DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	STP 2021(220)HES, etc.		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DALLAS	COLLIN	1
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012, etc.	

FINAL PLANS

NAME OF CONTRACTOR: _____

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED: _____

DATE WORK ACCEPTED: _____

SUMMARY OF CHANGE ORDERS:

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
STP 2021(220)HES, etc.
CSJ: 3236-02-012, etc.

FM 3133

COLLIN COUNTY

DESIGN SPEED = 40 MPH
FUNCTIONAL CLASSIFCATION = MAJOR COLLECTOR (RURAL)
ADT (2020) = 1,503 VPD
ADT (2040) = 2,081 VPD

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

CSJ: 3236-02-012
LIMITS: FROM FM 2862 SOUTH
TO BRANGUS ROAD

TOTAL LENGTH OF PROJECT =

ROADWAY	= 12,155.92	FT.	= 2.302 MI.
BRIDGE	= 0.00	FT.	= 0.000 MI.
TOTAL	= 12,155.92	FT.	= 2.302 MI.

CSJ: 3236-02-014
LIMITS: FROM FM 2862 SOUTH
TO GRAYSON COUNTY LINE

TOTAL LENGTH OF PROJECT =

ROADWAY	= 25,561.37	FT.	= 4.841 MI.
BRIDGE	= 0.00	FT.	= 0.000 MI.
TOTAL	= 25,561.37	FT.	= 4.841 MI.

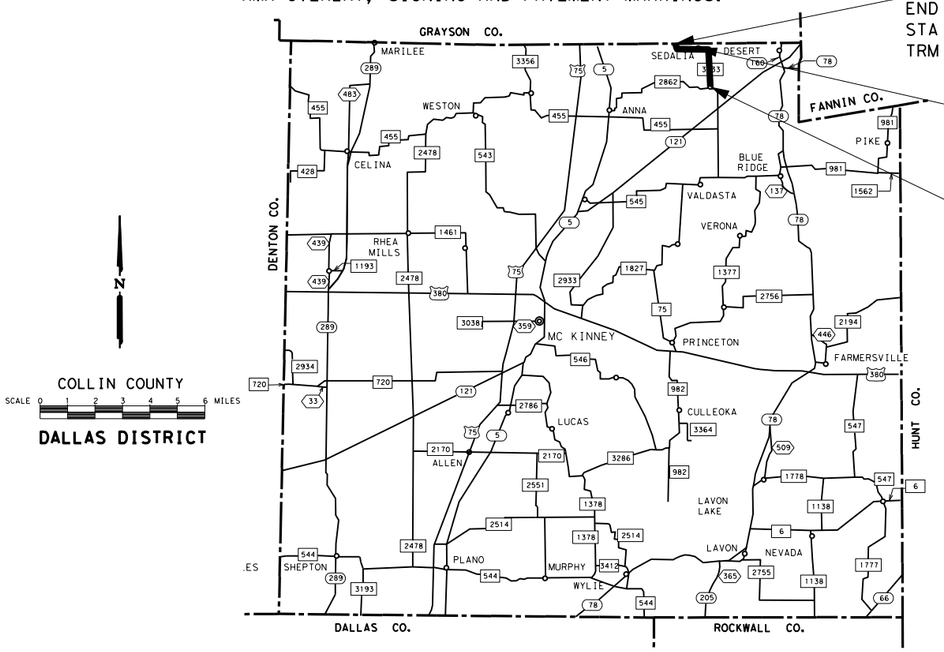
TYPE OF WORK: FOR THE CONSTRUCTION OF PROVIDE ADDITIONAL PAVED SURFACE WIDTH, SAFETY TREATED FIXED OBJECTS; RESTORE EXISTING PAVEMENT AND ADD SHOULDERS.

CONSISTING OF: SUBGRADE WIDENING, DRAINAGE, FLEX BASE, SURFACE TREATMENT, HMA OVERLAY, SIGNING AND PAVEMENT MARKINGS.

END PROJECT 3236-02-012, etc.
END CSJ 3236-02-014
STA 255+61.37
TRM 602+0.072

END CSJ 3236-02-012
STA 121+55.92
TRM 604+0.567

BEGIN PROJECT 3236-02-012, etc.
BEGIN CSJ 3236-02-012
BEGIN CSJ 3236-02-014
STA 0+00
TRM 606+0.849



COLLIN COUNTY

DALLAS DISTRICT

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____, P.E.
Signature of Registrant & Date

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 10/28/20
_____, P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 11/3/2020
20
_____, P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING 11/4/2020
20
_____, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING: 11/4/2020
20
_____, P.E.
DISTRICT ENGINEER

DATE:

1/8/2021 5:20:16 PM

INDEX OF SHEETS

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

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

, P.E. 1/8/2021
Signature of Registrant & Date

FM 3133
INDEX OF SHEETS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	2
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				

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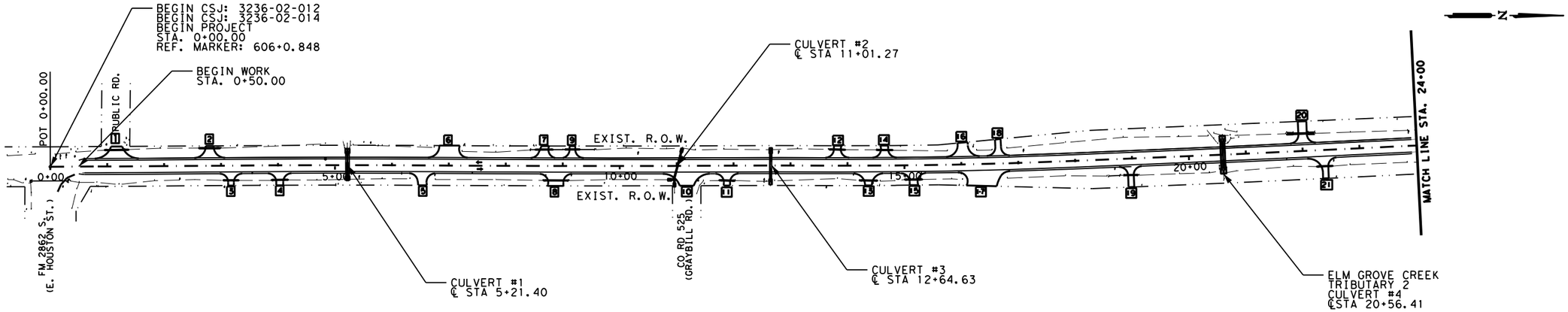

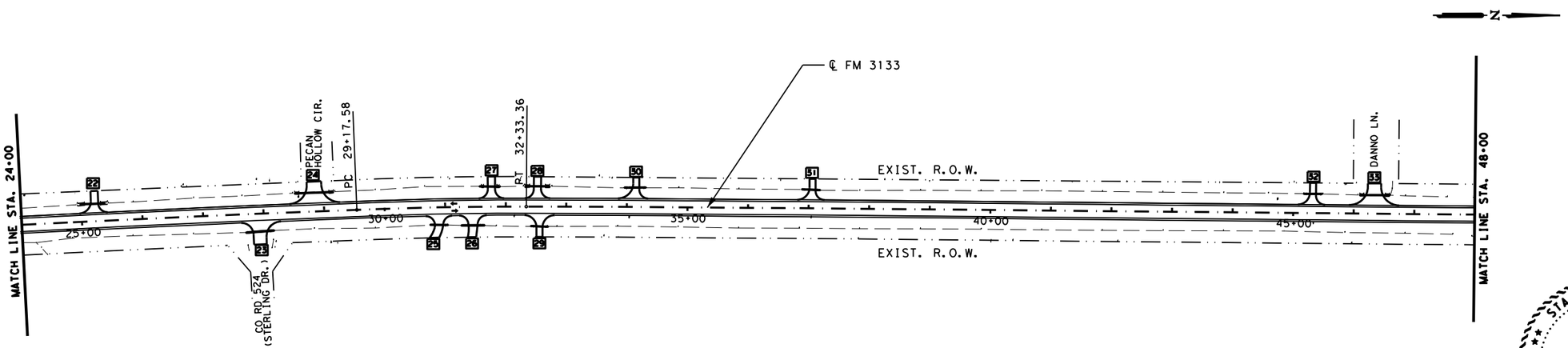

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DEGREE OF CURVE = 1° 00' 00.00"
TANGENT = 157.93
LENGTH = 315.78
RADIUS = 5,729.58
PC STATION = 29+17.58
PT STATION = 32+33.36

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

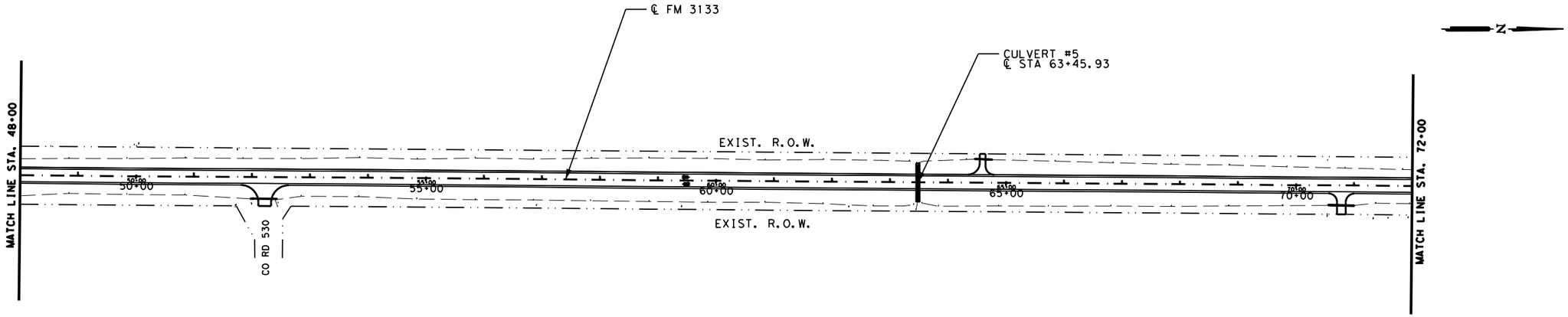
11/4/20

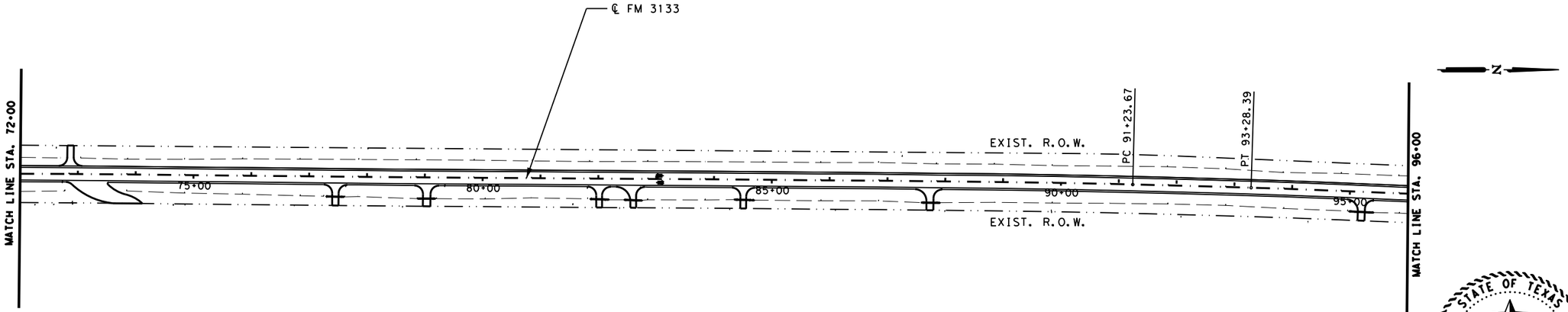
FM 3133
PROJECT LAYOUT

SCALE: 1" = 200'

SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	3
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





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TANGENT = 102.37
LENGTH = 204.72
RADIUS = 5,729.58
PC STATION = 91+23.67
PT STATION = 93+28.39

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

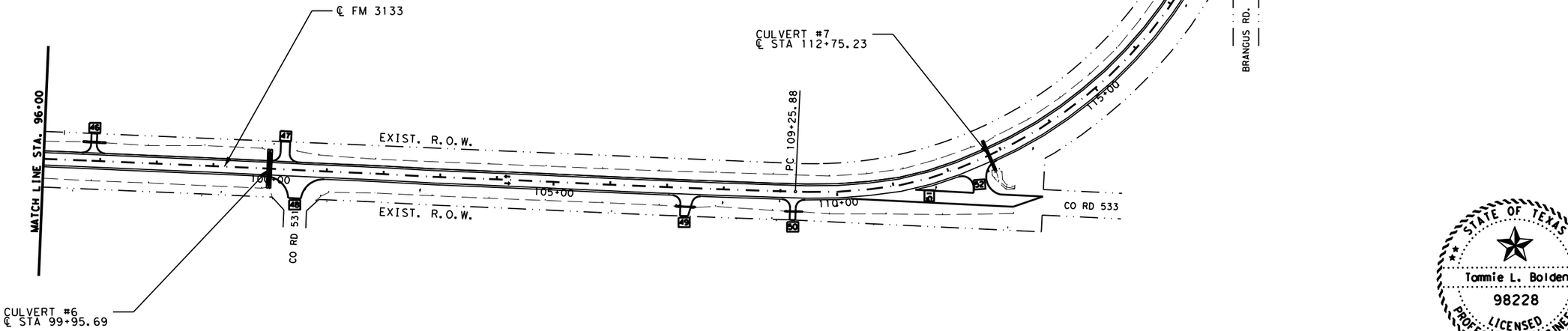
11/4/20

FM 3133
PROJECT LAYOUT

SCALE: 1" = 200'

SHEET 2 OF 6

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	4
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



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DEGREE OF CURVE = 7° 28' 06.80"
TANGENT = 792.56
LENGTH = 1,230.04
RADIUS = 767.16
PC STATION = 109+25.88
PT STATION = 121+55.92

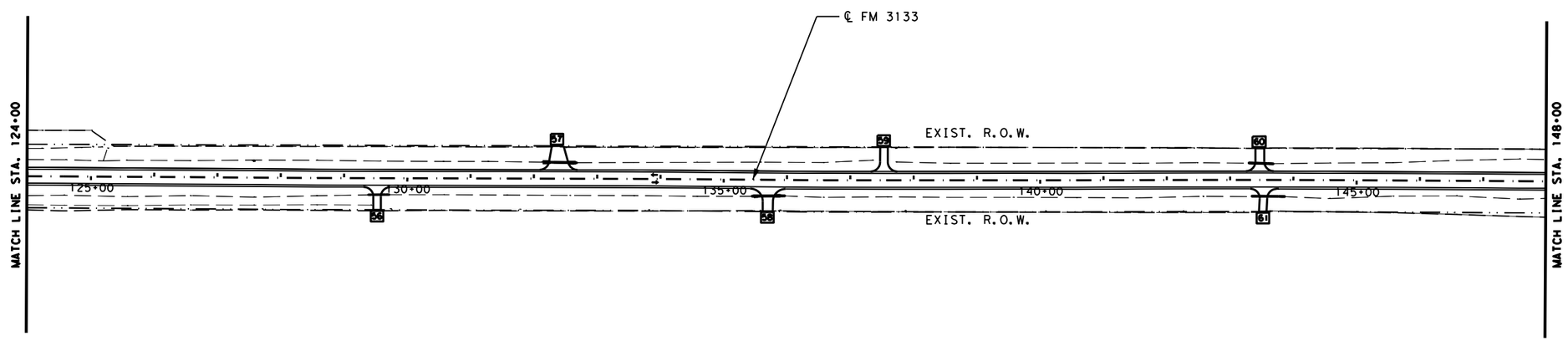
STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

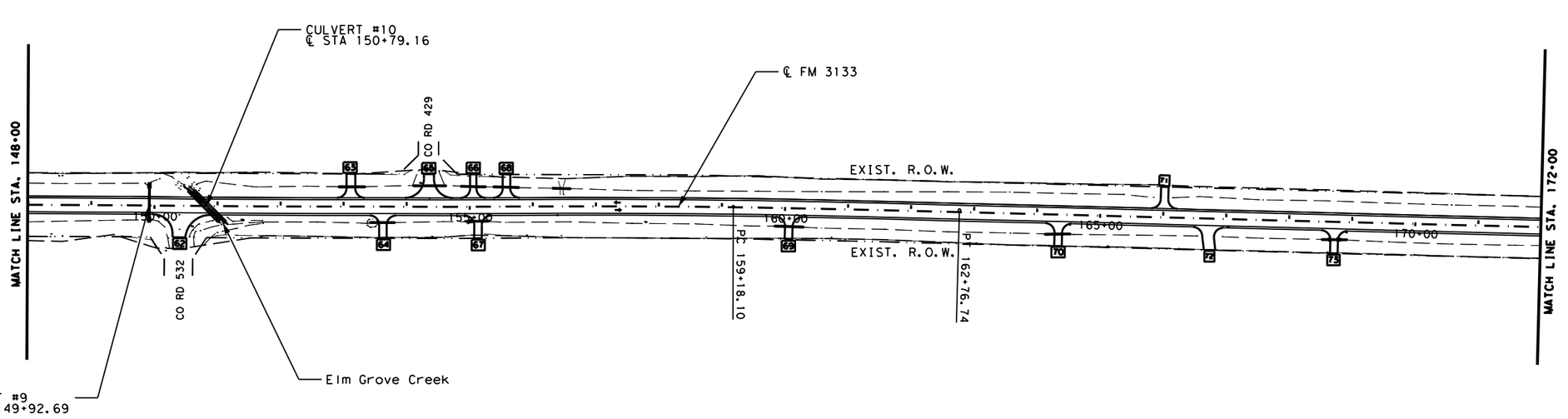
11/4/20

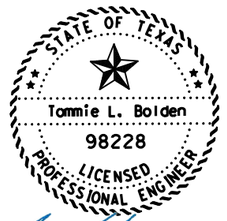
FM 3133
PROJECT LAYOUT

SCALE: 1" = 200'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	5
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				







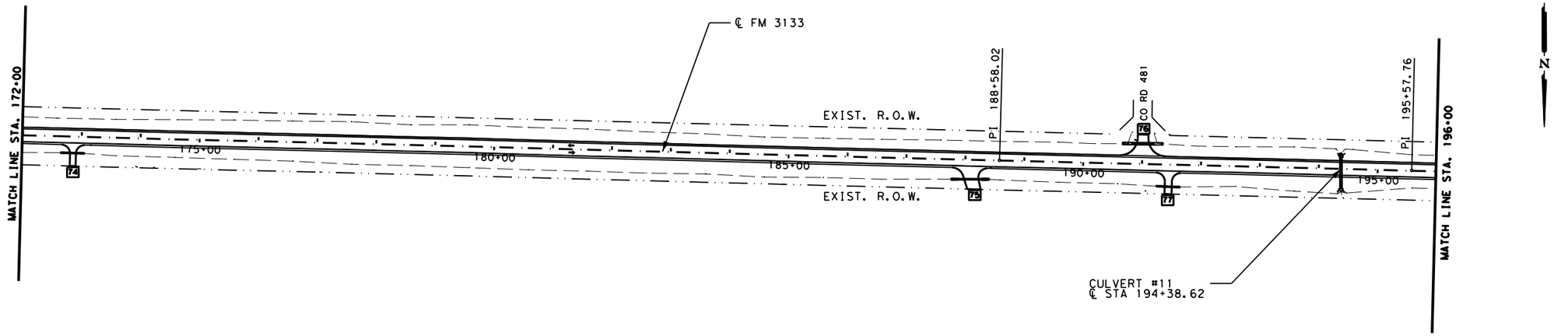
11/4/20

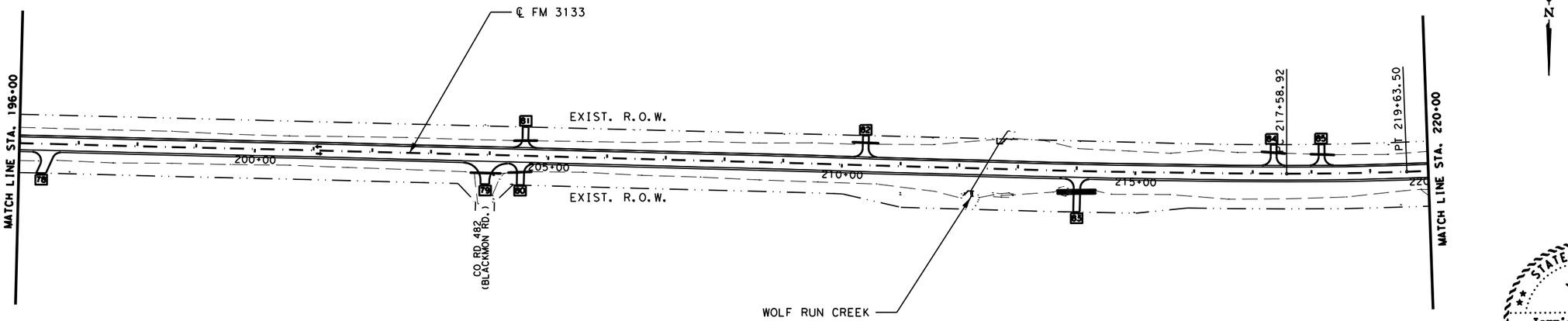
FM 3133
PROJECT LAYOUT

SCALE: 1" = 200'

SHEET 4 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	6
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





PI STATION = 218+61.22
DELTA = 2° 02' 46.75" (LT)
DEGREE OF CURVE = 1° 00' 00.98"
TANGENT = 102.30
LENGTH = 204.58
RADIUS = 5,728.03
PC STATION = 217+58.92
PT STATION = 219+63.50

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

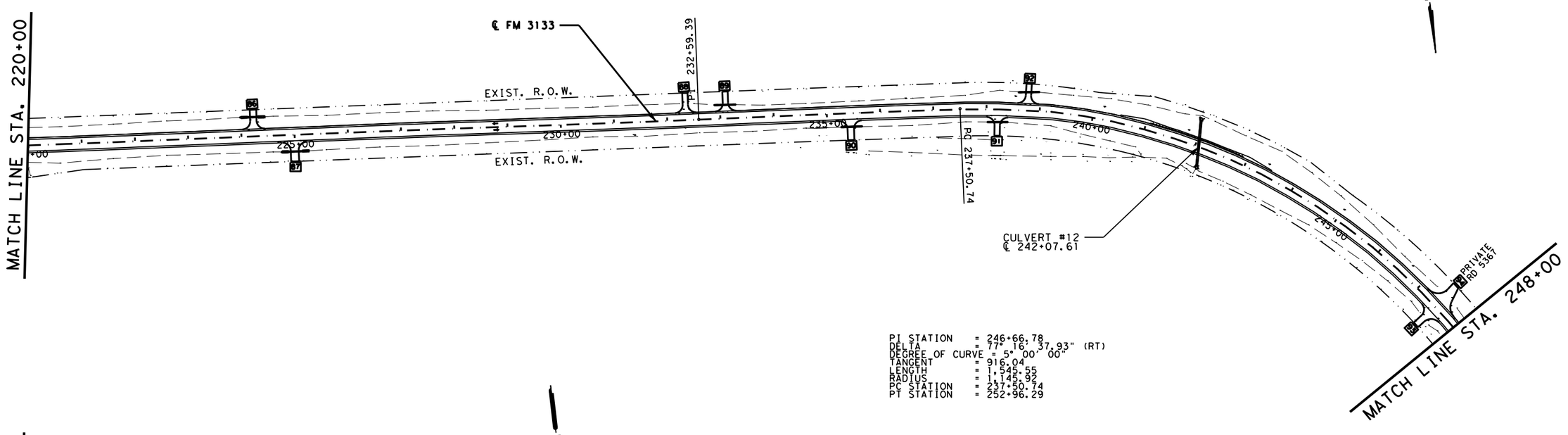
11/4/20

FM 3133
PROJECT LAYOUT

SCALE: 1" = 200'

SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	7
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133
PROJECT LAYOUT

SCALE: 1" = 200' SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	8
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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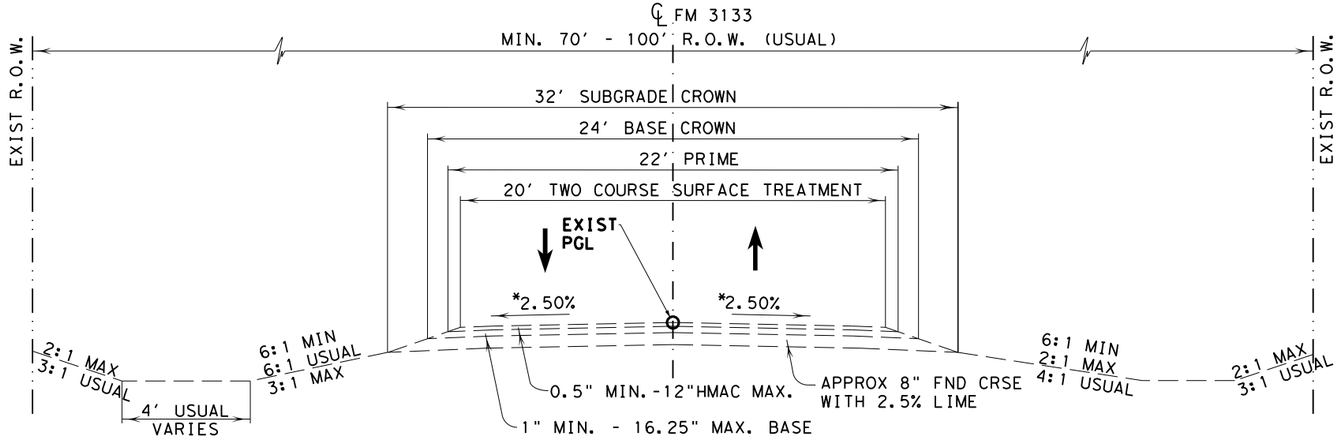
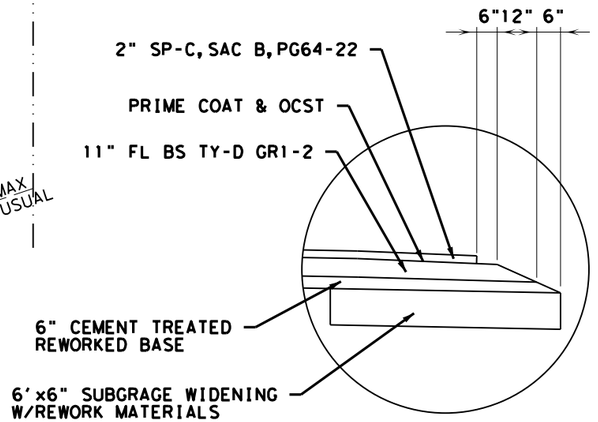
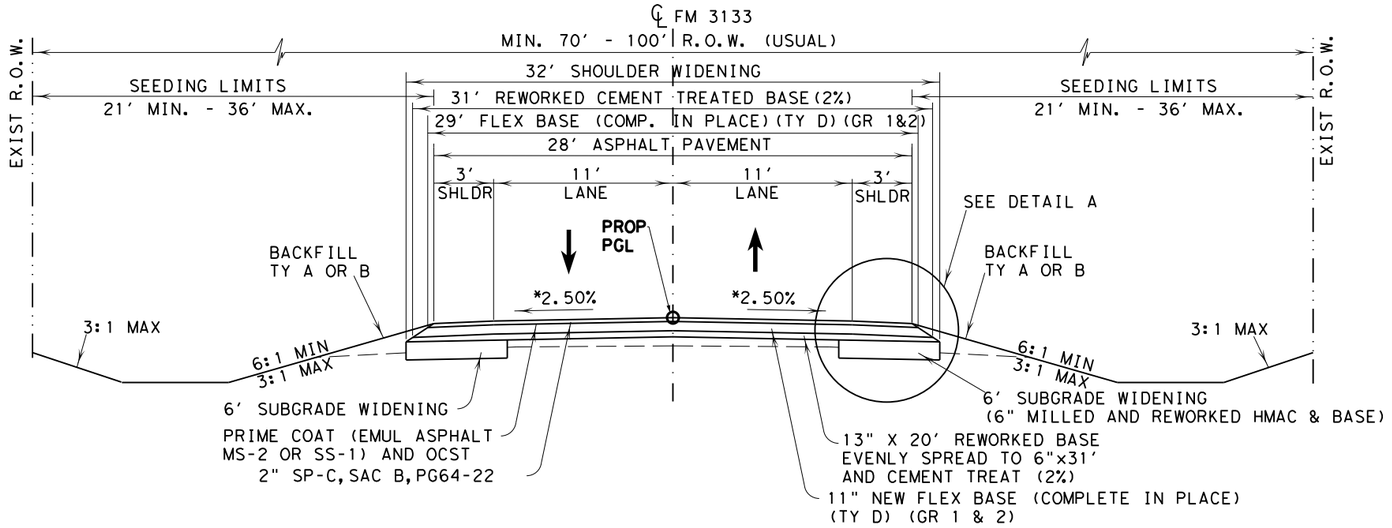


EXISTING TYPICAL SECTION
STA. 0+00.00 TO STA. 255+61.37



DETAIL A



PROPOSED TYPICAL SECTION
** STA. 0+00.00 TO STA. 241+00.00
STA. 243+00.00 TO STA. 255+61.37

NOTES:
1. PROPOSED PROFILE WILL INCREASE BY 6" FROM THE EXISTING PROFILE.
2. SAW CUT 10 FEET FROM CENTER FOR SUBGRADE WIDENING.
3. CSJ: 3236-02-012 WILL BE THE SHOULDER WORK STARTING FROM STA. 0+50.00 TO STA. 121+55.92.
4. CSJ: 3236-02-014 WILL BE THE MAIN LANES FROM STA. 0+50.00 TO STA. 121+55.92. THE FULL WIDTH OF THE PROPOSED ROADWAY WILL BE UNDER THIS CSJ FROM STA. 121+55.92 TO END OF PROJECT.

*CROSS SLOPE MAY VARY IN SUPERELEVATED SECTIONS.
**SEE NOTES 3 AND 4.

STATE OF TEXAS
TOMMIE L. BOLDEN
98228
LICENSED
PROFESSIONAL ENGINEER

11/17/20

FM 3133
TYPICAL SECTIONS

SCALE: NTS SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	9
CHECK XXX	CONTROL	SECTION	JOB	
CHECK XXX	3236	02	012, etc.	

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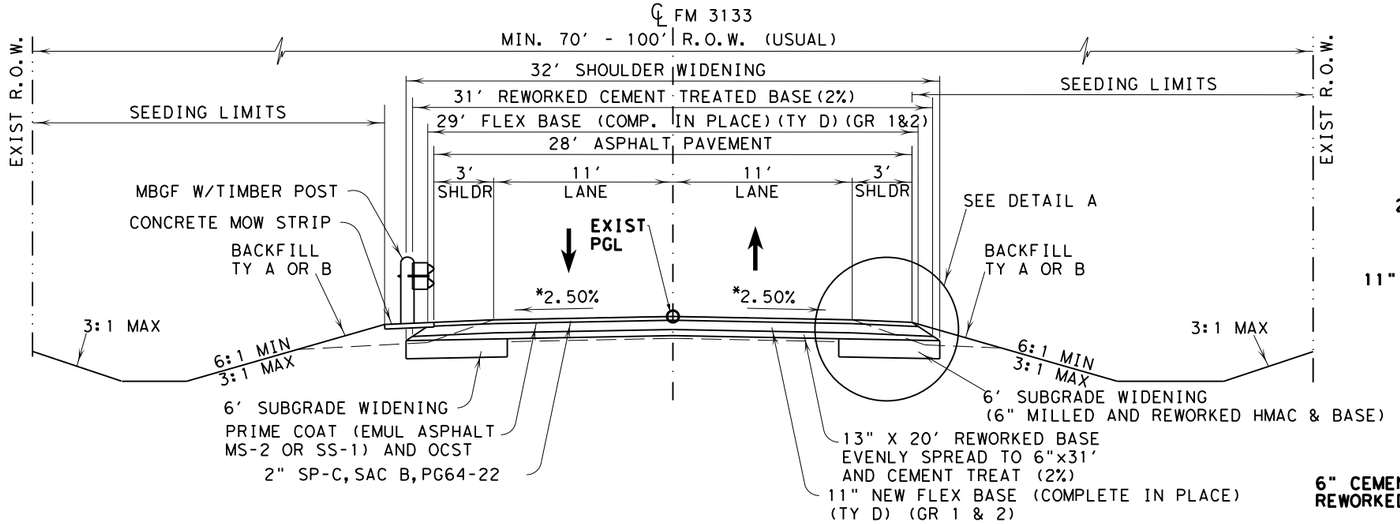
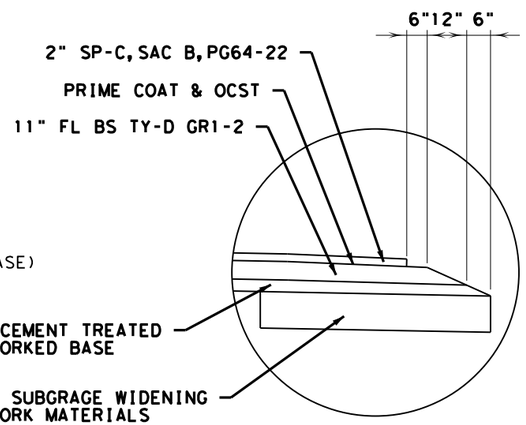


PROPOSED TYPICAL SECTION

**STA. 241+00.00 TO STA. 243+00.00 (0" PGL RISE)



DETAIL A

NOTES:
1. PROPSED PROFILE WILL MATCH THE EXISTING PROFILE.
2. SAW CUT 10 FEET FROM CENTER FOR SUBGRADE WIDENING.
3. CSJ: 3236-02-012 WILL BE THE SHOULDER WORK STARTING FROM STA. 0+50.00 TO STA. 121+55.92.
4. CSJ: 3236-02-014 WILL BE THE MAIN LANES FROM STA. 0+50.00 TO STA. 121+55.92. THE FULL WIDTH OF THE PROPOSED ROADWAY WILL BE UNDER THIS CSJ FROM STA. 121+55.92 TO END OF PROJECT.

*CROSS SLOPE MAY VARY IN SUPERELEVATED SECTIONS.
**SEE NOTES 3 AND 4.

STATE OF TEXAS
TOMMIE L. BOLDEN
98228
LICENSED PROFESSIONAL ENGINEER

11/17/20

FM 3133
TYPICAL SECTIONS

SCALE: NTS

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK XXX	TEXAS	DAL	COLLIN	10
CHECK XXX	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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EXISTING ROADWAY INVESTIGATION

Texas Department of Transportation

Project Name: F.M. 3133

CSJ: 3236-02-014

Boring No.	Coordinates		Nominal Location	Offset	Total Pavement Thickness (inches)	Layer Profile (inches)	Layer Description	Liquid Limit	Plastic Index	Sulfate (PPM)	Texas Class
	Latitude	Longitude									
1	33°23'55.62"N	96°18'30'15.87"W	SBML FM 3133	6'2"	16.25"	0-1.25"	HMAC				5.9
			Approx. 459' N. of	East of West		1.25"-16.25"	Base				
			Pvt. Rd. 5367	Edge		16.25"-40.25"	Brown and tan sandy clay	46	33	362	
2	33°23'48.10"N	96°29'48.59"W	EBML FM 3133	4'6"	12.5"	0-2.5"	HMAC				6.2
			Approx. 2589' E. of	North of South		2.5"-12.5"	Base				
			Pvt. Rd. 5367	Edge		12.5"-36.5"	Brown and tan clay w/ cal. nods.	59	41	1210	
3	33°23'47.29"N	96°29'13.51"W	EBML FM 3133	4'6"	11.0"	0-2.0"	HMAC				5.7
			Approx. 816' E. of	North of South		2.0"-11.0"	Base				
			Blackmon Rd.	Edge		11.0"-35.0"	Brown and tan sandy clay w/ cal. nods.	47	30	120	
4	33°23'45.97"N	96°28'38.76""W	EBML FM 3133	3'9"	12.0"	0-1.0"	HMAC				6.0
			Approx. 1598' W. of	North of South		1.0"-12.0"	Base				
			Wolf Front Rd.	Edge		12.0"-36.0"	Brown clay w/ cal. nods.	60	36	120	
5	33°23'45.20"N	96°28'04.09"W	EBML FM 3133	5'1"	19.5"	0-0.5"	Surface Treatment				6.2
			Approx. 1777' E. of	North of South		0.5"-10.5"	Concrete				
			Co. Rd. 429	Edge		10.5"-19.5"	Base				
						19.5"-43.5"	Dark brown clay	75	52	120	
6	33°23'34.65"N	96°27'37.45"W	S.B. FM 3133	5'11"	13.5"	0-0.5"	Surface Treatment				6.2
			Approx. 674' N. of	East of West		.05"-5.0"	Concrete				
			Co. Rd. 531	Edge		5.0"-13.5"	Base				
						13.5"-37.5"	Dark brown clay w/ limestone	69	43	332	
7	33°23'05.49"N	96°27'39.09"W	S.B. FM 3133	5'7"	10.75"	0-3.25"	HMAC				5.9
			Approx. 2272' S. of	East of West		3.25"-10.75"	Base				
			Co. Rd. 531	Edge		10.75"-33.0"	Gray clay w/ cal. nods.	56	34	100	
8	33°22'40.11"N	96°27'39.95"W	S.B. FM 3133	5'7"	13.0"	0-4.0"	HMAC				6.2
			Approx. 569' N. of	East of West		4.0"-13.0"	Base				
			Danno Lane	Edge		13.0"-37.0"	Gray clay w/ cal. nods.	76	42	<100	
9	33°22'06.69"N	96°27'40.25"W	S.B. FM 3133	4'5"	12.0"	0-2.5"	HMAC				5.3
			Approx. 967' S. of	East of West		2.5"-12..0"	Base				
			Co. Rd. 524	Edge		12.0"-36.0"	Gray and brown sandy clay w/ L.S.	49	24	<100	
10	33°21'52.00"N	96°27'40.33"W	N.B. FM 3133	4'7"	14.0"	0-5.5"	HMAC				5.5
			Approx. 333' N. of	West of East		5.5"-14.0"	Base				
			FM 2862	Edge		14.0"-38.0"	Brown sandy clay w/ L.S.	55	26	1014	
11	33°22'21.41"N	96°27'40.40"W	N.B. FM 3133	4'6"	13.0"	0-1.0"	HMAC				6.2
			Approx. 2265' N. of	West of East		1.0"-13.0"	Base				
			Co. Rd. 525	Edge		13.0"-37.0"	Gray clay w/ cal. nods.	77	37	<100	
12	33°22'49.84"N	96°27'39.47"W	N.B. FM 3133	5'0"	13.0"	0-12.0"	HMAC				6.2
			Approx. 1010' N. of	West of East		12.0"-13.0"	Base				
			Co. Rd. 530	Edge		13.0"-37.0"	Gray clay w/ cal. nods.	79	42	<100	
13	33°23'19.84"N	96°27'38.47"W	N.B. FM 3133	5'3"	12.0"	0-11.0"	HMAC				6.2
			Approx. 4050' N. of	West of East		11.0"-12.0"	Base				
			Co. Rd. 532	Edge		12.0"-36.0"	Gray clay w/ cal. nods.	87	57	<100	
14	33°23'44.95"N	96°27'45.67"W	W.B. FM 3133	5'6"	13.5"	0-4.75"	HMAC				6.2
			Approx. 2921' E. of	South of North		4.75"-13.5"	Base				
			Co. Rd. 532	Edge		13.5"-27.5"	Gray clay w/ cal. nods.	70	42	<100	
15	33°23'45.59"N	96°28'20.83"W	W.B. FM 3133	4'6"	13.0"	0-12.0"	HMAC				6
			Approx. 330' E. of	South of North		12.0"-13.0"	Base				
			Co. Rd. 429	Edge		13.0"-27.0"	Gray clay w/ cal. nods.	63	36	120	
16	33°23'46.39"N	96°28'46.69"W	W.B. FM 3133	5'2"	12.0"	0-8.5"	HMAC				6.2
			Approx. 1864' W. of	South of North		8.5"-12.0"	Base				
			Co. Rd. 429	Edge		12.0"-36.0"	Dark brown clay w/ cal. nods.	72	42	378	
17	33°23'48.03"N	96°29'30.97"W	W.B. FM 3133	5'4"	10.0"	0-2.5"	HMAC				5.5
			Approx. 715' W. of	South of North		2.5"-10.0"	Base				
			Blackmon Rd.	Edge		10.0"-34.0"	Light gray sandy clay	49	26	<100	
18	33°23'48.18"N	96°30'05.53"W	W.B. FM 3133	4'9"	10.0"	0-2.0"	HMAC				6.2
			Approx. 3633' W. of	South of North		2.0"-10.0"	Base				
			Blackmon Rd.	Edge		10.0"-34.0"	Gray clay	62	39	<100	

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
EXISTING CORE DATA

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	11
CHECK	CONTROL	SECTION	JOB	
DMH				
CHECK	3236	02	012,etc.	
TLB				

$FILE$

SPECIFICATION DATA

Table 1: Soil Constants Requirements				
Item	Description	Plasticity Index		Note
		Max	Min	
132	EMBANKMENT (FINAL)(DENS CONT) (TY C)	40	8	1

Note 1: Material excavated from the project must meet the PI requirements when used in the top 10 feet of embankment that supports the pavement structure or other locations shown in the plans. Do not use shale and obtain approval to incorporate shaley clay produced by the construction project.

Table 2: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
164	Drill Seed (Perm) (R) (C/S)	N/A	See Specifications		183915 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	9.50 Ton
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	27360 MG
314	Emuls Asph	N/A	0.20	Gal/SY	16441 Gals
3077	SP MIXES	See Plans	110	Lbs./SY/In	9603 Ton
3077	Tack Coat (Undiluted Application Rate)	New HMA	0.06	Gal/SY	4762 Gals
*For contractor's information only **Use Summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Plan Sheet for estimated daily rates.					
Note: (1) Base material weight based on 1.50 Ton/CY (dry- compacted) (2) Asphalt weight based on 110 Lbs./SY/In					

Table 3: Basis of Estimate for Temporary Erosion Control Items				
Item	Description	Rate		Quantity
164	Drill Seeding (Temp) (Warm or Cool)	See Specifications		183915 SY
166*	Fertilizer (12-6-6)	500	Lb/Ac	9.50 Ton
168	Vegetative Watering (Warm)**	12	MG/Ac/Day	27360 MG
For Contractor's Information Only. **Use Summer rate for calculation, adjust for Actual Field Conditions/Temperatures as Necessary. See Vegetation Establishment Sheet for estimated daily rates.				

CSJ: 3236-02-012,etc. Sheet 12

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GENERAL

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

The disturbed area for this project, as shown on the plans is 99.76 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

This project required permitting with environmental resources agencies as outlined in the Environmental Permits, Issues and Commitments (EPIC) Sheet. There is a high probability that an environmentally sensitive area could be encountered on the contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 "Project-Specific Locations", provides a listing of regulatory agencies that may need to be contacted regarding this project.

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

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

Jennifer Vorster Jennifer.Vorster@txdot.gov
Gerald Waltman Gerald.Waltman@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 Responses/
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.

Item 5:
Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (214-320-6682) for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (214-320-6636) for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.

Place construction stakes/station markings at intervals of no more than 100 feet or as directed by the Engineer. Place stakes and markings so as not to interfere with normal construction operations.

Item 7:
Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility locates performed.

Holiday restrictions – the engineer may decide that no lane closures or construction operations shall be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

- New Year's Eve and Day (noon on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (noon on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (noon on Friday thru 10:00pm Monday)
- Independence Day (noon on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (noon on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (noon on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (noon on December 23 thru 10:00 pm December 26)

Consult with appropriate electric company representatives according to their respective area to coordinate electrical services installations.

No significant traffic generator events identified.

Item 8:
This Project will be a Five-Day Workweek in accordance with Article 8.3.1.1.

Meet weekly with the engineer to notify him or her of planned work for the upcoming week.

Provide the engineer with a daily work schedule of planned work.

CSJ: 3236-02-012,etc. **Sheet 12** A

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Critical Path Method (CPM) schedule in P6 format will be required for this project. Submit baseline schedule and obtain approval prior to beginning construction. The Estimate will be held if monthly schedule update is not submitted.

The road-user cost liquidated damages are $799.00 per day.

Item 100:
Remove the existing roadway small signs, delineators and object markers as shown on the plans, or as directed, during construction within the right of way. Small sign, delineator and object marker removals are subsidiary to this Item.

The limits of preparing right of way will be measured from Sta. 0+50.00 to Sta. 255+61.37 along the centerline of construction.

The trimming or removal of trees is subsidiary to this item.

Item 104:
In those areas where the pavement is not to be overlaid, provide a smooth surface after the curb removal. Planing or grinding is considered an acceptable method at these locations. Measurement and payment is in accordance with this item.

Sawing of concrete is not paid for directly, but is considered subsidiary to this item.

Items 105, 251, 305, and 354:
Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly, but is subsidiary to this item.

Item 105:
Take possession of recycled asphalt pavement from the project and recycle the material.

Properly dispose of unsalvageable material at your own expense.

Item 110:
Excavated shale is not an acceptable material for embankment.

Items 110 and 132:
Scarify and loosen the excavated areas, unpaved surface areas, except rock, to a depth of at least 8 inches and compact in accordance with the specifications.

Excavation and embankment for driveways, sleeper slabs, alleys and intersections will not be paid for directly, but will be considered subsidiary to these items.

Item 132:
Excavated material from the project site has not been determined to be suitable for embankment. The bidder assumes all risk for the use of excavated materials for embankment and is expected to meet all material requirements for embankment regardless of the source.

Perform Tex-106-E (Plasticity Index) by an approved laboratory on excavated soils from sources outside right of way when used in roadway embankment. Provide the test results at no expense to the department. The engineer will sample and test soils produced by the construction project for specification requirements or material sources specified in the plans.

Earth embankment Type C, is mainly composed of material other than shale. Furnish material that is free from vegetation or other objectionable material and that conforms to the requirements of Table 1 (Sheet A). If necessary, treat material with lime slurry in accordance with Item 260, “Lime Treatment (Road-Mixed)” in order to meet these requirements. Use Tex-121-E, figure 1, page 4 to calculate the amount of lime required. When lime treated subgrade is specified, 3000 PPM is the maximum allowed sulfate content in the top 3 feet when material comes from borrow source. Follow recommendations of 260.4.4 for mixing and mellowing. The engineer will test material placed or excavated to a depth of one foot below and laterally to one foot outside the proposed treatment limit. Lime treatment of this material will not be paid for directly, but will be considered subsidiary to this item.

Do not use shaley clays in embankment unless approved in writing.

Item 134:
Start backfilling pavement edges as soon as possible after the surface course is started.

Backfill and compact the pavement edges to produce a smooth surface adjacent to the pavement with no vertical edges.

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

Blade the existing vegetation into a neat wind-row prior to overlay. After placing Ty A or Ty B backfill and placing seeding, the material from the wind-row shall be replaced on the completed slopes. Emulsion shall be placed at a 50/50 solution of water to emulsion over disturbed area. Emulsion rate=0.15 Gal/SY residual. This work, materials and equipment shall be subsidiary to Item 134.

Item 160:
Sequence construction operations to salvage topsoil from one location and spread on areas ready to receive topsoil. Keep stockpiling of topsoil to a minimum.

Use fertile clay or loam from the project site not more than six inches below natural grade as topsoil.

Item 161:
Provide tickets representing quantity of compost delivered to site.

Item 247:
Construct uniform layer thickness of 12 inches, or less with the required density and moisture content. Minimum PI is equal to three (3) for all grades.

CSJ: 3236-02-012,etc. **Sheet 12B**

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Item 301:
Provide liquid antistripping agents unless otherwise directed. Add the minimum dosage determined by the manufacturer or higher dosage determined by design requirement and try subsequent trials at 0.25% increments.

Item 314:
Apply MS-2 or SS-1 as a prime, dilute the asphalt with base finish water, distribute in successive applications, and work into the top 1/4” of flex base. Residual asphalt 0.20 Gal/SY.

Item 316:

	AC20-5TR, AC20-XP AC15-P	CRS-2P	RC-250
JANUARY			REQUIRES INTERMEDIATE COURSE TO BE PLACED
FEBRUARY			
MARCH		REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS	
APRIL			
MAY	REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS		
JUNE			
JULY			
AUGUST			
SEPTEMBER		REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS	
OCTOBER			
NOVEMBER			REQUIRES INTERMEDIATE COURSE TO BE PLACED
DECEMBER			

Do not begin rework or flexible base operations if a first course and intermediate surface treatment cannot be placed prior to October 31.

Field conditions and traffic may require the application of an additional (intermediate) surface treatment layer to preserve and sustain a particular project segment or phase. Typically, this will be prior to the project final AC asphalt surface treatment and will be meant to ensure that the pavement integrity is protected until hot season.

Utilize an asphalt distributor capable of providing a transversely varied asphalt rate. The Engineer will select the pavements where the transversely varied asphalt rate is required. When a transversely varied rate is required, the asphalt rate outside of the wheel paths will be between 22 and 32% higher than the asphalt rate applied in the wheel paths. Provide calibration documents to the Engineer that include a description of the spray bar(s) and nozzles that will be used and the percentage difference in asphalt rate achieved by each tested spray bar and nozzle arrangement. The nozzles proposed for use shall be clearly stamped or marked from the factory identifying the manufacturer.

First Course				
ITEM	APPLICATION			
	Emul. Asphalt Treatment	1st Course		
*Asphalt Type	MS-2 or SS-1	CRS-2P	AC20-5TR, AC20-XP,AC15-P	RC-250 #
*Asph. Rate (Gal/SY)	0.20	0.50	0.42	0.28
Aggregate Type		B or L	B or L	B or L
Aggregate Grade		3	3	5
Aggr. Rate (CY/SY)		1:105	1:105	1:125
Min. Cure Time	24 hrs	14 days		

In addition to the temperature requirements of this Item, AC Asphalts used in Surface Treatments and Sealcoats must be placed between May 15 and August 31. Emulsions may be substituted for AC Asphalts outside this timeframe only with the approval of the Engineer.

Item 320:
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.

The use of windrow pick-up equipment is allowed except on the first course of roadway material placed over the subgrade.

Item 361:
Provide Class HES concrete designed to attain a minimum average flexural strength of 255 psi or a minimum average compressive strength of 1,800 psi within the allowed lane closure times.

Tining will be required as described in Item 360.4.8.3 unless otherwise directed by the Engineer. Surface Test Type A utilizing a 10' straight edge as described under Item 585 will be required unless otherwise directed by the Engineer.

CSJ: 3236-02-012,etc. **Sheet 12C**

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Item 400:
Structural Excavation is not paid for directly but is considered subsidiary to pertinent Items.

When placing concrete storm drain pipe on slopes of greater than 10 percent, provide cement stabilized backfill to a depth shown on the plans.

Item 421:
Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Item 464:
The concrete collars and the connections of pipes to existing or proposed concrete boxes or pipe will not be paid for directly but will be considered subsidiary to the various bid items.

At locations where storm drains dead-end, plug with a concrete plug of a thickness equal to 1 ½ inches per foot of diameter of pipe with a minimum thickness of 3 inches. The cost of the plugs shall be included in the unit price bid per foot of the various storm drain pipes.

Item 479:
Accept ownership of inlet grates and manhole covers and properly dispose of them outside the limits of the right of way in accordance with federal, state and local regulations.

Item 496:
Concrete pavement removed as a result of removing the inlets will not be paid for directly but will be considered as subsidiary to Item 496.

Inlet grates and manhole covers become the property of the contractor for disposal.

Item 500:
Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

Item 502:
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.

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.
Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

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

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

Provide rectangular shape (CW12-2P) Temporary Clearance Signs on all bridges where the existing vertical clearance has changed. Install Signs to the satisfaction of the Engineer prior to opening to traffic. Plywood sign blanks will have minimum dimensions of 84" X 12". Work performed and materials are subsidiary to this item.

Do not operate or park any equipment/machinery closer than 30 feet from the traveled roadway after sunset unless authorized by the engineer.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

As approved by the Engineer, provide uniformed off duty police officers and squad cars during lane or ramp closures, night time work or other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce. Provide documentation such as payroll, log sheets with signatures and badge number, or invoices from the government entity providing the officers for reimbursement. Complete the weekly tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided. Reimbursement will not be made for coordination fees charged by any party.

Limit lane closures along FM 3133 to the hours between 9:00 am and 3:30 pm. Work in other areas of the project is not restricted to this time frame.

Item 506:
Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas, before the next rain event or within 24 hours of the discharge.

If temporary construction stream crossings are allowed under a Nationwide Permit, submit in writing for approval the type and location of each temporary stream crossing. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for temporary stream crossings. A temporary culvert crossing will consist of storm sewer pipes and 4- to 8-inch nominal size rock. Temporary stream crossings must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or cause more than minimal degradation of water quality. Remove the temporary stream crossings in their entirety and return the affected areas to their pre-existing elevation. All work and materials use for

temporary construction stream crossings will not be paid for directly but are subsidiary to pertinent Items.

Provide SW3P Signs. Obtain from the Engineer a copy of the project's completed TPDES Storm Water Program Construction Site Notice and Contractor Site Notice. Laminate the sheets and bond with adhesive to 36" X 36" plywood sign blanks. Ensure the sheets remain dry. Apply Type C Blue reflective sheeting as the background and add the text "SW3P" in 5" white lettering, centered at the top. Attach the signs to approved temporary mounts and locate at each of the project limits just inside the right of way line at a readable height or as directed by the Engineer. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. SW3P signs, maintenance, and reposting (for replacement or as needed to ensure readability) will be subsidiary to Item 502.

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

Item 530:
Provide Class "HES" concrete for concrete intersections and driveways listed or shown on the plans.

Item 585:
Use Surface Test Type A on all intersections and driveways.

Use Surface Test Type B pay adjustment schedule 3 on the travel lanes.

Item 644:
Prior to taking elevations to determine lengths for fabrication of sign posts, obtain verification of all proposed locations.

Provide two (2) sets of shop drawings for signs. The shop drawings shall conform to the details shown on the plans. The shop drawings shall show the details of the panels, wind beams, stiffeners, joint backing plates, splices, fasteners, brackets, and sign support connections. The shop drawings shall show letter types and sizes, interline spacing and message arrangements.

Affix a sign identification decal to the back of all signs in accordance with Item 643.

Prior to taking elevations to determine lengths for fabrication of sign posts and/or sign support towers, obtain verification of all proposed locations.

All sign mounts shall have a clamp base system for all small roadside sign assemblies.
Item 677:

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A water blasting method approved by the Engineer will be the only method allowed for the removal of permanent and temporary pavement markings except on a sealcoat surface. A 2 foot wide sealcoat will be required on sealcoat surfaces to eliminate permanent and temporary pavement markings.

Item 3077:
Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.

Provide PG binder 64-22 in Type SP-C mixture.

Item 6185:
The total number of truck mounted attenuators (TMAs) or trailer attenuators (TAs) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario	Required TMA/TA
(1-6)-18		1

TCP 2 Series	Scenario		Required TMA/TA	
(2-1)-18 / (2-2)-18 / (2-8)-18	All		1	
(2-3)-18	A	B	1	2

TCP 3 Series	Scenario			Required TMA/TA
(3-1)-13	All			2
(3-3)-14	A	B	D	2
		C		3
(3-5)-18	All			1

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

QUANTITY SHEET

CONTROLLING PROJECT ID 3236-02-012 **DISTRICT** Dallas **COUNTY** Collin
HIGHWAY FM 3133

		CONTROL SECTION JOB		**3236-02-012**		**3236-02-014**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00063127**		**A00066996**			
		COUNTY		**Collin**		**Collin**			
		HIGHWAY		**FM 3133**		**FM 3133**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	121.060		134.050		255.110	
	104-6001	REMOVING CONC (PAV)	SY	750.000		750.000		1,500.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	1,273.000		786.000		2,059.000	
	105-6096	REMOV STAB BASE AND ASPH PAV (0"-12")	SY	2,772.000		1,801.000		4,573.000	
	110-6001	EXCAVATION (ROADWAY)	CY	162.000		71.000		233.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	121.060		134.050		255.110	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	3,183.000		10,316.000		13,499.000	
	134-6004	BACKFILL (TY A OR B)	STA	121.060		134.050		255.110	
	150-6001	BLADING	STA	121.060		134.050		255.110	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	76,671.000		107,244.000		183,915.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	76,671.000		107,244.000		183,915.000	
	164-6066	DRILL SEEDING (PERM)(WARM OR COOL)	SY	76,671.000		107,244.000		183,915.000	
	168-6001	VEGETATIVE WATERING	MG	22,812.000		31,908.000		54,720.000	
	247-6292	FL BS (CMP IN PLACE)(TY D GR 1-2)(11")	SY	39,008.000		44,685.000		83,693.000	
	247-6483	FL BS(RDWY DEL)(TY D GR 1-2)(FNAL POS)	CY	2,466.000		2,731.000		5,197.000	
	251-6161	REWORK BS MTL (TY C)(13"-15.5")(OC)	SY	26,902.000		29,790.000		56,692.000	
	275-6001	CEMENT	TON	209.000		231.000		440.000	
	275-6004	CEMENT TREAT (MX EXST MTL & NW BS) (6")	SY	40,353.000		44,685.000		85,038.000	
	314-6021	EMULS ASPH (PRIME)(MS-2 OR SS-1)	GAL	7,802.000		8,639.000		16,441.000	
	316-6017	ASPH (AC-20-5TR)	GAL	5,757.000		5,754.000		11,511.000	
	316-6024	ASPH (CRS-2P)	GAL	6,851.000		6,851.000		13,702.000	
	316-6029	ASPH (RC-250)	GAL	5,754.000		5,754.000		11,508.000	
	316-6226	AGGR(TY-PB GR-5 SAC-B)	CY	131.000		131.000		262.000	
	316-6440	AGGR (TY-B GR-3 OR TY-L GR-3)(SAC-B)	CY	262.000		262.000		524.000	
	400-6005	CEM STABIL BKFL	CY	444.500		311.600		756.100	
	400-6006	CUT & RESTORING PAV	SY	230.500		139.600		370.100	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	307.900		286.500		594.400	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)	CY			3.000		3.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY			7.400		7.400	
	464-6002	RC PIPE (CL III)(15 IN)	LF			27.000		27.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	1,173.000		434.000		1,607.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	288.900		326.200		615.100	
	464-6007	RC PIPE (CL III)(30 IN)	LF	912.400				912.400	
	464-6008	RC PIPE (CL III)(36 IN)	LF	245.000		240.500		485.500	
	464-6009	RC PIPE (CL III)(42 IN)	LF			147.400		147.400	
	464-6010	RC PIPE (CL III)(48 IN)	LF			134.000		134.000	
	466-6136	HEADWALL (CH - PW - S) (DIA= 48 IN)	EA			2.000		2.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 3236-02-012 **DISTRICT** Dallas **COUNTY** Collin
HIGHWAY FM 3133

			CONTROL SECTION JOB	**3236-02-012**		**3236-02-014**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00063127**		**A00066996**			
			COUNTY	**Collin**		**Collin**			
			HIGHWAY	**FM 3133**		**FM 3133**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	467-6341	SET (TY II) (15 IN) (RCP) (6: 1) (P)	EA			2.000		2.000	
	467-6356	SET (TY II) (18 IN) (RCP) (3: 1) (C)	EA	4.000				4.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	70.000		40.000		110.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	6.000		2.000		8.000	
	467-6389	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	1.000				1.000	
	467-6391	SET (TY II) (24 IN) (RCP) (4: 1) (P)	EA	10.000		20.000		30.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	8.000				8.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	4.000				4.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	10.000				10.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	10.000		2.000		12.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA			8.000		8.000	
	467-6461	SET (TY II) (42 IN) (RCP) (3: 1) (C)	EA			4.000		4.000	
	467-6466	SET (TY II) (42 IN) (RCP) (6: 1) (P)	EA			2.000		2.000	
	496-6002	REMOV STR (INLET)	EA	2.000		1.000		3.000	
	496-6005	REMOV STR (WINGWALL)	EA			6.000		6.000	
	496-6042	REMOV STR (SMALL)	EA	57.000		44.000		101.000	
	500-6001	MOBILIZATION	LS	48.00%		52.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18.000				18.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	520.000		80.000		600.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	180.000		20.000		200.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	700.000		100.000		800.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	122.000				122.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	122.000				122.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	411.000		1,183.000		1,594.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	411.000		1,183.000		1,594.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	616.000		748.000		1,364.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	616.000		748.000		1,364.000	
	530-6005	DRIVEWAYS (ACP)	SY	3,034.000		2,191.000		5,225.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	1,189.000		796.000		1,985.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	20,710.000		26,070.000		46,780.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	9,643.000		12,664.000		22,307.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF			100.000		100.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA			2.000		2.000	
	560-6001	MAILBOX INSTALL-S (TWG-POST) TY 1	EA	15.000		14.000		29.000	
	560-6002	MAILBOX INSTALL-D (TWG-POST) TY 1	EA	4.000				4.000	
	560-6023	MAILBOX INSTALL-M (TWG-POST) TY 4	EA	1.000				1.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	24.000		21.000		45.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 3236-02-012 **DISTRICT** Dallas **COUNTY** Collin
HIGHWAY FM 3133

			CONTROL SECTION JOB		**3236-02-012**		**3236-02-014**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00063127**		**A00066996**			
			COUNTY		**Collin**		**Collin**			
			HIGHWAY		**FM 3133**		**FM 3133**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA			3.000		3.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)		EA	2.000				2.000	
	658-6048	INSTL OM ASSM (OM-2Z)(FLX)GND		EA	24.000		10.000		34.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)		LF	25,381.000		27,145.000		52,526.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)		LF	2,170.000		1,880.000		4,050.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)		LF	8,147.000		15,339.000		23,486.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2		EA	570.000		908.000		1,478.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)		LF	123.000				123.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)		LF	126.000		44.000		170.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)		LF	23,216.000		24,055.000		47,271.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)		LF	2,165.000		3,090.000		5,255.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)		LF	2,170.000		1,880.000		4,050.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)		LF	8,147.000		15,339.000		23,486.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	234.000		307.000		541.000	
	730-6107	FULL - WIDTH MOWING		CYC	2.000				2.000	
	3077-6013	SP MIXESSP-CSAC-B PG64-22		TON	4,557.000		5,046.000		9,603.000	
	3077-6075	TACK COAT		GAL	2,260.000		2,502.000		4,762.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	3.000				3.000	
	6185-6002	TMA (STATIONARY)		DAY	450.000				450.000	
	6185-6003	TMA (MOBILE OPERATION)		HR	120.000				120.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS	1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	

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SUMMARY OF ROADWAY ITEMS

CSJ#:	100 6002	104 6001	104 6017	105 6096	110 6001	112 6001	132 6006	134 6004	150 6001	247 6292	247 6483
	PREPARING ROW	REMOVING CONC (PAV)	REMOVING CONC (DRIVEWAYS)	REMOV STAB BASE AND ASPH PAV (0"-12")	EXCAVATION (ROADWAY)	SUBGRADE WIDENING (ORD COMP)	EMBANKMENT (FINAL)(DENS CONT)(TY C)	BACKFILL (TY A OR B)	BLADING	FL BS (CMP IN PLACE)(TY D GR 1-2)(11")	FL BS(RDWY DEL)(TY D GR 1-2)(FNAL POS)
	STA	SY	SY	SY	CY	STA	CY	STA	STA	SY	CY
FM 3133: 3236-02-012	121.06	750	1273	2772	162	121.06	3183	121.06	121.06	39008	2466
FM 3133: 3236-02-014	134.05	750	786	1801	71	134.05	3833	134.05	134.05	43195	2731
PROJECT TOTALS	**255.11**	**1500**	**2059**	**4573**	**233**	**255.11**	**7016**	**255.11**	**255.11**	**82203**	**5197**

SUMMARY OF ROADWAY ITEMS (CONT'D)

CSJ#:	251 6161	275 6001	275 6004	314 6021	316 6017	316 6024	316 6029	316 6226	316 6440	432 6045
	REWORK BS MTL (TY C)(13"-15.5")(OC)	CEMENT	CEMENT TREAT (MX EXST MTL & NW BS) (6")	EMULS ASPH (PRIME)(MS-2 OR SS-1)	ASPH (AC-20-5TR)	ASPH (CRS-2P)	ASPH (RC-250)	AGGR(TY-PB GR-5 SAC-B)	AGGR (TY-B GR-3 OR TY-L GR-3)(SAC-B)	RIPRAP (MOW STRIP)(4 IN)
	SY	TON	SY	GAL	GAL	GAL	GAL	CY	CY	CY
FM 3133: 3236-02-012	26902	209	40353	7802	5754	6851	5754	131	262	
FM 3133: 3236-02-014	29790	231	44685	8639	5754	6851	5754	131	262	7.4
PROJECT TOTALS	**56692**	440	**85038**	**16441**	11508	13702	11508	262	**524**	**7.4**

SUMMARY OF ROADWAY ITEMS (CONT'D)

CSJ#:	533 6003	533 6004	540 6001	544 6001	560 6001	560 6002	560 6023	3077 6013	3077 6075
	RUMBLE STRIPS (SHOULDER) ASPHALT	RUMBLE STRIPS (CENTERLINE) ASPHALT	MTL W-BEAM GD FEN (TIM POST)	GUARDRAIL END TREATMENT (INSTALL)	MAILBOX INSTALL-S (TWG-POST) TY 1	MAILBOX INSTALL-D (TWG-POST) TY 1	MAILBOX INSTALL-M (TWG-POST) TY 4	SP MIXES SP-C SAC-B PG64-22	TACK COAT
	LF	LF	LF	EA	EA	EA	EA	TON	GAL
FM 3133: 3236-02-012	20710	9643			15	4	1	4557	2260
FM 3133: 3236-02-014	26070	12664	100	2	14			5046	2502
PROJECT TOTALS	**46780**	**22307**	100	2	**29**	**4**	1	9603	4762

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

CSJ#:	502 6001	662 6004	662 6032	662 6034	662 6111	6001 6002	6185 6002	6185 6003
	BARRICADES, SIGNS AND TRAFFIC HANDLING	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	MO	**LF**	**LF**	**LF**	EA	EA	DAY	HR
FM 3133; CSJ: 3236-02-012	18	25381	2170	8147	570	3	450	120
FM 3133; CSJ: 3236-02-014		27145	1880	15339	908			
PROJECT TOTALS	**18**	**52526**	**4050**	**23486**	**1478**	**3**	**450**	**120**

FM 3133 QUANTITY SUMMARY SHEET

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	16
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				

$FILEL$

SIGNING AND PAVEMENT MARKING QUANTITY SUMMARY

LOCATION CSJ:3236-02-012	644 6001	644 6004	644 6007	658 6048	666 6018	666 6048	666 6303	666 6309	666 6312	666 6315	672 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 TY10BWG(1)SA(U)	INSTL OM ASSM (OM-2Z) (FLX)GND	REFL PAV MRK TY I (W)6"(DOT) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)4"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)6"(SLD) (100MIL)	RE PM W/RET REQ TY I (Y)4"(BRK) (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	REFL PAV MRK TY II-A-A
	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	EA
SIGNING AND PAVEMENT MARKINGS SHEET 1 OF 22	4			5		12	1966		130	1546	28
SIGNING AND PAVEMENT MARKINGS SHEET 2 OF 22	5			5		11	2305		150	1652	30
SIGNING AND PAVEMENT MARKINGS SHEET 3 OF 22	3			2		22	2249		90	1742	30
SIGNING AND PAVEMENT MARKINGS SHEET 4 OF 22	1			2		11	2319		280	380	22
SIGNING AND PAVEMENT MARKINGS SHEET 5 OF 22	1			2		11	2317		280		16
SIGNING AND PAVEMENT MARKINGS SHEET 6 OF 22				2			2400		300		16
SIGNING AND PAVEMENT MARKINGS SHEET 7 OF 22				0			2400		300		16
SIGNING AND PAVEMENT MARKINGS SHEET 8 OF 22				0			2400		300		16
SIGNING AND PAVEMENT MARKINGS SHEET 9 OF 22	2			2		11	2299		280	503	23
SIGNING AND PAVEMENT MARKINGS SHEET 10 OF 22	6		1	2	69	24	1949	1553	50	1775	28
SIGNING AND PAVEMENT MARKINGS SHEET 11 OF 22	2		1	2	54	24	612	612	10	549	9
TOTAL	**24**		**2**	**24**	**123**	**126**	**23216**	**2165**	**2170**	**8147**	**234**

SIGNING AND PAVEMENT MARKING QUANTITY SUMMARY

LOCATION CSJ:3236-02-014	644 6001	644 6004	644 6007	658 6048	666 6018	666 6048	666 6303	666 6309	666 6312	666 6315	672 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 TY10BWG(1)SA(U)	INSTL OM ASSM (OM-2Z) (FLX)GND	REFL PAV MRK TY I (W)6"(DOT) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)4"(SLD) (100MIL)	RE PM W/RET REQ TY I (W)6"(SLD) (100MIL)	RE PM W/RET REQ TY I (Y)4"(BRK) (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	REFL PAV MRK TY II-A-A
	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	EA
SIGNING AND PAVEMENT MARKINGS SHEET 11 OF 22	2						1621		200	633	20
SIGNING AND PAVEMENT MARKINGS SHEET 12 OF 22							2400		210	983	25
SIGNING AND PAVEMENT MARKINGS SHEET 13 OF 22	2			4		11	2312		80	1912	31
SIGNING AND PAVEMENT MARKINGS SHEET 14 OF 22	1	1				11	2324		170	1594	31
SIGNING AND PAVEMENT MARKINGS SHEET 15 OF 22							2400		130	1400	26
SIGNING AND PAVEMENT MARKINGS SHEET 16 OF 22							2400		300		16
SIGNING AND PAVEMENT MARKINGS SHEET 17 OF 22	1			2		11	2321		290	145	19
SIGNING AND PAVEMENT MARKINGS SHEET 18 OF 22	1					11	2324		290	1124	30
SIGNING AND PAVEMENT MARKINGS SHEET 19 OF 22							2400		210	1561	31
SIGNING AND PAVEMENT MARKINGS SHEET 20 OF 22	2						2366	34		2400	31
SIGNING AND PAVEMENT MARKINGS SHEET 21 OF 22	7			2				2400		2400	31
SIGNING AND PAVEMENT MARKINGS SHEET 22 OF 22	5	2		2			1188	656		1188	16
TOTAL	**21**	**3**	**0**	**10**	**0**	**44**	**24055**	**3090**	**1880**	**15339**	**307**

PAVEMENT MARKING AND SIGN SUMMARY

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	17
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	161	164	164	168	506	506	506	506	506	*506	*506
	6017	6051	6066	6001	6002	6003	6011	6020	6024	6038	6039
	COMPOST MANUF TOPSOIL (4")	DRILL SEED (TEMP)(WARM OR COOL)	DRILL SEEDING (PERM)(WARM OR COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTI ON EXITS (INSTALL) (TY 1)	CONSTRUCTI ON EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	MG	LF	LF	LF	SY	SY	LF	LF
FM 3133 CSJ: 3236-02-012	76671	76671	76671	22812	520	180	700	122	122	411.4	411.4
FM 3133 CSJ: 3236-02-014	107244	107244	107244	31908	80	20	100			1182.5	1182.5
PROJECT TOTALS	183915	183915	183915	54720	600	200	800	122	122	1594	1594

*ITEMS INCREASED BY 10% FOR PERIODIC REPLACEMENT.

SUMMARY OF EROSION CONTROL ITEMS (CONT'D)

LOCATION	*506	*506	730
	6041	6043	6107
	BIODEG EROSN CONT LOGS (INSTL)	BIODEG EROSN CONT LOGS (REMOVE)	FULL - WIDTH MOWING
	LF	LF	CYC
FM 3133 CSJ: 3236-02-012	616	616	2
FM 3133 CSJ: 3236-02-014	748	748	
PROJECT TOTALS	1364	1364	2

*ITEMS INCREASED BY 10% FOR PERIODIC REPLACEMENT.

FM 3133 EROSION CONTROL SUMMARY

SHEET 1 OF 1

DESIGN TLB	FED.RD. DIV.NO. 6	FEDERAL AID PROJECT NO. (SEE TITLE SHEET)		HIGHWAY NO. FM3133
GRAPHICS TLB	STATE TEXAS	DISTRICT DAL	COUNTY COLLIN	SHEET NO. 18
CHECK DMH				
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012, etc.	

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SUMMARY OF INTERSECTION AND DRIVEWAY ITEMS

INTERSECTION/DRIVEWAY NO. CSJ: 3236-02-012	THROAT WIDTH	RADII	104 6017	105 6096	464 6002	464 6003	464 6005	464 6007	464 6008	464 6009	467 6341	467 6363	467 6391	467 6423	467 6454	467 6466	496 6042	530 6005	530 6017
			REMOVING CONC (DRIVEWAYS)	REMOV STAB BASE AND ASPH PAV (0"-12")	RC PIPE (CL III)(15 IN)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(30 IN)	RC PIPE (CL III)(36 IN)	RC PIPE (CL III)(42 IN)	SET (TY II) (15 IN) (RCP) (6: 1) (P)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (4: 1) (P)	SET (TY II) (30 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	SET (TY II) (42 IN) (RCP) (6: 1) (P)	REMOV STR (SMALL)	DRIVEWAYS (ACP)	DRIVEWAYS (CONC) (HES)
	FT	FT	SY	SY		LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	SY	SY
1, PUBLIC RD.	13.6	30,30		60			26						2					57	
2	10.1	20,20		40		21						2					1	40	
3	12.0	15,15	51	35		21						2					1	43	
4	30.9	15,15		103		20						2					1	103	
5	14.4	15,15		68														68	
6	17.3	20,15		25													1	65	
7	21.8	15,15		102		112						2					1	102	
8	19.2	15,15	101			40						2					1		85
9	19.3	15,15	22	90													1	75	
10, CR 525 (GRAYBILL RD.)	22.1	30,30		76													1	76	
11	17.4	15,15		62		20						2					1	62	
12	19.2	15,15	84			19						2					1		84
13	48.0	20,20	188			26						2							188
14	10.8	15,15		48		19						2						48	
15	20.2	15,15	117			24						2					1		117
16	23.8	20,20		110														110	
17	11.3	15,20		25													1	49	
18	54.6	15,15	210														1		210
19	11.4	15,15		57		24						2						57	
20	23.2	15,15	117				33						2				1		117
21	11.3	25,15		51		20						2					1	51	
22	13.8	20,15		59		33						2					1	59	
23, CR 524 (STERLING DR.)	10.1	20,25		44			35						2				1	44	
24, PECAN HOLLOW CIR.	10.5	30,30		55		53						2					1	55	
25	16.2	15,15	70			20						2					1		70
26	14.7	15,15		80			16						2				1	80	
27	12.9	15,15		54		25						2					1	54	
28	9.1	15,15		51		33						2					1	51	
29	16.3	20,20		64		20						2						64	
30	11.2	25,15	51			29						2					1		51
31	9.2	20,15		39		20						2					1	39	
32	13.1	20,15		48		24						2						48	
33, DANNO LN.	19.9	30,30		65		39						2					1	66	
34, CR 530	40.0	30,30		220		34						2					1	220	
35	40.0	20,15		299		21						2						299	
36	8.5	15,15		25			26						2				1	33	
37	9.2	15,15		55													1	46	
38	14.8	15,2																59	
39	18.0	15,15		50		25						2					1	62	
40	19.3	15,15		45		22						2					1	45	
41	13.8	15,15		35		25						2					1	44	
42	14.8	25,15		75		20						2					1	75	
43	28.7	15,15		60		22						2					1	95	
44	39.4	20,15		75		20						2					1	144	
45	16.1	20,15	57			32						2					1		57
46	12.6	15,15		25				18						2				49	
47	13.2	15,15	59														1		59
48, CR 531	29.4	40,40	84														1		89
49	10.6	15,15		60		22						2					1	60	
50	12.1	15,15	62			20						2					1		62
51, CR 533	15.6	5000,0		72													1	72	
52, CR 533	10.0	20,32		63		135						4						63	
53, BRANGUS RD.	12.0	32.5,0		47				370						8			1	47	
54, BRANGUS RD.	15.7	0,5000		55													1	55	
TOTAL			**1273**	**2772**	**0**	**1060**	**136**	**388**	**0**	**0**	**0**	**70**	**10**	**10**	**0**	**0**	**42**	**3034**	**1189**

FM 3133
DRIVEWAYS & INTERSECTIONS SUMMARY

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	19
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

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SUMMARY OF INTERSECTION AND DRIVEWAY ITEMS

INTERSECTION/DRIVEWAY NO. CSJ: 3236-02-014	THROAT WIDTH	RADII	104 6017 REMOVING CONC (DRIVEWAYS)	105 6096 REMOV STAB BASE AND ASPH PAV (0"-12")	464 6002 RC PIPE (CL III)(15 IN)	464 6003 RC PIPE (CL III)(18 IN)	464 6005 RC PIPE (CL III)(24 IN)	464 6007 RC PIPE (CL III)(30 IN)	464 6008 RC PIPE (CL III)(36 IN)	464 6009 RC PIPE (CL III)(42 IN)	467 6341 SET (TY II) (15 IN) (RCP) (6: 1) (P)	467 6363 SET (TY II) (18 IN) (RCP) (6: 1) (P)	467 6391 SET (TY II) (24 IN) (RCP) (4: 1) (P)	467 6423 SET (TY II) (30 IN) (RCP) (6: 1) (P)	467 6454 SET (TY II) (36 IN) (RCP) (6: 1) (P)	467 6466 SET (TY II) (42 IN) (RCP) (6: 1) (P)	496 6042 REMOV STR (SMALL)	530 6005 DRIVEWAYS (ACP)	530 6017 DRIVEWAYS (CONC) (HES)
	FT	FT	SY	SY		LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	SY	SY
55	19.3	15,15		45					83						4		1	45	
56	13.8	15,15		35		20						2					1	44	
57	14.8	15,15		75			33						2				1	75	
58	28.7	20,20		60		32						2					1	95	
59	39.4	15,15		75													1	144	
60	16.1	15,15	57			19						2					1		57
61	12.6	15,15		25		32						2						49	
62, CR 532	13.2	40,40	59														1		59
63	29.4	15,15	84				22						2				1		89
64	10.6	15,15		60		19						2					1	60	
65, CR 429	12.1	30,30	62				32						2				1		57
66	15.6	15,15		72			20						2				1	72	
67	10.0	15,15		63		17						2						63	
68	12.0	15,15		47			20						2				1	47	
69	15.7	15,15		55		26						2					1	55	
70	19.3	15,15		45		20						2					1	44	
71	13.8	15,15		35													1	44	
72	14.8	15,15		75													1	75	
73	28.7	15,15		60		20						2					1	95	
74	39.4	15,15		75		20						2					1	144	
75	16.1	20,15	57				44						2				1		57
76, CR 481	12.6	30,30		25						32						2		49	
77	13.2	15,15	59				20						2				1		59
78	29.4	15,15	84														1		89
79, CR 482 (BLACKMON RD.)	10.6	30,30		60		32						2					1	60	
80	12.1	15,15	62			20						2					1		62
81	15.6	15,15		72		20						2					1	72	
82	10.0	15,15		63			24						2					63	
83	12.0	15,15		47					72						4		1	47	
84	15.7	15,15		55		21						2					1	55	
85	19.3	15,15		45		21						2					1	45	
86	13.8	15,15		35			27						2				1	44	
87	14.8	15,15		75			32						2				1	75	
88	28.7	15,15		60													1	95	
89	39.4	15,15		75		20						2					1	144	
90	16.1	15,15	57			20						2					1		57
91	12.6	15,15		25		18						2						49	
92	13.2	15,15	59	20		19						2					1		59
93	29.4	15,20	84														1		89
94, PRIVATE RD. 5367	10.6	25,25		60													1	60	
95	12.1	15,15	62		27						2						1		62
96	15.6	15,15		72		18						2					1	72	
97	10.0	20,20		63														63	
98	12.0	15,15		47													1	47	
TOTAL			**786**	**1801**	**27**	**434**	**274**	**0**	**155**	**32**	**2**	**40**	**20**	**0**	**8**	**2**	**38**	**2191**	**796**

FM 3133
DRIVEWAYS & INTERSECTIONS SUMMARY

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	20
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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SUMMARY OF DRAINAGE ITEMS

LOCATION CSJ 3236-02-012, etc.	400 6005 CEM STABIL BKFL CY	400 6006 CUT & RESTORING PAV SY	402 6001 TRENCH EXCAVATION PROTECTION LF	432 6026 RIPRAP (STONE COMMON)(DRY)(18 IN) CY	464 6003 RC PIPE (CL III)(18 IN) LF	464 6005 RC PIPE (CL III)(24 IN) LF	464 6007 RC PIPE (CL III)(30 IN) LF	464 6008 RC PIPE (CL III)(36 IN) LF	464 6009 RC PIPE (CL III)(42 IN) LF	464 6010 RC PIPE (CL III)(48 IN) LF
CULVERT 1	31.0	25.7	26.0			87.8				
CULVERT 2	30.7	11.4	26.4			65.1				
CULVERT 3	38.1	18.3	26.0					47.4		
CULVERT 4	57.4	31.0	40.0					97.2		
CULVERT 5	52.7	26.6	37.8				114.8			
CULVERT 6	59.3	31.3	40.2					100.4		
CULVERT 7	30.6	20.8	36.5		113.0					
CULVERT 8	144.7	65.4	75.0				409.6			
CULVERT 9	27.1	15.9	32.9			52.2				
CULVERT 10	106.7	53.0	67.2							134
CULVERT 11	47.6	20.2	45.7	3.0					50.4	
CULVERT 12	68.8	29.6	76.0					85.5		
CULVERT 13	61.4	20.9	64.7						65	
PROJECT TOTALS	756.1	370.1	594.4	3	113	205.1	524.4	330.5	115.4	134

SUMMARY OF DRAINAGE ITEMS

LOCATION CSJ 3236-02-012, etc.	466 6136 HEADWALL (CH - PW - S)(DIA= 48 IN) EA	467 6356 SET (TY II)(18 IN)(RCP)(3:1)(C) EA	467 6388 SET (TY II)(24 IN)(RCP)(3:1)(C) EA	467 6389 SET (TY II)(24 IN)(RCP)(3:1)(P) EA	467 6417 SET (TY II)(30 IN)(RCP)(3:1)(C) EA	467 6419 SET (TY II)(30 IN)(RCP)(4:1)(C) EA	467 6448 SET (TY II)(36 IN)(RCP)(3:1)(C) EA	467 6461 SET (TY II)(42 IN)(RCP)(3:1)(C) EA	496 6002 REMOV STR (INLET) EA	496 6005 REMOV STR (WINGWALL) EA	496 6042 REMOV STR (SMALL) EA
CULVERT 1			4						1		1
CULVERT 2			2	1					1		1
CULVERT 3							2				1
CULVERT 4							4				2
CULVERT 5					4						2
CULVERT 6							4				2
CULVERT 7		4									2
CULVERT 8					4	4					4
CULVERT 9			2						1		1
CULVERT 10	2										2
CULVERT 11								2		2	1
CULVERT 12							2			2	1
CULVERT 13								2		2	1
PROJECT TOTALS	2	4	8	1	8	4	12	4	3	6	21

FM 3133

SUMMARY OF CROSS DRAINAGE QUANTITIES

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	21
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

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SUGGESTED SEQUENCE OF WORK:

PHASE I

1. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS IN ADVANCE OF BARRICADE SETUP.
2. ERECT PROJECT SIGNS AND ADVANCE WARNING SIGNS AS SHOWN IN IN BC STANDARDS AND AS DIRECTED BY THE ENGINEER.
3. INSTALL SW3P CONTROL DEVICES NO SOONER THAN TWO (2) WEEKS IN ADVANCE OF SCHEDULED WORK IN THEIR CONTROL AREA.
4. REMOVE EXISTING CULVERTS AND INSTALL NEW CULVERTS AS INDICATED IN THE PLANS.
5. PREPARE EDGE FOR SUBGRADE WIDENING AND A 3:1 SAFETY EDGE ALONG THE EDGE OF SHOULDER AS SHOWN ON PLANS.
6. COMPLETE SUBGRADE WIDENING AS SHOWN IN TCP TYPICAL SECTION PHASE I IN ACCORDANCE WITH PROPOSED TYPICAL SECTION.

PHASE II

1. DELINEATE PAVEMENT EDGE WITH VERTICAL PANELS. SALVAGE EXISTING TOPSOIL FROM WORK AREA.
2. REWORK AND CEMENT TREAT BASE IN HALF WIDTHS. REWORK EACH SEGMENT FULL WIDTH EACH DAY TO WHERE NO GRADE DIFFERENCE IS PRESENT AT CENTERLINE AT COMPLETION OF DAILY OPERATIONS.
3. APPLY NEW BASE MATERIAL IN HALF WIDTHS.
4. COMPLETE WORK AS SHOWN IN TCP TYPICAL SECTION PHASE II IN ACCORDANCE WITH PROPOSED TYPICAL SECTION.

PHASE III

1. APPLY PRIME COAT IN HALF WIDTHS.
2. APPLY HOT MIX LAYER IN HALF WIDTHS.
3. APPLY ONE COURSE SURFACE TREATMENT IN HALF WIDTHS.
4. APPLY SHORT TERM PAVEMENT TABS.
5. RE-GRADE DITCHES AND BACK FILL PAVEMENT EDGES.
6. COMPLETE WORK AS SHOWN IN TCP TYPICAL SECTION PHASE III IN ACCORDANCE WITH PROPOSED TYPICAL SECTION.
7. ERECT PERMANENT SIGNS AND PLACE PERMANENT PAVEMENT MARKINGS.
8. ESTABLISH PERMANENT VEGETATIVE COVER.
9. RE-STABILIZE DISTURBED LAND TO ACHIEVE UNIFORM 70% VEGETATIVE COVER, AT MINIMUM. REMOVE SW3P DEVICES UPON ENGINEER'S DIRECTION OR AUTHORIZATION.
10. PERFORM FINAL SITE CLEAN UP AS DIRECTED BY THE ENGINEER AND REMOVE PROJECT LIMIT/ADVANCE WARNING SIGNS.

TCP GENERAL NOTES

1. THE CONTRACTOR MAY SUGGEST AN ALTERNATE SEQUENCE OF WORK TO THE ENGINEER FOR APPROVAL.
2. INTERMITTENT ONE-WAY TRAFFIC CONTROL (LANE CLOSURES) WILL BE IN ACCORDANCE WITH TCP AND WZ STANDARDS AND AS DIRECTED BY THE ENGINEER.
3. OVERNIGHT LANE CLOSURES WILL NOT BE PERMITTED.
4. COMPLY WITH TCP (7-1)-13, WHICH INCLUDES PROVISIONS FOR CERTAIN SIGNS TO BE INSTALLED AND TO REMAIN UNTIL PERMANENT PAVEMENT MARKINGS ARE IN PLACE. THESE SIGNS ARE IN ADDITION TO SIGNS THAT MAY BE REQUIRED BY THE VARIOUS TCP AND BC STANDARDS.
5. RECONSTRUCT PAVEMENT SECTION IN MAXIMUM 1-MILE LENGTHS. DO NOT PROCEED TO NEXT SECTION WITHOUT APPROVAL OF THE ENGINEER. PERFORM WORK IN SUCH A MANNER THAT THE ROADWAY IS OPEN FOR TRAFFIC AT THE END OF EACH WORKDAY.

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133 CONSTRUCTION NARRATIVE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	22
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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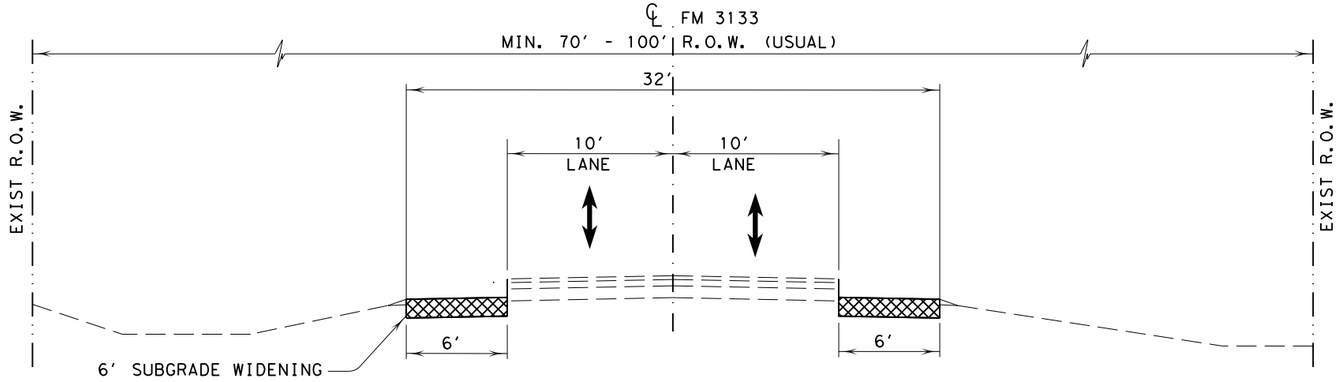
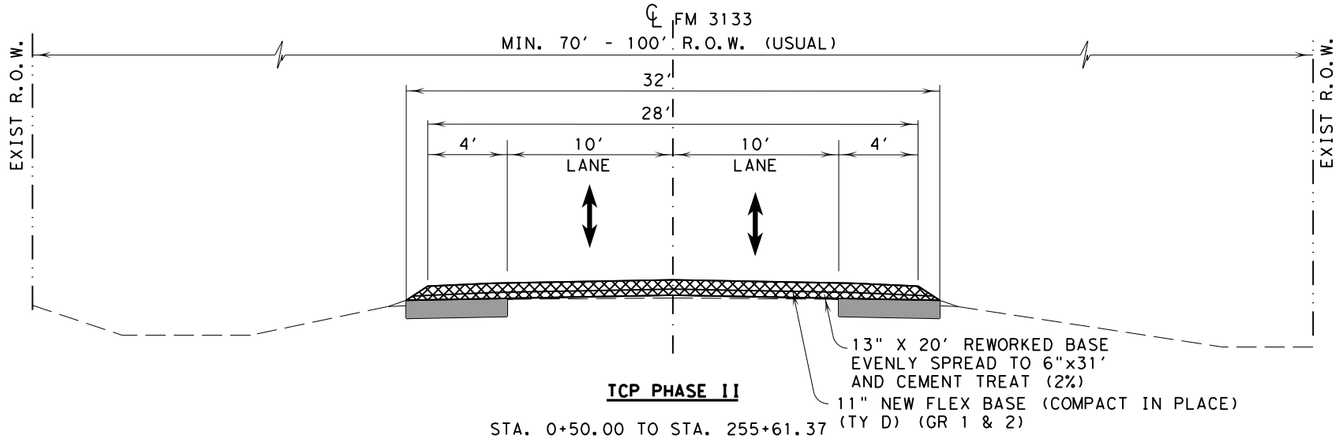


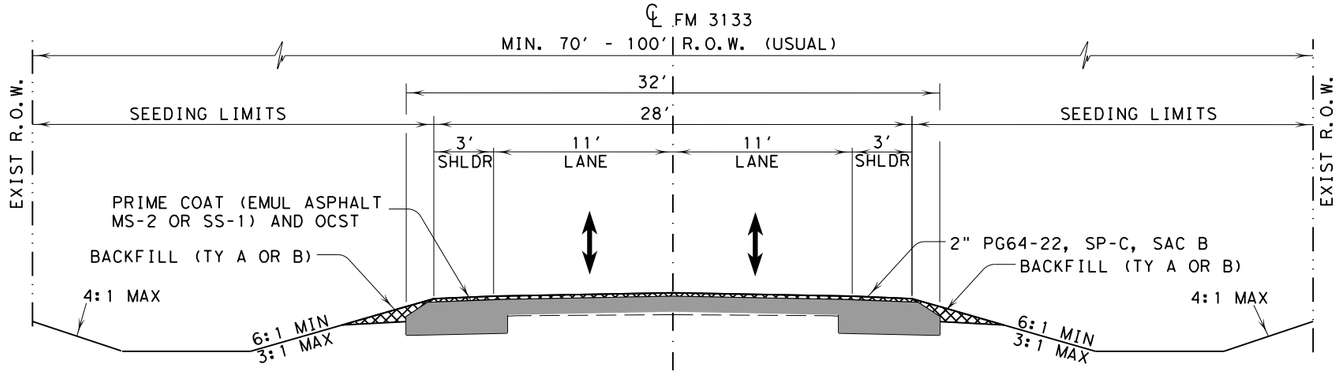
TCP PHASE I

STA. 0+50.00 TO STA. 255+61.37



TCP PHASE II

STA. 0+50.00 TO STA. 255+61.37



TCP PHASE III

STA. 0+50.00 TO STA. 255+61.37

LEGEND

CURRENT CONSTRUCTION PHASE

PREVIOUS CONSTRUCTION PHASE

NOTES:
1. CONTRACTOR MAY ALTERNATE TRAFFIC MOVEMENTS AS NECESSARY ON DIFFERENT SIDES OF ROADWAY THROUGH THE WORK ZONE UNTIL EACH PHASE IS COMPLETE.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

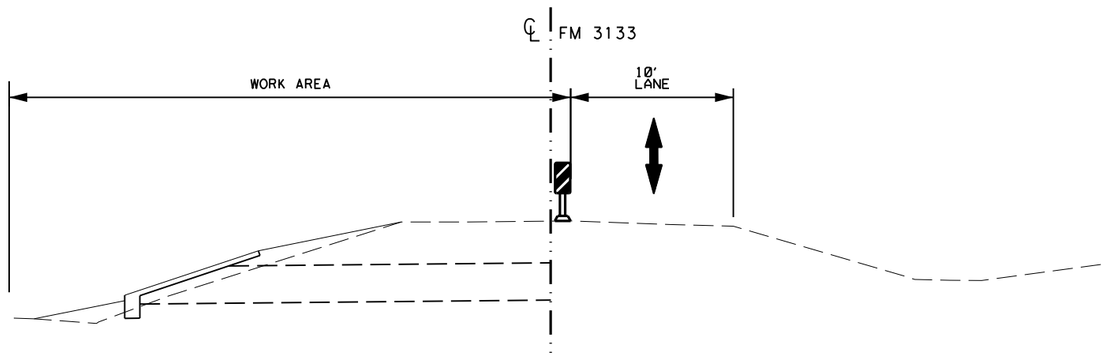
11/17/20

FM 3133
TCP PHASE
TYPICAL SECTIONS

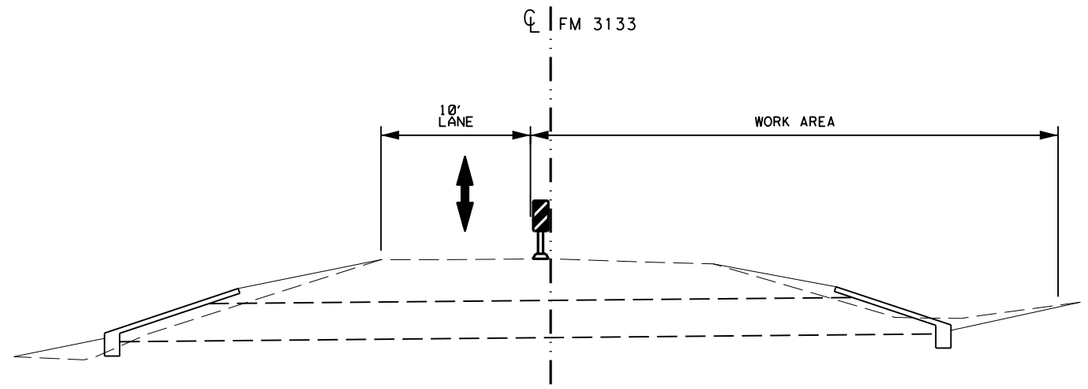
SCALE: NTS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	23
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



CULVERTS
PHASE 1



CULVERTS
PHASE 2

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

1/7/21

Texas Department of Transportation

FM 3133
CULVERT CONSTRUCTION DETAILS

SCALE: NTS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	24
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

DATE:
FILE:

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.

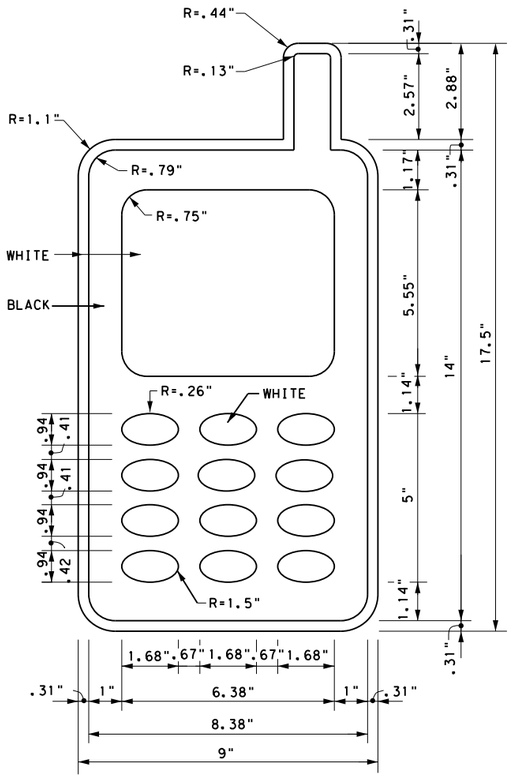
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

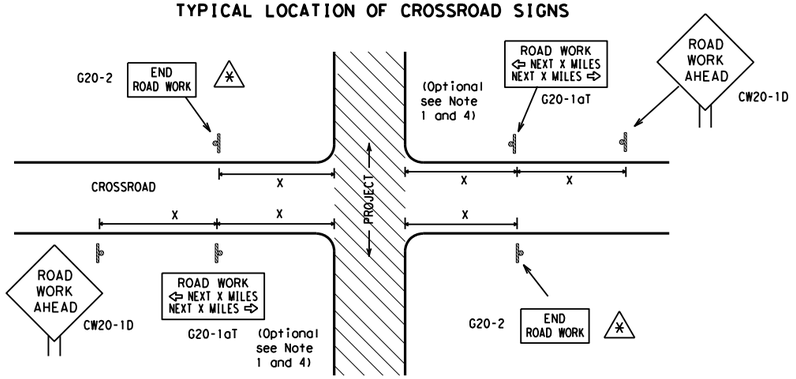
Texas Department of Transportation | Traffic Operations Division Standard

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	3236	02	012,etc.	FM3133
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	DAL	COLLIN		25

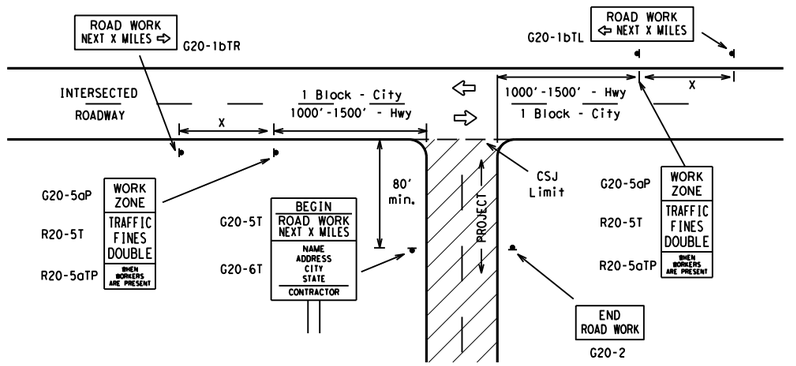
TYPICAL LOCATION OF CROSSROAD SIGNS



✱ 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

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

SPACING

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

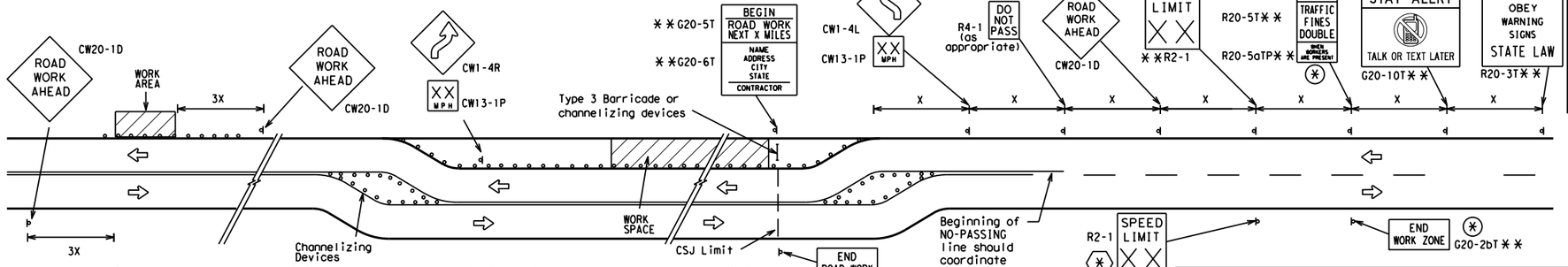
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

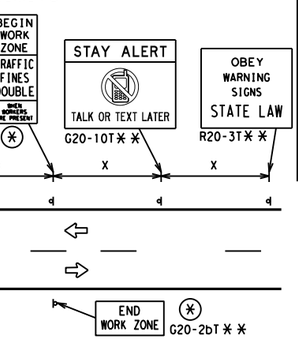
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. 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

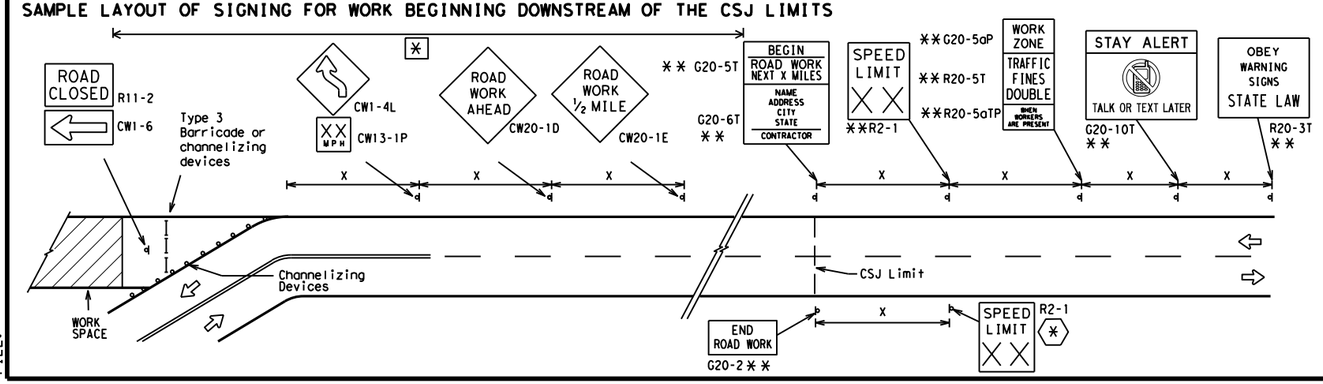


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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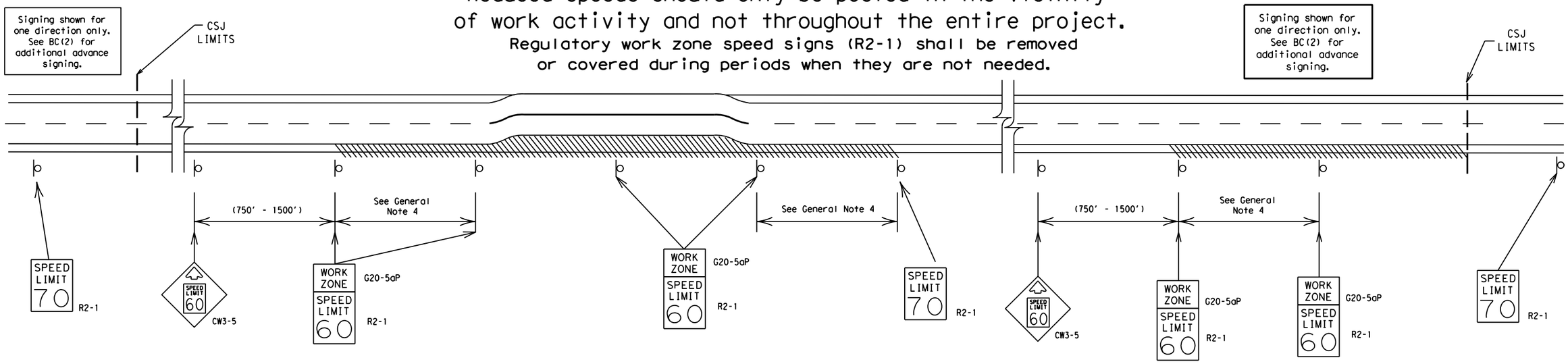
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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.

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BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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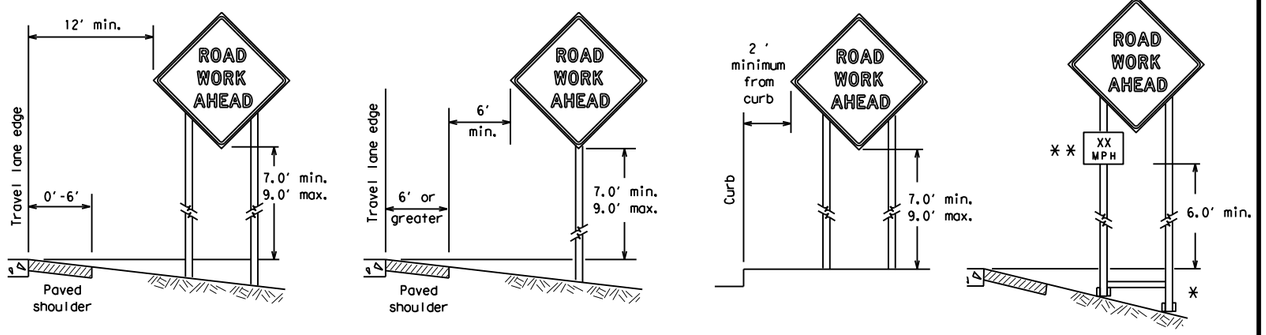
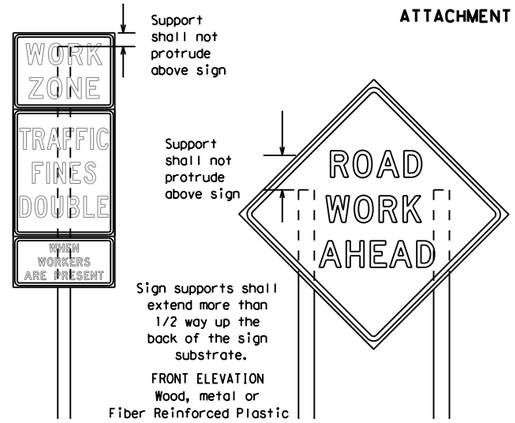
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

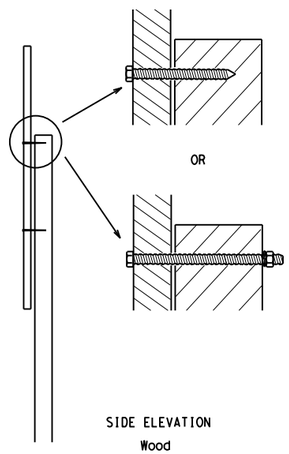


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





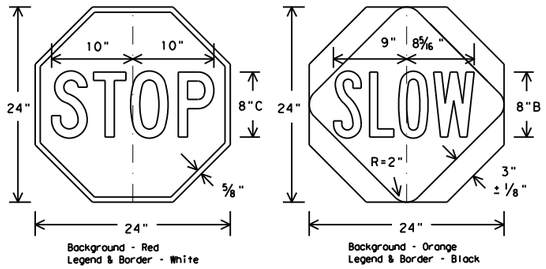
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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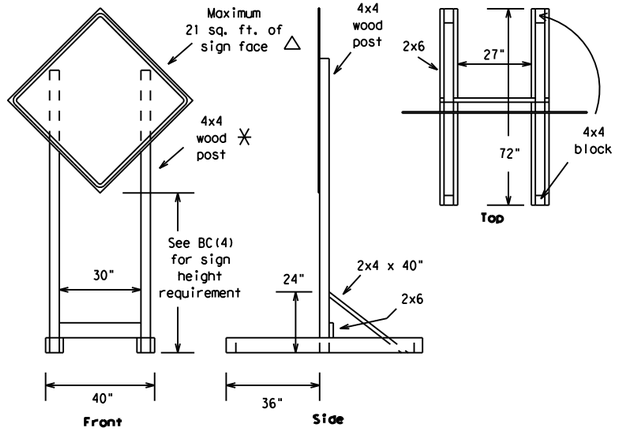
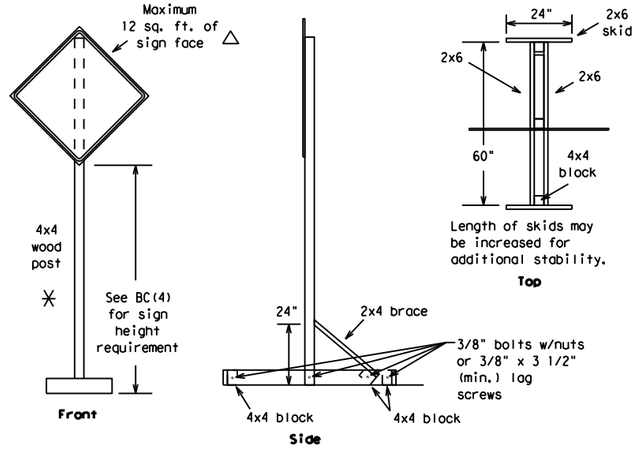
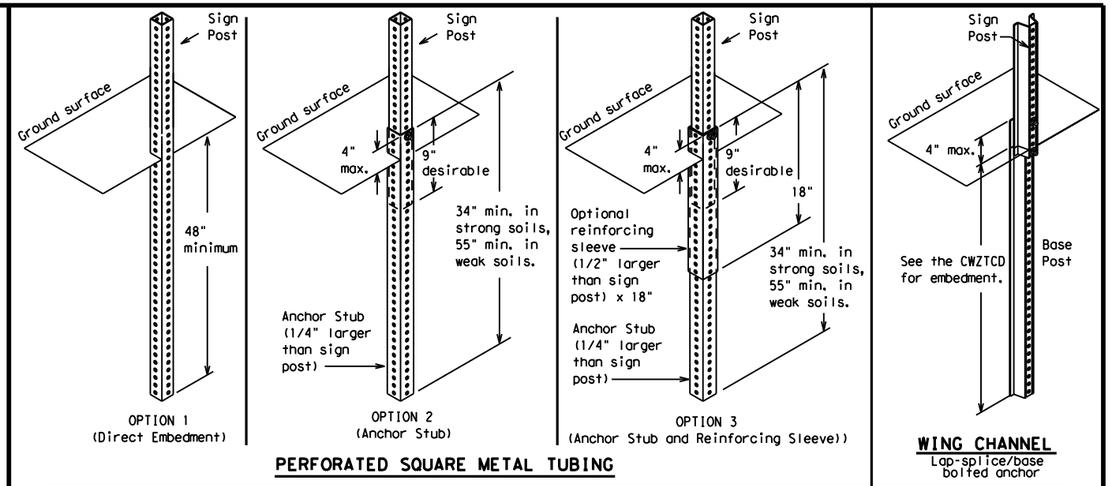




SKID MOUNTED WOOD SIGN SUPPORTS

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.

Texas Department of Transportation | Traffic Operations Division Standard

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** 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

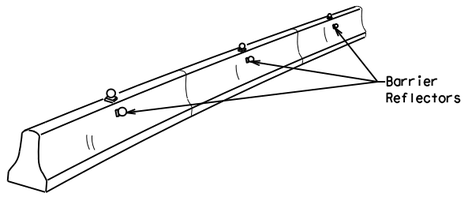
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

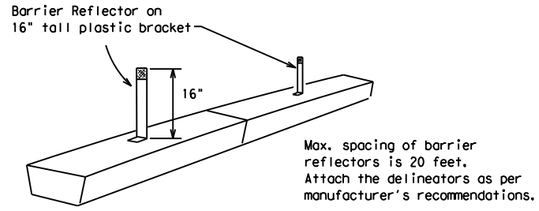
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	COLLIN		30

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.

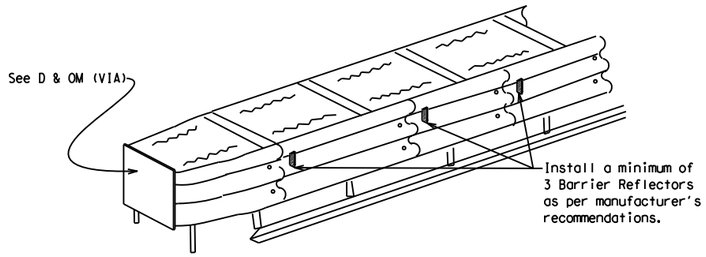


CONCRETE TRAFFIC BARRIER (CTB)

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)

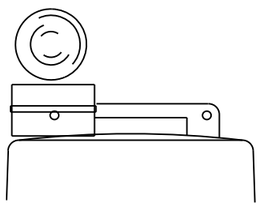


DELINEATION OF END TREATMENTS

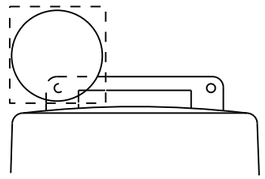
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

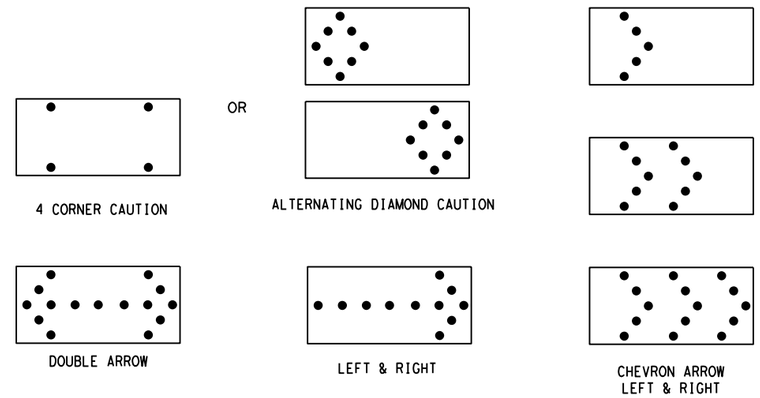
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		31

DATE:
FILE:

DATE:
FILE:

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:

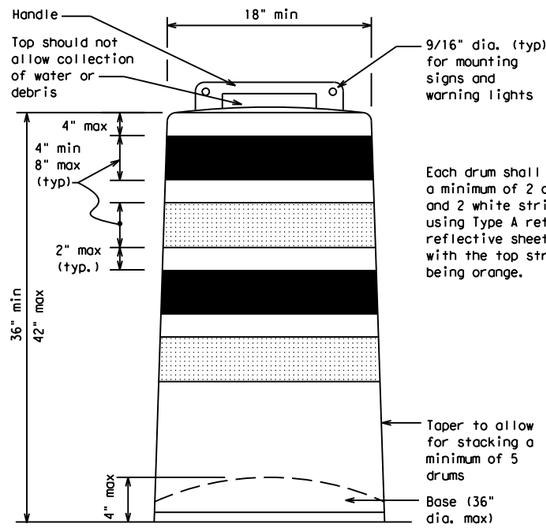
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

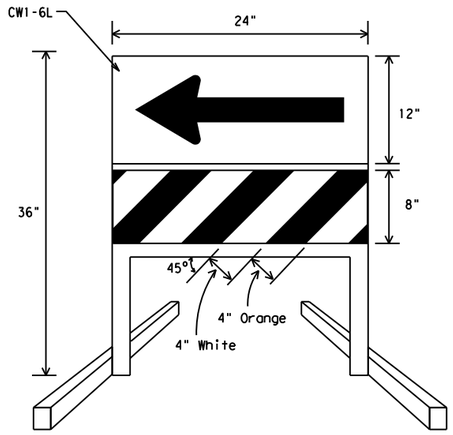
RETROREFLECTIVE SHEETING

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

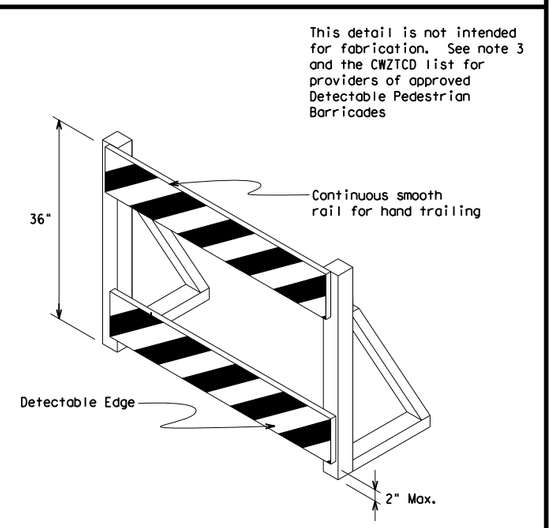
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





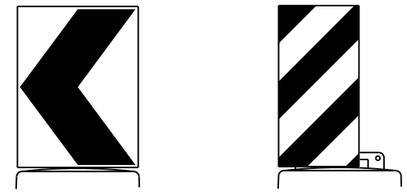
DIRECTION INDICATOR BARRICADE

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.

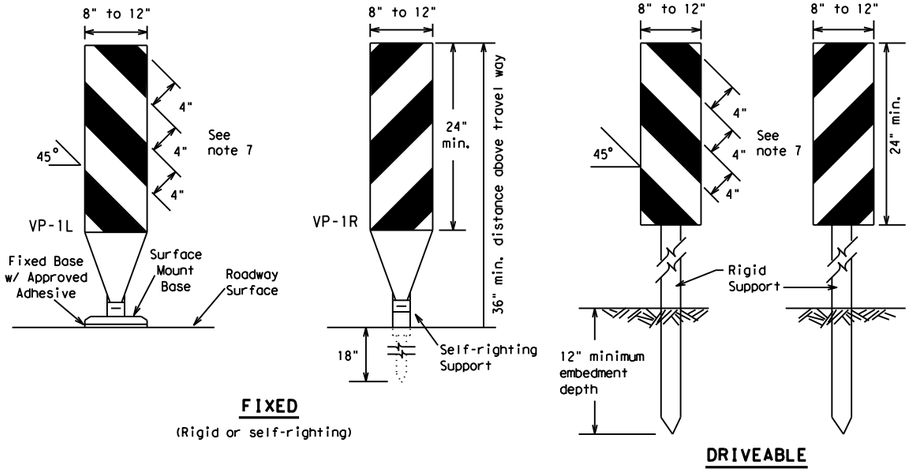
Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

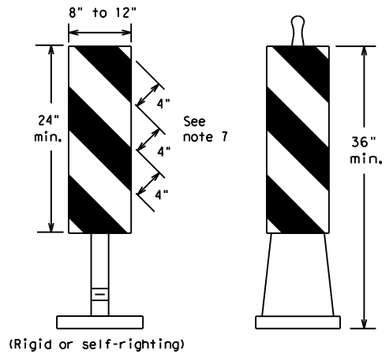
BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	DAL	COLLIN		32



FIXED
(Rigid or self-righting)

DRIVEABLE

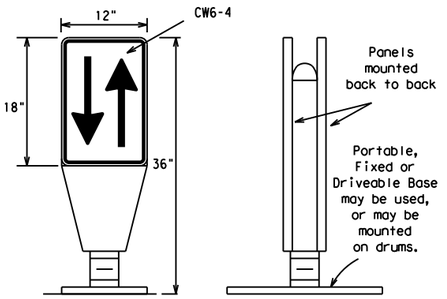


(Rigid or self-righting)

PORTABLE

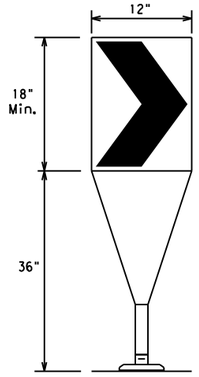
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



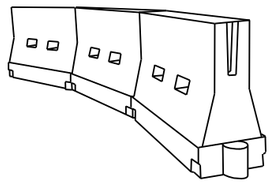
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3236	02	012,etc.	FM3133
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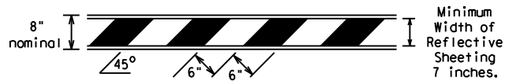
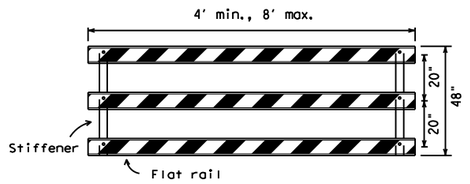
TYPE 3 BARRICADES

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.



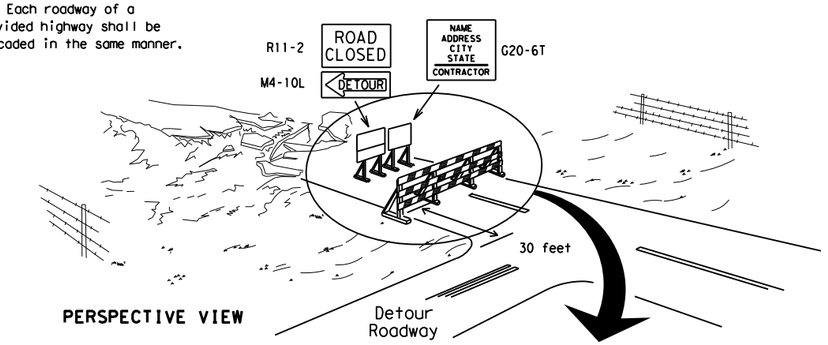
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

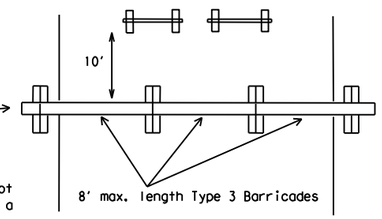
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

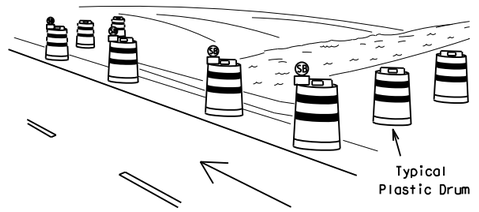
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

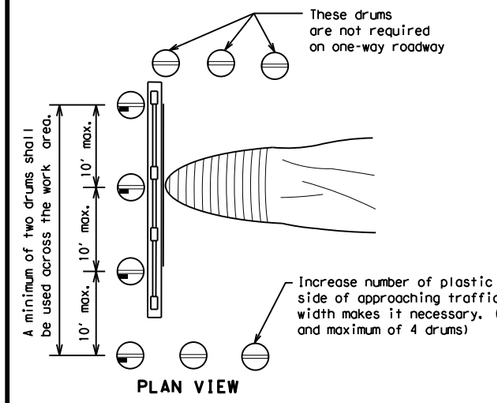
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

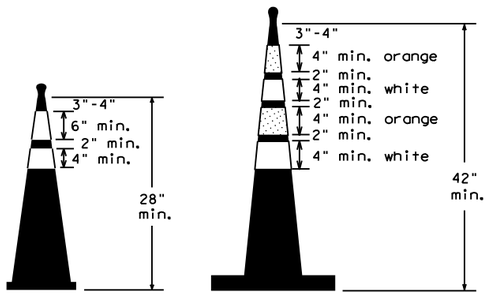
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

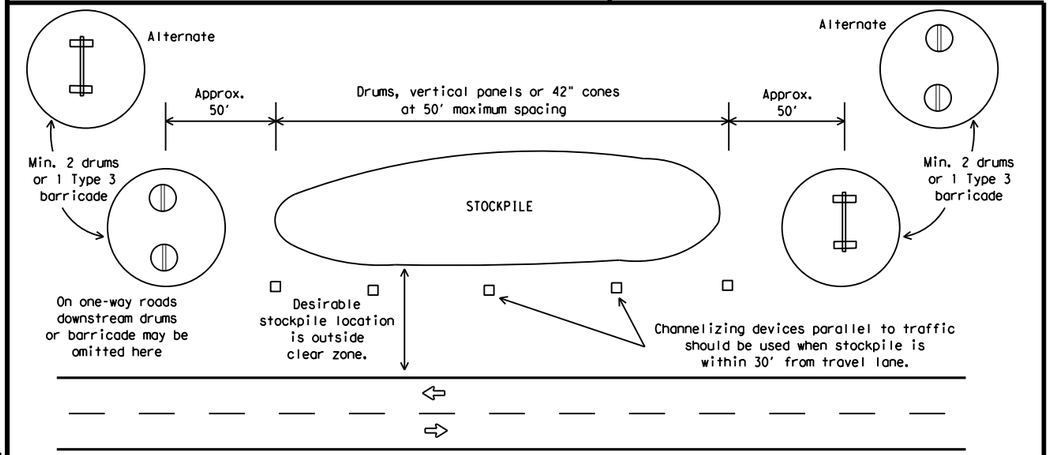
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

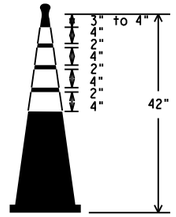
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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.

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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REVISIONS 9-07 8-14 7-13	3236	02	012, etc.	FM3133
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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.

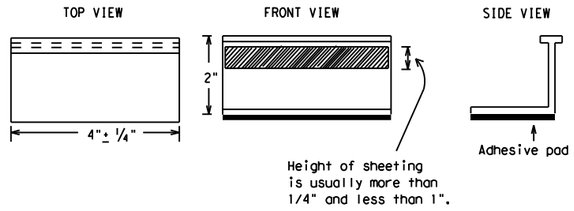
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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
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REVISIONS	3236	02	012,etc.	FM3133
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	DAL	COLLIN		35
11-02 8-14				

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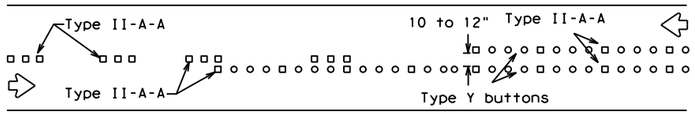
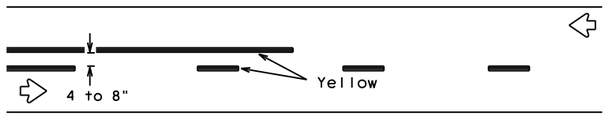
PAVEMENT MARKING PATTERNS

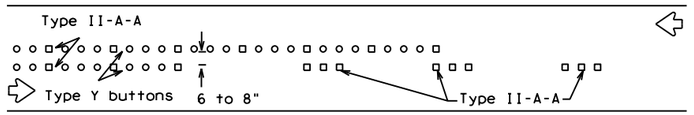
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



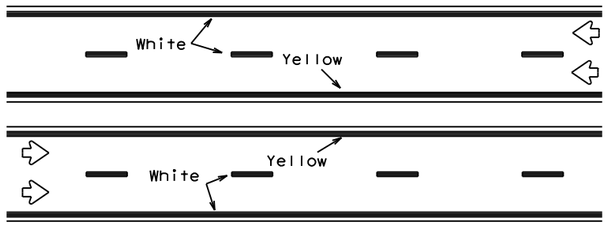
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



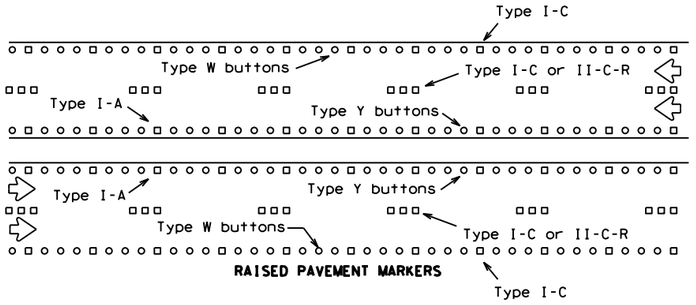
RAISED PAVEMENT MARKERS - PATTERN B

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



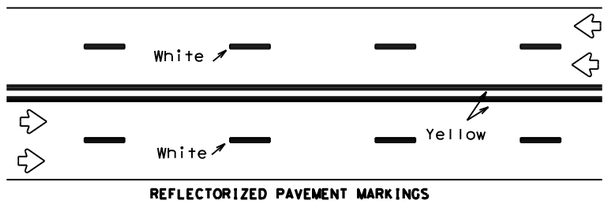
REFLECTORIZED PAVEMENT MARKINGS



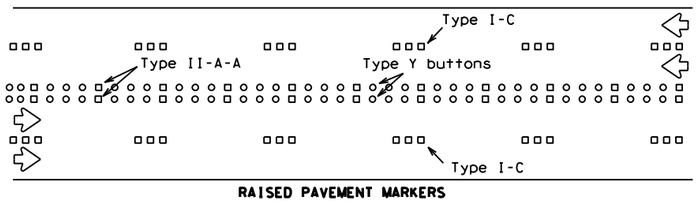
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



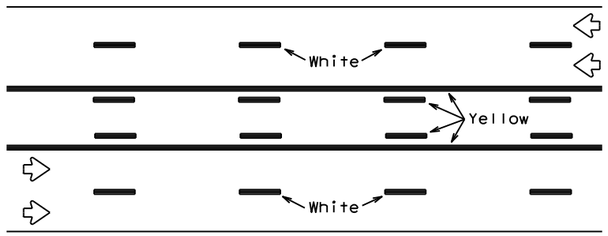
REFLECTORIZED PAVEMENT MARKINGS



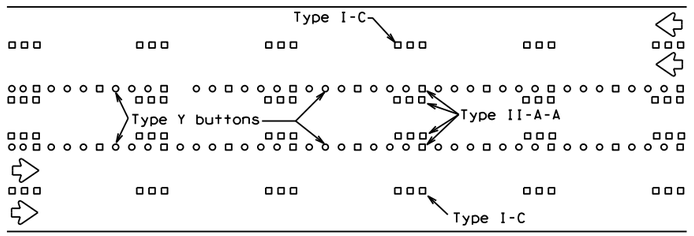
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

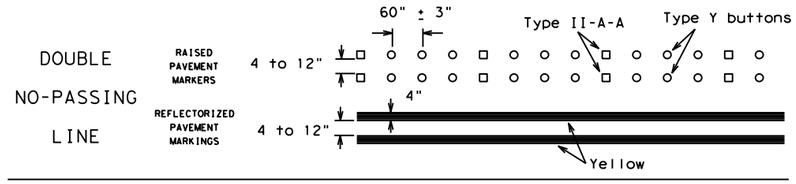
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

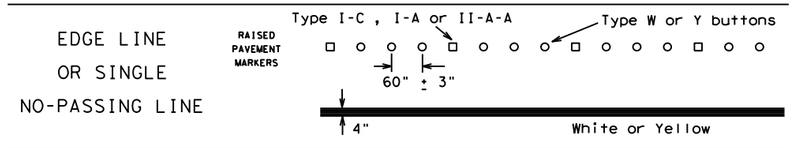
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

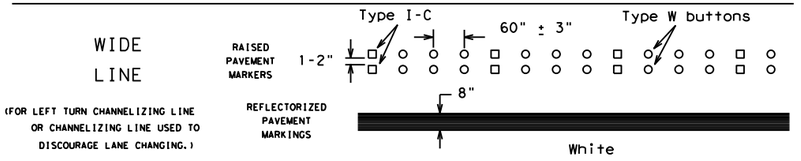


EDGE LINE OR SINGLE NO-PASSING LINE



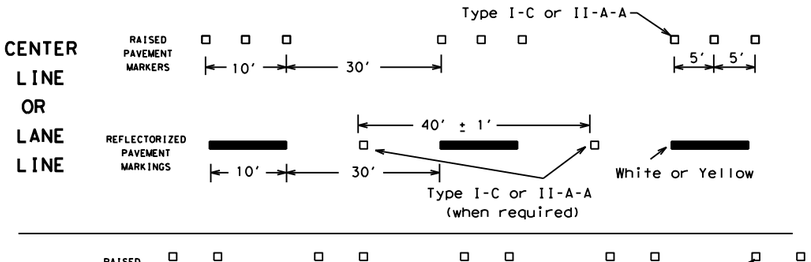
WIDE LINE

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

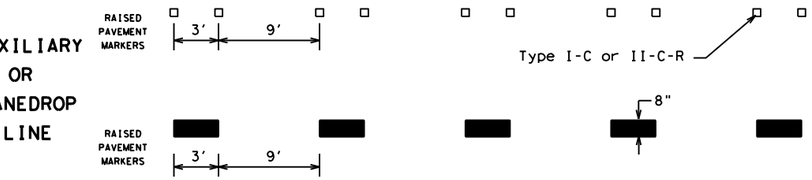


BROKEN LINES

CENTER LINE OR LANE LINE

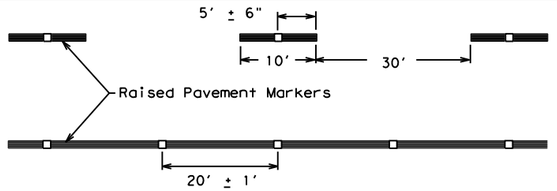


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

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	3236	02	012, etc.	FM3133
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	DAL	COLLIN		36
11-02 8-14				

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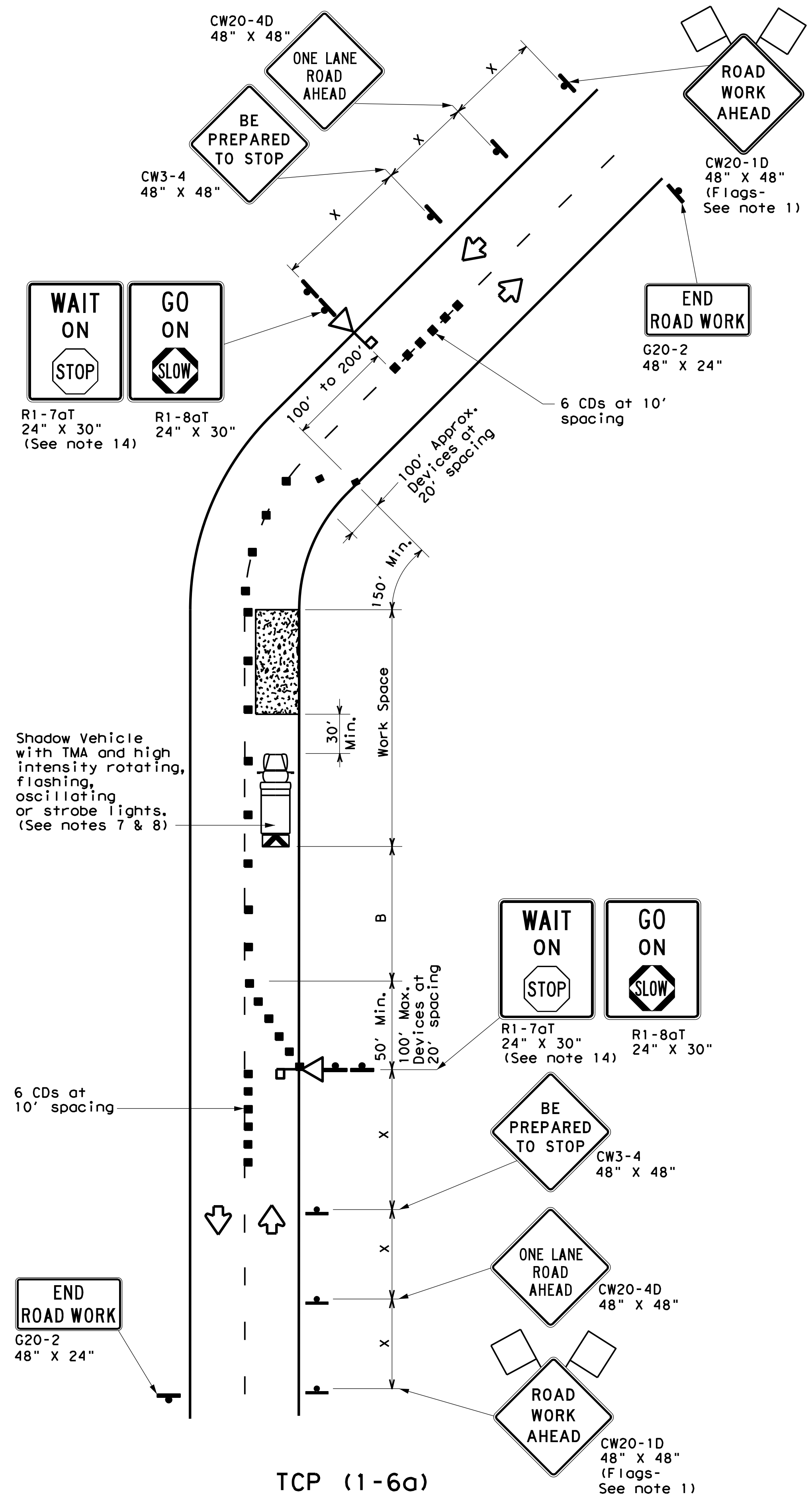
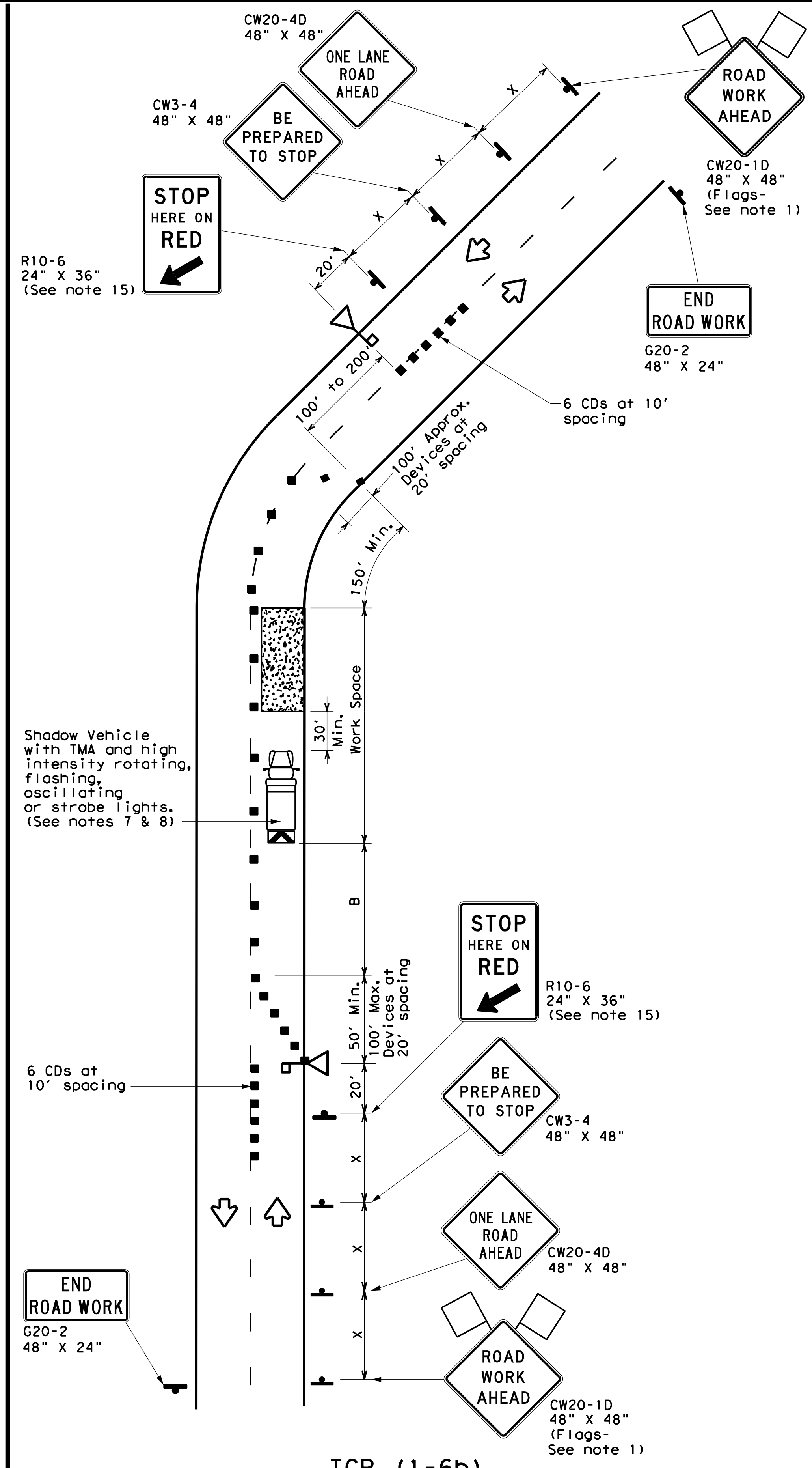


TCP (1-6a)

ONE LANE TWO-WAY CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)

ONE LANE TWO-WAY CONTROL WITH RED/YELLOW LENS AFADs

LEGEND

Symbol	Description	Symbol	Description
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Automated Flagger Assistance Device (AFAD)	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
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. AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
3. Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
4. Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
5. One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
6. When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
7. All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
8. 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.
9. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
10. Flaggers should use two-way radios or other methods of communication to control traffic.
11. Length of work space should be based on the ability of flaggers to communicate.
12. 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 AFAD.
13. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
14. The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
15. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS)

TCP(1-6)-18

FILE: tcp1-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	3236	02	012,etc.	FM3133
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	DAL		COLLIN	37

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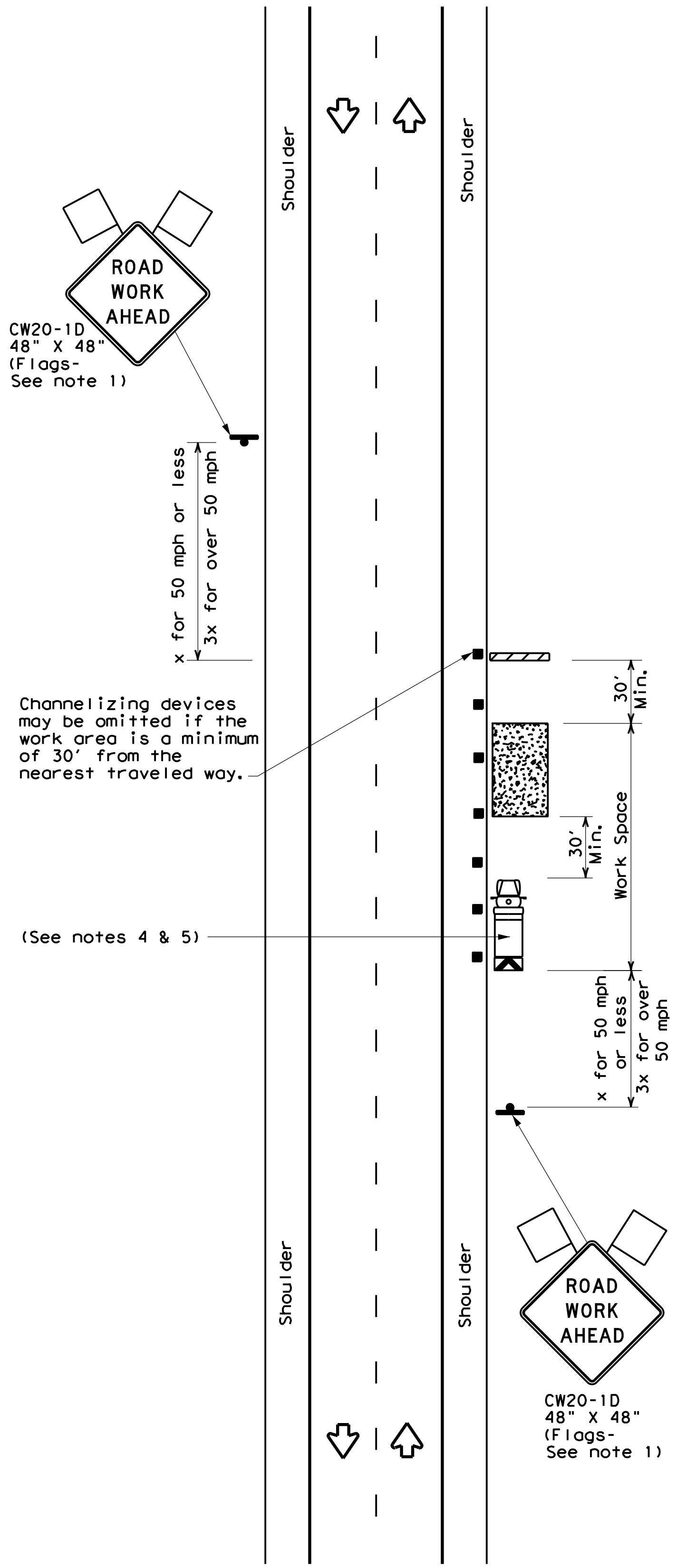
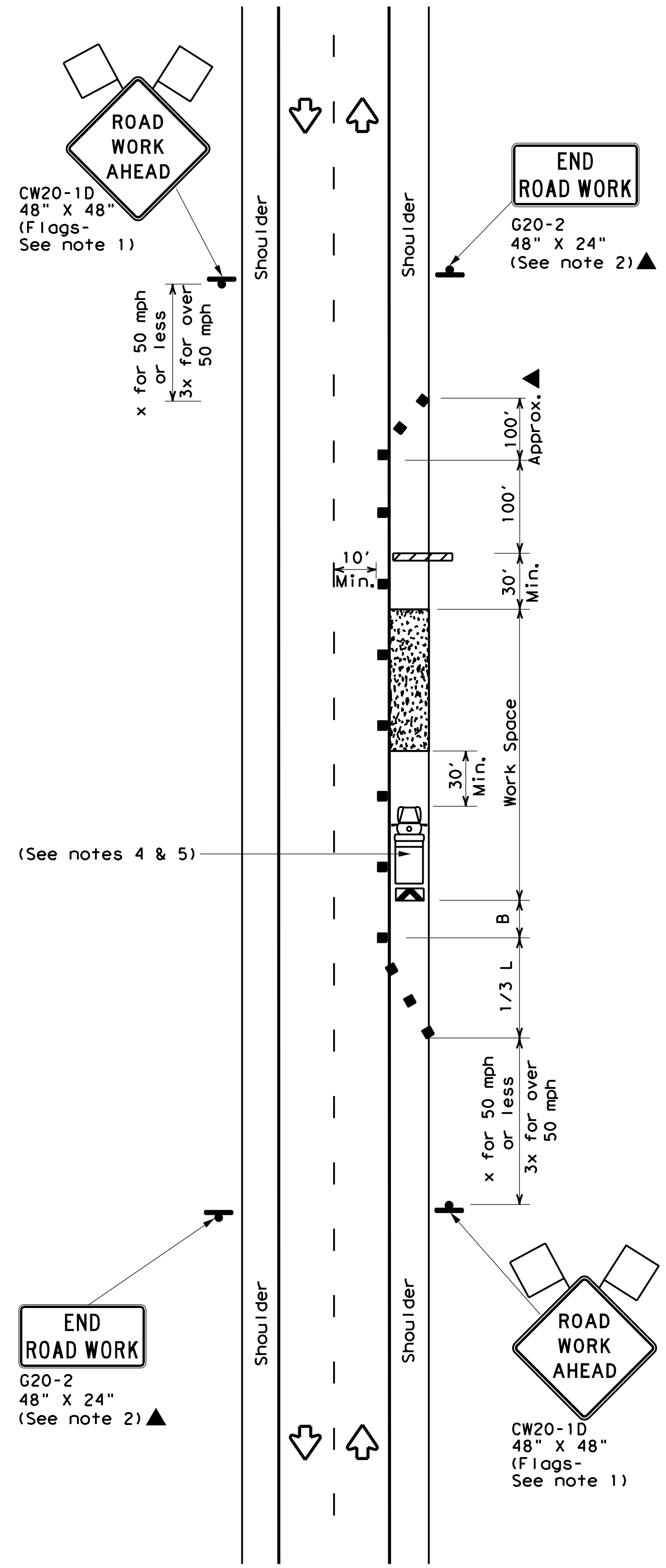


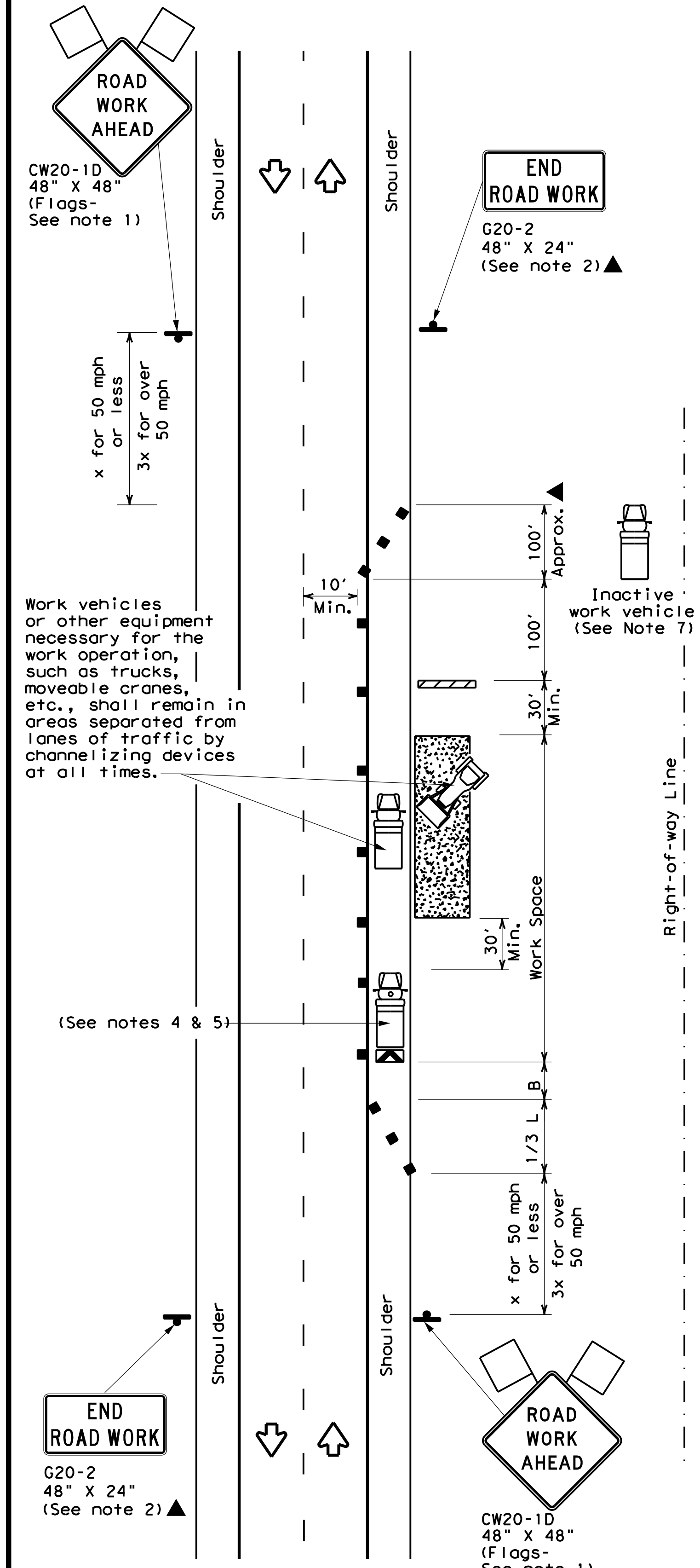
TCP (2-1a)

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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	38

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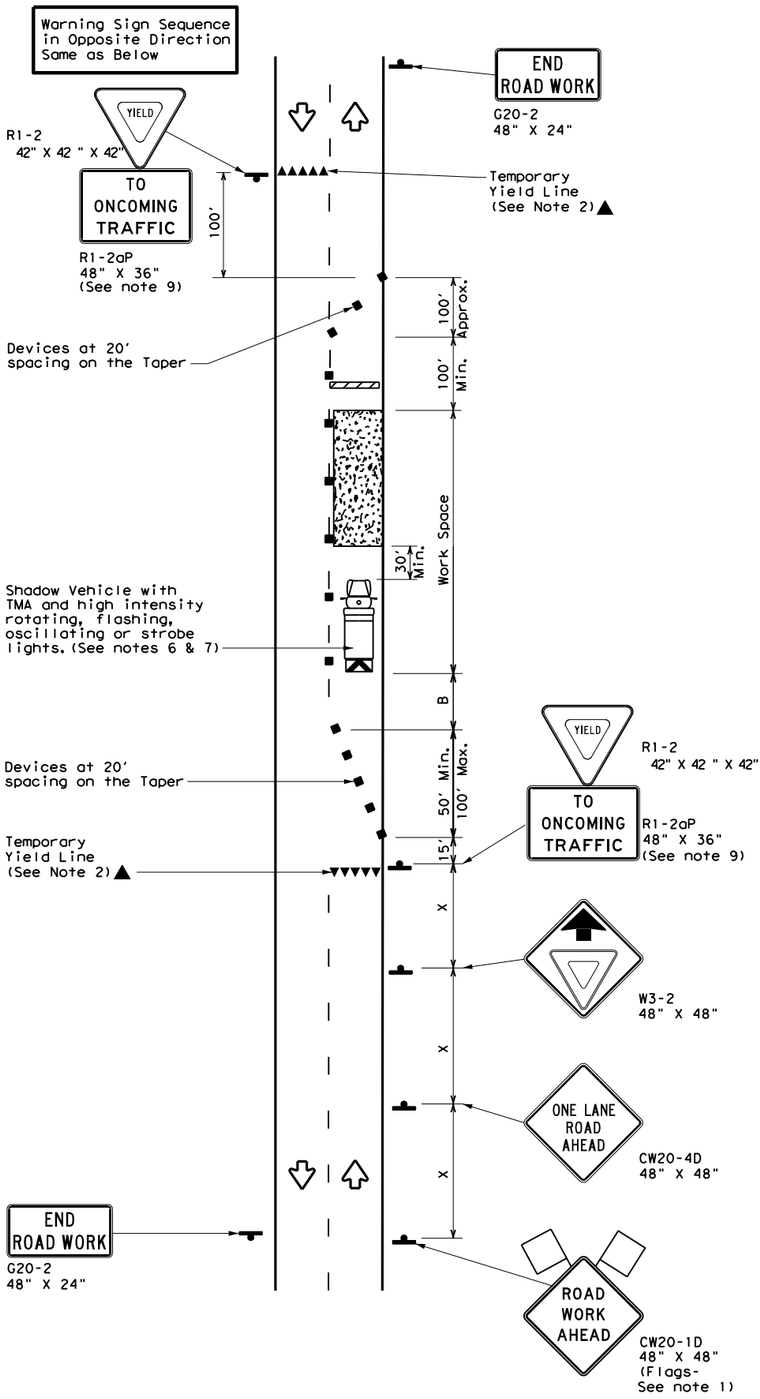
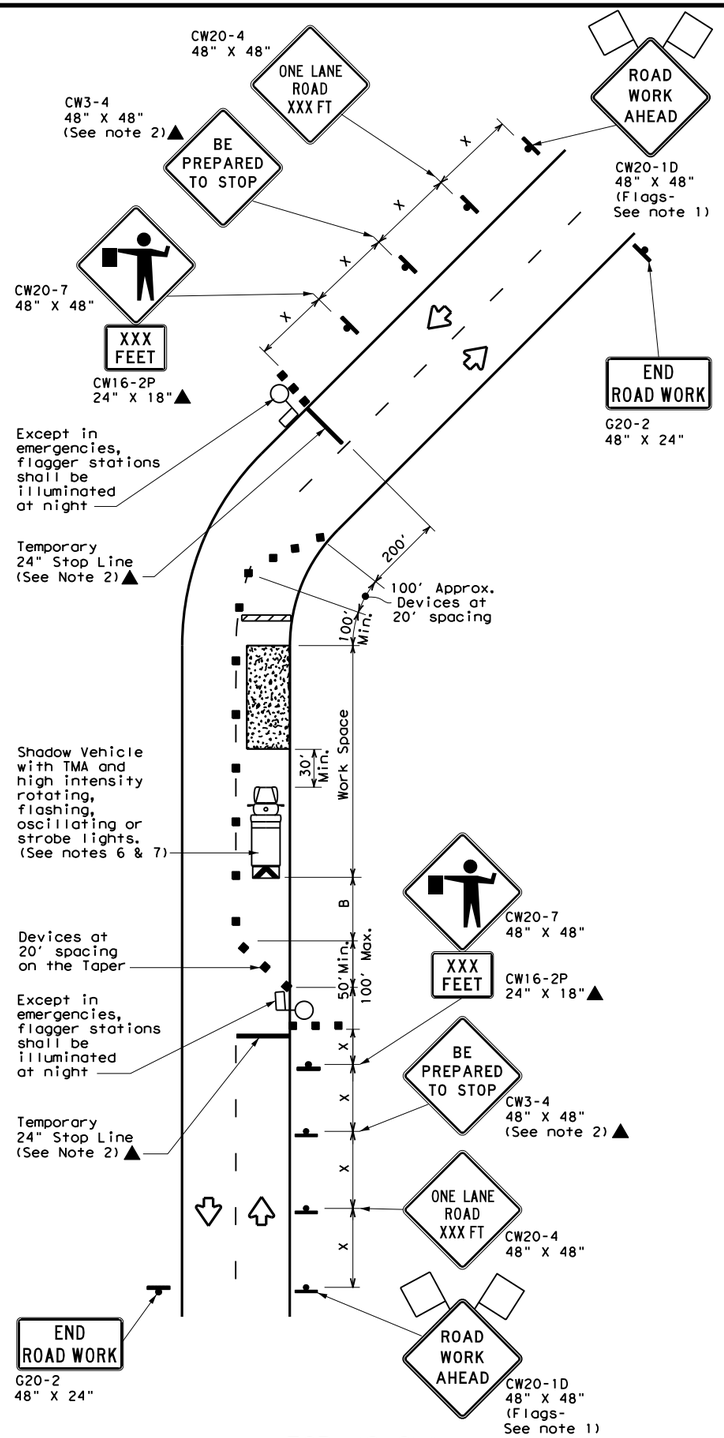


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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
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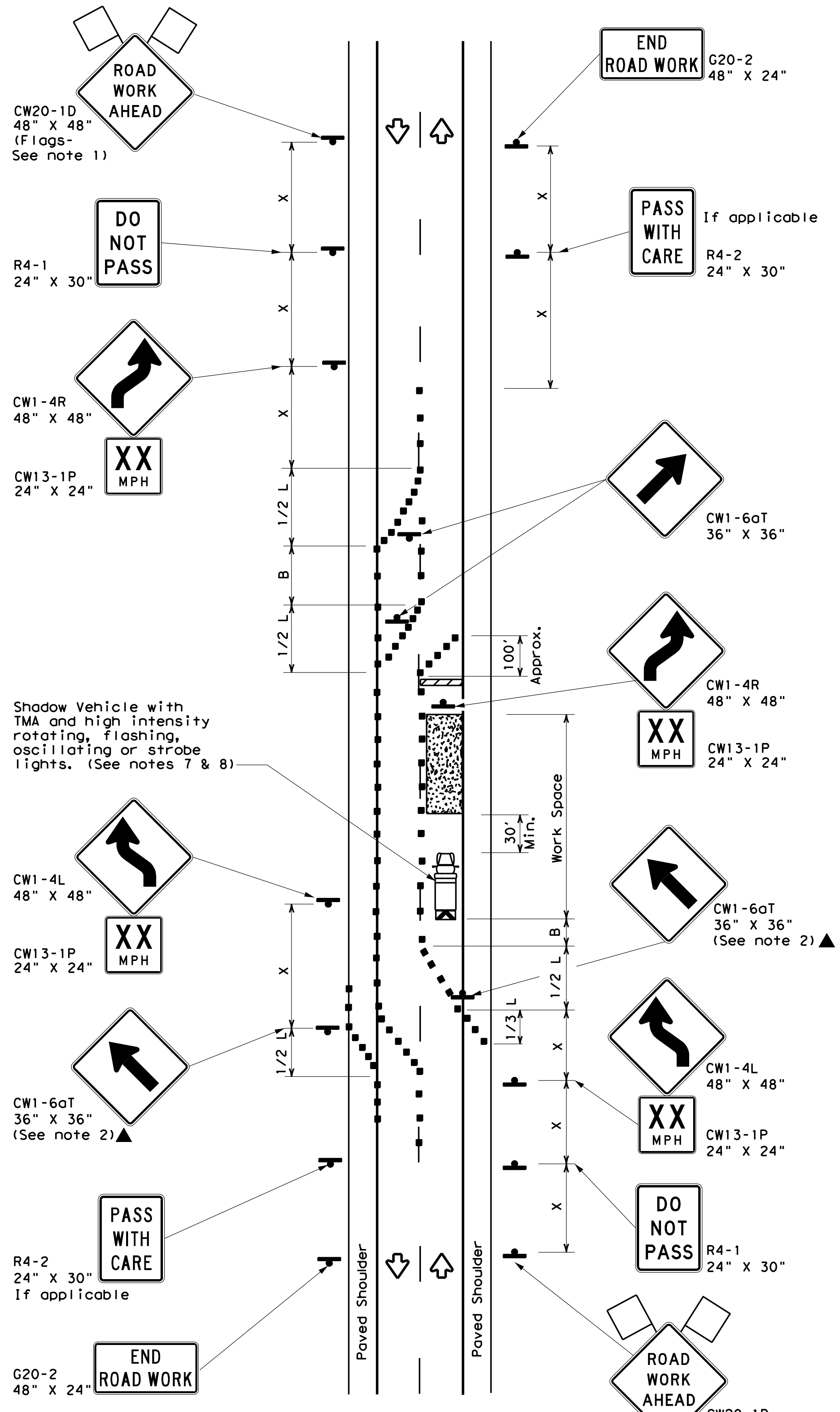
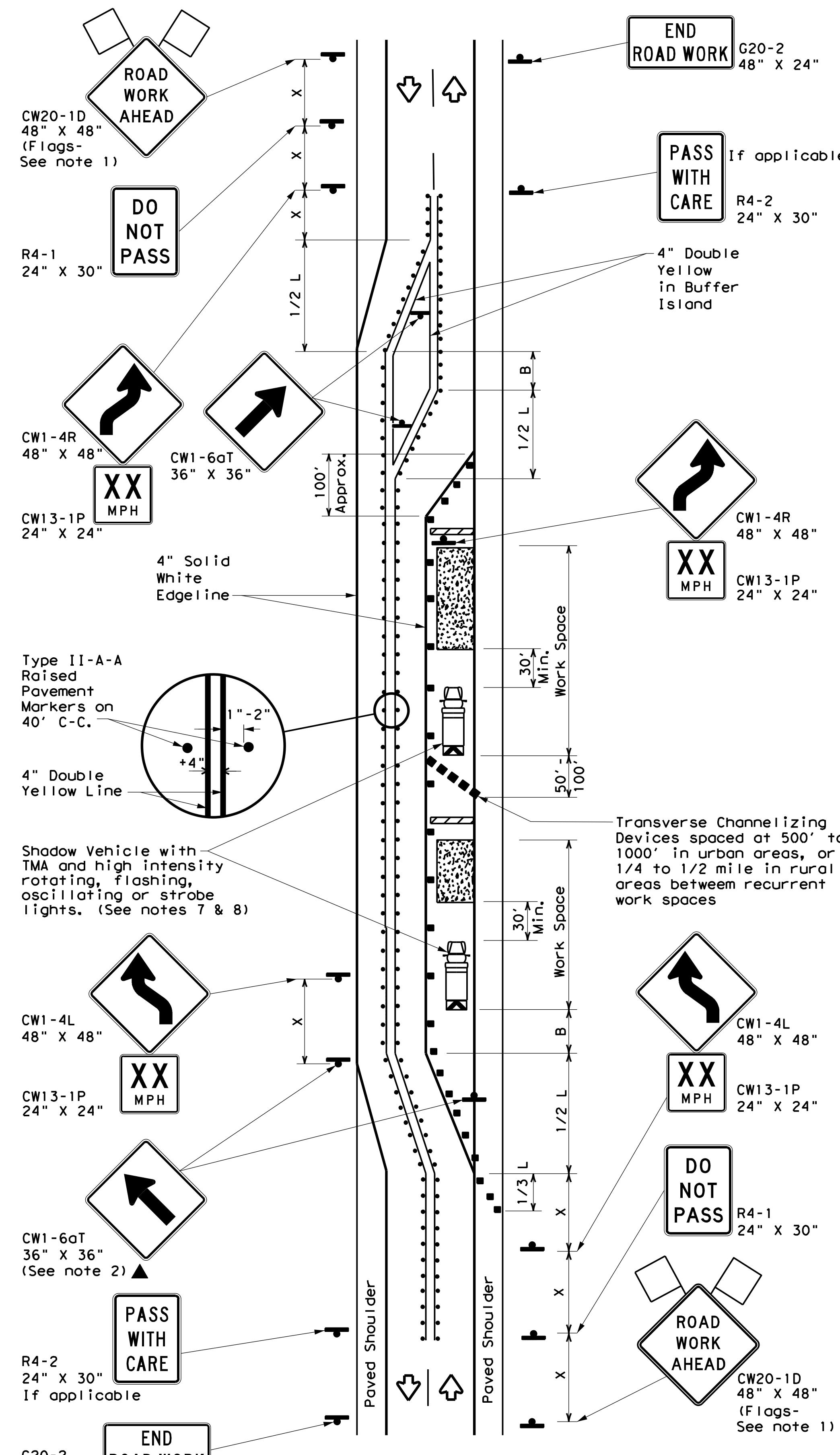
1-97 2-12	DAL	COLLIN		39
4-98 2-18				



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Heavy Work Vehicle	(symbol)	Truck Mounted Attenuator (TMA)
(symbol)	Trailer Mounted Flashing Arrow Board	(symbol)	Raised Pavement Markers Ty II-AA
(symbol)	Sign	(symbol)	Traffic Flow
(symbol)	Flag	(symbol)	Flagger

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

* Conventional Roads Only

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

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03, 1-97 2-12, 4-98 2-18	3236	02	012,etc.	FM3133
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163

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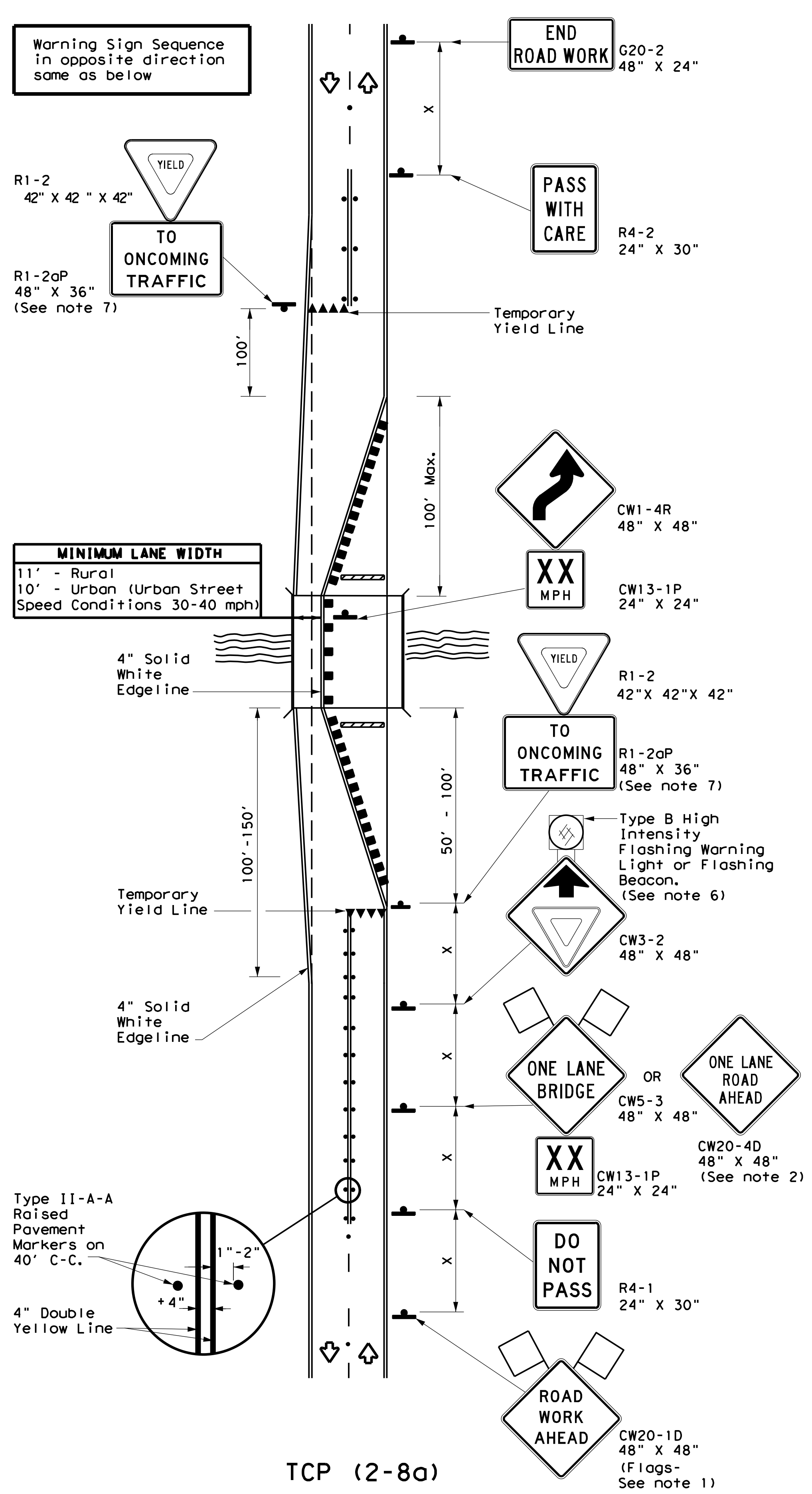
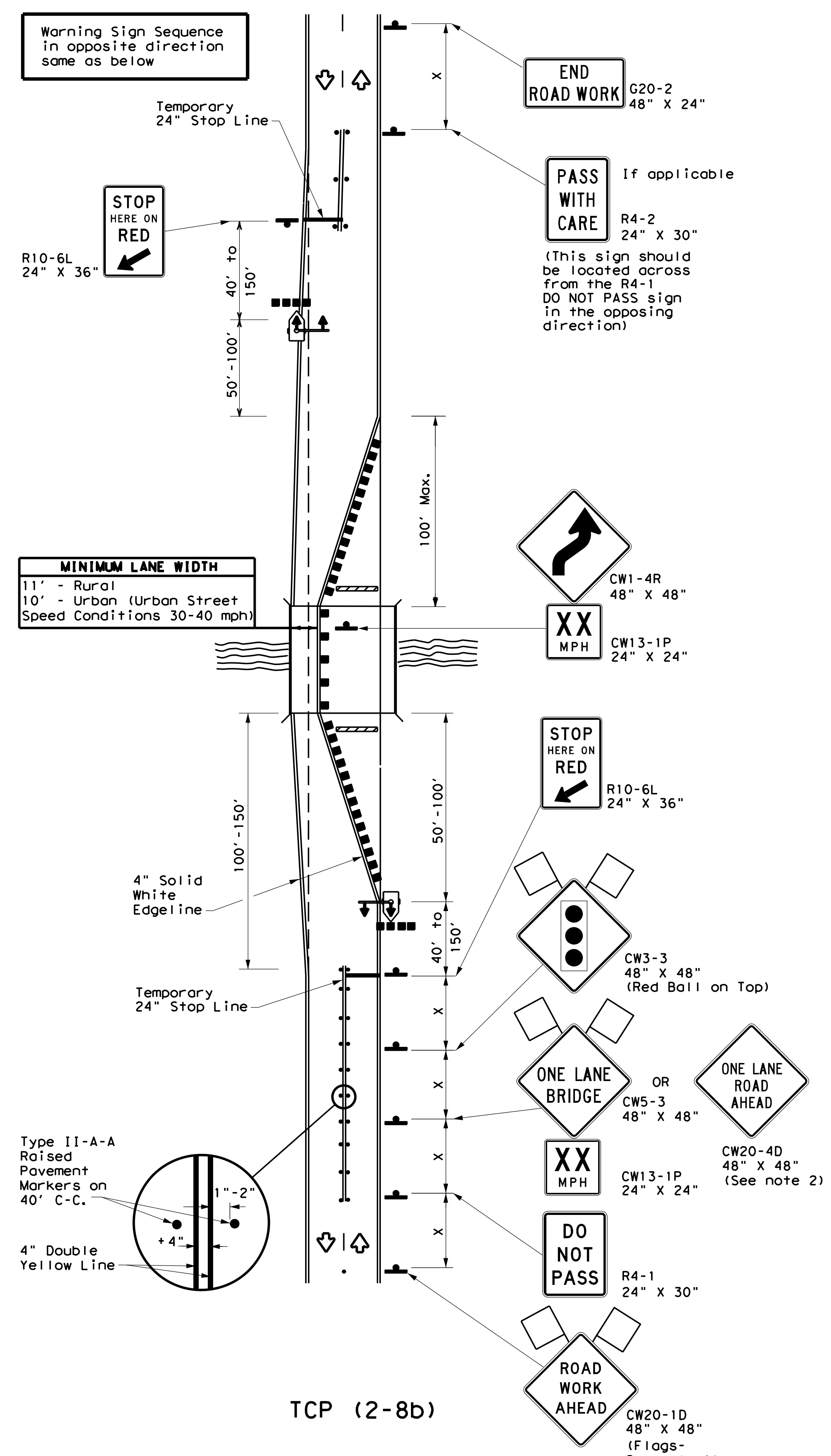


TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND

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

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

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (2-8a)

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

TCP (2-8b)

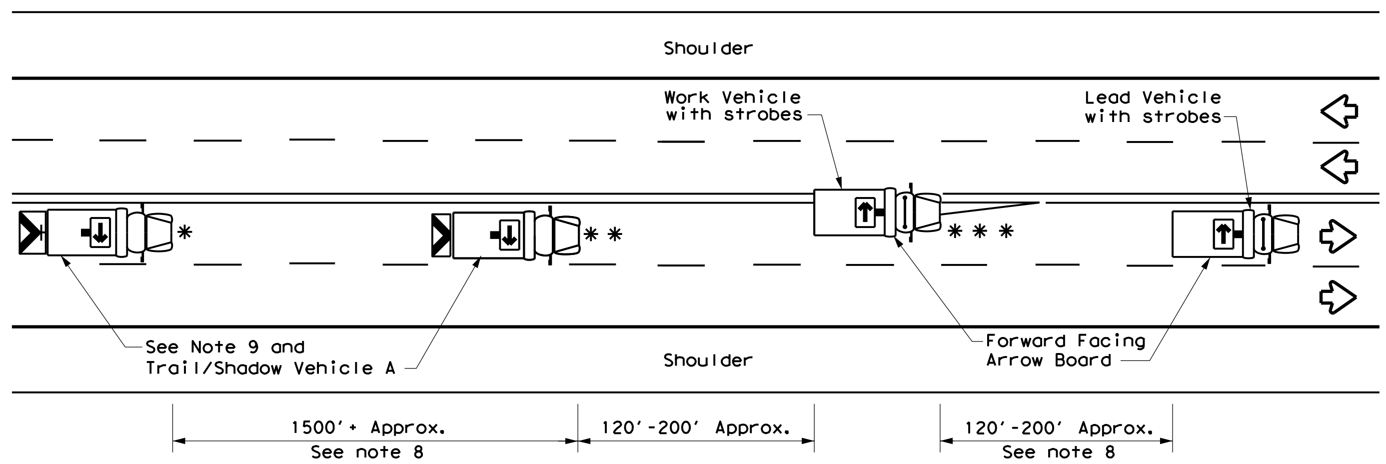
8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation — Traffic Operations Division Standard

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

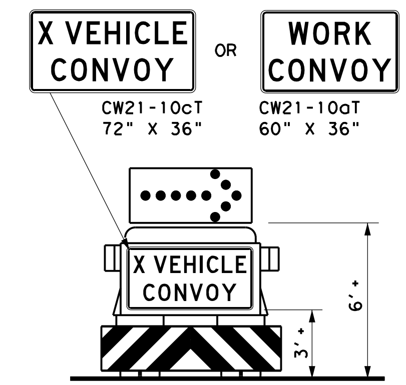
TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT 3236	SECT 02	JOB 012,etc.	HIGHWAY FM3133
REVISIONS 8-95 3-03, 1-97 2-12, 4-98 2-18	DIST DAL		COUNTY COLLIN	SHEET NO. 41



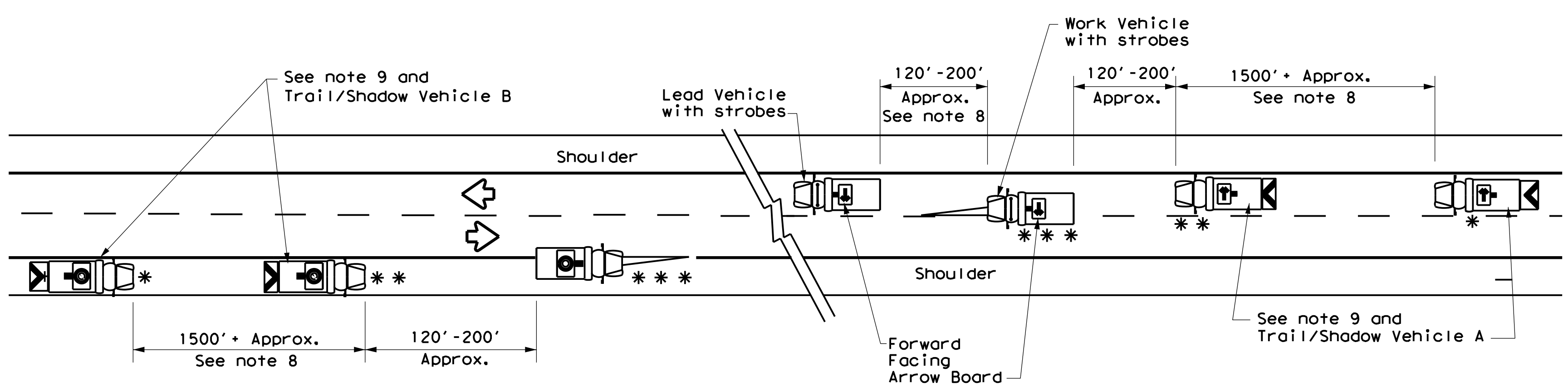
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



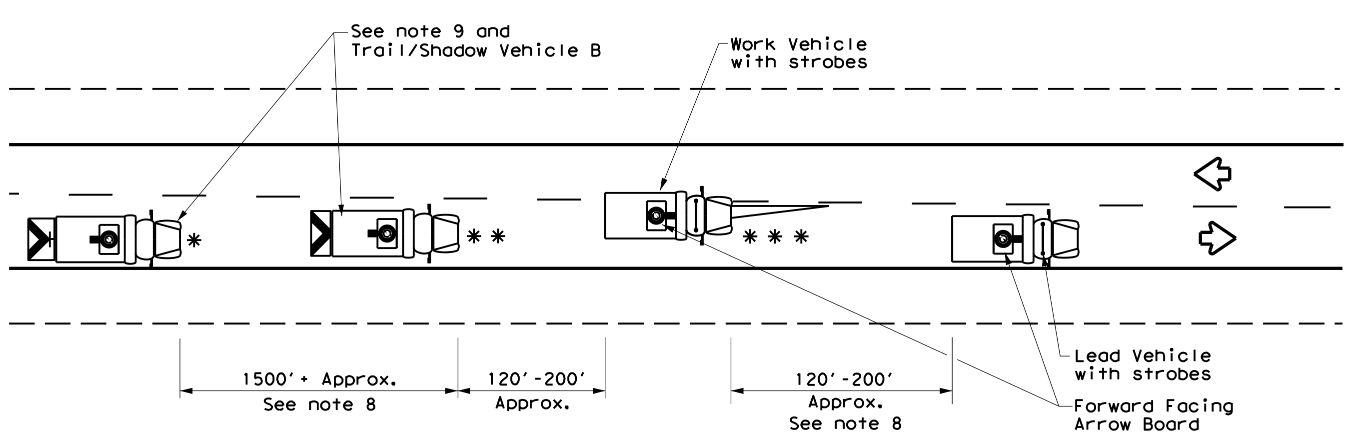
TRAIL/SHADOW VEHICLE A

with RIGHT Directional
display Flashing Arrow Board



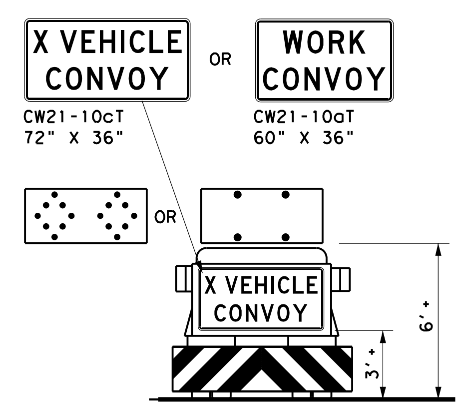
TCP (3-1b)

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

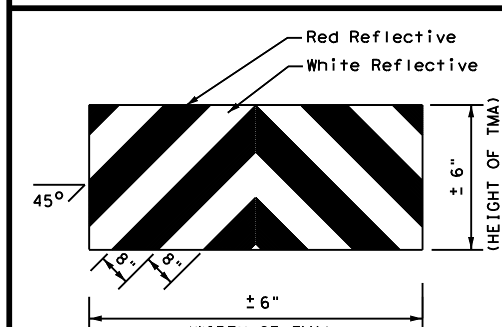
Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	3236	02	012,etc.	FM3133
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175

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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	
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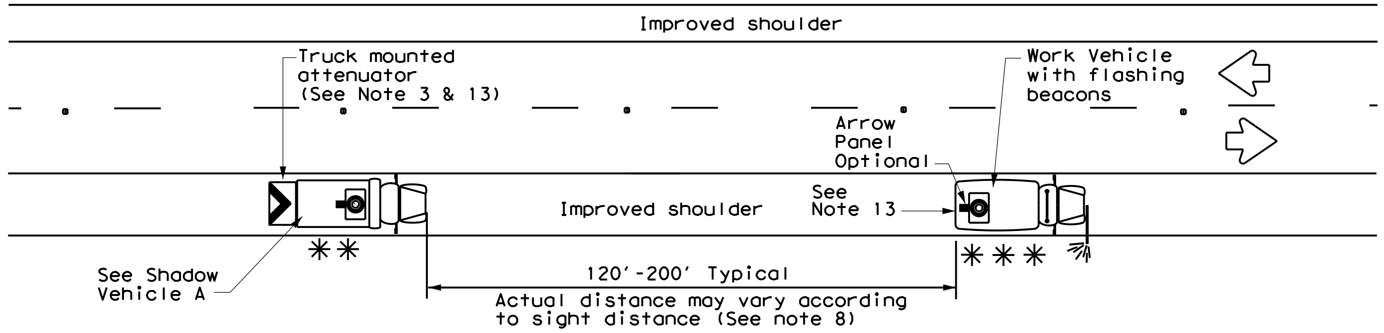
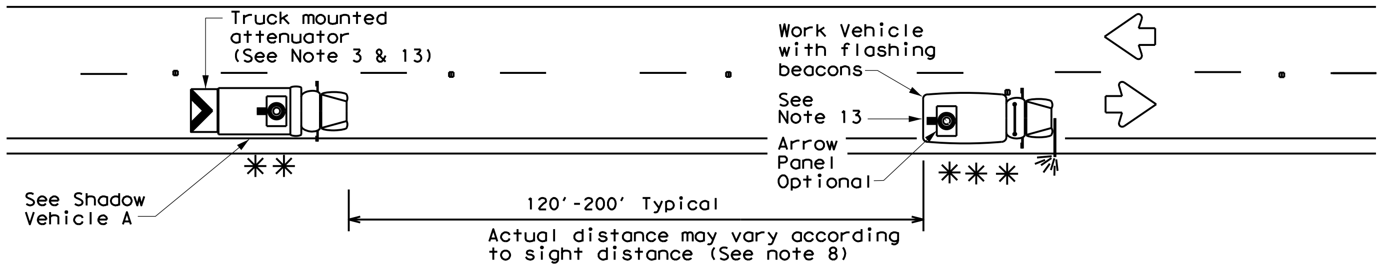
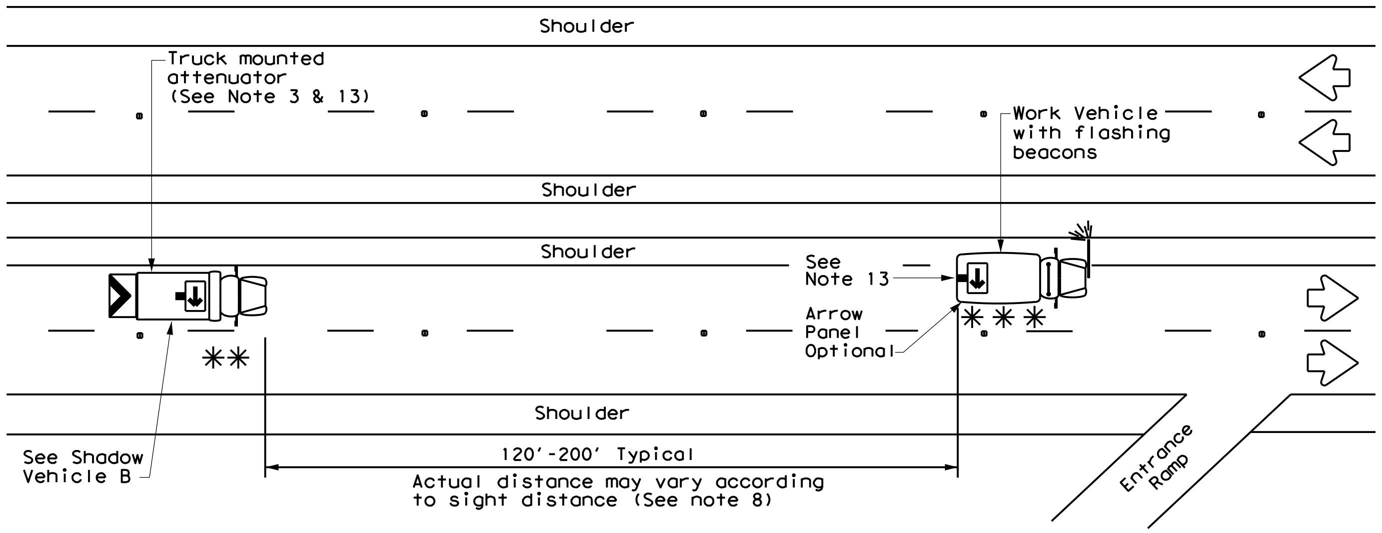


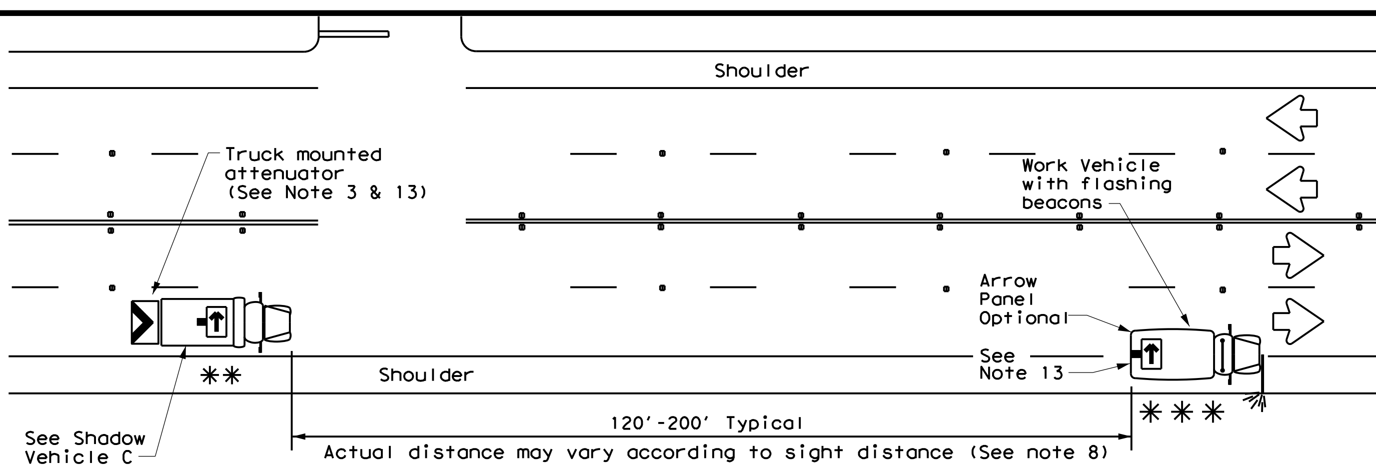
TWO LANE HIGHWAY WITH PAVED SHOULDERS MINIMUM 8'



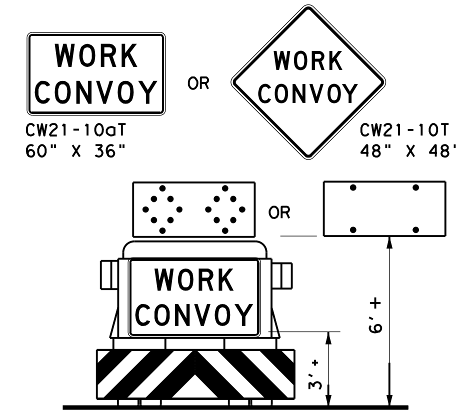
TWO LANE HIGHWAY WITH NO SHOULDER OR NARROW SHOULDER



MULTILANE HIGHWAY

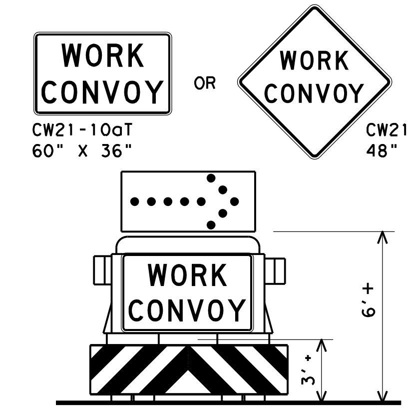


MULTILANE HIGHWAY



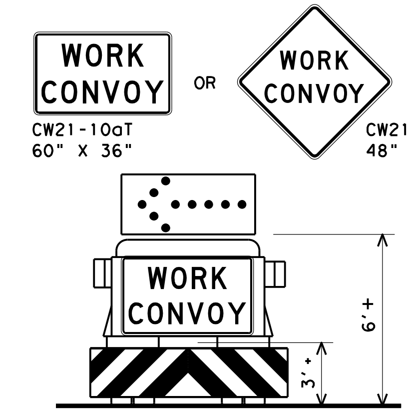
SHADOW VEHICLE A

with Flashing Arrow Board in Caution Mode



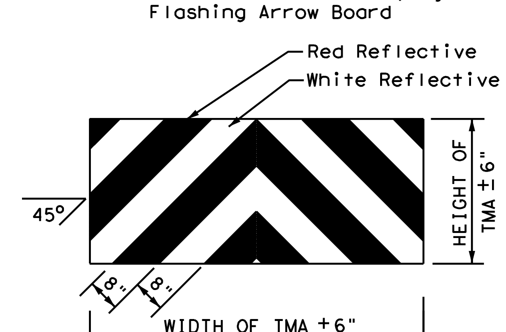
TYPICAL SHADOW VEHICLE B

with RIGHT Directional display Flashing Arrow Board



TYPICAL SHADOW VEHICLE C

with LEFT Directional display Flashing Arrow Board



STRIPING FOR TMA

LEGEND

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

TYPICAL USAGE

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

GENERAL NOTES

1. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
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 is required.
4. Striping on the back panel of all TMAs shall be 8" red reflective sheeting with white background, placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS-8300, TYPE A.
5. Flashing Arrow Panels shall be Type B or Type C as per BC Standards. The panel operation shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When the work convoy must change lanes, the Shadow Vehicle should change lanes first to protect the Work Vehicle.
8. Spacing between Shadow and Work Vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the Shadow Vehicle in time to slow down and/or change lanes as they approach the Work Convoy.
9. Use of an arrow panel on the Work Vehicle is optional except as provided in note 13, but may be required by the Engineer. If an arrow panel is not used, dual flashing beacons, mounted as high and as widely separated as practicable at the rear of the Work Vehicle shall be required.
10. On two-lane roadways, the Work and Shadow Vehicles should pull over periodically to allow motor vehicle traffic to pass.
11. Work and Shadow Vehicles should stay on the shoulder of highways having 8' or wider shoulders when possible.
12. A Trail Vehicle may be added to the operation when approved by the Engineer. See TCP(3) series standards.
13. The shadow vehicle may be omitted on conventional roadways when a TMA or TA and arrow panel is mounted to the herbicide vehicle. A separate shadow vehicle will be required on expressways and Freeways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS HERBICIDE TRUCK OPERATIONS

TCP(3-5)-18

FILE: tcp3-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2015	CONT	SECT	JOB	HIGHWAY
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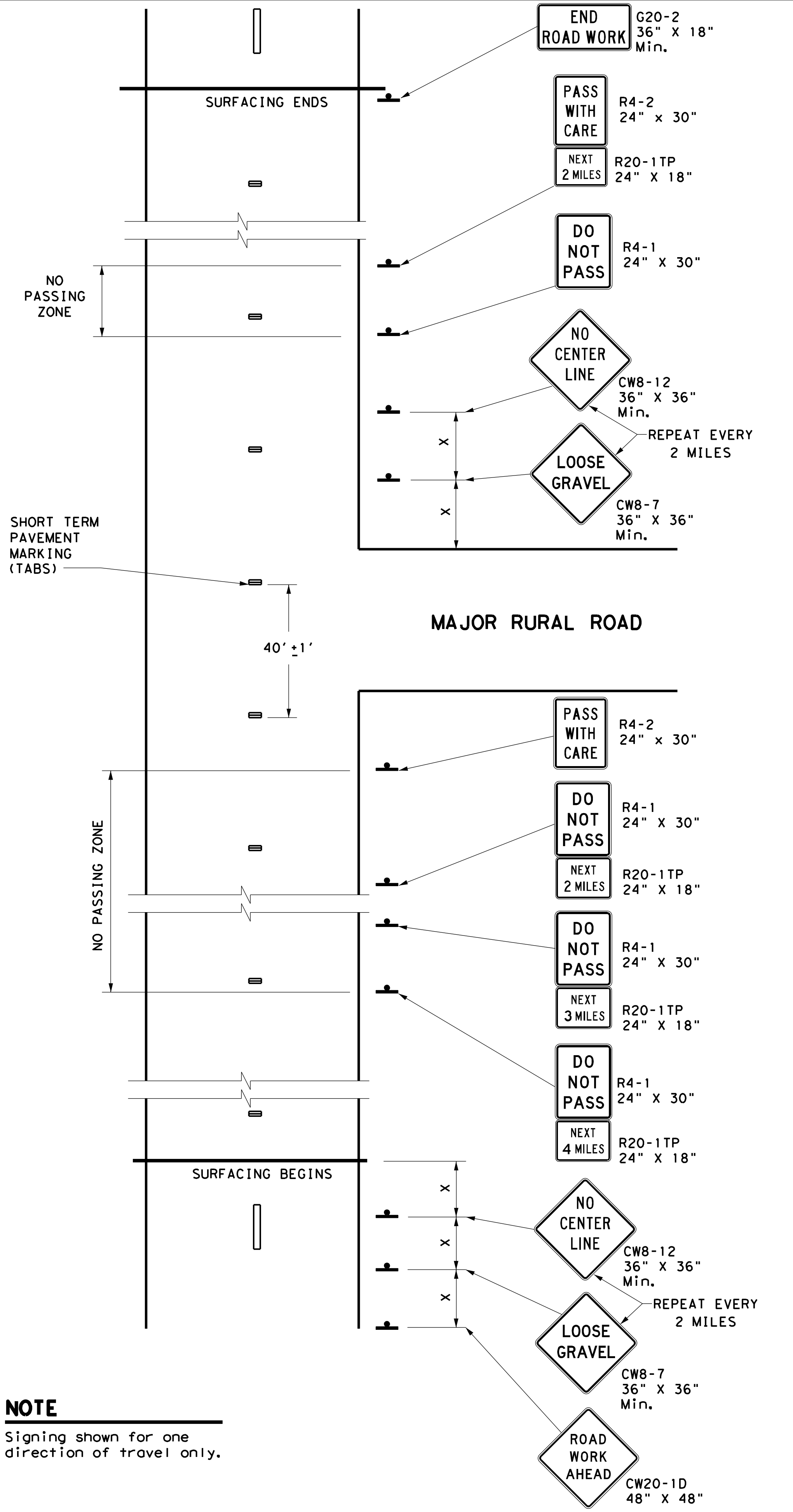
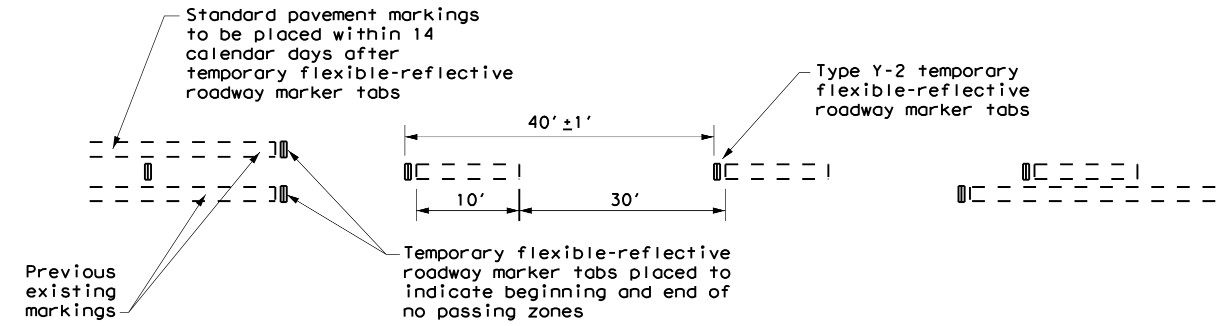


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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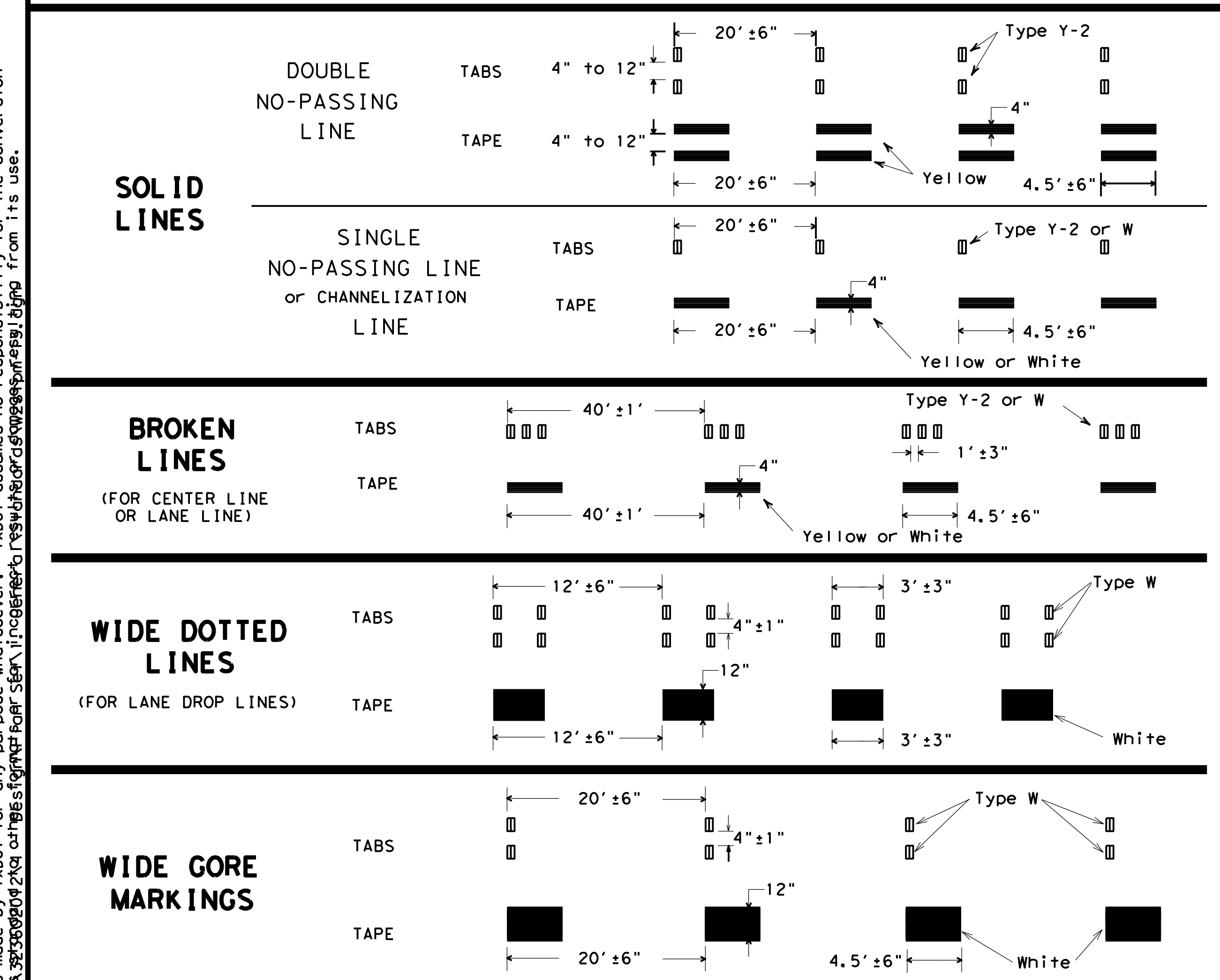
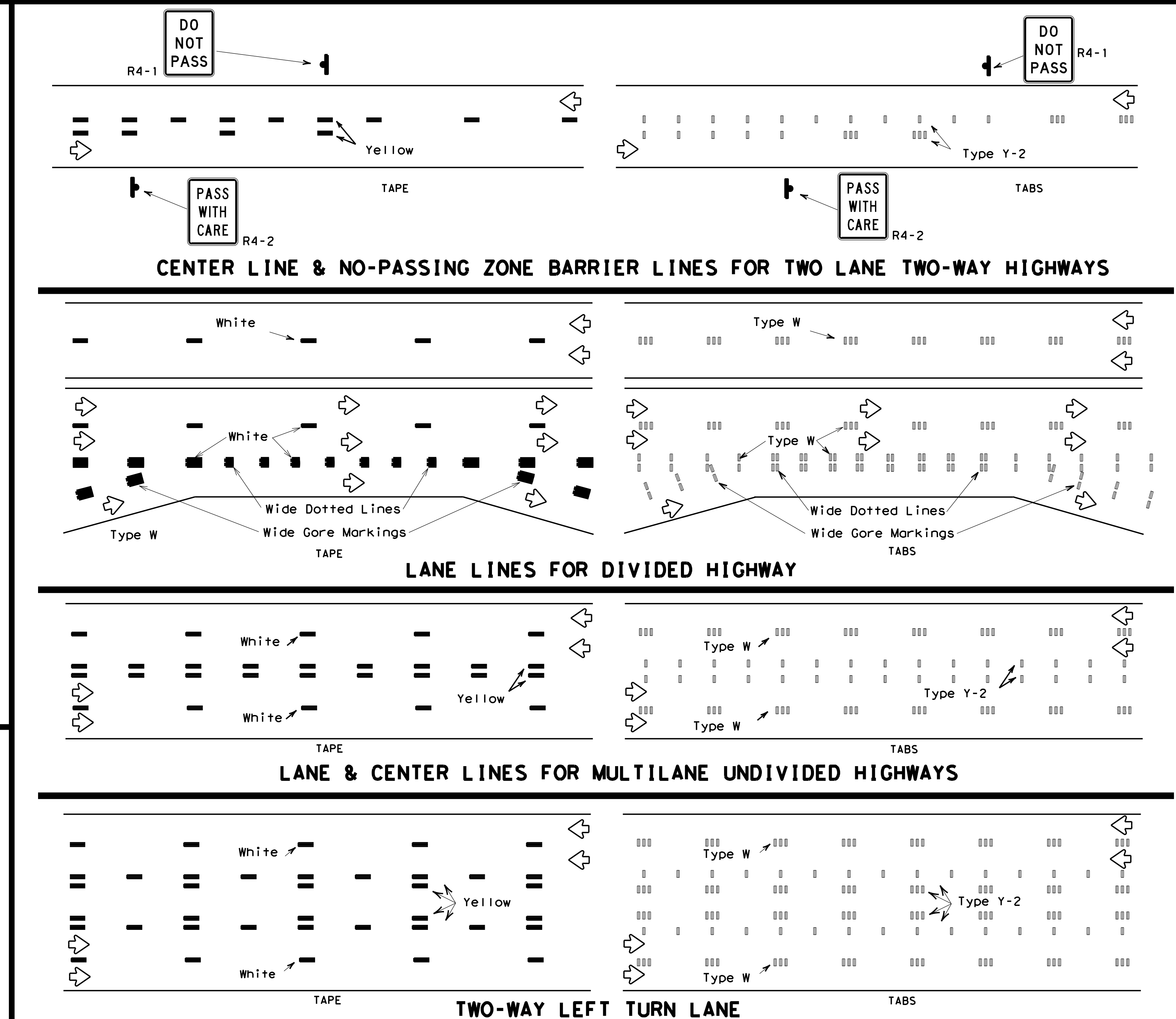
4-92 4-98	DIST		COUNTY	SHEET NO.
1-97 7-13	DAL		COLLIN	45

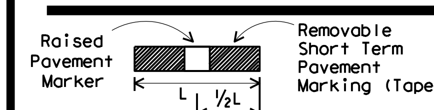
210

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS





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.

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.

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

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WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
1-97 3-03 7-13	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	46

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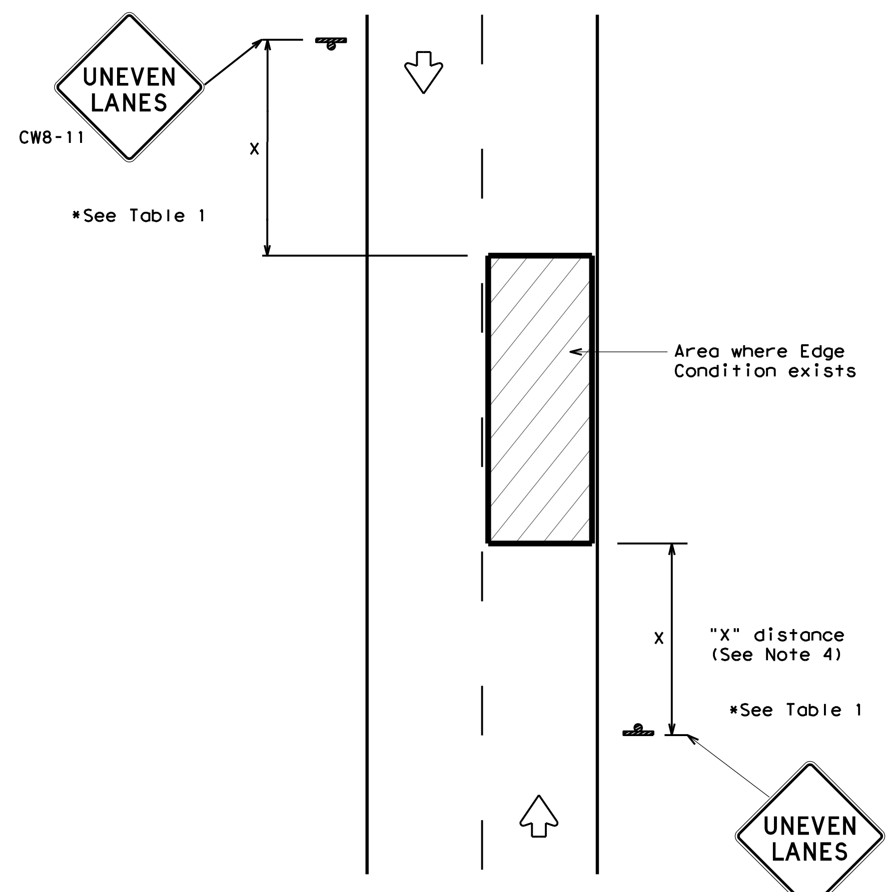
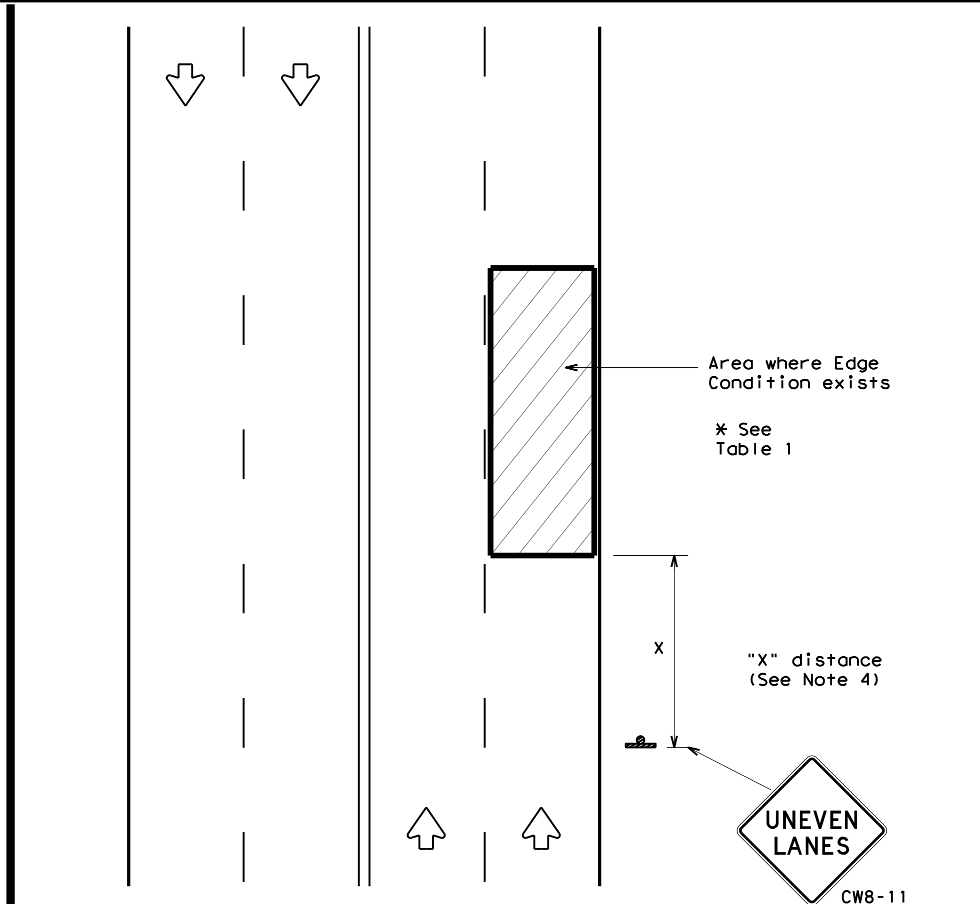
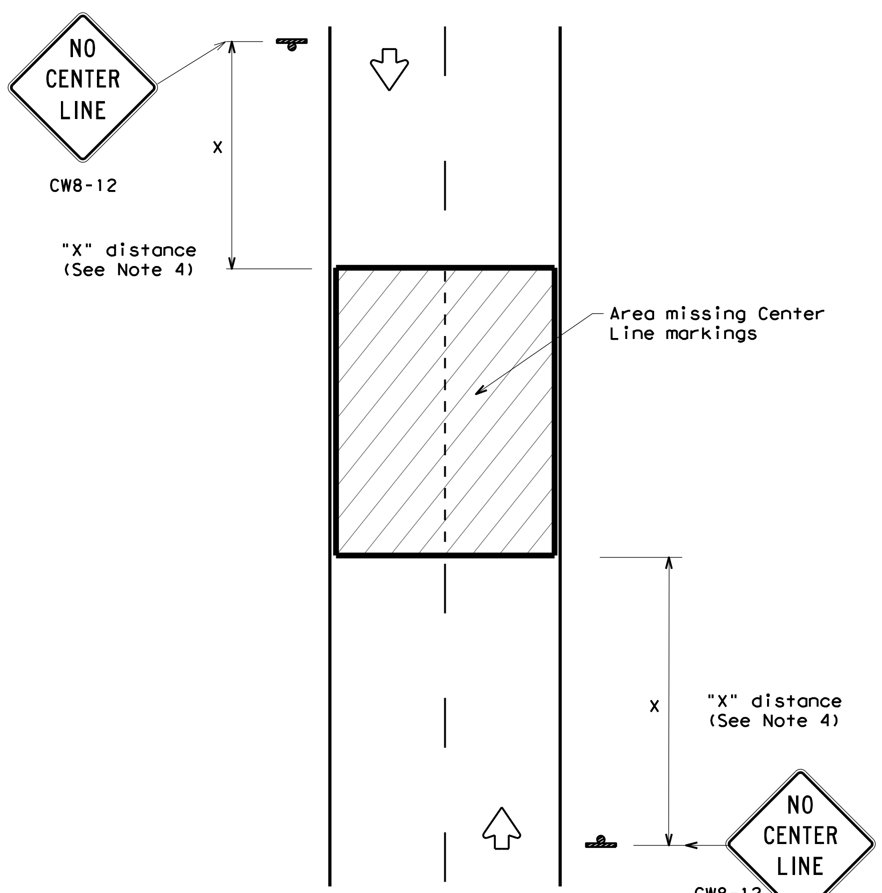


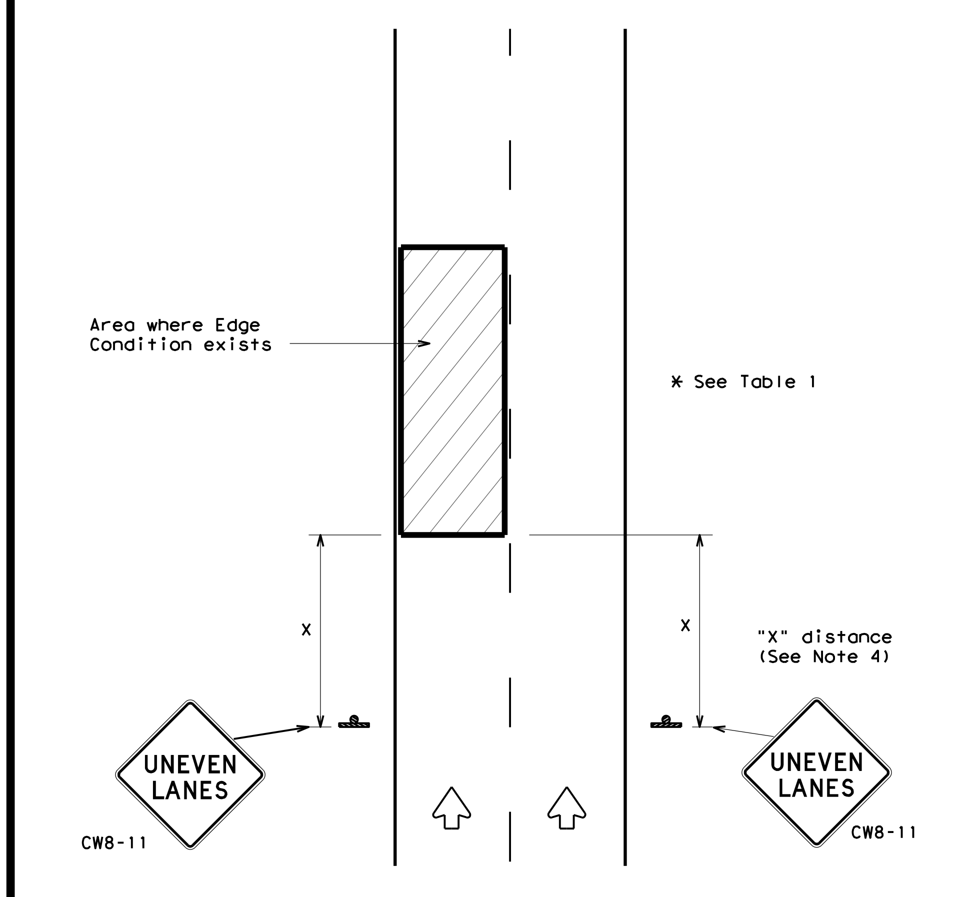
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

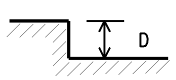
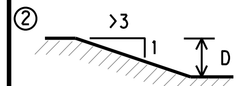
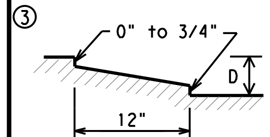
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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"

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SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT 3236	SECT 02	JOB 012,etc.	HIGHWAY FM3133
REVISIONS 8-95 2-98 7-13 1-97 3-03	DIST DAL		COUNTY COLLIN	SHEET NO. 47

112

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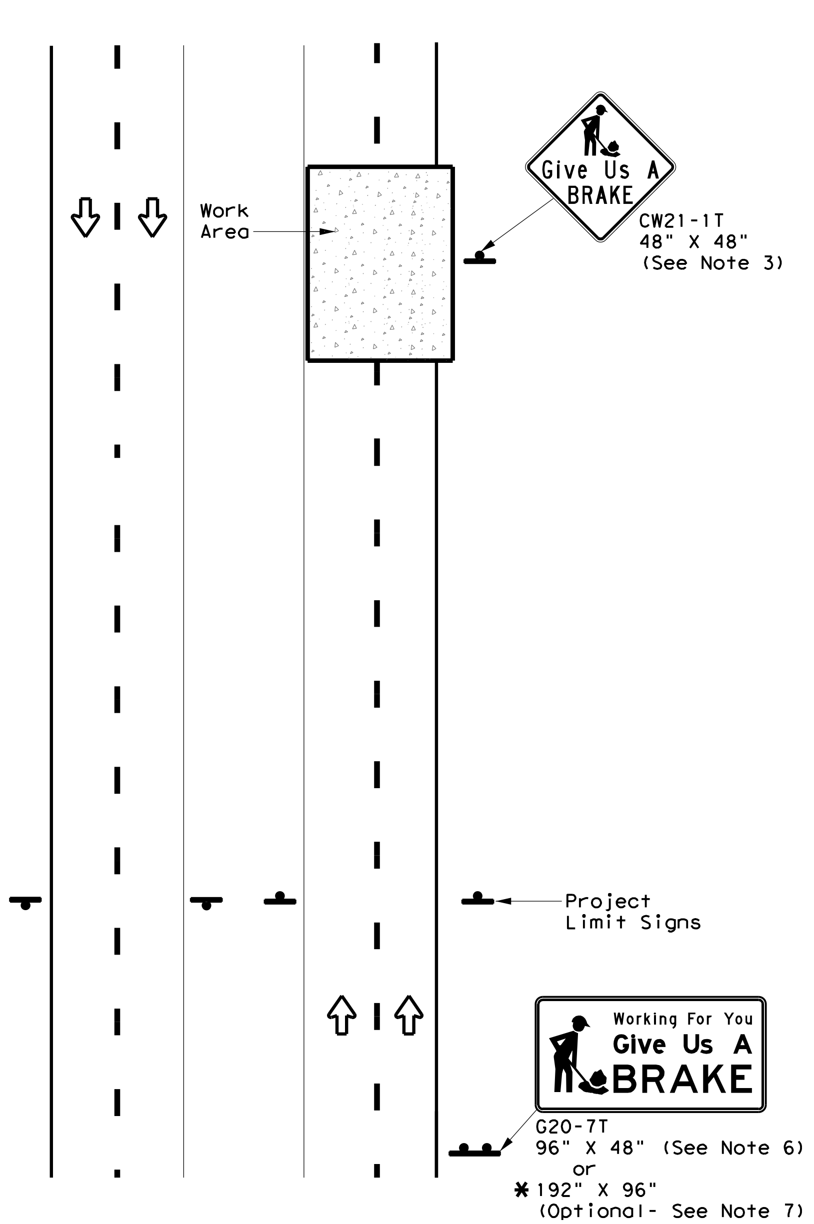
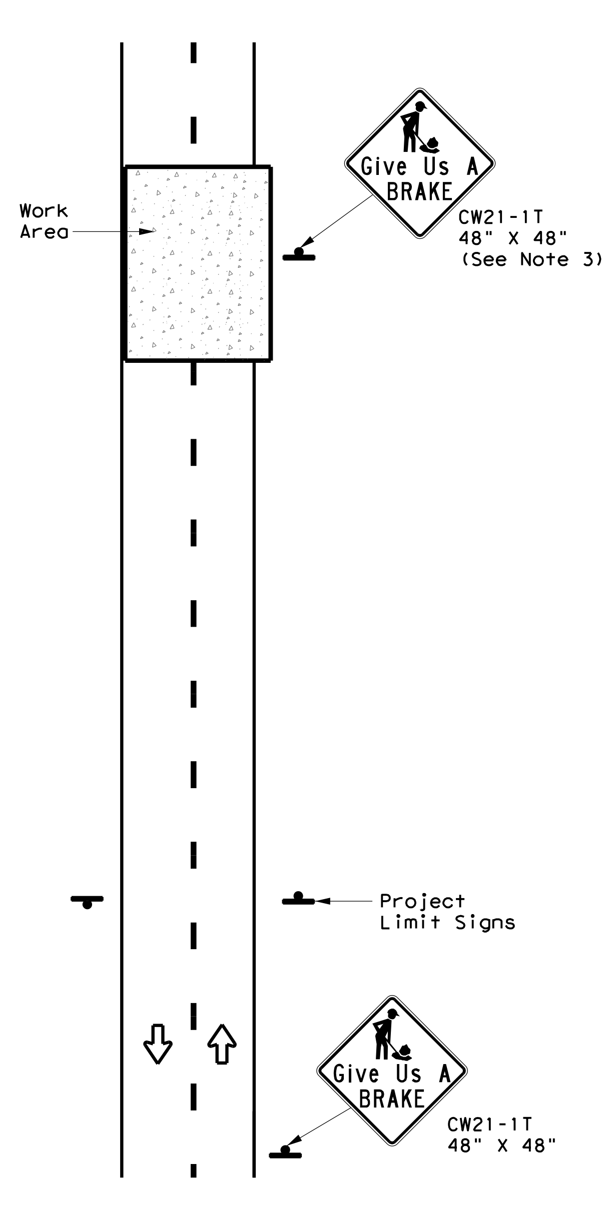


DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

LEGEND	
(symbol)	Sign
(symbol)	Large Sign
(arrow)	Traffic Flow

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

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   - Item 636 - Aluminum Signs
   - Item 647 - Large Roadside Sign Supports and Assemblies.
   - Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation
Traffic Operations Division Standard

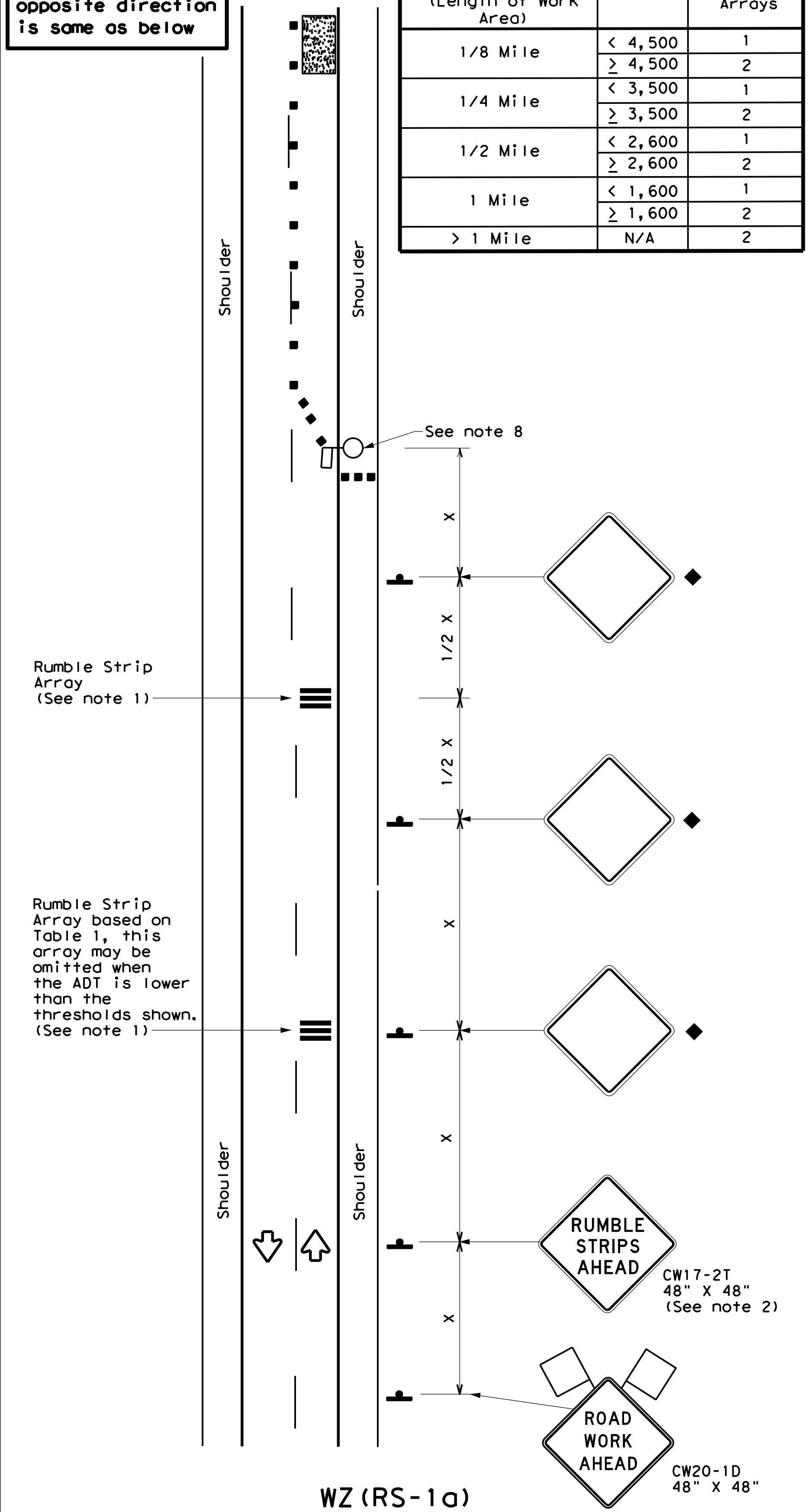
WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012, etc.	FM3133
6-96 5-98 7-13	DIST		COUNTY	SHEET NO.
8-96 3-03	DAL		COLLIN	48

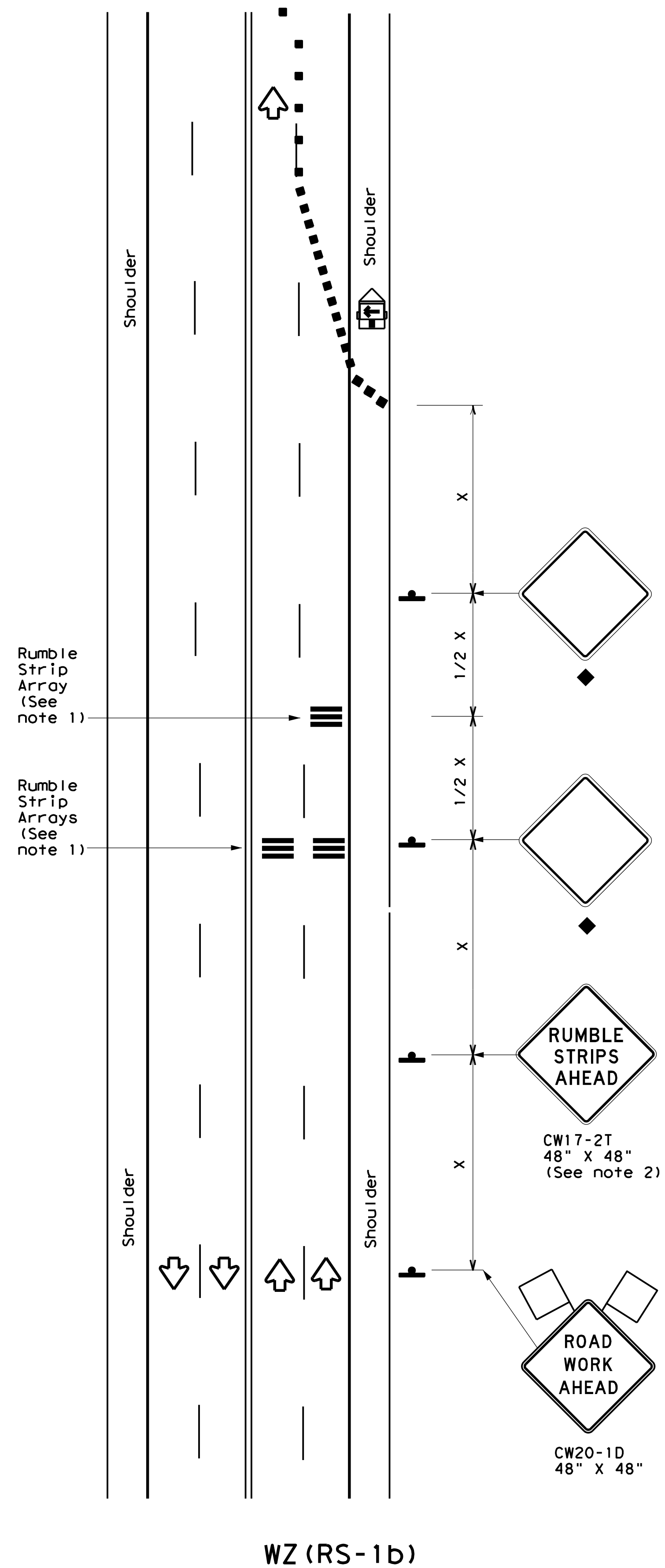
Warning sign and rumble strip sequence in opposite direction is same as below

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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'

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TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 4-16	3236	02	012, etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		49

118

DATE:
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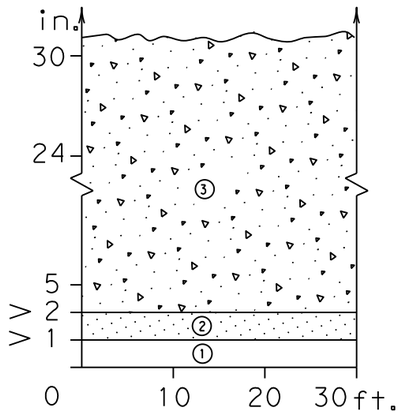
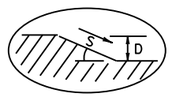
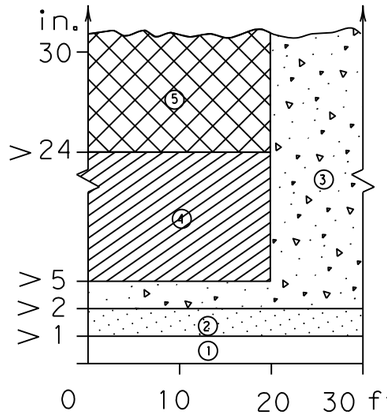
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

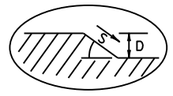


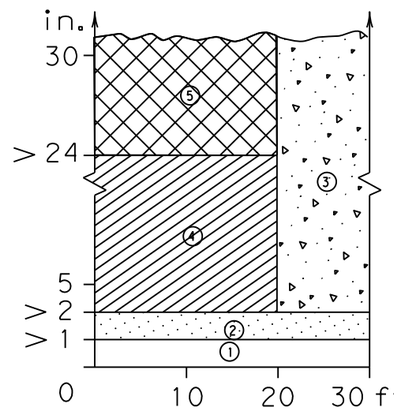
Edge Condition I
S = (3:1) (or flatter)



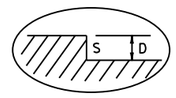


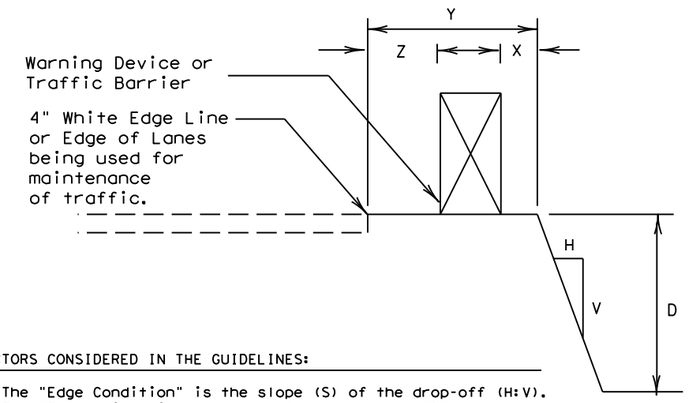
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

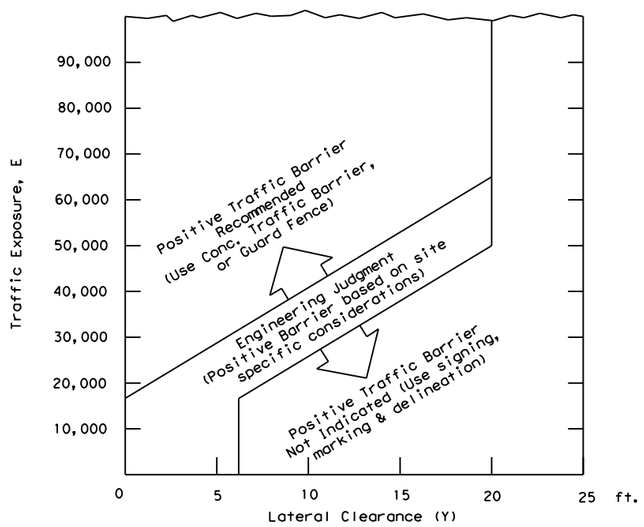
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

Date 11/4/2020

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
03-01	CONT	SECT	JOB	HIGHWAY
08-01 correct typos	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		50

```
Beginning chain FM3133 A description
==============================================================================

Point 376               X     2,591,308.02 Y     7,186,160.09 Sta       0+00.00

Course from 376 to 377 N 0° 10' 01.88" W Dist 1,682.67

Point 377               X     2,591,303.11 Y     7,187,842.75 Sta      16+82.67

Course from 377 to PC FM3133 A1 N 2° 35' 04.78" W Dist 1,258.25

                                   Curve Data
                                 *-----------*
Curve FM3133 A1
P.I.  Station              30+95.30 X        2,591,239.43  Y        7,189,253.33
Delta         =        2° 18' 00.00" (RT)
Degree        =        1° 00' 00.00"
Tangent       =              115.02
Length        =              230.00
Radius        =            5,729.58
External      =                2.06
Long Chord    =              307.41
Mid. Ord.     =                2.06
P.C.  Station              29+17.58  X        2,591,246.36  Y        7,189,099.73
P.T.  Station              32+33.36  X        2,591,240.75  Y        7,189,407.08
C.C.                                 X        2,596,970.12  Y        7,189,358.11
Back          = N   2° 35' 04.78"  W
Ahead         = N   0° 29' 23.24"  E
Chord Bear    = N   1° 02' 50.77"  W

Course from PT FM3133 A1 to PC FM3133 A2 N 0° 29' 23.24" E Dist 5,871.39

                                   Curve Data
                                 *-----------*
Curve FM3133 A2
P.I.  Station              92+26.03  X        2,591,291.81  Y        7,195,380.01
Delta         =        2° 00' 00.00" (RT)
Degree        =        1° 00' 00.00"
Tangent       =              100.01
Length        =              200.00
Radius        =            5,729.58
External      =                0.90
Long Chord    =              203.46
Mid. Ord.     =                0.90
P.C.  Station              91+23.67  X        2,591,290.94  Y        7,195,278.26
P.T.  Station              93+28.39  X        2,591,296.29  Y        7,195,481.66
C.C.                                 X        2,597,020.28  Y        7,195,229.28
Back          = N   0° 29' 23.24"  E
Ahead         = N   2° 31' 28.37"  E
Chord Bear    = N   1° 30' 25.80"  E

Course from PT FM3133 A2 to 378 N 2° 31' 28.37" E Dist 1,362.62

Point 378               X     2,591,356.31 Y     7,196,842.96 Sta     106+85.86

Course from 378 to PC FM3133 A3 N 2° 03' 42.01" E Dist 240.12

                                   Curve Data
                                 *-----------*
Curve FM3133 A3
P.I.  Station             115+41.52  X        2,591,393.28  Y        7,197,869.92
Delta         =       91° 30' 00.00" (LT)
Degree        =        7° 28' 06.80"
Tangent       =              787.51
Length        =            1,230.04
Radius        =              767.16
External      =              332.25
Long Chord    =            1,099.04
Mid. Ord.     =              231.84
P.C.  Station             109+25.88  X        2,591,364.95  Y        7,197,082.92
P.T.  Station             121+55.92  X        2,590,605.80  Y        7,197,877.64
C.C.                                 X        2,590,598.28  Y        7,197,110.52
Back          = N   2° 03' 42.01"  E
Ahead         = N  89° 26' 17.99"  W
Chord Bear    = N  43° 41' 17.99"  W

Course from PT FM3133 A3 to 379 N 89° 26' 17.89" W Dist 0.09

Point 379               X     2,590,605.71 Y     7,197,877.64 Sta     121+51.20

Course from 379 to 380 N 89° 48' 13.90" W Dist 3,944.09

Point 380               X     2,586,661.65 Y     7,197,891.14 Sta     160+95.29

Course from 380 to 381 N 88° 29' 28.41" W Dist 5,259.69

Point 381               X     2,581,403.78 Y     7,198,029.63 Sta     213+54.98

Course from 381 to PC FM3133 A4 N 89° 14' 31.08" W Dist 399.23

                                   Curve Data
                                 *-----------*
Curve FM3133 A4
P.I.  Station             218+61.21  X        2,580,902.28  Y        7,198,035.16
Delta         =        2° 00' 00.00" (LT)
Degree        =        1° 00' 00.00"
Tangent       =              100.01
Length        =              204.61
Radius        =            5,729.58
External      =                0.91
Long Chord    =              204.58
Mid. Ord.     =                0.91
P.C.  Station             217+58.92  X        2,581,004.58  Y        7,198,034.91
P.T.  Station             219+63.53  X        2,580,800.03  Y        7,198,031.76
C.C.                                 X        2,580,990.41  Y        7,192,305.35
Back          = N  89° 51' 29.57"  W
Ahead         = S  88° 05' 45.14"  W
Chord Bear    = S  89° 07' 07.78"  W

Course from PT FM3133 A4 to 382 S 87° 47' 40.44" W Dist 1,397.24

Point 382               X     2,579,403.82 Y     7,197,978.00 Sta     233+56.05

Course from 382 to PC FM3133 A5 S 87° 49' 43.02" W Dist 394.93
```

```
Continuing chain FM3133 A description
==============================================================================

                                   Curve Data
                                 *-----------*
Curve FM3133 A5
P.I.  Station             245+20.94  X        2,578,097.34  Y        7,197,928.46
Delta         =       76° 54' 00.00" (RT)
Degree        =        4° 58' 32.07"
Tangent       =              909.87
Length        =            1,545.55
Radius        =            1,145.92
External      =              318.92
Long Chord    =            1,427.64
Mid. Ord.     =              249.49
P.C.  Station             237+50.74  X        2,579,009.17  Y        7,197,963.03
P.T.  Station             252+96.29  X        2,577,859.46  Y        7,198,809.39
C.C.                                 X        2,578,965.75  Y        7,199,108.13
Back          = S  87° 49' 43.02"  W
Ahead         = N  15° 06' 40.98"  W
Chord Bear    = N  53° 38' 28.98"  W

Course from PT FM3133 A5 to 383 N 15° 06' 40.98" W Dist 264.04

Point 383               X     2,577,790.62 Y     7,199,064.30 Sta     255+61.37

==============================================================================
Ending chain FM3133 A description
```

SUPER ELEVATION TABLE DESIGN

STATION	SLOPE(%)
0+00.00	-2.0
108+10.00	-2.0
109+50.00	5.4
121+25.00	5.4
122+65.00	-2.0
236+52.00	-2.0
237+75.00	-4.5
252+75.00	-4.5
253+98.00	-2.0
255+56.23	-2.0

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

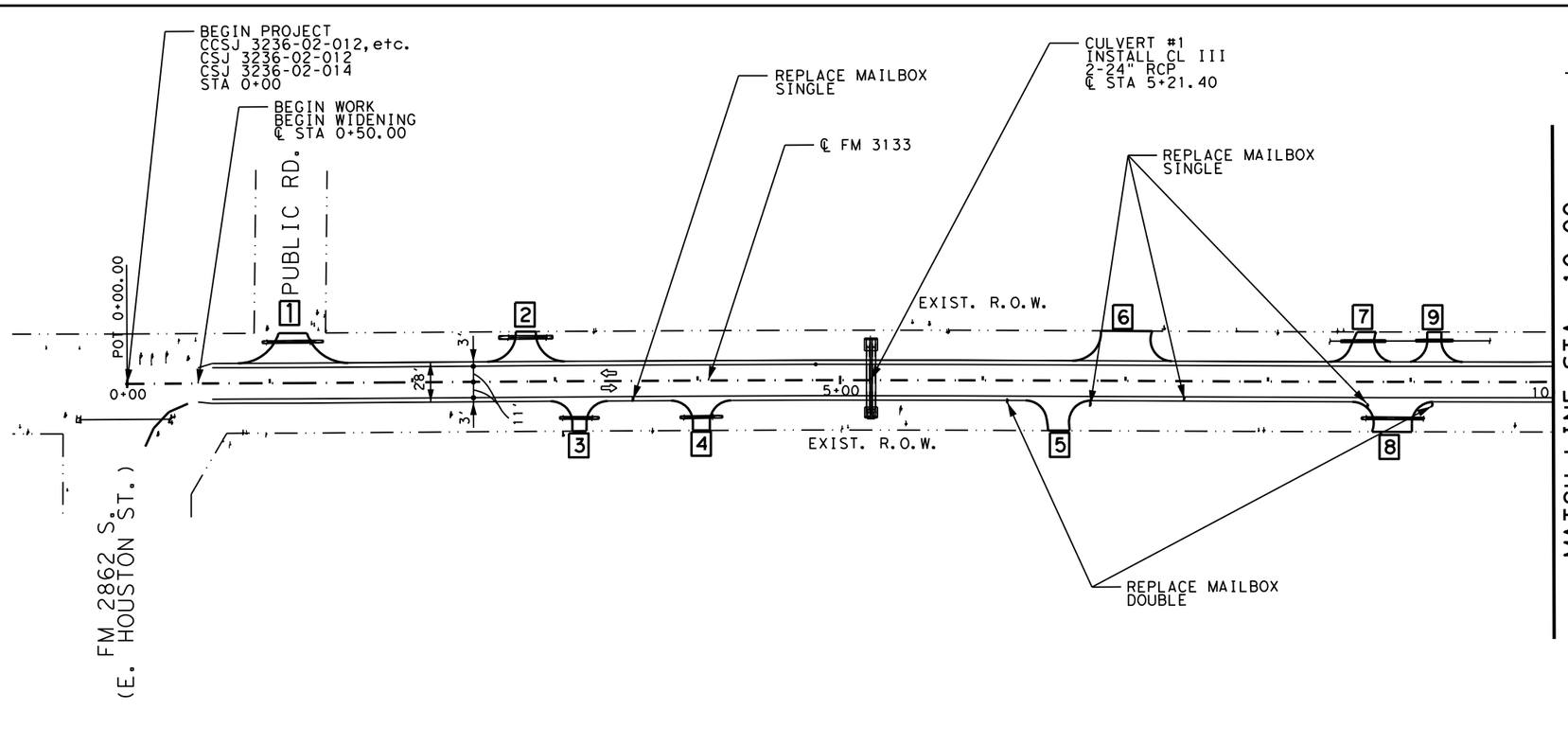
11/4/20

Texas Department of Transportation

FM 3133 HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	51
CHECK	CONTROL	SECTION	JOB	
DMH / TLB	3236	02	012, etc.	



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

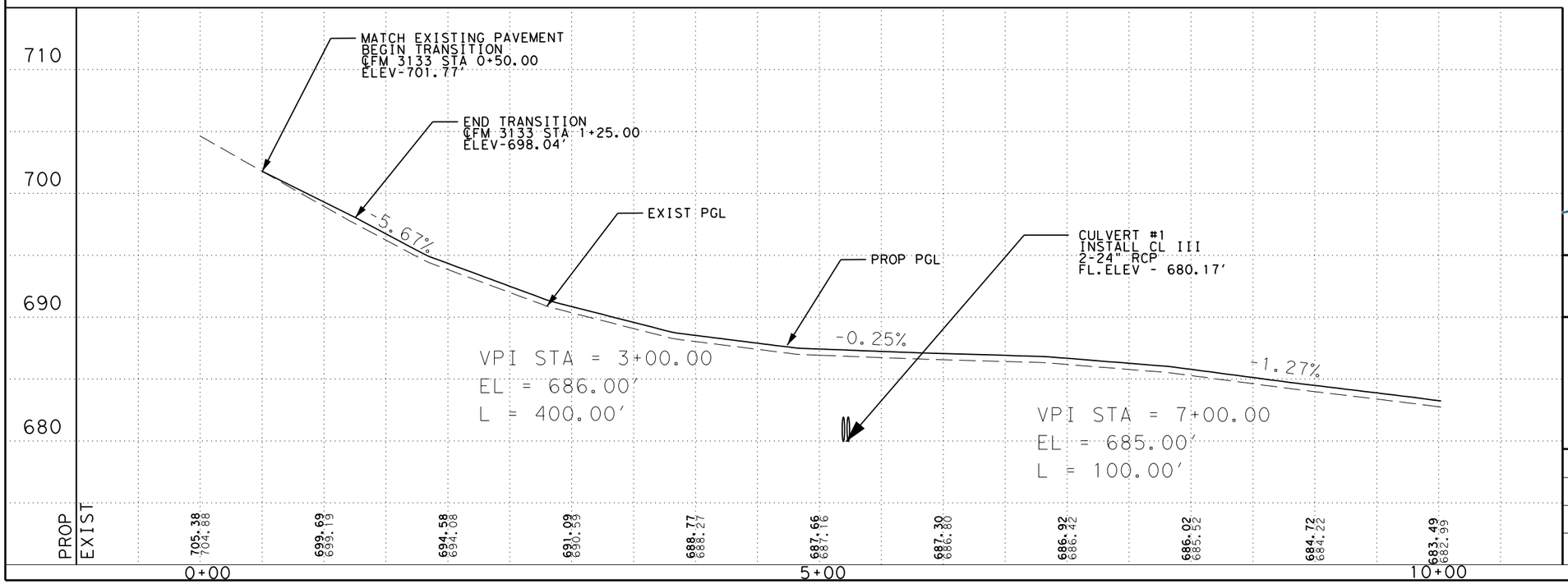
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

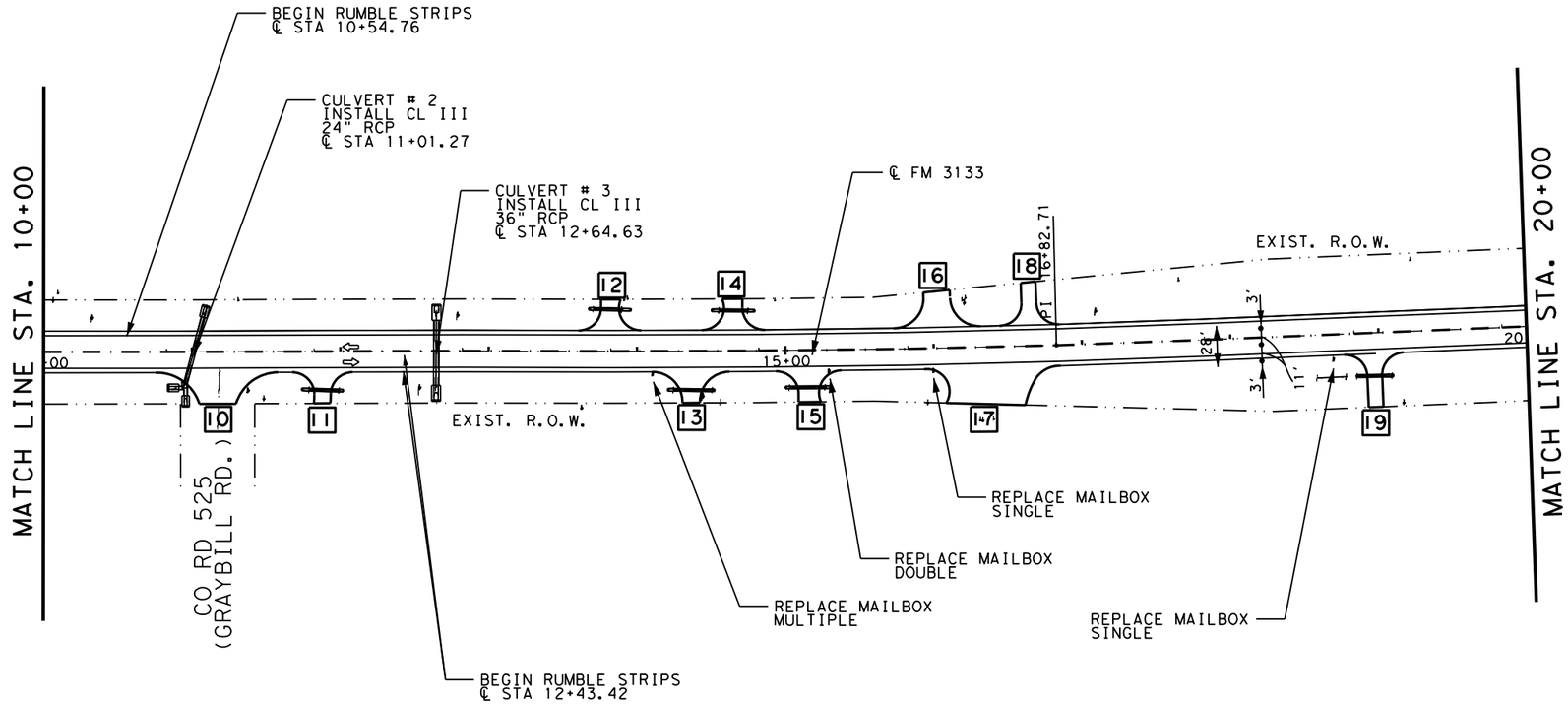
11/4/20

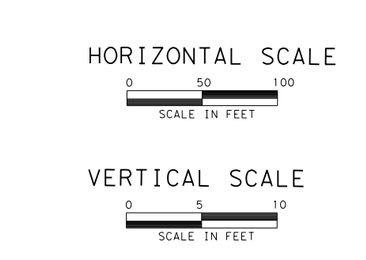
FM 3133
PLAN AND PROFILE
BEGIN PROJECT TO STA. 10+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 1 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	52
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				



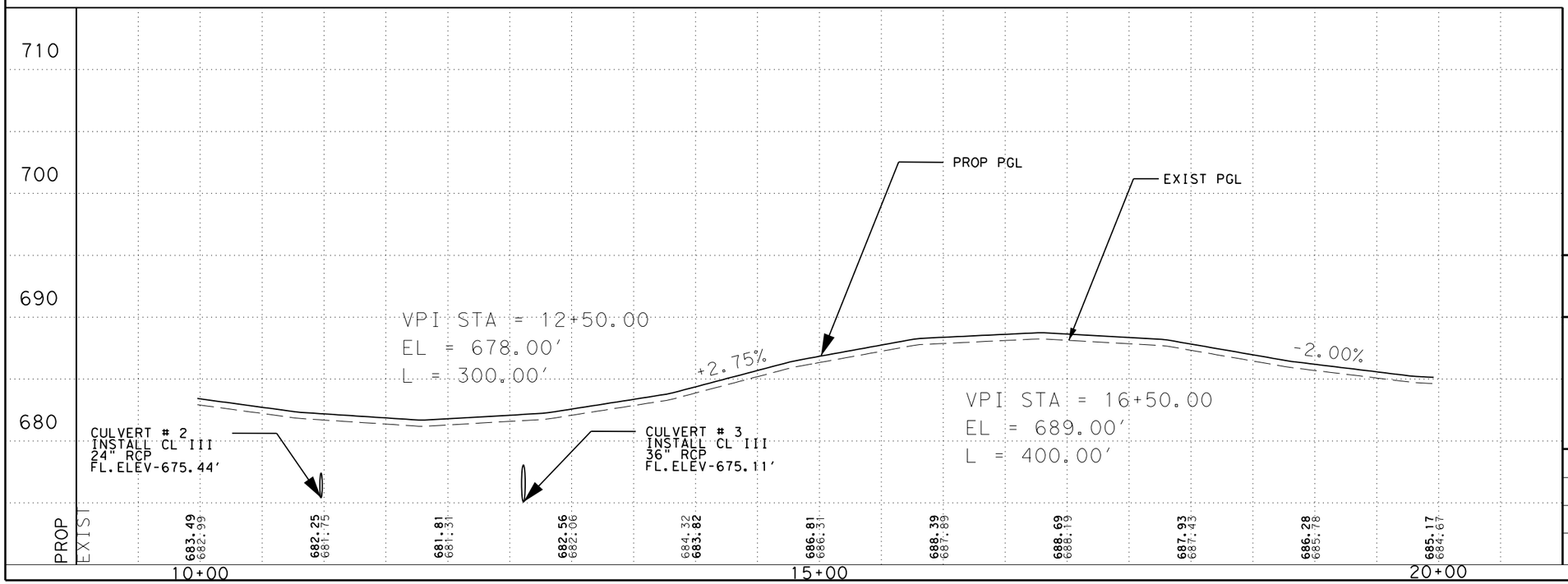


LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

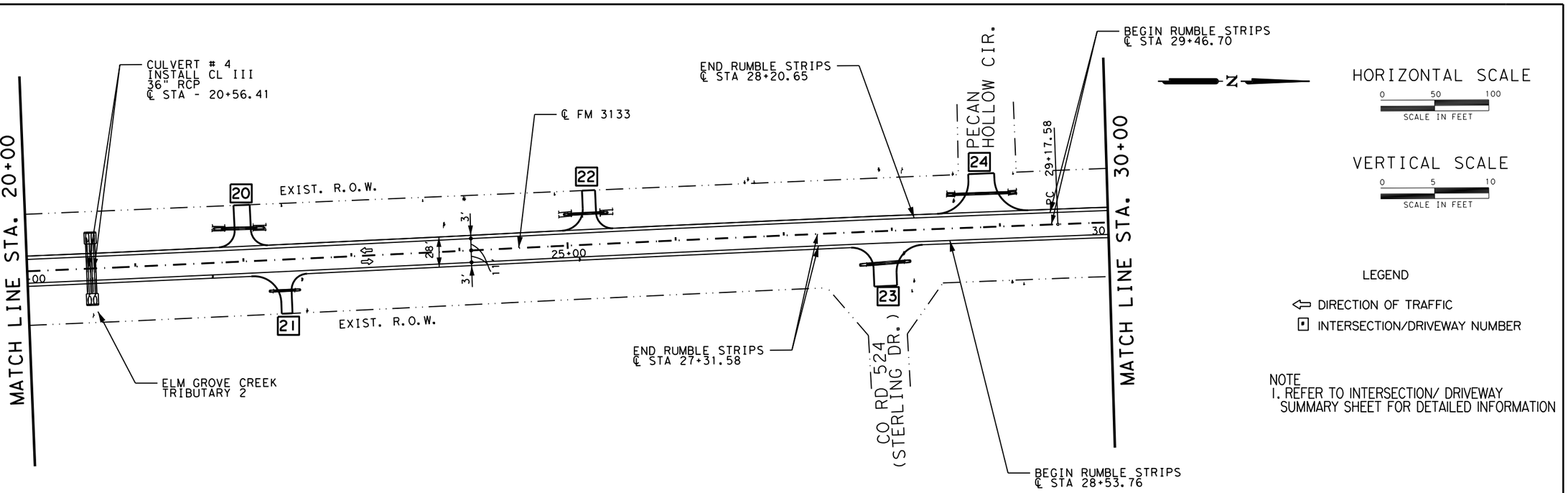
11/4/20

FM 3133
PLAN AND PROFILE
STA. 10+00.00 TO STA. 20+00.00

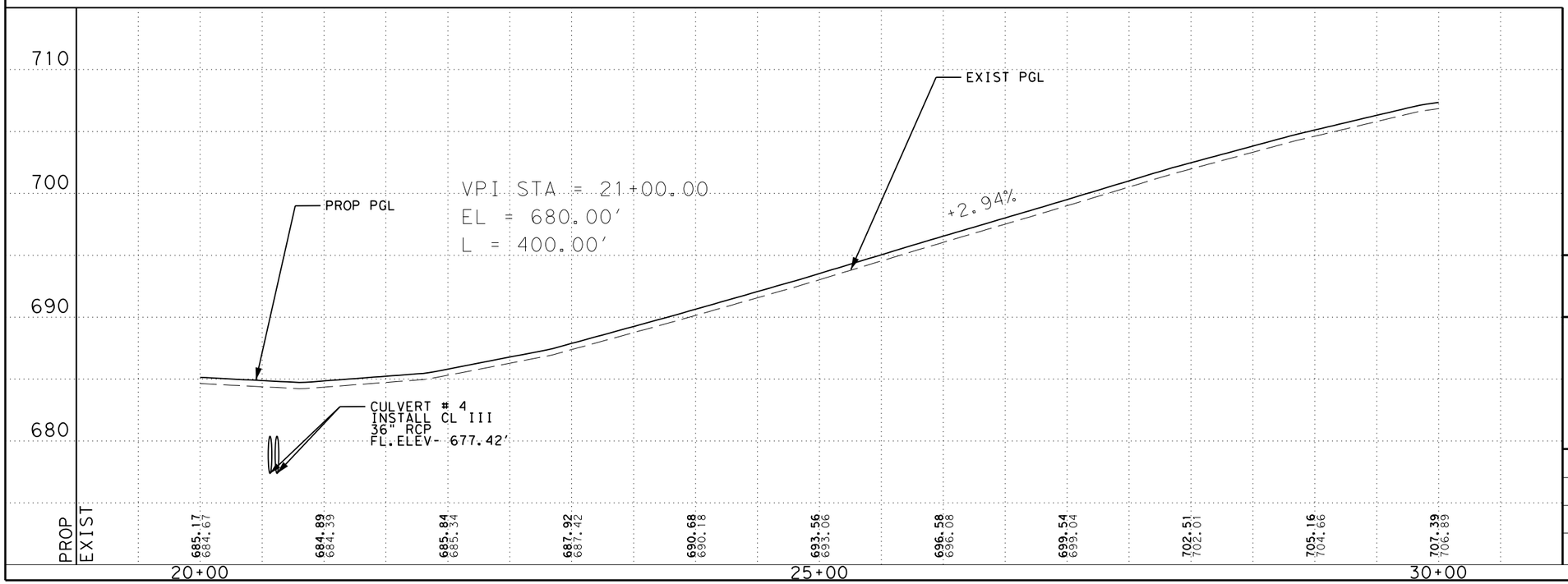
SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 2 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	53
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

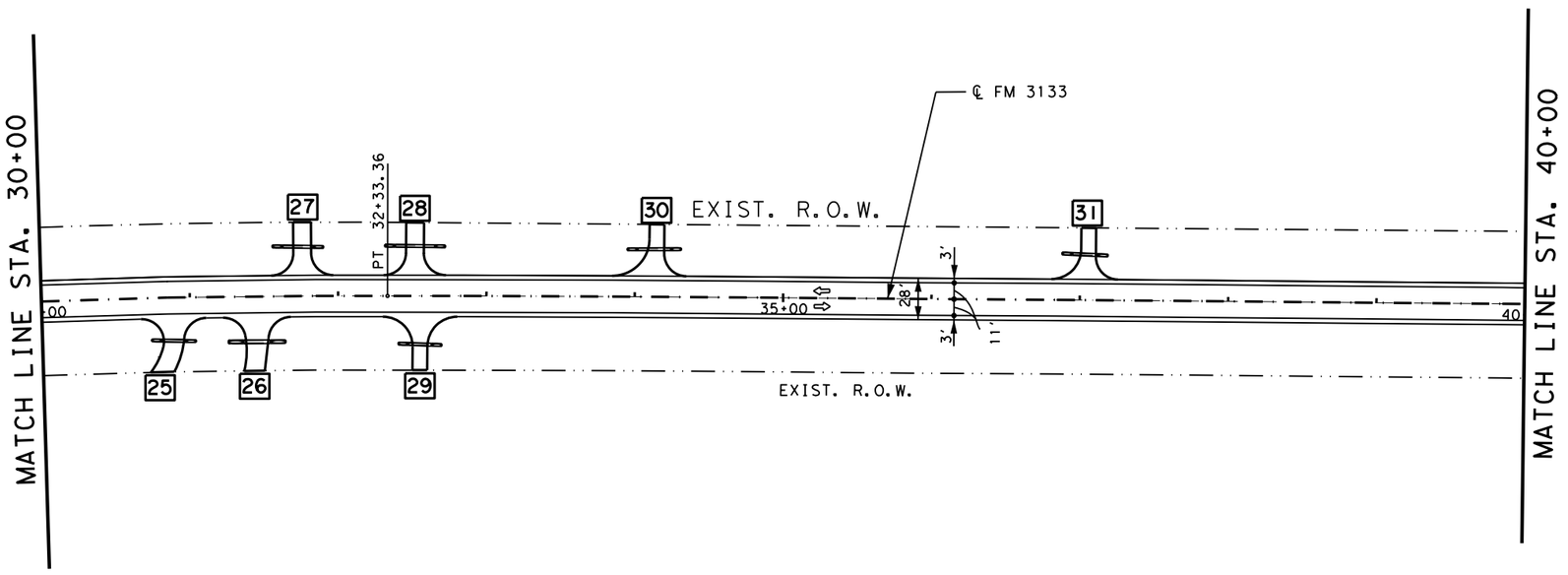
11/4/20

FM 3133
PLAN AND PROFILE
STA. 20+00.00 TO STA. 30+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 3 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	54
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

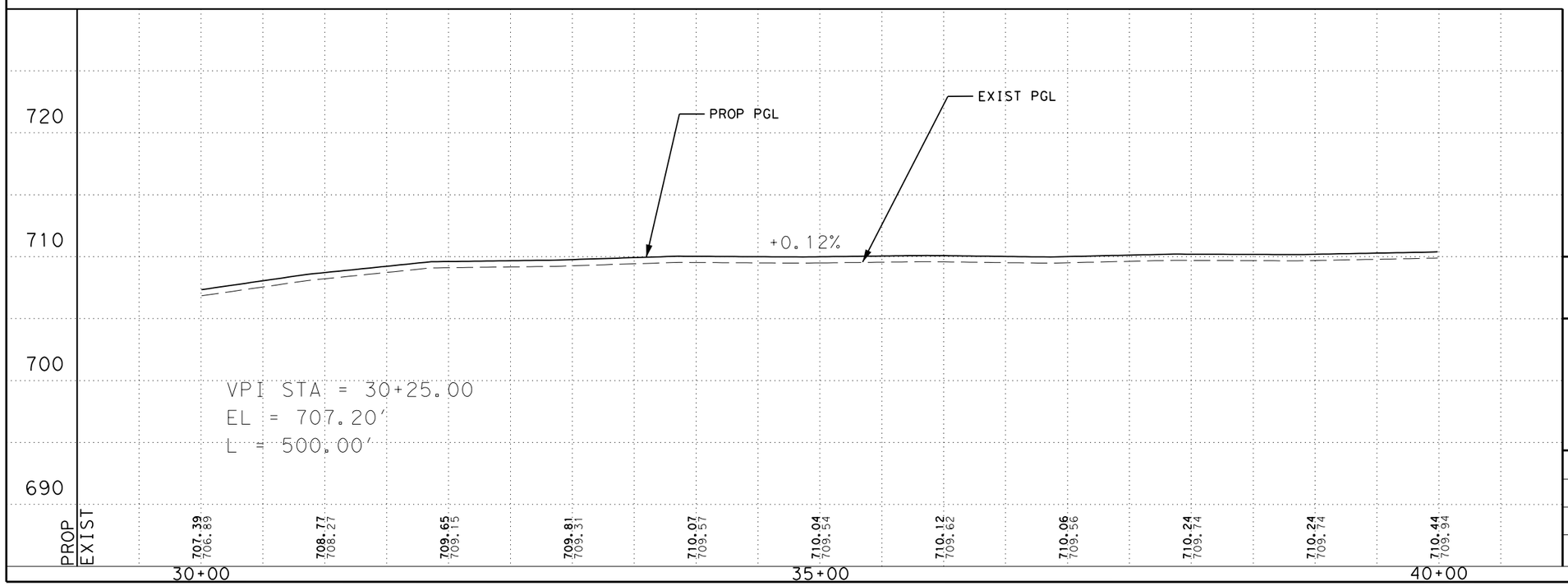
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

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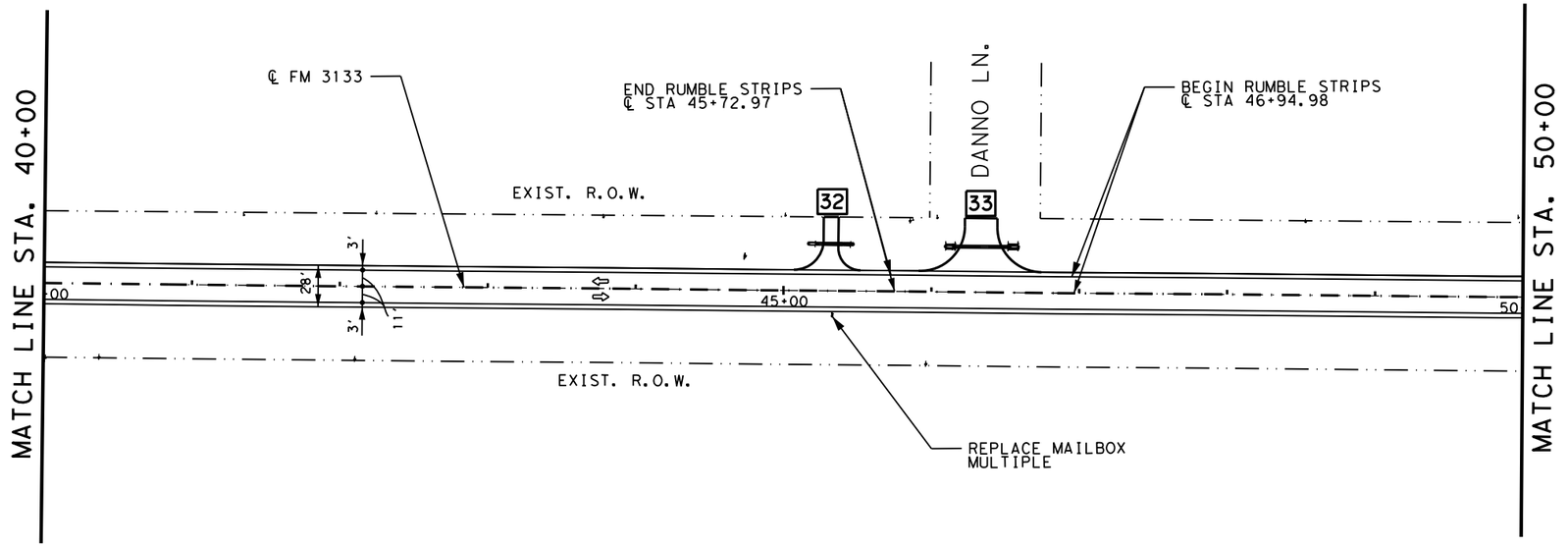
FM 3133
PLAN AND PROFILE
STA. 30+00.00 TO STA. 40+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 4 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	55
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

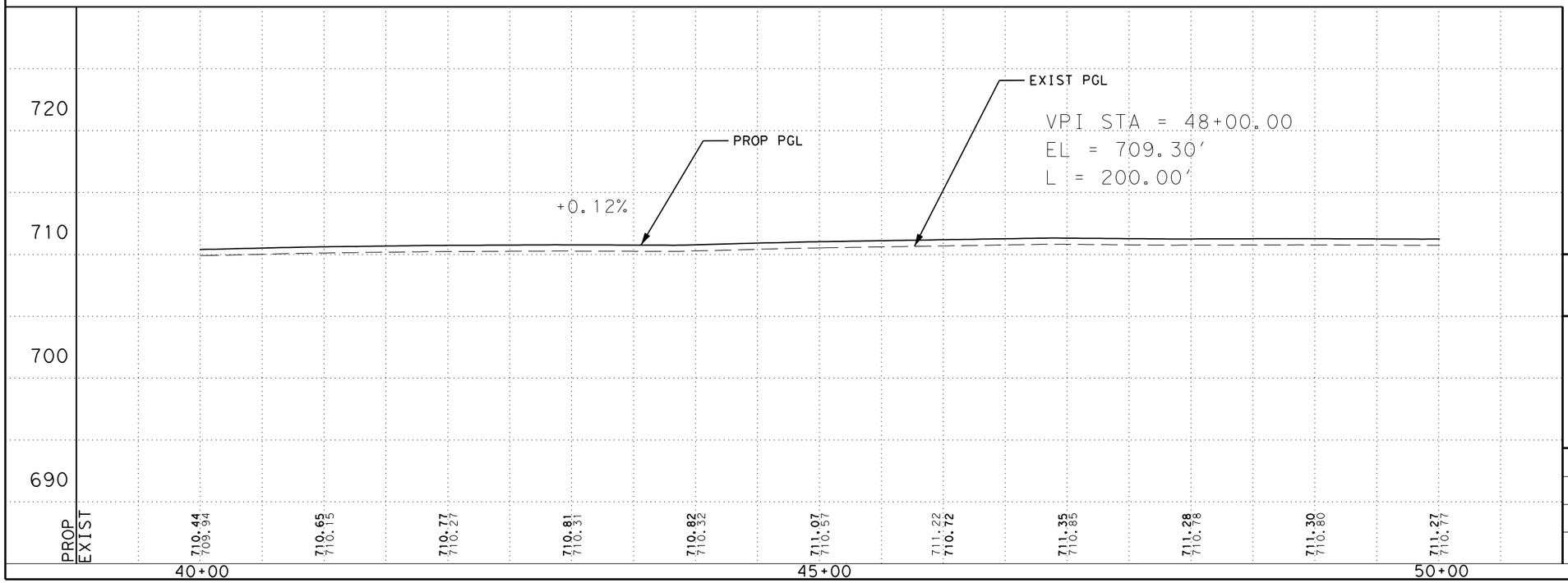
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

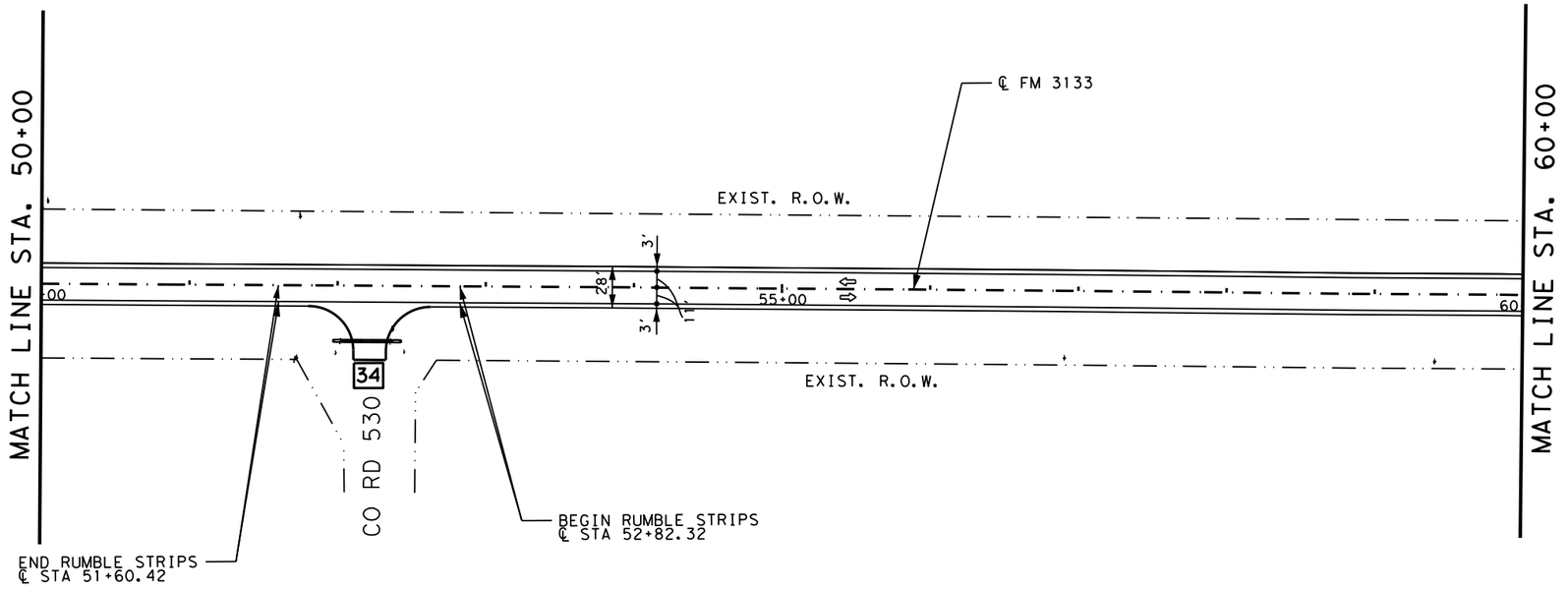
11/4/20

FM 3133
PLAN AND PROFILE
STA. 40+00.00 TO STA. 50+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 5 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	56
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

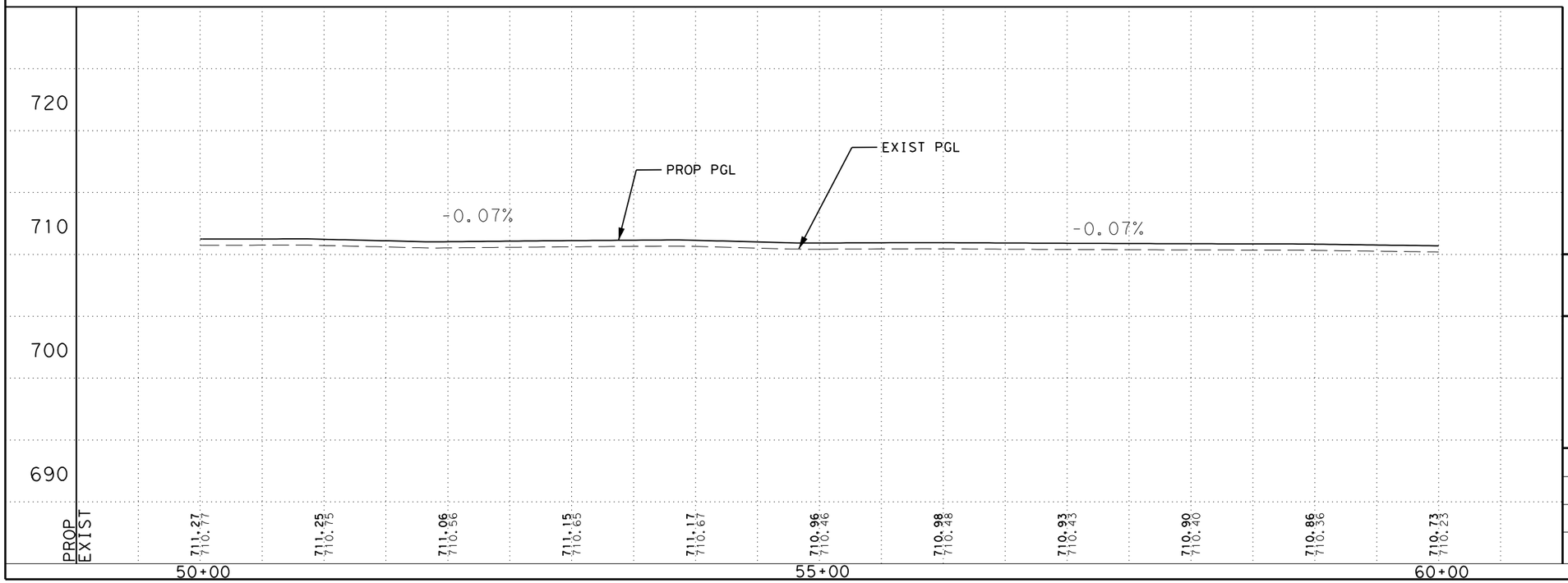
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
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PROFESSIONAL ENGINEER

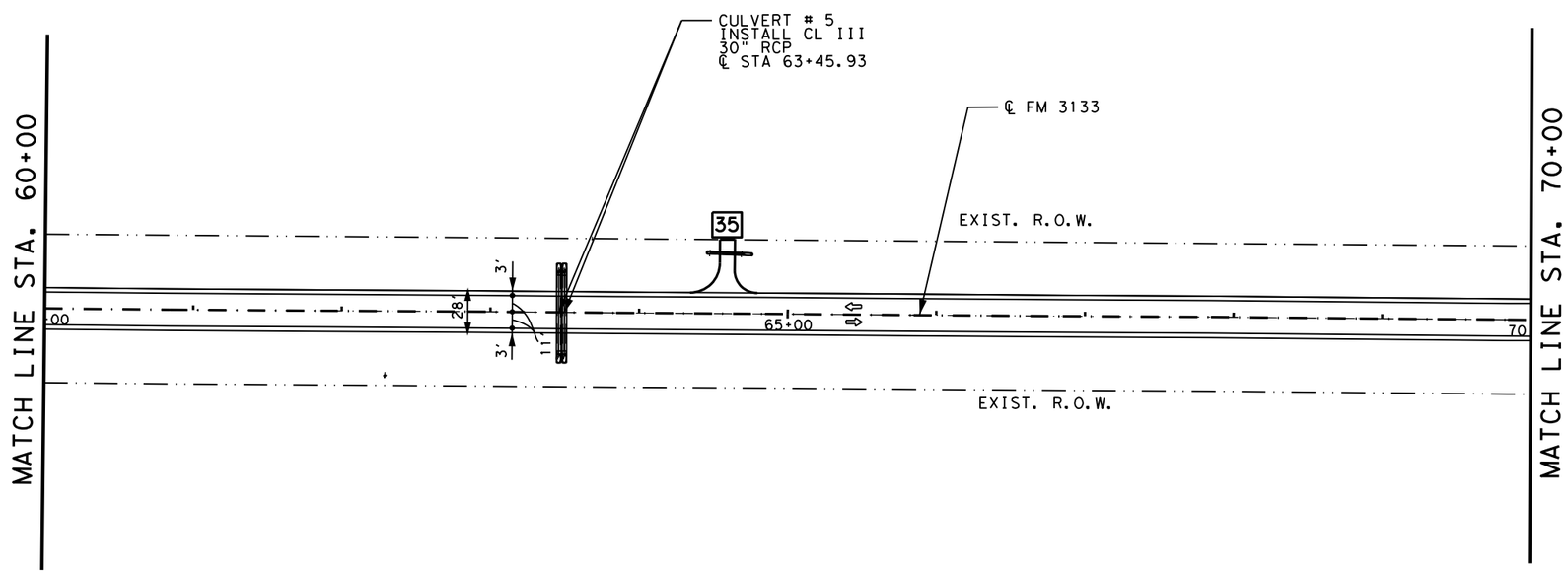
11/4/20

FM 3133
PLAN AND PROFILE
STA. 50+00.00 TO STA. 60+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 6 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	57
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

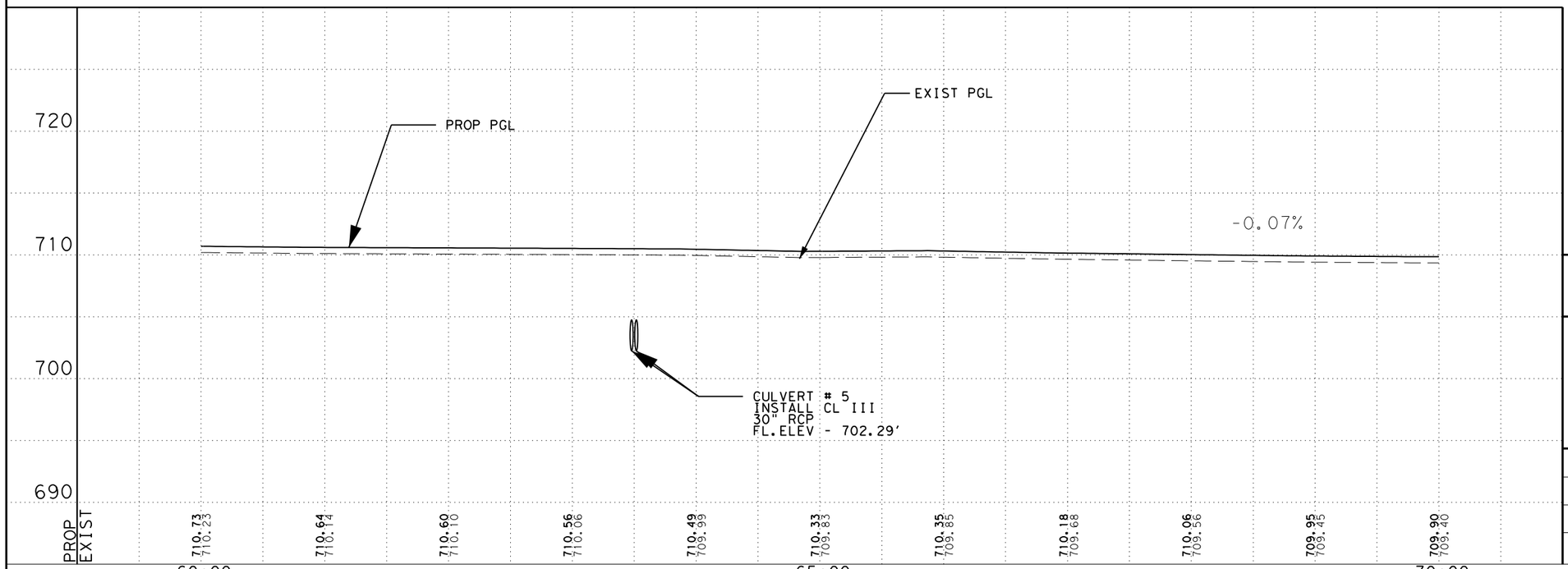
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



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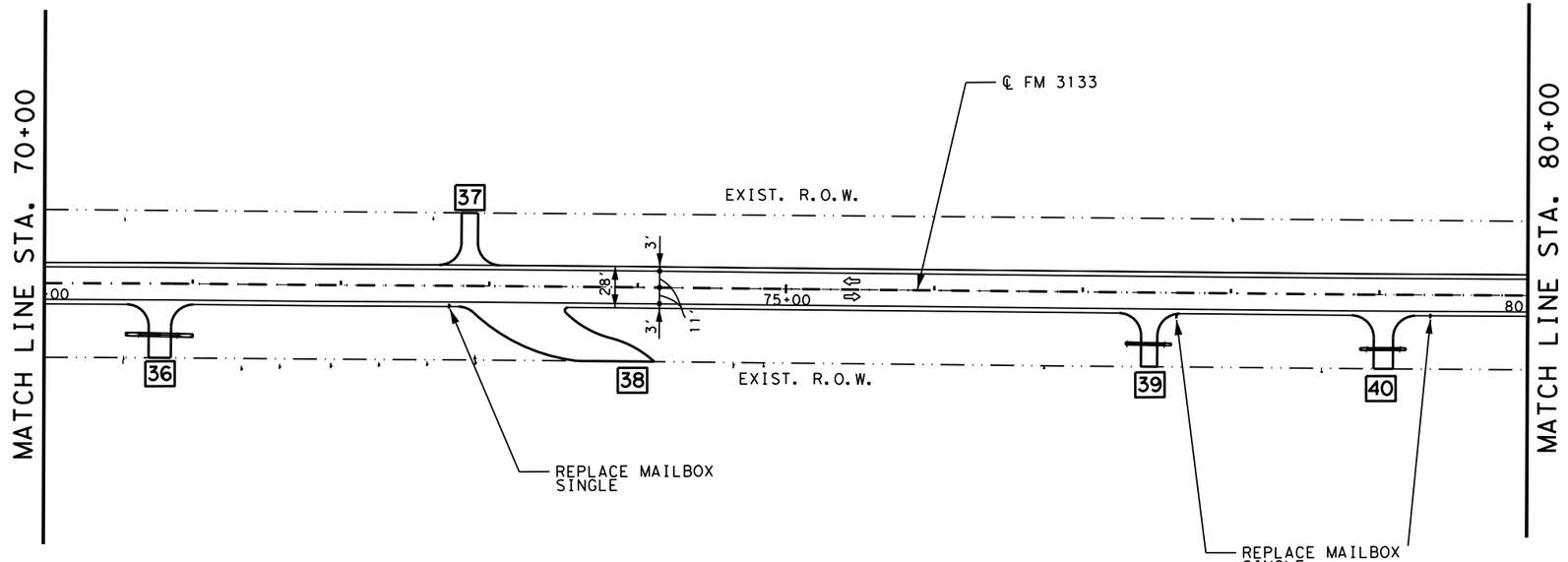
FM 3133
PLAN AND PROFILE

STA. 60+00.00 TO STA. 70+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 7 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	58
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

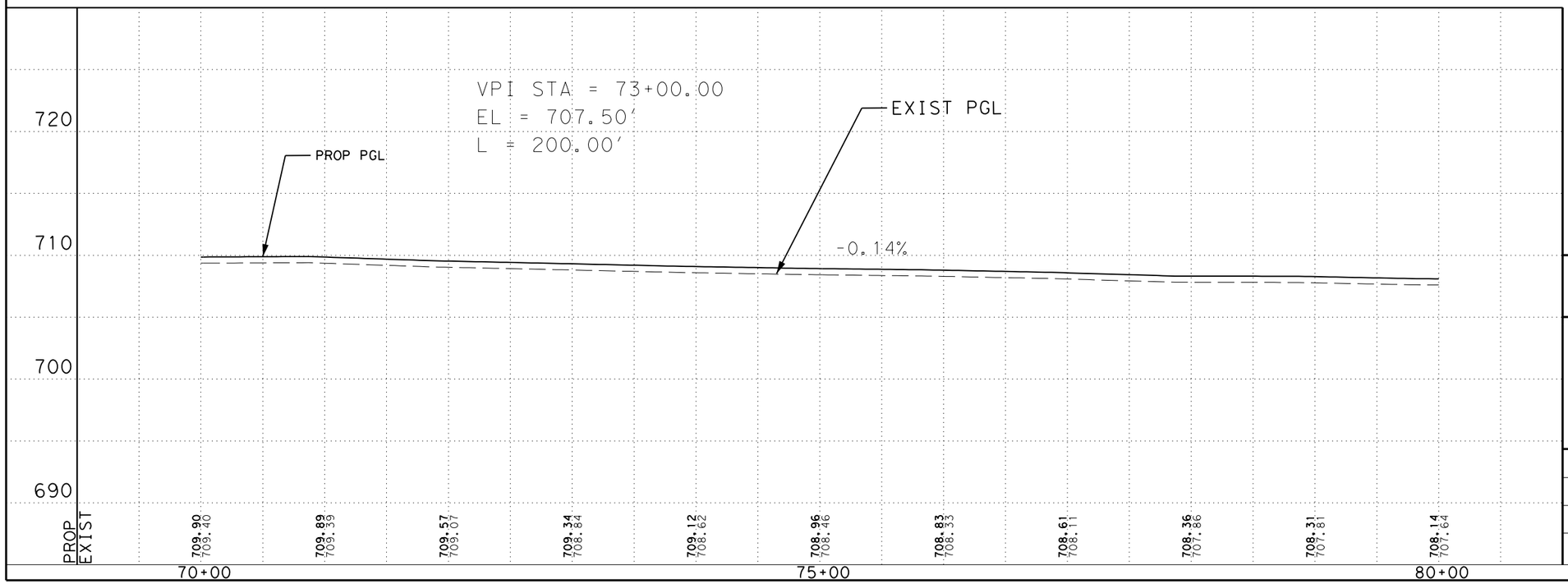
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

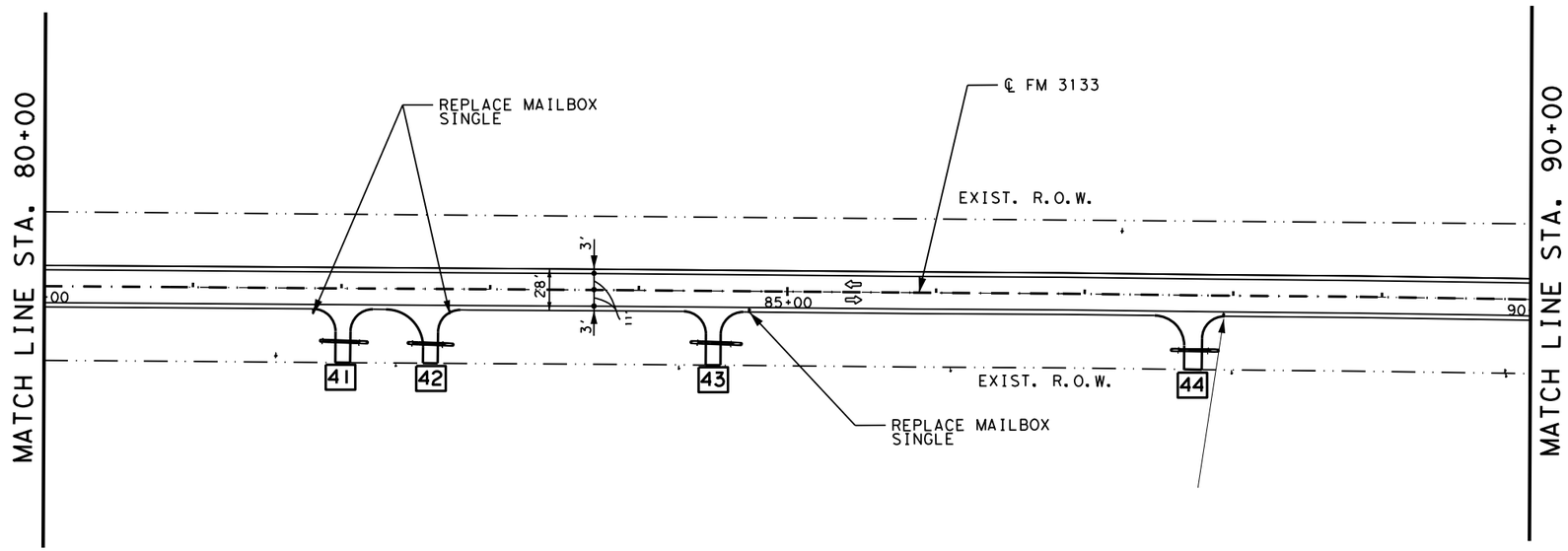
FM 3133
PLAN AND PROFILE

STA. 70+00.00 TO STA. 80+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 8 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	59
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

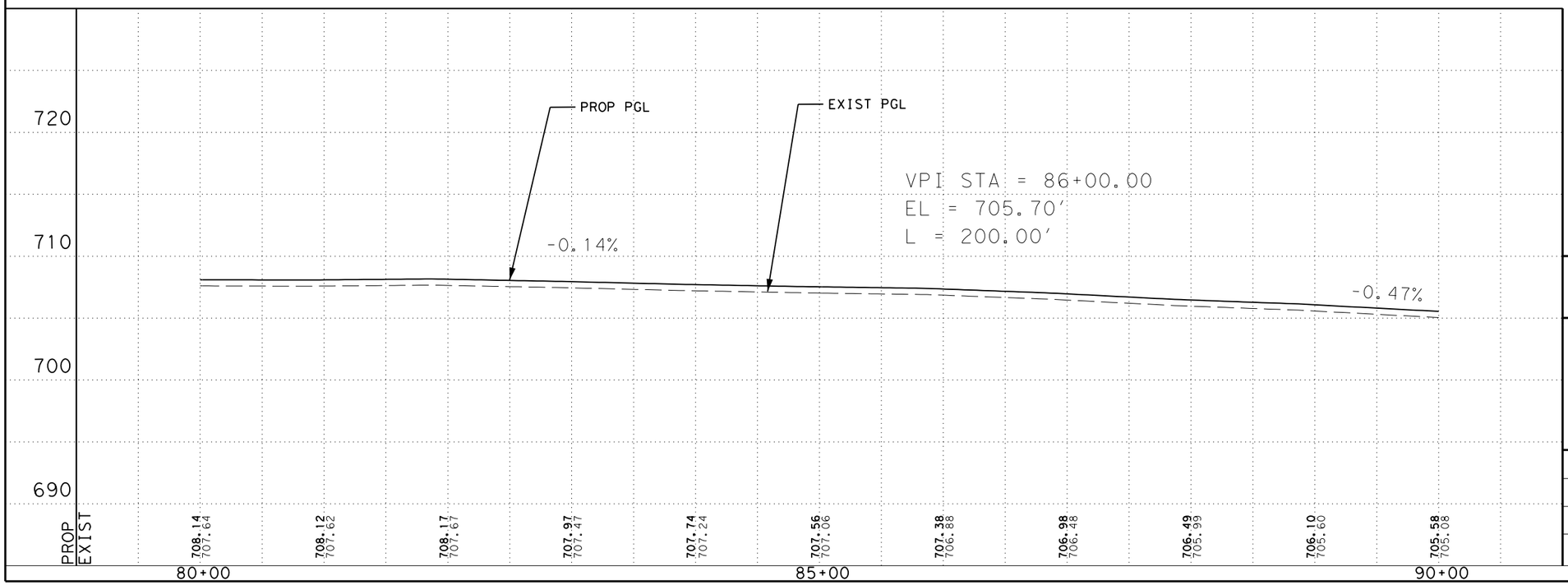
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

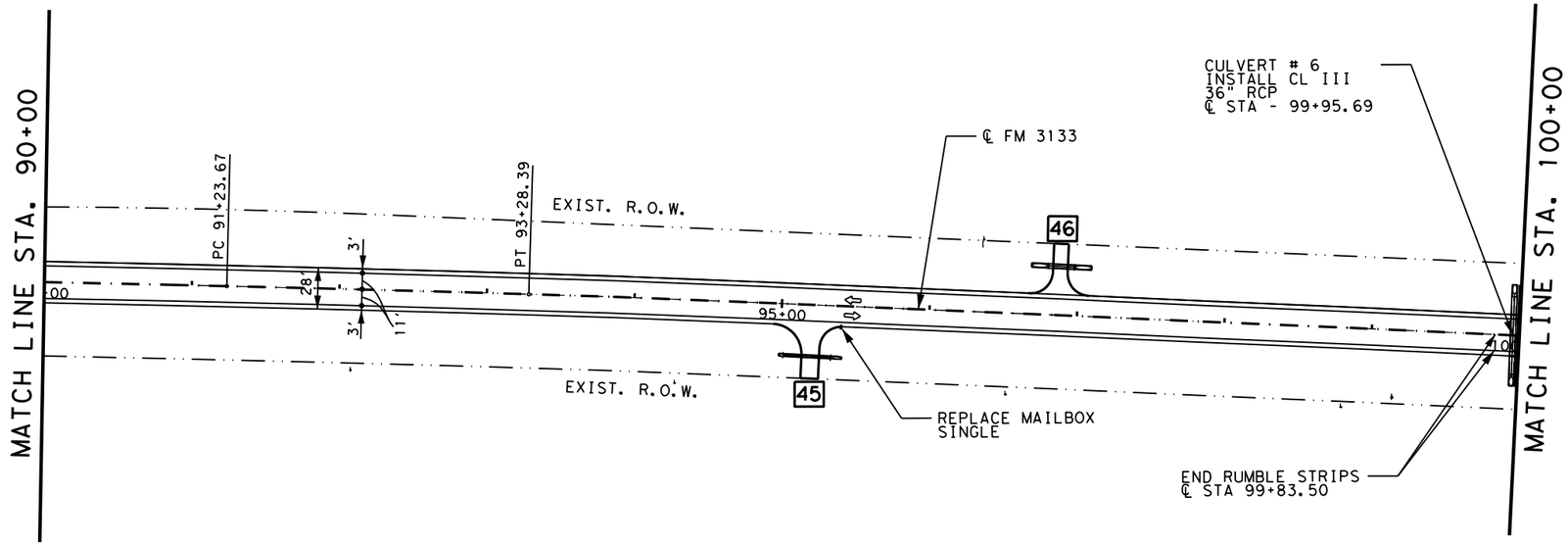
FM 3133
PLAN AND PROFILE

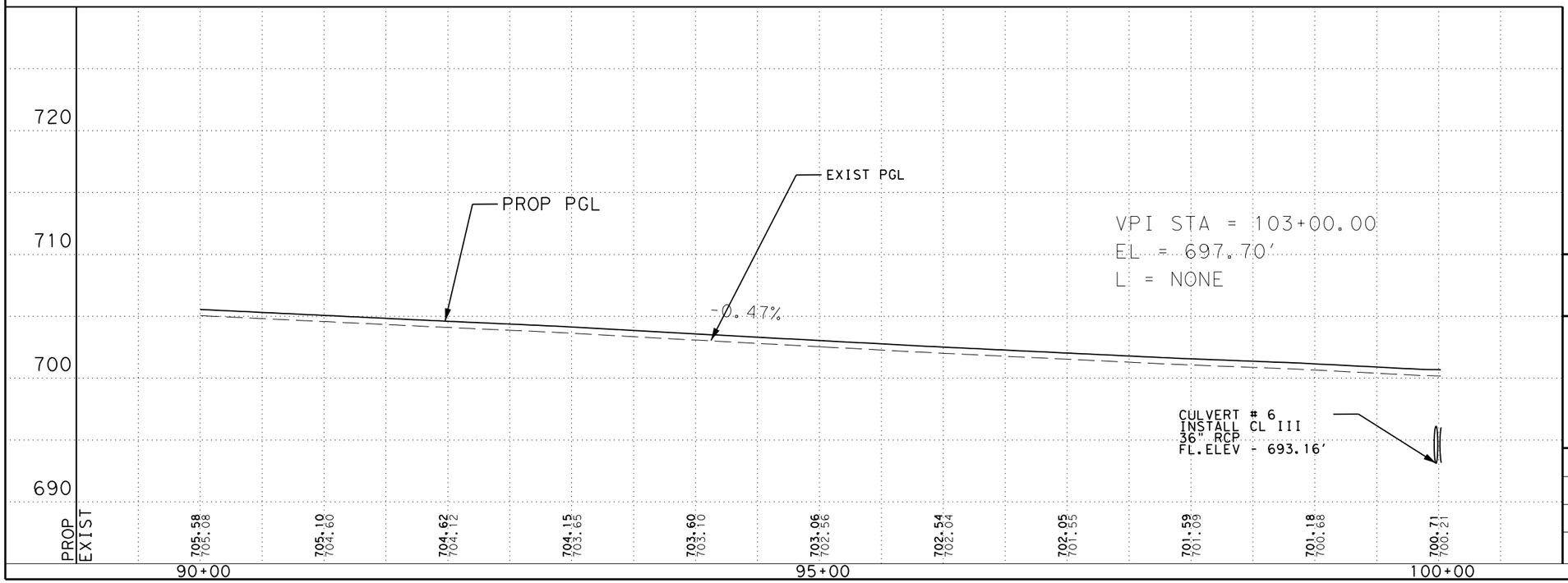
STA. 80+00.00 TO STA. 90+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 9 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	60
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				





HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

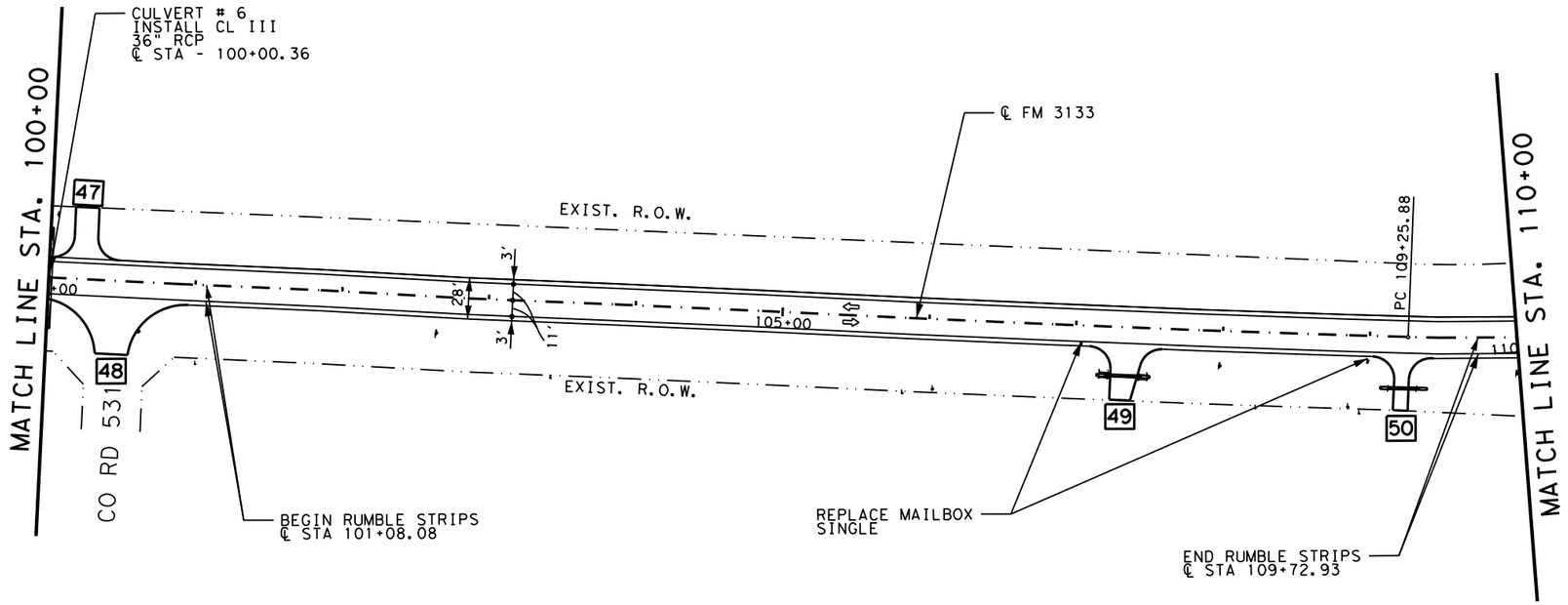
11/4/20

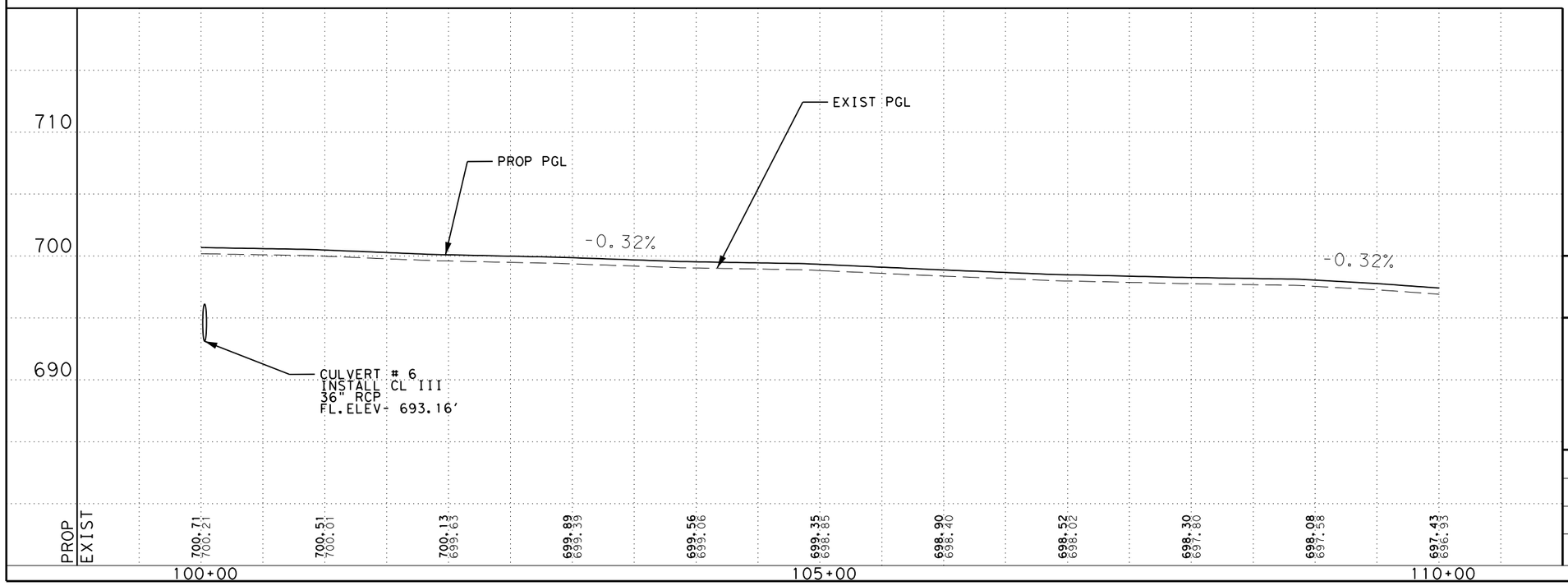
FM 3133
PLAN AND PROFILE
STA. 90+00.00 TO STA. 100+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 10 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	61
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				





HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

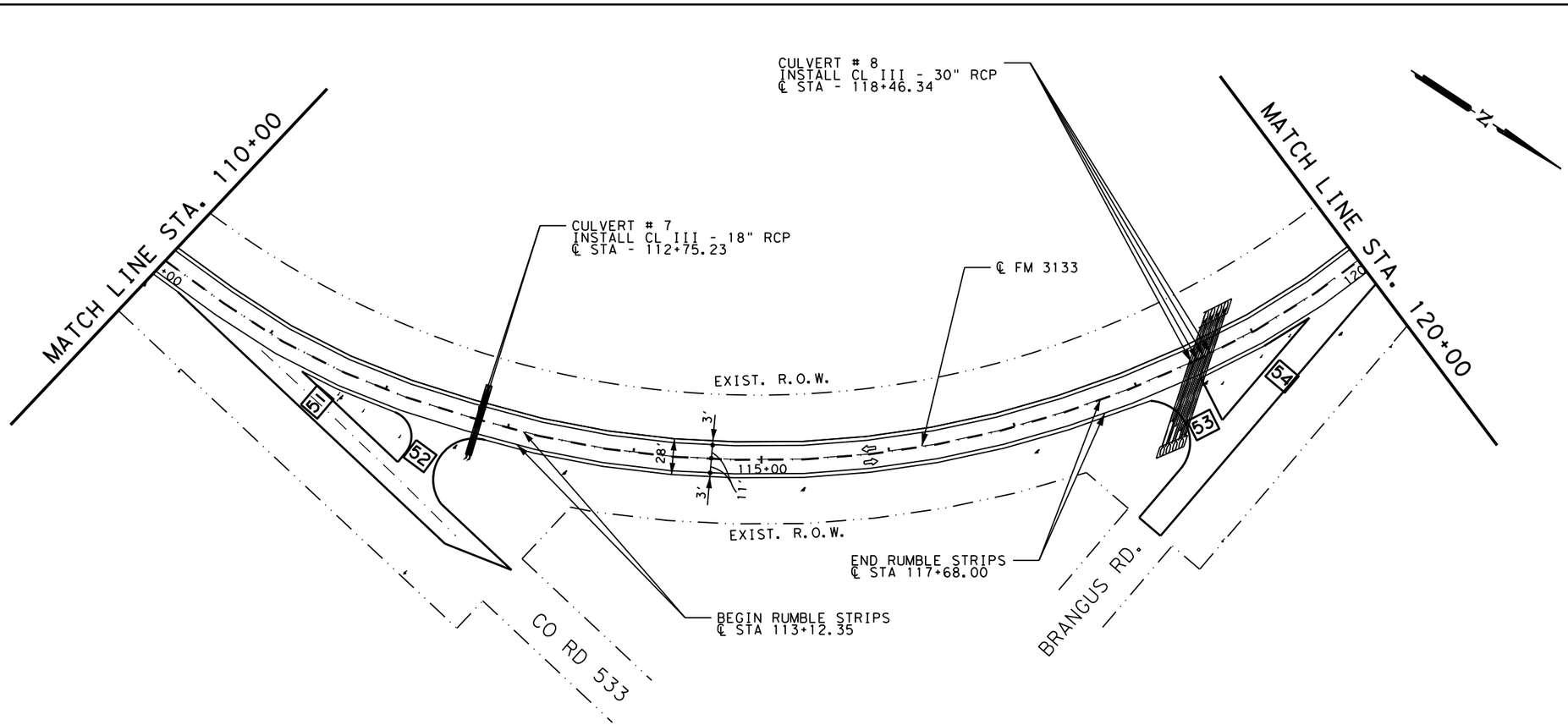
FM 3133
PLAN AND PROFILE

STA. 100+00.00 TO STA. 110+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 11 OF 26

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	62
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				



HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

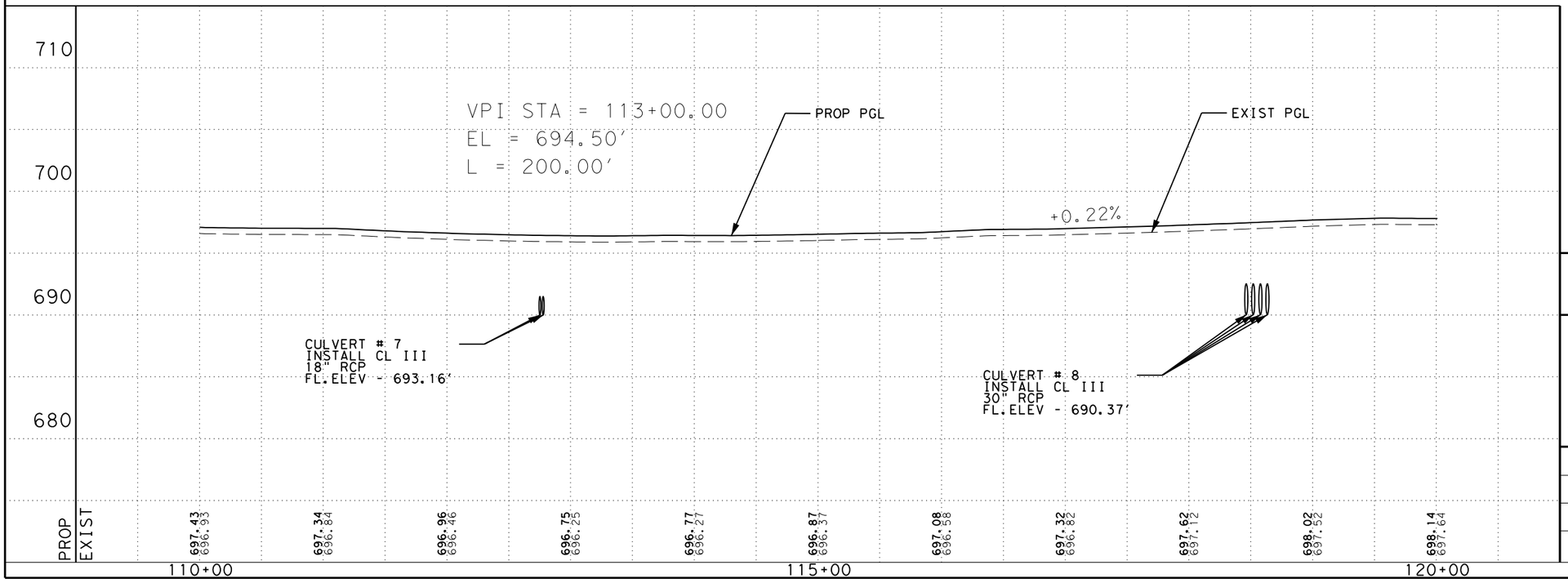
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

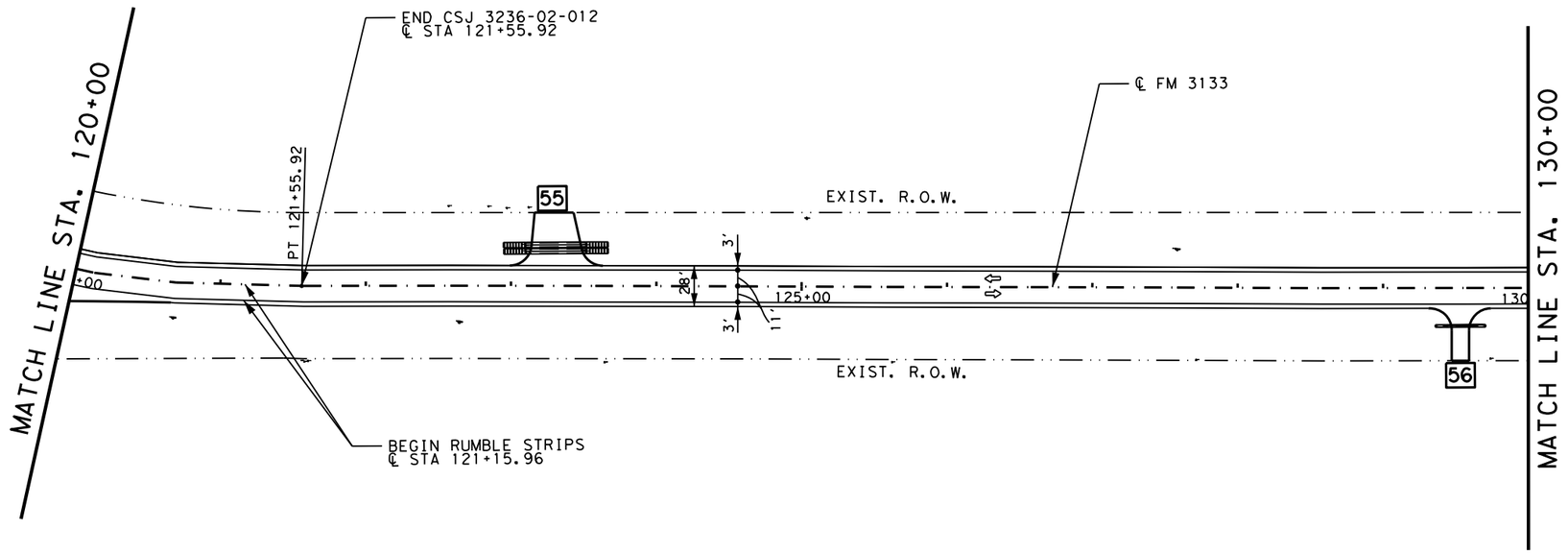
11/4/20

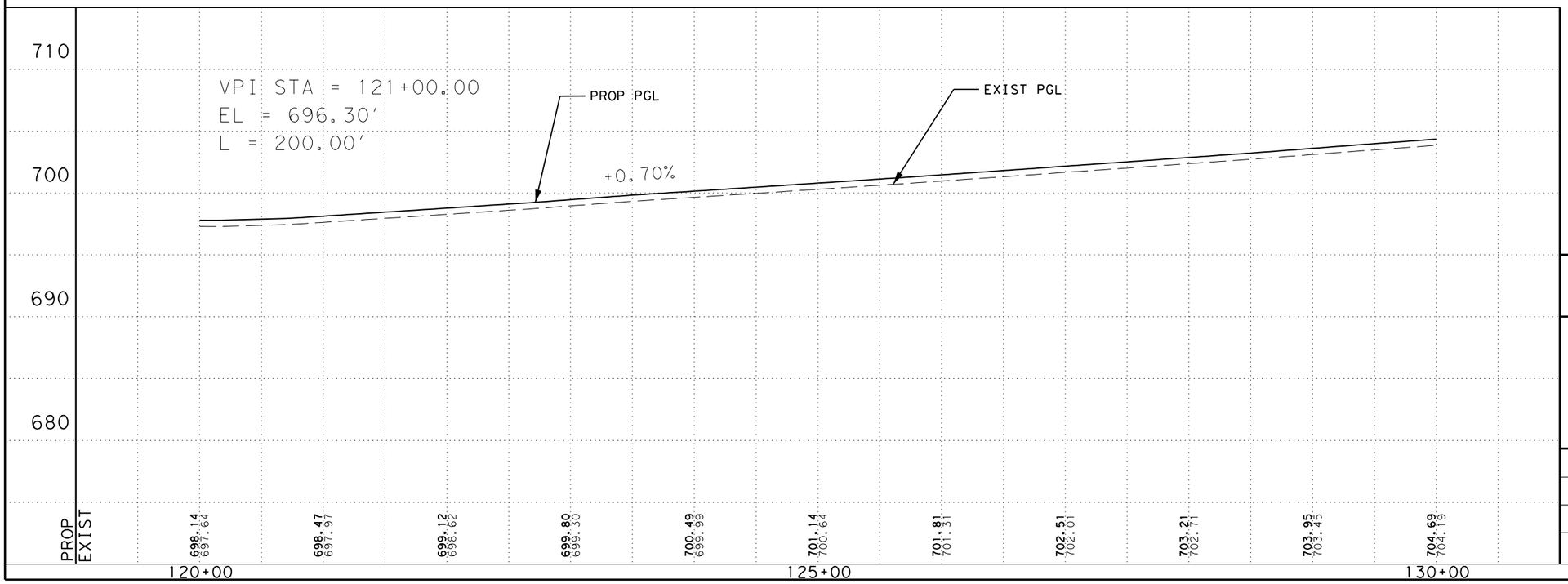
FM 3133
PLAN AND PROFILE
STA. 110+00.00 TO STA. 120+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 12 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	63
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





N

HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

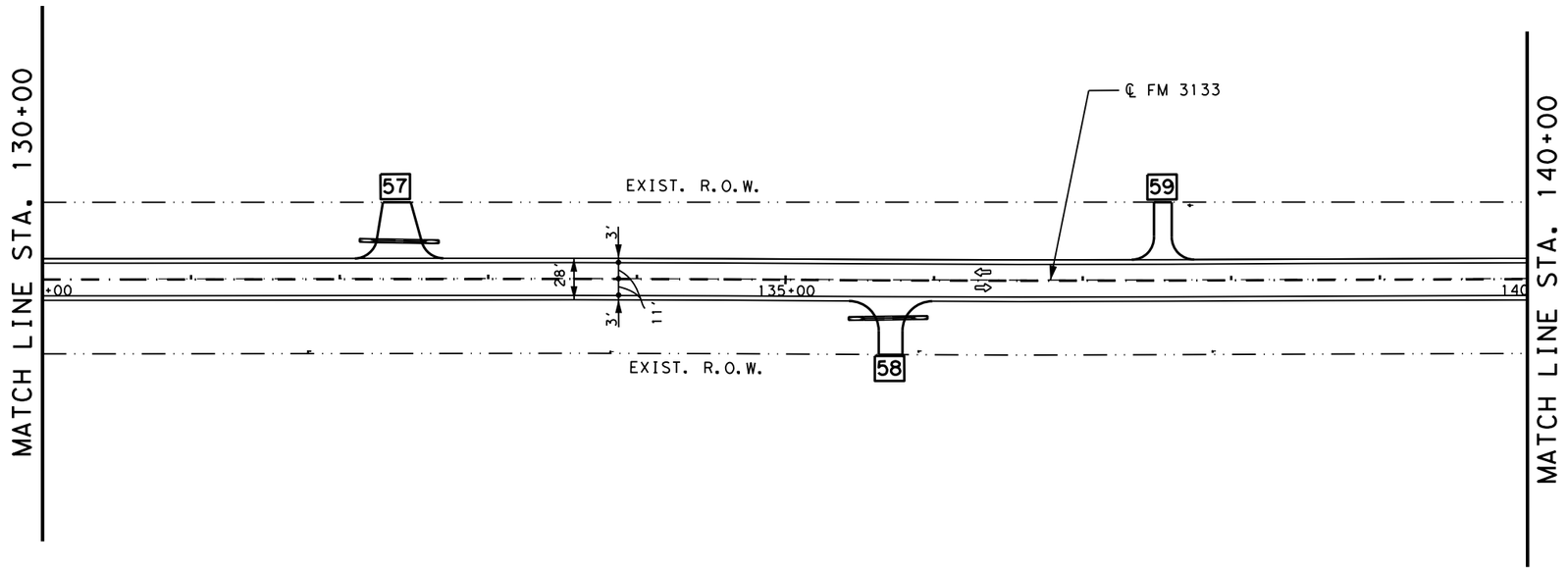
FM 3133
PLAN AND PROFILE

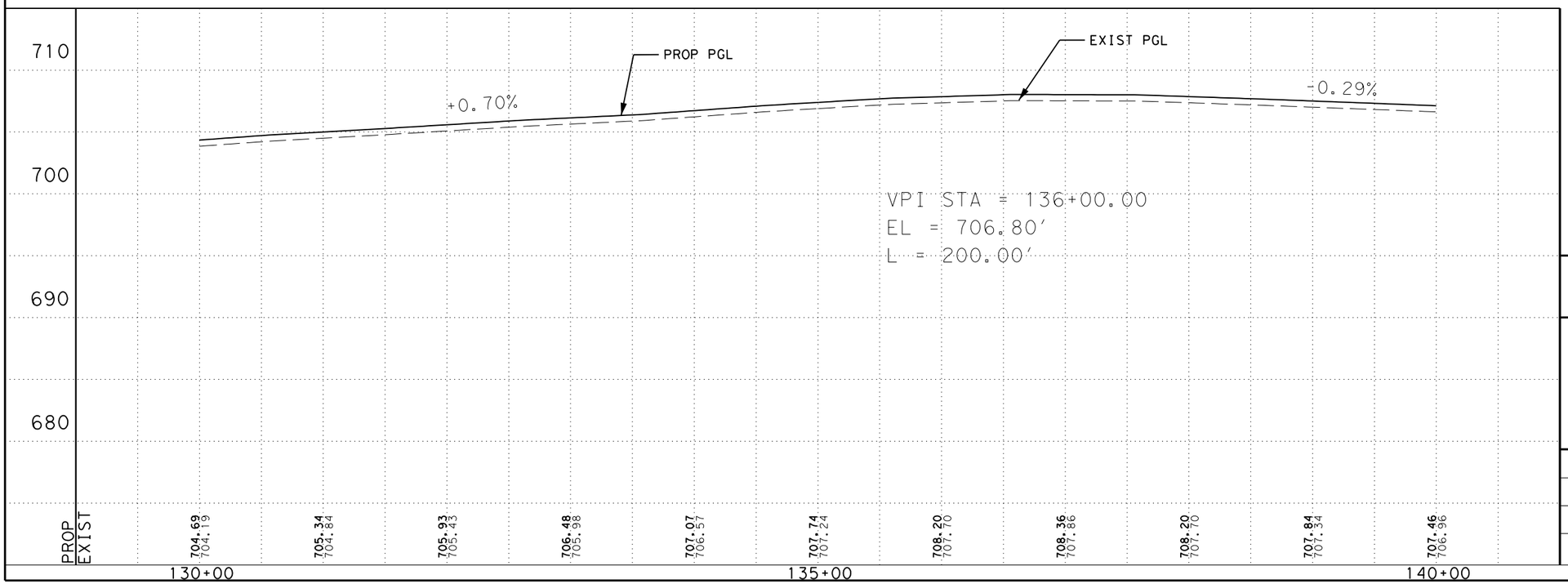
STA. 120+00.00 TO STA. 130+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 13 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	64
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





N

HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND
⇦ DIRECTION OF TRAFFIC
⊡ INTERSECTION/DRIVEWAY NUMBER

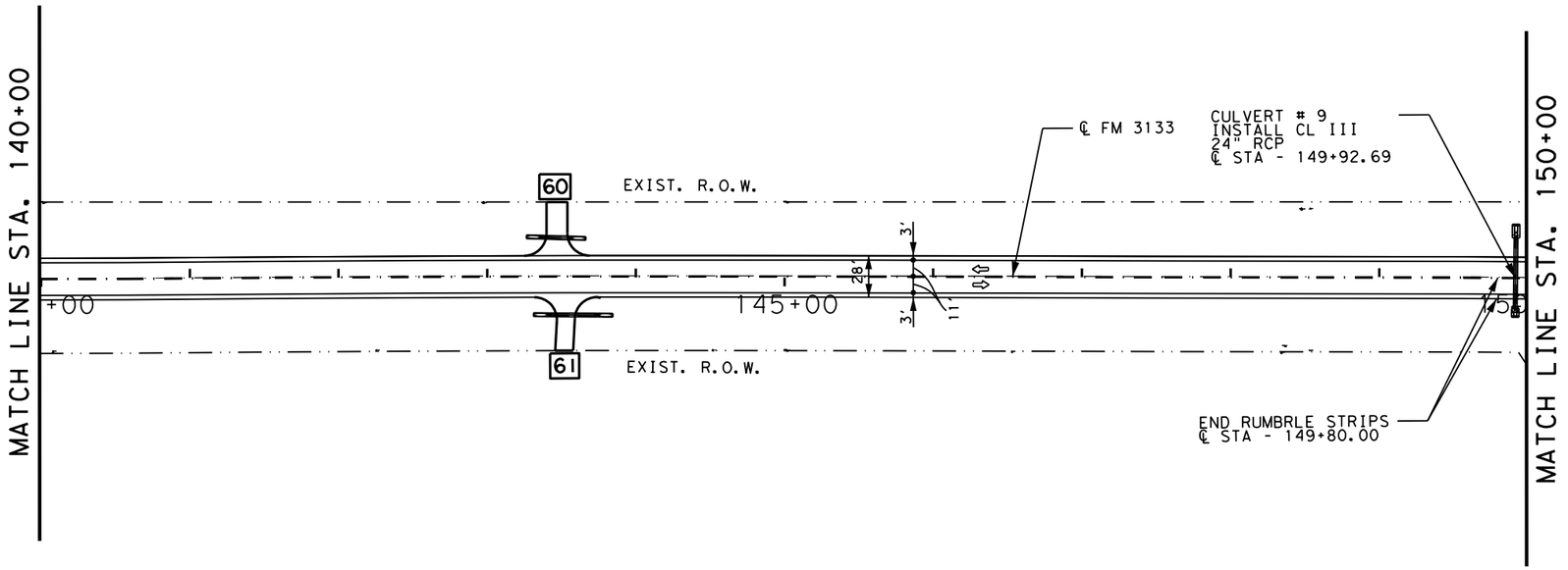
NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER
11/4/20

FM 3133
PLAN AND PROFILE
STA. 130+00.00 TO STA. 140+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	65
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

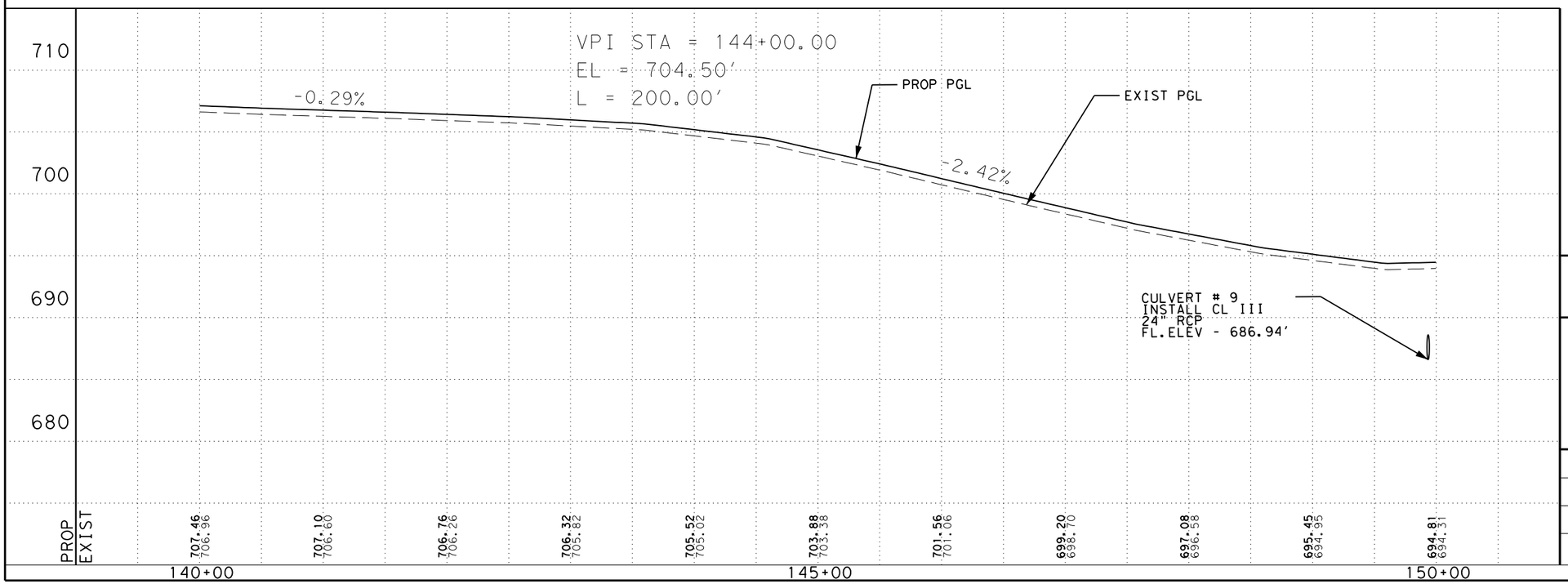
SCALE IN FEET

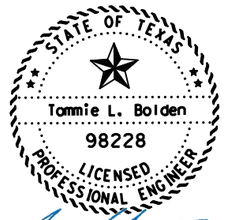
LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION





11/4/20

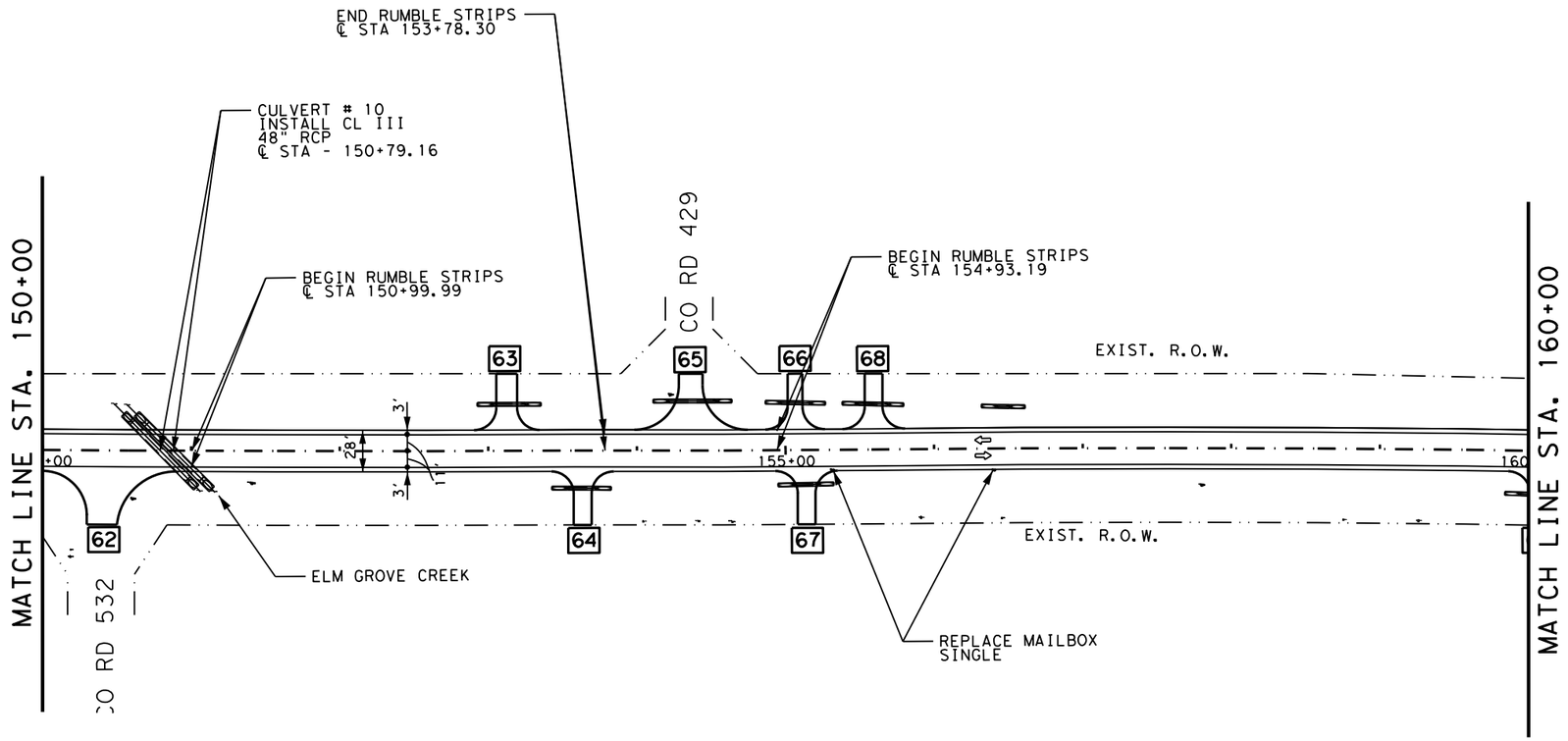
FM 3133
PLAN AND PROFILE

STA. 140+00.00 TO STA. 150+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 15 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	66
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



N

HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

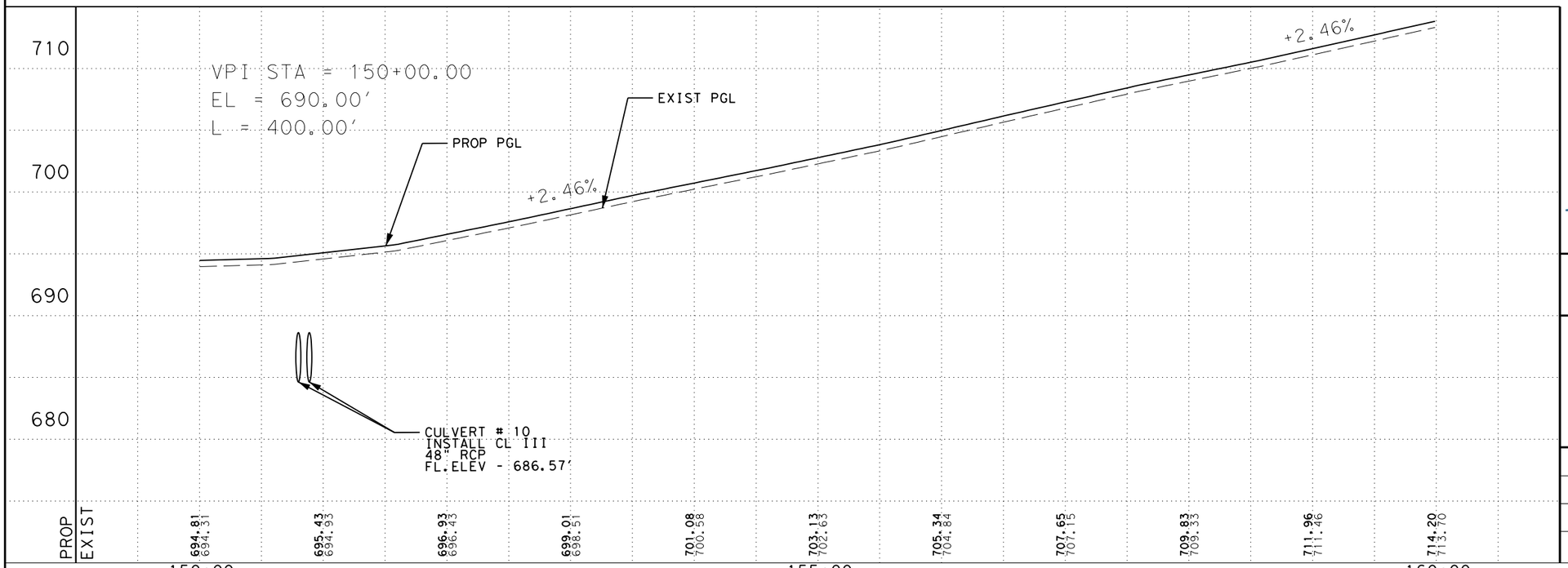
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

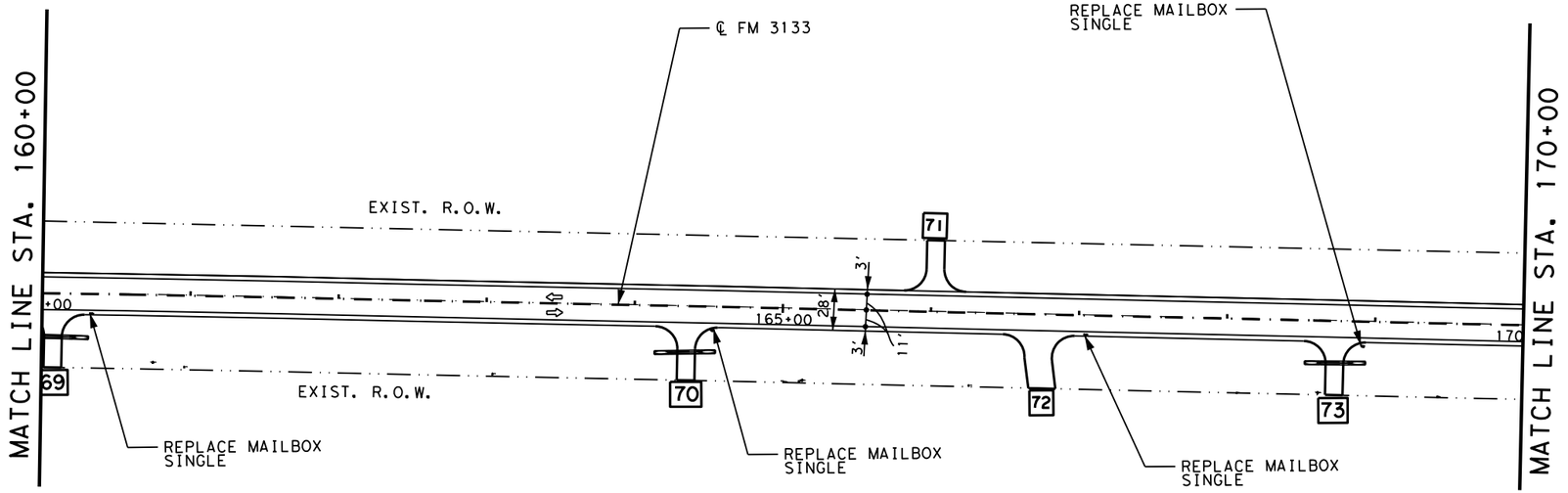
FM 3133
PLAN AND PROFILE

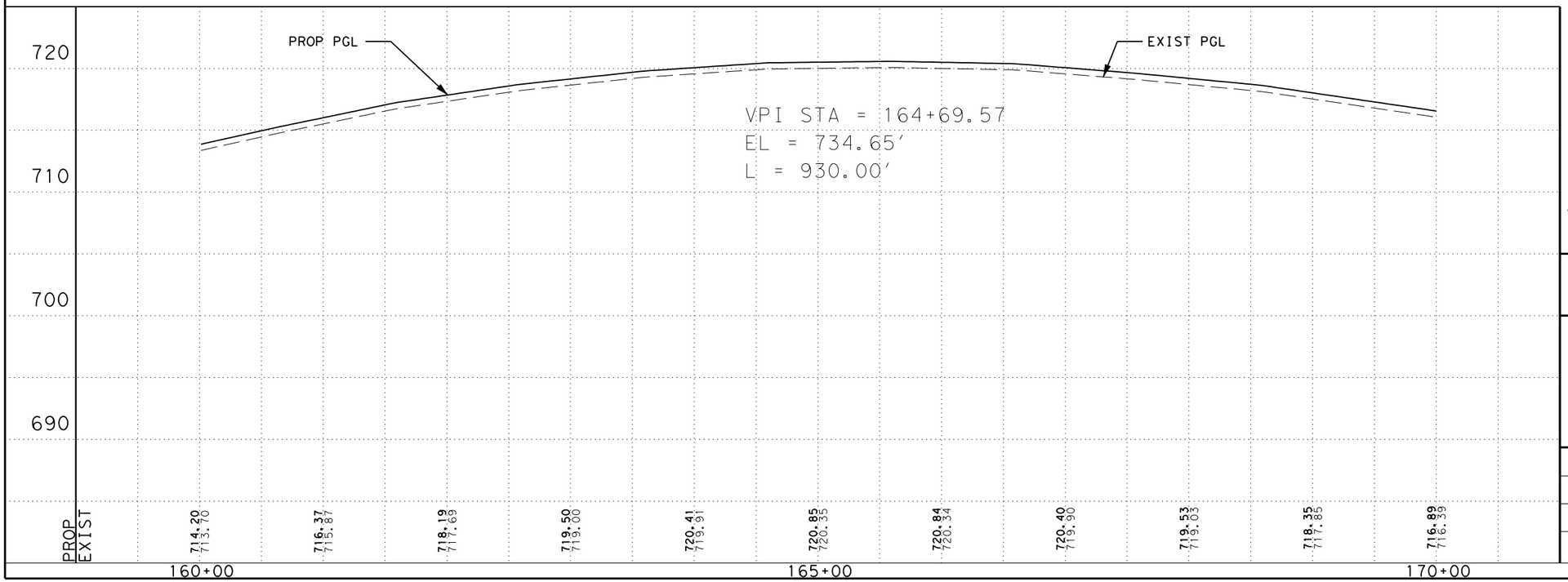
STA. 150+00.00 TO STA. 160+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 16 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	67
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	





N

HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

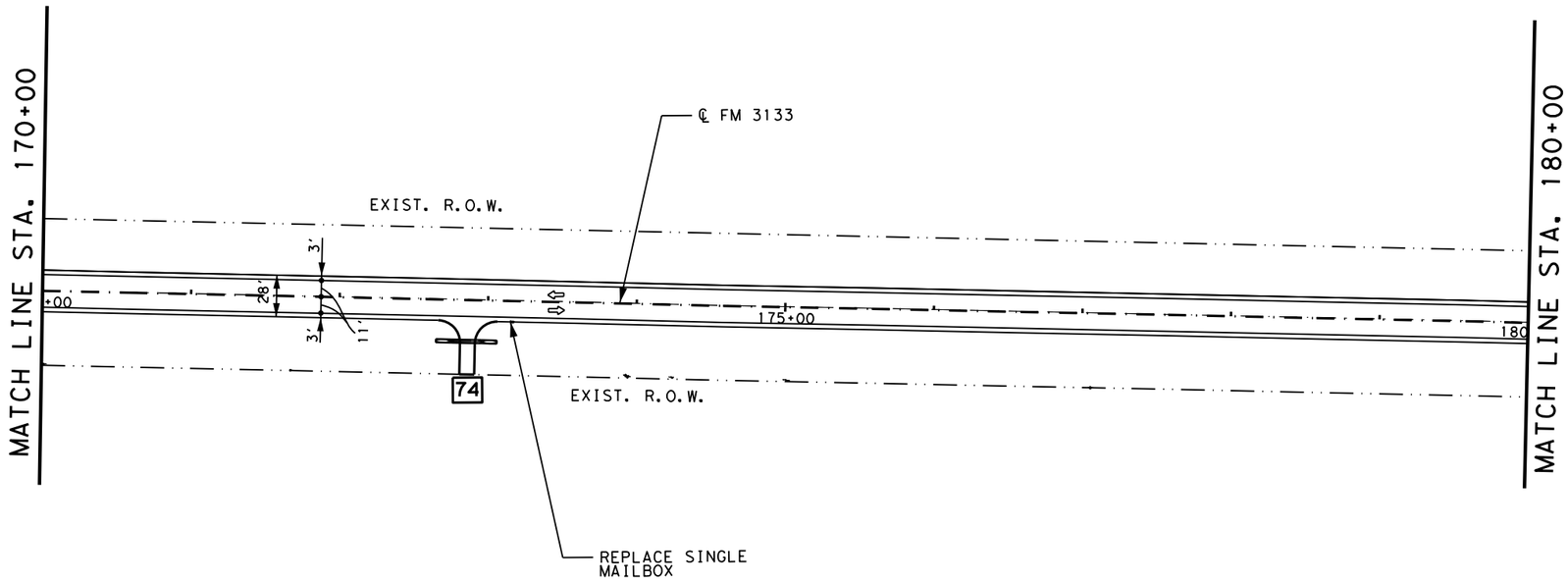
FM 3133
PLAN AND PROFILE

STA. 160+00.00 TO STA. 170+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 17 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	68
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



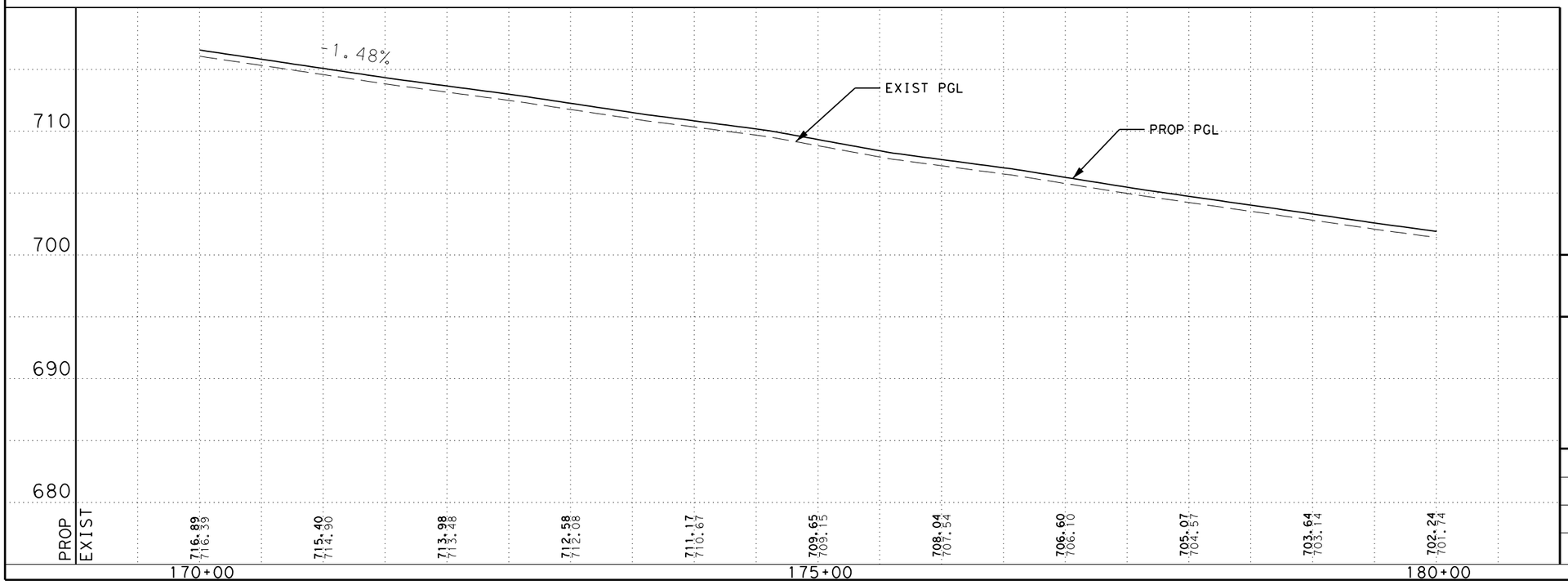
N

HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND
⇦ DIRECTION OF TRAFFIC
⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

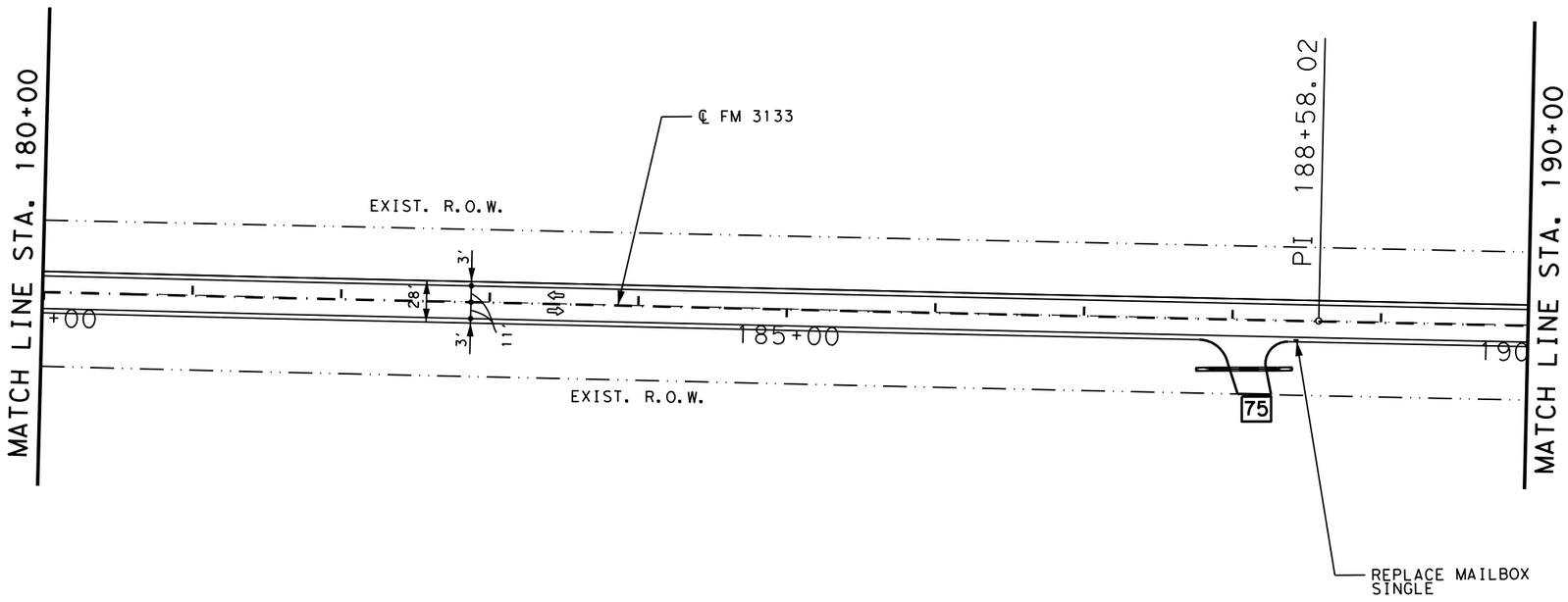
Texas Department of Transportation

FM 3133
PLAN AND PROFILE
STA. 170+00.00 TO STA. 180+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 18 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	69
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

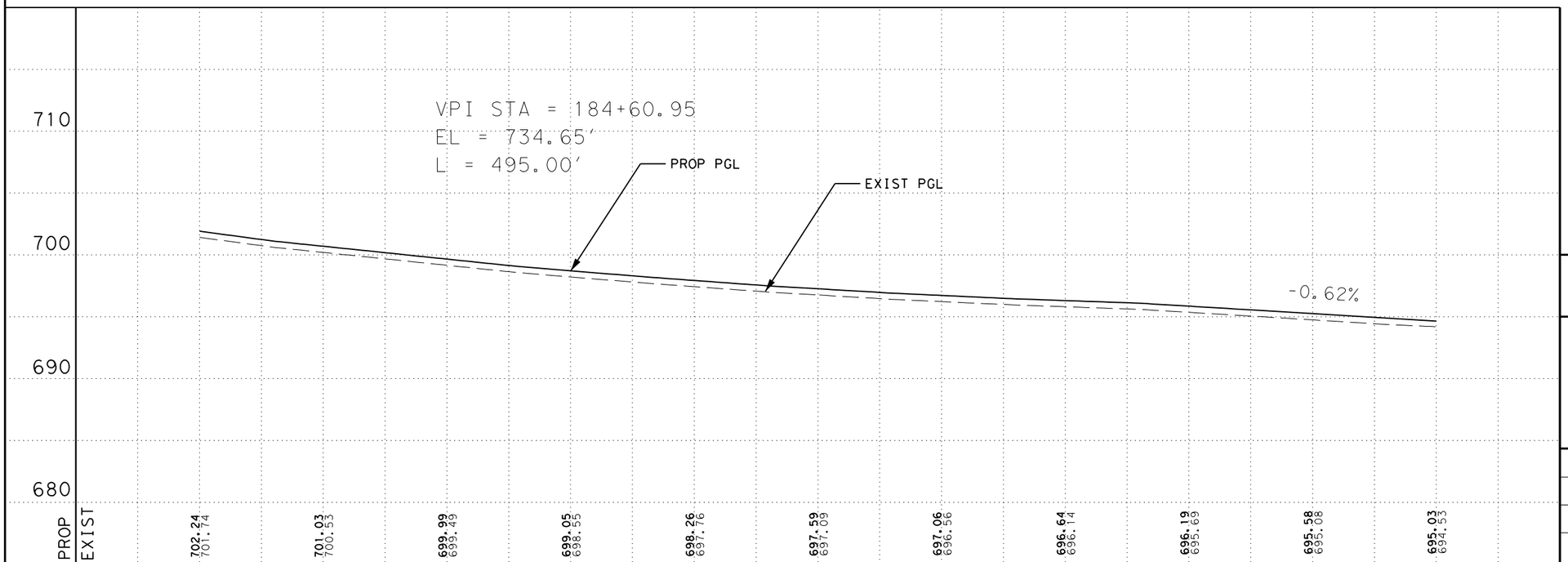
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

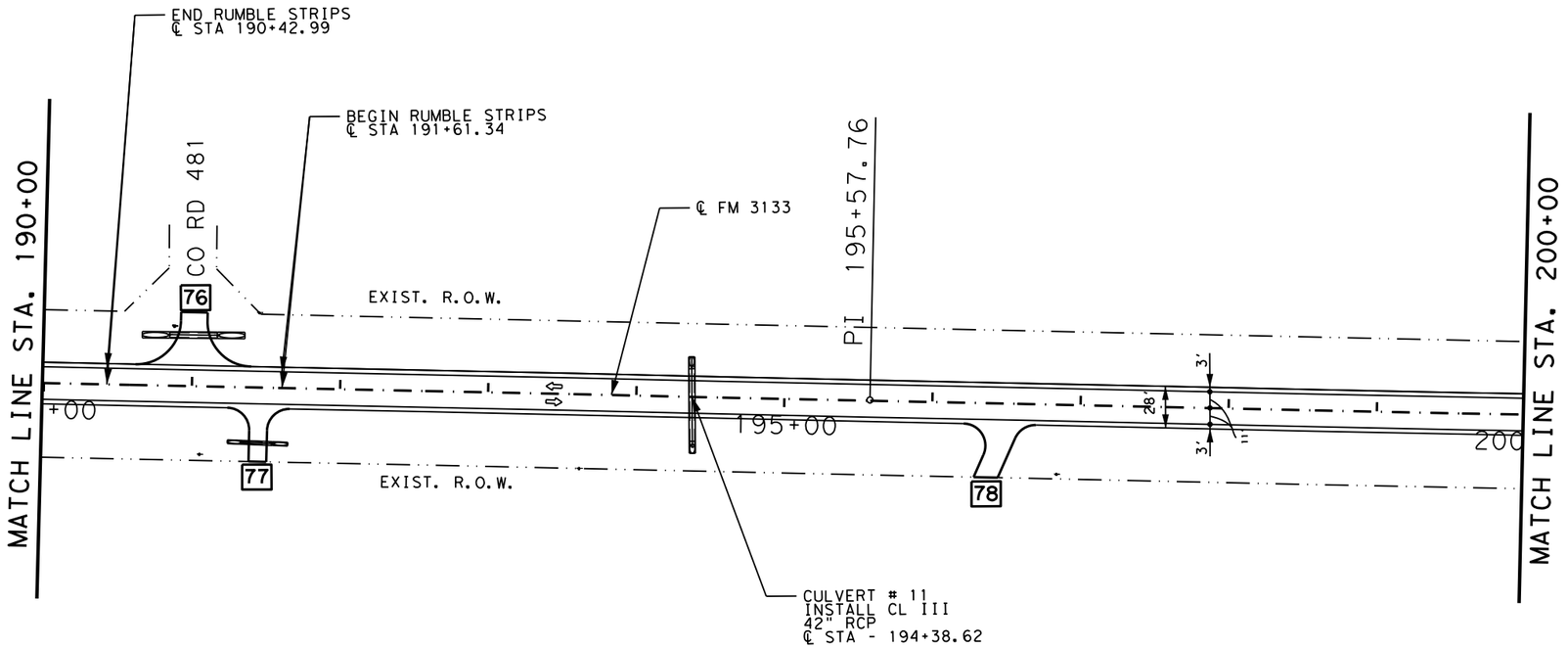
FM 3133
PLAN AND PROFILE

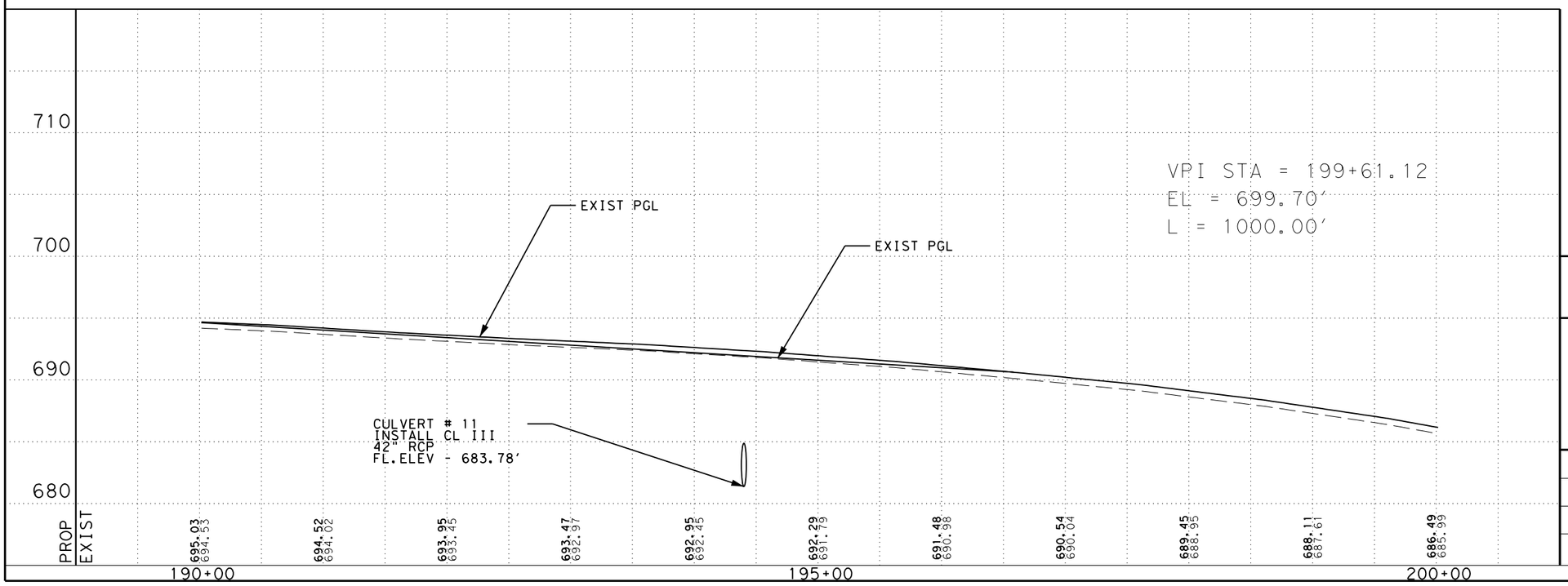
STA. 180+00.00 TO STA. 190+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 19 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	70
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

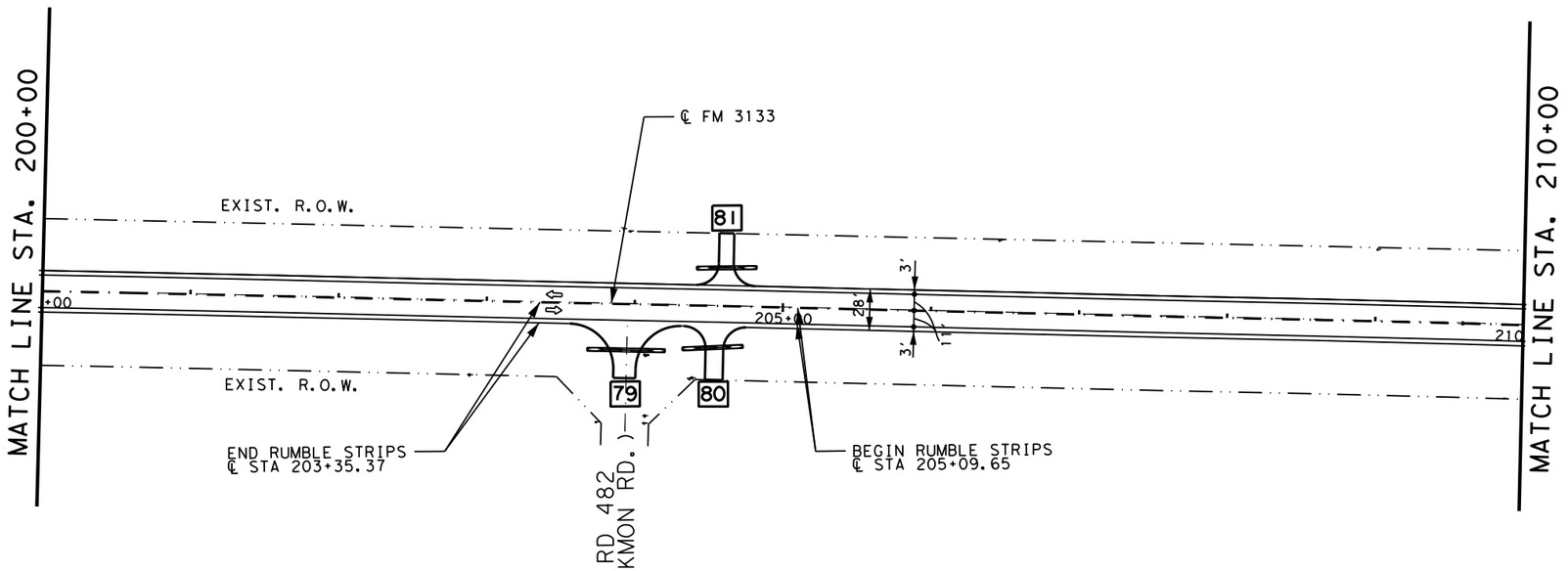
FM 3133
PLAN AND PROFILE

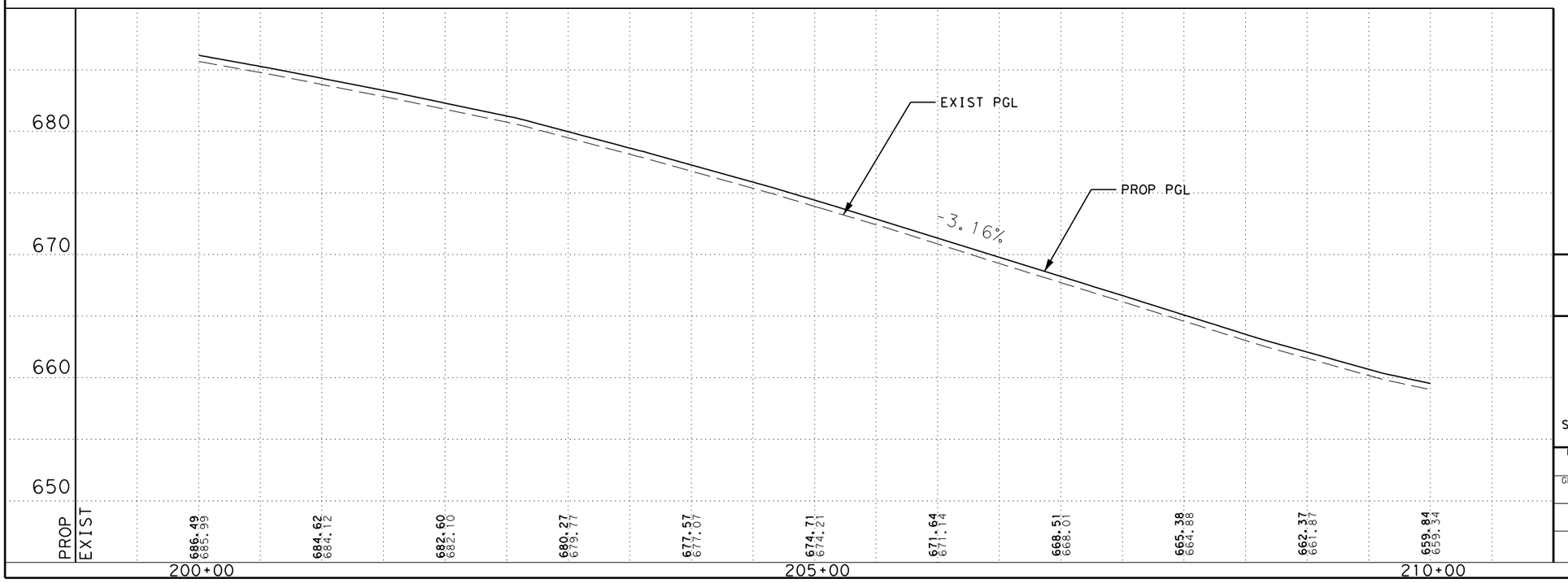
STA. 190+00.00 TO STA. 200+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 20 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	71
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				





HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND
⇦ DIRECTION OF TRAFFIC
⊡ INTERSECTION/DRIVEWAY NUMBER

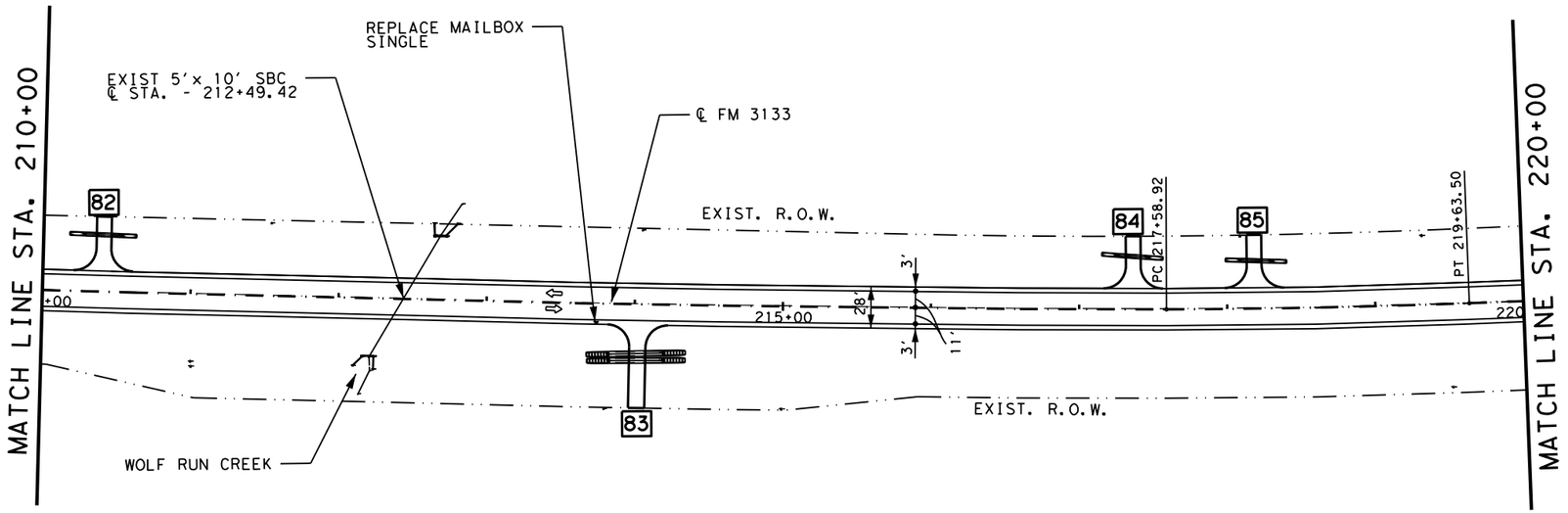
NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

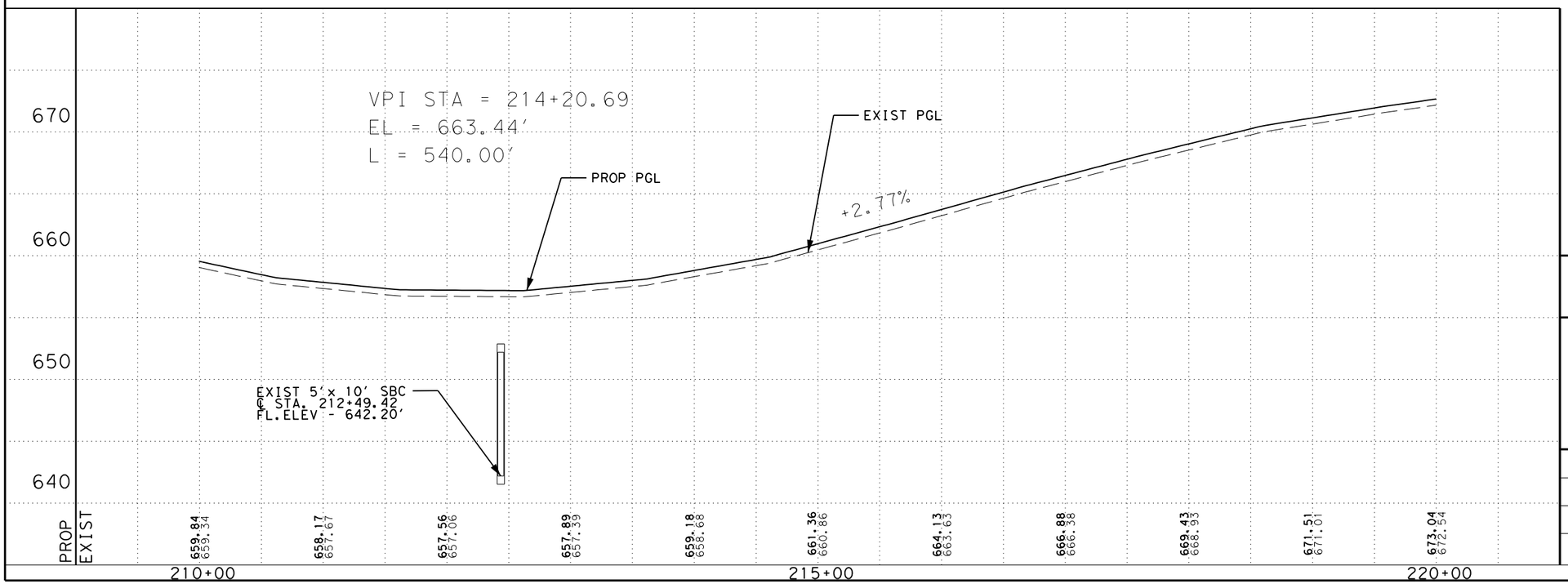
STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER
11/4/20

FM 3133
PLAN AND PROFILE
STA. 200+00.00 TO STA. 210+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'
SHEET 21 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	72
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

SCALE IN FEET

N

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

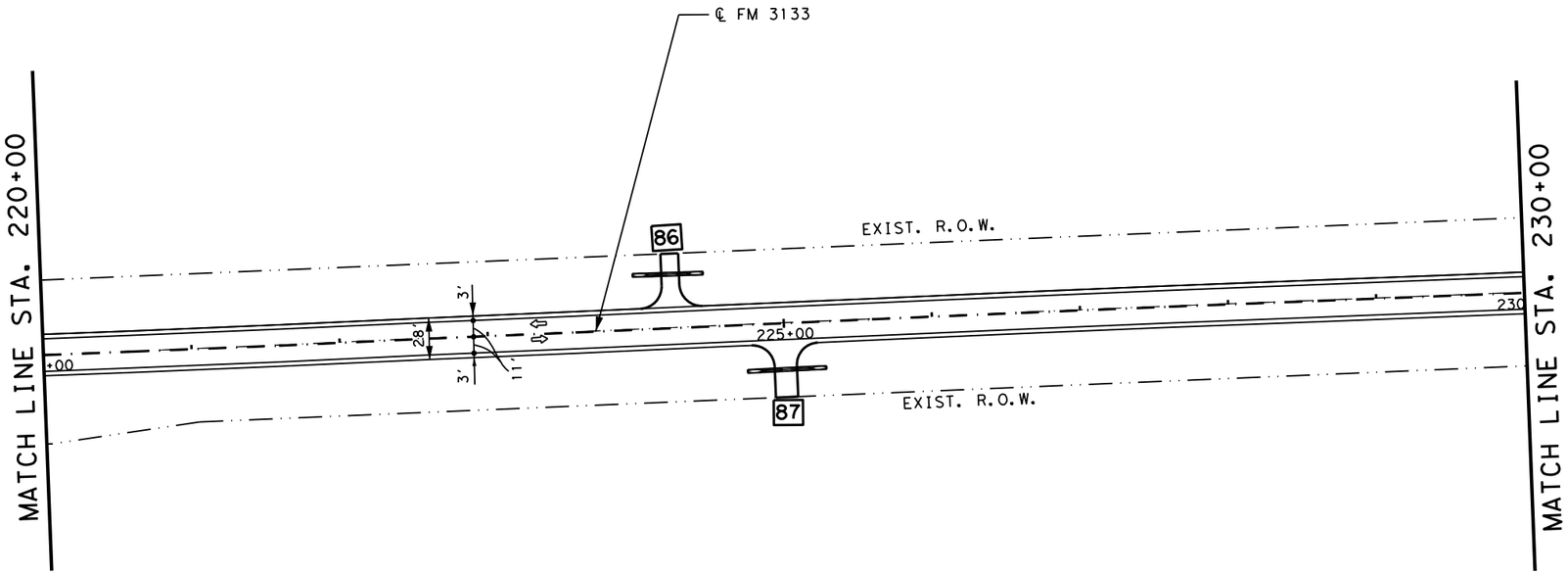
FM 3133
PLAN AND PROFILE

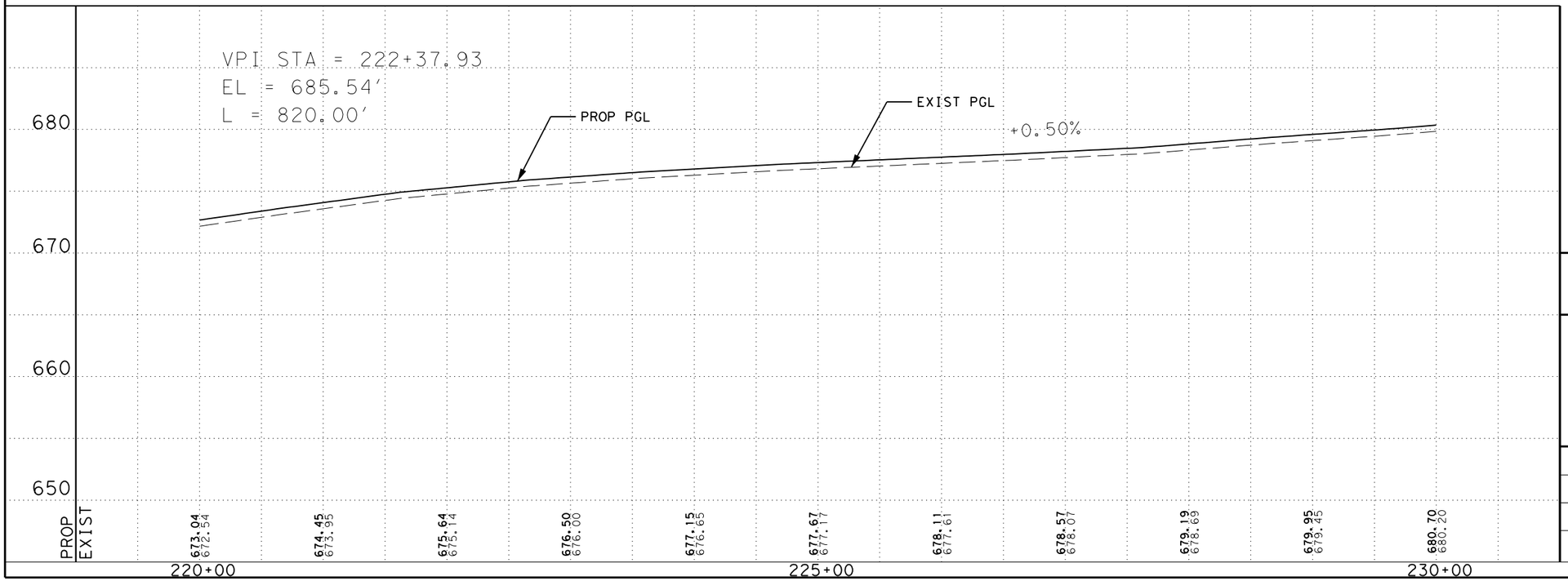
STA. 210+00.00 TO STA. 220+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 22 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	73
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				





HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

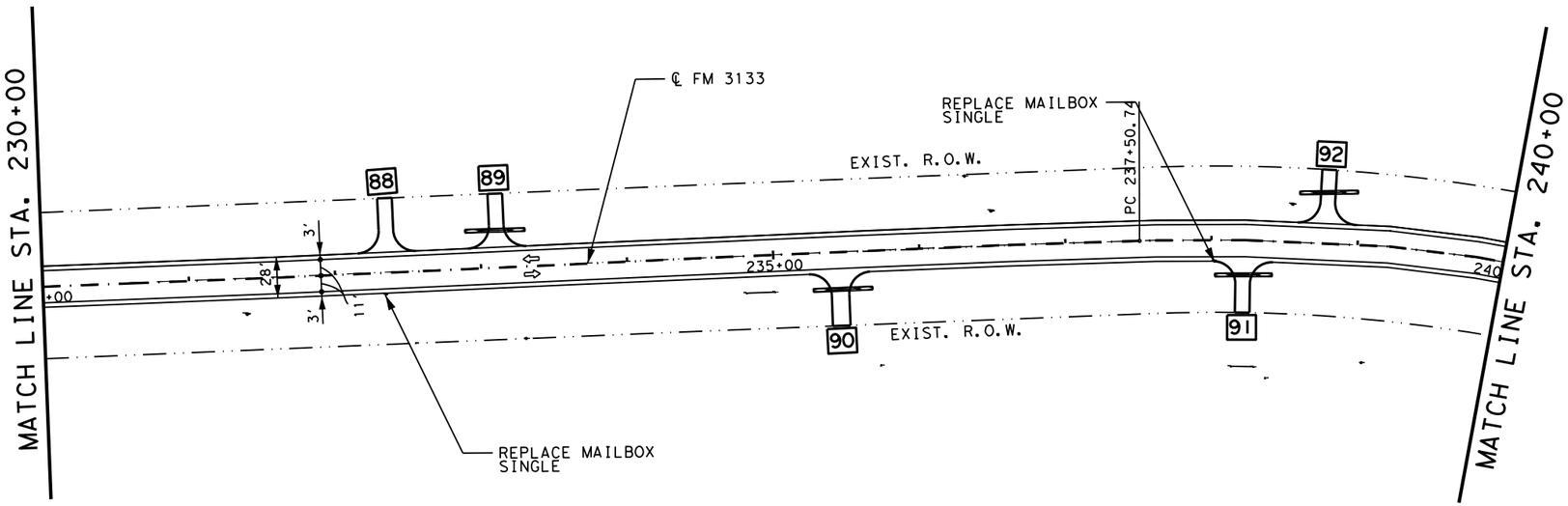
FM 3133
PLAN AND PROFILE

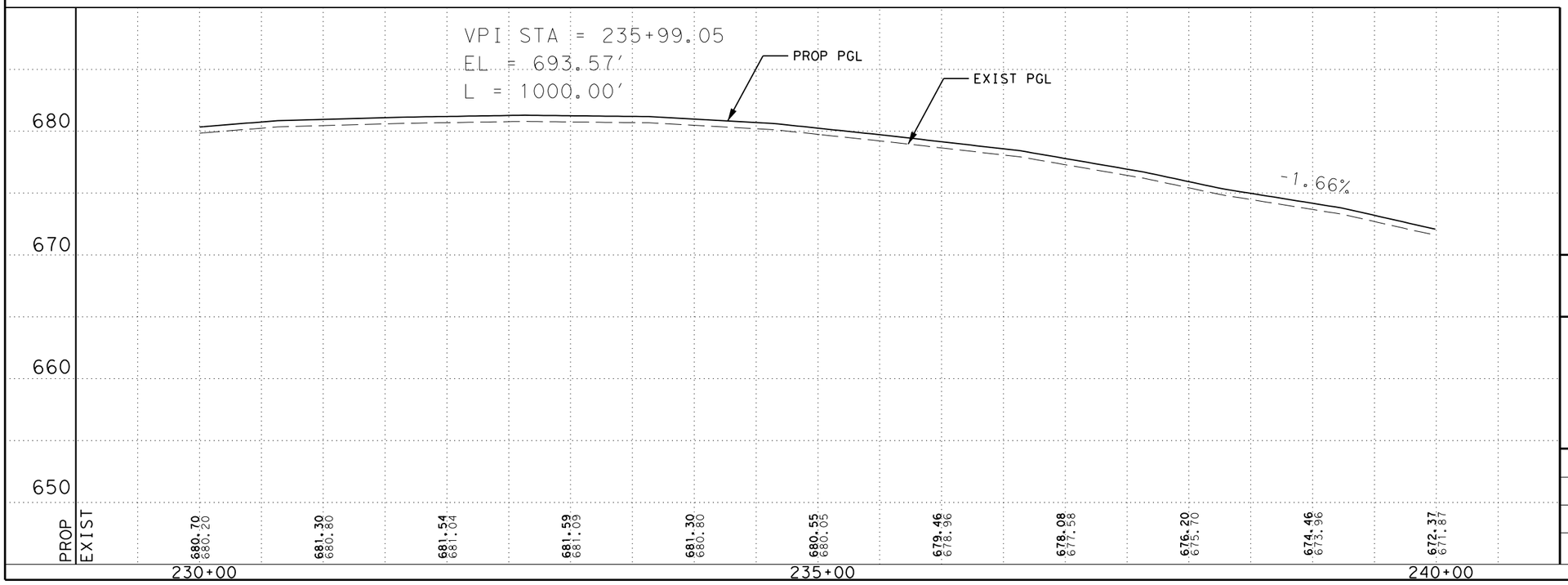
STA. 220+00.00 TO STA. 230+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 23 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	74
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	





HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

N

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

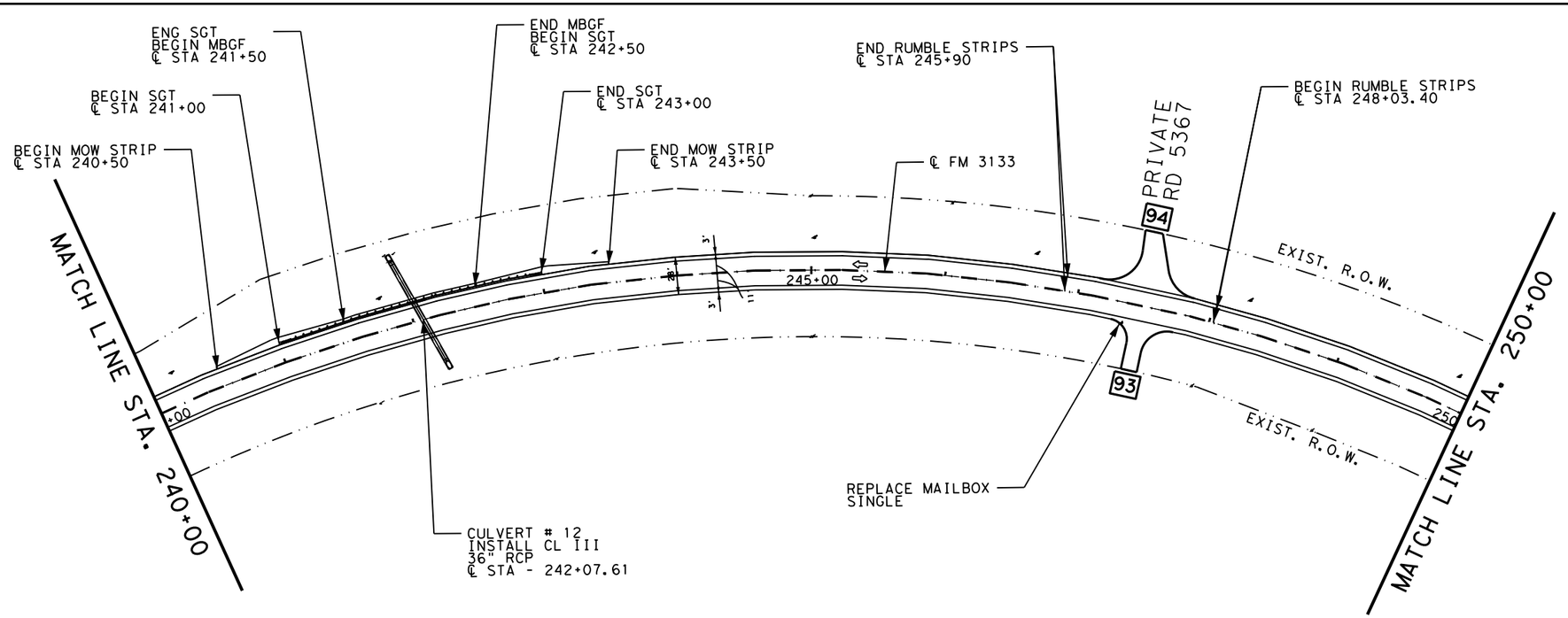
Texas Department of Transportation

FM 3133
PLAN AND PROFILE
STA. 230+00.00 TO STA. 240+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 24 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	75
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

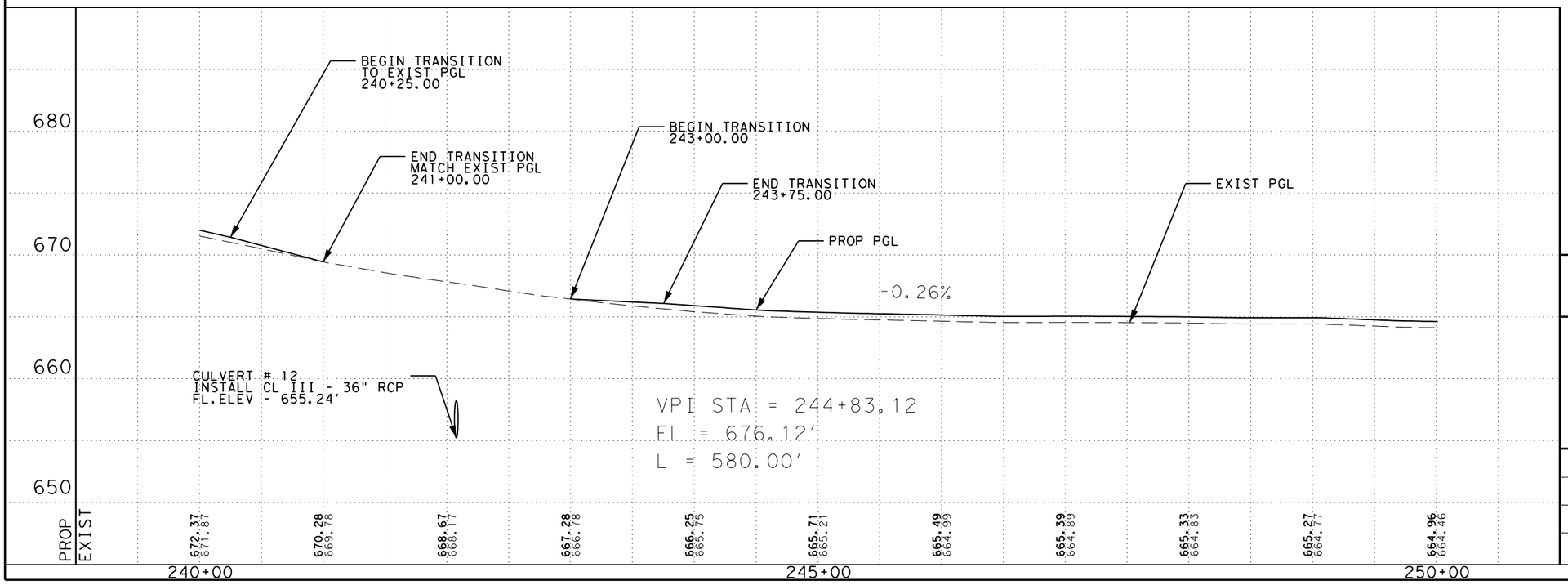


HORIZONTAL SCALE
0 50 100
SCALE IN FEET

VERTICAL SCALE
0 5 10
SCALE IN FEET

LEGEND
⇦ DIRECTION OF TRAFFIC
⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

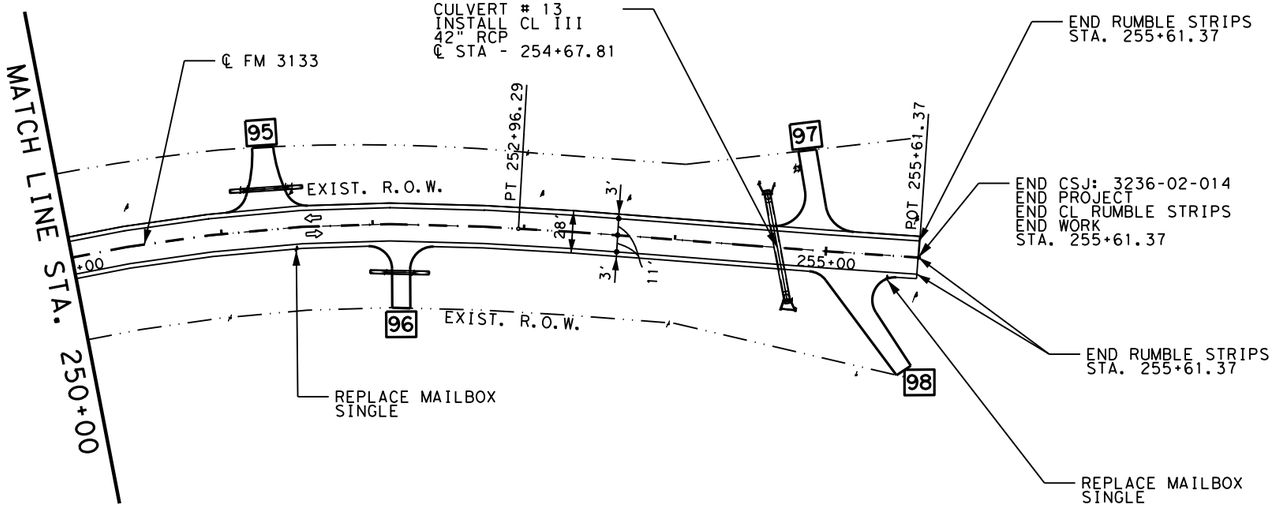
Texas Department of Transportation

FM 3133
PLAN AND PROFILE
STA. 240+00.00 TO STA. 250+00.00

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

SHEET 25 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	76
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



HORIZONTAL SCALE

0 50 100

SCALE IN FEET

VERTICAL SCALE

0 5 10

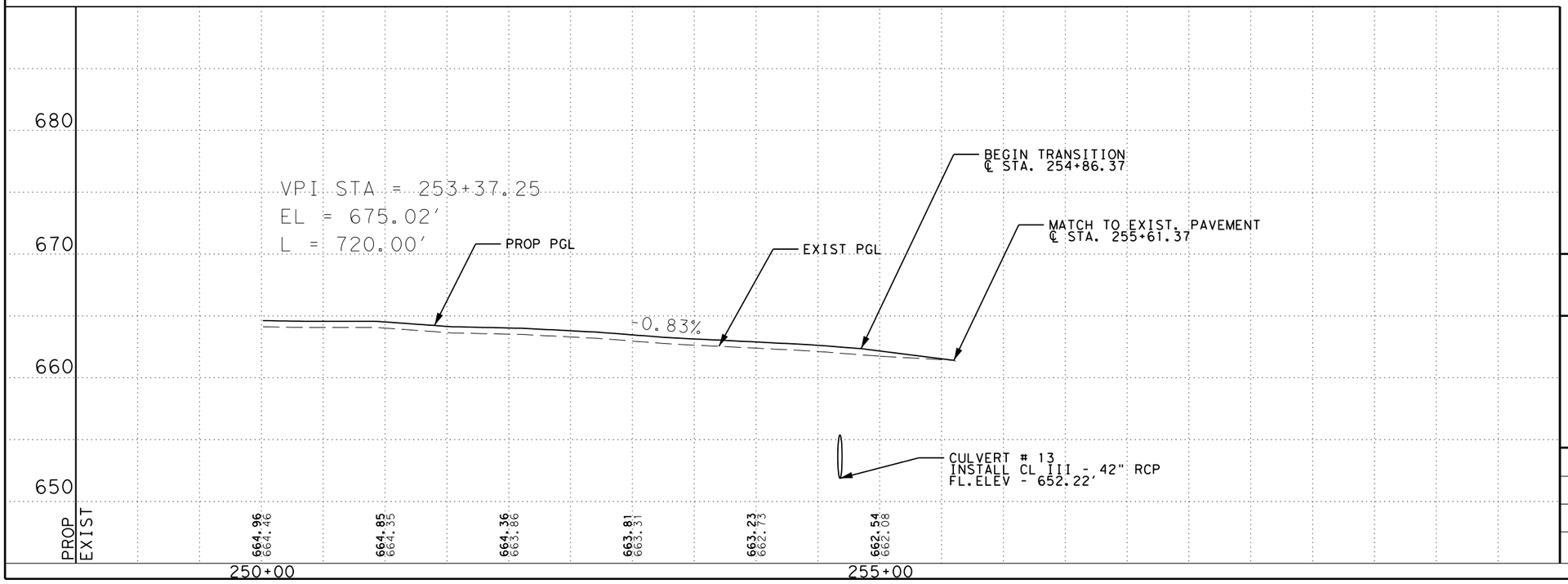
SCALE IN FEET

LEGEND

⇦ DIRECTION OF TRAFFIC

⊡ INTERSECTION/DRIVEWAY NUMBER

NOTE
1. REFER TO INTERSECTION/ DRIVEWAY SUMMARY SHEET FOR DETAILED INFORMATION



STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
PLAN AND PROFILE

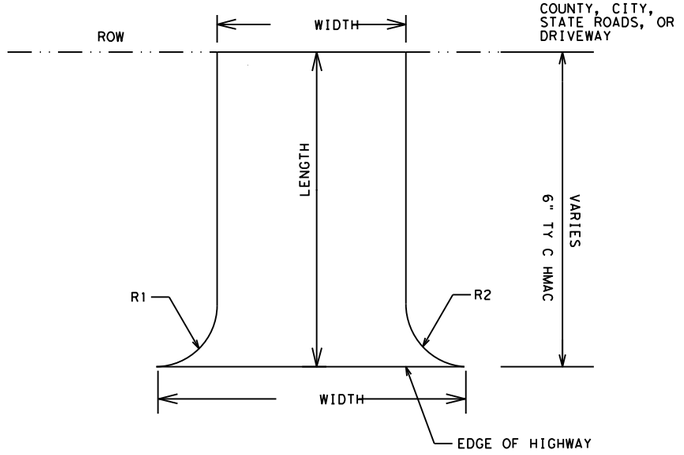
STA. 250+00.00 TO STA. 255+61.37

SCALE: HORZ: 1" = 100'
VERT: 1" = 10'

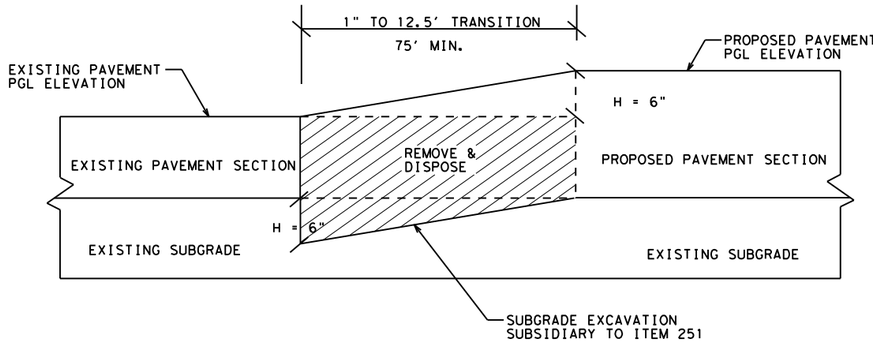
SHEET 26 OF 26

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	77
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

ASPHALT CONCRETE PAVEMENT DRIVEWAY COUNTY, CITY, OR STATE ROAD OVERLAY DETAILS

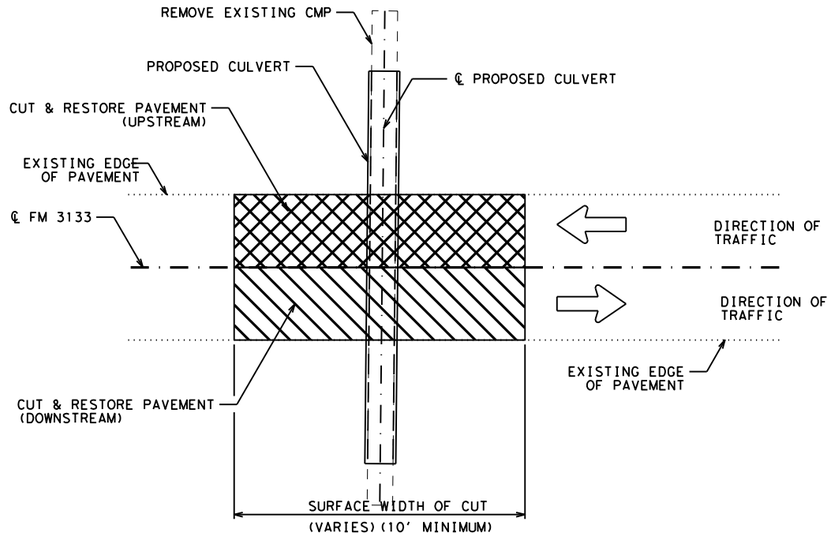


PLAN VIEW



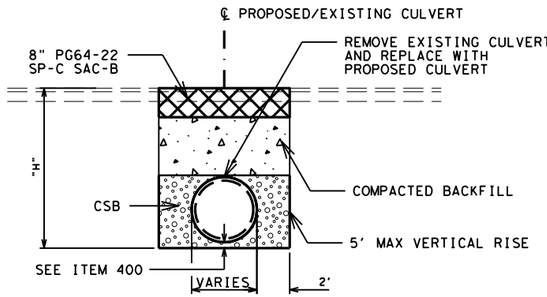
PAVEMENT SECTION TRANSITION DETAILS

NOTES:
1. TRANSITION TAPER (75' USUAL)



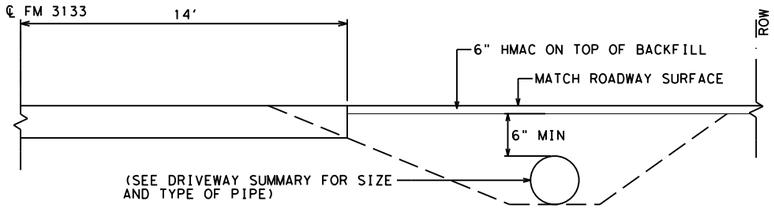
CUT & RESTORE DETAIL

PLAN VIEW



CUT & RESTORE DETAIL

SIDE VIEW



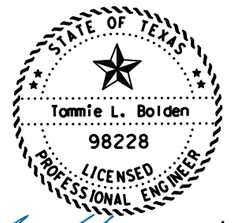
CROSS SECTION DRIVEWAY WITH PIPE

NOTES:

1. SEE "DRIVEWAY SUMMARY" SHEET FOR ADDITIONAL INFORMATION.
2. CUT AND RESTORE FOR DRIVEWAY & INTERSECTIONS WILL BE SUBSIDIARY TO VARIOUS BID ITEMS.

NOTES:

1. SEE THE TxDOT BARRICADE AND CONSTRUCTION AND TRAFFIC CONTROL PLAN STANDARDS FOR ADDITIONAL INFORMATION.
2. SEE CULVERT LAYOUTS FOR ADDITIONAL INFORMATION.
3. CULVERTS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM.
4. MAINTAIN POSITIVE DRAINAGE DURING CULVERT CONSTRUCTION.
5. MATCH EXISTING CROSS SLOPES AND ELEVATIONS.
6. PROVIDE DAYTIME ONE-WAY TRAFFIC CONTROL AS NECESSARY FOR PHASED CONSTRUCTION. RE-OPEN FM 3133 TO TWO-WAY TRAFFIC AT THE CONCLUSION OF EACH DAY'S WORK.



1/7/21

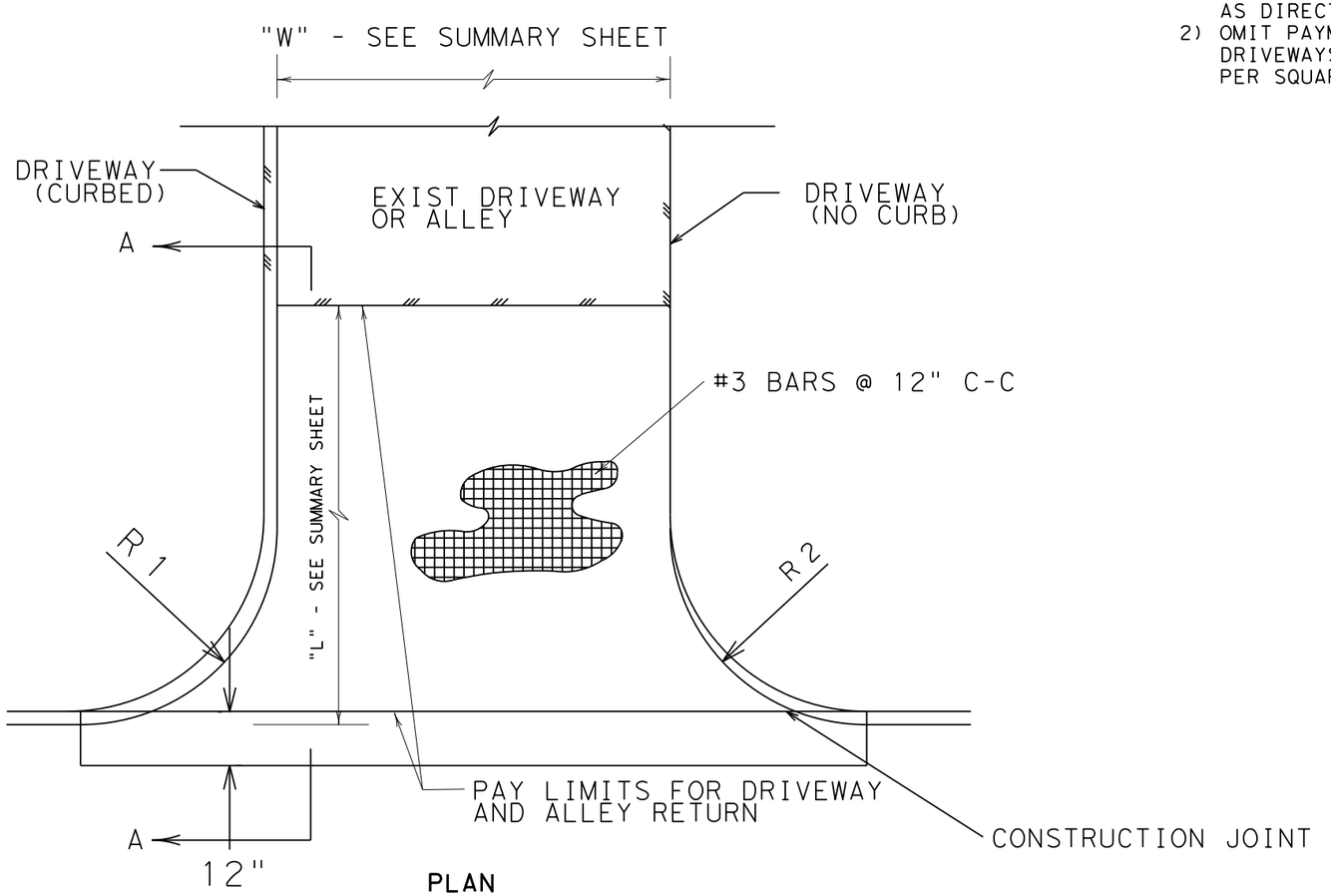
FM 3133 MISCELLANEOUS DETAILS

SCALE: NTS

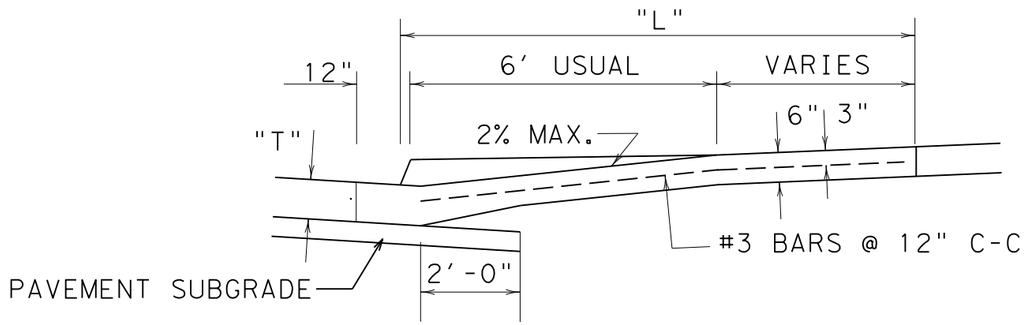
SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	78
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				

NOTES:
1) DRIVEWAY LOCATIONS MAY BE SHIFTED AT TIME OF CONSTRUCTION AS DIRECTED BY THE ENGINEER TO MATCH EXISTING CONDITIONS.
2) OMIT PAYMENT FOR CURB WITHIN LIMITS OF DRIVEWAY. CURBS ON DRIVEWAYS SHALL BE CONSIDERED SUBSIDIARY TO THE PRICE BID PER SQUARE YARD FOR DRIVEWAY AND WILL NOT BE PAID FOR DIRECTLY.



PLAN



PROFILE

CONCRETE DRIVEWAYS

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

CONCRETE DRIVEWAY DETAILS

SCALE: NTS

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	79
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

11/17/2020 1:40:34 PM

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
1 +00	36	19
2 +00	21	20
3 +00	34	5
4 +00	20	4
5 +00	38	2
6 +00	49	4
7 +00	16	2
8 +00	14	0
9 +00	11	0
10 +00	29	3
11 +00	86	3
12 +00	99	0
13 +00	86	4
14 +00	67	5
15 +00	39	12
16 +00	16	12
17 +00	5	0
18 +00	23	1
19 +00	61	1
20 +00	68	0
21 +00	48	1
22 +00	28	1
23 +00	19	0
24 +00	21	0
25 +00	11	0
26 +00	7	0
27 +00	7	0
28 +00	30	0
29 +00	26	0
30 +00	12	0
31 +00	18	0
32 +00	16	0
33 +00	16	0
34 +00	11	0
35 +00	13	0
36 +00	17	0
37 +00	14	0
38 +00	14	0
39 +00	15	0
40 +00	16	0
41 +00	19	0
42 +00	19	0
43 +00	20	0
44 +00	19	0

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
45 +00	15	0
46 +00	12	0
47 +00	13	0
48 +00	12	0
49 +00	17	0
50 +00	24	0
51 +00	23	0
52 +00	23	0
53 +00	25	0
54 +00	27	0
55 +00	27	0
56 +00	31	0
57 +00	34	0
58 +00	35	0
59 +00	35	0
60 +00	36	0
61 +00	36	0
62 +00	36	0
63 +00	52	0
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67 +00	34	0
68 +00	34	0
69 +00	36	0
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71 +00	26	0
72 +00	20	0
73 +00	21	0
74 +00	19	0
75 +00	17	0
76 +00	16	0
77 +00	16	0
78 +00	15	0
79 +00	29	0
80 +00	29	0
81 +00	18	0
82 +00	32	0
83 +00	32	0
84 +00	21	0
85 +00	23	0
86 +00	26	0
87 +00	26	0
88 +00	22	0
89 +00	20	0

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
90 +00	22	0
91 +00	21	0
92 +00	15	0
93 +00	8	0
94 +00	4	0
95 +00	2	0
96 +00	7	0
97 +00	11	0
98 +00	14	0
99 +00	16	0
100 +00	18	0
101 +00	21	0
102 +00	29	3
103 +00	37	6
104 +00	39	8
105 +00	43	8
106 +00	36	3
107 +00	24	0
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109 +00	27	0
110 +00	30	0
111 +00	27	0
112 +00	15	0
113 +00	28	0
114 +00	33	0
115 +00	24	0
116 +00	18	0
117 +00	14	0
118 +00	7	0
119 +00	26	6
120 +00	48	16
121 +00	31	12
122 +00	18	1
123 +00	16	0
124 +00	16	8
125 +00	14	8
126 +00	5	0
127 +00	5	0
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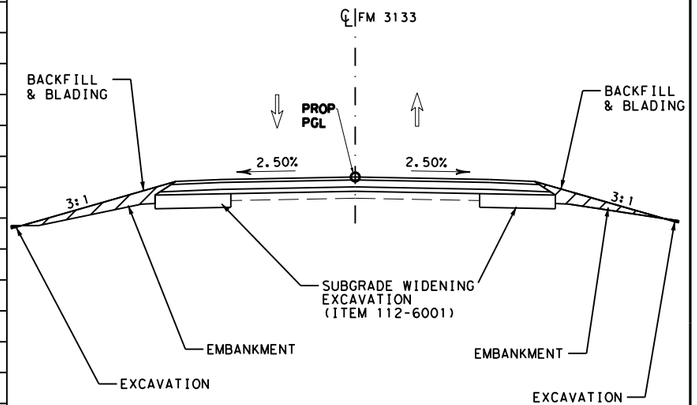
134 +00	12	0



FM 3133
EARTHWORK QUANTITIES

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	80
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

$FILEL$

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
135 +00	12	0
136 +00	13	0
137 +00	14	0
138 +00	6	0
139 +00	8	0
140 +00	14	0
141 +00	12	0
142 +00	14	0
143 +00	14	0
144 +00	11	0
145 +00	14	0
146 +00	24	2
147 +00	27	2
148 +00	16	0
149 +00	15	0
150 +00	98	15
151 +00	101	15
152 +00	31	9
153 +00	22	9
154 +00	11	0
155 +00	21	0
156 +00	19	0
157 +00	11	0
158 +00	14	0
159 +00	12	0
160 +00	22	0
161 +00	25	0
162 +00	23	0
163 +00	23	0
164 +00	16	0
165 +00	9	0
166 +00	13	0
167 +00	15	0
168 +00	9	0
169 +00	13	0
170 +00	13	0
171 +00	11	0
172 +00	12	0
173 +00	12	0
174 +00	16	0
175 +00	18	0
176 +00	18	0
177 +00	18	0
178 +00	19	0
179 +00	18	0

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
180 +00	16	0
181 +00	15	0
182 +00	16	0
183 +00	16	0
184 +00	16	0
185 +00	16	0
186 +00	16	0
187 +00	19	0
188 +00	28	0
189 +00	30	0
190 +00	23	0
191 +00	36	0
192 +00	44	0
193 +00	45	0
194 +00	98	0
195 +00	87	0
196 +00	21	0
197 +00	13	0
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200 +00	14	0
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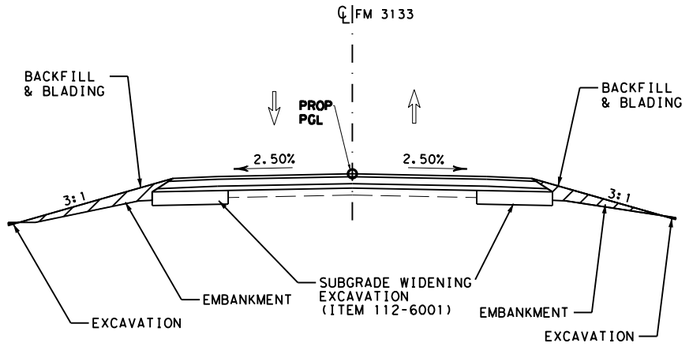
212 +00	75	0
213 +00	106	0
214 +00	79	0
215 +00	34	0
216 +00	82	0
217 +00	88	0
218 +00	29	0
219 +00	35	0
220 +00	43	0
221 +00	32	0
222 +00	29	0
223 +00	29	0
224 +00	24	0

EARTHWORK SUMMARY		
STATION	132 6006 EMBANKMENT CY	110 6001 EXCAVATION CY
225 +00	34	0
226 +00	36	0
227 +00	23	0
228 +00	18	0
229 +00	19	0
230 +00	21	0
231 +00	14	0
232 +00	6	0
233 +00	5	0
234 +00	11	0
235 +00	14	0
236 +00	11	0
237 +00	11	0
238 +00	14	0
239 +00	39	0
240 +00	82	0
241 +00	126	0
242 +00	172	1
243 +00	175	1
244 +00	117	1
245 +00	73	0
246 +00	53	0
247 +00	22	0
248 +00	4	0
249 +00	0	0
250 +00	0	0
251 +00	3	0
252 +00	7	0
253 +00	27	0
254 +00	32	0
255 +00	9	0
SUBTOTAL	**3001**	**3**
TOTAL	**7016**	**233**



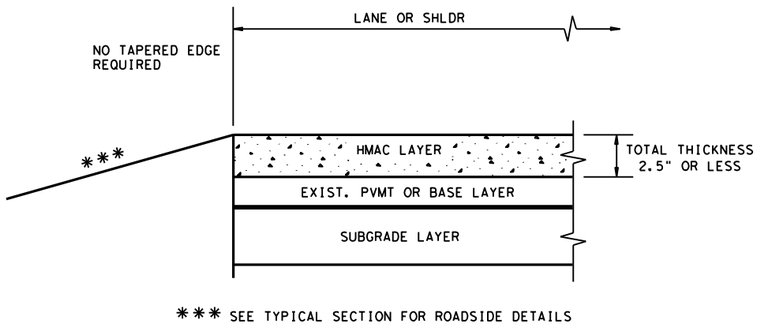
Texas Department of Transportation

FM 3133
EARTHWORK QUANTITIES

SHEET 2 OF 2

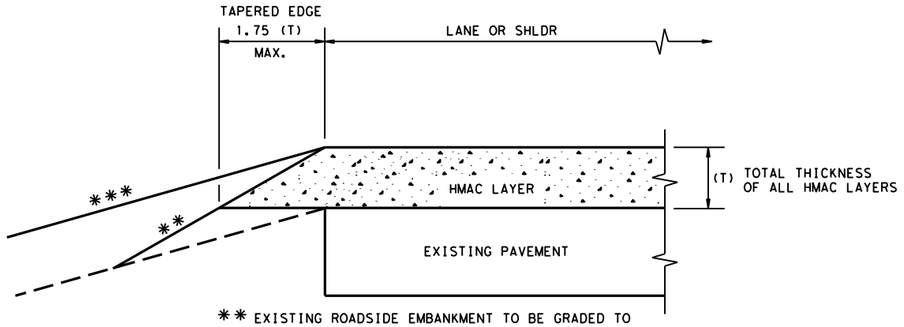
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	81
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012,etc.	

DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\TE(HMAC)-11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

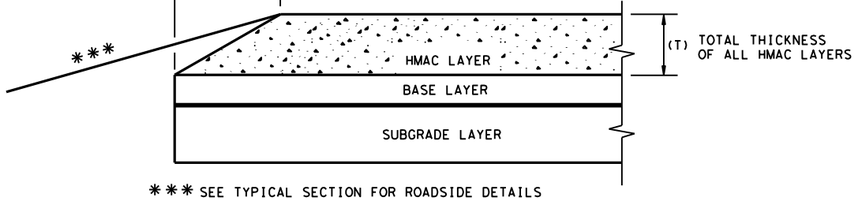
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

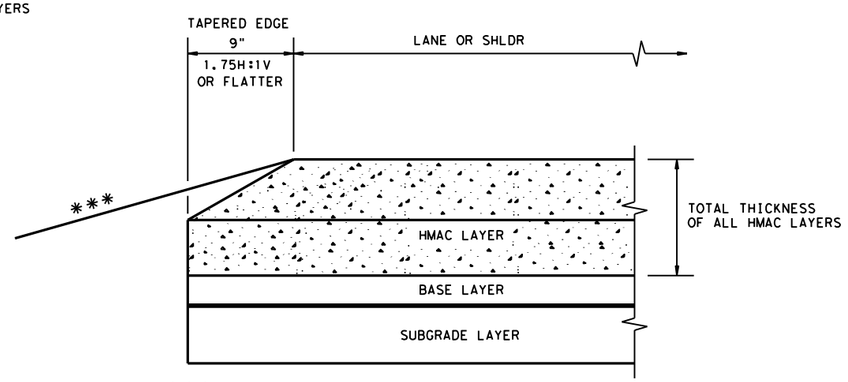
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

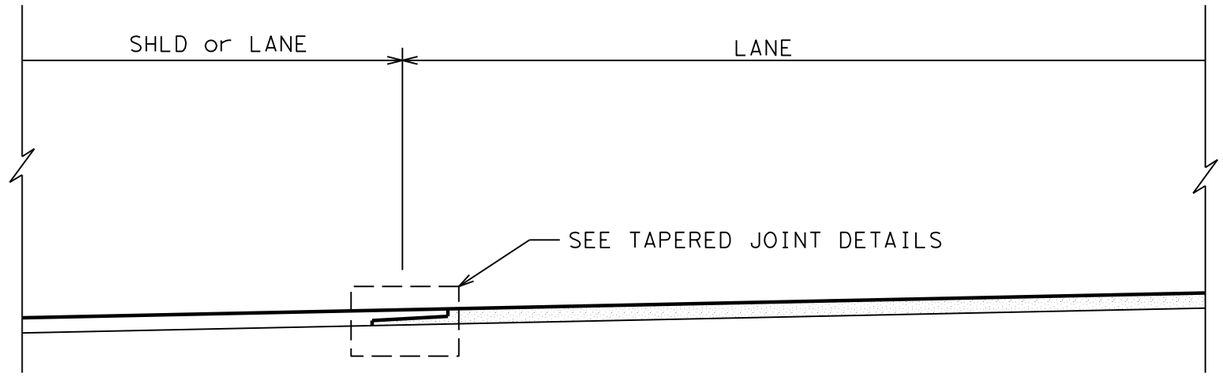
1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

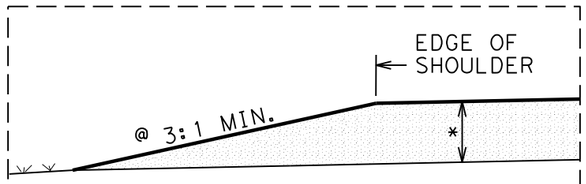
Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

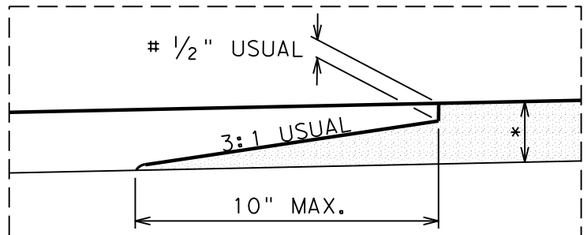
TE(HMAC)-11

FILE: tehmac11.dgn		DN: TxDOT		CK: RL	DW: KB		CK:
©TxDOT January 2011		CONT	SECT	JOB		HIGHWAY	
REVISIONS		3236	02	012,etc.		FM3133	
		DIST	COUNTY				SHEET NO.
		DAL	COLLIN				82

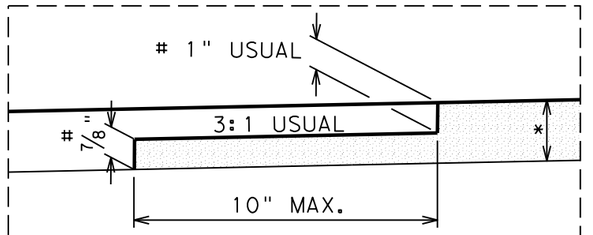




TAPERED OUTSIDE EDGE DETAIL



TAPERED JOINT DETAIL 1.5" TO 4" LIFTS



TAPERED JOINT DETAIL OVER 4" LIFTS

@ IF BACKFILLED SLOPE IS LESS THAN 3:1, COVER WEDGE WITH APPROVED BACKFILL.

* SEE TYPICAL SECTION FOR DEPTH AND TYPE OF HMA.
# NOTCH DEPTH SHALL NOT BE LESS THAN NOMINAL AGGREGATE SIZE.

NOTES:

1. THE ABOVE DETAILS SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL EXTEND BEYOND THE NORMAL LANE WIDTH AND BE LAID MONOLITHICALLY WITH ADJOINING MAT. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED STRIKE-OFF DEVICE THAT WILL PROVIDE A UNIFORM SLOPE AND WILL NOT RESTRICT THE MAIN SCREED. CLEAN WEDGE PRIOR TO PLACEMENT OF TACK COAT. TACK COAT SHALL BE APPLIED UNIFORMLY TO THE IN-PLACE TAPER WITH A DISTRIBUTOR BEFORE THE ADJACENT MAT IS PLACED. FINAL DENSITY REQUIREMENTS FOR THE ENTIRE PAVEMENT, INCLUDING THE TAPER AREA, WILL REMAIN UNCHANGED. COMPACTION OF THE INITIAL TAPER SECTION WILL BE REQUIRED AS NEAR TO FINAL DENSITY AS POSSIBLE. ROLL ADJACENT MAT FROM HOT SIDE TO COLD.

2. THE TYPE OF DEVICE TO PRODUCE ABOVE REFERENCED DETAILS SHALL PROVIDE INITIAL COMPACTION EQUIVALENT TO LAYDOWN MACHINE, WITH FINAL DENSITY ADHERING TO NOTE 1, AND BE APPROVED BY THE ENGINEER.

3. HOT MIX MATERIAL AND PLACEMENT SHALL BE PAID FOR UNDER THE PERTINENT ITEM. ANY ADDITIONAL SURFACE PREPARATION, TACK COAT, TACK COAT PLACEMENT, EQUIPMENT, LABOR, TOOLS AND INCIDENTALS TO PRODUCE TAPERED EDGE AND JOINTS AS DESCRIBED ABOVE SHALL BE CONSIDERED SUBSIDIARY TO THE HOT MIX ITEM.

4. THE TAPERED JOINT DETAIL IS NOT INTENDED FOR USE ON 2 WAY 2 LANE ROADBED CENTERLINE WITH LESS THAN 22' OVERALL WIDTH.

5. FULL PAVING OF ALL LANES AND SHOULDRS BY THE END OF EACH DAY PRODUCTION WILL NOT REQUIRE A TAPERED JOINT.

REVISED ON 9/10/08

HOT MIX EDGE AND LONGITUDINAL JOINT DETAILS DALLAS DISTRICT STANDARD

LJD(1-1)-07

FED. RD. DIV. NO.	PROJECT NUMBER		SHEET NUMBER
18	(See Title Sheet)		83
STATE	DISTRICT	COUNTY	
TEXAS	DAL	COLLIN	
CONTROL	SECTION	SECTION	HIGHWAY NUMBER
3236	02	012,etc.	FM3133

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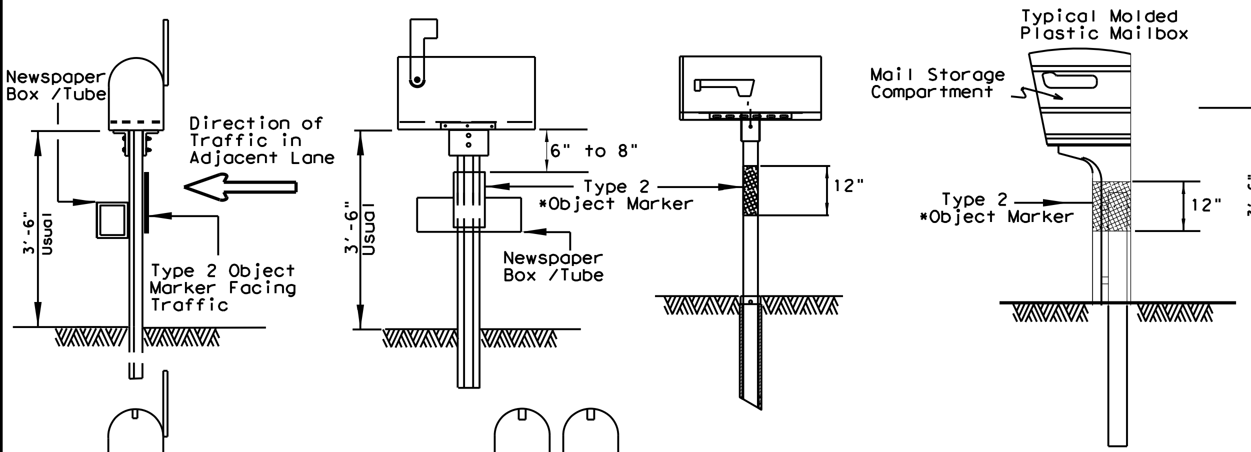
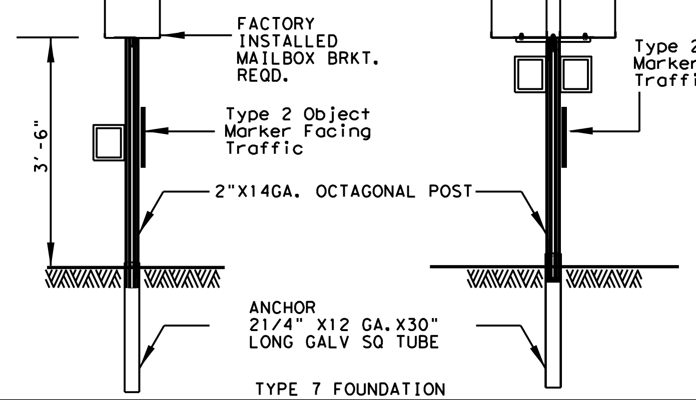




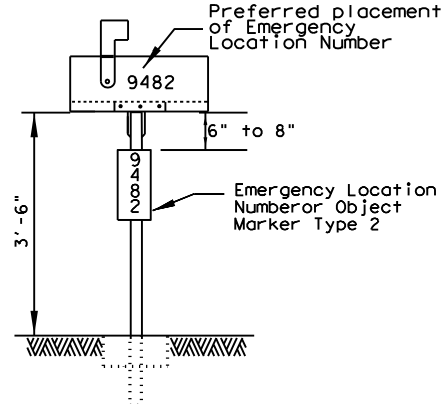
SINGLE AND DOUBLE MAILBOX MOUNT

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")

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
	LENGTH	WIDTH	HEIGHT	MAXIMUM WEIGHT	
SIZE	INCHES			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

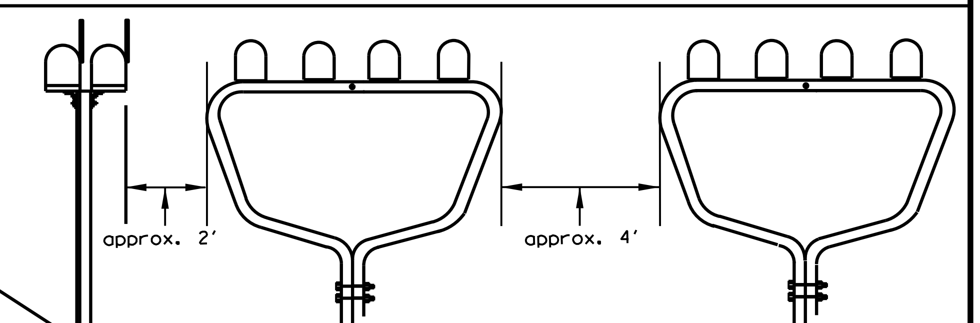
LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 1/2	11 1/2		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

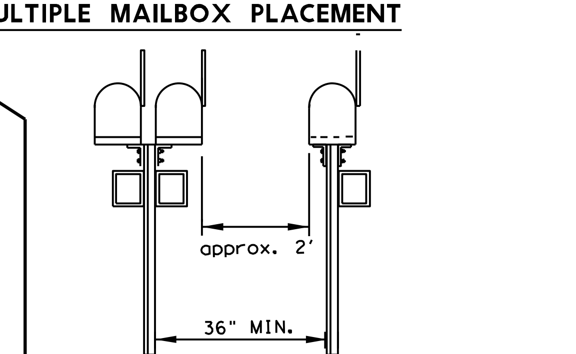
Mailboxes shall be made of light weight sheet metal or light weight plastic.
Lockable architectural mailboxes shall meet the requirements of the above table.

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



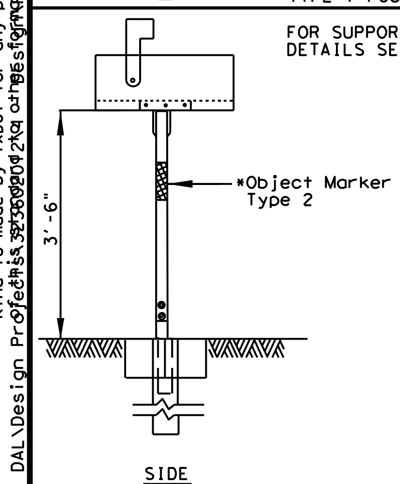
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

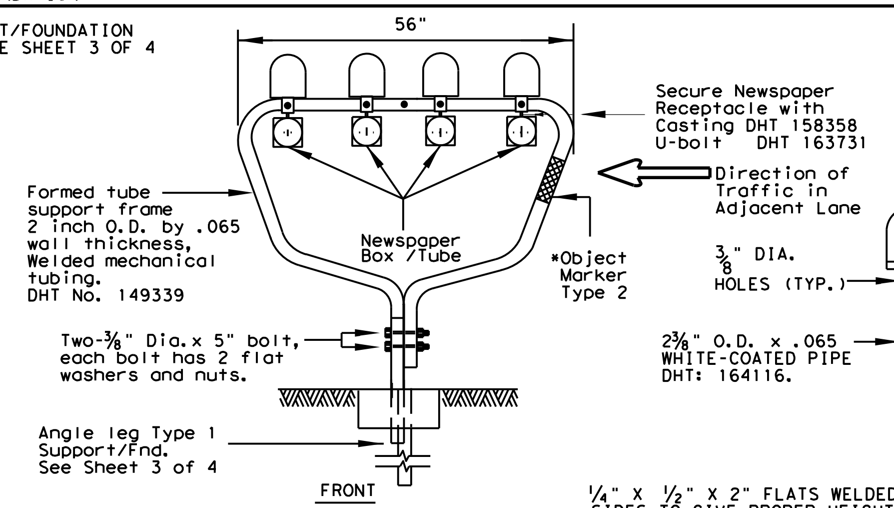
MULTIPLE MAILBOX PLACEMENT

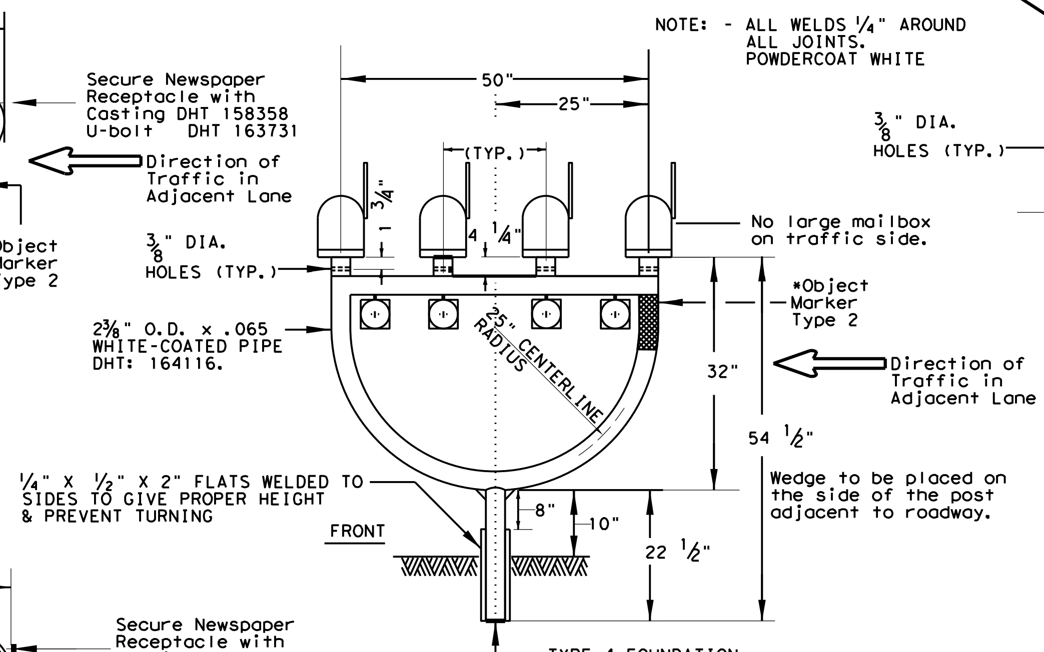


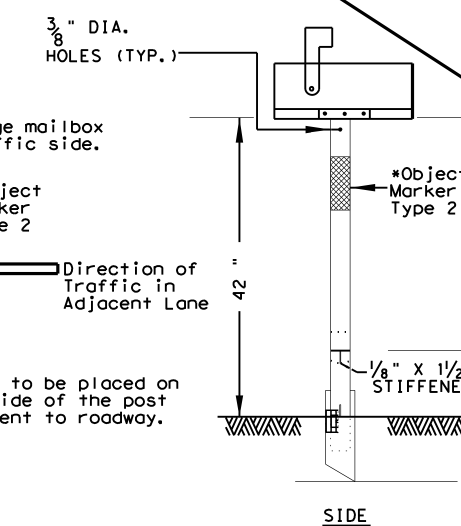
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT



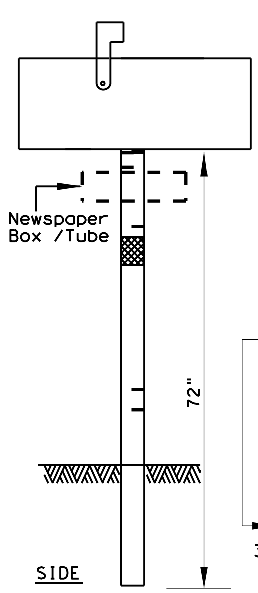


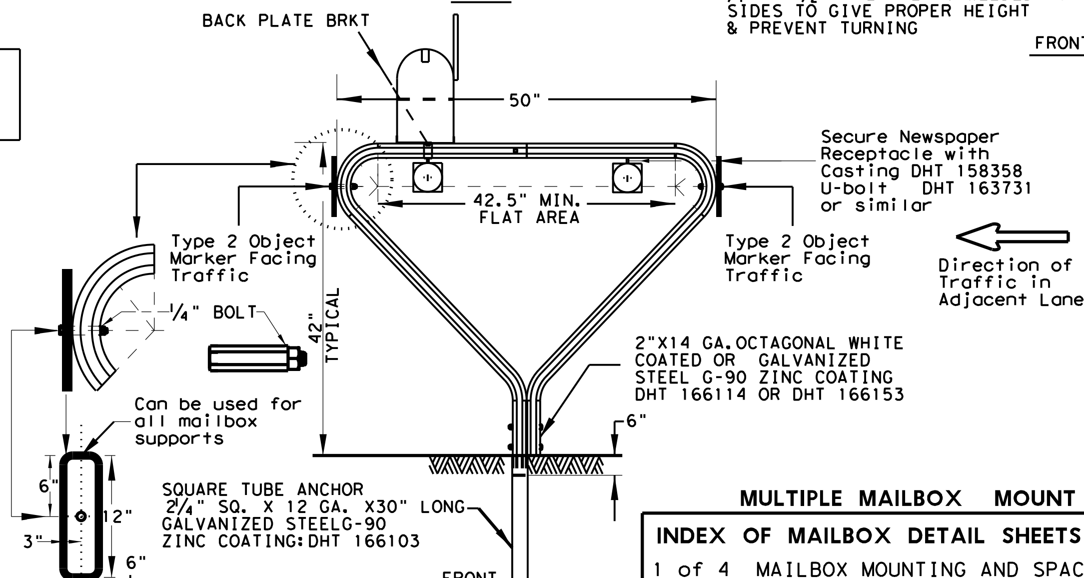




DOUBLE AND MULTIPLE MAILBOX MOUNT

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





MULTIPLE MAILBOX MOUNT

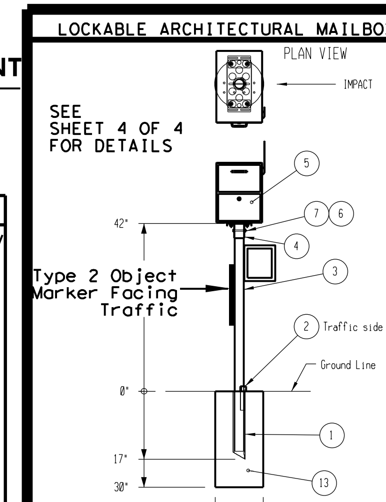
INDEX OF MAILBOX DETAIL SHEETS

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



SHEET 1 OF 4

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	3236	02	012,etc.		FM3133
	DIST		COUNTY		SHEET NO.
	DAL		COLLIN		84

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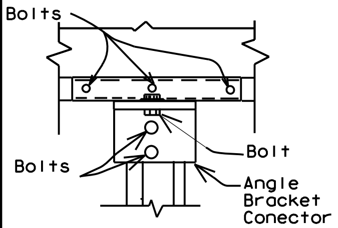
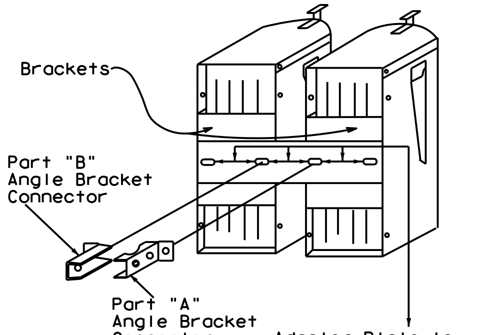


For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

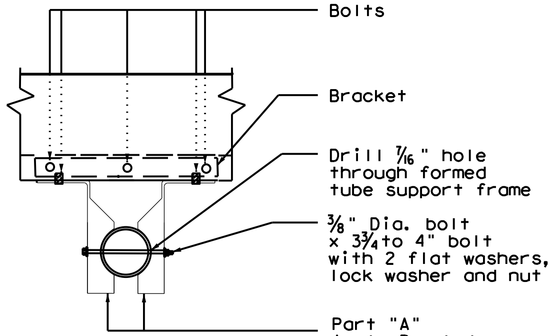
SINGLE MAILBOX



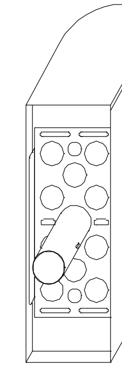
Adapter Plate to Bracket Attachment, 4 - ⅜" Dia.x ¾" bolt; each bolt has 2 flat washers, lock washer and nut per each bolt

(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

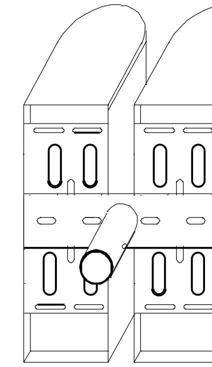


MULTIPLE MAILBOX



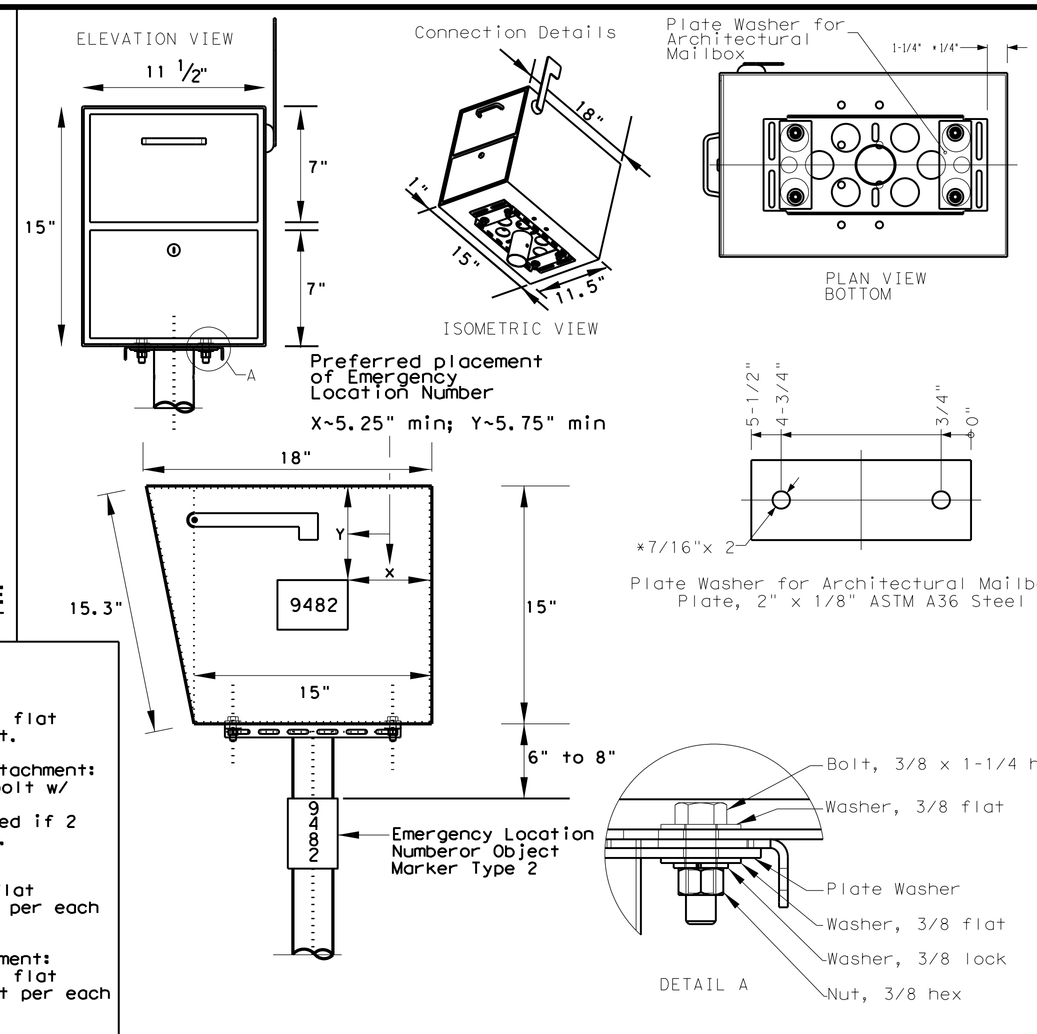
To be used with 2⅜" OD RR or thinwall Steel posts.

WELDED SINGLE MAILBOXBRACKET

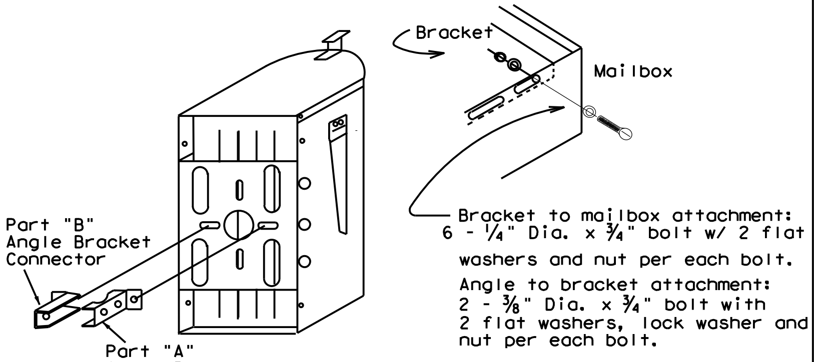


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS

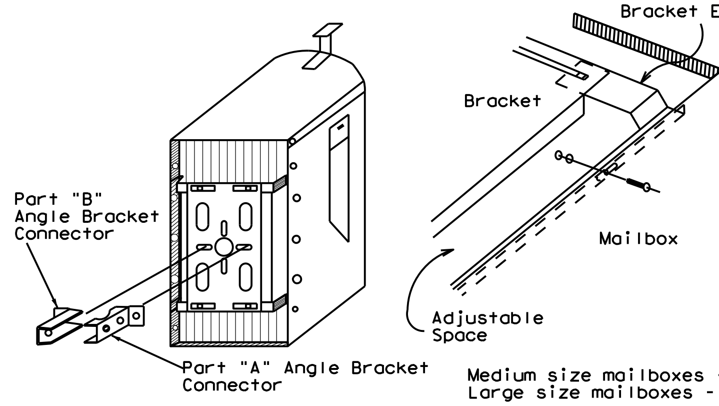


Bracket to mailbox attachment: 6 - ¼" Dia. x ¾" bolt w/ 2 flat washers and nut per each bolt.

Angle to bracket attachment: 2 - ⅜" Dia. x ¾" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to 2 - ⅜" Dia. x 2½" 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 - ¼" Dia. x ¾" bolt w/2 flat washers and nut per each bolt.

Bracket to bracket extension attachment: 2 - ¼" Dia. x ¾" 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 - ⅜" Dia. x ¾" bolt w/2 flat washers, lock washer and nut per each bolt.

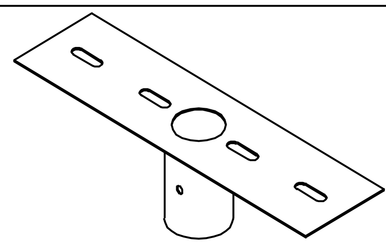
Angle to mailbox support attachment: 2 - ⅜" Dia. x 2½" bolt w/2 flat washers, lock washer, and nut per each bolt.

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

MEDIUM AND LARGE MAILBOXES

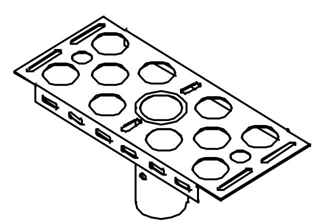
GENERAL NOTES

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.



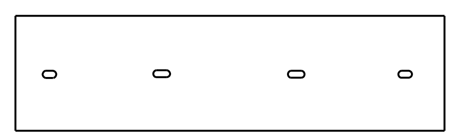
DHT 162323

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



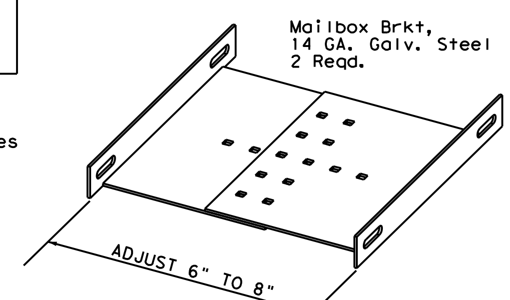
DHT 161443

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

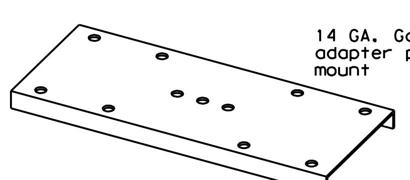


DHT #3789

Used for mounting two Mailboxes on the same post.



DHT 166105

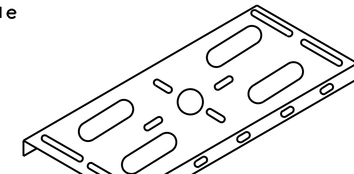


14 GA. Galv. Steel adapter plate for double mount

DHT 166108

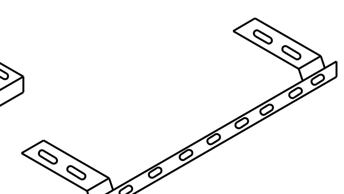
HARDWARE AT TXDOT REGIONAL WAREHOUSES

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



DHT 148939

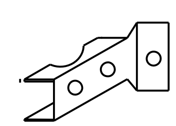
Mailbox Bracket



DHT 148938

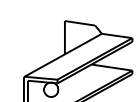
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



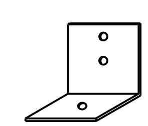
DHT 159489

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	3236	02	012, etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	85

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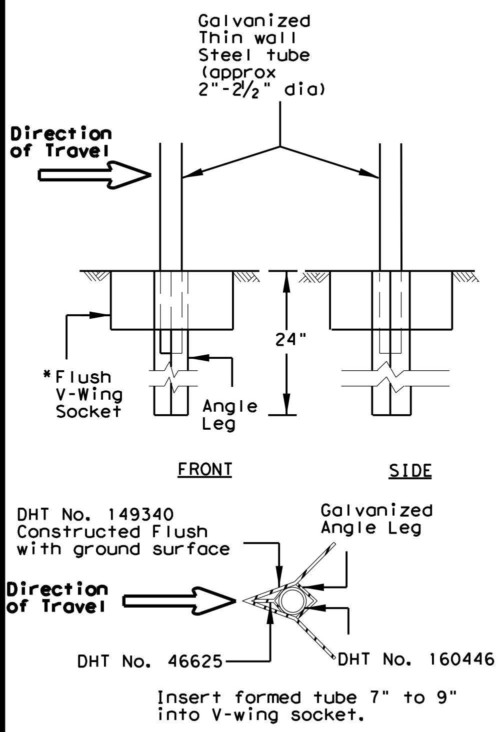
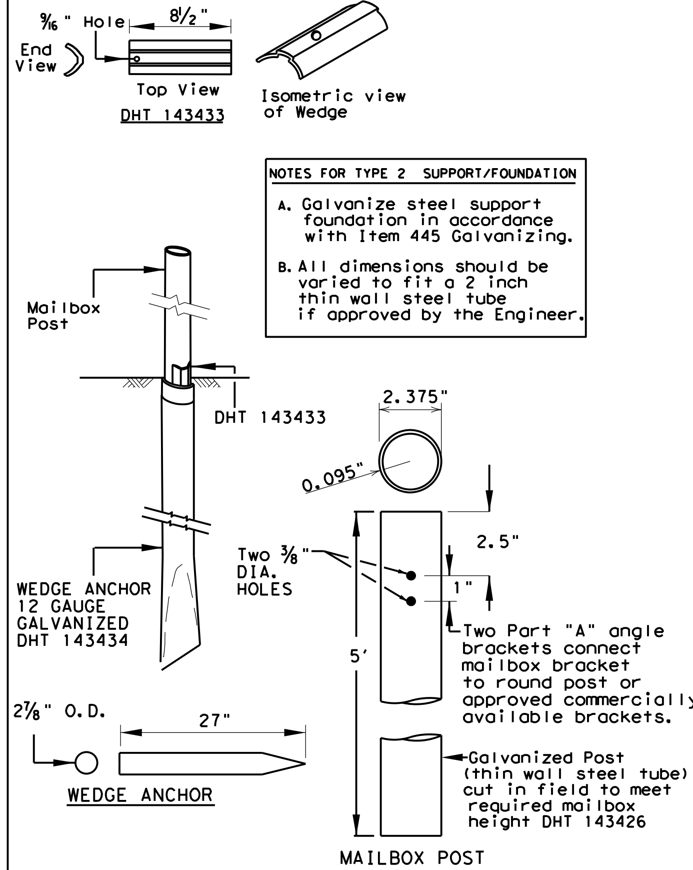


TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE

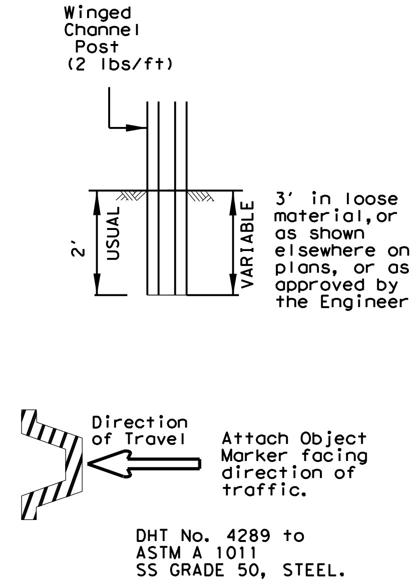


NOTES FOR TYPE 2 SUPPORT/FOUNDATION

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

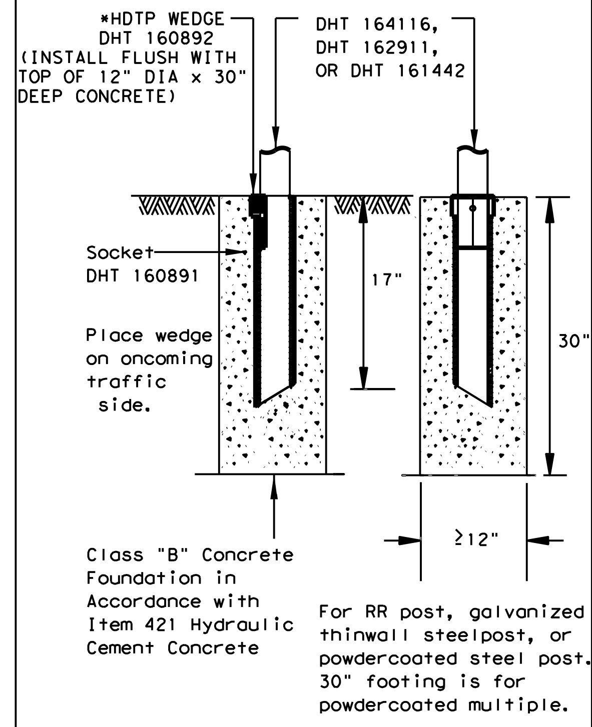
THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



TYPE 3 SUPPORT/FOUNDATION

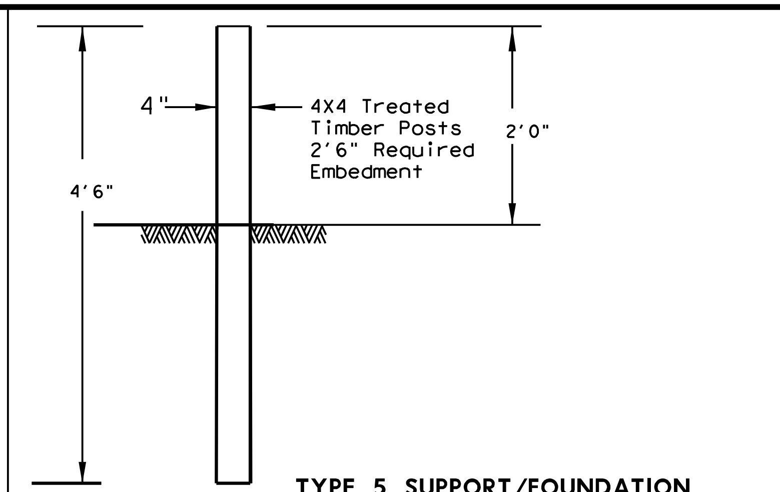
WINGED CHANNEL POST

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.

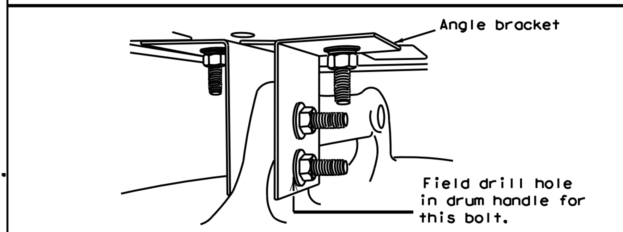


TYPE 5 SUPPORT/FOUNDATION

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.



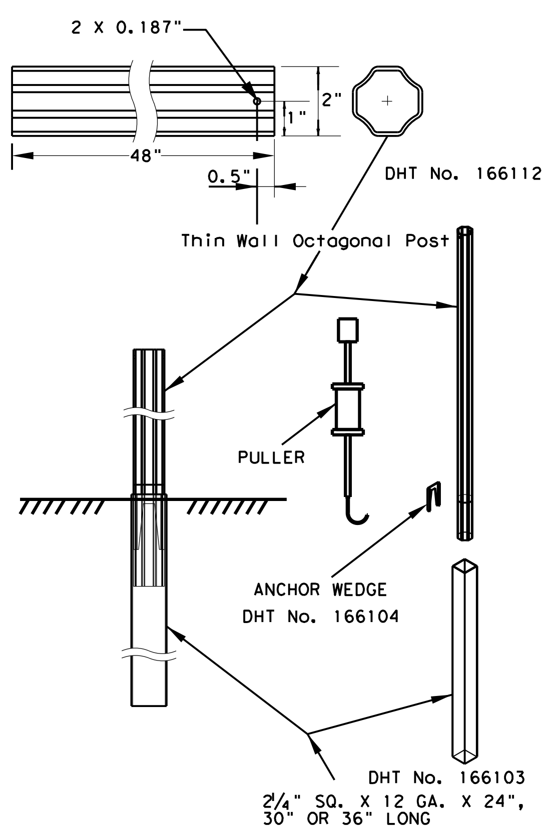
Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL

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.



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

SHEET 3 OF 4

Texas Department of Transportation — Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
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REVISIONS	DIST DAL	COUNTY COLLIN		SHEET NO. 86

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

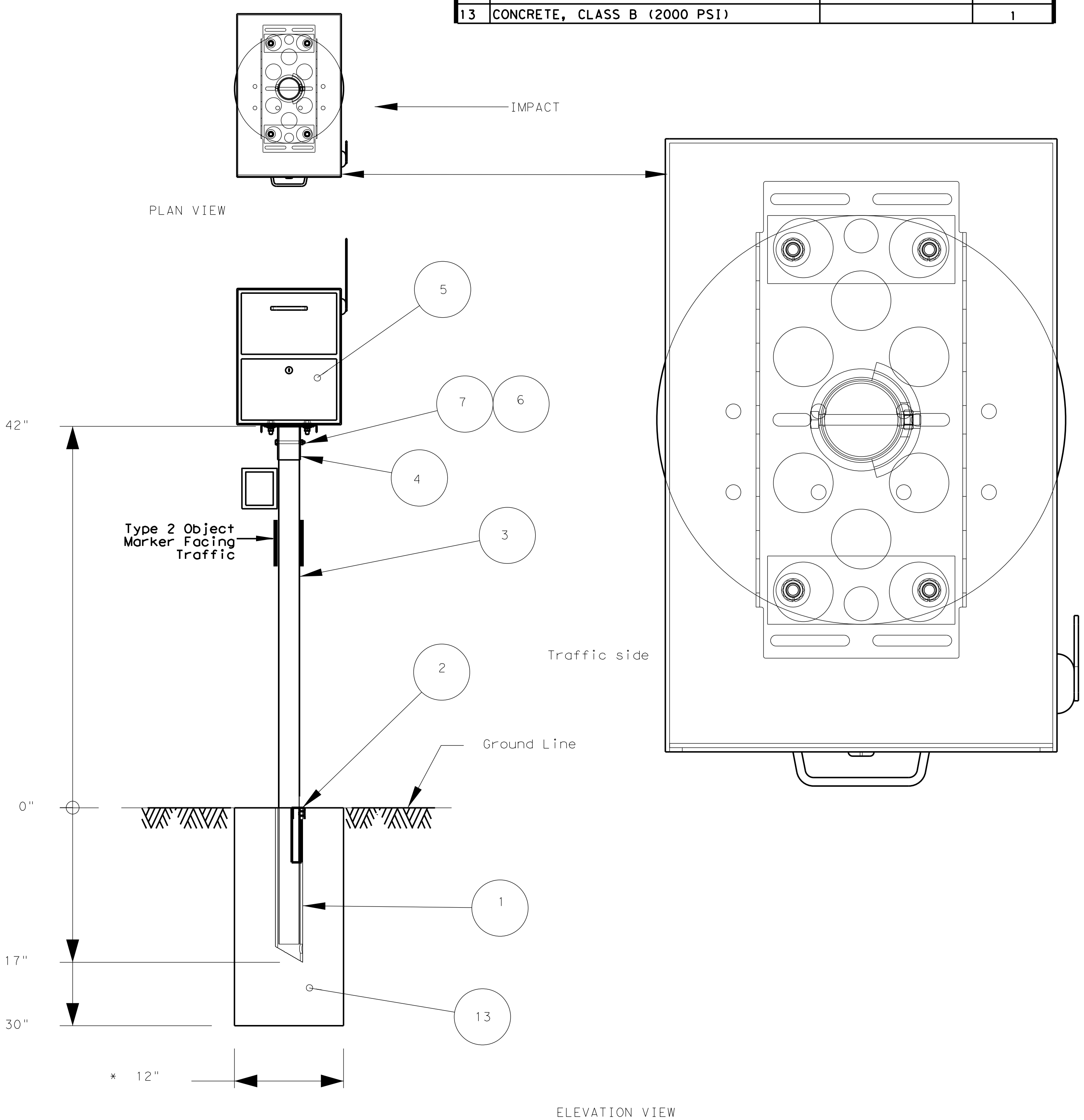

TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
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:
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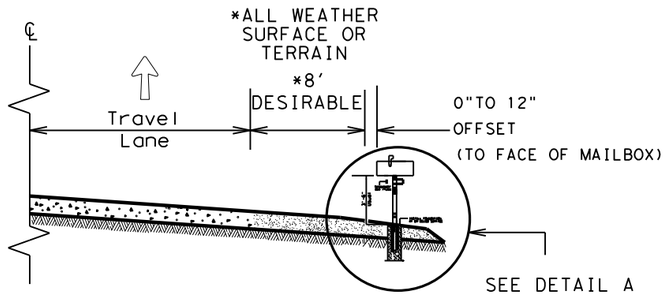
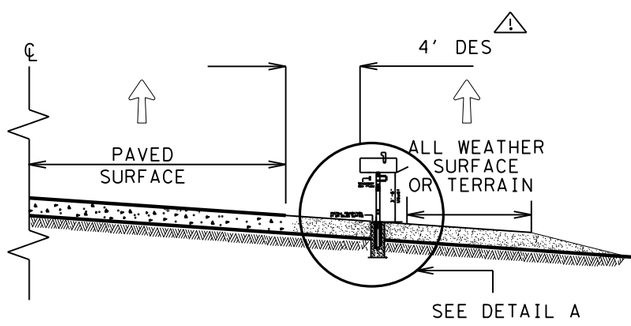
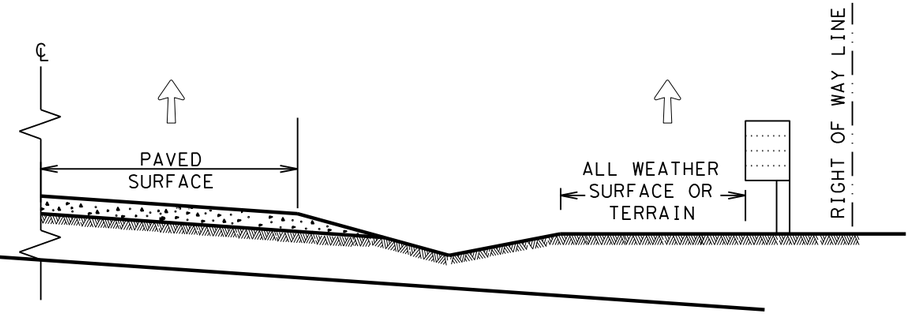
REVISIONS	3236	02	012, etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	87



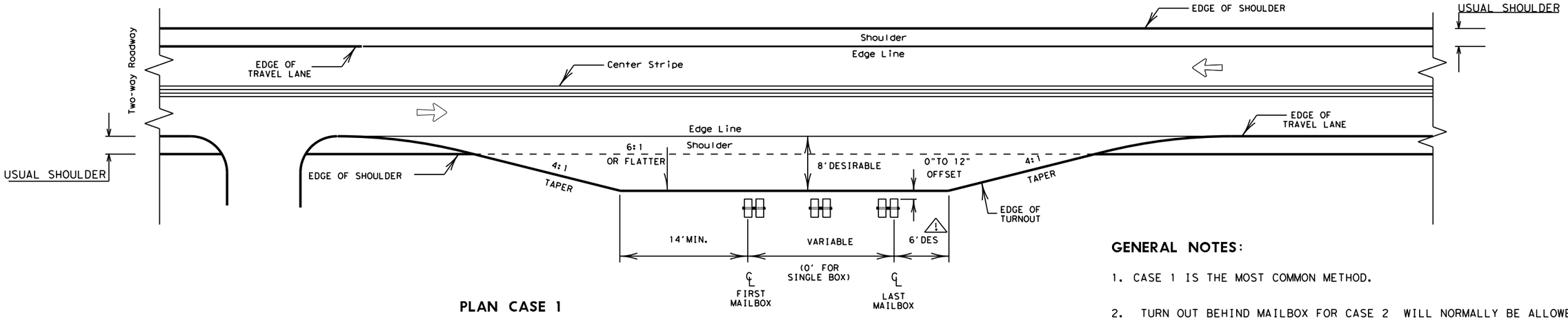
CASE 1. OFF TRAVEL WAY DELIVERY



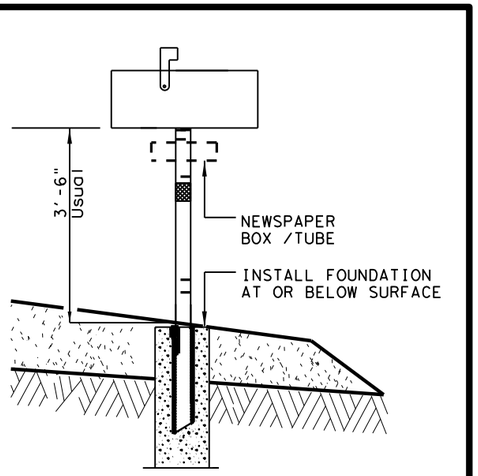
CASE 2. BACK SIDE DELIVERY



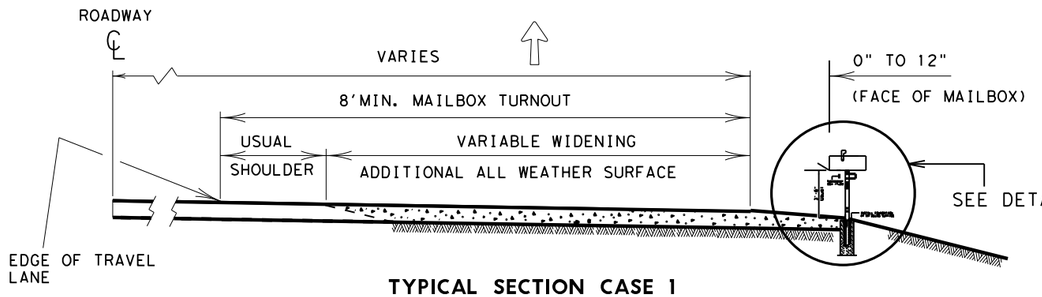
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. IF THE NUMBER OF MAILBOXES EXCEEDS FOUR, A COMMUNITY MAIL BOX SHOULD BE ENCOURAGED AT THESE LOCATIONS.

Texas Department of Transportation

Maintenance Division Standard

Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS
MB-14(2)

FILE: MB14(2).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		88

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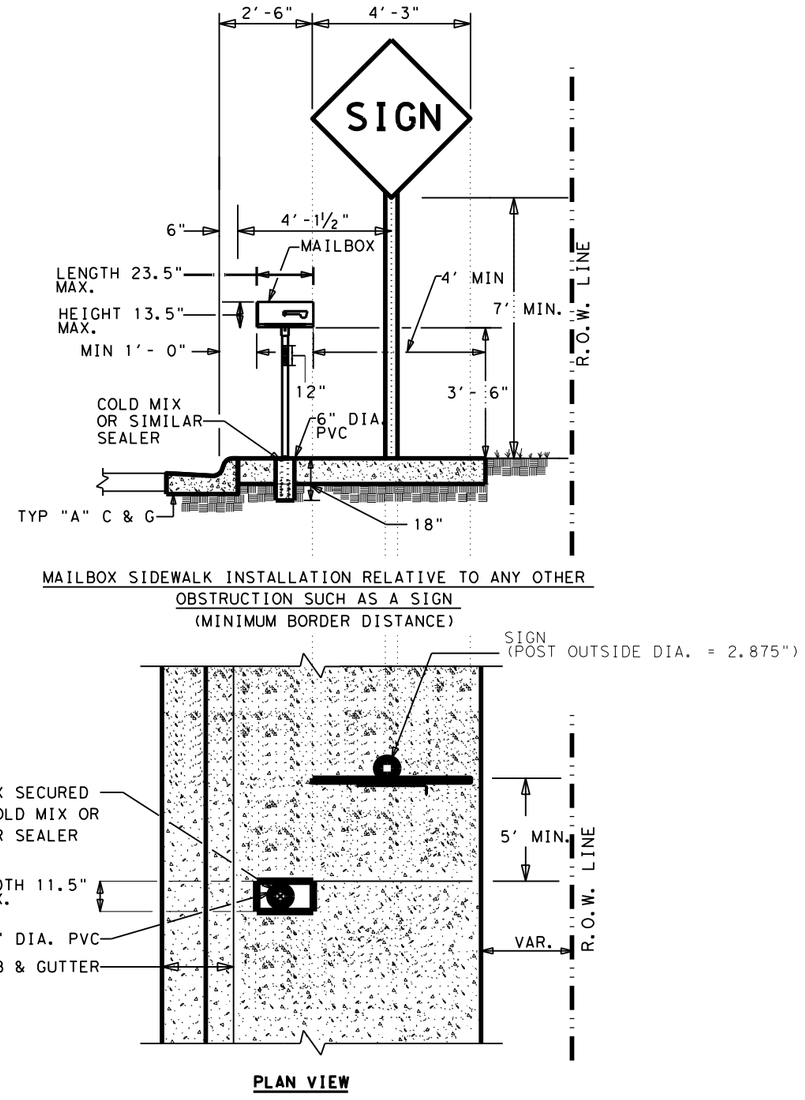
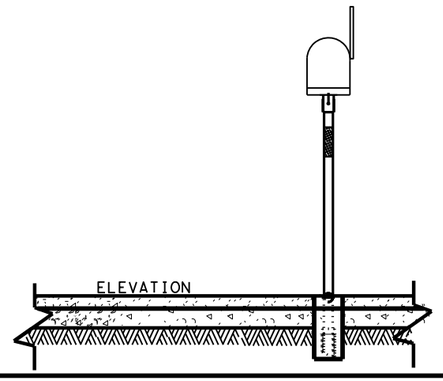
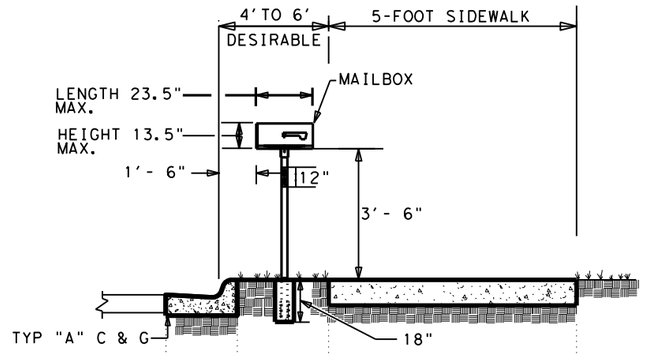


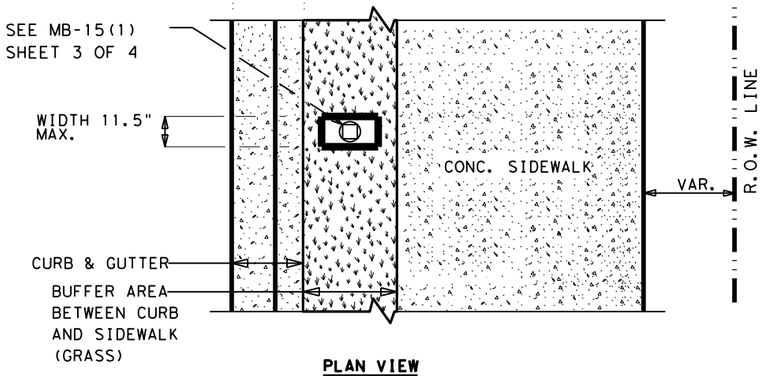
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

Texas Department of Transportation

Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2A)

FILE:MB-14(2A)	DN:	CK:	DW:	CK:
	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
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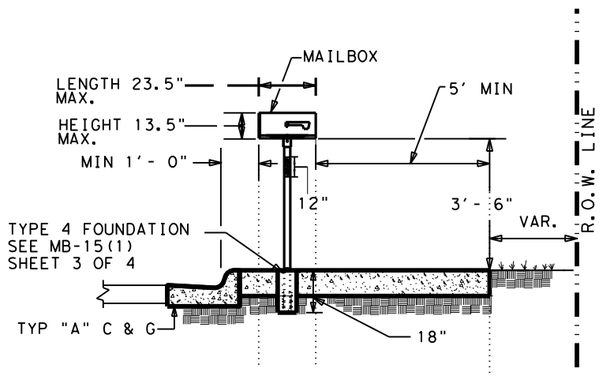
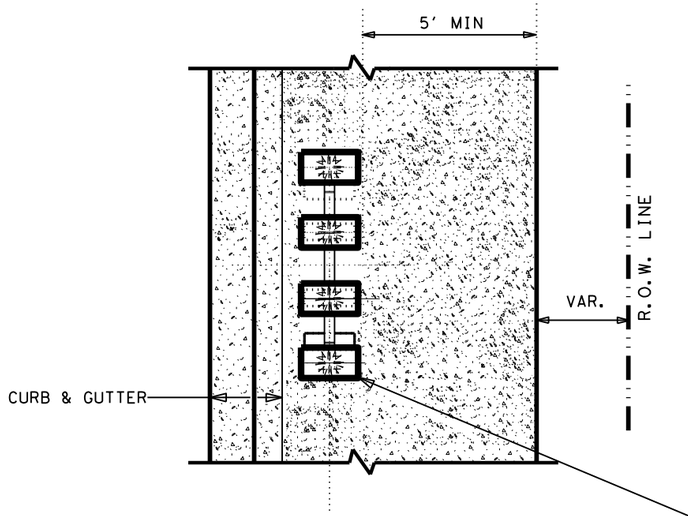
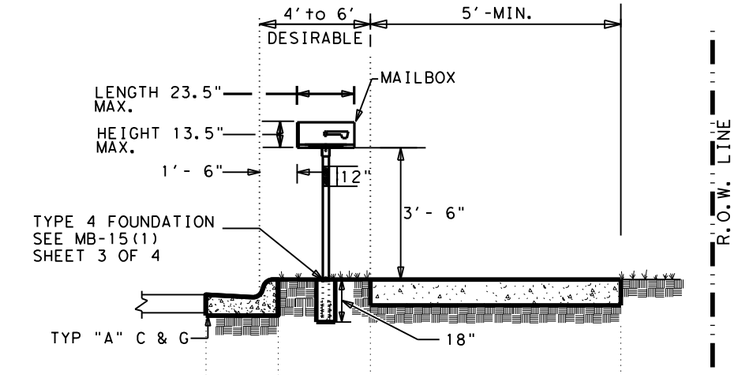


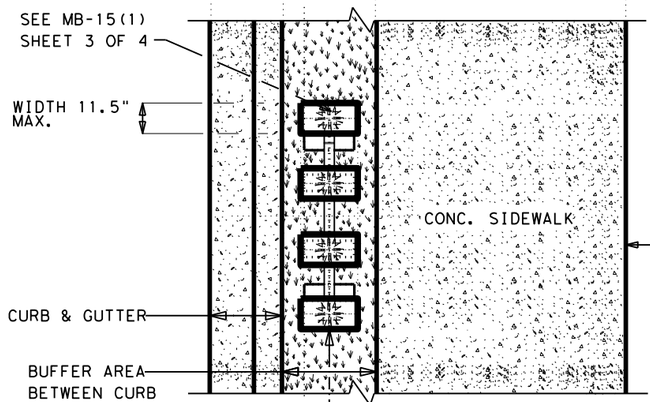
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



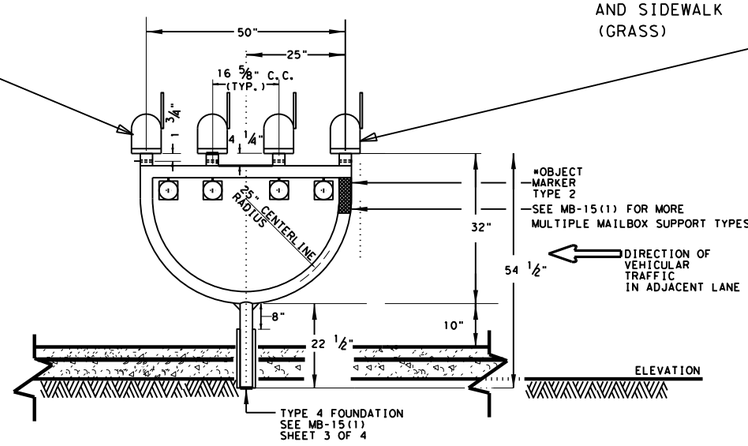
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



SHEET 3 OF 3

Texas Department of Transportation

Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
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REVISIONS	3236	02	012, etc.	FM3133
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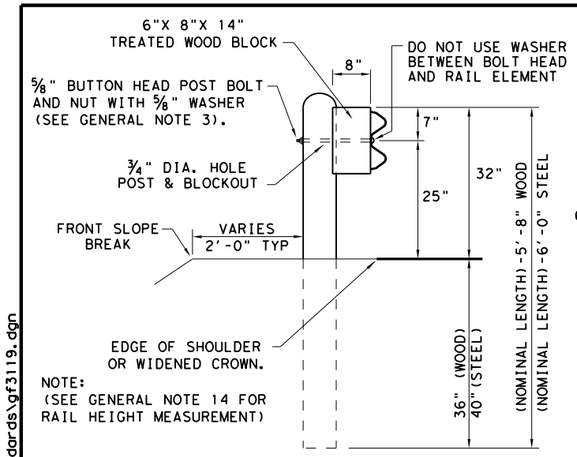
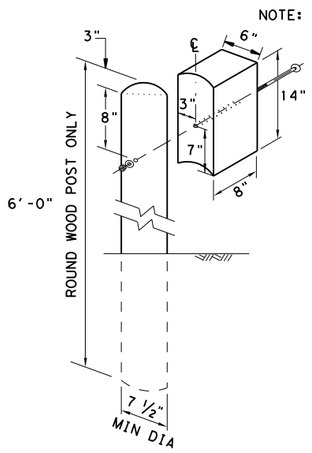


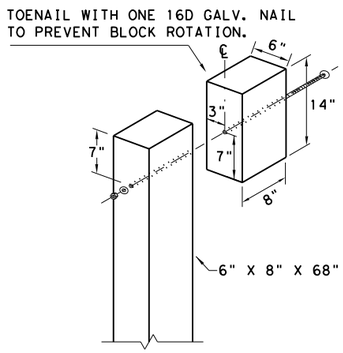
NOTE:
(SEE GENERAL NOTE 14 FOR
RAIL HEIGHT MEASUREMENT)

TYPICAL POST PLACEMENT

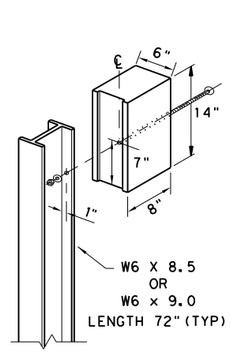


**WOOD BLOCK TO
ROUND WOOD POST**

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

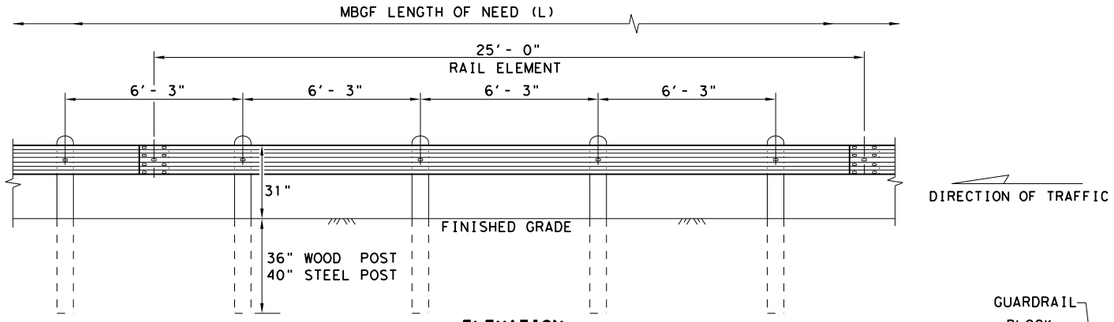


**WOOD BLOCK TO
RECTANGULAR WOOD POST**



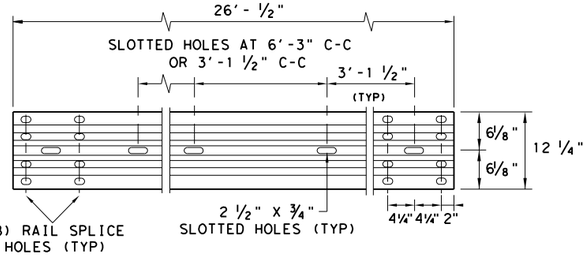
**ROUTED WOOD BLOCK
TO I-BEAM STEEL POST**

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)



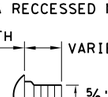
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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.

SPLICE BOLT LENGTH → VARIES

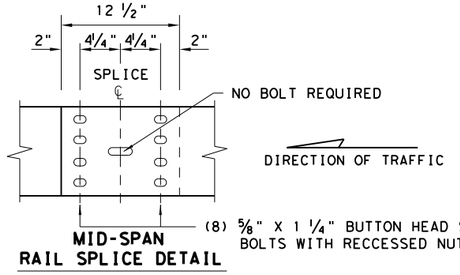
FBB01 = 1 ¼"
FBB02 = 2"



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

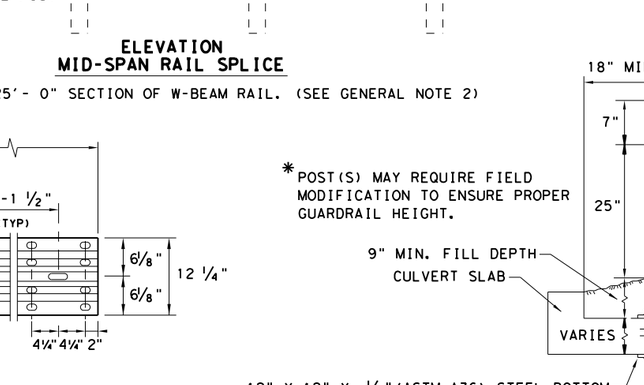
BUTTON HEAD BOLT

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



**MID-SPAN
RAIL SPLICE DETAIL**

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



* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 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

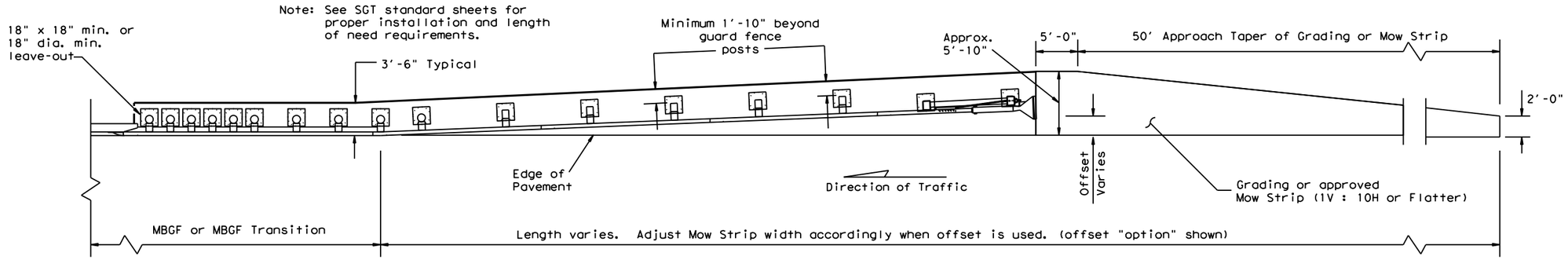
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS 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

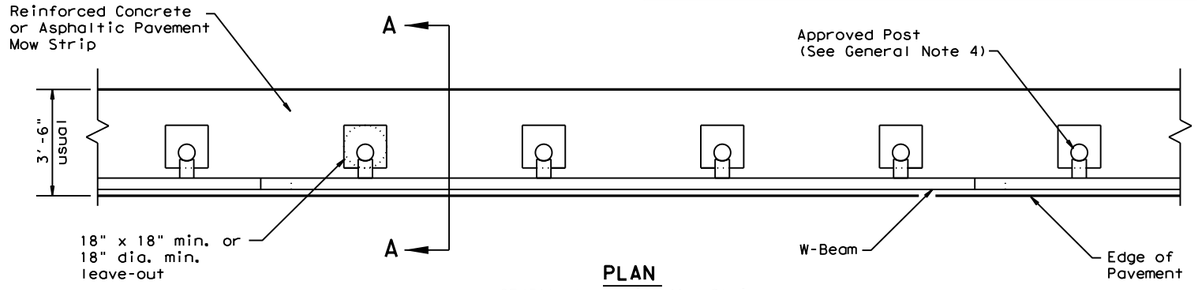
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		91

DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\gf31ms19.dgn

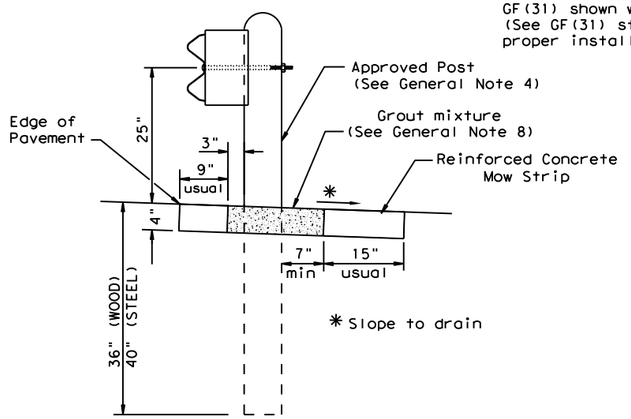


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



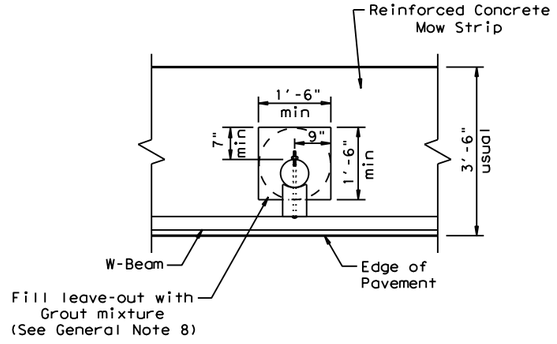
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

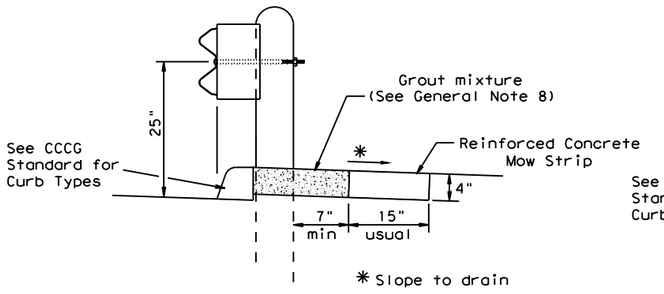
Note: Site Condition(s)

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

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

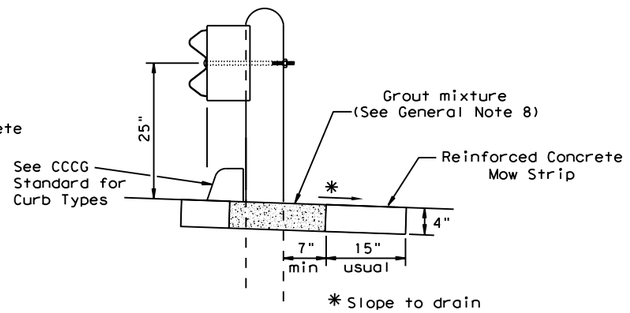
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



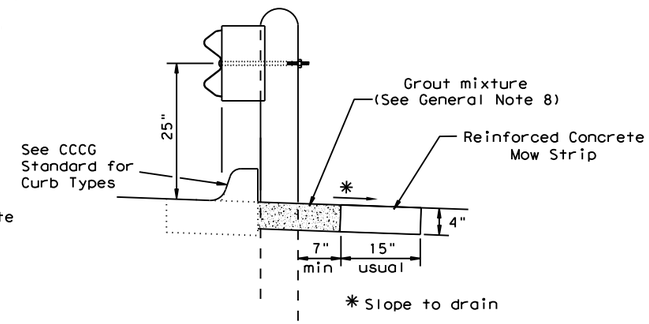
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

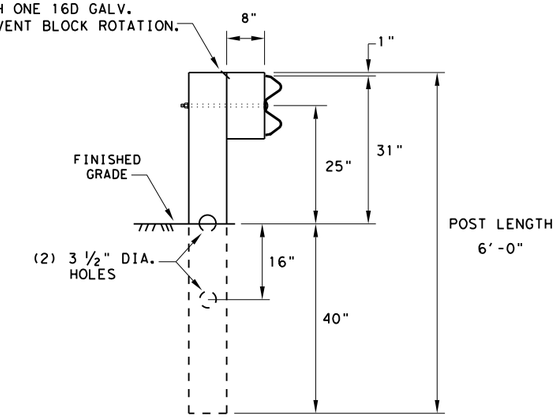
METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		92

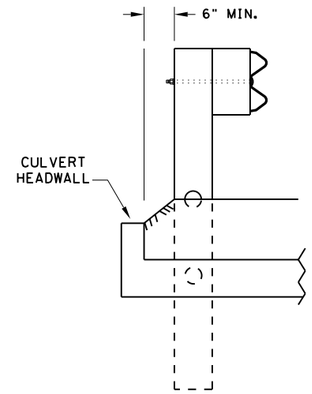
DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\gf31ls19.dgn

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



RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

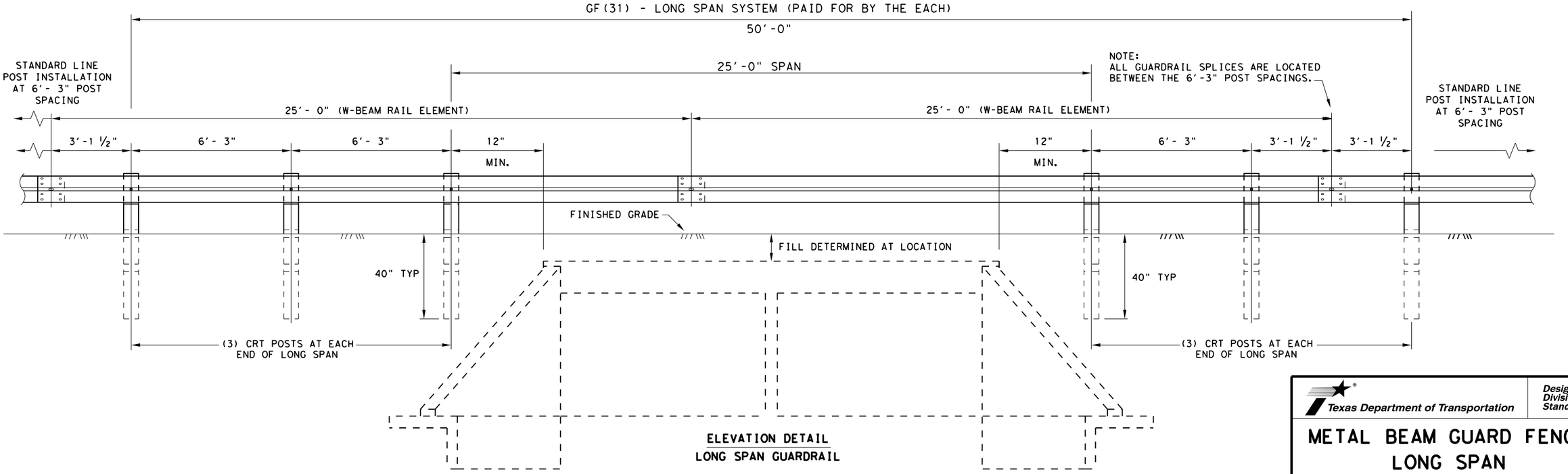
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

DIRECTION OF TRAFFIC

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

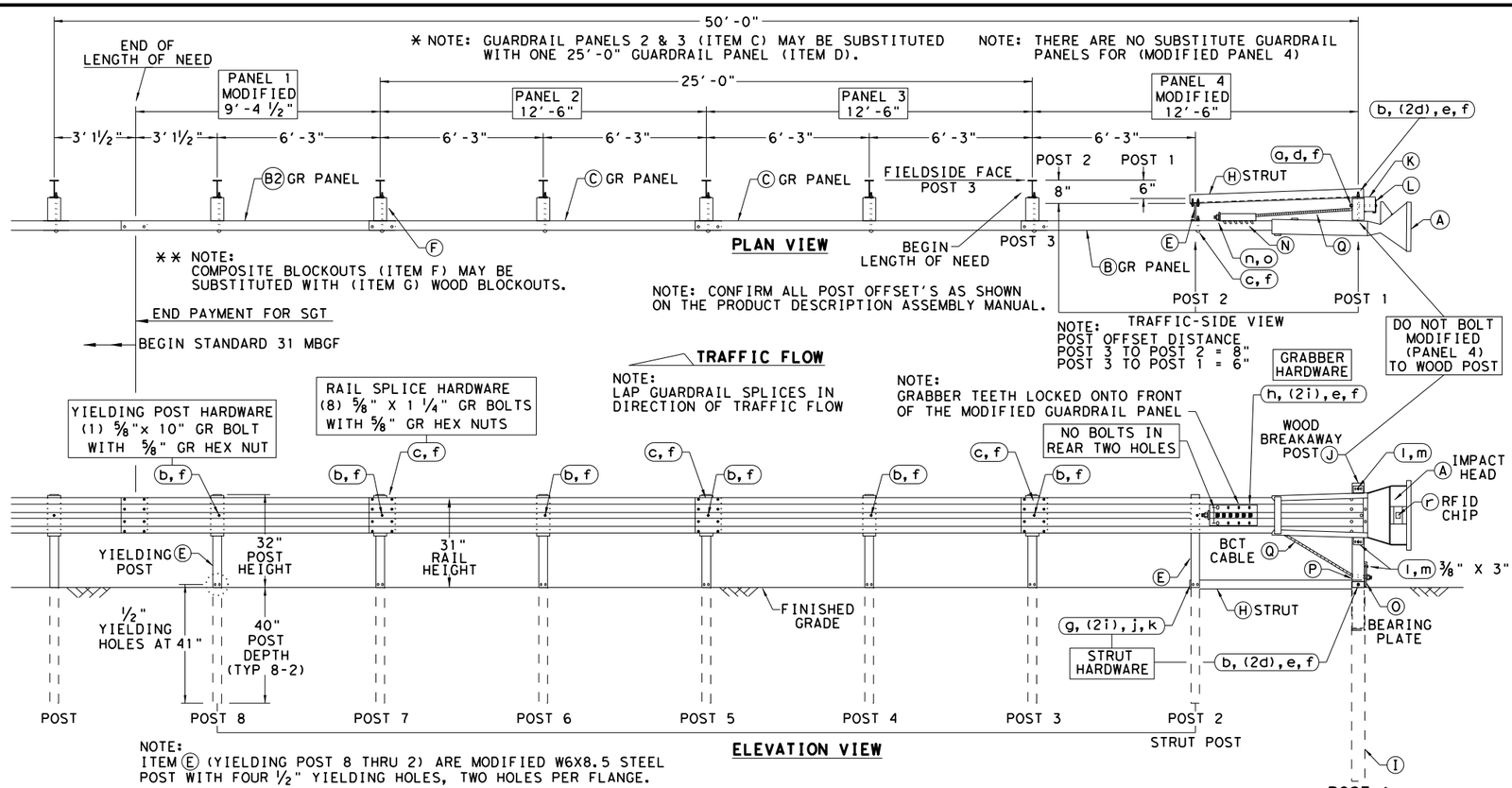
Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

FILE: gf31ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012, etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		93

DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\sgt153120.dgn

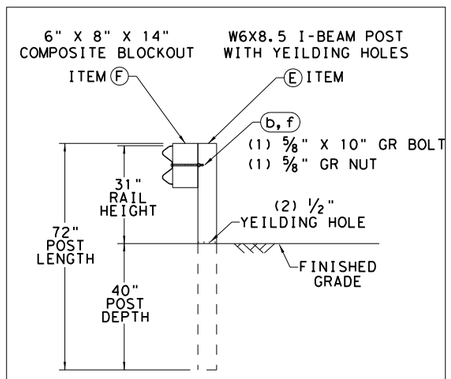


GENERAL NOTES

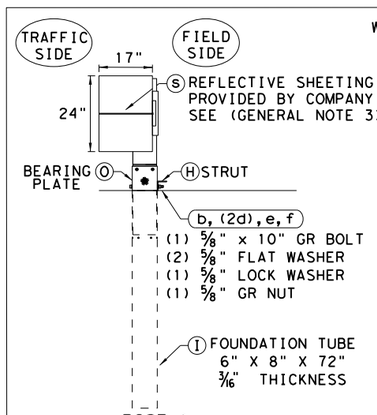
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

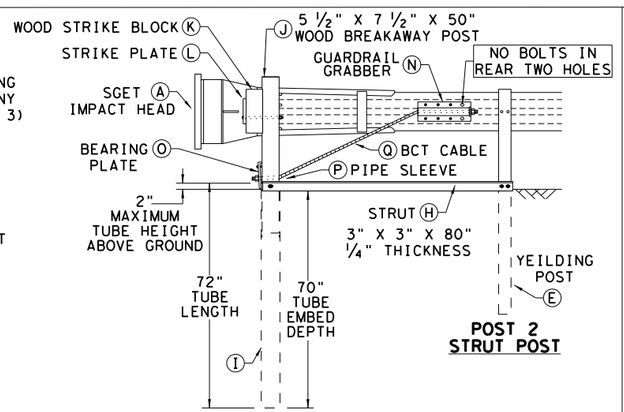
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



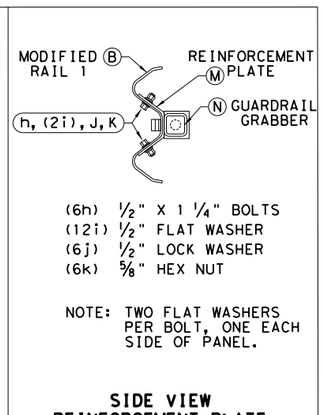
SIDE VIEW
POST 8 - POST 3 (TYP)



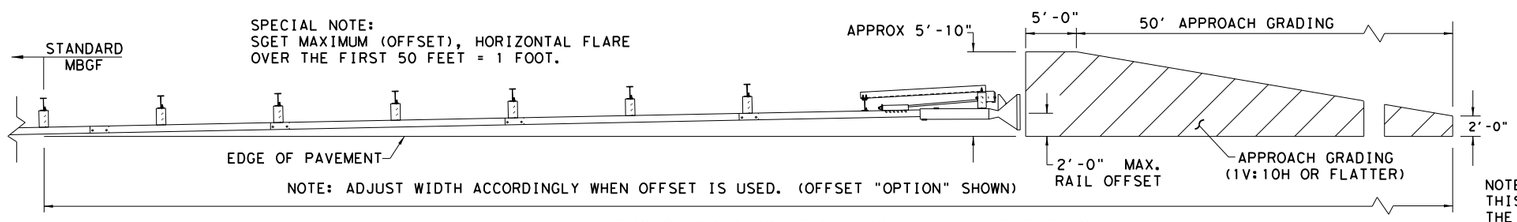
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



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	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		94

DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\sgt10s3116.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

PLAN VIEW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

BEGIN LENGTH OF NEED

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

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

POST 40" DEPTH (TYP 1-8)

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"× 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

LINE POST (3, 4, 5, 6, 7 & 8)

SECTION VIEW B-B

6'-0" (W6 X 8.5) I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

6'-0" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5) (SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3236	02	012,etc.	FM3133	
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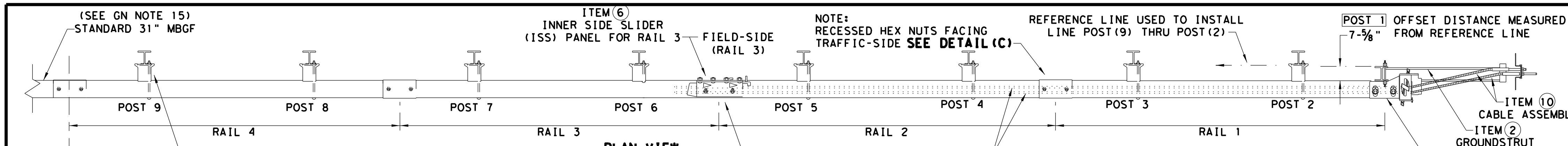
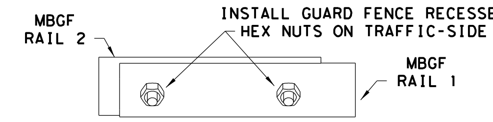
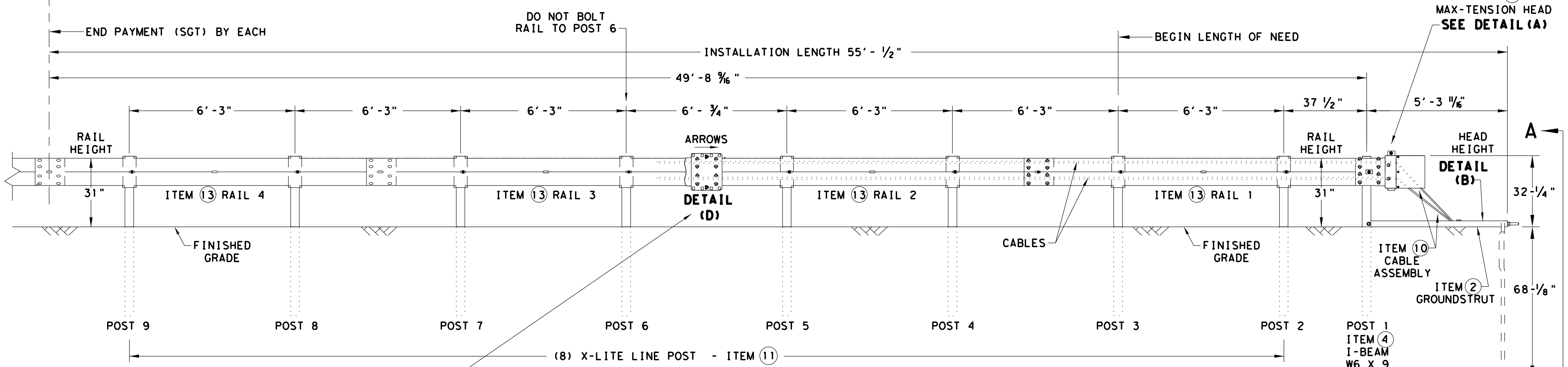


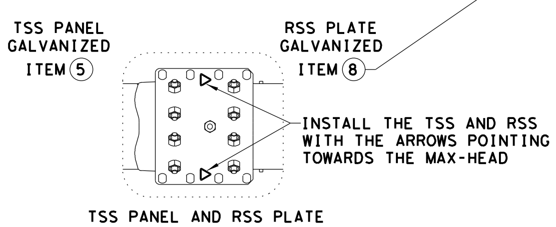
PLAN VIEW



DETAIL (C)



ELEVATION VIEW



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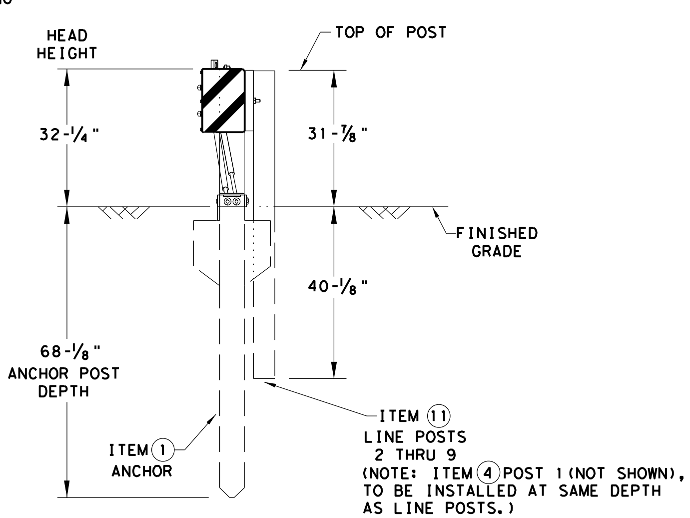
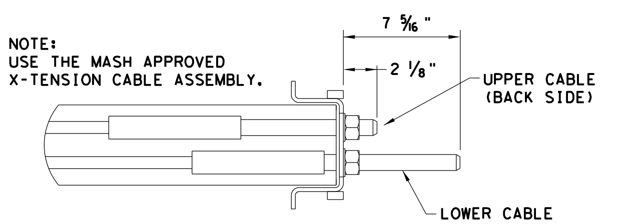
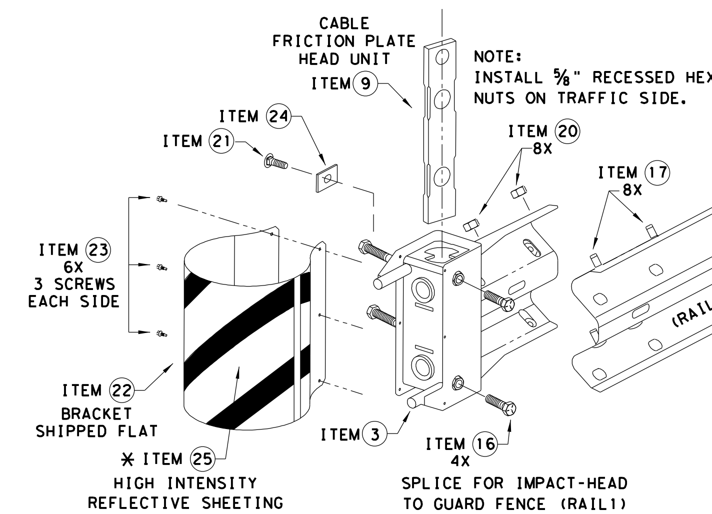


SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

SECTION VIEW A-A



DETAIL (B)



DETAIL (A)

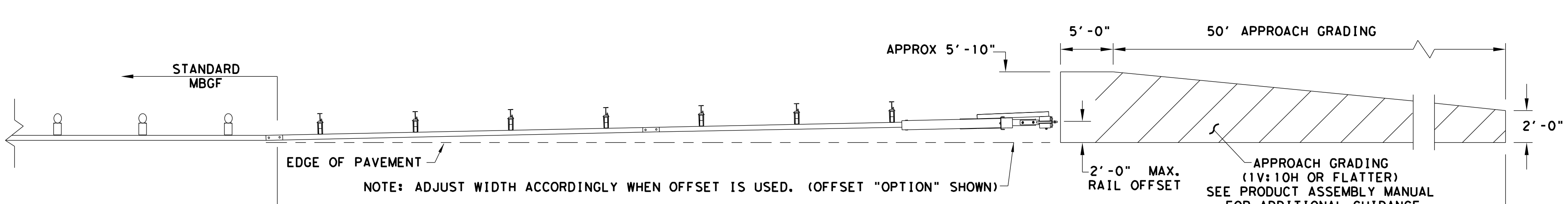
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation | Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	96

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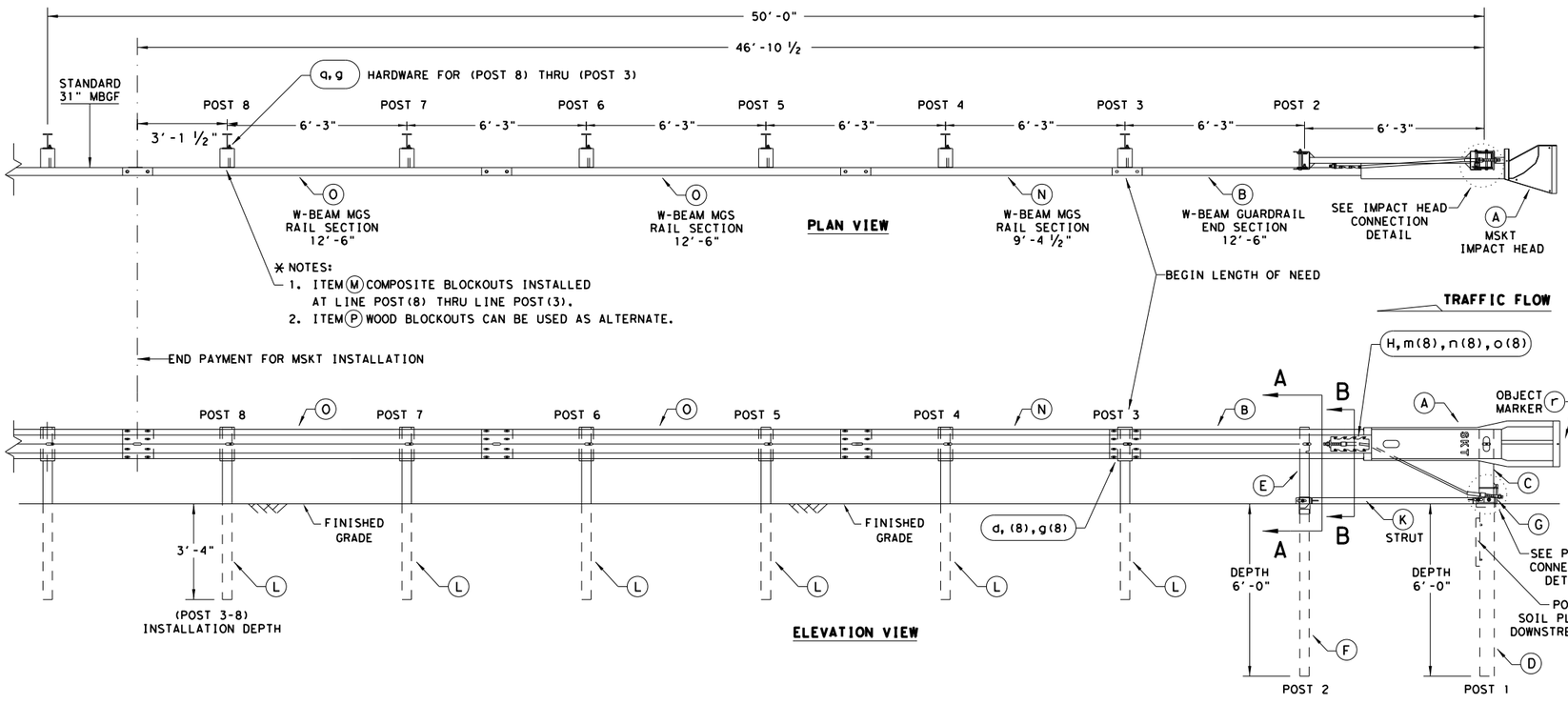
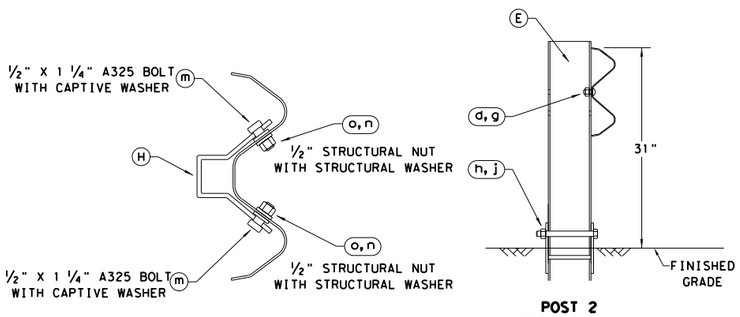
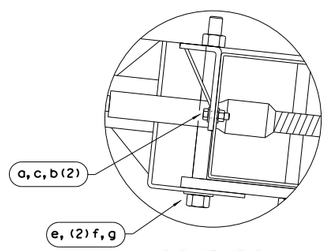
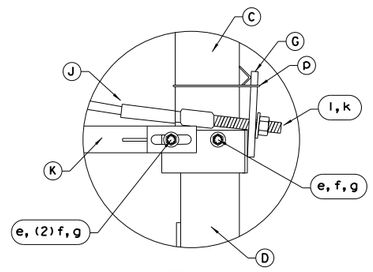


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

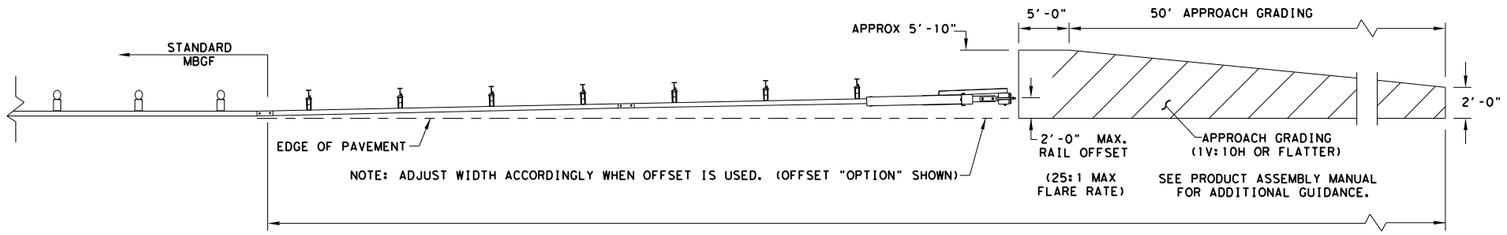






SEE NOTES: *

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 5/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

Texas Department of Transportation — Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3236	02	012,etc.	FM3133	
	DIST	COUNTY		SHEET NO.	
	DAL	COLLIN		97	

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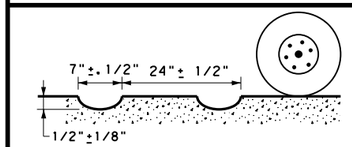
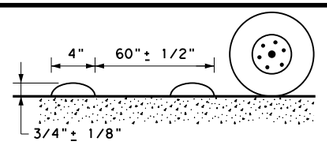
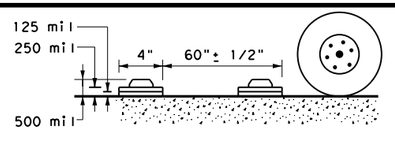
CENTERLINE RUMBLE STRIPS



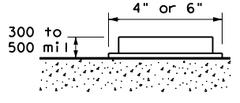
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

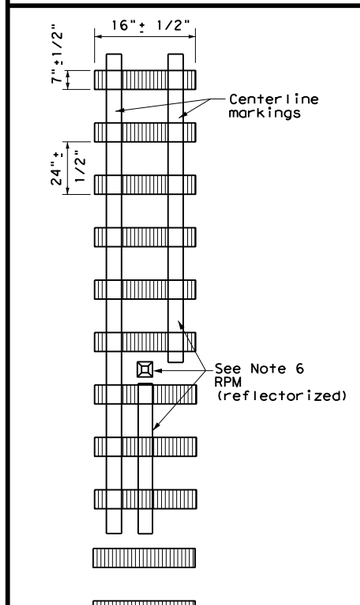


PREFORMED THERMOPLASTIC STRIPS



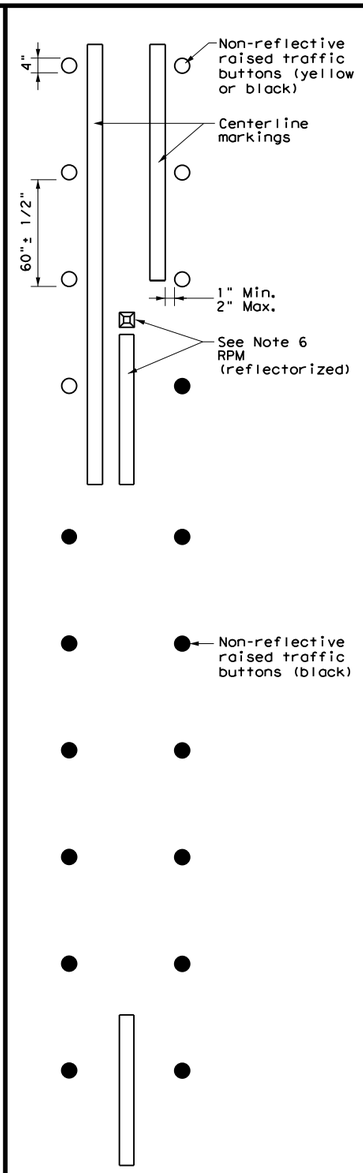
PROFILE MARKINGS

PROFILE VIEW



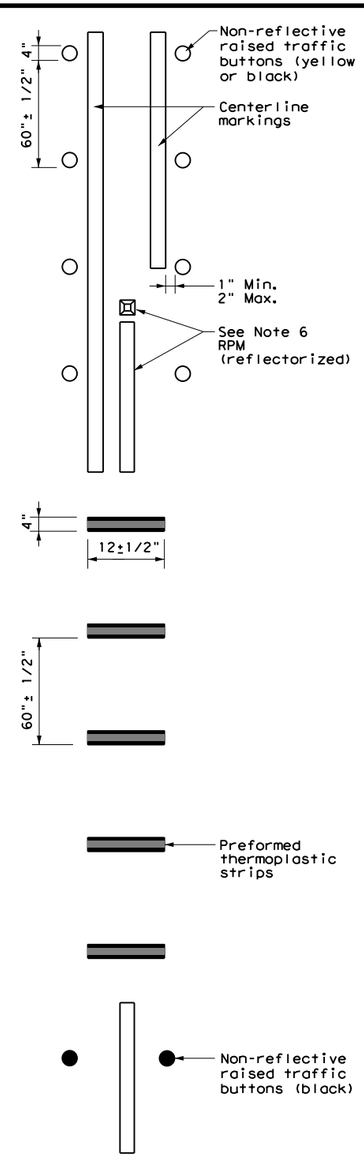
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



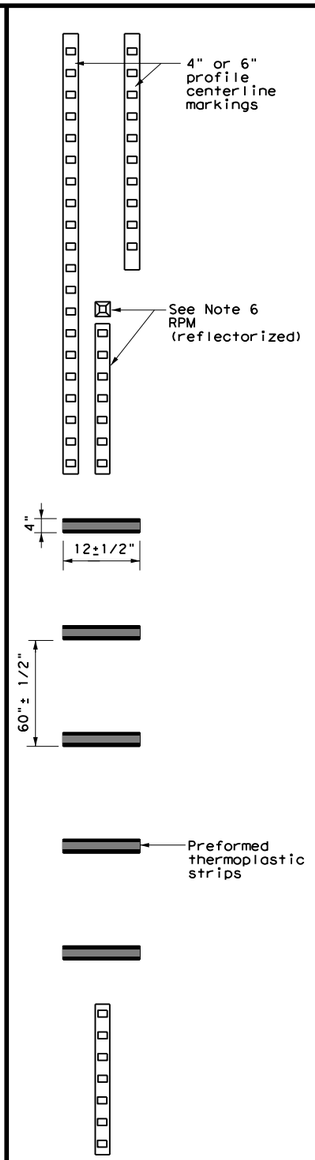
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

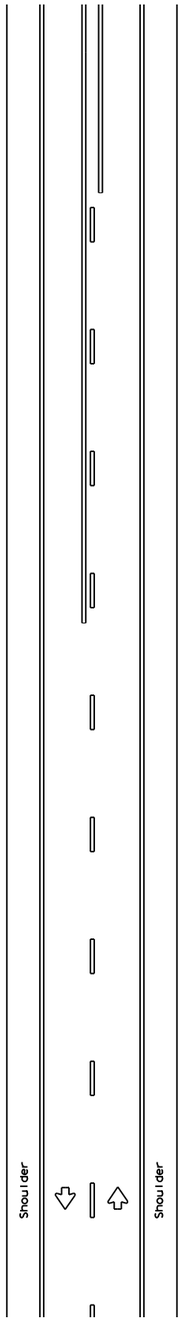
1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(4).



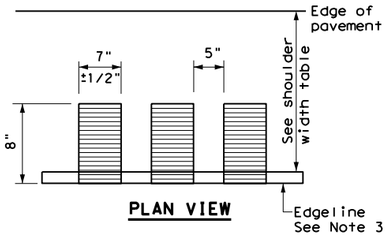
TWO LANE TWO-WAY ROADWAYS

Texas Department of Transportation®
Traffic Operations Division Standard

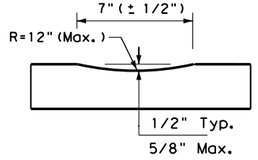
CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		98

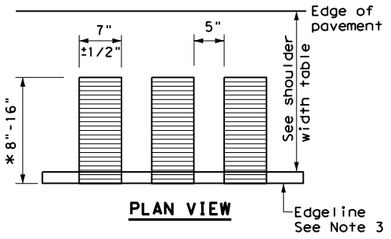


PLAN VIEW

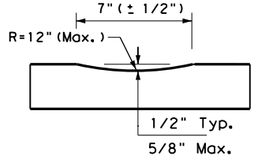


PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



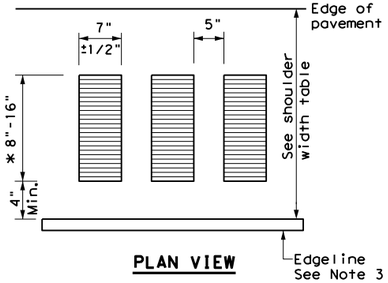
PLAN VIEW



* This distance may vary based on width of shoulder

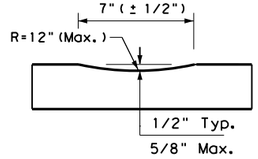
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



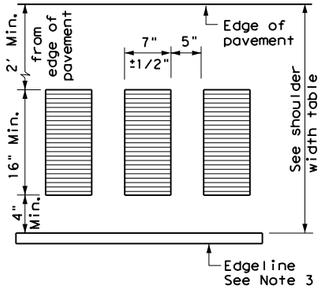
PLAN VIEW

* This distance may vary based on width of shoulder

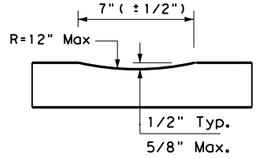


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

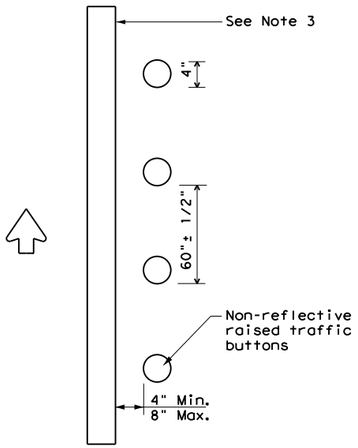


PLAN VIEW



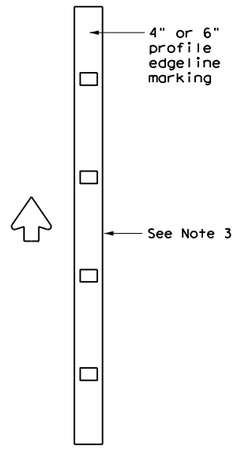
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

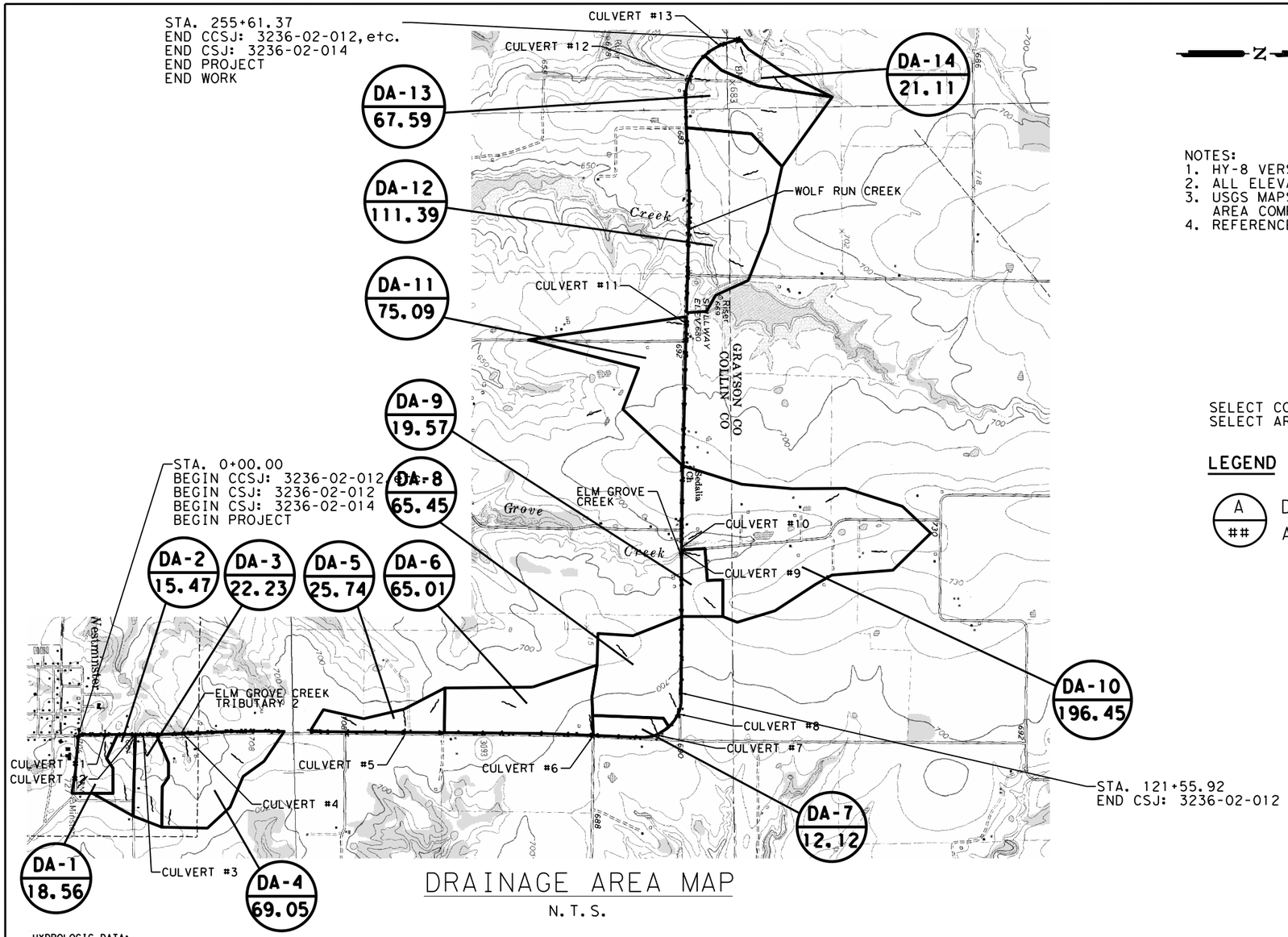
Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012, etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		99

DATE:
FILE:



DRAINAGE AREA MAP

N. T. S.

NOTES:
1. HY-8 VERSION 7.6 WAS USED FOR CULVERTS ANALYSIS.
2. ALL ELEVATIONS AREA BASED ON THE NAVD88 VERTICAL DATUM.
3. USGS MAPS AND AS-BUILTS (CSJ: 3236-02-001) WERE USED FOR DRAINAGE AREA COMPUTATIONS
4. REFERENCE: TxDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.

SELECT COUNTY: COLLIN
SELECT AREA TYPE: RURAL

LEGEND

A / ## — DRAINAGE AREA / AREA IN ACRES

HYDROLOGIC DATA:

DRAINAGE AREA	STATION	STRUCTURE	AREA (ACRES)	METHOD	Cr	Ci	Cv	Cs	C	Tc	10 YEAR INTENSITY (I) (IN/HR)	10 YEAR DISCHARGE (Q) (CFS)	100 YEAR INTENSITY (I) (IN/HR)	100 YEAR DISCHARGE (Q) (CFS)
DA-1	5+21.4	1 - 30" x 53.1' RCP w/Drop Inlet	18.56	RATIONAL	0.11	0.07	0.07	0.07	0.32	66.94	2.37	14.1	3.59	21.3
DA-2	11+01.27	1 - 24" x 61.4' RCP w/Drop Inlet	15.47	RATIONAL	0.11	0.07	0.07	0.07	0.32	69.79	2.30	11.4	3.49	17.3
DA-3	12+64.63	1 - 36" x 62.3' RCP w/3:1 SET	22.23	RATIONAL	0.11	0.07	0.07	0.07	0.32	43.01	3.17	22.6	4.80	34.2
DA-4	20+56.41	2 - 36" x 58.4' RCP w/3:1 SET	69.05	RATIONAL	0.11	0.07	0.07	0.07	0.32	40.31	3.31	73.1	5.00	110.5
DA-5	63+45.93	2 - 30" x 69.4' RCP w/3:1 SET	25.74	RATIONAL	0.11	0.07	0.07	0.07	0.32	39.85	3.33	16.5	5.04	24.9
DA-6	99+95.69	2 - 36" x 65.2' RCP w/3:1 SET	65.01	RATIONAL	0.11	0.07	0.07	0.07	0.32	52.27	2.80	58.2	4.23	88.1
DA-7	112+75.23	2 - 18" x 62.5' RCP w/3:1 SET	12.12	RATIONAL	0.11	0.07	0.07	0.07	0.32	33.86	3.69	14.3	5.57	21.6
DA-8	118+46.34	4 - 30" x 89.7' RCP	65.45	RATIONAL	0.11	0.07	0.07	0.07	0.32	0.00	2.79	58.4	4.22	88.4
DA-9	149+92.69	1 - 24" x 55.6' RCP w/Drop Inlet	19.57	RATIONAL	0.11	0.07	0.07	0.07	0.32	11.40	6.58	41.2	9.88	61.9
DA-10	150+79.16	2 - 48" x 83.6' RCP w/3:1 SET	196.45	RATIONAL	0.11	0.07	0.07	0.07	0.32	34.75	3.63	228.3	5.48	344.6
DA-11	194+38.62	1 - 42" x 76.9' RCP w/3:1 SET	75.09	RATIONAL	0.11	0.07	0.07	0.07	0.32	79.84	2.10	50.4	3.19	76.6
DA-12	212+43.56	1 - 5' x 10' x 95.3' SBC w/Wingwalls	111.39	RATIONAL	0.11	0.07	0.07	0.07	0.32	46.69	3.01	107.3	4.56	162.4
DA-13	242+07.61	1 - 36" x 103.2' RCP w/3:1 SET	67.59	RATIONAL	0.11	0.07	0.07	0.07	0.32	44.52	3.11	67.2	4.70	101.6
DA-14	254+67.81	1 - 42" x 84' RCP w/3:1 SET	21.11	RATIONAL	0.11	0.07	0.07	0.07	0.32	37.52	3.46	23.4	5.23	35.3

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133
DRAINAGE AREA MAP

SCALE: N. T. S.

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	100
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

11/4/2020 8:18:40 PM

CULVERT HYDRAULIC DATA

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	ALLOWABLE HEADWATER (FT)	10 YEAR (DESIGN) FLOW Q (CFS)	HW ELEV (FT)	INLET CONT DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	100 YEAR (DESIGN) FLOW Q (CFS)	HW ELEV (FT)	INLET CONT DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	COMMENTS
5+21.40	FM 3133	(EXIST) 1 - 30" X 53' CMP	DA-1	686.73	14	681.89	1.95	680.91	0.62	4.39	4.95	21.3	682.6	2.65	681.05	0.76	5.83	5.56	
		(PROP) 2 - 24" X 43.9' RCP				681.89	0.00	680.91	0.62	4.95	4.95		682.82	0.22	681.05	0.76	5.56	5.56	
11+01.27	FM 3133	(EXIST) 1 - 24" X 53.2' CMP	DA-2	681.40	11.4	678.20	0.00	676.60	0.93	0.00	2.33	17.3	679.87	0.26	676.8	1.13	1.97	2.60	
		(PROP) 1 - 24" X 65.1' RCP				678.20	2.05	676.60	0.93	5.22	2.33		679.87	3.16	676.8	1.13	6.68	2.60	
12+64.63	FM 3133	(EXIST) 1 - 36" X 53.7' CMP	DA-3	681.20	22.6	676.34	2.11	675.74	0.58	2.86	7.48	34.2	676.92	2.60	675.88	0.72	3.83	8.43	
		(PROP) 1 - 36" X 47.4' RCP				676.34	0.71	675.74	0.58	3.51	7.48		676.75	0.80	675.88	0.72	4.48	8.43	
20+56.41	FM 3133	(EXIST) 2 - 36" X 50' CMP	DA-4	684.04	73.1	680.33	1.76	679.14	1.65	5.37	5.25	110.5	681.04	2.45	679.48	1.99	6.33	5.85	
		(PROP) 2 - 36" X 47.4' RCP				680.33	2.37	679.14	1.65	5.49	5.25		681.04	3.12	679.48	1.99	6.31	5.85	
63+45.93	FM 3133	(EXIST) 2 - 30" X 57.5' CMP	DA-5	709.66	16.5	703.80	0.90	703.25	0.86	3.18	3.58	24.9	704.08	1.16	703.44	1.05	3.50	3.99	
		(PROP) 2 - 30" X 57.4' RCP				703.80	0.84	703.25	0.86	2.75	3.58		704.08	1.11	703.44	1.05	3.18	3.99	
99+95.69	FM 3133	(EXIST) 2 - 36" X 52.4' CMP	DA-6	699.71	58.2	696.27	0.88	694.79	1.48	3.88	4.95	88.1	696.93	1.51	695.11	1.8	4.98	5.51	
		(PROP) 2 - 36" X 50.2' RCP				696.27	2.49	694.79	1.48	6.34	4.95		696.93	3.21	695.11	1.8	6.93	5.51	
112+75.23	FM 3133	(EXIST) 2 - 18" X 52.6' CMP	DA-7	695.30	14.3	692.74	0.63	691.55	0.88	3.24	3.49	21.6	693.08	0.68	691.74	1.07	3.98	3.88	
		(PROP) 2 - 18" X 56.5' RCP				692.74	1.06	691.55	0.88	3.77	3.49		693.08	1.66	691.74	1.07	3.63	3.88	
118+46.34	FM 3133	(EXIST) 4 - 30" X 82.2' CMP	DA-8	696.49	58.4	692.94	0.77	692.06	1.57	3.57	4.98	88.4	694.06	1.25	692.38	1.89	4.33	5.54	
		(PROP) 4 - 30" X 102.4' RCP				692.94	1.80	692.06	1.57	3.36	4.98		694.06	2.34	692.38	1.89	4.12	5.54	
149+92.69	FM 3133	(EXIST) 1 - 24" X 49' CMP	DA-9	696.10	41.2	693.82	4.62	688.37	4.62	8.03	4.79	61.9	696.08	6.36	688.64	1.60	9.28	5.32	
		(PROP) 1 - 24" X 52.2' RCP				693.82	4.62	688.37	1.33	8.06	4.79		696.08	6.89	688.64	1.60	9.68	5.32	
150+79.16	FM 3133	(EXIST) 2 - 48" X 82' CMP	DA-10	694.42	228.3	688.55	1.15	687.85	1.14	3.1	4.55	141.0	688.93	1.5	688.11	1.4	3.57	5.09	
		(PROP) 2 - 48" X 62.6' RCP				688.55	1.22	687.85	1.14	3.47	4.55		688.93	1.58	688.11	1.4	3.93	5.09	
194+38.62	FM 3133	(EXIST) 1 - 42" X 54.2' CMP	DA-11	691.70	50.9	688.19	2.07	687.33	1.34	2.56	4.75	76.6	689.02	2.90	687.62	1.63	4.10	5.30	
		(PROP) 1 - 42" X 50.4' RCP				688.19	2.40	687.33	1.34	3.06	4.75		689.02	3.10	687.62	1.63	4.35	5.30	
212+43.56	FM 3133	(EXIST) 1 - 5' X 10' X 95.3' SBC	DA-12	656.45	107.3	643.78	0.30	643.72	1.23	0.50	5.22	162.4	644.09	0.43	644.04	1.55	0.58	5.93	
		SAME AS EXIST				643.78	0.30	643.72	1.23	0.50	5.22		644.09	0.43	644.04	1.55	0.58	5.93	
242+07.61	FM 3133	(EXIST) 1 - 36" X 85.6' CMP	DA-13	667.08	67.2	661.65	3.34	658.47	1.58	5.56	5.14	101.6	665.55	5.88	658.81	1.92	8.33	5.72	
		(PROP) 1 - 36" X 82.5' RCP				661.62	3.31	658.47	1.58	6.03	5.14		665.48	5.99	658.81	1.92	9.20	5.72	
254+67.81	FM 3133	(EXIST) 1 - 42" X 72.6' CMP	DA-14	661.84	23.4	654.32	1.54	653.25	0.91	4.91	3.84	35.3	654.75	1.95	653.46	1.12	5.64	4.3	
		(PROP) 1 - 42" X 65' RCP				654.32	1.22	653.25	0.91	4.52	3.84		654.75	1.66	653.46	1.12	5.23	4.3	

CULVERT INPUT DATA (HY-8, V7.6)

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	INLET STATION (FT)	INLET ELEVATION (FT)	OUTLET STATION (FT)	OUTLET ELEVATION (FT)	TAILWATER DATA
5+21.40	FM 3133	(EXIST) 1 - 30" X 53' CMP	DA-1	0.00	679.38	53.00	679.24	TRAPZ CH, BW=2.75, SS=3:1, CH S=0.0095 FT/FT, "n"=0.012 INV ELEV=680.53
		(PROP) 2 - 24" X 43.9' RCP		0.00	682.34	53.90	681.83	
11+01.27	FM 3133	(EXIST) 1 - 24" X 53.2' CMP	DA-2	0.00	679.38	53.20	679.23	TRAPZ CH, BW=2.50, SS=3:1, CH S=0.002 FT/FT, "n"=0.012 INV ELEV=675.91
		(PROP) 1 - 24" X 65.1' RCP		0.00	675.91	59.10	675.20	
12+64.63	FM 3133	(EXIST) 1 - 36" X 53.7' CMP	DA-3	0.00	672.58	53.70	671.71	TRAPZ CH, BW=3.50, SS=3:1, CH S=0.002 FT/FT, "n"=0.012 INV ELEV=675.16
		(PROP) 1 - 36" X 47.4' RCP		0.00	675.16	47.40	675.06	
20+56.41	FM 3133	(EXIST) 2 - 36" X 50' CGM PIPE	DA-4	0.00	678.03	50.00	677.98	TRAPZ CH, BW=3.50, SS=3:1, CH S=0.02 FT/FT, "n"=0.012 INV ELEV=677.49
		(PROP) 2 - 36" X 58.4' RCP		0.00	677.47	48.60	677.36	
63+45.93	FM 3133	(EXIST) 2 - 30" X 57.5' CMP	DA-5	0.00	702.00	50.00	677.98	TRAPZ CH, BW=2.50, SS=3:1, CH S=.005 FT/FT, "n"=0.012 INV ELEV=702.39
		(PROP) 2 - 30" X 57.4' RCP		0.00	702.39	57.40	702.21	
99+95.69	FM 3133	(EXIST) 2 - 36" X 52.4' CMP	DA-6	0.00	694.78	52.40	694.78	TRAPZ CH, BW=3.50, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=693.31
		(PROP) 2 - 36" X 50.2' RCP		0.00	693.27	50.20	693.04	
112+75.23	FM 3133	(EXIST) 2 - 18" X 52.6' CMP	DA-7	0.00	691.71	52.30	691.70	TRAPZ CH, BW=2.00, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=690.67
		(PROP) 2 - 18" X 56.5' RCP		0.00	690.64	56.50	689.92	
118+46.34	FM 3133	(EXIST) 4 - 30" X 82.2' CMP	DA-8	0.00	691.71	82.20	691.42	TRAPZ CH, BW=2.75, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=690.49
		(PROP) 4 - 30" X 102.4' RCP		0.00	690.49	102.40	690.16	
149+92.69	FM 3133	(EXIST) 1 - 24" X 49' CMP	DA-9	0.00	687.05	49.00	686.79	TRAPZ CH, BW=2.50, SS=3:1, CH S=0.0057 FT/FT, "n"=0.012 INV ELEV=687.04
		(PROP) 1 - 24" X 52.2' RCP		0.00	688.84	52.20	686.79	
150+79.16	FM 3133	(EXIST) 2 - 48" X 82' CMP	DA-10	0.00	686.72	82.00	686.45	TRAPZ CH, BW=4.50, SS=3:1, CH S=0.0053 FT/FT, "n"=0.012 INV ELEV=686.71
		(PROP) 2 - 48" X 62.6' RCP		0.00	686.67	62.60	686.47	
194+38.62	FM 3133	(EXIST) 1 - 42" X 54.2' CMP	DA-11	0.00	685.76	54.20	681.75	TRAPZ CH, BW=4.0, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=685.99
		(PROP) 1 - 42" X 50.4' RCP		0.00	685.43	50.40	683.61	
212+43.56	FM 3133	(EXIST) 1 - 5' X 10' X 95.3' SBC	DA-12	0.00	642.49	95.30	641.89	TRAPZ CH, BW=13.00, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=642.49
		SAME AS EXIST		0.00	642.49	95.30	641.89	
242+07.61	FM 3133	(EXIST) 1 - 36" X 85.6' CMP	DA-13	0.00	656.54	85.60	653.29	TRAPZ CH, BW=3.50, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=656.89
		(PROP) 1 - 36" X 82.5' RCP		0.00	656.54	82.50	654.07	
254+67.81	FM 3133	(EXIST) 1 - 42" X 72.6' CMP	DA-14	0.00	651.99	72.60	651.77	TRAPZ CH, BW=4.0, SS=3:1, CH S=0.005 FT/FT, "n"=0.012 INV ELEV=652.34
		(PROP) 1 - 42" X 65' RCP		0.00	652.31	65.00	652.16	

SELECT COUNTY: COLLIN
SELECT AREA TYPE: RURAL

NOTES:
1. HY-8 VERSION 7.6 WAS USED FOR CULVERTS ANALYSIS.
2. ALL ELEVATIONS AREA BASED ON THE NAVD88 VERTICAL DATUM.
3. USGS MAPS AND AS-BUILTS (CSJ: 3236-02-001) WERE USED FOR DRAINAGE AREA COMPUTATIONS
4. REFERENCE: TxDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.
5. FHWA HYRDRAULIC TOOLBOX 4.4 - JULY 10,2018 BUILD WAS USED FOR DROP INLET CALCULATIONS.

STATE OF TEXAS
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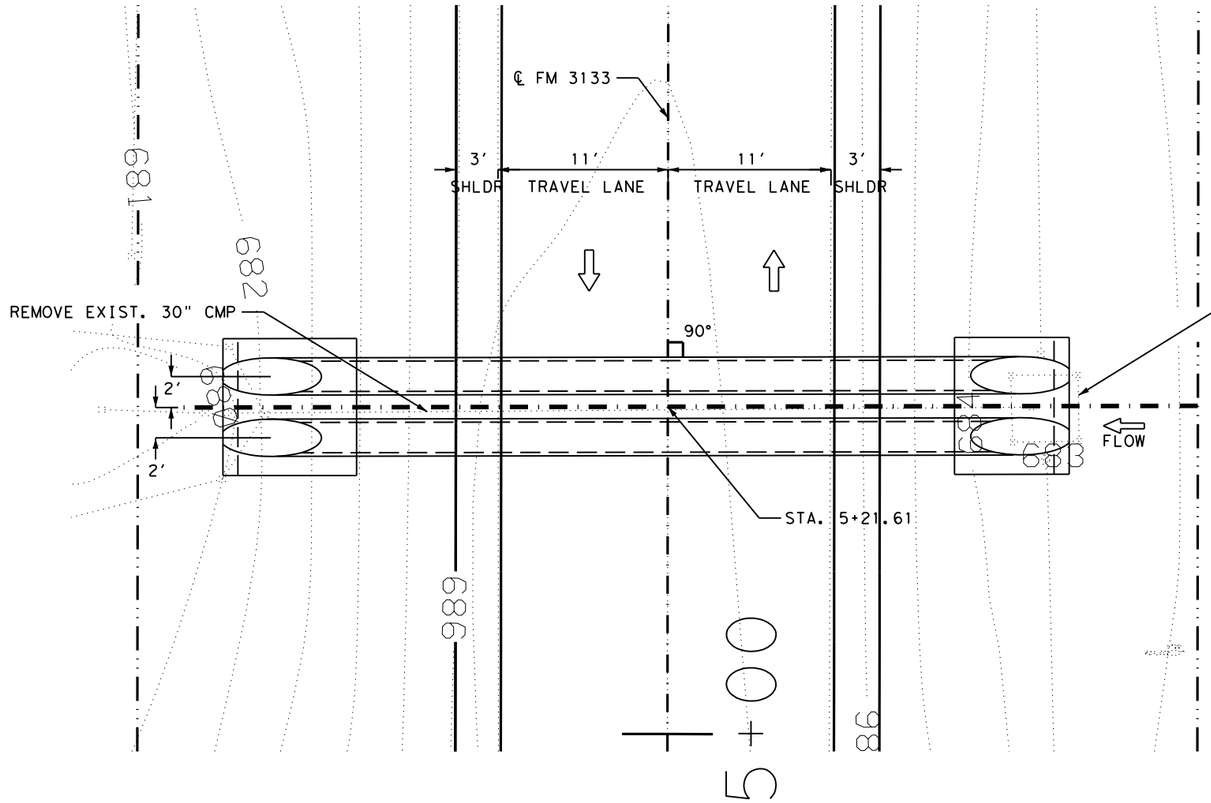
11/4/20

FM 3133
HYDRAULIC DATA

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	101
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

$FILEL$

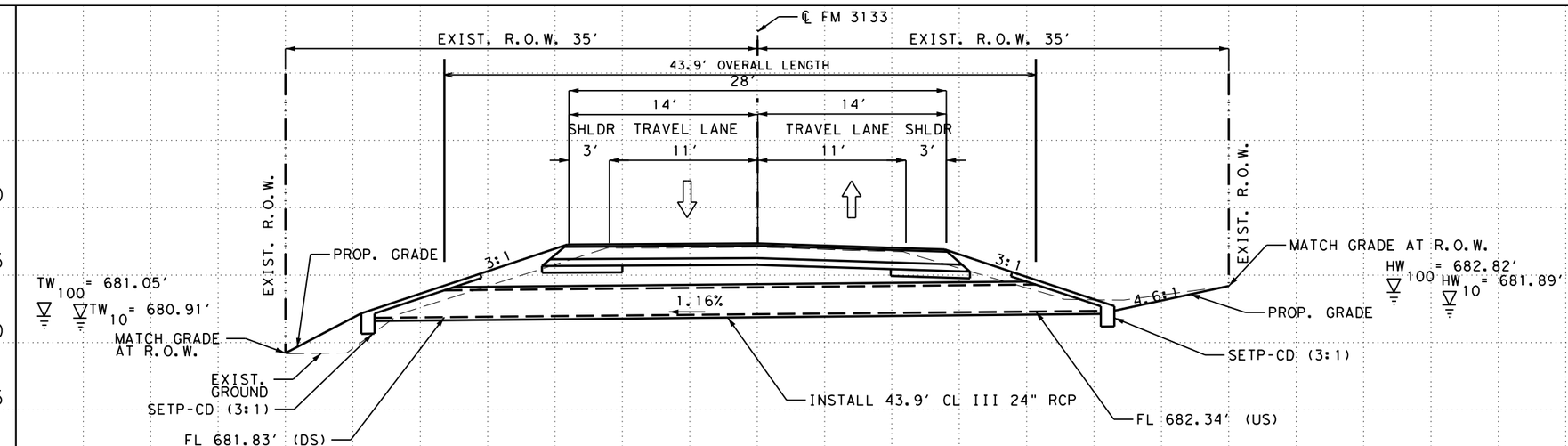


N

HORIZONTAL SCALE
0 2 4 6 8 10
SCALE IN FEET

VERTICAL SCALE
0 2 4 6 8 10
SCALE IN FEET

LOCATION CSJ: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6005	467 6388	496 6002	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(24 IN)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	REMOV STR (INLET)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA	EA
TOTAL	31	25.7	26.0	87.8	4.0	1.0	1.0



CULVERT #1
STA. 5+21.61

EXIST.: 1 - 30" X 53′ CMP W/DROP INLET
PROP. : 2 - 24" X 43.9′ RCP W/SETP-CD (3:1)(LT/RT)

STATE OF TEXAS
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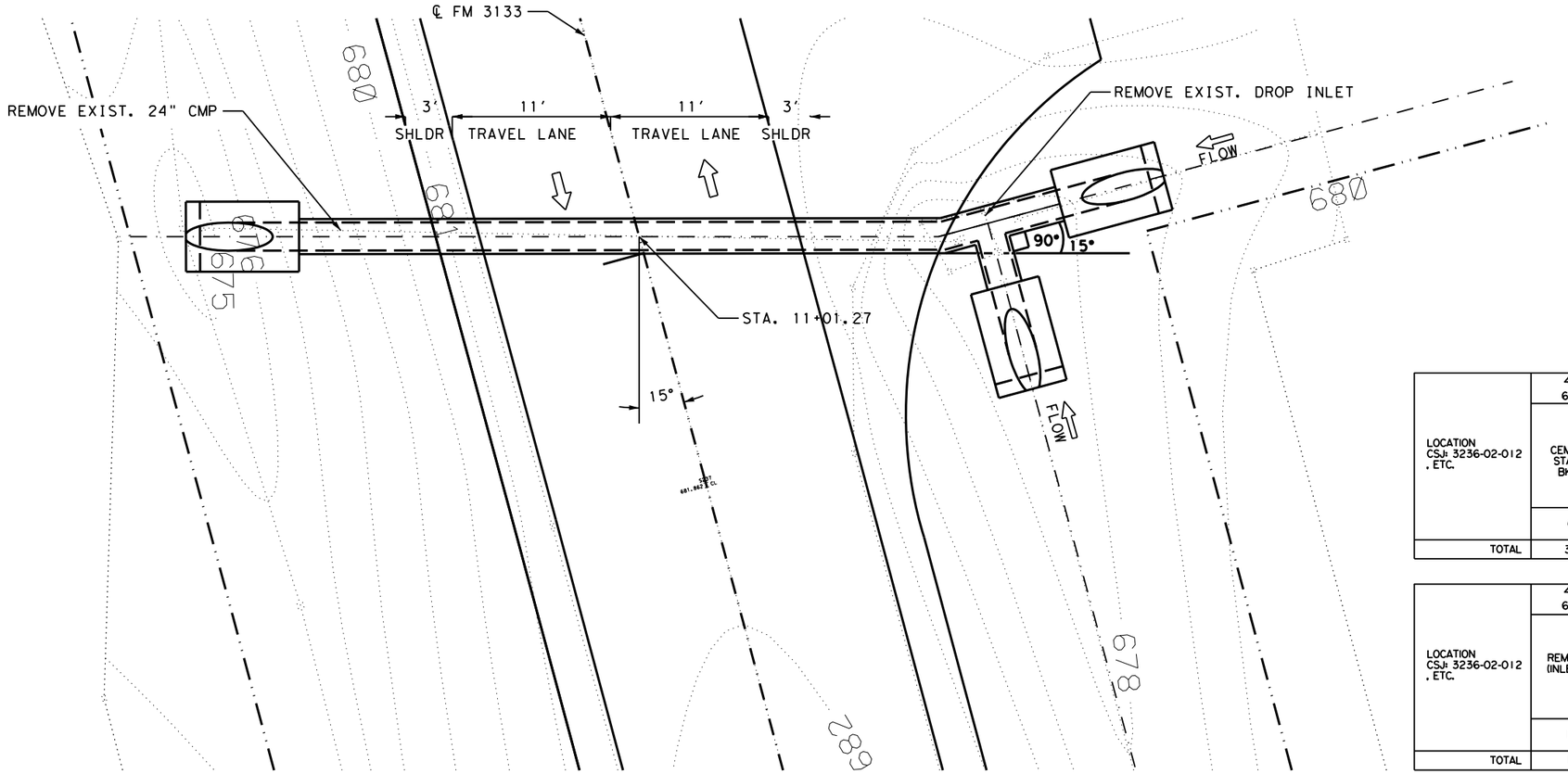
Texas Department of Transportation

FM 3133
CULVERT LAYOUT #1
STA 5+21.61

SCALE: 1" = 10′ SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	102
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



HORIZONTAL SCALE

0 2 4 6 8 10

SCALE IN FEET

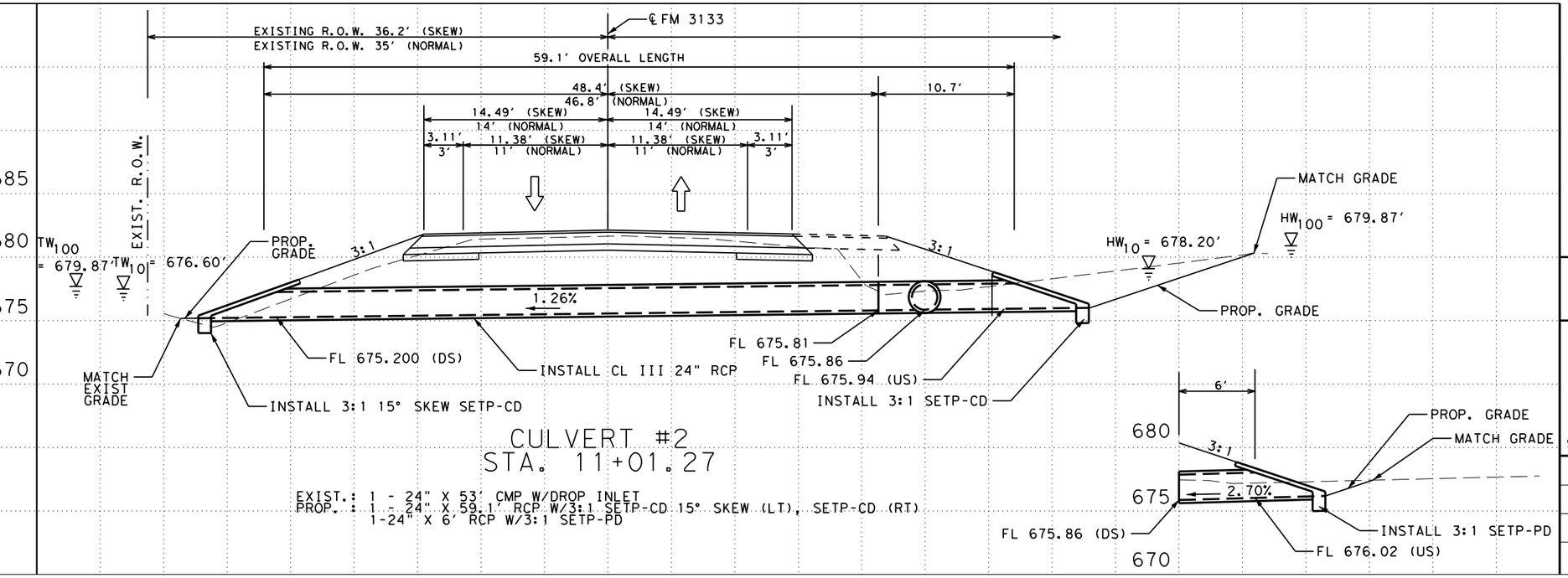
VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

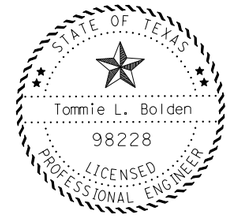
LOCATION CSJ# 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6005	467 6388	467 6389
	CEMENT STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(24 IN)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (3: 1) (P)
	CY	SY	LF	LF	EA	EA
TOTAL	30.7	11.4	26.4	65.1	2.0	1.0

LOCATION CSJ# 3236-02-012 , ETC.	496 6002	496 6042
	REMOV STR (INLET)	REMOV STR (SMALL)
	EA	EA
TOTAL	1.0	1.0



CULVERT #2
STA. 11+01.27

EXIST.: 1 - 24" X 53' CMP W/DROP INLET
PROP.: 1 - 24" X 59.1' RCP W/3:1 SETP-CD 15° SKEW (LT), SETP-CD (RT)
1-24" X 6' RCP W/3:1 SETP-PD



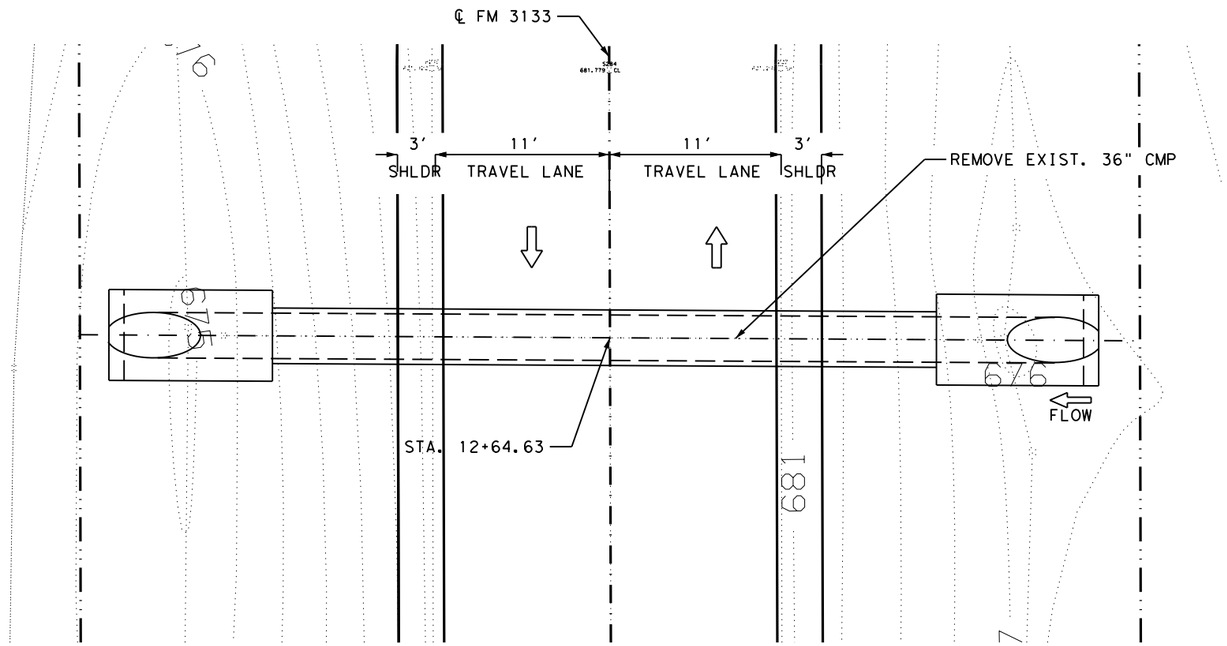
1/7/21

FM 3133
CULVERT LAYOUT #2
STA 11+01.27

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	103
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



HORIZONTAL SCALE

0 2 4 6 8 10

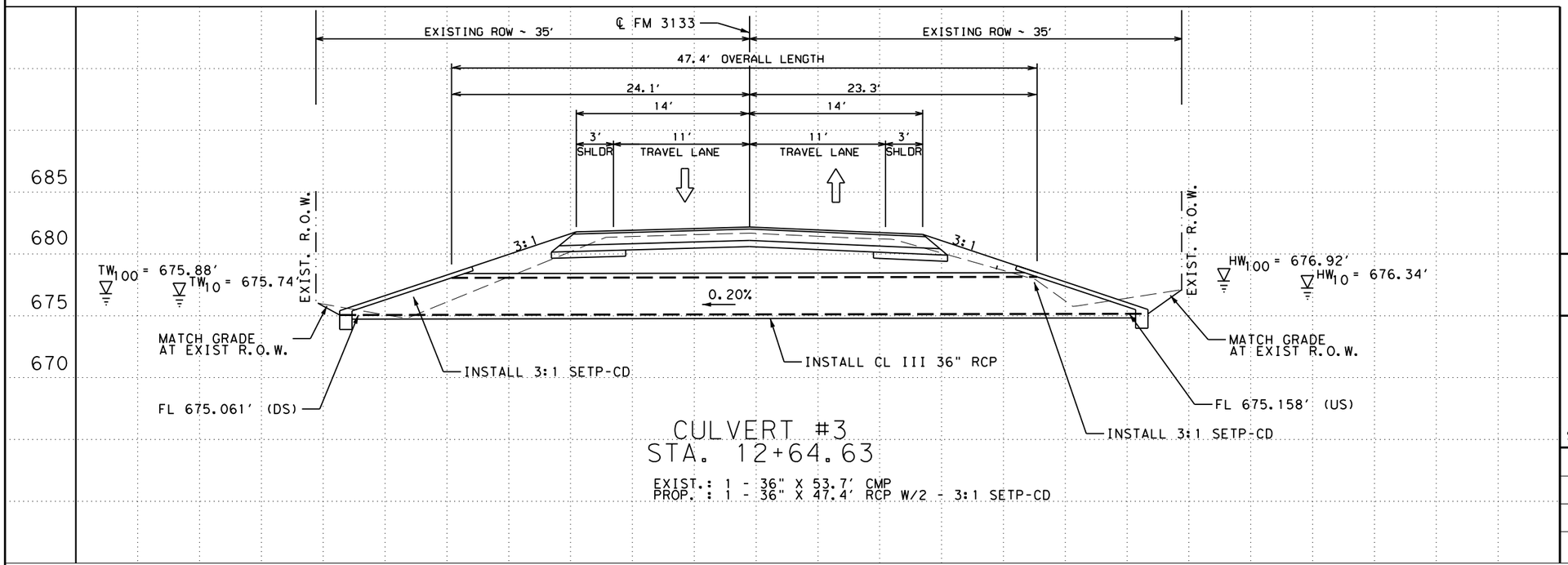
SCALE IN FEET

VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

LOCATION CSJ# 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6008	467 6448	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(36 IN)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA
TOTAL	38.1	18.3	26.0	47.4	2.0	1.0



CULVERT #3
STA. 12+64.63

EXIST.: 1 - 36" X 53.7' CMP
PROP. : 1 - 36" X 47.4' RCP W/2 - 3:1 SETP-CD

STATE OF TEXAS
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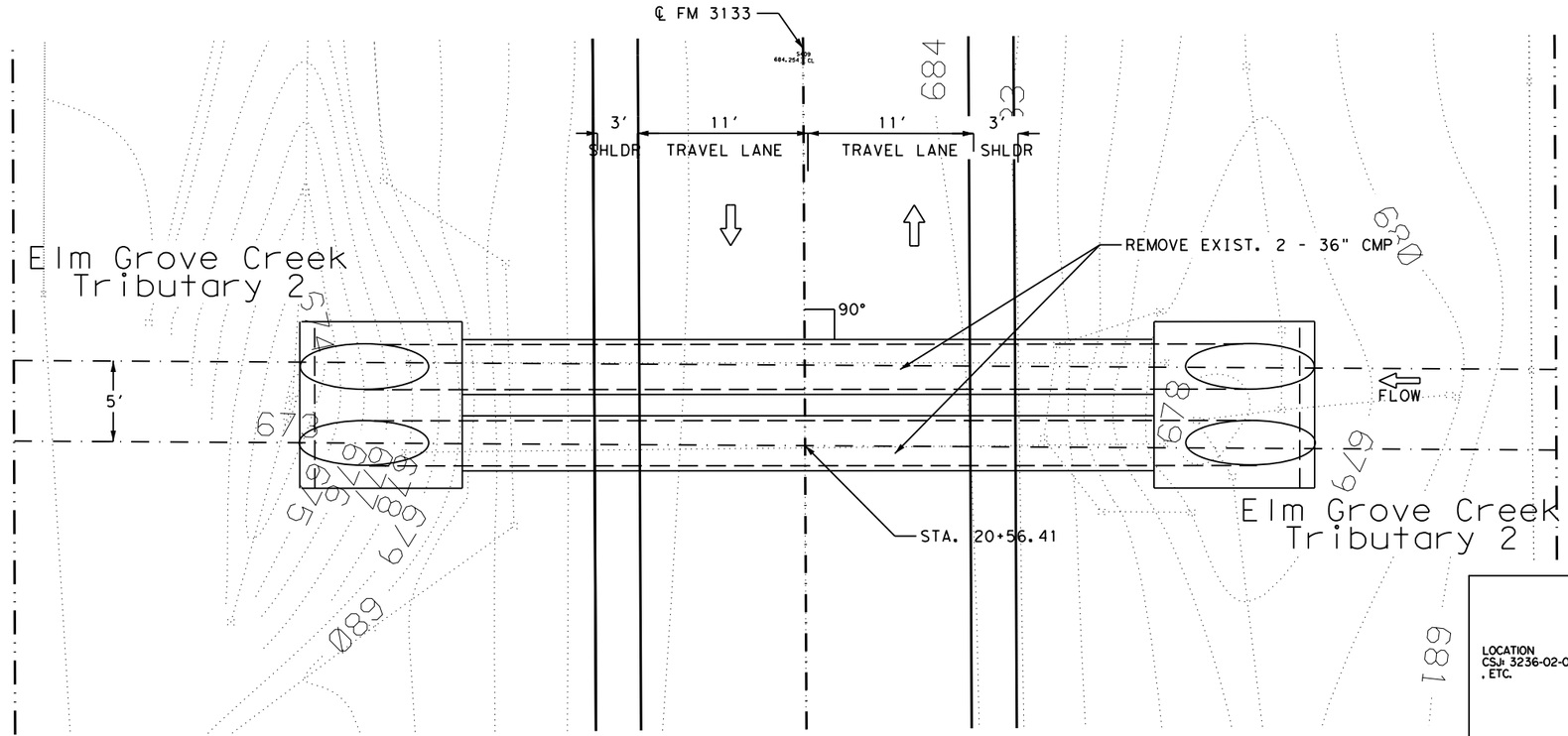
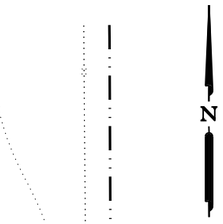
FM 3133
CULVERT LAYOUT #3
STA 12+64.63

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	104
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				





HORIZONTAL SCALE

0 2 4 6 8 10

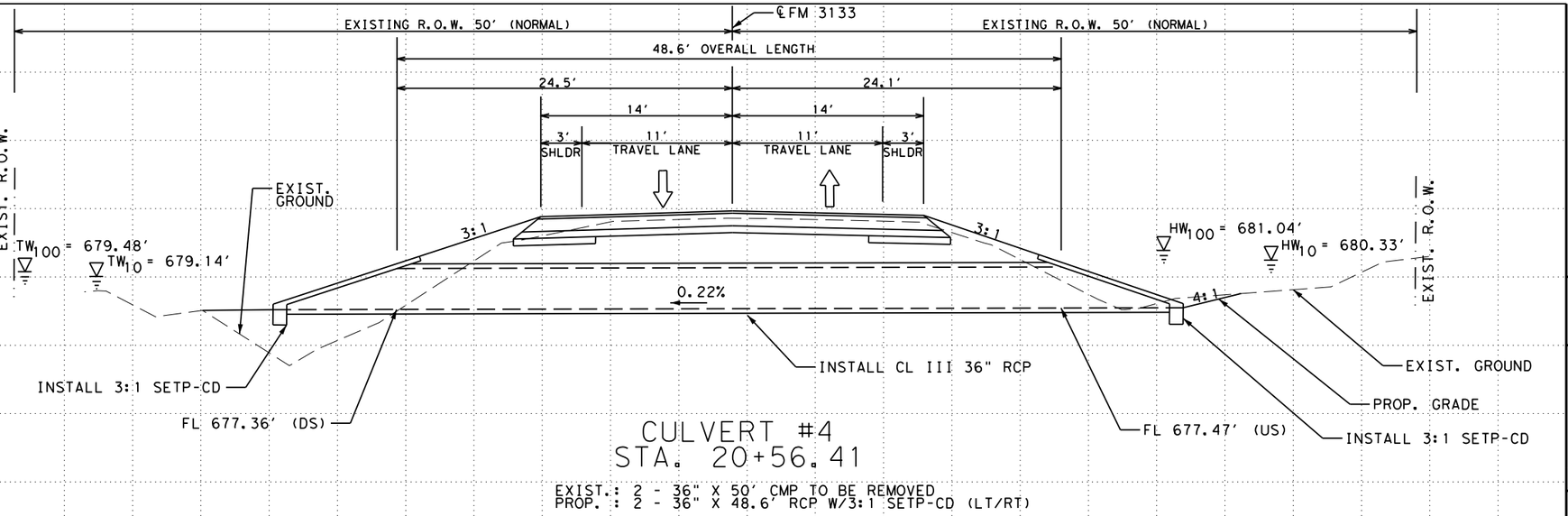
SCALE IN FEET

VERTICAL SCALE

0 2 4 6 8 10

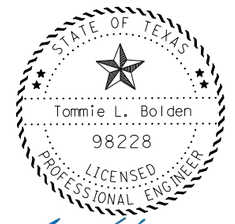
SCALE IN FEET

LOCATION CSJ: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6008	467 6448	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(36 IN)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA
TOTAL	57.4	31.0	40.0	97.2	4.0	2.0



CULVERT #4
STA. 20+56.41

EXIST.: 2 - 36" X 50' CMP TO BE REMOVED
PROP. : 2 - 36" X 48.6' RCP W/3:1 SETP-CD (LT/RT)



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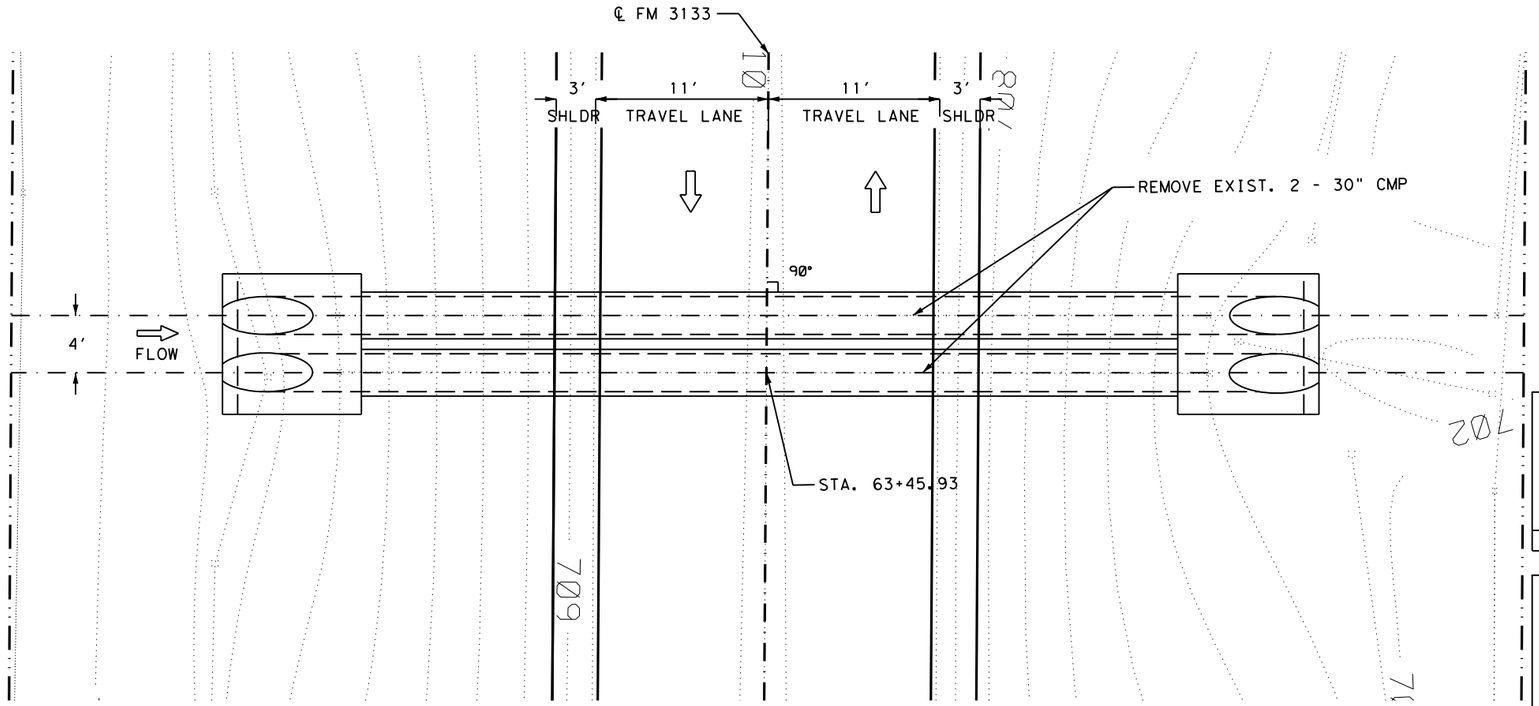
Texas Department of Transportation

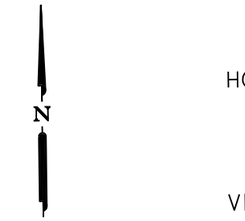
FM 3133
CULVERT LAYOUT #4
STA 20+56.41

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	105
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				





HORIZONTAL SCALE

0 2 4 6 8 10

SCALE IN FEET

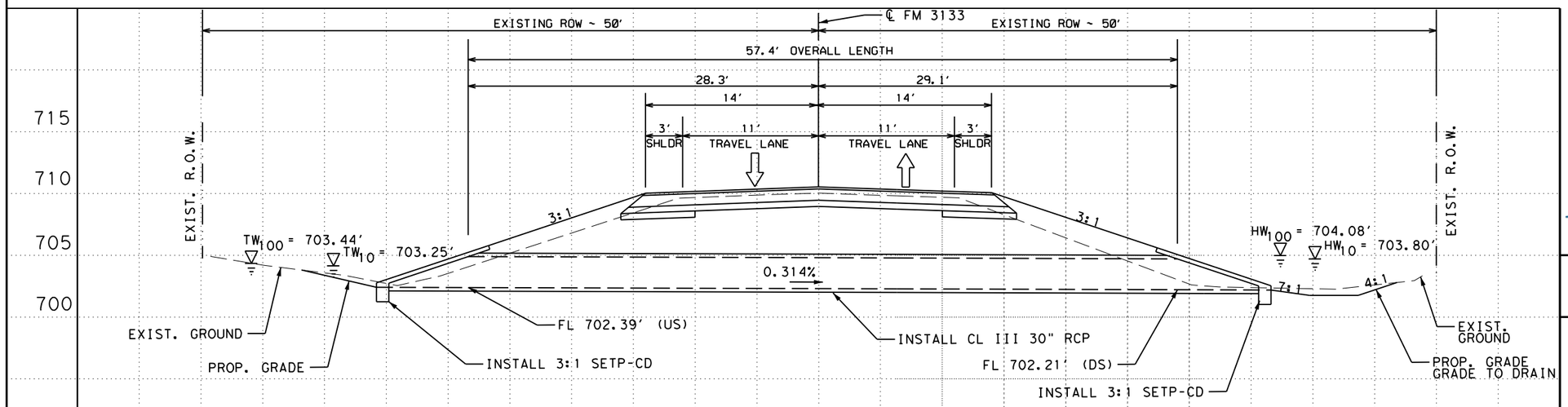
VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

LOCATION CSJ#: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6007	467 6417
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(30 IN)	SET (TY II) (30 IN) (RCP) (3:1) (C)
	CY	SY	LF	LF	EA
TOTAL	52.7	26.6	37.8	114.8	4.0

LOCATION CSJ#: 3236-02-012 , ETC.	496 6042
	REMOV STR (SMALL)
	EA
TOTAL	2.0



CULVERT #5
STA. 63+45.93

EXIST.: 2 - 30" X 57.53' CMP
PROP.: 2 - 30" X 57.4' RCP W/4-3:1 SETP-CD

STATE OF TEXAS
Tommie L. Bolden
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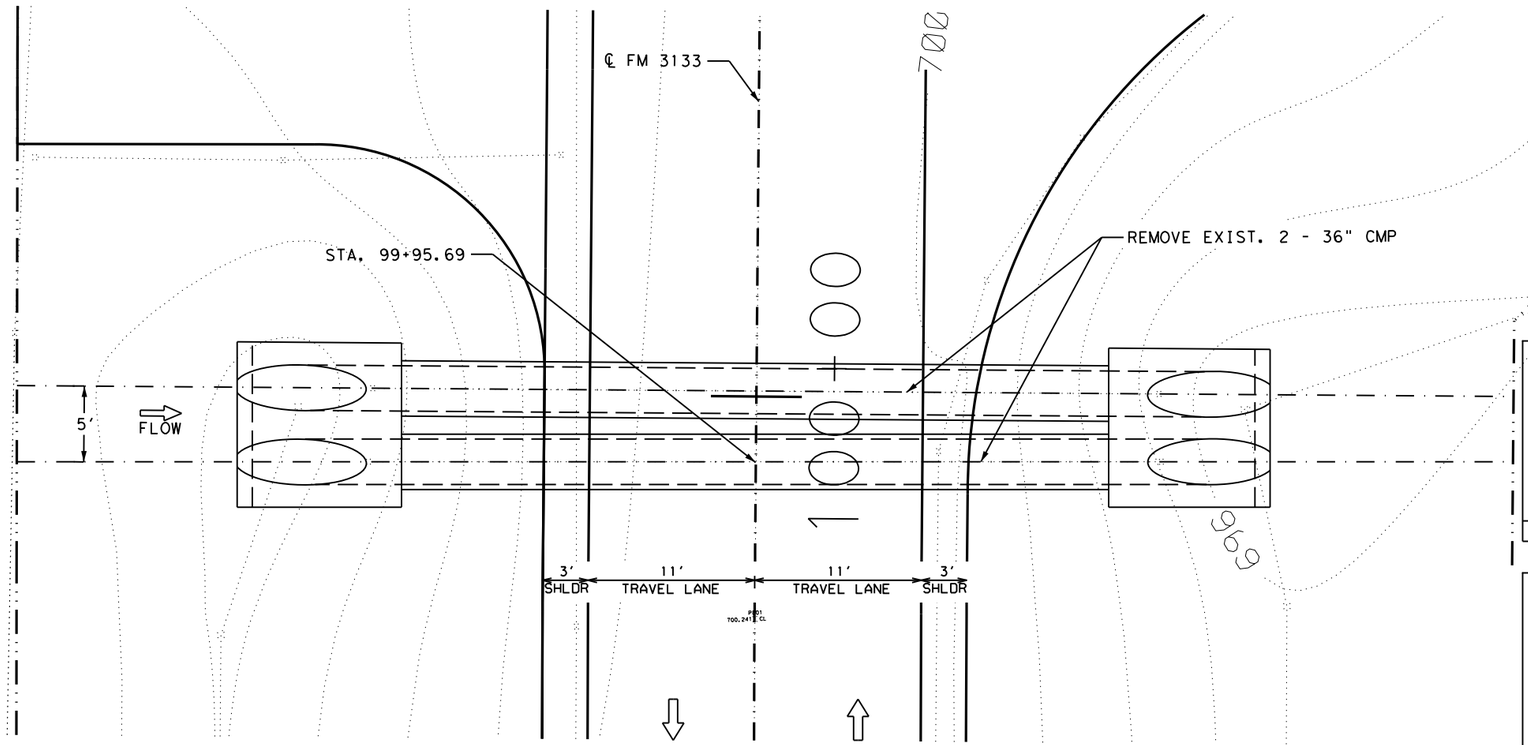
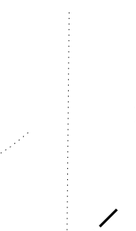
FM 3133
CULVERT LAYOUT #5
STA. 63+45.93

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	
CHECK	CONTROL	SECTION	JOB	106
DMH	3236	02	012, etc.	
CHECK				
TLB				





HORIZONTAL SCALE

0 2 4 6 8 10

SCALE IN FEET

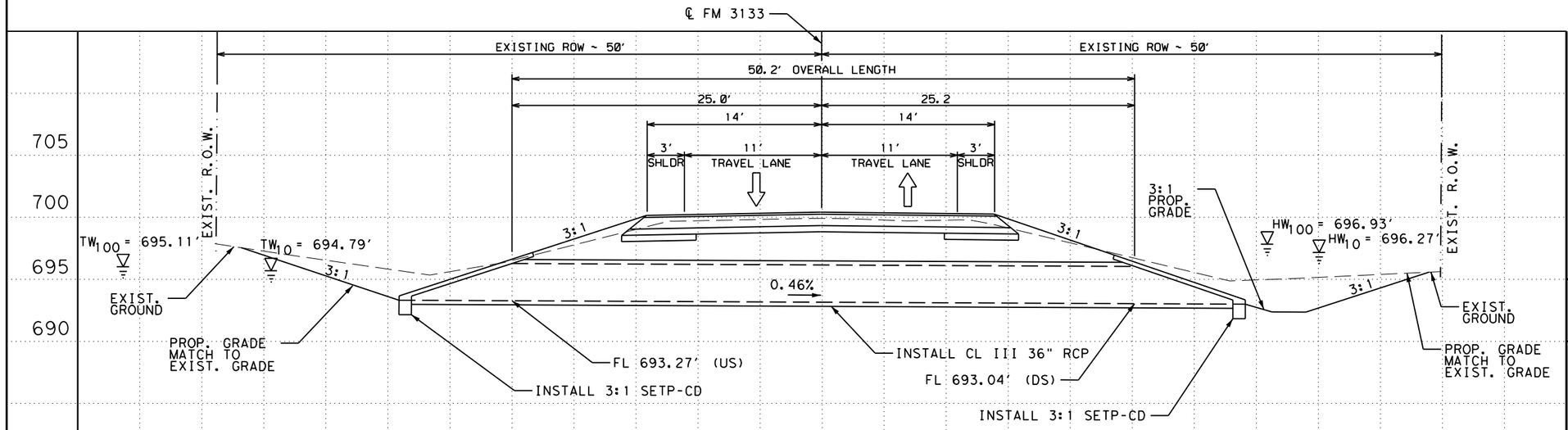
VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

	400 6005	400 6006	402 6001	464 6008	467 6448
LOCATION CSJ: 3236-02-012 , ETC.	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(36 IN)	SET (TY II) (36 IN) (RCP) (3: 1) (C)
	CY	SY	LF	LF	EA
TOTAL	59.3	31.3	40.2	100.4	4.0

	496 6042
LOCATION CSJ: 3236-02-012 , ETC.	REMOV STR (SMALL)
	EA
TOTAL	2.0



CULVERT #6
STA. 99+95.69

EXIST.: 2 - 36" X 52.4' CMP
PROP. : 2 - 36" X 50.2' RCP W/4 - SETP-CD

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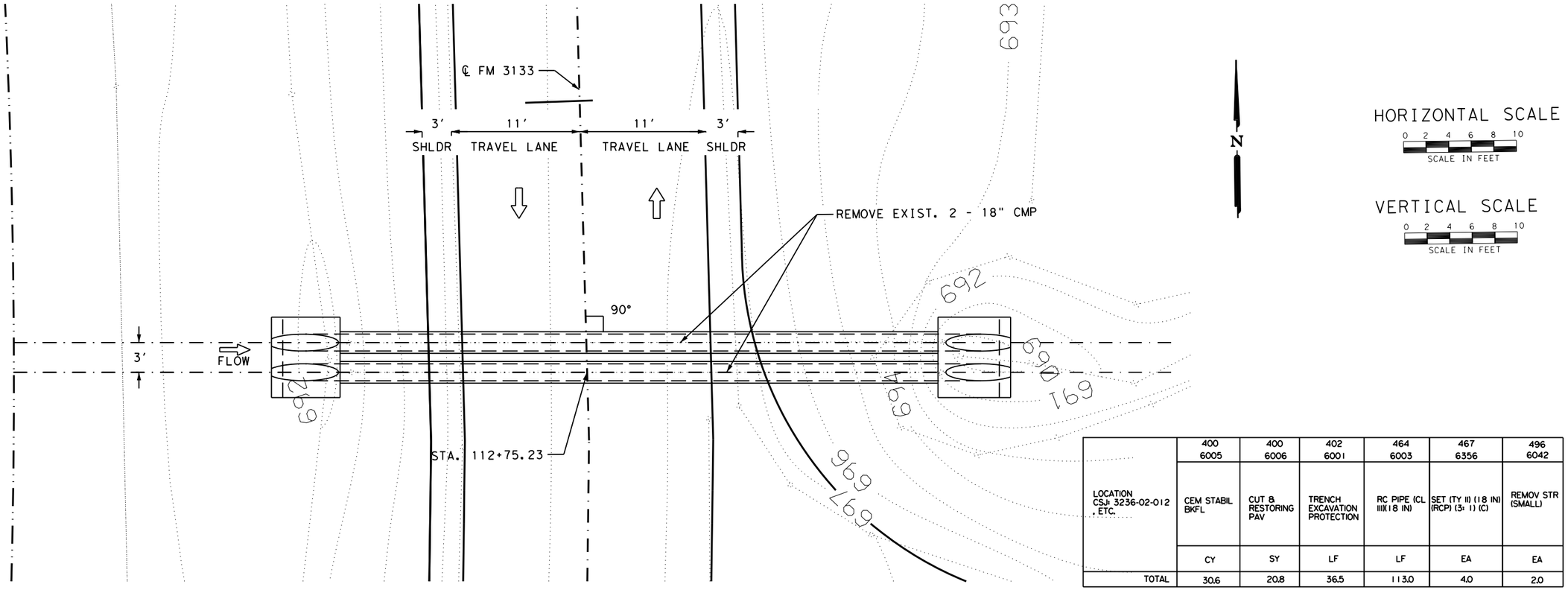
FM 3133
CULVERT LAYOUT #6
STA. 99+95.69

SCALE: 1" = 10'

SHEET 1 OF 1

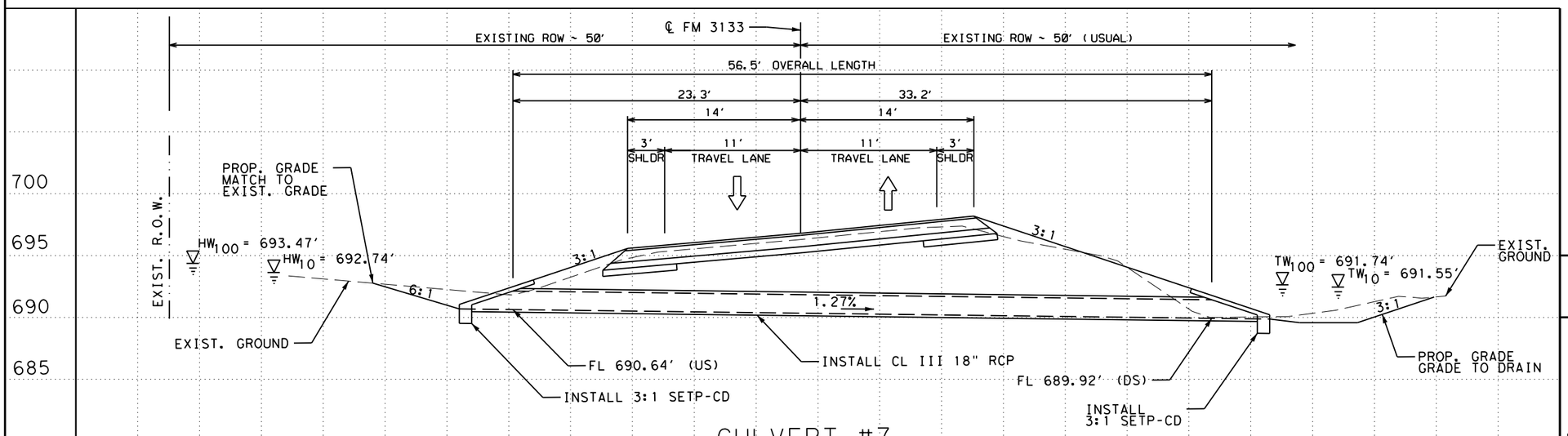
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	107
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				



HORIZONTAL SCALE
0 2 4 6 8 10
SCALE IN FEET

VERTICAL SCALE
0 2 4 6 8 10
SCALE IN FEET

LOCATION CSJs 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6003	467 6356	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(18 IN)	SET (TY II) (18 IN) (RCP) (3:1) (C)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA
TOTAL	30.6	20.8	36.5	113.0	4.0	2.0



CULVERT #7
STA. 112+75.23
EXIST.: 2 - 18" X 52.6′ CMP
PROP.: 2 - 18" X 56.5′ RCP W/4 - SETP-CD

STATE OF TEXAS
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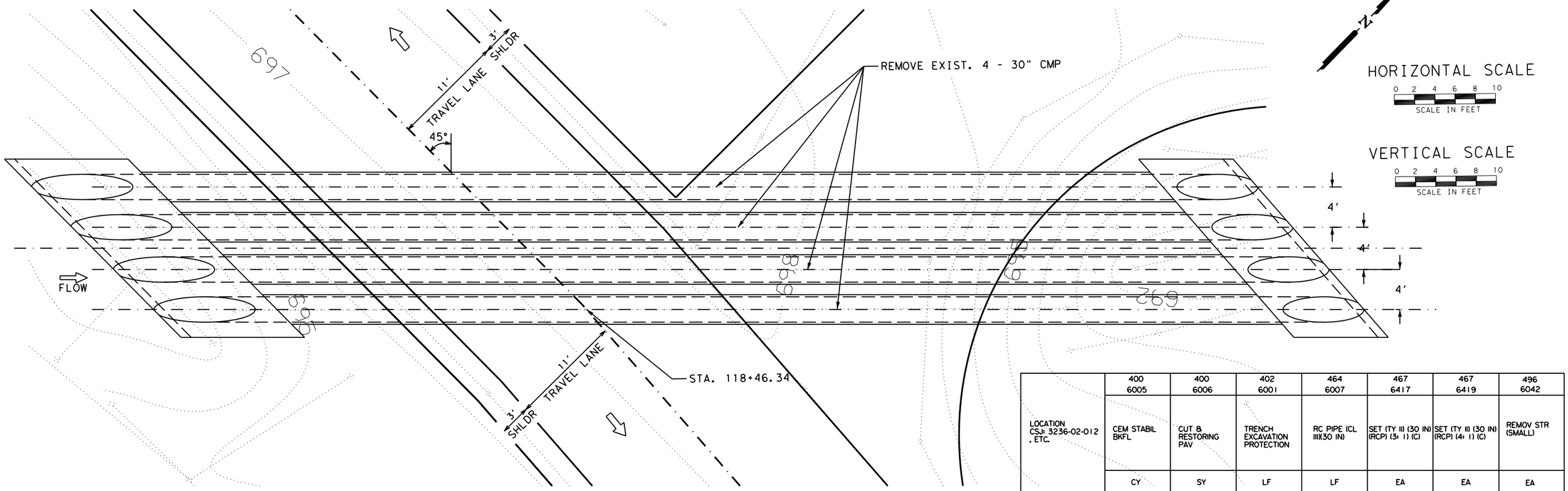
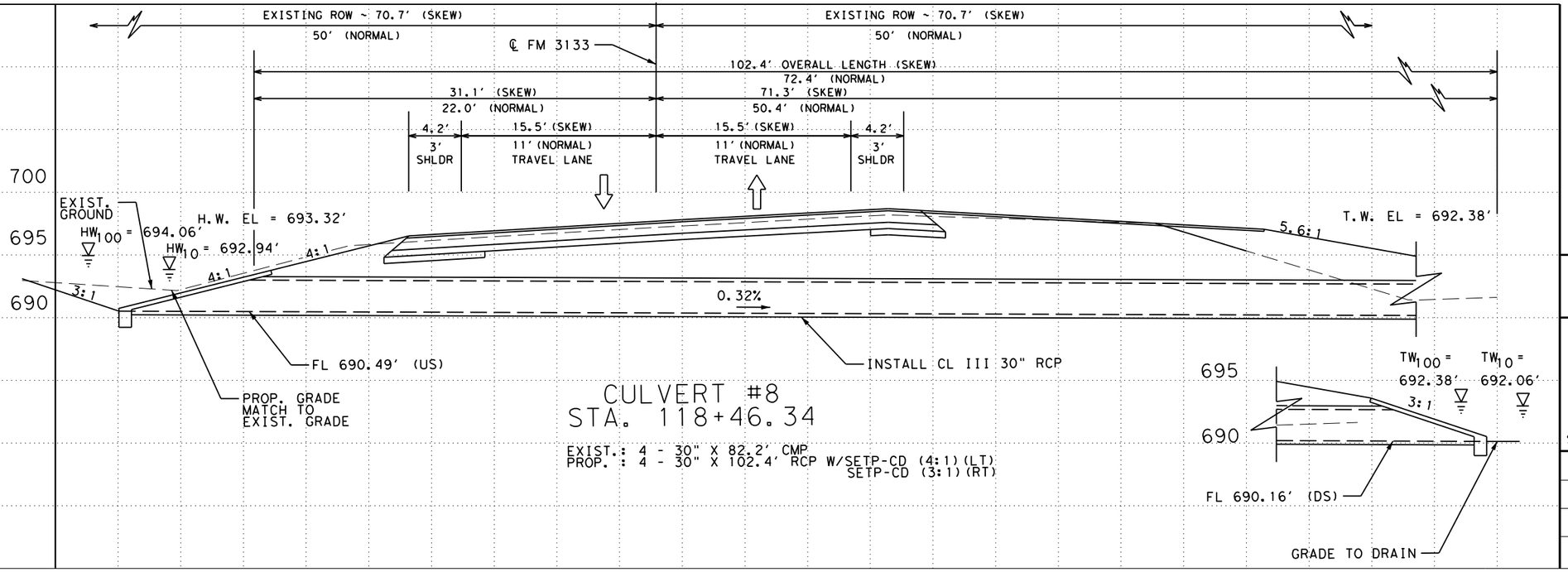
FM 3133
CULVERT LAYOUT #7
STA. 112+75.23

SCALE: 1" = 10′ SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	108
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				



LOCATION CSJ: 3236-02-012 , ETC.	400 6005 CEM STABIL BKFL	400 6006 CUT & RESTORING PAV	402 6001 TRENCH EXCAVATION PROTECTION	464 6007 RC PIPE (CL III)(30 IN)	467 6417 SET (TY II) (30 IN) (RCP) (3: 1) (C)	467 6419 SET (TY II) (30 IN) (RCP) (4: 1) (C)	496 6042 REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA	EA
TOTAL	144.7	65.4	75.0	409.6	4.0	4.0	4.0



STATE OF TEXAS
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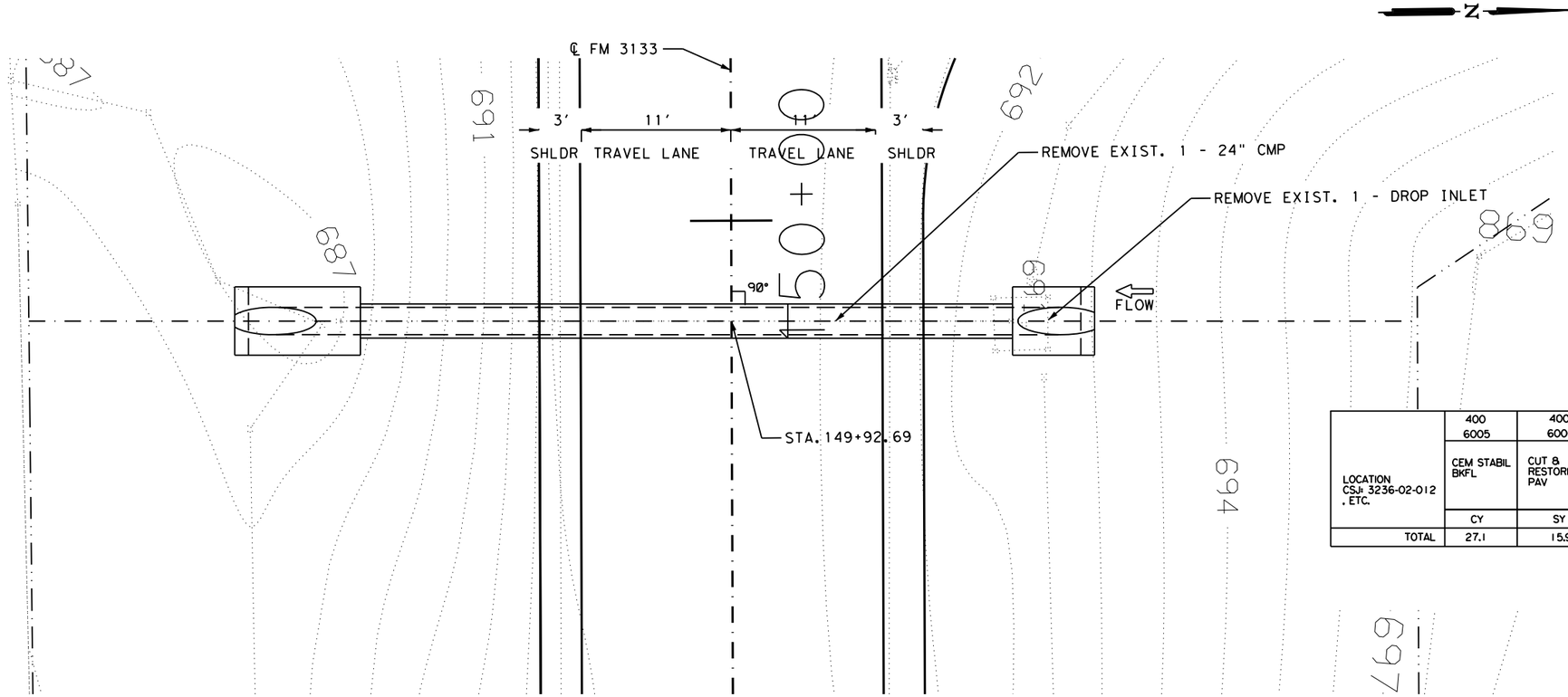
FM 3133
CULVERT LAYOUT #8
STA. 118+46.34

SCALE: 1" = 10'

SHEET 1 OF 1

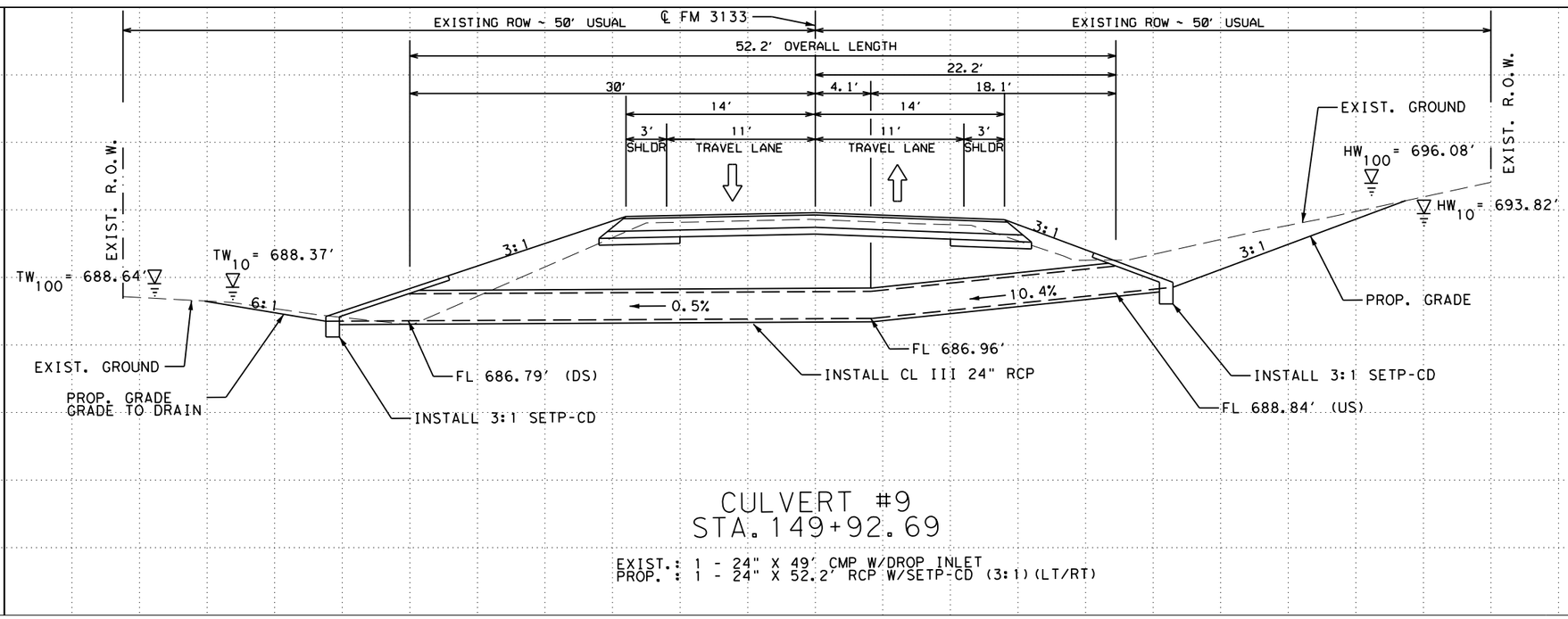
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	109
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				



HORIZONTAL SCALE
0 2 4 6 8 10
SCALE IN FEET

VERTICAL SCALE
0 2 4 6 8 10
SCALE IN FEET

LOCATION CSJs 3236-02-012 , ETC.	400 6005 CEM STABIL BKFL	400 6006 CUT & RESTORING PAV	402 6001 TRENCH EXCAVATION PROTECTION	464 6005 RC PIPE (CL III)(24 IN)	467 6388 SET (TY II) (24 IN) (RCP) (3: 1) (C)	496 6002 REMOV STR (INLET)	496 6042 REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA	EA
TOTAL	27.1	15.9	32.9	52.2	2.0	1.0	1.0



CULVERT #9
STA. 149+92.69

EXIST.: 1 - 24" X 49' CMP W/DROP INLET
PROP. : 1 - 24" X 52.2' RCP W/SETP-CD (3:1)(LT/RT)

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98228
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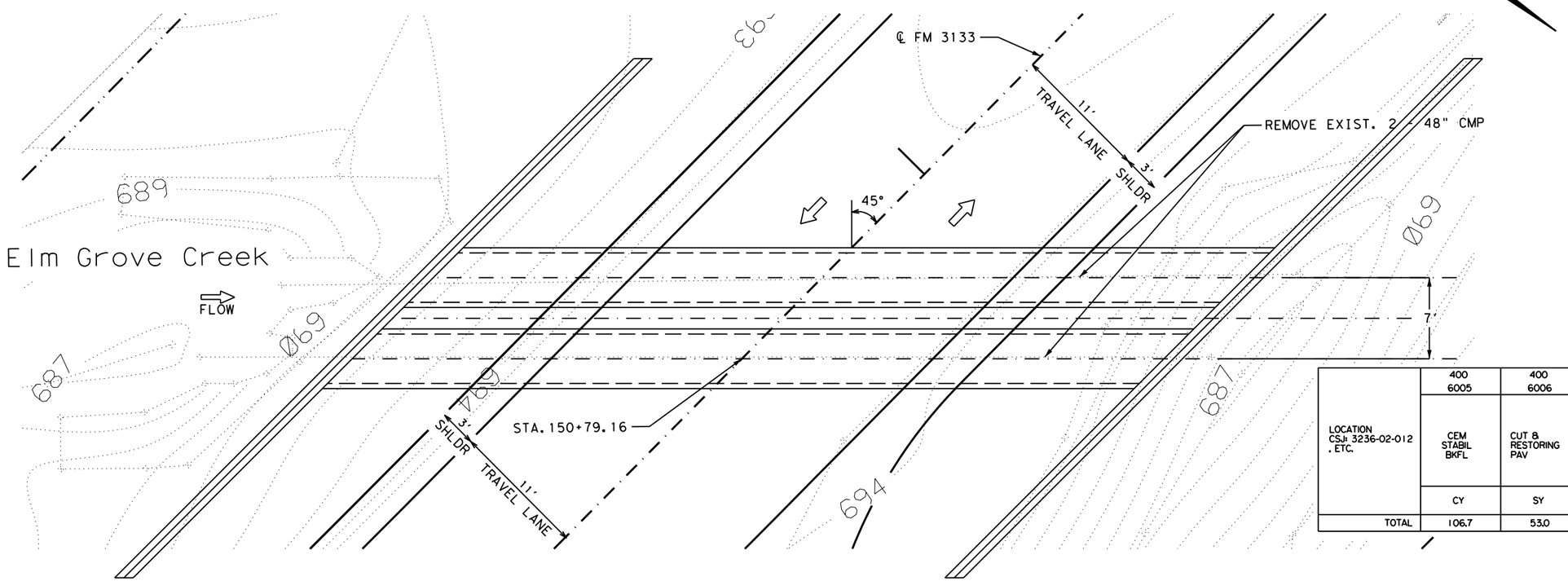
1/7/21

FM 3133
CULVERT LAYOUT #9
STA. 149+92.69

SCALE: 1" = 10' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	110
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	



HORIZONTAL SCALE

0 2 4 6 8 10

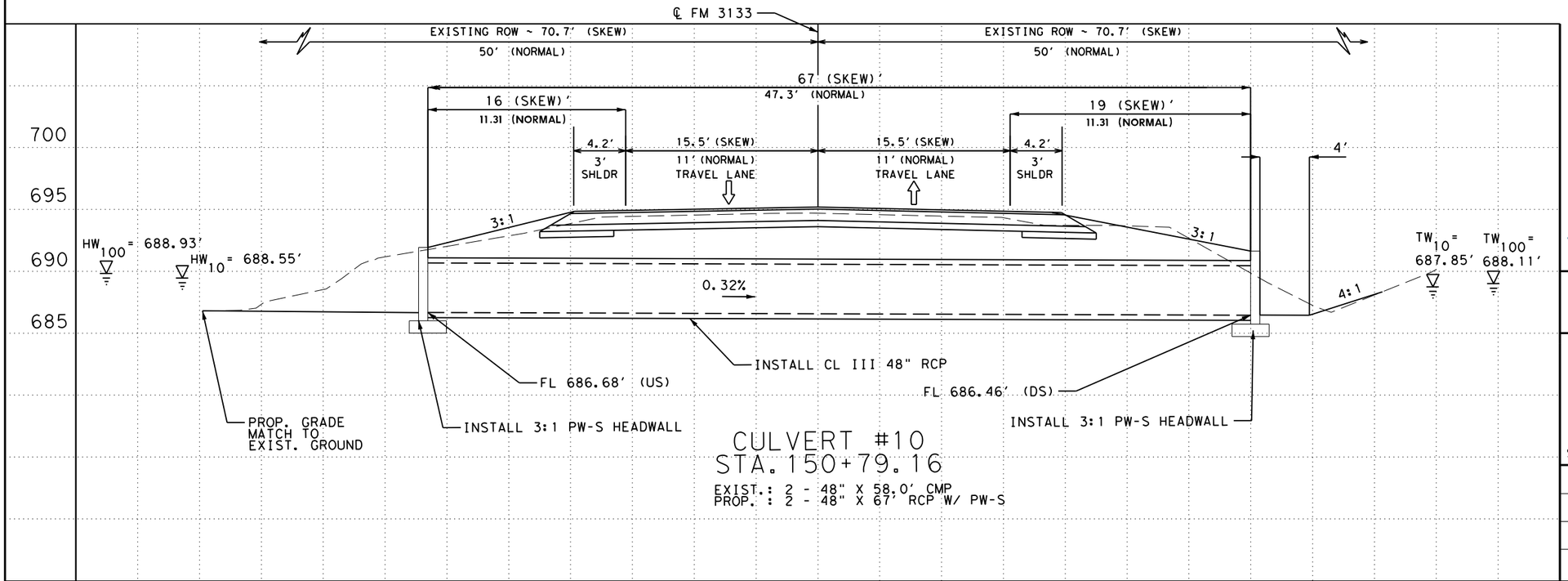
SCALE IN FEET

VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

LOCATION CSJ: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6010	466 6136	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III)(48 IN)	HEADWALL (CH-PW-S) (DIA= 48IN)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA
TOTAL	106.7	53.0	67.2	134	2	2.0



CULVERT #10
STA. 150+79.16

EXIST.: 2 - 48" X 58.0' CMP
PROP.: 2 - 48" X 67' RCP W/ PW-S

STATE OF TEXAS
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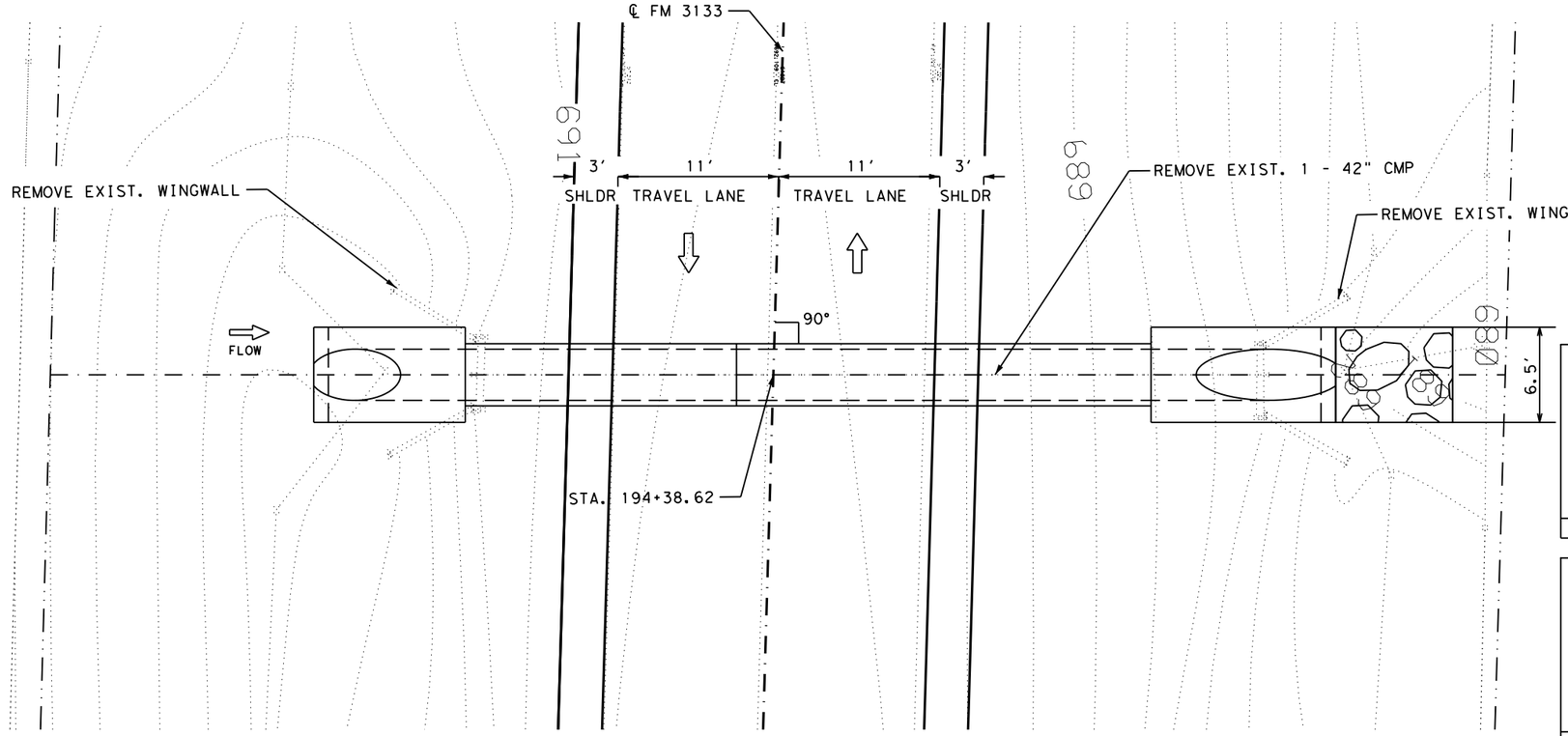
FM 3133
CULVERT LAYOUT #10
STA. 150+79.16

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	111
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012, etc.	



HORIZONTAL SCALE

0 2 4 6 8 10

SCALE IN FEET

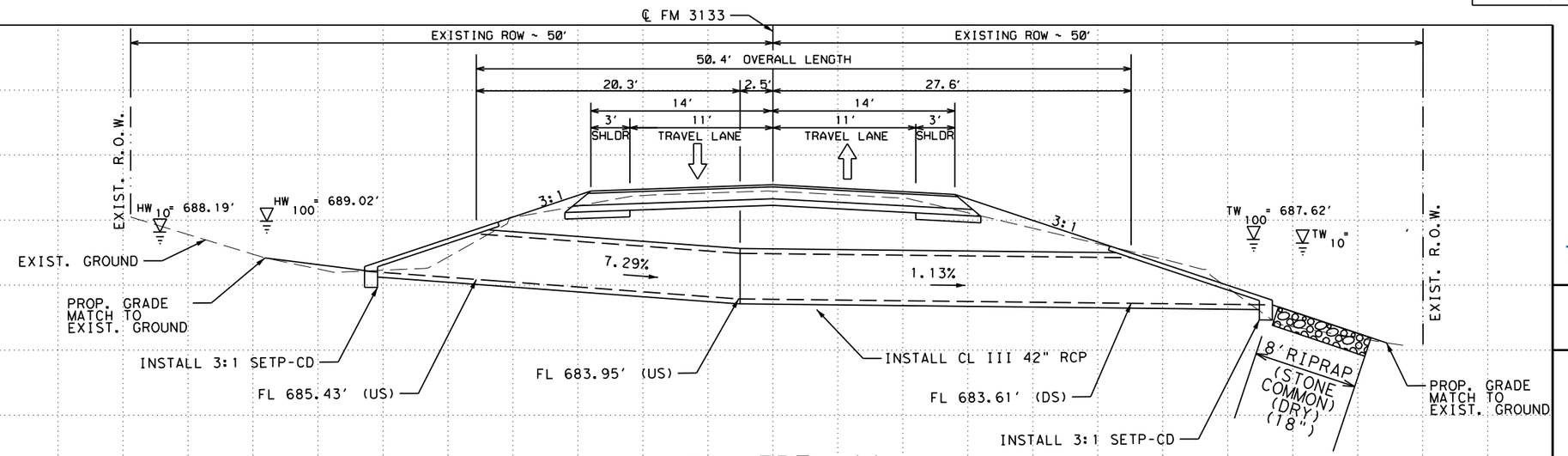
VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

LOCATION CSJ: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	432 6026
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RIPRAP (STONE COMMON(DRY) (18 IN)
	CY	SY	LF	CY
TOTAL	47.6	20.2	45.7	3.0

LOCATION CSJ: 3236-02-012 , ETC.	464 6009	467 6461	496 6005	496 6042
	RC PIPE (CL III(42 IN	SET (TY II) (42 IN) (RCP) (3: 1) (C)	REMOV STR (WINGWALL)	REMOV STR (SMALL)
	LF	EA	EA	EA
TOTAL	50.4	2.0	2.0	1.0



CULVERT #11
STA. 194+38.62

EXIST.: 1 - 42" X 54.2' CMP W/ 2-WINGWALLS
PROP. : 1 - 42" X 50.4' RCP W/ 2-3:1 SETP-CD

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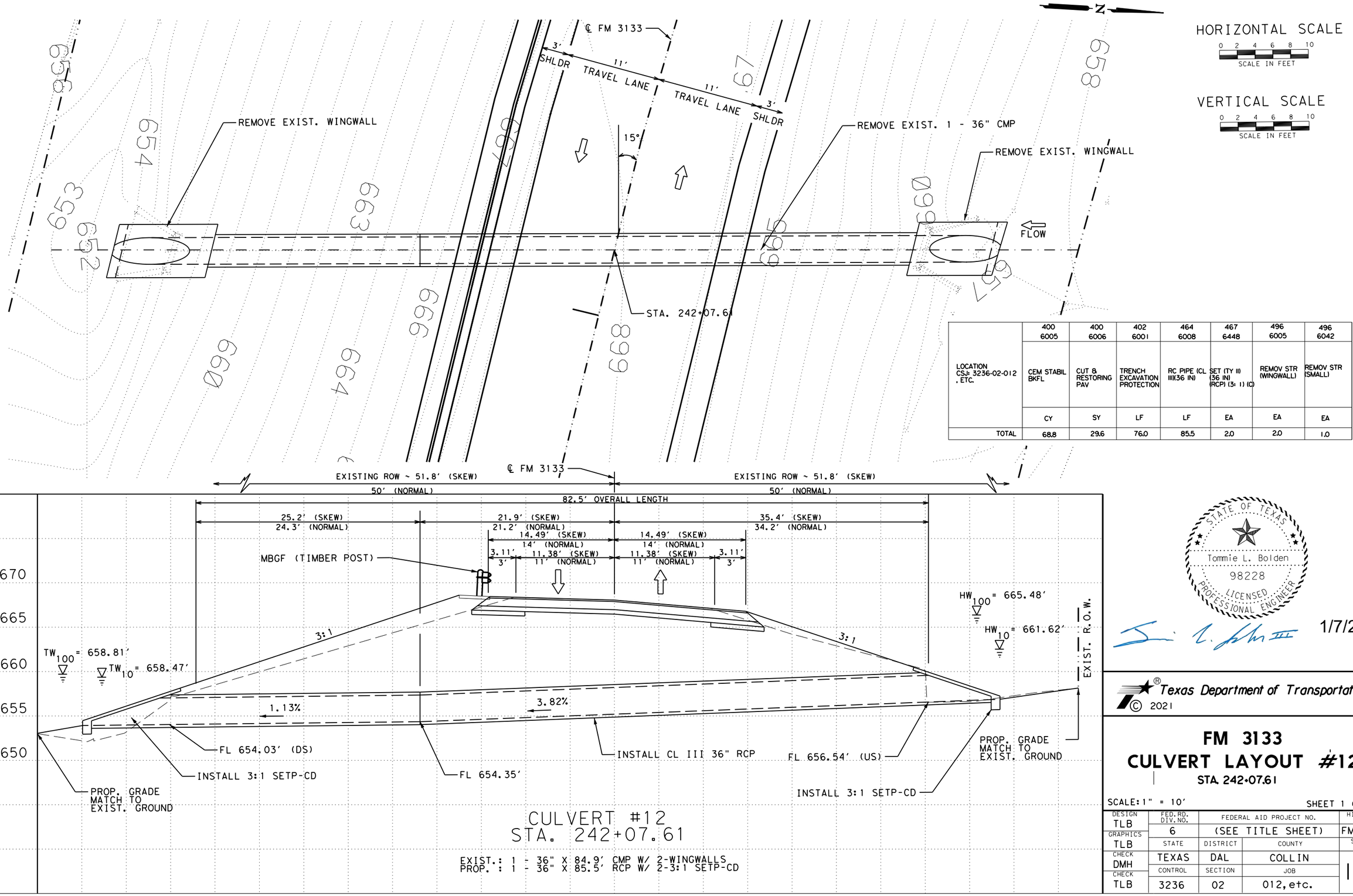
FM 3133
CULVERT LAYOUT #11
STA. 194+38.62

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	112
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\5. Drainage\Culvert Details\Culvert MA\Culvert11.dgn 1/7/2021 2:17:17 PM



HORIZONTAL SCALE
0 2 4 6 8 10
SCALE IN FEET

VERTICAL SCALE
0 2 4 6 8 10
SCALE IN FEET

LOCATION CSJ: 3236-02-012 , ETC.	400 6005	400 6006	402 6001	464 6008	467 6448	496 6005	496 6042
	CEM STABIL BKFL	CUT & RESTORING PAV	TRENCH EXCAVATION PROTECTION	RC PIPE (CL III(36 IN)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	REMOV STR (WINGWALL)	REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA	EA
TOTAL	68.8	29.6	76.0	85.5	2.0	2.0	1.0

CULVERT #12
STA. 242+07.61

EXIST.: 1 - 36" X 84.9' CMP W/ 2-WINGWALLS
PROP.: 1 - 36" X 85.5' RCP W/ 2-3:1 SETP-CD

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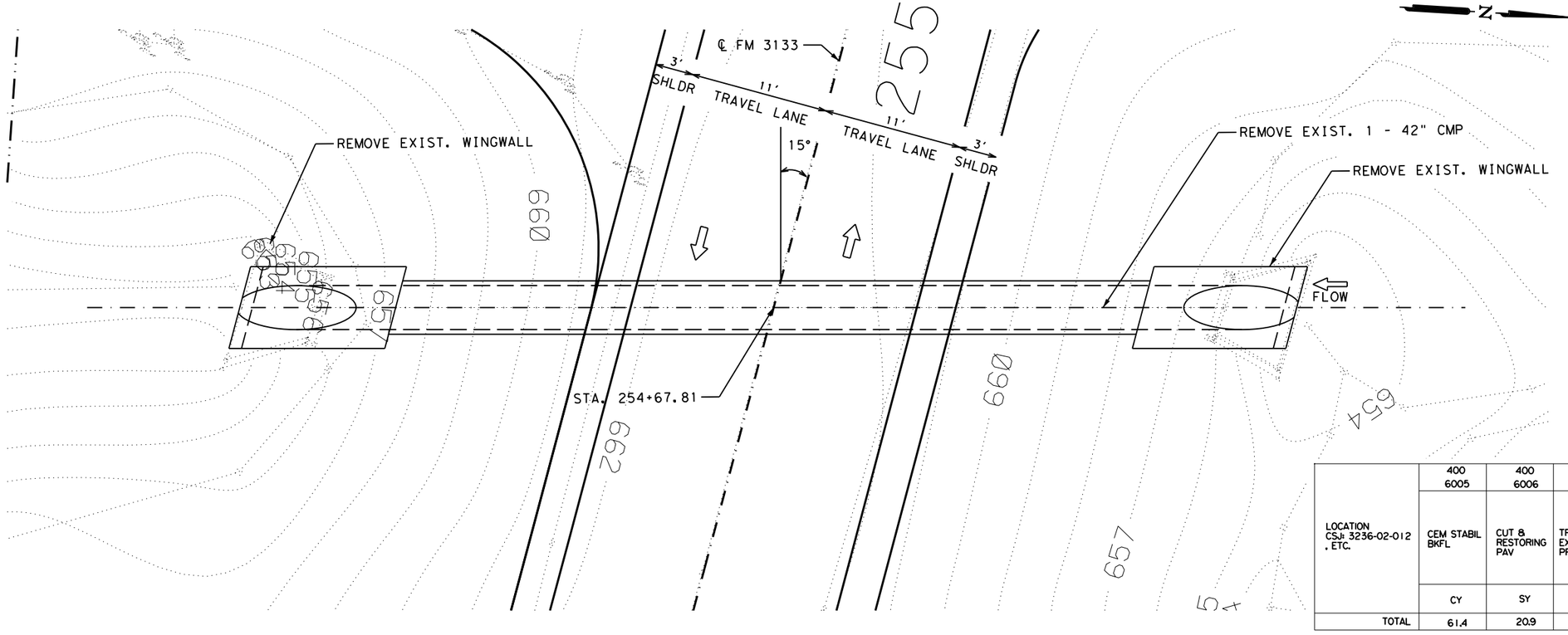
FM 3133
CULVERT LAYOUT #12
STA. 242+07.61

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	113
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012,etc.	



HORIZONTAL SCALE

0 2 4 6 8 10

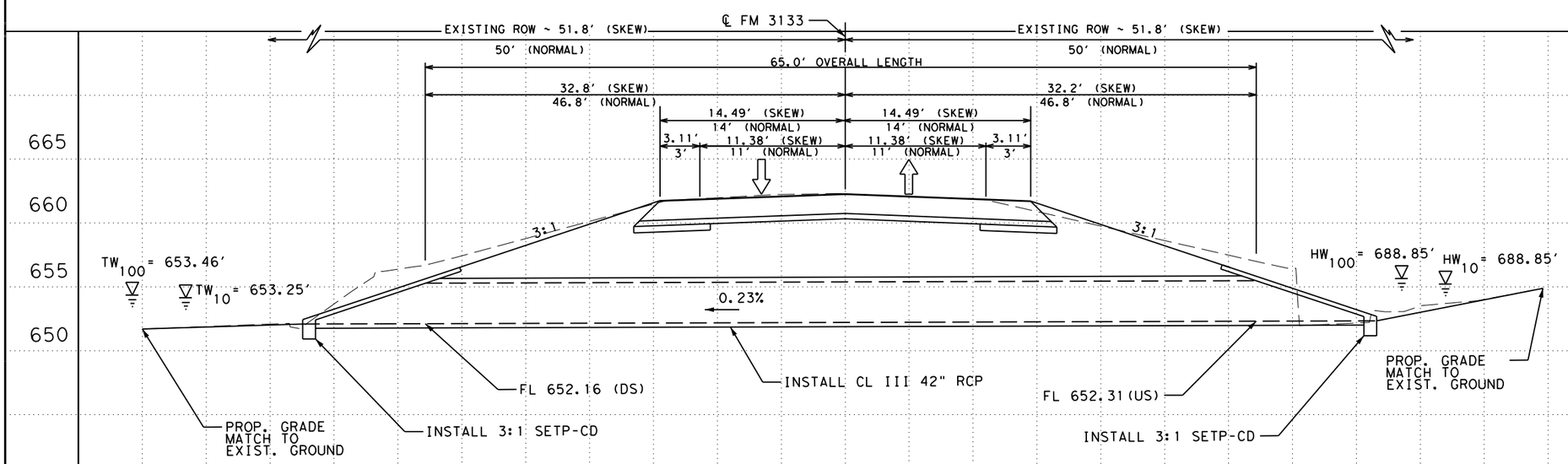
SCALE IN FEET

VERTICAL SCALE

0 2 4 6 8 10

SCALE IN FEET

LOCATION CSJ# 3236-02-012 , ETC.	400 6005 CEM STABIL BKFL	400 6006 CUT & RESTORING PAV	402 6001 TRENCH EXCAVATION PROTECTION	464 6009 RC PIPE (CL III)(42 IN)	467 6461 SET (TY II) (42 IN) (RCP) (3:1) (C)	496 6005 REMOV STR (WINGWALL)	496 6042 REMOV STR (SMALL)
	CY	SY	LF	LF	EA	EA	EA
TOTAL	61.4	20.9	64.7	65.0	2.0	2.0	1.0



CULVERT #13
STA. 254+67.81

EXIST.: 1 - 42" X 72.0' CMP W/ 2-WINGWALLS
PROP.: 1 - 42" X 65.0' RCP W/ 2-3:1 SETP-CD

STATE OF TEXAS
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PROFESSIONAL ENGINEER

1/7/21

Texas Department of Transportation

FM 3133
CULVERT LAYOUT #13
STA. 254+67.81

SCALE: 1" = 10'

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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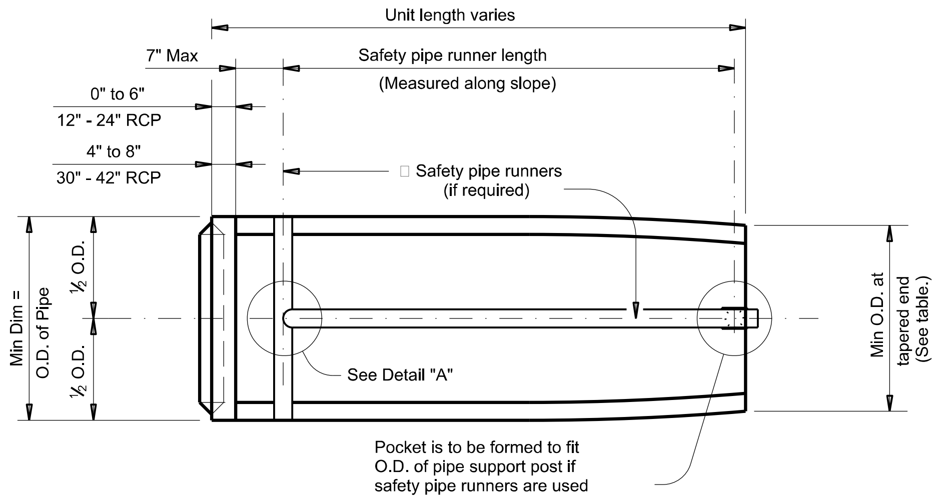
CHECK	CONTROL	SECTION	JOB	114
DMH				
CHECK	3236	02	012, etc.	
TLB				



PLAN VIEW

(Showing spigot end connection.)

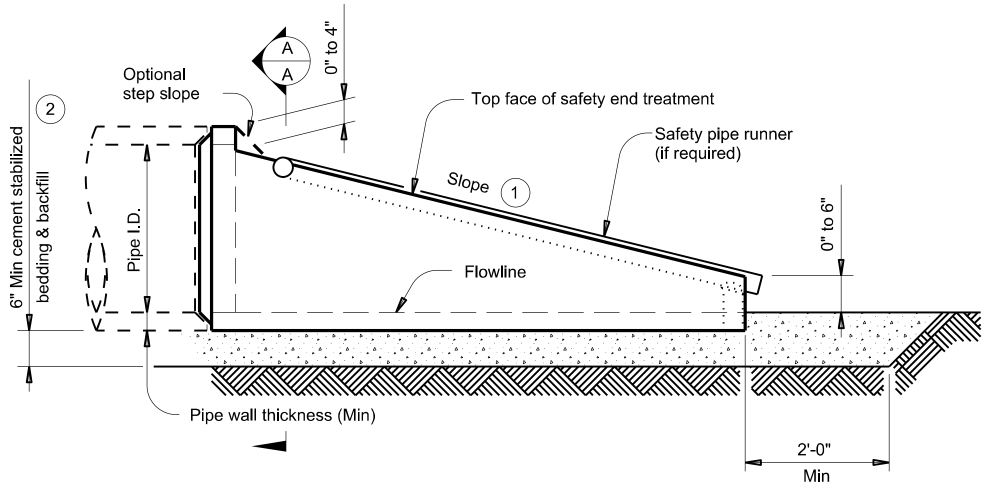
MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

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.

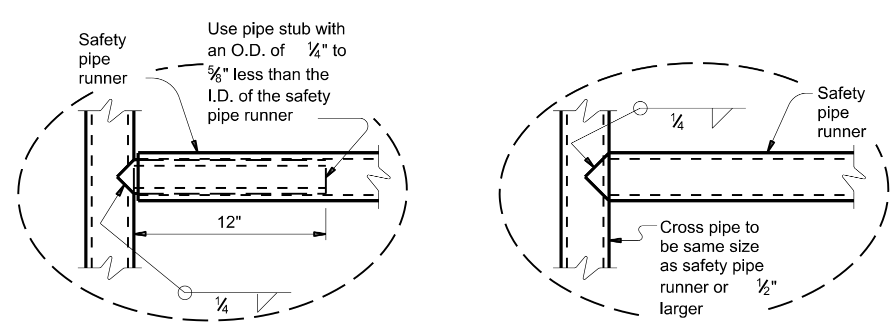
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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: Skew	Single Pipe: Pipe Runners Required	Multiple Pipe: Skew	Multiple Pipe: 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"				



LONGITUDINAL ELEVATION

(Showing spigot end connection.)



DETAIL A

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".

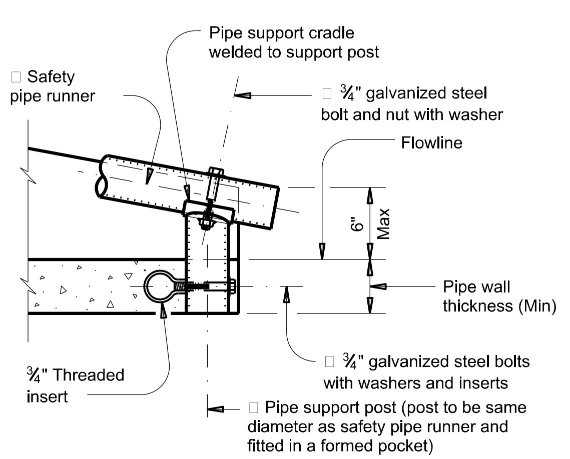
When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

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.

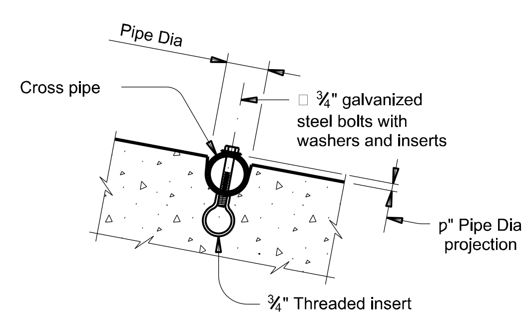
Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

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.



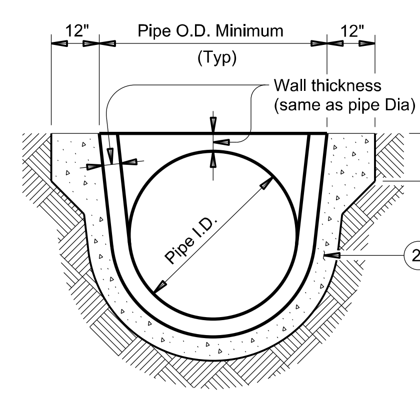
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

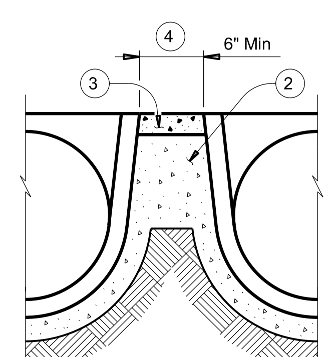


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	115

DATE: 11/4/2020 8:21:00 PM
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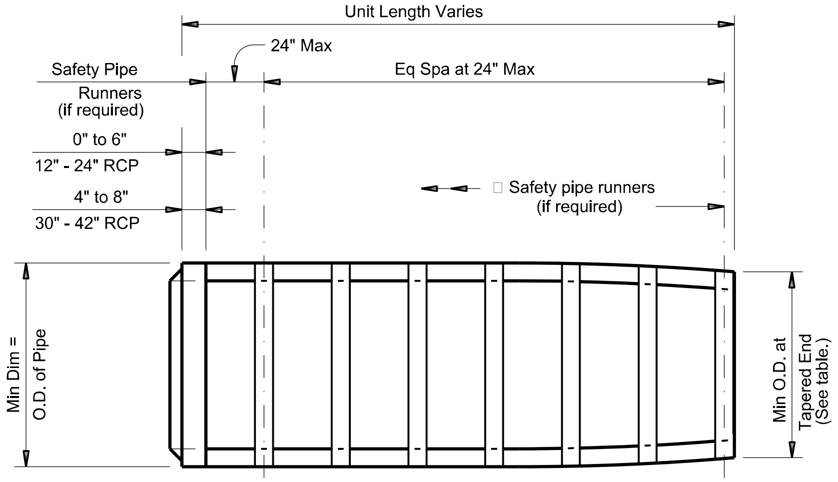
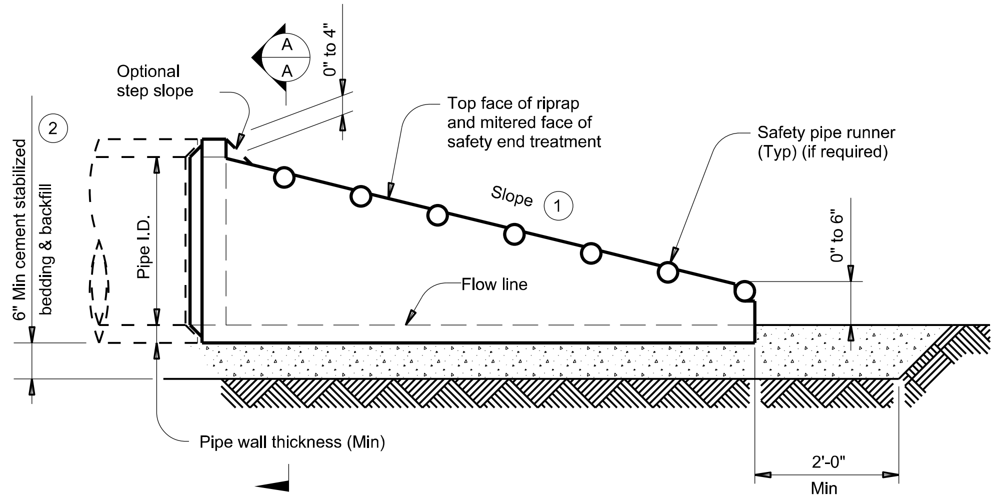


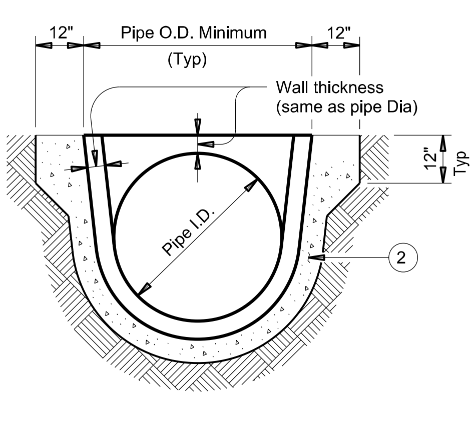
PLAN VIEW - 12" THRU 24"

(Showing spigot end connection.)

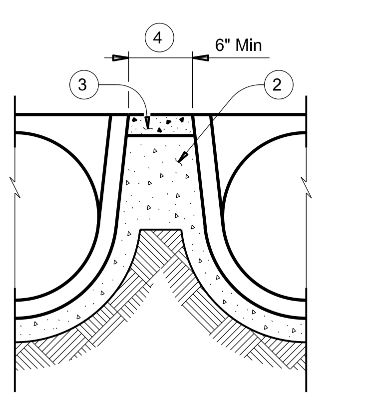


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

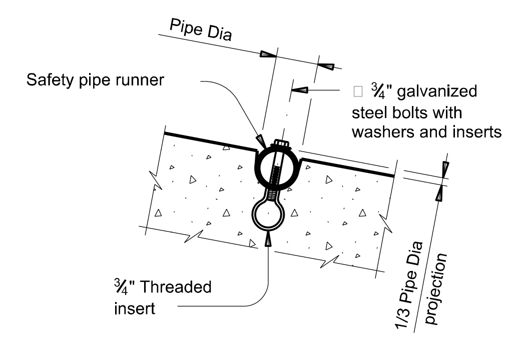
1 Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

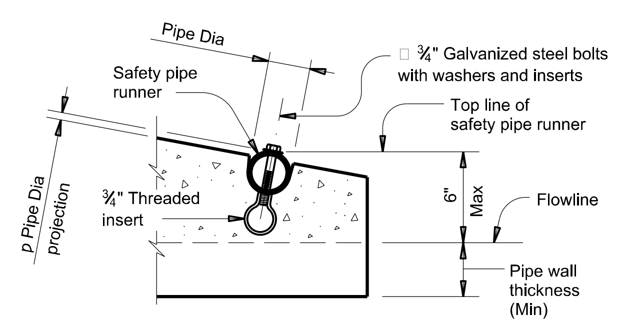
4 Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

5 Safety pipe runners are required for multiple pipe culverts with more than two pipes.

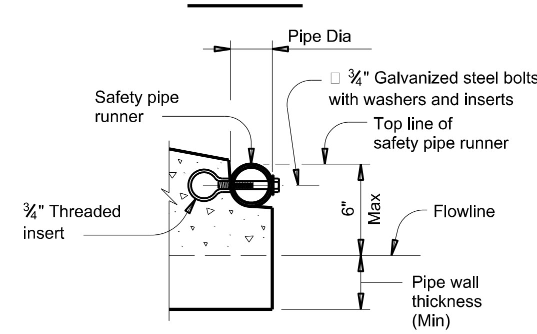


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements: Single Pipe	Pipe Runner Requirements: Multiple Pipe	Required Pipe Runner Sizes: Nominal Dia	Required Pipe Runner Sizes: O.D.	Required Pipe Runner Sizes: I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4' - 0"	No	5	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5' - 8"	No	5	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7' - 3"	No	5	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10' - 6"	No	5	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12' - 1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15' - 4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18' - 7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

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

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

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

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

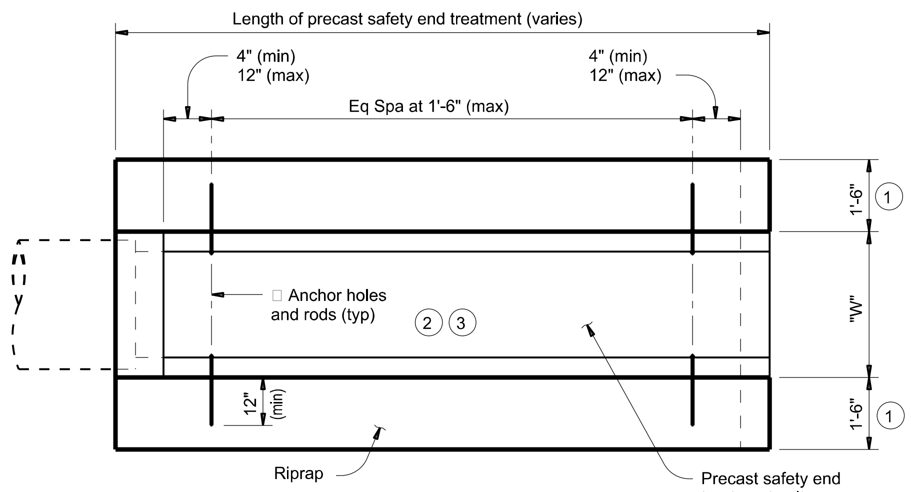
Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

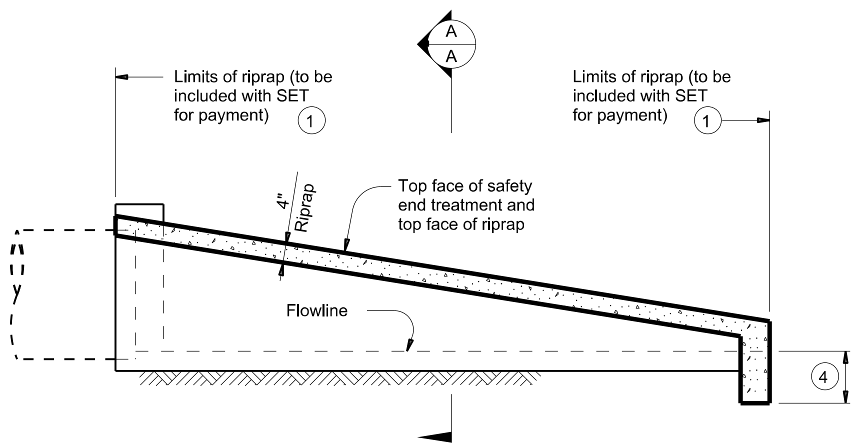
TYPE II ~ PARALLEL DRAINAGE

PSET-RP

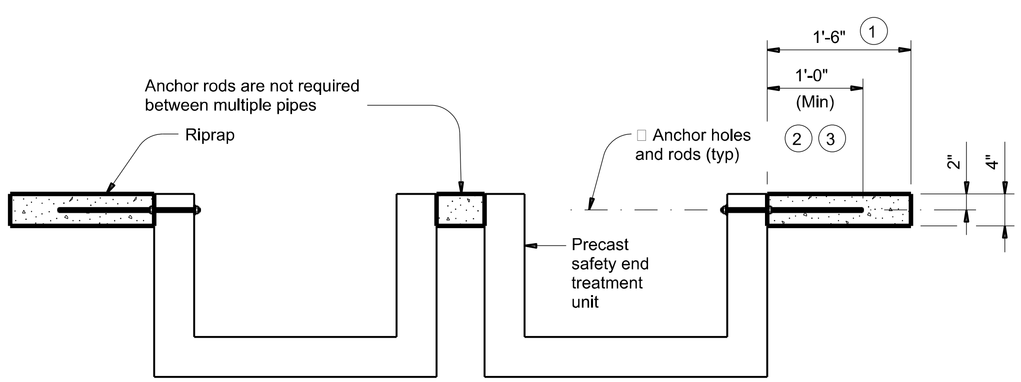
FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 3236	SECT 02	JOB 012,etc.	HIGHWAY FM3133
REVISIONS	DIST DAL	COUNTY COLLIN		SHEET NO. 116



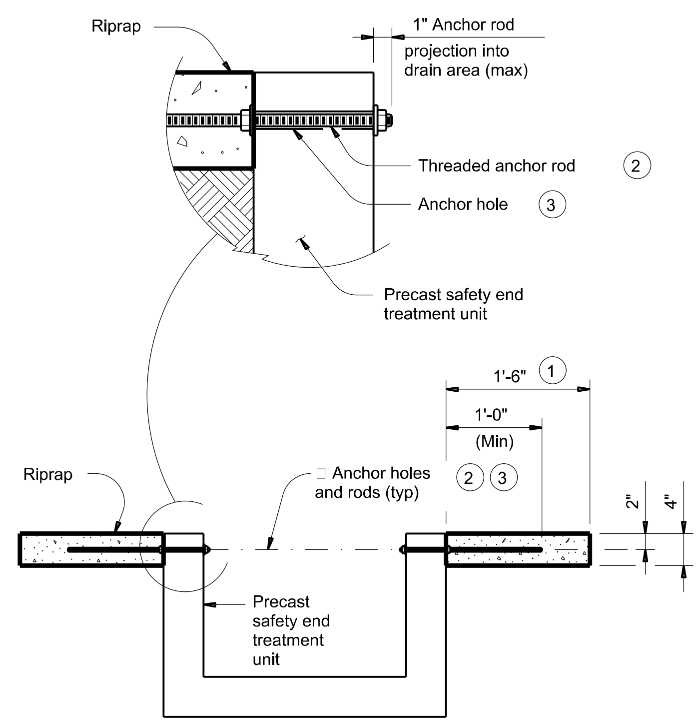
PLAN



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
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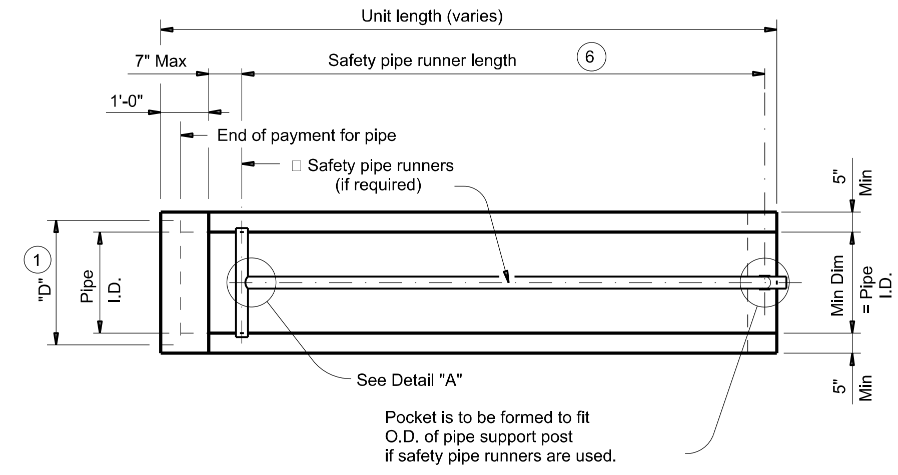
REVISIONS	DIST DAL	COUNTY COLLIN		SHEET NO. 117

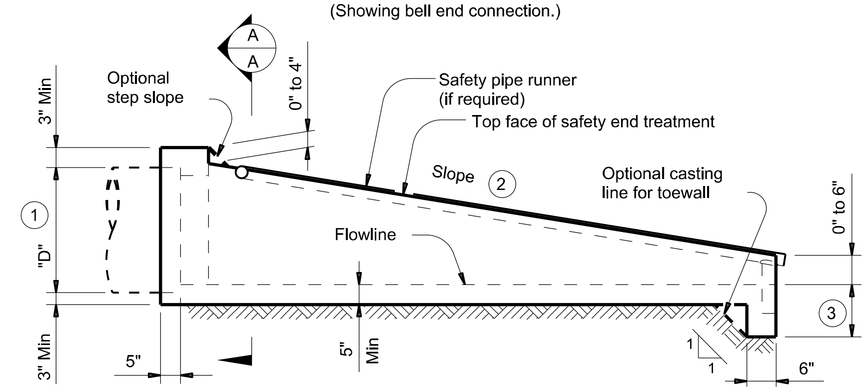
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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"				



PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

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).

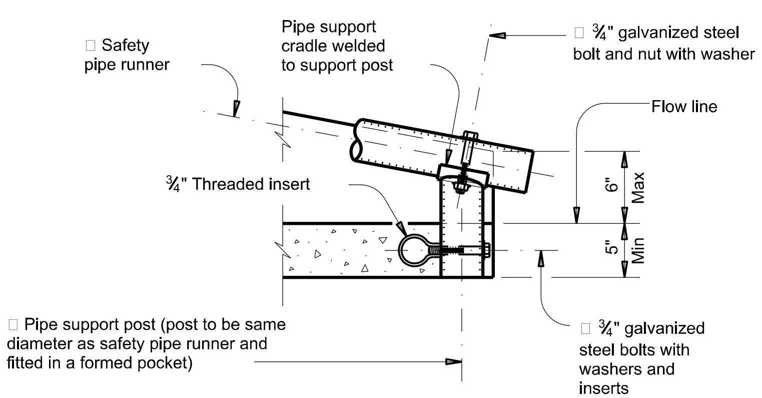
At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

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.

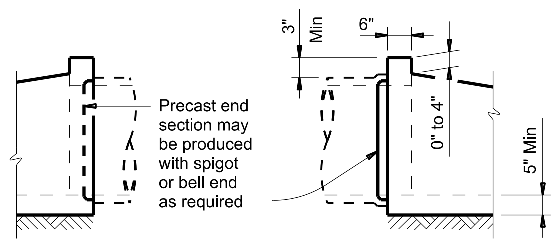
Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

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.



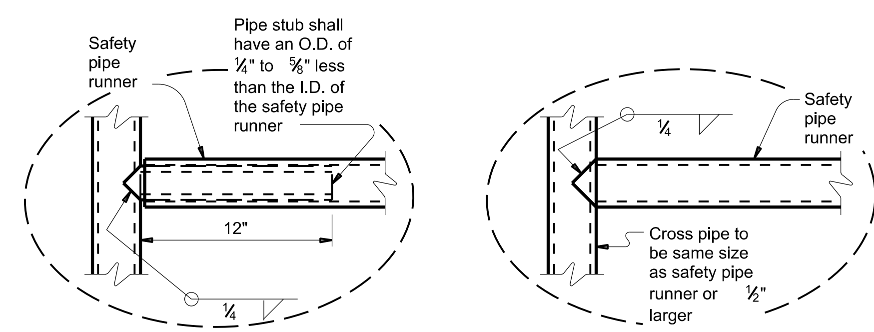
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)

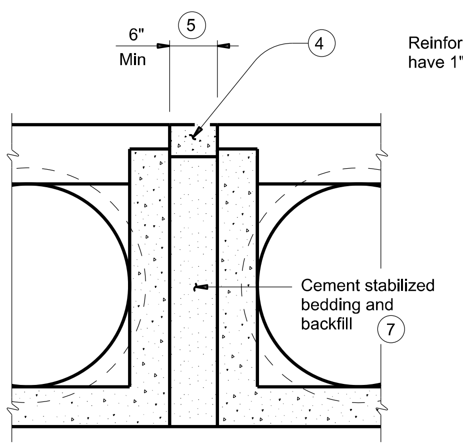


OPTION A

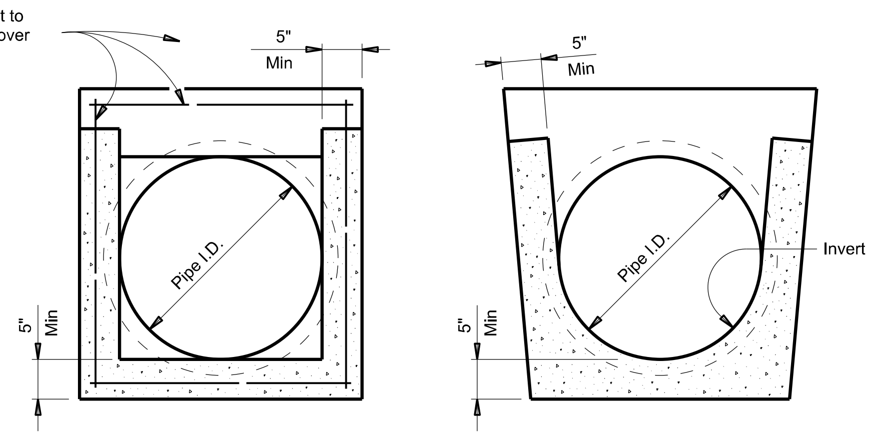
DETAIL A

(If required)

OPTION B



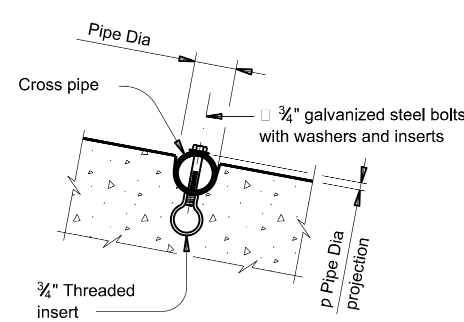
MULTIPLE PIPE INSTALLATION



OPTION WITH SQUARE BOTTOM

OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
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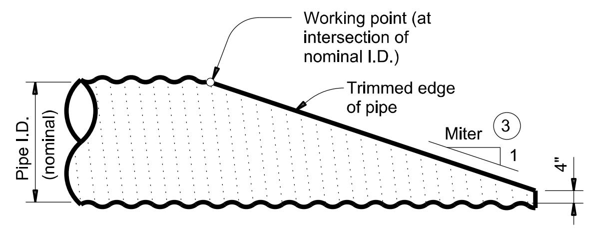
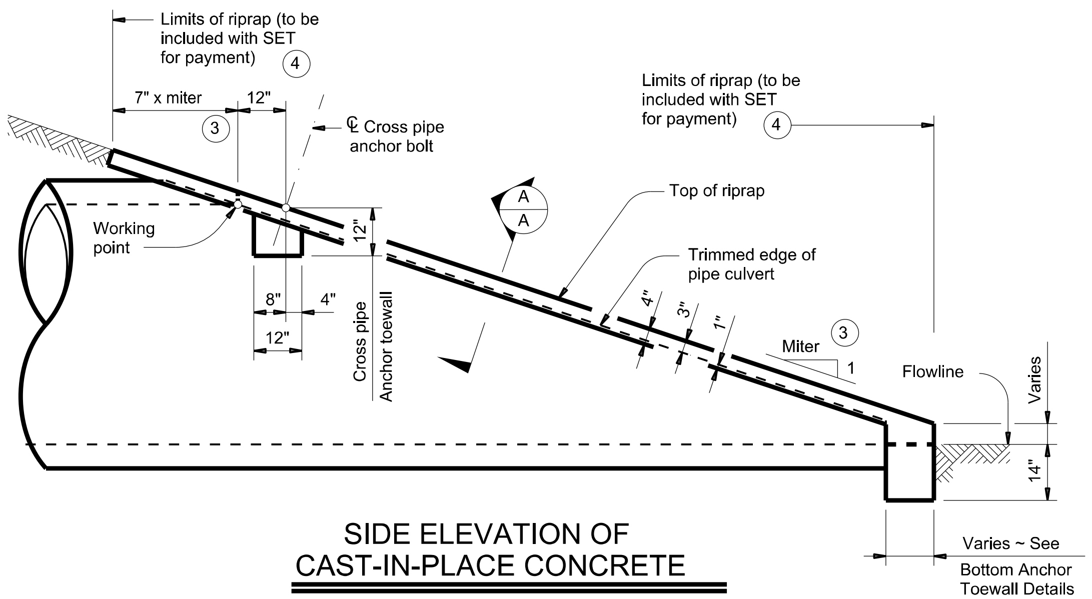


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

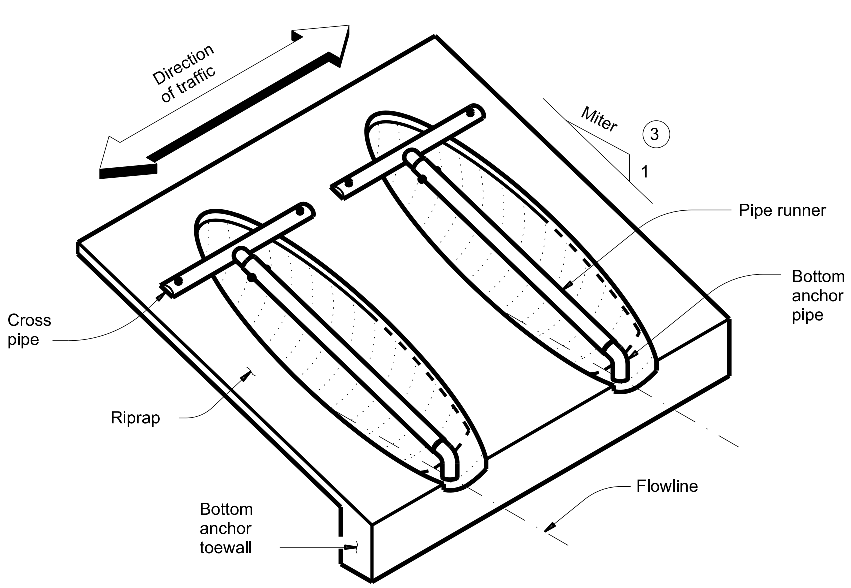
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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 0° Skew	3:1 15° Skew	3:1 30° Skew	3:1 45° Skew	4:1 Side Slope 0° Skew	4:1 15° Skew	4:1 30° Skew	4:1 45° Skew	6:1 Side Slope 0° Skew	6:1 15° Skew	6:1 30° Skew	6:1 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 0° Skew	3:1 15° Skew	3:1 30° Skew	3:1 45° Skew	4:1 Side Slope 0° Skew	4:1 15° Skew	4:1 30° Skew	4:1 45° Skew	6:1 Side Slope 0° Skew	6:1 15° Skew	6:1 30° Skew	6:1 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.

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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REVISIONS	DIST DAL	COUNTY COLLIN		SHEET NO. 119

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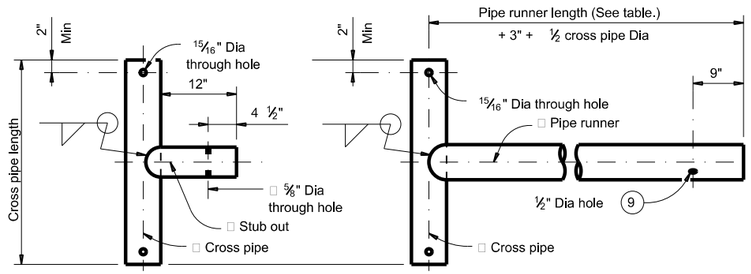
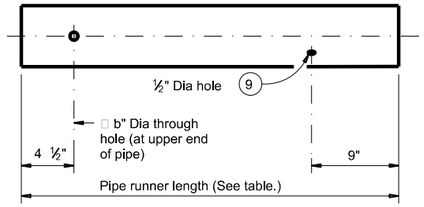


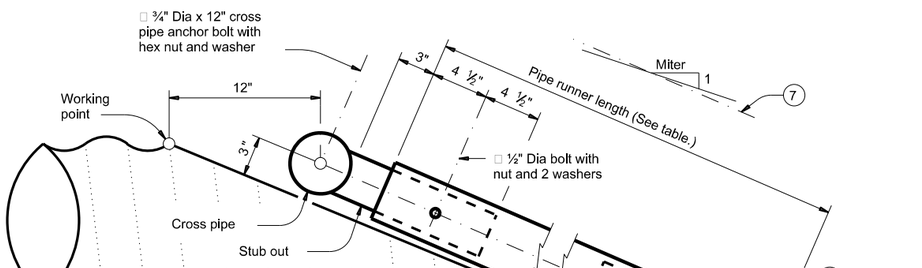
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



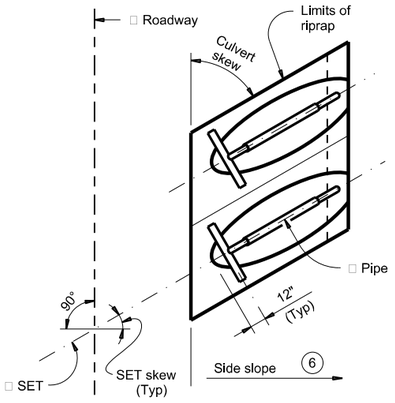
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

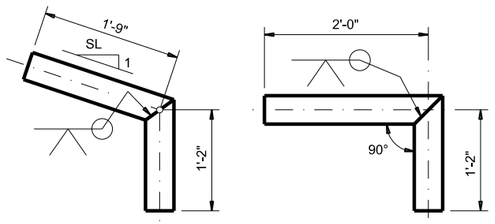


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

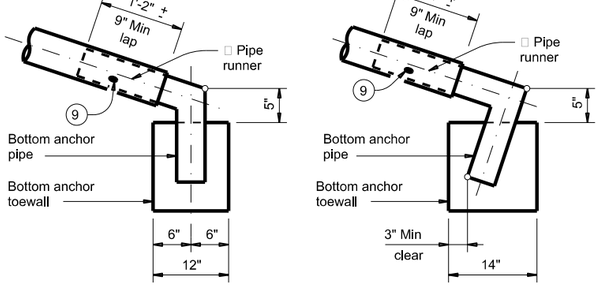


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

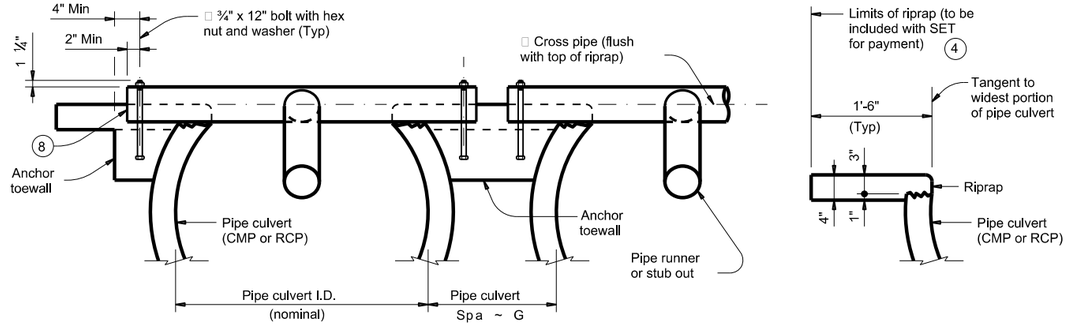
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL

SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the ½" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Payment for riprap and toewall is included in the price bid for each safety end treatment.
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

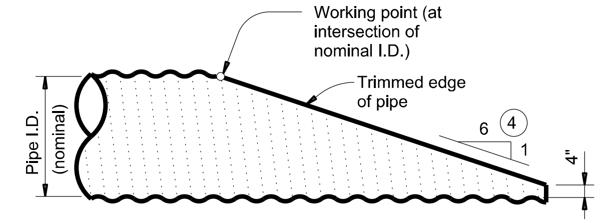
Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

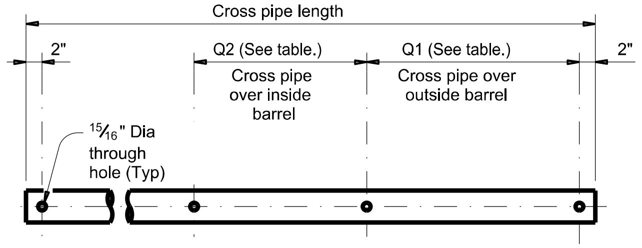
FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		120



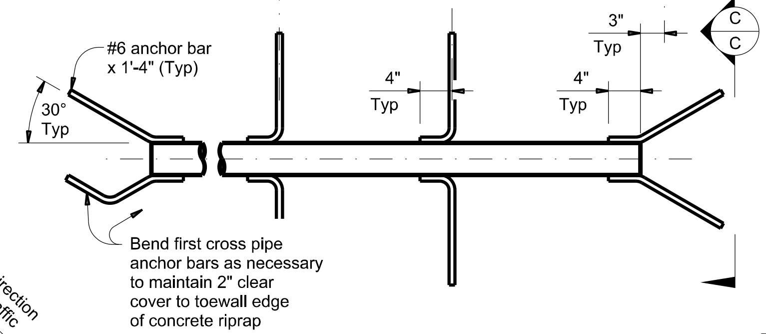
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

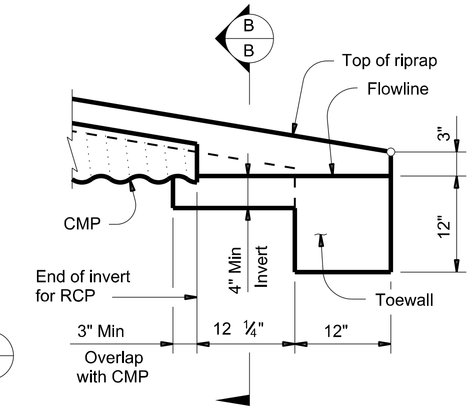
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

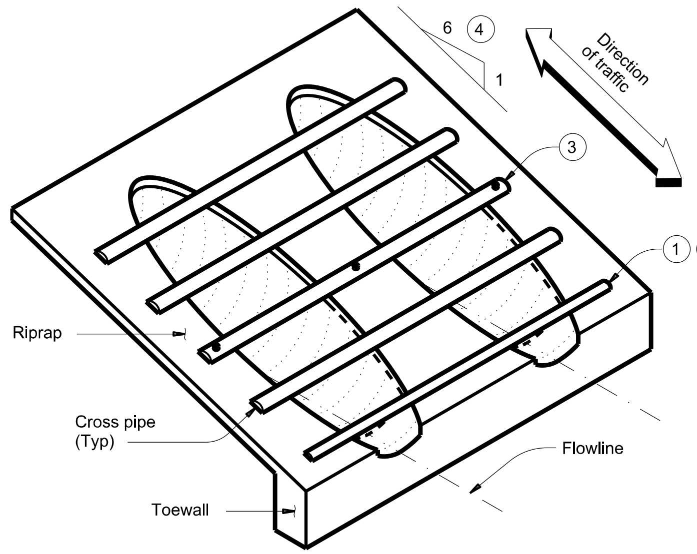


PIPE WITH ANCHOR BARS

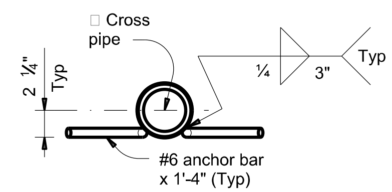


DETAIL "A"

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

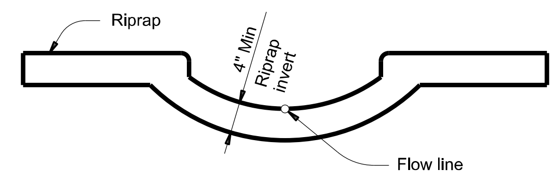


ISOMETRIC VIEW OF TYPICAL INSTALLATION



SECTION C-C

CROSS PIPE DETAILS



SECTION B-B

(Cross pipes not shown for clarity.)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

(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.

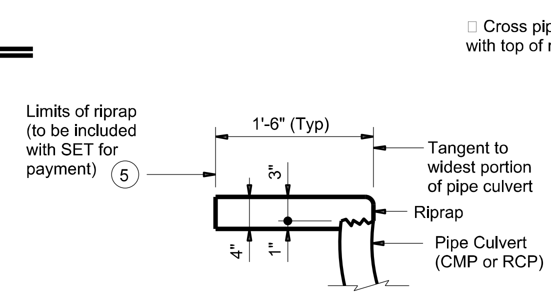
GENERAL NOTES:

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.

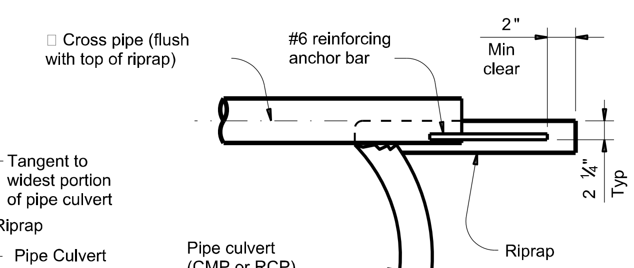
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

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

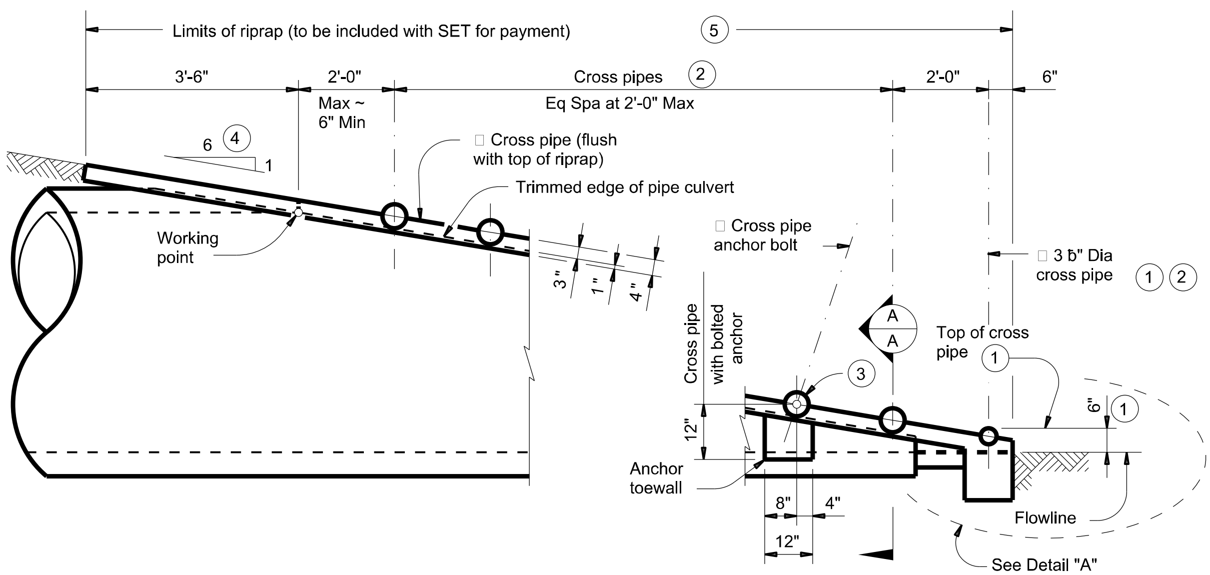
Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

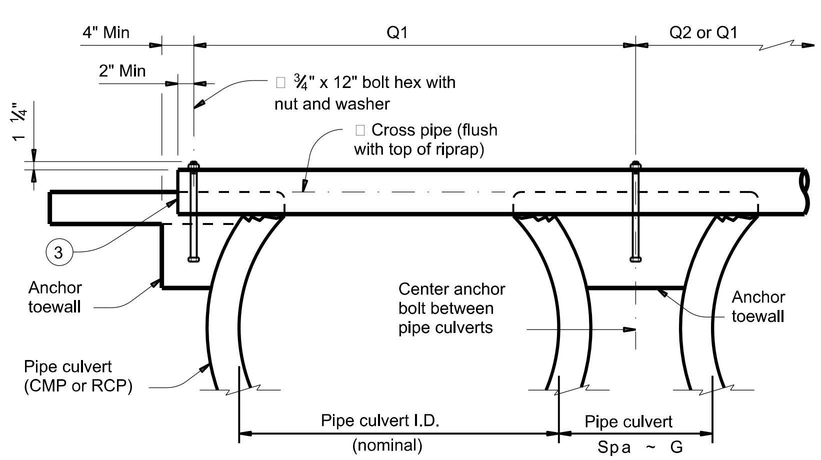


SHOWING CROSS PIPE WITH ANCHOR BAR



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

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	121

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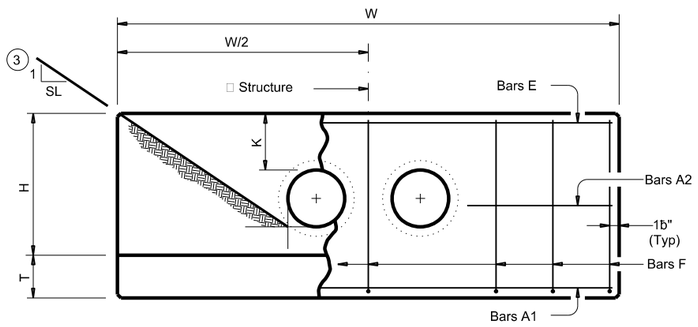
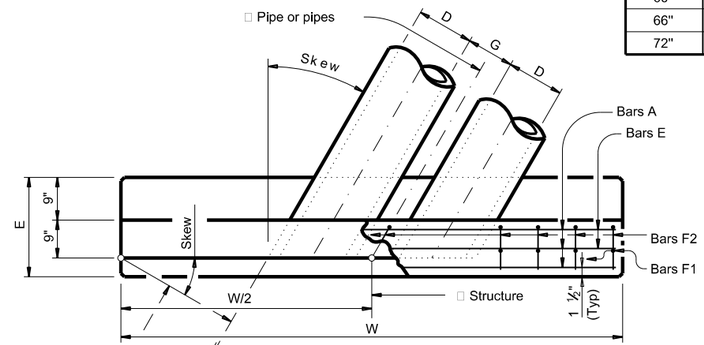
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	15° Skew						30° Skew						45° Skew					
		Values for One Pipe			Values To Be Added for Each Addt'l Pipe			Values for One Pipe			Values To Be Added for Each Addt'l Pipe			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)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' - 4"	124	1.1	1' - 9 ¾"	15	0.2	10' - 5"	130	1.2	2' - 0"	16	0.2	12' - 9"	159	1.5	2' - 5 ¾"	17	0.2
	15"	10' - 7"	136	1.3	2' - 3"	17	0.2	11' - 10"	159	1.5	2' - 6"	18	0.2	14' - 6"	191	1.8	3' - 0 ¾"	20	0.3
	18"	11' - 11"	165	1.5	2' - 9"	19	0.3	13' - 3"	174	1.7	3' - 1"	29	0.3	16' - 3"	207	2.1	3' - 9 ¼"	33	0.4
	21"	13' - 2"	203	1.9	3' - 2 ¼"	31	0.4	14' - 9"	233	2.1	3' - 6 ¾"	33	0.4	18' - 0"	276	2.6	4' - 4 ¼"	36	0.5
	24"	14' - 6"	240	2.1	3' - 8 ¼"	34	0.4	16' - 2"	251	2.4	4' - 1 ¾"	36	0.5	19' - 10"	318	2.9	5' - 0 ¾"	39	0.6
	27"	15' - 9"	258	2.5	4' - 0 ¾"	38	0.5	17' - 7"	292	2.8	4' - 6 ¼"	39	0.6	21' - 7"	342	3.4	5' - 6 ¼"	44	0.7
	30"	17' - 1"	297	2.8	4' - 5 ¾"	40	0.6	19' - 1"	311	3.1	5' - 0"	42	0.6	23' - 4"	388	3.8	6' - 1 ¾"	47	0.8
	33"	18' - 5"	320	3.3	4' - 9 ¾"	43	0.6	20' - 6"	358	3.6	5' - 4 ¾"	46	0.7	25' - 1"	439	4.4	6' - 7 ¼"	51	0.9
	36"	19' - 8"	401	4.0	5' - 3"	47	0.9	21' - 11"	422	4.5	5' - 10 ¾"	50	0.9	26' - 10"	517	5.5	7' - 2 ¼"	55	1.2
	42"	22' - 3"	476	5.0	6' - 0 ¾"	53	1.1	24' - 10"	528	5.6	6' - 8 ¾"	56	1.2	30' - 5"	634	6.9	8' - 3"	76	1.4
	48"	25' - 11"	577	6.6	6' - 9 ¾"	60	1.3	28' - 10"	637	7.3	7' - 7 ¼"	79	1.5	35' - 4"	791	9.0	9' - 3 ¾"	88	1.8
	54"	28' - 6"	711	7.8	7' - 9"	83	1.6	31' - 9"	781	8.7	8' - 8"	81	1.8	38' - 11"	958	10.7	10' - 7 ¼"	97	2.2
	60"	31' - 1"	805	9.2	8' - 6 ¼"	91	1.9	34' - 8"	881	10.2	9' - 6 ¼"	97	2.1	42' - 5"	1,113	12.5	11' - 8"	124	2.6
	66"	33' - 8"	907	10.6	9' - 0 ¾"	98	2.1	37' - 6"	1,028	11.8	10' - 1 ¼"	102	2.4	46' - 0"	1,235	14.5	12' - 4 ¼"	132	2.9
	72"	36' - 3"	1,071	12.1	9' - 8"	105	2.4	40' - 5"	1,207	13.5	10' - 9 ¼"	110	2.6	49' - 6"	1,446	16.6	13' - 2 ¼"	141	3.2
3:1	12"	13' - 6"	178	1.6	1' - 9 ¾"	15	0.2	15' - 0"	189	1.8	2' - 0"	15	0.2	18' - 5"	237	2.2	2' - 5 ¾"	17	0.2
	15"	15' - 3"	212	1.9	2' - 3"	17	0.2	17' - 0"	223	2.1	2' - 6"	17	0.3	20' - 10"	276	2.6	3' - 0 ¾"	20	0.3
	18"	17' - 1"	231	2.3	2' - 9"	19	0.3	19' - 1"	259	2.5	3' - 1"	29	0.3	23' - 4"	318	3.1	3' - 9 ¼"	32	0.4
	21"	18' - 11"	306	2.7	3' - 2 ¼"	31	0.4	21' - 1"	339	3.0	3' - 6 ¾"	33	0.4	25' - 10"	413	3.7	4' - 4 ¼"	36	0.5
	24"	20' - 8"	345	3.1	3' - 8 ¾"	35	0.4	23' - 1"	384	3.5	4' - 1 ¾"	36	0.5	28' - 3"	462	4.2	5' - 0 ¾"	40	0.6
	27"	22' - 6"	376	3.7	4' - 0 ¾"	38	0.5	25' - 1"	438	4.1	4' - 6 ¼"	39	0.6	30' - 9"	522	5.0	5' - 6 ¼"	44	0.7
	30"	24' - 4"	422	4.1	4' - 5 ¾"	40	0.6	27' - 2"	466	4.6	5' - 0"	42	0.6	33' - 3"	578	5.6	6' - 1 ¾"	47	0.8
	33"	26' - 2"	476	4.8	4' - 10"	43	0.6	29' - 2"	522	5.3	5' - 4 ¾"	46	0.7	35' - 9"	644	6.5	6' - 7 ¼"	51	0.9
	36"	27' - 11"	590	5.9	5' - 3"	47	0.8	31' - 2"	645	6.6	5' - 10 ¾"	50	0.9	38' - 2"	787	8.0	7' - 2 ¼"	56	1.2
	42"	31' - 7"	684	7.3	6' - 0 ¼"	53	1.1	35' - 3"	776	8.2	6' - 8 ¾"	56	1.2	43' - 2"	933	10.0	8' - 3"	79	1.4
	48"	36' - 9"	880	9.6	6' - 9 ¾"	61	1.3	41' - 0"	953	10.7	7' - 7 ¼"	81	1.5	50' - 2"	1,166	13.1	9' - 3 ¾"	88	1.8
	54"	40' - 5"	1,065	11.4	7' - 9"	85	1.6	45' - 0"	1,185	12.7	8' - 8"	89	1.8	55' - 2"	1,435	15.5	10' - 7 ¼"	97	2.2
	60"	44' - 0"	1,224	13.3	8' - 6 ¼"	93	1.9	49' - 1"	1,356	14.8	9' - 6 ¼"	96	2.1	60' - 1"	1,635	18.2	11' - 8"	124	2.6
	66"	47' - 7"	1,357	15.4	9' - 1"	98	2.1	53' - 1"	1,497	17.2	10' - 1 ¼"	103	2.3	65' - 1"	1,892	21.1	12' - 4 ¼"	130	2.9
	72"	51' - 3"	1,624	17.7	9' - 8"	105	2.3	57' - 2"	1,787	19.7	10' - 9 ¼"	109	2.6	70' - 0"	2,218	24.1	13' - 2 ¼"	139	3.2
4:1	12"	17' - 7"	232	2.1	1' - 9 ¾"	15	0.2	19' - 8"	259	2.4	2' - 0"	16	0.2	24' - 0"	314	2.9	2' - 5 ¾"	18	0.2
	15"	19' - 11"	272	2.5	2' - 3"	17	0.2	22' - 3"	301	2.8	2' - 6"	18	0.3	27' - 3"	361	3.5	3' - 0 ¾"	21	0.3
	18"	22' - 3"	313	3.0	2' - 9"	19	0.3	24' - 10"	344	3.3	3' - 1"	29	0.3	30' - 5"	427	4.0	3' - 9 ¼"	32	0.4
	21"	24' - 7"	407	3.6	3' - 2 ¼"	31	0.4	27' - 5"	446	4.0	3' - 6 ¾"	33	0.4	33' - 7"	549	4.9	4' - 4 ¼"	36	0.5
	24"	26' - 11"	455	4.1	3' - 8 ¾"	35	0.4	30' - 0"	499	4.5	4' - 1 ¾"	36	0.5	36' - 9"	609	5.6	5' - 0 ¾"	40	0.6
	27"	29' - 3"	514	4.8	4' - 0 ¾"	38	0.5	32' - 7"	562	5.4	4' - 6 ¼"	40	0.6	39' - 11"	703	6.6	5' - 6 ¼"	43	0.7
	30"	31' - 7"	568	5.4	4' - 5 ¾"	40	0.6	35' - 3"	620	6.0	5' - 0"	42	0.6	43' - 2"	768	7.4	6' - 1 ¾"	49	0.8
	33"	33' - 11"	634	6.2	4' - 10"	43	0.7	37' - 10"	710	7.0	5' - 4 ¾"	46	0.7	46' - 4"	848	8.5	6' - 7 ¼"	52	0.9
	36"	36' - 3"	776	7.7	5' - 3"	48	0.9	40' - 5"	868	8.6	5' - 10 ¾"	49	0.9	49' - 6"	1,058	10.6	7' - 2 ¼"	56	1.1
	42"	40' - 11"	921	9.6	6' - 0 ¼"	53	1.0	45' - 7"	1,022	10.7	6' - 8 ¾"	57	1.2	55' - 10"	1,262	13.1	8' - 3"	78	1.4
	48"	47' - 7"	1,152	12.6	6' - 10"	61	1.3	53' - 1"	1,268	14.0	7' - 7 ¼"	80	1.5	65' - 1"	1,587	17.2	9' - 3 ¾"	86	1.8
	54"	52' - 3"	1,416	14.9	7' - 9 ¼"	86	1.6	58' - 4"	1,589	16.6	8' - 8"	89	1.8	71' - 5"	1,924	20.4	10' - 7 ¼"	95	2.2
	60"	56' - 11"	1,606	17.5	8' - 6 ¾"	92	1.9	63' - 6"	1,806	19.5	9' - 6 ¼"	95	2.1	77' - 9"	2,192	23.9	11' - 8"	122	2.6
	66"	61' - 7"	1,819	20.2	9' - 0 ¾"	97	2.1	68' - 8"	2,019	22.5	10' - 1 ¼"	101	2.4	84' - 2"	2,472	27.6	12' - 4 ¼"	131	2.9
	72"	66' - 3"	2,150	23.2	9' - 8"	104	2.4	73' - 11"	2,379	25.9	10' - 9 ¼"	108	2.6	90' - 6"	2,937	31.7	13' - 2 ¼"	138	3.2
6:1	12"	25' - 11"	342	3.1	1' - 9 ¾"	15	0.2	28' - 10"	374	3.5	2' - 0"	16	0.2	35' - 4"	456	4.3	2' - 5 ¾"	17	0.2
	15"	29' - 3"	390	3.7	2' - 3"	17	0.2	32' - 7"	442	4.2	2' - 6"	18	0.2	39' - 11"	549	5.1	3' - 0 ¾"	20	0.3
	18"	32' - 7"	459	4.4	2' - 9"	20	0.3	36' - 4"	515	4.9	3' - 1"	29	0.3	44' - 7"	629	6.0	3' - 9 ¼"	33	0.4
	21"	36' - 0"	608	5.3	3' - 2 ¼"	31	0.4	40' - 2"	660	5.9	3' - 6 ¾"	33	0.4	49' - 2"	823	7.2	4' - 4 ¼"	38	0.5
	24"	39' - 4"	672	6.0	3' - 8 ¾"	35	0.4	43' - 11"	748	6.7	4' - 1 ¾"	36	0.5	53' - 9"	920	8.2	5' - 0 ¾"	42	0.6
	27"	42' - 8"	770	7.1	4' - 0 ¾"	38	0.5	47' - 8"	852	8.0	4' - 6 ¼"	41	0.5	58' - 4"	1,039	9.7	5' - 6 ¼"	45	0.7
	30"	46' - 1"	839	8.0	4' - 5 ¾"	40	0.6	51' - 5"	949	8.9	5' - 0"	44	0.6	62' - 11"	1,162	10.9	6' - 1 ¾"	48	0.8
	33"	49' - 5"	947	9.2	4' - 10"	45	0.7	55' - 2"	1,040	10.3	5' - 4 ¾"	48	0.7	67' - 6"	1,292	12.6	6' - 7 ¼"	50	0.9
	36"	52' - 10"	1,151	11.4	5' - 3"	49	0.8	58' - 11"	1,287	12.7	5' - 10 ¾"	51	1.0	72' - 1"	1,583	15.6	7' - 2 ¼"	55	1.1
	42"	59' - 6"	1,365	14.2	6' - 0 ¼"	55	1.0	66' - 5"	1,530	15.8	6' - 8 ¾"	57	1.2	81' - 4"	1,875	19.4	8' - 3"	76	1.4
	48"	69' - 4"	1,737	18.5	6' - 10"	59	1.3	77' - 4"	1,942	20.7	7' - 7 ¼"	79	1.5	94' - 9"	2,368	25.3	9' - 3 ¾"	86	1.8
	54"	76' - 1"	2,138	22.0	7' - 9 ¼"	83	1.6	84' - 10"	2,378	24.6	8' - 8"	87	1.8	103' - 11"	2,912	30.1	10' - 7 ¼"	95	2.2
	60"	82' - 10"	2,426	25.8	8' - 6 ¾"	90	1.9	92' - 5"	2,681	28.8	9' - 6 ¼"	94	2.1	113' - 2"	3,294	35.3	11' - 8"	122	2.6
	66"	89' - 7"	2,730	29.9	9' - 0 ¾"	96	2.1	99' - 11"	3,038	33.3	10' - 1 ¼"	101	2.4	122' - 4"	3,697	40.8	12' - 4 ¼"	130	2.9
	72"	96' - 3"	3,218	34.2	9' - 8"	102	2.4	107' - 5"	3,580	38.2	10' - 9 ¼"	108	2.6	131' - 6"	4,372	46.8	13' - 2 ¼"	139	3.2



ELEVATION

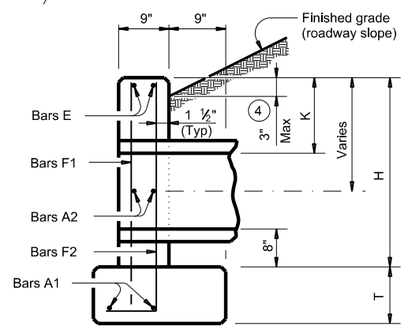


Lengths of wings based on SL:1 slope along this line.

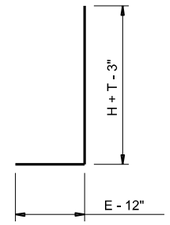
3 Toe of slope

PLAN OF SKEWED PIPES

Showing 30° skew.



SECTION AT CENTER OF PIPE



BARS F2

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.

(1) Total quantites 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).

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR SKEWED PIPE CULVERTS

CH-PW-S

FILE: chpwsste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		121-1

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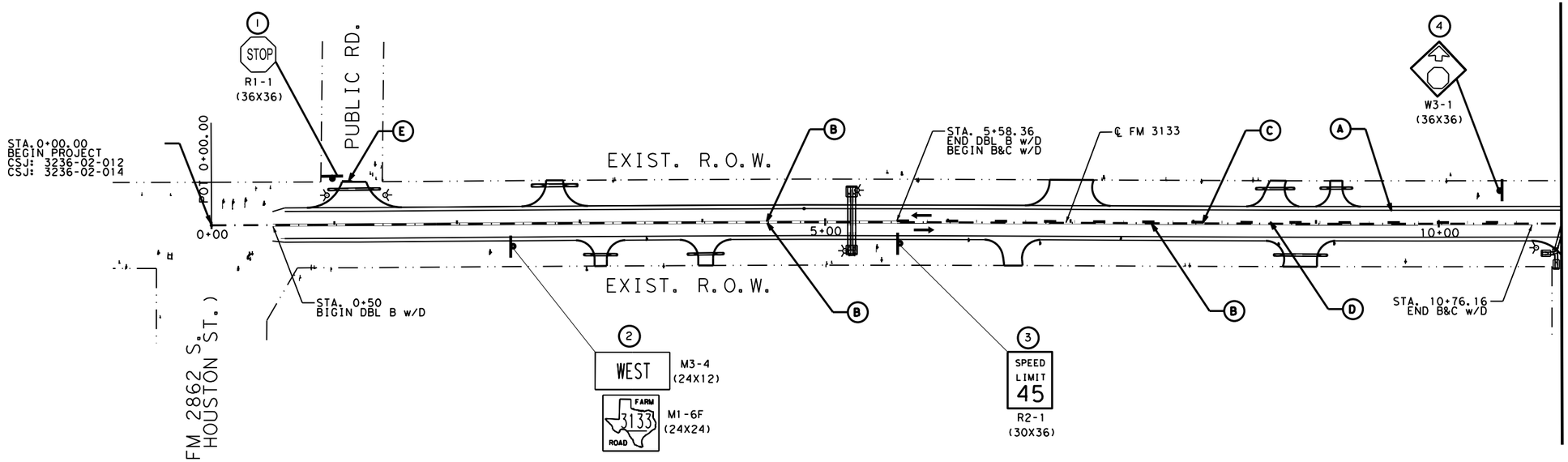

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 1 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	122
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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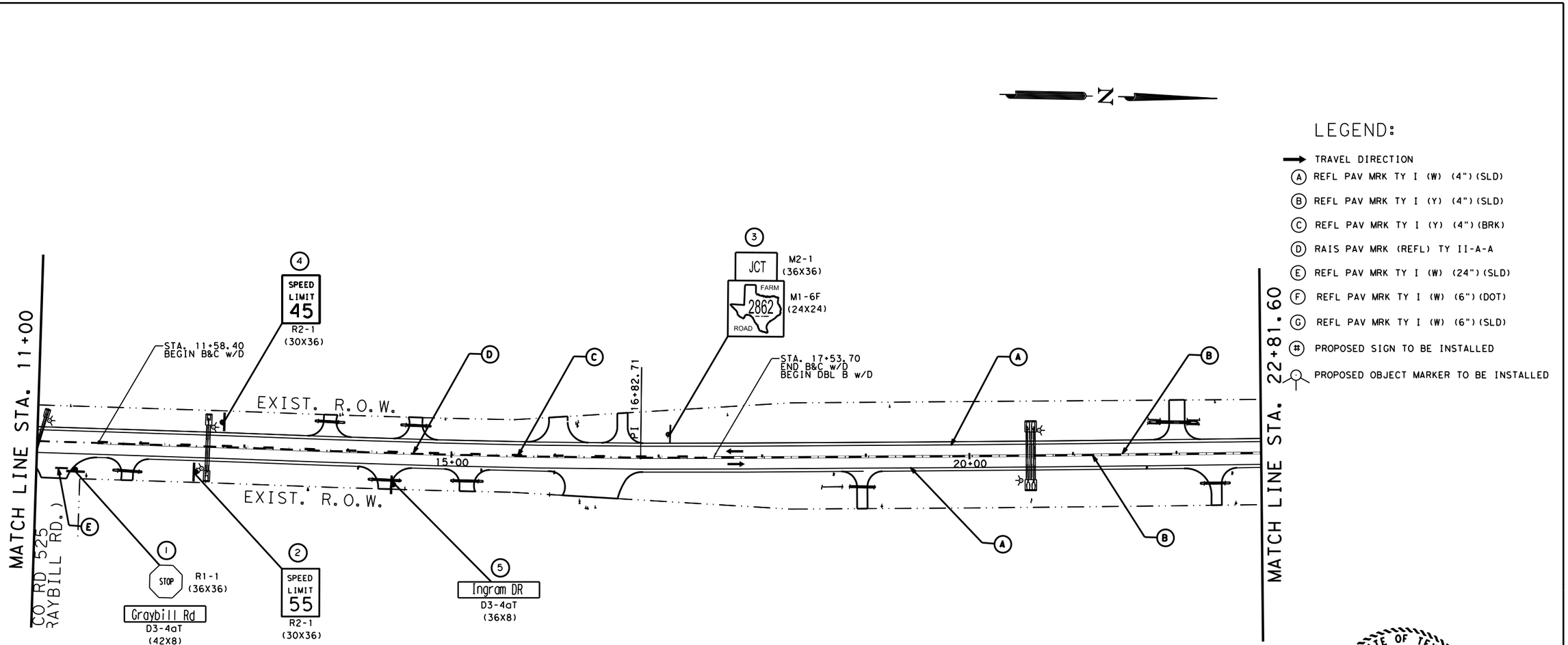

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FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 2 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	123
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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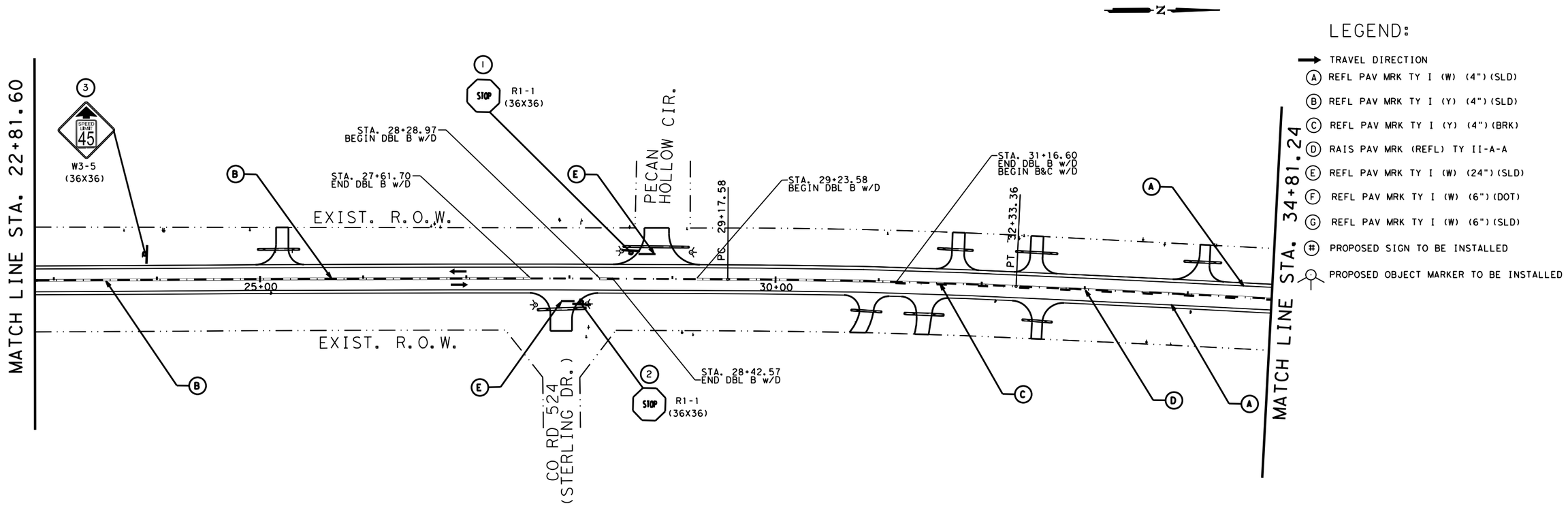

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SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 3 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	124
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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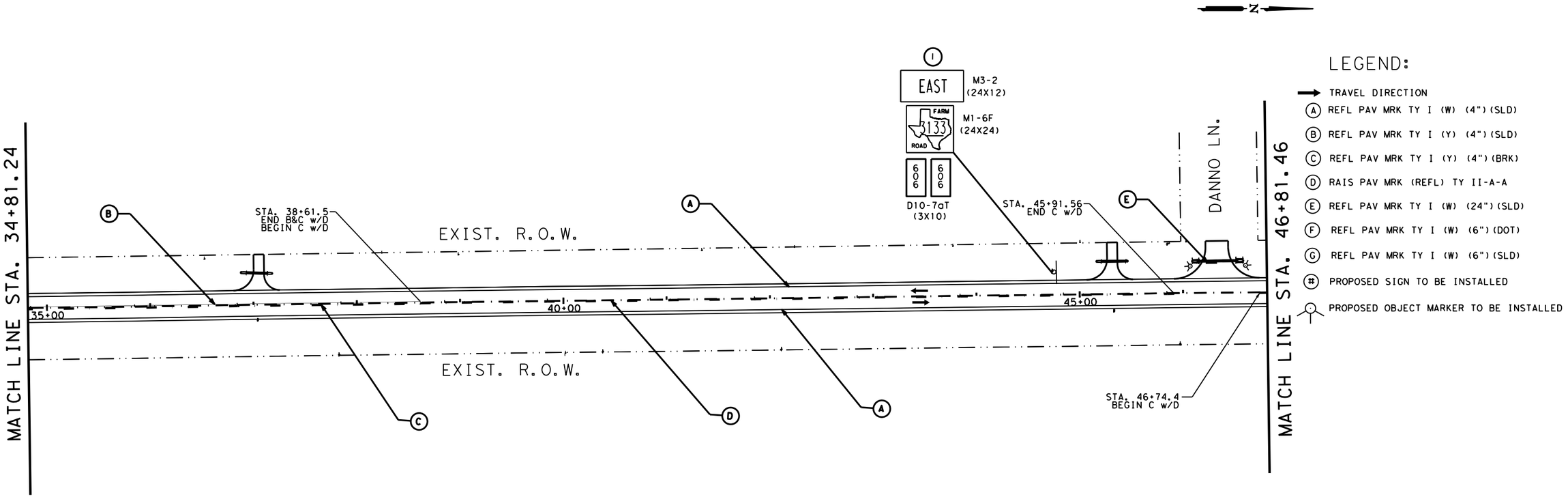

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FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 4 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	125
CHECK TLB	CONTROL	SECTION	JOB	
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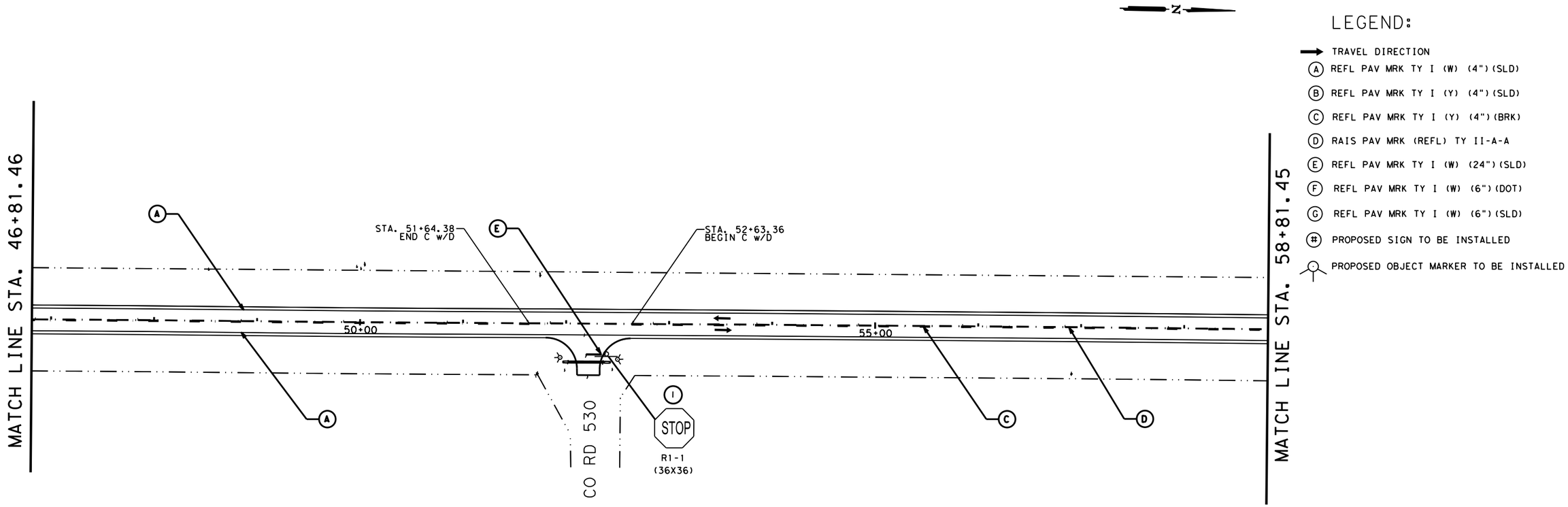

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

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SIGNING AND PAVEMENT MARKINGS LAYOUT

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SHEET 5 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	126
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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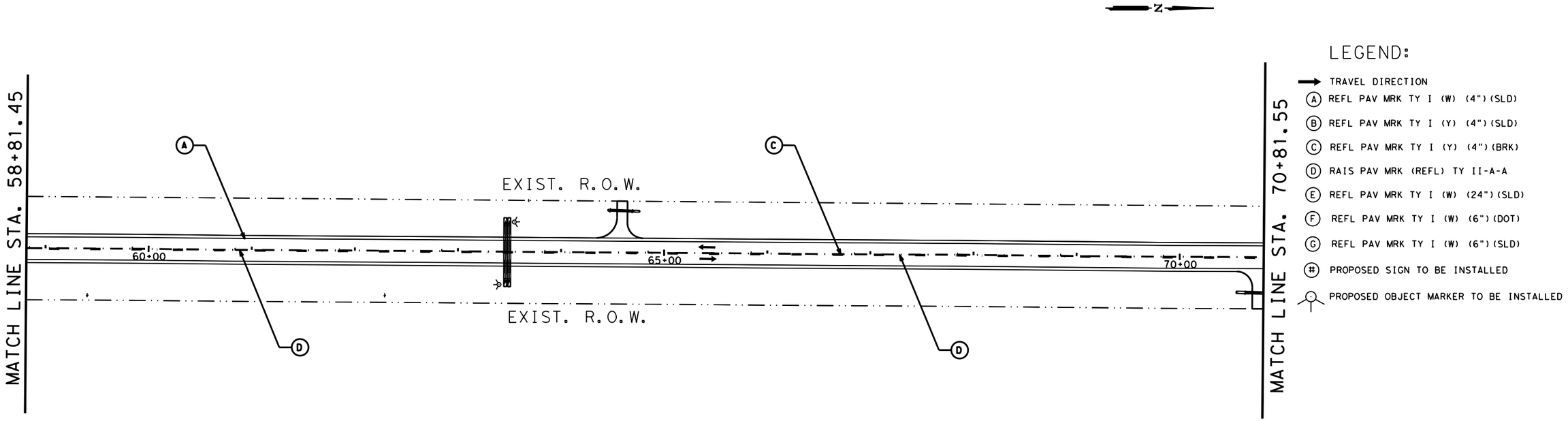

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
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- PROPOSED OBJECT MARKER TO BE INSTALLED

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SIGNING AND PAVEMENT MARKINGS LAYOUT

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DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	127
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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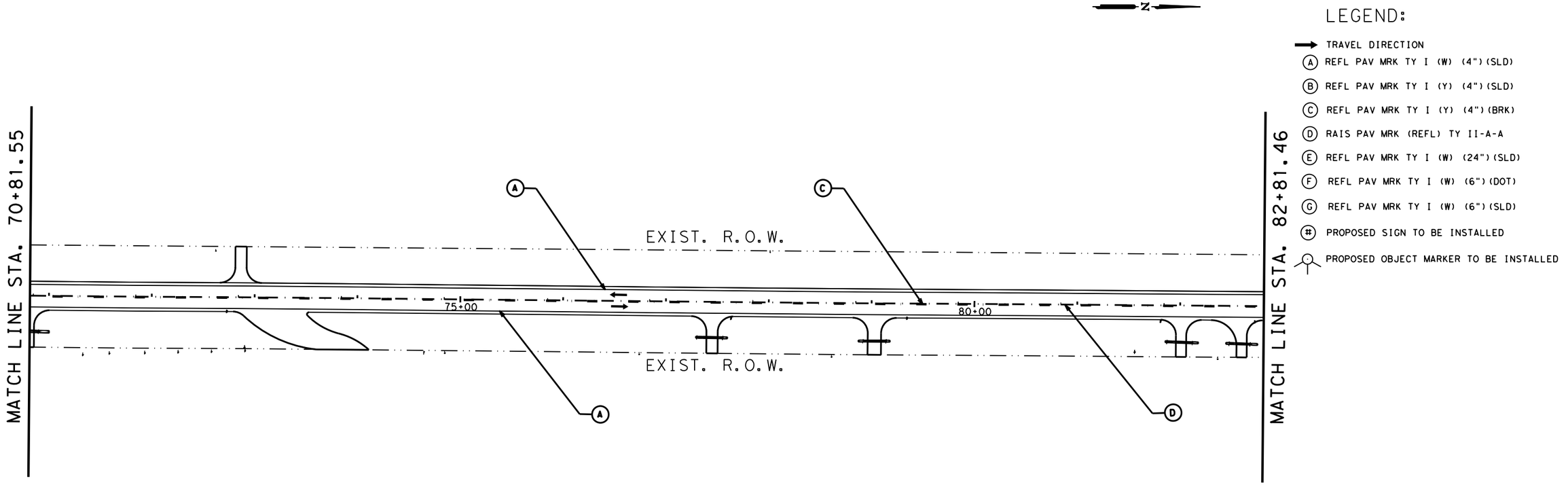

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SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 7 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	128
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				

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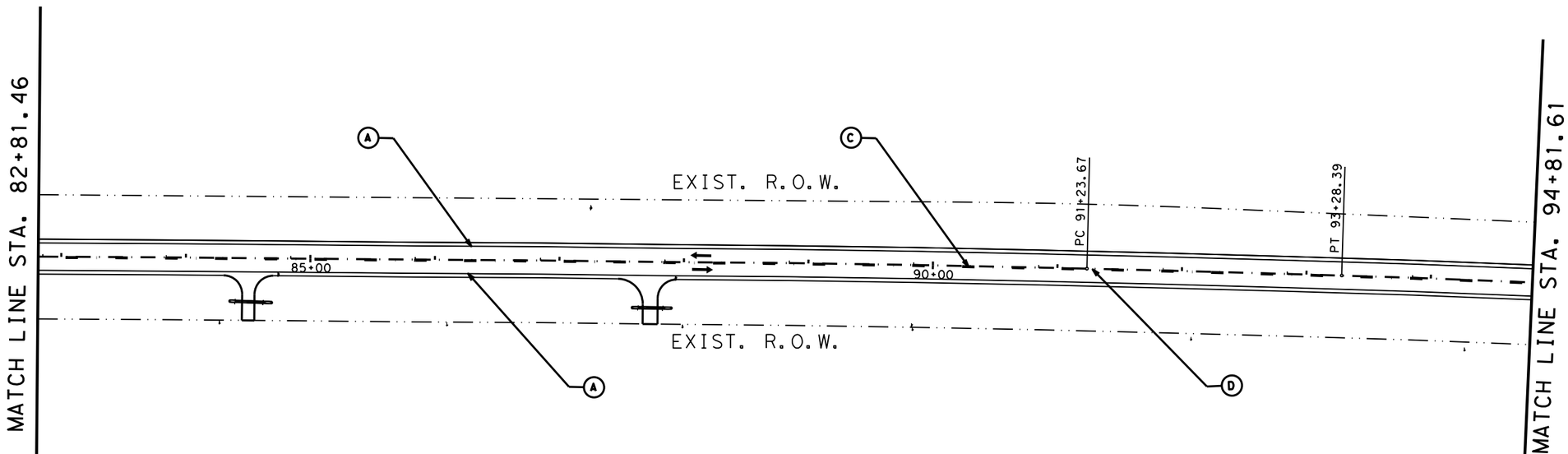

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
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SIGNING AND PAVEMENT MARKINGS LAYOUT

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SHEET 8 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	129
CHECK TLB	CONTROL	SECTION	JOB	
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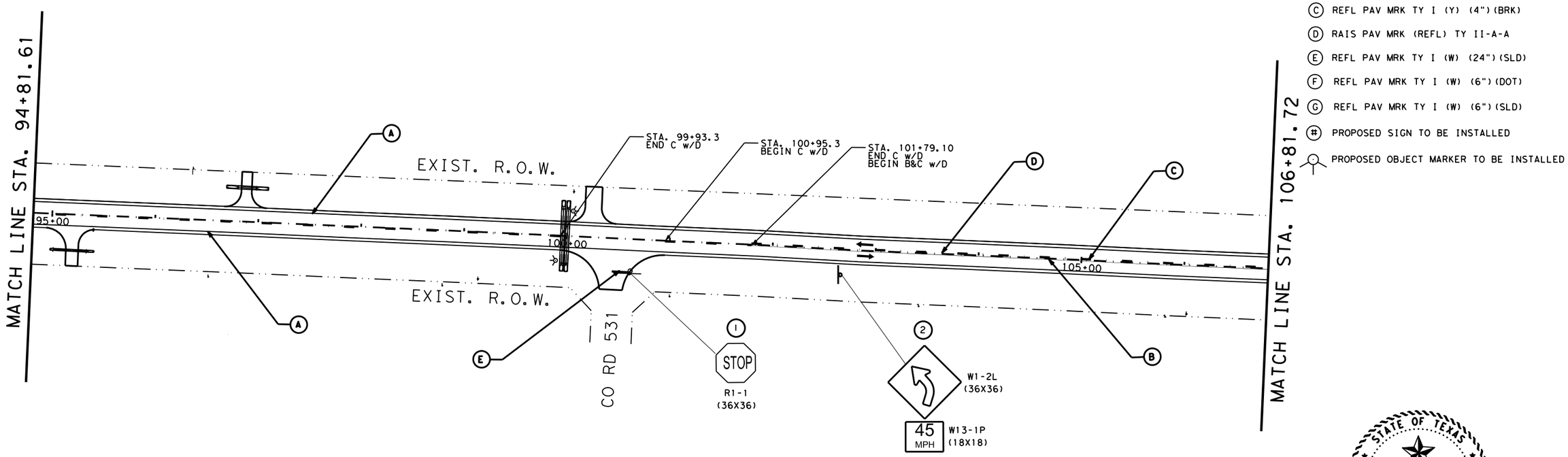

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SHEET 9 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	130
CHECK TLB	CONTROL	SECTION	JOB	
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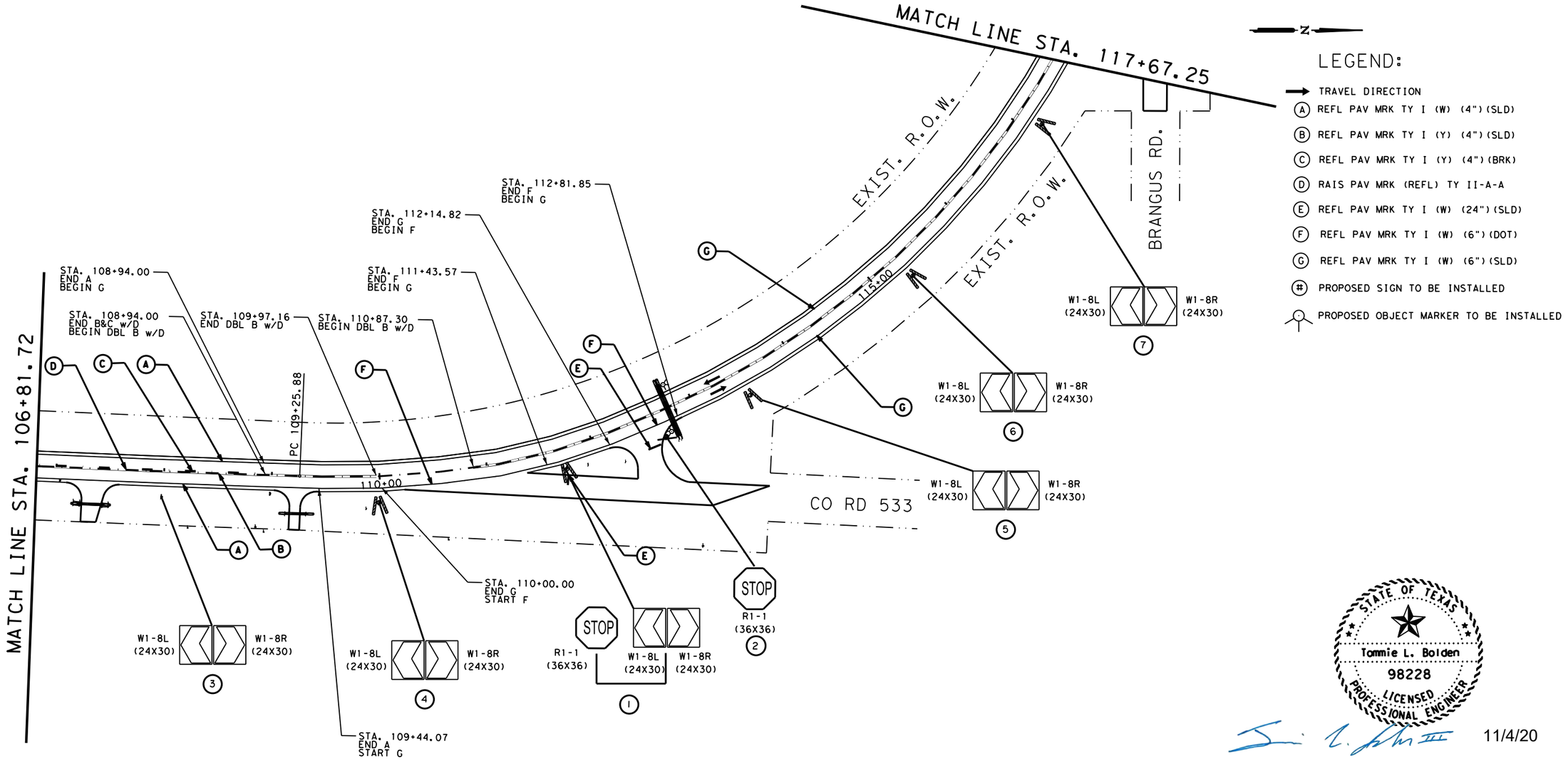

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SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 10 OF 22

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	131
CHECK TLB	CONTROL	SECTION	JOB	
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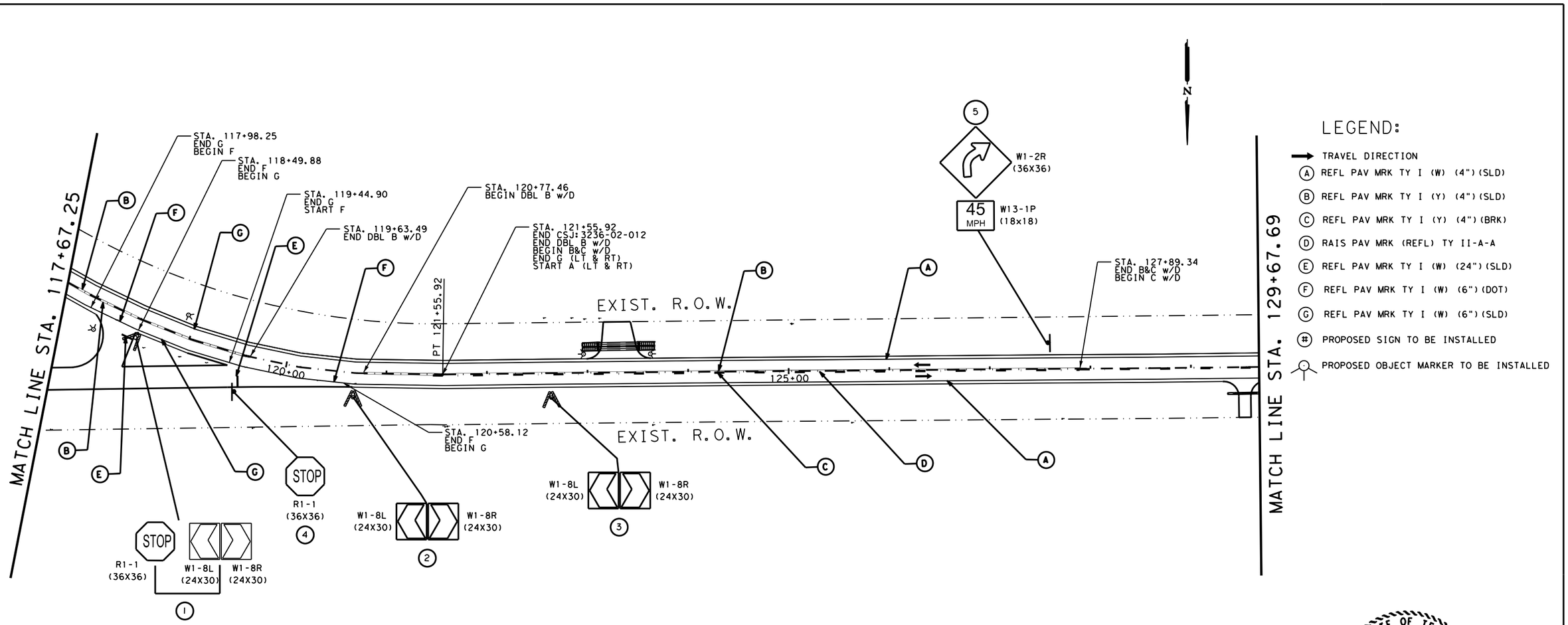

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
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SIGNING AND PAVEMENT MARKINGS LAYOUT

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SHEET 11 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	132
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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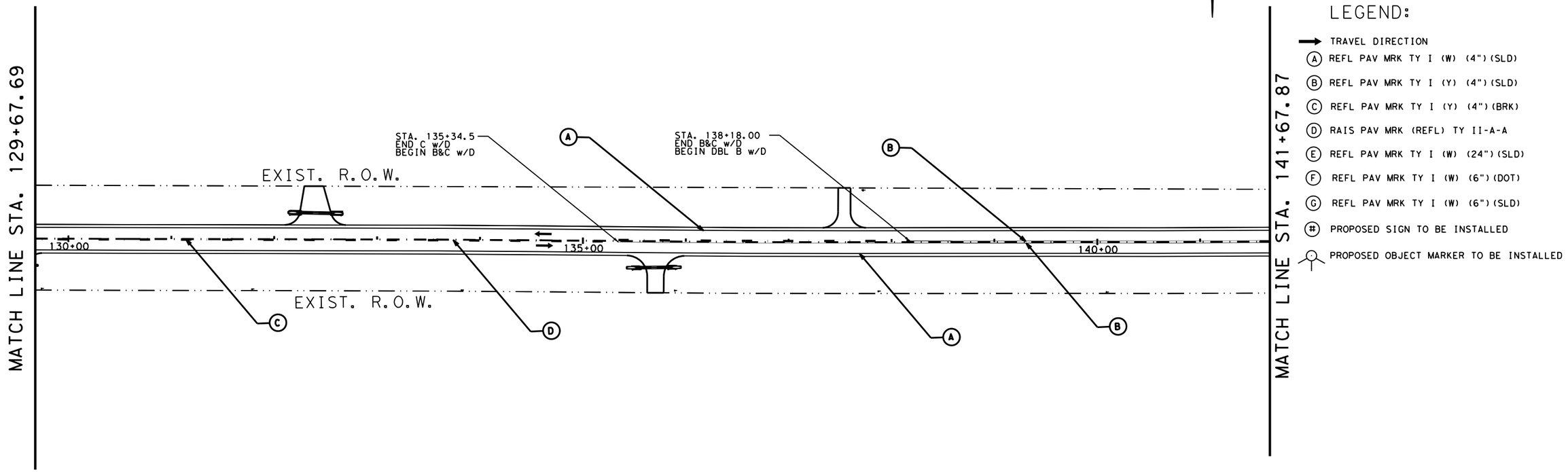

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LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
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- (G) REFL PAV MRK TY I (W) (6") (SLD)
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STATE OF TEXAS
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FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 12 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	133
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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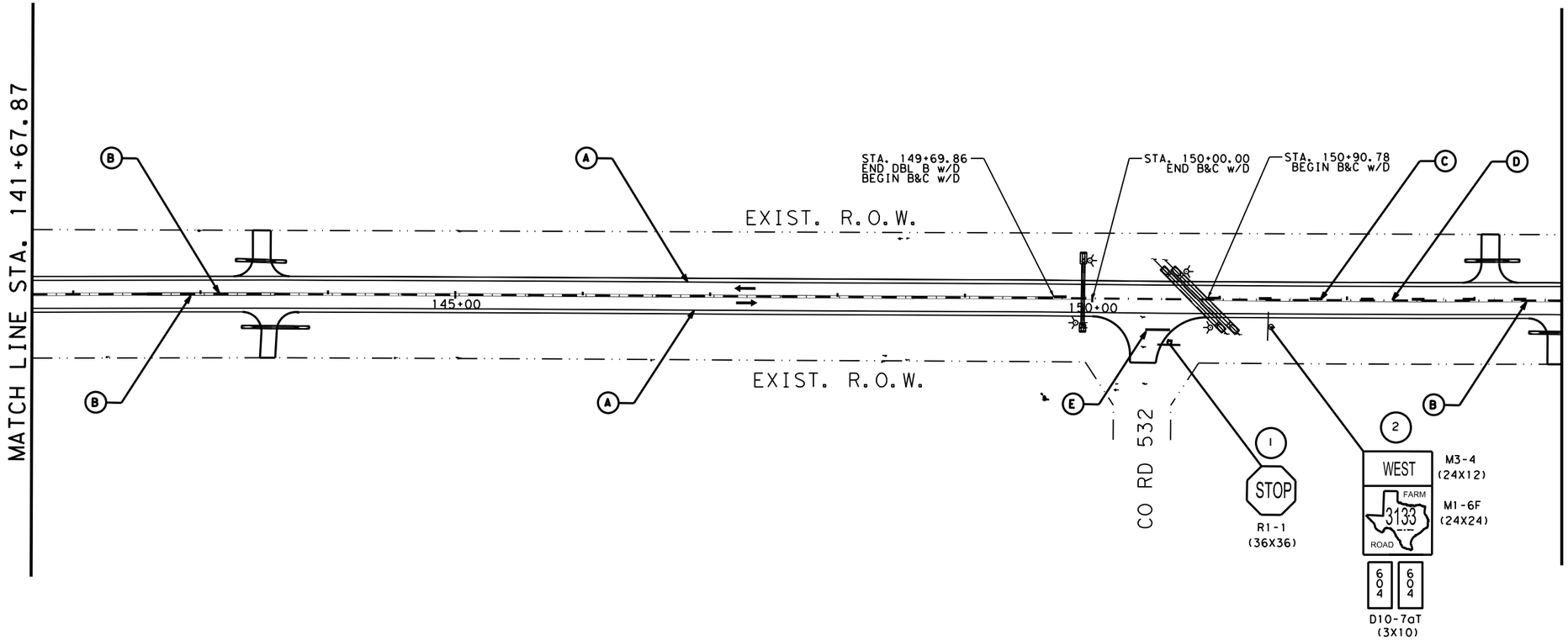

N

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
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11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 13 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	134
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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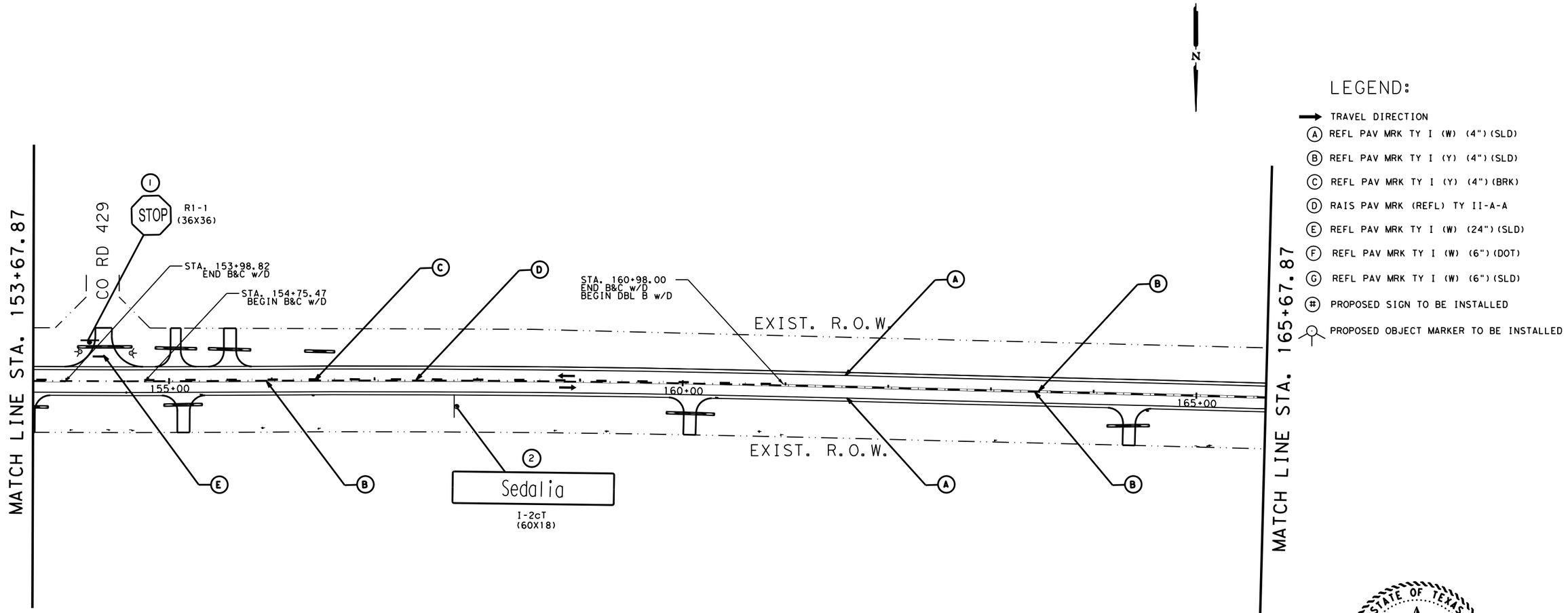

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 14 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	135
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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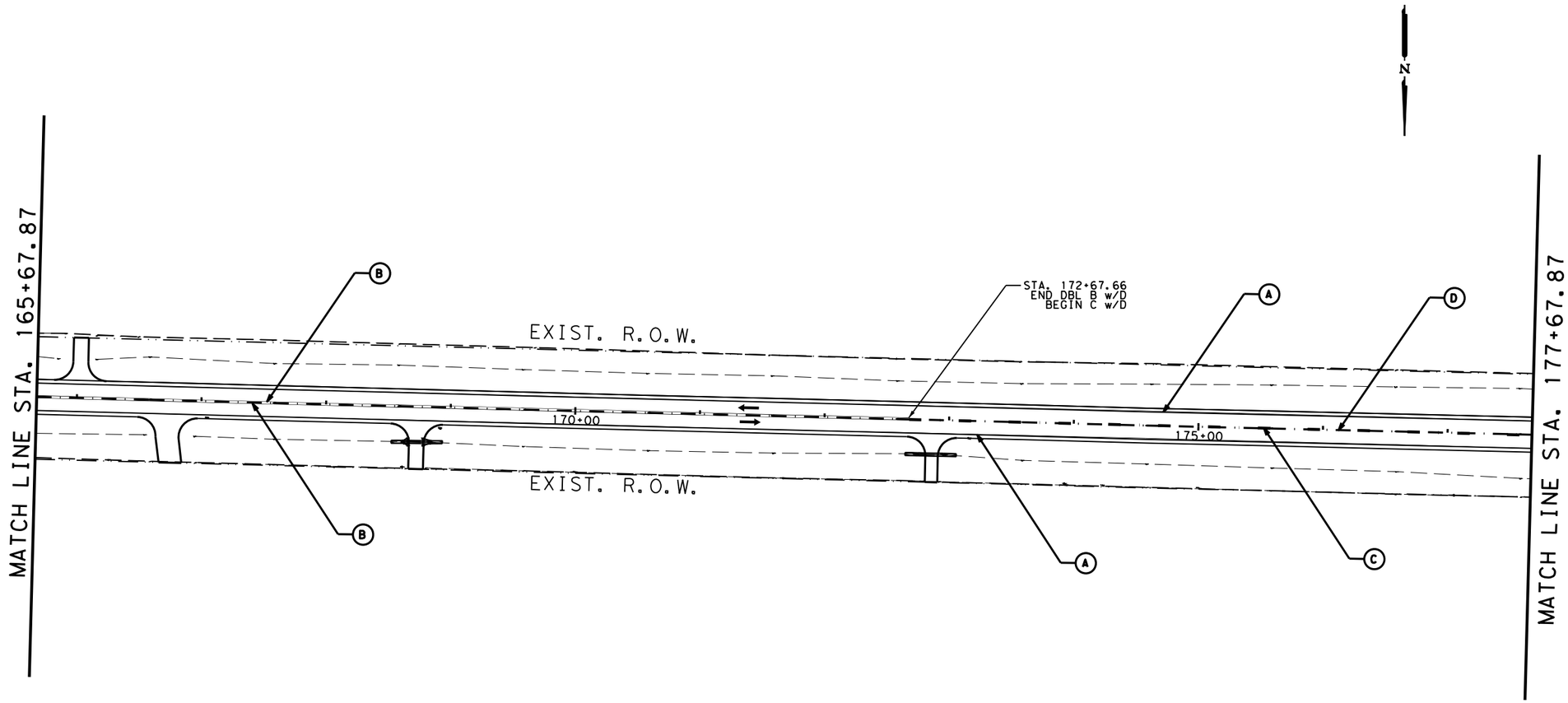

N

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
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11/4/20

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 15 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	136
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012,etc.	

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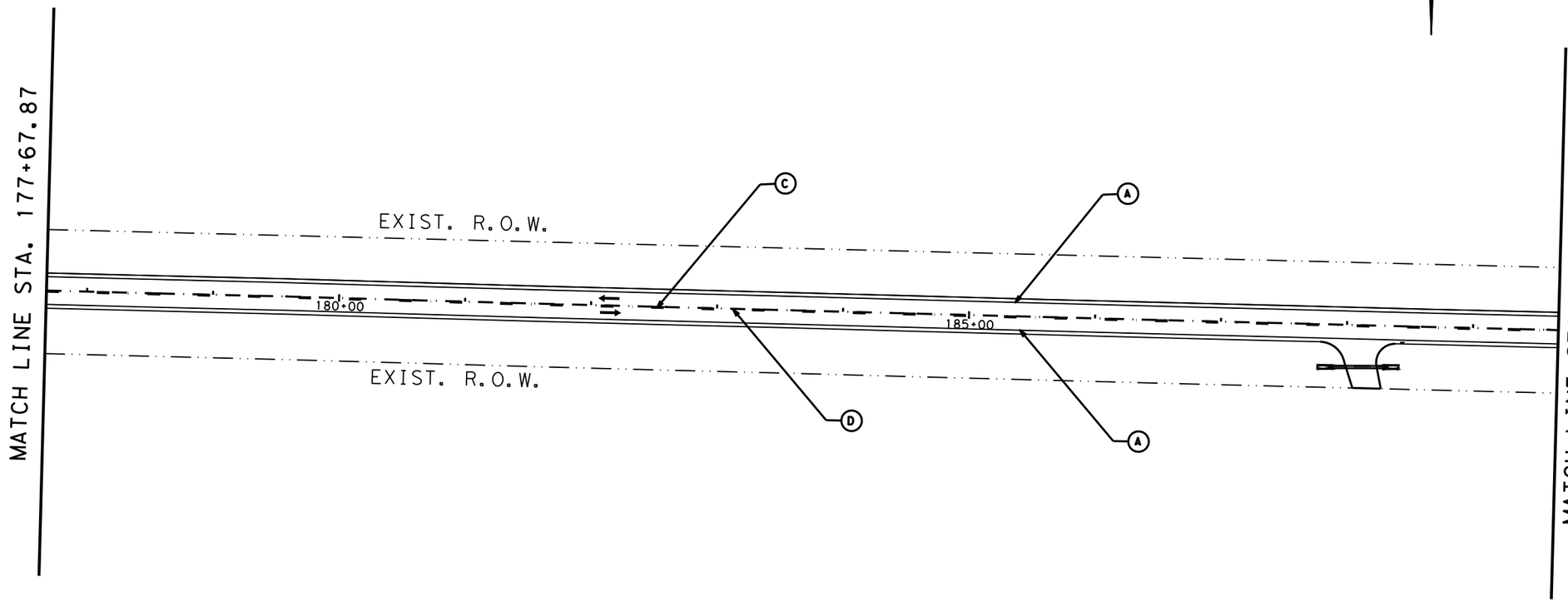

N

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 16 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	137
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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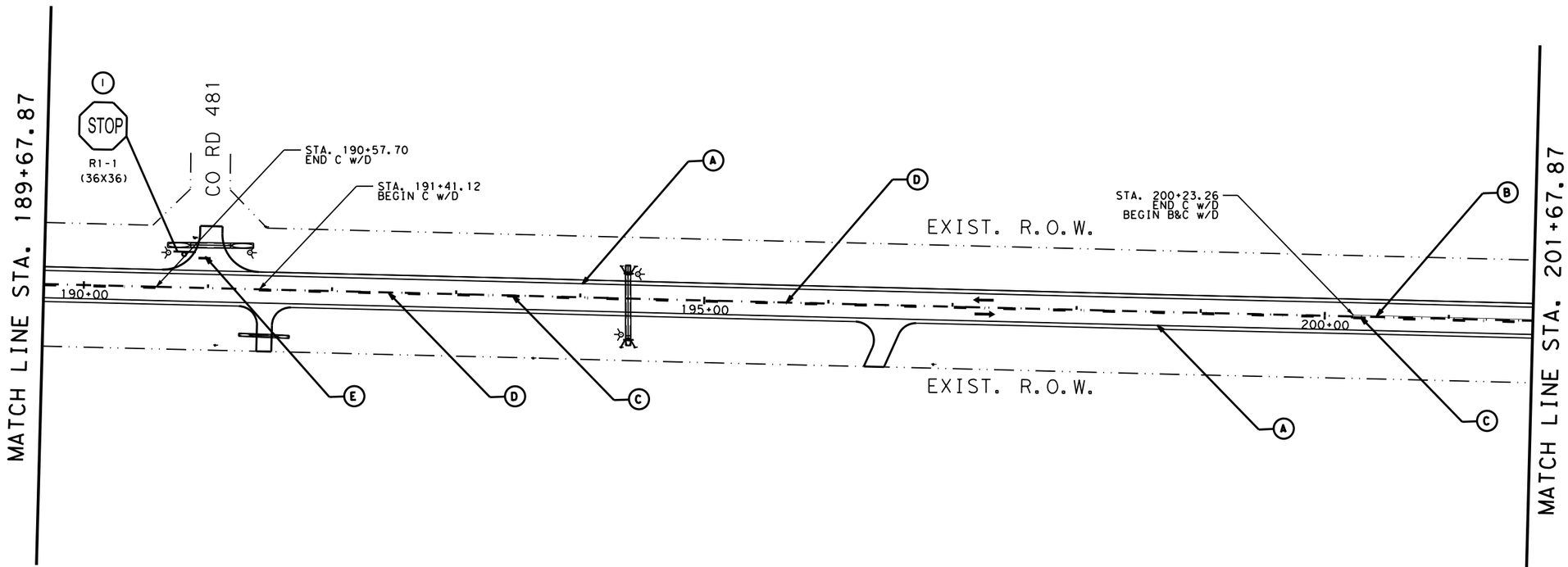

N

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
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PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 17 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	138
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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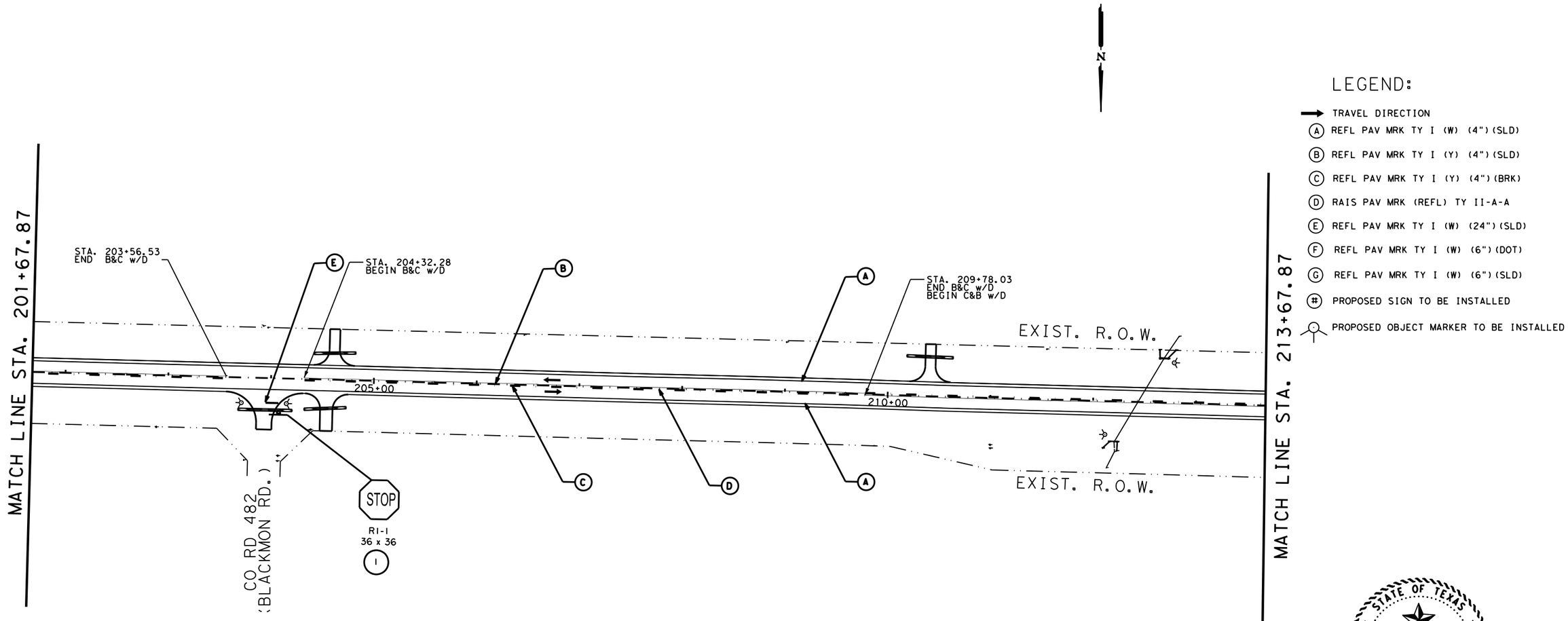

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 18 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	139
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012,etc.	

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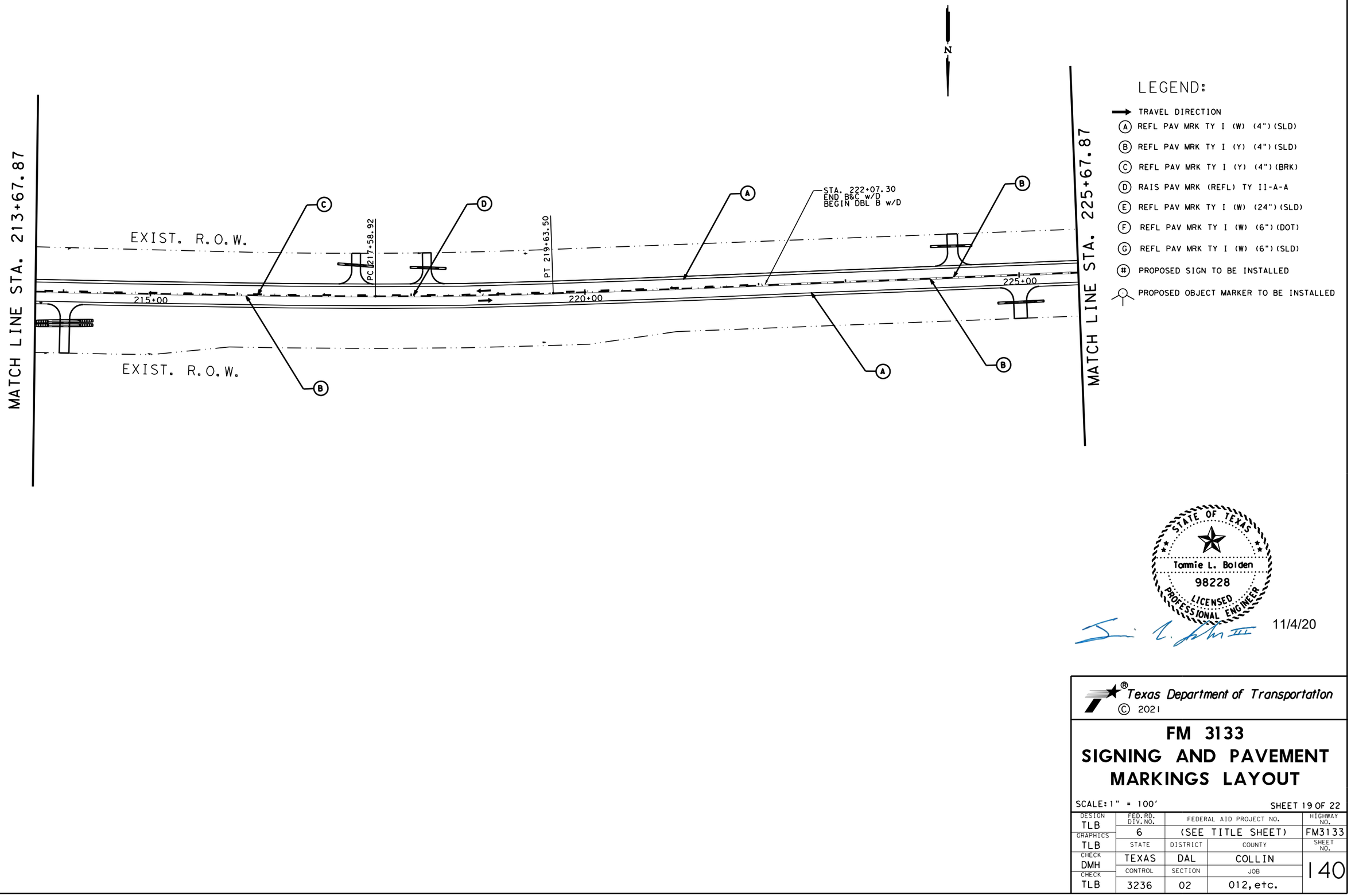

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
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LICENSED
PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 19 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	140
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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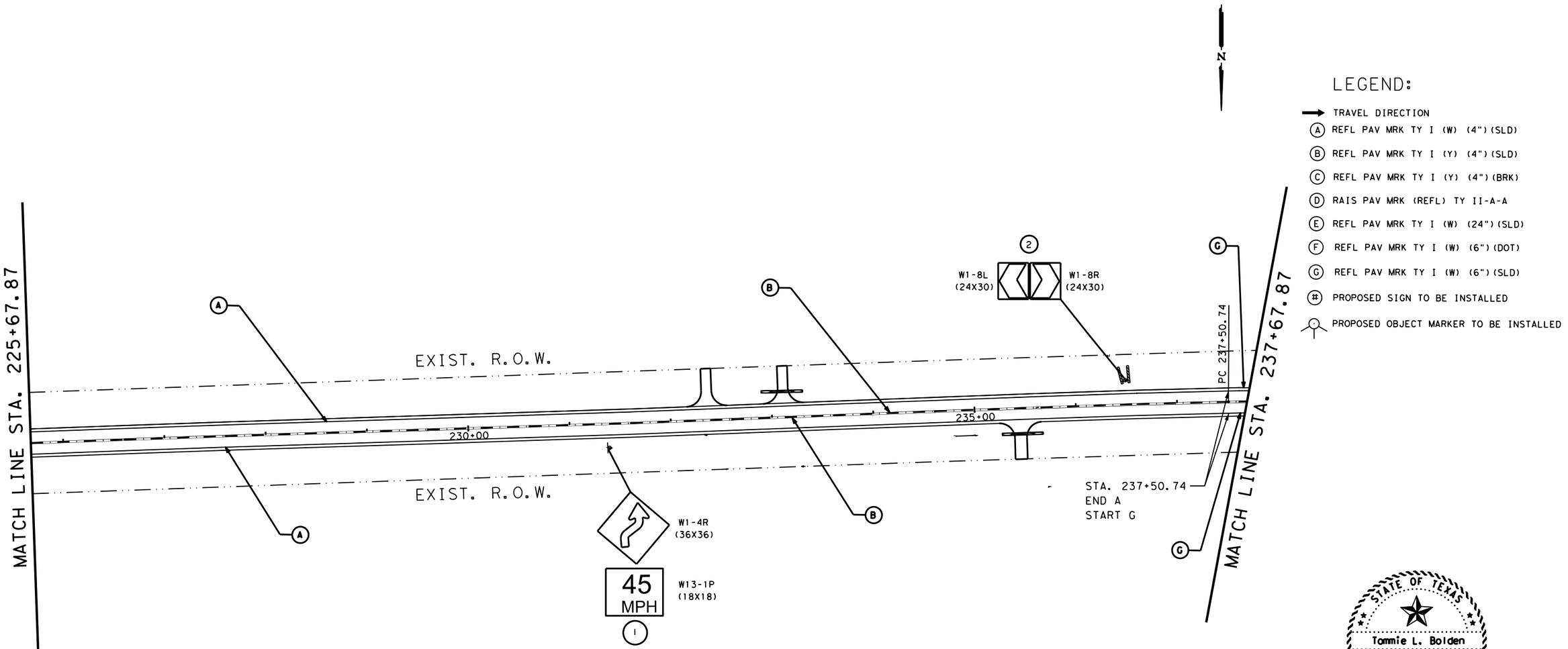

STATE OF TEXAS
Tommie L. Bolden
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PROFESSIONAL ENGINEER

11/4/20

Texas Department of Transportation

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 20 OF 22

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	141
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

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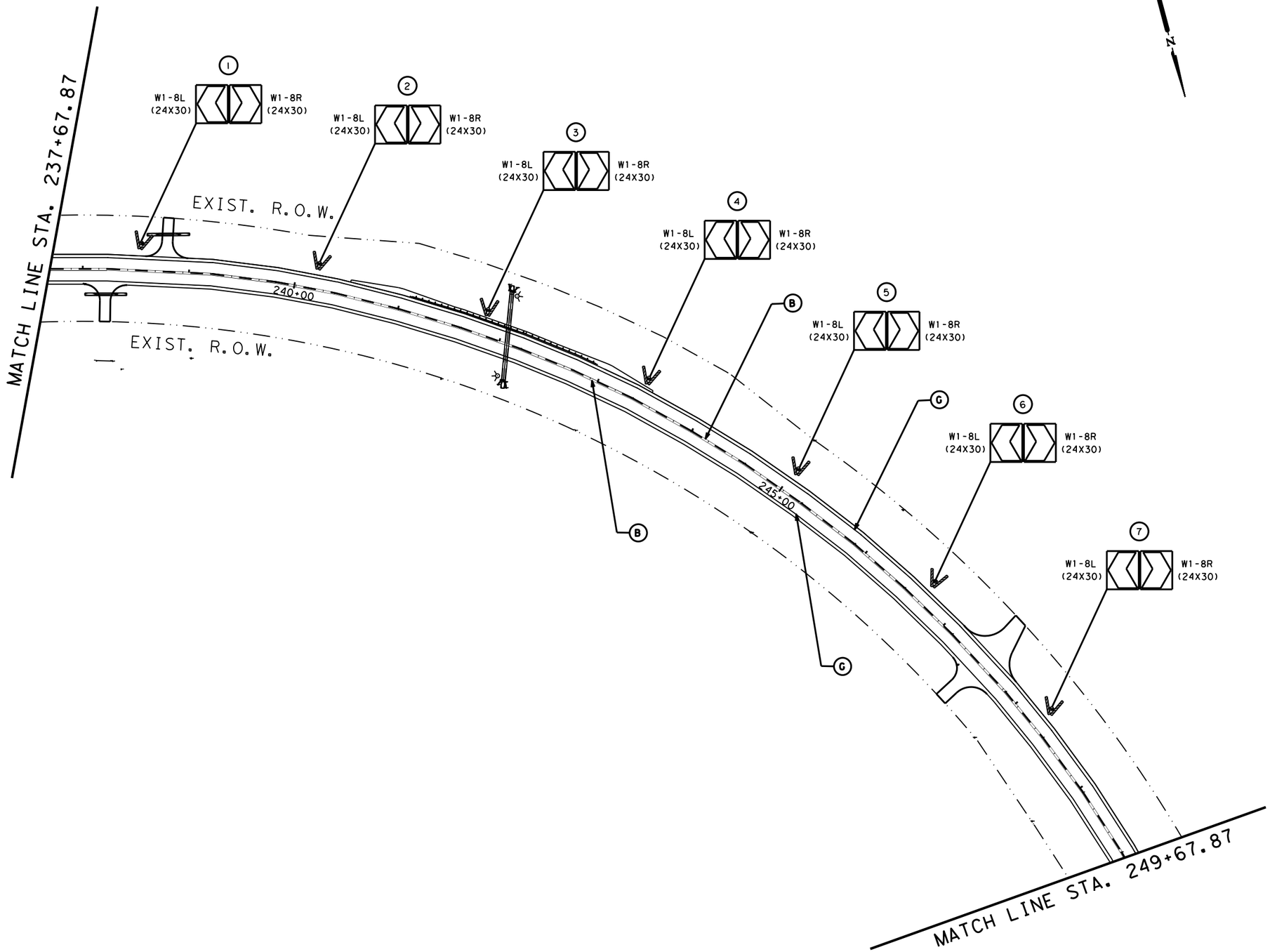

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
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LICENSED
PROFESSIONAL ENGINEER

11/4/20

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 21 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DAL	COLLIN	142
CHECK TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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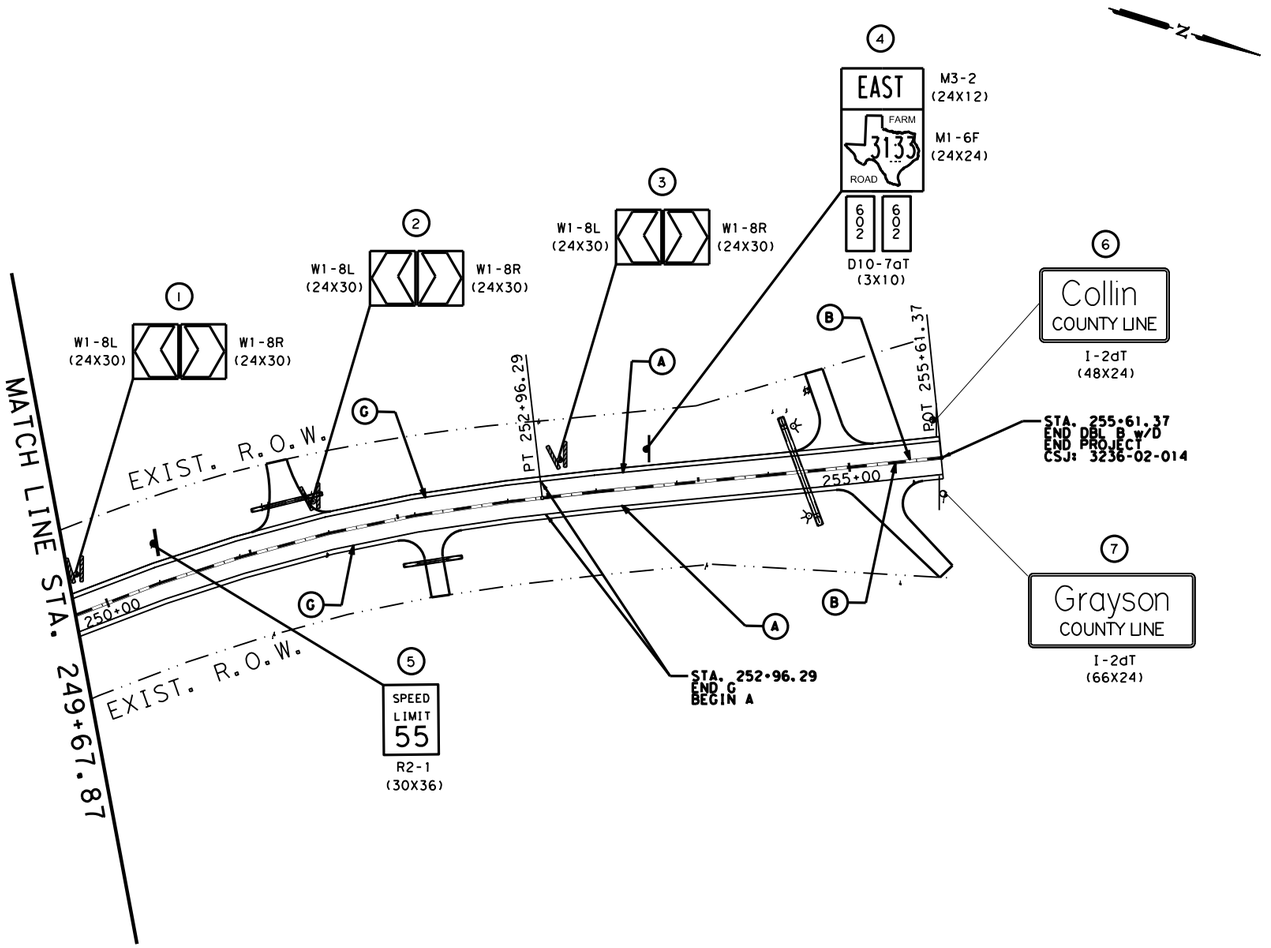

LEGEND:

- TRAVEL DIRECTION
- (A) REFL PAV MRK TY I (W) (4") (SLD)
- (B) REFL PAV MRK TY I (Y) (4") (SLD)
- (C) REFL PAV MRK TY I (Y) (4") (BRK)
- (D) RAIS PAV MRK (REFL) TY II-A-A
- (E) REFL PAV MRK TY I (W) (24") (SLD)
- (F) REFL PAV MRK TY I (W) (6") (DOT)
- (G) REFL PAV MRK TY I (W) (6") (SLD)
- (#) PROPOSED SIGN TO BE INSTALLED
- PROPOSED OBJECT MARKER TO BE INSTALLED

STATE OF TEXAS
Tammie L. Bolden
98228
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PROFESSIONAL ENGINEER

11/4/20

FM 3133
SIGNING AND PAVEMENT MARKINGS LAYOUT

SCALE: 1" = 100'

SHEET 22 OF 22

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS: TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK: DMH	TEXAS	DAL	COLLIN	143
CHECK: TLB	CONTROL	SECTION	JOB	
	3236	02	012, etc.	

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	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
1 OF 22												
	1		STOP	36X36	✓		10BWG	1	SA	P		
	2	M3-4	WEST	24X12	✓		10BWG	1	SA	P		
		M1-6F	FARM 3133 ROAD	24X24								
	3	R2-1	SPEED LIMIT 45	30X36			10BWG	1	SA	P		
	4	W3-1		36X36	✓		10BWG	1	SA	P		
2 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
		D3-4aT	Graybill Rd	42X8								
	2	R2-1	SPEED LIMIT 55	30X36	✓		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS

	Minimum Thickness
	0.080"
	0.100"
	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.
Square Feet
Less than 7.5
7.5 to 15
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

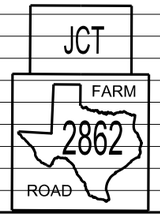
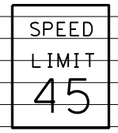
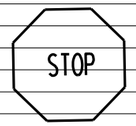
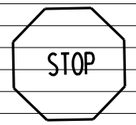
SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
4-16 8-16	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		144

DATE: 11/4/2020 8:25:14 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Pro...\Summary of Small Signs.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U" 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
2 OF 22											
	3	M2-1 M1-6F		21X15 24X24	✓		10BWG	1	SA	P		
	4	R2-1		30X36	✓		10BWG	1	SA	P		
	5	D3-4aT		36X8	✓		10BWG	1	SA	P		
3 OF 22											
	1	R1-1		36X36	✓		10BWG	1	SA	P		
	2	R1-1		36X36	✓		10BWG	1	SA	P		
	3	W3-5		36X36	✓		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
	Minimum Thickness
Square Feet 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: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
4-16	DIST	COUNTY		SHEET NO.
8-16	DAL	COLLIN		145

18

DATE: 11/4/2020 8:25:15 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\32360204 Small Signs.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED: P = "Plain", T = "T", U = "U"	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
4 OF 22												
	1	M3-2	EAST	24X12	✓		10BWG	1	SA	P		
		M1-6F	FARM 3133 ROAD	24X24								
		D10-7aT	6 0 6 / 6 0 6	3X10								
5 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
9 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
	2	W1-2L		36X36	✓		10BWG	1	SA	P		
		W13-1P	45 MPH	18X18								

ALUMINUM SIGN BLANKS THICKNESS

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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DATE: 11/4/2020 8:25:13 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Pr…

Texas Department of Transportation — Traffic Operations Division Standard

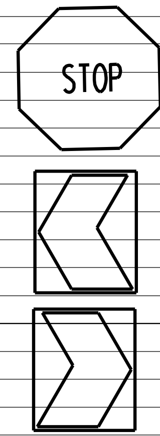
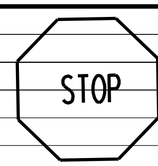
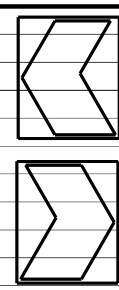
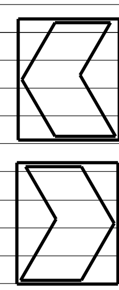
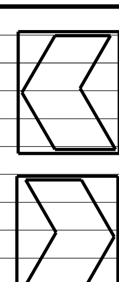
SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 3236	SECT 02	JOB 012,etc.	HIGHWAY FM3133
REVISIONS 4-16, 8-16	DIST DAL		COUNTY COLLIN	SHEET NO. 146

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
10 OF 22												
	1	R1-1 W1-8L W1-8R		36X36 24X30 24X30	✓		10BWG	1	SA	U		
	2	R1-1		36X36	✓		10BWG	1	SA	P		
	3	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	4	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	5	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
	Minimum Thickness
	0.080"
	0.100"
	0.125"

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	147

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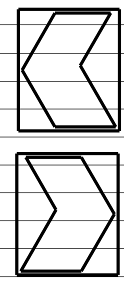
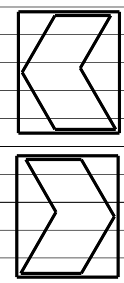
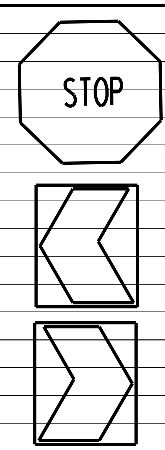
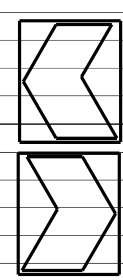
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
10 OF 22												
	6	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	7	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
11 OF 22												
	1	R1-1 W1-8L W1-8R		36X36 24X30 24X30	✓		10BWG	1	SA	U		
	2	W1-8L W1-8R		24X30 24X30	✓		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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Texas Department of Transportation

Traffic Operations Division Standard

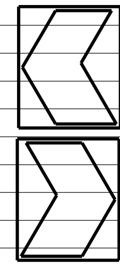
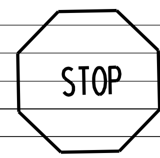
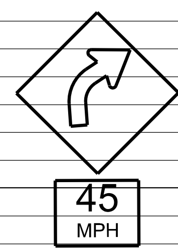
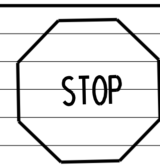
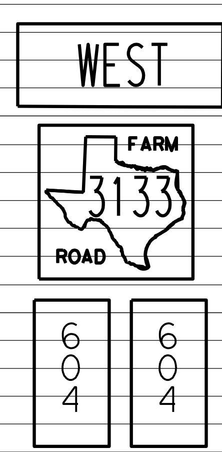
SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	148

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION: PREFABRICATED	MOUNTING DESIGNATION	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
11 OF 22												
	3	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	4	R1-1		36X36	✓		10BWG	1	SA	P		
	5	W1-2R W13-1P		36X36 18X18	✓		10BWG	1	SA	P		
13 OF 22												
	1	R1-1		36X36	✓		10BWG	1	SA	P		
	2	M3-4 M1-6F D10-7aT		24X12 24X24 3X10	✓		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: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	3236	02	012, etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		149

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	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
14 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
	2	I-2cT	Sedalia	60X18	✓		10BWG	1	SA	T		
17 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
18 OF 22												
	1	R1-1	STOP	36X36	✓		10BWG	1	SA	P		
20 OF 22												
	1	W1-4R W13-1P	45 MPH	36X36 18X18	✓		10BWG	1	SA	P		
	2			24X30 24X30	✓		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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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
4-16	DIST	COUNTY		SHEET NO.
8-16	DAL	COLLIN		150

18

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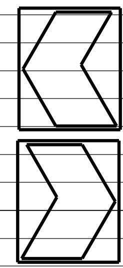
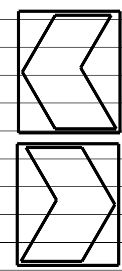
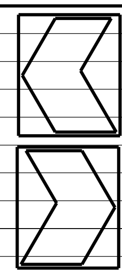
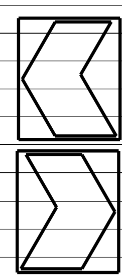
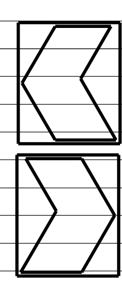
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION	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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
21 OF 22												
	1	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	2	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	3	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	4	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	5	W1-8L W1-8R		24X30 24X30	✓		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

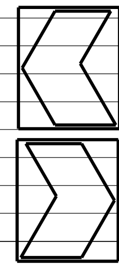
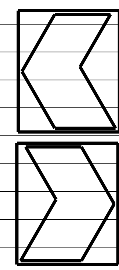
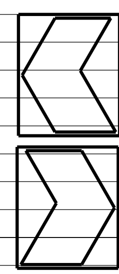
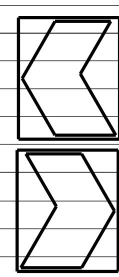
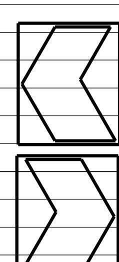
SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	151

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
21 OF 22												
	6	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	7	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
22 OF 22												
	1	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	2	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		
	3	W1-8L W1-8R		24X30 24X30	✓		10BWG	1	SA	P		

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	0.080"
	0.100"

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SUMMARY OF SMALL SIGNS

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FILE: sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	152

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SUMMARY OF SMALL SIGNS

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PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
22 OF 22												
		M3-2	EAST	24X12								
	4	M1-6F	FARM 3133 ROAD	24X24	✓		10BWG	1	SA	P		
		D10-7aT	602 602	3X10								
	5	R2-1	SPEED LIMIT 55	30X36	✓		10BWG	1	SA	P		
	6	I-2dT	Collin COUNTY LINE	48X24	✓		10BWG	1	SA	T		
	7	I-2dT	Grayson COUNTY LINE	66X24	✓		10BWG	1	SA	T		

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Square Feet	Minimum Thickness
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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:	sums16ex.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		3236	02	012,etc.	FM3133
4-16		DIST	COUNTY		SHEET NO.
8-16		DAL	COLLIN		153

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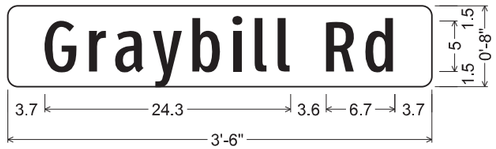
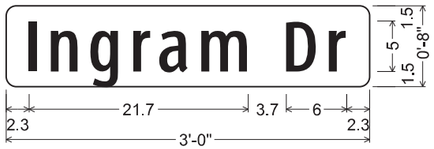


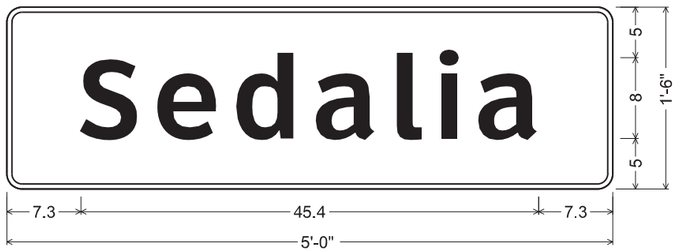
D3-4aT;
1.0" Radius, No border, Green;
"Graybill Rd" White, ClearviewHwy-2-W specified length;

SHEET 2 SIGN 1



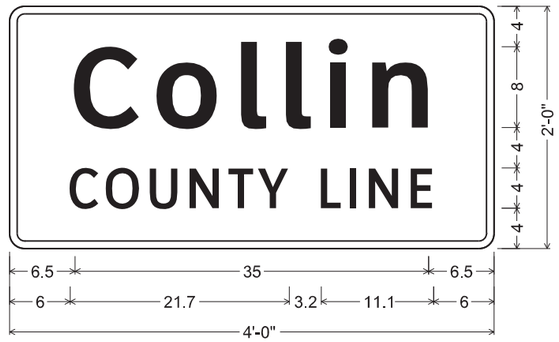
D3-4aT;
1.0" Radius, No border, Green;
"Ingram Dr" White, ClearviewHwy-2-W specified length;

SHEET 2 SIGN 5



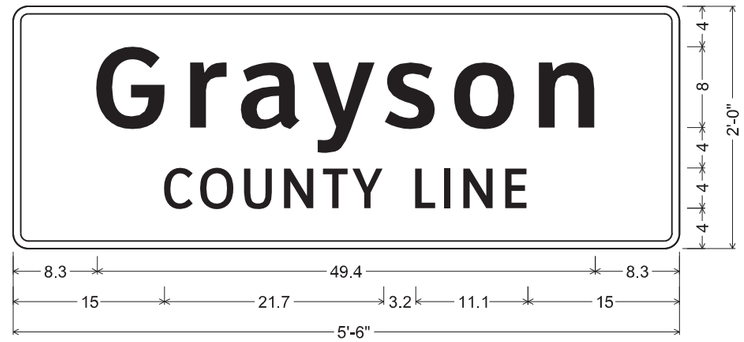
I-2cT 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Sedalia", ClearviewHwy-5-W-R;

SHEET 14 SIGN 2



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

SHEET 22 SIGN 6



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

SHEET 22 SIGN 7

STATE OF TEXAS
MARK A. ABOSO
112638
LICENSED PROFESSIONAL ENGINEER

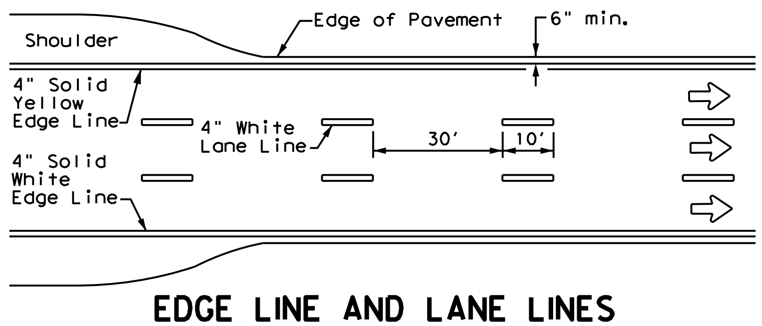
Mark A Aboso, P.E. 10/19/2020
Signature Date

Texas Department of Transportation

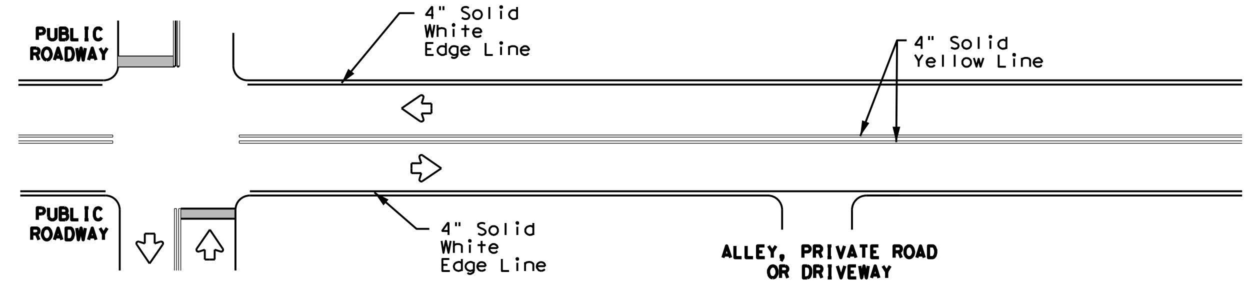
GUIDE SIGN DETAILS

SCALE: NTS SHEET 1 OF 1

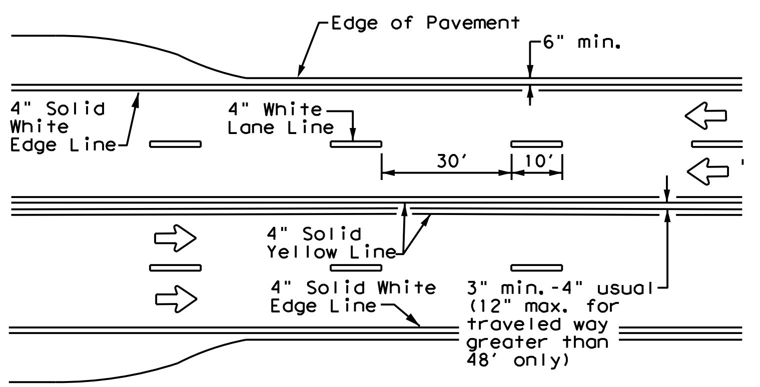
DESIGN/CK	FED.RD. DIV.NO.	FEDERAL-AID PROJECT NUMBER		HIGHWAY NO.
MAA	6	SEE TITLE SHEET		FM 3133
CHECK BLS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK BA	TEXAS	DALLAS	COLLIN	154
CHECK FRC	CONTROL	SECTION	JOB	
	3236	02	012,ETC	



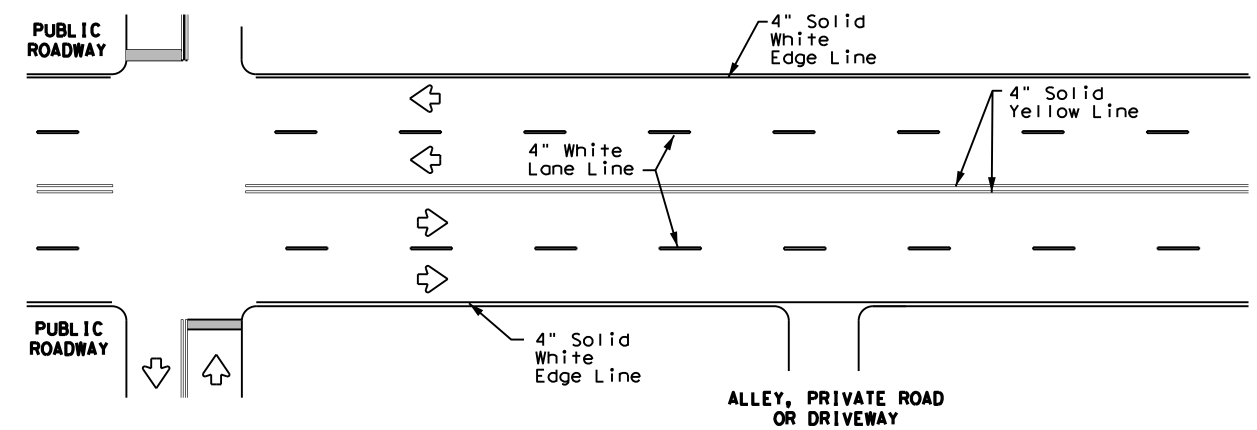
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



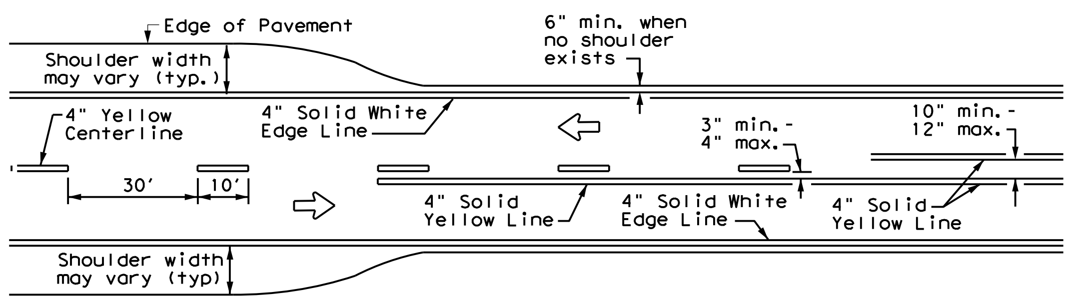
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



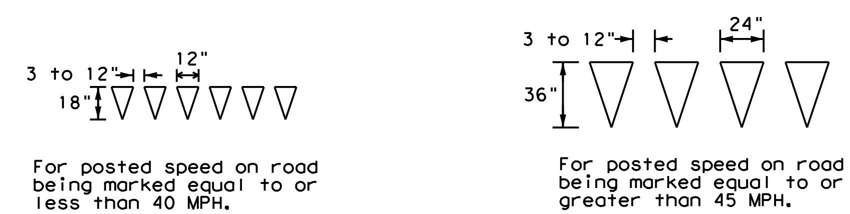
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



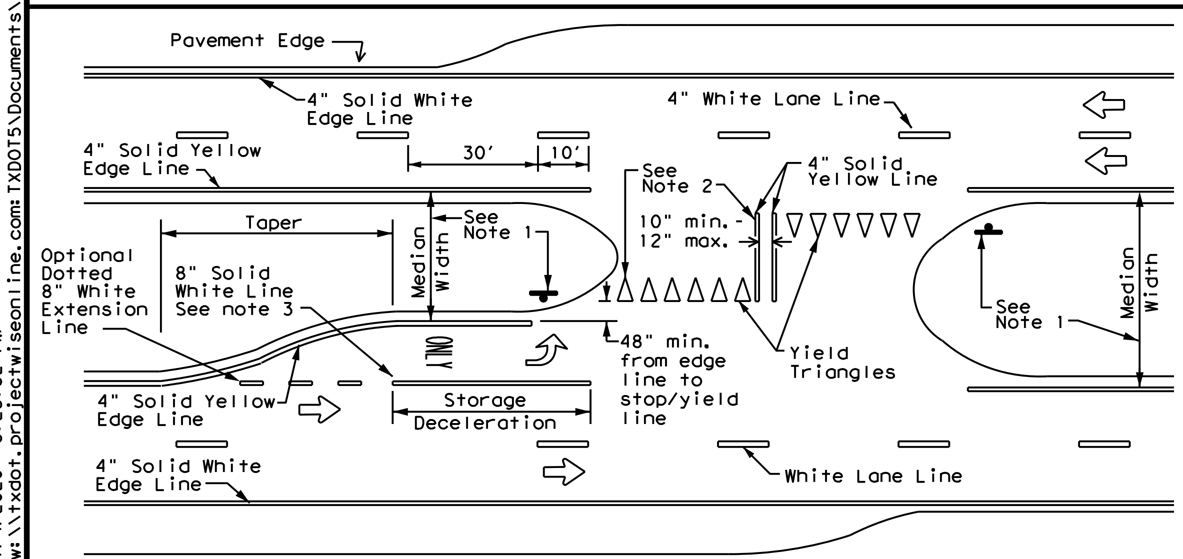
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

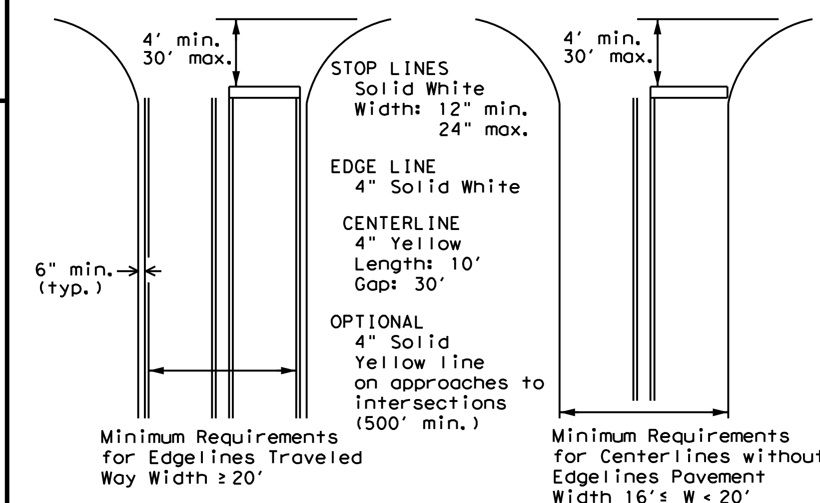
GENERAL NOTES

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

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.

Texas Department of Transportation — Traffic Safety Division Standard

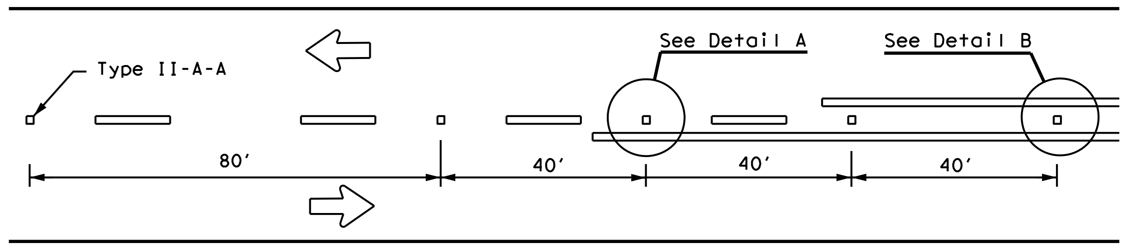
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

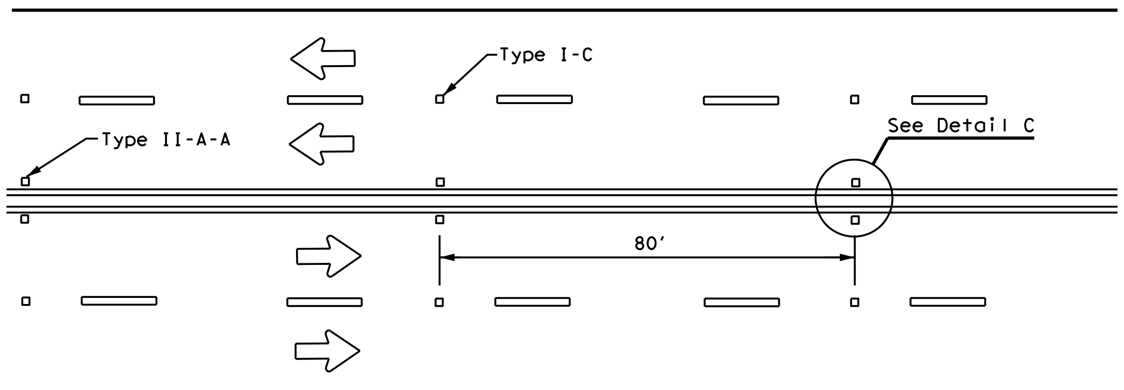
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 5-00 2-12 8-00 6-20	3236	02	012, etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	155

228

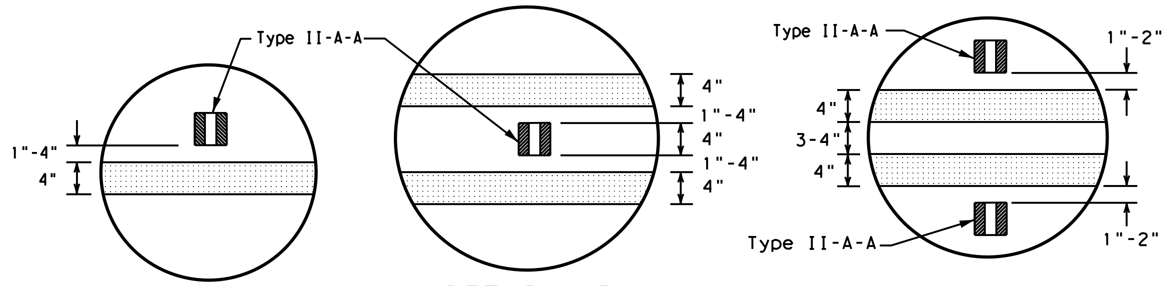
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



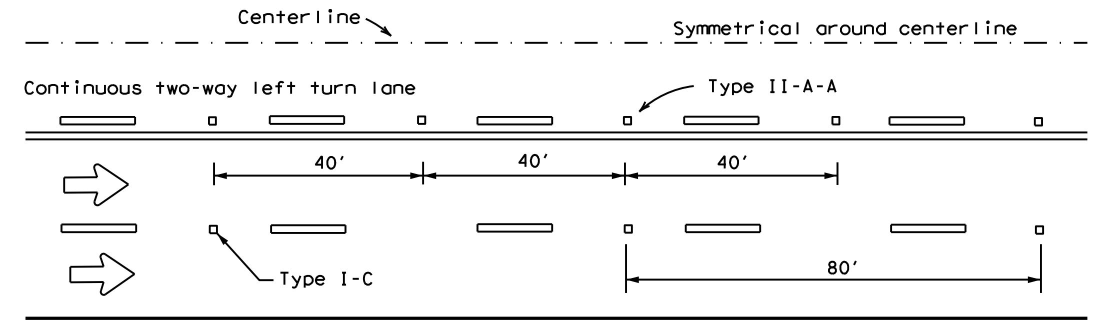
CENTERLINE FOR ALL TWO LANE ROADWAYS



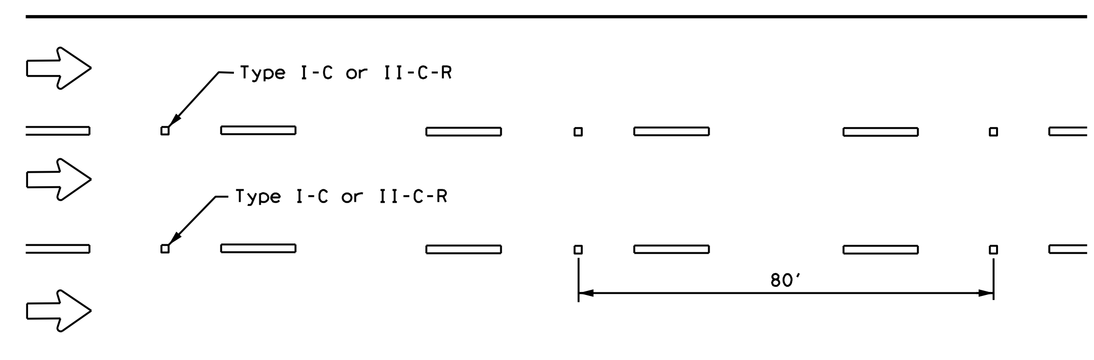
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

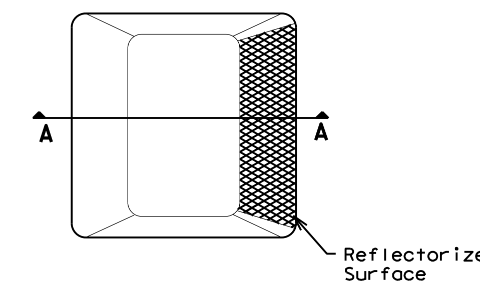


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

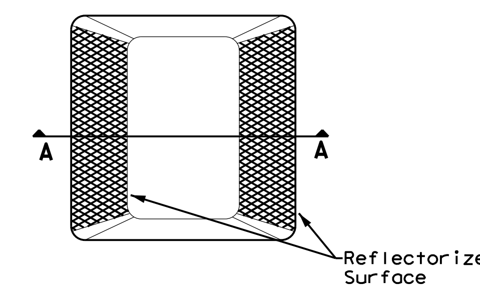
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

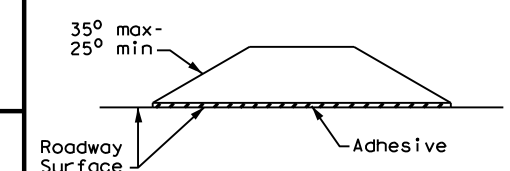
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

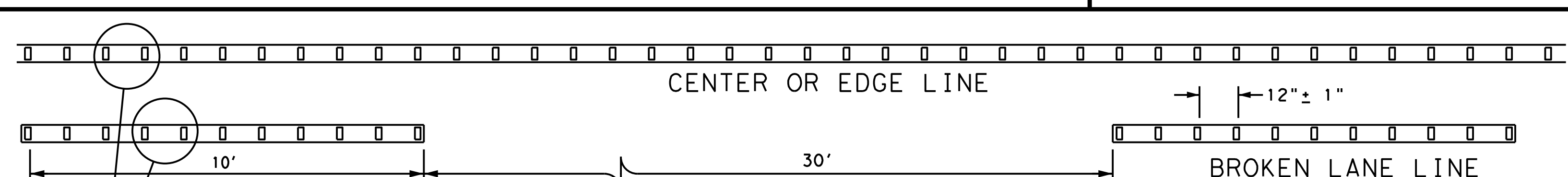


Type II (Top View)



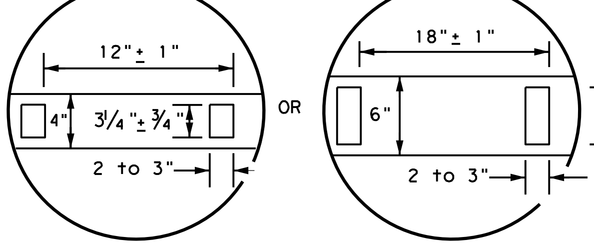
SECTION A

RAISED PAVEMENT MARKERS



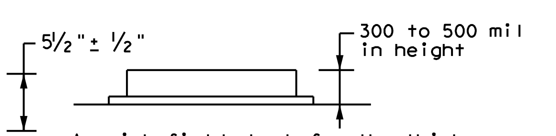
REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE



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.

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.

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	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	156

228

DATE: 11/4/2020 8:25:40 PM
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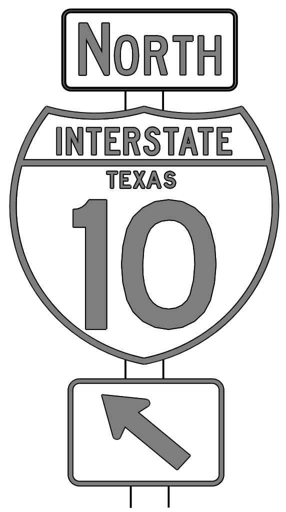
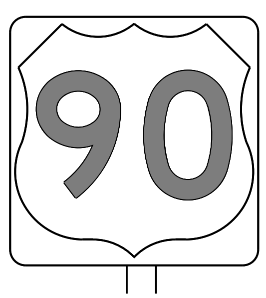
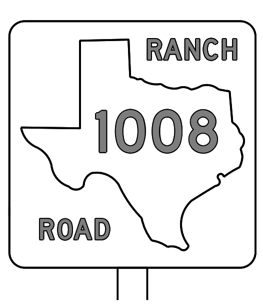
DATE: 11/4/2020 8:25:47 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\3236-02-012\...

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



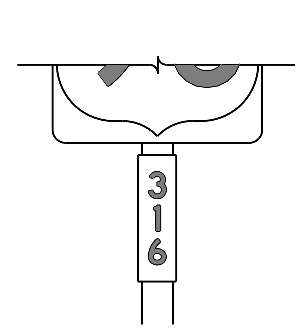


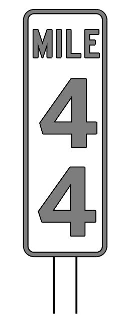


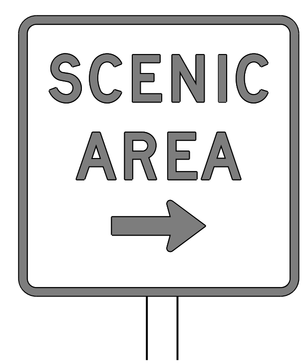
TYPICAL EXAMPLES

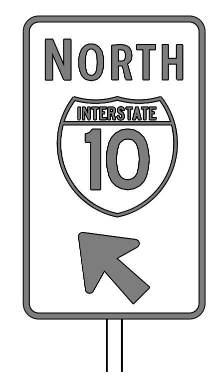
REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

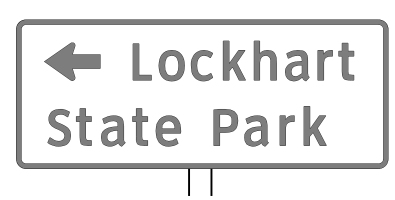
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

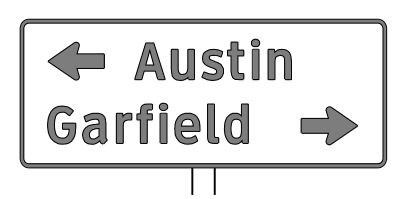












TYPICAL EXAMPLES

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

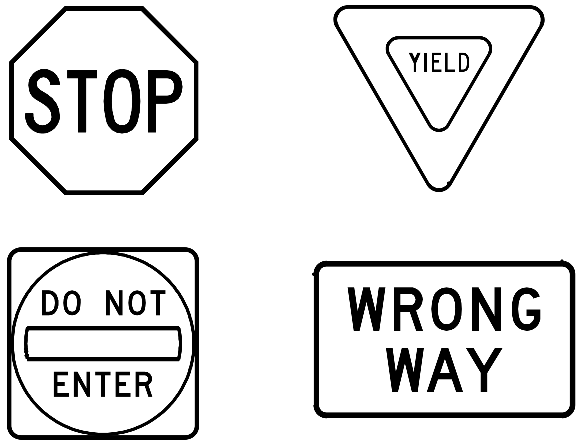
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	157

3

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

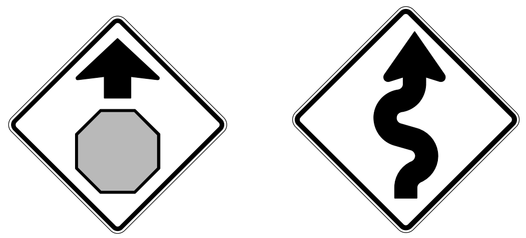
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

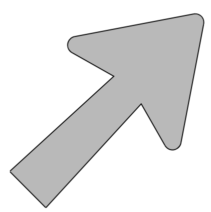
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	158

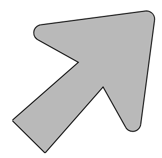
4

ARROW DETAILS

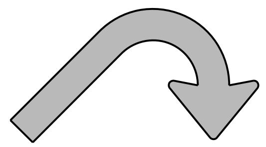
for Large Ground-Mounted and Overhead Guide Signs



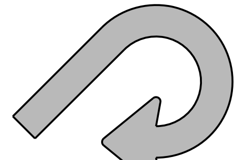
Type A



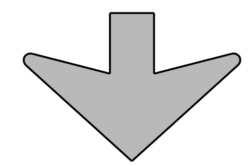
Type B



E-3



E-4



Down Arrow

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

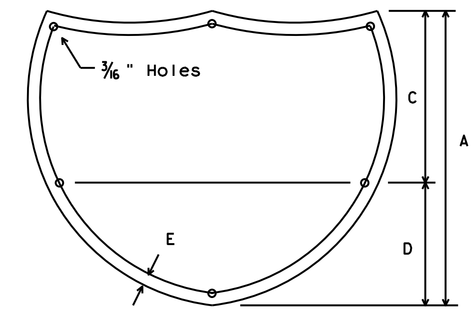
NOTE

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.

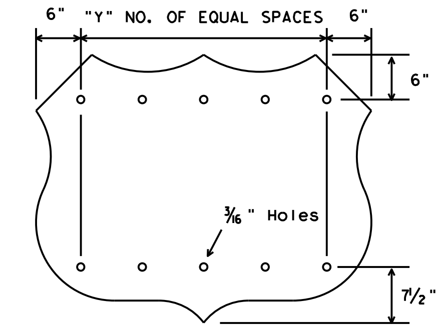
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



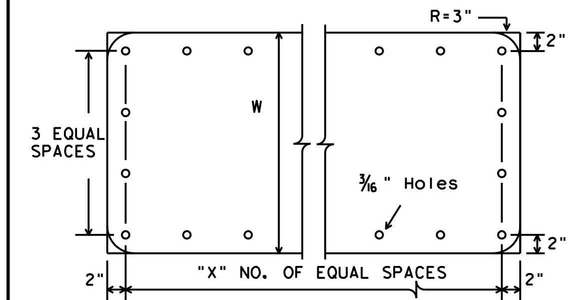
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



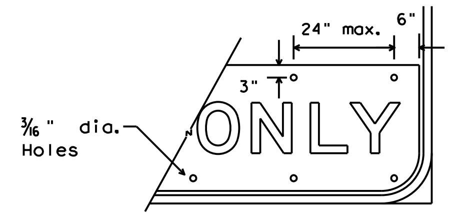
U.S. ROUTE MARKERS

Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



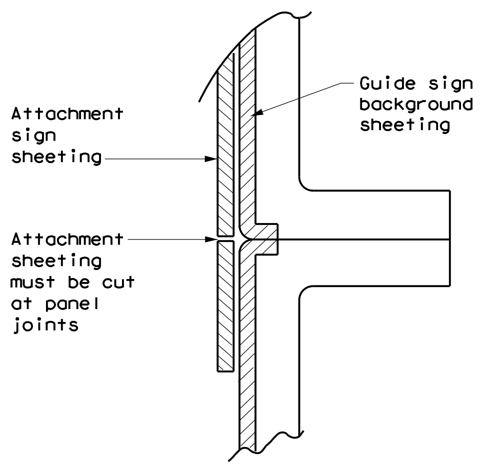
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

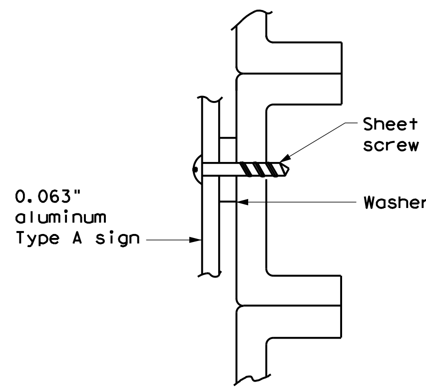


EXIT ONLY PANEL

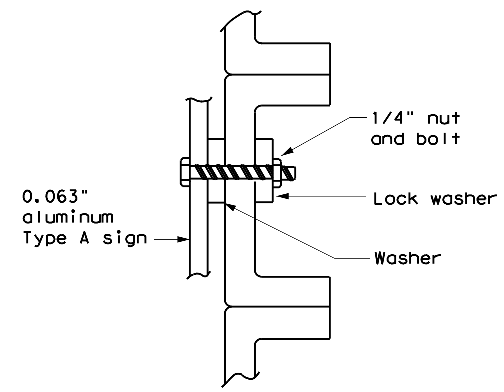
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

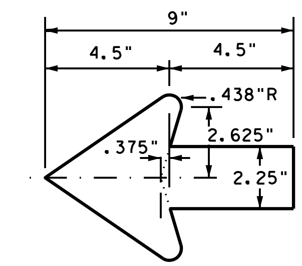
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

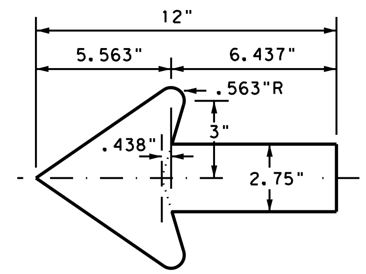
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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 12-03 7-13 9-08	3236	02	012, etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	159

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DATE: 11/4/2020 8:26:07 PM
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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)

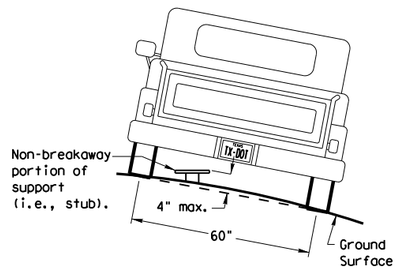
Anchor Type

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-3))

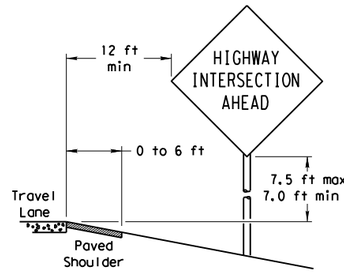
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

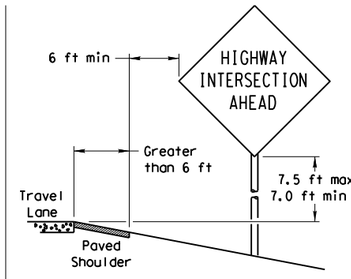
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

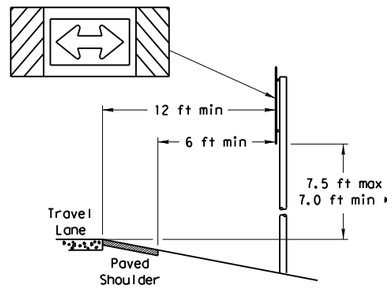
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



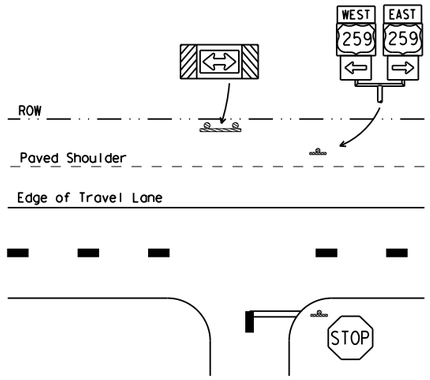
GREATER THAN 6 FT. WIDE

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.

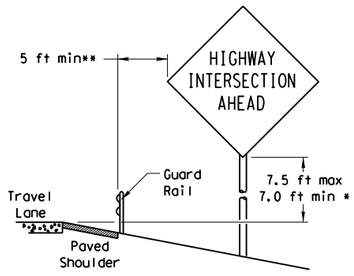
T-INTERSECTION



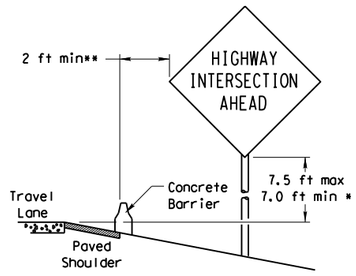
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



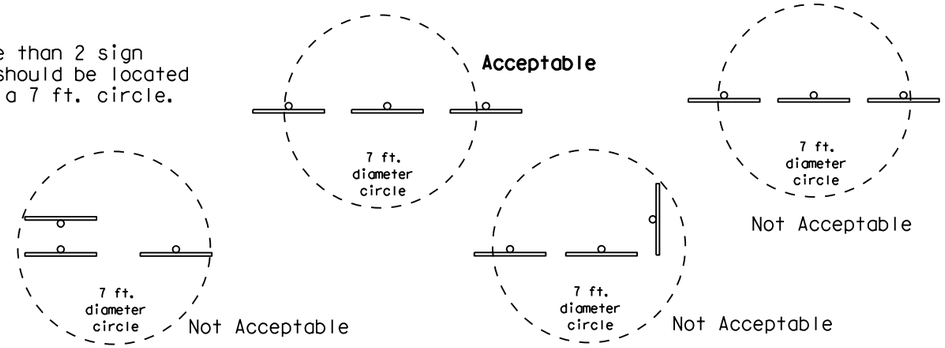
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

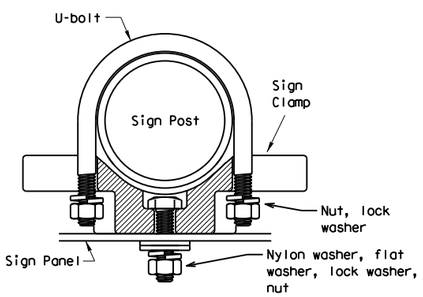
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

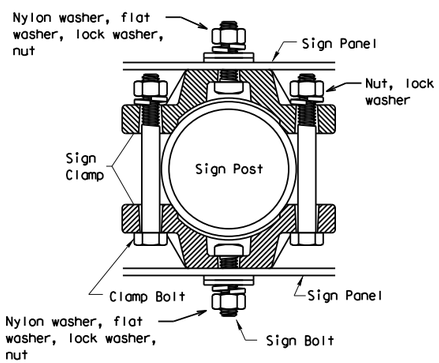


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

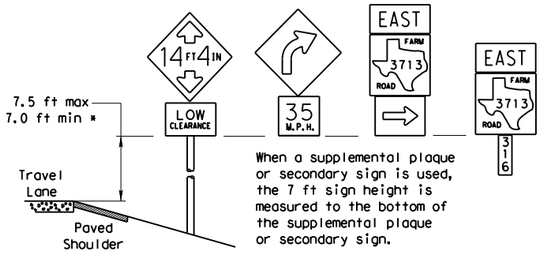
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



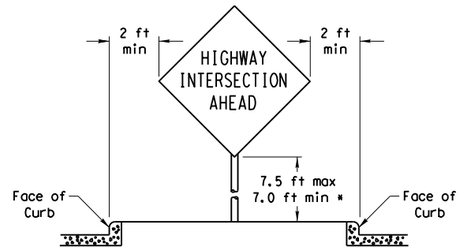
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



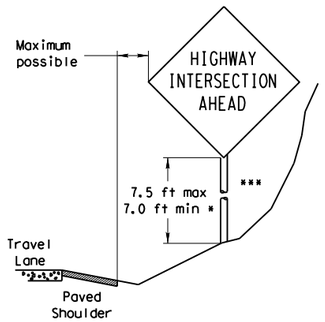
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

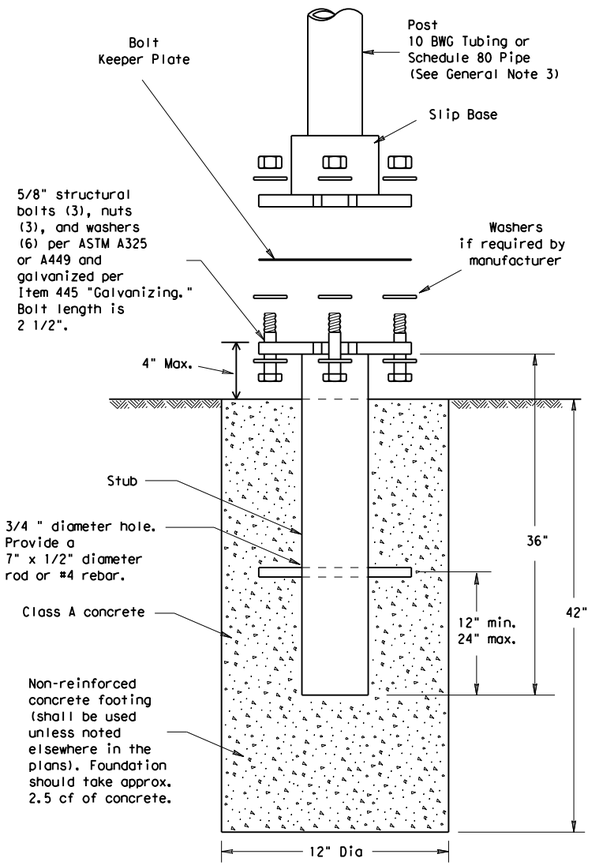
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

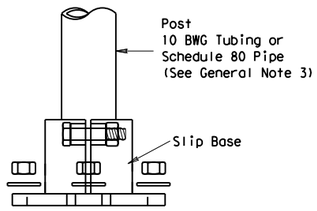
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		160

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

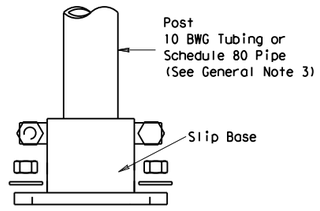


SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

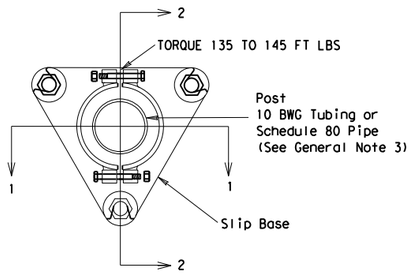
NOTE
The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.



SIDE VIEW 1-1



SIDE VIEW 2-2



TOP VIEW

DETAIL A

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

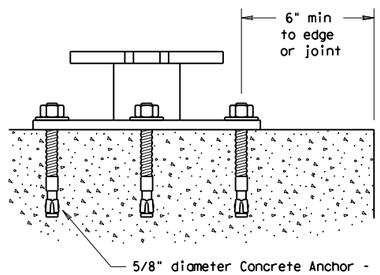
Foundation

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.

ADDED DETAIL A FOR CLAMP BASE
10-2010

Texas Department of Transportation
Dallas District Standard

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08(DAL)

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
12-10 (DISTRICT) ADDED CLAMP BASE DETAIL FOR SLIP BASE INSTALLATION	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		161

DATE:
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DATE: 11/4/2020 8:26:21 PM
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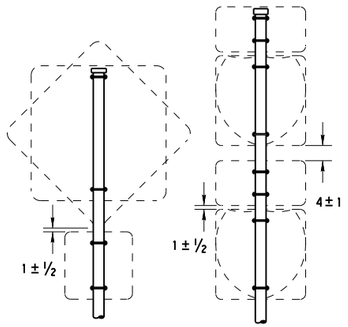
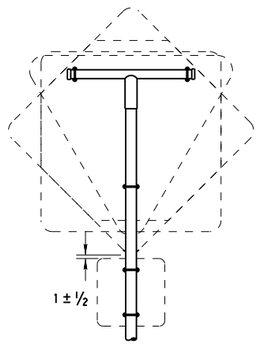
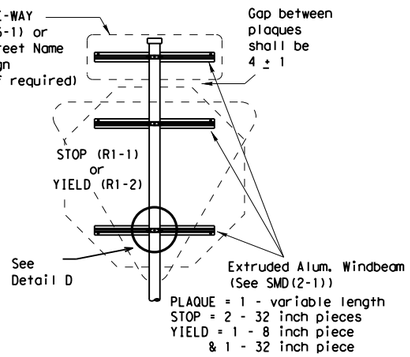


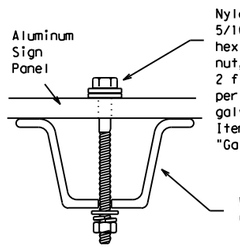
SM RD SGN ASSM TY XXXXX(1)XX(P)



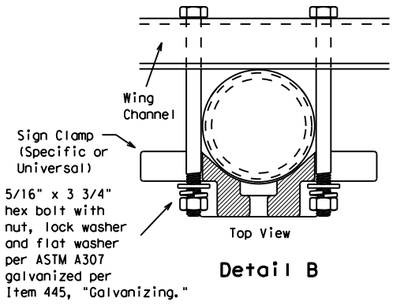
SM RD SGN ASSM TY XXXXX(1)XX(T)



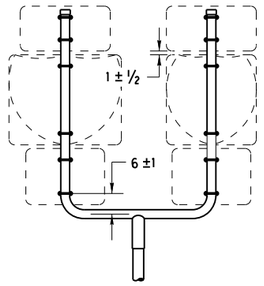
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



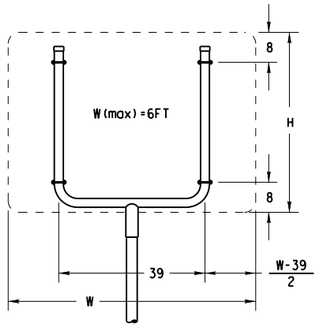
Detail A



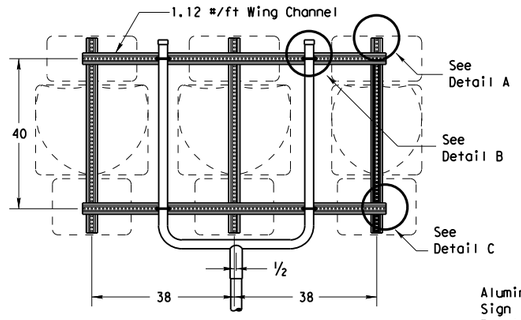
Detail B



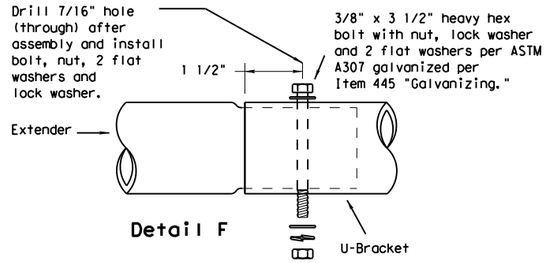
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

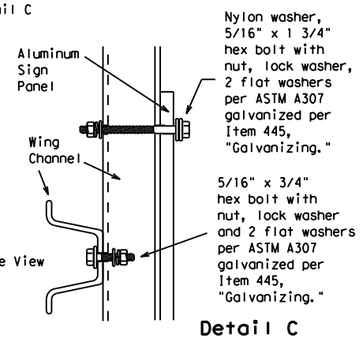


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

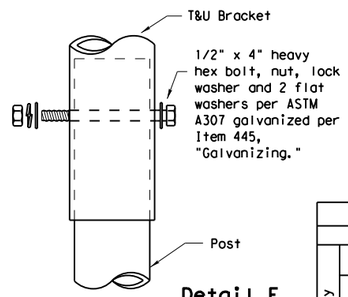


Detail F

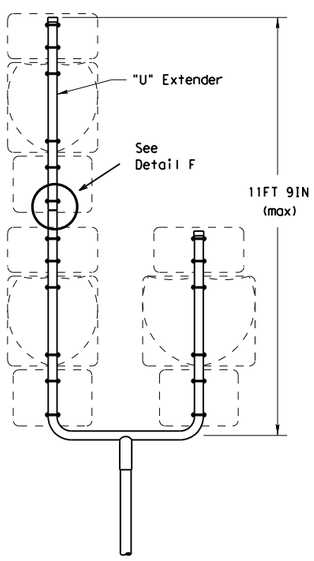
Splices shall only be allowed behind the sign substrate.



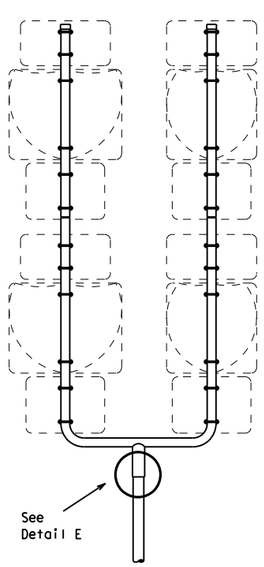
Detail C



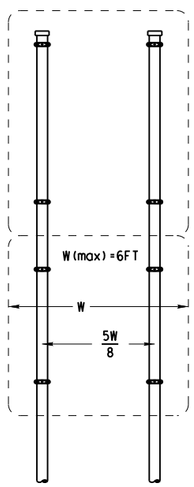
Detail E



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

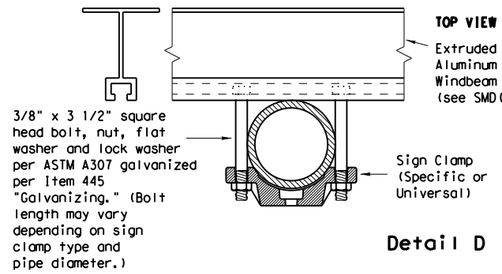


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

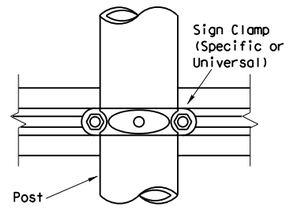


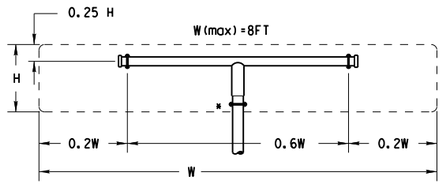
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

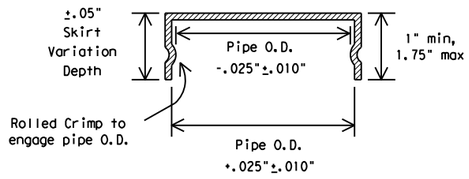




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

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
3236	02	012,etc.	FM3133

DIST	COUNTY	SHEET NO.
DAL	COLLIN	162

9-08 REVISIONS

DATE: 11/4/2020 8:26:28 PM
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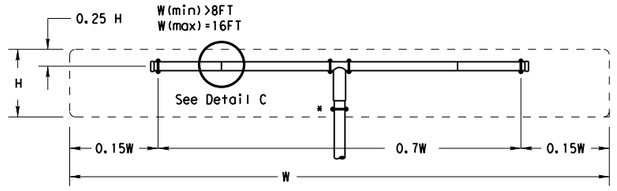
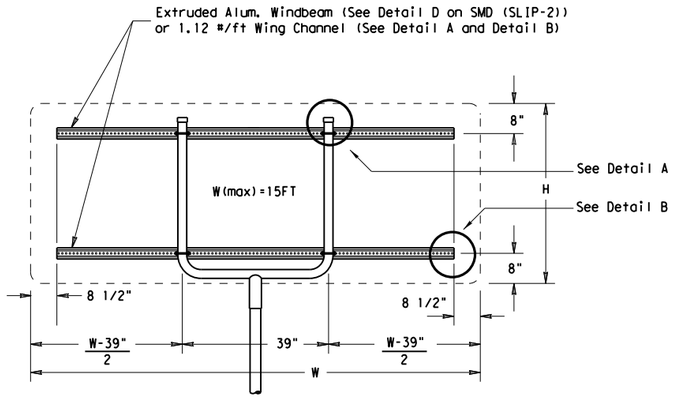
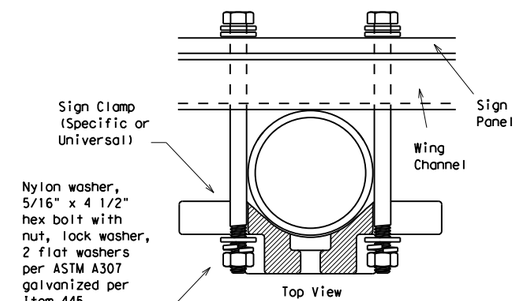


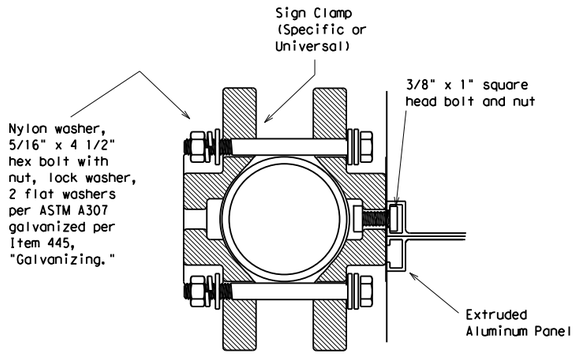
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



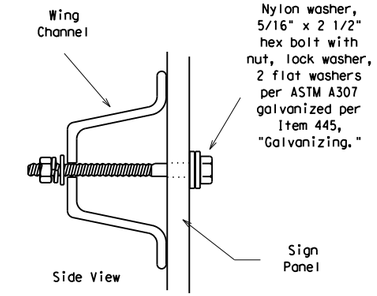
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



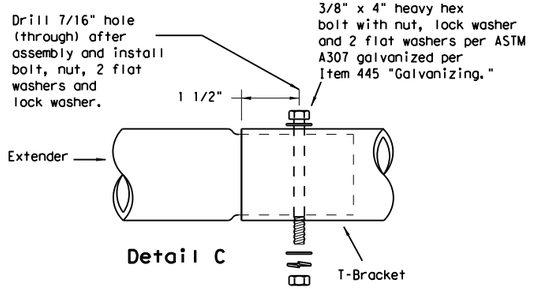
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

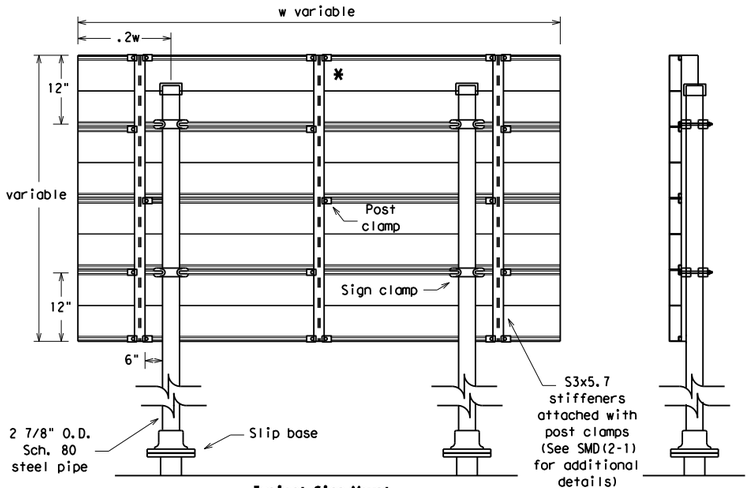


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

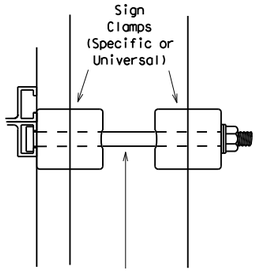


Typical Sign Mount

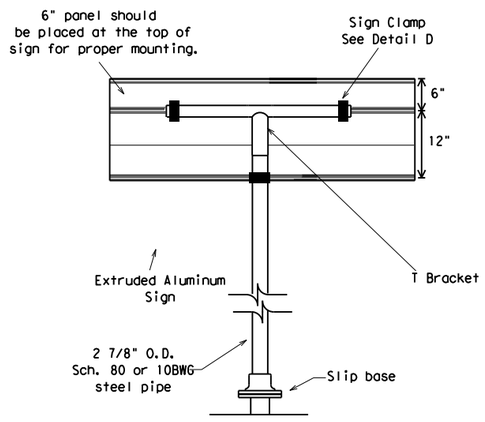
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

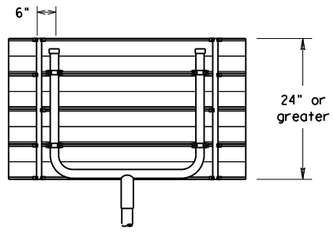
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

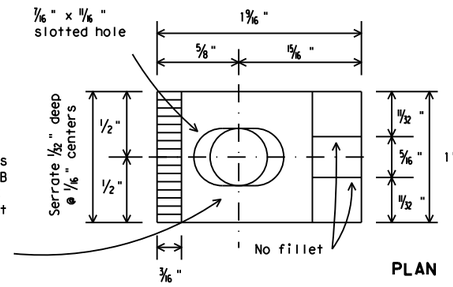
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

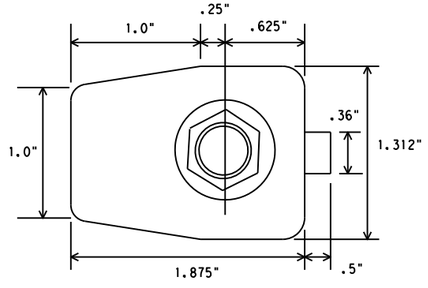
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		163

DATE: 11/4/2020 8:26:35 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\smd21-08.dgn

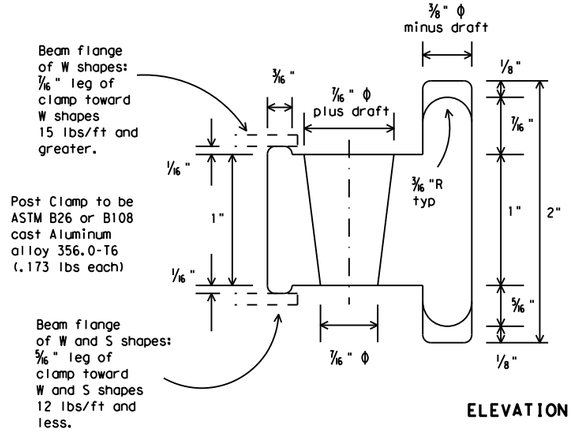
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

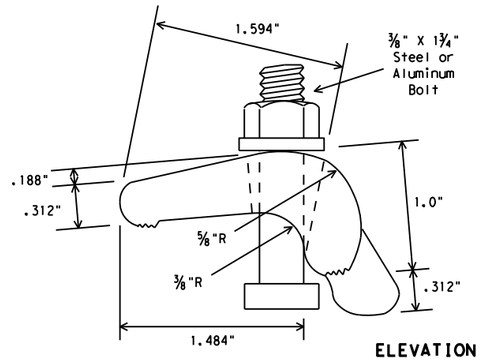


PLAN



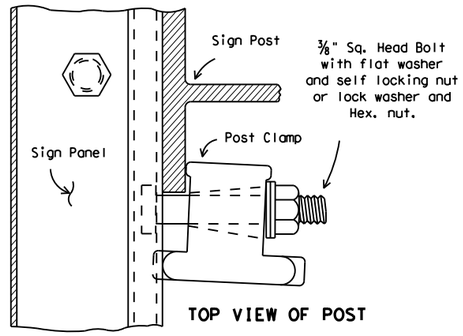
ELEVATION

POST CLAMP DETAIL

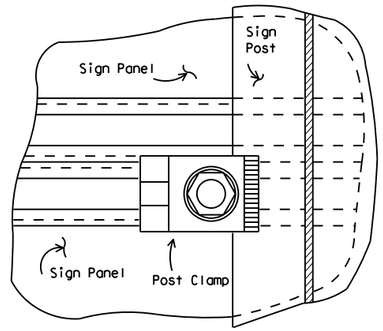


ELEVATION

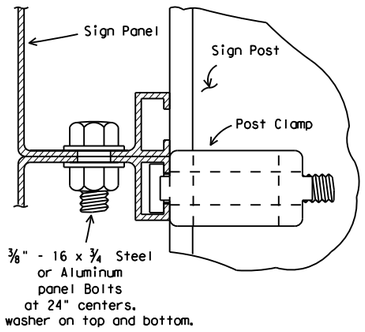
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

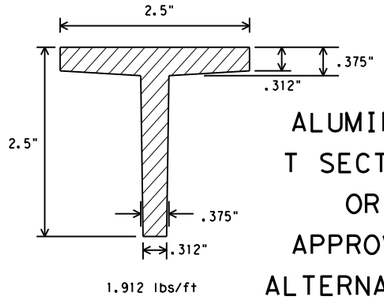
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

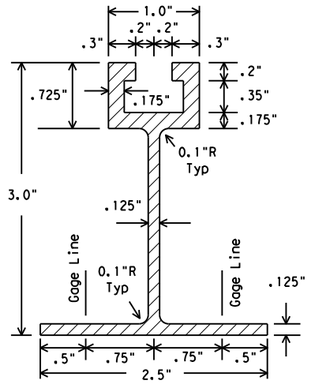


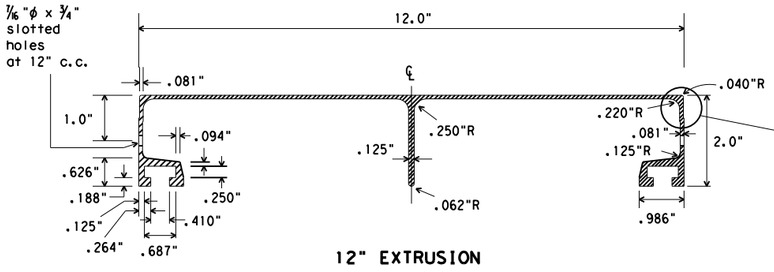
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

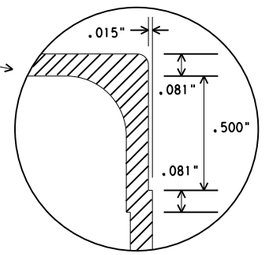
WINDBEAM CROSS SECTION

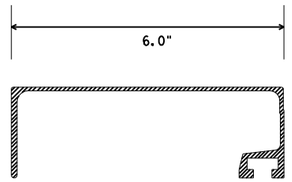
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative





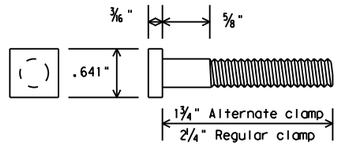
12" EXTRUSION





6" EXTRUSION

ALUMINUM SIGN PANEL EXTRUSION DETAILS



POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
3236	02	012,etc.	FM3133

DIST	COUNTY	SHEET NO.
DAL	COLLIN	164

DATE: 11/4/2020 8:26:42 PM
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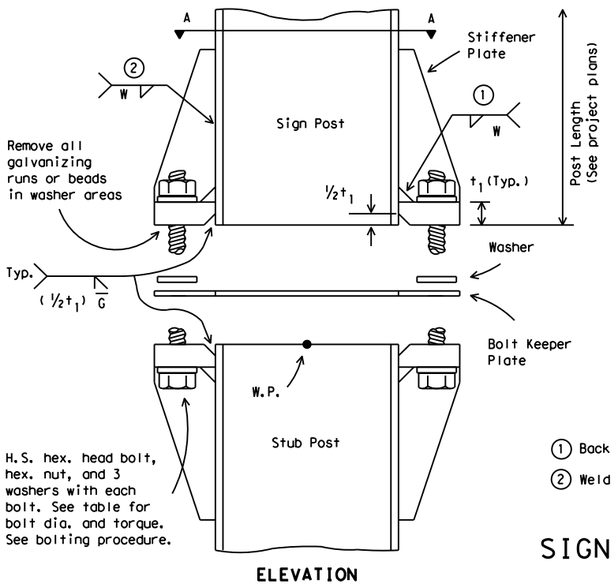
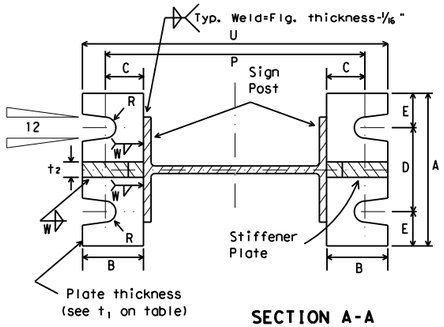
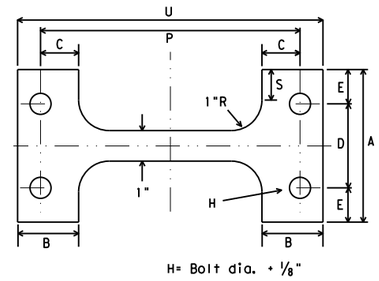


ELEVATION

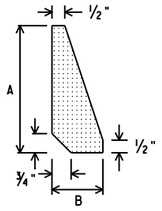


SECTION A-A



H= Bolt dia. + ⅛"

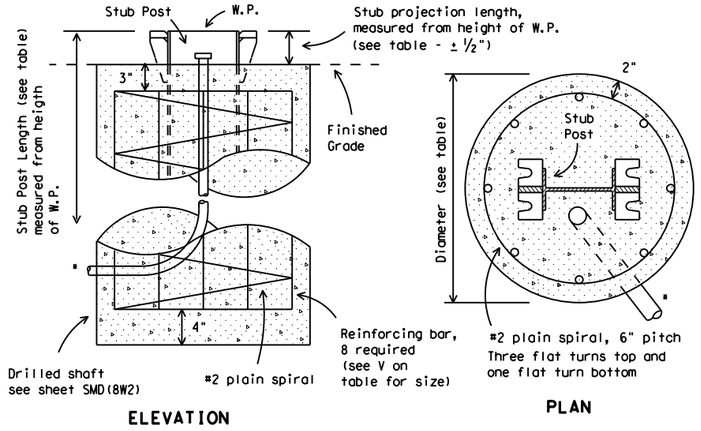
BOLT KEEPER PLATE
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

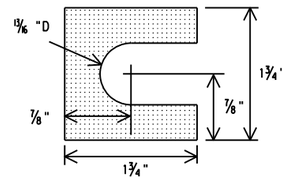
(See table for dimensions)



ELEVATION PLAN

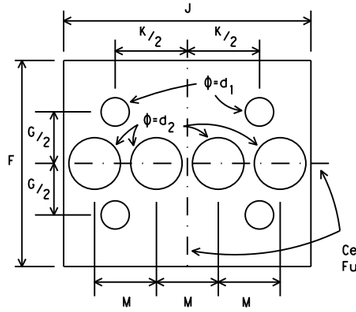
FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

Furnish two .012"+ thick and two .032"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

(1) Back up weld to be made before installing stiffener plate

(2) Weld W may be continued across clips to seal joint

SIGN POST AND STUB POST

(For W Shapes)

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

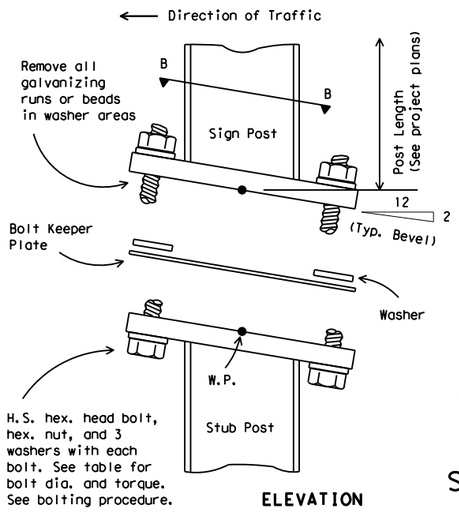
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

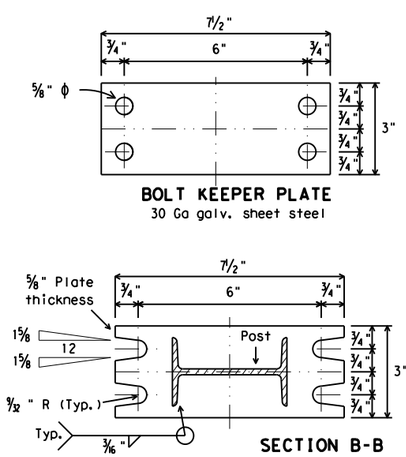
Perforated Fuse Plate Data Table											
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"

Bolt Keeper Data			Foundation Data			
P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
8½"		10"	2'-0"	3"		#5
8½"		10"	2'-6"	3"		#6
10⅝"		12⅛"	2'-6"	3"		#7
11"	1½"	12¾"	3'-0"	2½"		#8
12⅞"		14⅝"	3'-0"	2½"		#9
13⅛"		14⅞"	3'-0"	2½"		#10
15"		16¾"	3'-0"	2½"		#11
See Detail Below			3'-3½"	3½"	12"	Non-reinforced (3)

(3) Foundation design shall be Type G Mount, see SMD (TY G).

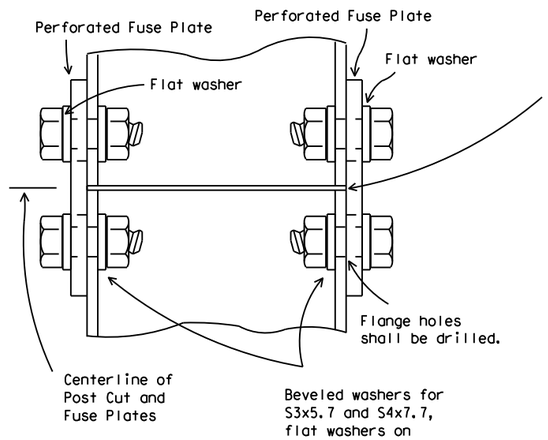


ELEVATION



SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

REVISIONS
4-98
9-08

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

CONT	SECT	JOB	HIGHWAY
3236	02	012,etc.	FM3133

DIST	COUNTY	SHEET NO.
DAL	COLLIN	165

DATE: 11/4/2020 8:26:49 PM
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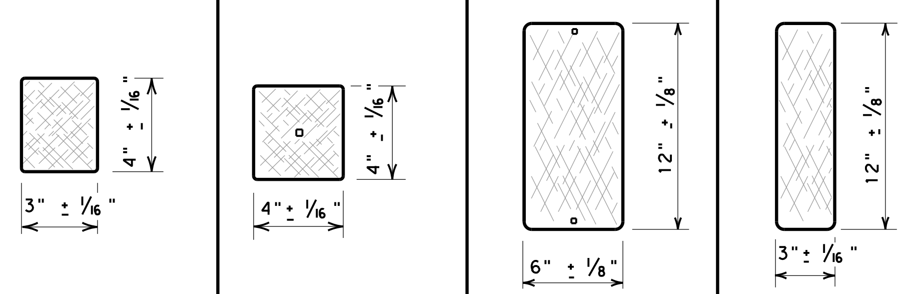
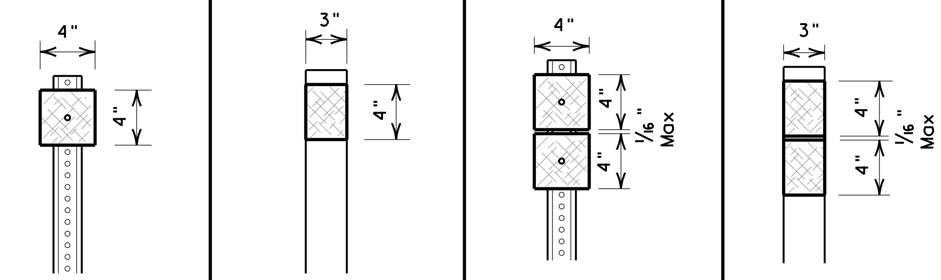
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS



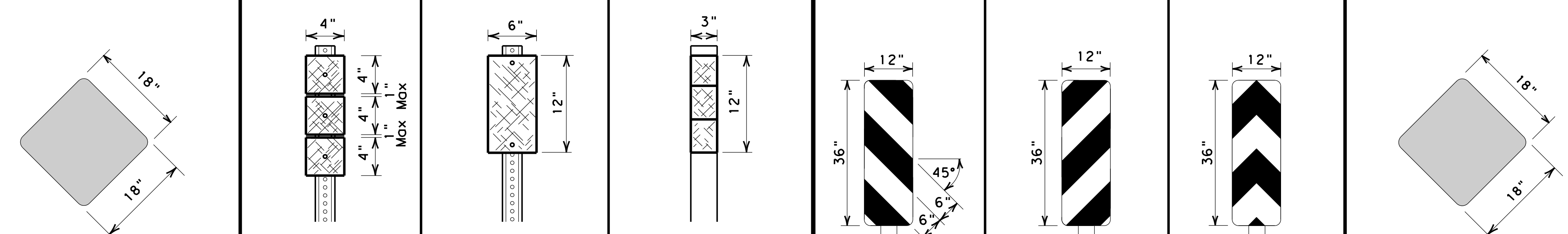
	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate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

DELINEATORS



	SINGLE		DOUBLE	
DEVICE	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS



	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{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

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

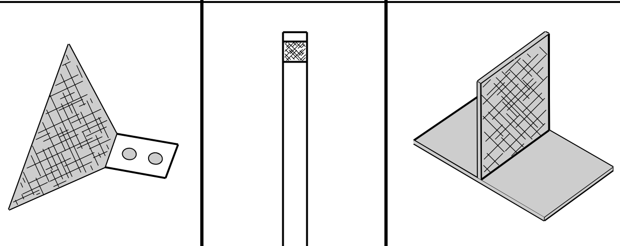
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS

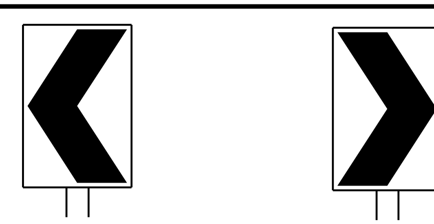
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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.		

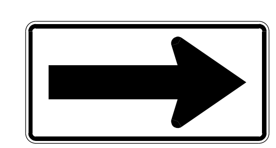
CHEVRONS



W1-8

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



W1-6

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

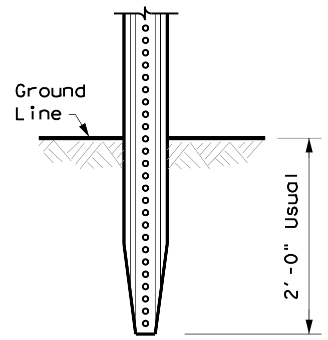
D & OM(1)-20

FILE:	dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT	August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS		3236	02	012,etc.	FM3133
10-09 3-15		DIST		COUNTY	SHEET NO.
4-10 7-20		DAL		COLLIN	166

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

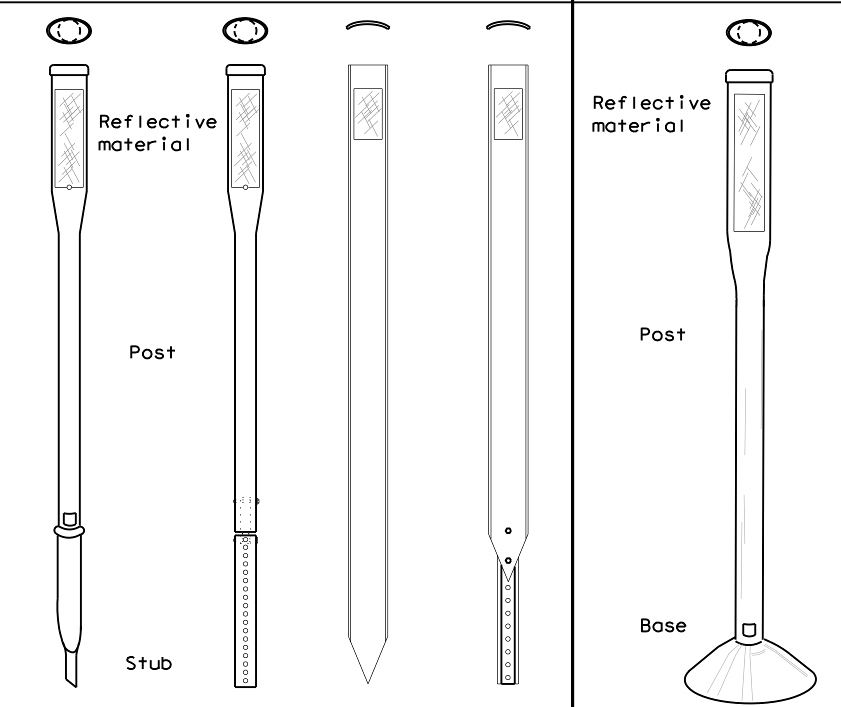


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND — EMBEDDED / SRF — SURFACE MOUNT

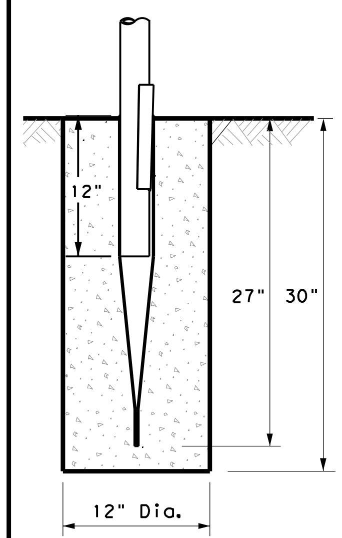


NOTES

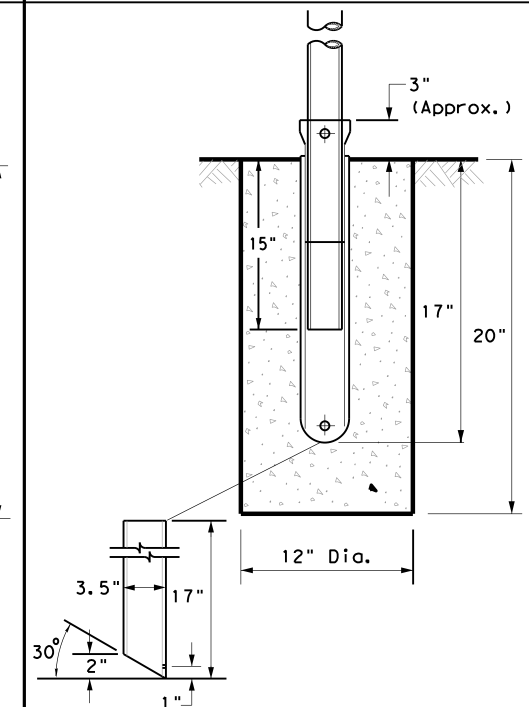
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

WEDGE ANCHOR SYSTEMS

WAS — STEEL



WAP — PLASTIC



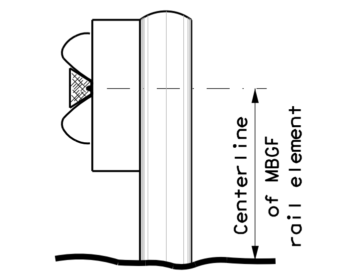
NOTE

1. Install per manufacturer's recommendations.

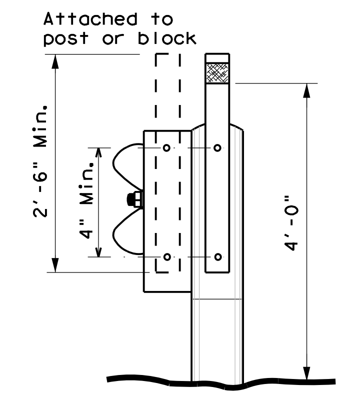
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

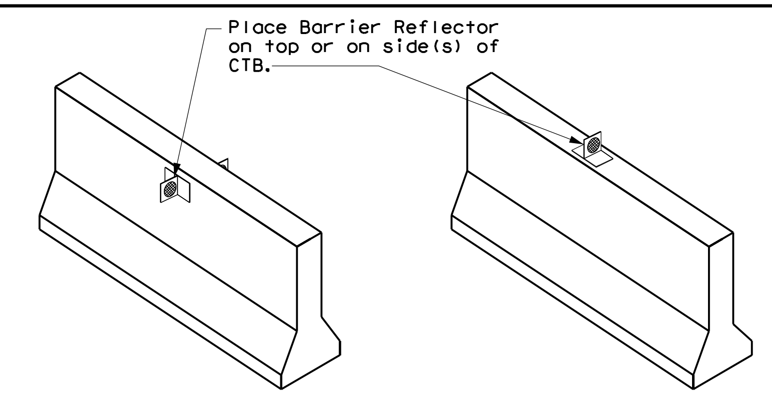
GF1



GF2



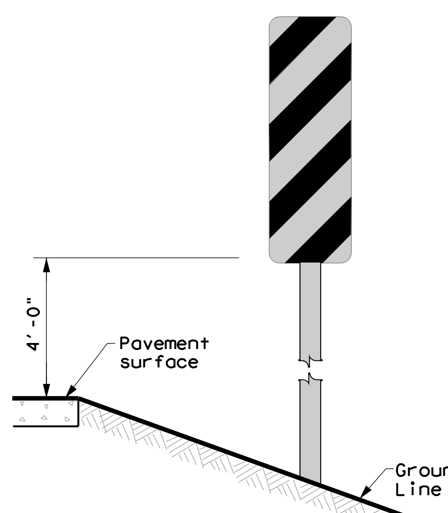
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

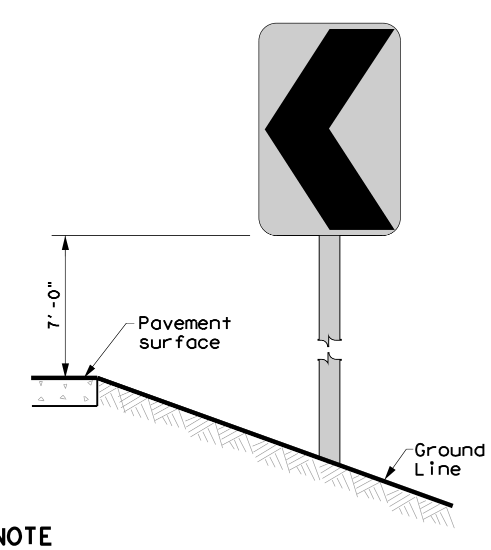
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

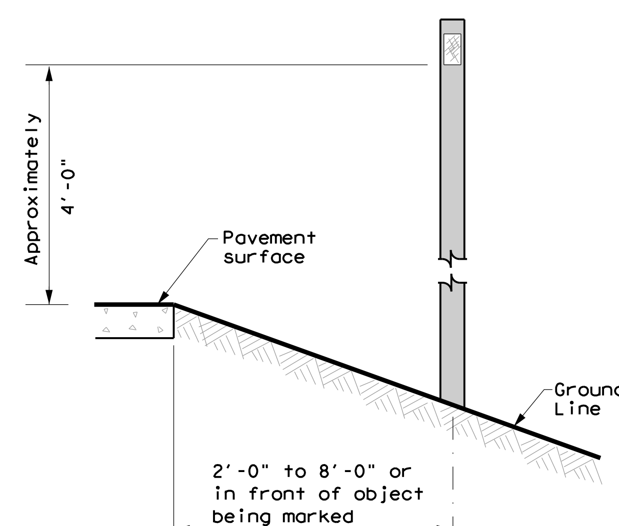
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	DAL		COLLIN	167

20B

DATE: 11/4/2020 8:26:56 PM
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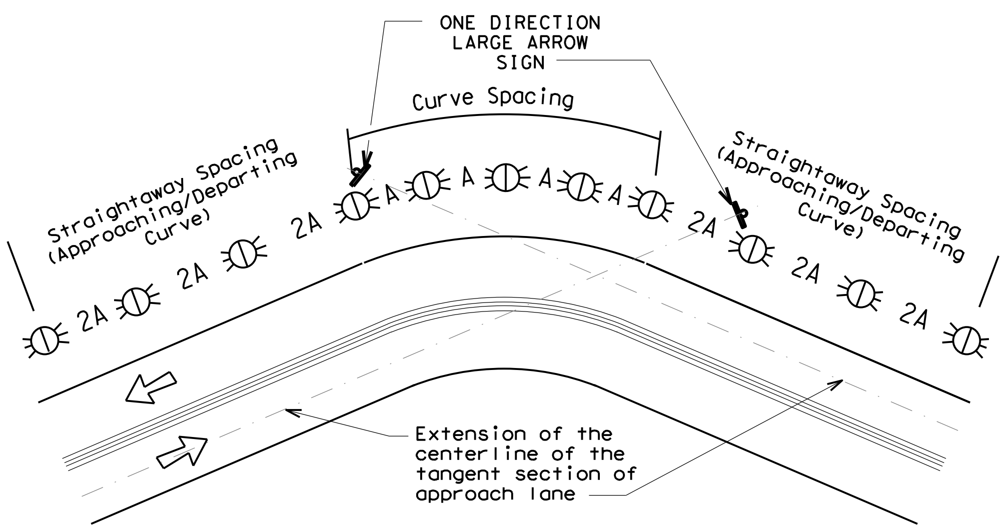
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

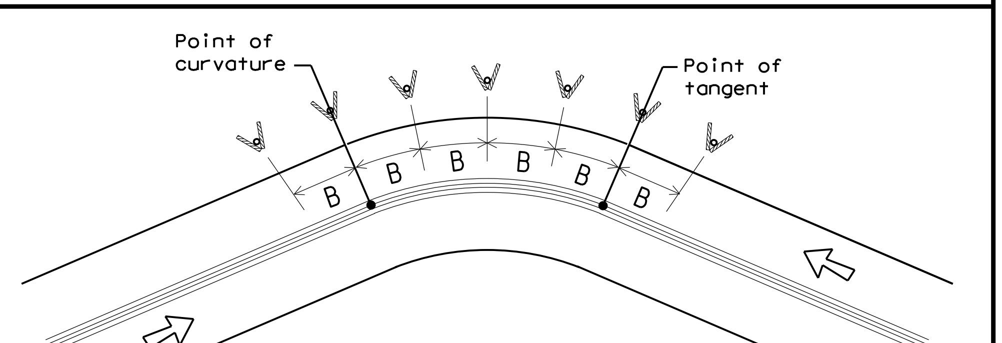
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

Symbol	Meaning
	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 3236	SECT 02	JOB 012,etc.	HIGHWAY FM3133
REVISIONS 3-15 8-15 8-15 7-20	DIST DAL		COUNTY COLLIN	SHEET NO. 168

20C

DATE: 11/4/2020 8:27:03 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\3236…

DATE: 11/4/2020 8:27:10 PM
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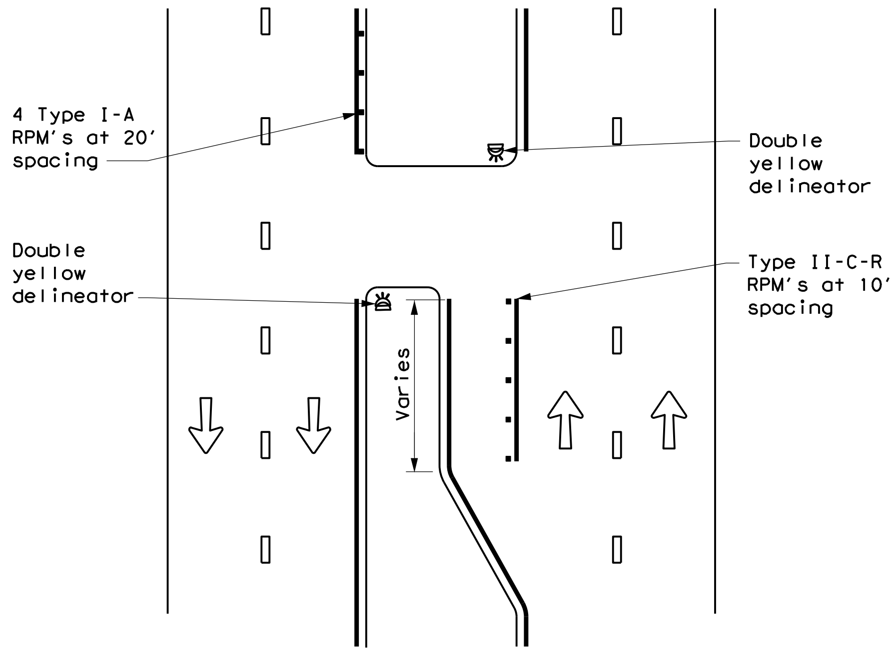
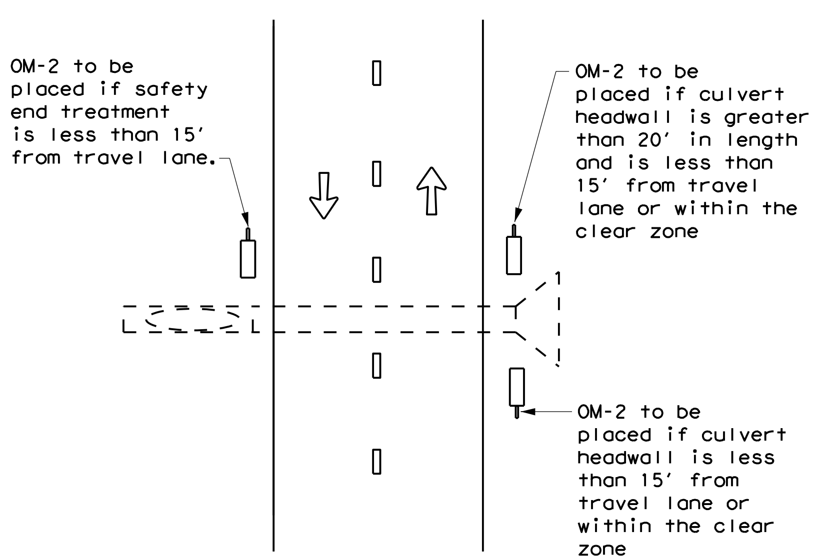
CROSSOVERS



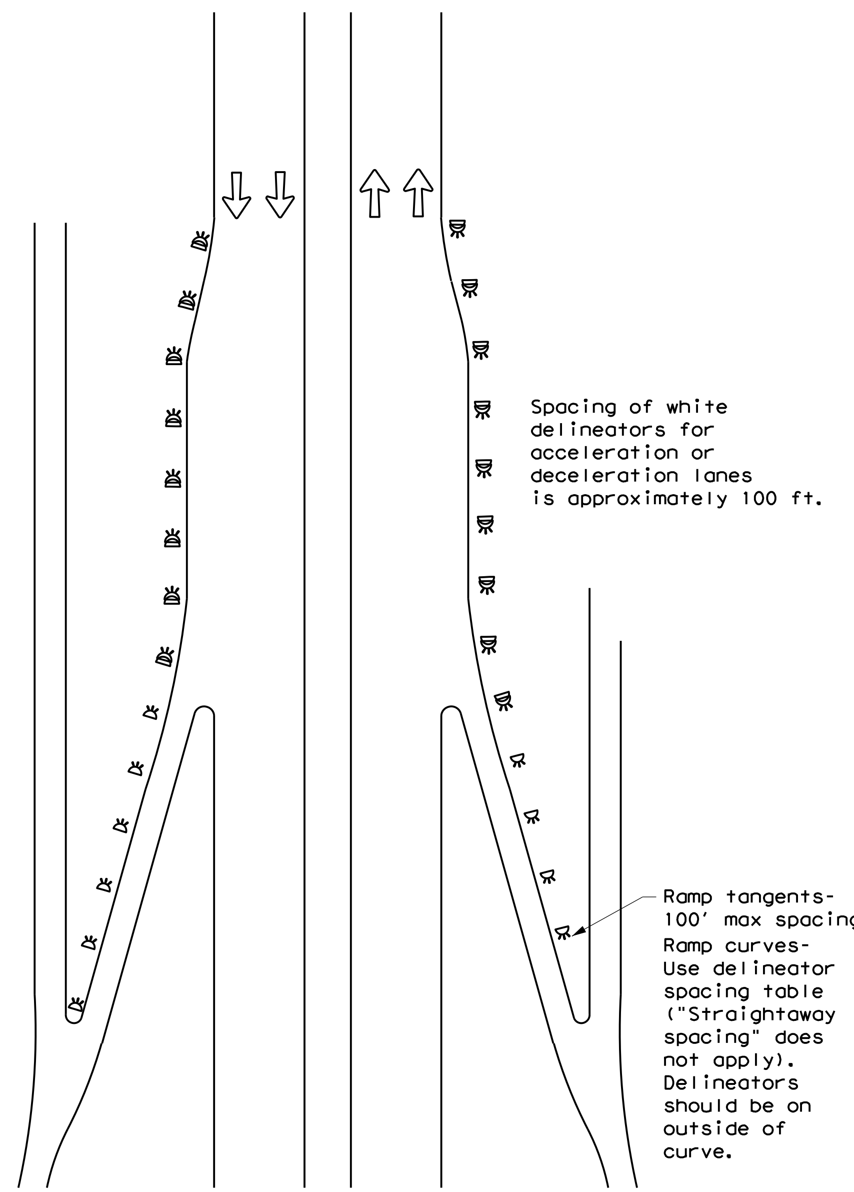
DETAIL 1

FOR CULVERTS WITHOUT MBGF



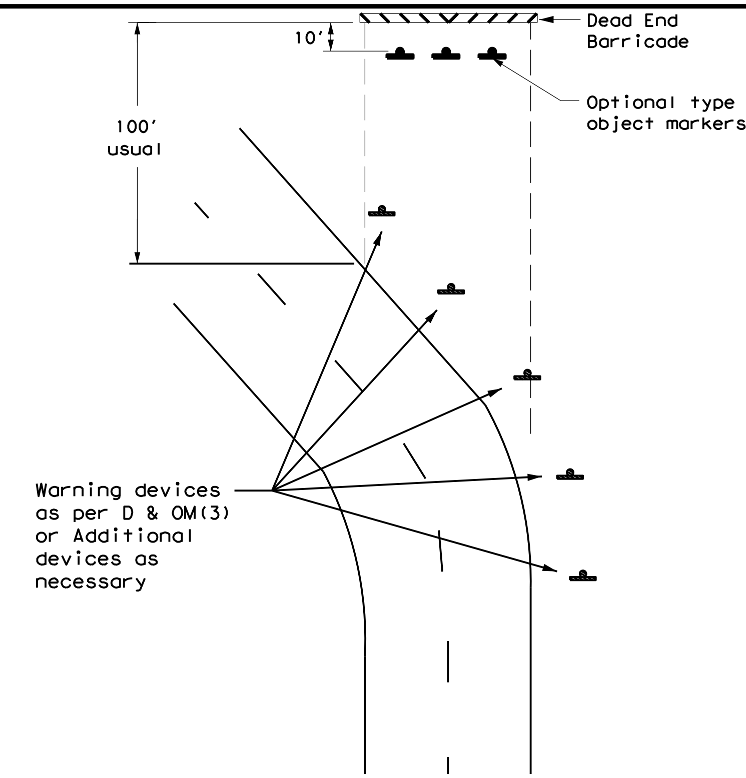
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



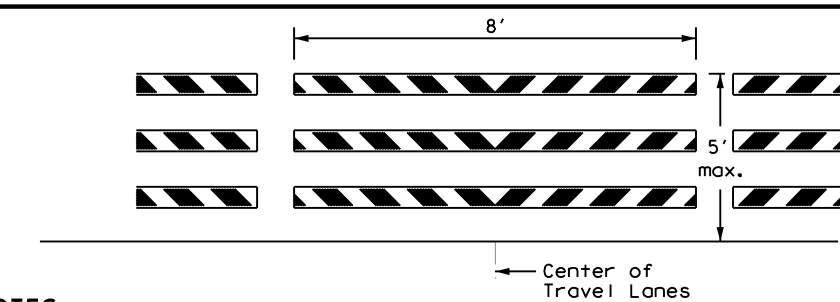
DETAIL 3

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

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

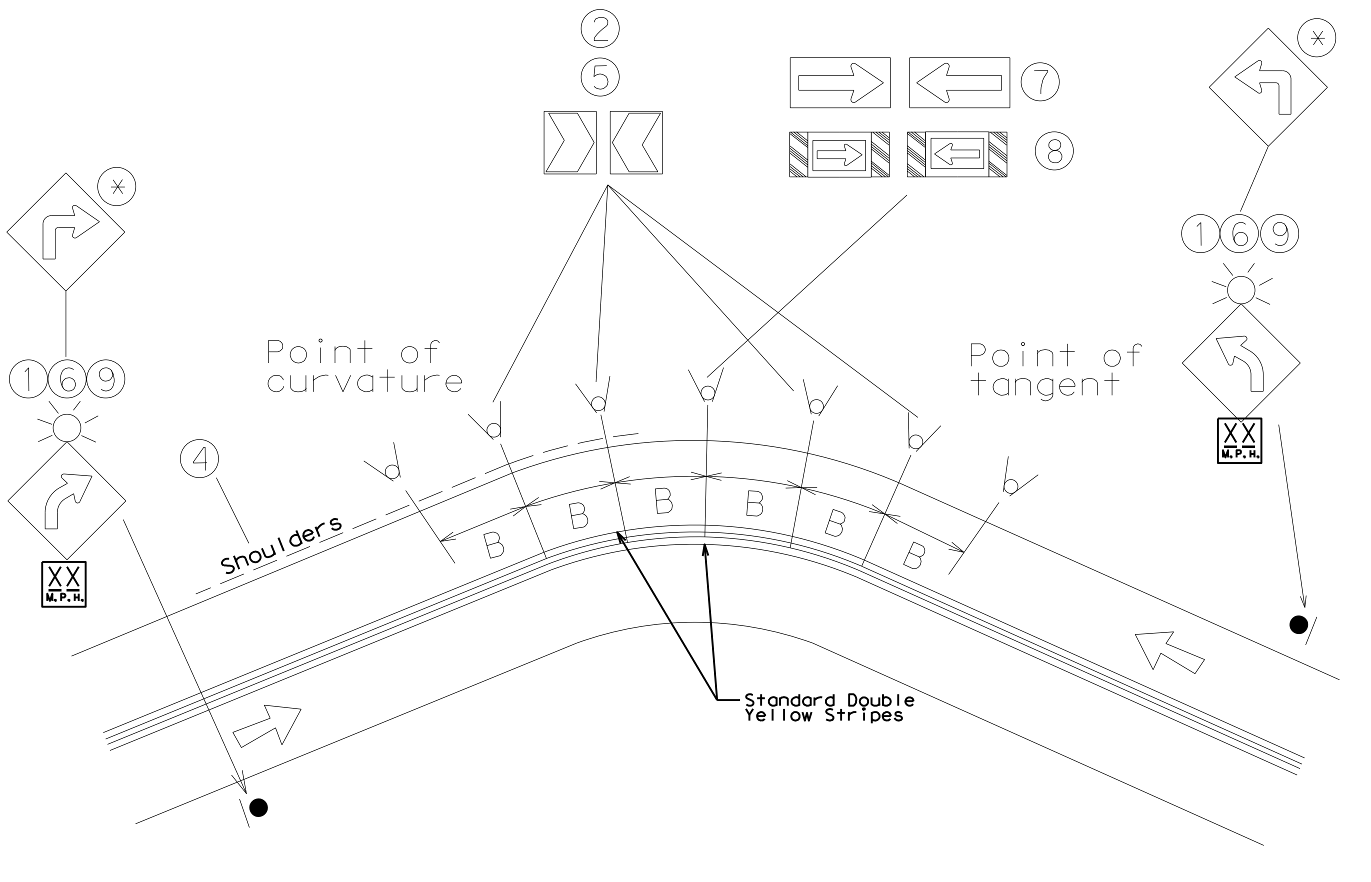
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

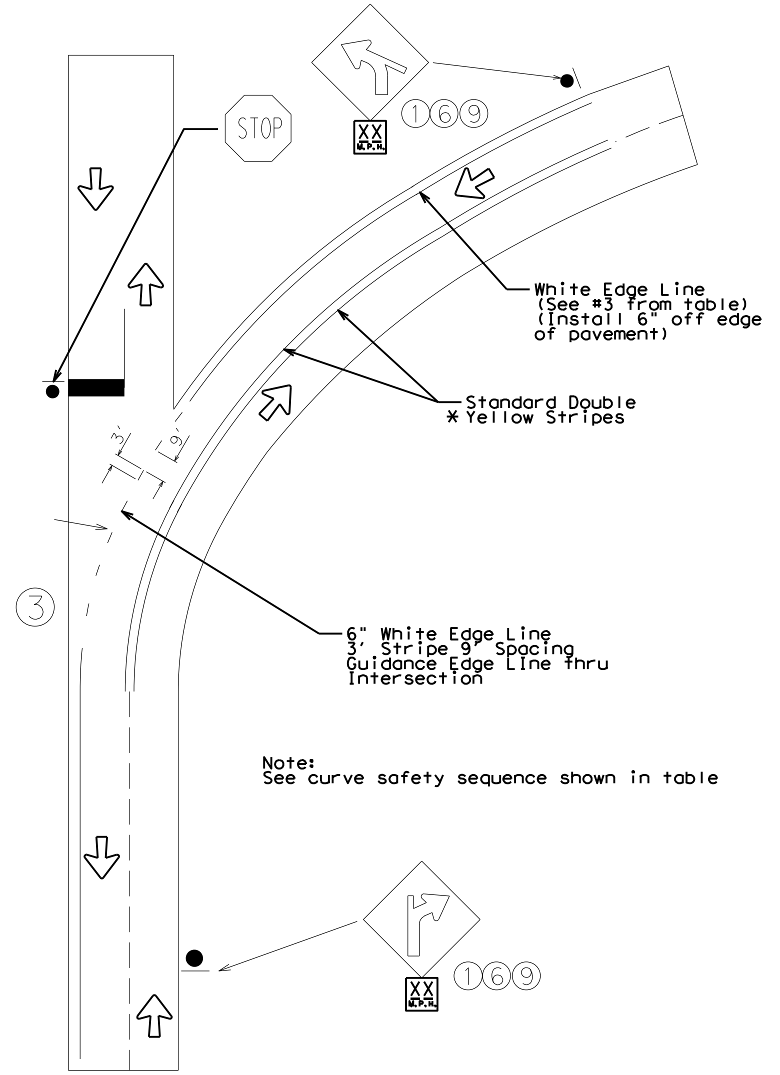
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	3236	02	012,etc.	FM3133
	DIST		COUNTY	SHEET NO.
	DAL		COLLIN	169

20D

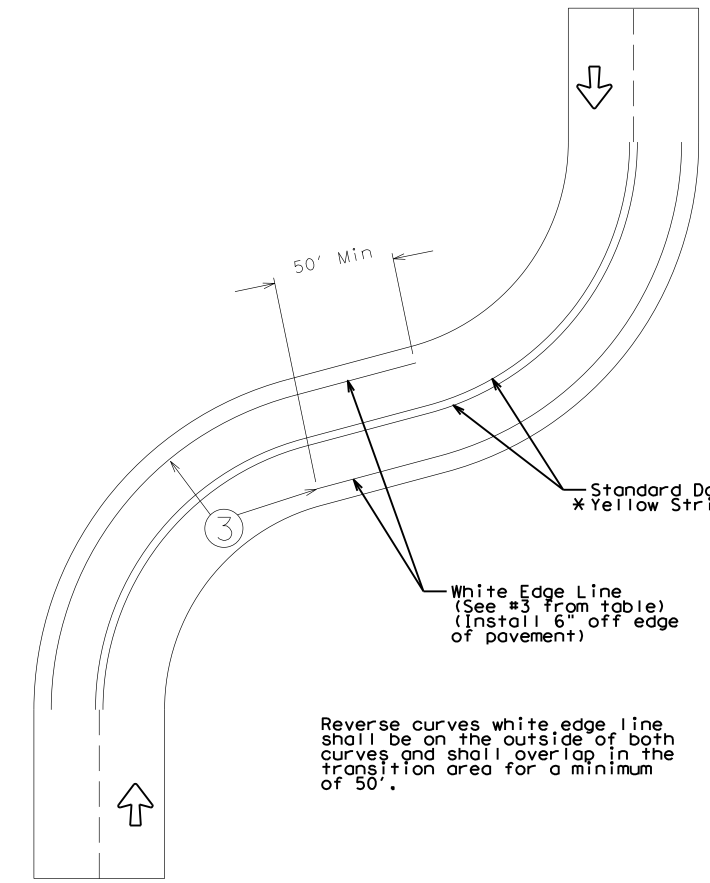
Dallas District Standard for Two-Lane Highway Curve Signing/Markings



Typical Curve Treatment with Intersection



Typical Reverse Curve Edge Line Treatment



Curve Safety Sequence

Applicable Minimum Measures

Advisory Speed 55 mph or higher	Advisory Speed 40-50 mph	Advisory speed 35 mph or less	Curve signing, delineation and pavement markings (listed in order from minimum to maximum level of treatment as needed)	
+	+	+	1	Advance warning (36" x 36") and advisory mph (18" x 18")
+	+	+	2	Chevron alignment signs if advisory speed is 15 mph or greater than posted speed
	+	+	3	Edge lines
			3a	Pavement width 24' or greater 6" solid white edge line
			3b	Pavement width 20' - 24' 4" solid white edge line
			3c	Pavement width 20' or less no edge line
		Supplemental Measures		
		#	4	Add shoulders and edge line (see #3a)
		#	5	Yellow high intensity flourescent chevron alignment signs - add
				reflective sheeting to sign support from bottom edge of sign
#	#	#	6	Large advance warning (48" x 48") and advisory mph (30" x 30")
#	#	#	7	Arrow sign (48" x 24")
		#	8	Large arrow sign with diagonals (96" x 36")
		#	9	Add flashers to advance warning signs
#	#	#	10	Surface treatment to improve friction
			**	The W1-1R or L sign shall only be used when the advisory speed is
				30 mph or less

* Standard Double Yellow Stripes shall be dropped through a non-signalized intersection within the city limit. Outside the city limit, the Standard Double Yellow Strip shall be carried through all non-signalized intersections.

+ = required
# = optional

Applications 4 - 10 are additional supplemental applications which may be added as directed by the Area Engineer.

Note:
"B" - Chevron Spacing referenced from D&OM(3)-15B

Notes:

1. Two methods will be used to determine the appropriate advisory speed for curves, the GPS Method(existing curves) and the Design Method (new curves).
2. Notify the Traffic Engineering Section for all requests on advisory speeds for existing curves.

OCT-2014 UPDATED NOTES
JAN-2016 NOTE ADDED
SEPT-2016 NOTE ADDED FOR STRIPING IN CURVE
MAR-2017 REMOVED REFERENCE TO DELINEATORS
MAY-2019 MODIFIED SIGN SIZE

TWO-LANE HIGHWAY CURVE SIGNING & MARKINGS

DALLAS DISTRICT STANDARD

SCALE: NTS SHEET 1 OF 1

DESIGN/CK	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
BLS	6	(SEE TITLE SHEET)		FM3133
CHECK BLS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK FRC	TEXAS	DALLAS	VARIOUS	170
CHECK ARO	CONTROL 3236	SECTION 02	JOB 012,etc.	

A. GENERAL SITE DATA

1. PROJECT LIMITS:

FM 3133: CSJ: 3236-02-012 - From FM 2862 South To Brangus Road
CSJ: 3236-02-014 - From FM 2862 South to Grayson County Line
Begin Project Coordinates : Latitude (N): 33.3990519 Longitude (W): -96.5044883
Ending Project Coordinates : Latitude (N): 33.3635950 Longitude (W): 96.4612363

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: Drainage Area Maps (Sheet 100)*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections (Sheets 9-10)*
- *Location of Erosion and Sediment Controls: SW3P Site Maps (Sheets 172-177)*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layouts (Sheets 102-114)*
- *Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shown on SW3P Site Map (if PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).*

3. PROJECT DESCRIPTION:

Provide additional paved surface width, safety treated fixed objects.

4. MAJOR SOIL DISTURBING ACTIVITIES:

1. Regrade areas disturbed due to storm drainage culvert installation.

2. Provide slopes as indicated in typical sections and culvert details.

3. Provide seeding to reestablish vegetation.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

Project area is composed of clay in fair condition with 85% grassy vegetative cover.

6. TOTAL PROJECT AREA: *116.19* Acres

7. TOTAL AREA TO BE DISTURBED: *99.76* Acres (*86* %)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.70*
AFTER CONSTRUCTION: *0.70*

9. NAME OF RECEIVING WATERS:

Wolf Run Creek, Elm Grove Creek, and Elm Grove Creek Tributary 2, which all flow to Sister Grove Creek (Segment 0821B: no water quality impairments).

10. PROJECT SW3P Binder:

A. For projects disturbing one to five acres, TxDOT will maintain a SW3P Binder at the project field office (if there is not a project field office, should be kept at the Area Office) which contains the following: Index Sheet, TCEQ Signature Authority, TxDOT's and Contractor's Small Construction Site Notice, SW3P Inspector Qualification Statements, EPIC Sheet, SW3P Sheet, Site Location Maps, Inspection and Maintenance Reports (Form 2118), Construction Stage Gate Checklist(s) (CSGC), Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, TxDOT and Contractor MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, TxDOT will follow the actions listed in (10.A.) above with the addition of the following: TxDOT and Contractor Notice Of Intent (N.O.I.) and Fee Payment Form, TxDOT and Contractor Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A.) and (10.B.) above are not required. Acreage is calculated by adding Total Area To Be Disturbed Acres on project (See #7 above) and the PSL(s) acreage located within one mile of project.

FILE NAME
DATE
DESIGNER

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

T	TEMPORARY SEEDING	T	PRESERVATION OF NATURAL RESOURCES
___	MULCHING (Hay or Straw)	___	FLEXIBLE CHANNEL LINER
___	BUFFER ZONES	___	RIGID CHANNEL LINER
___	PLANTING	___	SOIL RETENTION BLANKET
P	SEEDING	P	COMPOST MANUFACTURED TOPSOIL
___	SODDING	T	VERTICAL TRACKING
		___	OTHER:

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- T EROSION CONTROL LOGS
- ___ EROSION CONTROL COMPOST BERMS (Low Velocity)
- T ROCK FILTER DAMS
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ___ DIVERSION DIKE AND SWALE COMBINATIONS
- ___ PIPE SLOPE DRAINS
- ___ PAVED FLUMES
- T 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
- ___ OTHER:

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

3. STORM WATER MANAGEMENT:

A. Storm water drainage will be provided by ditches, inlets, and storm water systems which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facilities.

B. Sedimentaion basins are not feasible on the project due to limited room within the TxDOT ROW. Alternate BMP's have been included in the SW3P to provide equivalent sedimentation control.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

1. See construction progess schedule and duration of relevant soil distrubance and stabilization activities.

2. Preserve existing vegetation, maintain a vegetative buffer along receiving water, and pahse construction activities to minimize exposure of disturced soils to the extent practicable.

3. Avoid storing portable sanitary units, concrete washouts or chemicals within 50 feet upgradient of a receiving water or drainage conveyance without adequate pollution controls.

4. Install stormwater quality (SW3P) control devices (aka BMPs) to protect receiving waters prior to construction activities in their vicinity, as needed and as directed or authorized by the Engineer. Do not install more than two weeks prior to the activities.

5. Where work has temporarily ceased in a disturbed area (i.e., will exceed 14 days before next soil disturbance activity), stabilize soils, per TXR150000, with temporary seeding and/or as directed by Engineer.

6. Re-vegetate disturbed soils in completed project areas as soon as practicableor as directed by the Engineer.

7. When construction activity is complete, project area is stabilized, and as directed or authorized by the Engineer, remove all temporary SW3P controls.

5. NON-STORM WATER DISCHARGES:

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to timeframes described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

2. INSPECTION:

A TxDOT Inspector will perform a regularly scheduled SW3P inspection every 7 calendar days. An Inspection and Maintenance Report, signed by the TxDOT Inspector and the Contractor, will be filed for each inspection. Revise/clean/repair/replace each BMP control device in accordance with the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above.

3. WASTE MATERIALS:

On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

4. HAZARDOUS WASTE & SPILL REPORTING:

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

5. SANITARY WASTE:

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

6. CONSTRUCTION VEHICLE TRACKING:

On a regular basis, or as may be directed, dampen haul roads for dust control and construct construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways on project, abutting and traversing the project site.

7. MANAGEMENT PRACTICES:

A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
D. Clear all waterways as soon as practicable 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.
E. Procedures and/or practices should be taken to control dust.
F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

P.E. 11/4/2020
Signature of Registrant & Date

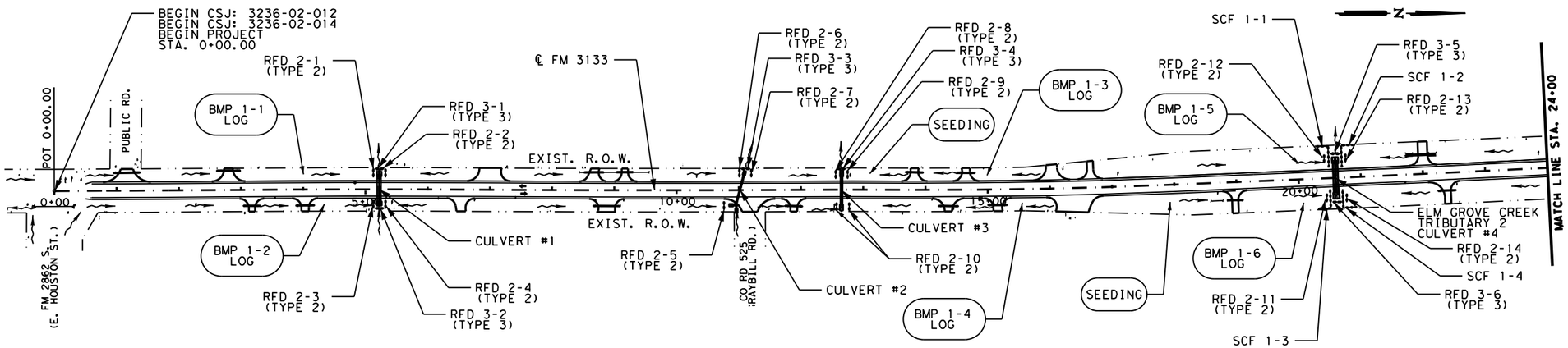
Texas Department of Transportation
© 2021

DALLAS DISTRICT ENVIRONMENTAL

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

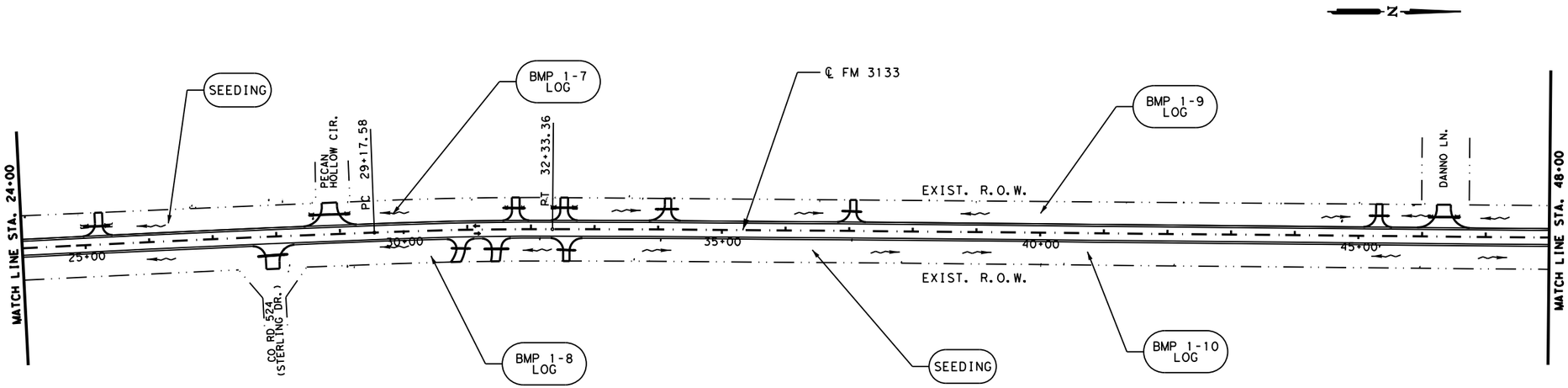
TEMPLATE REVISION DATE: 02/07/18

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS TLB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DMH	TEXAS	DALLAS	COLLIN	171
CHECK TLB	CONTROL 3236	SECTION 02	JOB 012,etc.	



DATE DISTURBED: _____

DATE STABILIZED: _____



LEGEND

⇨ DIRECTION OF TRAFFIC

〰► DIRECTION OF FLOW

LOGS BIODEGRADABLE EROSION CONTROL LOGS

RFD ROCK FILTER DAM (TY 2)

(SCF) SILT FENCING (WILDLIFE BARRIER)

NOTES:

1) CONSTRUCTION EXIT(S) TO BE PLACED AT A LOCATION APPROVED BY THE ENGINEER

2) BMP'S SHALL NOT BE INSTALLED IN THE CONTROL AREA NO SOONER THAN 2 WEEKS PRIOR TO SOIL BEING DISTURBED.

3) 30 LF OF ROCK FILTER DAMS SHOULD BE PLACED AT EACH CROSSING CULVERT AT THE DOWNSTREAM END.

4) EXACT LOCATION OF ROCK FILTER DAM, CONSTRUCTION EXITS, AND EROSION CONTROL LOGS TO BE DETERMINED BY THE ENGINEER.

5) PERFORM FINAL SEEDING AS SHOWN IN THE TYPICAL SECTIONS.

6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.

7) PRESERVE TREES AND STREAM BANK VEGETATION TO THE EXTENT PRACTICABLE.

8) SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF OTHER STORM WATER BMP's WHERE CONDITIONS WARRANT, AS AUTHORIZED OR DIRECTED BY THE ENGINEER.

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •
DATE PLACED
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS
DATE PLACED
PERMANENT SEEDING AS PER TYPICAL SECTIONS •
DATE PLACED

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 3-1	20		
RFD 3-2	20		
RFD 3-3	20		
RFD 3-4	20		
RFD 3-5	20		
RFD 3-6	20		

RFD 3 - ROCK FILTER DAM TYPE 3 ARE 20 FEET IN LENGTH EACH

	QTY. LF	DATE INSTALLED	DATE REMOVED
BMP 1-1	20		
BMP 1-2	20		
BMP 1-3	20		
BMP 1-4	20		
BMP 1-5	20		
BMP 1-6	20		
BMP 1-7	20		
BMP 1-8	20		
BMP 1-9	20		
BMP 1-10	20		

• BMP - LOGS ARE 20 FT EACH WITH 500FT SPACING

	QTY. LF	DATE INSTALLED	DATE REMOVED
SCF 1-1	56		
SCF 1-2	56		
SCF 1-3	56		
SCF 1-4	56		

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 2-1	20		
RFD 2-2	20		
RFD 2-3	20		
RFD 2-4	20		
RFD 2-5	20		
RFD 2-6	20		
RFD 2-7	20		
RFD 2-8	20		
RFD 2-9	20		
RFD 2-10	20		
RFD 2-11	20		
RFD 2-12	20		
RFD 2-13	20		
RFD 2-14	20		

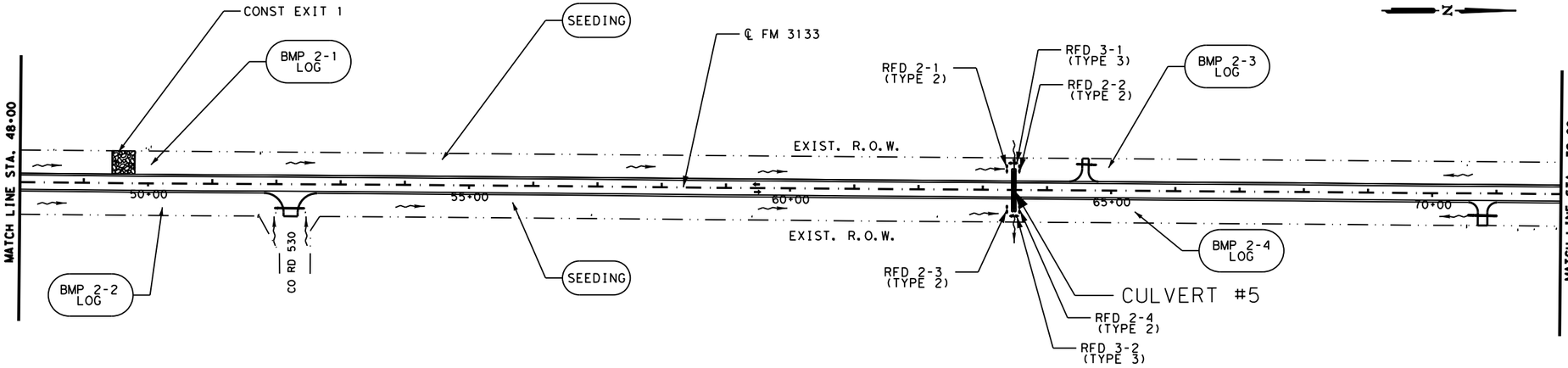
RFD 2 - ROCK FILTER DAM TYPE 2 ARE 20 FEET IN LENGTH EACH

FM 3133
SW3P LAYOUT
BEGIN PROJECT TO STA. 48+00.00

SCALE: 1" = 200'

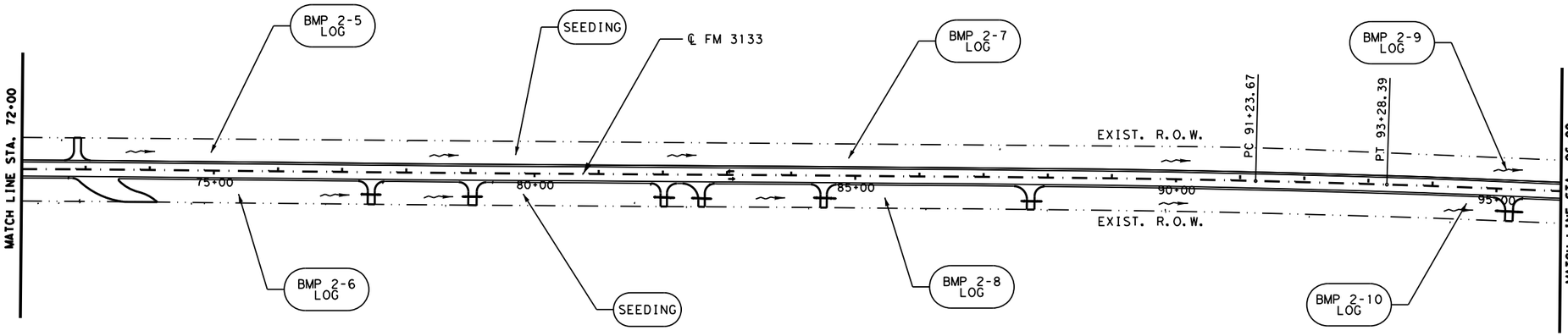
SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	172
CHECK				
TLB				



DATE DISTURBED: _____

DATE STABILIZED: _____



LEGEND

⇨ DIRECTION OF TRAFFIC

~~► DIRECTION OF FLOW

LOGS BIODEGRADABLE EROSION CONTROL LOGS

RFD ROCK FILTER DAM (TY 2)

SCF SILT FENCING (WILDLIFE BARRIER)

NOTES:

1) CONSTRUCTION EXIT(S) TO BE PLACED AT A LOCATION APPROVED BY THE ENGINEER

2) BMP'S SHALL NOT BE INSTALLED IN THE CONTROL AREA NO SOONER THAN 2 WEEKS PRIOR TO SOIL BEING DISTURBED.

3) 30 LF OF ROCK FILTER DAMS SHOULD BE PLACED AT EACH CROSSING CULVERT AT THE DOWNSTREAM END.

4) EXACT LOCATION OF ROCK FILTER DAM, CONSTRUCTION EXITS, AND EROSION CONTROL LOGS TO BE DETERMINED BY THE ENGINEER.

5) PERFORM FINAL SEEDING AS SHOWN IN THE TYPICAL SECTIONS.

6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.

7) PRESERVE TREES AND STREAM BANK VEGETATION TO THE EXTENT PRACTICABLE.

8) SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF OTHER STORM WATER BMP's WHERE CONDITIONS WARRANT, AS AUTHORIZED OR DIRECTED BY THE ENGINEER.

STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •	
DATE PLACED	
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS	
DATE PLACED	
PERMANENT SEEDING AS PER TYPICAL SECTIONS •	
DATE PLACED	

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY, LF	DATE INSTALLED	DATE REMOVED
BMP 2-1	20		
BMP 2-2	20		
BMP 2-3	20		
BMP 2-4	20		
BMP 2-5	20		
BMP 2-6	20		
BMP 2-7	20		
BMP 2-8	20		
BMP 2-9	20		
BMP 2-10	20		

BMP - LOGS ARE 20 FT EACH WITH 500FT SPACING

	QTY, LF	DATE INSTALLED	DATE REMOVED
RFD 2-1	20		
RFD 2-2	20		
RFD 2-3	20		
RFD 2-4	20		

RFD 2 - ROCK FILTER DAM TYPE 2 ARE 20 FEET IN LENGTH EACH

	QTY, LF	DATE INSTALLED	DATE REMOVED
RFD 3-1	20		
RFD 3-2	20		

RFD 3 - ROCK FILTER DAM TYPE 3 ARE 20 FEET IN LENGTH EACH

	QTY, SY	DATE INSTALLED	DATE REMOVED
CONST. EXIT	122		

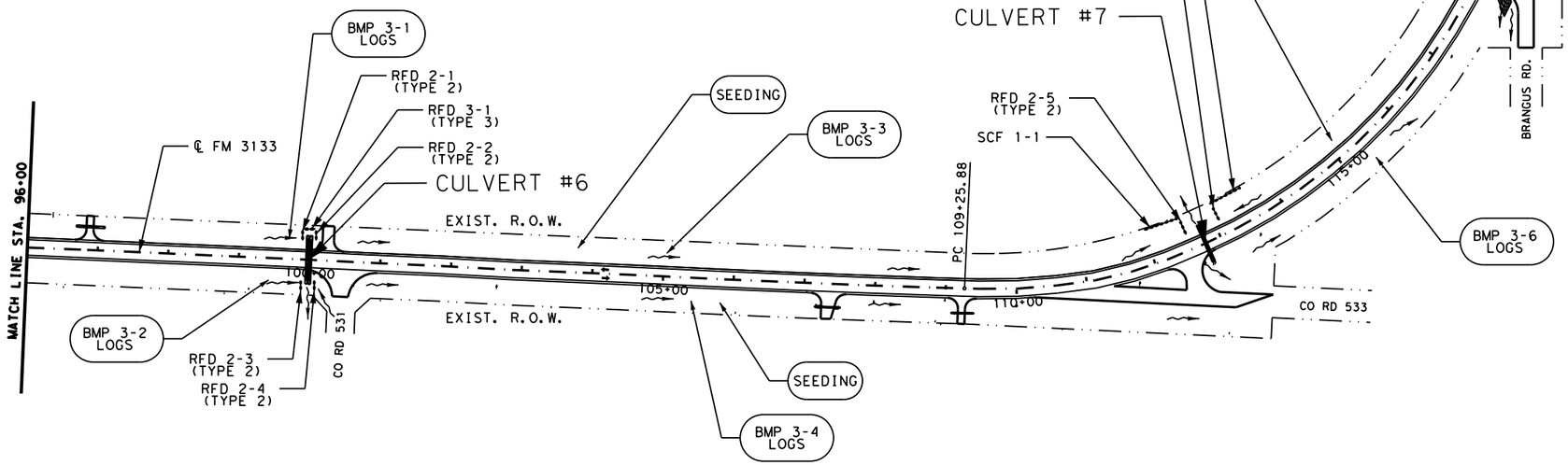
FM 3133
SW3P LAYOUT
STA. 48+00.00 TO 96+00.00

SCALE: 1" = 200' SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	173
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

DATE DISTURBED: _____

DATE STABILIZED: _____



LEGEND

- ⇨ DIRECTION OF TRAFFIC
- ⇝ DIRECTION OF FLOW
- LOGS BIODEGRADABLE EROSION CONTROL LOGS
- RFD ROCK FILTER DAM (TY 2)
- (SCF) SILT FENCING (WILDLIFE BARRIER)

NOTES:

1) CONSTRUCTION EXIT(S) TO BE PLACED AT A LOCATION APPROVED BY THE ENGINEER
2) BMP'S SHALL NOT BE INSTALLED IN THE CONTROL AREA NO SOONER THAN 2 WEEKS PRIOR TO SOIL BEING DISTURBED.
3) 30 LF OF ROCK FILTER DAMS SHOULD BE PLACED AT EACH CROSSING CULVERT AT THE DOWNSTREAM END.
4) EXACT LOCATION OF ROCK FILTER DAM, CONSTRUCTION EXITS, AND EROSION CONTROL LOGS TO BE DETERMINED BY THE ENGINEER.
5) PERFORM FINAL SEEDING AS SHOWN IN THE TYPICAL SECTIONS.
6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.
7) PRESERVE TREES AND STREAM BANK VEGETATION TO THE EXTENT PRACTICABLE.
8) SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF OTHER STORM WATER BMP's WHERE CONDITIONS WARRANT, AS AUTHORIZED OR DIRECTED BY THE ENGINEER.

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •
DATE PLACED
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS
DATE PLACED
PERMANENT SEEDING AS PER TYPICAL SECTIONS •
DATE PLACED

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY. LF	DATE INSTALLED	DATE REMOVED
BMP 3-1	20		
BMP 3-2	20		
BMP 3-3	20		
BMP 3-4	20		
BMP 3-5	20		
BMP 3-6	20		
BMP 3-7	20		
BMP 3-8	20		

BMP - LOGS ARE 20 FT EACH WITH 500FT SPACING

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 2-1	20		
RFD 2-2	20		
RFD 2-3	20		
RFD 2-4	20		
RFD 2-5	20		
RFD 2-6	20		
RFD 2-7	20		
RFD 2-8	20		

RFD 2 - ROCK FILTER DAM TYPE 2 ARE 20 FEET IN LENGTH EACH

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 3-1	20		
SCF 1-1	50		
SCF 1-2	50		
SCF 1-3	50		

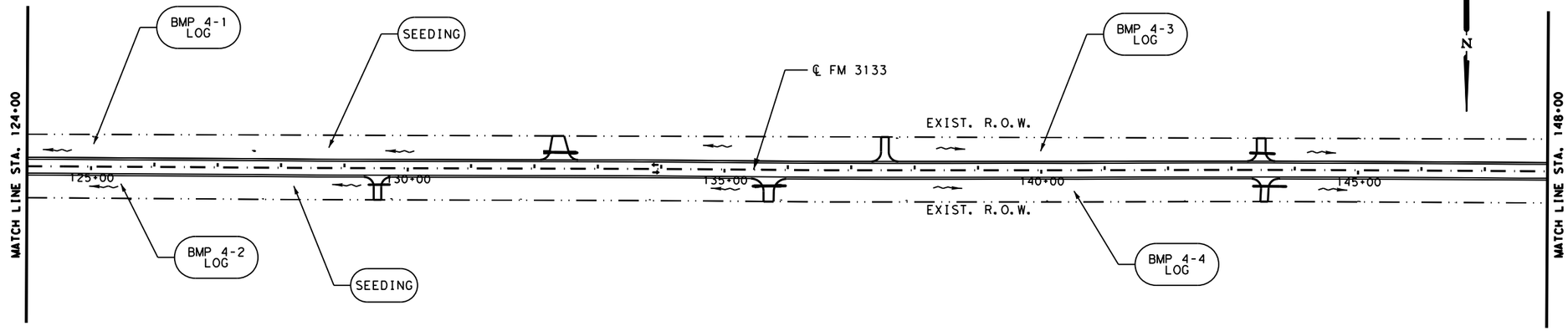
RFD 3 - ROCK FILTER DAM TYPE 3 ARE 20 FEET IN LENGTH EACH

FM 3133
SW3P LAYOUT

STA. 96+00.00 TO STA. 124+00.00

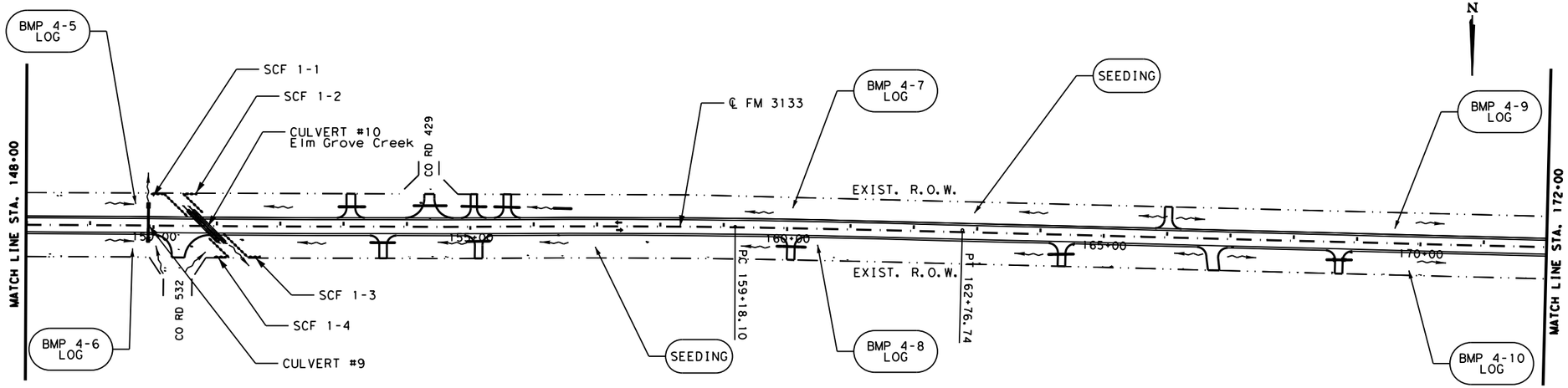
SCALE: 1" = 200' SHEET 3 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	174
CHECK				
TLB				



DATE DISTURBED: _____

DATE STABILIZED: _____



LEGEND

- ⇨ DIRECTION OF TRAFFIC
- ~~► DIRECTION OF FLOW
- LOGS BIODEGRADABLE EROSION CONTROL LOGS
- RFD ROCK FILTER DAM (TY 2)
- SCF SILT FENCING (WILDLIFE BARRIER)

NOTES:

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6) SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.
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8) SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF OTHER STORM WATER BMP's WHERE CONDITIONS WARRANT, AS AUTHORIZED OR DIRECTED BY THE ENGINEER.

STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED
PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •
DATE PLACED
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS
DATE PLACED
PERMANENT SEEDING AS PER TYPICAL SECTIONS •
DATE PLACED

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY. LF	DATE INSTALLED	DATE REMOVED
BMP 4-1	20		
BMP 4-2	20		
BMP 4-3	20		
BMP 4-4	20		
BMP 4-5	20		
BMP 4-6	20		
BMP 4-7	20		
BMP 4-8	20		
BMP 4-9	20		
BMP 4-10	20		

BMP - LOGS ARE 20 FT EACH WITH 500FT SPACING

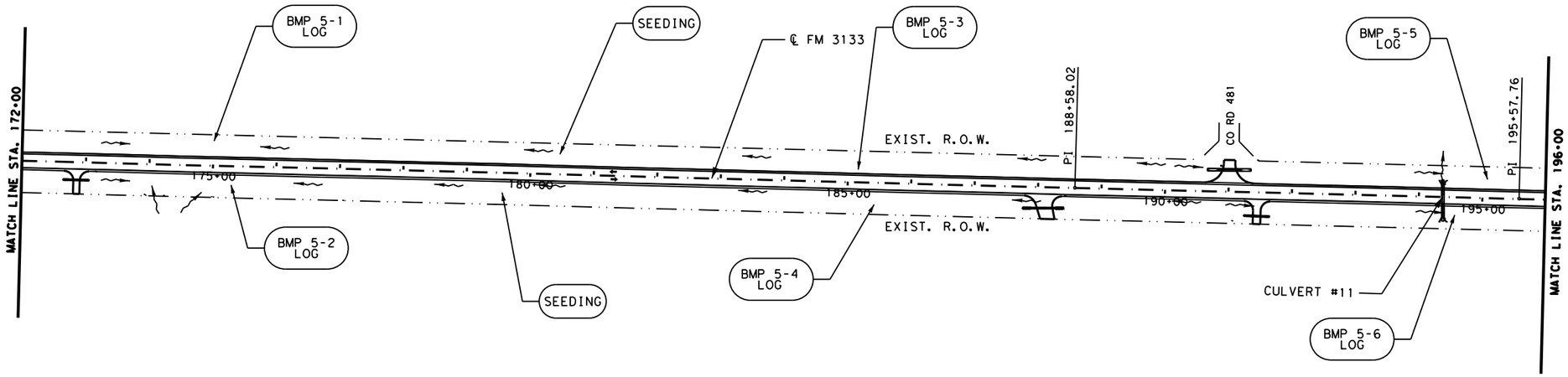
	QTY. LF	DATE INSTALLED	DATE REMOVED
SCF 1-1	70		
SCF 1-2	70		
SCF 1-3	70		
SCF 1-4	70		

FM 3133
SW3P LAYOUT

STA. 124+00.00 TO STA. 172+00.00

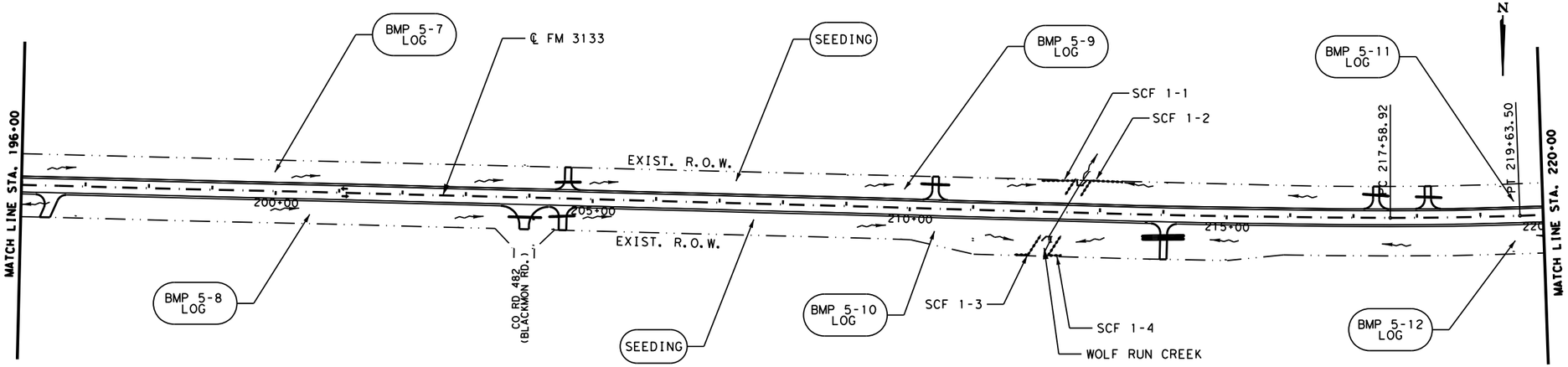
SCALE: 1" = 200'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	175
CHECK	CONTROL	SECTION	JOB	
DMH				
CHECK	3236	02	012, etc.	
TLB				



DATE DISTURBED: _____

DATE STABILIZED: _____



LEGEND

- ⇨ DIRECTION OF TRAFFIC
- ~~► DIRECTION OF FLOW
- LOGS BIODEGRADABLE EROSION CONTROL LOGS
- RFD ROCK FILTER DAM (TY 2)
- SCF SILT FENCING (WILDLIFE BARRIER)

NOTES:

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7) PRESERVE TREES AND STREAM BANK VEGETATION TO THE EXTENT PRACTICABLE.
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STATE OF TEXAS
Tammie L. Bolden
98228
LICENSED PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •	
DATE PLACED	
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS	
DATE PLACED	
PERMANENT SEEDING AS PER TYPICAL SECTIONS •	
DATE PLACED	

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY, LF	DATE INSTALLED	DATE REMOVED
BMP 5-1	20		
BMP 5-2	20		
BMP 5-3	20		
BMP 5-4	20		
BMP 5-5	20		
BMP 5-6	40		
BMP 5-7	20		
BMP 5-8	20		
BMP 5-9	20		
BMP 5-10	20		
BMP 5-11	20		
BMP 5-12	20		

BMP - LOGS ARE 20 FT EACH WITH 500FT SPACING

	QTY, LF	DATE INSTALLED	DATE REMOVED
SCF 1-1	80		
SCF 1-2	80		
SCF 1-3	80		
SCF 1-4	80		

FM 3133
SW3P LAYOUT

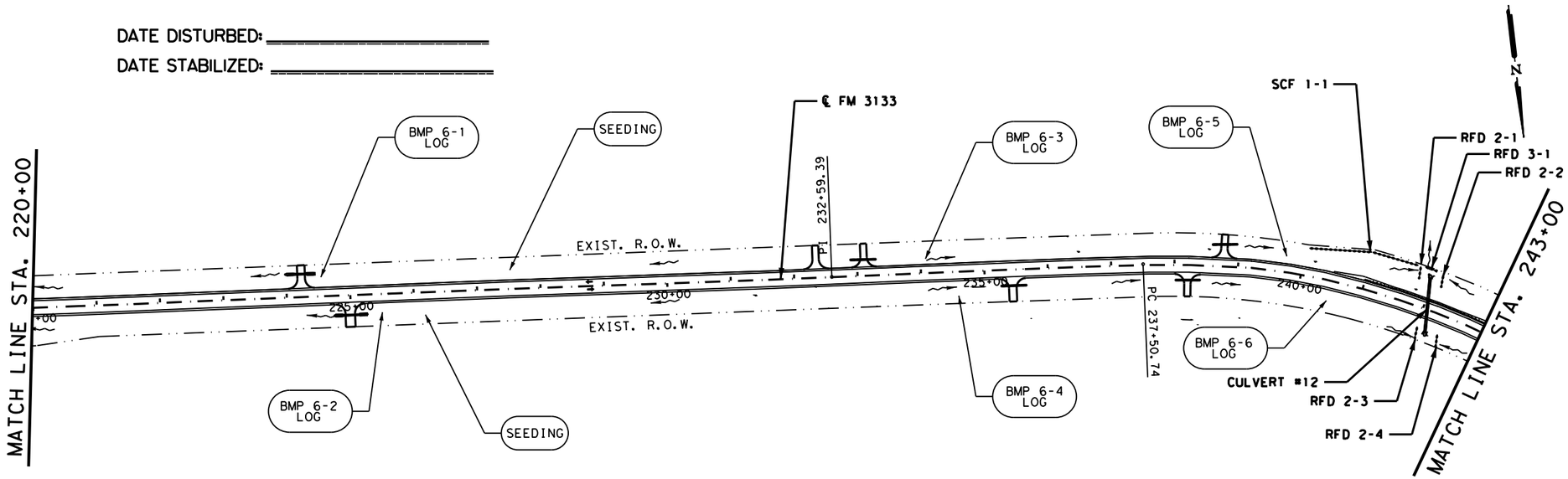
STA. 172+00.00 TO STA. 220+00.00

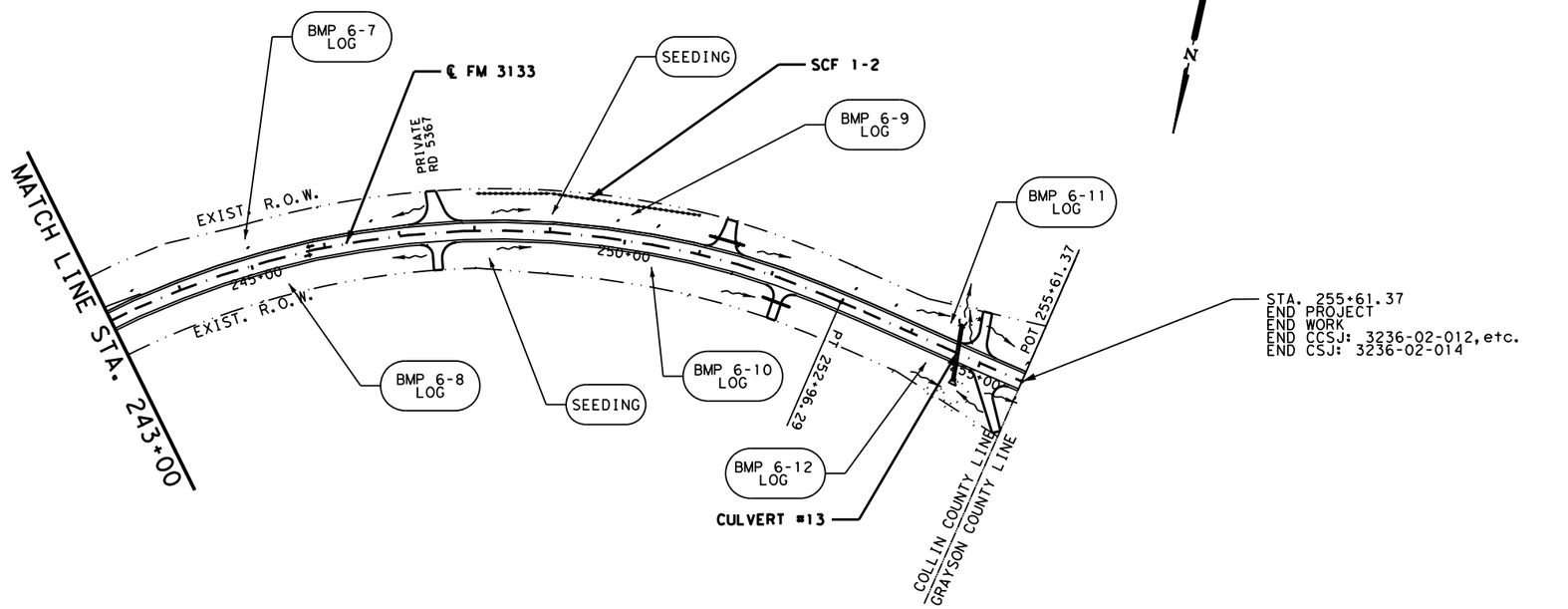
SCALE: 1" = 200' SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	176
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012,etc.	
CHECK				
TLB				

DATE DISTURBED: _____

DATE STABILIZED: _____





STA. 255+61.37
END PROJECT
END WORK
END CCSJ: 3236-02-012,etc.
END CSJ: 3236-02-014

LEGEND
- ⇨ DIRECTION OF TRAFFIC
- ~~► DIRECTION OF FLOW
- LOGS BIODEGRADABLE EROSION CONTROL LOGS
- RFD ROCK FILTER DAM (TY 2)
- SCF SILT FENCING (WILDLIFE BARRIER)

NOTES:

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STATE OF TEXAS
Tommie L. Bolden
98228
LICENSED PROFESSIONAL ENGINEER

11/17/20

TEMPORARY SEEDING •
DATE PLACED
COMPOST MANUF TOPSOIL AS PER TYPICAL SECTIONS
DATE PLACED
PERMANENT SEEDING AS PER TYPICAL SECTIONS •
DATE PLACED

• SHOW TEMP VS. PERMANENT SEEDING LOCATIONS ON SW3P LAYOUT.

	QTY. LF	DATE INSTALLED	DATE REMOVED
BMP 6-1	20		
BMP 6-2	20		
BMP 6-3	20		
BMP 6-4	20		
BMP 6-5	20		
BMP 6-6	20		
BMP 6-7	20		
BMP 6-8	20		
BMP 6-9	20		
BMP 6-10	20		
BMP 6-11	20		
BMP 6-12	20		

BMP - LOG ARE 20 FT EACH WITH 500FT SPACING

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 2-1	20		
RFD 2-2	20		
RFD 2-3	20		
RFD 2-4	20		

RFD 2 - ROCK FILTER DAM TYPE 2 ARE 20 FEET IN LENGTH EACH

	QTY. LF	DATE INSTALLED	DATE REMOVED
RFD 3-1	20		
SCF 1-1	175		
SCF 1-2	300		

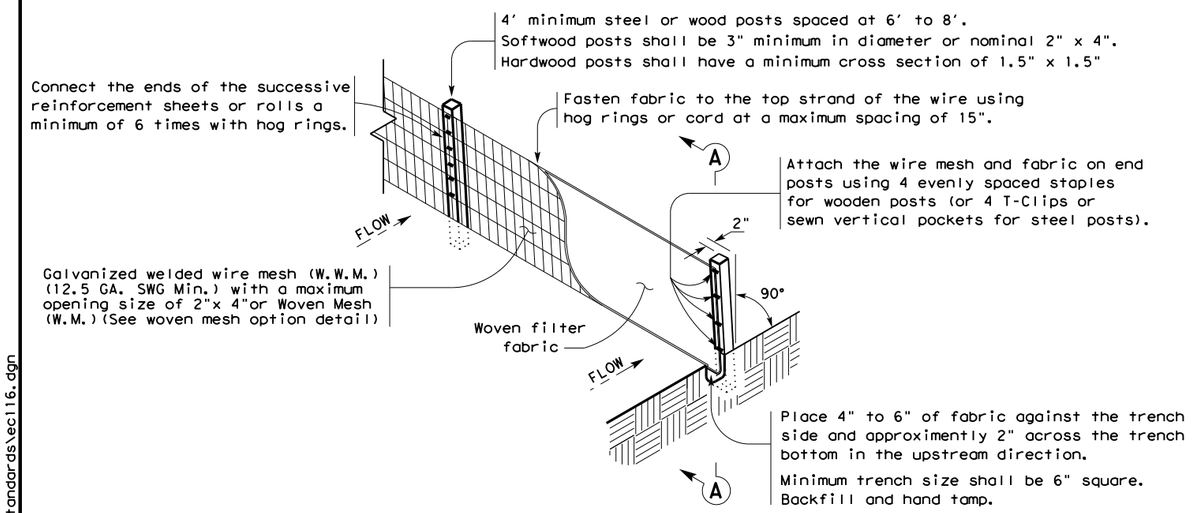
RFD 3 - ROCK FILTER DAM TYPE 3 ARE 20 FEET IN LENGTH EACH

FM 3133
SW3P LAYOUT
STA. 220+00.00 TO END PROJECT

SCALE: 1" = 200' SHEET 6 OF 6

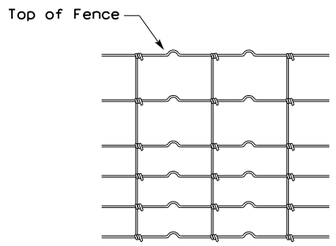
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
TLB	6	(SEE TITLE SHEET)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
TLB	TEXAS	DAL	COLLIN	177
CHECK	CONTROL	SECTION	JOB	
DMH	3236	02	012, etc.	
CHECK				
TLB				

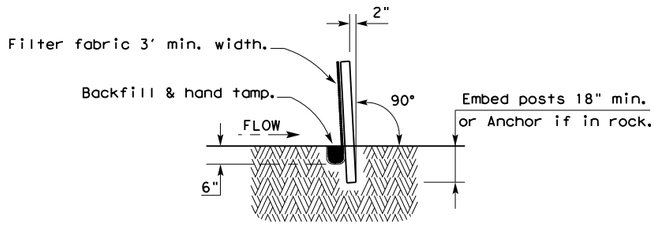
DATE: 2020
FILE: dc116.dgn
DW: TxDOT5\Documents\18 - DAL\Design Projects\32360201X4 - Design\Plan Set\1. General\Standards\ec116.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

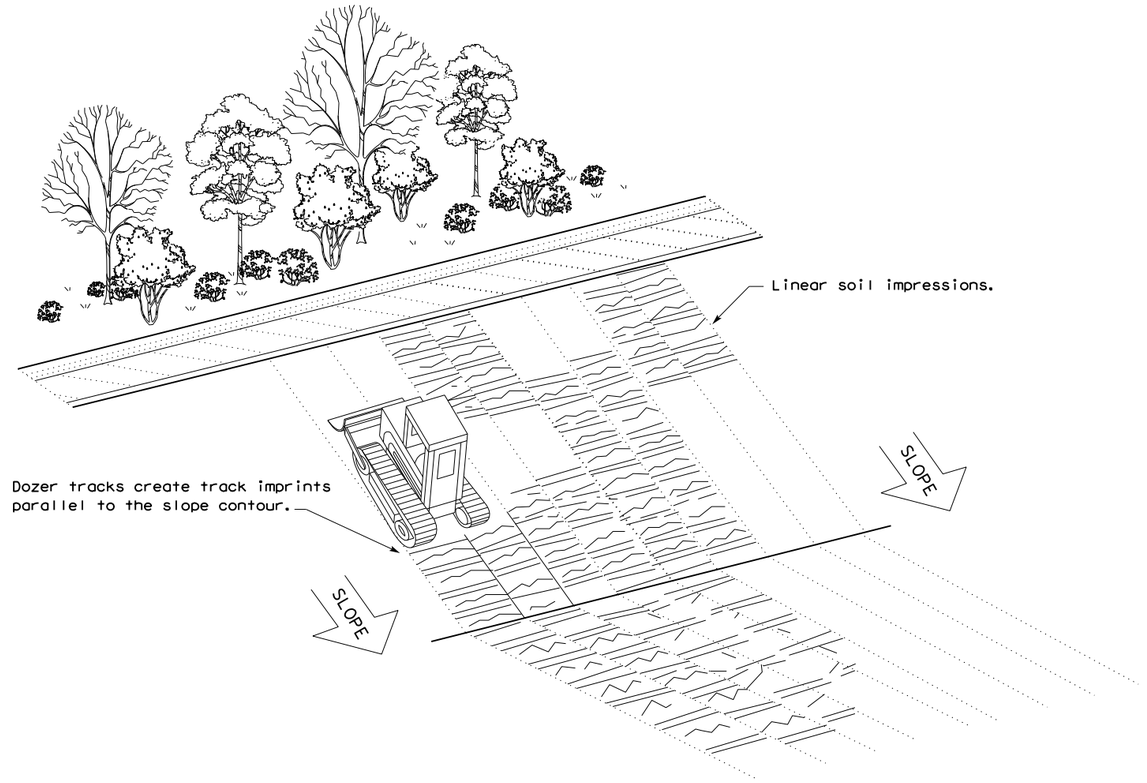
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

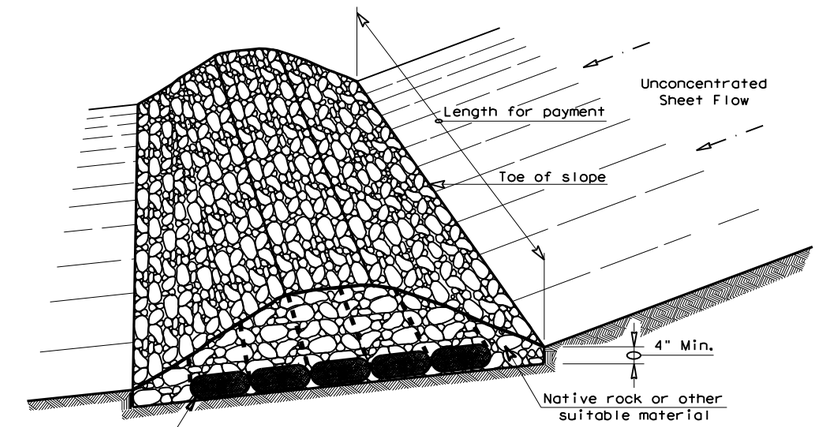
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

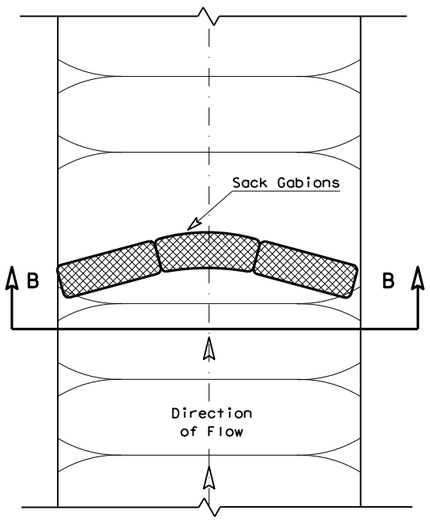
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		178

DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\ec216.dgn

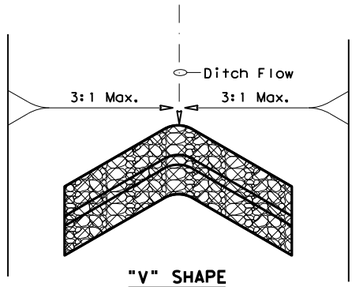


FILTER DAM AT TOE OF SLOPE

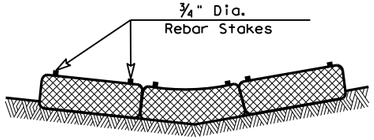
RFD1



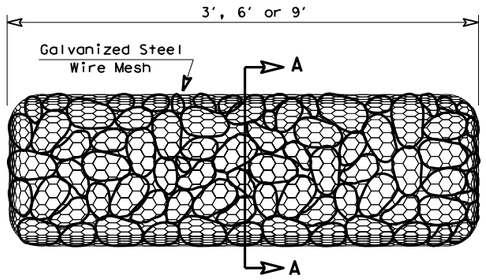
PLAN VIEW



"V" SHAPE PLAN VIEW

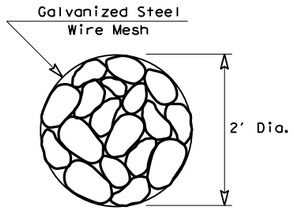


SECTION B-B

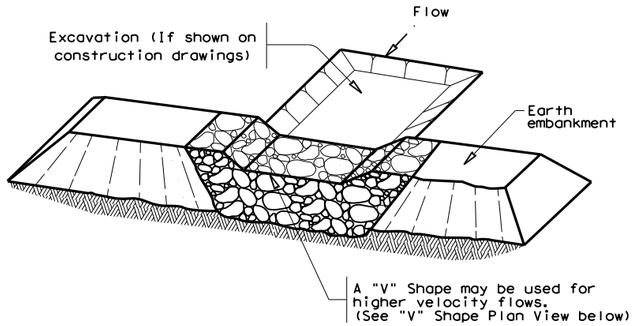


TYPE 4 (SACK GABIONS)

RFD4

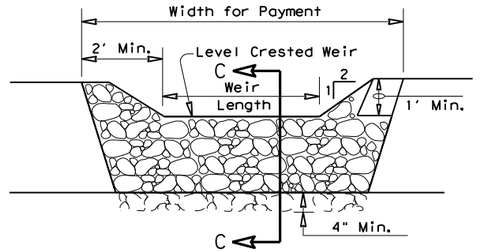


SECTION A-A

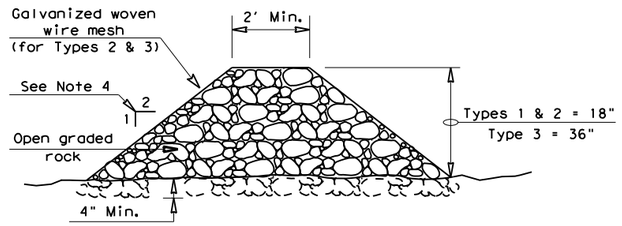


FILTER DAM AT SEDIMENT TRAP

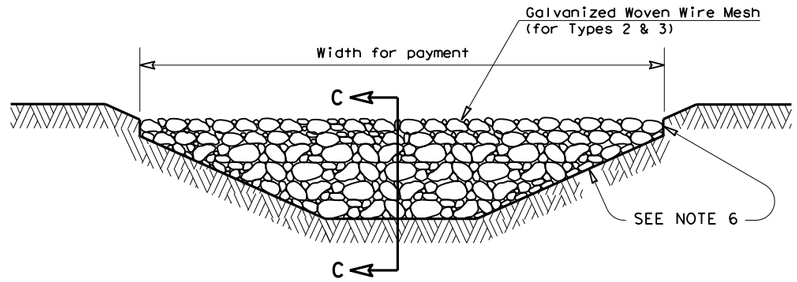
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

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.

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

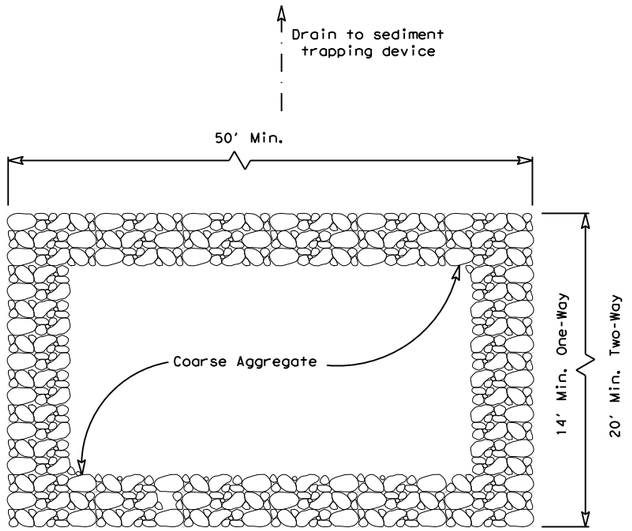
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

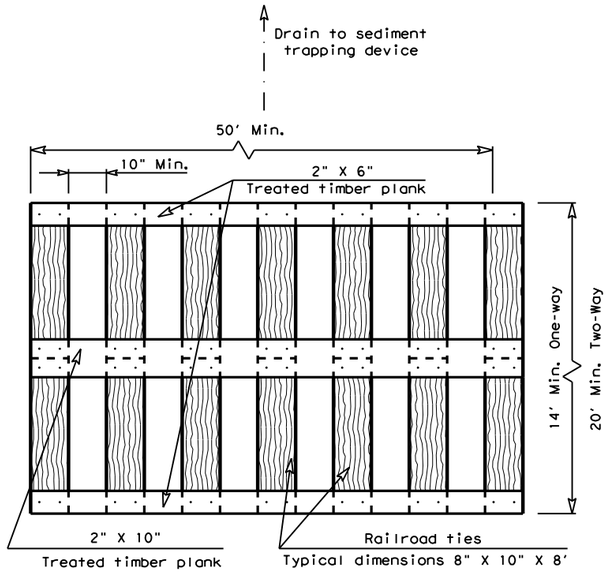
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012, etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		179

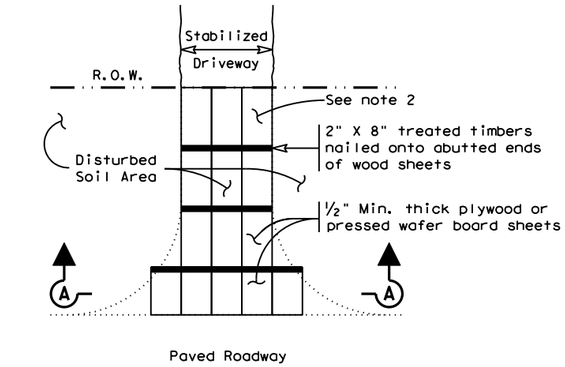
DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\ec316.dgn



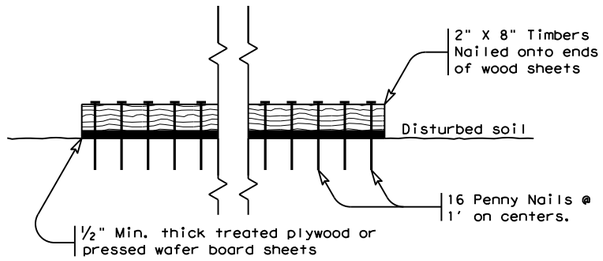
PLAN VIEW



PLAN VIEW



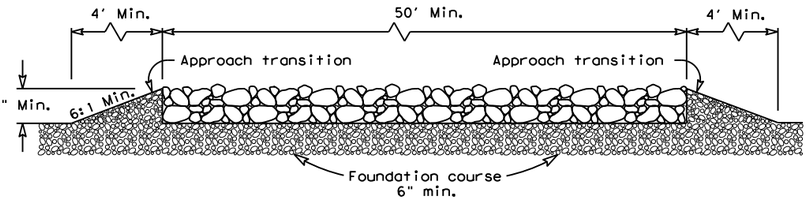
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

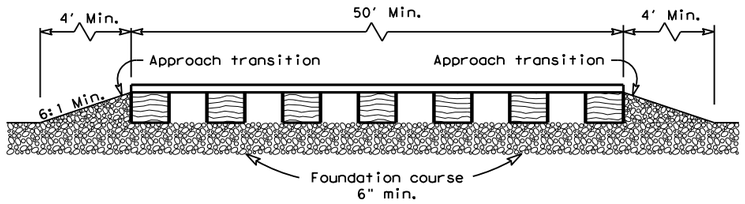
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

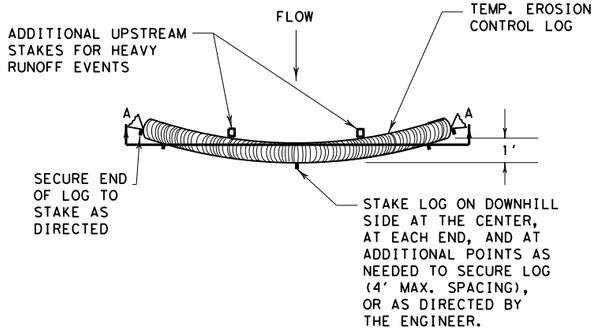
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

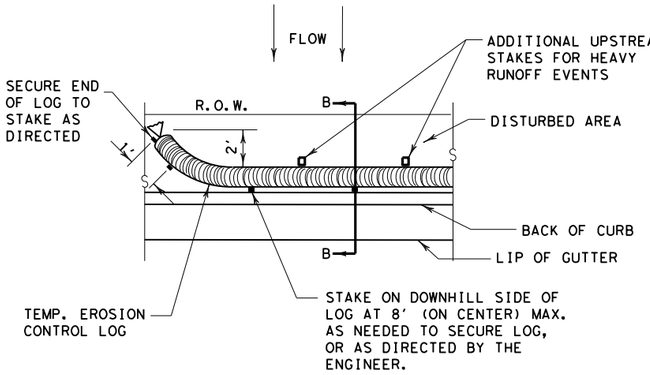
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		180

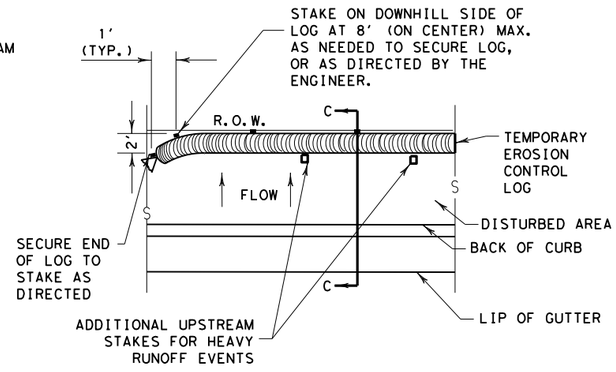
DATE: 11/4/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\323602012\4 - Design\Plan Set\1. General\Standards\EC(9)-16.dgn



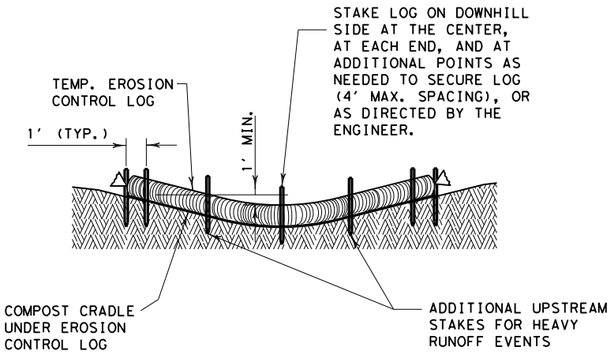
PLAN VIEW



PLAN VIEW



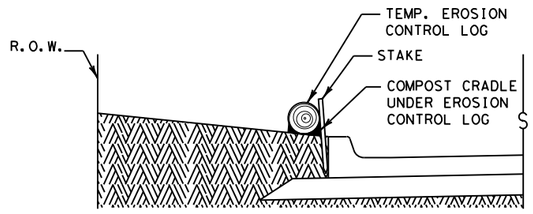
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

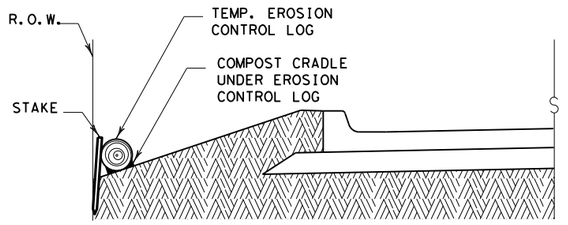
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

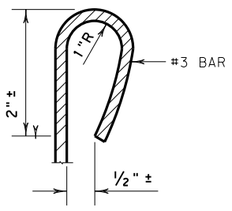
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

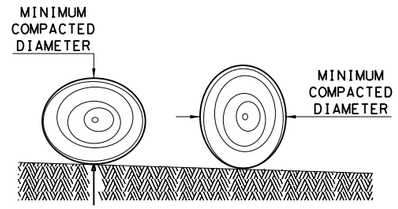
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	3236	02	012,etc.	FM3133	
	DIST	COUNTY		SHEET NO.	
	DAL	COLLIN		181	

DATE: 11/4/2020
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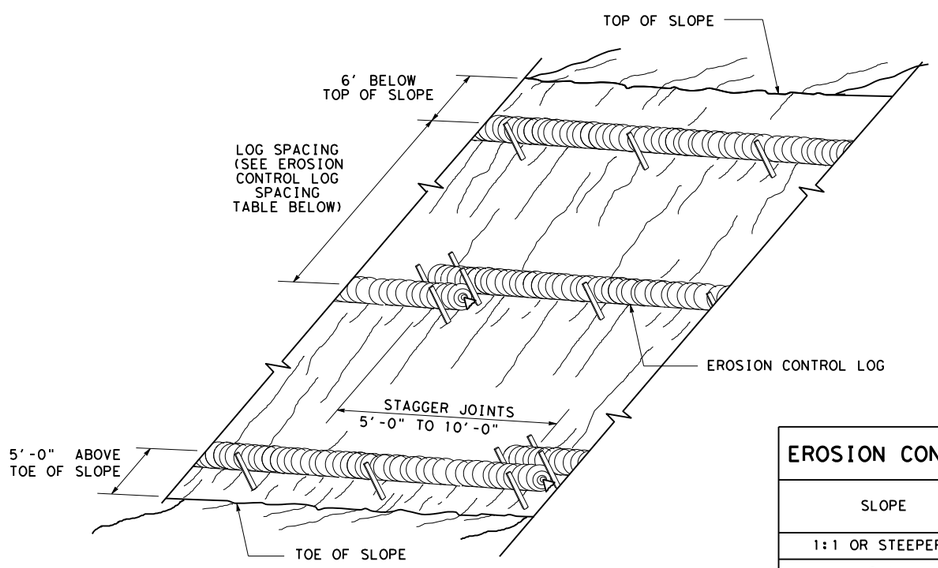
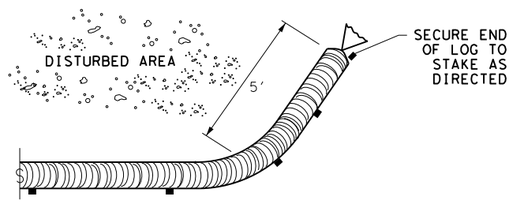


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

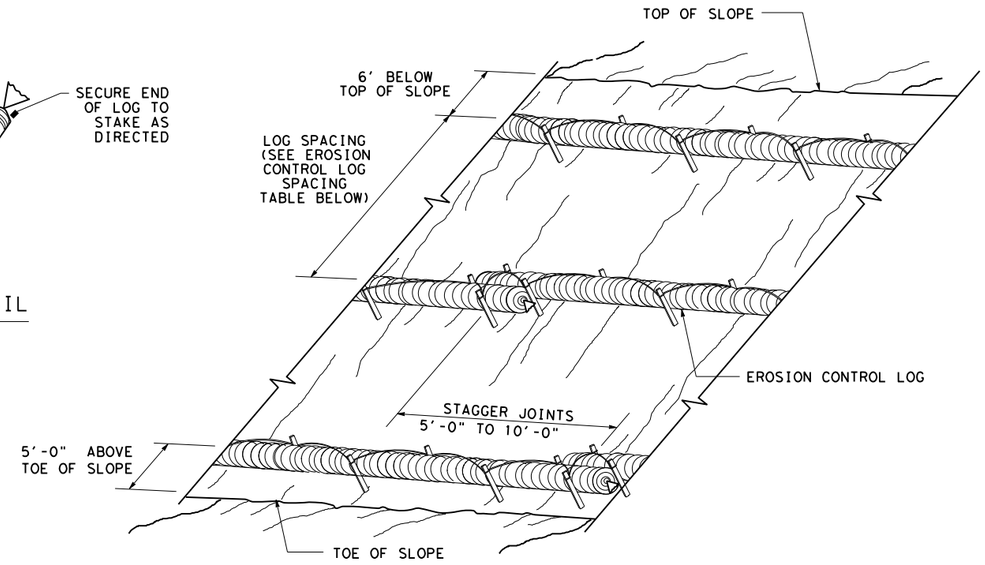
CL-SST



END SECTION RAP DETAIL

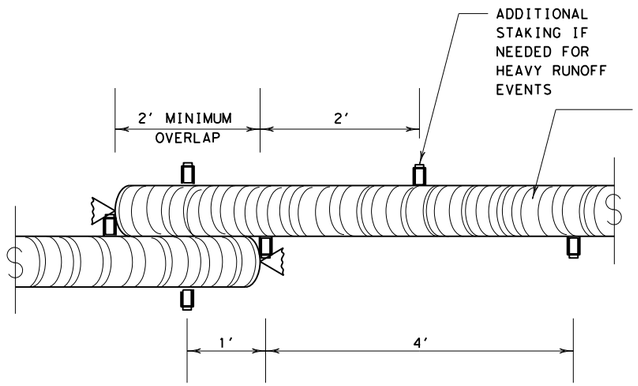
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

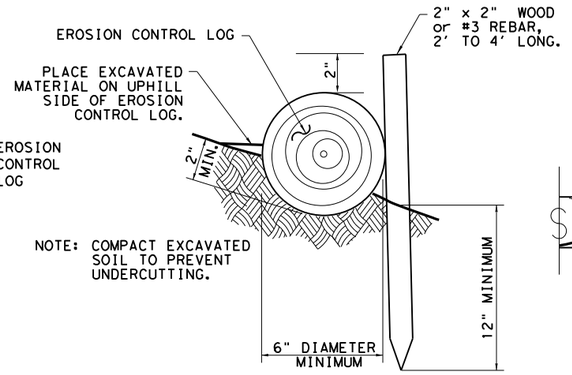
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

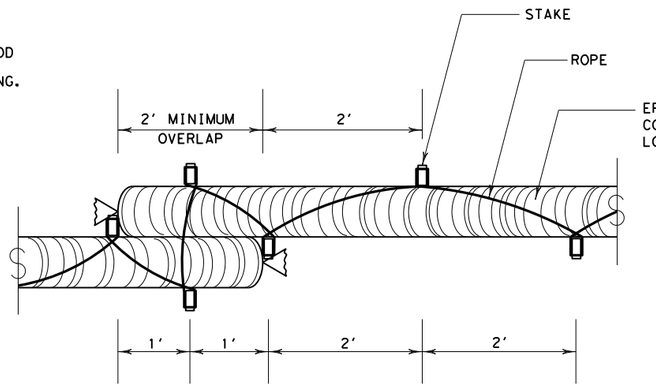


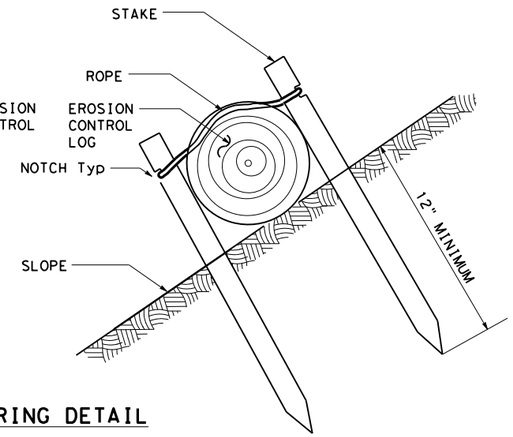


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

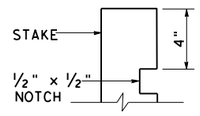
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3236	02	012,etc.	FM3133
	DIST	COUNTY		SHEET NO.
	DAL	COLLIN		182

DATE: 11/4/2020
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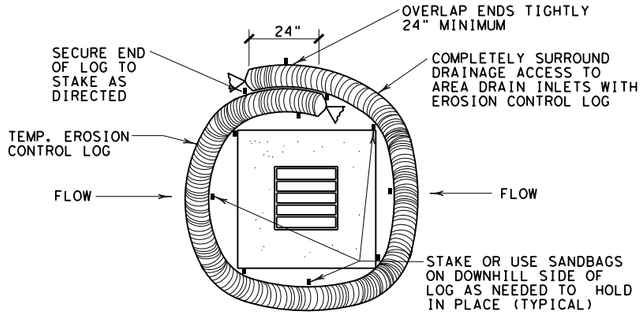
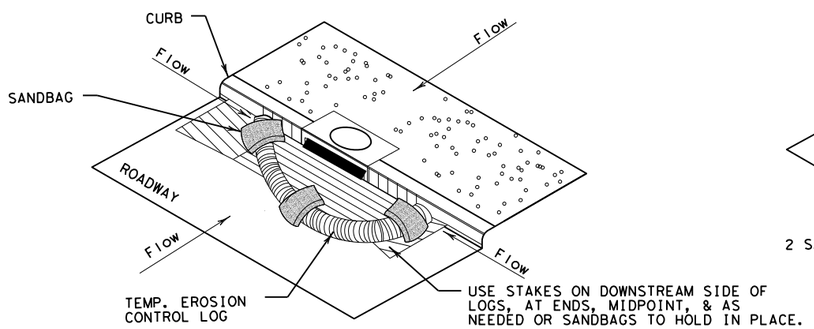


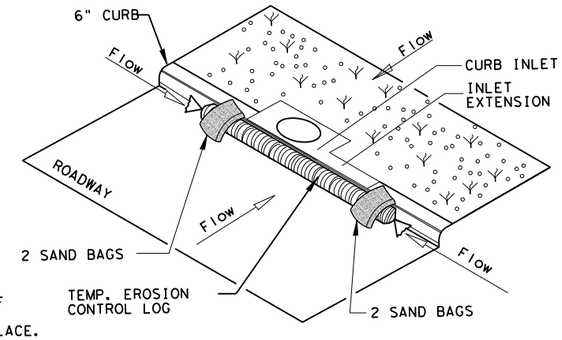
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

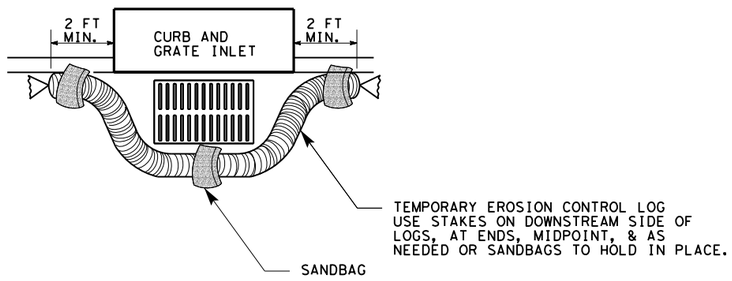
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

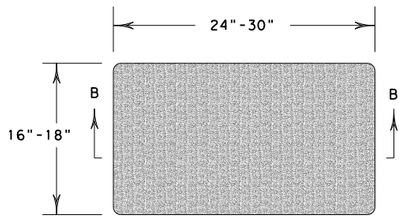
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
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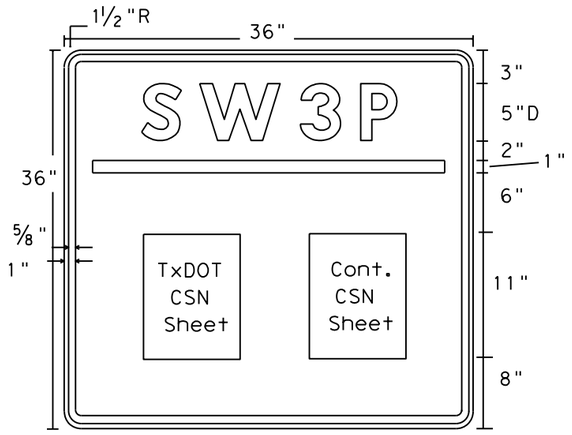
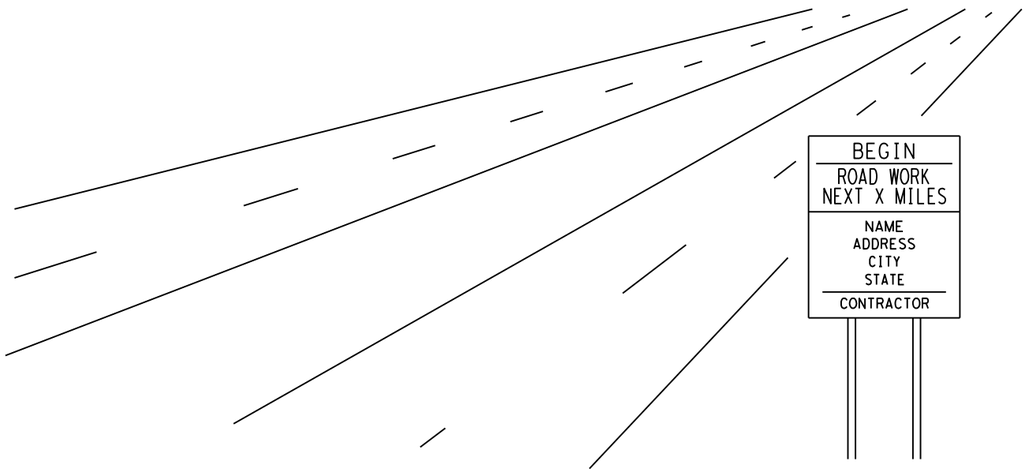
REVISIONS	3236	02	012,etc.		FM3133	
	DIST	COUNTY				SHEET NO.
	DAL	COLLIN				183



SW3P SIGN

TxDOT & Contractor Construction Site Note (CSN)



Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

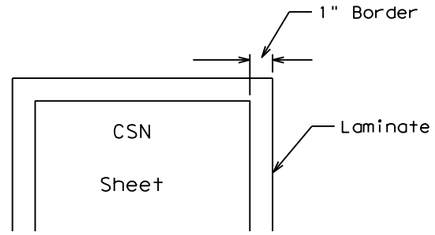
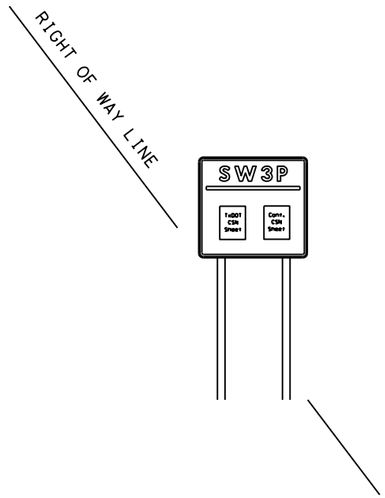


Figure 1



DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE:	DN: TxDOT	CK:	DW:	CK:	
©TxDOT 2016	DISTRICT	FEDERAL AID PROJECT			SHEET
	18	(See Title Sheet)			184
REVISION DATE: 10-16-15	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	COLLIN		3236	02	012,etc.	FM3133

USER ID

SURFACE PREPARATION ITEM 160* TOPSOIL SY / ITEM 161* COMPOST MANUF. TOPSOIL (BOS) (4") SY

SURFACE PREPARATION

Prepare planting area surface BEFORE placing Topsoil, Compost, Fertilizer, Seed and/or Sod.
Once project area has been completed to final lines, grade and compaction, remove objectionable materials from planting area surface and cultivate existing surface to a depth of 4 inches, unless otherwise specified or directed.

Refer to Items 160 and 161 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.

TOPSOIL NOTES:
1. When Topsoil is specified under Item 160, use suitable material salvaged from the project ROW in accordance with Item 160 specifications, and/or secure additional good material from approved sources.
2. Topsoil shall include only the top 6 inches of its native surface, and be easily cultivated, fertile, erosion-resistant and free of objectionable materials.
3. Topsoil obtained from sites outside of the ROW must come from approved sources and have a pH between 5.5 and 8.5 su.
4. Place Topsoil on pre-cultivated surface, spread to a uniform loose cover at thickness specified, and shape per plans. Water and roll the finished surface with a light roller or other suitable equipment per Item 160.3; do not over-compact.

COMPOST NOTES:
1. When Compost Manufactured Topsoil (4") is specified under Item 161, use compost meeting all requirements of Item 161.2 and Table 1. Provide quality control (QC) documentation and obtain Engineer approval prior to compost delivery.
2. Contractor shall provide tickets/invoices that document material type, quantity and placement for all compost delivered.
3. Additional topsoil may be required to be imported to achieve the compost/topsoil mix ratio. Topsoil must meet Item 160 specifications.

APPLICATION OF COMPOST MANUFACTURED TOPSOIL (4")

AFTER Surface Preparation, uniformly spread a 1-inch layer of compost on-grade with 3 inches topsoil over pre-cultivated planting area. (25% compost and 75% topsoil = 1" compost and 3" topsoil.)
Then mix compost and topsoil together by cultivating the compost into the topsoil (by till or disk) to a 4-inch (4") depth.
Roll the finished surface with a light corrugated drum; do not over-compact.

FERTILIZER ITEM 166* FERTILIZER AC

SOIL ANALYSIS FOR FERTILIZER APPLICATION RATE

Unless otherwise stated in the plans, Contractor shall perform at least one soil analysis on each project before fertilization, and submit results to Engineer with recommended fertilizer rates based on soil analysis.
Engineer may direct sample location(s). Soil analysis may be waived if both compost and sod are used on entire project.

FERTILIZER NOTES:
1. Refer to Item 166 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Apply fertilizer BEFORE seeding, or AFTER placing sod.
3. Use fertilizer containing nitrogen (N), phosphoric acid (P) and potash (K) nutrients, unless otherwise specified. At least 50% of the Nitrogen component shall be a slow-release sulfur-coated urea as described in Item 166.3. Do not apply more than 60 lbs Nitrogen per acre without Engineer concurrence.
4. Deliver fertilizer in bags, clearly labeled to show contents, unless otherwise specified or approved prior to delivery. When non-bagged, loose fertilizer is approved, provide documentation for each load of material delivered, to validate authenticity of the material.
5. Apply fertilizer uniformly, as a dry, granular material, essentially dust-free, and do not mix with water for application as a slurry.
6. When both temporary and permanent seeding are specified for the same area, apply half of the required fertilizer before the temporary seeding operation and the other half before the permanent seeding operation.

SEEDING FOR EROSION CONTROL ITEM 164* DRILL SEEDING AC

RECOMMENDED PLANTING SEASON	PERMANENT RURAL SEED MIX ITEM 164 - DRILL SEEDING (PERM) (RURAL)(CLAY)		PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN)(CLAY)		TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)	
		Pure Live Seed Rate**		Pure Live Seed Rate**		Pure Live Seed Rate**
WARM SEASON Mar.15th, April, May, June, July, August, Sept. 15th	Green Sprangletop (Van Horn)	- 1.0 lbs/AC	Green Sprangletop (Leptochloa dubia)	- 0.3 lbs/AC	Foxtail Millet (Setaria italica)	- 34 lbs/AC
	Sideoats Grama (Haskell)	- 1.0 lbs/AC	Sideoats Grama (El Reno)(Bouteloua curtipendula)	- 3.6 lbs/AC		
	Texas Grama (Atascosa)	- 1.0 lbs/AC	Buffalograss (Texoka)(Buchloe dactyloides)	- 1.6 lbs/AC		
	Hairy Grama (Chaparral)	- 0.4 lbs/AC	Bermudagrass (Cynodon dactylon)	- 2.4 lbs/AC		
	Shortspike Windmillgrass (Welder)	- 0.2 lbs/AC				
	Little Bluestem (OK Select)	- 0.8 lbs/AC				
	Purple Prairie Clover (Cuero)	- 0.6 lbs/AC				
	Engelmann Daisy (Eldorado)	- 0.75lbs/AC				
	Illinois Bundleflower	- 1.3 lbs/AC				
	Awnless Bushsunflower (Plateau)	- 0.2 lbs/AC				
COOL SEASON Sept 16th, Oct, Nov, Dec, Jan, Feb, Mar 14th						Pure Live Seed Rate**
					Tall Fescue (Festuca arundinaceae)	- 4.5 lbs/AC
					Western Wheatgrass (Agropyron smithii)	- 5.6 lbs/AC
					Red Winter Wheat (Triticum aestivum)	- 34 lbs/AC
					Cereal Rye	- 34 lbs/AC

SEEDING NOTES:
1. When seeding is specified under Item 164, refer to TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown. Materials and construction shall meet specifications.
2. Conduct seeding upon completion of each applicable construction stage (dependent upon planting season requirements), without compensation for additional move-ins.
3. Place seed AFTER preparing planting area surface. Refer to Surface Preparation detail this sheet, as well as Topsoil Item 160 and Compost Manufactured Topsoil Item 161 when specified. Apply fertilizer per Item 166 BEFORE seeding, per specifications and this sheet, to help drill the fertilizer into the soil.
4. When temporary grasses are well-established and more than 2 inches tall, mow planting area before seeding permanent grasses; mowing for this purpose will be subsidiary. When vegetation is not already well-established, cultivate planting area to a depth as described in Item 164.3, before temporary seeding and before permanent seeding.
5. Seed material must be appropriate to the location, soil type and season. Use the seed mix species and pure live seed rates designated in Tables 1-4 of the TxDOT 2014 Standard Specifications* for Item 164, unless otherwise specified.
6. All seed shall meet labeling, delivery, analysis, and testing requirements described in Item 164.2.1. Deliver seed in labeled, unopened bags or containers to Engineer prior to planting.
7. Uniformly plant seed over the designated planting area, along the contour of slopes, and drill seed to a depth as described in Item 164.3.4.
8. Hydroseeding may be allowed, when specified or Engineer concurs.
9. Implement and continue Vegetative Watering per the schedule, rate and volume specified under Item 168.

TXDOT REFERENCE MATERIALS:
- * "STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES" 2014
- "A GUIDANCE TO ROADSIDE VEGETATION ESTABLISHMENT" 2004
- ONLINE TRAINING COURSE: MNT415 REVEGETATION DURING CONSTRUCTION
- DALLAS DISTRICT "VEGETATION ESTABLISHMENT GUIDELINES"

SODDING FOR EROSION CONTROL ITEM 162* BLOCK SOD (BERMUDA) SY

BLOCK OR ROLL SOD	COMMON NAME	BOTANICAL NAME
	Common Bermuda Grass	Cynodon dactylon

SODDING NOTES:
1. Refer to Item 162 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Place sod between the average date of the last freeze in the Spring and 6 weeks before the average date of the first freeze in the Fall, per the Texas Almanac for the project area.
3. Place sod only AFTER soil surface preparation is complete as detailed in this sheet. Dry soil may require pre-watering.
4. Place all sod (blocks or rolls) within 24 hours of delivery to the site, and keep moist from the time it is dug up until it is planted. Sod with dried roots will not be accepted.
5. Place sod with joints alternating on each row to prevent all joints from lining up, and place blocks firmly against adjacent blocks. Roll, tamp and trim sod per Item 162.3.
6. Place fertilizer promptly AFTER sodding operation is complete in each area.
7. Water sod immediately following placement, and continue Vegetative Watering per Item 168.

VEGETATIVE WATERING FOR ESTABLISHING SEED AND SOD ITEM 168* VEGETATIVE WATERING MG

WATERING SCHEDULE

SEASON (Usual Months)	RATE	TIME SCHEDULE	TOTAL WATER ESTIMATE
SPRING & FALL (March, April, May, October)	7,000 gallons/acre per working day	Vegetative watering for seed shall begin on the day after rainfall described below and continue for 60 consecutive working days; vegetative watering for sod shall begin on the day the sod is placed and continue for a minimum of 15 consecutive working days.	420,000 gallons/acre (60 working days)
SUMMER (June, July, August, September)	12,000 gallons/acre per working day		720,000 gallons/acre (60 working days)
WINTER (November through February)	1,000 gallons/acre per working day	Vegetative watering for seed and/or sod shall begin on the day after placement for 15 consecutive working days	15,000 gallons/acre (15 working days)

Notes: Rate and frequency may be adjusted, with the approval of the Engineer, to meet site conditions (especially with sod).
For informational purposes only: 1,000 gallons equals 1 MG

VEGETATIVE WATERING NOTES:
1. Refer to Item 168 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Use clean water free of industrial waste and other substances harmful to vegetation growth, per Item 168.2.
3. Use Vegetative Watering to keep the seed bed moist during germination; not to provide initial watering. After drill seeding, postpone watering operations until site receives at least 1/2-inch of natural rainfall in a single day. Delay watering operations for warm season grasses until soil temperature exceeds 70 degrees F.
4. For sod, water immediately.
5. All water distribution equipment shall be furnished and operated to provide water at a uniform and controllable rate. Use a metering device on all watering equipment.
6. Evenly distribute water over entire area designated for seeding and/or sodding, using even spray patterns that do not disturb seed bed and/or dislodge seed from seed bed.
7. Do not water between the hours of 12:00 p.m. and 6:00 p.m. when daytime temperatures exceed 95 degrees F.
8. After initial establishment period, continue intermittent watering of newly established seed or sod at a rate of approximately 1-inch water/week, during summer months until end of contract.
9. If 1/4-inch or more of rainfall occurs on site on any given working day, no vegetative watering will be needed on that working day. (Note: 1/4-inch rain equals 7,000 gallons of water per acre.)
10. Should the Contractor fail to apply the specified amount of water within the time allowed, any seed or sod in poor condition shall be replaced, fertilized, and watered at Contractor's expense.

****Note:** The amount of Pure Live Seed (PLS) in one pound of bulk seed is based on three factors: % Purity, % Germination, and % Dormant. Use the following formula to calculate PLS in bulk seed: PLS = % Purity X (% Germination + % Dormant) Ensure that the specified amount of pure live seed is placed.

ROADSIDE MOWING ITEM 730* PROJECT MAINTENANCE AC

MOWING NOTES:
1. During project construction, once seed is established, use mowing to promote permanent grasses by mowing any remaining temporary grasses.
2. Also mow established turf and ROW grasses in designated areas of project limits as specified or directed by Engineer.
3. Remove litter and debris prior to mowing.
4. Do not mow on wet ground when soil rutting can occur.
5. Hand-trim around obstructions and stormwater control devices as needed.
6. Maintain paved surfaces free of tracked soils and clipped vegetation.

SEQUENCE OF WORK:
- CULTIVATE SURFACE SOIL.
- PREPARE / PLACE TOPSOIL, OR
- PREPARE / PLACE COMPOST MANUFACTURED TOPSOIL.
- APPLY FERTILIZER AND THEN PLACE SEEDING, OR
- PLACE SOD AND THEN APPLY FERTILIZER.
- CONDUCT VEGETATIVE WATERING.
- CONDUCT ROADSIDE MOWING, AS DIRECTED.

Texas Department of Transportation

VEGETATION ESTABLISHMENT SHEET

(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		FM3133
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DALLAS	COLLIN	185
CHECK	CONTROL	SECTION	JOB	
XXX	3236	02	012,etc.	
CHECK				
XXX				

DATE

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 damage resulting from its use.

I. STORMWATER POLLUTION PREVENTION PLAN-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 adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

Action Number:
1. Collin County Phase II MS4 Contact Tracy Homfeld
2.

☐ No Action Required ☒ Required Action

Action Number:
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. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# 3(a)

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.

Action Number:
1. PCN not required: 10 Elm Grove Creek Sta. 150+79.16

2. PCN not required: Culvert 12 Wolf Run Creek Sta. 212+43.56

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 for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action Number:
1.
2.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751 & 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action Number:
1.
2.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

See Page 2 of 2 for Species EPICs and BMPs.

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 immediated area, and contact the Engineer immediately.

Special Note: The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

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 Corp 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 Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, 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, canisters, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action Number:
1.
2.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action Number:
1.
2.

GENERAL NOTE:

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LAST REVISION: 1/15/15

 Texas Department of Transportation
Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) Sheet 1 of 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 3133
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Collin	
CONTROL	SECTION	JOB	SHEET NO.
3236	02	012, etc.	186

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Filled Out: XX/XX/XXXX
Prepared by: Name/Section

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

3. Texas garter snake and slender glass lizard - Terrestrial Reptile BMPs:

a) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site condition, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

b) For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

c) Inform contractors that if reptiles are found on project site allow species to safely leave the project area.

d) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

e) Contractors will be advised potential occurrence in the project area, and to avoid harming the species if encountered.

4. Southern crawfish frog - 1) Minimize impacts to wetland habitats including isolated ephemeral pools, 2) Water Quality BMPs, 3) Amphibian BMPs.

5. Strecker's chorus frog and Woodhouse's toad - Amphibian and Aquatic Reptile BMPs.

6. Amphibian and Aquatic Reptile BMPs:

a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

b) Minimize the impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats.

c) Maintain hydrologic regime and connections between wetlands and other aquatic features.

d) Use wildlife barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.

e) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

f) Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.

g) When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crawfish burrows) where feasible.

h) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.

i) N/A

7. Water Quality BMPs - In addition to BMPs required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 water quality permit:

a) Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.

b) When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

See Page 1 of 2 for Species EPICs and BMPs.

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Filled Out: XX/XX/XXXX
Prepared by: Name/Section

 Texas Department of Transportation
Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) Sheet 2 of 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 3133
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Collin	
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