INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. F 2021(613), ETC.

FHWA TEXAS DIVISION			SHEET NO. 1
STATE	DISTRICT	COUNTY	
TEXAS	PAR	RAINS	
CONTROL	SECTION	JOB	HIGHWAY NO.
2277	01	010,etc	FM 275

DESIGN SPEED = N/A
CURRENT A.D.T. (2017) = 1,100
PROJECTED A.D.T. (2037) = 1,500
FUNCTIONAL CLASS = MAJOR COLLECTOR
EXISTING NBI: 01-190-0-2277-01-001

CSJ: 2277-01-010
NET LENGTH OF ROADWAY = 27,153.43 FT = 5.143 MI
NET LENGTH OF BRIDGE = 0.00 FT = 0.000 MI
NET LENGTH OF PROJECT = 27,153.43 FT = 5.143 MI

CSJ: 2277-01-012
NET LENGTH OF ROADWAY = 550.00 FT = 0.104 MI
NET LENGTH OF BRIDGE = 150.00 FT = 0.028 MI
NET LENGTH OF PROJECT = 700.00 FT = 0.132 MI

FM 275
RAINS COUNTY

LIMITS: FROM SH 19 TO FM 514

FOR CONSTRUCTION OF: REHABILITATION OF EXISTING ROAD

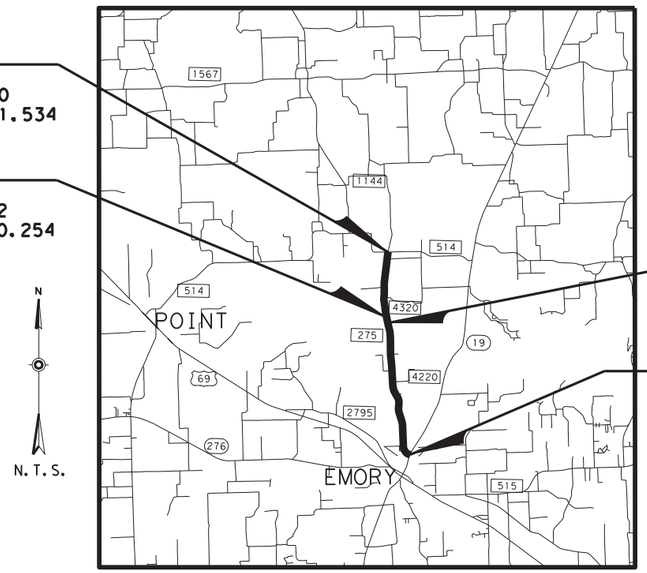
CONSISTING OF: SUBGRADE WIDENING, REWORK BASE COURSE MATERIAL, FLEXIBLE BASE, BRIDGE RECONSTRUCTION, AND EXTENDING STRUCTURES.

FINAL PLANS

LETTING DATE:
DATE CONTRACTOR BEGAN WORK:
DATE WORK WAS COMPLETED:
DATE WORK WAS ACCEPTED:
ORIGINAL CONTRACT WORKING DAYS:
USED OF WORKING DAYS
NO. OF CHANGE ORDERS:
FINAL CONTRACT COST:
PERCENT OVER/UNDER RUN:
CONTRACTOR:

END PROJECT
STA 278+97.00
CSJ: 2277-01-010
REF. MRK.: 256-1.534

END CSJ
STA 184+30
CSJ: 2277-01-012
REF. MRK.: 256+0.254



BEGIN CSJ
STA 177+30
CSJ: 2277-01-012
REF. MRK.: 256+0.387

BEGIN PROJECT
STA 0+19.00
CSJ: 2277-01-010
REF. MRK.: 258+1.741

I CERTIFY THAT THIS PROJECT WAS BUILT IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

AREA ENGINEER DATE

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 14 THRU BC (12)- 14 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

EXCEPTIONS = NONE
EQUATIONS = 197+54.73 (BK)
197+79.30 (AH)
RAILROAD CROSSINGS = NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012)

SUBMITTED FOR LETTING: 3/31/21
DESIGN ENGINEER

RECOMMENDED FOR LETTING: 3/31/2021
DocuSigned by: James Athins M
AREA ENGINEER

APPROVED FOR LETTING: 3/31/2021
DocuSigned by: Kool Paramanantham
DISTRICT ENGINEER

FILE: T:\PARTPDD\FM 275*2277-01-010*2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\A001 - TITLE SHEET.dgn
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10, 10A-10B	ESTIMATE & QUANTITY
11-18	QUANTITY SUMMARIES
	TRAFFIC CONTROL PLAN
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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "**" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Katie J Vick, P.E. — 03/30/2021

NAME — DATE

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

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

James Good — 3/31/21

NAME — DATE

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Texas Department of Transportation

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2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		2

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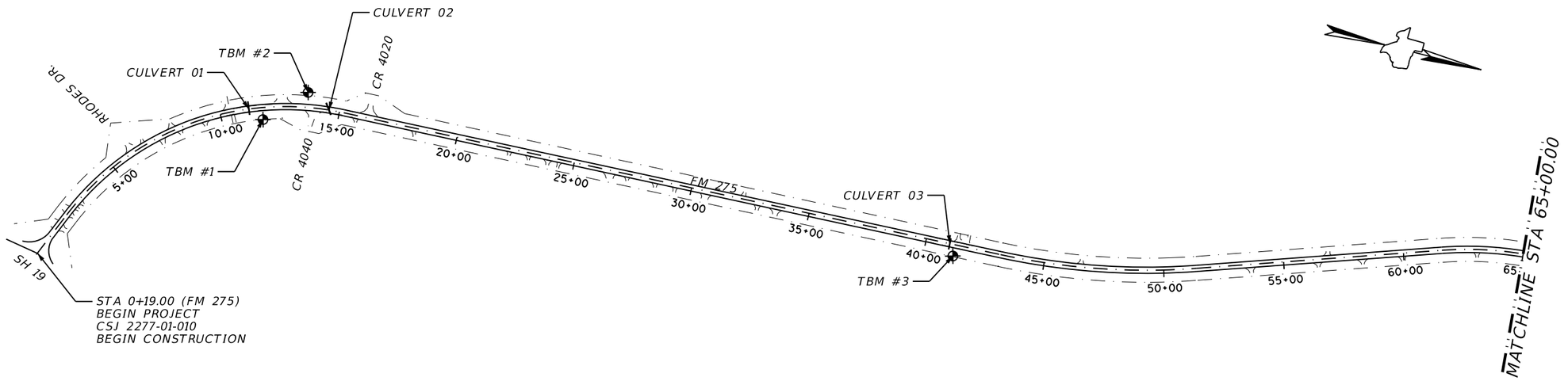

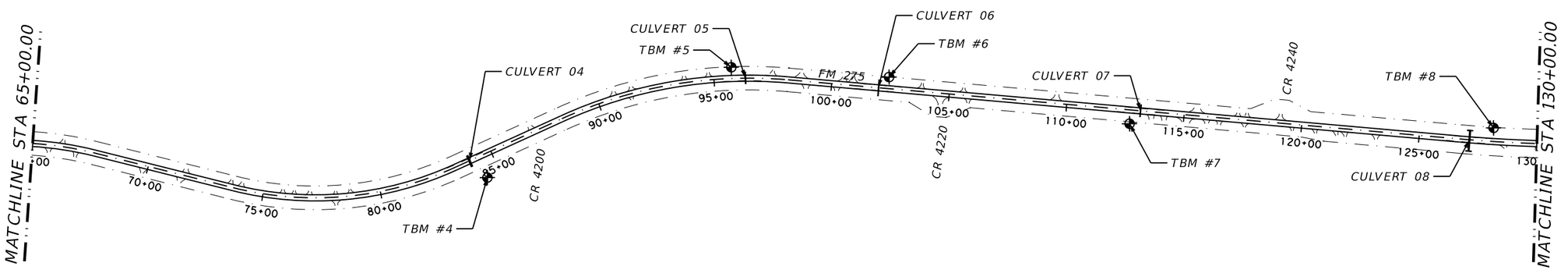

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- BENCHMARK

TBM	NORTHING	EASTING	ELEV.	DESCRIPTION
1	7016175.83	2808424.12	484.29	60D NAIL IN POWER POLE
2	7016329.70	2808267.58	482.39	60D NAIL IN POWER POLE
3	7019098.91	2808258.54	501.54	60D NAIL IN POWER POLE
4	7017915.47	2811284.62	455.94	60D NAIL IN POWER POLE
5	7018800.15	2810575.05	467.16	60D NAIL IN 8" HACKBERRY TREE
6	7019458.28	2810448.11	475.20	60D NAIL IN 20" HACKBERRY TREE
7	7020494.46	2810385.15	473.03	60D NAIL IN POWER POLE
8	7021993.06	2810017.53	454.96	60D NAIL IN 18" ELM TREE

0 250 500

SCALE: 1 = 500'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

PROJECT LAYOUT

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		3

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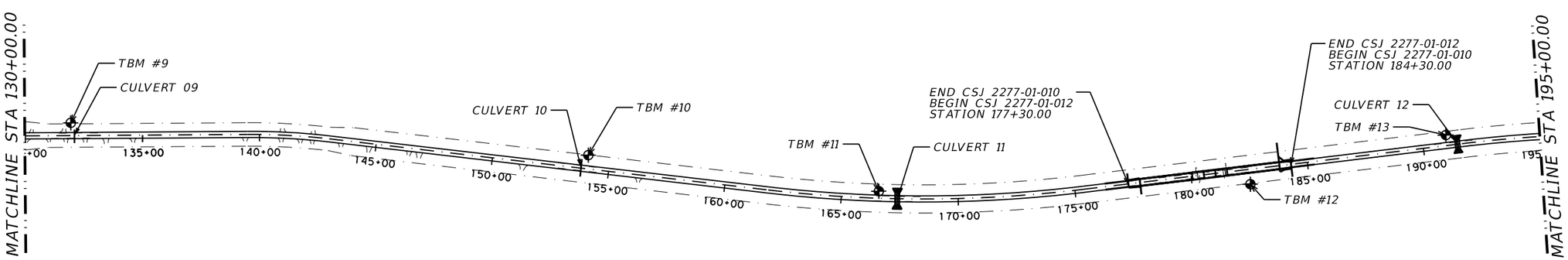

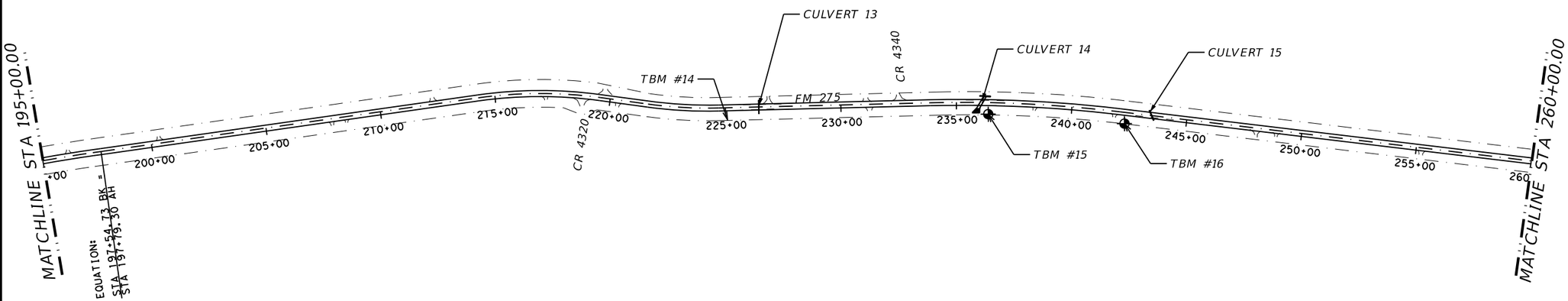

TBM	NORTHING	EASTING	ELEV.	DESCRIPTION
9	7027886.19	2806632.59	462.46	60D NAIL IN FENCE POST
10	7030098.94	2806520.51	441.23	60D NAIL IN ELM TREE
11	7031349.39	2806533.88	409.50	BOLT ON SIGN BASE
12	7032923.44	2806325.57	411.71	60D NAIL IN 30" ELM TREE
13	7033729.85	2806023.07	409.41	60D NAIL IN 8" HACKBERRY TREE
14	7030904.15	2808685.41	411.50	60D NAIL IN POWER POLE
15	7032022.47	2808535.10	434.60	60D NAIL IN 18" HACKBERRY TREE
16	7032612.66	2808509.38	466.50	60D NAIL IN RAILROAD TIE

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY

0 250 500

SCALE: 1 = 500'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

PROJECT LAYOUT

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		4

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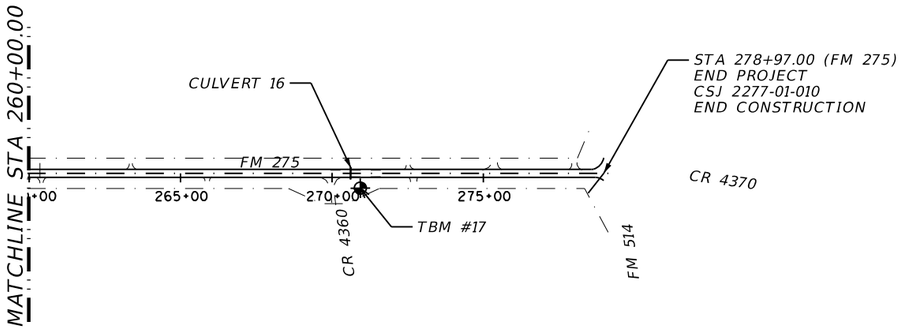

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- BENCHMARK

TBM	NORTHING	EASTING	ELEV.	DESCRIPTION
17	7041645.68	2806199.82	466.50	60D NAIL IN POWER POLE

0 250 500

SCALE: 1 = 500'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

PROJECT LAYOUT

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		5

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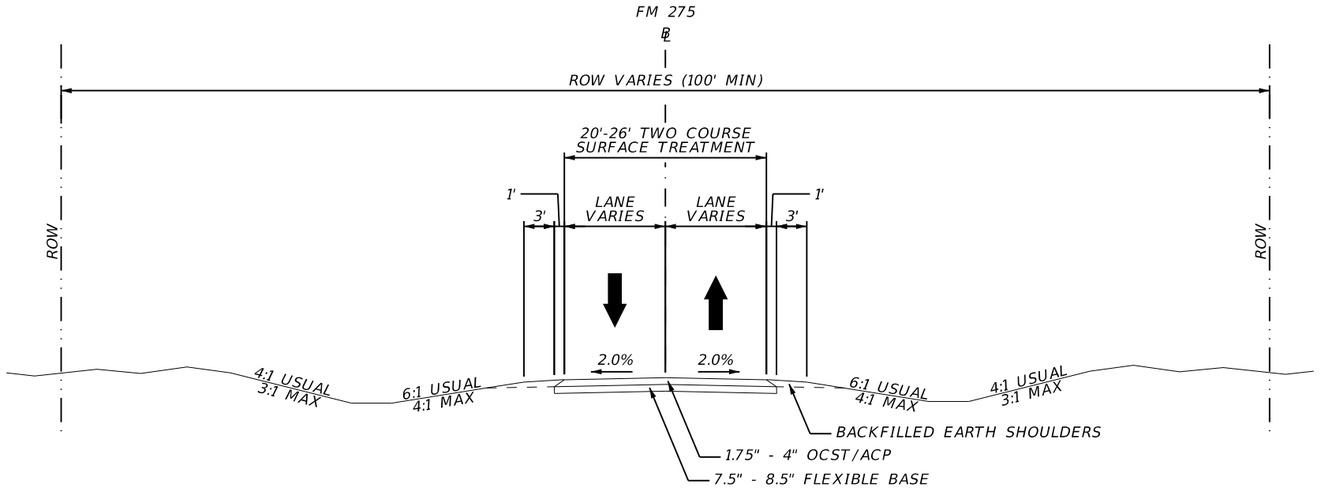
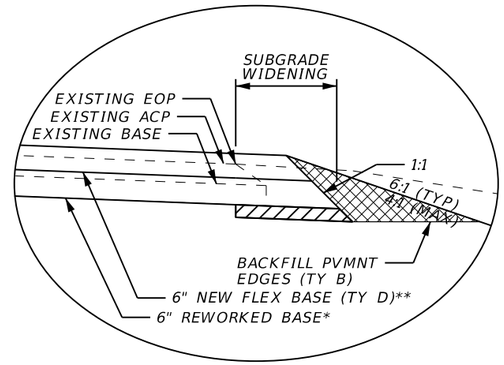


EXISTING TYPICAL SECTION

STA 0+19.00 TO STA 180+27.60
STA 181+47.60 TO 278+97.00
(EXISTING BRIDGE LIMITS: 180+27.60 TO 181+47.60)



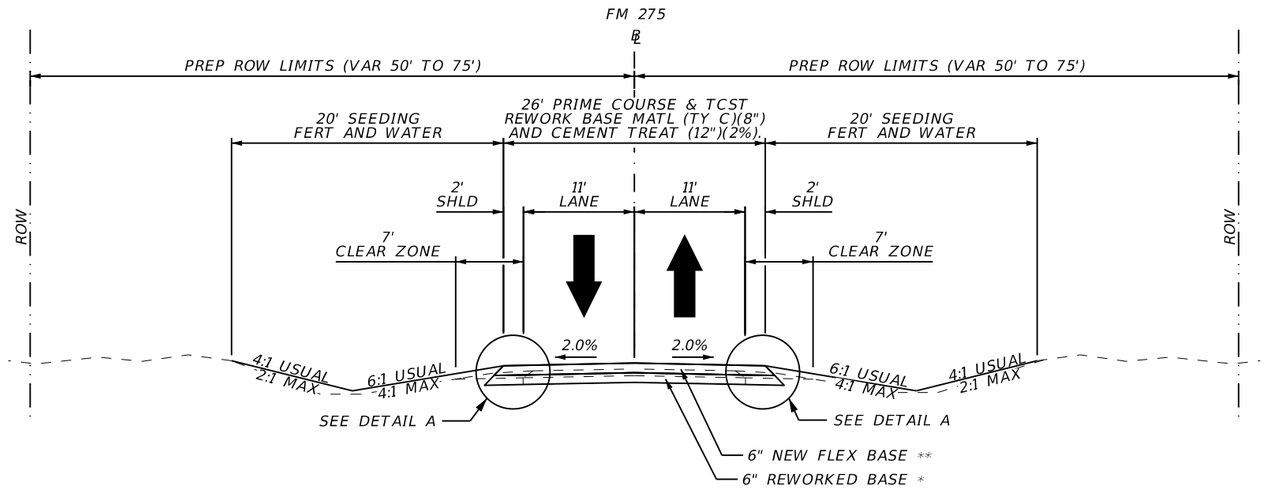
DETAIL A

N.T.S.
(APPLIES TO BOTH SIDES)

NOTES:

* SCARIFY AND REWORK EXISTING ACP SURFACE AND FLEXBASE FROM A 8" DEPTH @ 20' WIDTH TO A BASE DEPTH OF 6" @ 26'.

** CEMENT TREAT NEW FLEX BASE & REWORKED BASE MATERIAL MONOLITICALLY TO 12" AT 2% CEMENT BY WEIGHT



PROPOSED TYPICAL SECTION

STA 0+19.00 TO STA 180+05.00
STA 181+55.00 TO 278+97.00

SEE BRIDGE SHEETS FOR STA 180+05.00 TO STA 181+55.00

0' 15' 30'

Scale: 1"=30'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
TYPICAL SECTIONS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		6

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FM275

001 CUR FM275-1 CUR FM275-2 CUR FM275-3 CUR FM275-4 CUR FM275-5 CUR FM275-6 CUR-
FM275-7 CUR FM275-8 CUR FM275-9 002 CUR FM275-10 CUR FM275-11 CUR FM275-12 003

Beginning chain FM275 description

Point 001 N 7,015,402.6625 E 2,809,203.4944 Sta 0+13.00

Course from 001 to PC FM275-1 N 67° 09' 06.13" W Dist 207.1000

Curve Data

Curve FM275-1					
P.I. Station	9+48.96	N	7,015,766.0879	E	2,808,340.9755
Delta =	64° 55' 00.00" (RT)				
Degree =	5° 00' 00.00"				
Tangent =	728.8577				
Length =	1,298.3333				
Radius =	1,145.9156				
External =	212.1552				
Long Chord =	1,229.9940				
Mid. Ord. =	179.0127				
P.C. Station	2+20.10	N	7,015,483.0779	E	2,809,012.6443
P.T. Station	15+18.43	N	7,016,494.3912	E	2,808,312.5509
C.C.		N	7,016,539.0805	E	2,809,457.5948
Back = N	67° 09' 06.13" W				
Ahead = N	2° 14' 06.13" W				
Chord Bear = N	34° 41' 36.13" W				

Course from PT FM275-1 to PC FM275-2 N 2° 14' 06.13" W Dist 2,797.4667

Curve Data

Curve FM275-2					
P.I. Station	47+29.57	N	7,019,703.0880	E	2,808,187.3201
Delta =	16° 26' 00.00" (LT)				
Degree =	2° 00' 00.00"				
Tangent =	413.6731				
Length =	821.6667				
Radius =	2,864.7890				
External =	29.7129				
Long Chord =	818.8532				
Mid. Ord. =	29.4079				
P.C. Station	43+15.90	N	7,019,289.7297	E	2,808,203.4529
P.T. Station	51+37.57	N	7,020,094.9966	E	2,808,054.9075
C.C.		N	7,019,178.0062	E	2,805,340.8433
Back = N	2° 14' 06.13" W				
Ahead = N	18° 40' 06.13" W				
Chord Bear = N	10° 27' 06.13" W				

Course from PT FM275-2 to PC FM275-3 N 18° 40' 06.13" W Dist 1,022.6333

Curve Data

Curve FM275-3					
P.I. Station	64+66.41	N	7,021,353.9230	E	2,807,629.5589
Delta =	24° 08' 00.00" (RT)				
Degree =	4° 00' 00.00"				
Tangent =	306.2072				
Length =	603.3333				
Radius =	1,432.3945				
External =	32.3638				
Long Chord =	598.8832				
Mid. Ord. =	31.6487				
P.C. Station	61+60.20	N	7,021,063.8262	E	2,807,727.5728
P.T. Station	67+63.53	N	7,021,658.7385	E	2,807,658.7212
C.C.		N	7,021,522.3214	E	2,809,084.6049
Back = N	18° 40' 06.13" W				
Ahead = N	5° 27' 53.87" E				
Chord Bear = N	6° 36' 06.13" W				

Course from PT FM275-3 to PC FM275-4 N 5° 27' 53.87" E Dist 607.8667

Curve Data

Curve FM275-4					
P.I. Station	78+71.61	N	7,022,761.7830	E	2,807,764.2515
Delta =	38° 30' 00.00" (LT)				
Degree =	4° 00' 00.00"				
Tangent =	500.2145				
Length =	962.5000				
Radius =	1,432.3945				
External =	84.8295				
Long Chord =	944.4941				
Mid. Ord. =	80.0866				
P.C. Station	73+71.40	N	7,022,263.8421	E	2,807,716.6126
P.T. Station	83+33.90	N	7,023,181.1316	E	2,807,491.5587
C.C.		N	7,022,400.2592	E	2,806,290.7289
Back = N	5° 27' 53.87" E				
Ahead = N	33° 02' 06.13" W				
Chord Bear = N	13° 47' 06.13" W				

Course from PT FM275-4 to PC FM275-5 N 33° 02' 06.13" W Dist 497.3000

Curve Data

Curve FM275-5					
P.I. Station	93+34.02	N	7,024,019.5729	E	2,806,946.3393
Delta =	29° 30' 00.00" (RT)				
Degree =	3° 00' 00.00"				
Tangent =	502.8240				
Length =	983.3333				
Radius =	1,909.8593				
External =	65.0823				
Long Chord =	972.5078				
Mid. Ord. =	62.9376				
P.C. Station	88+31.20	N	7,023,598.0367	E	2,807,220.4547
P.T. Station	98+14.53	N	7,024,521.4401	E	2,806,915.3357
C.C.		N	7,024,639.1999	E	2,808,821.5611
Back = N	33° 02' 06.13" W				
Ahead = N	3° 32' 06.13" W				
Chord Bear = N	18° 17' 06.13" W				

Course from PT FM275-5 to PC FM275-6 N 3° 32' 06.13" W Dist 2,857.3667

Curve Data

Curve FM275-6					
P.I. Station	128+36.95	N	7,027,538.1016	E	2,806,728.9771
Delta =	3° 18' 00.00" (LT)				
Degree =	1° 00' 00.00"				
Tangent =	165.0456				
Length =	330.0000				
Radius =	5,729.5780				
External =	2.3767				
Long Chord =	329.9544				
Mid. Ord. =	2.3757				
P.C. Station	126+71.90	N	7,027,373.3700	E	2,806,739.1537
P.T. Station	130+01.90	N	7,027,701.9743	E	2,806,709.3349
C.C.		N	7,027,020.0906	E	2,801,020.4775
Back = N	3° 32' 06.13" W				
Ahead = N	6° 50' 06.13" W				
Chord Bear = N	5° 11' 06.13" W				

Course from PT FM275-6 to PC FM275-7 N 6° 50' 06.13" W Dist 946.7000

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

HORIZONTAL DATA

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		7

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FM275 (CONT.)

Curve Data

Curve FM275-7

P.I. Station	141+23.82	N	7,028,815.9187	E	2,806,575.8141
Delta =	7° 00' 00.00" (RT)				
Degree =	2° 00' 00.00"				
Tangent =	175.2180				
Length =	350.0000				
Radius =	2,864.7890				
External =	5.3534				
Long Chord =	349.7824				
Mid. Ord. =	5.3434				
P.C. Station	139+48.60	N	7,028,641.9460	E	2,806,596.6670
P.T. Station	142+98.60	N	7,028,991.1360	E	2,806,576.3186
C.C.		N	7,028,982.8878	E	2,809,441.0957
Back = N	6° 50' 06.13" W				
Ahead = N	0° 09' 53.87" E				
Chord Bear = N	3° 20' 06.13" W				

Course from PT FM275-7 to PC FM275-8 N 0° 09' 53.87" E Dist 1,888.2000

Curve Data

Curve FM275-8

P.I. Station	168+64.94	N	7,031,557.4656	E	2,806,583.7075
Delta =	13° 30' 00.00" (LT)				
Degree =	1° 00' 00.00"				
Tangent =	678.1402				
Length =	1,350.0000				
Radius =	5,729.5780				
External =	39.9920				
Long Chord =	1,346.8794				
Mid. Ord. =	39.7148				
P.C. Station	161+86.80	N	7,030,879.3282	E	2,806,581.7550
P.T. Station	175+36.80	N	7,032,217.3218	E	2,806,427.2980
C.C.		N	7,030,895.8245	E	2,800,852.2008
Back = N	0° 09' 53.87" E				
Ahead = N	13° 20' 06.13" W				
Chord Bear = N	6° 35' 06.13" W				

Course from PT FM275-8 to PC FM275-9 N 13° 20' 06.13" W Dist 1,628.5023

Curve Data

Curve FM275-9

P.I. Station	194+42.18	N	7,034,071.3331	E	2,805,987.8310
Delta =	5° 32' 00.00" (RT)				
Degree =	1° 00' 00.00"				
Tangent =	276.8819				
Length =	553.3333				
Radius =	5,729.5780				
External =	6.6863				
Long Chord =	553.1183				
Mid. Ord. =	6.6785				
P.C. Station	191+65.30	N	7,033,801.9165	E	2,806,051.6924
P.T. Station	197+18.64	N	7,034,345.6521	E	2,805,950.2457
C.C.		N	7,035,123.4138	E	2,811,626.7896
Back = N	13° 20' 06.13" W				
Ahead = N	7° 48' 06.13" W				
Chord Bear = N	10° 34' 06.13" W				

Course from PT FM275-9 to 002 N 7° 48' 06.13" W Dist 36.0927

Equation: Sta 197+54.73 (BK) = Sta 197+79.30 (AH)

End Region 1
Begin Region 2

Point 002 N 7,034,381.4107 E 2,805,945.3463 Sta 197+79.30

Course from 002 to PC FM275-10 N 7° 48' 06.13" W Dist 1,648.1507

Curve Data

Curve FM275-10

P.I. Station	216+93.03	N	7,036,277.4287	E	2,805,685.5667
Delta =	15° 50' 00.00" (RT)				
Degree =	3° 00' 00.00"				
Tangent =	265.5812				
Length =	527.7778				
Radius =	1,909.8593				
External =	18.3772				
Long Chord =	526.1000				
Mid. Ord. =	18.2020				
P.C. Station	214+27.45	N	7,036,014.3058	E	2,805,721.6180
P.T. Station	219+55.23	N	7,036,540.4048	E	2,805,722.6736
C.C.		N	7,036,273.5597	E	2,807,613.7993
Back = N	7° 48' 06.13" W				
Ahead = N	8° 01' 53.87" E				
Chord Bear = N	0° 06' 53.87" E				

Course from PT FM275-10 to PC FM275-11 N 8° 01' 53.87" E Dist 210.2616

Curve Data

Curve FM275-11

P.I. Station	223+18.96	N	7,036,900.5639	E	2,805,773.4935
Delta =	9° 10' 00.00" (LT)				
Degree =	2° 59' 34.61"				
Tangent =	153.4652				
Length =	306.2755				
Radius =	1,914.3593				
External =	6.1414				
Long Chord =	305.9490				
Mid. Ord. =	6.1218				
P.C. Station	221+65.49	N	7,036,748.6039	E	2,805,752.0513
P.T. Station	224+71.77	N	7,037,053.9990	E	2,805,770.4535
C.C.		N	7,037,016.0778	E	2,803,856.4698
Back = N	8° 01' 53.87" E				
Ahead = N	1° 08' 06.13" W				
Chord Bear = N	3° 26' 53.87" E				

Course from PT FM275-11 to PC FM275-12 N 1° 08' 06.13" W Dist 913.8897

Curve Data

Curve FM275-12

P.I. Station	237+98.03	N	7,038,380.0050	E	2,805,744.1817
Delta =	8° 14' 00.00" (RT)				
Degree =	1° 00' 00.00"				
Tangent =	412.3765				
Length =	823.3333				
Radius =	5,729.5780				
External =	14.8209				
Long Chord =	822.6251				
Mid. Ord. =	14.7826				
P.C. Station	233+85.66	N	7,037,967.7094	E	2,805,752.3504
P.T. Station	242+08.99	N	7,038,789.2209	E	2,805,795.1399
C.C.		N	7,038,081.2056	E	2,811,480.8042
Back = N	1° 08' 06.13" W				
Ahead = N	7° 05' 53.87" E				
Chord Bear = N	2° 58' 53.87" E				

Course from PT FM275-12 to 003 N 7° 05' 53.87" E Dist 3,704.3322

Point 003 N 7,042,465.1616 E 2,806,252.8915 Sta 279+13.32

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Ending chain FM275 description

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

HORIZONTAL DATA

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		8

DATE: 3/29/2021 11:10:43 AM
FILE: I:\PAR\PDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\A042 - HORIZONTAL DATA.dgn

GENERAL NOTES

General:

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

Greenville Area Office
James Atkins II, P.E. - James.Atkins@txdot.gov
Willie Bolden II, P.E. – Willie.Bolden@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.

Earthwork cross sections for bridge replacement may be obtained from the Area Engineer's office. Dispose of waste materials at an approved site. Furnish written approval from the property owner before disposal of waste materials.

Locate equipment a minimum of 30 feet from roadway when possible. Place signs and barricades as approved.

Stockpile sites for construction materials must be approved. Give at least 48 hours notification prior to stockpiling material.

Item 2 Instructions to Bidders:

View plans on-line or download from the web at:
http://www.txdot.gov/business/letting-bids/plans-online.html

Order plans from any of the plan reproduction companies shown on the web at:
http://www.txdot.gov/business/letting-bids/repro-companies.html

Item 5 Control of the Work:

The responsibility for the construction surveying on this contract will be in accordance with Section 5.9.3, Method C.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Work Week.

Right and left are determined based upon the forward direction of stationing in the specific control section.

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.

Item 8 Prosecution and Progress:

Before beginning work on this project submit in writing, for approval, a plan of construction operations outlining in detail a sequence of work to be followed.

Provide a Bar Chart progress schedule for this project.

This project includes SP 008---003 which allows up to a 90-day delay to begin work on the project to allow for flexibility in material availability.

SP 008-003 is required to allow for TxDOT to properly staff this project either with in-house or contract forces. This SP also allows the contractor ample time to obtain and schedule resources, material and manpower to ensure continuous prosecution of the work.

Item 9 Measurement and Payment:

Items of work for the Monthly Estimate will be cut off on the 25th of each month. Items of work performed after the 25th will be processed and paid on the following month's estimate. Material On Hand (MOH) will cut off on the 20th of each month. Special circumstances will be considered on a case by case basis.

Item 100 Preparing Right of Way:

Remove all trees 40 foot from centerline on both sides of roadway. At cross structures, remove trees to ROW line and within 100' of the structure, parallel to the roadway. Remove underbrush and neatly trim trees and overhanging branches to produce a 60' vertical clear area within the limits of Prep ROW. Remove any trees or underbrush that interferes with any construction operation, including relocation of ditches or other drainage elements. Receive approval of equipment used to trim limbs. A boom axe will not be allowed. Remove all trimmed debris from the ROW or mulch all debris and incorporate into the topsoil on State ROW to the satisfaction of the Engineer.

Item 110 Excavation:

Material below finished subgrade elevation suspected of containing sulfates will be tested in accordance with Tex -145-E by the Department. Treat subgrade material to the required depth and width in accordance with the Soil Sulfates Mitigation General Notes.

Before excavation operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

Item 112 Subgrade Widening:

Limit daily subgrade widening operations to the amount of base widening (proposed depth) that can be completed daily.

All pavement edge drop-offs, at end of day, shall be backfilled in accordance with Edge Treatment Condition I on the "Treatment for Various Edge Conditions" sheet. Backfill material shall be approved by the Engineer.

Item 132 Embankment:

Test potential embankment sources using Tex-145-E to determine the presence and concentration of sulfates. Do not bring soil with greater than 3000 ppm sulfates into project.

Embankment sources containing sulfates that meet specification requirements may be used as fill material provided it is placed with at least one foot of separation from materials to be treated with lime, cement, or other calcium-based stabilizers. When soils are to be placed with less than one foot of separation from material to be treated with lime, cement, or other calcium based stabilizers, process and treat such soils according to the Soil Sulfates Mitigation General Notes.

Excavation pits for project embankment made within 250 feet of State Right of Way must be approved.

Before embankment operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

County: RAINS **Control:** 2277-01-010, ETC.

Item 134 Backfilling Pavement Edges:

The backfill material source shall be approved.

Dirt driveway shaping/construction will be subsidiary to Item 134.

Item 152 Road Grader Work:

Use road grader work to windrow sod (6" depth), construct slopes, construct/repair dirt driveways, prepare driveways for surfacing, grade ditches as necessary to establish drainage and redistribute sod on finished slopes.

Cut ditches to proposed grade in the immediate vicinity of cross drain structures prior to placing Storm Water BMP devices at the early stages of the project.

If excess material is generated under this item, it may be utilized to construct slopes, or wasted as approved.

Item 164 Seeding for Erosion Control, 166 Fertilizer:

Apply fertilizer with a ratio of 3-1-2 (N-P-K) over the areas to be seeded. This work will not be paid for directly, but will be considered subsidiary.

Item 168 Vegetative Watering:

Use water trucks equipped with a sprinkler system adequate to permit coverage of the entire seeded area from the roadbed. This equipment must be available to perform watering throughout the duration of vegetative establishment.

Water all seeded areas the day seed is applied. Thereafter, maintain the seeded areas in a well-watered condition throughout the duration of vegetative establishment.

Item 247 Flexible Base:

Grading requirements
Tests to be in accordance with TxDOT Standard Test Methods

Soil Constants

Item Desc.	Linear Shrinkage	LL	Wet Ball	WBMV(incr. passing #40 sieve)
Item 247 Flex Base	6.0 max.	40 max.	40 max.	20% max.

PERCENT RETAINED ON SIEVE:

1-3/4”	7/8”	3/8”	No. 4	No. 40
0	10-35	30-50	45-65	70-85

Flexible Base will not contain more than 1% by weight of clay balls.
Place blue top hubs for alignment and elevations of new base at centerline and edge of pavement.

Measure roadway profile smoothness prior to the cover prime or prime course application.

Provide all profile measurements to the Engineer in electronic data files prior to the placement of the prime/cover prime coat using the format specified in Tex-1001-S. The Engineer will use Department software to evaluate longitudinal profiles to determine areas requiring corrective action. Correct 0.1-mi. sections having an average international roughness index (IRI) value greater than 100.0 in. per mile to an IRI value of 100.0 in. per mile or less. The average IRI for the left and right wheel paths will be used to determine acceptance for each 0.1-mi. section. However, the Engineer reserves the right to have the contractor correct isolated imperfections even if the 0.1-mi. section has a passing IRI. This work will be performed at the contractor’s expense. Once all corrections have been made, the prime/cover prime coat may be applied.

Re-profile and correct sections that fail to maintain ride quality until placement of the first seal coat, as directed. Correct re-profiled sections until specification requirements are met, as approved. In the spirit of partnering, the department will participate in 50% of an agreed upon cost of repair for any section that has to be subjected to traffic throughout the winter with only a cover prime coat.

Item 251 Reworking Base Courses:

Full depth HMAC patching and stabilized areas of various depths are to be expected and are to be reworked into existing base. Stabilized areas may include but are not limited to cement, fly ash, or asphalt treated base.

Areas with deep asphaltic patching or widening will require processing and relocation operations to incorporate additional flex base to reduce the asphaltic material ration to a 50% maximum by volume. This work will be subsidiary to this Item.

The finished roadway must match existing grades at project limits, highway intersections and

bridges. In these areas, salvage existing base and remove sufficient subgrade material to construct the full-depth proposed pavement section, according to the transition details shown in the plans. This removal will not be paid for directly, but will be considered subsidiary to the various bid items. Excess subgrade material generated by these transitions may be utilized to construct slopes, or wasted as approved by the Engineer.

Item 275 Cement Treatment (Road Mixed):

Microcracking is required where flexible base widths accept full roller width. When temperatures during curing period average below 60 degrees F, perform microcracking operations between 48 and 72 hours.

Subgrade, embankment or backfill suspected of containing sulfates will be tested in accordance with Tex-145-E by the Department. Subgrade, embankment or backfill material within one foot of any area to be treated using cement is subject to the following restriction:

Greater than 7,000 ppm sulfates – Do not treat with any cement or other calcium based stabilizers. Material within one foot of any area to be treated with cement or other calcium based stabilizers must be removed or processed as directed.

Item 300 Asphalts, Oils, and Emulsions:

Provide 1L (1qt.) clean and dry screw top or friction-lid sampling cans as directed.

Furnish at least one sample of each type of asphalt used on the project for QA/QC purposes.

Item 302 Aggregates for Surface Treatments:

Grade 5 Modified Grading Requirements
CUMULATIVE PERCENT RETAINED ON SIEVE:

1/2”	3/8”	No. 4	No. 8	No. 200
0	0-5	30-80	85-100	95-100

The decantation requirement for Grade 5 Modified aggregate is 4% maximum.

The requirements for Flakiness Index, Magnesium Sulfate Soundness, and Los Angeles Abrasion are waived for the Grade 5 Modified aggregate.

Use unmodified AC or PG for pre-coating aggregate. Emulsion pre-coating will not be allowed.

Use liquid antistrip or other approved antistrip agent complying with the requirements of Item 301 Asphalt Antistripping Agents. The aggregate will be evaluated for moisture susceptibility using test method TEX-530-C.

Item 316 Surface Treatments:

Unless otherwise permitted by the Engineer in writing, the open season for asphalt placement will be:

May 15- August 31 for AC

Permission to place asphalt outside of the open season may require the contractor to place a fog seal at the contractor's expense.

***Rates For Construction Projects**

First Course

ITEM	APPLICATION	
	Cover Prime	1st Course
*Asphalt Type	RC-250	AC-20-5TR or AC-20XP
*Asph. Rate (Gal/SY)	0.28	0.46
Aggregate Type	B or L	B
Aggregate Grade	5 or Mod 5	3
Aggr. Rate (CY/SY)	1:140	1:105
Min. Cure Time	14 days **	

Second Course

ITEM	APPLICATION
	2nd Course
*Asphalt Type	AC-20-5TR or AC-20XP
*Asph. Rate (Gal/SY)	0.36
Aggregate Type	PB
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

* The information above is intended to provide general guidance and as a basis of estimate. Based on the season and weather conditions at the time, the engineer will determine the asphalt type and rates to be used at the time of application.
** Or as approved by the Engineer

Item 340 Dense-Graded Hot-Mix Asphalt (Small Quantity):

All surface mixes are to be SAC A.

RAS is not allowed in surface mixes.

Use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It shall have a minimum storage capacity of approximately 25 tons. It shall be equipped with a pivoting discharge conveyor and shall completely and thoroughly remix

the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver shall have a surge storage insert with a minimum capacity of 20 tons.

Specify Hot Mix Asphalt Concrete (HMAC) or Warm Mix Asphalt (WMA) at the time of design submittal. After design submittal, continue producing the chosen design unless otherwise approved.

RAP from contractor owned sources may be used if the RAP is fractionated. The course fraction of contractor owned RAP will not be allowed if it consists primarily of siliceous aggregates.
A tack coat is required for all overlay areas and for all longitudinal joints unless otherwise directed.

Evaluation of the mixture for moisture susceptibility will be performed by using test method TEX 530-C (boil test) and there shall be no evidence of stripping during design verification or at any time during production.

The maximum nighttime paved surface vertical differential will be limited to two inches. Prevent ponding of water on any travel ways that are exposed to traffic.

Perform all sampling for aggregate quality testing on stockpiles at the HMAC plant. Mixture sampling for QC/QA testing will typically be taken from the truck at the plant; however, the Engineer may direct that a sample be taken at any point or location of mixture during production, delivery or placement.

Preparation and construction of permanent / temporary transitions, terminations of mix courses and transitions to driveways and intersecting roadways is subsidiary to Item 340. This includes all labor, machinery, materials and incidentals to complete the work including planing, removal, hauling and stockpiling of materials and necessary clean-up.

Item 400 Excavation and Backfill for Structures:

Excavation and backfill for bridge, culvert and Safety End Treatment construction/installation will be subsidiary to Item 462, 464, 466, and 467.

Pavement markings and RPM replacement will be subsidiary to "Cut and Restore Pavement".

Item 402 Trench Excavation Protection

Submit a Trench Excavation Protection Plan to the Engineer a minimum of three weeks prior to use. The excavation support plan shall address excavation/protection methods, work sequencing, traffic control, backfill operations, etc.

Item 416 Drill Shaft Foundations:

One core hole per bent/abutment required.

Concrete riprap is required for drill shaft foundations for Roadway Illumination Assemblies as shown on standard sheet RID (FND).

Provide single pole watertight breakaway electrical connectors shown on the TxDOT's Material Producer List (MPL) in the file "Roadway Illumination and Electrical Supplies." See the latest RID (LUM2) standard for additional details.

Item 420 ~ Concrete Structures:

Do not use membrane curing for structural elements.

Item 421 Hydraulic Cement Concrete:

Bridge deck target air entrainment shall be between 3.0% and 5.5%.

If the Contractor elects to use air entrainment in concrete when not required, the upper spec limit will not be waived.

Ground contacting concrete shall be sulfate resistant mix design.

Item 432 Riprap:

The Engineer may adjust placement of riprap in the field.

Filter fabric is required for stone riprap.

Bridge demolition waste concrete may be used for stone rip rap. Cut protruding rebar within 2" of concrete surface. Maximum waste concrete cobble size shall match proposed stone rip rap Dmax size.

Item 450 ~ Railing:

Removed bridge rail shall be retained by the contractor.

Item 454 Bridge Expansion Joint:

Materials used are to be approved by the Engineer before installation begins.

All Asphalt saw cutting and removal work, as well as block-out cleaning, required during the bridge joint repair will be subsidiary to this item and not paid for directly.

Item 462 Concrete Box Culverts and Drains

Required excavation and backfill will be subsidiary to this Item.

Item 464 Reinforced Concrete Pipe:

Required excavation and backfill will be subsidiary to this Item.

Concrete pipe collars shall be subsidiary this item.

Item 466 Headwalls and Wingwalls:

Unless shown in plans to obtain from offsite source, obtain headwall and wingwall backfill from ROW and perform grading to shape ditch to headwall/wingwall, per Engineers directions. This work will be subsidiary to this Item.

Riprap apron, between wingwalls, will be subsidiary to this Item.

Required excavation, backfill and pipe saw cutting will be subsidiary to this Item.

Removed headwalls and wingwalls may be broken into riprap size pieces (12" average diameter) for use as stone riprap on the project. Cut protruding steel reinforcement flush with concrete pieces. Broken concrete and riprap must be stored according to the requirements for material stockpiles indicated on the BC standards.

Item 467 Safety End Treatment:

Parallel pipe culverts ~ 30" diameter and smaller require precast SET unless directed by the Engineer to use cast-in-place SETs when precast SETs would project over 3" above surrounding ground surface or when otherwise indicated in the plans. Additional work to install cast in place SETs will be subsidiary to this Item.

Cross pipe culverts ~ 30" diameter and smaller require precast SET unless indicated otherwise in the plans.

Repair damage culvert ends prior to SET installation. Straighten CMP ends by straightening or cutting off damaged ends. Paint cut off ends with zinc paint. Repair minor damaged RCP ends with epoxy mortar. This work will be subsidiary to this Item.

When necessary to close connection gaps, grout precast SETs to culvert ends. Materials, labor and equipment will be subsidiary to this item.

On existing CMP parallel culverts with mitered metal ends, construct concrete cast in place SETs or remove the mitered ends and install precast or cast-in-place SETs. Replace/remove existing mitered metal ends that are not 6:1 or flatter.

Required excavation, backfill and pipe saw cutting will be subsidiary to this Item.

Unless shown in the plans to obtain backfill from offsite source, obtain SET backfill from the Right-of-Way. This work will be subsidiary to this Item.

Placement of concrete Riprap between multiple SETs on multiple barrel culverts will be subsidiary to this Item.
During SET installation, unless indicated otherwise in the plans, match SET flow line grade with the culvert flow line grade.
Removal and disposal of existing headwalls for parallel culverts will be subsidiary to this Item. Removed concrete headwalls and wingwalls may be broken into riprap size pieces (12" average diameter) for use as stone riprap. Cut protruding steel reinforcement. Broken concrete and riprap must be stored according to the requirements for material stockpiles indicated on BC(10)-14.

Item 472 Removing and Re-Laying Culvert:

Seal reinforced concrete pipe joints with either the original manufacturers seal or cementitious mortar per DMS-4675.

Required excavation and backfilling will be subsidiary to this Item. Obtain backfill from Right-of-way unless indicated otherwise in the plans.

Item 502 Barricades, Signs and Traffic Handling:

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

All flaggers are required to wear a white hard hat while performing flagging operations.

The traffic control plan for this contract consists of the installation and maintenance of warning signs and other traffic control devices shown in the plans, specification data which may be included in the general notes, applicable provisions of the Texas Manual on Uniform Traffic Control Devices (TMUTCD), traffic control plan sheets included in the plans, standard BC sheets and Item 502 of the Standard Specifications.

Do not begin Item 502, Barricades, Signs, and Traffic Handling, on the roadway until both of the following conditions are met:

1. The work schedule is approved.
2. No more than 5 workdays will pass between the beginning of Item 502 and the actual commencement of roadway work bid items.

The final estimate will be withheld until all disturbed areas are covered with at least 70% perennial vegetative cover.

Correct all deficiencies within the time frame noted on the Traffic Control Device Inspection Form 599. Failure to make corrections within time frame specified may result in no payment for this Item for the month of the noted deficiency.

Provide shadow vehicles equipped with Truck Mounted Attenuators (TMA) as shown on Traffic Control Plan (TCP) standards.

Ensure that all travel lanes are open at night.

Provide pilot car during one lane/two-way traffic operations.

Road closures must be approved by the Engineer. Provide a two-week advance notice to the Engineer prior to desired roadway closure period. Begin display of closure information on PCMBs ten days prior to roadway closure.

Item 506 Temporary Erosion, Sedimentation & Environmental Controls:

The Temporary Erosion Control measures for this project will consist of using the following items, as directed:

1. Temporary Silt Fence
2. Rock Filter Dams: All rock filter dams shall be installed with 6:1 slopes regardless of their location on the project. Failure to do so will result in no payment for the dam.

Silt fences will remain the property of the Contractor upon completion of the project. The final estimate will not be released until all silt fences have been properly removed, or as directed and 70% establishment of vegetative cover is obtained.

Acquire approval for any change to the location of temporary sediment fence, as shown in the plans, prior to installation. Placement of erosion protection devices may be altered, as directed, to satisfy the requirements of the SW3P.

The pay item to remove rock filter dams will require only a partial removal after 70 percent perennial vegetation has been established and approved. When removing the rock filter dams, leave the lower layer of rock adjacent to the ground in place so as not to disturb the soil.

Refer to the SW3P sheet for the total disturbed area for the project.

The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs) within one mile of the project limits will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within one mile of the project limits exceeds five acres, provide a copy of the Contractors NOI for PSLs on the ROW (to the appropriate MS4 operator when on an off-system route).

Item 540 Metal Beam Guard Fence:

Reinstall removed MBGF and SGT's on the same day.

MBGF delineation shall be installed within ten (10) working days of the completion of each MBGF section. Concrete mow strip is not considered to be a part of this work.

Item 542 Removing Metal Beam Guard Fence:

Removed MBGF rail shall be retained by the Contractor.

Item 560 Mailbox Assemblies:

Install new mailboxes unless the property owner chooses to have an existing, compliant mailbox reinstalled. Return all custom non-compliant mailboxes to the property owner.

All new mailboxes furnished and installed by the contractor will display the address number using one inch (1") adhesive back numbering. The color, type, and style of numbering shall be consistent throughout the project.

Install Type 2 Mailbox foundations. Set the mailbox foundations in 12" diameter by 30" deep concrete (Class B) foundations.

Item 644 Small Roadside Sign Support and Assemblies:

Upon removal of sign assemblies, deliver sign faces to TxDOT office at
3001 IH 30 East, Greenville TX.

Use the Southern Plains style triangular slip base for all post types.

Once the cover prime is completed, the Paris District Traffic Operations office will field verify the need and spacing of chevrons. If this verification results in fewer materials, the Paris District will purchase the excess signs at invoice price.
Remove the existing city street and county road topper from city and county signs and install

on the new city street and county road stop sign assemblies. This work will be subsidiary to Item 644.

Stake proposed sign locations and obtain Engineer's approval of locations prior to placing foundations.

Contact the Engineer to obtain updated curve travel speeds before manufacture of curve speed warning signs.

Item 662 Work Zone Pavement Markings:

Non-removable markings may be paint and beads.

Place flexible reflective roadway tabs in accordance with the current WZ (STPM) prior to seal coat operations. Place tabs to indicate the beginning and ending of no passing zones.

Cut, remove and properly dispose of the upright portions of all work zone tabs prior to acceptance of any roadway. Remove entire tab when located on HMAC or concrete surfaces.

Item 666 Reflectorized Pavement Markings:

No stripe will be placed unless the inspector is present and at least 24 hours advance notice has been given by the Contractor.

Lay out pilot lines for approval 24 hours prior to all final pavement marking applications.

Use equipment with footage counters capable of measuring the linear footage placed. Calibrate counters prior to the beginning of striping operations.

Due to problems in traffic handling, do not place a dash center stripe and edge line at the same time.

Contact the Engineer 7 days before pavement marking placement for re-establishment of no-pass zones.

Item 6001 Portable Changeable Message Board:

Two (2) portable changeable message boards are required for advance warning.

Item 6185 Truck Mounted Attenuators:

Shadow vehicles with truck mounted attenuator (TMA) are required on the traffic control plan and TCP standards for this project. The contractor will be responsible for determining if one or more of these traffic control operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

QUANTITY SHEET

CONTROLLING PROJECT ID 2277-01-010 **DISTRICT** Paris **COUNTY** Rains
HIGHWAY FM 275

			CONTROL SECTION JOB		**2277-01-010**		**2277-01-012**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00114605**		**A00122859**			
			COUNTY		**Rains**		**Rains**			
			HIGHWAY		**FM 275**		**FM 275**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA	271.530		7.000		278.530	
	104-6017	REMOVING CONC (DRIVEWAYS)		SY	182.000				182.000	
	110-6001	EXCAVATION (ROADWAY)		CY			20.000		20.000	
	110-6002	EXCAVATION (CHANNEL)		CY	170.000		300.000		470.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)		STA	271.530				271.530	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)		CY	802.000		300.000		1,102.000	
	134-6002	BACKFILL (TY B)		STA	271.530				271.530	
	152-6001	ROAD GRADER WORK (ORD COMP)		STA	271.530				271.530	
	164-6009	BROADCAST SEED (TEMP) (WARM)		SY	61,954.000				61,954.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)		SY	61,954.000				61,954.000	
	164-6015	STRAW/HAY MLCH SEED(PERM)(RURAL)(CLAY)		SY	123,906.000				123,906.000	
	168-6001	VEGETATIVE WATERING		MG	742.000				742.000	
	247-6076	FL BS (CMP IN PLC)(TY D GR 4) (6")		SY	78,442.000				78,442.000	
	247-6096	FL BS (CMP IN PLC)(TY D GR 4)		TON	540.000				540.000	
	251-6034	REWORK BS MTL (TY C) (8") (ORD COMP)		SY	72,408.000				72,408.000	
	275-6001	CEMENT		TON	953.000				953.000	
	275-6023	CEMENT TREAT(MX EXST MTL & NW BS)(12")		SY	78,442.000				78,442.000	
	316-6029	ASPH (RC-250)		GAL	21,964.000				21,964.000	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)		CY	561.000				561.000	
	316-6404	AGGR (TY-PB GR-4 OR TY-PL GR-4 SAC-A)		CY	653.000				653.000	
	316-6405	ASPH (AC-20-5TR OR AC-20XP)		GAL	64,322.000				64,322.000	
	316-6440	AGGR (TY-B GR-3 OR TY-L GR-3)(SAC-B)		CY	747.000				747.000	
	340-6011	D-GR HMA(SQ) TY-B PG64-22		TON			554.000		554.000	
	340-6034	D-GR HMA(SQ) TY-C PG64-22		TON			184.000		184.000	
	400-6005	CEM STABIL BKFL		CY	164.000		62.000		226.000	
	400-6006	CUT & RESTORING PAV		SY	113.000				113.000	
	402-6001	TRENCH EXCAVATION PROTECTION		LF	88.000				88.000	
	416-6002	DRILL SHAFT (24 IN)		LF			486.000		486.000	
	420-6013	CL C CONC (ABUT)		CY			22.000		22.000	
	420-6025	CL C CONC (BENT)		CY			16.000		16.000	
	420-6037	CL C CONC (COLUMN)		CY			8.000		8.000	
	422-6001	REINF CONC SLAB		SF			4,819.000		4,819.000	
	422-6015	APPROACH SLAB		CY			48.000		48.000	
	425-6011	PRESTR CONC SLAB BEAM (4SB15)		LF			1,188.000		1,188.000	
	432-6002	RIPRAP (CONC)(5 IN)		CY	37.000				37.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)		CY	109.000				109.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)		CY			836.000		836.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 2277-01-010 **DISTRICT** Paris **COUNTY** Rains
HIGHWAY FM 275

			CONTROL SECTION JOB		**2277-01-010**		**2277-01-012**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00114605**		**A00122859**			
			COUNTY		**Rains**		**Rains**			
			HIGHWAY		**FM 275**		**FM 275**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	450-6018	RAIL (TY T631)		LF			324.000		324.000	
	462-6054	CONC BOX CULV (6 FT X 3 FT)(EXTEND)		LF	30.000				30.000	
	462-6055	CONC BOX CULV (6 FT X 4 FT)(EXTEND)		LF	51.000				51.000	
	462-6073	CONC BOX CULV (10 FT X 5 FT)(EXTEND)		LF	20.000				20.000	
	464-6001	RC PIPE (CL III)(12 IN)		LF	24.000				24.000	
	464-6002	RC PIPE (CL III)(15 IN)		LF	15.000				15.000	
	464-6003	RC PIPE (CL III)(18 IN)		LF	126.000				126.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF	20.000				20.000	
	464-6010	RC PIPE (CL III)(48 IN)		LF	88.000				88.000	
	466-6103	HEADWALL (CH - PW - 0) (DIA= 48 IN)		EA	2.000				2.000	
	466-6151	WINGWALL (FW - 0) (HW=4 FT)		EA	2.000				2.000	
	466-6152	WINGWALL (FW - 0) (HW=5 FT)		EA	2.000				2.000	
	466-6167	WINGWALL (FW - S) (HW=6 FT)		EA	1.000				1.000	
	466-6195	WINGWALL (PW - 2) (HW=6 FT)		EA	1.000				1.000	
	467-6319	SET (TY II) (12 IN) (CMP) (6: 1) (P)		EA	8.000				8.000	
	467-6326	SET (TY II) (12 IN) (RCP) (6: 1) (P)		EA	14.000				14.000	
	467-6333	SET (TY II) (15 IN) (CMP) (6: 1) (P)		EA	2.000				2.000	
	467-6341	SET (TY II) (15 IN) (RCP) (6: 1) (P)		EA	4.000				4.000	
	467-6348	SET (TY II) (18 IN) (CMP) (6: 1) (P)		EA	44.000				44.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)		EA	108.000				108.000	
	467-6380	SET (TY II) (24 IN) (CMP) (6: 1) (P)		EA	2.000				2.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)		EA	18.000				18.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)		EA	46.000				46.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)		EA	4.000				4.000	
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)		EA	4.000				4.000	
	480-6001	CLEAN EXIST CULVERTS		EA	3.000				3.000	
	496-6006	REMOV STR (HEADWALL)		EA	6.000				6.000	
	496-6007	REMOV STR (PIPE)		LF	252.000				252.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)		EA			1.000		1.000	
	496-6016	REMOV STR (PIPE)		EA	1.000				1.000	
	500-6001	MOBILIZATION		LS	100.00%				100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	21.000				21.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)		LF	1,090.000				1,090.000	
	506-6011	ROCK FILTER DAMS (REMOVE)		LF	1,090.000				1,090.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	1,530.000				1,530.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	1,530.000				1,530.000	
	530-6004	DRIVEWAYS (CONC)		SY	182.000				182.000	

ESTIMATE & QUANTITY

QUANTITY SHEET

CONTROLLING PROJECT ID 2277-01-010 **DISTRICT** Paris **COUNTY** Rains
HIGHWAY FM 275

				CONTROL SECTION JOB	2277-01-010		2277-01-012		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00114605		A00122859			
				COUNTY	Rains		Rains			
				HIGHWAY	FM 275		FM 275			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL		
	530-6005	DRIVEWAYS (ACP)	SY		259.000				259.000	
	530-6008	TURNOUTS (ACP)	SY		1,113.000				1,113.000	
	530-6016	DRIVEWAYS (BASE)	SY		3,048.000				3,048.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF				400.000		400.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF				500.000		500.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA				4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA				4.000		4.000	
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA		3.000				3.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3	EA		37.000				37.000	
	560-6008	MAILBOX INSTALL-D (WC-POST) TY 3	EA		6.000				6.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA		53.000				53.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA		2.000				2.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA		7.000				7.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA		66.000				66.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA		32.000				32.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA				6.000		6.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF		179.000				179.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF		144.000				144.000	
	662-6031	WK ZN PAV MRK NON-REMOV(W)36"(YLD TRI)	EA		5.000				5.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF		7,531.000				7,531.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF		22,332.000				22,332.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA		2,311.000				2,311.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF		144.000				144.000	
	666-6102	REF PAV MRK TY I(W)36"(YLD TRI)(100MIL)	EA		5.000				5.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF		179.000				179.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF		55,119.000				55,119.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF		7,531.000				7,531.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF		22,332.000				22,332.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA		561.000				561.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA		2.000				2.000	
	6185-6002	TMA (STATIONARY)	DAY		330.000				330.000	
	6185-6003	TMA (MOBILE OPERATION)	HR		40.000				40.000	
	18	ENVIRONMENTAL: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000				1.000	

ESTIMATE & QUANTITY

SUMMARY OF ROADWAY ITEMS															PRIME COURSE		FIRST COURSE		SECOND COURSE	
STATION		Length	EXISTING ROADWAY WIDTH (AVG)	PROPOSED ROADWAY WIDTH	0100 6002	0112 6001	0134 6002	0152 6001	0247 6076	0247 6096	0251 6034	0275 6001	0275 6023	0316 6029	0316 6403	0316 6405	0316 6440	0316 6405	0316 6404
					PREPARING ROW	SUBGRADE WIDENING (ORD COMP)	BACKFILL (TY B)	ROAD GRADER WORK (ORD COMP)	FL BS (CMP IN PLC) (TY D GR 4) (6")	FL BS (CMP IN PLC) (TY D GR 4)	REWORK BS MTL (TY C) (8") (ORD COMP)	CEMENT	CEMENT TREAT (MX EXST MTL & NW BS) (12")	ASPH (RC-250)	AGGR (TY B GR-5 OR TY-L GR-5)	ASPH (AC-20-5TR OR AC-20XP)	AGGR (TY-B GR-3 OR TY-L GR-3) (SAC-B)	ASPH (AC-20-5TR OR AC-20XP)	AGGR (TY-PB GR-4 OR TY-PL GR-4) (SAC-A)
FROM	TO	FT	FT	FT	STA	STA	STA	STA	SY	TON	SY	TON	SY	GAL	CY	GAL	CY	GAL	CY
0+19	177+30	17,711	24	26	177.11	177.11	177.11	177.11	51,165	* 360	47,229	622	51,165	14,326	366	23,536	487	18,419	426
184+30	278+97	9,442	24	26	94.42	94.42	94.42	94.42	27,277	* 180	25,179	331	27,277	7,638	195	12,547	260	9,820	227
CSJ 2277-01-010 TOTALS:					271.53	271.53	271.53	271.53	78,442	540	72,408	953	78,442	21,964	561	36,083	747	28,239	653

** ITEM USED FOR CURVE SUPERELEVATION MODIFICATIONS*
EQUATION: 197+54.73 (BK) = 197+79.30 (AH)
CSJ BREAK BETWEEN STA. 177+30 = 184+30

PRIME COURSE:

RC-250 @ 0.28 GAL/SY
GR 5 OR MOD 5 B OR L @ 1CY / 140 SY

CEMENT TREATMENT:

BASED ON AN ASSUMED DRY COMPACTED UNIT WEIGHT OF 135 LBS/CF @ 2% BY WEIGHT

FIRST COURSE:

AC-20-5TR OR AC-20XP @ 0.46 GAL/SY
GR 3 B OR L @ 1 CY / 105 SY

SECOND COURSE:

AC-20-5TR OR AC-20XP @ 0.36 GAL/SY
GR 4 PB OR PL @ 1 CY / 120 SY

SUMMARY OF TRAFFIC CONTROL ITEMS			
LOCATION	6001 6002	6185 6002	6185 6003
	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	DAY	HR
FM 275	2	330	40
CSJ 2277-01-010 TOTALS:	2	330	40

FM 275

QUANTITY SUMMARIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		11

DATE: 3/29/2021 3:23:18 PM
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SUMMARY OF DRIVEWAY AND PARALLEL DRAINAGE ITEMS

LOCATION		DRIVEWAY MATERIAL	LENGTH (L)	WIDTH (W)	RADIUS (R_1)	RADIUS (R_2)	EXISTING PIPE MATERIAL	EXISTING PIPE DIAMETER	104 6017 REMOVING CONC (DRIVEWAYS)	530 6004 DRIVEWAYS (CONC)	530 6005 DRIVEWAYS (ACP)	530 6016 DRIVEWAYS (BASE)	464 6001 RC PIPE (CL III)(12 IN)	464 6002 RC PIPE (CL III)(15 IN)	464 6003 RC PIPE (CL III)(18 IN)	464 6005 RC PIPE (CL III)(24 IN)	467 6319 SET (TY II) (12 IN) (CMP) (6:1) (P	467 6326 SET (TY II) (12 IN) (RCP) (6:1) (P	467 6333 SET (TY II) (15 IN) (CMP) (6:1) (P	467 6341 SET (TY II) (15 IN) (RCP) (6:1) (P	467 6348 SET (TY II) (18 IN) (CMP) (6:1) (P	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P	467 6380 SET (TY II) (24 IN) (CMP) (6:1) (P	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P	480 6001 CLEAN EXIST CULVERTS	496 6007 REMOV STR (PIPE)
STATION	LT/RT		FT	FT	FT	FT		IN	SY	SY	SY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
1+61	LT	CONCRETE	8	37	15	15	CMP	18	44	44											2					
1+74	RT	CONCRETE	8	18	20	20	RCP	18	31	31												2				
2+30	RT	GRASS	8	14	15	15	RCP	18				24			8 *							1				
2+40	LT	CONCRETE	8	26	15	15	CMP	18	34	34											2					
2+67	RT	GRASS	8	12	10	10	RCP	18				18			16 *											
2+98	RT	GRAVEL	8	11	15	15	RCP	18				21										1				
6+01 (RHODES DR)	LT	ASPHAULT	8	9	15	15	RCP	18			19											2				
6+60	LT	GRAVEL	8	9	15	15	RCP	18				19										2				
7+36	RT	CONCRETE	8	15	15	20	RCP	24	26	26														2		
7+89	LT	GRAVEL	8	11	25	20	RCP	18				26										2				
8+18	RT	GRASS	8	12	15	15	RCP	18				22										2				
9+32	RT	GRAVEL	8	12	15	15	RCP	18				22										2				
10+37	LT	GRAVEL	8	13	25	30	RCP	15				32								2						
10+51	RT	GRASS	8	13	90	90	RCP	15				76								2						
12+61	LT	GRAVEL	8	43	30	30	DITCH BLOCK					60														
13+94 CR 4040	RT	ASPHAULT	8	19	28	35	DITCH BLOCK				40															
15+74	RT	GRAVEL	8	10	20	15	RCP	24				22												2		
16+22 CR 4020	LT	ASPHAULT	8	16	28	38	DITCH BLOCK				38															
18+00	LT	GRAVEL	8	12	15	15	RCP	18				22										2				
18+22	RT	GRAVEL	8	12	15	10	CMP	18				20			20						2					
22+27	RT	GRASS	8	12	15	15	RCP	18				22										2				
23+08	RT	GRAVEL	8	9	20	15	RCP	18				21										2				
23+92	RT	GRAVEL	8	12	20	20	RCP	18				25										2				
24+37	RT	GRASS	8	10	10	15	PVC	6				18		15												
26+58	RT	GRAVEL	8	28	25	10	RCP	18				38										2				
27+31	RT	GRAVEL	8	11	20	10	CMP	18				21									2					
28+49	RT	GRAVEL	8	12	15	10	CMP	18				20									2					
29+33	RT	GRAVEL	8	12	15	15	RCP	18				22										2				
30+62	RT	GRASS	8	28	15	15	RCP	18				36										2				
32+20	LT	GRASS	8	12	20	10	RCP	18				22										2				
32+84	RT	GRASS	8	13	20	15	RCP	18				24										2				
33+62	RT	GRAVEL	8	21	25	20	DITCH BLOCK					35														
41+30	LT	GRAVEL	8	9	20	15	DITCH BLOCK					21														
41+75	LT	GRAVEL	8	11	15	15	DITCH BLOCK					21														
46+54	LT	GRASS	8	12	15	15	CMP	12				22					2									
49+35	RT	GRAVEL	8	12	15	15	DITCH BLOCK					22														
50+49	RT	GRAVEL	8	12	15	15	CMP	18				22									2					
53+64	RT	GRAVEL	8	16	20	15	CMP	18				27			20						2					
56+44	RT	GRASS	8	11	20	20	RCP	24				24												2		
56+87	LT	GRASS	8	16	20	10	RCP	24				25												2		
58+28	RT	GRAVEL	8	12	20	20	RCP	24				25												2		
59+98	RT	GRASS	8	15	20	10	CMP	24				24											2			
63+08	RT	GRASS	8	11	15	15	CMP	18				21									2					
65+71	RT	GRAVEL	8	14	20	10	RCP	24				24												2		
66+28	LT	GRASS	8	11	20	15	RCP	2 X 24				23												4		
66+83	RT	GRAVEL	8	12	15	15	RCP	18				22			6							2				4
69+81	RT	GRAVEL	8	12	20	20	RCP	24				25												2		
71+44	RT	SAND	8	17	15	25	CMP	18				30									2					
71+59	LT	GRAVEL	8	17	10	15	RCP	2 X 24				24												4		
73+56	LT	GRAVEL	8	9	20	15	RCP	2 X 24				21				20 *								2		
74+05	LT	GRAVEL	8	11	25	15	RCP	2 X 24				24												2		
75+82	LT	GRAVEL	8	10	15	15	RCP	2 X 24				20				24 *								2		
76+32	LT	GRASS	8	10	15	15	RCP	2 X 24				20												2		
77+00	LT	GRAVEL	8	13	20	15	RCP	2 X 24				24												4		
78+10	RT	GRAVEL	8	12	20	20	RCP	2 X 24				25												4		
78+11	LT	GRASS	8	11	15	10	RCP	2 X 24				19												4		
78+73	LT	GRAVEL	8	11	10	15	RCP	24				19												2		
CSJ 2277-01-010 SUBTOTAL:									135	135	97	1,262	0	15	46	0	2	0	0	4	18	34	2	44	0	4

* PIPE USED TO JOIN DRIVEWAY PIPES TO FORM ONE PIPE RUN

FM 275

QUANTITY SUMMARIES

SHEET 2 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		12

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SUMMARY OF DRIVEWAY AND PARALLEL DRAINAGE ITEMS

LOCATION		DRIVEWAY MATERIAL	LENGTH (L)	WIDTH (W)	RADIUS (R_1)	RADIUS (R_2)	EXISTING PIPE MATERIAL	EXISTING PIPE DIAMETER	104 6017	530 6004	530 6005	530 6016	464 6001	464 6002	464 6003	464 6005	467 6319	467 6326	467 6333	467 6341	467 6348	467 6363	467 6380	467 6395	480 6001	496 6007
STATION	LT/RT		FT	FT	FT	FT		IN	REMOVING CONC (DRIVEWAYS)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	RC PIPE (CL III)(12 IN)	RC PIPE (CL III)(15 IN)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	SET (TY II) (12 IN) (CMP) (Gt 1) (P	SET (TY II) (12 IN) (RCP) (Gt 1) (P	SET (TY II) (15 IN) (CMP) (Gt 1) (P	SET (TY II) (15 IN) (RCP) (Gt 1) (P	SET (TY II) (18 IN) (CMP) (Gt 1) (P	SET (TY II) (18 IN) (RCP) (Gt 1) (P	SET (TY II) (24 IN) (CMP) (Gt 1) (P	SET (TY II) (24 IN) (RCP) (Gt 1) (P	CLEAN EXIST CULVERTS	REMOV STR (PIPE)
									SY	SY	SY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
86+95	LT	GRASS	8	17	15	15	CMP	18				26			20						2					
86+95	RT	GRAVEL	8	12	10	10	RCP	18				18										2				
87+35	RT	GRASS	8	12	10	10	CMP	18				18			20						2					20
90+71	LT	GRAVEL	8	15	20	15	RCP	24				26												2		
91+41	RT	GRAVEL	8	11	15	15	RCP	18				21										2				
91+50	LT	GRAVEL	8	15	15	15	RCP	18				24										2				
93+76	LT	GRASS	8	13	15	15	RCP	18				23										2				
94+78	LT	GRAVEL	8	11	15	15	RCP	18				21										2				
97+50	LT	GRAVEL	8	9	25	20	CMP	12				24					2									
98+71	LT	GRAVEL	8	15	25	25	RCP	12				32						2								
98+94	RT	GRASS	8	19	15	15	DITCH	BLOCK				28														
100+23	RT	GRASS	8	16	15	15	DITCH	BLOCK				25														
100+50	LT	GRAVEL	8	10	20	20	DITCH	BLOCK				24														
100+90	LT	GRAVEL	8	12	20	20	DITCH	BLOCK				25														
103+83	LT	GRAVEL	8	8	20	15	RCP	18				20										2				
104+66 CR 4220	RT	ASPHAULT	8	19	30	27	RCP	18			28											2			1	
105+61	LT	GRAVEL	8	10	15	15	DITCH	BLOCK				20														
105+83	RT	GRAVEL	8	10	15	15	RCP	18				20										2			1	
109+56	LT	GRAVEL	8	18	20	20	CMP	12				31					2									
113+62	RT	GRASS	8	18	15	18	RCP	12				28						2								
114+17	RT	GRASS	8	19	15	15	RCP	12				28						2								
115+09	RT	GRAVEL	8	33	20	15	DITCH	BLOCK				42														
115+54	LT	GRAVEL	8	27	20	20	DITCH	BLOCK				39														
115+98	RT	GRASS	8	15	20	15	RCP	18				26										2				
116+51	RT	GRASS	8	13	15	15	RCP	18				23										2				
117+28	LT	GRAVEL	8	12	15	15	RCP	18				22										1				
117+65	LT	GRAVEL	8	11	15	15	RCP	18				21				12 *						1				
117+59	RT	GRAVEL	8	9	20	20	RCP	18				23										2				
119+08 CR 4240	LT	ASPHAULT	8	8	11	5	RCP	18			14											2				
119+63	RT	GRAVEL	8	9	15	15	CMP	18				19									2					
120+61	RT	GRAVEL	8	10	15	15	CMP	18				20									2					
121+52	RT	GRAVEL	8	10	20	10	CMP	18				20										1				20
121+88	RT	GRAVEL	8	11	15	15	RCP	18				21				40 *						1				
123+19	RT	GRAVEL	8	12	20	15	CMP	18				24									2					
128+61	RT	GRAVEL	8	15	25	5	DITCH	BLOCK				24														
130+03	RT	GRAVEL	8	14	5	15	DITCH	BLOCK				20														
130+26	LT	GRAVEL	8	11	20	15	RCP	18				23						2								
131+01	RT	GRAVEL	8	10	15	10	DITCH	BLOCK				18														
131+66	LT	GRASS	8	14	20	10	DITCH	BLOCK				24														
131+72	RT	GRASS	8	13	15	15	CMP	12				23	24				2									24
132+56	RT	GRASS	8	15	15	15	CMP	18				24			20						2					20
133+45	RT	GRASS	8	16	15	15	RCP	12				25						2								
134+61	RT	GRAVEL	8	11	15	15	RCP	12				21						2								
139+39	RT	GRASS	8	14	15	15	RCP	18				24										2				
140+95	RT	GRAVEL	8	14	15	10	RCP	18				22										2				
140+97	LT	GRASS	8	15	10	15	RCP	18				23										2				
141+77	RT	GRAVEL	8	12	15	15	RCP	18				22										2				
142+27	LT	GRAVEL	8	14	10	15	RCP	18				22										2				
142+29	RT	GRAVEL	8	11	15	15	RCP	18				21										2				
143+52	RT	GRASS	8	15	15	10	CMP	18				23				20					2					20
144+71	RT	CONCRETE	8	12	15	15	RCP	12	22	22								2								
146+43	RT	GRASS	8	13	15	15	RCP	12				23			36 *							1				24
146+88	RT	CONCRETE	8	16	15	15	RCP	18	25	25								1								
151+34	RT	GRAVEL	8	15	15	25	CMP	18				28									2					
156+31	RT	GRAVEL	8	12	15	15	RCP	18				22										2				
196+14	LT	GRAVEL	8	11	15	15	RCP	18				21										2				
200+35	LT	GRASS	8	12	15	20	RCP	18				24										2				
CSJ 2277-01-010 SUBTOTAL:									47	47	42	1,259	24	0	60	20	6	12	0	0	16	50	0	2	2	128

* PIPE USED TO JOIN DRIVEWAY PIPES TO FORM ONE PIPE RUN

FM 275

QUANTITY SUMMARIES

SHEET 3 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		13

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SUMMARY OF DRIVEWAY AND PARALLEL DRAINAGE ITEMS

LOCATION		DRIVEWAY MATERIAL	LENGTH (L)	WIDTH (W)	RADIUS (R_1)	RADIUS (R_2)	EXISTING PIPE MATERIAL	EXISTING PIPE DIAMETER	104 6017	530 6004	530 6005	530 6016	464 6001	464 6002	464 6003	464 6005	467 6319	467 6326	467 6333	467 6341	467 6348	467 6363	467 6380	467 6395	480 6001	496 6007
									REMOVING CONC (DRIVEWAYS)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	RC PIPE (CL III)(12 IN)	RC PIPE (CL III)(15 IN)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	SET (TY II) (12 IN) (CMP) (6:1) (P	SET (TY II) (12 IN) (RCP) (6:1) (P	SET (TY II) (15 IN) (CMP) (6:1) (P	SET (TY II) (15 IN) (RCP) (6:1) (P	SET (TY II) (18 IN) (CMP) (6:1) (P	SET (TY II) (18 IN) (RCP) (6:1) (P	SET (TY II) (24 IN) (CMP) (6:1) (P	SET (TY II) (24 IN) (RCP) (6:1) (P	CLEAN EXIST CULVERTS	REMOV STR (PIPE)
STATION	LT/RT		FT	FT	FT	FT		IN	SY	SY	SY	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
205+00	LT	GRAVEL	8	12	15	15	CMP	18				22									2					
207+86	RT	GRAVEL	8	12	15	15	CMP	18				22			20						2					20
208+49	RT	GRAVEL	8	10	10	15	RCP	18				18										2			1	
212+30	LT	GRASS	8	17	15	15	CMP	18				26									2					
217+21	RT	GRASS	8	12	15	10	RCP	12				20										2				
218+81 CR 4320	RT	ASPHAULT	8	18	35	24	RCP	18			37											2				
219+73	LT	GRAVEL	8	21	25	30	DITCH BLOCK					39														
220+34	RT	GRASS	8	15	10	15	RCP	18				23										2				
226+87	LT	GRAVEL	8	10	30	25	CMP	15				29							2							
231+08	LT	GRASS	8	18	15	15	RCP	18				27										2				
231+24	RT	GRASS	8	19	15	10	RCP	12				26						2								
232+50 CR 4340	LT	ASPHAULT	8	30	12	20	RCP	18			39											2				
238+38	RT	GRAVEL	8	11	5	15	RCP	18				17										2				
241+86	RT	GRASS	8	12	10	15	RCP	18				20										2				
248+05	RT	GRAVEL	8	12	15	15	CMP	18				22									2					
248+91	RT	GRAVEL	8	11	15	15	CMP	18				21									2					
255+23	RT	GRASS	8	16	15	15	RCP	18				25										2				
260+41	RT	GRASS	8	12	15	15	RCP	18				22										2				
263+36	LT	GRAVEL	8	10	15	15	RCP	18				20										2				
265+88	RT	GRAVEL	8	15	10	10	RCP	18				21										2				
269+98 CR 4360	RT	ASPHAULT	8	36	18	14	DITCH BLOCK				44															
272+52	LT	GRASS	8	13	15	15	DITCH BLOCK					23														
272+70	RT	GRASS	8	21	10	10	DITCH BLOCK					26														
275+37	LT	GRAVEL	8	18	25	15	RCP	18				31														
278+00	LT	GRAVEL	8	18	15	15	RCP	18				27														
CSJ 2277-01-010 SUBTOTAL:									0	0	120	527	0	0	20	0	0	2	2	0	10	24	0	0	1	20
CSJ 2277-01-010 PROJECT TOTAL:									182	182	259	3,048	24	15	126	20	8	14	2	4	44	108	2	46	3	152

* PIPE USED TO JOIN DRIVEWAY PIPES TO FORM ONE PIPE RUN

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FM 275

QUANTITY SUMMARIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		14

SUMMARY OF SIGNING & PAVEMENT MARKING ITEMS

ROADWAY PLAN SHEET NO.	STATION		0644 6001	0644 6004	0644 6030	0644 6076	0662 6016	0662 6012	0662 6031	0662 6032	0662 6034	0662 6111	0666 6048	0666 6102	0666 6138	0666 6342	0666 6344	0666 6345	0672 6009
			IN SM RD SN SUP&AM TY10BWG (1)SA(P)	IN SM RD SN SUP&AM TY10BWG (1)SA(T)	IN SM RD SN SUP&AM TYS80 (1)SA(T)	REMOVE SM RD SN SUP&AM	WK ZN PAV MRK NON-REMOV (W)24" (SLD)	WK ZN PAV MRK NON-REMOV (W)8" (SLD)	WK ZN PAV MRK NON-REMOV (W)36" (YLD TRI)	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 Y-2	REFL PAV MRK TY I (W)24" (SLD) (100MIL)	REF PAV MRK TY I (W) 36" (YLD TRI) (100MIL)	REFL PAV MRK TY I (Y) 8" (SLD) (100MIL)	REF PROF PAV MRK TY I (W)4" (SLD) (100 MIL)	REF PROF PAV MRK TY I (Y)4" (BRK) (100MIL)	REF PROF PAV MRK TY I (Y)4" (SLD) (100MIL)	REFL PAV MRKR TY II-A-A
	FROM	TO	EA	EA	EA	EA	LF	LF	EA	LF	LF	LF	LF	EA	LF	LF	LF	LF	EA
SHEET 1 OF 12	0+19	24+00	22		2	19	58	179	5	364	3,535	353	58	5	179	4,817	364	3,535	58
SHEET 2 OF 12	24+00	48+00	2			4				800	1,002	100				4,800	800	1,002	43
SHEET 3 OF 12	48+00	72+00	1	1		3				504	3,245	325				4,800	504	3,245	59
SHEET 4 OF 12	72+00	96+00	1	1		3				61	4,617	462				4,781	61	4,617	60
SHEET 5 OF 12	96+00	120+00	6			7	29			800	992	100	29			4,715	800	992	42
SHEET 6 OF 12	120+00	144+00	1			1				794	1,323	132				4,800	794	1,323	46
SHEET 7 OF 12	144+00	168+00	1		1	2				651	2,184	218				4,800	651	2,184	52
SHEET 8 OF 12	168+00	192+00	2			2				800	1,839	184				4,380	800	1,839	53
SHEET 9 OF 12	192+00	216+00	3			3				792	1,025	103				4,751	792	1,025	43
SHEET 10 OF 12	216+00	240+00	5		2	7	29			703	2,077	208	29			4,731	703	2,077	52
SHEET 11 OF 12	240+00	264+00	2			2				800		80				4,800	800		30
SHEET 12 OF 12	264+00	278+97	7		2	10	28			462	493	46	28			2,944	462	493	23
CSJ 2277-01-010 TOTALS			53	2	7	66	144	179	5	7,531	22,332	2,311	144	5	179	55,119	7,531	22,332	561

SUMMARY OF MAILBOX ITEMS

STATION	RT/LT	530 6008	560 6003	560 6007	560 6008
		TURNOUTS (ACP)	MAILBOX INSTALL-M (TWG-POST) TY 1	MAILBOX INSTALL-S (WC-POST) TY 3	MAILBOX INSTALL-D (WC-POST) TY 3
		SY	EA	EA	EA
3+26	RT	21		1	
6+59	RT	30			1
9+53	RT	19		1	
12+00	RT	29		1	
15+97	RT	19		1	
18+45	RT	21		1	
23+55	RT	27		1	
23+59	RT		1		
24+20	RT	14		1	
26+07	RT	27			1
27+46	RT	19			1
28+70	RT	19		1	
29+65	RT	24		1	
41+28	RT	29		1	
52+86	RT	29		1	
53+92	RT	21			1
57+02	RT	29		1	
58+57	RT	20		1	
66+66	RT	22		1	
70+18	RT	24		1	
74+48	RT	29		1	
75+51	RT	28		1	
78+40	RT	21		1	
94+87	RT	29		1	
98+14	RT	29		1	
100+48	RT	61			1
101+11	RT				
104+12	RT	29			1
109+36	RT	29		1	
114+50	RT	11	1		
116+23	RT	7		1	
118+05	RT	28	1		
119+85	RT	19		1	
121+14	RT	27		1	
122+11	RT	20		1	
129+25	RT	29		1	
130+46	RT	28		1	
132+83	RT	21		1	
134+29	RT	26		1	
142+02	RT	16		1	
220+86	RT	29		1	
227+06	RT	29		1	
247+83	RT	23		1	
260+63	RT	19		1	
263+38	RT	29		1	
266+21	RT	25		1	
275+36	RT	29		1	
CSJ 2277-01-010 TOTALS		1,113	3	37	6

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FM 275

QUANTITY SUMMARIES

SHEET 5 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		15

STRUCTURE DESCRIPTION	LOCATION	SUMMARY OF DRAINAGE QUANTITIES														
		0110	0132	0400	0400	0402	0432	0462	0462	0462	0464	0466	0466	0466	0466	0466
		6002	6003	6005	6006	6001	6002	6054	6055	6073	6010	6103	6151	6152	6167	6195
		EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RIPRAP (CONC) (5 IN)	CONC BOX CULV (6 FT X 3 FT) (EXTEND)	CONC BOX CULV (6 FT X 4 FT) (EXTEND)	CONC BOX CULV (10 FT X 5 FT)	RC PIPE (CL III) (48 IN)	HEADWALL (CH-PW-0) (DIA= 48 IN)	WINGWALL (FW - 0) (HW=4 FT)	WINGWALL (FW - 0) (HW=5 FT)	WINGWALL (FW - S) (HW=6 FT)	WINGWALL (PW - 2) (HW=6 FT)
		CY	CY	CY	SY	LF	CY	LF	LF	LF	LF	EA	EA	EA	EA	EA
CULVERT 01	STA 11+20.93	12	10													
CULVERT 02	STA 14+55.67	36	4													
CULVERT 03	STA 40+99.74	3	5													
CULVERT 04	STA 84+00.88	10	14													
CULVERT 05	STA 96+33.92	9	5													
CULVERT 06	STA 101+99.80	5	9													
CULVERT 07	STA 113+14.48	17	5													
CULVERT 08	STA 127+13.97	12	35	164	113	88					88	2				
CULVERT 09	STA 132+09.30	15	11													
CULVERT 10	STA 153+81.31	4	18													
CULVERT 11	STA 167+39.21		265				16		51					2		
CULVERT 12	STA 191+46.38		308				14	30					2			
CULVERT 13	STA 226+45.11	12	8													
CULVERT 14	STA 236+08.41		98				7			20					1	1
CULVERT 15	STA 243+46.71	33	3													
CULVERT 16	STA 270+61.25	2	4													
PROJECT TOTALS:		170	802	164	113	88	37	30	51	20	88	2	2	2	1	1

STRUCTURE DESCRIPTION	LOCATION	SUMMARY OF DRAINAGE QUANTITIES							
		0467	0467	0467	0496	0496	0496	0658	0432
		6390	6419	6450	6016	6006	6007	6047	6031
		SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (30 IN) (RCP) (4: 1) (C)	SET (TY II) (36 IN) (RCP) (4: 1) (C)	REMOV STR (PIPE)	REMOV STR (HEADW ALL)	REMOV STR (PIPE)	INSTL OM ASSM (OM-2Y) (WC) GND	RIPRAP (STONE PROTECTION) (12 INCH)
		EA	EA	EA	EA	EA	LF	EA	CY
CULVERT 01	STA 11+20.93	2					8	2	
CULVERT 02	STA 14+55.67			2			20	2	
CULVERT 03	STA 40+99.74	2					8	2	
CULVERT 04	STA 84+00.88		4				16	2	
CULVERT 05	STA 96+33.92	2					8	2	
CULVERT 06	STA 101+99.80	2					4	2	
CULVERT 07	STA 113+14.48	2					4	2	
CULVERT 08	STA 127+13.97				1			2	23
CULVERT 09	STA 132+09.30	2					4	2	
CULVERT 10	STA 153+81.31	2						2	
CULVERT 11	STA 167+39.21					2		2	
CULVERT 12	STA 191+46.38					2		2	55
CULVERT 13	STA 226+45.11	2					4	2	
CULVERT 14	STA 236+08.41					2		2	31
CULVERT 15	STA 243+46.71			2			16	2	
CULVERT 16	STA 270+61.25	2					8	2	
PROJECT TOTALS:		18	4	4	1	6	100	32	109

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FM 275

QUANTITY SUMMARIES

SHEET 6 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		16

CK:
DW:
CK:
DN:

SUMMARY OF LANDSCAPE ITEMS

STATION		LENGTH	SEEDING WIDTH		164 6015 STRAW/HAY MLCH SEED(PER M)(RURAL)(CLAY)	164 6009 BROADCAST SEED (TEMP)(WARM)	164 6011 BROADCAST SEED (TEMP)(COOL)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2 *
FROM	TO	FT	LT	RT	SY	SY	SY	MG	LB
0+19	143+00	14,281	20	20	63,471	31,736	31,736	380	6,246
143+00	222+00	7,900	20	20	35,111	17,556	17,556	210	3,455
222+00	278+98	5,698	20	20	25,324	12,662	12,662	152	2,492
				PROJECT TOTALS:	123,906	61,954	61,954	742	12,193

* FOR CONTRACTORS INFROMATION ONLY: 2 CYCLES AT 50 LBS. NITROGEN PER ACRE AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE

WATERING: BASED ON 2 APPLICATIONS, 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

SUMMARY OF EROSION CONTROL ITEMS

STATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL)(TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
1+83	RT			15	15
1+89	LT			15	15
2+04	RT			15	15
2+62	LT			15	15
2+82	RT			15	15
5+70	LT			15	15
6+41	LT			15	15
7+72	LT			15	15
7+78	RT			15	15
8+94	RT			15	15
10+29	RT			15	15
10+96	RT	15	15		
11+03	LT	15	15		
11+51	LT	15	15		
11+51	RT	15	15		
14+06	LT	15	15		
14+37	RT	15	15		
14+70	LT	15	15		
17+91	RT	15	15		
16+10	RT			15	15
18+58	RT			15	15
22+49	RT			15	15
23+34	RT			15	15
24+10	RT			15	15
26+85	RT			15	15
27+64	RT			15	15
28+82	RT			15	15
29+52	RT			15	15
31+03	RT			15	15
32+45	LT			15	15
32+59	RT			15	15
40+72	RT	15	15		
40+76	LT	15	15		
41+11	LT	15	15		
41+17	RT	15	15		
46+33	LT			15	15
53+37	RT			15	15
56+61	LT			15	15
56+69	RT			15	15
58+01	RT			15	15
59+76	RT			15	15
62+82	RT			15	15
65+94	RT			15	15
66+02	LT			15	15
66+55	RT			15	15
69+57	RT			15	15
71+16	RT			15	15
71+33	LT			15	15
73+33	LT			15	15
73+81	LT			15	15
76+08	LT			15	15
76+75	LT			15	15
77+82	RT			15	15
78+38	LT			15	15
83+68	RT	15	15		
83+77	LT	15	15		
84+28	RT	15	15		
84+36	LT	15	15		
87+21	LT			15	15
CSJ 2277-01-010 SUBTOTAL:		240	240	645	645

SUMMARY OF EROSION CONTROL ITEMS

STATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL)(TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
91+00	LT			15	15
91+70	RT			15	15
91+72	LT			15	15
93+97	LT			15	15
95+00	LT			15	15
96+02	RT	15	15		
96+09	LT	15	15		
96+60	RT	15	15		
96+61	LT	15	15		
97+73	LT			15	15
99+00	LT				
101+80	RT	15	15		
101+81	LT	15	15		
102+20	RT	15	15		
102+27	LT	15	15		
104+11	LT			15	15
105+07	RT			15	15
105+60	RT			15	15
109+87	LT			15	15
112+87	RT	15	15		
112+97	LT	15	15		
113+31	RT	15	15		
113+36	LT	15	15		
113+79	RT			15	15
114+43	RT			15	15
115+75	RT			15	15
116+34	RT			15	15
117+04	LT			15	15
117+35	RT			15	15
117+48	LT			15	15
118+76	LT			15	15
119+44	RT			15	15
120+39	RT			15	15
121+30	RT			15	15
101+70	RT			15	15
122+95	RT			15	15
126+85	RT	15	15		
126+94	LT	15	15		
127+30	LT	15	15		
127+38	RT	15	15		
130+56	LT			15	15
131+54	RT			15	15
131+96	RT	15	15		
131+98	LT	15	15		
132+24	LT	15	15		
132+28	RT	15	15		
132+73	RT			15	15
133+68	RT			15	15
134+89	RT			15	15
139+61	RT			15	15
141+14	RT			15	15
141+19	LT			15	15
141+92	RT			15	15
142+05	LT			15	15
142+49	RT			15	15
143+21	RT			15	15
144+97	RT			15	15
146+20	RT			15	15
146+64	RT			15	15
CSJ 2277-01-010 SUBTOTAL:		300	300	570	570

SUMMARY OF EROSION CONTROL ITEMS

STATION	LT/RT	506 6002 ROCK FILTER DAMS (INSTALL)(TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
		LF	LF	LF	LF
151+01	RT			15	15
153+54	LT	15	15		
153+57	RT	15	15		
154+06	LT	15	15		
154+10	RT	15	15		
166+84	RT	15	15		
166+90	LT	15	15		
167+84	LT	15	15		
167+88	RT	15	15		
179+88	LT	15	15		
179+88	RT	15	15		
180+78	RT	70	70		
181+96	LT	15	15		
181+96	RT	15	15		
191+17	LT	15	15		
191+20	RT	15	15		
191+73	LT	15	15		
191+77	RT	15	15		
196+43	LT			15	15
200+63	LT			15	15
208+06	RT			15	15
208+72	RT			15	15
212+69	LT			15	15
217+44	RT			15	15
219+10	RT			15	15
220+59	RT			15	15
226+26	RT	15	15		
226+27	LT	15	15		
226+59	LT	15	15		
226+63	RT	15	15		
227+11	LT	15	15		
230+79	LT			15	15
230+98	RT			15	15
232+16	LT			15	15
235+64	RT	15	15		
235+94	LT	15	15		
236+25	RT	15	15		
236+49	LT	15	15		
238+68	RT			15	15
242+15	RT			15	15
243+01	LT	15	15		
243+55	LT	15	15		
243+80	RT	15	15		
248+30	RT			15	15
249+12	RT			15	15
255+43	RT			15	15
260+53	RT			15	15
263+58	LT			15	15
265+65	RT				
270+41	RT	15	15		
270+43	LT	15	15		
270+76	LT	15	15		
270+78	RT	15	15		
275+07	LT			15	15
277+70	LT			15	15
CSJ 2277-01-010 SUBTOTAL:		550	550	315	315
CSJ 2277-01-010 PROJECT TOTAL:		1090	1090	1530	1530

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FM 275
QUANTITY SUMMARIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		17

SUMMARY OF LAKE FORK CREEK BRIDGE ITEMS									
LOCATION	400 6005	416 6002	420 6013	420 6025	420 6037	422 6001	425 6011	432 6033	450 6018
	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (BENT)	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC SLAB BEAM (4SB15)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631)
	CY	LF	CY	CY	CY	SF	LF	CY	LF
STA 180+05 - 181+55	62	486	22	16	8	4819	1188	836	324
CSJ 2277-01-012 TOTALS	62	486	22	16	8	4819	1188	836	324

CAP ELEVATIONS (FT)

	STEP 1 (RIGHT)	STEP 5 (LT. SIDE)	STEP 5 (RT. SIDE)	STEP 9 (LEFT)
ABUT 1 (FWD)	417.864	418.185	418.185	417.864

	STEP 1 (RIGHT)	STEP 5 (LT. SIDE)	STEP 5 (RT. SIDE)	STEP 9 (LEFT)
BENT 2 (BK)	418.039	418.361	418.361	418.039
(FWD)	418.042	418.363	418.363	418.042

	STEP 1 (RIGHT)	STEP 5 (LT. SIDE)	STEP 5 (RT. SIDE)	STEP 9 (LEFT)
BENT 3 (BK)	418.065	418.386	418.386	418.065
(FWD)	418.063	418.385	418.385	418.063

	STEP 1 (RIGHT)	STEP 5 (LT. SIDE)	STEP 5 (RT. SIDE)	STEP 9 (LEFT)
ABUT 4 (BK)	417.933	418.254	418.254	417.933

SUMMARY OF ROADWAY ITEMS				100 6002	110 6001	110 6002	132 6003	340 6011	340 6034	422 6015
LOCATION		LENGTH	WIDTH	PREPARING ROW	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	D-GR HMA (SQ) TY-B PG64-22	D-GR HMA (SQ) TY-C PG64-22	APPROACH SLAB
FROM	TO	LF	LF	STA	CY	CY	CY	TON	TON	CY
177+30	177+80	50	28	0.50				51	17	
177+80	179+85	205	30	2.05				226	75	
179+85	181+75	190	30	1.90		300				48
181+75	183+80	205	30	2.05	20		300	226	75	
183+80	184+30	50	28	0.50				51	17	
CSJ 2277-01-012 TOTALS				**7.00**	**20**	**300**	**300**	**554**	**184**	**48**

* AVERAGE WIDTH
(1) BASED ON 110 LBS/SY/IN

SUMMARY OF REMOVAL ITEMS		496 6010
LOCATION		REMOV STR (BRIDGE 100 - 499 FT LENGTH)
FROM	TO	EA
180+29	181+49	1
CSJ 2277-01-012 TOTALS		**1**

SUMMARY OF GUARD FENCE ITEMS			540 6002	544 6001	542 6001	542 6003	658 6062
LOCATION		LT/RT	MTL W-BEAM GD FEN (STEEL POST)	GUARDRAIL END TREATMENT (INSTALL)	REMOVE METAL BEAM GUARD FENCE	REMOVE DOWNSTREAM ANCHOR TERMINAL	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
FROM	TO		LF	EA	LF	EA	EA
179+25	183+82	LT	200	2	250	2	3
177+75	182+32	RT	200	2	250	2	3
CSJ 2277-01-012 TOTALS			400	4	500	4	6

FM 275
QUANTITY SUMMARIES

SHEET 8 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		18

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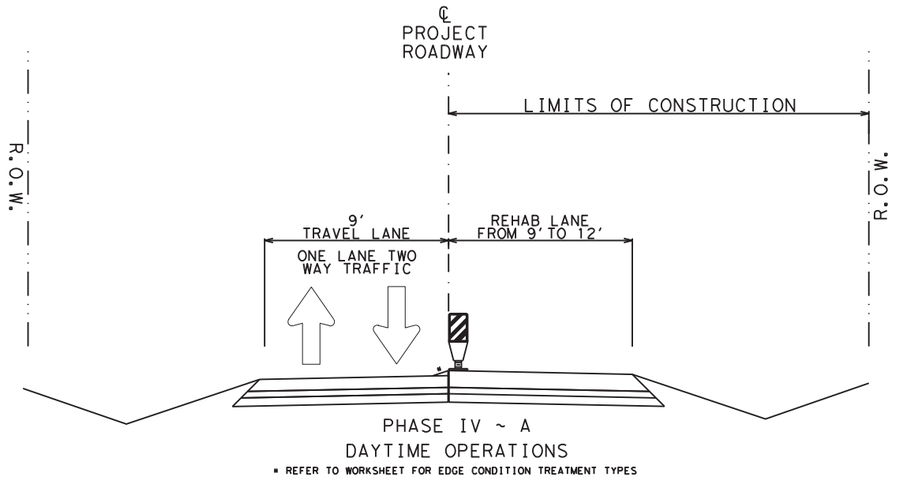

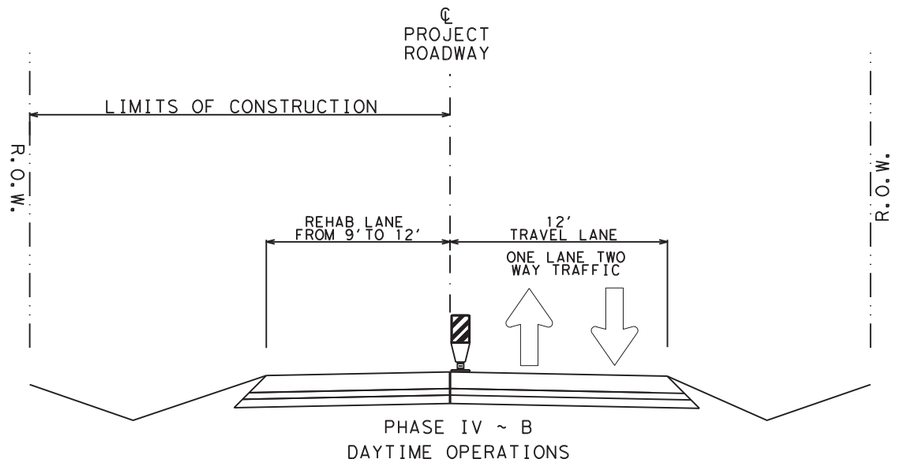

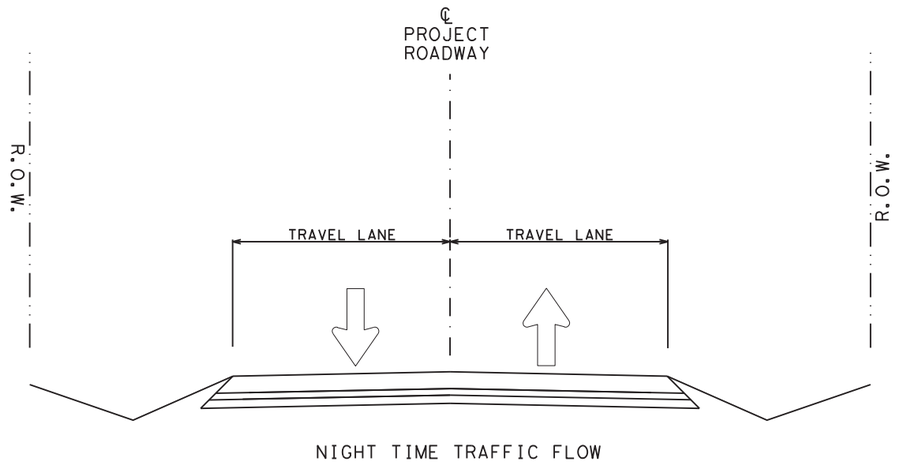

Phase I ~ STA. 177+30 TO 184+30 BRIDGE CONSTRUCTION

Place advanced warning signs per BC(2)-14 Standard.

Place detour signage per the "TRAFFIC CONTROL DETOUR LAYOUT" and applicable standards.

Close roadway to traffic from Sta. 177+30 to 184+30

Install Erosion Control Devices

Perform bridge construction.

Phase II ~ STA. 127+13 CULVERT REPLACEMENT

Place advanced warning signs per BC(2)-14 Standard.

Update detour signage to close roadway at new location per the "TRAFFIC CONTROL DETOUR LAYOUT" and applicable standards.

Close roadway to traffic at Sta. 127+13

Install Erosion Control Devices

Replace existing culvert

Remove advanced warning signs and open roadway to traffic flow.

Phase III - VIII TO BE PERFORMED FROM STA. 0+19 - 177+30 & 184+30 TO 278+97

Phase III ~ Erosion Control

Install erosion control devices utilizing the applicable TCP (2-1)-18 layout or TCP (2-2b)-18.

Phase IV ~ Culvert Work (Cross and Parallel Culverts)

Perform off-pavement culvert operations utilizing the applicable TCP (2-1)-18 layout.

Perform on-pavement culvert operations utilizing TCP(2-2b)-18.

Culvert work may proceed in advance of roadway rehabilitation when approved by the Engineer. Adhere to the Worksheet for Edge Condition Treatment Types.

Phase V ~ Roadway Rehabilitation

Refer to the Traffic Control Plan (TCP) Typical Sections for construction work area and traffic flow.

Perform pavement rehabilitation operations and install work zone pavement markings utilizing TCP(2-2b)-18.

Limit roadway rehabilitation operations to 1 mile sections. Prior to advancement to the next section, all backfilling and temporary seeding must be completed and the section be approved by the Engineer. Adhere to the Worksheet for Edge Condition Treatment Types.

Phase VI ~ Final Pavement Markings

Install final pavement markings using TCP(3-1)-13 and TCP(3-3)-14.

Phase VII ~ Backfill, Sign and Seeding Operations

Perform pavement backfill operations, sign installation and seeding utilizing TCP(2-1)-18.

Phase VIII ~ Project Clean Up

Remove erosion control devices, construction debris and waste material utilizing TCP (2-1)-18.

Notes: Prior to a specific construction operation, the traffic control standard specified for the construction phase in this narrative must be evaluated thoroughly for appropriateness. All traffic control operations must adhere to the Texas Manual on Uniform Traffic Control Devices (TMUTCD) and the applicable Traffic Control Standards. Construction phase order may be varied when approved by the Engineer. Submit a Work and Traffic Control Sequence plan to the Engineer for approval. Ensure that both travel lanes are open at night. Provide access to private property and Public Roads at all times. Provide pilot car during one lane/two way traffic operations. Road closures must be approved by the Engineer.

3/31/21

FM 275
TRAFFIC CONTROL NARRATIVE

NOT TO SCALE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		19

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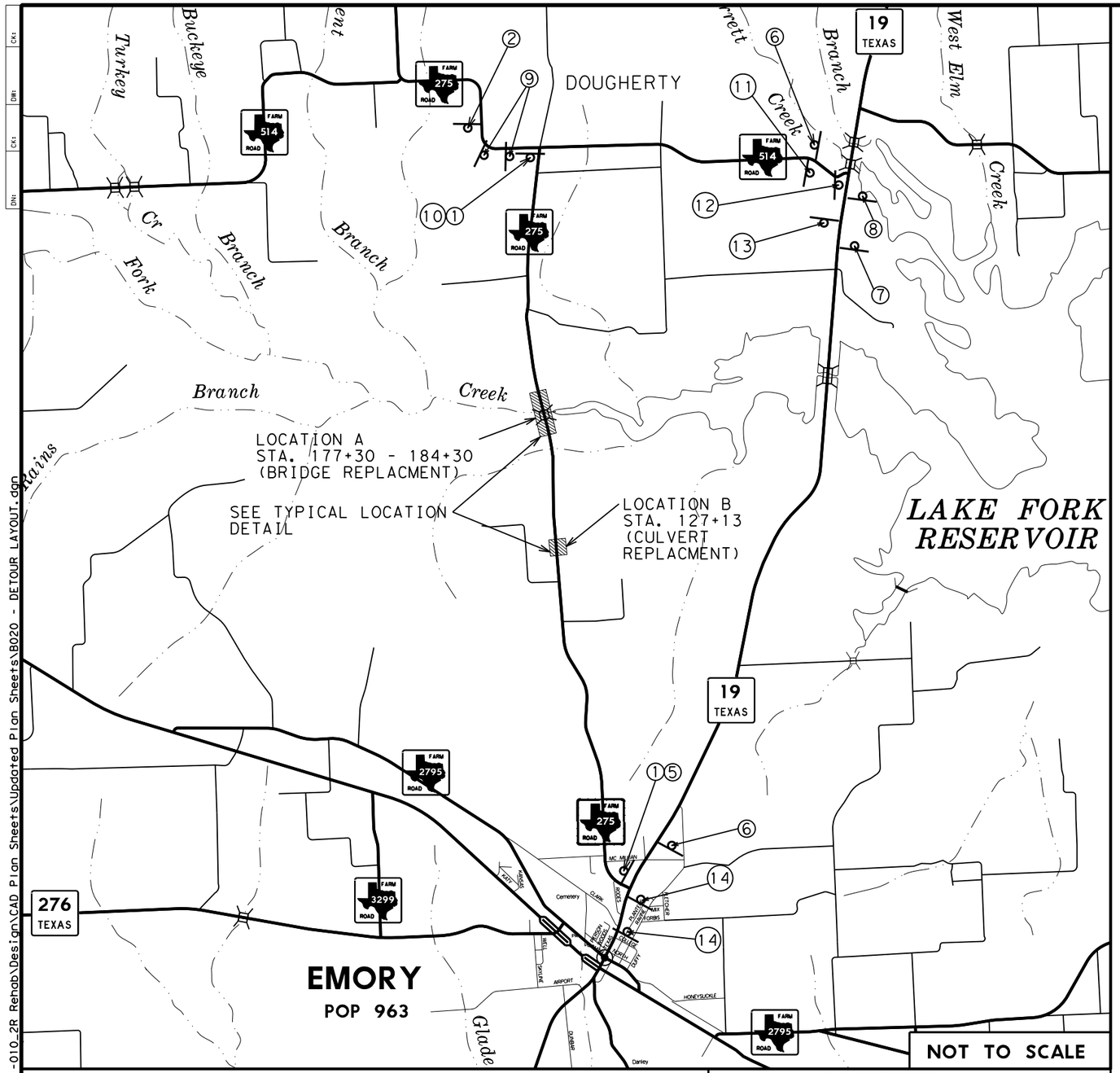

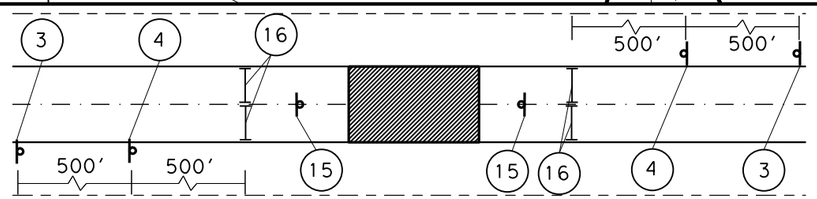

TYPICAL LOCATION DETAIL

LOCATIONS

LOCATION A - STA. 177+30 - 184+30 (BRIDGE)

LOCATION B - STA. 127+13 (CULVERT)

LEGEND:

- TYPE III BARRICADES (SKID MOUNT)
- TRAFFIC SIGN AND POST
- CLOSED WORK AREA

① ROAD CLOSED X.XX MILES AHEAD / LOCAL TRAFFIC ONLY — R11-3a, 60 X 30

② DETOUR 1500 FT — CW20-2A, 48 X 48

③ ROAD CLOSED 1000 FT — CW20-3B, 48 X 48

④ ROAD CLOSED 500 FT — CW20-3C, 48 X 48

⑤ DETOUR — M4-9R, 30 X 24

⑥ DETOUR — M4-8, 24 X 12
NORTH — M3-1, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24

⑦ DETOUR — M4-8, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M5-1L, 21 X 15

⑧ DETOUR — M4-8, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M6-1L, 21 X 15

⑨ DETOUR — M4-8, 24 X 12
SOUTH — M3-3, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M6-3, 21 X 15

⑩ DETOUR — M4-9L, 30 X 24

⑪ DETOUR — M4-8, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M5-1R, 21 X 15

⑫ DETOUR — M4-8, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M6-1R, 21 X 15

⑬ DETOUR — M4-8, 24 X 12
SOUTH — M3-3, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24

⑭ DETOUR — M4-8, 24 X 12
NORTH — M3-1, 24 X 12
FARM 275 ROAD — M1-6F, 24 X 24
M6-3, 21 X 15

⑮ ROAD CLOSED — R11-2, 48 X 3

⑯ TY III BARRICADE

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER
3/31/21

FM 275
TRAFFIC CONTROL DETOUR LAYOUT

NOTES:
DO NOT PERFORM ROAD CLOSURE AT BOTH BRIDGE AND CULVERT LOCATIONS AT THE SAME TIME. SEE "TRAFFIC CONTROL NARATIVE" SHEET FOR MORE DETAILS.

UTILIZE THE TRAFFIC CONTROL DEVICES IN THIS TCP WITH THOSE REQUIRED ON BC (1)-14 THROUGH BC (12)-14 WITH SUPPORT FROM THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

SIGN AND DEVICE SPACING NOT TO SCALE. UTILIZE TXDOT STANDARDS AND THE TMUTCD FOR APPROPRIATE SIGN/DEVICE SIZE AND SPACING.

ADVANCE PORTABLE CHANGEABLE MESSAGE BOARDS REQUIRED DURING ROAD CLOSURE AND TWO WEEKS PRIOR TO CLOSURE.

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		20

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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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

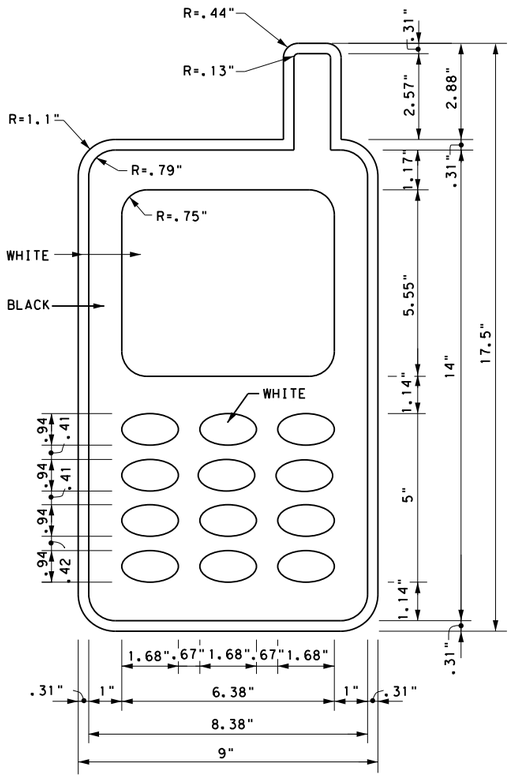
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

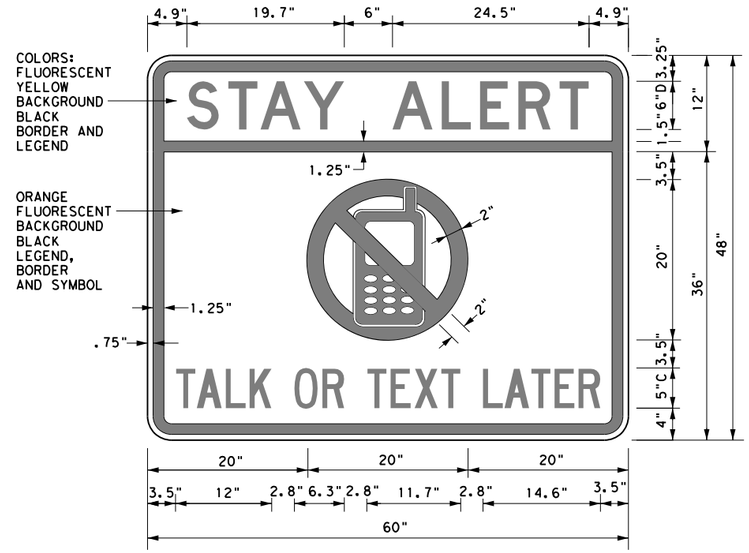
12. The Engineer has the final decision on the location of all traffic control devices.

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 APPAREL 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.





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	PAR	RAINS		21

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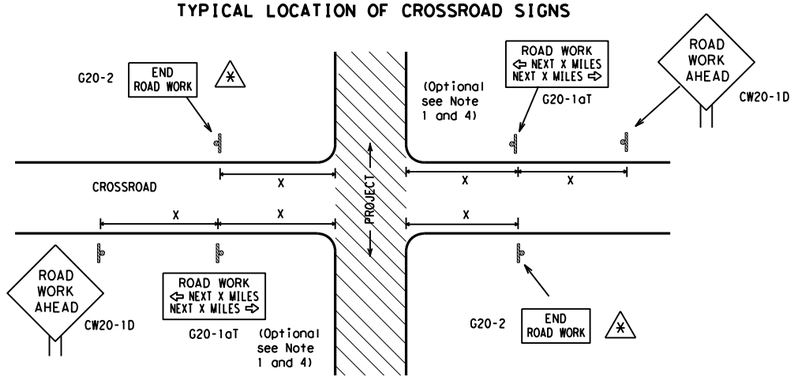
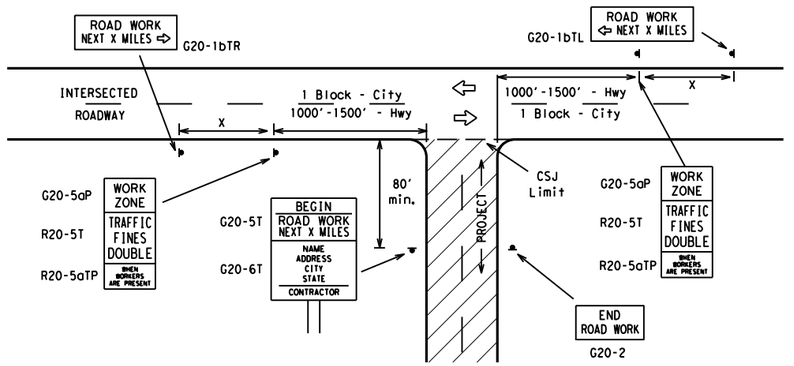
TYPICAL LOCATION OF CROSSROAD SIGNS



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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. 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			SPACING	
Sign Number or Series	Conventional Road	Expressway/ Freeway	Posted Speed	Sign Spacing "X" △
			MPH	Feet (Apprx.)
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"	30	120
			35	160
			40	240
			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
			55	500[2]
			60	600[2]
			65	700[2]
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	70	800[2]
			75	900[2]
			80	1000[2]
			*	*[3]

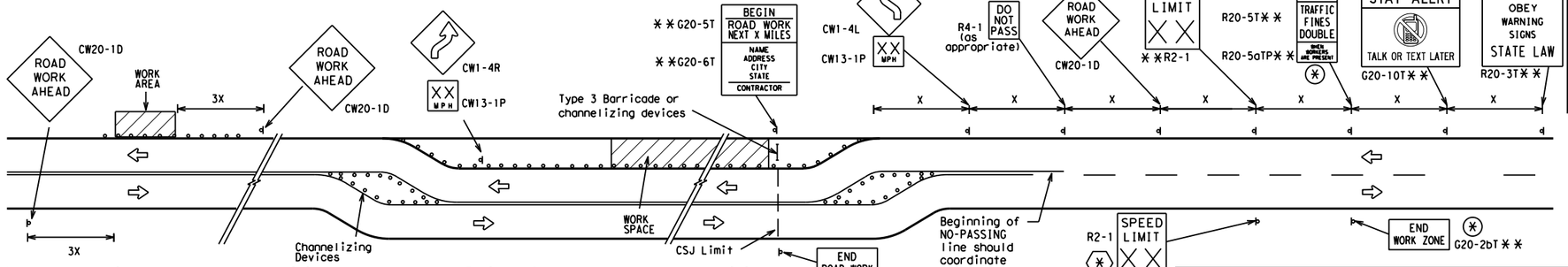
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

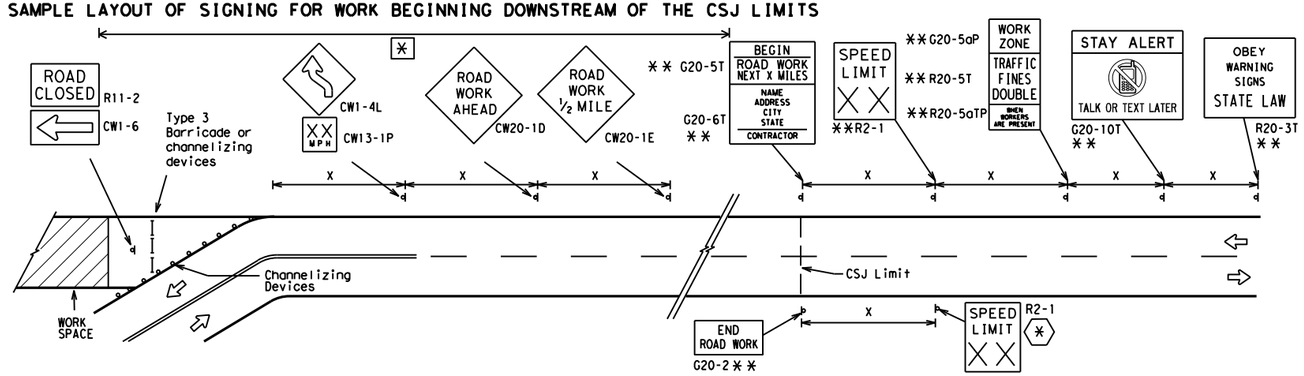
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

(*) 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.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	PAR	RAINS		22

DATE: 3/29/2021 11:11:13 AM
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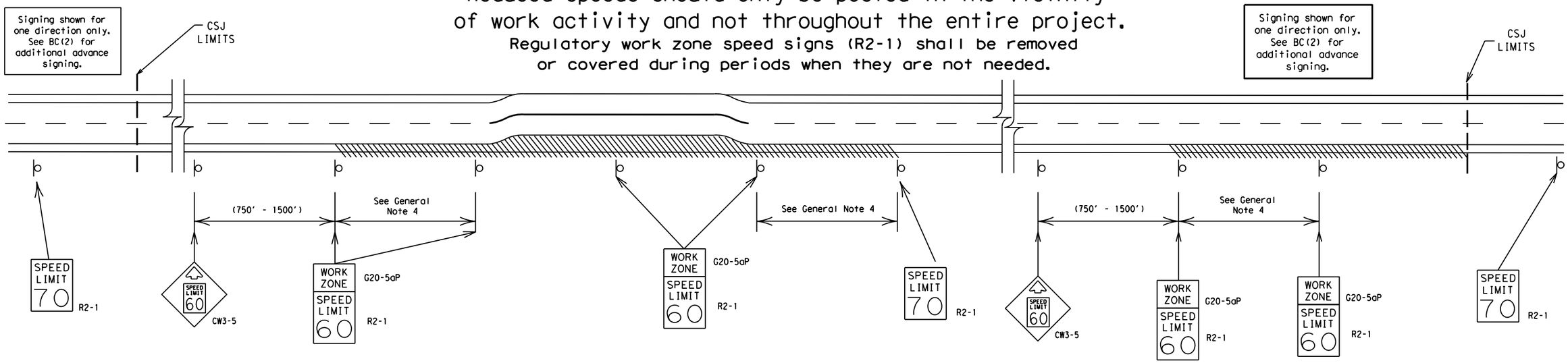
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	2277	01	010,etc	FM 275
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	PAR	RAINS		23

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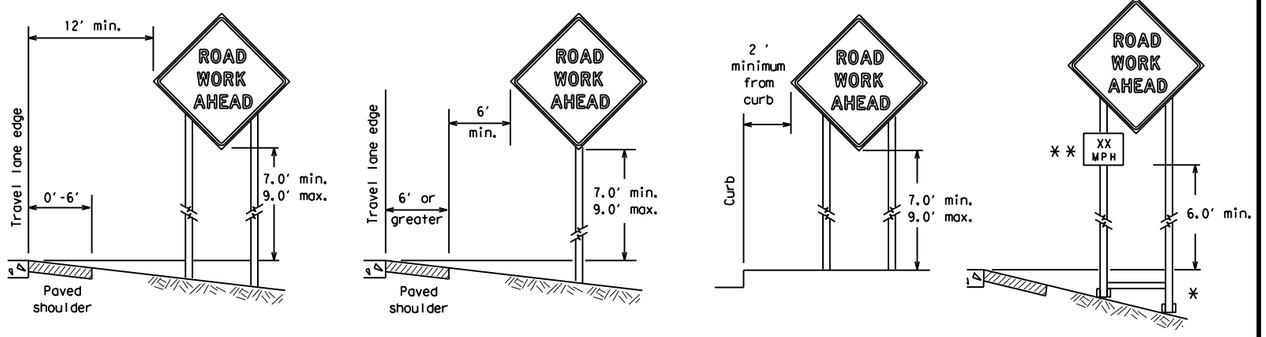
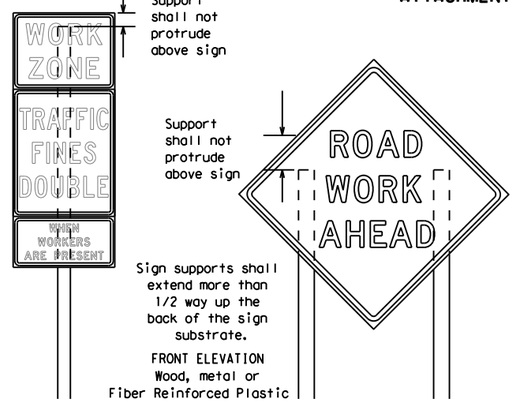
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

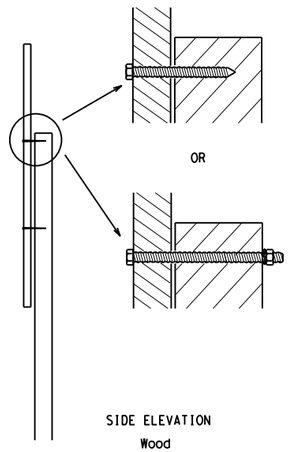


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





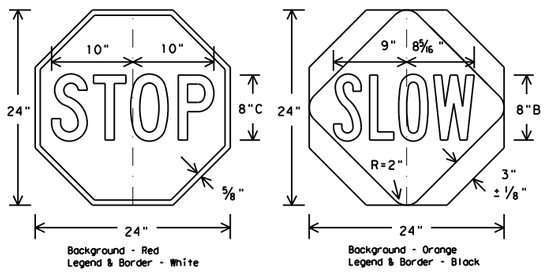
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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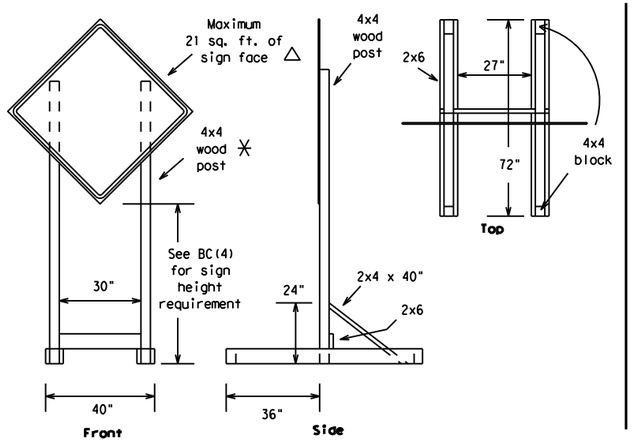
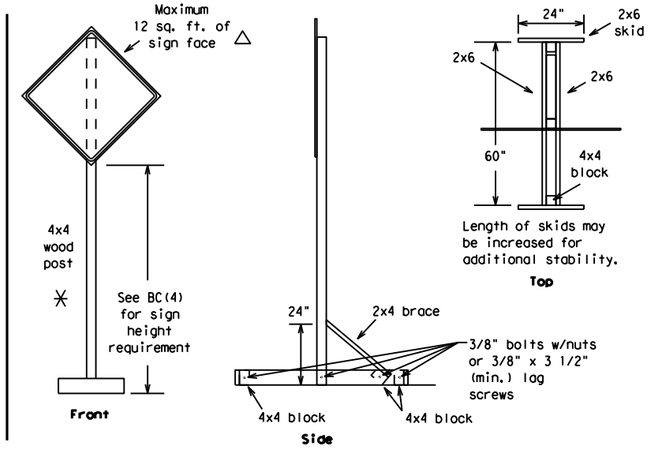
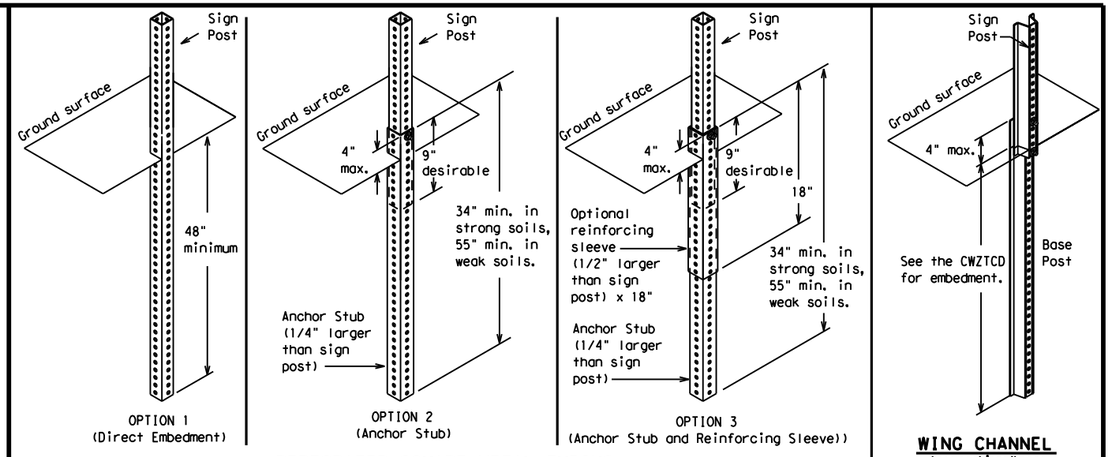




SKID MOUNTED WOOD SIGN SUPPORTS

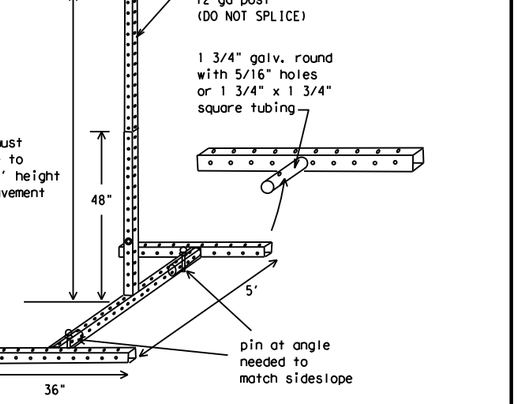
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

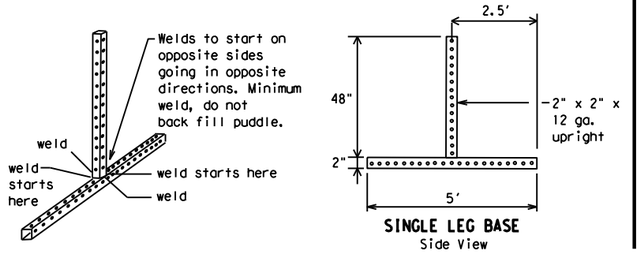


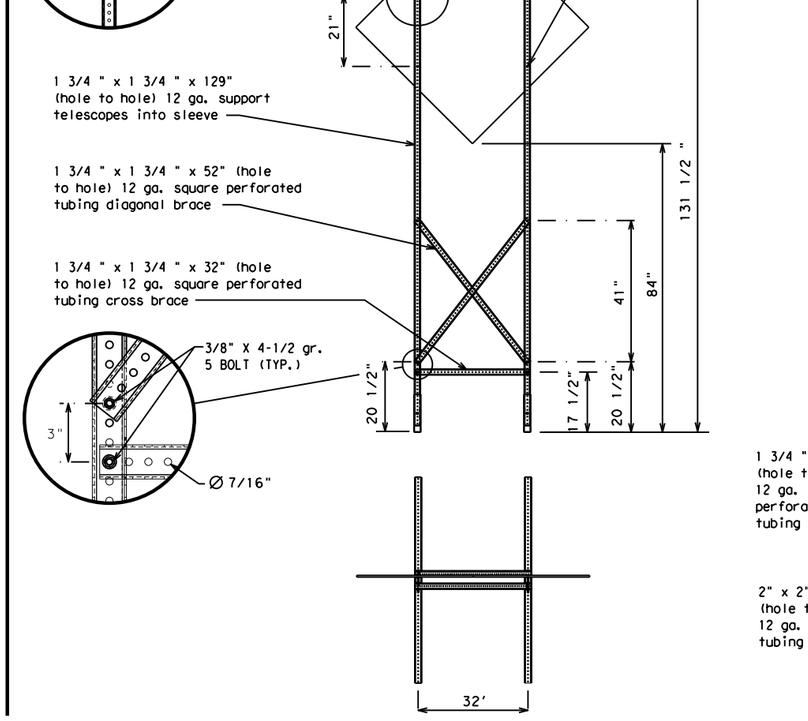
PERFORATED SQUARE METAL TUBING

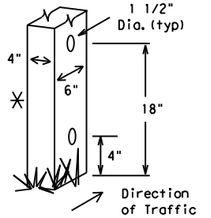
GROUND MOUNTED SIGN SUPPORTS

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.



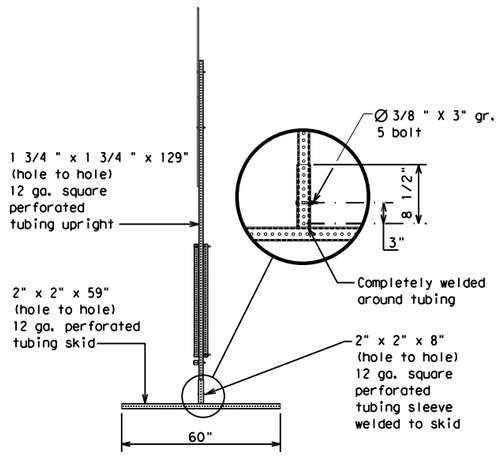






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND 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.

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	PAR	RAINS		25

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM-XX AM
STAY IN LANE *				

* 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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	PAR	RAINS		26

100

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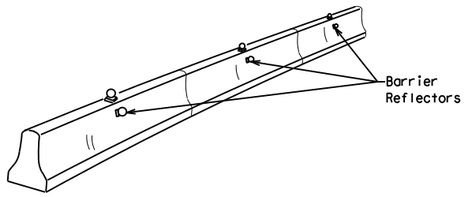
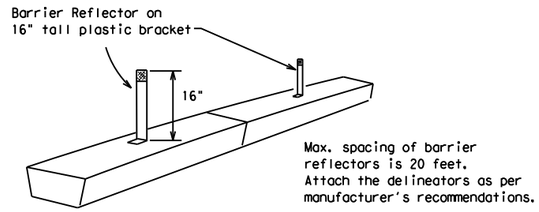
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

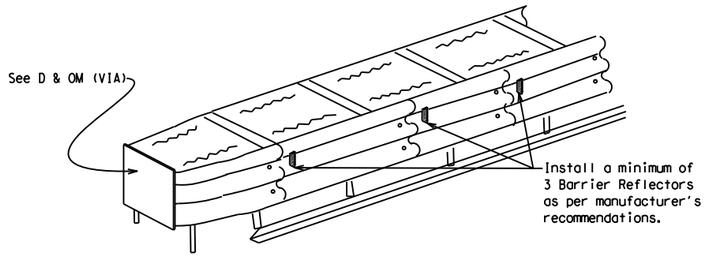


CONCRETE TRAFFIC BARRIER (CTB)

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.



LOW PROFILE CONCRETE BARRIER (LPCB)

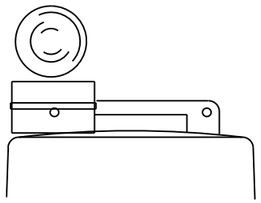


DELINEATION OF END TREATMENTS

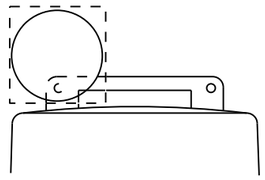
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

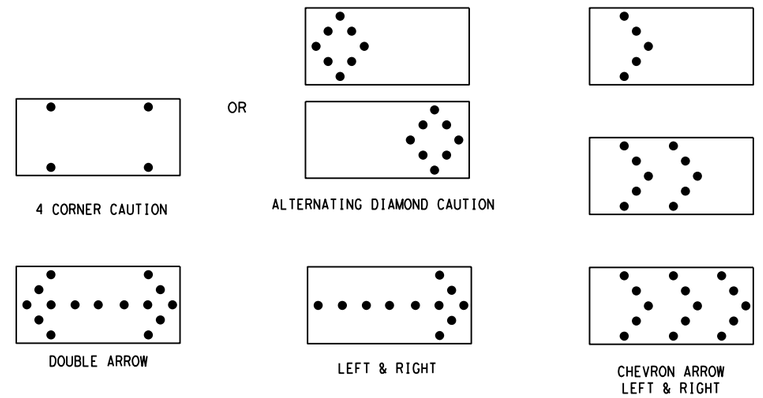
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		27

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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:

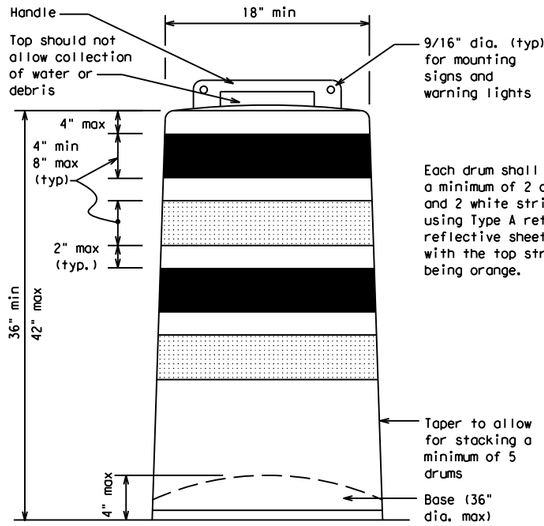
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

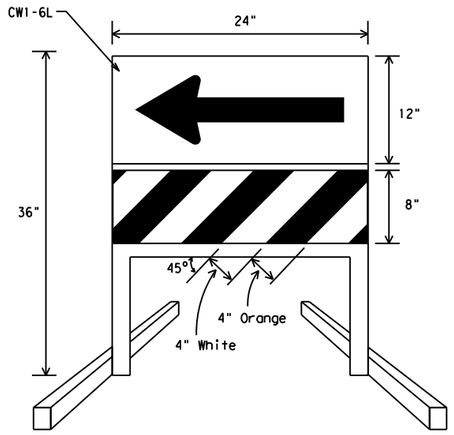
RETROREFLECTIVE SHEETING

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 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

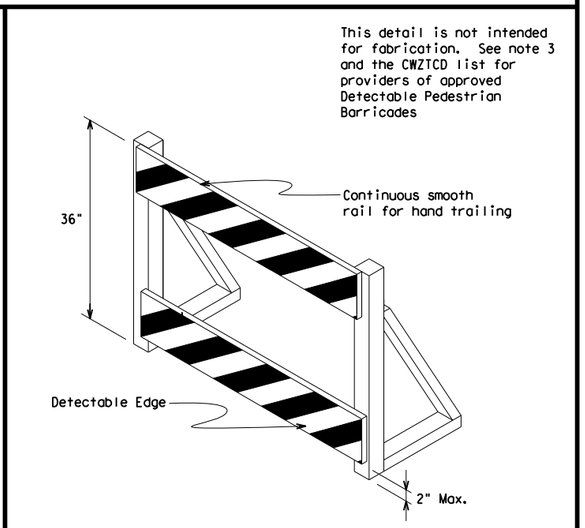
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other 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.





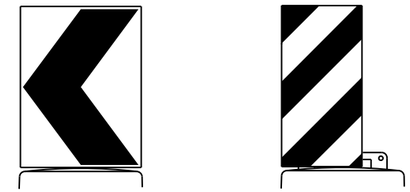
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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REVISIONS	2277	01	010,etc	FM 275
4-03 7-13	DIST	COUNTY		SHEET NO.
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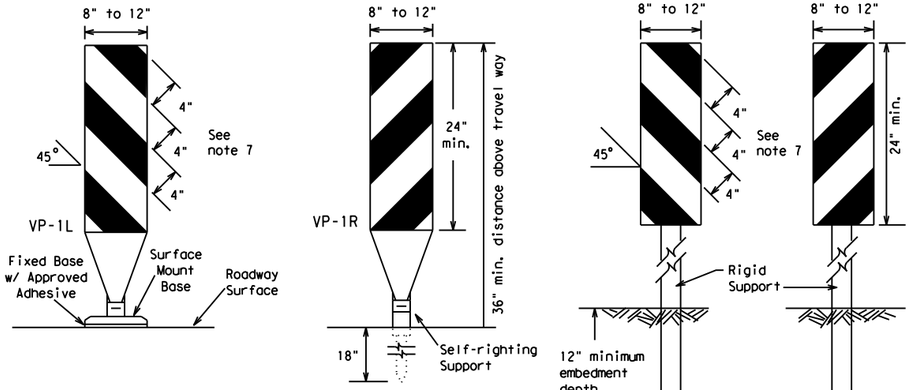
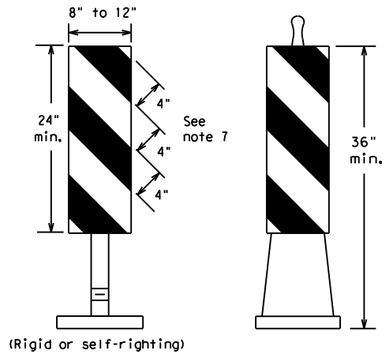


FIXED
(Rigid or self-righting)

DRIVEABLE

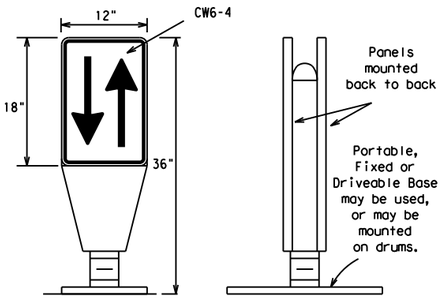


(Rigid or self-righting)

PORTABLE

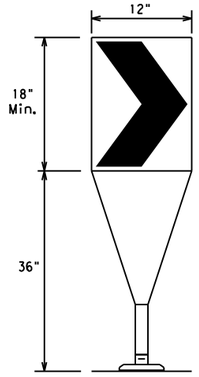
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



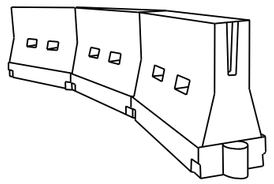
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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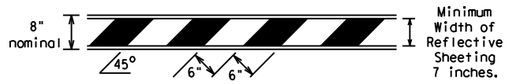
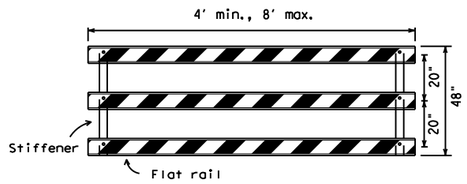
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



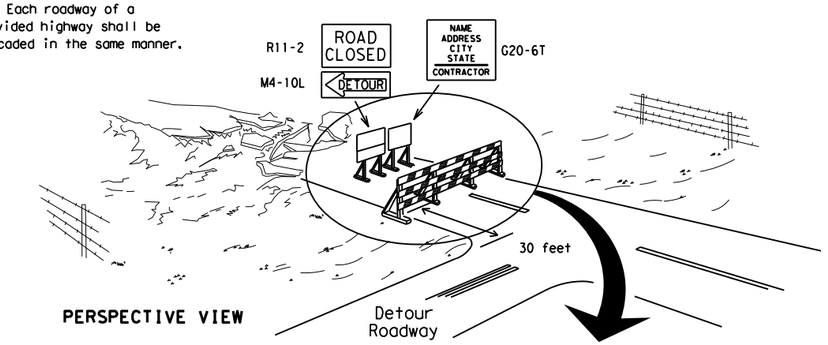
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

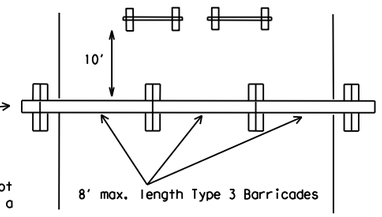
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

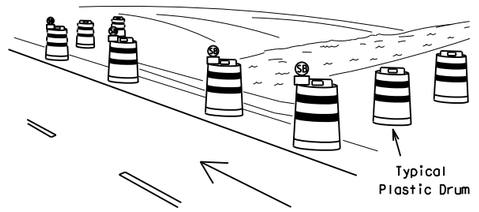
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

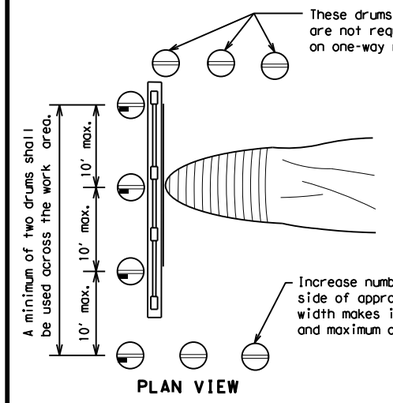
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

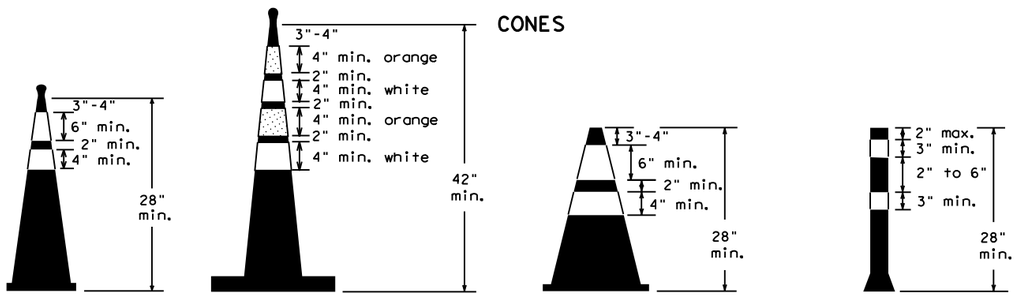
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

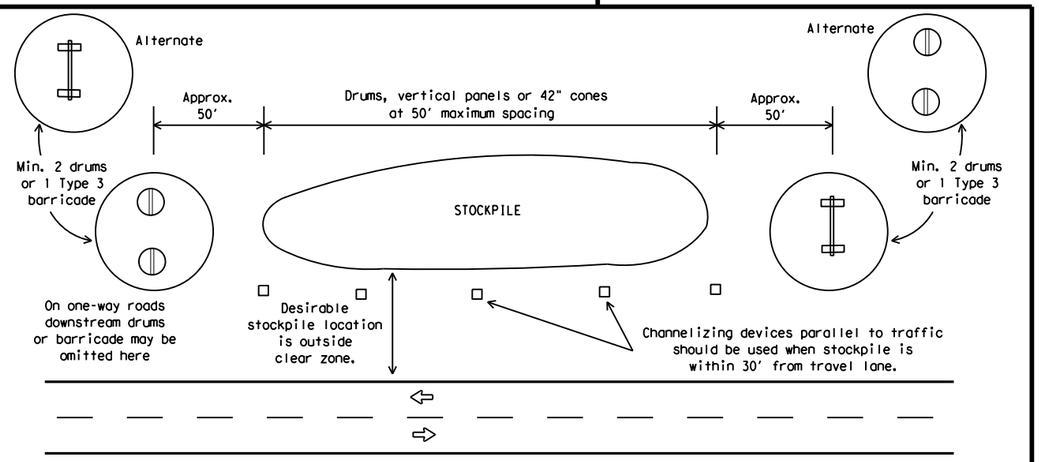
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



28" Cones shall have a minimum weight of 9 1/2 lbs.

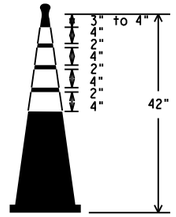
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

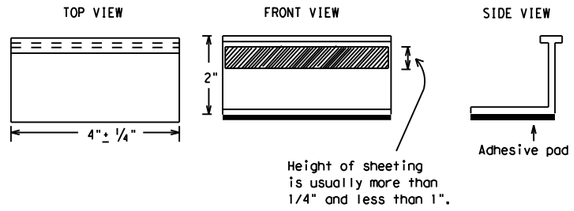
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	PAR	RAINS		31
11-02 8-14				

105

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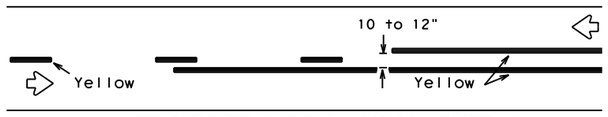
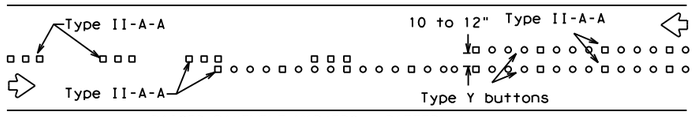
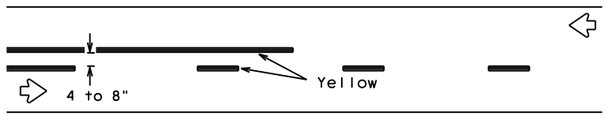
PAVEMENT MARKING PATTERNS



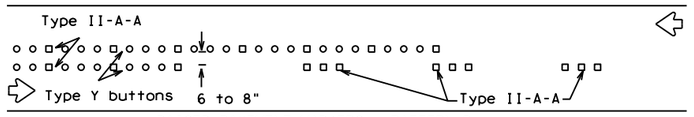
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



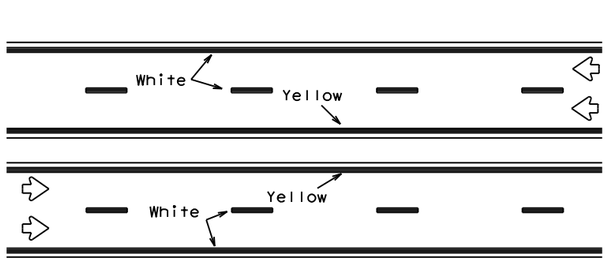
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



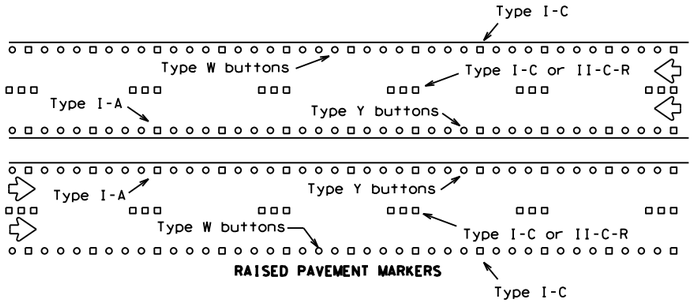
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

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



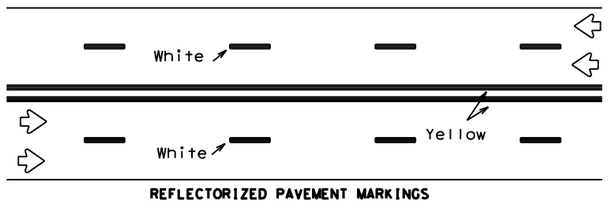
REFLECTORIZED PAVEMENT MARKINGS



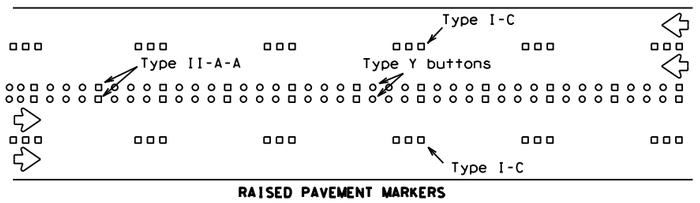
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



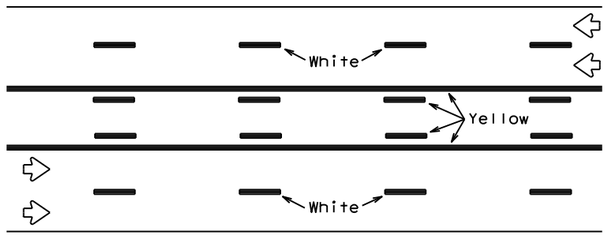
REFLECTORIZED PAVEMENT MARKINGS



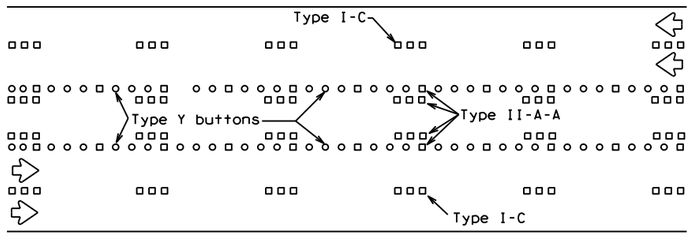
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

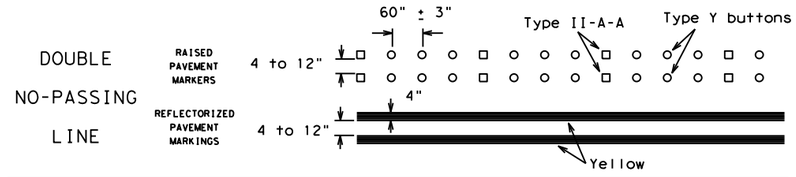
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

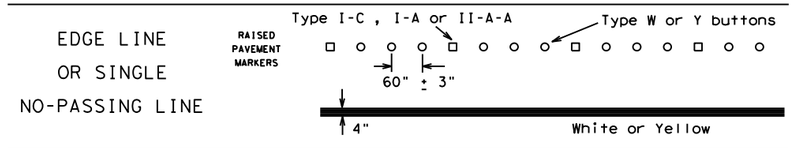
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

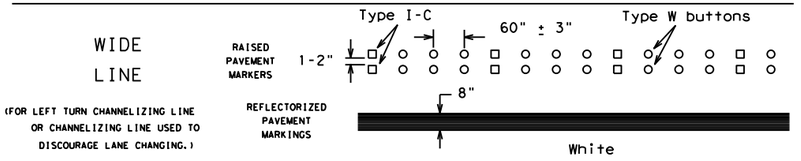


EDGE LINE OR SINGLE NO-PASSING LINE



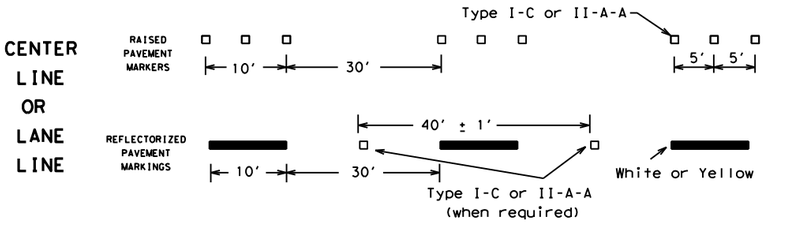
WIDE LINE

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

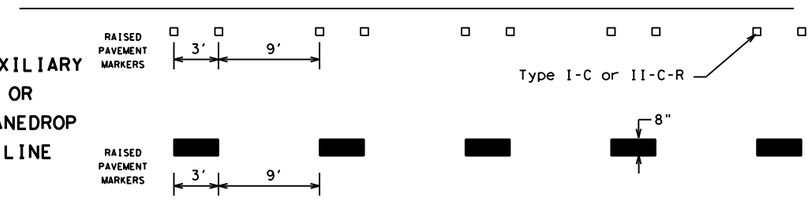


BROKEN LINES

CENTER LINE OR LANE LINE

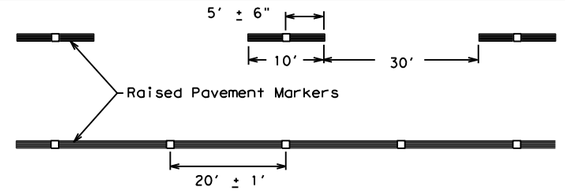


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

Traffic Operations Division Standard

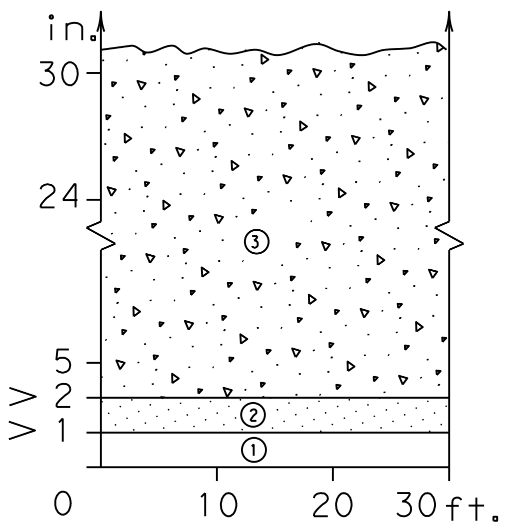
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

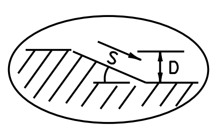
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	PAR	RAINS		32
11-02 8-14				

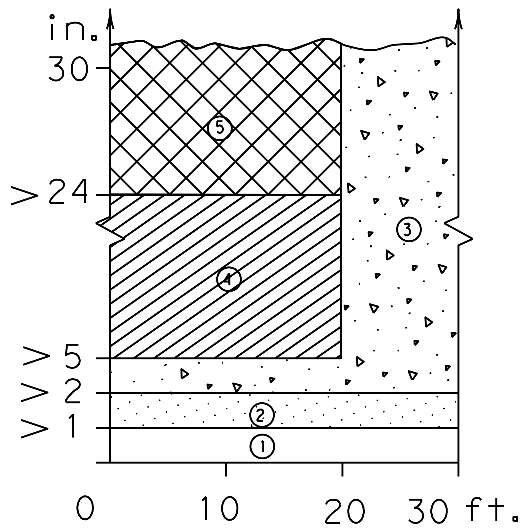
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

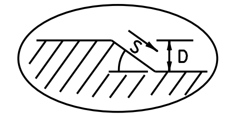


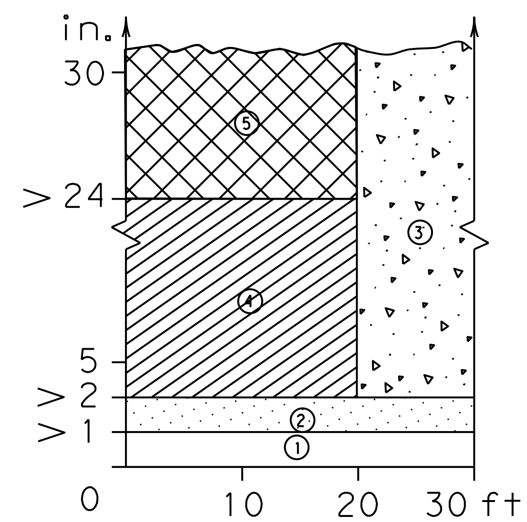
Edge Condition I
S = (3:1) (or flatter)





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





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

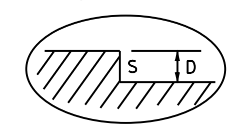
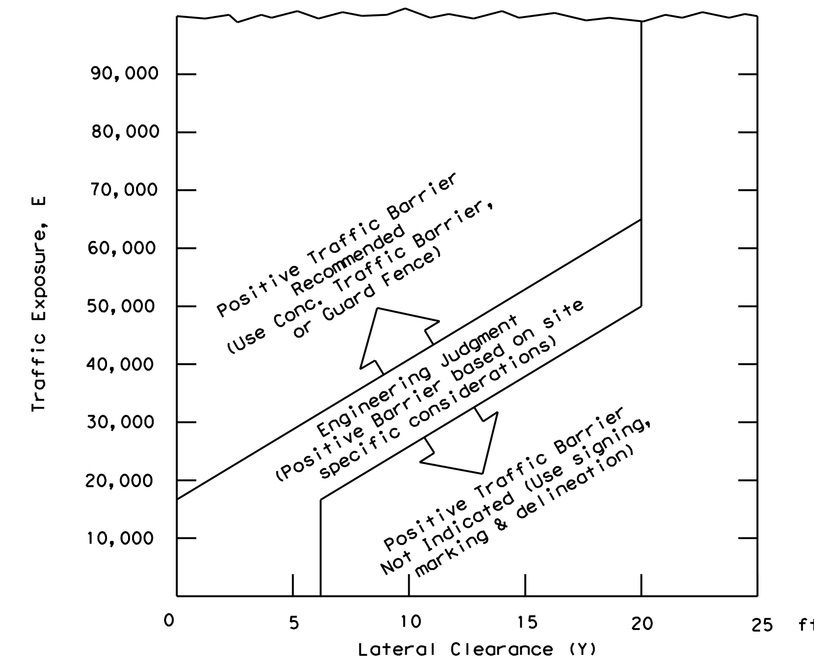


FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▒)

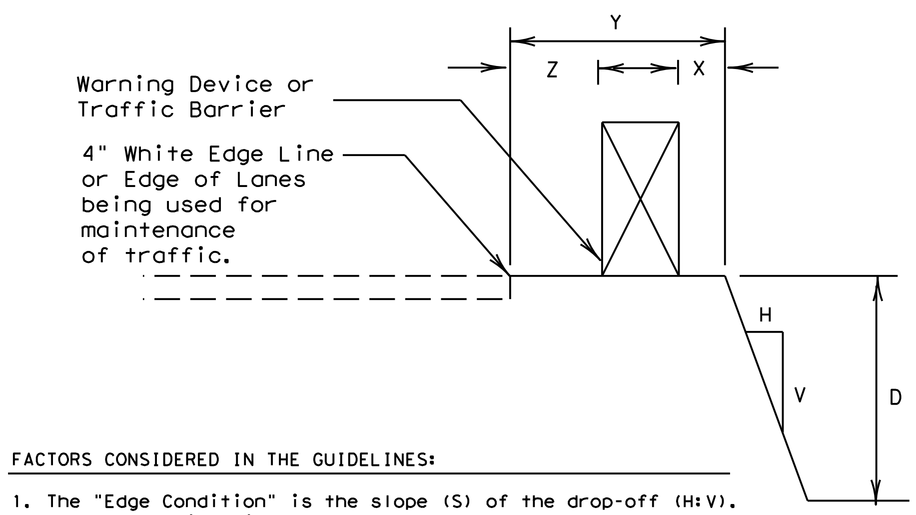


1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

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

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

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



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

FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".
2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.
3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.
4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.
5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Edge Condition Notes:

1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.
2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.
3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.
4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

Engineer's Seal

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	2277	01	010,etc	FM 275
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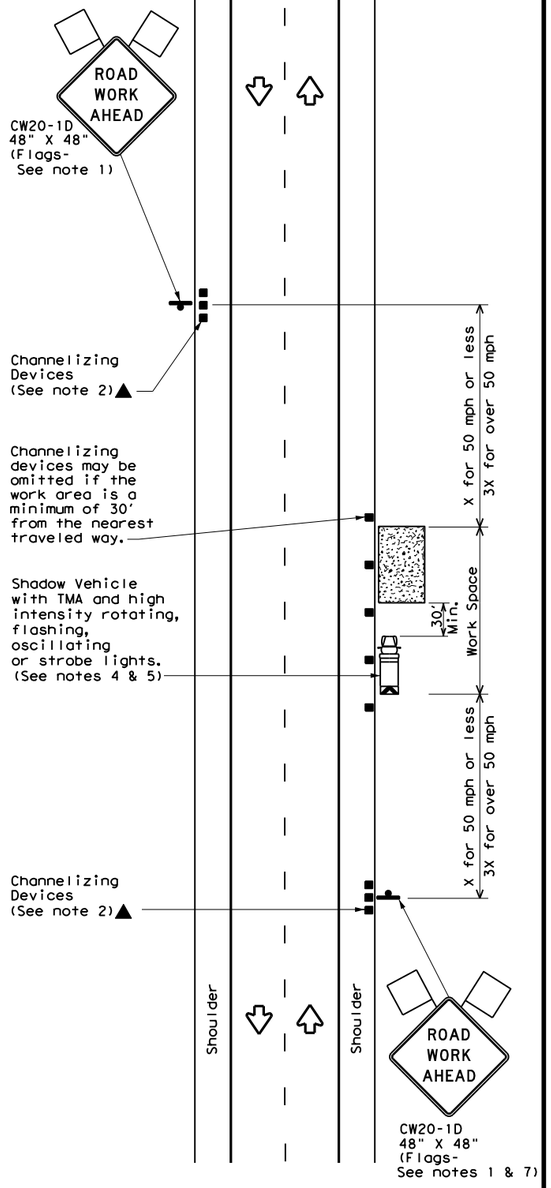
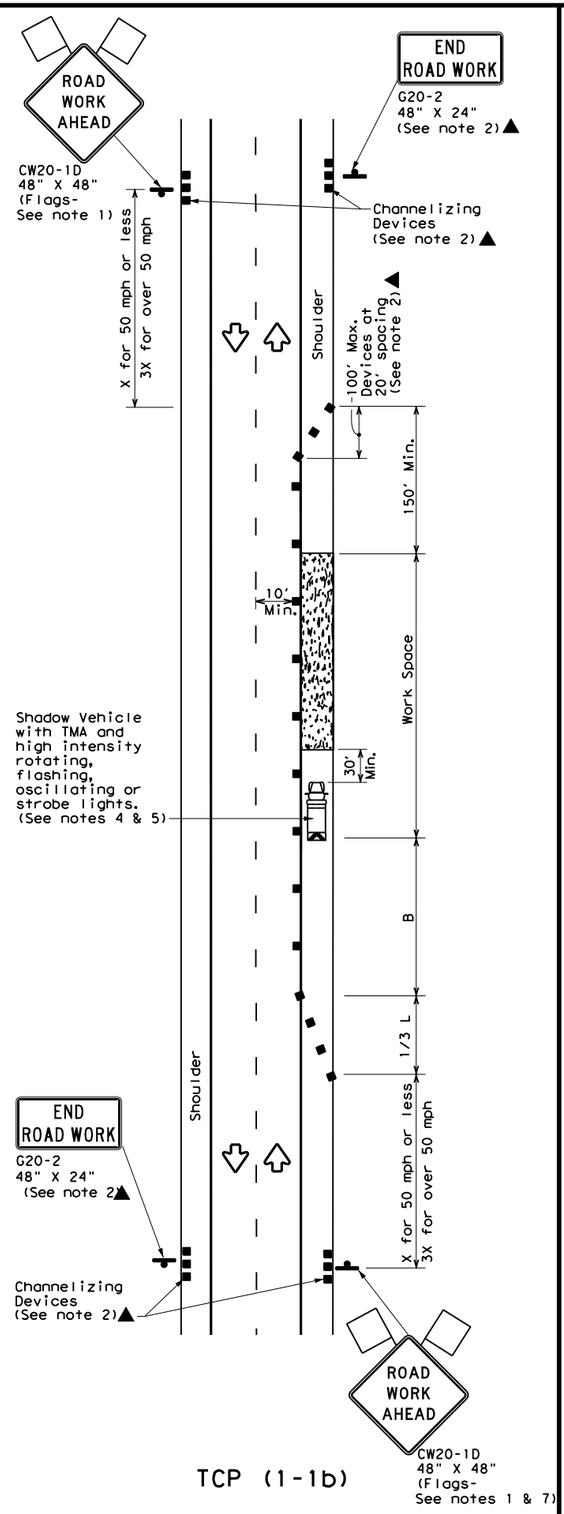


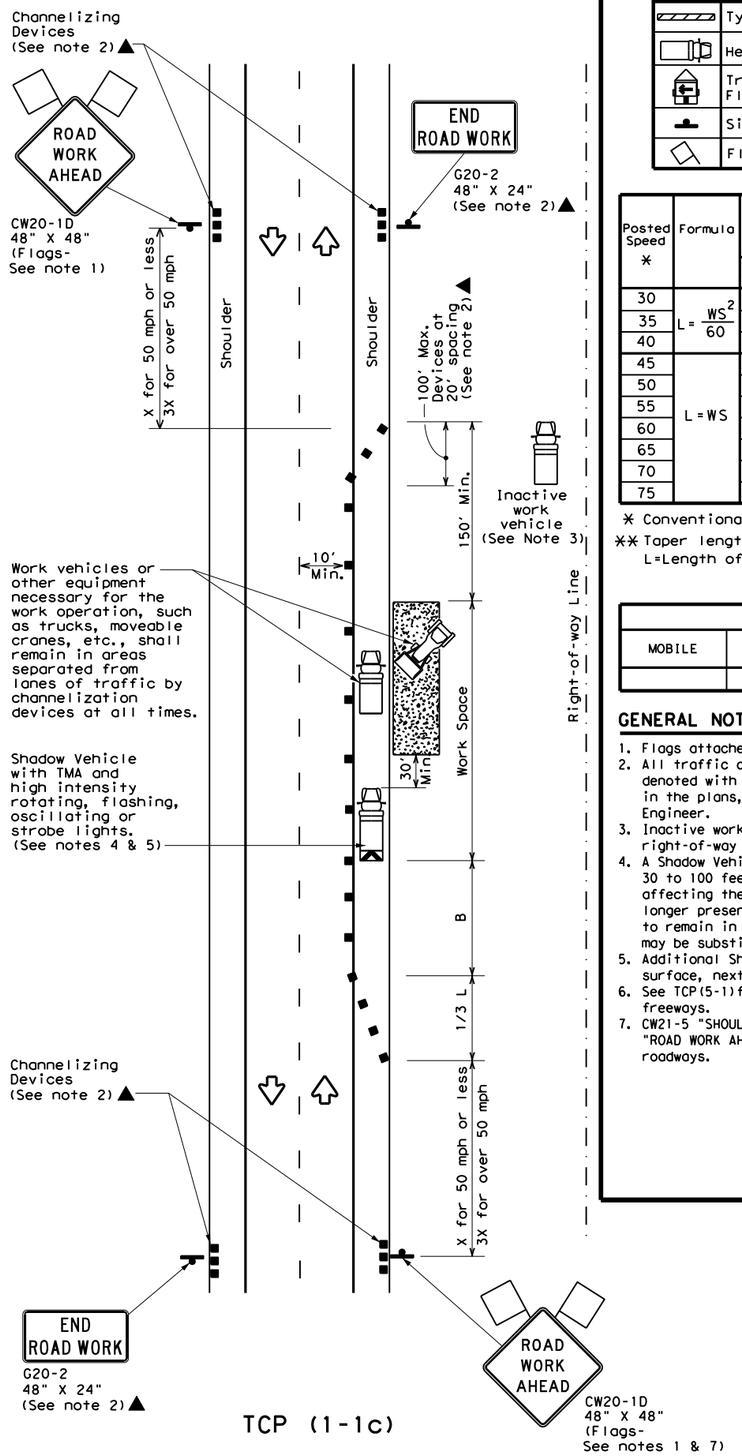
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
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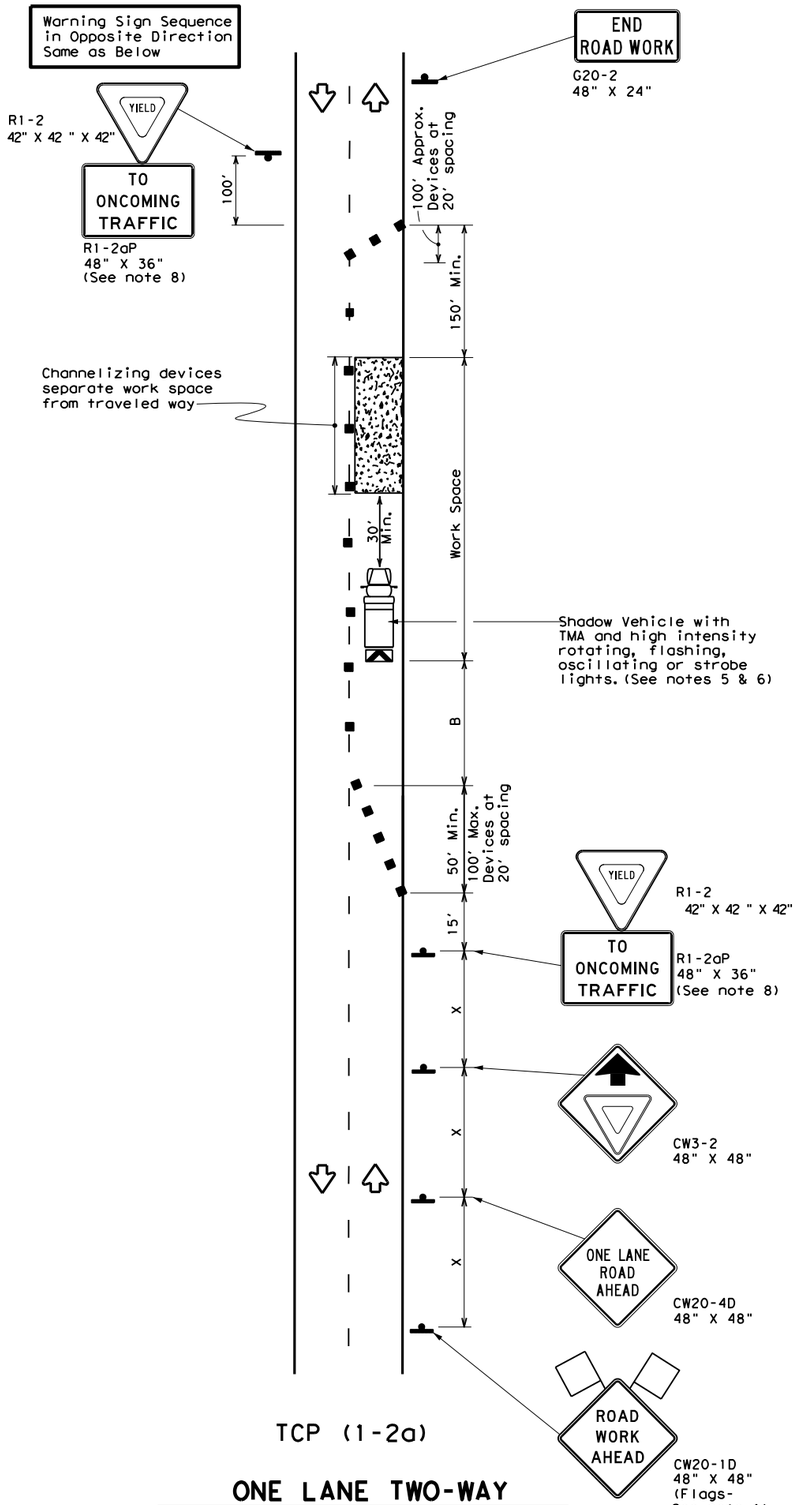
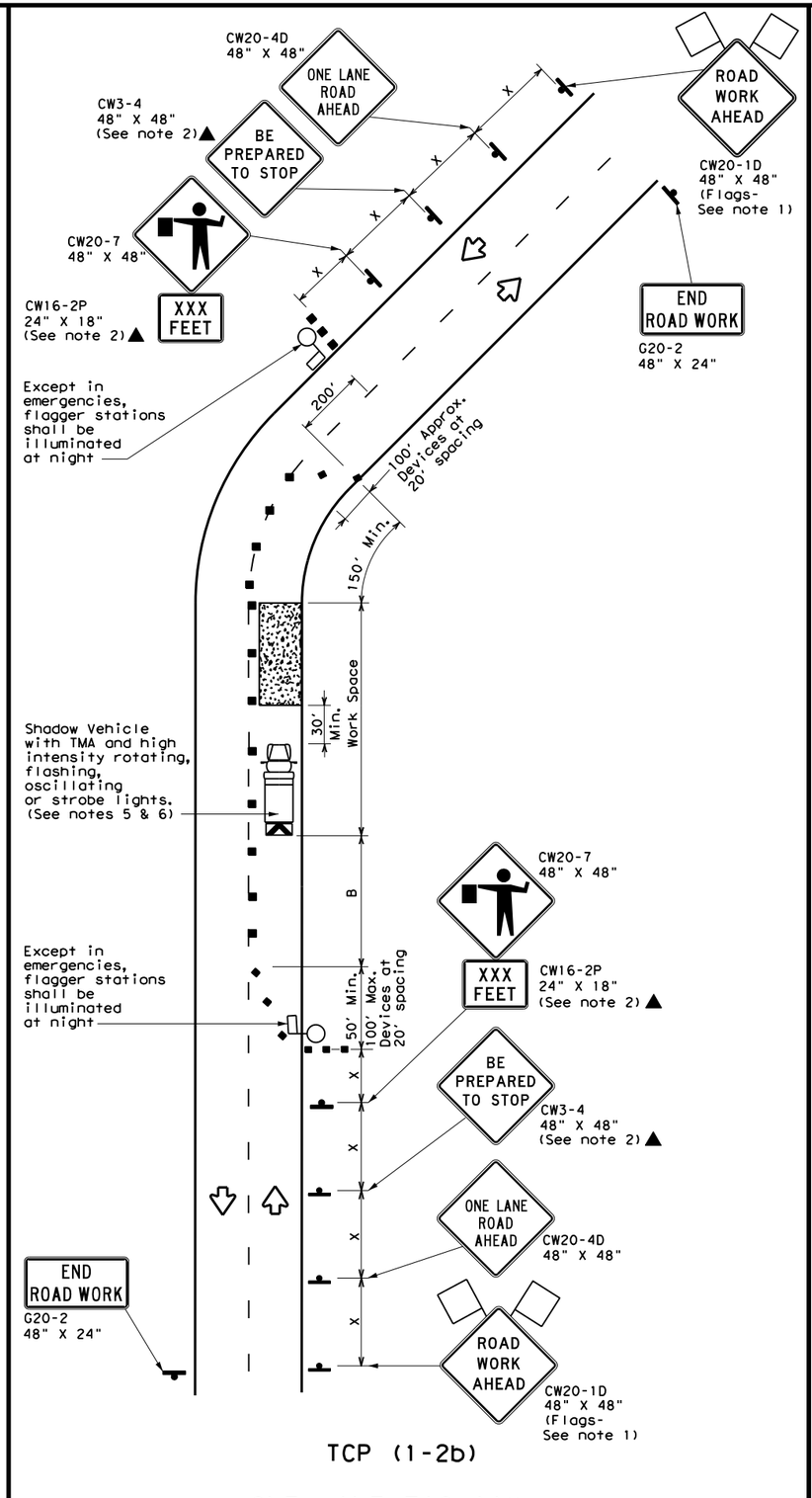


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		35

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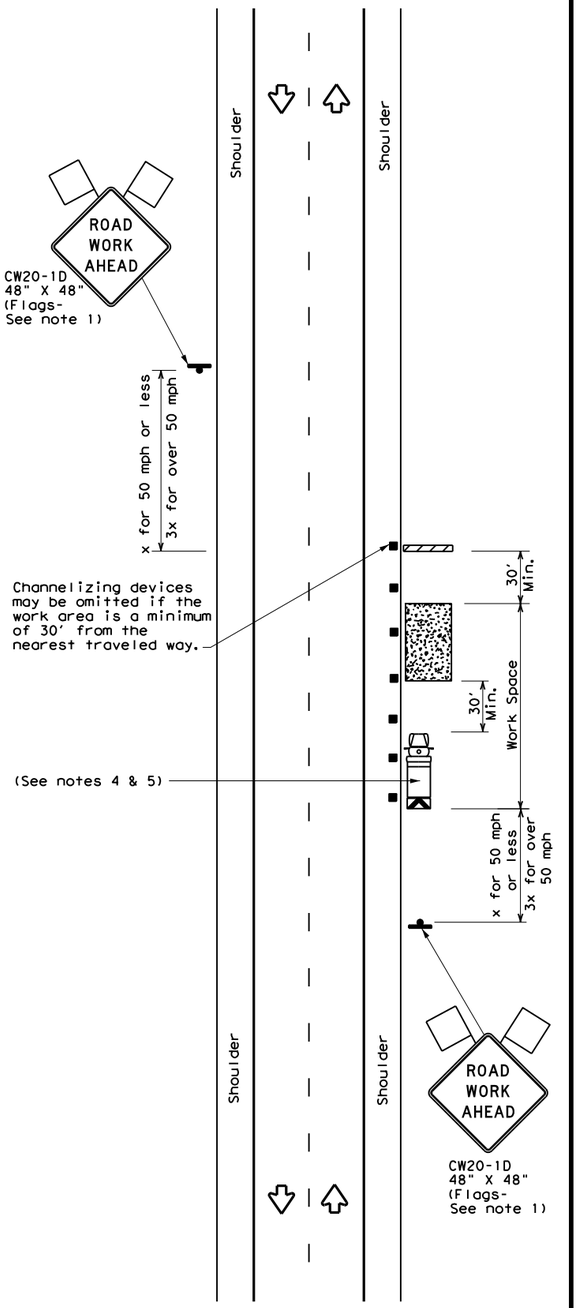
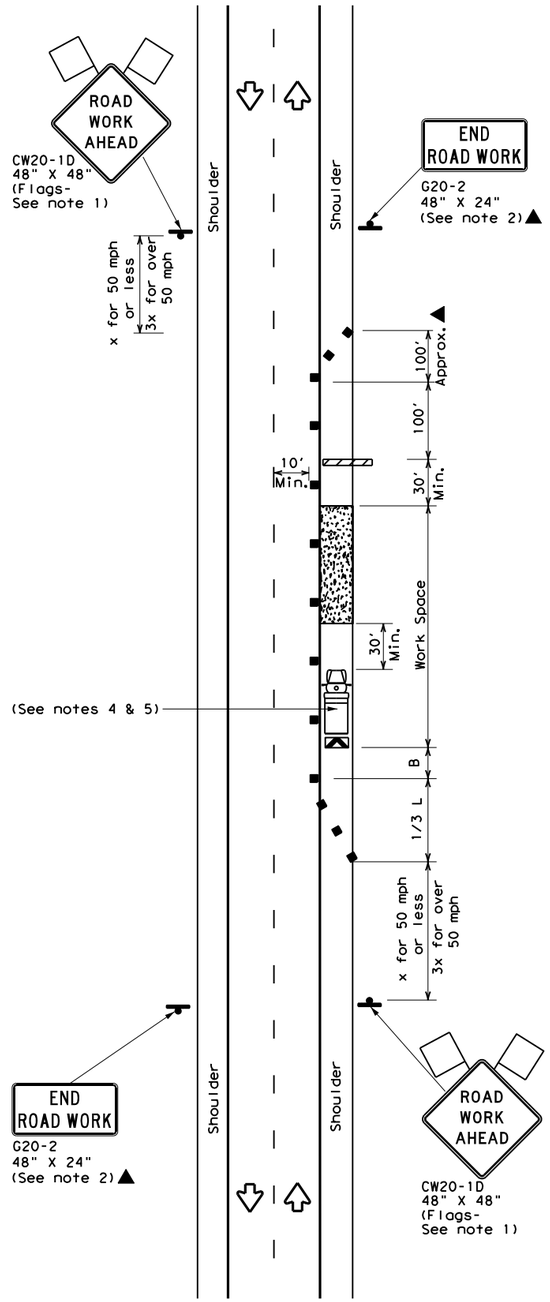


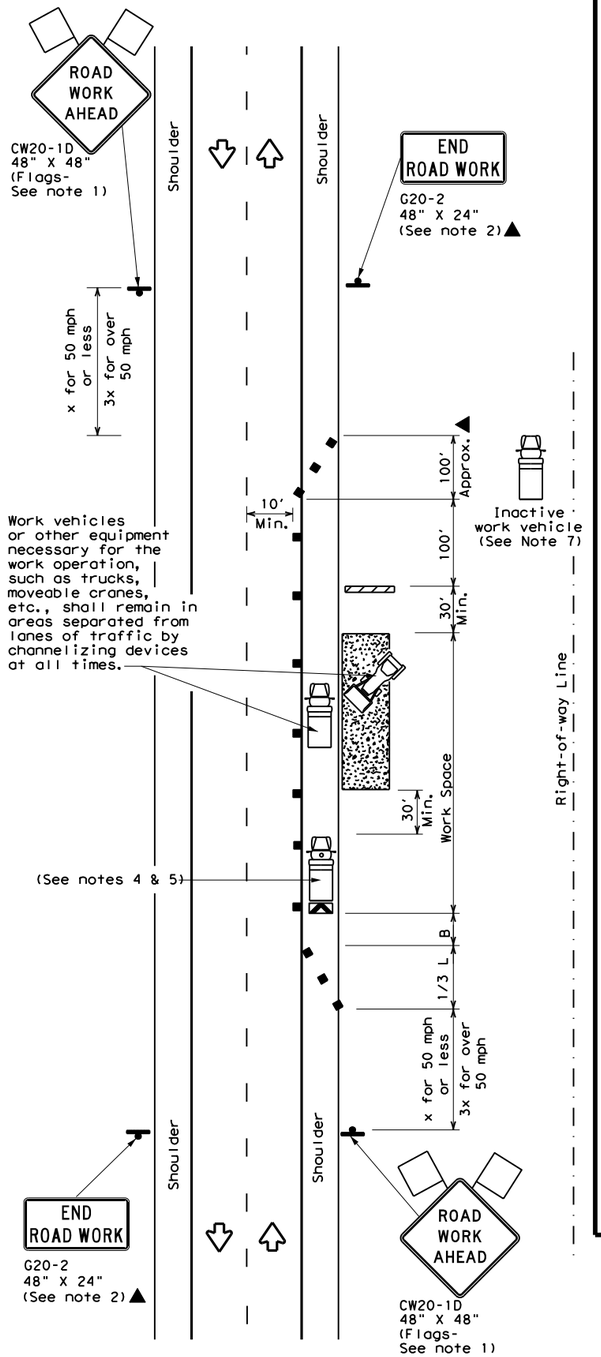
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	PAR	RAINS		36
1-97 2-18				

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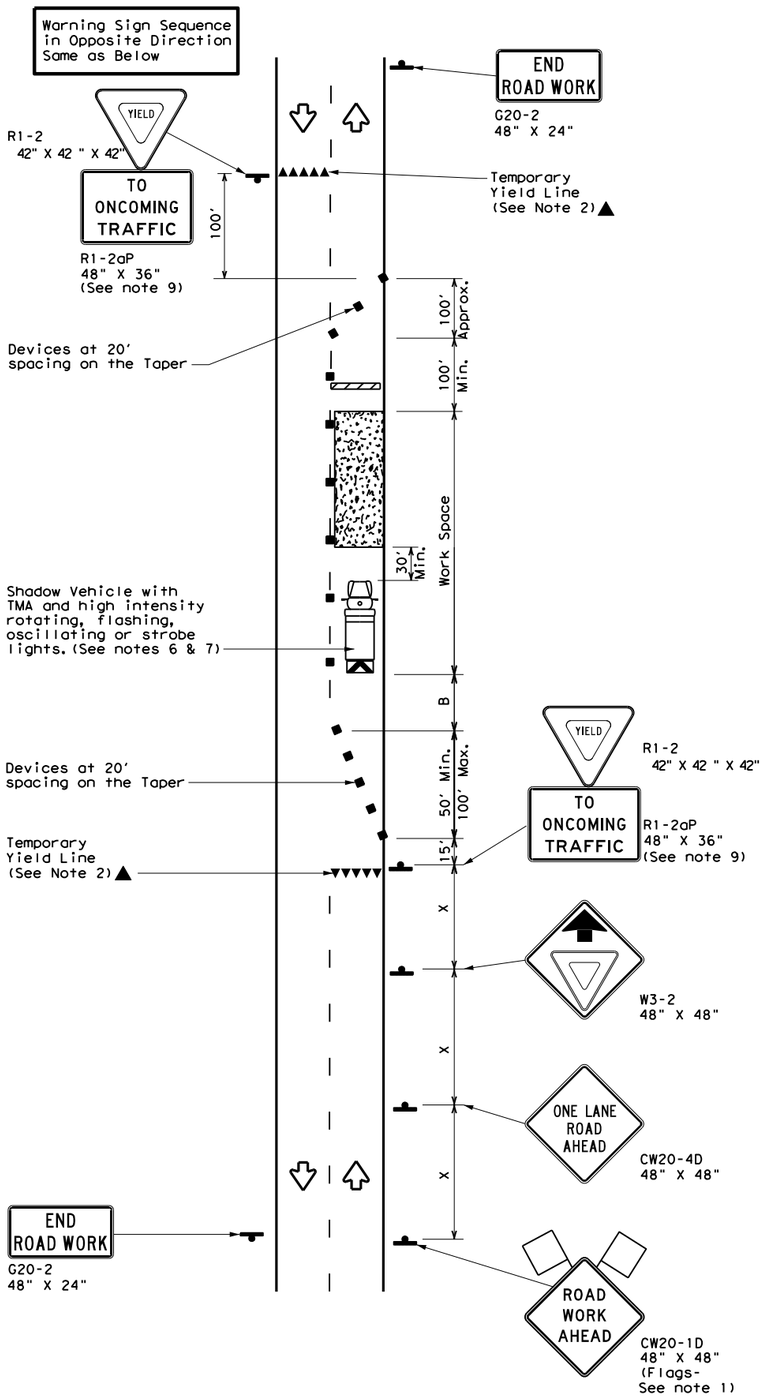
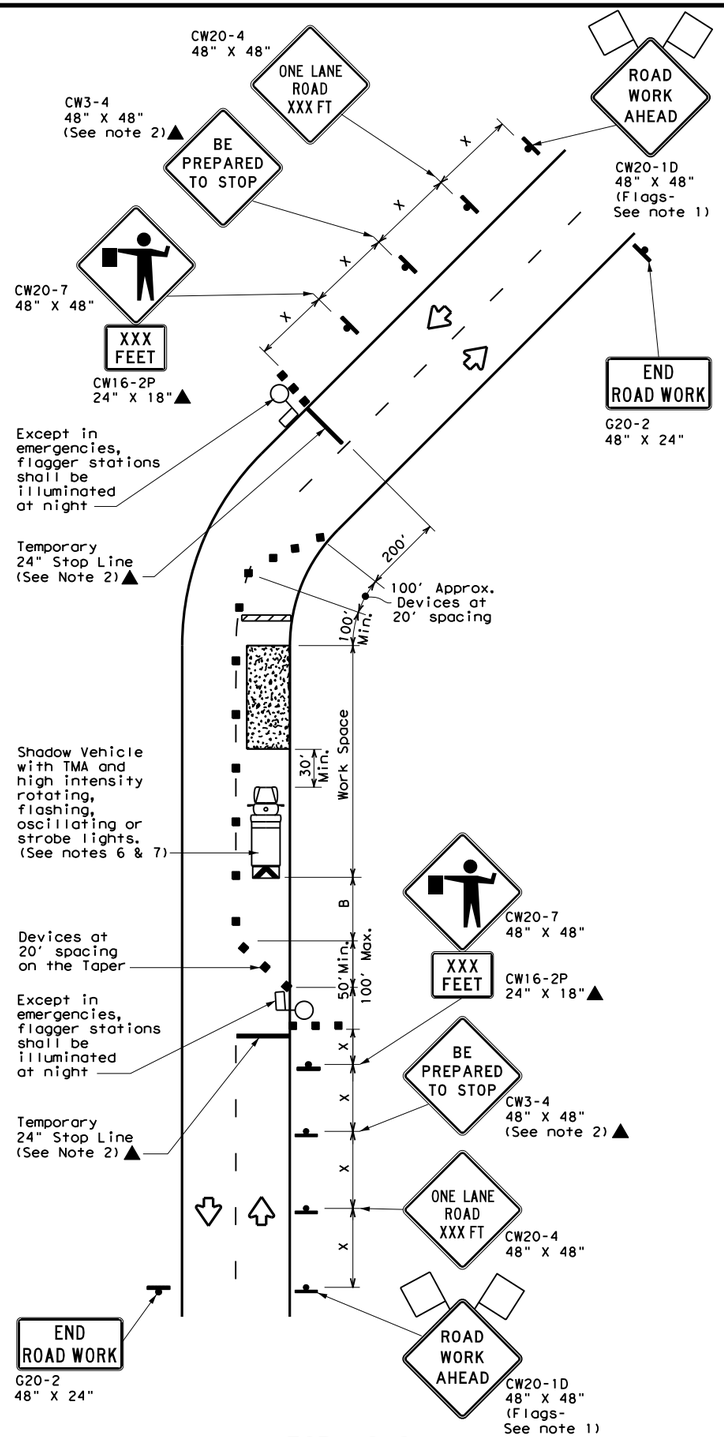


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	2277	01	010,etc	FM 275
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	PAR	RAINS		37

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LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal
	Heavy Work Vehicle		Truck Mounted Attenuator

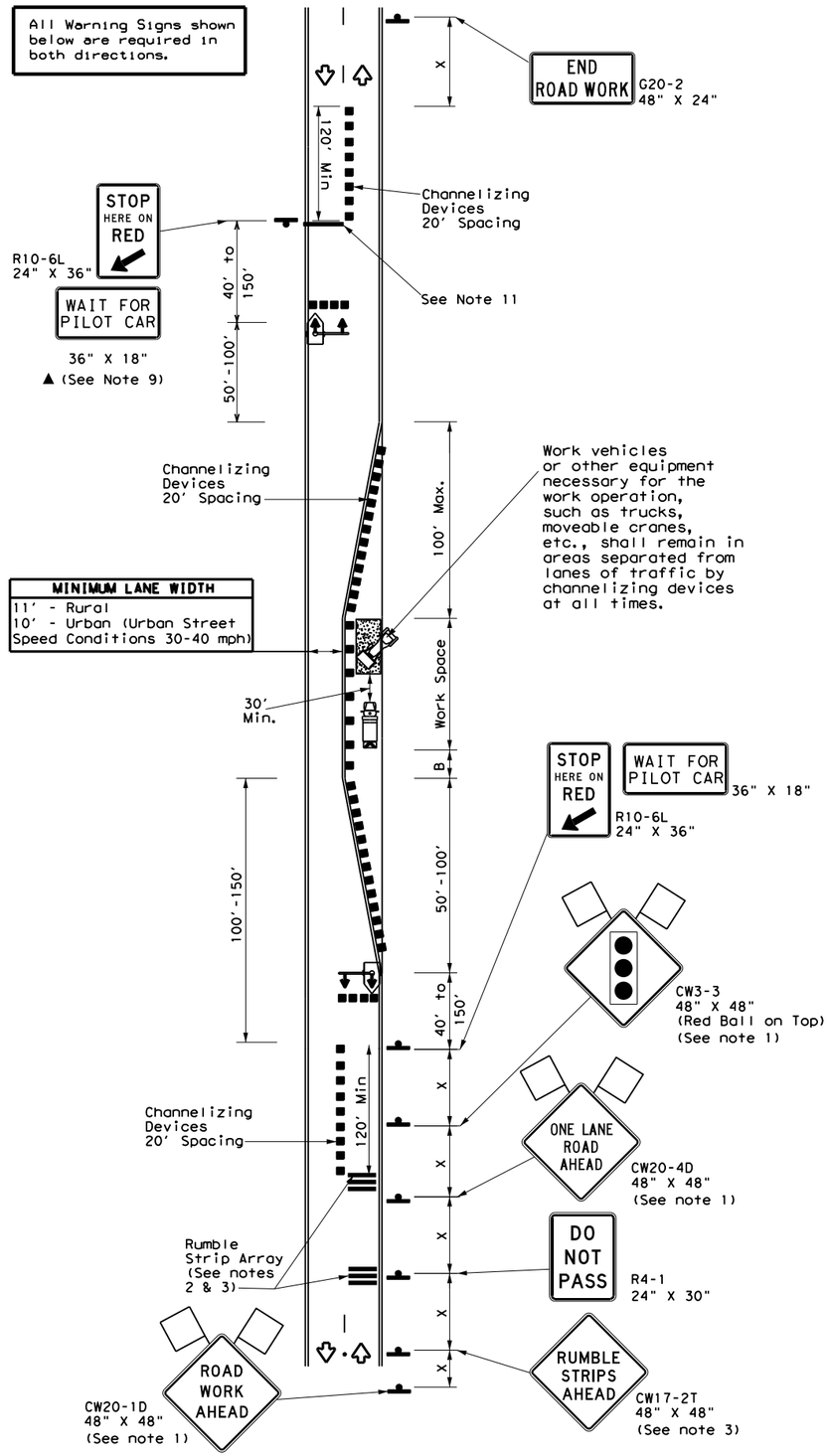
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	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
		✓		

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'



ONE LANE TWO-WAY (WITH NO SHOULDERS) TRAFFIC CONTROL WITH TRAFFIC SIGNAL

GENERAL NOTES

1. Flags attached to signs, where shown, are REQUIRED.
2. 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.
3. 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.
4. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
5. Removal of the Temporary Rumble Strips should be accomplished before removing the advance warning signs.
6. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
7. Temporary Rumble Strips shall be installed as per manufacturer's recommendations.
8. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
9. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
10. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table on left).
11. 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.
12. Channelizing devices on the center line may be omitted when approved by the Engineer.

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

Texas Department of Transportation
PARIS DISTRICT STANDARD

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

TCP(2-8)-20 (PAR)

REVISIONS

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

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2277	01	010,etc	FM 275
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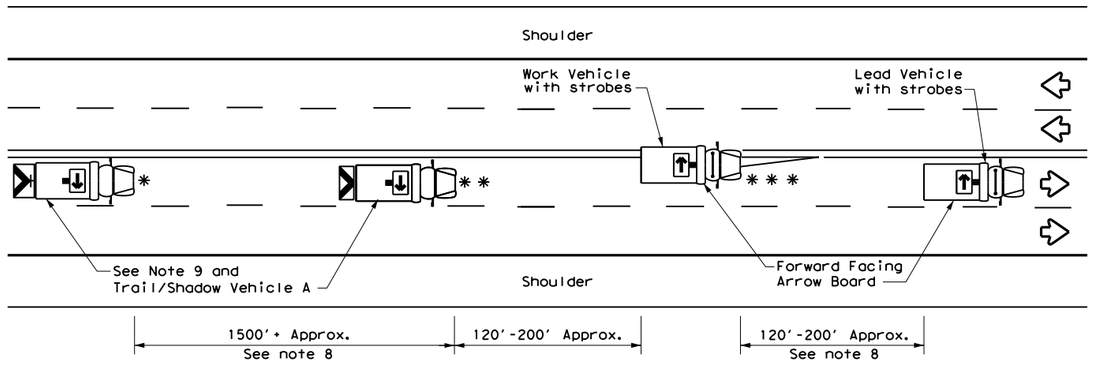
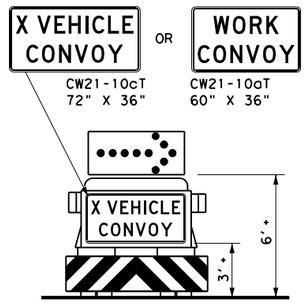
PAR	RAINS		38



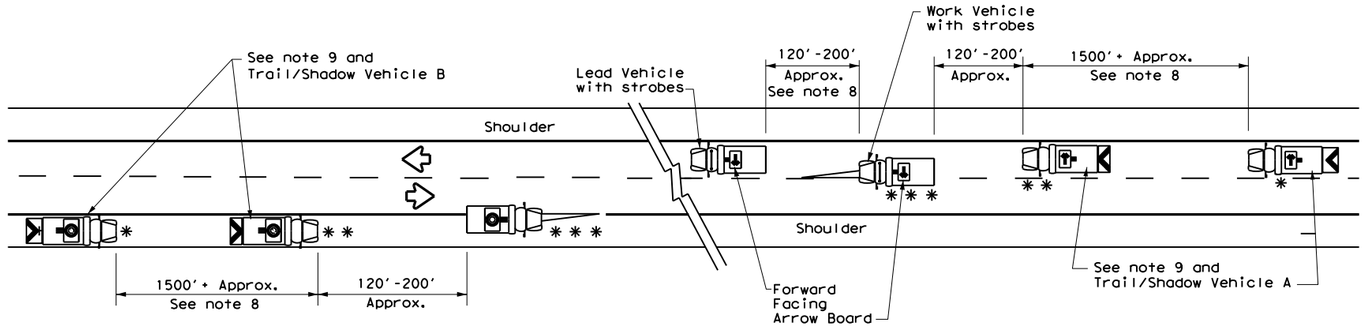
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

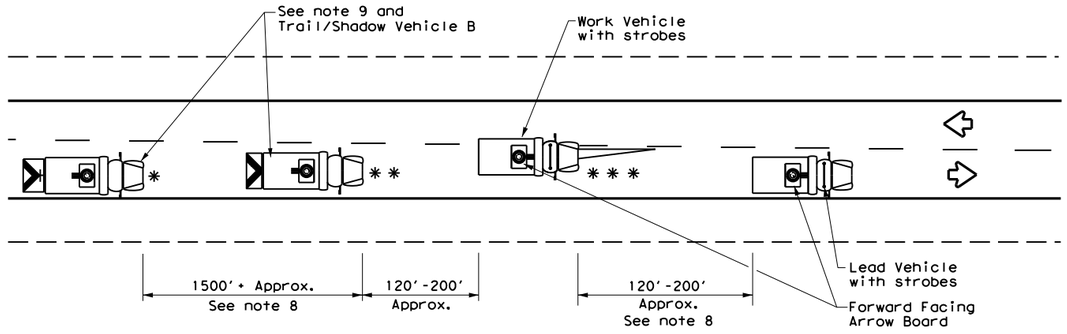


WORK ON SHOULDER

WORK ON TRAVEL LANE

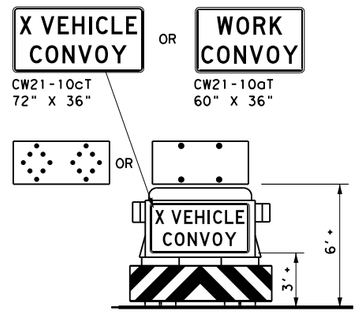
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

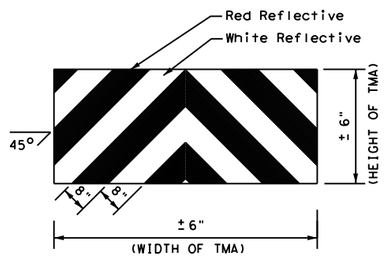
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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	PAR	RAINS		39

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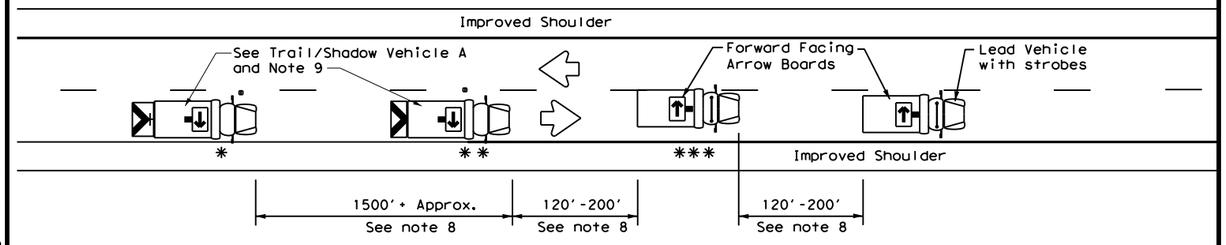
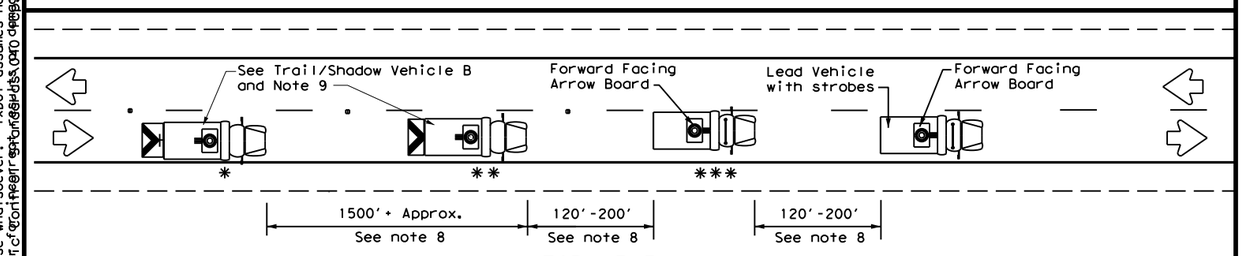


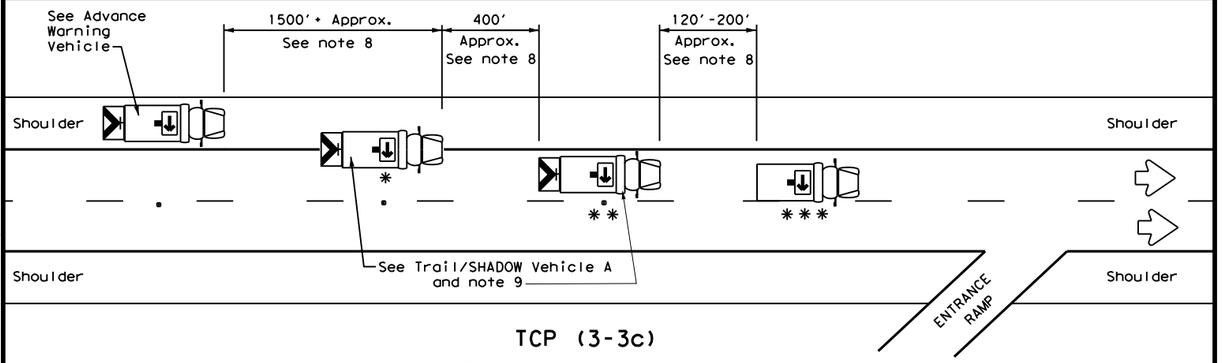
TCP (3-3a)

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



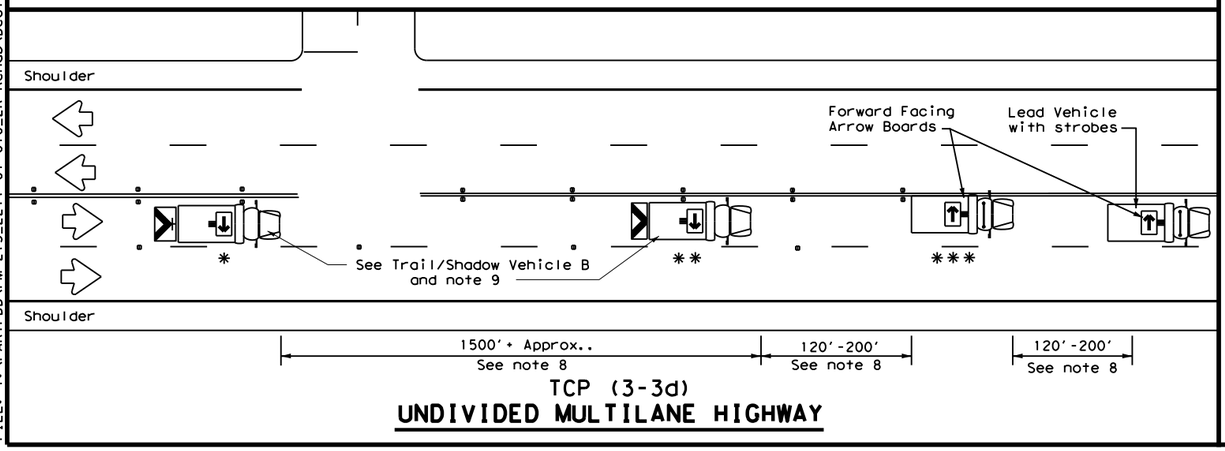
TCP (3-3b)

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



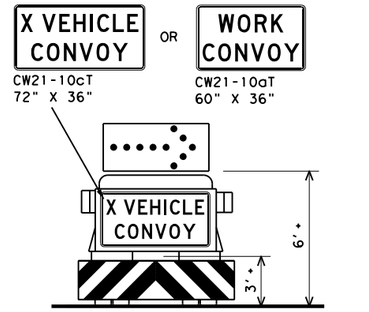
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



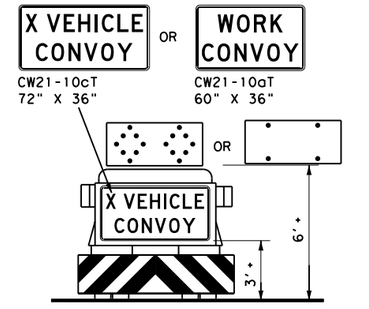
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



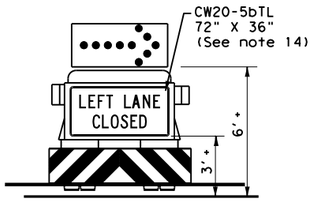
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

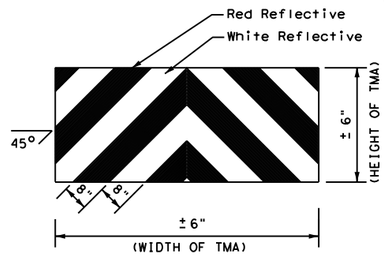


TRAIL/SHADOW VEHICLE B

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

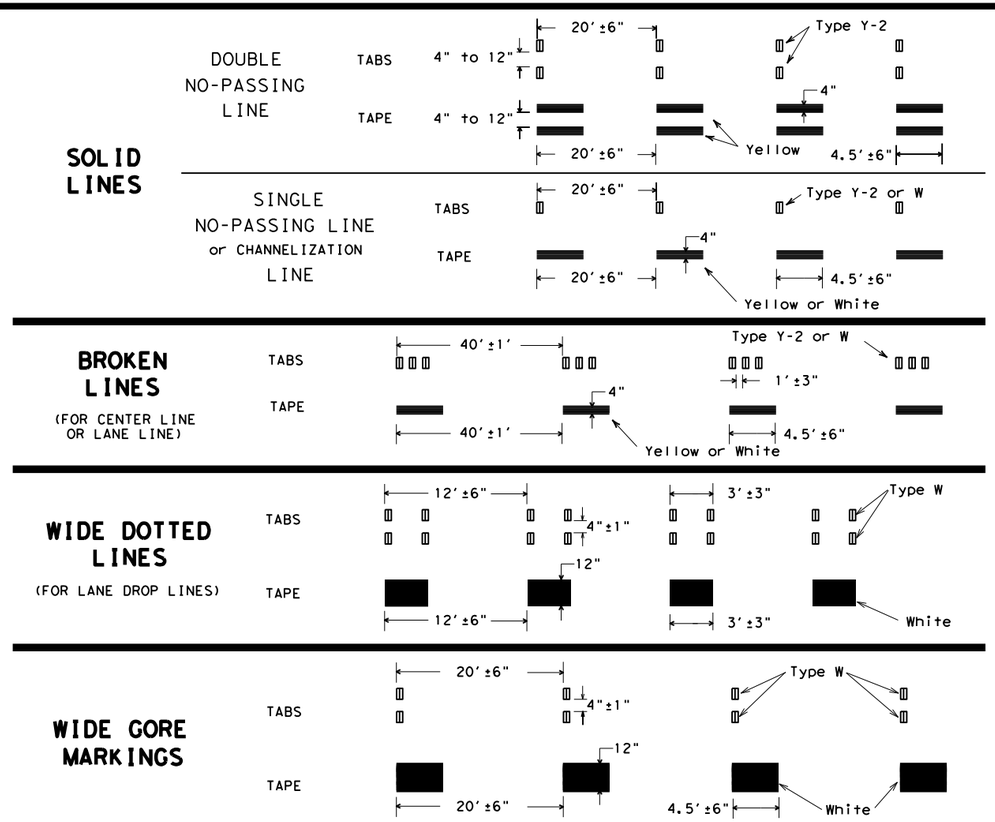
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	PAR	RAINS		40
1-97 7-14				

DATE: 3/29/2021 11:11:47 AM
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated\FP Plan Sheet

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



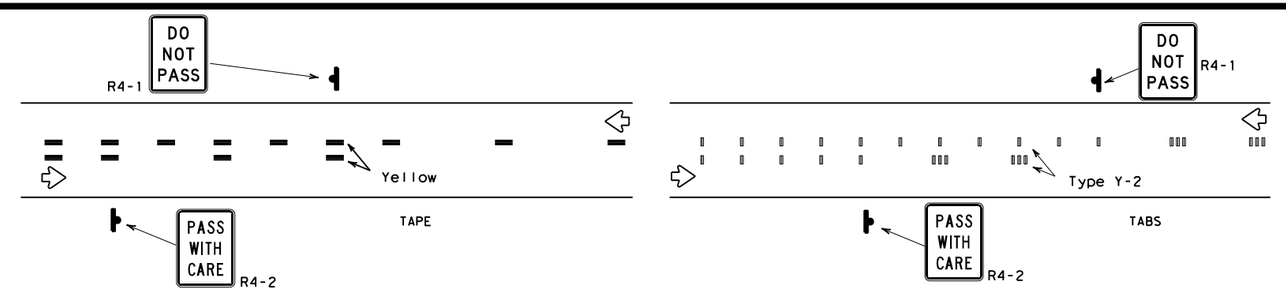
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

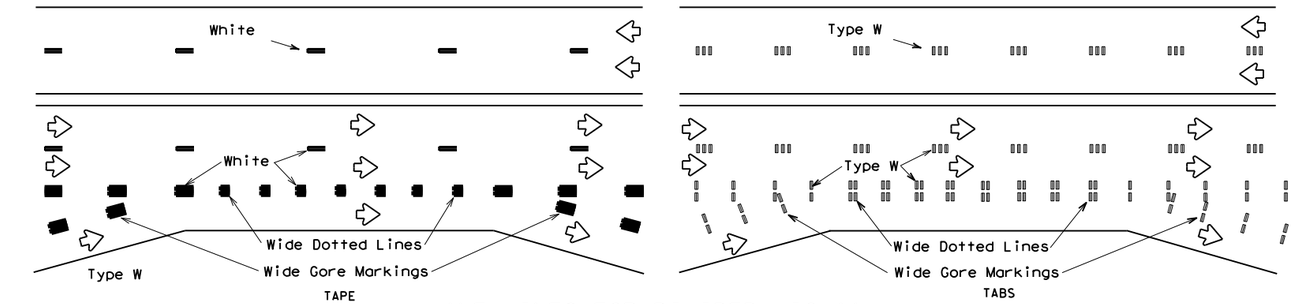
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

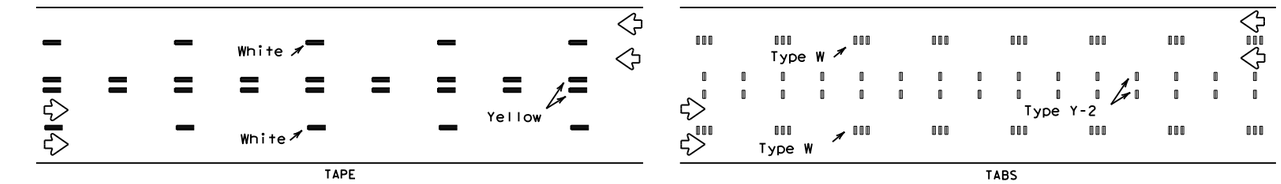
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



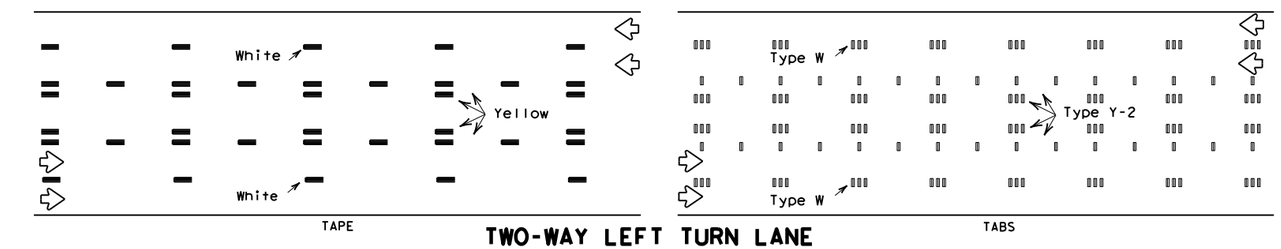
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



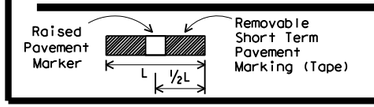
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
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1-97		DIST	COUNTY		SHEET NO.
3-03		PAR	RAINS		41
7-13					

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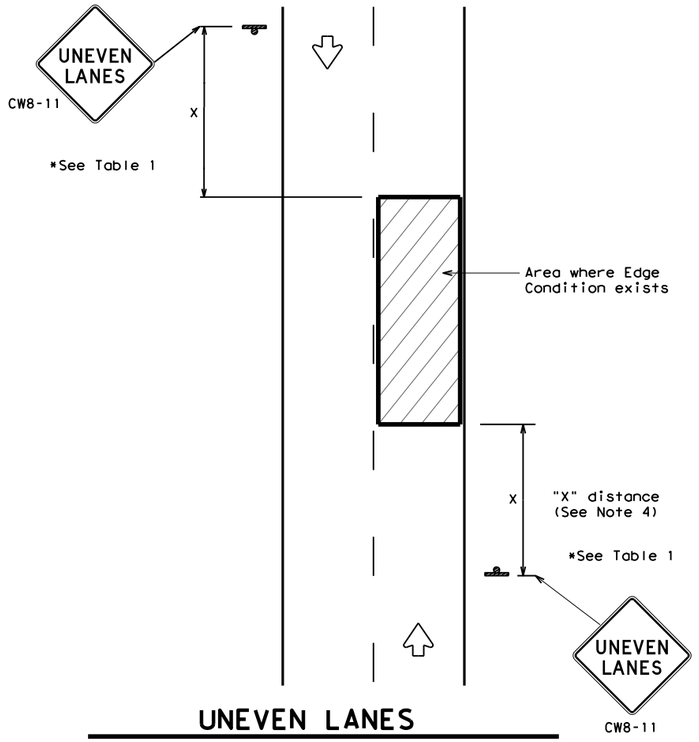
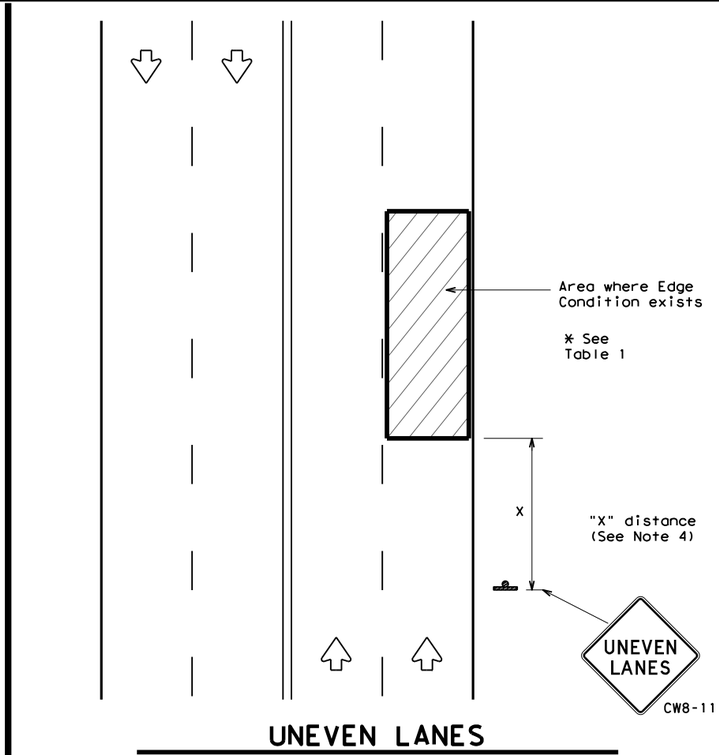
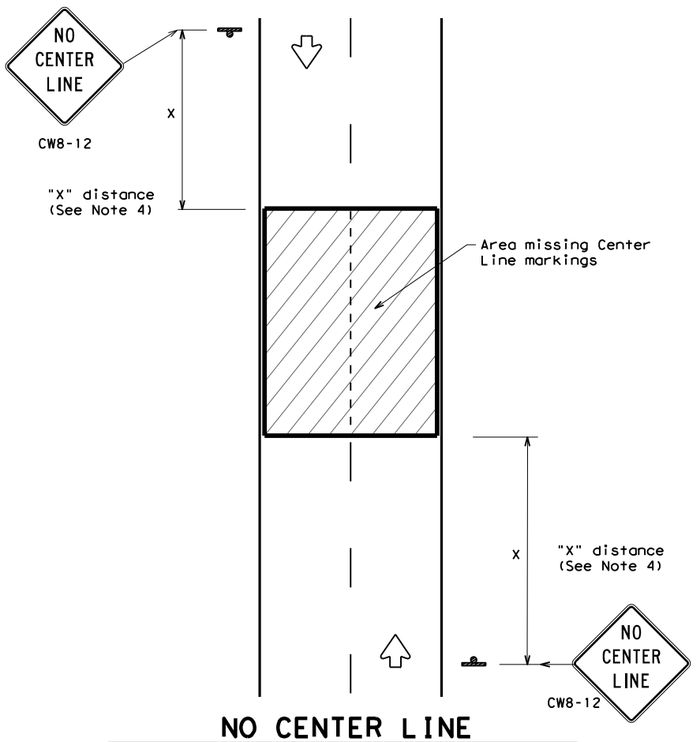


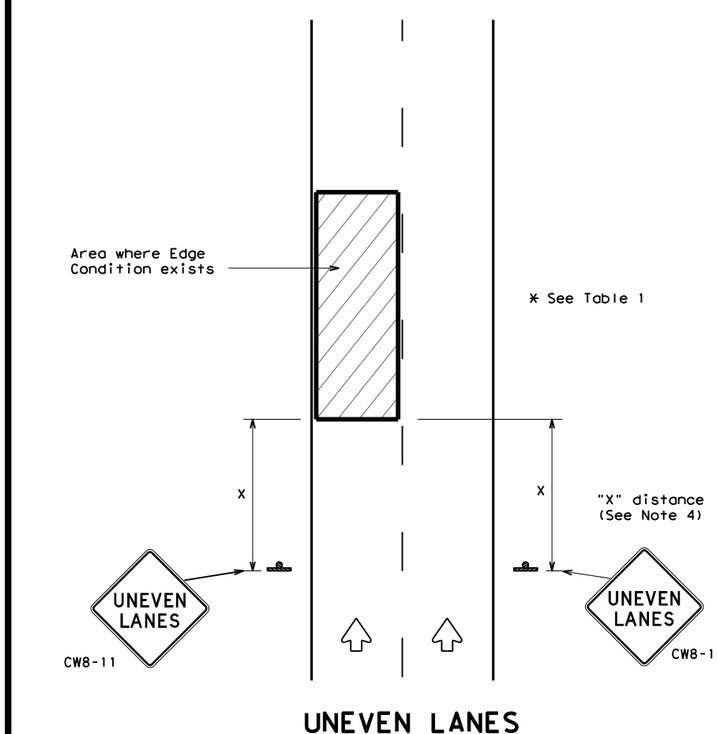
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

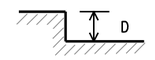
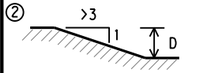
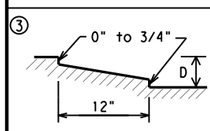
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE:	wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
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8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		PAR	RAINS		42

DATE: 3/29/2021 11:11:50 AM
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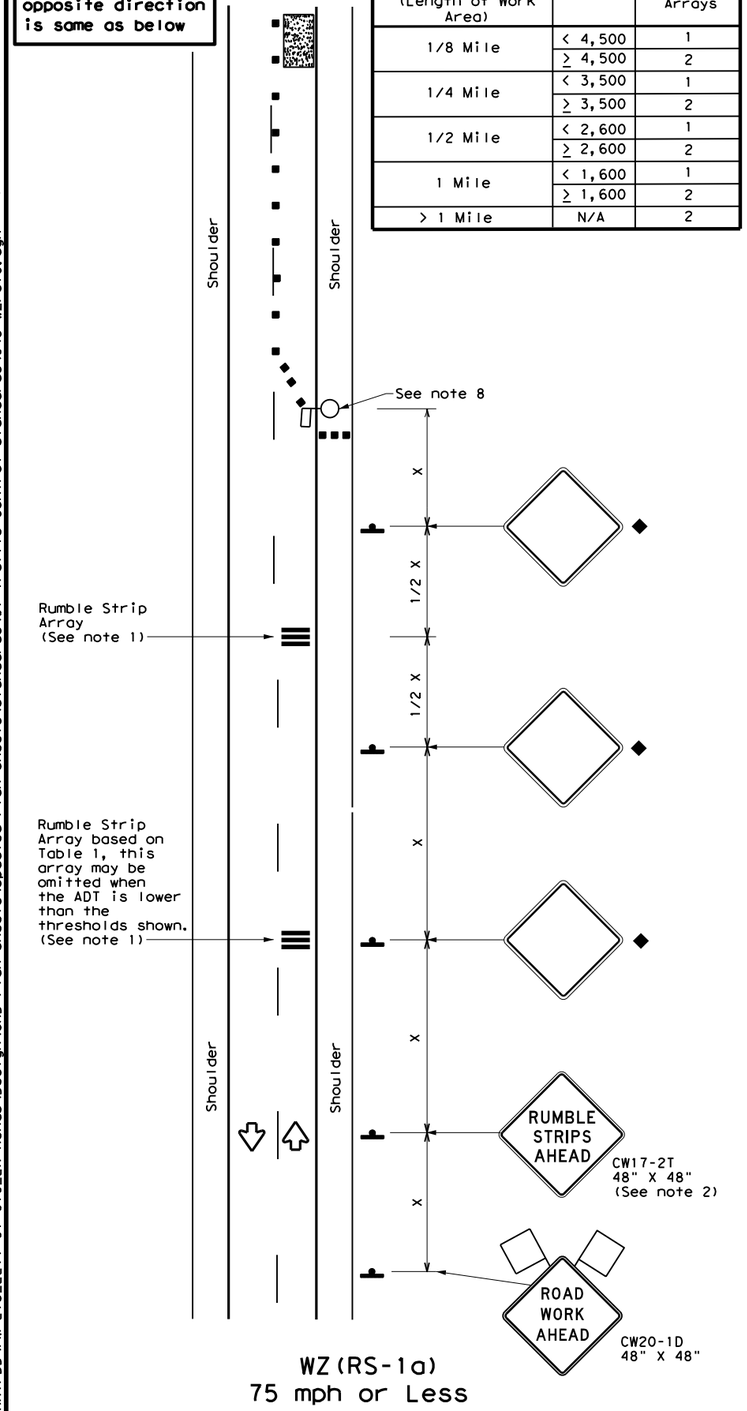
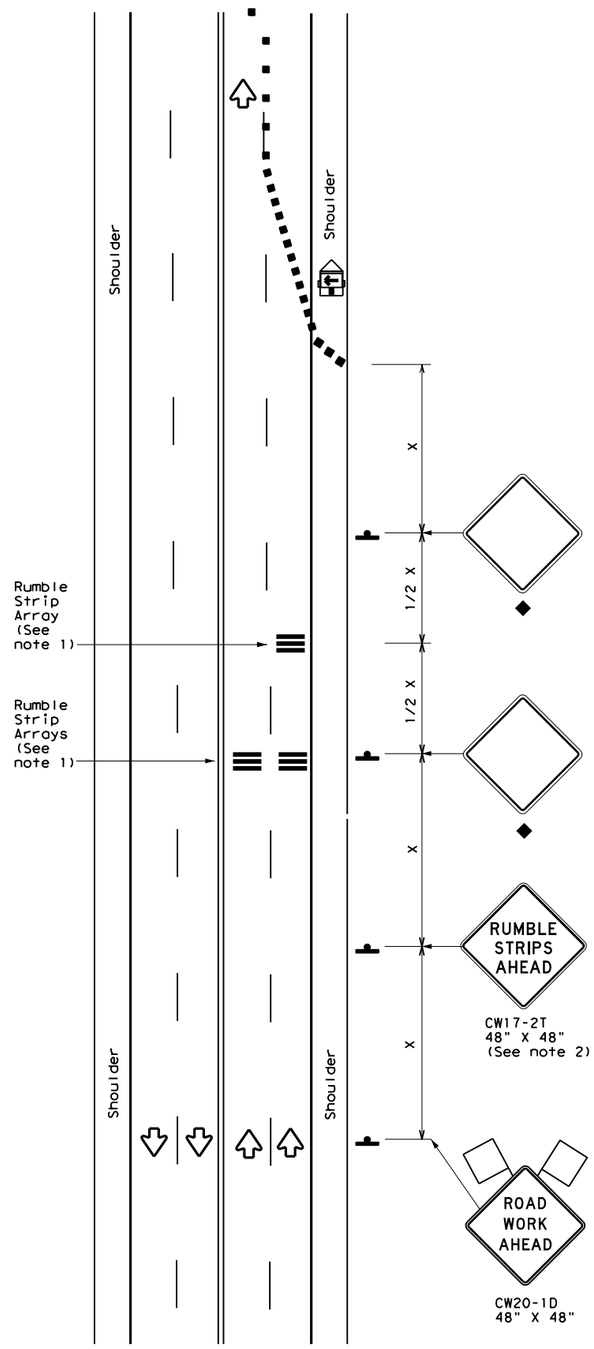
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

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. Removal of the Temporary Rumble Strips should be accomplished before removing the advance 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 AFAD or a portable traffic signal.
9. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

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.**

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
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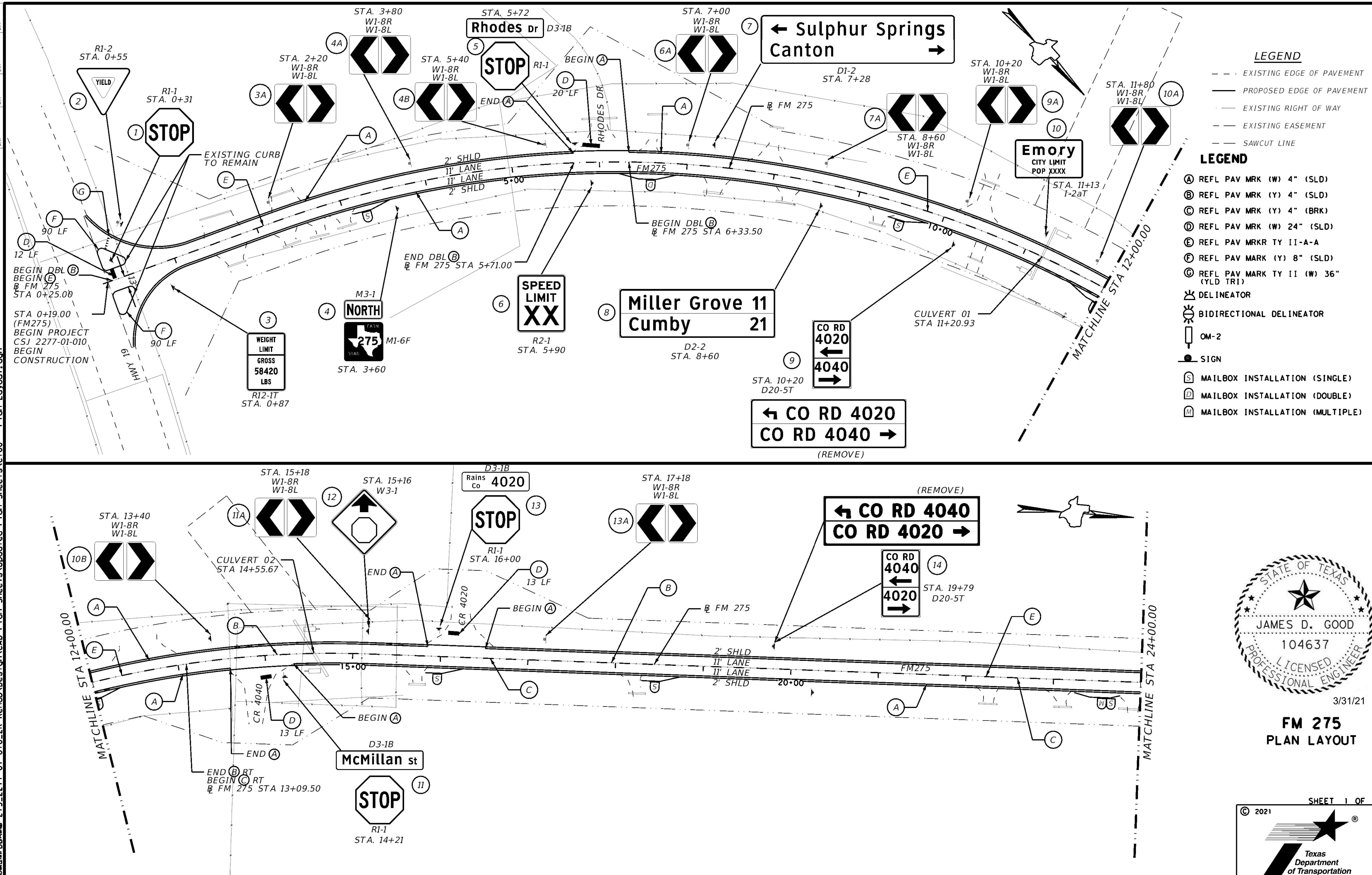
2-14	DIST	COUNTY		SHEET NO.
4-16	PAR	RAINS		43



FM 275
PLAN LAYOUT

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

SHEET 1 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST		COUNTY	SHEET NO.
PAR		RAINS	44

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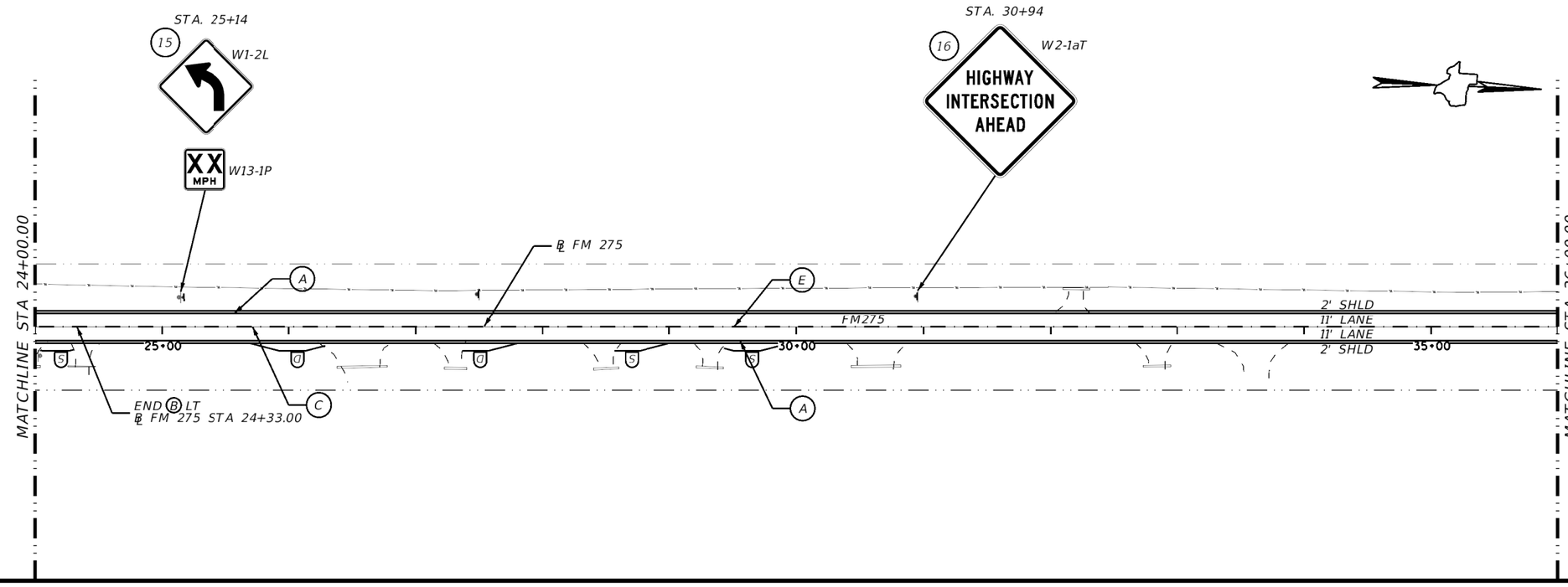
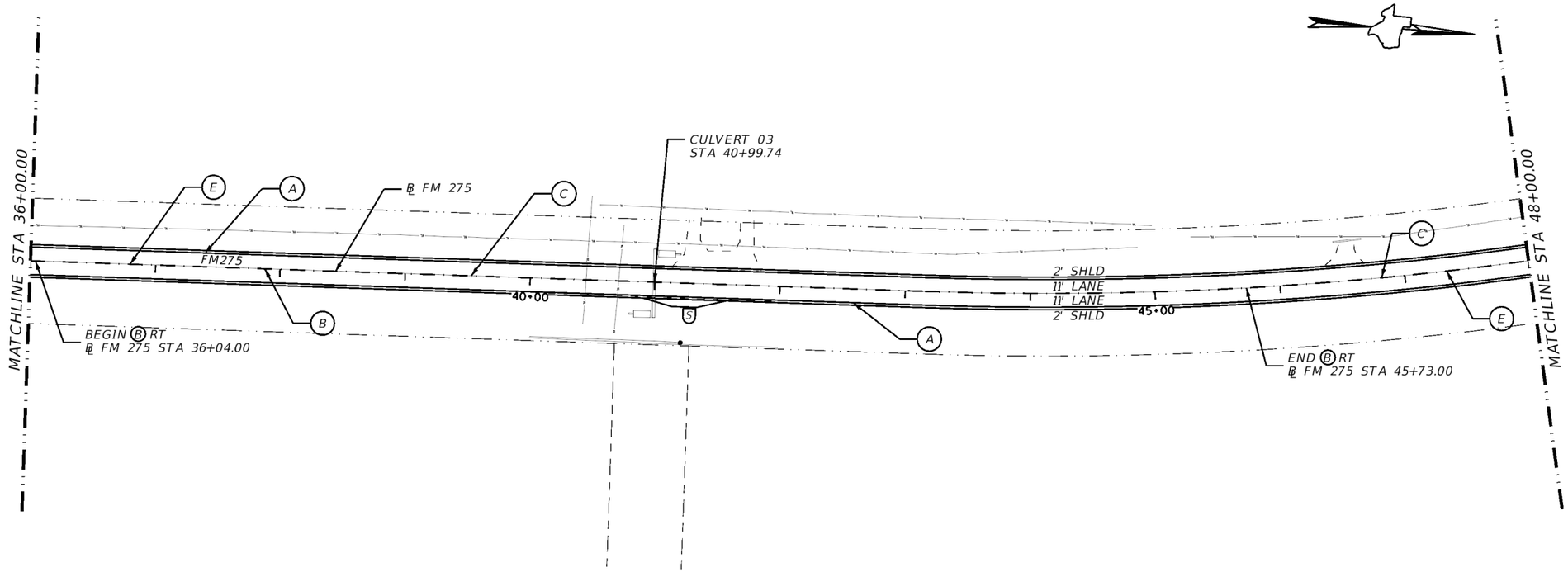


LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRK (Y) 4" (SLD)
- (C) REFL PAV MRK (Y) 4" (BRK)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) REFL PAV MARK (Y) 8" (SLD)
- (G) REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- (S) MAILBOX INSTALLATION (SINGLE)
- (D) MAILBOX INSTALLATION (DOUBLE)
- (M) MAILBOX INSTALLATION (MULTIPLE)



NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 2 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		45

DATE: 8/10/2021 7:41:15 AM
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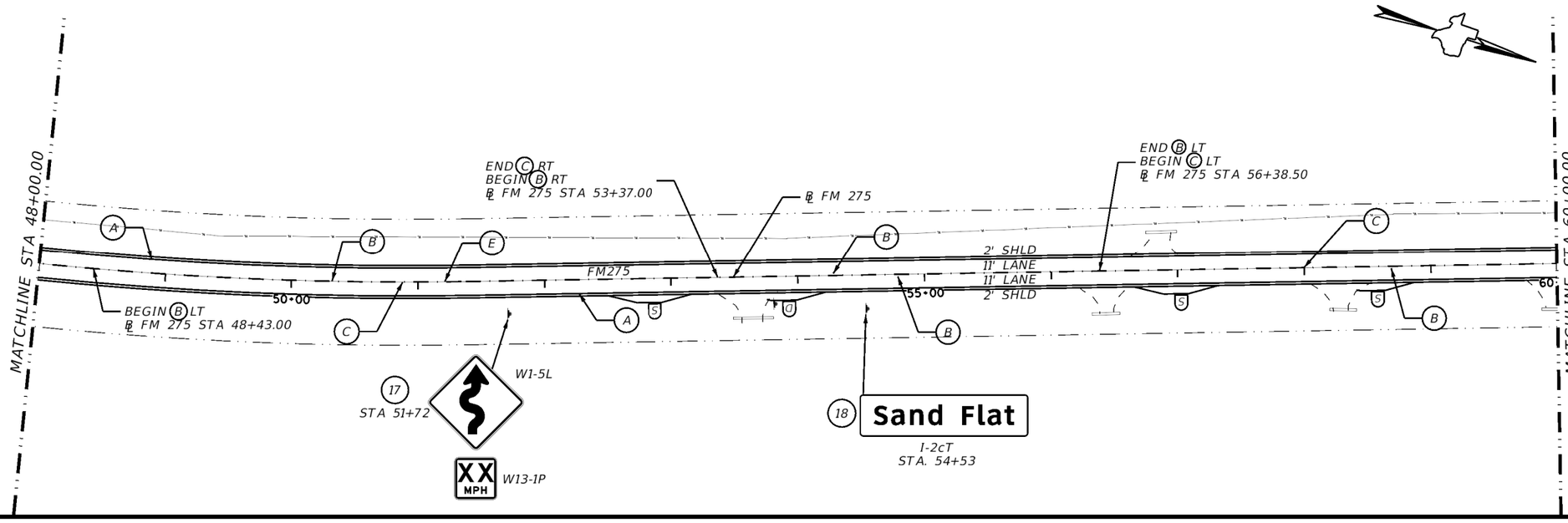

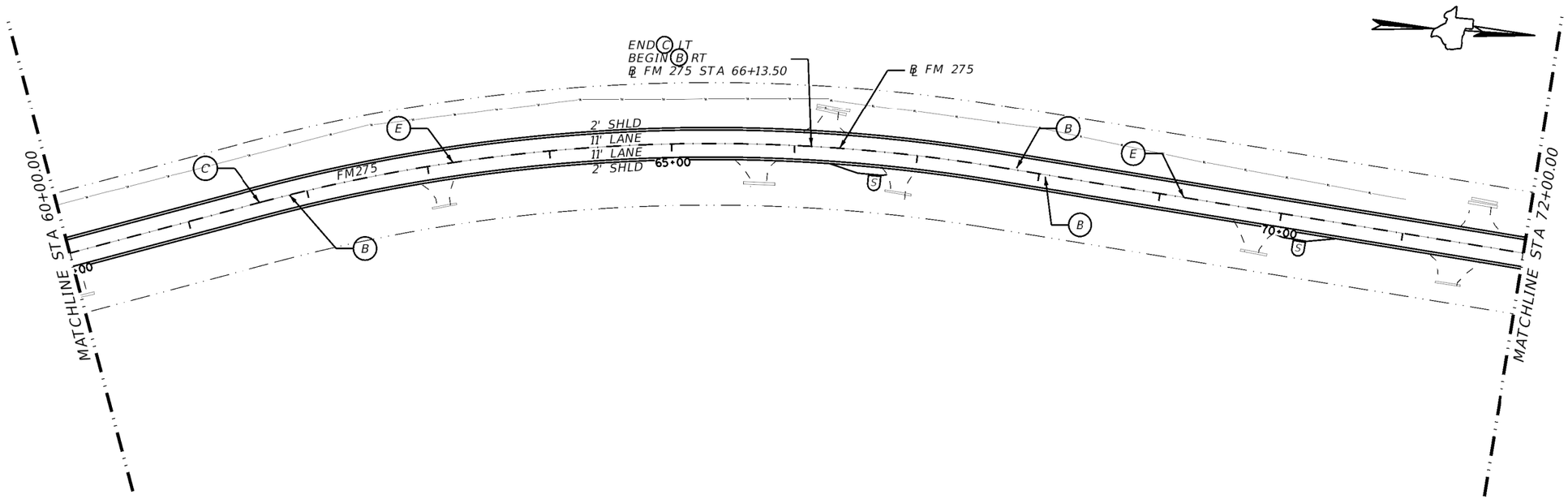

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRK (Y) 4" (SLD)
- (C) REFL PAV MRK (Y) 4" (BRK)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) REFL PAV MARK (Y) 8" (SLD)
- (G) REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- (S) MAILBOX INSTALLATION (SINGLE)
- (D) MAILBOX INSTALLATION (DOUBLE)
- (M) MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 3 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		46

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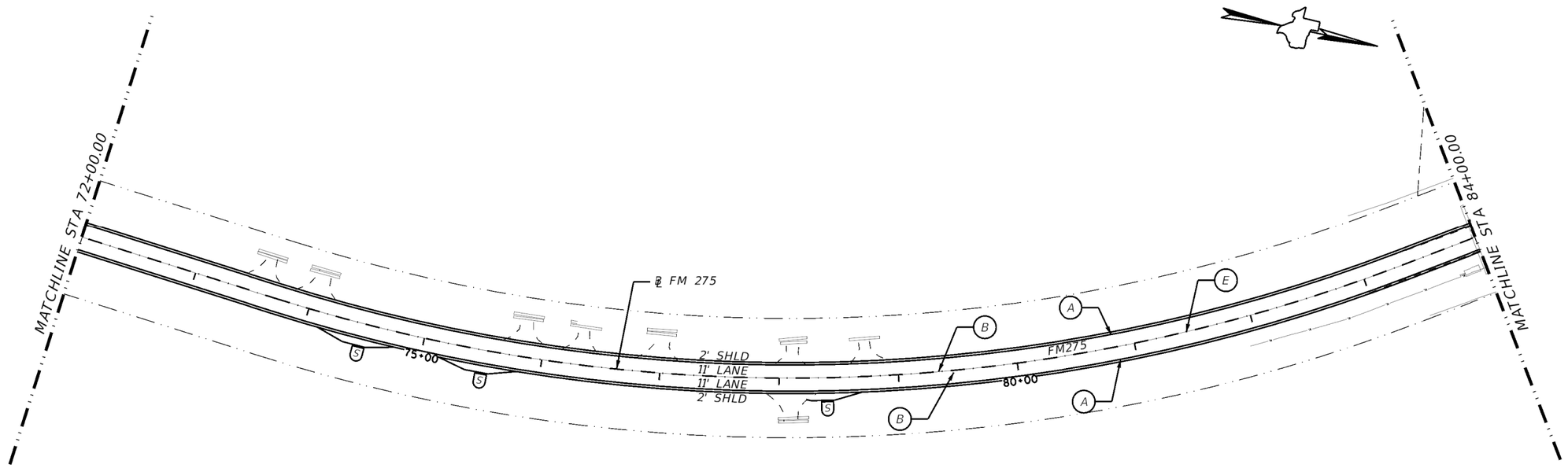
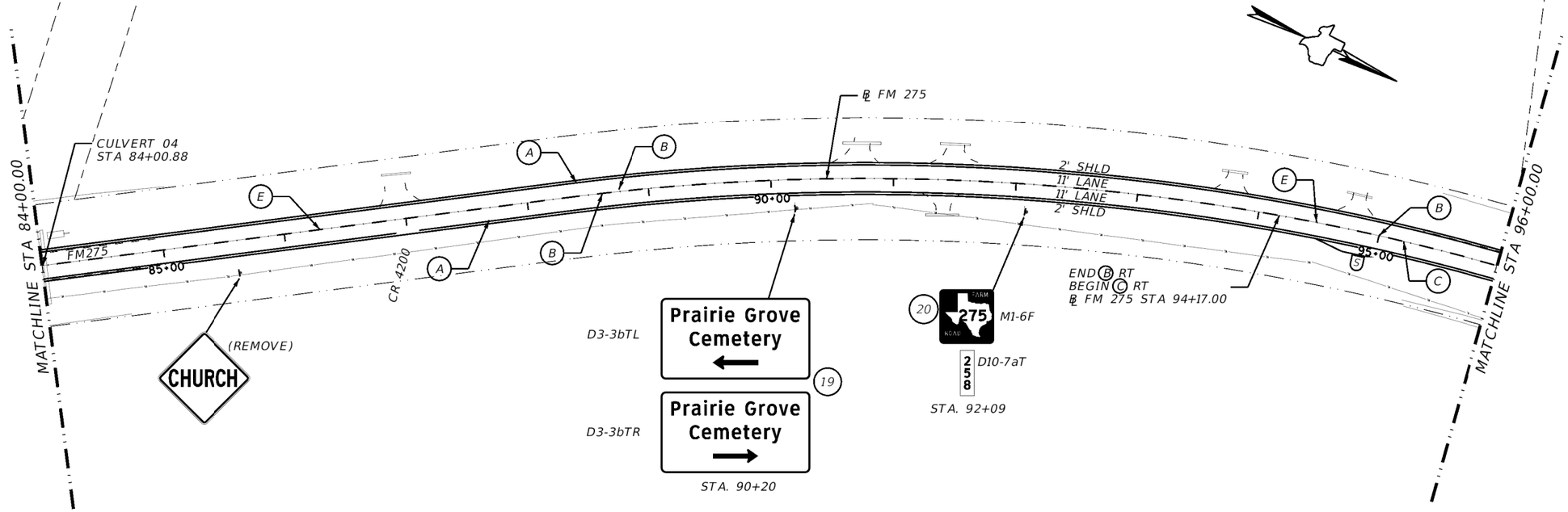


LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRK (Y) 4" (SLD)
- (C) REFL PAV MRK (Y) 4" (BRK)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) REFL PAV MARK (Y) 8" (SLD)
- (G) REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- (S) MAILBOX INSTALLATION (SINGLE)
- (D) MAILBOX INSTALLATION (DOUBLE)
- (M) MAILBOX INSTALLATION (MULTIPLE)



NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 4 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		47

DATE: 8/19/2021 9:09:36 AM
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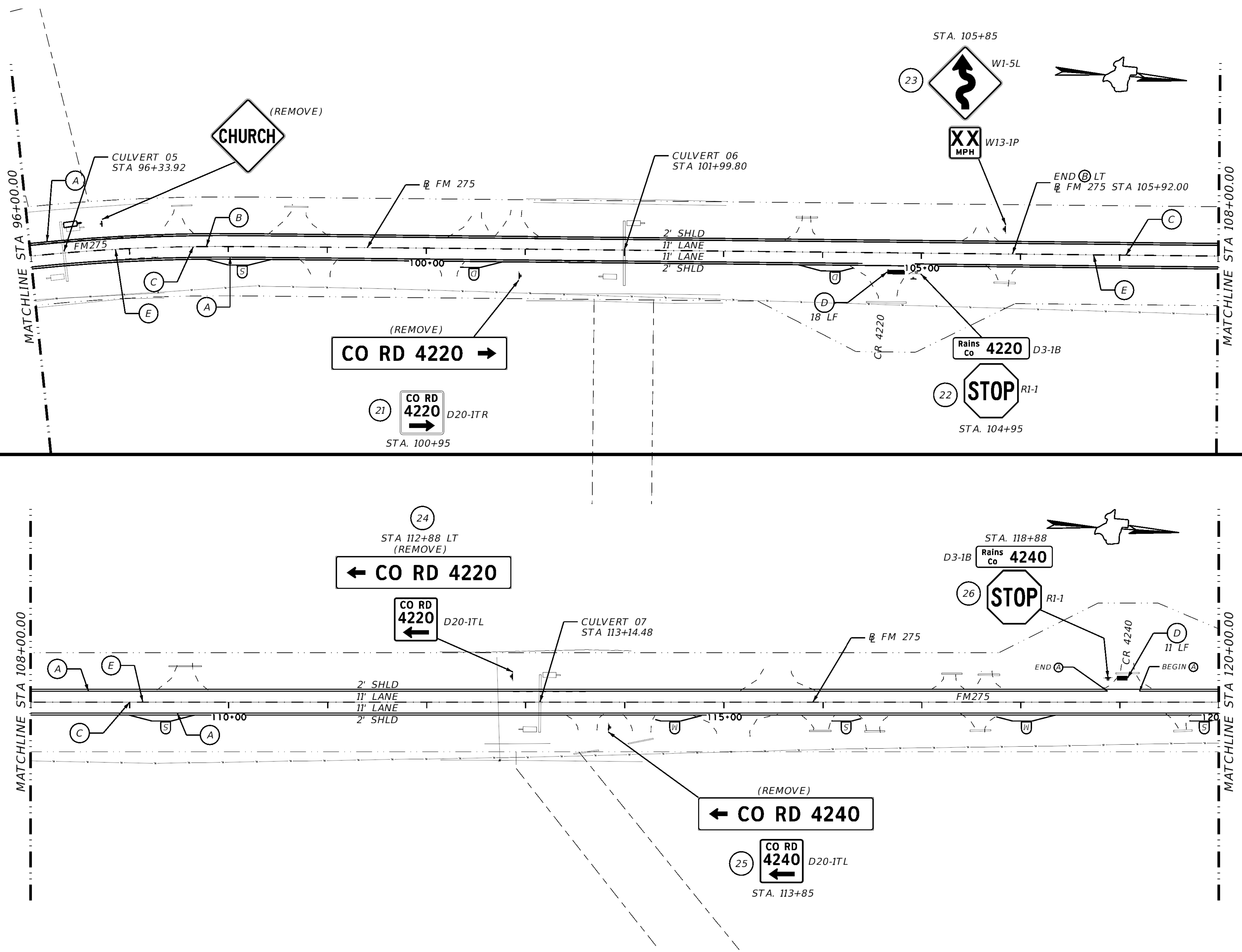

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- Ⓢ MAILBOX INSTALLATION (SINGLE)
- Ⓓ MAILBOX INSTALLATION (DOUBLE)
- Ⓜ MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100
SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER
3/31/21

FM 275
PLAN LAYOUT

SHEET 5 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST		COUNTY	SHEET NO.
PAR		RAINS	48

DATE: 3/28/2021 2:46:15 PM
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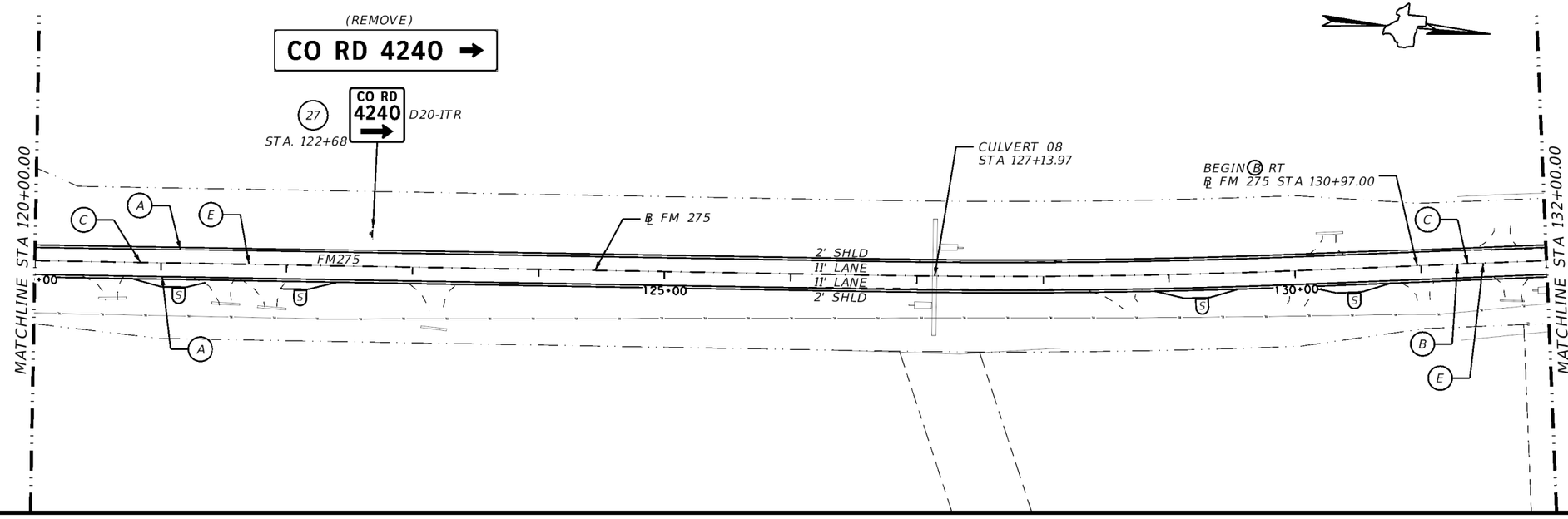

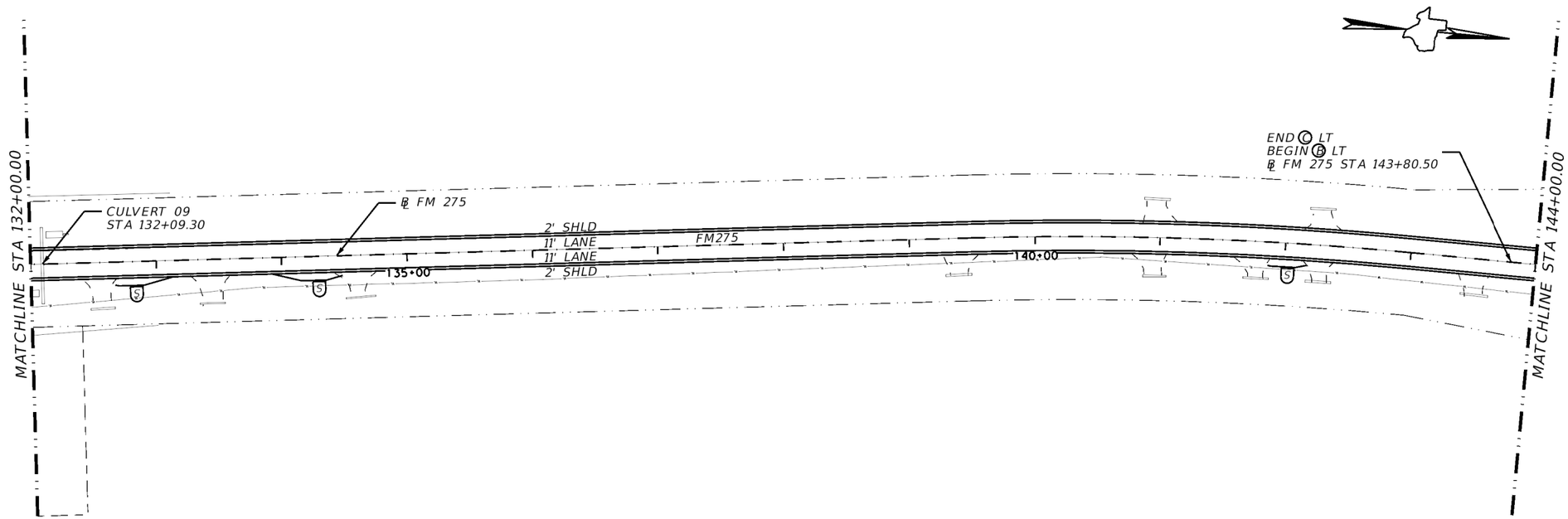

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- Ⓢ MAILBOX INSTALLATION (SINGLE)
- Ⓓ MAILBOX INSTALLATION (DOUBLE)
- Ⓜ MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 6 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		49

DATE: 8/28/2020 2:46:45 PM
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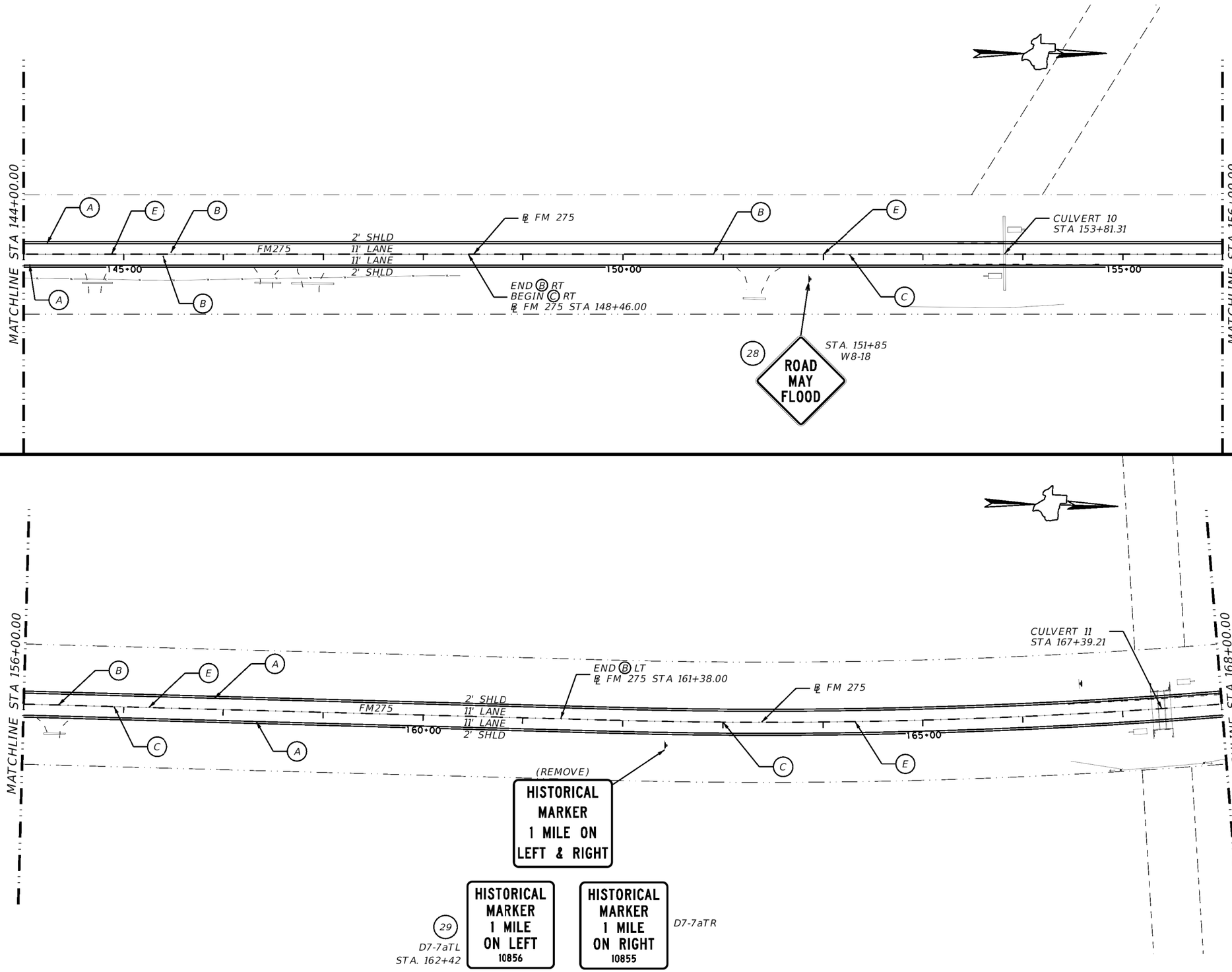

LEGEND

- *EXISTING EDGE OF PAVEMENT*
- *PROPOSED EDGE OF PAVEMENT*
- *EXISTING RIGHT OF WAY*
- *EXISTING EASEMENT*
- *SAWCUT LINE*

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- Ⓢ MAILBOX INSTALLATION (SINGLE)
- Ⓓ MAILBOX INSTALLATION (DOUBLE)
- Ⓜ MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 7 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		50

DATE: 8/19/2021 2:47:14 PM
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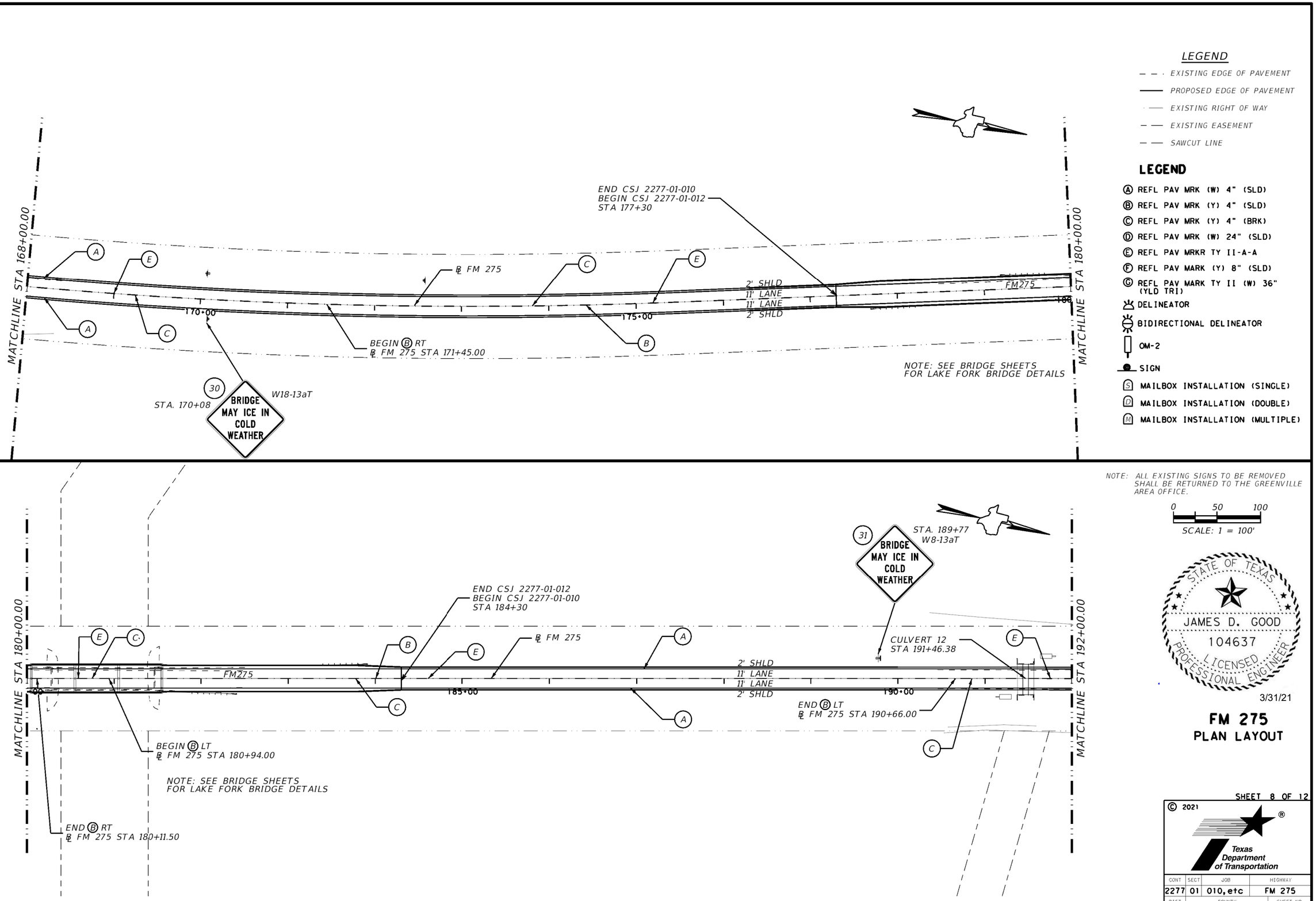

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- Ⓢ MAILBOX INSTALLATION (SINGLE)
- Ⓓ MAILBOX INSTALLATION (DOUBLE)
- Ⓜ MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 8 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		51

DATE: 8/10/2021 10:00:13 AM
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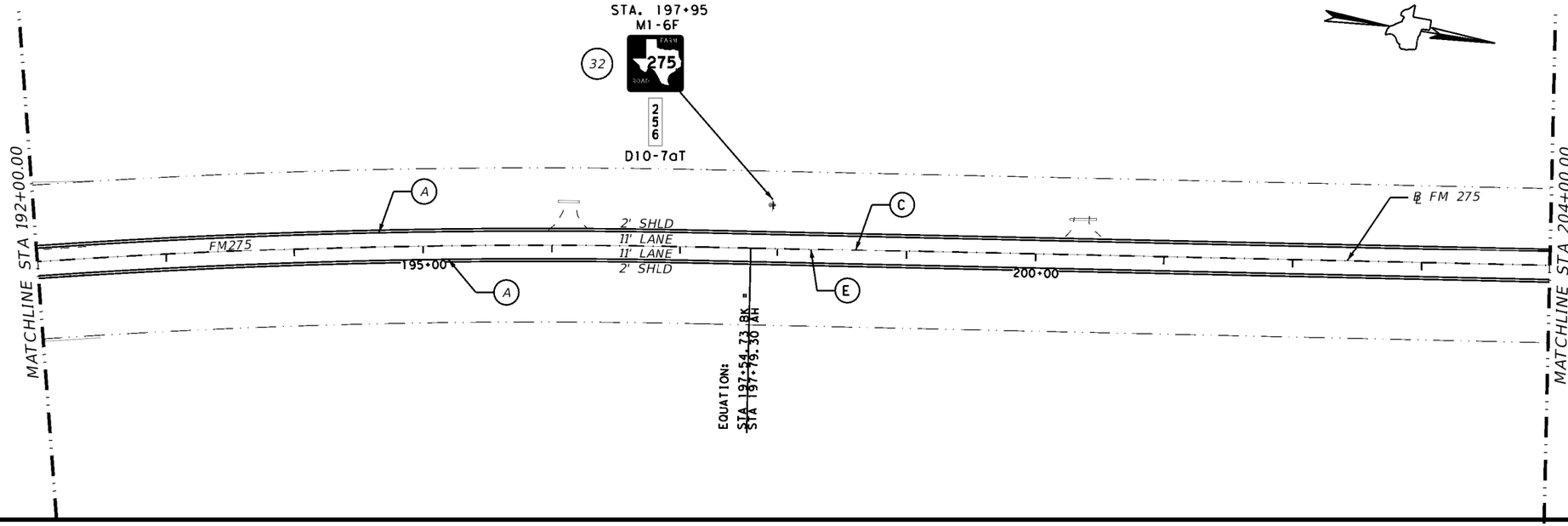

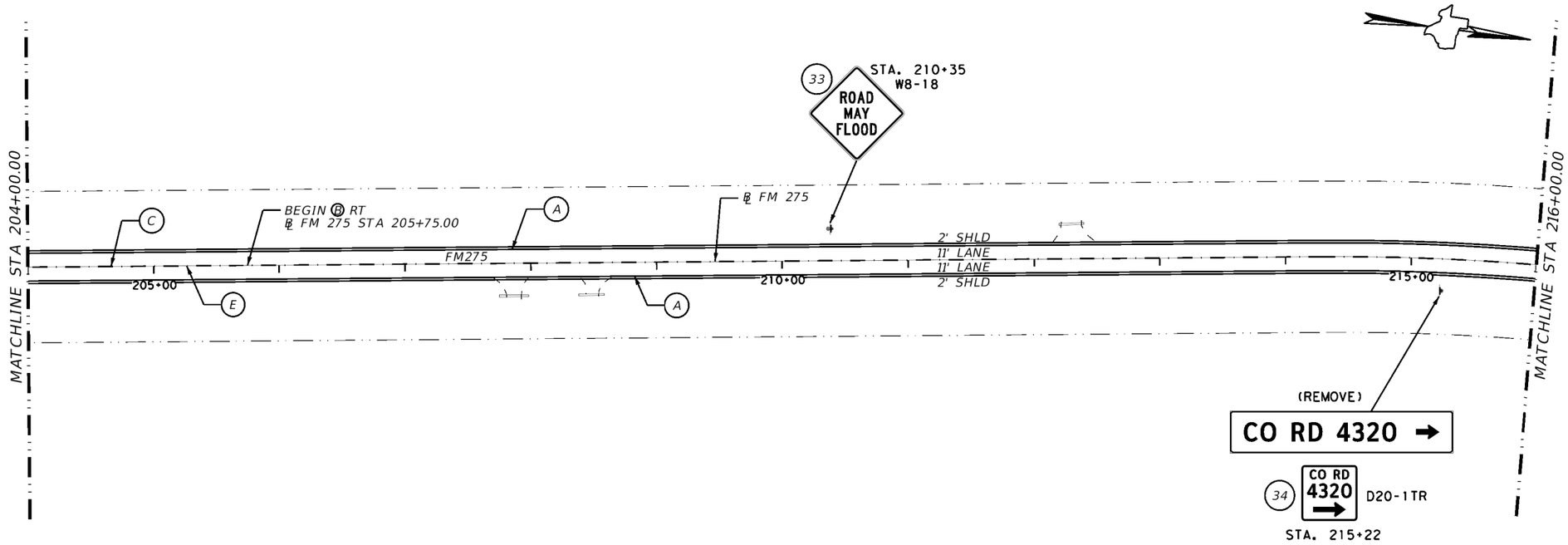

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRK (Y) 4" (SLD)
- (C) REFL PAV MRK (Y) 4" (BRK)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) REFL PAV MARK (Y) 8" (SLD)
- (G) REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- (S) MAILBOX INSTALLATION (SINGLE)
- (D) MAILBOX INSTALLATION (DOUBLE)
- (M) MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 9 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		52

DATE: 8/28/2021 2:47:45 PM
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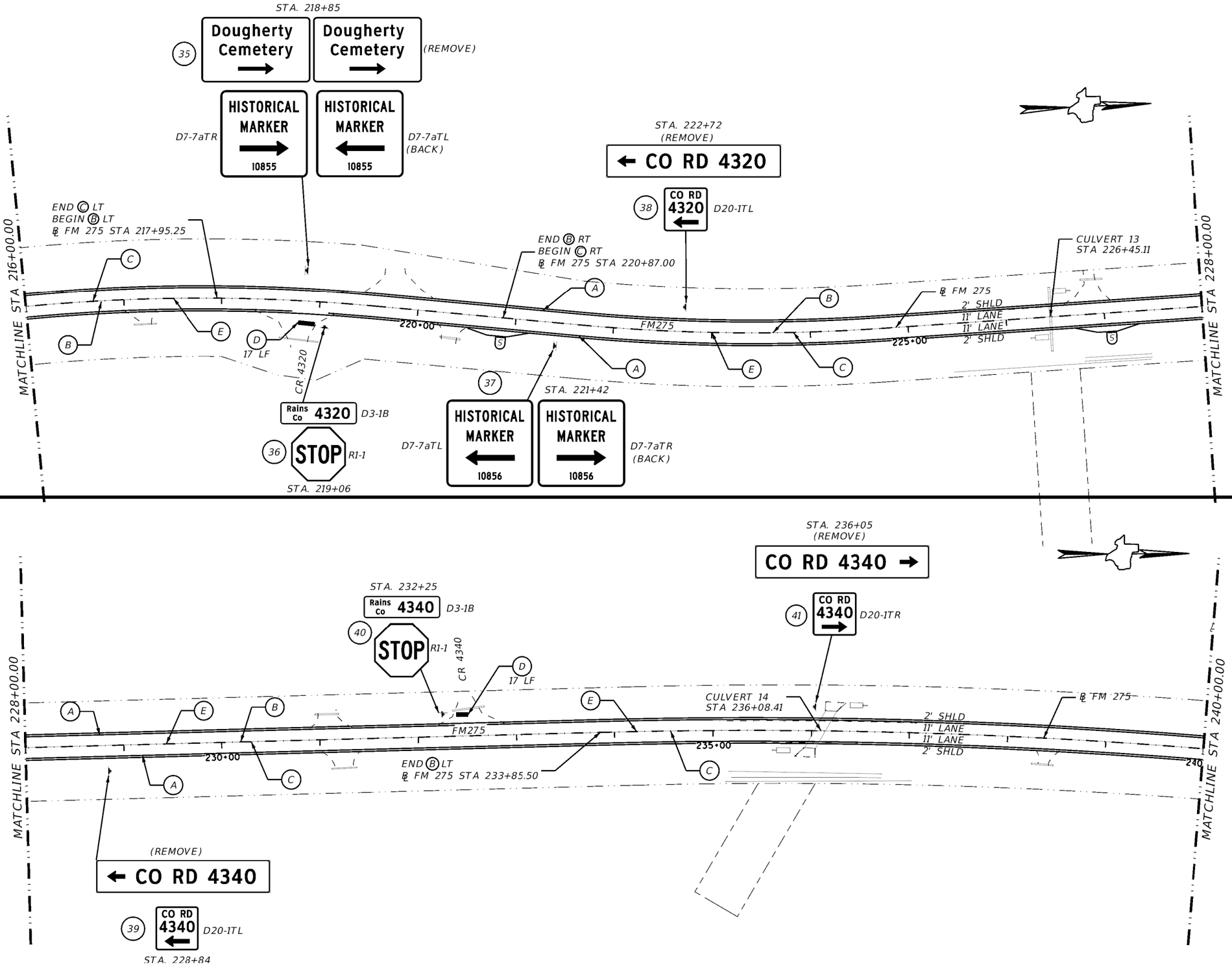

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- Ⓢ MAILBOX INSTALLATION (SINGLE)
- Ⓓ MAILBOX INSTALLATION (DOUBLE)
- Ⓜ MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 10 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		53

DATE: 3/29/2021 2:48:15 PM
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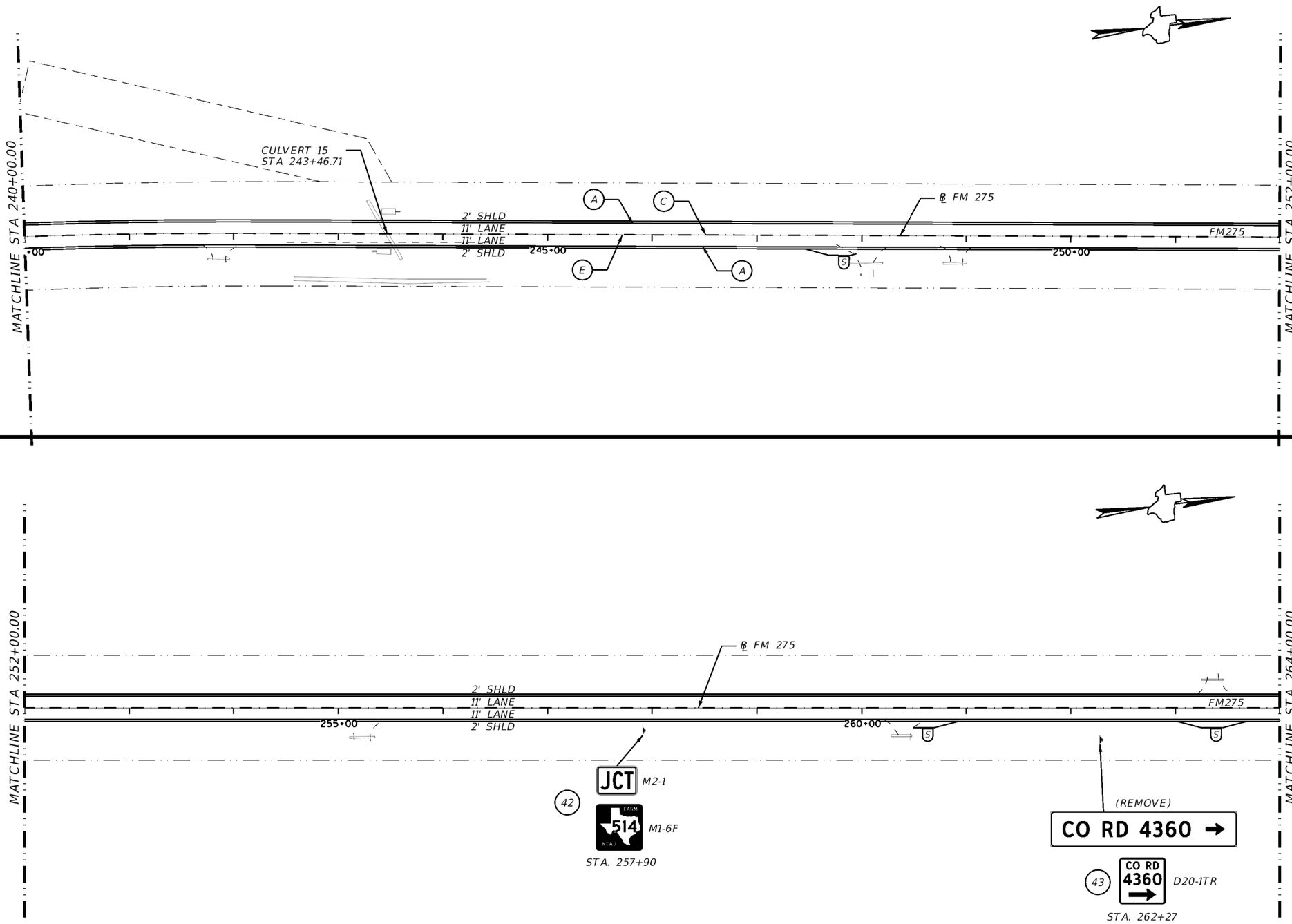

LEGEND

- *EXISTING EDGE OF PAVEMENT*
- *PROPOSED EDGE OF PAVEMENT*
- *EXISTING RIGHT OF WAY*
- *EXISTING EASEMENT*
- *SAWCUT LINE*

LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRK (Y) 4" (SLD)
- (C) REFL PAV MRK (Y) 4" (BRK)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRKR TY II-A-A
- (F) REFL PAV MARK (Y) 8" (SLD)
- (G) REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- (S) MAILBOX INSTALLATION (SINGLE)
- (D) MAILBOX INSTALLATION (DOUBLE)
- (M) MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
PLAN LAYOUT

SHEET 11 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		54

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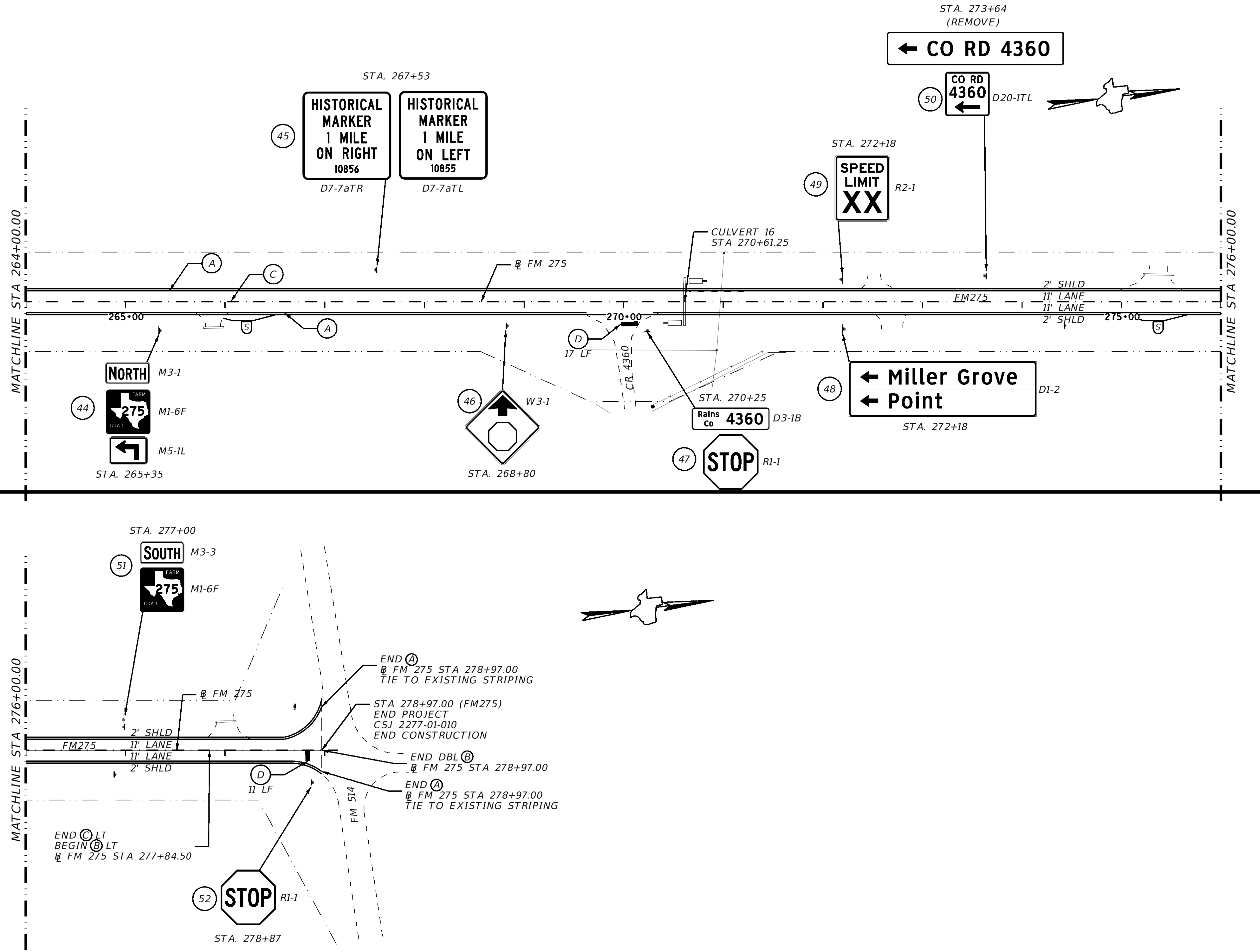

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRK (Y) 4" (SLD)
- Ⓒ REFL PAV MRK (Y) 4" (BRK)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRKR TY II-A-A
- Ⓕ REFL PAV MARK (Y) 8" (SLD)
- Ⓖ REFL PAV MARK TY II (W) 36" (YLD TRI)
- DELINEATOR
- BIDIRECTIONAL DELINEATOR
- OM-2
- SIGN
- S MAILBOX INSTALLATION (SINGLE)
- D MAILBOX INSTALLATION (DOUBLE)
- M MAILBOX INSTALLATION (MULTIPLE)

NOTE: ALL EXISTING SIGNS TO BE REMOVED SHALL BE RETURNED TO THE GREENVILLE AREA OFFICE.

0 50 100
SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER
3/31/21

FM 275
PLAN LAYOUT

SHEET 12 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST		COUNTY	SHEET NO.
PAR		RAINS	55

DATE: 2:49:00 PM
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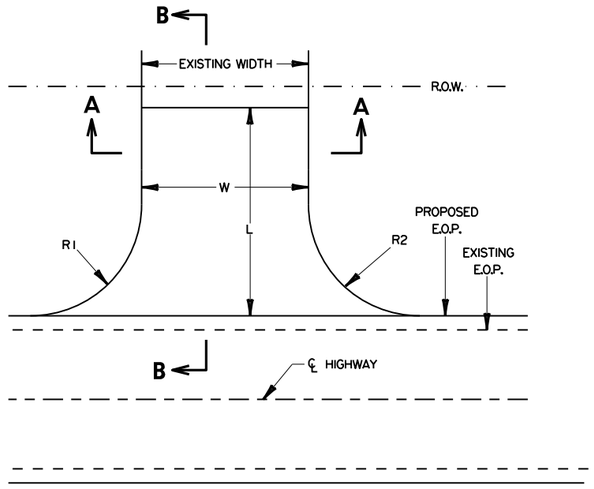
DW:
CK:
DN:

PLAN:



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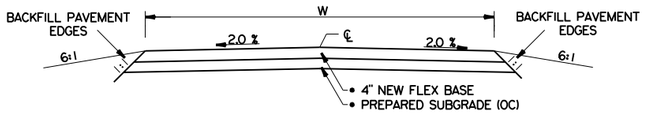

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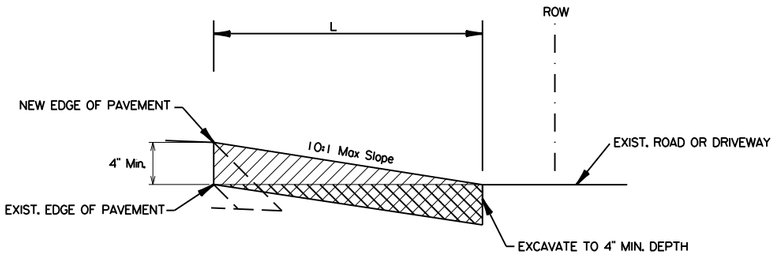
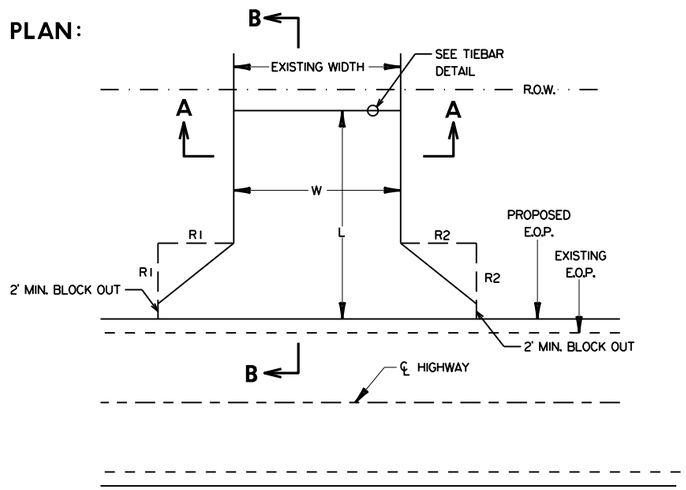


NOTES:
1. THIS WORK WILL BE MEASURED AND PAID FOR AS: "DRIVEWAYS (BASE)"
2. DIMENSIONS W, L, R1 AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

GRAVEL SURFACE DRIVEWAY
NTS

NOTE: EXCAVATION FOR ALL DRIVEWAY TYPES WILL BE CONSIDERED SUBSIDIARY TO DRIVEWAY BID ITEMS.

PLAN:



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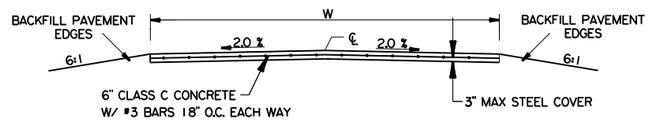

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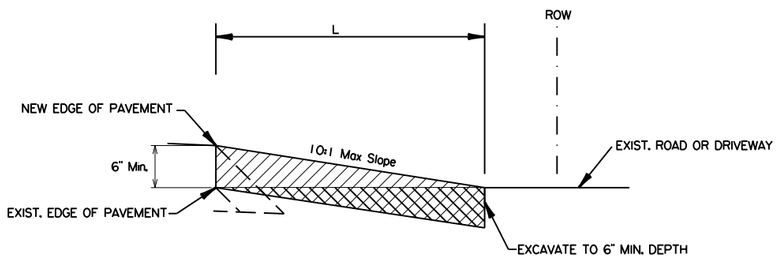
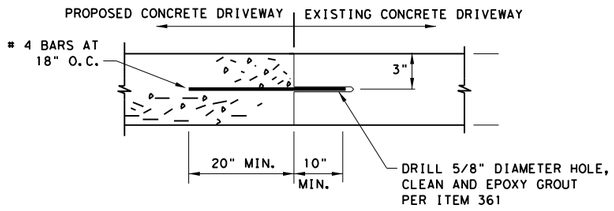
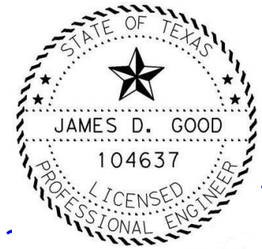




TIE - BAR DETAIL
NTS

NOTES:
1. THIS WORK WILL BE MEASURED AND PAID FOR AS: DRIVEWAYS (CONC)
2. DIMENSIONS W, L, R1 AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

CONCRETE DRIVEWAY
NTS



3/31/21

FM 275
DRIVEWAY DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		56

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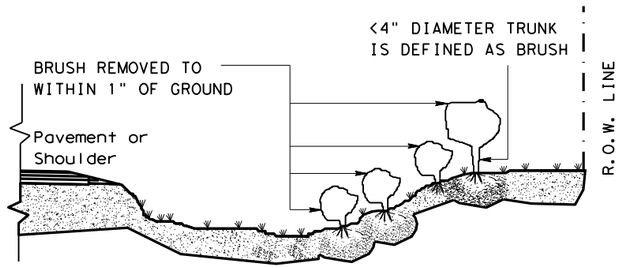
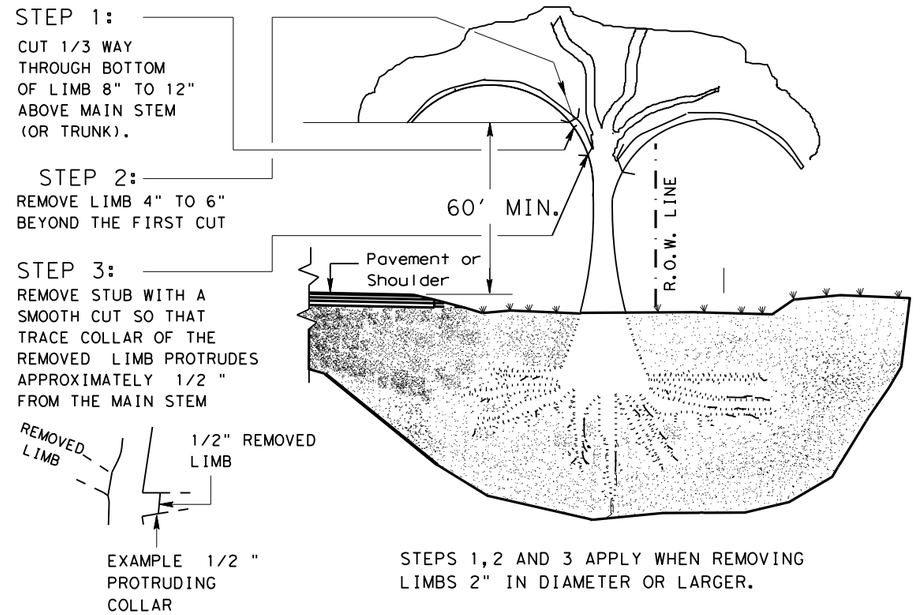
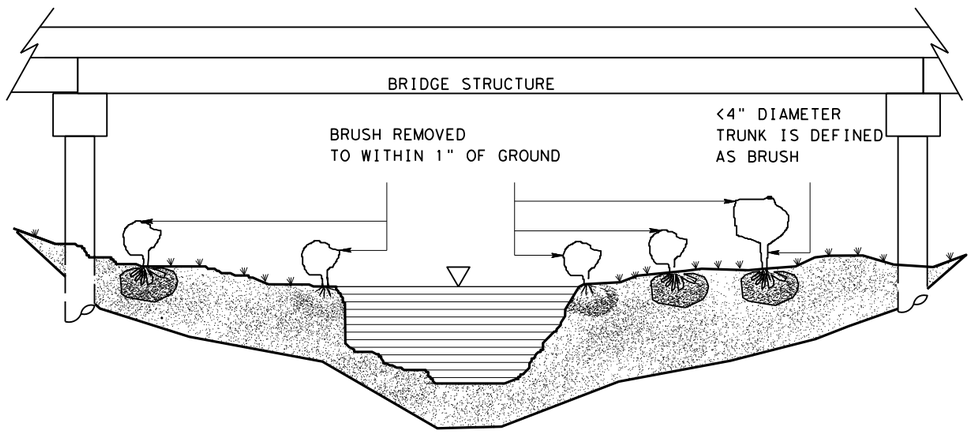


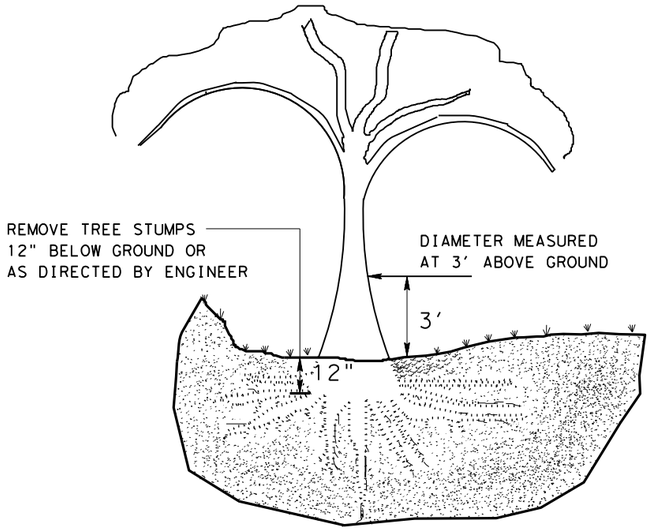
BRUSH REMOVAL



TREE TRIMMING



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL



TREE REMOVAL

SPECIFIC LOCATION SPECIFIED IN PLANS

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

TREE TRIMMING & BRUSH REMOVAL

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		57

DATE: 3/29/2021 11:12:30 AM
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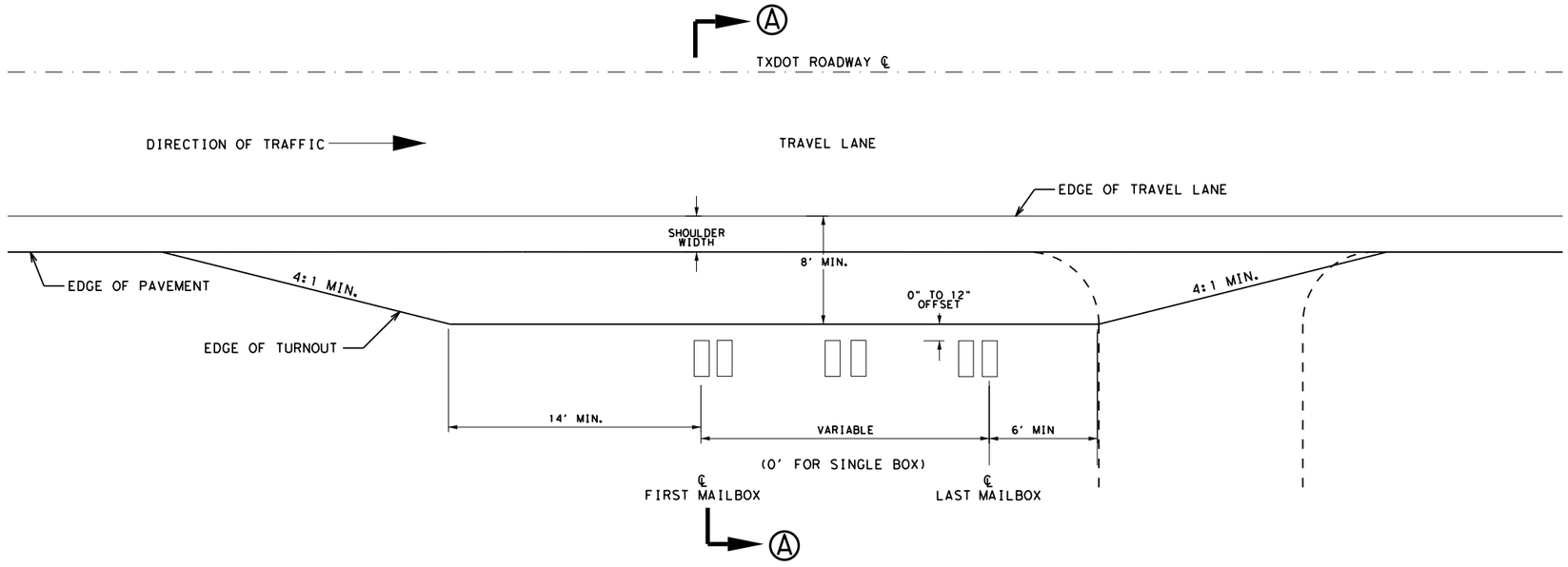
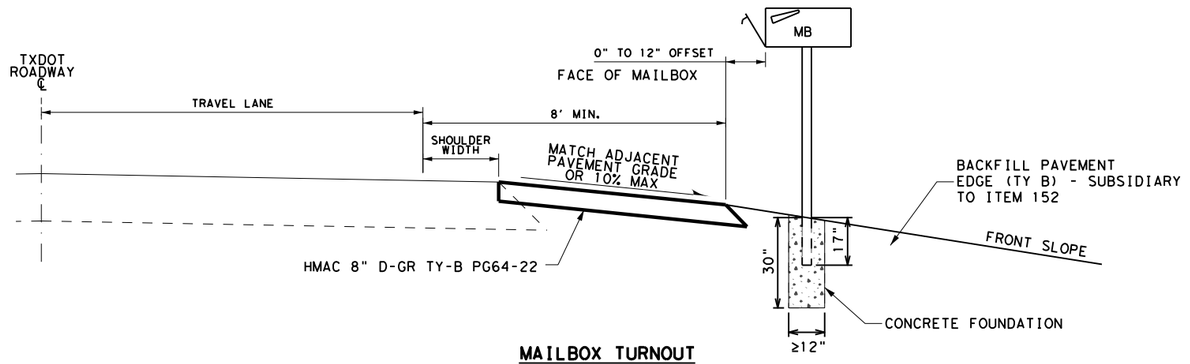


MAILBOX TURNOUT
PLAN



MAILBOX TURNOUT
SECTION A-A

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
MAILBOX TURNOUT DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		58

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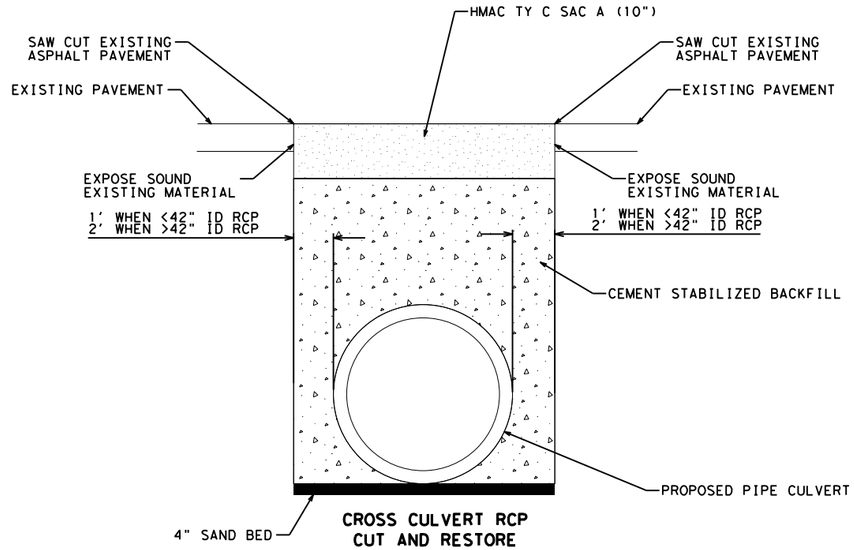

CROSS CULVERT RCP CUT AND RESTORE HMAC DETAIL

SECTIONAL VIEW - NOT TO SCALE

NOTES:

1. SEE ROADWAY TYPICAL SECTIONS FOR PAVEMENT REPLACEMENT SECTION. PAVEMENT USED TO RESTORE CUT AREAS SHALL BE PERMANENT PAVEMENT STRUCTURE.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN THE RIDING SURFACE OF THE REPLACED PAVEMENT. MAINTENANCE WILL BE SUBSIDIARY TO ITEM 400 CUT & RESTORING PAVEMENT (SY).
3. CEMENT STABILIZED BACKFILL PAID AS ITEM 400 CEM STABIL BKFL (CY). REFER TO CULVERT LAYOUT SHEETS FOR CEMENT STABILIZED BACKFILL QUANTITIES.

PROP CULVERT NO	EXIST CULVERT SIZE	PROP CULVERT SIZE	BEGIN STATION *	END STATION *	ITEM 400-6005** CEM STAB BACKFILL (CY)	ITEM 400-6006 ** CUT & RESTORING PAV (SY)	ITEM 402-6001** TRENCH EXCAVATION PROTECTION (LF)
08	42" RCP	48" RCP	126+94.55	127+33.39	164	113	88

*BEGIN AND END STATION ARE THE CUT AND RESTORE LIMITS CALCULATED BASED ON THE CUT AND RESTORE DETAILS SHOWN.

**QUANTITIES PER CULVERT SHOWN IN THIS TABLE ARE FOR CONTRACTOR'S INFORMATION ONLY. TOTAL PROJECT QUANTITIES ARE INCLUDED ON THE "SUMMARY OF DRAINAGE QUANTITIES" SHEET.

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275

CUT & RESTORE DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		59

SCALE: NTS

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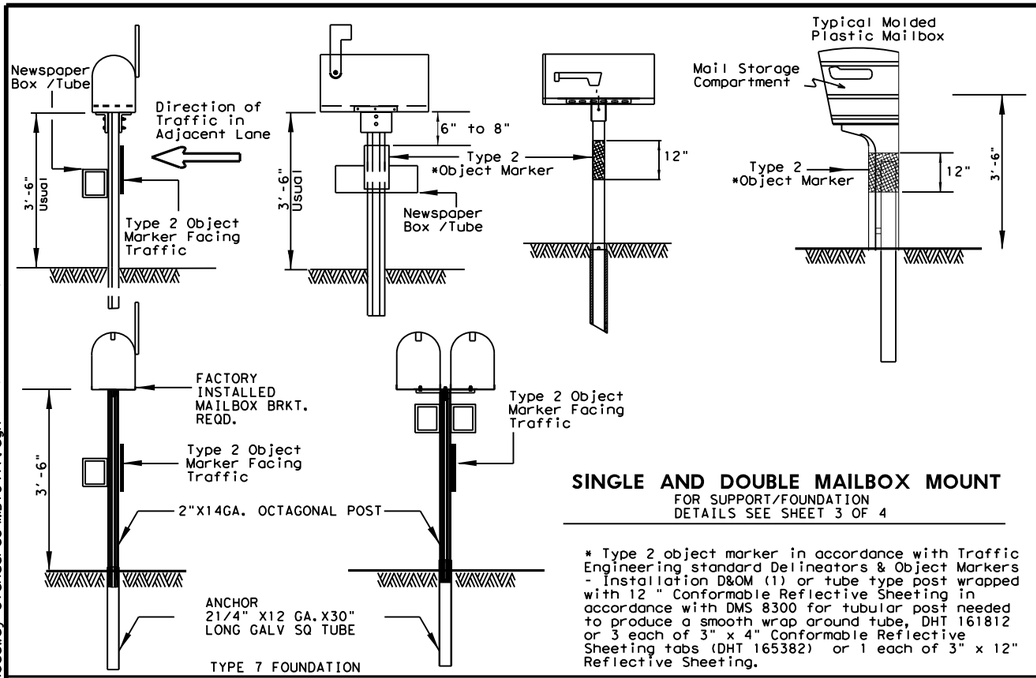


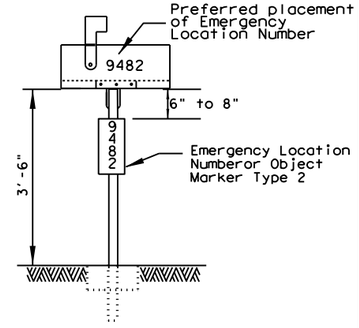
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

* Type 2 object marker in accordance with Traffic Engineering standard Delineators & Object Markers - Installation D&OM (1) or tube type post wrapped with 12 " Conformable Reflective Sheeting in accordance with DMS 8300 for tubular post needed to produce a smooth wrap around tube, DHT 161812 or 3 each of 3" x 4" Conformable Reflective Sheeting tabs (DHT 165382) or 1 each of 3" x 12" Reflective Sheeting.

Note: Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Pedestrian Facilities Curb ramps standard *PED-XX for pedestrian facilities.

*PED-XX: XX is the standard year for example PED- 12 , PED-13,etc.



PLACEMENT OF EMERGENCY LOCATION NUMBER

Location Number shall be placed on: 1. A yellow, type A plate with class 1 flat surface reflective sheeting in accordance with DMS 8600. The color of numbers shall be black. or 2: A green or blue plate with white numbers attached to post beside the object marker. Other contrasting color configuration, as approved , may be used. (Use Same type plate as used for the type 2 Object Marker. Recommended sign size is 6" by 15")

MAILBOX SIZES

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
SIZE	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	MAXIMUM WEIGHT (POUNDS)	
SMALL	19 1/2	6	7	5	5
MEDIUM	22 1/2	8	11 1/2	7	7
LARGE	23 1/2*	11 1/2*	13 1/2*	10	10

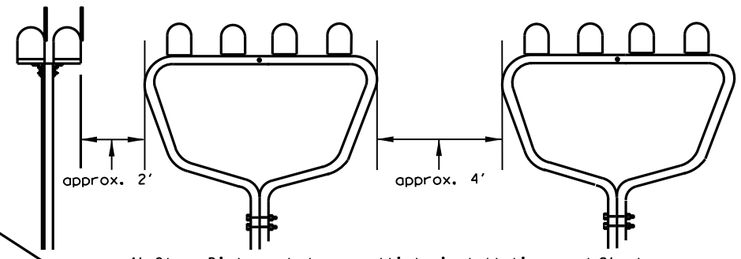
* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT (POUNDS)
SIDE	18	15	18.3	15	22.4
BACK	11 1/2	11 1/2		15	

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

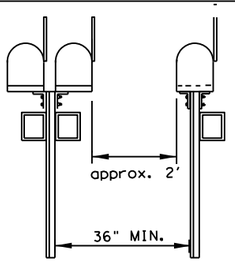
Mailboxes shall be made of light weight sheet metal or light weight plastic. Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



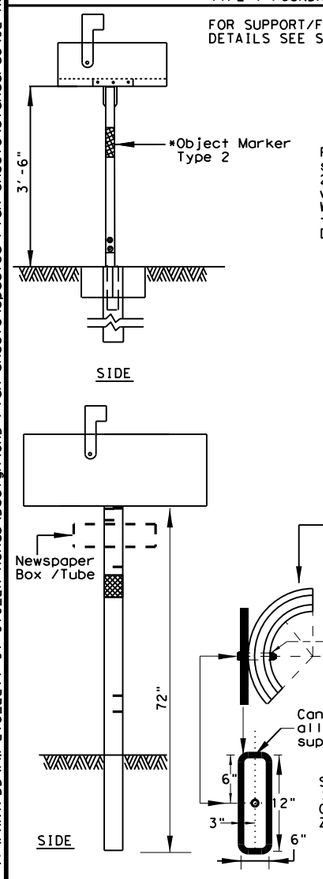
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

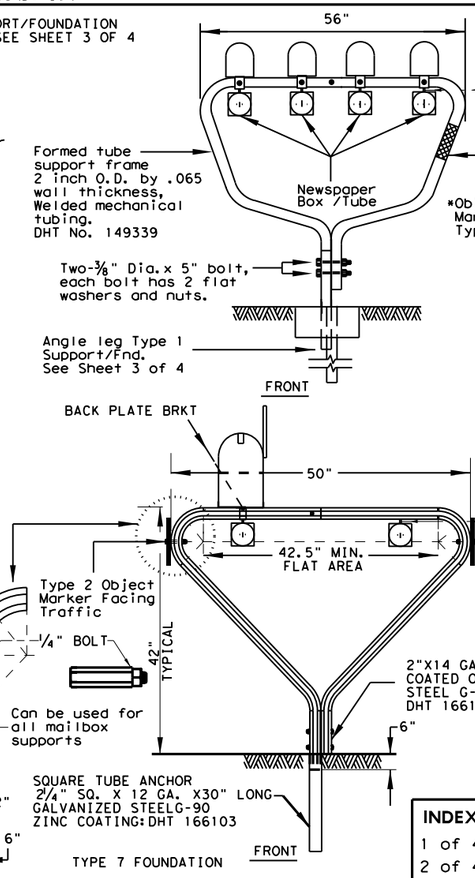
MULTIPLE MAILBOX PLACEMENT

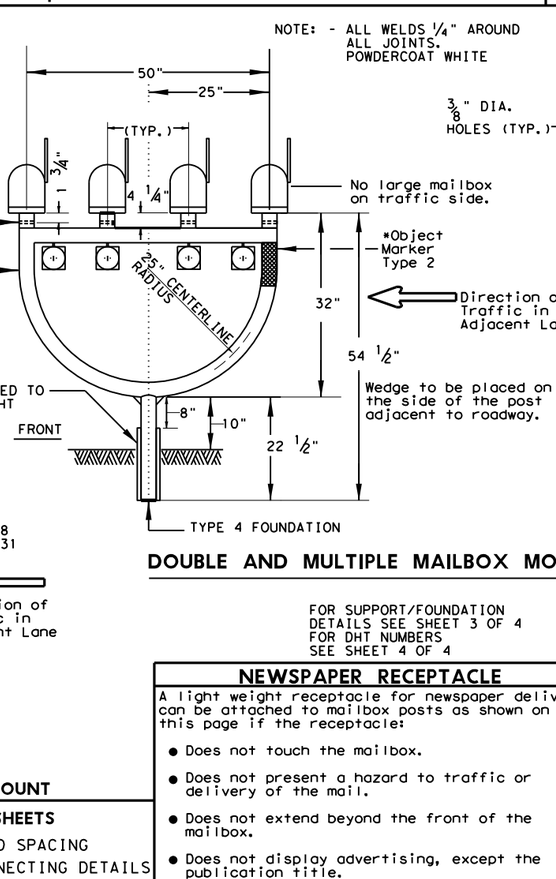


Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT

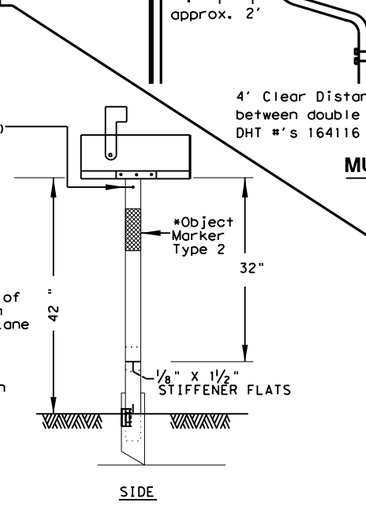






DOUBLE AND MULTIPLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

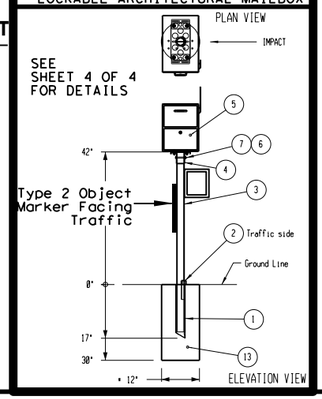


NEWSPAPER RECEPTACLE

A light weight receptacle for newspaper delivery can be attached to mailbox posts as shown on this page if the receptacle:

- Does not touch the mailbox.
- Does not present a hazard to traffic or delivery of the mail.
- Does not extend beyond the front of the mailbox.
- Does not display advertising, except the publication title.
- Newspaper receptacles on separate supports are prohibited.

LOCKABLE ARCHITECTURAL MAILBOX



MULTIPLE MAILBOX MOUNT

INDEX OF MAILBOX DETAIL SHEETS

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND SPACING

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		60

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.

3/29/2021 11:12:36 AM
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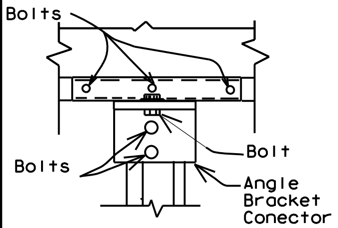
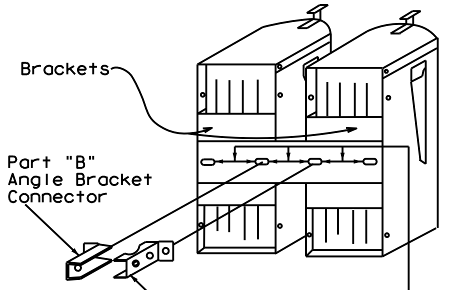


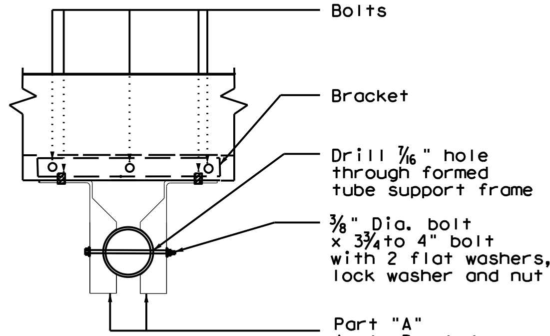
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

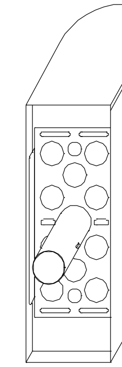


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

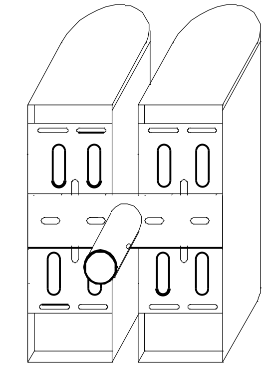


MULTIPLE MAILBOX



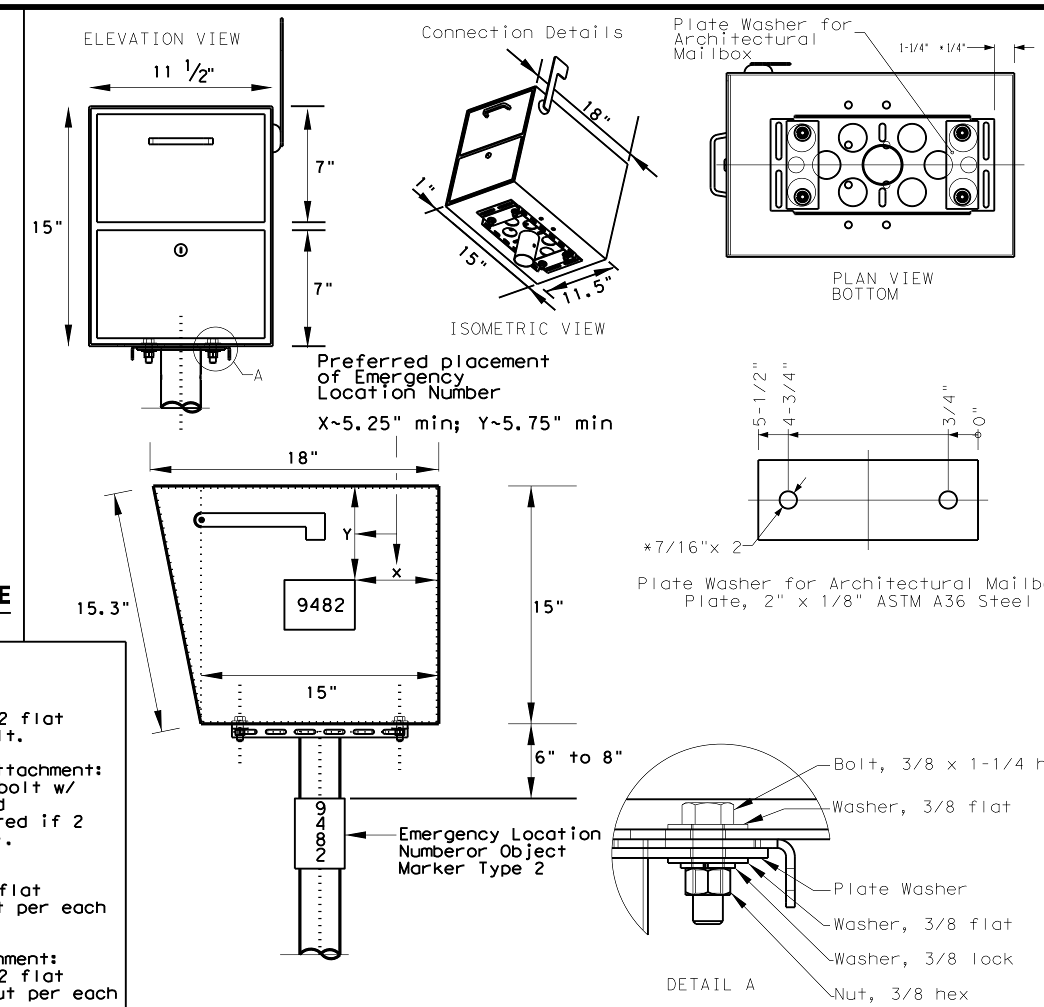
To be used with 2 3/8" OD RR or thinwall Steel posts.

WELDED SINGLE MAILBOXBRACKET

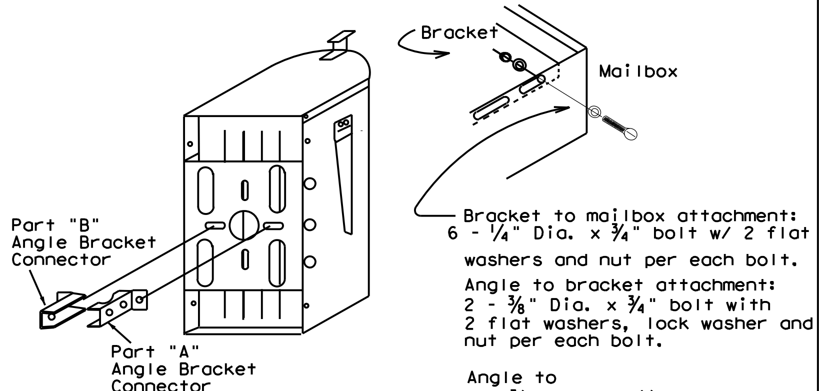


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS

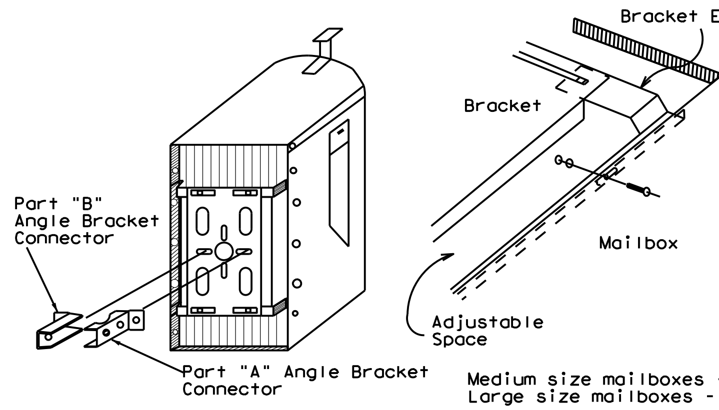


Bracket to mailbox attachment: 6 - 1/4" Dia. x 3/4" bolt w/ 2 flat washers and nut per each bolt.

Angle to bracket attachment: 2 - 3/8" Dia. x 3/4" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to 2 - 3/8" Dia. x 2 1/2" bolt with 2 flat washers, lock washer and nut per each bolt.

SMALL MAILBOX



Use both Parts "A" and "B" Angle Bracket Connectors for Winged Channel Posts

Bracket to mailbox attachment:
6 - 1/4" Dia. x 3/4" bolt w/2 flat washers and nut per each bolt.

Bracket to bracket extension attachment:
2 - 1/4" Dia. x 3/4" carriage bolt w/ flat washer, lock washer and nut per bolt (4 bolts required if 2 bracket extensions are used).

Angle to bracket attachment:
2 - 3/8" Dia. x 3/4" bolt w/2 flat washers, lock washer and nut per each bolt.

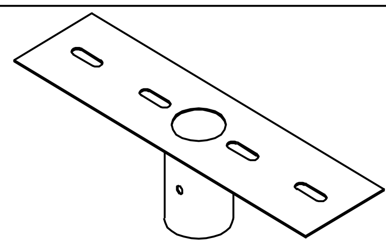
Angle to mailbox support attachment:
2 - 3/8" Dia. x 2 1/2" bolt w/2 flat washers, lock washer, and nut per each bolt.

Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES

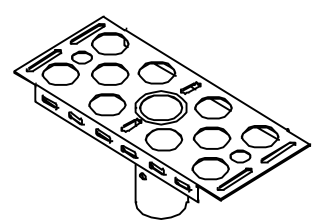
GENERAL NOTES

1. Connecting hardware detailed on this sheet is for the hardware that the Department stocks at the Regional Warehouses. This hardware is available to the contractor only when so stated elsewhere in the plans or specification.
2. Hardware for mounting mailboxes to the support/foundation furnished by industry should be used when shown on the Maintenance Divisions "Approved Products List." Only mailbox hardware that have been crash tested in accordance with NCHRP Report 350, will be on the approved list.
3. Hardware furnished by industry shall be erected in accordance with the manufacturer's recommendation.
4. Bracket and bracket extension shall be constructed of 14 gauge galvanized steel sheet metal.
5. The angles, brackets and adapter plates shall be constructed of 12 gauge galvanized steel sheet metal.
6. Items with evidence of damage to the galvanized coating or wet storage stains (white rust) will not be accepted.



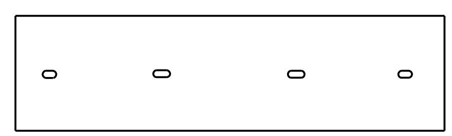
DHT 162323

For use with galvanized thinwall steel posts DHT # 143426 or powder-coated thinwall steel post DHT # 162911.



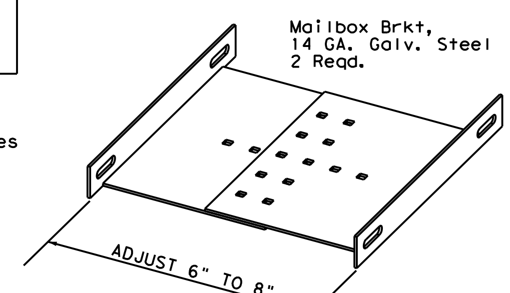
DHT 161443

For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

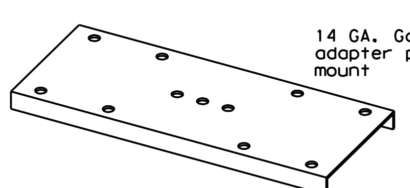


DHT #3789

Used for mounting two Mailboxes on the same post.



DHT 166105

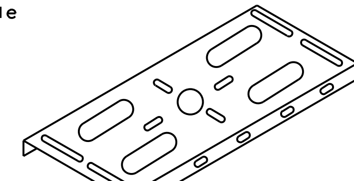


14 GA. Galv. Steel adapter plate for double mount

DHT 166108

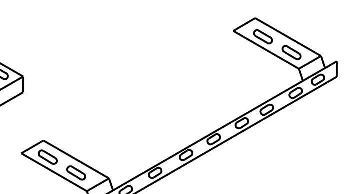
HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.



DHT 148939

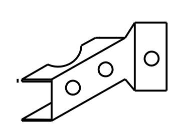
Mailbox Bracket



DHT 148938

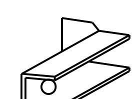
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



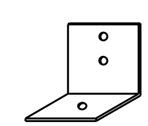
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

Texas Department of Transportation

Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED DHT 163730	2277	01	010,etc	FM 275
	DIST		COUNTY	SHEET NO.
	PAR		RAINS	61

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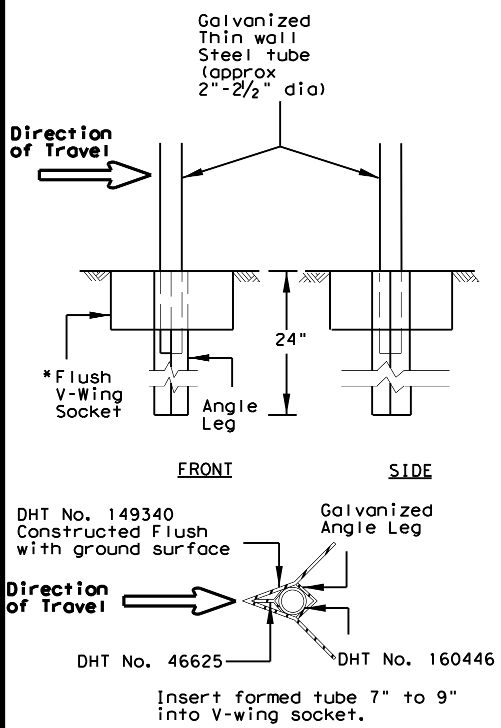
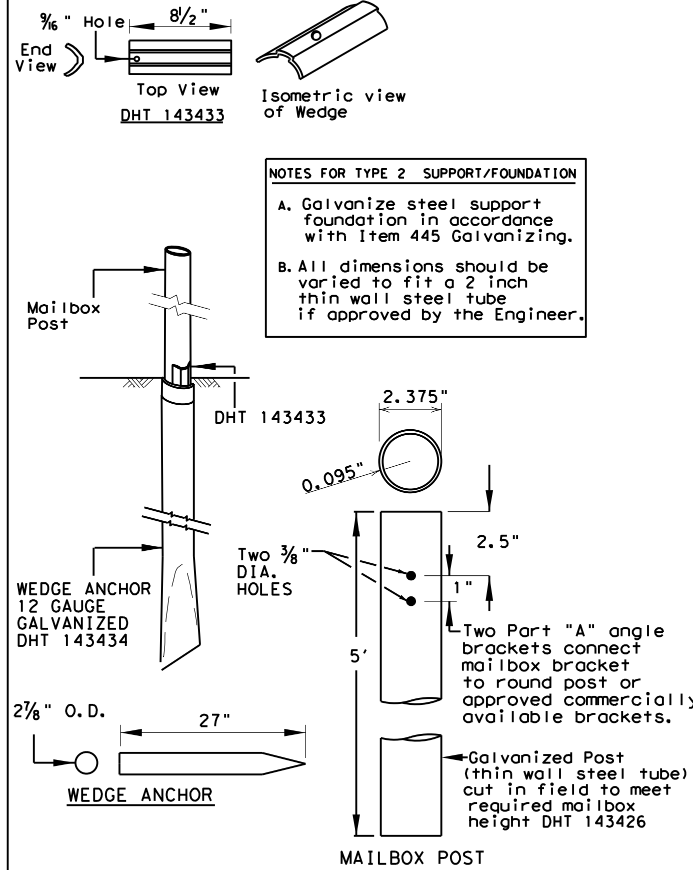


TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



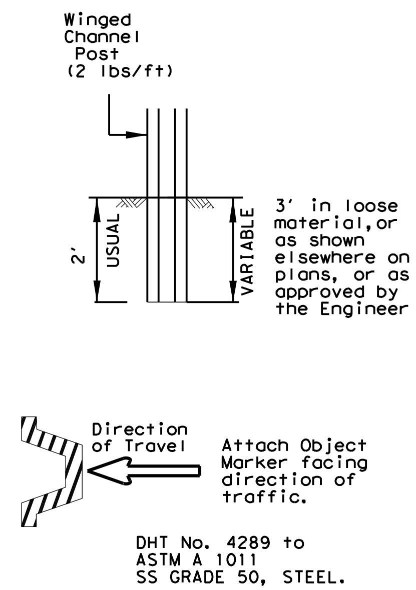
NOTES FOR TYPE 2 SUPPORT/FOUNDATION

A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

B. All dimensions should be varied to fit a 2 inch thin wall steel tube if approved by the Engineer.

TYPE 2 SUPPORT/FOUNDATION

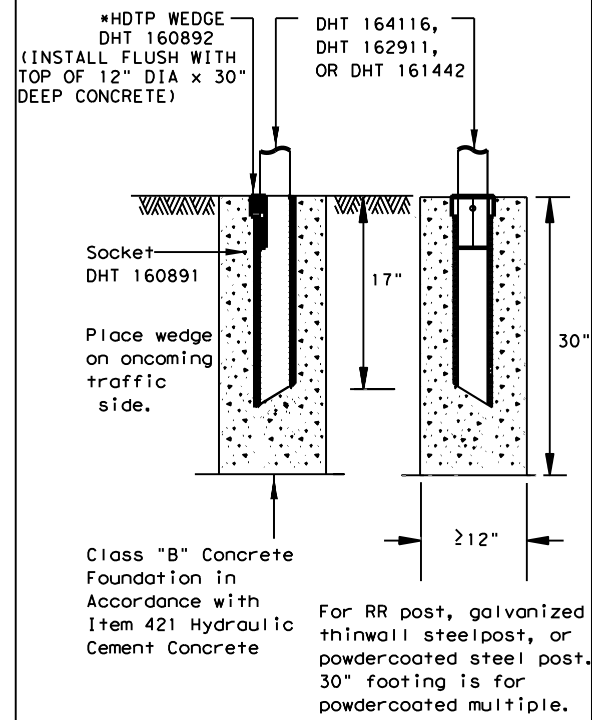
THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



TYPE 3 SUPPORT/FOUNDATION

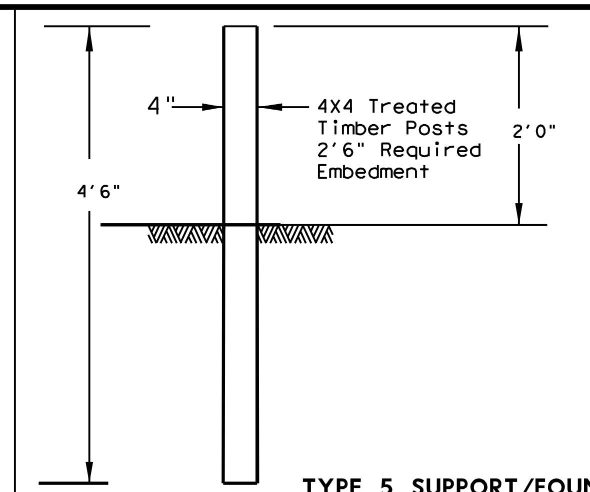
WINGED CHANNEL POST

Note on DHT Number
See Table of Applicable DHT Numbers on this sheet 4 for DHT description.



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

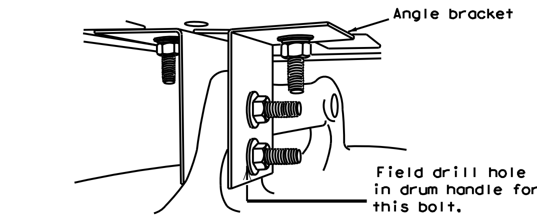


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

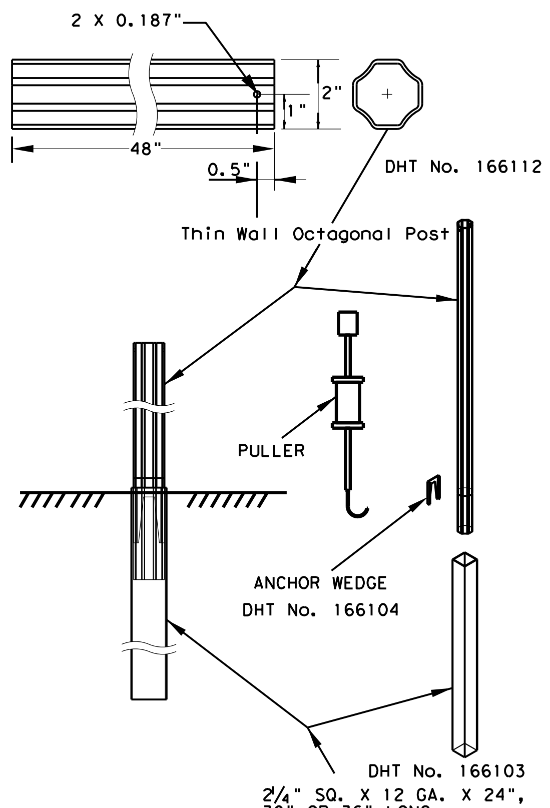
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



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

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- SP = Single 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
- Ty 7 = Wedge Anchor

Type of Bracket
- AB = Angle Bracket.
- TB = 2.375" Tube Bracket

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

GENERAL NOTES

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. type 1, 2, 3, 4 or 7 supports or foundation can be used for single or double mailbox installations. The RCR post should be used only for a single installation with a small mailbox. The Type 5 support/foundation is used for the single molded plastic mailbox. The Type 4 support/foundation is used for the 2.375" O.D. RR post, thin wall steel post, and white multiple mailbox post.
4. The Type 1 or type 7 support/foundation can be used for a multiple mailbox mount.
5. The Type 4 support should be used with thin wall steel pipe for the medium, large and double mailbox installations.
6. 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.

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MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
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REVISIONS	2277	01	010,etc	FM 275
	DIST		COUNTY	SHEET NO.
	PAR		RAINS	62

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LOCKABLE ARCHITECTURAL MAILBOX

SINGLE-MOUNT INSTALLATION PARTS			
#	PART NAME	PART/DHT #	QTY
1	SOCKET, TYPE 4 FOUNDATION	160891	1
2	WEDGE FOR TYPE 4 FOUNDATION	160892	1
3	THIN-WALL WHITE STEEL TUBE 2.375 OD	162911	1
4	BRACKET FOR ATTACHING MAILBOX	161443	1
5	ARCHITECTURAL MAILBOX	SEE NOTE	1
6	NUT, 5/16" HEX	NUT, 5/16" HEX	1
7	BOLT, 5/16 X 3 HEX	GRADE 5	1
8	PLATE WASHER FOR ARCHITECTURAL MAILBOX	SEE SEE SHEET 2	2
9	WASHER, 3/8 FLAT		8
10	WASHER, 3/8 LOCK		4
11	NUT, 3/8 HEX		4
12	BOLT, 3/8 X 1-1/4 HEX	GRADE 5	4
13	CONCRETE, CLASS B (2000 PSI)		1

LOCKABLE ARCHITECTURAL MAILBOX DETAILS

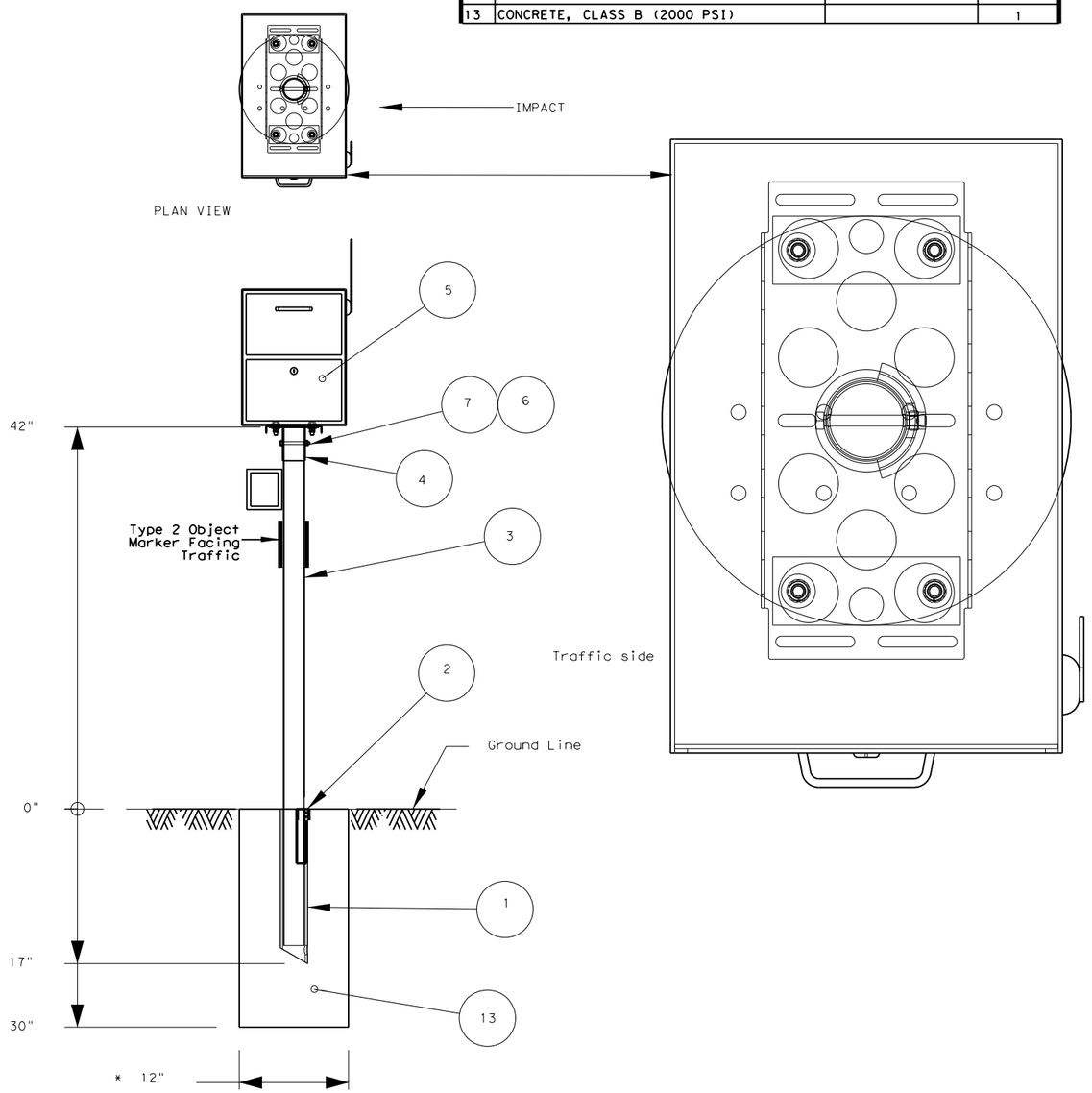

TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
160892	WEDGE FOR TYPE 4 FOUNDATION
166104	WEDGE FOR TYPE 7 FOUNDATION
	POSTS
4289	WINGED CHANNEL MAILBOX POST
149339	MULTIPLE MAILBOX POST (GALVANIZED TUBING)
164116	MULTIPLE MAILBOX POST (WHITE COATED)
166114	MULTIPLE MAILBOX POST (WHITE COATED OCTAGONAL)
166153	MULTIPLE MAILBOX POST (GALVANIZED OCTAGONAL)
161442	RECYCLED RUBBER POST. FOR SMALL MAILBOX ONLY
143426	THIN-WALL GALVANIZED STEEL TUBE 2.375" OUTER DIAMETER
162911	THINWALL WHITE STEEL TUBE 2.375" OUTER DIAMETER
166152	SINGLE OR DOUBLE THIN-WALL MAILBOX POST GALVANIZED 2" OCTAGONAL
166112	SINGLE OR DOUBLE THIN-WALL MAILBOX POST WHITECOATED 2" OCTAGONAL
	REFLECTIVE SHEETING
161812	REFLECTIVE SHEETING FOR EMERGENCY LOCATION NUMBER PANEL
	CONNECTING HARDWARE
2917	ANGLE BRACKET USED FOR TEMPORARY MAILBOX SUPPORT
166105	BRACKET FOR SINGLE MOUNTING OF MAILBOXES (MOUNTING KIT)
3789	PLATE FOR DOUBLE MOUNTING OF MAILBOXES
166108	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES (MOUNTING KIT)
166111	BRACKET FOR MULTIPLE MOUNTING OF MAILBOXES (MOUNTING KIT)
148939	BRACKET FOR ATTACHING SMALL OR MEDIUM SIZE MAIL BOX
148938	EXTENDER TO BRACKET FOR ATTACHING LARGE MAILBOX
159489	ANGLE BRACKET PART A
159490	ANGLE BRACKET PART B
162323	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES ON THINWALL STEEL POST, GALVANIZED OR POWDERCOATED.
161443	BRACKET FOR ATTACHING MAILBOX TO RECYCLED RUBBER POST AND TO MULTIPLE WHITE MAILBOX POST
158358	CASTING (NEWSPAPER RECEPTACLE BRACKET)
163731	U-BOLT (NEWSPAPER RECEPTACLE BRACKET)
160698	BOLT;HEX HEAD, GALV;3/8"DIA X 3/4"L HD, W/2-FLAT WASHERS
163750	BOLT;HEX HEAD, GALV;3/8" X 1-1/2, 16 NC, W/WASHERS
160701	BOLT;HEX HEAD, GALV;3/8"DIA X 2-1/2"L, HD, W/2-FLAT WASHERS
163730	BOLT;HEX HEAD, GALV;3/8" X 3-1/2", NC, W/NUT, 2 FLAT WASHERS
160699	BOLT;HEX HEAD, GALV;3/8"DIA X 3-3/4"L HD, W/2-FLAT WASHERS
160700	BOLT;HEX HEAD, GALV;3/8"DIA X 4"L HD, W/2-FLAT WASHERS

Texas Department of Transportation | Maintenance Division Standard

DHT NUMBERS TABLE

MB-15(1)

FILE:MB14(1).DGN	DN:	CK:	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		63

NOTES:

1. THE FLOODPLAIN SHOWN IS ZONE A ACCORDING TO THE RAINS COUNTY FIRM PANELS 48379C0035D AND 48379C0045D EFFECTIVE DATE APRIL 17, 2012.
2. THE HYDROLOGIC MODEL WAS DEVELOPED IN HEC-HMS 4.1 BASED ON METHODOLOGY DESCRIBED IN THE TXDOT HYDRAULIC MANUAL, JULY 2016.

   LOSS METHOD: SCS CURVE NUMBER
   TRANSFORM METHOD: SCS UNIT HYDROGRAPH
3. PRECIPITATION DEPTHS WERE DETERMINED USING THE INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE 2016 TXDOT IDF INTERFACE SPREADSHEET FOR RAINES COUNTY.
4. Tc VALUES FOR ALL BASINS EXCEPT B.01 WERE ESTIMATED USING NRCS METHODOLOGY IN TR-55.
5. FOR BASIN B.01 HYDROLOGY AND HYDRAULIC CALCULATIONS REFER TO THE LAKE FORK CREEK BRIDGE HYDRAULIC DATA SHEETS.
6. CULVERTS DESIGNED FOR THE 5-YEAR STORM.

LEGEND

- EXISTING ROADS
- EXISTING RIGHT OF WAY
- DRAINAGE AREA BOUNDARY
- X.XX — DRAINAGE AREA ID
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- 10-FT USGS CONTOUR
- TIME OF CONCENTRATION PATH

0 500 1000

SCALE: 1 = 1000'

DRAINAGE AREA CALCULATIONS

ID	AREA (AC)	Lag Time (MIN)	CN	PEAK FLOW (CFS)		
				2-YR	5-YR	100-YR
A.01	6.9	16	67	7.3	13.4	37.8
A.02	38.7	34	66	26.6	50.3	145.9
A.03	14.7	10	47	0.8	5.3	46.6
A.04	31.2	27	55	7.5	21.4	93.1

24-HR CUMULATIVE PRECIPITATION DEPTH (IN)					
2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
3.73	4.91	5.87	7.03	8.00	9.06

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3/31/21

FM 275

DRAINAGE AREA MAP

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		64

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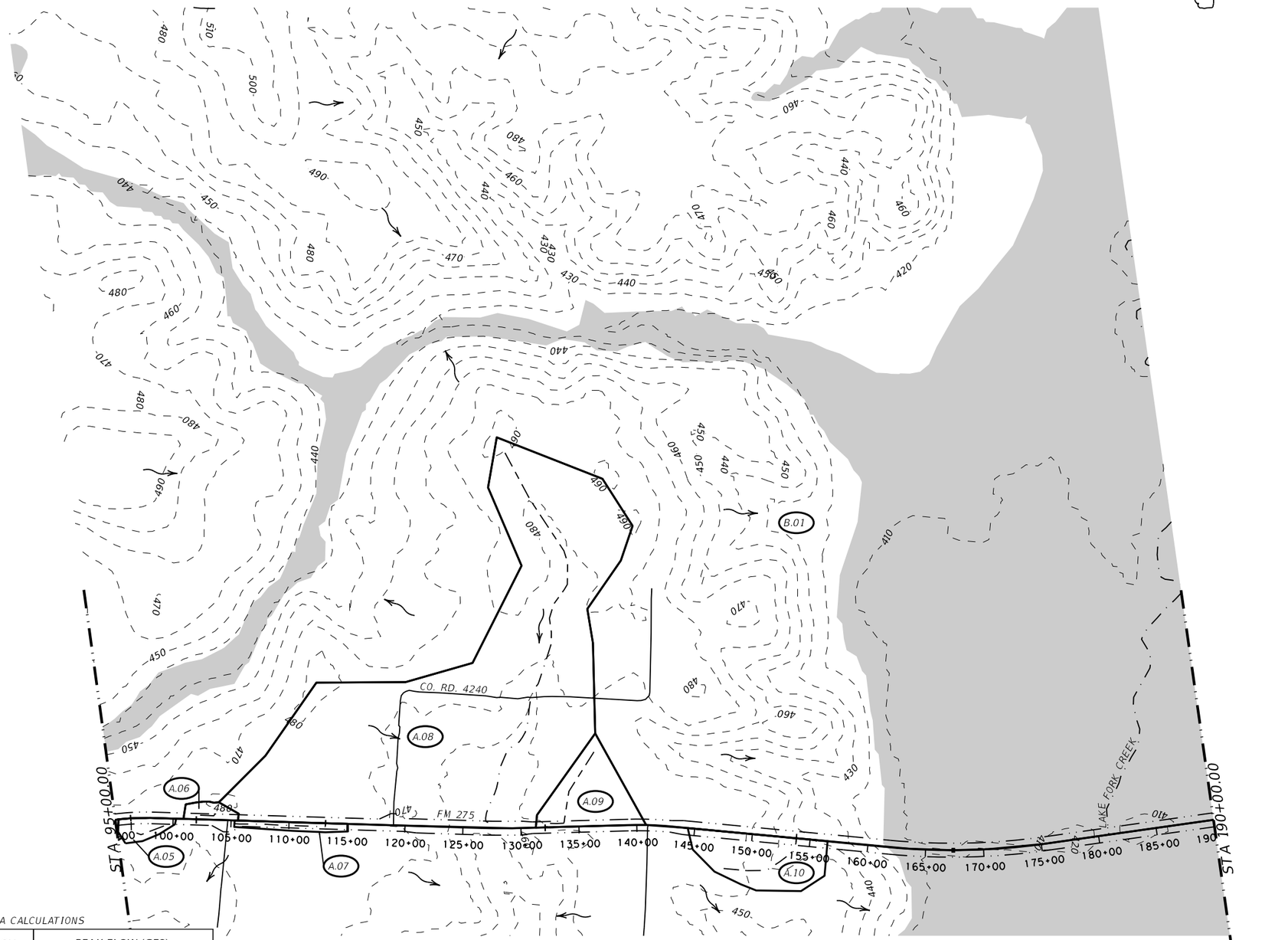

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   TRANSFORM METHOD: SCS UNIT HYDROGRAPH
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5. FOR BASIN B.01 HYDROLOGY AND HYDRAULIC CALCULATIONS REFER TO THE LAKE FORK CREEK BRIDGE HYDRAULIC DATA SHEETS.
6. CULVERTS DESIGNED FOR THE 5-YEAR STORM.

LEGEND

- EXISTING ROADS
- EXISTING RIGHT OF WAY
- DRAINAGE AREA BOUNDARY
- X.XX DRAINAGE AREA ID
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- 10-FT USGS CONTOUR
- TIME OF CONCENTRATION PATH

0 500 1000

SCALE: 1 = 1000'

DRAINAGE AREA CALCULATIONS

ID	AREA (AC)	Lag Time (MIN)	CN	PEAK FLOW (CFS)		
				2-YR	5-YR	100-YR
A.05	1.8	18	58	0.8	1.9	7.2
A.06	1.4	10	62	1.2	2.5	8.2
A.07	1.6	10	75	3.3	5.3	12.5
A.08	118.0	38	75	132.7	214.0	508.4
A.09	9.2	26	71	10.1	17.3	44.5
A.10	10.7	28	80	18.0	27.2	59.1

24-HR CUMULATIVE PRECIPITATION DEPTH (IN)					
2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
3.73	4.91	5.87	7.03	8.00	9.06

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DRAINAGE AREA MAP

SHEET 2 OF 3

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CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINES		65

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NOTES:

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   LOSS METHOD: SCS CURVE NUMBER
   TRANSFORM METHOD: SCS UNIT HYDROGRAPH
3. PRECIPITATION DEPTHS WERE DETERMINED USING THE INTENSITY-DURATION-FREQUENCY COEFFICIENTS BASED ON THE 2016 TXDOT IDF INTERFACE SPREADSHEET FOR RAINES COUNTY.
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5. FOR BASIN B.01 HYDROLOGY AND HYDRAULIC CALCULATIONS REFER TO THE LAKE FORK CREEK BRIDGE HYDRAULIC DATA SHEETS.
6. CULVERTS DESIGNED FOR THE 5-YEAR STORM.

LEGEND

- EXISTING ROADS
- EXISTING RIGHT OF WAY
- DRAINAGE AREA BOUNDARY
- X.XX DRAINAGE AREA ID
- FEMA FLOOD ZONE A
- FLOW DIRECTION
- 10-FT USGS CONTOUR
- TIME OF CONCENTRATION PATH

0 500 1000

SCALE: 1 = 1000'

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DRAINAGE AREA MAP

DRAINAGE AREA CALCULATIONS

ID	AREA (AC)	Lag Time (MIN)	CN	PEAK FLOW (CFS)		
				2-YR	5-YR	100-YR
A.13	4.9	22	83	10.8	15.7	32.4
A.14	121.1	34	85	249.5	359.0	722.7
A.15	15.2	22	82	32.0	47.2	98.9
A.16	4.0	19	82	9.1	13.5	28.2

24-HR CUMULATIVE PRECIPITATION DEPTH (IN)					
2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
3.73	4.91	5.87	7.03	8.00	9.06

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CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		66

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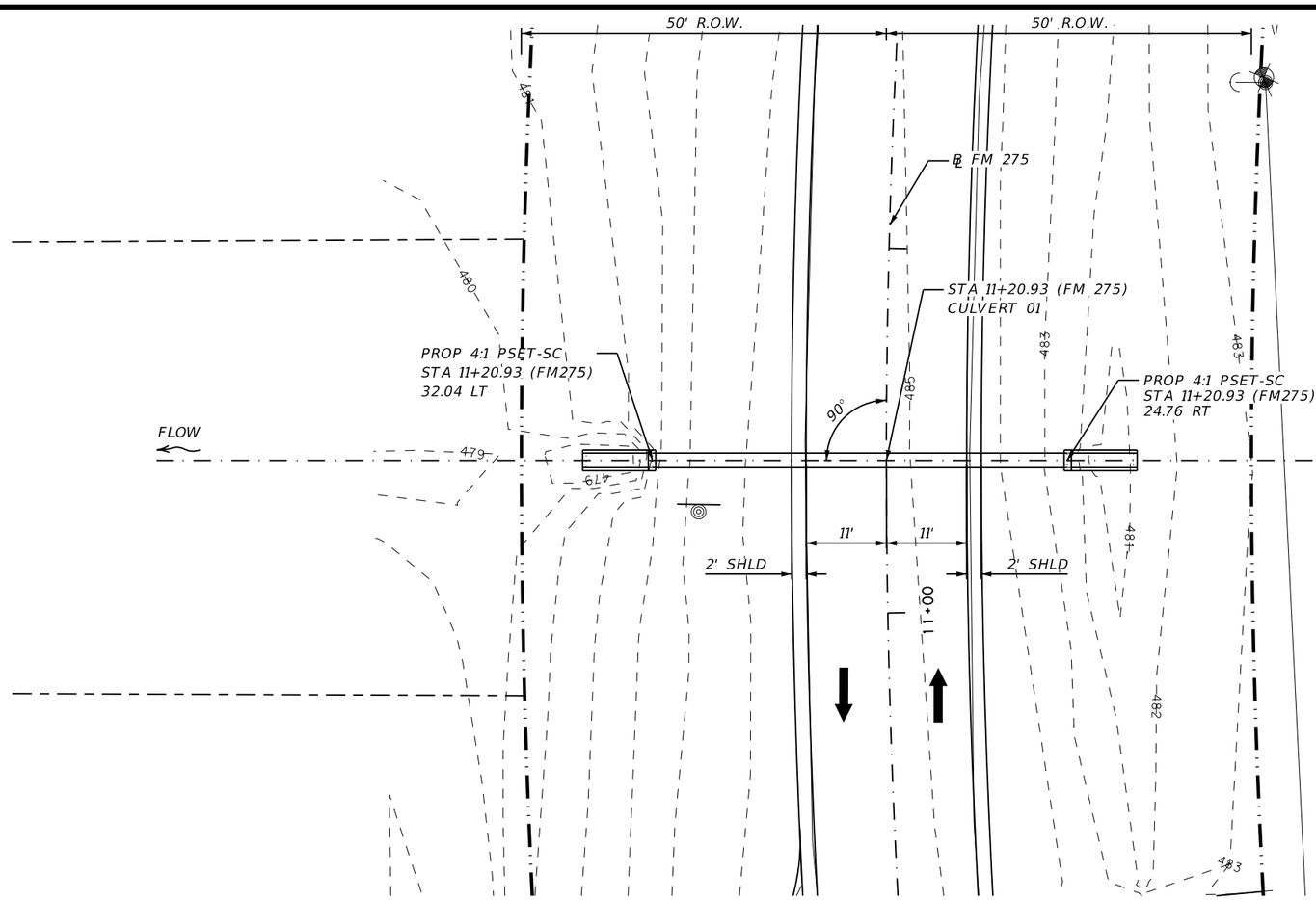


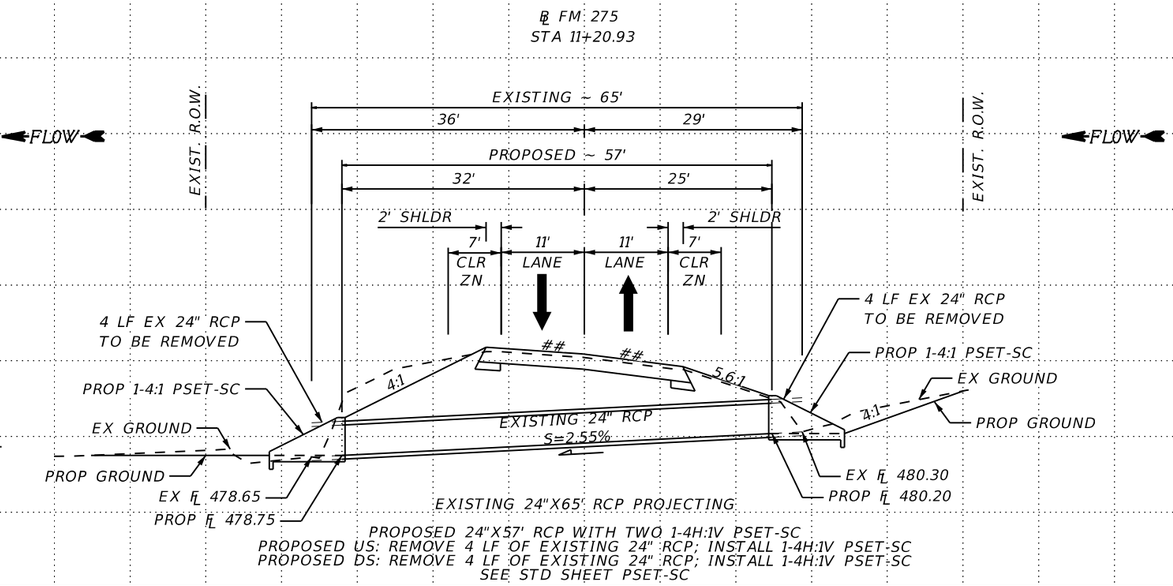
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	12	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	10	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	8	LF
0658 6047	INSTL OM ASSM (OM-2Y)(WC)GND	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



PROPOSED 24"X57' RCP WITH TWO 1-4H:1V PSET-SC
PROPOSED US: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

CULVERT 01

FLOW

Q_5	=	13.4	CFS
Q_{100}	=	37.8	CFS

PROPOSED HEADWATER

HW_5	=	482.37	
HW_{100}	=	485.10	

PROPOSED TAILWATER

TW_5	=	479.38	
TW_{100}	=	479.86	

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CULVERT LAYOUT
CULVERT 01

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 1 OF 16

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CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		67

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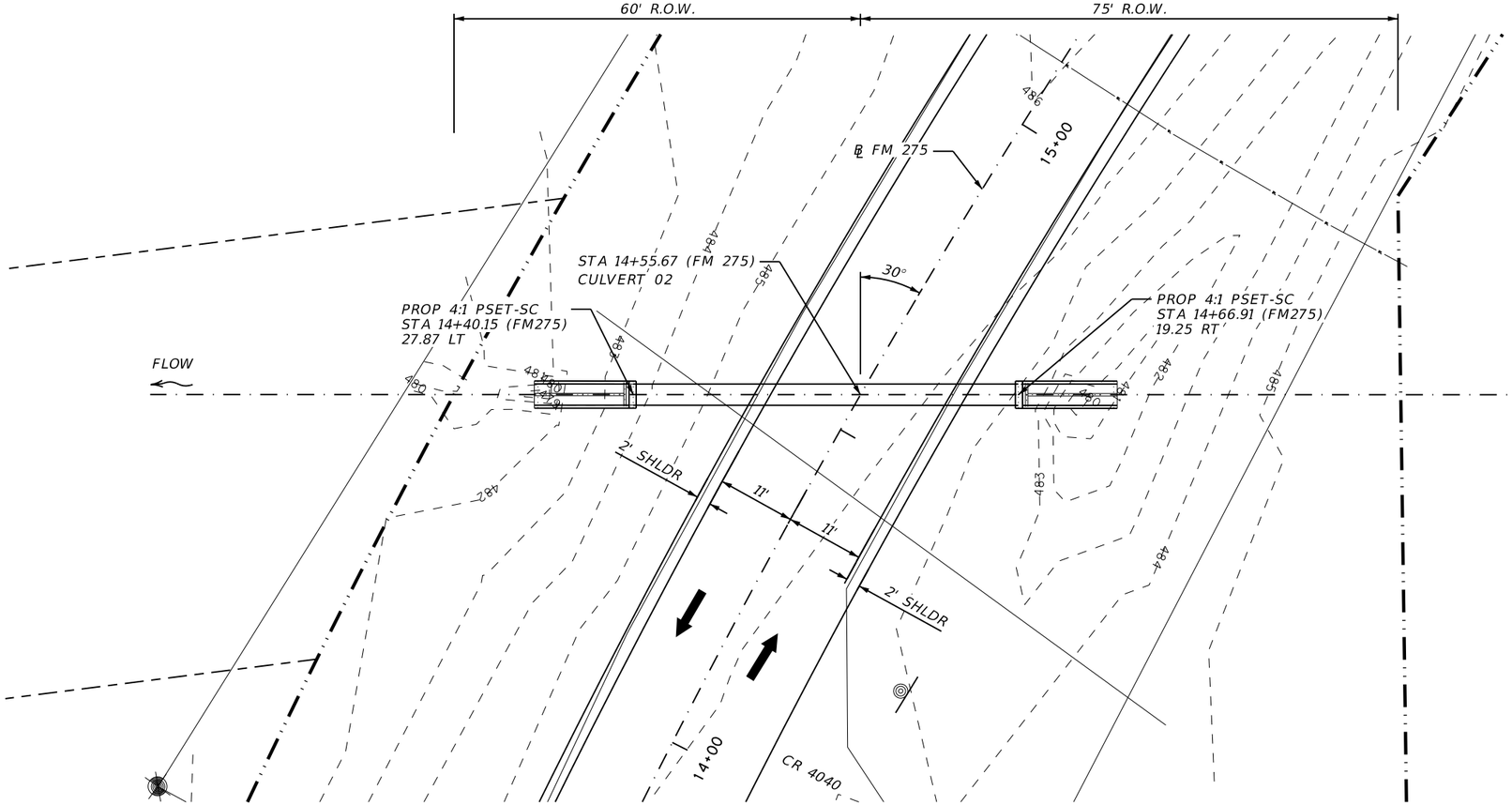


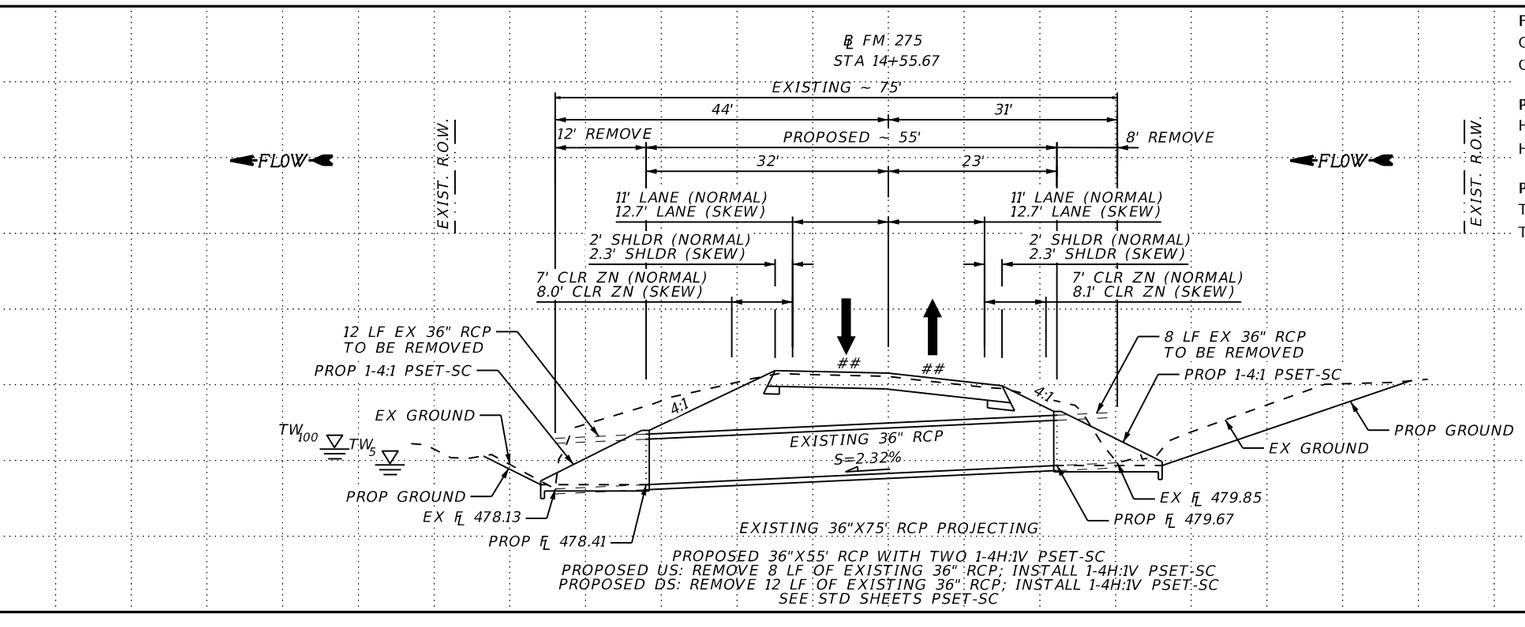
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	36	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	4	CY
0467 6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	20	LF
0658 6047	INSTL OM ASSM (OM-2Y)(WC)GND	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



FLOW

Q_5	=	50.3	CFS
Q_{100}	=	145.9	CFS

PROPOSED HEADWATER

HW_5	=	484.10	
HW_{100}	=	485.36	

PROPOSED TAILWATER

TW_5	=	480.00	
TW_{100}	=	480.99	

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FM 275
CULVERT LAYOUT
CULVERT 02

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 2 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		68

DATE: 3/29/2021 11:13:04 AM
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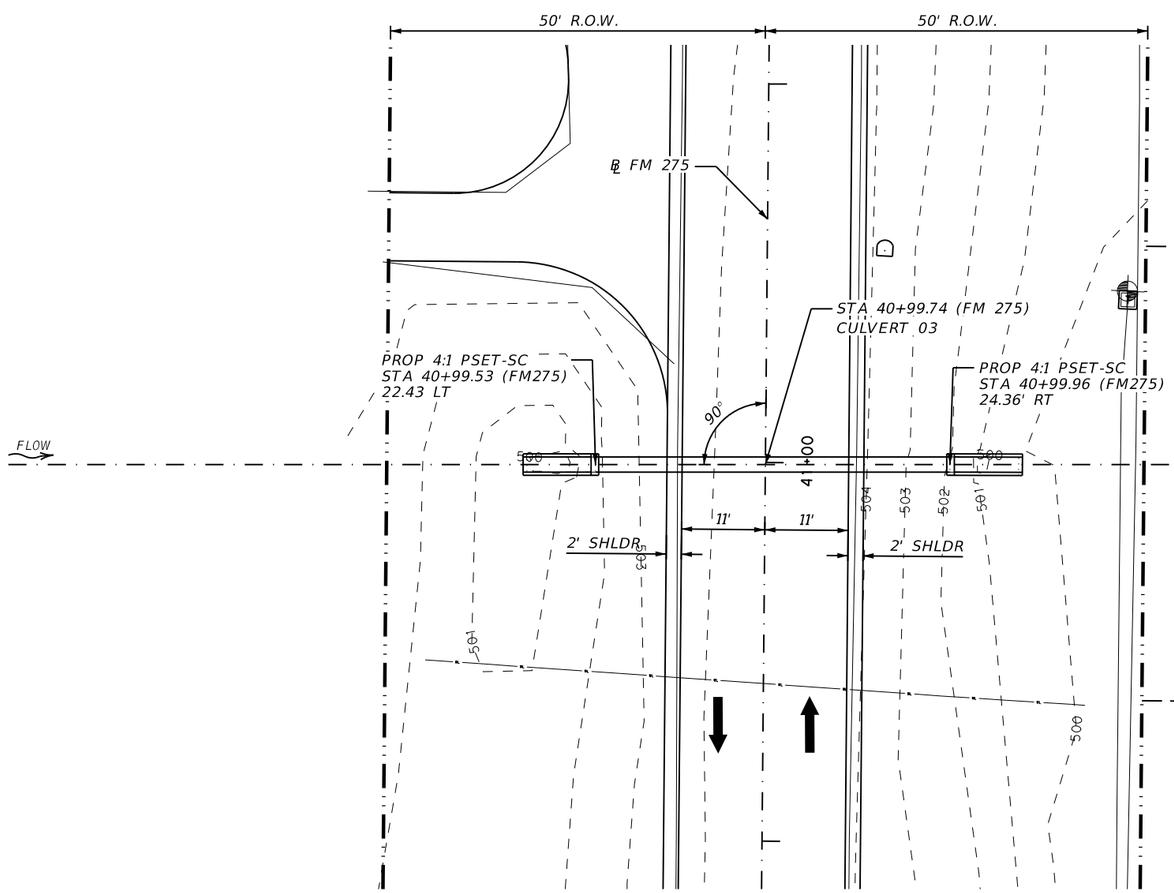
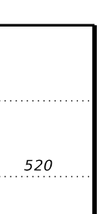




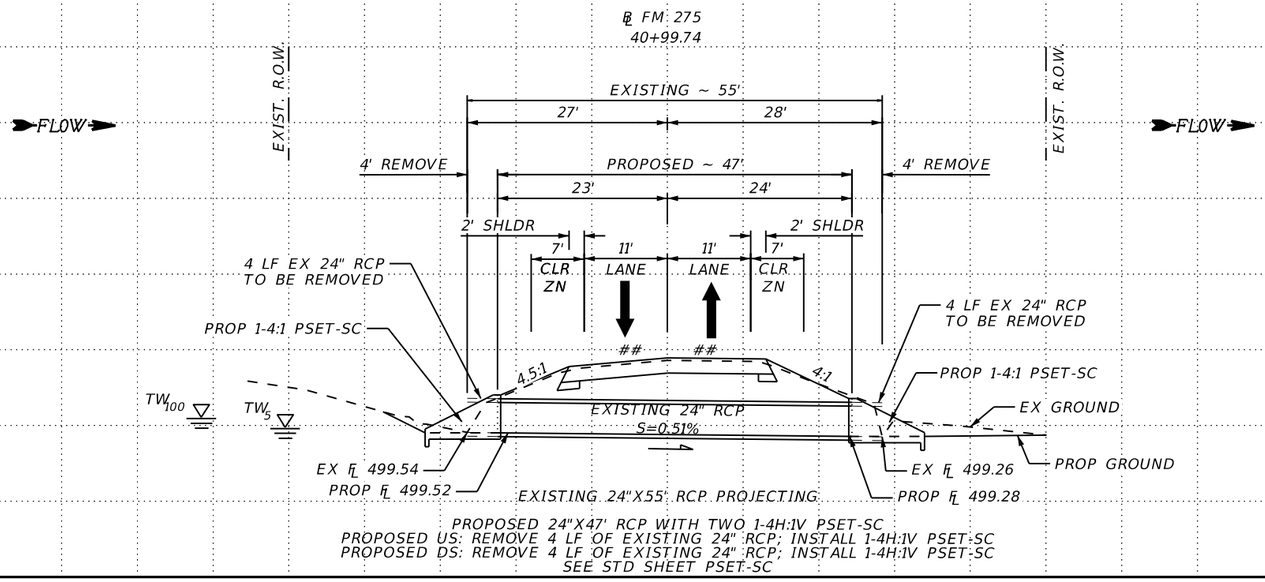
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	3	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	5	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	8	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



PROPOSED 24"X47' RCP WITH TWO 1-4H:1V PSET-SC
PROPOSED US: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	5.3	CFS
Q_{100}	=	46.6	CFS

PROPOSED HEADWATER

HW_5	=	500.71	
HW_{100}	=	502.38	

PROPOSED TAILWATER

TW_5	=	499.74	
TW_{100}	=	500.40	

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275

CULVERT LAYOUT CULVERT 03

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 3 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		69

DATE: 3/29/2021 11:13:07 AM
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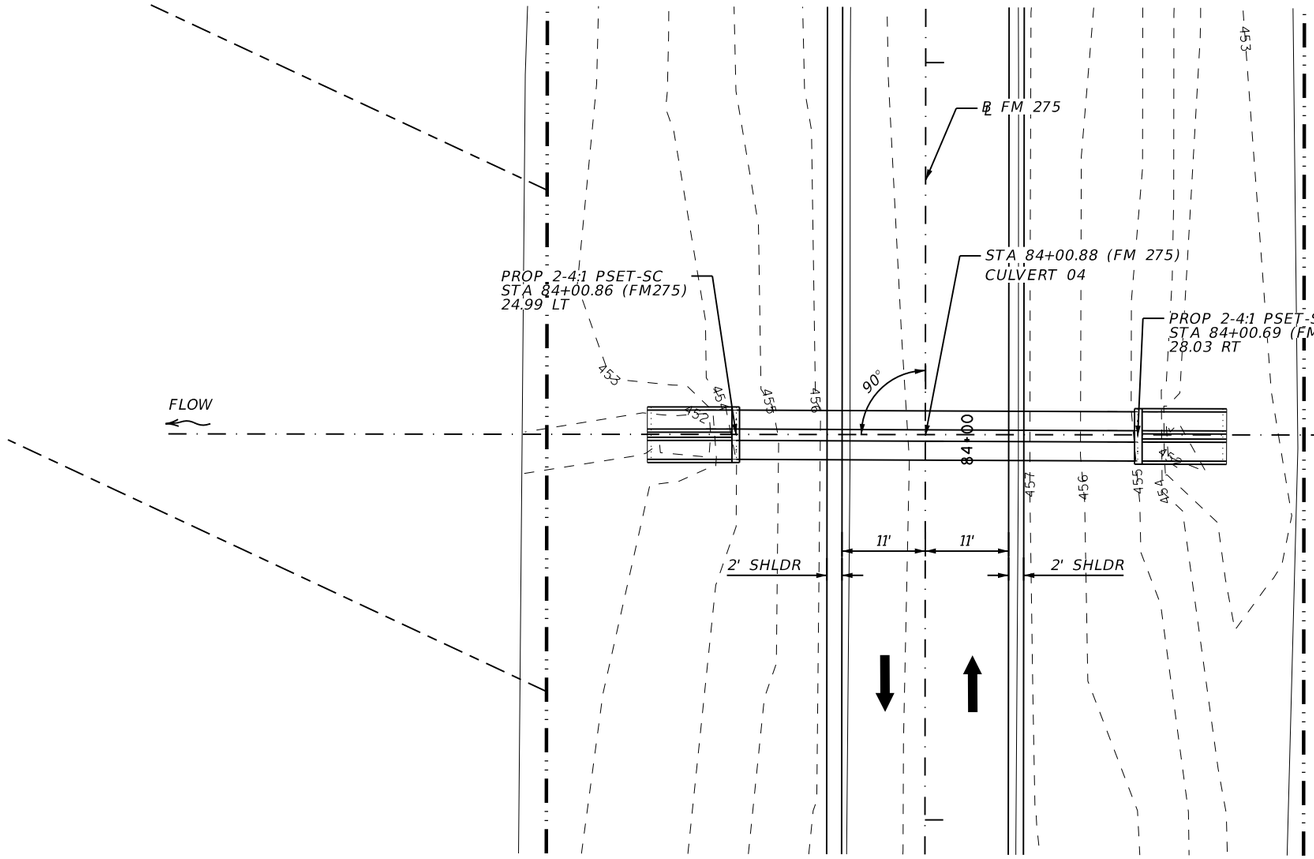
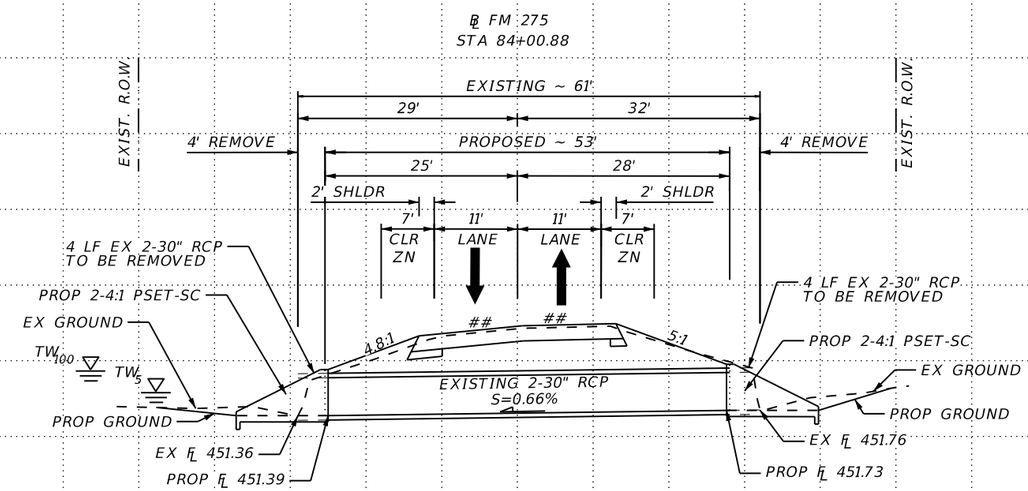


LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	10	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	14	CY
0467 6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	4	EA
0496 6007	REMOV STR (PIPE)	16	LF



EXISTING 2-30"X61' RCP PROJECTING

PROPOSED 2-30"X53' RCP WITH TWO 2-4H:1V PSET-SC
PROPOSED US: REMOVE 4 LF OF EXISTING 2-30" RCP; INSTALL 2-4H:1V PSET-SC
PROPOSED DS: REMOVE 4 LF OF EXISTING 2-30" RCP; INSTALL 2-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	21.4	CFS
Q_{100}	=	93.1	CFS

PROPOSED HEADWATER

HW_5	=	453.32
HW_{100}	=	457.32

PROPOSED TAILWATER

TW_5	=	452.93
TW_{100}	=	454.39

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

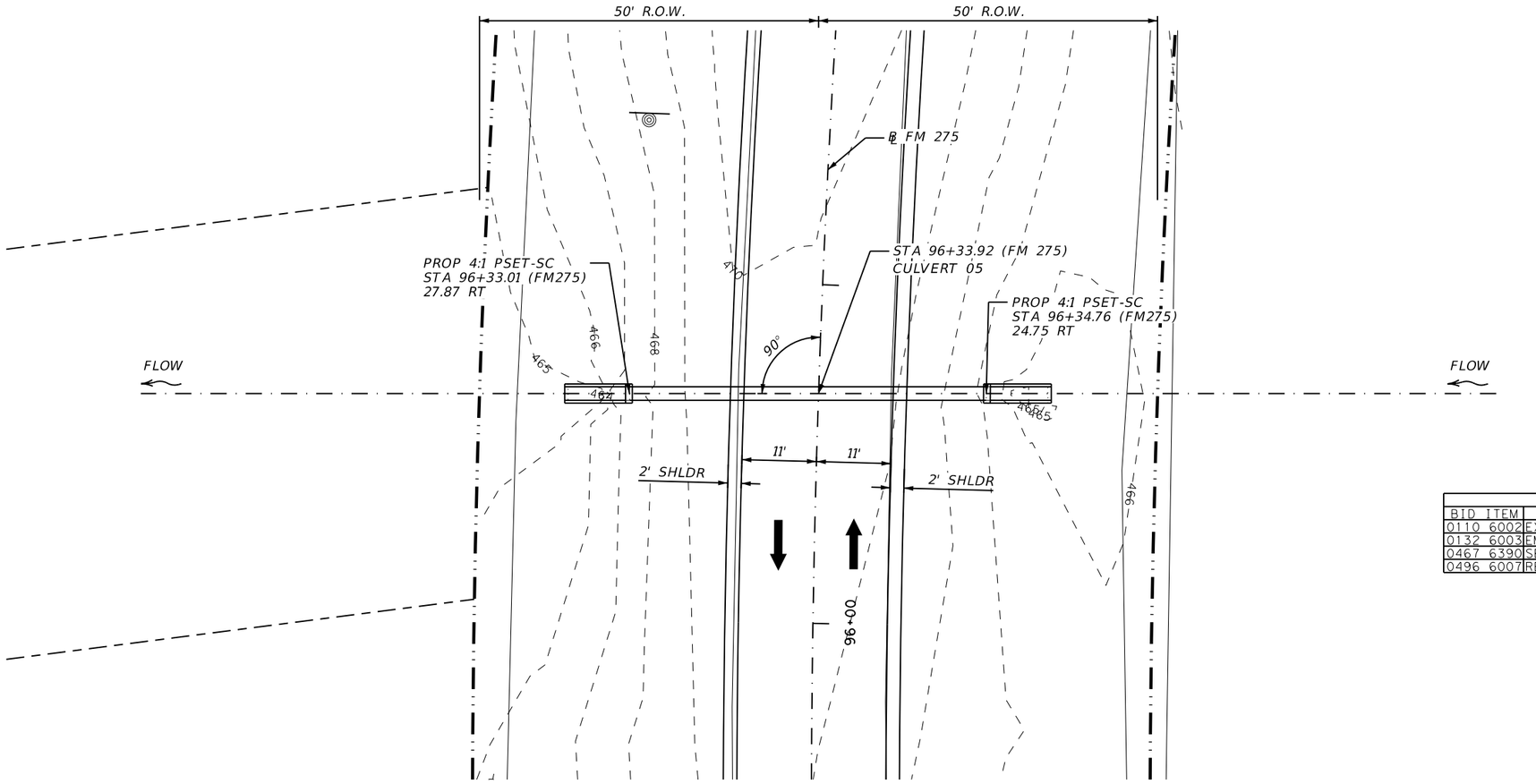
FM 275
CULVERT LAYOUT
CULVERT 04

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		70

DATE: 3/29/2021 11:13:10 AM
FILE: T:\PAR\PDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\E204 CULVERT LAYOUT.dgn



LEGEND

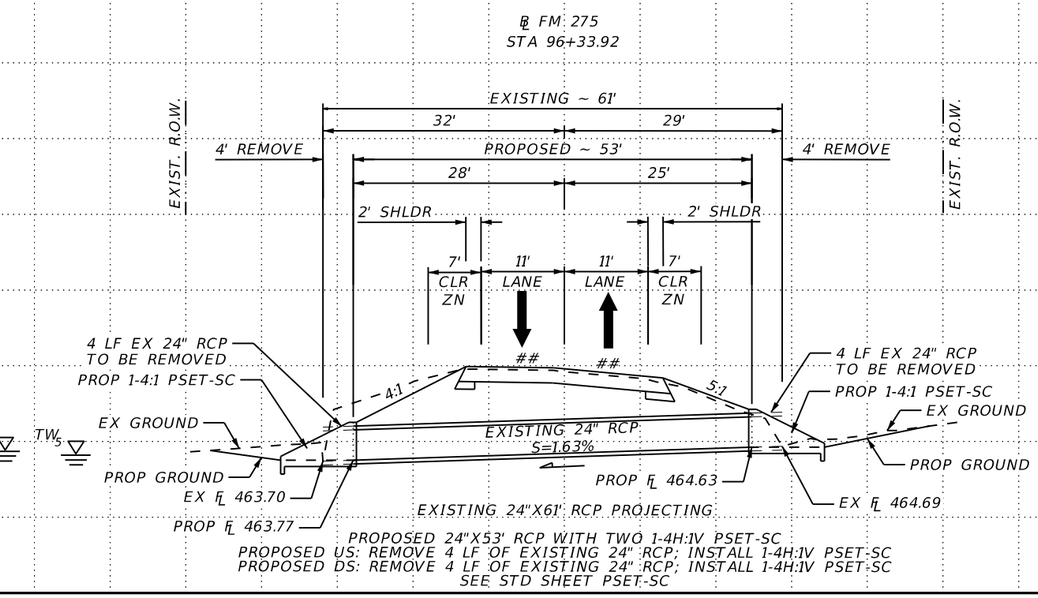
- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES

BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	9	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	5	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	8	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



FLOW

Q_5	=	1.9	CFS
Q_{100}	=	7.2	CFS

PROPOSED HEADWATER

HW_5	=	465.32
HW_{100}	=	466.05

PROPOSED TAILWATER

TW_5	=	464.16
TW_{100}	=	464.41

STATE OF TEXAS
JAMES D. GOOD
104637
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PROFESSIONAL ENGINEER

3/31/21

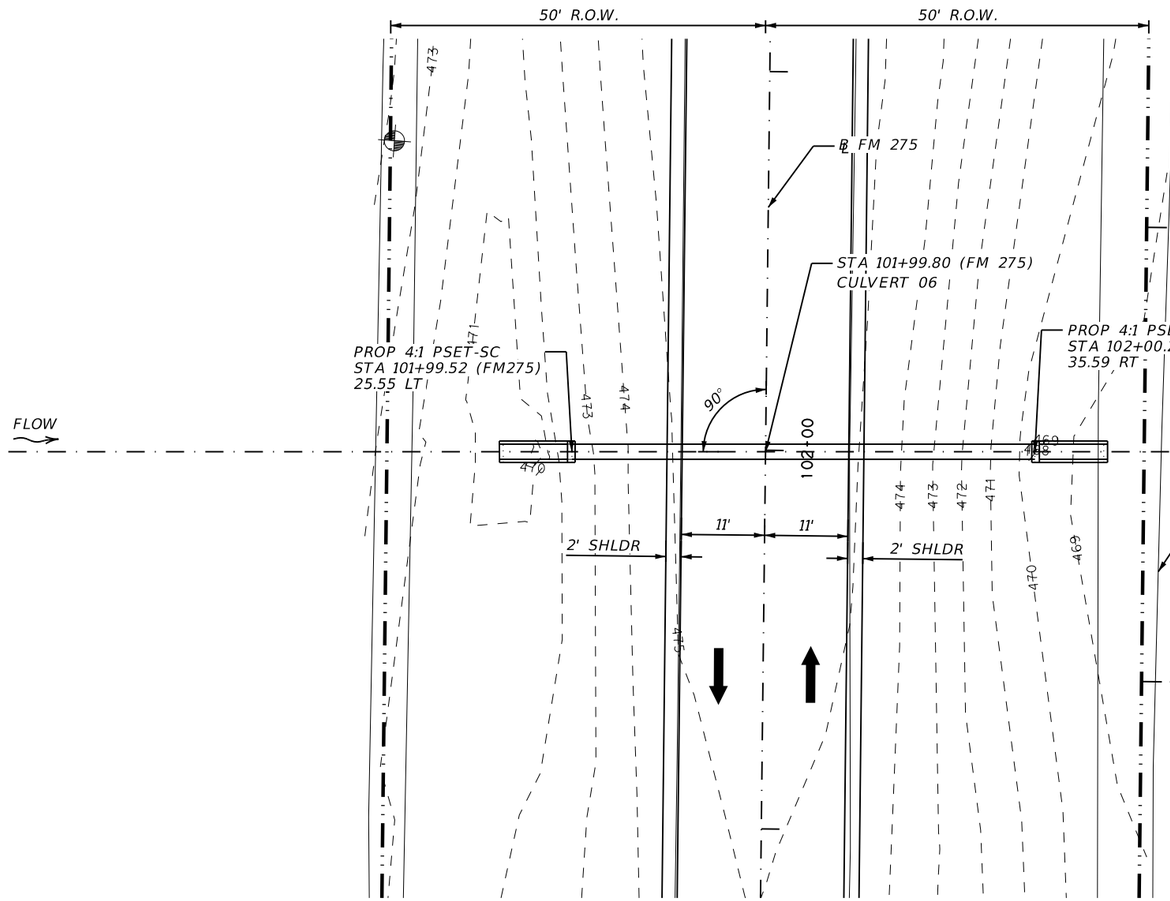
FM 275
CULVERT LAYOUT
CULVERT 05

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		71

DATE: 3/29/2021 11:13:12 AM
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\Updated Plan Sheets\E205 CULVERT LAYOUT.dgn



LEGEND

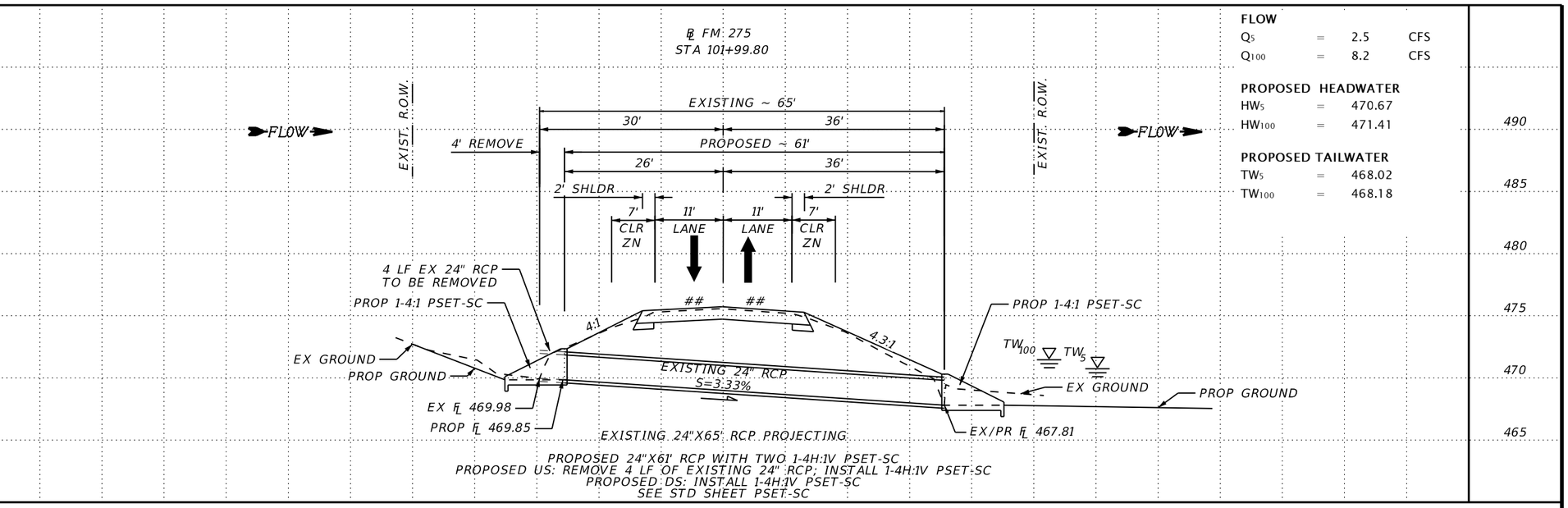
- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES

BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	5	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	9	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	4	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



FLOW

Q_5	=	2.5	CFS
Q_{100}	=	8.2	CFS

PROPOSED HEADWATER

HW_5	=	470.67
HW_{100}	=	471.41

PROPOSED TAILWATER

TW_5	=	468.02
TW_{100}	=	468.18

STATE OF TEXAS
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104637
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PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 06

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 6 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		72

DATE: 3/29/2021 11:13:15 AM
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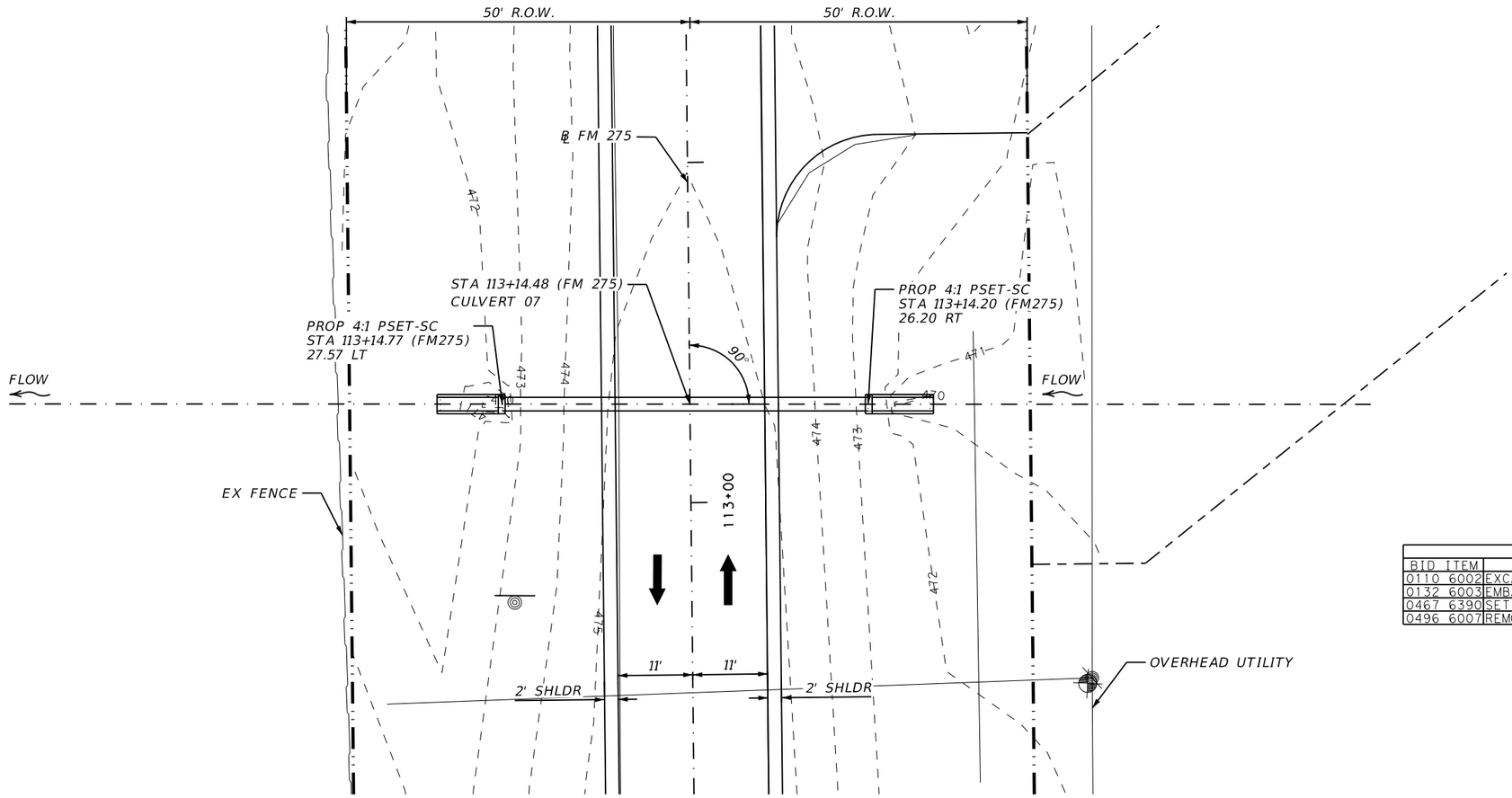


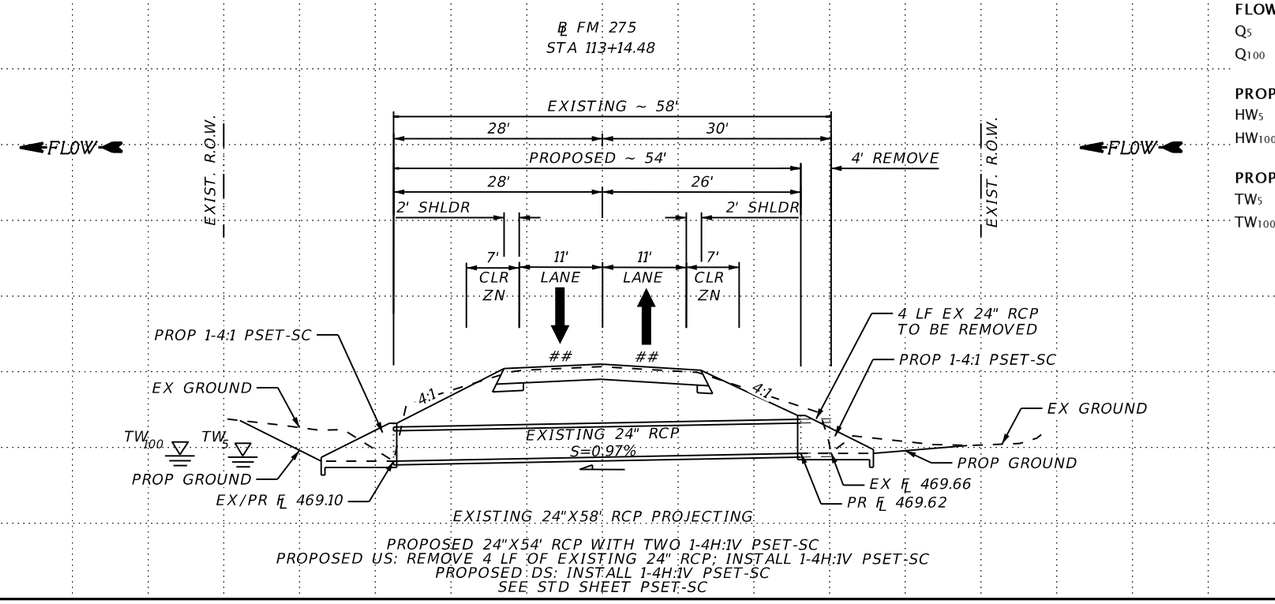
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	17	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	5	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	4	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



EXISTING 24"X58' RCP PROJECTING

PROPOSED 24"X54' RCP WITH TWO 1-4H:1V PSET-SC
PROPOSED US: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	5.3	CFS
Q_{100}	=	12.5	CFS

PROPOSED HEADWATER

HW_5	=	470.81	
HW_{100}	=	471.64	

PROPOSED TAILWATER

TW_5	=	469.34	
TW_{100}	=	469.45	

STATE OF TEXAS
JAMES D. GOOD
104637
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PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 07

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 7 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		73

DATE: 3/29/2021 11:13:18 AM
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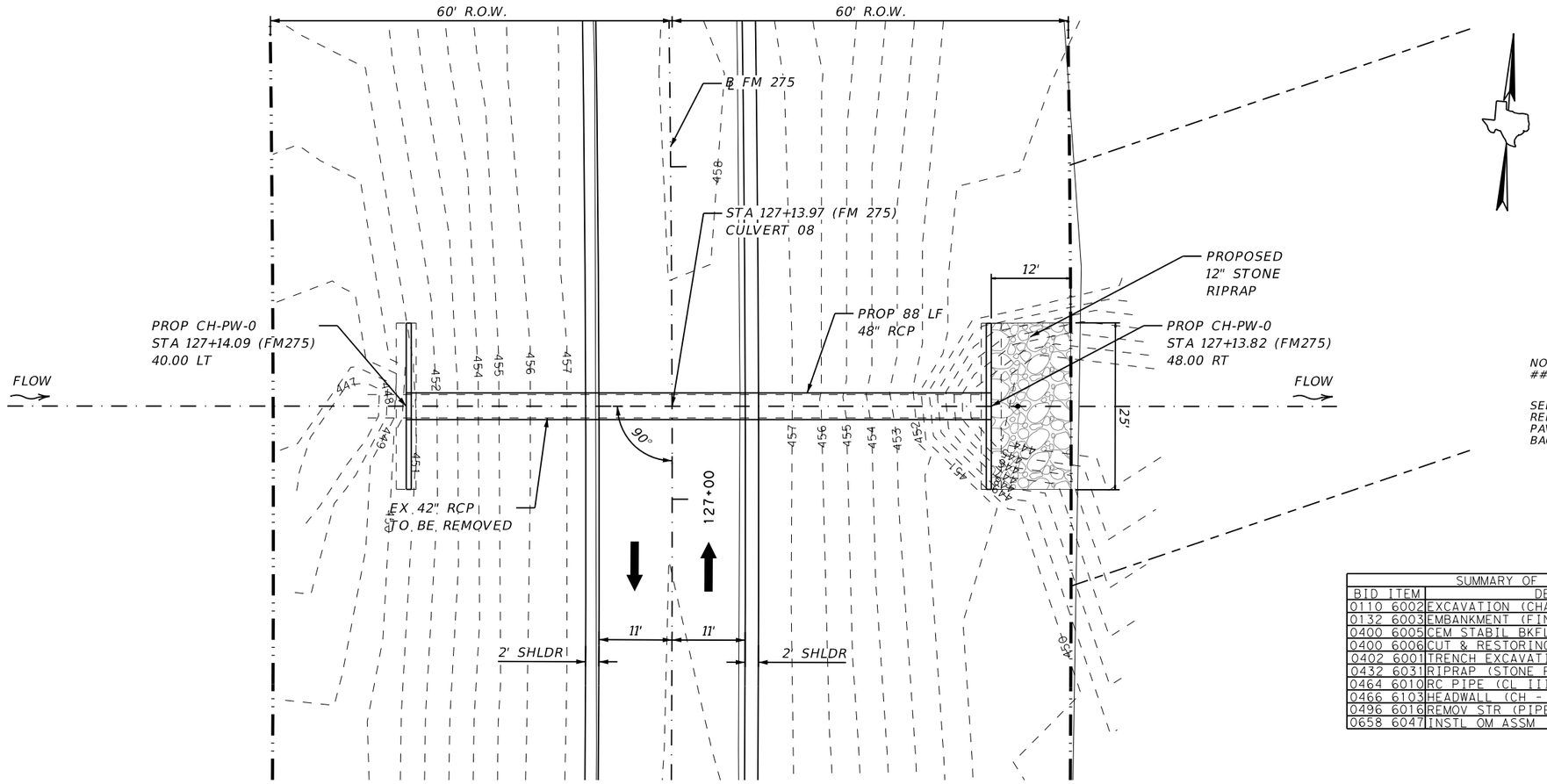

LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SEE TRAFFIC CONTROL PLAN CULVERT REPLACEMENT SHEETS FOR CUT & RESTORING PAV, TEMPORARY SPL SHORING, AND CEM STABIL BACKFILL DETAILS.

SUMMARY OF CULVERT QUANTITIES

BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	12	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	35	CY
0400 6005	CEM STABIL BKFL	164	CY
0400 6006	CUT & RESTORING PAV	113	SY
0402 6001	TRENCH EXCAVATION PROTECTION	88	LF
0432 6031	RIPRAP (STONE PROTECTION)(12 IN)	23	CY
0464 6010	RC PIPE (CL III) (48 IN)	88	LF
0466 6103	HEADWALL (CH - PW - 0) (DIA= 48 IN)	2	EA
0496 6016	REMOV STR (PIPE)	1	EA
0658 6047	INSTL OM ASSM (OM-2Y)(WC)GND	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

FLOW

Q_5	=	214.0	CFS
Q_{100}	=	508.4	CFS

PROPOSED HEADWATER

HW_5	=	456.79
HW_{100}	=	458.62

PROPOSED TAILWATER

TW_5	=	449.10
TW_{100}	=	451.48

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 08

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 8 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		74

DATE: 3/29/2021 11:13:21 AM
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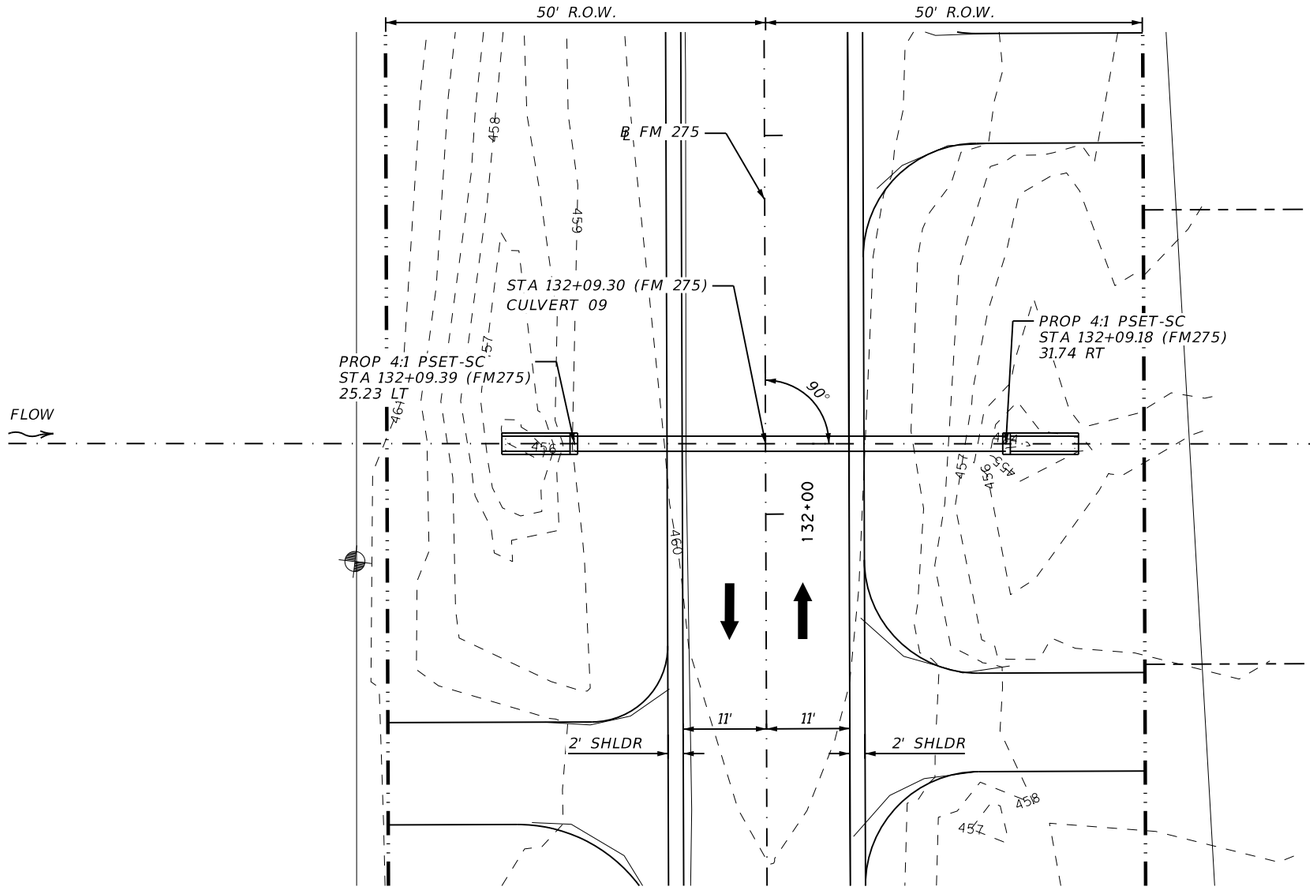


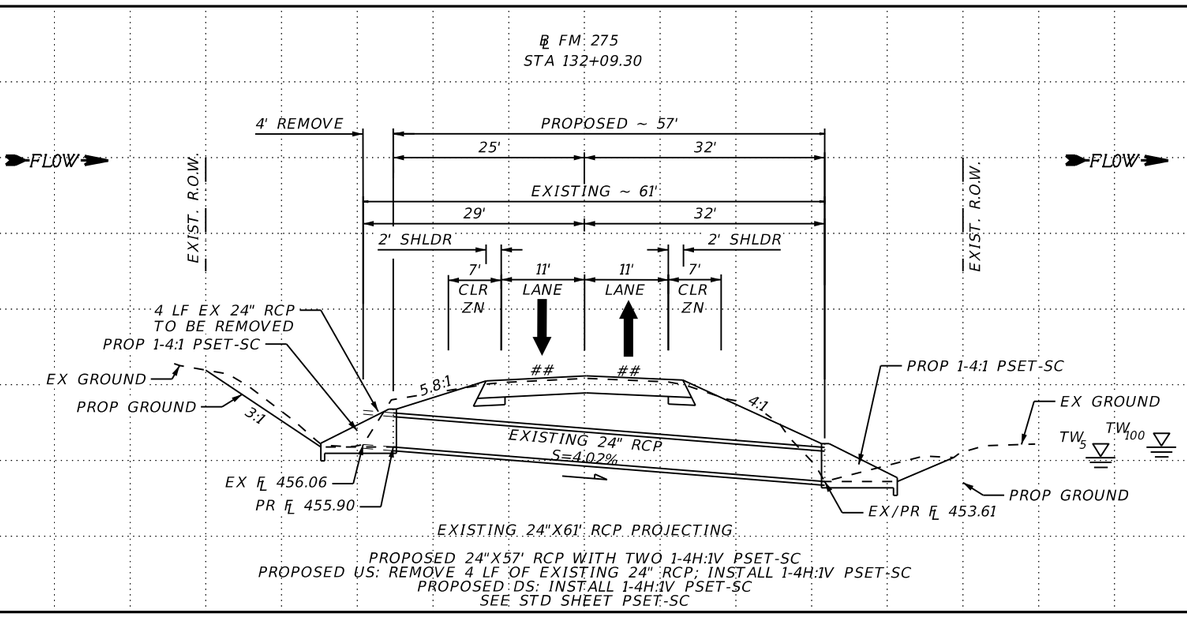
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	15	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	11	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	4	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



EXISTING 24"X61' RCP PROJECTING

PROPOSED 24"X57' RCP WITH TWO 1-4H:1V PSET-SC
PROPOSED US: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	17.3	CFS
Q_{100}	=	44.5	CFS

PROPOSED HEADWATER

HW_5	=	458.70
HW_{100}	=	460.28

PROPOSED TAILWATER

TW_5	=	455.15
TW_{100}	=	455.81

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 09

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		75

DATE: 3/29/2021 11:13:24 AM
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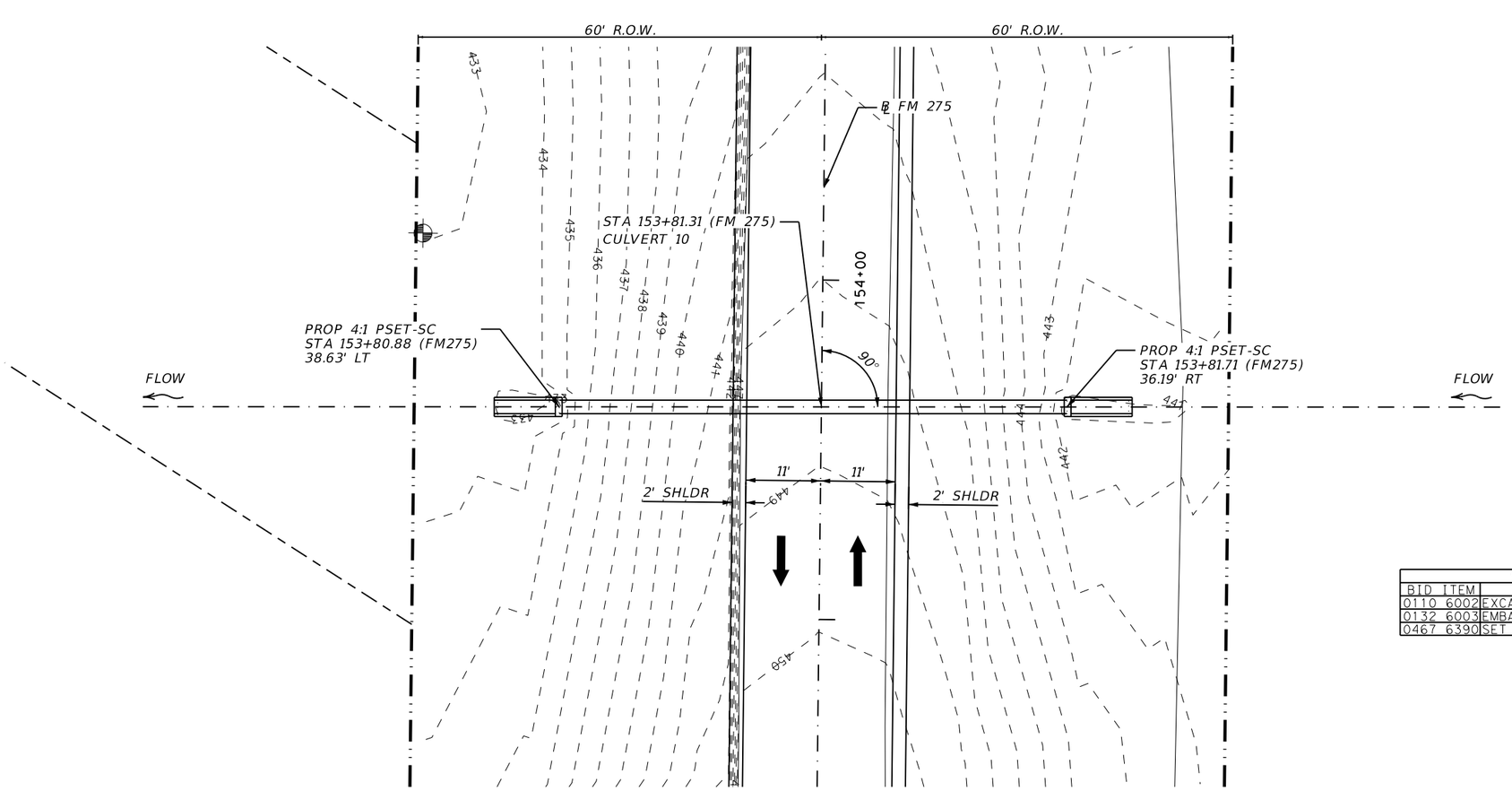

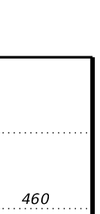

LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	4	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	18	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

FLOW

Q_5	=	27.2	CFS
Q_{100}	=	59.1	CFS

PROPOSED HEADWATER

HW_5	=	443.46
HW_{100}	=	443.99

PROPOSED TAILWATER

TW_5	=	440.33
TW_{100}	=	440.73

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 10

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 10 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		76

DATE: 3/29/2021 11:13:27 AM
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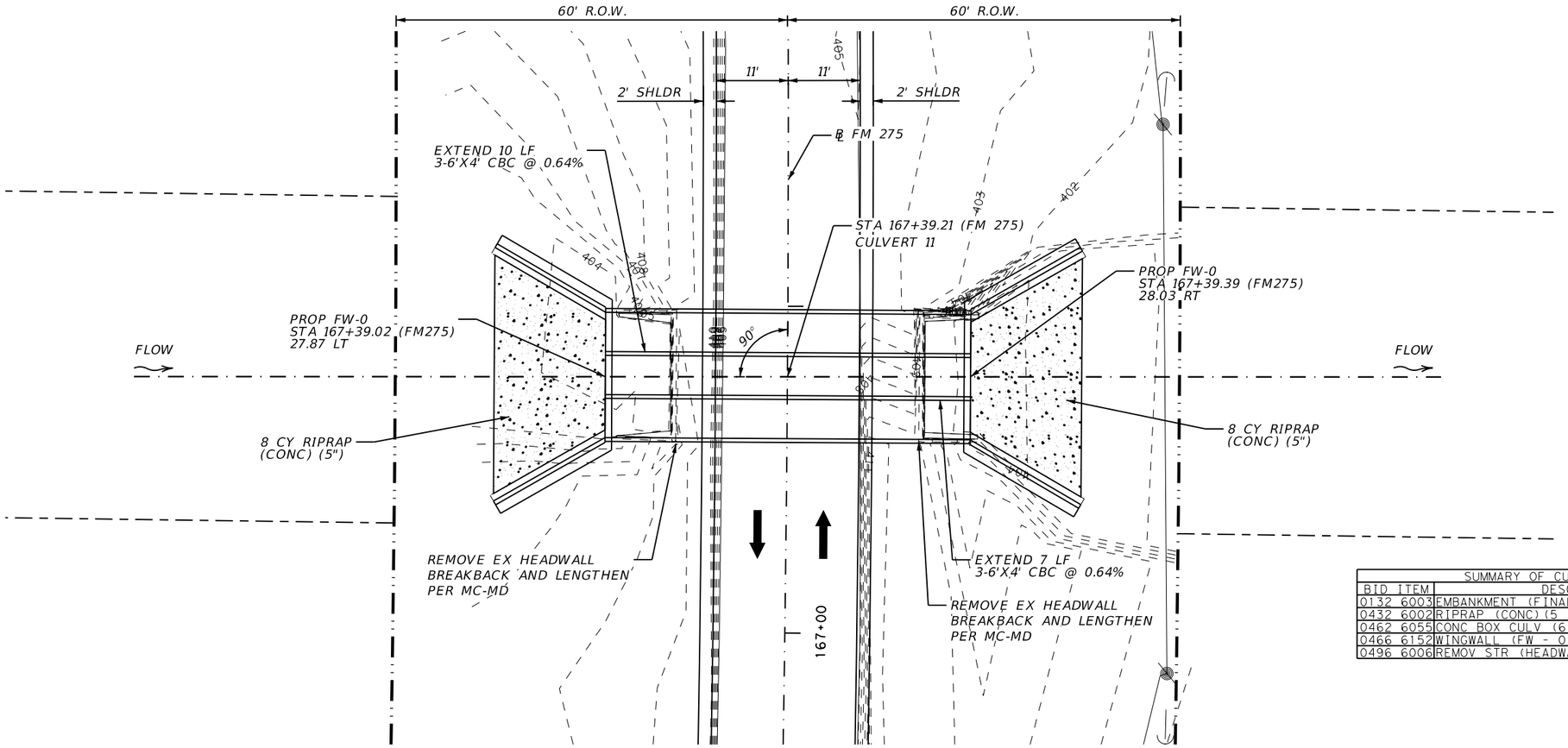


LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

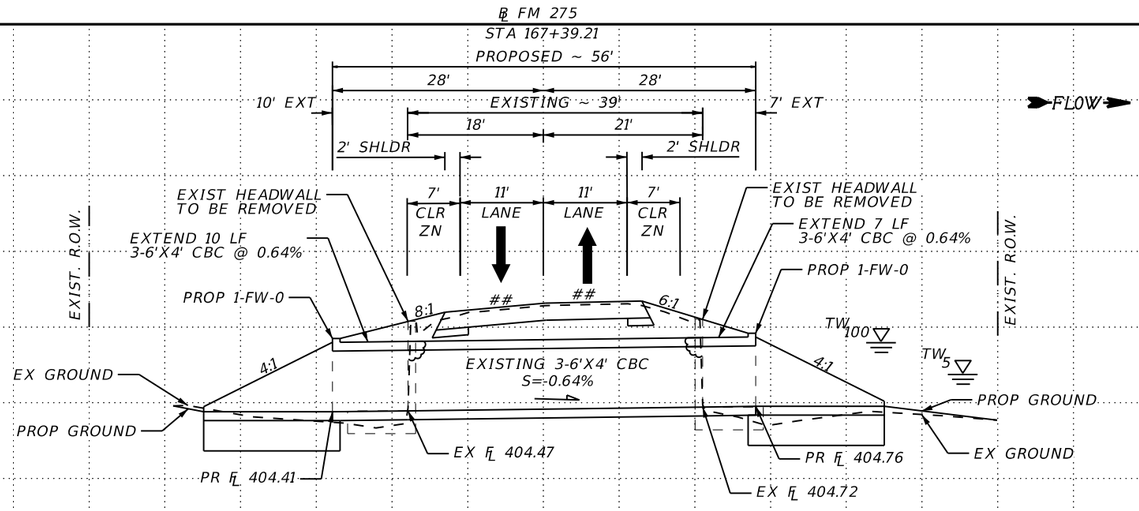
NOTES:

1. CULVERT 11 LOCATED IN FLOODPLAIN WHICH IS ZONE A ACCORDING TO THE RAINS COUNTY FIRM PANEL 48379C0045D EFFECTIVE DATE APRIL 17, 2012.
2. CULVERT 11 CULVERT 12, AND EXISTING BRIDGE AT LAKE FORK CREEK MULTIPLE OPENING HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS v5.0.4.

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	265	CY
0432 6002	RIPRAP (CONC)(5 IN)	16	CY
0462 6055	CONC BOX CULV (6 FT X 4 FT) (EXTEND)	51	LF
0466 6152	WINGWALL (FW - 0) (HW=5 FT)	2	EA
0496 6006	REMOV STR (HEADWALL)	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



EXISTING 3-6'X4'X39' CBC WITH TWO 1-FW-0

PROPOSED 3-6'X4'X56' CBC WITH TWO 1-FW-0
PROPOSED US: EXTEND EXISTING 3-6'X4' CBC BY 10'; INSTALL 1-FW-0
PROPOSED DS: EXTEND EXISTING 3-6'X4' CBC BY 7'; INSTALL 1-FW-0
SEE STD SHEETS BCS, MC-MD, MC-6-16, AND FW-0

FLOW

Q_{25}	=	17,188	CFS
Q_{100}	=	25,612	CFS

PROPOSED HEADWATER

HW_{25}	=	415.68
HW_{100}	=	416.47

PROPOSED TAILWATER

TW_{25}	=	414.73
TW_{100}	=	415.82

CULVERT 11 HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT CULVERT 11

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		77

DATE: 3/29/2021 11:13:29 AM
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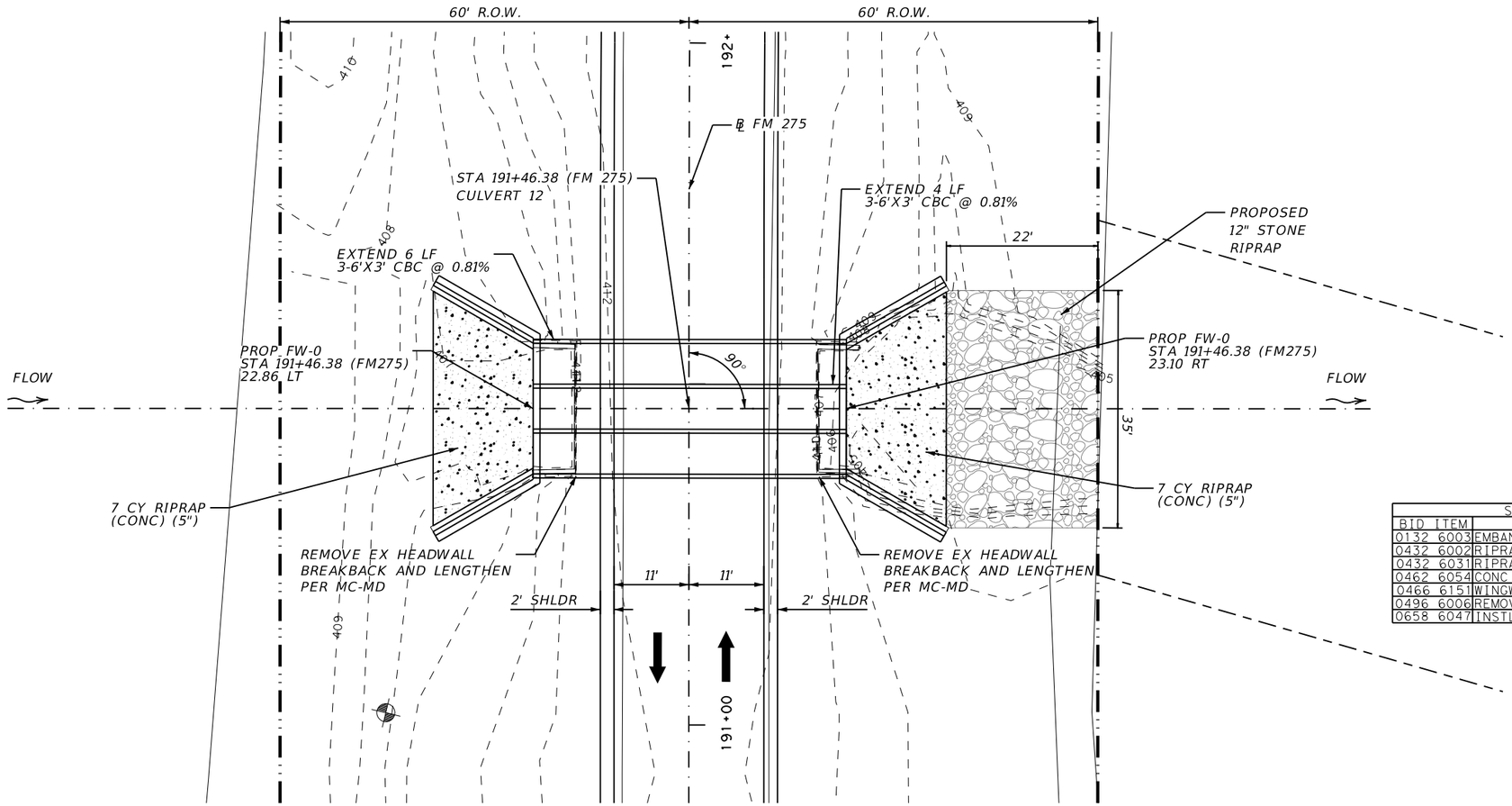


LEGEND

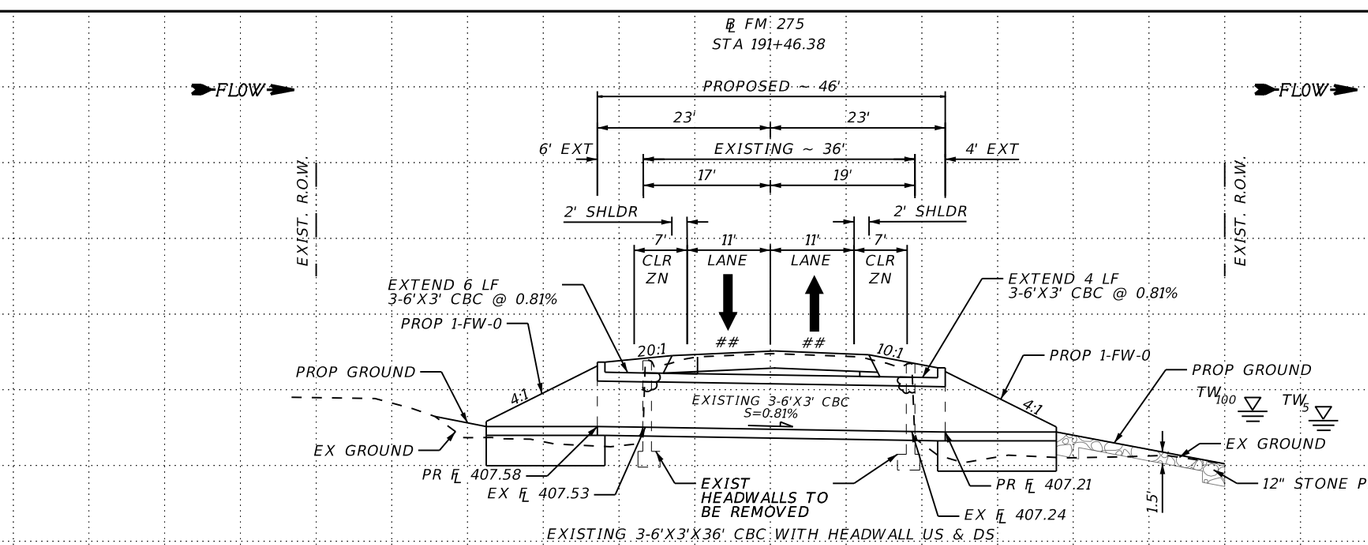
- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTES:

1. CULVERT 11 LOCATED IN FLOODPLAIN WHICH IS ZONE A ACCORDING TO THE RAINS COUNTY FIRM PANEL 48379C0045D EFFECTIVE DATE APRIL 17, 2012.
2. CULVERT 11, CULVERT 12, AND EXISTING BRIDGE AT LAKE FORK CREEK MULTIPLE OPENING HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS v5.0.4.

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	308	CY
0432 6002	RIPRAP (CONC)(5 IN)	14	CY
0432 6031	RIPRAP (STONE PROTECTION)(12 IN)	55	CY
0462 6054	CONC BOX CULV (6 FT X 3 FT) (EXTEND)	30	LF
0466 6151	WINGWALL (FW - 0) (HW=4 FT)	2	EA
0496 6006	REMOV STR (HEADWALL)	2	EA
0658 6047	INSTL OM ASSM (OM-2Y)(WC)GND	2	EA



EXISTING 3-6'X3'X36' CBC WITH HEADWALL US & DS

PROPOSED 3-6'X3'X46' CBC WITH FW-0 US & DS
PROPOSED US: EXTEND EXISTING 3-6'X3' CBC BY 6 LF; INSTALL FW-0
PROPOSED DS: EXTEND EXISTING 3-6'X3' CBC BY 4 LF; INSTALL FW-0
SEE STD SHEETS BCS, MC-MD, MC-6-16, AND FW-0

FLOW

Q_{25}	=	17,188	CFS
Q_{100}	=	25,612	CFS

PROPOSED HEADWATER

HW_{25}	=	415.68
HW_{100}	=	416.47

PROPOSED TAILWATER

TW_{25}	=	414.73
TW_{100}	=	415.82

CULVERT 12 HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 12

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		78

DATE: 3/29/2021 11:13:32 AM
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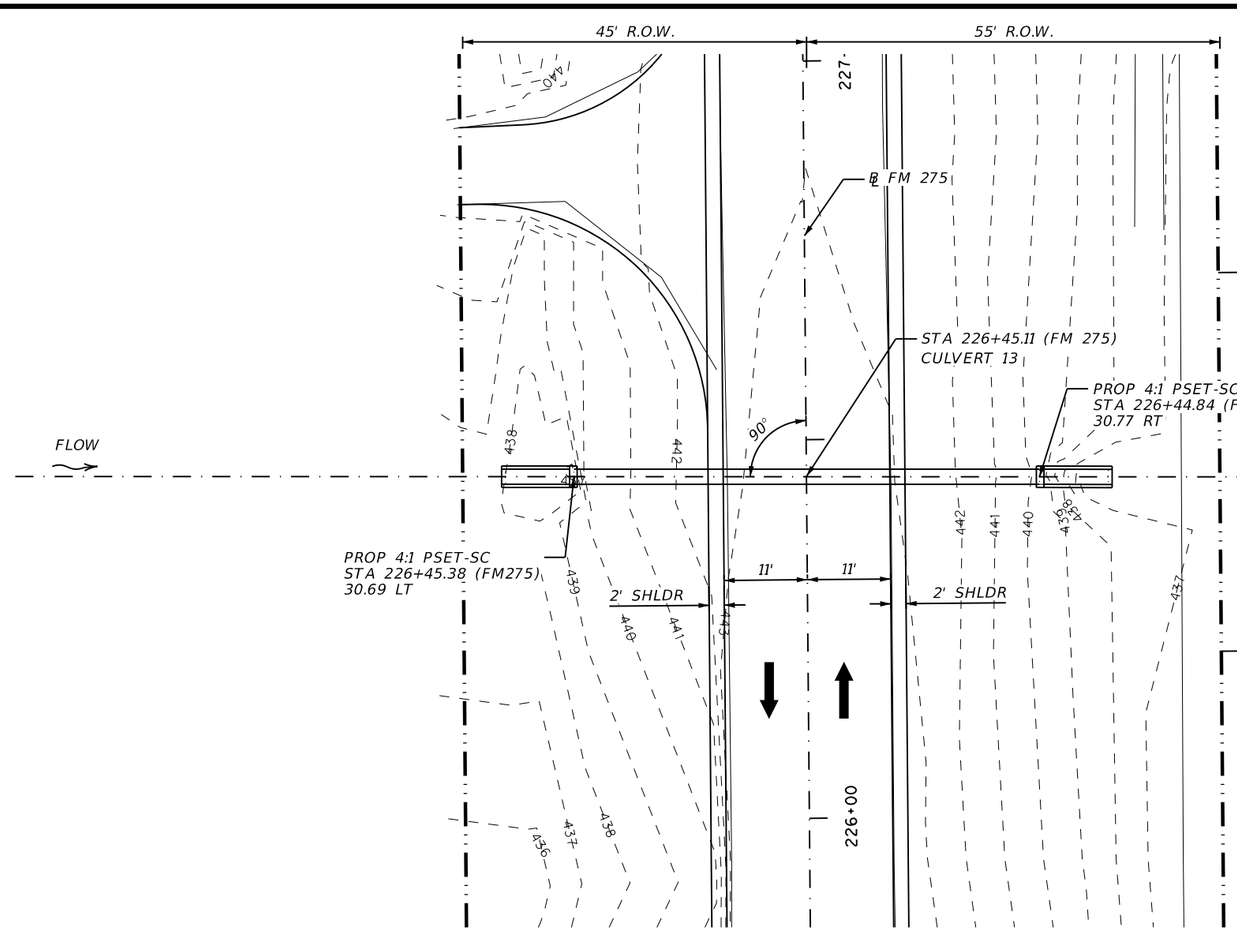
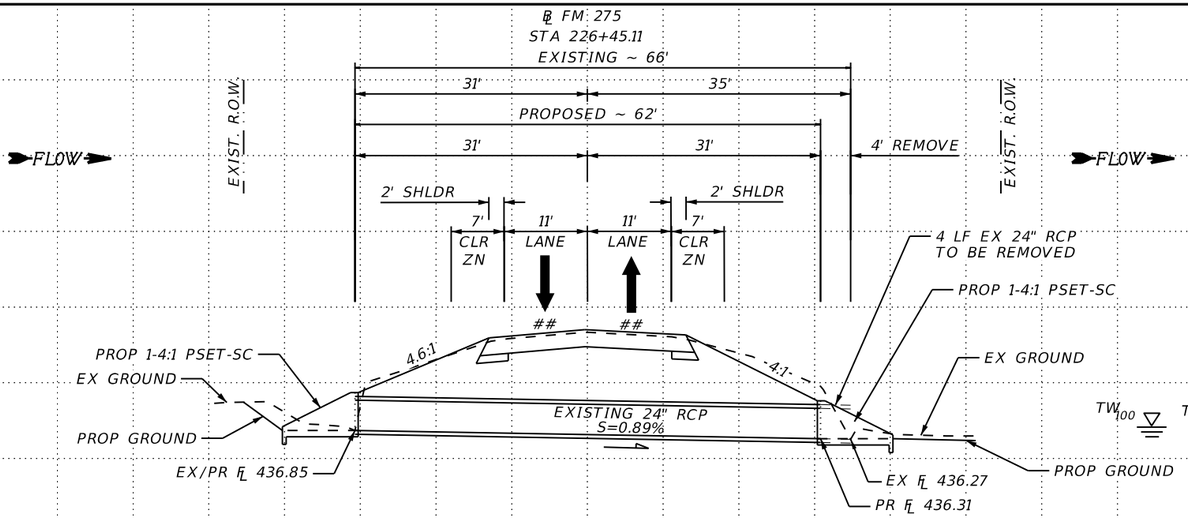


NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	12	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	8	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4:1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	4	LF

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



EXISTING 24"X66' RCP PROJECTING

PROPOSED 24"X62' RCP WITH TWO 1-4H:1V PSET-SC
PROPOSED US: INSTALL 1-4H:1V PSET-SC
PROPOSED DS: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	15.7	CFS
Q_{100}	=	32.4	CFS

PROPOSED HEADWATER

HW_5	=	439.34
HW_{100}	=	440.26

PROPOSED TAILWATER

TW_5	=	436.89
TW_{100}	=	437.16

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 13

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 13 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		79

DATE: 3/29/2021 11:13:35 AM
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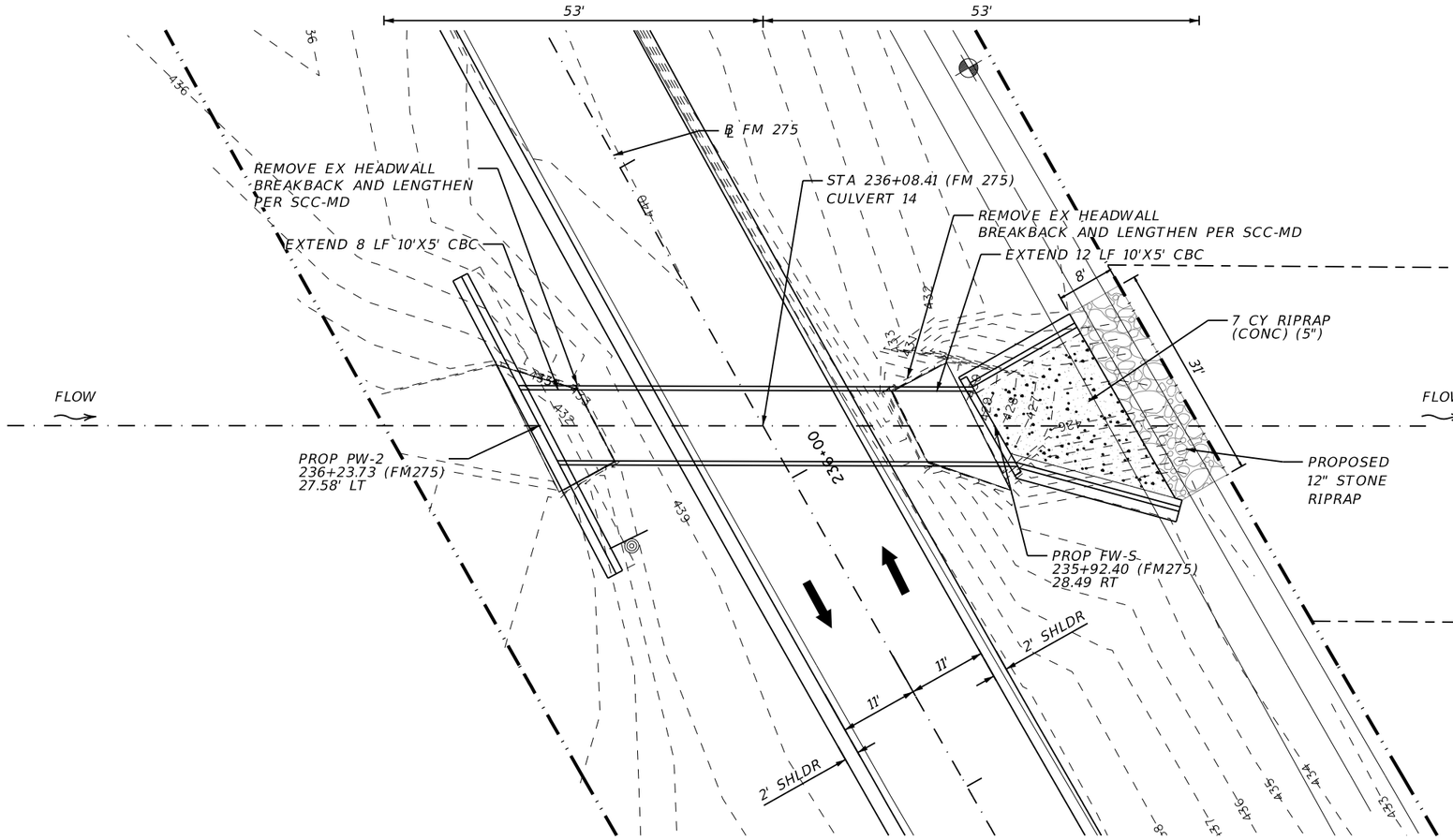


LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP
- FEMA 100-YR FLOODPLAIN

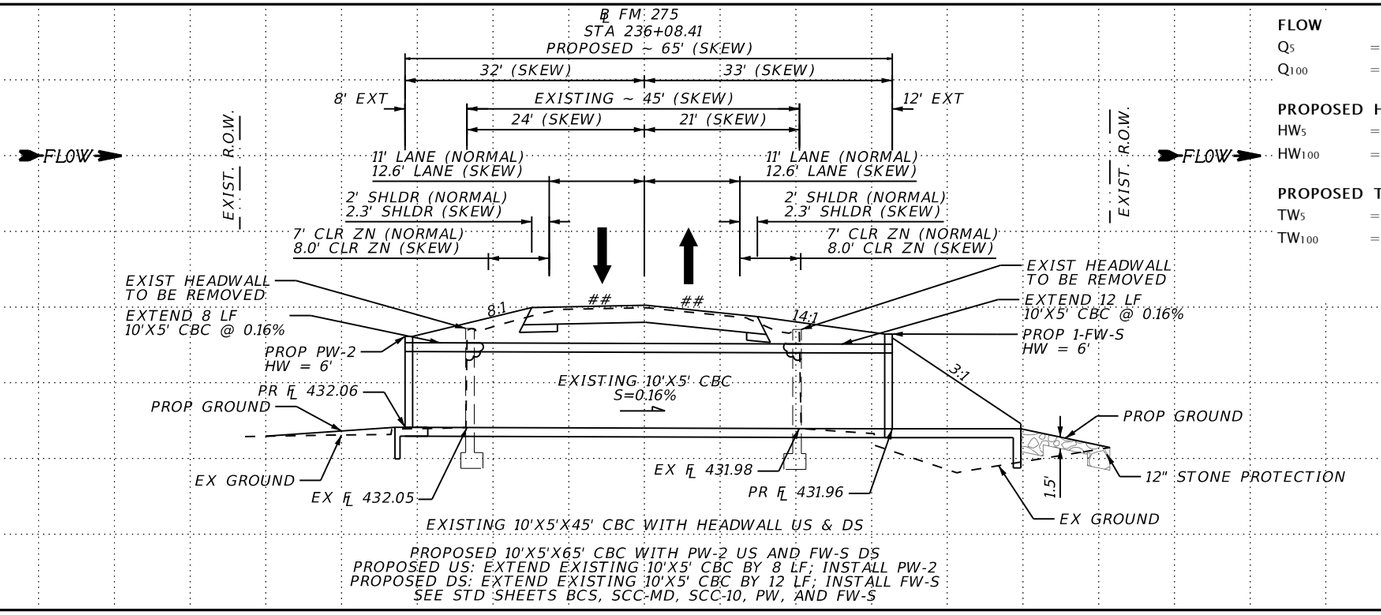
NOTES:

1. FLOODPLAIN SHOWN IS ZONE A ACCORDING TO THE RAINS COUNTY FIRM PANEL 48379C0035D EFFECTIVE DATE APRIL 17, 2012.

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0132 6003	EMBANKMENT (FINAL) (ORD COMP) (TY B)	98	CY
0432 6002	RIPRAP (CONC) (5 IN)	7	CY
0432 6031	RIPRAP (STONE PROTECTION) (12 IN)	31	CY
0462 6073	CONC BOX CULV (10 FT X 5 FT) (EXTEND)	20	LF
0466 6167	WINGWALL (FW - S) (HW=6 FT)	1	EA
0466 6195	WINGWALL (PW - 2) (HW=6 FT)	1	EA
0496 6006	REMOV STR (HEADWALL)	2	EA
0658 6047	INSTL OM ASSM (OM-2Y) (WC) GND	2	EA

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET



EXISTING 10'X5'X45' CBC WITH HEADWALL US & DS

PROPOSED 10'X5'X65' CBC WITH PW-2 US AND FW-S DS
PROPOSED US: EXTEND EXISTING 10'X5' CBC BY 8 LF; INSTALL PW-2
PROPOSED DS: EXTEND EXISTING 10'X5' CBC BY 12 LF; INSTALL FW-S
SEE STD SHEETS BCS, SCC-MD, SCC-10, PW, AND FW-S

FLOW

Q_5	=	359.0	CFS
Q_{100}	=	722.7	CFS

PROPOSED HEADWATER

HW_5	=	439.42
HW_{100}	=	440.60

PROPOSED TAILWATER

TW_5	=	438.35
TW_{100}	=	440.59

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 14

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		80

DATE: 3/29/2021 11:13:38 AM
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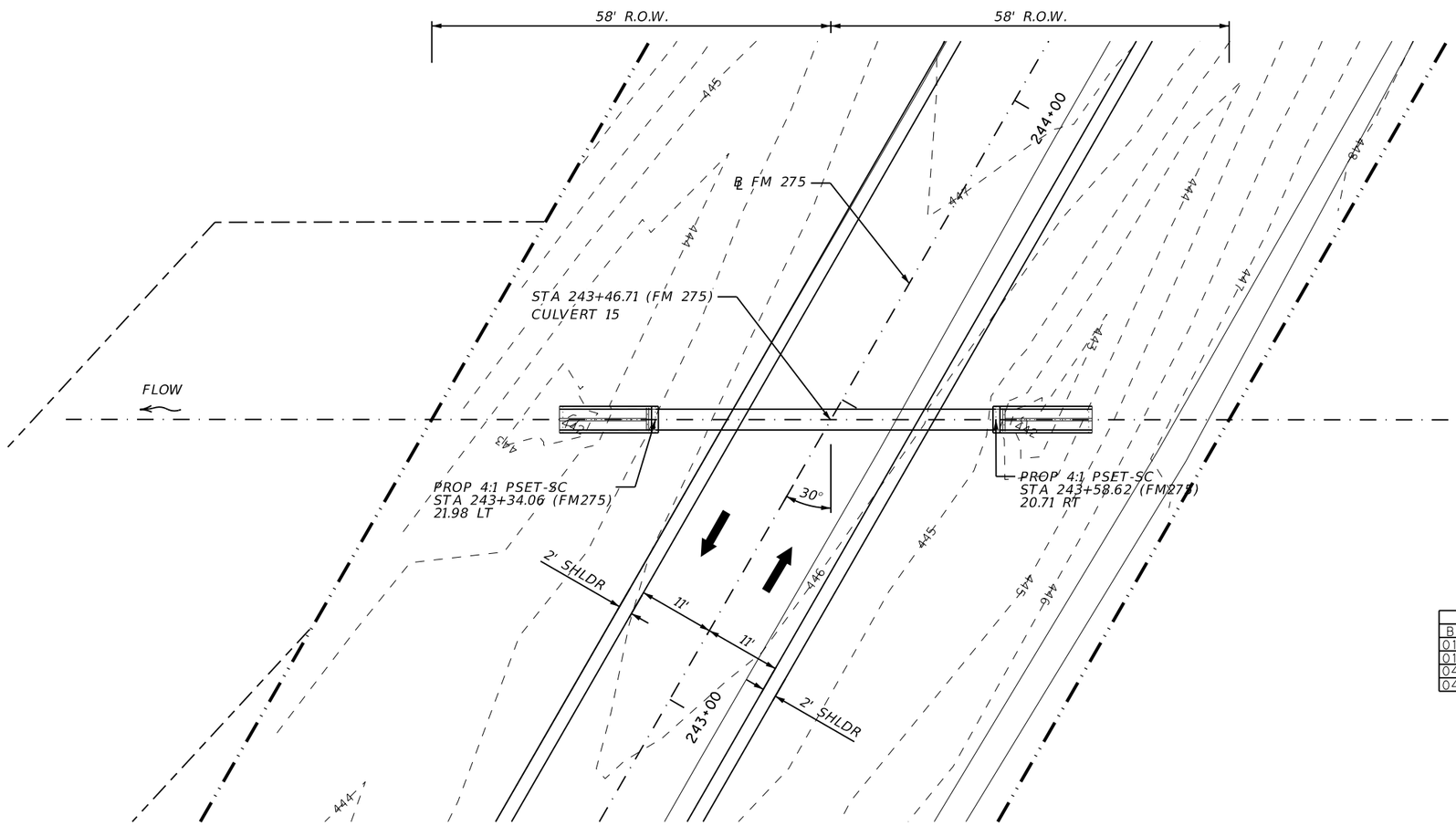
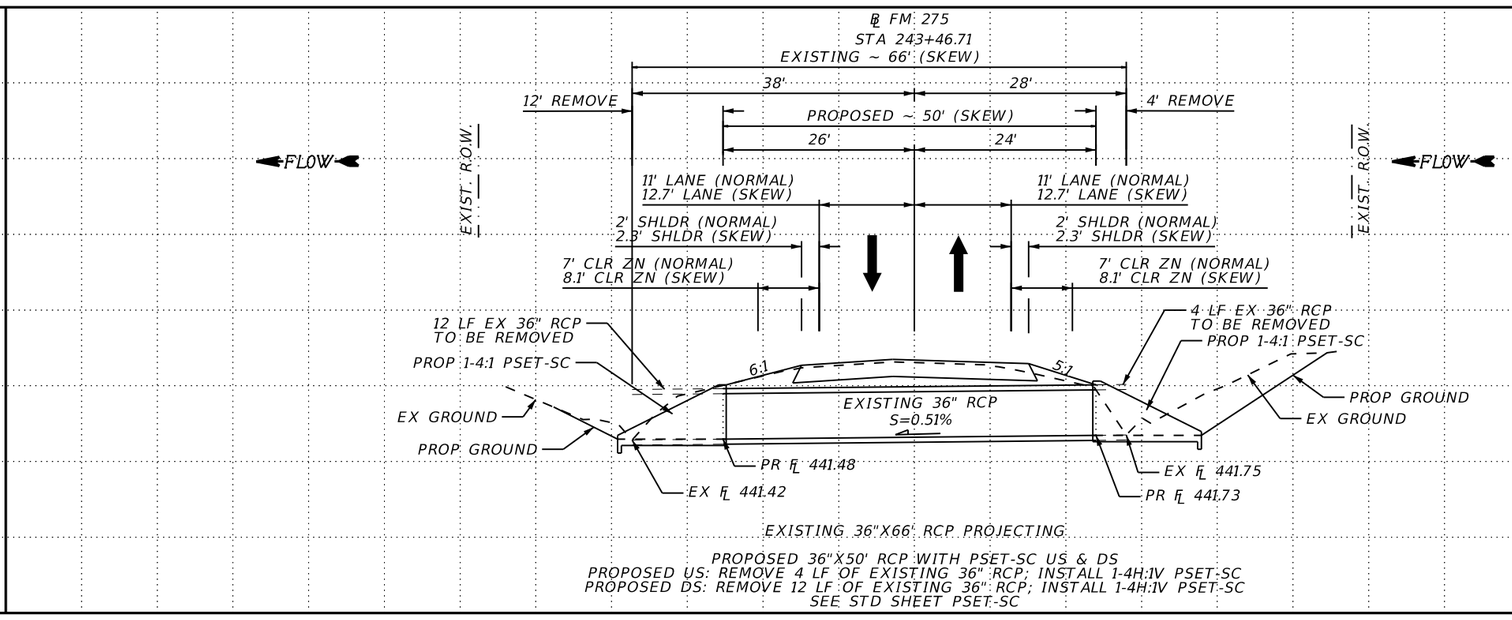


LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES			
BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	33	LF
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	3	LF
0467 6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)	2	LF
0496 6007	REMOV STR (PIPE)	16	LF



EXISTING 36"X66" RCP PROJECTING

PROPOSED 36"X50' RCP WITH PSET-SC US & DS
PROPOSED US: REMOVE 4 LF OF EXISTING 36" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: REMOVE 12 LF OF EXISTING 36" RCP; INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	47.2	CFS
Q_{100}	=	98.9	CFS

PROPOSED HEADWATER

HW_5	=	445.00
HW_{100}	=	445.40

PROPOSED TAILWATER

TW_5	=	443.76
TW_{100}	=	444.60

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 15

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 15 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		81

DATE: 3/29/2021 11:13:41 AM
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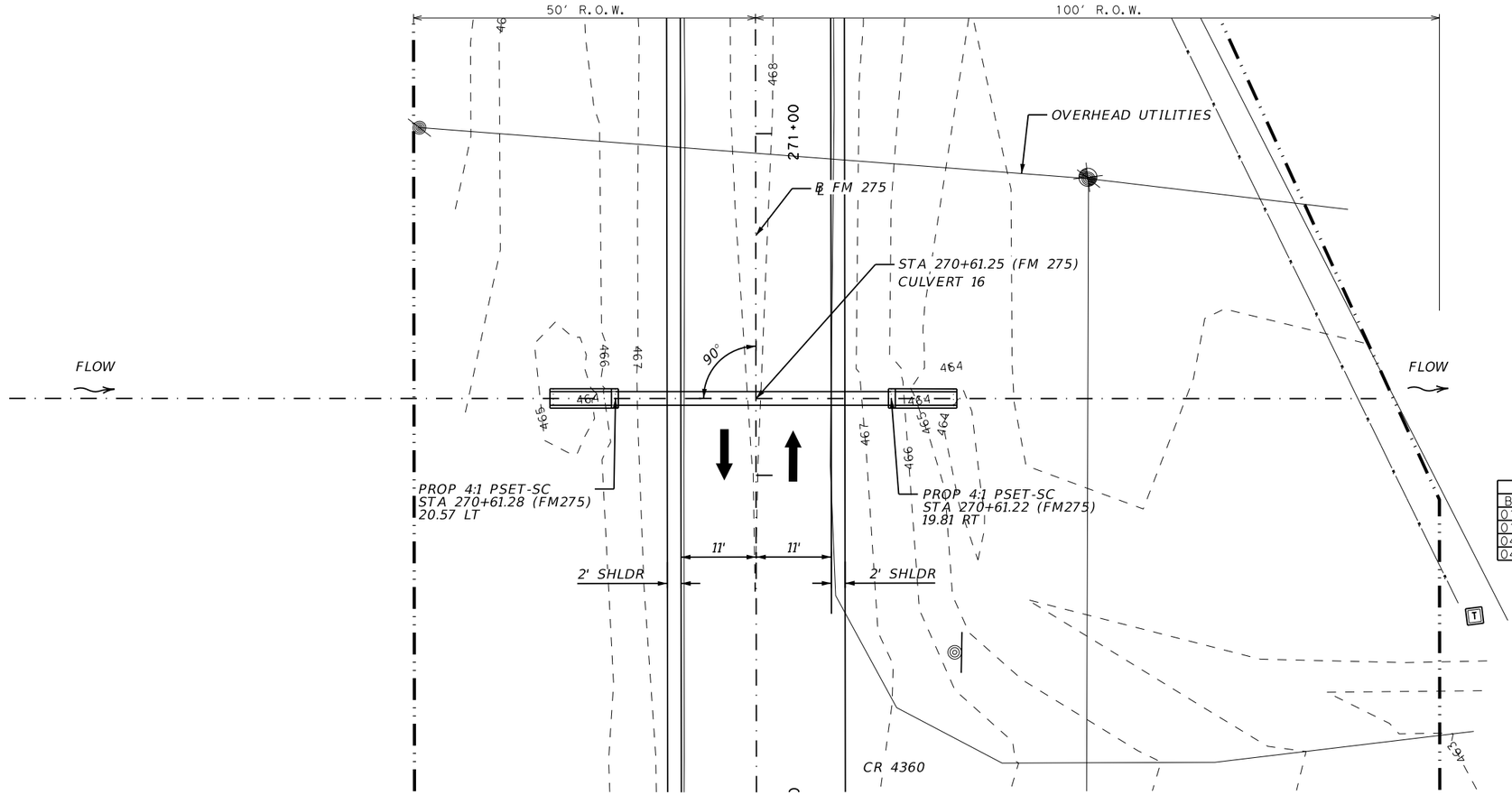


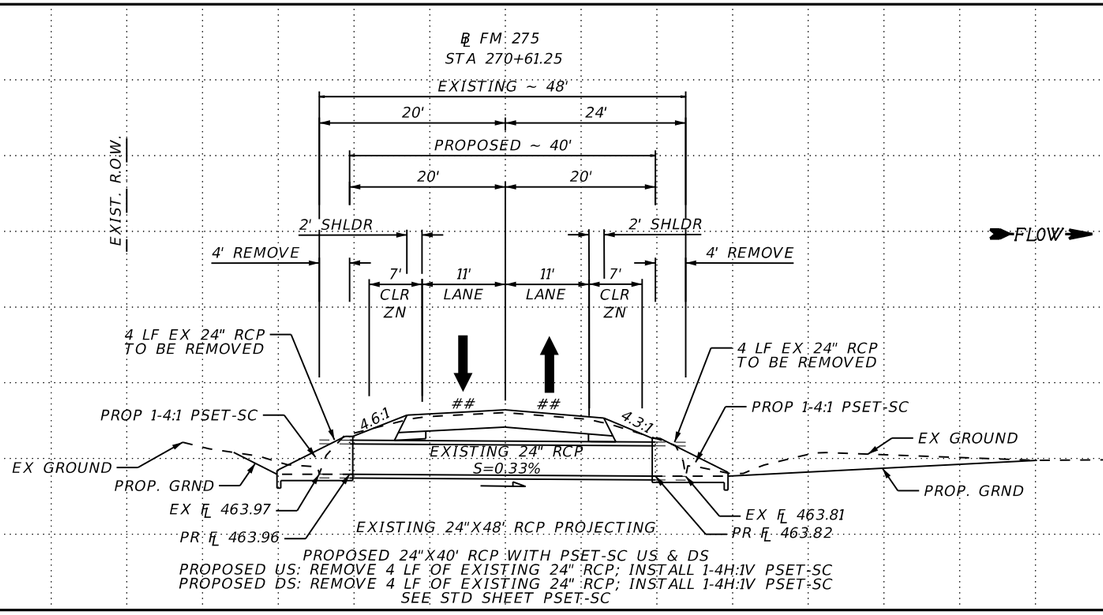
LEGEND

- EXISTING RIGHT OF WAY
- EXISTING DRAINAGE EASEMENT
- FLOW DIRECTION
- CONCRETE RIPRAP

NOTE:
- MATCH EXISTING ROADWAY SUPERELEVATION

SUMMARY OF CULVERT QUANTITIES

BID ITEM	DESCRIPTION	QUANTITY	
0110 6002	EXCAVATION (CHANNEL)	2	CY
0132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	4	CY
0467 6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	2	EA
0496 6007	REMOV STR (PIPE)	8	LF



PROPOSED 24"X40' RCP WITH PSET-SC US & DS
PROPOSED US: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
PROPOSED DS: REMOVE 4 LF OF EXISTING 24" RCP; INSTALL 1-4H:1V PSET-SC
SEE STD SHEET PSET-SC

FLOW

Q_5	=	13.5	CFS
Q_{100}	=	28.2	CFS

PROPOSED HEADWATER

HW_5	=	465.44	
HW_{100}	=	465.66	

PROPOSED TAILWATER

TW_5	=	464.47	
TW_{100}	=	464.75	

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
CULVERT LAYOUT
CULVERT 16

SCALE: 1"= 20' HORIZ.
1"= 10' VERT.

SHEET 16 OF 16

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		82

DATE: 3/29/2021 11:13:44 AM
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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" (2) Conc (Curb) (CY)	Class "C" (3) Conc (Wingwall) (CY)	Total Wingwall Area (SF)
CULVERT 11 - STA 167+39.21 (Both)	3 ~ 6'x 4'	2'	MC-6-16	FW-0	0°	4:1	7"	7"	0.250'	4.583'	17.000'	9.815'	19.630'	N/A	N/A	15.4	0.4	13.4	194
CULVERT 12 - STA 191+46.38 (Both)	3 ~ 6'x 3'	1.5'	MC-6-16	FW-0	0°	4:1	7"	7"	0.666'	4.000'	14.667'	8.468'	16.936'	N/A	N/A	13.2	1.0	9.6	146
CULVERT 14 - STA 236+12.19 (Lt)	1 ~10'x 5'	4'	SCC-10	PW-2	30°	3:1	7"	7"	0.416'	6.000'	N/A	N/A	17.321'	12.894'	N/A	0.0	0.2	13.4	202
CULVERT 14 - STA 236+12.19 (Rt)	1 ~10'x 5'	4'	SCC-10	FW-S	30°	3:1	7"	7"	0.666'	6.000'	17.000'	17.000'	24.042'	N/A	N/A	5.2	0.3	7.5	130

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER
3/31/21

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		83

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 for any purpose whatsoever. TxDOT assumes no responsibility for incorrect results or damages resulting from its use.

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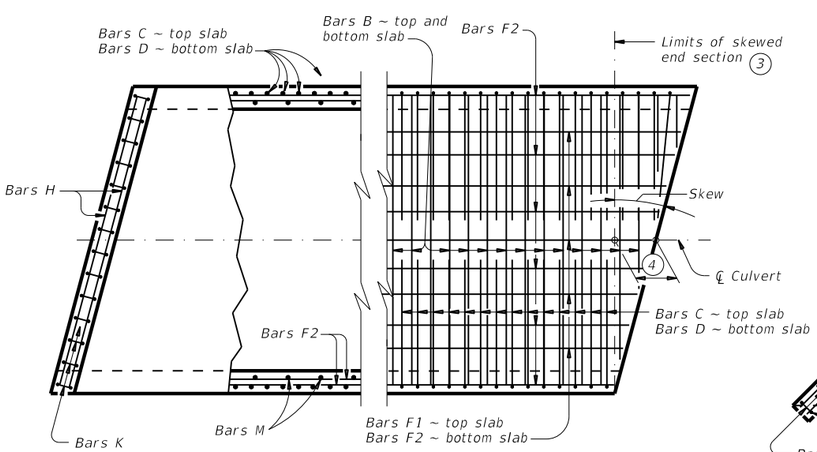
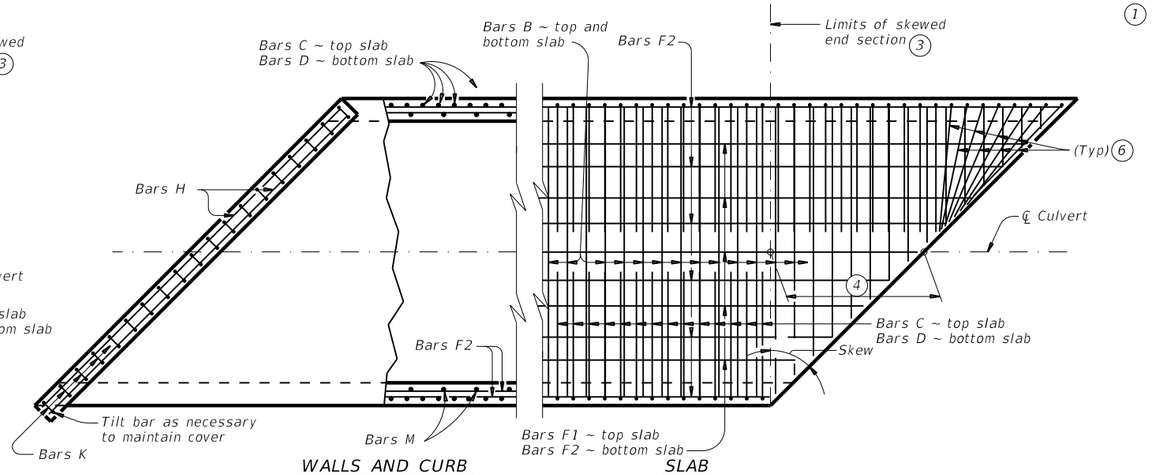
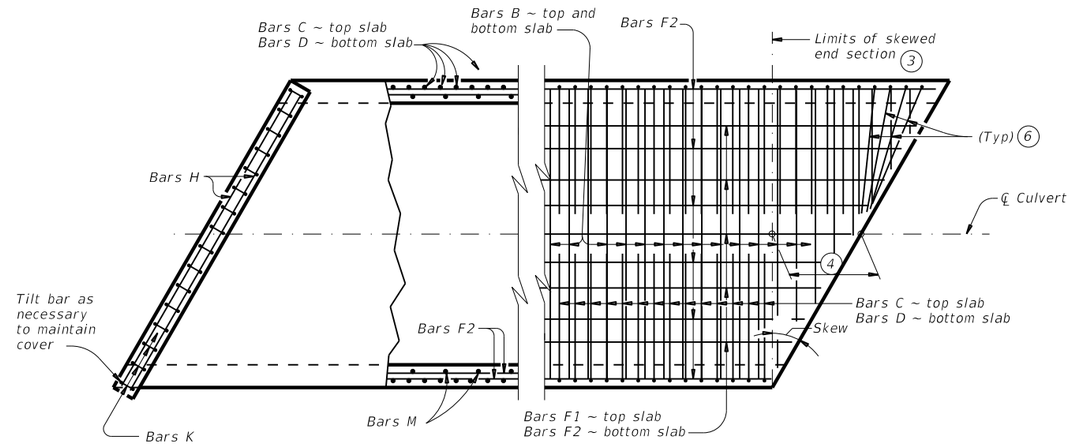


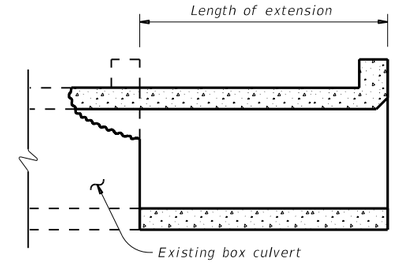
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



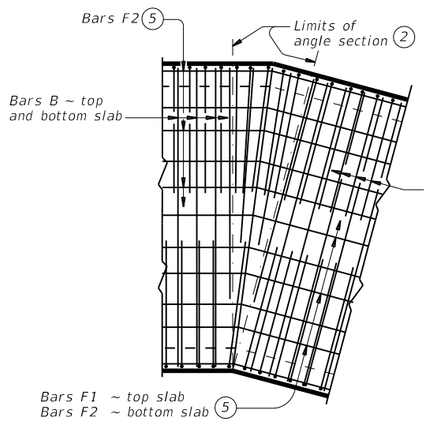
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



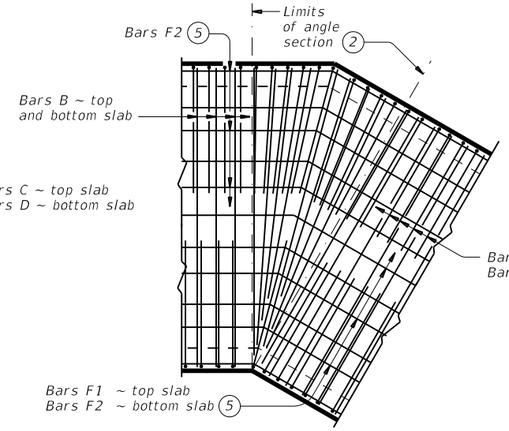
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



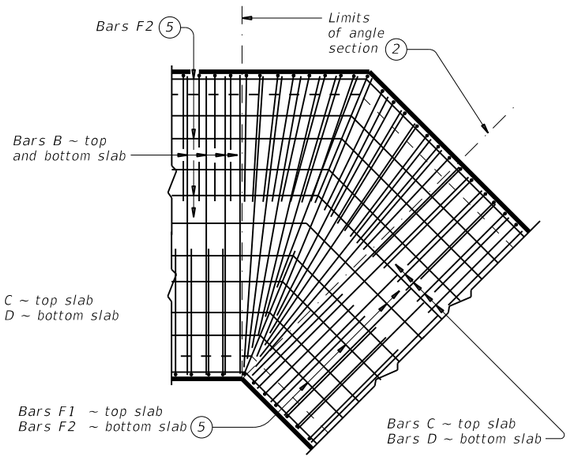
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

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

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

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		84

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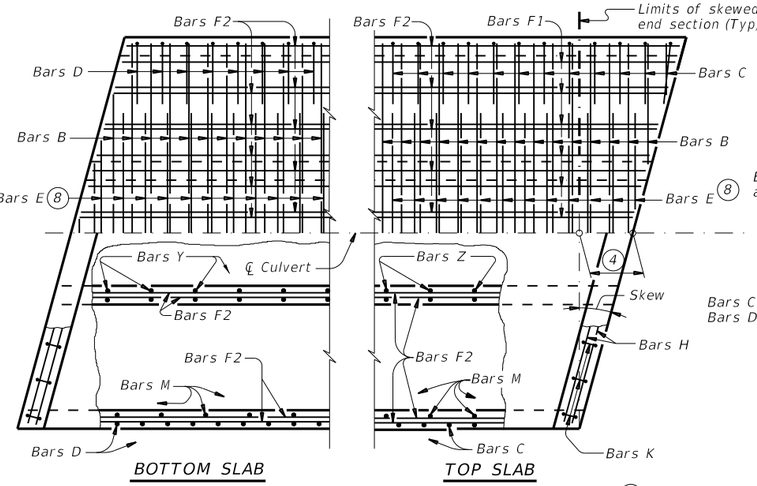
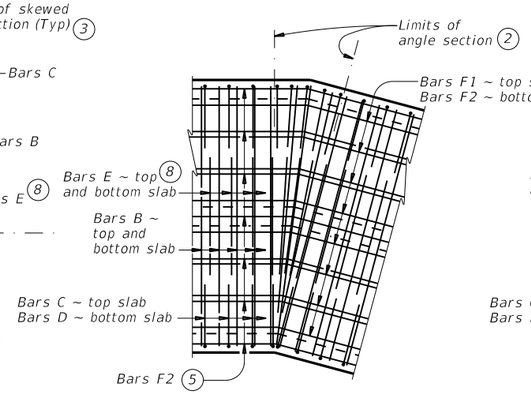
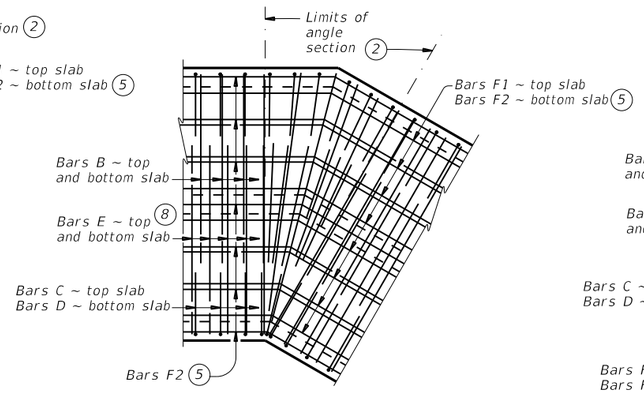


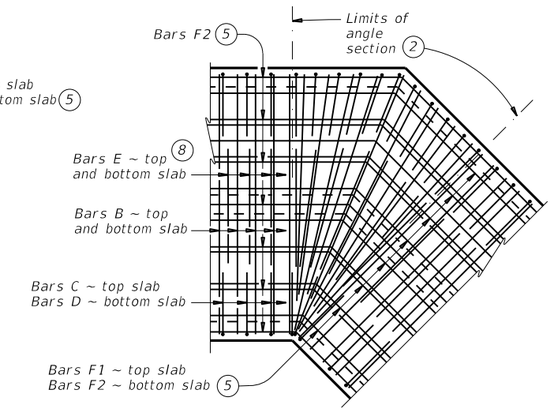
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



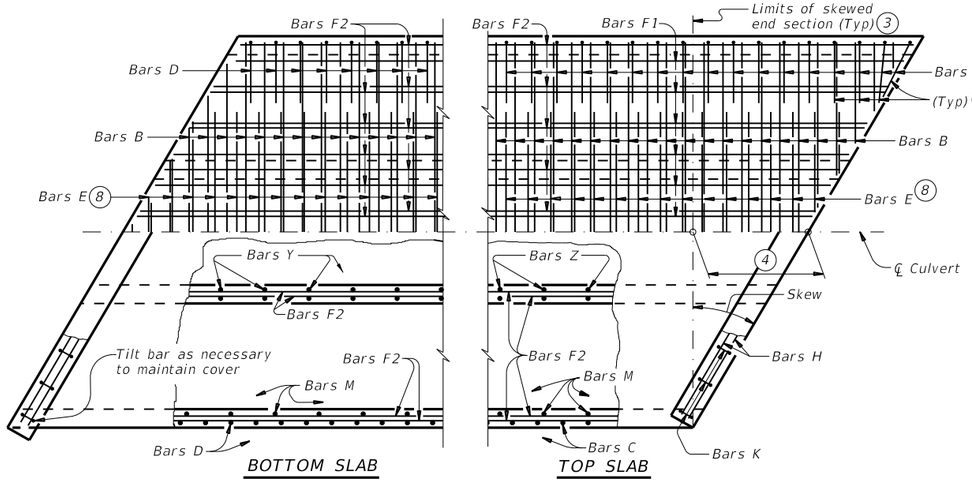
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



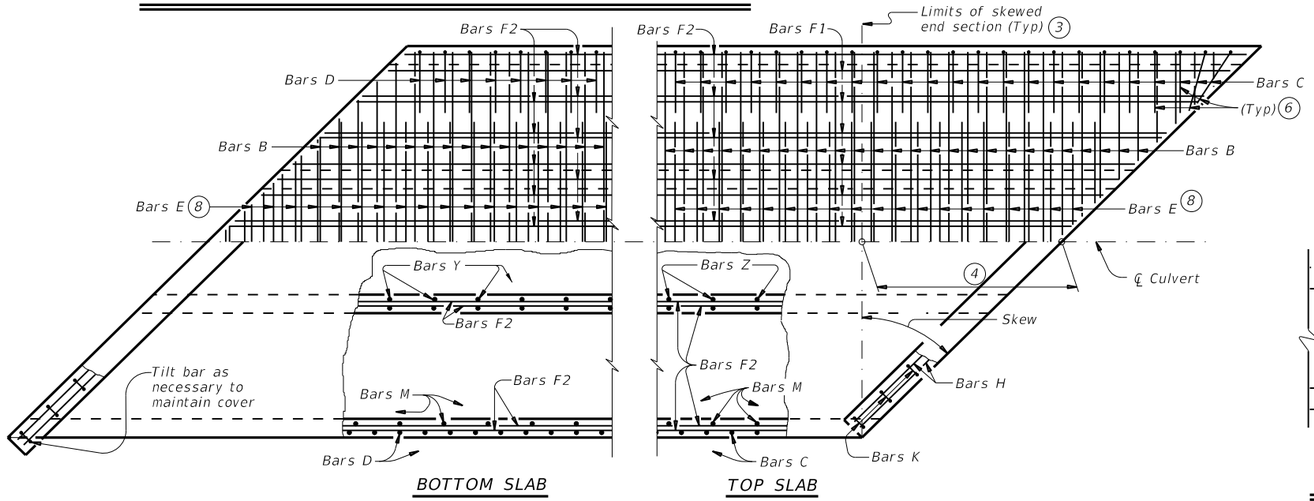
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

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

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

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

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

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

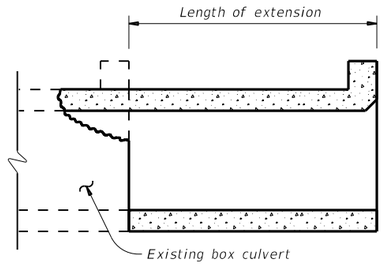
(4) *[One half of overall width] x [tangent of the skew angle]*

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

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

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

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



LENGTHENING DETAIL (1)

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

GENERAL NOTES:

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

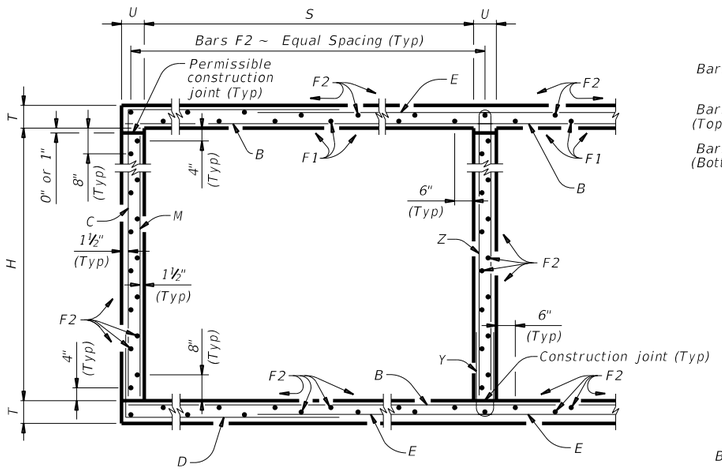
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

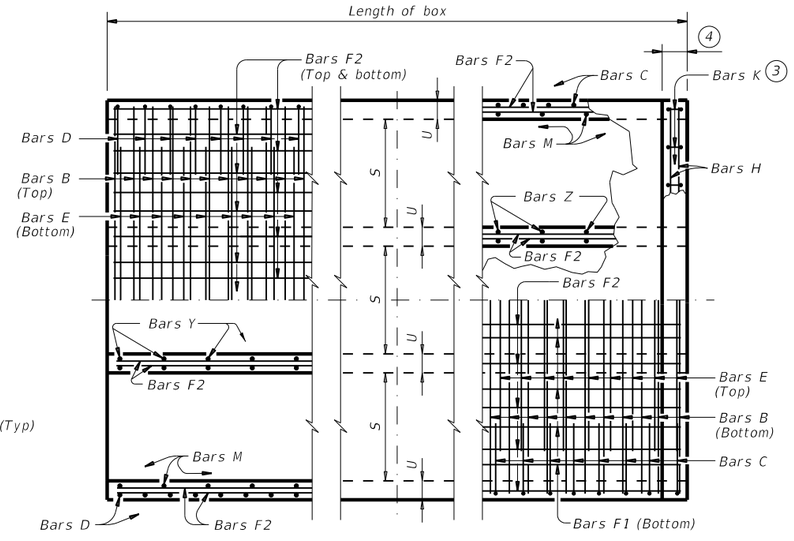
MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		85

DATE: 3/29/2021 11:13:54 AM
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\Standards\mc616ste-20.dgn

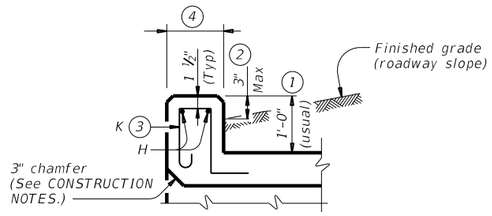


TYPICAL SECTION



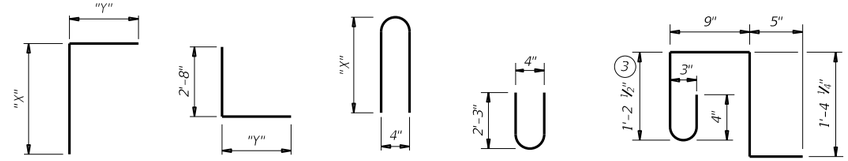
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010, etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		86

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DATE: 3/29/2021 11:13:56 AM
FILE: T:\PARIPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\MC616STE-20.dgn

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4						Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																				Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6' – 0"	2' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	44	18"	39' – 9"	1,168	108	9"	2' – 0"	144	54	9"	4' – 9"	171	5' – 5"	195	13' – 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' – 0"	2' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	63	18"	39' – 9"	1,673	108	9"	2' – 0"	144	108	9"	4' – 9"	343	5' – 5"	391	20' – 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' – 0"	2' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	82	18"	39' – 9"	2,177	108	9"	2' – 0"	144	162	9"	4' – 9"	514	5' – 5"	586	26' – 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' – 0"	2' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	101	18"	39' – 9"	2,682	108	9"	2' – 0"	144	216	9"	4' – 9"	685	5' – 5"	782	33' – 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' – 0"	2' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	120	18"	39' – 9"	3,186	108	9"	2' – 0"	144	270	9"	4' – 9"	857	5' – 5"	977	39' – 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' – 0"	3' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	3' – 0"	216	54	9"	4' – 9"	171	7' – 5"	268	13' – 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' – 0"	3' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	3' – 0"	216	108	9"	4' – 9"	343	7' – 5"	535	20' – 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' – 0"	3' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	3' – 0"	216	162	9"	4' – 9"	514	7' – 5"	803	26' – 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' – 0"	3' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	3' – 0"	216	216	9"	4' – 9"	685	7' – 5"	1,070	33' – 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' – 0"	3' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	3' – 0"	216	270	9"	4' – 9"	857	7' – 5"	1,338	39' – 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' – 0"	4' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	4' – 0"	289	54	9"	4' – 9"	171	9' – 5"	340	13' – 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' – 0"	4' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	4' – 0"	289	108	9"	4' – 9"	343	9' – 5"	679	20' – 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' – 0"	4' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	4' – 0"	289	162	9"	4' – 9"	514	9' – 5"	1,019	26' – 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' – 0"	4' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	4' – 0"	289	216	9"	4' – 9"	685	9' – 5"	1,359	33' – 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' – 0"	4' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	4' – 0"	289	270	9"	4' – 9"	857	9' – 5"	1,698	39' – 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' – 0"	5' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	56	18"	39' – 9"	1,487	108	9"	5' – 0"	361	54	9"	4' – 9"	171	11' – 5"	412	13' – 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' – 0"	5' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	79	18"	39' – 9"	2,098	108	9"	5' – 0"	361	108	9"	4' – 9"	343	11' – 5"	824	20' – 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' – 0"	5' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	102	18"	39' – 9"	2,708	108	9"	5' – 0"	361	162	9"	4' – 9"	514	11' – 5"	1,235	26' – 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' – 0"	5' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	125	18"	39' – 9"	3,319	108	9"	5' – 0"	361	216	9"	4' – 9"	685	11' – 5"	1,647	33' – 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' – 0"	5' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	148	18"	39' – 9"	3,930	108	9"	5' – 0"	361	270	9"	4' – 9"	857	11' – 5"	2,059	39' – 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' – 0"	6' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	62	18"	39' – 9"	1,646	108	9"	6' – 0"	433	54	9"	4' – 9"	171	13' – 5"	484	13' – 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' – 0"	6' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	87	18"	39' – 9"	2,310	108	9"	6' – 0"	433	108	9"	4' – 9"	343	13' – 5"	968	20' – 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' – 0"	6' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	112	18"	39' – 9"	2,974	108	9"	6' – 0"	433	162	9"	4' – 9"	514	13' – 5"	1,452	26' – 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' – 0"	6' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	137	18"	39' – 9"	3,638	108	9"	6' – 0"	433	216	9"	4' – 9"	685	13' – 5"	1,936	33' – 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' – 0"	6' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	162	18"	39' – 9"	4,302	108	9"	6' – 0"	433	270	9"	4' – 9"	857	13' – 5"	2,420	39' – 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

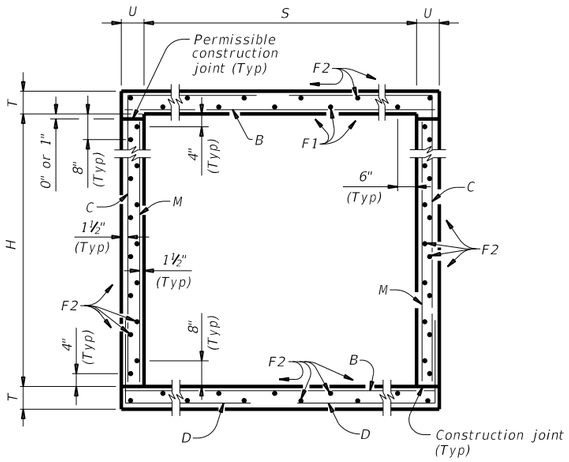
6'-0" SPAN

0' TO 16' FILL

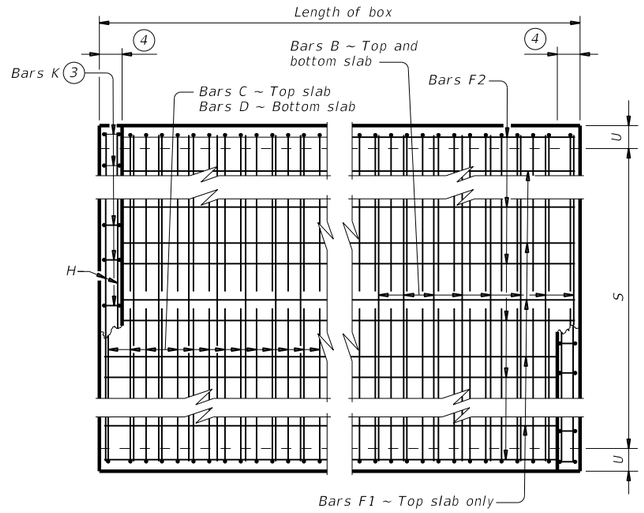
MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		87

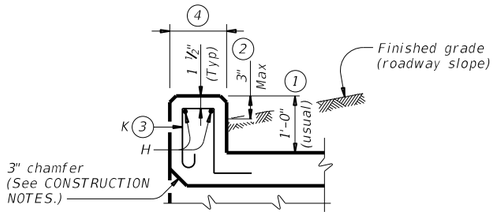
DATE: 4/29/2021 11:32:43 AM
FILE: C:\Users\cbyrd\Downloads\scc10ste-21.dgn



TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

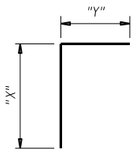
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'_c = 4,000 psi) for top slabs of:
- culverts with overlay,
-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

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min
- Uncoated or galvanized ~ #7 = 3'-3" Min

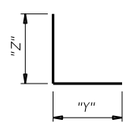
GENERAL NOTES:

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

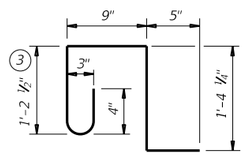
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

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

SCC-10

FILE: scc10ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		88

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Wt	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
10' – 0"	4' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	10' – 4"	2,514	4' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	10' – 11"	29	24	67	0.724	219.9	0.8	96	29.8	8,893
10' – 0"	4' – 0"	9"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	10' – 5"	2,535	4' – 7"	5' – 10"	162	#6	6"	9' – 0"	2,190	5' – 10"	3' – 2"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	10' – 11"	29	24	67	0.793	221.0	0.8	96	32.5	8,934
10' – 0"	4' – 0"	10"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	10' – 7"	2,575	4' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	82	12"	4' – 0"	219	7	39' – 9"	186	37	39' – 9"	982	11' – 1"	30	26	72	0.897	222.2	0.8	102	36.7	8,991
10' – 0"	4' – 0"	11"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	10' – 8"	2,595	4' – 9"	5' – 11"	162	#6	6"	9' – 3"	2,251	5' – 11"	3' – 4"	82	12"	4' – 0"	219	7	39' – 9"	186	37	39' – 9"	982	11' – 1"	30	26	72	0.967	223.3	0.8	102	39.5	9,032
10' – 0"	4' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	10' – 10"	2,636	4' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	11' – 3"	30	26	72	1.074	228.0	0.8	102	43.8	9,223
10' – 0"	4' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	10' – 11"	2,656	4' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	11' – 5"	31	26	72	1.183	230.1	0.9	103	48.2	9,306
10' – 0"	4' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	11' – 1"	2,697	5' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	11' – 7"	31	26	72	1.294	233.1	0.9	103	52.6	9,428
10' – 0"	4' – 0"	15"	12"	30'	162	#6	6"	11' – 9"	2,859	162	#6	6"	11' – 3"	2,737	5' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	4' – 0"	289	7	39' – 9"	186	37	39' – 9"	982	11' – 9"	31	26	72	1.407	236.2	0.9	103	57.2	9,549
10' – 0"	5' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	11' – 4"	2,758	5' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	10' – 11"	29	24	67	0.767	230.5	0.8	96	31.5	9,316
10' – 0"	5' – 0"	9"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	11' – 5"	2,778	5' – 7"	5' – 10"	162	#6	6"	9' – 0"	2,190	5' – 10"	3' – 2"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	10' – 11"	29	24	67	0.836	231.5	0.8	96	34.3	9,356
10' – 0"	5' – 0"	10"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	11' – 7"	2,819	5' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	82	12"	5' – 0"	274	7	39' – 9"	186	41	39' – 9"	1,089	11' – 1"	30	26	72	0.947	232.4	0.8	102	38.7	9,397
10' – 0"	5' – 0"	11"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	11' – 8"	2,839	5' – 9"	5' – 11"	162	#6	6"	9' – 3"	2,251	5' – 11"	3' – 4"	82	12"	5' – 0"	274	7	39' – 9"	186	41	39' – 9"	1,089	11' – 1"	30	26	72	1.016	233.4	0.8	102	41.5	9,438
10' – 0"	5' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	11' – 10"	2,879	5' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	11' – 3"	30	26	72	1.130	238.6	0.8	102	46.0	9,645
10' – 0"	5' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	11' – 11"	2,900	5' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	11' – 5"	31	26	72	1.245	240.7	0.9	103	50.7	9,729
10' – 0"	5' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	12' – 1"	2,940	6' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	11' – 7"	31	26	72	1.362	243.7	0.9	103	55.4	9,850
10' – 0"	5' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	12' – 3"	2,981	6' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	5' – 0"	361	7	39' – 9"	186	41	39' – 9"	1,089	11' – 9"	31	26	72	1.481	272.5	0.9	103	60.1	11,004
10' – 0"	6' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	12' – 4"	3,001	6' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	10' – 11"	29	24	67	0.811	241.0	0.8	96	33.3	9,737
10' – 0"	6' – 0"	8"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	12' – 4"	3,001	6' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	10' – 11"	29	24	67	0.811	241.0	0.8	96	33.3	9,737
10' – 0"	6' – 0"	9"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	12' – 6"	3,042	6' – 7"	5' – 11"	162	#6	6"	9' – 1"	2,210	5' – 11"	3' – 2"	82	12"	6' – 0"	329	7	39' – 9"	186	45	39' – 9"	1,195	11' – 1"	30	26	72	0.926	241.5	0.8	102	37.9	9,761
10' – 0"	6' – 0"	10"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	12' – 7"	3,062	6' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	82	12"	6' – 0"	329	7	39' – 9"	186	45	39' – 9"	1,195	11' – 1"	30	26	72	0.996	242.5	0.8	102	40.7	9,801
10' – 0"	6' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	12' – 10"	3,123	6' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	11' – 3"	30	26	72	1.185	249.1	0.8	102	48.2	10,067
10' – 0"	6' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	12' – 11"	3,143	6' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	11' – 5"	31	26	72	1.307	251.2	0.9	103	53.1	10,150
10' – 0"	6' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	13' – 1"	3,183	7' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	11' – 7"	31	26	72	1.430	254.2	0.9	103	58.1	10,271
10' – 0"	6' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	13' – 3"	3,224	7' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	6' – 0"	433	7	39' – 9"	186	45	39' – 9"	1,195	11' – 9"	31	26	72	1.556	283.1	0.9	103	63.1	11,425
10' – 0"	7' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	13' – 4"	3,244	7' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	10' – 11"	29	24	67	0.854	248.9	0.8	96	35.0	10,052
10' – 0"	7' – 0"	8"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	13' – 4"	3,244	7' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	10' – 11"	29	24	67	0.854	248.9	0.8	96	35.0	10,052
10' – 0"	7' – 0"	9"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	13' – 6"	3,285	7' – 7"	5' – 11"	162	#6	6"	9' – 1"	2,210	5' – 11"	3' – 2"	82	12"	7' – 0"	383	7	39' – 9"	186	45	39' – 9"	1,195	11' – 1"	30	26	72	0.975	248.9	0.8	102	39.8	10,058
10' – 0"	7' – 0"	10"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	13' – 7"	3,305	7' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	82	12"	7' – 0"	383	7	39' – 9"	186	45	39' – 9"	1,195	11' – 1"	30	26	72	1.045	249.9	0.8	102	42.6	10,098
10' – 0"	7' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	13' – 10"	3,366	7' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	11' – 3"	30	26	72	1.241	257.0	0.8	102	50.5	10,382
10' – 0"	7' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	13' – 11"	3,386	7' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	11' – 5"	31	26	72	1.368	259.1	0.9	103	55.6	10,465
10' – 0"	7' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	14' – 1"	3,427	8' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	11' – 7"	31	26	72	1.498	262.1	0.9	103	60.8	10,587
10' – 0"	7' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	14' – 3"	3,467	8' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	11' – 9"	31	26	72	1.630	290.9	0.9	103	66.1	11,740
10' – 0"	8' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	14' – 4"	3,488	8' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	10' – 11"	29	24	67	0.897	259.5	0.8	96	36.7	10,474
10' – 0"	8' – 0"	8"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	14' – 4"	3,488	8' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	10' – 11"	29	24	67	0.897	259.5	0.8	96	36.7	10,474
10' – 0"	8' – 0"	9"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	14' – 6"	3,528	8' – 7"	5' – 11"	162	#6	6"	9' – 1"	2,210	5' – 11"	3' – 2"	82	12"	8' – 0"	438	7	39' – 9"	186	49	39' – 9"	1,301	11' – 1"	30	26	72	1.025	259.0	0.8	102	41.8	10,462
10' – 0"	8' – 0"	10"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	14' – 7"	3,548	8' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	82	12"	8' – 0"	438	7	39' – 9"	186	49	39' – 9"	1,301	11' – 1"	30	26	72	1.095	260.0	0.8	102	44.6	10,502
10' – 0"	8' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	14' – 10"	3,609	8' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	11' – 3"	30	26	72	1.296	267.5	0.8	102	52.7	10,803
10' – 0"	8' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	14' – 11"	3,630	8' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	11' – 5"	31	26	72	1.430	269.6	0.9	103	58.1	10,887
10' – 0"	8' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	15' – 1"	3,670	9' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	11' – 7"	31	26	72	1.566	272.6	0.9	103	63.5	11,008
10' – 0"	8' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	15' – 3"	3,711	9' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	8' – 0"	577	7	39' – 9"	186	49	39' – 9"	1,301	11' – 9"	31	26	72	1.704	301.5	0.9	103	69.0	12,162

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

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

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

SCC-10

FILE: scc10ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		89

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DATE: 4/29/2021 11:33:43 AM
FILE: C:\Users\cbyrd1\Downloads\scc10ste-21.dgn

SECTION DIMENSIONS				(5) FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	" X "	" Y "	No.	Size	Spa	Length	Wt	" Y "	" Z "	No.	Spa	Length	Wt	No.	Length	Wt	No.	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
10' – 0"	9' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	15' – 4"	3,731	9' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	9' – 0"	649	7	39' – 9"	186	53	39' – 9"	1,407	10' – 11"	29	24	67	0.940	270.0	0.8	96	38.4	10,895
10' – 0"	9' – 0"	8"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	15' – 4"	3,731	9' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	108	9"	9' – 0"	649	7	39' – 9"	186	53	39' – 9"	1,407	10' – 11"	29	24	67	0.940	270.0	0.8	96	38.4	10,895
10' – 0"	9' – 0"	9"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	15' – 6"	3,772	9' – 7"	5' – 11"	162	#6	6"	9' – 1"	2,210	5' – 11"	3' – 2"	108	9"	9' – 0"	649	7	39' – 9"	186	53	39' – 9"	1,407	11' – 1"	30	26	72	1.074	273.0	0.8	102	43.8	11,023
10' – 0"	9' – 0"	10"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	15' – 7"	3,792	9' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	162	6"	9' – 0"	974	7	39' – 9"	186	53	39' – 9"	1,407	11' – 1"	30	26	72	1.144	282.2	0.8	102	46.6	11,388
10' – 0"	9' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	15' – 10"	3,853	9' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	162	6"	9' – 0"	974	7	39' – 9"	186	53	39' – 9"	1,407	11' – 3"	30	26	72	1.352	286.2	0.8	102	54.9	11,550
10' – 0"	9' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	15' – 11"	3,873	9' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	162	6"	9' – 0"	974	7	39' – 9"	186	53	39' – 9"	1,407	11' – 5"	31	26	72	1.492	288.3	0.9	103	60.5	11,633
10' – 0"	9' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	16' – 1"	3,913	10' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	162	6"	9' – 0"	974	7	39' – 9"	186	53	39' – 9"	1,407	11' – 7"	31	26	72	1.634	291.3	0.9	103	66.2	11,754
10' – 0"	9' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	16' – 3"	3,954	10' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	162	6"	9' – 0"	974	7	39' – 9"	186	53	39' – 9"	1,407	11' – 9"	31	26	72	1.778	320.1	0.9	103	72.0	12,908
10' – 0"	10' – 0"	8"	7"	7'	162	#6	6"	10' – 11"	2,656	162	#6	6"	16' – 4"	3,974	10' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	10' – 11"	29	24	67	0.984	286.9	0.8	96	40.2	11,571
10' – 0"	10' – 0"	8"	7"	10'	162	#6	6"	10' – 11"	2,656	162	#6	6"	16' – 4"	3,974	10' – 6"	5' – 10"	162	#6	6"	8' – 11"	2,170	5' – 10"	3' – 1"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	10' – 11"	29	24	67	0.984	286.9	0.8	96	40.2	11,571
10' – 0"	10' – 0"	9"	8"	13'	162	#6	6"	11' – 1"	2,697	162	#6	6"	16' – 6"	4,015	10' – 7"	5' – 11"	162	#6	6"	9' – 1"	2,210	5' – 11"	3' – 2"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 1"	30	26	72	1.123	289.9	0.8	102	45.8	11,699
10' – 0"	10' – 0"	10"	8"	16'	162	#6	6"	11' – 1"	2,697	162	#6	6"	16' – 7"	4,035	10' – 8"	5' – 11"	162	#6	6"	9' – 2"	2,230	5' – 11"	3' – 3"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 1"	30	26	72	1.193	290.9	0.8	102	48.6	11,739
10' – 0"	10' – 0"	12"	9"	20'	162	#6	6"	11' – 3"	2,737	162	#6	6"	16' – 10"	4,096	10' – 10"	6' – 0"	162	#6	6"	9' – 5"	2,291	6' – 0"	3' – 5"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 3"	30	26	72	1.407	295.0	0.8	102	57.1	11,901
10' – 0"	10' – 0"	13"	10"	23'	162	#6	6"	11' – 5"	2,778	162	#6	6"	16' – 11"	4,116	10' – 11"	6' – 0"	162	#6	6"	9' – 6"	2,312	6' – 0"	3' – 6"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 5"	31	26	72	1.553	297.0	0.9	103	63.0	11,984
10' – 0"	10' – 0"	14"	11"	26'	162	#6	6"	11' – 7"	2,819	162	#6	6"	17' – 1"	4,157	11' – 0"	6' – 1"	162	#6	6"	9' – 8"	2,352	6' – 1"	3' – 7"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 7"	31	26	72	1.702	300.1	0.9	103	69.0	12,106
10' – 0"	10' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	17' – 3"	4,197	11' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	162	6"	10' – 0"	1,082	7	39' – 9"	186	53	39' – 9"	1,407	11' – 9"	31	26	72	1.852	328.9	0.9	103	75.0	13,259

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

DATE: 4/29/2021 11:34:33 AM
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HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

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

SCC-10

FILE: scc10ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		90

DATE: 3/29/2021 11:14:06 AM
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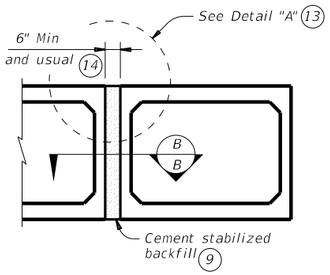
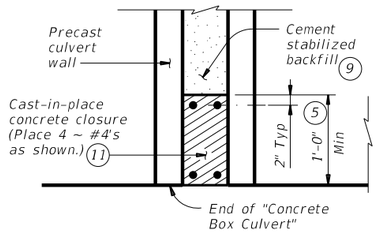
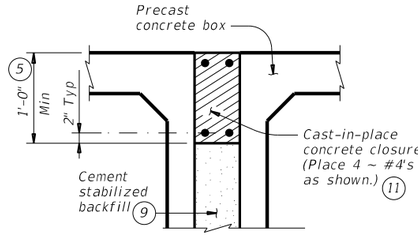


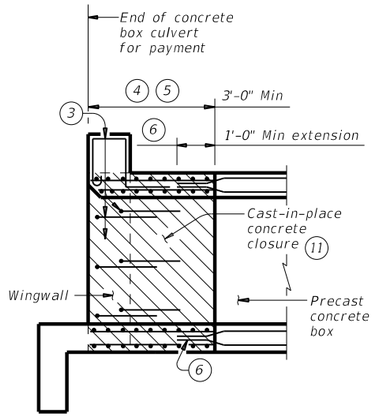
MULTIPLE UNIT PLACEMENT



SECTION B-B

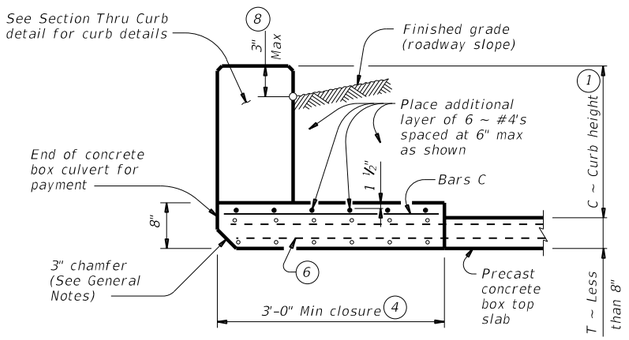


DETAIL "A" (13)

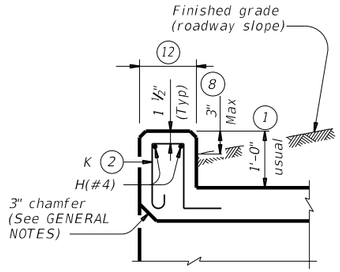


WINGWALL CONNECTION

(Also applies to safety end treatment.)

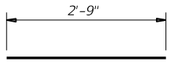


SECTION THRU TOP SLABS LESS THAN 8"

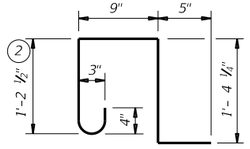


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



BARS C (#4)
(Spa = 1'-0" Max)



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

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

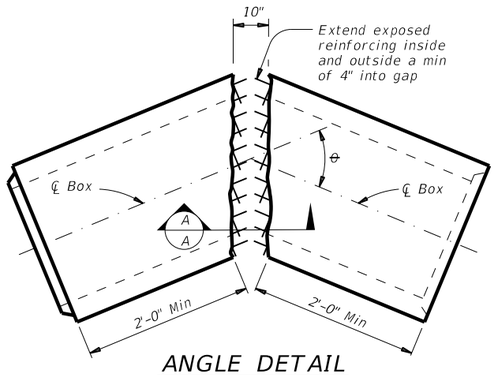
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

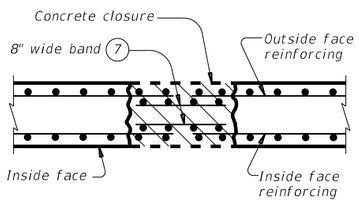
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

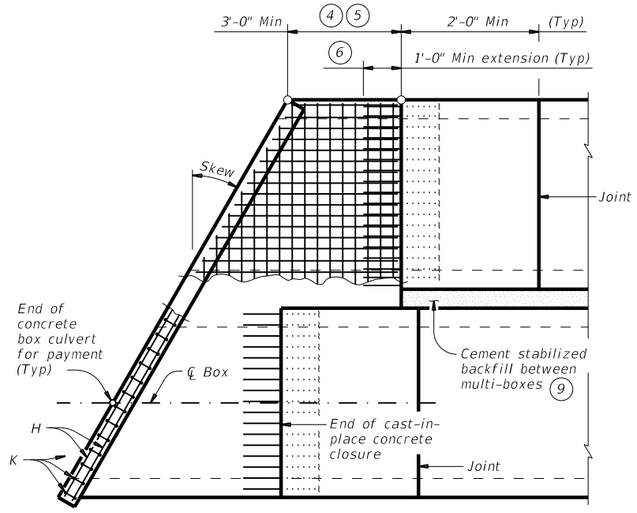
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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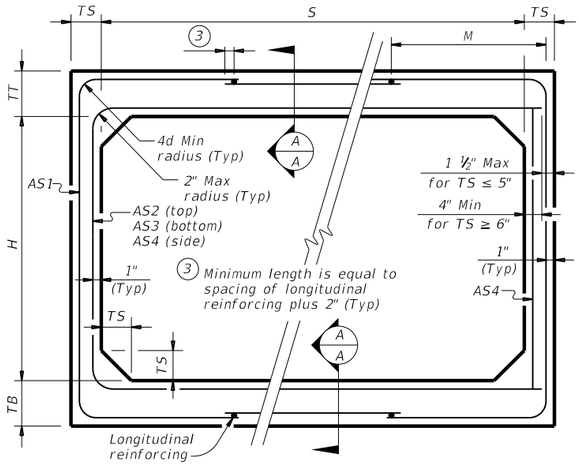
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	–	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	–	–	–	6.8
6	2	7	7	7	3 – 5	43	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	–	–	–	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	–	–	–	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	–	–	–	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	–	–	–	6.8
6	3	8	7	7	< 2	–	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	–	–	–	7.5
6	3	7	7	7	3 – 5	39	0.17	0.18	0.17	0.17	–	–	–	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	–	–	–	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	–	–	–	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	–	–	–	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	–	–	–	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	–	–	–	7.5
6	4	8	7	7	< 2	–	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	–	–	–	8.2
6	4	7	7	7	3 – 5	39	0.17	0.21	0.19	0.17	–	–	–	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	–	–	–	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	–	–	–	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	–	–	–	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	–	–	–	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	–	–	–	8.2
6	5	8	7	7	< 2	–	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	–	–	–	8.9
6	5	7	7	7	3 – 5	43	0.17	0.23	0.21	0.17	–	–	–	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	–	–	–	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	–	–	–	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	–	–	–	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	–	–	–	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	–	–	–	8.9
6	6	8	7	7	< 2	–	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	–	–	–	9.6
6	6	7	7	7	3 – 5	52	0.17	0.24	0.22	0.17	–	–	–	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	–	–	–	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	–	–	–	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	–	–	–	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	–	–	–	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	–	–	–	9.6

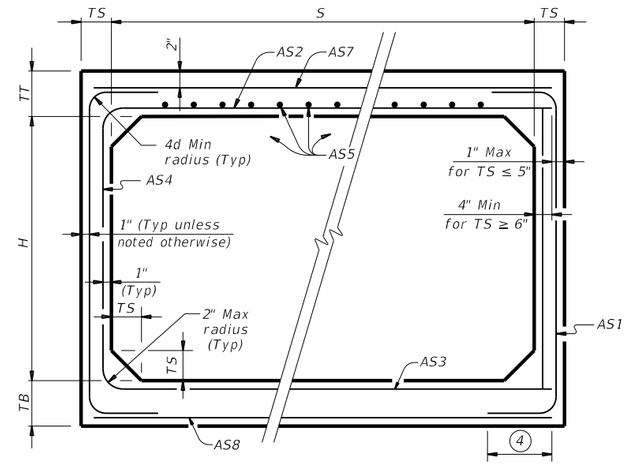
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)

SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

6'-0" SPAN

SCP-6

FILE: scp06sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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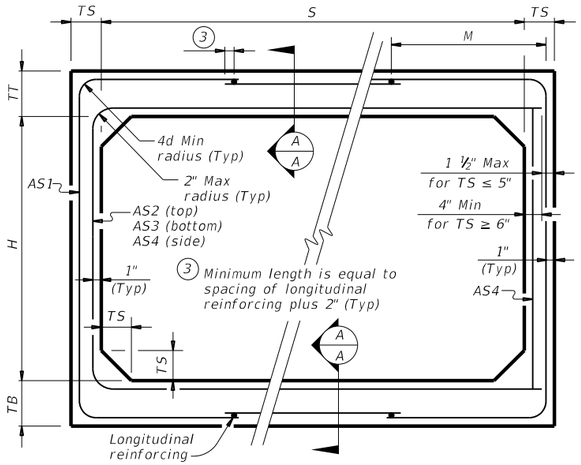
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
10	4	10	10	10	< 2	–	0.33	0.34	0.27	0.24	0.24	0.24	0.24	16.5
10	4	10	10	10	2 < 3	58	0.38	0.35	0.30	0.24	–	–	–	16.5
10	4	10	10	10	3 – 5	53	0.31	0.28	0.27	0.24	–	–	–	16.5
10	4	10	10	10	10	52	0.36	0.32	0.33	0.24	–	–	–	16.5
10	4	10	10	10	15	52	0.47	0.42	0.43	0.24	–	–	–	16.5
10	4	10	10	10	20	52	0.61	0.54	0.55	0.24	–	–	–	16.5
10	4	10	10	10	25	52	0.75	0.67	0.68	0.24	–	–	–	16.5
10	5	10	10	10	< 2	–	0.30	0.36	0.30	0.24	0.24	0.24	0.24	17.5
10	5	10	10	10	2 < 3	58	0.35	0.39	0.34	0.24	–	–	–	17.5
10	5	10	10	10	3 – 5	52	0.28	0.31	0.30	0.24	–	–	–	17.5
10	5	10	10	10	10	52	0.33	0.35	0.36	0.24	–	–	–	17.5
10	5	10	10	10	15	47	0.42	0.46	0.47	0.24	–	–	–	17.5
10	5	10	10	10	20	47	0.55	0.59	0.61	0.24	–	–	–	17.5
10	5	10	10	10	25	47	0.68	0.73	0.75	0.24	–	–	–	17.5
10	6	10	10	10	< 2	–	0.28	0.38	0.33	0.24	0.24	0.24	0.24	18.5
10	6	10	10	10	2 < 3	58	0.32	0.42	0.37	0.24	–	–	–	18.5
10	6	10	10	10	3 – 5	53	0.26	0.34	0.33	0.24	–	–	–	18.5
10	6	10	10	10	10	52	0.30	0.38	0.39	0.24	–	–	–	18.5
10	6	10	10	10	15	47	0.39	0.49	0.51	0.24	–	–	–	18.5
10	6	10	10	10	20	47	0.50	0.63	0.65	0.24	–	–	–	18.5
10	6	10	10	10	25	47	0.61	0.78	0.80	0.24	–	–	–	18.5
10	7	10	10	10	< 2	–	0.25	0.40	0.36	0.24	0.24	0.24	0.24	19.5
10	7	10	10	10	2 < 3	58	0.30	0.45	0.40	0.24	–	–	–	19.5
10	7	10	10	10	3 – 5	58	0.24	0.36	0.35	0.24	–	–	–	19.5
10	7	10	10	10	10	52	0.28	0.40	0.42	0.24	–	–	–	19.5
10	7	10	10	10	15	47	0.36	0.52	0.54	0.24	–	–	–	19.5
10	7	10	10	10	20	47	0.46	0.67	0.69	0.24	–	–	–	19.5
10	7	10	10	10	25	47	0.56	0.82	0.85	0.24	–	–	–	19.5
10	8	10	10	10	< 2	–	0.24	0.41	0.38	0.24	0.24	0.24	0.24	20.5
10	8	10	10	10	2 < 3	64	0.27	0.47	0.43	0.24	–	–	–	20.5
10	8	10	10	10	3 – 5	58	0.24	0.38	0.38	0.24	–	–	–	20.5
10	8	10	10	10	10	52	0.26	0.42	0.44	0.24	–	–	–	20.5
10	8	10	10	10	15	47	0.34	0.54	0.57	0.24	–	–	–	20.5
10	8	10	10	10	20	47	0.43	0.69	0.72	0.24	–	–	–	20.5
10	9	10	10	10	< 2	–	0.24	0.42	0.41	0.24	0.24	0.24	0.24	21.5
10	9	10	10	10	2 < 3	70	0.26	0.50	0.46	0.24	–	–	–	21.5
10	9	10	10	10	3 – 5	64	0.24	0.40	0.40	0.24	–	–	–	21.5
10	9	10	10	10	10	58	0.25	0.43	0.46	0.24	–	–	–	21.5
10	9	10	10	10	15	52	0.32	0.56	0.59	0.24	–	–	–	21.5
10	9	10	10	10	20	47	0.40	0.71	0.75	0.24	–	–	–	21.5
10	10	10	10	10	< 2	–	0.24	0.44	0.44	0.24	0.24	0.24	0.24	22.5
10	10	10	10	10	2 < 3	79	0.25	0.52	0.48	0.24	–	–	–	22.5
10	10	10	10	10	3 – 5	70	0.24	0.42	0.43	0.24	–	–	–	22.5
10	10	10	10	10	10	64	0.24	0.44	0.48	0.24	–	–	–	22.5
10	10	10	10	10	15	52	0.30	0.57	0.61	0.24	–	–	–	22.5
10	10	10	10	10	20	52	0.38	0.73	0.77	0.24	–	–	–	22.5

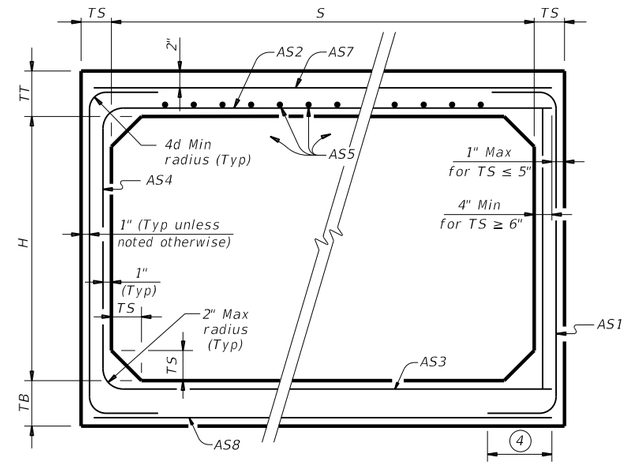
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

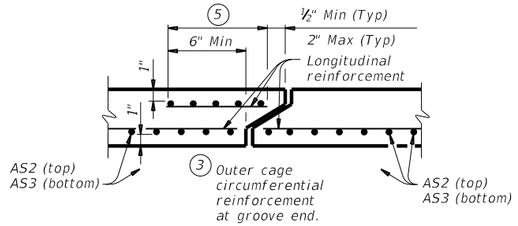
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

10'-0" SPAN

SCP-10

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	PAR	RAINS		93

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

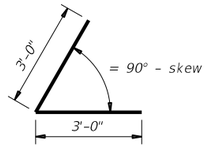
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2–wings) (4)		Estimated Quantities per ft of Toewall (1–toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'–6"	2'–10"	10"	1'–0"	7"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

TABLE OF WINGWALL REINFORCING
(2–wings)

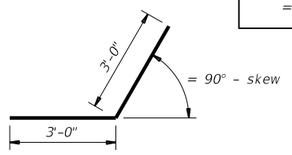
Bar	Size	No.	Spa
D1	#6	~	1'–0"
D2	#6	~	1'–0"
E1	#4	~	1'–0"
F	#4	~	1'–0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'–0"
V	#4	~	1'–0"

TABLE OF TOEWALL REINFORCING

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



BARS D1



BARS D2

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

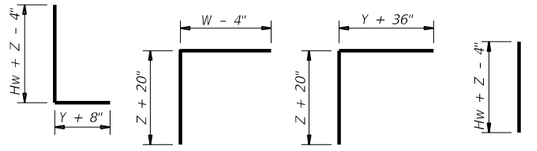
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW–1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW–2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW–2 and Hw < 4'

For cast–in–place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

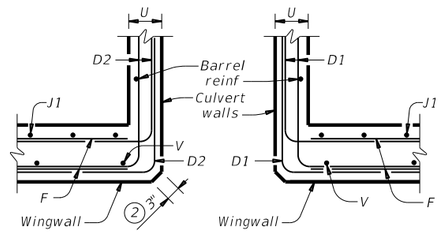
For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW–1
= (2)(Hw)(Lw) – 6 SF for Type PW–2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW–2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

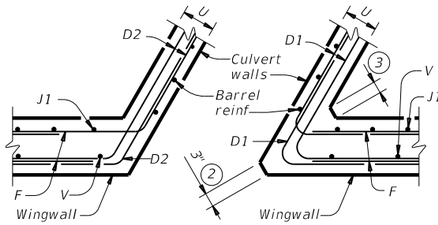
See applicable box culvert standard sheet for S, H, T, and U values.



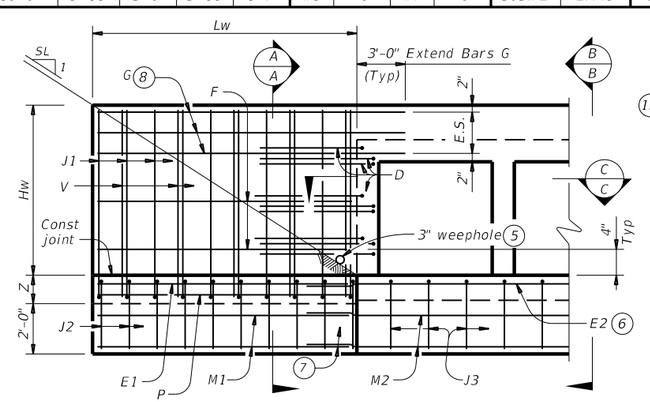
BARS J1 BARS J2 BARS J3 BARS V



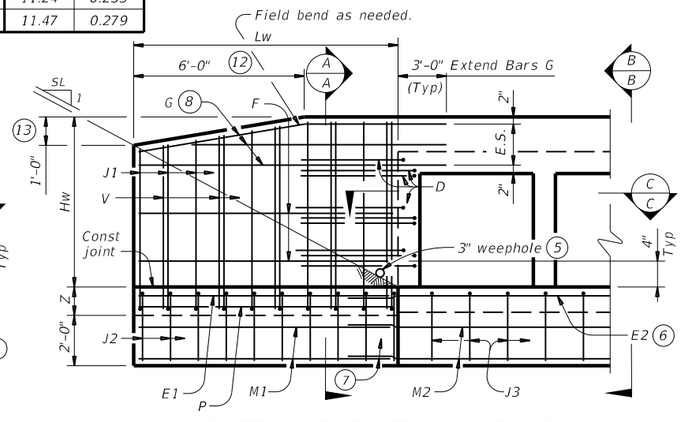
SECTION C-C - PW-1



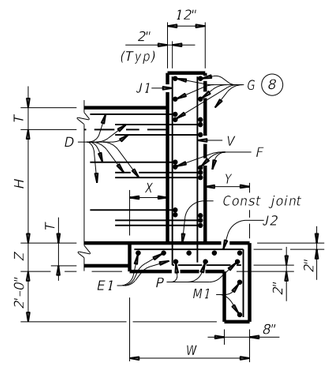
SECTION C-C - PW-2



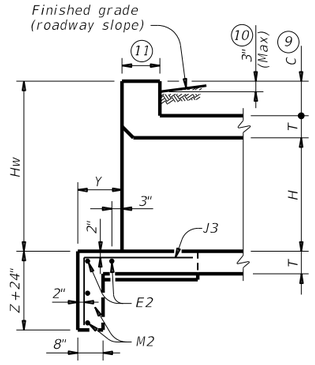
PARTIAL ELEVATION - PW-1



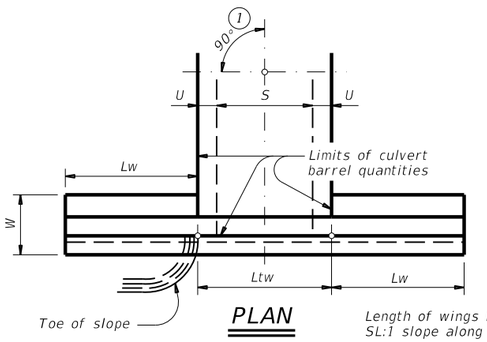
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

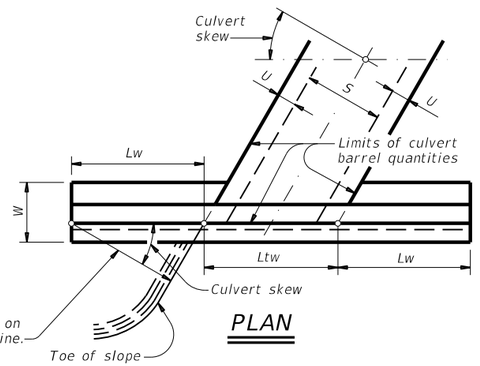


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

(1) Skew = 0°

(2) At discharge end, chamfer may be ¾" minimum.

(3) For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"

(4) Quantities shown are for two Type PW–1 wings. Adjust concrete volume for Type PW–2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.

(5) Provide weepholes for Hw = 5'–0" and greater. Fill around weepholes with coarse gravel.

(6) Extend Bars E2 1'–6" minimum into the wingwall footing.

(7) Lap Bars M1 1'–6" minimum with Bars M2.

(8) Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.

(9) 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

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

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

(11) 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.

(12) 3'–0" for Hw < 4'.

(13) 6" for Hw < 4'.

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

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation

Bridge Division Standard

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

PW

FILE:	pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		2277	01	010,etc	FM 275
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

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

TABLE OF WINGWALL REINFORCING
(2~wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

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

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

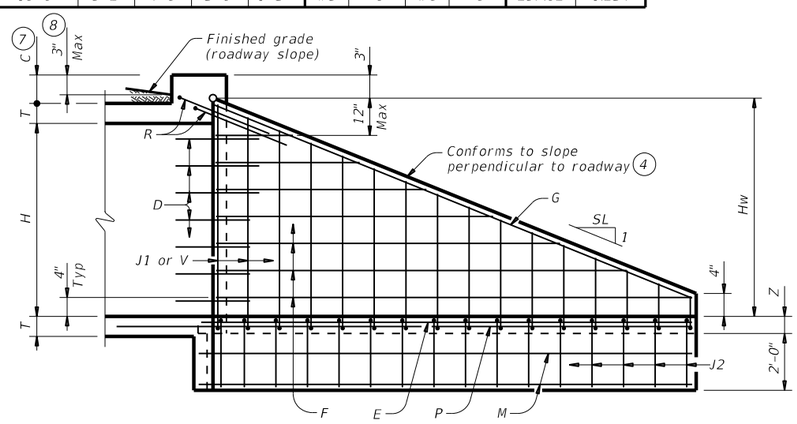
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

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

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

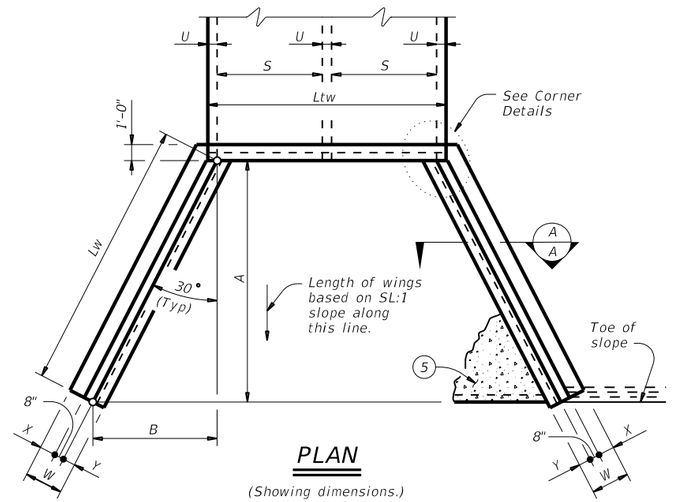
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

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



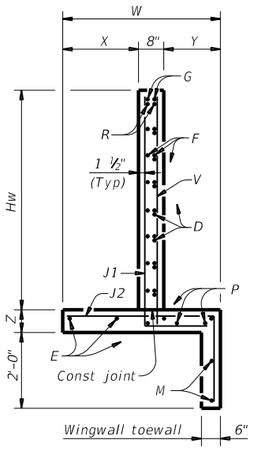
INSIDE ELEVATION

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

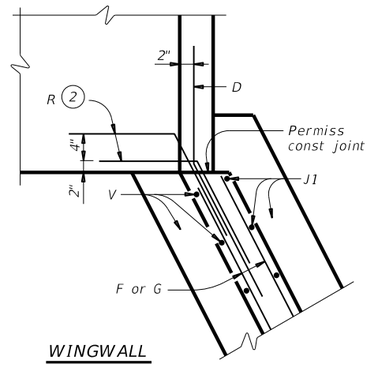


PLAN

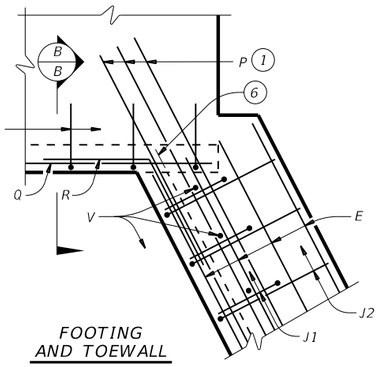
(Showing dimensions.)



SECTION A-A



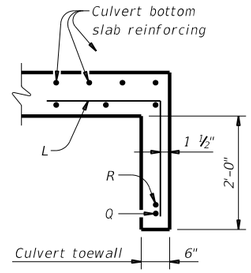
WINGWALL



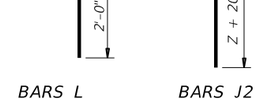
FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B (5)

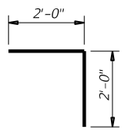


BARS D

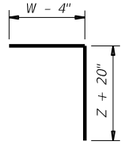
BARS R

BARS J1

BARS V



BARS L



BARS J2

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

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

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

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

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

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

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	PAR	RAINS		95

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

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

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
DL	#5	~	1'-0"
DS	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
RS	#5	3	~
RL	#5	3	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

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

Hw = H + T + C - 0.250'
A = (Hw - 0.333')(Sc)
B = (A) [tanget (θ + 15°)]
Lw = (A) ÷ [cosine (θ + 15°)]

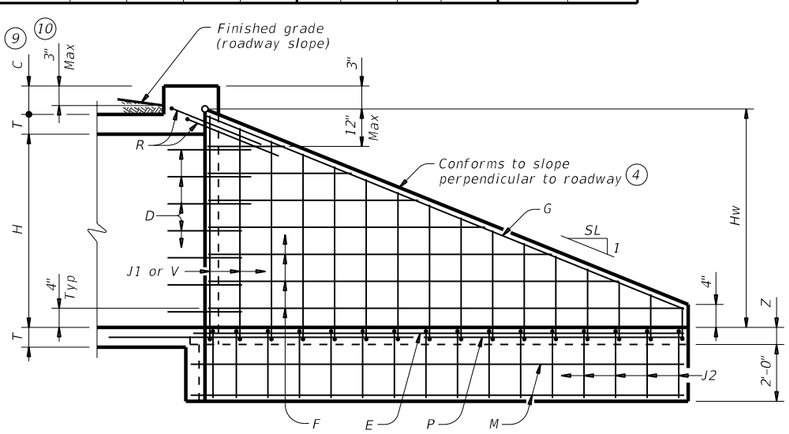
For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine θ

For precast culverts:
Ltw = [(N) (2U + S) + (N - 1) (0.5')] ÷ cosine θ

Total wingwall area (two wings ~ SF) = 0.5 (Hw + 0.333') (Lw + A)

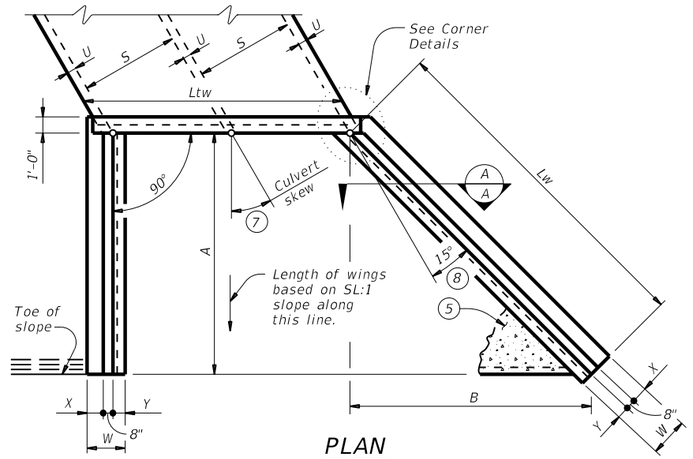
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
A = Length of short wingwalls
Lw = Length of long wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
θ = Culvert skew

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



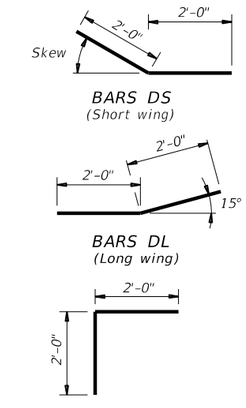
INSIDE ELEVATION

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



PLAN

(Showing dimensions and 30° skew.)



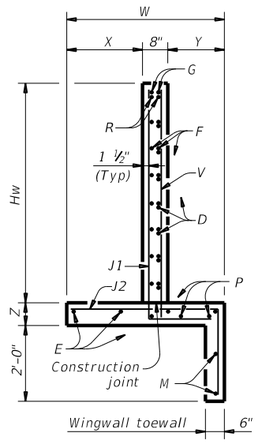
1. Extend Bars P 3'-0" minimum into bottom slab of box culvert.
2. Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by 0.5 x (A + Lw).
4. Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.
5. When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
6. At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.
7. Applicable values of skew are: 15°, 30°, and 45°.
8. Typical wingwall angle for all skews.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

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

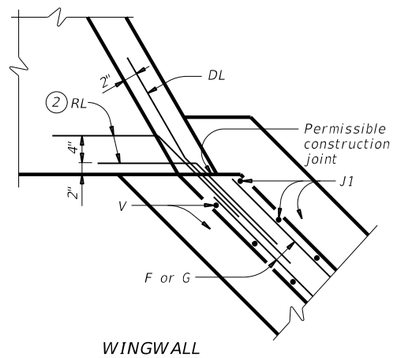
MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing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

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

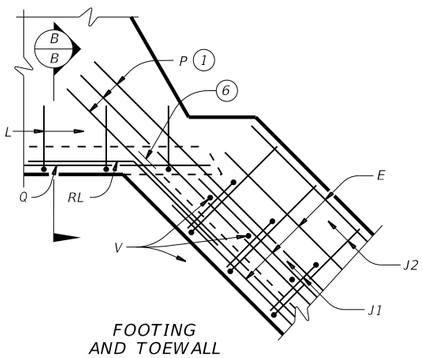
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



SECTION A-A



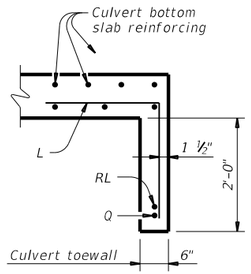
WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B ⑤

Texas Department of Transportation

Bridge Division Standard

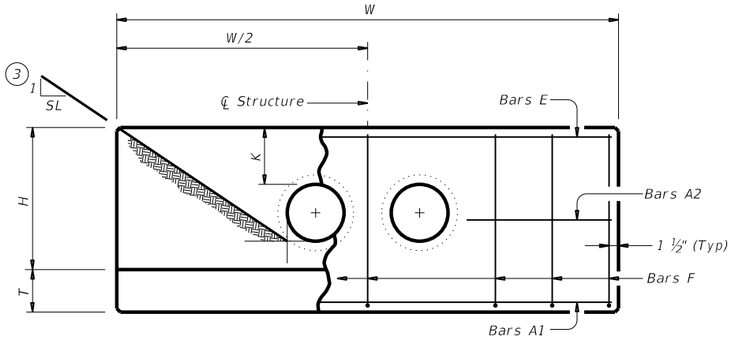
CONCRETE WINGWALLS WITH FLARED WINGS FOR SKEWED BOX CULVERTS

FW-S

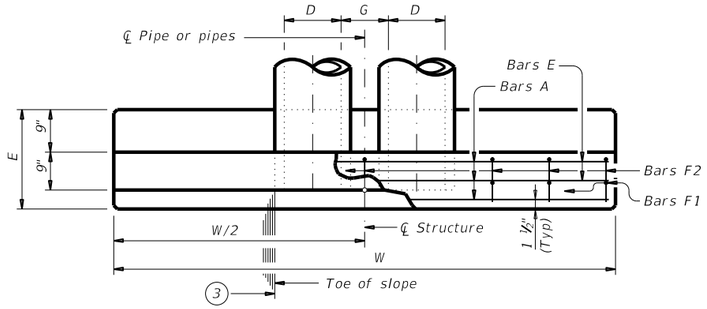
FILE: fw-sstde-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		96

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

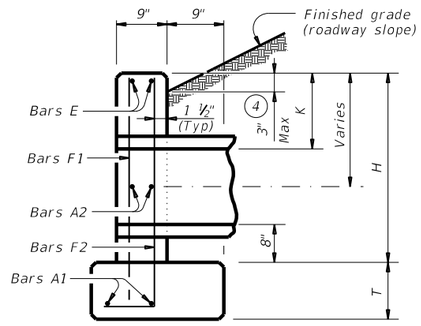
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4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



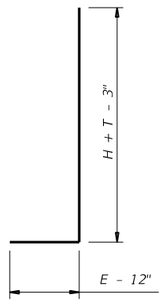
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

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

TABLE OF REINFORCING STEEL (6)

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		97

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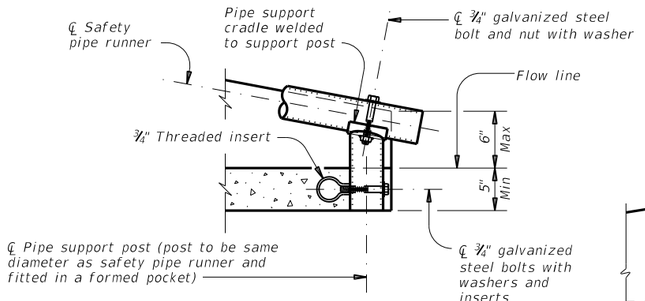
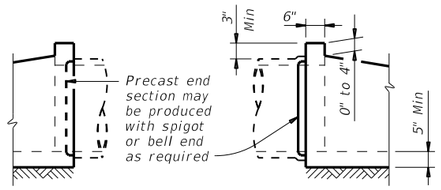
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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



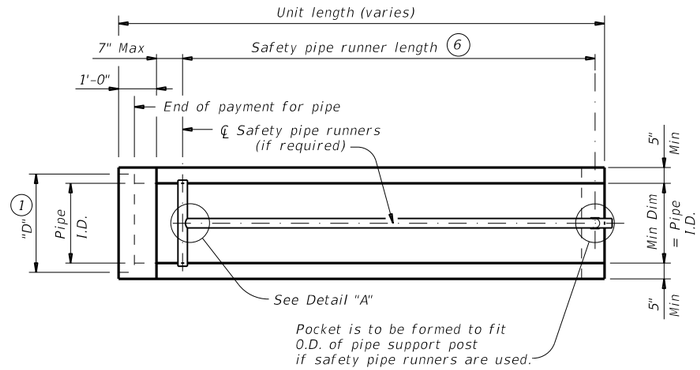
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



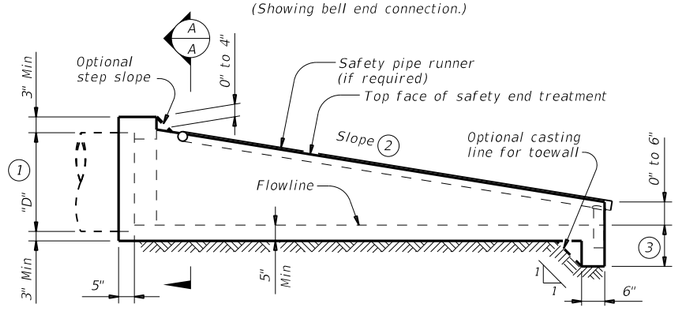
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



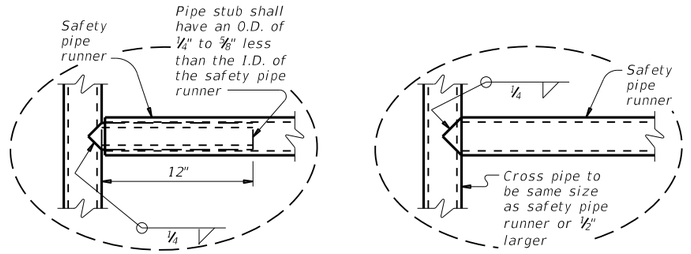
PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

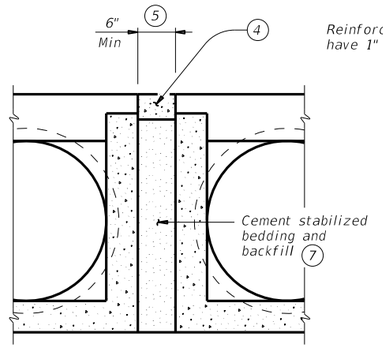


OPTION A

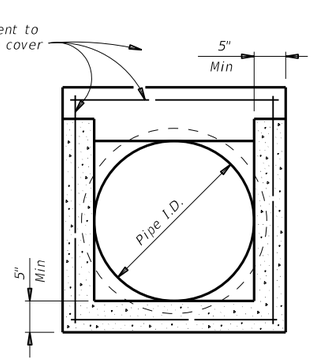
DETAIL A

(If required)

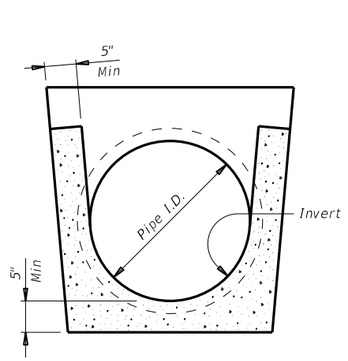
OPTION B



MULTIPLE PIPE INSTALLATION

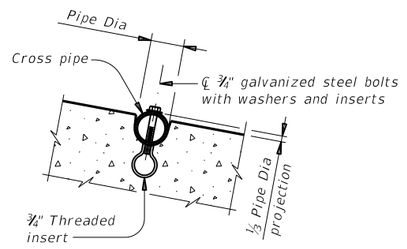


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

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

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

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

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II ~ CROSS DRAINAGE

PSET-SC

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	RAINS		98

DATE: 3/29/2021 3:02:52 PM
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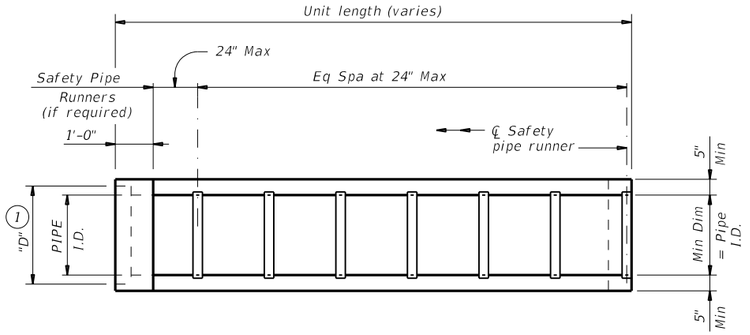
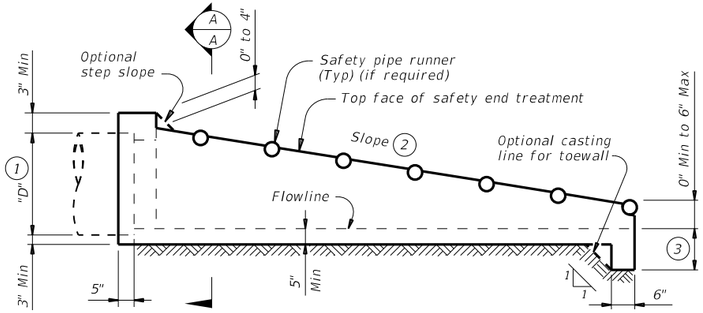


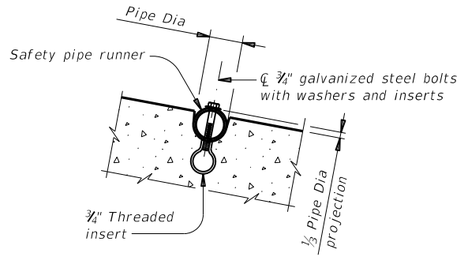
PLAN

(Showing bell end connection.)



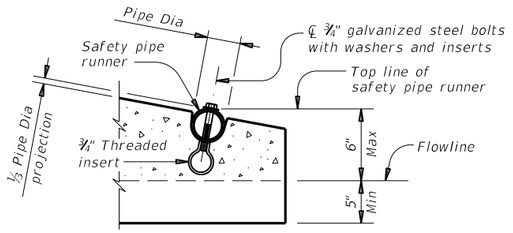
LONGITUDINAL ELEVATION

(Showing bell end connection.)

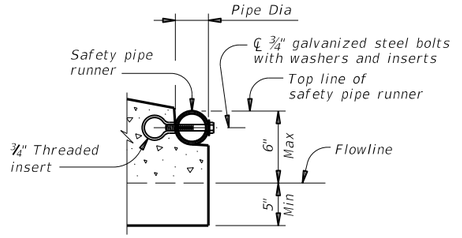


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



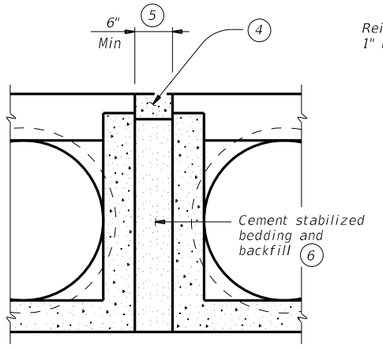
OPTION A



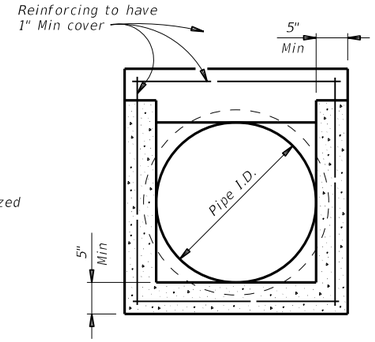
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

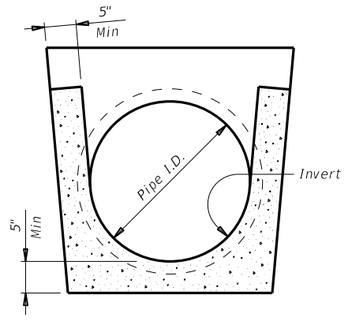
(If required)



MULTIPLE PIPE INSTALLATION

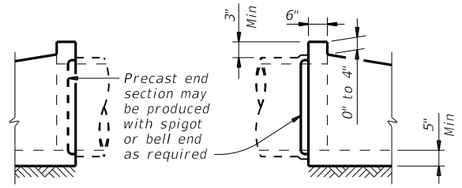


OPTION WITH SQUARE BOTTOM



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"	N/A	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 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

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	RAINS		98A

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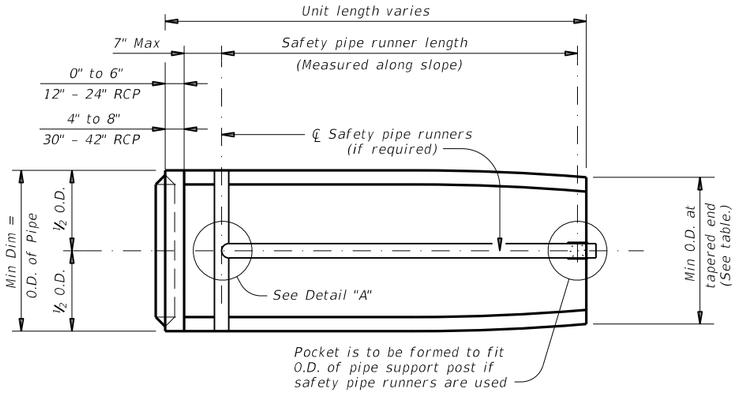
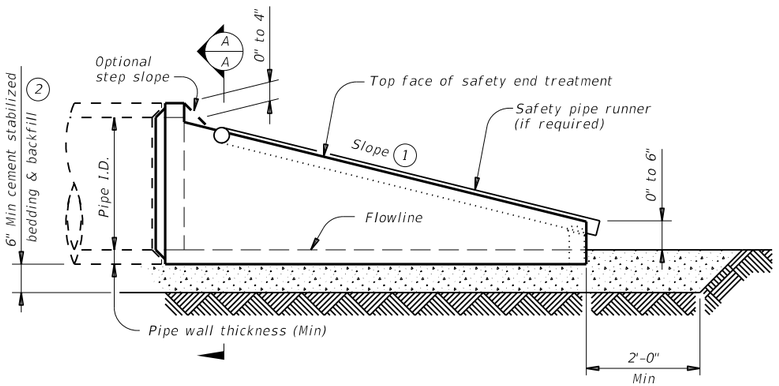


PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

(Showing spigot end connection.)

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

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

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

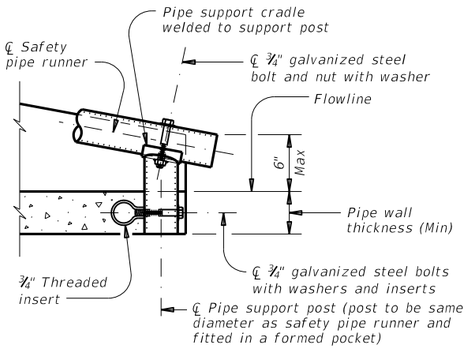
(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

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

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

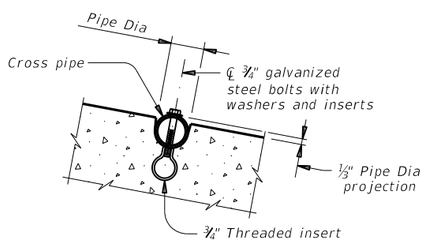
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' – 0"	≤ 45°	No	≤ 45°	No
					4:1	2' – 8"				
					6:1	4' – 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' – 10"	≤ 45°	No	≤ 45°	No
					4:1	3' – 9"				
					6:1	5' – 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
					4:1	4' – 10"				
					6:1	7' – 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' – 3"	≤ 45°	No	≤ 30°	No
					4:1	7' – 0"			> 30°	Yes
					6:1	10' – 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' – 3"	≤ 15°	No	≤ 15°	No
					4:1	8' – 2"	> 15°	Yes	> 15°	Yes
					6:1	12' – 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' – 10"	= 0°	No	≥ 0°	Yes
					4:1	10' – 4"	> 0°	Yes		
					6:1	15' – 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' – 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' – 6"				
					6:1	18' – 7"				



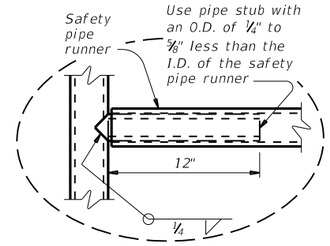
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

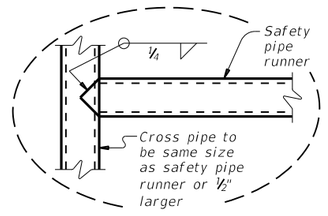


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

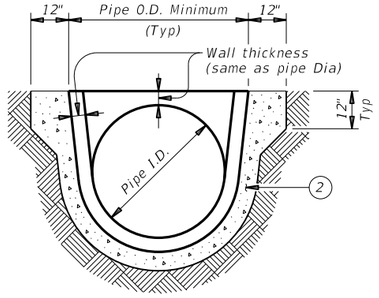


OPTION A

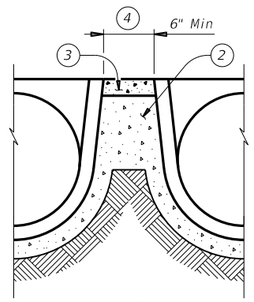


OPTION B

DETAIL A



SECTION A-A



MULTIPLE PIPE INSTALLATION

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

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

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	RAINS		99

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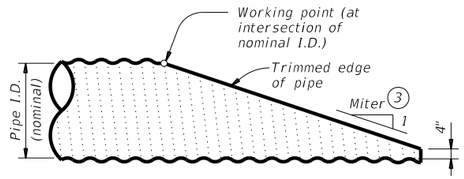
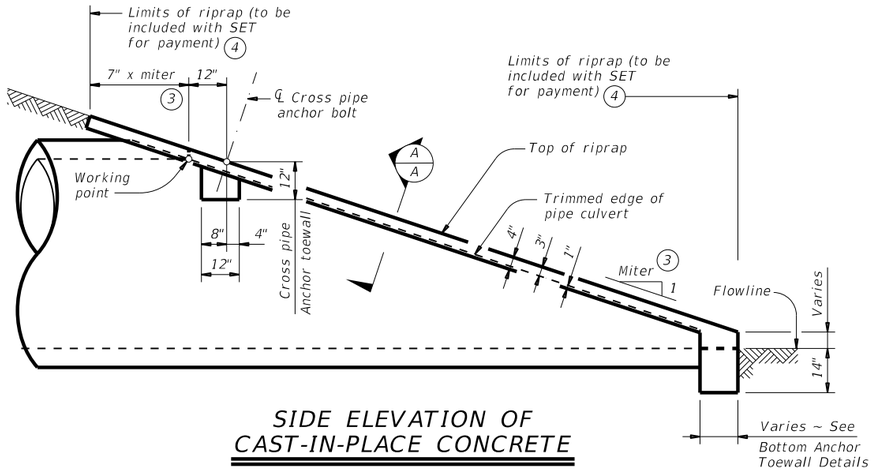


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

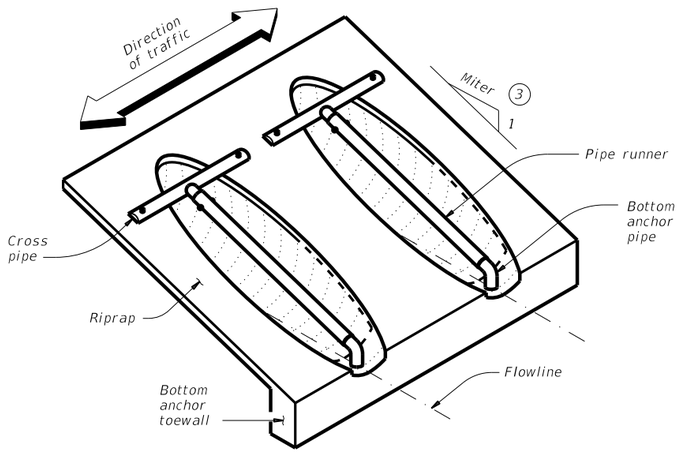
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

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

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

TYPICAL PIPE CULVERT MITERS (3)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		100

DATE: 3/29/2021 11:14:36 AM
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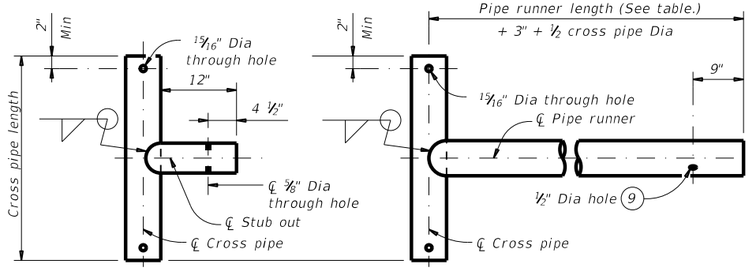
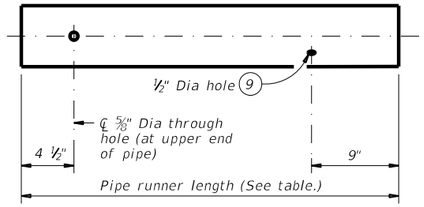


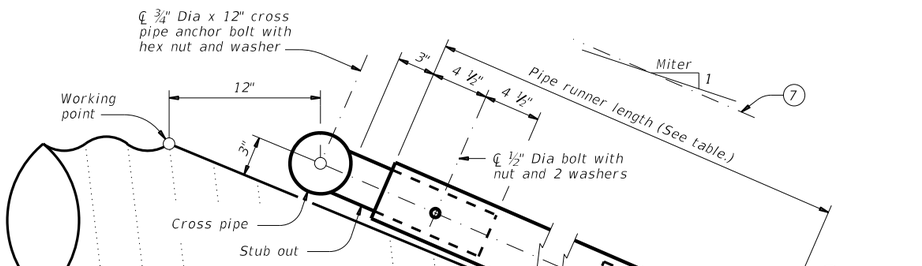
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



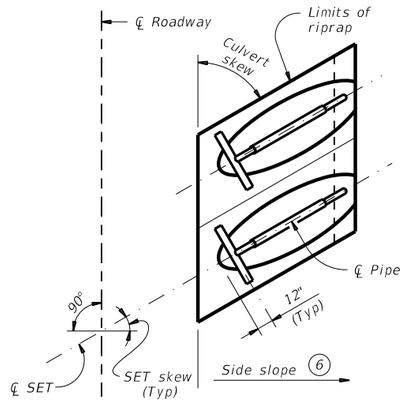
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

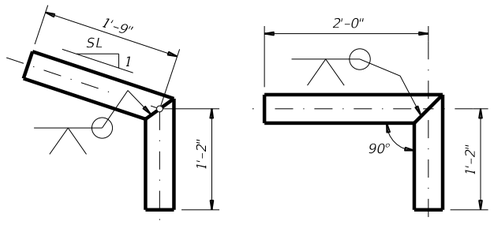


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

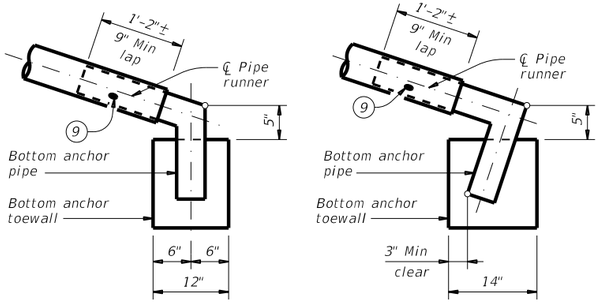


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

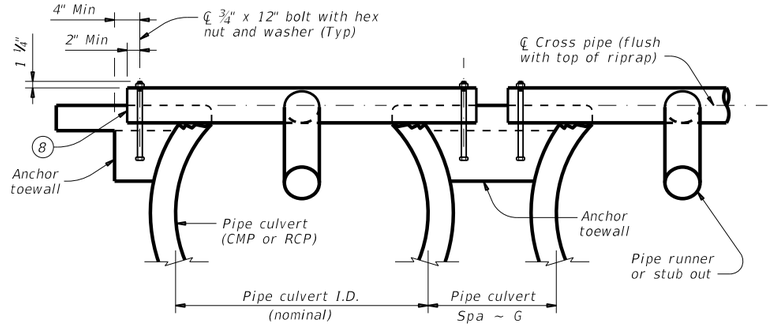
BOTTOM ANCHOR PIPE DETAILS (10)



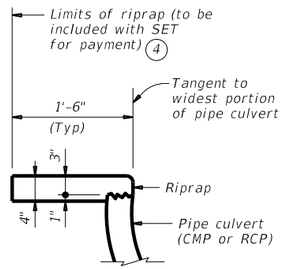
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

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

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

MATERIAL NOTES:

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

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

Provide ASTM A307 bolts and nuts.

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

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

GENERAL NOTES:

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

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

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

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

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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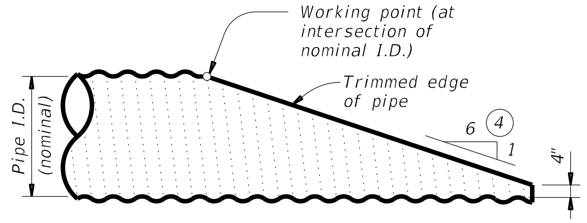
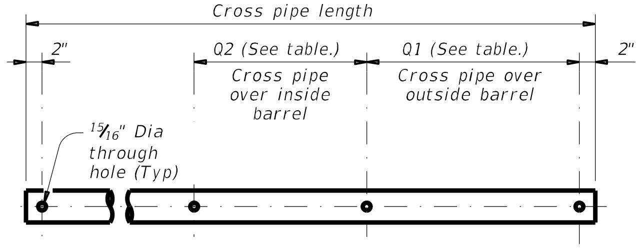
	PAR	RAINS		101



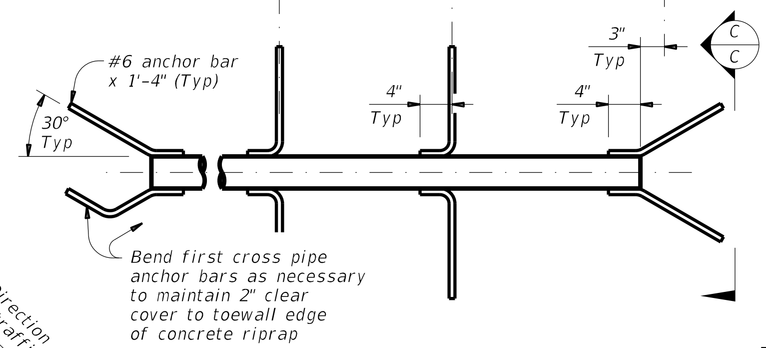
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

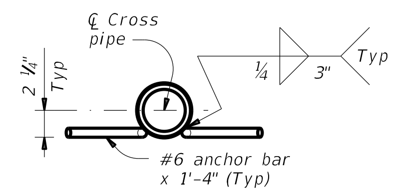
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

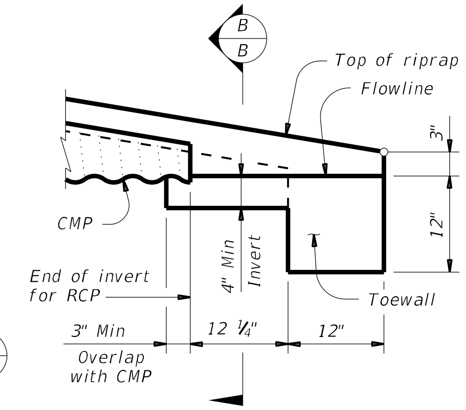


PIPE WITH ANCHOR BARS



SECTION C-C

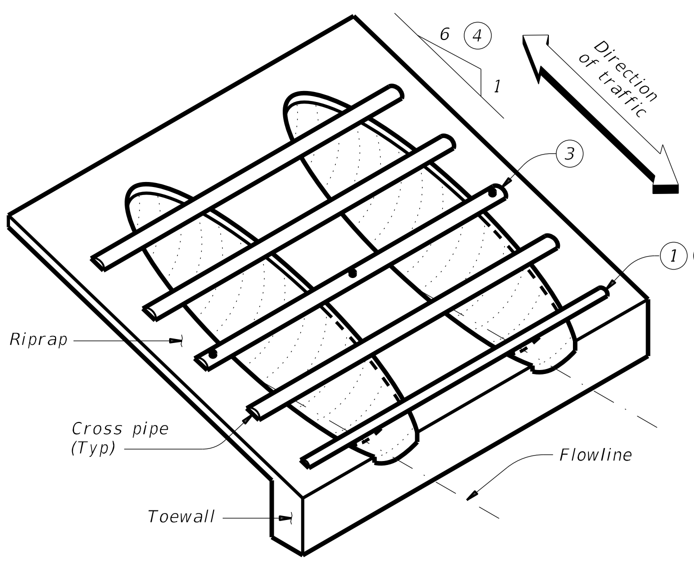
CROSS PIPE DETAILS



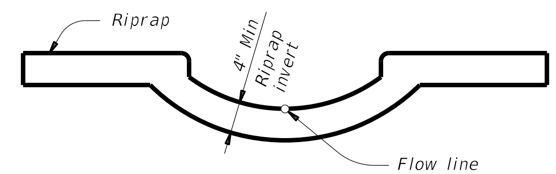
DETAIL "A"

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

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

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

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

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

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

MATERIAL NOTES:

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

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

Provide ASTM A307 bolts and nuts.

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

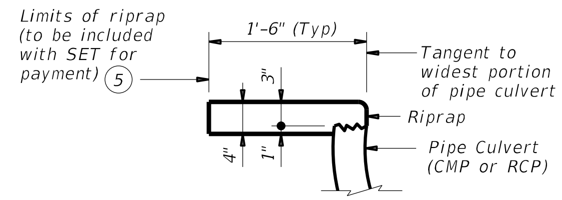
GENERAL NOTES:

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

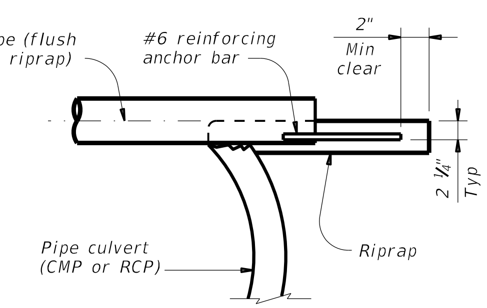
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

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

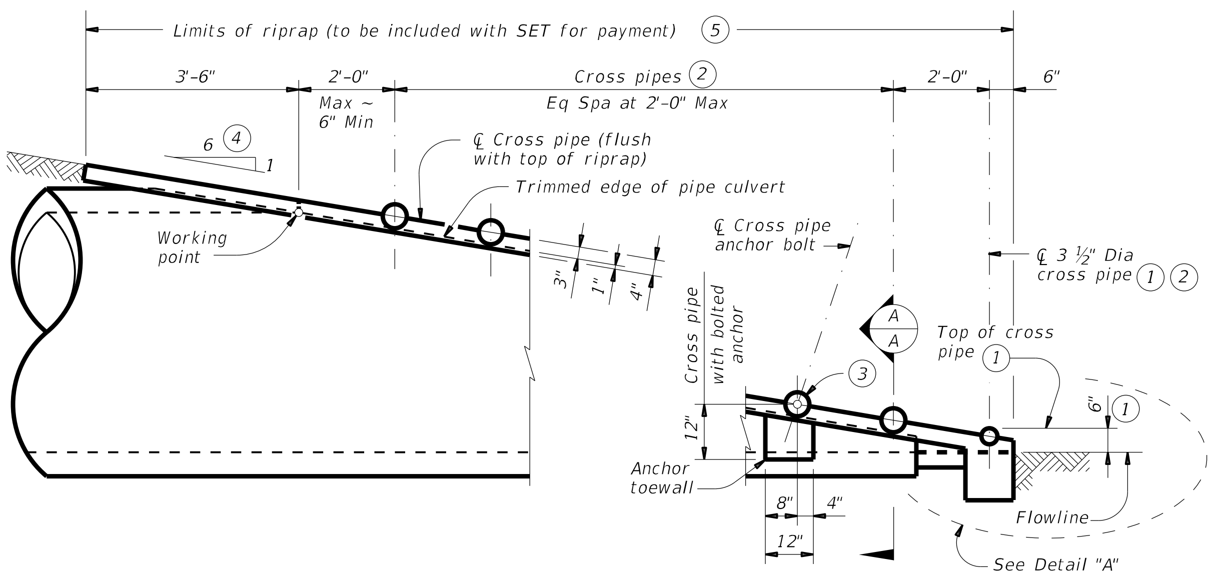
Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

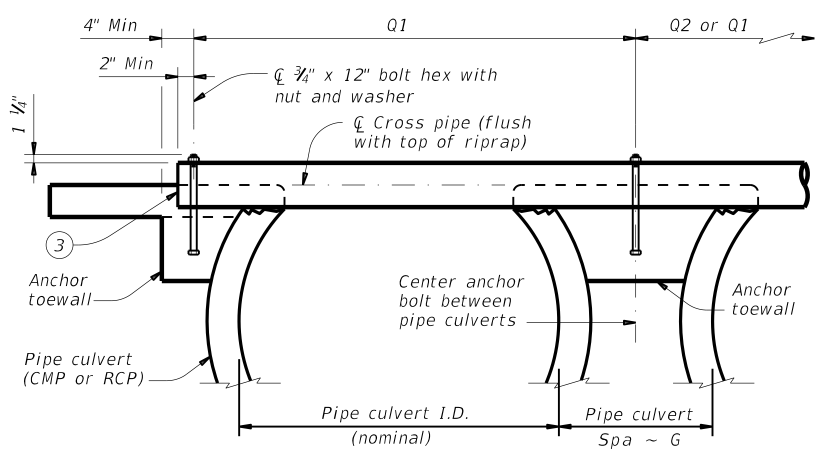


SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

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.

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Texas Department of Transportation | Bridge Division Standard

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

SETP-PD

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REVISIONS	DIST PAR	COUNTY RAINS		SHEET NO. 101A

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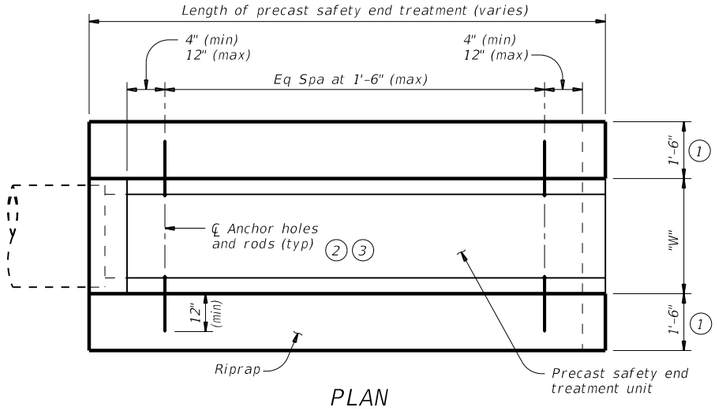
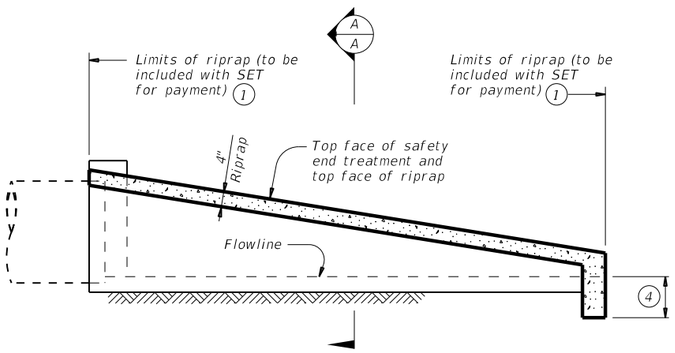
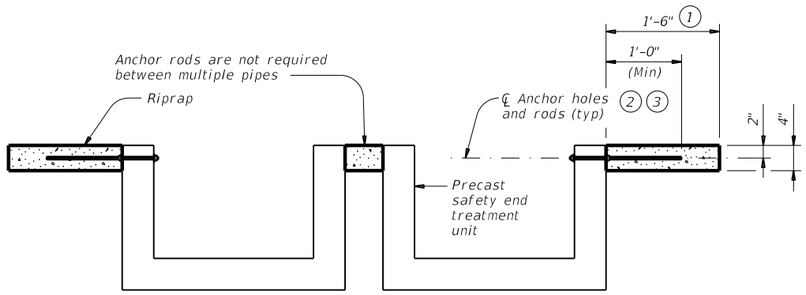


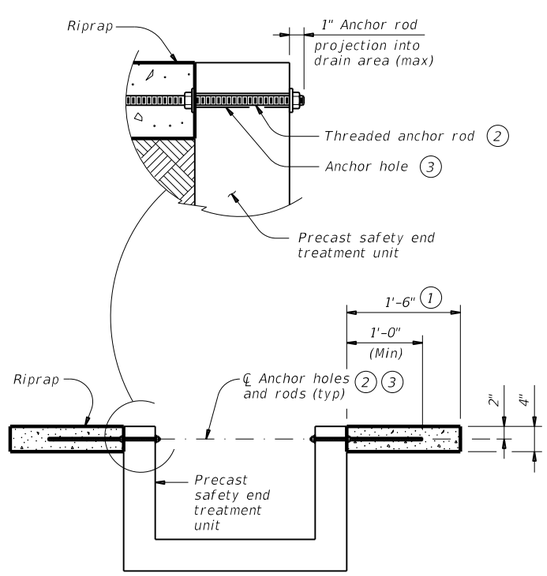
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

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

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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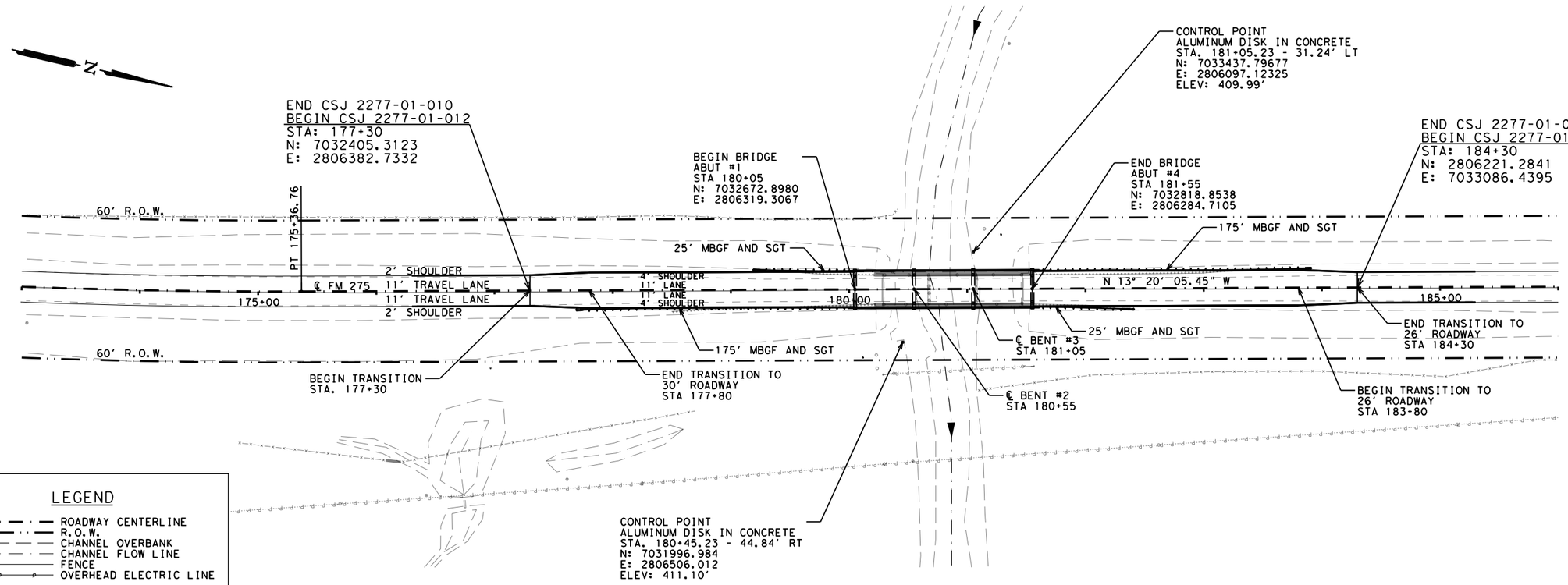
	PAR	RAINS		102



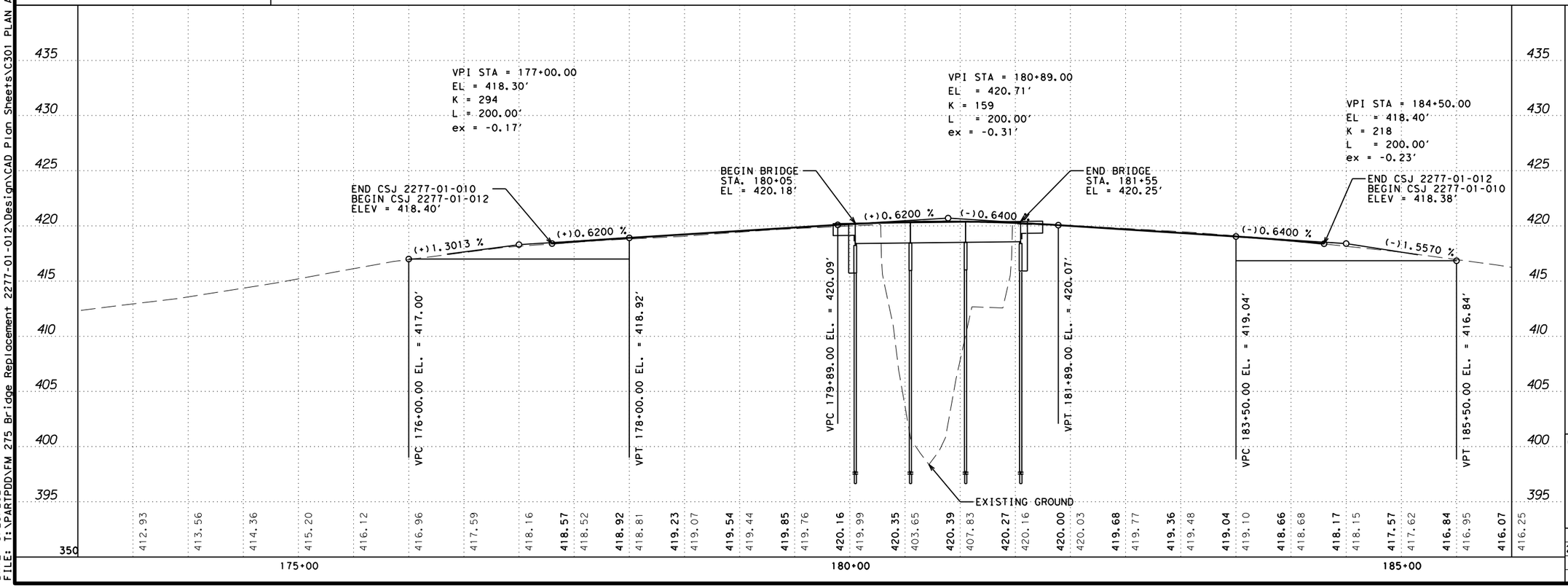
DESIGN SPEED: 55 MPH
AADT: 1100 (2017) 1500 (2037)
FUNCTIONAL CLASS: MAJOR COLLECTOR

EXISTING STRUCTURE:
STA. 180+29 - 181+49
120' THREE-SPAN PAN GIRDER
W/ CONCRETE DECK

PROPOSED STRUCTURE:
STA. 180+05 - 181+55
150' THREE-SPAN PRESTRESSED
CONCRETE SLAB BEAMS
0° SKEW

LEGEND

- ROADWAY CENTERLINE
- R.O.W.
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- FENCE
- OVERHEAD ELECTRIC LINE



SCALE
HORIZONTAL: 1" = 100'
VERTICAL: 1" = 10'

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

03/30/2021
Katie J. Vick, P.E.

FM 275
PLAN AND PROFILE
LAKE FORK CREEK BRIDGE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		103

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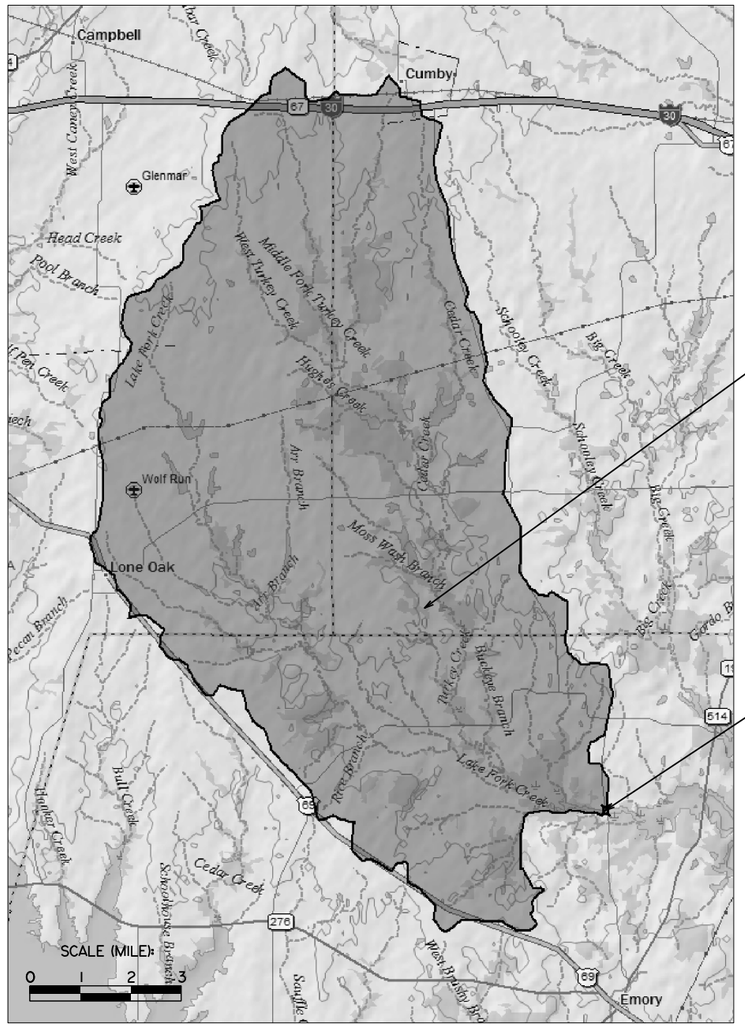

N

DRAINAGE AREA = 101.28 SQ. MI.

LAKE FORK CREEK
BRIDGE LOCATION

HYDROLOGIC METHOD

DRAINAGE AREAS WERE DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS AND FIELD OBSERVATIONS.

THE PEAK FLOWS WERE DETERMINED USING THE NRCS UNIT HYDROGRAPH FOR NATURAL BASINS MODELLED IN HEC-HMS 4.2.

NRCS Unit Hydrograph Method		
Frequency	Depth (in)	Flow (cfs)
2 year	3.7	5119
5 year	5.1	8986
25 year	7.75	17188
100 year	10.3	25612
Lag (min)	482.63	
Time Interval (min)	60	
Curve Number	80.1	

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03/30/2021

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FM 275
LAKE FORK CREEK BRIDGE HYDRAULIC DATA

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		104

DATE: 3/29/2021 11:14:48 AM
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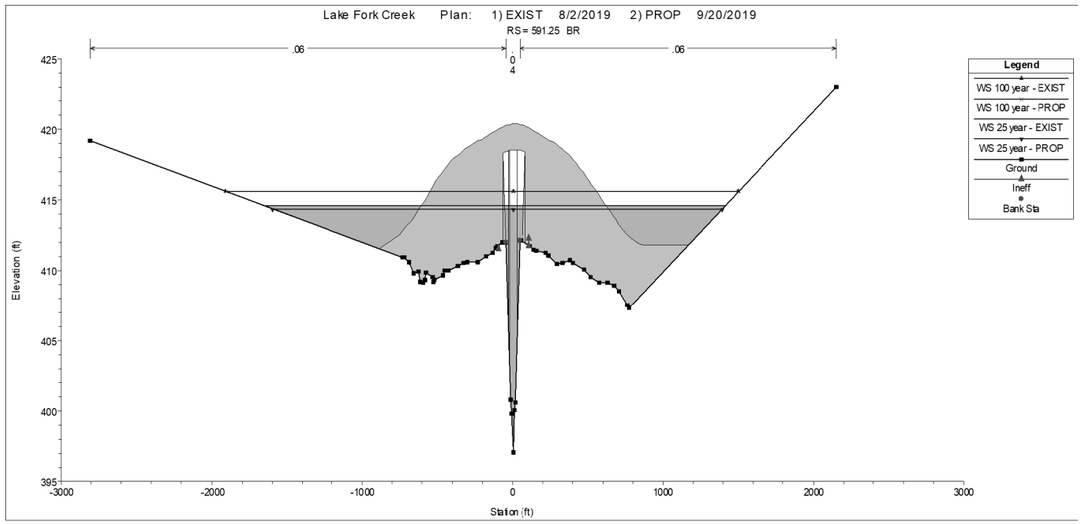
	EXISTING	PROPOSED
LOW CHORD	417.07	418.35
LOWEST ROAD ELEVATION	411.80	411.80

HEC-RAS 25 Year Flood Event

River Station	Existing Water Surface Elev (ft)	Proposed Water Surface Elev (ft)	Difference (ft)	Existing Channel Velocity (ft/s)	Proposed Channel Velocity (ft/s)	Difference (ft/s)
1044.63	415.84	415.77	-0.07	4.86	4.95	0.09
869.62	415.81	415.74	-0.07	3.28	3.37	0.09
765.4	415.78	415.71	-0.07	2.91	2.96	0.05
633.91	415.75	415.68	-0.07	2.8	2.66	-0.14
Bridge						
563.69	414.74	414.73	-0.01	4.08	3.78	-0.3
440.97	414.67	414.67	0	4.42	4.42	0
341.76	414.63	414.63	0	3.8	3.8	0
232.76	414.57	414.57	0	3.86	3.87	0.01
127.05	414.51	414.51	0	4.18	4.2	0.02
25.07	414.32	414.32	0	5.82	5.82	0

HEC-RAS 100 Year Flood Event

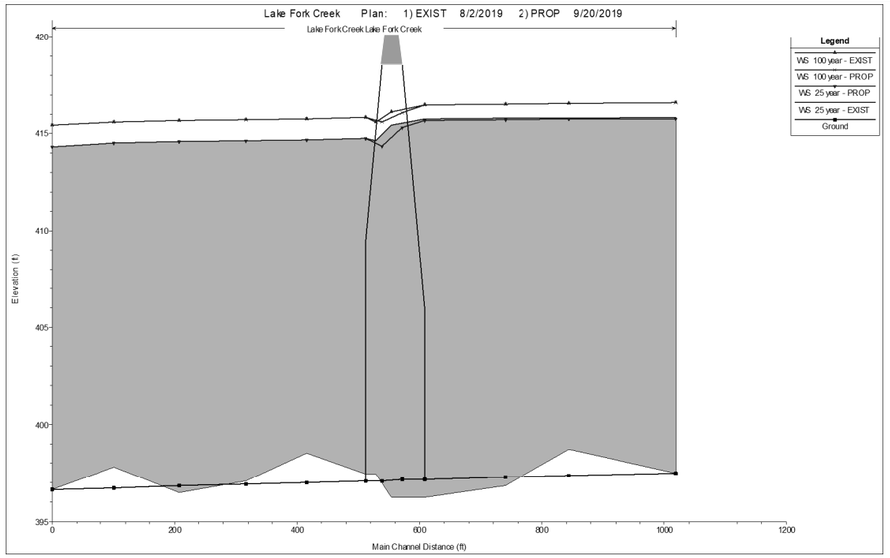
River Station	Existing Water Surface Elev (ft)	Proposed Water Surface Elev (ft)	Difference (ft)	Existing Channel Velocity (ft/s)	Proposed Channel Velocity (ft/s)	Difference (ft/s)
1044.63	416.59	416.59	0	5.93	5.92	-0.01
869.62	416.54	416.55	0.01	4.05	4.07	0.02
765.4	416.5	416.51	0.01	3.67	3.66	-0.01
633.91	416.46	416.47	0.01	3.52	3.32	-0.2
Bridge						
563.69	415.84	415.82	-0.02	4.46	4.24	-0.22
440.97	415.77	415.76	-0.01	4.71	4.72	0.01
341.76	415.72	415.72	0	4.23	4.23	0
232.76	415.66	415.66	0	4.28	4.29	0.01
127.05	415.59	415.59	0	4.59	4.61	0.02
25.07	415.42	415.42	0	6.15	6.15	0



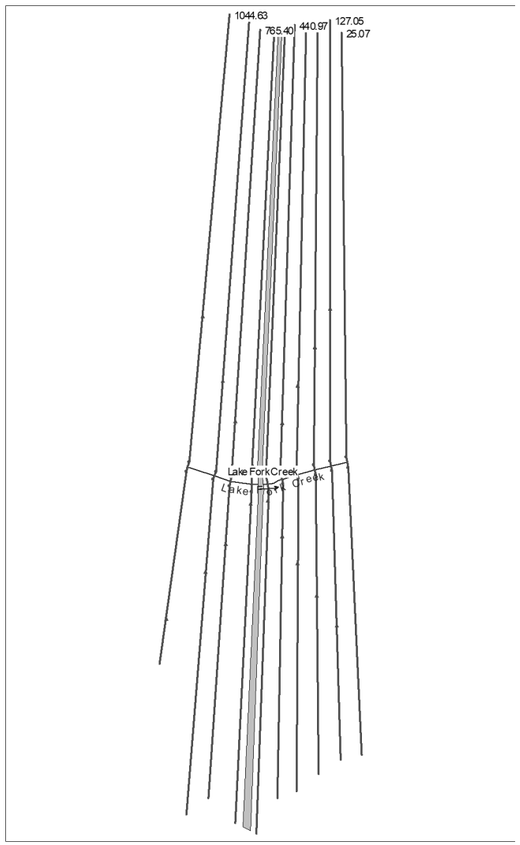
SECTION AT DOWNSTREAM BRIDGE FACE
RIVER STA. 591

NOTES:

1. THE EXISTING AND PROPOSED WATER SURFACE ELEVATIONS WERE COMPUTED USING HEC-RAS 5.0.6.
2. THE NATURAL GROUND, EXISTING BRIDGE AND PROPOSED BRIDGE CONDITIONS WERE MODELED IN HEC-RAS USING THE ENERGY (STANDARD STEP) METHOD FOR LOW FLOW AND HIGH FLOW. THE REACH BOUNDARY CONDITIONS WERE ESTABLISHED BY CALCULATING NORMAL DEPTH WITH A CHANNEL SLOPE OF 0.001 UPSTREAM AND DOWNSTREAM.
3. THIS SITE LIES WITHIN A FLOOD HAZARD AREA (ZONE A) AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NO. FM 48379C0045D.
4. COORDINATION WITH THE RAINS COUNTY FLOODPLAIN ADMINISTRATOR WAS COMPLETED ON XX/XX/XXXX.



WATER SURFACE PROFILES



CROSS-SECTION LAYOUT

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03/30/2021

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FM 275
LAKE FORK CREEK BRIDGE HYDRAULIC DATA

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		105

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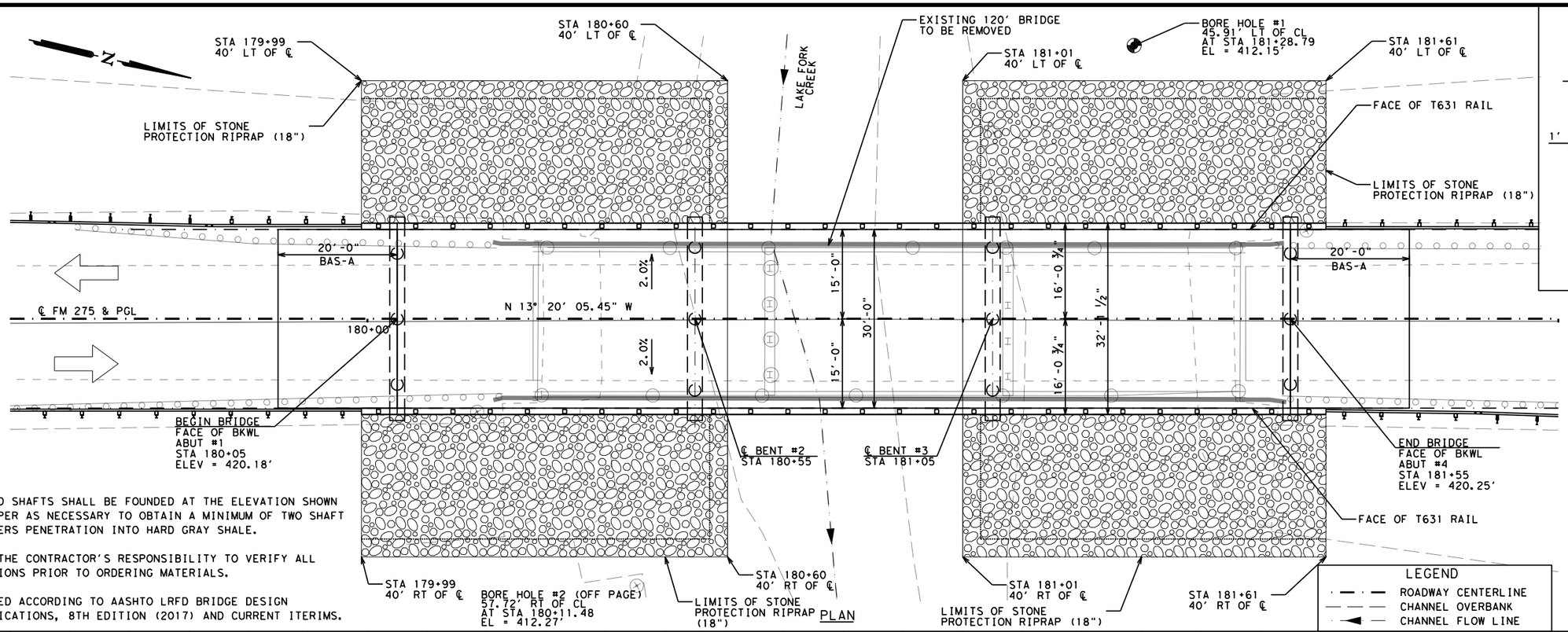
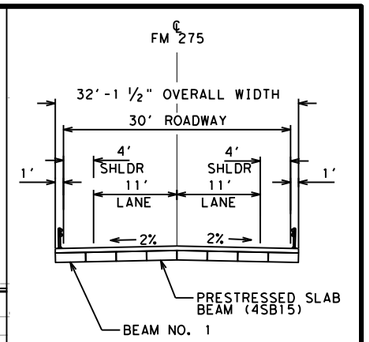




TYPICAL TRANSVERSE SECTION

ALL ABUTMENTS AND BENTS ARE ON BEARING N76° 39' 55"E

NOTES:
DRILLED SHAFTS SHALL BE FOUNDED AT THE ELEVATION SHOWN OR DEEPER AS NECESSARY TO OBTAIN A MINIMUM OF TWO SHAFT DIAMETERS PENETRATION INTO HARD GRAY SHALE.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.

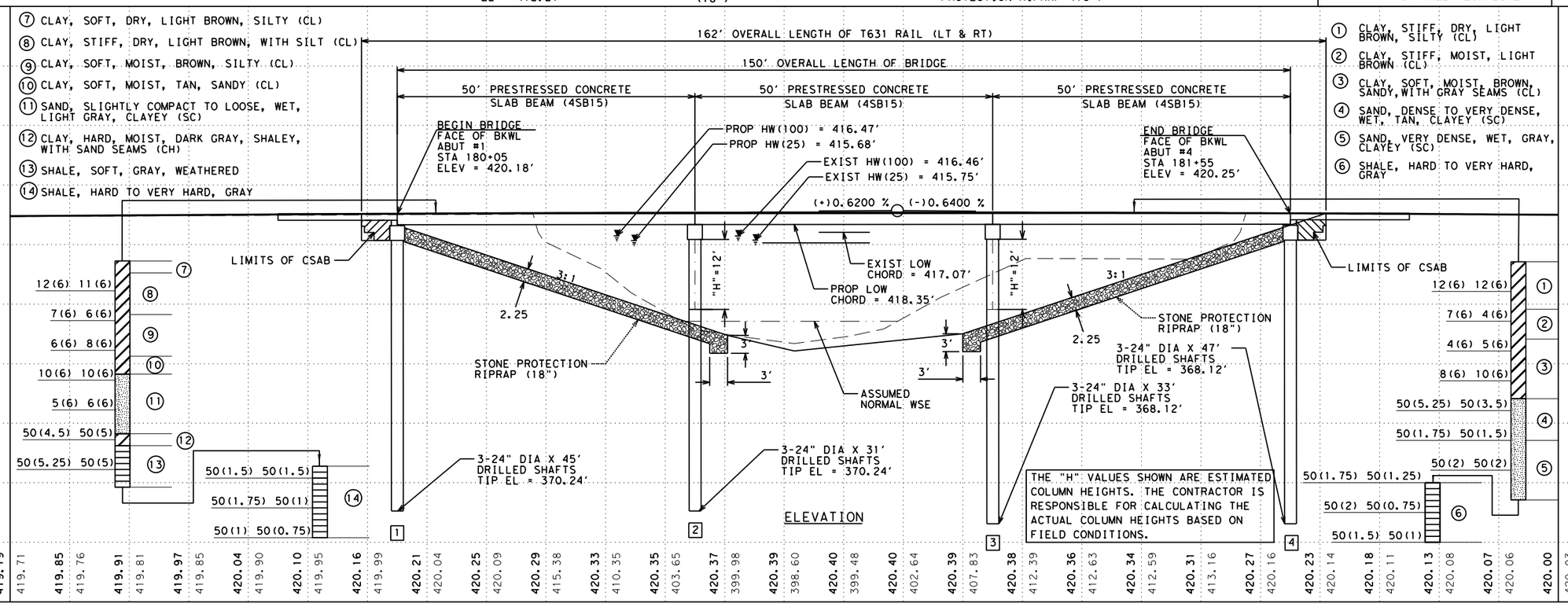
DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017) AND CURRENT ITERIMS.

BRIDGE DATA

DESIGN SPEED: 55 MPH
AADT: 1100 (2017) 1500 (2037)
FUNCTIONAL CLASS: MAJOR COLLECTOR
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-190-0-2277-01-001
STA. 180+29 - 181+49
120' THREE-SPAN PAN GIRDER
W/ CONCRETE DECK

PROPOSED STRUCTURE:
NBI#: 01-190-0-2277-01-002
STA. 180+05 - 181+55
150' THREE-SPAN PRESTRESSED
CONCRETE SLAB BEAMS
0° SKEW



ELEVATION

THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.

REFER TO PLAN AND PROFILE SHEETS FOR CONTROL INFORMATION

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FM 275
BRIDGE LAYOUT LAKE FORK CREEK

SCALE
VERTICAL: 1" = 20'
HORIZONTAL: 1" = 20'

SHEET OF

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		106

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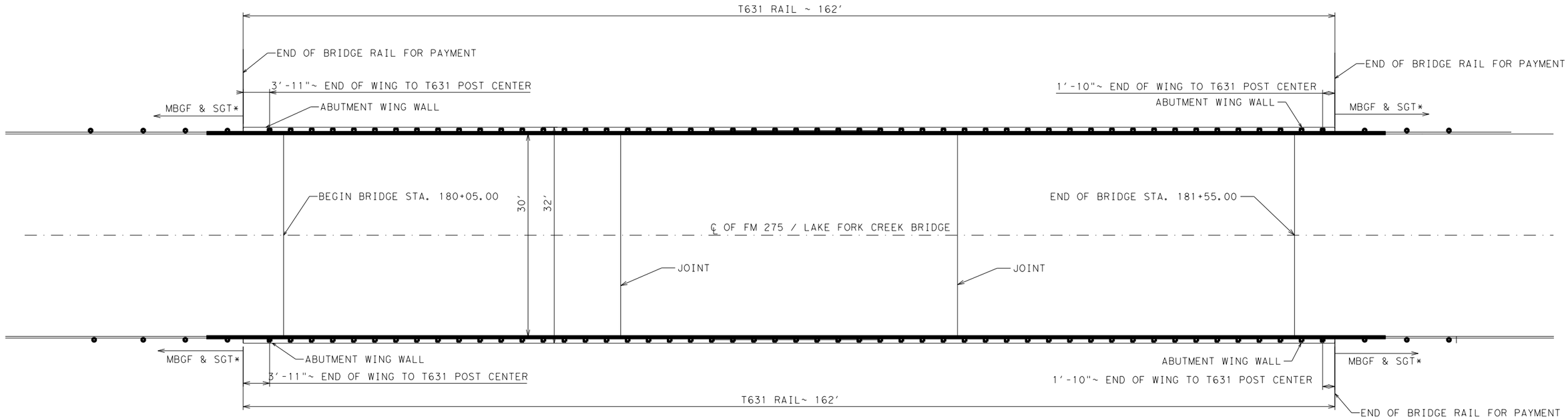
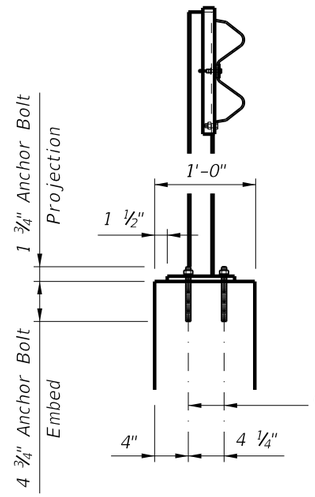


* SEE BRIDGE PLAN AND PROFILE SHEET



℄ ⅝" Dia ASTM-A193 Gr B7 or F1554 Gr 105 fully threaded rods with one Hardened Washer and one Regular Lock Washer placed under each Heavy Hex Nut ASTM-A563. See "Material Notes" for anchor installation.

ABUTMENT WING WALL EPOXY ADHESIVE ANCHORAGE

NOTES:

Utiilize this sheet in conjuction with Traffic Rail standard T631.

Wing wall epoxy adhesive anchor bolts must be 5/8" Dia ASTM-A193 Gr B7 or F1554 Gr 105 fully threaded rods with one Hardened Washer and one Regular Lock Washer placed under each Heavy Hex Nut ASTM-A563. Embed threaded rods 4 3/4" Min into slab and/or abutment wingwall using a Type III, Class C, D, E or F epoxy adhesive anchorage system capable of obtaining an ultimate load, per threaded rod, of 8 kips in tension. Submit evidence of the proposed epoxy adhesive anchorage system's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the Manufacturer's instructions.

Galvanize all steel components except reinforcing steel.

Flame cutting of galvanized steel is prohibited.

Repair damaged galvanization per Item 445 ~ Galvanizing.

Use through drilled holes for bridge deck mounted posts.

The Contractor shall layout post locations before bridge deck or wing wall drilling.

Utilize standard TCP (2-8) -18 for traffic control during bridge rail, MBGF and SGT installation.

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FM 275
BRIDGE RAIL LAYOUT
LAKE FORK CREEK

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		107

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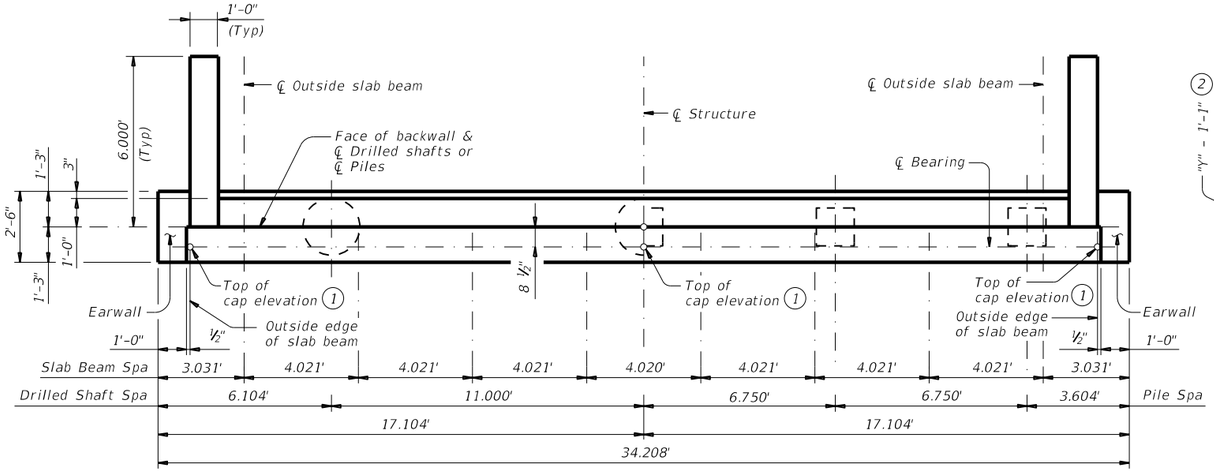
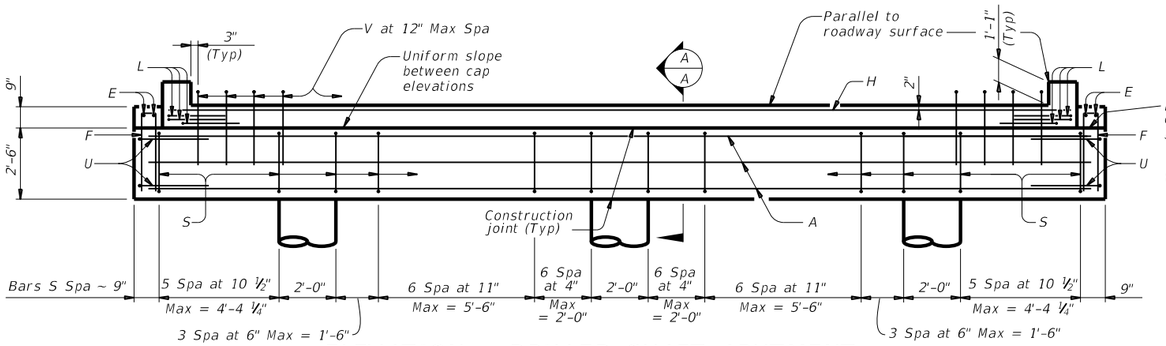
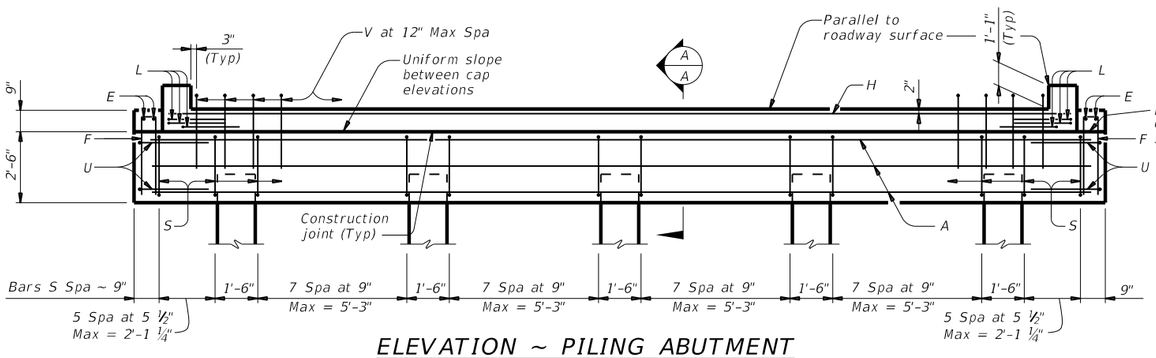


SHOWING DRILLED SHAFTS SHOWING PILES

PLAN

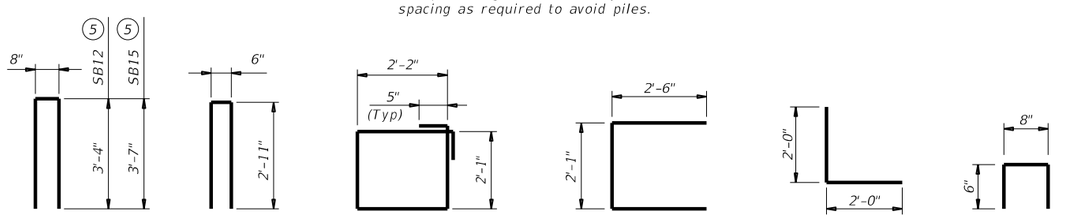


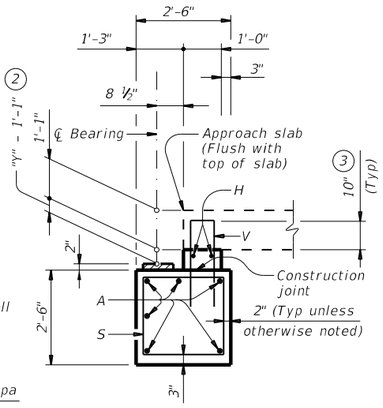
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

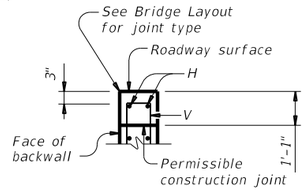
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





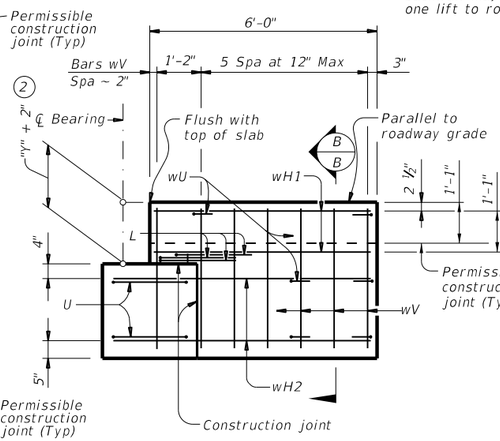
SECTION A-A (4)

(With Approach Slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

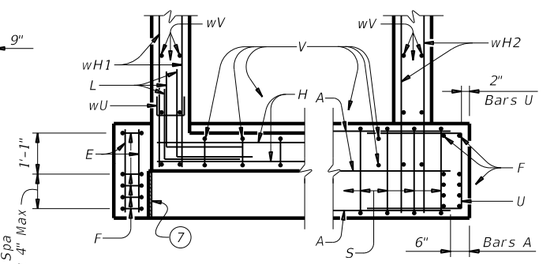
(Without Approach Slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	4SB12	4SB15	4SB12	4SB15
25	43	46	26	28
30	48	51	29	31
35	53	57	32	34
40	57	62	34	37
45		67		40
50		71		43

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			4SB12	4SB15	4SB12	4SB15
A	6	#11	33'-3"	33'-3"	1,060	1,060
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	31'-10"	31'-10"	66	66
L	6	#6	4'-0"	4'-0"	36	36
S	44	#4	9'-4"	9'-4"	275	275
U	4	#6	7'-1"	7'-1"	43	43
V	31	#5	7'-4"	7'-10"	237	253
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel		Lb	2,043	2,066		
Cl "C" Conc (Abut)		CY	10.4	10.8		

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) See Span Details for "Y".

(3) Increase as required to maintain 3" from finished grade.

(4) See Bridge Layout to determine if approach slab is present.

(5) See Bridge Layout for beam type used in the superstructure.

(6) Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.2 CY Class "C" concrete and 66 Lb reinforcing steel for 2 additional Bars H.

(7) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-30 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

PRESTR CONCRETE SLAB BEAM

30' ROADWAY

APSB-30

FILE: psbste17-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		108

DATE: 3/29/2021 11:15:10 AM
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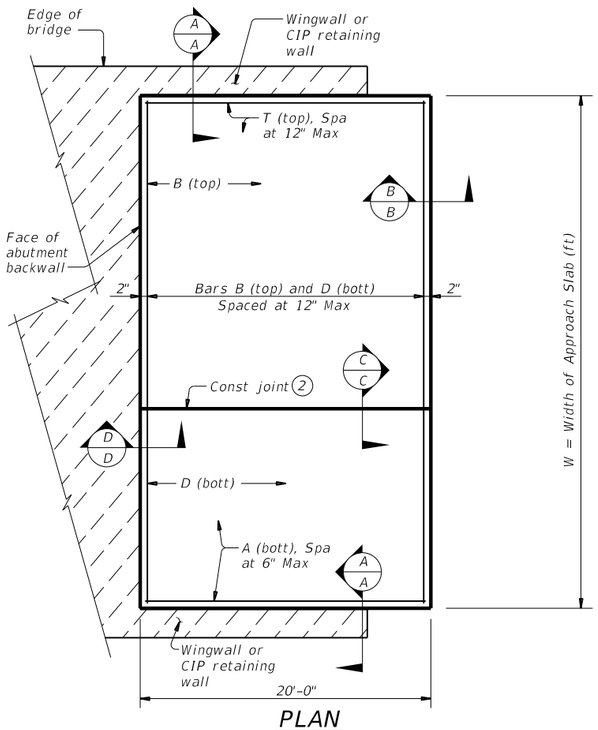
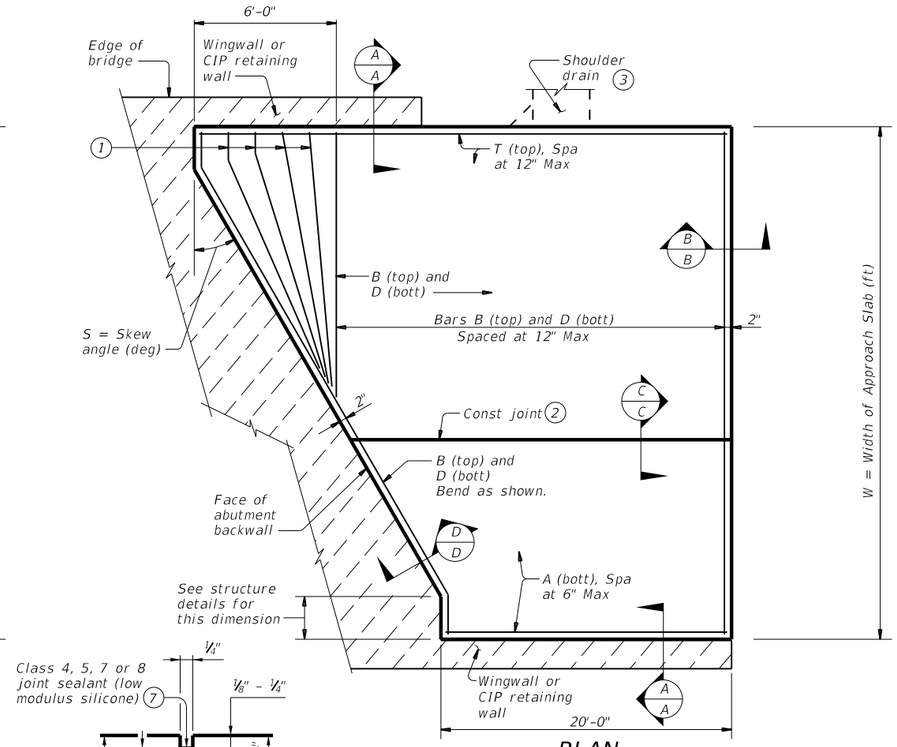


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

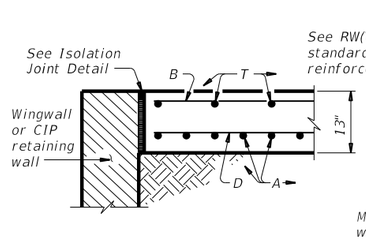
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

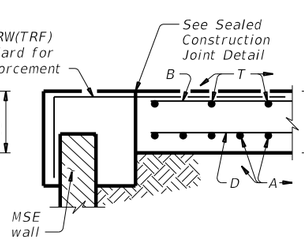
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

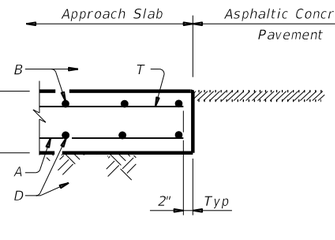
Cover dimensions are clear dimensions, unless noted otherwise.

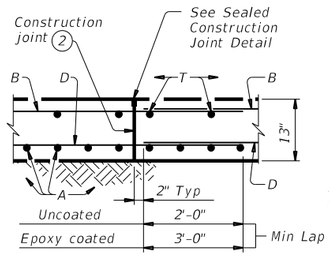


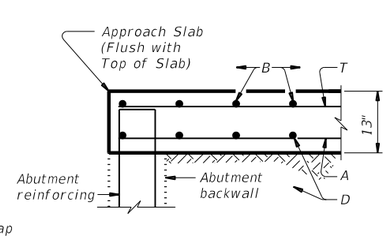
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





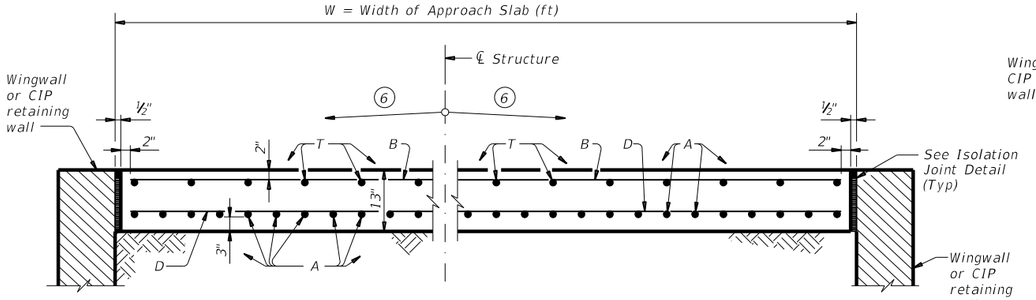


SECTION A-A

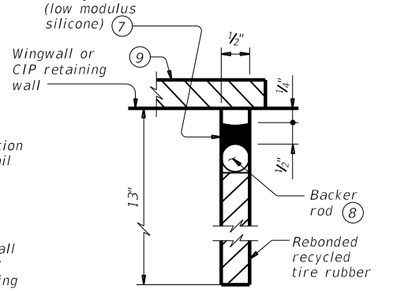
SECTION B-B

SECTION C-C (5)

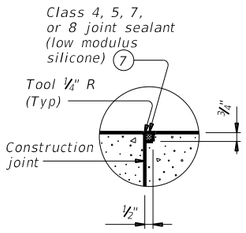
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basasheet1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		109

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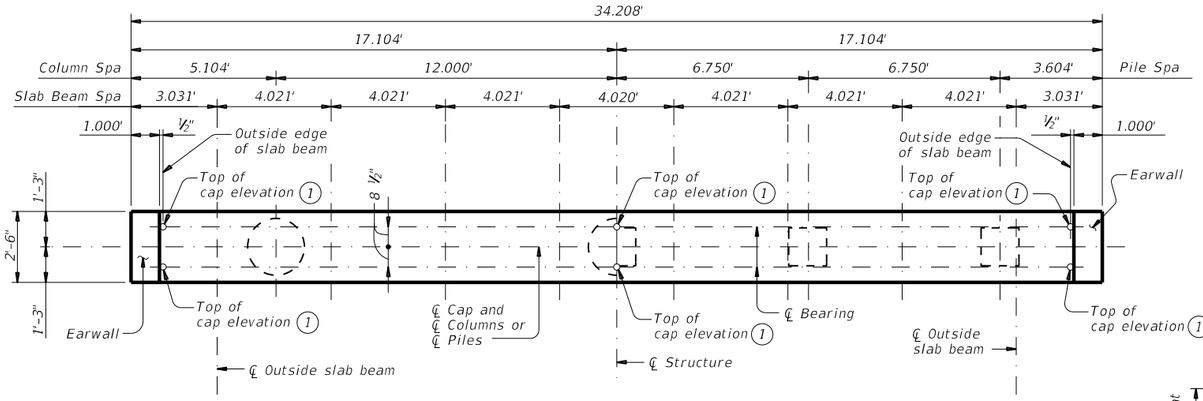
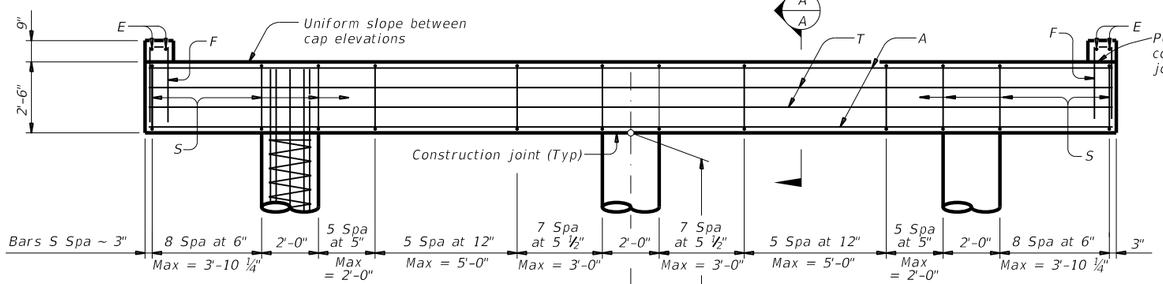
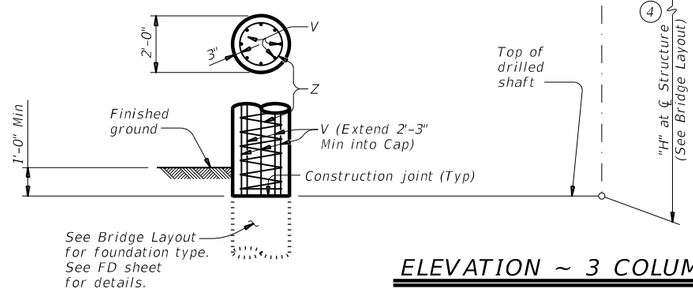


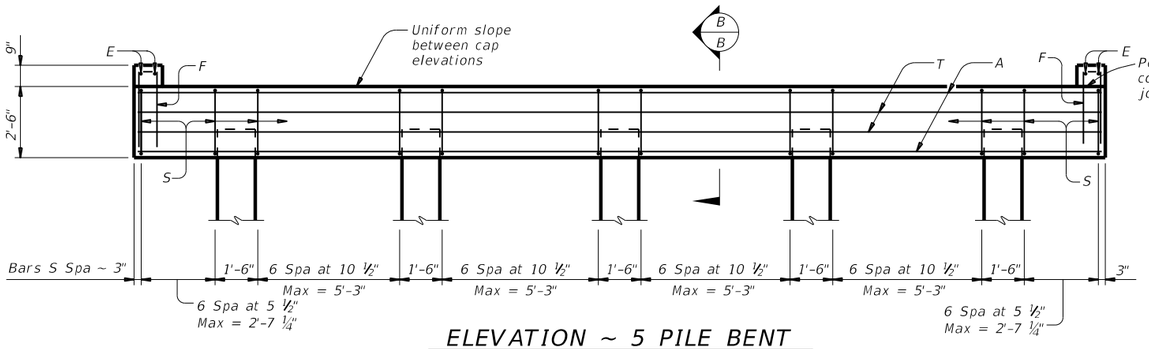
SHOWING COLUMNS SHOWING PILES

PLAN



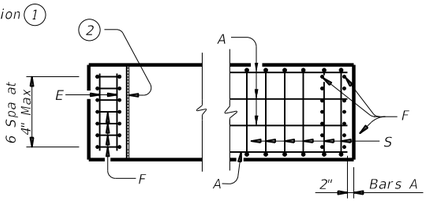


ELEVATION ~ 3 COLUMN BENT



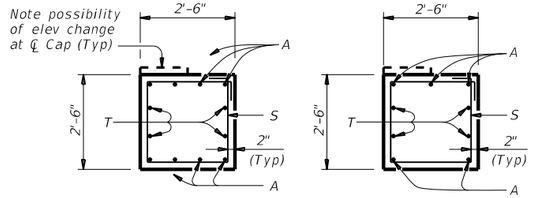
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.

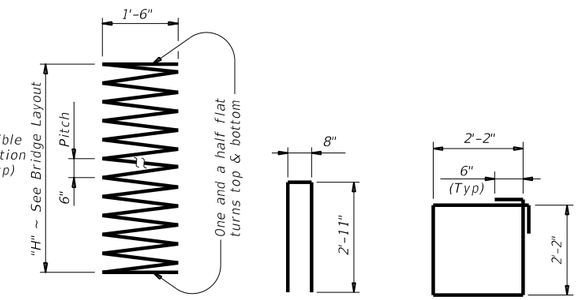


EARWALL CAP

CAP END DETAIL



SECTION A-A SECTION B-B



BARS Z BARS F BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	4SB12	4SB15	4SB12	4SB15
25	65	70	39	42
30	75	81	45	48
35	83	90	50	54
40	91	99	55	60
45		108		65
50		117		70

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	33'-10"	1,438
E	4	#4	2'-2"	6
F	14	#4	6'-6"	63
S	54	#5	9'-8"	545
T	4	#5	33'-10"	141
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,752
Cl "C" Conc (Cap)			CY	8.0
Cl "C" Conc (Col)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	33'-10"	899
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	42	#5	9'-8"	424
T	4	#5	33'-10"	141
Reinforcing Steel			Lb	1,531
Cl "C" Conc (Cap)			CY	8.0

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of Cap Elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

These bent details may be used with standard SPSB-30 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS

PRESTR CONCRETE SLAB BEAM

30' ROADWAY

BPSB-30

FILE: psbste27-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		110

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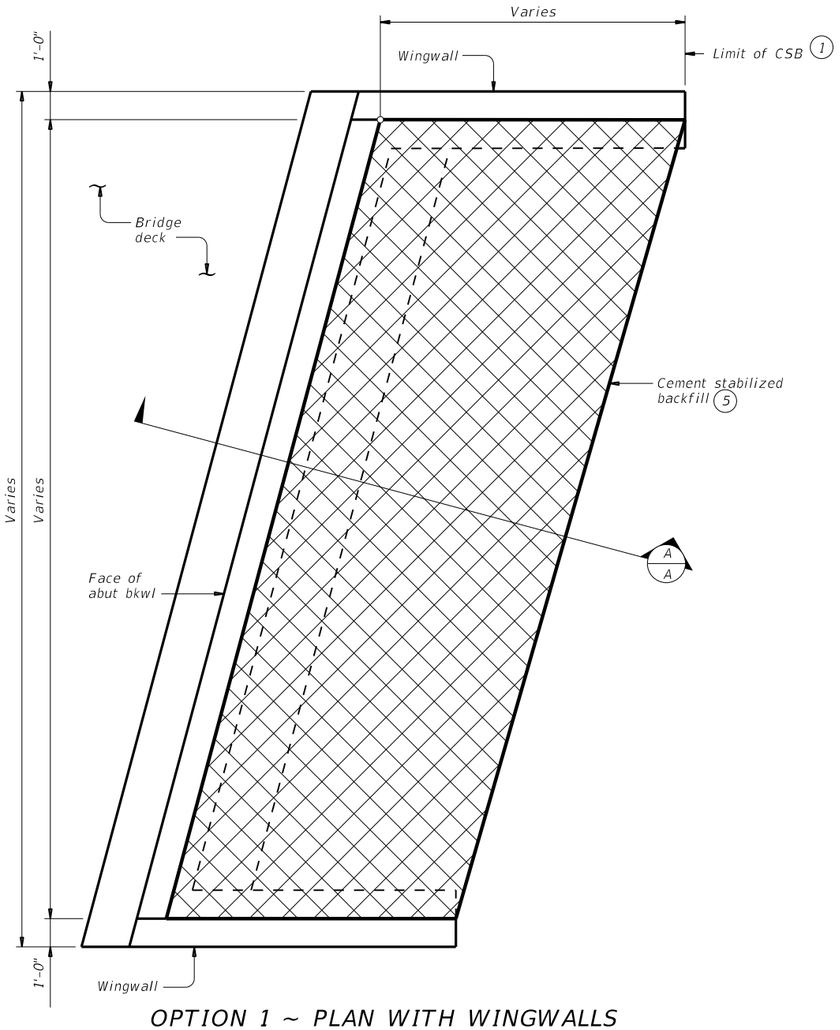
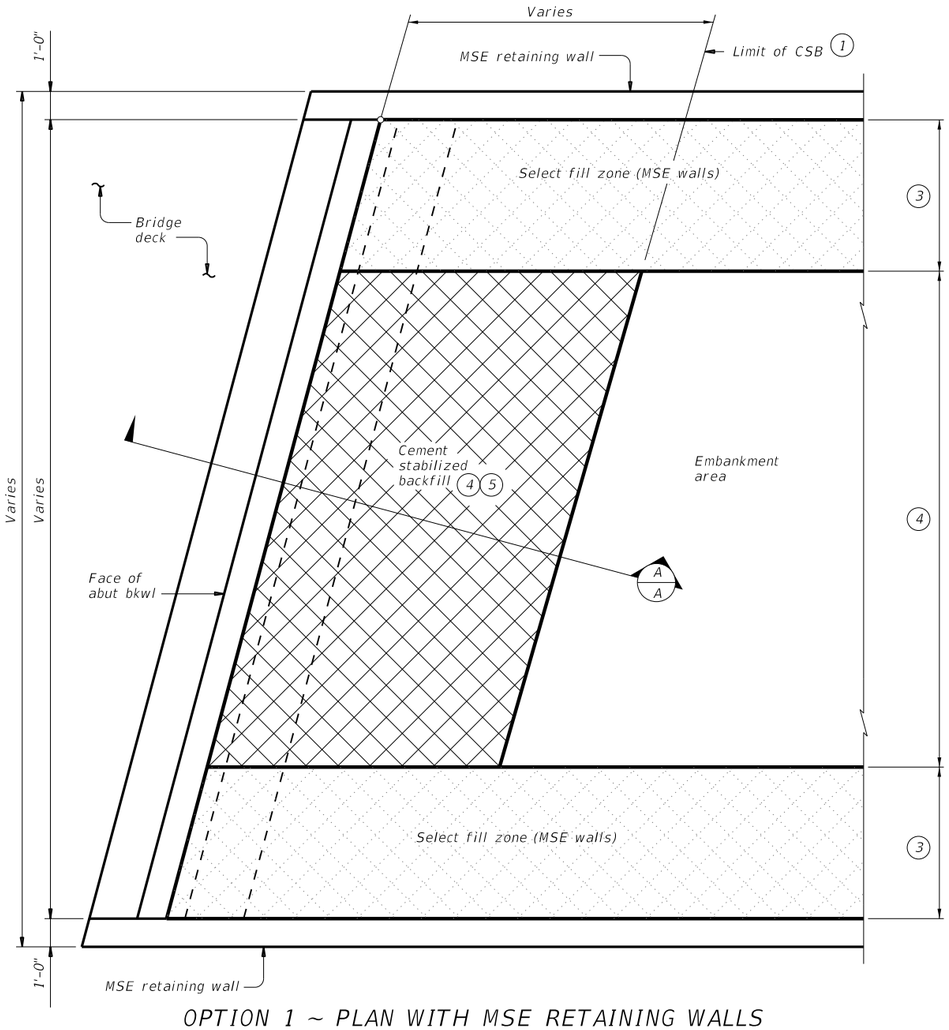
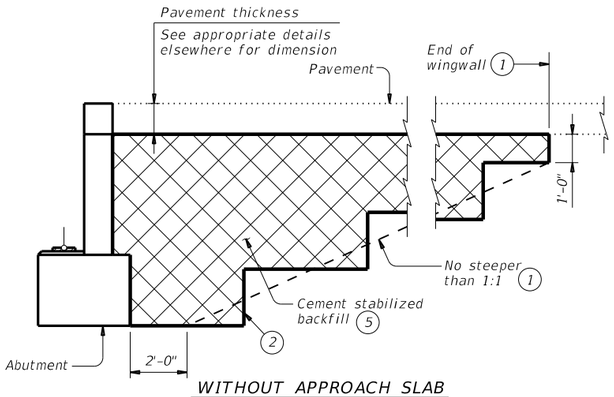


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



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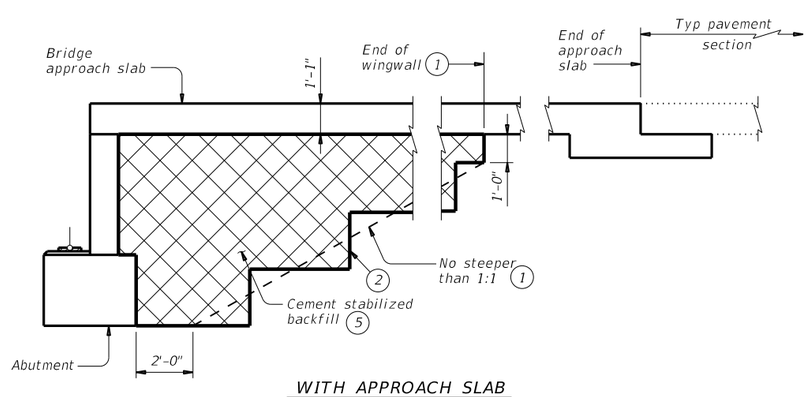

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

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

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		111

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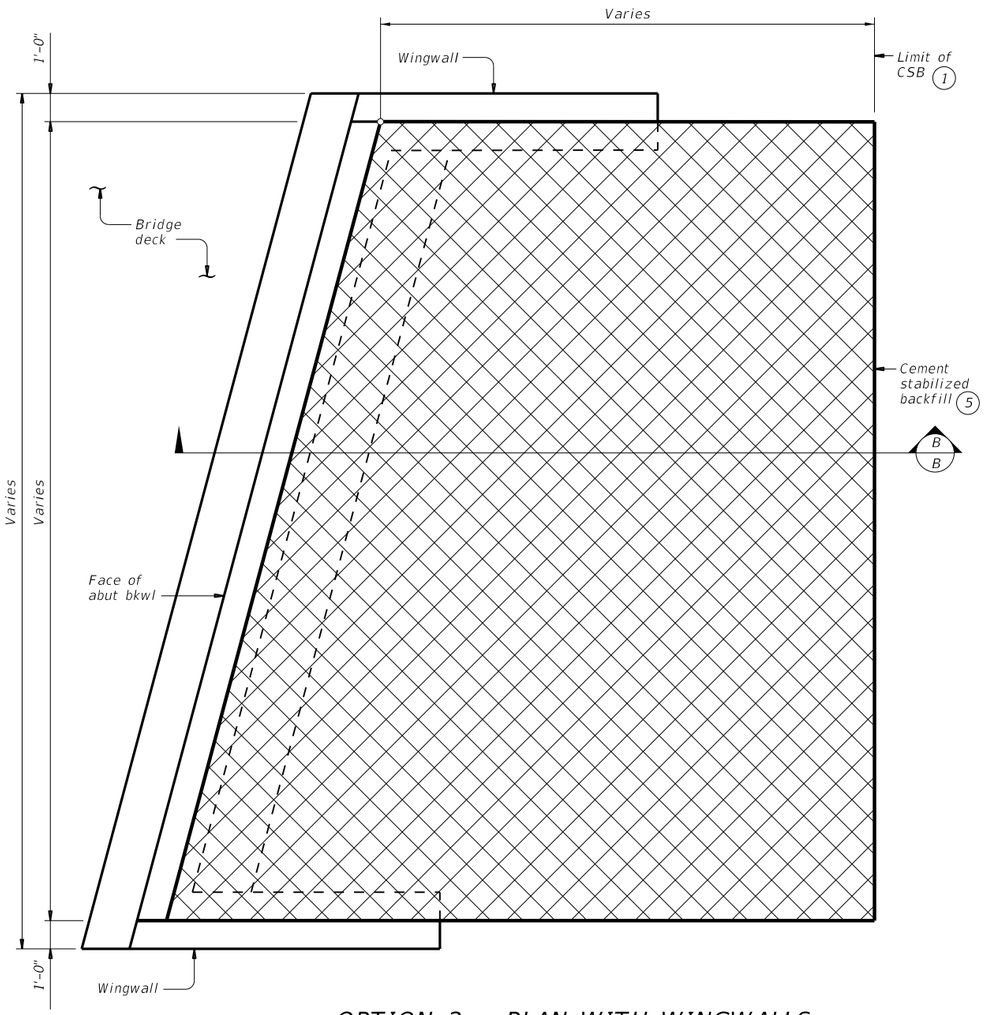
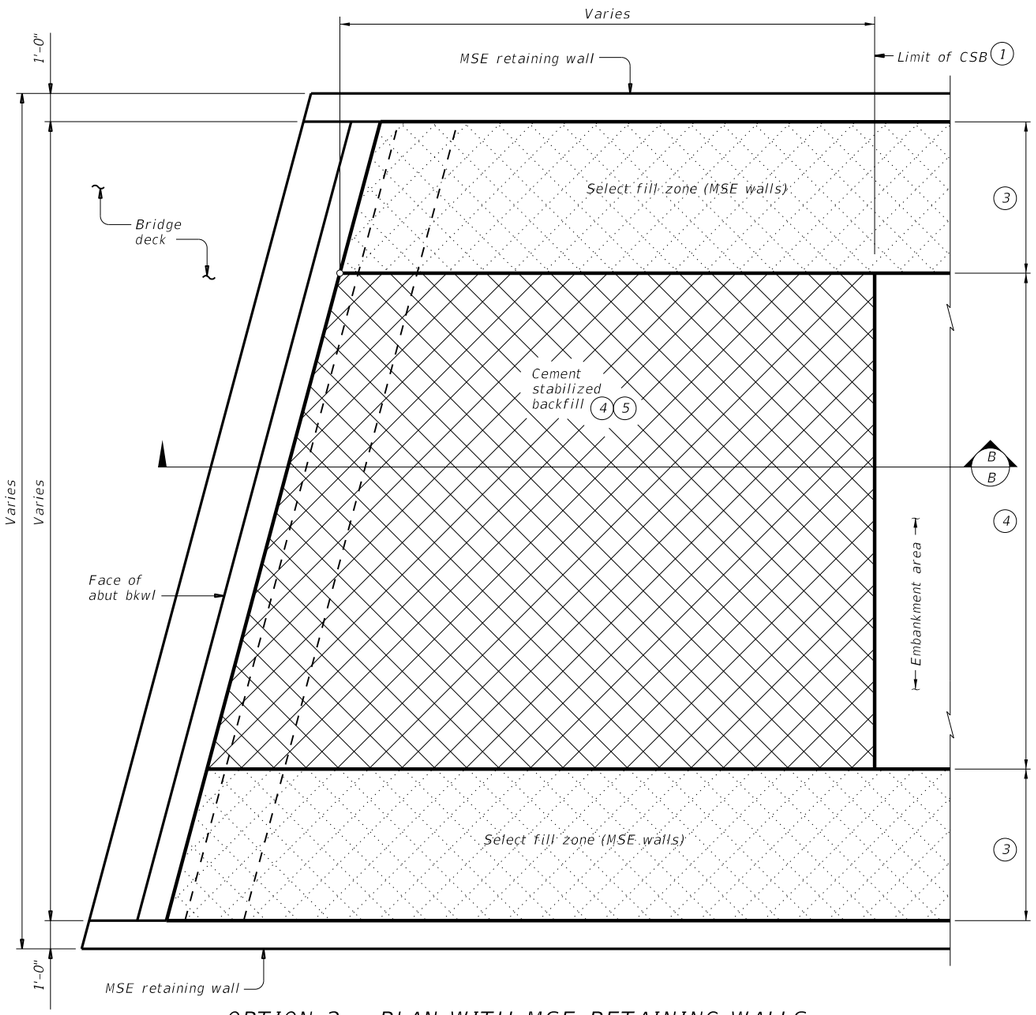


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

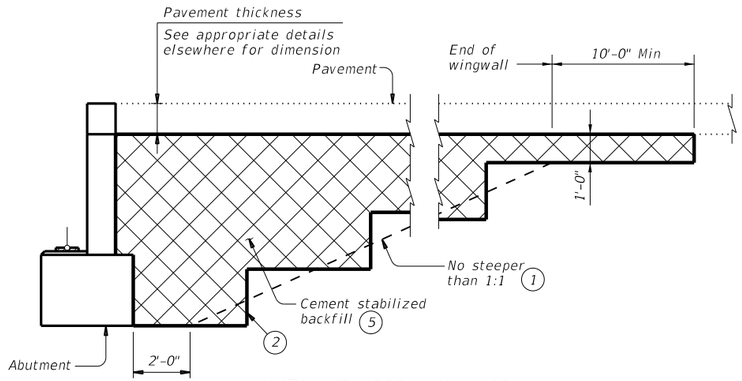
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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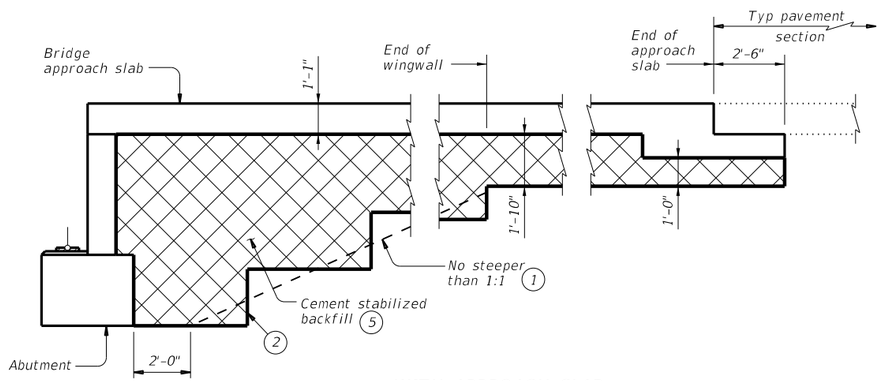

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
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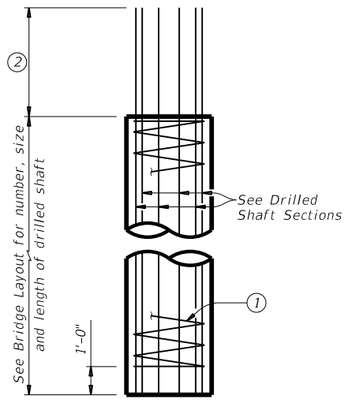
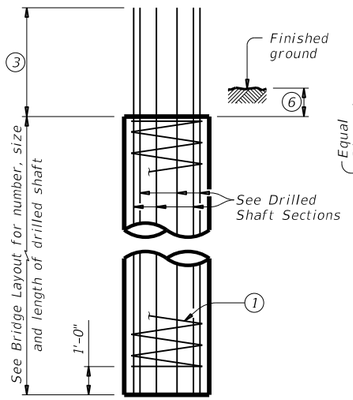
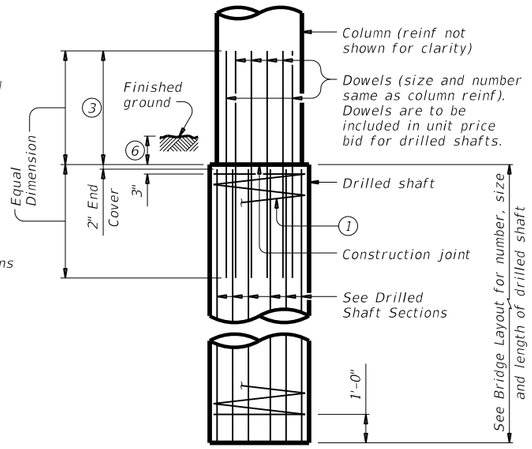


ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS

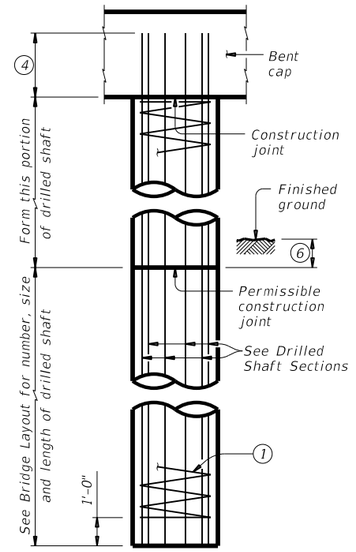


INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA

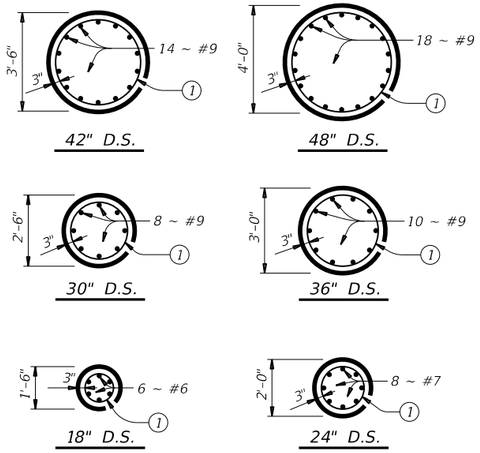


INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA

DRILLED SHAFT DETAILS



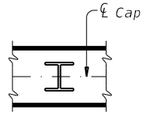
OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)



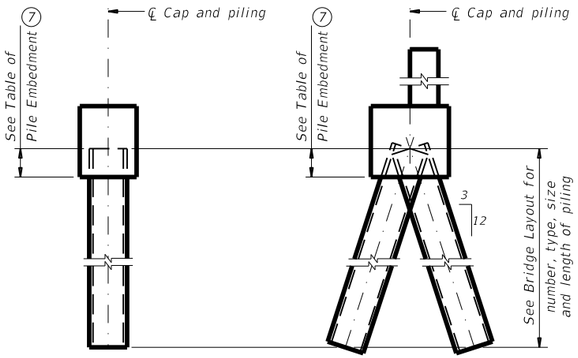
DRILLED SHAFT SECTIONS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

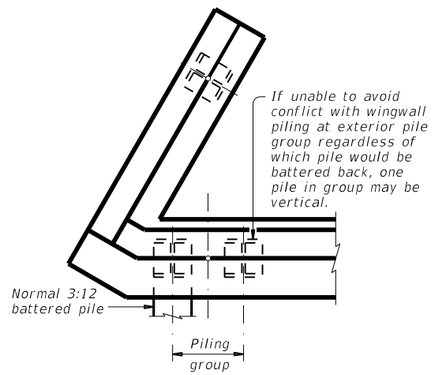
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



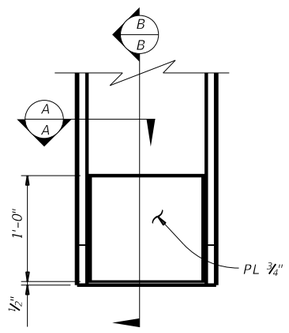
ORIENTATION OF STEEL H-PILING

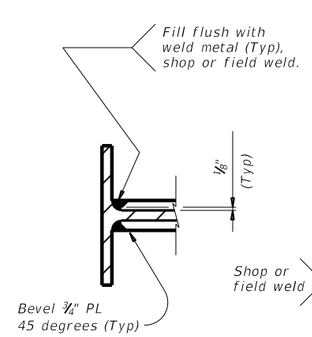


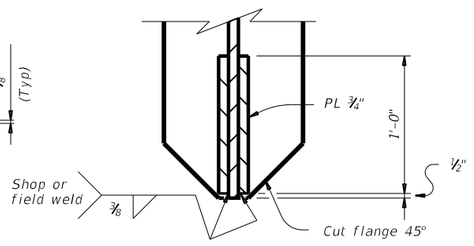
PILING DETAILS
(Concrete or steel H)



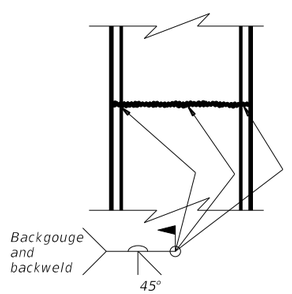
DETAIL "A"
(Showing plan view of a 30° skewed abutment)

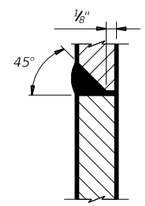






STEEL H-PILE TIP REINFORCEMENT
See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL
Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		113

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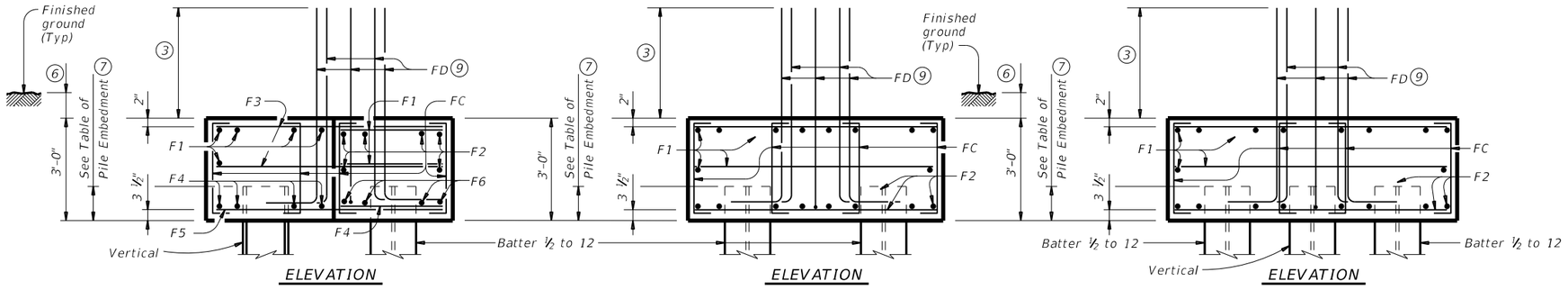
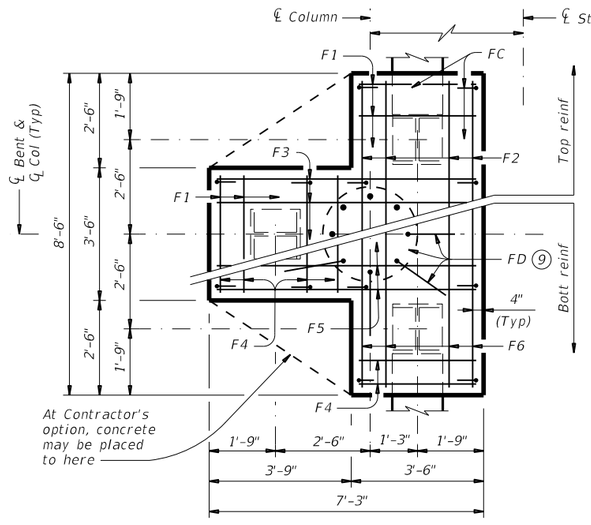
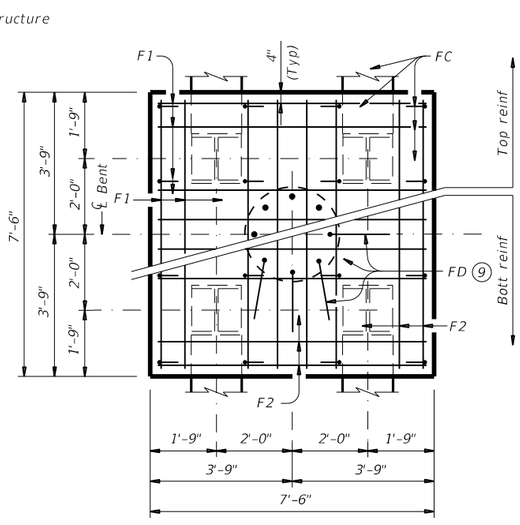




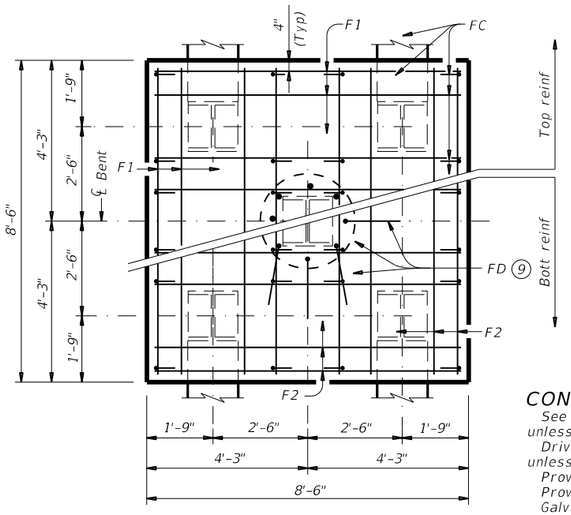
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



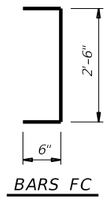
FOUR PILE FOOTING (8)

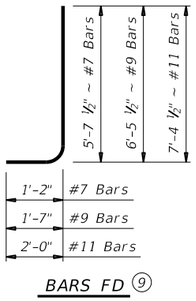
For 42" Dia and smaller columns.



FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.





(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		114

DATE: 3/29/2021 11:15:23 AM
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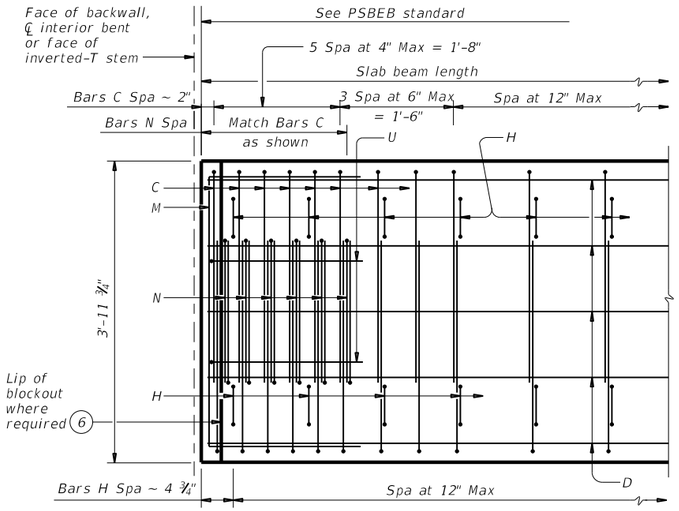
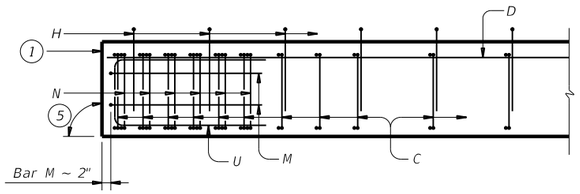
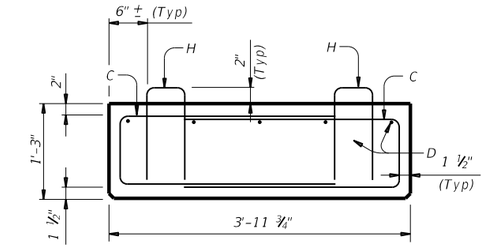


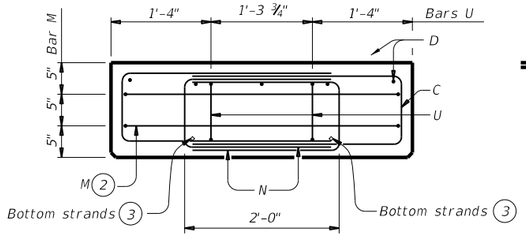
PART PLAN



ELEVATION

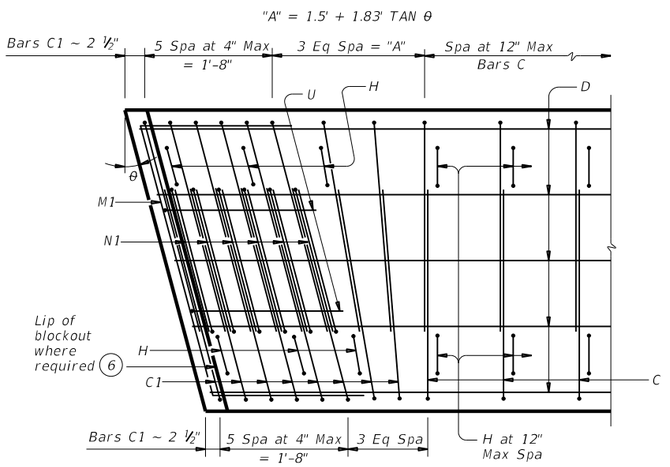


SECTION



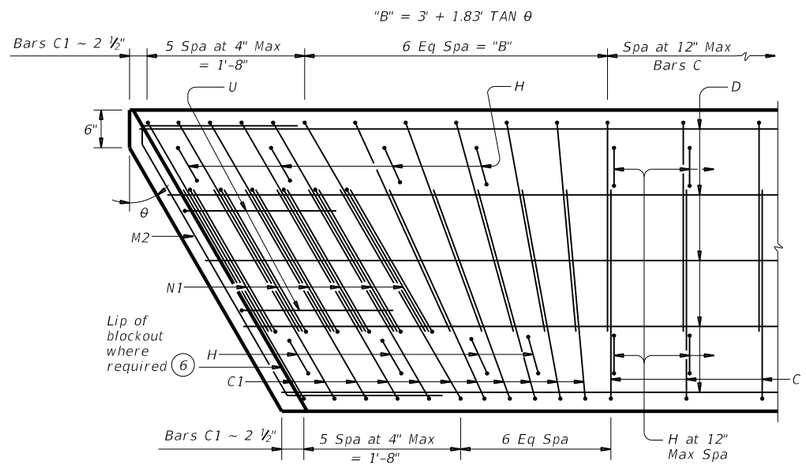
END MAT REINFORCING

Bars H not shown for clarity.



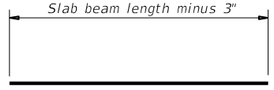
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)

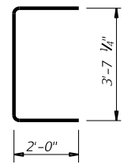


PART SKEW PLAN

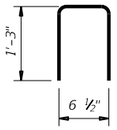
(Showing θ over 15° to 30° Skew)



BARS D(#6)



BARS M(#4)



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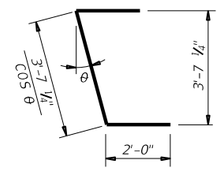

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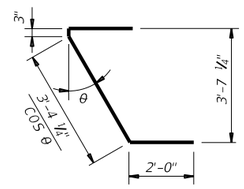

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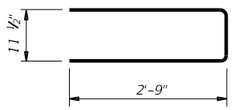
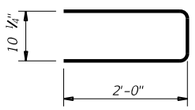
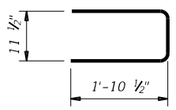


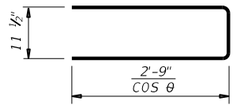
BARS C(#4)



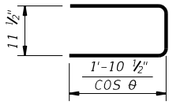
BARS U(#5)



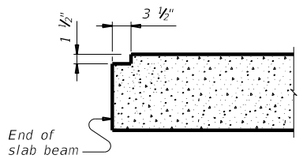
BARS N(#4)



BARS C1(#4)



BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	716.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	13,429
Weight (4)	lb/ft	746

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

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

(1) See End Mat Reinforcing detail.
(2) Adjust bars M vertically to avoid strands.
(3) See sheet PSBND or PSBSD for strand locations.
(4) Assumes 150 pcf weight density of concrete.
(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 4SB15)

PSB-4SB15

FILE: psbsts02-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		115

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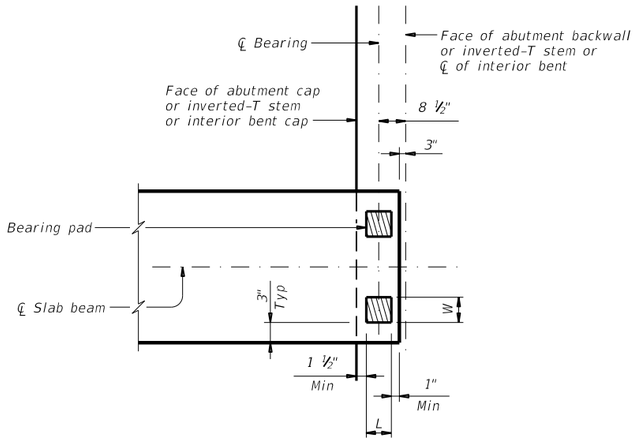
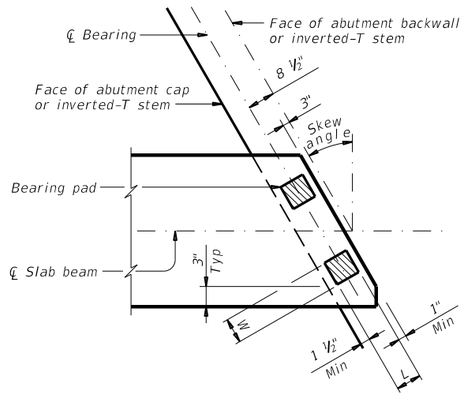
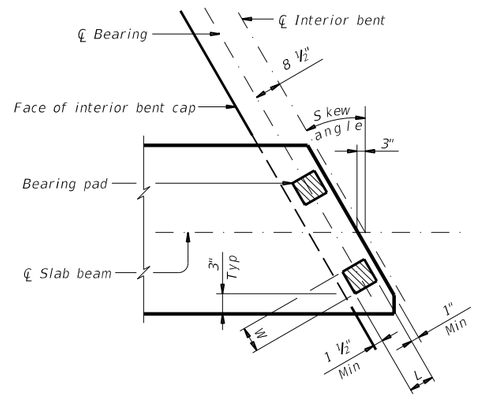


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



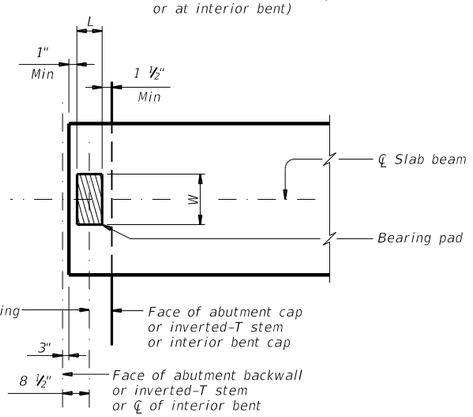
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

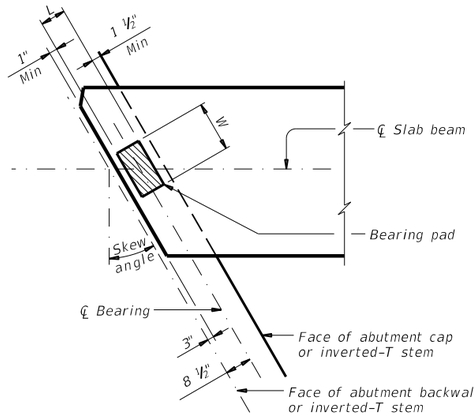
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

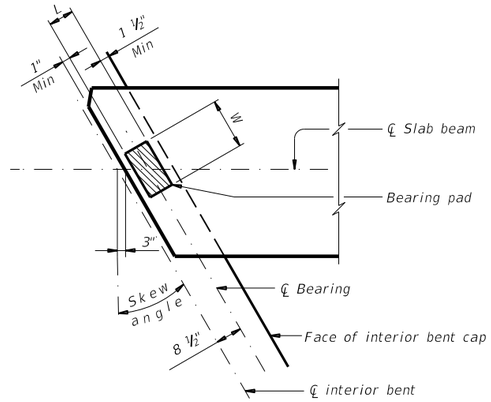
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



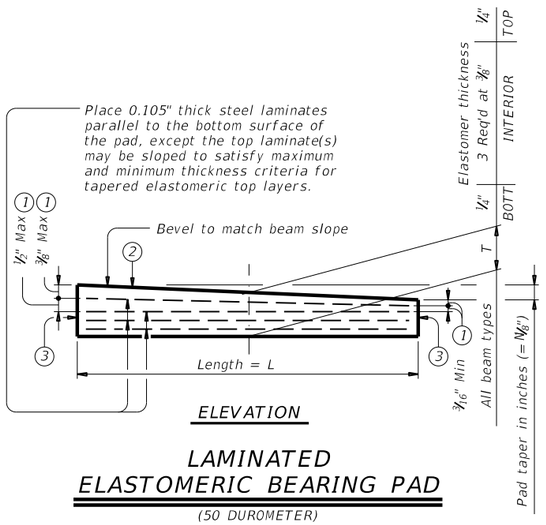
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:
These details accommodate skew angles up to 30°.
Shop drawings for approval are required.
A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation
Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		116

DATE: 3/29/2021 11:15:28 AM
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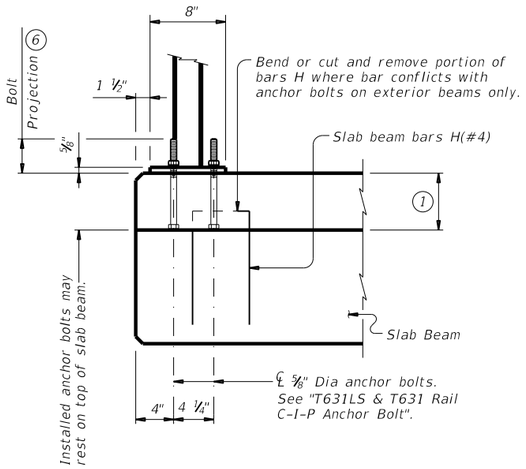
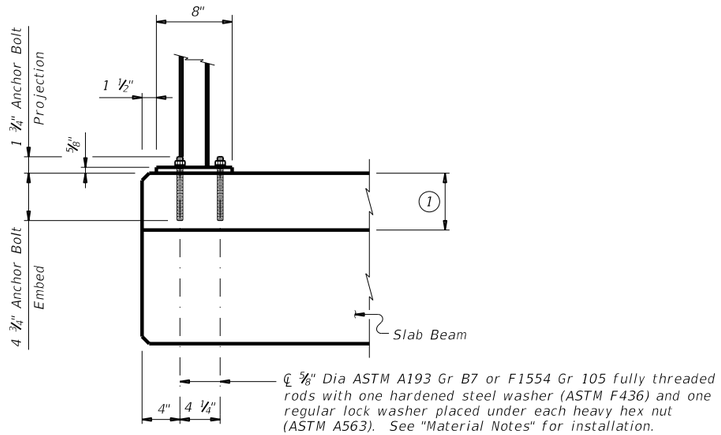


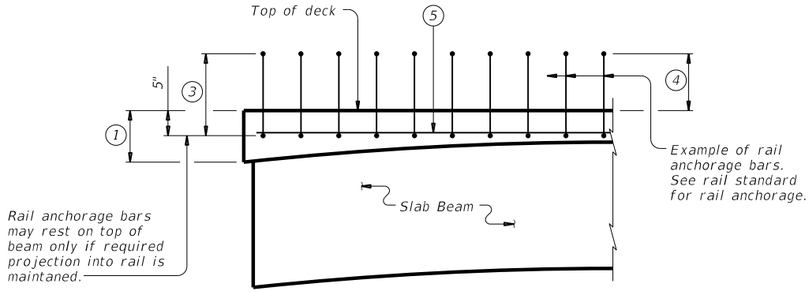
CAST-IN-PLACE ANCHORAGE OPTION



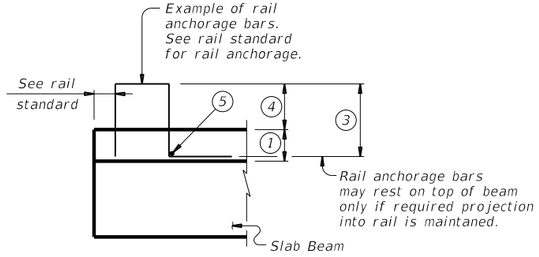
ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT 2 7

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.
4. See rail standard for projection from finished grade or top of sidewalk.
5. Place additional (#5) longitudinal bar.
6. Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" preformed bitumuminous fiber material under concrete rail, as shown.



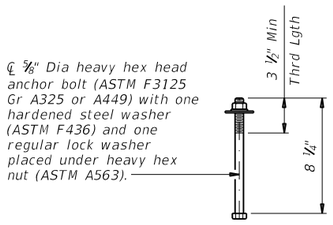
PART SPAN ELEVATION



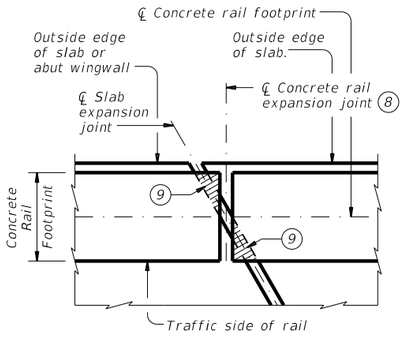
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	PAR	RAINS		117

DATE: 3/29/2021 11:15:31 AM
FILE: T:\PARIPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\psbsts08-21.dgn

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	NO. OF STRANDS: TOTAL	NO. OF STRANDS: DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ②: Moment	Shear	LOAD RATING: STRENGTH I: Inv	Opr	SERVICE III: Inv
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.914	-1.217	448	0.450	0.450	1.40	1.82	1.71
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.292	-1.685	530	0.450	0.450	1.25	1.62	1.29
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.730	-2.219	675	0.450	0.450	1.33	1.73	1.23
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.218	-2.796	820	0.440	0.440	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.725	-0.897	551	0.450	0.450	1.77	2.29	2.41
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.020	-1.244	574	0.450	0.450	1.23	1.59	1.45
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.361	-1.640	708	0.450	0.450	1.15	1.49	1.14
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.739	-2.068	864	0.440	0.440	1.32	1.71	1.19
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.179	-2.574	1054	0.440	0.440	1.34	1.73	1.08
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000	2.680	-3.153	1276	0.440	0.440	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.903	-1.184	444	0.430	0.430	1.47	1.91	1.80
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.276	-1.639	508	0.430	0.430	1.32	1.71	1.37
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.708	-2.159	647	0.430	0.430	1.18	1.53	1.02
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.200	-2.744	799	0.430	0.430	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.716	-0.874	529	0.430	0.430	1.85	2.40	2.53
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.007	-1.212	570	0.430	0.430	1.29	1.67	1.53
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.343	-1.598	680	0.430	0.430	1.21	1.57	1.22
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.725	-2.032	842	0.430	0.430	1.36	1.76	1.24
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.149	-2.508	1013	0.420	0.420	1.41	1.82	1.16
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000	2.643	-3.073	1227	0.420	0.420	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.904	-1.187	341	0.340	0.340	1.38	1.79	1.67
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.277	-1.646	407	0.340	0.340	1.32	1.71	1.37
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.711	-2.169	518	0.340	0.340	1.24	1.60	1.08
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	2.205	-2.758	640	0.340	0.340	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.723	-0.888	431	0.350	0.350	1.69	2.19	2.32
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	1.017	-1.231	438	0.350	0.350	1.16	1.50	1.37
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.346	-1.605	545	0.340	0.340	1.21	1.57	1.21
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.729	-2.043	675	0.340	0.340	1.47	1.91	1.38
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000	2.166	-2.542	823	0.340	0.340	1.33	1.73	1.06
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000	2.665	-3.115	998	0.340	0.340	1.32	1.71	1.02

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

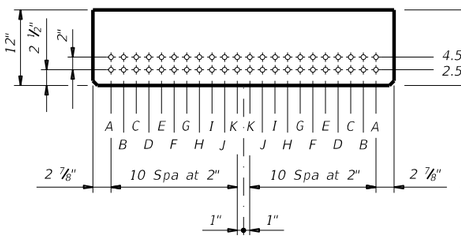
② Portion of full HL93.

DESIGN NOTES:

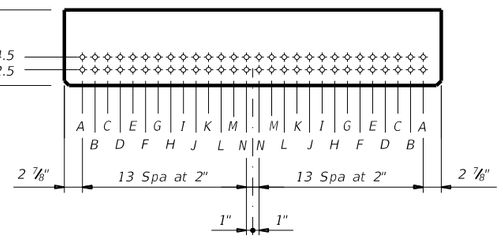
Designed according to AASHTO LRFD Bridge Design Specifications.
Load rated using Load and Resistance Factor Rating according to AASTHO Manual for Bridge Evaluation.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

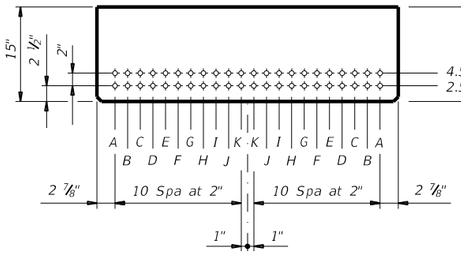
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



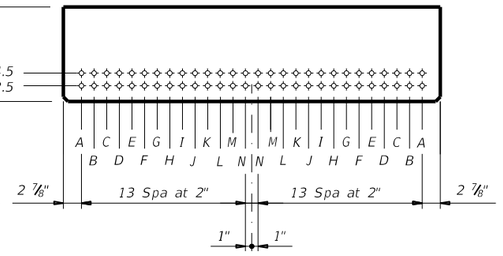
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

24', 28' & 30' ROADWAY

PSBSD

FILE: psbsts08-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	2277	01	010,etc	FM 275
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	PAR	RAINS		118

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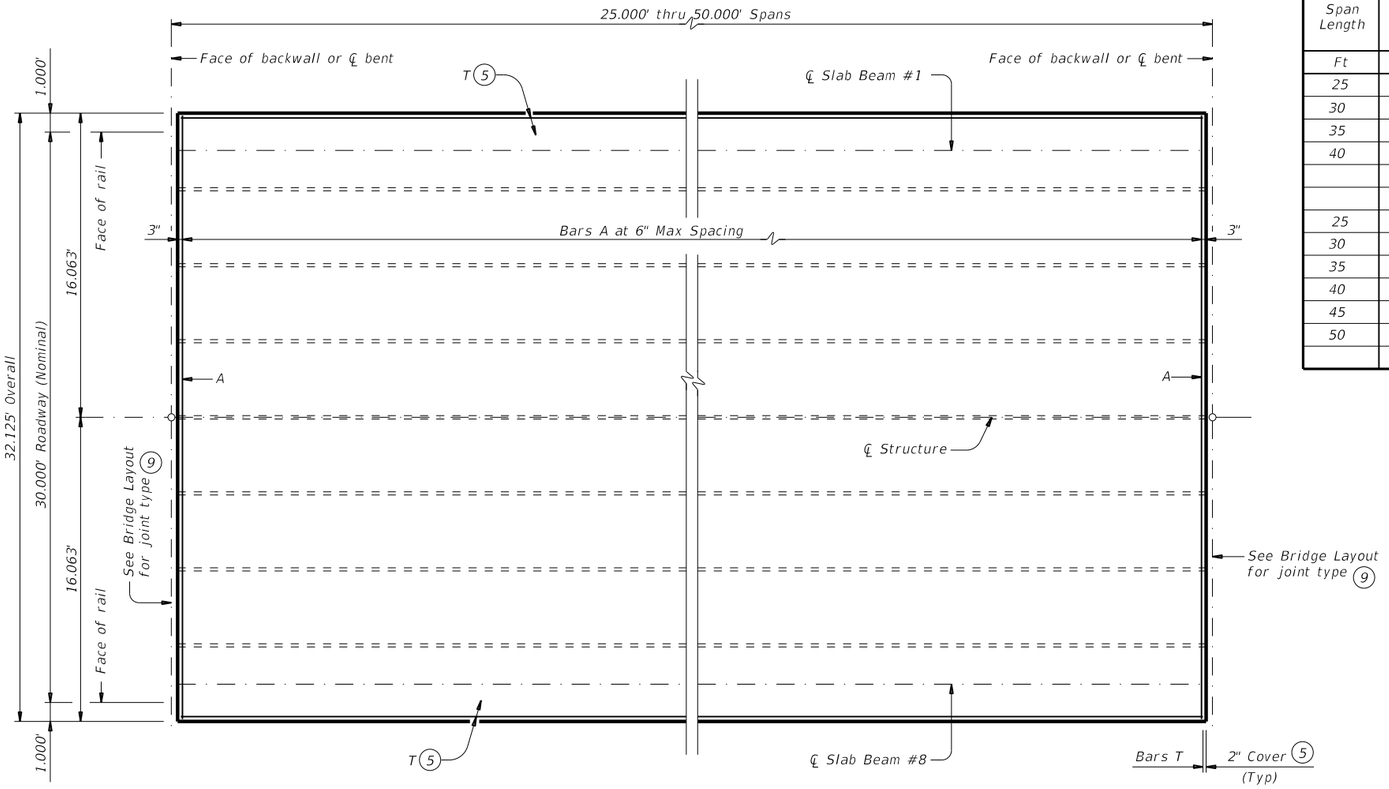
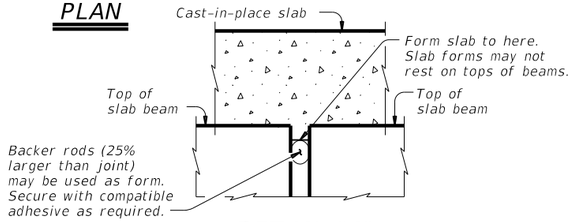
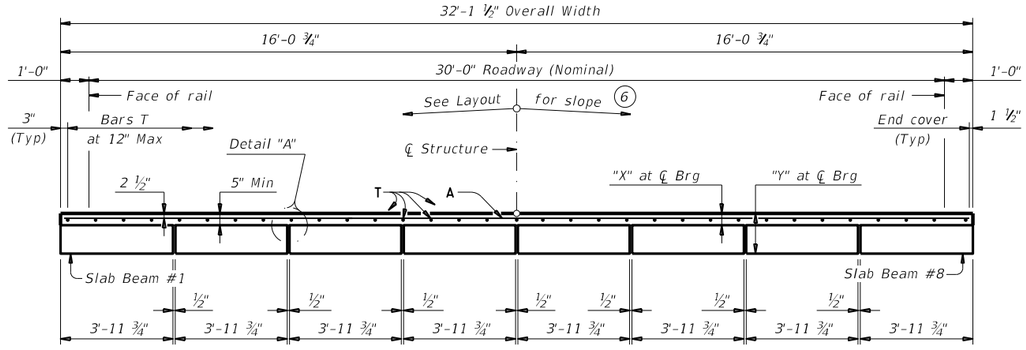


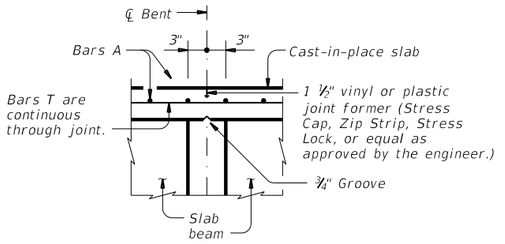
PLAN



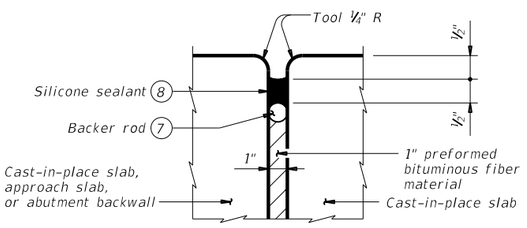
DETAIL "A"



TYPICAL TRANSVERSE SECTION



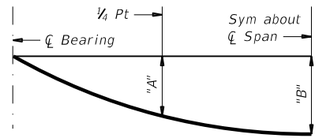
CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	4SB12	0.003	0.005	5 ¼"	1'-5 ¼"
30	4SB12	0.007	0.010	5 ½"	1'-5 ½"
35	4SB12	0.014	0.020	6"	1'-6"
40	4SB12	0.025	0.035	6 ½"	1'-6 ½"
25	4SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	4SB15	0.004	0.005	5 ½"	1'-8 ½"
35	4SB15	0.007	0.010	5 ½"	1'-8 ½"
40	4SB15	0.013	0.018	5 ¾"	1'-8 ¾"
45	4SB15	0.021	0.029	6 ½"	1'-9 ½"
50	4SB15	0.032	0.045	7"	1'-10"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (4SB12 OR 4SB15) (1)			TOTAL (2) REINF STEEL
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	803	196.00	196.00	196.00	2,250
30	964	236.00	236.00	236.00	2,700
35	1,124	276.00	276.00	276.00	3,150
40	1,285	316.00	316.00	316.00	3,600
45	1,446	356.00	356.00	356.00	4,050
50	1,606	396.00	396.00	396.00	4,500

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-0"
Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

30' ROADWAY

SPSB-30

FILE: psbste36-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	RAINS		119

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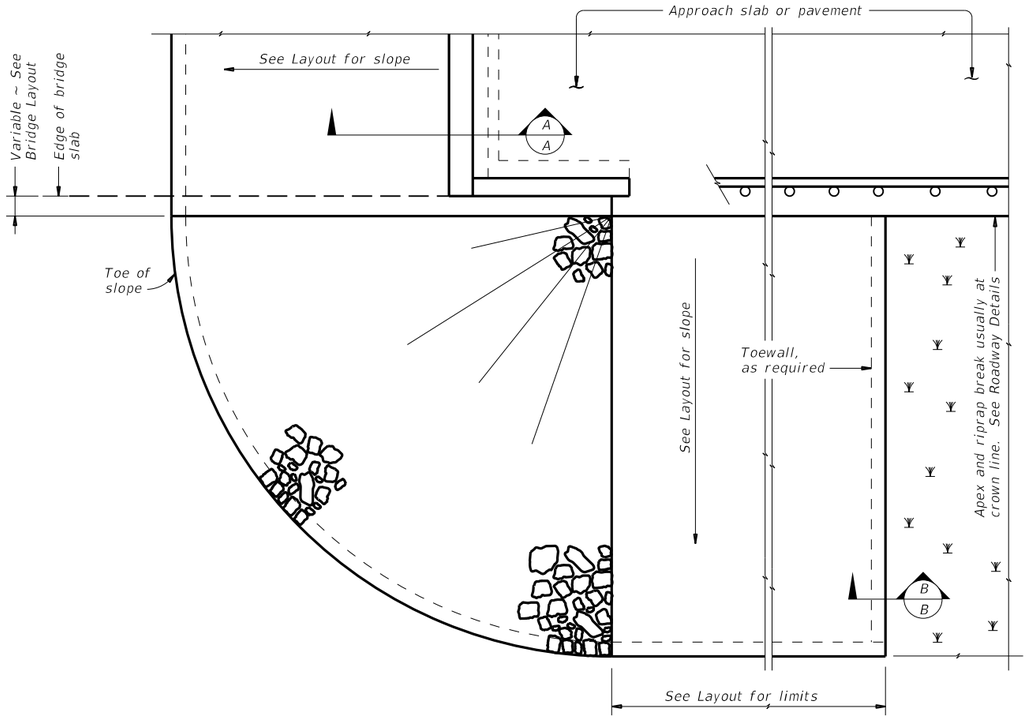
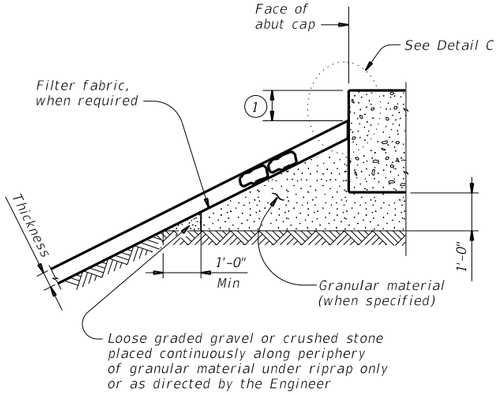
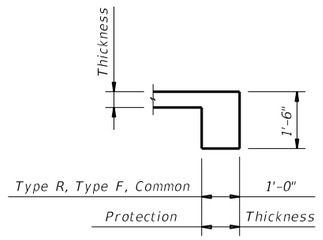


PLAN

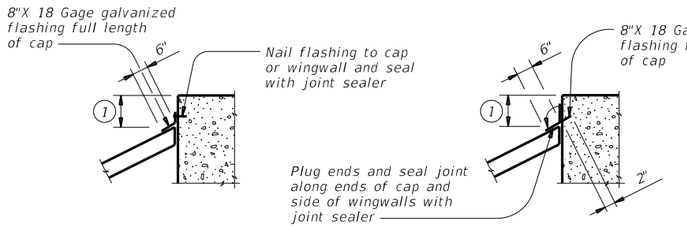


SECTION A-A AT CAP



SECTION B-B

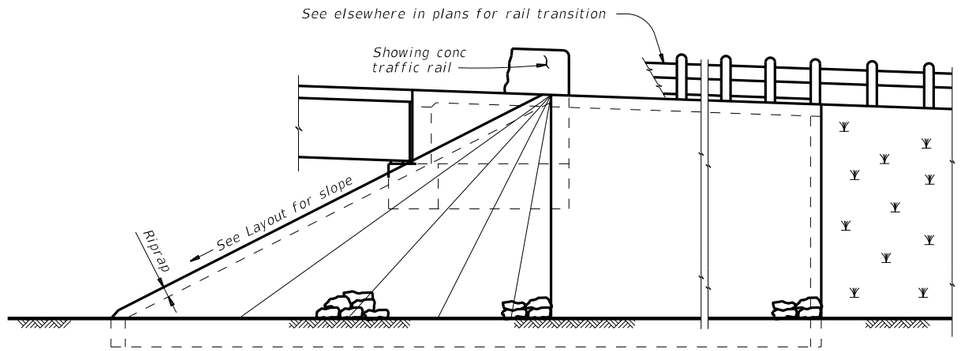
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
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	PAR	RAINS		120

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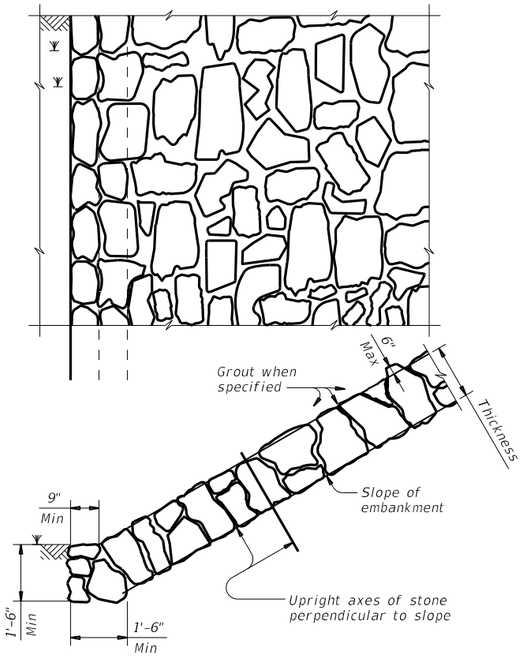


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

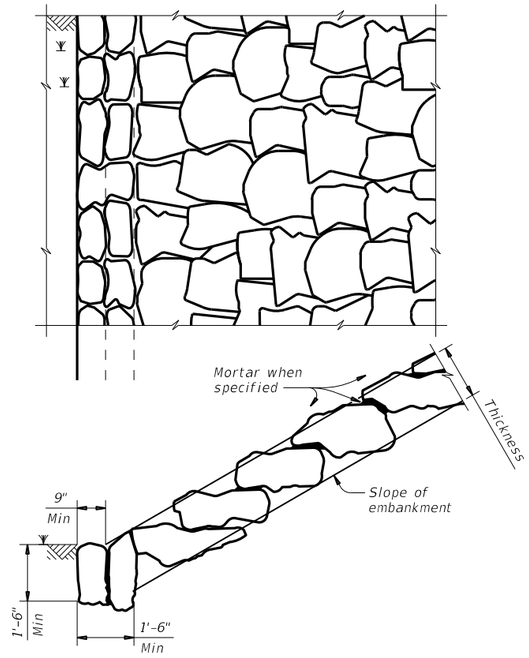


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

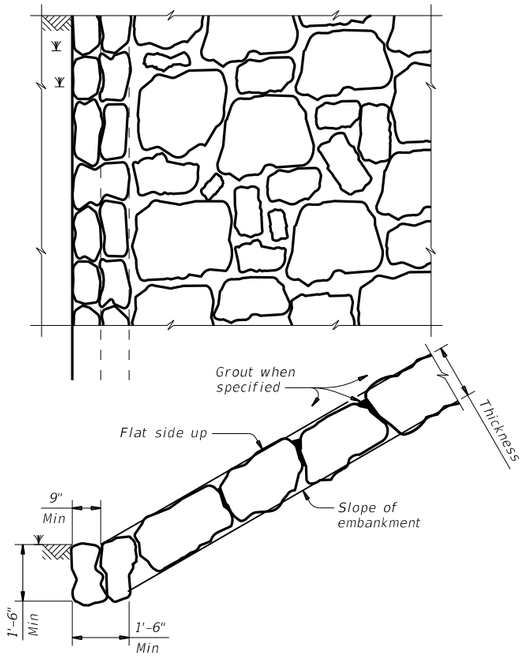


FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

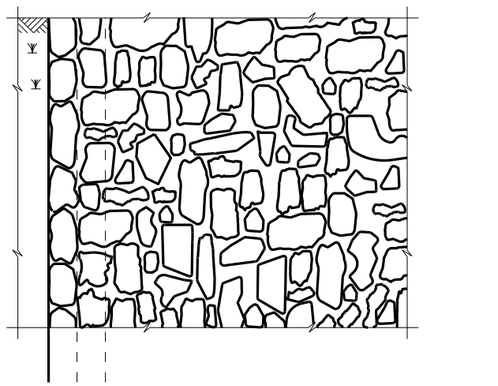


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

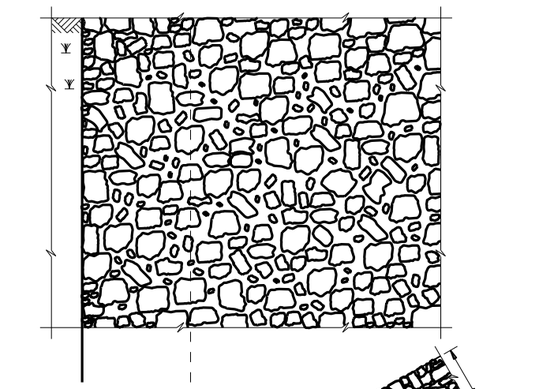


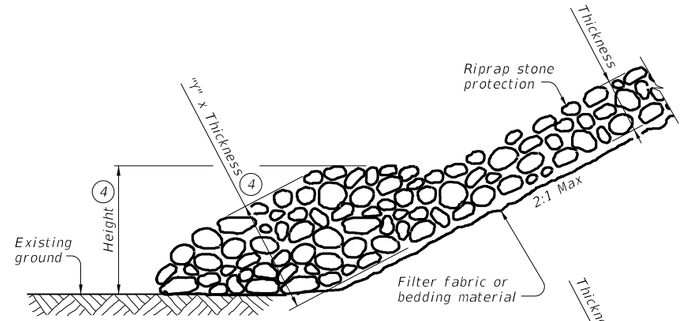
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

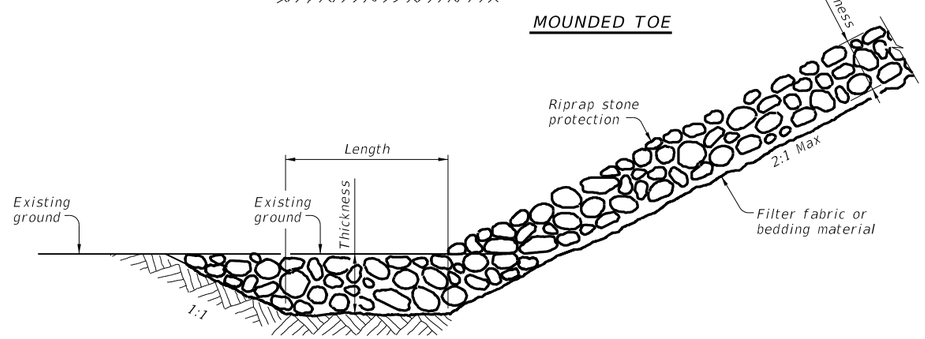
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		121

DATE: 3/29/2021
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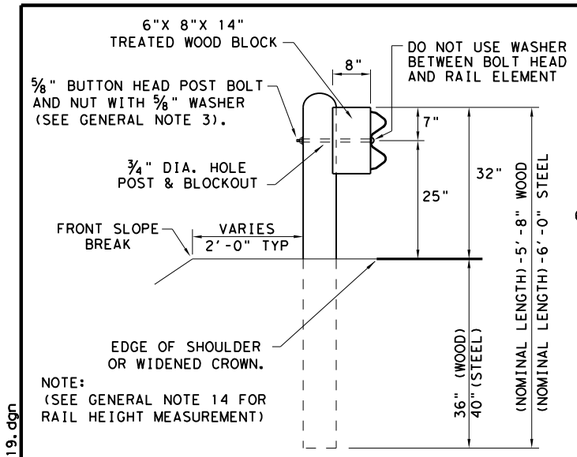
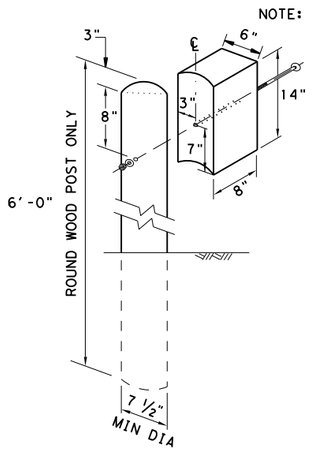
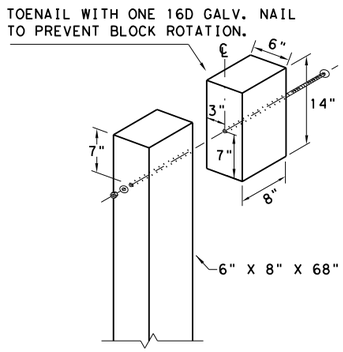


TYPICAL POST PLACEMENT

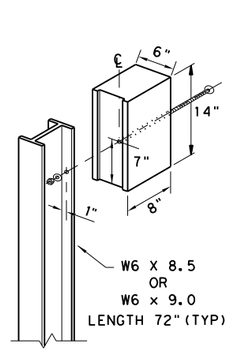


WOOD BLOCK TO ROUND WOOD POST

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

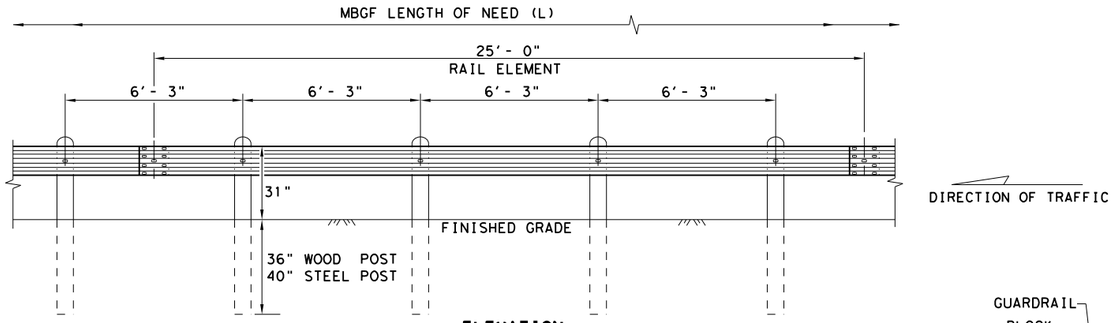


WOOD BLOCK TO RECTANGULAR WOOD POST



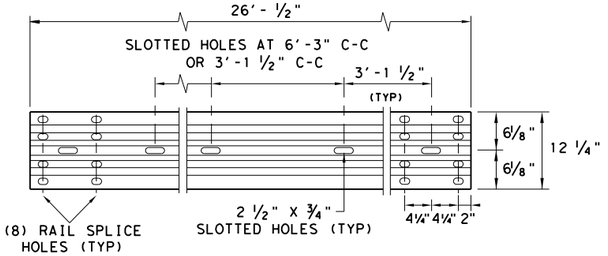
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

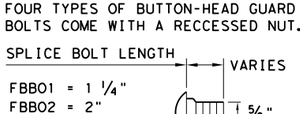
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

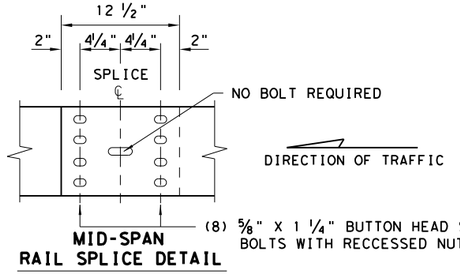
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



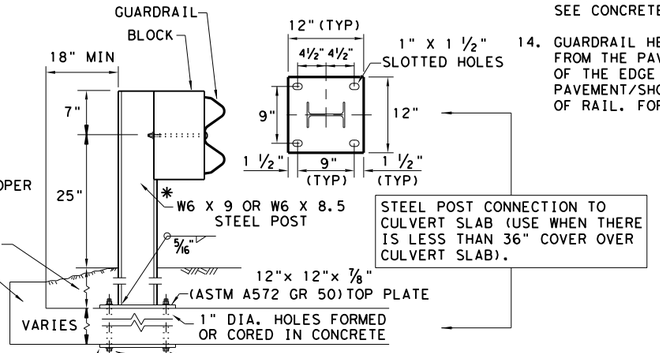
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		122

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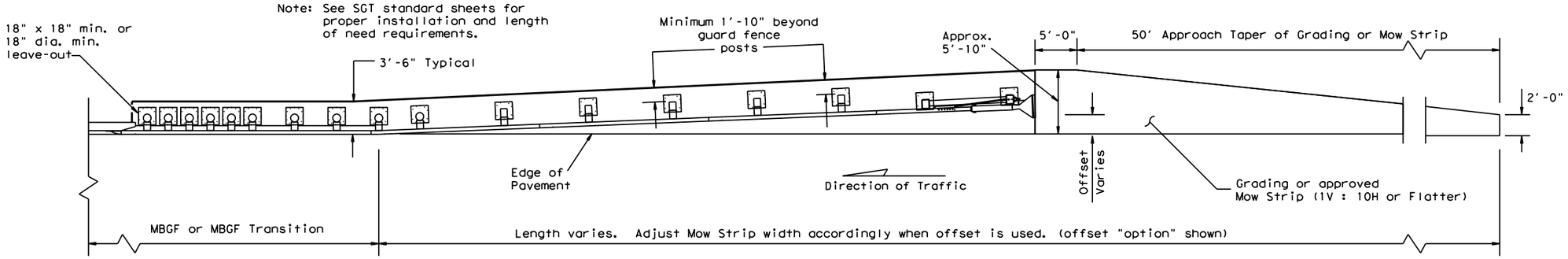
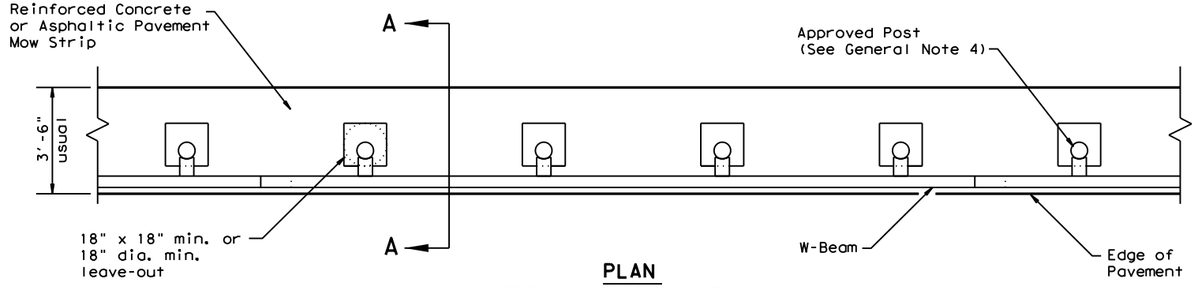
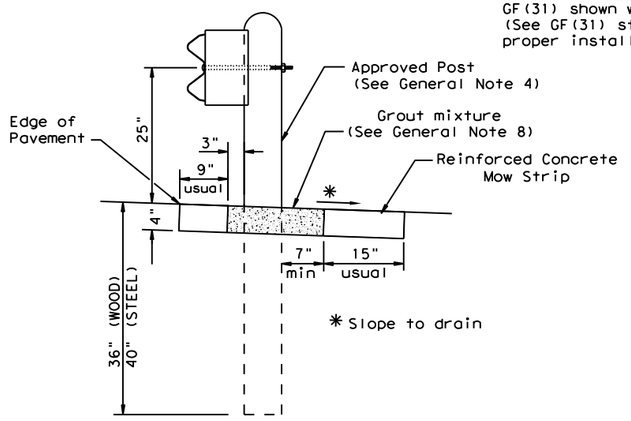


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



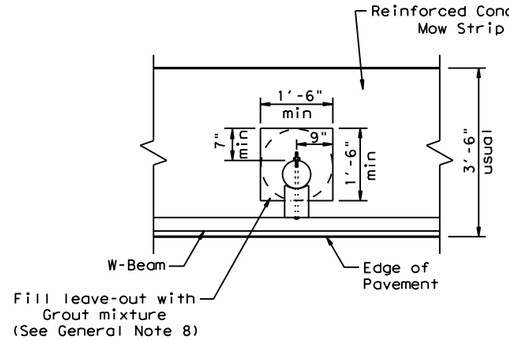
PLAN

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



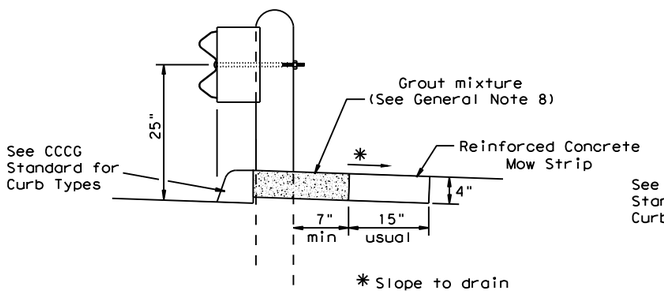
SECTION A-A

Typical



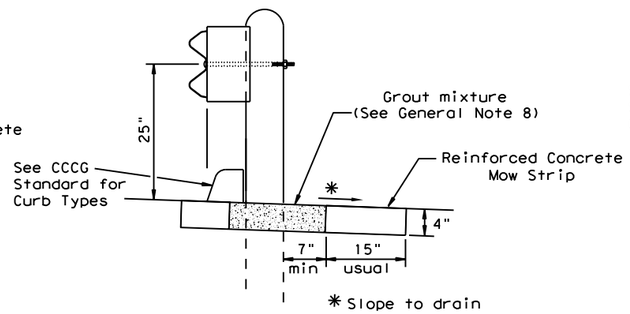
MOW STRIP DETAIL

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



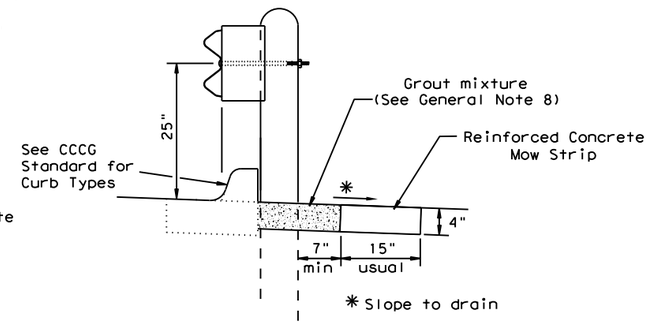
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	PAR	RAINS		123

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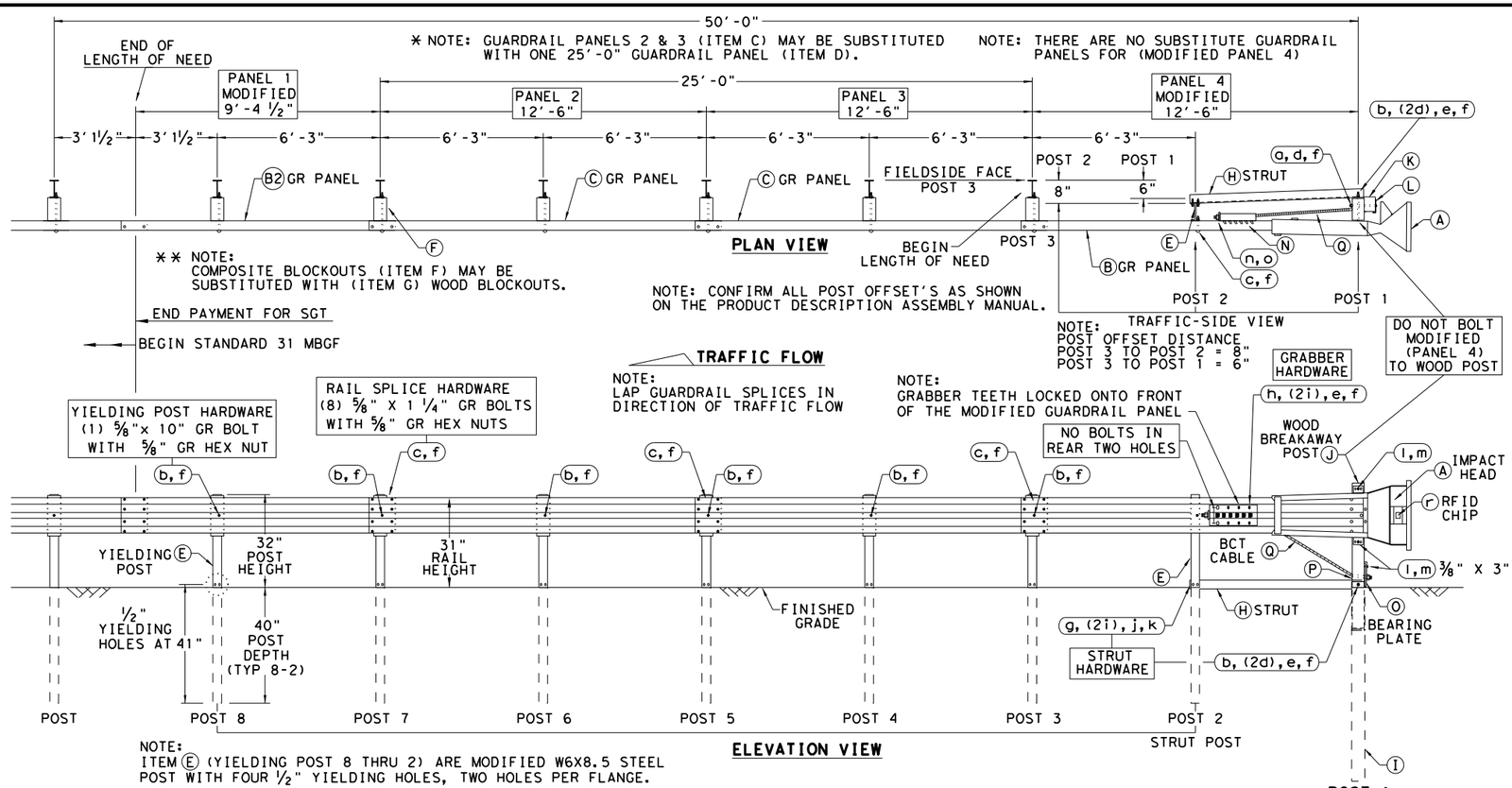
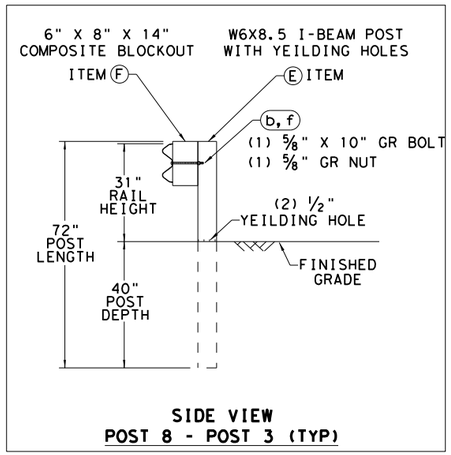


GENERAL NOTES

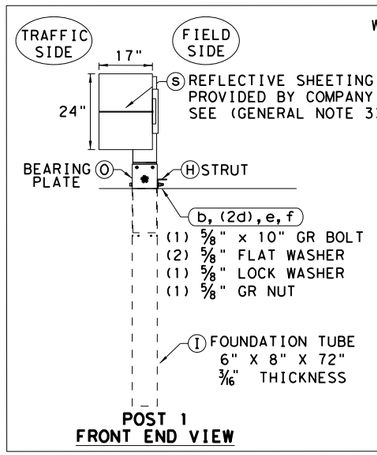
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D *	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G **	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

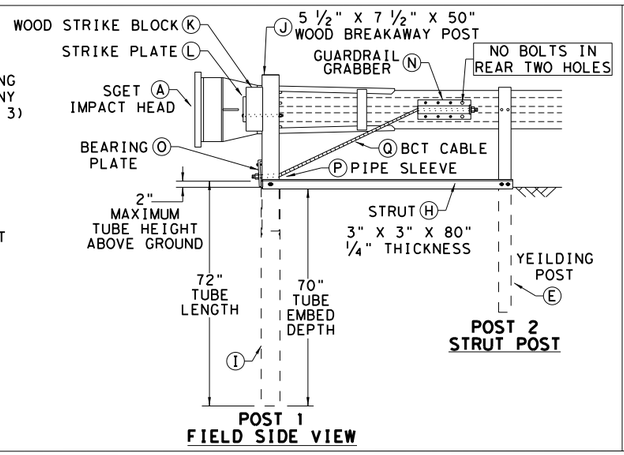
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



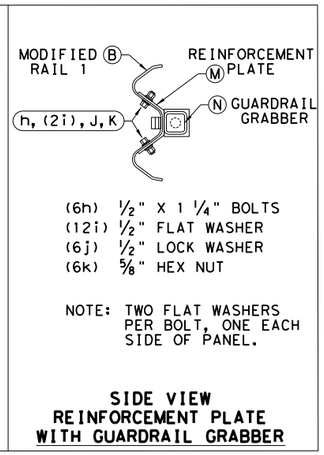
SIDE VIEW
POST 8 - POST 3 (TYP)



POST 1
FRONT END VIEW



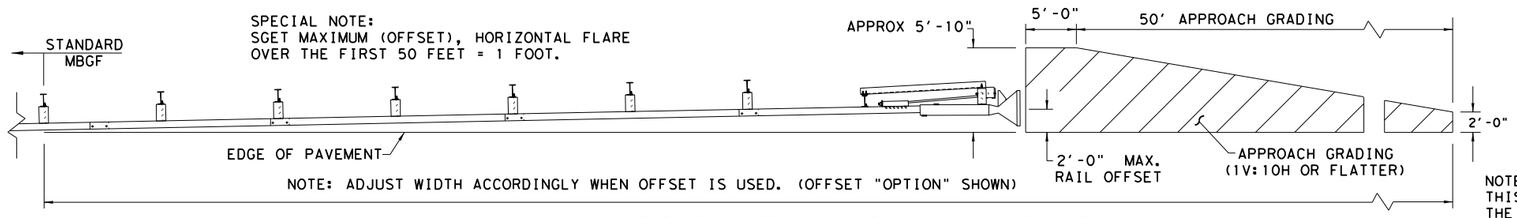
POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



(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

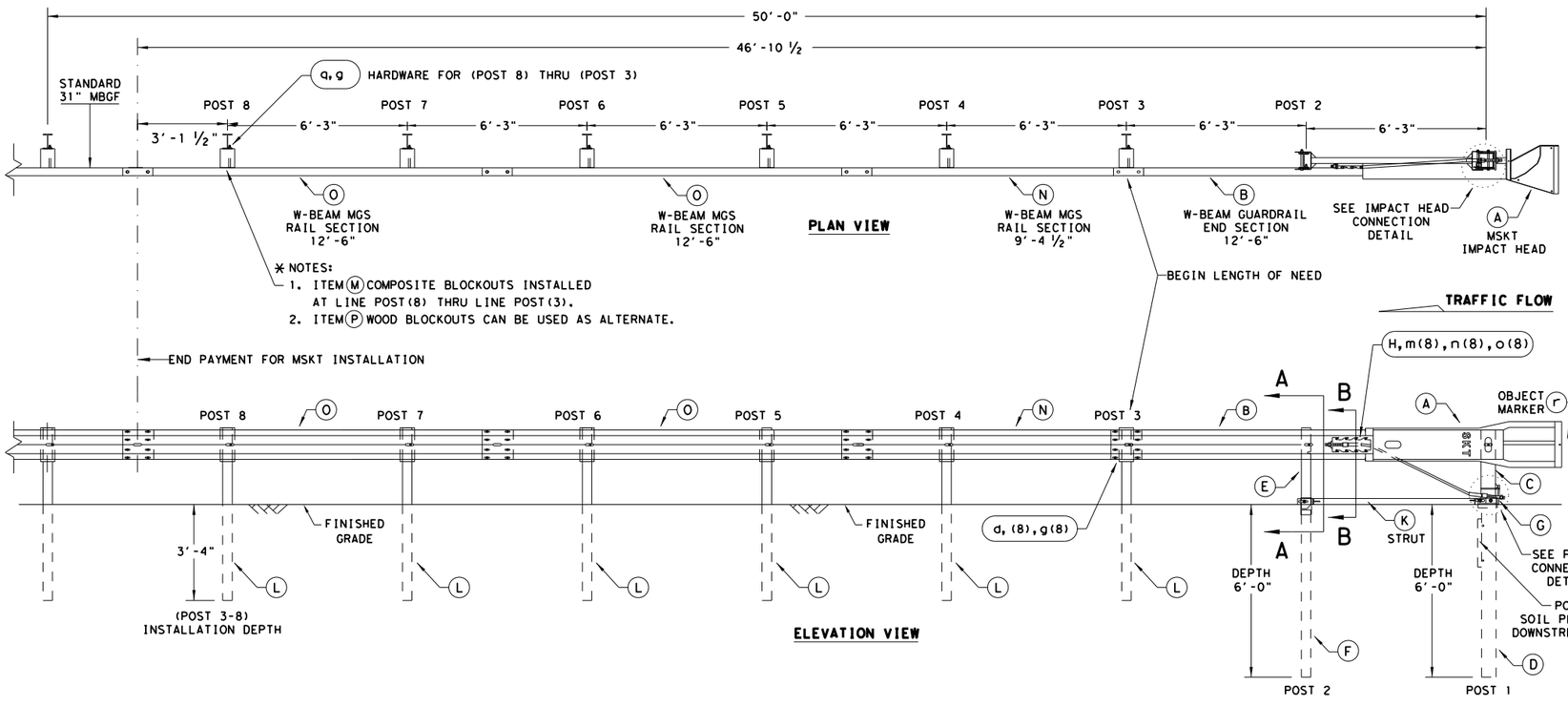
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

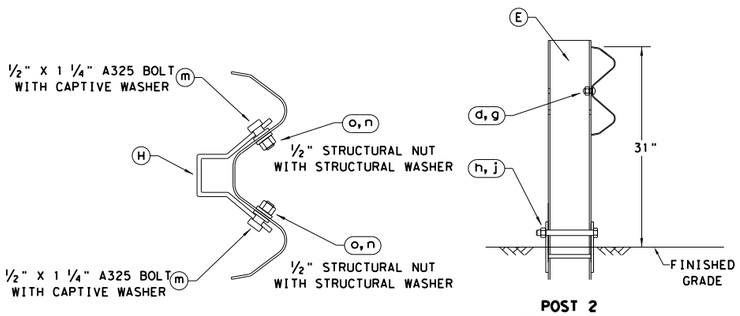
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

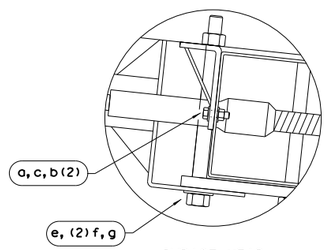
FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		124

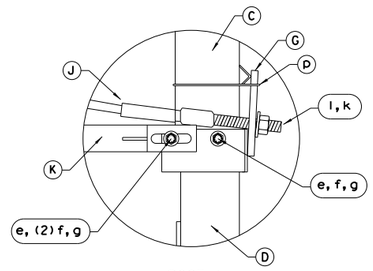
DATE: 3/29/2021
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\Standards\04 Bridge Standards\125 sgt12s3118.dgn

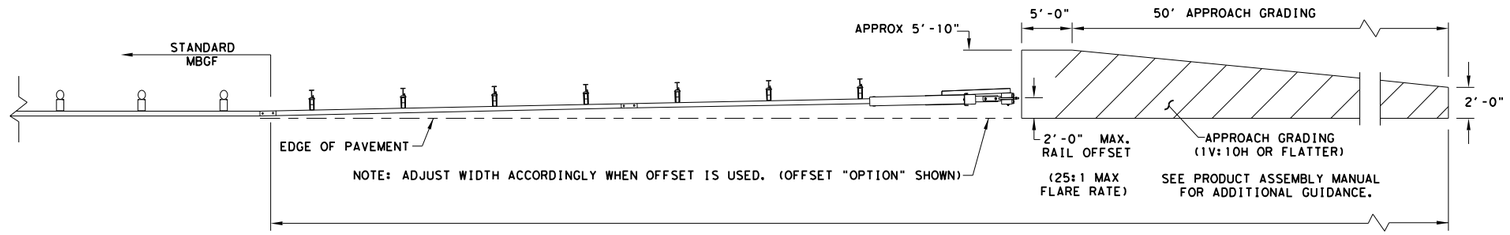


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		125

SUMMARY OF SMALL SIGNS

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

STATION	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
0+31 LT	1	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
0+55 LT	2	R1-2	YEILD	48 x 48 x 48	X		10BWG	1	SA	P		
0+87 RT	3	R12-1T	WEIGHT LIMIT/GROSS (WEIGHT) LBS	24 x 36	X		10BWG	1	SA	P		
2+20 LT	3A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
3+60 RT	4	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
3+80 LT	4A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
5+40 LT	4B	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
5+72 LT	5	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rhodes Dr									
5+90 RT	6	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		10BWG	1	SA	P		
7+00 LT	6A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
7+28 LT	7	D1-2	(DESTINATION - 2 LINE)	120 x 30	X		S80	1	SA	T		
8+60 LT	7A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
8+60 RT	8	D2-2	(DESTINATIONS) (DISTANCES) <2 LINES>	96 x 30	X		S80	1	SA	T		
10+20 RT	9	D20-5T	CO RD 4020	24 x 42	X		10BWG	1	SA	P		
			<----									
			4040									
			---->									
10+20 LT	9A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
11+13 LT	10	I-2aT	(CITY NAME) CITY LIMIT	42 x 24	X		10BWG	1	SA	P		
11+80 LT	10A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
13+40 LT	10B	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
14+21 RT	11	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			McMillan St									
15+18 LT	11A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								
15+16 LT	12	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
16+00 LT	13	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4020									
17+18 LT	13A	W1-8R	<CHEVRON RIGHT>	30 x 36	X		10BWG	1	SA	P		
		W1-8L	<CHEVRON LEFT>	30 x 36								

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
4-16	DIST	COUNTY		SHEET NO.
8-16	PAR	RAINS		126

DATE: 3/29/2021 11:15:50 AM
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Update\SOSS16.dgn

SUMMARY OF SMALL SIGNS

STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
19+79 LT	14	D20-5T	CO RD 4040	24 x 42	X		10BWG	1	SA	P		
			<----									
			4020									
			---->									
25+14 LT	15	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	(SPEED) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
30+94 LT	16	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	X		10BWG	1	SA	P		
51+72 RT	17	W1-5R	SYMBOL - WINDING ROAD RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	(SPEED) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
54+53 RT	18	I-2cT	SAND FLAT	72 x 18	X		10BWG	1	SA	T		
90+20 RT	19	D3-3bTL	Prairie Grove	N/A	X		10BWG	1	SA	T		
			Cemetery									
			<----									
		D3-3bTR	Prairie Grove	N/A								
			Cemetery									
			---->									
92+09 RT	20	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
100+95 RT	21	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			---->									
104+95 RT	22	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4220									
105+85 LT	23	W1-5L	SYMBOL - WINDING ROAD LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	(SPEED) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
112+88 LT	24	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			<----									
113+85 RT	25	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			<----									
118+88 LT	26	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4240									
122+68 LT	27	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			---->									
151+85 RT	28	W8-18	ROAD MAY FLOOD	36 x 36	X		10BWG	1	SA	P		
162+42 RT	29	D7-7aTR	HISTORICAL MARKER <ARROW RIGHT>	48 x 48	X		S80	1	SA	T		
		D7-7aTL	HISTORICAL MARKER <ARROW LEFT>	48 x 48								
170+08 RT	30	W8-13aT	BRIDGE MAY ICE	36 x 36	X		10BWG	1	SA	P		
			IN COLD WEATHER									
189+77 LT	31	W8-13aT	BRIDGE MAY ICE	36 x 36	X		10BWG	1	SA	P		
			IN COLD WEATHER									
197+95 LT	32	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10								
210+35 LT	33	W8-18	ROAD MAY FLOOD	36 x 36	X		10BWG	1	SA	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"

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
4-16	DIST	COUNTY		SHEET NO.
8-16	PAR	RAINS		127

DATE: 3/29/2021 11:15:52 AM
FILE: T:\PARTPDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Update\FM 275_2277-01-010_SUMMARY OF SMALL SIGNS.dgn

SUMMARY OF SMALL SIGNS

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

STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
215+22 RT	34	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			---->									
218+85 LT	35	D7-7aTR	HISTORICAL MARKER <ARROW RIGHT>	48 x 48	X		S80	1	SA	T		
		D7-7aTL	HISTORICAL MARKER <ARROW LEFT>	48 x 48								
219+06 RT	36	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4320									
221+42 RT	37	D7-7aTR	HISTORICAL MARKER <ARROW RIGHT>	48 x 48	X		S80	1	SA	T		
		D7-7aTL	HISTORICAL MARKER <ARROW LEFT>	48 x 48								
222+72 LT	38	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			<----									
228+84 RT	39	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			<----									
232+25 LT	40	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4340									
236+05 LT	41	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			---->									
257+90 RT	42	M2-1	JCT <AUXILIARY SIGN>	21 x 15	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
262+27 RT	43	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			---->									
265+35 RT	44	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M5-1L	<ARROW - STRAIGHT THEN LEFT> <AUX. SIGN>	21 x 15								
267+53 LT	45	D7-7aTR	HISTORICAL MARKER <ARROW RIGHT>	48 x 48	X		S80	1	SA	T		
		D7-7aTL	HISTORICAL MARKER <ARROW LEFT>	48 x 48								
268+80 RT	46	W3-1	SYMBOL - STOP AHEAD	30 x 30	X		10BWG	1	SA	P		
270+25 RT	47	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
			Rains Co 4360									
272+18 RT	48	D1-2	(DESTINATION - 2 LINE)	102 x 30	X		S80	1	SA	T		
272+18 LT	49	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		10BWG	1	SA	P		
273+64 LT	50	D20-1T	COUNTY ROAD (NUMBER)	24 x 24	X		10BWG	1	SA	P		
			<----									
277+00 LT	51	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	X		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
278+87 RT	52	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
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http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	2277	01	010,etc	FM 275
	DIST		COUNTY	SHEET NO.
	PAR		RAINS	128

18

DATE: 3/29/2021 11:15:54 AM
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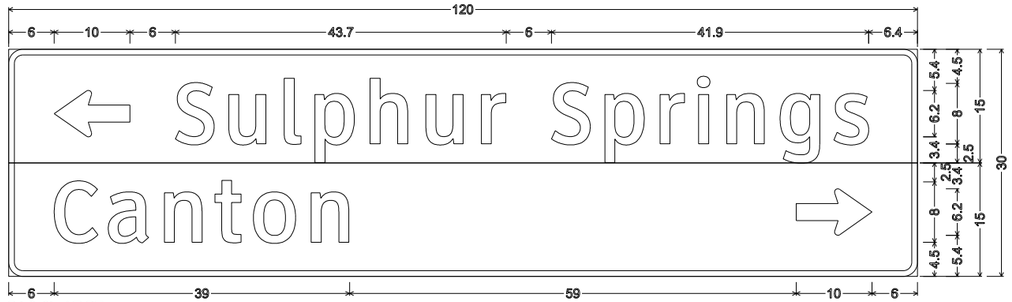
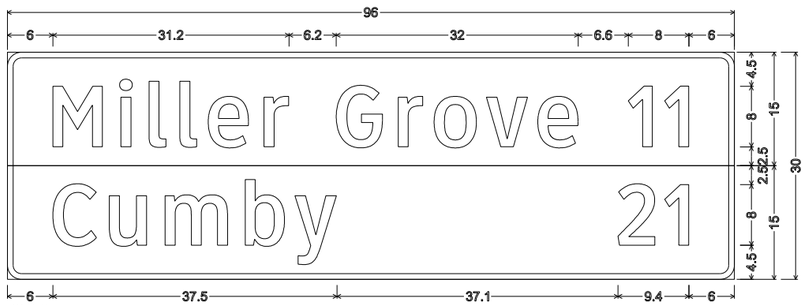


D1-2 8in LT-RT;
1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 10.0" X 6.1" 180"; "Sulphur Springs" ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
"Canton" ClearviewHwy-3-W; Standard Arrow Custom 10.0" X 6.1" 0";
Table of letter and object lefts.

⇦	S	u	l	p	h	u	r	S	p	r	l	n	g	s
6.0	22.0	29.1	36.4	40.4	47.7	55.1	62.4	71.7	78.7	86.0	90.9	94.8	101.9	109.0

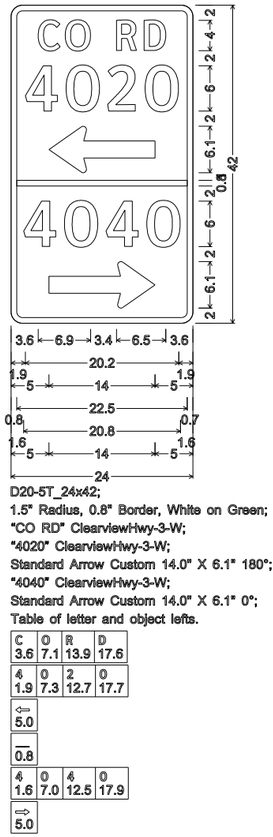
C	a	n	t	o	n	⇨
6.0	13.1	20.6	27.2	32.3	39.9	104.0



D2-2 8in;
1.9" Radius, 0.8" Border, White on Green;
"Miller Grove" ClearviewHwy-3-W; "11" ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
"Cumby" ClearviewHwy-3-W; "21" ClearviewHwy-3-W;
Table of letter and object lefts.

M	i	l	l	e	r	G	r	o	v	e	1	1
6.0	14.8	18.7	22.8	26.5	33.9	43.4	51.6	56.4	63.3	70.0	82.0	86.8

C	u	m	b	y	2	1
6.0	13.5	20.8	31.4	38.0	80.6	86.8



D20-5T_24x42;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4020" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180";
"4040" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0";
Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6

4	0	2	0
1.9	7.3	12.7	17.7

⇦
5.0

—
0.8

4	0	4	0
1.6	7.0	12.5	17.9

⇨
5.0

I-2aT 8in;
1.5" Radius, 0.8" Border, White on Green;
"Emory" ClearviewHwy-6-W;
"CITY LIMIT" ClearviewHwy-3-W;
"POP XXXX" ClearviewHwy-3-W;
Table of letter and object lefts.

E	m	o	r	y
4.9	11.2	20.6	27.9	32.2

C	I	T	Y	L	I	M	I	T
10.6	13.4	14.5	16.8	21.4	23.6	25.0	28.4	29.5

P	O	P	X	X	X	X
10.9	13.5	16.7	21.0	23.6	26.2	28.8

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275

SIGN DETAILS

SHEET 1 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		129

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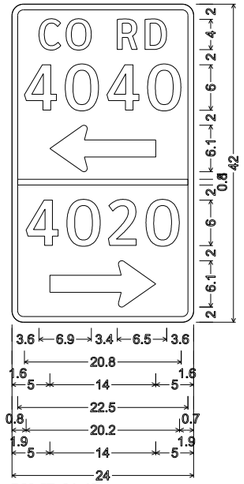
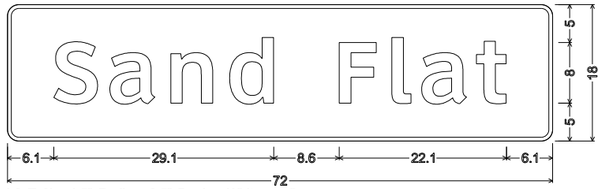


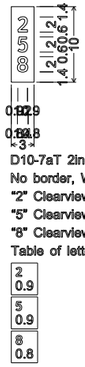
D20-5T_24x42;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4040" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
"4020" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 1.6	0 7.0	4 12.5	0 17.9
⇦ 5.0			
— 0.8			
4 1.9	0 7.3	2 12.7	0 17.7
⇨ 5.0			



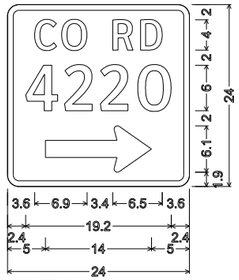
I-2cT 8in; 1.5" Radius, 0.5" Border, White on Green;
"Sand Flat" ClearviewHwy-5-W-R;
Table of letter and object lefts.

S 6.1	a 13.5	n 21.6	d 29.3	F 43.8	l 50.8	a 54.7	t 61.9	



D10-7aT 2in;
No border, White on Green;
"2" ClearviewHwy-4-W;
"5" ClearviewHwy-4-W;
"8" ClearviewHwy-4-W;
Table of letter and object lefts.

2 0.9
5 0.9
8 0.8



D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4220" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.4	2 7.5	2 12.2	0 17.2
⇨ 5.0			

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SIGN DETAILS

SHEET 2 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		130

DATE: 3/29/2021 11:16:00 AM
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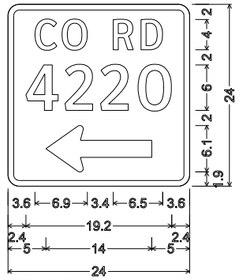
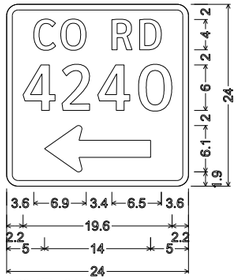


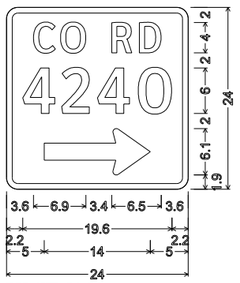
D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4220" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.4	2 7.5	2 12.2	0 17.2
⇦ 5.0			



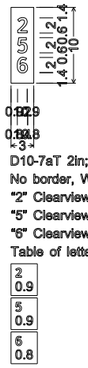
D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4240" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.2	2 7.3	4 12.0	0 17.4
⇦ 5.0			



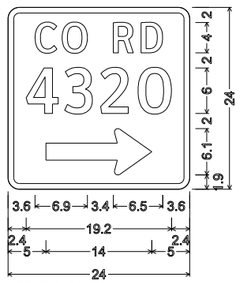
D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4240" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.2	2 7.3	4 12.0	0 17.4
⇨ 5.0			



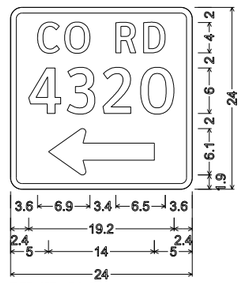
D10-7aT 2in;
No border, White on Green;
"2" ClearviewHwy-4-W;
"5" ClearviewHwy-4-W;
"6" ClearviewHwy-4-W;
Table of letter and object lefts.

2 0.9
5 0.9
6 0.8



D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4320" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.4	3 7.5	2 12.2	0 17.2
⇨ 5.0			



D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4320" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
Table of letter and object lefts.

C 3.6	O 7.1	R 13.9	D 17.6
4 2.4	3 7.5	2 12.2	0 17.2
⇦ 5.0			

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FM 275

SIGN DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		131

DATE: 3/29/2021 11:16:02 AM
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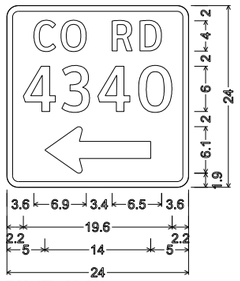
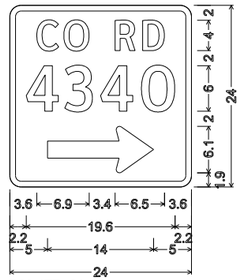


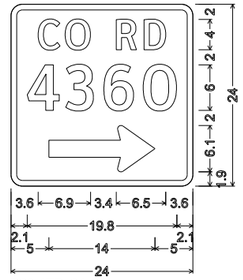
D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4340" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6
4	3	4	0
2.2	7.3	12.0	17.4
⇦			
5.0			



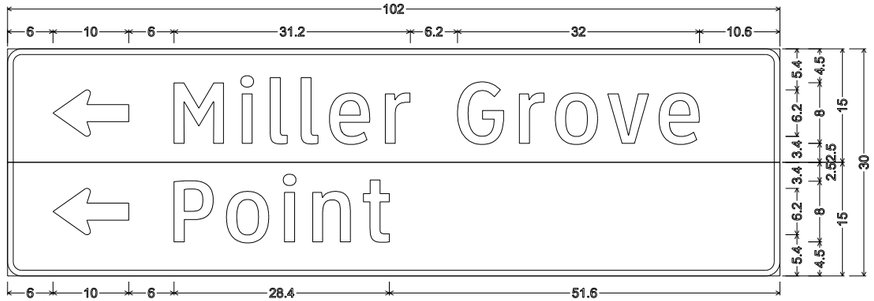
D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4340" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6
4	3	4	0
2.2	7.3	12.0	17.4
⇨			
5.0			



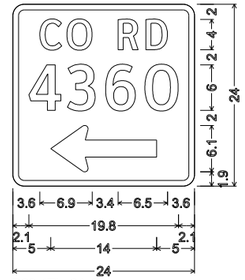
D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4360" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;
Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6
4	3	4	0
2.1	7.2	12.3	17.4
⇨			
5.0			



D1-2 8in LT-LT;
1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 10.0" X 6.1" 180"; "Miller Grove" ClearviewHwy-3-W;
1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 10.0" X 6.1" 180"; "Point" ClearviewHwy-3-W;
Table of letter and object lefts.

⇦	M	i	l	l	e	r	G	r	o	v	e
6.0	22.0	30.8	34.7	38.8	42.5	49.9	59.4	67.6	72.4	79.3	86.0
⇦	P	o	i	n	t						
6.0	22.0	28.9	36.4	40.3	47.0						



D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD" ClearviewHwy-3-W;
"4360" ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;
Table of letter and object lefts.

C	O	R	D
3.6	7.1	13.9	17.6
4	3	4	0
2.1	7.2	12.3	17.4
⇦			
5.0			

STATE OF TEXAS
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3/31/21

FM 275

SIGN DETAILS

SHEET 4 OF 4

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		132

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

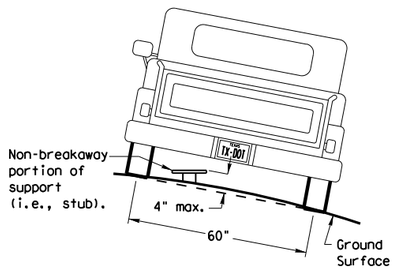
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

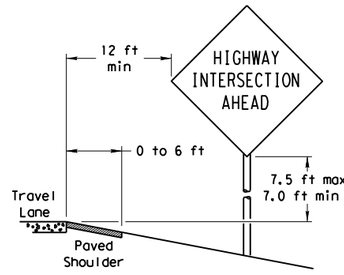
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

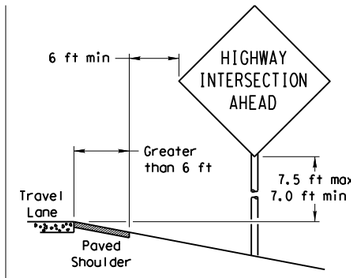
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

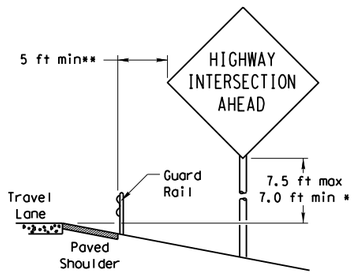
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



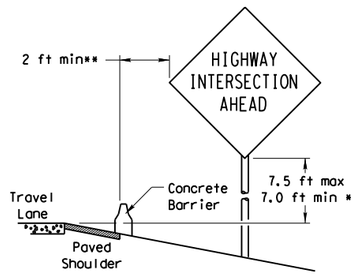
GREATER THAN 6 FT. WIDE

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



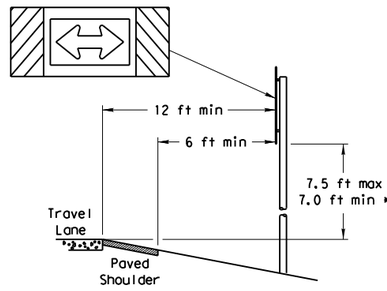
BEHIND GUARDRAIL



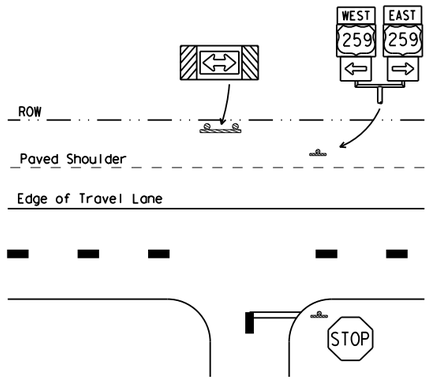
BEHIND CONCRETE BARRIER

**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:

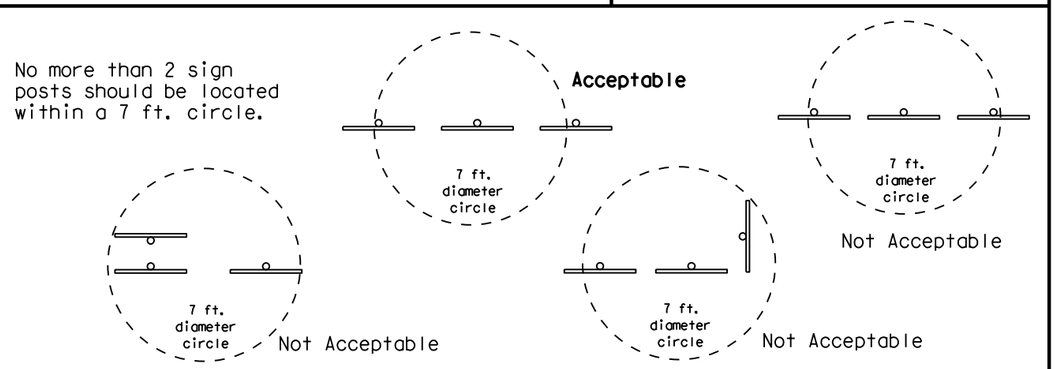
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(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.

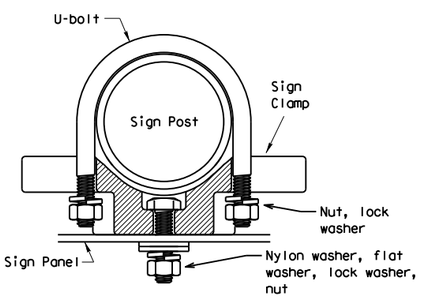
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

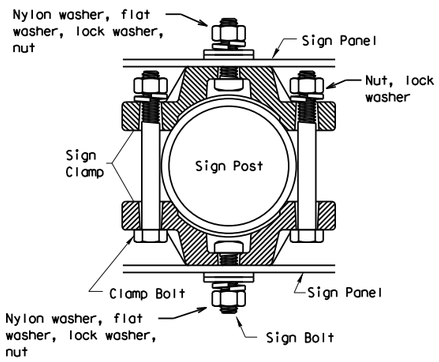


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

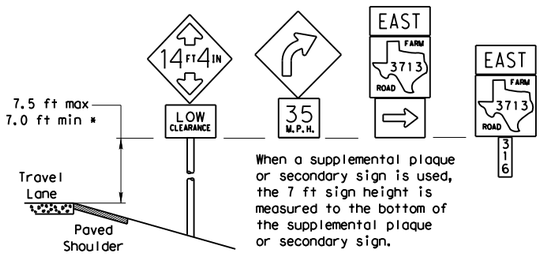
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



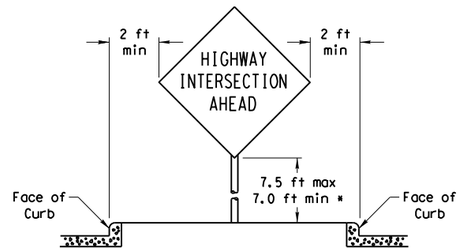
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



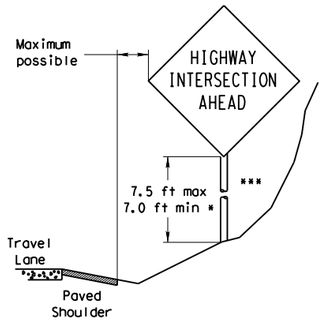
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		133

DATE: 3/29/2021 11:16:09 AM
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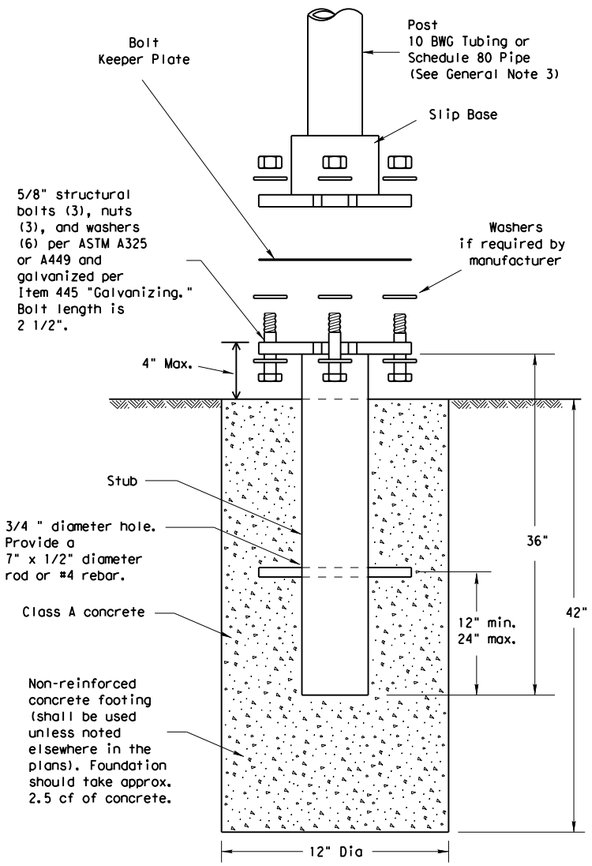
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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.

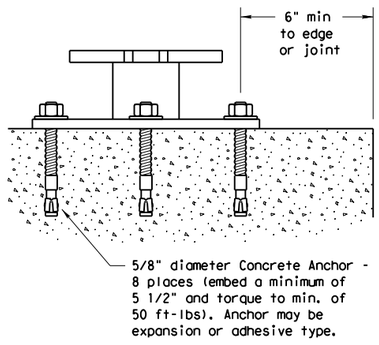
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum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

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		134

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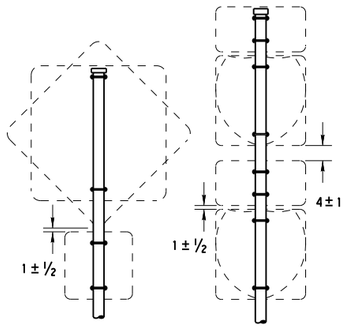
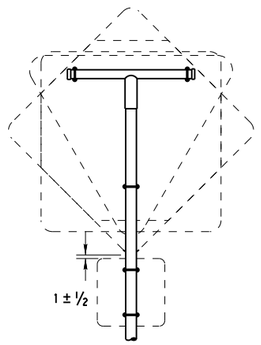
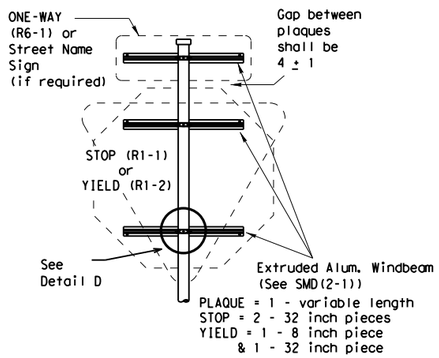


SM RD SGN ASSM TY XXXXX(1)XX(P)



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



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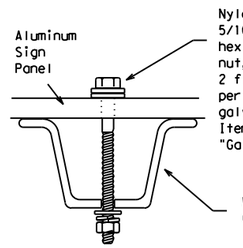
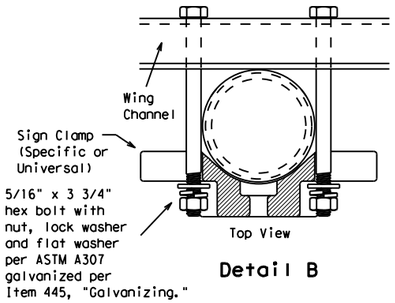
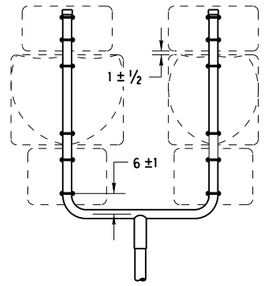


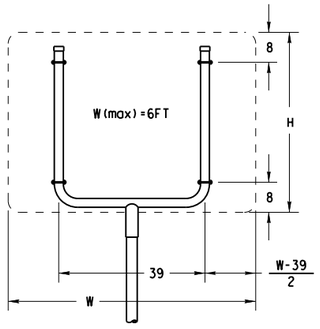
Detail A



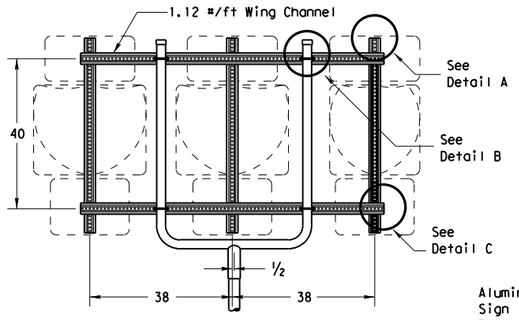
Detail B



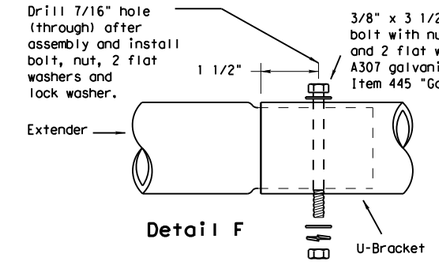
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

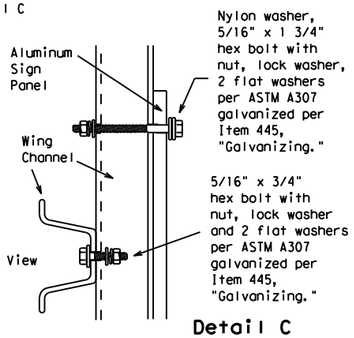


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

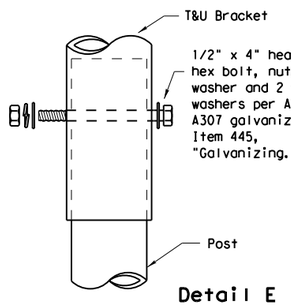


Detail F

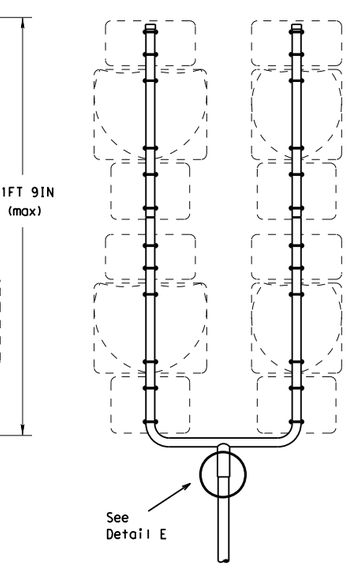
Splices shall only be allowed behind the sign substrate.



Detail C

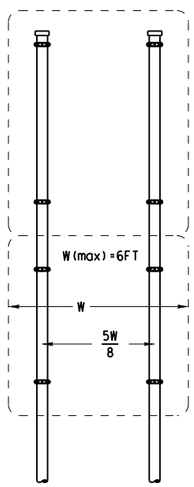


Detail E



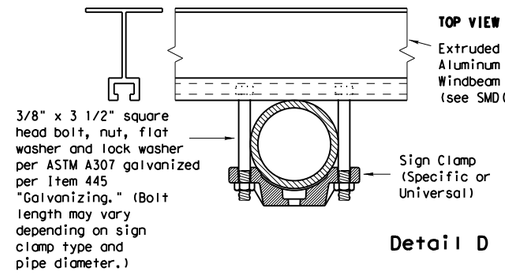
SM RD SGN ASSM TY S80(1)XX(U-1EXT)

SM RD SGN ASSM TY S80(1)XX(U-2EXT)

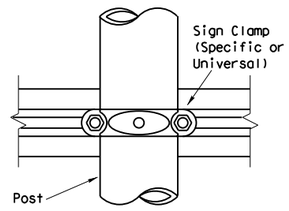


SM RD SGN ASSYM TY XXXXX(2)XX(P)

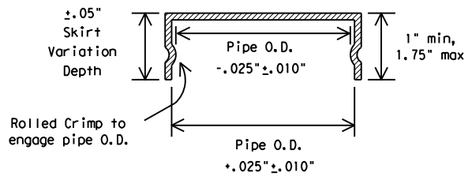
SIDE VIEW



Detail D



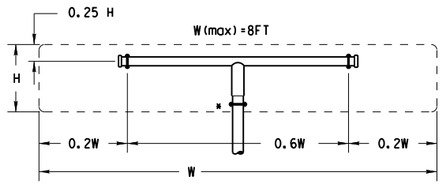
FRICTION CAP DETAIL



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.



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

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

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

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275

DIST	COUNTY	SHEET NO.
PAR	RAINS	135

9-08 REVISIONS

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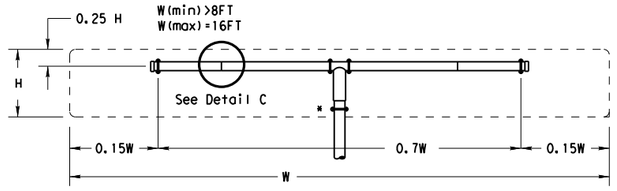
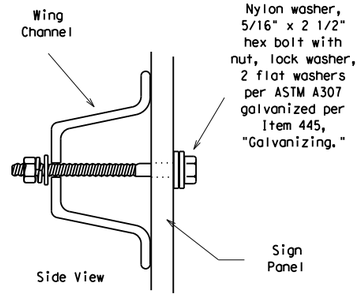
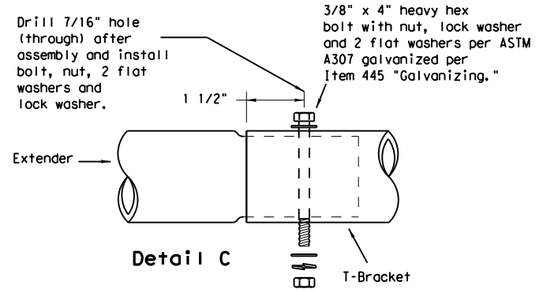


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



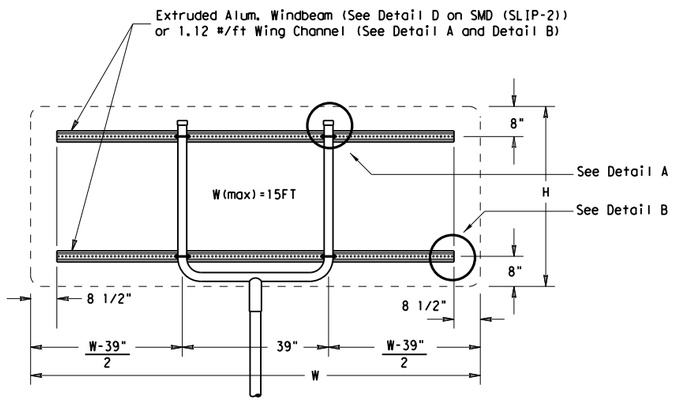
Detail C

Splices shall only be allowed behind the sign substrate.

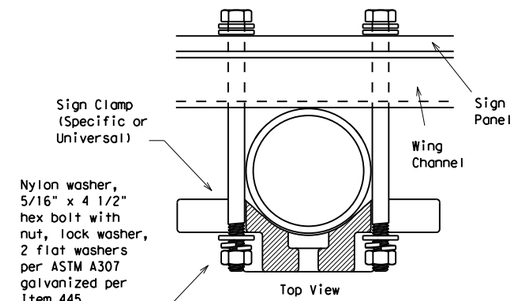
GENERAL NOTES:

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

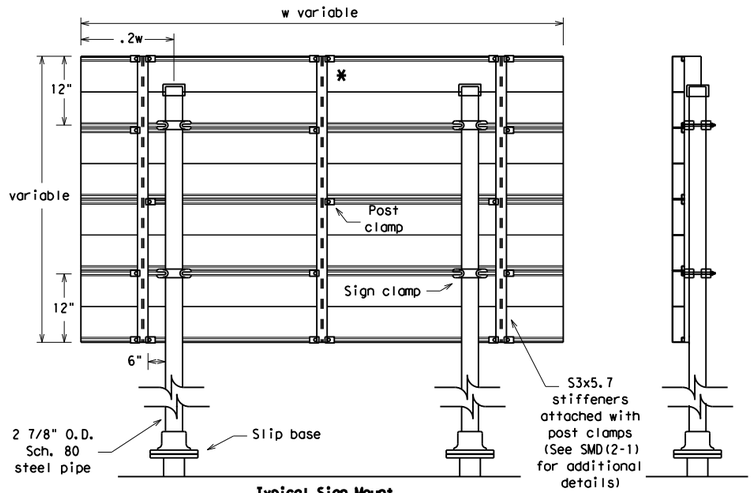
1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material 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.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail A

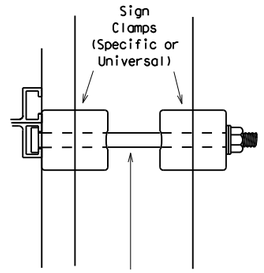


Typical Sign Mount

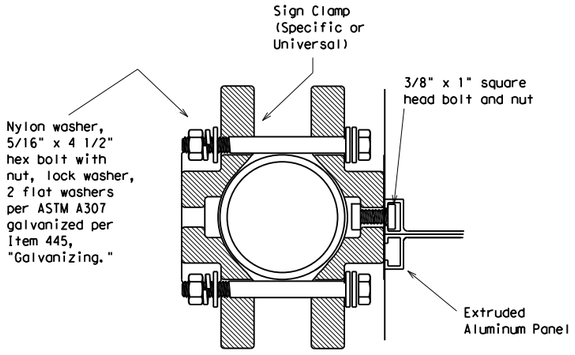
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

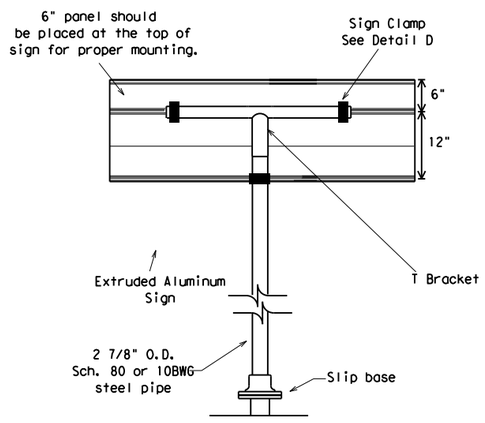
See Detail E
for clamp installation



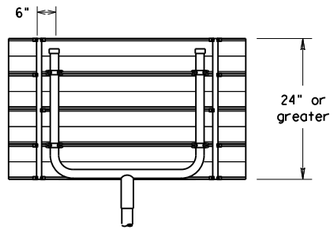
Detail E



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



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

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

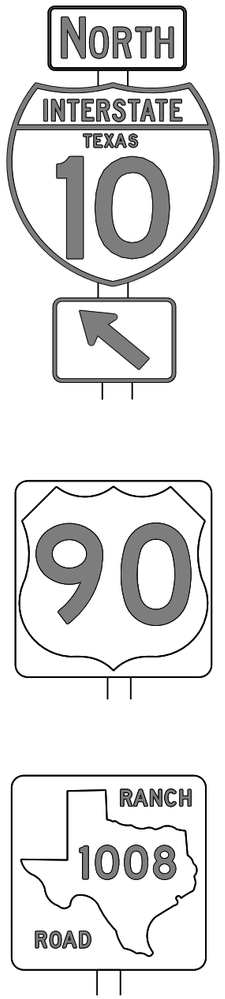
SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		136

DATE: DATE/TIME 11:16:15 AM
FILE: DOCUMENTNAME 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Update\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

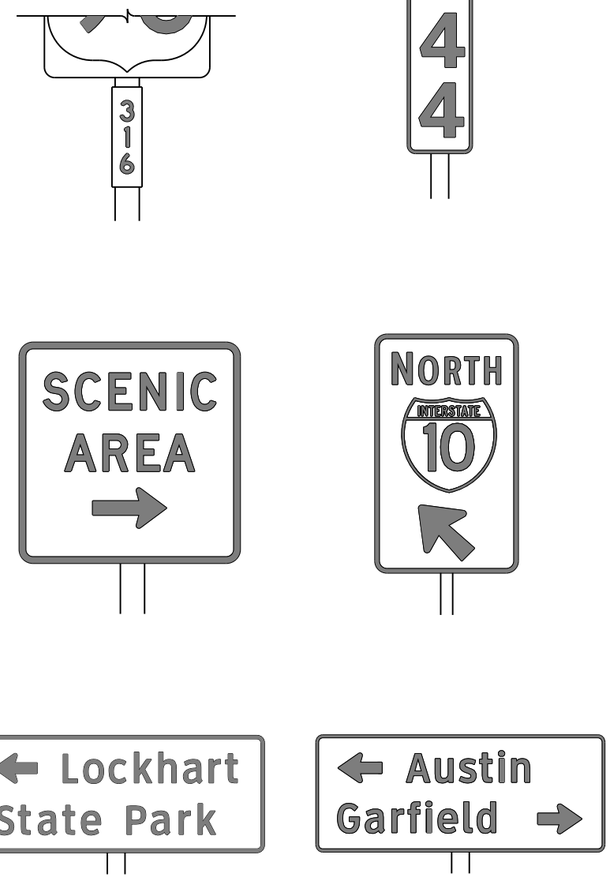
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

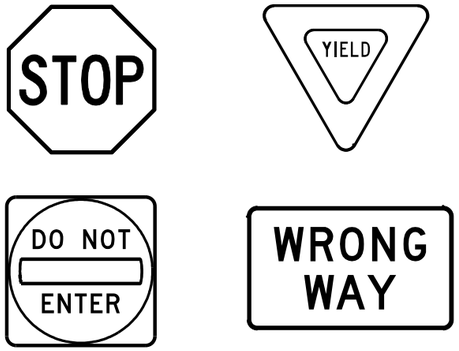
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	RAINS		137

DATE: 8/18/2008 11:16:17 AM
FILE: DGN: tsr4-13.dgn

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

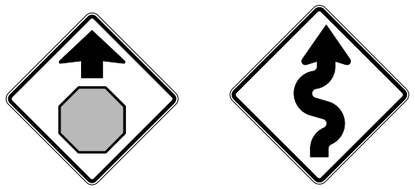
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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	2277	01	010,etc	FM 275
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	RAINS		138

4

DATE: 8/21/2013 11:16:18 AM
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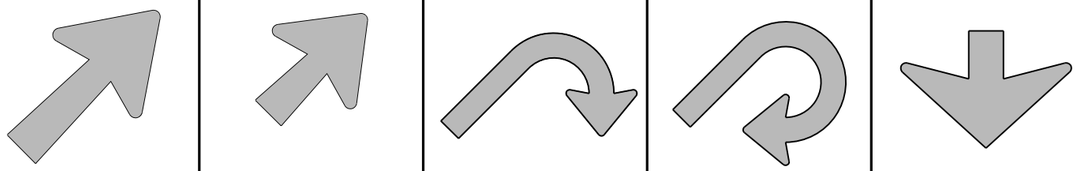
ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

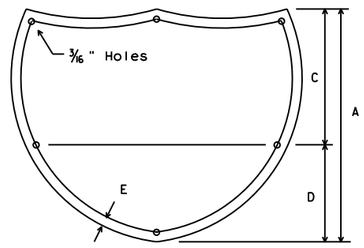
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

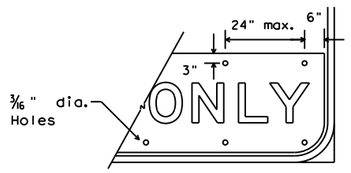
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

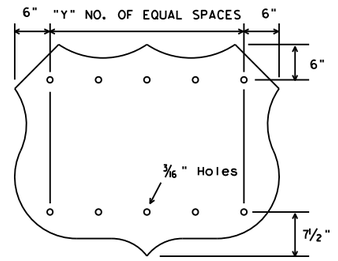


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

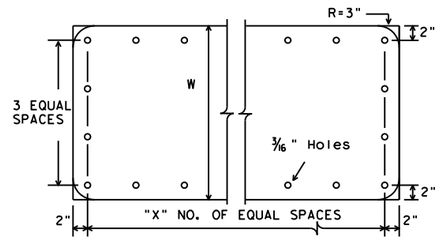


EXIT ONLY PANEL



U.S. ROUTE MARKERS

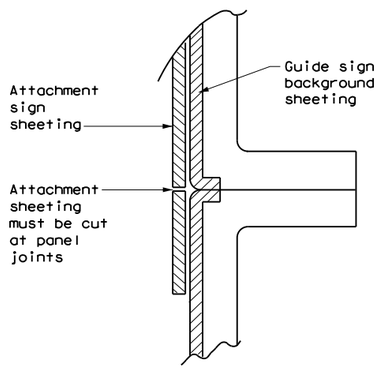
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

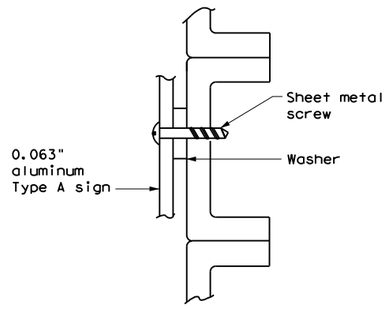
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



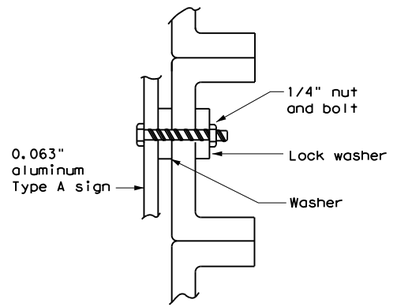
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



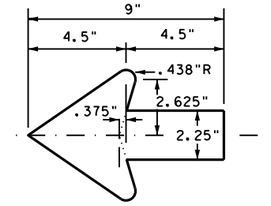
NUT/BOLT ATTACHMENT

NOTE:

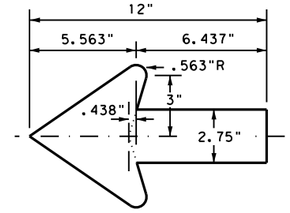
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PAR	RAINS		139

5

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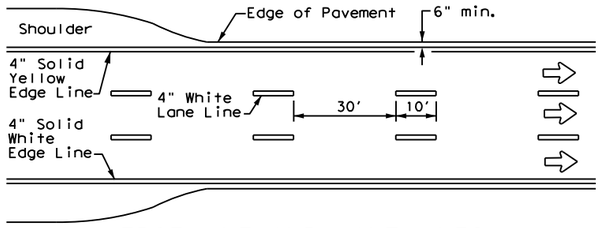
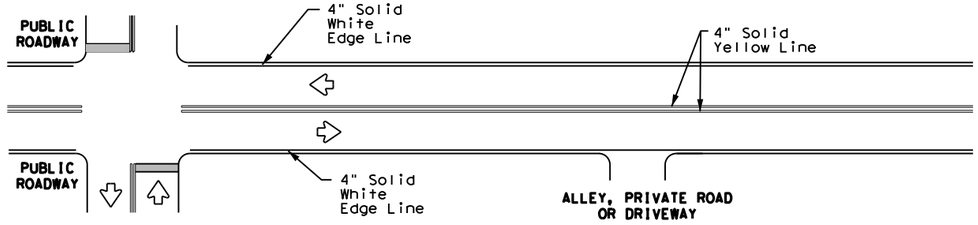
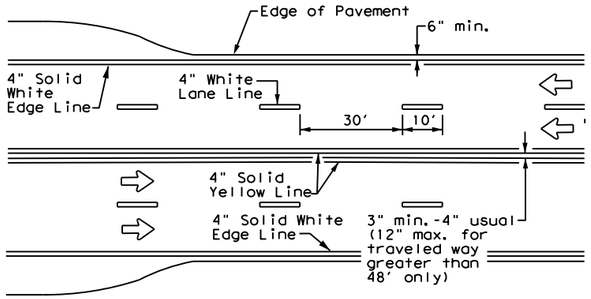


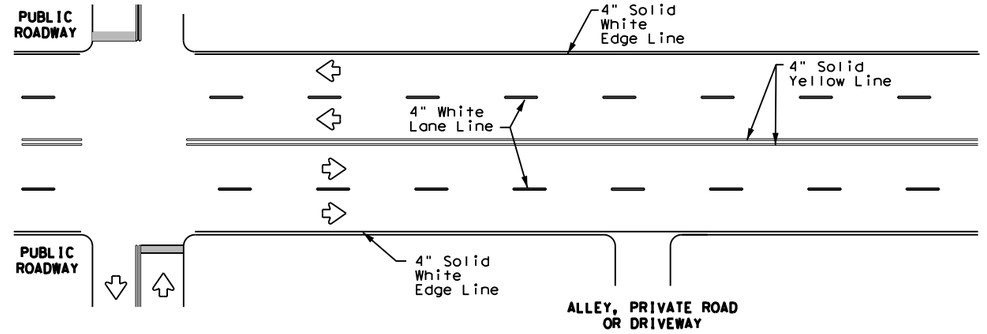
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



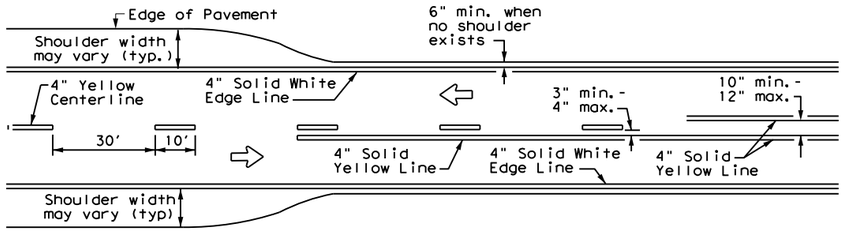
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



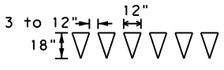
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



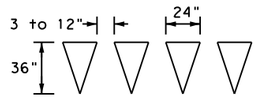
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

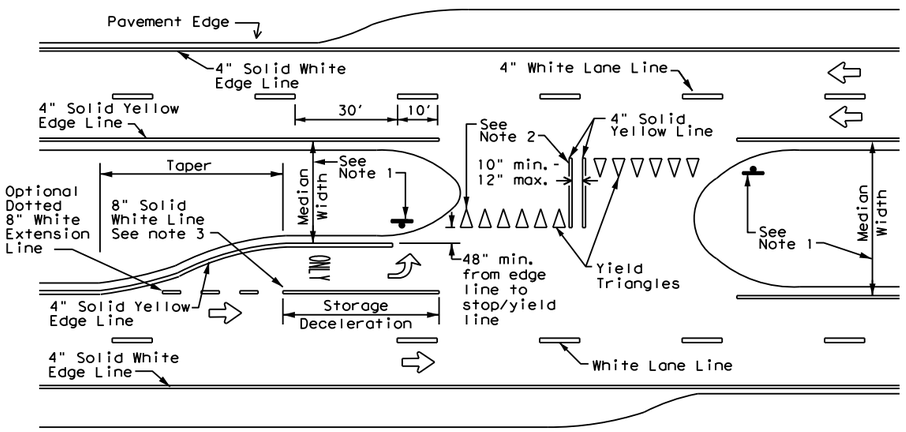


For posted speed on road being marked equal to or less than 40 MPH.



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.

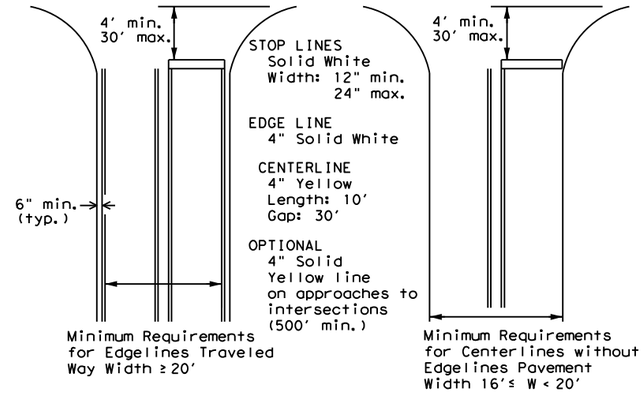
GENERAL NOTES

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

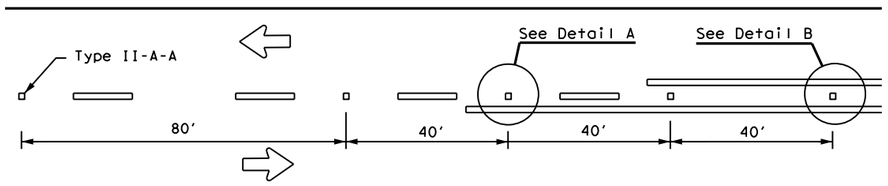
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

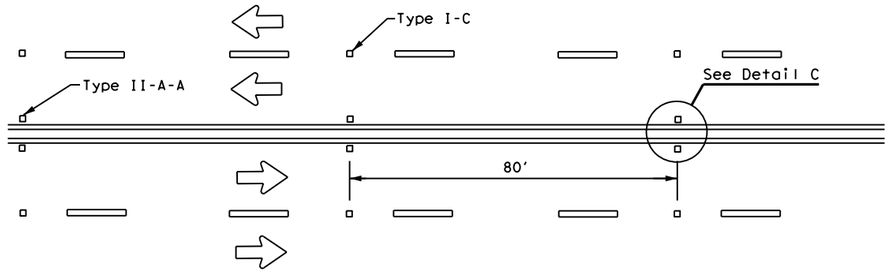
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	2277	01	010,etc	FM 275
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	PAR	RAINS		140

22A

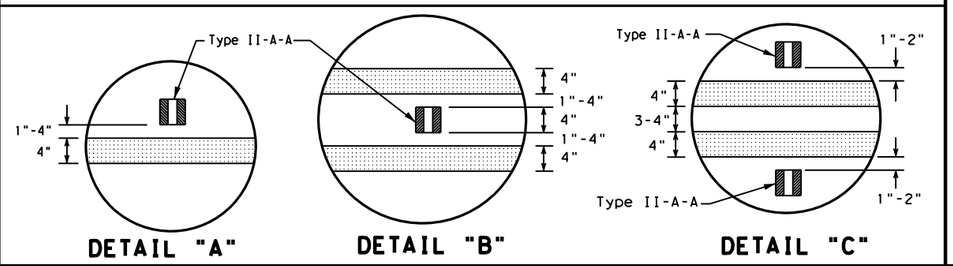
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



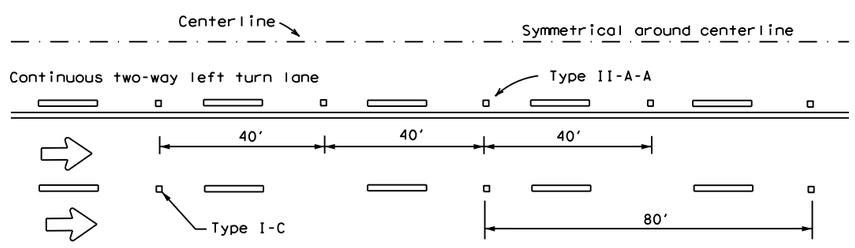
CENTERLINE FOR ALL TWO LANE ROADWAYS



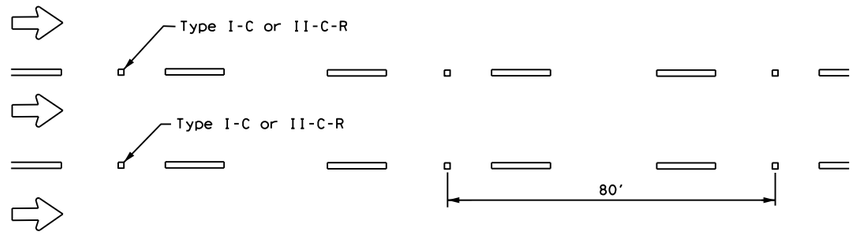
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

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

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

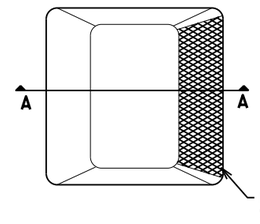
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

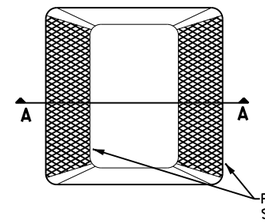
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

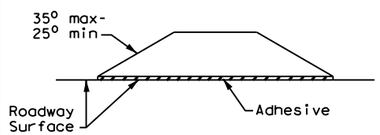
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

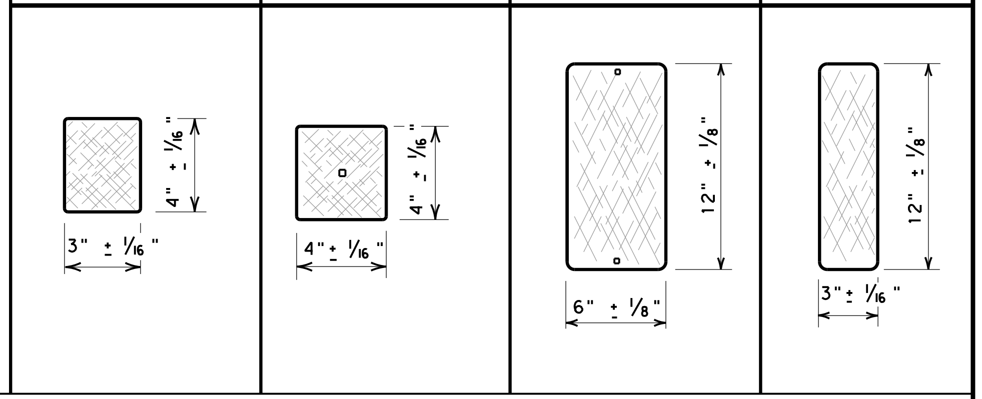
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	2277	01	010,etc	FM 275
	DIST	COUNTY		SHEET NO.
	PAR	RAINS		141

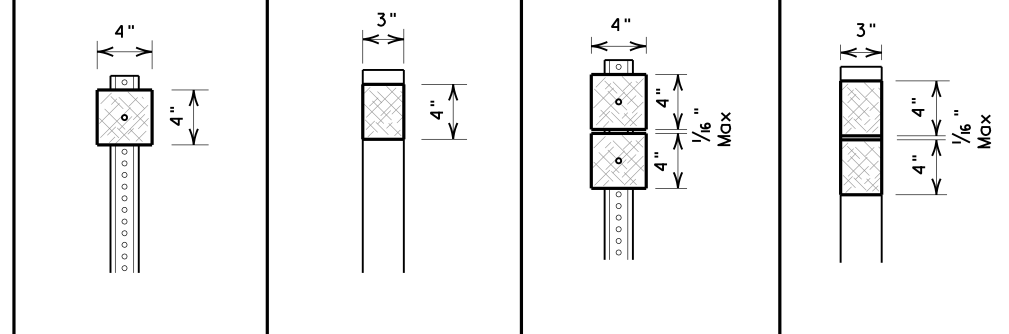
22B

DATE: 3/29/2021 11:16:22 AM
FILE: T:\PAR\PDD\FM 275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated Plan Sheets\06 Pavement Markings\pm2-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

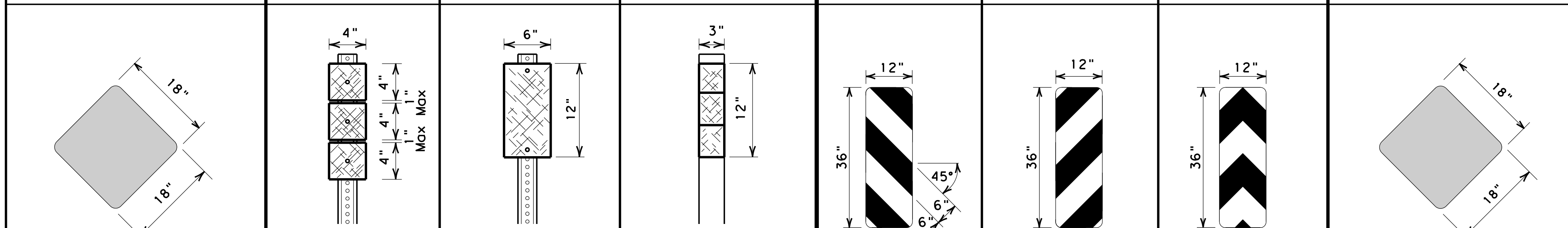
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

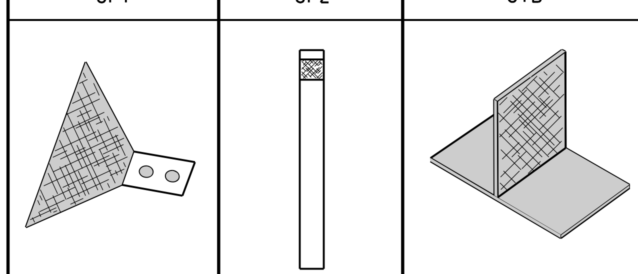
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

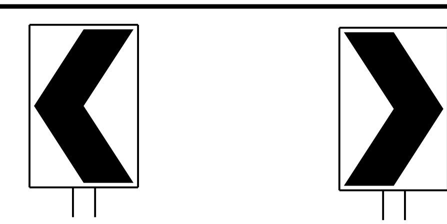
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

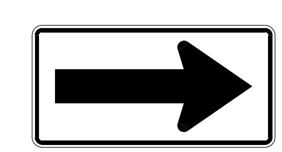
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE

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).

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 2277	SECT 01	JOB 010,etc	HIGHWAY FM 275
REVISIONS 10-09 3-15, 4-10 7-20	DIST PAR		COUNTY RAINS	SHEET NO. 142

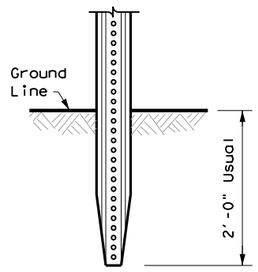
20A

DATE: 11:16:24 AM
FILE: ...275_2277-01-010_2R Rehab\Design\CAD Plan Sheets\Updated...

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

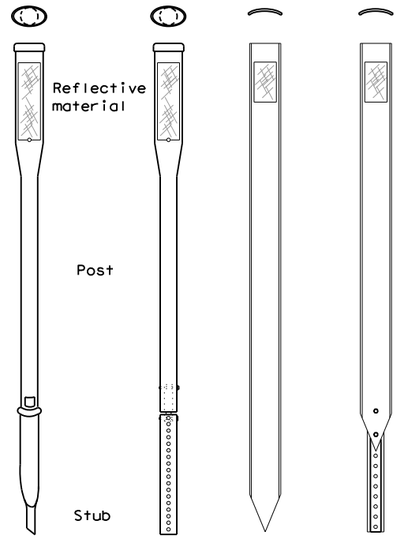


NOTES

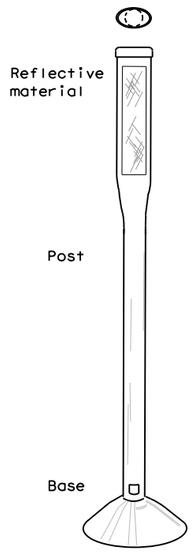
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND



SRF



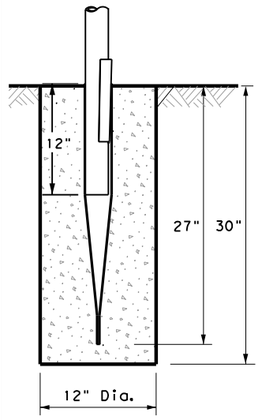
EMBEDDED | SURFACE MOUNT

NOTES

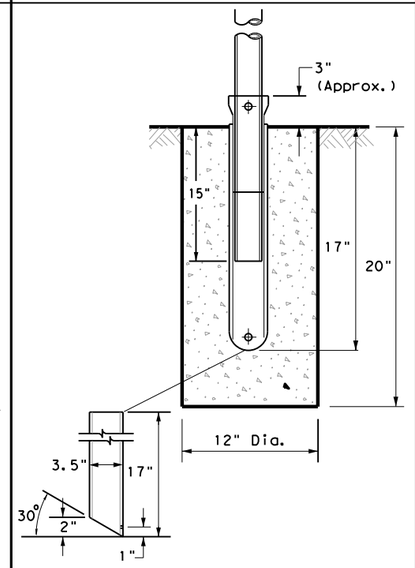
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

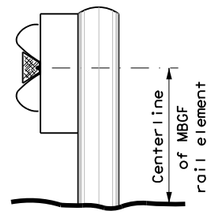
NOTE

1. Install per manufacturer's recommendations.

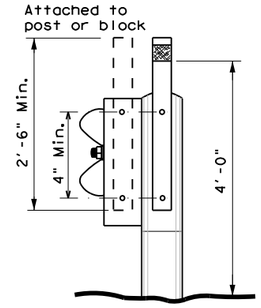
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

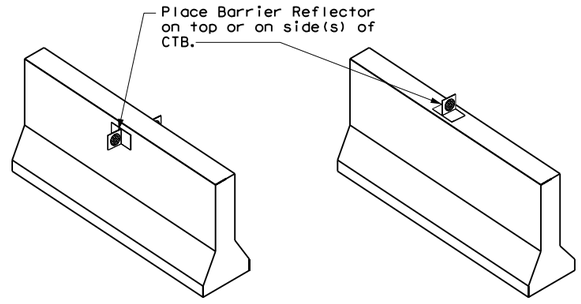
GF1



GF2



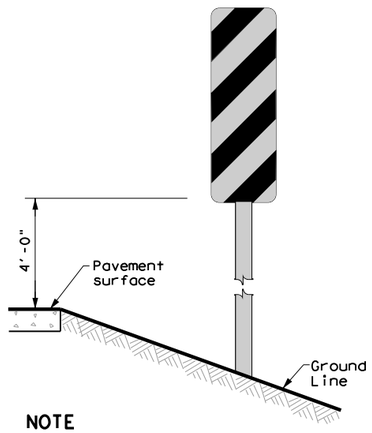
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

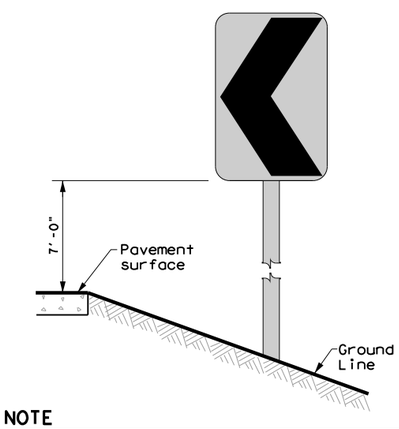
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

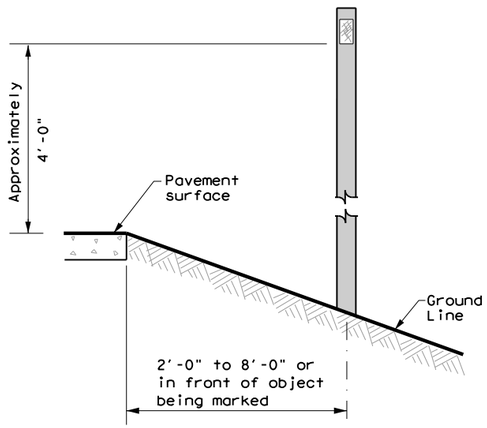
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PAR	RAINS		143

20B

DATE: 3/29/2021 11:16:26 AM
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DATE: 3/29/2021 11:16:28 AM
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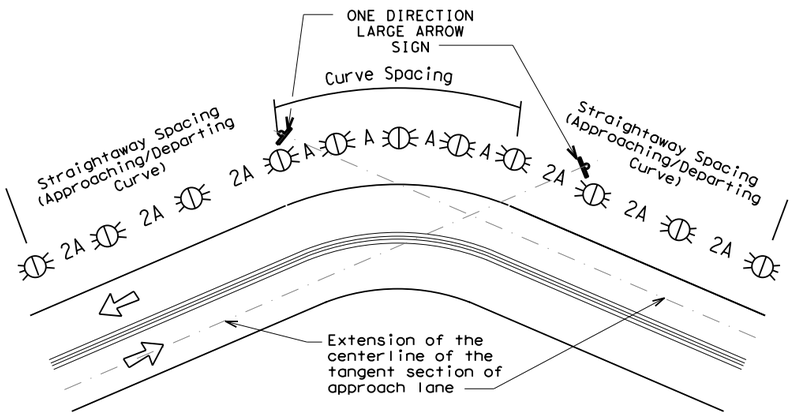
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

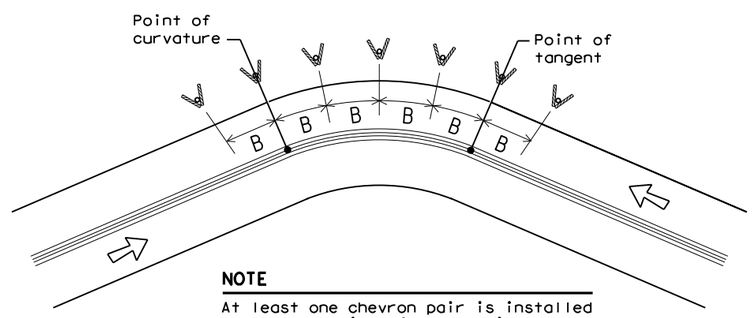
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	PAR	RAINS		144

20C

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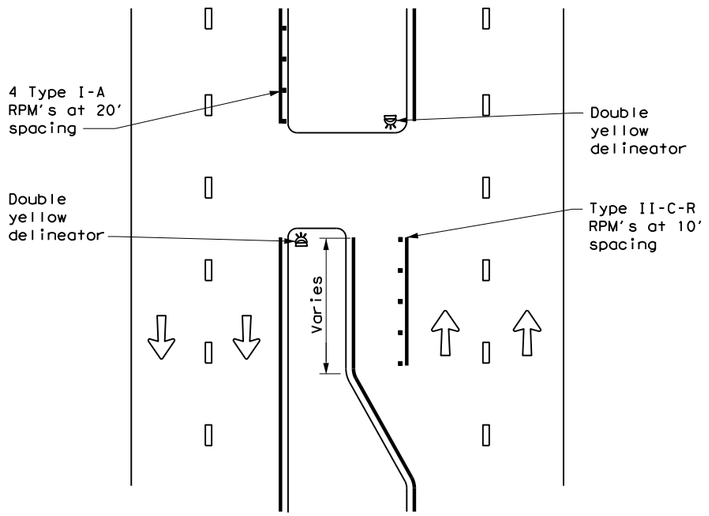
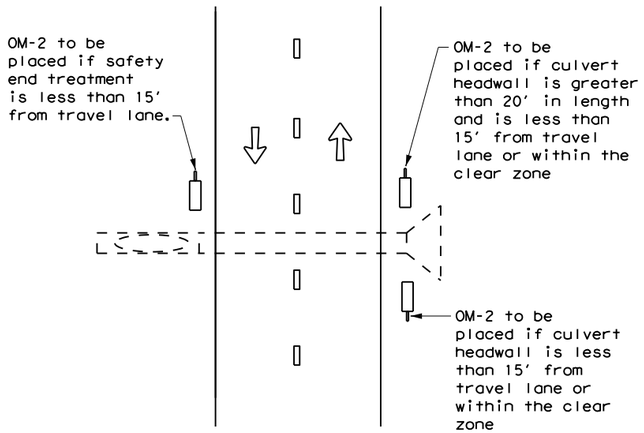
CROSSOVERS



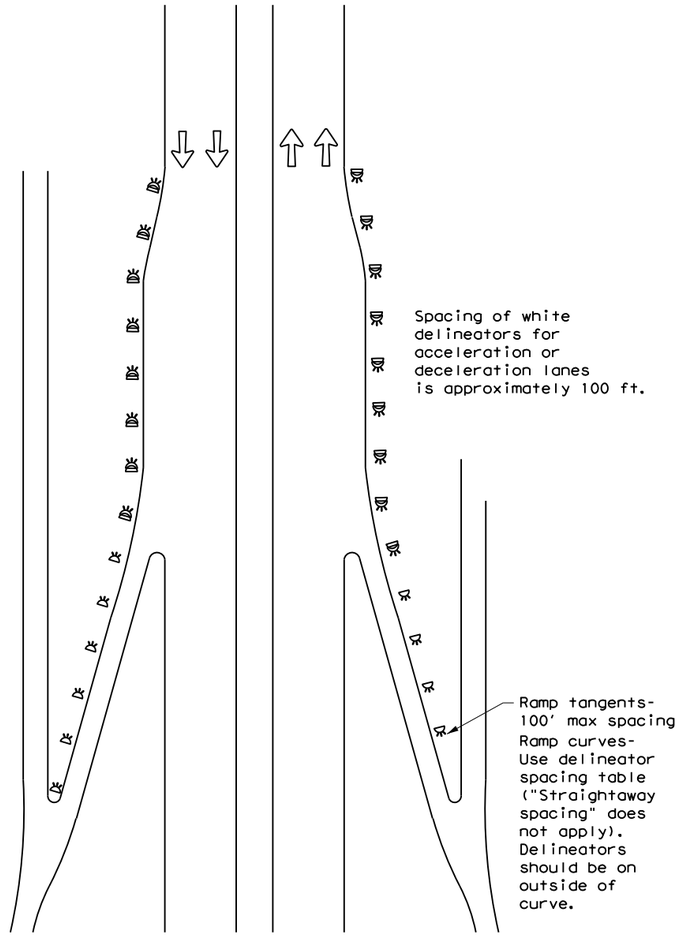
DETAIL 1

FOR CULVERTS WITHOUT MBGF



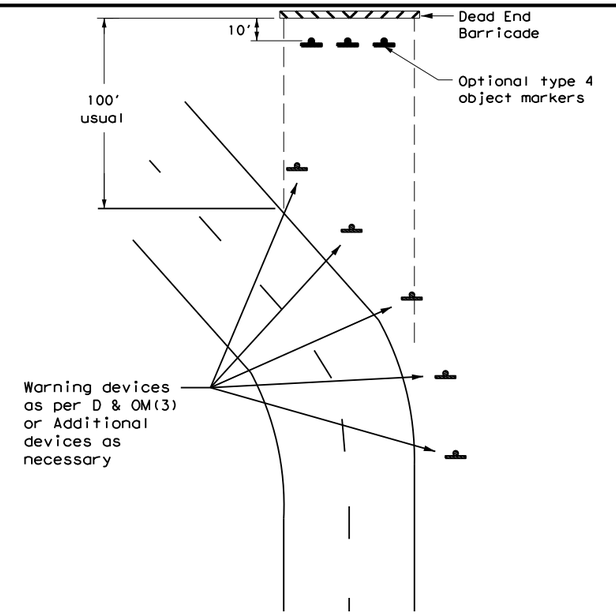
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



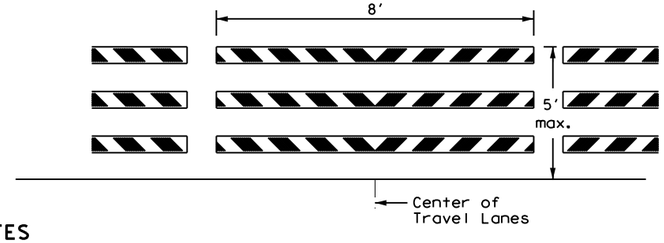
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
3-15	DIST	COUNTY		SHEET NO.
7-20	PAR	RAINS		145

20D

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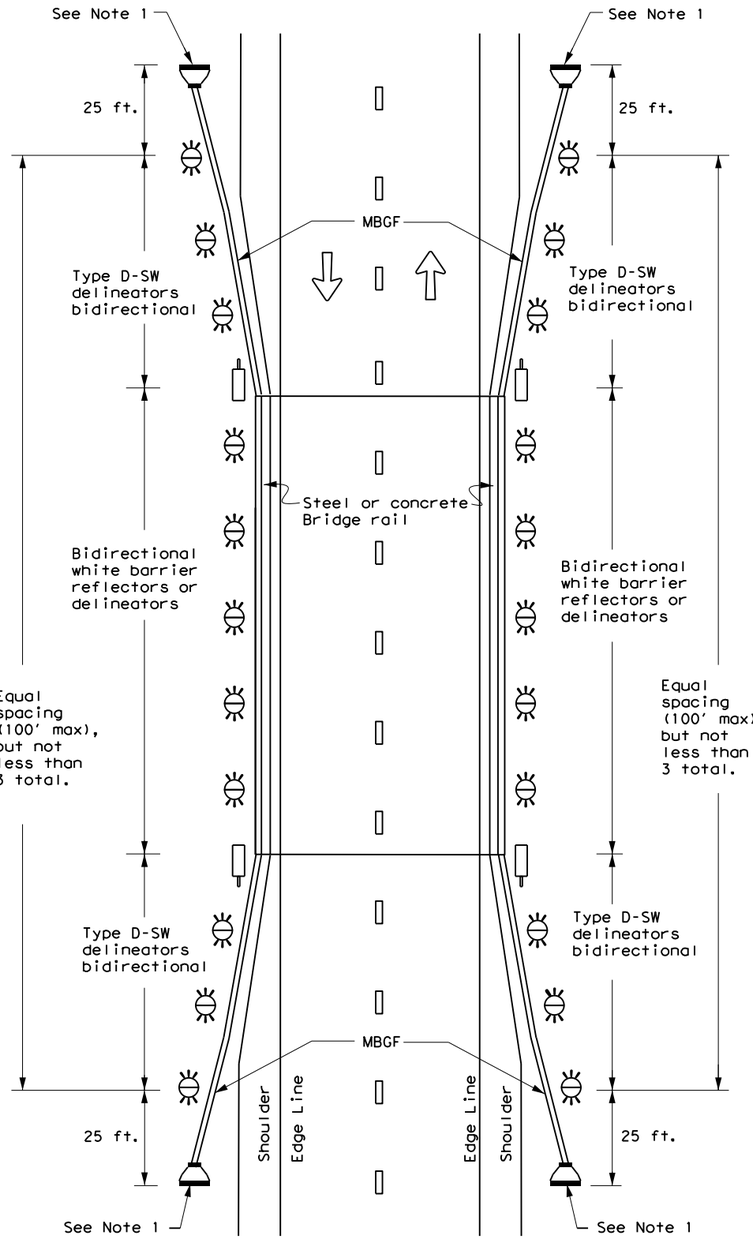
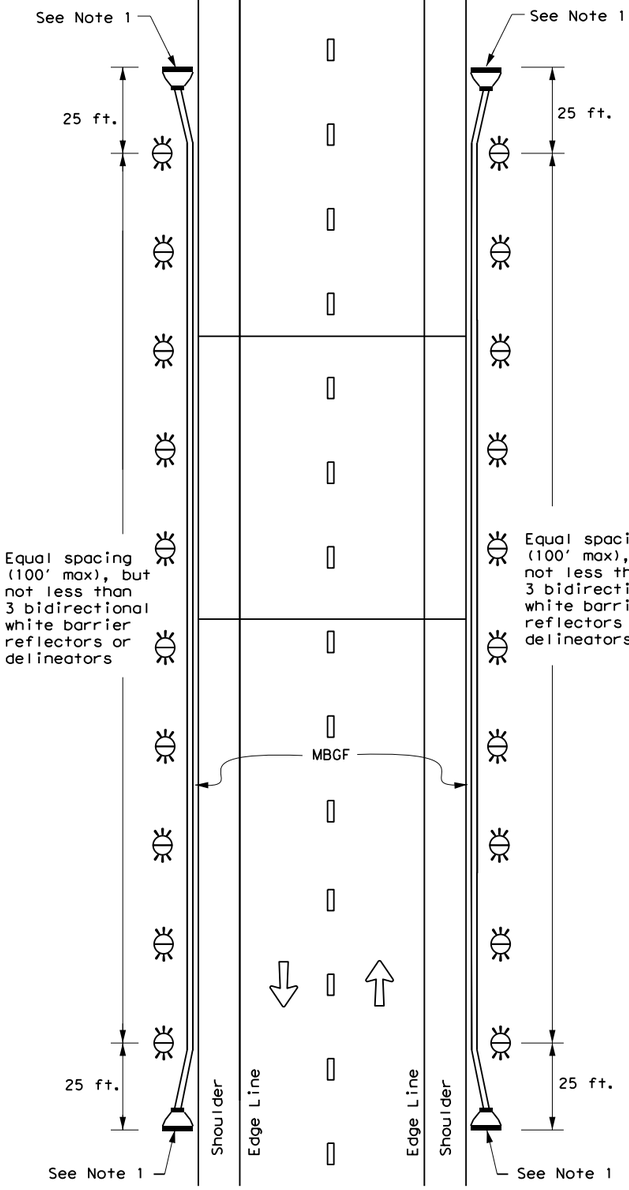
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

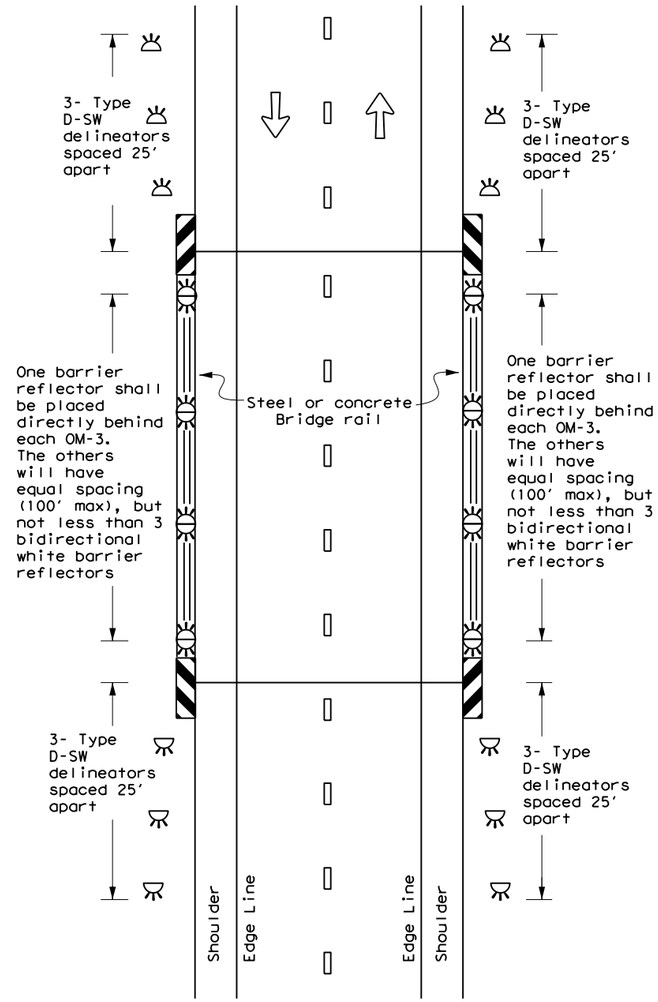
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2277	01	010,etc	FM 275
7-20	DIST	COUNTY		SHEET NO.
	PAR	RAINS		146

20E

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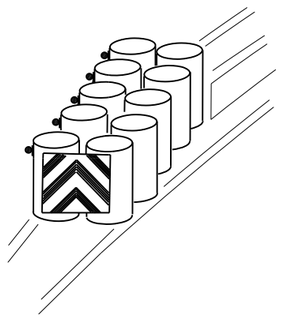
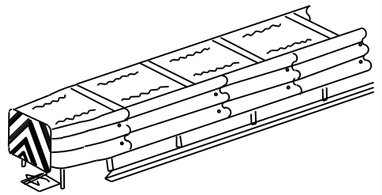
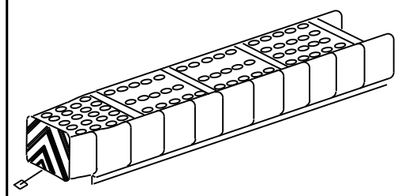
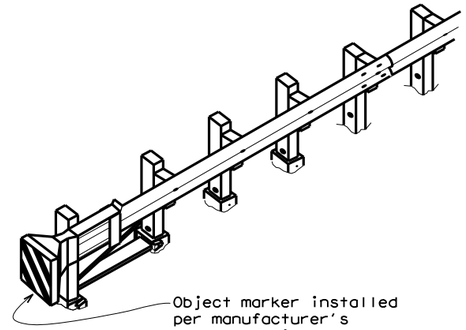
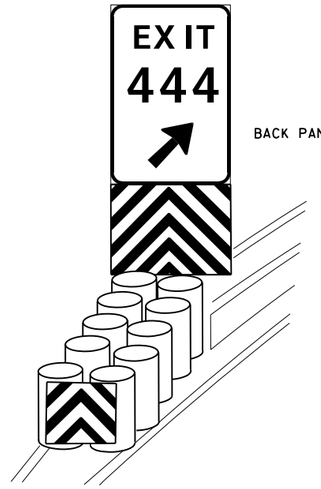
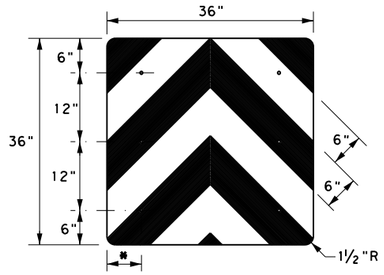


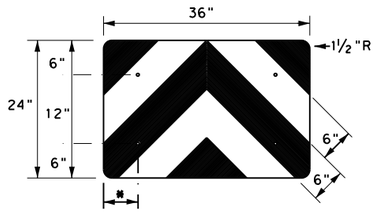




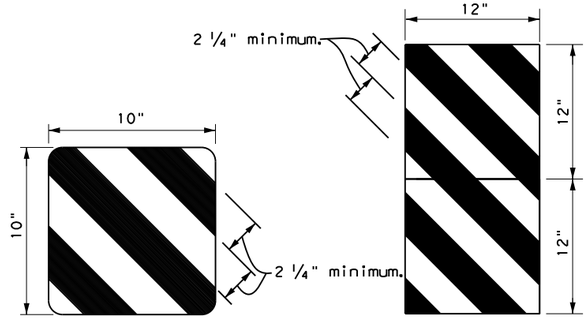




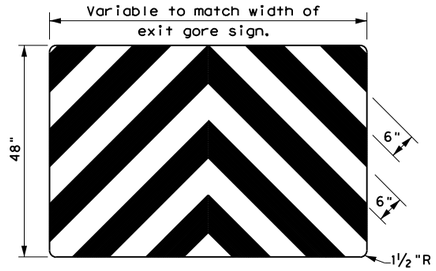


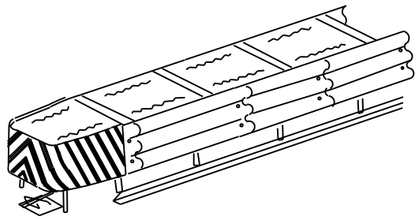


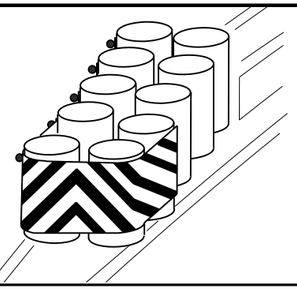
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

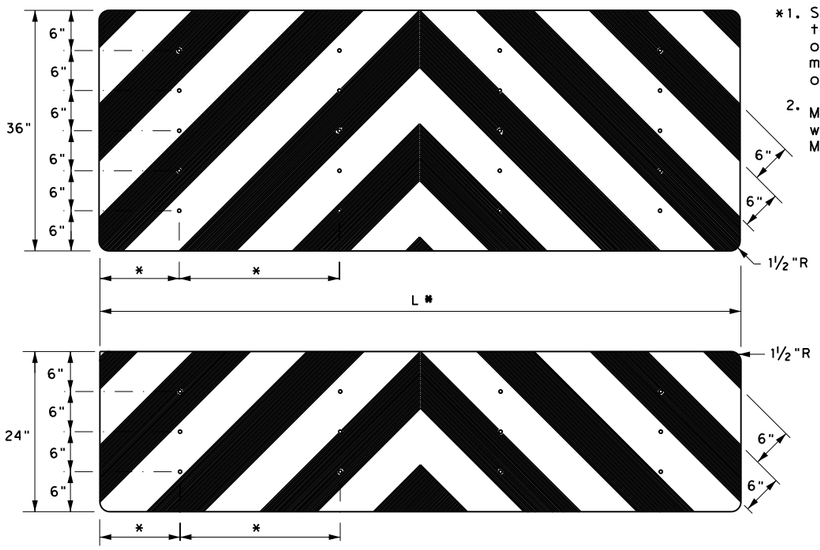


OBJECT MARKERS SMALLER THAN 3 FT^2









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	2277	01	010,etc	FM 275
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	PAR	RAINS		147
4-98 7-20				

20G

CK:
DW:
CK:
DN:

SITE DESCRIPTION

PROJECT LIMITS: *FM 275 FROM SH 19 TO FM 514*

BEGIN: 32°52'53.15" N 95°45'43.80" W *END: 32°57'21.52" N 95°46'10.05" W*

PROJECT DESCRIPTION: *RECONSTRUCTION AND RESURFACING OF EXISTING ROADWAY. WORK WILL CONSIST OF SUBGRADE WIDENING, REWORK BASE MATERIAL, FLEX BASE, BRIDGE RECONSTRUCTION, CULVERT IMPROVEMENTS.*

MAJOR SOIL DISTURBING ACTIVITIES:

INCLUDES PAVEMENT REMOVAL, SUBGRADE WIDENING, FLEXBASE, SURFACE TREATMENT, BRIDGE RECONSTRUCTION, AND CONSTRUCTION OF CULVERTS.

TOTAL PROJECT AREA: *69.6 ACRES*

TOTAL AREA TO BE DISTURBED: *69.6 AC*

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

THE EXISTING SOIL IS IN FAIR CONDITION AND IS COVERED WITH APPROXIMATELY 90% VEGETATIVE COVER BY VISUAL INSPECTION

NAME OF RECEIVING WATERS:

PROJECT RUNOFF FLOWS INTO ADJACENT NATURAL CREEKS AND STREAMS WHICH FLOW INTO LAKE FORK RESERVOIR. LAKE FORK RESERVOIR DISCHARGES INTO LAKE FORK CREEK WHICH FLOWS SOUTHEAST APPROXIMATELY 20 MILES AND DISCHARGES TO SABINE RIVER.

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EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES & STRUCTURAL PRACTICES:

EROSION CONTROL:

- X TEMPORARY SEEDING
- X PERMANENT PLANTING, SODDING, OR SEEDING
- ___ MULCHING
- ___ SOIL RETENTION BLANKET
- ___ BUFFER ZONES
- ___ PRESERVATION OF NATURAL RESOURCES

OTHER: *DISTURBED AREAS ON WHICH CONSTRUCTION ACTIVITY HAS CEASED (TEMPORARILY OR PERMANENTLY) SHALL BE STABILIZED WITHIN FOURTEEN (14) DAYS OR AS SOON AS PRACTICAL.*

SEDIMENTATION CONTROL:

- X SILT FENCES
- ___ HAY BALES
- X ROCK BERMS
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ___ DIVERSION DIKE AND SWALE COMBINATIONS
- ___ PIPE SLOPE DRAINS
- ___ PAVED FLUMES
- ___ ROCK BEDDING AT CONSTRUCTION EXIT
- ___ TIMBER MATTING AT CONSTRUCTION EXIT
- ___ CHANNEL LINERS
- ___ SEDIMENT TRAPS
- ___ SEDIMENT BASINS
- ___ STORM INLET SEDIMENT TRAP
- ___ STONE OUTLET STRUCTURES
- ___ CURBS AND GUTTERS
- ___ STORM SEWERS
- ___ VELOCITY CONTROL DEVICES

POST-CONSTRUCTION CONTROLS:

- ___ RETENTION / IRRIGATION
- ___ EXTENDED DETENTION BASIN (ie: ROCK BERMS)
- X VEGETATIVE FILTER STRIPS
- ___ GRASSY SWALES
- ___ VEGETATIVE LINED DRAINAGE DITCHES
- ___ CONSTRUCTED WET LANDS
- ___ WET BASINS
- ___ SAND FILTER SYSTEMS

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:

MAJOR SOIL DISTURBING ACTIVITIES SHALL NOT BE PERFORMED UNTIL EMBANKMENT PLACEMENT IS SCHEDULED TO BEGIN WITHIN FIVE (5) WORKING DAYS.

INSTALL EROSION AND SEDIMENTATION CONTROLS PRIOR TO SOIL DISTURBANCE WHENEVER POSSIBLE.

ONCE BEGUN, EARTHWORK ACTIVITIES SHALL BE PROGRESSED WITHOUT DELAY, UNLESS APPROVED BY THE ENGINEER, UNTIL FINAL GRADING IS ACCOMPLISHED.

EROSION CONTROL MEASURES SHALL BE APPLIED IMMEDIATELY UPON COMPLETION OF THE EMBANKMENT PLACEMENT TO MINIMIZE POTENTIAL WATER QUALITY IMPACTS.

REMARKS: *DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WETLAND, WATERBODY OR STREAMBED.*

THE CONTRACTOR SHALL DESIGNATE A LOCATION FOR, CONSTRUCT, AND MAINTAIN AN AREA FOR CONCRETE MIXING, HANDLING, AND DELIVERY EQUIPMENT TO WASH OUT. CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS. ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICAL OF TEMPORARY EMBANKMENT, TEMPORARY BRIDGES, MATTING, FALSEWORK, PILING, DEBRIS, OR OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT A PART OF THE FINISHED WORK.

MAINTENANCE: *All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.*

INSPECTION: *An inspection will be performed by a TxDOT inspector at least once every seven (7) calendar days. An inspection and maintenance report will be made per each inspection. Stormwater controls will be modified as directed by the Engineer based on these reports.*

OTHER EROSION AND SEDIMENT CONTROLS:

WASTE MATERIALS: *All trash and construction debris from the job site will be disposed of by the Contractor at a local dump. No construction materials will be buried on site.*

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): *Any hazardous waste spills shall be reported to the TxDOT Safety Officer in Paris. It shall be the responsibility of the waste owner to provide for the required clean-up. If the owner cannot be determined, the district laboratory shall direct in the clean-up operation.*

SANITARY WASTE: *ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR. ALL SANITARY WASTE FROM PERMANENT SITES WILL BE COLLECTED BY LOCAL SANITARY SEWER SYSTEMS.*

OFFSITE VEHICLE TRACKING:

- X HAUL ROADS DAMPENED FOR DUST CONTROL
- X LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- X EXCESS DIRT ON ROAD REMOVED DAILY
- ___ STABILIZED CONSTRUCTION ENTRANCE

THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL SUBCONTRACTORS ARE AWARE OF AND COMPLY WITH ALL COMPONENTS OF THE SW3P.

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED PROFESSIONAL ENGINEER

3/31/21

SHEET 1 OF 1

FM 275

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010, ETC.	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		148

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.

[X] No Action Required   [ ] Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

[ ] No Permit Required

[X] Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

[ ] Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

[ ] Individual 404 Permit Required

[ ] Other Nationwide Permit Required: NWP# _______

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
[X] Temporary Vegetation	[X] Silt Fence	[ ] Vegetative Filter Strips
[ ] Blankets/Matting	[X] 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	[X] 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.

[X] No Action Required   [ ] Required Action

Action No.

1.

2.

3.

4.

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.

[X] No Action Required   [ ] Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

[X] No Action Required   [ ] Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Hazardous Materials or Contamination Issues Specific to this Project:

[ ] No Action Required   [X] Required Action

Asbestos Containing Material:

1. Asbestos Containing Materials (ACM's) were identifed in the texture coating on the abutment wall, piers, pier caps, and barrier wall under bridge at piers.
2. TxDOT will be responsible for contracting a specialty subcontractor to abate ACM's in accordance with TxDOT 2014 Standard Specification 6.10 and applicable regulatory requirements, including 40 CFR 61.145 (Renovation and Demolition of Structures - Asbestos NESHAP) and OSHA 29 CFR 1926.1101 (Asbestos Standard for Construction), prior to dismantling the bridge.

Lead-Containing Paint:

1. Concentrations of lead were identified in the grey paint on the metal barrier rail on the bridge, and in the grey paint on the metal I-beams. The Contractor is responsible to identify locations on the bridge that will require torch cutting, grinding, sawing, etc. Once the locations are identified the Contractor shall notify the Project Engineer.
2. TxDOT will be responsible for contracting a specialty subcontractor to spot abate these locations by stripping back the paint in accordance with TxDOT 2014 Standard Specification 6.10 and TxDOT Bridge Division special provisions (SP 006-030 and SP 006-031) prior to dismantling the bridge.
3. The Contractor shall only torch cut, grind, or saw steel elements at locations where the lead-containing paint has been stripped back to expose uncoated steel.
4. The Contractor will be responsible for recycling the portions of the bridge that contain lead-containing paint in accordance with all applicable State and Federal guidelines, including Item 6.10.2-Removal & Disposal of Painted Steel (2014 Standard Specifications).

Does the project involve the demolition of a span bridge?

[X] Yes   [ ] No (No further action required)

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

[X] No Action Required   [ ] Required Action

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	2277	01	010,etc	FM 275
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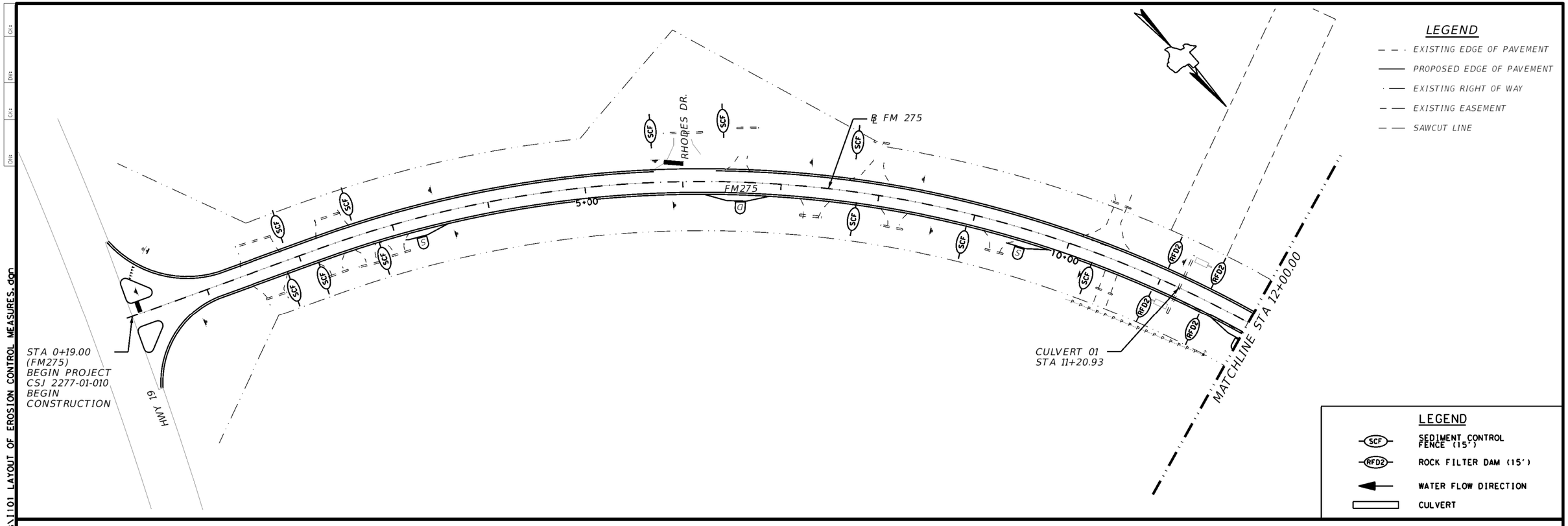

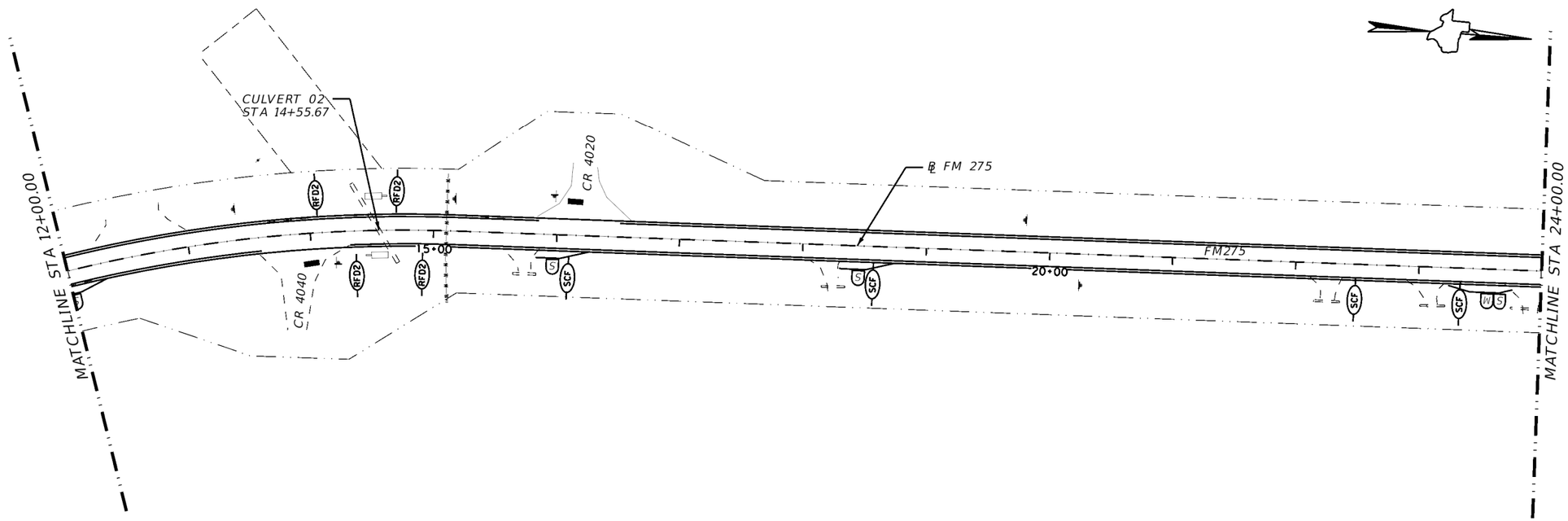

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SCALE: 1 = 100'

STATE OF TEXAS
JAMES D. GOOD
104637
LICENSED
PROFESSIONAL ENGINEER

3/31/21

FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 1 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		150

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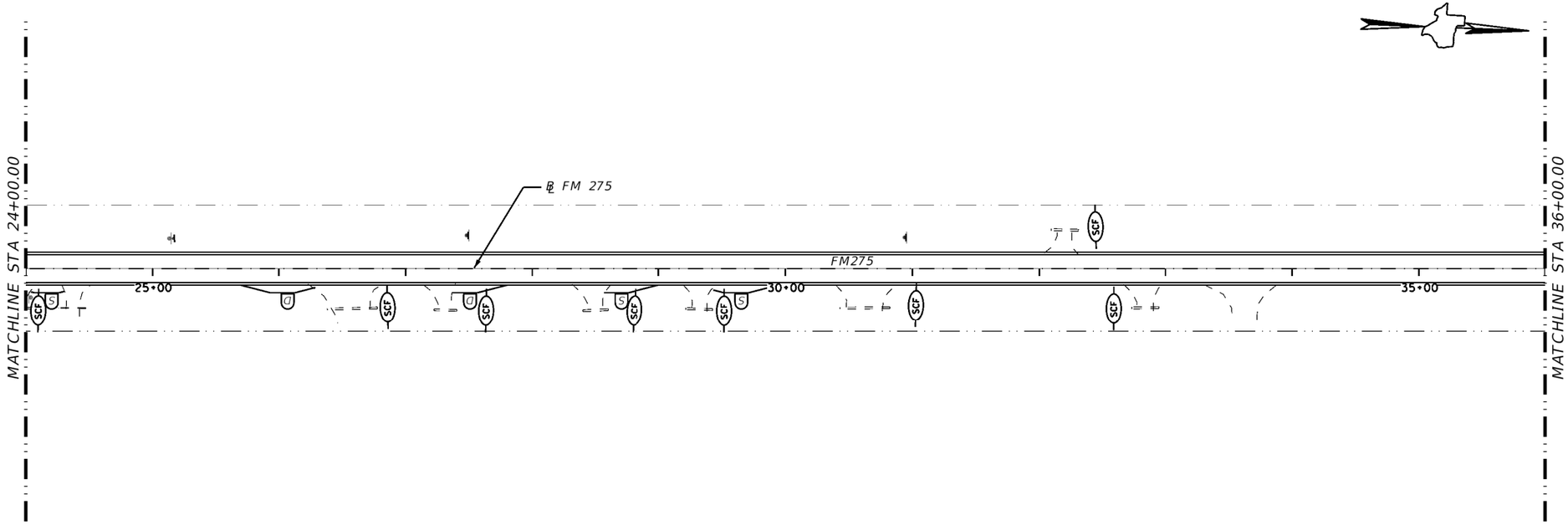
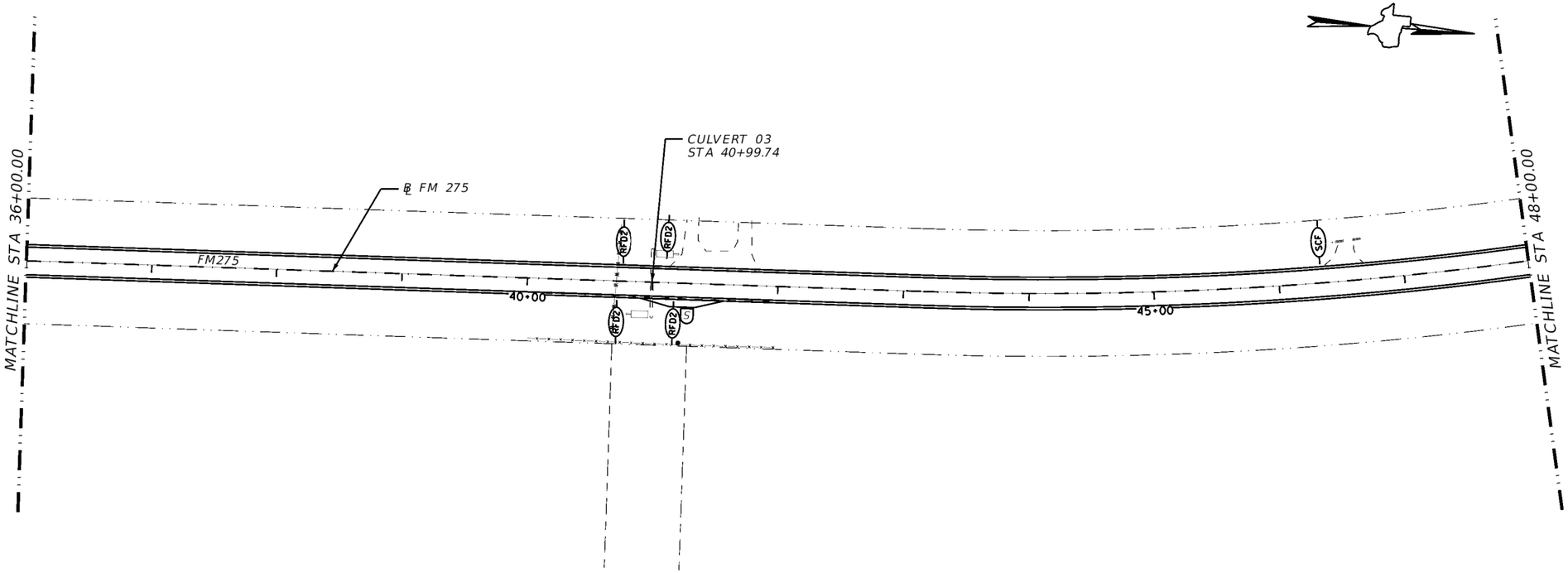


LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 2 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		151

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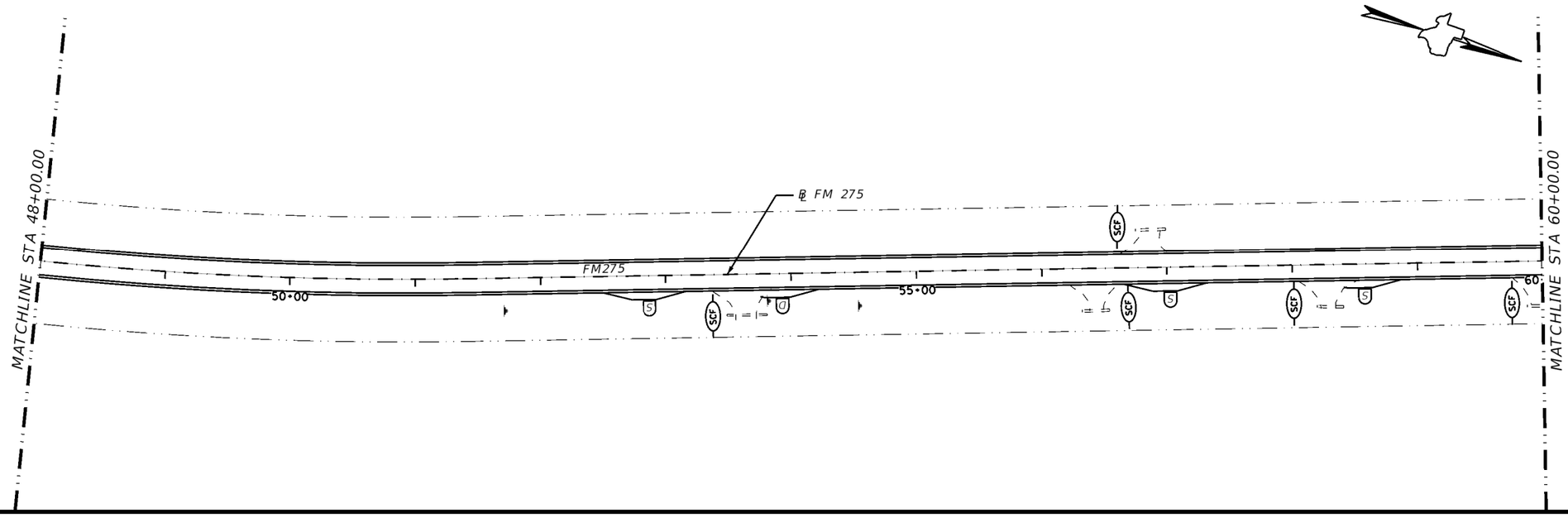

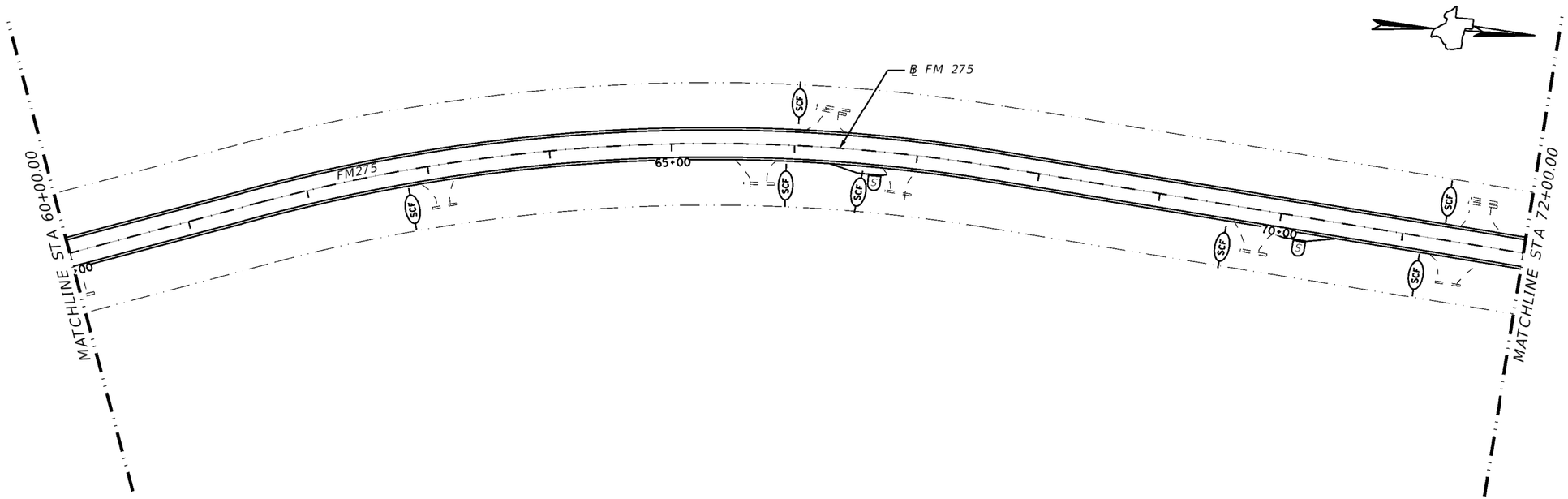

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 3 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		152

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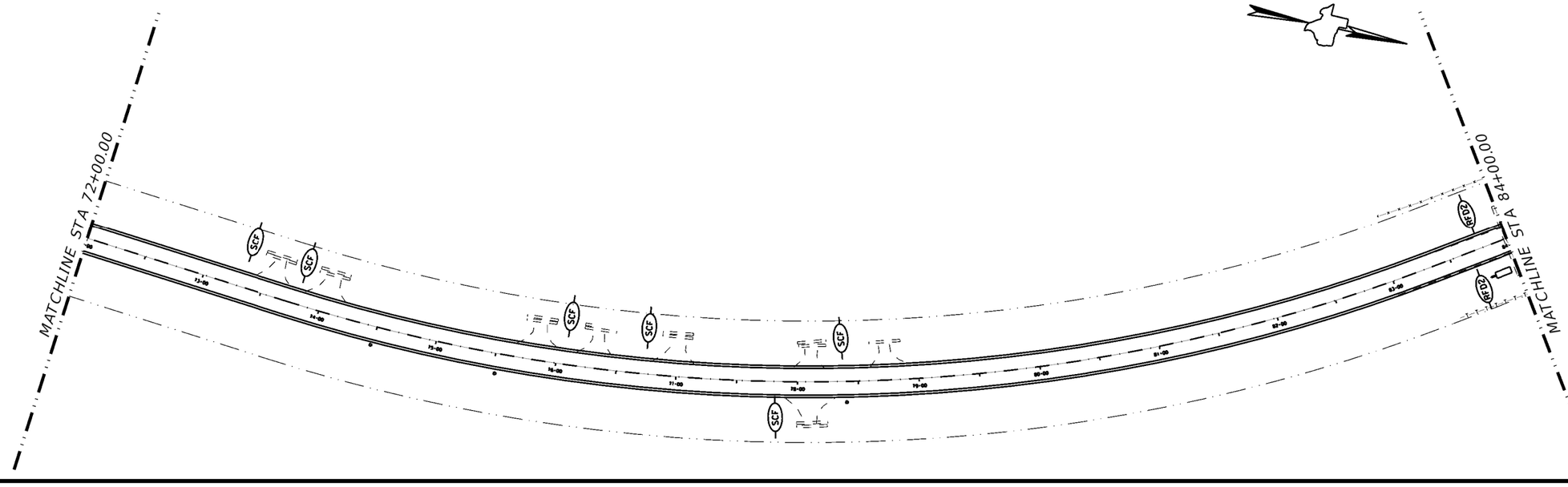
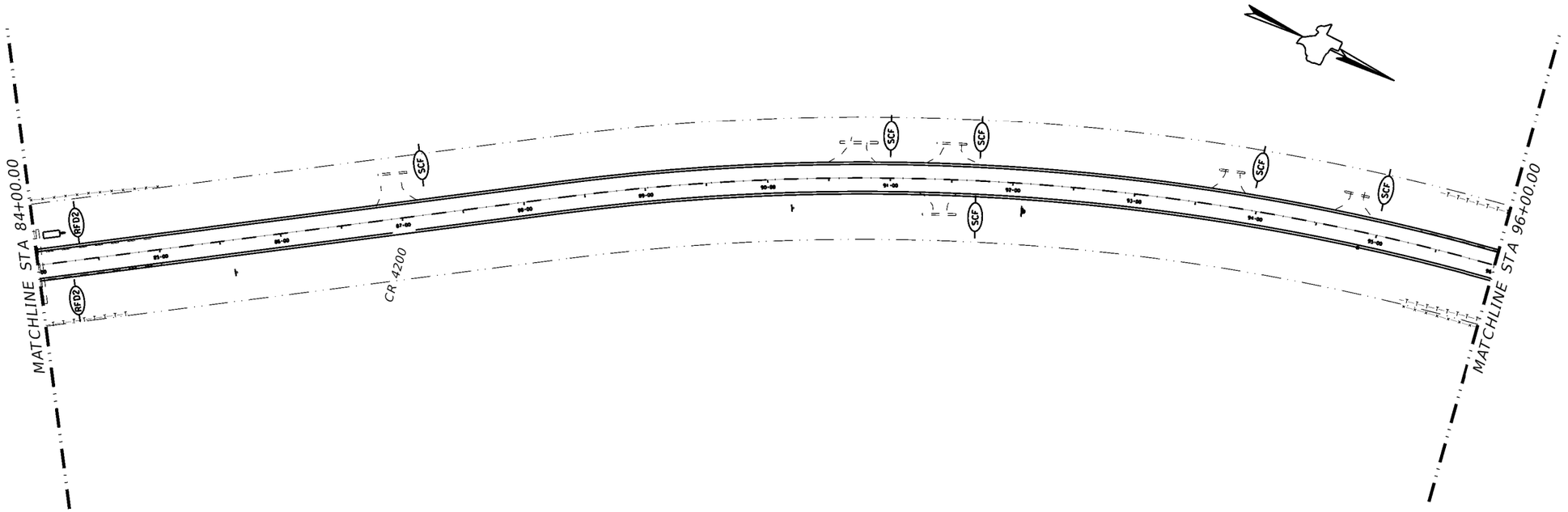


LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT



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SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 4 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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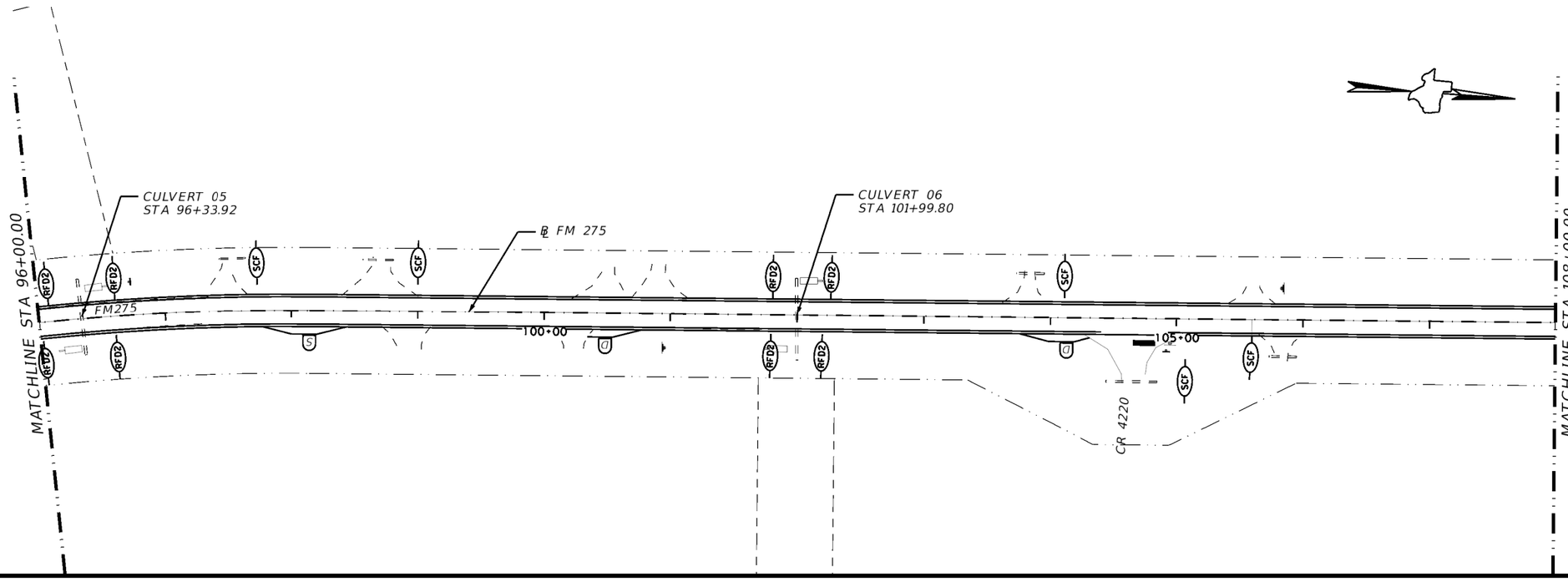

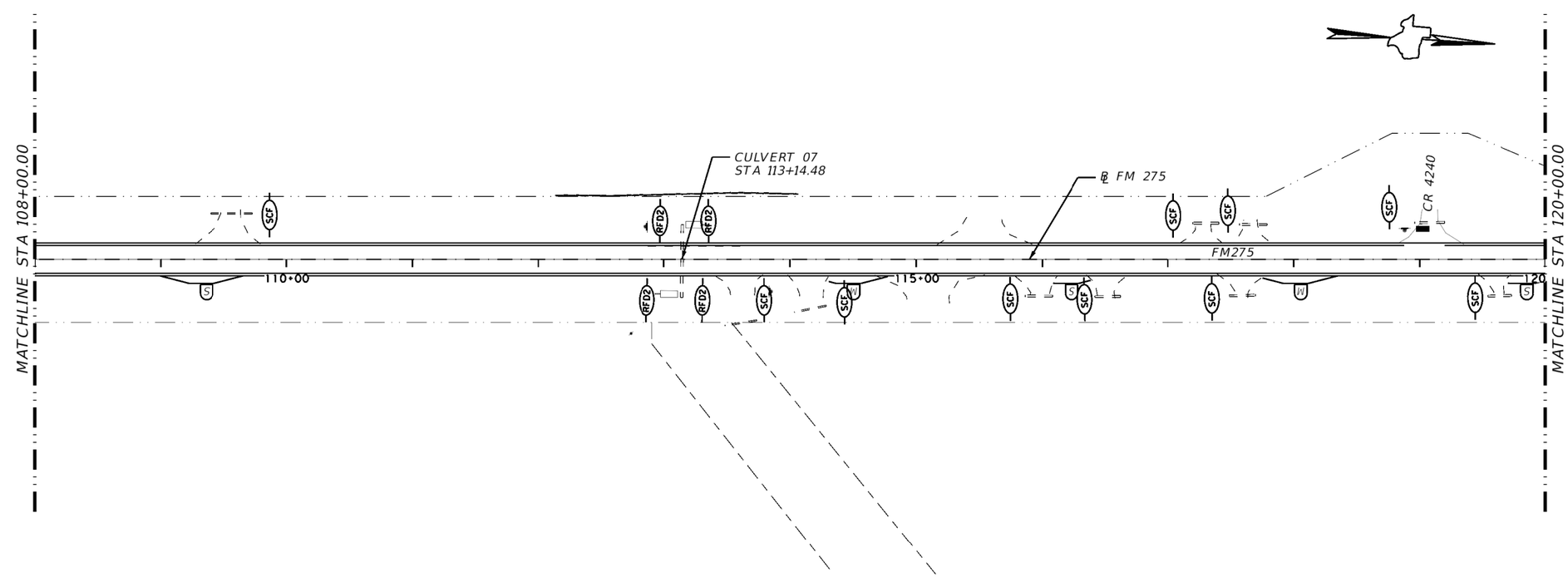

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
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- CULVERT

0 50 100

SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 5 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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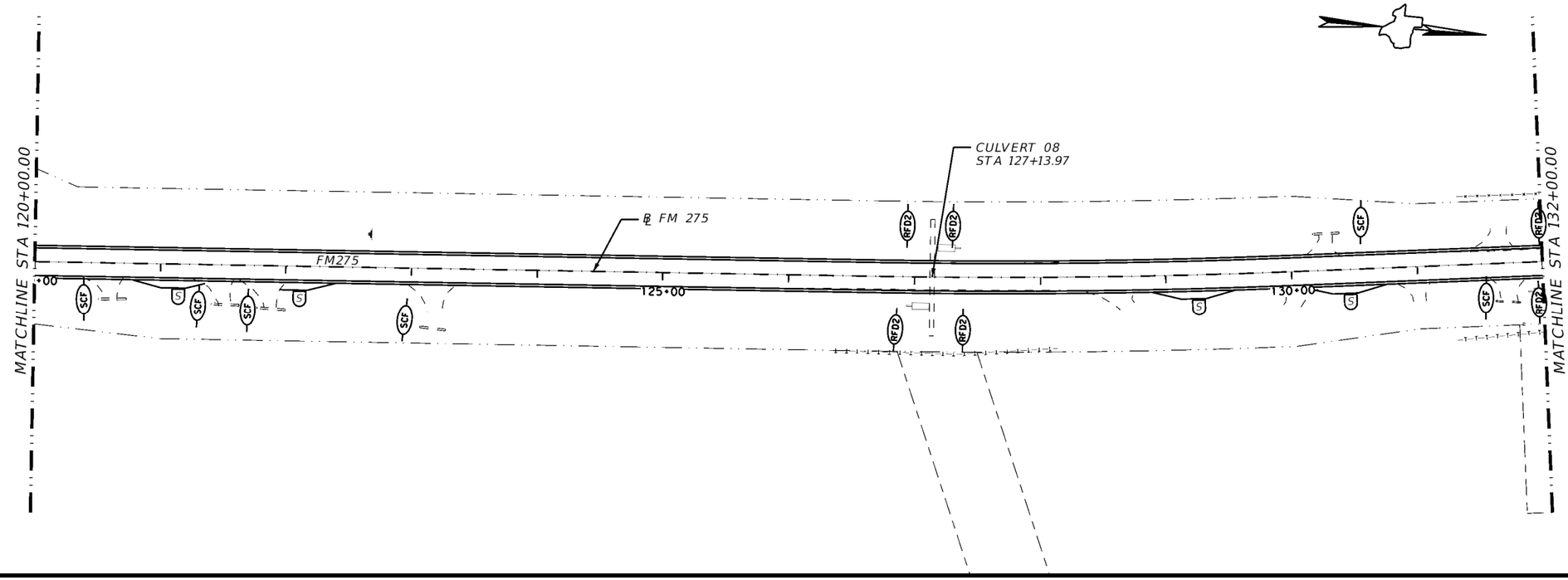

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
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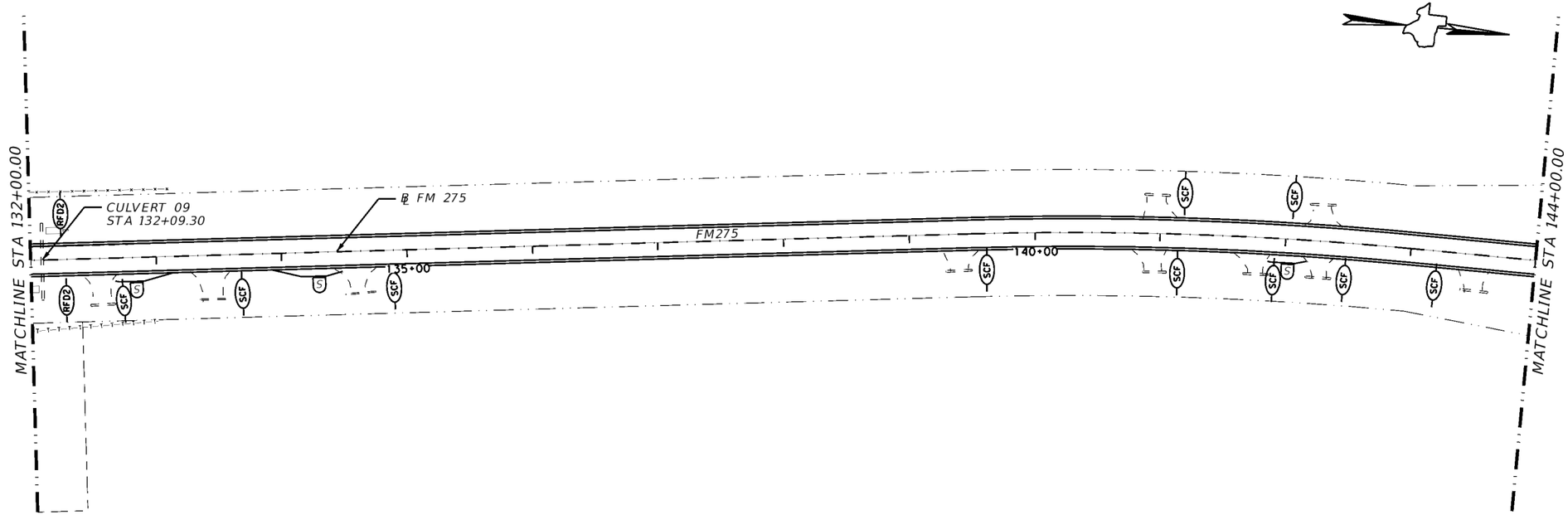
- CULVERT



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SCALE: 1 = 100'

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3/31/21

FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 6 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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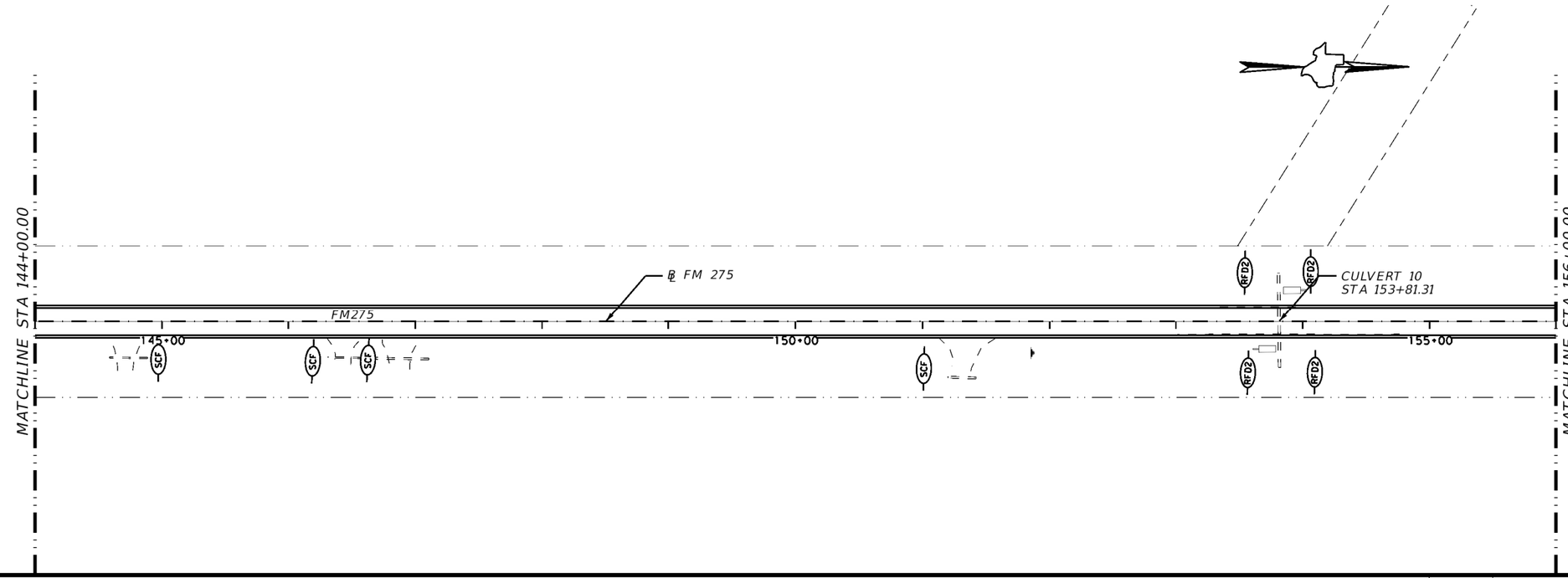

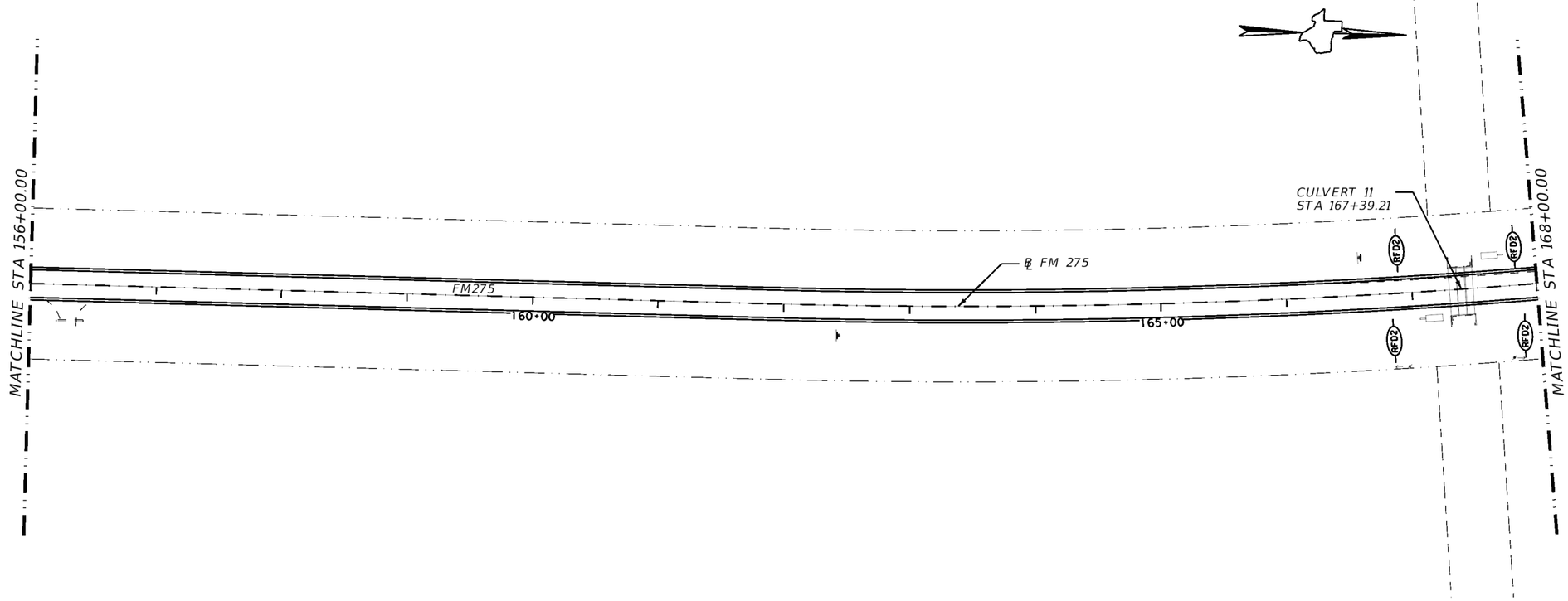

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
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- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

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- CULVERT

0 50 100

SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 7 OF 12

Texas Department of Transportation

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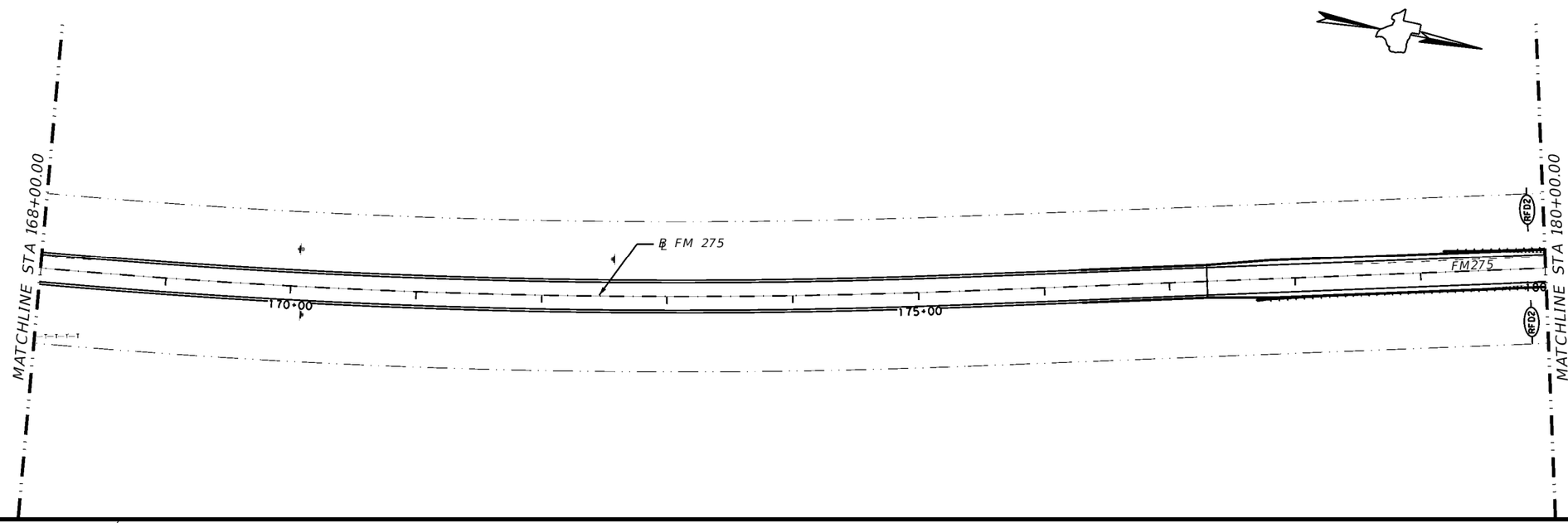

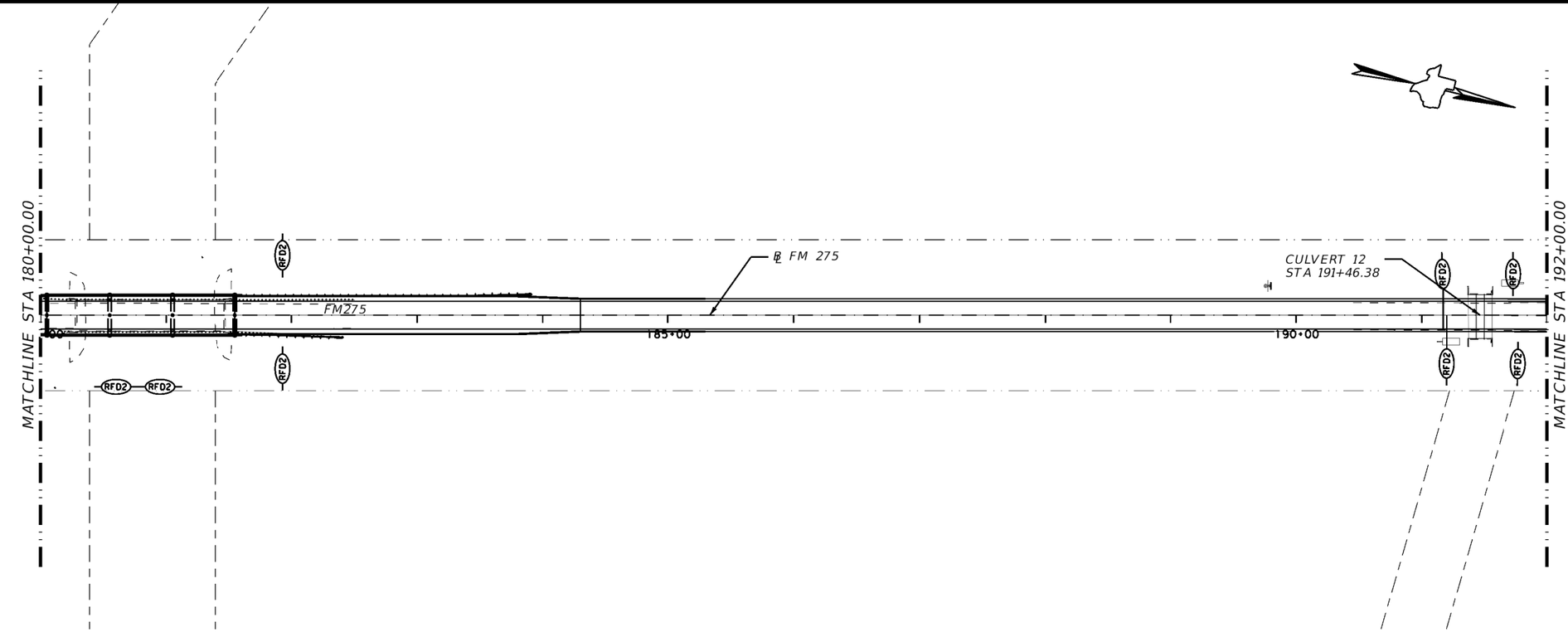

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

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- CULVERT

0 50 100
SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 8 OF 12

Texas Department of Transportation

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DIST	COUNTY		SHEET NO.
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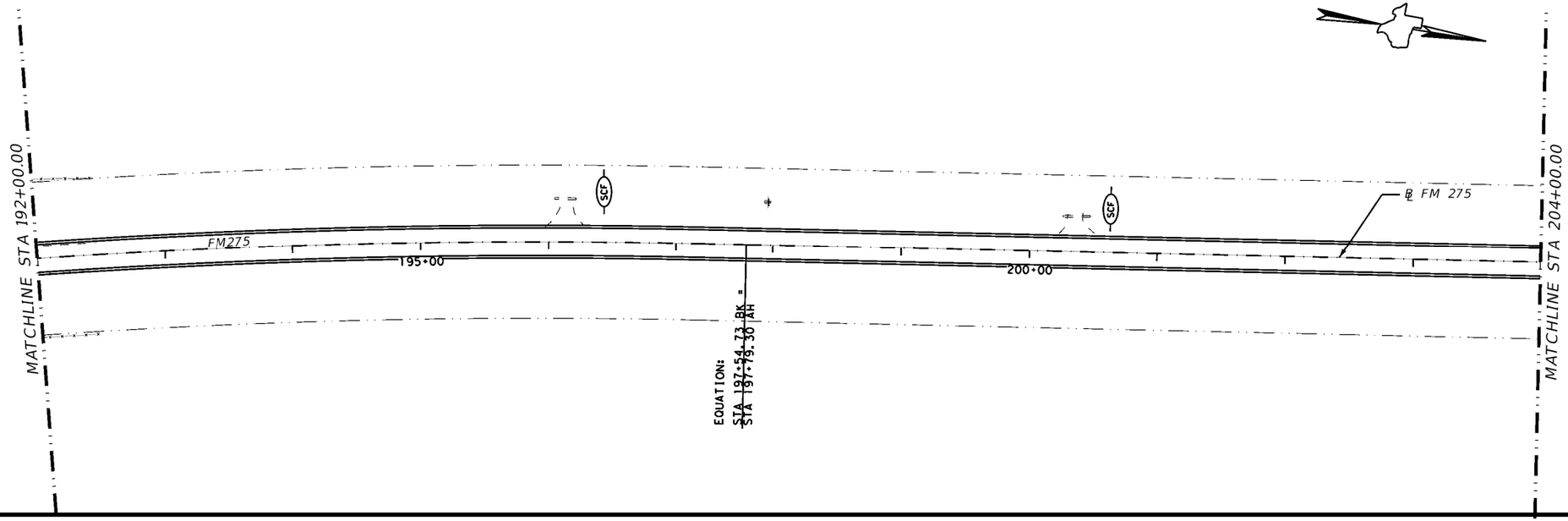

LEGEND

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LEGEND

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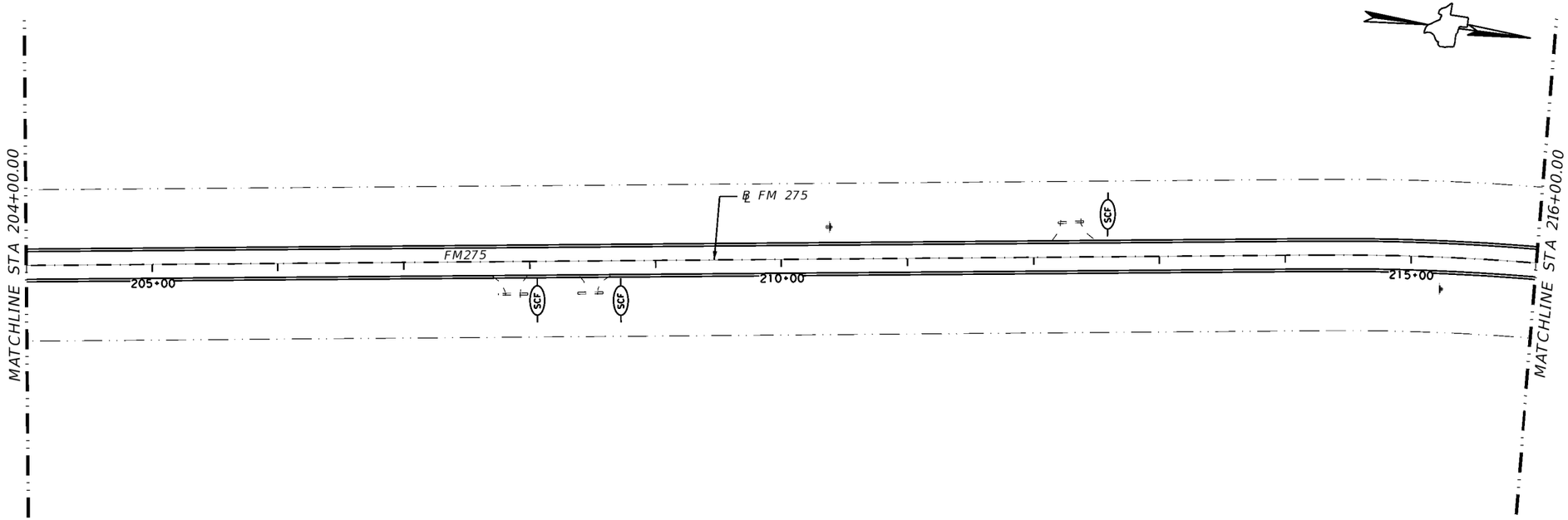

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STATE OF TEXAS
JAMES D. GOOD
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LICENSED PROFESSIONAL ENGINEER

3/31/21

FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 9 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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PAR	RAINS		158

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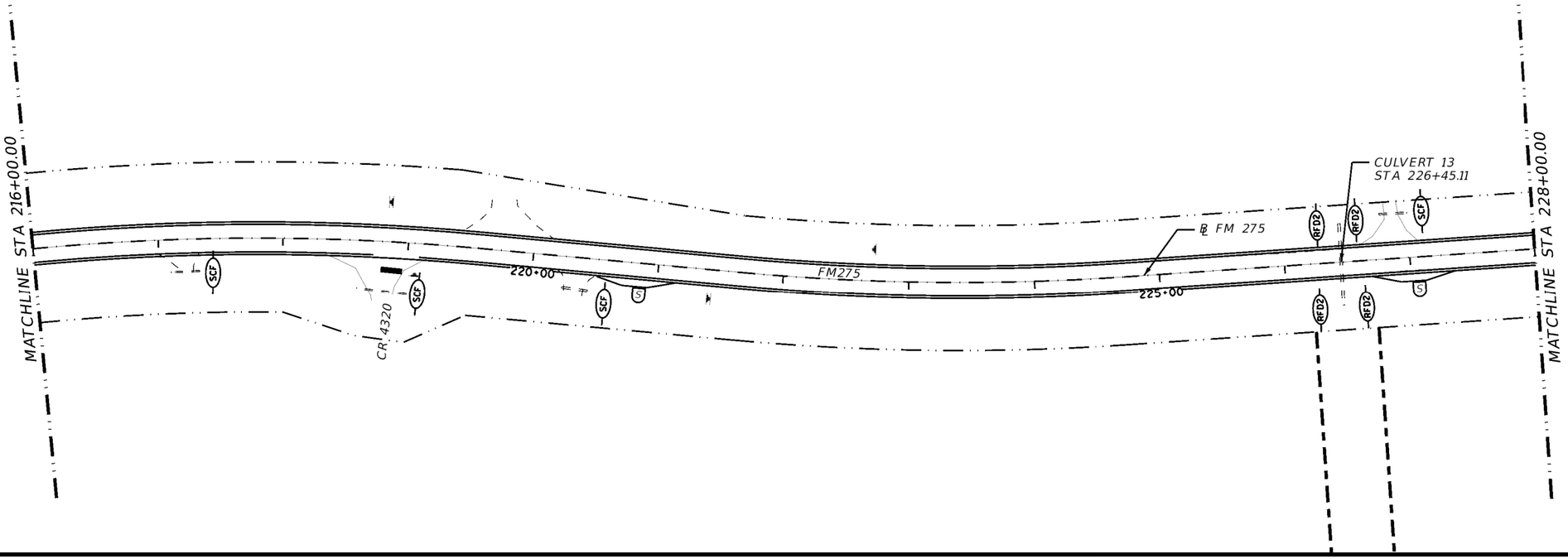

LEGEND

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- SAWCUT LINE

LEGEND

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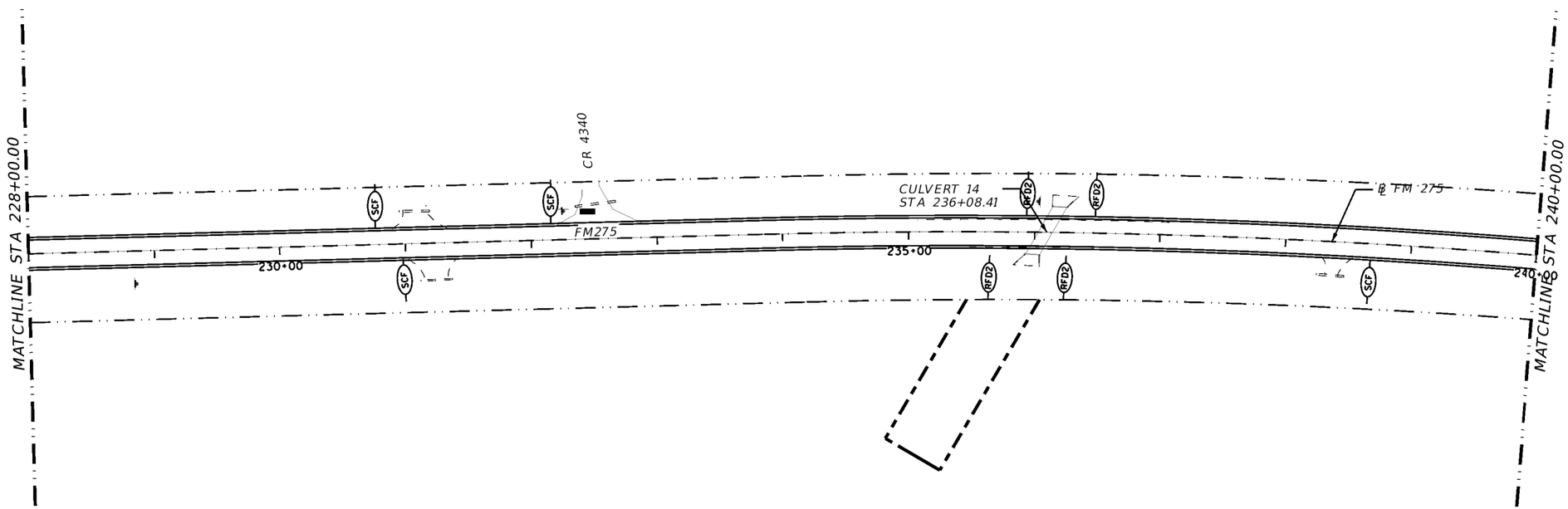
- CULVERT



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SCALE: 1 = 100'

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3/31/21

FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 10 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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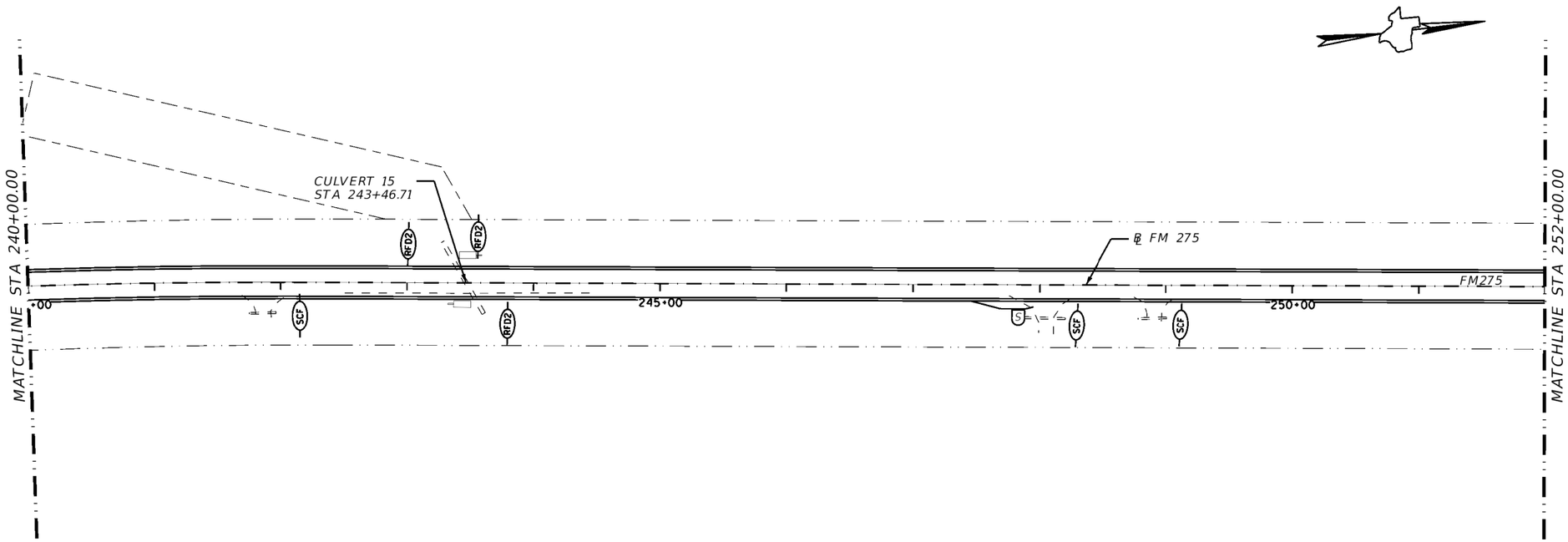

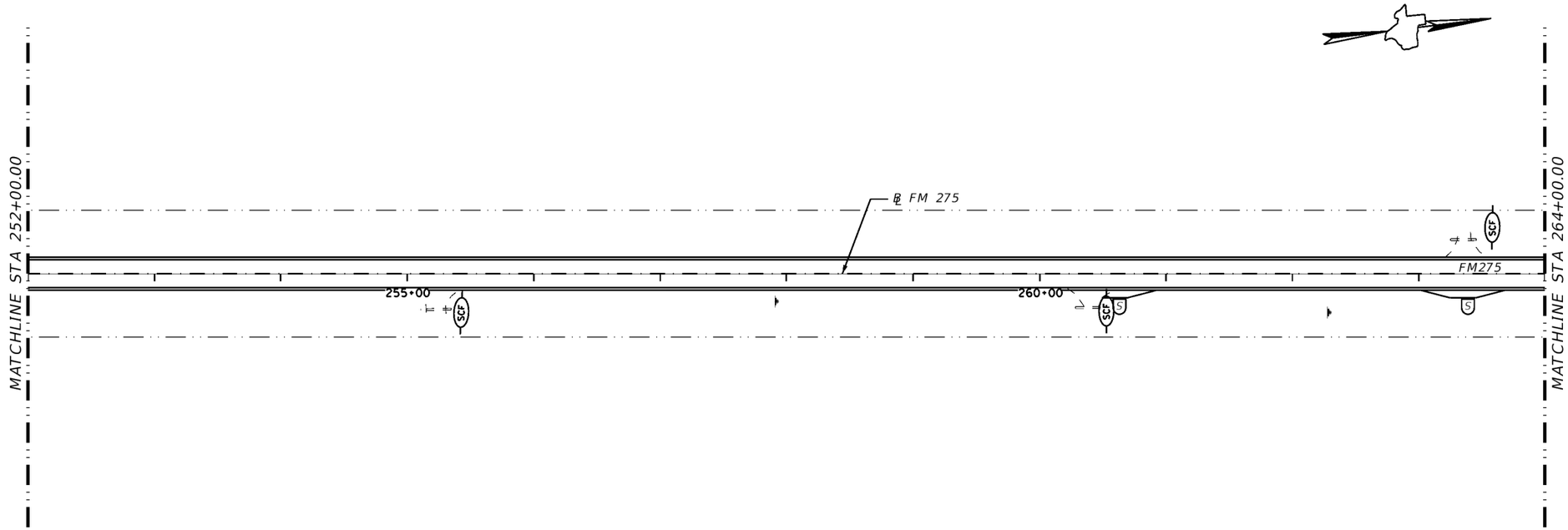

LEGEND

- EXISTING EDGE OF PAVEMENT
- PROPOSED EDGE OF PAVEMENT
- EXISTING RIGHT OF WAY
- EXISTING EASEMENT
- SAWCUT LINE

LEGEND

- SCF — SEDIMENT CONTROL FENCE (15')
- RFD2 — ROCK FILTER DAM (15')
- WATER FLOW DIRECTION
- CULVERT

0 50 100

SCALE: 1 = 100'

STATE OF TEXAS
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3/31/21

FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 11 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
DIST	COUNTY		SHEET NO.
PAR	RAINS		160

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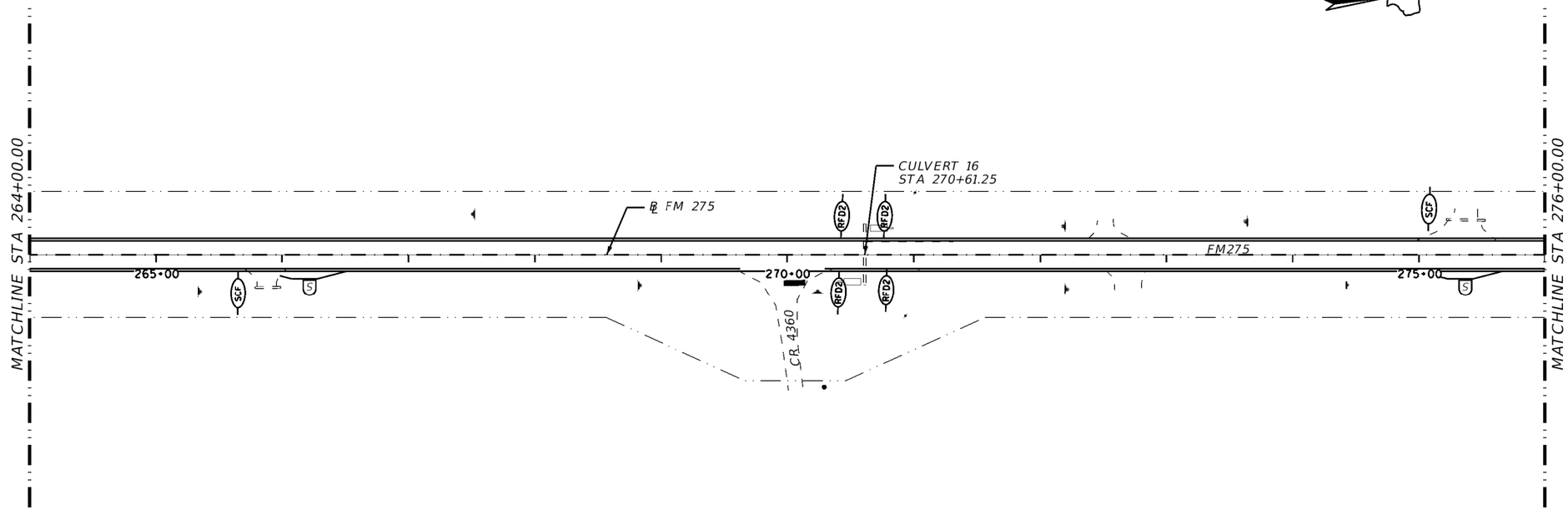

LEGEND

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LEGEND

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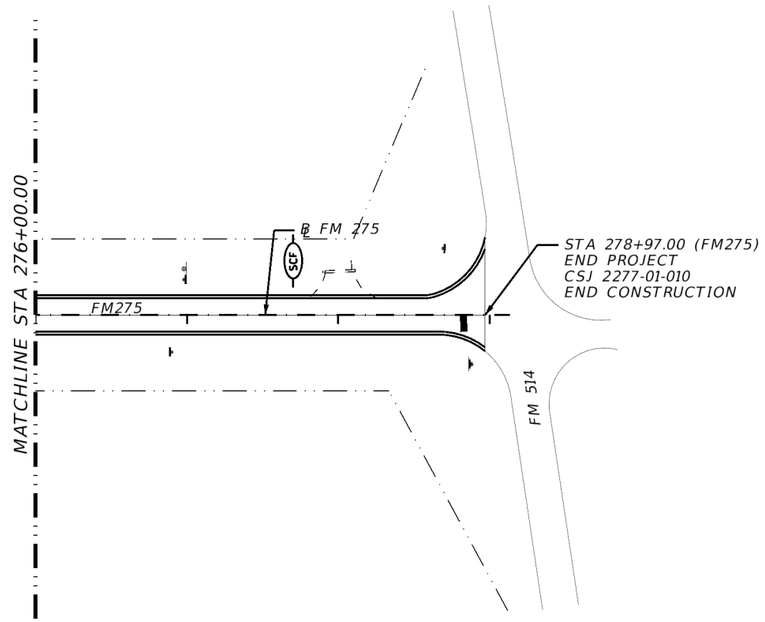

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SCALE: 1 = 100'

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FM 275
LAYOUT OF EROSION CONTROL MEASURES

SHEET 12 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
2277	01	010,etc	FM 275
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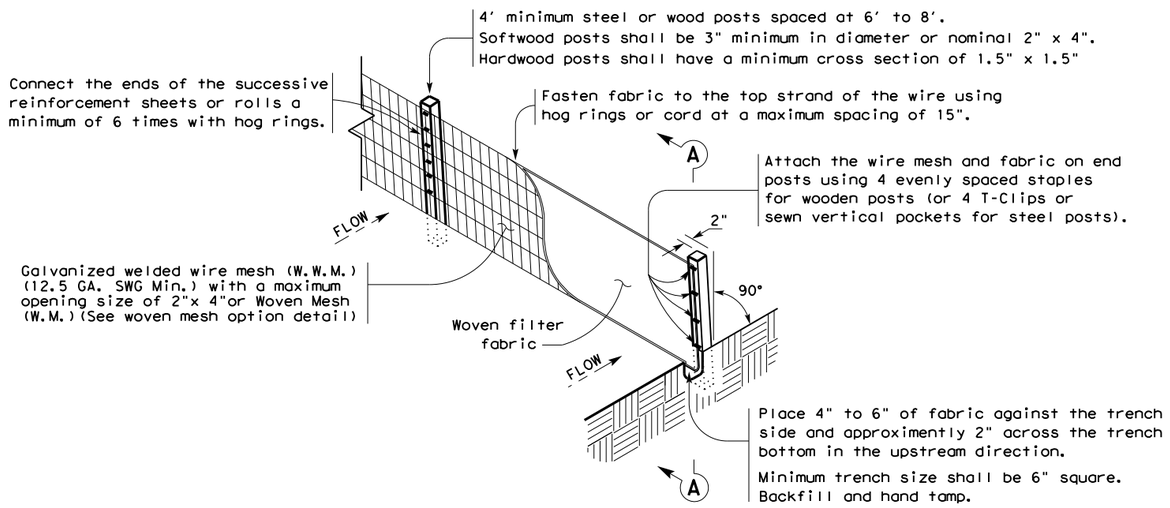
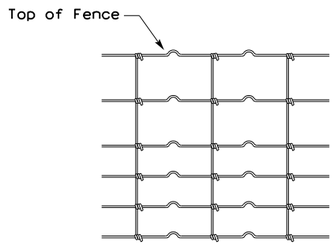
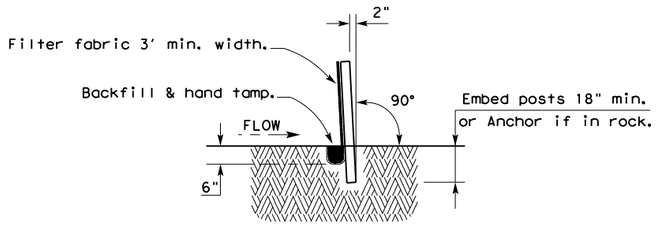


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

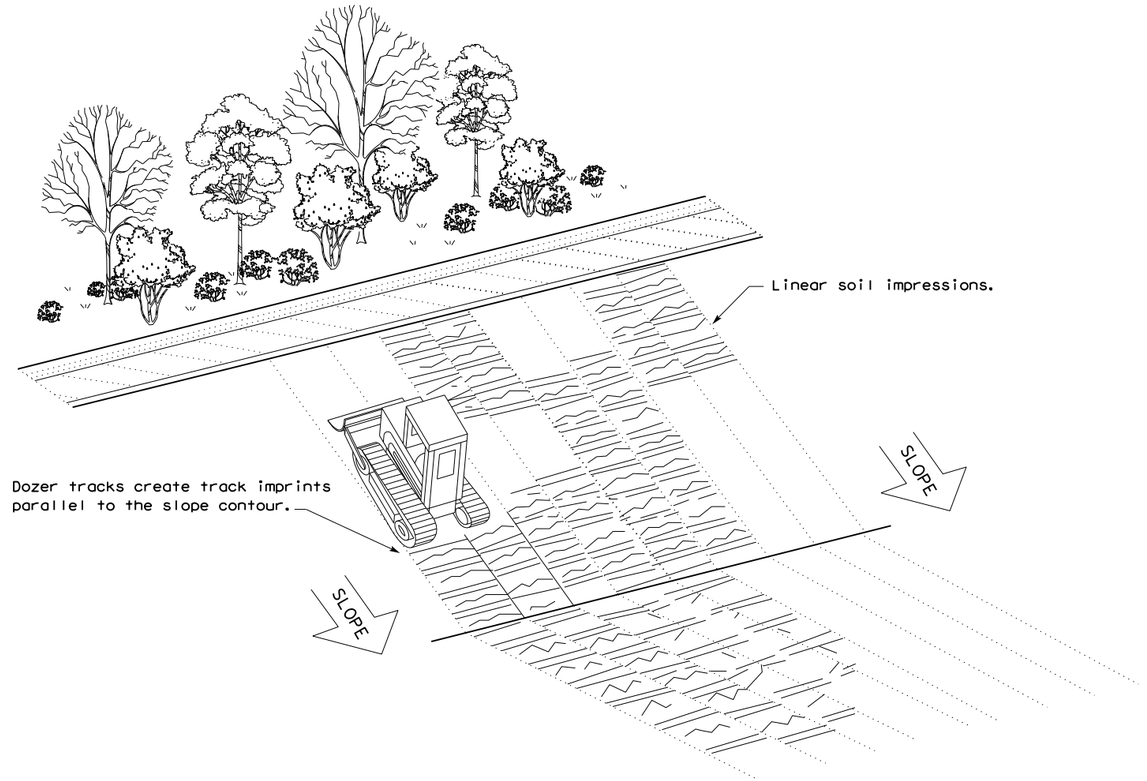
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

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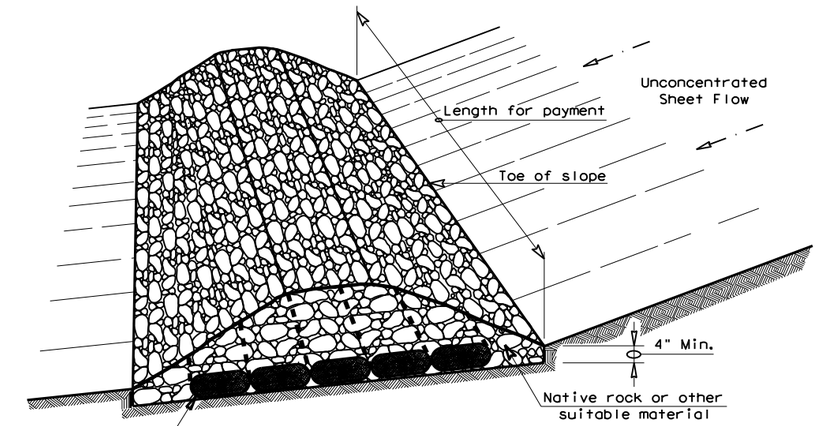
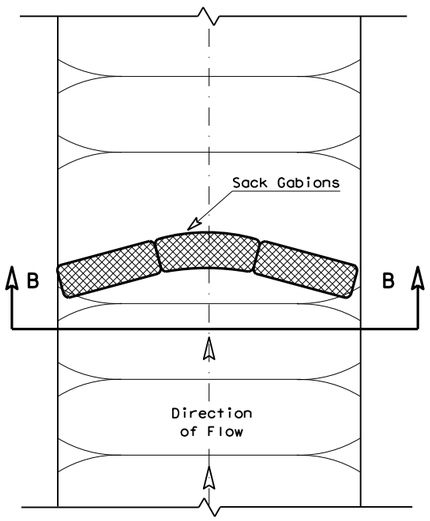
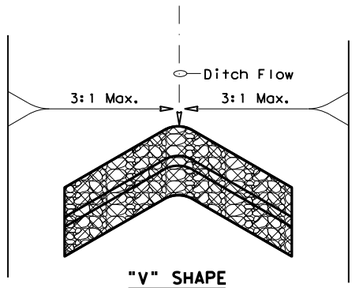


FILTER DAM AT TOE OF SLOPE

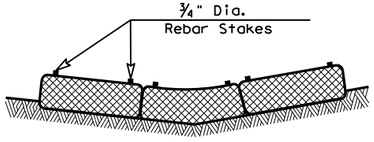
RFD1



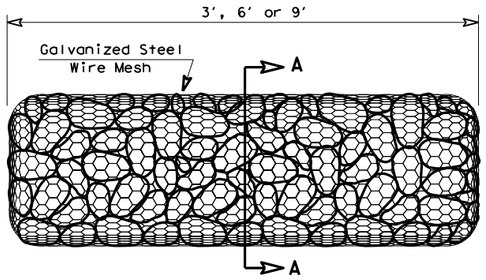
PLAN VIEW



"V" SHAPE PLAN VIEW

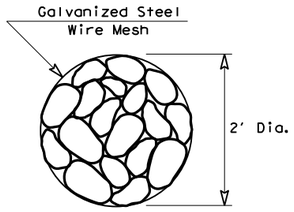


SECTION B-B

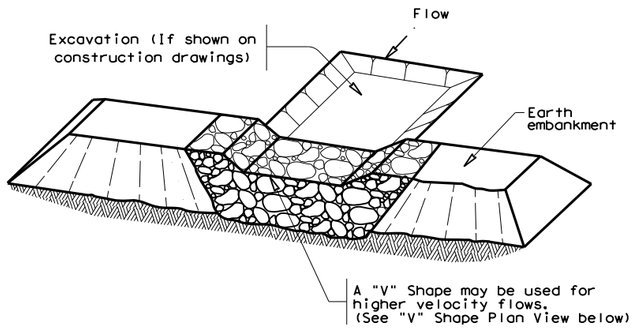


TYPE 4 (SACK GABIONS)

RFD4

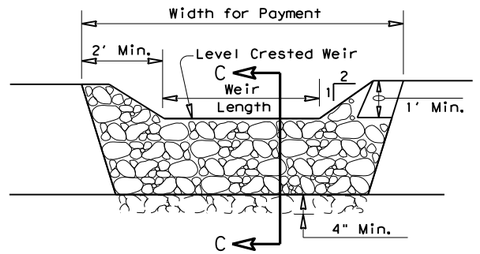


SECTION A-A

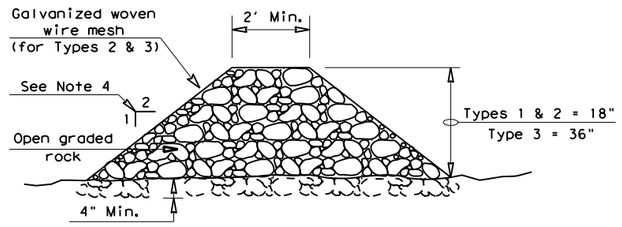


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

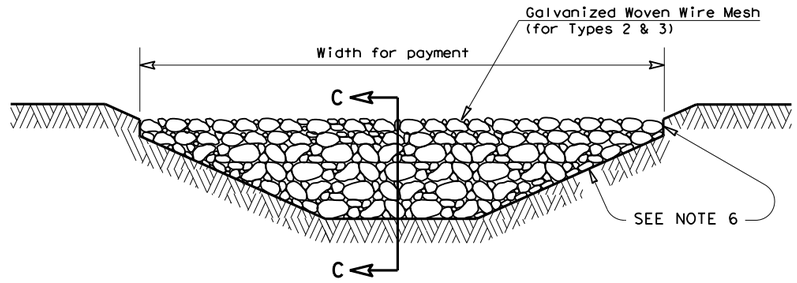
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 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	2277	01	010,etc	FM 275
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