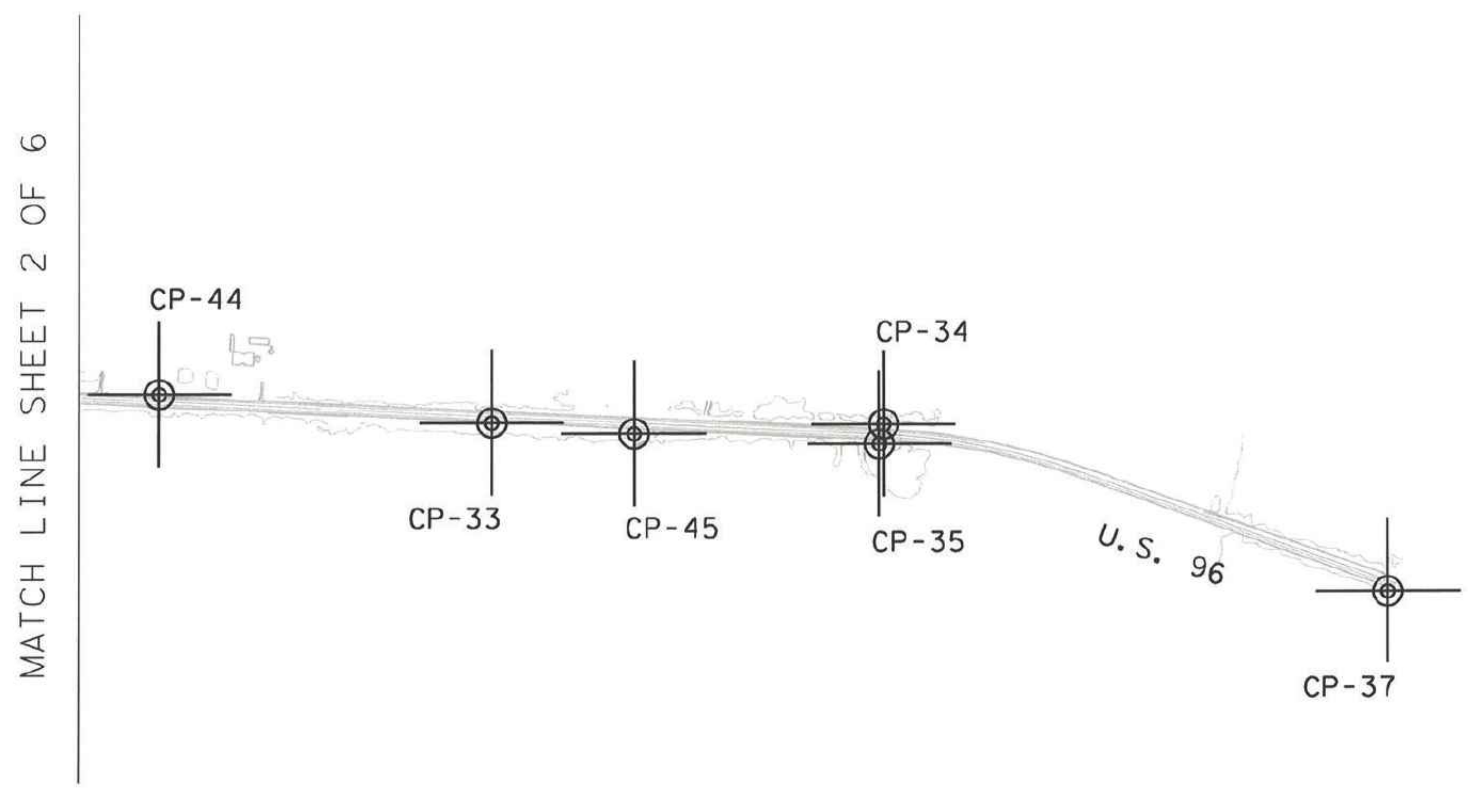
Texas Department of Transportation

SURVEY CONTROL INDEX SHEET

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.	SHEET NO.
		62

STATE	DISTRICT	COUNTY	
TEXAS	11	SHELBY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96





STATE OF TEXAS
REGISTERED
GORDON ... DERSON
6617
PROFESSIONAL
LAND SURVEYOR

10 OCT 2018

HORIZONTAL AND VERTICAL CONTROL - SURFACE				
PNT	NORTHING	EASTING	ELEV.	DESCRIPTION
33	10612950.92	4219588.64	399.41'	5/8"IR W/TXDOT ALUMINUM CAP
34	10611394.44	4220070.74	447.43'	BERNSTIEN-ROD
35	10611388.09	4219986.68	446.85'	5/8"IR W/TXDOT ALUMINUM CAP
37	10609183.98	4220033.21	413.06'	5/8"IR W/TXDOT ALUMINUM CAP
44	10614306.57	4219287.34	401.82'	TXDOT TYPE II MONUMENT STAMPED "2018"
45	10612371.66	4219722.44	430.04'	TXDOT TYPE II MONUMENT STAMPED "2018"

NOTES:

1) ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203). PROJECT COORDINATES ARE BASED ON GPS OBSERVATIONS UTILIZING TXDOT VRS. COORDINATES AND ELEVATIONS ARE BASED ON NAD83/93, NAVD88, GEOID 12A. ALL COORDINATES SHOWN HEREON ARE SURFACE, AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00003. UNITS: US SURVEY FEET

2) A SITE CALIBRATION SHOULD BE PERFORMED WHILE UTILIZING THE CONTROL SHOWN HEREON

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

STATE OF TEXAS
JIMMY ROY THOMPSON
106346
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
C8A8E2...
11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

Survey Date: October 10, 2018

SAM
SURVEYING · AERIAL MAPPING · ENGINEERING
4801 Southwest Parkway
Building Two, Suite 100
Austin, Texas 78735
(512) 447-0575
Fax (512) 326-3029

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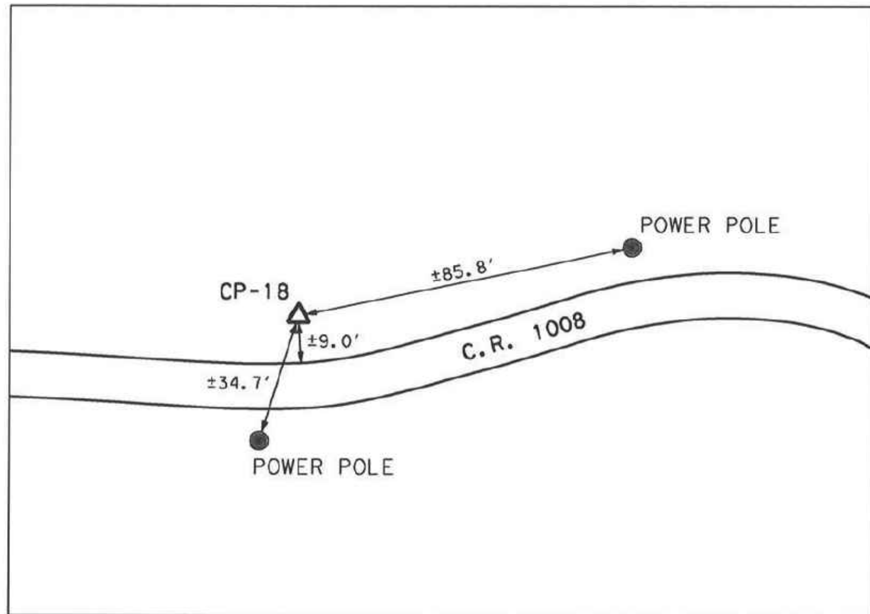
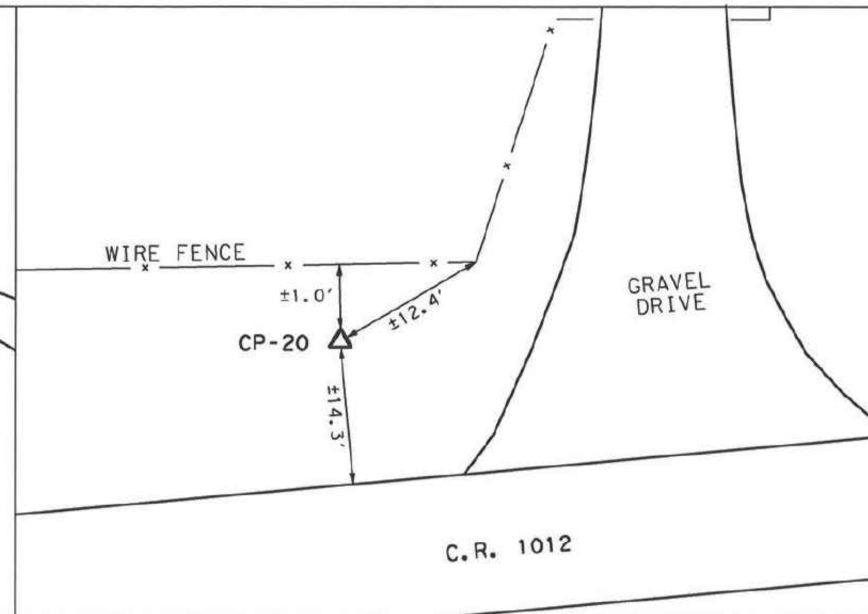
SURVEY CONTROL INDEX SHEET

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			63
STATE	DISTRICT	COUNTY	
TEXAS	11	SHELBY	
CONTROL	SECTION	JOB	HICHWAY NO.
0809	02	070	US 96



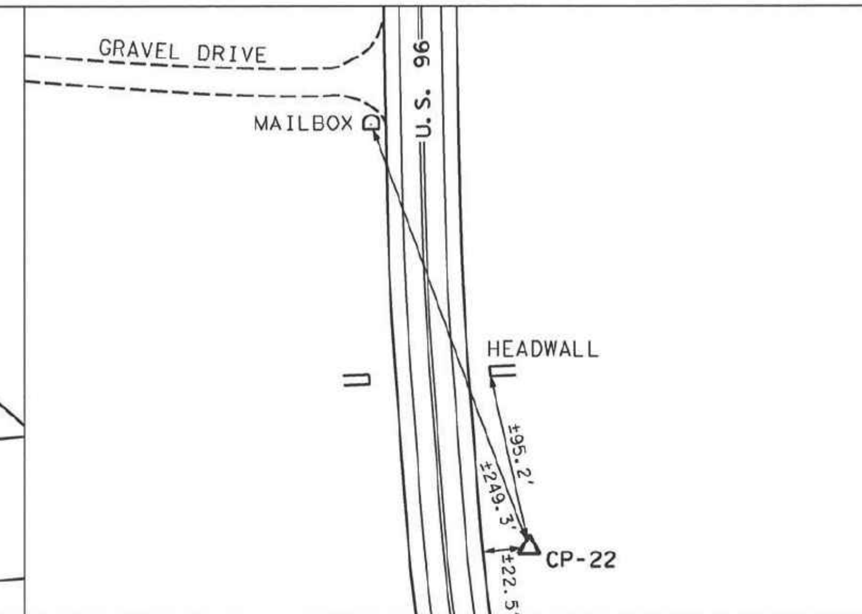
CP-18 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE NORTH RIGHT-OF-WAY OF C.R. 1008, APPROXIMATELY 705 FEET EAST OF THE INTERSECTION OF U.S. 96 AND C.R. 1008, LOCATED ±85.8 FEET WEST OF A POWER POLE, ±34.7 FEET NORTHEAST OF A POWER POLE, AND ±9.0 FEET NORTH OF THE C.R. 1008 EDGE PAVEMENT.

CP-18
N = 10630670.85
E = 4214912.76
ELEV.= 473.27'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP



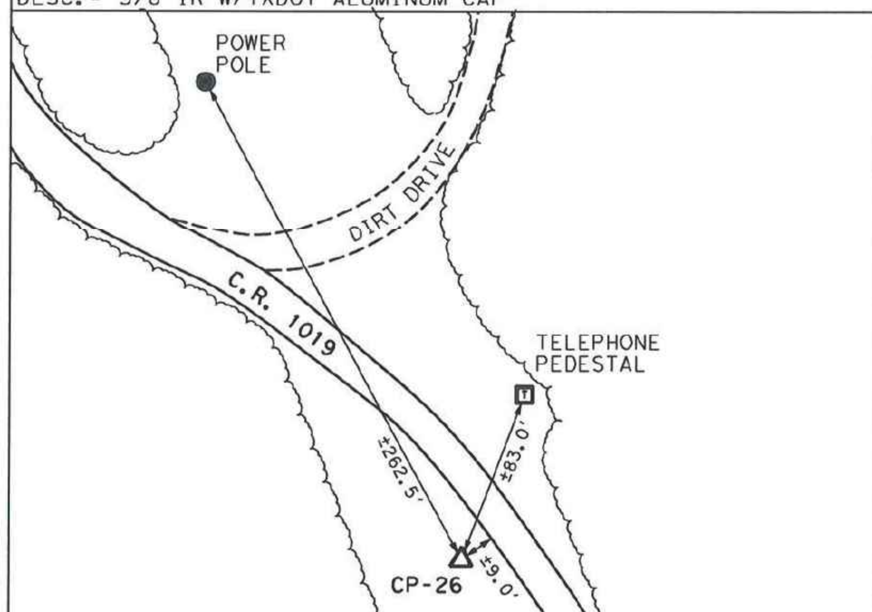
CP-20 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE NORTH RIGHT-OF-WAY OF C.R. 1012, APPROXIMATELY 550 FEET WEST OF THE INTERSECTION OF U.S. 96 AND C.R. 1012, LOCATED ±1.0 FEET SOUTH OF A WIRE FENCE, ±12.4 FEET SOUTHWEST OF A FENCE CORNER, AND ±14.3 FEET NORTH OF THE C.R. 1012 EDGE PAVEMENT.

CP-20
N = 10628888.97
E = 4213757.36
ELEV.= 498.72'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP



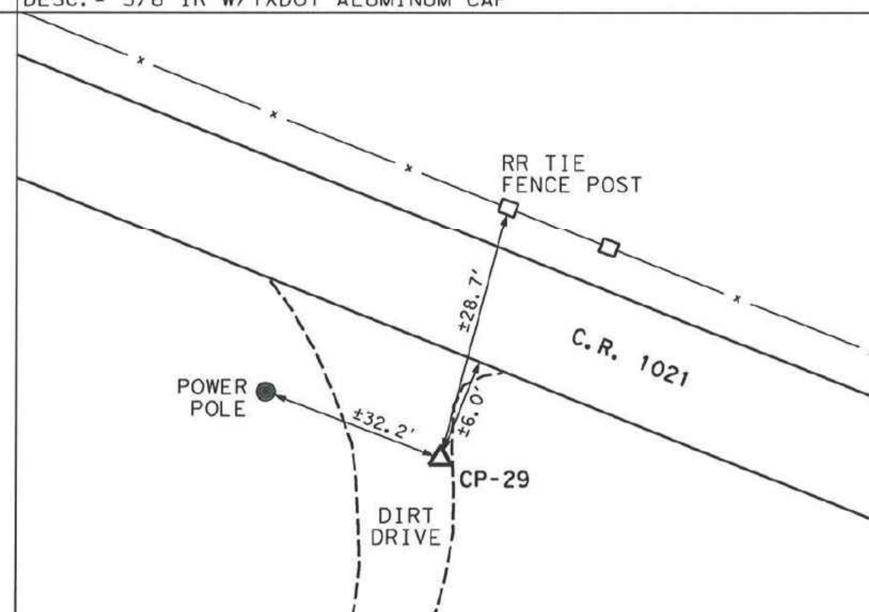
CP-22 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.27 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1012, LOCATED ±22.5 FEET EAST OF THE U.S. 96 EDGE PAVEMENT, ±95.2 FEET SOUTH OF A HEADWALL, AND ±249.3 FEET SOUTH OF A MAILBOX.

CP-22
N = 10627443.46
E = 4214491.84
ELEV.= 448.78'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP



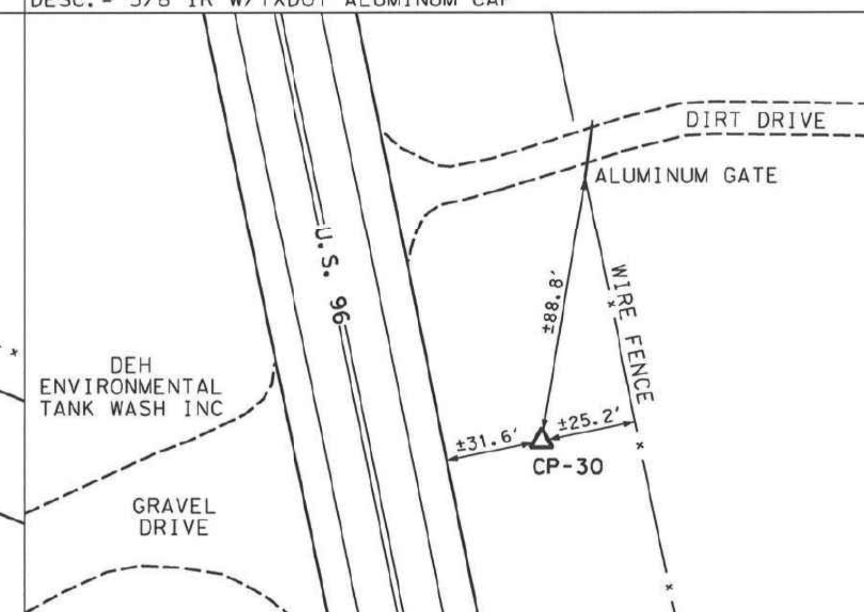
CP-26 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE SOUTH RIGHT-OF-WAY OF C.R. 1019, APPROXIMATELY 0.17 MILE SOUTHEAST OF THE INTERSECTION OF U.S. 96 AND C.R. 1019, LOCATED ±9.0 FEET WEST OF THE C.R. 1019 EDGE GRAVEL, ±83.0 FEET SOUTHWEST OF A TELEPHONE PEDESTAL, AND ±262.5 FEET SOUTHEAST OF A POWER POLE.

CP-26
N = 10621542.67
E = 4217397.02
ELEV.= 456.47'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP



CP-29 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE SOUTH RIGHT-OF-WAY OF C.R. 1021, APPROXIMATELY 0.12 MILE SOUTHEAST OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±6.0 FEET SOUTHWEST OF THE C.R. 1021 EDGE GRAVEL, ±32.2 FEET SOUTHEAST OF A POWER POLE, AND ±28.7 FEET SOUTHWEST OF A RR TIE FENCE POST.

CP-29
N = 10619530.44
E = 4218465.29
ELEV.= 475.33'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP



CP-30 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.52 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±31.6 FEET EAST OF THE U.S. 96 EDGE PAVEMENT, ±25.2 FEET SOUTHWEST OF A WIRE FENCE, AND ±88.8 FEET SOUTHWEST OF AN ALUMINUM GATE.

CP-30
N = 10617138.00
E = 4218570.58
ELEV.= 428.79'
DESC.= 5/8"IR W/TXDOT ALUMINUM CAP

N

NOT TO SCALE

STATE OF TEXAS REGISTERED GORDON N. ANDERSON 6617 PROFESSIONAL LAND SURVEYOR

10 OCT 2018

Survey Date: October 10, 2018

SAM SURVEYING · AERIAL MAPPING · ENGINEERING
4801 Southwest Parkway Building Two, Suite 100 Austin, Texas 78735 (512) 447-0575 Fax: (512) 326-3029

 Texas Department of Transportation

SURVEY CONTROL INDEX SHEET

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			64
STATE	DISTRICT	COUNTY	
TEXAS	11	SHELBY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96

NOTES:

1) ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203). PROJECT COORDINATES ARE BASED ON GPS OBSERVATIONS UTILIZING TXDOT VRS. COORDINATES AND ELEVATIONS ARE BASED ON NAD83/93, NAVD88, GEOID 12A. ALL COORDINATES SHOWN HEREON ARE SURFACE, AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SURFACE ADJUSTMENT FACTOR OF 1.00003.
UNITS: US SURVEY FEET

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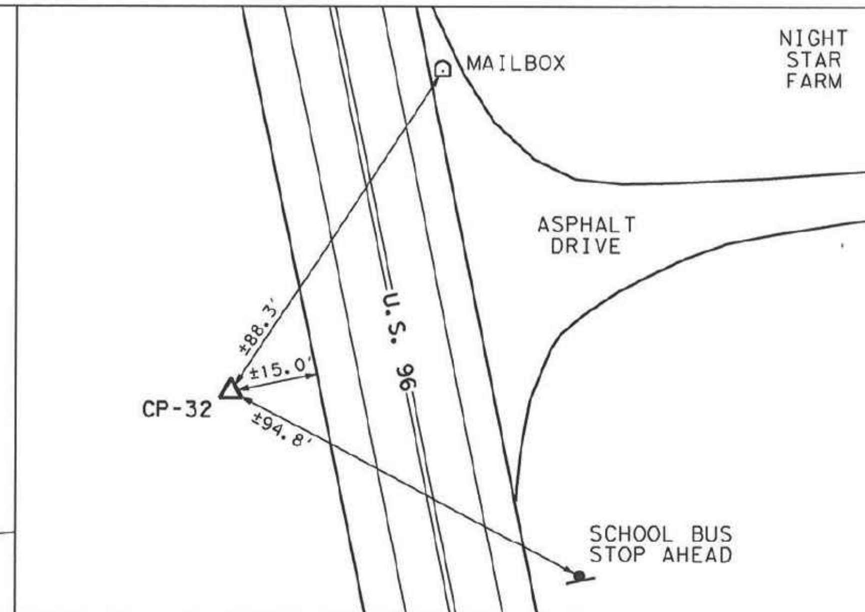
STATE OF TEXAS JIMMY ROY THOMPSON 106346 LICENSED PROFESSIONAL ENGINEER

DocuSigned by: C8A8E2...
11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

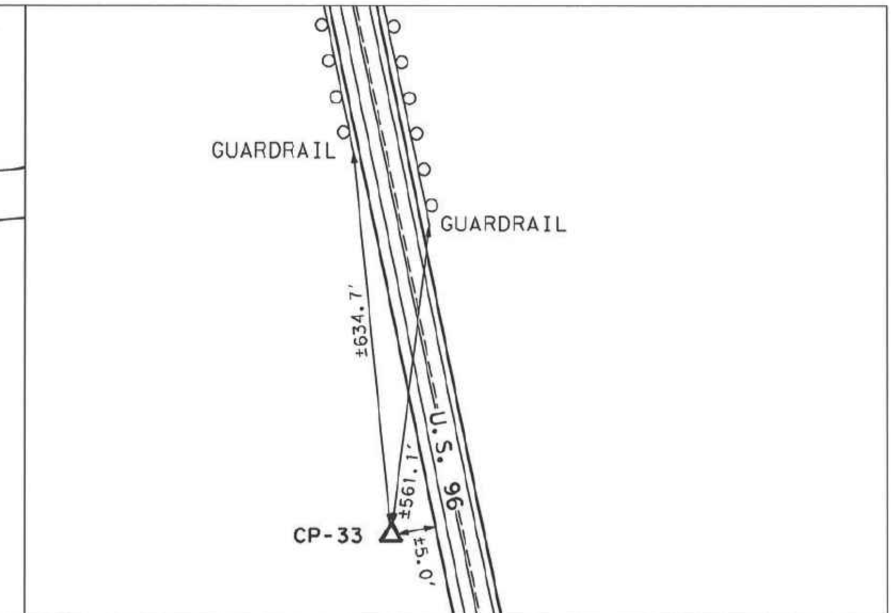
CP-31 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.93 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±60.0 FEET EAST OF THE U.S. 96 EDGE PAVEMENT, ±15.6 FEET SOUTHWEST OF A WIRE FENCE, AND ±36.2 FEET NORTHWEST OF A WIRE FENCE CORNER.

CP-31
N = 10615047.56
E = 4219146.68
ELEV. = 429.33'
DESC. = 5/8"IR W/TXDOT ALUMINUM CAP



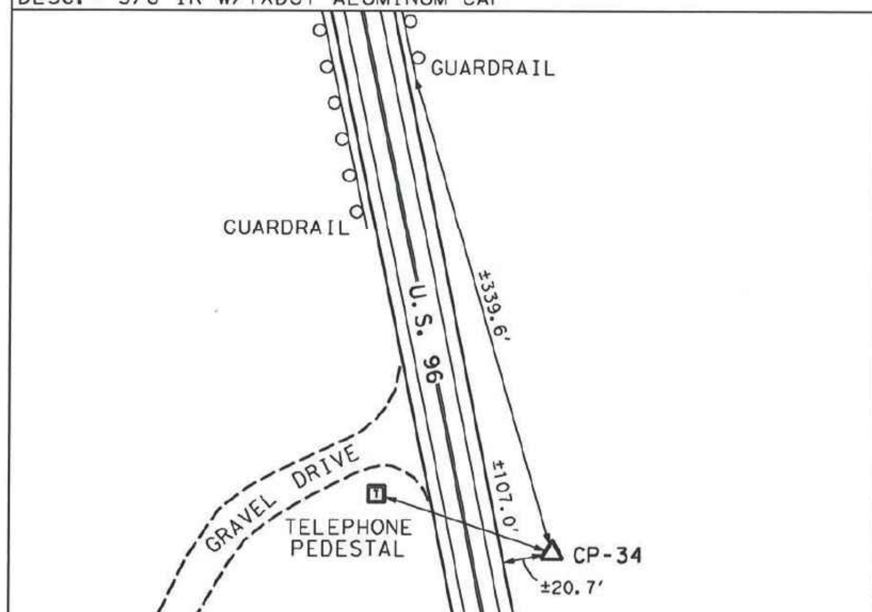
CP-32 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.94 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±94.8 FEET NORTHWEST OF A SCHOOL BUS STOP AHEAD SIGN, ±15.0 FEET WEST OF THE U.S. 96 EDGE PAVEMENT, AND 88.3± FEET SOUTHWEST OF A MAILBOX.

CP-32
N = 10614950.10
E = 4219049.71
ELEV. = 417.83'
DESC. = 5/8"IR W/TXDOT ALUMINUM CAP



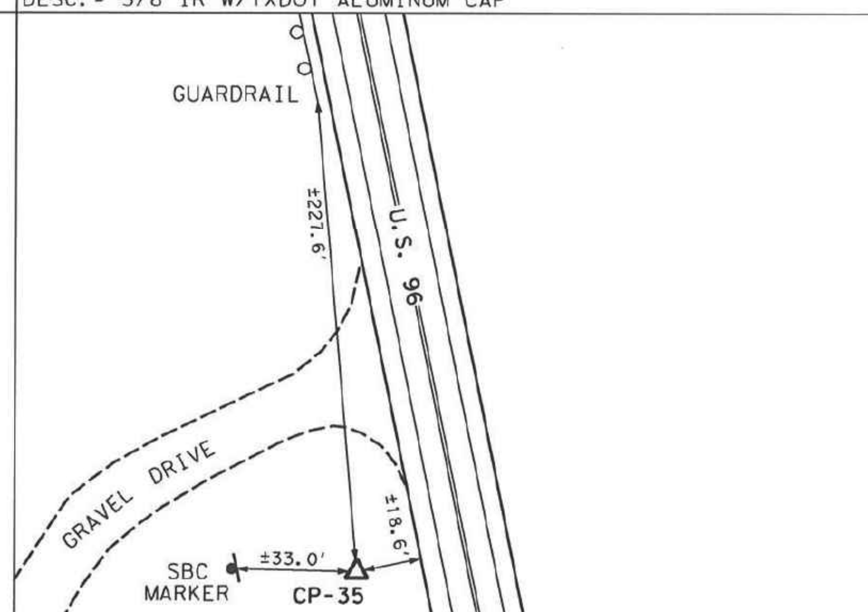
CP-33 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 1.33 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±5.0 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±634.7 FEET SOUTH OF A GUARDRAIL, AND 561.1± FEET SOUTHWEST OF A GUARDRAIL.

CP-33
N = 10612950.92
E = 4219588.64
ELEV. = 399.41'
DESC. = 5/8"IR W/TXDOT ALUMINUM CAP



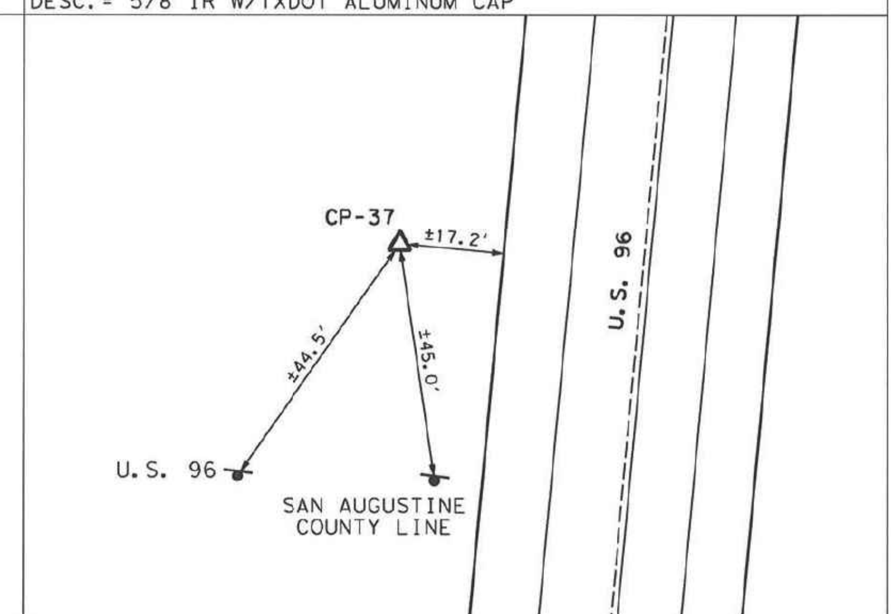
CP-34 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 1.64 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±20.7 FEET EAST THE U.S. 96 EDGE PAVEMENT, ±339.6 FEET SOUTHEAST OF A GUARDRAIL, AND 107.0± FEET SOUTHEAST OF A TELEPHONE PEDESTAL.

CP-34
N = 10611394.44
E = 4220070.74
ELEV. = 447.43'
DESC. = BERNSTIEN-ROD



CP-35 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 1.64 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±18.6 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±227.6 FEET SOUTH OF A GUARDRAIL, AND 33.0± FEET EAST OF A SBC MARKER.

CP-35
N = 10611388.09
E = 4219986.68
ELEV. = 446.85'
DESC. = 5/8"IR W/TXDOT ALUMINUM CAP



CP-37 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 2.06 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±17.2 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±44.5 FEET NORTHEAST OF A U.S. 96 SIGN, AND 45.0± FEET NORTHWEST OF A SAN AUGUSTINE COUNTY LINE SIGN.

CP-37
N = 10609183.98
E = 4220033.21
ELEV. = 413.06'
DESC. = 5/8"IR W/TXDOT ALUMINUM CAP

N

NOT TO SCALE

STATE OF TEXAS REGISTERED GORDON N. ANDERSON 6617 PROFESSIONAL LAND SURVEYOR

18 OCT 2018

Survey Date: October 10, 2018

SAM SURVEYING · AERIAL MAPPING · ENGINEERING
4801 Southwest Parkway Building Two, Suite 100 Austin, Texas 78735 (512) 447-0575 Fax: (512) 326-3029

 Texas Department of Transportation

NOTES:

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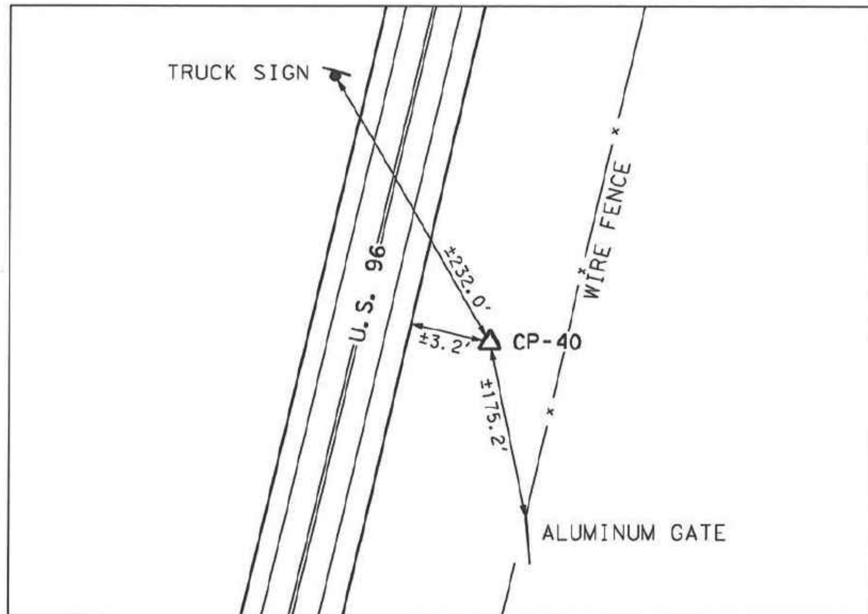
STATE OF TEXAS JIMMY ROY THOMPSON 106346 LICENSED PROFESSIONAL ENGINEER

DocuSigned by: C8A8E2... 11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

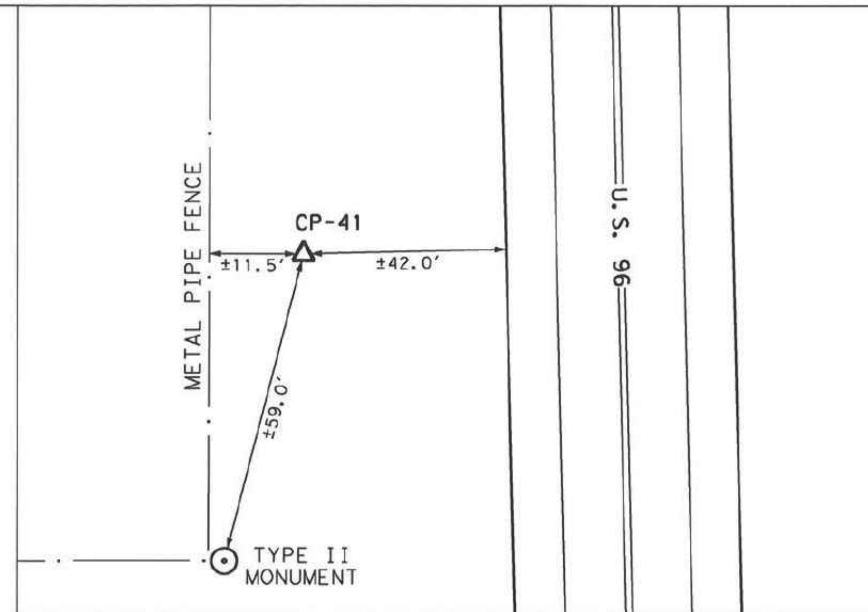
SURVEY CONTROL INDEX SHEET

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			65
STATE	DISTRICT	COUNTY	
TEXAS	11	SHELBY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96



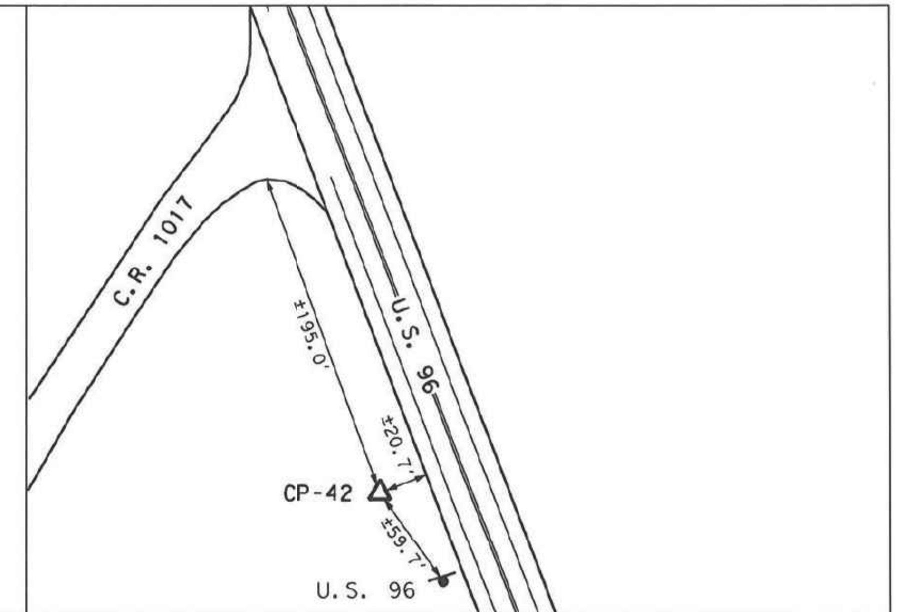
CP-40 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.57 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 417, LOCATED ±3.2 FEET EAST THE U.S. 96 EDGE PAVEMENT, ±232.0 FEET SOUTHEAST OF A TRUCK SIGN, AND 175.2± FEET NORTHWEST OF AN ALUMINUM GATE.

CP-40
N = 10633041.87
E = 4214229.28
ELEV. = 449.89'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"



CP-41 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 0.22 MILE SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1008, LOCATED ±42.0 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±232.0 FEET SOUTHEAST OF A TRUCK SIGN, AND 175.2± FEET NORTHWEST OF AN ALUMINUM GATE.

CP-41
N = 10629478.91
E = 4214223.99
ELEV. = 482.34'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"

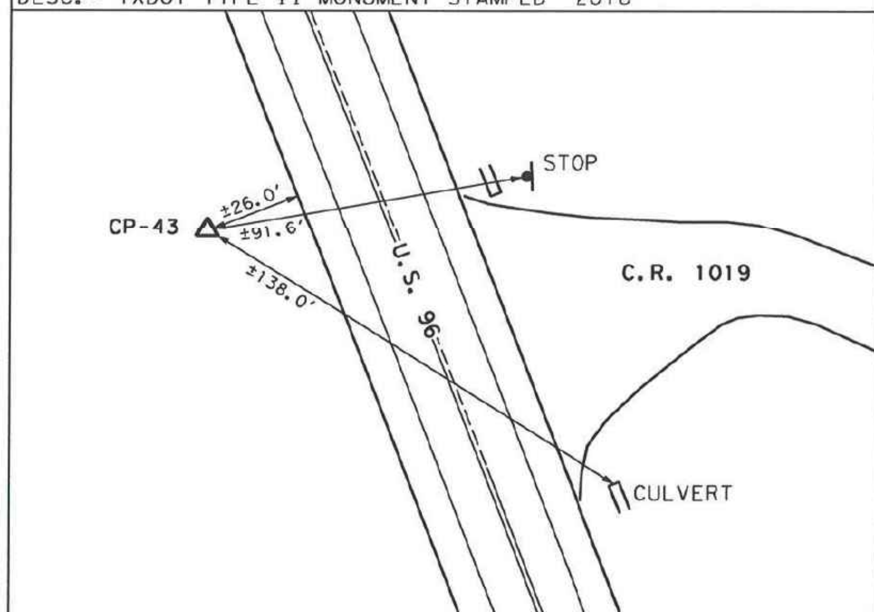


CP-42 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 195 FEET SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1017, LOCATED ±20.7 FEET WEST THE U.S. 96 EDGE PAVEMENT, AND 59.7± FEET NORTHWEST OF A U.S. 96 SIGN.

CP-42
N = 10624210.01
E = 4215757.93
ELEV. = 464.84'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"

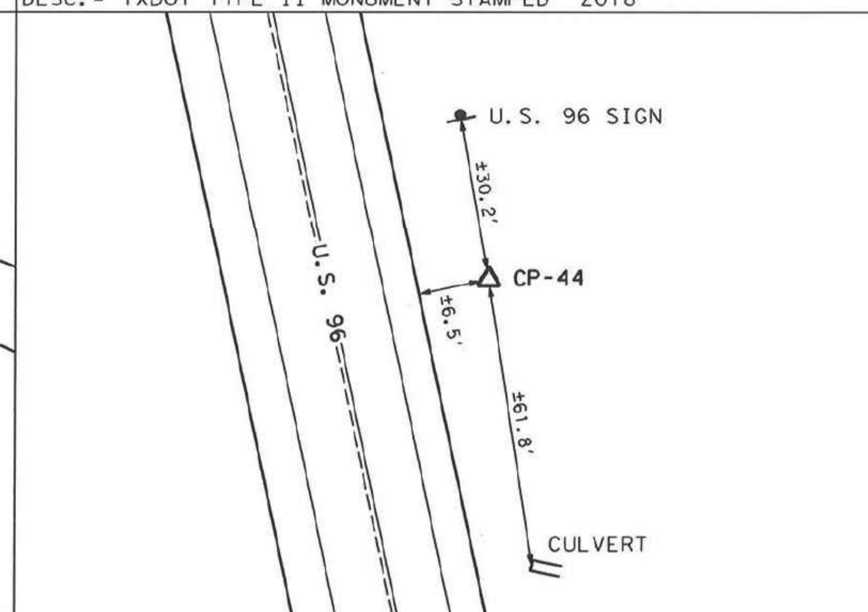
N

NOT TO SCALE



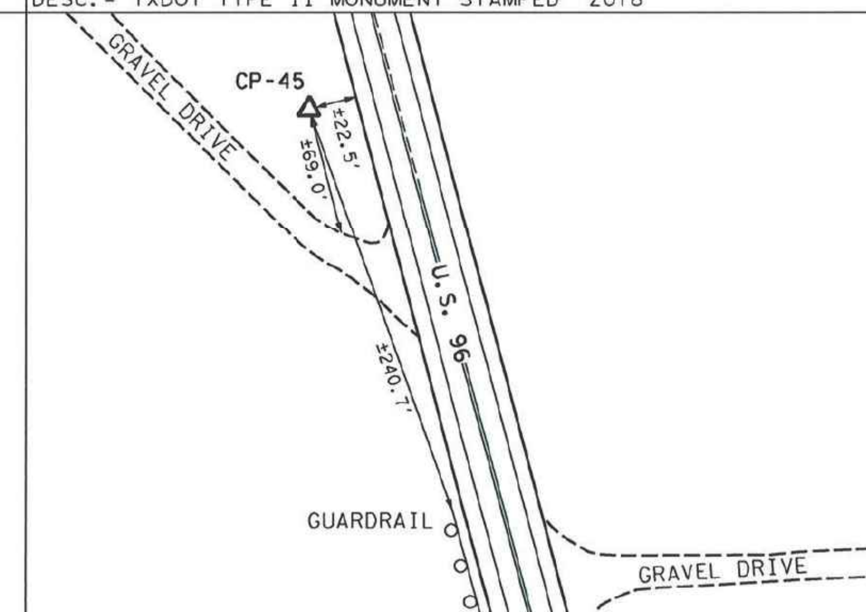
CP-43 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, AT THE INTERSECTION OF U.S. 96 AND C.R. 1019, LOCATED ±26.0 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±91.6 FEET WEST OF A STOP SIGN, AND 138.0± FEET NORTHWEST OF A CULVERT.

CP-43
N = 10622130.81
E = 4216692.73
ELEV. = 461.54'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"



CP-44 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE EAST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 1.07 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±6.5 FEET EAST THE U.S. 96 EDGE PAVEMENT, ±30.2 FEET SOUTH OF A U.S. 96 SIGN, AND 61.8± FEET NORTH OF A CULVERT.

CP-44
N = 10614306.57
E = 4219287.34
ELEV. = 401.82'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"



CP-45 IS A 5/8 INCH IRON ROD WITH A TXDOT ALUMINUM CAP IN THE WEST RIGHT-OF-WAY OF U.S. 96, APPROXIMATELY 1.45 MILES SOUTH OF THE INTERSECTION OF U.S. 96 AND C.R. 1021, LOCATED ±22.5 FEET WEST THE U.S. 96 EDGE PAVEMENT, ±69.0 FEET NORTH OF A GRAVEL DRIVE, AND 240.7± FEET NORTH OF A GUARDRAIL.

CP-45
N = 10612371.66
E = 4219722.44
ELEV. = 430.04'
DESC. = TXDOT TYPE II MONUMENT STAMPED "2018"

STATE OF TEXAS
REGISTERED
GORDON N. ANDERSON
6617
PROFESSIONAL LAND SURVEYOR

10 OCT 2018

Survey Date: October 10, 2018

SAM
SURVEYING · AERIAL MAPPING · ENGINEERING
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Building Two, Suite 100
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SURVEY CONTROL INDEX SHEET

NOTES:

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UNITS: US SURVEY FEET

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STATE OF TEXAS
JIMMY ROY THOMPSON
106346
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
C8A8E2A4A3DE4F6...
11/4/2021

U.S. 96
FROM FM 417
TO THE SAN AUGUSTINE COUNTY LINE
CSJ NO. 0809-02-070

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			66
STATE	DISTRICT	COUNTY	
TEXAS	11	SHELBY	
CONTROL	SECTION	JOB	HIGHWAY NO.
0809	02	070	US 96

PROPOSED CENTERLINE - US 96

Beginning chain US96CL1 description

Point 223 N 10,632,715.7387 E 4,214,147.2489 Sta 2547+09.43

Course from 223 to 224 N 9° 45′ 17.10" E Dist 1,558.5116

Point 224 N 10,634,251.7174 E 4,214,411.3094 Sta 2562+67.94

Course from 224 to PC US96CL11 N 9° 37′ 03.57" E Dist 1,174.1333

Curve Data

Curve US96CL11						
P.I. Station	2580+08.79	N	10,635,968.0980	E	4,214,702.1576	
Delta =	32° 13′ 28.45"	(LT)				
Degree =	2° 55′ 13.77"					
Tangent =	566.7156					
Length =	1,103.3950					
Radius =	1,961.8533					
External =	80.2130					
Long Chord =	1,088.9096					
Mid. Ord. =	77.0622					
P.C. Station	2574+42.07	N	10,635,409.3478	E	4,214,607.4750	
P.T. Station	2585+45.47	N	10,636,491.2693	E	4,214,484.3084	
C.C.		N	10,635,737.1198	E	4,212,673.1963	
Back = N	9° 37′ 03.57" E					
Ahead = N	22° 36′ 24.88" W					
Chord Bear = N	6° 29′ 40.65" W					

Course from PT US96CL11 to 225 N 22° 36′ 24.88" W Dist 644.3088

Point 225 N 10,637,086.0719 E 4,214,236.6318 Sta 2591+89.78

Course from 225 to PC US96CL12 N 23° 06′ 04.66" W Dist 3,811.3618

Curve Data

Curve US96CL12						
P.I. Station	2632+39.49	N	10,640,811.0454	E	4,212,647.6965	
Delta =	8° 01′ 11.96"	(RT)				
Degree =	1° 41′ 06.61"					
Tangent =	238.3471					
Length =	475.9157					
Radius =	3,400.0000					
External =	8.3441					
Long Chord =	475.5273					
Mid. Ord. =	8.3237					
P.C. Station	2630+01.14	N	10,640,591.8106	E	4,212,741.2139	
P.T. Station	2634+77.06	N	10,641,041.1833	E	4,212,585.6811	
C.C.		N	10,641,925.8275	E	4,215,868.5769	
Back = N	23° 06′ 04.66" W					
Ahead = N	15° 04′ 52.70" W					
Chord Bear = N	19° 05′ 28.68" W					

Curve Data

Curve US96CL13						
P.I. Station	2641+52.01	N	10,641,692.8923	E	4,212,410.0646	
Delta =	4° 42′ 48.44"	(RT)				
Degree =	0° 20′ 57.71"					
Tangent =	674.9562					
Length =	1,349.1509					
Radius =	16,400.0000					
External =	13.8833					
Long Chord =	1,348.7705					
Mid. Ord. =	13.8716					
P.C. Station	2634+77.06	N	10,641,041.1833	E	4,212,585.6811	
P.T. Station	2648+26.21	N	10,642,356.8282	E	4,212,288.5946	
C.C.		N	10,645,308.2907	E	4,228,420.8254	
Back = N	15° 04′ 52.70" W					
Ahead = N	10° 22′ 04.26" W					
Chord Bear = N	12° 43′ 28.48" W					

PROPOSED CENTERLINE - US 96 CONTINUED

Curve Data

Curve US96CL14						
P.I. Station	2656+28.71	N	10,643,146.2271	E	4,212,144.1706	
Delta =	5° 32′ 07.60"	(LT)				
Degree =	0° 20′ 42.56"					
Tangent =	802.5017					
Length =	1,603.7547					
Radius =	16,600.0000					
External =	19.3865					
Long Chord =	1,603.1311					
Mid. Ord. =	19.3639					
P.C. Station	2648+26.21	N	10,642,356.8282	E	4,212,288.5946	
P.T. Station	2664+29.96	N	10,643,918.0134	E	4,211,924.2735	
C.C.		N	10,639,369.3722	E	4,195,959.6294	
Back = N	10° 22′ 04.26" W					
Ahead = N	15° 54′ 11.86" W					
Chord Bear = N	13° 08′ 08.06" W					

Course from PT US96CL14 to PC US96CL15 N 15° 54′ 11.86" W Dist 667.3992

Curve Data

Curve US96CL15						
P.I. Station	2677+15.13	N	10,645,153.9880	E	4,211,572.1200	
Delta =	4° 46′ 49.34"	(LT)				
Degree =	0° 23′ 13.68"					
Tangent =	617.7644					
Length =	1,234.8119					
Radius =	14,800.0000					
External =	12.8874					
Long Chord =	1,234.4538					
Mid. Ord. =	12.8762					
P.C. Station	2670+97.36	N	10,644,559.8683	E	4,211,741.3965	
P.T. Station	2683+32.17	N	10,645,731.9342	E	4,211,353.9206	
C.C.		N	10,640,504.4532	E	4,197,507.8583	
Back = N	15° 54′ 11.86" W					
Ahead = N	20° 41′ 01.20" W					
Chord Bear = N	18° 17′ 36.53" W					

Course from PT US96CL15 to PC US96CL16 N 20° 41′ 01.20" W Dist 366.1192

Curve Data

Curve US96CL16						
P.I. Station	2693+70.32	N	10,646,703.1700	E	4,210,987.2376	
Delta =	4° 48′ 36.86"	(RT)				
Degree =	0° 21′ 29.16"					
Tangent =	672.0307					
Length =	1,343.2719					
Radius =	16,000.0000					
External =	14.1071					
Long Chord =	1,342.8775					
Mid. Ord. =	14.0946					
P.C. Station	2686+98.29	N	10,646,074.4552	E	4,211,224.6043	
P.T. Station	2700+41.56	N	10,647,349.5750	E	4,210,803.4283	
C.C.		N	10,651,725.7861	E	4,226,193.3203	
Back = N	20° 41′ 01.20" W					
Ahead = N	15° 52′ 24.35" W					
Chord Bear = N	18° 16′ 42.78" W					

Course from PT US96CL16 to 226 N 15° 52′ 24.35" W Dist 2,443.0414

Point 226 N 10,649,699.4590 E 4,210,135.2242 Sta 2724+84.61

Course from 226 to 227 N 16° 23′ 37.48" W Dist 715.6463

Point 227 N 10,650,386.0105 E 4,209,933.2426 Sta 2732+00.25

Course from 227 to 228 N 15° 23′ 55.40" W Dist 751.5929

Point 228 N 10,651,110.6223 E 4,209,733.6686 Sta 2739+51.84

Course from 228 to PC US96CL17 N 15° 45′ 38.91" W Dist 1,140.7044

NOTE:
ALIGNMENT RELATED RECONSTRUCTION ENDS AT MILL CREEK. EXISTING ALIGNMENT IS PROVIDED TO REFERENCE MINOR ITEMS OF WORK, (DRIVEWAYS, CROSS CULVERTS, ETC.)

STATE OF TEXAS
ROBERT D. AUSTIN
67596
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 6

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			67
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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PROPOSED CENTERLINE - US 96 CONTINUED

			Curve Data			
Curve US96CL17			*----------*			
P.I. Station		2754+45.74	N	10,652,548.3572	E	4,209,327.8927
Delta	=	2° 31′ 44.99"	(RT)			
Degree	=	0° 21′ 29.16"				
Tangent	=	353.1951				
Length	=	706.2756				
Radius	=	16,000.0000				
External	=	3.8979				
Long Chord	=	706.2182				
Mid. Ord.	=	3.8969				
P.C. Station		2750+92.55	N	10,652,208.4408	E	4,209,423.8282
P.T. Station		2757+98.82	N	10,652,892.1759	E	4,209,247.0503
C.C.			N	10,656,554.3928	E	4,224,822.2925
Back	= N 15° 45′ 38.91" W					
Ahead	= N 13° 13′ 53.92" W					
Chord Bear	= N 14° 29′ 46.42" W					

Course from PT US96CL17 to 229 N 13° 13′ 53.92" W Dist 1,397.9933

Point 229 N 10,654,253.0562 E 4,208,927.0657 Sta 2771+96.82

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Ending chain US96CL1 description

PROPOSED CENTERLINE - FM 417

Beginning chain FM417CL description

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Point FM001 N 10,636,030.2614 E 4,214,613.0253 Sta 100+00.00

Course from FM001 to PC FM417CL1 S 84° 19′ 52.82" E Dist 897.9498

			Curve Data			
Curve FM417CL1			*----------*			
P.I. Station		112+55.65	N	10,635,906.2339	E	4,215,862.5356
Delta	=	43° 21′ 00.93"	(LT)			
Degree	=	6° 21′ 58.31"				
Tangent	=	357.7010				
Length	=	680.9443				
Radius	=	900.0000				
External	=	68.4782				
Long Chord	=	664.8181				
Mid. Ord.	=	63.6363				
P.C. Station		108+97.95	N	10,635,941.5660	E	4,215,506.5838
P.T. Station		115+78.89	N	10,636,124.8868	E	4,216,145.6274
C.C.			N	10,636,837.1648	E	4,215,595.4818
Back	= S 84° 19′ 52.82" E					
Ahead	= N 52° 19′ 06.25" E					
Chord Bear	= N 73° 59′ 36.72" E					

Course from PT FM417CL1 to FM002 N 52° 19′ 06.25" E Dist 301.1060

Point FM002 N 10,636,308.9447 E 4,216,383.9286 Sta 118+80.00

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Ending chain FM417CL description

NOTE:
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STATE OF TEXAS
ROBERT D. AUSTIN
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HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 6

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			68
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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PROPOSED CENTERLINE - CR 1009

Beginning chain CR1009CL description

Point CR301 N 10,638,405.6263 E 4,213,673.7589 Sta 100+00.00

Course from CR301 to PC CR1009CL1 S 66° 53′ 55.35" W Dist 26.9947

Curve Data					
Curve CR1009CL1					
P.I. Station	100+71.08	N	10,638,377.7388	E	4,213,608.3817
Delta =	47° 34′ 39.64" (RT)				
Degree =	57° 17′ 44.81"				
Tangent =	44.0820				
Length =	83.0387				
Radius =	100.0000				
External =	9.2850				
Long Chord =	80.6734				
Mid. Ord. =	8.4962				
P.C. Station	100+26.99	N	10,638,395.0347	E	4,213,648.9289
P.T. Station	101+10.03	N	10,638,396.0027	E	4,213,568.2613
C.C.		N	10,638,487.0160	E	4,213,609.6931
Back = S	66° 53′ 55.34" W				
Ahead = N	65° 31′ 25.02" W				
Chord Bear = N	89° 18′ 44.84" W				

Course from PT CR1009CL1 to CR302 N 65° 31′ 25.02" W Dist 59.9666

Point CR302 N 10,638,420.8480 E 4,213,513.6838 Sta 101+70.00

Ending chain CR1009CL description

PROPOSED CENTERLINE - CR 1024

Beginning chain CR1024CL description

Point CR201 N 10,649,756.2946 E 4,210,118.5034 Sta 100+00.00

Course from CR201 to PC CR1024CL1 S 74° 03′ 03.18" W Dist 30.3712

Curve Data					
Curve CR1024CL1					
P.I. Station	100+63.25	N	10,649,738.9148	E	4,210,057.6891
Delta =	24° 43′ 32.77" (RT)				
Degree =	38° 11′ 49.87"				
Tangent =	32.8778				
Length =	64.7319				
Radius =	150.0000				
External =	3.5609				
Long Chord =	64.2308				
Mid. Ord. =	3.4783				
P.C. Station	100+30.37	N	10,649,747.9491	E	4,210,089.3013
P.T. Station	100+95.10	N	10,649,743.9314	E	4,210,025.1963
C.C.		N	10,649,892.1750	E	4,210,048.0838
Back = S	74° 03′ 03.18" W				
Ahead = N	81° 13′ 24.05" W				
Chord Bear = S	86° 24′ 49.57" W				

Course from PT CR1024CL1 to CR202 N 81° 13′ 24.05" W Dist 479.3377

Point CR202 N 10,649,817.0702 E 4,209,551.4714 Sta 105+74.44

Ending chain CR1024CL description

NOTE:
ALIGNMENT RELATED RECONSTRUCTION ENDS AT MILL CREEK. EXISTING ALIGNMENT IS PROVIDED TO REFERENCE MINOR ITEMS OF WORK, (DRIVEWAYS, CROSS CULVERTS, ETC.)

PROPOSED CENTERLINE - CR 1006

Beginning chain CR1006CL description

Point CR101 N 10,649,703.2679 E 4,210,134.1037 Sta 100+00.00

Course from CR101 to PC CR1006CL1 N 74° 03′ 03.19" E Dist 35.1027

Curve Data					
Curve CR1006CL1					
P.I. Station	100+65.38	N	10,649,721.2346	E	4,210,196.9716
Delta =	22° 49′ 37.31" (RT)				
Degree =	38° 11′ 49.87"				
Tangent =	30.2821				
Length =	59.7610				
Radius =	150.0000				
External =	3.0262				
Long Chord =	59.3666				
Mid. Ord. =	2.9663				
P.C. Station	100+35.10	N	10,649,712.9135	E	4,210,167.8552
P.T. Station	100+94.86	N	10,649,717.6082	E	4,210,227.0358
C.C.		N	10,649,568.6876	E	4,210,209.0727
Back = N	74° 03′ 03.19" E				
Ahead = S	83° 07′ 19.50" E				
Chord Bear = N	85° 27′ 51.84" E				

Course from PT CR1006CL1 to CR102 S 83° 07′ 19.50" E Dist 281.7721

Point CR102 N 10,649,683.8648 E 4,210,506.7801 Sta 103+76.64

Ending chain CR1006CL description

STATE OF TEXAS
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HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 6

Lockwood, Andrews & Newnam, Inc.
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TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			69
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

PROPOSED HTM - PHASE 1 STEP 2

Beginning chain HTMP1 description

Point HTM201 N 10,633,494.8781 E 4,214,281.1997 Sta 155+00.00

Course from HTM201 to HTM202 N 10° 43′ 42.71" E Dist 765.1416

Point HTM202 N 10,634,246.6452 E 4,214,423.6353 Sta 162+65.14

Course from HTM202 to HTM203 N 9° 37′ 03.57" E Dist 669.9523

Point HTM203 N 10,634,907.1810 E 4,214,535.5660 Sta 169+35.09

Course from HTM203 to PC HTMP11 N 9° 37′ 03.57" E Dist 507.1228

Curve Data

Curve HTMP11

P.I. Station	180+12.69	N	10,635,969.6294	E	4,214,715.6025
Delta =	32° 13′ 28.60" (LT)				
Degree =	2° 54′ 04.56"				
Tangent =	570.4716				
Length =	1,110.7080				
Radius =	1,974.8533				
External =	80.7448				
Long Chord =	1,096.1265				
Mid. Ord. =	77.5731				
P.C. Station	174+42.22	N	10,635,407.1760	E	4,214,620.2923
P.T. Station	185+52.92	N	10,636,496.2680	E	4,214,496.3090
C.C.		N	10,635,737.1198	E	4,212,673.1963
Back = N	9° 37′ 03.57" E				
Ahead = N	22° 36′ 25.03" W				
Chord Bear = N	6° 29′ 40.73" W				

Course from PT HTMP11 to HTM204 N 22° 36′ 25.03" W Dist 644.4195

Point HTM204 N 10,637,091.1726 E 4,214,248.5894 Sta 191+97.34

Course from HTM204 to HTM205 N 23° 06′ 04.66" W Dist 1,245.2212

Point HTM205 N 10,638,236.5428 E 4,213,760.0170 Sta 204+42.57

Course from HTM205 to PC HTMP12 N 23° 06′ 04.66" W Dist 2,566.1406

Curve Data

Curve HTMP12

P.I. Station	232+46.14	N	10,640,815.3078	E	4,212,660.0117
Delta =	8° 01′ 11.96" (RT)				
Degree =	1° 41′ 29.90"				
Tangent =	237.4358				
Length =	474.0960				
Radius =	3,387.0000				
External =	8.3122				
Long Chord =	473.7091				
Mid. Ord. =	8.2918				
P.C. Station	230+08.71	N	10,640,596.9113	E	4,212,753.1715
P.T. Station	234+82.80	N	10,641,044.5657	E	4,212,598.2334
C.C.		N	10,641,925.8275	E	4,215,868.5769
Back = N	23° 06′ 04.66" W				
Ahead = N	15° 04′ 52.70" W				
Chord Bear = N	19° 05′ 28.68" W				

Curve Data

Curve HTMP13

P.I. Station	241+57.22	N	10,641,695.7582	E	4,212,422.7561
Delta =	4° 42′ 48.44" (RT)				
Degree =	0° 20′ 58.71"				
Tangent =	674.4211				
Length =	1,348.0815				
Radius =	16,387.0000				
External =	13.8723				
Long Chord =	1,347.7014				
Mid. Ord. =	13.8606				

PROPOSED HTM - PHASE 1 STEP 2 (CONT)

P.C. Station	234+82.80	N	10,641,044.5657	E	4,212,598.2334
P.T. Station	248+30.88	N	10,642,359.1677	E	4,212,301.3824
C.C.		N	10,645,308.2907	E	4,228,420.8254
Back = N	15° 04′ 52.70" W				
Ahead = N	10° 22′ 04.26" W				
Chord Bear = N	12° 43′ 28.48" W				

Curve Data

Curve HTMP14

P.I. Station	249+67.89	N	10,642,493.9375	E	4,212,276.7257
Delta =	0° 56′ 42.04" (LT)				
Degree =	0° 20′ 41.59"				
Tangent =	137.0067				
Length =	274.0072				
Radius =	16,612.9999				
External =	0.5649				
Long Chord =	274.0041				
Mid. Ord. =	0.5649				
P.C. Station	248+30.88	N	10,642,359.1677	E	4,212,301.3824
P.T. Station	251+04.89	N	10,642,628.2822	E	4,212,249.8496
C.C.		N	10,639,369.3722	E	4,195,959.6295
Back = N	10° 22′ 04.26" W				
Ahead = N	11° 18′ 46.30" W				
Chord Bear = N	10° 50′ 25.28" W				

Curve Data

Curve HTMP15

P.I. Station	255+55.25	N	10,643,068.7301	E	4,212,155.8882
Delta =	3° 21′ 43.36" (LT)				
Degree =	0° 22′ 24.13"				
Tangent =	450.3588				
Length =	900.4592				
Radius =	15,345.5756				
External =	6.6071				
Long Chord =	900.3300				
Mid. Ord. =	6.6043				
P.C. Station	251+04.89	N	10,642,628.2822	E	4,212,249.8496
P.T. Station	260+05.35	N	10,643,502.9096	E	4,212,036.2584
C.C.		N	10,639,426.6317	E	4,197,241.9809
Back = N	12° 02′ 32.90" W				
Ahead = N	15° 24′ 16.26" W				
Chord Bear = N	13° 43′ 24.58" W				

Curve Data

Curve HTMP16

P.I. Station	262+05.36	N	10,643,696.6159	E	4,211,986.4537
Delta =	1° 22′ 50.30" (LT)				
Degree =	0° 20′ 42.59"				
Tangent =	200.0067				
Length =	399.9939				
Radius =	16,599.5220				
External =	1.2049				
Long Chord =	399.9843				
Mid. Ord. =	1.2048				
P.C. Station	260+05.35	N	10,643,502.9096	E	4,212,036.2584
P.T. Station	264+05.34	N	10,643,889.0660	E	4,211,931.9962
C.C.		N	10,639,369.3722	E	4,195,959.6295
Back = N	14° 25′ 09.33" W				
Ahead = N	15° 47′ 59.64" W				
Chord Bear = N	15° 06′ 34.48" W				

Ending chain HTMP1 description

NOTE:
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STATE OF TEXAS
ROBERT D. AUSTIN
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11/03/2021
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HORIZONTAL ALIGNMENT DATA

SHEET 4 OF 6

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			70
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

PROPOSED HTM - PHASE 2

Beginning chain HTMP2 description

Point HTM210 N 10,633,494.8781 E 4,214,281.1997 Sta 255+00.00

Course from HTM210 to HTM211 N 9° 18′ 20.29" E Dist 765.0091

Point HTM211 N 10,634,249.8195 E 4,214,404.9023 Sta 262+65.01

Course from HTM211 to HTM212 N 9° 37′ 03.57" E Dist 669.9782

Point HTM212 N 10,634,910.3809 E 4,214,516.8373 Sta 269+34.99

Course from HTM212 to HTM213 N 9° 37′ 03.57" E Dist 225.1951

Point HTM213 N 10,635,132.4109 E 4,214,554.4613 Sta 271+60.18

Course from HTM213 to PC HTMP21 N 8° 51′ 12.50" E Dist 281.8212

Curve Data

Curve HTMP21					
P.I. Station	276+38.05	N	10,635,604.5887	E	4,214,628.0096
Delta =	11° 28′ 55.29"	(LT)			
Degree =	2° 56′ 17.43"				
Tangent =	196.0504				
Length =	390.7877				
Radius =	1,950.0467				
External =	9.8303				
Long Chord =	390.1341				
Mid. Ord. =	9.7810				
P.C. Station	274+42.00	N	10,635,410.8742	E	4,214,597.8358
P.T. Station	278+32.79	N	10,635,800.4328	E	4,214,619.0185
C.C.		N	10,635,711.0021	E	4,212,671.0236
Back = N	8° 51′ 12.50" E				
Ahead = N	2° 37′ 42.79" W				
Chord Bear = N	3° 06′ 44.85" E				

Curve Data

Curve HTMP22					
P.I. Station	281+89.11	N	10,636,156.5619	E	4,214,607.4308
Delta =	20° 44′ 35.64"	(LT)			
Degree =	2° 56′ 34.78"				
Tangent =	356.3176				
Length =	704.8343				
Radius =	1,946.8530				
External =	32.3385				
Long Chord =	700.9913				
Mid. Ord. =	31.8101				
P.C. Station	278+32.79	N	10,635,800.4328	E	4,214,619.0185
P.T. Station	285+37.63	N	10,636,485.5016	E	4,214,470.4603
C.C.		N	10,635,737.1198	E	4,212,673.1953
Back = N	1° 51′ 49.06" W				
Ahead = N	22° 36′ 24.70" W				
Chord Bear = N	12° 14′ 06.88" W				

Course from PT HTMP22 to HTM214 N 22° 36′ 24.30" W Dist 644.1806

Point HTM214 N 10,637,080.1866 E 4,214,222.8346 Sta 291+81.81

Course from HTM214 to HTM215 N 23° 06′ 04.66" W Dist 1,245.2212

Point HTM215 N 10,638,225.5568 E 4,213,734.2622 Sta 304+27.03

Course from HTM215 to PC HTMP23 N 23° 06′ 04.66" W Dist 2,566.1406

PROPOSED HTM - PHASE 2 (CONT)

Curve Data

Curve HTMP23					
P.I. Station	332+32.57	N	10,640,806.1272	E	4,212,633.4868
Delta =	8° 01′ 11.96"	(RT)			
Degree =	1° 40′ 39.97"				
Tangent =	239.3987				
Length =	478.0153				
Radius =	3,415.0000				
External =	8.3809				
Long Chord =	477.6252				
Mid. Ord. =	8.3604				
P.C. Station	329+93.17	N	10,640,585.9253	E	4,212,727.4167
P.T. Station	334+71.18	N	10,641,037.2804	E	4,212,571.1978
C.C.		N	10,641,925.8275	E	4,215,868.5769
Back = N	23° 06′ 04.66" W				
Ahead = N	15° 04′ 52.70" W				
Chord Bear = N	19° 05′ 28.68" W				

Curve Data

Curve HTMP24					
P.I. Station	341+46.76	N	10,641,689.5895	E	4,212,395.4196
Delta =	4° 42′ 48.54"	(RT)			
Degree =	0° 20′ 56.56"				
Tangent =	675.5776				
Length =	1,350.3931				
Radius =	16,415.0000				
External =	13.8962				
Long Chord =	1,350.0124				
Mid. Ord. =	13.8844				
P.C. Station	334+71.18	N	10,641,037.2804	E	4,212,571.1978
P.T. Station	348+21.58	N	10,642,354.1367	E	4,212,273.8381
C.C.		N	10,645,308.2907	E	4,228,420.8254
Back = N	15° 04′ 52.70" W				
Ahead = N	10° 22′ 04.16" W				
Chord Bear = N	12° 43′ 28.43" W				

NOTE:
ALIGNMENT RELATED RECONSTRUCTION ENDS AT MILL CREEK. EXISTING ALIGNMENT IS PROVIDED TO REFERENCE MINOR ITEMS OF WORK, (DRIVEWAYS, CROSS CULVERTS, ETC.)

Curve Data

Curve HTMP25					
P.I. Station	349+58.45	N	10,642,488.7762	E	4,212,249.2053
Delta =	0° 56′ 42.04"	(LT)			
Degree =	0° 20′ 42.79"				
Tangent =	136.8742				
Length =	273.7423				
Radius =	16,596.9384				
External =	0.5644				
Long Chord =	273.7392				
Mid. Ord. =	0.5644				
P.C. Station	348+21.58	N	10,642,354.1367	E	4,212,273.8381
P.T. Station	350+95.32	N	10,642,622.9911	E	4,212,222.3552
C.C.		N	10,639,367.2399	E	4,195,947.8829
Back = N	10° 22′ 04.16" W				
Ahead = N	11° 18′ 46.20" W				
Chord Bear = N	10° 50′ 25.18" W				

Curve Data

Curve HTMP26					
P.I. Station	355+45.00	N	10,643,065.4817	E	4,212,142.2578
Delta =	3° 21′ 48.05"	(LT)			
Degree =	0° 22′ 26.68"				
Tangent =	449.6816				
Length =	899.1048				
Radius =	15,316.5582				
External =	6.5997				
Long Chord =	898.9758				
Mid. Ord. =	6.5969				
P.C. Station	350+95.32	N	10,642,622.9911	E	4,212,222.3552
P.T. Station	359+94.42	N	10,643,502.5109	E	4,212,036.3384
C.C.		N	10,639,894.8009	E	4,197,150.7284
Back = N	10° 15′ 37.05" W				
Ahead = N	13° 37′ 25.11" W				
Chord Bear = N	11° 56′ 31.08" W				

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

HORIZONTAL ALIGNMENT DATA

SHEET 5 OF 6

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			71
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

PROPOSED HTM - PHASE 2 (CONT)

			Curve Data			

Curve HTMP27						
P.I. Station		361+94.63	N	10,643,696.4109	E	4,211,986.4890
Delta	=	1° 22′ 55.45"	(LT)			
Degree	=	0° 20′ 42.65"				
Tangent	=	200.2053				
Length	=	400.3911				
Radius	=	16,598.8197				
External	=	1.2073				
Long Chord	=	400.3814				
Mid. Ord.	=	1.2072				
P.C. Station		359+94.42	N	10,643,502.5109	E	4,212,036.3384
P.T. Station		363+94.81	N	10,643,889.0521	E	4,211,931.9774
C.C.			N	10,639,369.5496	E	4,195,960.2864
Back	= N	14° 25′ 04.19" W				
Ahead	= N	15° 47′ 59.64" W				
Chord Bear	= N	15° 06′ 31.91" W				

==========

Ending chain HTMP2 description

NOTE:
ALIGNMENT RELATED RECONSTRUCTION ENDS AT MILL CREEK. EXISTING ALIGNMENT IS PROVIDED TO REFERENCE MINOR ITEMS OF WORK, (DRIVEWAYS, CROSS CULVERTS, ETC.)

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

HORIZONTAL ALIGNMENT DATA

SHEET 6 OF 6

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			72
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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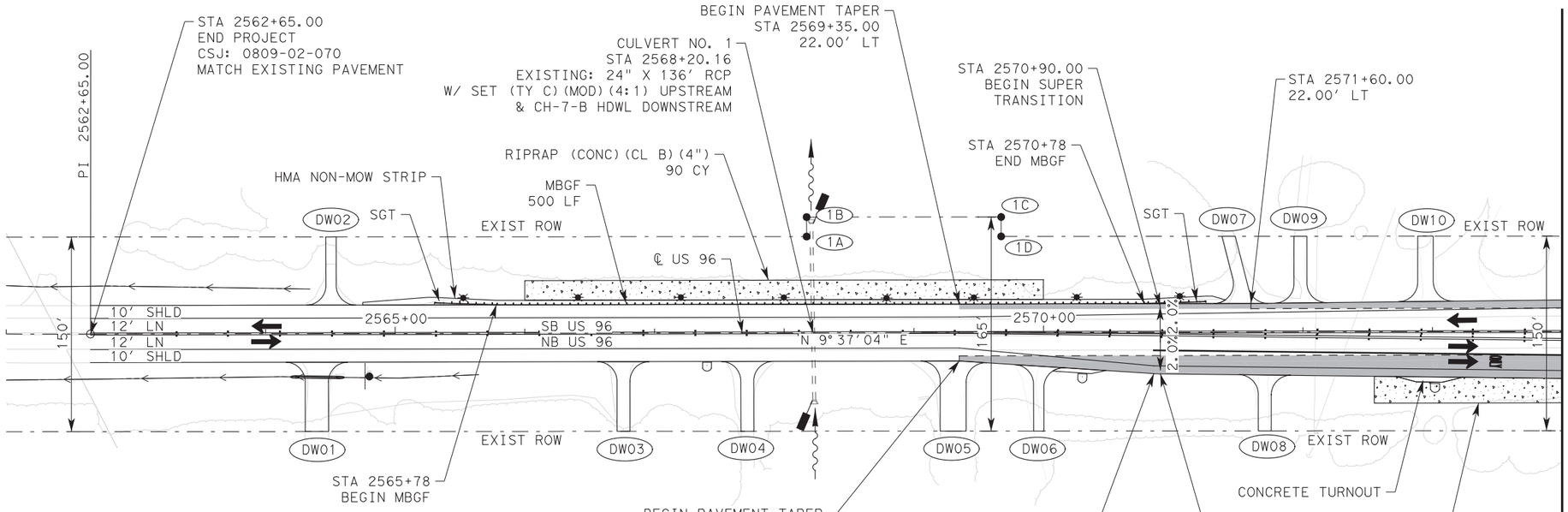


ROW CONTROL		
POINT	STATION	OFFSET
1A	2568+17.43	74.17' LT
1B	2568+17.43	89.17' LT
1C	2569+67.43	89.01' LT
1D	2569+67.43	74.01' LT

LEGEND

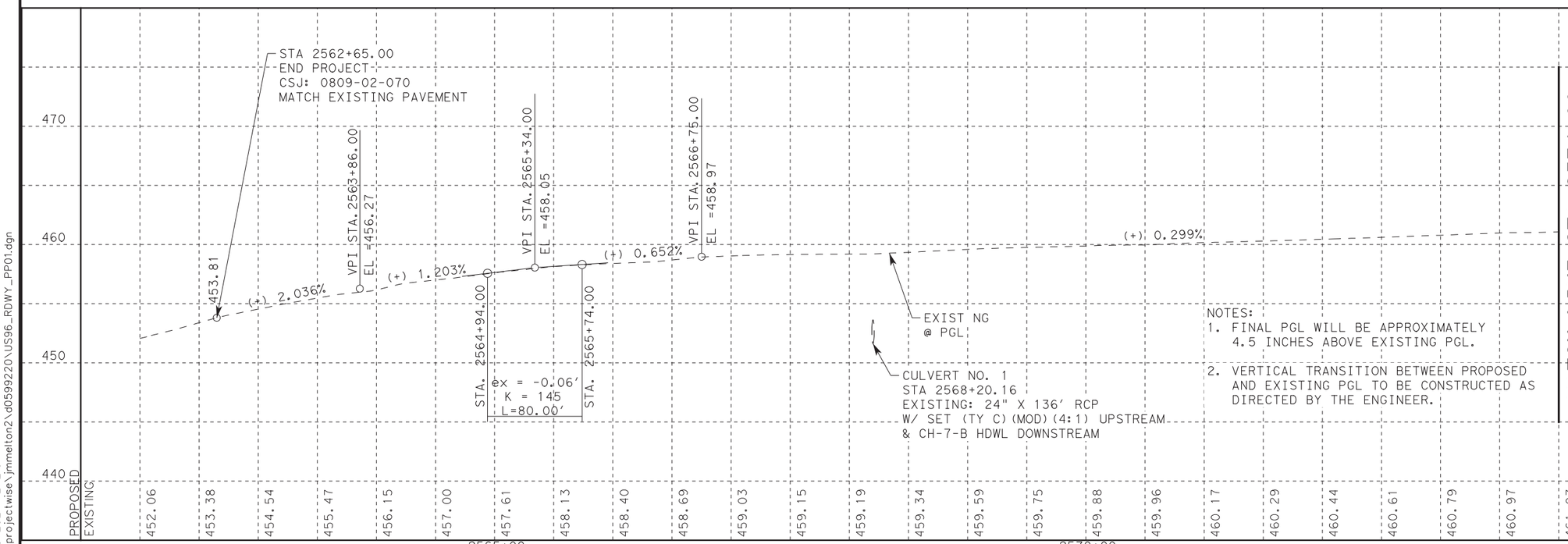
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



NOTES:
1. FINAL PGL WILL BE APPROXIMATELY 4.5 INCHES ABOVE EXISTING PGL.
2. VERTICAL TRANSITION BETWEEN PROPOSED AND EXISTING PGL TO BE CONSTRUCTED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2562+65 TO STA 2574+00)

SHEET 1 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			73
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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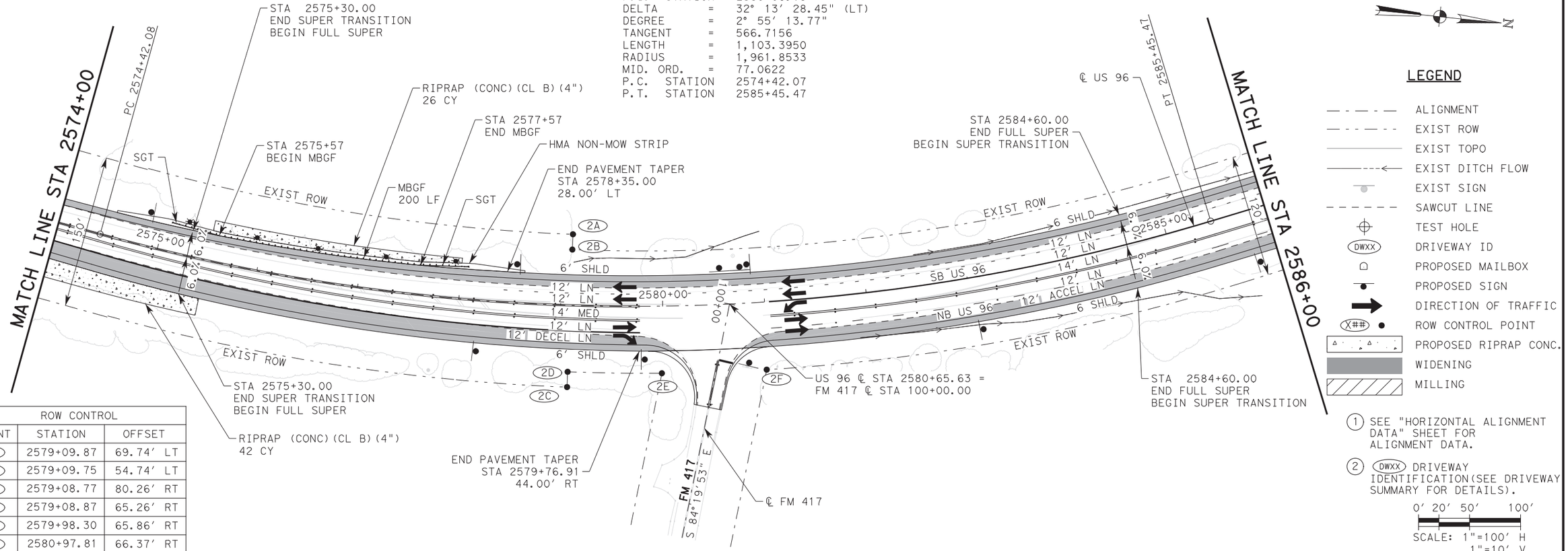
C-1
P.I. STATION 2580+08.79
DELTA = 32° 13′ 28.45" (LT)
DEGREE = 2° 55′ 13.77"
TANGENT = 566.7156
LENGTH = 1,103.3950
RADIUS = 1,961.8533
MID. ORD. = 77.0622
P.C. STATION 2574+42.07
P.T. STATION 2585+45.47



ROW CONTROL		
POINT	STATION	OFFSET
2A	2579+09.87	69.74′ LT
2B	2579+09.75	54.74′ LT
2C	2579+08.77	80.26′ RT
2D	2579+08.87	65.26′ RT
2E	2579+98.30	65.86′ RT
2F	2580+97.81	66.37′ RT

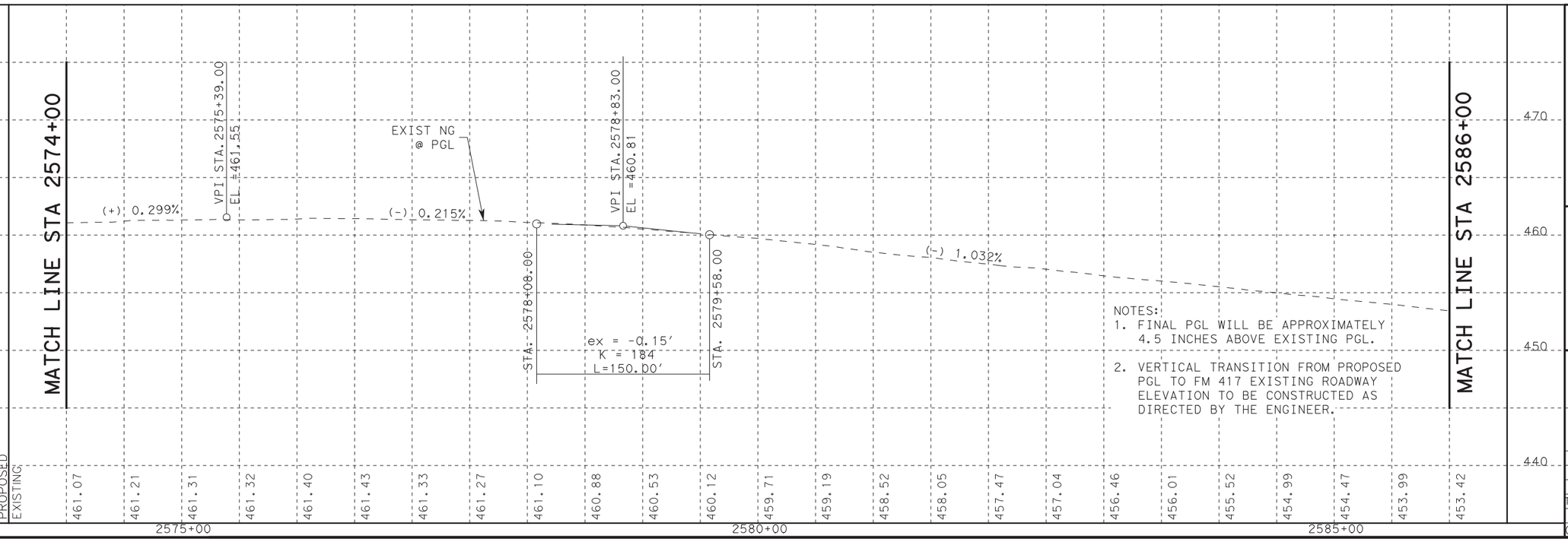
LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



NOTES:
1. FINAL PGL WILL BE APPROXIMATELY 4.5 INCHES ABOVE EXISTING PGL.
2. VERTICAL TRANSITION FROM PROPOSED PGL TO FM 417 EXISTING ROADWAY ELEVATION TO BE CONSTRUCTED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2574+00 TO STA 2586+00)

SHEET 2 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			74
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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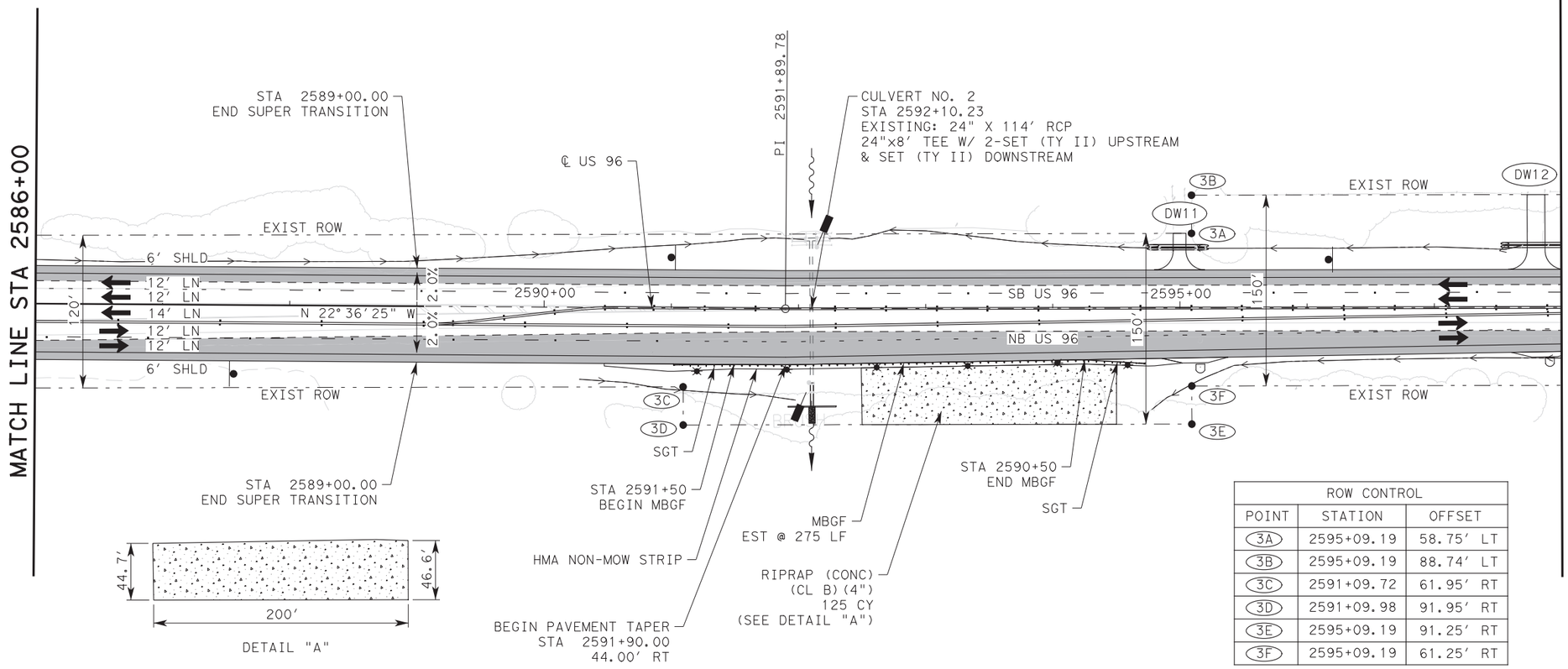


ROW CONTROL		
POINT	STATION	OFFSET
3A	2595+09.19	58.75' LT
3B	2595+09.19	88.74' LT
3C	2591+09.72	61.95' RT
3D	2591+09.98	91.95' RT
3E	2595+09.19	91.25' RT
3F	2595+09.19	61.25' RT

LEGEND

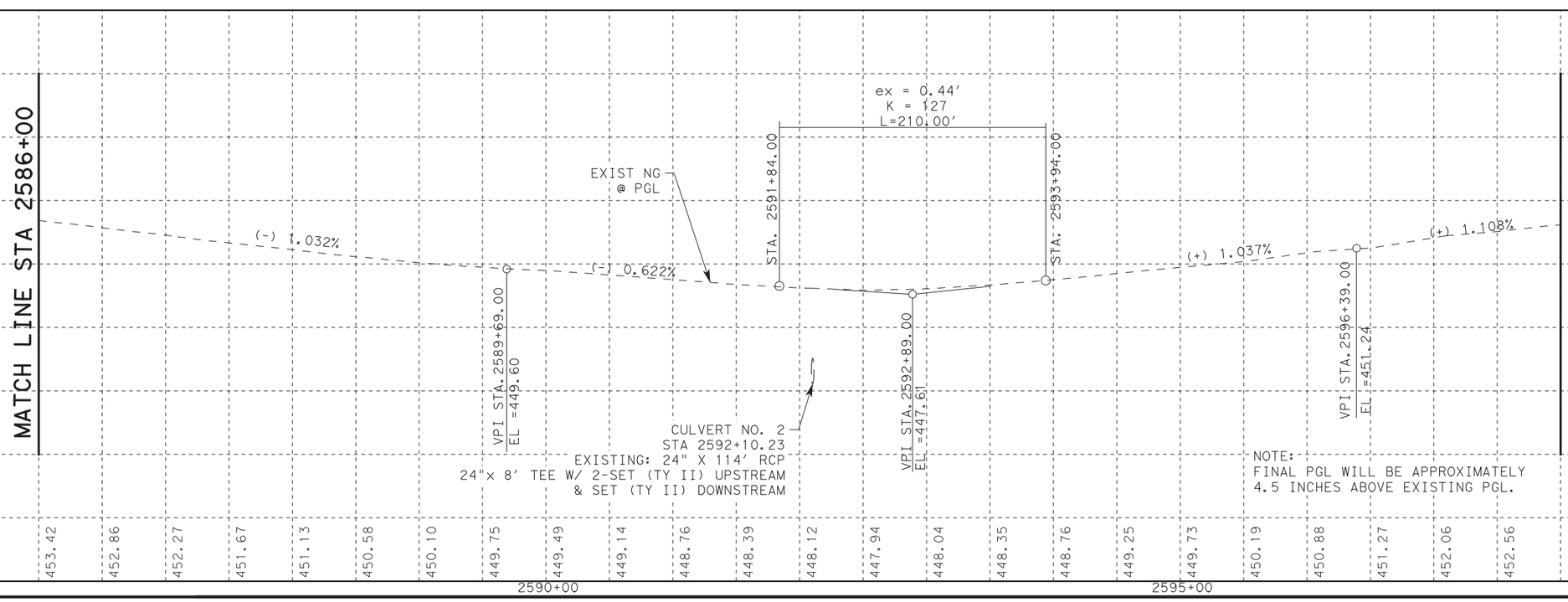
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2586+00 TO STA 2598+00)

SHEET 3 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			75
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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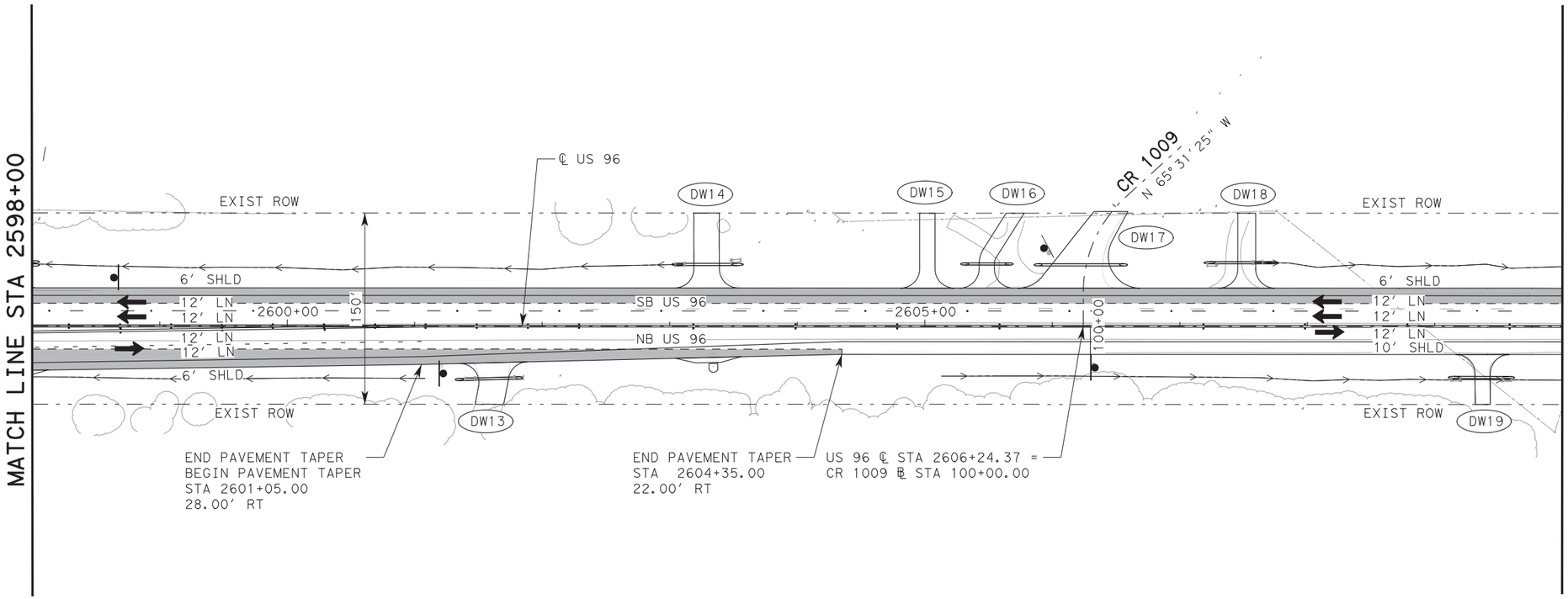


LEGEND

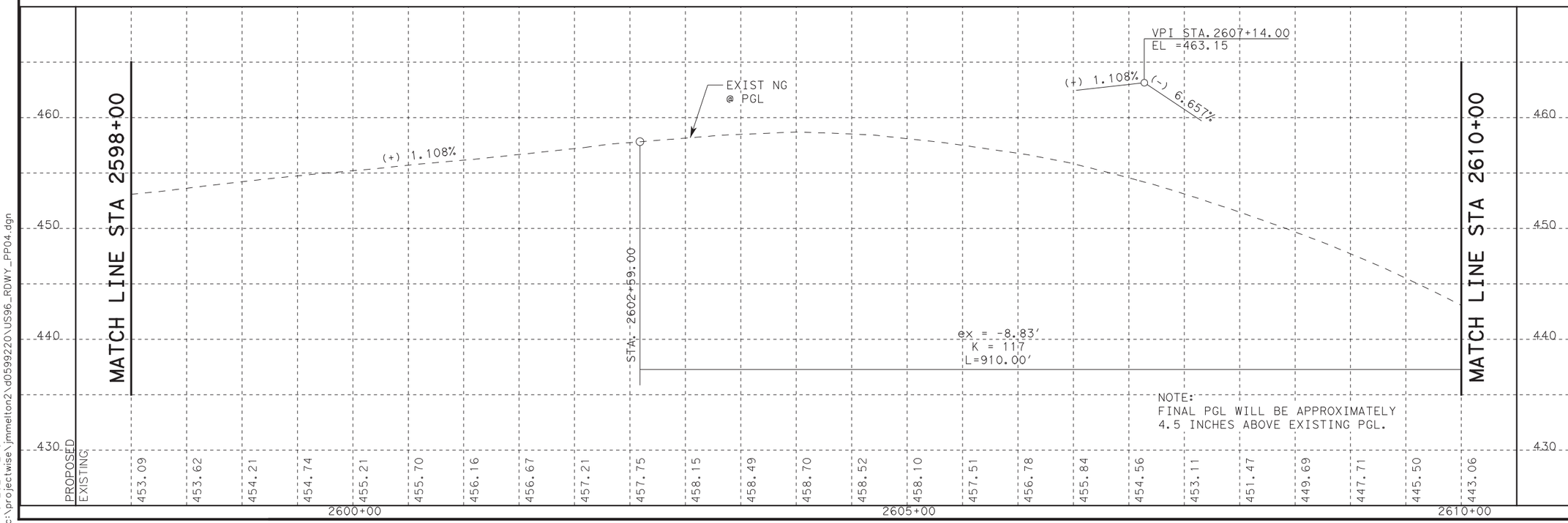
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2598+00 TO STA 2610+00)

SHEET 4 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			76
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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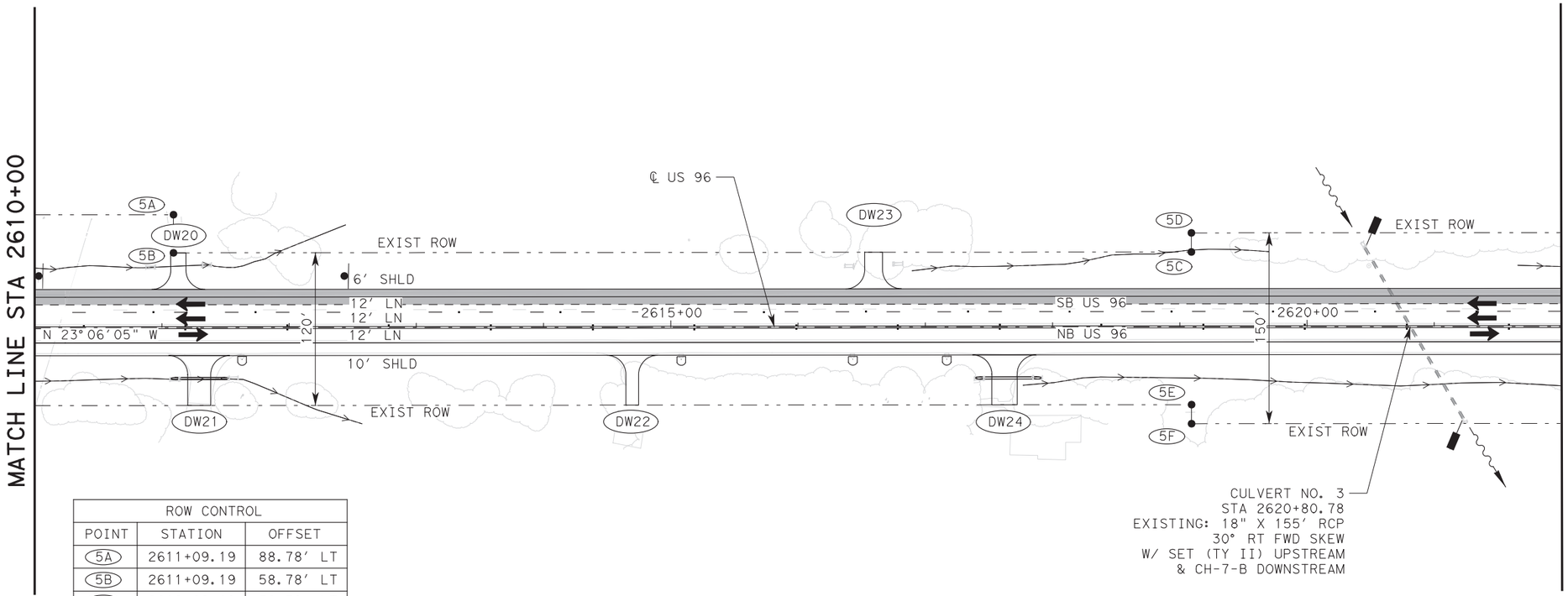


ROW CONTROL		
POINT	STATION	OFFSET
5A	2611+09.19	88.78' LT
5B	2611+09.19	58.78' LT
5C	2619+09.19	58.79' LT
5D	2619+09.19	73.79' LT
5E	2619+09.19	61.21' RT
5F	2619+09.19	76.21' RT

LEGEND

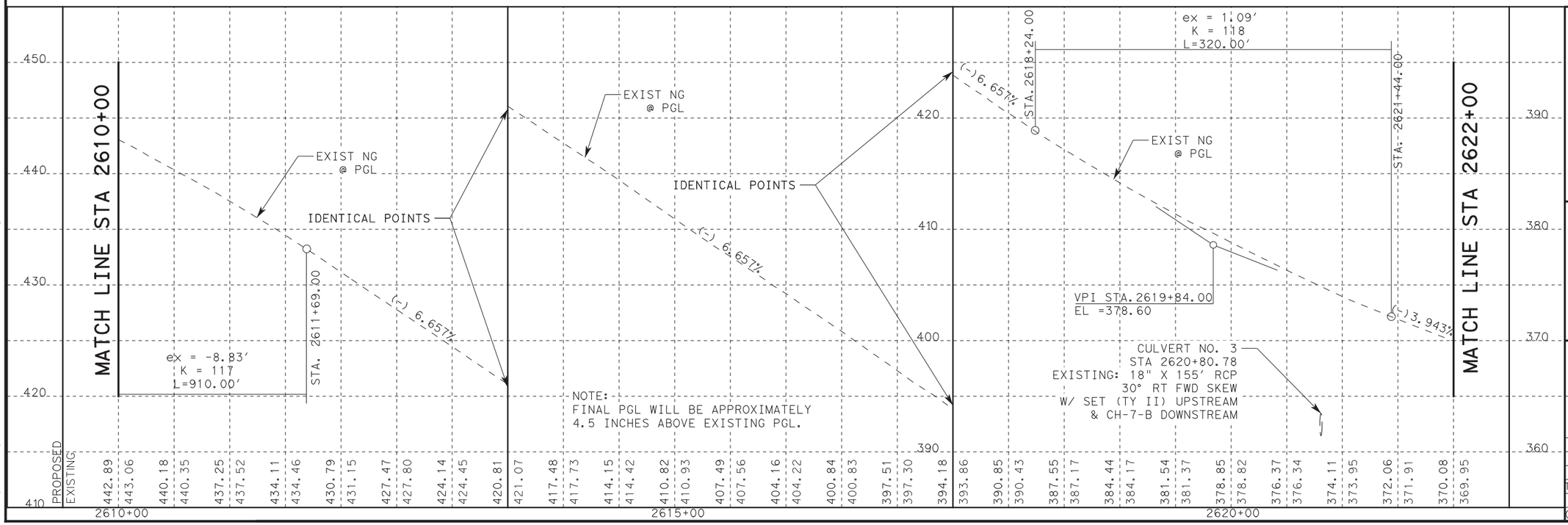
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
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11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2610+00 TO STA 2622+00)

SHEET 5 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			77
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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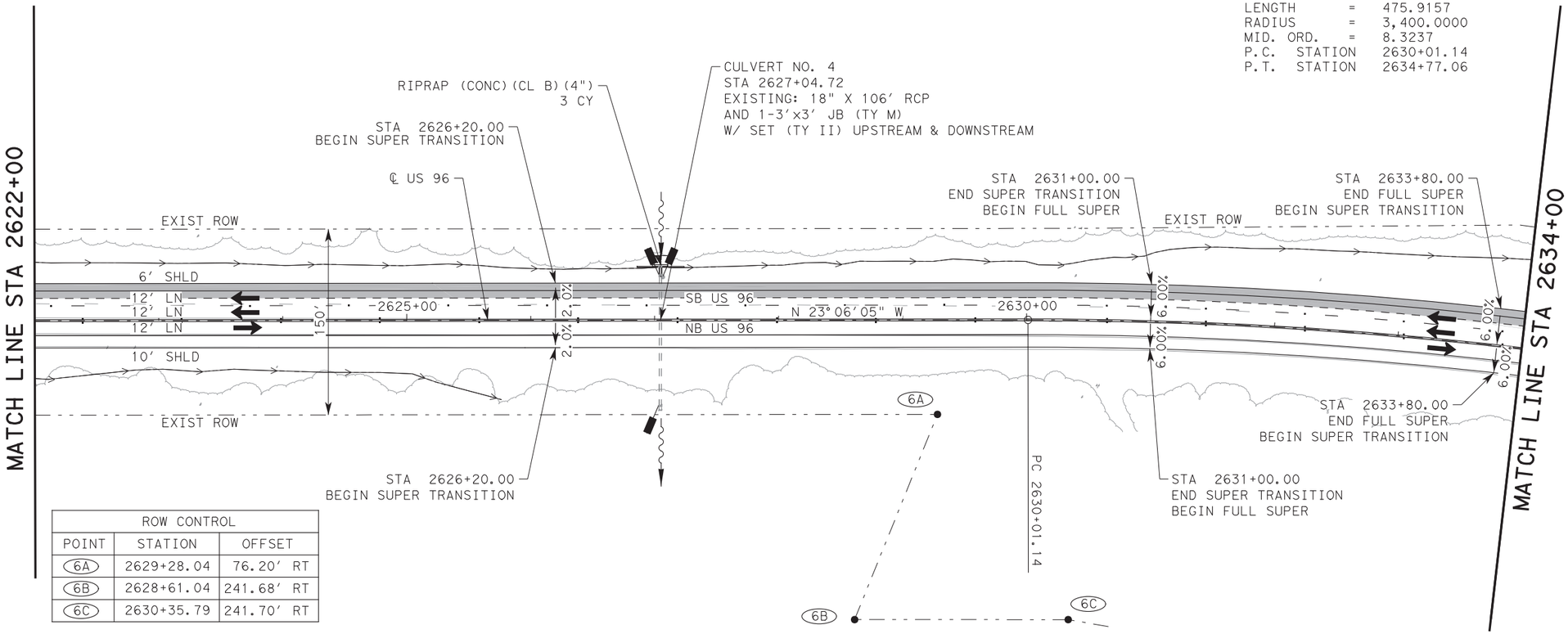
C-2
P.I. STATION = 2632+39.49
DELTA = 8° 01′ 11.96" (RT)
DEGREE = 1° 41′ 06.61"
TANGENT = 238.3471
LENGTH = 475.9157
RADIUS = 3,400.0000
MID. ORD. = 8.3237
P.C. STATION = 2630+01.14
P.T. STATION = 2634+77.06



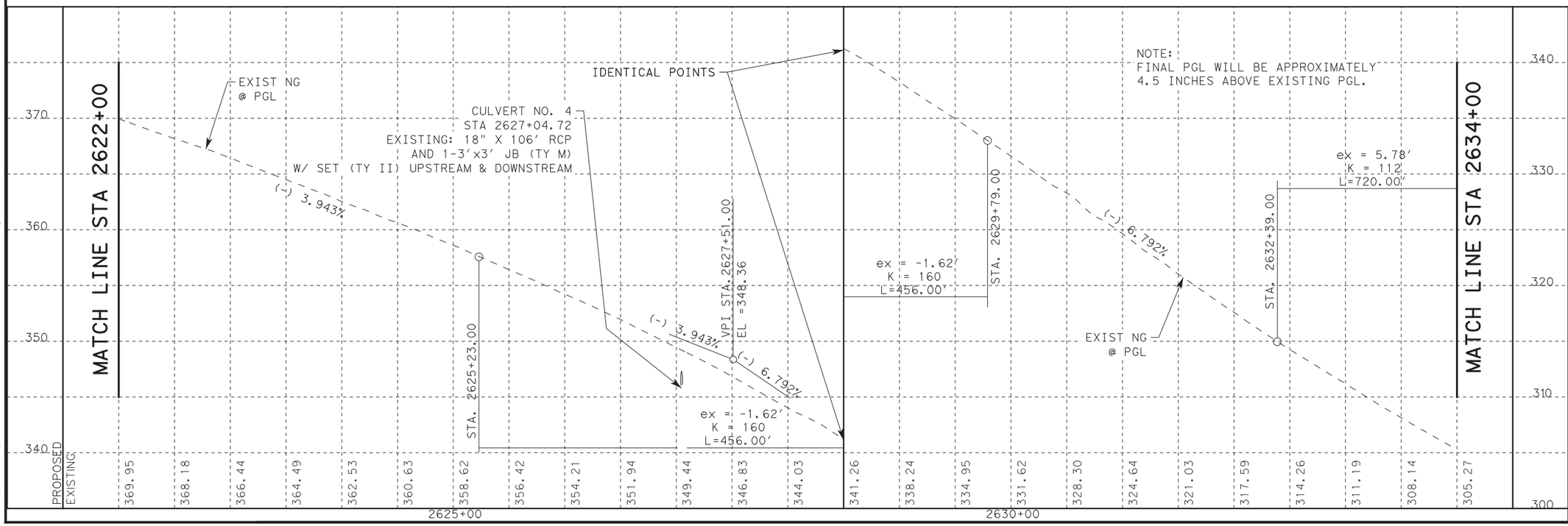
ROW CONTROL		
POINT	STATION	OFFSET
6A	2629+28.04	76.20′ RT
6B	2628+61.04	241.68′ RT
6C	2630+35.79	241.70′ RT

LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.
2. (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2622+00 TO STA 2634+00)

SHEET 6 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			78
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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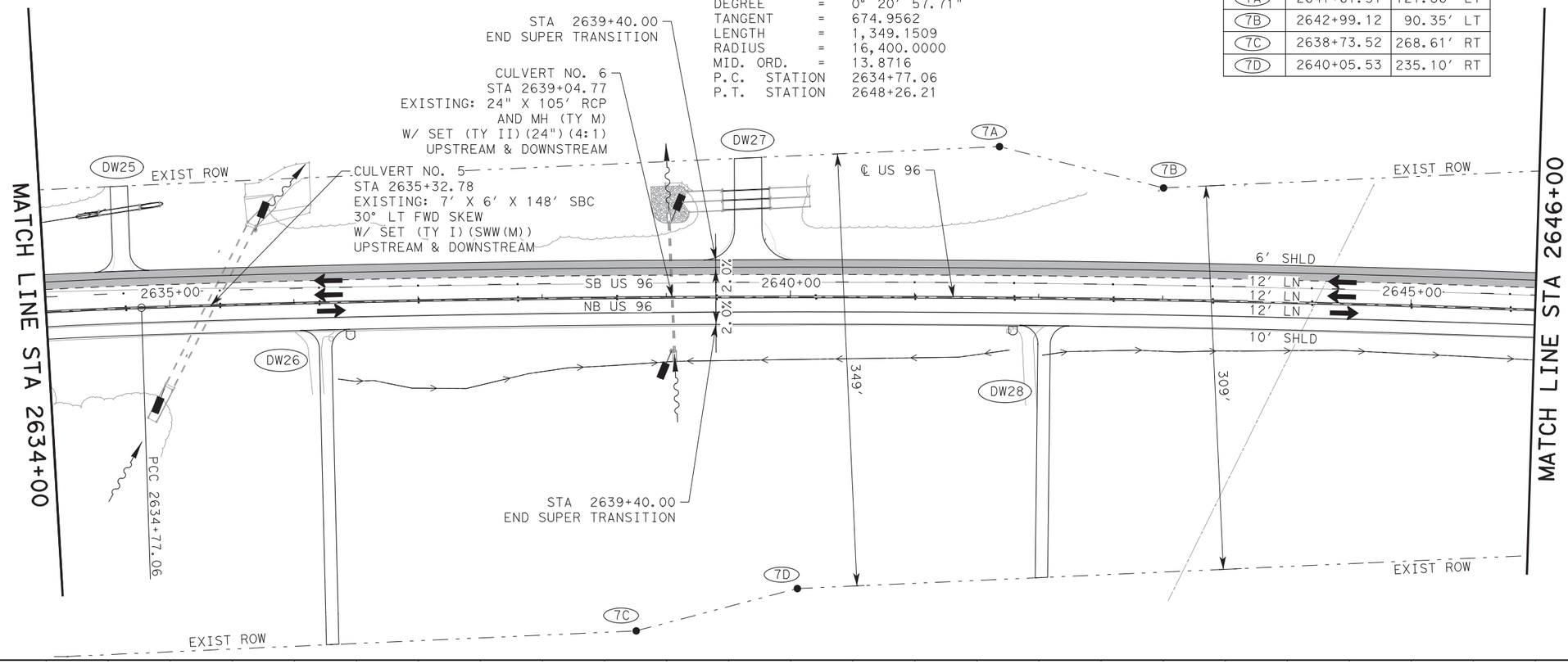
C-3
P.I. STATION = 2641+52.01
DELTA = 4° 42′ 48.44" (RT)
DEGREE = 0° 20′ 57.71"
TANGENT = 674.9562
LENGTH = 1,349.1509
RADIUS = 16,400.0000
MID. ORD. = 13.8716
P.C. STATION = 2634+77.06
P.T. STATION = 2648+26.21

ROW CONTROL		
POINT	STATION	OFFSET
7A	2641+67.37	121.86′ LT
7B	2642+99.12	90.35′ LT
7C	2638+73.52	268.61′ RT
7D	2640+05.53	235.10′ RT

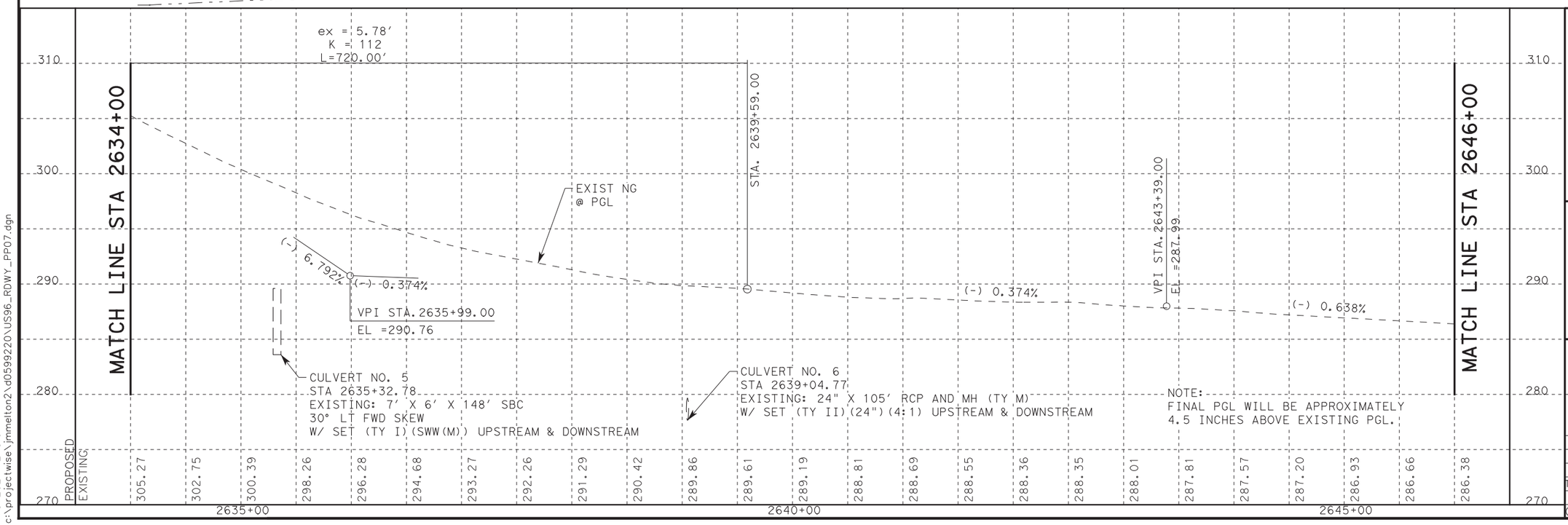


LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.
2. (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2634+00 TO STA 2646+00)

SHEET 7 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			79
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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C-4

P.I. STATION		2656+28.71
DELTA	=	5° 32' 07.60" (LT)
DEGREE	=	0° 20' 42.56"
TANGENT	=	802.5017
LENGTH	=	1,603.7547
RADIUS	=	16,600.0000
MID. ORD.	=	19.3639
P.C. STATION		2648+26.21
P.T. STATION		2664+29.96

ROW CONTROL

POINT	STATION	OFFSET
8A	2651+97.94	162.91' LT
8B	2651+95.75	192.84' LT
8C	2657+01.26	221.38' LT
8D	2657+02.53	191.41' LT

LEGEND

- · - · -	ALIGNMENT
- · · - · · -	EXIST ROW
———	EXIST TOPO
——←——	EXIST DITCH FLOW
●	EXIST SIGN
- - - - -	SAWCUT LINE
⊕	TEST HOLE
DWXX	DRIVEWAY ID
⌂	PROPOSED MAILBOX
●	PROPOSED SIGN
➡	DIRECTION OF TRAFFIC
X## ●	ROW CONTROL POINT
▨	PROPOSED RIPRAP CONC.
▬	WIDENING
▨	MILLING

① SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

② DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V

NOTE:
FINAL PGL WILL BE APPROXIMATELY 4.5 INCHES ABOVE EXISTING PGL.

ROBERT D. AUSTIN
67596
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2646+00 TO
STA 2658+00)

SHEET 8 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			80
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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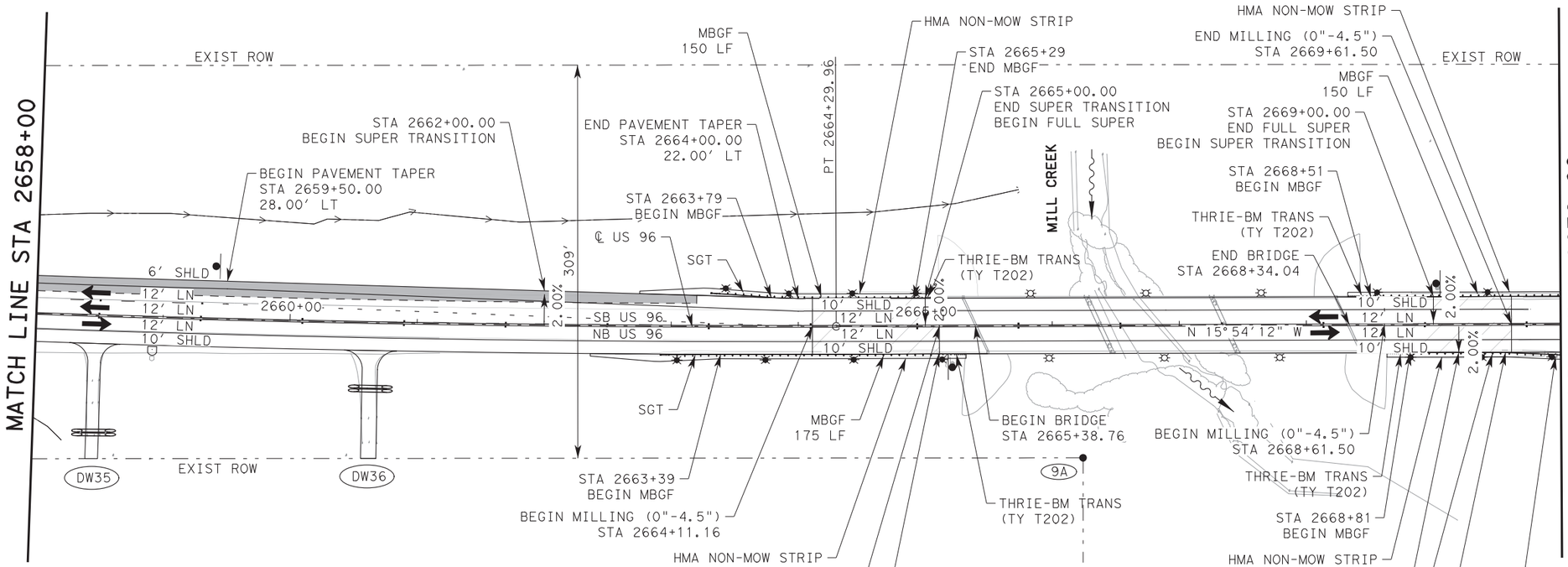


ROW CONTROL		
POINT	STATION	OFFSET
9A	2666+23.93	104.02' RT
9B	2666+23.53	300.87' RT

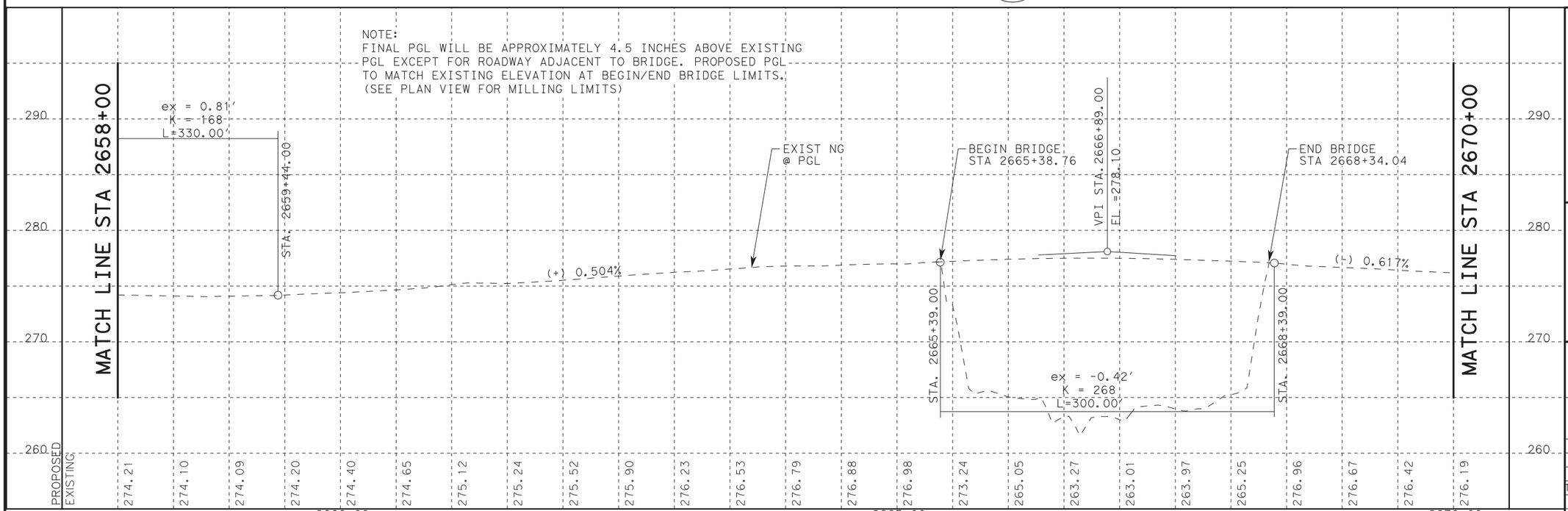
LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.
2. (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2658+00 TO STA 2670+00)

SHEET 9 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.			SHEET NO.
6				81
STATE	STATE DIST. NO.	COUNTY		
TEXAS	LFK	SHELBY		
CONT	SECT	JOB	HIGHWAY	
0809	02	070	US 96	

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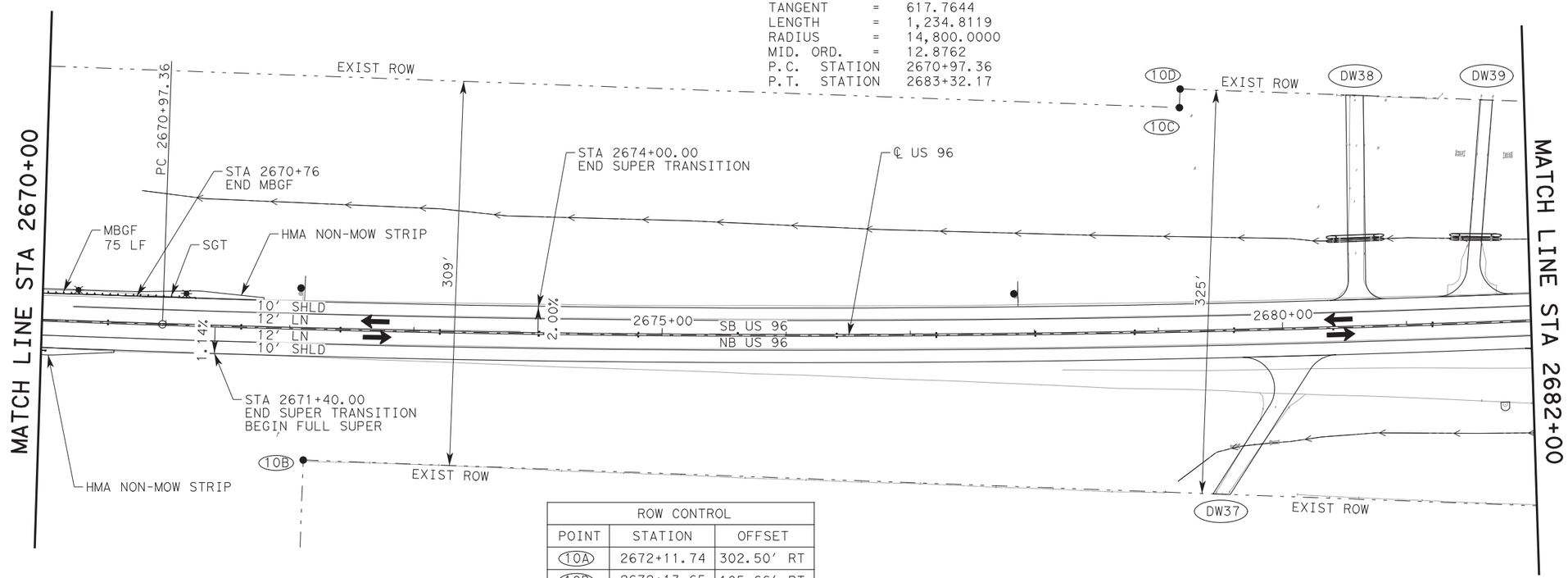
C-5
P.I. STATION 2677+15.13
DELTA = 4° 46′ 49.34" (LT)
DEGREE = 0° 23′ 13.68"
TANGENT = 617.7644
LENGTH = 1,234.8119
RADIUS = 14,800.0000
MID. ORD. = 12.8762
P.C. STATION 2670+97.36
P.T. STATION 2683+32.17



ROW CONTROL		
POINT	STATION	OFFSET
10A	2672+11.74	302.50′ RT
10B	2672+13.65	105.66′ RT
10C	2679+20.65	180.13′ LT
10D	2579+21.52	195.10′ LT

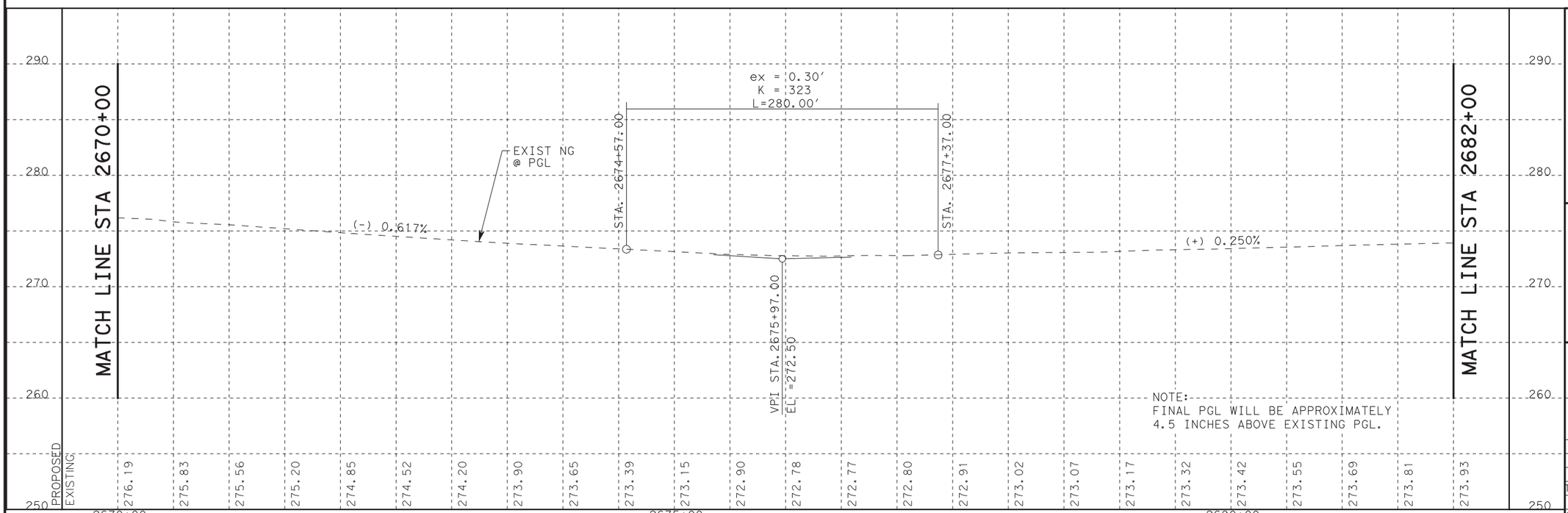
LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



NOTE:
FINAL PGL WILL BE APPROXIMATELY 4.5 INCHES ABOVE EXISTING PGL.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2670+00 TO STA 2682+00)

SHEET 10 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			82
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

11/3/2021 2:16:11 PM
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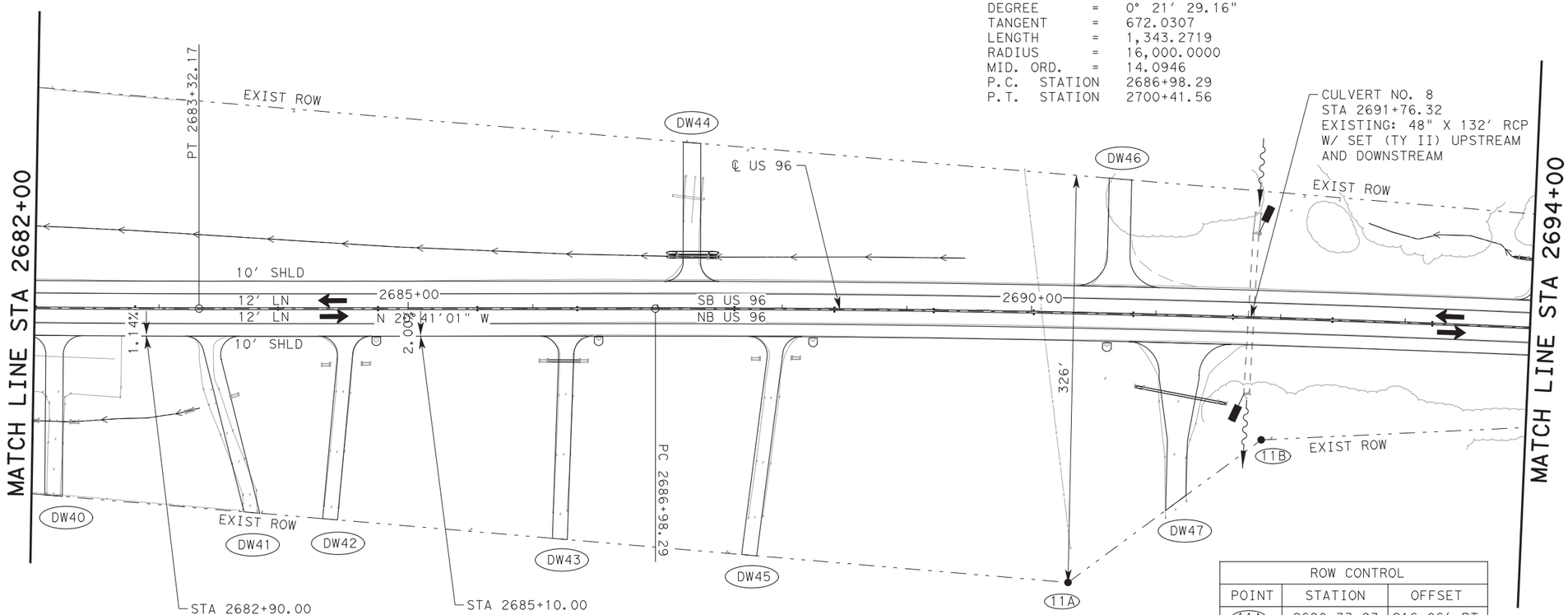
C-6
P.I. STATION 2693+70.32
DELTA = 4° 48′ 36.86" (RT)
DEGREE = 0° 21′ 29.16"
TANGENT = 672.0307
LENGTH = 1,343.2719
RADIUS = 16,000.0000
MID. ORD. = 14.0946
P.C. STATION 2686+98.29
P.T. STATION 2700+41.56



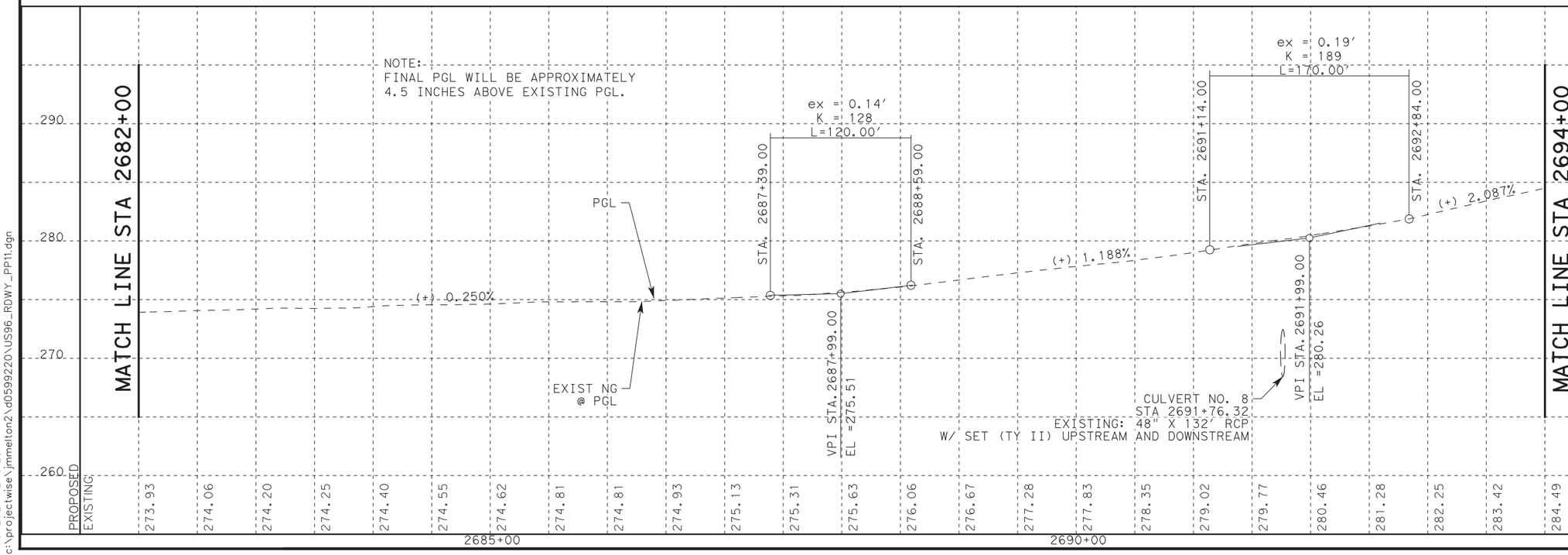
ROW CONTROL		
POINT	STATION	OFFSET
11A	2690+33.93	216.06′ RT
11B	2691+87.44	97.80′ RT

LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.
2. (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA. 2682+00 TO STA. 2694+00)

SHEET 11 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			83
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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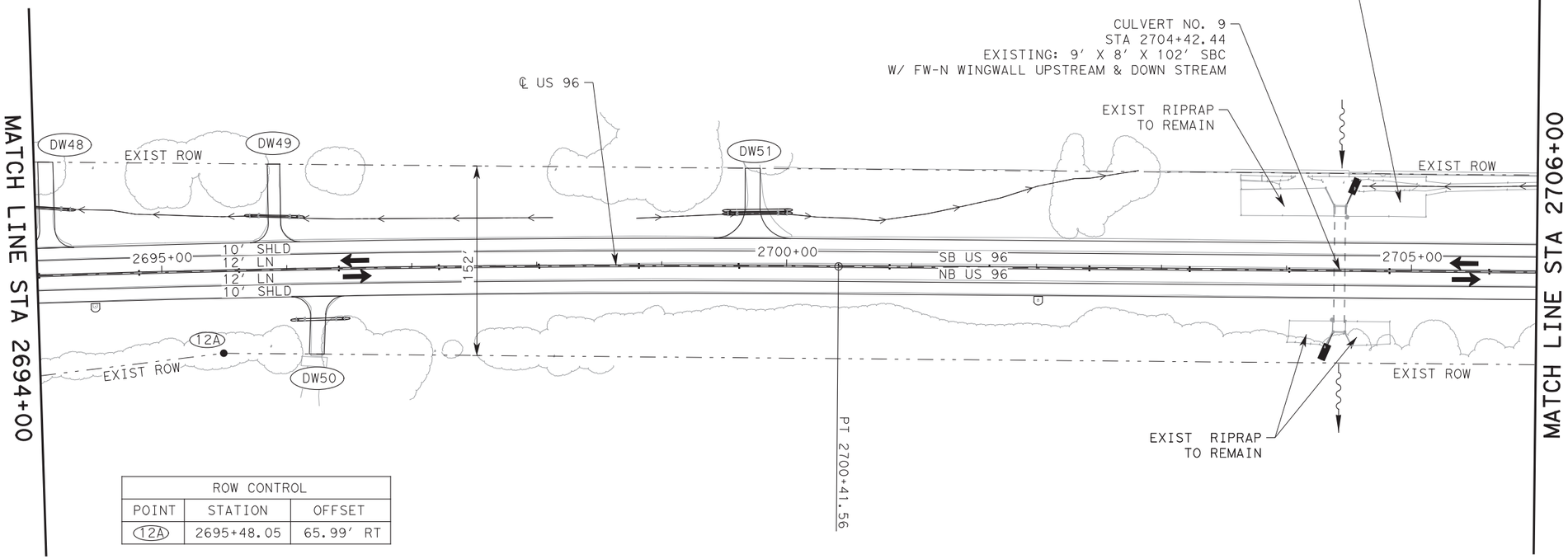


ROW CONTROL		
POINT	STATION	OFFSET
12A	2695+48.05	65.99' RT

LEGEND

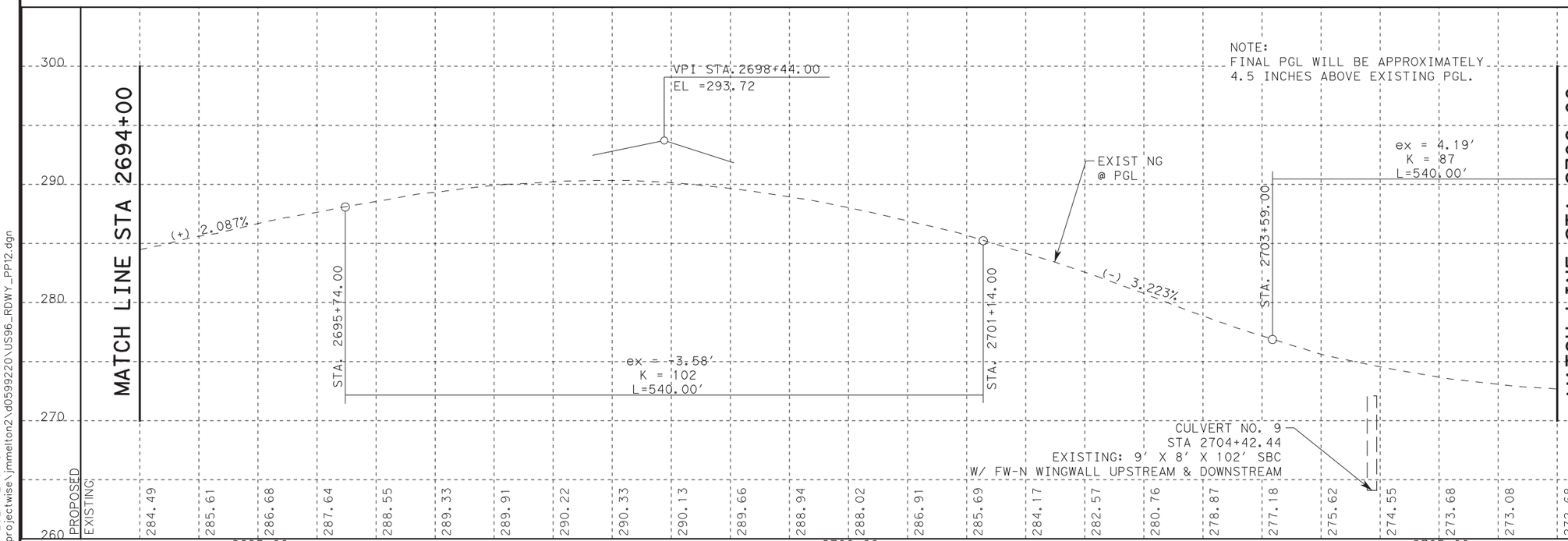
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2694+00 TO STA 2706+00)

SHEET 12 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			84
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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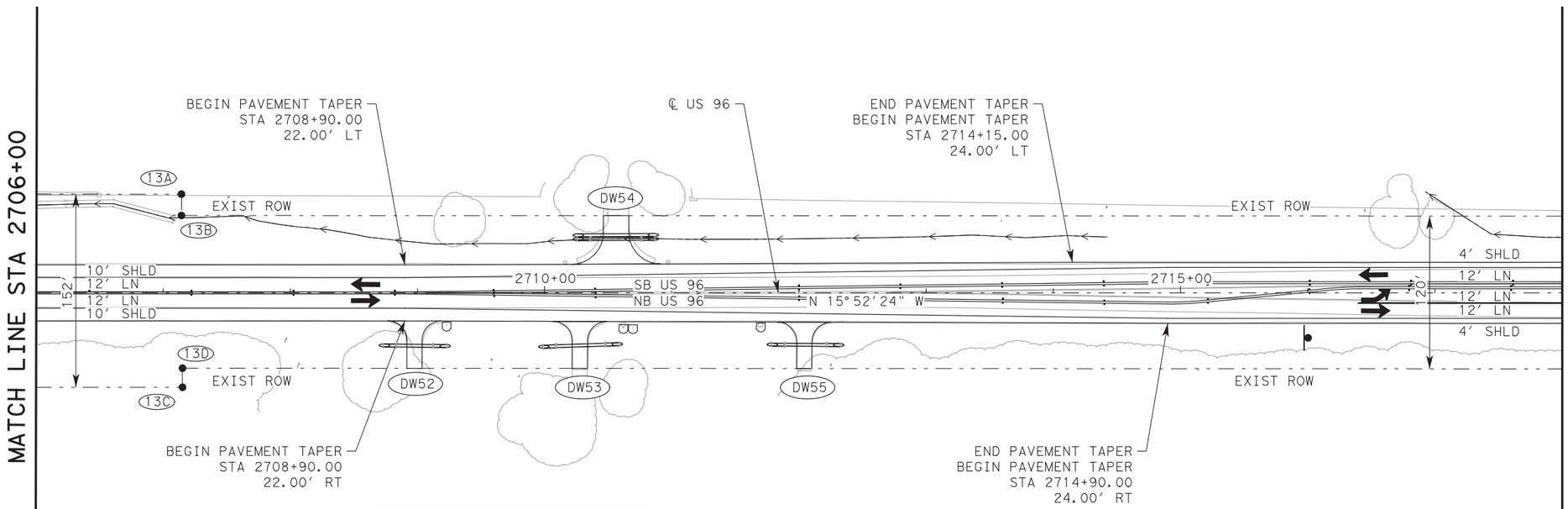


ROW CONTROL		
POINT	STATION	OFFSET
13A	2707+14.42	77.58' LT
13B	2707+14.42	60.85' LT
13C	2707+15.24	74.15' RT
13D	2707+15.24	59.15' RT

LEGEND

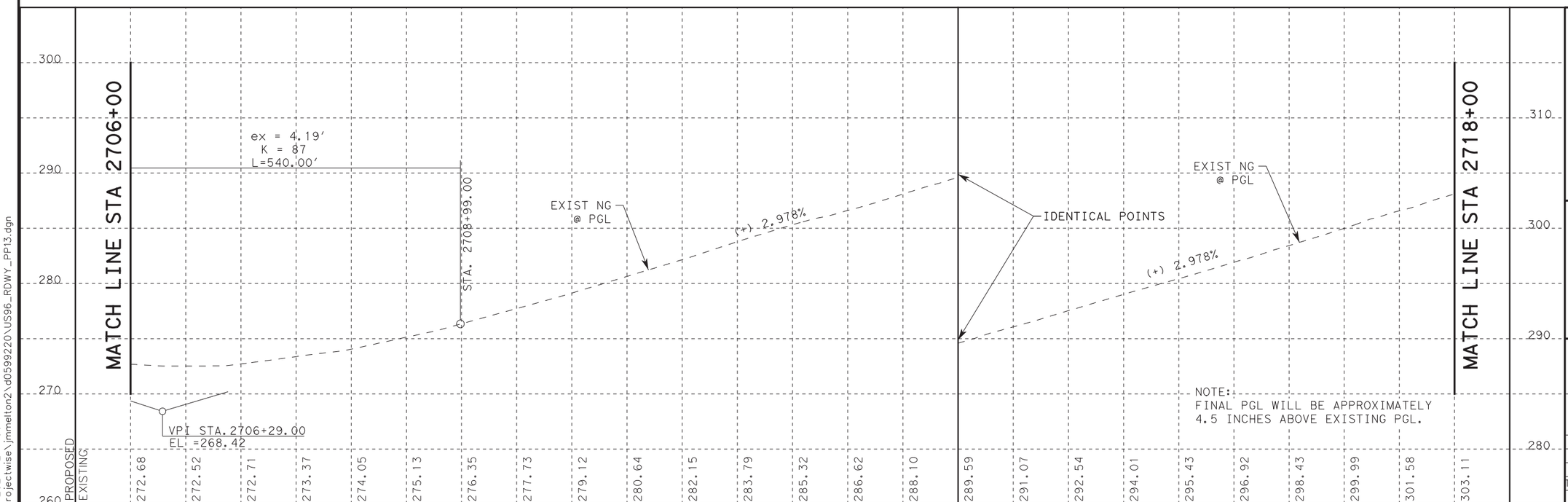
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



NOTE:
FINAL PGL WILL BE APPROXIMATELY
4.5 INCHES ABOVE EXISTING PGL.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2706+00 TO
STA 2718+00)

SHEET 13 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			85
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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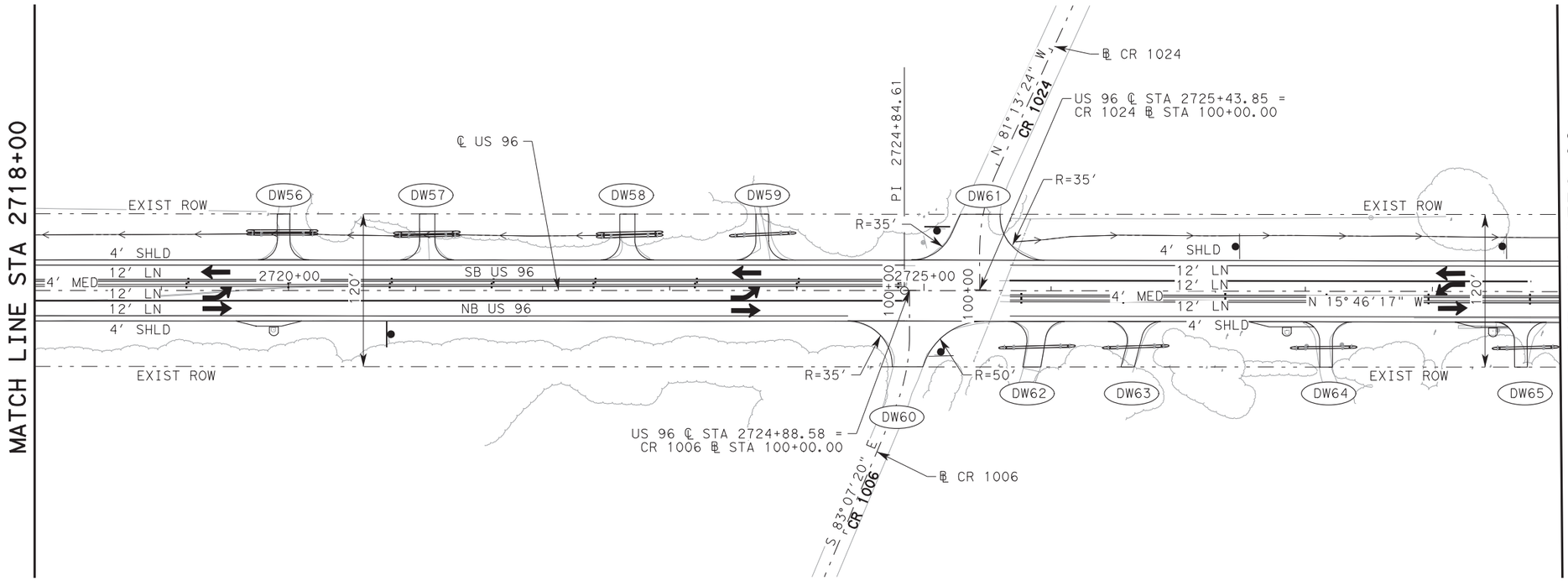


LEGEND

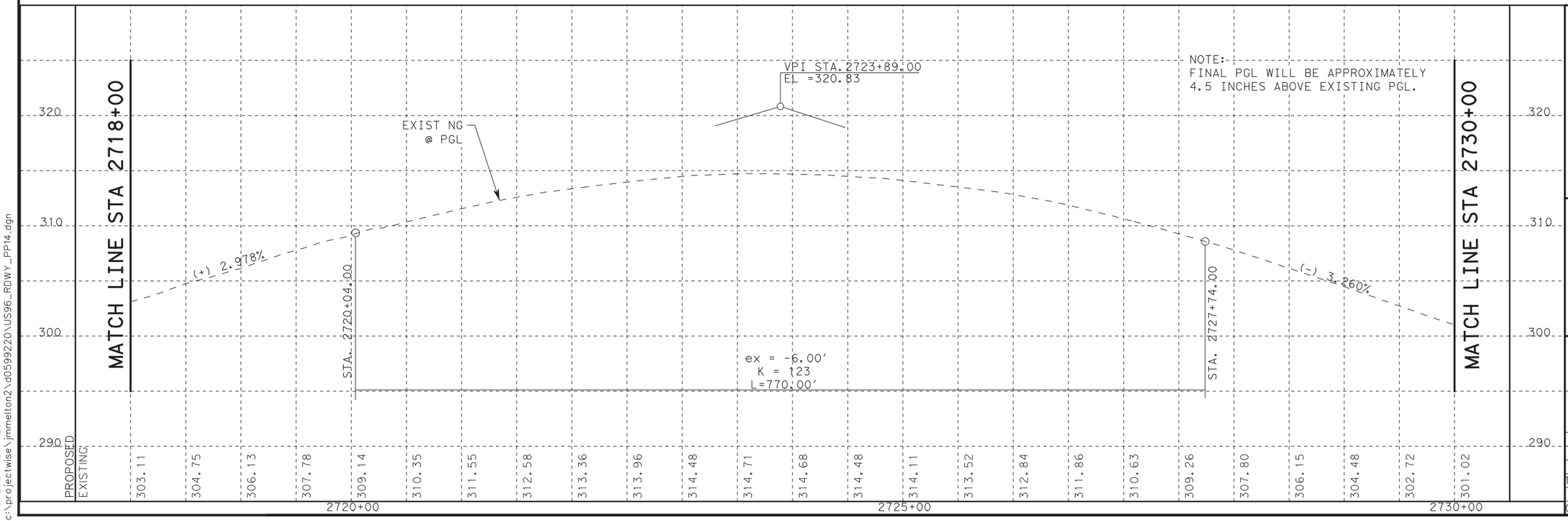
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA. 2718+00 TO STA. 2730+00)

SHEET 14 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			86
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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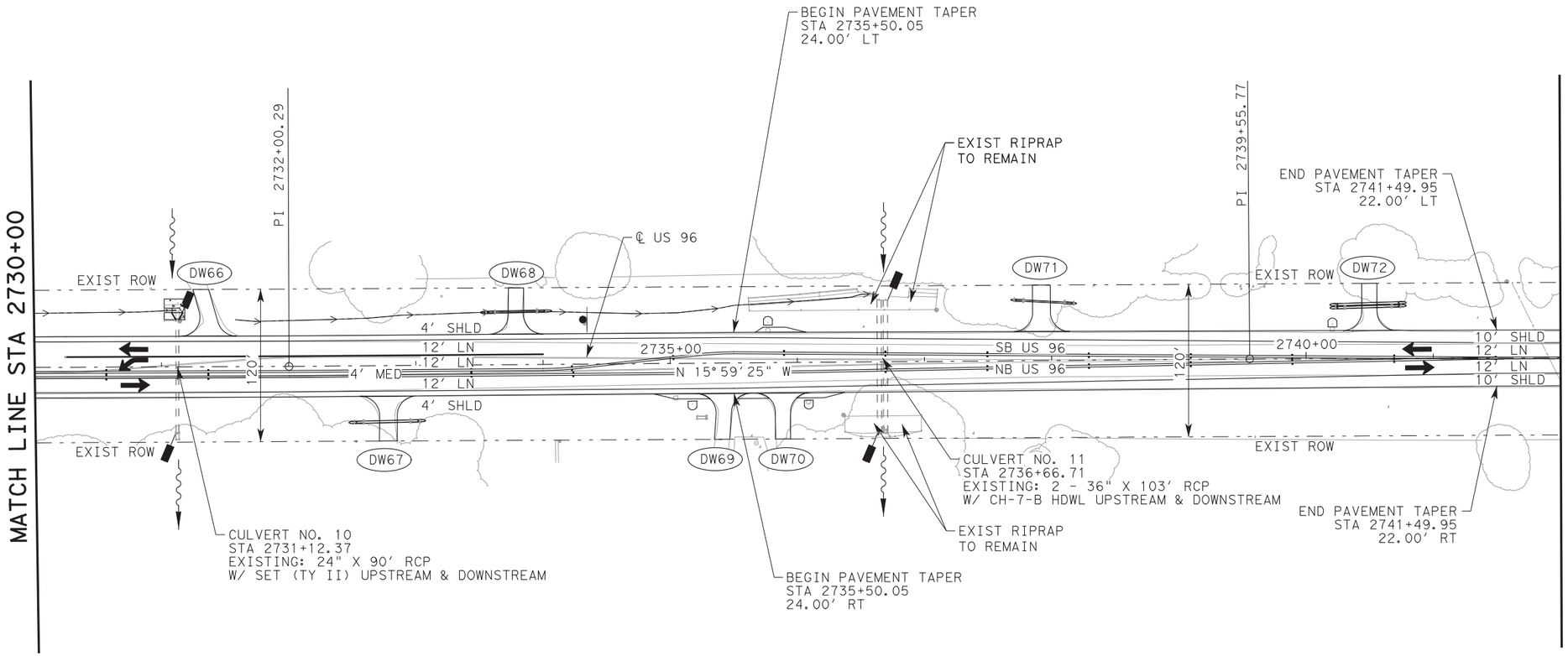

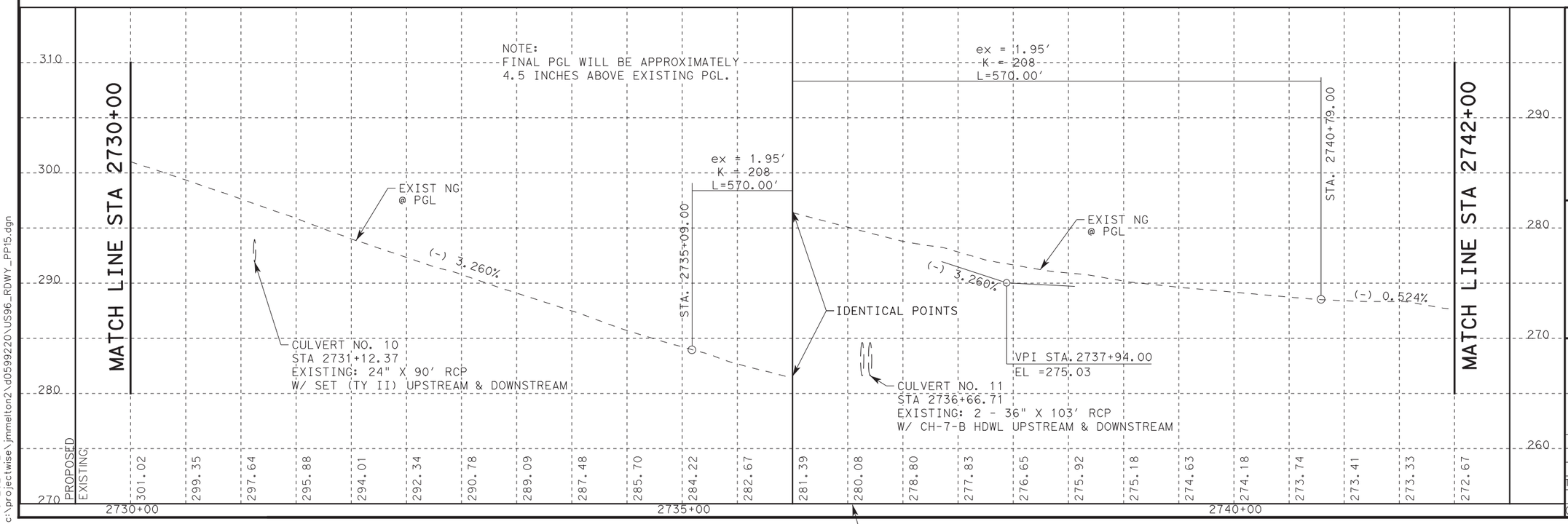

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2730+00 TO STA 2742+00)

SHEET 15 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			87
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

11/3/2021 2:17:47 PM
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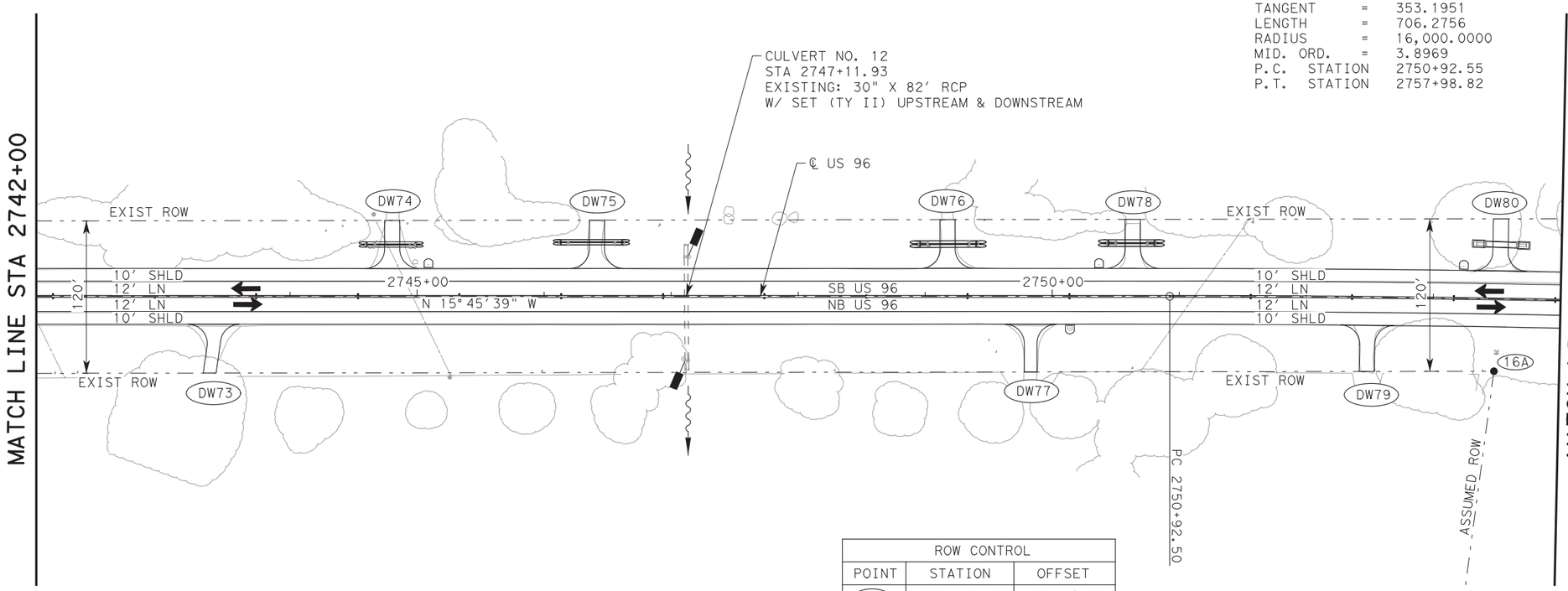
C-7
P.I. STATION = 2754+45.74
DELTA = 2° 31′ 44.99" (RT)
DEGREE = 0° 21′ 29.16"
TANGENT = 353.1951
LENGTH = 706.2756
RADIUS = 16,000.0000
MID. ORD. = 3.8969
P.C. STATION = 2750+92.55
P.T. STATION = 2757+98.82



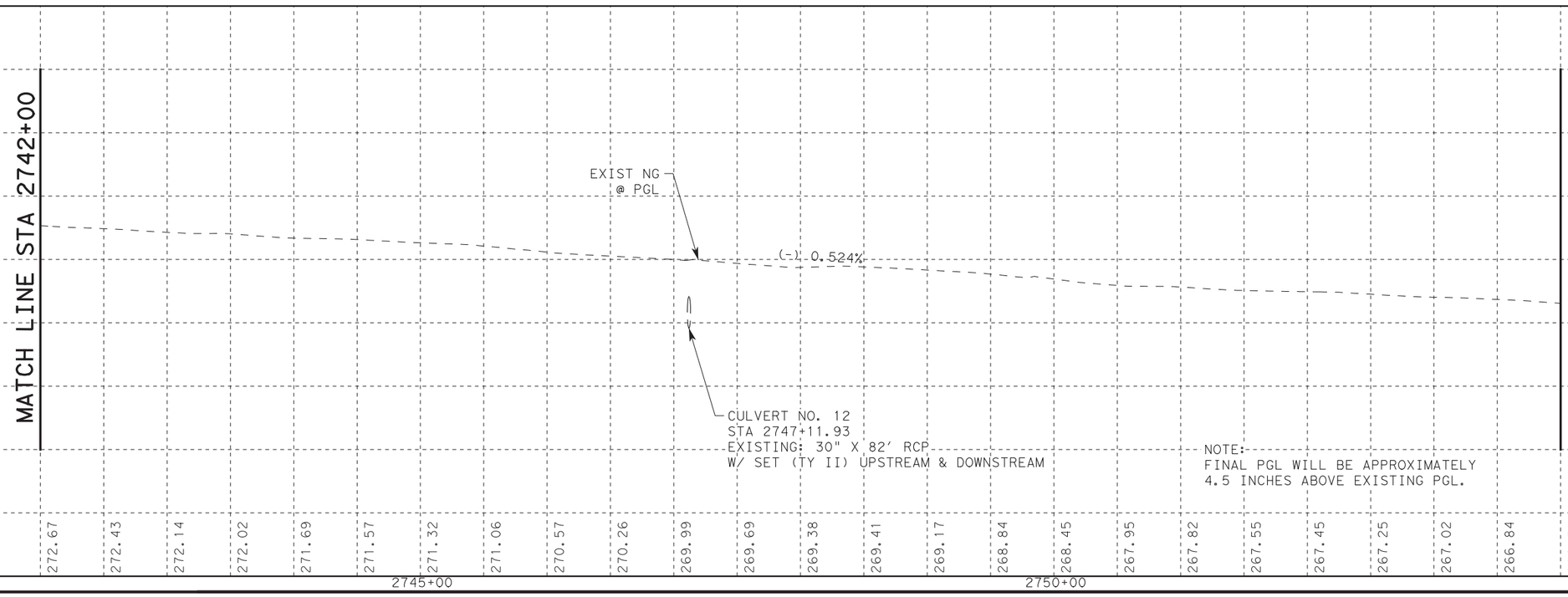
ROW CONTROL		
POINT	STATION	OFFSET
16A	2753+48.59	56.95′ RT
16B	2753+25.46	252.36′ RT

LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.
2. DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′
SCALE: 1"=100′ H
1"=10′ V



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

PLAN & PROFILE

(STA 2742+00 TO STA 2754+00)

SHEET 16 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			88
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

11/3/2021 2:18:08 PM
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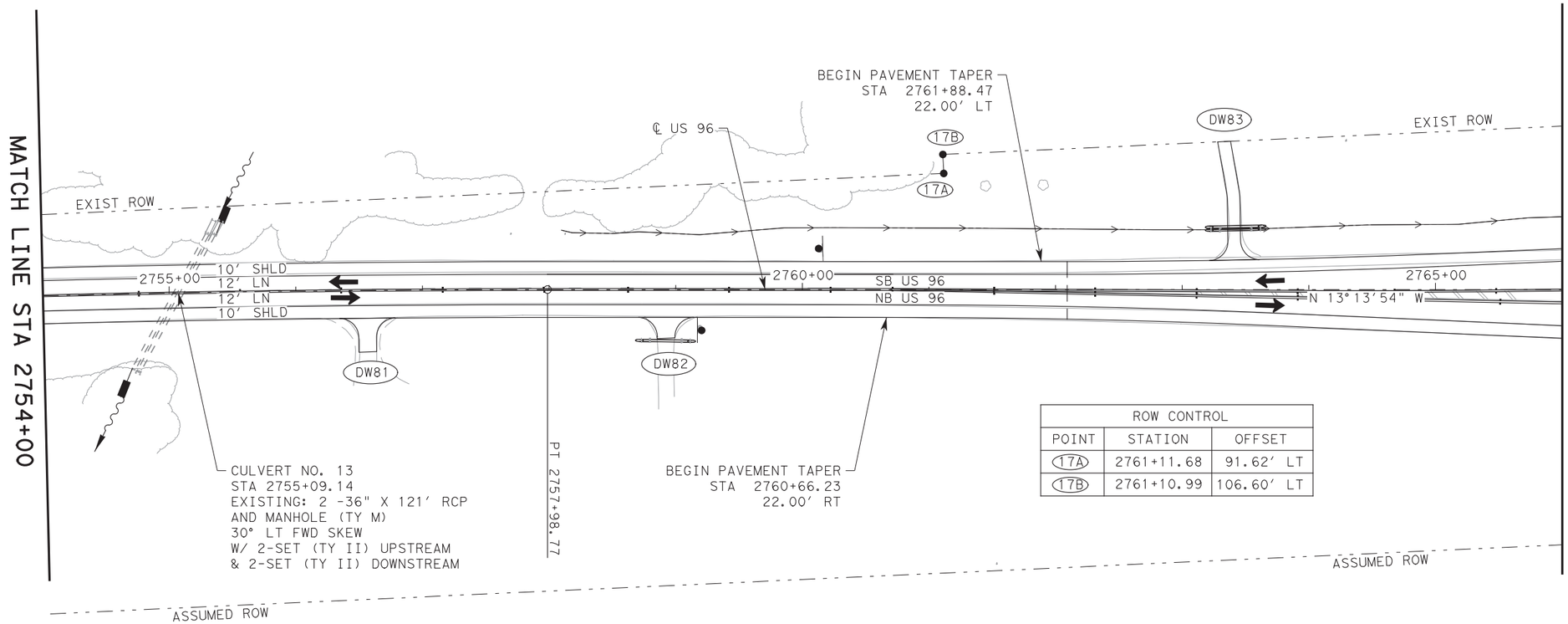


ROW CONTROL		
POINT	STATION	OFFSET
17A	2761+11.68	91.62′ LT
17B	2761+10.99	106.60′ LT

LEGEND

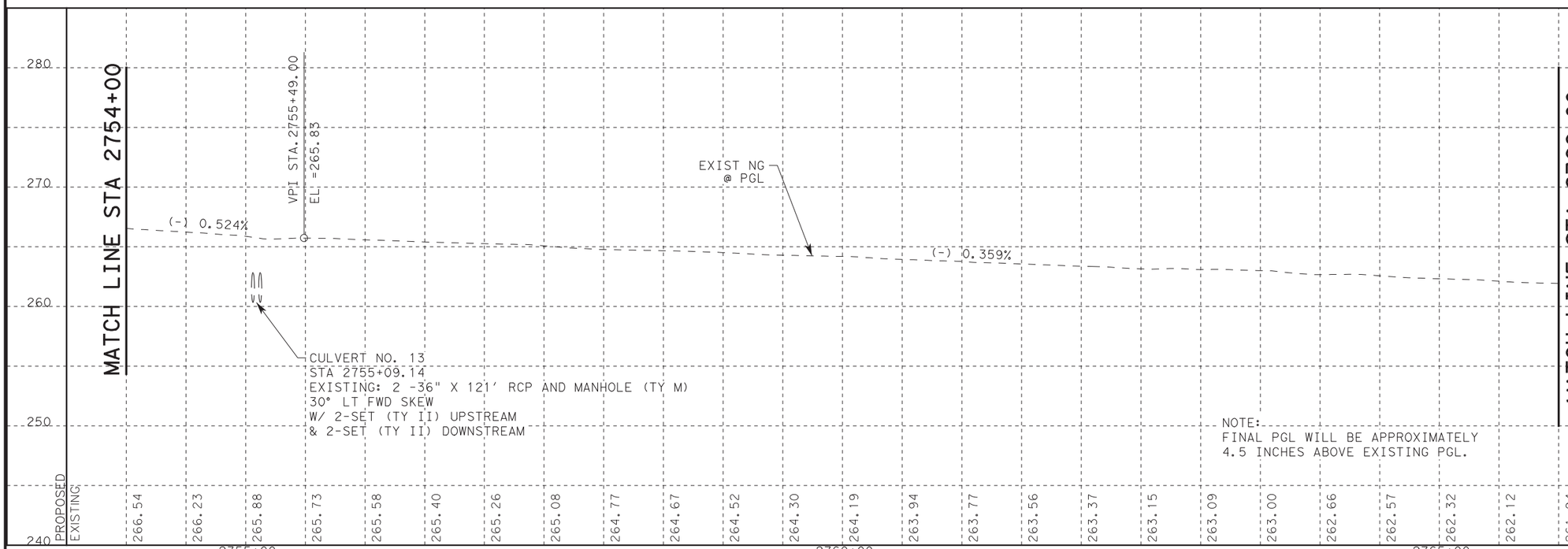
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- (DWXX) DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- (X##) ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) (DWXX) DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0′ 20′ 50′ 100′

SCALE: 1"=100′ H
1"=10′ V



ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
11/03/2021

PLAN & PROFILE

(STA 2754+00 TO STA 2766+00)

SHEET 17 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			89
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

11/3/2021 2:18:29 PM
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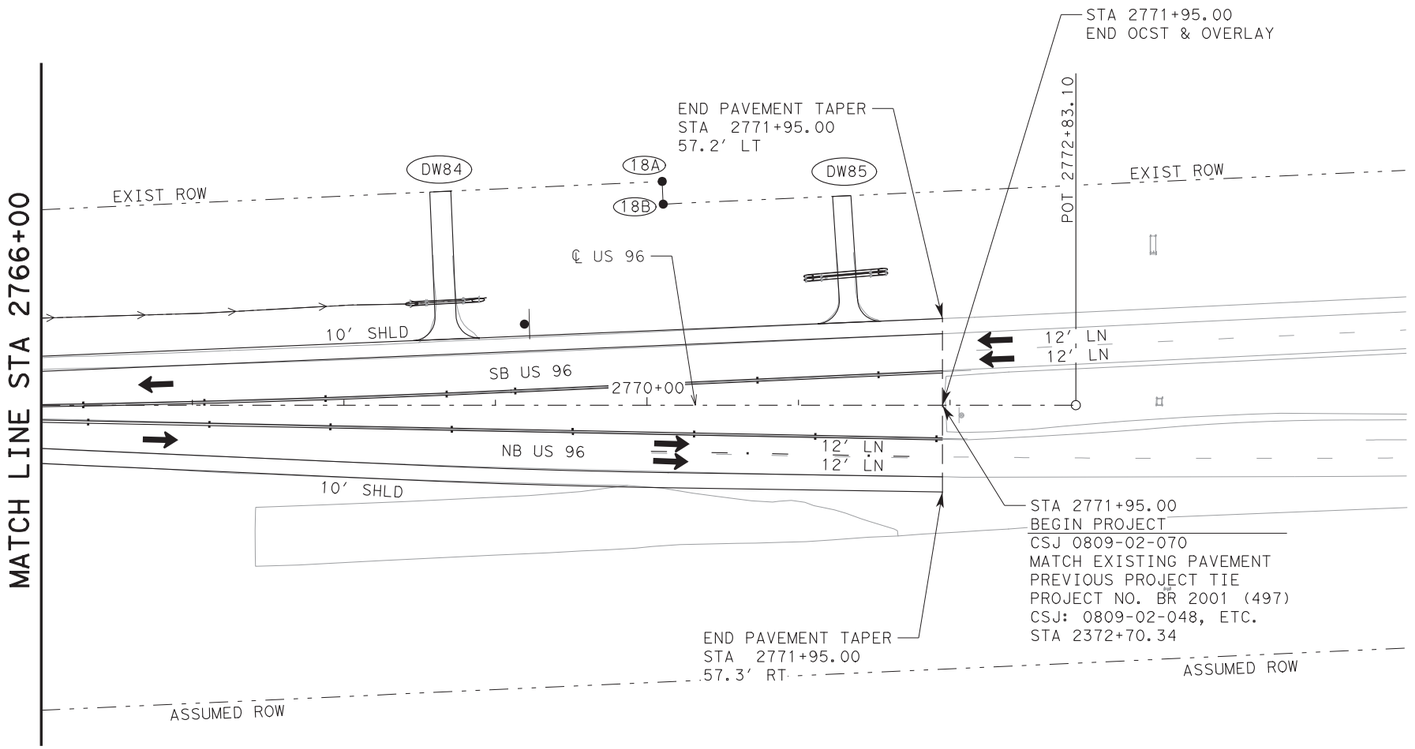


ROW CONTROL		
POINT	STATION	OFFSET
18A	2770+10.06	147.63' LT
18B	2770+10.74	132.65' LT

N

LEGEND

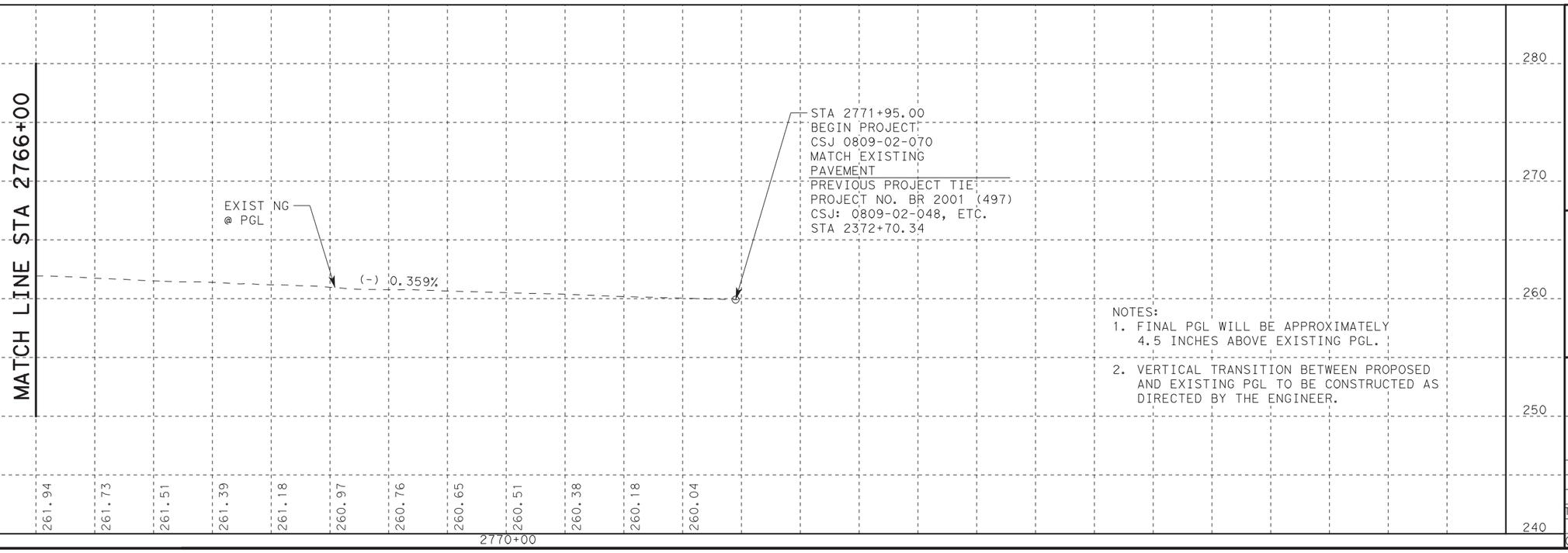
- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- EXIST SIGN
- SAWCUT LINE
- TEST HOLE
- DWXX — DRIVEWAY ID
- PROPOSED MAILBOX
- PROPOSED SIGN
- DIRECTION OF TRAFFIC
- X## — ROW CONTROL POINT
- PROPOSED RIPRAP CONC.
- WIDENING
- MILLING

(1) SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ALIGNMENT DATA.

(2) DWXX DRIVEWAY IDENTIFICATION(SEE DRIVEWAY SUMMARY FOR DETAILS).

0' 20' 50' 100'

SCALE: 1"=100' H
1"=10' V



NOTES:
1. FINAL PGL WILL BE APPROXIMATELY 4.5 INCHES ABOVE EXISTING PGL.
2. VERTICAL TRANSITION BETWEEN PROPOSED AND EXISTING PGL TO BE CONSTRUCTED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

PLAN & PROFILE

(STA 2766+00 TO STA 2771+95)

SHEET 18 OF 18

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			90
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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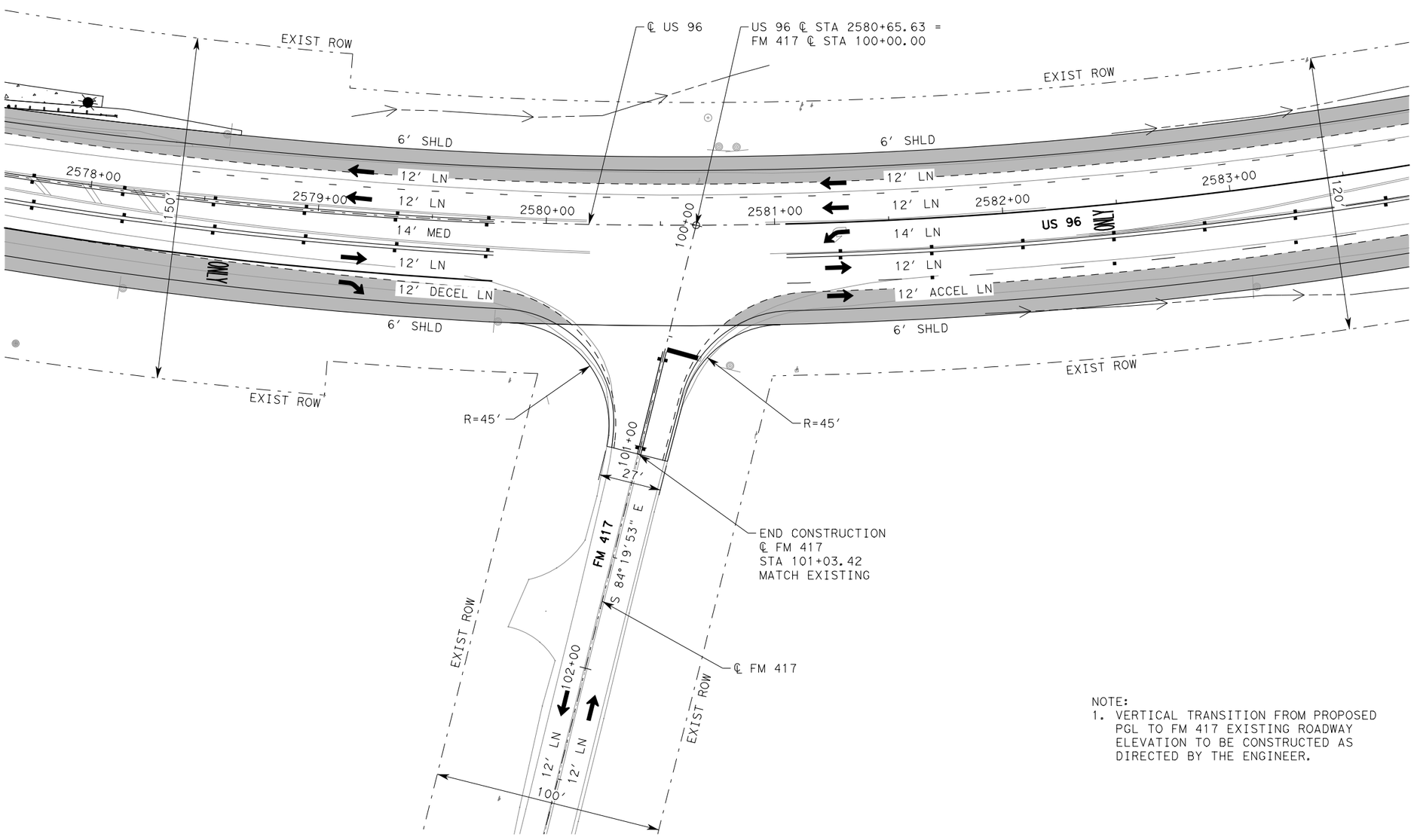

N

LEGEND

- ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- WIDENING
- SAWCUT LINE
- DIRECTION OF TRAFFIC

0′ 10′ 25 50

SCALE: 1"=50′

NOTE:
1. VERTICAL TRANSITION FROM PROPOSED PGL TO FM 417 EXISTING ROADWAY ELEVATION TO BE CONSTRUCTED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
ROBERT D. AUSTIN
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LICENSED
PROFESSIONAL ENGINEER
12/08/2021

Robert D. Austin

INTERSECTION DETAILS

(FM 417)

Lockwood, Andrews & Newnam, Inc.
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TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			91
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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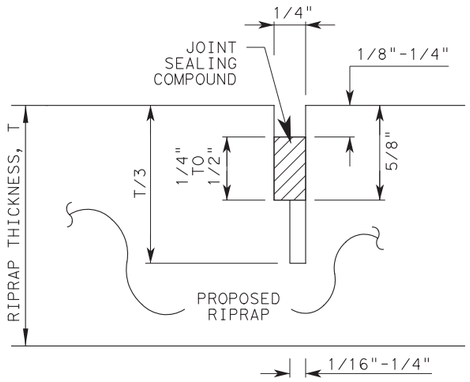
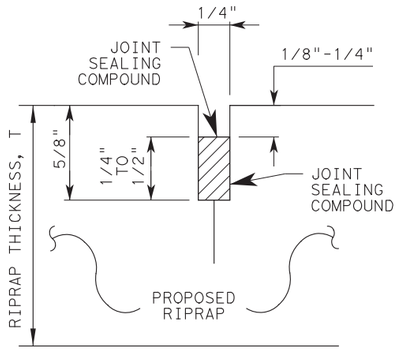
JOINT SEALING DETAIL



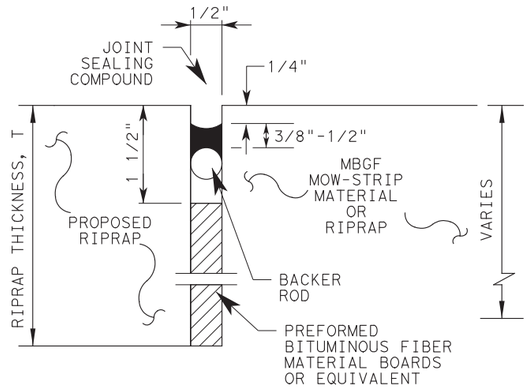
SAWED CONTRACTION JOINT

N.T.S.



CONSTRUCTION CONTRACTION JOINT

N.T.S.

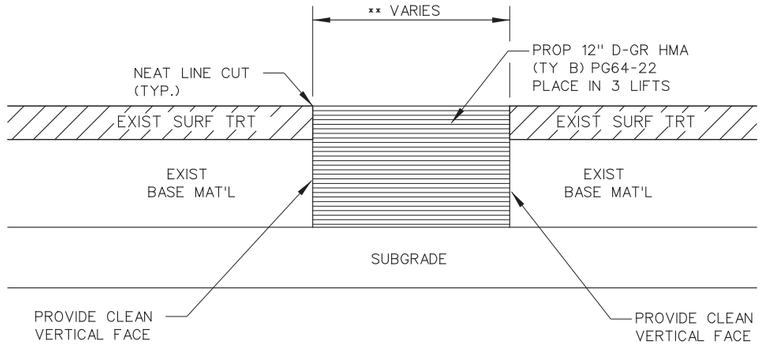


FORMED ISOLATION JOINT

N.T.S.

NOTES:

1. ISOLATION JOINT TO BE USED AT ALL LOCATIONS WHERE PROPOSED RIPRAP ABUTS TO PROPOSED MBGF MOW-STRIP MATERIAL AND AS DIRECTED BY THE ENGINEER.
2. THE LOCATION OF SAWED OR CONSTRUCTION JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER.
3. THE JOINT RESERVOIR FOR SEALANT SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR CONSTRUCTION AND SAWED JOINTS.
4. REFER TO DMS-6310 "JOINT SEALERS AND FILLERS" FOR THE CLASSIFICATIONS.
5. USE JOINT SEALANT CLASS 5 OR 8 FOR ALL JOINT TYPES UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED BY THE ENGINEER.
6. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS".
7. ALL LABOR AND MATERIALS ASSOCIATED WITH THE CONSTRUCTION OF THESE JOINTS WILL BE SUBSIDIARY TO THE APPLICABLE BID ITEMS.



ITEM 351 FULL DEPTH BASE REPAIR DETAIL

LOCATIONS AS DIRECTED

** MINIMUM DIMENSIONS 6' WIDTH X 25' LENGTH

N.T.S.

NOTES:

ALL REPAIR AREAS SHALL BE DETERMINED AND MARKED IN THE FIELD BY THE ENGINEER PRIOR TO ANY REPAIR WORK TO BE PERFORMED. BASED ON ACTUAL WORK, FINAL QUANTITIES SHALL BE ADJUSTED AND PAID AS PER ITEM 351.

STATE OF TEXAS
ROBERT D. AUSTIN
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11/03/2021
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MISCELLANEOUS ROADWAY DETAILS

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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			92
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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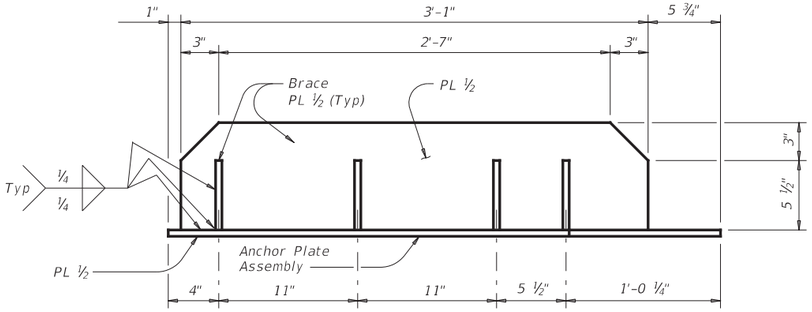
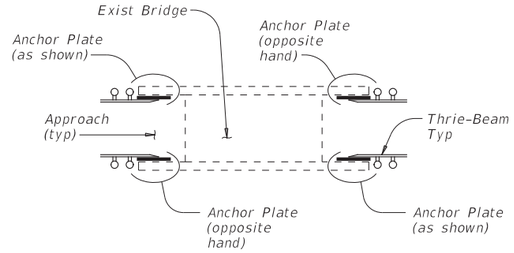
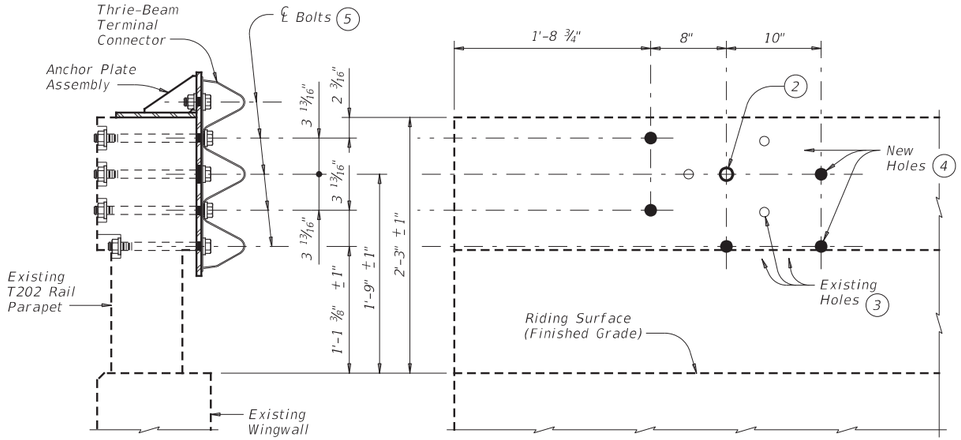


PLAN



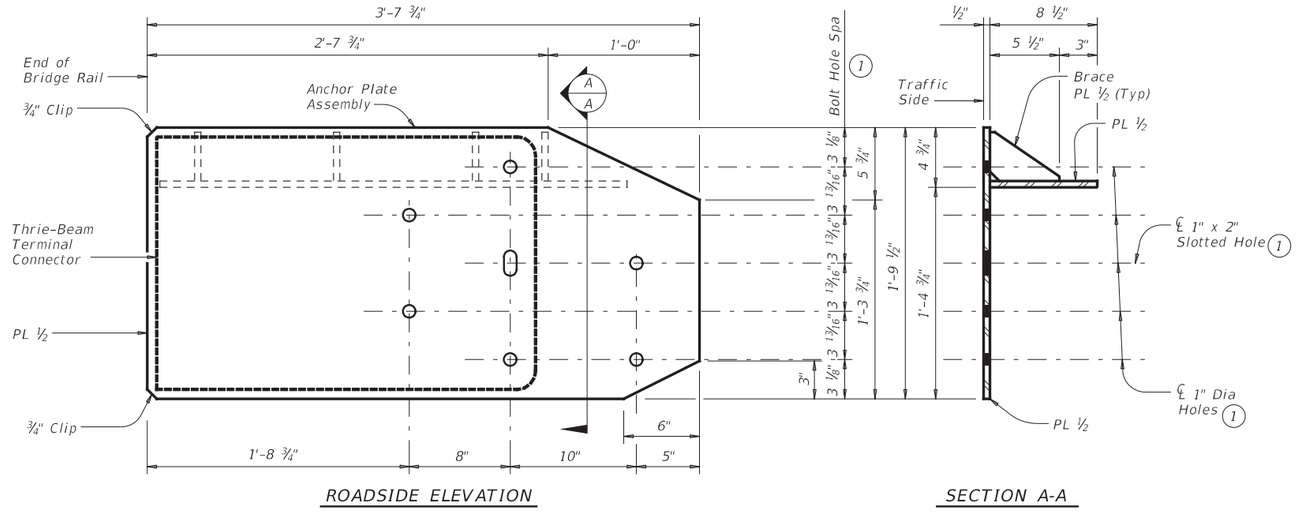
LOCATION DETAILS



SECTION
Showing completed installation

ROADSIDE ELEVATION
Anchor Plate assembly and Thrie-Beam Terminal Connector not shown for clarity

DETAILS OF BOLTS AND HOLES (1)

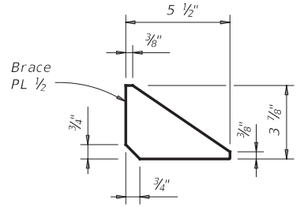


ROADSIDE ELEVATION

SECTION A-A

ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only.
For other side, Anchor Plate must be built opposite hand.



BRACE PLATE DETAILS

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.

Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection to the Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld splatter. Grind edges and corners to a 1/16" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

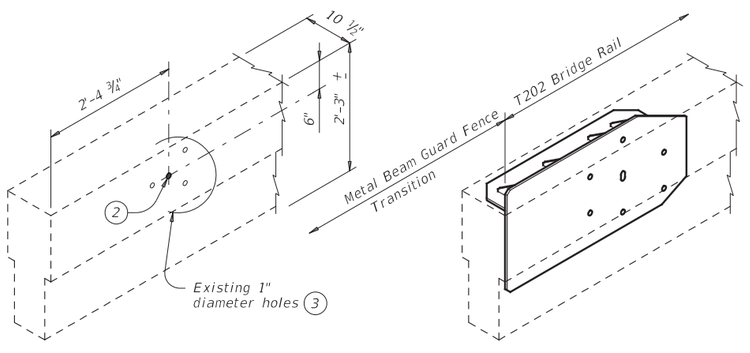
GENERAL NOTES:

These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.

Shop drawings are not required for this installation.

Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "Mtl Bm Gd Fen Trans (Anchor Plate)".

Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.



EXISTING PARAPET
Shown after removal of existing MBGF Transition connector and prior to coring new bolt holes

ANCHOR PLATE PLACEMENT

INSTALLATION DETAILS

This sheet is intended as a guide in preparing job-specific details to retrofit existing T202 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 Anchor Plate location) above the finished riding surface, as seen by an errant vehicle, must be between 2'-2" and 2'-4". 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 Anchorage Plate and MBGF transition positioning.

(1) The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location prior to fabrication of the Anchor Plate assembly and prior to coring bolt holes in the existing T202 parapet.

(2) If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.

(3) If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.

(4) Drill new 1" diameter holes, each with a 2 ½" diameter x 1" deep recess, through existing railing parapet. Recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the contractor's expense.

(5) 7 ~ ⅞" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 ~ 1 ¾" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of ½" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.

STATE OF TEXAS
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

Texas Department of Transportation

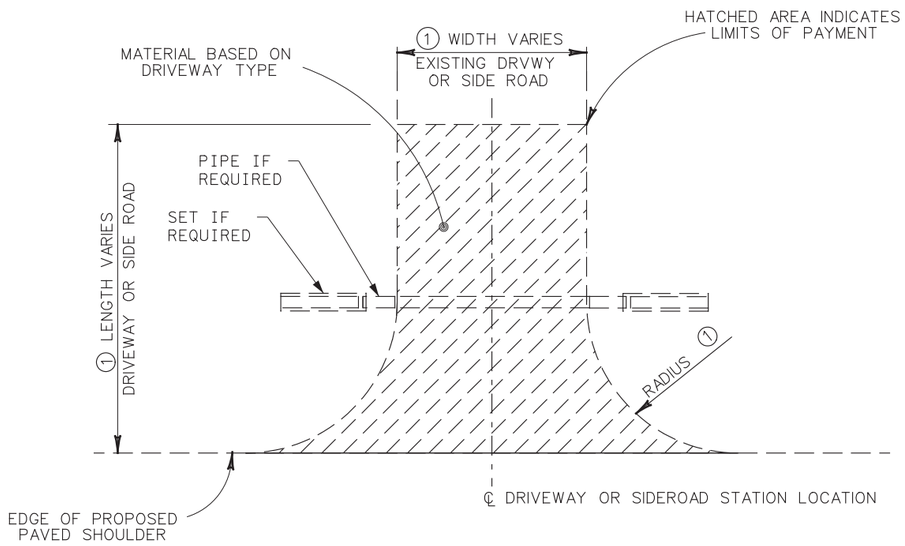
Bridge Division Standard

T202 TRANSITION RETROFIT GUIDE

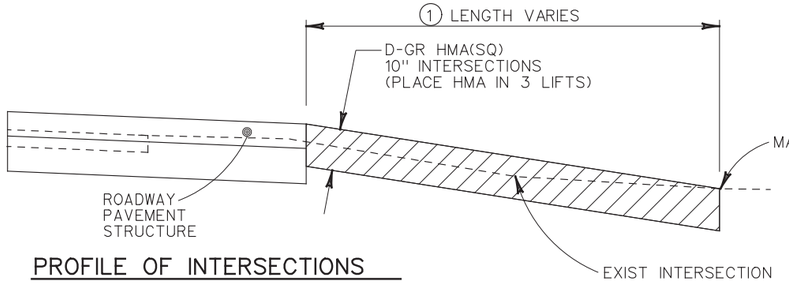
(NOT TO BE USED AS A STANDARD)

T202TR

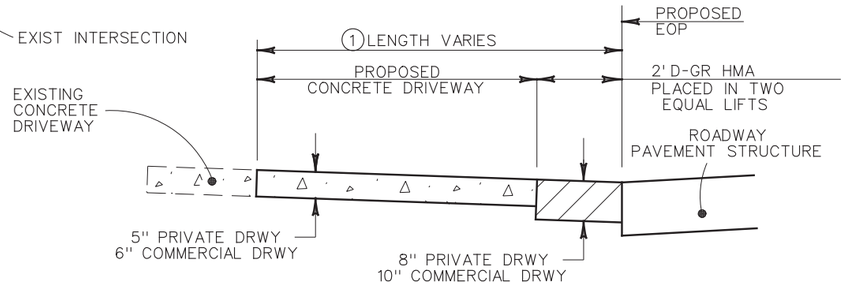
FILE: rlstd026-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		93



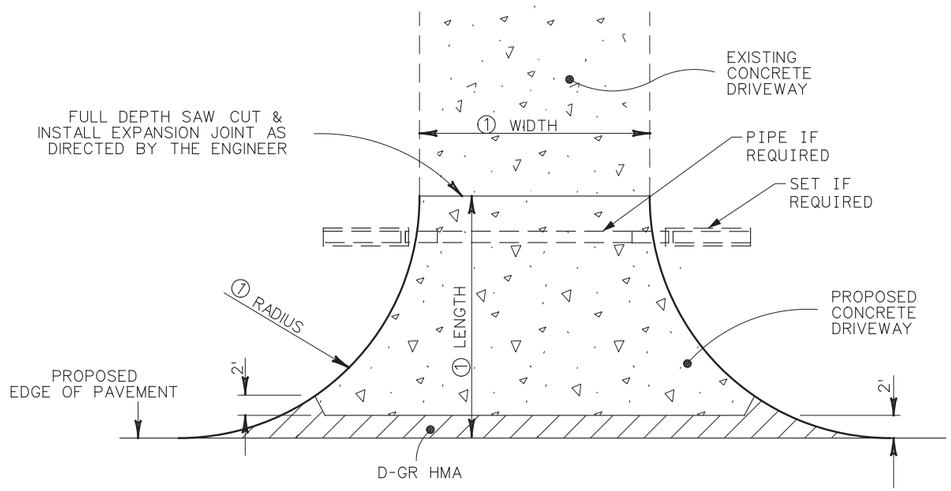
TYPICAL PLAN VIEW OF NON-CONC DRIVEWAYS & SIDE ROADS



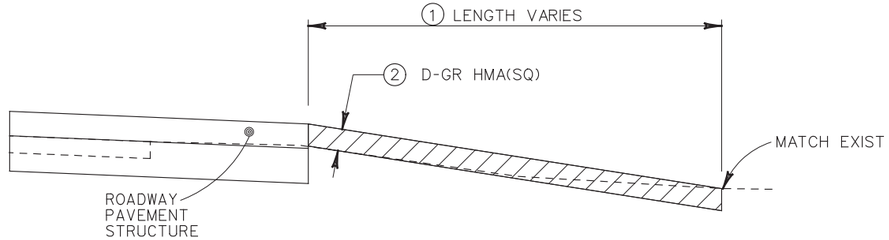
PROFILE OF INTERSECTIONS



PROFILE OF CONCRETE DRIVEWAYS



TYPICAL PLAN VIEW OF CONCRETE DRIVEWAYS



PROFILE OF DRIVEWAY / SIDE ROADS

DETAIL NOTES:

① SEE SUMMARY ELSEWHERE IN PLANS FOR LENGTH, WIDTH AND RADIUS.

② THICKNESS SHOWN ELSEWHERE IN THE PLANS.

③ FULL DEPTH HMA MAY BE USED IN LIEU OF FLEX BASE, COVERED PRIME & ONE CST.

GENERAL NOTES:

1. CONCRETE SURFACE - USE REINFORCING STEEL CONSISTING OF NO.3 OR 4 BARS MEETING THE REQUIREMENTS OF GRADE 60 REINFORCING STEEL. PLACE BARS ON 12 INCH CENTERS IN EACH DIRECTION, SUPPORTED ON REINFORCING CHAIRS.
2. CONCRETE SURFACE - WELDED WIRE FABRIC WILL NOT BE ALLOWED FOR REINFORCING.
3. CONCRETE SURFACE - UNLESS OTHERWISE DIRECTED, INSTALL 1/2 INCH PREMOLDED EXPANSION JOINT MATERIAL BETWEEN EXISTING CONCRETE AND NEW CONCRETE.
4. PREPARATION AND CONSTRUCTION OF DRIVEWAYS/SIDEROADS SHALL BE PAID FOR UNDER ITEM 530 INTERSECTIONS, DRIVEWAYS, AND TURNOUTS. NO ADDITIONAL PAYMENT WILL BE MADE FOR REMOVAL OF EXISTING GRAVEL AND DIRT DRIVEWAYS. THE NECESSARY EXCAVATION, GRADING, COMPACTION, HMA AND INCIDENTALS WILL BE CONSIDERED SUBSIDIARY TO ITEM 530.
5. D-GR HMA TYPE & RATE AS SHOWN ELSEWHERE IN PLANS. FOR D-GR HMA THICKER THAN 4", PLACE IN 2 LIFTS.

STATE OF TEXAS
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11/03/2021
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DRIVEWAY & SIDE ROAD DETAILS

Lockwood, Andrews & Newnam, Inc.
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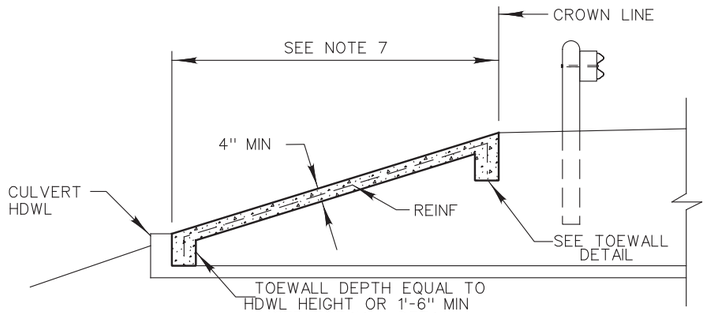
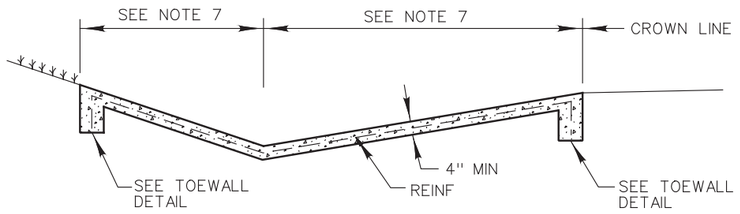
FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			94
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96



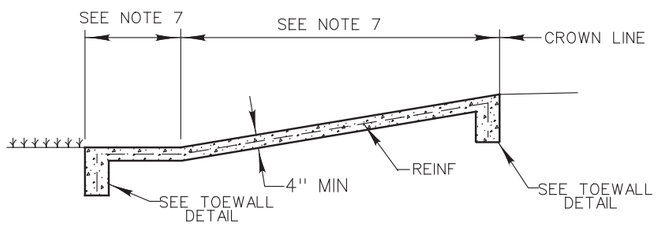
CONCRETE RIPRAP AT CULVERT SECTION

QUANTITY FOR 4" CONC RIPRAP INCLUDES THE QUANTITY FOR THE 6" WIDE TOEWALL AND WILL BE PAID FOR UNDER ITEM 432, RIPRAP (CONC)(4 IN).



CONCRETE RIPRAP AT TYPICAL V-BOTTOM DITCH

QUANTITY FOR 4" CONC RIPRAP INCLUDES THE QUANTITY FOR THE 6" WIDE TOEWALL AND WILL BE PAID FOR UNDER ITEM 432, RIPRAP (CONC)(4 IN).



CONCRETE RIPRAP AT TYPICAL FILL SECTION

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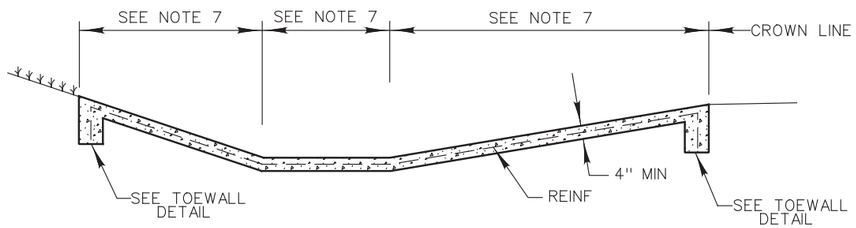
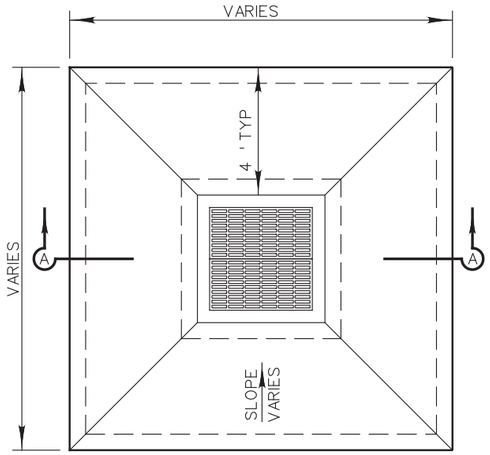
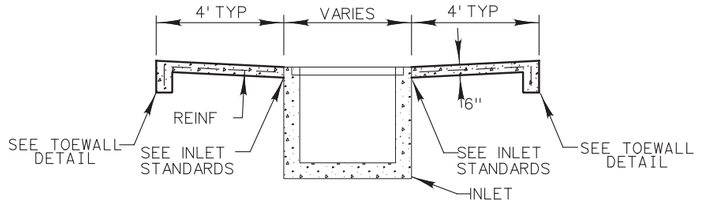


CONCRETE RIPRAP AT TYPICAL FLAT BOTTOM DITCH

QUANTITY FOR 4" CONC RIPRAP INCLUDES THE QUANTITY FOR THE 6" WIDE TOEWALL AND WILL BE PAID FOR UNDER ITEM 432, RIPRAP (CONC)(4 IN).

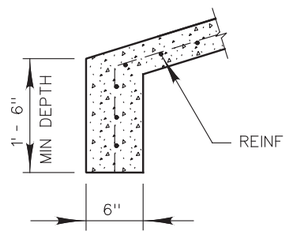


CONCRETE RIPRAP AT INLET



CONCRETE RIPRAP AT INLET RIPRAP APRON DETAILS

SECTION A-A



TOEWALL DETAIL

GENERAL NOTES:

1. USE CL B CONCRETE UNLESS OTHERWISE NOTED IN PLANS. USE CL A CONCRETE FOR RIPRAP APRON AROUND INLETS.
2. PROVIDE CONSTRUCTION JOINTS OR GROOVED JOINTS EXTENDING THE FULL SLANT SLOPE HEIGHT AT INTERVALS OF APPROXIMATELY 20 FEET UNLESS OTHERWISE DIRECTED.
3. PLACE PREMOLDED OR BOARD EXPANSION JOINTS VERTICALLY AND AT RIGHT ANGLES TO THE LONGITUDINAL AXIS OF THE RIPRAP IN SECTIONS NO LESS THAN 8 FEET IN WIDTH OR MORE THAN 40 FEET IN LENGTH.
4. RIPRAP MAY EXTEND BEYOND CROWN LINE, UP TO EDGE OF PAVEMENT.
5. USE NO.3 OR NO.4 BARS @ 12" O.C. IN BOTH DIRECTIONS SUPPORTED ON REINFORCING CHAIRS.
6. SEE QUANTITY SUMMARIES FOR RIPRAP LOCATIONS.
7. CONSTRUCT SLOPES TO THAT OF THE APPROPRIATE TYPICAL SECTION OR CROSS SECTION UNLESS OTHERWISE DIRECTED.

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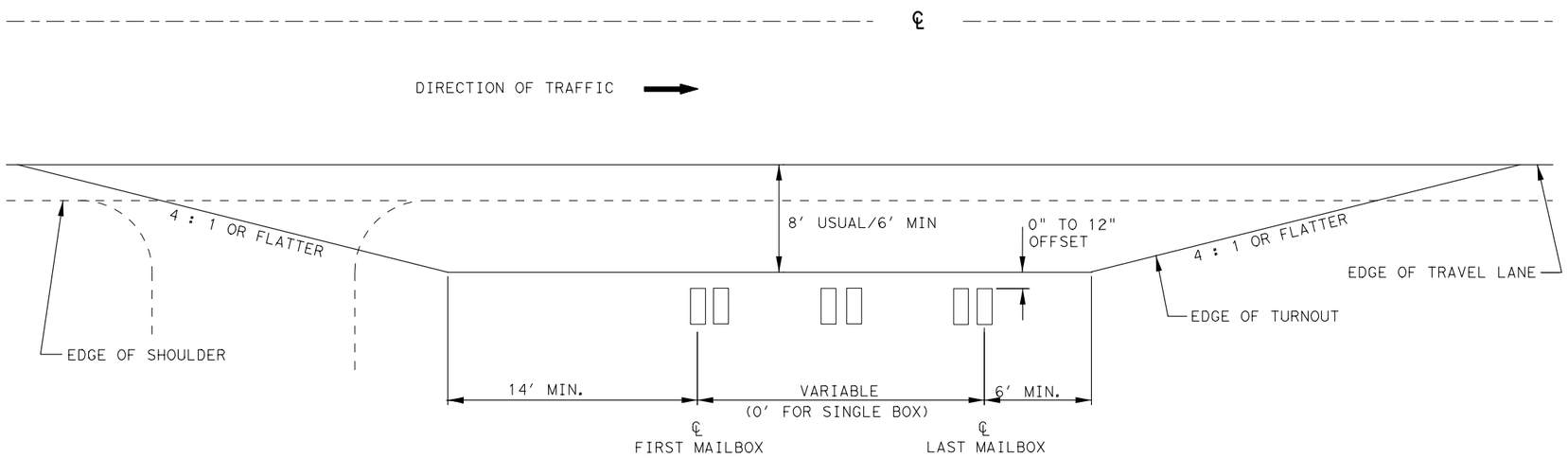
NOT TO SCALE

LUFKIN DISTRICT STANDARD

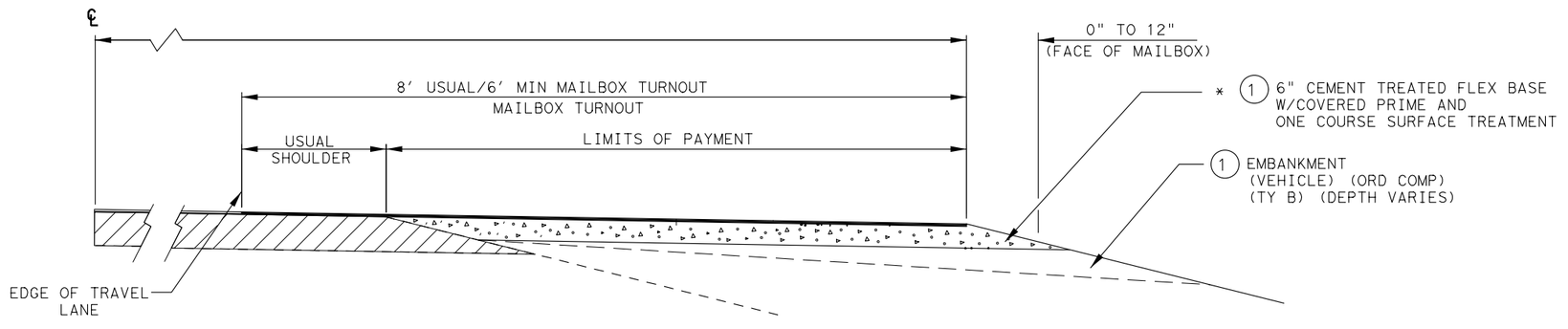
CONCRETE RIPRAP DETAILS

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		95

ISSUED 01-09
REVISED 03-14
REVISED 10/20/2016: MODIFIED TITLE BLOCK
REVISED 04/03/2017: MODIFIED NOTES FOR PAYMENT



PLAN



TYPICAL SECTION

(1) SUBSIDIARY TO ITEM 530 (TURNOUTS)

* D-GR HMA TY-D PG64-22 (5") MAY BE USED AT THE OPTION OF THE CONTRACTOR IN LIEU OF CEMENT TREAT, FLEX BASE, COVERED PRIME AND SURFACE TREATMENT.
PLACE IN 2 LIFTS UNLESS OTHERWISE APPROVED.

STATE OF TEXAS
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12/08/2021
Robert D. Austin

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MAILBOX TURNOUT DETAILS

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		96

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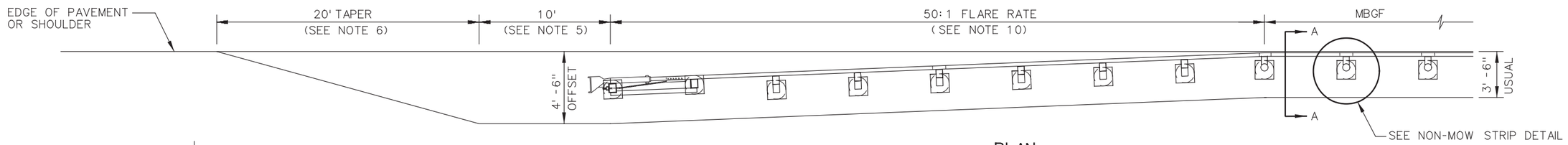
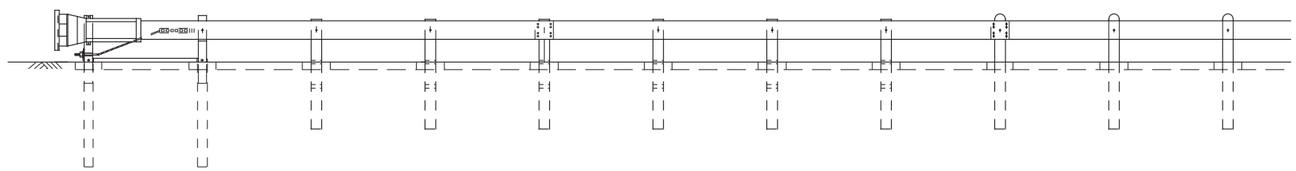
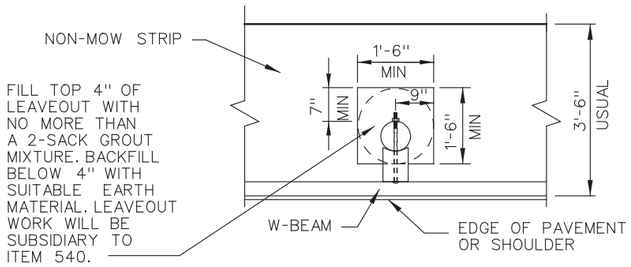


PLAN

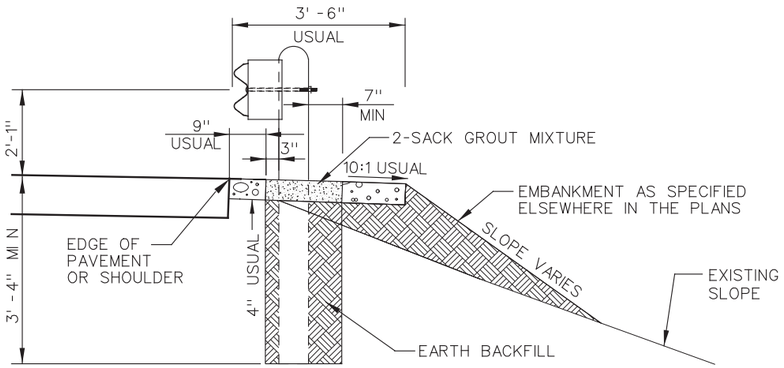


ELEVATION



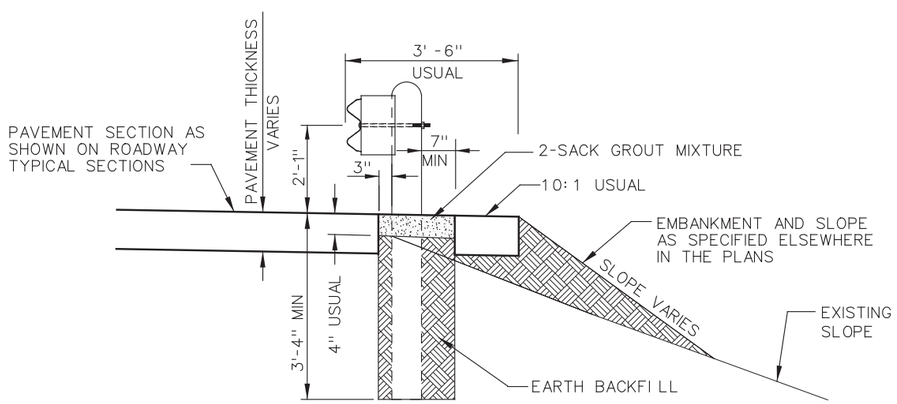
NON-MOW STRIP DETAIL

HOT MIX ASPHALTIC PAVEMENT NON-MOW STRIP WITH 18"X18" OR 18" DIA. MINIMUM LEAVEOUT



SECTION A-A

ASPHALTIC NON-MOW STRIP



OPTIONAL SECTION A-A

WIDEN PAVEMENT SECTION

GENERAL NOTES

1. NON-MOW STRIPS SHALL BE HOT MIX ASPHALTIC PAVEMENT UNLESS OTHERWISE SHOWN ON THE PLANS. HOT MIX ASPHALTIC PAVEMENT SHALL MEET THE REQUIREMENTS OF AND BE PLACED IN ACCORDANCE WITH THE PERTINENT BID ITEM AS SHOWN ON THE PLANS. OTHER MATERIALS MAY BE USED AS INDICATED ELSEWHERE IN THE PLANS. MATERIALS FOR THE OPTIONAL WIDENED PAVEMENT SECTION SHALL BE AS SHOWN IN THE ROADWAY TYPICAL SECTIONS.
2. THE TYPE OF APPROVED POST WILL BE SHOWN ELSEWHERE IN THE PLANS. SEE THE APPLICABLE STANDARD SHEETS FOR ADDITIONAL DETAILS AND INFORMATION.
3. THE LIMITS OF PAYMENT FOR HOT MIX ASPHALTIC PAVEMENT WILL INCLUDE LEAVEOUTS FOR POST.
4. THE LEAVEOUTS SHALL BE FILLED WITH NO MORE THAN A 2-SACK GROUT MIXTURE AND PLACED IN ACCORDANCE WITH SECTION 421.2.7, "MORTAR AND GROUT". PAYMENT FOR FURNISHING AND PLACING THE GROUT MIXTURE WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
5. THE NON-MOW STRIP SHALL BE EXTENDED FULL WIDTH FOR 10' IN ADVANCE OF THE GUARDRAIL END TREATMENT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. A 20' TAPER WILL BE USED IN ADVANCE OF GUARDRAIL UNLESS OTHERWISE SHOWN IN THE PLANS, OR DIRECTED BY THE ENGINEER.
7. EXACT LOCATION OF MBGF PLACEMENT WILL BE SHOWN ELSEWHERE IN THE PLANS TO MEET APPROPRIATE CLEAR ROADWAY WIDTH AND CLEAR ZONE REQUIREMENTS.
8. EXCAVATION REQUIRED TO CONSTRUCT NON-MOW STRIP WILL NOT BE MEASURED OR PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.
9. THE FLARE RATE MAY BE DECREASED OR ELIMINATED IF DIRECTED BY THE ENGINEER.
10. WHEN THE EXISTING NON-MOW STRIP IS TO REMAIN IN PLACE, FILLING THE EXISTING POST HOLES WITH GROUT AND DIGGING NEW POST HOLES WILL BE SUBSIDIARY. THE TOP 4 INCHES OF A POST HOLE WITHIN AN EXISTING NON-MOW STRIP SHALL BE BACKFILLED WITH HMA. THIS WORK WILL NOT BE PAID FOR BUT WILL BE SUBSIDIARY TO ITEM 542.

NOT TO SCALE

REVISED: 2-19-09
ADDED EDGE OF PAVEMENT OR SHOULDER LINE TO PLAN VIEW AND DETAIL.
REVISED: 7-16-10
CHANGED DEPTH OF NON-MOW STRIP FROM 5" TO 4".
REVISED: 12-30-11
REVISED HEIGHT OF W-BEAM ABOVE PAVEMENT SURFACE
REVISED: 9-29-16
REVISED SLOPE BEHIND POSTS; REMOVED SLOPE GENERAL NOTE
REVISED: 10-20-2016
MODIFIED TITLE BLOCK
REVISED: 04-07-2017
ADDED NOTE 10
REVISED: 07-10-2017
REVISED SLOPE BEHIND MBGF
REVISED: 02-02-2018
REVISED SPECIFICATION REFERENCE IN NOTE 4

LUFKIN DISTRICT STANDARD

NON-MOW STRIP DETAILS

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		97

11/3/2021 2:20:21 PM
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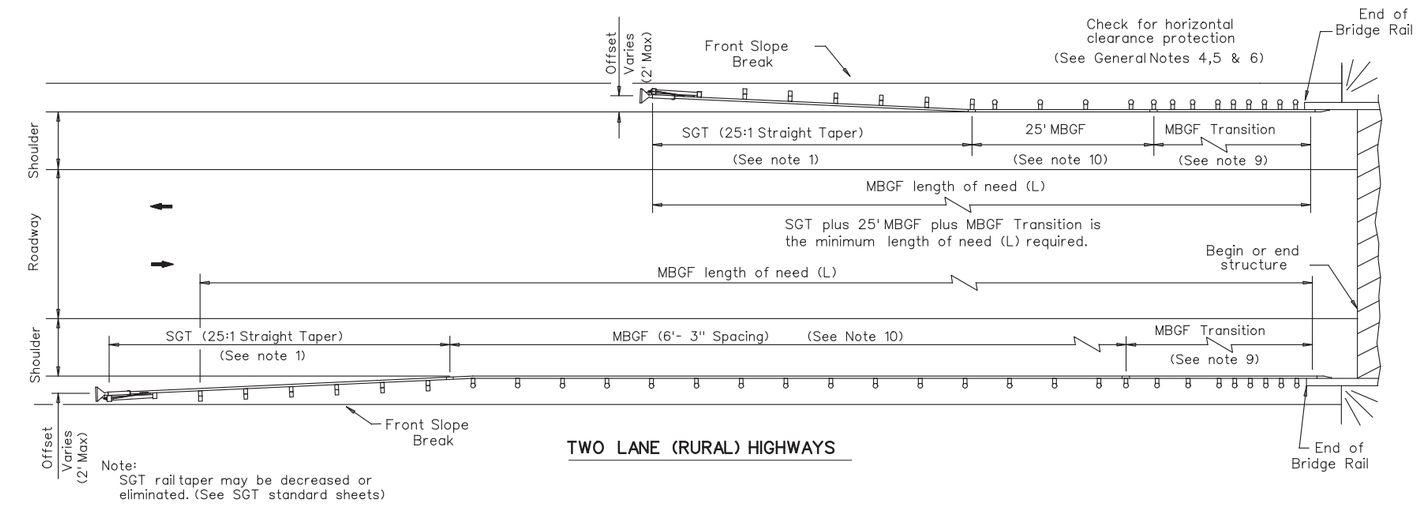
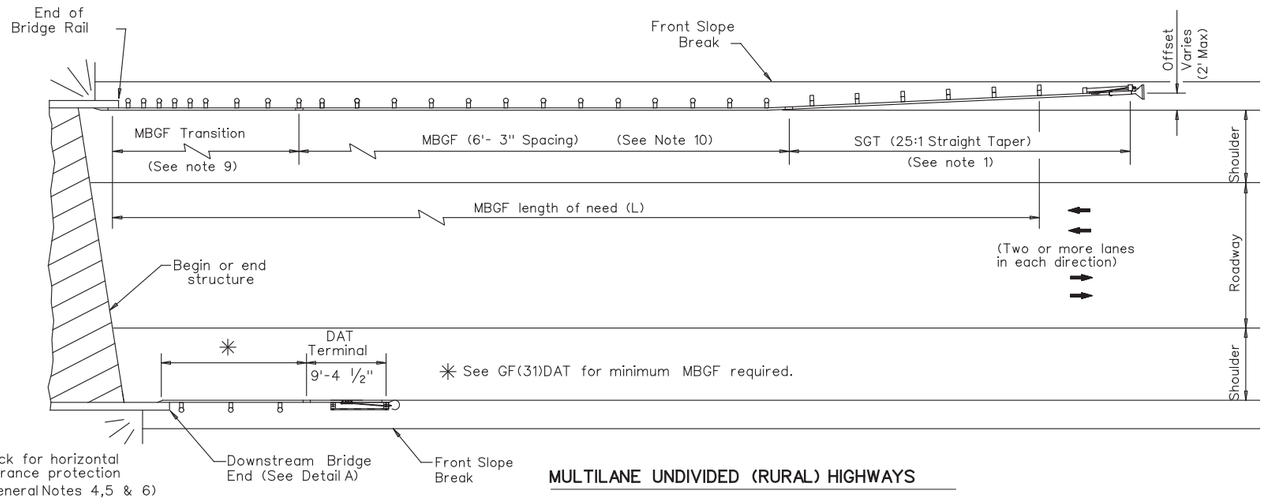
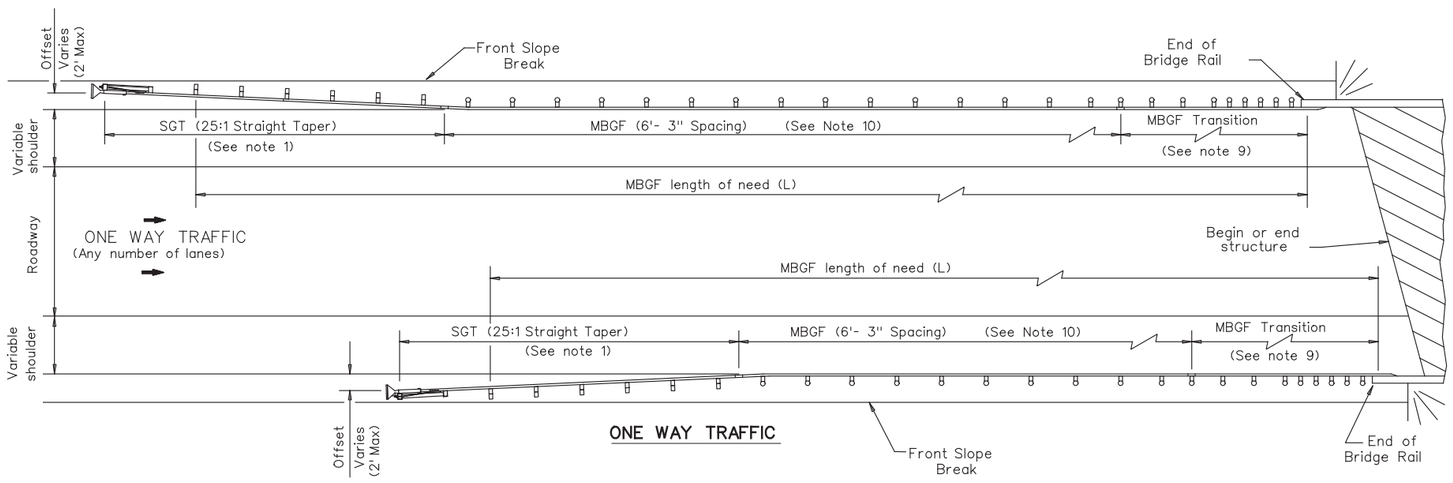


Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)

TWO LANE (RURAL) HIGHWAYS



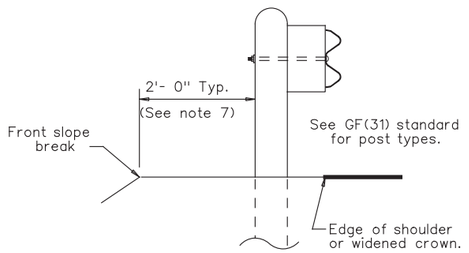
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



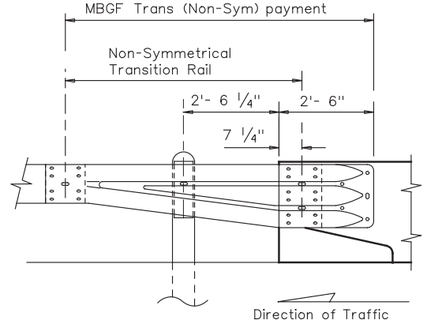
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		99

DATE: 11/3/2021
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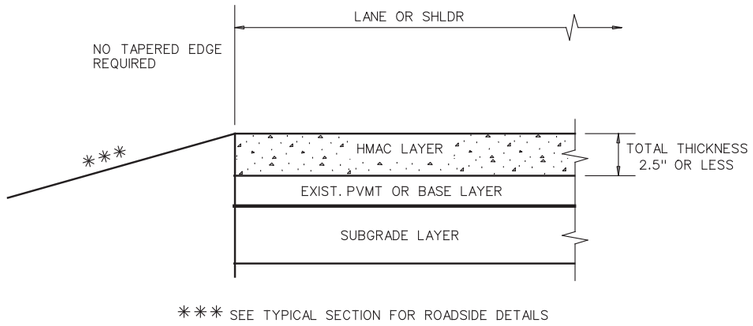
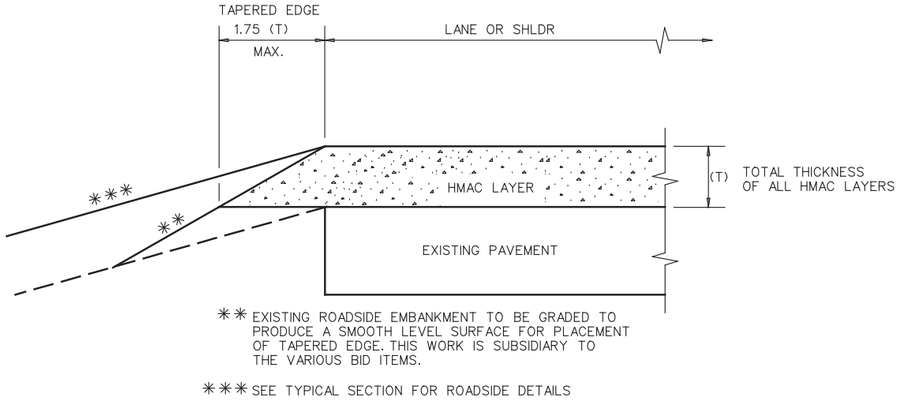


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

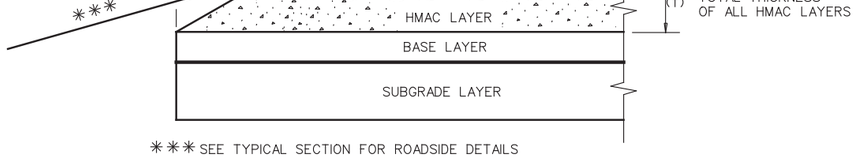
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

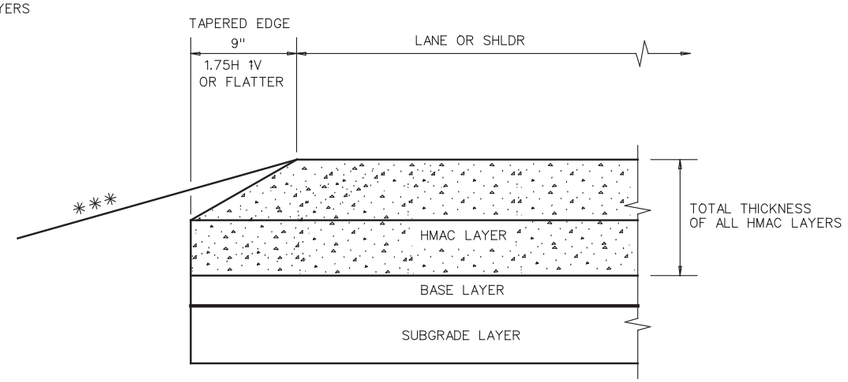
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H 1V: OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
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REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		100

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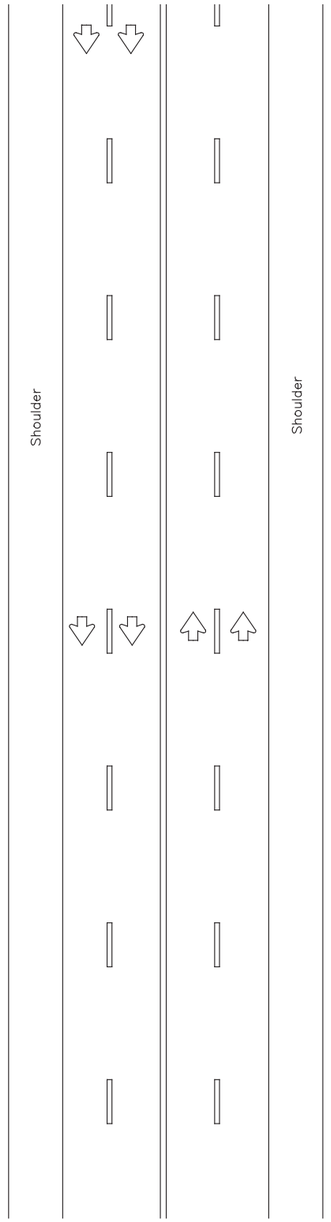
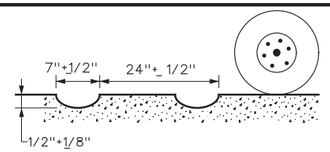
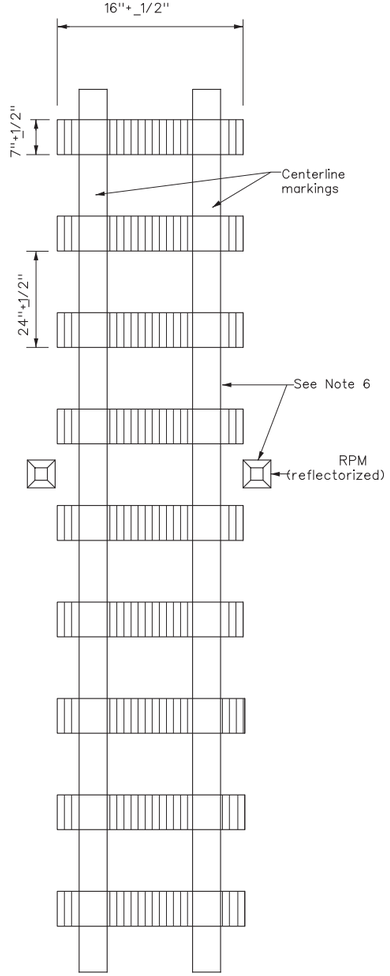


MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

CENTERLINE RUMBLE STRIPS

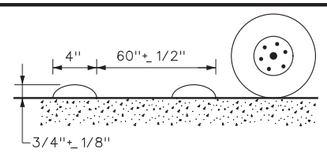


PROFILE VIEW

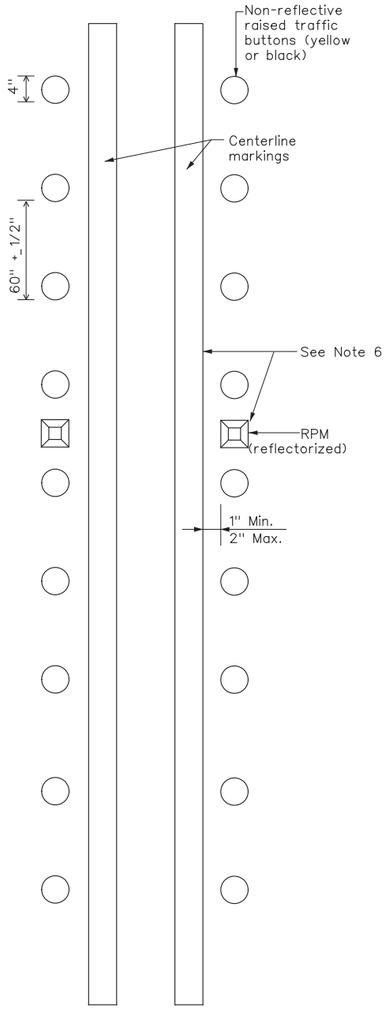


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

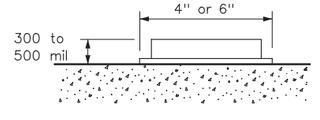


PROFILE VIEW

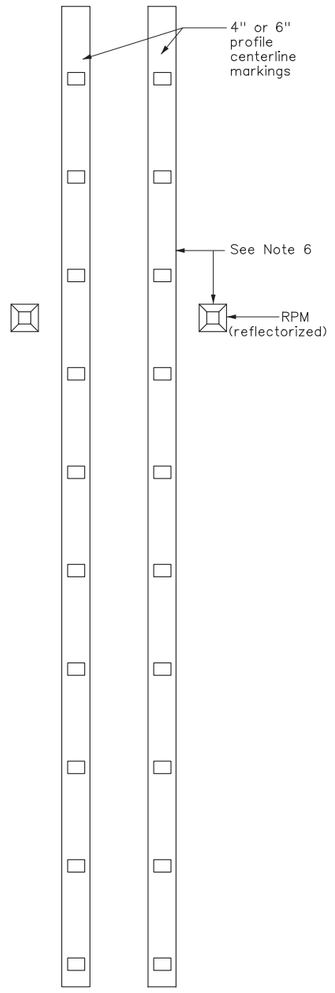


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 3

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

11. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS

RS(2)-13

FILE: rs(2)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		101

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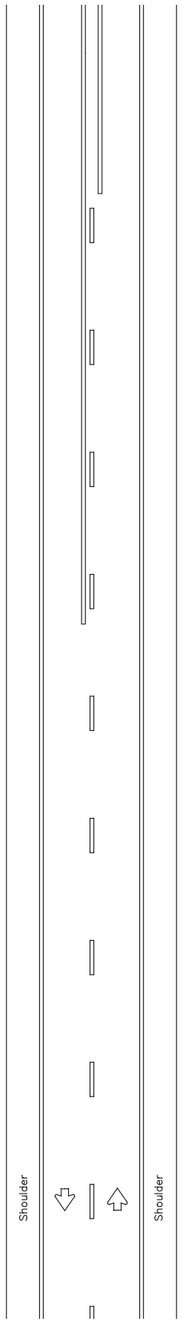
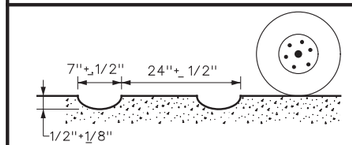
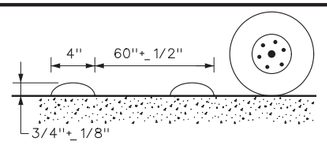


TWO LANE TWO-WAY ROADWAYS

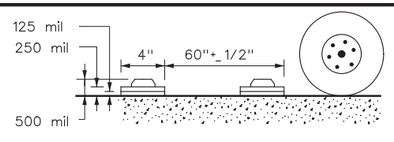
CENTERLINE RUMBLE STRIPS



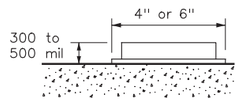
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

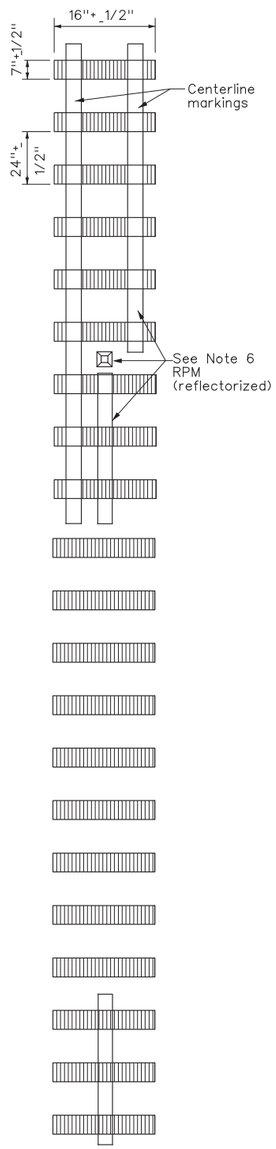


PREFORMED THERMOPLASTIC STRIPS



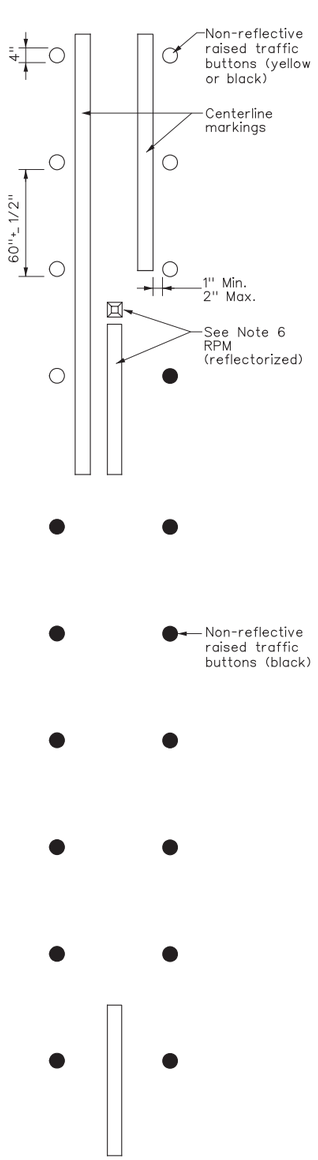
PROFILE MARKINGS

PROFILE VIEW



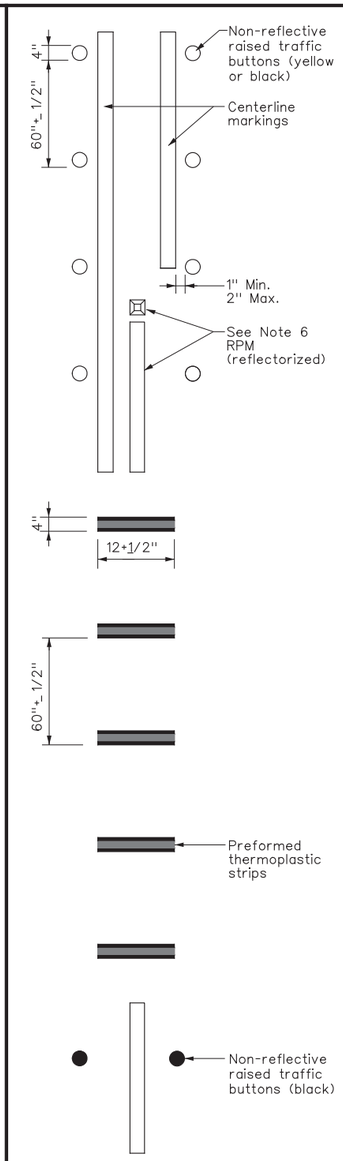
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



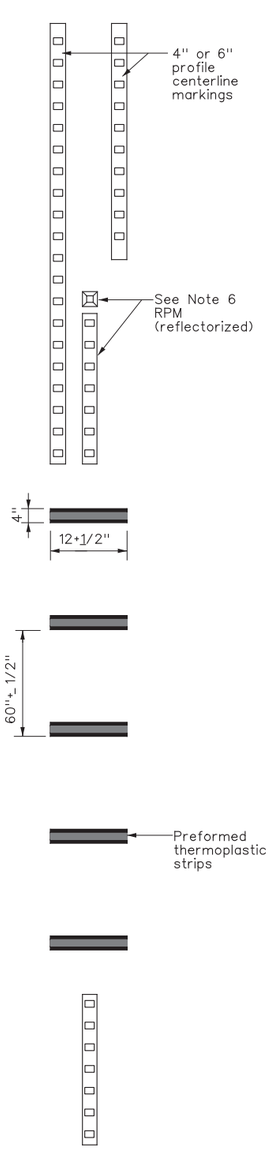
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

12. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		102

DATE:
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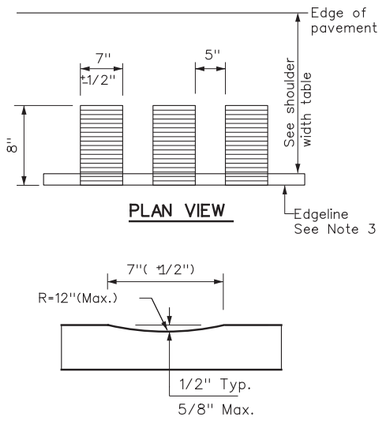
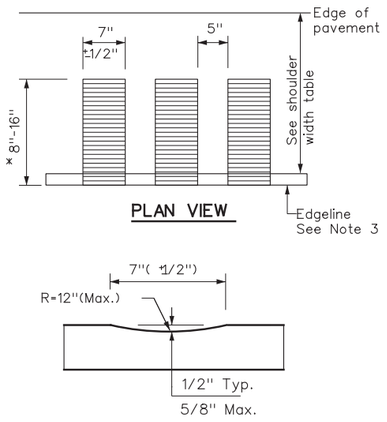


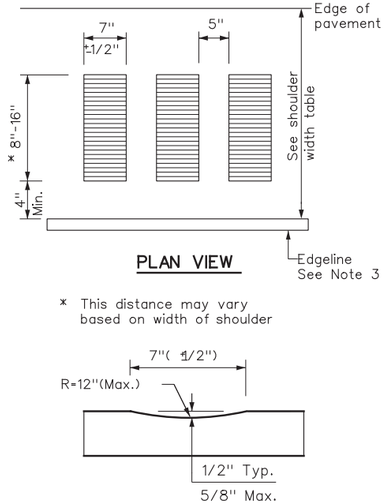
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



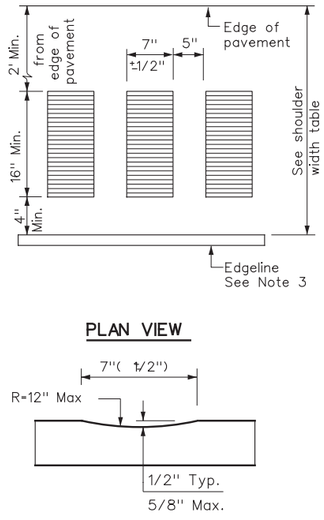
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



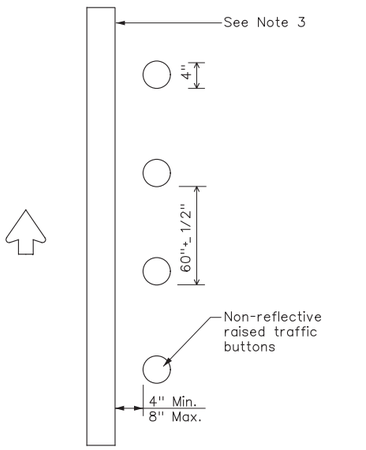
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



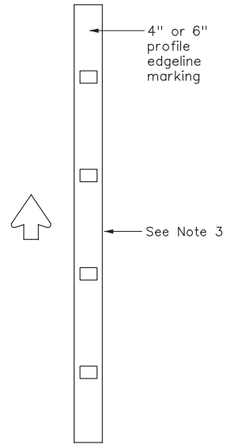
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



OPTION 5

RAISED EDGELINE RUMBLE STRIPS



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
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REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
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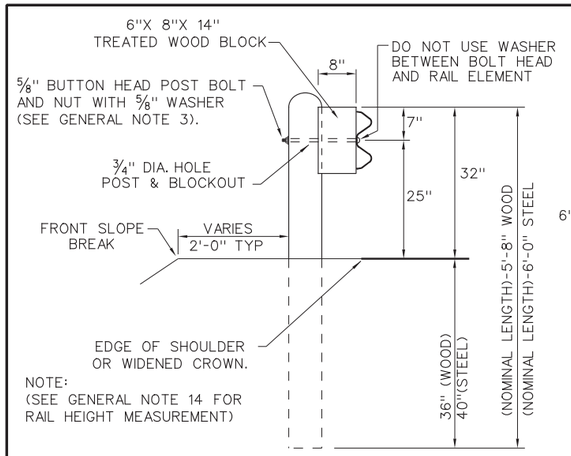
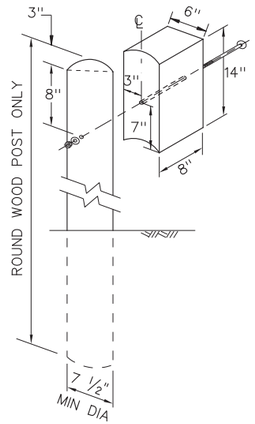
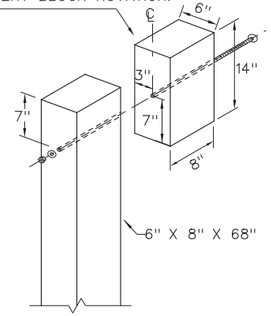


TYPICAL POST PLACEMENT

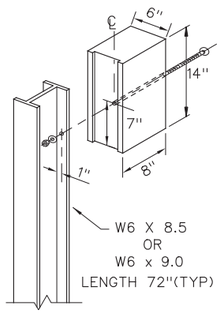


WOOD BLOCK TO ROUND WOOD POST

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

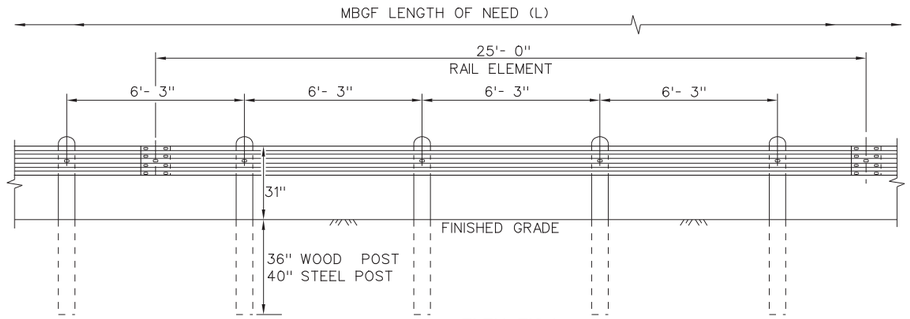


WOOD BLOCK TO RECTANGULAR WOOD POST



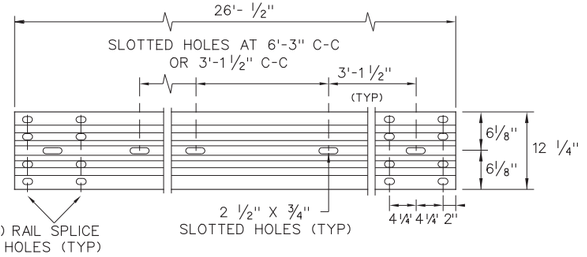
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



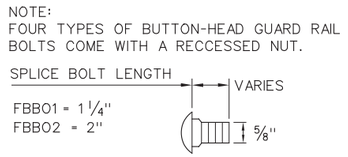
ELEVATION MID-SPAN RAIL SPLICE

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



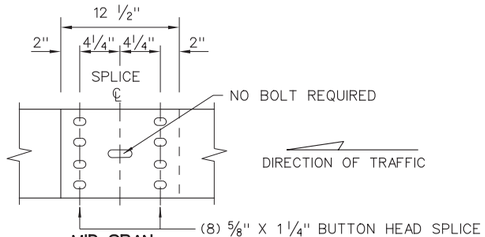
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



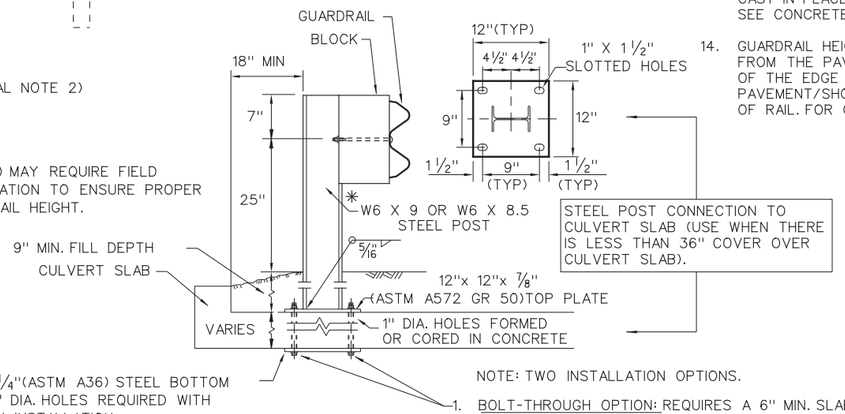
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

NOTE: 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 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	LFK	SHELBY		104

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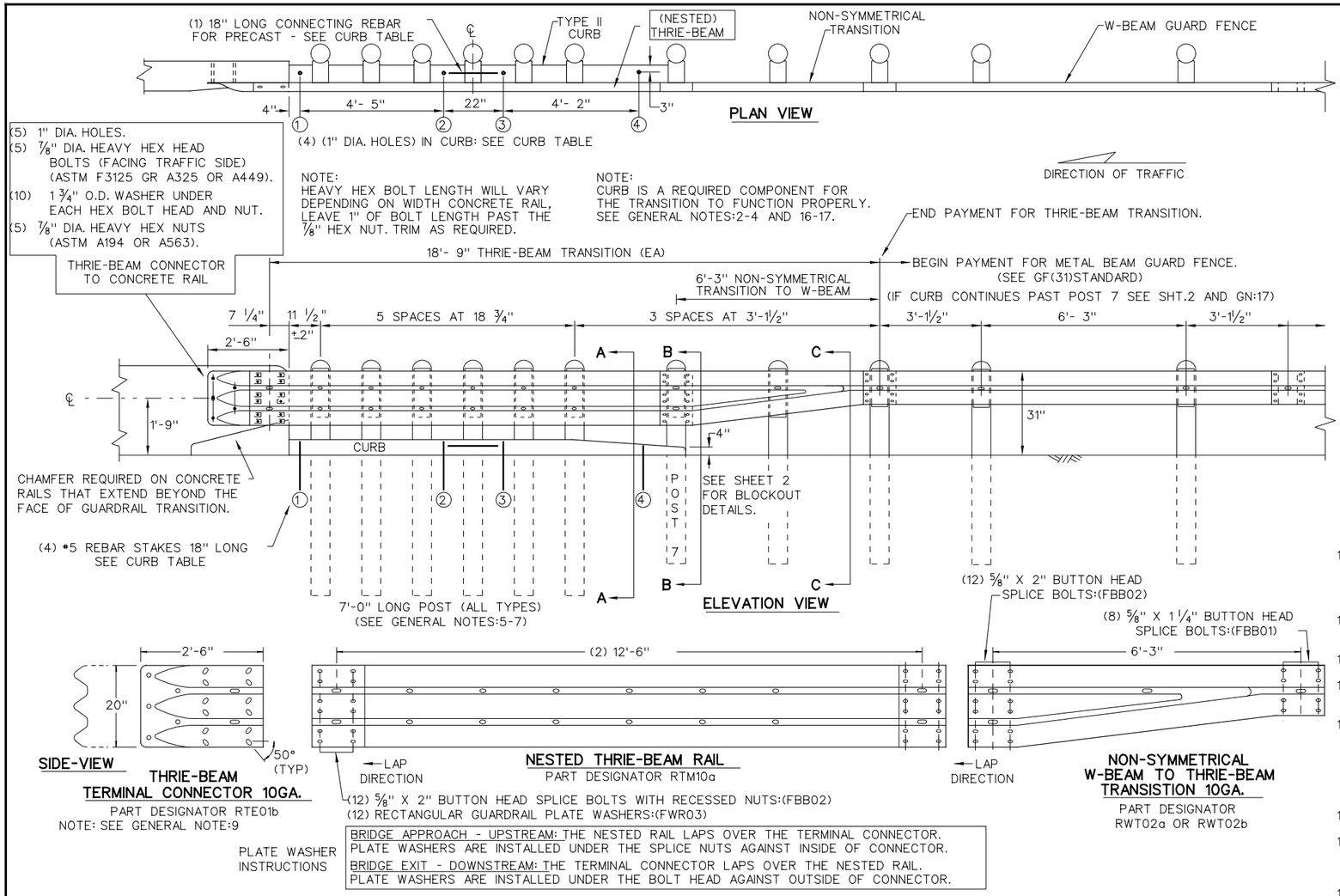
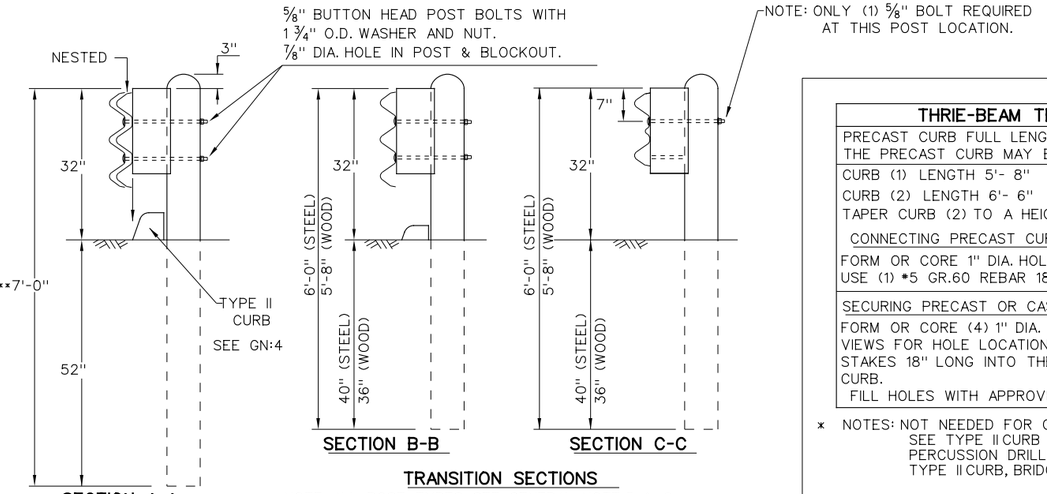
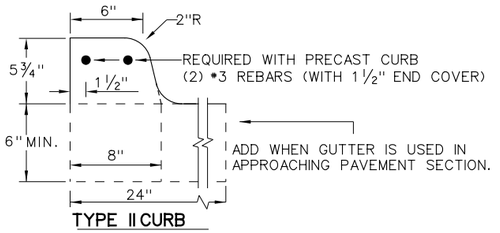




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB 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.



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

TYPE II CURB DETAILS

GENERAL NOTES

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		106

DATE: 12/8/2021
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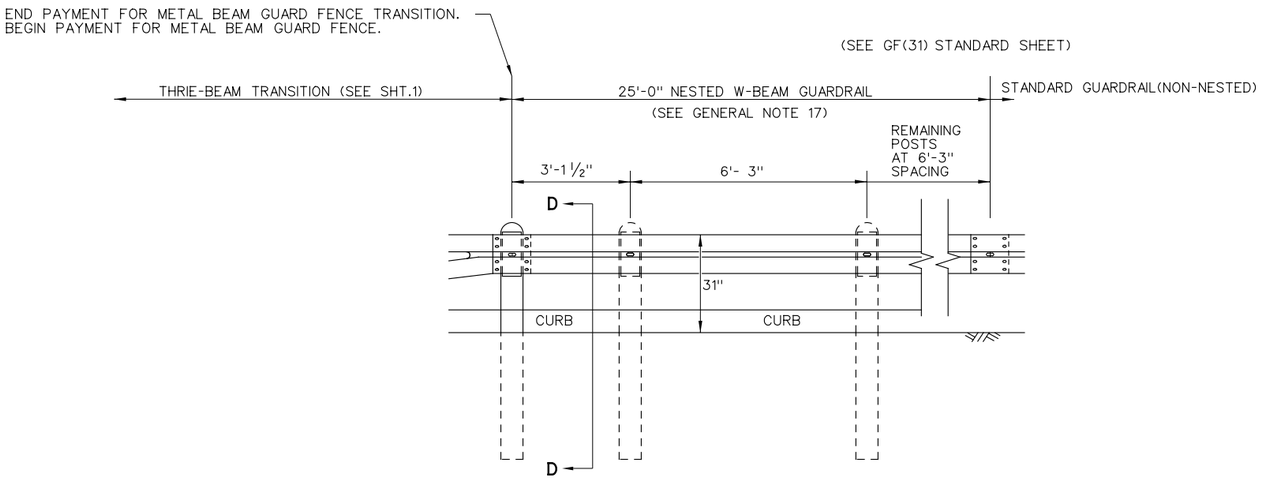
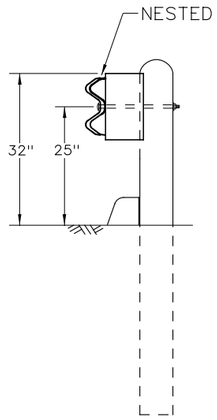
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



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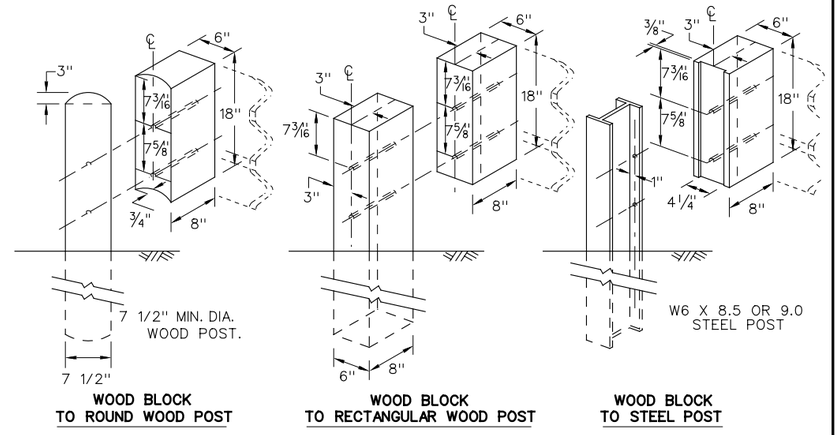

THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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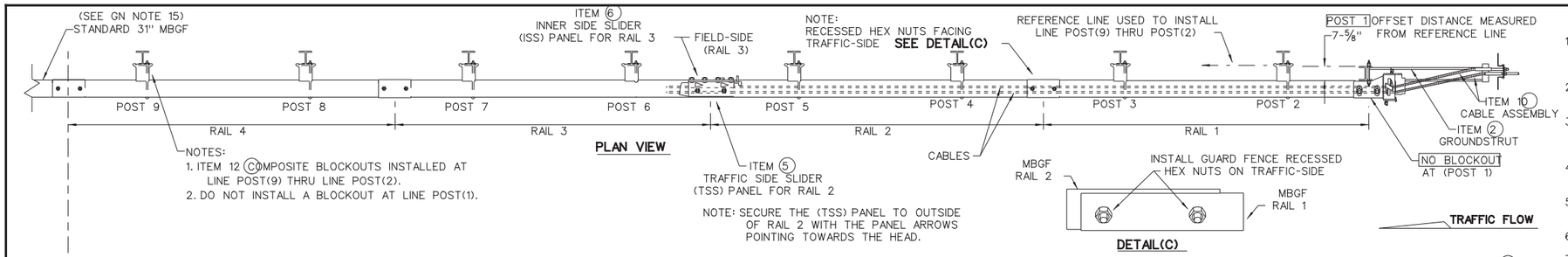
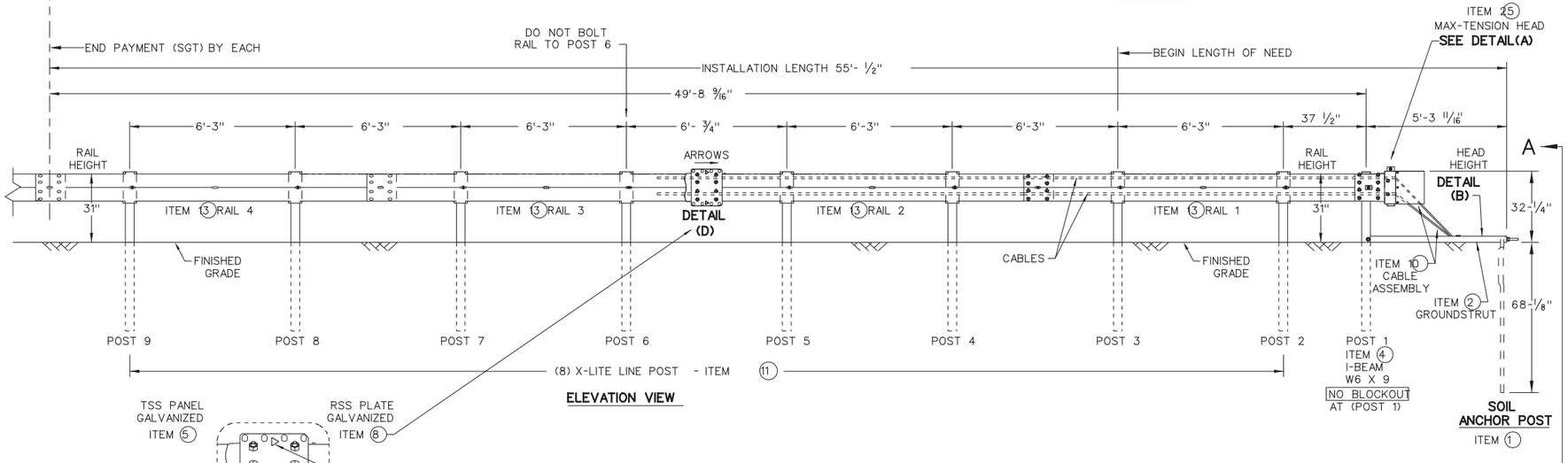
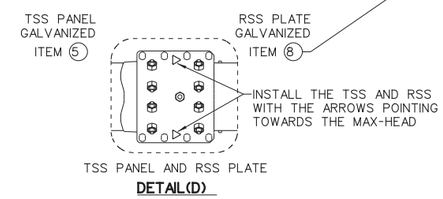
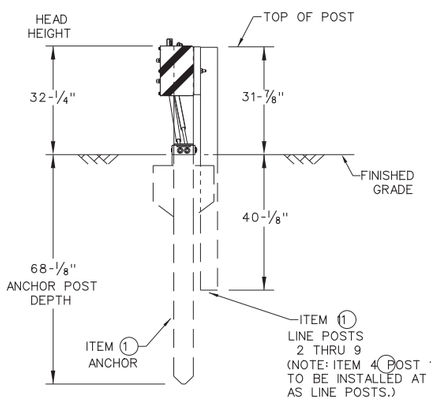
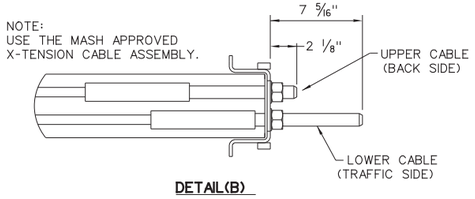
	LFK	SHELBY		107

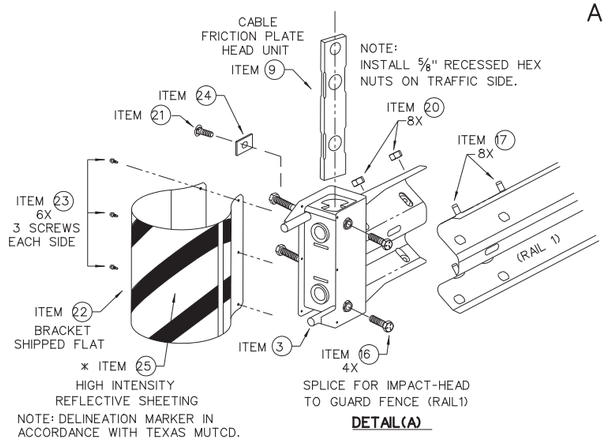


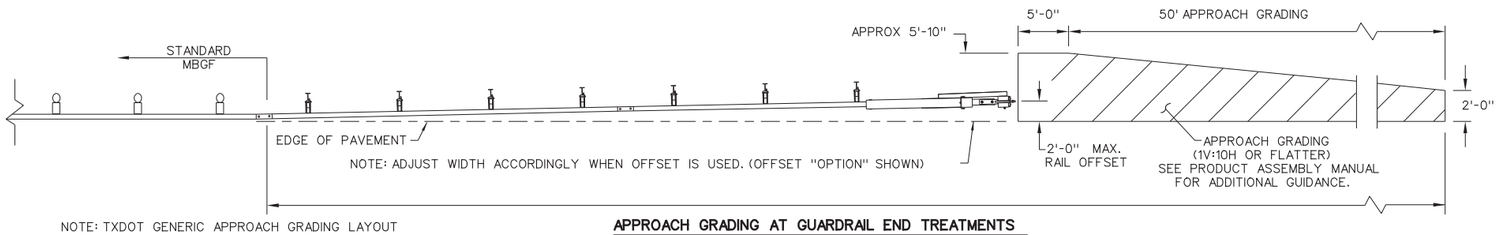












GENERAL NOTES

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
REVISIONS	0809	02	070	US 96
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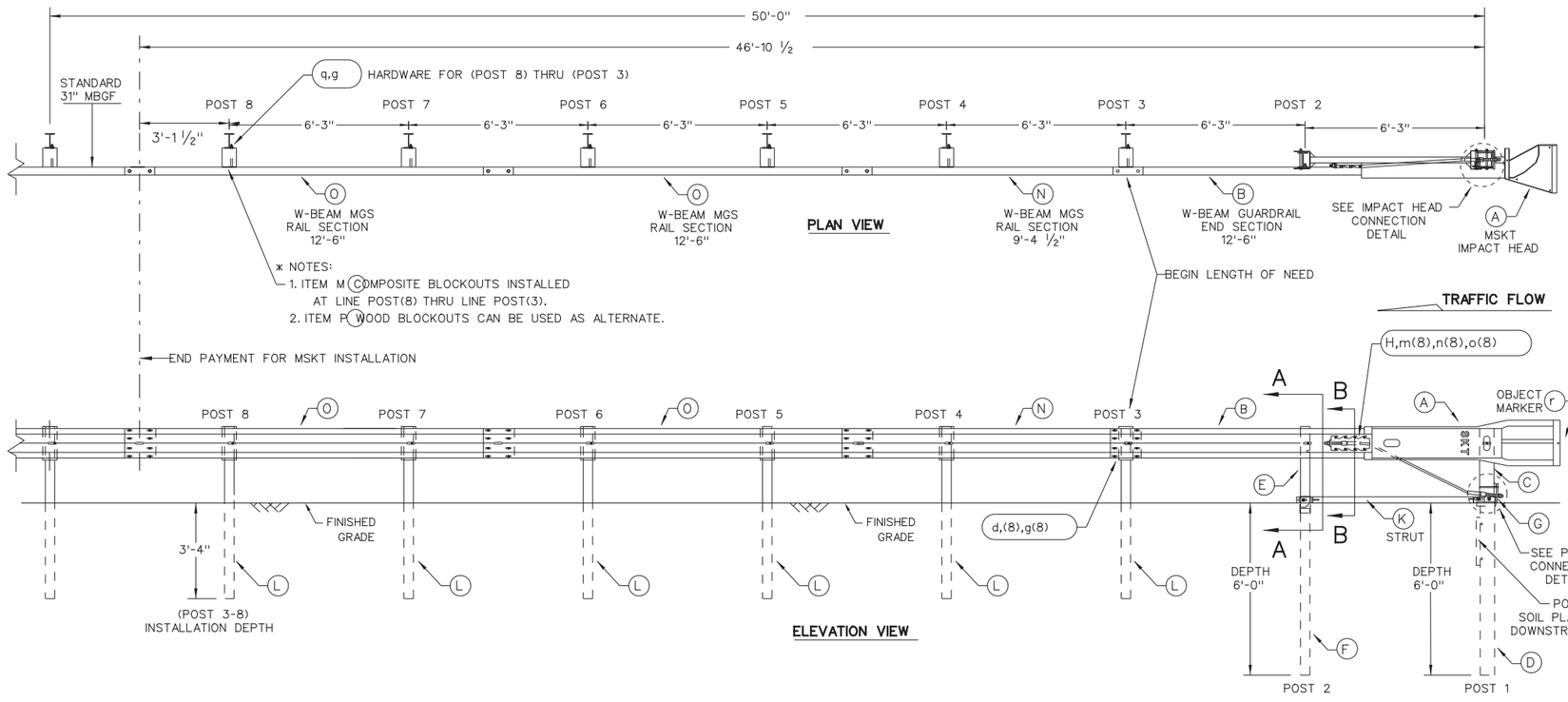
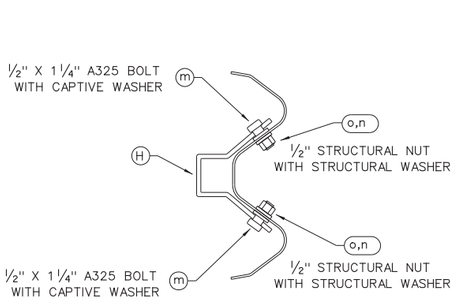
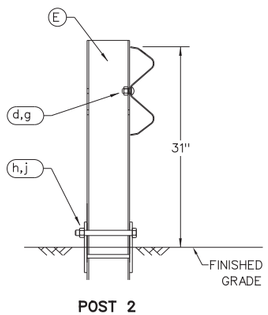
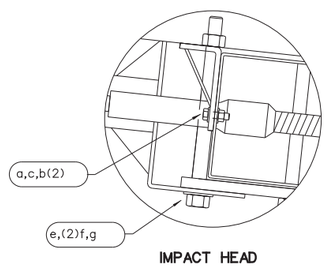
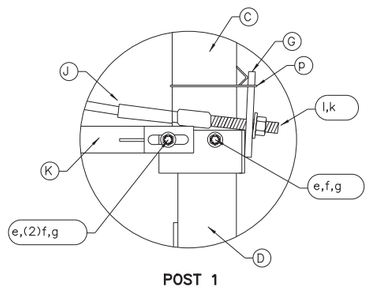


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



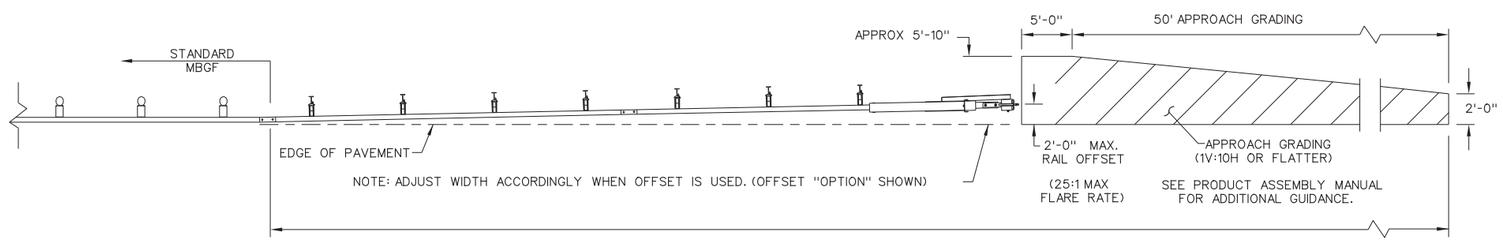






SEE NOTES: *

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

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.
	LFK	SHELBY		111

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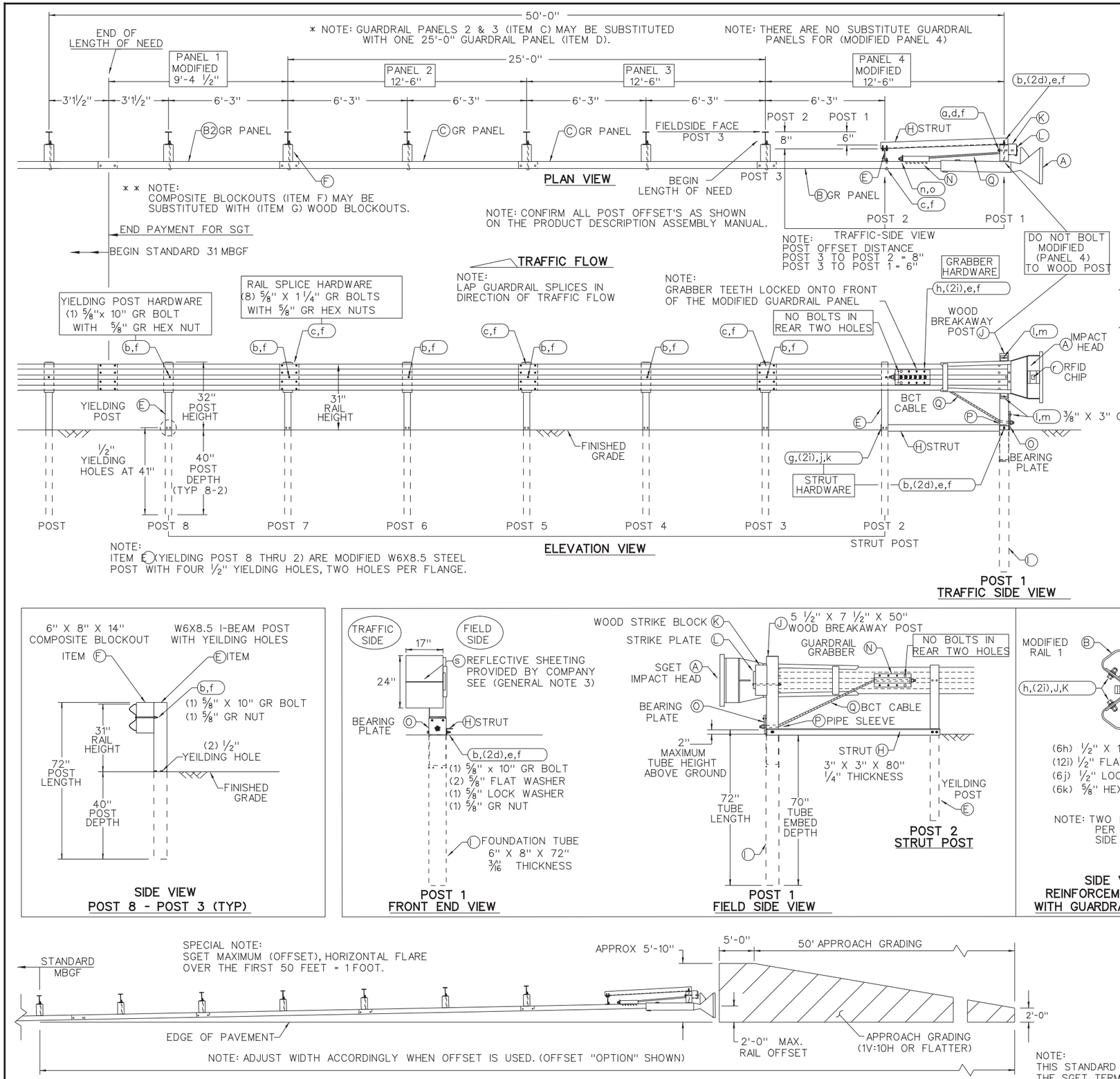


GENERAL NOTES

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

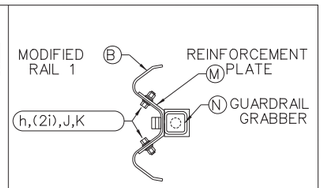
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	1	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD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

ALTERNATIVE ITEMS * **
NOTE: SEE PLAN VIEW

SIDE VIEW
POST 8 - POST 3 (TYP)

POST 1
FRONT END VIEW

POST 1
FIELD SIDE VIEW



(6h) 1/2" X 1 1/4" BOLTS
(12i) 1/2" FLAT WASHER
(6j) 1/2" LOCK WASHER
(6k) 5/8" HEX NUT

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE WITH GUARDRAIL GRABBER

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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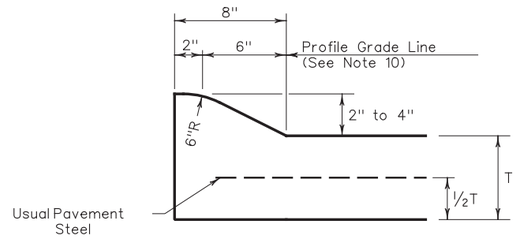
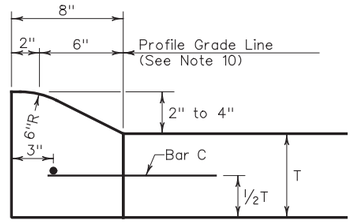
	LFK	SHELBY		112

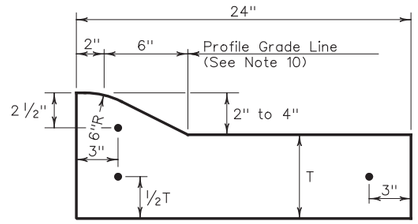
DATE:
FILE:



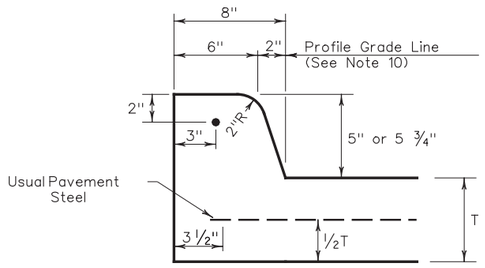
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



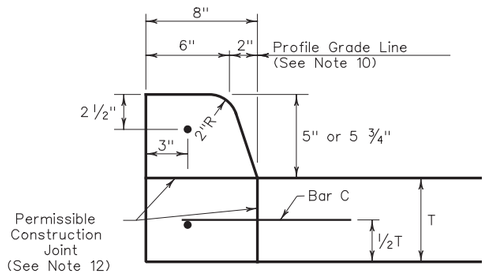
TYPE I CURB
2" - 4" HEIGHT



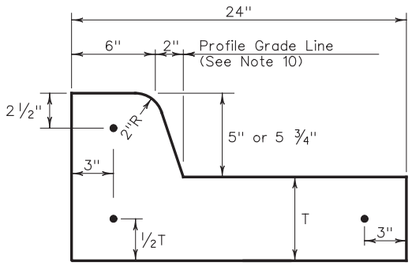
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



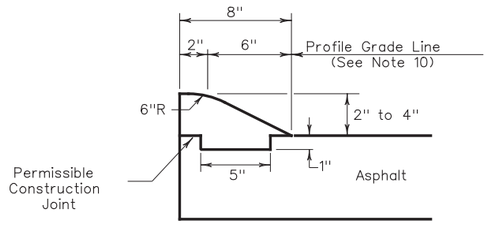
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



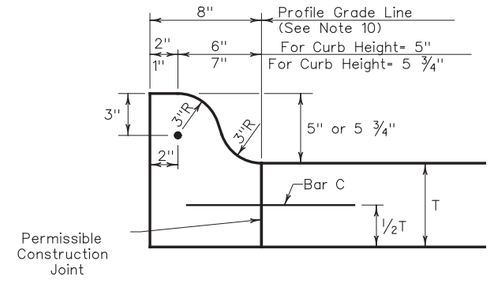
TYPE II CURB
5" - 5 ¾" HEIGHT



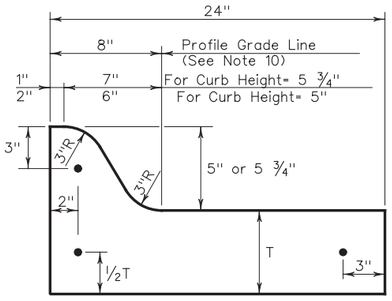
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



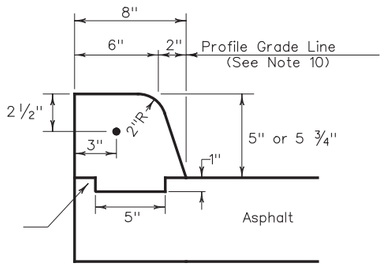
TYPE III CURB (KEYED)
2" - 4" HEIGHT



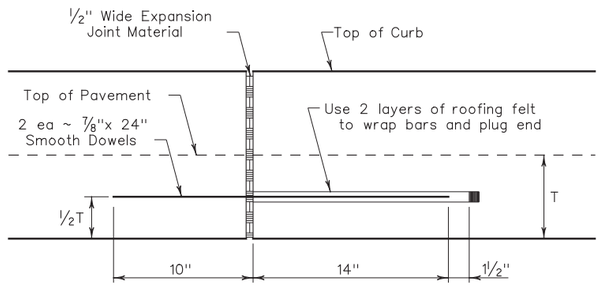
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

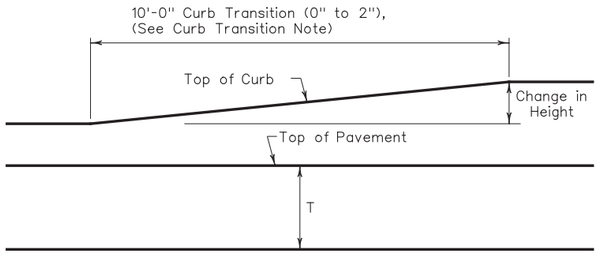


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

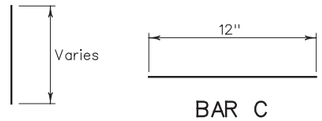
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans,or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.



BAR B

BAR C

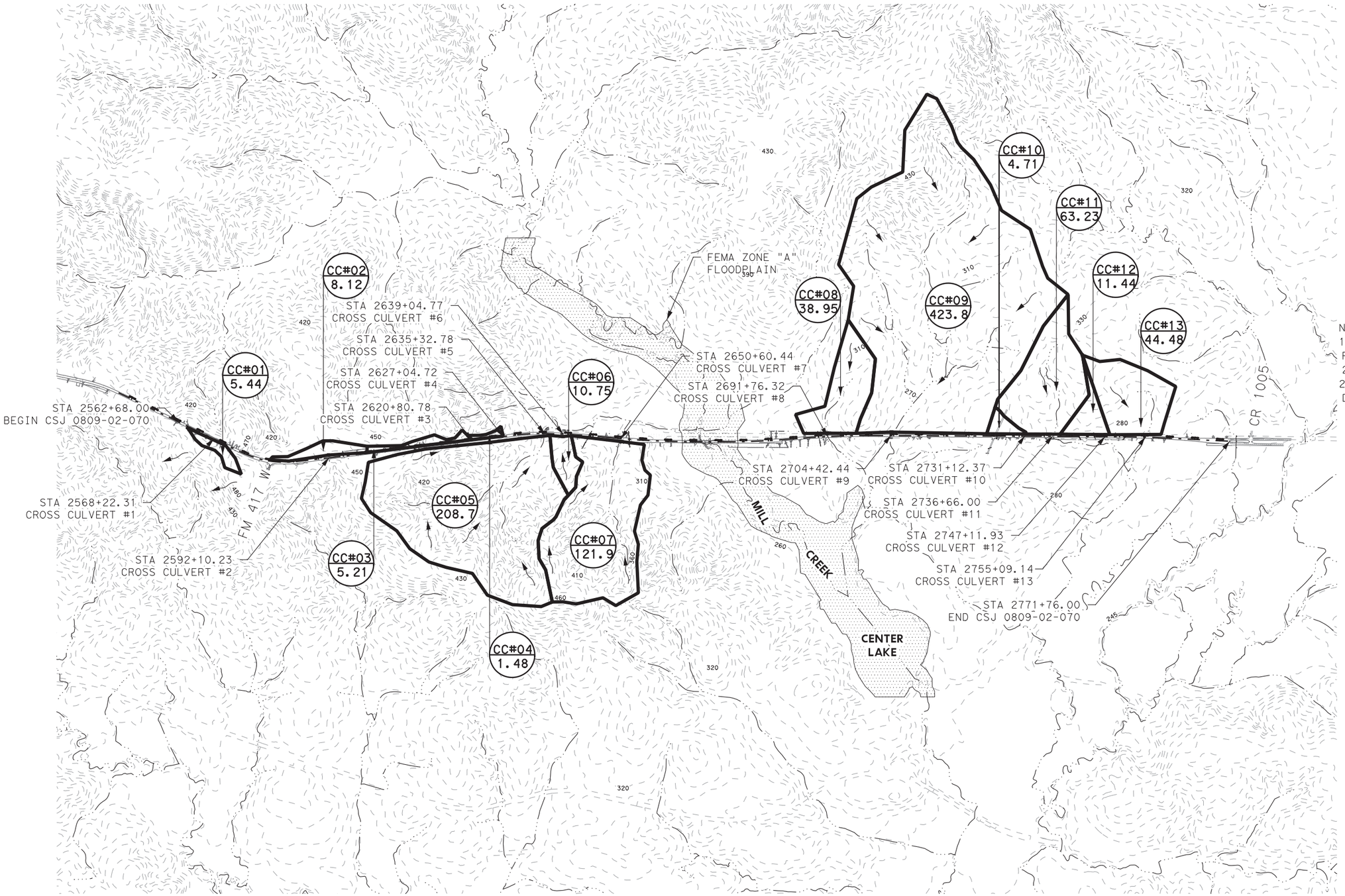
Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		113



LEGEND

DRAINAGE AREA:

CC#XX / AC

- STRUCTURE TYPE: CC=CROSS CULVERT
- SEQUENTIAL N°
- ACREAGE (Ac.)

FLOW ARROWS

CONTOUR

STREAMS

FLOODPLAIN

NOTES:

1. FLOODPLAIN SHOWN ON FEMA FIRM PANELS 4810040009B DATED JUNE 1, 2017
2. CONTOURS SHOWN FROM TNRIS LIDAR DATED 2011

0′ 1000′ 2000′

SCALE: 1"=2000′

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

EXTERNAL ENLARGED DRAINAGE AREA MAP

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A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			114
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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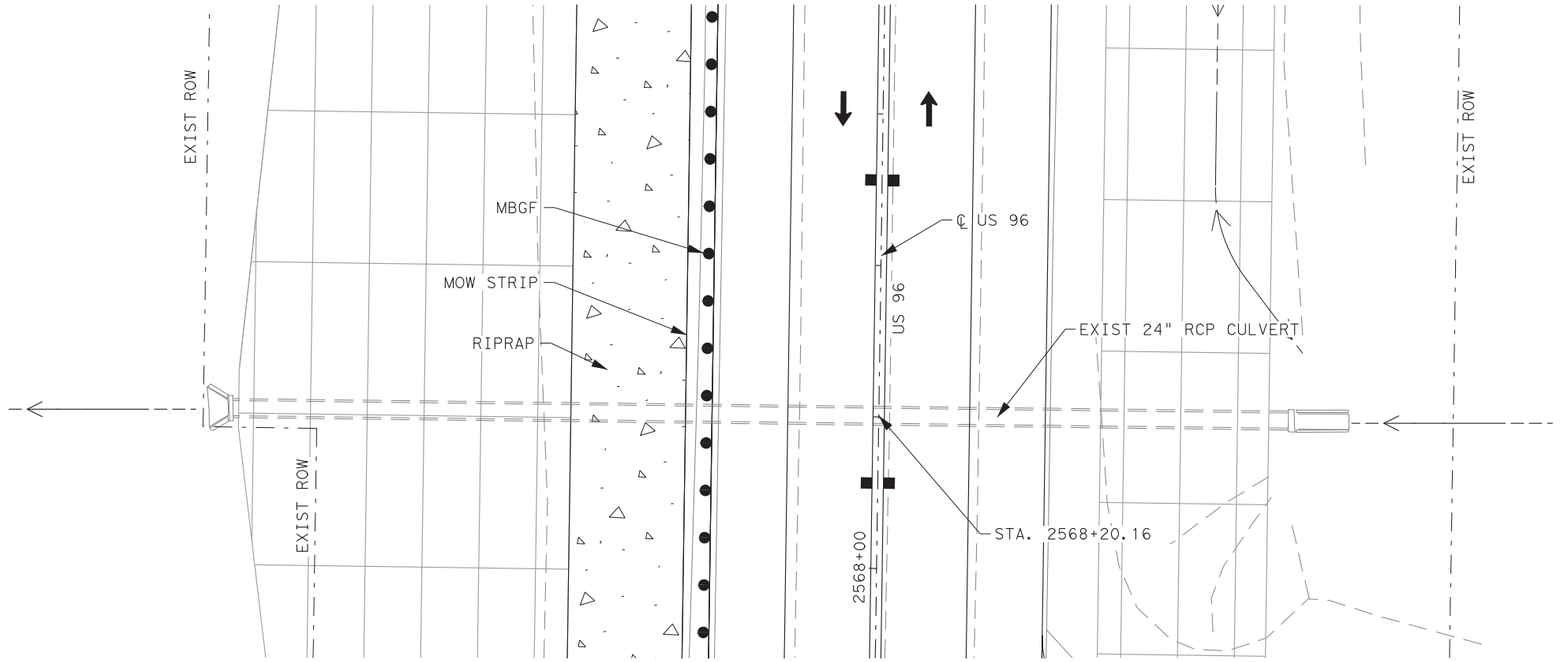
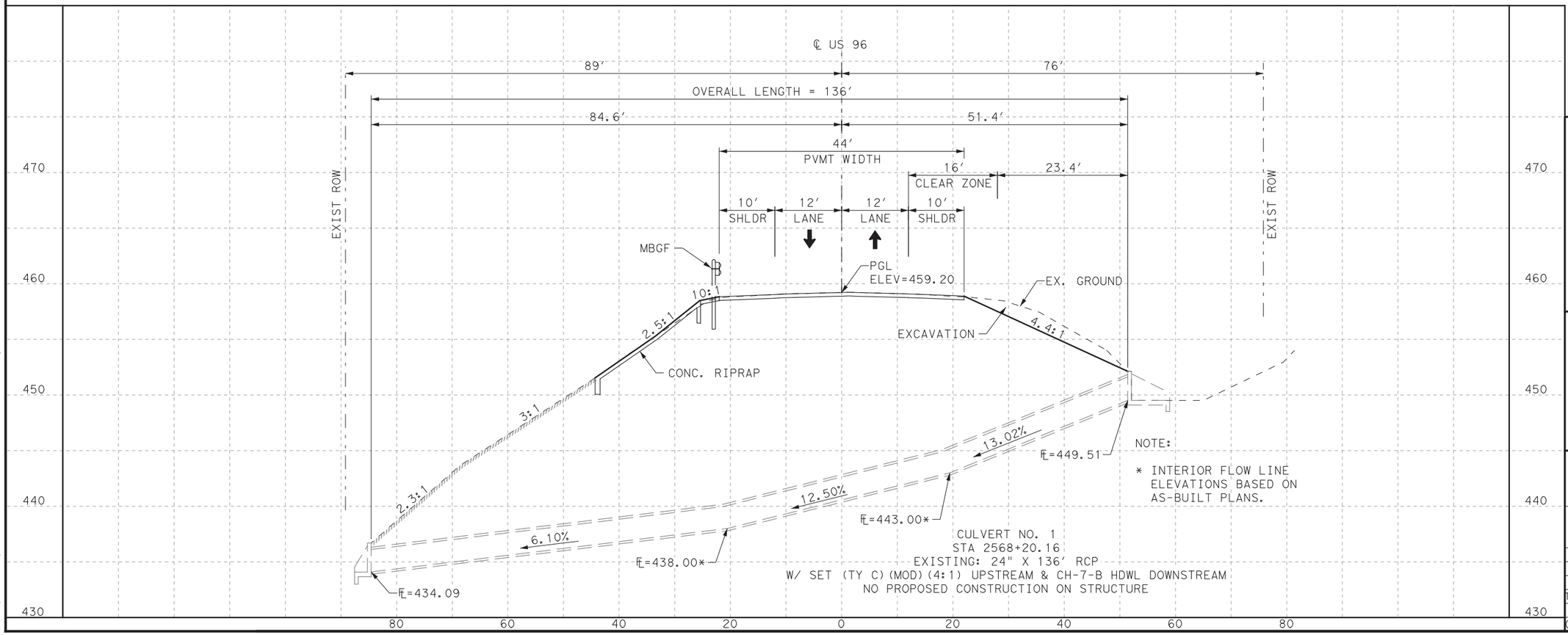


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

CULVERT LAYOUT

(NO. 01
STA 2568+22.31)

SHEET 1 OF 13

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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			115
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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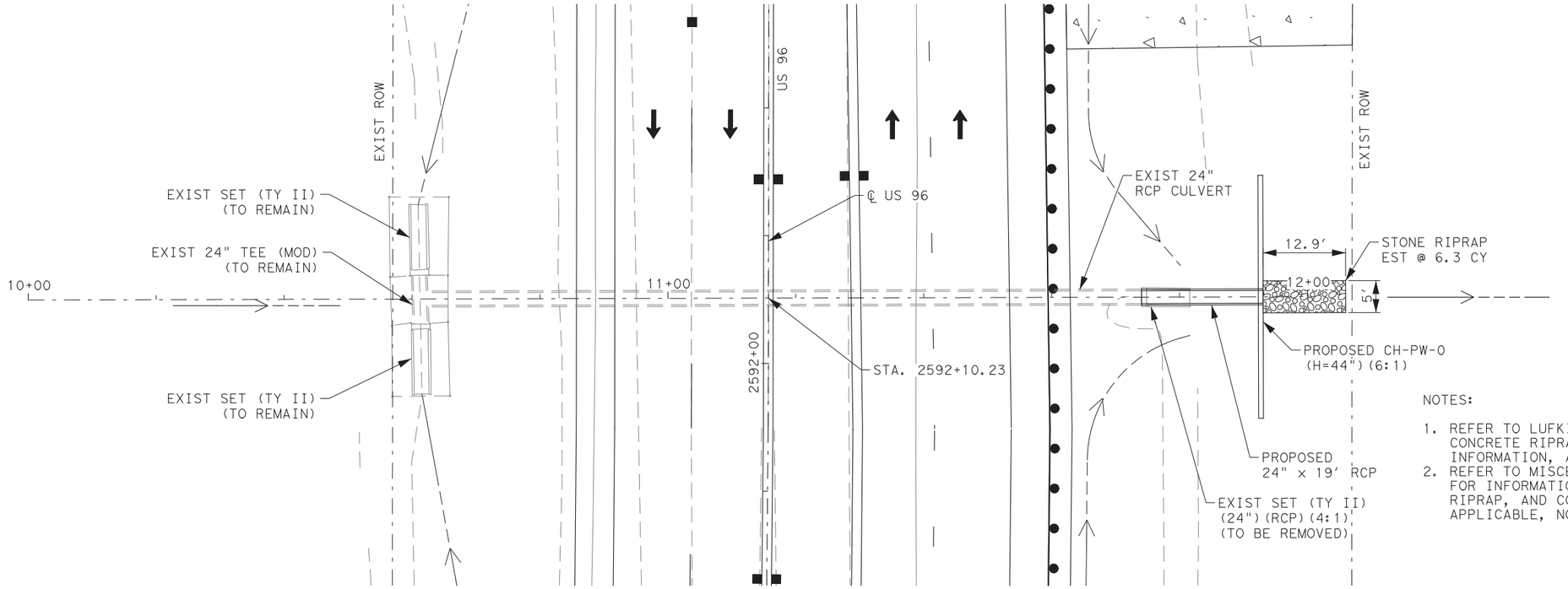

NOTES:

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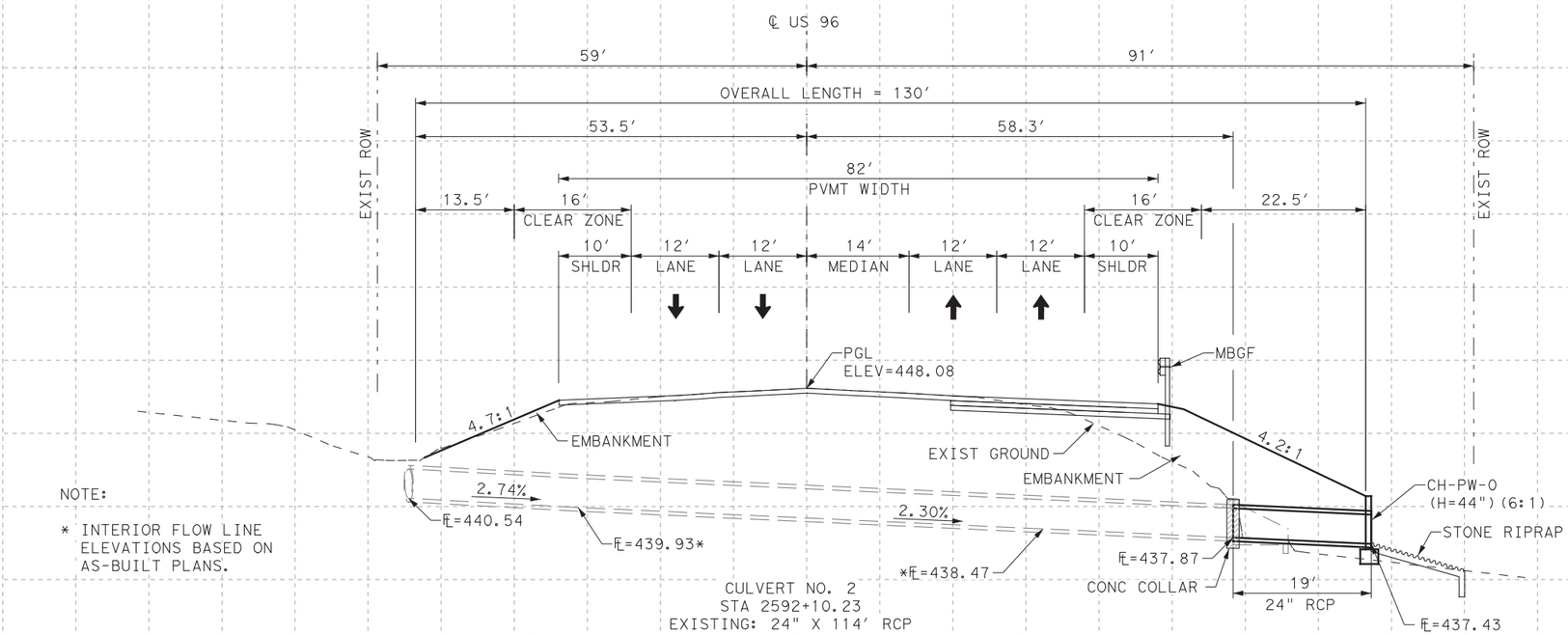

NOTE:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

CULVERT NO. 2
STA 2592+10.23
EXISTING: 24" X 114′ RCP
24"x 8′ TEE W/ 2-SET (TY II) UPSTREAM & SET (TY II) DOWNSTREAM
REMOVE SET (TY II) (24") (RCP) AND EXTEND 19′ DOWNSTREAM
USING 24" RCP (TY III) AND CH-PW-O (H=44") (6:1)

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
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PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

CULVERT LAYOUT

(NO. 02
STA 2592+10.23)

SHEET 2 OF 13

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			116
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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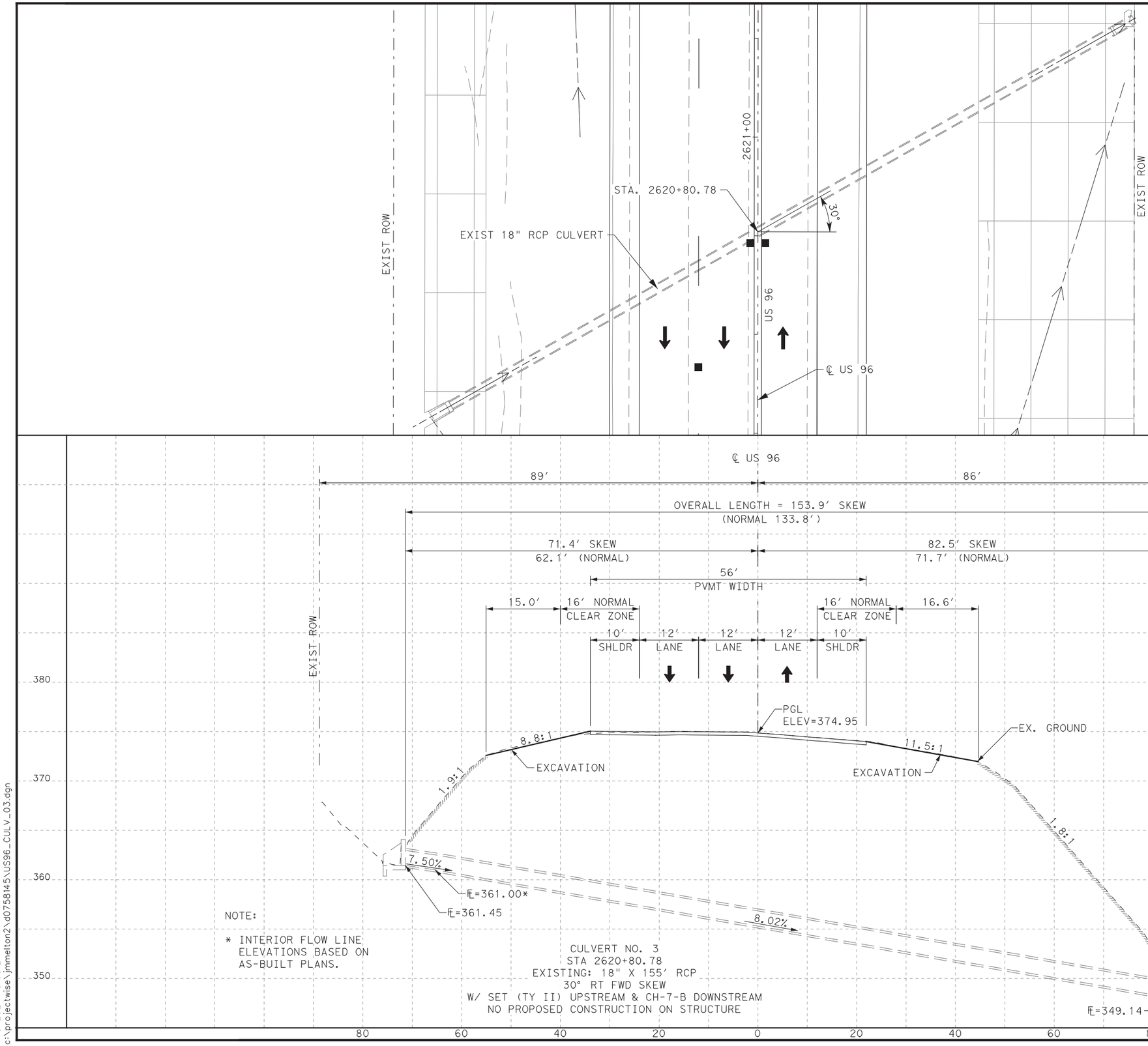

NOTE:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

CULVERT NO. 3
STA 2620+80.78
EXISTING: 18" X 155′ RCP
30° RT FWD SKEW
W/ SET (TY II) UPSTREAM & CH-7-B DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

CULVERT LAYOUT

(NO. 03
STA 2620+80.78)

SHEET 3 OF 13

Lockwood, Andrews & Newnam, Inc.
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TBPE FIRM REGISTRATION NO. 2614

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FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		117

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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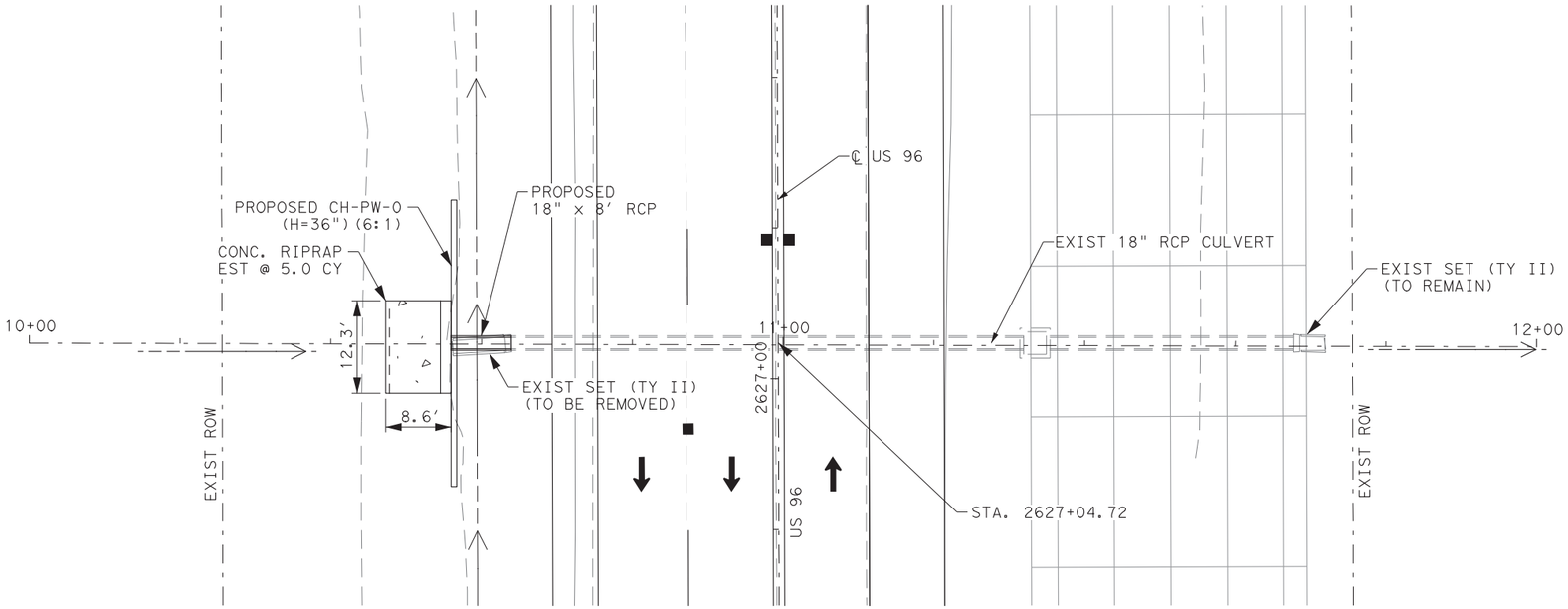

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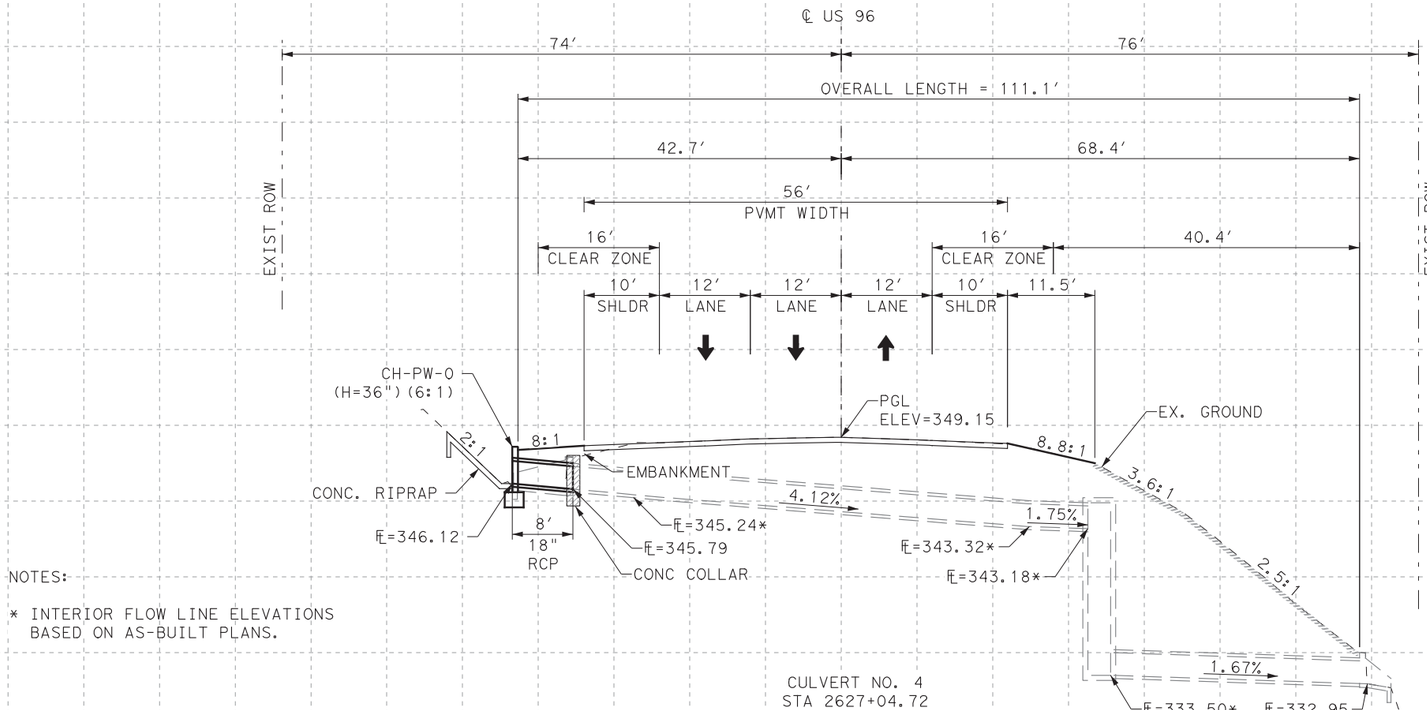

NOTES:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

CULVERT NO. 4
STA 2627+04.72
EXISTING: 18" X 106' RCP AND 1-3'x3' JCT BOX (TY M)
W/ SET (TY II) UPSTREAM & DOWNSTREAM
REMOVE SET UPSTREAM AND EXTEND 8' UPSTREAM
USING CH-PW-0 (H=36") (6:1)

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

STATE OF TEXAS
ROBERT D. AUSTIN
67596
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PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 04
STA 2627+04.72)

SHEET 4 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			118
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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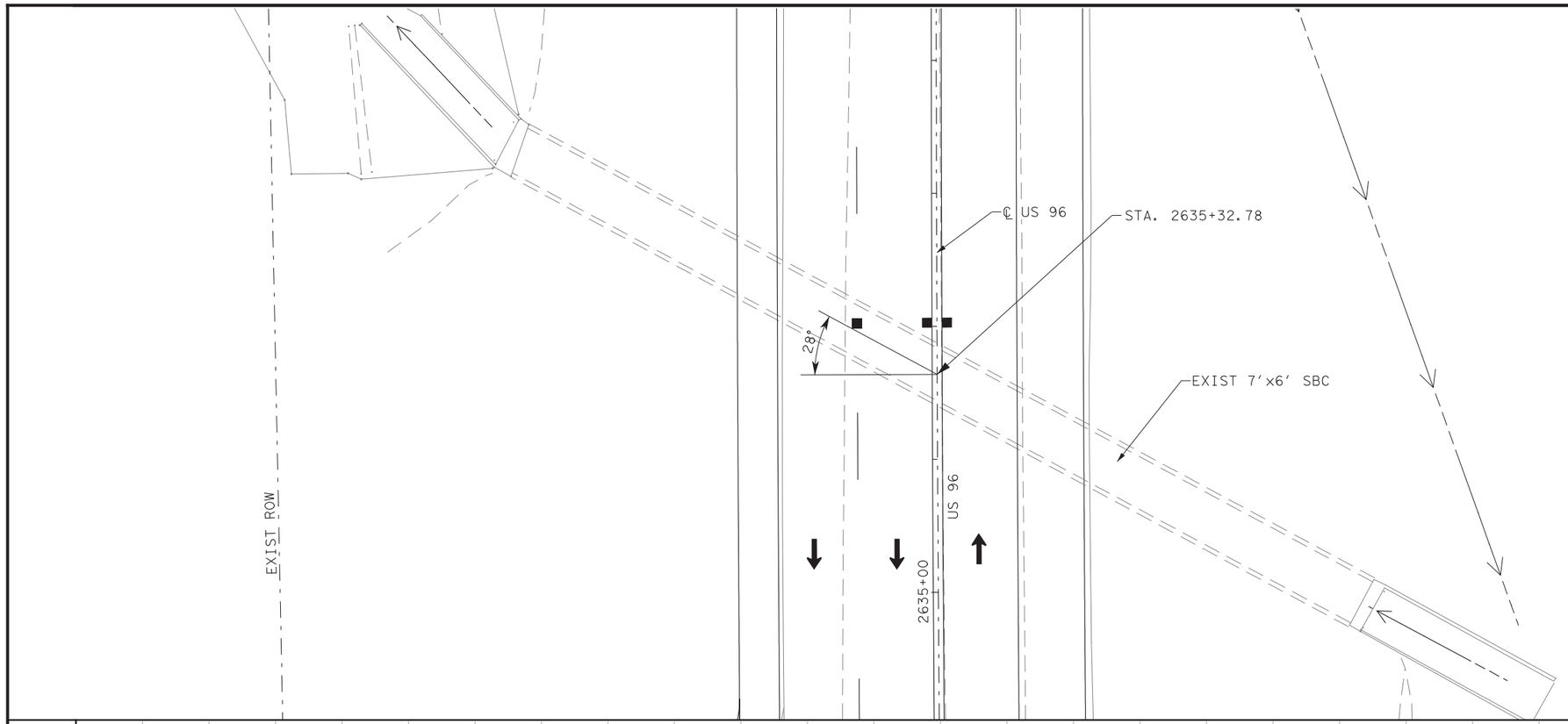

NOTES:

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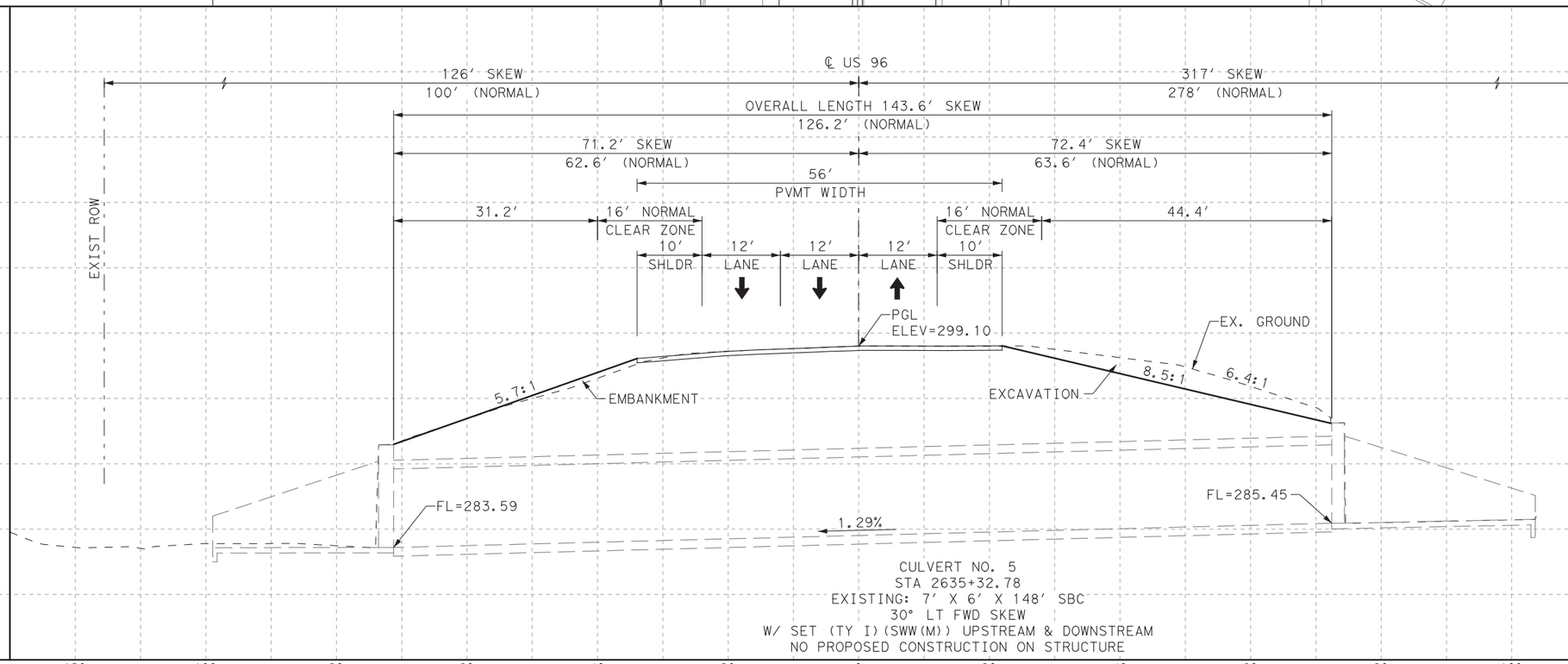

CULVERT NO. 5
STA 2635+32.78
EXISTING: 7′ X 6′ X 148′ SBC
30° LT FWD SKEW
W/ SET (TY I)(SWW(M)) UPSTREAM & DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

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ROBERT D. AUSTIN
67596
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11/03/2021

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CULVERT LAYOUT

(NO. 05
STA 2635+32.78)

SHEET 5 OF 13

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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			119
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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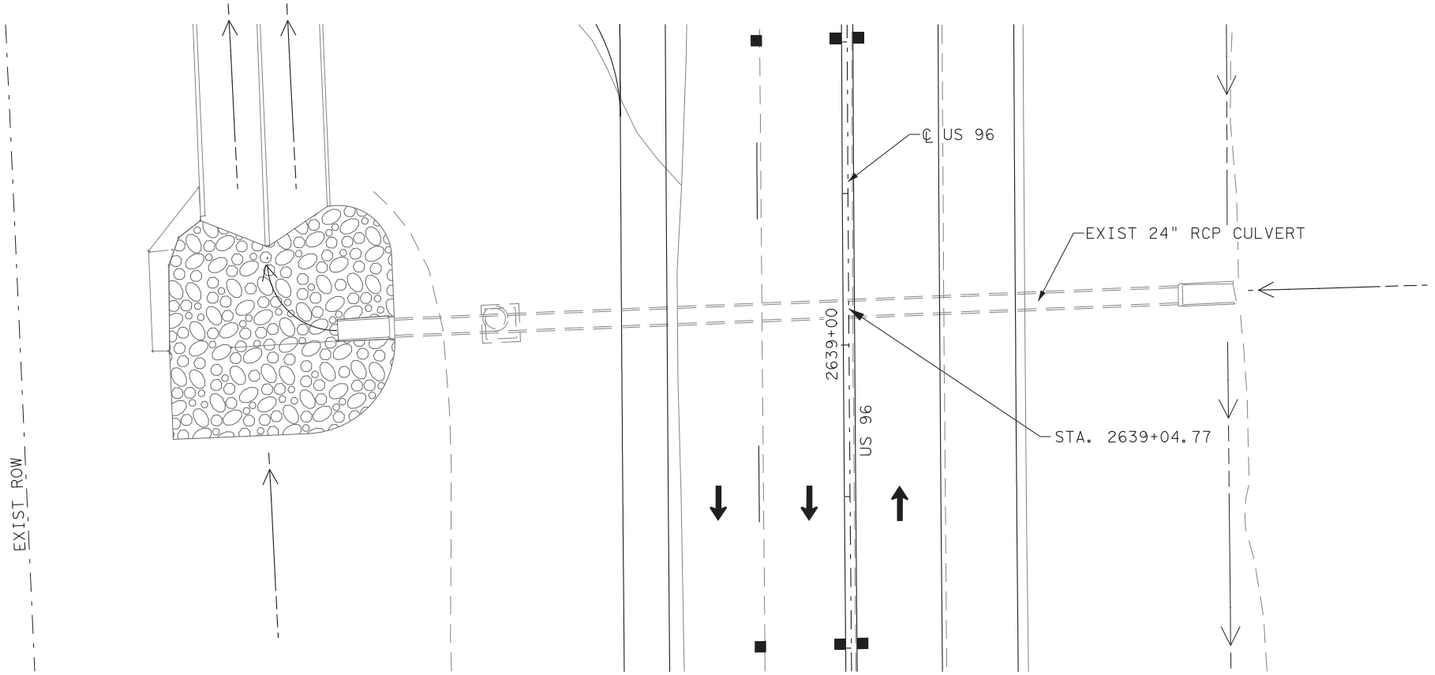

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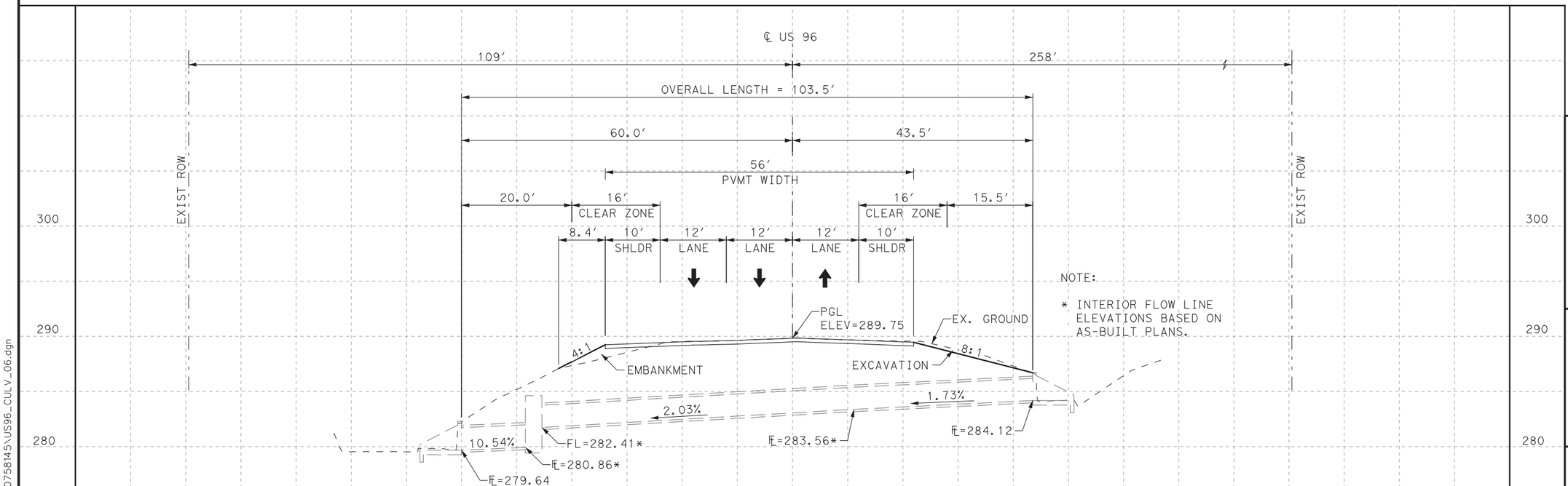
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



CULVERT NO. 6
STA 2639+04.77
EXISTING: 24" X 105′ RCP AND MH (TY M)
W/ SET (TY II)(24")(4:1) UPSTREAM & DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 06
STA 2639+04.77)

SHEET 6 OF 13

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			120
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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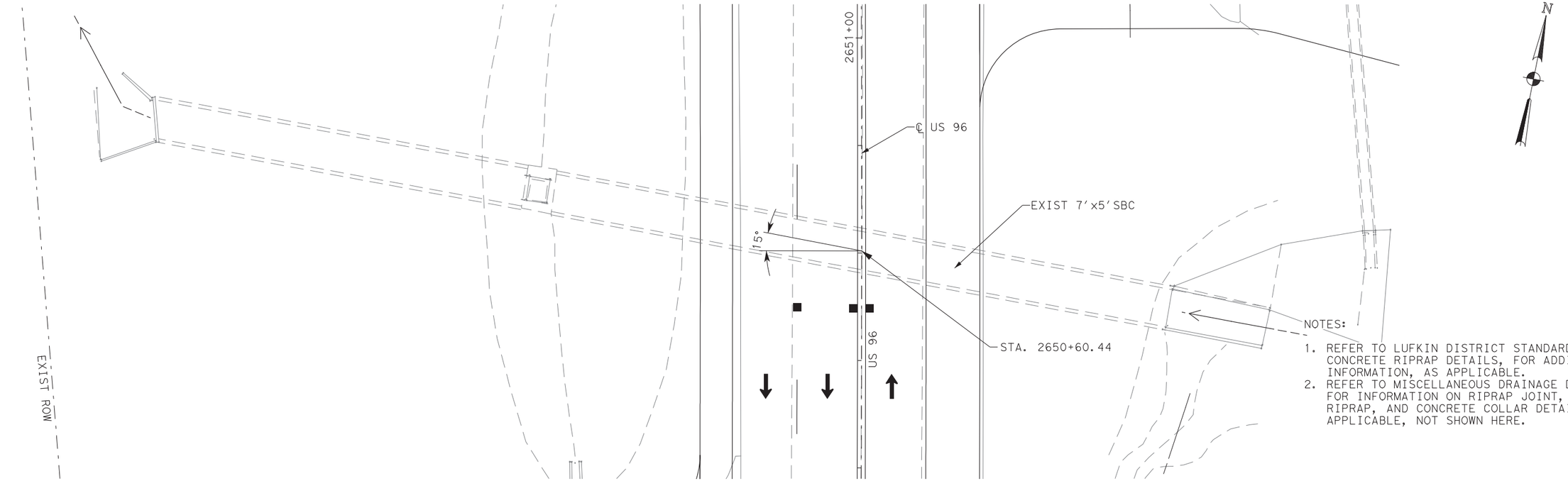

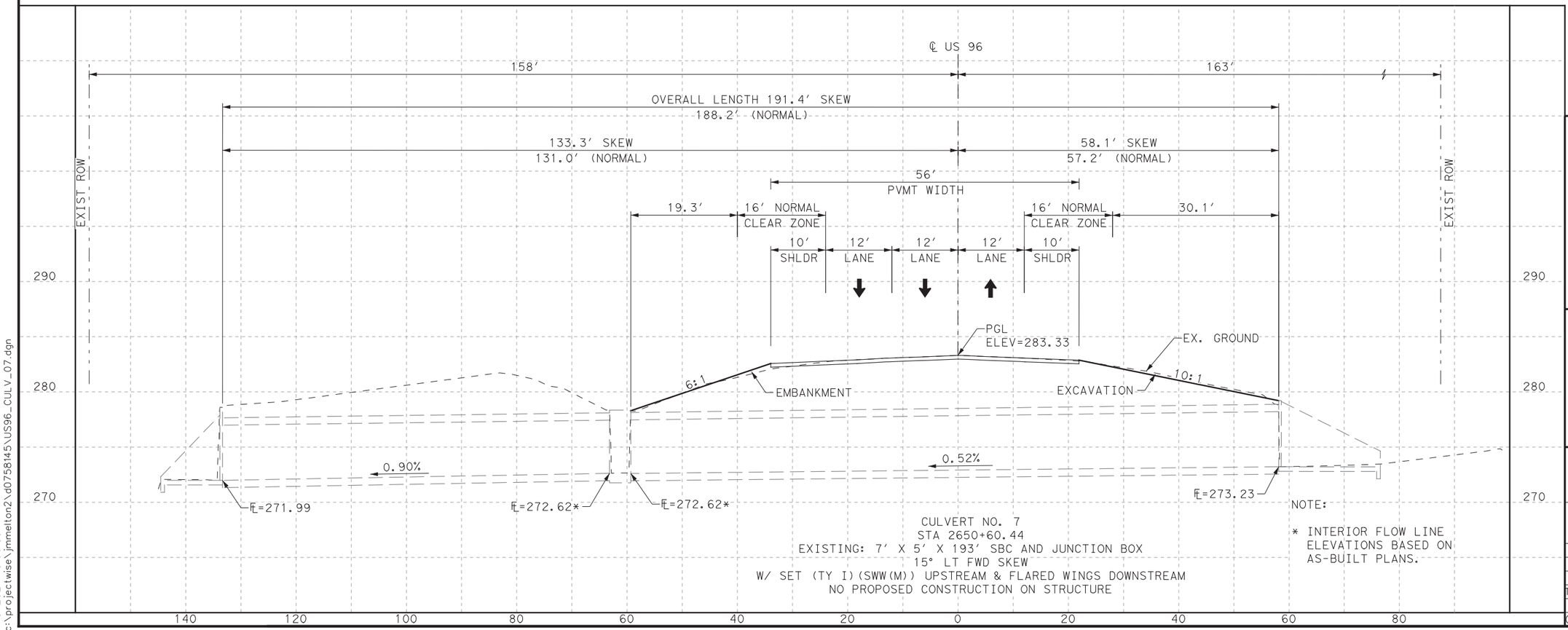

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 7
STA 2650+60.44)

SHEET 7 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			121
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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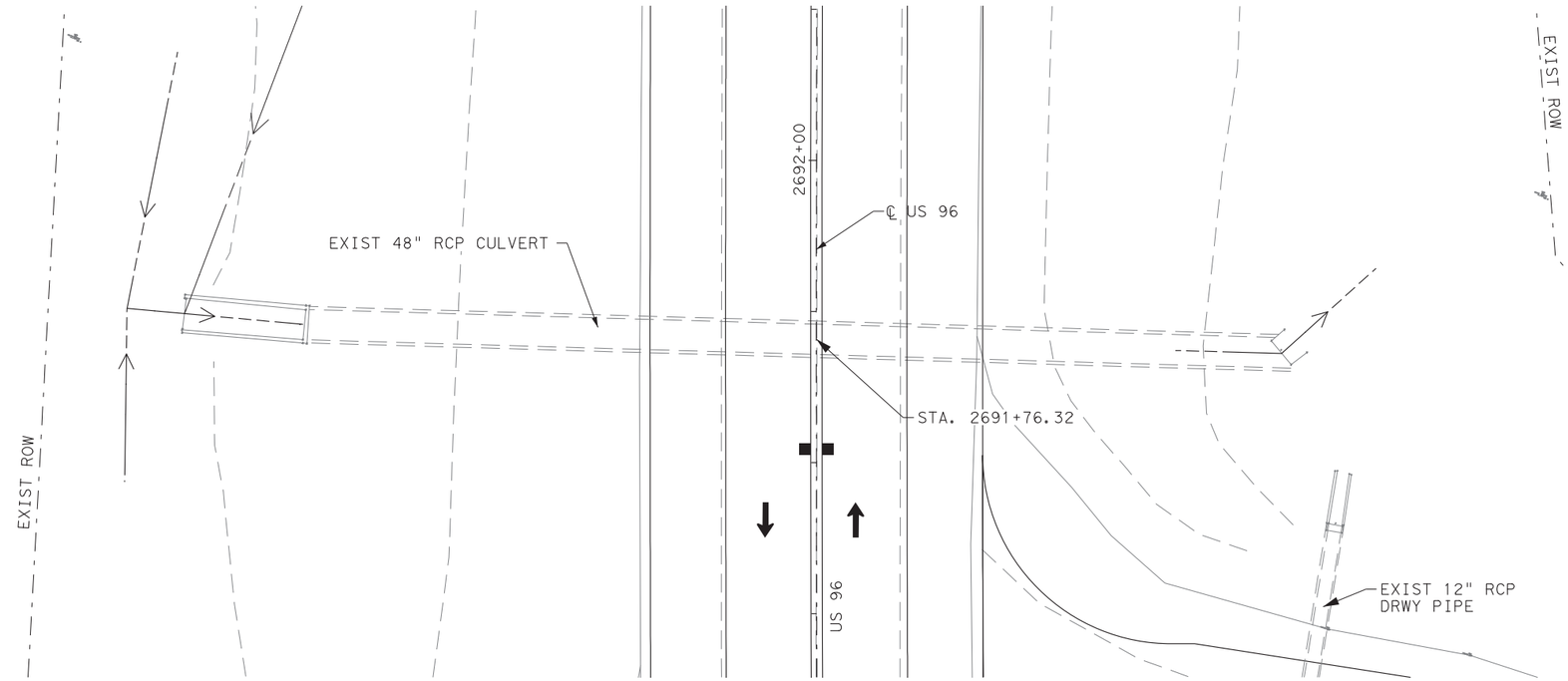

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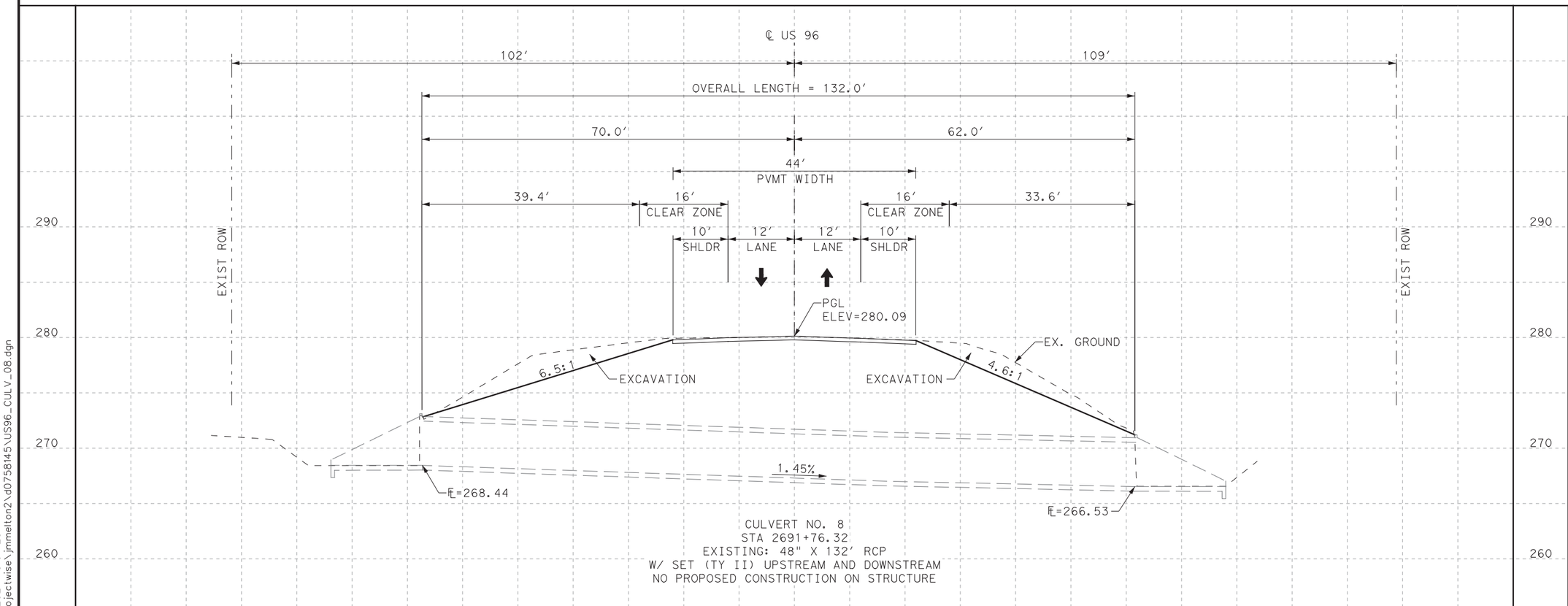
1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



CULVERT NO. 8
STA 2691+76.32
EXISTING: 48" X 132′ RCP
W/ SET (TY II) UPSTREAM AND DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 8
STA 2691+76.32)

SHEET 8 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			122
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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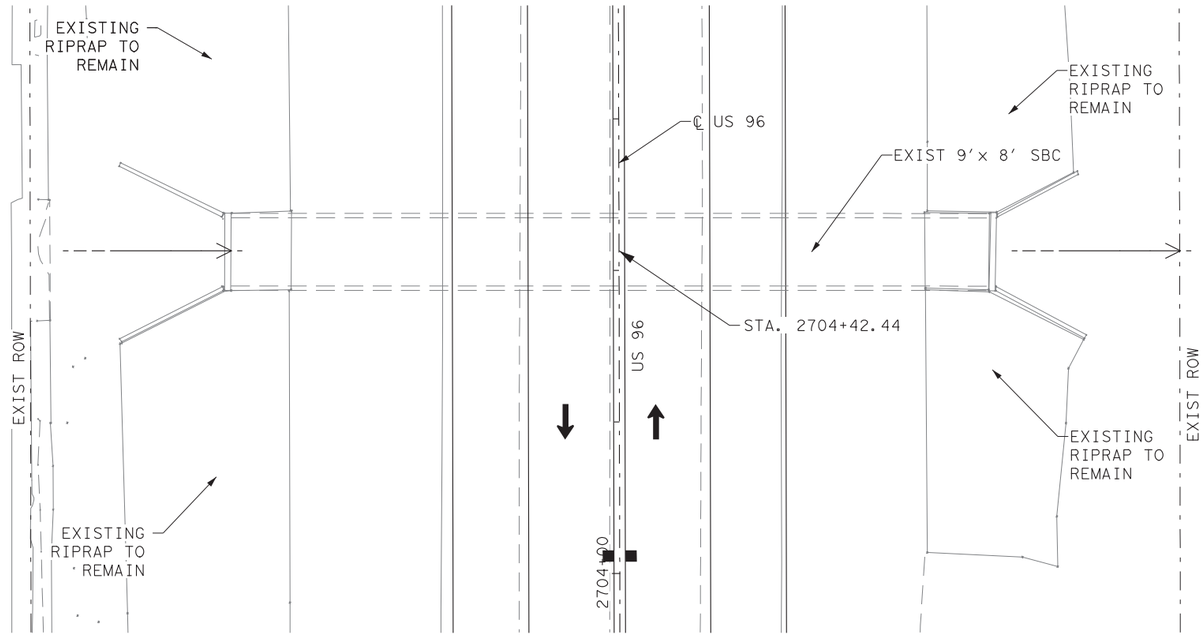
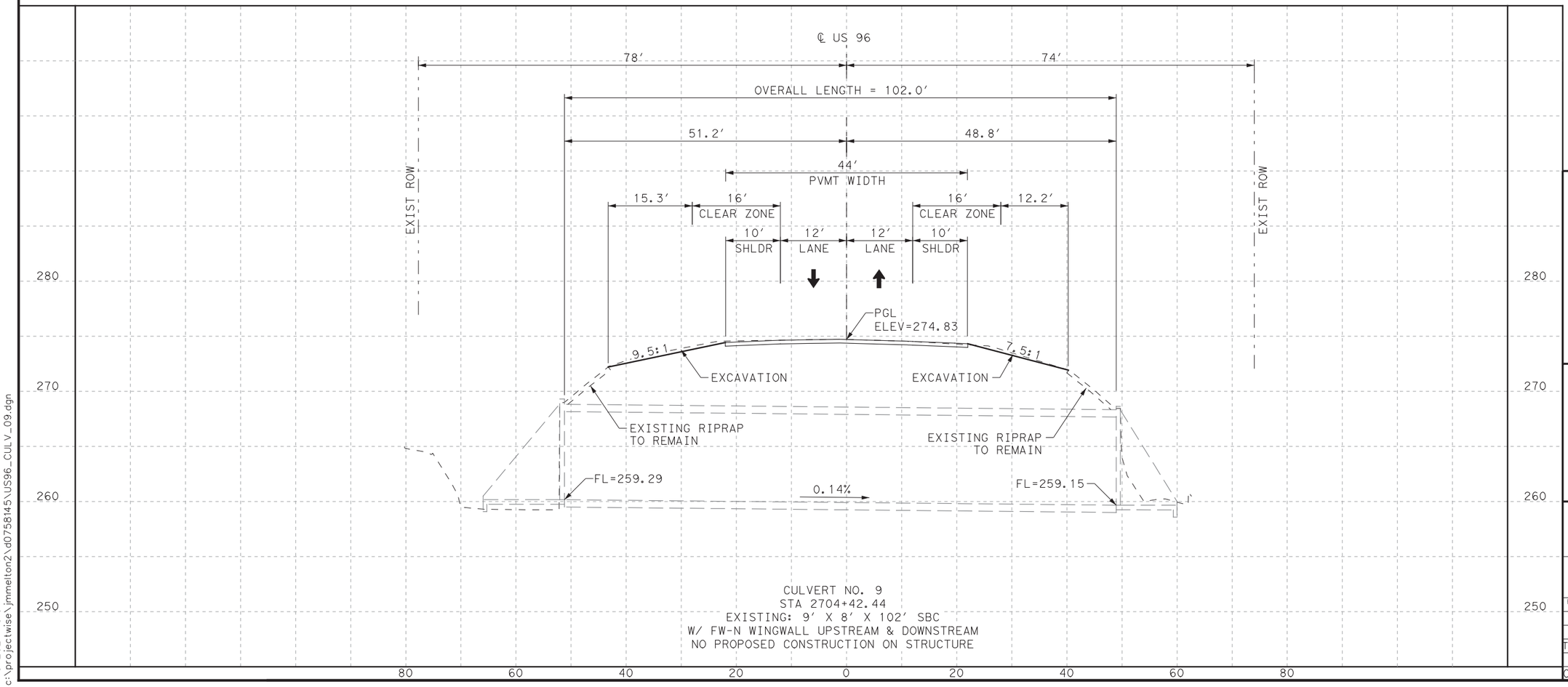


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



CULVERT NO. 9
STA 2704+42.44
EXISTING: 9′ X 8′ X 102′ SBC
W/ FW-N WINGWALL UPSTREAM & DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 09
STA 2704+42.44)

SHEET 9 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			123
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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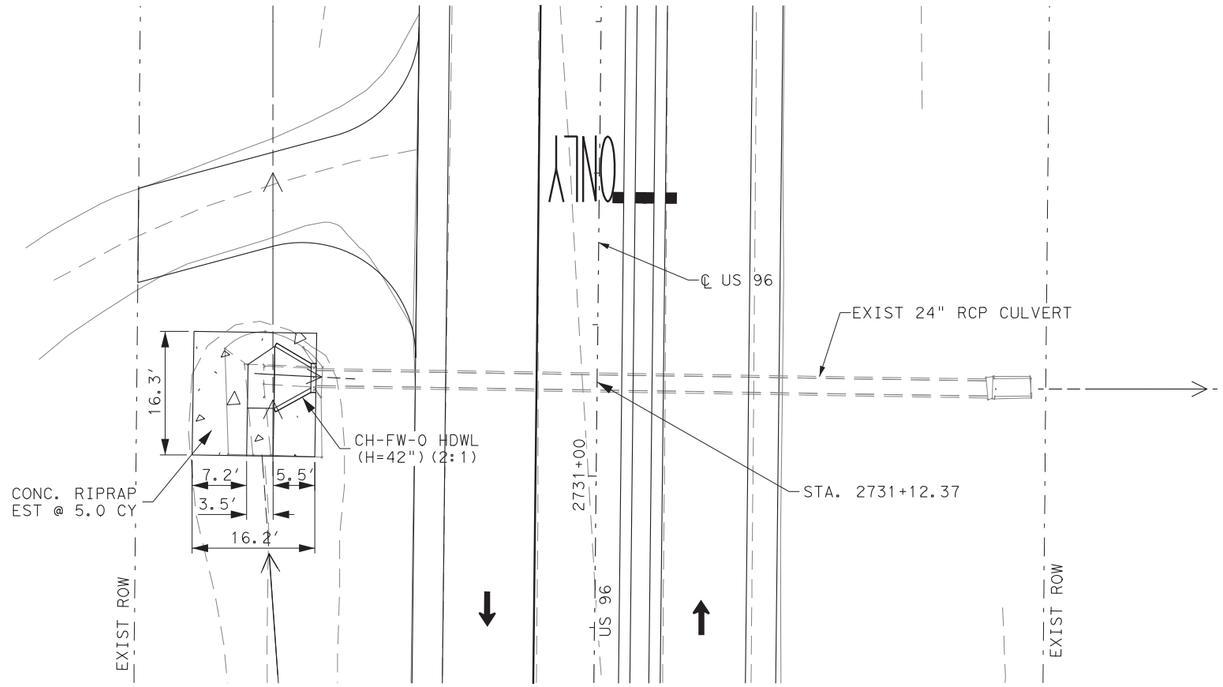
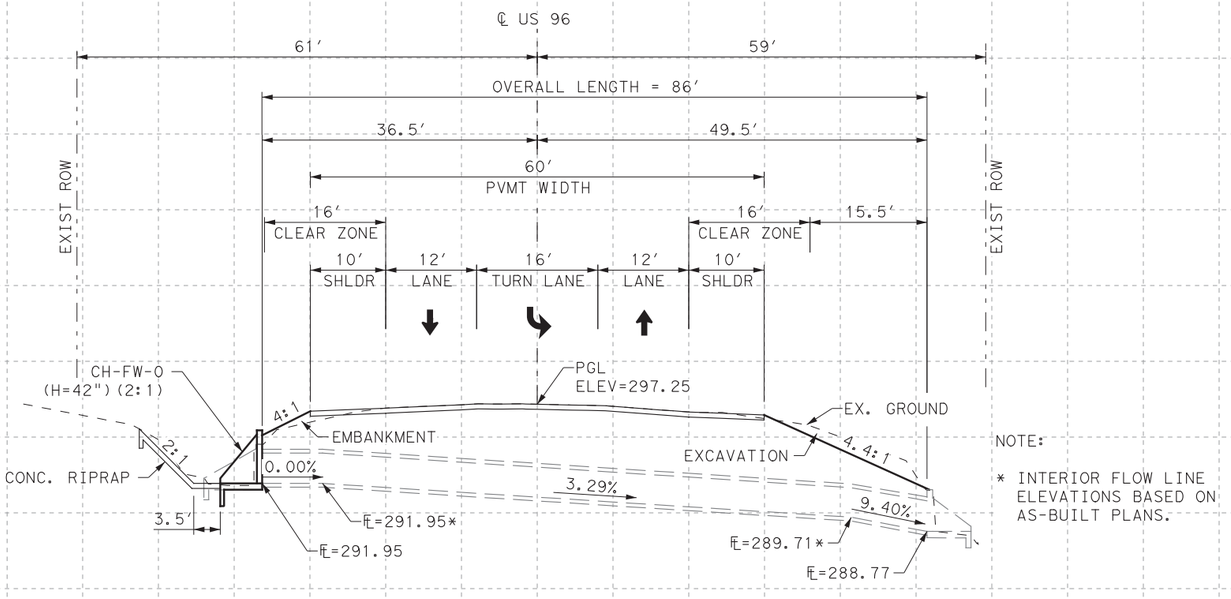


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



CULVERT NO. 10
STA 2731+12.37
EXISTING: 24" X 90' RCP
W/ SET (TY II) UPSTREAM & DOWNSTREAM
REMOVE SET (TY II) UPSTREAM AND REPLACE
USING CH-FW-0 (H=42")(2:1)

NOTE:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

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

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT
(NO. 10
STA 2731+12.37)

SHEET 10 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			124
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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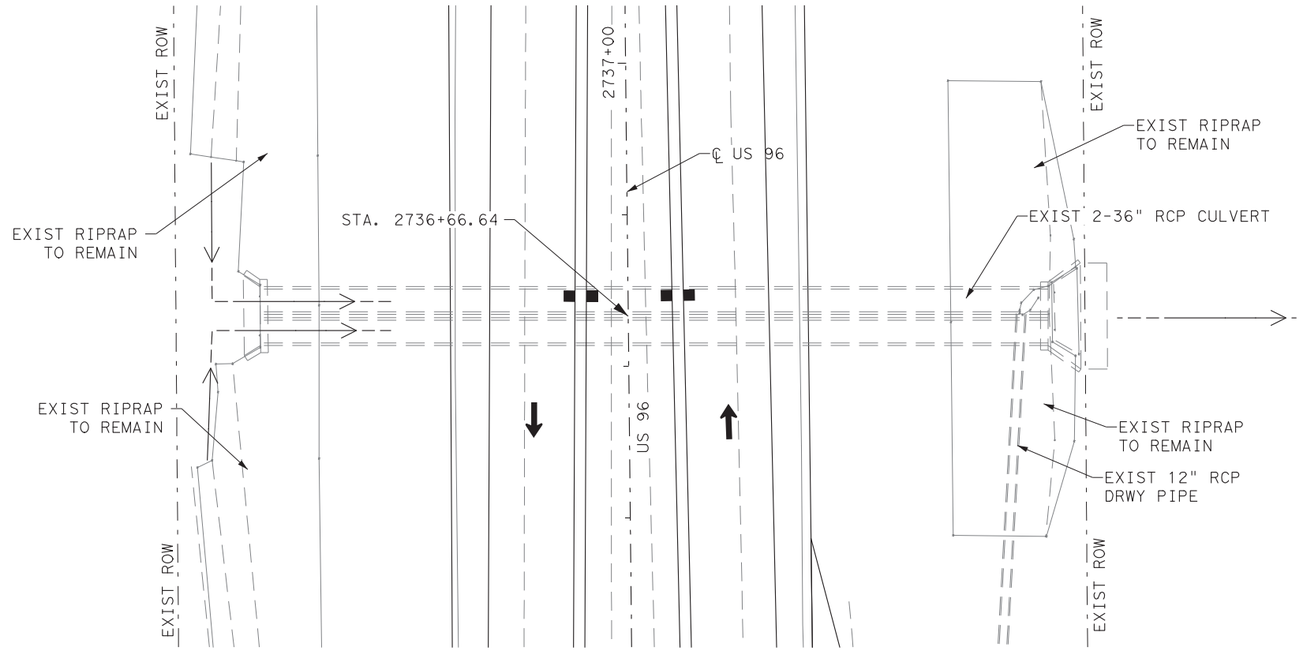
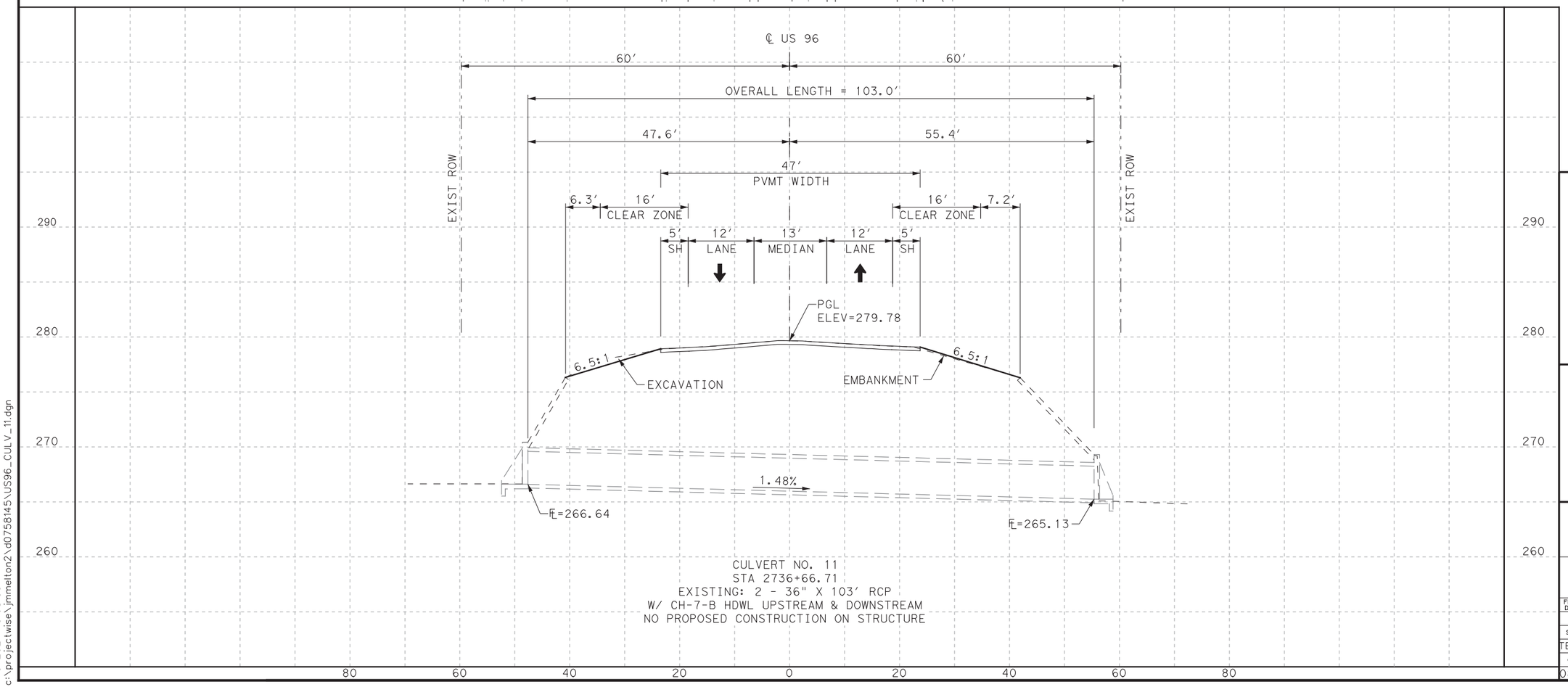


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



CULVERT NO. 11
STA 2736+66.71
EXISTING: 2 - 36" X 103′ RCP
W/ CH-7-B HDWL UPSTREAM & DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 11
STA 2736+66.64)

SHEET 11 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			125
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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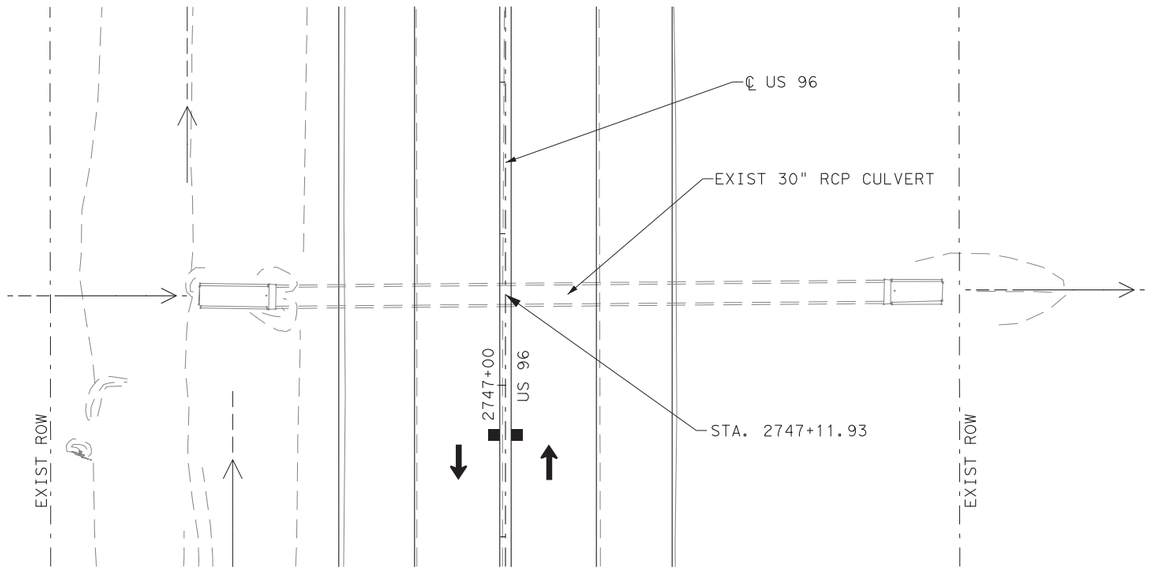
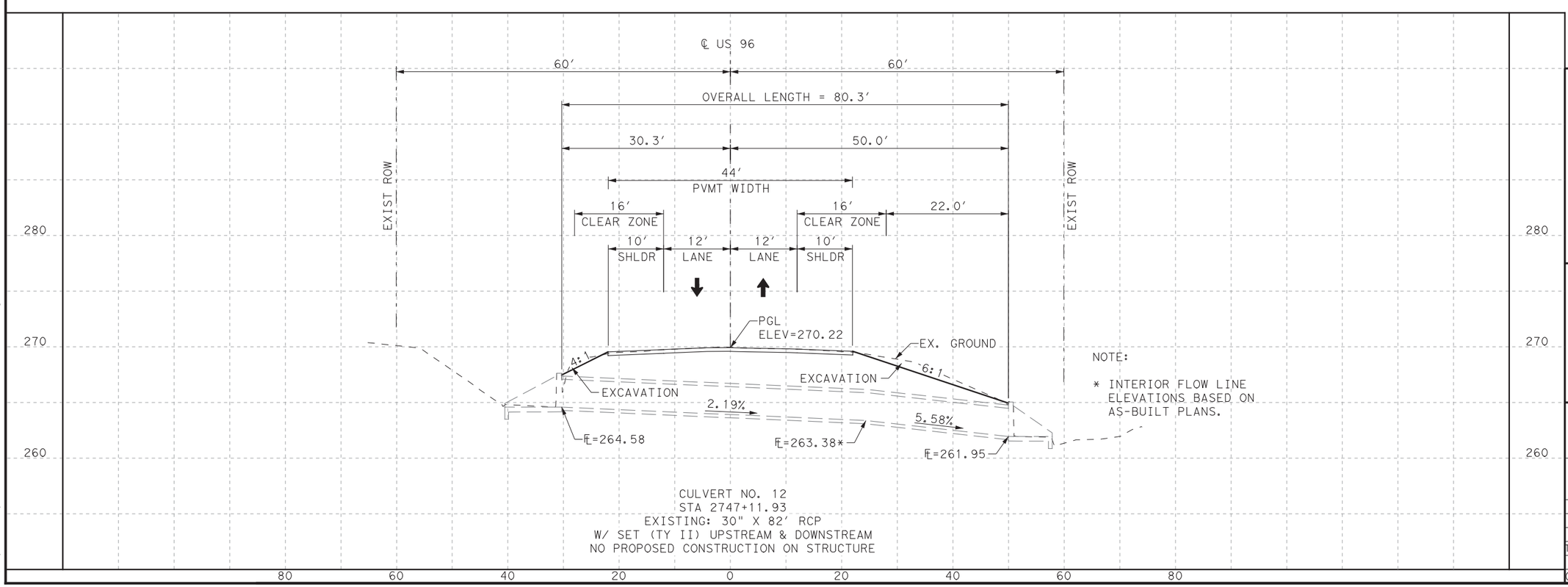


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



NOTE:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

CULVERT NO. 12
STA 2747+11.93
EXISTING: 30" X 82′ RCP
W/ SET (TY II) UPSTREAM & DOWNSTREAM
NO PROPOSED CONSTRUCTION ON STRUCTURE

CULVERT LAYOUT

(NO. 12
STA 2747+11.93)

SHEET 12 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			126
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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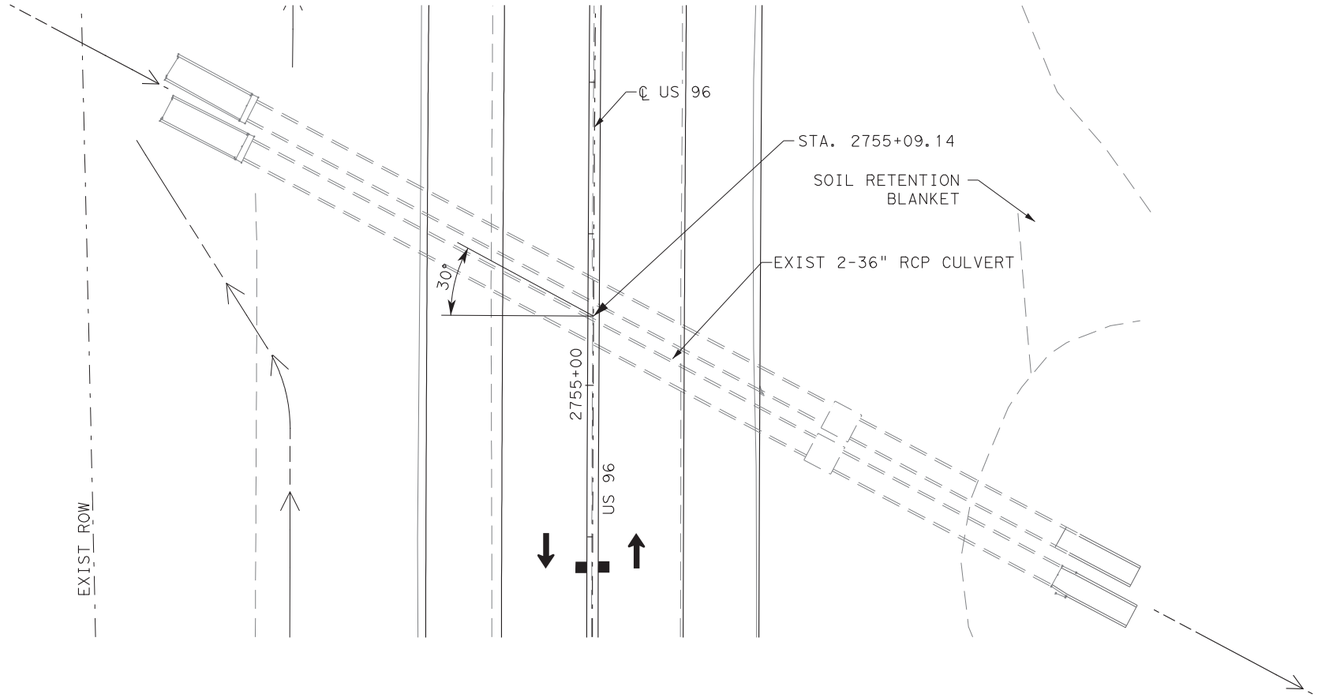
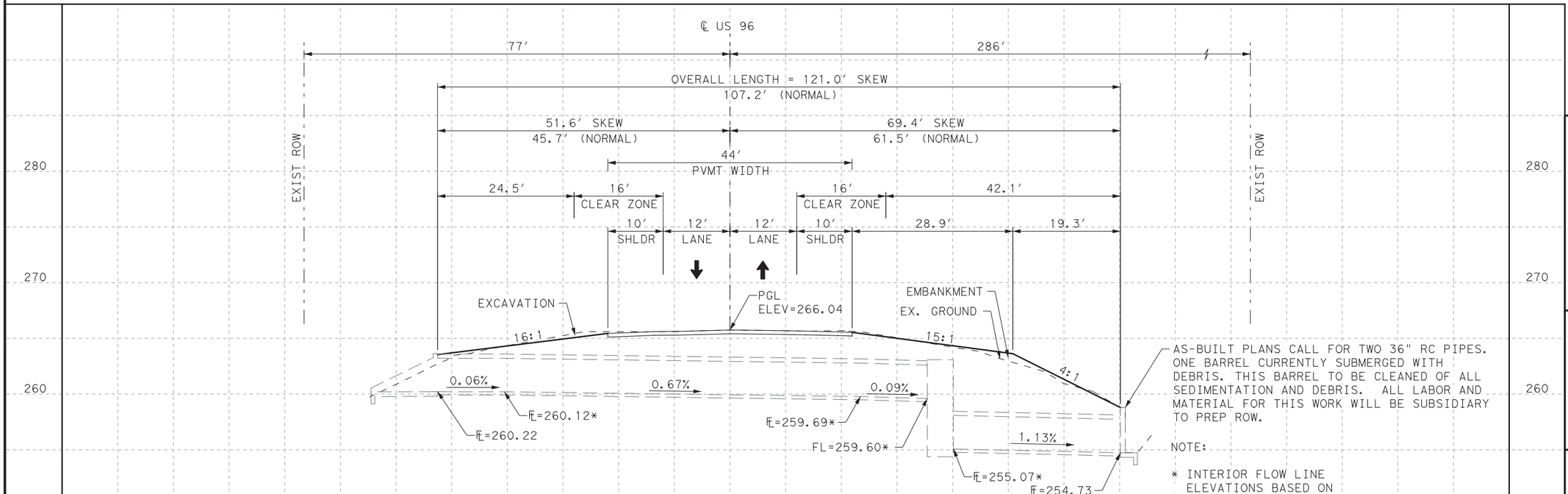


NOTES:

1. REFER TO LUFKIN DISTRICT STANDARD, CONCRETE RIPRAP DETAILS, FOR ADDITIONAL INFORMATION, AS APPLICABLE.
2. REFER TO MISCELLANEOUS DRAINAGE DETAILS FOR INFORMATION ON RIPRAP JOINT, ROCK RIPRAP, AND CONCRETE COLLAR DETAILS, AS APPLICABLE, NOT SHOWN HERE.



AS-BUILT PLANS CALL FOR TWO 36" RC PIPES. ONE BARREL CURRENTLY SUBMERGED WITH DEBRIS. THIS BARREL TO BE CLEANED OF ALL SEDIMENTATION AND DEBRIS. ALL LABOR AND MATERIAL FOR THIS WORK WILL BE SUBSIDIARY TO PREP ROW.

NOTE:

* INTERIOR FLOW LINE ELEVATIONS BASED ON AS-BUILT PLANS.

CULVERT NO. 13
STA 2755+09.14
EXISTING: 2 -36" X 121′ RCP AND MANHOLE (TY M)
30° LT FWD SKEW
W/ 2-SET (TY II) UPSTREAM
& 2-SET (TY II) DOWNSTREAM
NO PROPOSED CONSTRUCTION FOR STRUCTURE

0′ 5 10 20
SCALE: 1"=20′ H
1"=10′ V

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

CULVERT LAYOUT

(NO. 13
STA 2755+09.14)

SHEET 13 OF 13

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			127
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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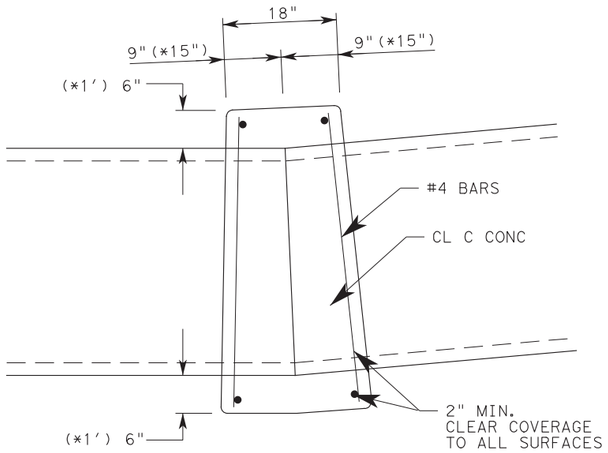
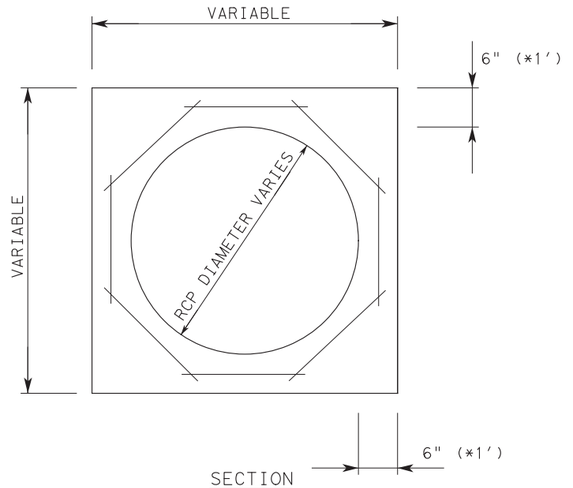


PLAN



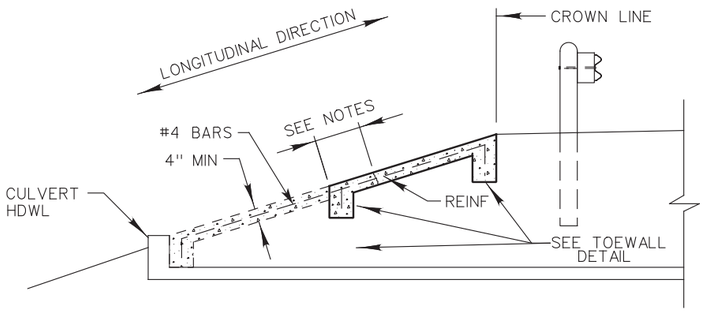
SECTION

*FOR >36" DIAMETER AND LARGER PIPE

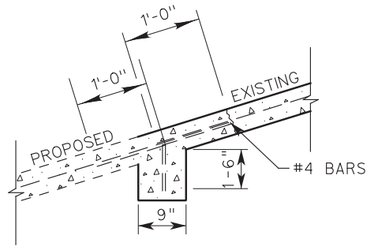
RCP JOINT CONCRETE COLLAR

COLLAR NOTES:

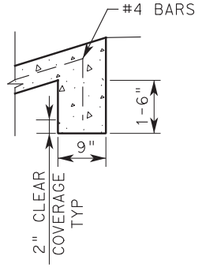
1. A CLASS "C" CONCRETE COLLAR SHALL BE USED WHERE CONNECTING RCP TO EXISTING RCP AND AS DIRECTED BY THE ENGINEER. THE RCP EXTENSION LENGTH SHOWN IN THE PLANS WILL BE THE LIMIT OF MEASUREMENT FOR PAYMENT.
2. WHEN REMOVING THE EXISTING END TREATMENT, THE EXISTING PIPE REINFORCEMENT SHALL BE EXPOSED A MINIMUM OF 6" AND WILL BE INCORPORATED IN THE CONCRETE COLLAR PLACEMENT.
3. THE INSIDE PIPE DIMENSION SHALL BE MAINTAINED REGARDLESS OF FORMING METHOD.
4. COLLAR REINFORCEMENT SHALL BE #4 BARS MINIMUM AND MAY BE CUT IN THE FIELD TO FIT THE INSTALLATION.



CONCRETE RIPRAP CONNECTION



INTERMEDIATE TOEWALL



TOEWALL

RIPRAP NOTES:

1. USE CLASS "B" CONCRETE UNLESS OTHERWISE NOTED IN THE PLANS.
2. BREAKBACK EXISTING CONCRETE RIPRAP TO EXPOSE A MINIMUM OF 1' REINFORCEMENT STEEL TO PROVIDE OVERLAP WITH PROPOSED REINFORCMENT STEEL. LOCATION OF PROPOSED/EXISTING RIPRAP MAY DIFFER FROM WHAT IS SHOWN.
3. PROVIDE SAWED OR CONSTRUCTION JOINT EXTENDING THE FULL SLOPED HEIGHT AT INTERVALS OF APPROXIMATELY 20' UNLESS OTHERWISE DIRECTED BY THE ENGINEER. SEE MISCELLANEOUS ROADWAY DETAILS.
4. PLACE PREMOLDED OR BOARD EXPANSION ISOLATED JOINT AT RIGHT ANGLE TO THE LONGITUDINAL AXIS IN SECTIONS MEASURING NO LESS THAN 8' OR MORE THAN 40' IN LENGTH. SEE MISCELLANEOUS ROADWAY DETAILS.
5. USE NO. 4 BARS O.C. IN BOTH DIRECTIONS.
6. IF EXISTING TOEWALL (INTERMEDIATE AFTER PLACEMENT OF ADDITIONAL RIPRAP) IS AVAILABLE, EXPOSE A MINIMUM OF 6" EXISTING REINFORCEMENT STEEL AND OVERLAP WITH PROPOSED BENT REINFORCEMENT.

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

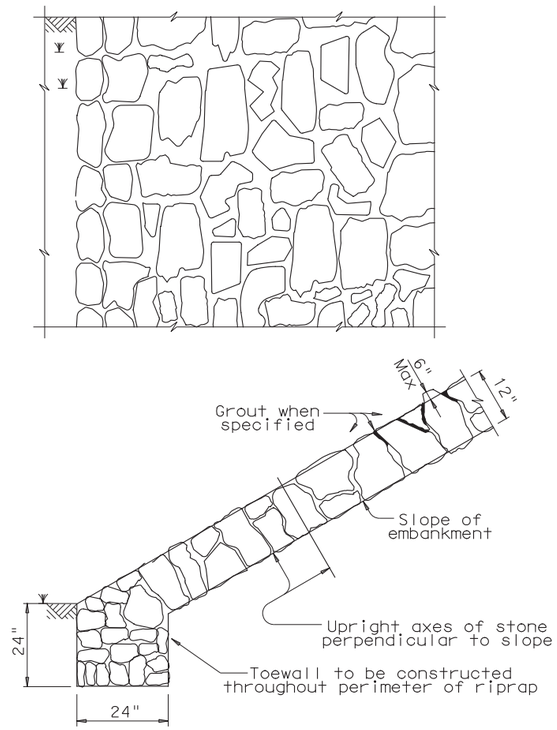
MISCELLANEOUS DRAINAGE DETAILS

SHEET 1 OF 2

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			128
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96



TYPE R STONE RIPRAP

DRY OR GROUTED

STONE RIPRAP NOTES:

1. SEE CULVERT LAYOUTS AND CROSS DRAINAGE SUMMARY SHEET FOR STONE RIPRAP LOCATIONS AND SURFACE AREA DIMENSIONS.
2. SEE CULVERT LAYOUT FOR LENGHTS AND WIDTHS
3. CONSTRUCT SLOPES AS PER PROPOSED SLOPE NOTED ON THE CULVERT LAYOUT OR APPLICABLE CROSS SECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
4. FILTER FABRIC WILL BE REQUIRED PRIOR TO PLACEMENT OF STONE RIPRAP. LABOR AND MATERIAL FOR THIS CONSTRUCTION IS SUBSIDIARY TO ITEM 432.
5. GROUTING WILL BE APPLIED BETWEEN STONES ONLY WHEN DIRECTED BY ENGINEER. LABOR AND MATERIAL FOR THIS CONSTRUCTION IS SUBSIDIARY TO ITEM 432.
6. REFER TO ITEM 432 RIPRAP FOR INFORMATION AND DETAILS NOT NOTED HERE.

STATE OF TEXAS
ROBERT D. AUSTIN
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LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

MISCELLANEOUS DRAINAGE DETAILS

SHEET 2 OF 2

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			129
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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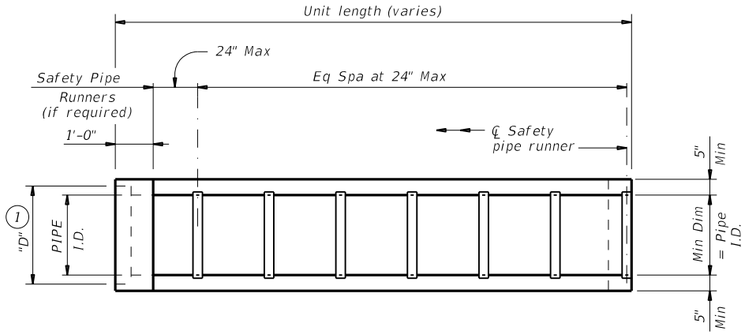
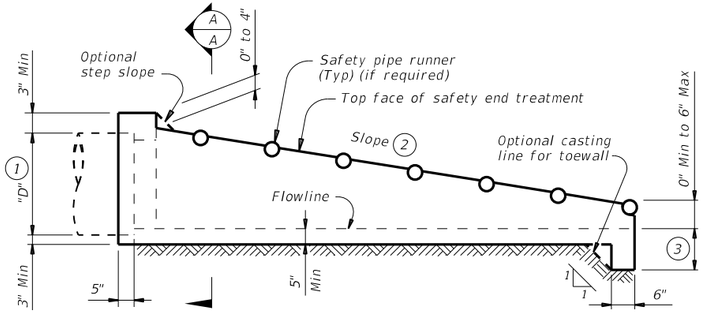


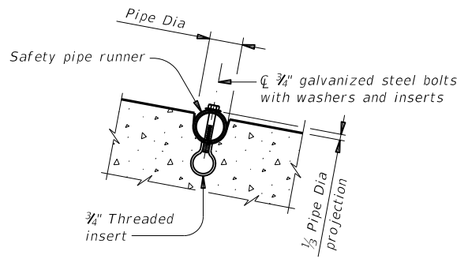
PLAN

(Showing bell end connection.)



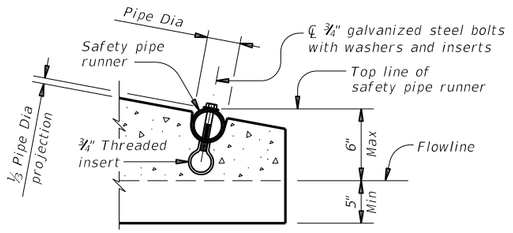
LONGITUDINAL ELEVATION

(Showing bell end connection.)

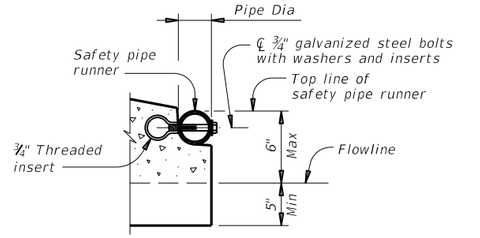


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



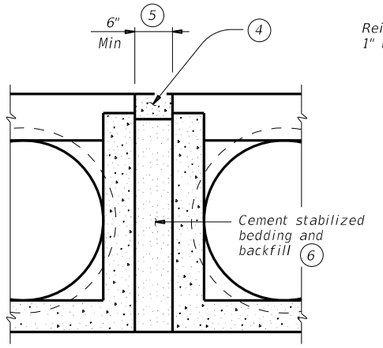
OPTION A



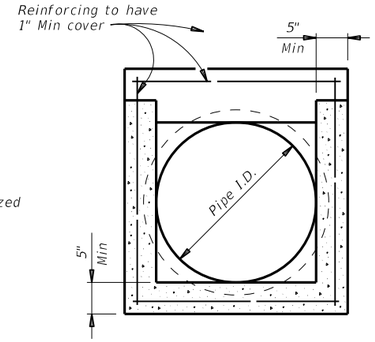
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

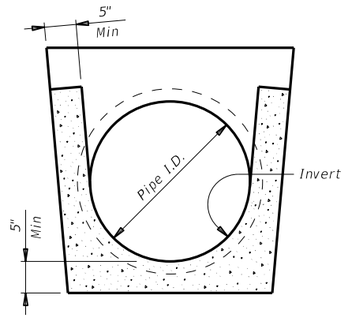
(If required)



MULTIPLE PIPE INSTALLATION

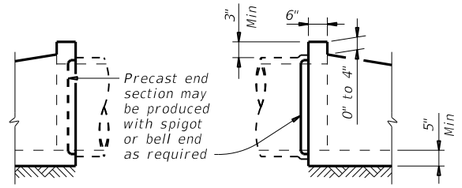


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		130

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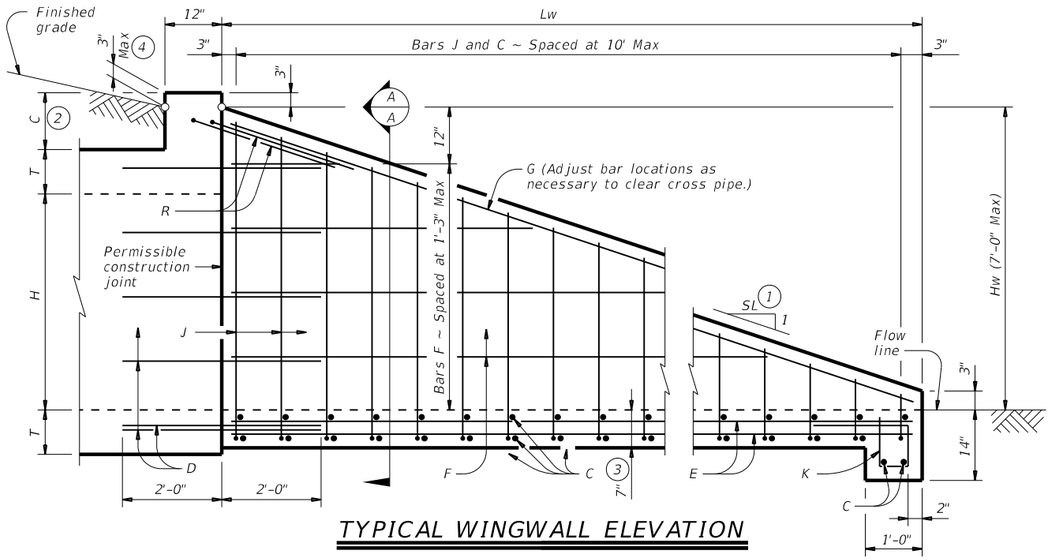
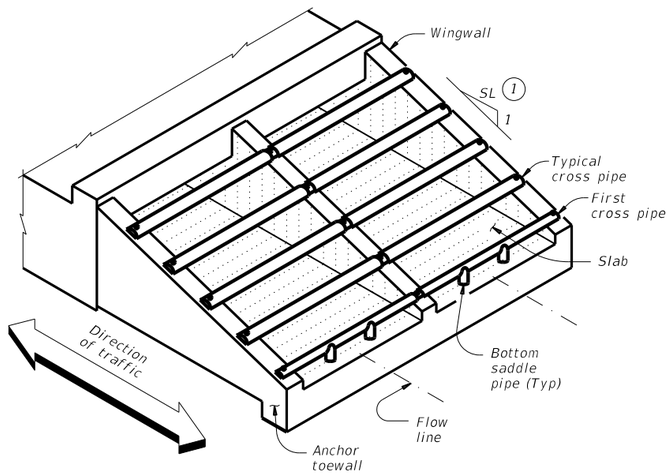


TYPICAL WINGWALL ELEVATION

(Cross pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing bolted anchor option.)

WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$

$Lw = (Hw - 0.250')\ (SL)$

For cast-in-place culverts:

$Atw = (N)\ (S) + (N + 1)\ (U)$

For precast culverts:

$Atw = (N)\ (2U + S) + (N - 1)\ (0.500')$

Total Wingwall Area (SF)
$= (0.5)\ (Hw + 0.250')\ (Lw)\ (N - 1)$

Total Concrete Volume (CY)
$= [(\text{Wingwall Area})\ (0.583') +$
$(Lw)\ (Atw)\ (0.583') +$
$(Atw)\ (1.000')\ (1.167' - 0.583')] \div (27)$

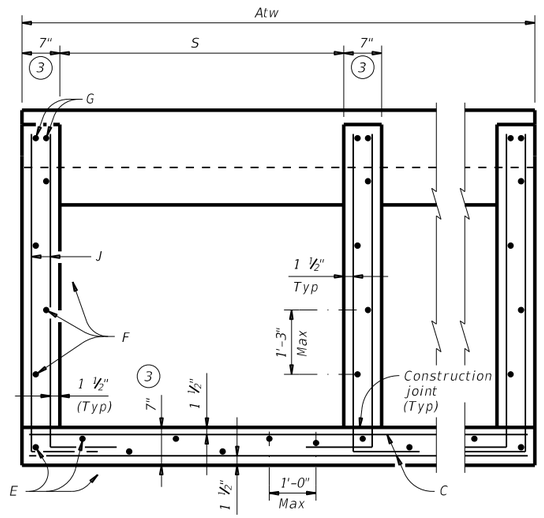
Total Reinforcing (Lb)
$= (1.55)\ (Lw)\ (Atw) +$
$(4.43)\ (Atw) +$
$(K)\ (Hw)\ (N + 1)\ (\sqrt{Lw})$

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K
6:1 ~	10.41

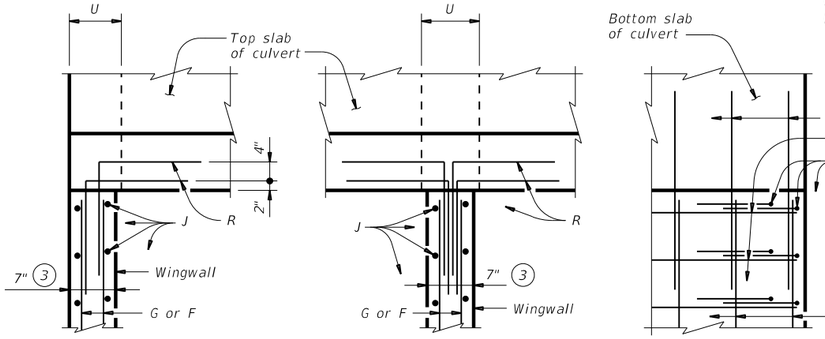
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

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



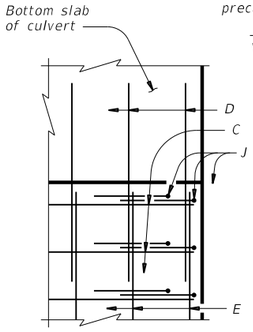
SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)

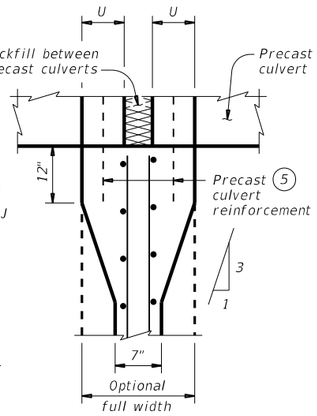


AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)

AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)



AT INTERIOR WINGWALL
(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

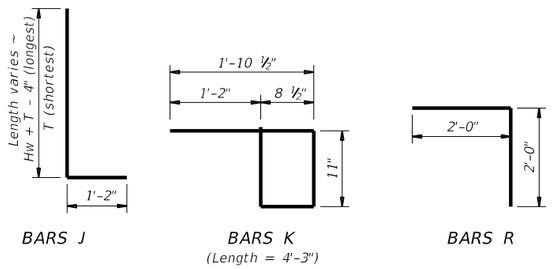


TABLE OF REINFORCING BAR SIZES AND SPACING		
Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'- 0" Max
F	#4	1'- 3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'- 0" Max
R	#4	As shown

(1) Provide 6:1 or flatter slope.

(2) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to Extended Curb Details the Extended Curb Details (ECD) standard sheet.

(3) Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" Minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.

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

(5) For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1½".
Provide Class "C" concrete (f`c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with Item 445, "Galvanizing."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.
Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for concrete, reinforcing steel, and cross pipes resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT

FOR BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		131

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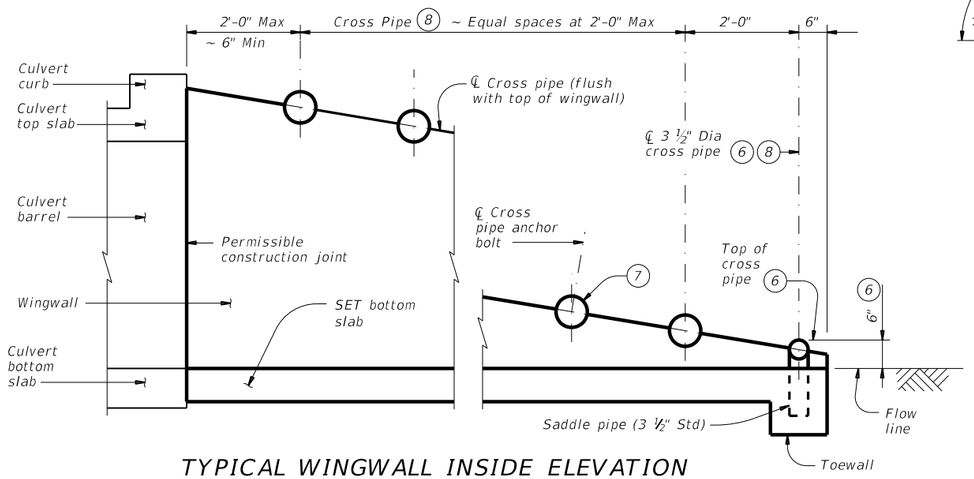
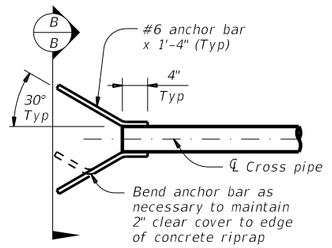
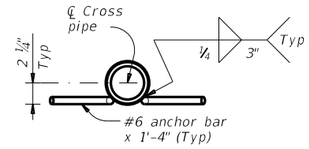


TYPICAL WINGWALL INSIDE ELEVATION

(Showing installation of cross pipes.)



PART PLAN



SECTION B-B

OPTIONAL ANCHOR BAR DETAILS

REQUIRED PIPE SIZES (8)		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)
First Pipe	3 ½" STD	2 ½" STD
30" to 42"	4" STD	3" STD
48" to 72"	5" STD	4" STD
78" to 120"	6" STD	5" STD

STANDARD PIPE SIZES		
Pipe Size	Pipe O.D.	Pipe I.D.
2 ½" STD	2.875"	2.469"
3" STD	3.500"	3.068"
3 ½" STD	4.000"	3.548"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"
6" STD	6.625"	6.065"

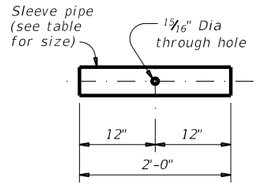
(6) The proper installation of the first cross pipe is critical for vechicle saftey. Place the top of the first cross pipe at no more than 6" above the flow line.

(7) Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

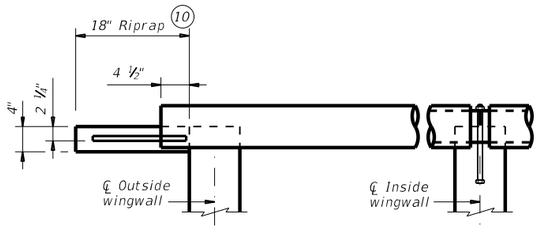
(8) Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 1#2" saddle pipes for the 3 1#2" first cross pipe.

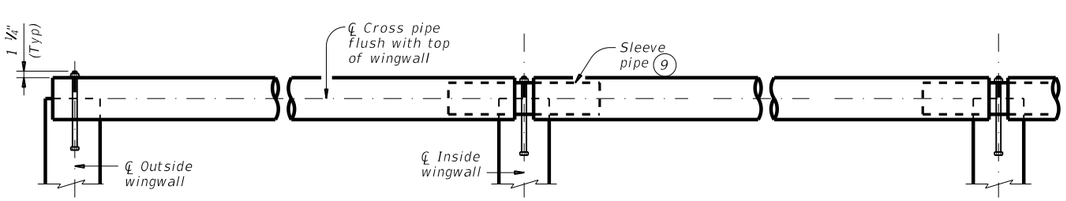
(9) At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter throughhole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.

(10) Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap".



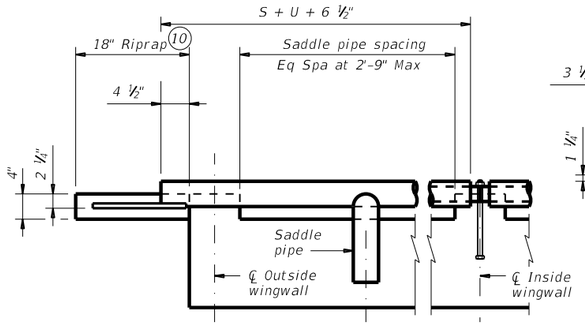
SLEEVE PIPE DETAILS (9)

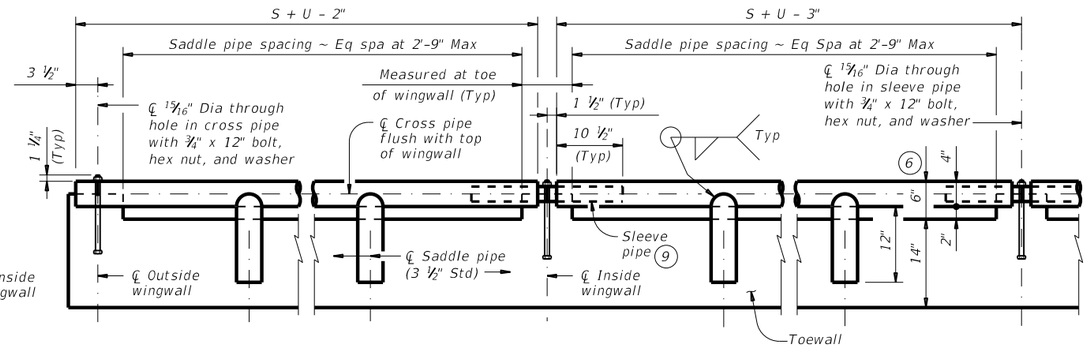




SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 ½" First Cross Pipe detail.)





SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

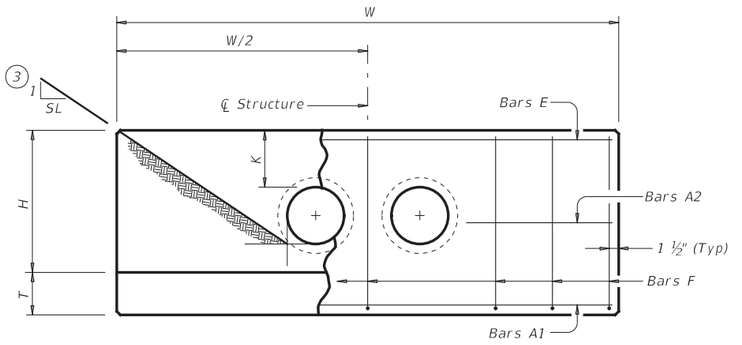
FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

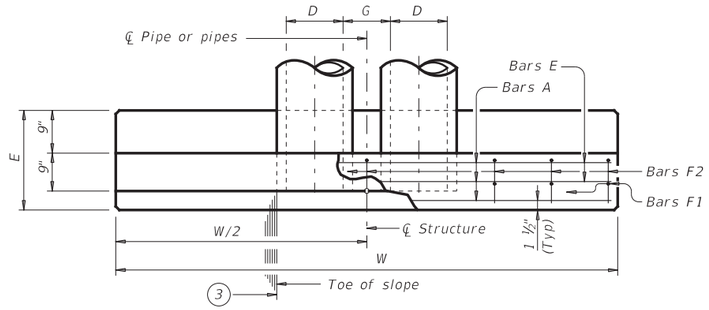
FILE: setbpdse-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimesions	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		132

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

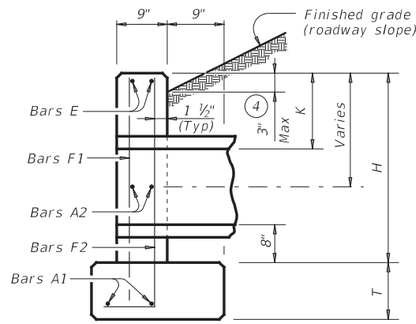
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4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



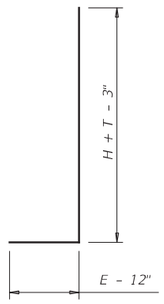
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

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

TABLE OF REINFORCING STEEL (6)

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

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

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

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

DATE:
FILE:

Texas Department of Transportation

Bridge Division Standard

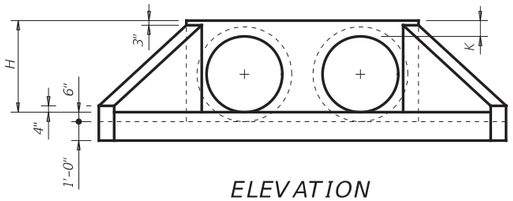
CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		133

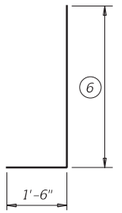
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' – 7 ½"	2' – 6"	2' – 10"	3' – 3 ¼"	88	0.6	1' – 9"	20	0.2
	15"	5' – 5 ¾"	2' – 9 ½"	3' – 4"	3' – 10 ¼"	103	0.7	2' – 2"	24	0.3
	18"	6' – 4 ¼"	3' – 1"	3' – 10"	4' – 5"	124	0.9	2' – 8"	32	0.3
	21"	7' – 2 ¾"	3' – 4 ½"	4' – 4"	5' – 0"	143	1.1	3' – 1"	43	0.4
	24"	8' – 2 ½"	3' – 9 ½"	4' – 10"	5' – 7"	164	1.3	3' – 7"	50	0.5
	27"	9' – 1"	4' – 1"	5' – 4"	6' – 2"	179	1.5	3' – 11"	56	0.6
	30"	9' – 11 ½"	4' – 4 ½"	5' – 10"	6' – 8 ¾"	203	1.7	4' – 4"	65	0.8
	33"	10' – 10"	4' – 8"	6' – 4"	7' – 3 ¾"	224	2.0	4' – 8"	71	0.9
	36"	11' – 8 ¼"	4' – 11 ½"	6' – 10"	7' – 10 ¾"	249	2.2	5' – 1"	81	1.0
	42"	13' – 5 ¼"	5' – 6 ½"	7' – 10"	9' – 0 ½"	298	2.8	5' – 10"	97	1.3
	48"	15' – 9"	6' – 1 ½"	9' – 4"	10' – 9 ¼"	360	3.8	6' – 7"	117	1.7
	54"	17' – 5 ¾"	6' – 8 ½"	10' – 4"	11' – 11 ¼"	427	4.5	7' – 6"	151	2.1
	60"	19' – 2 ¾"	7' – 3 ½"	11' – 4"	13' – 1"	481	5.3	8' – 3"	174	2.5
	66"	20' – 11 ½"	7' – 10 ½"	12' – 4"	14' – 3"	544	6.2	8' – 9"	194	2.9
	72"	22' – 8 ½"	8' – 5 ½"	13' – 4"	15' – 4 ¾"	601	7.1	9' – 4"	213	3.3
3:1	12"	6' – 3"	2' – 6"	4' – 3"	4' – 11"	118	0.8	1' – 9"	22	0.2
	15"	7' – 5"	2' – 9 ½"	5' – 0"	5' – 9 ¼"	137	1.1	2' – 2"	28	0.3
	18"	8' – 6 ¾"	3' – 1"	5' – 9"	6' – 7 ¾"	170	1.3	2' – 8"	37	0.5
	21"	9' – 8 ¾"	3' – 4 ½"	6' – 6"	7' – 6"	195	1.6	3' – 1"	48	0.6
	24"	11' – 0"	3' – 9 ½"	7' – 3"	8' – 4 ½"	227	2.0	3' – 7"	58	0.7
	27"	12' – 2"	4' – 1"	8' – 0"	9' – 2 ¾"	251	2.3	3' – 11"	67	0.8
	30"	13' – 4"	4' – 4 ½"	8' – 9"	10' – 1 ¼"	293	2.7	4' – 4"	77	1.0
	33"	14' – 5 ¾"	4' – 8"	9' – 6"	10' – 11 ¾"	318	3.1	4' – 8"	84	1.2
	36"	15' – 7 ¾"	4' – 11 ½"	10' – 3"	11' – 10"	351	3.5	5' – 1"	96	1.4
	42"	17' – 11 ½"	5' – 6 ½"	11' – 9"	13' – 6 ¾"	432	4.5	5' – 10"	119	1.7
	48"	21' – 1 ¾"	6' – 1 ½"	14' – 0"	16' – 2"	537	6.1	6' – 7"	146	2.3
	54"	23' – 5 ½"	6' – 8 ½"	15' – 6"	17' – 10 ¾"	630	7.3	7' – 6"	186	2.9
	60"	25' – 9 ¼"	7' – 3 ½"	17' – 0"	19' – 7 ½"	719	8.7	8' – 3"	219	3.4
	66"	28' – 1"	7' – 10 ½"	18' – 6"	21' – 4 ¼"	811	10.1	8' – 9"	242	3.9
	72"	30' – 4 ¾"	8' – 5 ½"	20' – 0"	23' – 1 ¼"	924	11.7	9' – 4"	272	4.4
4:1	12"	7' – 10 ¾"	2' – 6"	5' – 8"	6' – 6 ½"	148	1.1	1' – 9"	24	0.3
	15"	9' – 4"	2' – 9 ½"	6' – 8"	7' – 8 ½"	181	1.5	2' – 2"	32	0.4
	18"	10' – 9 ½"	3' – 1"	7' – 8"	8' – 10 ¼"	221	1.9	2' – 8"	42	0.5
	21"	12' – 2 ¾"	3' – 4 ½"	8' – 8"	10' – 0"	260	2.3	3' – 1"	57	0.7
	24"	13' – 9 ½"	3' – 9 ½"	9' – 8"	11' – 2"	301	2.8	3' – 7"	67	0.9
	27"	15' – 3"	4' – 1"	10' – 8"	12' – 3 ¾"	334	3.3	3' – 11"	77	1.0
	30"	16' – 8 ¼"	4' – 4 ½"	11' – 8"	13' – 5 ¾"	385	3.8	4' – 4"	89	1.3
	33"	18' – 1 ¾"	4' – 8"	12' – 8"	14' – 7 ½"	425	4.5	4' – 8"	101	1.4
	36"	19' – 7"	4' – 11 ½"	13' – 8"	15' – 9 ¼"	472	5.1	5' – 1"	115	1.7
	42"	22' – 5 ¾"	5' – 6 ½"	15' – 8"	18' – 1"	583	6.5	5' – 10"	141	2.1
	48"	26' – 6 ¼"	6' – 1 ½"	18' – 8"	21' – 6 ¾"	730	8.9	6' – 7"	175	2.8
	54"	29' – 5"	6' – 8 ½"	20' – 8"	23' – 10 ¼"	875	10.7	7' – 6"	226	3.6
	60"	32' – 3 ¾"	7' – 3 ½"	22' – 8"	26' – 2"	996	12.7	8' – 3"	264	4.3
	66"	35' – 2 ½"	7' – 10 ½"	24' – 8"	28' – 5 ¾"	1,140	14.9	8' – 9"	300	4.9
	72"	38' – 1 ¼"	8' – 5 ½"	26' – 8"	30' – 9 ½"	1,297	17.3	9' – 4"	334	5.6
6:1	12"	11' – 2"	2' – 6"	8' – 6"	9' – 9 ¾"	224	1.9	1' – 9"	28	0.4
	15"	13' – 2 ¼"	2' – 9 ½"	10' – 0"	11' – 6 ½"	268	2.5	2' – 2"	37	0.5
	18"	15' – 2 ½"	3' – 1"	11' – 6"	13' – 3 ¼"	330	3.2	2' – 8"	50	0.7
	21"	17' – 2 ¾"	3' – 4 ½"	13' – 0"	15' – 0 ¼"	387	3.9	3' – 1"	69	0.9
	24"	19' – 4 ½"	3' – 9 ½"	14' – 6"	16' – 9"	453	4.8	3' – 7"	80	1.2
	27"	21' – 4 ¾"	4' – 1"	16' – 0"	18' – 5 ¾"	512	5.7	3' – 11"	96	1.4
	30"	23' – 5 ¼"	4' – 4 ½"	17' – 6"	20' – 2 ½"	593	6.7	4' – 4"	110	1.7
	33"	25' – 5 ½"	4' – 8"	19' – 0"	21' – 11 ¼"	675	7.8	4' – 8"	127	2.0
	36"	27' – 5 ¾"	4' – 11 ½"	20' – 6"	23' – 8"	735	9.0	5' – 1"	144	2.3
	42"	31' – 6 ¼"	5' – 6 ½"	23' – 6"	27' – 1 ½"	922	11.5	5' – 10"	179	3.0
	48"	37' – 3 ½"	6' – 1 ½"	28' – 0"	32' – 4"	1,191	15.9	6' – 7"	231	4.0
	54"	41' – 4 ¼"	6' – 8 ½"	31' – 0"	35' – 9 ½"	1,424	19.2	7' – 6"	300	5.0
	60"	45' – 4 ¾"	7' – 3 ½"	34' – 0"	39' – 3"	1,631	22.9	8' – 3"	353	6.0

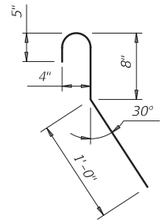


ELEVATION

(Showing dimensions.)



BARS V



BARS CL

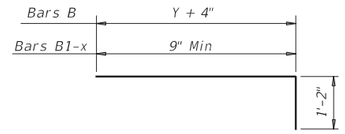
(Length = 2'-5")

TABLE OF (5) REINFORCING STEEL

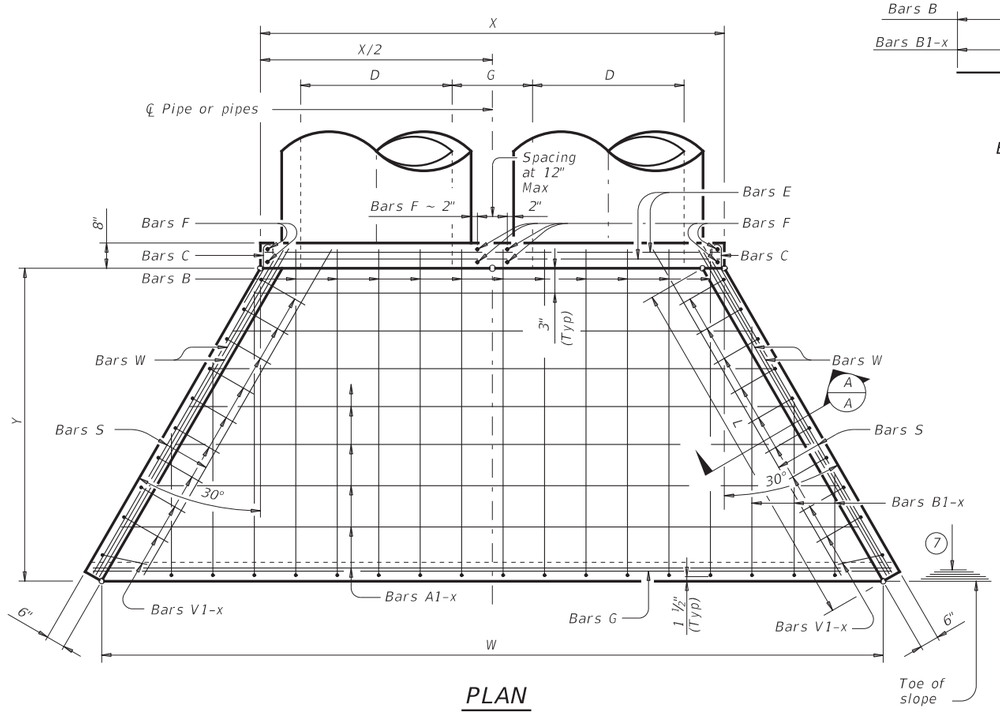
Bar	Size	Spa	No.
A	#4	1' – 0"	~
B	#3	1' – 6"	~
C	#4	1' – 0"	~
D	#3	1' – 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' – 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

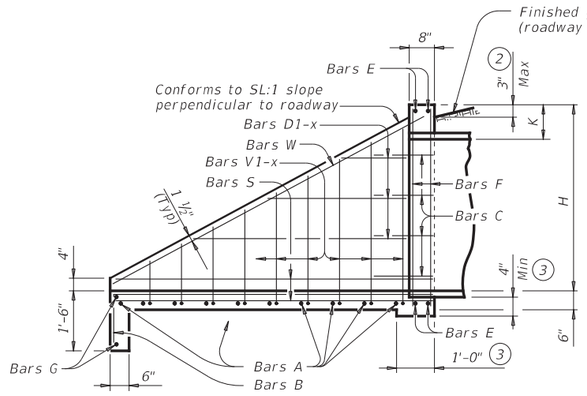
Dia of Pipe (D)	G	K (4)	H
12"	0' – 9"	1' – 0"	2' – 0"
15"	0' – 11"	1' – 0"	2' – 3"
18"	1' – 2"	1' – 0"	2' – 6"
21"	1' – 4"	1' – 0"	2' – 9"
24"	1' – 7"	1' – 0"	3' – 0"
27"	1' – 8"	1' – 0"	3' – 3"
30"	1' – 10"	1' – 0"	3' – 6"
33"	1' – 11"	1' – 0"	3' – 9"
36"	2' – 1"	1' – 0"	4' – 0"
42"	2' – 4"	1' – 0"	4' – 6"
48"	2' – 7"	1' – 3"	5' – 3"
54"	3' – 0"	1' – 3"	5' – 9"
60"	3' – 3"	1' – 3"	6' – 3"
66"	3' – 3"	1' – 3"	6' – 9"
72"	3' – 4"	1' – 3"	7' – 3"



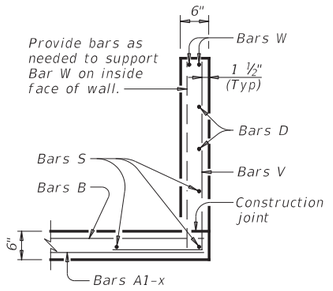
BARS B and B1-x



PLAN



TYPICAL WING ELEVATION



SECTION A-A

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Do not mount bridge rails of any type directly to these culvert headwalls.

This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

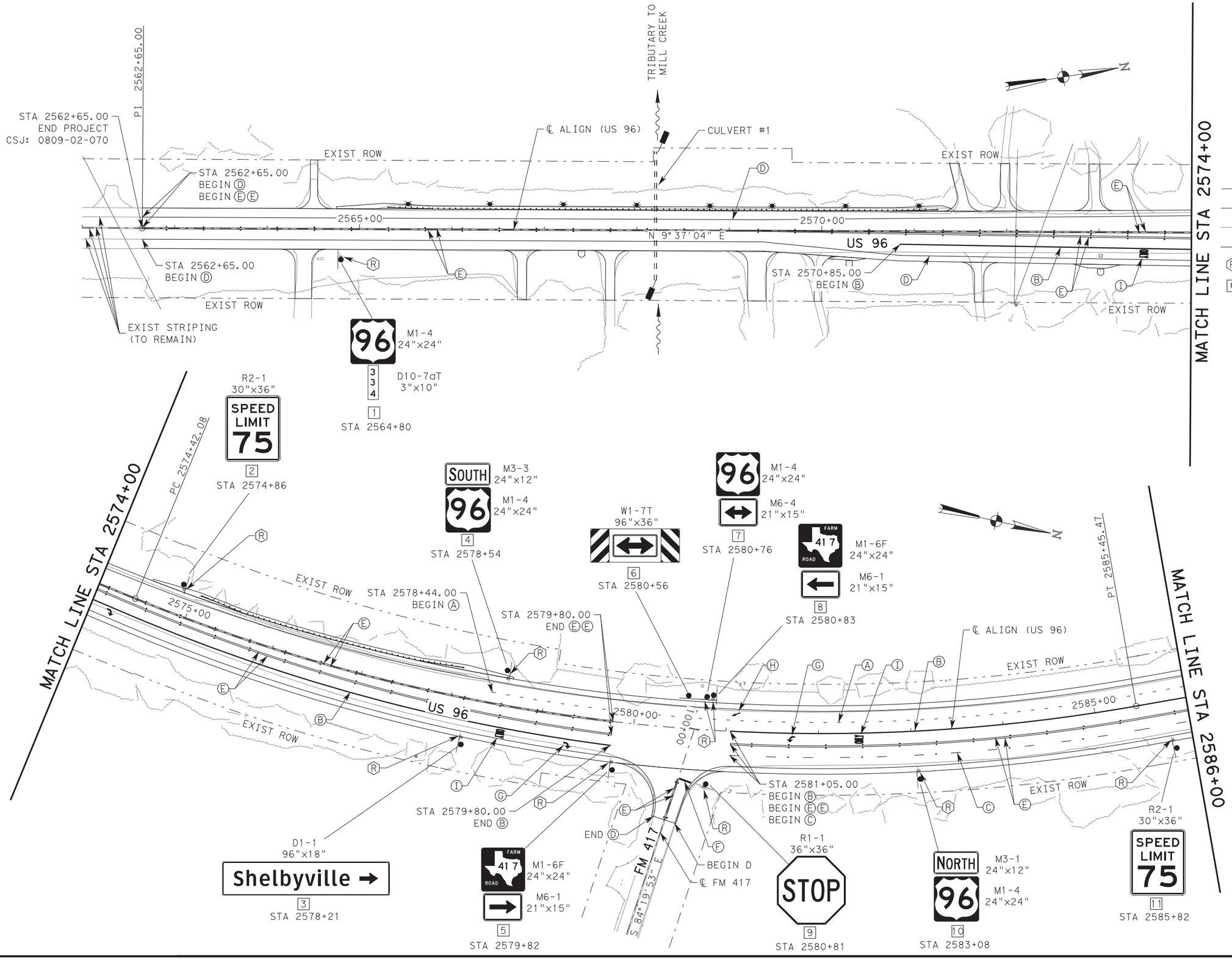
Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

FILE: chfw00se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		134

DATE:
FILE:



LEGEND

- Ⓐ RE PM TY I(W)4"(LNDP)
- Ⓑ RE PM TY I(W)8"(SLD)
- Ⓒ RE PM TY I(W)4"(BRK)
- Ⓓ RE PM TY I(W)4"(SLD)
- Ⓔ RE PM TY I(Y)4"(SLD)
- Ⓕ PRFB MRK (W)24"(SLD)
- Ⓖ PRFB MRK (W)(ARROW)
- Ⓗ PRFB MRK (W)(LNDP ARR)
- Ⓘ PRFB MRK (W)(WORD)
- RDWY ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- Ⓡ EXIST SIGN (REMOVE)
- # PROP SIGN (INSTALL)
- DELINEATOR (CTB)(BI)
- DELINEATOR (GF1)(BI)
- OBJECT MARKER

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2962+00 TO STA 2986+00)

SHEET 1 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			135
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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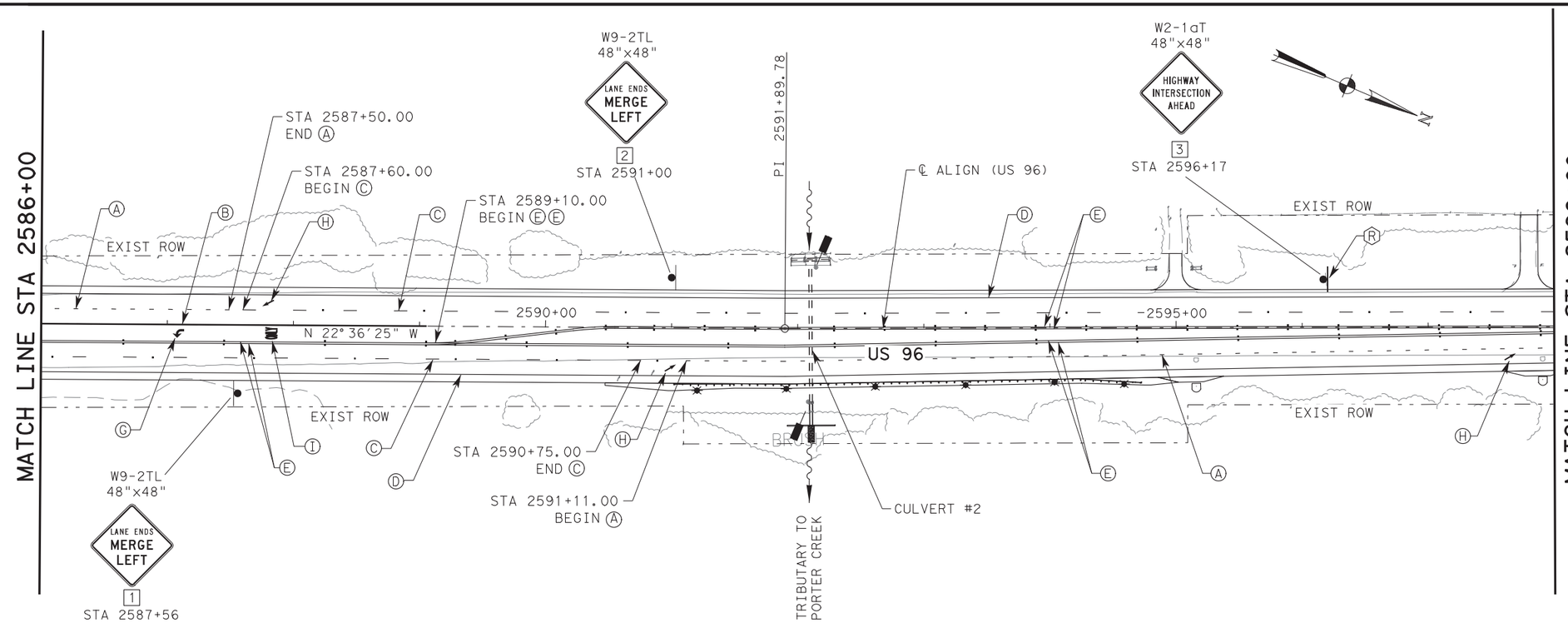

LEGEND

Ⓐ	RE PM TY I(W)4"(LNDP)
Ⓑ	RE PM TY I(W)8"(SLD)
Ⓒ	RE PM TY I(W)4"(BRK)
Ⓓ	RE PM TY I(W)4"(SLD)
Ⓔ	RE PM TY I(Y)4"(SLD)
Ⓕ	PRFB MRK (W)24"(SLD)
Ⓖ	PRFB MRK (W)(ARROW)
Ⓗ	PRFB MRK (W)(LNDP ARR)
Ⓘ	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
Ⓡ	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'

SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2586+00 TO STA 2609+50)

SHEET 2 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			136
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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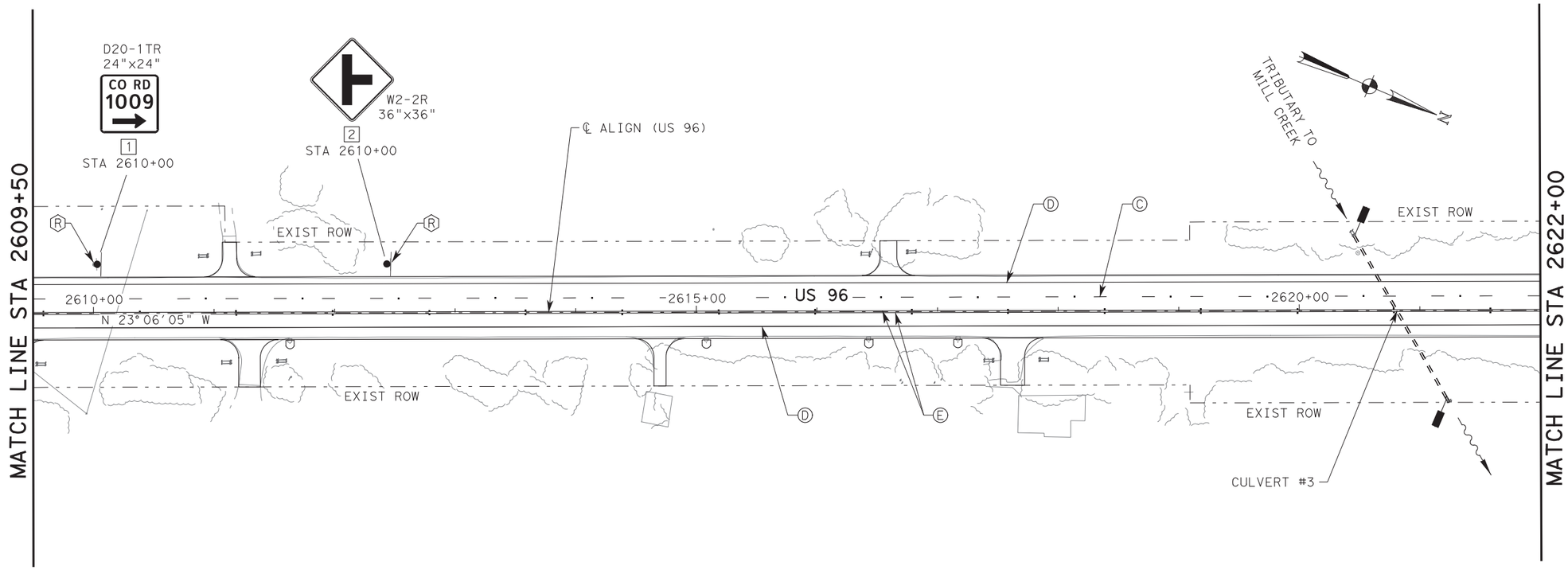

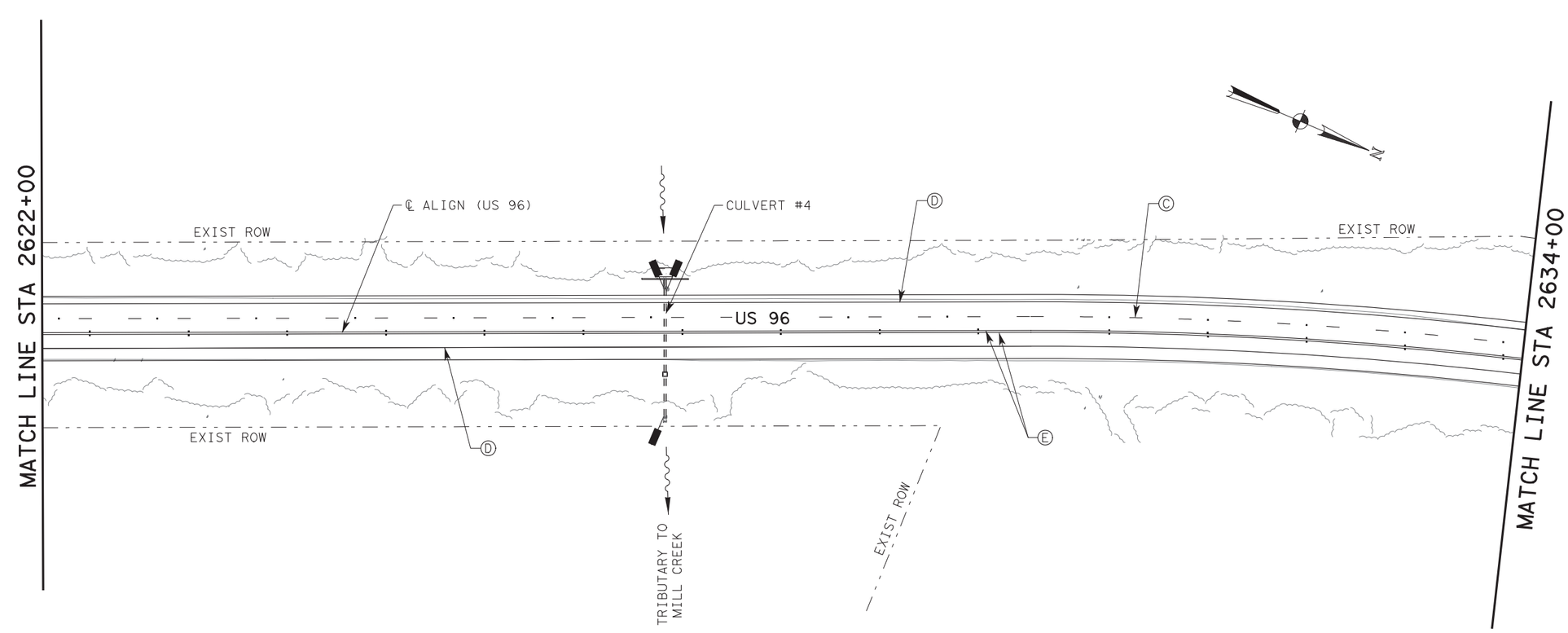

LEGEND

- (A) RE PM TY I(W)4"(LNDP)
- (B) RE PM TY I(W)8"(SLD)
- (C) RE PM TY I(W)4"(BRK)
- (D) RE PM TY I(W)4"(SLD)
- (E) RE PM TY I(Y)4"(SLD)
- (F) PRFB MRK (W)24"(SLD)
- (G) PRFB MRK (W)(ARROW)
- (H) PRFB MRK (W)(LNDP ARR)
- (I) PRFB MRK (W)(WORD)
- RDWY ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- (R) EXIST SIGN (REMOVE)
- [#] PROP SIGN (INSTALL)
- DELINEATOR (CTB)(BI)
- DELINEATOR (GF1)(BI)
- OBJECT MARKER

0' 20' 50' 100'

SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2609+50 TO STA 2634+00)

SHEET 3 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			137
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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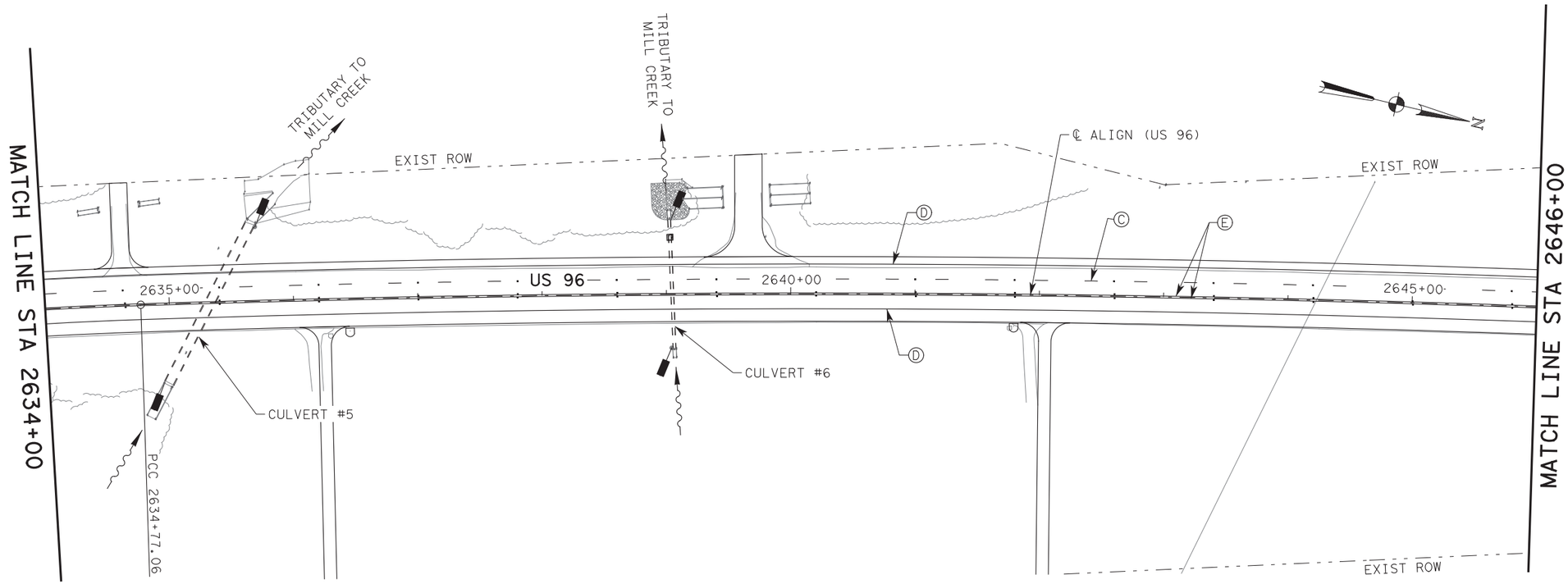
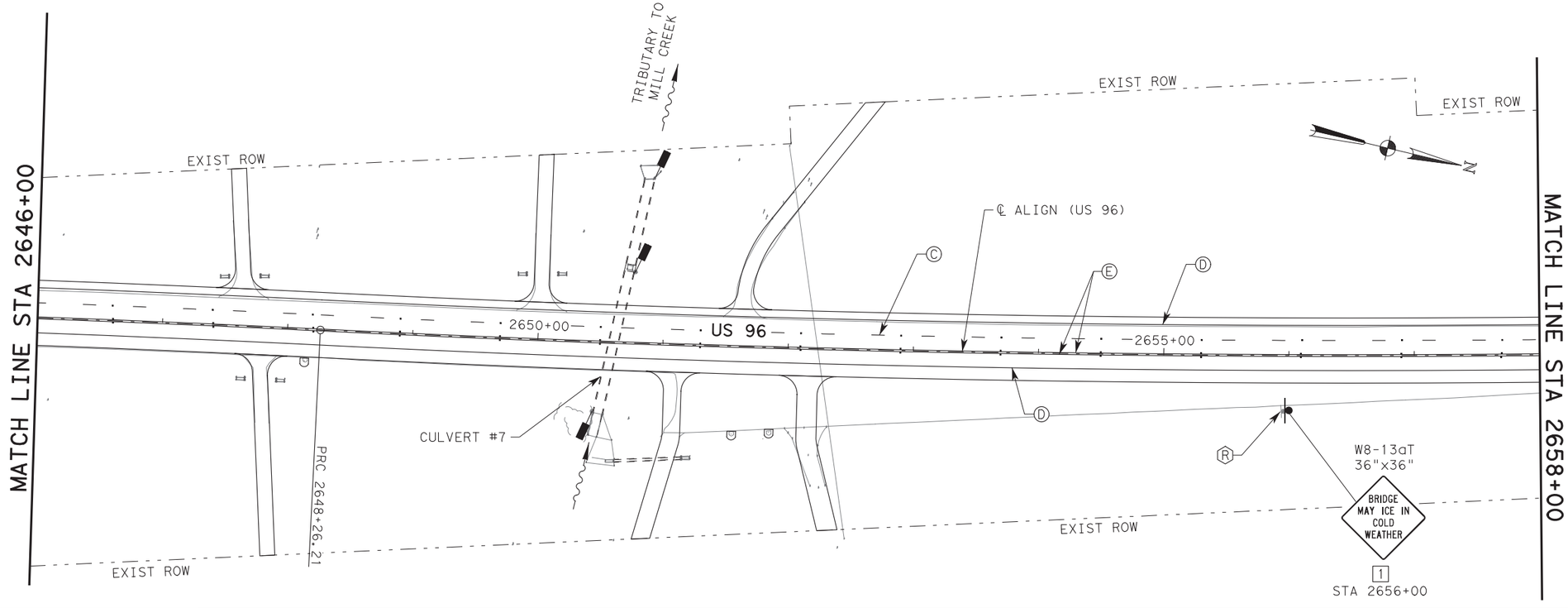


LEGEND

Ⓐ	RE PM TY I(W)4"(LNDP)
Ⓑ	RE PM TY I(W)8"(SLD)
Ⓒ	RE PM TY I(W)4"(BRK)
Ⓓ	RE PM TY I(W)4"(SLD)
Ⓔ	RE PM TY I(Y)4"(SLD)
Ⓕ	PRFB MRK (W)24"(SLD)
Ⓖ	PRFB MRK (W)(ARROW)
Ⓗ	PRFB MRK (W)(LNDP ARR)
Ⓘ	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
Ⓡ	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'

SCALE: 1"=100'



STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2634+00 TO STA 2658+00)

SHEET 4 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.	SHEET NO.
6		138

STATE	STATE DIST. NO.	COUNTY
TEXAS	LFK	SHELBY

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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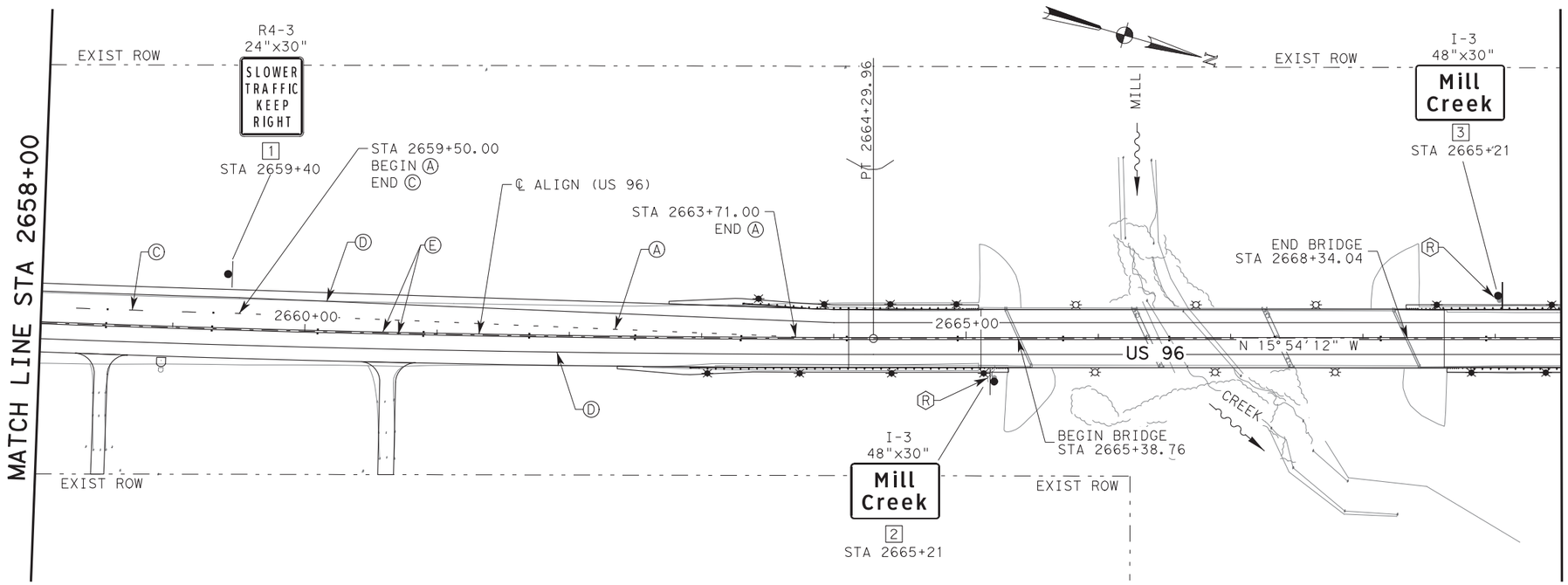

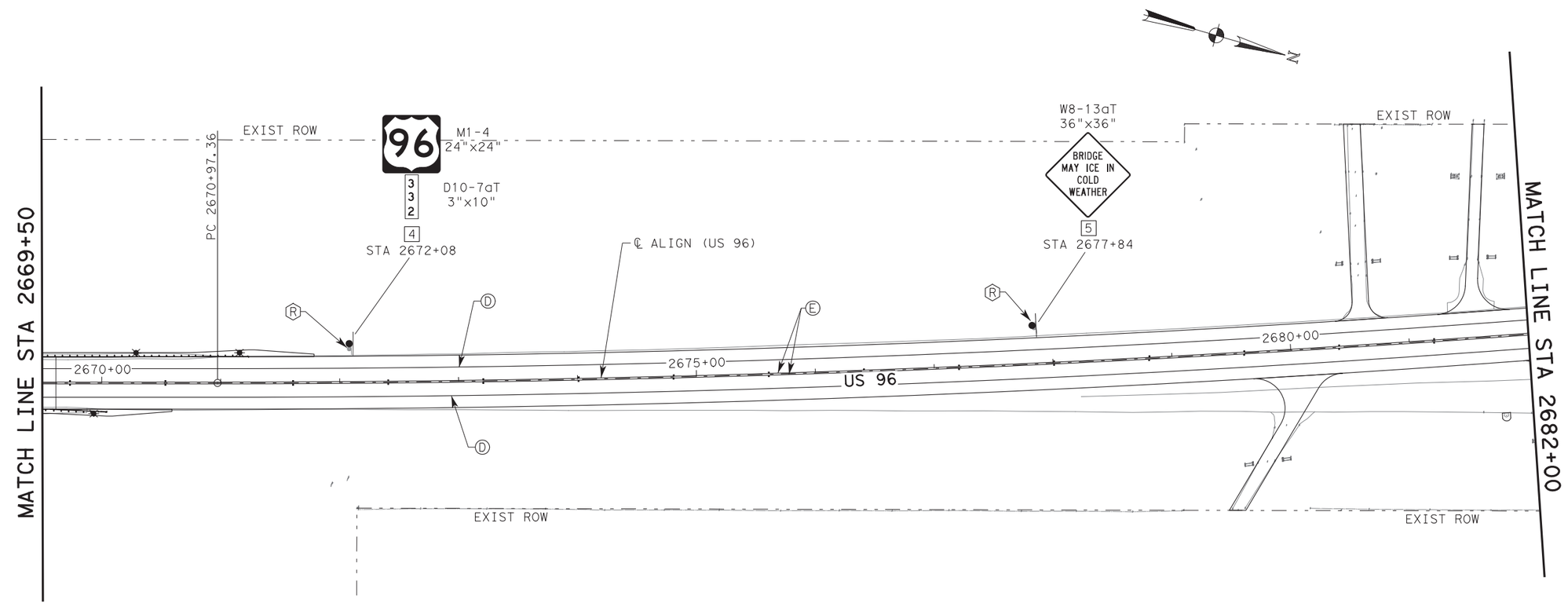

LEGEND

- Ⓐ RE PM TY I(W)4"(LNDP)
- Ⓑ RE PM TY I(W)8"(SLD)
- Ⓒ RE PM TY I(W)4"(BRK)
- Ⓓ RE PM TY I(W)4"(SLD)
- Ⓔ RE PM TY I(Y)4"(SLD)
- Ⓕ PRFB MRK (W)24"(SLD)
- Ⓖ PRFB MRK (W)(ARROW)
- Ⓗ PRFB MRK (W)(LNDP ARR)
- Ⓘ PRFB MRK (W)(WORD)
- RDWY ALIGNMENT
- EXIST ROW
- EXIST TOPO
- EXIST DITCH FLOW
- Ⓡ EXIST SIGN (REMOVE)
- # PROP SIGN (INSTALL)
- DELINEATOR (CTB)(BI)
- DELINEATOR (GF1)(BI)
- OBJECT MARKER

0' 20' 50' 100'
SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2658+00 TO STA 2682+00)

SHEET 5 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			139
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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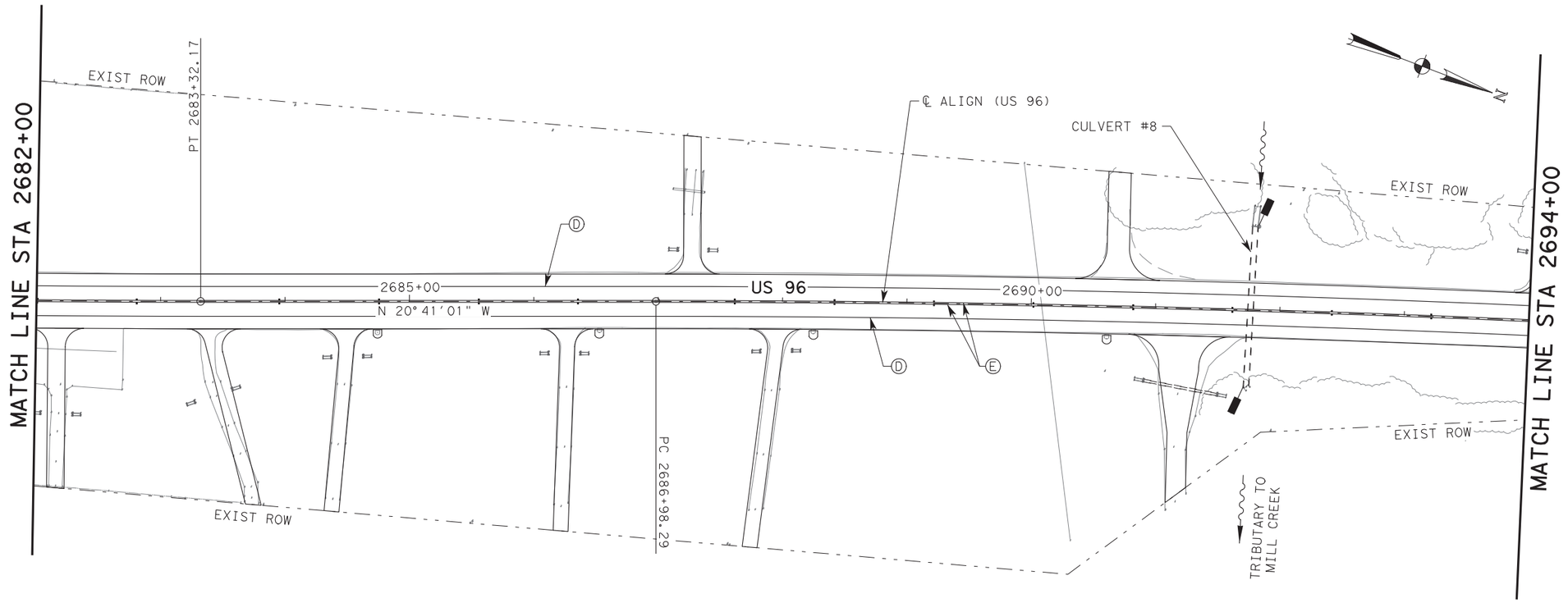

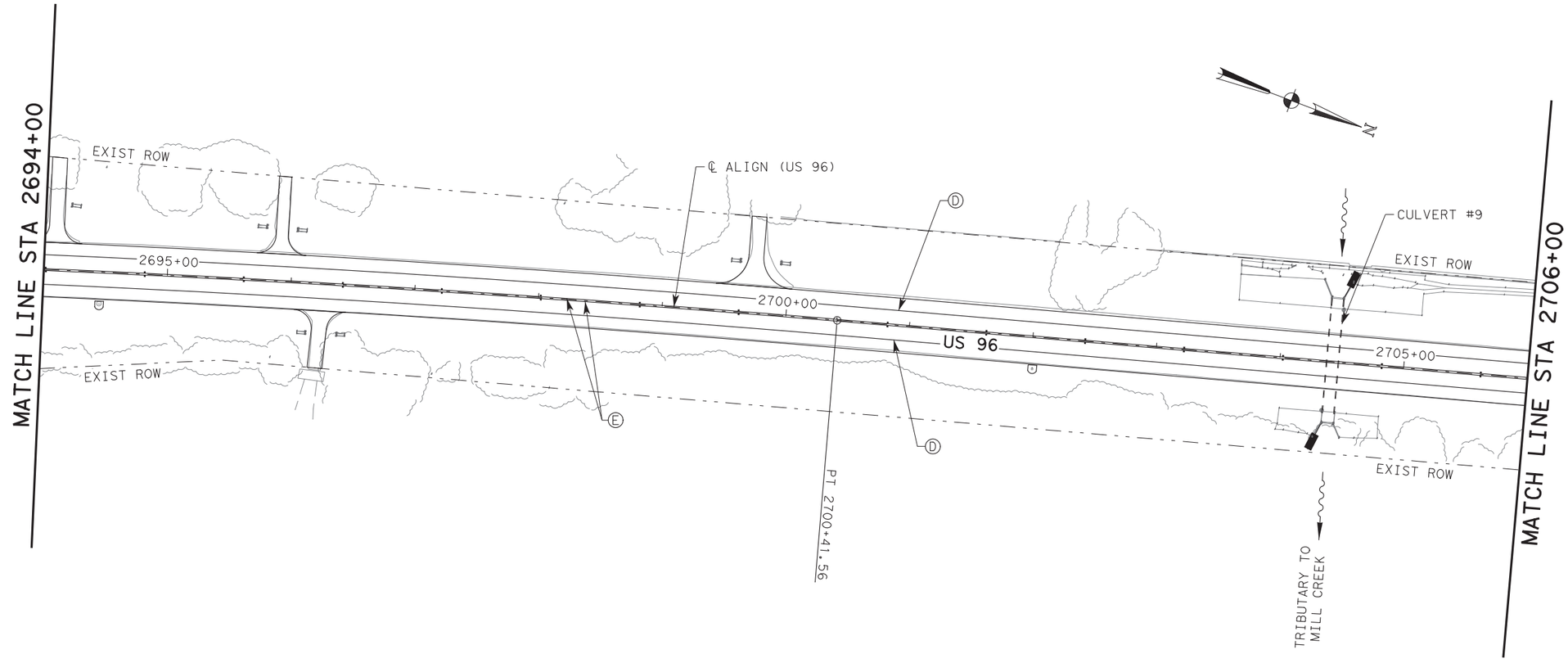

LEGEND

Ⓐ	RE PM TY I(W)4"(LNDP)
Ⓑ	RE PM TY I(W)8"(SLD)
Ⓒ	RE PM TY I(W)4"(BRK)
Ⓓ	RE PM TY I(W)4"(SLD)
Ⓔ	RE PM TY I(Y)4"(SLD)
Ⓕ	PRFB MRK (W)24"(SLD)
Ⓖ	PRFB MRK (W)(ARROW)
Ⓗ	PRFB MRK (W)(LNDP ARR)
Ⓘ	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
Ⓡ	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'
SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2682+00 TO STA 2706+00)

SHEET 6 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			140
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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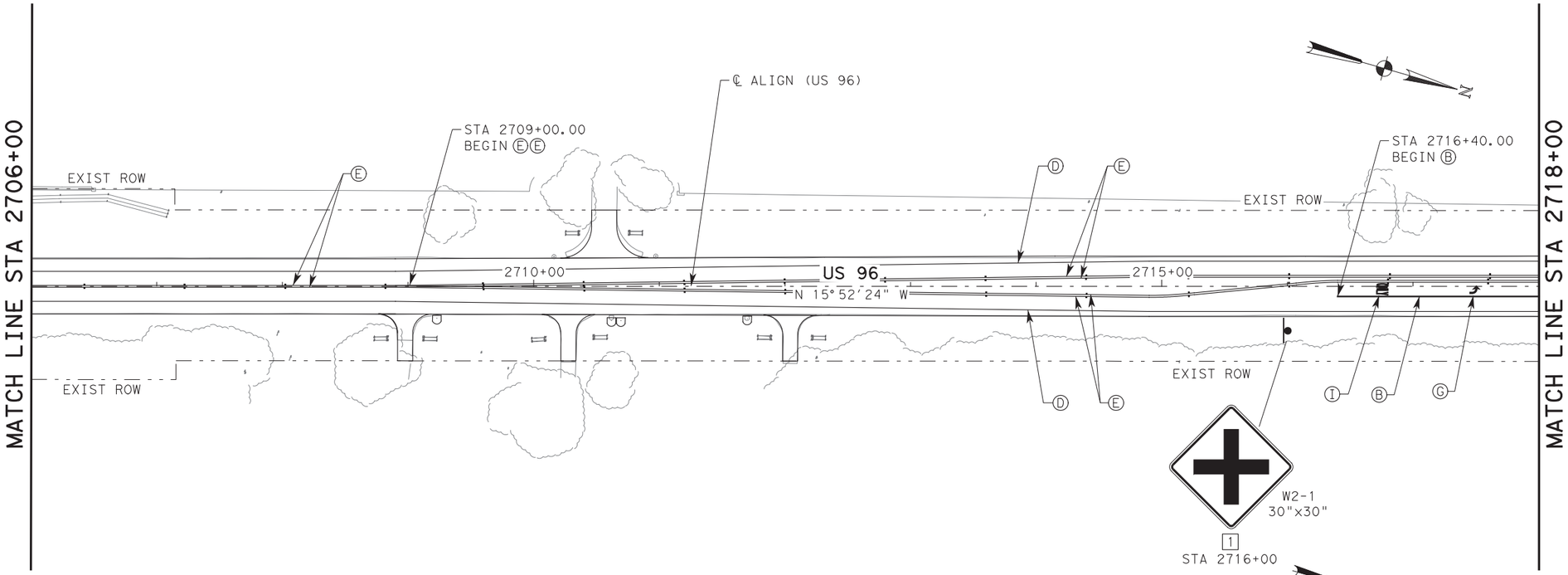

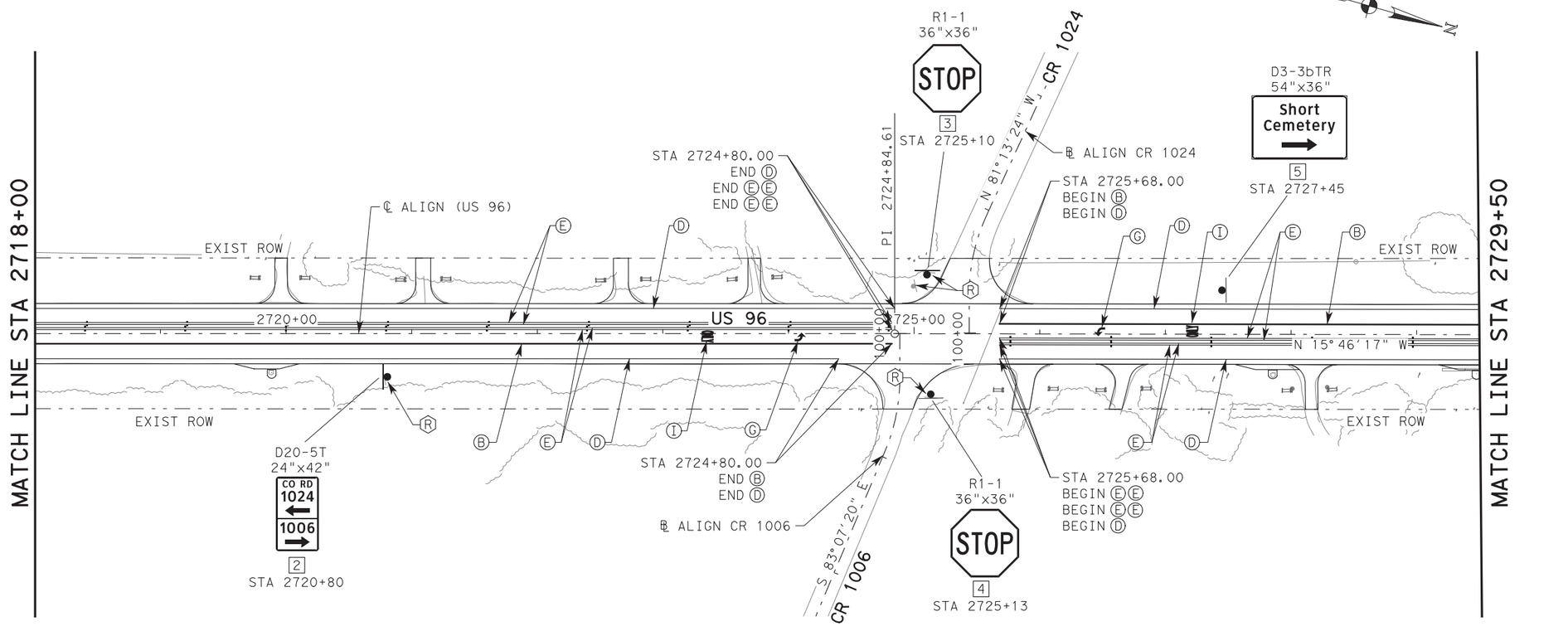

LEGEND

(A)	RE PM TY I(W)4"(LNDP)
(B)	RE PM TY I(W)8"(SLD)
(C)	RE PM TY I(W)4"(BRK)
(D)	RE PM TY I(W)4"(SLD)
(E)	RE PM TY I(Y)4"(SLD)
(F)	PRFB MRK (W)24"(SLD)
(G)	PRFB MRK (W)(ARROW)
(H)	PRFB MRK (W)(LNDP ARR)
(I)	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
(R)	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'

SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2706+00 TO STA 2729+50)

SHEET 7 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			141
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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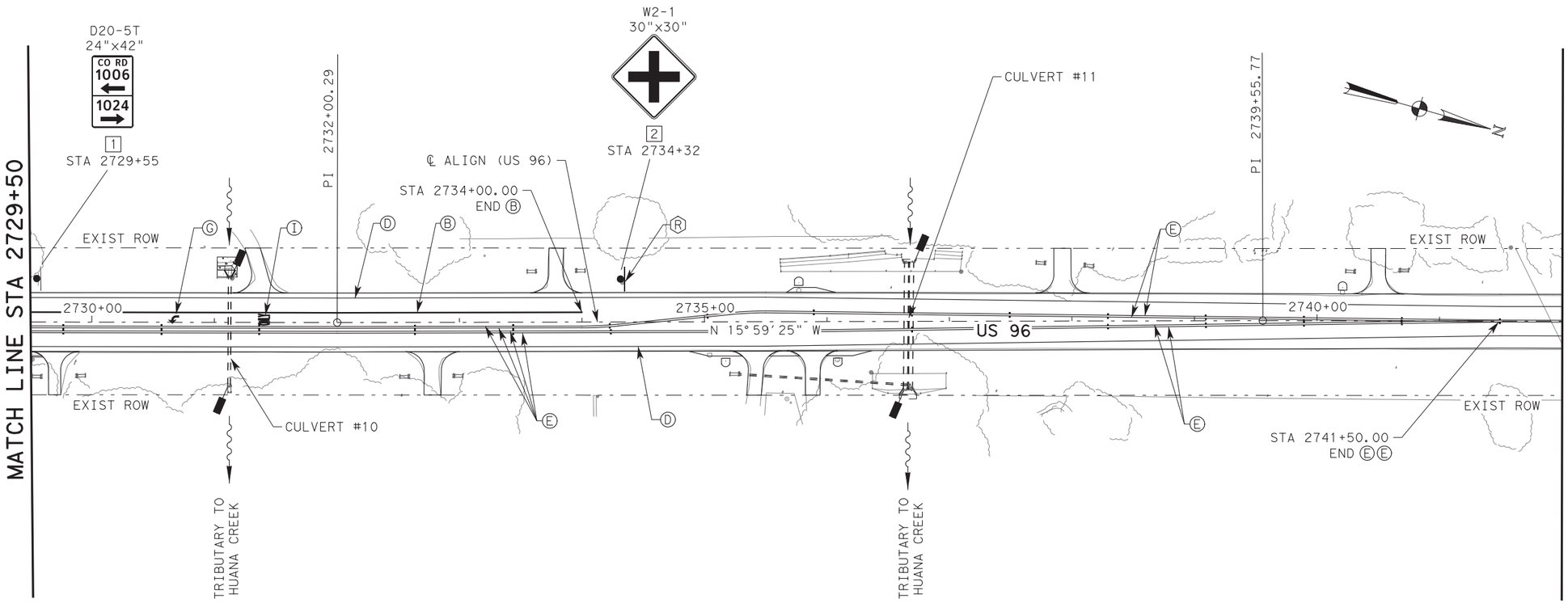

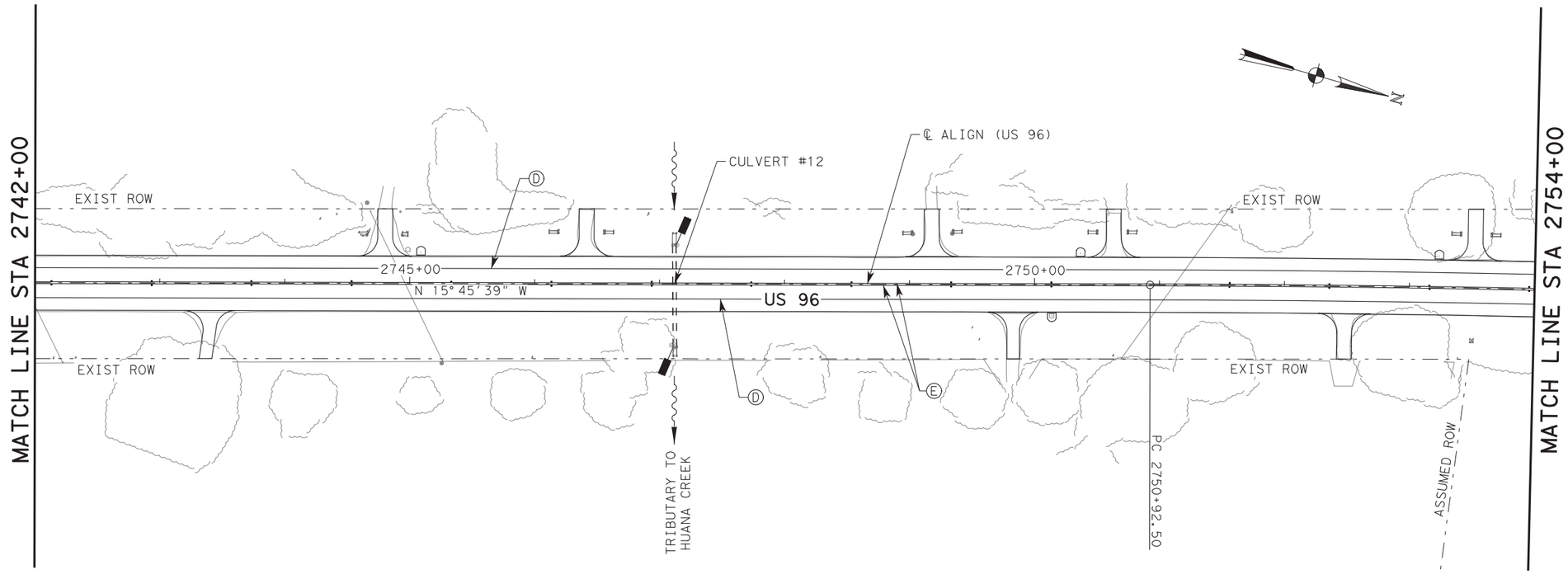

LEGEND

Ⓐ	RE PM TY I(W)4"(LNDP)
Ⓑ	RE PM TY I(W)8"(SLD)
Ⓒ	RE PM TY I(W)4"(BRK)
Ⓓ	RE PM TY I(W)4"(SLD)
Ⓔ	RE PM TY I(Y)4"(SLD)
Ⓕ	PRFB MRK (W)24"(SLD)
Ⓖ	PRFB MRK (W)(ARROW)
Ⓗ	PRFB MRK (W)(LNDP ARR)
Ⓘ	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
Ⓡ	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'
SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2729+50 TO STA 2754+00)

SHEET 8 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			142
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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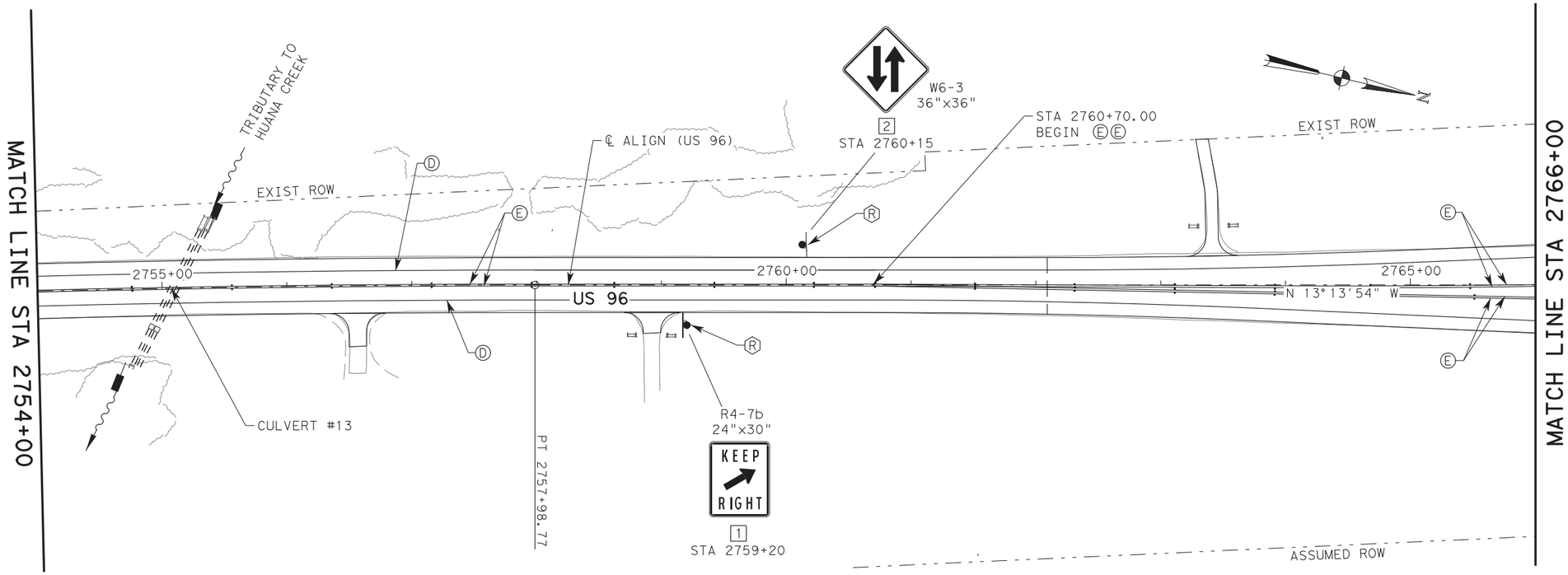

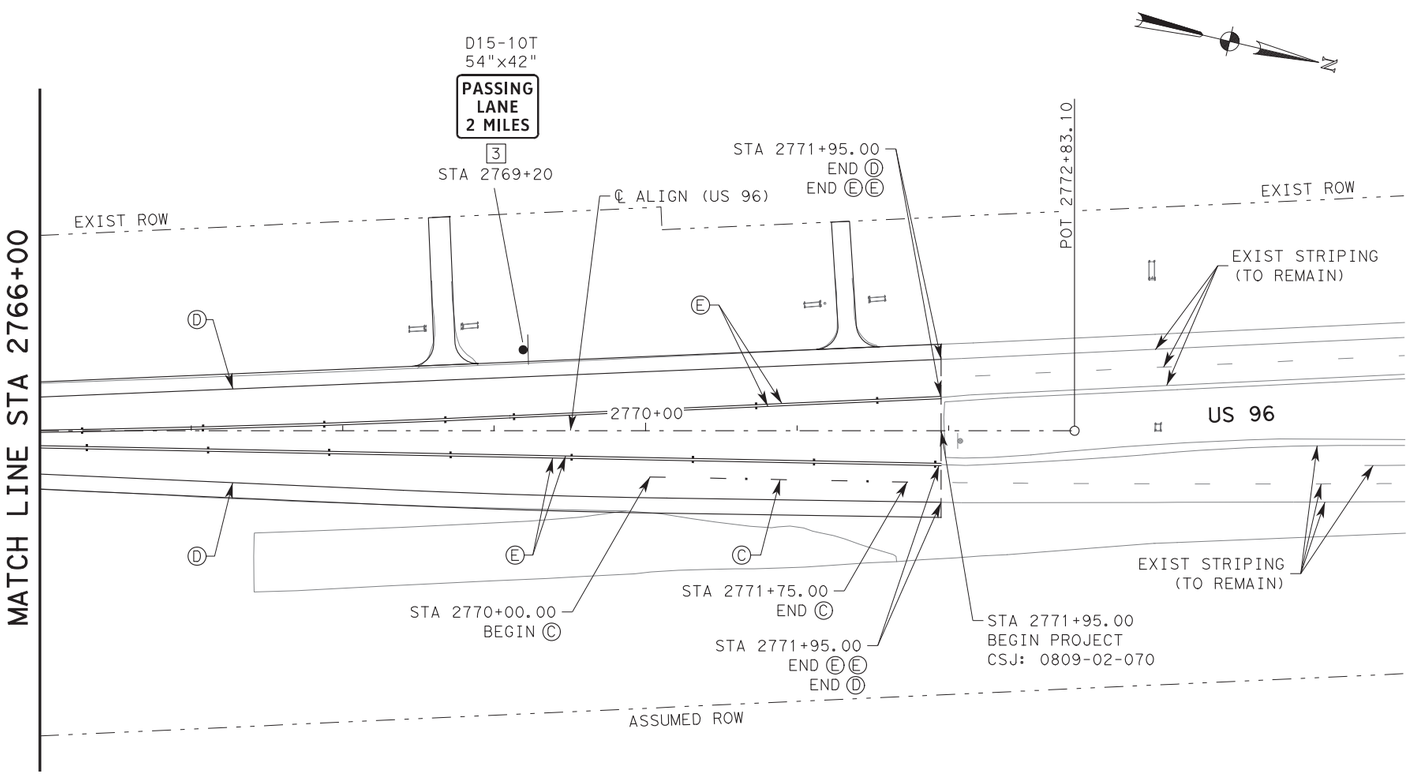

LEGEND

Ⓐ	RE PM TY I(W)4"(LNDP)
Ⓑ	RE PM TY I(W)8"(SLD)
Ⓒ	RE PM TY I(W)4"(BRK)
Ⓓ	RE PM TY I(W)4"(SLD)
Ⓔ	RE PM TY I(Y)4"(SLD)
Ⓕ	PRFB MRK (W)24"(SLD)
Ⓖ	PRFB MRK (W)(ARROW)
Ⓗ	PRFB MRK (W)(LNDP ARR)
Ⓘ	PRFB MRK (W)(WORD)
	RDWY ALIGNMENT
	EXIST ROW
	EXIST TOPO
	EXIST DITCH FLOW
Ⓡ	EXIST SIGN (REMOVE)
#	PROP SIGN (INSTALL)
	DELINEATOR (CTB)(BI)
	DELINEATOR (GF1)(BI)
	OBJECT MARKER

0' 20' 50' 100'

SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGNING & PAVEMENT MARKING LAYOUT

(STA 2754+00 TO STA 2771+95)

SHEET 9 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			143
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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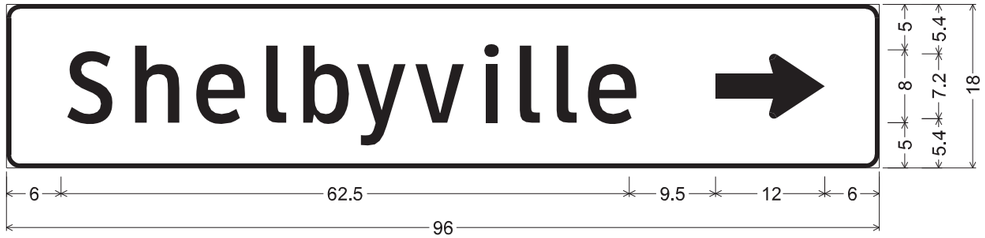
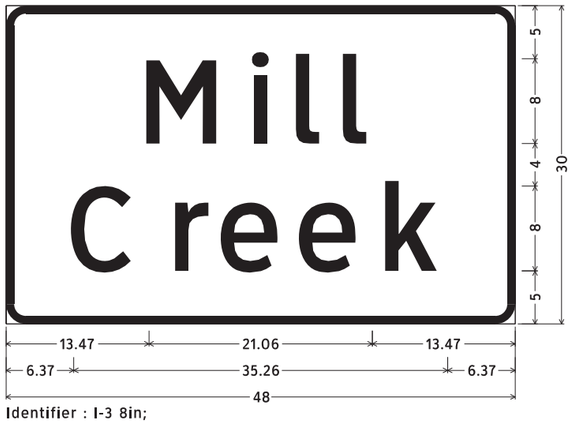


D1-1 8in RT;
1.5" Radius, 0.5" Border, White on, Green;
"Shelbyville", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';

SIGN NO. 3
(SIGNING AND PAVEMENT MARKING LAYOUT
SHEET 1 OF 9)



Identifier : I-3 8in;
1.88" Radius, 0.75" Border, White on Green;
[Mill] ClearviewHwy-5-W-R; [Creek] ClearviewHwy-5-W-R

SIGN NO. 2 AND 3
(SIGNING AND PAVEMENT MARKING LAYOUT
SHEET 5 OF 9)

NOT TO SCALE

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGN DETAILS

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			144
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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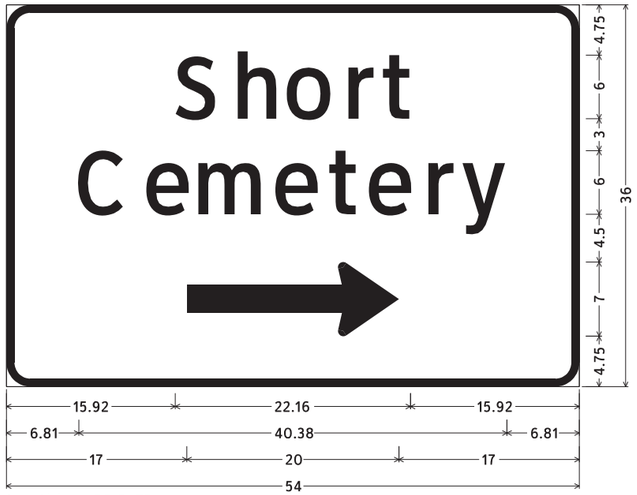

Identifier : D3-3bTR;
2.25" Radius, 0.75" Border, White on Green;
[Short] ClearviewHwy-3-W; [Cemetery] ClearviewHwy-3-W;
Standard Arrow Custom 20.00" X 7.00" 0{

SIGN NO. 5
(SIGNING AND PAVEMENT MARKING LAYOUT
SHEET 7 OF 9)

NOT TO SCALE

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SIGN DETAILS

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			145
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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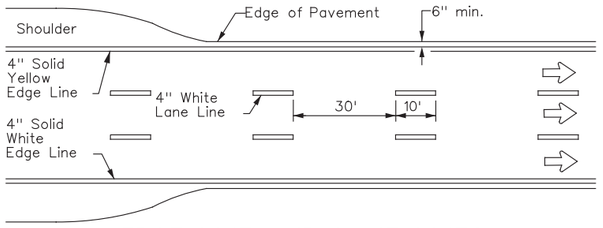
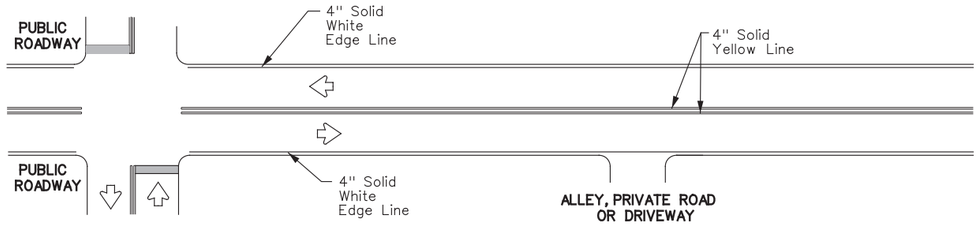
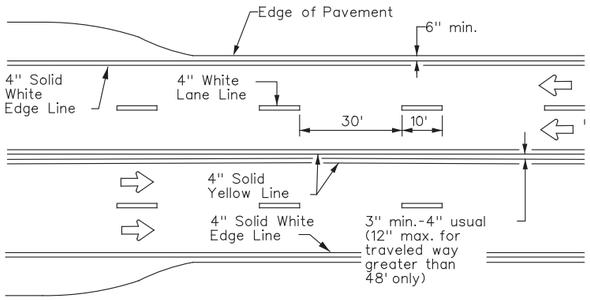


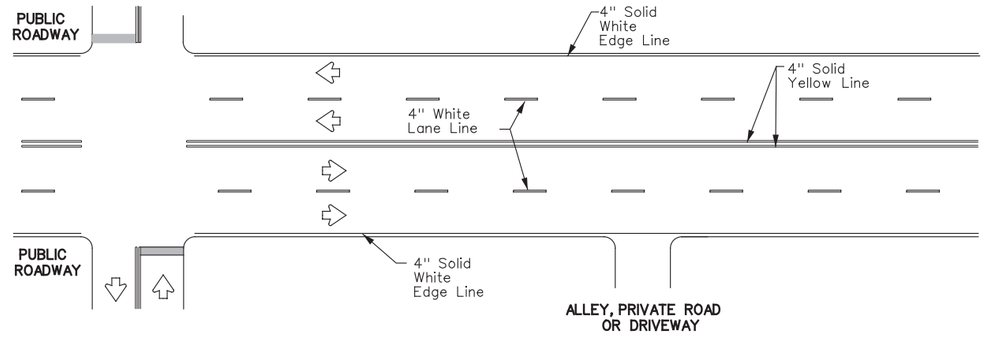
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



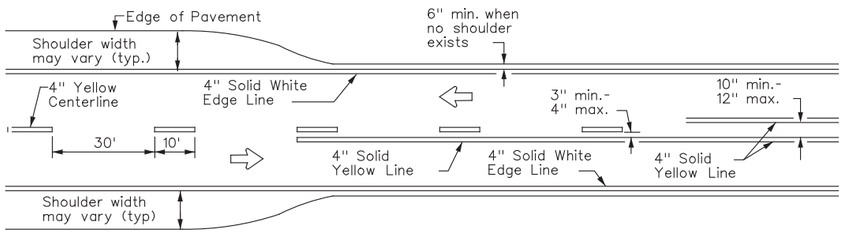
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



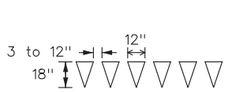
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



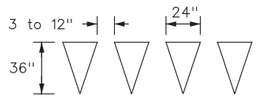
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

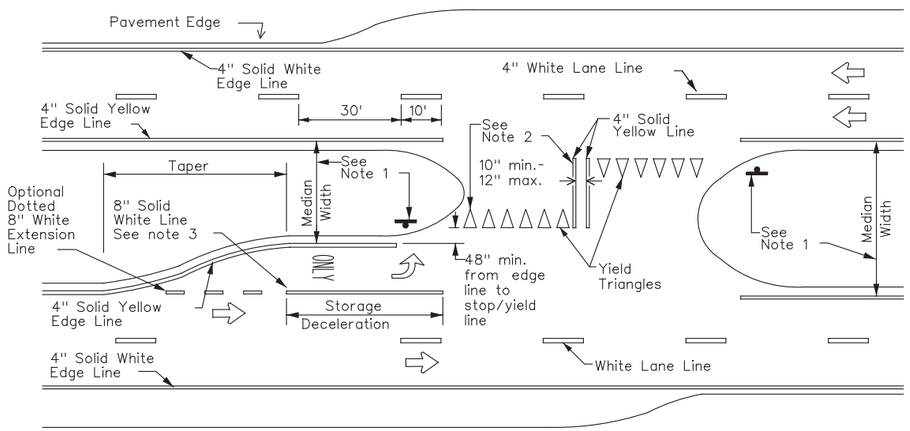


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



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 are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles 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.

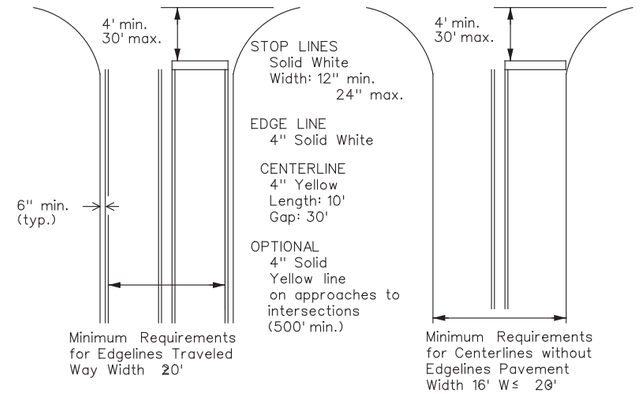
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 inside of edgeline to the inside of edgeline 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.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

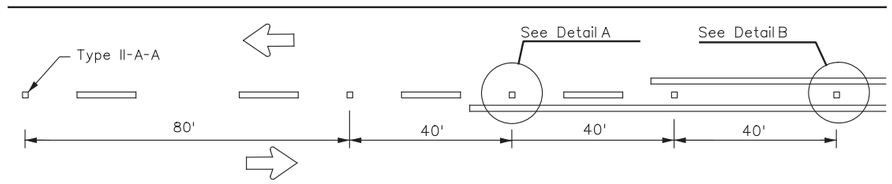
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0809	02	070	US 96
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LFK	SHELBY		146

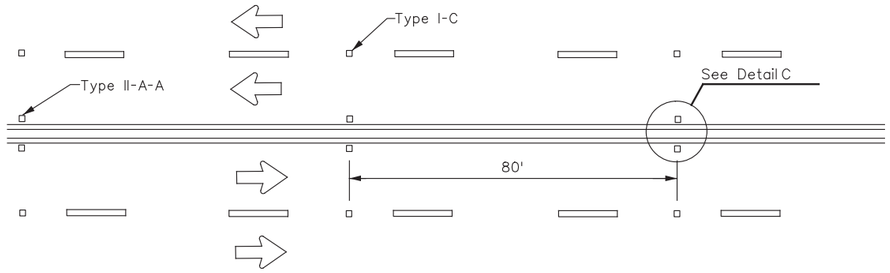
22A

DATE:
FILE:

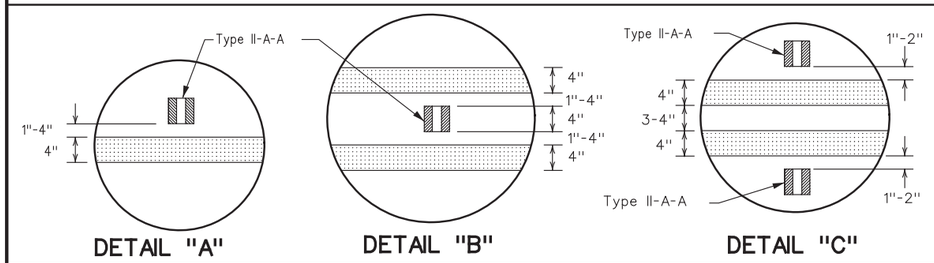
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



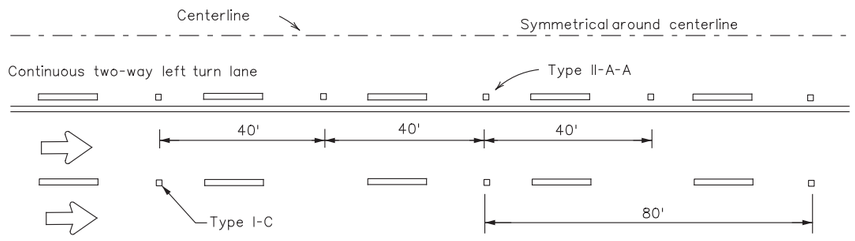
CENTERLINE FOR ALL TWO LANE ROADWAYS



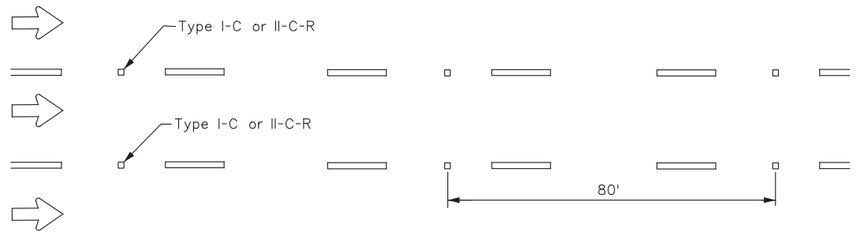
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

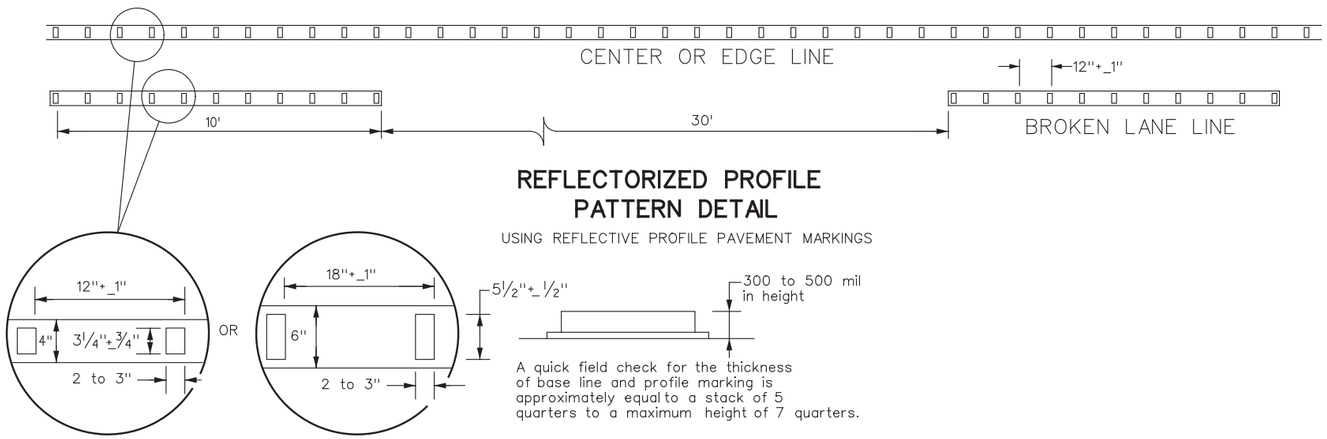


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

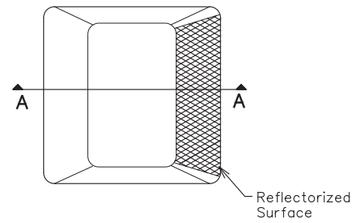
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

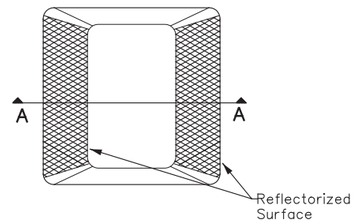
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

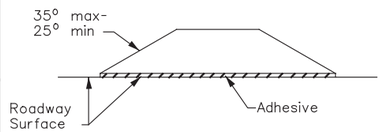
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

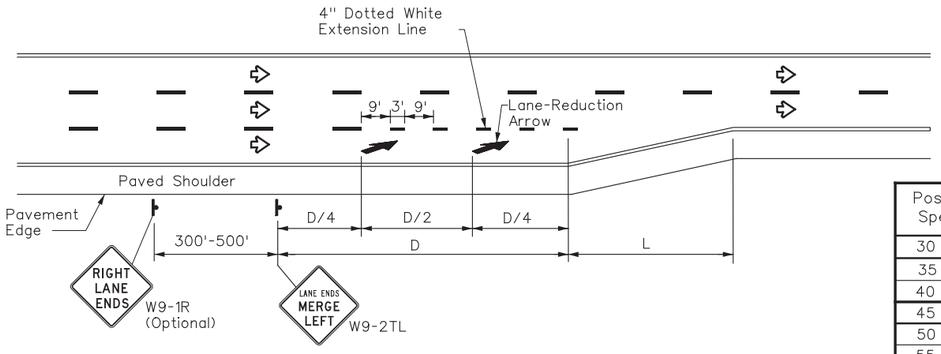
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0809	02	070	US 96
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LFK	SHELBY		147

22B

DATE:
FILE:

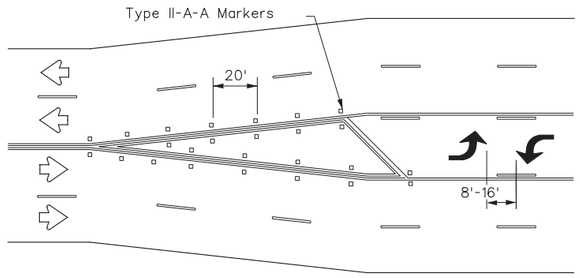


LANE REDUCTION

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	

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 W9-1R "RIGHT LANE ENDS" 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.



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.

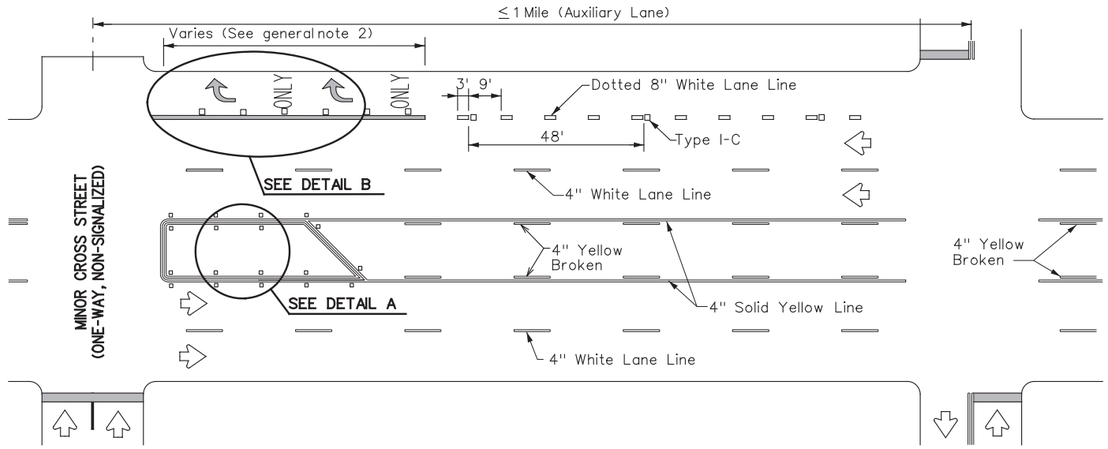
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

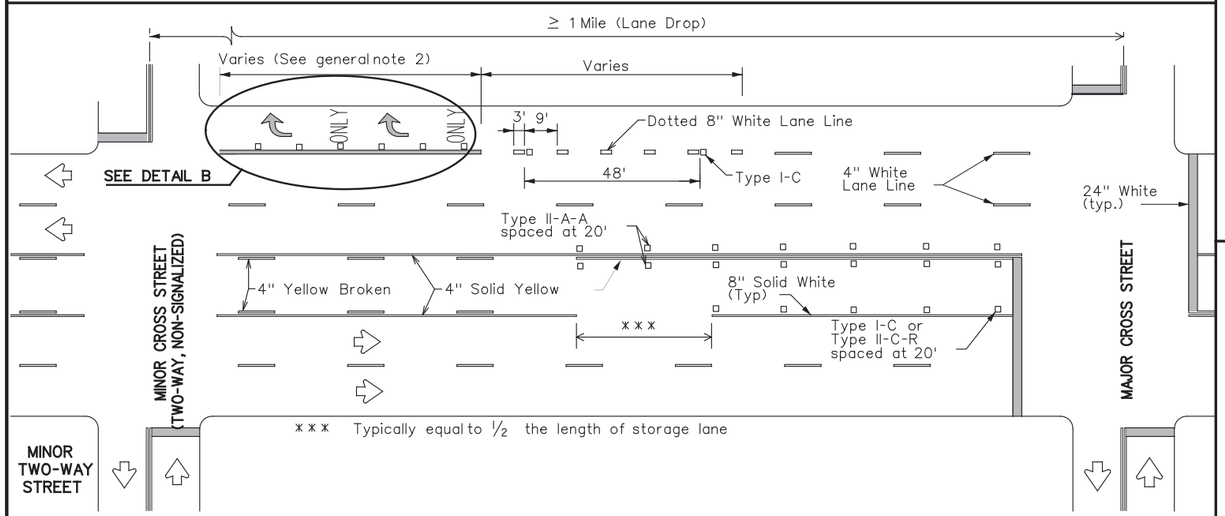
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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.

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

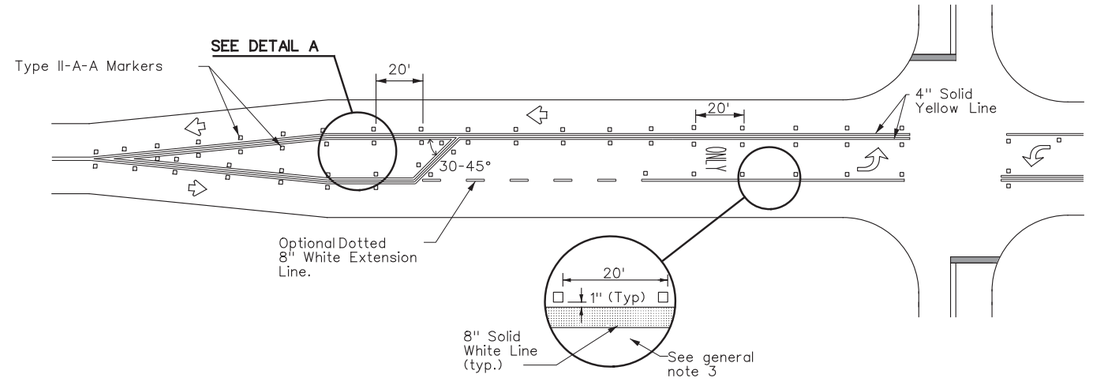
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



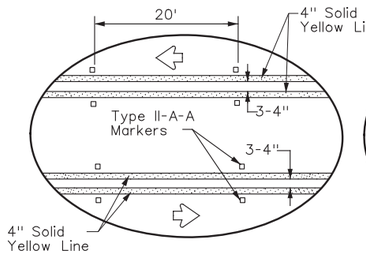
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



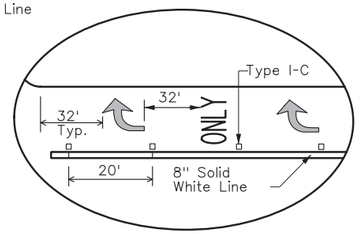
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	LFK	SHELBY		148
3-03 6-20				

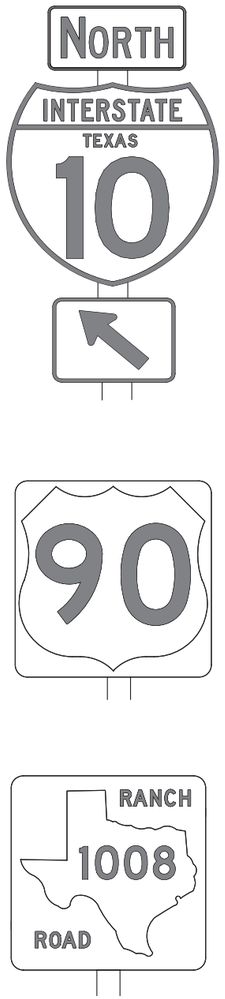
22C

DATE:
FILE:

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

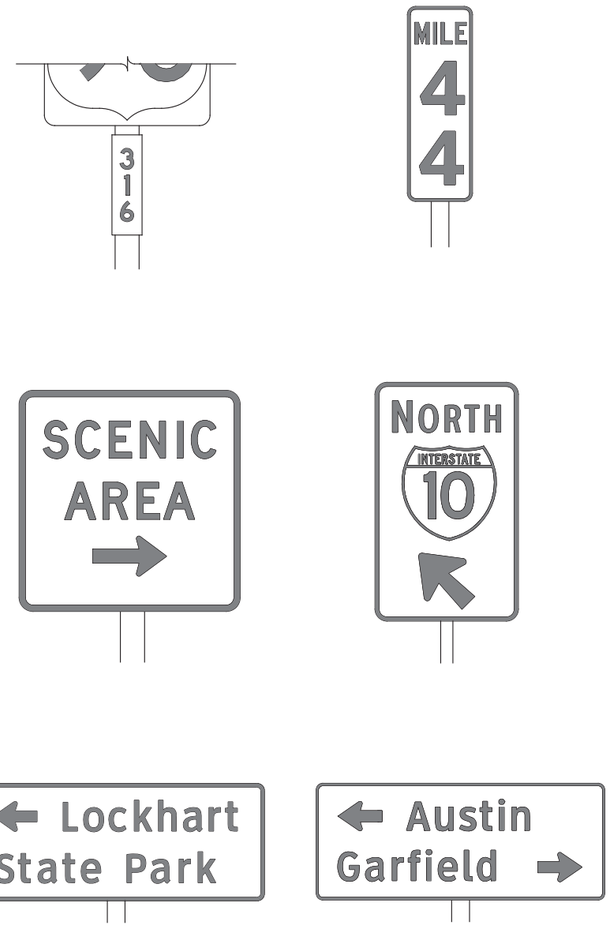
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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	080902		070	US 96
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LFK	SHELBY		149

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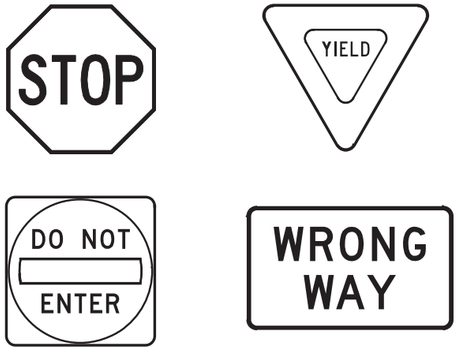
DATE:
FILE:

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

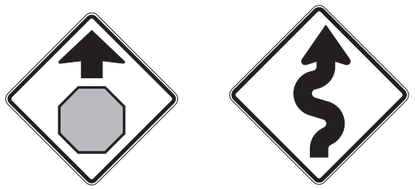
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND,BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

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

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LFK	SHELBY		150

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DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

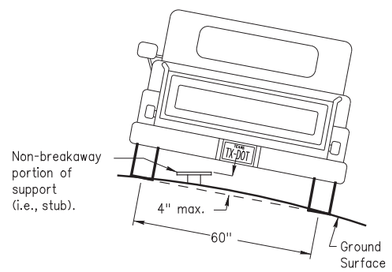
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 */ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

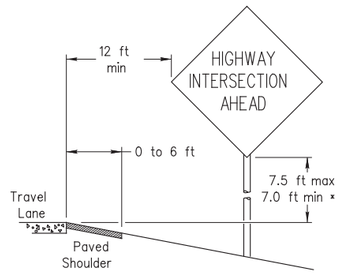
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

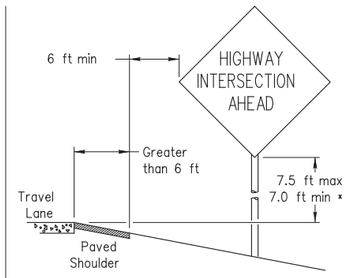
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

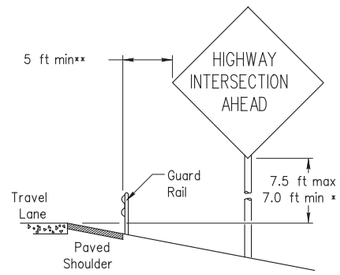
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



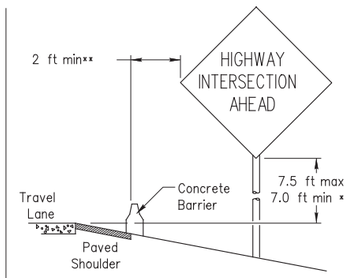
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



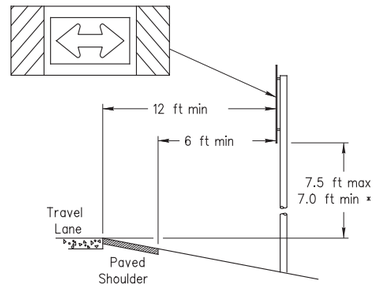
BEHIND GUARDRAIL



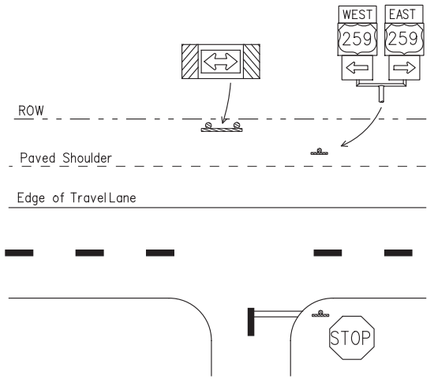
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

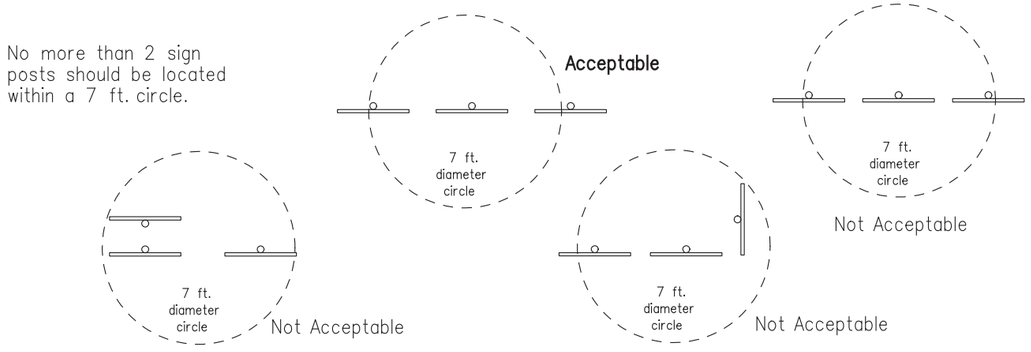
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

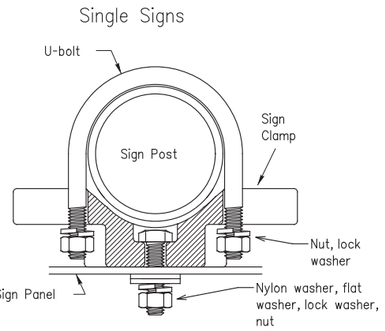
The maximum values may be increased when directed by the Engineer.

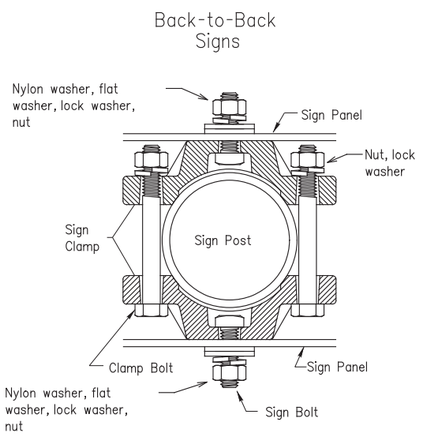
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

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



TYPICAL SIGN ATTACHMENT DETAIL





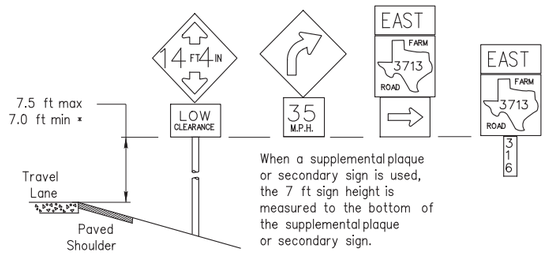
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

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

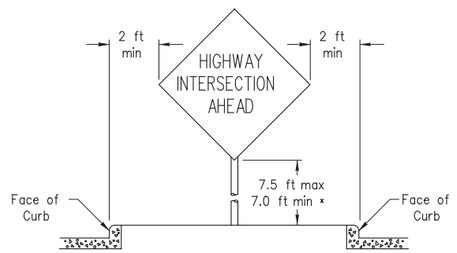
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



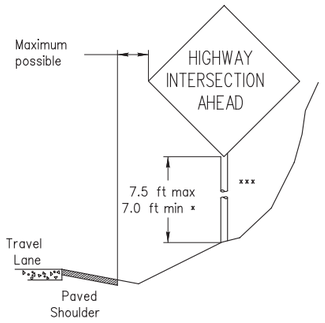
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

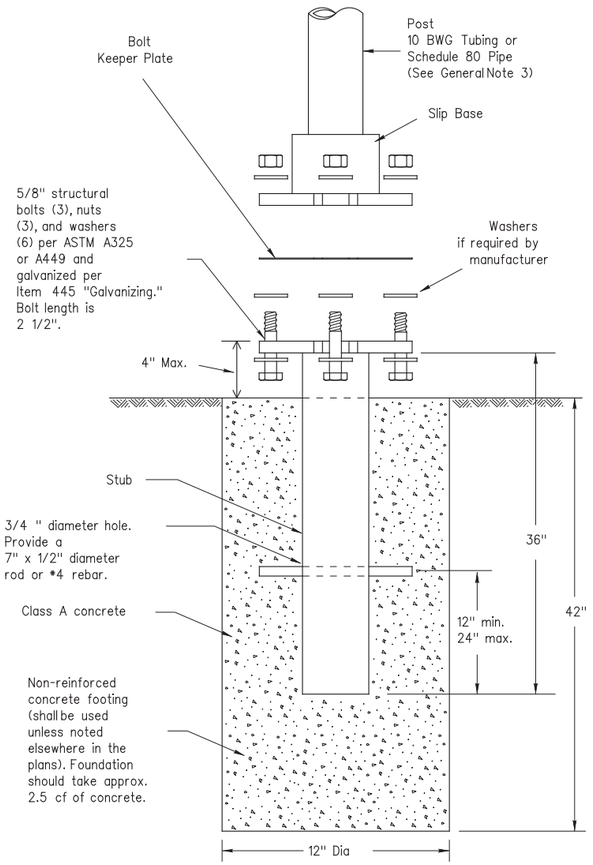
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		151

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

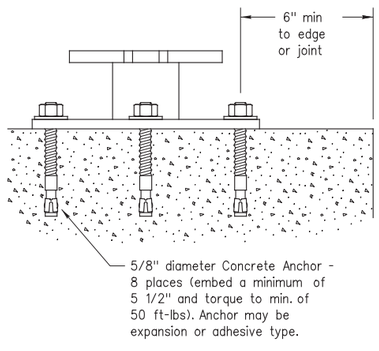
Foundation

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

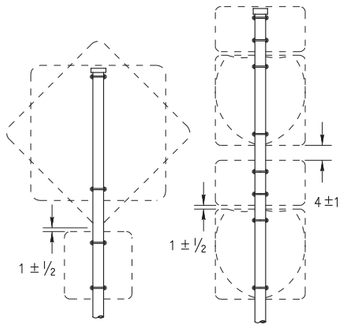
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS			
9-08			

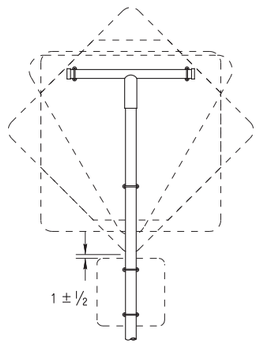
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		152

DATE:
FILE:

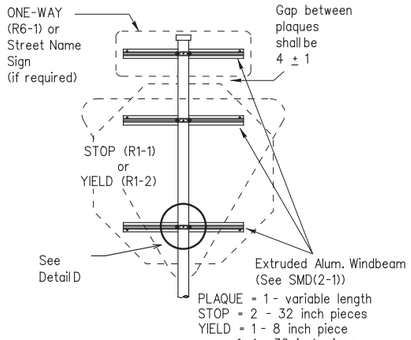
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



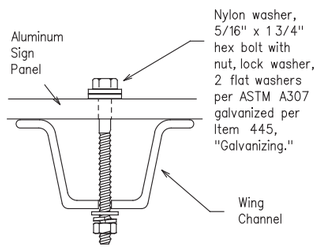
SM RD SGN ASSM TY XXXXX(1)XX(P)



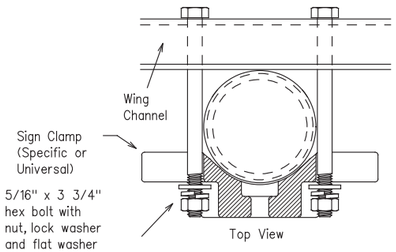
SM RD SGN ASSM TY XXXXX(1)XX(T)



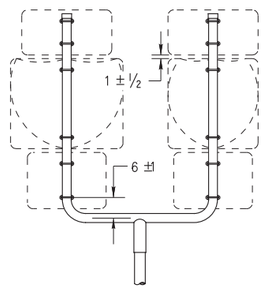
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



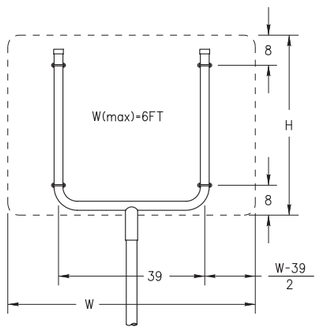
Detail A



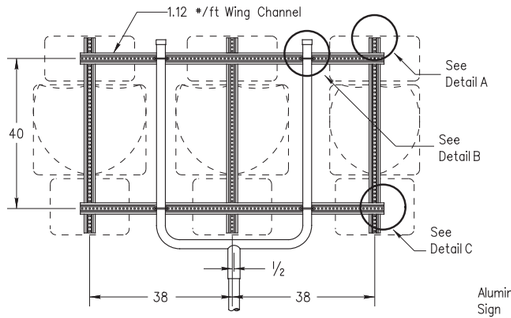
Detail B



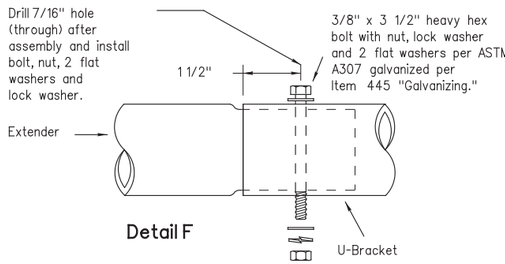
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

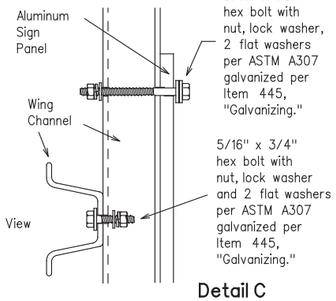


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

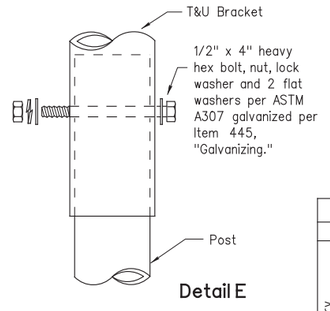


Detail F

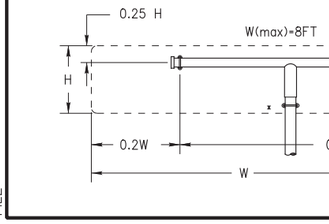
Splices shall only be allowed behind the sign substrate.



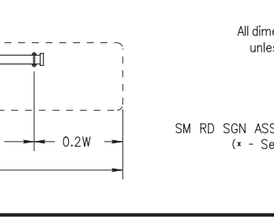
Detail C



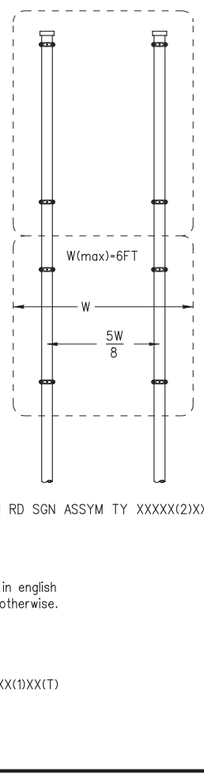
Detail E



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

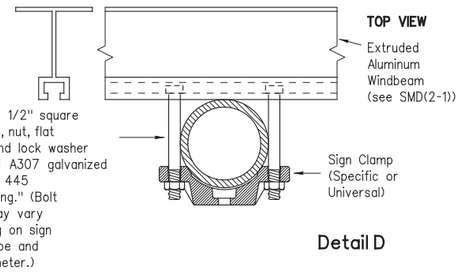


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

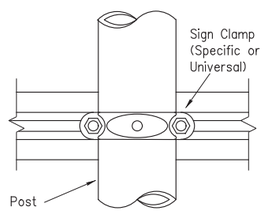


SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



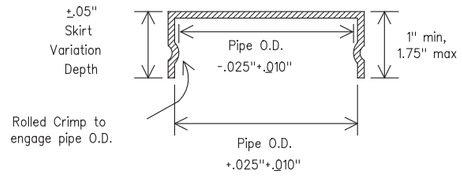
Detail D



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. See table above.
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.

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

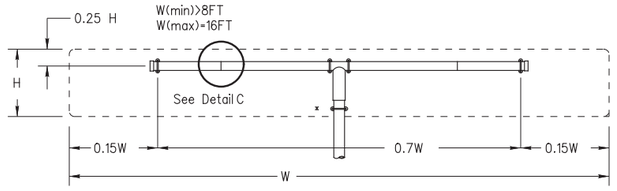
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

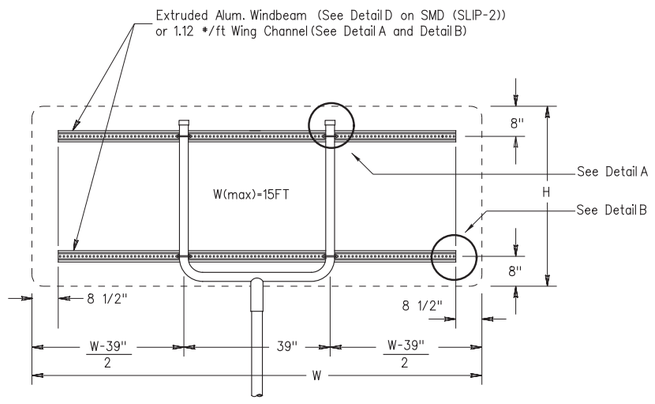
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		153

DATE:
FILE:

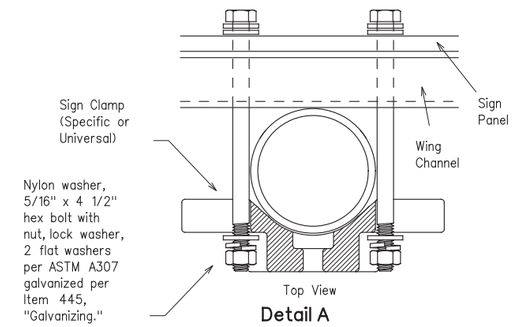
DATE:
FILE:



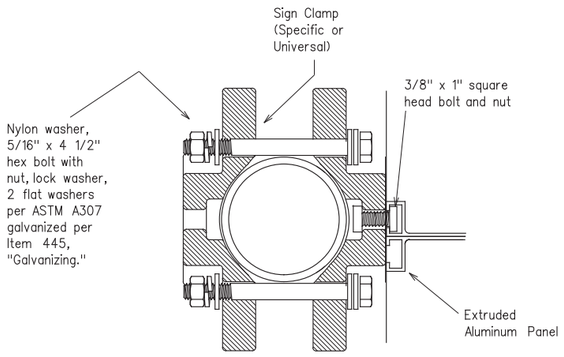
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



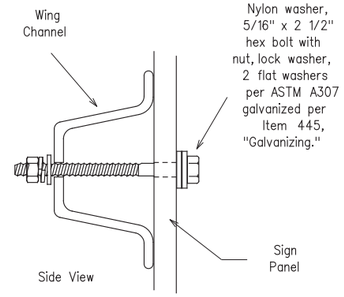
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



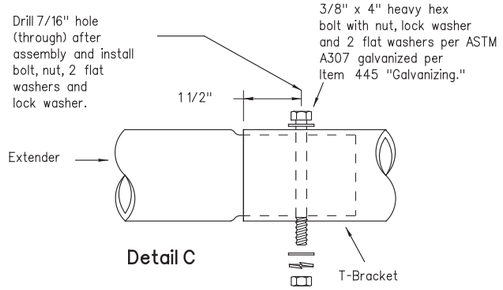
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

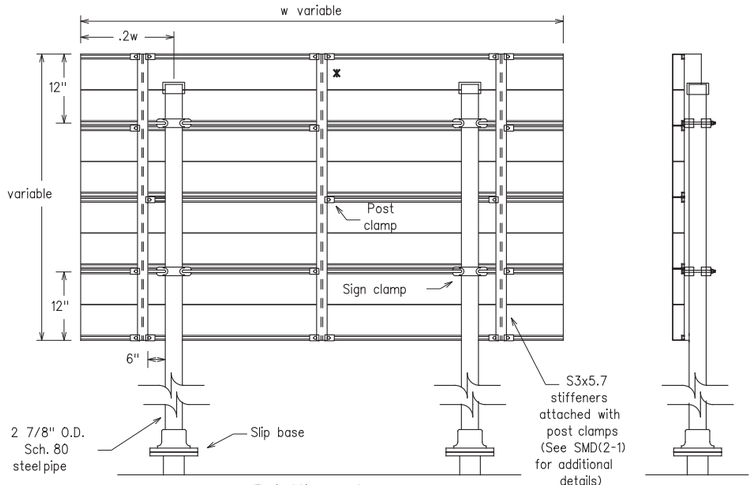


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

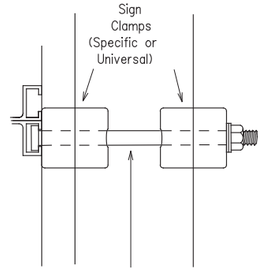


Typical Sign Mount

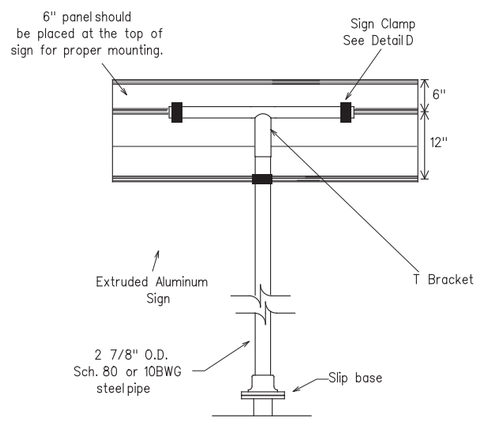
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

✖ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

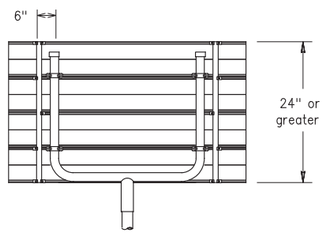
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

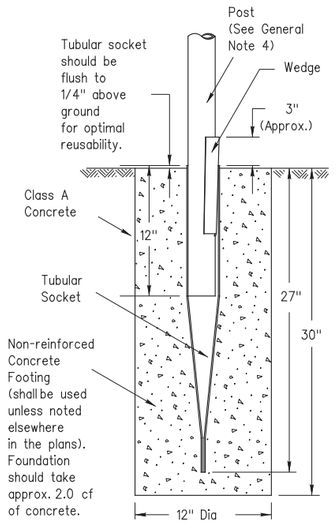
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		154

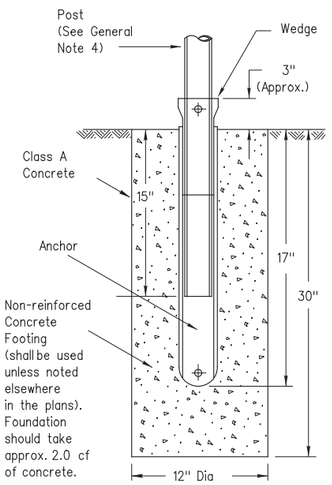
DATE:
FILE:

Wedge Anchor Steel System



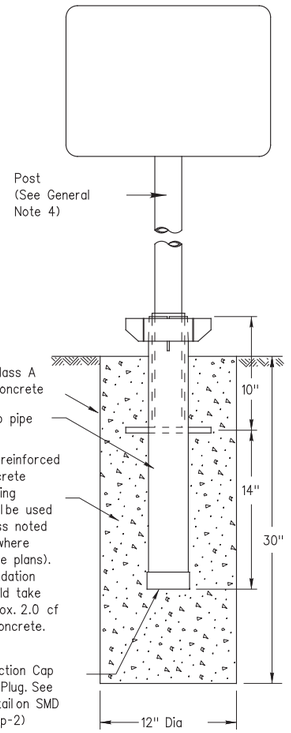
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

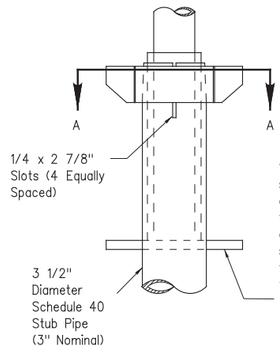


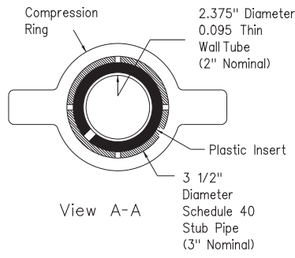
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



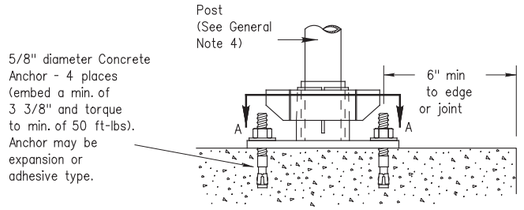
SM RD SGN ASSM TY TWT(X)UA(P)



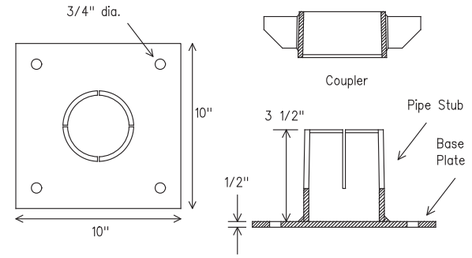


View A-A

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

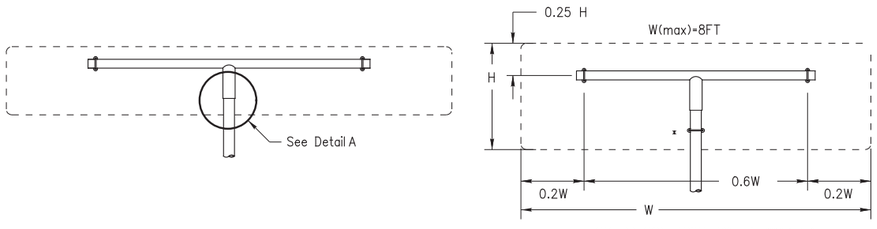


Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized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



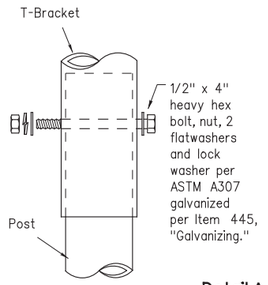
SM RD SGN ASSM TY TWT(X)UB(P)

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



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

(x - See General Note 6)



Detail A

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

NOTE

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

GENERAL NOTES:

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

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

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

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

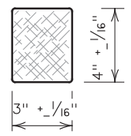
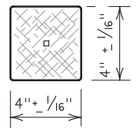
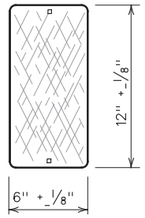
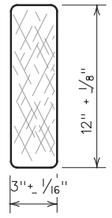
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

DIST	COUNTY	SHEET NO.
LFK	SHELBY	155

26E

DATE:
FILE:

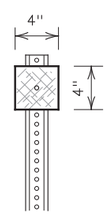
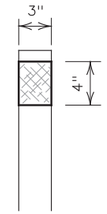
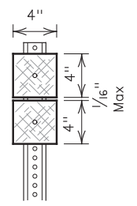
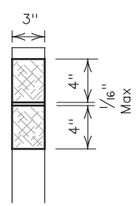
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

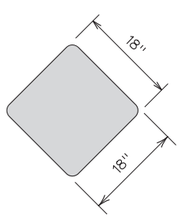
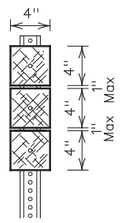
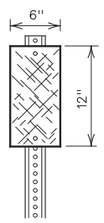
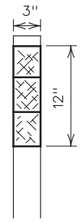
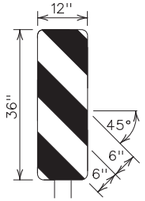
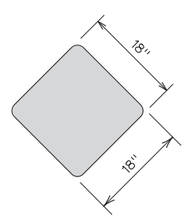
NOTE

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.

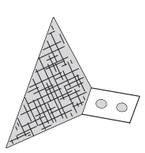
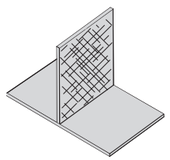
DELINEATORS

	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

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B or C Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

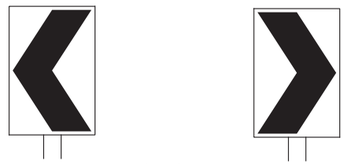
SHEETING: Yellow, White, Red

NOTE

1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE

W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LFK	SHELBY		156

20A

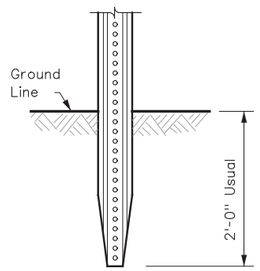
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

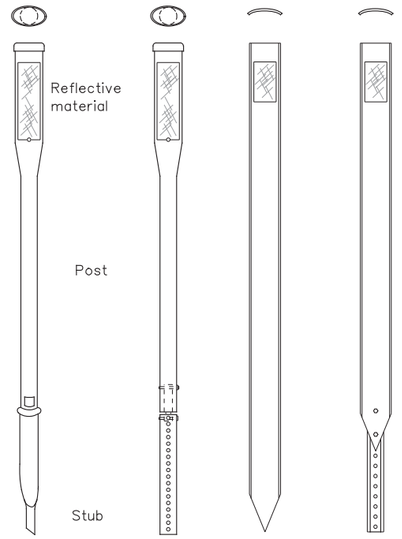


NOTES

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.

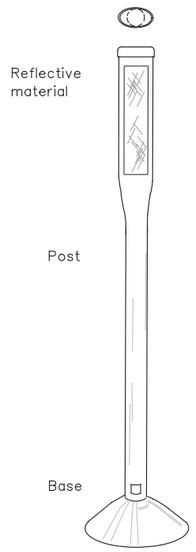
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



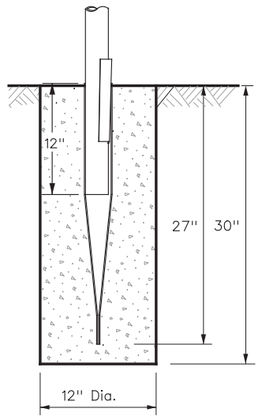
SURFACE MOUNT

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.

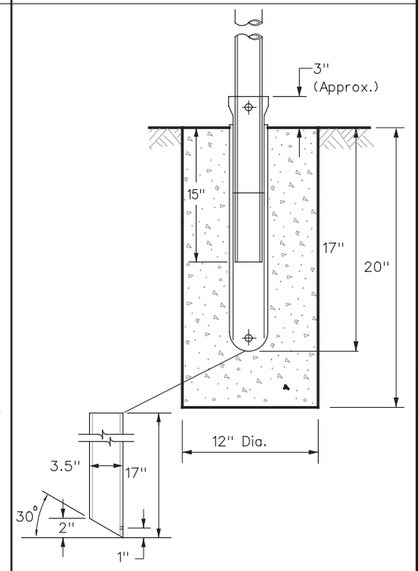
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

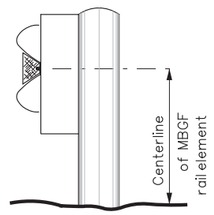
NOTE

1. Install per manufacturer's recommendations.

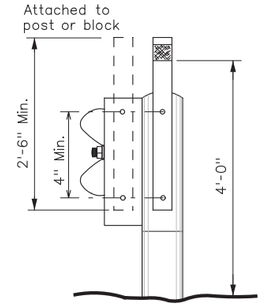
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

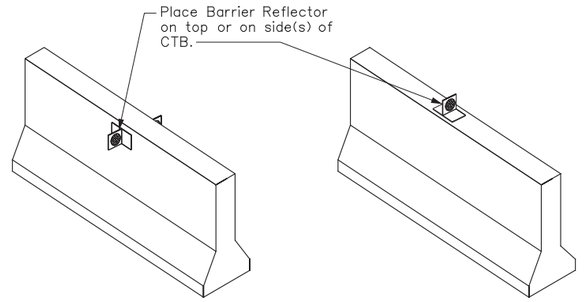
GF1



GF2



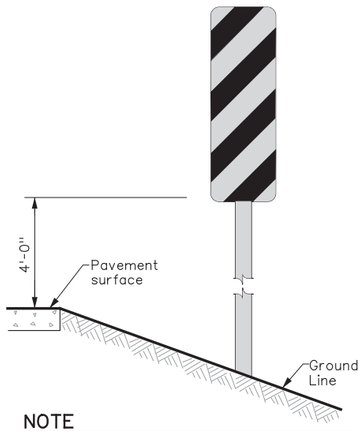
CONCRETE TRAFFIC BARRIER (CTB)



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.

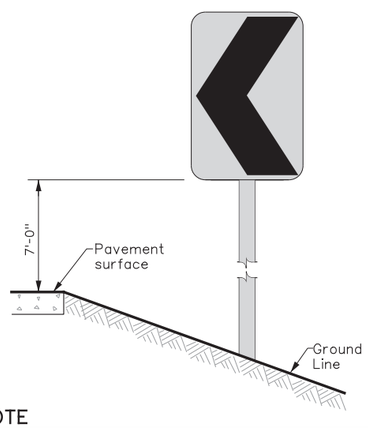
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

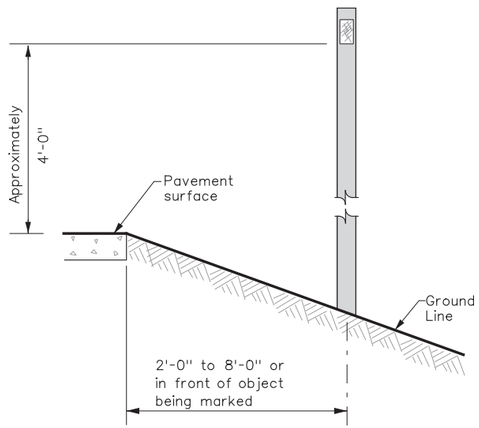
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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.

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Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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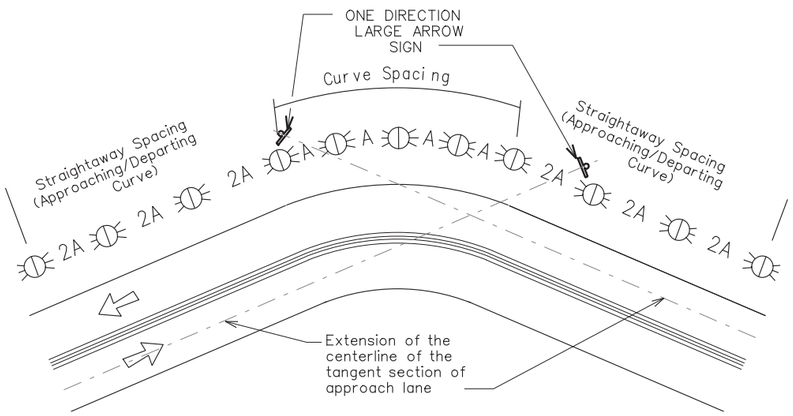
20B

DATE:
FILE:

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

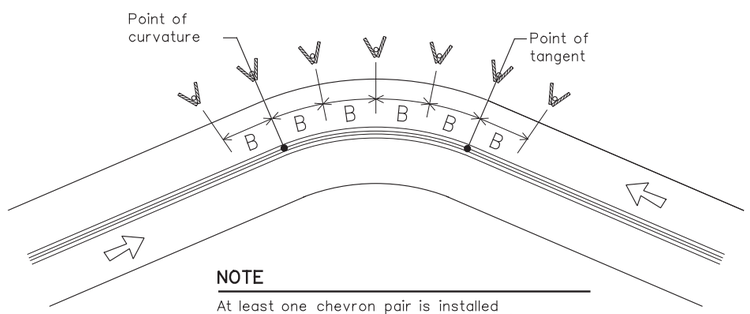
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		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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8-15 7-20	LFK	SHELBY		158

20C

DATE:
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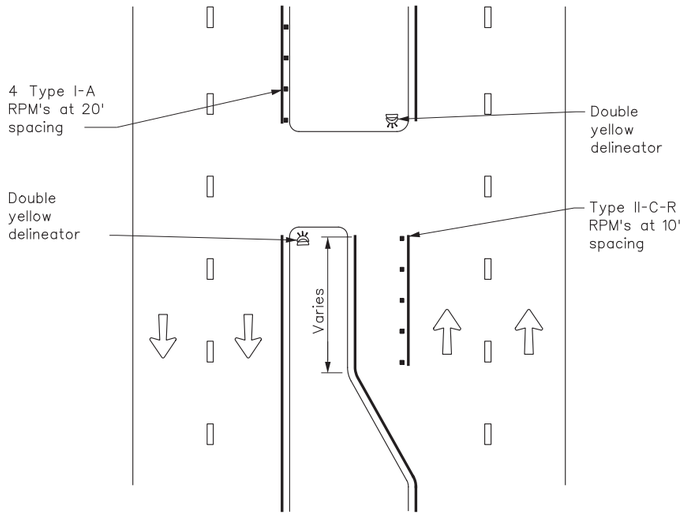
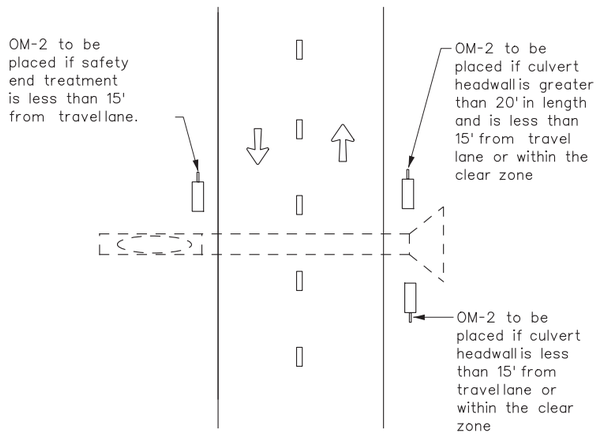
CROSSOVERS



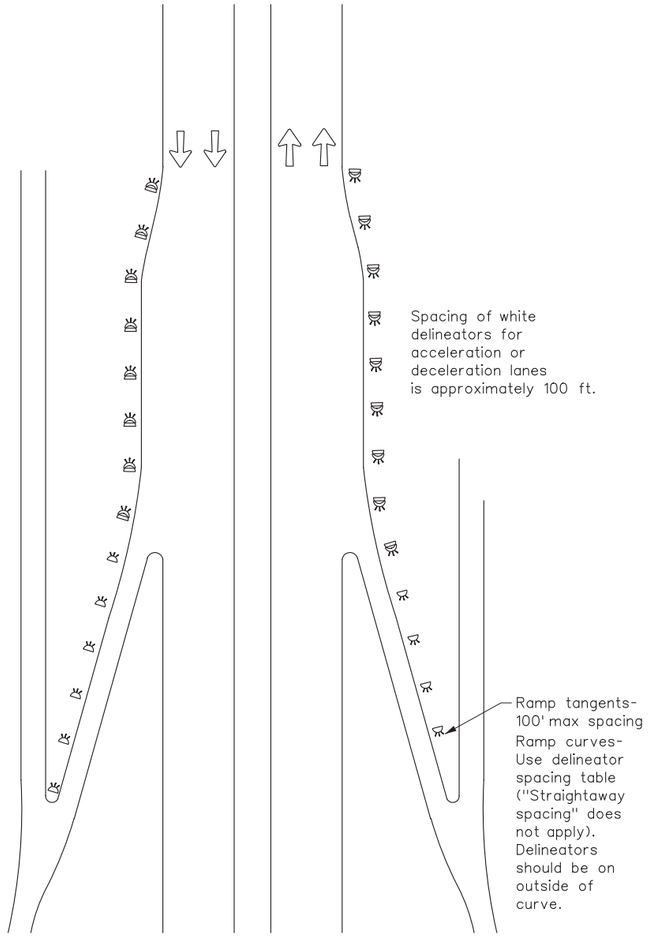
DETAIL 1

FOR CULVERTS WITHOUT MBGF



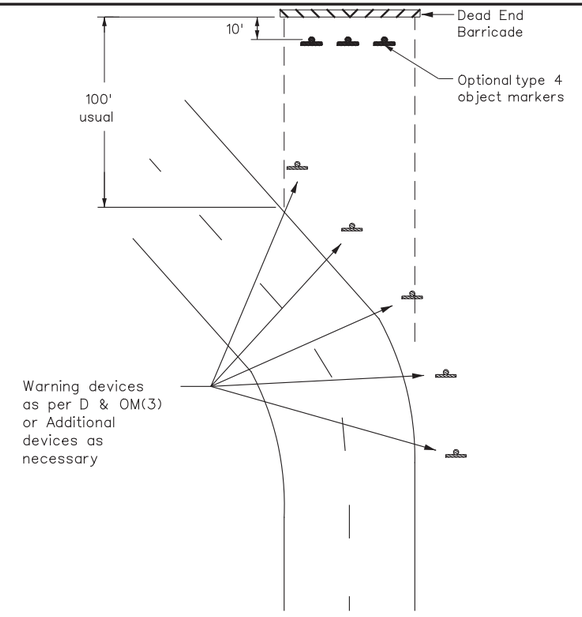
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



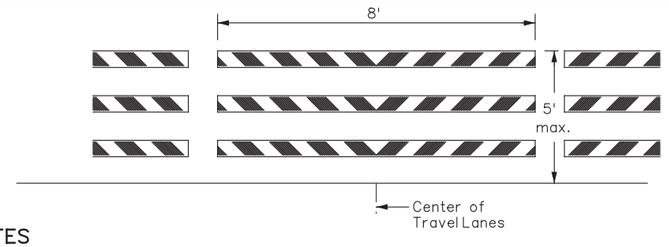
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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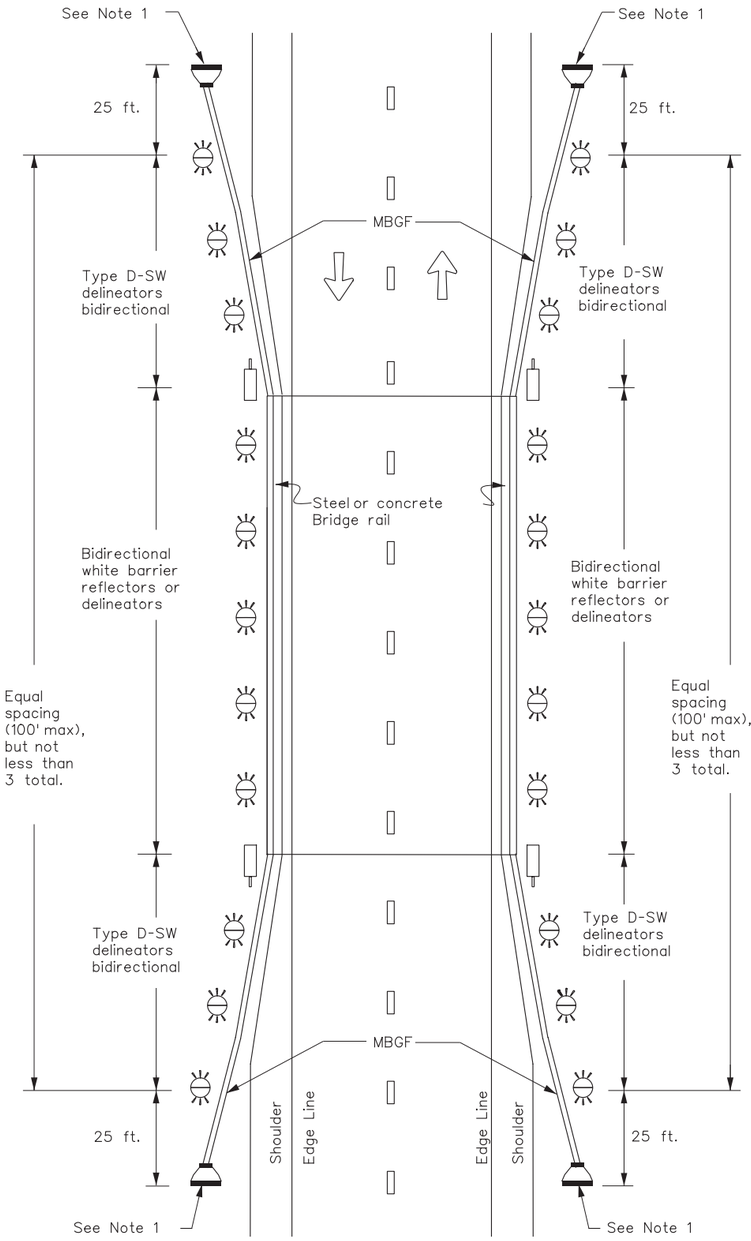
3-15 7-20	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		159

20D

DATE:
FILE:

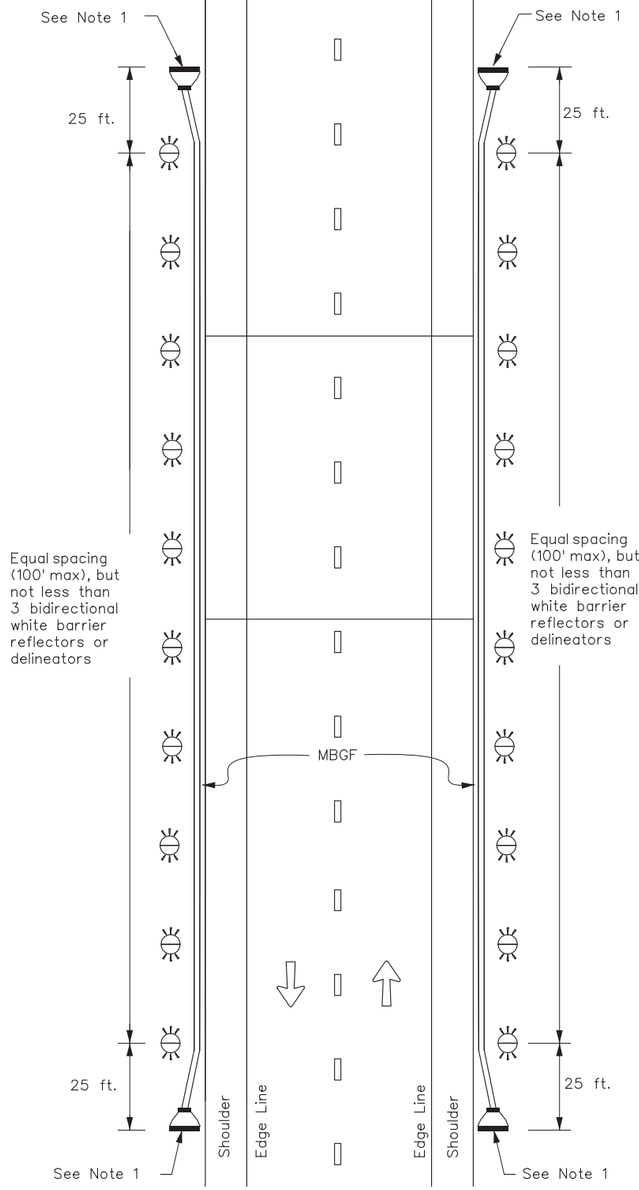
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

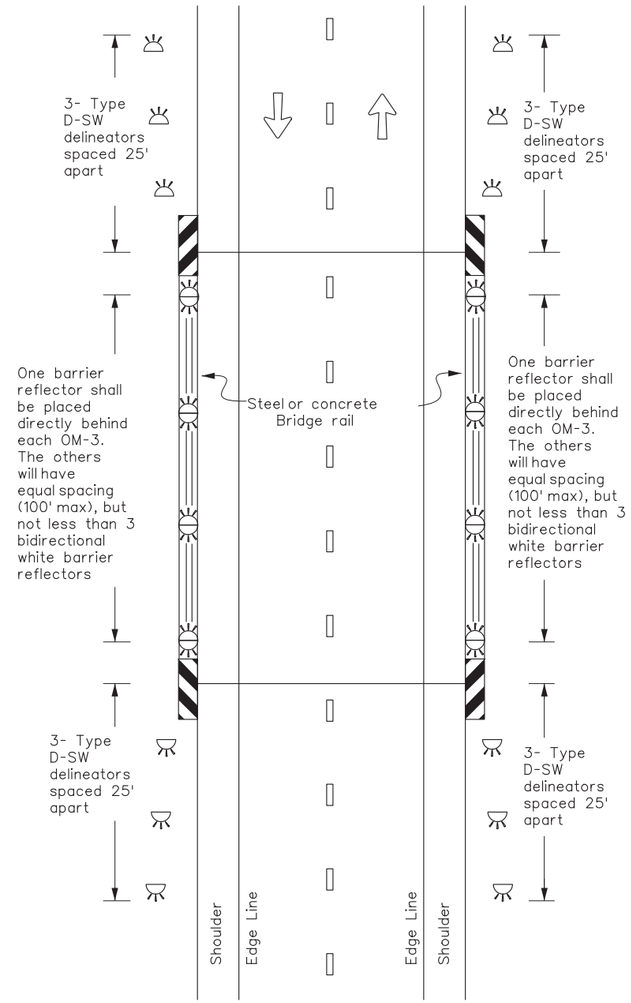
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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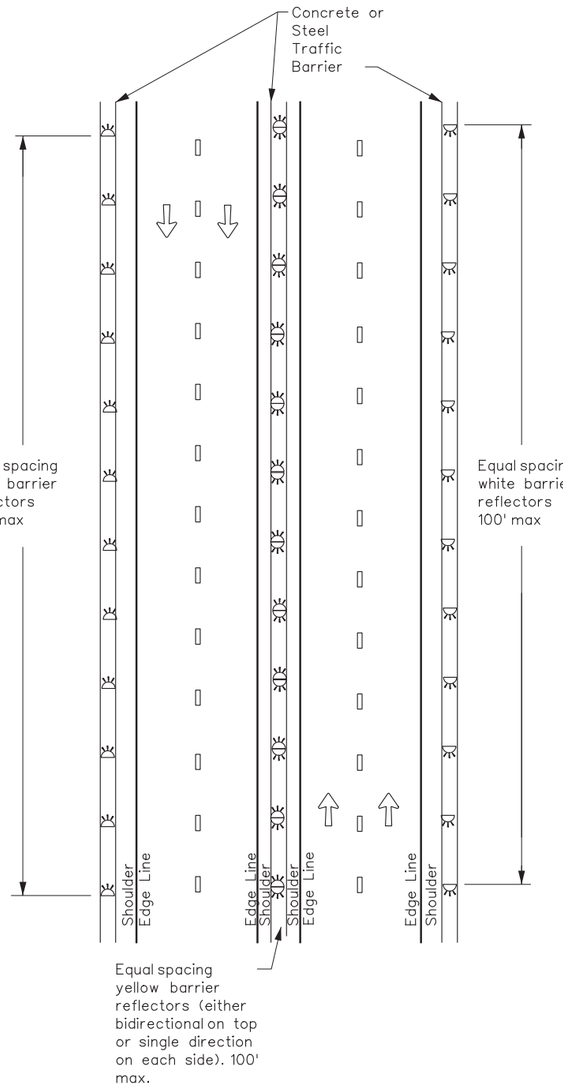
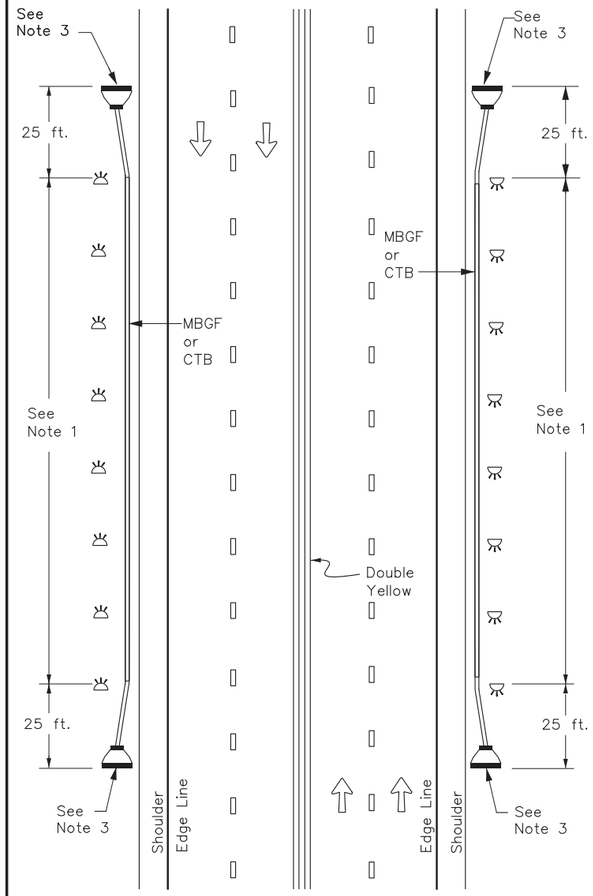
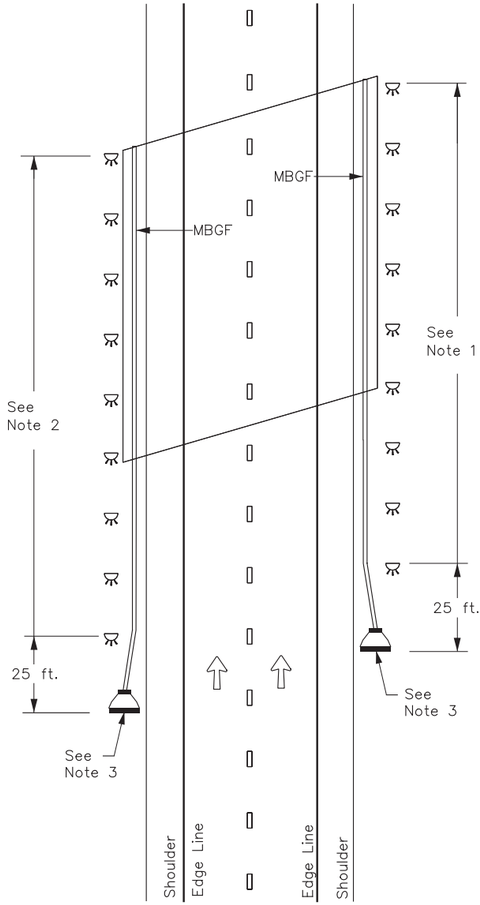
CONTINUOUS CONCRETE OR STEEL BARRIER



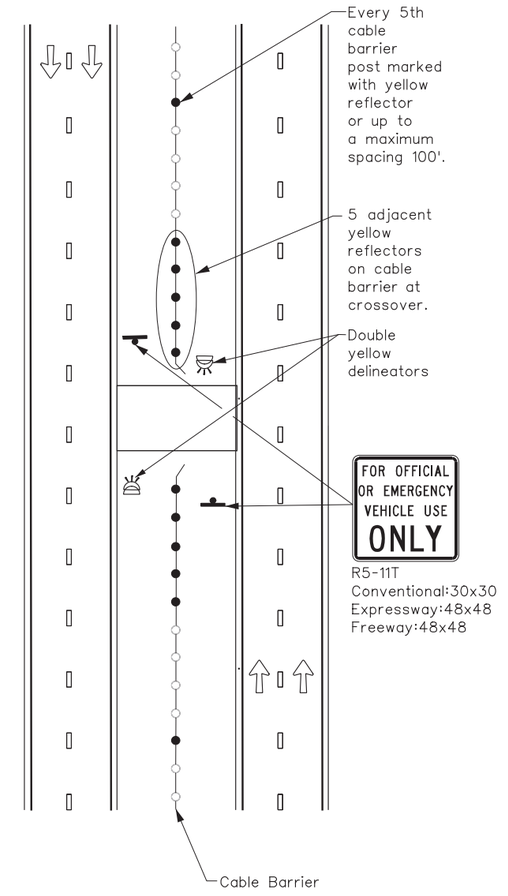
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)

2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.

3. 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.

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(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	LFK	SHELBY		161

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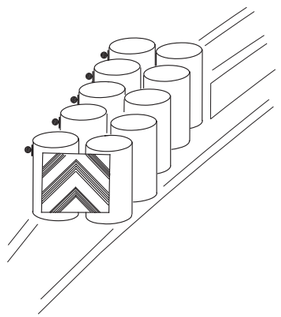
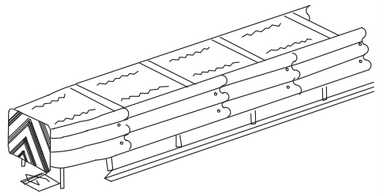
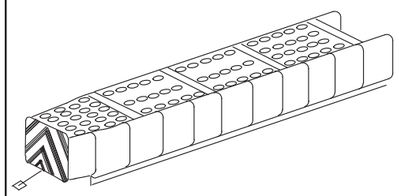
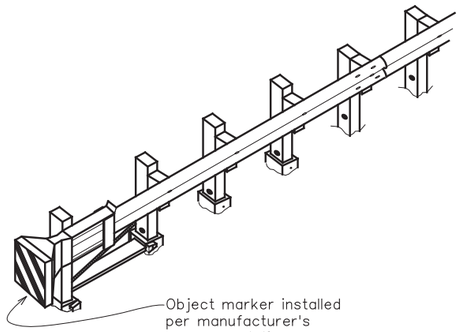
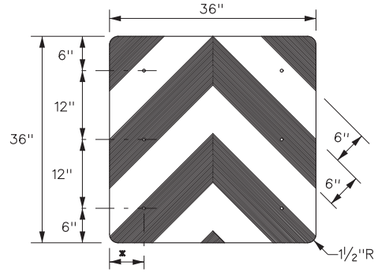
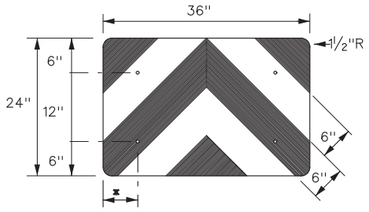




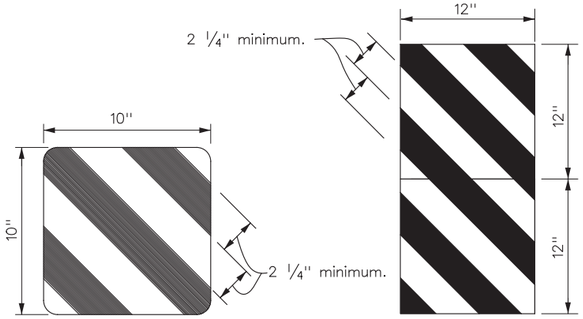




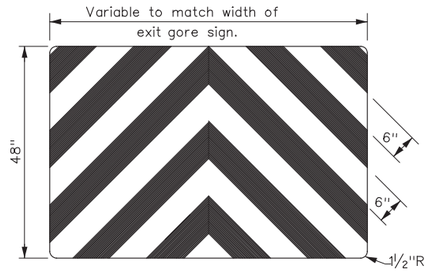


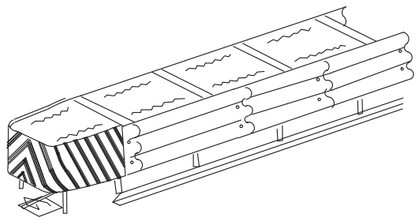


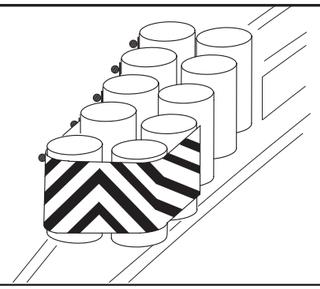
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

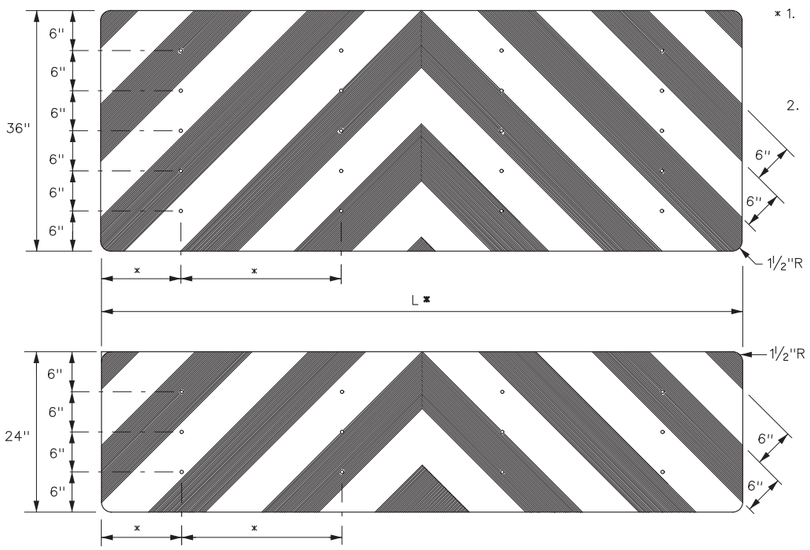


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

* 1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

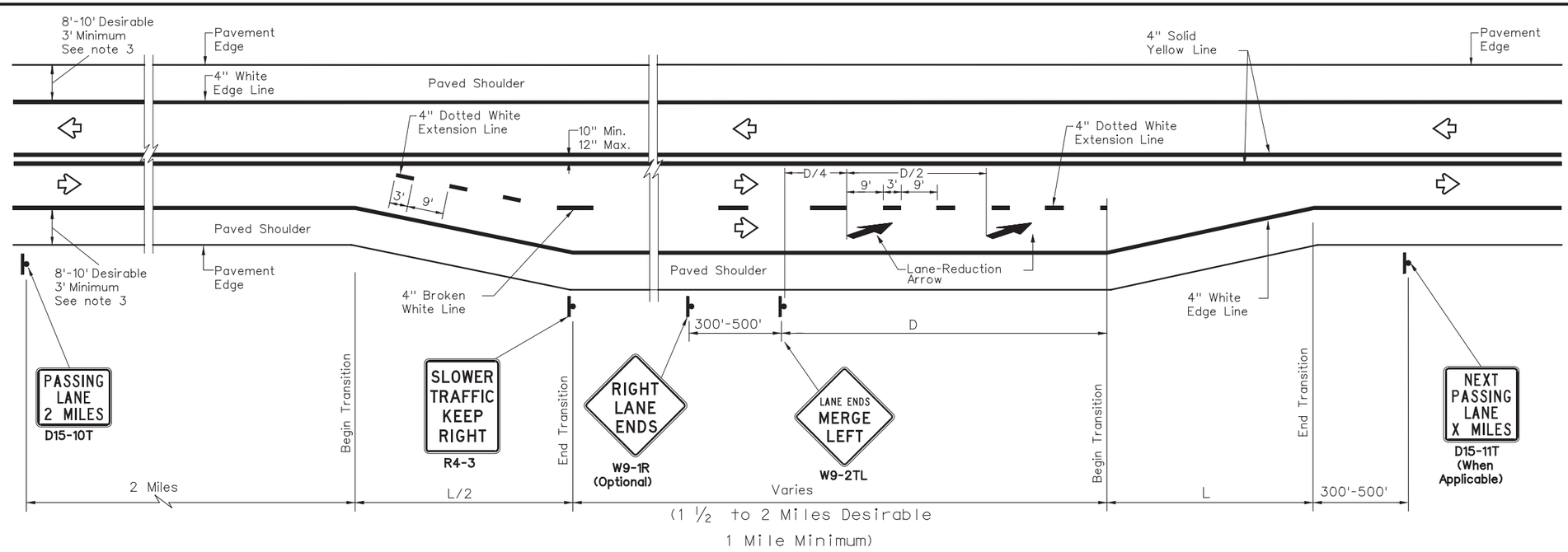
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	LFK	SHELBY		162
4-98 7-20				

20G

DATE:
FILE:



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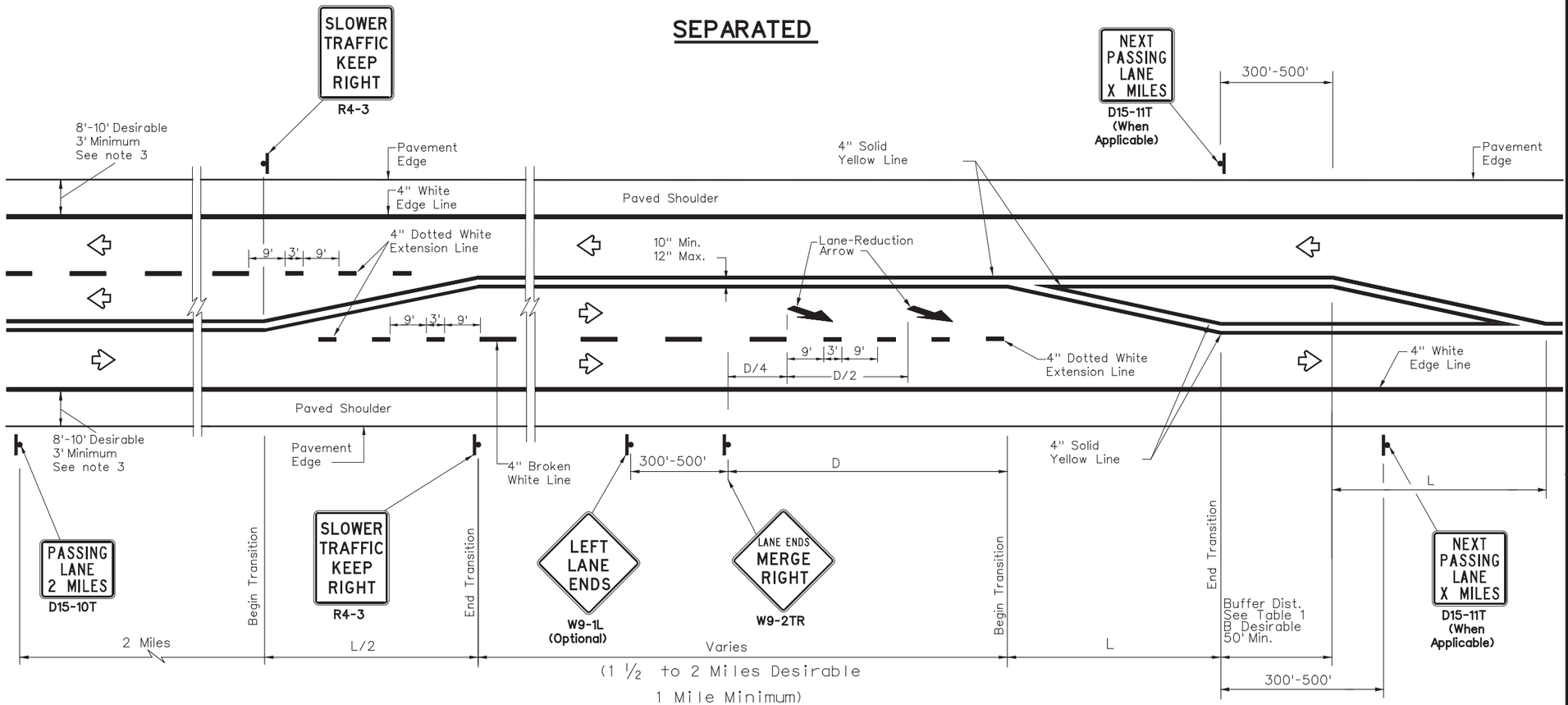

ALTERNATING

LEGEND	
	Sign
	Traffic Flow

TYPICAL TAPER LENGTH (L)	
Formula *	L = WS

* Transition length should be rounded up to nearest 5 foot increment.

L=Length of Transition (FT)
W=Width of Offset (FT)
S=Posted Speed (MPH)

EXAMPLE

A 12 foot lane is added on a 70 mph roadway. The length of the transition should be:

L=12x70=840 ft

TABLE 1
ADVANCE WARNING SIGN DISTANCE (D) AND BUFFER DISTANCE (B)

Posted Speed	D (FT)	B (FT)
40	670	305
45	775	360
50	885	425
55	990	495
60	1100	570
65	1200	645
70	1250	730
75	1350	820

GENERAL NOTES

1. For minimum and desirable design details, see the Roadway Design Manual, Chapter 4, Section 6, Super 2 Highways.
2. For Raised Pavement Markers(RPM)details, see Pavement Markings Standard sheet, PM(2). Note that RPMs are not recommended on the 4" dotted white extension lines.
3. For rumble strip options available for the designed shoulder width, see rumble strip standard sheet RS(4).

Texas Department of Transportation

Traffic Operations Division Standard

TEXAS SUPER 2 PASSING LANES

TS2(PL-1)-18

FILE: ts2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT May 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
2-12	DIST	COUNTY		SHEET NO.
3-12	LFK	SHELBY		163
3-18				

DATE:
FILE:

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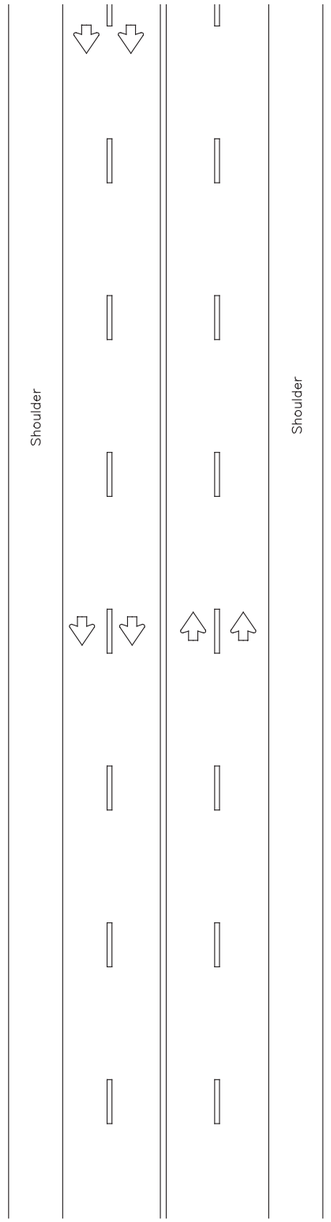
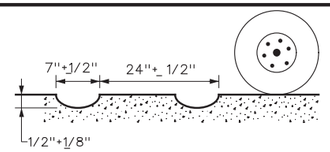
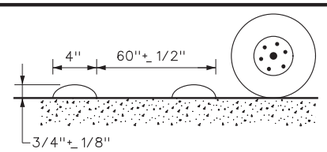


MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

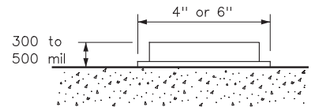
CENTERLINE RUMBLE STRIPS



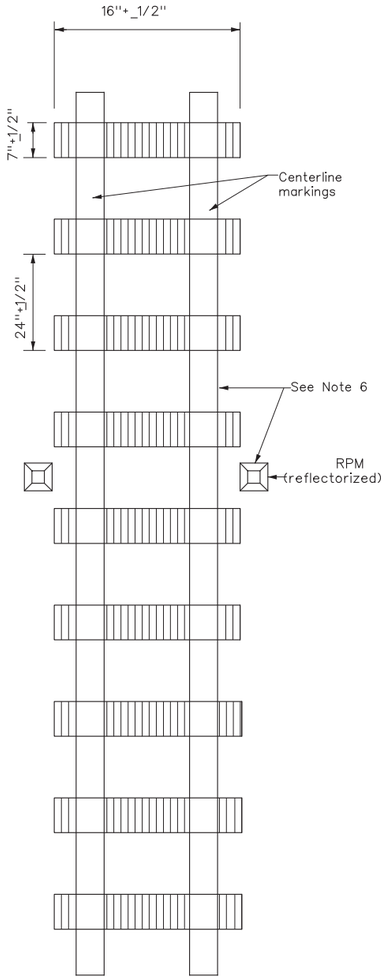
PROFILE VIEW



PROFILE VIEW

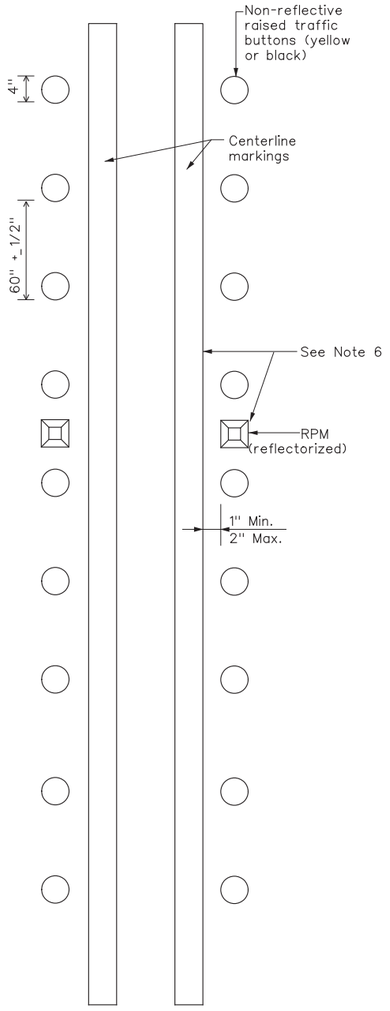


PROFILE VIEW



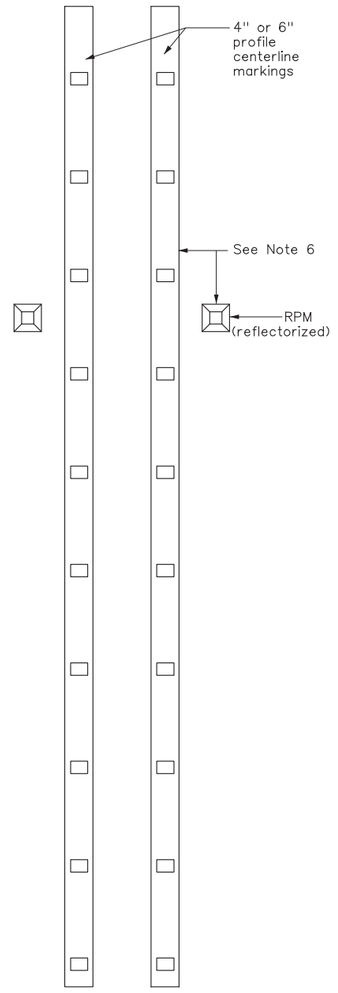
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

11. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS

RS(2)-13

FILE: rs(2)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		164

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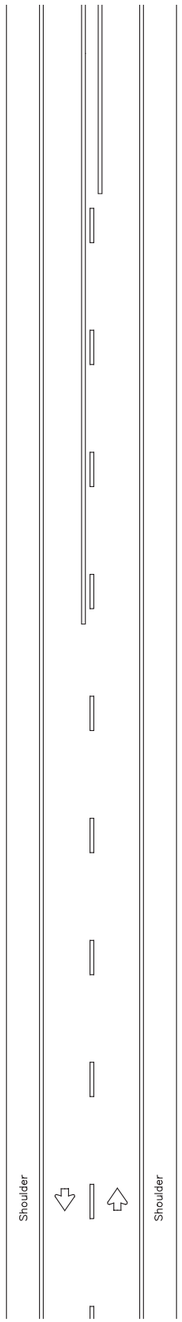
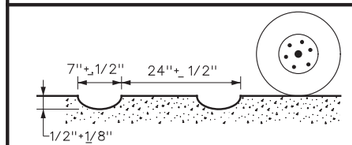
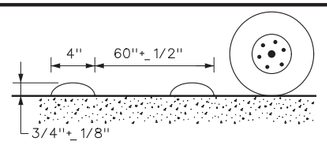


TWO LANE TWO-WAY ROADWAYS

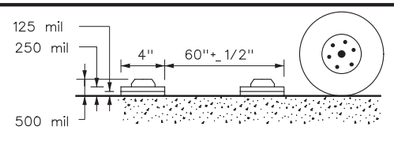
CENTERLINE RUMBLE STRIPS



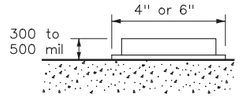
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

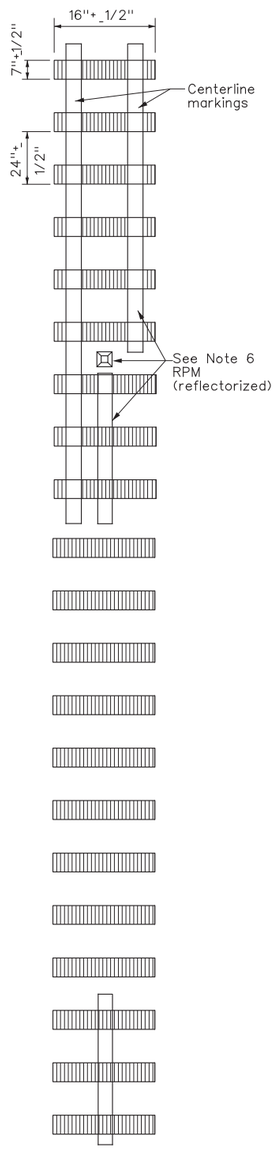


PREFORMED THERMOPLASTIC STRIPS



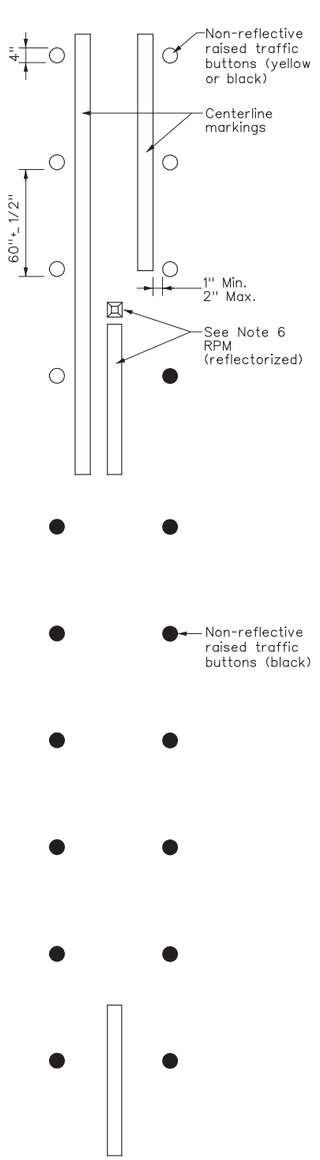
PROFILE MARKINGS

PROFILE VIEW



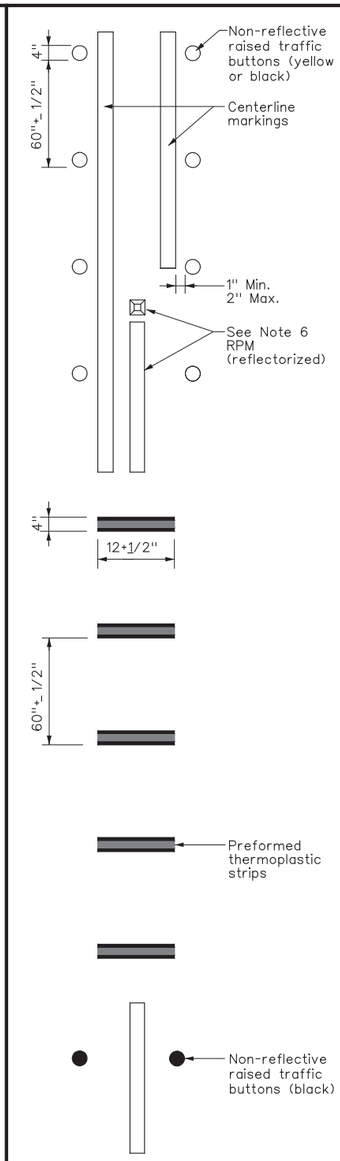
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



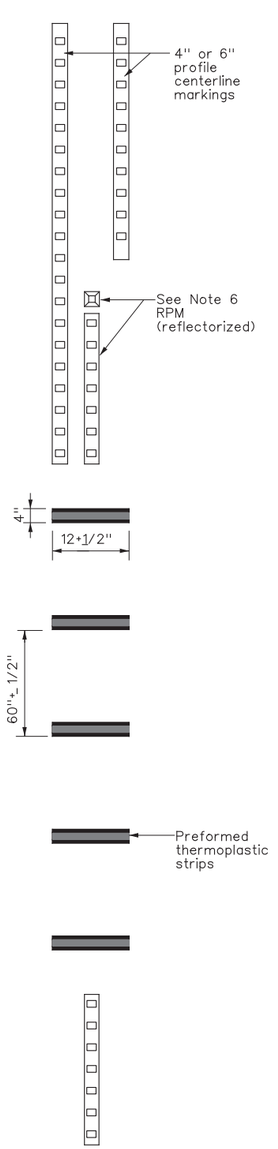
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

12. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		165

DATE:
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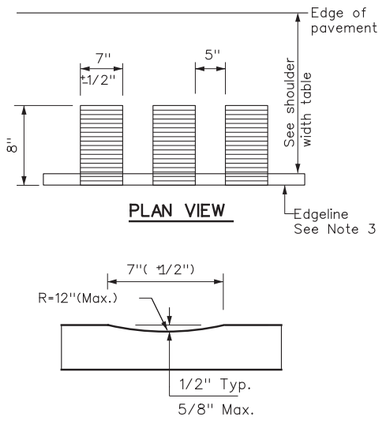
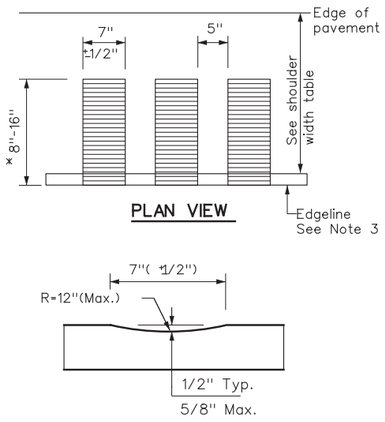


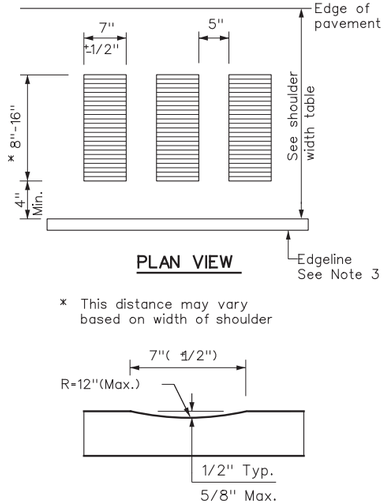
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



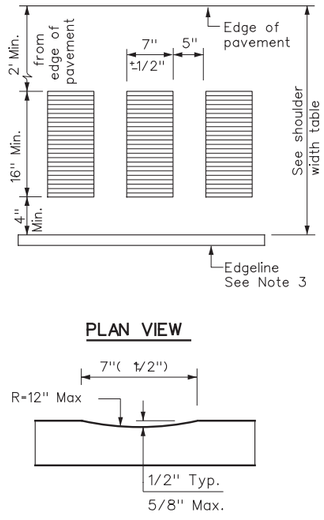
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



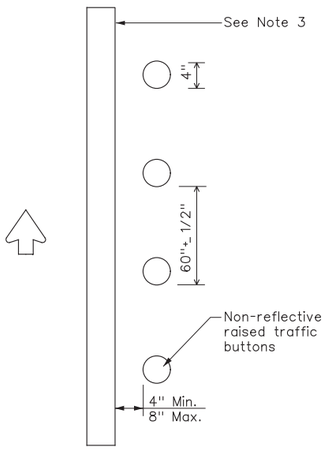
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



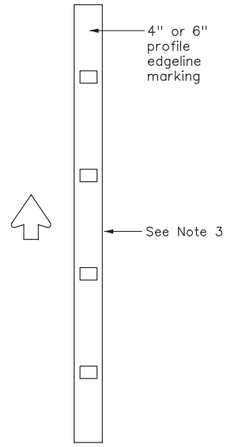
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



OPTION 5

RAISED EDGELINE RUMBLE STRIPS



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	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		166

CONDUIT AND CONDUCTOR SUMMARY								
SERVICE NO	CIRCUIT LETTER	RUN NO	RUN LENGTH (FEET)	CONDUIT (NO & LENGTH IN FEET)		CONDUCTOR (NO & LENGTH IN FEET) (1)		
				618		620		
				CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (2") (BORE)	(GROUND) ELEC CONDR (NO. 8) BARE		ELEC CONDR (NO. 8) INSULATED
						NO	LF	NO	LF
1	A	1	26	26		1	31	2	62
1	A	2	255	255		1	260	2	520
1	A	3	88	88		1	93	2	186
1	A	4	92		92	1	97	2	194
1	A	5	8	8		1	13	2	26
1	A	6	102		102	1	107	2	214
1	A	7	12		12	1	17	2	34
TOTAL			583	377	206		618		1236

(1) INCLUDES 5' TURNS IN GROUND BOXES AND POLE SUPPORTS

SHEET SUMMARY			
ITEM	DESCRIPTION	UNIT	EST QTY
*416	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	16
610	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	2
618	CONDT (PVC) (SCH 40) (2")	LF	377
618	CONDT (PVC) (SCH 40) (2") (BORE)	LF	206
620	ELEC CONDR (NO. 8) BARE	LF	618
620	ELEC CONDR (NO. 8) INSULATED	LF	1236
624	GROUND BOX TY C (162911) W/APRON	EA	5
628	TY A 120/240 060 (NS)SS(E)SP(O)	EA	1

* ASSUMED N=10 BLOWS/FT

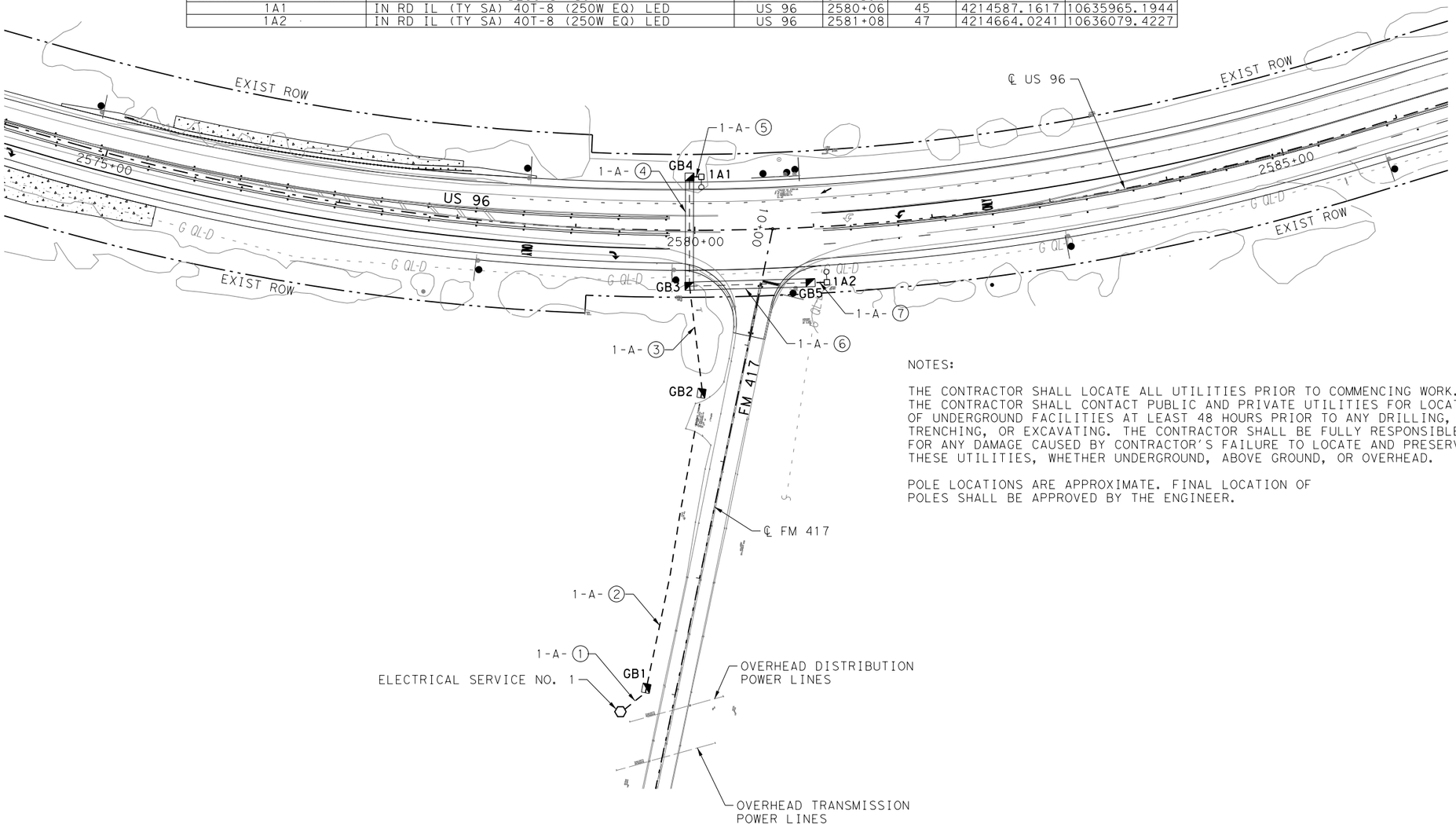
LEGEND

- PROP IN RD IL (TY SA) 40T-8 (250W EQ) LED
- PROPOSED GROUND BOX TY C (W/APRON)
- PROPOSED ELECTRIC SERVICE
- PROPOSED CONDUIT
- PROPOSED CONDUIT (BORE)
- DIRECTION OF TRAFFIC FLOW
- (X) CONDUIT RUN NUMBER

RUN ID: X-X-(X)
- RUN NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

POLE ID: XXX
- POLE NUMBER
- CIRCUIT LETTER
- SERVICE NUMBER

ROAD ILLUMINATION ASSEMBLIES SUMMARY							
LUMINAIRE POLE NUMBER	DESCRIPTION	CENTERLINE	STATION	OFFSET	X	Y
1A1	IN RD IL (TY SA) 40T-8 (250W EQ) LED	US 96	2580+06	45	4214587.1617	10635965.1944
1A2	IN RD IL (TY SA) 40T-8 (250W EQ) LED	US 96	2581+08	47	4214664.0241	10636079.4227



NOTES:

THE CONTRACTOR SHALL LOCATE ALL UTILITIES PRIOR TO COMMENCING WORK. THE CONTRACTOR SHALL CONTACT PUBLIC AND PRIVATE UTILITIES FOR LOCATION OF UNDERGROUND FACILITIES AT LEAST 48 HOURS PRIOR TO ANY DRILLING, BORING, TRENCHING, OR EXCAVATING. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY DAMAGE CAUSED BY CONTRACTOR'S FAILURE TO LOCATE AND PRESERVE THESE UTILITIES, WHETHER UNDERGROUND, ABOVE GROUND, OR OVERHEAD.

POLE LOCATIONS ARE APPROXIMATE. FINAL LOCATION OF POLES SHALL BE APPROVED BY THE ENGINEER.

ELECTRICAL SERVICE DATA												
ELEC SERV ID	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION	SERVICE CONDUIT SIZE	SERVICE CONDUCTOR NO. /SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE/AMPS	TWO-POLE CONTACTOR AMPS	PANEL BD/ LOADCENTER AMP RATING	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
1	161	TY A (120/240) 060 (NS) SS (E) SP (O)	1½ IN.	3/#6	N/A	2P/60	60	N/A	A	2P/20	2	0.5

0 50 100
HORIZONTAL SCALE IN FEET

SCALE 1" = 100'

STATE OF TEXAS
DAVID A. NUFER
68818
LICENSED PROFESSIONAL ENGINEER

11/4/2021

ILLUMINATION LAYOUT
(FM 417)

HUITT-ZOLLARS
HUITT-ZOLLARS, INC. ENGINEERING / SURVEYING
1717 McKINNEY AVE., STE. 1400 DALLAS, TEXAS 75202
Firm No. F-761

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		167

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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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		DIST	COUNTY		SHEET NO.
		LFK	SHELBY		168

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.
2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.
3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.
4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.
12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.
3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.
4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.
5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

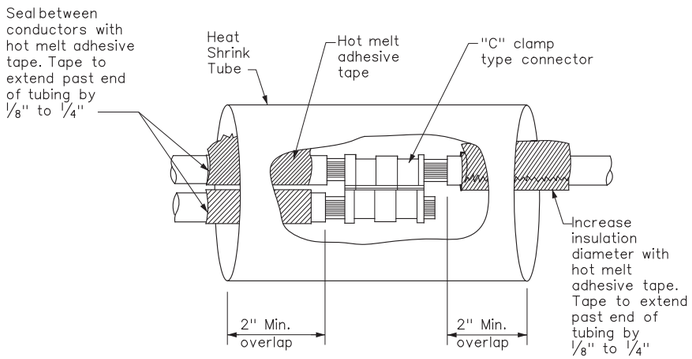
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

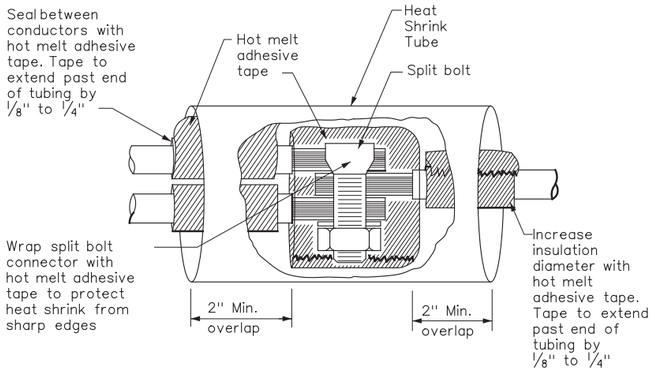
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

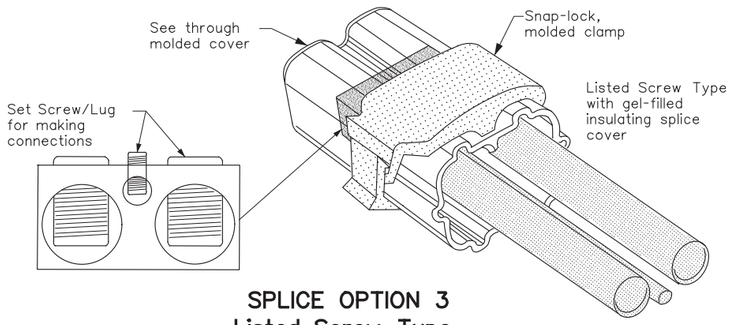
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
2. Do not place ground rods in the same drilled hole as a timber pole.
3. Install ground rods so the imprinted part number is at the upper end of the rod.
4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.
6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
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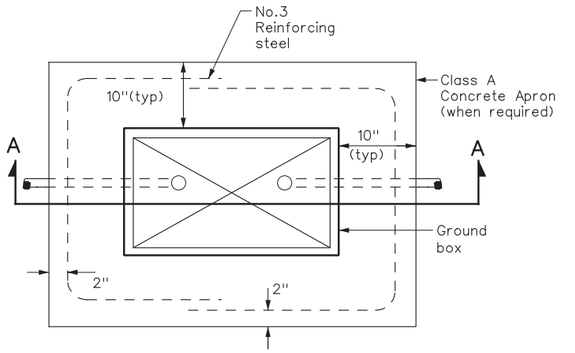
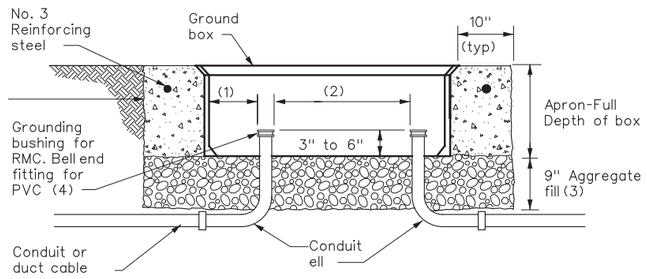


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

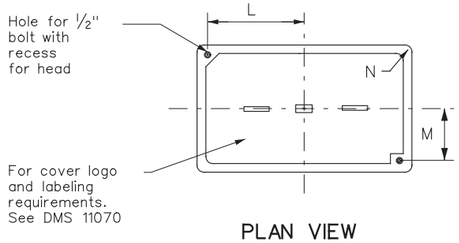
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



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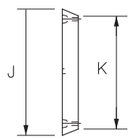

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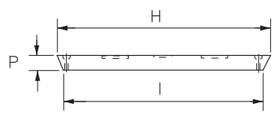

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

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	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		170

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ELECTRICAL SERVICES NOTES

1.Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2.Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3.Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4.Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5.The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed *2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock *2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock *2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6.Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7.When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8.Provide wiring and electrical components rated for 75° C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9.All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10.Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11.Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12.Ensure all mounting hardware and installation details of services conform to utility company specifications.

13.For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14.When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15.Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1.Provide threaded hub for all conduit entries into the top of enclosure.

2.Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3.Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4.Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1.Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2.When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1.Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit ** Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/*2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/*6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/*6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

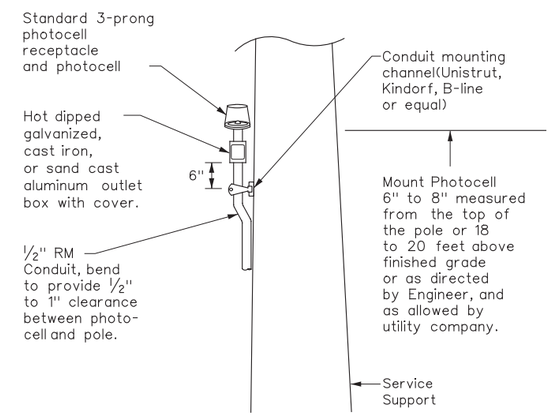
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	LFK	SHELBY		171

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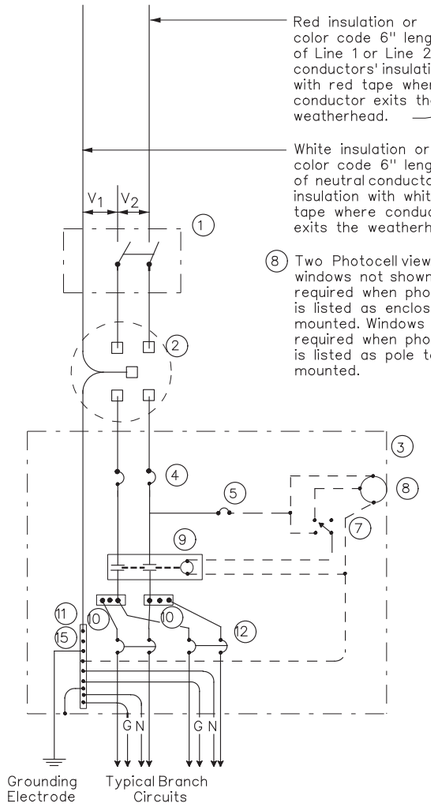
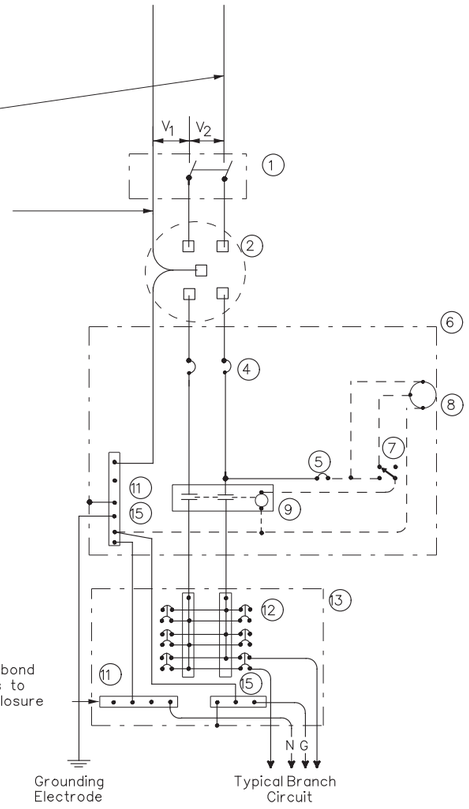


SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
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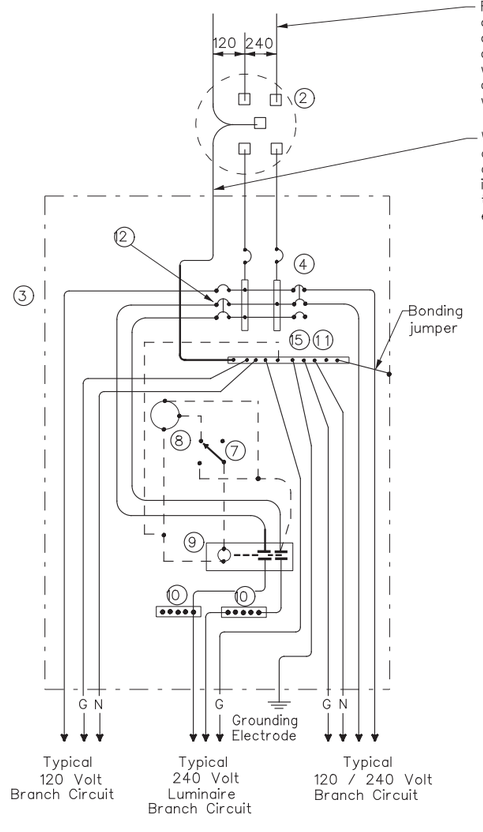
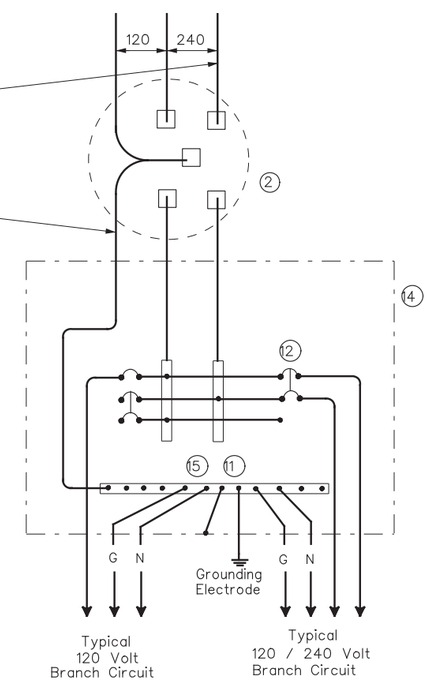


SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
– – – –	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		172

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

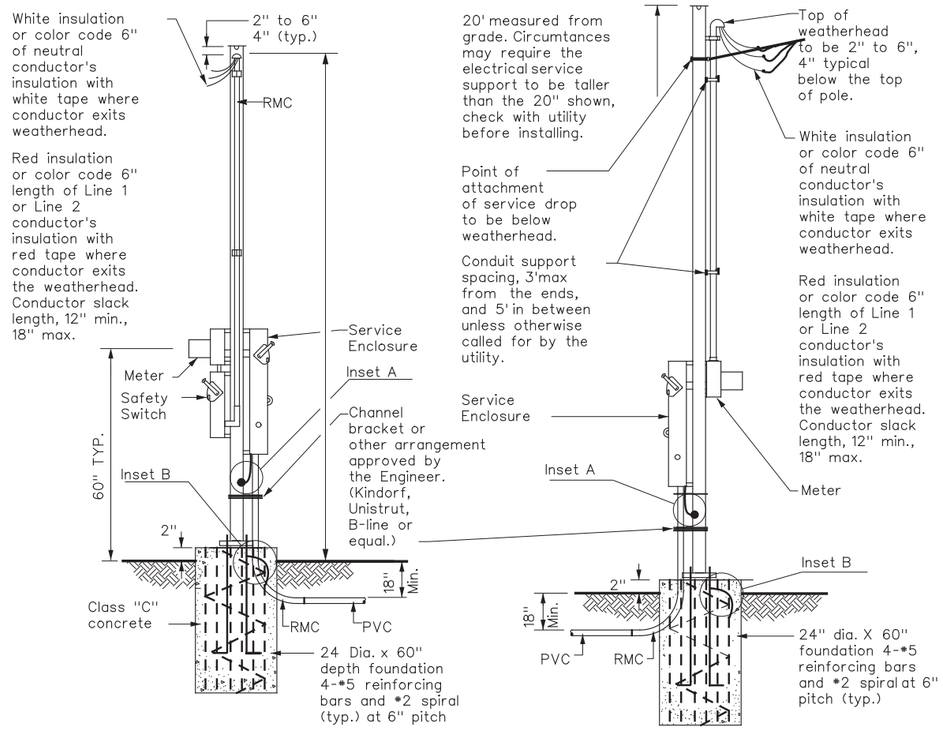
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

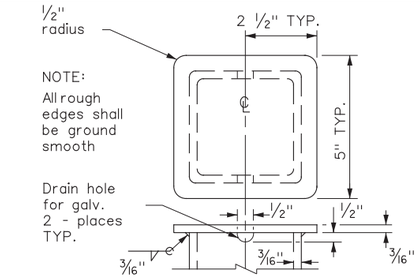
11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.



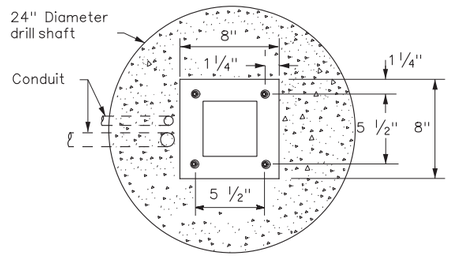
WITH SAFETY SWITCH

WITHOUT SAFETY SWITCH

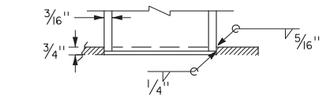
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

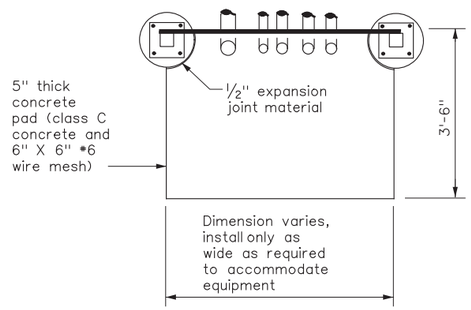


BASE PLATE DETAIL



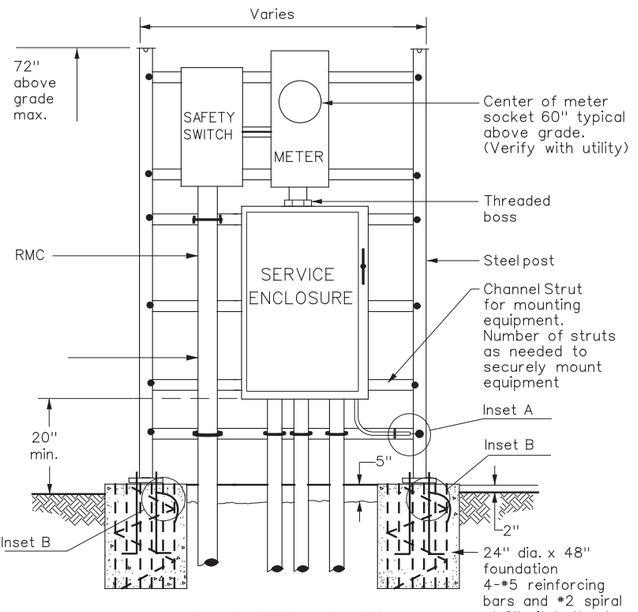
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



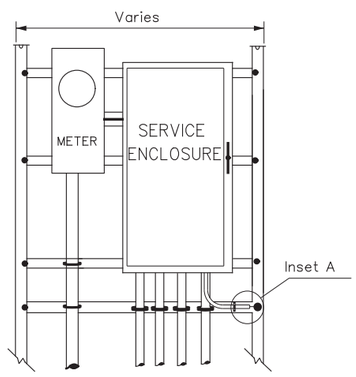
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)



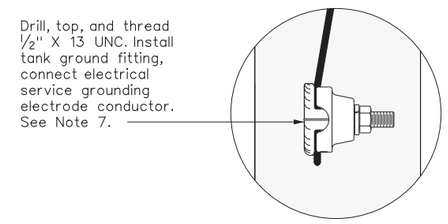
WITH SAFETY SWITCH

FRONT VIEW



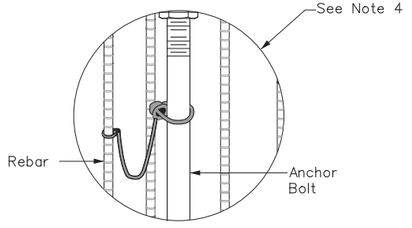
WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

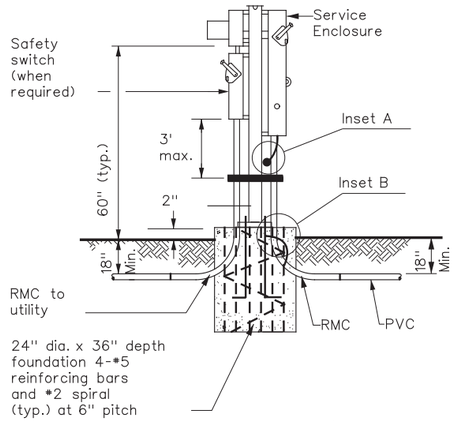


FRONT VIEW

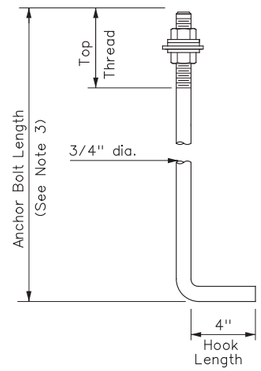
INSET A



INSET B



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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	LFK	SHELBY		173

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

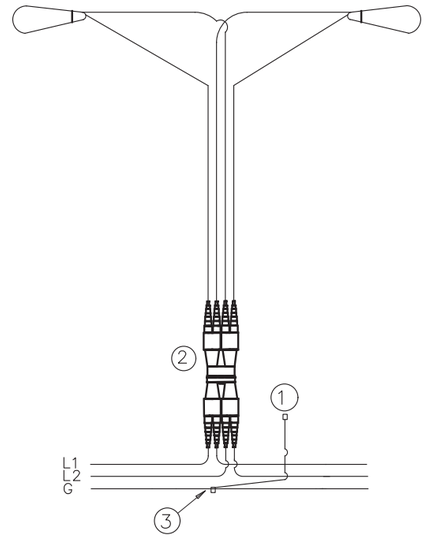
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

1. Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

2. Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

3. Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

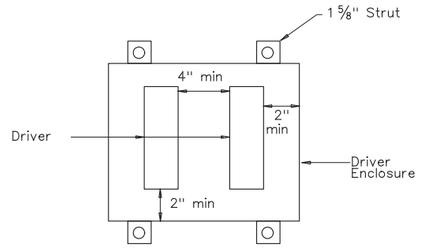
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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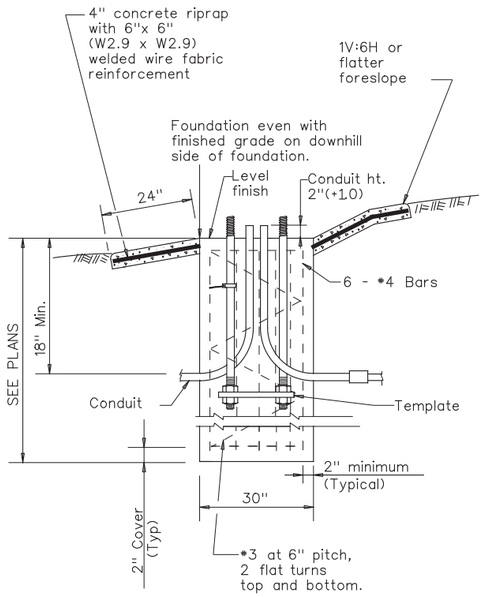
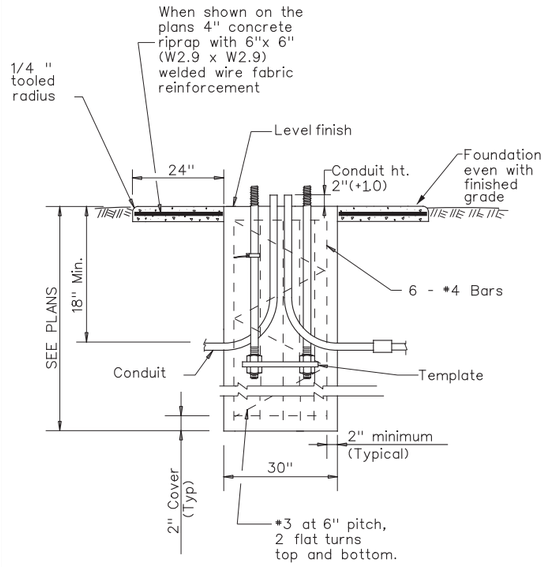


SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in.x 30in.
40-50 ft.	15 in.	17 1/4 in.	1 1/4in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS
(See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6'	6'	6'
>20 ft. to 30 ft.	8'	6'	6'
>30 ft. to 40 ft.	8'	8'	6'
>40 ft. to 50 ft.	10'	8'	6'

TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

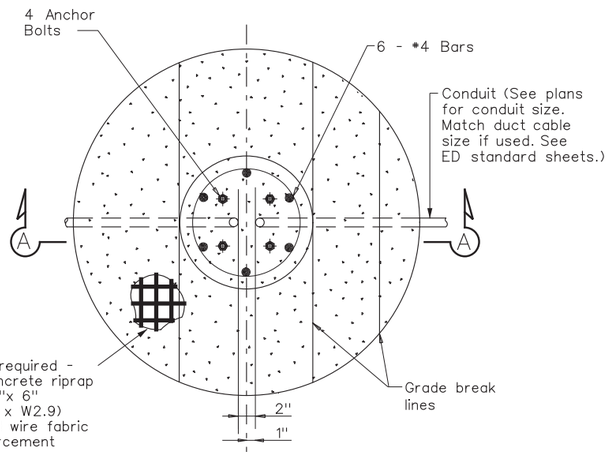
TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

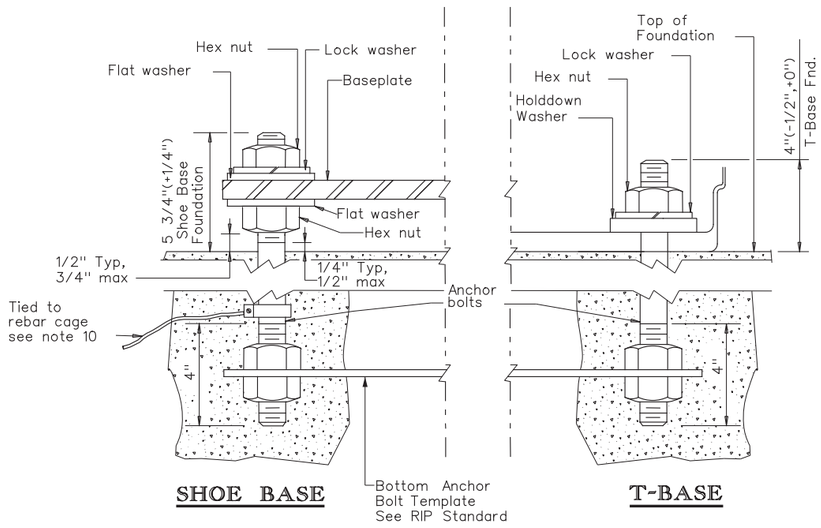
ROADWAY FUNCTIONAL CLASSIFICATION	* POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum (13 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

RID(2)-20

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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	Type SA 20 S - 4)			(150W EQ) LED		Type SA 20 T - 4)			(150W EQ) LED						
	Type SA 20 S - 4 - 4)			(150W EQ) LED		Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	Type SA 30 S - 4)			(250W EQ) LED		Type SA 30 T - 4)			(250W EQ) LED		Type SP 28 S - 4)			(250W EQ) LED	
	Type SA 30 S - 4 - 4)			(250W EQ) LED		Type SA 30 T - 4 - 4)			(250W EQ) LED		Type SP 28 S - 4 - 4)			(250W EQ) LED	
	Type SA 30 S - 8)			(250W EQ) LED		Type SA 30 T - 8)			(250W EQ) LED		Type SP 28 S - 8)			(250W EQ) LED	
	Type SA 30 S - 8 - 8)			(250W EQ) LED		Type SA 30 T - 8 - 8)			(250W EQ) LED		Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	Type SA 40 S - 4)			(250W EQ) LED		Type SA 40 T - 4)			(250W EQ) LED		Type SP 38 S - 4)			(250W EQ) LED	
	Type SA 40 S - 4 - 4)			(250W EQ) LED		Type SA 40 T - 4 - 4)			(250W EQ) LED		Type SP 38 S - 4 - 4)			(250W EQ) LED	
	Type SA 40 S - 8)			(250W EQ) LED		Type SA 40 T - 8)			(250W EQ) LED		Type SP 38 S - 8)			(250W EQ) LED	
	Type SA 40 S - 8 - 8)			(250W EQ) LED		Type SA 40 T - 8 - 8)			(250W EQ) LED		Type SP 38 S - 8 - 8)			(250W EQ) LED	
	Type SA 40 S - 10)			(250W EQ) LED		Type SA 40 T - 10)			(250W EQ) LED		Type SP 38 S - 10)			(250W EQ) LED	
	Type SA 40 S - 10 - 10)			(250W EQ) LED		Type SA 40 T - 10 - 10)			(250W EQ) LED		Type SP 38 S - 10 - 10)			(250W EQ) LED	
	Type SA 40 S - 12)			(250W EQ) LED		Type SA 40 T - 12)			(250W EQ) LED		Type SP 38 S - 12)			(250W EQ) LED	
	Type SA 40 S - 12 - 12)			(250W EQ) LED		Type SA 40 T - 12 - 12)			(250W EQ) LED		Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	Type SA 50 S - 4)			(400W EQ) LED		Type SA 50 T - 4)			(400W EQ) LED		Type SP 48 S - 4)			(400W EQ) LED	
	Type SA 50 S - 4 - 4)			(400W EQ) LED		Type SA 50 T - 4 - 4)			(400W EQ) LED		Type SP 48 S - 4 - 4)			(400W EQ) LED	
	Type SA 50 S - 8)			(400W EQ) LED		Type SA 50 T - 8)			(400W EQ) LED		Type SP 48 S - 8)			(400W EQ) LED	
	Type SA 50 S - 8 - 8)			(400W EQ) LED		Type SA 50 T - 8 - 8)			(400W EQ) LED		Type SP 48 S - 8 - 8)			(400W EQ) LED	
	Type SA 50 S - 10)			(400W EQ) LED		Type SA 50 T - 10)			(400W EQ) LED		Type SP 48 S - 10)			(400W EQ) LED	
	Type SA 50 S - 10 - 10)			(400W EQ) LED		Type SA 50 T - 10 - 10)			(400W EQ) LED		Type SP 48 S - 10 - 10)			(400W EQ) LED	
	Type SA 50 S - 12)			(400W EQ) LED		Type SA 50 T - 12)			(400W EQ) LED		Type SP 48 S - 12)			(400W EQ) LED	
	Type SA 50 S - 12 - 12)			(400W EQ) LED		Type SA 50 T - 12 - 12)			(400W EQ) LED		Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S- Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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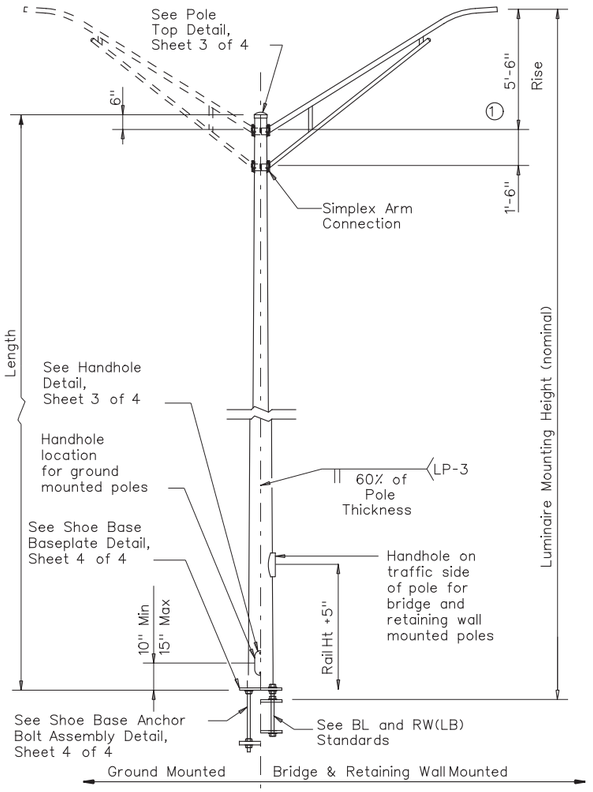
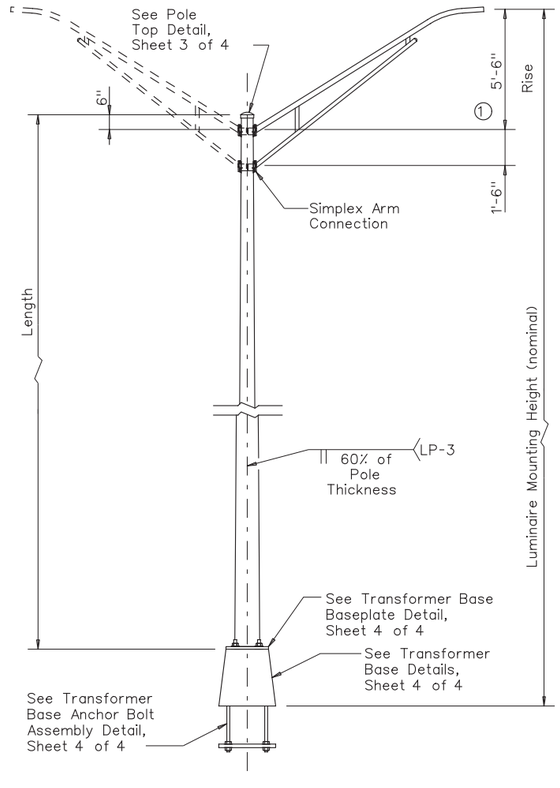


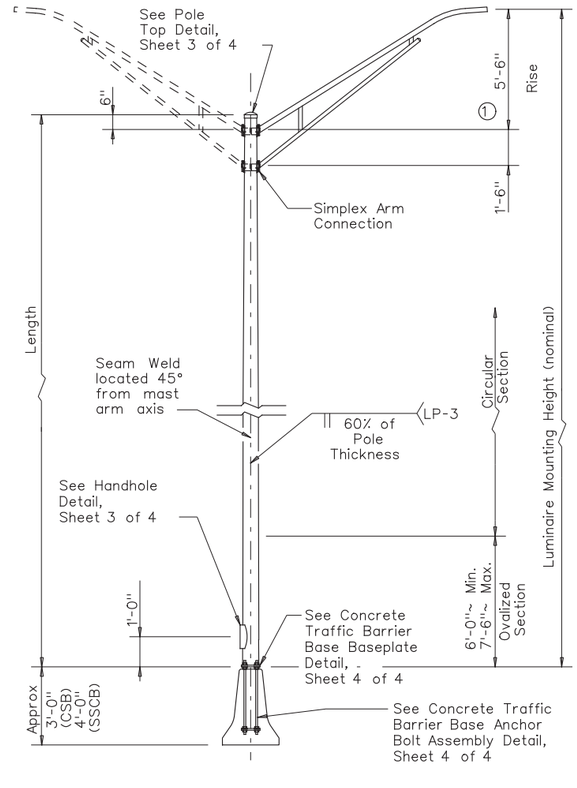
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal)(ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal)(ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal)(ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About LC of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③ or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame A36	A572 Gr.50, or	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates A36		36
Heavy Hex (H.H.) Nuts A563	A194 Gr 2H,or Gr DH	
Flat Washers F436		

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/ 4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4 ° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.

2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.

3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.

5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."

6. Steel poles shall be fabricated in accordance with Item 441,"Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.

7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.

8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.

9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."

10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.

11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."

12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.

13. Erect transformer base poles in accordance with sheet RID(1).

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ROADWAY ILLUMINATION POLES

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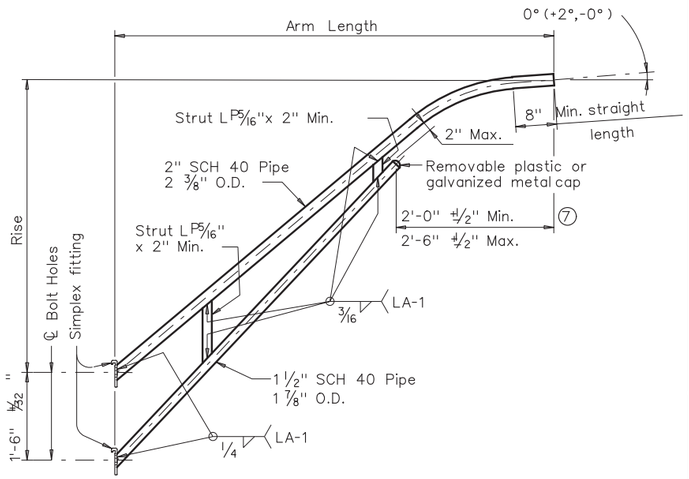
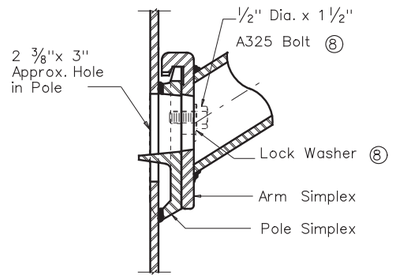


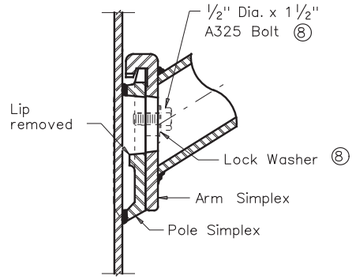
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"

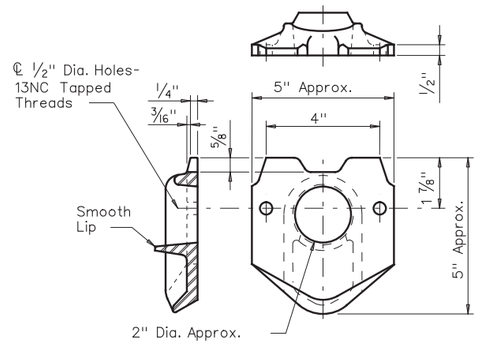


UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

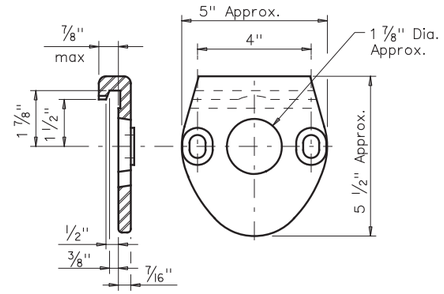


LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



POLE SIMPLEX DETAIL ⑨



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

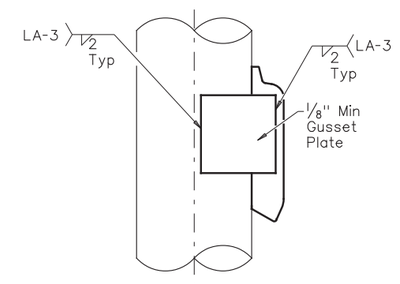
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

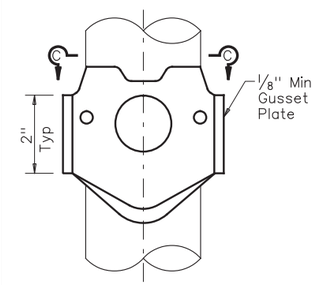
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

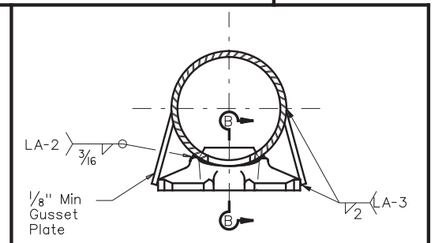
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 5 ,or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B,A500 Gr B, A501, A 1008 HSLAS-F Gr 50 6 ,or A1011 HSLAS-F Gr 50 6
Arm Struts and Gusset Plates 4	ASTM A36,A572 Gr 50 6 or A588
Misc.	ASTM designations as noted



SIDE

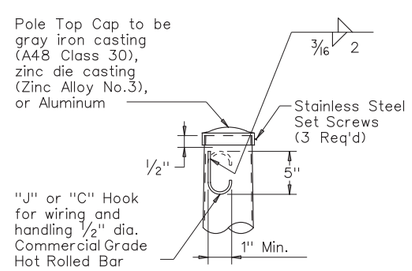


ELEVATION

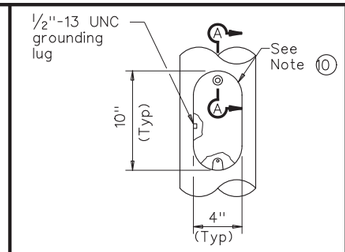


SECTION C-C

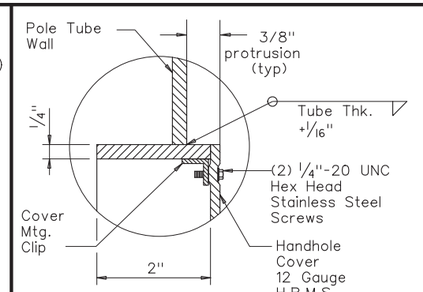
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
7-17	DIST	COUNTY		SHEET NO.
12-19	LFK	SHELBY		178

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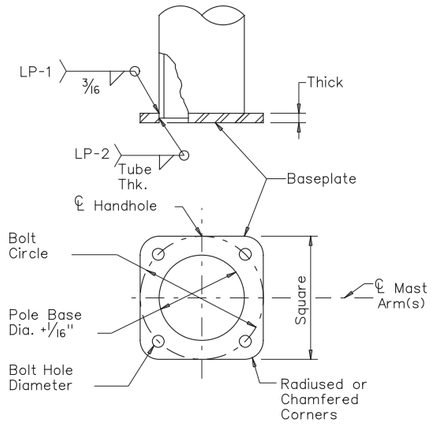
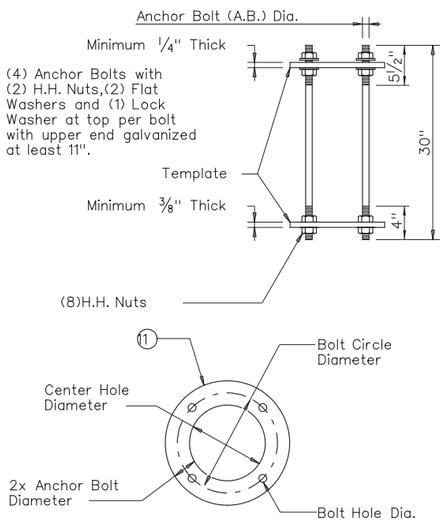


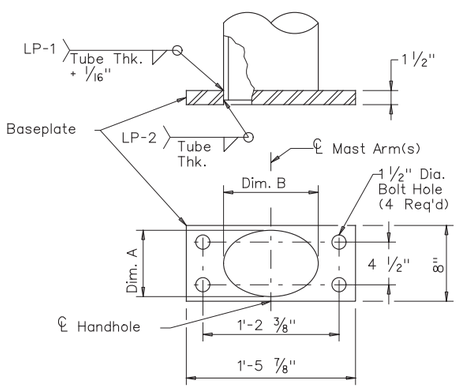
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20'- 39'	13"	13"	1 1/4"	1 1/4"
40'	15"	15"	1 1/4"	1 1/2"
50'	15"	15"	1 1/2"	1 1/2"



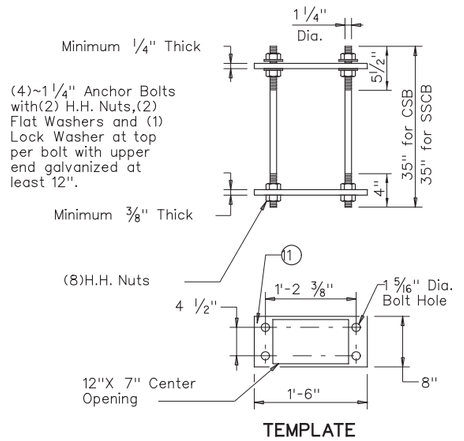
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20'-39'	1"	13"	11"	1 1/16"
40'-50'	1 1/4"	15"	12 1/2"	1 5/16"



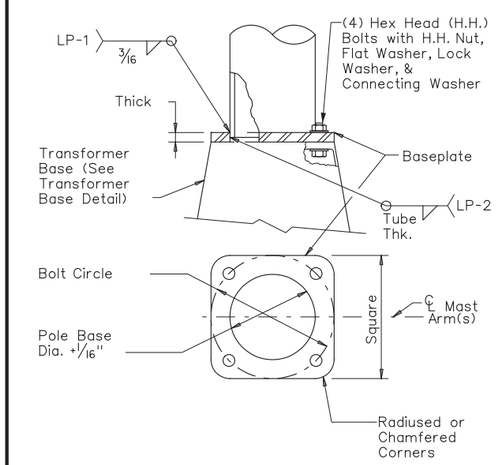
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA. (12)	DIM. A	DIM. B
28'- 38'	9"	7"+- 1/4"	10"+- 1/4"
48'	10 1/2"	7"+- 1/4"	13"+- 1/4"



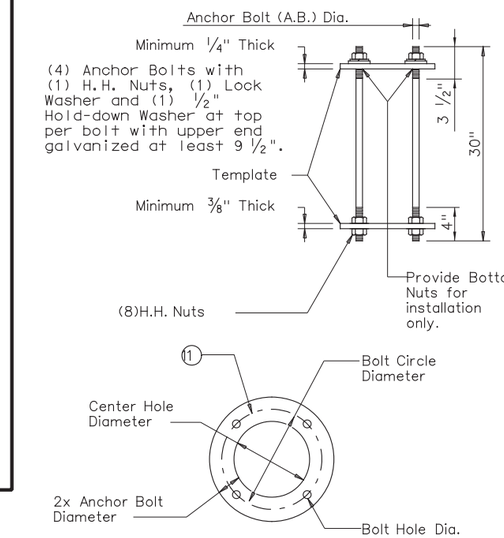
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20'- 39'	1"	14"	12"	1 1/16"
40'- 50'	1 1/4"	17 1/4"	14 3/4"	1 5/16"



TRANSFORMER BASE BASEPLATE

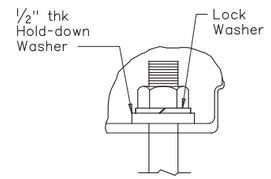
TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20'- 39'	13"	13"	1 1/4"	1"	1 1/4"	A
40'	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50'	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



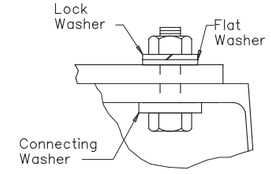
TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE DETAILS

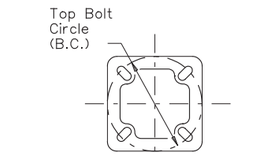
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



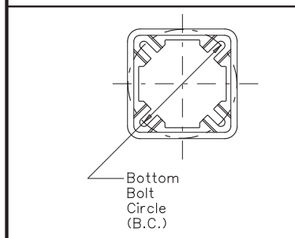
DETAIL A



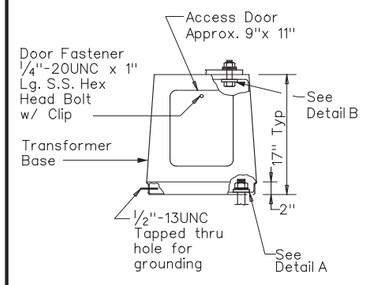
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers,and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	+- 1/2"
Threaded length	+- 1/2"
Galvanized length (if required)	- 1/4"

SHEET 4 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
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	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		179

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NOTES:
(1) THE PURPOSE OF THIS SHEET IS TO POINT THE USER TO THE APPROPRIATE LOCATIONS TO FIND THE REQUIRED CONTENT OF THE SWP3.
(2) THE PROJECT LIMITS SHOWN ON THE TITLE SHEET AND LIMITS OF TXDOT RIGHT OF WAY SHALL ALSO BE THE LIMITS OF COVERAGE OF THE SWP3.

PROJECT DESCRIPTION

A. NATURE OF ACTIVITY: FOR THE CONSTRUCTION OF SUPER-2 HIGHWAY CONSISTING OF ADD PASSING LANES AND OVERLAY EXISTING PAVEMENT

B. POTENTIAL POLLUTANTS AND THEIR SOURCES:
POLLUTANT: SEDIMENT, SOURCE: DISTURBED SOIL
POLLUTANT: OIL AND GREASE, SOURCE: VEHICLES AND EQUIPMENT

C. INTENDED SEQUENCE OF ACTIVITIES: SEE CONSTRUCTION SCHEDULE FOR ESTIMATED START DATES AND DURATION OF SOIL-DISTURBING ACTIVITIES

D. TOTAL AREA OF SITE: 102.8 ACRES AREA TO BE DISTURBED: 44.8 ACRES

E. DATA DESCRIBING THE SOIL OR QUALITY OF ANY DISCHARGE FROM THE SITE:
SANDY CLAY LOAM

F. GENERAL LOCATION MAP: SEE TITLE SHEET OF THE PROJECT PLANS

G. DETAILED SITE MAP/MAPS INDICATING THE FOLLOWING:
- i. DRAINAGE PATTERNS: SEE SWP3 LAYOUTS
- ii. ANTICIPATED SLOPES AFTER MAJOR GRADING ACTIVITIES: SEE TYPICAL SECTIONS
- iii. AREAS WHERE SOIL DISTURBANCE WILL OCCUR: SEE SWP3 LAYOUTS
- iv. LOCATIONS OF ALL CONTROLS OR BUFFERS (PLANNED/IN PLACE): SEE SWP3 LAYOUTS
- v. LOCATIONS WHERE TEMPORARY OR PERMANENT STABILIZATION PRACTICES ARE EXPECTED TO BE USED: SEE SWP3 LAYOUTS
- vi. LOCATION OF CONSTRUCTION SUPPORT ACTIVITIES: SEE SWP3 LAYOUTS
- vii. SURFACE WATERS, INCLUDING WETLANDS, AT, ADJACENT, OR IN CLOSE PROXIMITY TO THE SITE (* INDICATES IMPAIRED WATERS): SEE SWP3 LAYOUTS
- viii. LOCATIONS WHERE STORMWATER DISCHARGES DIRECTLY TO A SURFACE WATER BODY OR MS4: SEE SWP3 LAYOUTS
- ix. VEHICLE WASH AREAS: N/A
- x. DESIGNATED POINTS ON THE SITE WHERE VEHICLES WILL EXIT FROM UNSTABLE DIRT TO PAVED ROAD: SHOWN ON SWP3 LAYOUT SHEETS.

H. LOCATION AND DESCRIPTION OF CONSTRUCTION SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITTEE'S NOI: CONSTRUCTION SUPPORT ACTIVITIES ARE NOT COVERED UNDER THIS SWP3 AS IT IS NOT AUTHORIZED UNDER THIS PERMITTEE'S CGP. THE PERMITTEE WILL MAKE REFERENCE TO CONSTRUCTION SUPPORT ACTIVITIES THAT ARE COVERED UNDER THE CONTRACTOR'S SWP3 AND CGP ON SWP3 LAYOUTS

I. NAME OF RECEIVING WATER(S) AT OR NEAR SITE:
MILL CREEK AND UNNAMED TRIBUTARIES TO MILL CREEK.
PORTER CREEK AND UNNAMED TRIBUTARIES TO PORTER CREEK.
HUANA CREEK AND UNNAMED TRIBUTARIES TO HUANA CREEK.

AN ASTERISK (*) INDICATES AN IMPAIRED WATER

NEAREST CLASSIFIED SEGMENT NUMBER: 0504

CLASSIFIED SEGMENT NAME: TOLEDO BEND RESERVOIR

J. COPY OF TPDES GENERAL PERMIT: SEE SWP3 FILE

K. NOI AND ACKNOWLEDGEMENT CERTIFICATE OR SITE NOTICE: SEE SWP3 FILE

L. STORMWATER AND ALLOWABLE NON-STORMWATER DISCHARGE LOCATIONS: SEE SWP3 LAYOUTS

M. LOCATIONS OF POLLUTANT GENERATING ACTIVITIES: ACTIVITIES AUTHORIZED UNDER THIS PERMITTEE'S CGP CAN BE FOUND ON SWP3 LAYOUTS. THIS SHEET WILL ALSO REFERENCE THE LOCATION OF POLLUTANT GENERATING ACTIVITIES THAT ARE COVERED BY THE CONTRACTOR'S CGP AND SWP3.

DESCRIPTION OF BMPS

A. GENERAL REQUIREMENTS: EROSION AND SEDIMENT CONTROLS SHOWN ON SWP3 LAYOUTS WERE DESIGNED TO RETAIN SEDIMENT ON-SITE TO THE EXTENT PRACTICABLE WITH CONSIDERATION OF LOCAL TOPOGRAPHY, SOIL TYPE, AND RAINFALL. THE EROSION AND SEDIMENT CONTROLS WILL BE INSTALLED AND MAINTAINED ACCORDING TO MANUFACTURER AND TXDOT STORM WATER MANAGEMENT GUIDELINES. CONTROLS TO MINIMIZE THE OFF-SITE TRANSPORT OF LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION MATERIALS INCLUDE: CONSTRUCTION MATERIALS TO BE STORED IN LOCATIONS THAT MINIMIZE THEIR EXPOSURE TO PRECIPITATION & STORM WATER RUNOFF; COLLECTION OF CONSTRUCTION DEBRIS IN RECEPTACLES WITH A SECURE COVER MEETING STATE AND LOCAL SOLID WASTE MANAGEMENT REGULATIONS; HAULING AND EMPTYING RECEPTACLES AT APPROVED LANDFILL SITES; PROHIBITING THE BURIAL OF CONSTRUCTION DEBRIS; COLLECTION OF SANITARY WASTE FROM PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATIONS BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

B. EROSION CONTROL AND STABILIZATION PRACTICES

T/P	TEMP/PERM SEEDING		PROTECTION OF TREES AND VEGETATION
T/P	MULCHING (HAY OR STRAW)		GEOTEXTILES
	VEGETATIVE BUFFER STRIPS	T	SLOPE TEXTURING
	SOD STABILIZATION		TEMP VELOCITY DISSIPATION DEVICES
P	BLOCK SOD		FLOW DIVERSION MECHANISMS
T/P	SOIL RET BLANKET		

T = TEMPORARY; P = PERMANENT

DATES:
1. MAJOR GRADING ACTIVITIES: SEE CONTRUCTION SCHEDULE FOR THESE DATES
2. WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE: _____
3. WHEN STABILIZATION MEASURES ARE INITIATED: _____

INITIATE EROSION CONTROL AND STABILIZATION MEASURES IMMEDIATELY IN THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED AND WILL NOT RESUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. INITIATE STABILIZATION MEASURES THAT PROVIDE A PROTECTIVE COVER IMMEDIATELY IN THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED. "IMMEDIATELY" MEANS NO LATER THAN THE NEXT WORK DAY FOLLOWING THE DAY WHEN THE SOIL-DISTURBING ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. STABILIZATION MEASURES MUST BE COMPLETED NO MORE THAN 14 CALENDAR DAYS AFTER INITIATION BEGINS.

THE SCHEDULE OF IMPLEMENTATION OF THESE PRACTICES WILL BE BASED ON THE INTENDED SEQUENCE OF MAJOR SOIL-DISTURBING ACTIVITIES. SEE CONSTRUCTION SCHEDULE

C. SEDIMENT CONTROL PRACTICES

T	SILT FENCE		VEGETATIVE BUFFER STRIPS
T	ROCK FILTER DAMS, CONST EXITS		

IF SITE WILL DISTURB 10 OR MORE ACRES WITHIN A COMMON DRAINAGE LOCATION AND A SEDIMENTATION BASIN IS NOT FEASIBLE, PROVIDE REASON: DUE TO ROLLING TERRAIN AND RESTRAINED RIGHT OF WAY, A SEDIMENTATION BASIN IS NOT FEASIBLE.

THE SCHEDULE OF IMPLEMENTATION OF THESE PRACTICES WILL BE BASED ON THE INTENDED SEQUENCE OF MAJOR SOIL-DISTURBING ACTIVITIES. SEE CONSTRUCTION SCHEDULE

DESCRIPTION OF PERMANENT STORM WATER CONTROLS

PROVIDE A DESCRIPTION OF ANY MEASURES THAT WILL BE INSTALLED DURING THE CONSTRUCTION PROCESS TO CONTROL POLLUTANTS IN STORM WATER DISCHARGES THAT MAY OCCUR AFTER CONSTRUCTION OPERATIONS HAVE BEEN COMPLETED: N/A

OTHER REQUIRED CONTROLS AND BMPS

TXDOT WILL UTILIZE ROCK AT CONSTRUCTION ENTRANCES AND SPRINKLING, AS NEEDED, TO MINIMIZE OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST.

SEE SECTION A ABOVE FOR DESCRIPTION OF CONSTRUCTION AND WASTE MATERIALS AND CONTROLS USED FOR THOSE THAT MAY BE STORED ON-SITE.

AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS: PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, FUELS, MOTOR OIL, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. STORE MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS. CONTACT THE SPILL COORDINATOR IMMEDIATELY IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS.

MAINTENANCE REQUIREMENTS

EFFECTIVELY MAINTAIN THE OPERATING CONDITIONS OF ALL EROSION AND SEDIMENT CONTROL AND OTHER PROTECTIVE MEASURES IDENTIFIED IN THE SWP3. IF SITE INSPECTIONS REQUIRED BY THIS PERMIT IDENTIFY BMP'S THAT ARE NOT OPERATING EFFECTIVELY, MAINTENANCE SHALL BE PERFORMED BEFORE THE NEXT ANTICIPATED STORM EVENT, OR AS NECESSARY TO MAINTAIN THE CONTINUED EFFECTIVENESS OF STORM WATER CONTROLS. IF MAINTENANCE PRIOR TO THE NEXT ANTICIPATED STORM EVENT IS UNPRACTICABLE, SCHEDULE AND ACCOMPLISH MAINTENANCE AS SOON AS PRACTICAL. CONTROLS THAT HAVE BEEN INTENTIONALLY DISABLED, RUN-OVER, REMOVED OR OTHERWISE RENDERED INEFFECTIVE MUST BE REPLACED OR CORRECTED IMMEDIATELY UPON DISCOVERY. IF A CONTROL HAS BEEN USED INCORRECTLY, IS PERFORMING INADEQUATELY OR IS DAMAGED, THE OPERATOR SHALL REPLACE OR MODIFY THE CONTROL AS SOON AS PRACTICABLE AFTER THE DISCOVERY.

INSPECTION OF CONTROLS

A) QUALIFIED PERSONNEL SHALL INSPECT DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED, AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION, STRUCTURAL CONTROL MEASURES, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE, ONCE EVERY 7 CALENDAR DAYS. DISTURBED AREAS THAT ARE EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF, OR THE POTENTIAL FOR, POLLUTANTS ENTERING THE DRAINAGE SYSTEM. SEDIMENT AND EROSION CONTROL MEASURES IDENTIFIED ON THE SWP3 SHALL BE OBSERVED TO ENSURE THAT THEY ARE OPERATING CORRECTLY. LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE SHALL BE INSPECTED FOR EVIDENCE OF OFF-SITE SEDIMENT TRACKING.

D) THE SWP3 MUST BE MODIFIED BASED ON THE RESULTS OF INSPECTION TO BETTER CONTROL POLLUTANTS IN RUNOFF. REVISIONS TO THE SWP3 MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOLLOWING THE INSPECTION. IF EXISTING BMPS ARE MODIFIED OR ADDITIONAL BMPS ARE NECESSARY, AN IMPLEMENTATION SCHEDULE MUST BE DESCRIBED IN THE SWP3. IMPLEMENTATION OF CHANGES SHOULD BE DONE PRIOR TO THE NEXT STORM EVENT IF POSSIBLE, OTHERWISE, THEY SHOULD BE DONE AS SOON AS PRACTICABLE.

E) A REPORT SUMMARIZING THE SCOPE, DATE, NAME AND QUALIFICATIONS OF INSPECTOR, AND MAJOR OBSERVATIONS RELATING TO THE IMPLEMENTATION OF THE SWP3 SHALL BE PRODUCED AND RETAINED AS PART OF THE SWP3. MAJOR OBSERVATIONS INCLUDE: LOCATIONS OF DISCHARGES OF SEDIMENT OR OTHER POLLUTANTS FROM THE SITE, LOCATIONS OF BMPS THAT NEED TO BE MAINTAINED, LOCATIONS OF BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION AND LOCATIONS WHERE BMPS ARE NEEDED. ACTIONS TAKEN AS A RESULT OF INSPECTIONS MUST BE DESCRIBED WITHIN AND RETAINED AS PART OF THE SWP3. REPORTS MUST IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE. WHERE THE REPORT DOES NOT IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE, THE REPORT MUST CONTAIN A CERTIFICATION THAT THE SITE IS IN COMPLIANCE WITH THE SWP3 AND PERMIT.

OTHER SWP3 CONTENT

TXDOT WILL ENSURE THE APPROPRIATE POLLUTION PREVENTION MEASURES (I.E. VEGETATED BUFFER STRIPS, SILT FENCE, ETC.) ARE IDENTIFIED AND IMPLEMENTED FOR ALL ELIGIBLE NON-STORMWATER WATER COMPONENTS OF DISCHARGE SUCH AS WASHING OF VEHICLES, STRUCTURES, AND PAVEMENT WHERE SOAPS AND DETERGENTS ARE NOT USED AND THE PURPOSE IS TO REMOVE DIRT, MUD OR DUST; UNCONTAMINATED WATER USED FOR DUST CONTROL; AND LAWN WATERING AND SIMILAR IRRIGATION DRAINAGE.

CHECKLIST FOR CONTENTS OF AREA OFFICE SWP3 FILE:

- ☐ CONTACT FORM *
- ☐ NOI AND ACKNOWLEDGEMENT CERTIFICATE (IF EQUAL OR GREATER THAN 5 ACRES)
- ☐ APPLICABLE CONSTRUCTION SITE NOTICE *
- ☐ SWP3 CERTIFICATION STATEMENT (SIGNED BY AE)
- ☐ TPDES GENERAL PERMIT
- ☐ SWP3 PLAN
- ☐ INSPECTION AND MAINTENANCE REPORT
- ☐ INSPECTOR QUALIFICATION FORM
- ☐ DELEGATION OF SIGNATURE AUTHORITY (ALL INSPECTORS SIGNING REPORTS)
- ☐ NOTICE OF TERMINATION

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

* SYMBOL INDICATES THAT THE INFORMATION SHOULD BE DISPLAYED ON THE PROJECT BULLETIN BOARD

ANY REPORTABLE QUANTITY OF HAZARDOUS MATERIAL RELEASE MUST BE REPORTED TO NATIONAL RESPONSE CENTER AT 1-800-424-8802 AND TO STATE OF TEXAS SPILL-REPORTING HOTLINE AT 1-800-832-8224

TXDOT SWP3 INDEX
(SWP3I)

CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96
DIST	COUNTY		SHEET NO.
LFK	SHELBY		180

(REVISED OCTOBER 30, 2013)

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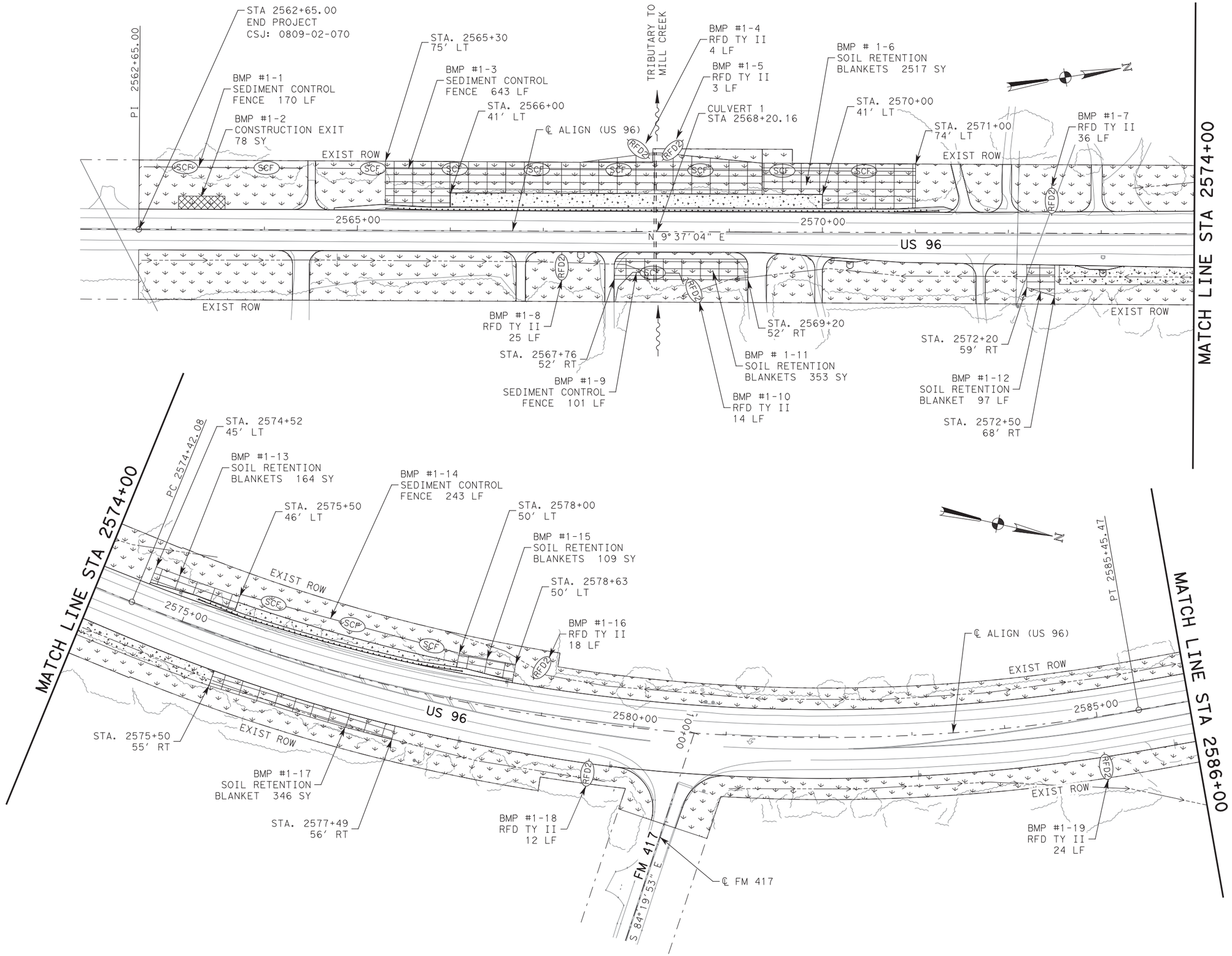

LEGEND

- RFD2 — ROCK FILTER DAM (TY 2)
- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- CELL FIBER MULCH SEED (TEMP)
- SOIL RETENTION BLANKETS
- CONSTRUCTION EXIT
- RIPRAP (CONC)
- STONE RIPRAP
- FLOW DIRECTION
- CULVERT/CREEK FLOW DIRECTION

NOTE:

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2. SWP3 ITEMS SHOULD BE ADJUSTED TO ACCOMODATE ACTUAL FIELD CONDITIONS, OR AS DIRECTED.

0' 20' 50' 100'
SCALE: 1"=100'

STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2962+00 TO STA 2986+00)

SHEET 1 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			181
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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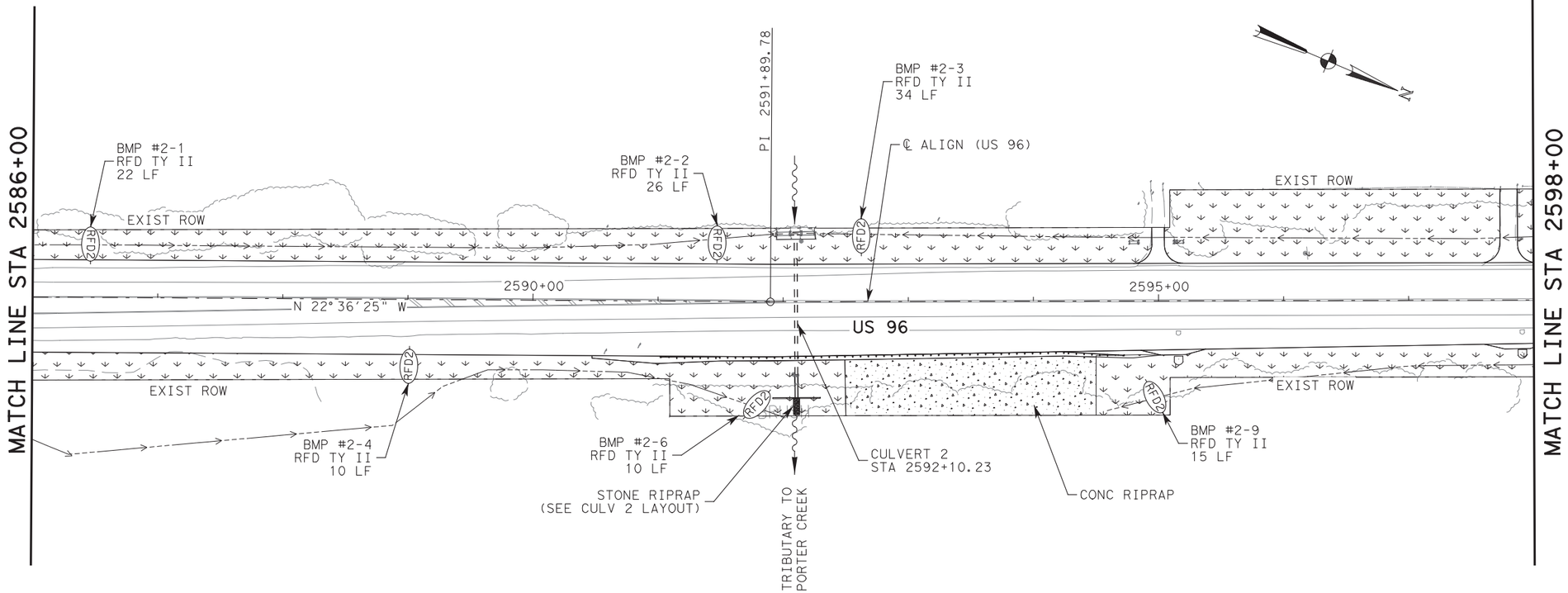

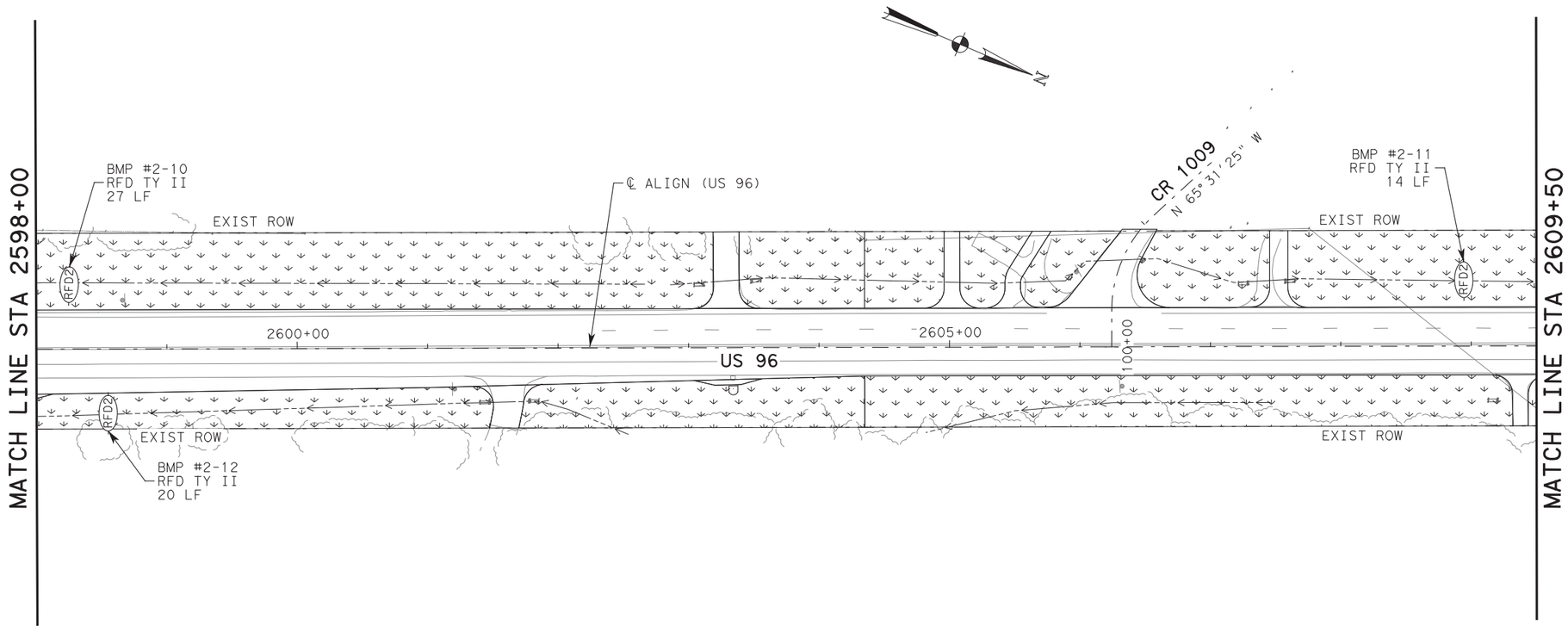

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2586+00 TO STA 2609+50)

SHEET 2 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			182
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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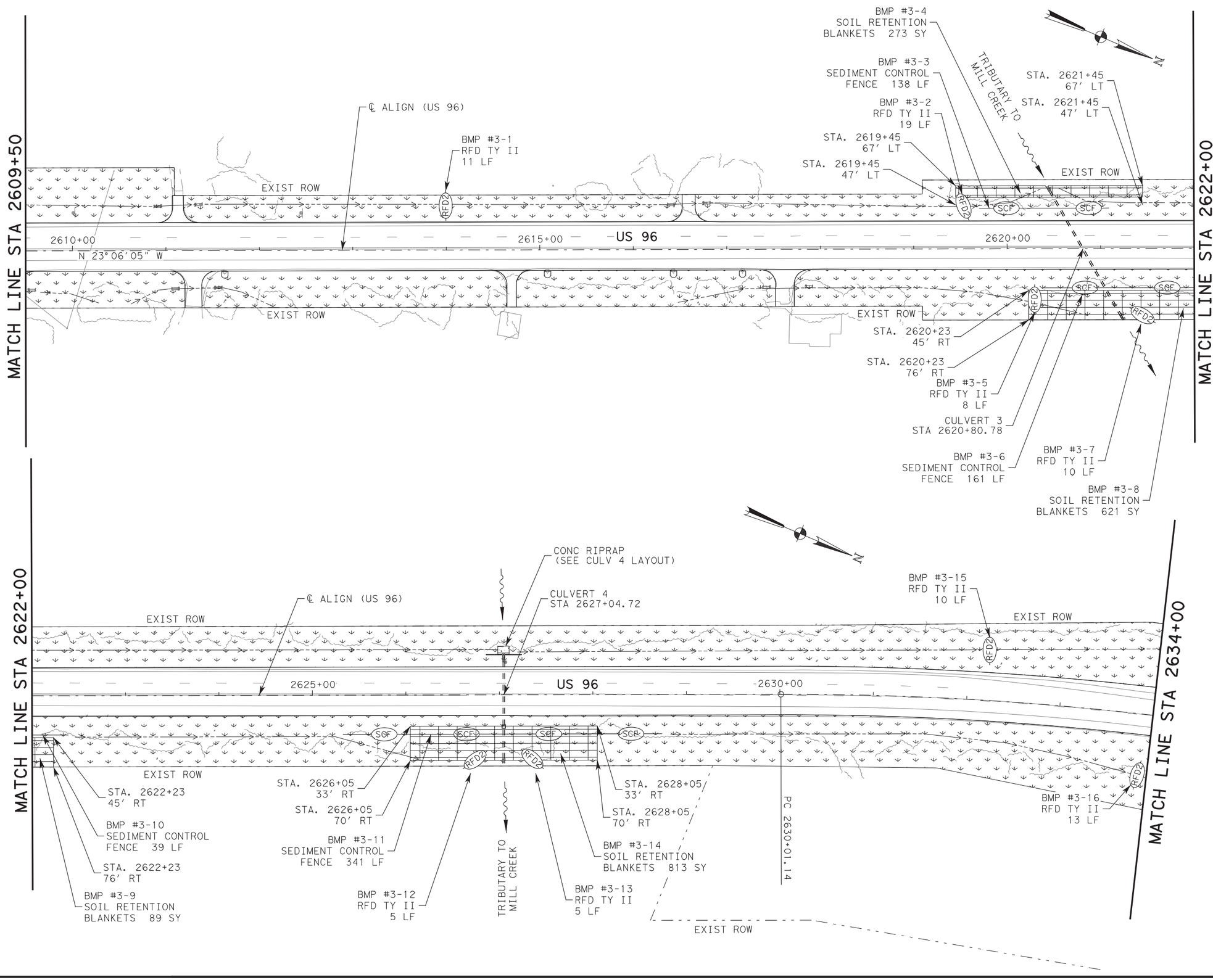

LEGEND

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- TEMPORARY SEDIMENT CONTROL FENCE
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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2609+50 TO STA 2634+00)

SHEET 3 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			183
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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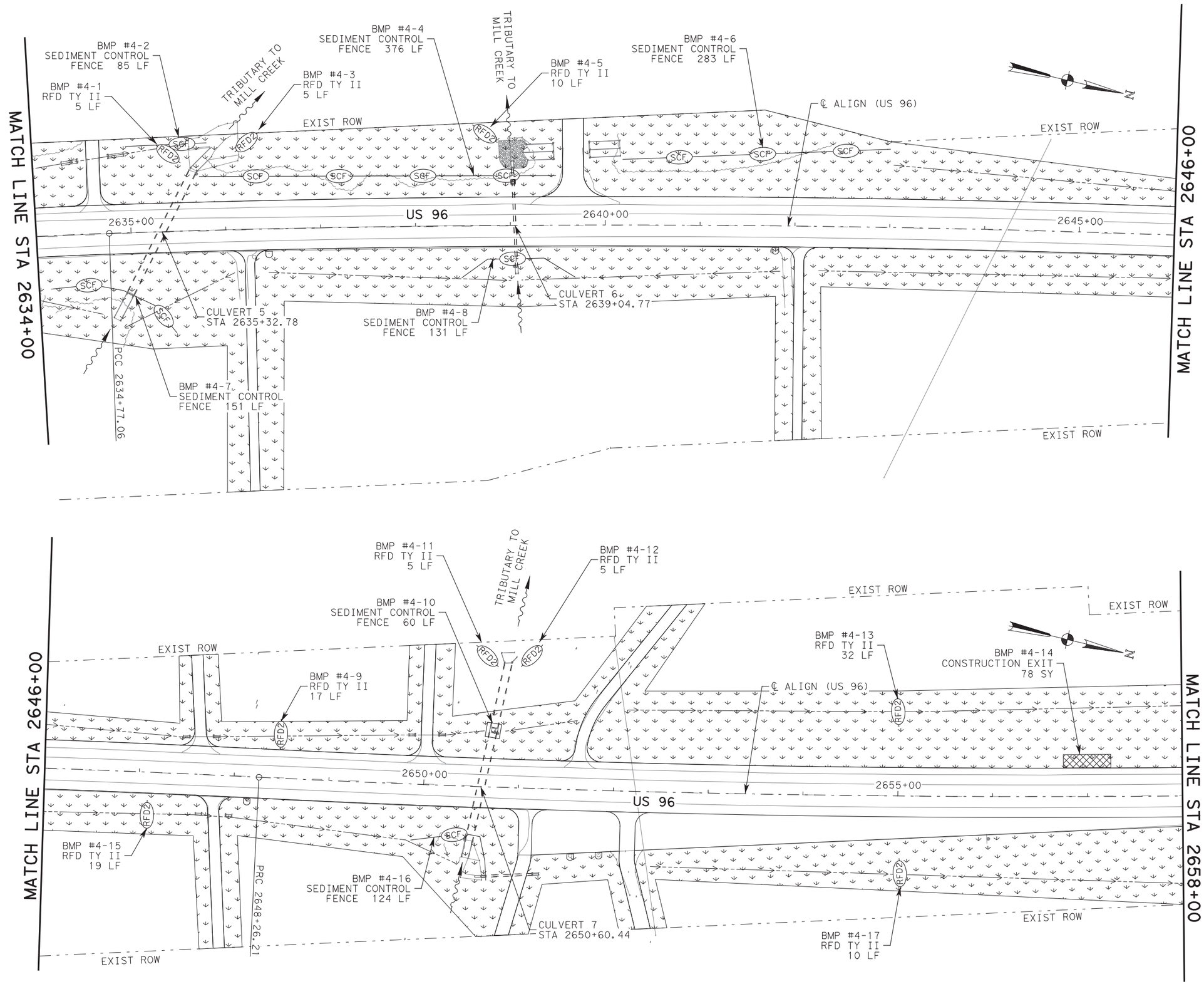

LEGEND

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2634+00 TO STA 2658+00)

SHEET 4 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			184

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	

CONT	SECT	JOB	HIGHWAY
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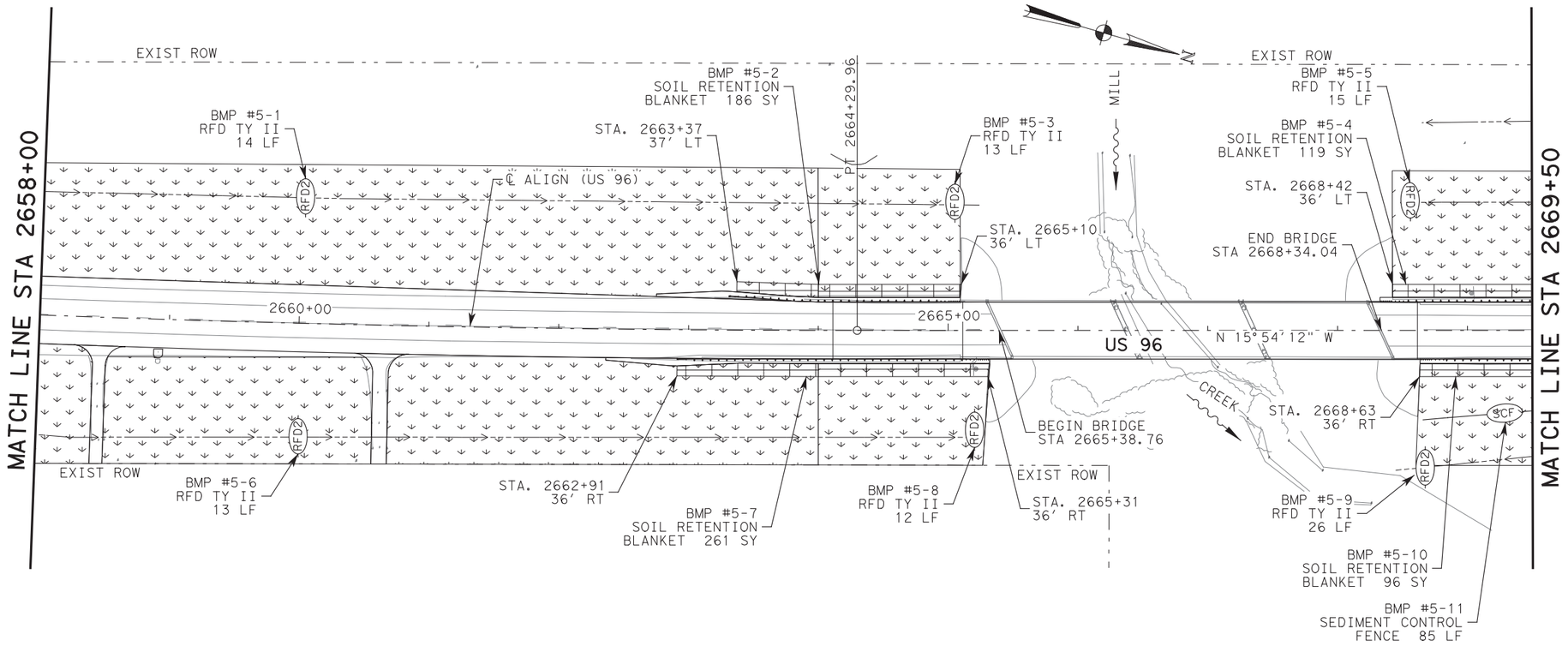

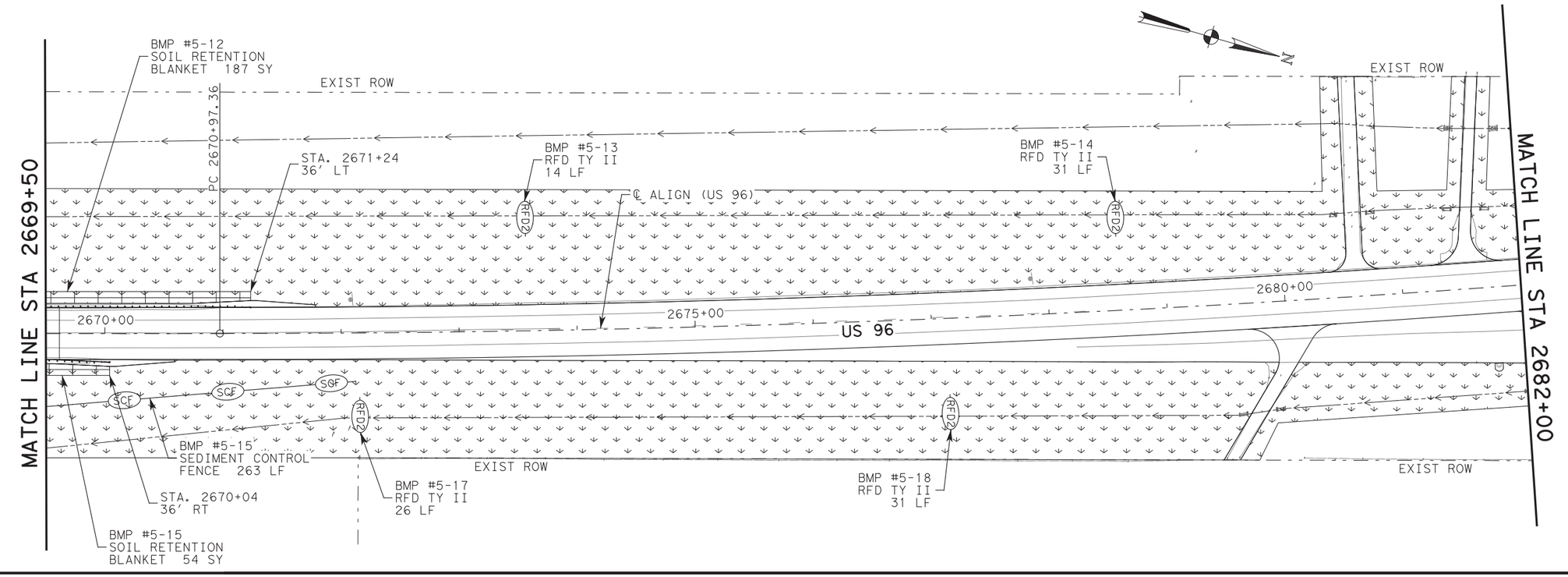

LEGEND

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- TEMPORARY SEDIMENT CONTROL FENCE
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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2658+00 TO STA 2682+00)

SHEET 5 OF 9

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			185

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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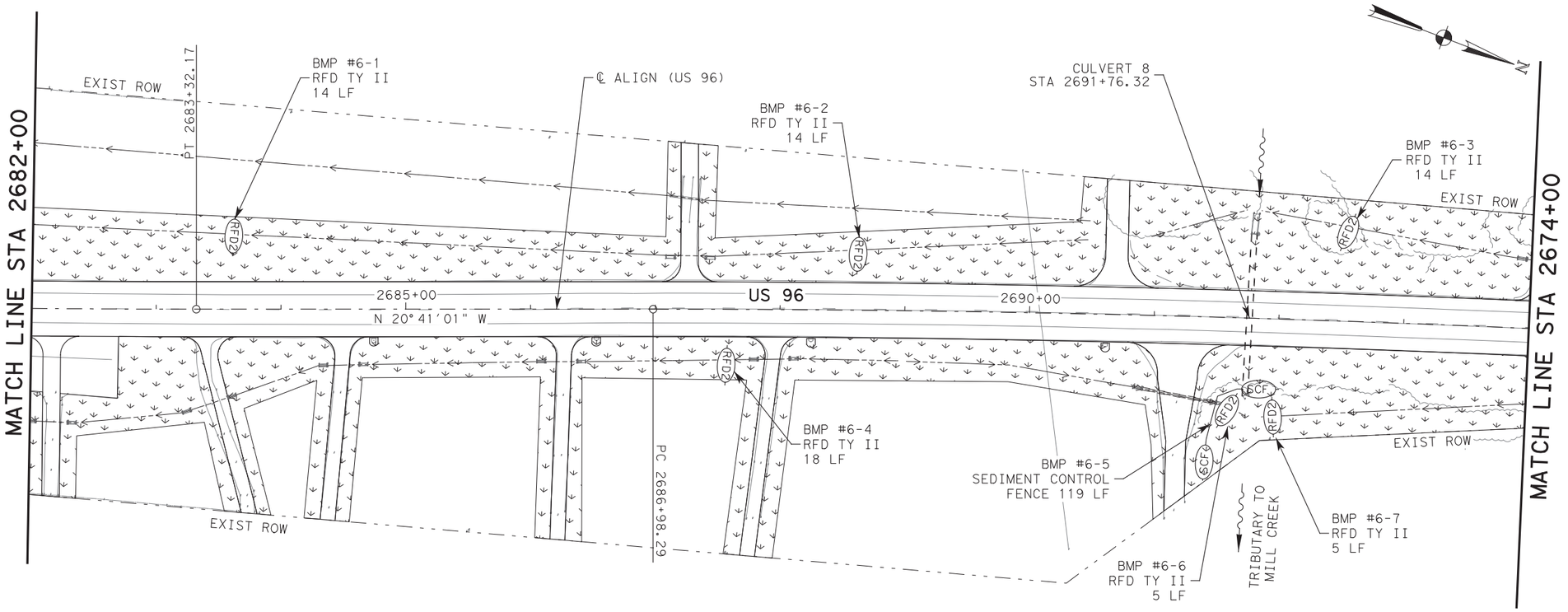

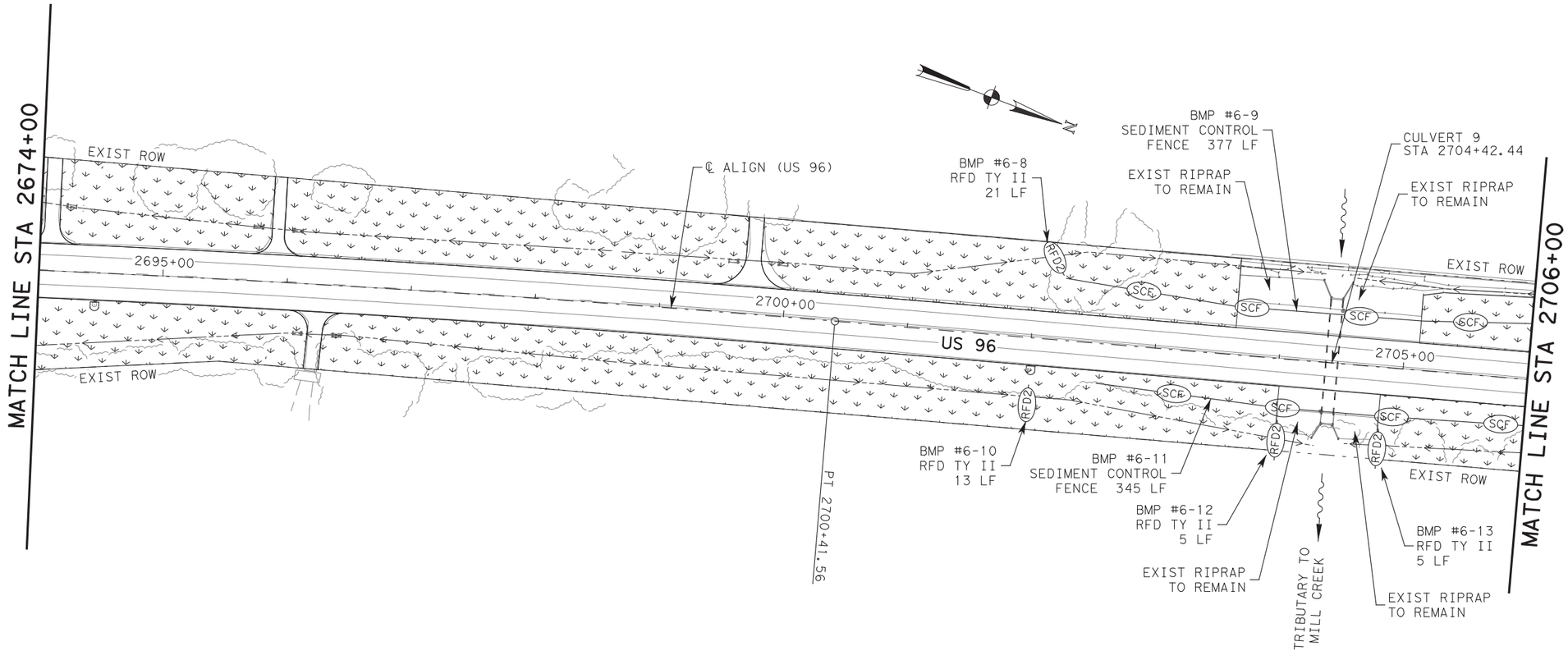

LEGEND

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2682+00 TO STA 2706+00)

SHEET 6 OF 9

Lockwood, Andrews & Newnam, Inc.
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FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			186
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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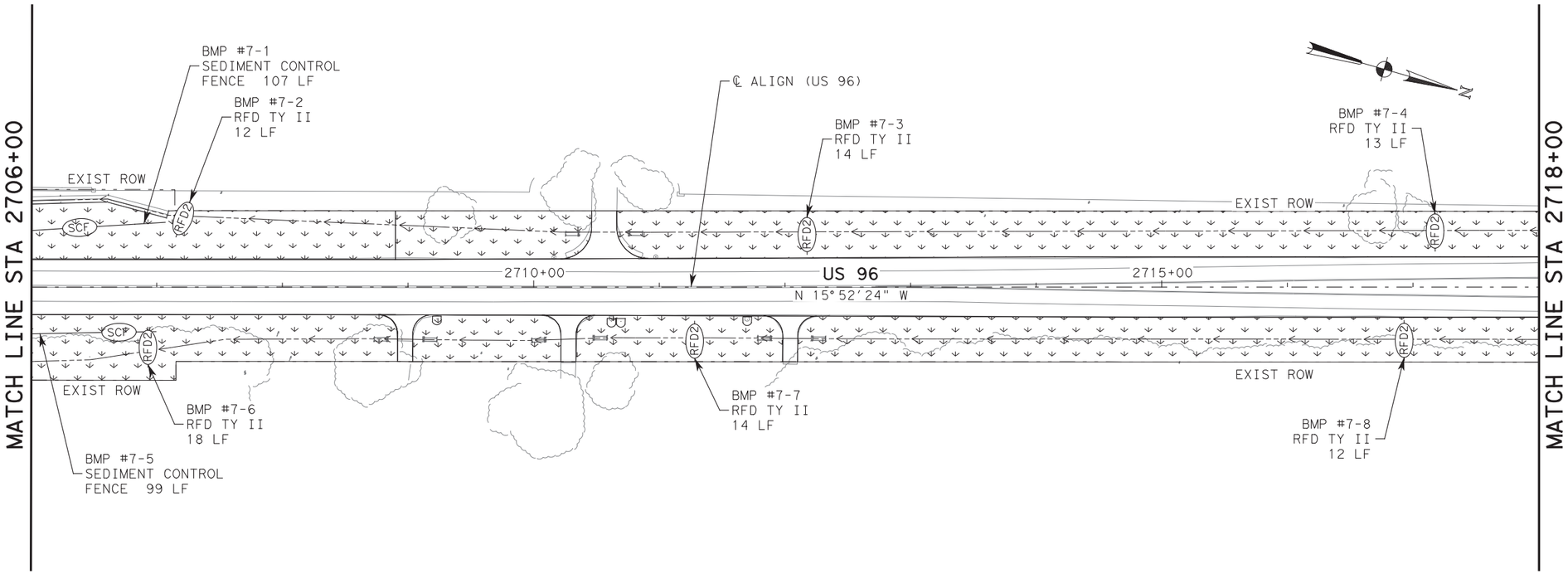

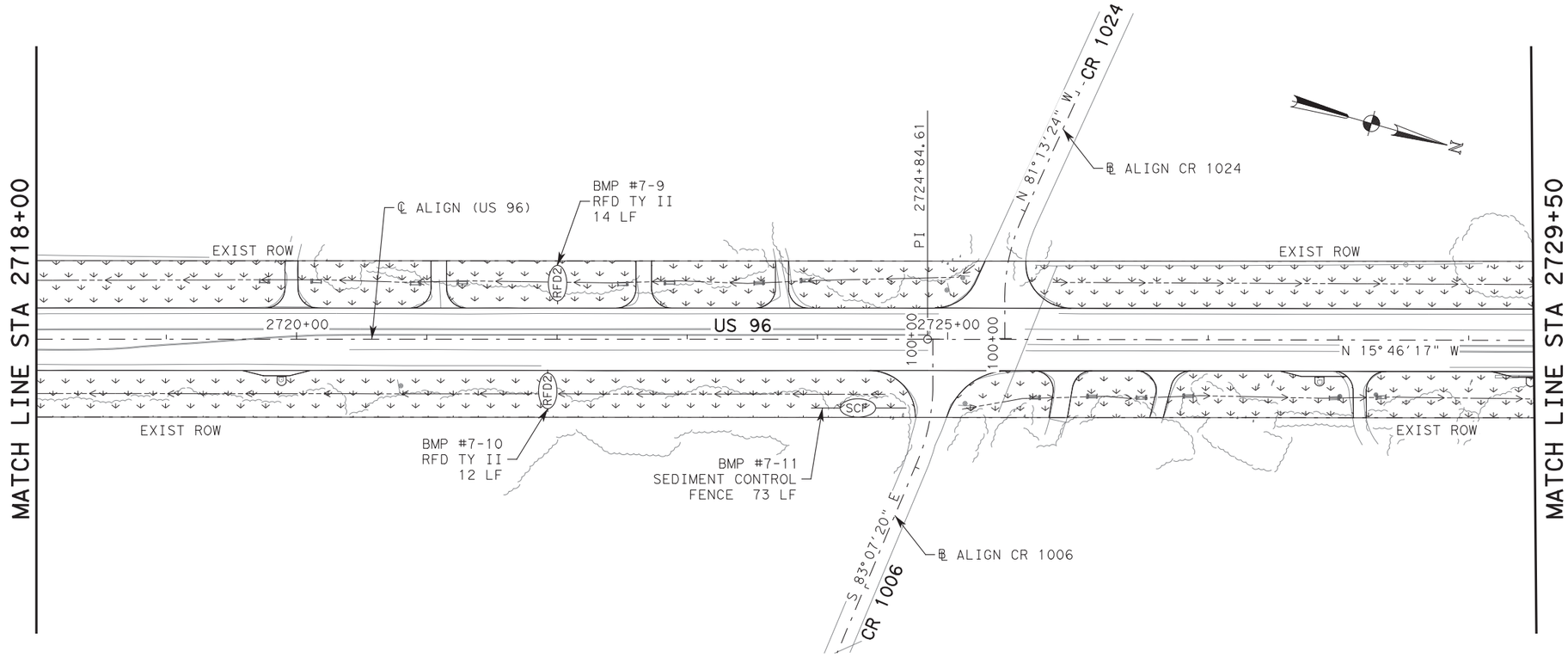

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

SWP3 LAYOUT

(STA 2706+00 TO STA 2729+50)

SHEET 7 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			187

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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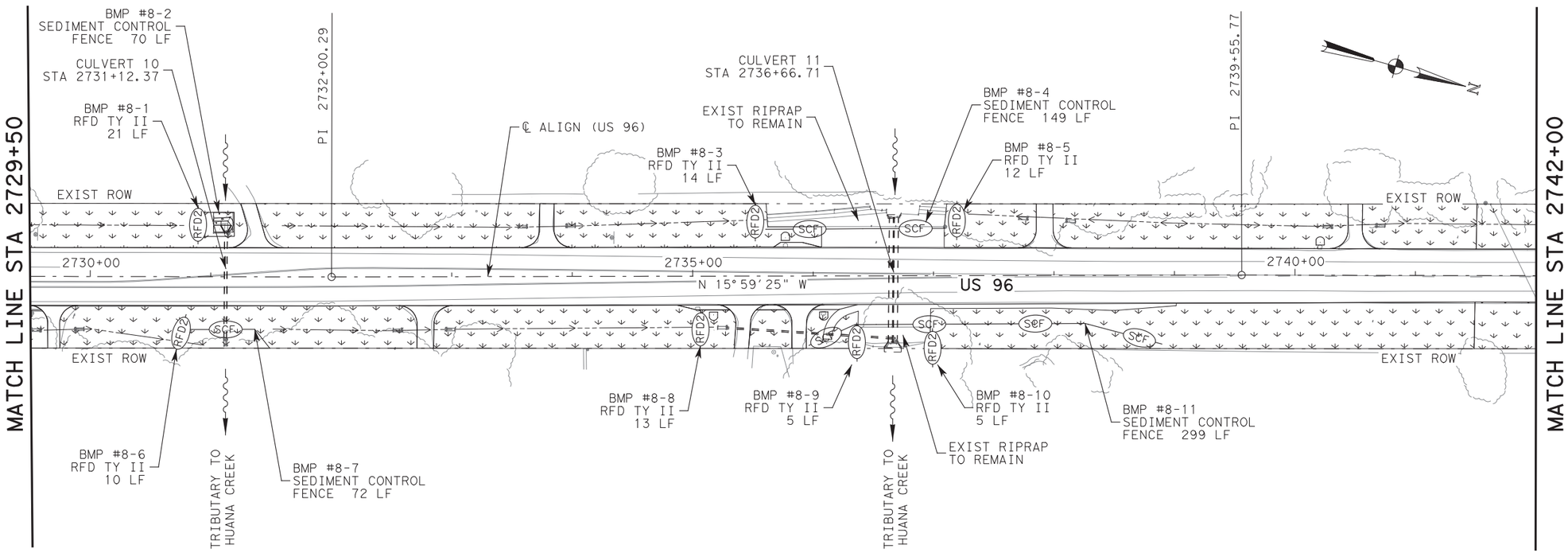

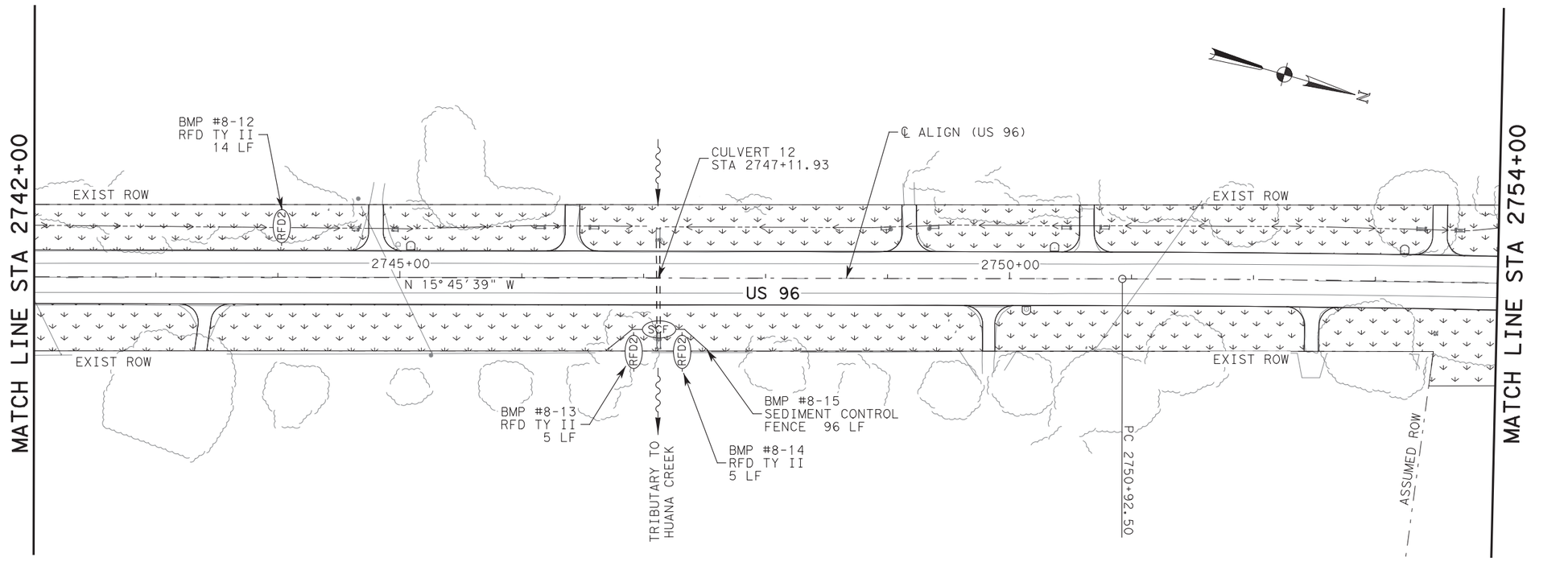

LEGEND

- ROCK FILTER DAM (TY 2) — RFD2
- TEMPORARY SEDIMENT CONTROL FENCE — SCF
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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2729+50 TO STA 2754+00)

SHEET 8 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
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TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			188
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
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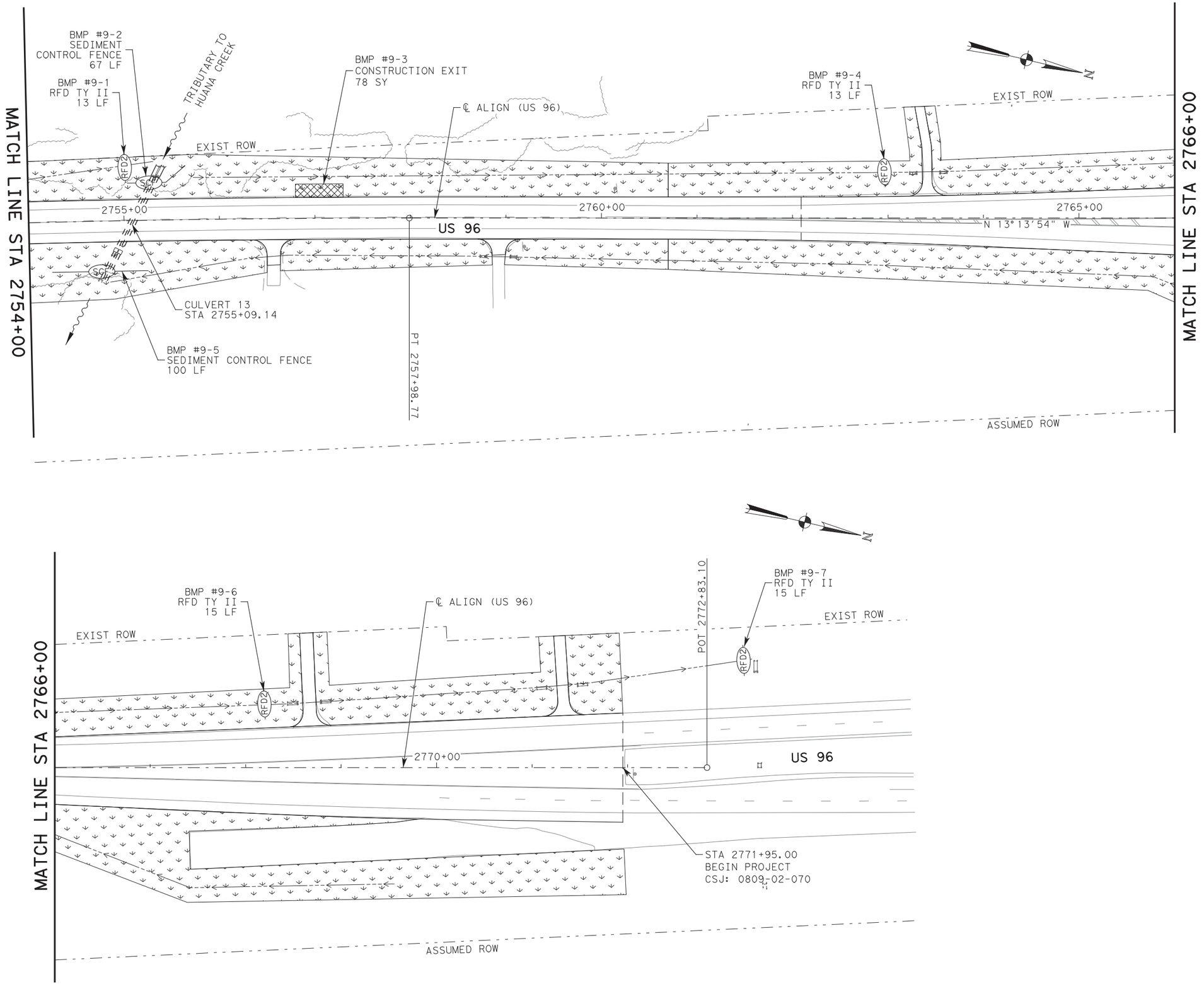

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STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED
PROFESSIONAL ENGINEER
11/03/2021

Robert D. Austin

SWP3 LAYOUT

(STA 2754+00 TO STA 2771+95)

SHEET 9 OF 9

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

TEXAS DEPARTMENT OF TRANSPORTATION
© 2021

FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			189
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SWP3 and revise when necessary to control pollution or required by the Engineer.
3. Project requires that a NOI and Large Site Notice be posted on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. NOT must be filed with TCEQ for the project when final stabilization has been achieved.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Unnamed Tributaries

2.

3.

4.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☒ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☒ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

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

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.

In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA), ROW clearing activities shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.

☐ No Action Required ☒ Required Action

Action No.

TPWD BMPs:
1. Timber rattlesnakes may occur in the project area. Avoid harming the species if encountered and allow to safely leave the project area.
2. Cover all open trenches and excavated pits. Visually inspect excavated areas for trapped wildlife prior to backfilling.
3. Minimize disturbing or removing downed trees, rotting stumps, and leaflitter where feasible.
4. Apply hydromulching, hydroseeding and/or non-plastic containing soil retention blanket in areas for soil stabilization. See General Notes.
3. Implement water quality BMPs per SWP3 and Section 401.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SWP3:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):
Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.
1.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required

☐ Required Action

Action No.

1.

Texas Department of Transportation

Design Division Standard

EPIC

(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0809	02	070	US 96
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LFK	SHELBY		190

NWP GENERAL CONDITIONS

AS APPLICABLE TO
THIS PROJECT

2. AQUATIC LIFE MOVEMENTS. NO ACTIVITY MAY SUBSTANTIALLY DISRUPT THE NECESSARY LIFE CYCLE MOVEMENTS OF THOSE SPECIES OF AQUATIC LIFE INDIGENOUS TO THE WATERBODY, INCLUDING THOSE SPECIES THAT NORMALLY MIGRATE THROUGH THE AREA, UNLESS THE ACTIVITY'S PRIMARY PURPOSE IS TO IMPOUND WATER.

3. SPAWNING AREAS. ACTIVITIES IN SPAWNING AREAS DURING SPAWNING SEASONS MUST BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. ACTIVITIES THAT RESULT IN THE PHYSICAL DESTRUCTION (E.G., THROUGH EXCAVATION, FILL, OR DOWNSTREAM SMOTHERING BY SUBSTANTIAL TURBIDITY) OF AN IMPORTANT SPAWNING AREA ARE NOT AUTHORIZED.

6. SUITABLE MATERIAL. NO ACTIVITY MAY USE UNSUITABLE MATERIAL (E.G., TRASH, DEBRIS, CAR BODIES, ASPHALT, ETC.). MATERIAL USED FOR CONSTRUCTION OR DISCHARGED MUST BE FREE FROM TOXIC POLLUTANTS IN TOXIC AMOUNTS (SEE SECTION 307 OF THE CLEAN WATER ACT).

8. ADVERSE EFFECTS FROM IMPOUNDMENTS. IF THE ACTIVITY CREATES AN IMPOUNDMENT OF WATER, ADVERSE EFFECTS TO THE AQUATIC SYSTEM DUE TO ACCELERATING THE PASSAGE OF WATER, AND/OR RESTRICTING ITS FLOW MUST BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE.

9. MANAGEMENT OF WATER FLOWS. TO THE MAXIMUM EXTENT PRACTICABLE, THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS MUST BE MAINTAINED FOR EACH ACTIVITY, INCLUDING STREAM CHANNELIZATION AND STORM WATER MANAGEMENT ACTIVITIES, EXCEPT AS PROVIDED BELOW. THE ACTIVITY MUST BE CONSTRUCTED TO WITHSTAND EXPECTED HIGH FLOWS. THE ACTIVITY MUST NOT RESTRICT OR IMPEDE THE PASSAGE OF NORMAL OR HIGH FLOWS, UNLESS THE PRIMARY PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER OR MANAGE HIGH FLOWS. THE ACTIVITY MAY ALTER THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS IF IT BENEFITS THE AQUATIC ENVIRONMENT (E.G., STREAM RESTORATION OR RELOCATION ACTIVITIES).

11. EQUIPMENT. HEAVY EQUIPMENT WORKING IN WETLANDS OR MUD FLATS MUST BE PLACED ON MATS, OR OTHER MEASURES MUST BE TAKEN TO MINIMIZE SOIL DISTURBANCE.

12. SOIL EROSION AND SEDIMENT CONTROLS. APPROPRIATE SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND ALL EXPOSED SOIL AND OTHER FILLS, AS WELL AS ANY WORK BELOW THE ORDINARY HIGH WATER MARK OR HIGH TIDE LINE, MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE. PERMITTEES ARE ENCOURAGED TO PERFORM WORK WITHIN WATERS OF THE UNITED STATES DURING PERIODS OF LOW-FLOW OR NO-FLOW.

13. REMOVAL OF TEMPORARY FILLS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AFFECTED AREAS MUST BE REVEGETATED, AS APPROPRIATE.

14. PROPER MAINTENANCE. ANY AUTHORIZED STRUCTURE OR FILL SHALL BE PROPERLY MAINTAINED, INCLUDING MAINTENANCE TO ENSURE PUBLIC SAFETY AND COMPLIANCE WITH APPLICABLE NWP GENERAL CONDITIONS, AS WELL AS ANY ACTIVITY-SPECIFIC CONDITIONS ADDED BY THE DISTRICT ENGINEER TO AN NWP AUTHORIZATION.

23. MITIGATION. THE DISTRICT ENGINEER WILL CONSIDER SEVERAL FACTORS WHEN DETERMINING APPROPRIATE AND PRACTICABLE MITIGATION NECESSARY TO ENSURE THAT ADVERSE EFFECTS ON THE AQUATIC ENVIRONMENT ARE MINIMAL.

25. WATER QUALITY. WHERE STATES AND AUTHORIZED TRIBES, OR EPA WHERE APPLICABLE, HAVE NOT PREVIOUSLY CERTIFIED COMPLIANCE OF AN NWP WITH CWA SECTION 401, INDIVIDUAL 401 WATER QUALITY CERTIFICATION MUST BE OBTAINED OR WAIVED (SEE 33 CFR 330.4(C)). THE DISTRICT ENGINEER OR STATE OR TRIBE MAY REQUIRE ADDITIONAL WATER QUALITY MANAGEMENT MEASURES TO ENSURE THAT THE AUTHORIZED ACTIVITY DOES NOT RESULT IN MORE THAN MINIMAL DEGRADATION OR WATER QUALITY.

27. REGIONAL AND CASE-BY-CASE CONDITIONS. THE ACTIVITY MUST COMPLY WITH ANY REGIONAL CONDITIONS THAT MAY HAVE BEEN ADDED BY THE DIVISION ENGINEER (SEE 33 CFR 330.4(E)) AND WITH ANY CASE SPECIFIC CONDITIONS ADDED BY THE CORPS OR BY THE STATE, INDIAN TRIBE, OR U.S. EPA IN ITS SECTION 401 WATER QUALITY CERTIFICATION, OR BY THE STATE IN ITS COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION.

FOR A COMPLETE LIST OF GENERAL CONDITIONS GO TO:

http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/NationwideGeneralPermits.aspx

USACE - PERMIT #14

AS APPLICABLE TO
THIS PROJECT

ACTIVITIES REQUIRED FOR CROSSINGS OF WATERS OF THE UNITED STATES ASSOCIATED WITH THE CONSTRUCTION, EXPANSION, MODIFICATION, OR IMPROVEMENT OF LINEAR TRANSPORTATION PROJECTS (E.G., ROADS, HIGHWAYS, RAILWAYS, TRAILS, AIRPORT RUNWAYS, AND TAXIWAYS) IN WATERS OF THE U.S. FOR LINEAR TRANSPORTATION PROJECTS IN NON-TIDAL WATERS, THE DISCHARGE CANNOT CAUSE THE LOSS OF GREATER THAN 1/2-ACRE OF WATERS OF THE U.S. ANY STREAM CHANNEL MODIFICATION, INCLUDING BANK STABILIZATION, IS LIMITED TO THE MINIMUM NECESSARY TO CONSTRUCT OR PROTECT THE LINEAR TRANSPORTATION PROJECT; SUCH MODIFICATIONS MUST BE IN THE IMMEDIATE VICINITY OF THE PROJECT.

THIS NWP ALSO AUTHORIZES TEMPORARY STRUCTURES, FILLS, AND WORK NECESSARY TO CONSTRUCT THE LINEAR TRANSPORTATION PROJECT. APPROPRIATE MEASURES MUST BE TAKEN TO MAINTAIN DOWNSTREAM FLOWS AND MINIMIZE FLOODING TO THE MAXIMUM EXTENT PRACTICABLE, WHEN TEMPORARY STRUCTURES, WORK, AND DISCHARGES, INCLUDING COFFERDAMS, ARE NECESSARY FOR CONSTRUCTION ACTIVITIES, ACCESS FILLS, OR DEWATERING OF CONSTRUCTION SITES. TEMPORARY FILLS MUST CONSIST OF MATERIALS, AND BE PLACED IN A MANNER THAT WILL NOT BE ERODED BY EXPECTED HIGH FLOWS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AREAS AFFECTED BY TEMPORARY FILLS MUST BE REVEGETATED, AS APPROPRIATE.

THIS NWP CANNOT BE USED TO AUTHORIZE NON-LINEAR FEATURES COMMONLY ASSOCIATED WITH TRANSPORTATION PROJECTS, SUCH AS VEHICLE MAINTENANCE OR STORAGE BUILDINGS, PARKING LOTS, TRAIN STATIONS, OR AIRCRAFT HANGARS.

NOTIFICATION: THE PERMITTEE MUST SUBMIT A PRE-CONSTRUCTION NOTIFICATION (PCN) TO THE DISTRICT ENGINEER PRIOR TO COMMENCING THE ACTIVITY IF: (1) THE LOSS OF WATERS OF THE U.S. EXCEEDS 1/10-ACRE; OR (2) THERE IS A DISCHARGE IN A SPECIAL AQUATIC SITE, INCLUDING WETLANDS.

NOTE:

THE PROJECT CROSSES JURISDICTIONAL WATERS OF THE U.S. COORDINATION WITH USACE WAS NOT REQUIRED BECAUSE IMPACTS WILL NOT EXCEED THE ABOVE CRITERIA. THIS PERMIT AUTHORIZES THE ACTIVITIES WHICH WILL IMPACT WATERS OF THE U.S. THE NWP GENERAL CONDITIONS AND THE NWP #14 LIMITS MUST BE FOLLOWED IN ORDER TO MAINTAIN COMPLIANCE WITH THE NWP. PROJECT PLANS PROVIDE THE EXTENT OF WORK AUTHORIZED BY THE USACE. ANY CHANGES AT WATERS OF THE U.S. WILL REQUIRE COORDINATION WITH THE USACE. IF COORDINATION MAY BE NEEDED, CONTACT THE TXDOT LUFKIN DISTRICT ENVIRONMENTAL SECTION AT 1-800-687-8087.

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC):

USACE

Texas Department of Transportation

EPIC

(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)

SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	LFK	SHELBY		191
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

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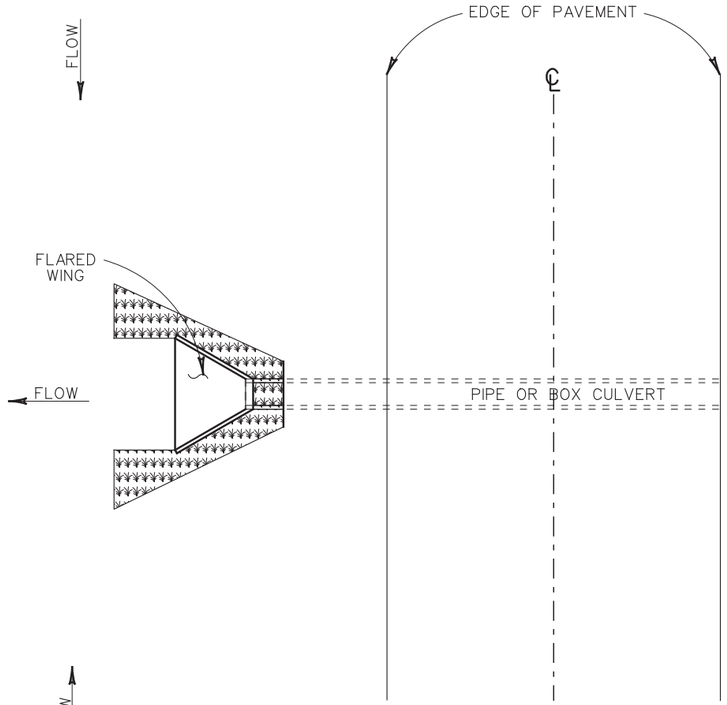
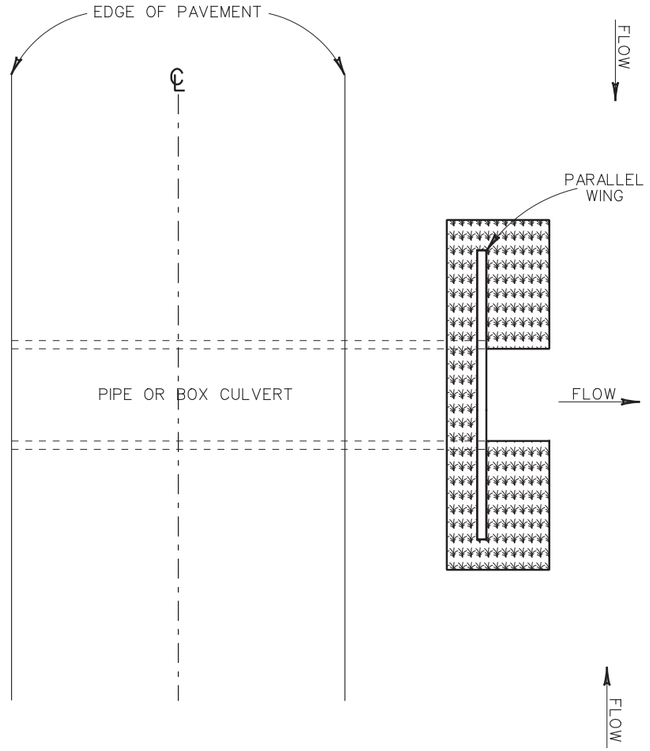
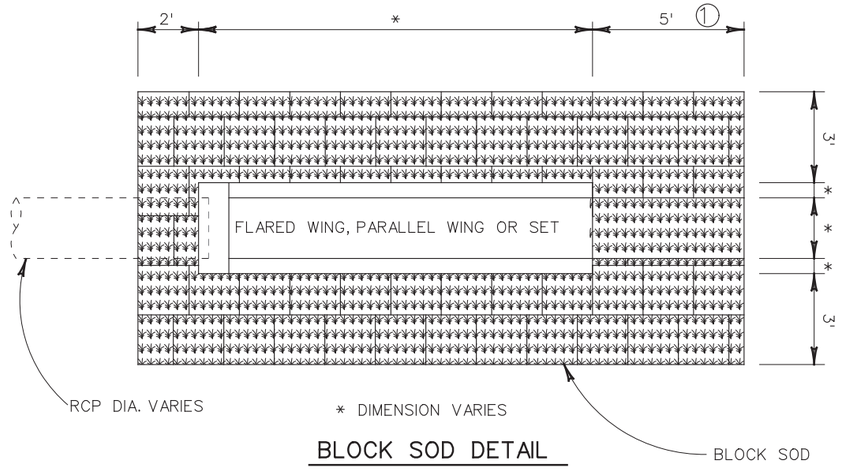


FLARED WING CROSS DRAINAGE DETAIL ①



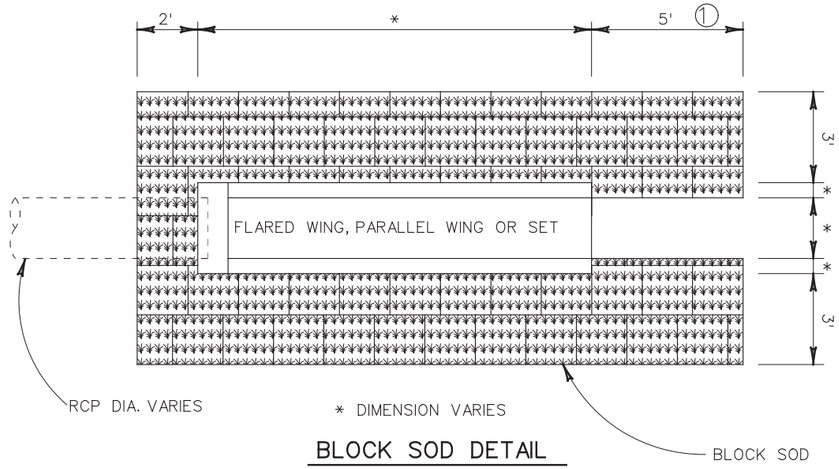
PARALLEL WING CROSS DRAINAGE DETAIL ①

SYMBOL	DESCRIPTION
	BLOCK SODDING



BLOCK SOD DETAIL

PLACE AT ALL PARALLEL CULVERTS WHERE WORK IS PROPOSED.



BLOCK SOD DETAIL

PLACE AT ALL CROSSROAD CULVERTS WHERE WORK IS PROPOSED. DO NOT PLACE SOD DIRECTLY IN THE CHANNEL.

① DO NOT PLACE BLOCK SOD WHERE RIPRAP (STONE COMMON) IS INSTALLED.

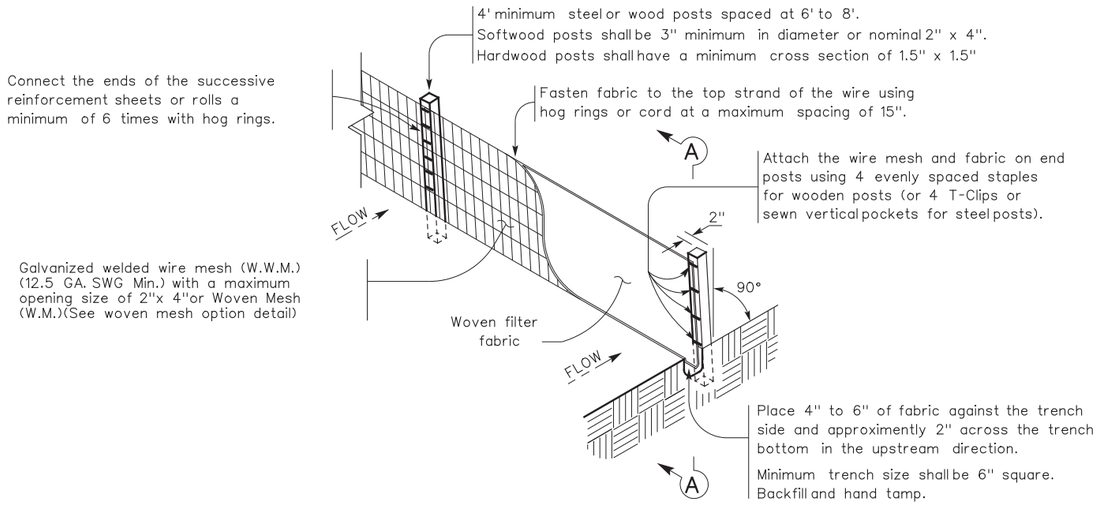
STATE OF TEXAS
ROBERT D. AUSTIN
67596
LICENSED PROFESSIONAL ENGINEER
11/03/2021
Robert D. Austin

BLOCK SOD DETAILS

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
TBPE FIRM REGISTRATION NO. 2614

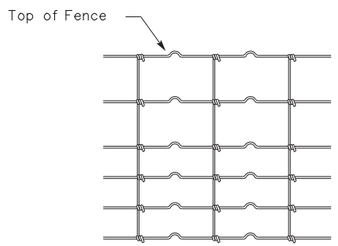
TEXAS DEPARTMENT OF TRANSPORTATION

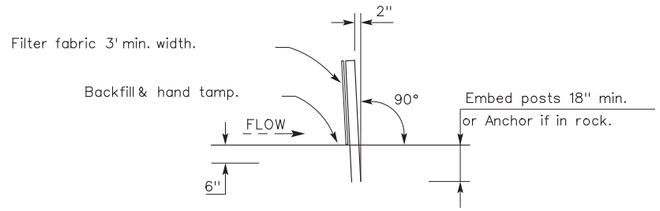
FED.NO. DIV.NO.	PROJECT NO.		SHEET NO.
6			192
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	SHELBY	
CONT	SECT	JOB	HIGHWAY
0809	02	070	US 96



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.

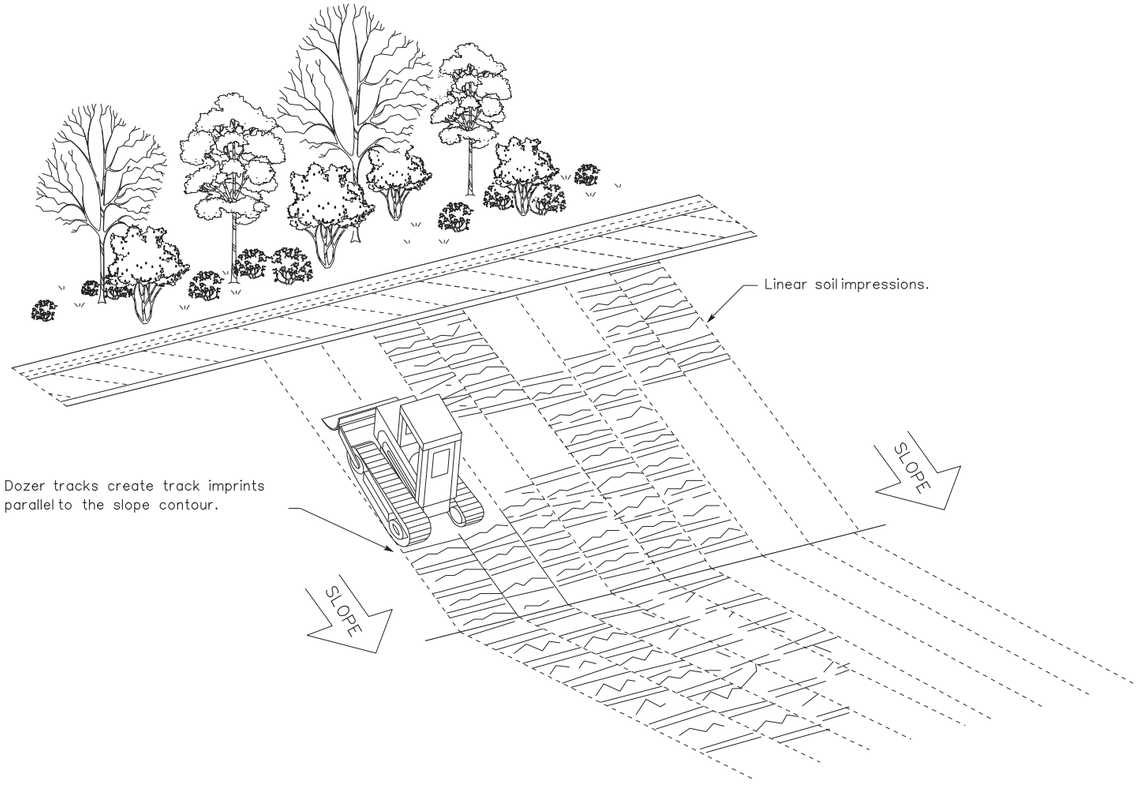
LEGEND

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	0809	02	070		US 96		
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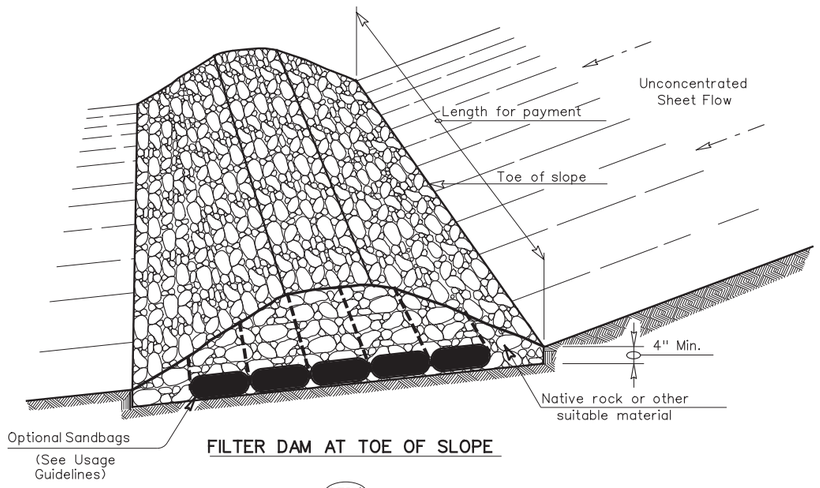
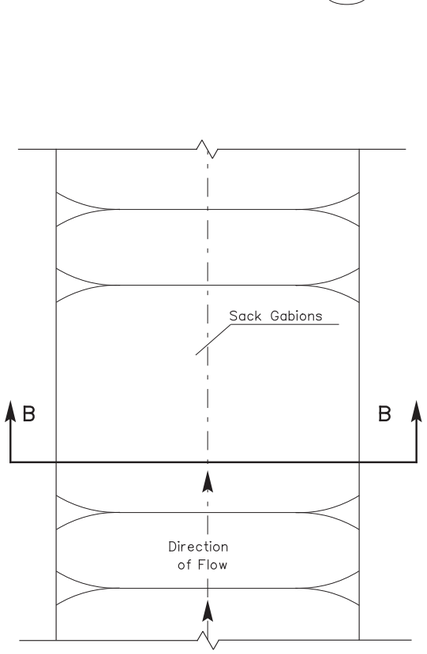
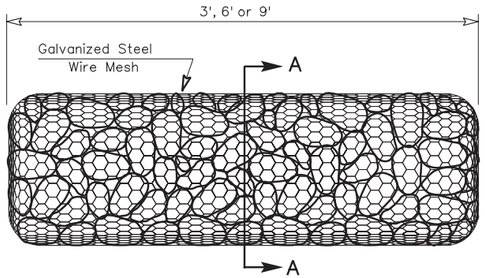


FILTER DAM AT TOE OF SLOPE

RFD1

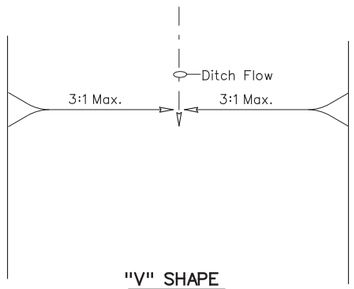


PLAN VIEW



TYPE 4 (SACK GABIONS)

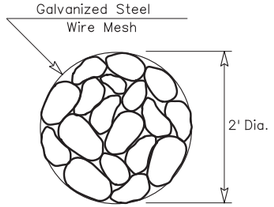
RFD4



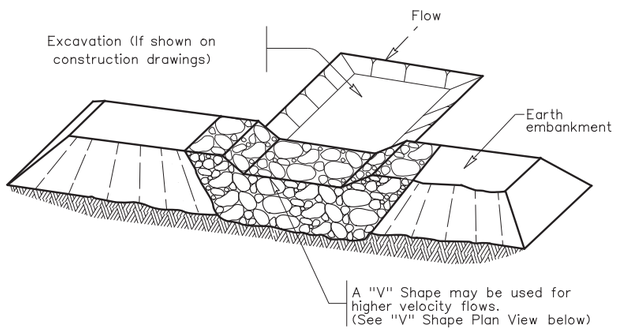
"V" SHAPE PLAN VIEW

¾" Dia.
Rebar Stakes

SECTION B-B

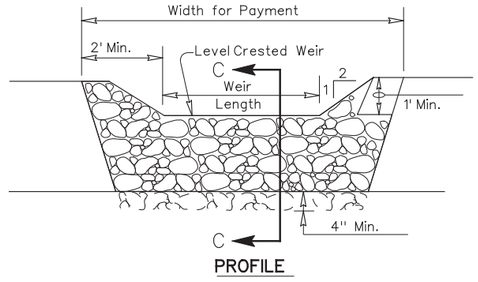


SECTION A-A

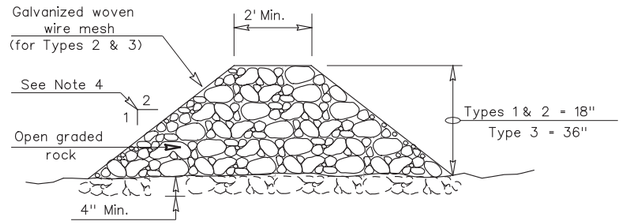


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

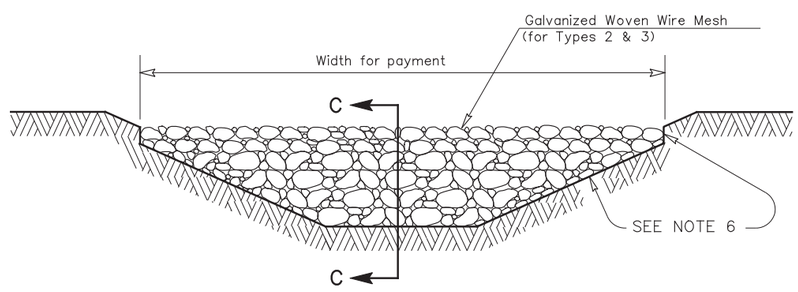
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

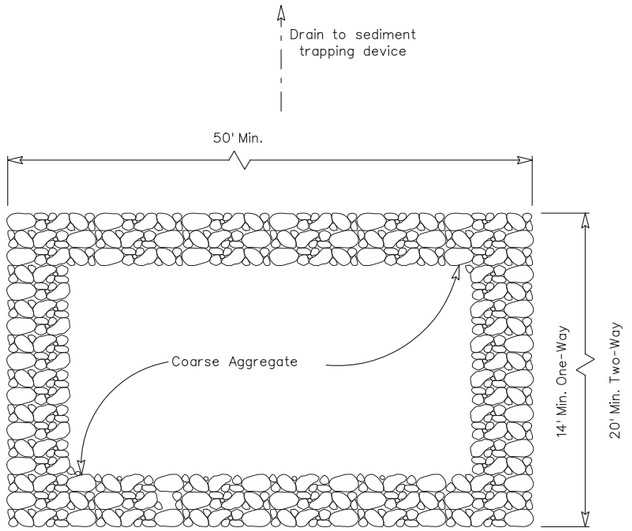
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

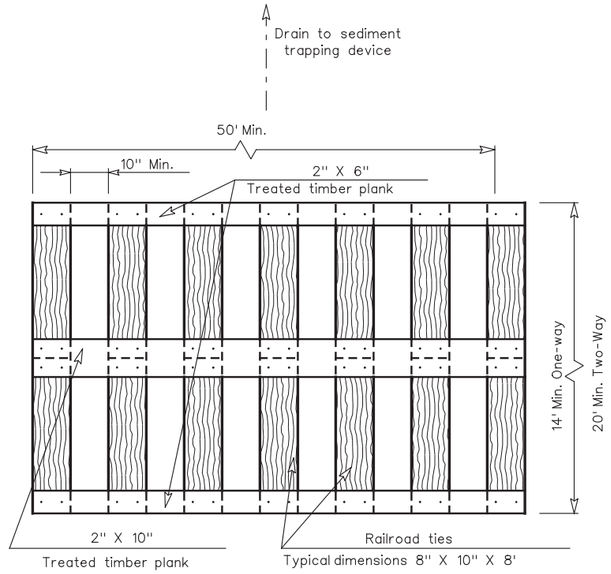
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		194

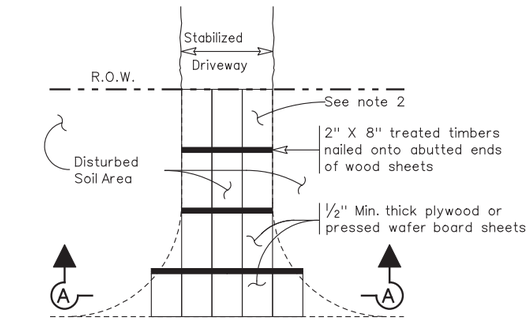
DATE: 11/3/2021
FILE: c:\projectwise\jmelton2\d0649766\ec316.dgn



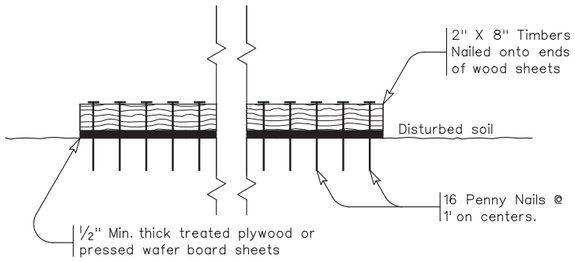
PLAN VIEW



PLAN VIEW



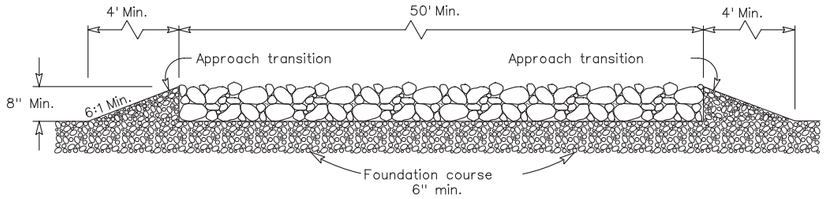
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

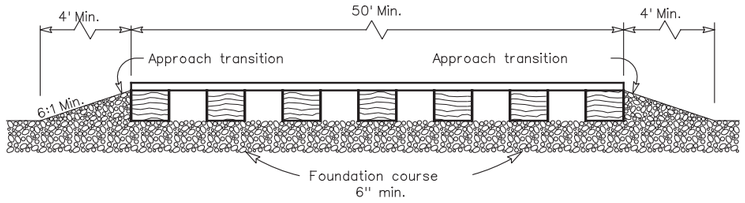
SHORT TERM



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
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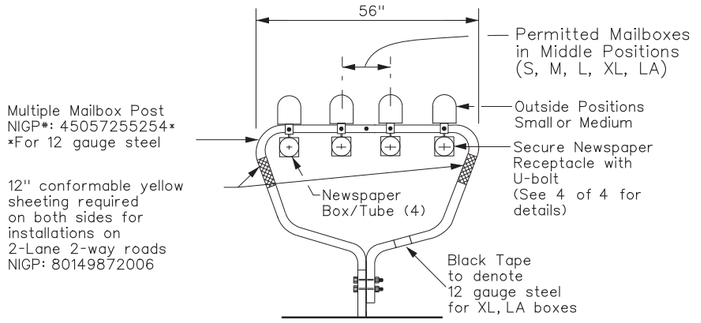
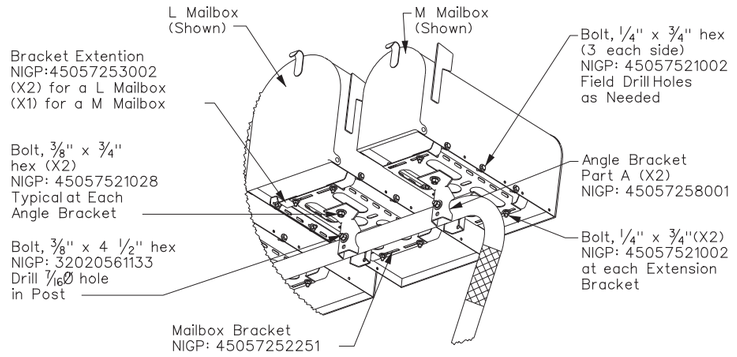
REVISIONS	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		195

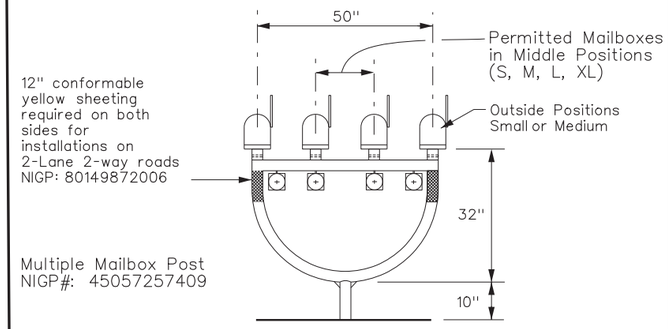
DATE:
FILE:

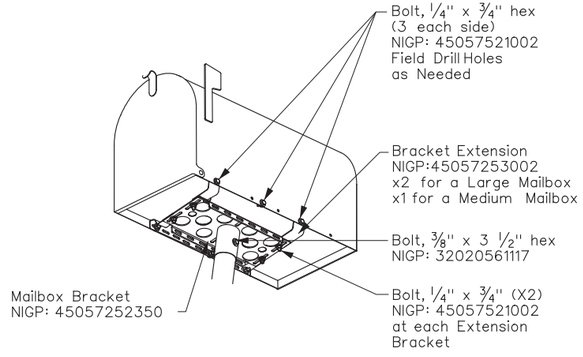
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

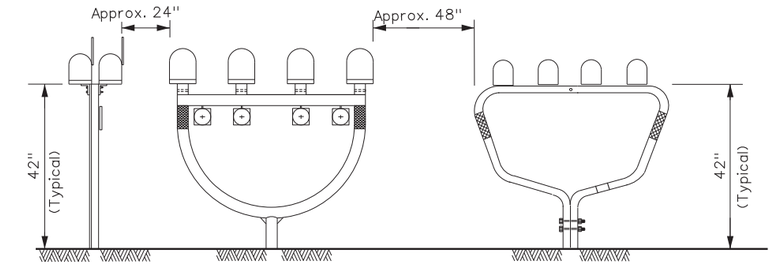
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX ** WEIGHT
	LENGTH	WIDTH	HEIGHT	
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

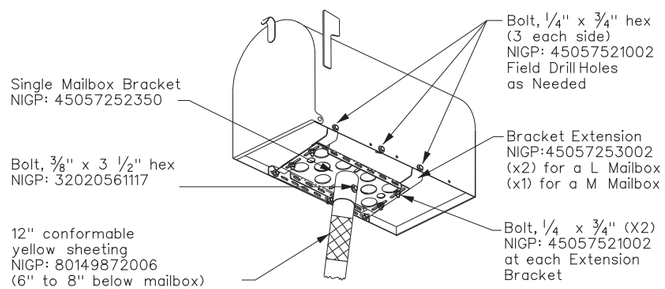
TYPICAL INSTALLATION MEASUREMENTS

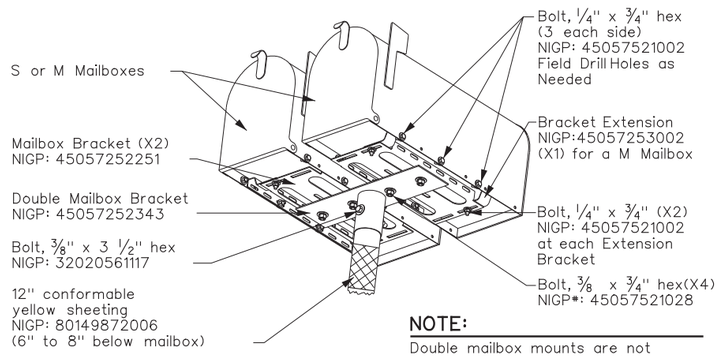


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

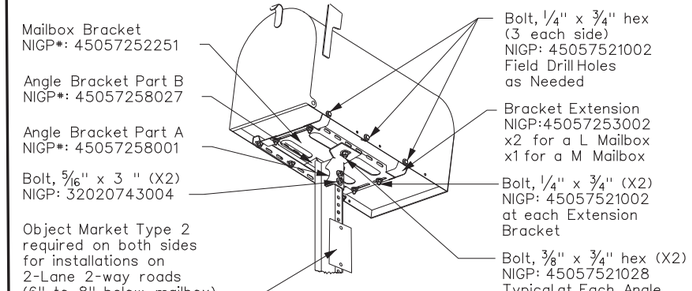


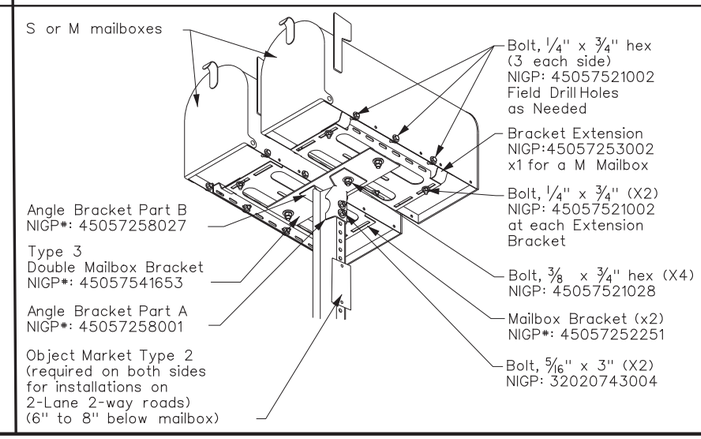


NOTE:

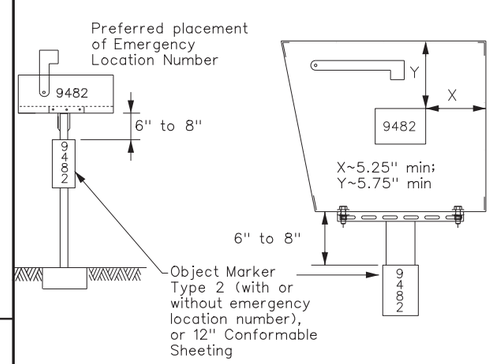
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

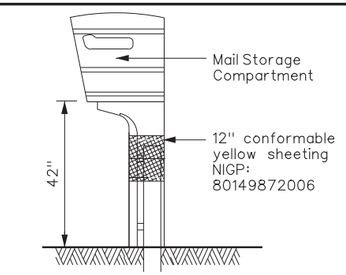


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		196

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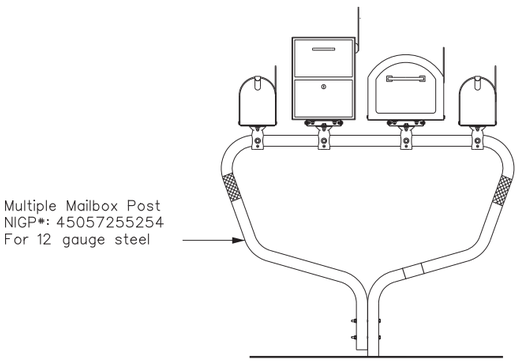
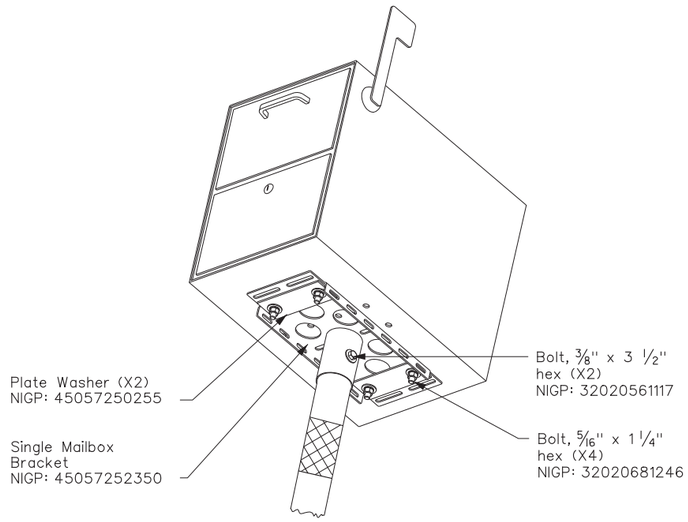
DATE:
FILE:

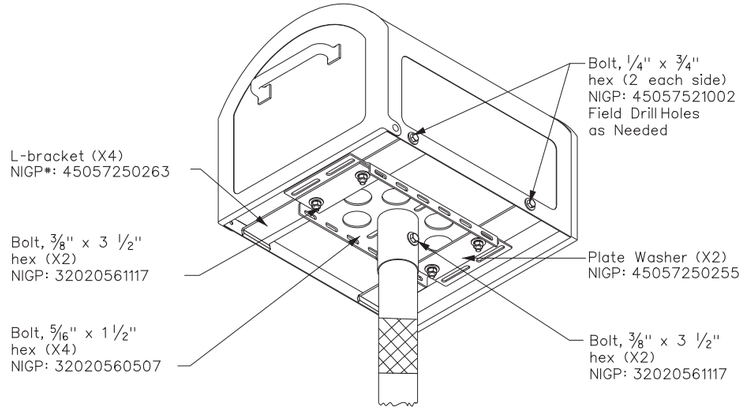
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

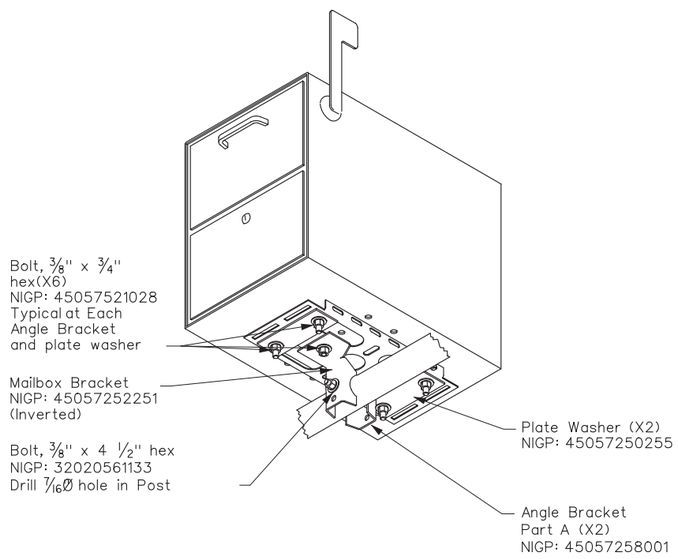


TYPE 2/4 - SINGLE XL MAILBOX

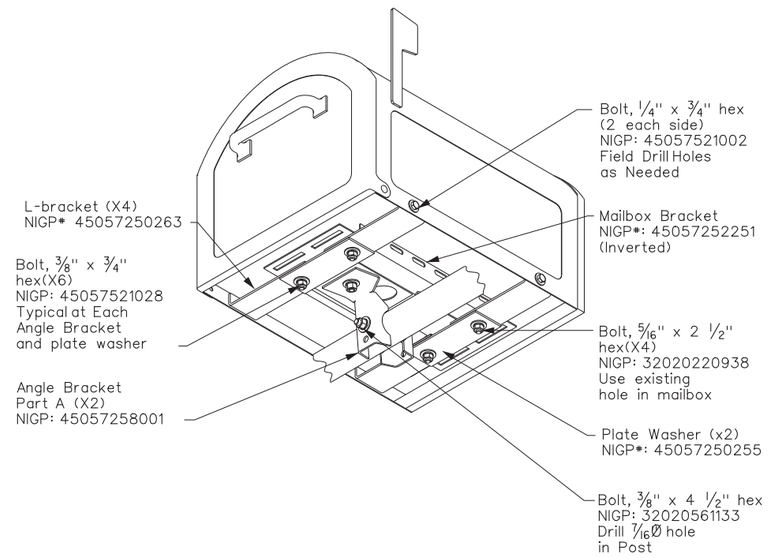


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multipost.

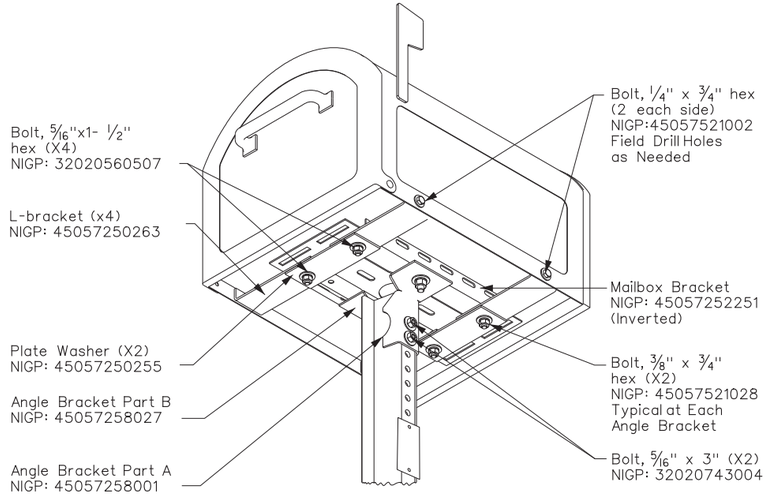
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

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	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		197

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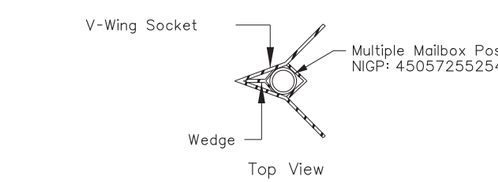
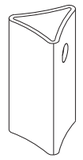
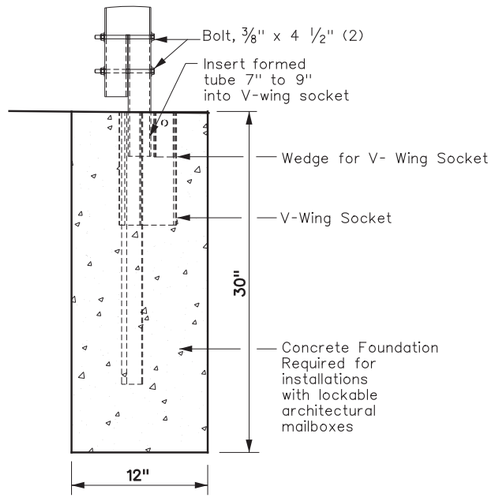
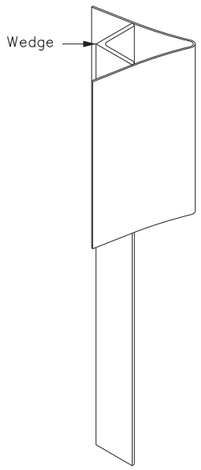
TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage

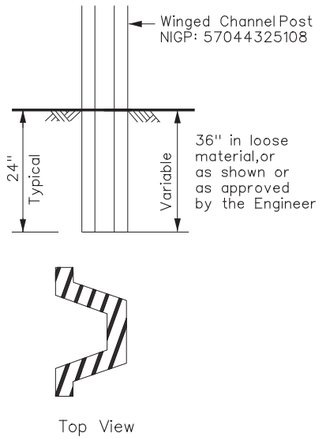








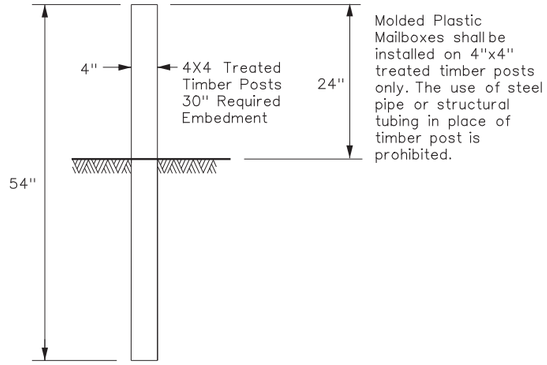
TYPE 3 - SUPPORT/FOUNDATION



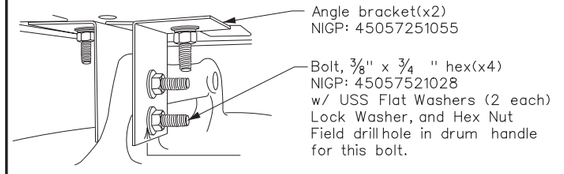
NOTES:

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

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

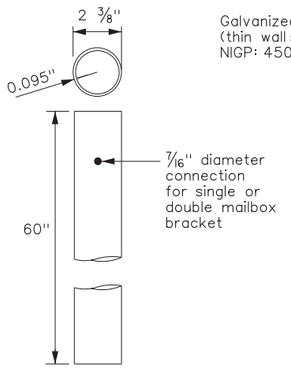
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

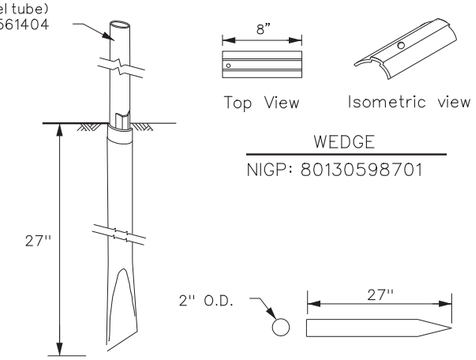
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

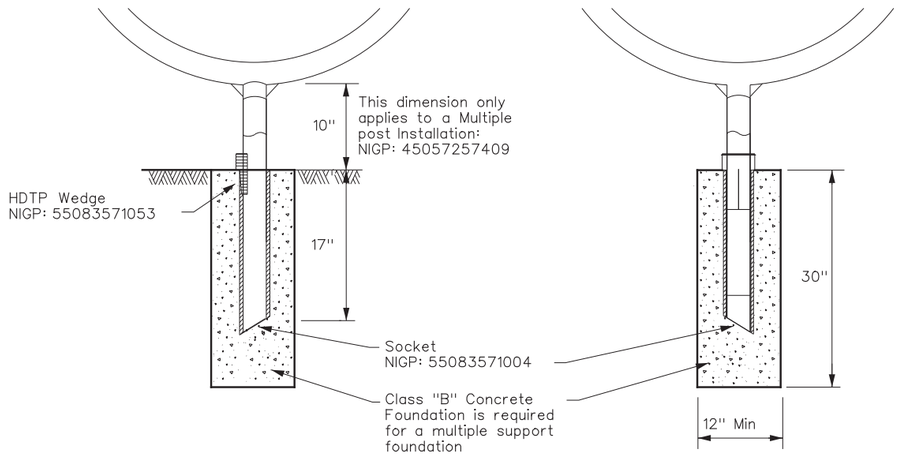


WEDGE ANCHOR
NIGP: 80130238407

WEDGE
NIGP: 80130598701

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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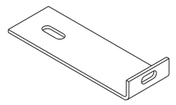
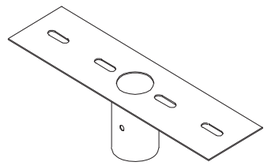
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		198

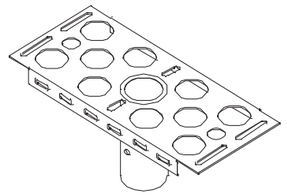
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: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



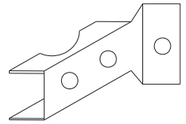
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



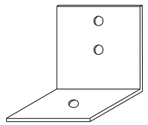
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



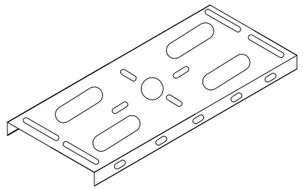
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



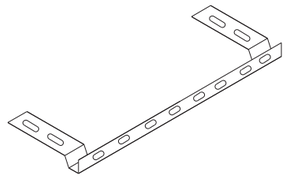
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



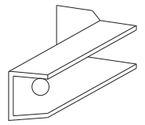
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



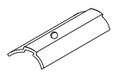
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



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

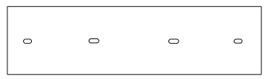


NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double

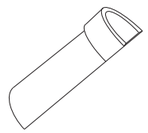


NIGP: 80130598701
Wedge for Type 2

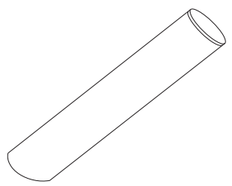
NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes



NIGP: 45057541653
Type 3 double mailbox bracket

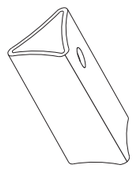


NIGP: 55083571053
Type 4 Mailbox Wedge

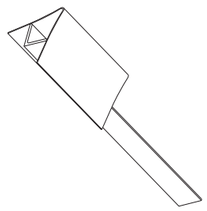


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

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

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

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

DATE:
FILE:

SHEET 4 OF 4

Texas Department of Transportation

Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0809	02	070	US 96
	DIST	COUNTY		SHEET NO.
	LFK	SHELBY		199