DESIGN	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
AM	6	C 574-2-21		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DALLAS	NAVARRO	1
CHECK JP	CONTROL 0574	SECTION 02	JOB 021	

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

STATE PROJECT
C 574-2-21
CSJ: 0574-02-021

FM 636

NAVARRO COUNTY

LIMITS: FROM: FM 1129
TO: CR 4666/MORGAN SPRINGS RD.

DESIGN SPEED = 50 MPH

ADT = 235 (2021)
335 (2041)

FUNCTIONAL CLASSIFICATION = MINOR COLLECTOR

NOTE:

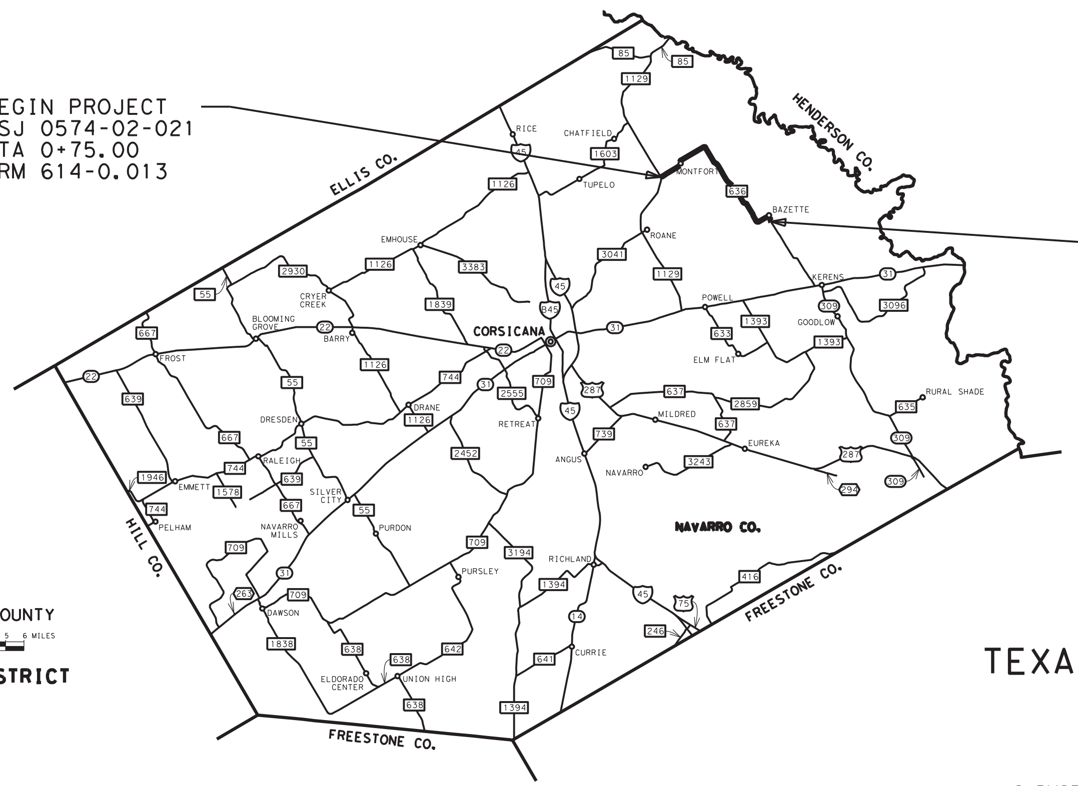
SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000-008)

TOTAL LENGTH OF PROJECT =

ROADWAY	=	45,205.00 FT.	=	8.562 MI.
BRIDGE	=	60.00 FT.	=	0.011 MI.
TOTAL	=	45,265.00 FT.	=	8.573 MI.

FOR THE CONSTRUCTION OF RESTORATION OF EXISTING PAVEMENT AND ADD SHOULDERS CONSISTING OF: REMIX, SRF TRT, GRADING, RUMBLE STRIPS, PVMNT MARKS AND SIGNS

BEGIN PROJECT
CSJ 0574-02-021
STA 0+75.00
TRM 614-0.013



END PROJECT
CSJ 0574-02-021
STA 453+40.00
TRM 622+0.841

NAVARRO COUNTY

DALLAS DISTRICT

TEXAS DEPARTMENT OF TRANSPORTATION

EQUATIONS: NONE
EXCEPTIONS: STA. 96+50.00 TO STA. 97+10.00
(WILLOW CREEK BRIDGE)
RAILROAD CROSSINGS: NONE

SUBMITTED FOR LETTING 1/4/ 20 21
Amanda McKittrick, P.E., P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 1/6/2021
, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

RECOMMENDED FOR LETTING 1/4 20 21
Juan A. Paredes, P.E. P.E.
AREA ENGINEER

APPROVED FOR LETTING: 1/6/2021
, P.E.
DISTRICT ENGINEER

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

__________, P.E.
Signature of Registrant & Date

DATE:

SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3-7	PROJECT LAYOUT
8	CONTROL POINT DATA
9-11	TYPICAL SECTIONS
12,12A-F	GENERAL NOTES
13,13A-B	ESTIMATE & QUANTITY
14	SUMMARY OF TRAFFIC CONTROL ITEMS
15	SUMMARY OF ROADWAY ITEMS
16-18	SUMMARY OF EARTHWORK
19-20	SUMMARY OF DRIVEWAY ITEMS
21-23	SUMMARY OF DRAINAGE ITEMS
24	SUMMARY OF PAVEMENT AND SIGN ITEMS
25	SUMMARY OF SW3P ITEMS
26-32	SUMMARY OF SMALL SIGNS
	TRAFFIC CONTROL PLAN
33-34	TRAFFIC CONTROL PLAN - NARRATIVE
35	TCP - TYPICAL SECTION - CULV REPLACEMENTS
36	TCP - TYPICAL SECTION - CULV EXTENSIONS
37-39	TCP - TYPICAL SECTIONS
40	TRAFFIC CONTROL PLAN - MISC DETAILS
41-44	TEMPORARY SPECIAL SHORING
45	TREATMENT OF VARIOUS EDGE CONDITIONS
	TRAFFIC CONTROL PLAN STANDARDS
*46-57	BC (1)-14 THRU BC (12)-14
*58-60	TCP (1-1)-18 THRU TCP (1-3)-18
*61-62	TCP (2-1)-18 THRU TCP (2-2)-18
*63	TCP (3-1)-13
*64	TCP (3-3)-14
*65	TCP (7-1)-13
*66	WZ (RS)-16
*67	WZ (STPM)-13
*68	WZ (UL)-13
	ROADWAY DETAILS
69-74	ALIGNMENT DATA
75-77	SUPERELEVATION TABLE
78-115	PLAN AND PROFILE
116-120	MISCELLANEOUS DETAILS
121-122	DRIVEWAY DETAILS
123-124	PAVEMENT CORE DATA
	ROADWAY DETAILS STANDARDS
*125	GF(31)-19
*126	GF(31)LS-19
*127	GF(31)MS-19
**128	LJD (1-1)-07(DAL)
*129-131	MB-14 (2) THRU MB-14 (2B)
*132-135	MB-15 (1)
*136	SGT(10S)31-16
*137	SGT(11S)31-18
*138	SGT(12S)31-18
*139	SGT(15)31-20
*140	TE (HMAC)-11

SHEET NO.	DESCRIPTION
	DRAINAGE DETAILS
141-144	DRAINAGE AREA MAP
145-146	RUNOFF COMPUTATIONS
147-150	CULVERT HYDRAULIC COMPUTATIONS
151-175	CULVERT LAYOUTS
176-179	RIPRAP DETAIL
180	CONCRETE COLLAR DETAILS
181	BCS
	DRAINAGE DETAILS STANDARDS
*182	CH-FW-0
*183	CH-PW-0
*184	CH-PW-S
*185	MC-MD
*186-187	MC-5-20
*188	PSET-RC
*189	PSET-RP
*190	PSET-RR
*191	PSET-SC
*192	PSET-SP
*193	PW
*194-195	SCC-5&6
*196	SCC-MD
*197	SCP-5
*198-200	SETP-FW-0
*201	SETP-PD
*202-203	SRR
	BRIDGE
	NONE
	TRAFFIC SIGNAL
	NONE
	SIGNING
204-222	SMALL SIGN LAYOUT
223	GUIDE SIGN DETAILS
	SIGNING STANDARDS
*224	SMD (GEN)-08
**225	SMD (SLIP-1)-08(DAL)
*226-227	SMD (SLIP-2)-08 THRU SMD (SLIP-3)-08
*228-230	TSR (3)-13 THRU TSR (5)-13
	PAVEMENT MARKINGS & DELINEATION
231-249	PAVEMENT MARKING AND DELINEATION LAYOUT
	PAVEMENT MARKINGS & DELINEATION STANDARDS
*250-255	D&OM (1)-20 THRU D&OM (6)-20
*256	D&OM (VIA)-15
*257-258	PM (1)-20 THRU PM (2)-20
*259-260	RS (3)-13 THRU RS (4)-13
**261	TWO-LANE HIGHWAY CURVE SIGNING & MARKINGS (DAL)
*262	MILLED EDGELINE RUMBLE STRIPS
	ENVIRONMENTAL ISSUES
263	STORMWATER POLLUTION PREVENTION PLAN (SW3P)
264-265	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
266-275	SW3P SITE MAP

SHEET NO.	DESCRIPTION
	ENVIRONMENTAL ISSUES STANDARDS
*276-278	EC (1)-16 THRU EC (3)-16
*279-281	EC (9)-16
**282	SW3P SIGN SHEET (DAL)
**283	VEGETATIVE ESTABLISHMENT SHEET (DAL)
	MISCELLANEOUS ITEMS
**284	TRB-15(1) DAL
	RAILROAD REQUIREMENTS
	NONE

* STATEWIDE STANDARDS
** DALLAS DISTRICT STANDARDS

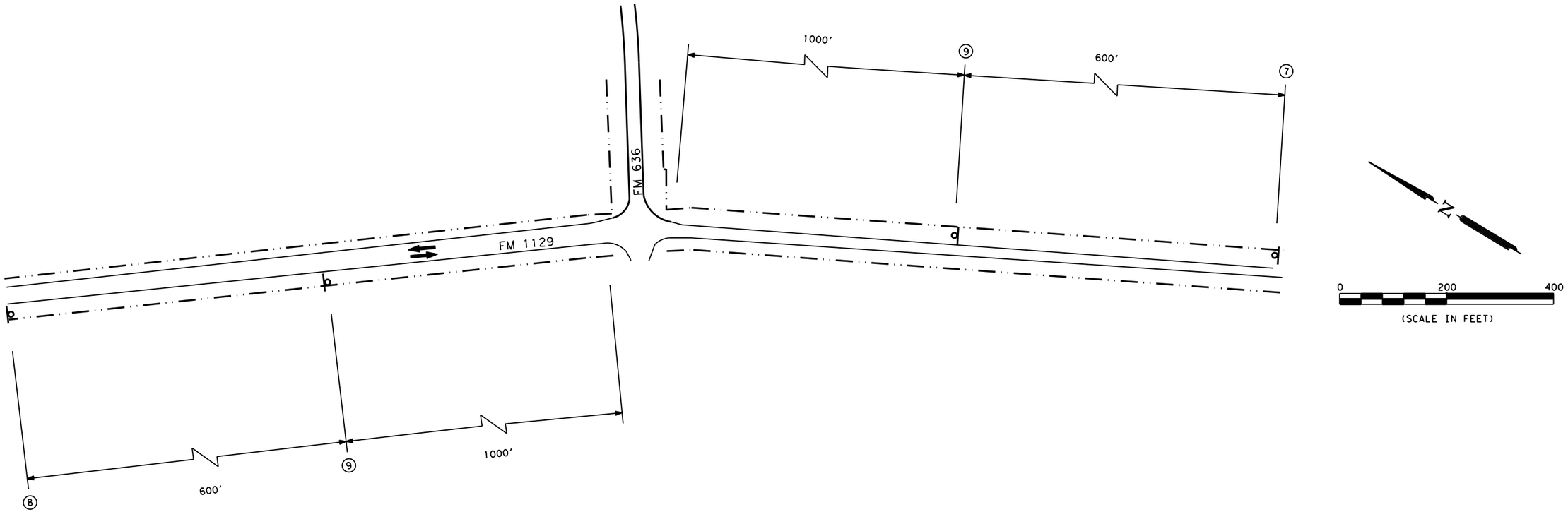
THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

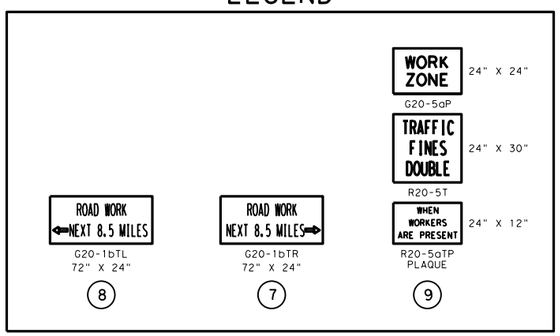
Amanda McKittrick, P.E. P.E. 1/26/2021
Signature of Registrant & Date

INDEX OF SHEETS

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HWY NO.
GRAPHICS	6	SEE TITLESHEET		FM 636
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	2
	0574	02	021	



LEGEND



STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

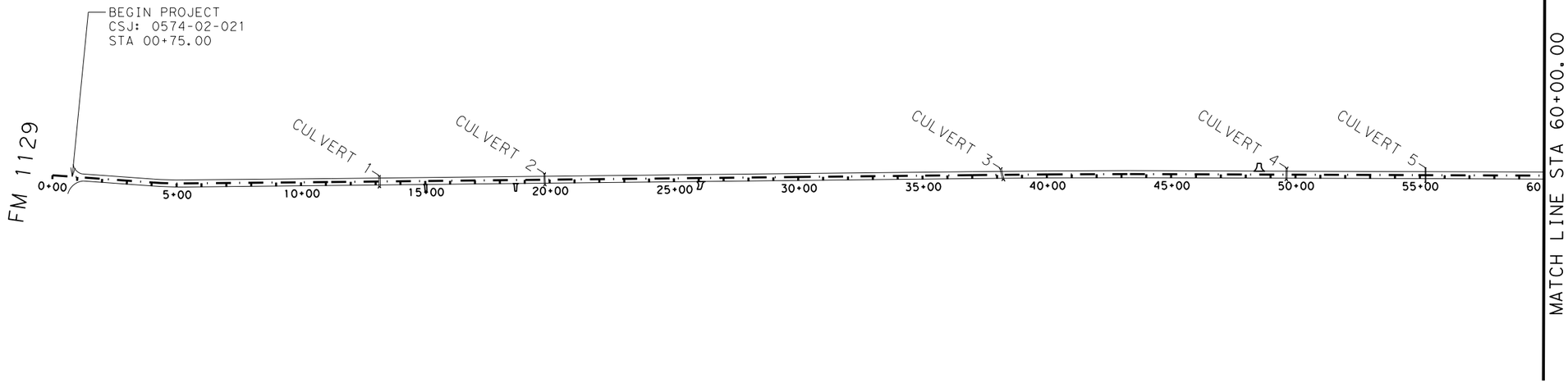
Texas Department of Transportation

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

FM 1129

SCALE: 1" = 200′ SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DALLAS	NAVARRO	3
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



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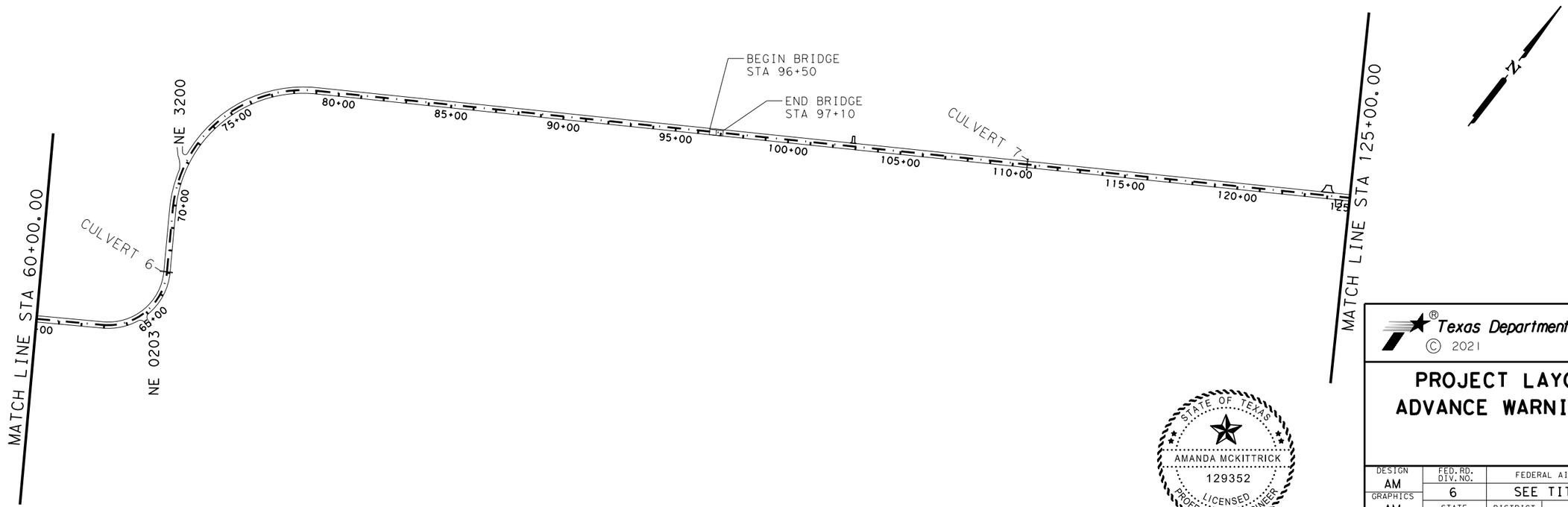

Texas Department of Transportation

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DALLAS	NAVARRO	
CHECK	CONTROL	SECTION	JOB	4
CHECK	0574	02	021	

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

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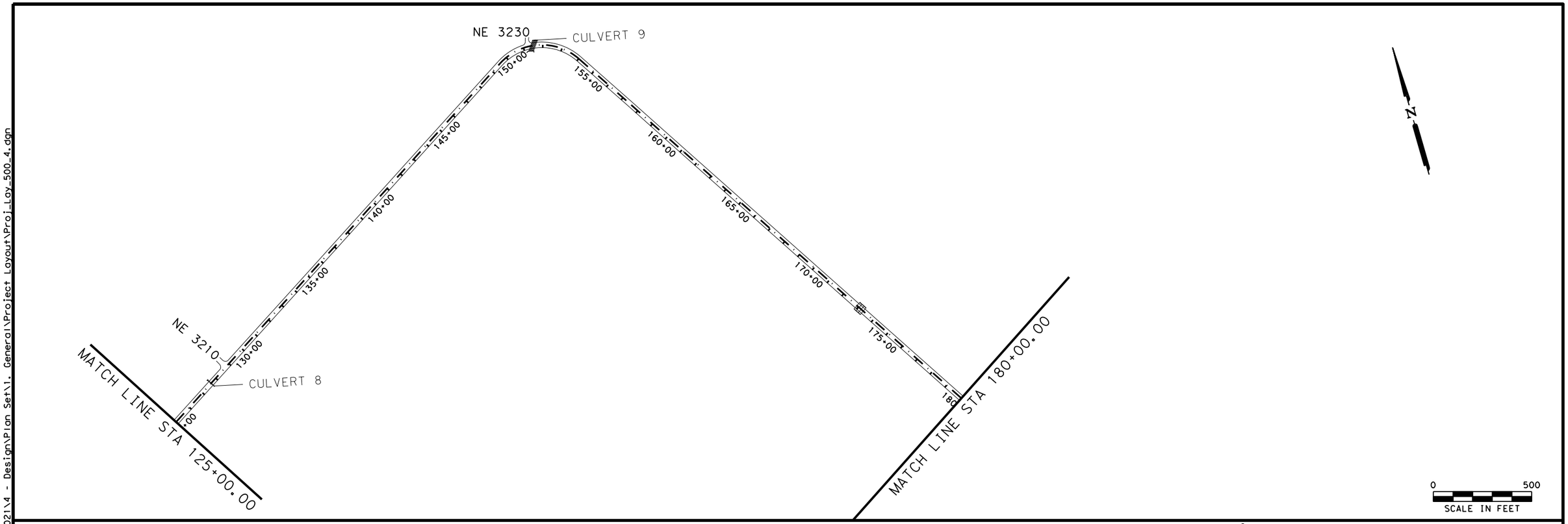

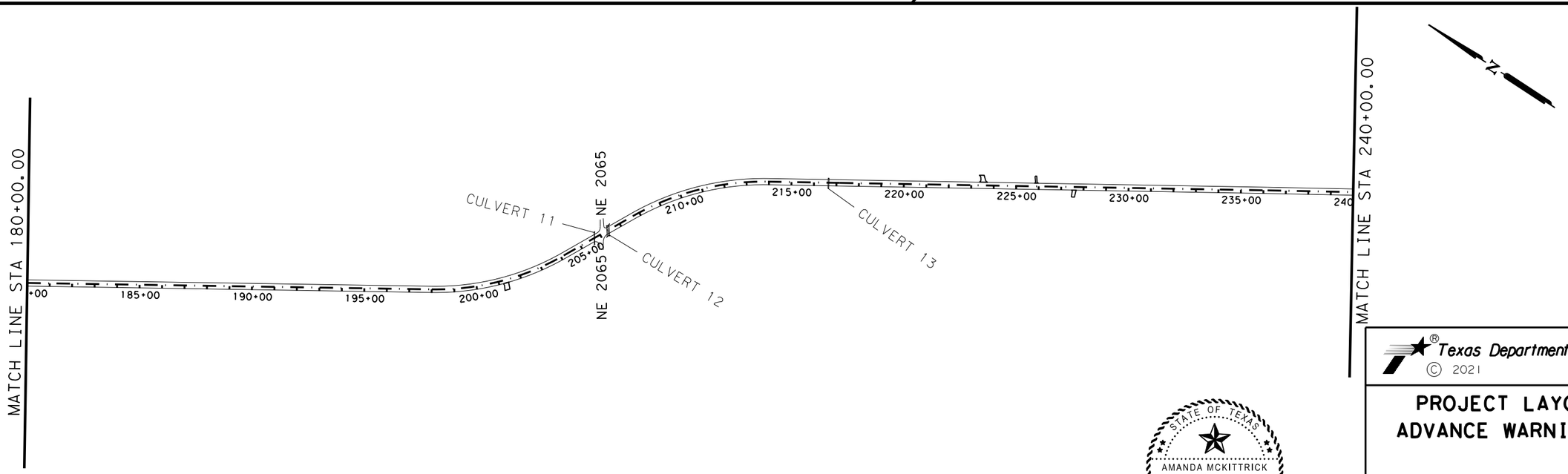

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DALLAS	NAVARRO	5
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

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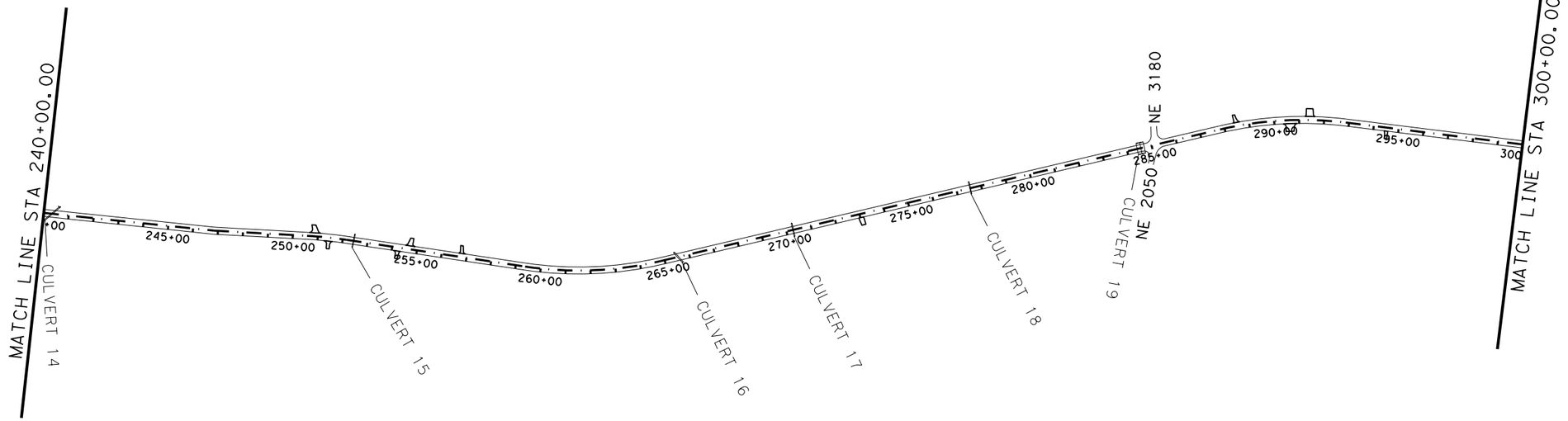

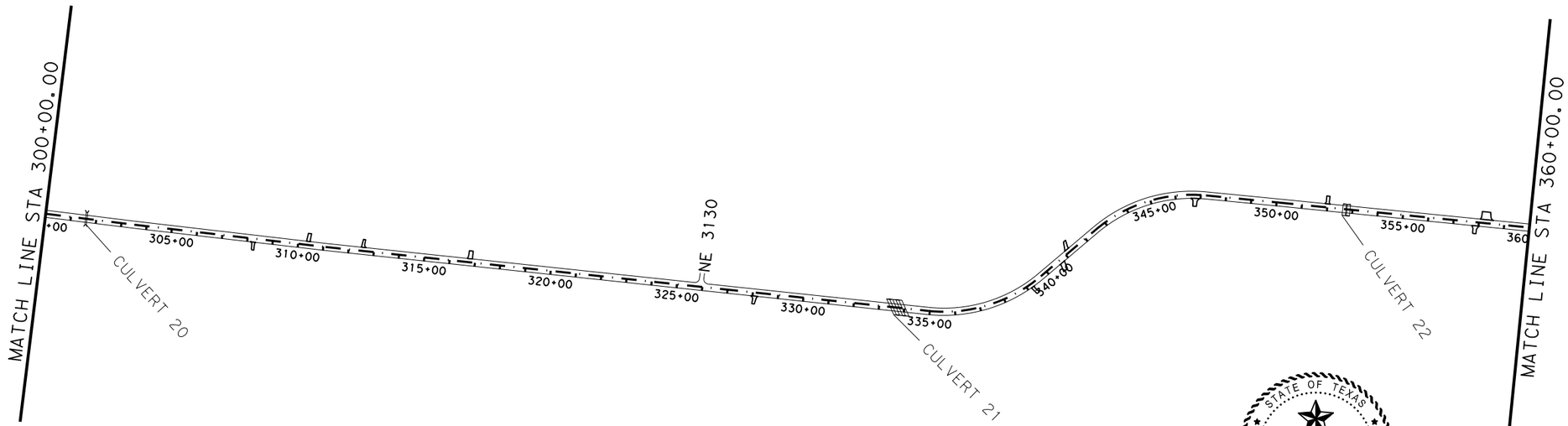

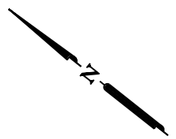

Amanda McKittrick, P.E. P.E. 1/7/2021

Signature of Registrant & Date

Texas Department of Transportation

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

SHEET 4 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DALLAS	NAVARRO	6
CHECK	CONTROL	SECTION	JOB	
CHECK	0574	02	021	

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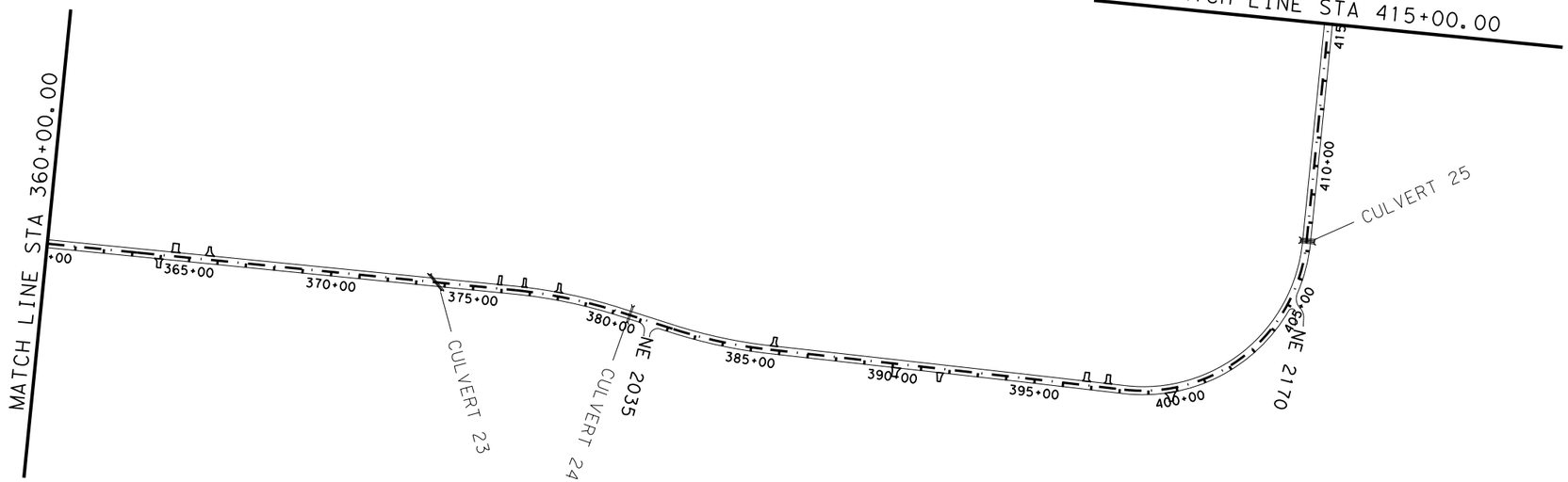

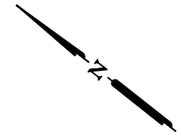

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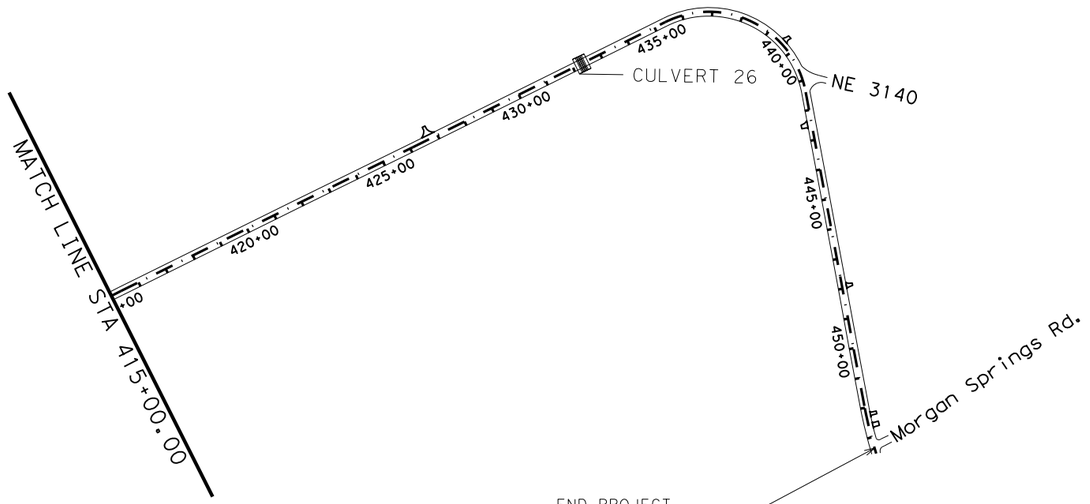

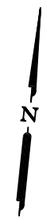

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

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PROJECT LAYOUT AND ADVANCE WARNING SIGNS

SHEET 5 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DALLAS	NAVARRO	7
CHECK	CONTROL	SECTION	JOB	
CHECK	0574	02	021	

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CP Number	Coordinates		Elevation	Description
	NORTH	EAST		
E1750019	6,743,071.80	2,667,291.84	368.92	3 1/4" Aluminum Rebar Cap
E1750029	6,743,297.37	2,667,226.10	368.60	3 1/4" Aluminum Rebar Cap
E1750039	6,751,159.23	2,661,189.51	399.18	3 1/4" Aluminum Rebar Cap
E1750049	6,751,509.68	2,661,089.60	399.17	3 1/4" Aluminum Rebar Cap
E1750059	6,755,711.80	2,654,568.77	411.72	3 1/4" Aluminum Rebar Cap
E1750069	6,755,812.92	2,654,323.68	416.13	3 1/4" Aluminum Rebar Cap
E1750079	6,763,517.18	2,648,830.97	432.03	3 1/4" Aluminum Rebar Cap
E1750089	6,764,027.72	2,648,618.81	430.26	3 1/4" Aluminum Rebar Cap
E1750099	6,771,439.34	2,642,525.72	315.67	3 1/4" Aluminum Rebar Cap
E1750109	6,771,678.81	2,642,202.13	316.16	3 1/4" Aluminum Rebar Cap
E1750119	6,772,883.30	2,635,126.30	330.37	3 1/4" Aluminum Rebar Cap
E1750129	6,772,780.15	2,634,807.05	327.95	3 1/4" Aluminum Rebar Cap

STATE OF TEXAS
AMANDA MCKITTRICK
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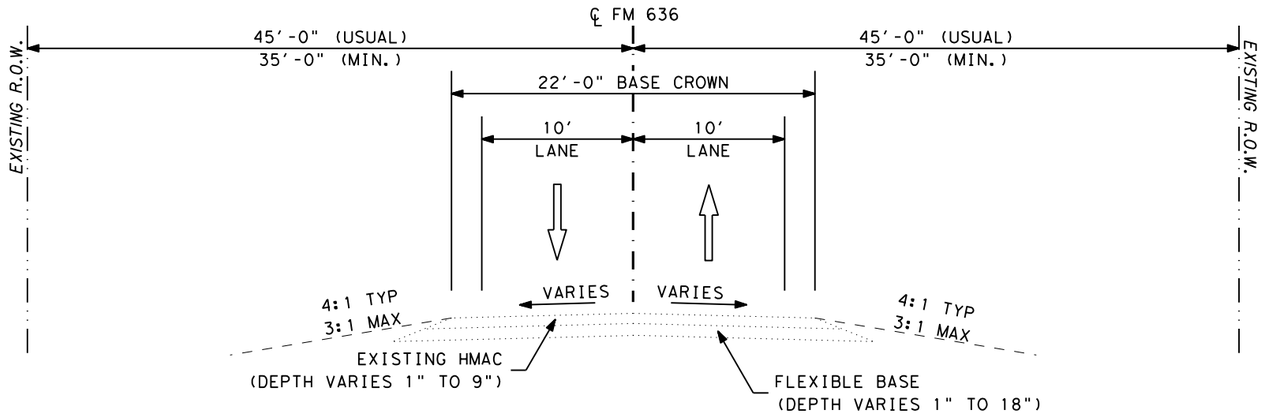
Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636

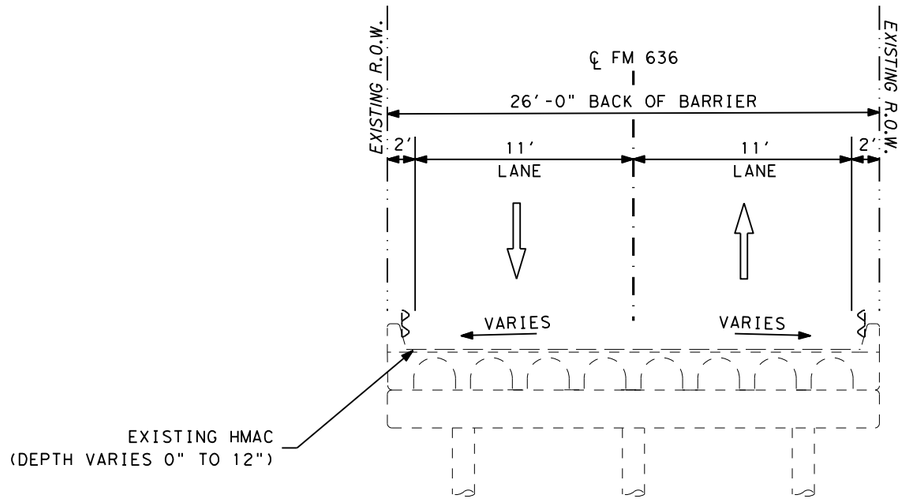
CONTROL DATA POINTS

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	8
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



EXISTING TYPICAL SECTION

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00



EXISTING TYPICAL SECTION

STA. 96+50.00 TO STA. 97+10.00
** NO WORK TO BE DONE WITHIN THE LIMITS OF THE BRIDGE **

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636

EXISTING TYPICALS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	9
	0574	02	021	

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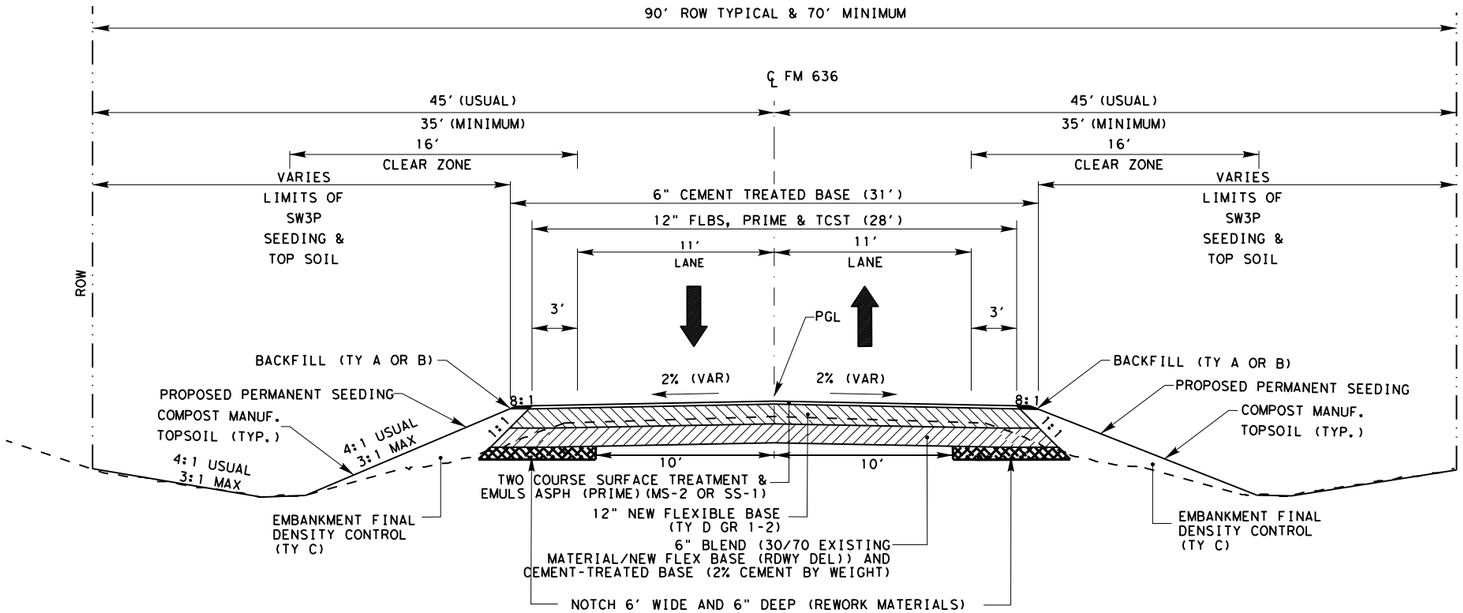

PROPOSED TYPICAL SECTION

STA. 00+75.00 TO STA. 62+97.00
STA. 79+01.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 149+57.00
STA. 154+01.00 TO STA. 398+16.00
STA. 407+27.00 TO STA. 435+40.00
STA. 441+40.00 TO STA. 453+40.00

1. REWORK 8" OF EX MATERIALS (22' WIDE) (ITEM 251), AND SPREAD OUT OVER TO 31' SECTION. THEN FILL 6' X 0.5' NOTCHES ON EACH SIDE OF SECTION (ITEM 112) , AND MIX 6" WITH 2% CEMENT (31' WIDE)(ITEM 275).
2. PLACE 12" OF NEW FLEXIBLE BASE MATERIAL (28' WIDE) (ITEM 247).
3. APPLY PRIME (ITEM 314) & TWO COURSE SURFACE TREATMENT (ITEM 316).
4. PGL WILL BE 10" HIGHER THAN EXISTING.

** NOTE: THE LIMITS FROM STA 96+50 TO STA 97+10 ARE EXEMPT **

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

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FM 636
PROPOSED
TYPICAL SECTIONS

NOT TO SCALE

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	10
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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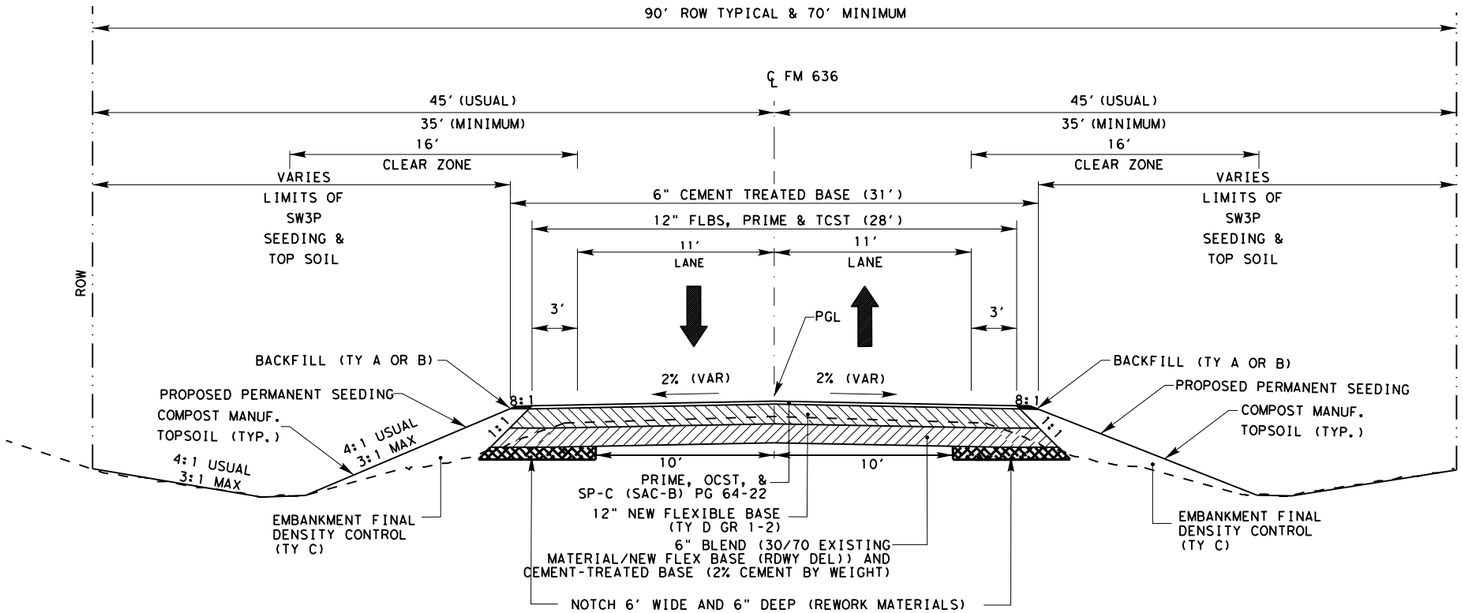

PROPOSED TYPICAL SECTION

STA. 62+97.00 TO STA. 79+01.00
STA. 149+57.00 TO STA. 154+01.00
STA. 398+16.00 TO STA. 407+27.00
STA. 435+40.00 TO STA. 441+40.00

1. REWORK 8" OF EX MATERIALS (22' WIDE) (ITEM 251), AND SPREAD OUT OVER TO 31' SECTION. THEN FILL 6' X 0.5' NOTCHES ON EACH SIDE OF SECTION (ITEM 112) , AND MIX 6" WITH 2% CEMENT (31' WIDE)(ITEM 275).
2. PLACE 12" OF NEW FLEXIBLE BASE MATERIAL (28' WIDE) (ITEM 247).
3. APPLY PRIME (ITEM 314) & ONE COURSE SURFACE TREATMENT (ITEM 316).
4. PLACE 2" SUPERPAVE SP-C PG 64-22 (SAC-B) (28' WIDE)(ITEM 3077).
5. PGL WILL BE 12" HIGHER THAN EXISTING.

** NOTE: THE LIMITS FROM STA 96+50 TO STA 97+10 ARE EXEMPT **

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
PROPOSED
TYPICAL SECTIONS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	11
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:31:11 PM
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SPECIFICATION DATA

Table 1: Soil Constants Requirements				
Item	Description	Plasticity Index		Note
		Max	Min	
132	EMBANKMENT (FINAL)(DC)(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
161	Compost Manuf Topsoil	4”			301,767 SY
162	Block Sod	N/A	See Specifications		858 SY
164	Drill Seed (Perm) (R) (C)	N/A	See Specifications		300,909 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	31,175 LBS
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	44,892 MG
247	FL BS (CMP IN PLC)(TY-D GR-1-2)(12")	12”			140,638 SY
247	FL BS (RDWY DEL) (TY D GR 1-2)	N/A			19,464 Ton
251	REWORK BS MTL (TY B) (8")(ORD COMP)	8”		N/A	110,501 SY
275	Cement	N/A	2	% by weight	820 TON
275	CEMENT TREAT(EXIST MATL)(6")	6”		NA	155,706 SY
314	Prime Coat (MS-2 or SS-1)	N/A	0.20	Gal/SY	28,813 Gal
316	Asph (CRS-2P)	See Specifications Below			70,319 GAL
316	Asph (RC-250)	See Specifications Below			12,996 GAL
316	Asph (AC-15P, AC-20-5TR, AC-20XP)	See Specifications Below			46,644 GAL
316	Aggr (TY-B GR-5 or TY-L GR-5)	See Specifications Below			372 CY

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316	Aggr (TY-PB GR-4 or TY-PL GR-4)(SAC-B)	See Specifications Below			1,080 CY
316	Aggr (TY-B GR-4 or TY-L GR-4) (SAC-B)	See Specifications Below			387 CY
316	Aggr (TY-B GR-3 or TY-L GR-3)(SAC-B)	See Specificationa Below			1,340 CY
3077	SP MIXES SP-C SAC-B PG64-22	SP Plans	110	Lbs./SY/In	1,416 Ton
*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. ***Portland Concrete Cement					
Note: (1) Base material weight based on 1.50 Ton/CY (dry- compacted) (2) Asphalt weight based on 110 Lbs./SY/In (3) Subgrade weight based on 1.75 Ton/CY (dry-compacted) (4) Item 314 Residual Asphalt 0.20 Gal/SY					

Table 3: Basis of Estimate for Temporary Erosion Control Items				
Item	Description	Rate		Quantity
164	Drill Seeding (Temp) (Warm or Cool)	See Specifications		300,909 SY
166*	Fertilizer (12-6-6)	500	Lb/Ac	31,175 LBS
168	Vegetative Watering (Warm)**	12	MG/Ac/Day	44,892 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.				

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 93.4 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 resource 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.

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

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):

Juan Paredes Juan.Paredes@txdot.gov
Amanda McKittrick Amanda.McKittrick@txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT’s Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

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

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 (214-320-6205) for locates a minimum of 48 hours in advance of excavation. If city or tow n
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)

No significant traffic generator events identified.

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

Nighttime work is allowed in accordance with Article 8.3.3.

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.

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.

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.

Tree trimming and tree brush removal shall be performed in accordance to details shown on TRB-15(1)DAL.

Avoid pruning oak trees between March 15 and the end of June to limit the potential spread of Oak Wilt disease.

Department will mark any trees to be removed with florescent orange paint.

Do not use a telescopic side boom rotary mower.

Tree Removal – Cut all trees as close to the ground as possible but no higher than 6 in. above the ground level until the stump can be removed according to the plans.

Brush Removal – Remove all brush at culverts, headwalls, wingwalls, guardrail, cable barrier, riprap, and as directed.

The limits of preparing right of way will be measured from Sta. 0+75 to Sta. 453+40 along the centerline of construction, excluding Sta. 96+50 to Sta. 97+10.

Remove and dispose of all dead fall (trees and/or limbs already fallen to the ground) from within the limits of the right of way. Any limbs that are less than 4 in. in diameter will be paid for in the same manner as trees that are to be felled and removed.

Do not use any chemical agents to aid in the deterioration or removal of the stump.

Do not prune the canopy to less than half of the overall height of the tree.

Trees blocking signs shall be trimmed as directed.

Burning of brush will not be permitted. Cleanup shall be continuous and concurrent with pruning, trimming, and removal operations.

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Item 104:
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 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.

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:

<table>
<tr><th></th><th>AC20-5TR, AC20-XP
AC15-P</th><th>CRS-2P</th><th>RC-250</th></tr>
<tr><td>JANUARY</td><td></td><td></td><td rowspan="3">REQUIRES INTERMEDIATE COURSE TO BE PLACED</td></tr>
<tr><td>FEBRUARY</td><td></td><td></td></tr>
<tr><td>MARCH</td><td></td><td rowspan="4">REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS</td><td></td></tr>
<tr><td>APRIL</td><td></td><td></td></tr>
<tr><td>MAY</td><td rowspan="4">REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS</td><td></td><td></td></tr>
<tr><td>JUNE</td><td></td><td></td></tr>
<tr><td>JULY</td><td></td><td></td></tr>
<tr><td>AUGUST</td><td></td><td></td></tr>
</table>

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<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>SEPTEMBER</td><td></td><td rowspan="4">REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>OCTOBER</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>NOVEMBER</td><td></td><td></td><td rowspan="4">REQUIRES INTERMEDIATE COURSE TO BE PLACED</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>DECEMBER</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

RC-250 is only allowed as a first course in accordance with table above.

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.

<table>
<tr><th colspan="5">First Course</th></tr>
<tr><th rowspan="2">ITEM</th><th colspan="4">APPLICATION</th></tr>
<tr><th>Emul. Asphalt Treatment</th><th colspan="3">1st Course</th></tr>
<tr><td>*Asphalt Type</td><td>MS-2 or SS-1</td><td>CRS-2P</td><td>AC20-5TR, AC20-XP, AC15-P</td><td>RC-250 #</td></tr>
<tr><td>*Asph. Rate (Gal/SY)</td><td>0.20</td><td>0.50</td><td>0.42</td><td>0.28</td></tr>
<tr><td>Aggregate Type</td><td></td><td>B or L</td><td>B or L</td><td>B or L</td></tr>
<tr><td>Aggregate Grade</td><td></td><td>3</td><td>3</td><td>5</td></tr>
<tr><td>Aggr. Rate (CY/SY)</td><td></td><td>1:105</td><td>1:105</td><td>1:125</td></tr>
<tr><td>Min. Cure Time</td><td>24 hrs</td><td colspan="3">14 days (Emulsion)</td></tr>
</table>

When RC-250 is used as the 1st course, an intermediate course will be required and will be placed as soon as temperature allows which will be before 2nd Course is placed.

Intermediate Seal	
ITEM	APPLICATION
	Intermediate Course
*Asphalt Type	CRS-2P
*Asph. Rate (Gal/SY)	0.44
Aggregate Type	B or L
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

Second Course	
ITEM	APPLICATION
	2nd Course
*Asphalt Type	AC20-5TR, AC20-XP, AC15-P
*Asph. Rate (Gal/SY)	0.36
Aggregate Type	PB or PL
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

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

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.

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.

Provide sulfate resistant concrete for box culverts and all drilled shafts.

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Strength evaluation using maturity testing, Tex-426-A, may be used for all concrete elements except drilled shafts and mass concrete pours.

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.

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.

Do not commence work on the road before sunrise. 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.

Traffic Control Plans with Lane Closures causing backups of 10 minutes or greater in duration will be modified by the Engineer.

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

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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 540:
Furnish one type of post throughout the project except as specifically noted in the plans.

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

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

Items 644:
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 730:
At the discretion of the Engineer, mow non-paved areas within the project prior to placement of permanent vegetation. Mow up to three (3) cycles per growing season.

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

Superpave Mixtures used as concrete pavement underlayment is deemed as "Exempt Production".

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

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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	
(1-1)-18 / (1-2)-18			1	
(1-3)-18	A	B	1	2

TCP 2 Series	Scenario	Required TMA/TA
(2-1)-18 / (2-2)-18	All	1

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

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 0574-02-021 **DISTRICT** Dallas **COUNTY** Navarro
HIGHWAY FM 636

		CONTROL SECTION JOB		**0574-02-021**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00031508**			
		COUNTY		**Navarro**			
		HIGHWAY		**FM 636**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	452.000		452.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	169.000		169.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	800.000		800.000	
	110-6001	EXCAVATION (ROADWAY)	CY	15,808.000		15,808.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	452.000		452.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	57,824.000		57,824.000	
	134-6004	BACKFILL (TY A OR B)	STA	452.000		452.000	
	152-6001	ROAD GRADER WORK (ORD COMP)	STA	452.000		452.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	301,767.000		301,767.000	
	162-6002	BLOCK SODDING	SY	858.000		858.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	300,909.000		300,909.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	300,909.000		300,909.000	
	168-6001	VEGETATIVE WATERING	MG	44,892.000		44,892.000	
	247-6133	FL BS (RDWY DEL) (TY D GR 1-2)	TON	19,464.000		19,464.000	
	247-6313	FL BS (CMP IN PLC)(TY D GR1-2)(12")	SY	140,638.000		140,638.000	
	251-6026	REWORK BS MTL (TY B) (8") (ORD COMP)	SY	110,501.000		110,501.000	
	275-6001	CEMENT	TON	820.000		820.000	
	275-6004	CEMENT TREAT (MX EXST MTL & NW BS) (6")	SY	155,706.000		155,706.000	
	314-6021	EMULS ASPH (PRIME)(MS-2 OR SS-1)	GAL	28,813.000		28,813.000	
	316-6024	ASPH (CRS-2P)	GAL	70,320.000		70,320.000	
	316-6029	ASPH (RC-250)	GAL	12,996.000		12,996.000	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)	CY	372.000		372.000	
	316-6419	ASPH (AC-15P, AC-20-5TR OR AC-20XP)	GAL	46,644.000		46,644.000	
	316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	CY	1,080.000		1,080.000	
	316-6435	AGGR (TY-B GR-4 OR TY-L GR-4 SAC-B)	CY	387.000		387.000	
	316-6440	AGGR (TY-B GR-3 OR TY-L GR-3)(SAC-B)	CY	1,416.000		1,416.000	
	400-6008	CUT & RESTORE ASPH PAVING	SY	194.000		194.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	101.000		101.000	
	403-6001	TEMPORARY SPL SHORING	SF	957.000		957.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	352.000		352.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	20.000		20.000	
	462-6052	CONC BOX CULV (5 FT X 4 FT)(EXTEND)	LF	12.000		12.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	672.000		672.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	572.000		572.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	208.000		208.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	16.000		16.000	
	464-6009	RC PIPE (CL III)(42 IN)	LF	12.000		12.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0574-02-021 **DISTRICT** Dallas **COUNTY** Navarro
HIGHWAY FM 636

		CONTROL SECTION JOB		**0574-02-021**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00031508**			
		COUNTY		**Navarro**			
		HIGHWAY		**FM 636**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	464-6010	RC PIPE (CL III)(48 IN)	LF	188.000		188.000	
	466-6003	HEADWALL (CH - FW - 0) (DIA= 18 IN)	EA	2.000		2.000	
	466-6097	HEADWALL (CH - PW - 0) (DIA= 24 IN)	EA	9.000		9.000	
	466-6099	HEADWALL (CH - PW - 0) (DIA= 30 IN)	EA	4.000		4.000	
	466-6101	HEADWALL (CH - PW - 0) (DIA= 36 IN)	EA	2.000		2.000	
	466-6103	HEADWALL (CH - PW - 0) (DIA= 48 IN)	EA	4.000		4.000	
	466-6130	HEADWALL (CH - PW - S) (DIA= 24 IN)	EA	2.000		2.000	
	466-6132	HEADWALL (CH - PW - S) (DIA= 30 IN)	EA	2.000		2.000	
	466-6135	HEADWALL (CH - PW - S) (DIA= 42 IN)	EA	2.000		2.000	
	466-6136	HEADWALL (CH - PW - S) (DIA= 48 IN)	EA	2.000		2.000	
	466-6181	WINGWALL (PW - 1) (HW=6 FT)	EA	2.000		2.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	60.000		60.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	3.000		3.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	24.000		24.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	19.000		19.000	
	496-6005	REMOV STR (WINGWALL)	EA	2.000		2.000	
	496-6006	REMOV STR (HEADWALL)	EA	34.000		34.000	
	496-6007	REMOV STR (PIPE)	LF	392.000		392.000	
	496-6023	REMOVE STR (JUNCTION BOX)	EA	1.000		1.000	
	496-6050	REMOV STR (DRIVEWAY CULVERT)	EA	43.000		43.000	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	19.000		19.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	3,240.000		3,240.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	3,240.000		3,240.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	225.000		225.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	225.000		225.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	7,425.000		7,425.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	7,425.000		7,425.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	500.000		500.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	500.000		500.000	
	530-6005	DRIVEWAYS (ACP)	SY	2,391.000		2,391.000	
	530-6006	DRIVEWAYS (SURF TREAT)	SY	1,387.000		1,387.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	169.000		169.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	7,118.000		7,118.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	3,559.000		3,559.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0574-02-021 **DISTRICT** Dallas **COUNTY** Navarro
HIGHWAY FM 636

		CONTROL SECTION JOB		**0574-02-021**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00031508**			
		COUNTY		**Navarro**			
		HIGHWAY		**FM 636**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	100.000		100.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)	EA	2.000		2.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA	22.000		22.000	
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4	EA	3.000		3.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	79.000		79.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	5.000		5.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	84.000		84.000	
	658-6048	INSTL OM ASSM (OM-2Z)(FLX)GND	EA	104.000		104.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	30.000		30.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	89,760.000		89,760.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	5,824.000		5,824.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	300.000		300.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	3,759.000		3,759.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	3,759.000		3,759.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	7,518.000		7,518.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	83,394.000		83,394.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	4,980.000		4,980.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	54,042.000		54,042.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	982.000		982.000	
	730-6107	FULL - WIDTH MOWING	CYC	4.000		4.000	
	3077-6013	SP MIXESSP-CSAC-B PG64-22	TON	1,218.000		1,218.000	
	3077-6075	TACK COAT	GAL	1,218.000		1,218.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	300.000		300.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	125.000		125.000	
	18	ENVIRONMENTAL: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF TRAFFIC CONTROL ITEMS

LOCATION	662 6034	662 6111	6001 6002	6185 6002	6185 6003
	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TYY-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	EA	EA	DAY	HR
STA 0+75.00 TO STA 453+40.00	89760	5824	2	300	125
PROJECT TOTALS	**89760**	**5824**	**2**	**300**	**125**

FM 636
SUMMARY

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	14
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF ROADWAY ITEMS

LOCATION	100 6002	112 6001	134 6004	152 6001
	PREPARING ROW	SUBGRADE WIDENING (ORD COMP)	BACKFILL (TY A OR B)	ROAD GRADER WORK (ORD COMP)
	STA	STA	STA	STA
STA 0+75.00 TO STA 453+40.00	452	452	452	452
PROJECT TOTALS	**452**	**452**	**452**	**452**

SUMMARY OF ROADWAY ITEMS

LOCATION	247 6133	247 6313	251 6026	275 6001	275 6004	314 6021	316 6024	316 6029	316 6403	316 6419	316 6434	316 6435	316 6440	3077 6013	3077 6075
	FL BS (RDWY DEL) (TY D GR 1-2)	FL BS (CMP IN PLC)(TY D GR1-2) (12")	REWORK BS MTL (TY B) (8") (ORD COMP)	CEMENT	CEMENT TREAT (MX EXST MTL & NW BS) (6")	EMULS ASPH (PRIME)(MS-2 OR SS-1)	ASPH (CRS-2P)	ASPH (RC-250)	AGGR (TY-B GR-5 OR TY-L GR-5)	ASPH (AC-15P, AC-20-5TR OR AC-20XP)	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	AGGR (TY-B GR-4 OR TY-L GR-4 SAC-B)	AGGR (TY-B GR-3 OR TY-L GR-3)(SAC-B)	SUPERPAVE MIXTURES SP-C SAC-B PG64-22	TACK COAT
	TON	SY	SY	TON	SY	GAL	GAL	GAL	CY	GAL	CY	CY	CY	TON	GAL
STA 0+75.00 TO STA 453+40.00	19464	140638	110501	820	155706	28813	70320	12996	372	46644	1080	387	1416	1218	1218
PROJECT TOTALS	**19464**	**140638**	**110501**	**820**	**155706**	**28813**	**70320**	**12996**	**372**	**46644**	**1080**	**387**	**1339**	**1218**	**1218**

SUMMARY OF ROADWAY ITEMS

LOCATION	432 6045	540 6001	540 6020	544 6001
	RIPRAP (MOW STRIP) (4IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN (LONGSPAN SYSTEM)	GUARDRAIL END TREATMENT (INSTALL)
	CY	LF	EA	EA
STA 0+75.00 TO STA 453+40.00	20	100	2	4
PROJECT TOTALS	**20**	**100**	**2**	**4**

Texas Department of Transportation

FM 636
SUMMARY
ROADWAY ITEMS

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	15
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

EARTHWORK SUMMARY

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
000+75	001+00	15	4
001+00	002+00	43	53
002+00	003+00	40	87
003+00	004+00	46	90
004+00	005+00	40	148
005+00	006+00	33	205
006+00	007+00	25	225
007+00	008+00	21	239
008+00	009+00	20	220
009+00	010+00	27	170
010+00	011+00	33	128
011+00	012+00	35	116
012+00	013+00	28	226
013+00	014+00	26	227
014+00	015+00	35	97
015+00	016+00	35	85
016+00	017+00	30	109
017+00	018+00	33	112
018+00	019+00	33	156
019+00	020+00	25	277
020+00	021+00	27	254
021+00	022+00	27	181
022+00	023+00	19	222
023+00	024+00	18	240
024+00	025+00	23	223
025+00	026+00	33	134
026+00	027+00	39	78
027+00	028+00	33	104
028+00	029+00	32	114
029+00	030+00	34	153
030+00	031+00	27	194
031+00	032+00	27	183
032+00	033+00	31	172
033+00	034+00	30	181
034+00	035+00	32	164
035+00	036+00	33	150
036+00	037+00	35	134
037+00	038+00	38	180
038+00	039+00	40	163
039+00	040+00	37	111
040+00	041+00	35	134
041+00	042+00	43	85
042+00	043+00	46	72
043+00	044+00	43	105
044+00	045+00	40	105
045+00	046+00	41	99
046+00	047+00	45	98
047+00	048+00	44	119
048+00	049+00	39	157
049+00	050+00	40	187
050+00	051+00	41	164
051+00	052+00	41	135
052+00	053+00	45	131
053+00	054+00	45	129
054+00	055+00	45	105
055+00	056+00	44	142
056+00	057+00	46	158
057+00	058+00	45	104
058+00	059+00	38	108
059+00	060+00	34	126
060+00	061+00	31	142
061+00	062+00	30	151
062+00	063+00	33	152
063+00	064+00	34	134
064+00	065+00	33	130
065+00	066+00	35	200
066+00	067+00	42	306
067+00	068+00	43	262
068+00	069+00	38	136
069+00	070+00	33	114
070+00	071+00	28	126

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
071+00	072+00	32	118
072+00	073+00	29	111
073+00	074+00	26	100
074+00	075+00	30	85
075+00	076+00	30	86
076+00	077+00	29	97
077+00	078+00	28	123
078+00	079+00	28	163
079+00	080+00	26	177
080+00	081+00	30	148
081+00	082+00	33	132
082+00	083+00	31	137
083+00	084+00	33	145
084+00	085+00	33	167
085+00	086+00	31	164
086+00	087+00	29	158
087+00	088+00	27	167
088+00	089+00	28	165
089+00	090+00	32	161
090+00	091+00	32	153
091+00	092+00	30	147
092+00	093+00	34	145
093+00	094+00	31	178
094+00	095+00	26	325
095+00	096+00	0	0
096+00	097+00	0	0
097+00	098+00	0	0
098+00	098+60	0	0
098+60	099+00	14	53
099+00	100+00	30	154
100+00	101+00	28	161
101+00	102+00	32	158
102+00	103+00	37	141
103+00	104+00	37	138
104+00	105+00	36	152
105+00	106+00	34	163
106+00	107+00	33	169
107+00	108+00	33	177
108+00	109+00	30	197
109+00	110+00	27	259
110+00	111+00	30	270
111+00	112+00	33	215
112+00	113+00	31	199
113+00	114+00	32	176
114+00	115+00	35	154
115+00	116+00	38	154
116+00	117+00	38	143
117+00	118+00	36	119
118+00	119+00	37	102
119+00	120+00	37	101
120+00	121+00	38	119
121+00	122+00	34	148
122+00	123+00	34	155
123+00	124+00	38	131
124+00	125+00	38	139
125+00	126+00	36	175
126+00	127+00	35	198
127+00	128+00	38	199
128+00	129+00	39	159
129+00	130+00	34	144
130+00	131+00	34	151
131+00	132+00	37	141
132+00	133+00	41	142
133+00	134+00	43	145
134+00	135+00	35	158
135+00	136+00	31	170
136+00	137+00	35	157
137+00	138+00	34	152
138+00	139+00	35	151
139+00	140+00	40	140
140+00	141+00	47	125

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
141+00	142+00	42	130
142+00	143+00	33	161
143+00	144+00	40	160
144+00	145+00	45	131
145+00	146+00	40	131
146+00	147+00	37	127
147+00	148+00	46	104
148+00	149+00	48	102
149+00	150+00	40	109
150+00	151+00	32	179
151+00	152+00	33	232
152+00	153+00	33	215
153+00	154+00	35	180
154+00	155+00	44	121
155+00	156+00	45	89
156+00	157+00	48	75
157+00	158+00	50	71
158+00	159+00	46	78
159+00	160+00	44	86
160+00	161+00	41	101
161+00	162+00	40	106
162+00	163+00	39	107
163+00	164+00	36	114
164+00	165+00	38	107
165+00	166+00	40	102
166+00	167+00	40	102
167+00	168+00	36	111
168+00	169+00	33	117
169+00	170+00	43	98
170+00	171+00	54	79
171+00	172+00	56	68
172+00	173+00	53	43
173+00	174+00	44	58
174+00	175+00	51	79
175+00	176+00	55	69
176+00	177+00	43	72
177+00	178+00	42	71
178+00	179+00	45	74
179+00	180+00	46	85
180+00	181+00	45	93
181+00	182+00	40	93
182+00	183+00	34	99
183+00	184+00	30	109
184+00	185+00	30	104
185+00	186+00	36	94
186+00	187+00	35	101
187+00	188+00	34	99
188+00	189+00	35	102
189+00	190+00	34	117
190+00	191+00	33	123
191+00	192+00	31	124
192+00	193+00	33	118
193+00	194+00	33	110
194+00	195+00	33	103
195+00	196+00	33	104
196+00	197+00	33	101
197+00	198+00	29	108
198+00	199+00	27	129
199+00	200+00	28	132
200+00	201+00	27	120
201+00	202+00	29	118
202+00	203+00	33	128
203+00	204+00	37	139
204+00	205+00	34	141
205+00	206+00	39	94
206+00	207+00	41	81
207+00	208+00	39	92
208+00	209+00	43	71
209+00	210+00	43	67
210+00	211+00	41	68
211+00	212+00	41	72

	110 6001	132 6006
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT) (TY C)
	CY	CY
SHEET TOTAL	7,440	28,528

DATE:1/6/2021 TIME:2:32:39 PM
FILE:pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\1. General\Summaries\Earthwork Summ.dgn

Texas Department of Transportation

FM 636
SUMMARY
EARTHWORK

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DAL	NAVARRO	16
CHECK	CONTROL	SECTION	JOB	
MK	0574	02	021	
CHECK				

EARTHWORK SUMMARY

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
141+00	142+00	42	130
142+00	143+00	33	161
143+00	144+00	40	160
144+00	145+00	45	131
145+00	146+00	40	131
146+00	147+00	37	127
147+00	148+00	46	104
148+00	149+00	48	102
149+00	150+00	40	109
150+00	151+00	32	179
151+00	152+00	33	232
152+00	153+00	33	215
153+00	154+00	35	180
154+00	155+00	44	121
155+00	156+00	45	89
156+00	157+00	48	75
157+00	158+00	50	71
158+00	159+00	46	78
159+00	160+00	44	86
160+00	161+00	41	101
161+00	162+00	40	106
162+00	163+00	39	107
163+00	164+00	36	114
164+00	165+00	38	107
165+00	166+00	40	102
166+00	167+00	40	102
167+00	168+00	36	111
168+00	169+00	33	117
169+00	170+00	43	98
170+00	171+00	54	79
171+00	172+00	56	68
172+00	173+00	53	43
173+00	174+00	44	58
174+00	175+00	51	79
175+00	176+00	55	69
176+00	177+00	43	72
177+00	178+00	42	71
178+00	179+00	45	74
179+00	180+00	46	85
180+00	181+00	45	93
181+00	182+00	40	93
182+00	183+00	34	99
183+00	184+00	30	109
184+00	185+00	30	104
185+00	186+00	36	94
186+00	187+00	35	101
187+00	188+00	34	99
188+00	189+00	35	102
189+00	190+00	34	117
190+00	191+00	33	123
191+00	192+00	31	124
192+00	193+00	33	118
193+00	194+00	33	110
194+00	195+00	33	103
195+00	196+00	33	104
196+00	197+00	33	101
197+00	198+00	29	108
198+00	199+00	27	129
199+00	200+00	28	132
200+00	201+00	27	120
201+00	202+00	29	118
202+00	203+00	33	128
203+00	204+00	37	139
204+00	205+00	34	141
205+00	206+00	39	94
206+00	207+00	41	81
207+00	208+00	39	92
208+00	209+00	43	71
209+00	210+00	43	67
210+00	211+00	41	68
211+00	212+00	41	72

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
283+00	284+00	29	143
284+00	285+00	35	103
285+00	286+00	40	68
286+00	287+00	32	108
287+00	288+00	25	114
288+00	289+00	24	118
289+00	290+00	26	116
290+00	291+00	27	110
291+00	292+00	27	111
292+00	293+00	27	128
293+00	294+00	31	119
294+00	295+00	36	104
295+00	296+00	36	104
296+00	297+00	37	100
297+00	298+00	37	96
298+00	299+00	33	110
299+00	300+00	29	136
300+00	301+00	28	182
301+00	302+00	28	225
302+00	303+00	29	197
303+00	304+00	31	136
304+00	305+00	32	120
305+00	306+00	32	116
306+00	307+00	39	92
307+00	308+00	43	76
308+00	309+00	42	74
309+00	310+00	37	97
310+00	311+00	36	108
311+00	312+00	38	104
312+00	313+00	37	100
313+00	314+00	35	95
314+00	315+00	31	110
315+00	316+00	29	135
316+00	317+00	28	139
317+00	318+00	28	126
318+00	319+00	29	121
319+00	320+00	30	127
320+00	321+00	30	131
321+00	322+00	30	137
322+00	323+00	29	138
323+00	324+00	30	120
324+00	325+00	31	108
325+00	326+00	32	93
326+00	327+00	29	113
327+00	328+00	30	127
328+00	329+00	34	124
329+00	330+00	34	147
330+00	331+00	32	172
331+00	332+00	30	199
332+00	333+00	28	263
333+00	334+00	30	217
334+00	335+00	33	183
335+00	336+00	30	229
336+00	337+00	33	182
337+00	338+00	33	150
338+00	339+00	31	131
339+00	340+00	35	115
340+00	341+00	42	106
341+00	342+00	42	134
342+00	343+00	31	165
343+00	344+00	33	128
344+00	345+00	41	87
345+00	346+00	44	85
346+00	347+00	43	87
347+00	348+00	46	81
348+00	349+00	46	89
349+00	350+00	34	110
350+00	351+00	27	138
351+00	352+00	29	146
352+00	353+00	29	228
353+00	354+00	27	238

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
354+00	355+00	29	145
355+00	356+00	29	128
356+00	357+00	31	122
357+00	358+00	37	80
358+00	359+00	32	105
359+00	360+00	25	163
360+00	361+00	26	157
361+00	362+00	27	135
362+00	363+00	30	111
363+00	364+00	38	81
364+00	365+00	35	87
365+00	366+00	27	114
366+00	367+00	28	112
367+00	368+00	27	125
368+00	369+00	29	133
369+00	370+00	30	131
370+00	371+00	29	133
371+00	372+00	33	109
372+00	373+00	35	139
373+00	374+00	34	187
374+00	375+00	39	139
375+00	376+00	49	81
376+00	377+00	41	93
377+00	378+00	30	110
378+00	379+00	30	137
379+00	380+00	35	132
380+00	381+00	39	123
381+00	382+00	37	144
382+00	383+00	32	148
383+00	384+00	28	160
384+00	385+00	28	155
385+00	386+00	31	138
386+00	387+00	33	116
387+00	388+00	34	105
388+00	389+00	35	95
389+00	390+00	39	75
390+00	391+00	39	76
391+00	392+00	35	94
392+00	393+00	33	109
393+00	394+00	33	120
394+00	395+00	32	120
395+00	396+00	30	125
396+00	397+00	31	125
397+00	398+00	34	133
398+00	399+00	34	149
399+00	400+00	31	142
400+00	401+00	32	123
401+00	402+00	31	125
402+00	403+00	30	134
403+00	404+00	33	124
404+00	405+00	37	86
405+00	406+00	35	113
406+00	407+00	31	215
407+00	408+00	29	259
408+00	409+00	27	212
409+00	410+00	30	142
410+00	411+00	31	122
411+00	412+00	30	126
412+00	413+00	31	119
413+00	414+00	46	114
414+00	415+00	48	115
415+00	416+00	33	122
416+00	417+00	31	122
417+00	418+00	34	106
418+00	419+00	38	85
419+00	420+00	39	72
420+00	421+00	37	78
421+00	422+00	36	89
422+00	423+00	35	100
423+00	424+00	33	106
424+00	425+00	35	96

	110 6001	132 6006
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT) (TY C)
	CY	CY
SHEET TOTAL	7,450	25,615

FM 636
SUMMARY
EARTHWORK

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	17
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

EARTHWORK SUMMARY

CL FM 636 STATION		110 6001	132 6006
FROM	TO	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)
		CY	CY
425+00	426+00	35	101
426+00	427+00	33	106
427+00	428+00	31	107
428+00	429+00	32	106
429+00	430+00	36	98
430+00	431+00	35	138
431+00	432+00	35	229
432+00	433+00	34	270
433+00	434+00	32	205
434+00	435+00	32	149
435+00	436+00	27	145
436+00	437+00	29	134
437+00	438+00	31	129
438+00	439+00	28	131
439+00	440+00	29	112
440+00	441+00	36	80
441+00	442+00	36	81
442+00	443+00	29	106
443+00	444+00	31	119
444+00	445+00	31	123
445+00	446+00	31	112
446+00	447+00	30	108
447+00	448+00	37	95
448+00	449+00	39	82
449+00	450+00	36	90
450+00	451+00	37	102
451+00	452+00	30	129
452+00	453+00	26	197
453+00	453+40	11	99

	110 6001	132 6006
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT) (TY C)
	CY	CY
SHEET TOTAL	918	3,681
PROJECT TOTAL	15,808	57,824

FM 636
SUMMARY
EARTHWORK

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	18
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DRIVEWAY SUMMARY

DRIVEWAY NUMBER/ INTERSECTION NAME	STATION	OFFSET	EXISTING DRIVEWAY TYPE	THROAT WIDTH (FT)	0104 6017	0105 6011	0464			0467			0496 6050	0530		
							✳ 6003	✳ 6005	✳ 6007	6363	6395	6423		6005	6006	6017
					REMOV CONC DWYS	REMOV STAB BASE (2'-6")	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	SET (TY II)(18 IN)(RCP) (6:1)(P)	SET (TY II)(24 IN)(RCP) (6:1)(P)	SET (TY II)(30 IN)(RCP) (6:1)(P)	REMOV STR (DRIVEWAY CULVERT)	DRIVEWAYS (ACP)	DRIVEWAYS (SURF TREAT)	DWY (CONC) (HES)
					SY	SY	LF	LF	LF	EA	EA	EA	EA	SY	SY	SY
1	15+00	RIGHT	ASPHALT	8		27	14			2			1	27		
2	18+63	RIGHT	GRAVEL	11			17			2			1	34		
3	26+09	RIGHT	GRAVEL	14										58		
4	48+54	LEFT	GRAVEL	22			28			2			1	75		
NE0203	64+75	RIGHT	GRAVEL	21		60								60		
NE3200	71+99	LEFT	GRAVEL	27		129								129		
5	102+88	LEFT	DIRT	12			18			2			1	42		
6	123+96	LEFT	GRAVEL	30			36			2			1	121		
7	124+52	RIGHT	GRAVEL	25			31			2			1	88		
NE3210	128+81	LEFT	DIRT	26										71		
NE3230	151+25	LEFT	GRAVEL	18										38		
8	201+32	RIGHT	DIRT	21					27			2	1		77	
NE2065	206+16	RIGHT	GRAVEL	19											93	
NE2065	205+96	LEFT	GRAVEL	18											40	
9	223+54	LEFT	GRAVEL	19											72	
10	225+91	LEFT	DIRT	11				17			2		1		27	
11	227+57	RIGHT	GRAVEL	15											52	
12	250+87	LEFT	ASPHALT	22		77	28			2			1	77		
13	251+43	RIGHT	GRAVEL	14			20			2			1	50		
14	254+22	RIGHT	GRAVEL	14										46		
15	254+71	LEFT	GRAVEL	17										63		
16	256+81	LEFT	GRAVEL	12			18			2			1	43		
17	273+04	RIGHT	DIRT	18											100	
NE3180	285+11	LEFT	GRAVEL	24											101	
NE2050	284+98	RIGHT	GRAVEL	27											116	
18	288+50	LEFT	GRAVEL	13			19			2			1	44		
19	290+64	RIGHT	GRAVEL	32			38			2			1	119		
20	291+40	LEFT	GRAVEL	28			34			2			1	98		
21	294+57	RIGHT	DIRT	11											39	
22	308+23	RIGHT	GRAVEL	11										38		
23	310+40	LEFT	GRAVEL	13			19			2			1	45		
24	312+58	LEFT	GRAVEL	11			15			2			1	38		
25	316+81	LEFT	DIRT	16			22			2			1		56	
SHEET TOTAL					0	294	357	17	27	30	2	2	17	1405	773	0

✳ FOR CONTRACTOR'S INFORMATION ONLY. QUANTITIES HAVE BEEN ACCOUNTED FOR IN OTHER SUMMARY BOXES.

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FM 636
SUMMARY
DRIVEWAYS

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DAL	NAVARRO	19
CHECK	CONTROL	SECTION	JOB	
MK	0574	02	021	
CHECK				

DRIVEWAY SUMMARY

DRIVEWAY NUMBER/ INTERSECTION NAME	STATION	OFFSET	EXISTING DRIVEWAY TYPE	THROAT WIDTH (FT)	0104 6017	0105 6011	0464 ⁎6003	0464 ⁎6005	0464 ⁎6007	0467 6363	0467 6395	0467 6423	0496 6050	0530 6005	0530 6006	0530 6017
					REMOV CONC DWYS	REMOV STAB BASE (2'-6")	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	RC PIPE (CL III) (30 IN)	SET (TY II)(18 IN)(RCP) (6:1)(P)	SET (TY II)(24 IN)(RCP) (6:1)(P)	SET (TY II)(30 IN)(RCP) (6:1)(P)	REMOV STR (DRIVEWAY CULVERT)	DRIVEWAYS (ACP)	DRIVEWAYS (SURF TREAT)	DWY (CONC) (HES)
					SY	SY	LF	LF	LF	EA	EA	EA	EA	SY	SY	SY
NE3130	325+94	LEFT	ASPHALT	20		38	26			2			1	38		
26	328+07	RIGHT	GRAVEL	12				18			2		1	47		
27	339+21	RIGHT	GRAVEL	11				17			2		1		39	
28	340+73	RIGHT	GRAVEL	18				24			2		1		65	
29	341+16	LEFT	DIRT	13			19			2			1		47	
30	346+79	RIGHT	ASPHALT	16		62	22			2			1	62		
31	352+01	LEFT	GRAVEL	12			18			2			1		45	
32	357+83	RIGHT	DIRT	14			20			2			1		57	
33	358+30	LEFT	GRAVEL	36				42			2		1	129		
34	363+95	RIGHT	DIRT	14			20			2			1	54		
35	364+51	LEFT	GRAVEL	21			27			2			1	75		
36	365+73	LEFT	GRAVEL	12			18			2			1	51		
37	375+92	LEFT	CONC	10	38			16			2		1			38
38	376+77	LEFT	CONC	10	36			16			2		1			36
39	378+00	LEFT	CONC	11	44		17			2			1			44
NE2035	381+34	RIGHT	ASPHALT	25		94								94		
40	385+82	LEFT	DIRT	12			18			2			1		50	
41	390+12	RIGHT	DIRT	18			24			2			1		68	
42	391+67	RIGHT	CONC	15	51		21			2			1			51
43	396+77	LEFT	DIRT	15			21			2			1		59	
44	397+54	LEFT	DIRT	14			20			2			1		52	
45	399+80	RIGHT	GRAVEL	15				20			2		1		73	
NE2170	405+10	RIGHT	ASPHALT	24		52								52		
46	426+70	LEFT	DIRT	17				23			2		1	64		
47	439+59	LEFT	DIRT	12			18			2			1	32		
NE3140	441+05	LEFT	ASPHALT	32		166								166		
48	442+44	RIGHT	ASPHALT	15		38								38		
49	447+94	LEFT	GRAVEL	12				18			2		1	29		
50	452+25	LEFT	GRAVEL	12				18			2		1		25	
51	452+61	LEFT	GRAVEL	14				20			2		1		34	
Morgan Springs Rd.	453+31	LEFT	ASPHALT	25		55								55		
				SHEET TOTAL	169	506	309	232	0	30	22	0	26	986	614	169
				DRIVEWAY TOTAL	169	800	666	249	27	60	24	2	43	2391	1387	169

MAILBOX SUMMARY

DRIVEWAY NUMBER/ INTERSECTION NAME	STATION	OFFSET	0560 6011	0560 6012
			MAILBOX INSTALL-S (TWW-POST) TY 4	MAILBOX INSTALL-D (TWW-POST) TY 4
			EA	EA
2	18+84.16	RIGHT	1	
3	25+87.38	RIGHT	1	
	32+41.00	RIGHT	1	
4	48+18.35	RIGHT	1	
	62+19.8	RIGHT	1	
12	250+79.46	RIGHT	1	
13	251+73.07	RIGHT	1	
15	254+67.97	RIGHT		1
NE3180	285+72.54	LEFT	1	
18	288+84.01	LEFT	1	
21	294+30.66	RIGHT	1	
22	308+40.17	LEFT	1	
23	310+10.98	LEFT	1	
24	312+85.29	LEFT	1	
NE3130	325+60.47	LEFT		1
26	328+04.58	LEFT	1	
30	347+01.82	LEFT	1	
33	358+59.96	LEFT	1	
35	364+12.99	LEFT		1
36	365+98.63	LEFT	1	
39	377+78.67	LEFT	1	
44	397+79.68	LEFT	1	
46	426+32.97	LEFT	1	
48	442+51.27	LEFT	1	
49	448+16.57	LEFT	1	
		TOTALS	22	3

⁎ FOR CONTRACTOR'S INFORMATION ONLY. QUANTITIES HAVE BEEN ACCOUNTED FOR IN OTHER SUMMARY BOXES.

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FM 636
SUMMARY
DRIVEWAYS

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
AM	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	20
MK	0574	02	021	
CHECK				

SUMMARY OF DRAINAGE ITEMS

LOCATION	400 6008	402 6001	403 6001	432 6031	462 6052	464 6003	464 6005	464 6007	464 6008	464 6009	464 6010
	CUT & RESTORE ASPH PAVING	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (STONE PROTECTION) (12 IN)	CONC BOX CULV (5 FT X 4 FT)(EXTEND)	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)	RC PIPE (CL III)(48 IN)
	SY	LF	SF	CY	LF	LF	LF	LF	LF	LF	LF
CULV #1, STA. 13+15.70			173	22	12						
CULV #2, STA. 19+80.28				10				20			
CULV #3, STA. 38+20.42				18						12	
CULV #4, STA. 49+63.95				13					16		
CULV #5, STA. 55+22.73				9			19				
CULV #6, STA. 67+03.98				8			17				
CULV #7, STA. 110+63.96				12			15				
CULV #8, STA. 127+65.08	25			8			53				
CULV #9, STA. 151+51.08			172	26							44
CULV #11, STA. 205+70.95				6		6					
CULV #12, STA. 206+40.47				10				14			
CULV #13, STA. 216+64.85				6			7				
CULV #14, STA. 240+32.90	26			20				93			
CULV #15, STA. 252+44.00				4							
CULV #16, STA. 265+55.00	27			14			104				
CULV #17, STA. 270+27.00	27			14			108				
CULV #18, STA. 277+55.00	23	9		16				54			
CULV #19, STA. 284+55.00	39	43	310	24							92
CULV #20, STA. 301+61.00	27	49	302	20							52
CULV #21, STA. 333+74.90				24							
CULV #22, STA. 352+75.25				22							
CULV #23, STA. 373+68.74				7							
CULV #24, STA. 380+59.00				8							
CULV #25, STA. 407+29.43				16							
CULV #26, STA. 432+21.58				15							
DRIVEWAYS						666	249	27			
PROJECT TOTALS	**194**	**101**	**957**	**352**	**12**	**672**	**572**	**208**	**16**	**12**	**188**

FM 636
SUMMARY
DRAINAGE ITEMS

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	21
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF DRAINAGE ITEMS

LOCATION	466 6003	466 6097	466 6099	466 6101	466 6103	466 6130	466 6132	466 6135	466 6136	466 6181	467 6390
	HEADWALL (CH - FW - Ø) (DIA= 18 IN)	HEADWALL (CH - PW - Ø) (DIA= 24 IN)	HEADWALL (CH - PW - Ø) (DIA= 30 IN)	HEADWALL (CH - PW - Ø) (DIA= 36 IN)	HEADWALL (CH - PW - Ø) (DIA= 48 IN)	HEADWALL (CH - PW - S) (DIA= 24 IN)	HEADWALL (CH - PW - S) (DIA= 30 IN)	HEADWALL (CH - PW - S) (DIA= 42 IN)	HEADWALL (CH - PW - S) (DIA= 48 IN)	WINGWALL (PW - 1) (HW=6 FT)	SET (TY II) (24 IN) (RCP) (4: 1) (C)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
CULV #1, STA. 13+15.70										2	
CULV #2, STA. 19+80.28			2								
CULV #3, STA. 38+20.42								2			
CULV #4, STA. 49+63.95				2							
CULV #5, STA. 55+22.73		2									
CULV #6, STA. 67+03.98		2									
CULV #7, STA. 110+63.96		2									
CULV #8, STA. 127+65.08		1									1
CULV #9, STA. 151+51.08									2		
CULV #11, STA. 205+70.95	2										
CULV #12, STA. 206+40.47											
CULV #13, STA. 216+64.85											2
CULV #14, STA. 240+32.90							2				
CULV #15, STA. 252+44.00											
CULV #16, STA. 265+55.00						2					
CULV #17, STA. 270+27.00		2									
CULV #18, STA. 277+55.00			2								
CULV #19, STA. 284+55.00					2						
CULV #20, STA. 301+61.00					2						
CULV #21, STA. 333+74.90											
CULV #22, STA. 352+75.25											
CULV #23, STA. 373+68.74											
CULV #24, STA. 380+59.00											
CULV #25, STA. 407+29.43											
CULV #26, STA. 432+21.58											
PROJECT TOTALS	2	9	4	2	4	2	2	2	2	2	3

FM 636
SUMMARY
DRAINAGE ITEMS

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	22
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF DRAINAGE ITEMS

LOCATION	467 6419	480 6001	496 6005	496 6006	496 6007	496 6023
	SET (TY II) (30 IN) (RCP) (4: 1) (C)	CLEAN EXIST CULVERTS	REMOV STR (WINGWALL)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOVE STR (JUNCTION BOX)
	EA	EA	EA	EA	LF	EA
CULV #1, STA. 13+15.70		1	2			
CULV #2, STA. 19+80.28		1		2		
CULV #3, STA. 38+20.42		1		2		
CULV #4, STA. 49+63.95		1		2		
CULV #5, STA. 55+22.73		1		2		
CULV #6, STA. 67+03.98		1		2		1
CULV #7, STA. 110+63.96		1		2		
CULV #8, STA. 127+65.08				2	45	
CULV #9, STA. 151+51.08		1		2	16	
CULV #11, STA. 205+70.95		1		2	10	
CULV #12, STA. 206+40.47	2	1		2	6	
CULV #13, STA. 216+64.85		1		2	9	
CULV #14, STA. 240+32.90		1		2	8	
CULV #15, STA. 252+44.00		1				
CULV #16, STA. 265+55.00				2	52	
CULV #17, STA. 270+27.00				2	54	
CULV #18, STA. 277+55.00				2	50	
CULV #19, STA. 284+55.00				2	92	
CULV #20, STA. 301+61.00				2	50	
CULV #21, STA. 333+74.90		1				
CULV #22, STA. 352+75.25		1				
CULV #23, STA. 373+68.74		1				
CULV #24, STA. 380+59.00		1				
CULV #25, STA. 407+29.43		1				
CULV #26, STA. 432+21.58		1				
PROJECT TOTALS	2	19	2	34	392	1

FM 636
SUMMARY
DRAINAGE ITEMS

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	23
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

LOCATION	533 6003	533 6004	644 6001	644 6004	644 6076	658 6048	658 6062
	RUMBLE STRIPS (SHOULDER) ASPHALT	RUMBLE STRIPS (CENTERLINE) ASPHALT	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Z)(FLX)GND	INSTL DEL ASSM (D-SW)SZ1 (BRF) GF2(BI)
	LF	LF	EA	EA	EA	EA	LF
STA 0+75.00 TO STA 453+40.00	7118	3559	79	5	84	104	30
PROJECT TOTALS	7118	3559	79	5	84	104	30

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

LOCATION	666 6048	666 6303	666 6309	666 6315	666 6342	666 6344	666 6345	672 6009
	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"(SLD)(100MIL)	REF PROF PAV MRK TY I(W)4"(SLD) (100MIL)	REF PROF PAV MRK TY I(Y)4"(BRK) (100MIL)	REF PROF PAV MRK TY I(Y)4"(SLD) (100MIL)	REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	LF	LF	LF	EA
STA 0+75.00 TO STA 453+40.00	300	3759	3759	7518	83394	4980	54042	982
PROJECT TOTALS	300	3759	3759	7518	83394	4980	54042	982

FM 636
SUMMARY
SIGNS & PVMT MRKS

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	24
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	161 6017	162 6002	164 6035	164 6051	168 6001	730 6107
	COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEED (TEMP)(WARM OR COOL)	VEGETATIVE WATERING	FULL - WIDTH MOWING
	SY	SY	SY	SY	MG	CYC
STA 0+75.00 TO STA 453+40.00	301767	858	300909	300909	44892	4
PROJECT TOTALS	**301767**	**858**	**300909**	**300909**	**44892**	**4**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	506 ✳ 6002	506 ✳ 6011	506 6020	506 6024	506 ✳ 6038	506 ✳ 6039	506 ✳ 6041	506 ✳ 6043
	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF	SY	SY	LF	LF	LF	LF
STA 0+75.00 TO STA 453+40.00	3240	3240	225	225	6750	6750		
10% INCREASE					675	675	500	500
PROJECT TOTALS	**3240**	**3240**	**225**	**225**	**7425**	**7425**	**500**	**500**

✳ NOTES:
-SW3P QUANTITIES ARE BEING INCREASED BY 10% TO ACCOUNT FOR REPLACEMENTS NEEDED DUE TO DAMAGE OR DIFFERING SITE CONDITIONS.

Texas Department of Transportation

FM 636
SUMMARY
EROSION CONTROL

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	25
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
1	2	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
1	3	W3-1		36" X 36"	X		10 BWG	1	SA	P		
1	4	R12-1T	WEIGHT LIMIT GROSS 58420 LBS	24" X 36"	X		10 BWG	1	SA	P		
		M3-3	SOUTH	24" X 12"								
1	5	M1-6F	FARM 636	24" X 24"	X		10 BWG	1	SA	P		
		D10-7aT	6 4	3" X 10"								
		D10-7aT	6 4	3" X 10"								
1	6	D2-1	KERENS 13	66" X 18"	X		10 BWG	1	SA	T		
		M2-1	JCT FARM 1129 ROAD	24" X 12"								
1	7				X		10 BWG	1	SA	P		
		M1-6F		24" X 24"								
3	1	W1-3L		36" X 36"	X		10 BWG	1	SA	P		
		W13-1P	30 MPH	18" X 18"								
		W1-8L										
3	2			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
3	3			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
3	4			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
3	5			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

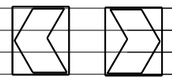
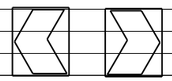
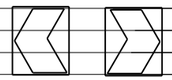
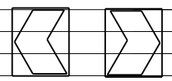
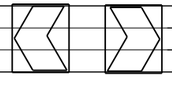
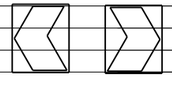
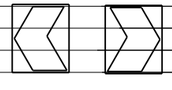
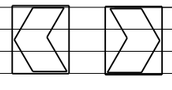
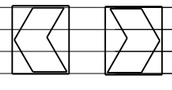
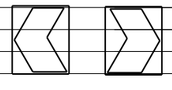
SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0574	02	021	FM 636
4-16		DIST	COUNTY		SHEET NO.
8-16		DAL	NAVARRO		26

DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
3	6	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
3	7	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
3	8	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
3	9	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
3	10	R1-1		36" X 36"	X		10 BWG	1	SA	P		
3	11	R1-1		36" X 36"	X		10 BWG	1	SA	P		
4	1	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
4	2	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
4	3	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
4	4	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
4	5	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
4	6	W1-8L W1-8R		18" X 24"	X		10 BWG	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"

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

http://www.txdot.gov/

NOTE:

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

DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0574	02	021	FM 636
4-16 8-16		DIST	COUNTY		SHEET NO.
		DAL	NAVARRO		27

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
		W1-8L										
4	7			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
4	8	W1-3L		36" X 36"								
					X		10 BWG	1	SA	P		
		W13-1P	30 MPH	18" X 18"								
		M3-1	NORTH	24" X 12"								
5	1	M1-6F	FARM 636 ROAD	24" X 24"	X		10 BWG	1	SA	P		
		D10-7aT	6 6	3" X 10"								
		D10-7aT	6 6	3" X 10"								
6	1	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
		W1-1R		36" X 36"								
6	2				X		10 BWG	1	SA	P		
		W13-1P	15 MPH	18" X 18"								
		W1-8L										
7	1			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	2			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	3			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	4			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	5			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	6			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
7	7			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										

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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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: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
4-16 8-16	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		28

DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

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
7	8	W1-1L		36" X 36"								
		W13-1P	15 MPH	18" X 18"	X		10 BWG	1	SA	P		
9	1	W1-4L		24" X 24"	X		10 BWG	1	SA	P		
9	2	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
9	3	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
9	4	M3-3	SOUTH	24" X 12"								
		M1-6F	FARM 636 ROAD	24" X 24"	X		10 BWG	1	SA	P		
		D10-7aT	6 1 8	3" X 10"								
		D10-7aT	6 1 8	3" X 10"								
10	1	W1-4L		24" X 24"	X		10 BWG	1	SA	P		
12	1	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
12	2	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
13	1	M3-1	NORTH	24" X 12"								
		M1-6F	FARM 636 ROAD	24" X 24"	X		10 BWG	1	SA	P		
		D10-7aT	6 2 0	3" X 10"								
		D10-7aT	6 2 0	3" X 10"								
14	1	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
14	2	W1-4L		36" X 36"	X		10 BWG	1	SA	P		
		W13-1P	45 MPH	18" X 18"	X							
16	1	R1-1	STOP	36" X 36"	X		10 BWG	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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http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

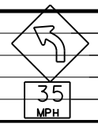
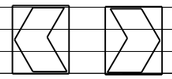
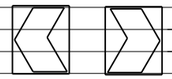
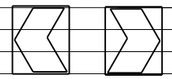
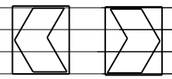
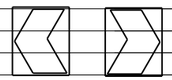
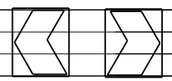
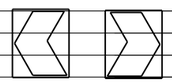
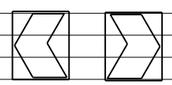
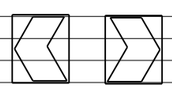
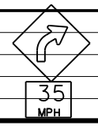
SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0574	02	021	FM 636
4-16		DIST	COUNTY		SHEET NO.
8-16		DAL	NAVARRO		29

DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

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
17	1	W1-2L		36" X 36"								
		W13-1P		18" X 18"	X		10 BWG	1	SA	P		
17	2	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	3	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	4	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	5	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	6	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	7	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	8	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	9	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
17	10	R1-1		36" X 36"	X		10 BWG	1	SA	P		
18	1	W1-8L W1-8R		18" X 24"	X		10 BWG	1	SA	P		
18	2	W1-2R W13-1P		36" X 36" 18" X 18"	X		10 BWG	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"

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

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NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
4-16 8-16	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		30

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
		M3-3	SOUTH FARM 636 ROAD	24" X 12"								
18	3				X		10 BWG	1	SA	P		
		M1-6F		24" X 24"								
		D10-7aT	636	3" X 10"								
		D10-7aT	636	3" X 10"								
18	4	W1-2R		36" X 36"								
					X		10 BWG	1	SA	P		
		W13-1	45 MPH	18" X 18"								
		W1-8L										
19	1			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	2			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	3			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	4			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	5			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	6			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
		W1-8L										
19	7			18" X 24"	X		10 BWG	1	SA	P		
		W1-8R										
19	8	D3-3bTL	Bazette Cemetery	54" X 36"	X		10 BWG	1	SA	T		
19	9	D3-3bTL	Prairie Point Cemetery	66" X 36"	X		10 BWG	1	SA	T		
19	10	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		

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FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0574	02	021	FM 636
4-16		DIST	COUNTY		SHEET NO.
8-16		DAL	NAVARRO		31

DATE: 11/18/2020 07:54 AM
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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
19	11	D3-3bTR	Bazette Cemetery ⇨	54" X 36"	X		10 BWG	1	SA	T		
19	12	D3-3bTR	Prairie Point Cemetery ⇨	66" X 36"	X		10 BWG	1	SA	T		
19	13	W1-2R		36" X 36"	X		10 BWG	1	SA	P		
		W13-1P	35 MPH	18" X 18"								
19	14	R1-1	STOP	36" X 36"	X		10 BWG	1	SA	P		
5	2	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
5	3	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
9	5	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
9	6	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
13	2	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
13	3	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
18	5	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		
18	6	R2-1	SPEED LIMIT 55	24" X 30"	X		10 BWG	1	SA	P		

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
4-16	DIST	COUNTY		SHEET NO.
8-16	DAL	NAVARRO		32

DATE: 11/18/2020 07:54 AM
FILE: $DOCUMENT NAME$

THE FOLLOWING SEQUENCE OF WORK IS THE SUGGESTED METHOD OF PROSECUTION OF THE CONSTRUCTION ACTIVITIES OF THIS PROJECT. THIS SEQUENCE OF WORK MAY BE REVISED WITH THE APPROVAL OF THE ENGINEER.

GENERAL

1. LIMIT LANE CLOSURES AT CROSS STREETS TO THE HOURS BETWEEN 9:00 AM AND 4:00 PM, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

2. DAILY OPERATION ONLY. CONTRACTOR SHALL RESTORE EDGE CONDITIONS IN ACCORDANCE WITH EDGE CONDITION SHEET AT THE END OF EACH WORKDAY

3. ACCESS TO DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES AND CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

4. TRAFFIC CONTROL & LANE CLOSURES WILL BE IN ACCORDANCE WITH THE PLANS, BC, TCP, AND WZ STANDARDS AND AS DIRECTED BY THE ENGINEER. OVERNIGHT LANE CLOSURES WILL BE PERMITTED, AS APPROVED BY THE ENGINEER. LIMIT LANE CLOSURES TO 1-MILE IN LENGTH.

5. THE CONTRACTOR WILL PROVIDE AND MAINTAIN SKILLED FLAGGERS EQUIPPED WITH TWO-WAY RADIOS TO HANDLE TRAFFIC THROUGH THE WORK AREAS.

6. PROVIDE ONE (1) PILOT CAR TO BE USED AS DIRECTED BY THE ENGINEER.

7. ALL PAVEMENT EDGE DROP-OFFS SHALL BE BACK FILLED BY A SUITABLE MATERIAL TO FORM A STABLE 3:1 SLOPE AT THE END OF EACH WORKDAY. PAVEMENT EDGE DROP-OFFS WILL NOT BE ALLOWED TO REMAIN OVERNIGHT.

8. 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 BC, TCP, AND WZ STANDARDS.

9. MAINTAIN POSITIVE DRAINAGE DURING CONSTRUCTION.

10. AT LEAST ONE-LANE (TWO-WAY TRAFFIC CONTROL) SHALL REMAIN OPEN AT ALL TIMES DURING LANE CLOSURES.

11. THE CONTRACTOR SHALL COVER OR REMOVE ANY EXISTING SIGN OR PAVEMENT MARKING THAT CONFLICTS WITH TCP TO AVOID CONFUSION FOR THE TRAVELLING PUBLIC. PAYMENT FOR THIS WORK SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES.

12. SUBGRADE WIDENING ITEM SHALL BE USED TO REMOVE EXISTING EDGE MATERIAL AND PREPARE FOR BASE WIDENING.

13. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL ONLY BE PLACED IN AREAS WHERE SOIL DISTURBANCE IS EXPECTED TO OCCUR WITHIN TWO WEEKS. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL BE REMOVED IN EACH AREA WITHIN TWO WEEKS OF VEGETATION ESTABLISHMENT OR AS APPROVED BY THE ENGINEER.

SUGGESTED SEQUENCE OF CONSTRUCTION

PHASE 1

1. SET BARRICADES AND ADVANCE WARNING SIGNS.

2. INSTALL AND MAINTAIN STORM WATER POLLUTION PREVENTION PLAN ITEMS.

PHASE 2

DRAINAGE

1. CONSTRUCT CROSS-DRAINAGE CULVERT USING DAILY LANE CLOSURES WITH CUT AND RESTORE AS SHOWN IN THE PLANS.
   (FOR CULVERT #8, #14, #16, #17, #18, #19 & #20)

   A. CONSTRUCT THE DOWNSTREAM PORTION OF THE CROSS-DRAINAGE CULVERT AS SHOWN IN THE PLANS.

   B. CONSTRUCT THE UPSTREAM PORTION OF THE CROSS-DRAINAGE CULVERT AS SHOWN IN THE PLANS.

2. CONSTRUCT CULVERT EXTENSIONS AND END TREATMENTS AS SHOWN ON THE PLANS.
   (FOR CULVERT #1, #2, #3, #4, #5, #6, #7, #9, #11, #12, #13, #14, & #15)

   A. CONSTRUCT CULVERT EXTENSION AND END TREATMENT FOR THE DOWNSTREAM PORTION OF ALL CULVERTS AS SHOWN IN THE PLANS.

   B. CONSTRUCT CULVERT EXTENSION AND END TREATMENT FOR THE UPSTREAM PORTION OF ALL CULVERTS AS SHOWN IN THE PLANS.

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
TRAFFIC CONTROL PLAN NARRATIVE

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	33
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

PHASE 3

ROADWAY

1. GENERAL

   CONSTRUCTION OF SUBSEQUENT PHASES SHALL BE CONSTRUCTED USING DAILY LANE CLOSURES AND ONE-LANE TWO-WAY TRAFFIC CONTROL. DO NOT EXCEED ONE MILE UNLESS APPROVED BY THE ENGINEER.

2. REWORK 8" OF EXISTING MATERIAL AND CONSTRUCT THE SUBGRADE WIDENING FROM STA 0+75.00 TO STA 96+50.00 AND STA 97+10.00 TO STA 453+40.00.

   A. STRIP GRASS AND TOPSOIL AWAY FROM WORK AREA.

   B. SAW-CUT AND MILL REMAINING ASPHALT AND BASE INTO NEAT WINDROWS ALONG THE OUTSIDE OF THE PROPOSED SUBGRADE LAYER AS DIRECTED BY THE ENGINEER. REFER TO TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

   C. PERFORM THE SUBGRADE WIDENING.

3. REWORK REMAINING BASE MATERIAL AND ASPHALTIC CONCRETE PAVEMENT 22′ WIDE USING ORDINARY COMPACTION FROM STA 0+75.00 TO STA 96+50.00 AND STA 97+10.00 TO STA 453+40.00. THE REWORKED MATERIAL SHALL BE SPREAD OUT OVER THE 28′ BASE LAYER WIDTH. BLEND SHALL BE EVENLY DISTRIBUTED CONSISTING OF A MAXIMUM OF 30% RAP AND A MINIMUM OF 70% OF FLEXIBLE BASE. ADDITIONAL FLEXIBLE BASE SHALL BE BROUGHT IN TO ACHIEVE ACCEPTABLE BLEND AT PROPOSED DEPTH AND WIDTH.

4. CEMENT TREAT REWORKED BASE LAYER AT STA 0+75.00 TO STA 96+50.00 AND STA 97+10.00 TO STA 453+40.00. BLENDING SHALL CONSIST OF 2% CEMENT BY WEIGHT. CURE CEMENT TREATED LAYER. REWORK THE CEMENT TREATED LAYER AS NECESSARY AND AS DIRECTED BY THE ENGINEER.

5. CONSTRUCT THE FULL-WIDTH FLEXIBLE BASE LAYER AT STA 0+75.00 TO STA 96+50.00 AND STA 97+10.00 TO STA 453+40.00. REWORK THE FLEXIBLE BASE LAYER AS NECESSARY AND AS DIRECTED BY THE ENGINEER.

6. PRIME FLEXIBLE BASE AT STA 0+75.00 TO STA 96+50.00 AND STA 97+10.00 TO STA 453+40.00.

   A. REGRADE FRONT SLOPES, BACK SLOPES AND DITCHES AS NECESSARY.

   B. EVENLY REDISTRIBUTE THE WINDROWED TOPSOIL AND TEMPORARILY STABILIZE DISTURBED AREAS AS SHOWN IN THE PLANS AND AS DIRECTED BY THE ENGINEER. INSTALL, RELOCATE OR REMOVE SW3P DEVICES AS NEEDED OR DIRECTED.

7. DO NOT PROCEED TO THE NEXT ROADWAY LAND WITHOUT APPROVAL FROM THE ENGINEER.

PHASE 4

1. AFTER THE FINAL LAND, PERFORM 2 COURSE SURFACE TREATMENT AT STA 0+75.00 TO STA 62+97.00, STA 79+01.00 TO STA 96+50.00, STA 97+10.00 TO STA 149+57.00, STA 154+01.00 TO STA 398+16.00, STA 407+27.00 TO STA 435+40.00, AND 441+40.00 TO 453+40.00.

   A. INSTALL SHORT TERM PAVEMENT MARKINGS IMMEDIATELY AFTER PLACEMENT OF THE SURFACE TREATMENT.

   B. REGRADE FRONT SLOPES, BACK SLOPES, AND DITCHES AS NECESSARY.

2. AFTER THE FINAL LAND, PERFORM A 1 COURSE SURFACE TREATMENT AND 2" OVERLAY AT STA 62+97.00 TO STA 79+01.00, STA 149+57.00 TO STA 154+01.00, STA 398+16.00 TO STA 407+27.00, AND STA 435+40.00 TO STA 441+40.00.

   A. INSTALL SHORT TERM PAVEMENT MARKINGS IMMEDIATELY AFTER PLACEMENT OF THE OVERLAY.

   B. REGRADE FRONT SLOPES, BACK SLOPES, AND DITCHES AS NECESSARY.

PHASE 5

1. INSTALL PERMANENT PAVEMENT MARKINGS. SHORT TERM PAVEMENT MARKINGS SHALL BE REPLACED BY PERMANENT MARKINGS NO LATER THAN 14 CALENDAR DAYS FOLLOWING PLACEMENT OF THE SURFACE.

2. ESTABLISH PERMANENT VEGETATIVE COVER AS SHOWN IN THE PLANS AND AS DIRECTED BY THE ENGINEER.

3. REMOVE SW3P DEVICES UPON FINAL ESTABLISHMENT OF VEGETATIVE COVER, AS AUTHORIZED OR DIRECTED BY THE ENGINEER.

4. FINAL CLEAN UP.

5. REMOVE BARRICADES AND WARNING SIGNS.

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

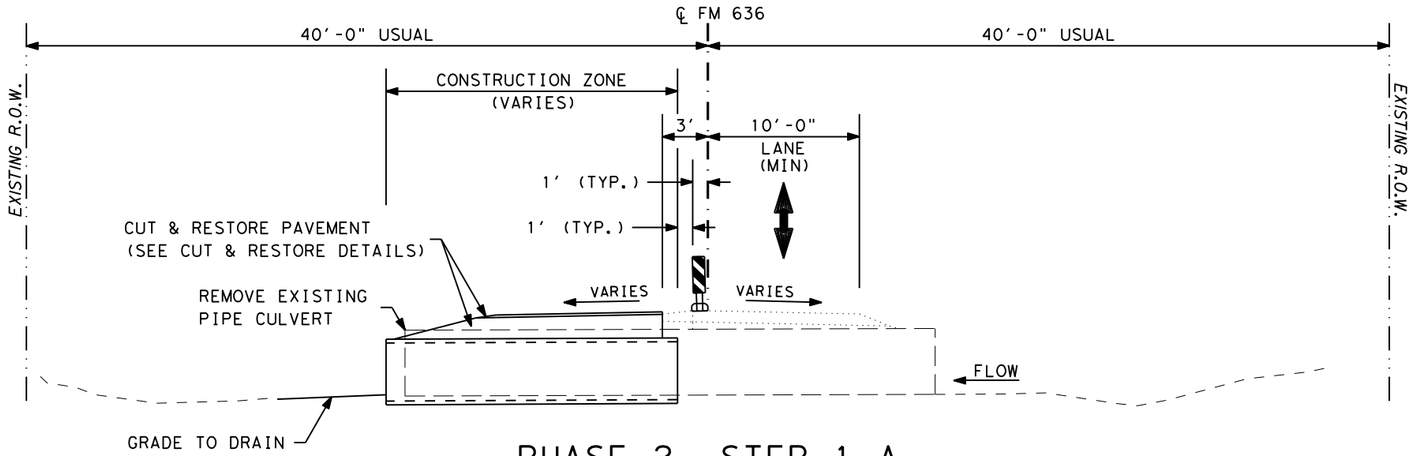
Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
TRAFFIC CONTROL PLAN NARRATIVE

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	34
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



PHASE 2, STEP 1.A

CULVERT #8, #14, #16, #17, #18, #19 AND #20

PHASE 2, STEP 1.B

CULVERT #8, #14, #16, #17, #18, #19 AND #20

LEGEND

VERTICAL PANEL

NOTES:

1. SEE THE TXDOT BARRICADE AND CONSTRUCTION AND TRAFFIC CONTROL PLAN STANDARDS FOR ADDITONAL INFORMATION.
2. SEE CULVERT LAYOUTS FOR ADDITONAL INFORMATION.
3. SEE TEMPORARY SPECIAL SHORING DETAILS FOR ADDITIONAL INFORMATION.
4. CULVERTS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM UNLESS OTHERWISE APPROVED BY THE ENGINEER.
5. MAINTAIN POSITIVE DRAINAGE DURING PHASED CULVERT CONSTRUCTION.
6. MATCH EXISTING CROSS SLOPES AND ELEVATIONS.

STATE OF TEXAS
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129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
TRAFFIC CONTROL PLAN
TYPICAL SECTIONS
CULVERT REPLACEMENT

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	35
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:34:22 PM

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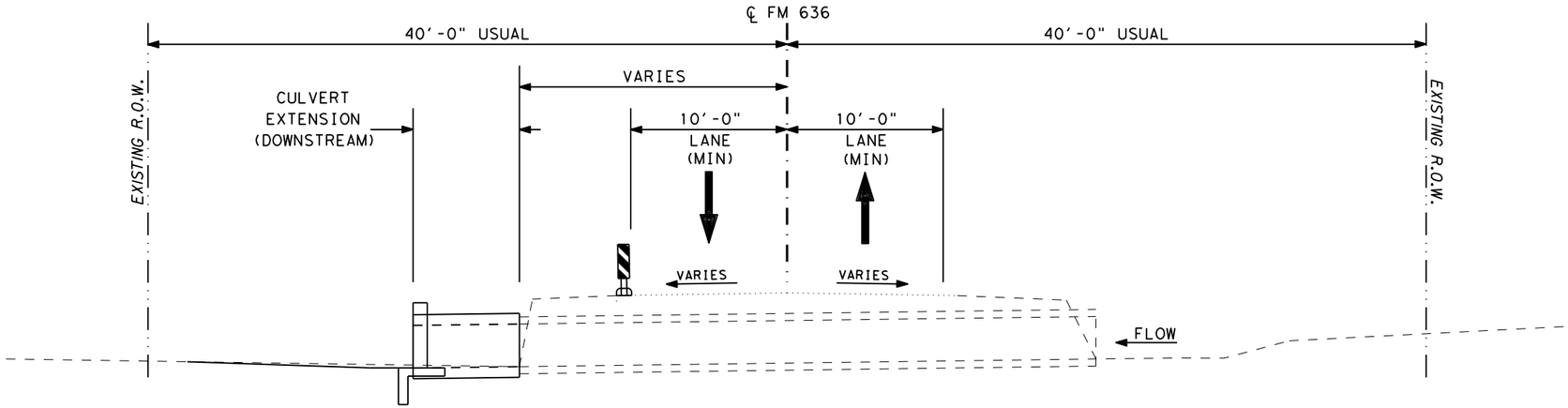
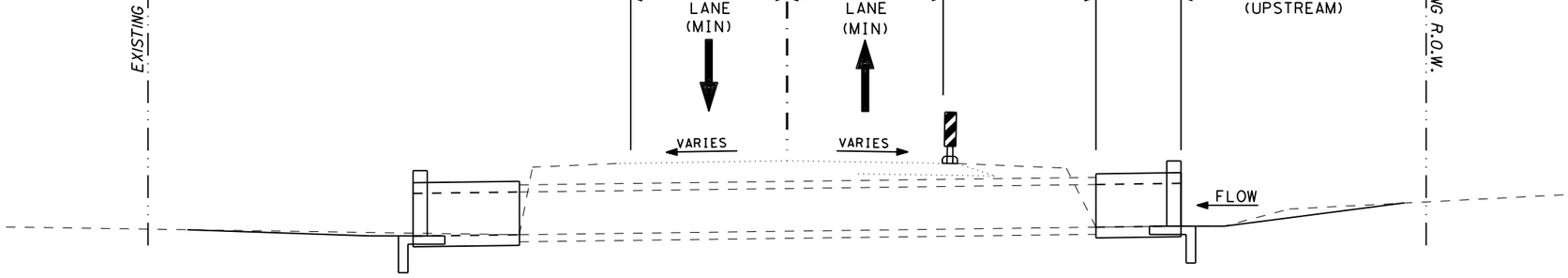


PHASE 2, STEP 2.A

CULVERT #1, #2, #3, #4, #5, #6, #7, #9, #11, #12, #13, #14 & #15



PHASE 2, STEP 2.B

CULVERT #1, #2, #3, #4, #5, #6, #7, #9, #11, #12, #13, #14 & #15

LEGEND

VERTICAL PANEL

NOTES:

1. SEE THE TXDOT BARRICADE AND CONSTRUCTION AND TRAFFIC CONTROL PLAN STANDARDS FOR ADDITONAL INFORMATION.
2. SEE CULVERT LAYOUTS FOR ADDITONAL INFORMATION.
3. SEE TEMPORARY SPECIAL SHORING DETAILS FOR ADDITIONAL INFORMATION.
4. CULVERTS SHALL BE CONSTRUCTED FROM DOWNSTREAM TO UPSTREAM UNLESS OTHERWISE APPROVED BY THE ENGINEER.
5. MAINTAIN POSITIVE DRAINAGE DURING PHASED CULVERT CONSTRUCTION.
6. MATCH EXISTING CROSS SLOPES AND ELEVATIONS.

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FM 636
TRAFFIC CONTROL PLAN
TYPICAL SECTIONS
CULVERT EXTENSION

NOT TO SCALE

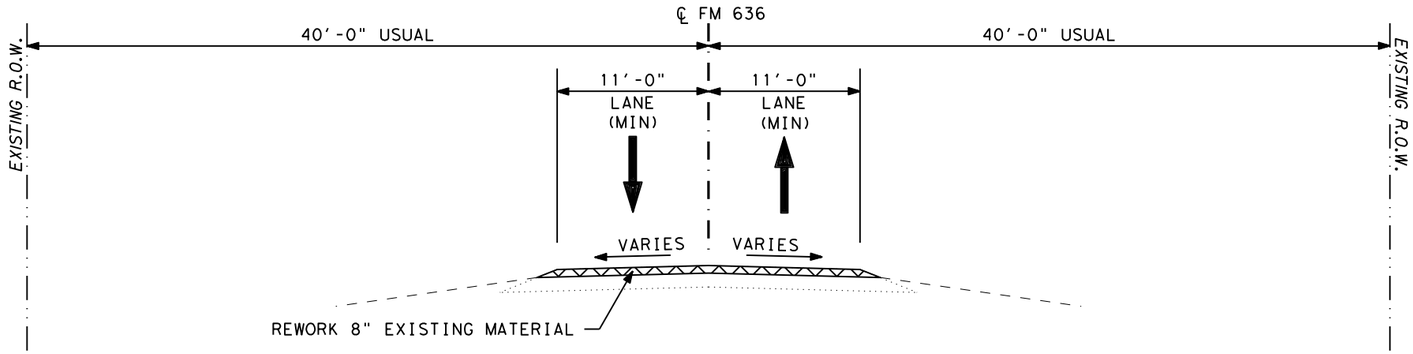
SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	36
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:34:22 PM
FILE:pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\2. TCP\TCP Typ Sections.dgn

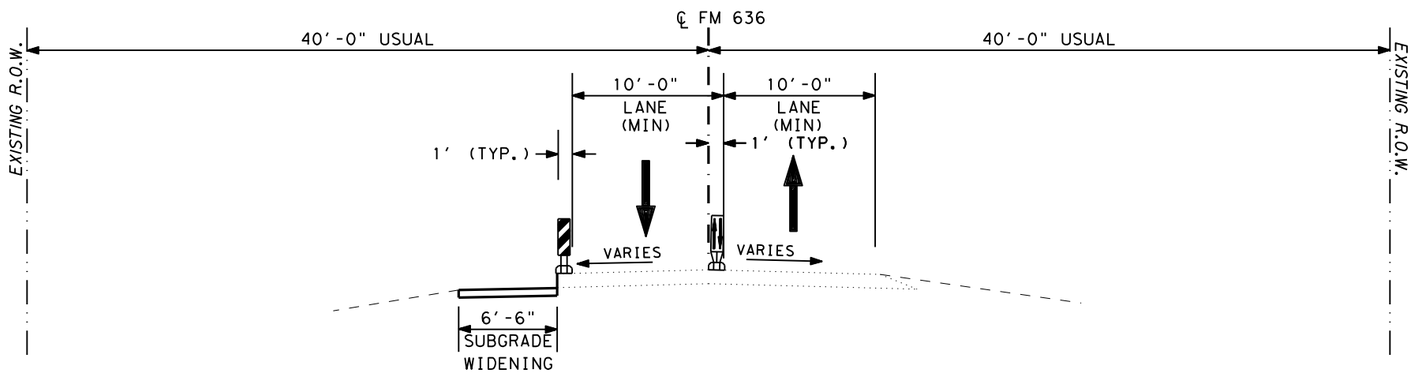
LEGEND

VERTICAL PANEL



PHASE 3, STEP 2

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00



PHASE 3, STEP 2.C

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00

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FM 636
TRAFFIC CONTROL PLAN
TYPICAL SECTIONS

NOT TO SCALE

SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	37
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:34:22 PM
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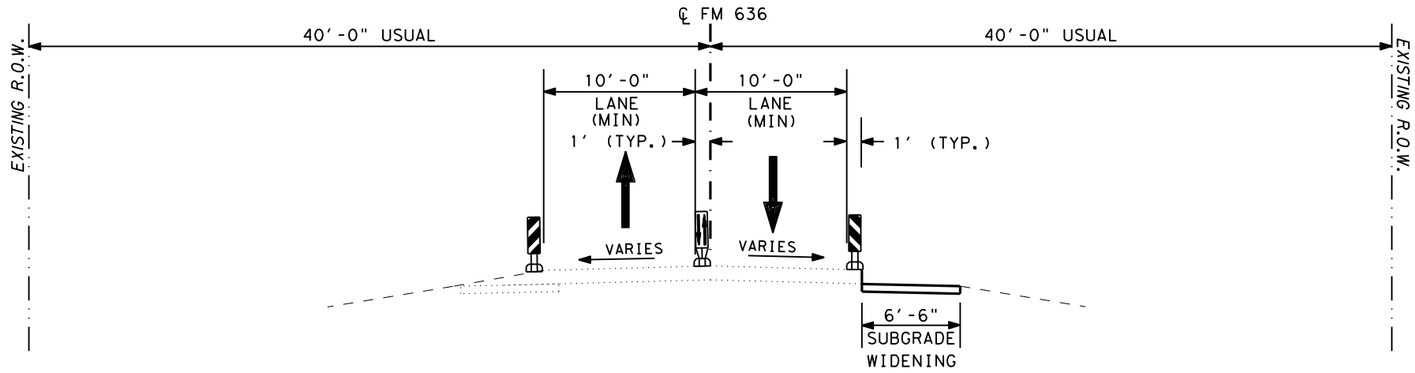
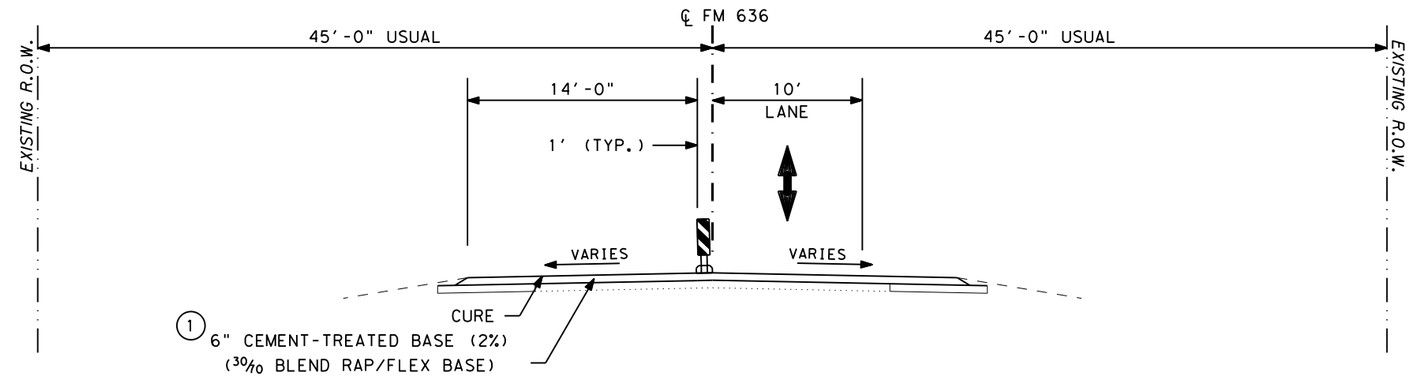


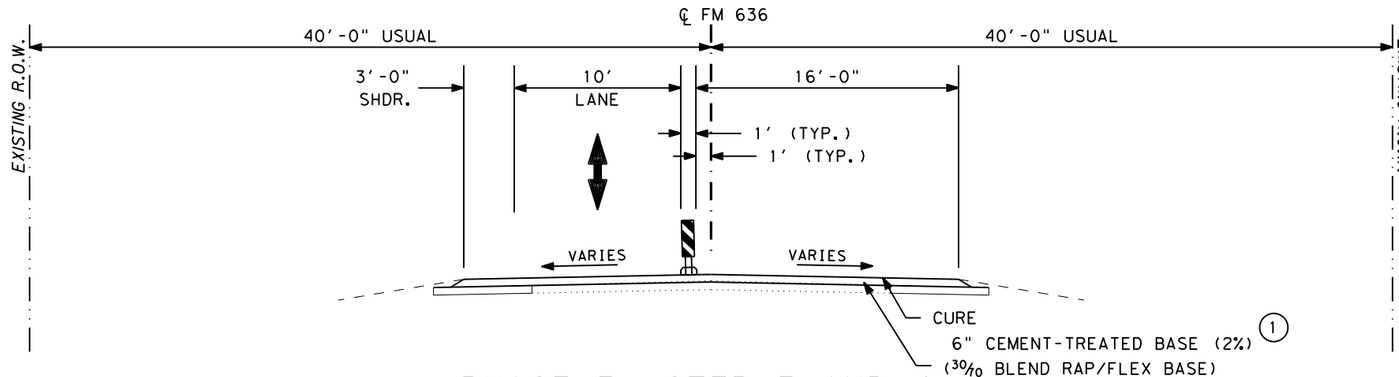
PHASE 3, STEP 2.C

STA. 00+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00



PHASE 3, STEP 3 AND 4

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00



PHASE 3, STEP 3 AND 4

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00

LEGEND

VERTICAL PANEL

* DURING CURING PROCESS, AT THE END OF EACH DAY, WINDROWED ASPHALT AND BASE MATERIAL SHALL BE REPLACED. MATERIAL SHALL BE EVENLY DISTRIBUTED. ONCE THE ASPHALT AND BASE MATERIAL HAS BEEN REPLACED, ROADWAY SHALL BE REOPENED TO TRAFFIC.

(1) FL BS (RDWY DEL) (TY D GR 1-2)

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TRAFFIC CONTROL PLAN
TYPICAL SECTIONS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	38
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:34:23 PM
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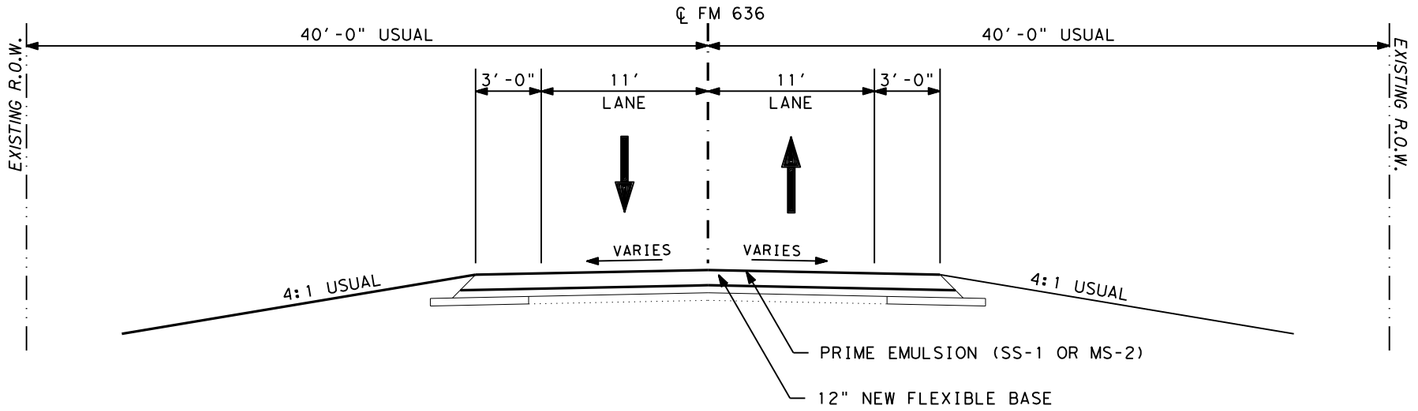
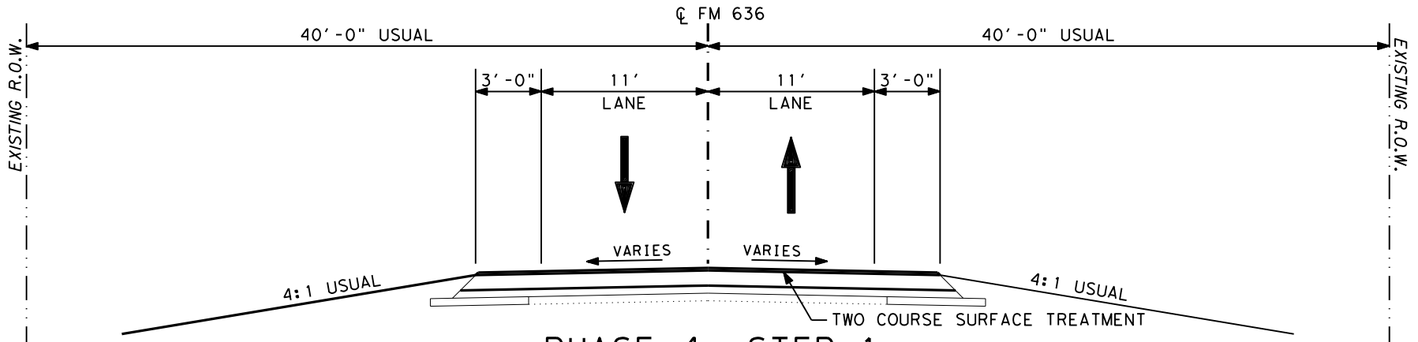


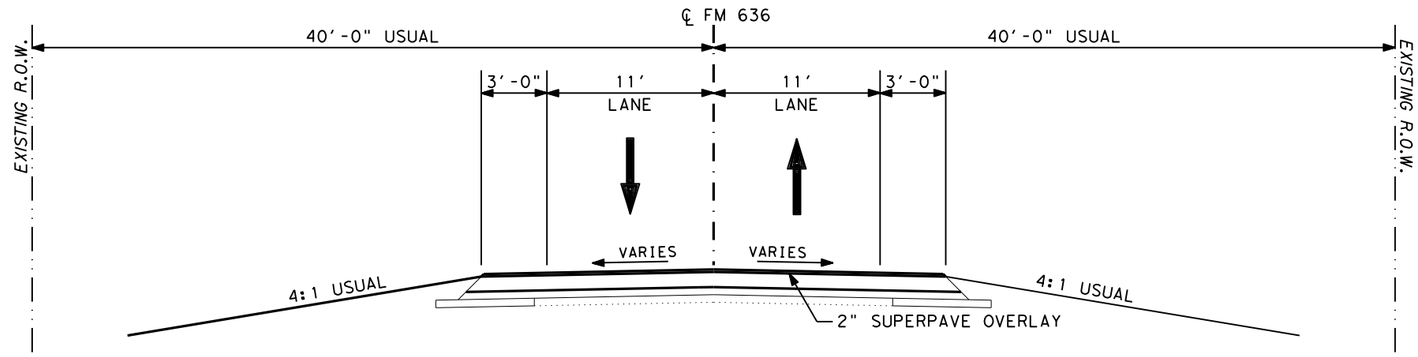
PHASE 3, STEP 5 AND STEP 6

STA. 0+75.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 453+40.00



PHASE 4, STEP 1

STA. 0+75.00 TO STA. 62+97.00
STA. 79+01.00 TO STA. 96+50.00
STA. 97+10.00 TO STA. 149+57.00
STA. 154+01.00 TO STA. 398+16.00
STA. 407+27.00 TO STA. 435+40.00
STA. 441+40.00 TO STA. 453+40.00



PHASE 4, STEP 2

STA. 62.97.00 TO STA. 79+01.00
STA. 149+57.00 TO STA. 154+01.00
STA. 398+16.00 TO STA. 407+27.00
STA. 435+40.00 TO STA. 441+40.00

LEGEND

VERTICAL PANEL

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TRAFFIC CONTROL PLAN
TYPICAL SECTIONS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	39
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/6/2021 TIME:2:34:23 PM
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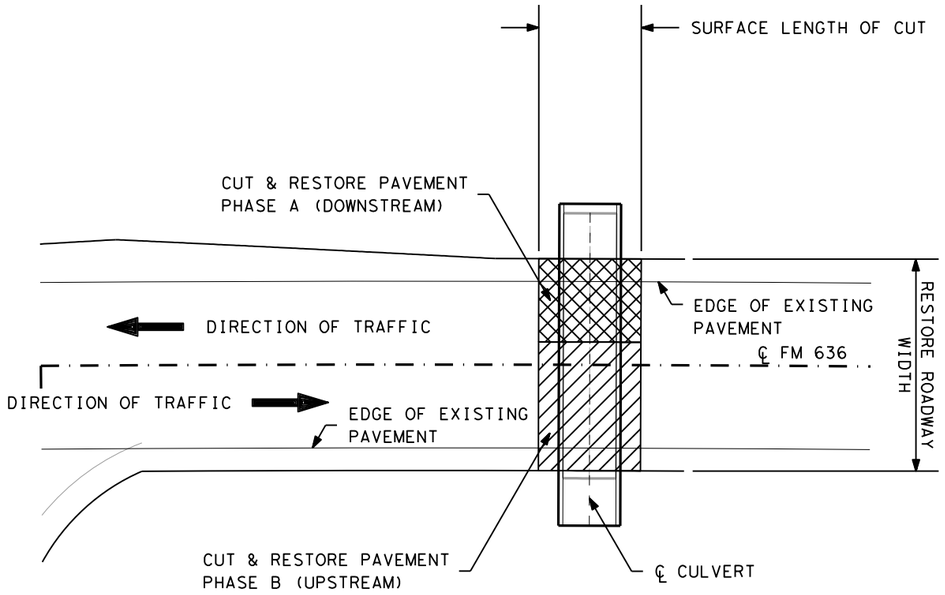
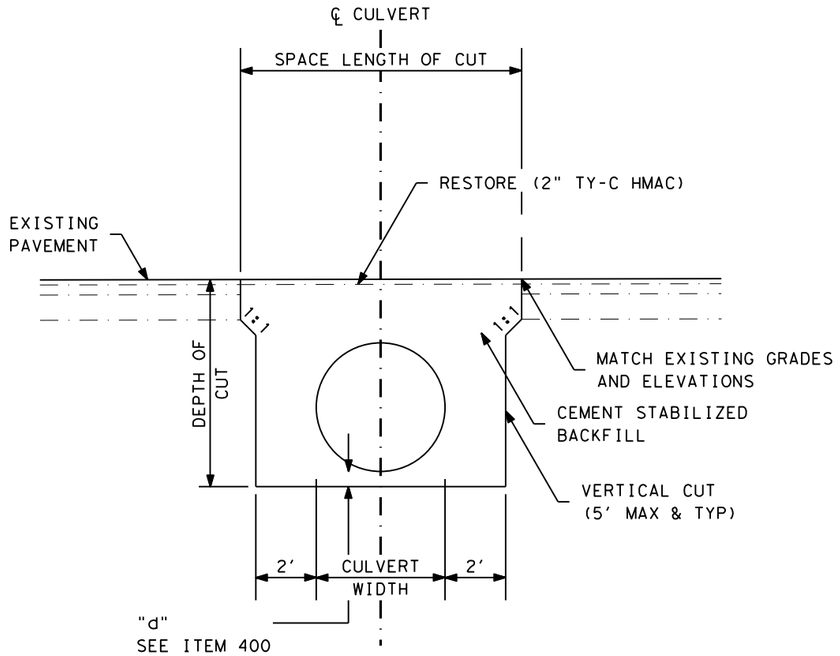


CUT & RESTORE DETAIL

PLAN VIEW
NTS
EXISTING CULVERT TO BE REMOVED



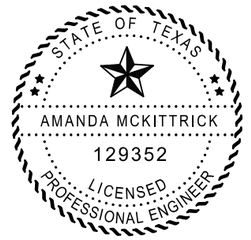
CUT & RESTORE DETAIL

PROFILE VIEW
NTS
EXISTING CULVERT TO BE REMOVED

ITEM 400 - CUT & RESTORE PAVEMENT

CULVERT	LOCATION	AREA
		SY
8	STA. 127+60 TO STA. 127+70	25
14	STA. 240+33 TO STA. 240+39	26
16	STA. 265+50 TO STA. 265+60	27
17	STA. 270+22 TO STA. 265+32	27
18	STA. 277+50 TO STA. 277+60	23
19	STA. 284+48 TO STA. 284+62	39
20	STA. 301+55 TO STA. 265+67	27
	TOTAL	194

NOTE: EXISTING CULVERT AT THE INDICATED LOCATION WILL BE REMOVED AND REPLACED.

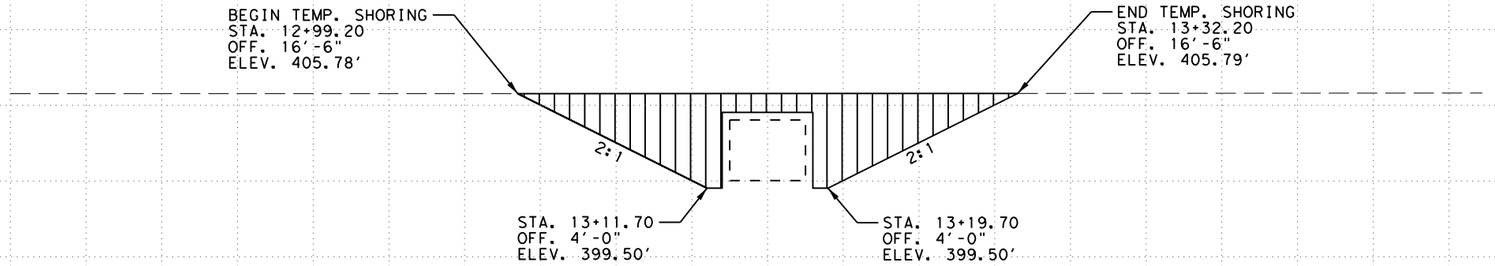


Amanda McKittrick, P.E.

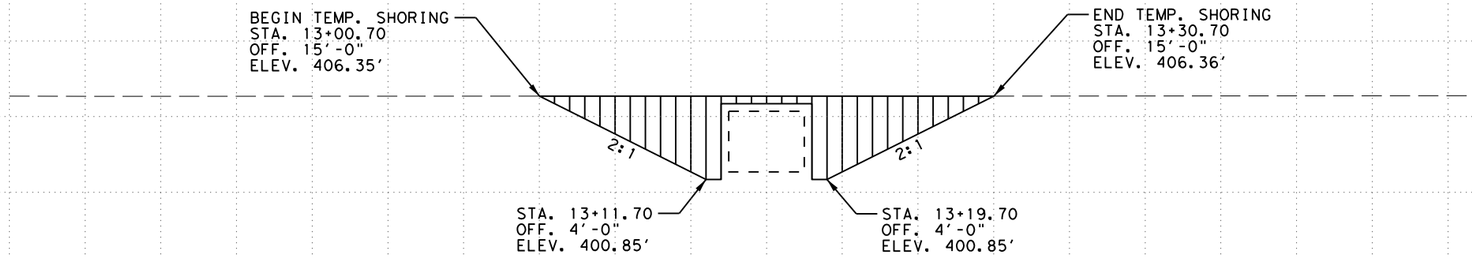
FM 636
TRAFFIC CONTROL PLAN
MISCELLANEOUS DETAILS

NOT TO SCALE SHEET OF

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	40
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



CULVERT #1 (LT)
STA. 13+15.70
TOTAL SHORING = 98 SF



CULVERT #1 (RT)
STA. 13+15.70
TOTAL SHORING = 75 SF

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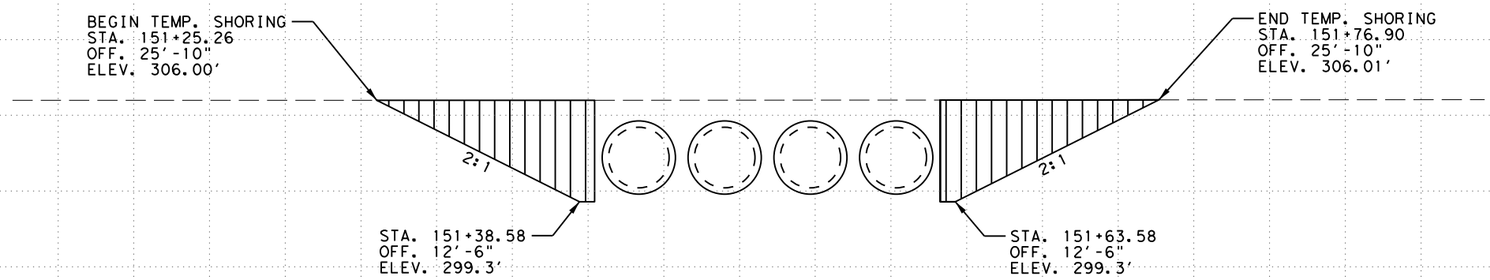
TEMPORARY SPECIAL SHORING

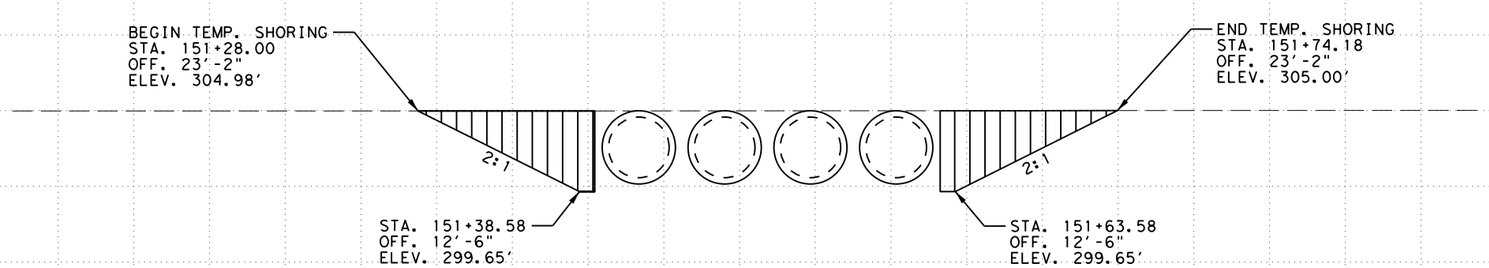
SCALE: 1"=10'

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	41
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



CULVERT #9 (LT)
STA. 151+51.08
TOTAL SHORING = 104 SF



CULVERT #9 (RT)
STA. 151+51.08
TOTAL SHORING = 68 SF

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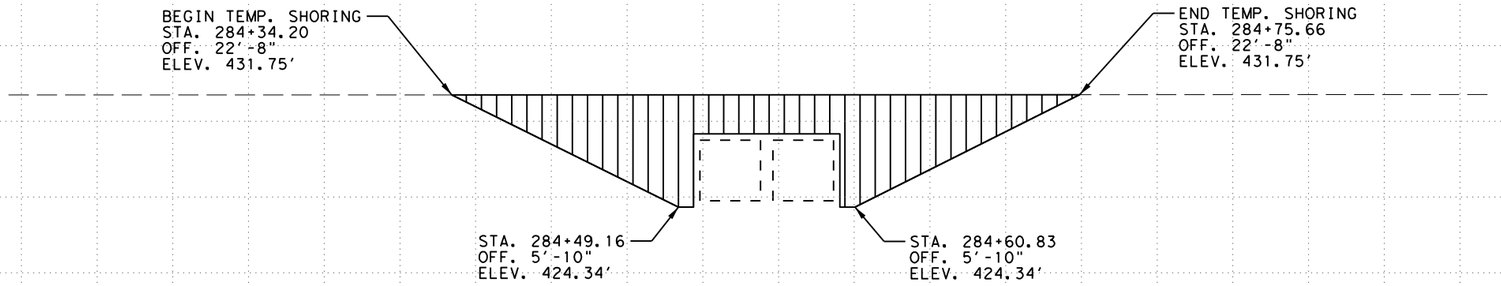
TEMPORARY SPECIAL SHORING

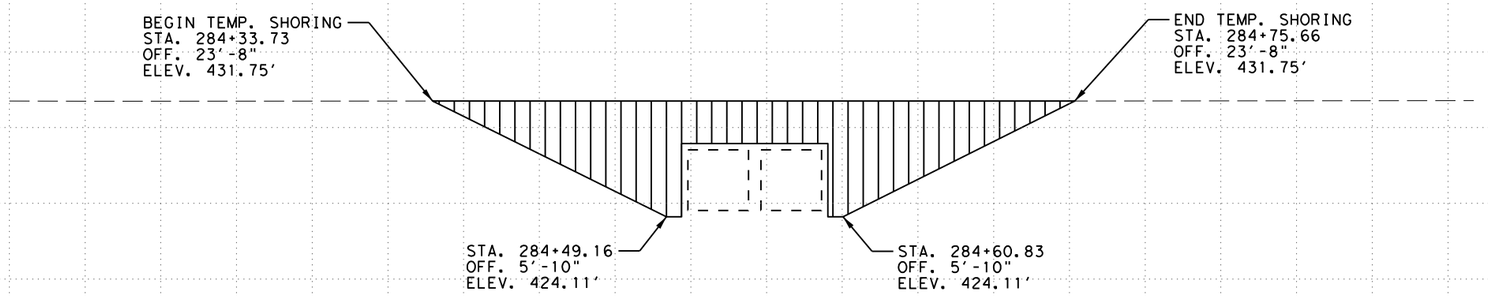
SCALE: 1"=10'

SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	42
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



CULVERT #19 (LT)
STA. 284+55
TOTAL SHORING = 150 SF



CULVERT #19 (RT)
STA. 284+55
TOTAL SHORING = 160 SF

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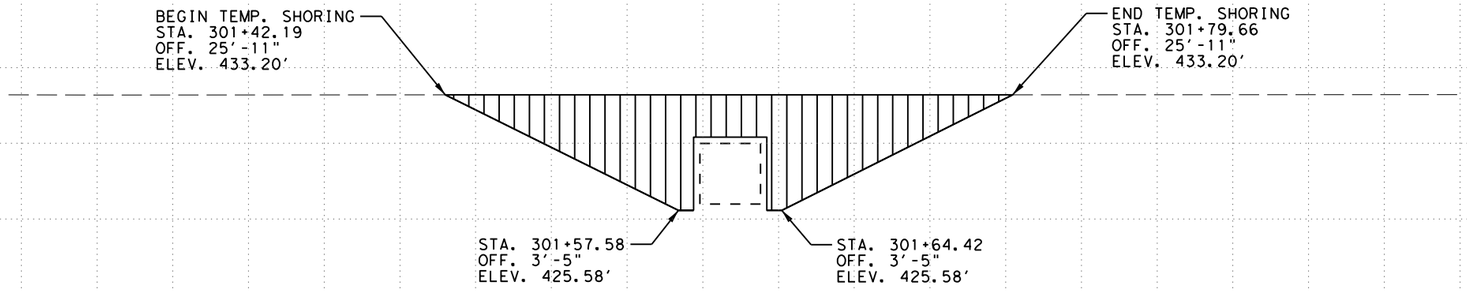
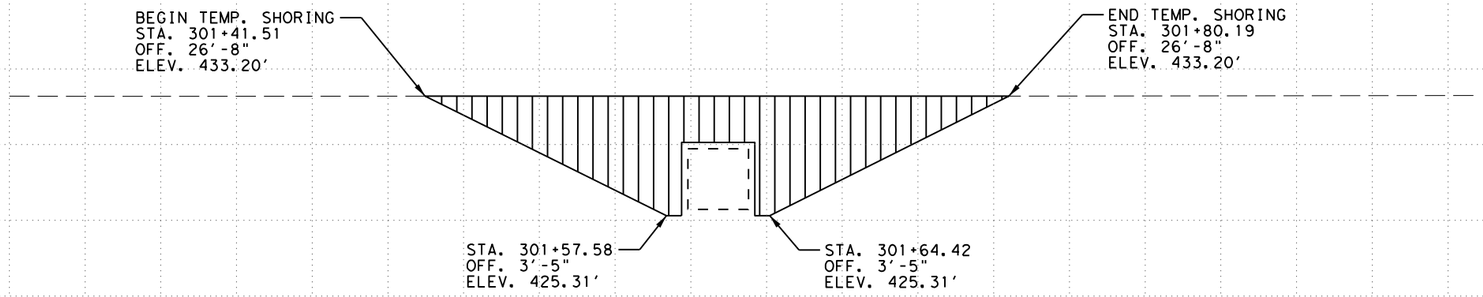
TEMPORARY SPECIAL SHORING

SCALE: 1"=10'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	43
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



CULVERT #20 (LT)
STA. 301+61
TOTAL SHORING = 146 SF



CULVERT #20 (RT)
STA. 301+61
TOTAL SHORING = 156 SF

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TEMPORARY SPECIAL SHORING

SCALE: 1"=10'

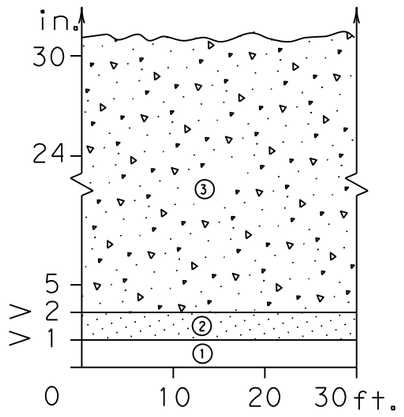
SHEET 4 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	44
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

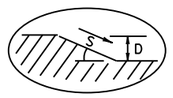
DATE:
FILE:

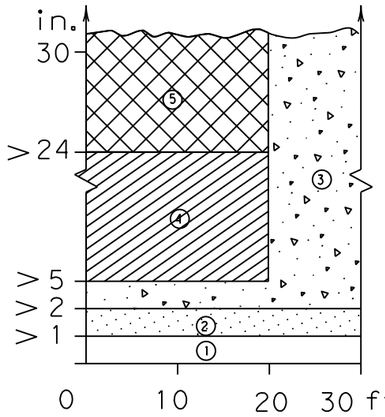
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

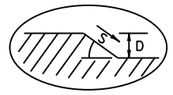


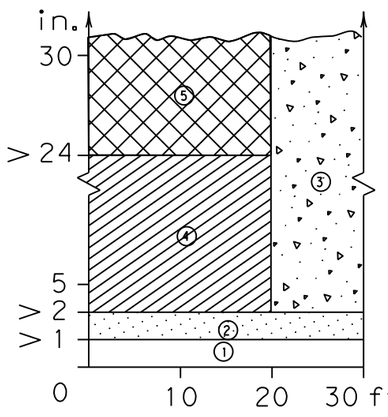
Edge Condition I
S = (3:1) (or flatter)



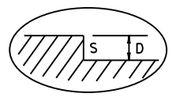


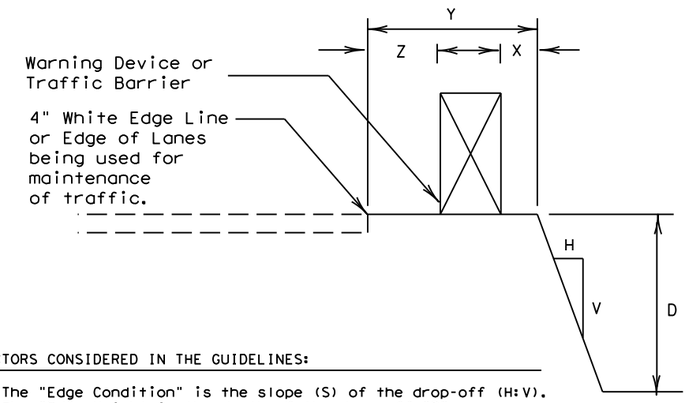
Edge Condition II
S = ((2.99):1) to (1:1)





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:

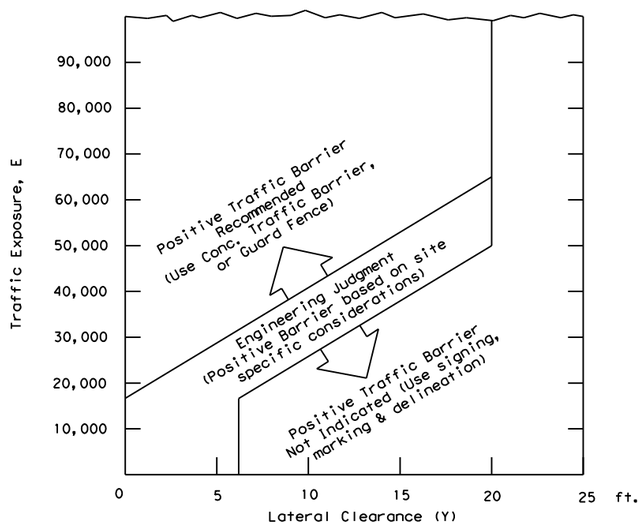
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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 differen-tial 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 (▨)



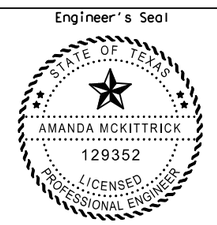
1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the dura-tion time in years of the dropoff condition.

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



Date 1/7/2021

Amanda McKittrick, P.E.

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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REVISIONS
03-01
08-01 correct typos

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DIST	COUNTY		SHEET NO.
DAL	NAVARRO		45

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

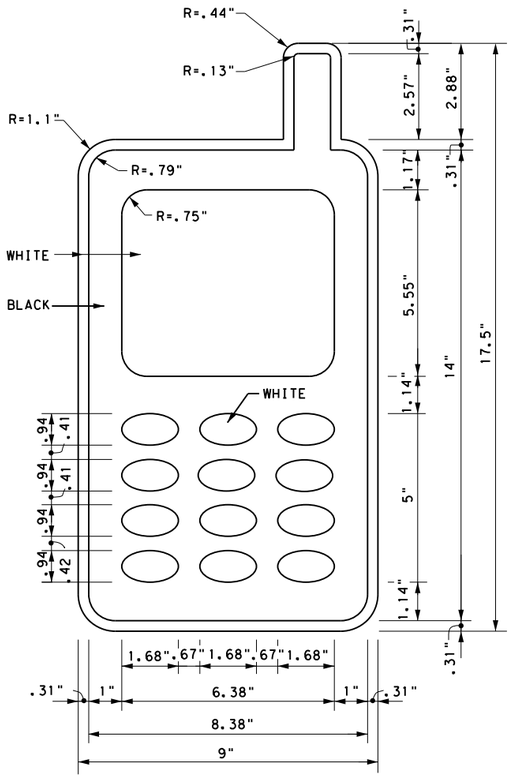
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

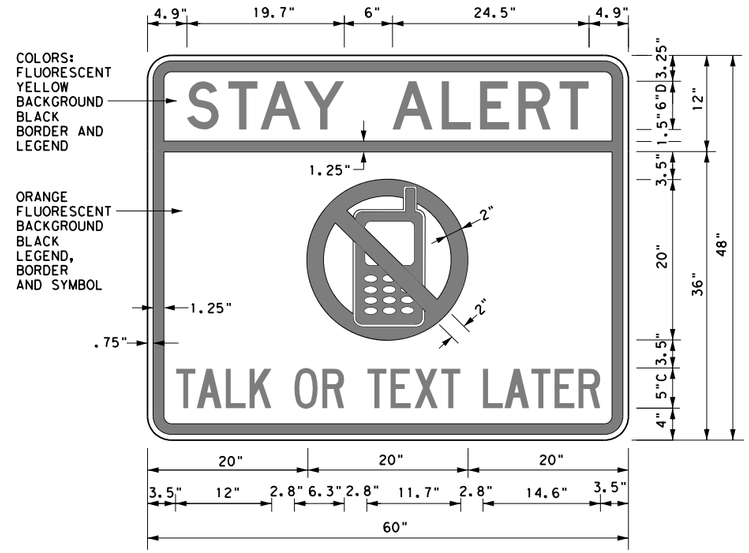
12. The Engineer has the final decision on the location of all traffic control devices.

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

WORKER SAFETY APPAREL NOTES:

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





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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	DAL	NAVARRO		46

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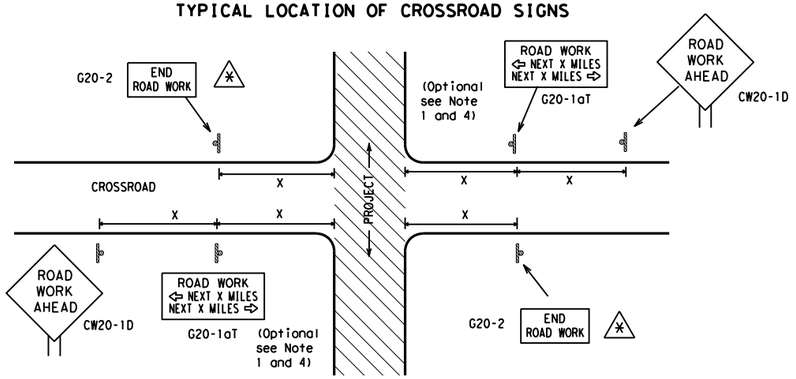
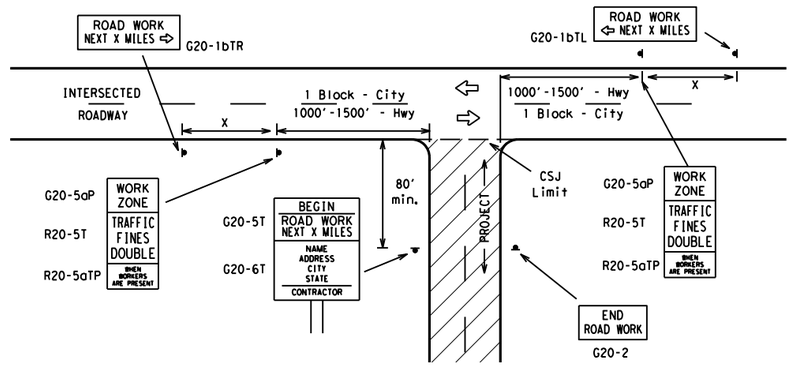
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

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]

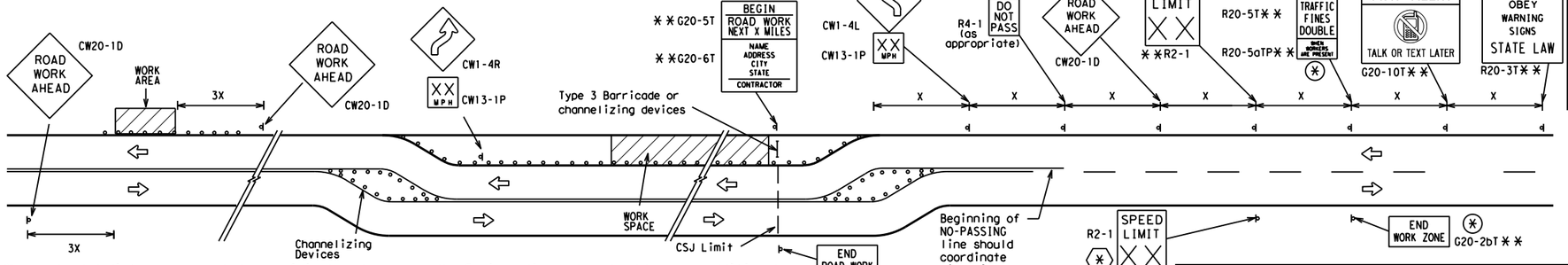
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

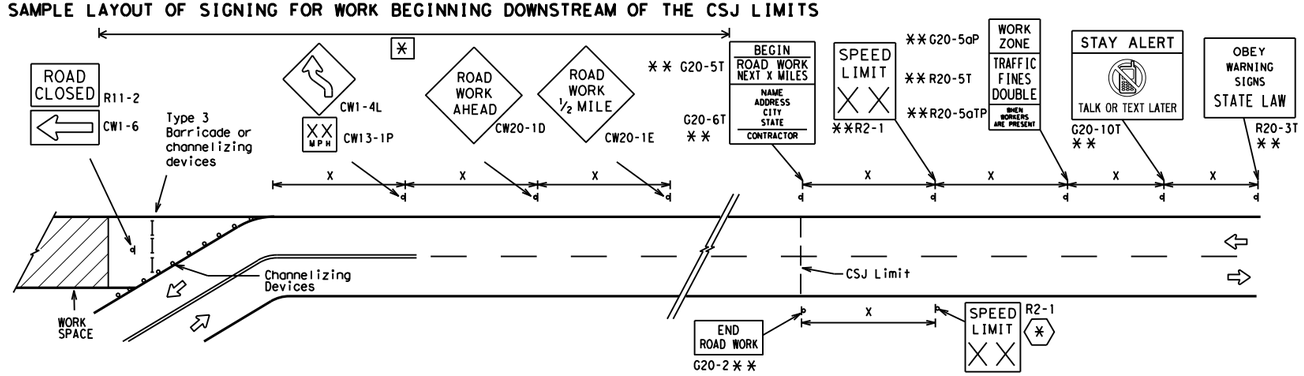
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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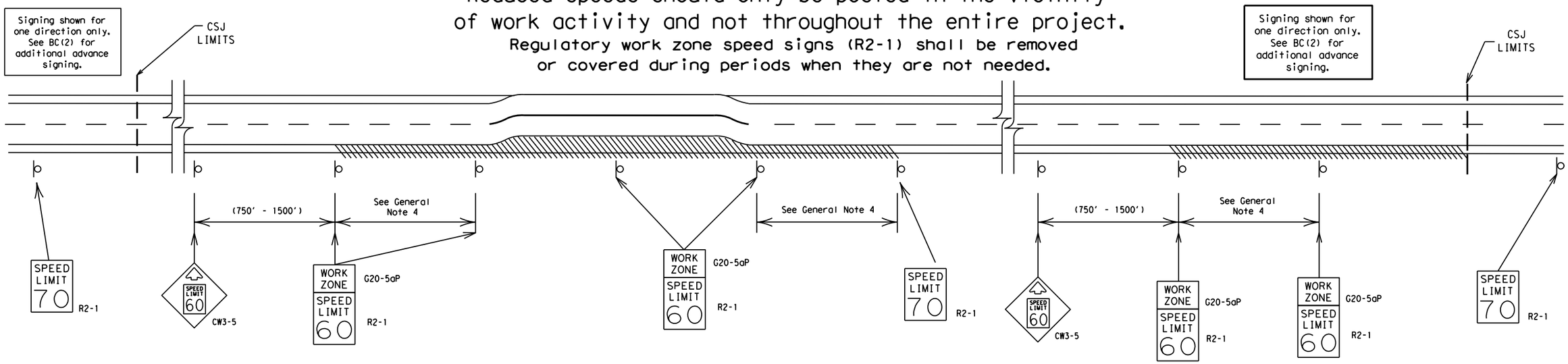
REVISIONS	0574	02	021	FM 636
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	NAVARRO		47

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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SHEET 3 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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	DAL	NAVARRO		48

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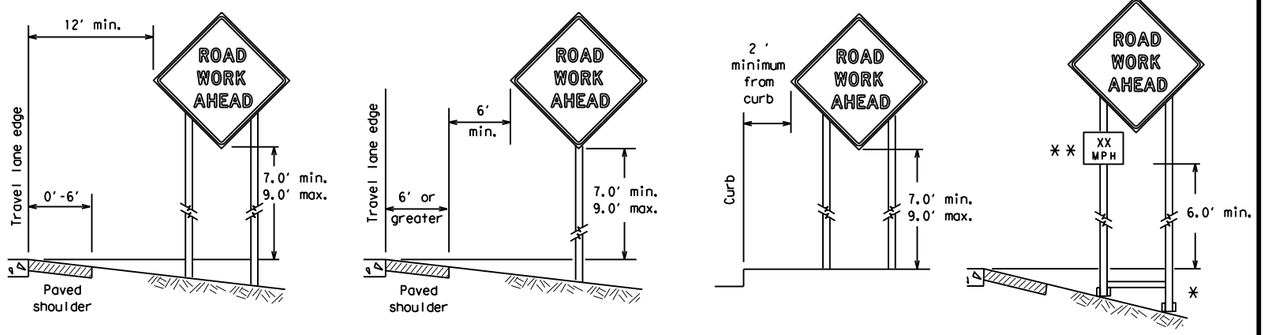
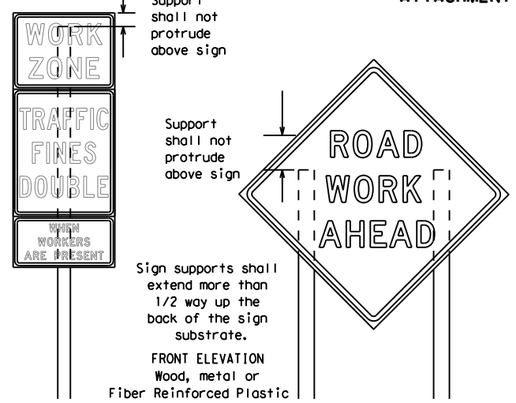
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



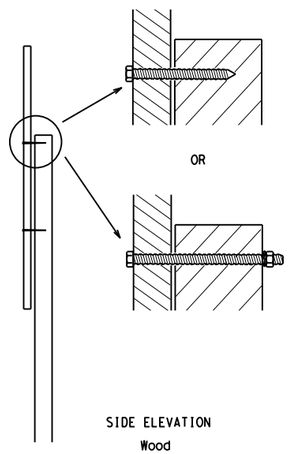
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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



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.

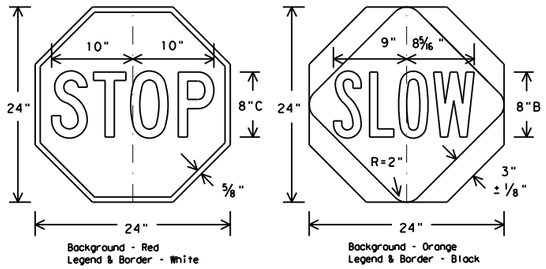


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	NAVARRO		49

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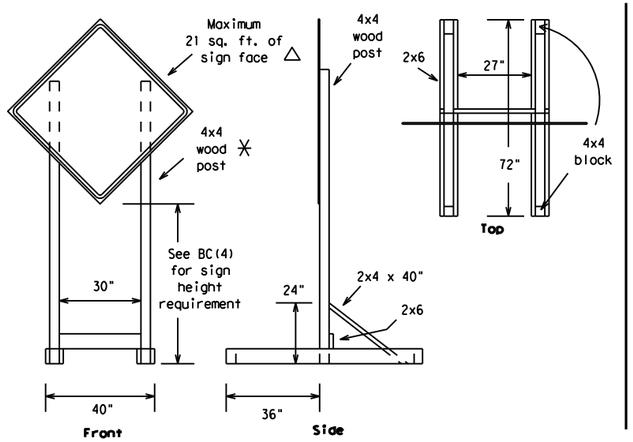
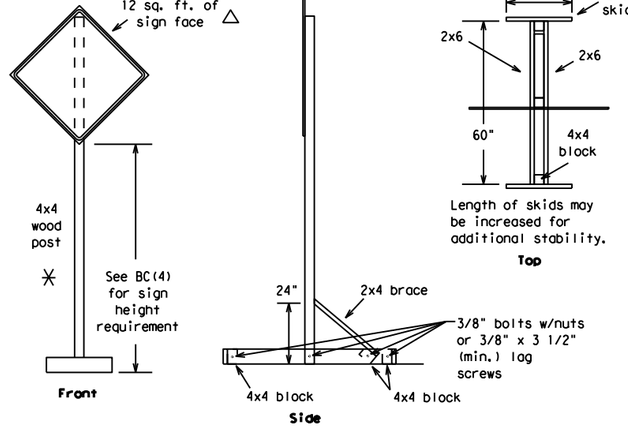
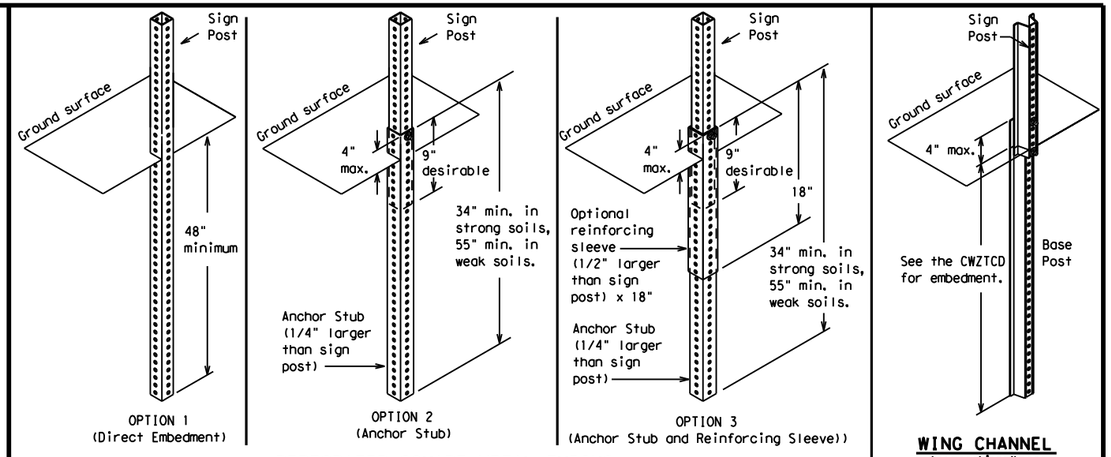




SKID MOUNTED WOOD SIGN SUPPORTS

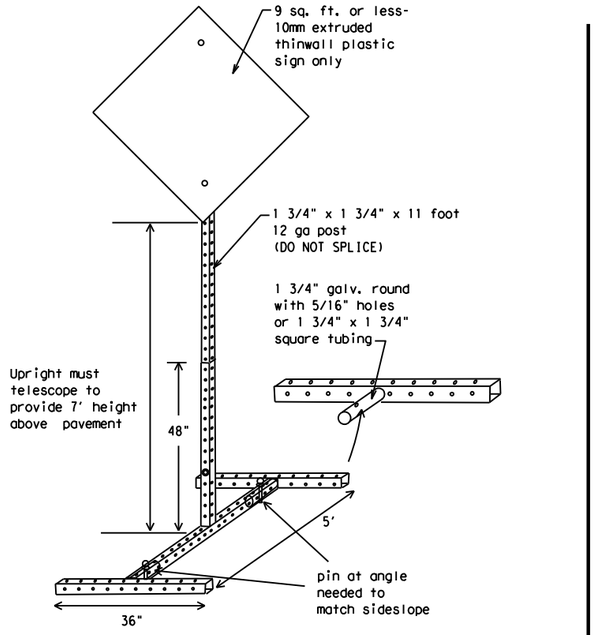
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

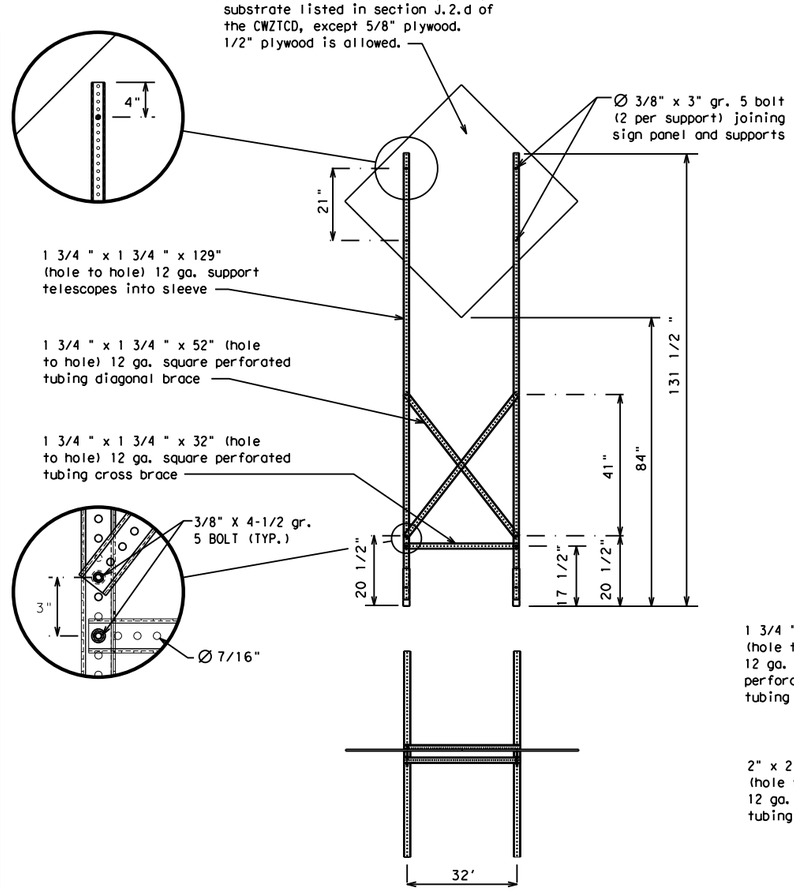


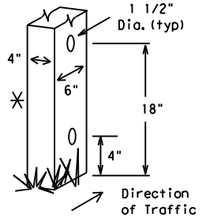
PERFORATED SQUARE METAL TUBING

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.

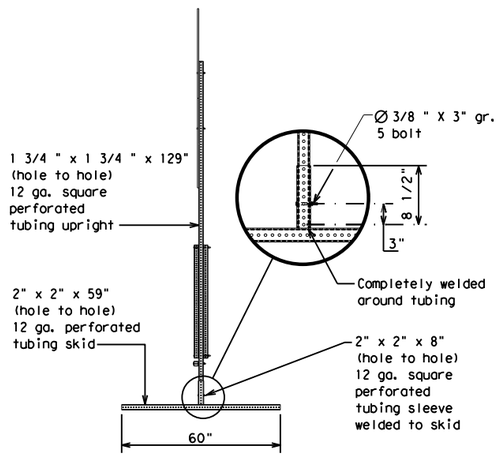






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING 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

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	NAVARRO		50

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic 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
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	NAVARRO		51

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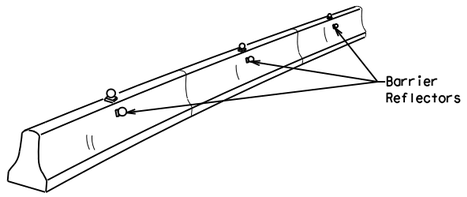
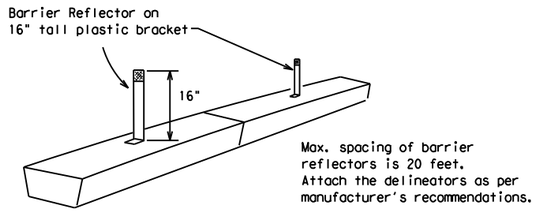
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

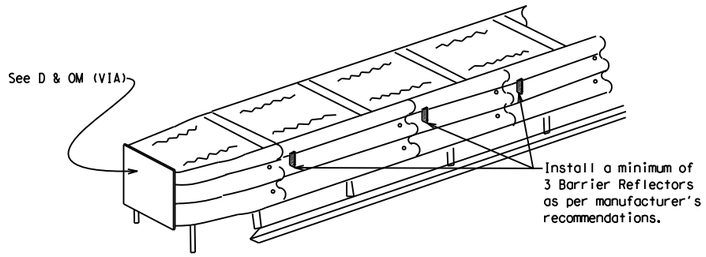


CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

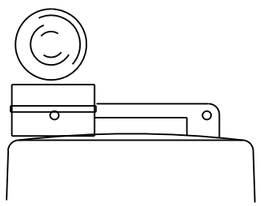


DELINEATION OF END TREATMENTS

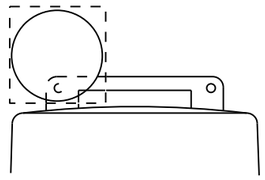
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

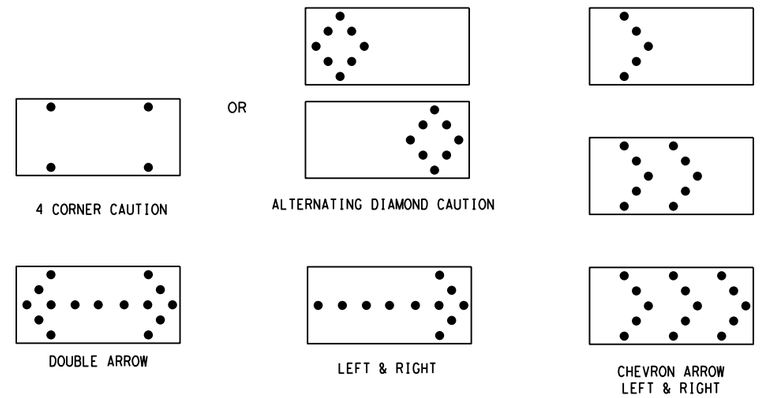
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		52

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

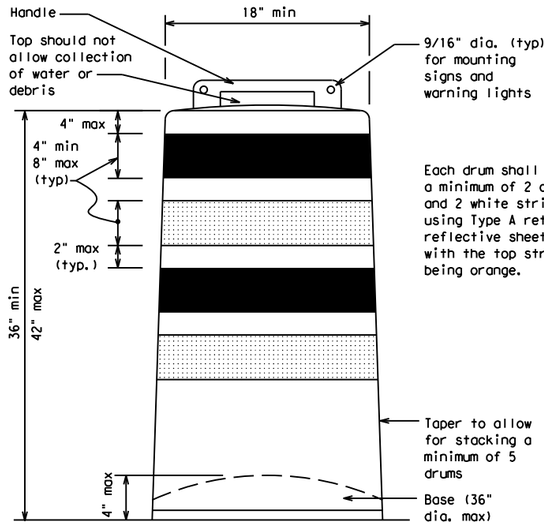
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

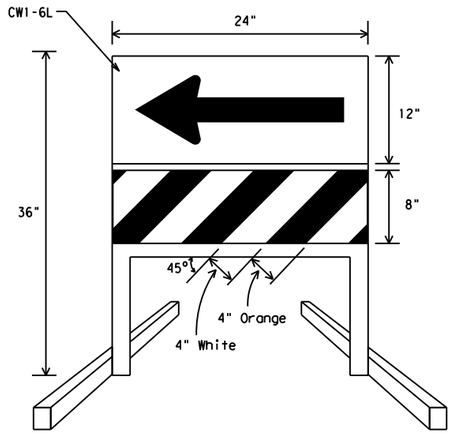
RETROREFLECTIVE SHEETING

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

BALLAST

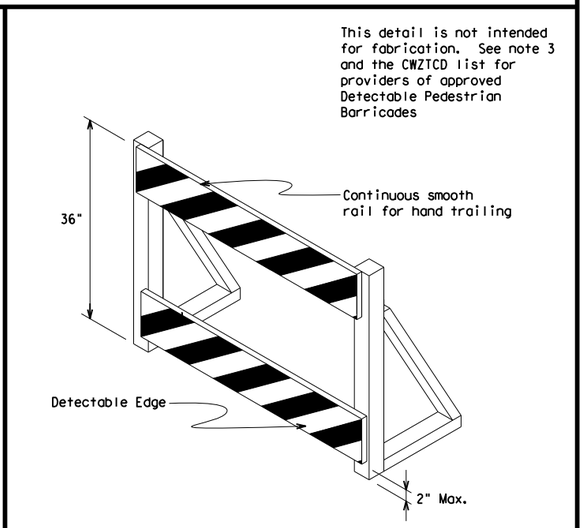
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





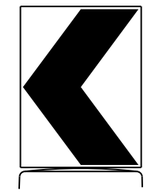
DIRECTION INDICATOR BARRICADE

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

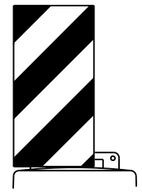


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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9-07 8-14	DAL	NAVARRO		53

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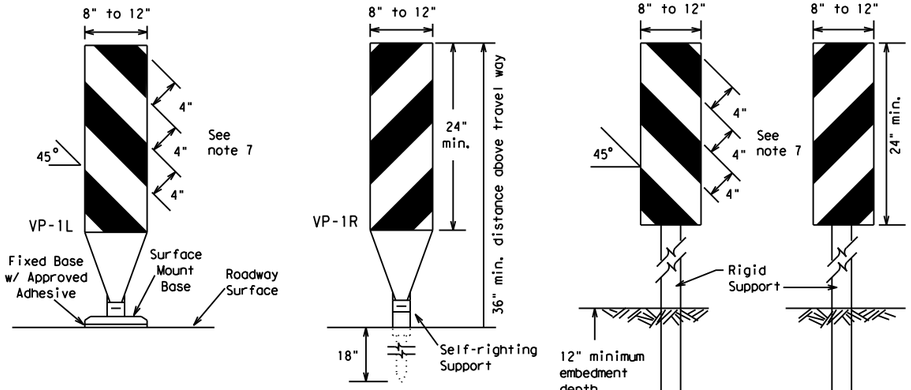
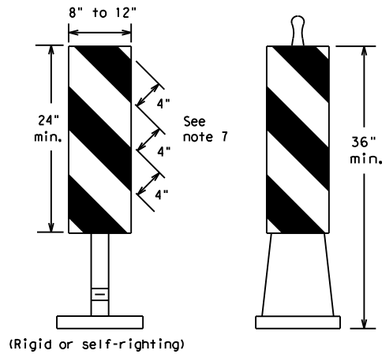


FIXED
(Rigid or self-righting)

DRIVEABLE

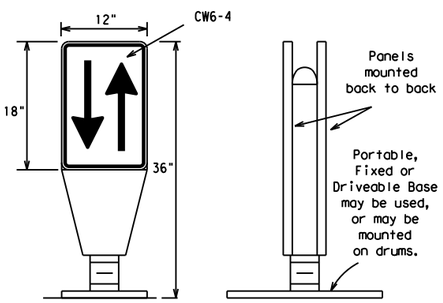


(Rigid or self-righting)

PORTABLE

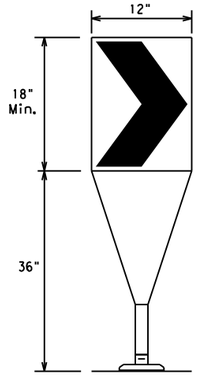
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



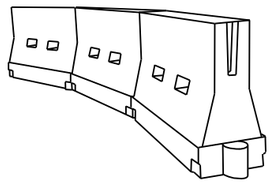
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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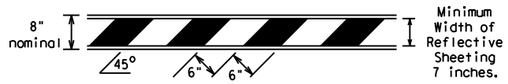
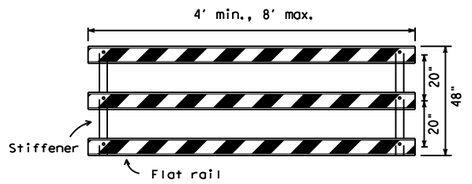
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



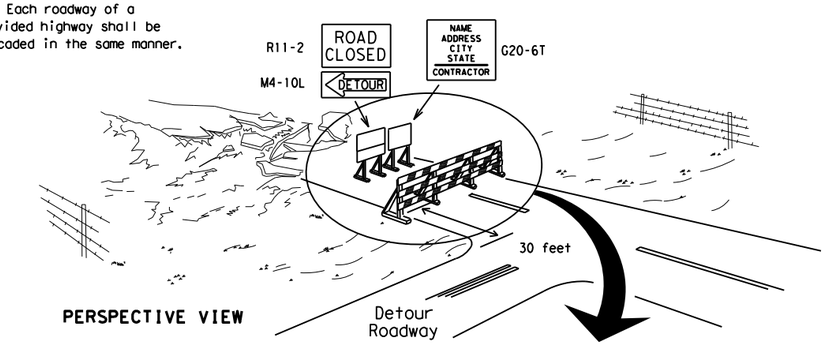
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

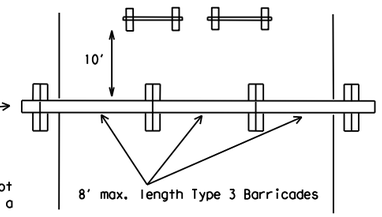
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

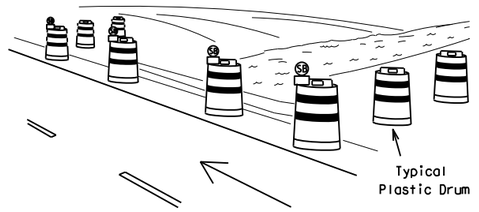
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

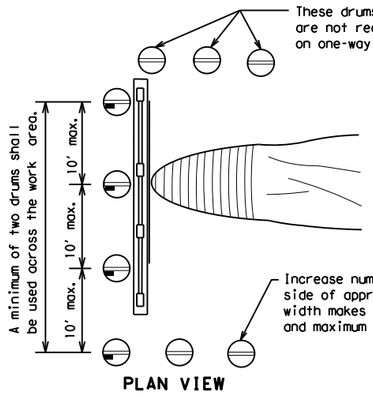
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

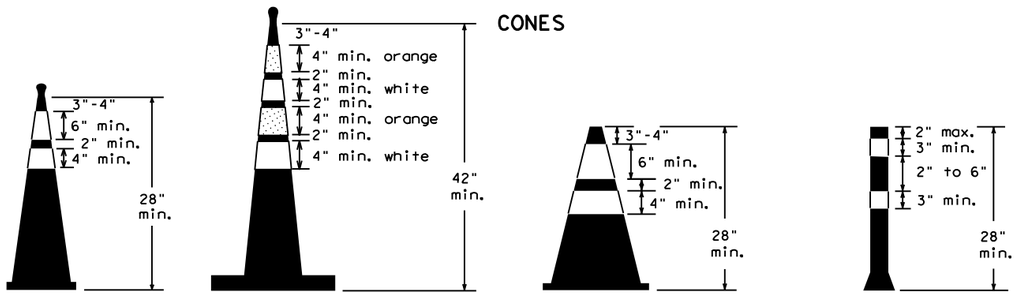
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

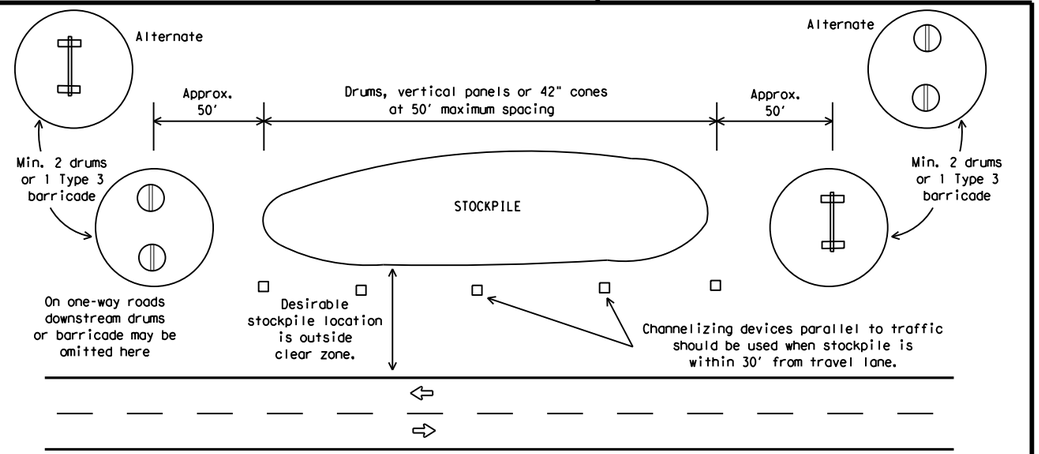
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

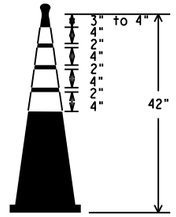
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	DAL	NAVARRO		55

WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

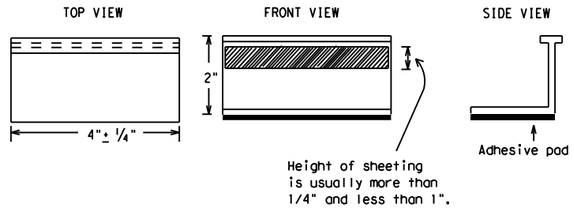
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	DAL	NAVARRO		56
11-02 8-14				

105

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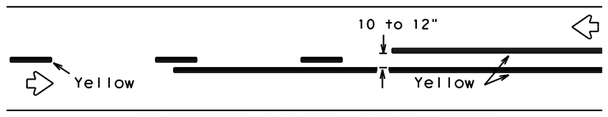
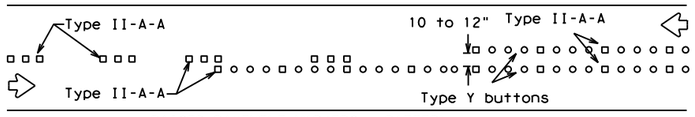
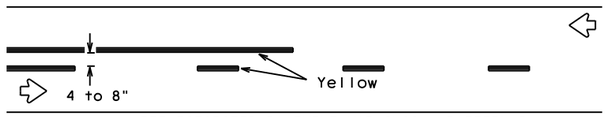
PAVEMENT MARKING PATTERNS



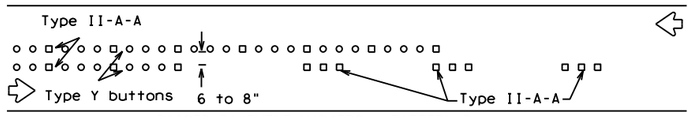
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



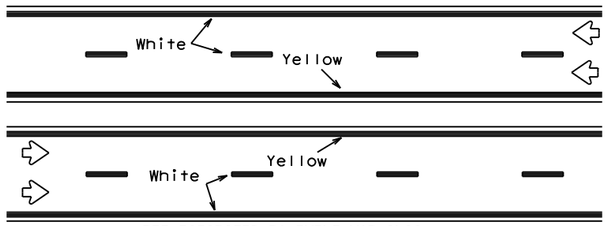
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



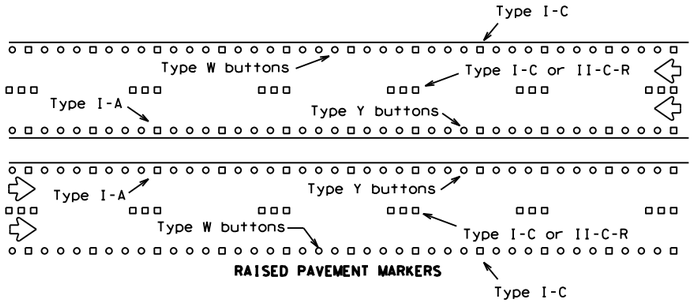
RAISED PAVEMENT MARKERS - PATTERN B

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

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



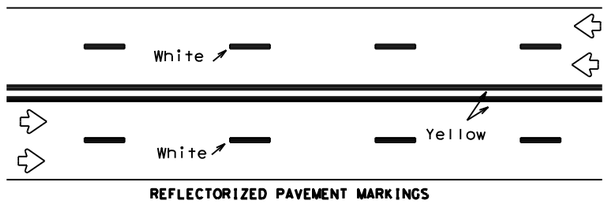
REFLECTORIZED PAVEMENT MARKINGS



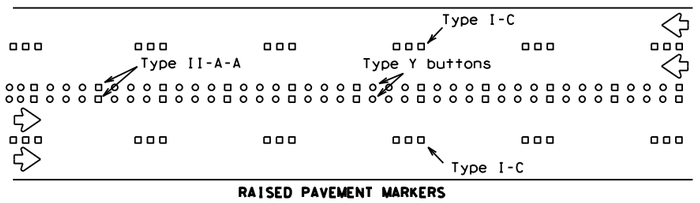
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



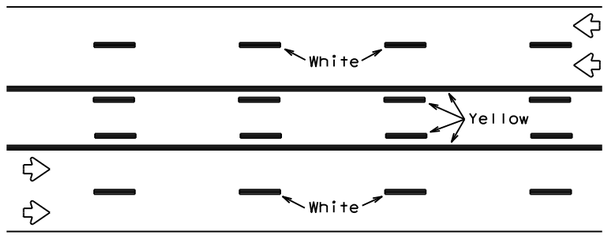
REFLECTORIZED PAVEMENT MARKINGS



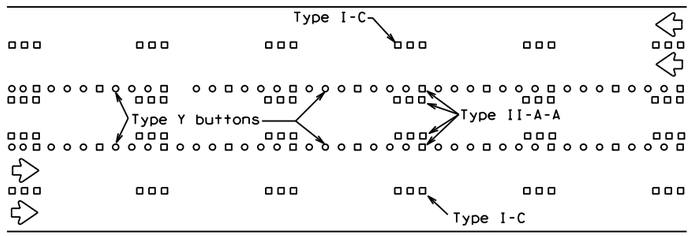
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

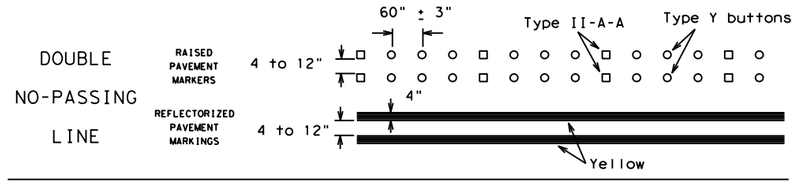
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

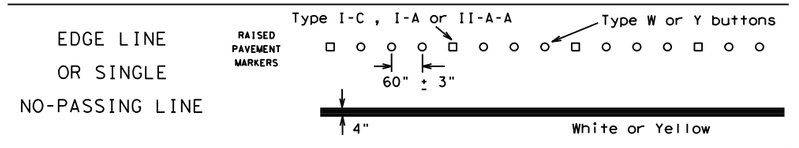
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

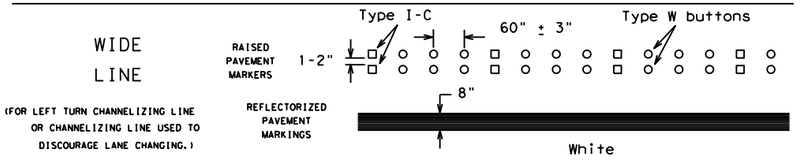


EDGE LINE OR SINGLE NO-PASSING LINE



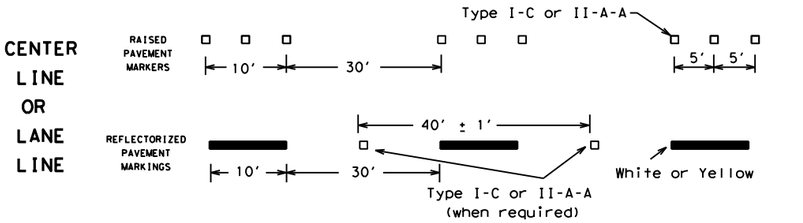
WIDE LINE

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

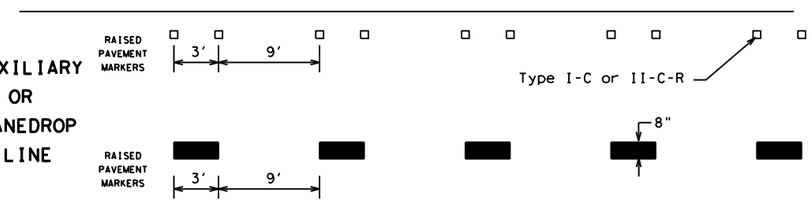


BROKEN LINES

CENTER LINE OR LANE LINE

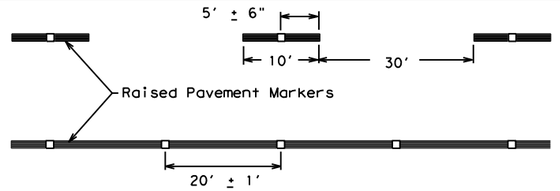


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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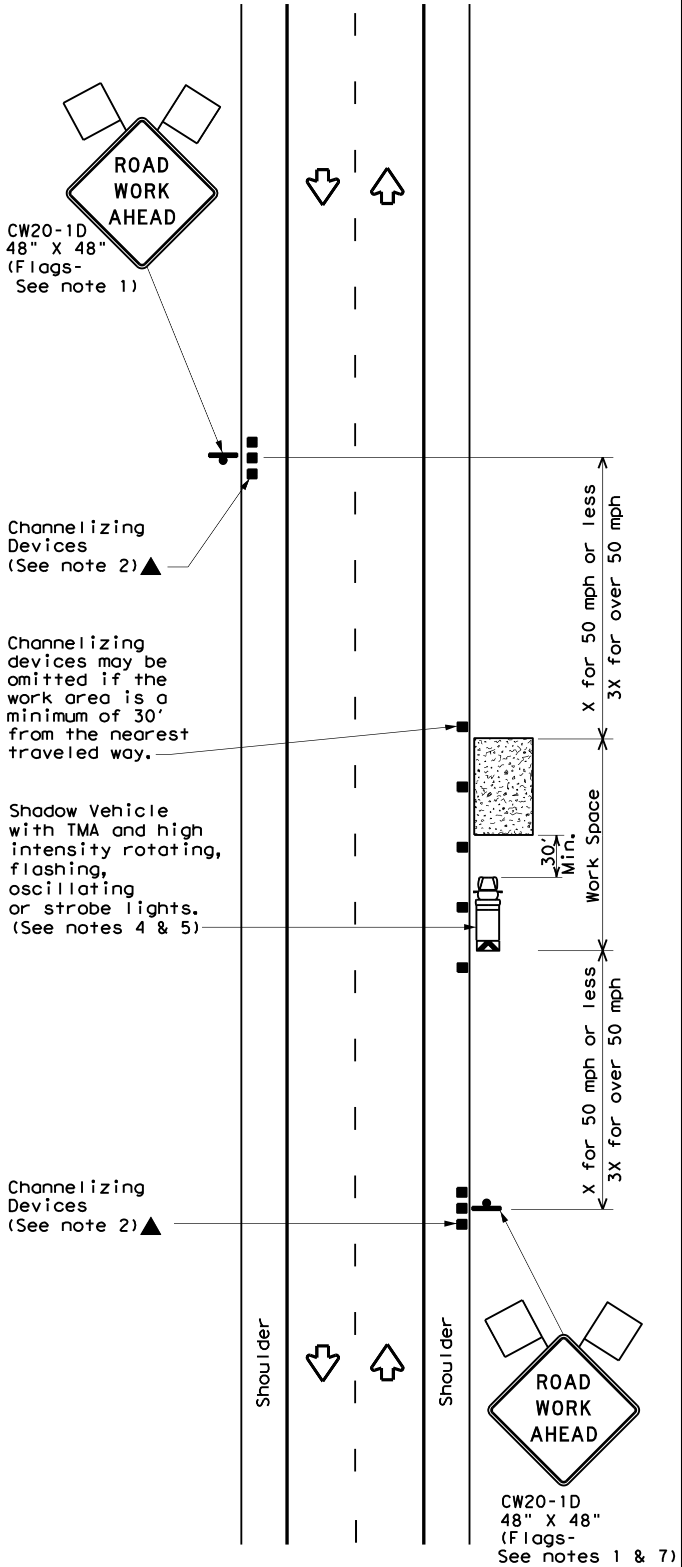
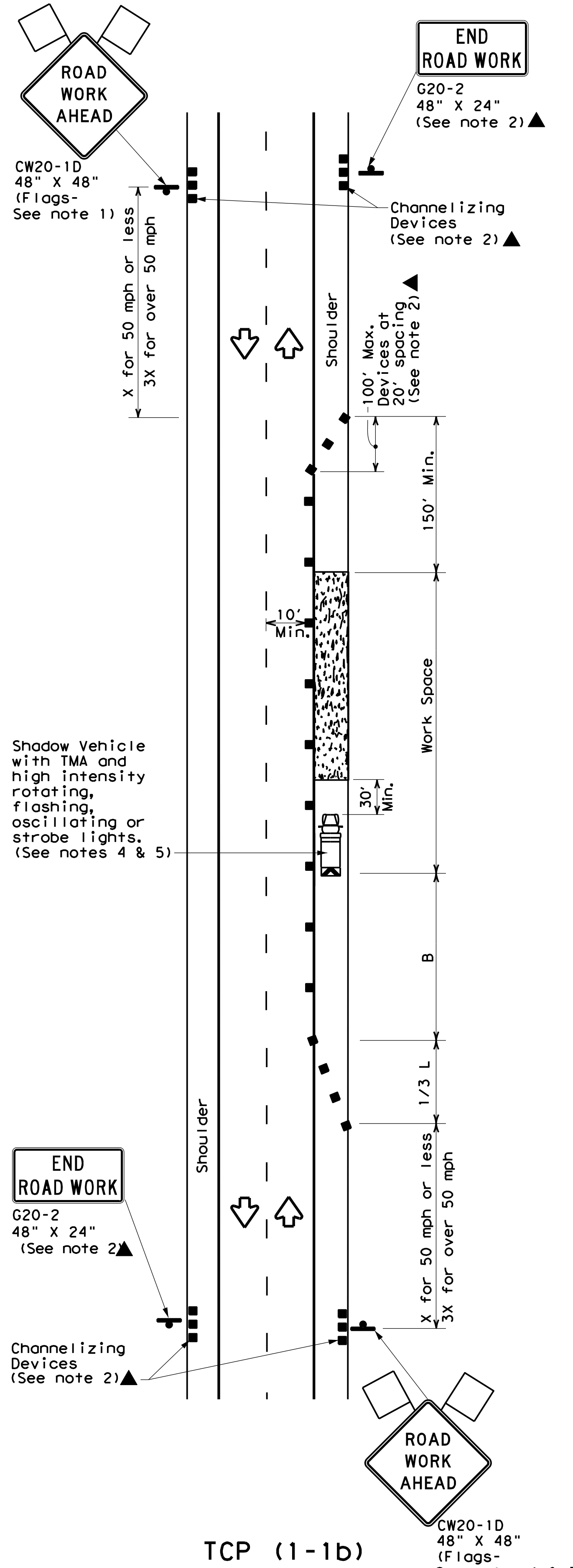
11-02 8-14				



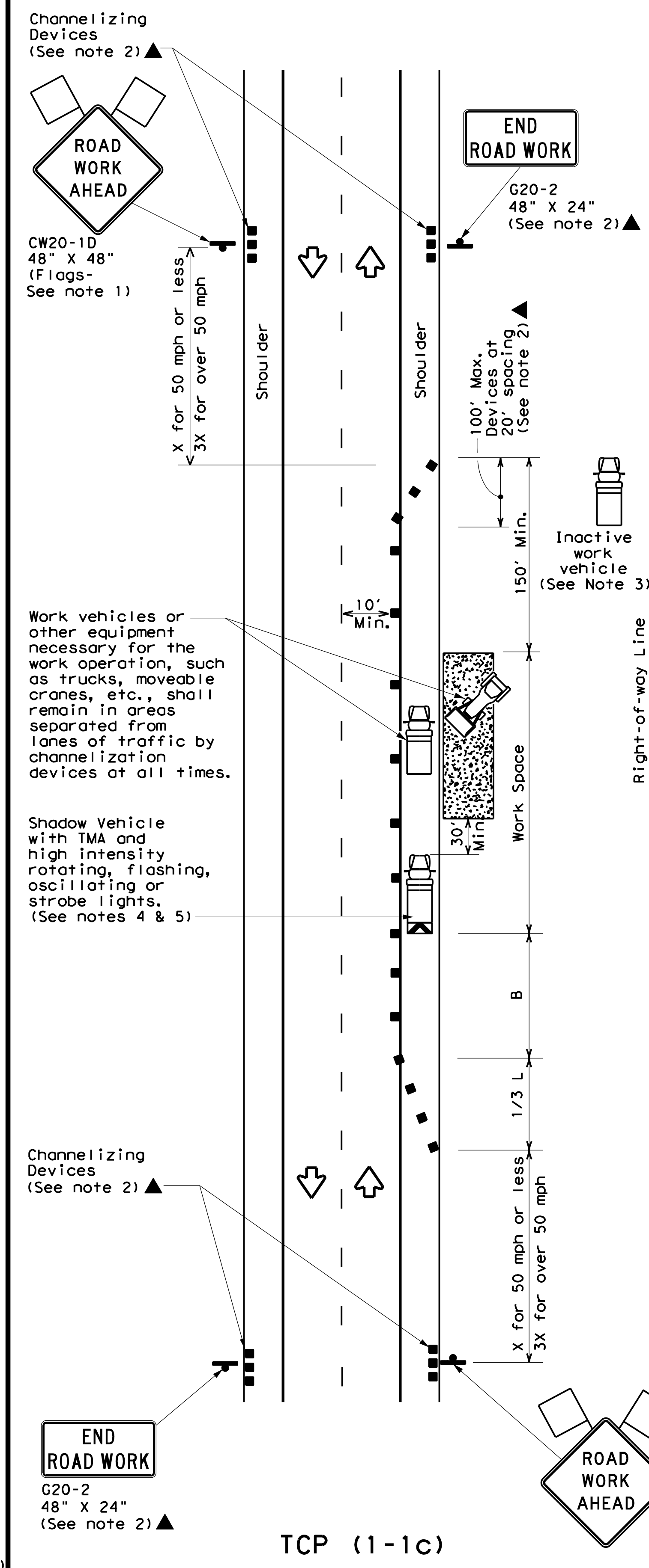
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND

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

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	DIST DAL		COUNTY NAVARRO	SHEET NO. 58

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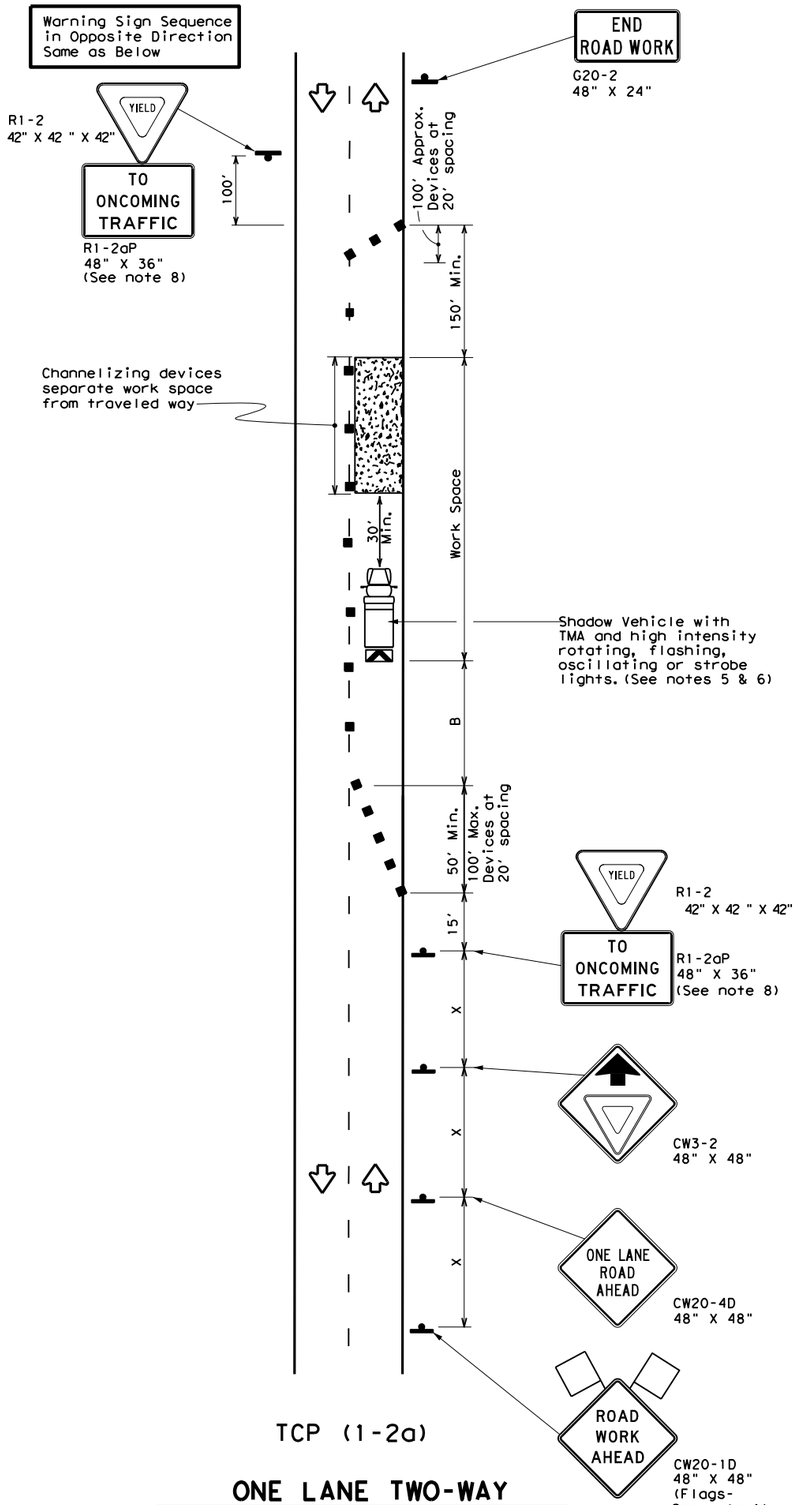
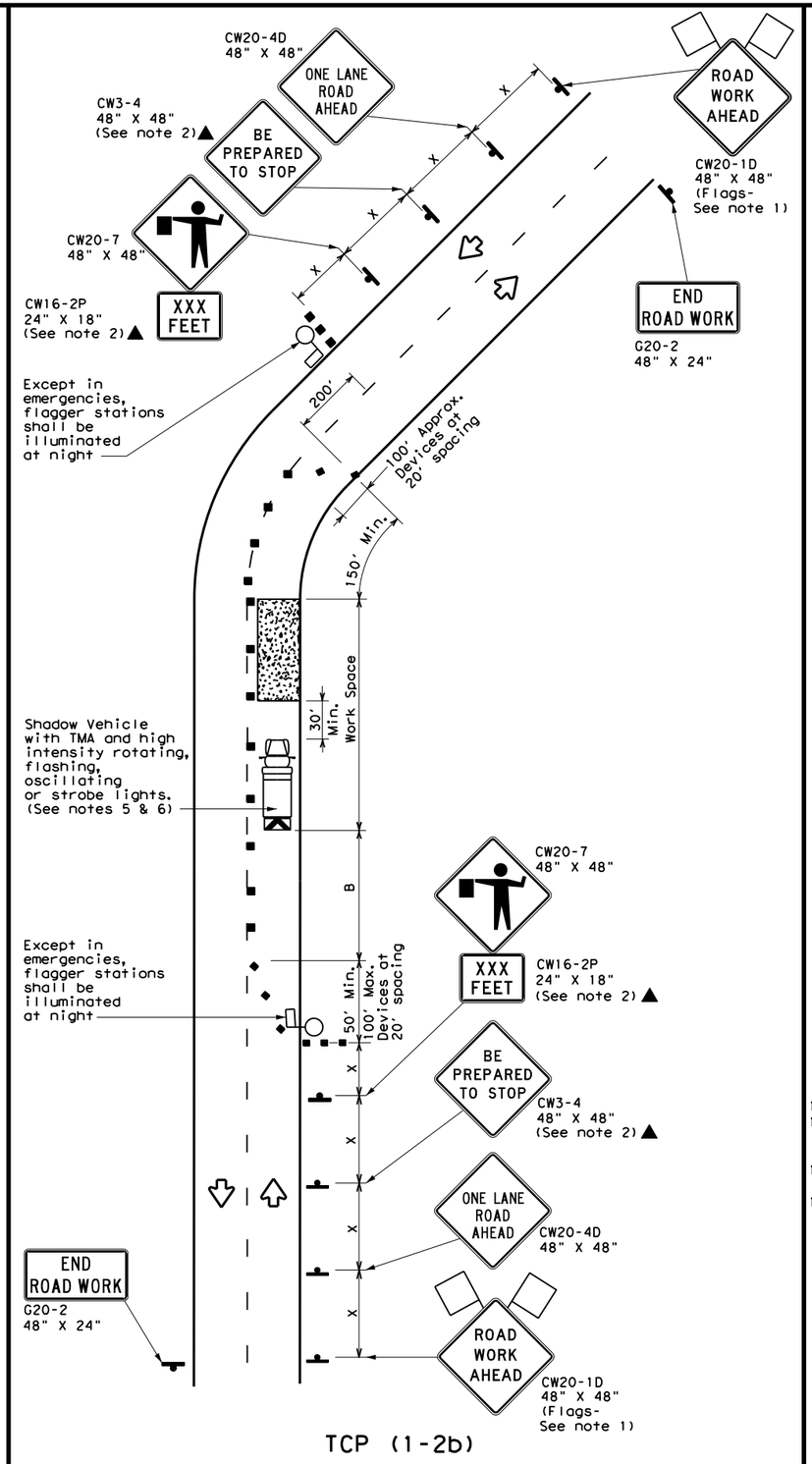


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0574	02	021	FM 636
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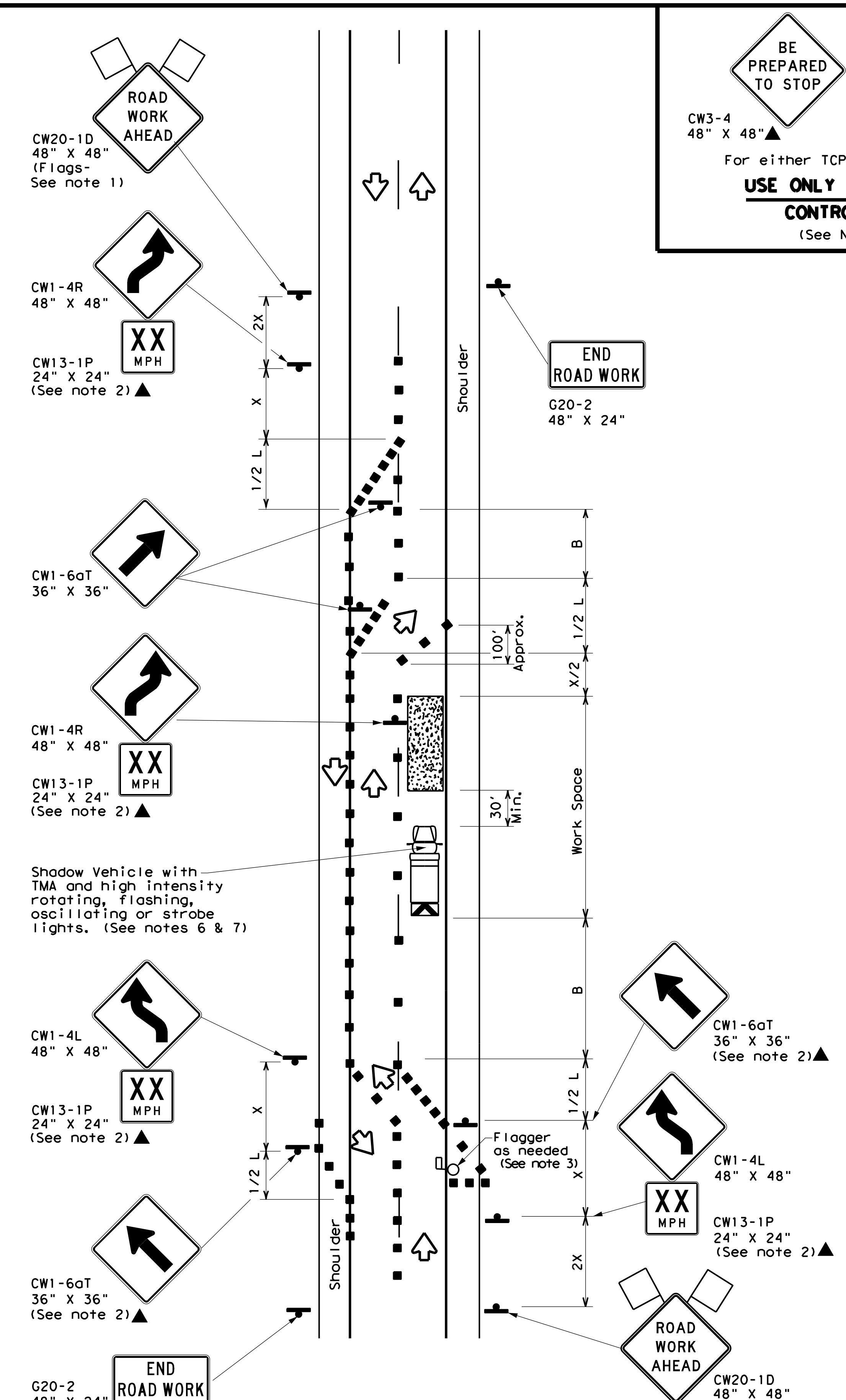
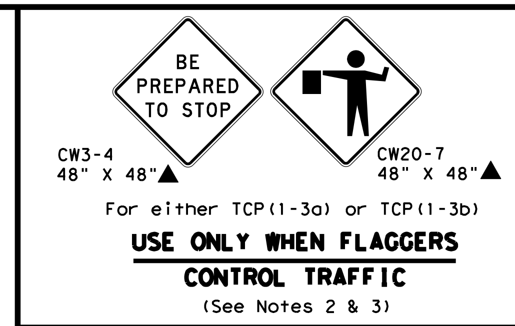
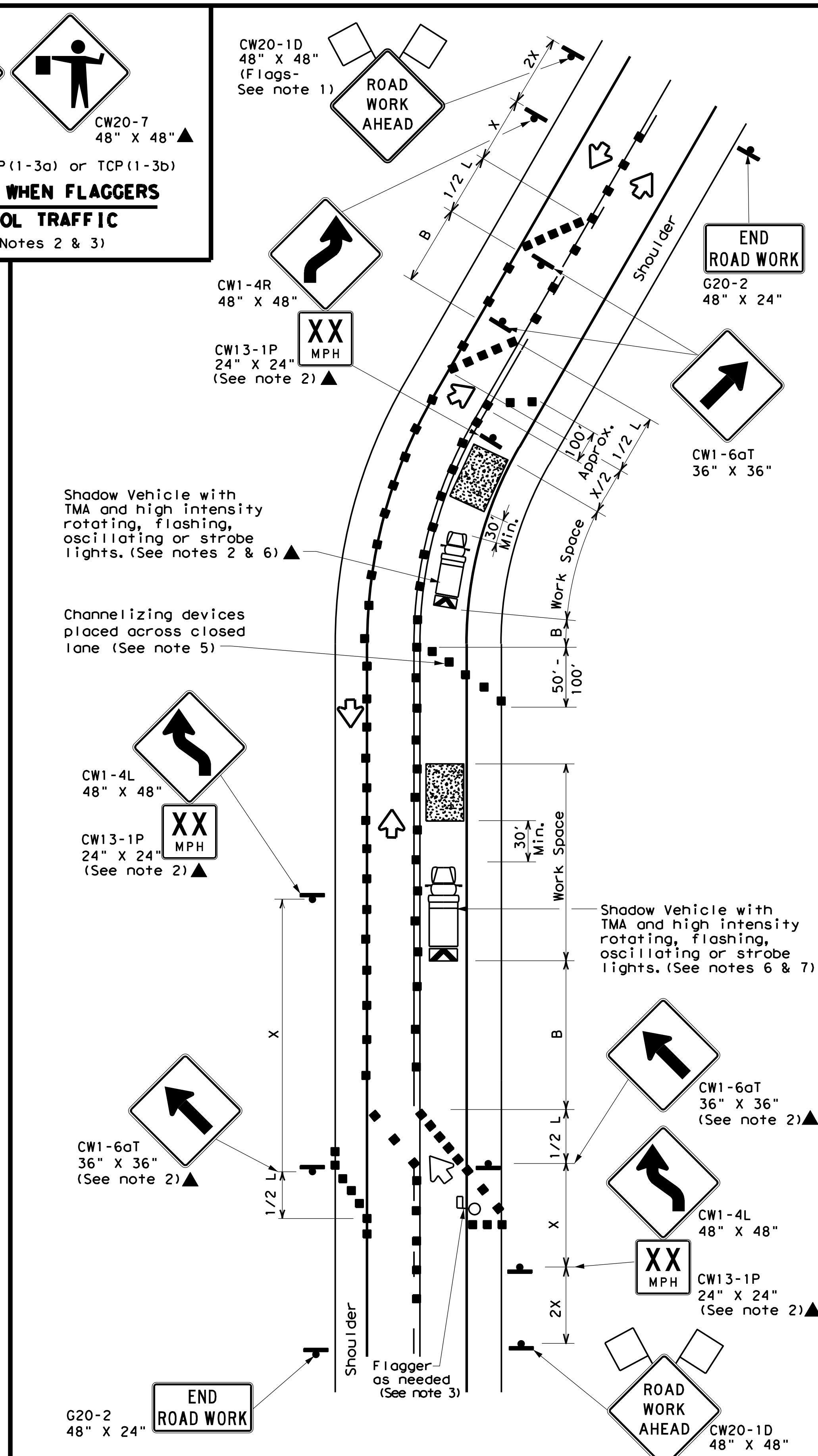


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW





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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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 elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		60

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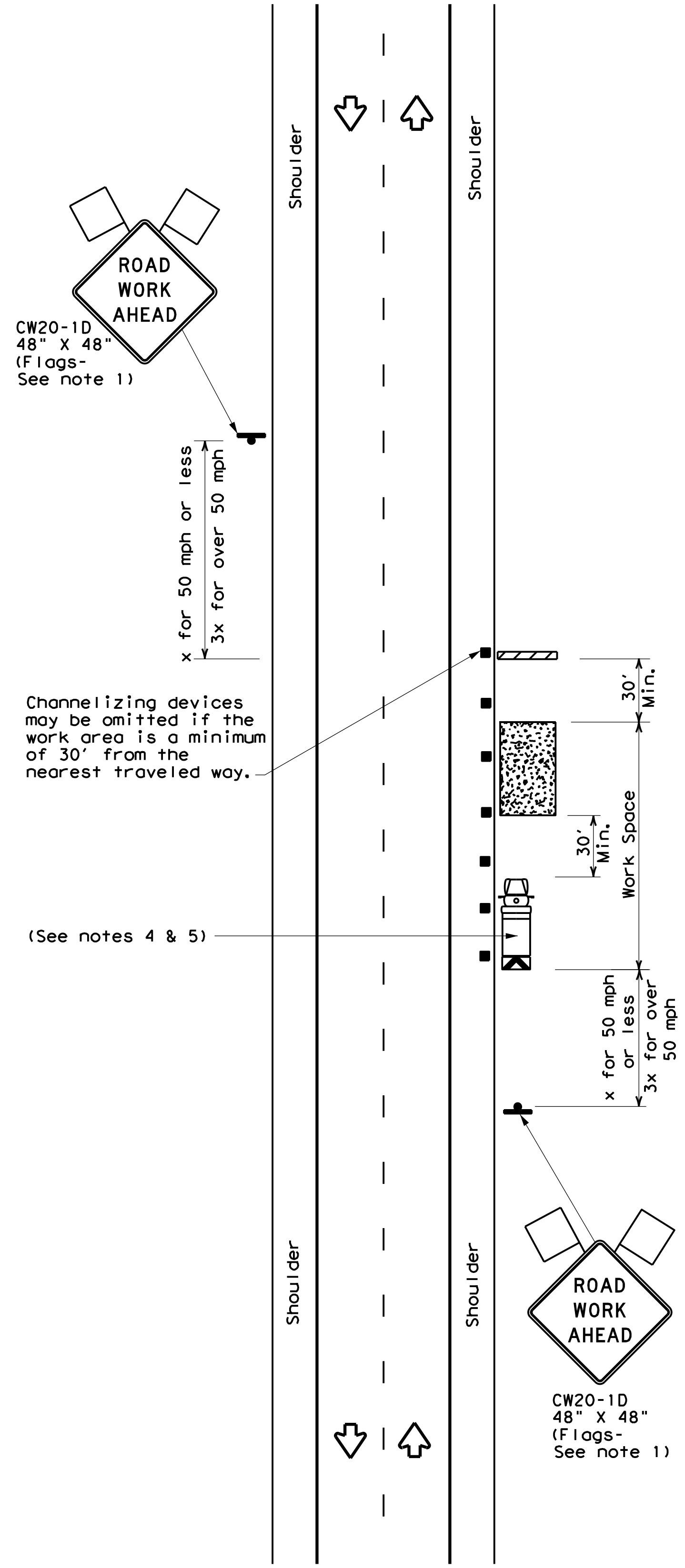
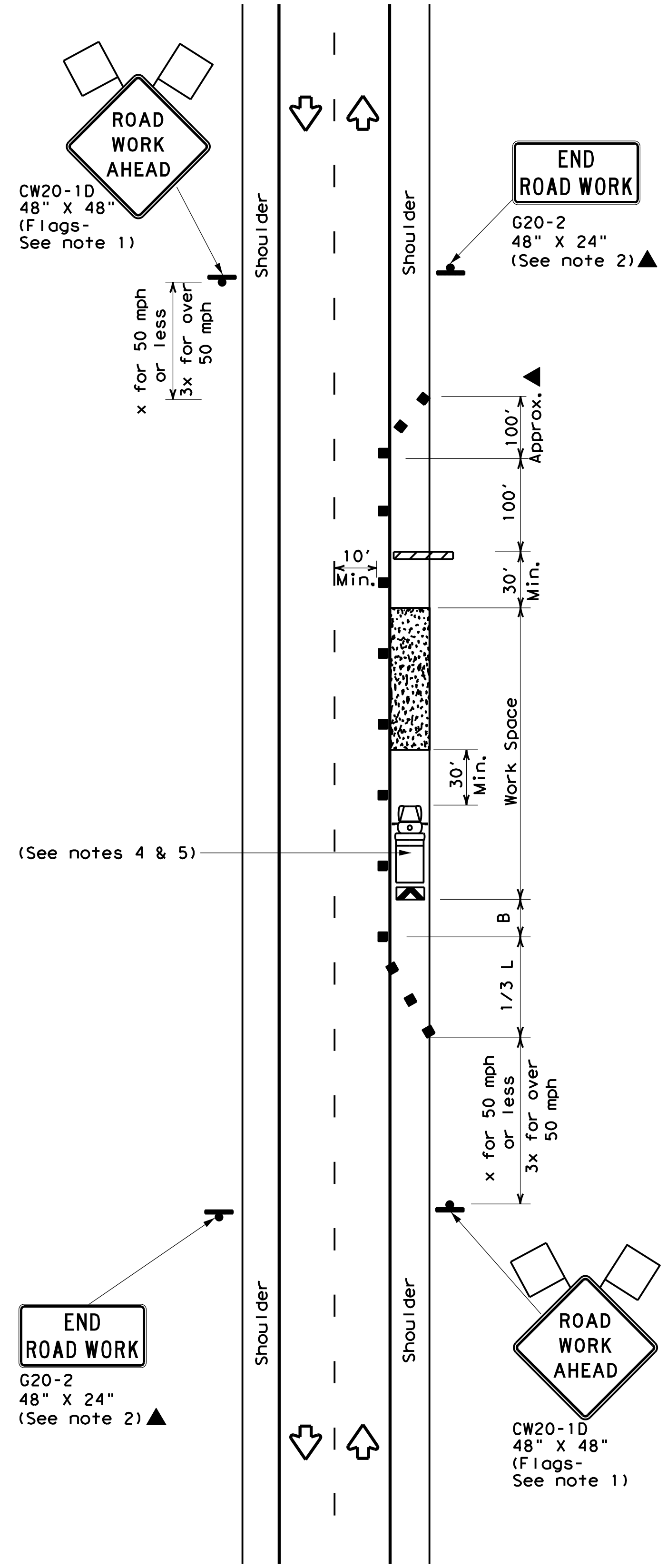


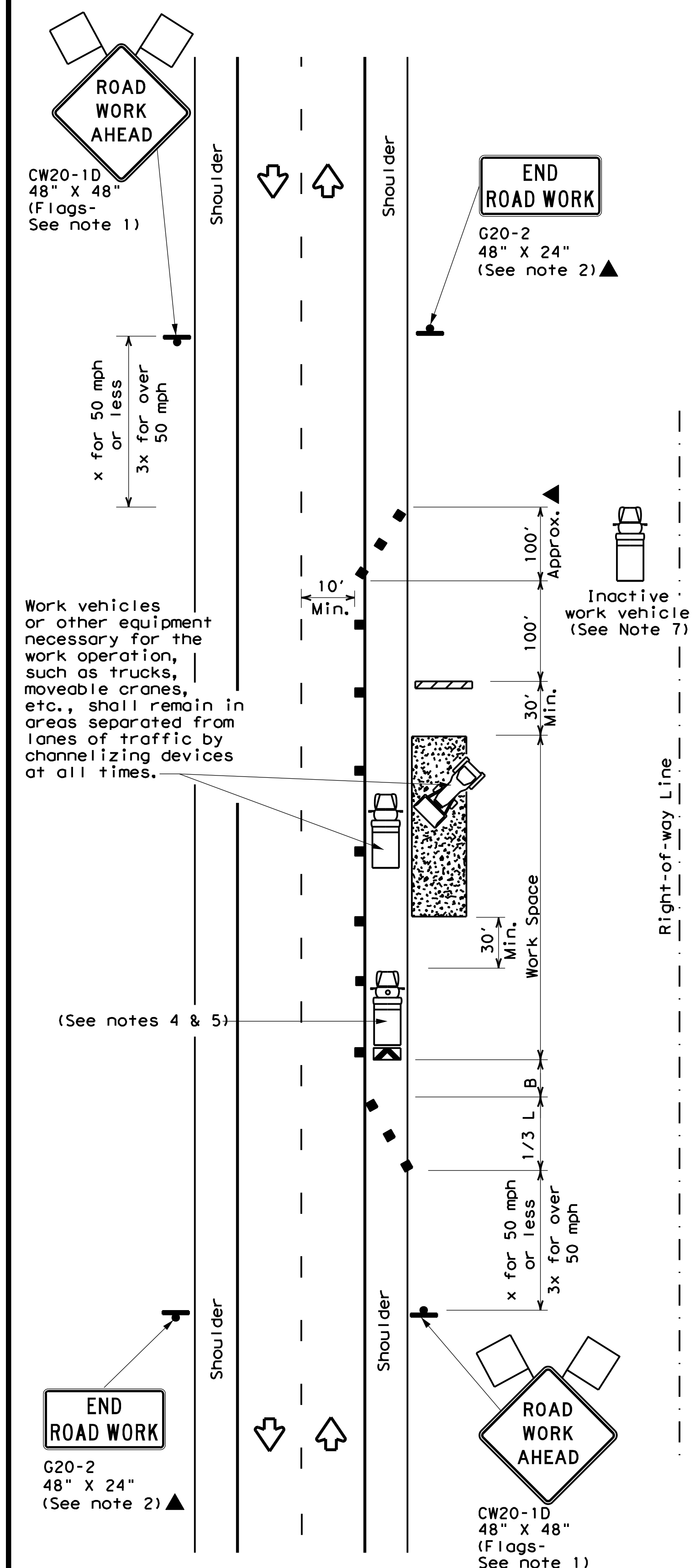
TCP (2-1a)

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
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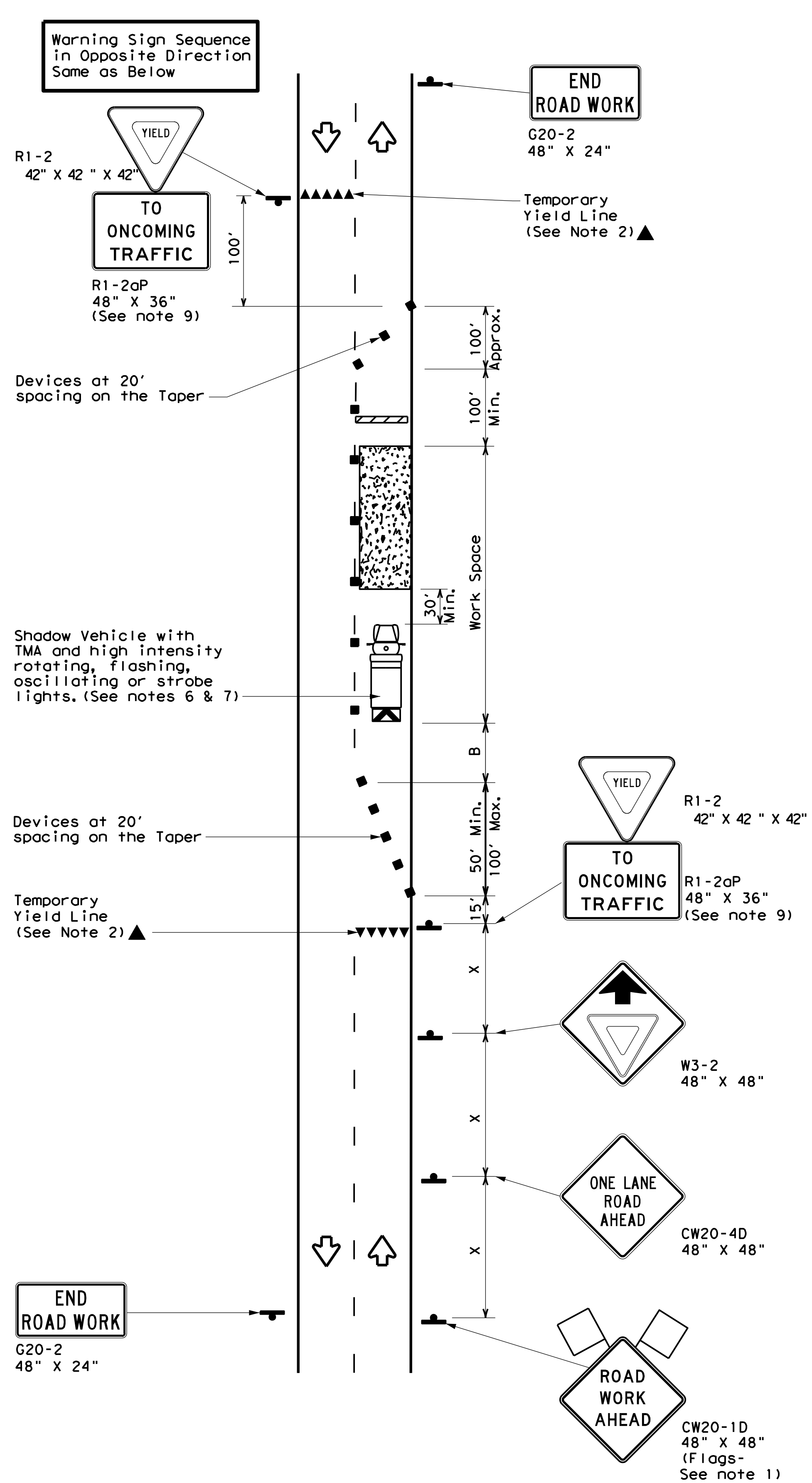


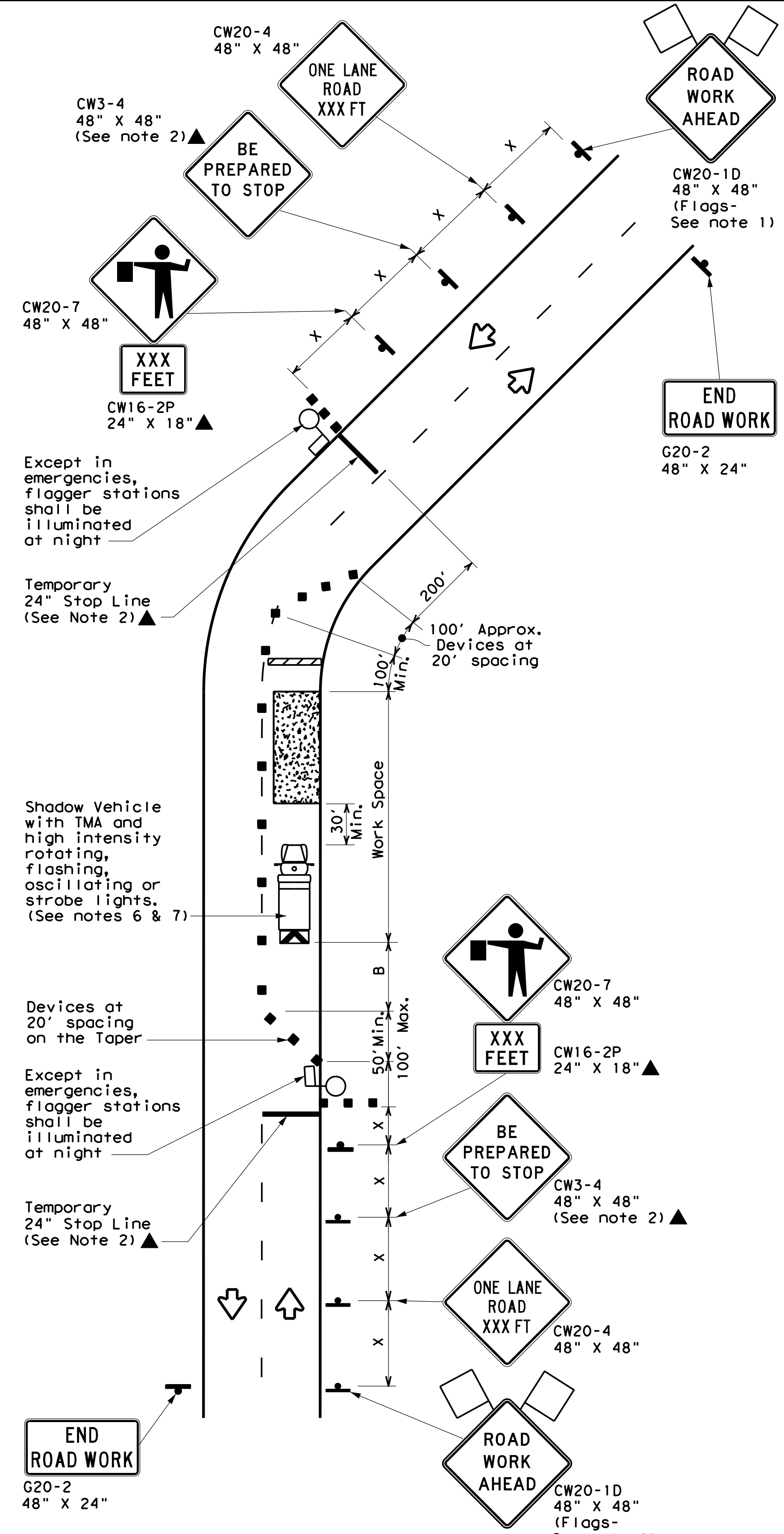
TCP (2-2a)

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

(symbol)	Type 3 Barricade	(symbol)	Channelizing Devices
(symbol)	Heavy Work Vehicle	(symbol)	Truck Mounted Attenuator (TMA)
(symbol)	Trailer Mounted Flashing Arrow Board	(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"	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. 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

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162

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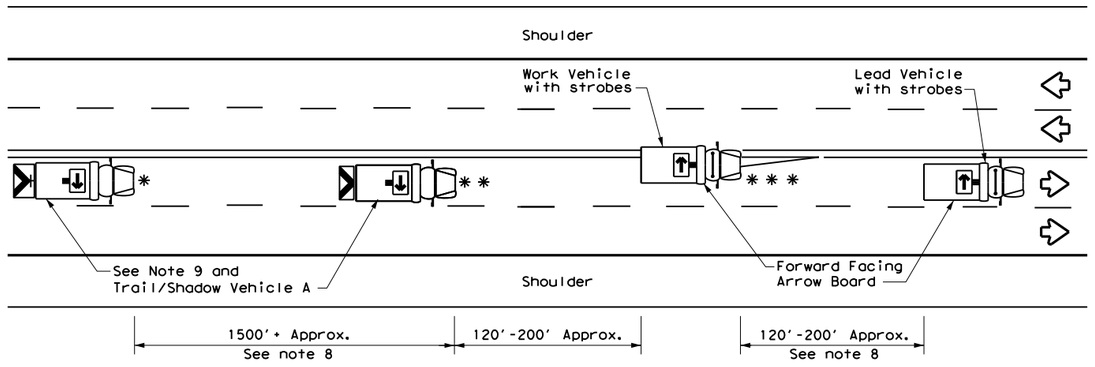
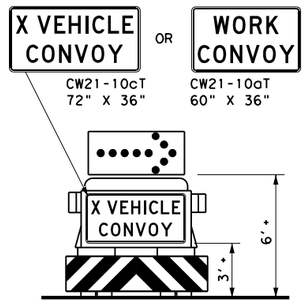


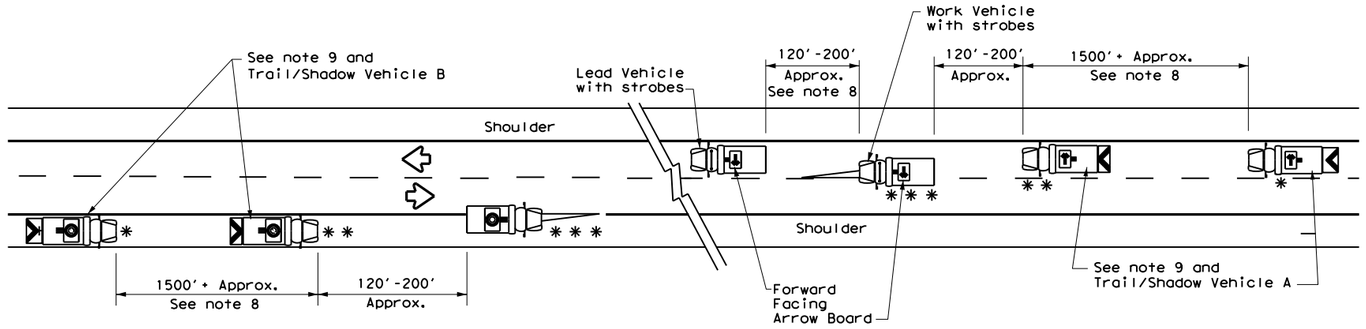
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

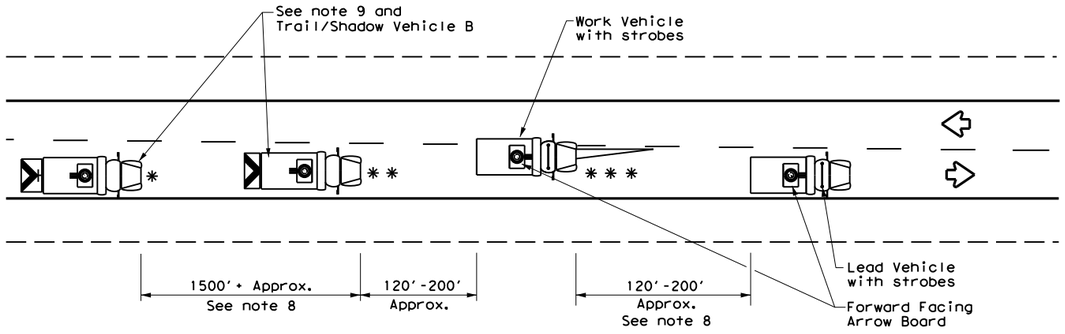


WORK ON SHOULDER

WORK ON TRAVEL LANE

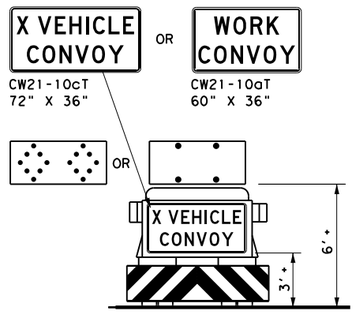
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

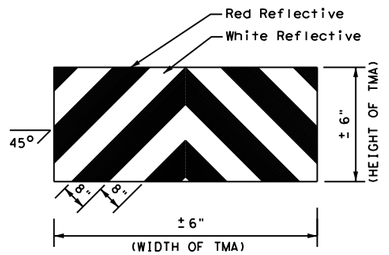
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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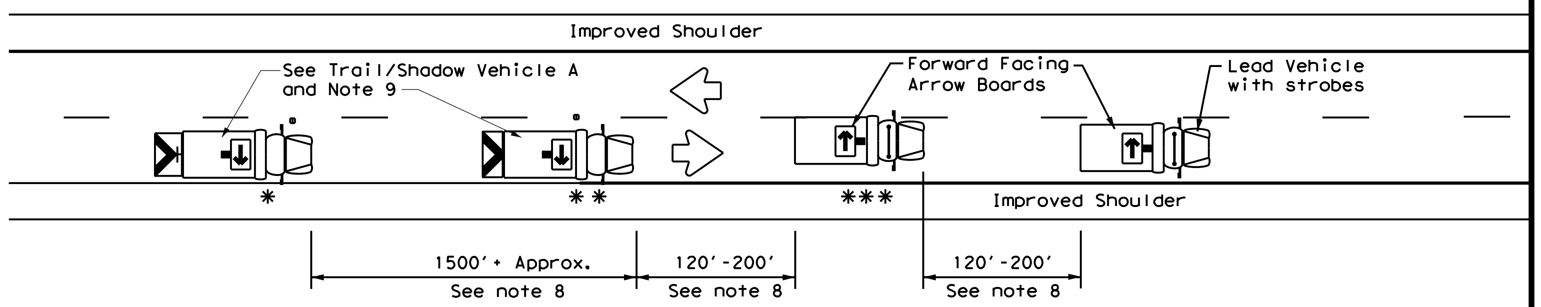
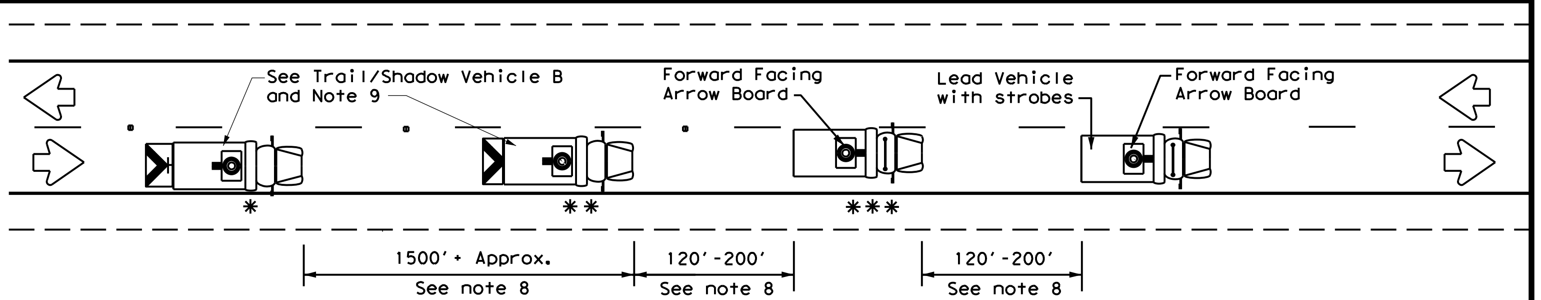


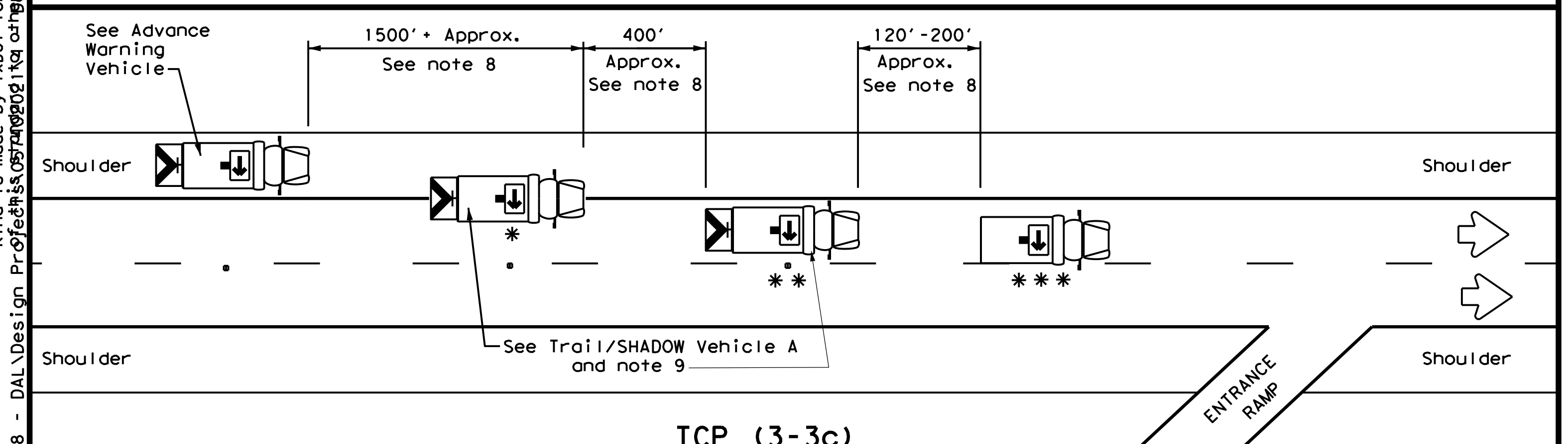
TCP (3-3a)

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



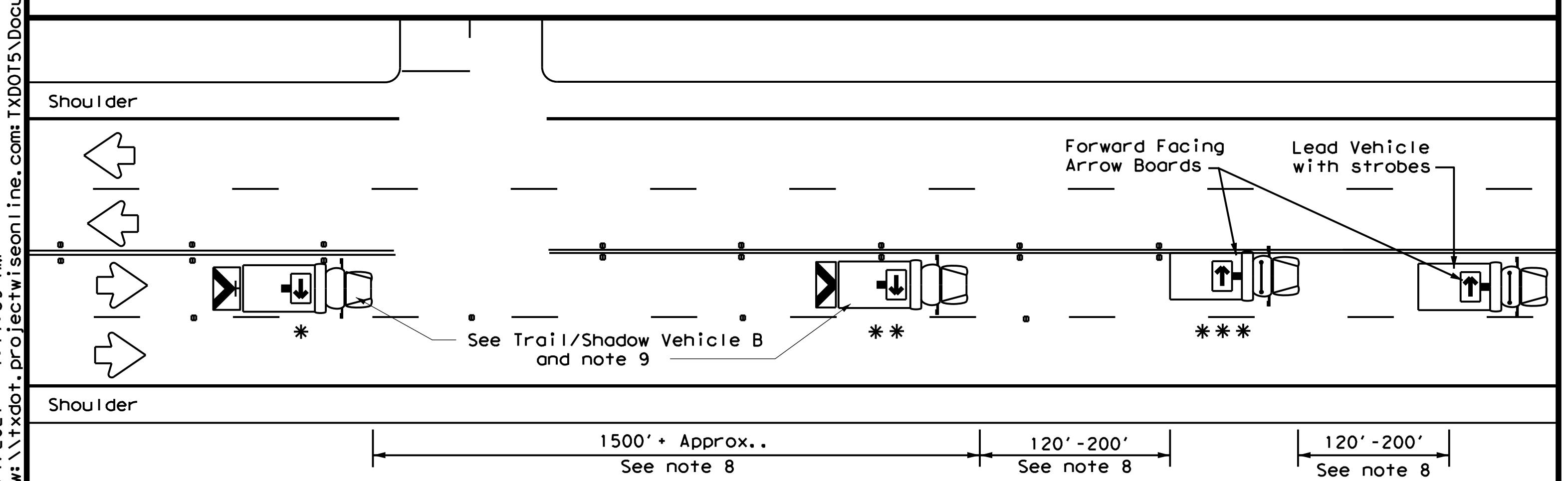
TCP (3-3b)

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



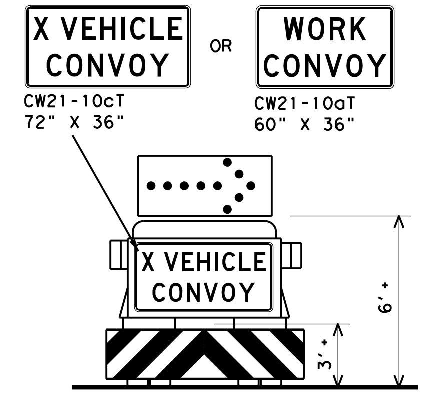
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



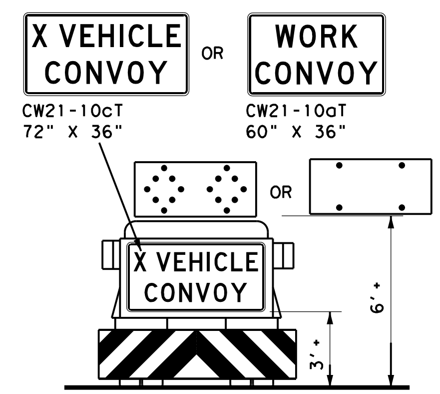
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



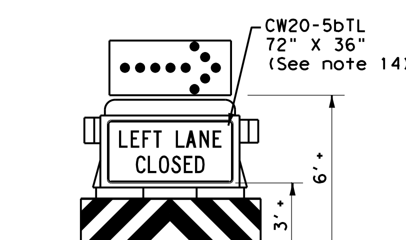
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

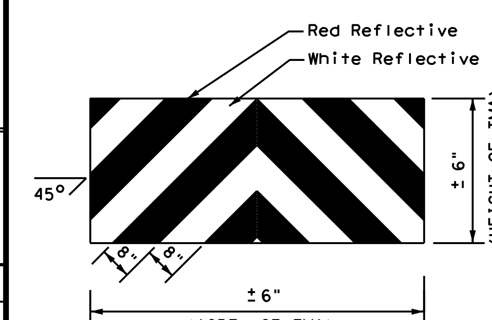


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

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 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 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 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS 2-94 4-98 8-95 7-13 1-97 7-14	DIST DAL		COUNTY NAVARRO	SHEET NO. 64

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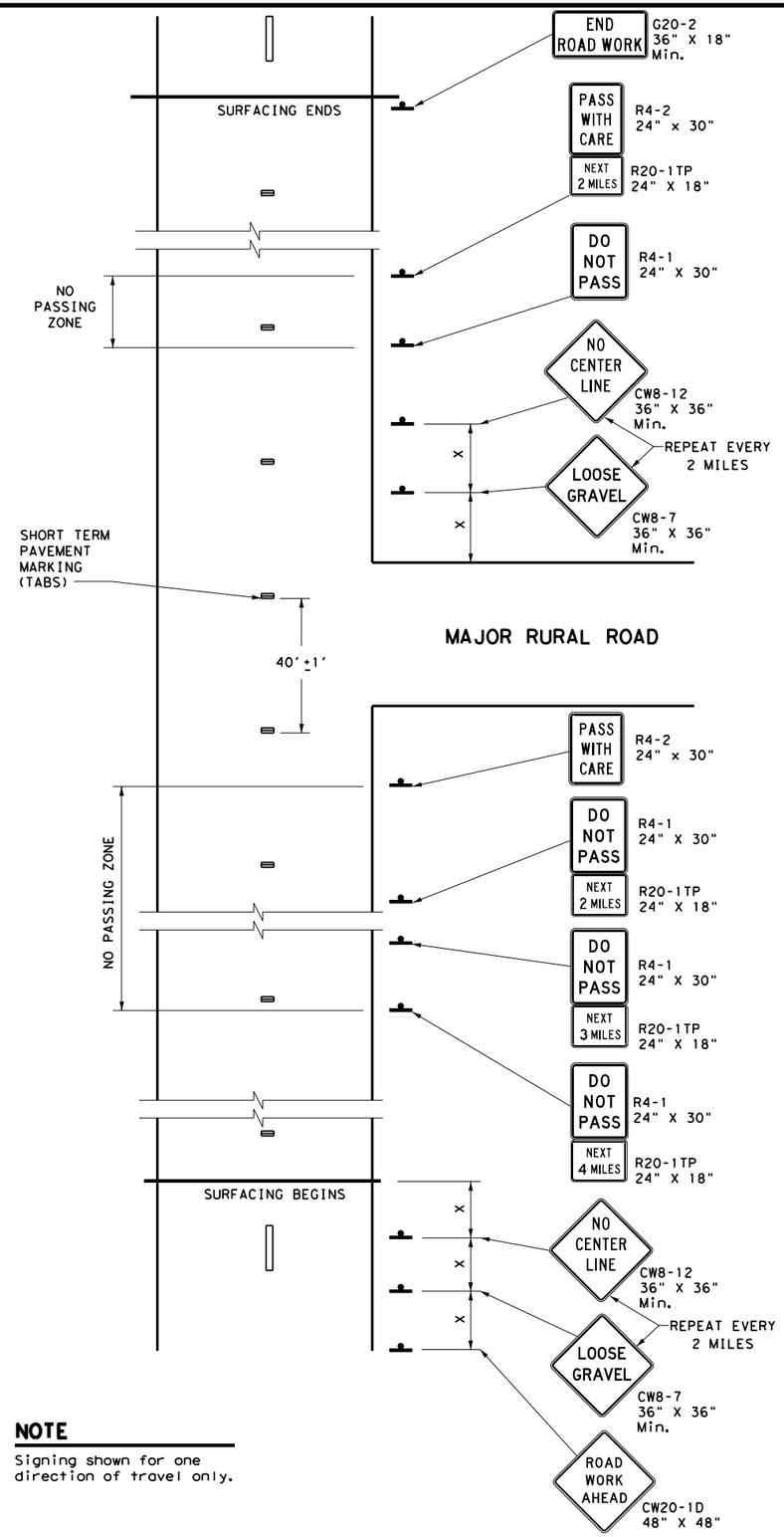
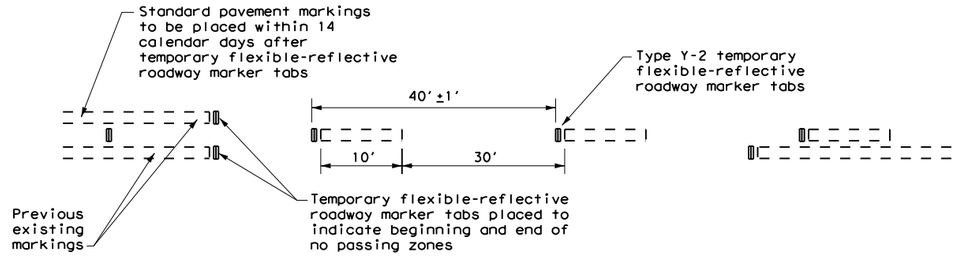


NOTE

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

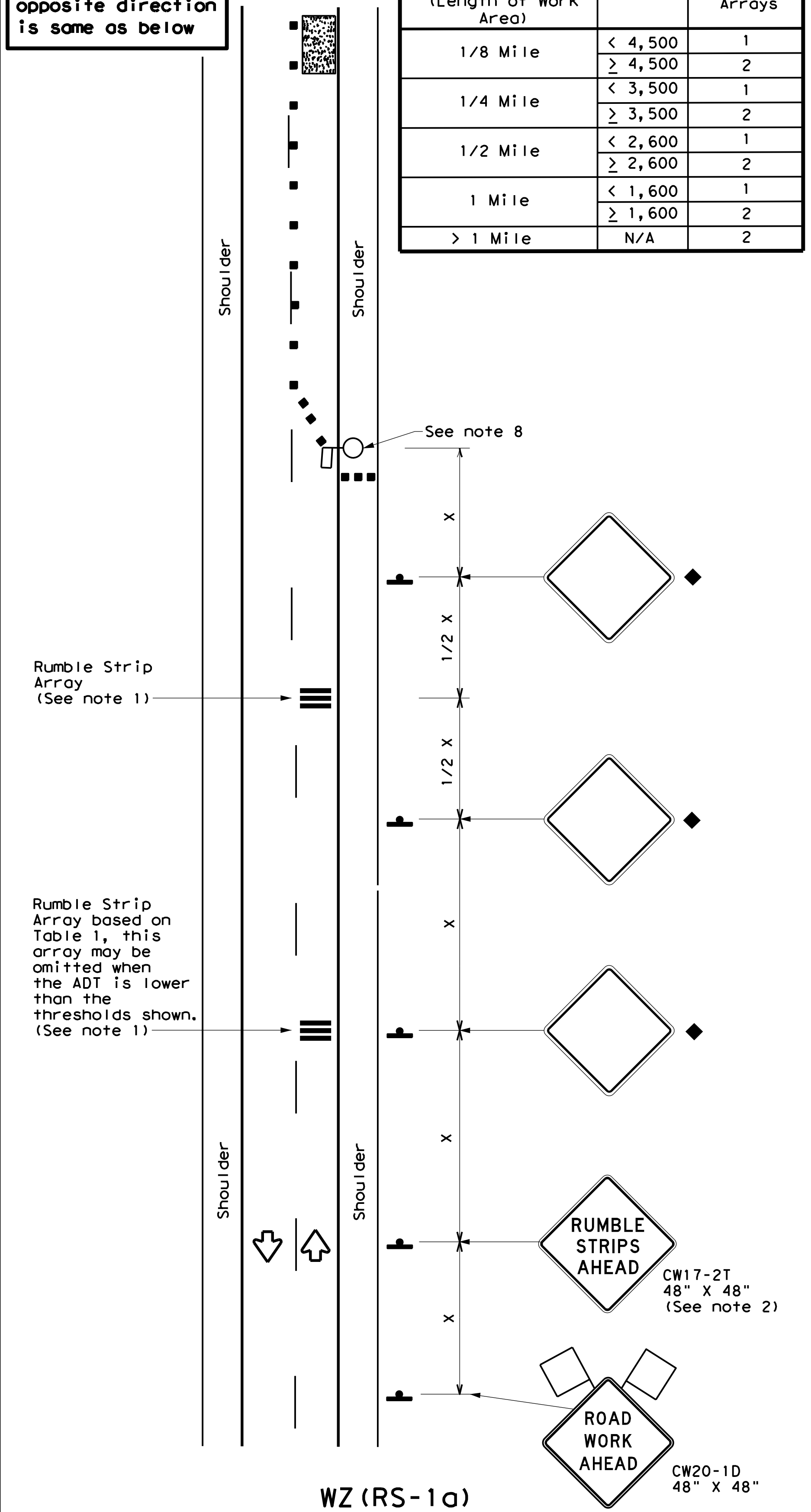
TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	DAL	NAVARRO		65

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

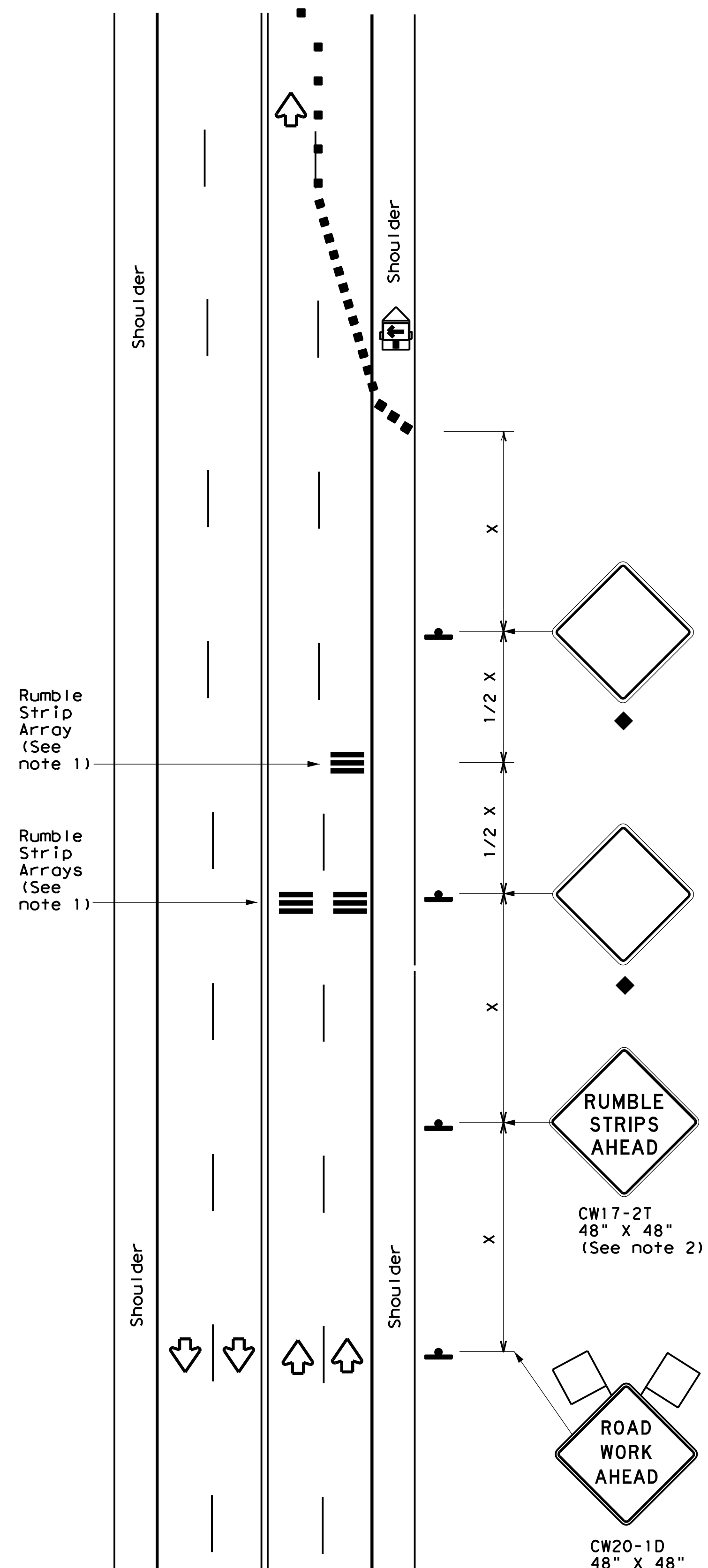
TABLE 1

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

LEGEND

Type 3 Barricade		Channelizing Devices	
Heavy Work Vehicle		Truck Mounted Attenuator (TMA)	
Trailer Mounted Flashing Arrow Panel		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
	✓	✓		

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

TABLE 2

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

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS 2-14 4-16	DIST DAL	COUNTY NAVARRO		SHEET NO. 66

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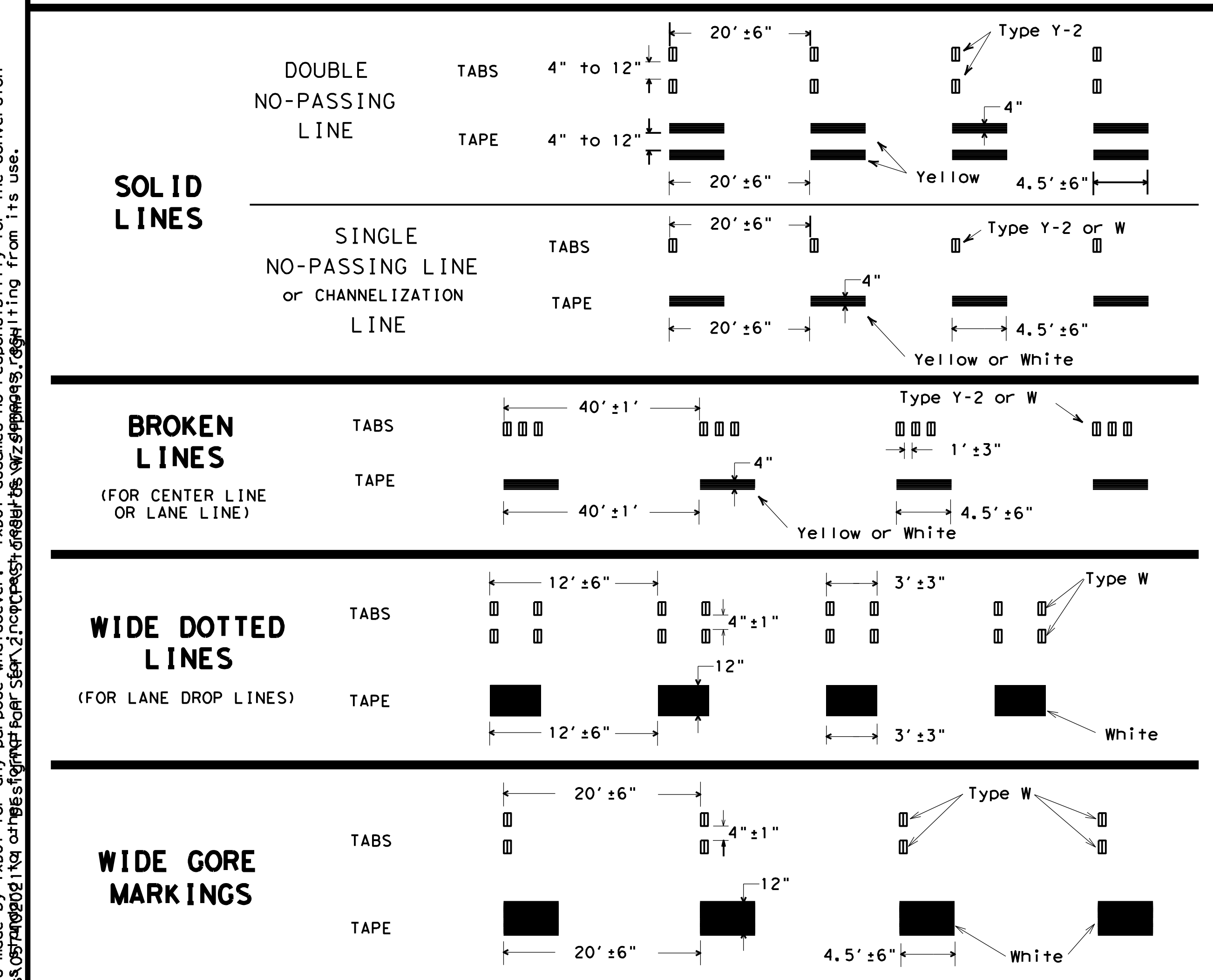
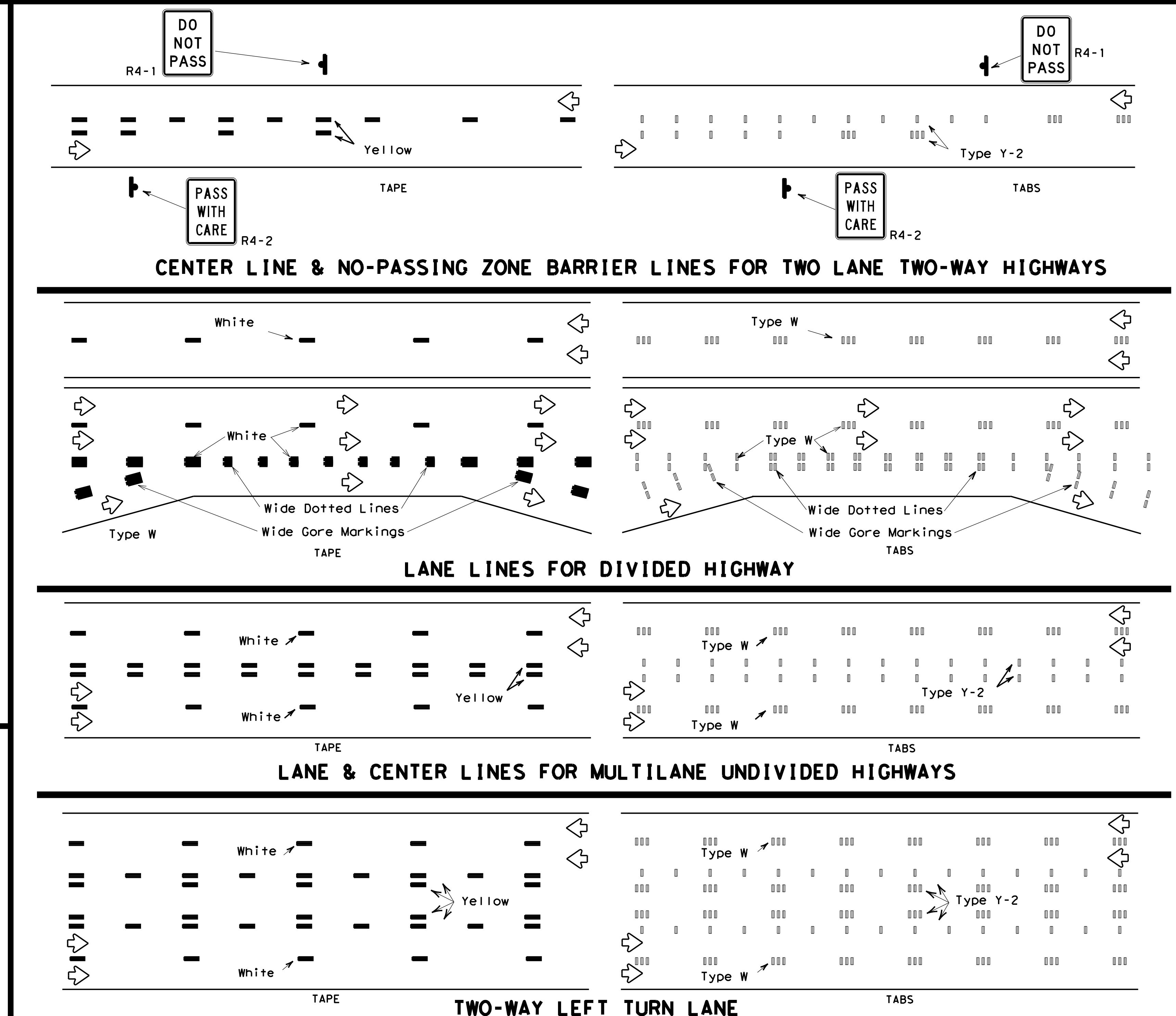
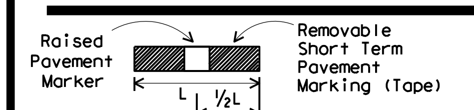
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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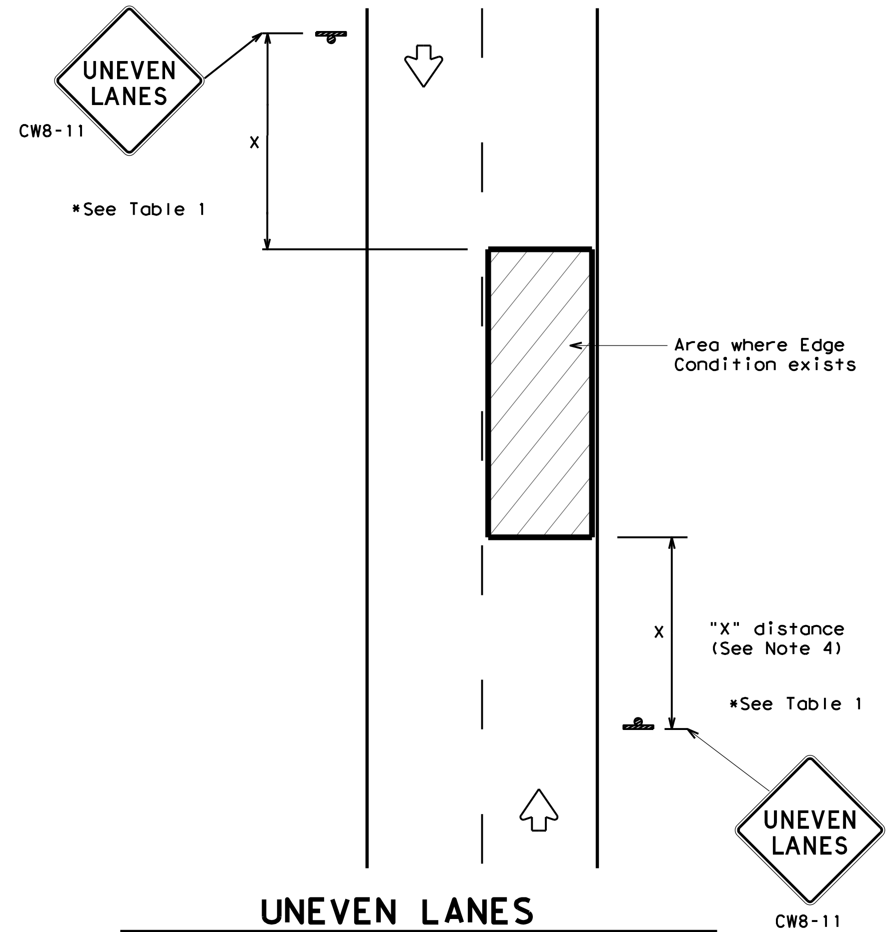
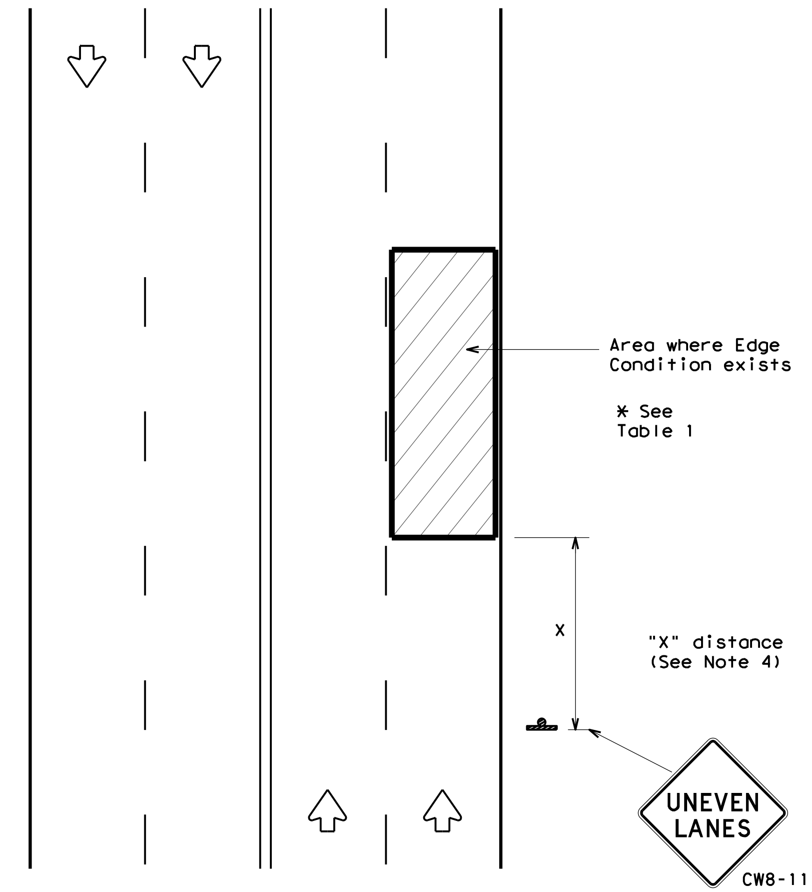


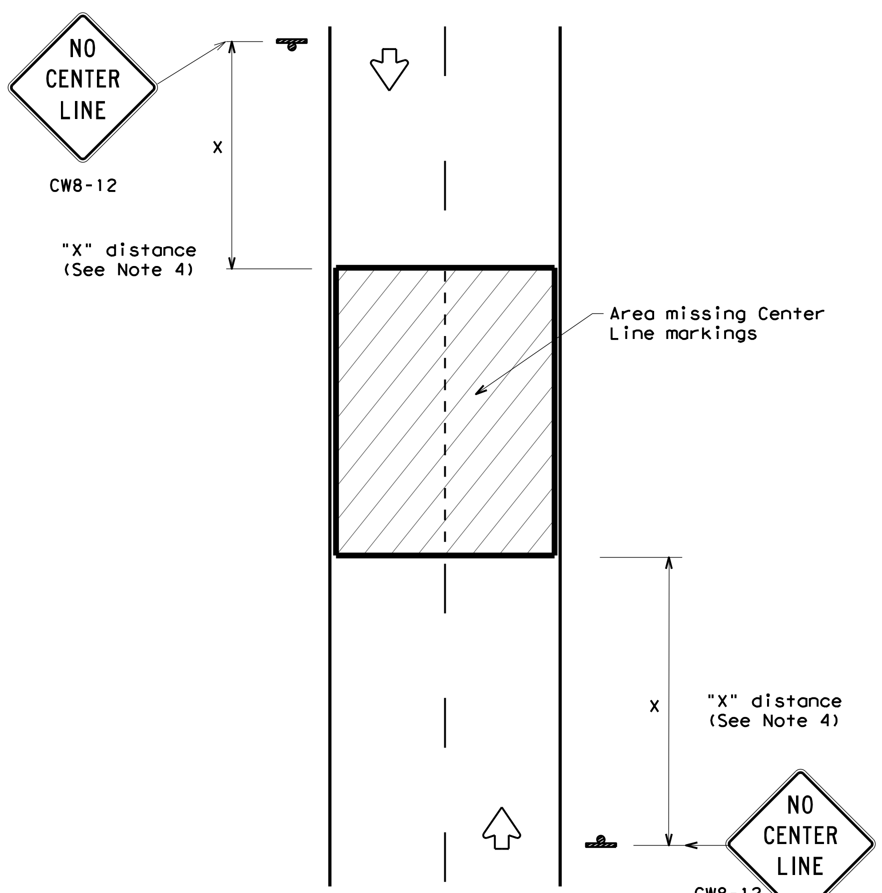
UNEVEN LANES

TWO LANE CONVENTIONAL ROAD



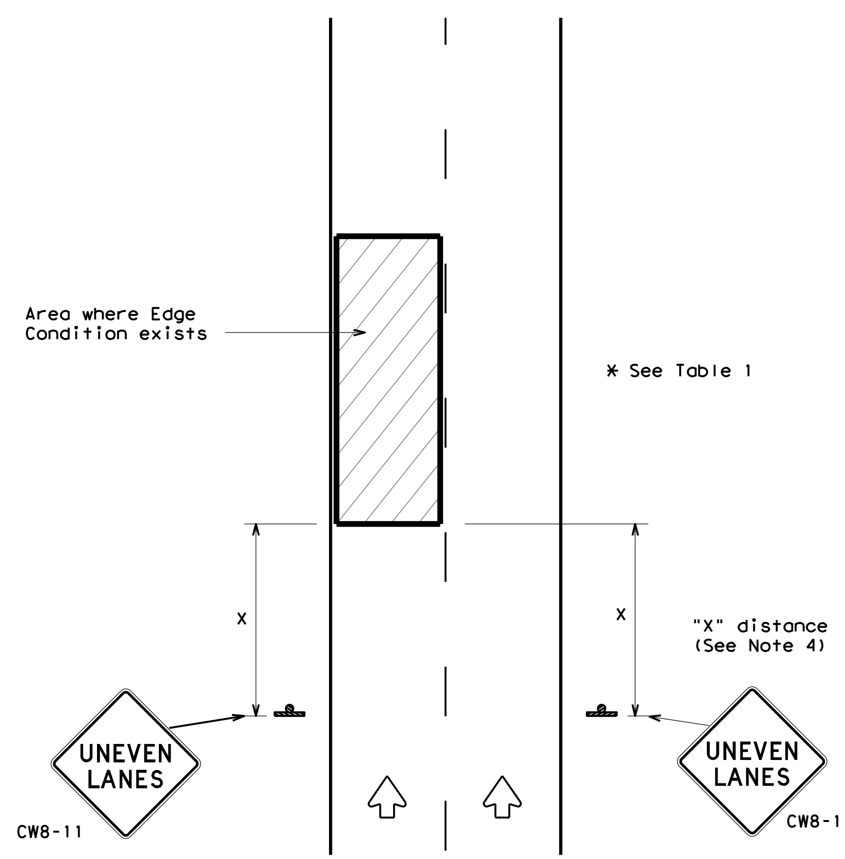
UNEVEN LANES

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 (D)	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 (>3, 1, D)	Less than or equal to 3"	Sign: CW8-11
③ (0" to 3/4", D, 12") Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

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

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

Texas Department of Transportation — Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS 8-95 2-98 7-13 1-97 3-03	DIST DAL	COUNTY NAVARRO		SHEET NO. 68

112

DATE: 1/7/2021 7:18:02 AM
FILE: pw:\\txdot.projectwiseonline.com:TxDOT5\Documents\18 - DAL\Design Projects\0574020...

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
POB	( )	0+00.0000 R1	6767460.214	2628112.398
PC	( )	4+05.7921 R1	6767650.329	2628470.899
Tangential Direction:		N 62.1 E		
Tangential Length:		405.7921		
Element: Circular				
PC	( )	4+05.7921 R1	6767650.329	2628470.899
PI	( )	4+67.0344 R1	6767679.021	2628525.005
CC	( )		6768975.521	2627768.143
PT	( )	5+28.2087 R1	6767712.029	2628576.591
Radius:		1500		
Delta:		4.7 Left		
Degree of Curvature (Arc):		3.8		
Length:		122.4166		
Tangent:		61.2423		
Chord:		122.3826		
Middle Ordinate:		1.2486		
External:		1.2497		
Tangent Direction:		N 62.1 E		
Radial Direction:		S 27.9 E		
Chord Direction:		N 59.7 E		
Radial Direction:		S 32.6 E		
Tangent Direction:		N 57.4 E		
Element: Linear				
PT	( )	5+28.2087 R1	6767712.029	2628576.591
PI	( )	11+21.9771 R1	6768032.049	2629076.739
Tangential Direction:		N 57.4 E		
Tangential Length:		593.7684		
Element: Linear				
PI	( )	11+21.9771 R1	6768032.049	2629076.739
PI	( )	29+90.4495 R1	6769040.387	2630649.775
Tangential Direction:		N 57.3 E		
Tangential Length:		1868.4724		
Element: Linear				
PI	( )	29+90.4495 R1	6769040.387	2630649.775
PI	( )	36+99.7998 R1	6769423.427	2631246.816
Tangential Direction:		N 57.3 E		
Tangential Length:		709.3503		
Element: Linear				
PI	( )	36+99.7998 R1	6769423.427	2631246.816
PI	( )	40+03.2557 R1	6769586.607	2631502.664
Tangential Direction:		N 57.5 E		
Tangential Length:		303.4559		
Element: Linear				
PI	( )	40+03.2557 R1	6769586.607	2631502.664
PI	( )	43+34.0599 R1	6769763.218	2631782.378
Tangential Direction:		N 57.7 E		
Tangential Length:		330.8042		
Element: Linear				
PI	( )	43+34.0599 R1	6769763.218	2631782.378
PI	( )	54+94.3311 R1	6770375.434	2632767.985
Tangential Direction:		N 58.2 E		
Tangential Length:		1160.2713		

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PI	( )	54+94.3311 R1	6770375.434	2632767.985
PC	( )	62+96.5542 R1	6770798.995	2633449.276
Tangential Direction:		N 58.1 E		
Tangential Length:		802.2231		
Element: Circular				
PC	( )	62+96.5542 R1	6770798.995	2633449.276
PI	( )	65+55.8163 R1	6770935.882	2633669.455
CC	( )		6771019.801	2633311.999
PT	( )	67+04.2223 R1	6771156.449	2633533.195
Radius:		260		
Delta:		89.8 Left		
Degree of Curvature (Arc):		22		
Length:		407.6681		
Tangent:		259.2621		
Chord:		367.1726		
Middle Ordinate:		75.8912		
External:		107.1741		
Tangent Direction:		N 58.1 E		
Radial Direction:		S 31.9 E		
Chord Direction:		N 13.2 E		
Radial Direction:		N 58.3 E		
Tangent Direction:		N 31.7 W		
Element: Linear				
PT	( )	67+04.2223 R1	6771156.449	2633533.195
PC	( )	69+83.6423 R1	6771394.166	2633386.34
Tangential Direction:		N 31.7 W		
Tangential Length:		279.42		
Element: Circular				
PC	( )	69+83.6423 R1	6771394.166	2633386.34
PI	( )	75+69.9717 R1	6771892.986	2633078.183
CC	( )		6771698.996	2633879.776
PT	( )	79+00.9992 R1	6772195.711	2633580.319
Radius:		580		
Delta:		90.6 Right		
Degree of Curvature (Arc):		9.9		
Length:		917.3569		
Tangent:		586.3294		
Chord:		824.683		
Middle Ordinate:		172.1097		
External:		244.7316		
Tangent Direction:		N 31.7 W		
Radial Direction:		N 58.3 E		
Chord Direction:		N 13.6 E		
Radial Direction:		S 31.1 E		
Tangent Direction:		N 58.9 E		
Element: Linear				
PT	( )	79+00.9992 R1	6772195.711	2633580.319
PI	( )	135+25.3717 R1	6775099.602	2638397.059
Tangential Direction:		N 58.9 E		
Tangential Length:		5624.3725		

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636 HORIZONTAL CONTROL DATA

SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	69
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PI	( )	135+25.3717 R1	6775099.602	2638397.059
PI	( )	142+92.7065 R1	6775496.555	2639053.741
Tangential Direction:		N 58.8 E		
Tangential Length:		767.3348		
Element: Linear				
PI	( )	142+92.7065 R1	6775496.555	2639053.741
PC	( )	149+57.0425 R1	6775839.472	2639622.731
Tangential Direction:		N 58.9 E		
Tangential Length:		664.336		
Element: Circular				
PC	( )	149+57.0425 R1	6775839.472	2639622.731
PI	( )	152+38.7435 R1	6775984.88	2639864.002
CC	( )		6775595.375	2639769.842
PT	( )	154+01.4013 R1	6775745.318	2640012.21
Radius:		285		
Delta:		89.3 Right		
Degree of Curvature (Arc):		20.1		
Length:		444.3588		
Tangent:		281.701		
Chord:		400.6977		
Middle Ordinate:		82.3048		
External:		115.7249		
Tangent Direction:		N 58.9 E		
Radial Direction:		S 31.1 E		
Chord Direction:		S 76.4 E		
Radial Direction:		S 58.3 W		
Tangent Direction:		S 31.7 E		
Element: Linear				
PT	( )	154+01.4013 R1	6775745.318	2640012.21
PI	( )	157+56.7150 R1	6775443.155	2640199.147
Tangential Direction:		S 31.7 E		
Tangential Length:		355.3138		
Element: Linear				
PI	( )	157+56.7150 R1	6775443.155	2640199.147
PI	( )	161+16.4717 R1	6775136.239	2640386.836
Tangential Direction:		S 31.4 E		
Tangential Length:		359.7566		
Element: Linear				
PI	( )	161+16.4717 R1	6775136.239	2640386.836
PC	( )	197+99.9991 R1	6771997.445	2642314.619
Tangential Direction:		S 31.6 E		
Tangential Length:		3683.5274		

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Circular				
PC	( )	197+99.9991 R1	6771997.445	2642314.619
PI	( )	201+14.2115 R1	6771729.7	2642479.063
CC	( )		6772599.301	2643294.553
PT	( )	204+13.4510 R1	6771582.773	2642756.807
Radius:		1150		
Delta:		30.6 Left		
Degree of Curvature (Arc):		5		
Length:		613.4519		
Tangent:		314.2124		
Chord:		606.2044		
Middle Ordinate:		40.6628		
External:		42.1533		
Tangent Direction:		S 31.6 E		
Radial Direction:		S 58.4 W		
Chord Direction:		S 46.8 E		
Radial Direction:		S 27.9 W		
Tangent Direction:		S 62.1 E		
Element: Linear				
PT	( )	204+13.4510 R1	6771582.773	2642756.807
PC	( )	207+67.2668 R1	6771417.327	2643069.558
Tangential Direction:		S 62.1 E		
Tangential Length:		353.8158		
Element: Circular				
PC	( )	207+67.2668 R1	6771417.327	2643069.558
PI	( )	210+88.9687 R1	6771266.897	2643353.923
CC	( )		6770378.7	2642520.122
PT	( )	213+95.2806 R1	6770992.594	2643522
Radius:		1175		
Delta:		30.6 Right		
Degree of Curvature (Arc):		4.9		
Length:		628.0138		
Tangent:		321.702		
Chord:		620.5653		
Middle Ordinate:		41.7085		
External:		43.2435		
Tangent Direction:		S 62.1 E		
Radial Direction:		S 27.9 W		
Chord Direction:		S 46.8 E		
Radial Direction:		S 58.5 W		
Tangent Direction:		S 31.5 E		
Element: Linear				
PT	( )	213+95.2806 R1	6770992.594	2643522
PI	( )	217+15.6227 R1	6770719.451	2643689.367
Tangential Direction:		S 31.5 E		
Tangential Length:		320.3421		
Element: Linear				
PI	( )	217+15.6227 R1	6770719.451	2643689.367
PI	( )	236+19.0284 R1	6769095.707	2644682.549
Tangential Direction:		S 31.5 E		
Tangential Length:		1903.4057		

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation
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FM 636
HORIZONTAL CONTROL DATA

SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	70
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PI	( )	236+19.0284 R1	6769095.707	2644682.549
PI	( )	241+37.0867 R1	6768653.081	2644951.746
Tangential Direction:		S 31.3 E		
Tangential Length:		518.0583		
Element: Linear				
PI	( )	241+37.0867 R1	6768653.081	2644951.746
PI	( )	246+83.8626 R1	6768187.61	2645238.627
Tangential Direction:		S 31.6 E		
Tangential Length:		546.7759		
Element: Linear				
PI	( )	246+83.8626 R1	6768187.61	2645238.627
PC	( )	250+56.9406 R1	6767879.842	2645449.495
Tangential Direction:		S 34.4 E		
Tangential Length:		373.078		
Element: Circular				
PC	( )	250+56.9406 R1	6767879.842	2645449.495
PI	( )	251+36.0903 R1	6767814.548	2645494.232
CC	( )		6766918.979	2644047.089
PT	( )	252+15.1257 R1	6767745.379	2645532.708
Radius:		1700		
Delta:		5.3 Right		
Degree of Curvature (Arc):		3.4		
Length:		158.1851		
Tangent:		79.1497		
Chord:		158.128		
Middle Ordinate:		1.8396		
External:		1.8416		
Tangent Direction:		S 34.4 E		
Radial Direction:		S 55.6 W		
Chord Direction:		S 31.8 E		
Radial Direction:		S 60.9 W		
Tangent Direction:		S 29.1 E		
Element: Linear				
PT	( )	252+15.1257 R1	6767745.379	2645532.708
PC	( )	259+37.6024 R1	6767114.012	2645883.917
Tangential Direction:		S 29.1 E		
Tangential Length:		722.4767		

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Circular				
PC	( )	259+37.6024 R1	6767114.012	2645883.917
PI	( )	262+14.0251 R1	6766872.448	2646018.291
CC	( )		6767818.883	2647151.062
PT	( )	264+83.8930 R1	6766697.263	2646232.112
Radius:		1450		
Delta:		21.6 Left		
Degree of Curvature (Arc):		4		
Length:		546.2905		
Tangent:		276.4227		
Chord:		543.0654		
Middle Ordinate:		25.651		
External:		26.113		
Tangent Direction:		S 29.1 E		
Radial Direction:		S 60.9 W		
Chord Direction:		S 39.9 E		
Radial Direction:		S 39.3 W		
Tangent Direction:		S 50.7 E		
Element: Linear				
PT	( )	264+83.8930 R1	6766697.263	2646232.112
PI	( )	274+93.0027 R1	6766060.087	2647014.614
Tangential Direction:		S 50.8 E		
Tangential Length:		1009.1097		
Element: Linear				
PI	( )	274+93.0027 R1	6766060.087	2647014.614
PC	( )	287+81.1684 R1	6765246.253	2648013.136
Tangential Direction:		S 50.8 E		
Tangential Length:		1288.1657		
Element: Circular				
PC	( )	287+81.1684 R1	6765246.253	2648013.136
PI	( )	290+36.8285 R1	6765084.732	2648211.311
CC	( )		6764137.789	2647109.694
PT	( )	292+87.1429 R1	6764864.552	2648341.244
Radius:		1430		
Delta:		20.3 Right		
Degree of Curvature (Arc):		4		
Length:		505.9745		
Tangent:		255.6601		
Chord:		503.3392		
Middle Ordinate:		22.3202		
External:		22.6741		
Tangent Direction:		S 50.8 E		
Radial Direction:		S 39.2 W		
Chord Direction:		S 40.7 E		
Radial Direction:		S 59.5 W		
Tangent Direction:		S 30.5 E		
Element: Linear				
PT	( )	292+87.1429 R1	6764864.552	2648341.244
PI	( )	303+51.3393 R1	6763948.041	2648882.096
Tangential Direction:		S 30.5 E		
Tangential Length:		1064.1964		

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
HORIZONTAL CONTROL DATA

SHEET 3 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	71
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PI	( )	303+51.3393 R1	6763948.041	2648882.096
PI	( )	311+09.0383 R1	6763298.136	2649271.624
Tangential Direction:		S 30.9 E		
Tangential Length:		757.699		
Element: Linear				
PI	( )	311+09.0383 R1	6763298.136	2649271.624
PI	( )	326+81.0627 R1	6761957.938	2650093.286
Tangential Direction:		S 31.5 E		
Tangential Length:		1572.0244		
Element: Linear				
PI	( )	326+81.0627 R1	6761957.938	2650093.286
PC	( )	334+93.9363 R1	6761264.933	2650518.148
Tangential Direction:		S 31.5 E		
Tangential Length:		812.8736		
Element: Circular				
PC	( )	334+93.9363 R1	6761264.933	2650518.148
PI	( )	337+46.3041 R1	6761049.895	2650650.241
CC	( )		6761573.746	2651020.875
PT	( )	339+70.8816 R1	6760996.901	2650896.982
Radius:		590		
Delta:		46.3 Left		
Degree of Curvature (Arc):		9.7		
Length:		476.9454		
Tangent:		252.3679		
Chord:		464.0646		
Middle Ordinate:		47.5417		
External:		51.7083		
Tangent Direction:		S 31.6 E		
Radial Direction:		S 58.4 W		
Chord Direction:		S 54.7 E		
Radial Direction:		S 12.1 W		
Tangent Direction:		S 77.9 E		
Element: Linear				
PT	( )	339+70.8816 R1	6760996.901	2650896.982
PC	( )	342+51.9469 R1	6760937.88	2651171.78
Tangential Direction:		S 77.9 E		
Tangential Length:		281.0652		

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Circular				
PC	( )	342+51.9469 R1	6760937.88	2651171.78
PI	( )	344+99.6330 R1	6760885.869	2651413.944
CC	( )		6760365.924	2651048.937
PT	( )	347+20.5441 R1	6760675.781	2651545.136
Radius:		585		
Delta:		45.9 Right		
Degree of Curvature (Arc):		9.8		
Length:		468.5973		
Tangent:		247.6861		
Chord:		456.1695		
Middle Ordinate:		46.2957		
External:		50.2743		
Tangent Direction:		S 77.9 E		
Radial Direction:		S 12.1 W		
Chord Direction:		S 54.9 E		
Radial Direction:		S 58.0 W		
Tangent Direction:		S 32.0 E		
Element: Linear				
PT	( )	347+20.5441 R1	6760675.781	2651545.136
PI	( )	350+06.2216 R1	6760433.468	2651696.451
Tangential Direction:		S 32.0 E		
Tangential Length:		285.6774		
Element: Linear				
PI	( )	350+06.2216 R1	6760433.468	2651696.451
PI	( )	363+16.2067 R1	6759321.038	2652388.231
Tangential Direction:		S 31.9 E		
Tangential Length:		1309.9852		
Element: Linear				
PI	( )	363+16.2067 R1	6759321.038	2652388.231
PC	( )	376+49.9406 R1	6758188.566	2653092.755
Tangential Direction:		S 31.9 E		
Tangential Length:		1333.7338		
Element: Circular				
PC	( )	376+49.9406 R1	6758188.566	2653092.755
PI	( )	378+38.9927 R1	6758027.879	2653192.355
CC	( )		6757240.25	2651562.821
PT	( )	380+26.6636 R1	6757850.004	2653256.397
Radius:		1800		
Delta:		12 Right		
Degree of Curvature (Arc):		3.2		
Length:		376.723		
Tangent:		189.0521		
Chord:		376.0358		
Middle Ordinate:		9.8466		
External:		9.9007		
Tangent Direction:		S 31.8 E		
Radial Direction:		S 58.2 W		
Chord Direction:		S 25.8 E		
Radial Direction:		S 70.2 W		
Tangent Direction:		S 19.8 E		

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636 HORIZONTAL CONTROL DATA

SHEET 4 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	72
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PT	( )	380+26.6636 R1	6757850.004	2653256.397
PC	( )	382+20.1037 R1	6757668.001	2653321.926
Tangential Direction:		S 19.8 E		
Tangential Length:		193.44		
Element: Circular				
PC	( )	382+20.1037 R1	6757668.001	2653321.926
PI	( )	383+94.6935 R1	6757503.734	2653381.068
CC	( )		6758260.818	2654968.458
PT	( )	385+68.1317 R1	6757354.389	2653471.499
Radius:		1750		
Delta:		11.4 Left		
Degree of Curvature (Arc):		3.3		
Length:		348.0281		
Tangent:		174.5898		
Chord:		347.4548		
Middle Ordinate:		8.6446		
External:		8.6875		
Tangent Direction:		S 19.8 E		
Radial Direction:		S 70.2 W		
Chord Direction:		S 25.5 E		
Radial Direction:		S 58.8 W		
Tangent Direction:		S 31.2 E		
Element: Linear				
PT	( )	385+68.1317 R1	6757354.389	2653471.499
PI	( )	394+66.6729 R1	6756585.772	2653936.907
Tangential Direction:		S 31.2 E		
Tangential Length:		898.5412		
Element: Linear				
PI	( )	394+66.6729 R1	6756585.772	2653936.907
PC	( )	398+16.0679 R1	6756286.395	2654117.045
Tangential Direction:		S 31.0 E		
Tangential Length:		349.3949		
Element: Circular				
PC	( )	398+16.0679 R1	6756286.395	2654117.045
PI	( )	403+99.2816 R1	6755786.671	2654417.734
CC	( )		6756582.849	2654609.732
PT	( )	407+27.4311 R1	6756094.417	2654913.144
Radius:		575		
Delta:		90.8 Left		
Degree of Curvature (Arc):		10		
Length:		911.3632		
Tangent:		583.2137		
Chord:		818.919		
Middle Ordinate:		171.3071		
External:		244.0014		
Tangent Direction:		S 31.0 E		
Radial Direction:		S 59.0 W		
Chord Direction:		S 76.4 E		
Radial Direction:		S 31.8 E		
Tangent Direction:		N 58.2 E		

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PT	( )	407+27.4311 R1	6756094.417	2654913.144
PI	( )	415+34.7452 R1	6756520.415	2655598.915
Tangential Direction:		N 58.2 E		
Tangential Length:		807.3141		
Element: Linear				
PI	( )	415+34.7452 R1	6756520.415	2655598.915
PI	( )	421+84.3349 R1	6756859.214	2656153.154
Tangential Direction:		N 58.6 E		
Tangential Length:		649.5897		
Element: Linear				
PI	( )	421+84.3349 R1	6756859.214	2656153.154
PI	( )	426+09.0789 R1	6757079.491	2656516.315
Tangential Direction:		N 58.8 E		
Tangential Length:		424.7441		
Element: Linear				
PI	( )	426+09.0789 R1	6757079.491	2656516.315
PC	( )	435+39.7842 R1	6757565.678	2657309.936
Tangential Direction:		N 58.5 E		
Tangential Length:		930.7053		
Element: Circular				
PC	( )	435+39.7842 R1	6757565.678	2657309.936
PI	( )	439+69.2091 R1	6757790.004	2657676.111
CC	( )		6757288.548	2657479.712
PT	( )	441+39.6957 R1	6757376.663	2657792.539
Radius:		325		
Delta:		105.8 Right		
Degree of Curvature (Arc):		17.6		
Length:		599.9115		
Tangent:		429.4249		
Chord:		518.2968		
Middle Ordinate:		128.8697		
External:		213.545		
Tangent Direction:		N 58.5 E		
Radial Direction:		S 31.5 E		
Chord Direction:		S 68.6 E		
Radial Direction:		S 74.3 W		
Tangent Direction:		S 15.7 E		
Element: Linear				
PT	( )	441+39.6957 R1	6757376.663	2657792.539
PI	( )	447+59.2029 R1	6756780.36	2657960.502
Tangential Direction:		S 15.7 E		
Tangential Length:		619.5072		
Element: Linear				
PI	( )	447+59.2029 R1	6756780.36	2657960.502
PI	( )	450+03.2434 R1	6756545.262	2658025.961
Tangential Direction:		S 15.6 E		
Tangential Length:		244.0405		

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
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Amanda McKittrick, P.E.

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FM 636 HORIZONTAL CONTROL DATA

SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	73
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:7:18:19 AM
FILE:pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574020214 - Design\Plan Set\1. General\Horizontal Alignment\Horizontal Alignment Report.dgn

Alignment Name: CL_FM636
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
PI	( )	450+03.2434 R1	6756545.262	2658025.961
PC	( )	452+01.7133 R1	6756354.301	2658080.036
Tangential Direction:		S 15.8 E		
Tangential Length:		198.4699		
Element: Circular				
PC	( )	452+01.7133 R1	6756354.301	2658080.036
PI	( )	454+04.9905 R1	6756158.715	2658135.42
CC	( )		6756716.672	2659359.718
PT	( )	456+05.1456 R1	6755988.601	2658246.699
Radius:		1330		
Delta:		17.4 Left		
Degree of Curvature (Arc):		4.3		
Length:		403.4323		
Tangent:		203.2772		
Chord:		401.8874		
Middle Ordinate:		15.2675		
External:		15.4448		
Tangent Direction:		S 15.8 E		
Radial Direction:		S 74.2 W		
Chord Direction:		S 24.5 E		
Radial Direction:		S 56.8 W		
Tangent Direction:		S 33.2 E		

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
HORIZONTAL
CONTROL DATA

SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	74
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

ROADWAY SUPERELEVATION TABLE
FM 636

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
0+75.0000 R1	-2.00%	Normal Crown	
2+69.0000 R1	-2.00%	Normal Crown In	Linear
4+63.5000 R1	-2.00%	Full Super In	Linear
4+71.5000 R1	-2.00%	Full Super Out	Linear
6+66.0000 R1	-2.00%	Normal Crown Out	Linear
34+12.3815 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
0+00.0000 R1	-2.00%	Normal Crown	
2+69.0000 R1	-2.00%	Normal Crown In	Linear
3+25.0002 R1	-2.00%	Level Crown In	Linear
3+81.0005 R1	-2.00%	Reverse Crown In	Linear
4+63.5000 R1	-2.00%	Full Super In	Linear
4+71.5000 R1	-2.00%	Full Super Out	Linear
5+53.9995 R1	-2.00%	Reverse Crown Out	Linear
6+09.9998 R1	-2.00%	Level Crown Out	Linear
6+66.0000 R1	-2.00%	Normal Crown Out	Linear
34+12.3815 R1	-2.00%	Normal Crown	Linear

Superelevation: LT

Station	Cross	Point Type	Transition
34+12.3815 R1	-2.00%	Normal Crown	
61+81.0000 R1	-2.00%	Normal Crown In	Linear
63+46.0000 R1	-5.80%	Full Super In	Linear
66+55.0000 R1	-5.80%	Full Super Out	Linear
68+20.0000 R1	-2.00%	Normal Crown Out	Linear
68+86.0000 R1	-2.00%	Normal Crown In	Linear
69+28.0000 R1	0.00%	Level Crown In	Linear
70+26.0000 R1	4.60%	Full Super In	Linear
78+59.0000 R1	4.60%	Full Super Out	Linear
79+56.0000 R1	0.00%	Level Crown Out	Linear
79+99.0000 R1	-2.00%	Normal Crown Out	Linear
114+29.0208 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
34+12.3815 R1	-2.00%	Normal Crown	
61+81.0000 R1	-2.00%	Normal Crown In	Linear
62+23.0000 R1	0.00%	Level Crown In	Linear
63+46.0000 R1	5.80%	Full Super In	Linear
66+55.0000 R1	5.80%	Full Super Out	Linear
67+77.0000 R1	0.00%	Level Crown Out	Linear
68+20.0000 R1	-2.00%	Normal Crown Out	Linear
68+86.0000 R1	-2.00%	Normal Crown In	Linear
70+26.0000 R1	-4.60%	Full Super In	Linear
78+59.0000 R1	-4.60%	Full Super Out	Linear
79+99.0000 R1	-2.00%	Normal Crown Out	Linear
114+29.0208 R1	-2.00%	Normal Crown	Linear

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
114+29.0208 R1	-2.00%	Normal Crown	
148+01.0000 R1	-2.00%	Normal Crown In	Linear
148+57.0000 R1	0.00%	Level Crown In	Linear
149+13.0000 R1	2.00%	Reverse Crown In	Linear
150+25.0000 R1	6.00%	Full Super In	Linear
153+35.0000 R1	6.00%	Full Super Out	Linear
154+47.0000 R1	2.00%	Reverse Crown Out	Linear
155+03.0000 R1	0.00%	Level Crown Out	Linear
155+59.0000 R1	-2.00%	Normal Crown Out	Linear
176+00.7002 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
114+29.0208 R1	-2.00%	Normal Crown	
148+01.0000 R1	-2.00%	Normal Crown In	Linear
150+25.0000 R1	-6.00%	Full Super In	Linear
153+35.0000 R1	-6.00%	Full Super Out	Linear
155+59.0000 R1	-2.00%	Normal Crown Out	Linear
176+00.7002 R1	-2.00%	Normal Crown	Linear

Superelevation: LT

Station	Cross	Point Type	Transition
176+00.7002 R1	-2.00%	Normal Crown	
196+52.0000 R1	-2.00%	Normal Crown In	Linear
198+65.0000 R1	-5.60%	Full Super In	Linear
203+50.0000 R1	-5.60%	Full Super Out	Linear
205+63.0000 R1	-2.00%	Normal Crown Out	Linear
206+17.0000 R1	-2.00%	Normal Crown In	Linear
206+73.0526 R1	0.00%	Level Crown In	Linear
207+29.1053 R1	2.00%	Reverse Crown In	Linear
208+30.0000 R1	5.60%	Full Super In	Linear
213+30.0000 R1	5.60%	Full Super Out	Linear
214+30.8947 R1	2.00%	Reverse Crown Out	Linear
214+86.9474 R1	0.00%	Level Crown Out	Linear
215+43.0000 R1	-2.00%	Normal Crown Out	Linear
232+26.1106 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
176+00.7002 R1	-2.00%	Normal Crown	
196+52.0000 R1	-2.00%	Normal Crown In	Linear
197+08.0526 R1	0.00%	Level Crown In	Linear
197+64.1053 R1	2.00%	Reverse Crown In	Linear
198+65.0000 R1	5.60%	Full Super In	Linear
203+50.0000 R1	5.60%	Full Super Out	Linear
204+50.8947 R1	2.00%	Reverse Crown Out	Linear
205+06.9474 R1	0.00%	Level Crown Out	Linear
205+63.0000 R1	-2.00%	Normal Crown Out	Linear
206+17.0000 R1	-2.00%	Normal Crown In	Linear
208+30.0000 R1	-5.60%	Full Super In	Linear
213+30.0000 R1	-5.60%	Full Super Out	Linear
215+43.0000 R1	-2.00%	Normal Crown Out	Linear
232+26.1106 R1	-2.00%	Normal Crown	Linear

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

Texas Department of Transportation

FM 636

SUPERELEVATION TABLE

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	75
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

ROADWAY SUPERELEVATION TABLE
FM 636

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
232+26.1106 R1	-2.00%	Normal Crown	
249+27.0000 R1	-2.00%	Normal Crown In	Linear
249+83.1194 R1	-2.00%	Level Crown In	Linear
250+39.2388 R1	-2.00%	Reverse Crown In	Linear
251+15.0000 R1	-2.00%	Full Super In	Linear
251+60.0000 R1	-2.00%	Full Super Out	Linear
252+35.7612 R1	-2.00%	Reverse Crown Out	Linear
252+91.8806 R1	-2.00%	Level Crown Out	Linear
253+48.0000 R1	-2.00%	Normal Crown Out	Linear
255+76.3641 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
232+26.1106 R1	-2.00%	Normal Crown	
249+27.0000 R1	-2.00%	Normal Crown In	Linear
251+15.0000 R1	-2.00%	Full Super In	Linear
251+60.0000 R1	-2.00%	Full Super Out	Linear
253+48.0000 R1	-2.00%	Normal Crown Out	Linear
255+76.3641 R1	-2.00%	Normal Crown	Linear

Superelevation: LT

Station	Cross	Point Type	Transition
255+76.3641 R1	-2.00%	Normal Crown	
257+96.0000 R1	-2.00%	Normal Crown In	Linear
259+95.0000 R1	-5.10%	Full Super In	Linear
264+25.0000 R1	-5.10%	Full Super Out	Linear
266+24.0000 R1	-2.00%	Normal Crown Out	Linear
276+32.5307 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
255+76.3641 R1	-2.00%	Normal Crown	
257+96.0000 R1	-2.00%	Normal Crown In	Linear
258+52.0563 R1	0.00%	Level Crown In	Linear
259+08.1127 R1	2.00%	Reverse Crown In	Linear
259+95.0000 R1	5.10%	Full Super In	Linear
264+25.0000 R1	5.10%	Full Super Out	Linear
265+11.8873 R1	2.00%	Reverse Crown Out	Linear
265+67.9437 R1	0.00%	Level Crown Out	Linear
266+24.0000 R1	-2.00%	Normal Crown Out	Linear
276+32.5307 R1	-2.00%	Normal Crown	Linear

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
276+32.5307 R1	-2.00%	Normal Crown	
286+41.0000 R1	-2.00%	Normal Crown In	Linear
286+97.0563 R1	0.00%	Level Crown In	Linear
287+53.1127 R1	2.00%	Reverse Crown In	Linear
288+40.0000 R1	5.10%	Full Super In	Linear
292+25.0000 R1	5.10%	Full Super Out	Linear
293+11.8873 R1	2.00%	Reverse Crown Out	Linear
293+67.9437 R1	0.00%	Level Crown Out	Linear
294+24.0000 R1	-2.00%	Normal Crown Out	Linear
313+90.5396 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
276+32.5307 R1	-2.00%	Normal Crown	
286+41.0000 R1	-2.00%	Normal Crown In	Linear
288+40.0000 R1	-5.10%	Full Super In	Linear
292+25.0000 R1	-5.10%	Full Super Out	Linear
294+24.0000 R1	-2.00%	Normal Crown Out	Linear
313+90.5396 R1	-2.00%	Normal Crown	Linear

Superelevation: LT

Station	Cross	Point Type	Transition
313+90.5396 R1	-2.00%	Normal Crown	
333+96.0000 R1	-2.00%	Normal Crown In	Linear
335+36.0000 R1	-4.60%	Full Super In	Linear
339+29.0000 R1	-4.60%	Full Super Out	Linear
340+69.0000 R1	-2.00%	Normal Crown Out	Linear
341+54.0000 R1	-2.00%	Normal Crown In	Linear
341+96.3700 R1	0.00%	Level Crown In	Linear
342+94.0000 R1	4.60%	Full Super In	Linear
346+79.0000 R1	4.60%	Full Super Out	Linear
347+76.1200 R1	0.00%	Level Crown Out	Linear
348+19.0000 R1	-2.00%	Normal Crown Out	Linear
361+85.2424 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
313+90.5396 R1	-2.00%	Normal Crown	
333+96.0000 R1	-2.00%	Normal Crown In	Linear
334+38.3600 R1	0.00%	Level Crown In	Linear
335+36.0000 R1	4.60%	Full Super In	Linear
339+29.0000 R1	4.60%	Full Super Out	Linear
340+26.4600 R1	0.00%	Level Crown Out	Linear
340+69.0000 R1	-2.00%	Normal Crown Out	Linear
341+54.0000 R1	-2.00%	Normal Crown In	Linear
342+94.0000 R1	-4.60%	Full Super In	Linear
346+79.0000 R1	-4.60%	Full Super Out	Linear
348+19.0000 R1	-2.00%	Normal Crown Out	Linear
361+85.2420 R1	-2.00%	Normal Crown	Linear

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E. P.E. 1/7/2021
Signature of Registrant & Date

Texas Department of Transportation

FM 636

SUPERELEVATION TABLE

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	76
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

ROADWAY SUPERELEVATION TABLE
FM 636

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
361+85.2424 R1	-2.00%	Normal Crown	
375+80.0000 R1	-2.00%	Normal Crown In	Linear
376+21.8000 R1	0.00%	Level Crown In	Linear
376+96.0000 R1	3.60%	Full Super In	Linear
379+80.0000 R1	3.60%	Full Super Out	Linear
380+54.8000 R1	0.00%	Level Crown Out	Linear
380+96.0000 R1	-2.00%	Normal Crown Out	Linear
381+51.0000 R1	-2.00%	Normal Crown In	Linear
382+66.0000 R1	-3.60%	Full Super In	Linear
385+22.0000 R1	-3.60%	Full Super Out	Linear
386+38.0000 R1	-2.00%	Normal Crown Out	Linear
391+92.0998 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
361+85.2424 R1	-2.00%	Normal Crown	
375+80.0000 R1	-2.00%	Normal Crown In	Linear
376+96.0000 R1	-3.60%	Full Super In	Linear
379+80.0000 R1	-3.60%	Full Super Out	Linear
380+96.0000 R1	-2.00%	Normal Crown Out	Linear
381+51.0000 R1	-2.00%	Normal Crown In	Linear
381+91.9600 R1	0.00%	Level Crown In	Linear
382+66.0000 R1	3.60%	Full Super In	Linear
385+22.0000 R1	3.60%	Full Super Out	Linear
385+96.2700 R1	0.00%	Level Crown Out	Linear
386+38.0000 R1	-2.00%	Normal Crown Out	Linear
391+92.0998 R1	-2.00%	Normal Crown	Linear

Superelevation: LT

Station	Cross	Point Type	Transition
391+92.0998 R1	-2.00%	Normal Crown	
396+61.0000 R1	-2.00%	Normal Crown In	Linear
398+85.0000 R1	-6.00%	Full Super In	Linear
406+60.0000 R1	-6.00%	Full Super Out	Linear
408+84.0000 R1	-2.00%	Normal Crown Out	Linear
421+33.6077 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
391+92.0998 R1	-2.00%	Normal Crown	
396+61.0000 R1	-2.00%	Normal Crown In	Linear
397+17.0000 R1	0.00%	Level Crown In	Linear
397+73.0000 R1	2.00%	Reverse Crown In	Linear
398+85.0000 R1	6.00%	Full Super In	Linear
406+60.0000 R1	6.00%	Full Super Out	Linear
407+72.0000 R1	2.00%	Reverse Crown Out	Linear
408+28.0000 R1	0.00%	Level Crown Out	Linear
408+84.0000 R1	-2.00%	Normal Crown Out	Linear
421+33.6077 R1	-2.00%	Normal Crown	Linear

Superelevation Data Report
FM 636

Superelevation: LT

Station	Cross	Point Type	Transition
421+33.6077 R1	-2.00%	Normal Crown	
433+81.0000 R1	-2.00%	Normal Crown In	Linear
434+37.0000 R1	0.00%	Level Crown In	Linear
434+93.0000 R1	2.00%	Reverse Crown In	Linear
436+05.0000 R1	6.00%	Full Super In	Linear
440+70.0000 R1	6.00%	Full Super Out	Linear
441+82.0000 R1	2.00%	Reverse Crown Out	Linear
442+38.0000 R1	0.00%	Level Crown Out	Linear
442+94.0000 R1	-2.00%	Normal Crown Out	Linear
446+70.7045 R1	-2.00%	Normal Crown	Linear

Superelevation: RT

Station	Cross	Point Type	Transition
421+33.6077 R1	-2.00%	Normal Crown	
433+81.0000 R1	-2.00%	Normal Crown In	Linear
436+05.0000 R1	-6.00%	Full Super In	Linear
440+70.0000 R1	-6.00%	Full Super Out	Linear
442+94.0000 R1	-2.00%	Normal Crown Out	Linear
446+70.7045 R1	-2.00%	Normal Crown	Linear

STATE OF TEXAS
AMANDA L. MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

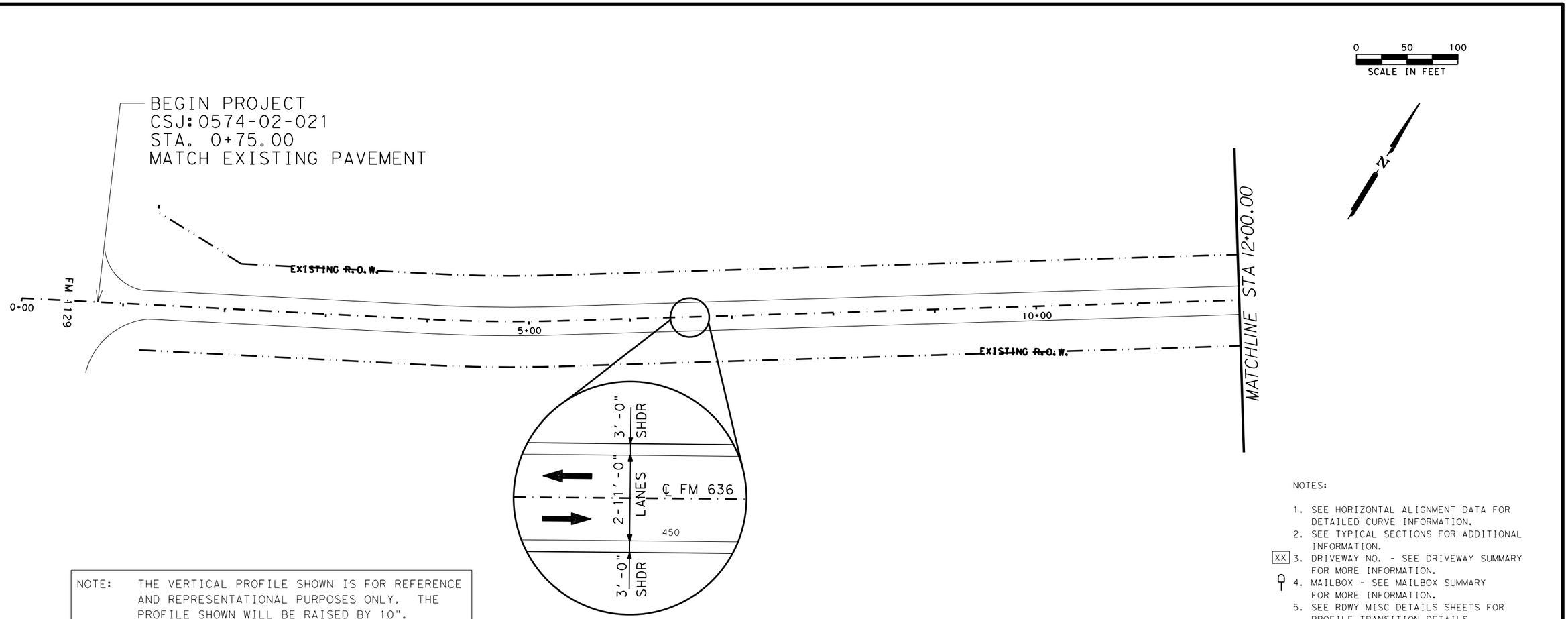
Texas Department of Transportation

FM 636

SUPERELEVATION TABLE

SHEET 3 OF 3

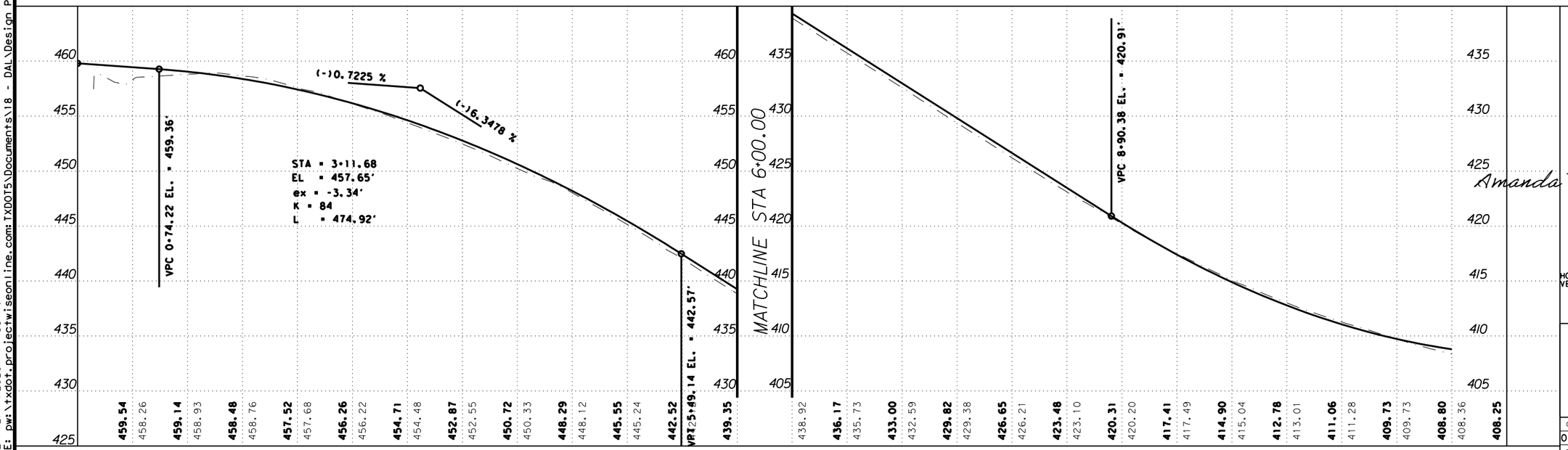
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	77
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 1 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		78

DATE: 12/11/2020 11:59 AM
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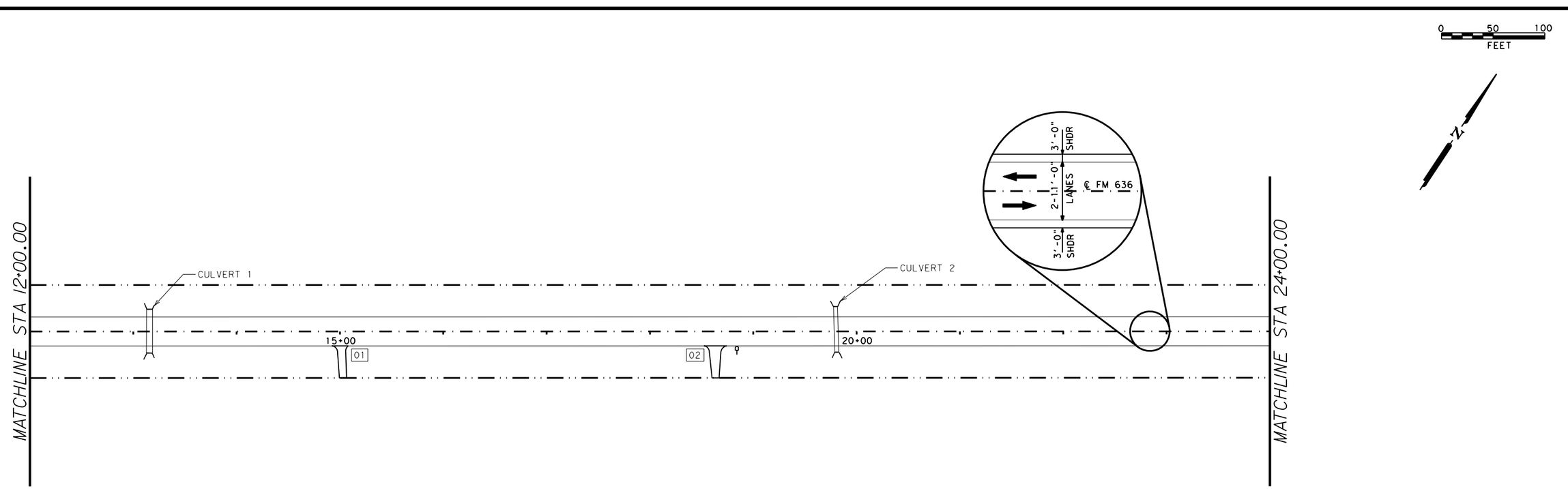
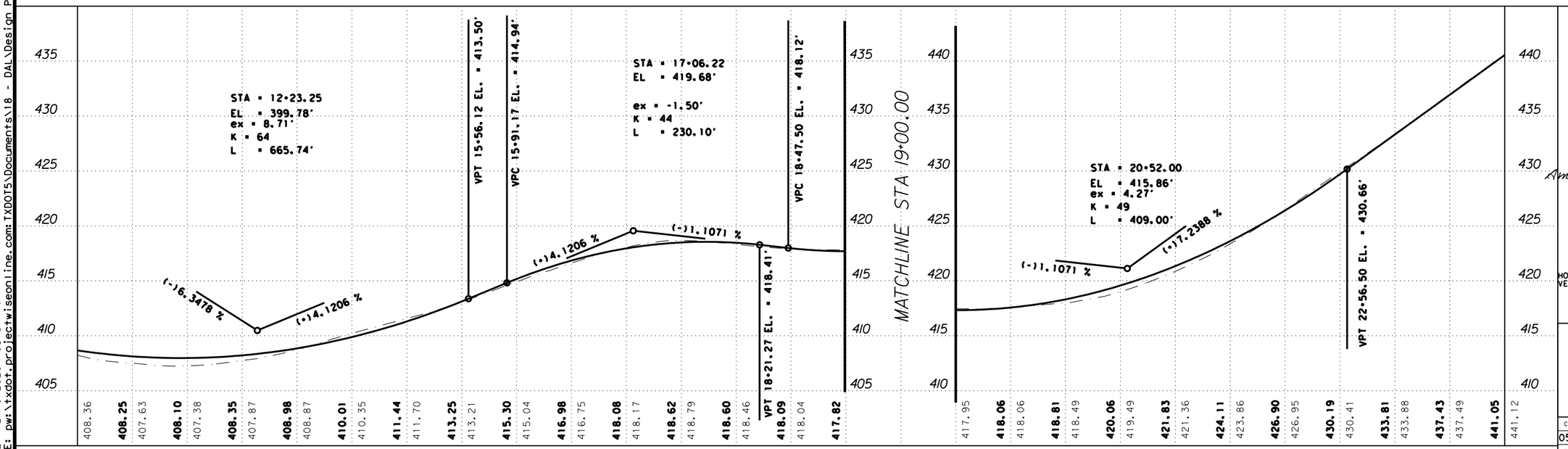


NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		79

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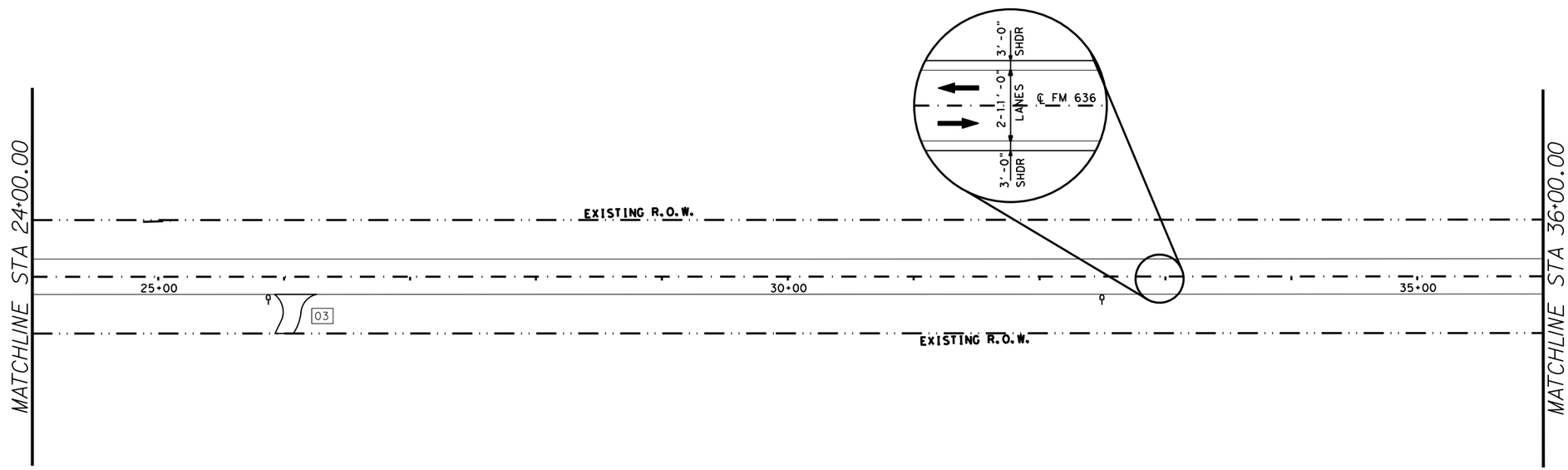

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SCALE IN FEET

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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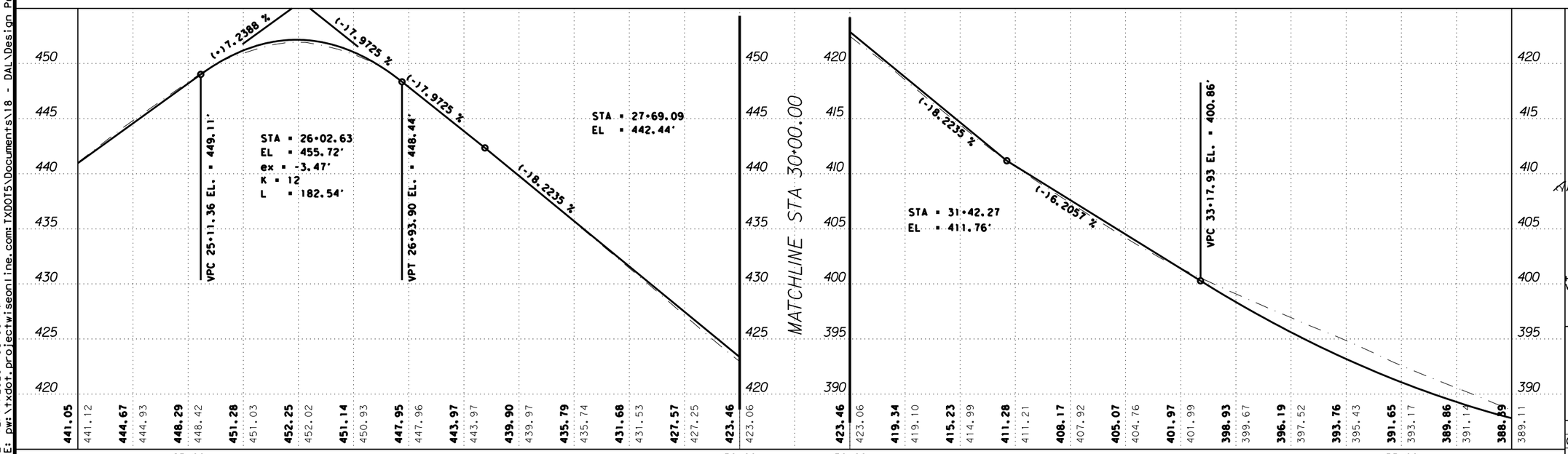
NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 3 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		80

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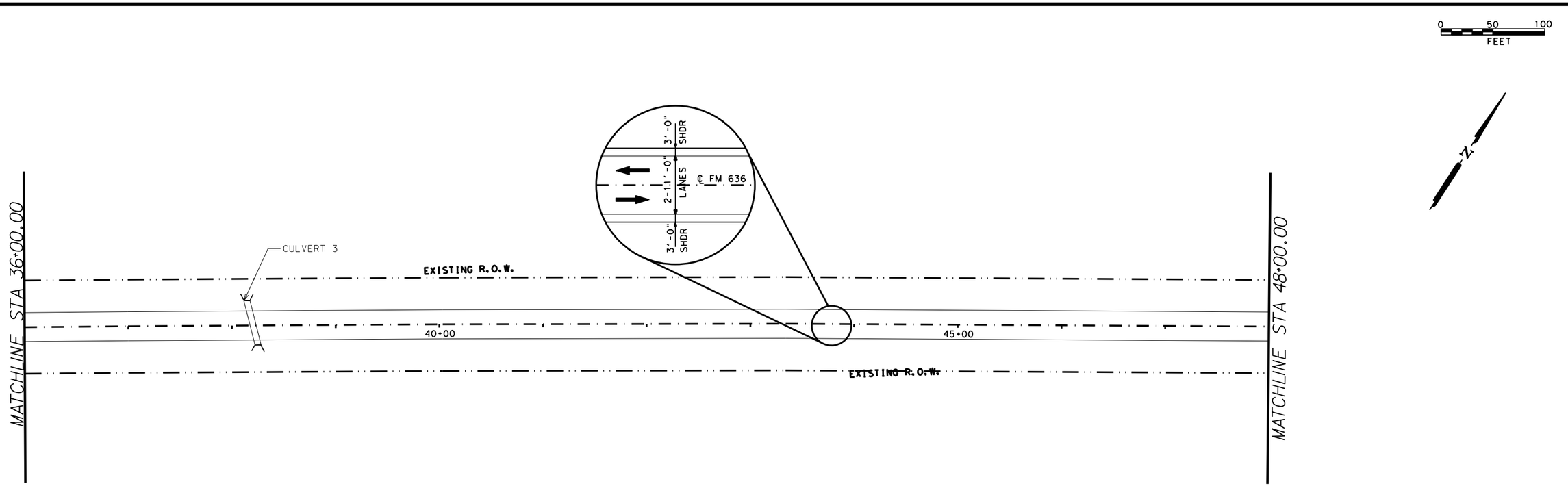

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
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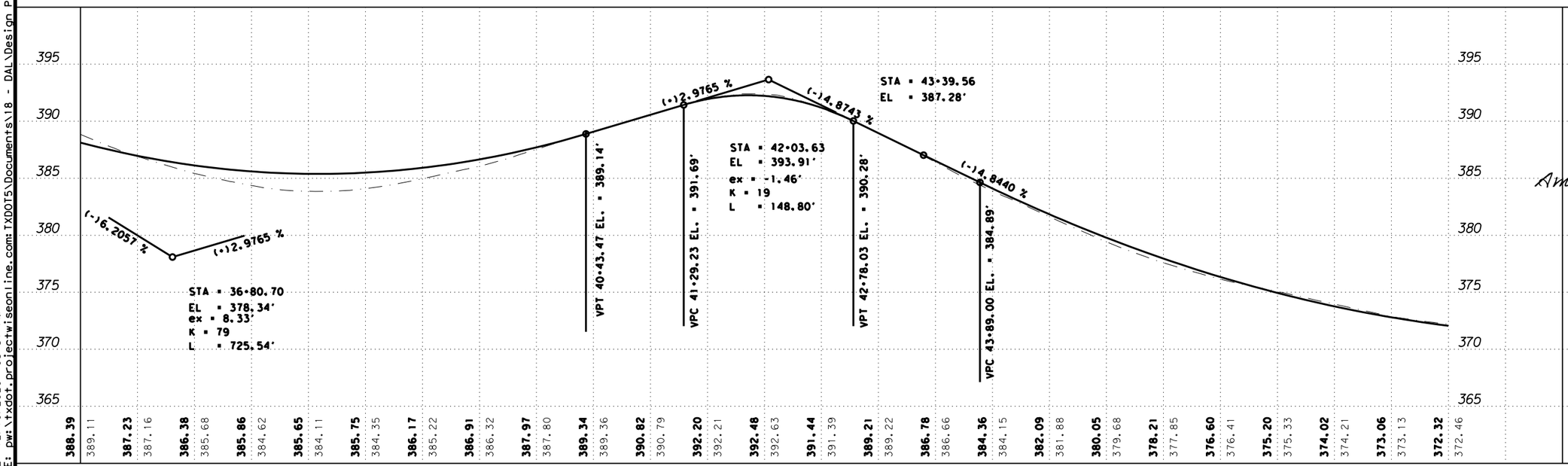

STATE OF TEXAS
AMANDA MCKITTRICK
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Amanda McKittrick, P.E.

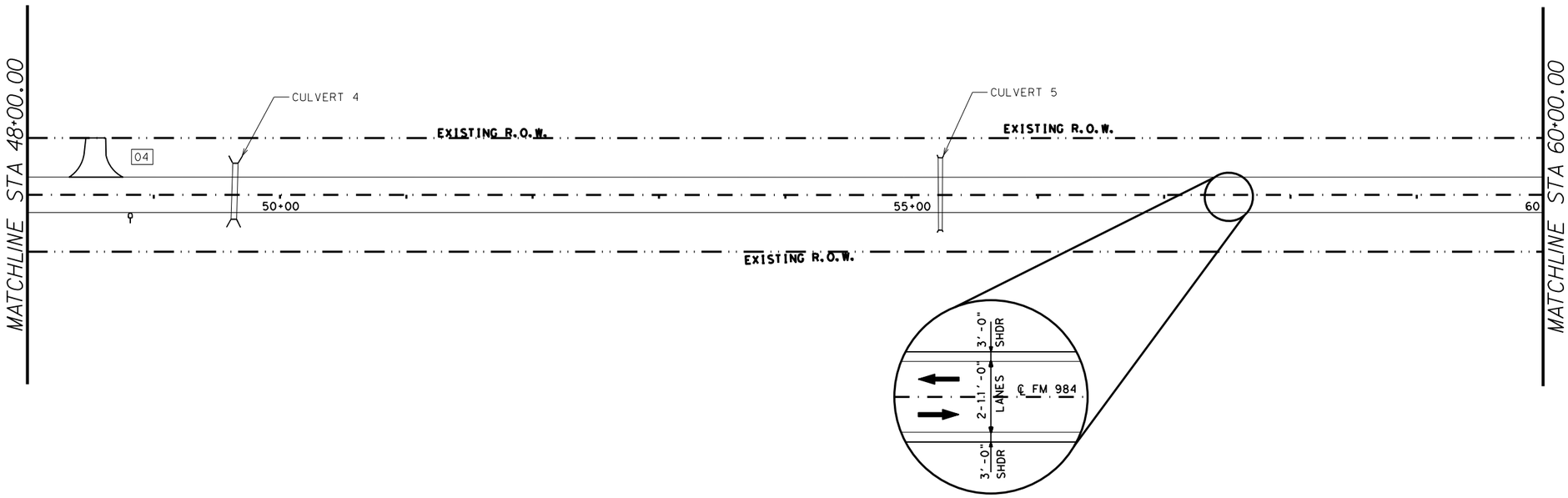
FM 636
PLAN & PROFILE

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

SHEET 4 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		81



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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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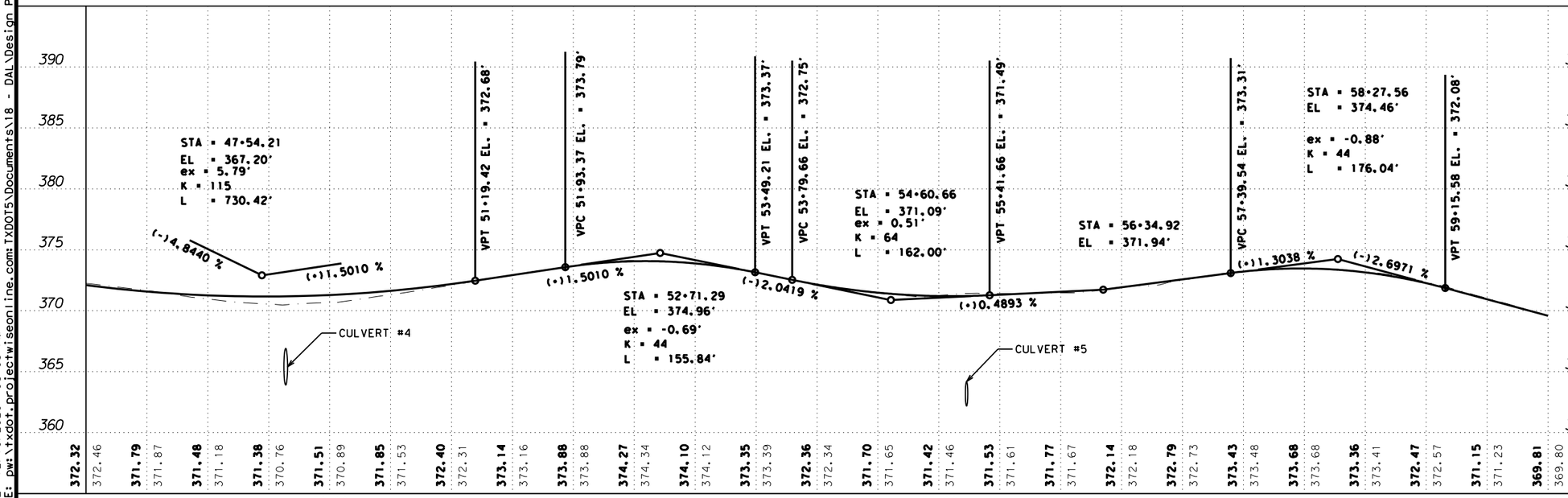

STATE OF TEXAS
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FM 636
PLAN & PROFILE

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

SHEET 5 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		82

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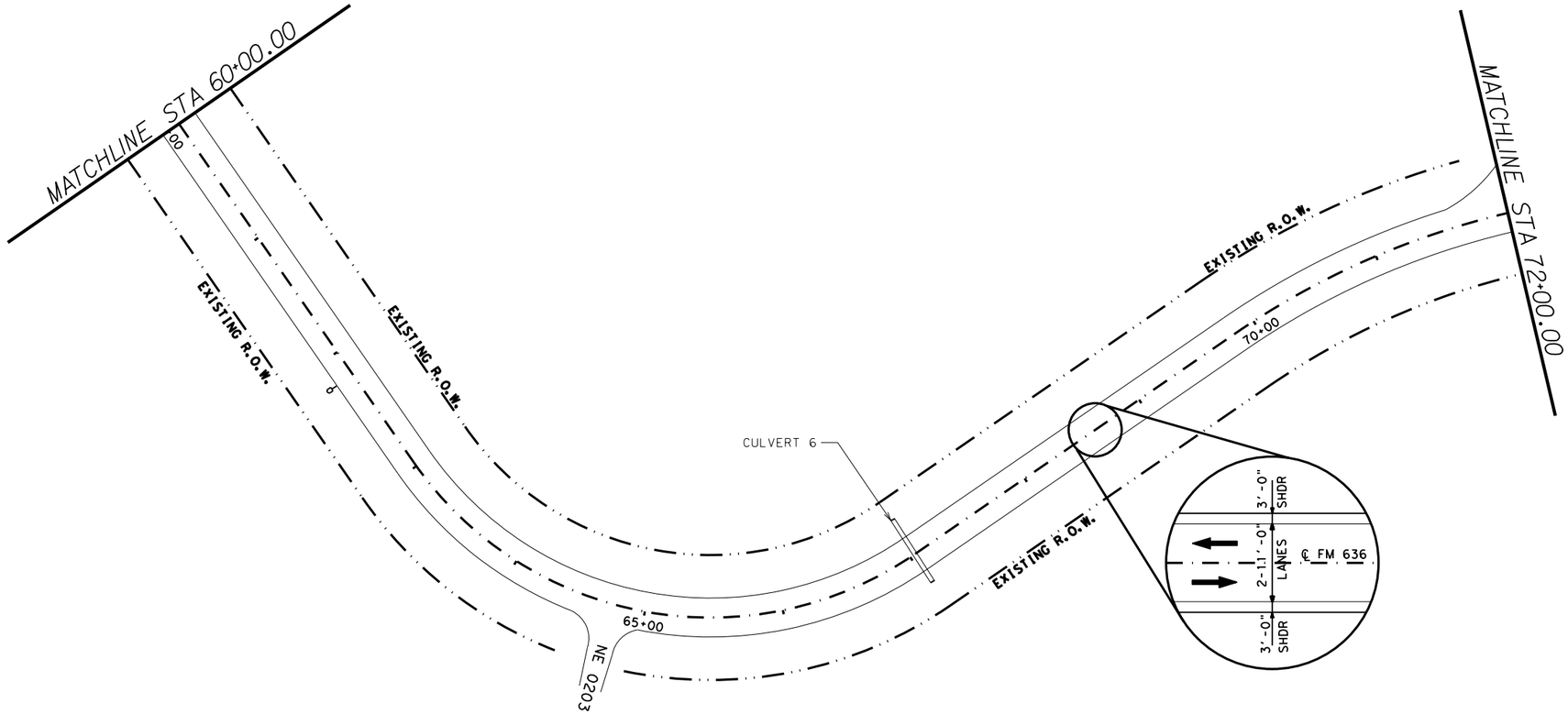

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NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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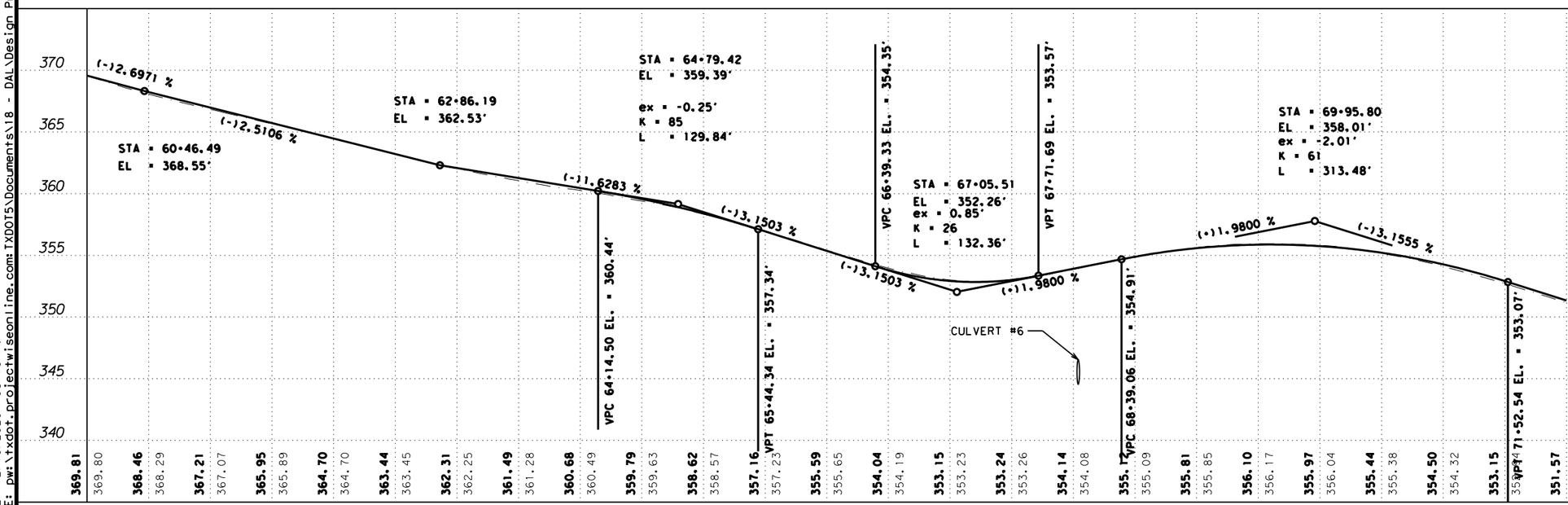
NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
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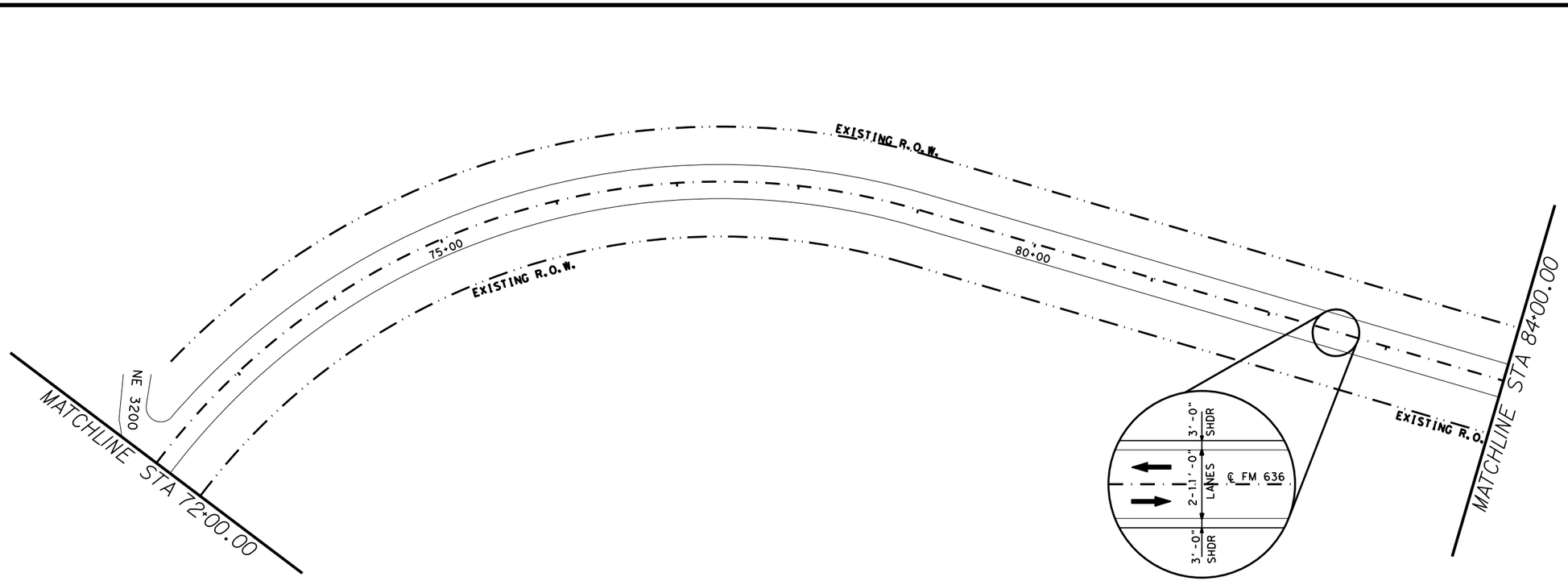
HORZ SCALE: 1"=100'
VERT SCALE: 1"=10'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		83



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FEET

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NOTES:

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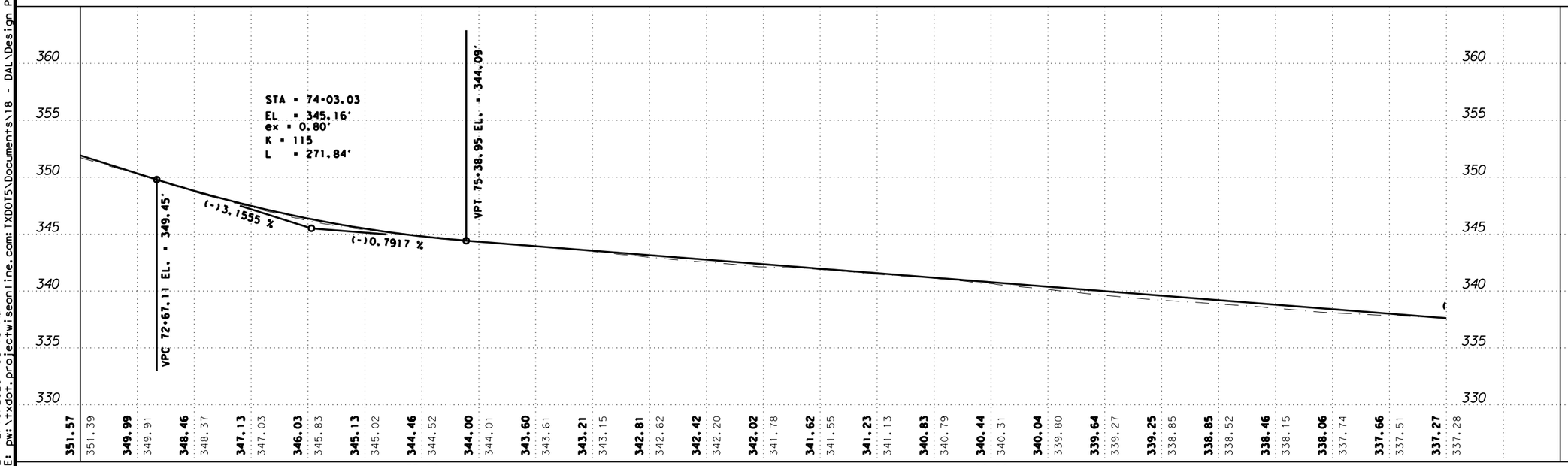

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VERT SCALE: 1"=10'

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		84

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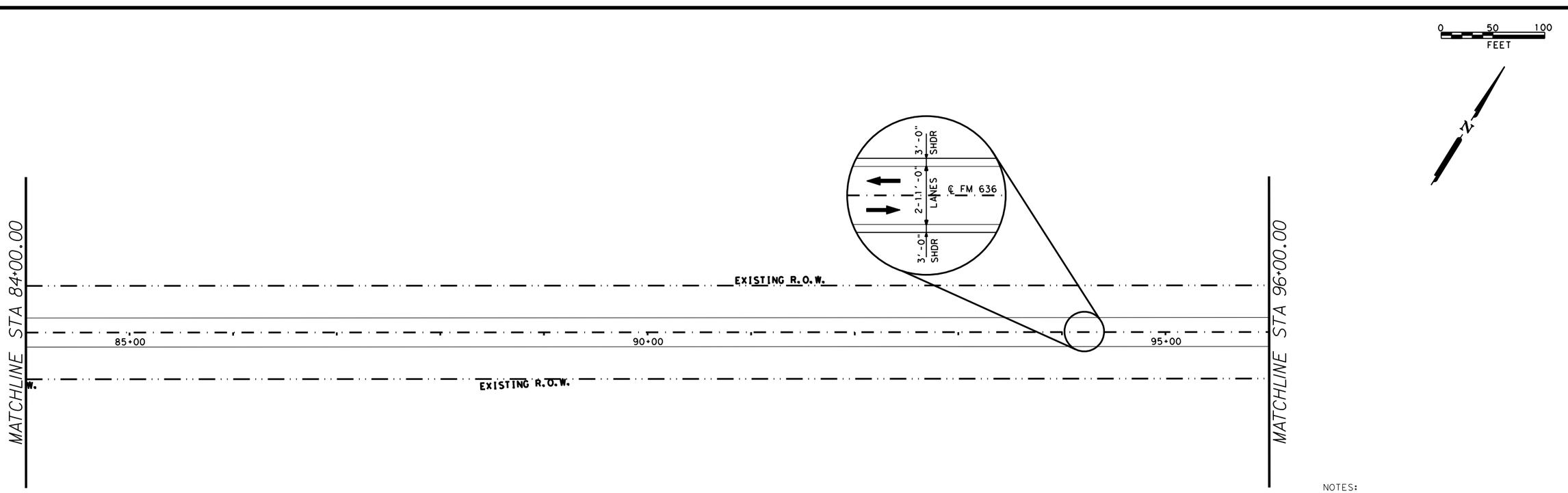

NOTES:

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3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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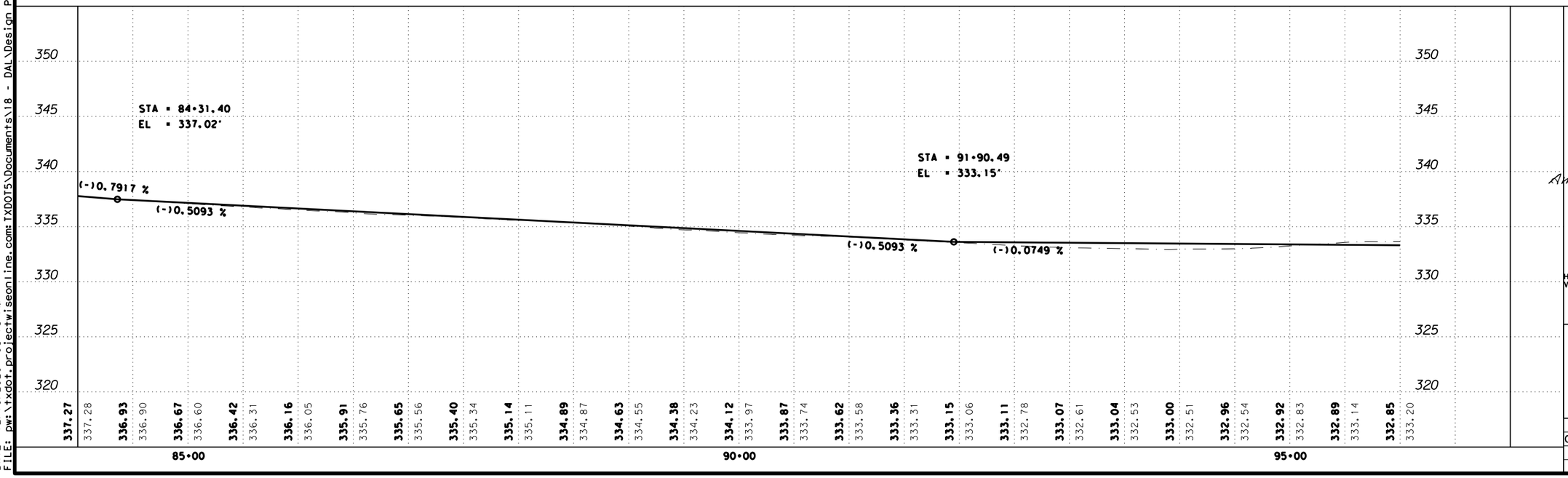

STATE OF TEXAS
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FM 636
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HORZ SCALE: 1"=100'
VERT SCALE: 1"=10'

SHEET 8 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		85

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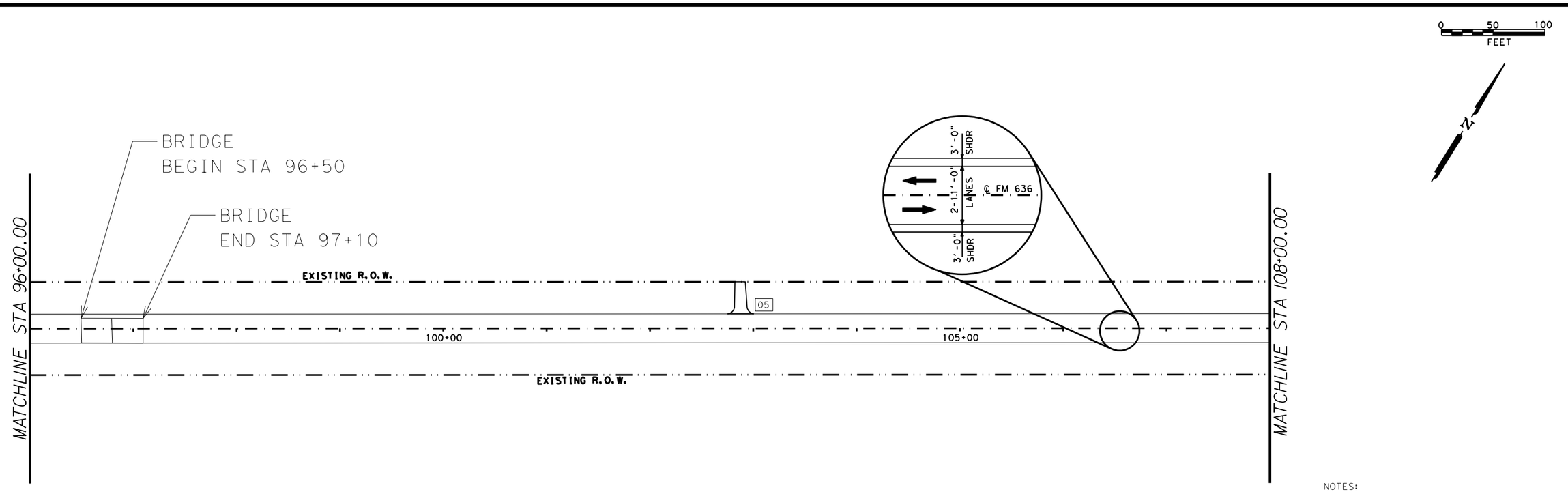

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FEET

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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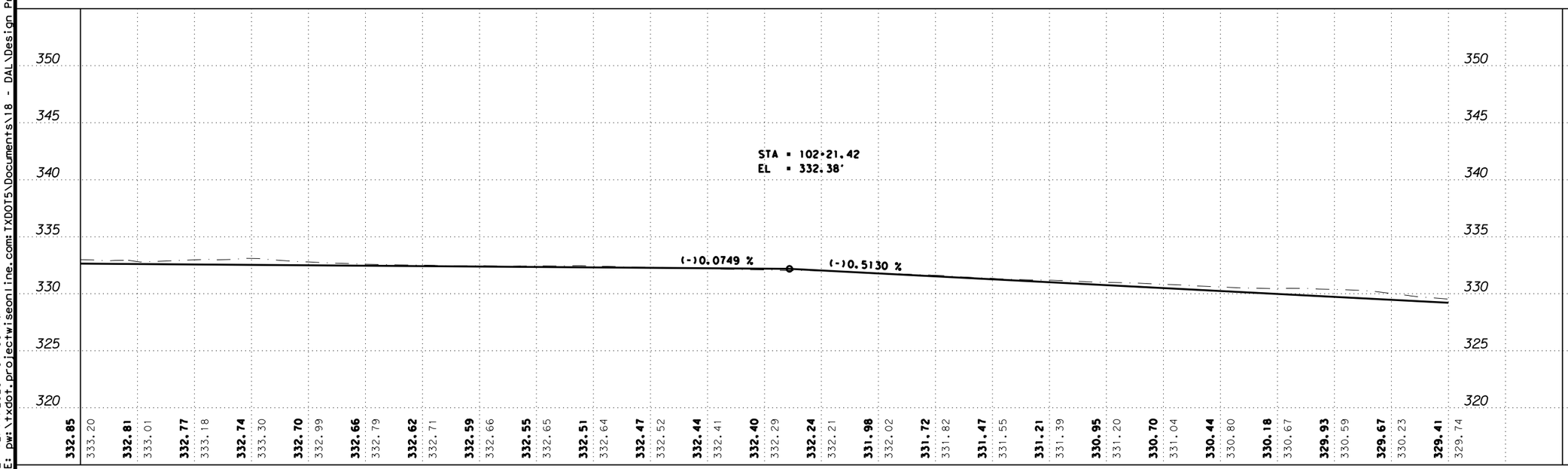

STATE OF TEXAS
AMANDA MCKITTRICK
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Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 9 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		86

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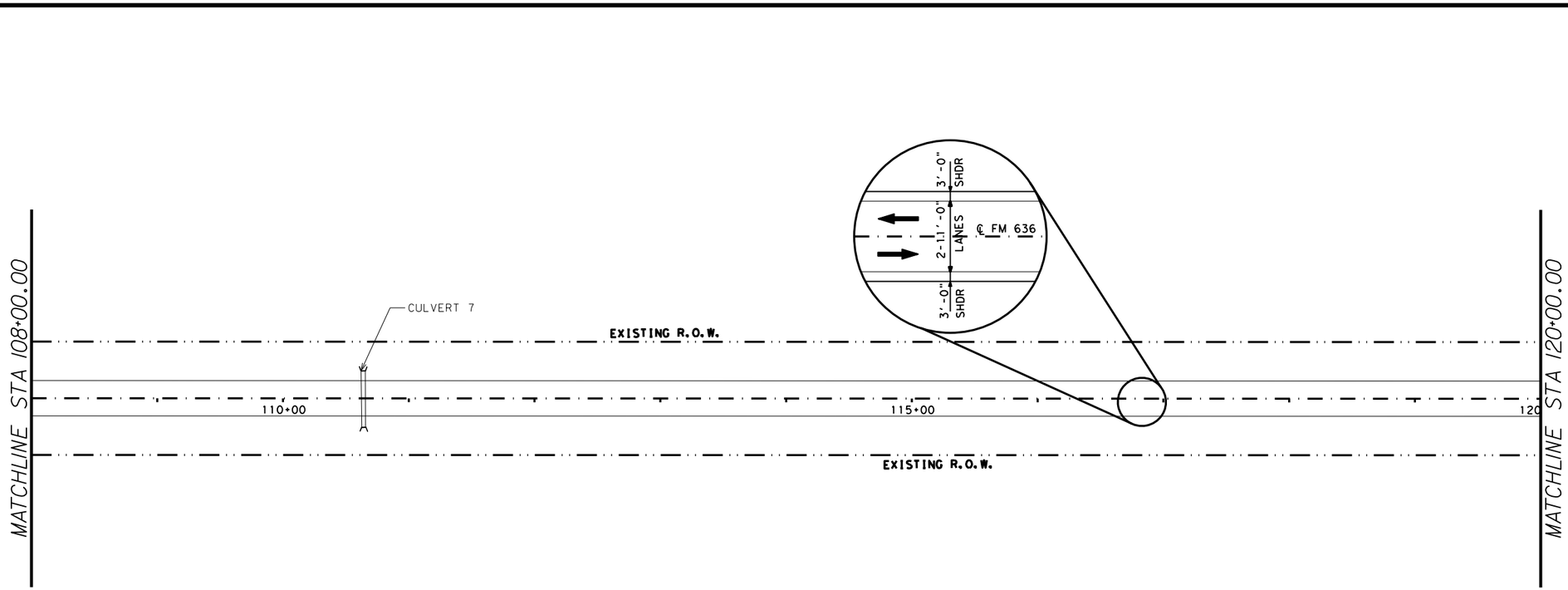

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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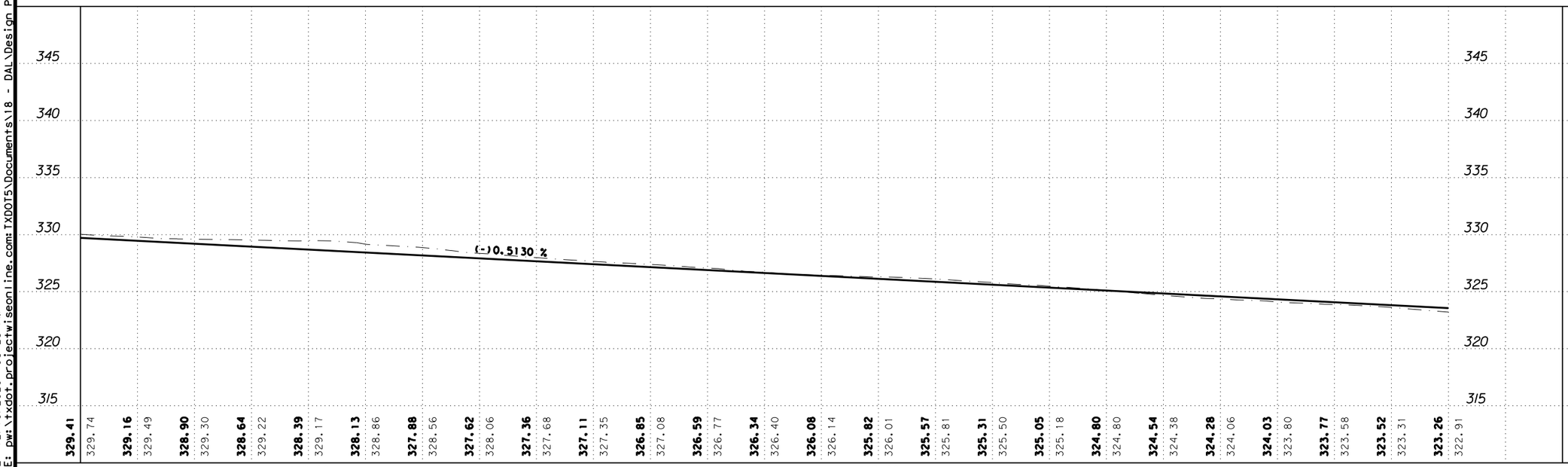

STATE OF TEXAS
AMANDA MCKITTRICK
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 10 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		87

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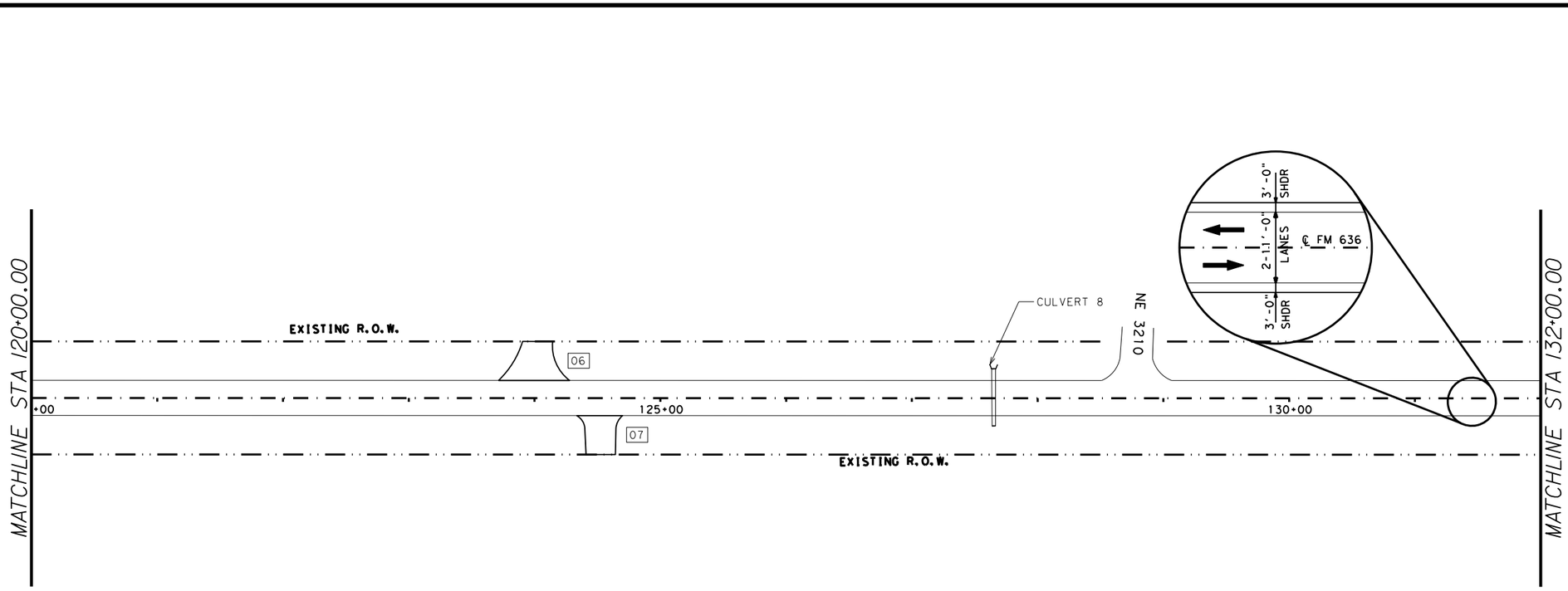

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FEET

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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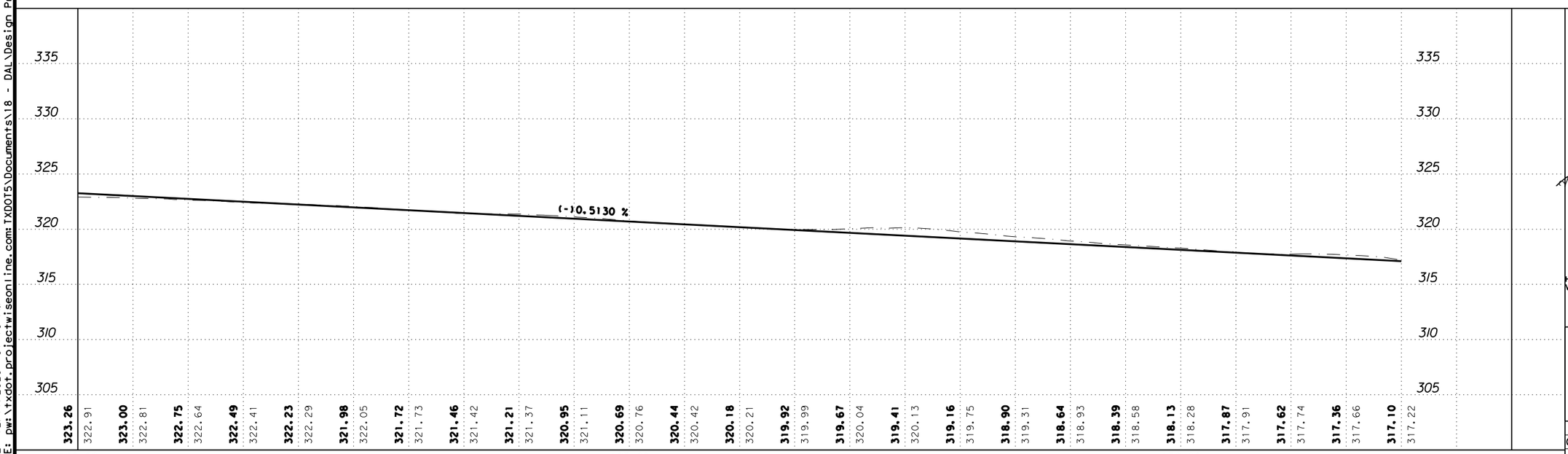

STATE OF TEXAS
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129352
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Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		88

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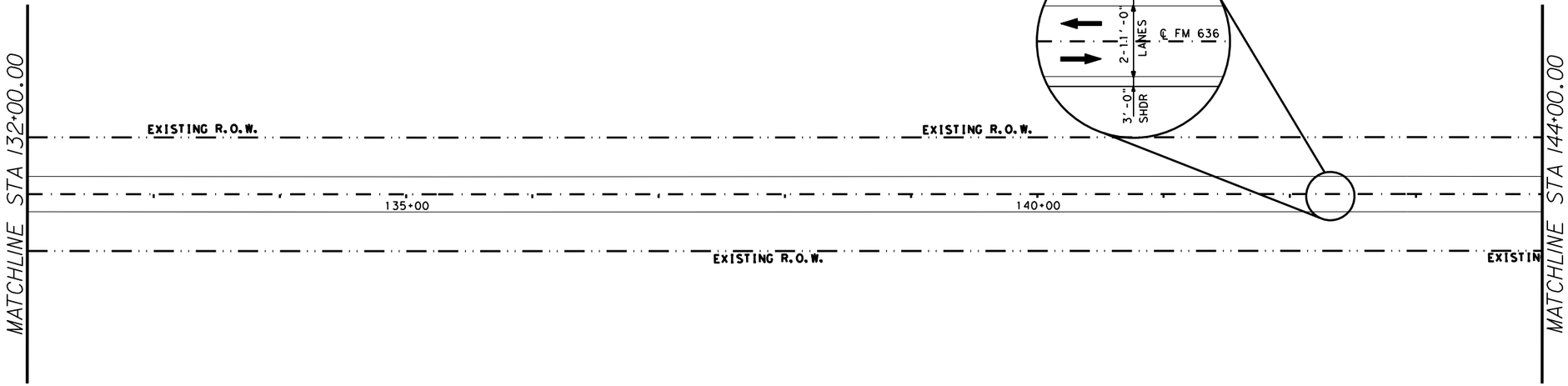

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NOTES:

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3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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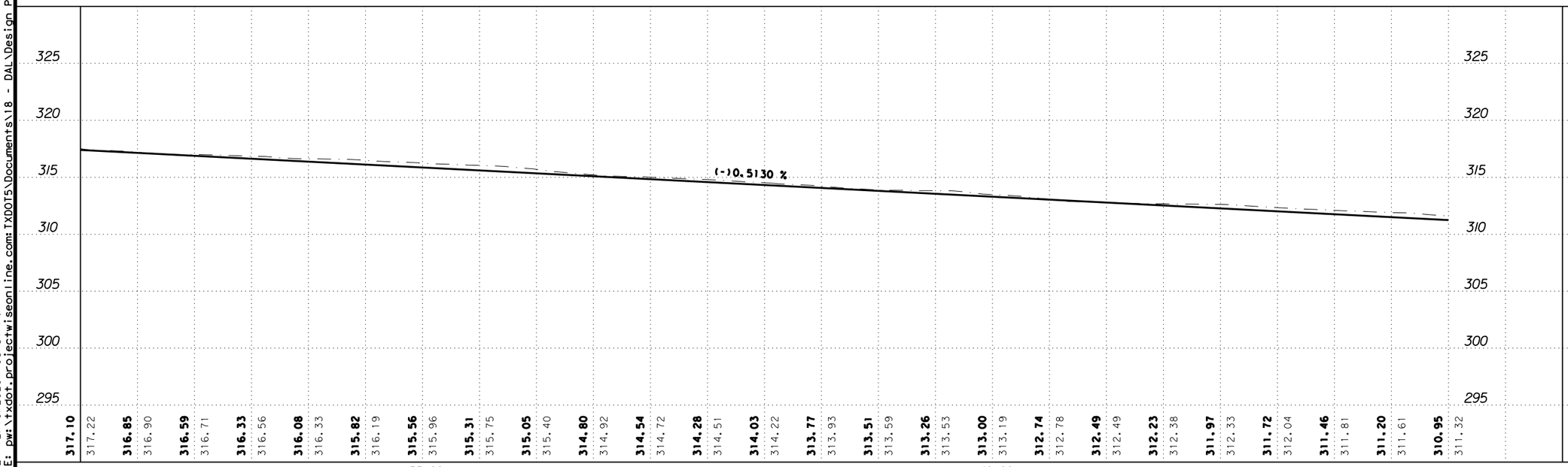

STATE OF TEXAS
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Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 12 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		89

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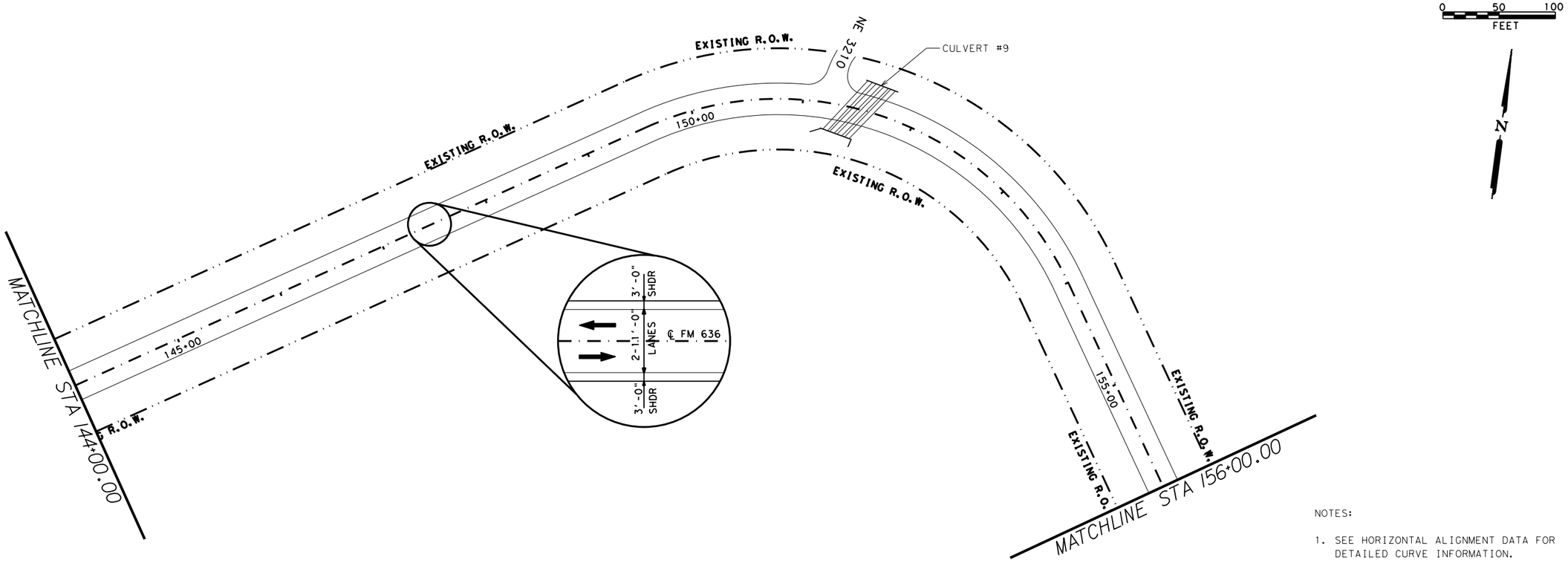

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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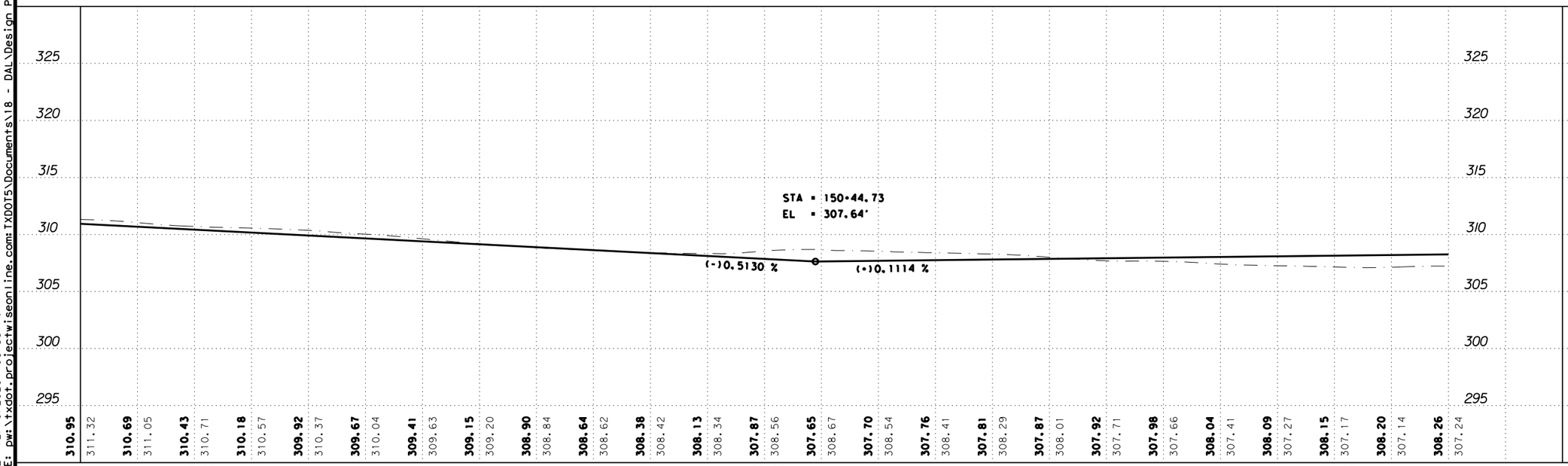

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		90

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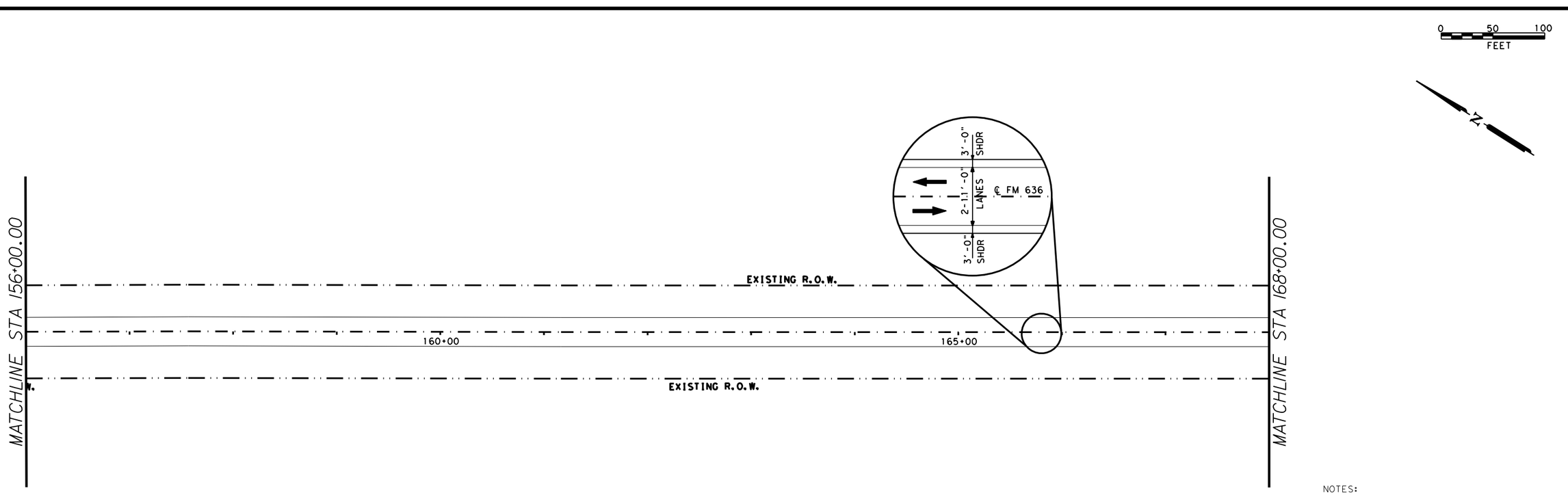

NOTES:

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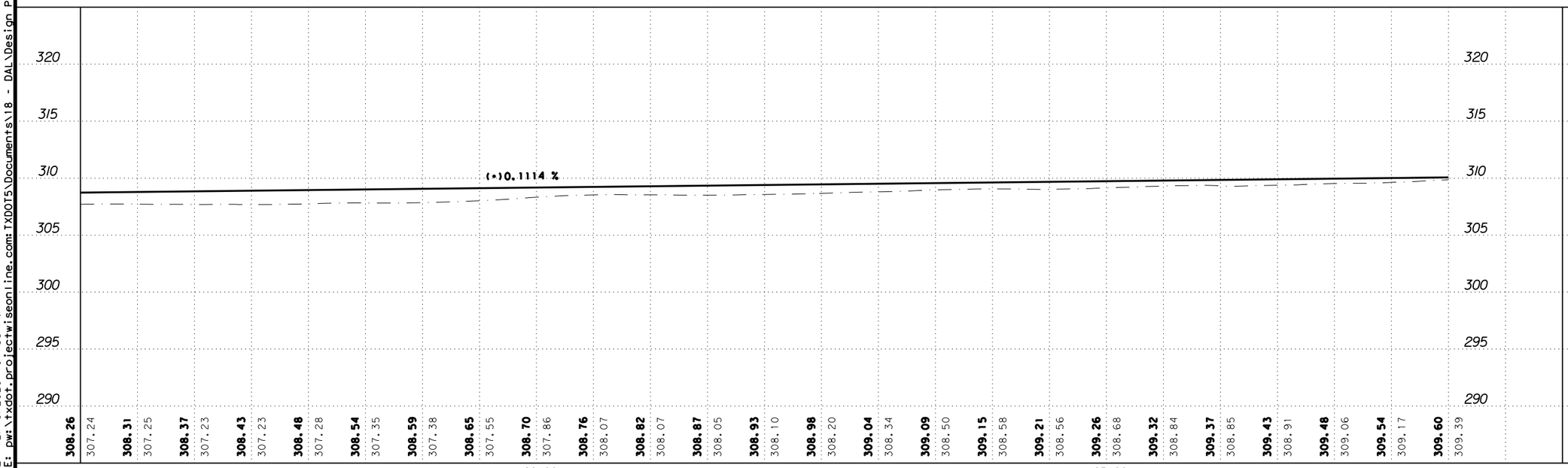

STATE OF TEXAS
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Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 14 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		91

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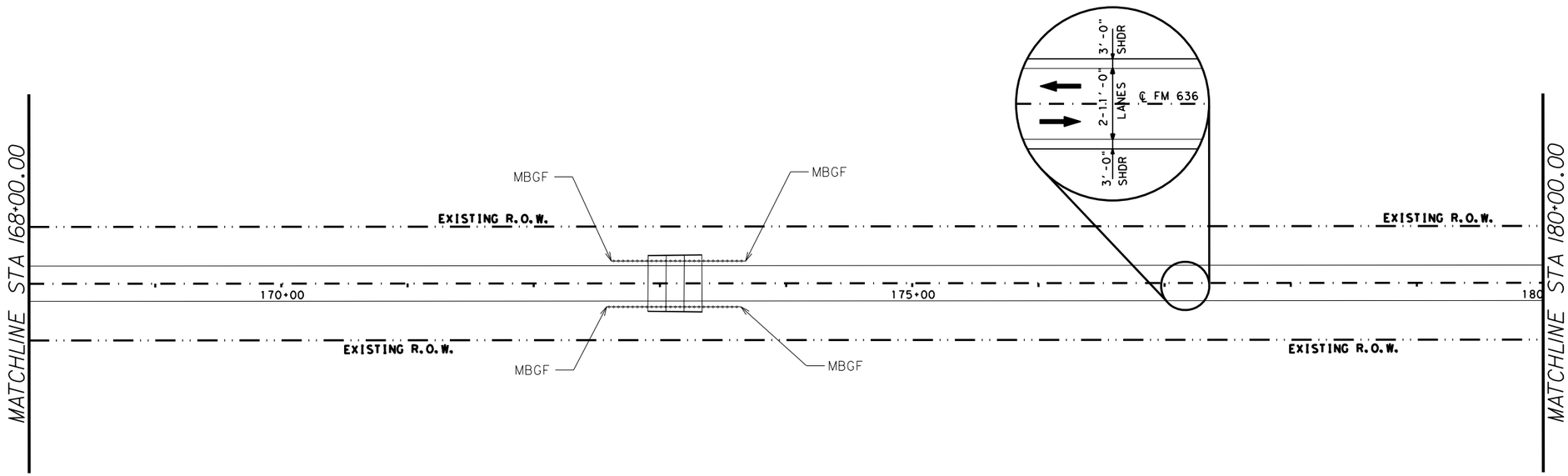

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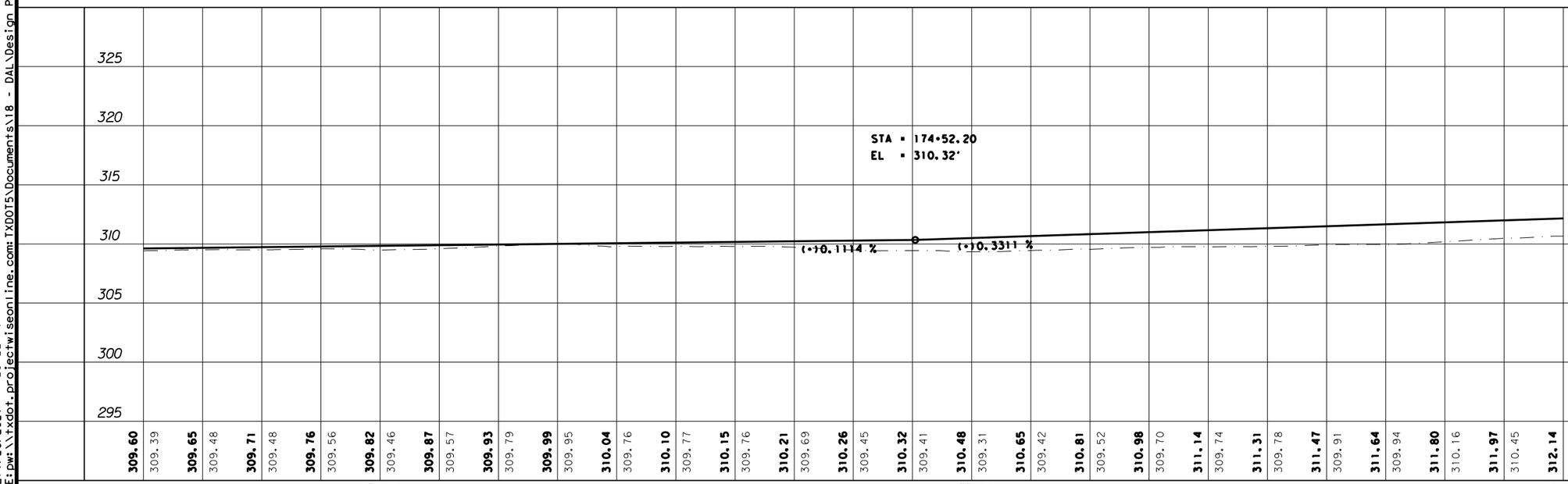
FEET

N

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



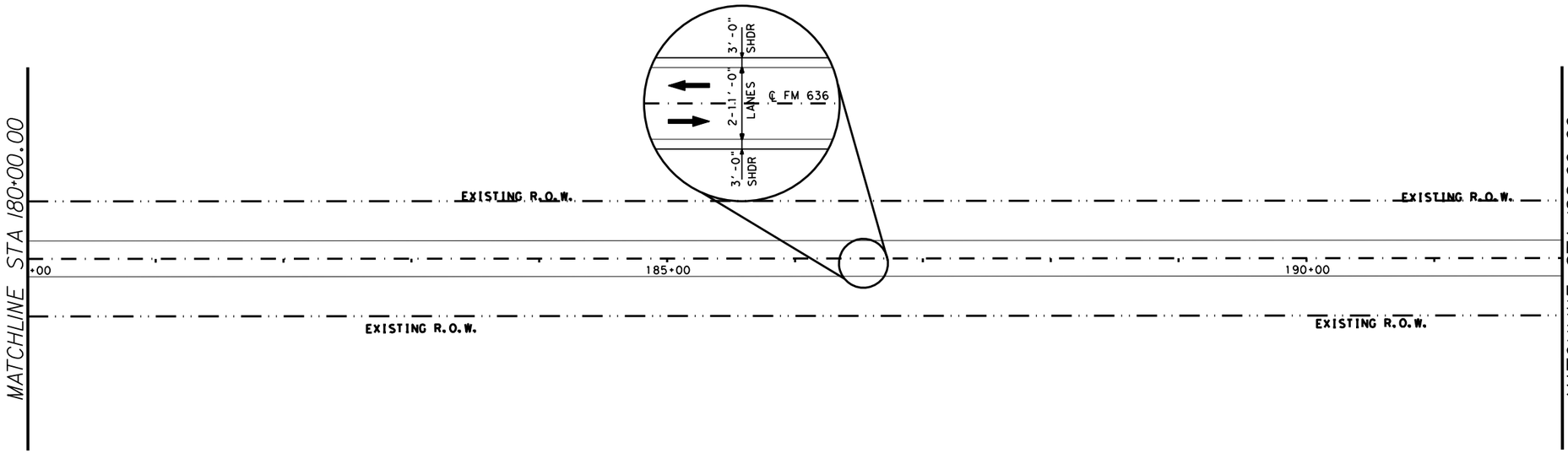
STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		92



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FEET

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NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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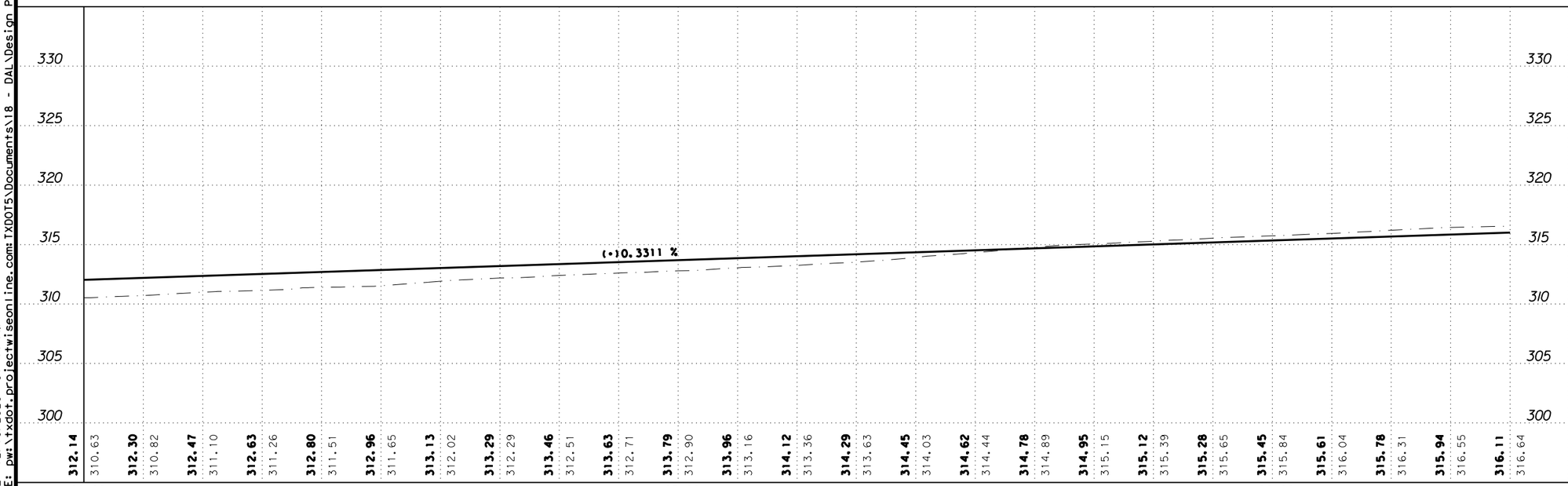

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		93

DATE: 12/10/2020 07:44 PM
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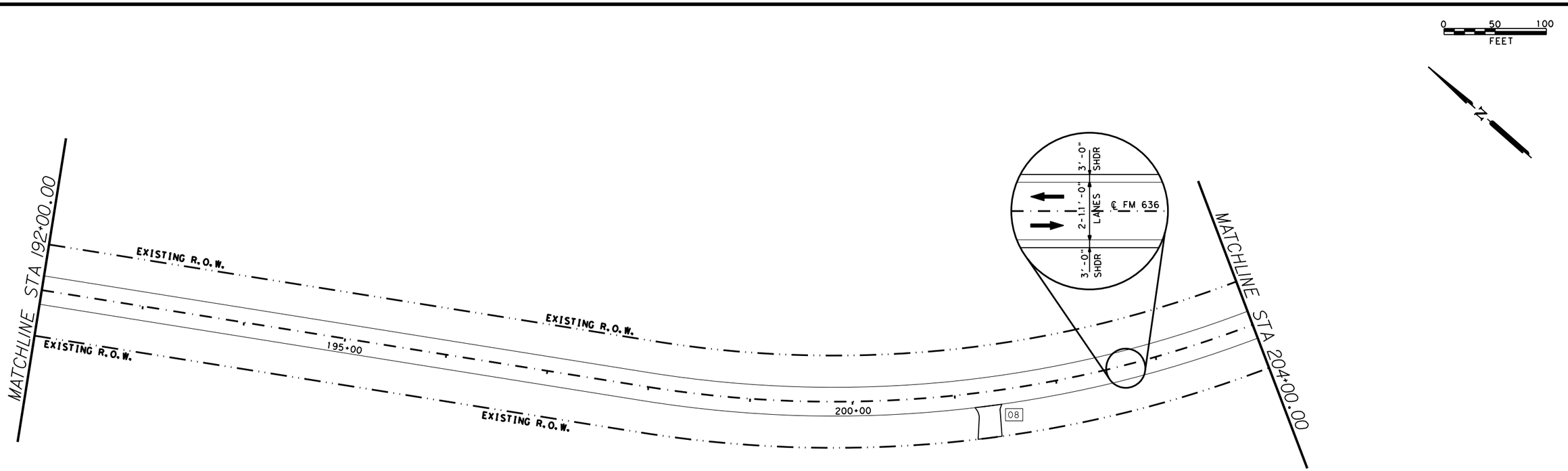

NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
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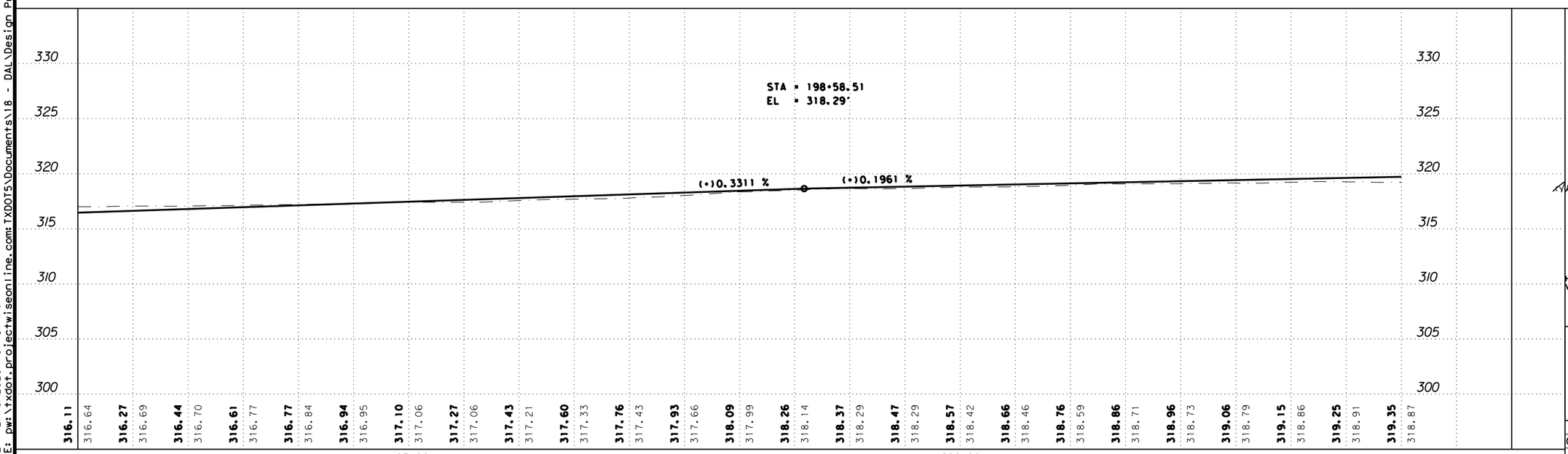

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 17 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		94

DATE: 12/10/2020 07:57 PM
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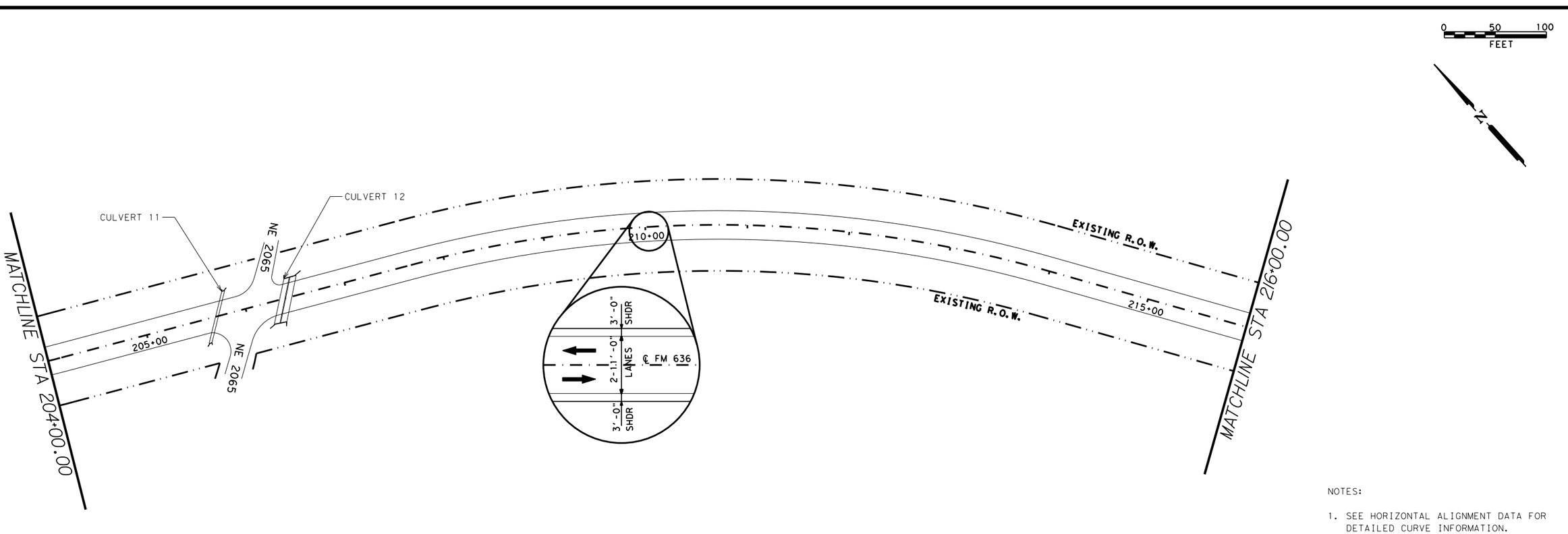

NOTES:

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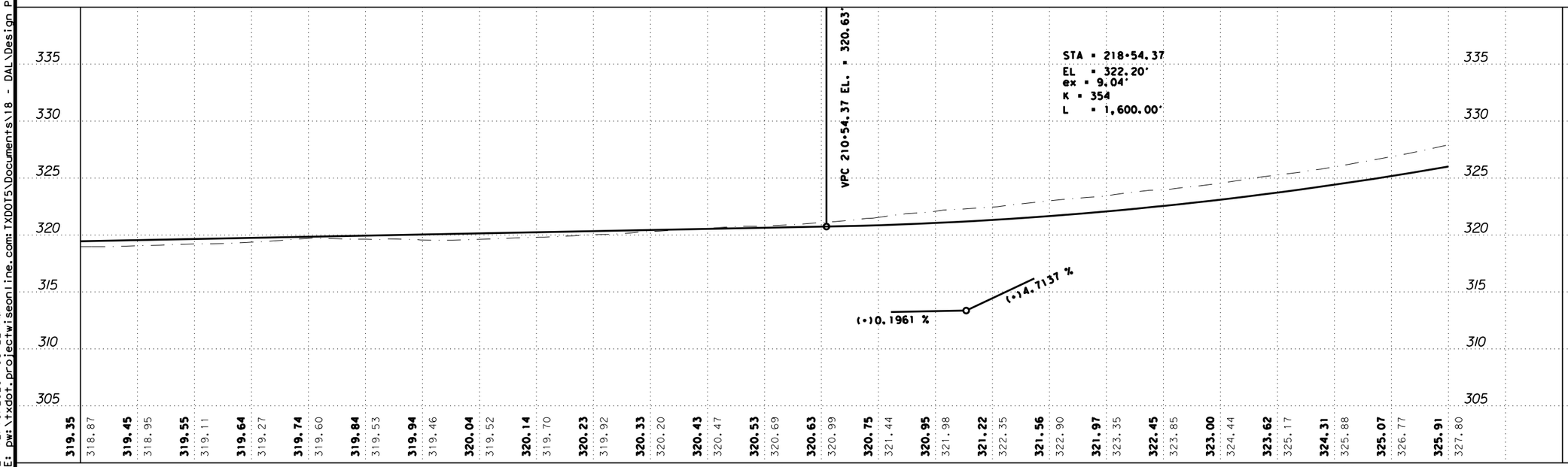

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		95

DATE: 12/10/2020 08:22 PM
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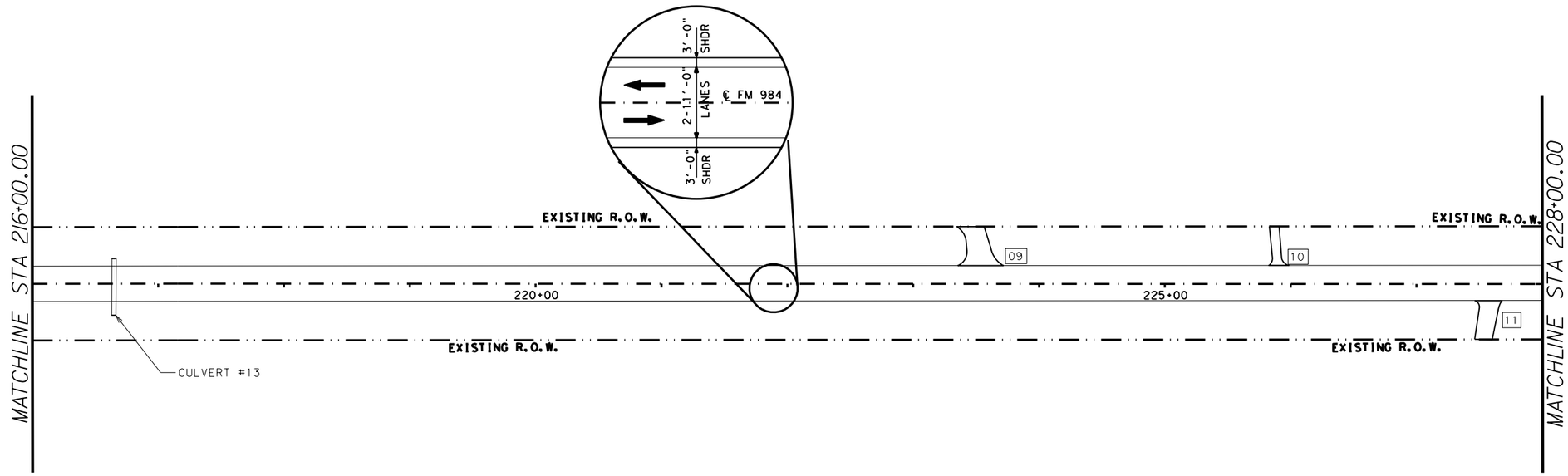

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FEET

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NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
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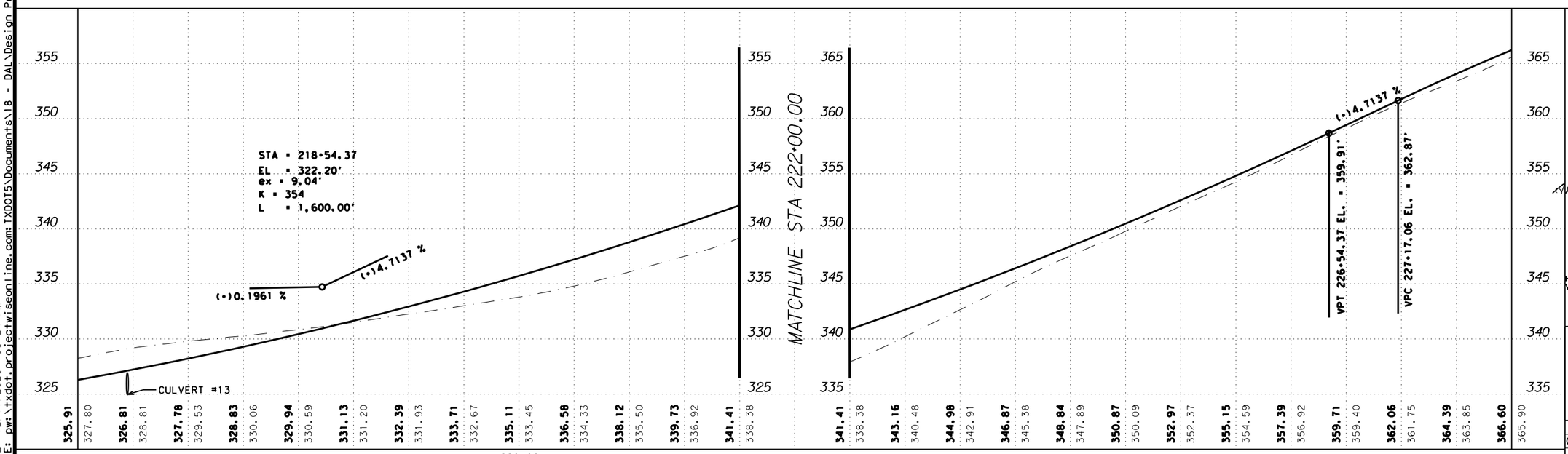
NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



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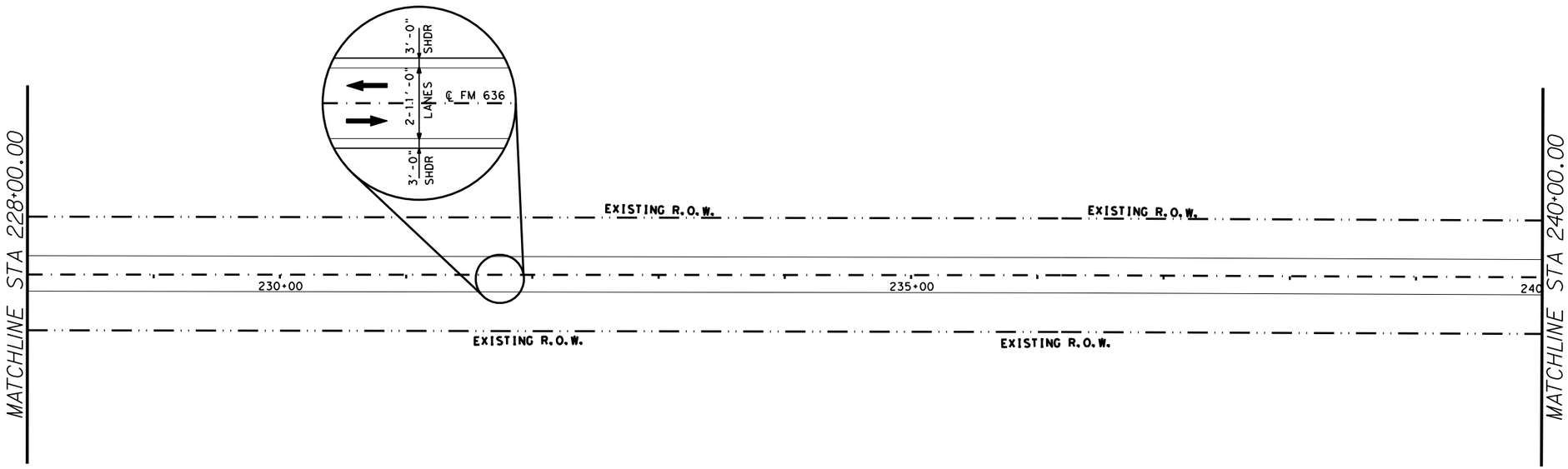

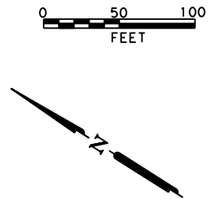

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FEET

NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
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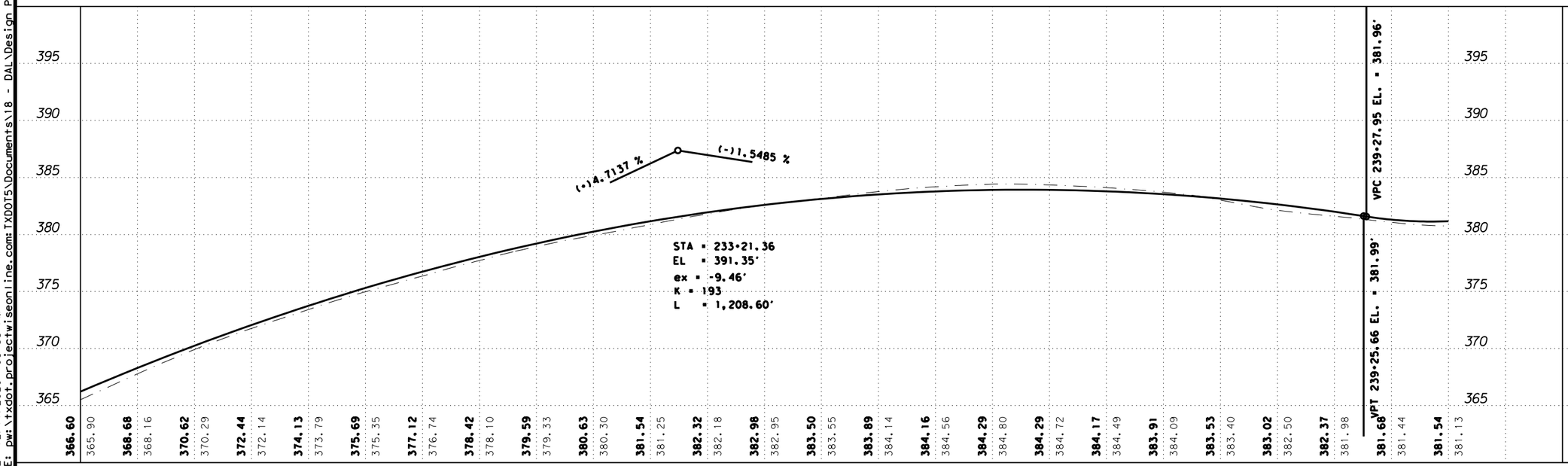
NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		97

DATE: 12/11/2020 08:35 PM
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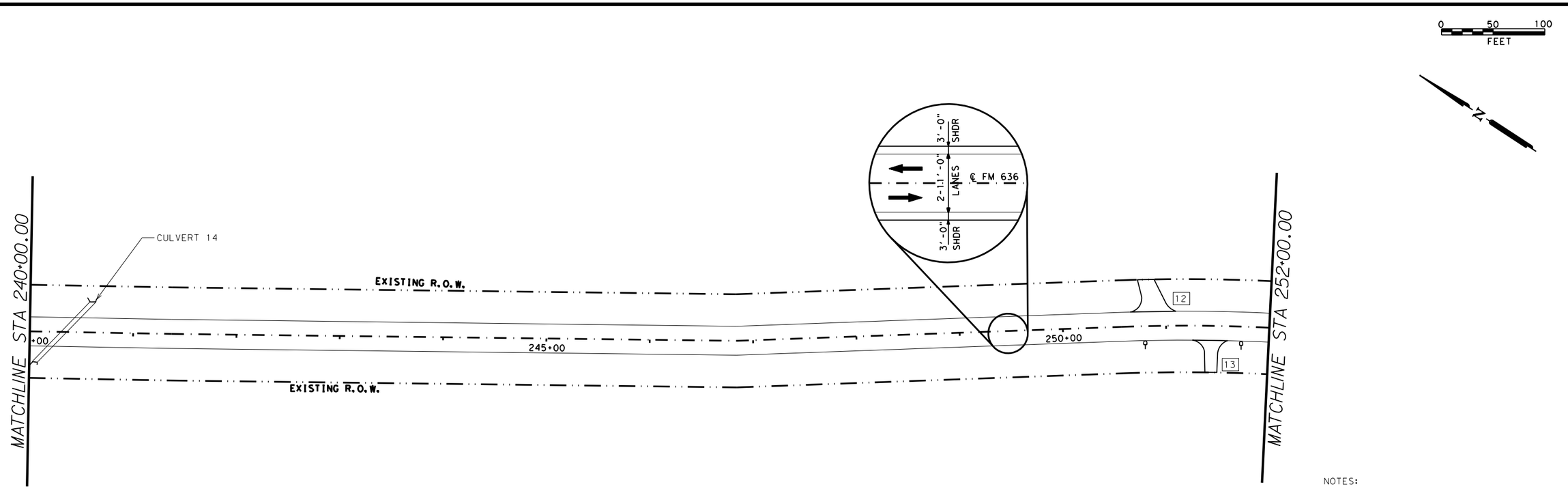

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".

NOTES:

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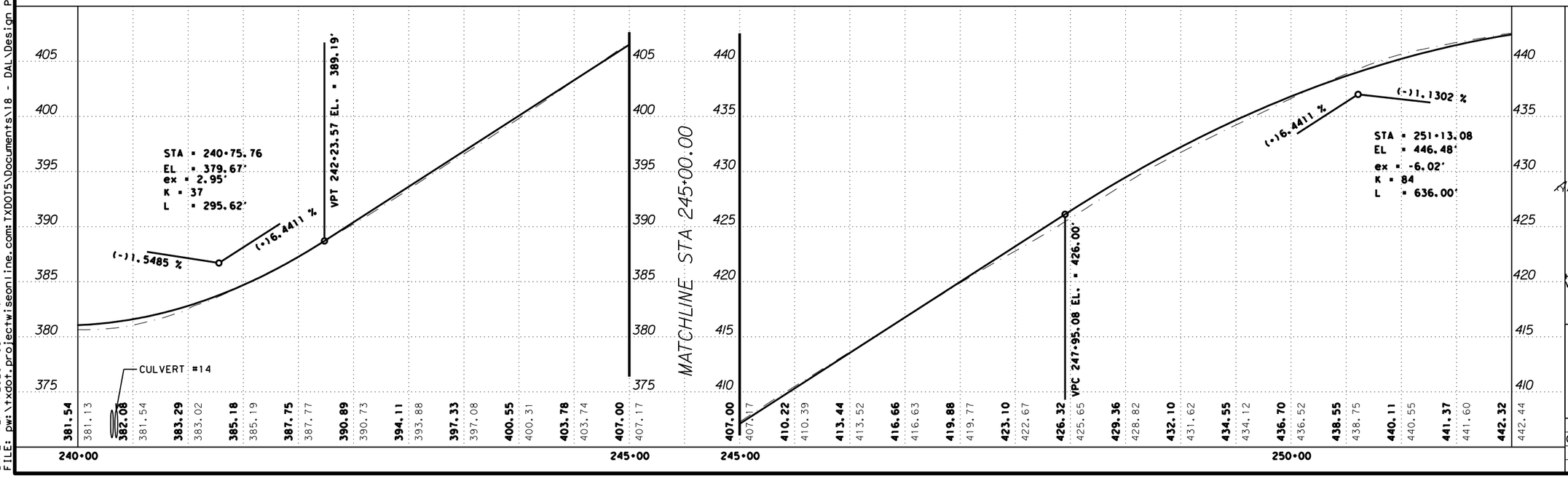
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

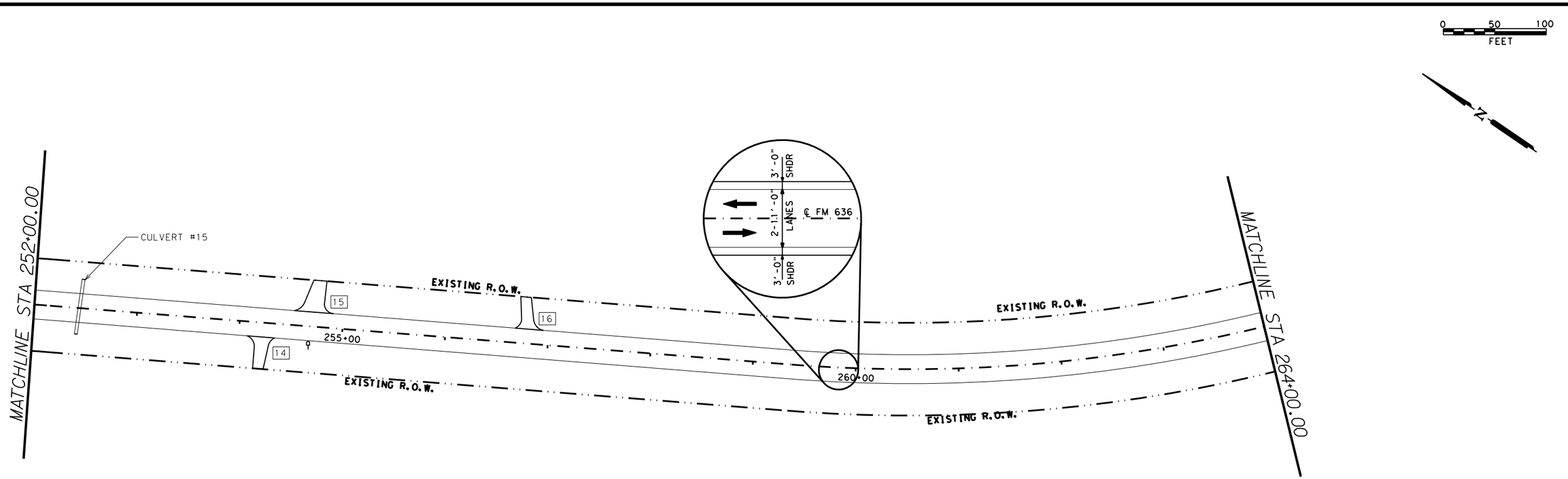
FM 636
PLAN & PROFILE

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

SHEET 21 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		98



NOTES:

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3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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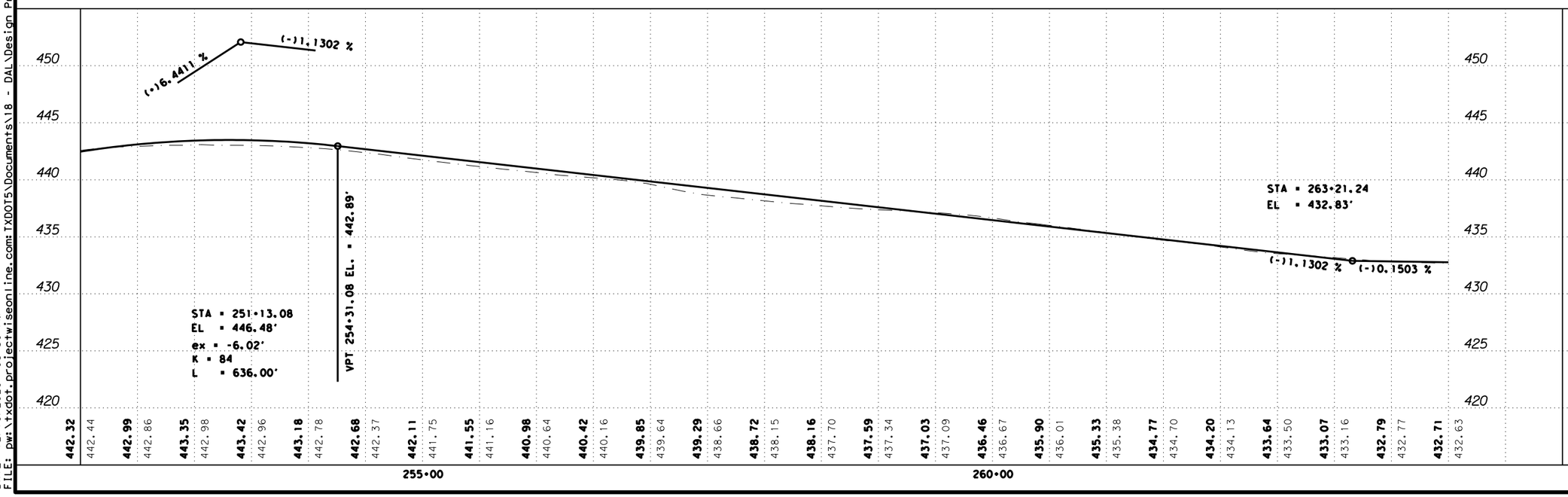

STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		99

DATE: 12/10/2020 08:50 PM
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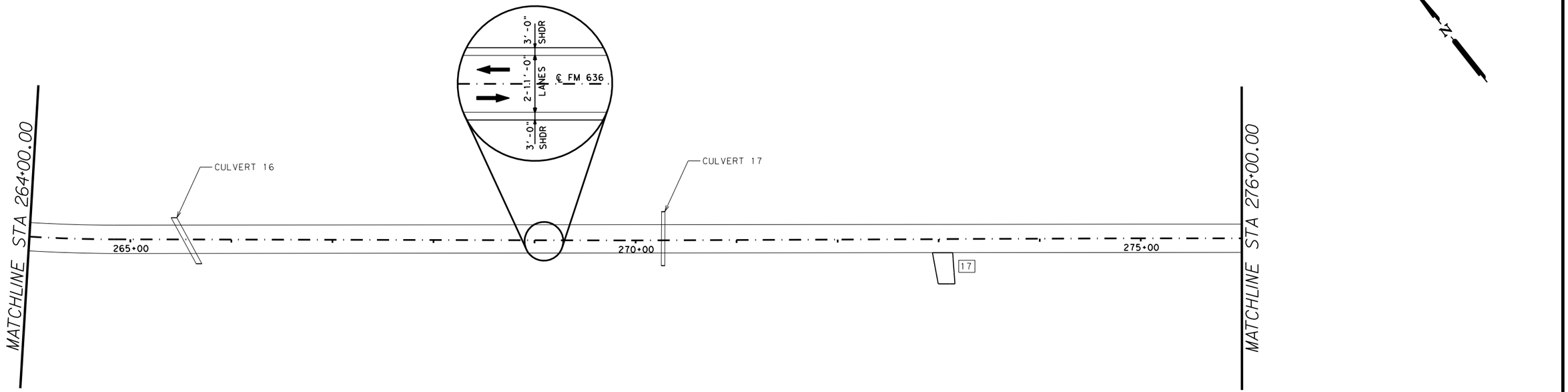

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FEET

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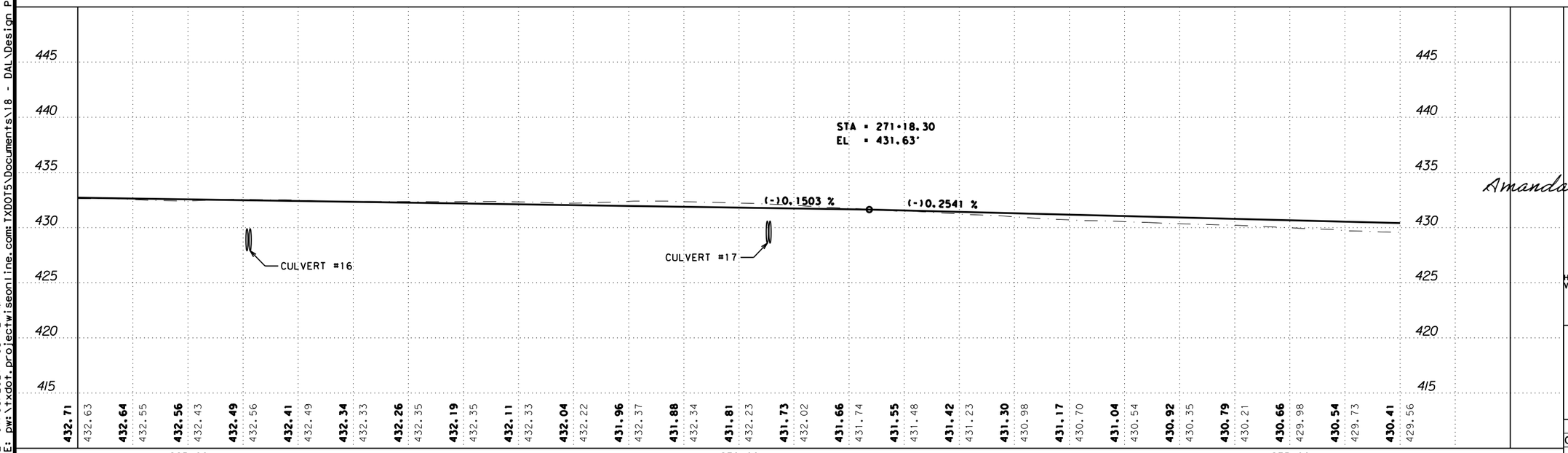
NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
XX 3. DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 23 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		100

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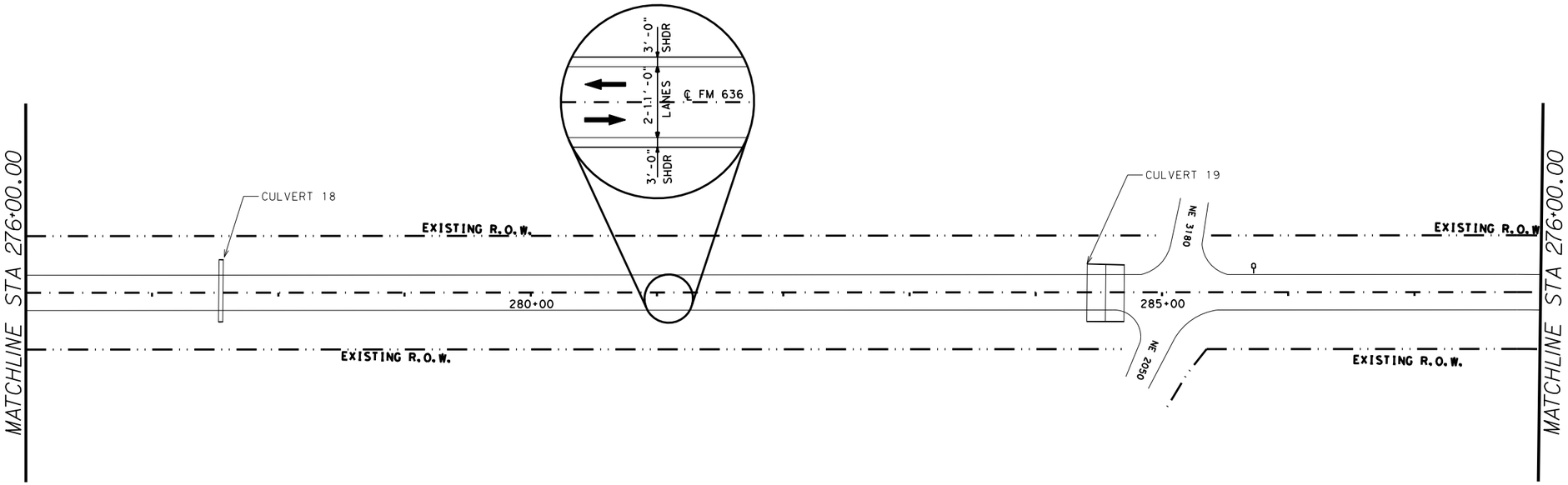

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FEET

N

NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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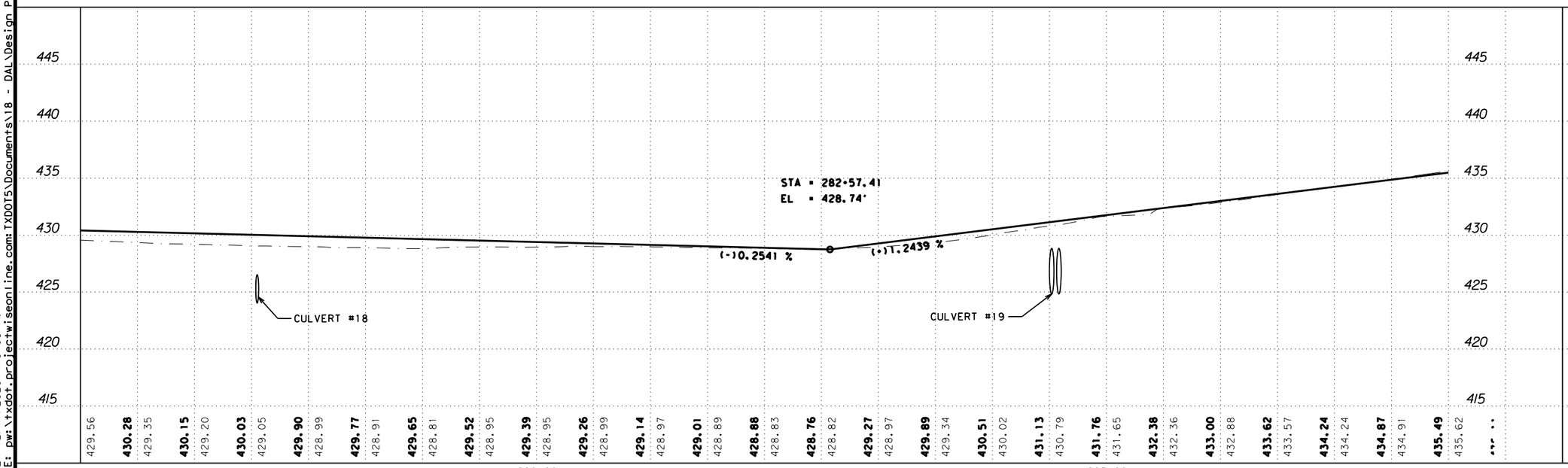
THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 24 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		101

DATE: 12/11/2020 10:08 PM
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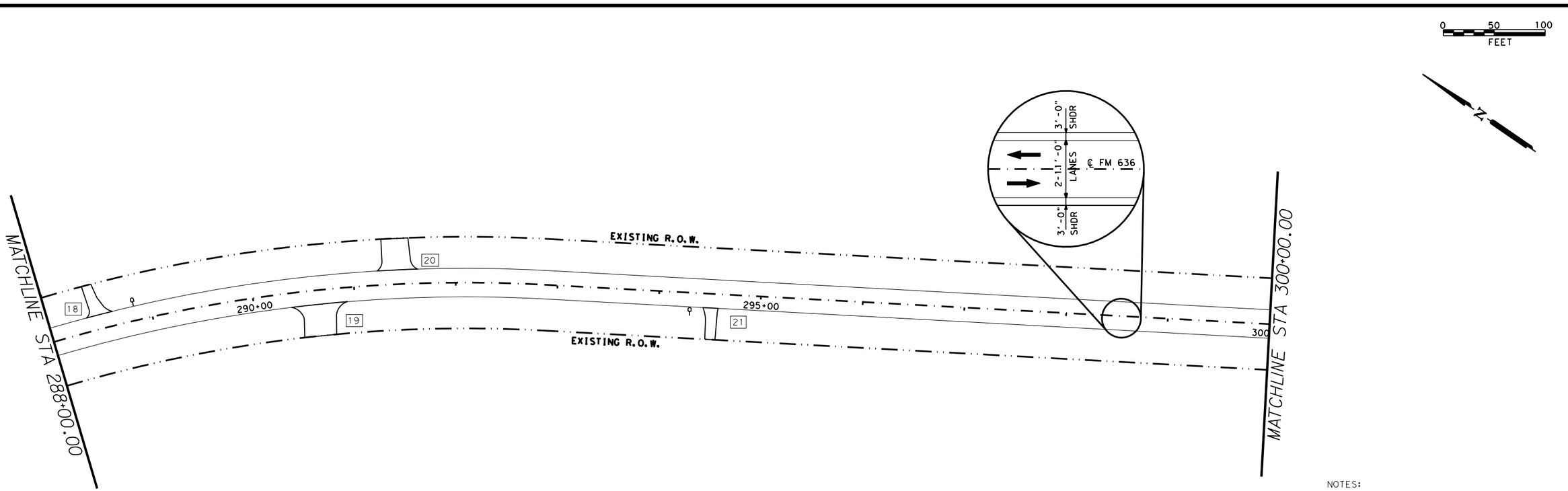

NOTES:

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3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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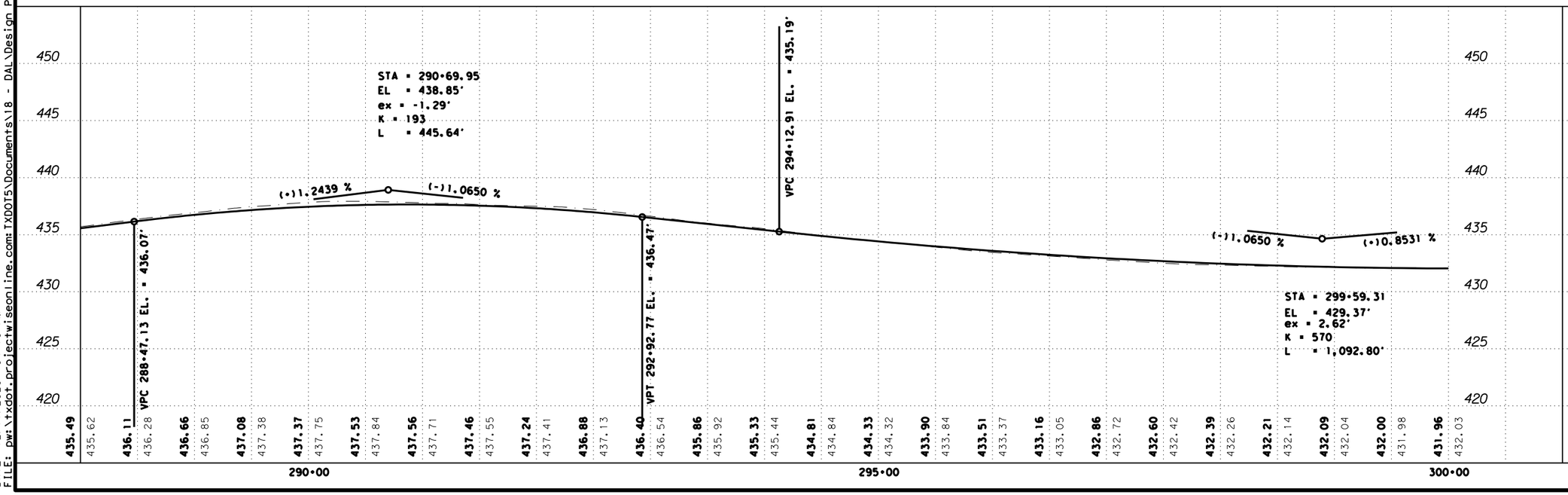


STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

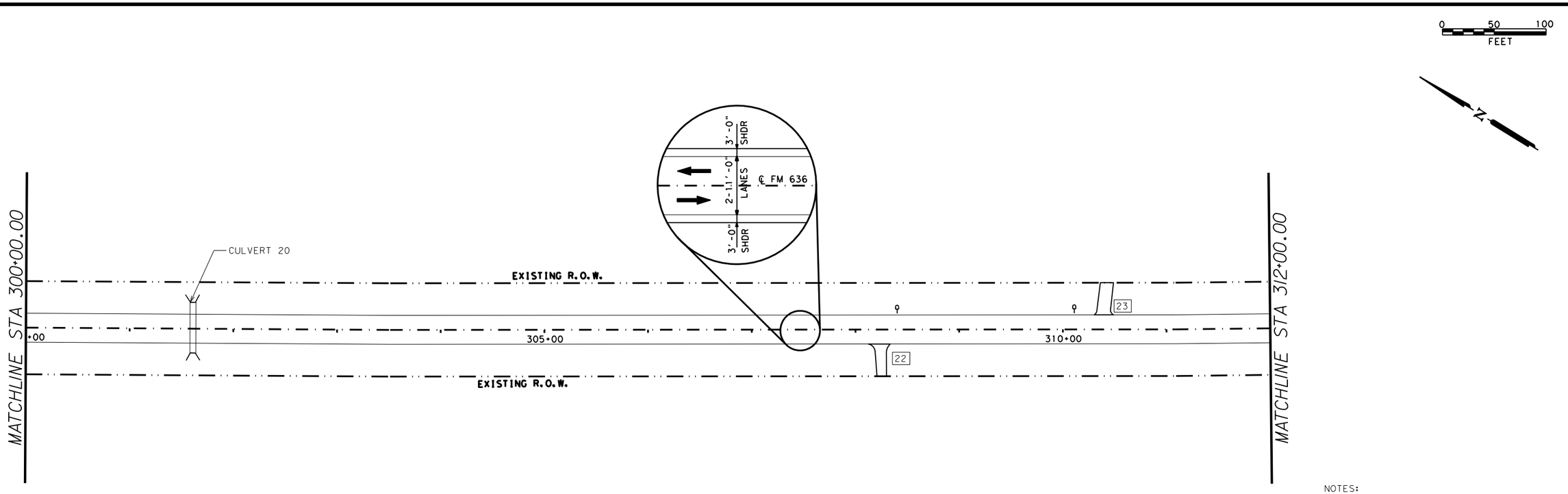
FM 636
PLAN & PROFILE

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

SHEET 25 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		102



NOTES:

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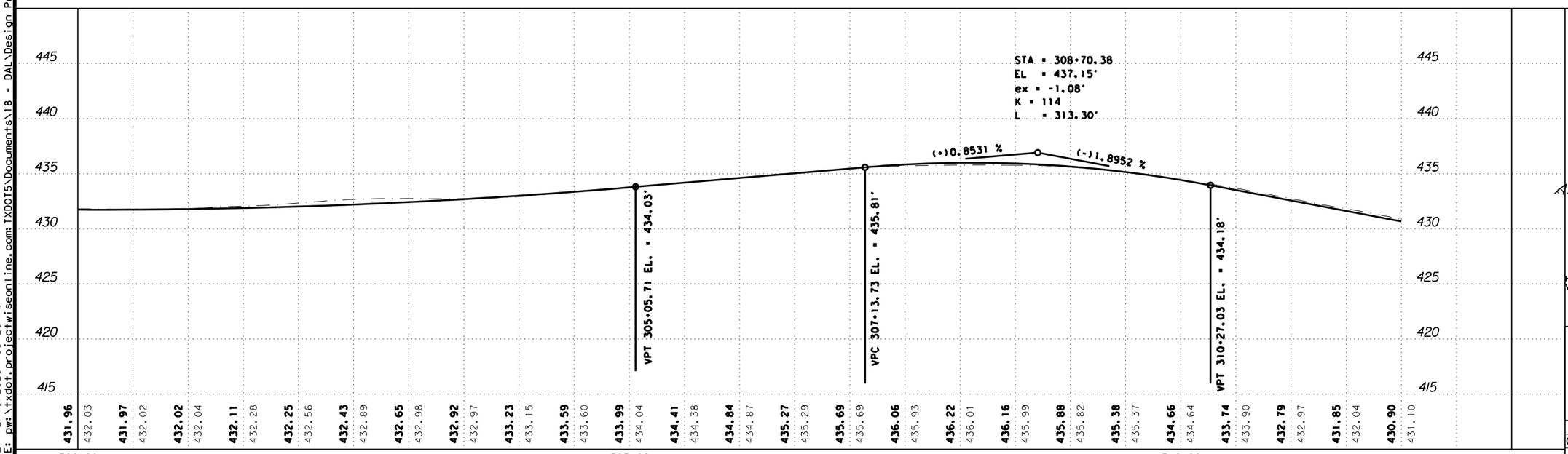


STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

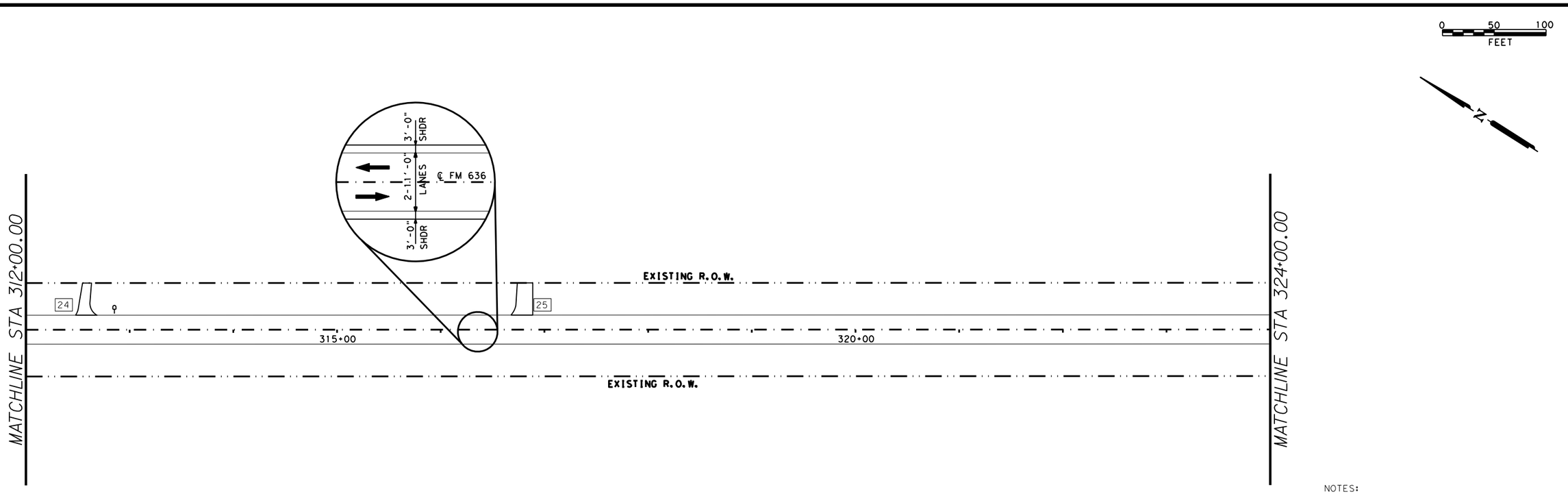
FM 636
PLAN & PROFILE

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

SHEET 26 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		103



NOTES:

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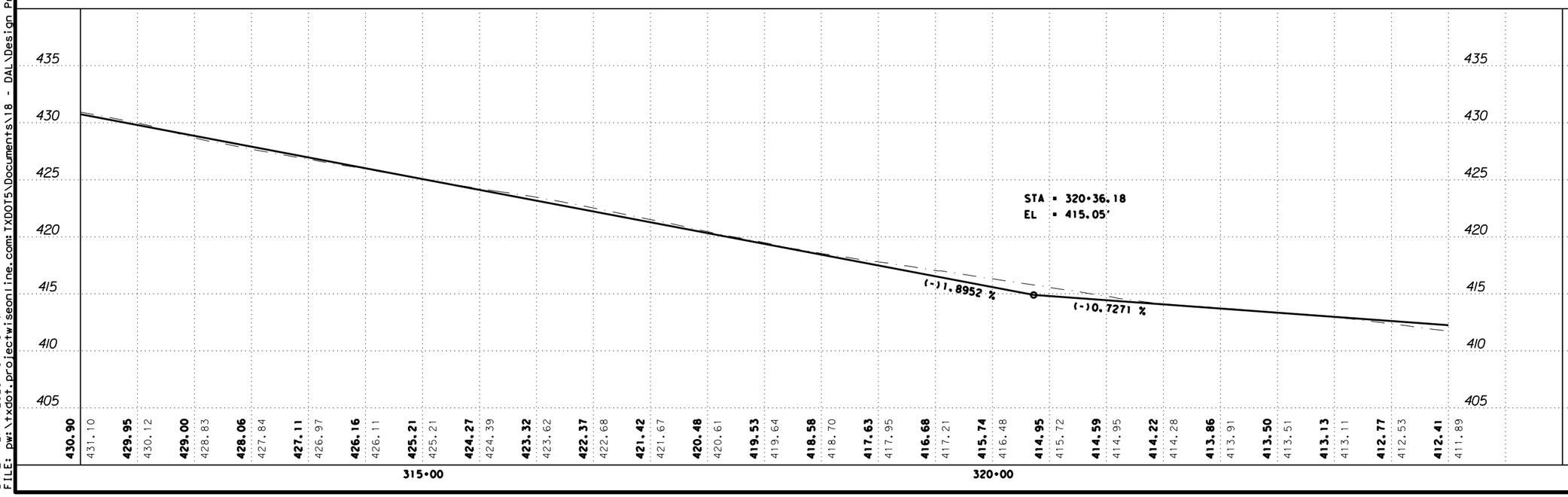


STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

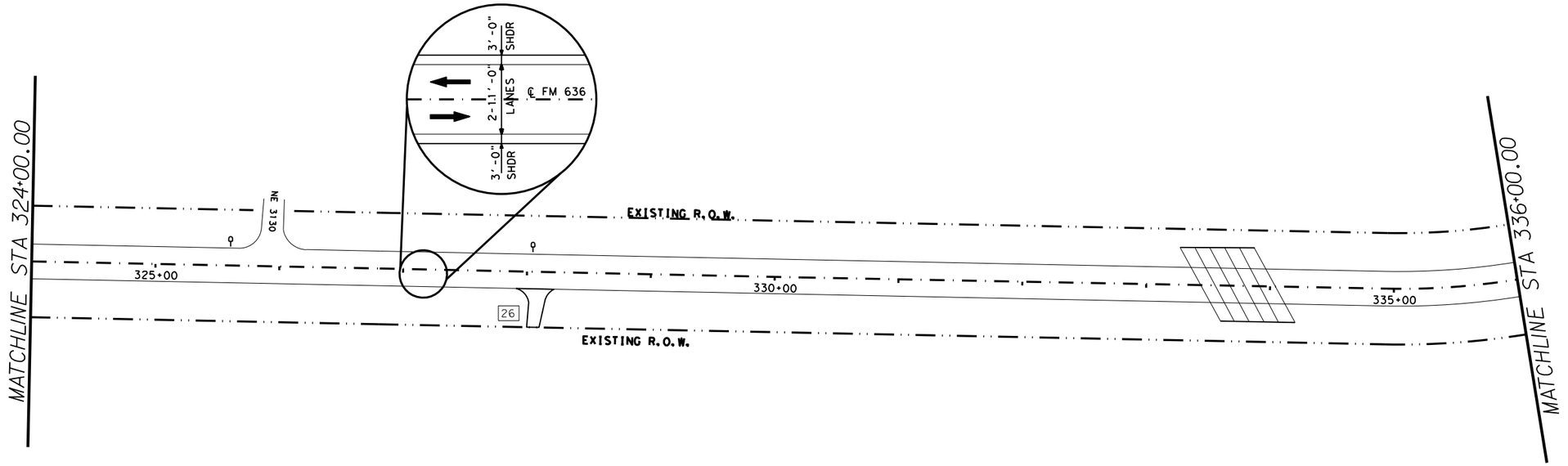
Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		104



0 50 100
FEET

N

NOTES:

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2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
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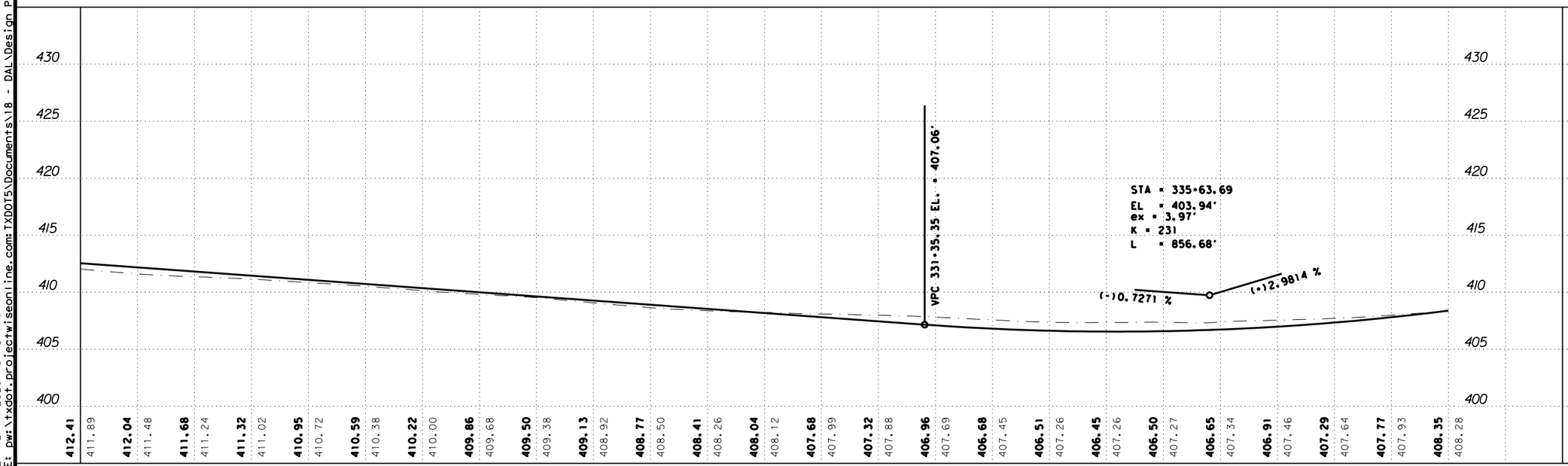

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 28 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		105

DATE: 12/11/2020 04:37 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574021\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile28.dgn

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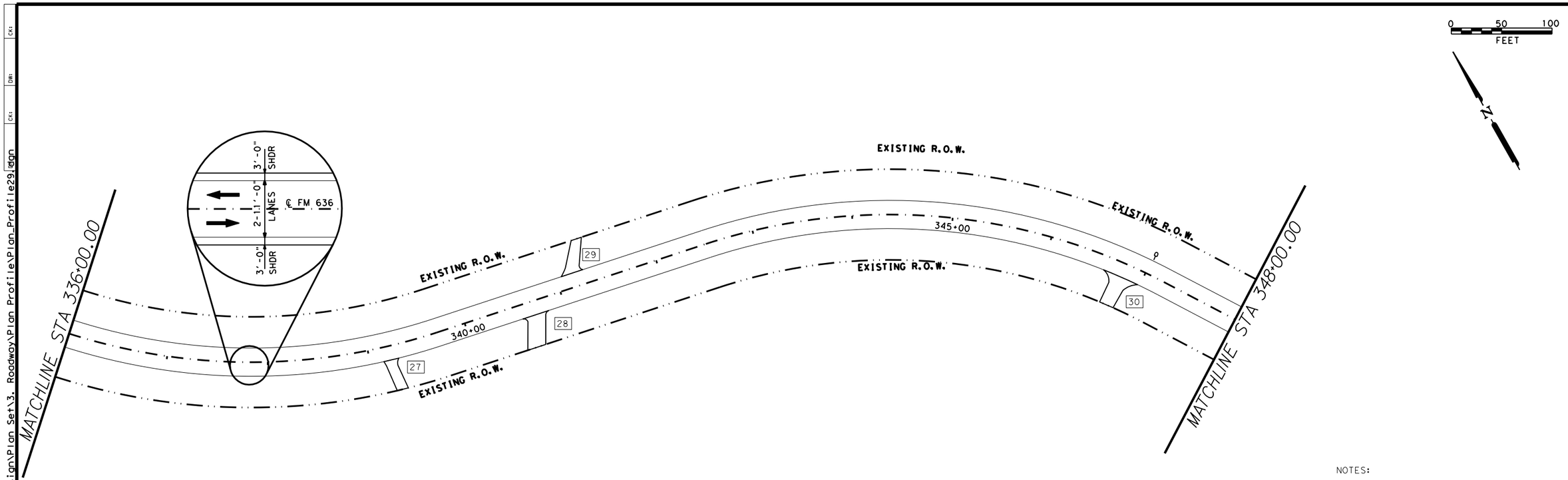
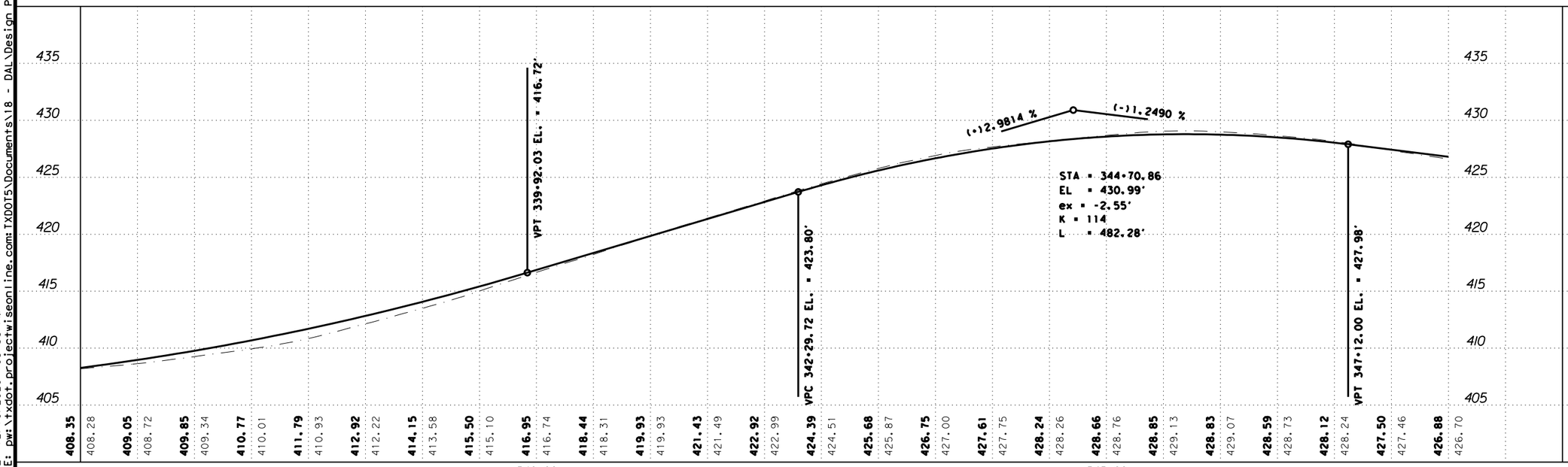


NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 29 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		106

CK: CK: DW: CK:

DATE: 12/10/2020 09:36 PM
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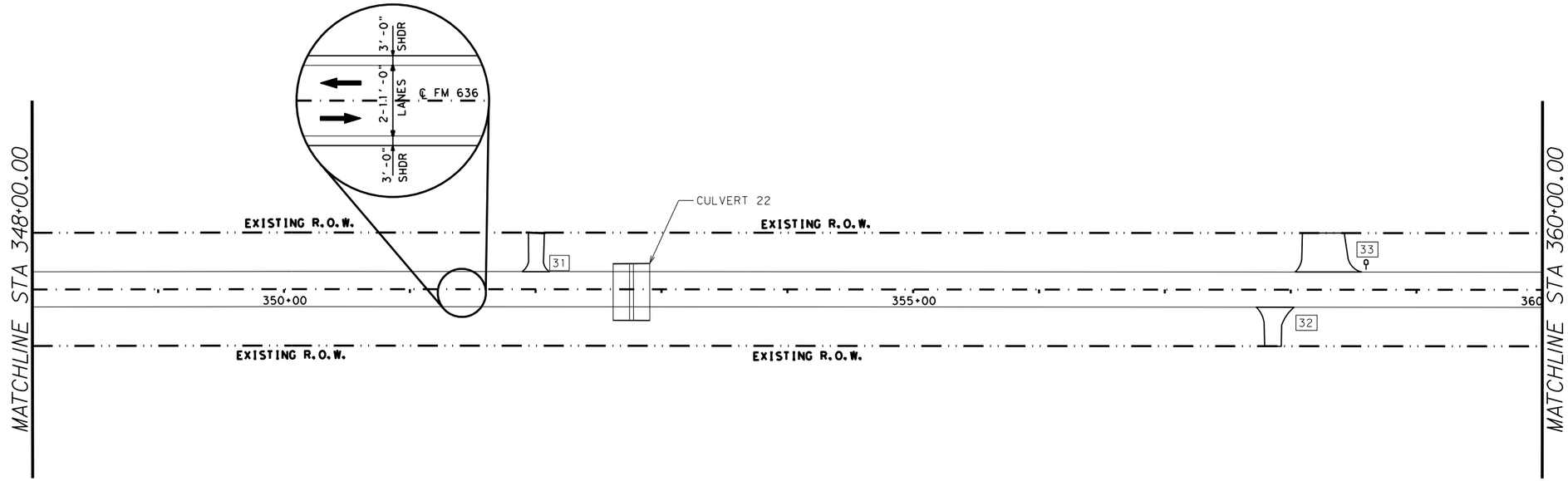


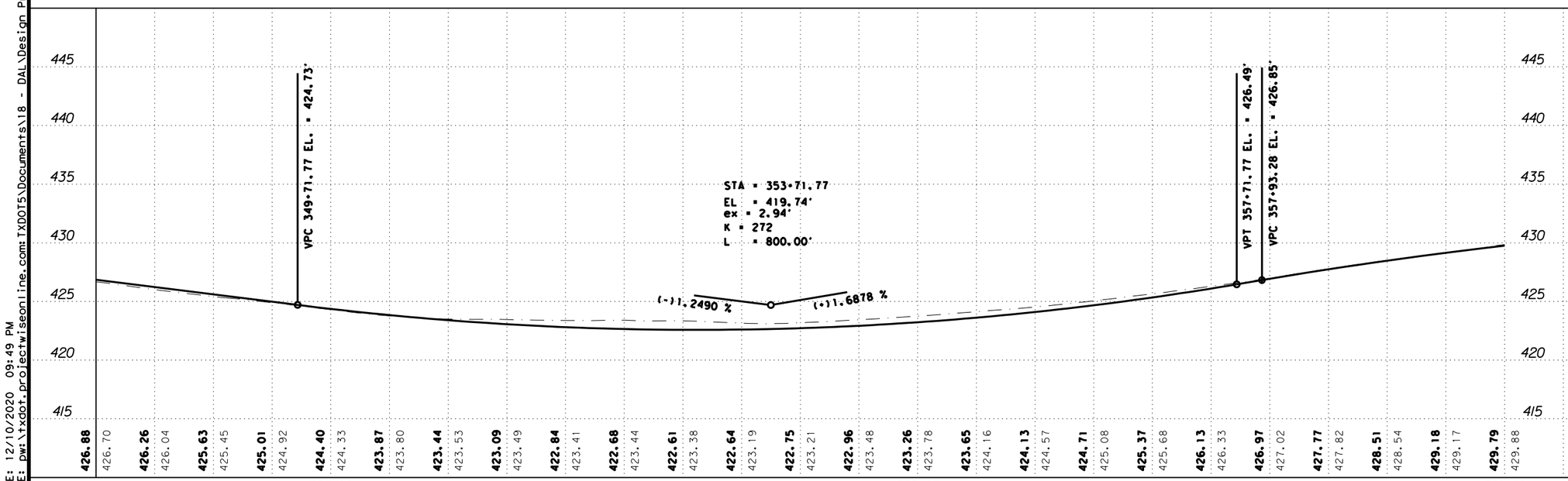
0 50 100
FEET

N

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 30 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		107

DATE: 12/10/2020 09:49 PM
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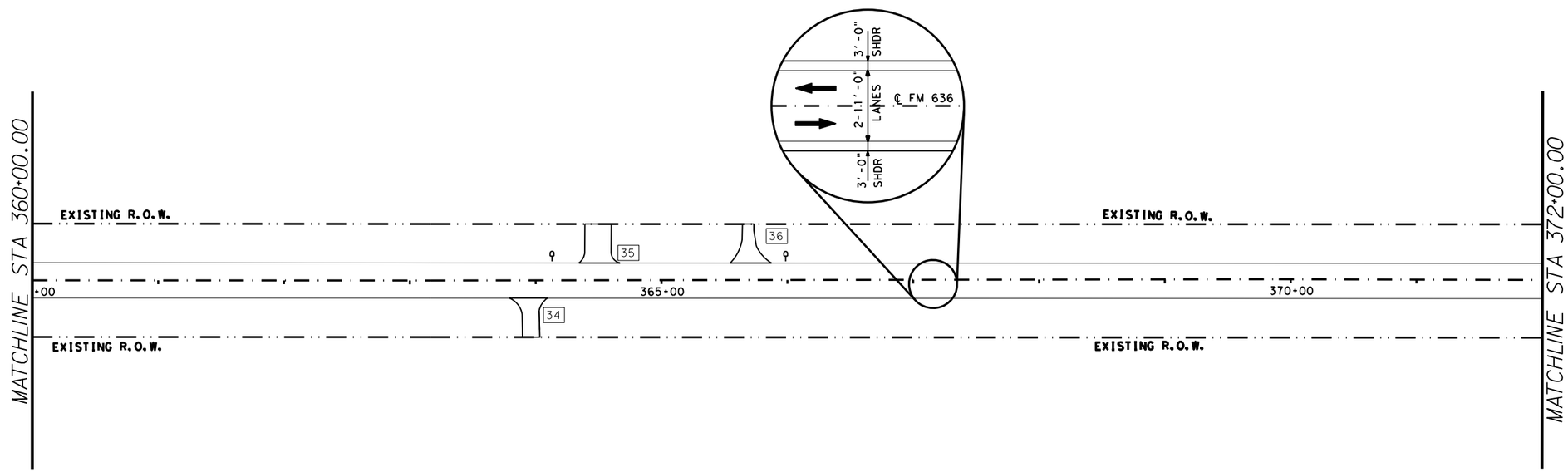


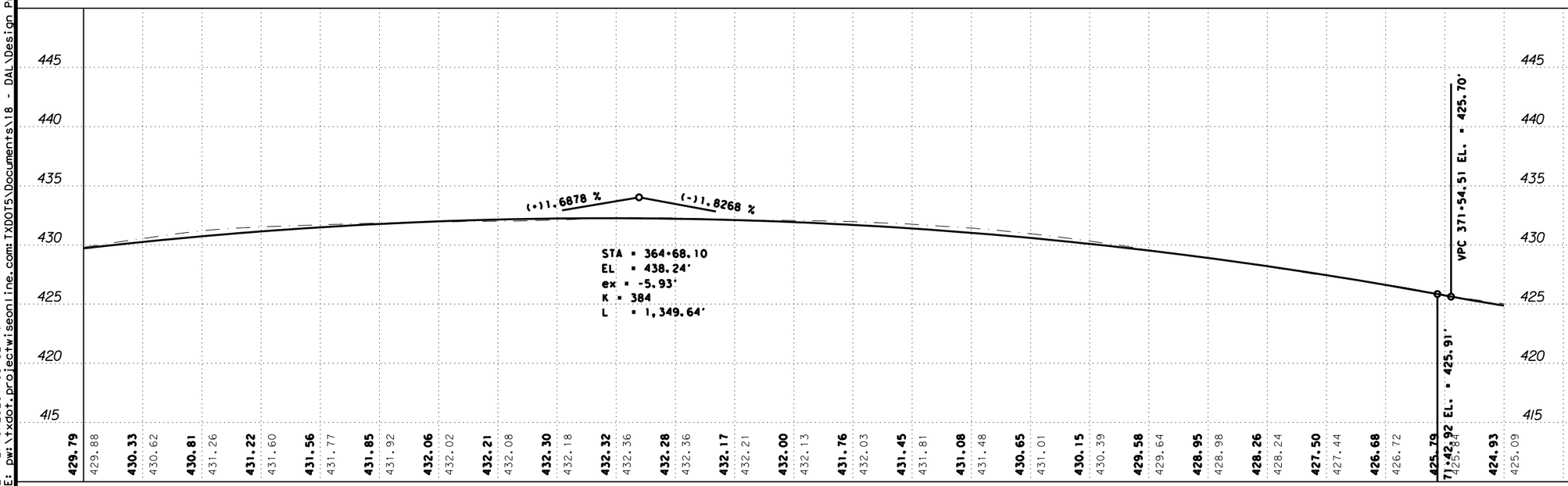
0 50 100
FEET

N

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
XX 3. DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 31 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		108

DATE: 12/10/2020 09:52 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\05740202\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile31.dgn

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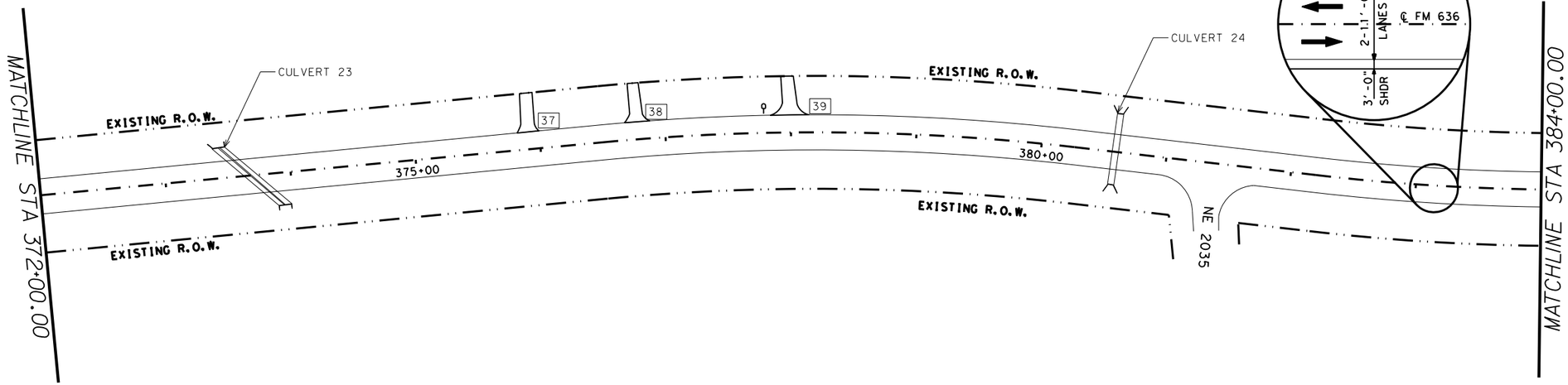


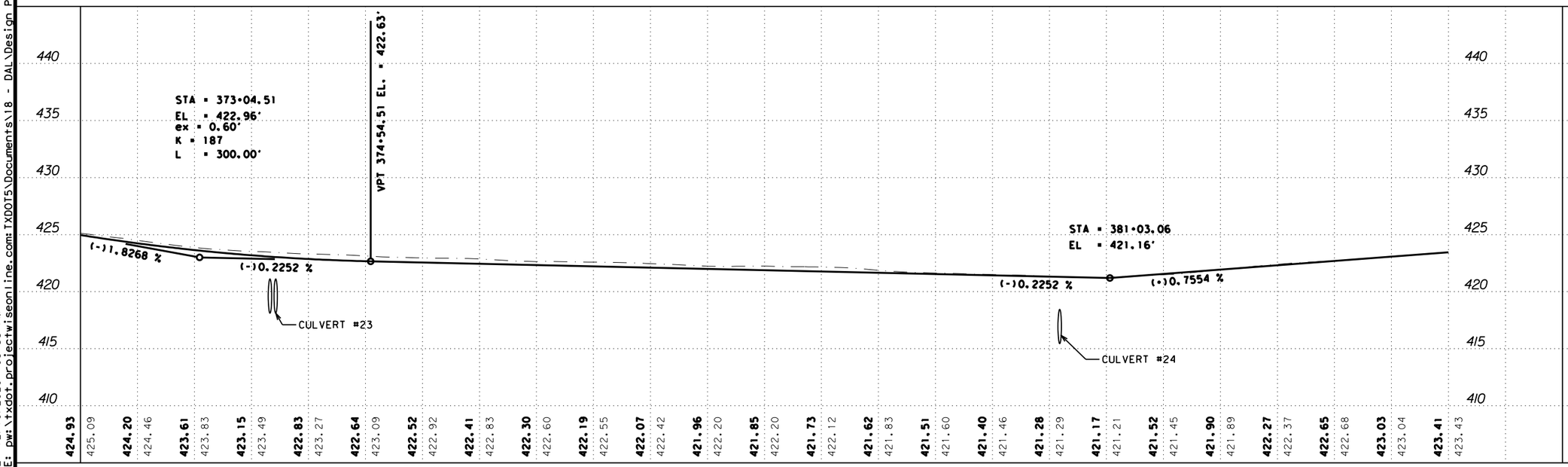
0 50 100
FEET

N

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER
Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		109

DATE: 12/10/2020 09:55 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile32.dgn
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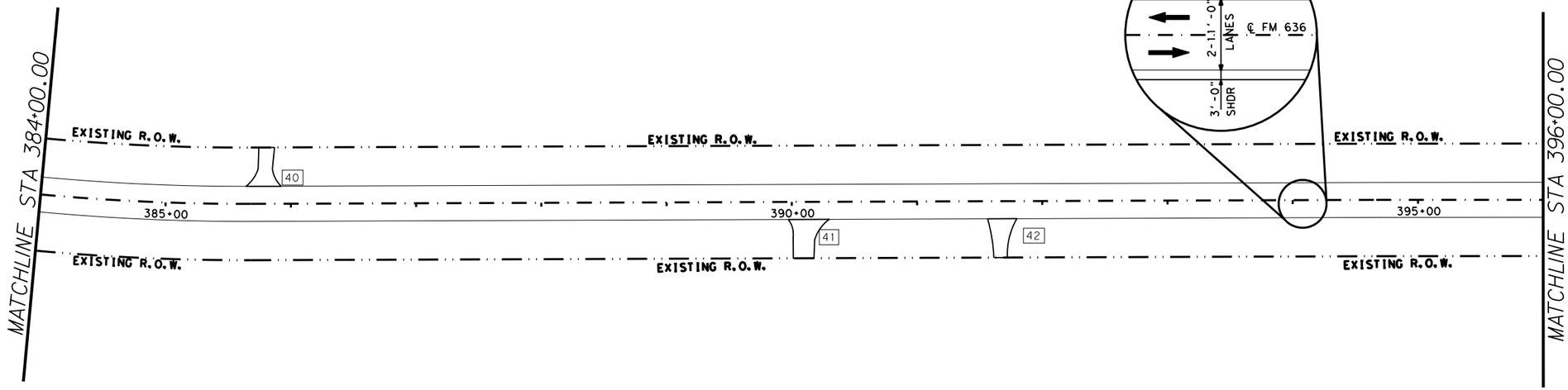

0 50 100
FEET

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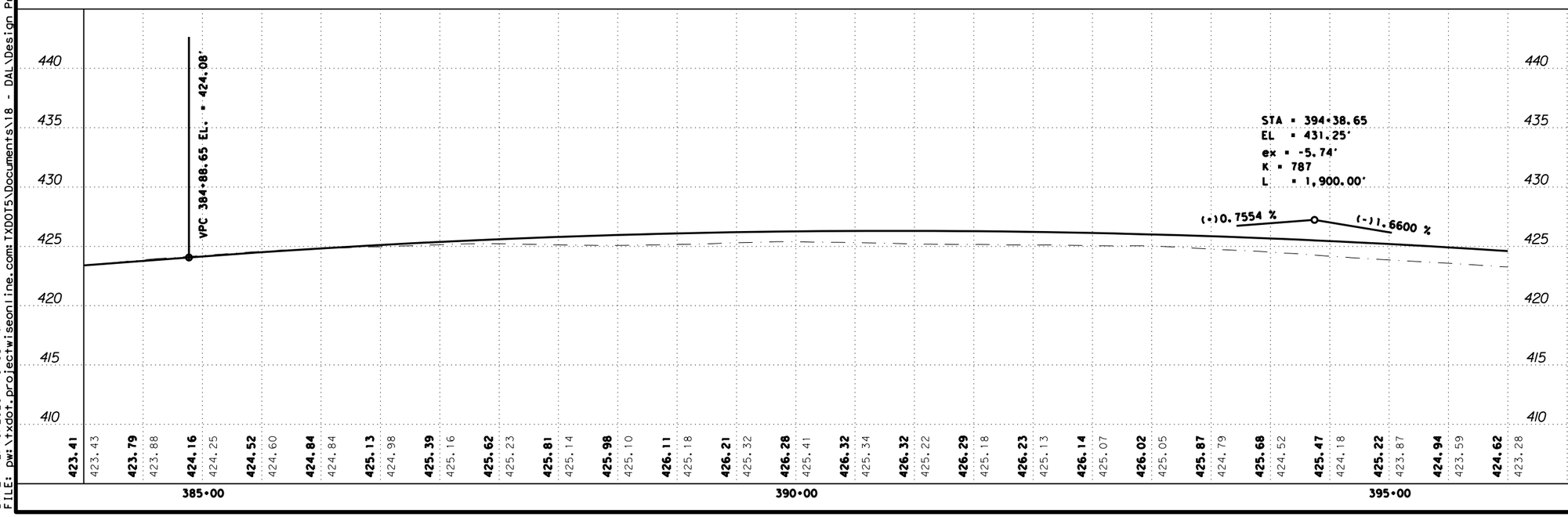
NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 33 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		110

DATE: 12/10/2020 10:05 PM
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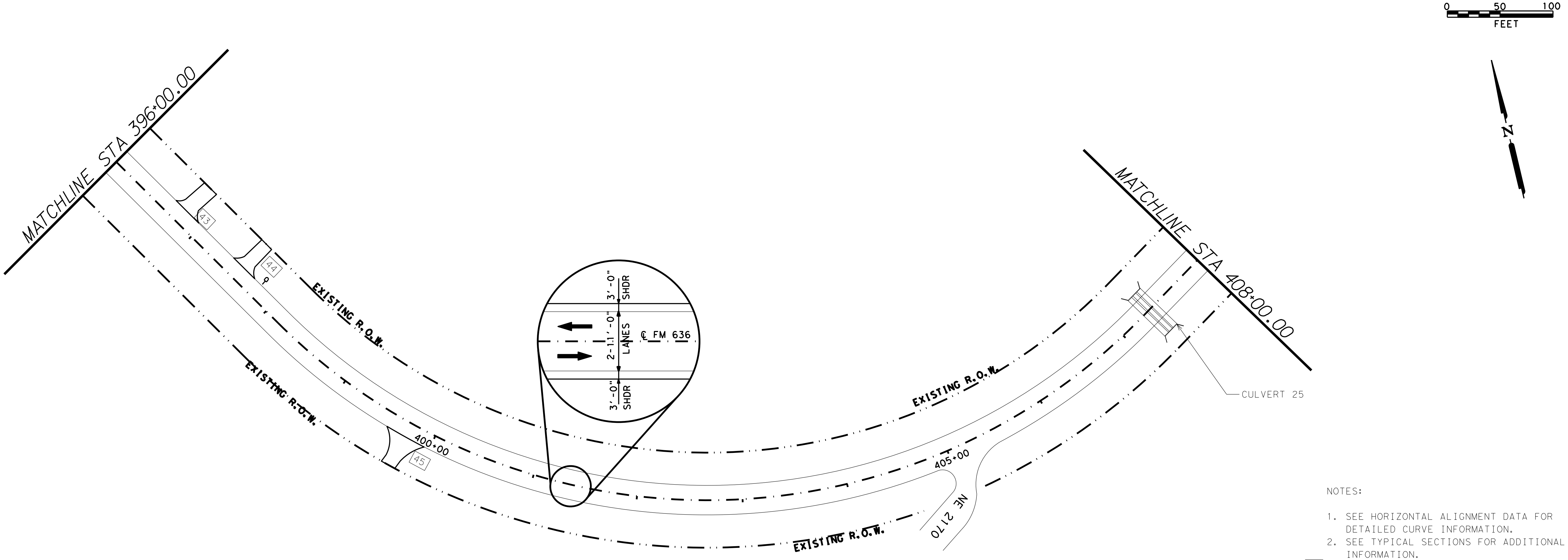
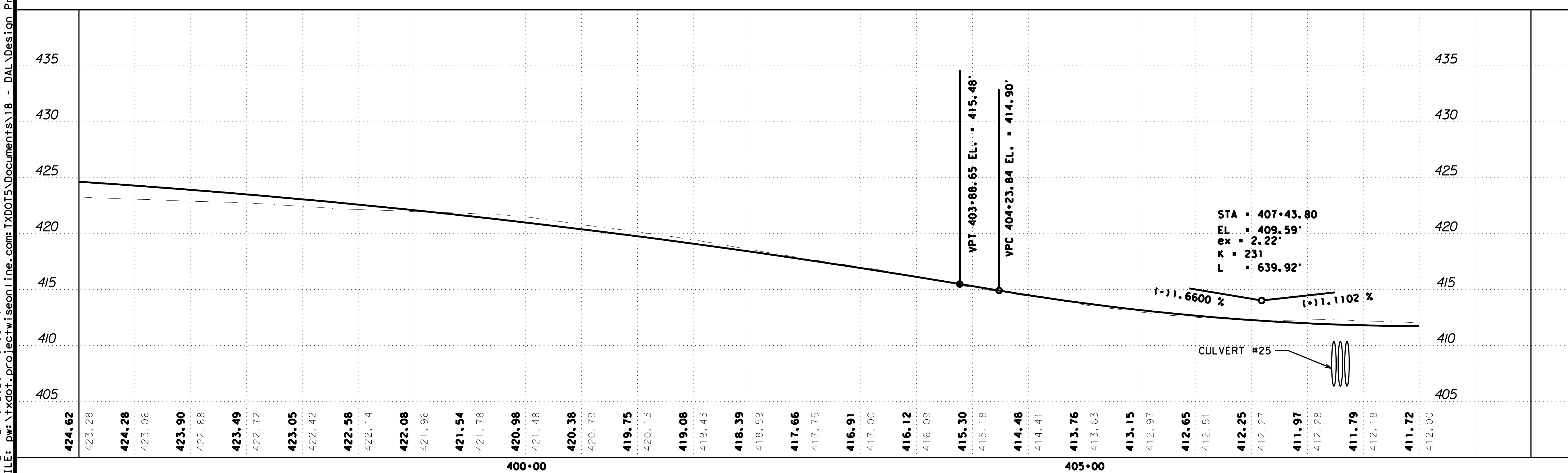


NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

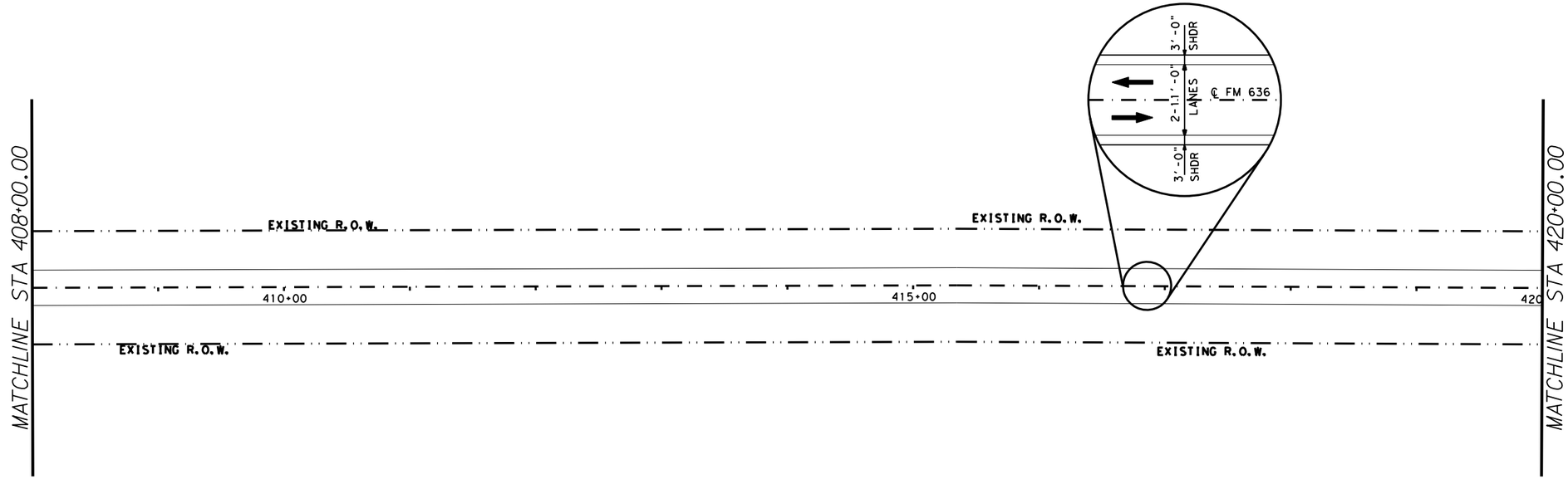
HORZ SCALE: 1"=100'
VERT SCALE: 1"=10'

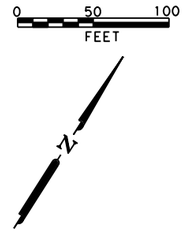
SHEET 34 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST		COUNTY	SHEET NO.
DAL		NAVARRO	111

DATE: 12/10/2020 10:08 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile34.dgn

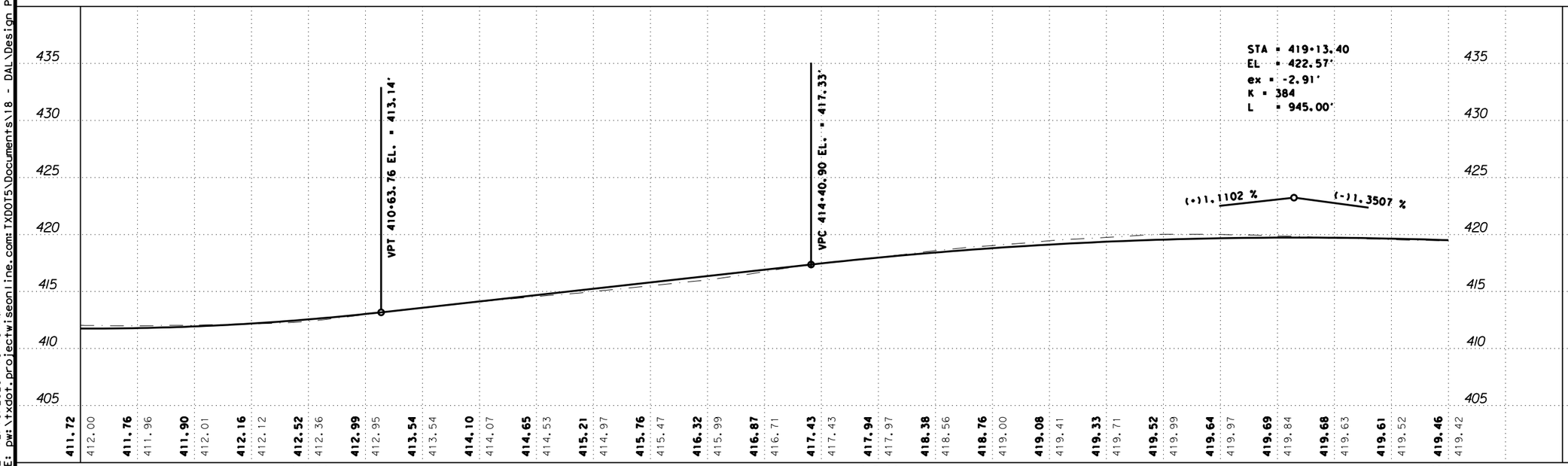




NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

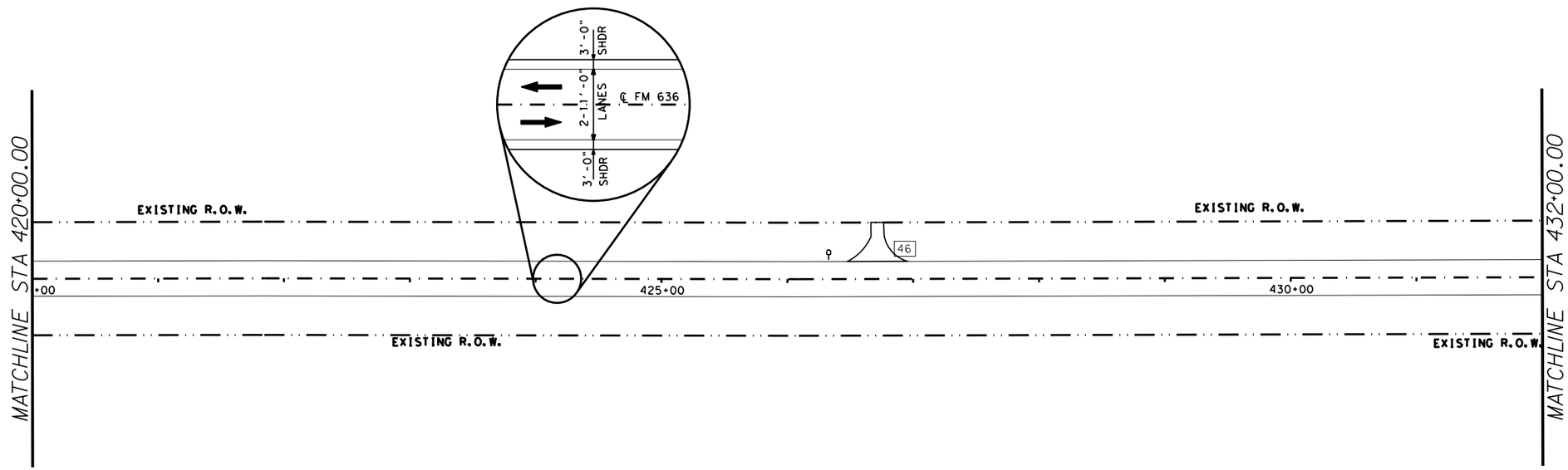
HORZ SCALE: 1"=100'
VERT SCALE: 1"=10'

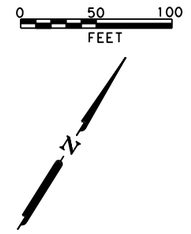
SHEET 35 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		112

DATE: 12/10/2020 10:10 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile35.dgn

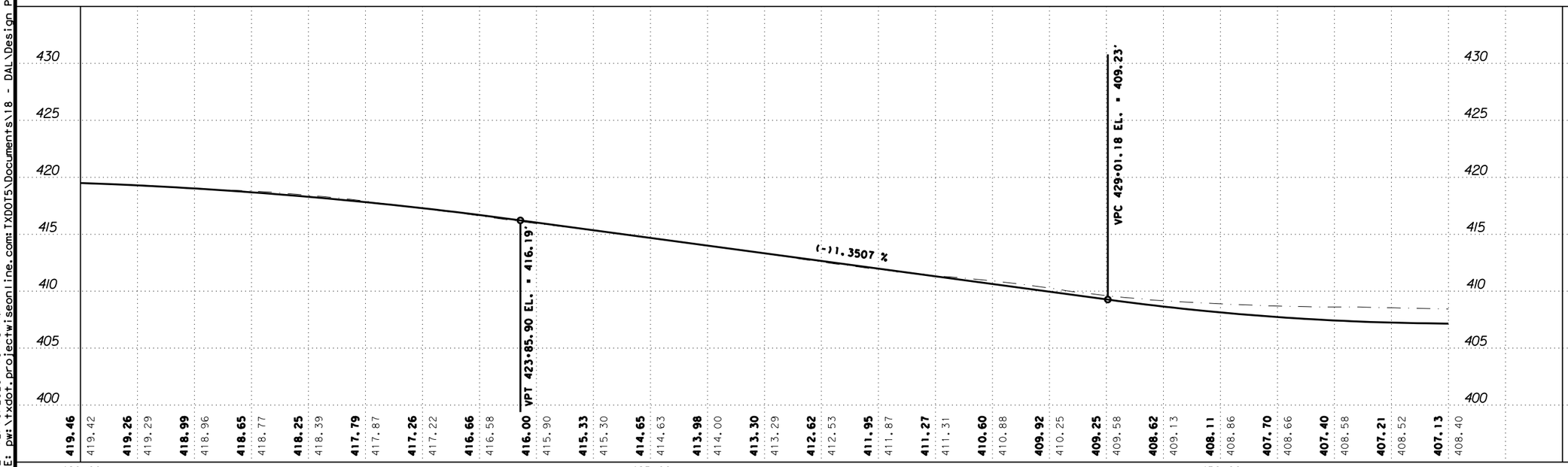




NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

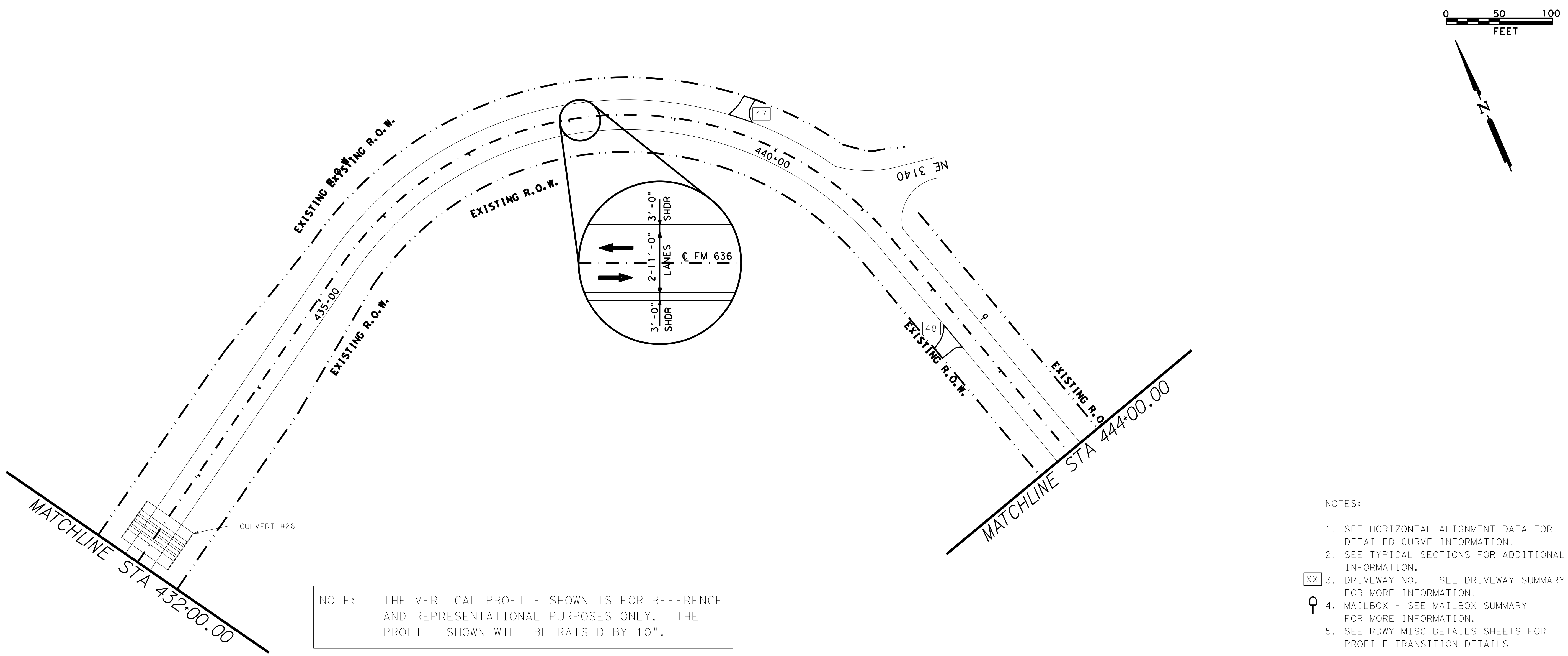
HORZ SCALE: 1"=100'
VERT SCALE: 1"=10'

SHEET 36 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		113

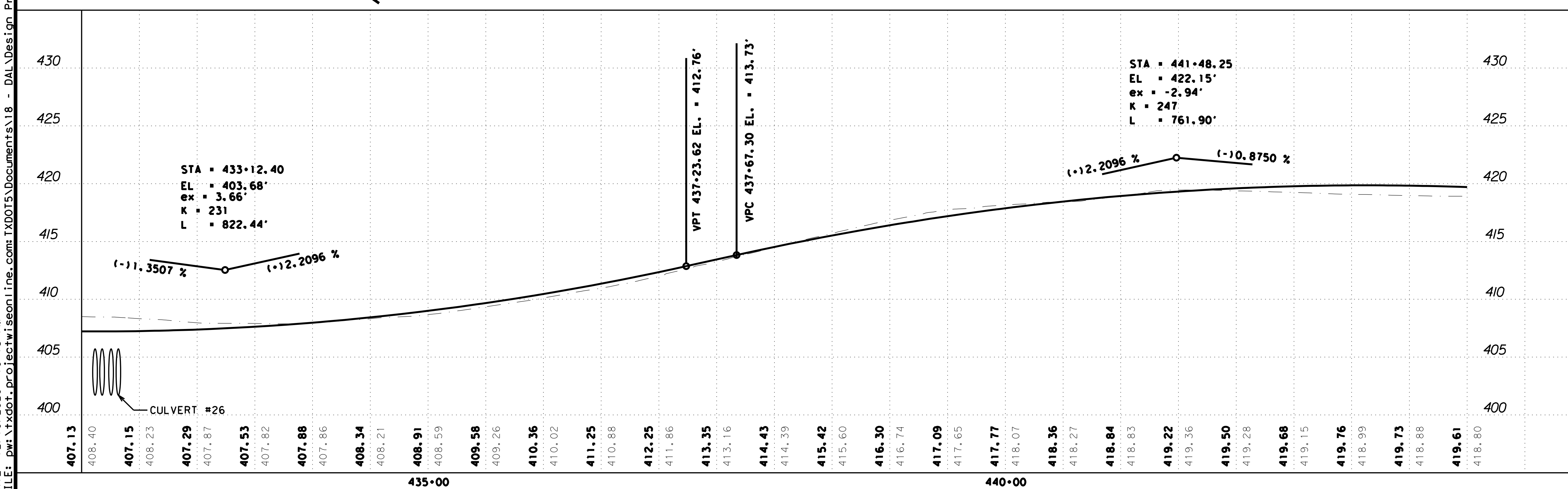
DATE: 12/10/2020 10:13 PM
FILE: pw:\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574021\4 - Design\Plan Set\3. Roadway\Plan Profile\Plan_Profile36.dgn



NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. XX DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 37 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST		COUNTY	SHEET NO.
DAL		NAVARRO	114

DATE: 12/10/2020 10:15 PM
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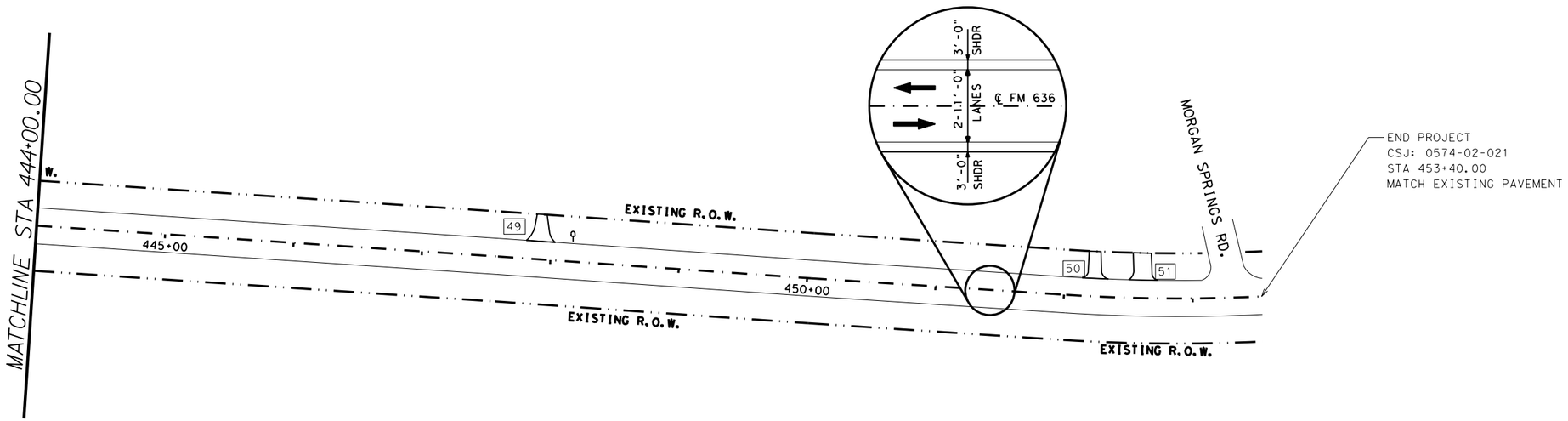


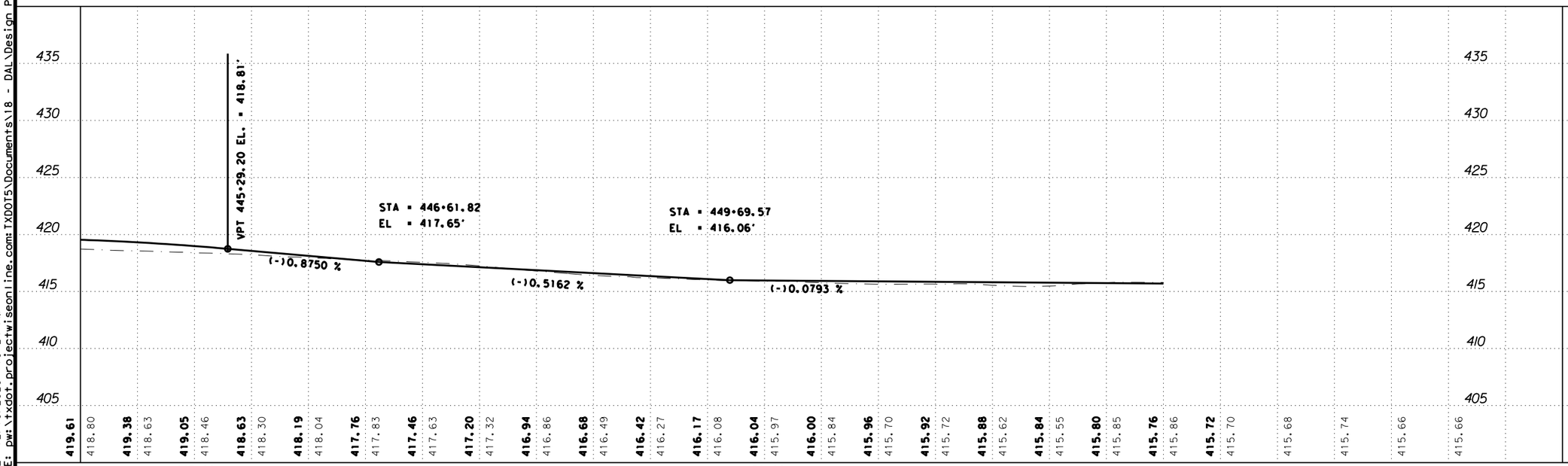
0 50 100
FEET

N

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA FOR DETAILED CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.
3. [XX] DRIVEWAY NO. - SEE DRIVEWAY SUMMARY FOR MORE INFORMATION.
4. MAILBOX - SEE MAILBOX SUMMARY FOR MORE INFORMATION.
5. SEE RDWY MISC DETAILS SHEETS FOR PROFILE TRANSITION DETAILS

NOTE: THE VERTICAL PROFILE SHOWN IS FOR REFERENCE AND REPRESENTATIONAL PURPOSES ONLY. THE PROFILE SHOWN WILL BE RAISED BY 10".



STATE OF TEXAS
AMANDA MCKITTRICK
129352
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PLAN & PROFILE

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

SHEET 38 OF 38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		115

DATE: 12/10/2020 10:24 PM
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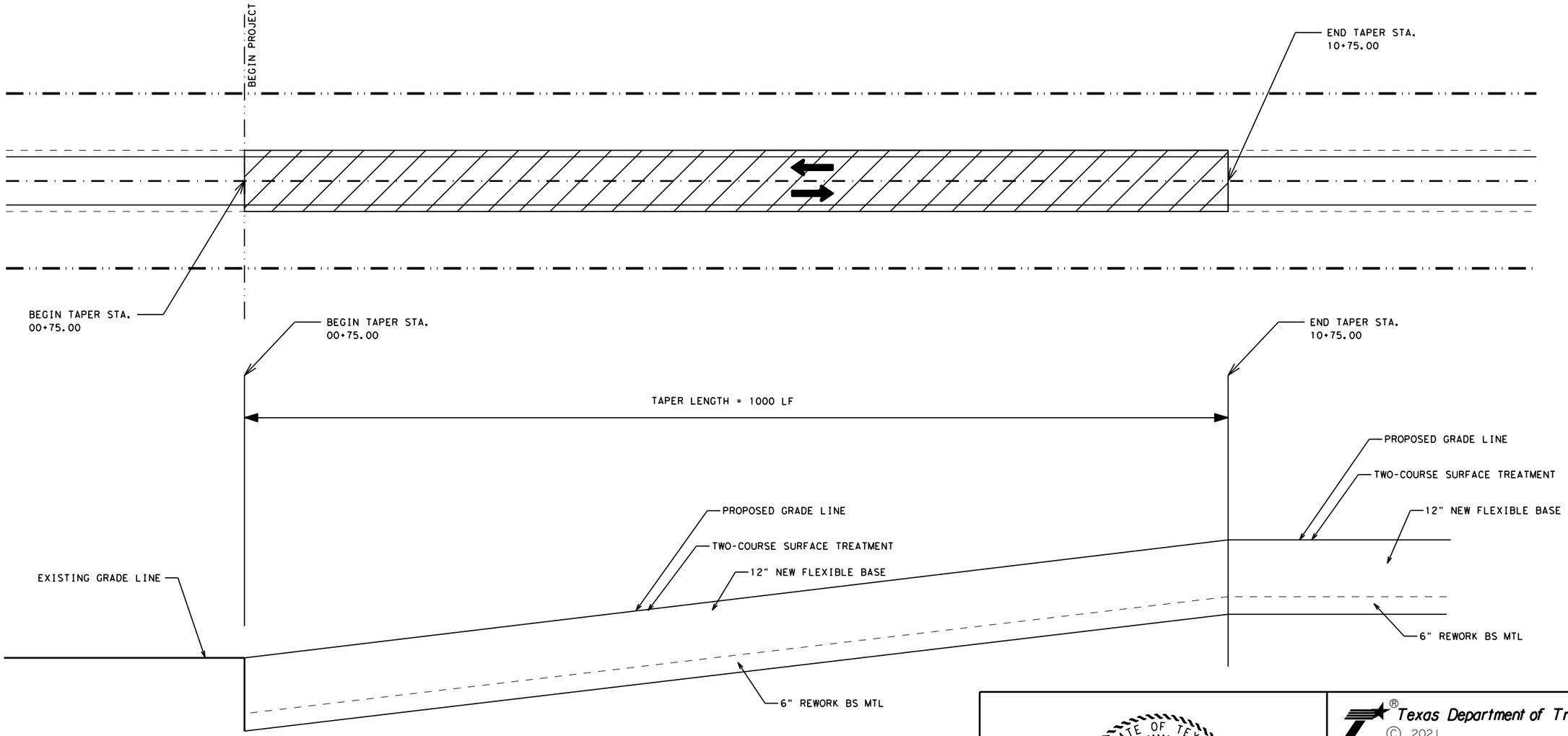
CK: DW: CK: CK:

TRANSITION DETAIL



NOTE

REMOVAL OF EXISTING SUBGRADE SHALL BE PAID FOR UNDER ITEM 110

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E., P.E. 1/7/2021
Signature of Registrant & Date

Texas Department of Transportation

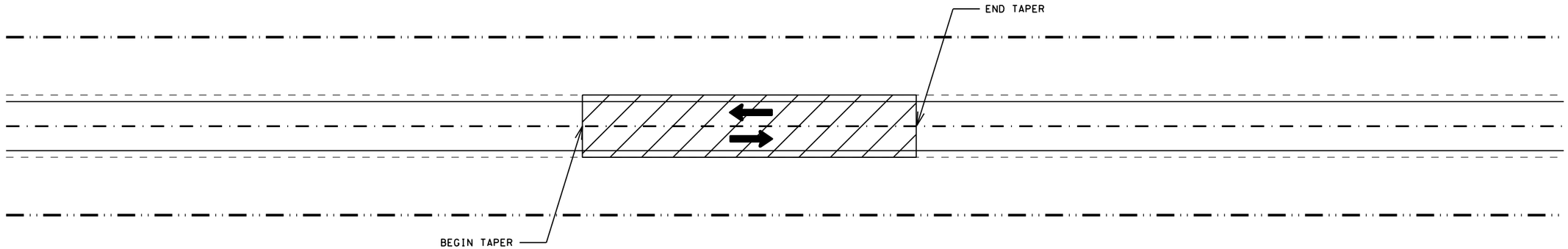
FM 636
ROADWAY
MISCELLANEOUS DETAILS

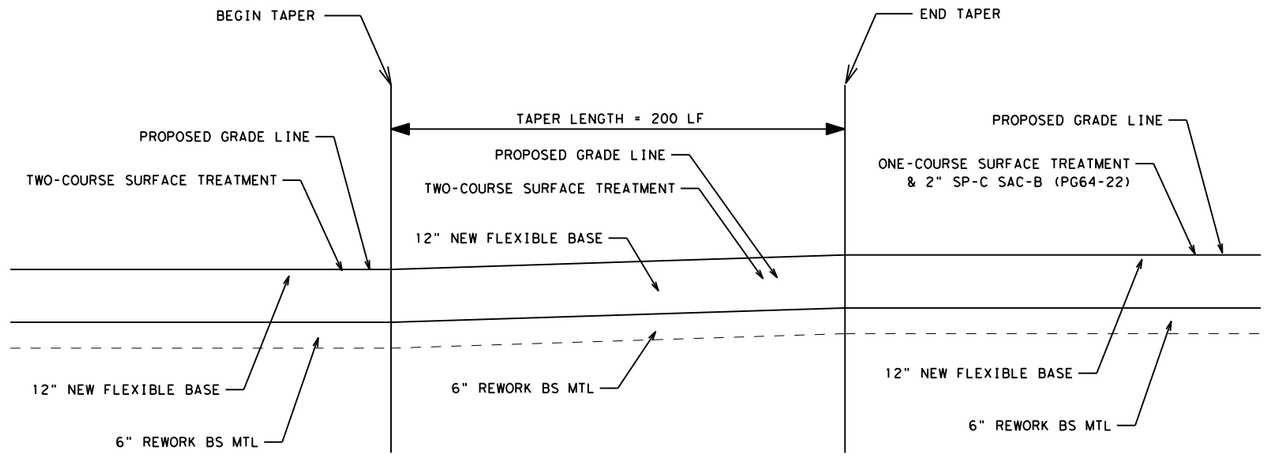
N.T.S.

SHEET 1 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	116
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

TRANSITION DETAIL





BEGIN TAPER	END TAPER
STA. 60+97.00	STA. 62+97.00
STA. 147+57.00	STA. 149+57.00
STA. 396+16.00	STA. 398+16.00
STA. 433+40.00	STA. 435+40.00

NOTE

REMOVAL OF EXISTING SUBGRADE SHALL BE PAID FOR UNDER ITEM 110

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E. P.E. 1/7/2021
Signature of Registrant & Date

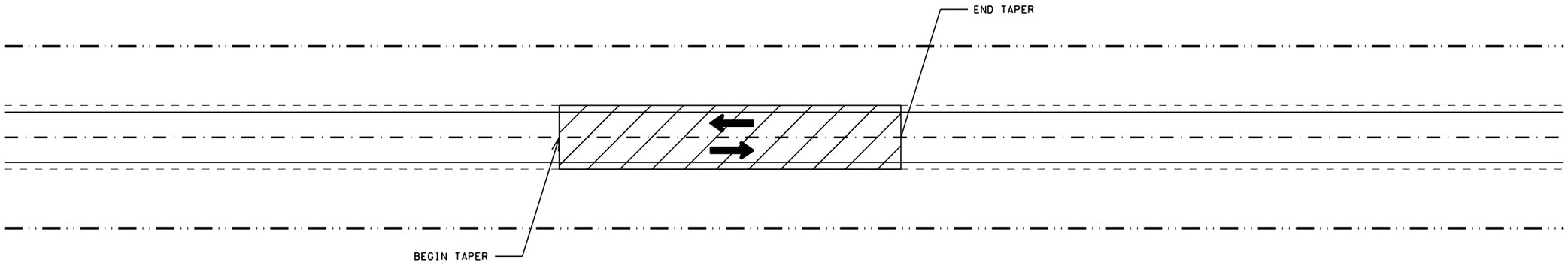
Texas Department of Transportation

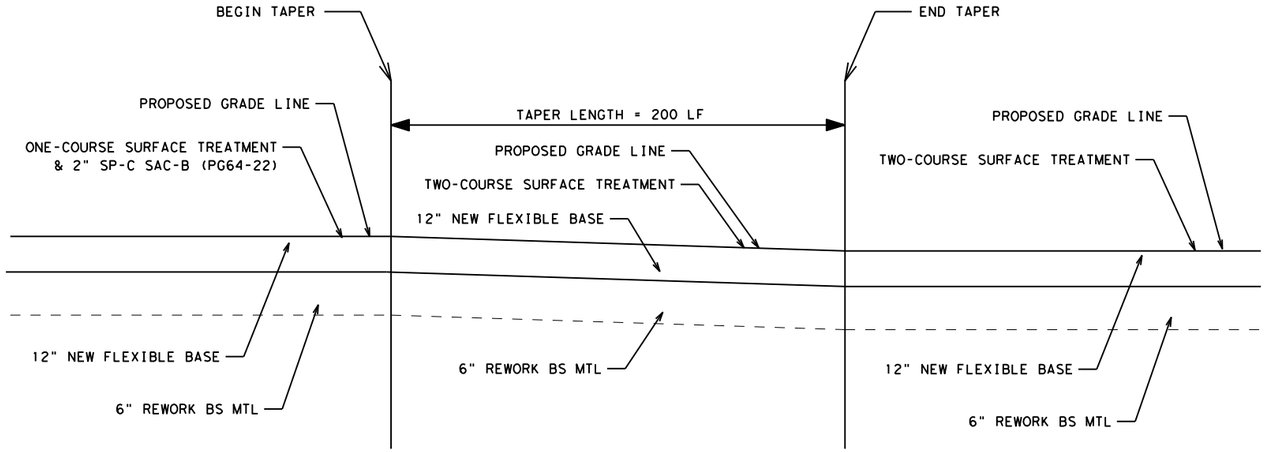
FM 636
ROADWAY
MISCELLANEOUS DETAILS

SHEET 2 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	117
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

TRANSITION DETAIL





END TAPER	END TAPER
STA. 79+01.00	STA. 81+01.00
STA. 154+01.00	STA. 156+01.00
STA. 407+27.00	STA. 409+27.00

NOTE

REMOVAL OF EXISTING SUBGRADE SHALL BE PAID FOR UNDER ITEM 110

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E. P.E. 1/7/2021
Signature of Registrant & Date

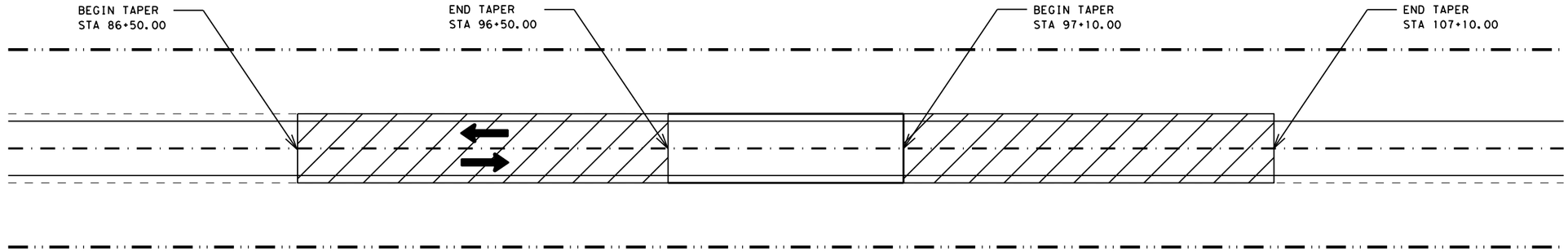
Texas Department of Transportation

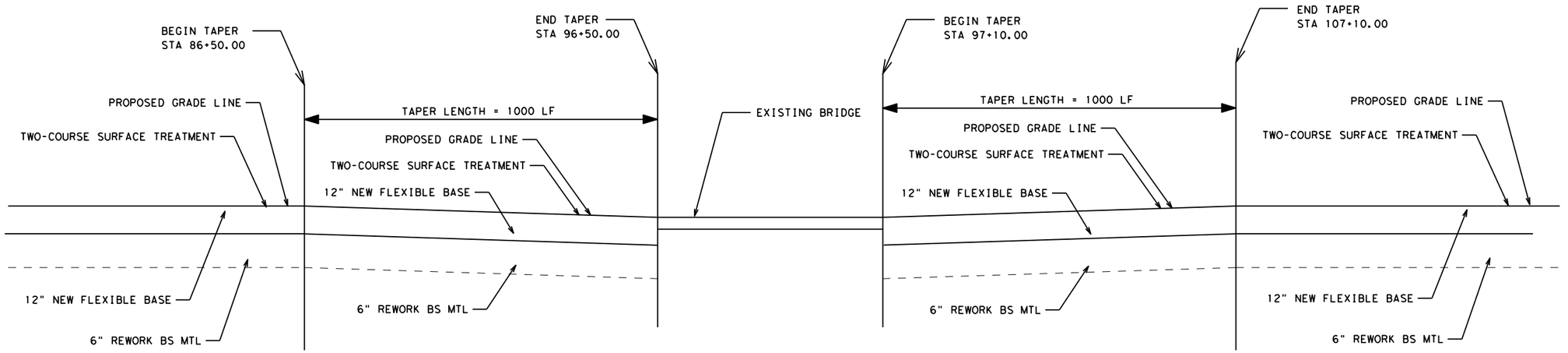
FM 636
ROADWAY
MISCELLANEOUS DETAILS

SHEET 3 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	118
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

BRIDGE TRANSITION DETAIL





NOTE

REMOVAL OF EXISTING SUBGRADE SHALL BE PAID FOR UNDER ITEM 110

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

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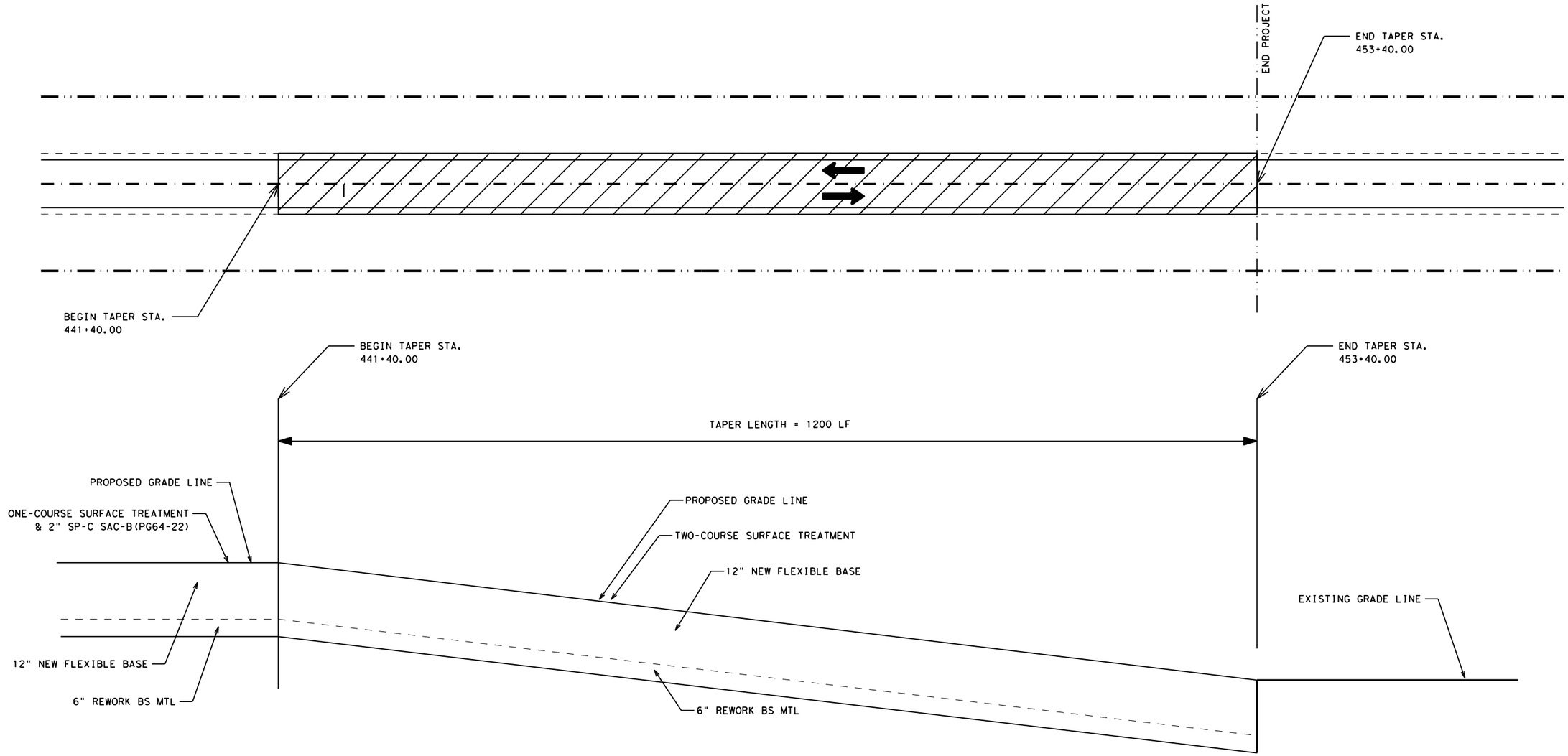
Texas Department of Transportation

FM 636
ROADWAY
MISCELLANEOUS DETAILS

SHEET 4 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	119
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

TRANSITION DETAIL



NOTE

REMOVAL OF EXISTING SUBGRADE SHALL BE PAID FOR UNDER ITEM 110

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FM 636
ROADWAY
MISCELLANEOUS DETAILS

N. T. S.

SHEET 5 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	120
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:7:23:04 AM
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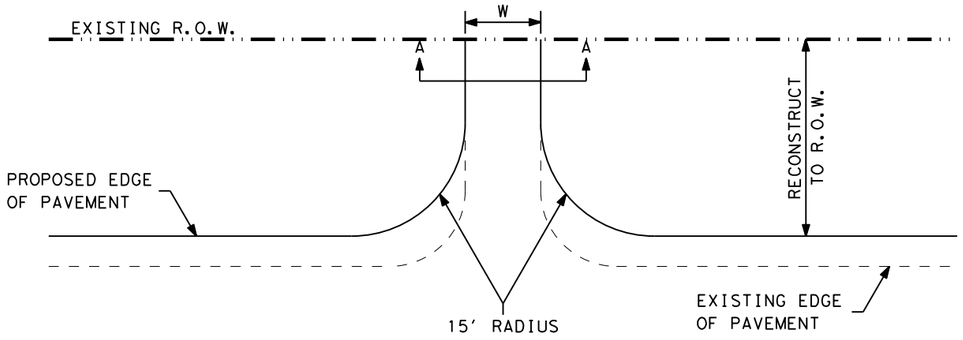
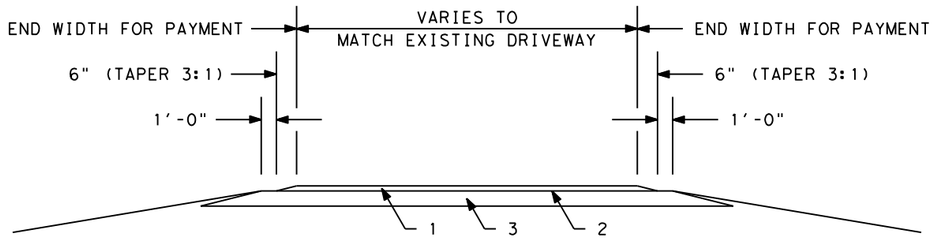
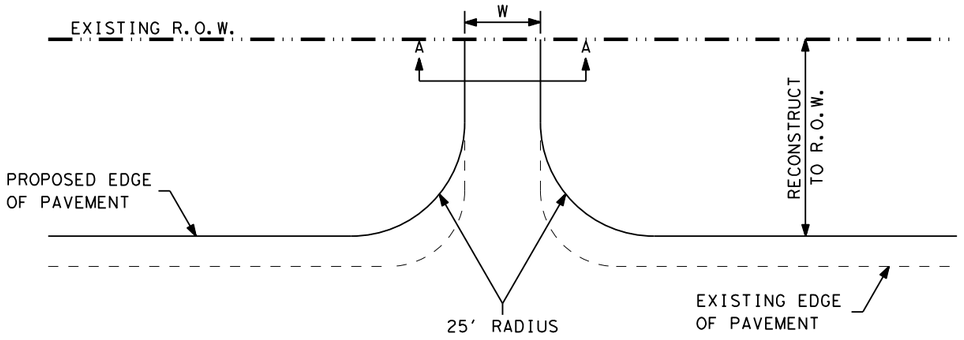
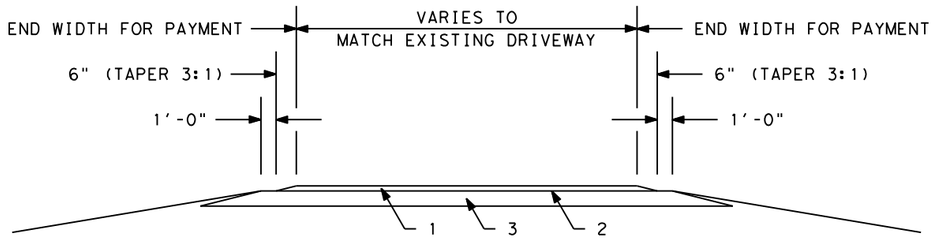




1. 2" SP-C SAC-B (PG 64-22) OR SURFACE TREAT (MINIMUM DEPTH)
2. PRIME COAT (MC-30)
3. 6" NEW FLEXIBLE BASE TY D GR 1-2

ASPHALT DRIVEWAYS (PRIVATE)
SECTION A-A
NTS

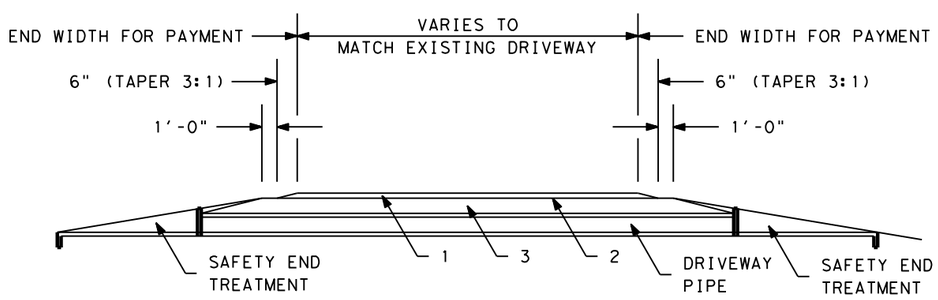


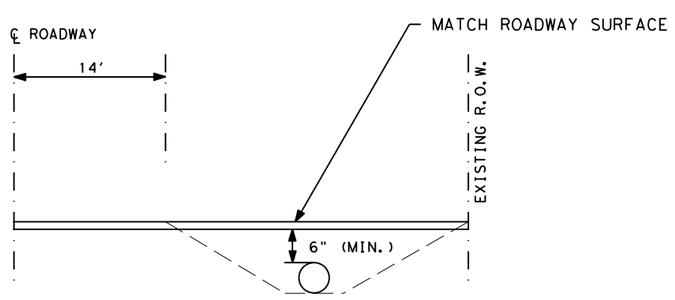


1. 2" SP-C SAC-B (PG 64-22) OR SURFACE TREAT (MINIMUM DEPTH)
2. PRIME COAT (MC-30)
3. 6" NEW FLEXIBLE BASE TY D GR 1-2

ASPHALT STREET OR CO. ROAD
SECTION A-A
NTS

1/7/2021





CROSS SECTION DRIVEWAY WITH PIPES
FOR PIPE AND END TREATMENT QUANTITY SEE SUMMARY SHEETS

NOTE:

MATERIALS FURNISHED FOR THE PLACEMENT OF DRIVEWAYS WILL BE SUBSIDIARY TO ITEM 530.

"W" = WIDTH FOR PAYMENT
FOR INFORMATION REGARDING THE EXISTING DRIVEWAYS REFER TO THE EXISTING DRIVEWAY DATA SHEETS

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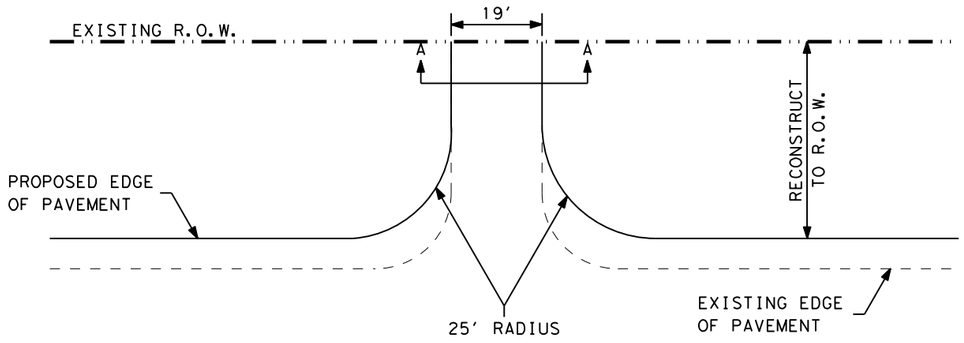
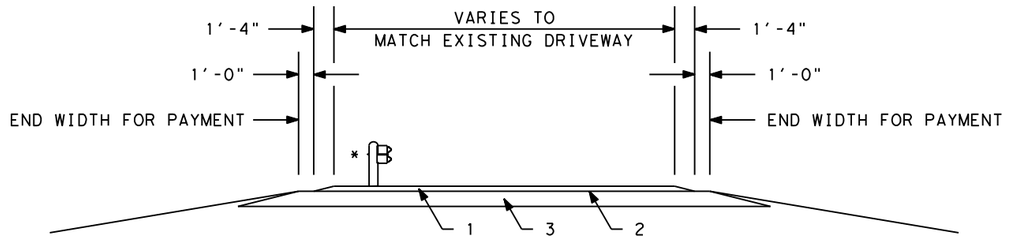
DRIVEWAY DETAILS

SCALE: NTS

SHEET 1 OF 2

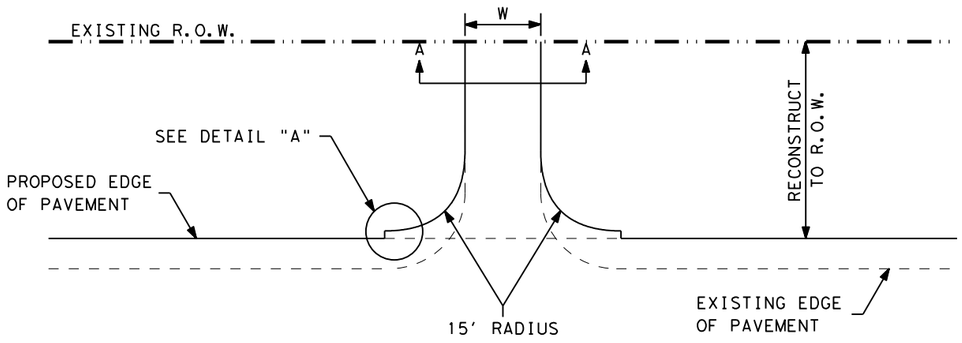
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	121
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

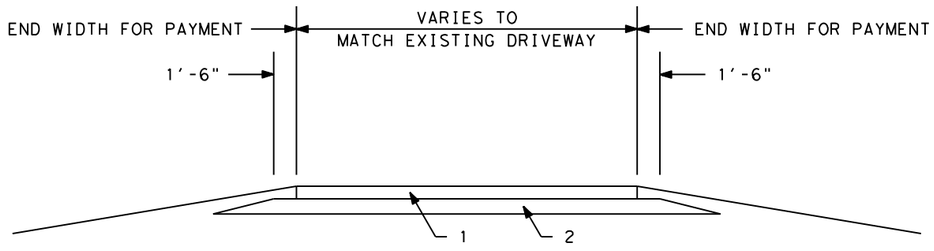




1. 2" SP-C SAC-B (PG 64-22) OR SURFACE TREAT(MINIMUM DEPTH)
2. PRIME COAT (MC-30)
3. 6" NEW FLEXIBLE BASE TY D GR 1-2

AT INTERSECTIONS W/MBGF
SECTION A-A
NTS





1. 6" HES CONCRETE SURFACE
2. 6" NEW FLEXIBLE BASE TY D GR 1-2

CONCRETE DRIVEWAYS (PRIVATE)
SECTION A-A
NTS

GENERAL DRIVEWAY REQUIREMENTS

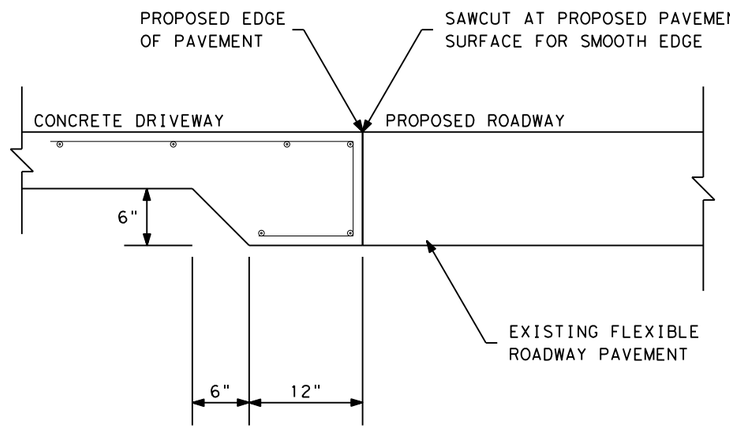
1. AN EXPANSION JOINT SHALL BE LOCATED AT THE R.O.W. LINE ON CONCRETE DRIVEWAYS.
2. REINFORCING FOR CONCRETE DRIVES SHALL CONSIST OF #3 BARS AT 12" C-C OR #4 BARS AT 18" C-C.
3. MINIMUM PAVING WIDTH "W" IS 10 LF.
4. REFER TO DETAIL "A" FOR PAVEMENT TIE-IN DETAILS.

NOTE:

MATERIALS FURNISHED FOR THE PLACEMENT OF DRIVEWAYS WILL BE SUBSIDIARY TO ITEM 530.

"W" = WIDTH FOR PAYMENT
FOR INFORMATION REGARDING THE EXISTING DRIVEWAYS REFER TO THE EXISTING DRIVEWAY DATA SHEETS

* - THE ADDITIONAL WIDTH OF CROWN BEHIND THE MBGF WILL BE MAINTAINED BEHIND THE END TREATMENT.



DETAIL "A"

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E. 1/7/2021
Signature of Registrant & Date

Texas Department of Transportation

DRIVEWAY DETAILS

SCALE: NTS SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	122
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

EXISTING ROADWAY INVESTIGATION
Texas Department of Transportation
FM 636, from FM 1129 to Morgan Springs Rd., Navarro County
CSJ: 0574-02-021

Boring No.	Coordinates		Offset	Total Pavement Thickness (inches)	Layer Profile (inches)	Layer Description
	Latitude	Longitude				
B-1	32.21340	-96.36698	EB Lane	21.00	0.0 - 3.0	Aspalt
					3.0 - 21.0	Base
					21.0 - 36.0	Clay, soft to stiff, light brown and light gray (CH)
B-2	32.21702	-96.35999	WB Lane	23.00	0.0 - 3.0	Aspalt
					3.0 - 23.0	Base
					23.0 - 36.0	Clay, stiff to hard, moist, brownish yellow and light gray (CH)
B-3	32.22084	-96.35241	EB Lane	10.25	0.0 - 0.25	Aspalt
					0.25 - 10.25	Base
					10.25 - 36.0	Clay, stiff, moist, dark gray (CH)
B-4	32.22607	-96.34927	WB Lane	15.50	0.0 - 6.0	Asphalt
					6.0 - 15.5	Base
					15.5 - 36.0	Clay, stiff, moist, dark gray (CH)
B-5	32.22977	-96.34167	WB Lane	17.00	0.0 - 1.0	Asphalt
					1.0 - 17.0	Base
					17.0 - 36.0	Clay, very stiff to hard, moist, dark gray (CH)
B-6	32.23334	-96.33421	WB Lane	16.00	0.0 - 6.5	Asphalt
					6.5 - 16.0	Base
					16.0 - 36.0	Clay, stiff, moist, dark gray (CH)
B-7	32.23418	-96.32771	WB Lane	18.00	0.0 - 6.0	Asphalt
					6.0 - 12.0	Base
					12.0 - 36.0	Clay, stiff, moist, dark gray (CH)
B-8	32.22780	-96.32336	EB Lane	14.25	0.0 - 2.0	Asphalt
					2.0 - 14.25	Base
					14.25 - 36.0	Clay, soft to stiff, moist, dark gray (CH)
B-9	32.22251	-96.31791	EB Lane	18.00	0.0 - 3.0	Asphalt
					3.0 - 18.0	Base
					18.0 - 36.0	Clay, very stiff, moist, dark gray (CH)

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Texas Department of Transportation

FM 636

PAVEMENT CORE DATA

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	123
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

EXISTING ROADWAY INVESTIGATION
Texas Department of Transportation
FM 636, from FM 1129 to Morgan Springs Rd., Navarro County
CSJ: 0574-02-021

Boring No.	Coordinates		Offset	Total Pavement Thickness (inches)	Layer Profile (inches)	Layer Description
	Latitude	Longitude				
B-10	32.21591	-96.31324	WB Lane	22.00	0.0 - 8.0	Asphalt
					8.0 - 22.0	Base
					22.0 - 36.0	Clay, stiff, moist, dark gray (CH)
B-11	32.21012	-96.30910	EB Lane	10.50	0.0 - 1.0	Asphalt
					1.0 - 10.5	Base
					10.5 - 36.0	Clay, stiff to very stiff, moist, dark gray (CL)
B-12	32.20514	-96.30246	WB Lane	12.50	0.0 - 0.5	Asphalt
					0.5 - 12.5	Base
					12.5 - 36.0	Clay, stiff, moist, dark gray (CL)
B-13	32.19893	-96.29832	EB Lane	12.00	0.0 - 1.0	Asphalt
					1.0 - 12.0	Base
					12.0 - 36.0	Clay, stiff to very stiff, moist, dark gray (CH)
B-14	32.19395	-96.29325	WB Lane	14.00	0.0 - 2.0	Asphalt
					2.0 - 14.0	Base
					14.0 - 36.0	Clay, stiff to hard, moist, brown (CH)
B-15	32.18785	-96.28854	EB Lane	13.00	0.0 - 1.0	Asphalt
					1.0 - 13.0	Base
					13.0 - 36.0	clay, stiff to very stiff, moist, dark gray (CL)
B-16	32.18148	-96.28453	WB Lane	12.00	0.0 - 1.0	Asphalt
					1.0 - 12.0	Base
					12.0 - 18.0	Sand, moist, dark brown, clayey (SC)
					18.0 - 36.0	Clay, hard, moist, dark brown (CL)
B-17	32.18223	-96.27807	EB Lane	14.00	0.0 - 0.5	Asphalt
					0.5 - 14.0	Base
					14.0 -36.0	Clay, very stiff, moist, dark gray (CL)
B-18	32.18175	-96.27161	WB Lane	15.00	0.0 - 1.0	Asphalt
					1.0 - 15.0	Base
					15.0 - 36.0	Clay, hard to stiff, moist, reddish brown and brown (CL)

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FM 636

PAVEMENT CORE DATA

SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	124
	0574	02	021	

DATE: 1/7/2021
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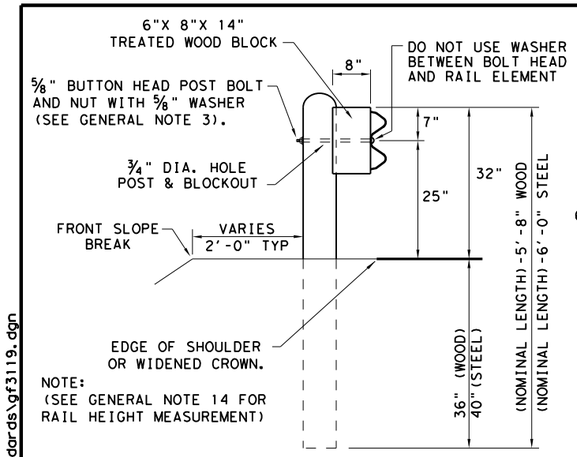
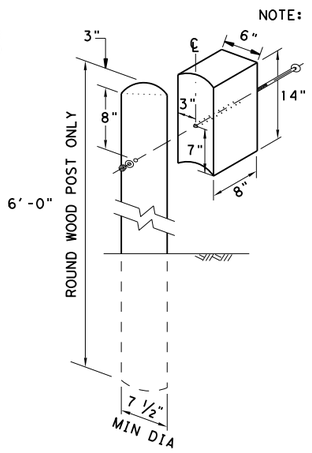
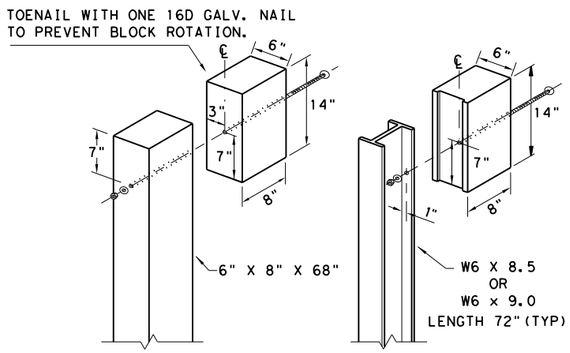


TYPICAL POST PLACEMENT



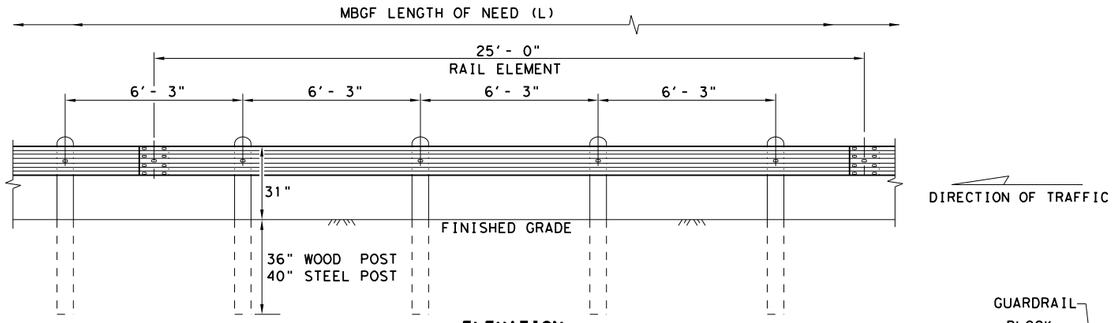
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

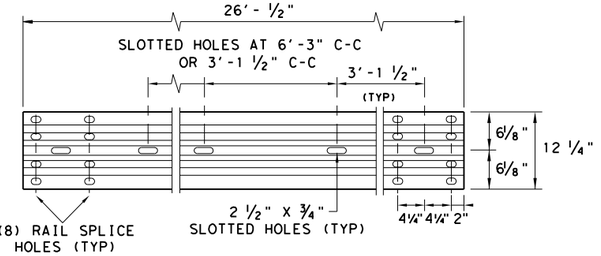
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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

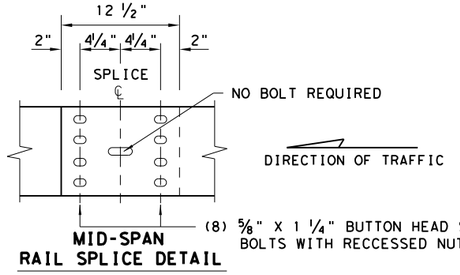
FBB01 = 1 ¼"
FBB02 = 2"

⅝"

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

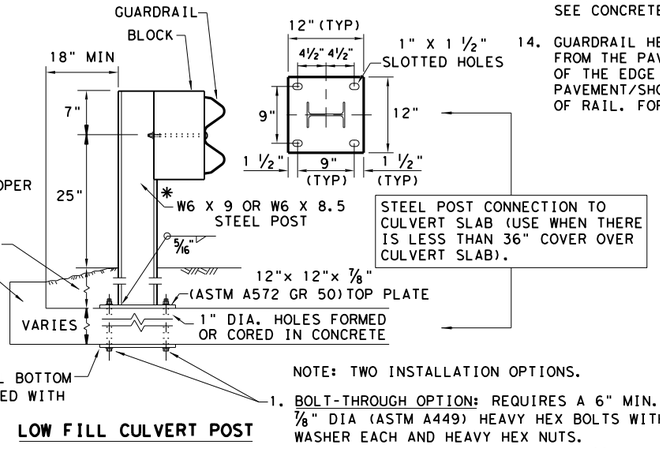
BUTTON HEAD BOLT

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.



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.

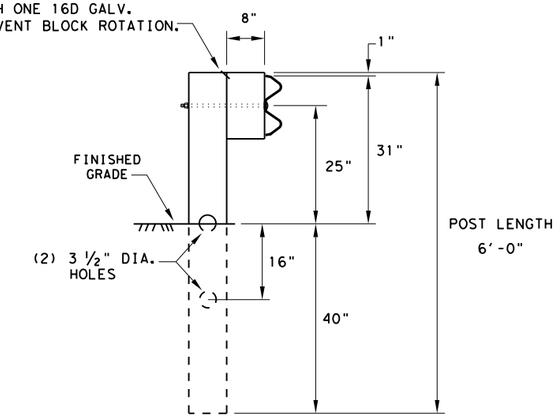
Texas Department of Transportation — Design Division Standard

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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		125

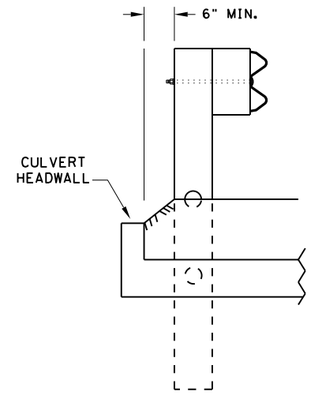
DATE: 1/7/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\Standards\gf31ls19.dgn

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

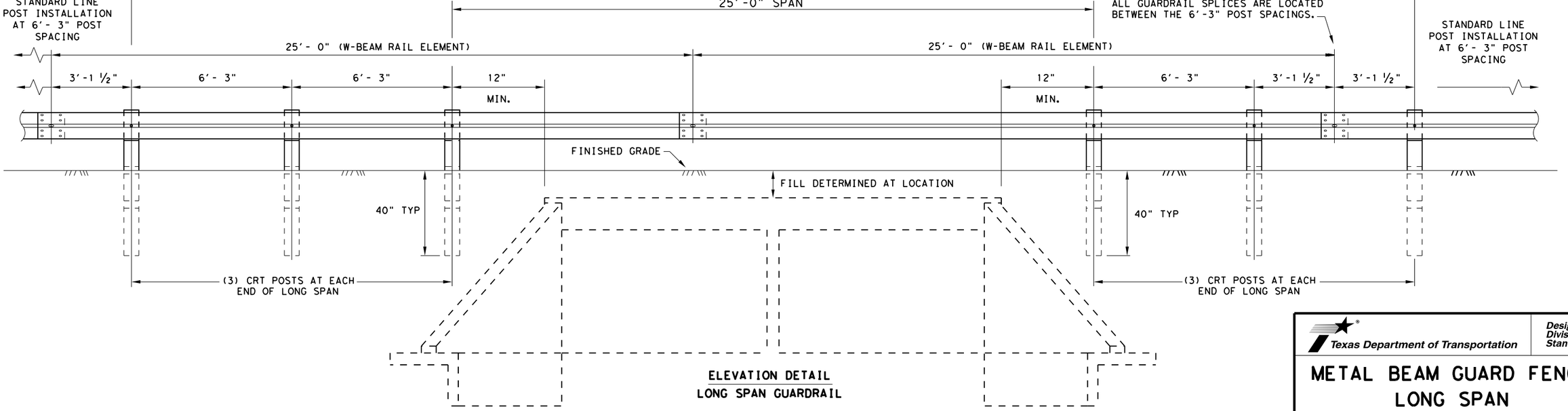
GENERAL NOTES

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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		126

DATE: 1/7/2021
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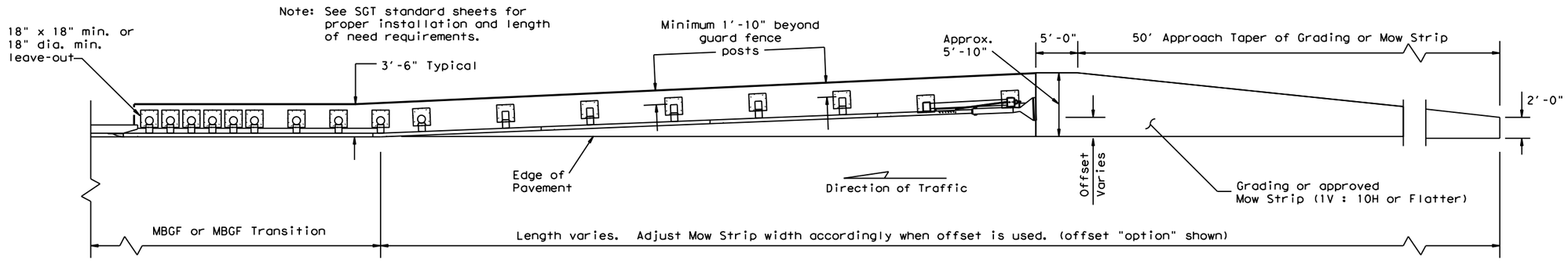
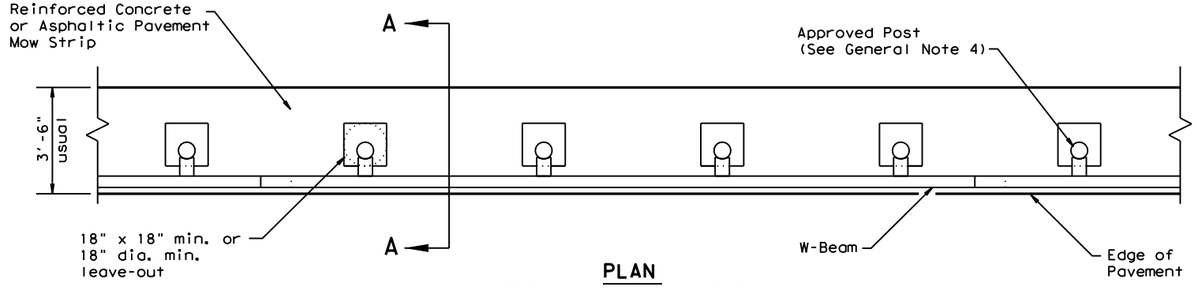


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



PLAN

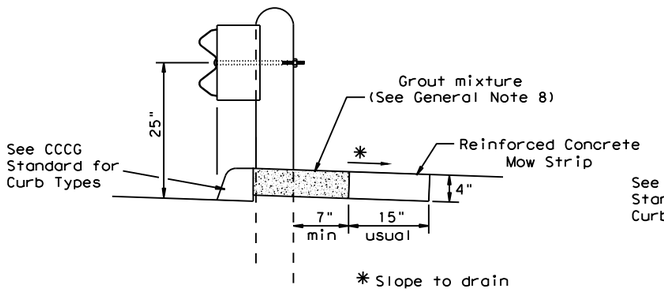
GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)

SECTION A-A

Typical

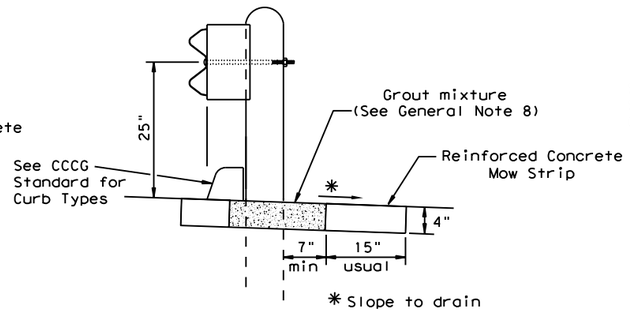
MOW STRIP DETAIL

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



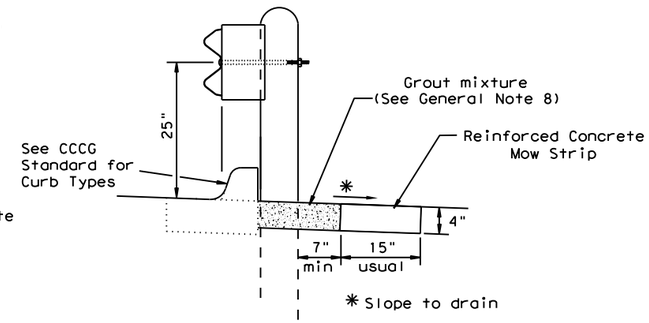
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

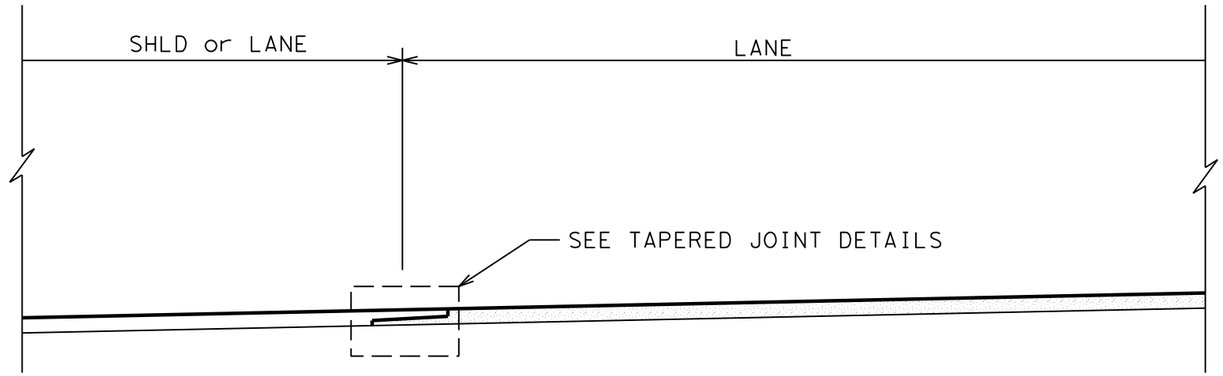
Texas Department of Transportation

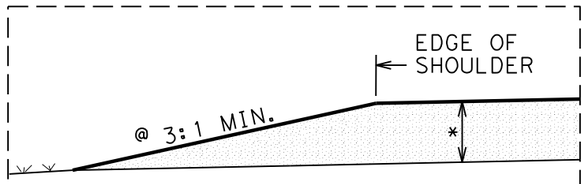
Design Division Standard

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

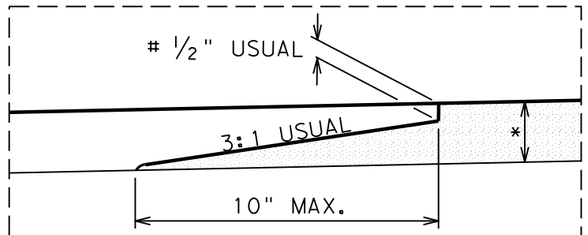
GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		127

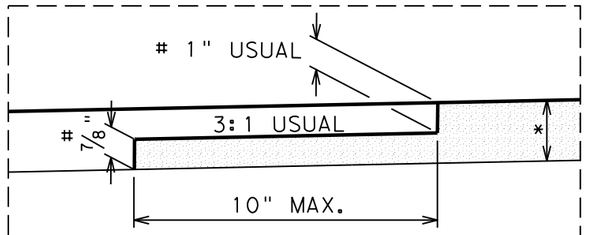




TAPERED OUTSIDE EDGE DETAIL



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.

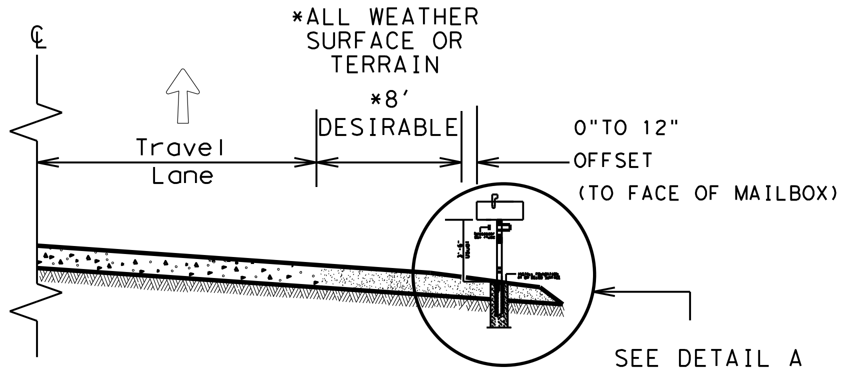
5. FULL PAVING OF ALL LANES AND SHOULDRS BY THE END OF EACH DAY PRODUCTION WILL NOT REQUIRE A TAPERED JOINT.

HOT MIX EDGE AND LONGITUDINAL JOINT DETAILS DALLAS DISTRICT STANDARD

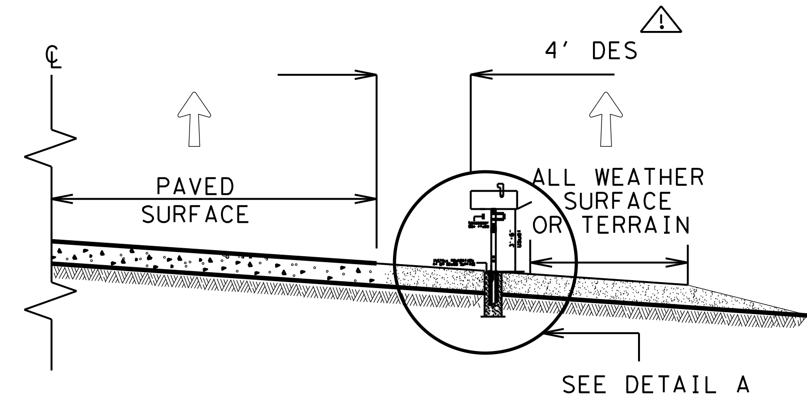
LJD(1-1)-07

FED. RD. DIV. NO.	PROJECT NUMBER		SHEET NUMBER
18	SEE TITLE SHEET		128
STATE	DISTRICT	COUNTY	
TEXAS	DAL	NAVARRO	
CONTROL	SECTION	JOB	HIGHWAY NUMBER
0574	02	021	FM 636

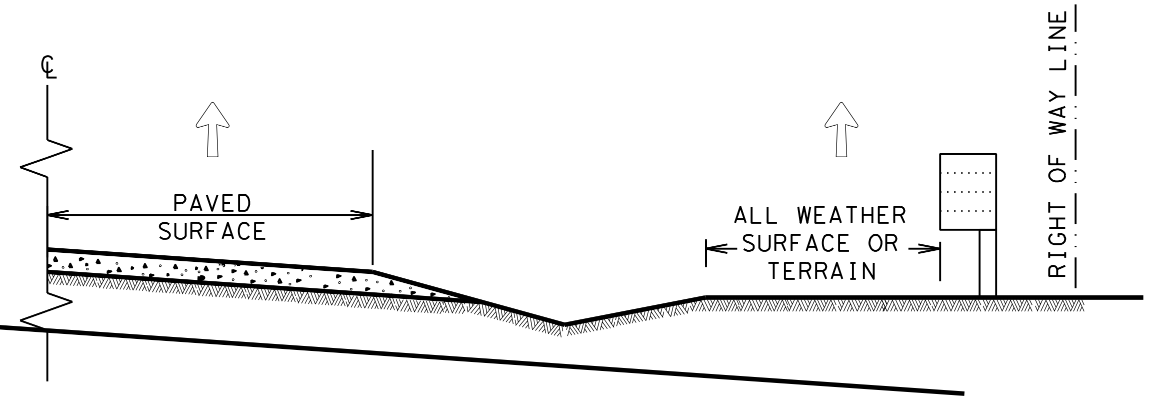
REVISED ON 9/10/08



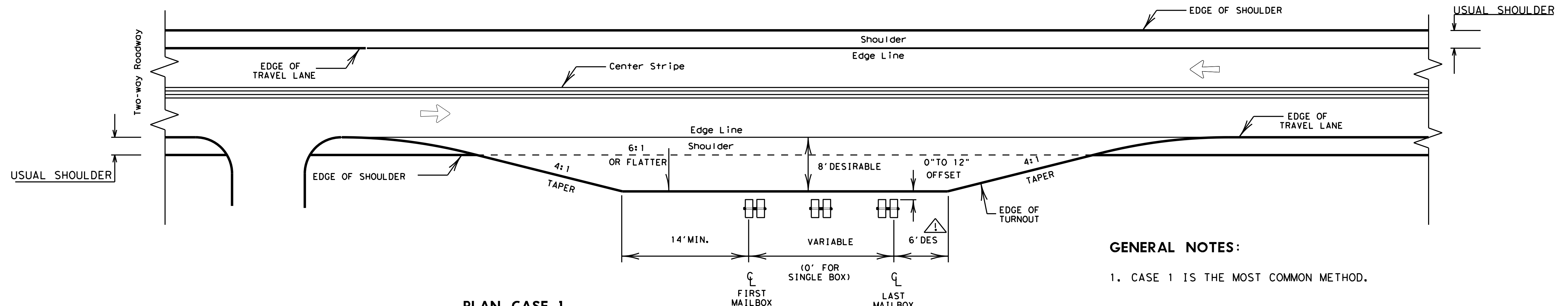
CASE 1. OFF TRAVEL WAY DELIVERY



CASE 2. BACK SIDE DELIVERY



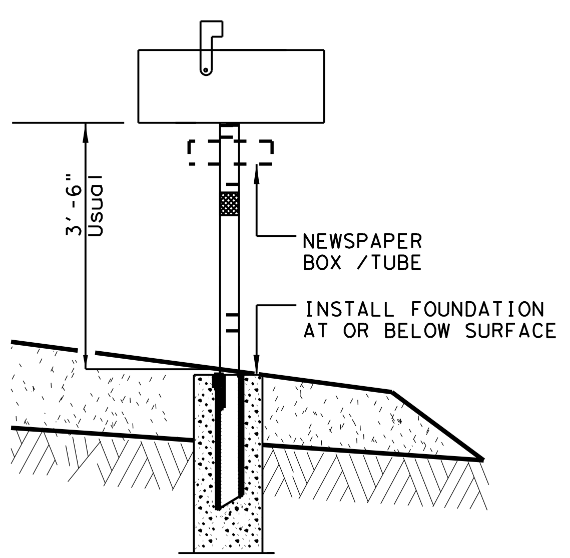
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



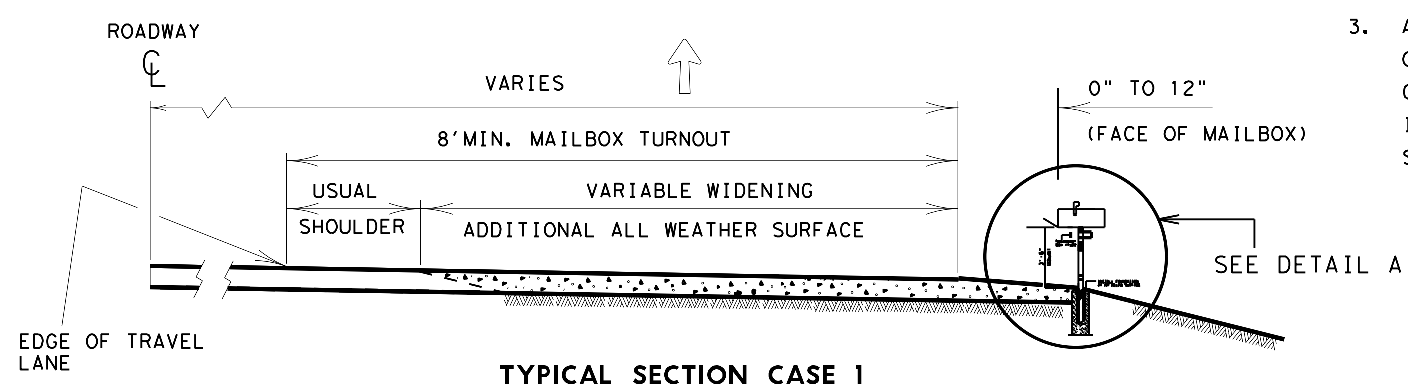
PLAN CASE 1

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.



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

SHEET 1 OF 3

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	0574	02	021	FM 636	
DECEMBER 2012-NEW TXDOT TITLE BLOCK	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		129	

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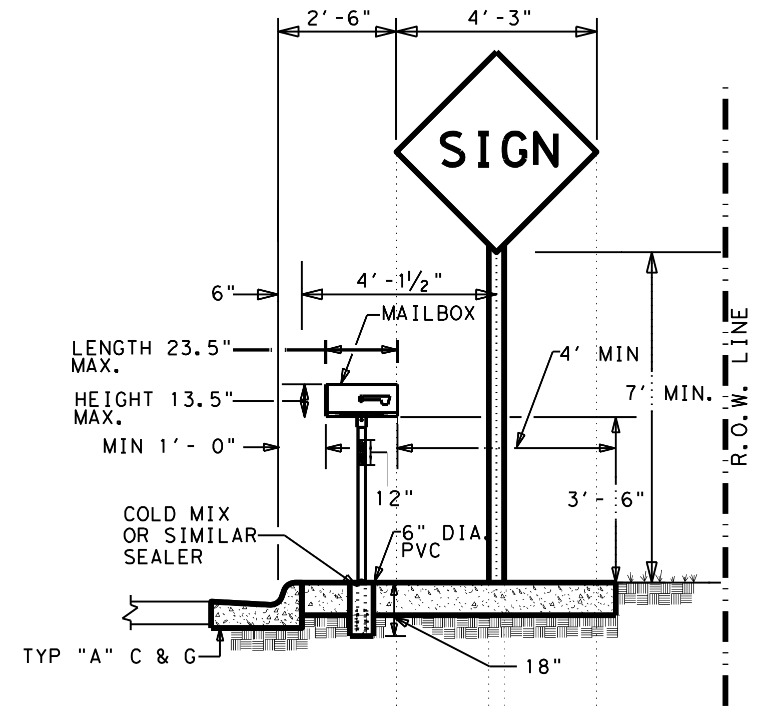
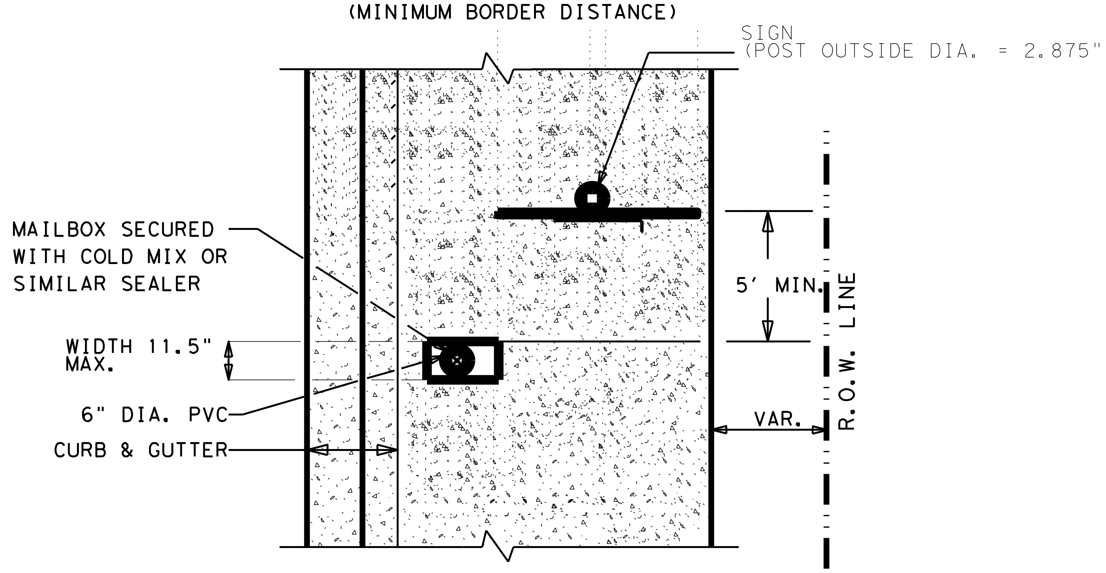
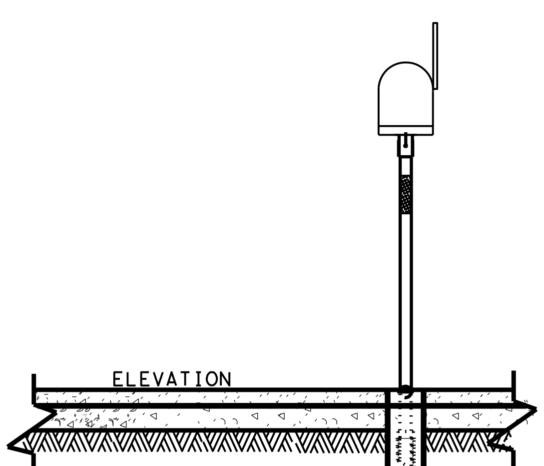
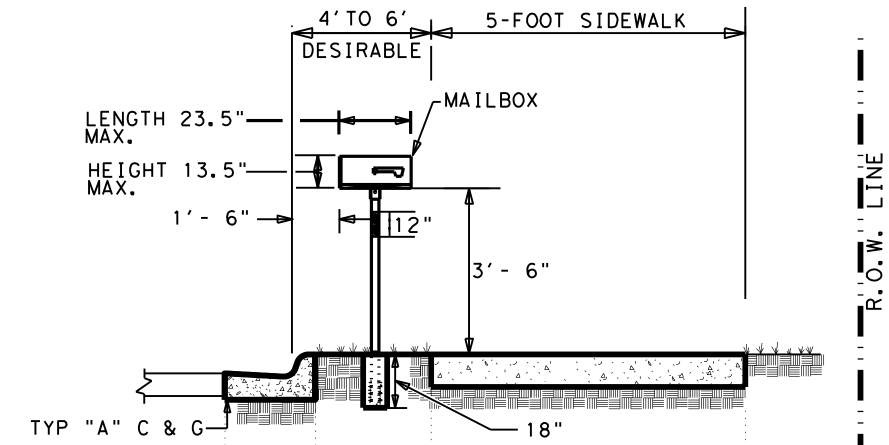


MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

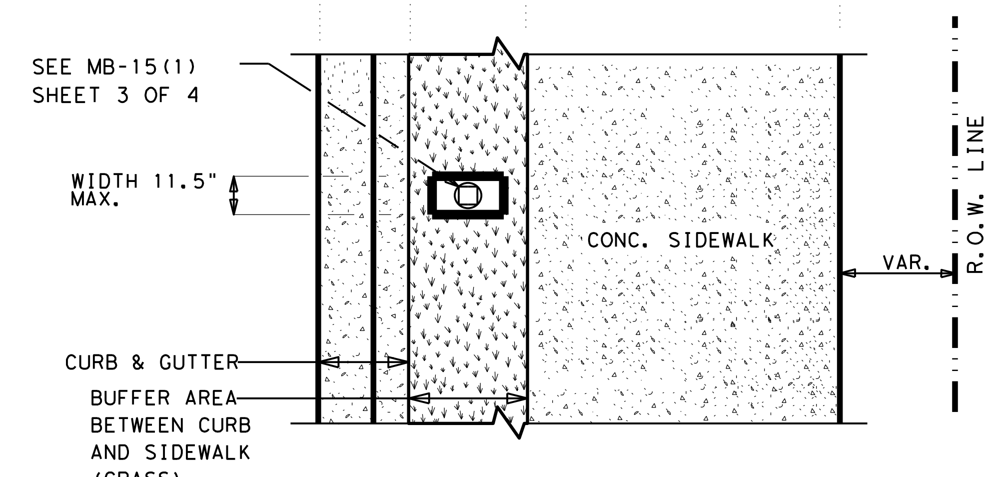


PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



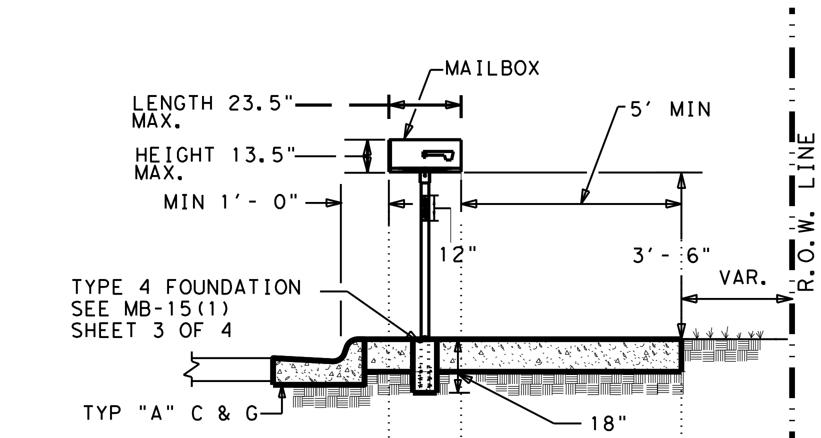
PLAN VIEW

Texas Department of Transportation | Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

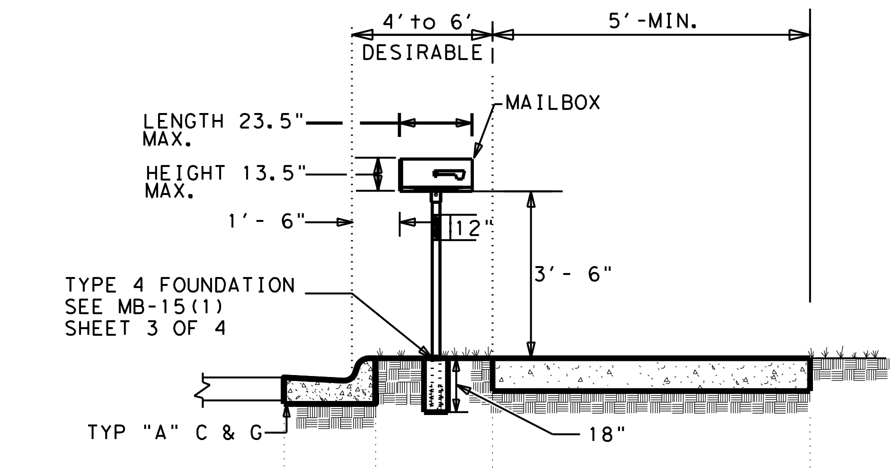
MB-14(2A)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	130



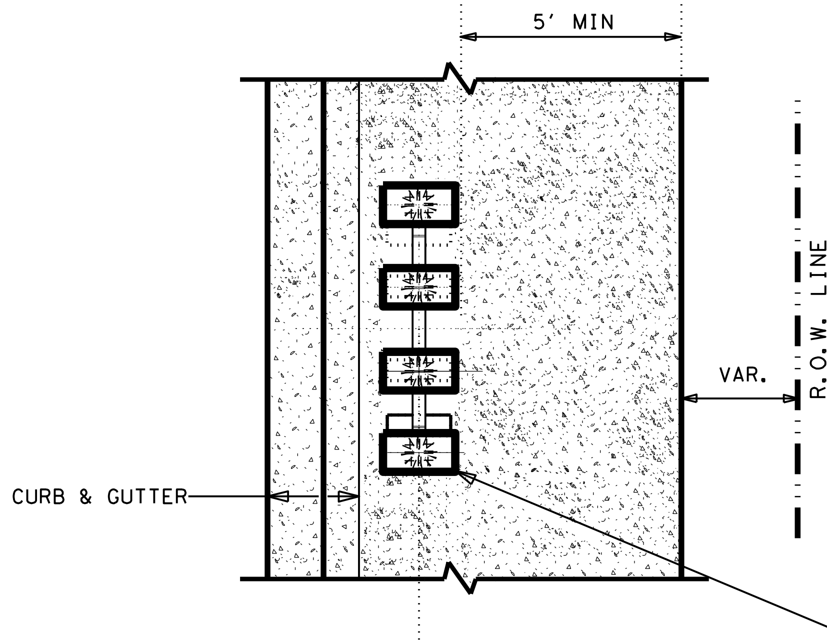
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN

(MINIMUM BORDER DISTANCE)

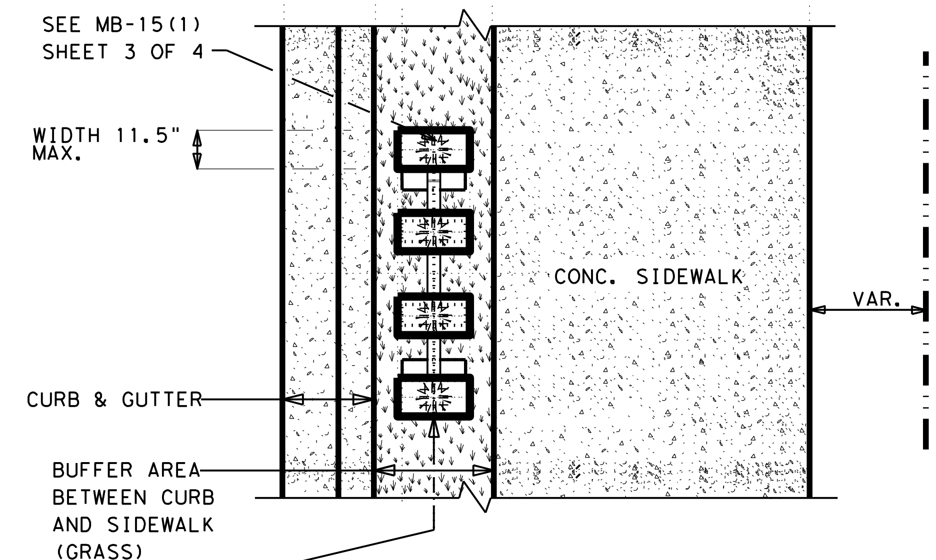


MAILBOX SIDEWALK INSTALLATION

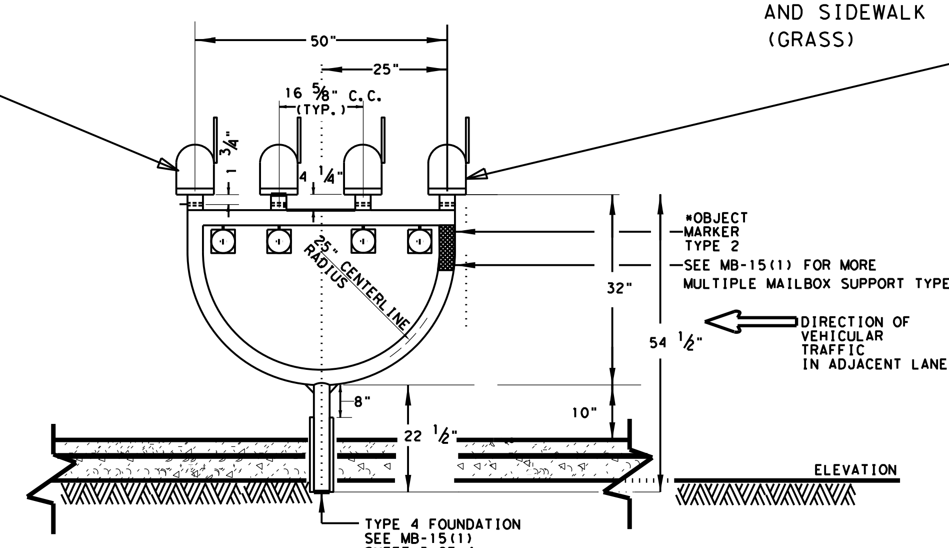
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



PLAN VIEW



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SHEET 3 OF 3

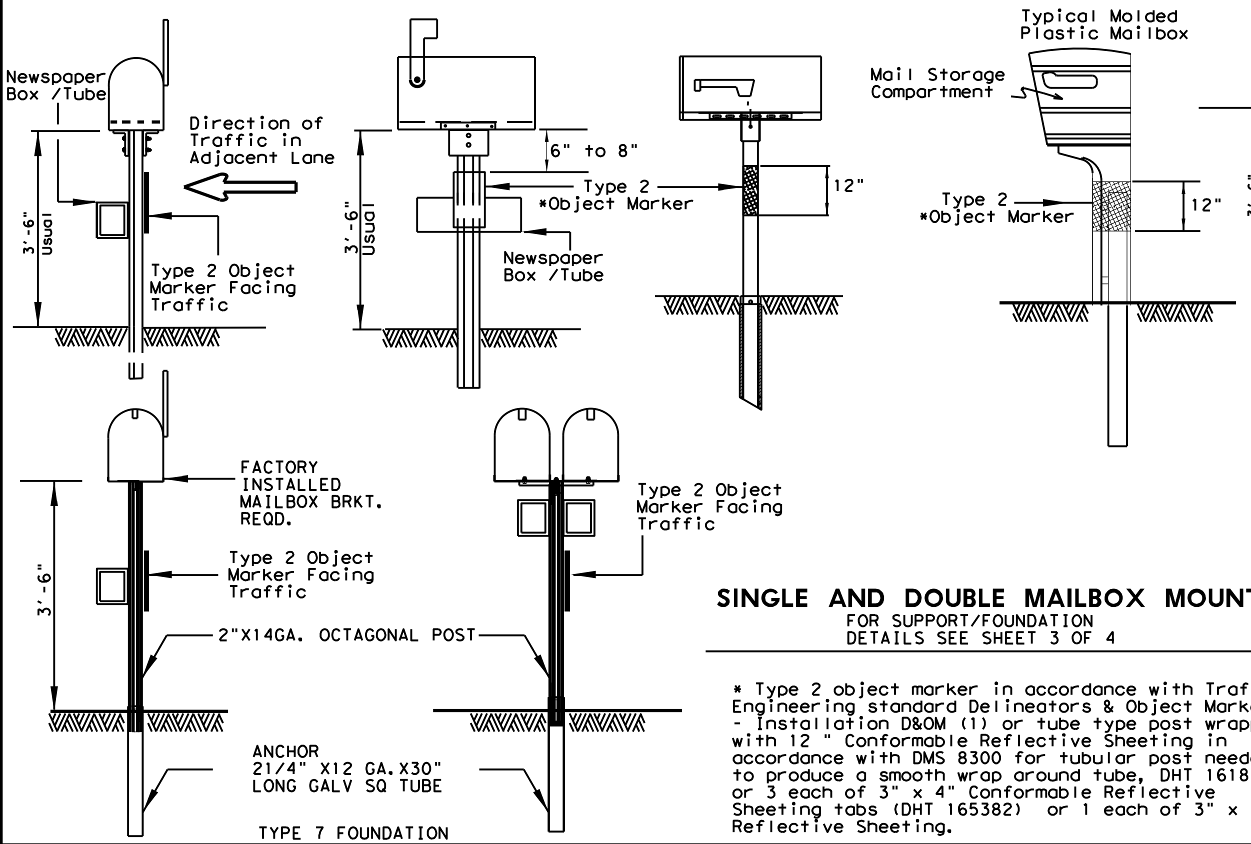
Texas Department of Transportation

Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	131



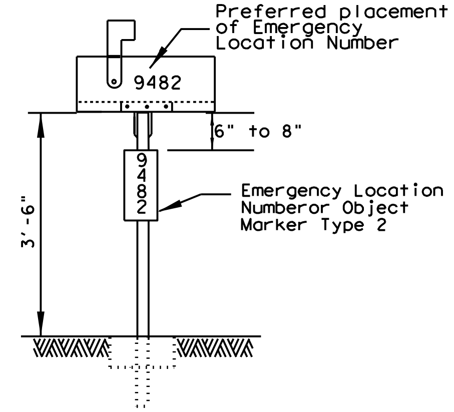
SINGLE AND DOUBLE MAILBOX MOUNT

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")

SIZE	TYPICAL MAILBOX SIZE: LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	LIGHT WEIGHT MATERIAL, MAXIMUM WEIGHT (POUNDS): SHEET METAL	**PLASTIC
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)

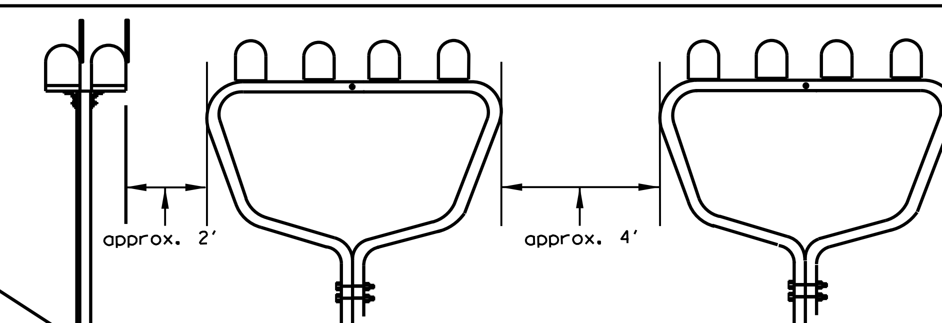
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 1/2	11 1/2		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

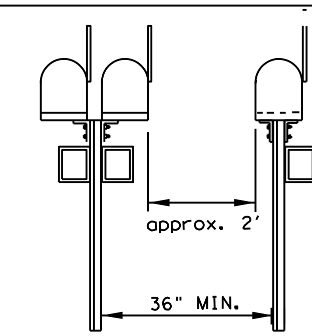
Mailboxes shall be made of light weight sheet metal or light weight plastic.
Lockable architectural mailboxes shall meet the requirements of the above table.

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



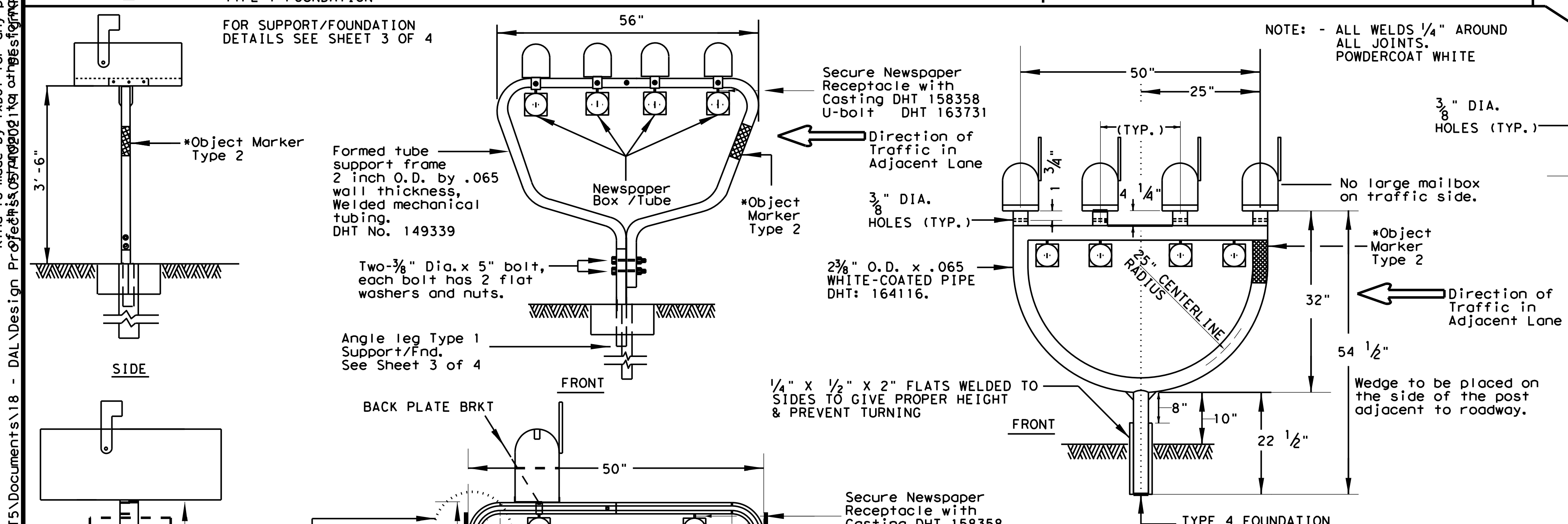
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

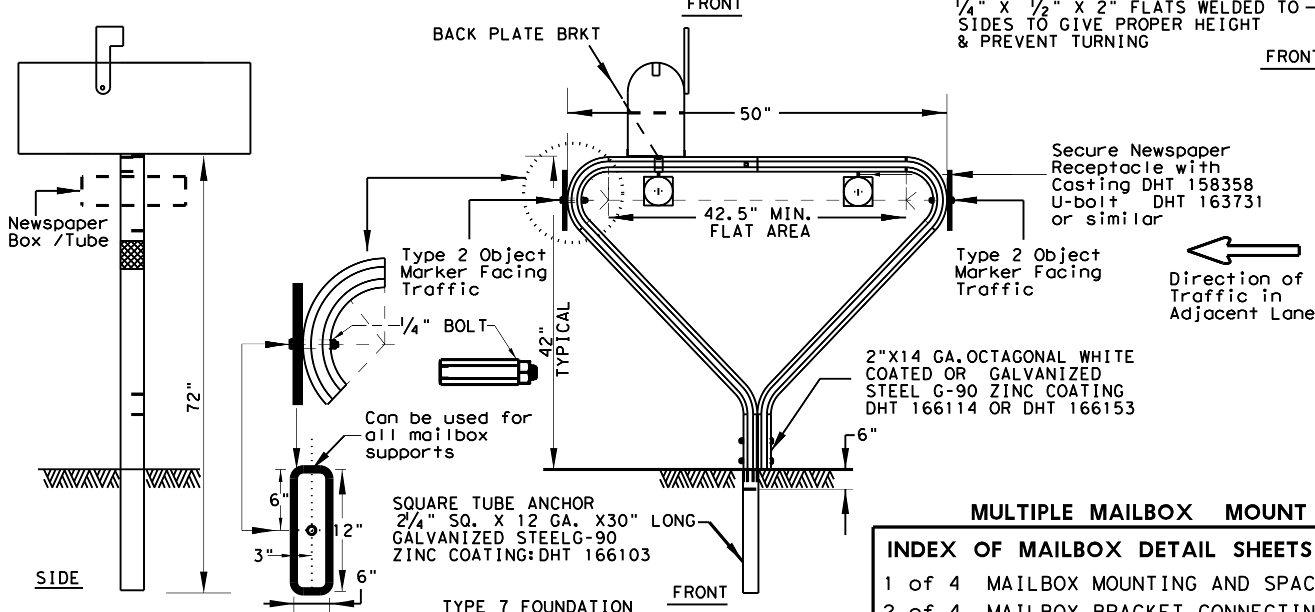


Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT



DOUBLE AND MULTIPLE MAILBOX MOUNT



MULTIPLE MAILBOX MOUNT

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

INDEX OF MAILBOX DETAIL SHEETS

1 of 4 MAILBOX MOUNTING AND SPACING
2 of 4 MAILBOX BRACKET CONNECTING DETAILS
3 Of 4 MAILBOX SUPPORT / FOUNDATION
4 of 4 TABLE OF DHT NUMBERS

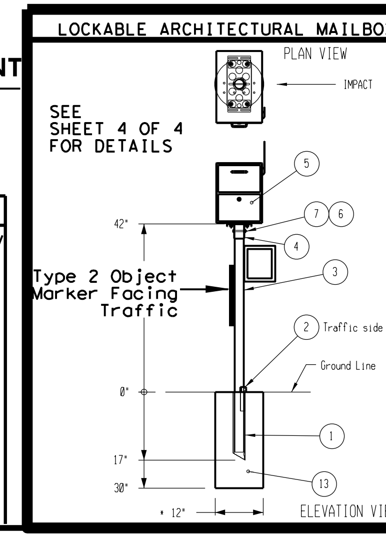
NEWSPAPER RECEPTACLE

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

SEE SHEET 4 OF 4 FOR DETAILS

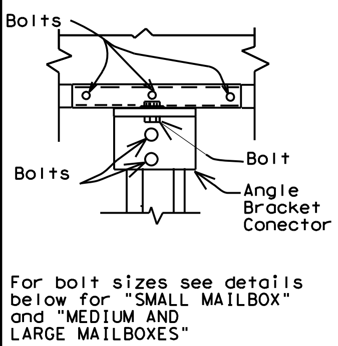


Texas Department of Transportation — Maintenance Division Standard

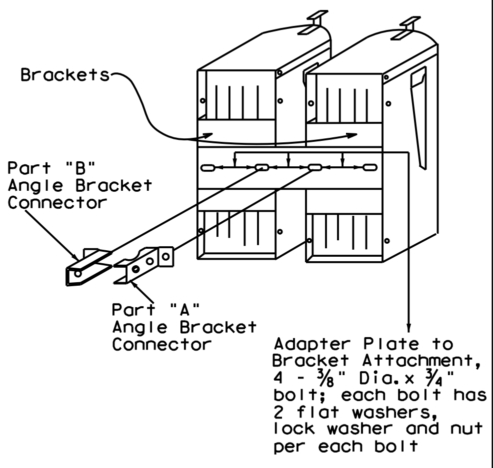
MAILBOX MOUNTING AND SPACING

MB-15(1)

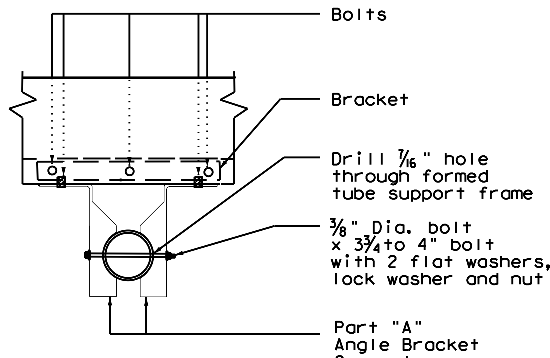
FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		132



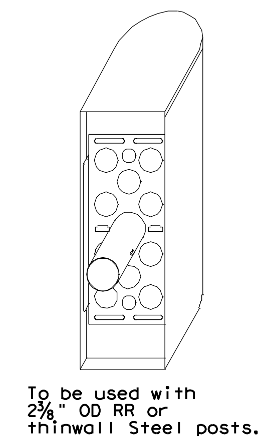
SINGLE MAILBOX



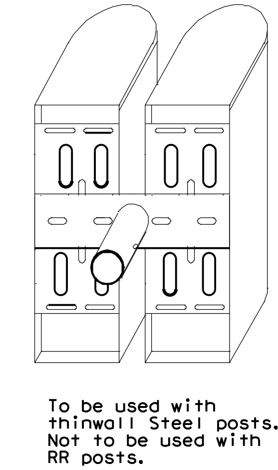
DOUBLE MAILBOX



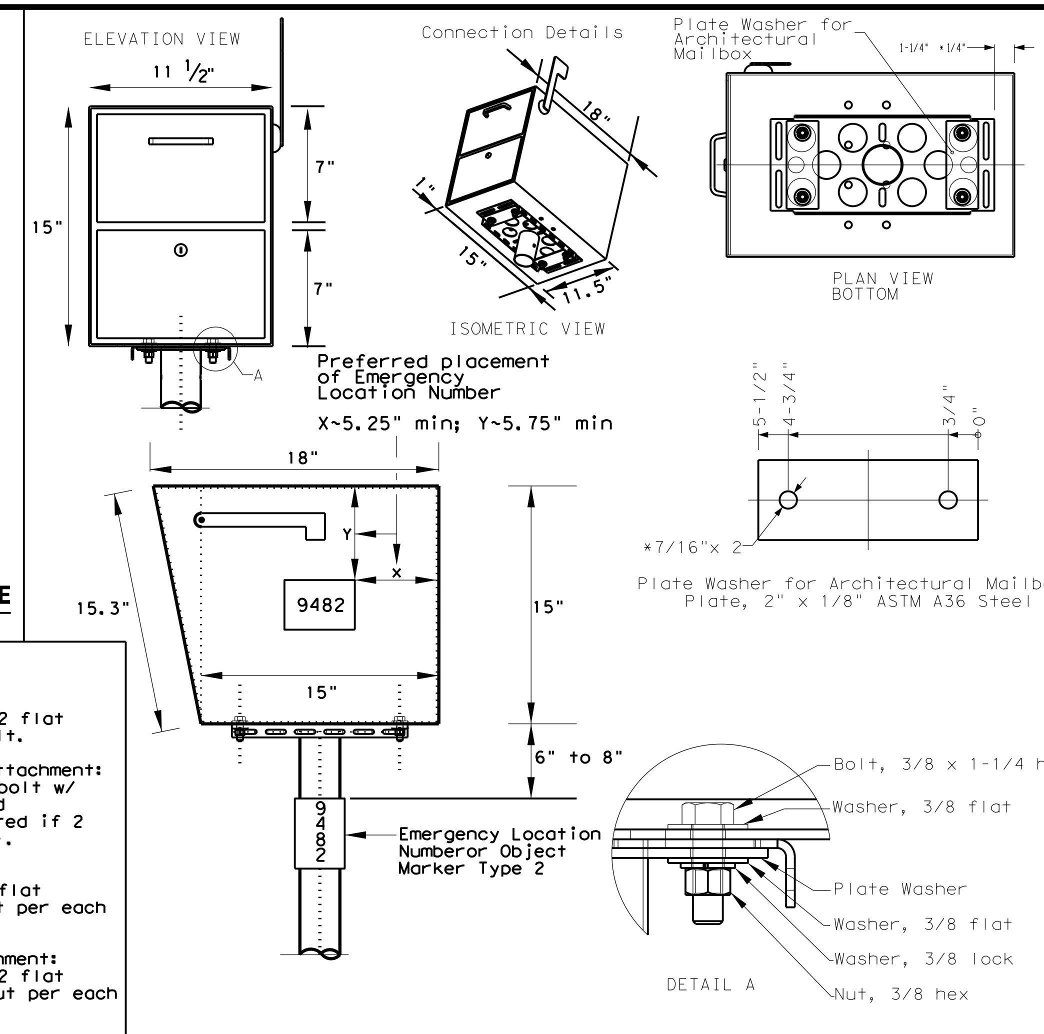
MULTIPLE MAILBOX



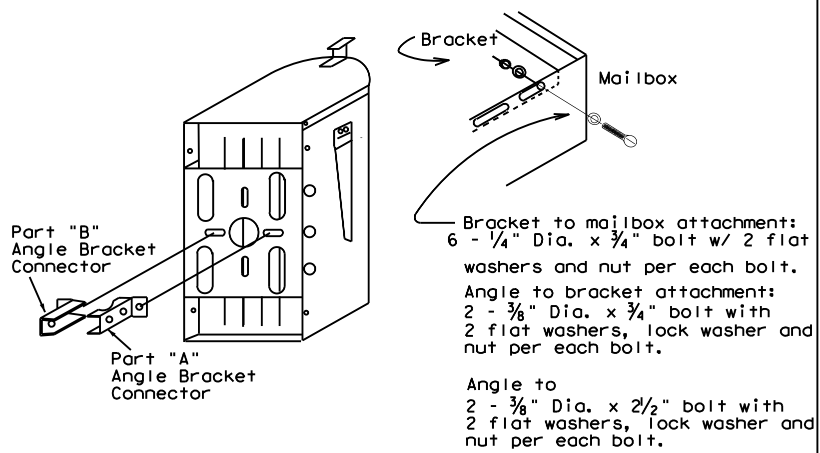
WELDED SINGLE MAILBOXBRACKET



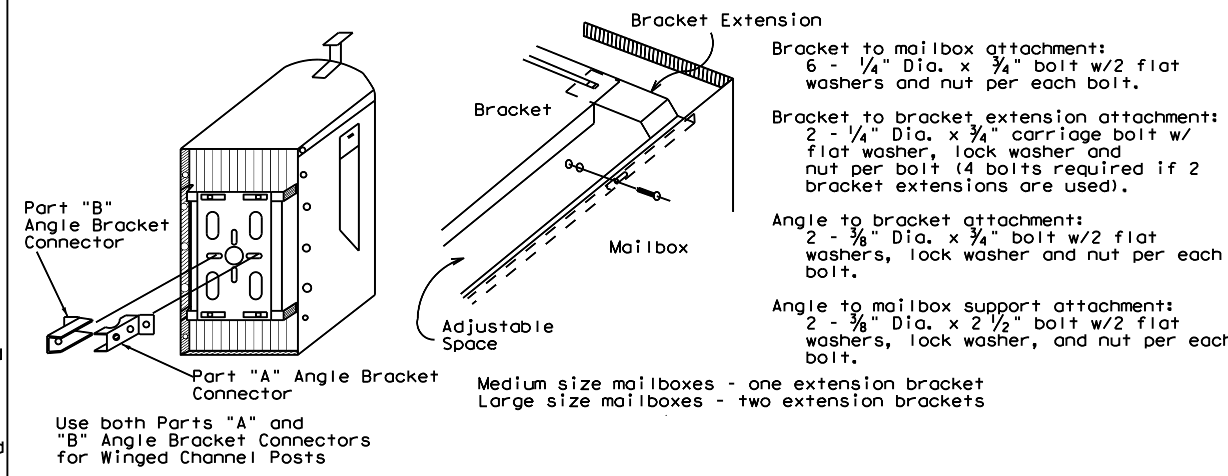
WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS



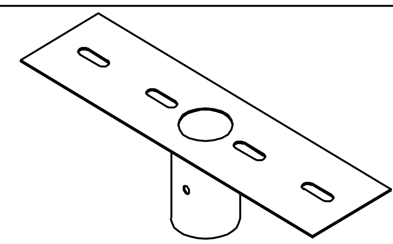
SMALL MAILBOX



MEDIUM AND LARGE MAILBOXES

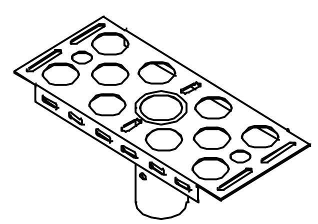
GENERAL NOTES

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.



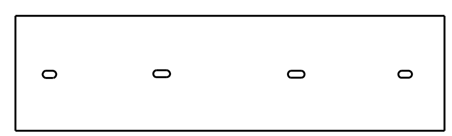
DHT 162323

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



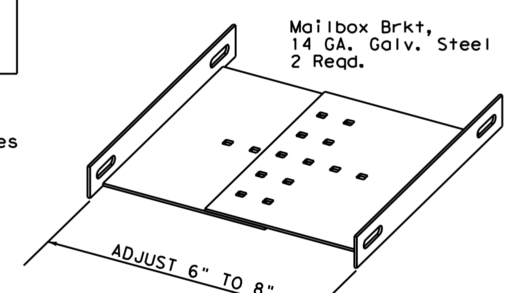
DHT 161443

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

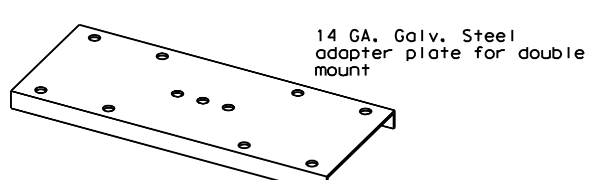


DHT #3789

Used for mounting two Mailboxes on the same post.



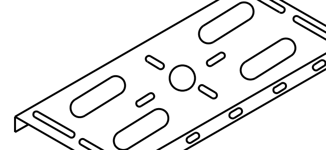
DHT 166105



DHT 166108

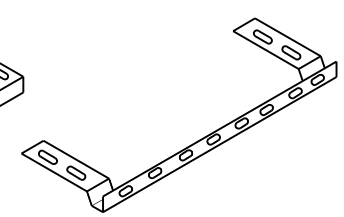
HARDWARE AT TXDOT REGIONAL WAREHOUSES

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

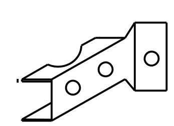


DHT 148938

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

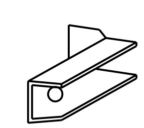
Bracket Extension

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



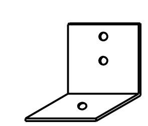
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

SHEET 2 OF 4

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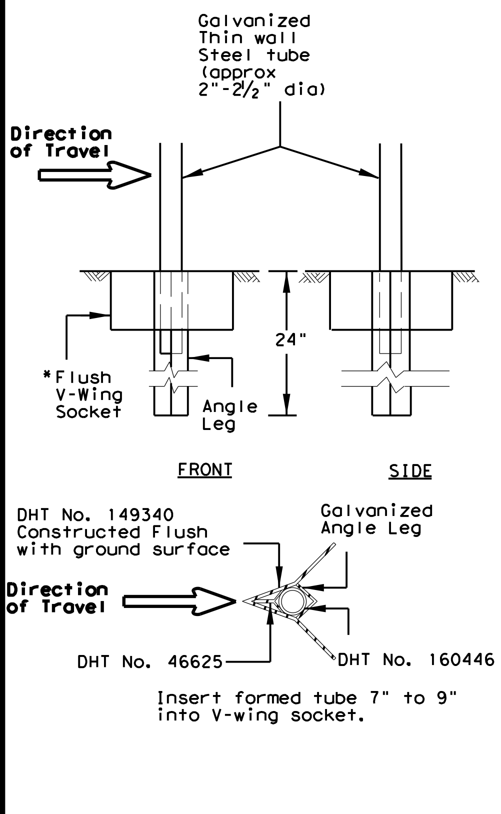
MAILBOX BRACKET CONNECTING DETAILS

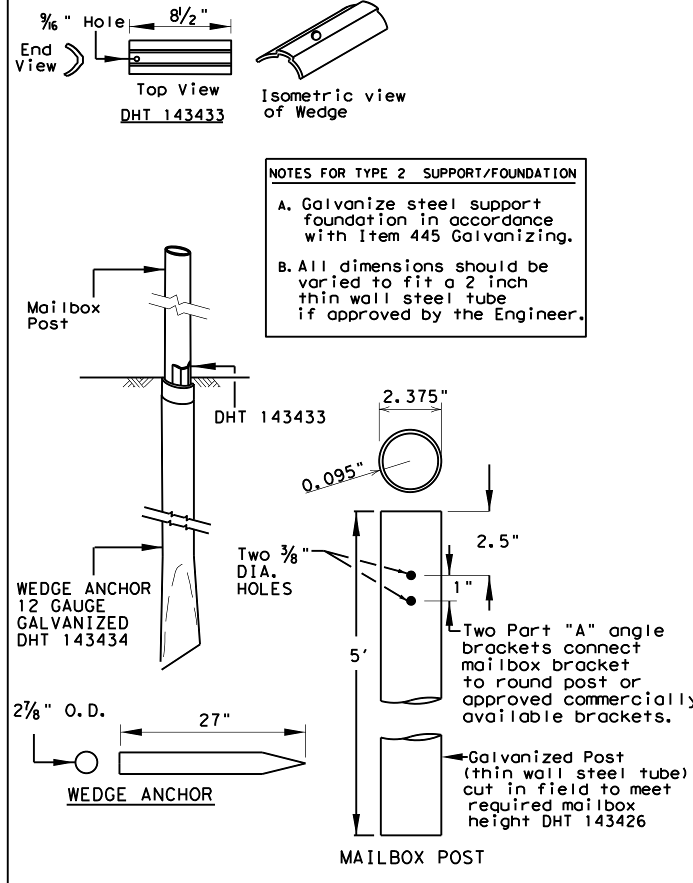
MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED DHT 163730	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	133



TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



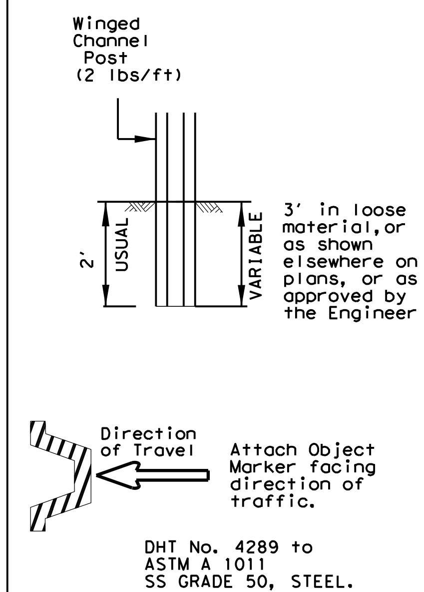
NOTES FOR TYPE 2 SUPPORT/FOUNDATION

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

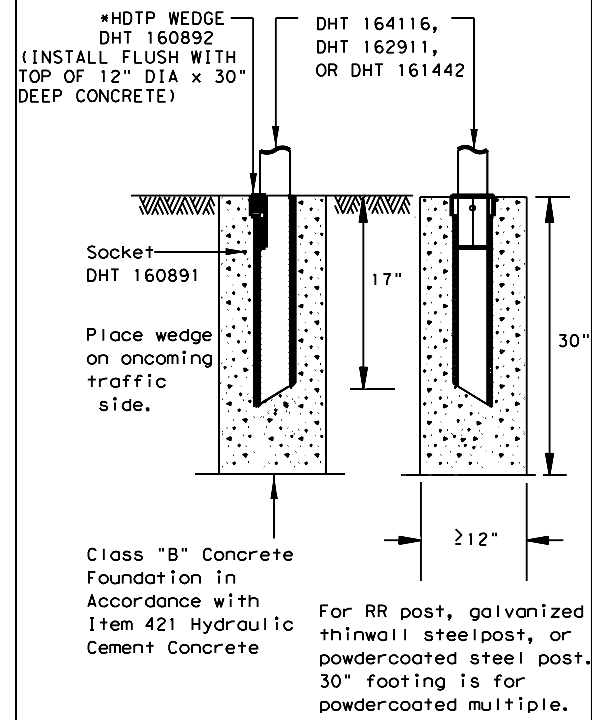
THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



TYPE 3 SUPPORT/FOUNDATION

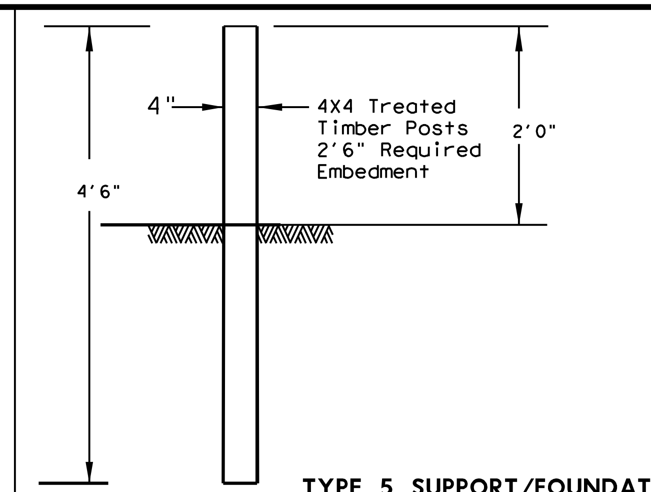
WINGED CHANNEL POST

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.

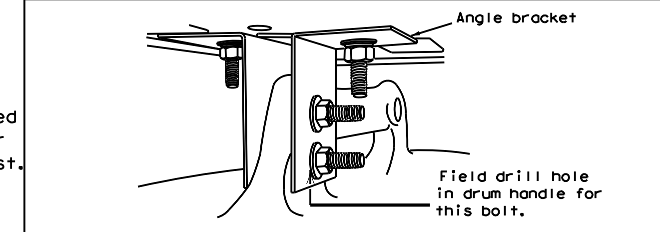


TYPE 5 SUPPORT/FOUNDATION

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.



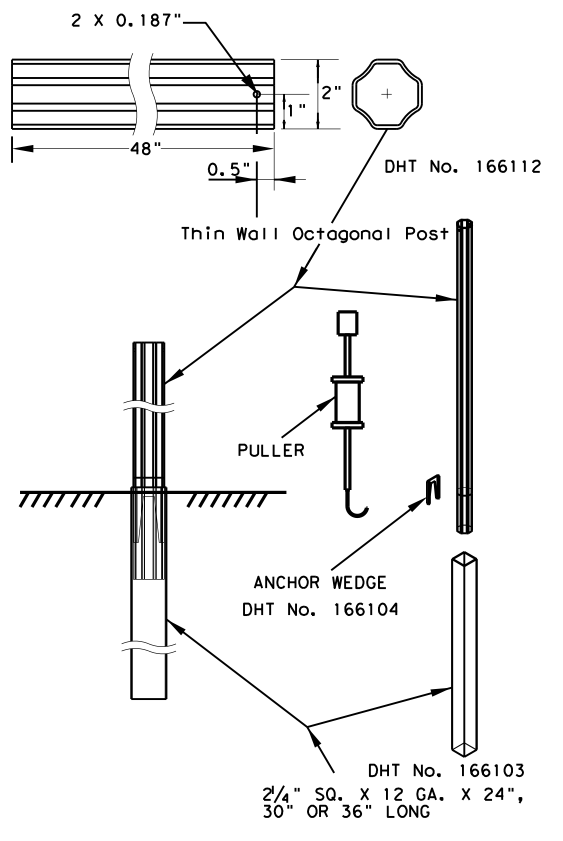
Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

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

Texas Department of Transportation — Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	134

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

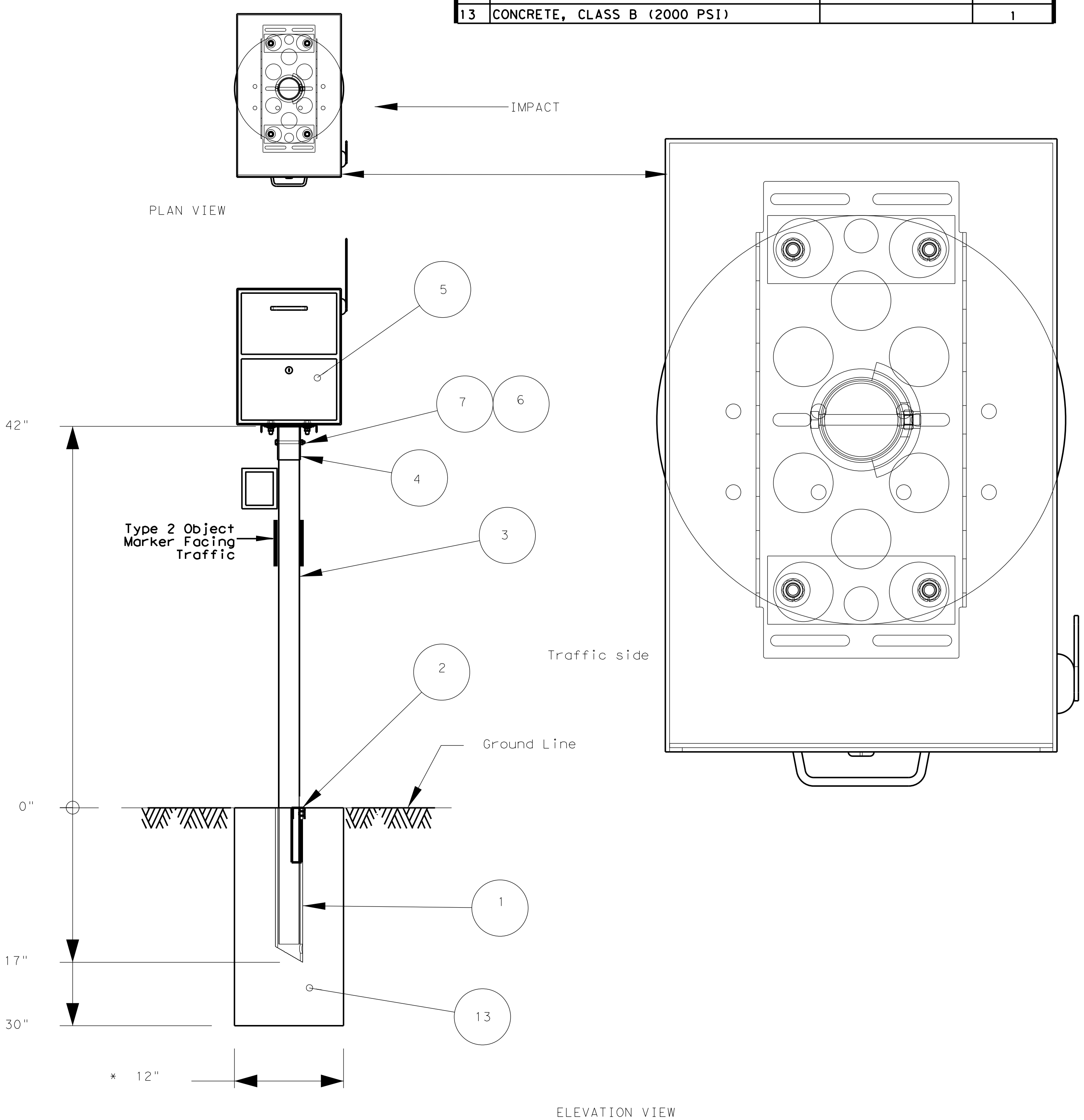


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
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

SHEET 4 OF 4

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DHT NUMBERS TABLE

MB-15(1)

FILE: MB14(1).DGN	DN:	CK:	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	135

DATE: 1/7/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\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)

ANGLE STRUT PN: 15202G

ANCHOR PADDLE PN: 15204A

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:C

SEE NOTE:A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

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

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

POST 40" DEPTH (TYP 1-8)

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

ELEVATION VIEW

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

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

(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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

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

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)

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"

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

FINISHED GRADE

SECTION VIEW B-B

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

SECTION VIEW A-A

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

POST(2)

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 ⅜")
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	0574	02	021		FM 636	
	DIST	COUNTY			SHEET NO.	
	DAL	NAVARRO			136	

DATE: 1/7/2021
FILE: dw: \\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Profiles\SGT11S3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 ⅛"

RAIL
HEIGHT
31"

ARROWS

DETAIL (D)

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

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

68-⅛"

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1

(8) X-LITE LINE POST - ITEM (11)

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

ELEVATION VIEW

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

SOIL
ANCHOR POST
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE

DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 ⅝"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

(RAIL 1)

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

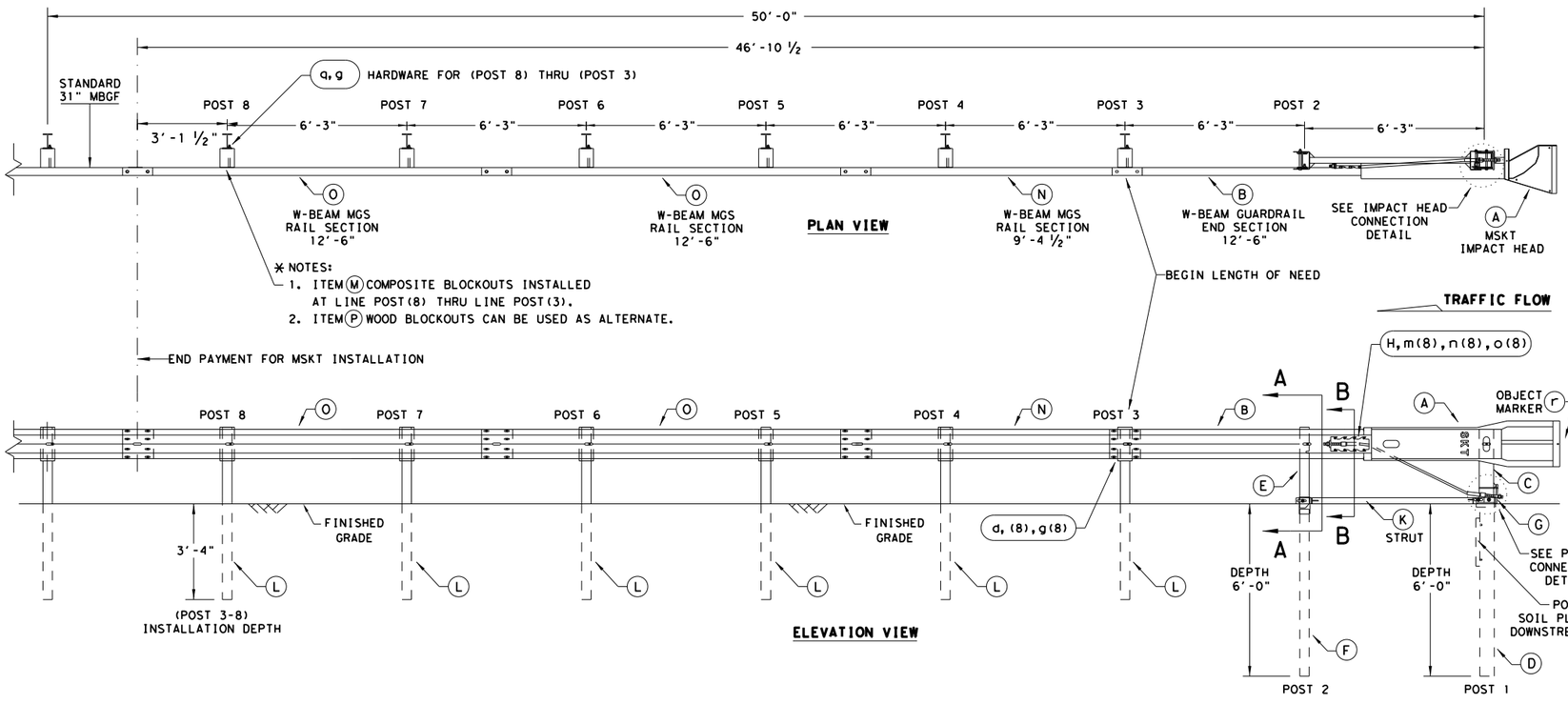
Texas Department of Transportation

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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		137

DATE: 1/7/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\3. Roadway\Standards\sgt12s3118.dgn



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

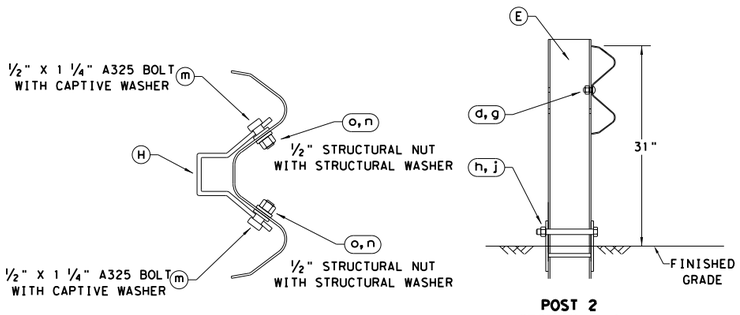
GENERAL NOTES

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

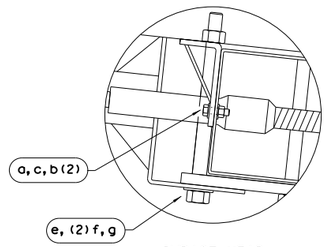
SEE NOTES: *

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

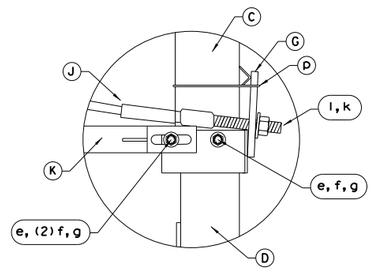


SECTION B-B
ANCHOR BRACKET

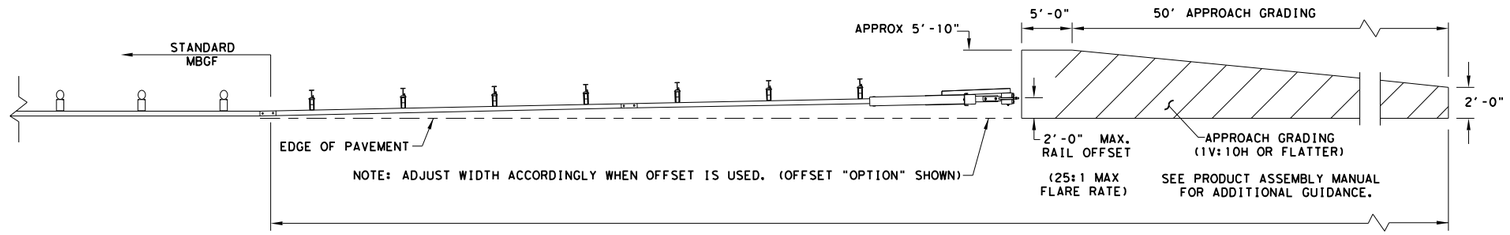
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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.

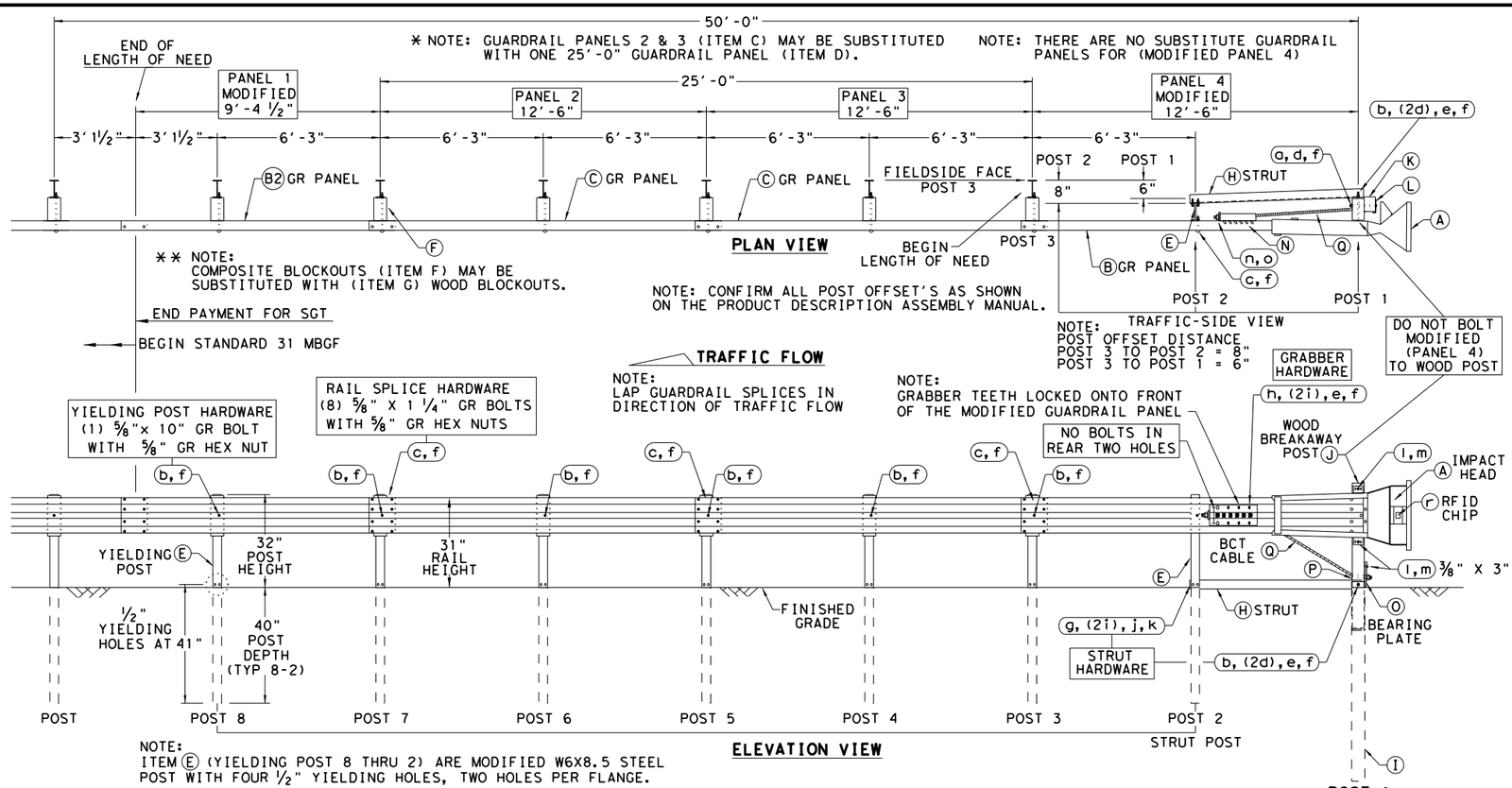
Texas Department of Transportation

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	0574	02	021	FM 636	
	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		138	

DATE: 1/7/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574020214 - Design\Plan Set\3. Roadway\Standards\sgt153120.dgn

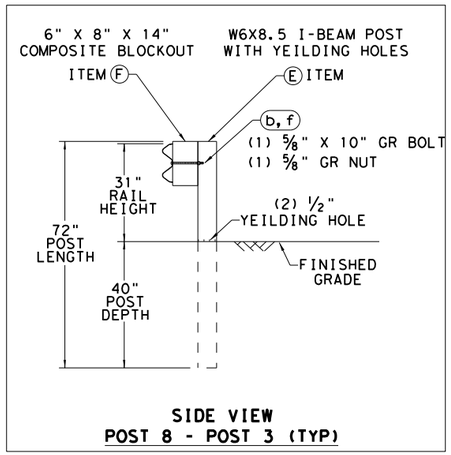


GENERAL NOTES

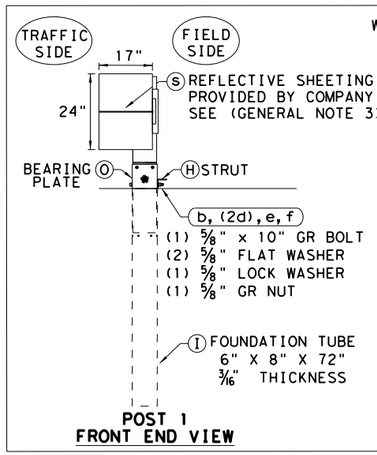
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

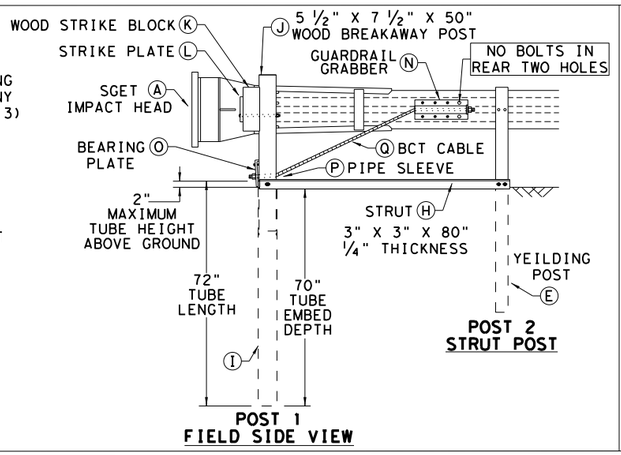
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



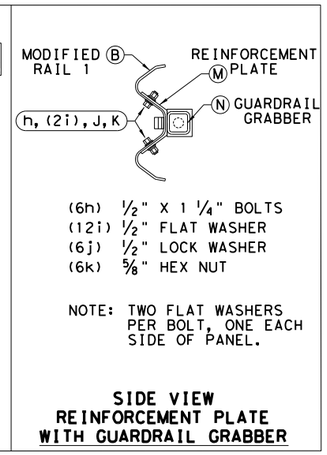
SIDE VIEW
POST 8 - POST 3 (TYP)



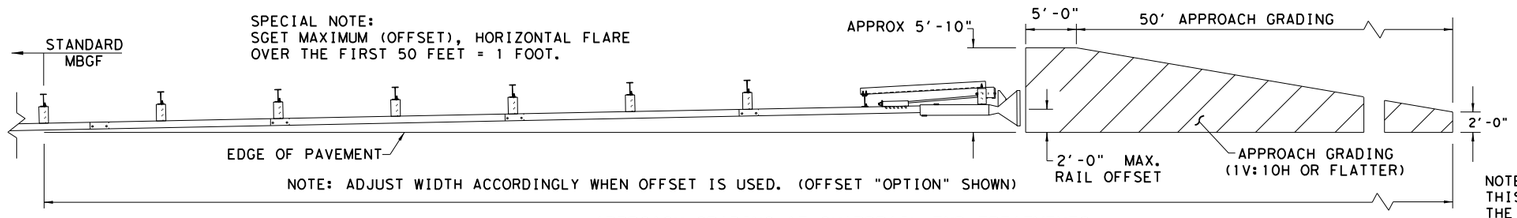
POST 1
FRONT END VIEW



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	0574	02	021	FM 636	
	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		139	

DATE: 1/7/2021
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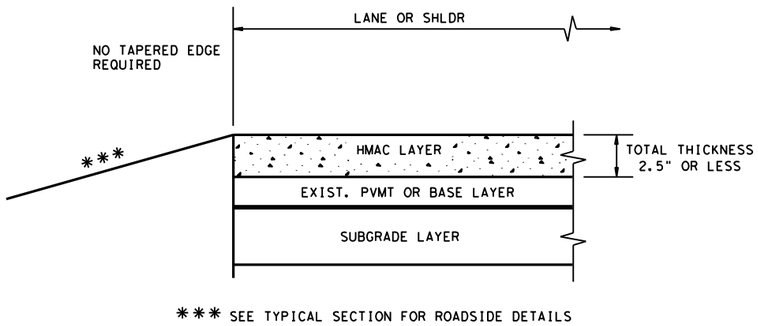
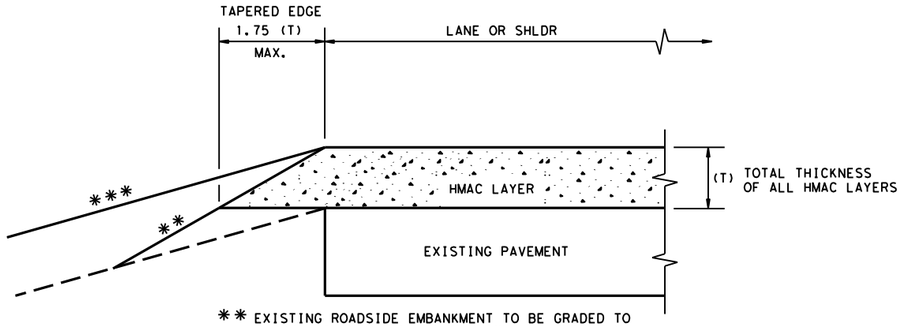


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

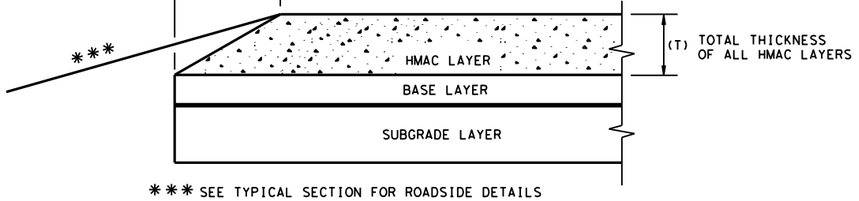
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

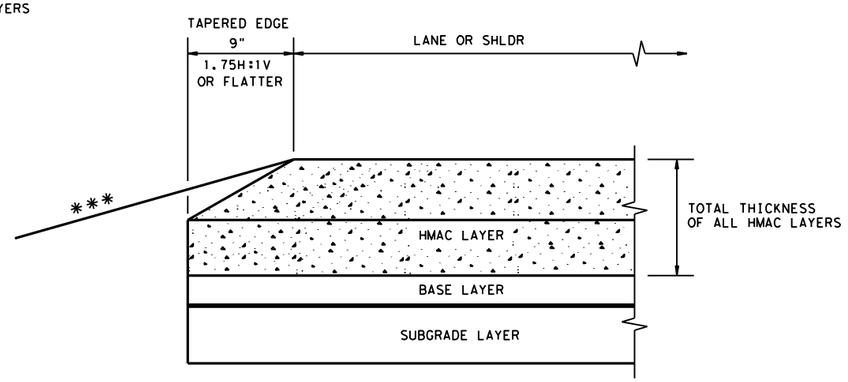
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

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.

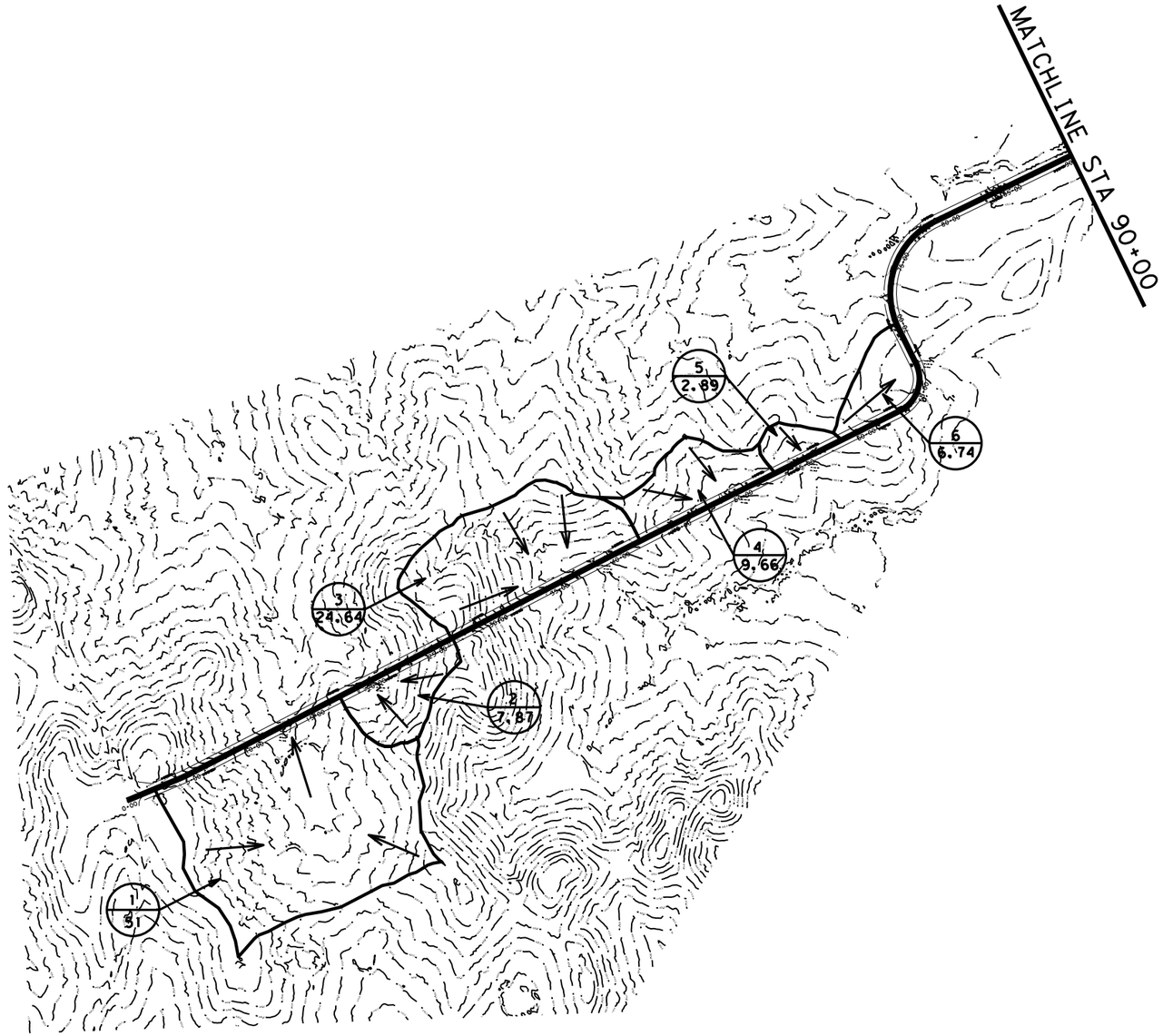
(NOT TO SCALE)

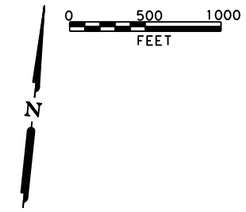
Texas Department of Transportation | Design Division Standard

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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		140

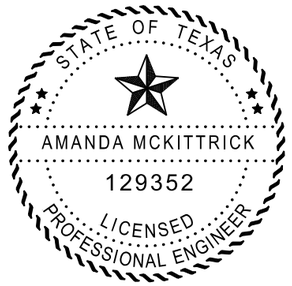




LEGEND

AN / DA — AREA NAME / DRAINAGE AREA (ACRES)

→ FLOW DIRECTION



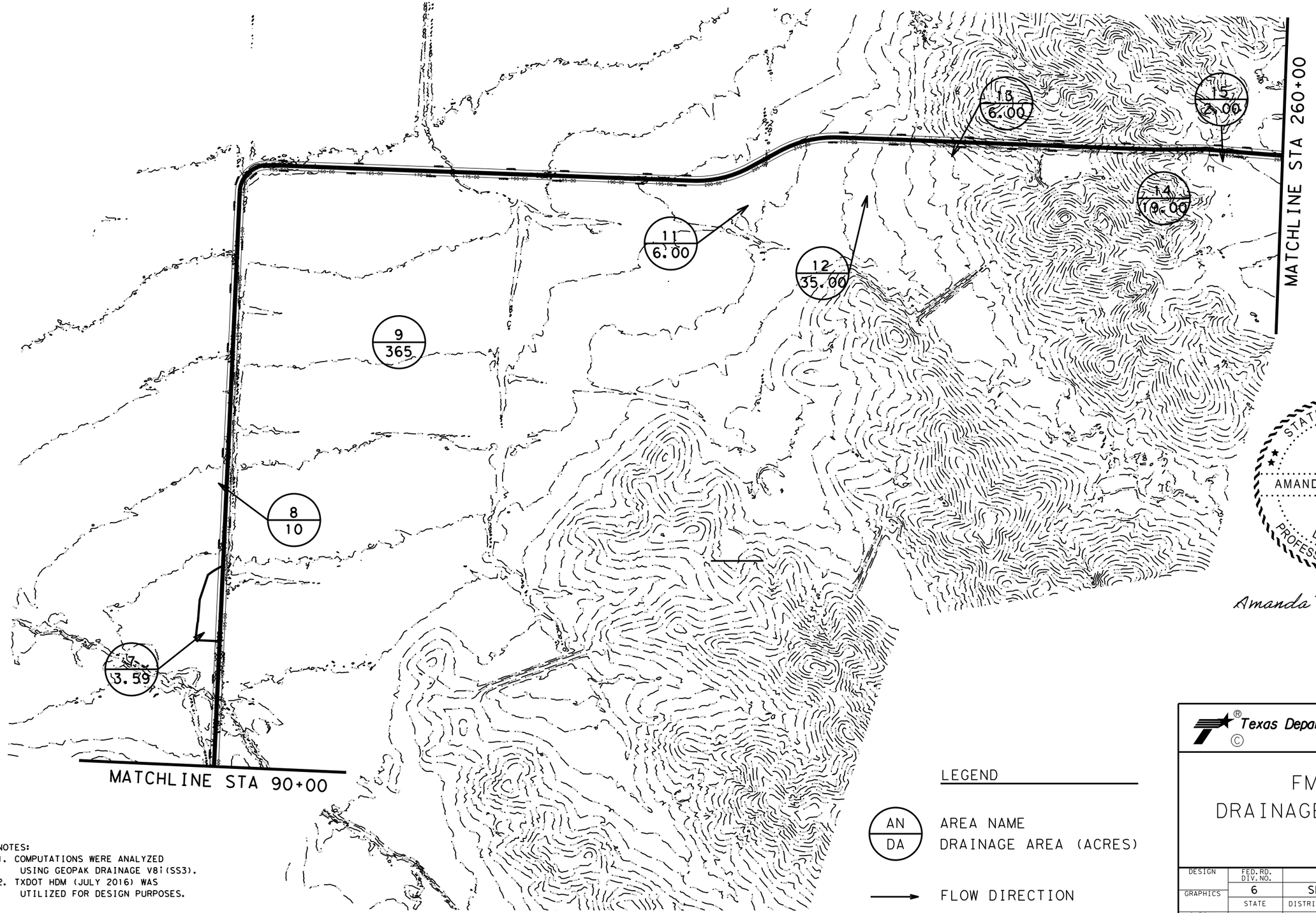
Amanda McKittrick, P.E.

NOTES:
1. COMPUTATIONS WERE ANALYZED USING GEOPAK DRAINAGE V8i (SS3).
2. TXDOT HDM (JULY 2016) WAS UTILIZED FOR DESIGN PURPOSES.

FM 636
DRAINAGE AREA MAP

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	141
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

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LEGEND

AN / DA — AREA NAME / DRAINAGE AREA (ACRES)

FLOW DIRECTION

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FM 636
DRAINAGE AREA MAP

SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
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CHECK	CONTROL	SECTION	JOB	
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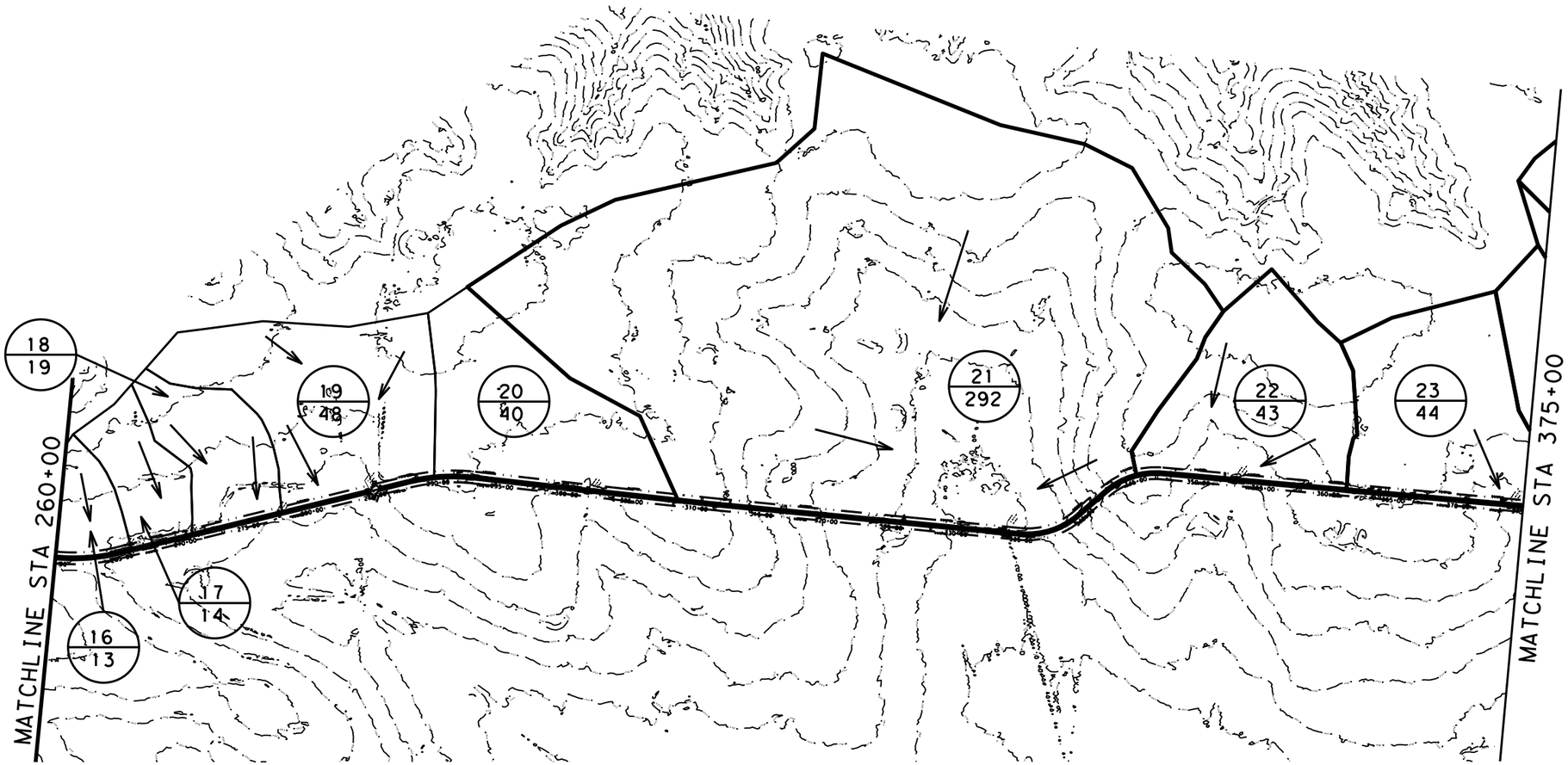

STATE OF TEXAS
AMANDA MCKITTRICK
129352
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LEGEND

AN / DA — AREA NAME / DRAINAGE AREA (ACRES)

FLOW DIRECTION

Texas Department of Transportation

FM 636
DRAINAGE AREA MAP

SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
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CHECK	CONTROL	SECTION	JOB	
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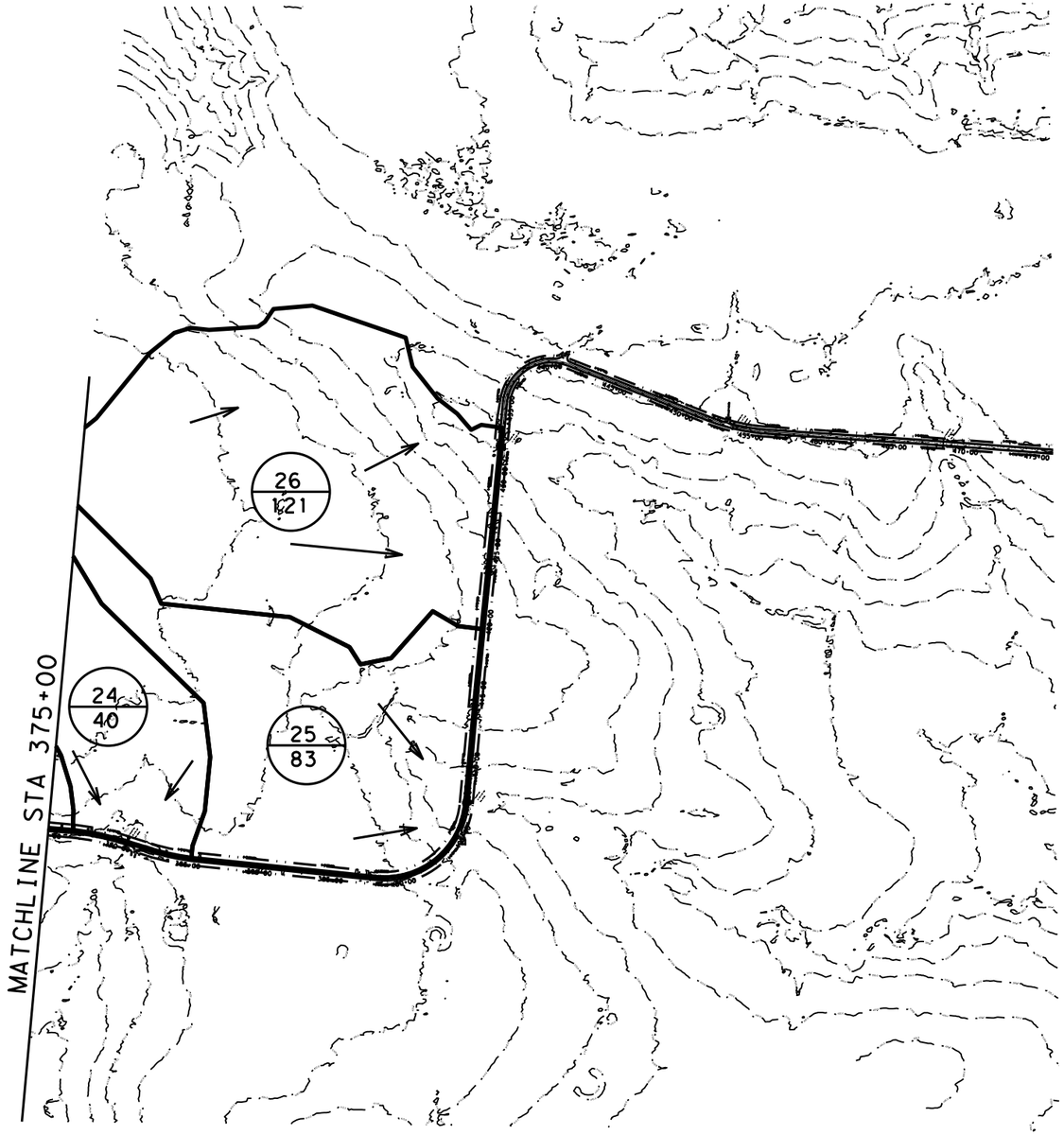

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AMANDA MCKITTRICK
129352
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

LEGEND

AN / DA — AREA NAME / DRAINAGE AREA (ACRES)

→ FLOW DIRECTION

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FM 636
DRAINAGE AREA MAP

SHEET 4 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	144
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:10:57:04 AM
FILE:pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574021\4 - Design\Plan Set\5. Drainage\FM 636*Drainage Area Map.dgn

SUMMARY WATERSHED PARAMETERS AND PEAK DISCHARGES (RATIONAL METHOD)

DRAINAGE AREA (#)	CULVERT NAME	STATION	PROPOSED STRUCTURE	HYDROLOGIC METHOD	STORM FREQUENCY (YR)	RUNOFF COEFFICIENT "C"	TIME OF CONCENTRATION "tc" (MINUTES)	RAINFALL INTENSITY "I" (IN/HR)	DRAINAGE AREA "A" (AC)	DRAINIAGE AREA PEAK DISCHARGE "Q = C X I X A" (CFS)
1	1	13+15.70	1-5'X4'X51' SBC	RATIONAL	10-YR	0.35	26	4.57	50.9	81.31
					100-YR		26	7.03		125.19
2	2	19+80.28	1-30"X61' RCP	RATIONAL	10-YR	0.35	13	6.49	7.87	17.88
					100-YR		13	9.96		27.44
3	3	38+20.42	1-42"X52' RCP	RATIONAL	10-YR	0.35	19	5.41	24.64	46.69
					100-YR		19	8.32		71.78
4	4	49+63.95	1-36"X57' RCP	RATIONAL	10-YR	0.35	13	6.49	9.66	21.92
					100-YR		13	9.96		33.65
5	5	55+22.73	1-24"X72' RCP	RATIONAL	10-YR	0.35	12	6.72	2.89	6.80
					100-YR		12	10.31		10.44
6	6	67+03.98	1-24"X67' RCP	RATIONAL	10-YR	0.35	18	5.56	6.47	12.59
					100-YR		18	8.55		19.36
7	7	110+63.96	1-24"X56' RCP	RATIONAL	10-YR	0.30	15	6.08	3.59	6.54
					100-YR		15	9.34		10.05
8	8	127+65.08	1-24"X53' RCP	RATIONAL	10-YR	0.35	48	3.13	10.00	10.96
					100-YR		48	4.84		16.94
9	9	151+51.08	4-48"X64' RCP	RATIONAL	10-YR	0.35	72	2.38	365	303.80
					100-YR		72	3.68		470.48
11	11	205+70.95	1-18"X47' RCP	RATIONAL	10-YR	0.35	26	4.57	6.00	9.59
					100-YR		26	7.03		14.77
12	12	206+40.47	2-30"X48' RCP	RATIONAL	10-YR	0.35	25	4.67	35.00	57.21
					100-YR		25	7.19		88.07
13	13	216+64.85	1-24"X46' RCP	RATIONAL	10-YR	0.35	14	6.28	6.00	13.18
					100-YR		14	9.64		20.24
14	14	240+32.90	2-30"X83' RCP	RATIONAL	10-YR	0.35	11	6.96	19.00	46.30
					100-YR		11	10.68		71.03
15	15	252+44.00	1-18"X54' RCP	RATIONAL	10-YR	0.35	15	6.08	2	4.26
					100-YR		15	9.34		6.54
16	16	265+55.00	2-24"X52' RCP	RATIONAL	10-YR	0.35	26	4.57	13	20.78
					100-YR		26	7.03		32.00
17	17	270+27.00	2-24"X54' RCP	RATIONAL	10-YR	0.35	30	4.20	14	20.60
					100-YR		30	6.48		31.74
18	18	277+55.00	1-30"X54' RCP	RATIONAL	10-YR	0.35	31	4.12	19	27.42
					100-YR		31	6.35		42.25
19	19	284+55.00	2-48"X46' RCP	RATIONAL	10-YR	0.35	39	3.58	48	60.16
					100-YR		39	5.52		92.82
20	20	301+61.00	1-48"X52' RCP	RATIONAL	10-YR	0.35	36	3.76	40	52.70
					100-YR		36	5.81		81.28
21	21	333+74.90	5-58"X59.25' RCP	RATIONAL	10-YR	0.35	60	2.70	292	275.69
					100-YR		60	4.17		426.46
22	22	352+75.25	2-48"X69.08' RCP	RATIONAL	10-YR	0.35	11	6.96	43	104.78
					100-YR		11	10.68		160.75

NOTES:

1. THESE CALCULATIONS WERE PERFORMED TO VERIFY THAT THE EXTENSIONS AND REPLACEMENTS OF THE DRAINAGE STRUCTURES DID NOT ADVERSELY AFFECT THEIR HYDRAULIC PERFORMANCE.
2. RAINFALL INTNSITY CALCULATIONS WERE BASED ON TXDOT HYDRAULIC DESIGN MANUAL CH. 4 AND SEC. 12.
3. ALL CULVERTS WERE LOCATED IN FEMA ZONE "A", WHICH NO BASE FLOODS ARE DETERMINED.
4. TXDOT HDM JULY 2016 VERSION WAS UTILIZED FOR THE DESIGN OF THIS PROJECT.

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
PROFESSIONAL ENGINEER

Marlena Kelly ,P.E. 1/8/21
Signature of Registrant & Date

Texas Department of Transportation

FM 636

RUNOFF COMPUTATIONS

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	145
CHECK JP	CONTROL	SECTION	JOB	
	0574	02	021	

SUMMARY WATERSHED PARAMETERS AND PEAK DISCHARGES (RATIONAL METHOD)

DRAINAGE AREA (#)	CULVERT NAME	STATION	PROPOSED STRUCTURE	HYDROLOGIC METHOD	STORM FREQUENCY (YR)	RUNOFF COEFFICIENT "C"	TIME OF CONCENTRATION "tc" (MINUTES)	RAINFALL INTENSITY "I" (IN/HR)	DRAINAGE AREA "A" (AC)	DRAINIAGE AREA PEAK DISCHARGE "Q = C X I X A" (CFS)
23	23	237+68.74	2-36"X70.2' RCP	RATIONAL	10-YR	0.35	22	5.01	44	77.18
					100-YR		22	7.71		118.73
24	24	380+59.00	1-36"X55.43' RCP	RATIONAL	10-YR	0.35	51	3.01	40	42.13
					100-YR		51	4.65		65.11
25	25	407+29.43	3-48"X52' RCP	RATIONAL	10-YR	0.35	49	3.09	83	89.78
					100-YR		49	4.77		138.70
26	26	432+21.58	4-48"X57' RCP	RATIONAL	10-YR	0.35	46	3.22	121	136.41
					100-YR		46	4.97		210.67

NOTES:

1. THESE CALCULATIONS WERE PERFORMED TO VERIFY THAT THE EXTENSIONS AND REPLACEMENTS OF THE DRAINAGE STRUCTURES DID NOT ADVERSELY AFFECT THEIR HYDRAULIC PERFORMANCE.
2. RAINFALL INTNSITY CALCULATIONS WERE BASED ON TXDOT HYDRAULIC DESIGN MANUAL CH. 4 AND SEC. 12.
3. ALL CULVERTS WERE LOCATED IN FEMA ZONE "A", WHICH NO BASE FLOODS ARE DETERMINED.
4. TXDOT HDM JULY 2016 VERSION WAS UTILIZED FOR THE DESIGN OF THIS PROJECT.

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED PROFESSIONAL ENGINEER

Marlena Kelly ,P.E. 1/8/21
Signature of Registrant & Date

Texas Department of Transportation

FM 636

RUNOFF COMPUTATIONS

N.T.S

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
AM	6	SEE TITLE SHEET		FM 636
GRAPHICS AM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MK	TEXAS	DAL	NAVARRO	146
CHECK JP	CONTROL	SECTION	JOB	
	0574	02	021	

CULVERT HYDRAULIC DATA

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	ALLOWABLE HEADWATER (FT)	10 YEAR (DESIGN)							100 YEAR (CHECK)							COMMENTS
					FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	
13+15.70	FM 636	(EXIST) 4'X5'X43' SBC	DA-1	408.37	81.31	404.81	3.34	401.12	1.22	13.71	7.55	125.19	406.02	4.55	401.39	1.49	14.98	8.45	
		(PROP) 4'X5'X51' SBC				404.83	3.34	400.87	1.22	14.10	7.55		406.05	4.56	401.14	1.49	15.39	8.45	
19+80.28	FM 636	(EXIST) 30"X45' RCP	DA-2	419.19	17.88	413.93	2.15	411.62	0.51	8.87	5.85	27.44	414.69	2.91	411.74	0.63	9.83	6.62	
		(PROP) 30"X61' RCP				414.09	2.15	411.54	0.51	9.15	5.85		414.85	2.91	411.66	0.63	10.10	6.62	
38+20.42	FM 636	(EXIST) 42"X45' RCP	DA-3	385.00	46.69	381.02	3.26	378.34	0.89	8.90	6.98	71.78	382.31	4.55	378.54	1.09	10.06	7.84	
		(PROP) 42"X52' RCP				381.03	3.26	378.30	0.89	8.97	6.98		382.32	4.55	378.50	1.09	10.12	7.84	
49+63.95	FM 636	(EXIST) 36"X45' RCP	DA-4	371.60	21.92	367.26	2.19	364.75	0.68	10.10	4.78	33.65	367.95	2.88	364.92	0.85	11.11	5.38	
		(PROP) 36"X57' RCP				367.27	2.19	364.50	0.68	10.46	4.78		367.96	2.88	364.67	0.85	11.44	5.38	
55+22.73	FM 636	(EXIST) 24"X58' RCP	DA-5	372.51	6.80	364.76	1.33	362.67	0.37	8.08	3.39	10.44	365.16	1.73	362.76	0.46	8.94	3.86	
		(PROP) 24"X72' RCP				364.85	1.33	362.47	0.37	8.18	3.39		365.25	1.73	362.56	0.46	9.13	3.86	
67+03.98	FM 636	(EXIST) 24"X54' RCP	DA-6	353.80	12.59	347.99	1.96	345.47	0.49	9.26	4.30	19.36	348.86	2.83	345.60	0.62	10.19	4.87	
		(PROP) 24"X67' RCP				348.01	1.96	345.24	0.49	9.44	4.30		348.88	2.83	345.37	0.62	10.40	4.87	
110+63.96	FM 636	(EXIST) 24"X45' RCP	DA-7	329.66	6.54	326.15	1.27	323.11	0.32	10.42	3.94	10.05	326.55	1.67	323.19	0.40	11.32	4.50	
		(PROP) 24"X56' RCP				326.19	1.27	322.67	0.32	10.43	3.94		326.59	1.67	322.75	0.40	11.79	4.50	

REFERENCES:

1) TXDOT'S HYDRAULIC DESIGN MANUAL (JULY 2016).

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
PROFESSIONAL ENGINEER

Marlena Kelly 1/8/21

Texas Department of Transportation

FM 636

HYDRAULIC CALCULATIONS SHEET

SCALE: N.T.S. SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
CHECK	6	SEE TITLE SHEET	FM 636
	STATE	DISTRICT / COUNTY	SHEET NO.
GRAPHICS	TEXAS	DAL / NAVARRO	147
CHECK	CONTROL	SECTION / JOB	
	0574	02 / 021	

CULVERT HYDRAULIC DATA

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	ALLOWABLE HEADWATER (FT)	10 YEAR (DESIGN)							100 YEAR (CHECK)							COMMENTS
					FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	
127+65.08	FM 636	(EXIST) 18"X 46' MCP	DA-8	320.96	10.96	318.38	2.49	315.87	0.90	11.66	1.61	16.94	320.52	4.63	316.08	1.11	12.99	1.81	
		(PROP) 24"X 54' RCP				318.09	2.49	316.08	1.11	8.58	1.81		318.09	2.49	316.08	1.11	8.58	1.81	
151+51.08	FM 636	(EXIST) 4-48"X 60' RCP	DA-9	308.73	303.80	304.71	4.14	303.37	3.16	7.14	2.92	470.48	306.70	6.13	303.37	3.73	11.07	3.26	
		(PROP) 4-48"X 70' RCP				303.73	4.14	404.47	3.73	7.02	2.92		306.73	6.13	303.94	3.73	9.97	3.26	
205+70.95	FM 636	(EXIST) 18"X 53' RCP	DA-11	320.28	9.59	318.26	2.17	316.49	0.59	6.36	2.58	14.77	319.88	3.77	316.63	0.73	8.61	2.91	
		(PROP) 18"X 48' RCP				318.26	2.17	316.49	0.59	6.36	2.58		319.78	3.77	316.63	0.73	8.61	2.91	
206+40.47	FM 636	(EXIST) 2-30"X 47' RCP	DA-12	320.36	57.21	317.80	2.77	315.31	0.48	7.11	2.49	88.07	319.78	4.85	315.48	0.65	9.60	2.97	
		(PROP) 2-30"X 50' RCP				318.03	3.03	315.34	0.51	7.47	2.59		319.78	4.85	315.48	0.65	9.60	2.97	
216+64.85	FM 636	(EXIST) 24"X 46' RCP	DA-13	329.96	13.18	327.97	2.05	325.89	0.25	6.08	1.58	20.24	328.81	2.98	325.94	0.30	7.45	1.78	
		(PROP) 24"X 43' RCP				327.97	2.05	325.89	0.25	6.08	1.58		328.81	2.98	325.94	0.30	7.45	1.78	
240+32.90	FM 636	(EXIST) 1-30"X 81' RCP	DA-14	382.67	46.30	375.91	2.54	372.05	0.92	12.21	5.57	71.03	382.75	9.28	372.21	1.08	15.51	6.20	
		(PROP) 2-30"X 85' RCP				375.91	2.54	372.05	0.92	12.21	5.57		377.08	3.71	372.21	1.08	13.45	6.20	

REFERENCES:

1) TXDOT'S HYDRAULIC DESIGN MANUAL (JULY 2016).

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
PROFESSIONAL ENGINEER

1/8/21

FM 636

HYDRAULIC CALCULATIONS SHEET

SCALE: N.T.S. SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CHECK	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	148
	0574	02	021	

CULVERT HYDRAULIC DATA

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	ALLOWABLE HEADWATER (FT)	10 YEAR (DESIGN)							100 YEAR (CHECK)							COMMENTS
					FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	
252+44	FM 636	(EXIST) 18"X54' RCP	DA-15	443.51	4.26	440.81	1.15	438.00	0.41	9.04	1.83	6.54	441.19	1.53	438.10	0.52	9.89	2.07	
		(PROP) 18"X54' RCP				440.81	1.15	438.00	0.41	9.04	1.83		441.19	1.53	438.10	0.52	9.89	2.07	
265+55	FM 636	(EXIST) 24"X52' RCP	DA-16	433.28	20.78	431.66	3.05	428.30	0.71	10.04	4.31	32.00	433.33	4.72	428.47	0.88	11.07	4.86	
		(PROP) (2)-24"X52' RCP				430.34	1.73	428.30	1.67	10.77	5.88		430.97	2.36	428.47	0.88	9.44	4.86	
270+27	FM 636	(EXIST) 24"X54' RCP	DA-17	433.02	20.60	432.01	3.03	429.06	0.78	8.97	3.71	31.74	433.09	4.11	429.25	0.97	9.59	4.17	
		(PROP) 2-24"X54' RCP				431.33	2.35	429.25	0.97	8.39	4.17		431.33	2.35	429.25	0.97	8.39	4.17	
277+55	FM 636	(EXIST) 24"X50' RCP	DA-18	429.94	27.42	428.93	4.33	424.64	0.85	10.30	4.35	42.25	428.93	4.33	424.64	0.85	10.30	4.35	
		(PROP) 30"X 54' RCP				427.51	2.91	424.64	0.85	9.68	4.35		429.18	2.91	424.84	1.05	10.93	4.88	
284+55	FM 636	(EXIST)(2)-48"X46' RCP	DA-19	431.75	60.16	427.06	2.30	426.17	1.64	6.98	3.47	92.82	427.77	3.01	426.52	1.99	7.84	3.89	
		(PROP)(2)-48"X46' RCP				427.06	2.30	426.17	1.64	6.98	3.47		427.77	3.01	426.52	1.99	7.84	3.89	
301+61	FM 636	(EXIST) 48"X50' RCP	DA-20	433.20	52.70	428.5	3.26	426.53	1.54	8.07	3.36	81.28	429.6	4.36	426.87	1.88	9.09	3.76	
		(PROP) 48"X52' RCP				428.5	3.26	426.53	1.54	8.07	3.36		429.6	4.36	426.87	1.88	9.09	3.76	

REFERENCES:

1) TXDOT'S HYDRAULIC DESIGN MANUAL (JULY 2016).

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
PROFESSIONAL ENGINEER

Marlena Kelly 1/8/21

Texas Department of Transportation

FM 636

HYDRAULIC CALCULATIONS SHEET

SCALE: N.T.S. SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CHECK	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	149
	0574	02	021	

CULVERT HYDRAULIC DATA

STATION	ROADWAY	DESCRIPTION	DRAINAGE AREA ID	ALLOWABLE HEADWATER (FT)	10 YEAR (DESIGN)							100 YEAR (CHECK)							COMMENTS
					FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	FLOW "Q" (CFS)	HW ELEV (FT)	HW DEPTH (FT)	TW ELEV (FT)	TW DEPTH (FT)	OUTLET VELOCITY (FT/S)	TW VELOCITY (FT/S)	
333+74.90	FM 636	(EXIST) 5-48"X59.25' RCP	DA-21	408.02	275.69	404.10	3.34	402.56	1.80	9.37	13.70	426.46	405.28	4.52	402.94	2.18	10.52	15.32	
		(PROP) 5-48"X59.25' RCP				404.10	3.34	402.56	1.80	9.37	13.70		405.28	4.52	402.94	2.18	10.52	15.32	
352+75.25	FM 636	(EXIST) 2-48"X45.44' RCP	DA-22	424.27	104.78	420.82	3.22	418.53	1.67	10.77	5.88	160.75	421.90	4.30	418.89	2.03	11.94	6.56	
		(PROP) 2-48"X45.44' RCP				420.82	3.22	418.53	1.67	10.77	5.88		421.90	4.30	418.89	2.03	11.94	6.56	
373+68.74	FM 636	(EXIST) 2-36"X72.20' RCP	DA-23	424.30	77.18	421.56	3.20	418.90	1.13	9.31	7.99	118.73	423.14	4.78	419.16	1.39	10.41	8.95	
		(PROP) 2-36"X72.20' RCP				421.56	3.20	418.90	1.13	9.31	7.99		423.14	4.78	419.16	1.39	10.41	8.95	
380+59.00	FM 636	(EXIST) 36"X57.43' RCP	DA-24	422.69	42.13	419.05	3.43	415.99	0.88	9.55	6.40	65.11	420.96	5.34	416.20	1.09	10.76	7.19	
		(PROP) 36"X57.43' RCP				419.05	3.43	415.99	0.88	9.55	6.40		420.96	5.34	416.20	1.09	10.76	7.19	
407+29.43	FM 636	(EXIST) 3-48"X48.85' RCP	DA-25	412.76	89.78	408.83	2.29	407.03	0.98	8.46	11.64	138.70	409.54	3.00	407.25	1.20	9.41	13.07	
		(PROP) 3-48"X48.85' RCP				408.83	2.29	407.83	0.98	8.46	11.64		409.54	3.00	407.25	1.20	9.41	13.07	
432+21.58	FM 636	(EXIST) 4-48"X53.5' RCP	DA-26	409.21	136.41	404.40	2.48	402.82	1.51	9.21	9.02	210.67	405.16	3.24	403.15	1.84	10.20	10.09	
		(PROP) 4-48"X53.5' RCP				404.40	2.48	402.82	1.51	9.21	9.02		405.16	3.24	403.15	1.84	10.20	10.09	

REFERENCES:

1) TXDOT'S HYDRAULIC DESIGN MANUAL (JULY 2016).

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
PROFESSIONAL ENGINEER

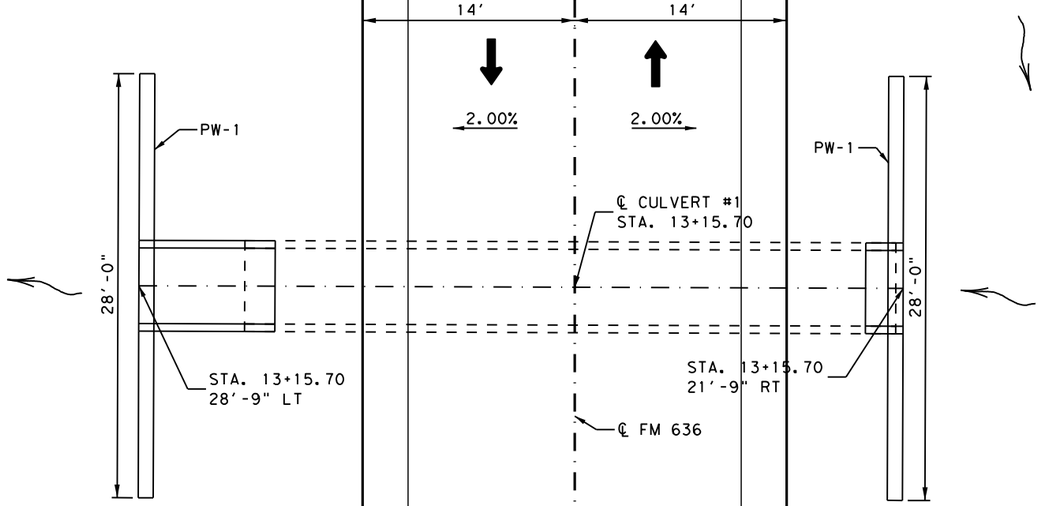
1/8/21

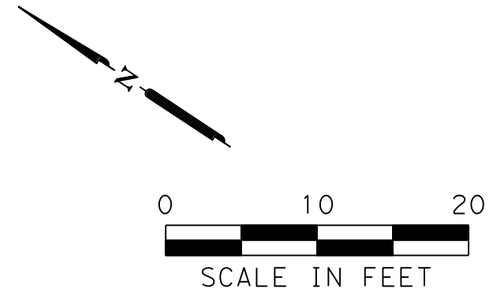
FM 636

HYDRAULIC CALCULATIONS SHEET

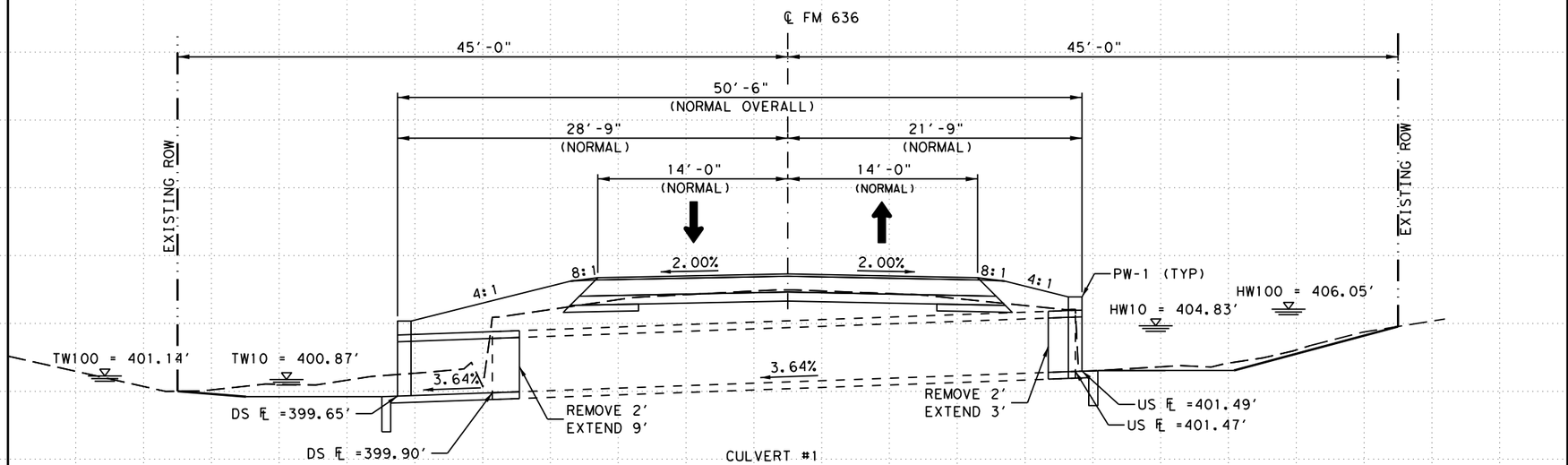
SCALE: N.T.S. SHEET 4 OF 4

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CHECK	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
GRAPHICS	TEXAS	DAL	NAVARRO	
CHECK	CONTROL	SECTION	JOB	150
	0574	02	021	





HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	14.10	81.31	400.87	404.83
100 YEAR	15.39	125.19	401.14	406.05



CULVERT #1
STA. 13+15.70
EXISTING 5'X 4'X 43' SBC
PROPOSED REMOVE 2' & EXTEND 9' LT,
REMOVE 2' & EXTEND 3' RT
W/ 2 PW-1

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET PW-1

FOR SBC TO SBC CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED
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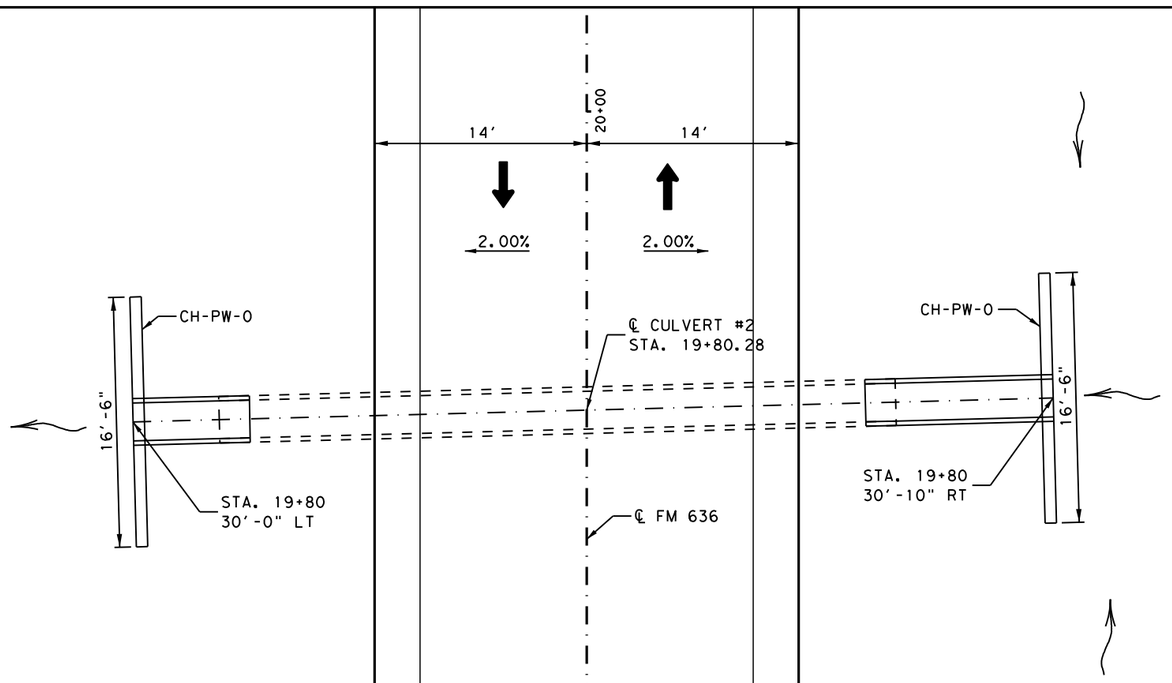
1/8/21

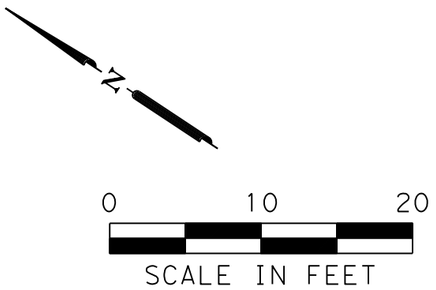
Texas Department of Transportation

FM 636
CULVERT #1
PLAN & PROFILE

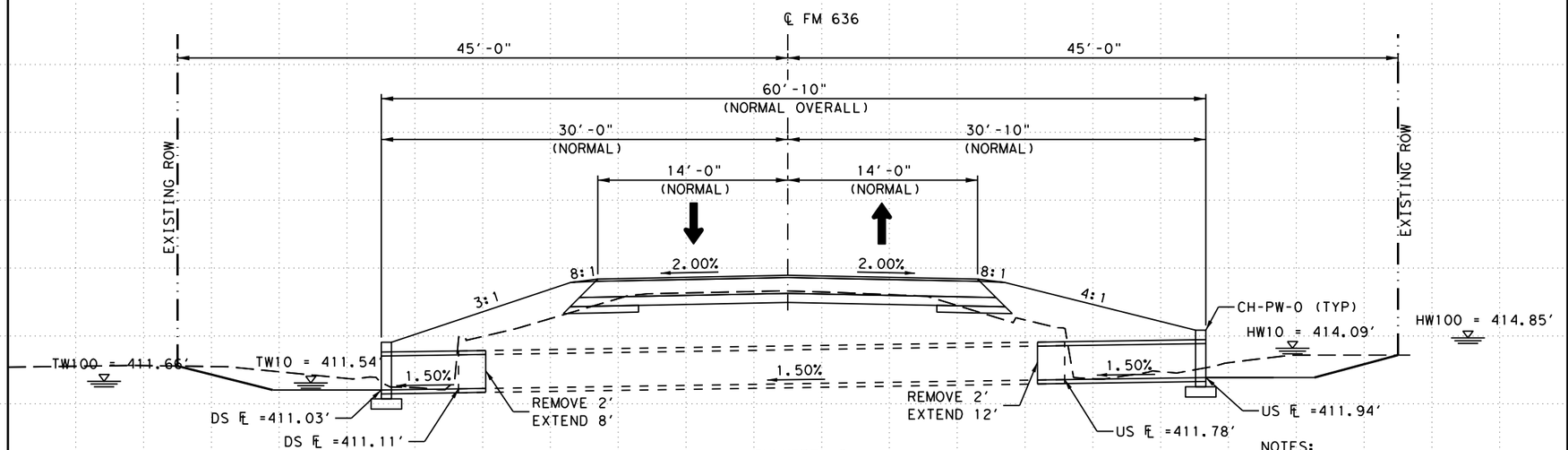
SHEET 1 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	151
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	





HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.15	17.88	411.54	414.09
100 YEAR	10.10	27.44	411.66	414.85



CULVERT #2
STA. 19+80.28
EXISTING 30"X44.7' RCP
PROPOSED REMOVE 2' & EXTEND 8' LT,
REMOVE 2' & EXTEND 12' RT
W/ 2 PW

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

STATE OF TEXAS
MARLENA KELLY
114354
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PROFESSIONAL ENGINEER

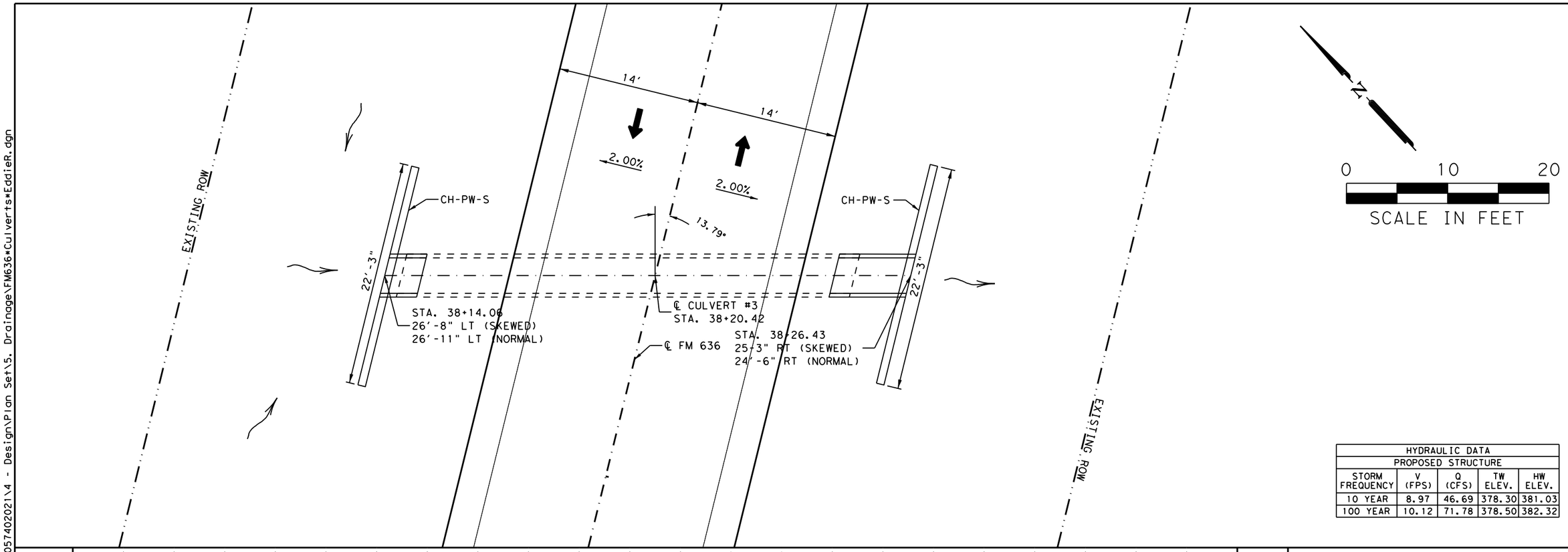
Marlena Kelly 1/8/21

Texas Department of Transportation

FM 636
CULVERT #2
PLAN & PROFILE

SHEET 2 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	152
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	8.97	46.69	378.30	381.03
100 YEAR	10.12	71.78	378.50	382.32

CULVERT #3
STA. 38+20.42
EXISTING 42"X44.7' RCP
PROPOSED REMOVE 2' & EXTEND 4' LT,
REMOVE 2' & EXTEND 8' RT
W/ 2 CH-PW-S

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-S

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

STATE OF TEXAS
MARLENA KELLY
114354
LICENSED PROFESSIONAL ENGINEER

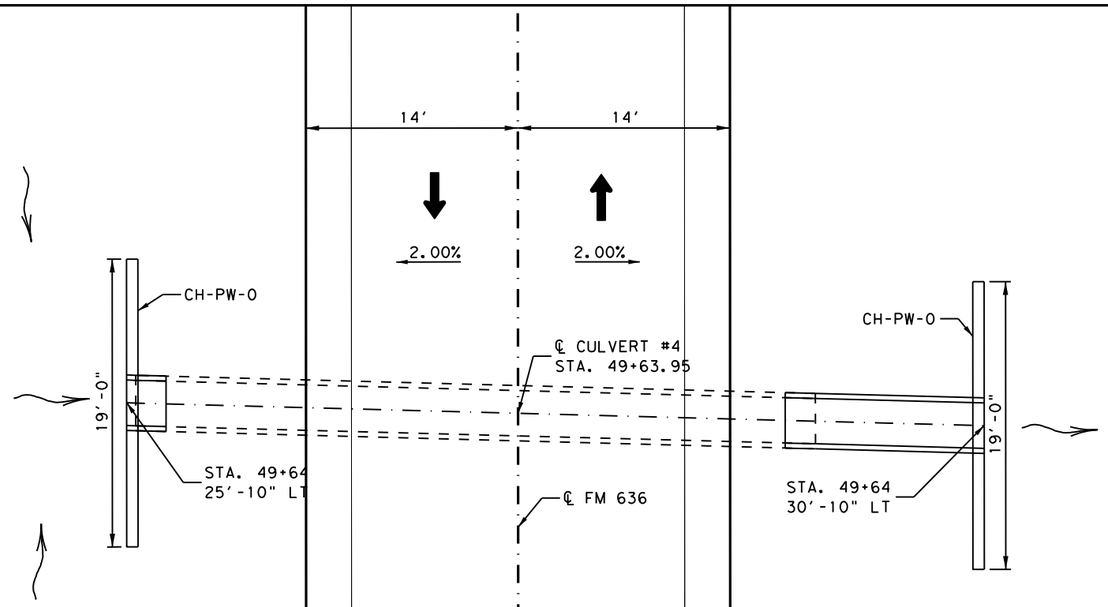
1/8/21

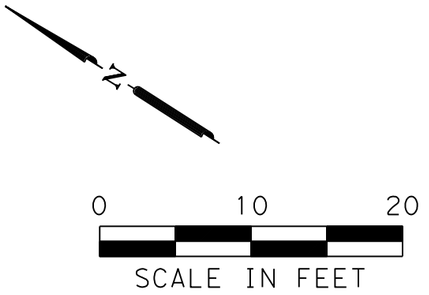
Texas Department of Transportation

FM 636
CULVERT #3
PLAN & PROFILE

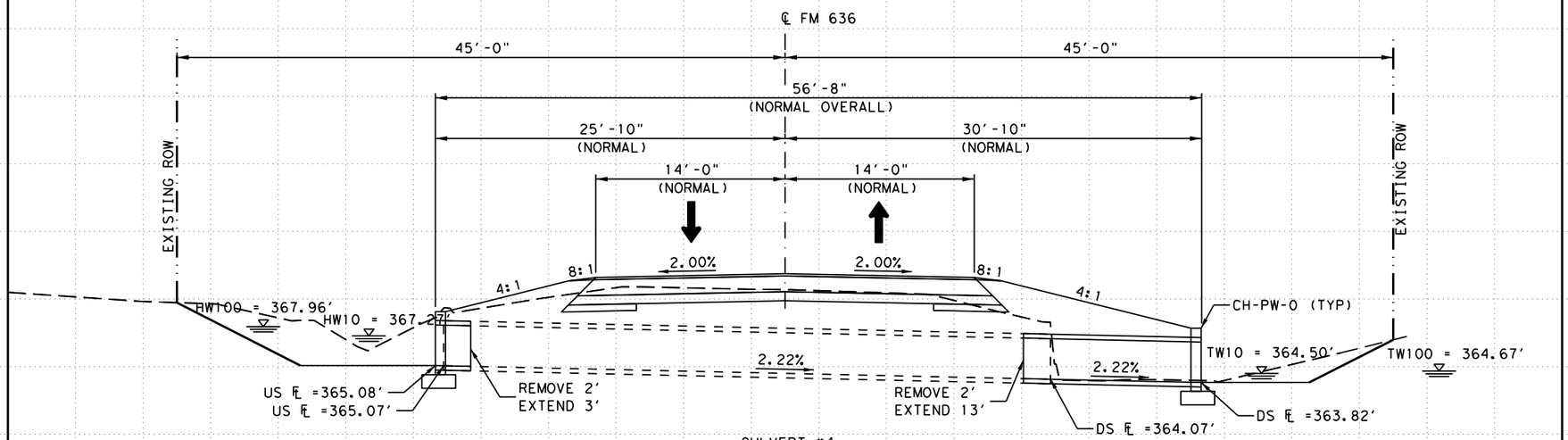
SHEET 3 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	153
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	





HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	10.46	21.92	364.50	367.27
100 YEAR	11.44	33.65	364.67	367.96

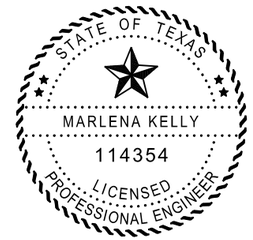


CULVERT #4
STA. 49+63.95
EXISTING 36"X44.9' RCP
PROPOSED REMOVE 2' & EXTEND 3' LT,
REMOVE 2' & EXTEND 13' RT
W/ 2 CH-PW-0

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS



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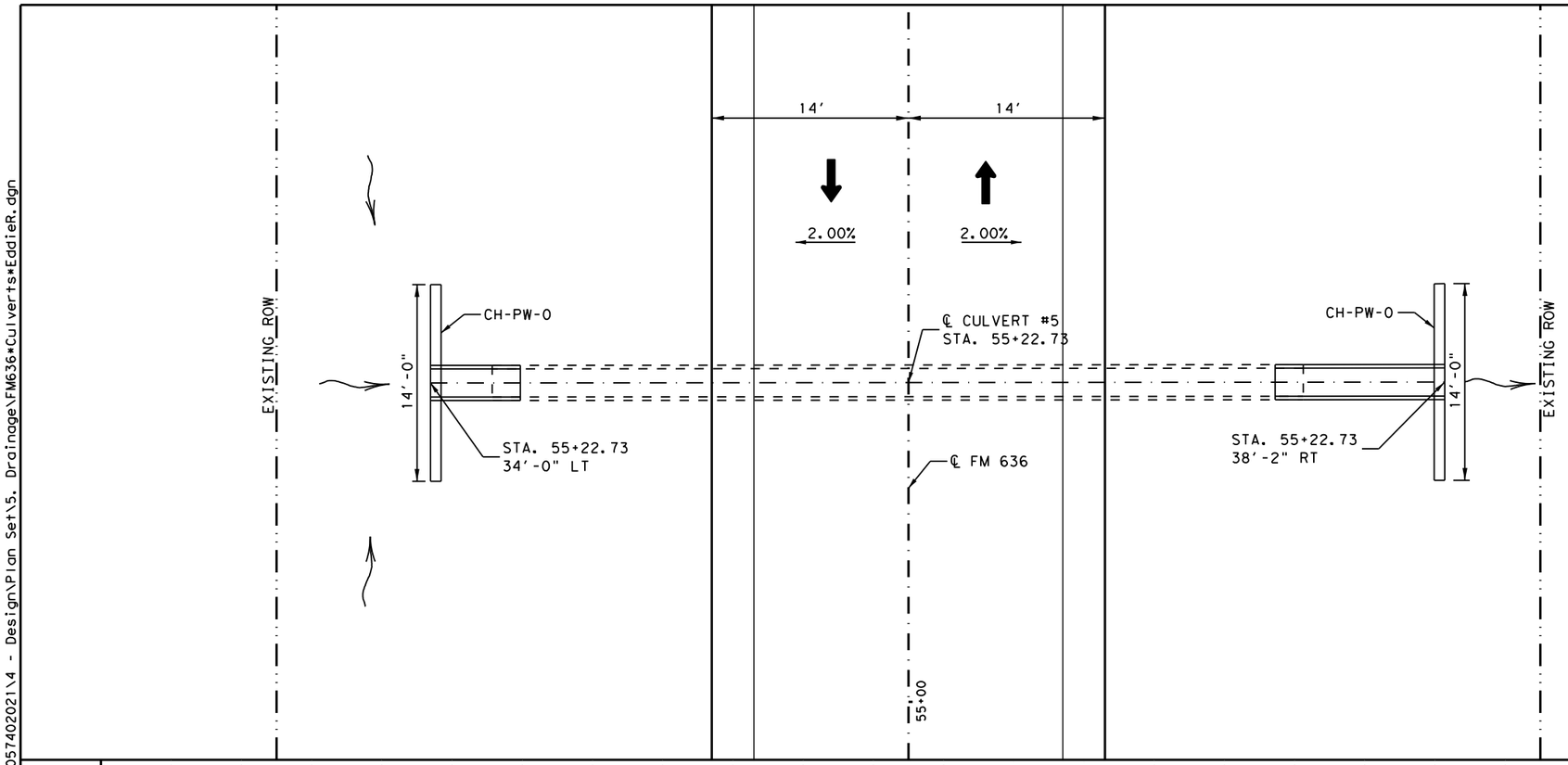
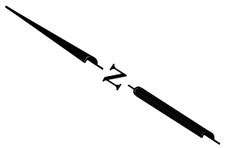
CULVERT #4
PLAN & PROFILE

SHEET 4 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	154
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

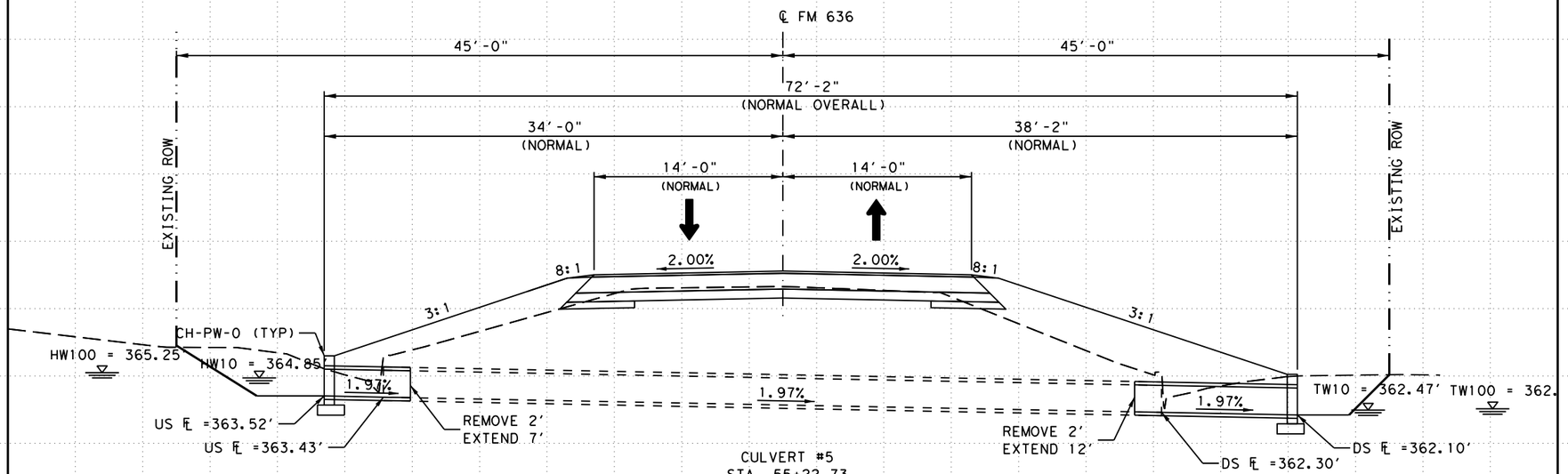




0 10 20

SCALE IN FEET

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	8.18	6.80	362.47	364.85
100 YEAR	9.13	10.44	362.56	365.25



CULVERT #5
STA. 55+22.73
EXISTING 24"X57.8' RCP
PROPOSED REMOVE 2' & EXTEND 7' LT,
REMOVE 2' & EXTEND 12' RT
W/ 2 CH-PW-0

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

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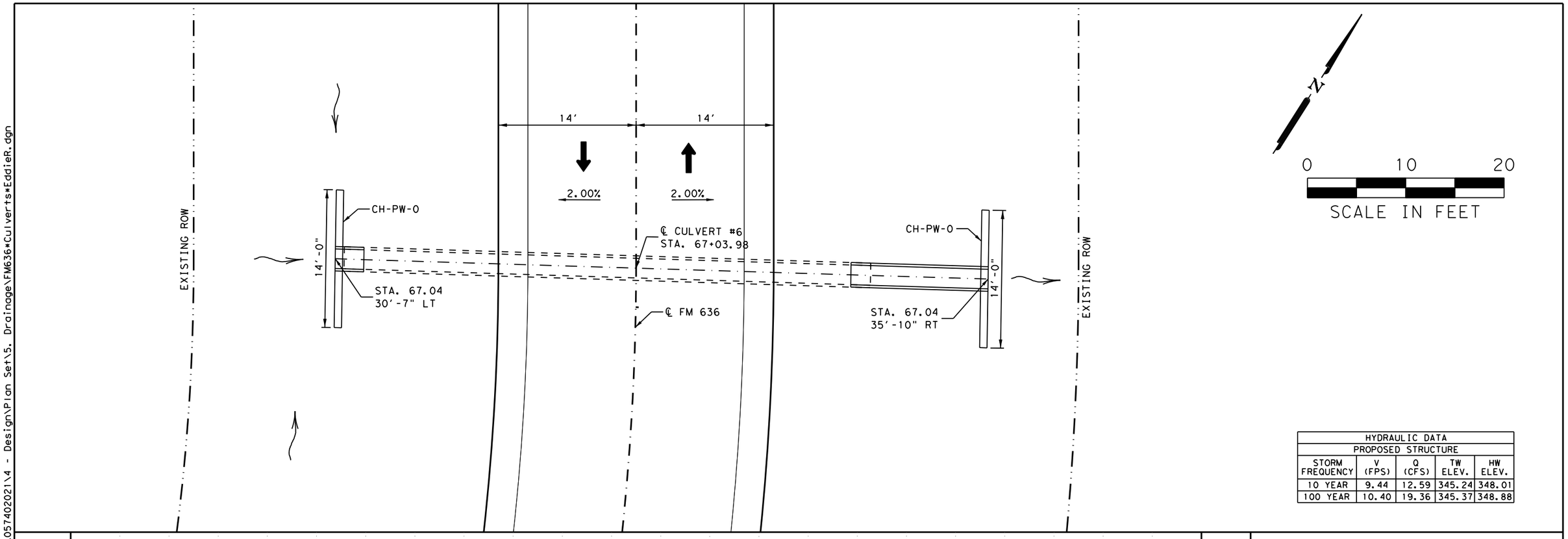
CULVERT #5
PLAN & PROFILE

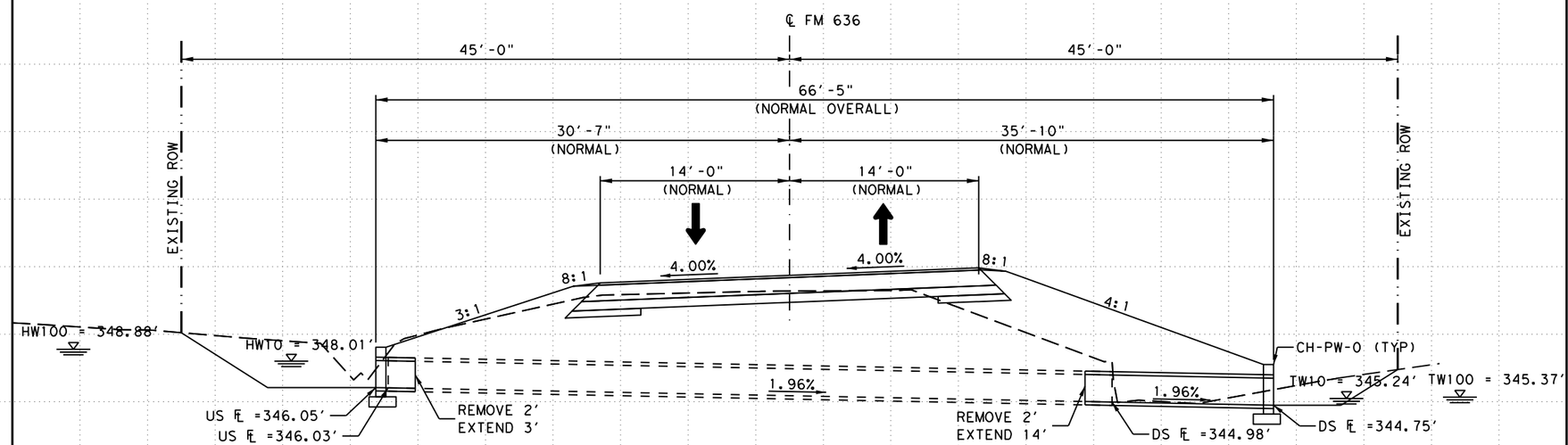
SHEET 5 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	155
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:1:13:50 PM
FILE:pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\5. Drainage\FM636*Culverts*EddieR.dgn



HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.44	12.59	345.24	348.01
100 YEAR	10.40	19.36	345.37	348.88



CULVERT #6
STA. 67+03.98
EXISTING 24"X53.6' RCP
PROPOSED REMOVE 2' & EXTEND 3' LT,
REMOVE 2' & EXTEND 14' RT
W/ 2 CH-PW-0

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

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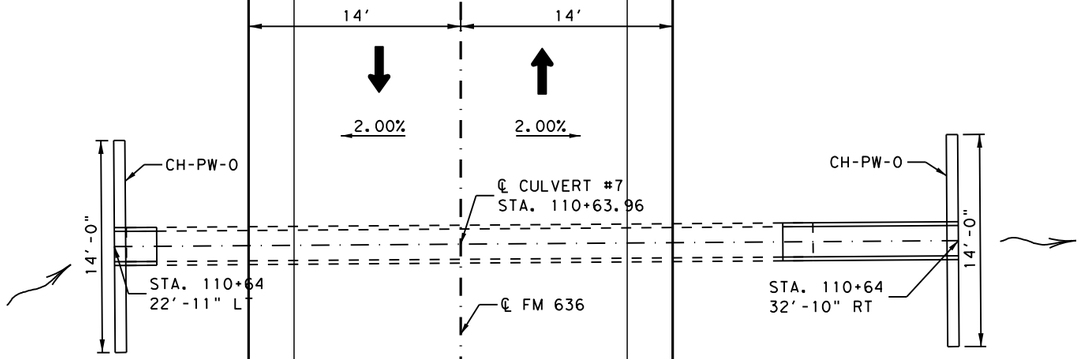
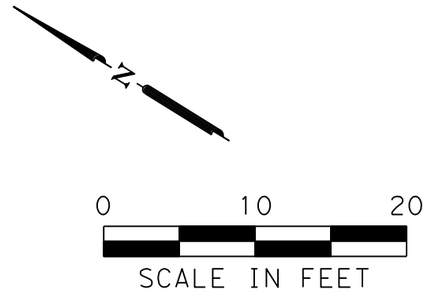
CULVERT #6
PLAN & PROFILE

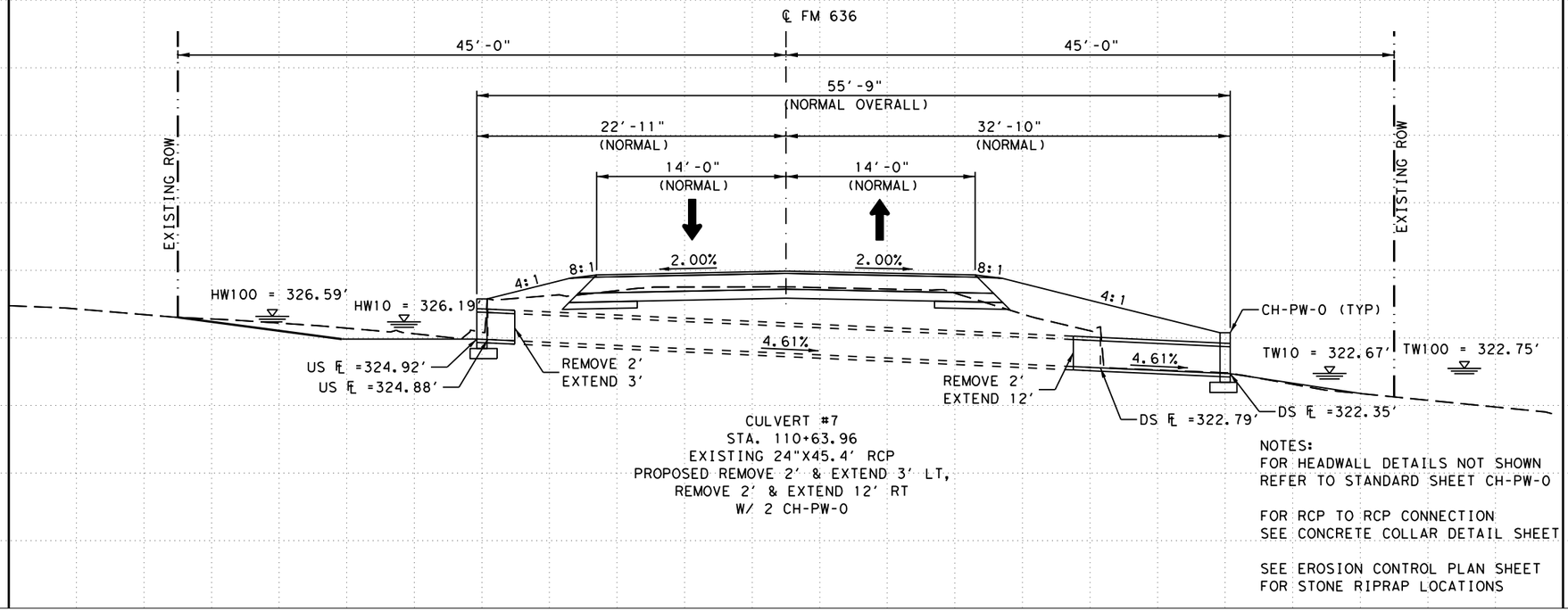
SHEET 6 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	156
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	





HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	10.43	6.54	322.67	326.19
100 YEAR	11.79	10.05	322.75	326.59

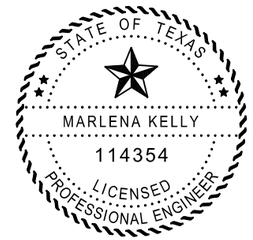


CULVERT #7
STA. 110+63.96
EXISTING 24"X45.4′ RCP
PROPOSED REMOVE 2′ & EXTEND 3′ LT,
REMOVE 2′ & EXTEND 12′ RT
W/ 2 CH-PW-0

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS



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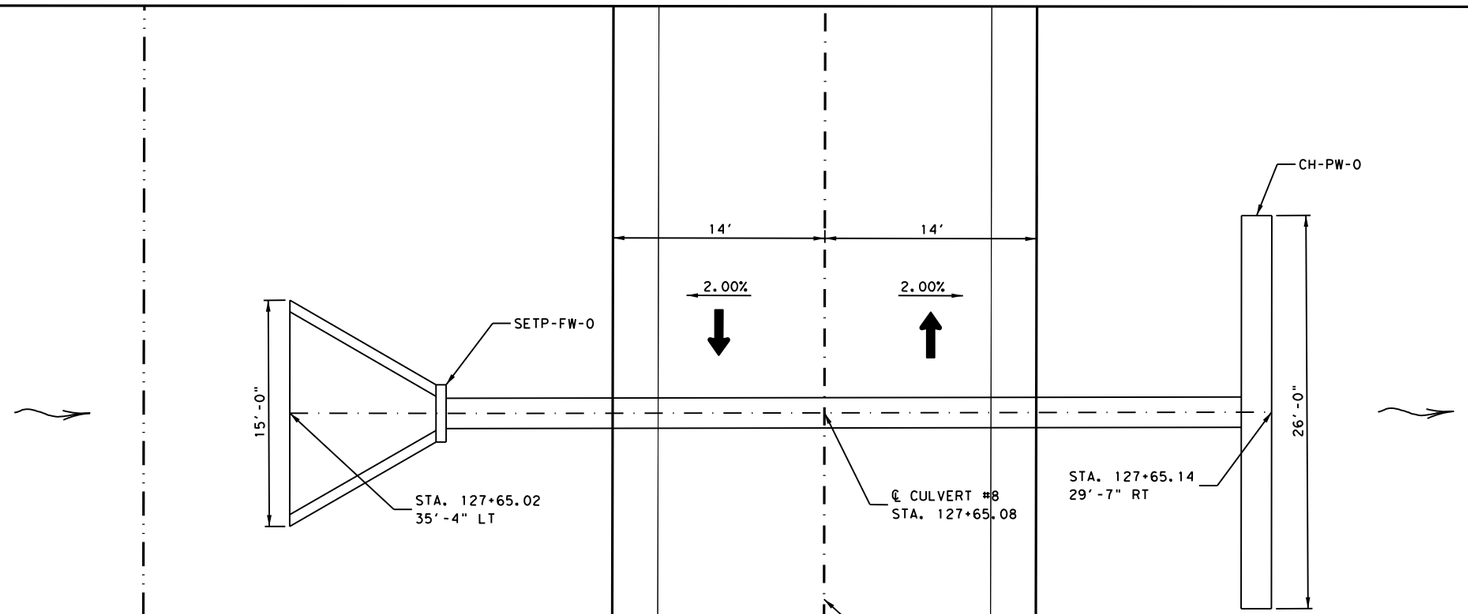
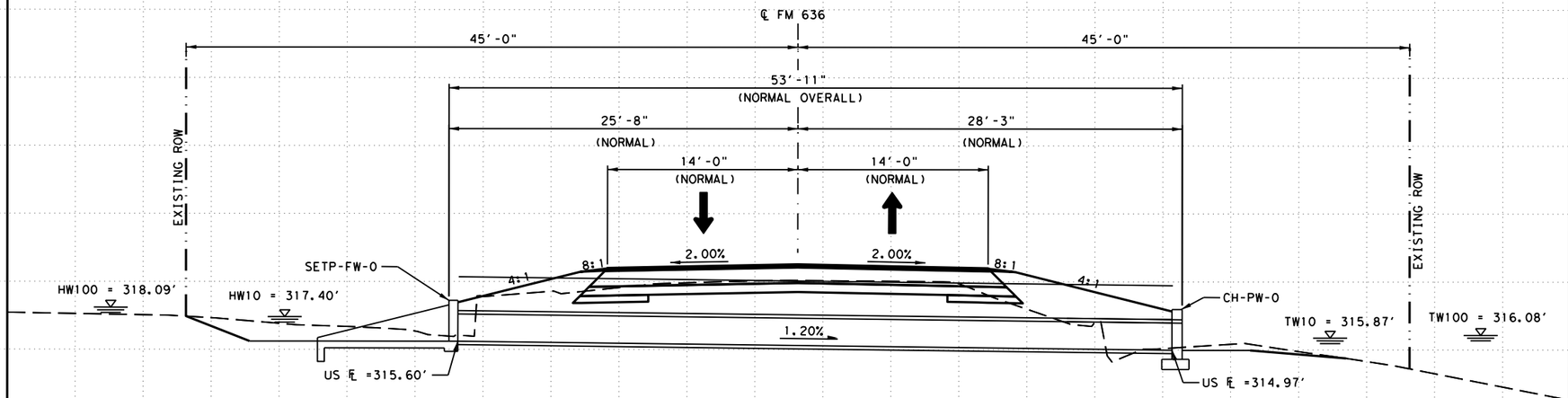
CULVERT #7
PLAN & PROFILE

SHEET 7 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	157
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	7.72	10.96	315.87	317.40
100 YEAR	8.58	16.94	316.08	318.09



CULVERT #8
STA. 127+65.08
EXISTING 24" X 45' CMP TO BE REMOVED
PROPOSED 24" X 53' RCP
SETP-FW-0 LT & CH-PW-0 RT

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CULVERT #8
PLAN & PROFILE

SCALE: 1"=100'

SHEET 8 OF 25

DESIGN	FED.RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	158
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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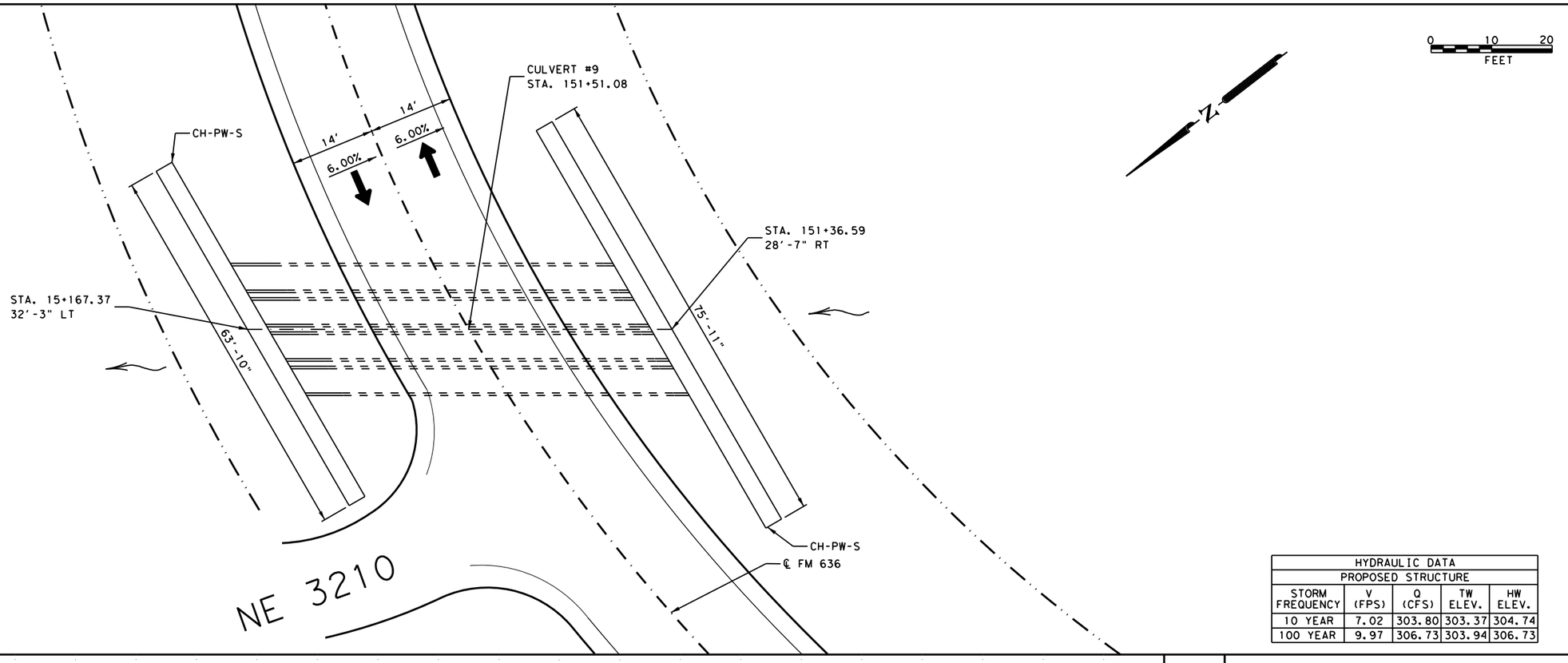
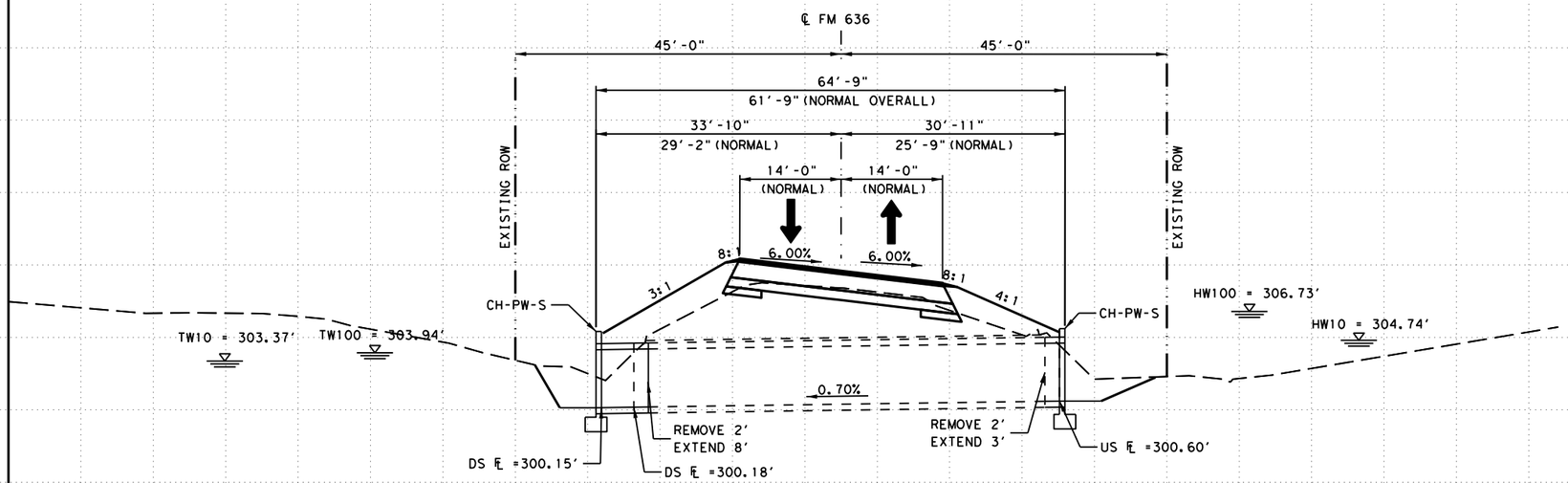


HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	7.02	303.80	303.37	304.74
100 YEAR	9.97	306.73	303.94	306.73



CULVERT #9
STA. 151+51.08
EXISTING 4-48"X 57' RCP
PROPOSED REMOVE 2' & EXTEND 8' LT,
REMOVE 2' & EXTEND 3' RT
W/ 2 CH-PW-S

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CULVERT #9
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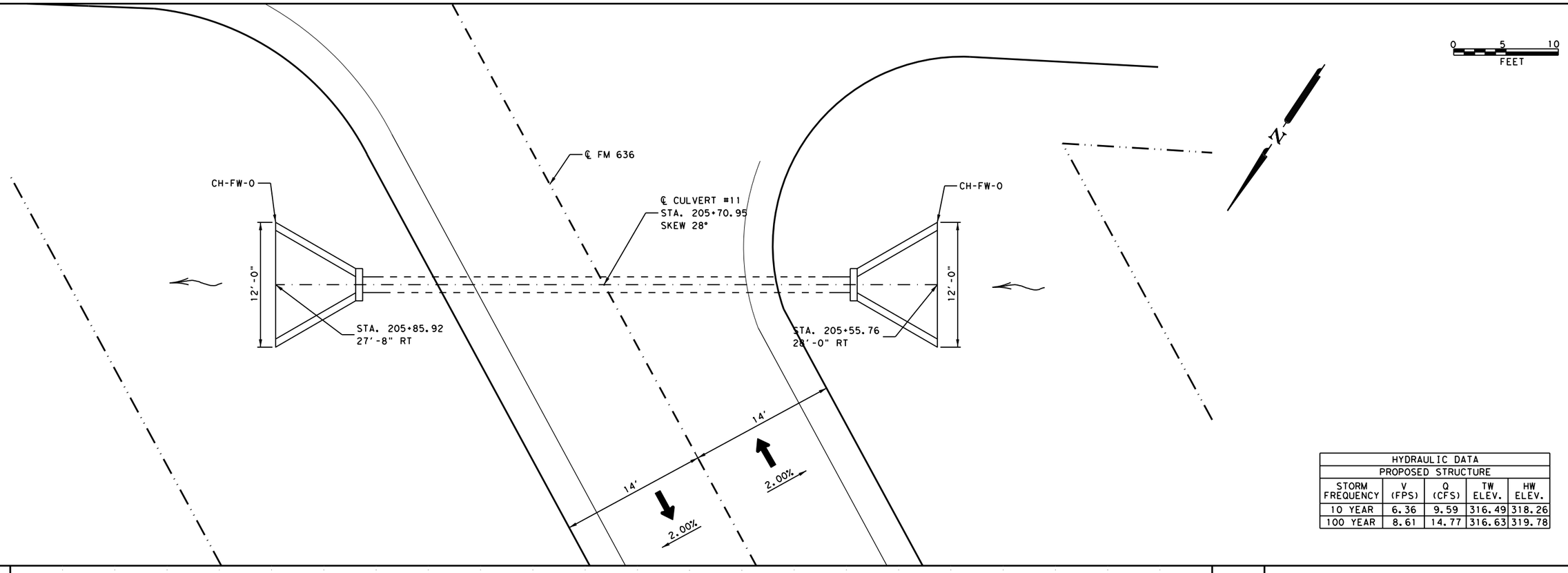
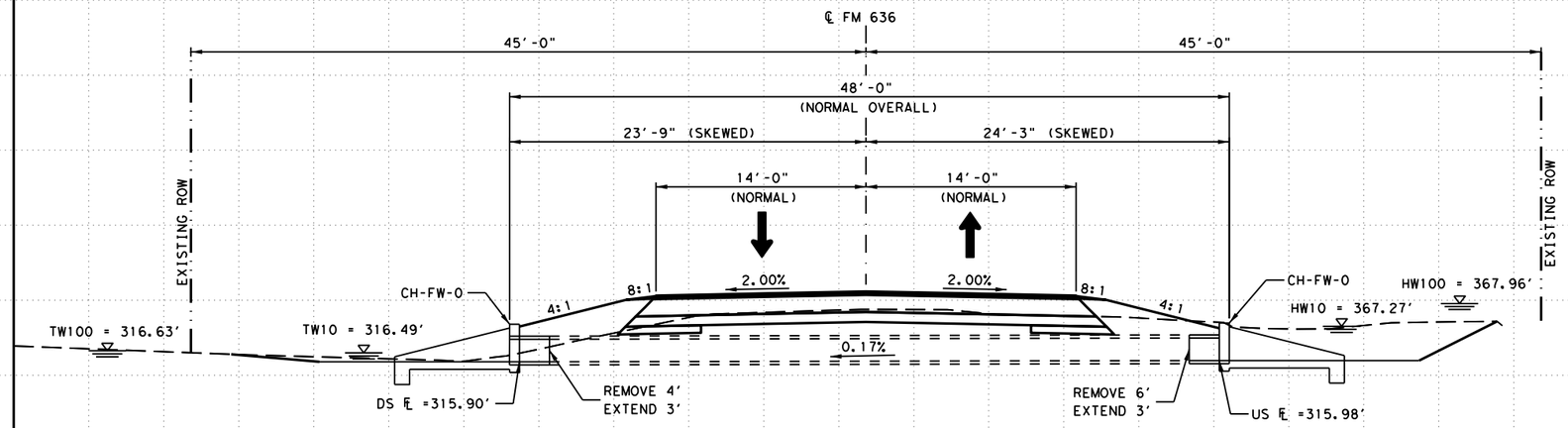
SHEET 9 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	159
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	6.36	9.59	316.49	318.26
100 YEAR	8.61	14.77	316.63	319.78



CULVERT #11
STA. 205+70.9523
EXISTING 18"X 47' RCP
PROPOSED REMOVE 4' & EXTEND 3' LT,
REMOVE 6' & EXTEND 3' RT
W/ 2 SETP-FW-0

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CULVERT #11
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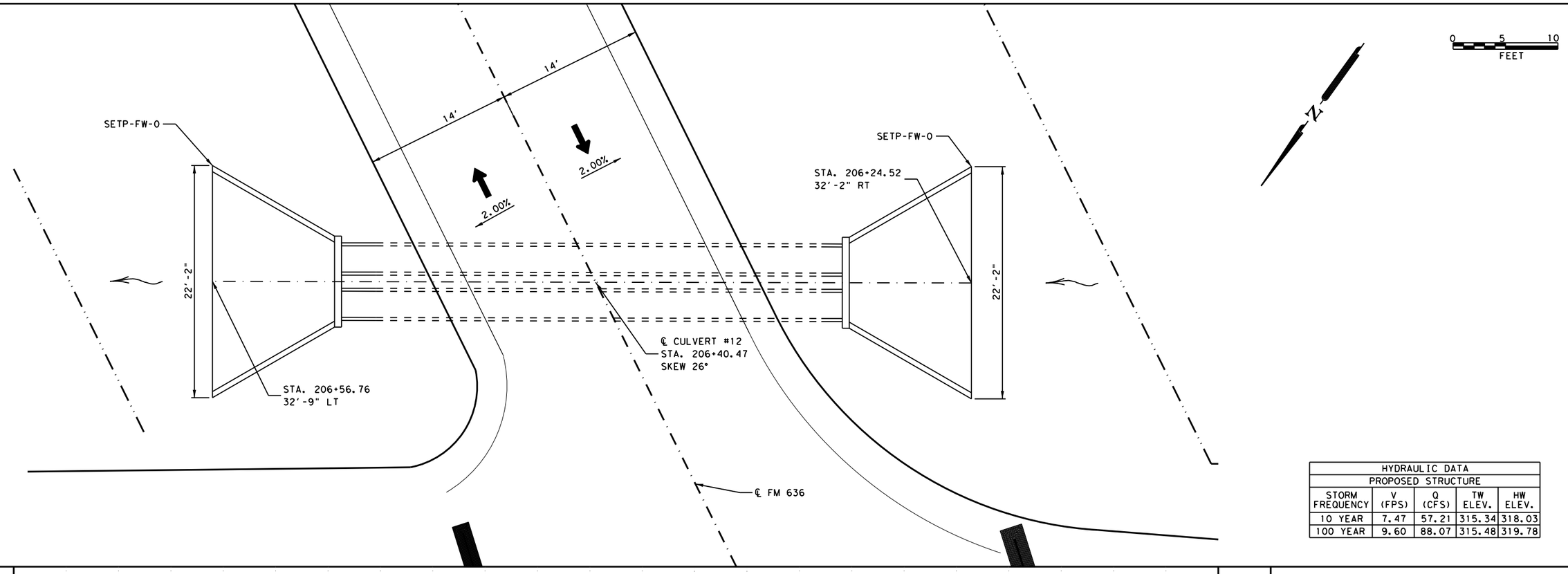
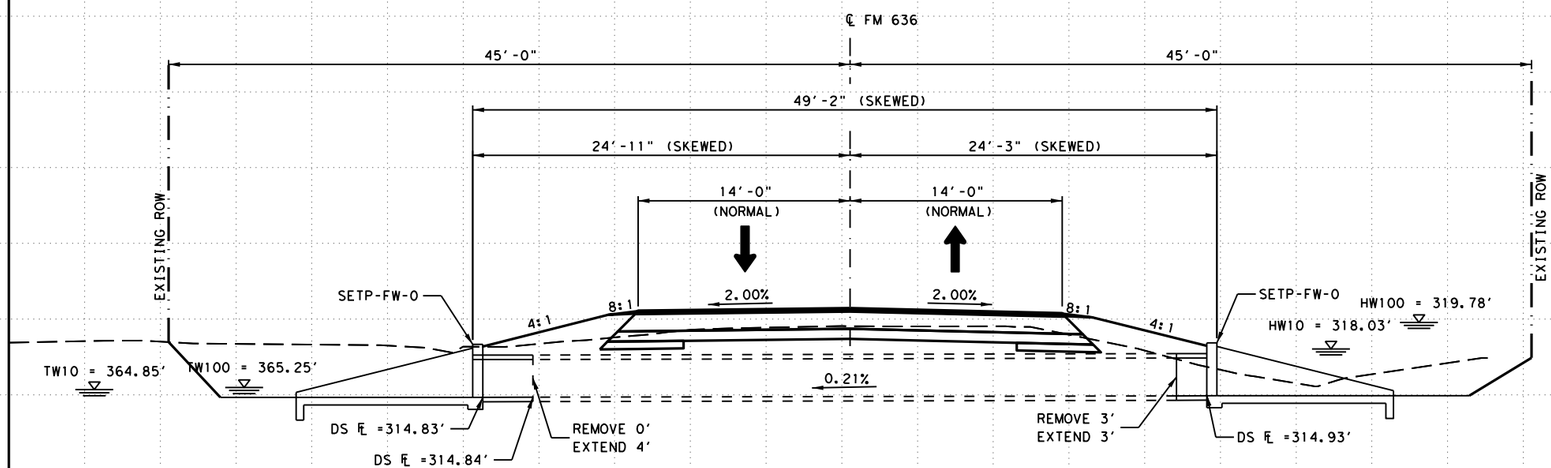
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	160
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	7.47	57.21	315.34	318.03
100 YEAR	9.60	88.07	315.48	319.78



CULVERT #12
STA. 206+40.47
EXISTING 2-30"X 48' RCP
PROPOSED REMOVE 0' & EXTEND 4' LT,
REMOVE 3' & EXTEND 3' RT
W/ 2 SETP-FW-0

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DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	161
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:1:14:02 PM
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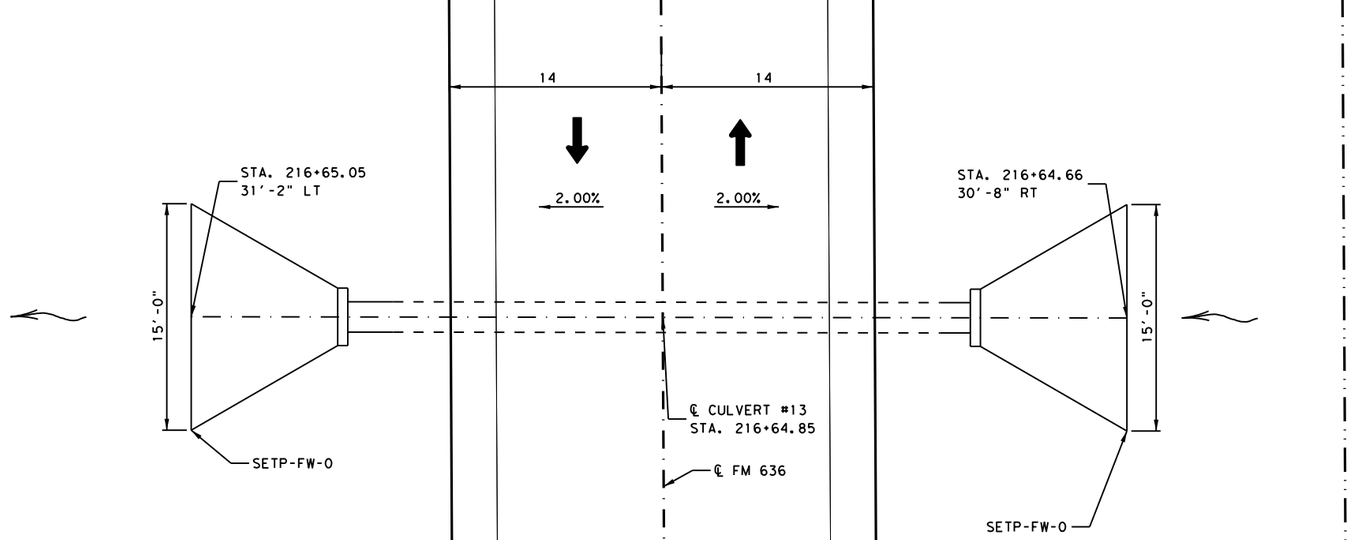
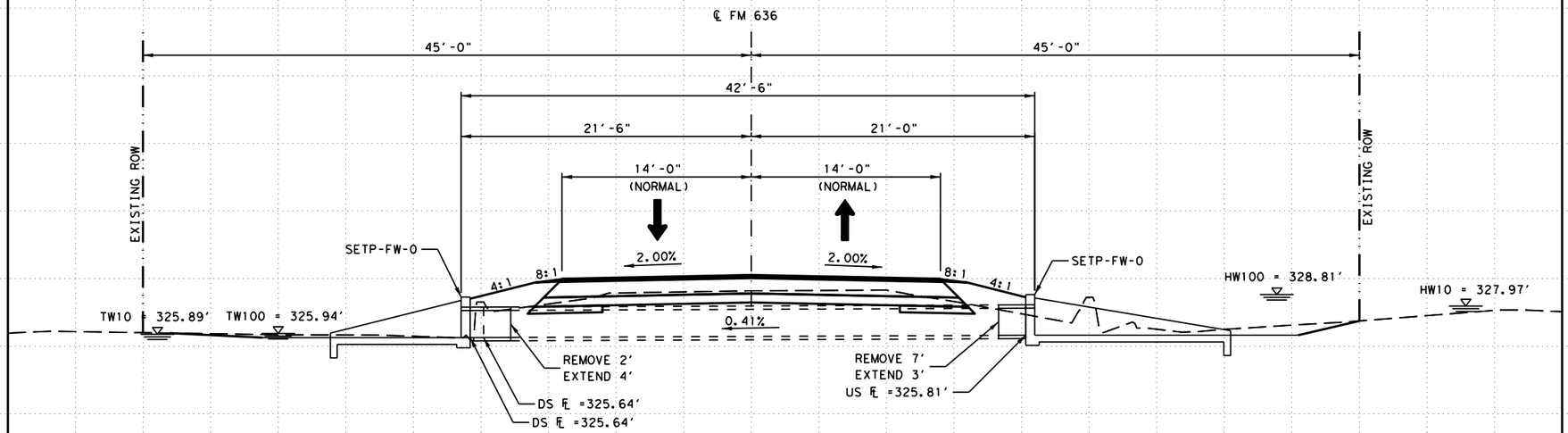


0 5 10
FEET

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	6.08	13.18	325.89	327.97
100 YEAR	7.45	20.24	325.94	328.81



CULVERT #13
STA. 216+64.85
EXISTING 24"X 45' RCP
PROPOSED REMOVE 2' & EXTEND 4' LT,
REMOVE 7' & EXTEND 3' RT
W/ 2 SETP-FW-0

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CULVERT #13
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DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	162
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:1:14:04 PM
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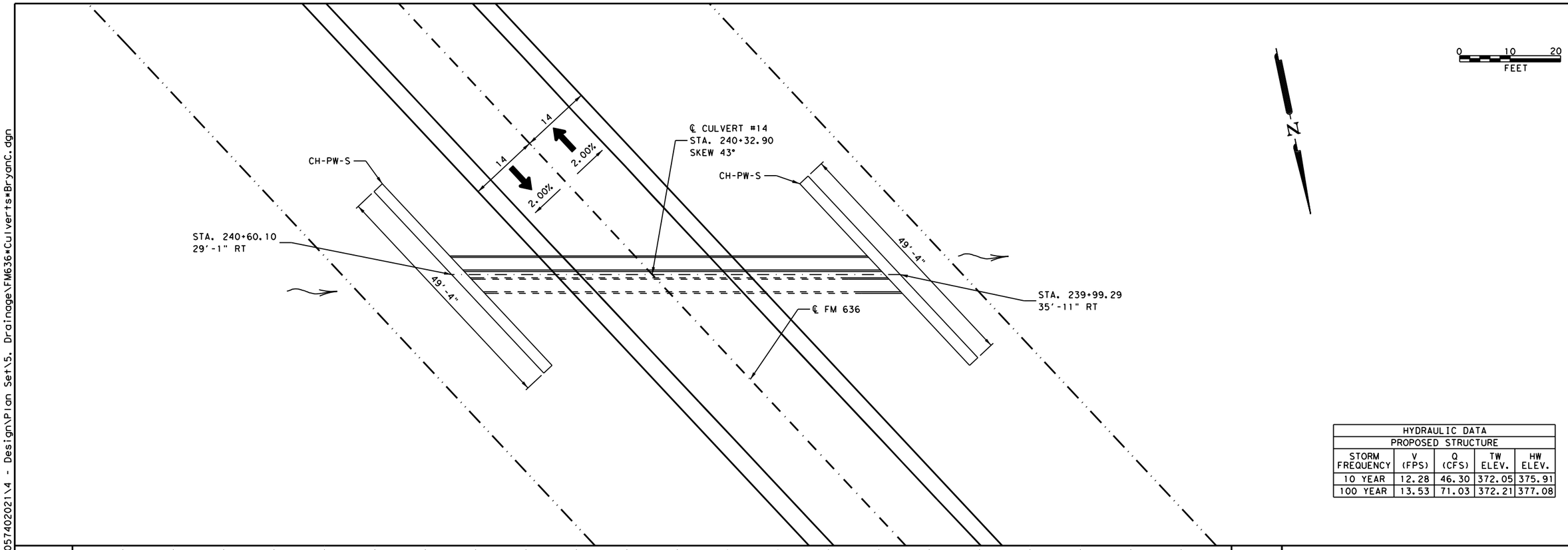
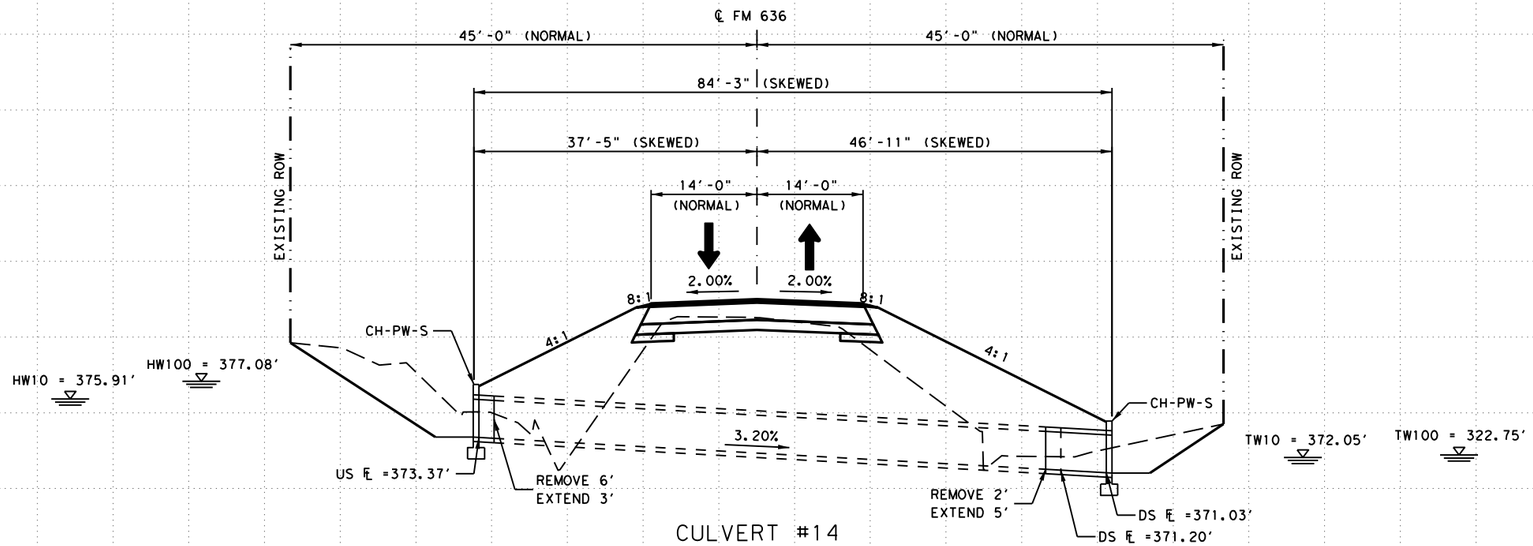


HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	12.28	46.30	372.05	375.91
100 YEAR	13.53	71.03	372.21	377.08



CULVERT #14
STA. 240+32.90
EXISTING 30"X 80' RCP
ADD 1-30"X 85 RCP
PROPOSED REMOVE 6' & EXTEND 3' LT,
REMOVE 2' & EXTEND 5' RT
W/ 2 CH-PW-S

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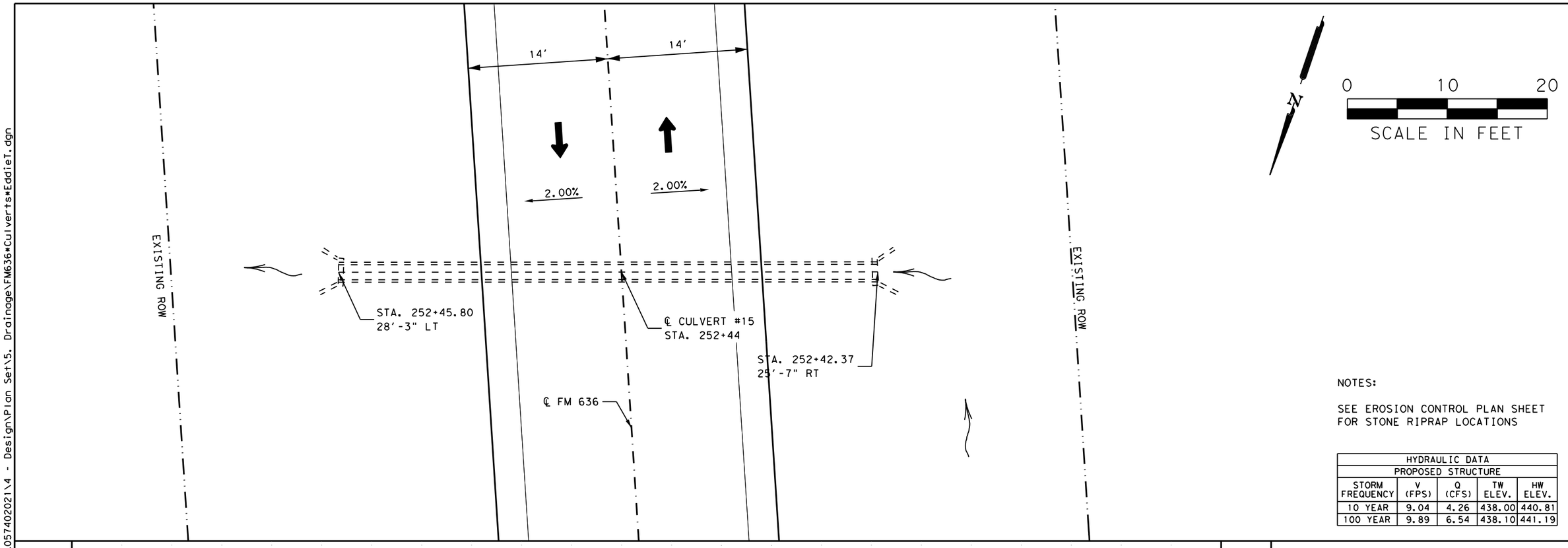
CULVERT #14
PLAN & PROFILE

SCALE: 1"=100'

SHEET 13 OF 25

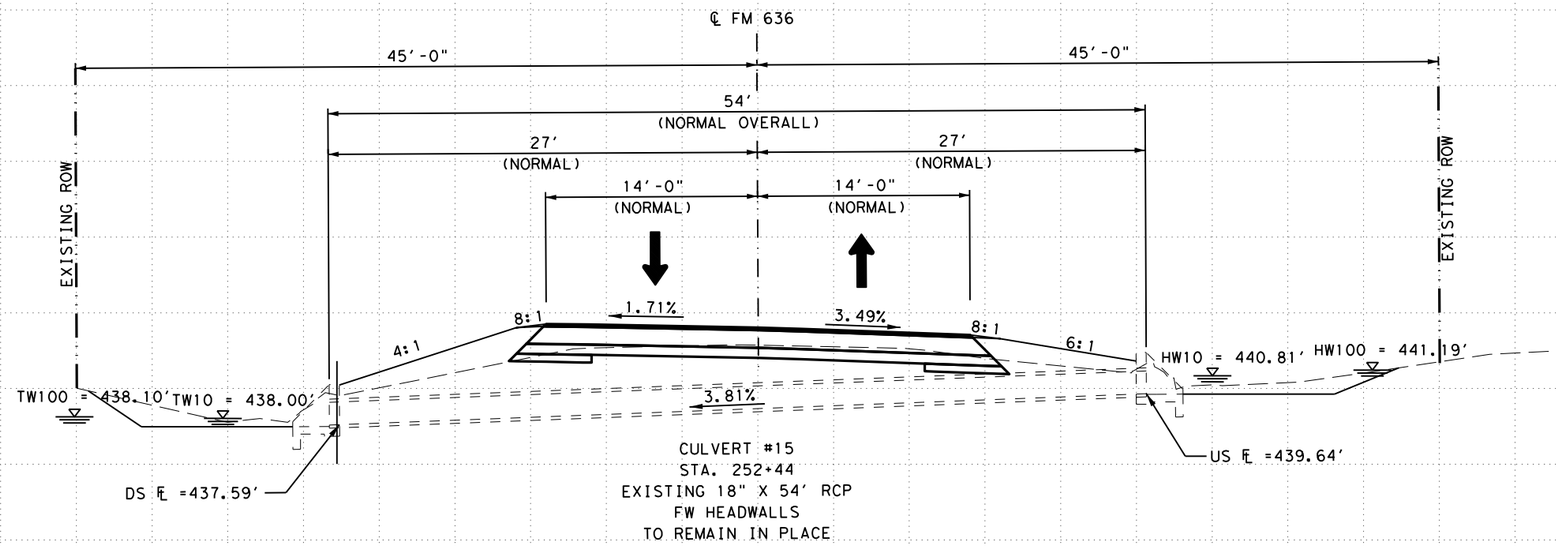
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	163
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



NOTES:

SEE EROSION CONTROL PLAN SHEET FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.04	4.26	438.00	440.81
100 YEAR	9.89	6.54	438.10	441.19



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CULVERT #15
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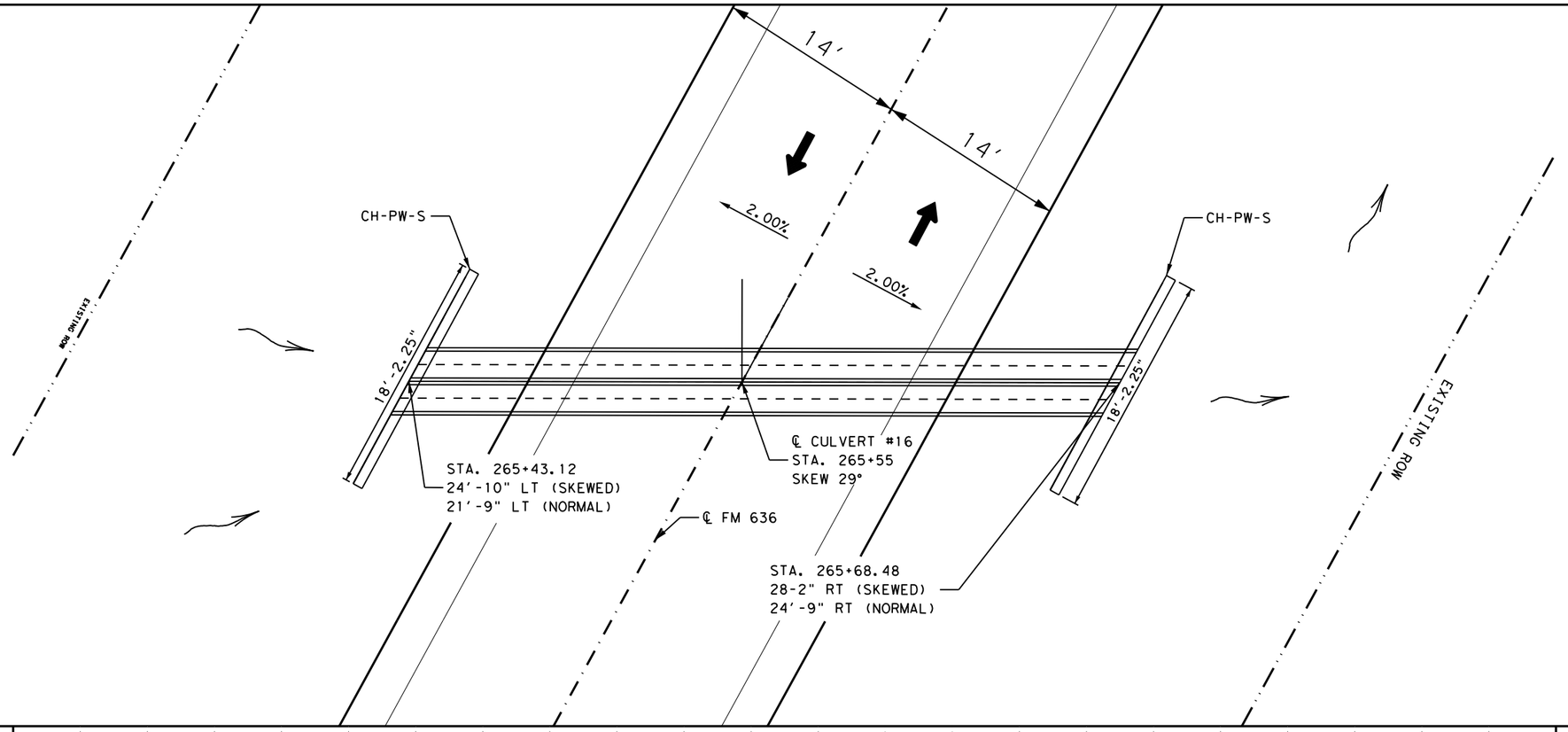
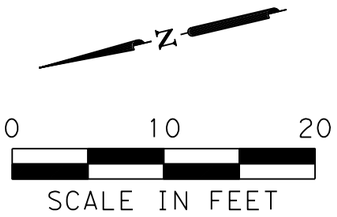
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	164
	CONTROL	SECTION	JOB	
	0574	02	021	



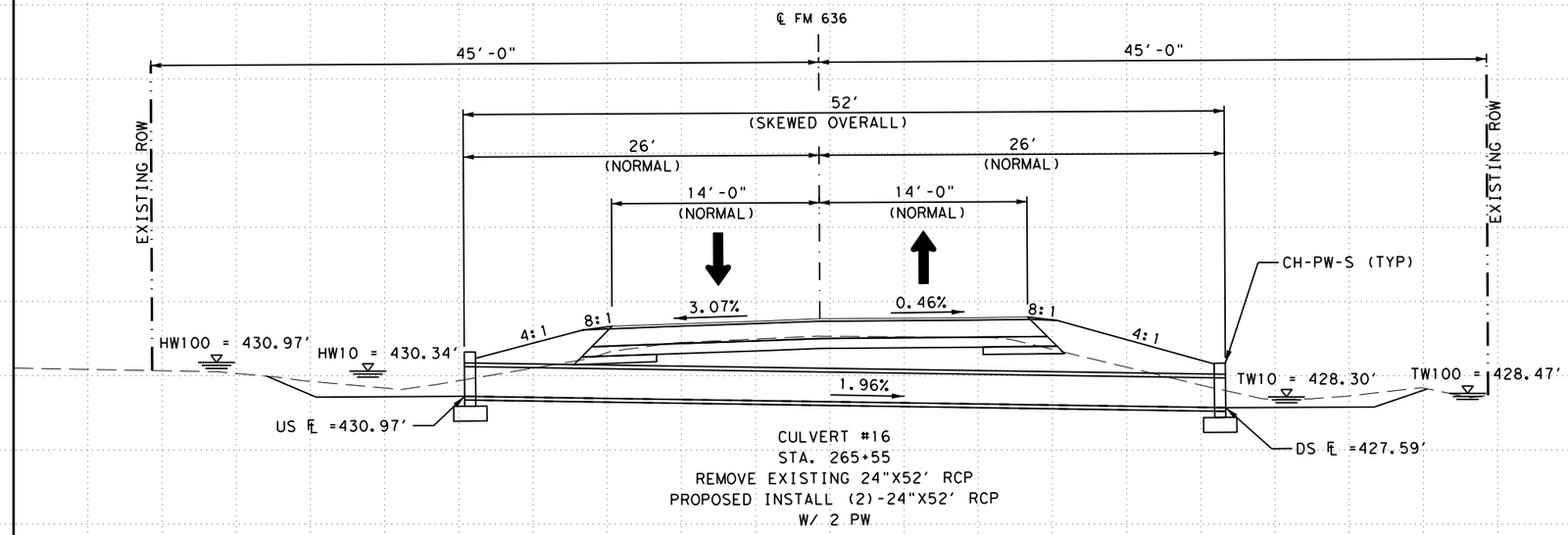


NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

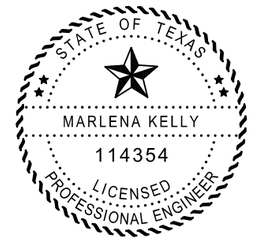
FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	8.56	20.78	428.30	430.34
100 YEAR	9.44	32.00	428.47	430.97



CULVERT #16
STA. 265+55
REMOVE EXISTING 24"X52' RCP
PROPOSED INSTALL (2)-24"X52' RCP
W/ 2 PW



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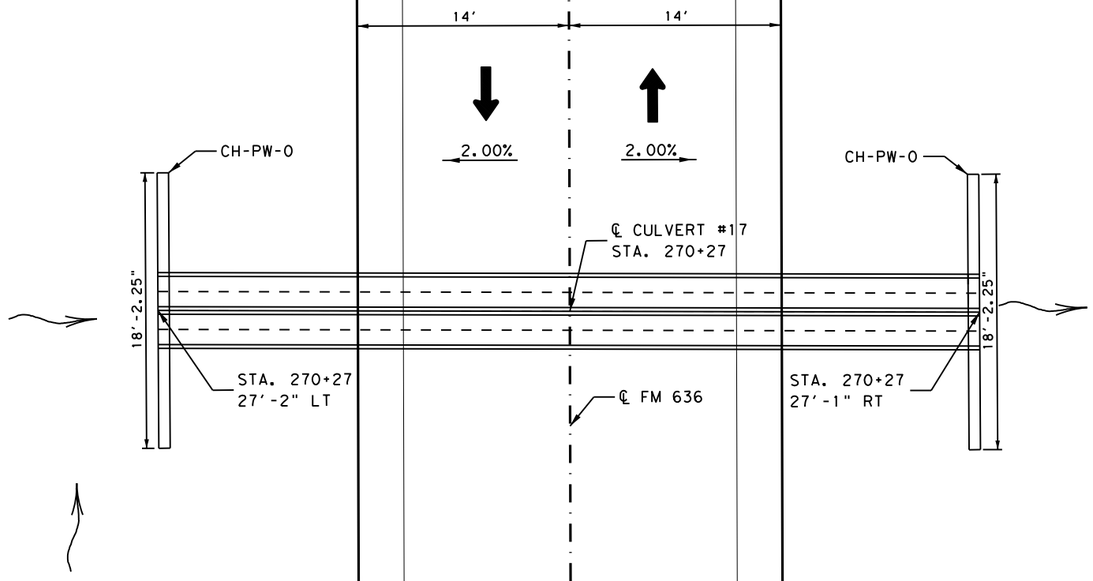
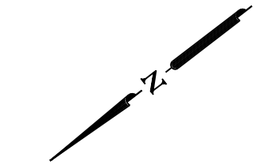
FM 636
CULVERT #16
PLAN & PROFILE

SHEET 15 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	165
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	





0 10 20

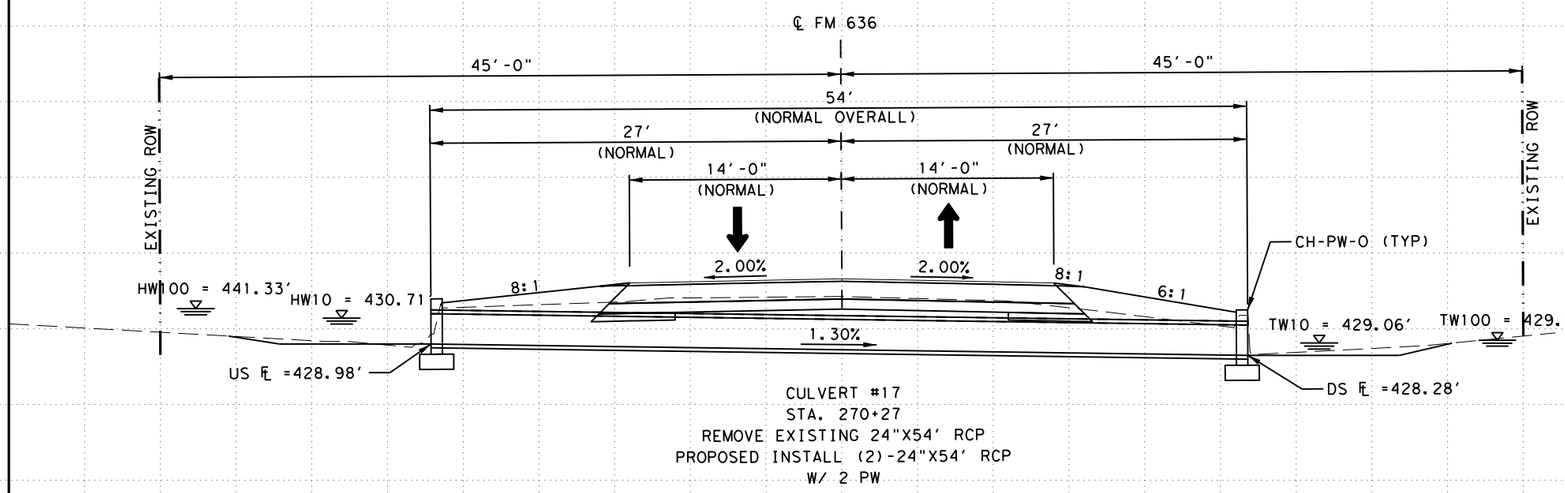
SCALE IN FEET

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	7.55	20.60	429.06	430.71
100 YEAR	8.39	31.74	429.25	431.33



CULVERT #17
STA. 270+27
REMOVE EXISTING 24"X54' RCP
PROPOSED INSTALL (2)-24"X54' RCP
W/ 2 PW

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CULVERT #17
PLAN & PROFILE

SHEET 16 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	166
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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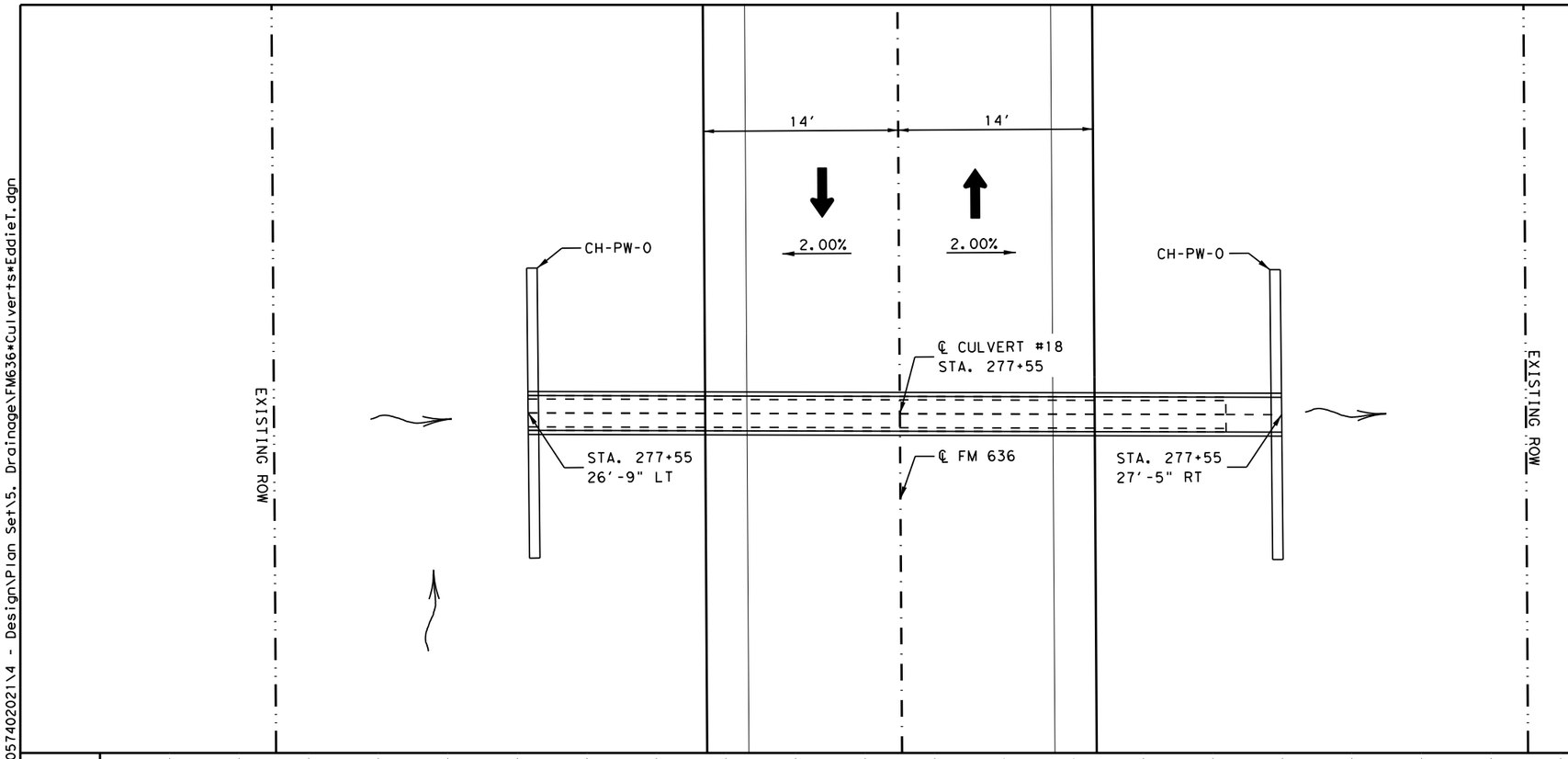
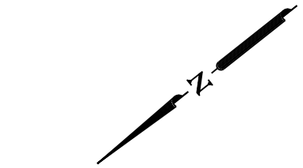




0 10 20

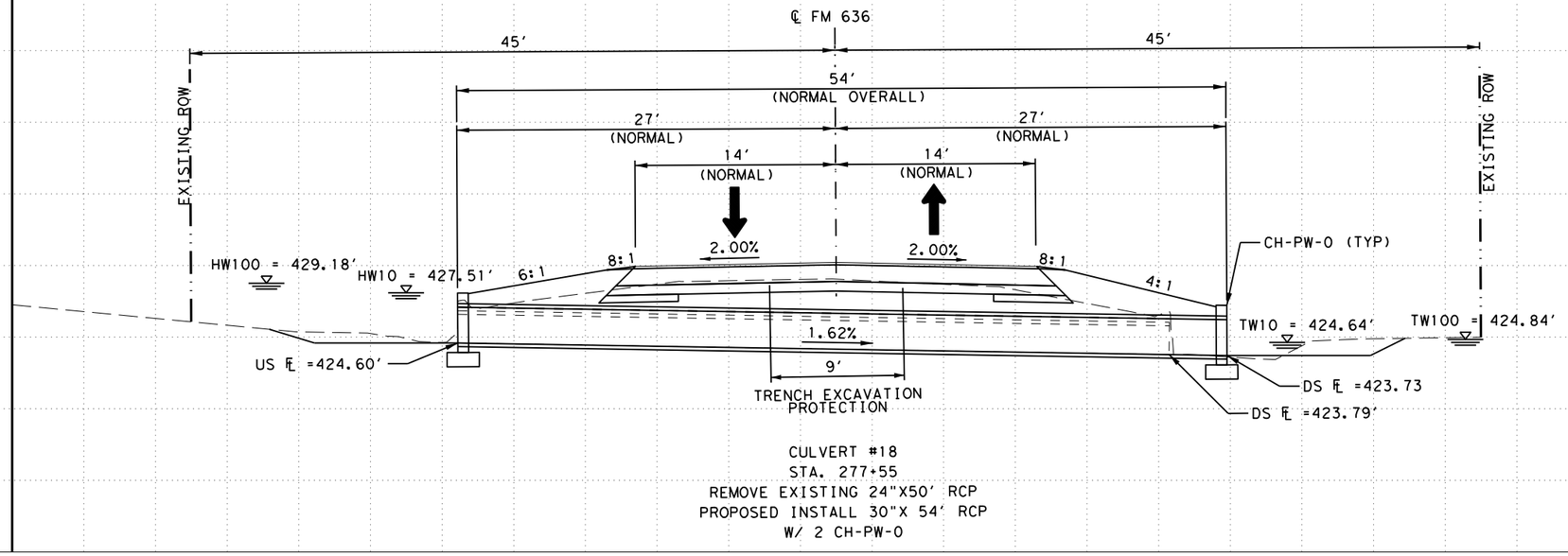
SCALE IN FEET

NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.68	27.42	424.64	427.51
100 YEAR	10.93	42.25	424.84	429.18



CULVERT #18
STA. 277+55
REMOVE EXISTING 24"X50' RCP
PROPOSED INSTALL 30"X 54' RCP
W/ 2 CH-PW-0

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CULVERT #18
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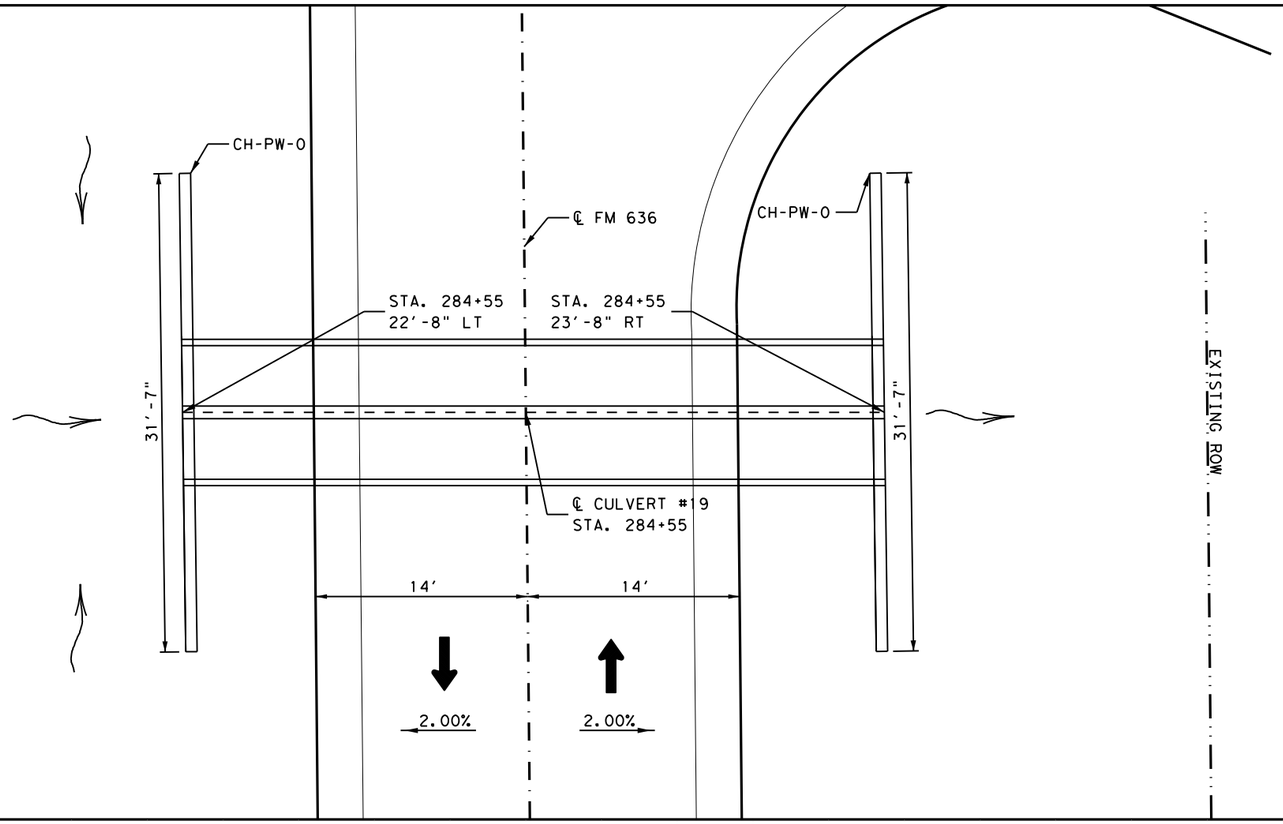
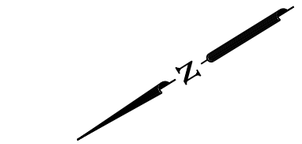
SHEET 17 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	167
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



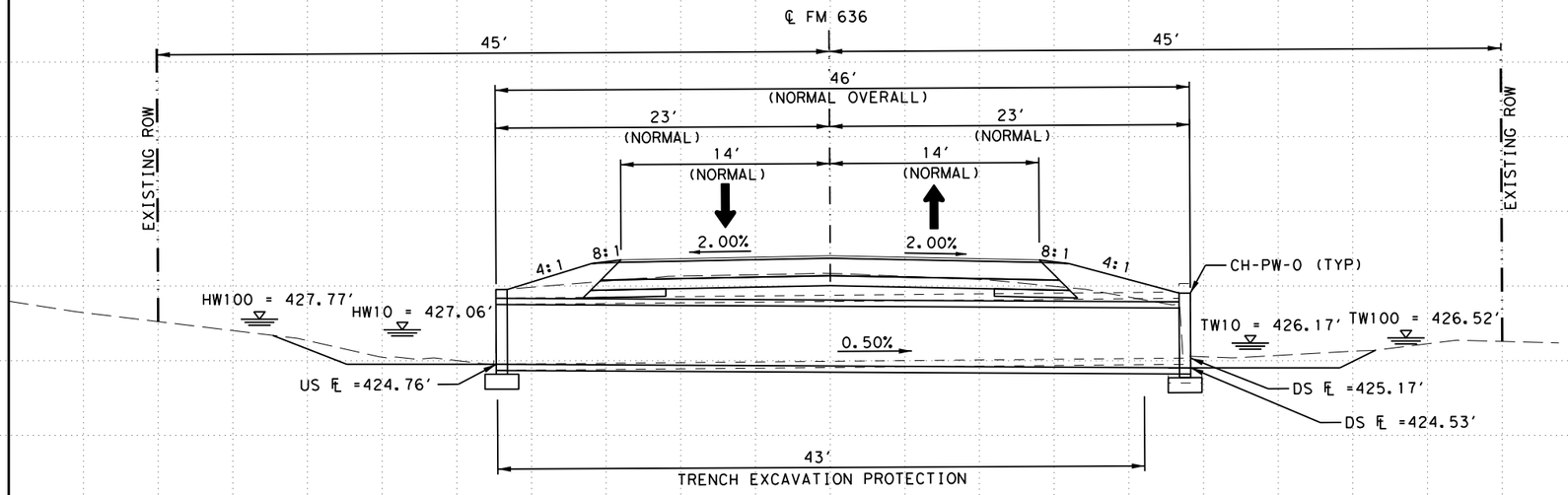


NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	6.98	60.16	426.17	427.06
100 YEAR	7.84	92.82	426.52	427.77



CULVERT #19
STA. 284+55
REMOVE EXISTING (2)-48"X46' RCP
PROPOSED INSTALL (2)-48"X46' RCP
W/ 2 CH-PW-0

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CULVERT #19
PLAN & PROFILE

SHEET 18 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	168
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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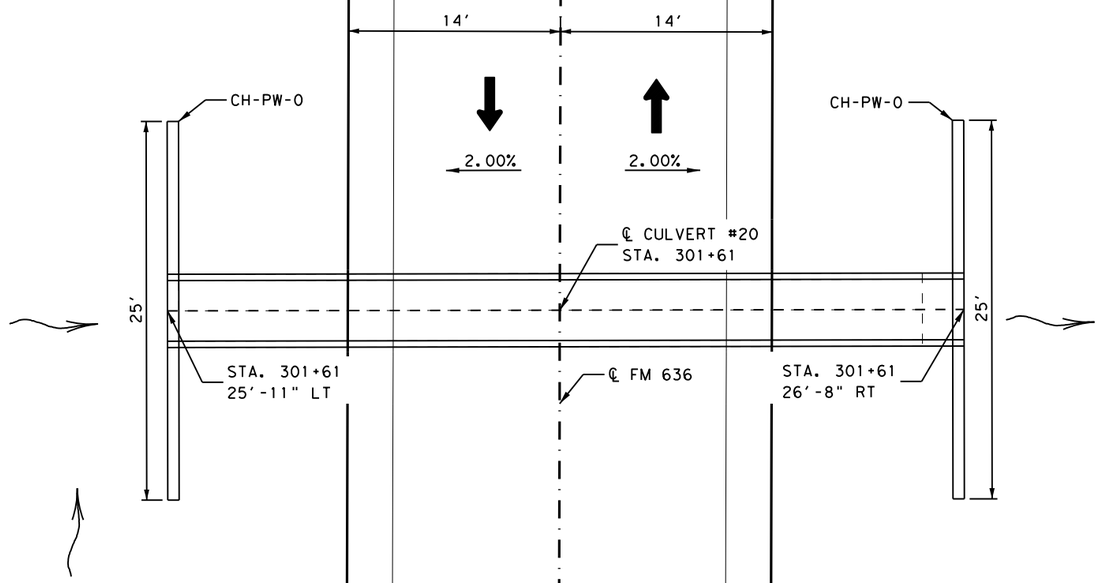
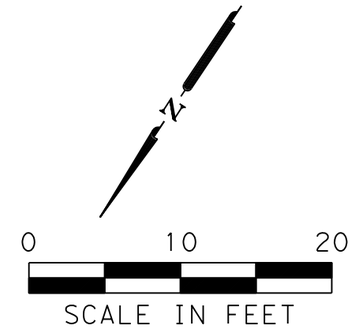


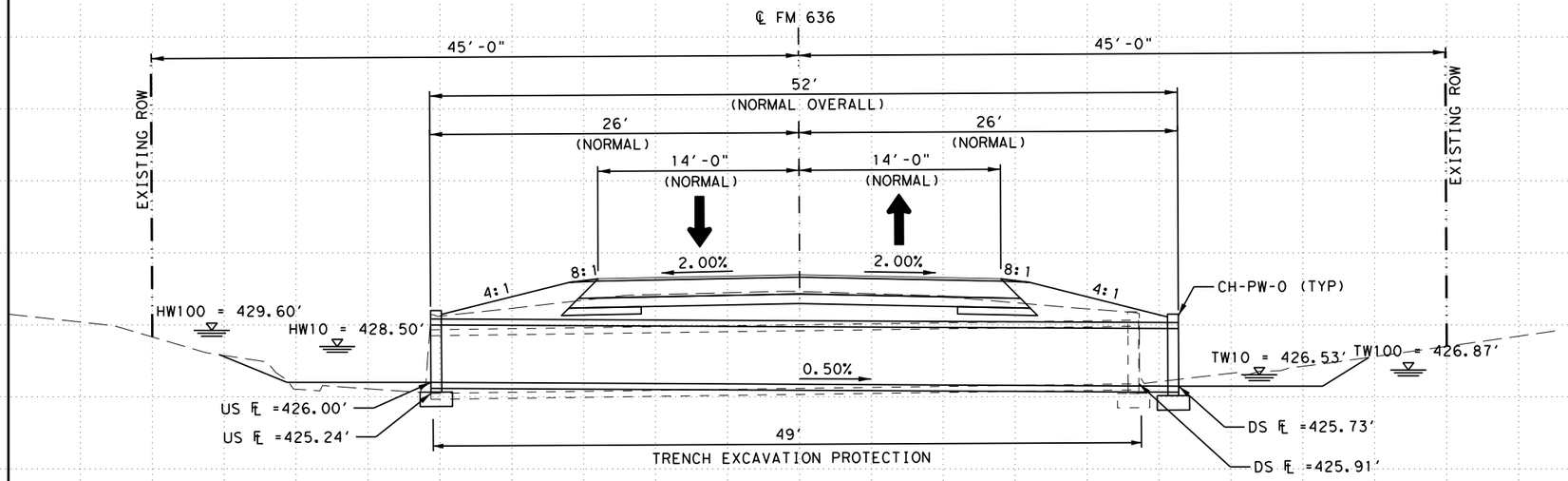


NOTES:
FOR HEADWALL DETAILS NOT SHOWN
REFER TO STANDARD SHEET CH-PW-0

FOR RCP TO RCP CONNECTION
SEE CONCRETE COLLAR DETAIL SHEET

SEE EROSION CONTROL PLAN SHEET
FOR STONE RIPRAP LOCATIONS

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	8.07	52.70	426.53	428.50
100 YEAR	9.09	81.28	426.87	429.60



CULVERT #20
STA. 301+61
REMOVE EXISTING 48"X50' RCP
PROPOSED INSTALL 48"X52' RCP
W/ 2 CH-PW-0

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CULVERT #20
PLAN & PROFILE

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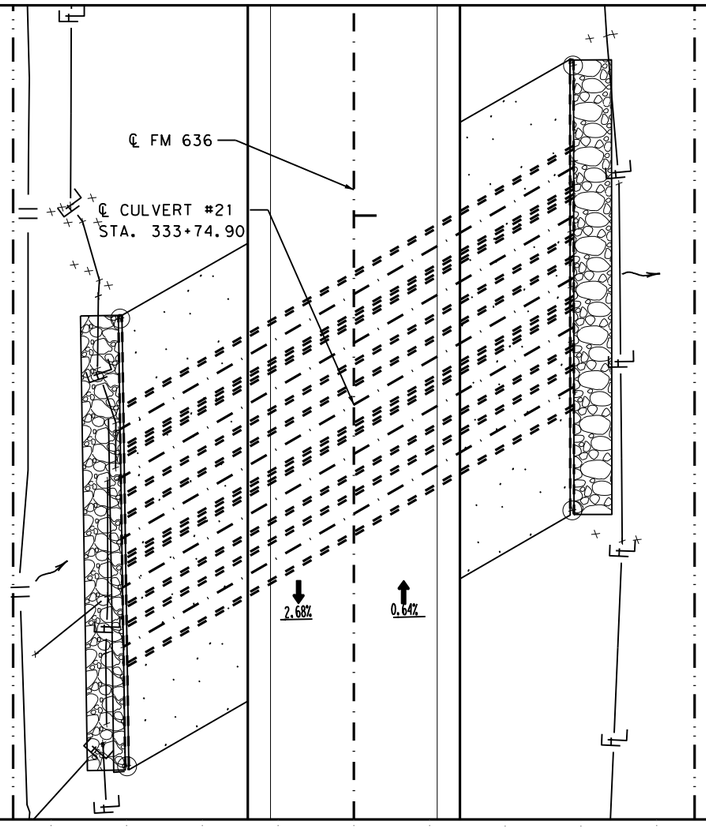
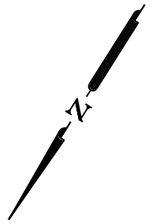
DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	169
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

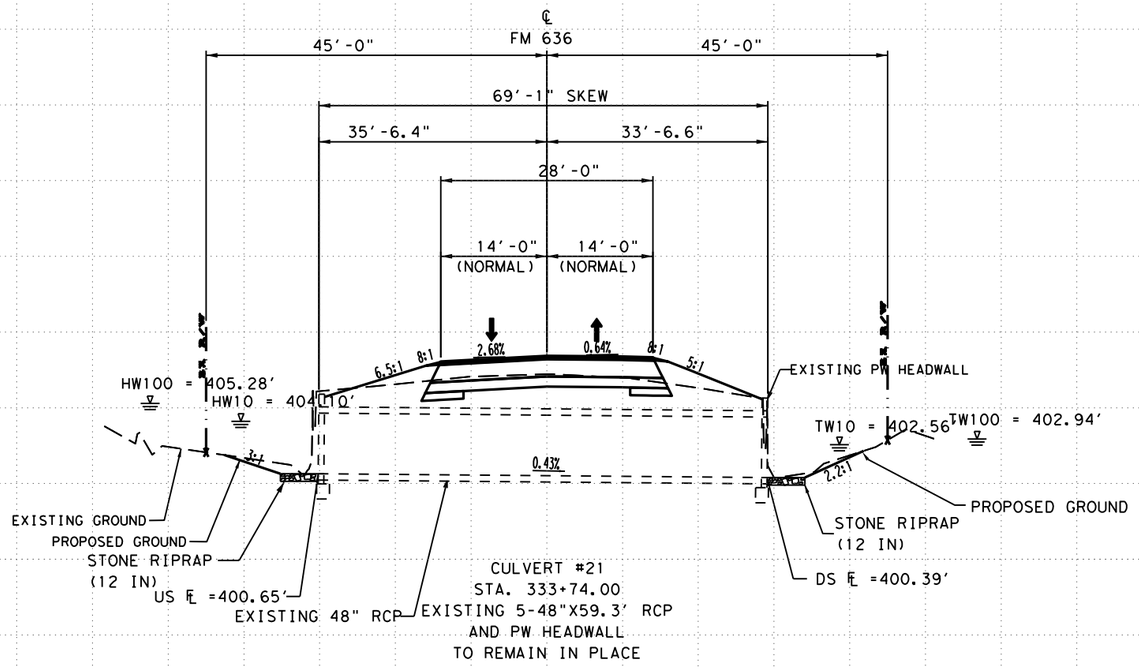




0 10 20
SCALE IN FEET

LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
333+74	LEFT	12	104
333+74	RIGHT	12	107
SUBTOTAL		24	211

HYDRAULIC DATA PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.37	275.69	402.56	404.10
100 YEAR	10.52	426.46	402.94	405.28



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SCALE: 1"=100′ SHEET 20 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	170
CHECK	CONTROL	SECTION	JOB	
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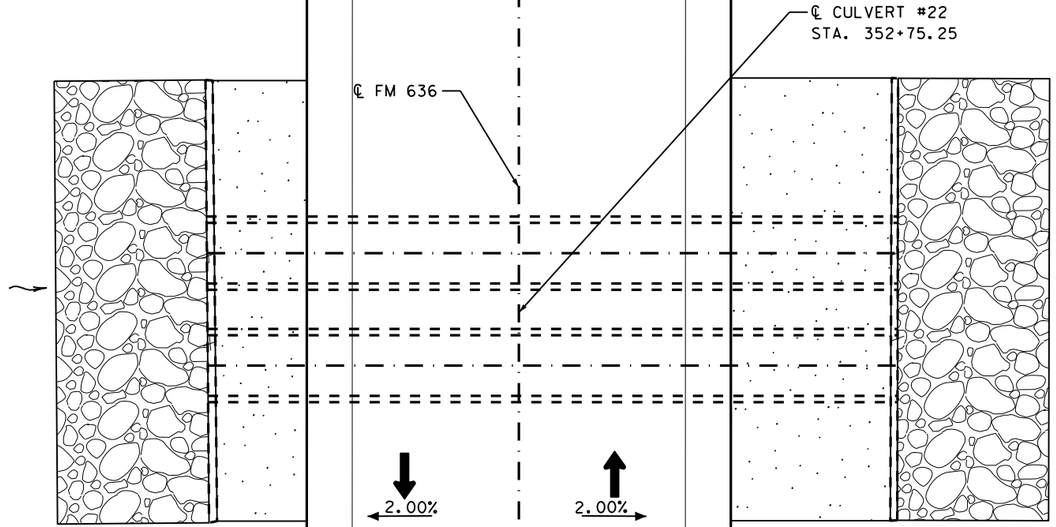
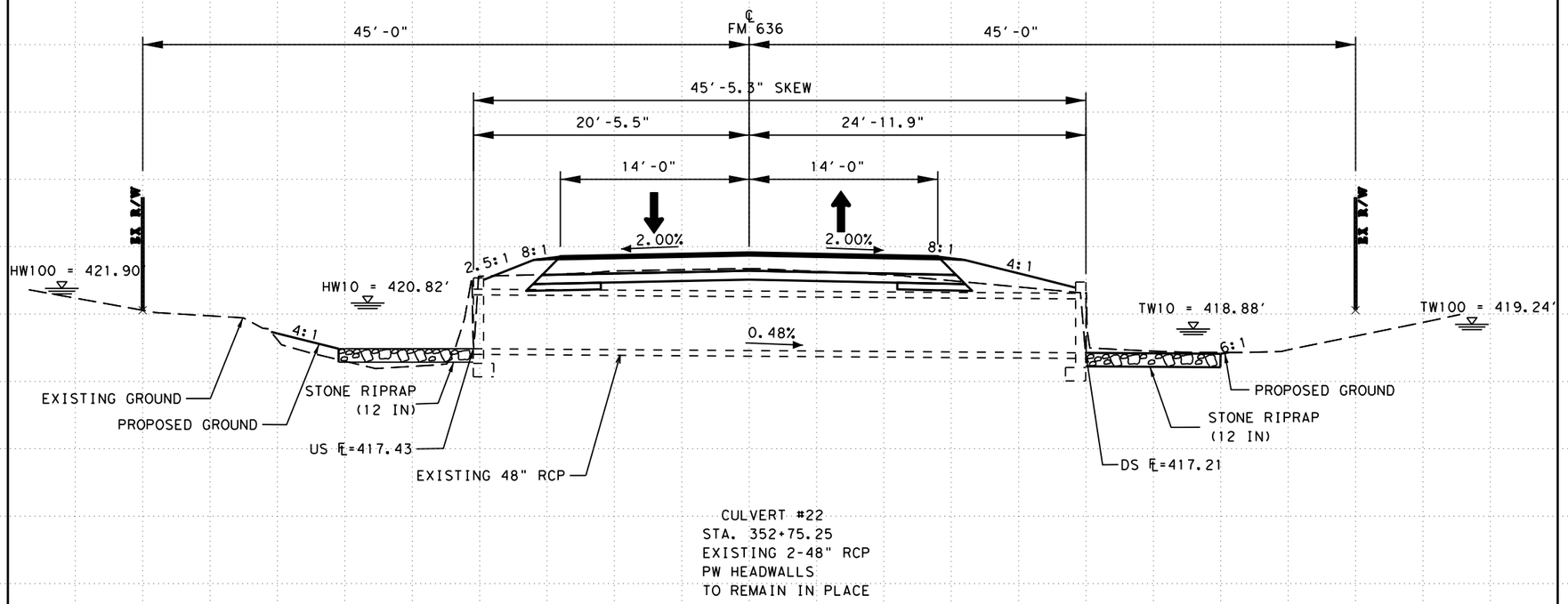


0 2 4 6 8 10
SCALE IN FEET

LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
352+76	LEFT	11	20
352+76	RIGHT	11	34
SUBTOTAL		22	54

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	10.77	104.78	418.88	420.82
100 YEAR	11.94	160.75	419.24	421.90



CULVERT #22
STA. 352+75.25
EXISTING 2-48" RCP
PW HEADWALLS
TO REMAIN IN PLACE

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SHEET 21 OF 25

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	171
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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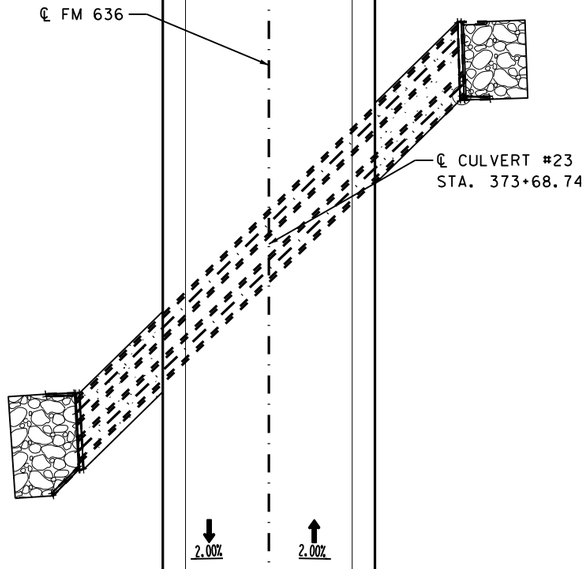
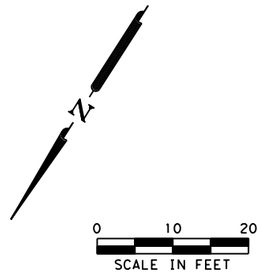
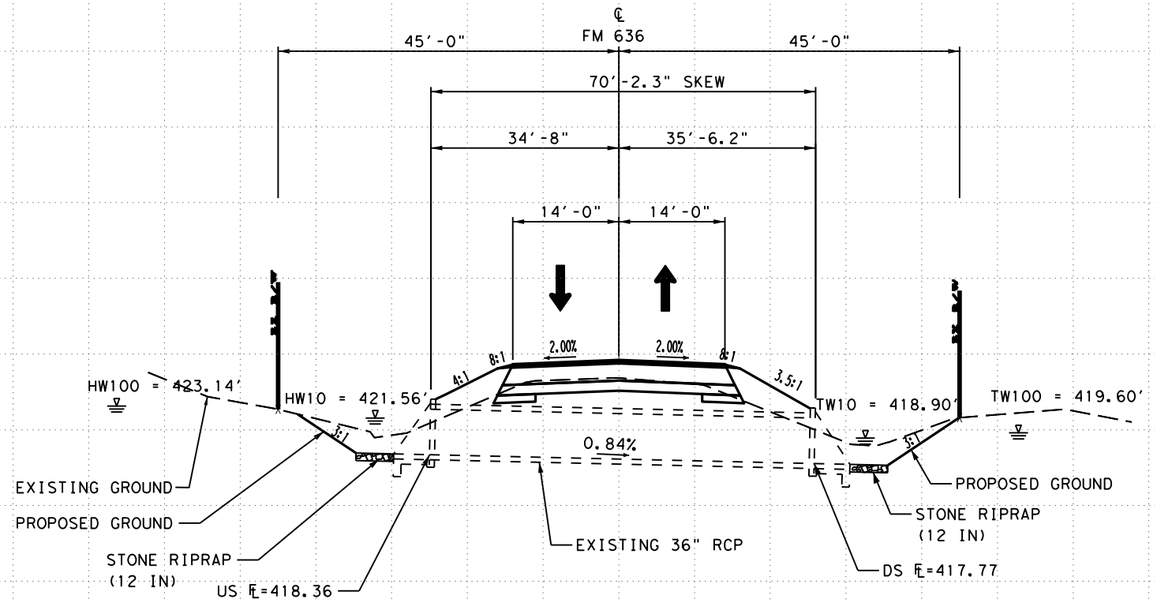




LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
373+68	LEFT	4	13
373+68	RIGHT	3	15
SUBTOTAL		7	28

HYDRAULIC DATA PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.31	77.18	418.90	421.56
100 YEAR	10.41	118.73	419.60	423.14



CULVERT #23
STA. 373+68.74
EXISTING 2-36" RCP
AND FW SAFETY END TREATMENT
TO REMAIN IN PLACE

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CULVERT #23
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SCALE: 1"=100' SHEET 22 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	172
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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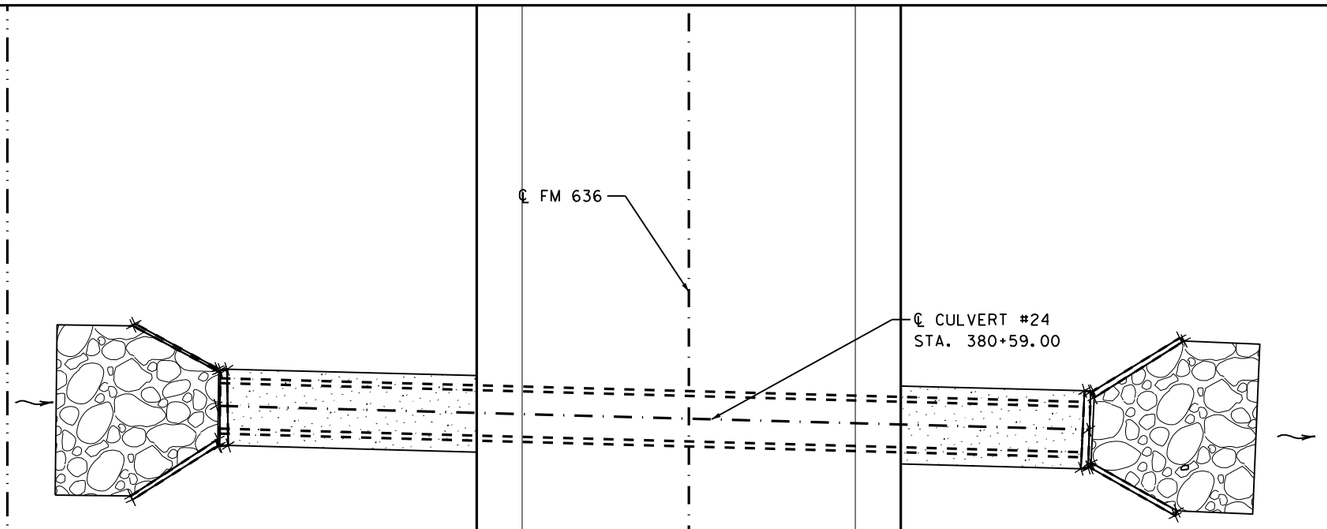
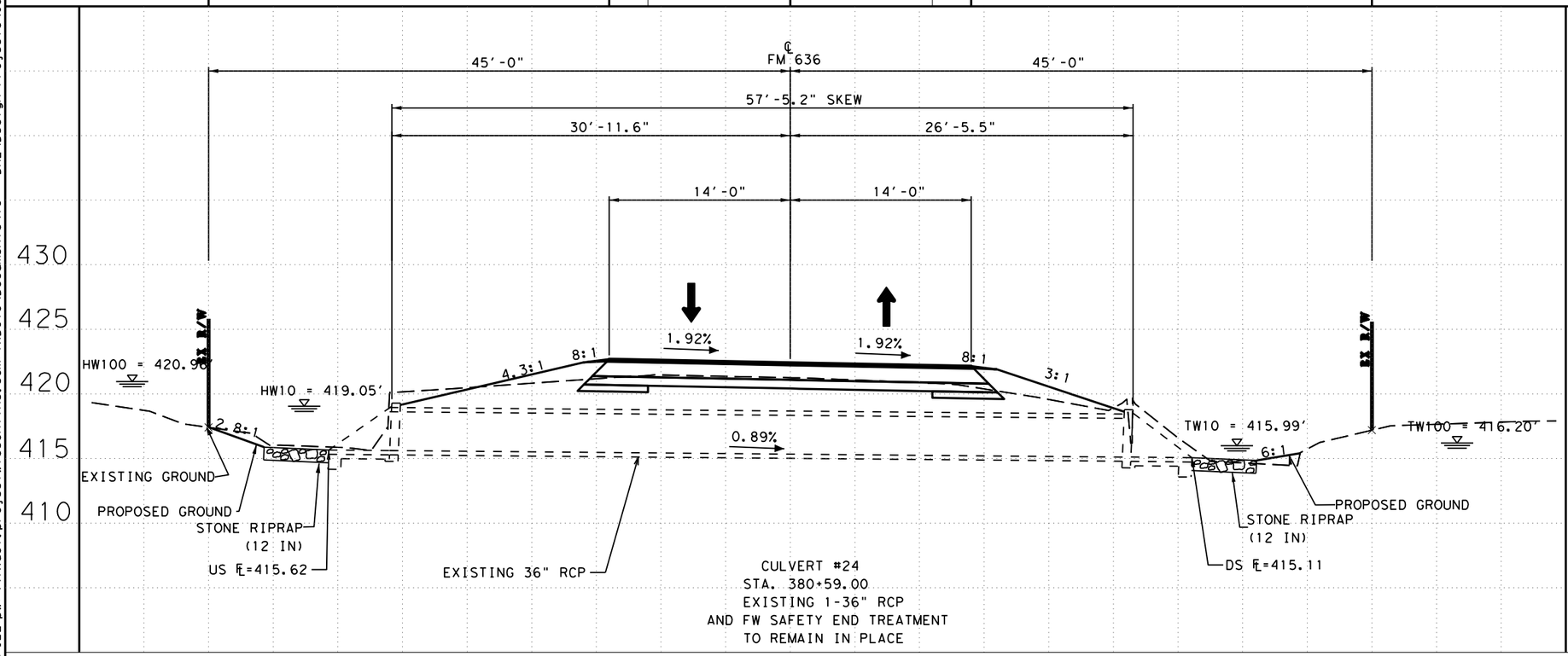


0 2 4 6 8 10
SCALE IN FEET

LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
380+59	LEFT	4	9
380+59	RIGHT	4	7
SUBTOTAL		8	16

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.55	42.13	415.99	419.05
100 YEAR	10.76	65.11	416.20	420.96



CULVERT #24
STA. 380+59.00
EXISTING 1-36" RCP
AND FW SAFETY END TREATMENT
TO REMAIN IN PLACE

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SHEET 23 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	173
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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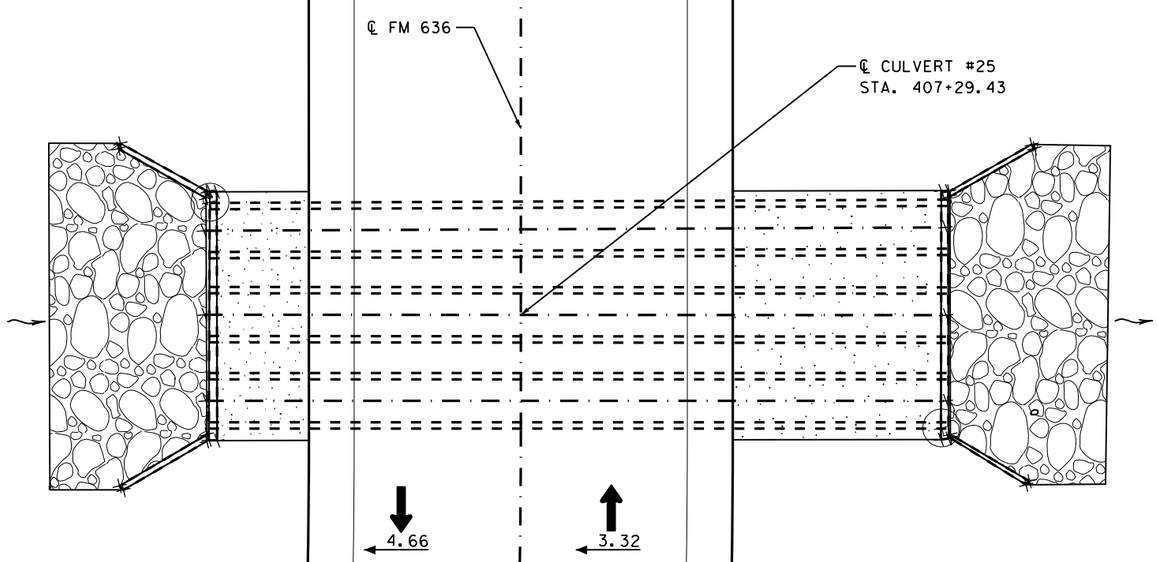
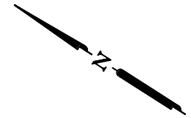
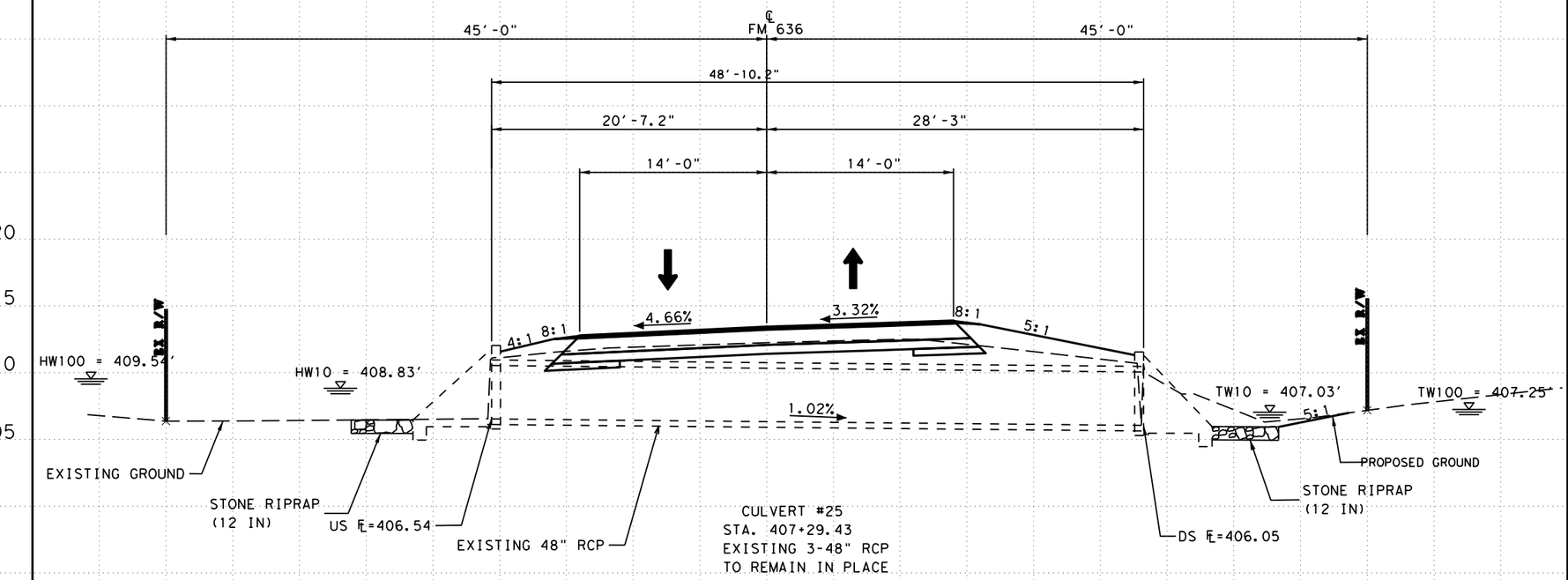




0 2 4 6 8 10
SCALE IN FEET

LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
407+35	LEFT	8	11
407+35	RIGHT	8	25
SUBTOTAL		16	36

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	8.46	89.78	407.03	408.83
100 YEAR	9.41	138.70	407.25	409.54



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SHEET 24 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	174
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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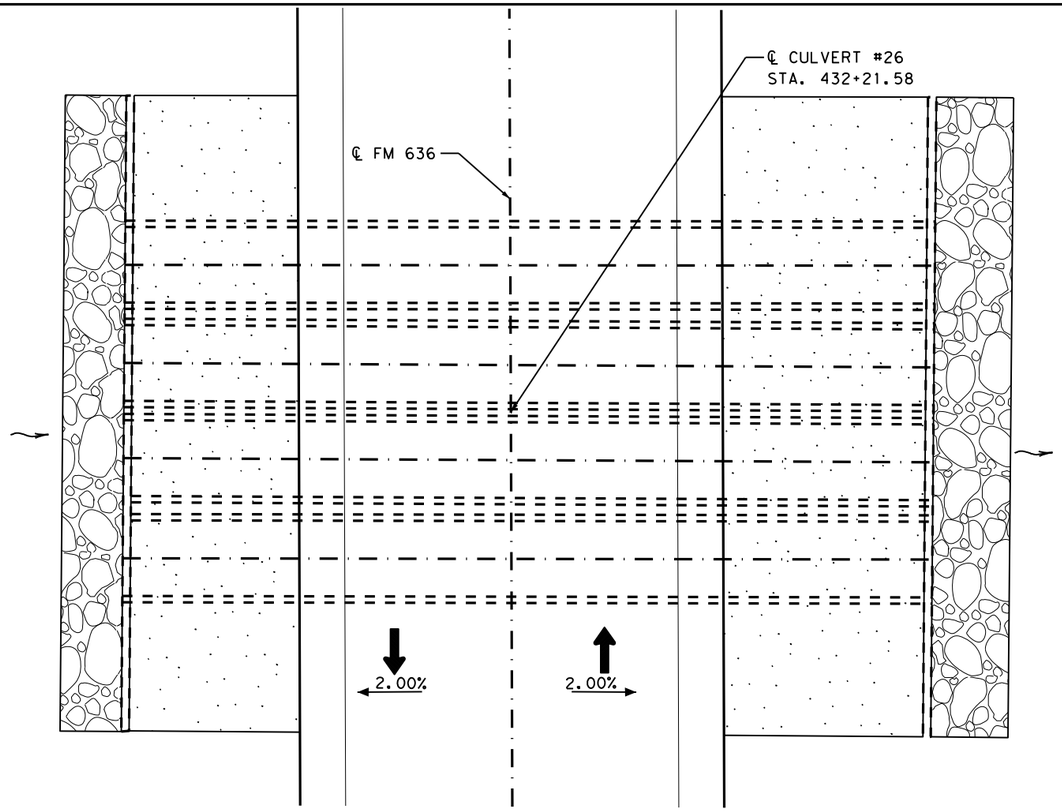
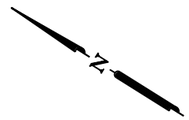
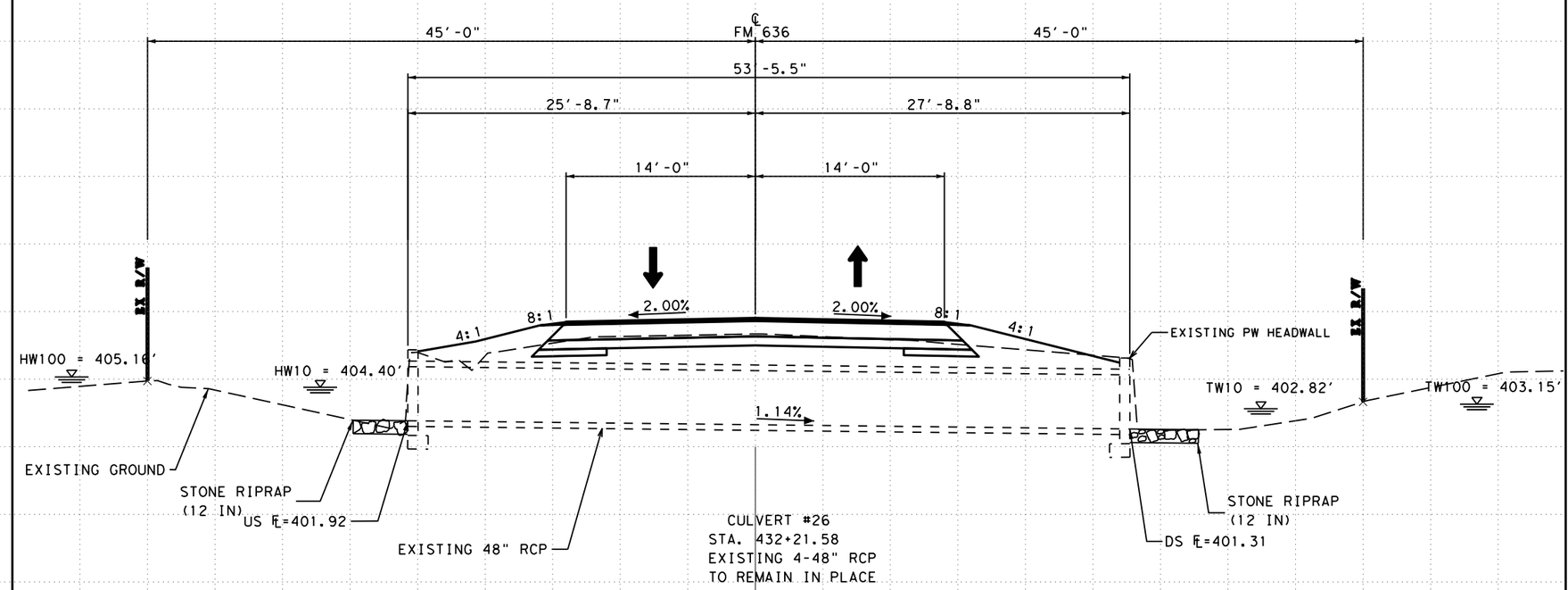




0 2 4 6 8 10
SCALE IN FEET

LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
432+31	LEFT	7	52
432+31	RIGHT	8	63
SUBTOTAL		15	115

HYDRAULIC DATA				
PROPOSED STRUCTURE				
STORM FREQUENCY	V (FPS)	Q (CFS)	TW ELEV.	HW ELEV.
10 YEAR	9.21	136.41	402.82	404.40
100 YEAR	10.20	210.67	403.15	405.16



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SHEET 25 OF 25

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	175
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:1:14:34 PM
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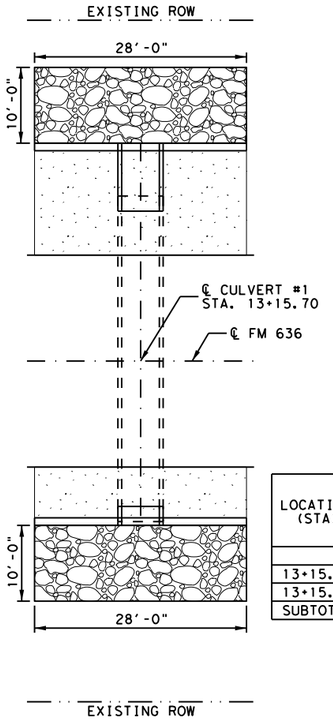
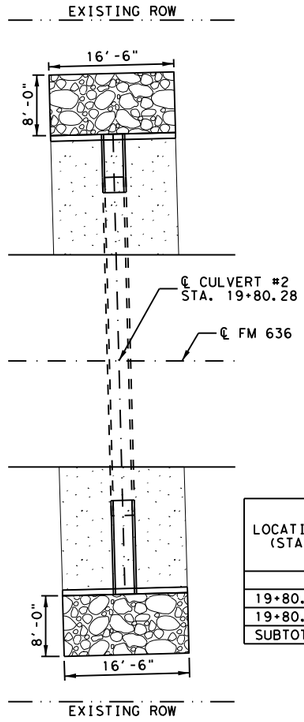
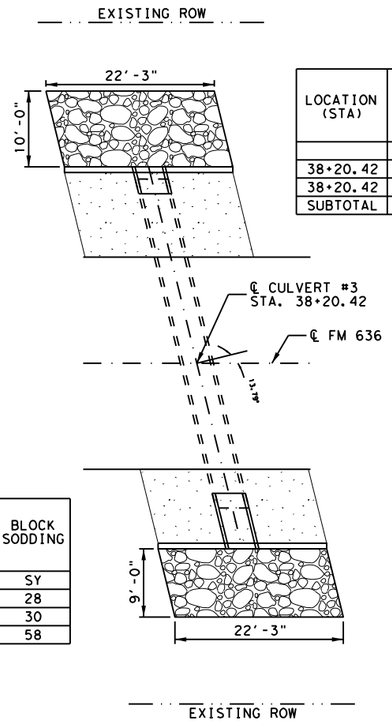


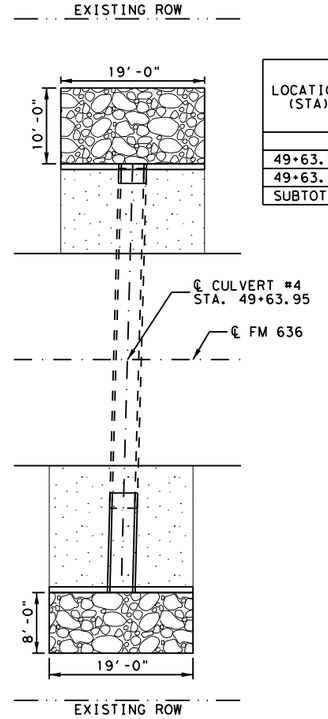
LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
13+15.70	LEFT	11	43
13+15.70	RIGHT	11	21
SUBTOTAL		22	64



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
19+80.28	LEFT	5	28
19+80.28	RIGHT	5	30
SUBTOTAL		10	58



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
38+20.42	LEFT	9	28
38+20.42	RIGHT	9	25
SUBTOTAL		18	53

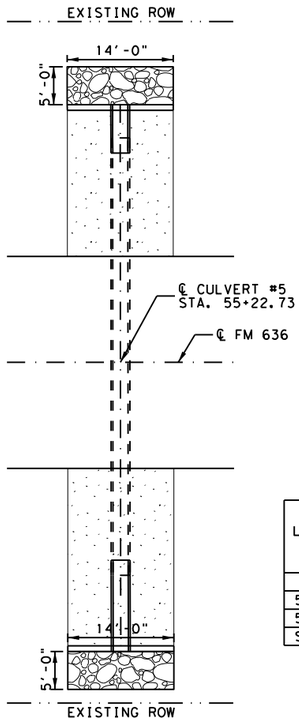


LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
49+63.95	LEFT	7	24
49+63.95	RIGHT	6	34
SUBTOTAL		13	58

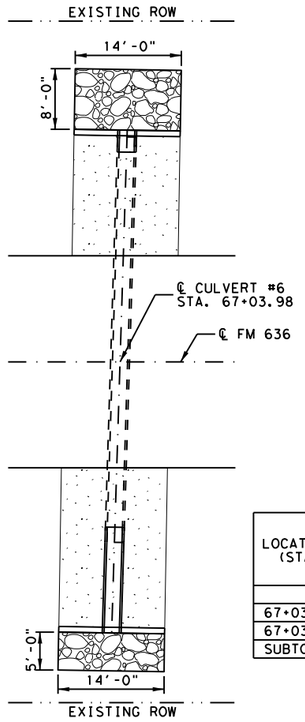
LEGEND

STONE RIPRAP

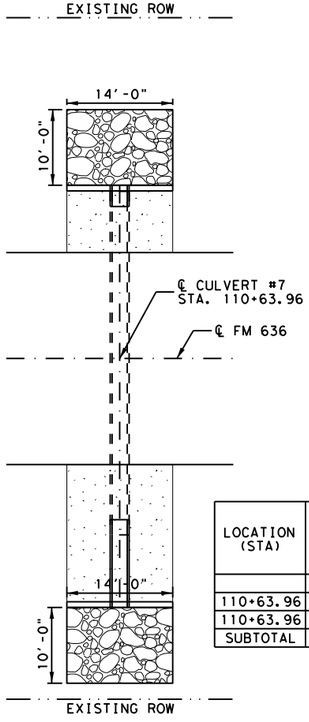
BLOCK SODDING



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
55+22.73	LEFT	3	30
55+22.73	RIGHT	3	37
SUBTOTAL		9	67



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
67+03.98	LEFT	5	25
67+03.98	RIGHT	3	33
SUBTOTAL		8	58



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
110+63.96	LEFT	6	13
110+63.96	RIGHT	6	29
SUBTOTAL		12	42

STATE OF TEXAS
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Marlena Kelly 1/8/21

Texas Department of Transportation

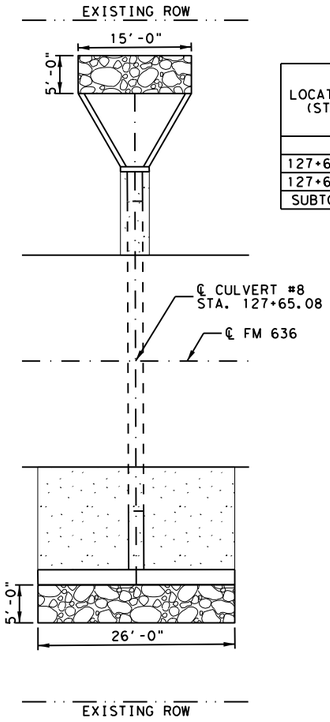
FM 636

RIPRAP DETAIL

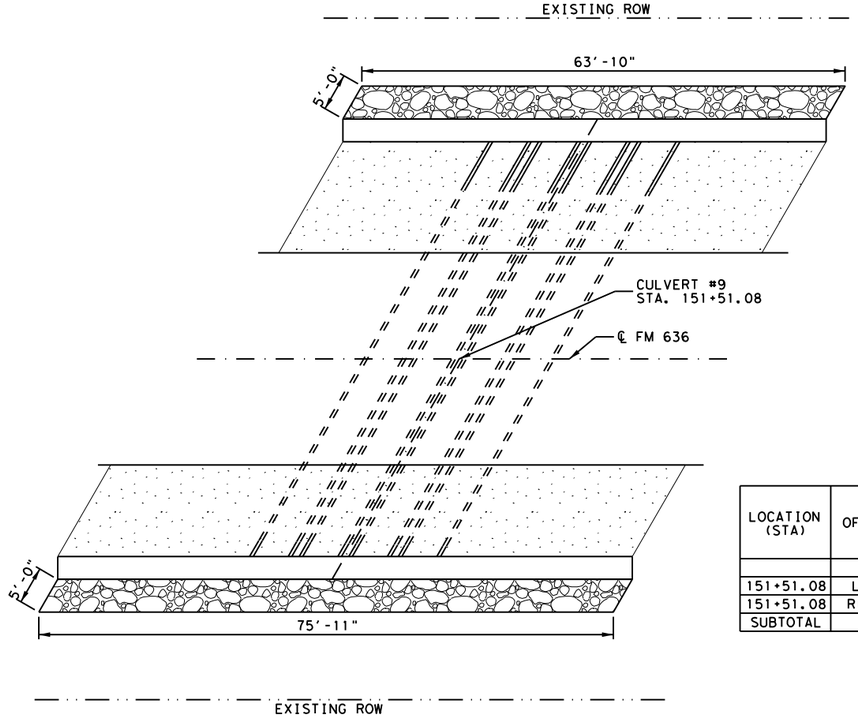
NOT TO SCALE

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	176
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
127+65.08	LEFT	3	5
127+65.08	RIGHT	5	39
SUBTOTAL		8	44

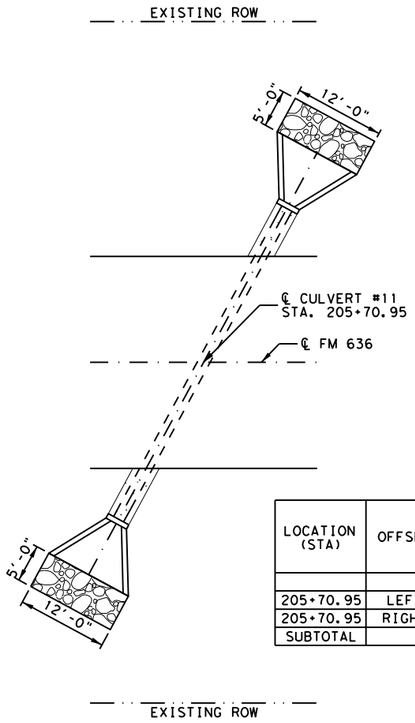


LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
151+51.08	LEFT	12	105
151+51.08	RIGHT	14	102
SUBTOTAL		26	108

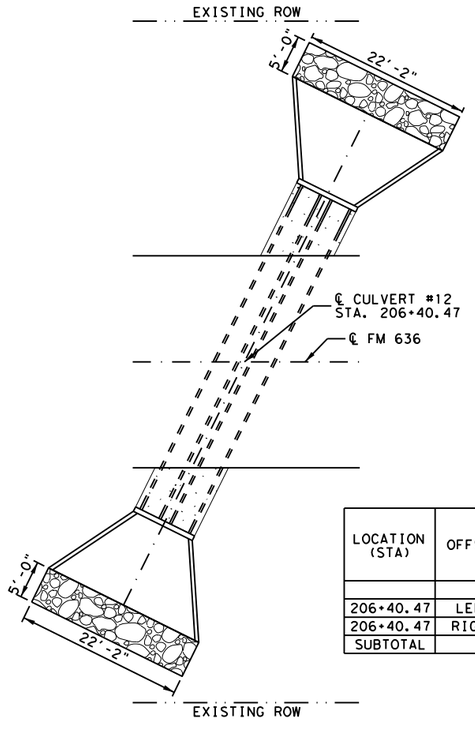
LEGEND

STONE RIPRAP

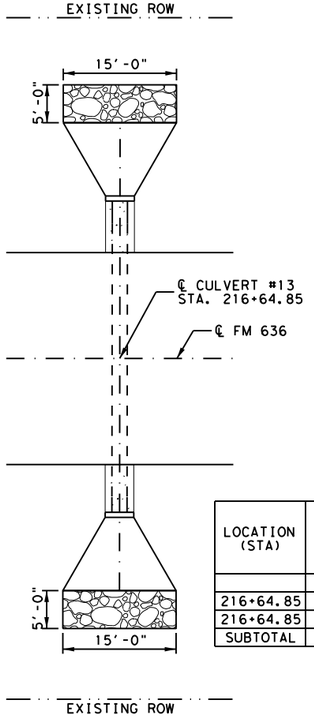
BLOCK SODDING



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
205+70.95	LEFT	3	3
205+70.95	RIGHT	3	3
SUBTOTAL		6	6



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
206+40.47	LEFT	5	9
206+40.47	RIGHT	5	8
SUBTOTAL		10	17



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
216+64.85	LEFT	3	3
216+64.85	RIGHT	3	3
SUBTOTAL		6	6

STATE OF TEXAS
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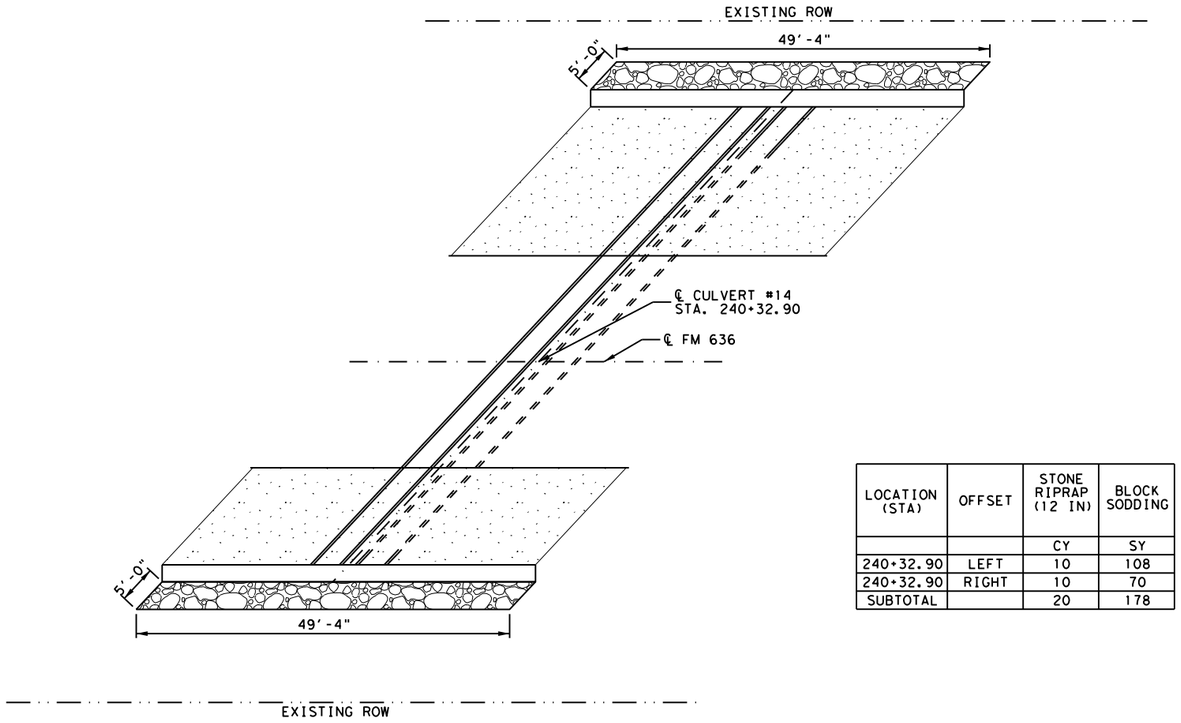
RIPRAP DETAIL

NOT TO SCALE

SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	177
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
240+32.90	LEFT	10	108
240+32.90	RIGHT	10	70
SUBTOTAL		20	178

LEGEND

STONE RIPRAP

BLOCK SODDING

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RIPRAP DETAIL

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SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	178
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

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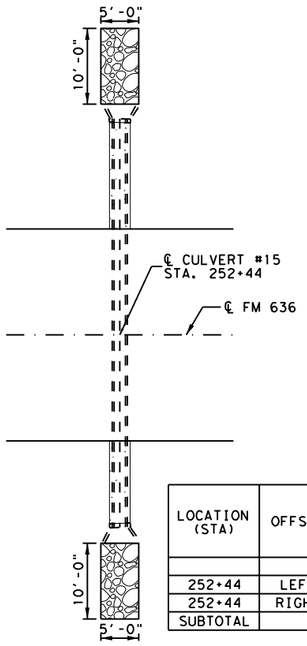
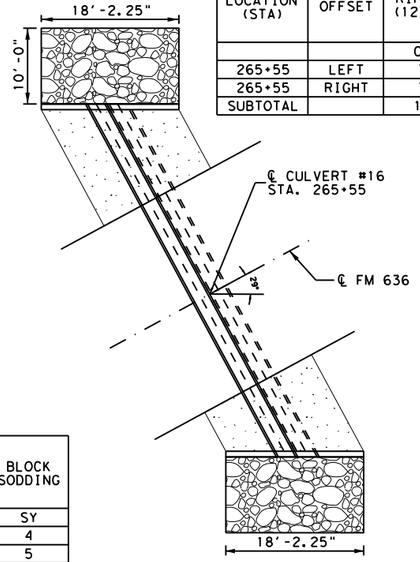


LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
252+44	LEFT	2	4
252+44	RIGHT	2	5
SUBTOTAL		4	9

EXISTING ROW

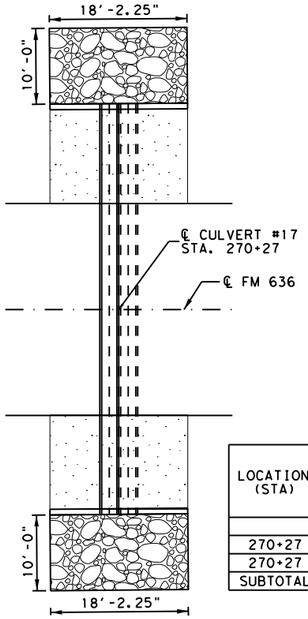
EXISTING ROW



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
265+55	LEFT	7	24
265+55	RIGHT	7	18
SUBTOTAL		14	42

EXISTING ROW

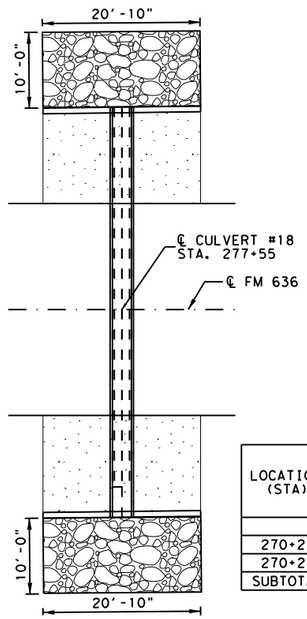
EXISTING ROW



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
270+27	LEFT	7	26
270+27	RIGHT	7	26
SUBTOTAL		14	52

EXISTING ROW

EXISTING ROW



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
270+27	LEFT	8	28
270+27	RIGHT	8	28
SUBTOTAL		16	56

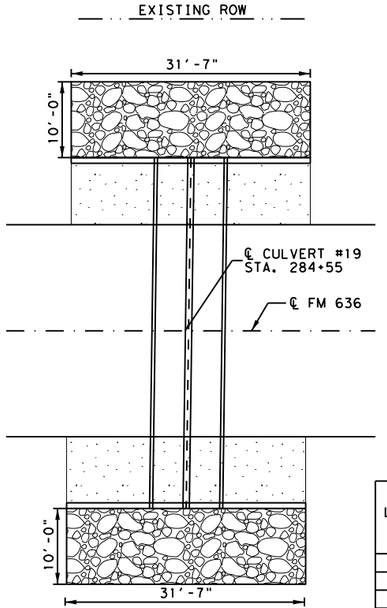
EXISTING ROW

EXISTING ROW

EXISTING ROW

EXISTING ROW

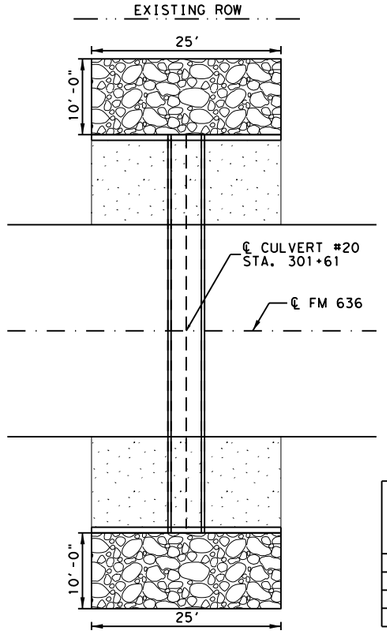
EXISTING ROW



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
284+55	LEFT	12	29
284+55	RIGHT	12	31
SUBTOTAL		24	60

EXISTING ROW

EXISTING ROW



LOCATION (STA)	OFFSET	STONE RIPRAP (12 IN)	BLOCK SODDING
		CY	SY
301+61	LEFT	10	31
301+61	RIGHT	10	34
SUBTOTAL		20	65

EXISTING ROW

LEGEND

STONE RIPRAP

BLOCK SODDING

STATE OF TEXAS
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Texas Department of Transportation

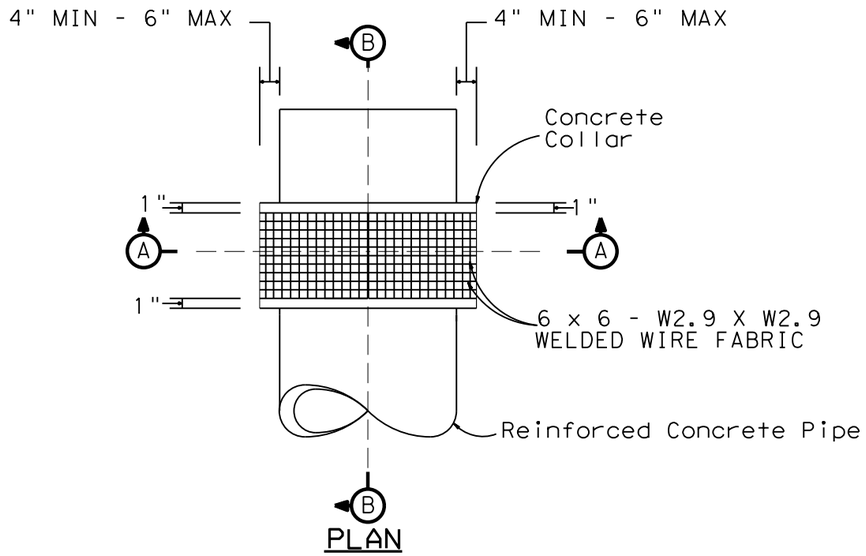
FM 636

RIPRAP DETAIL

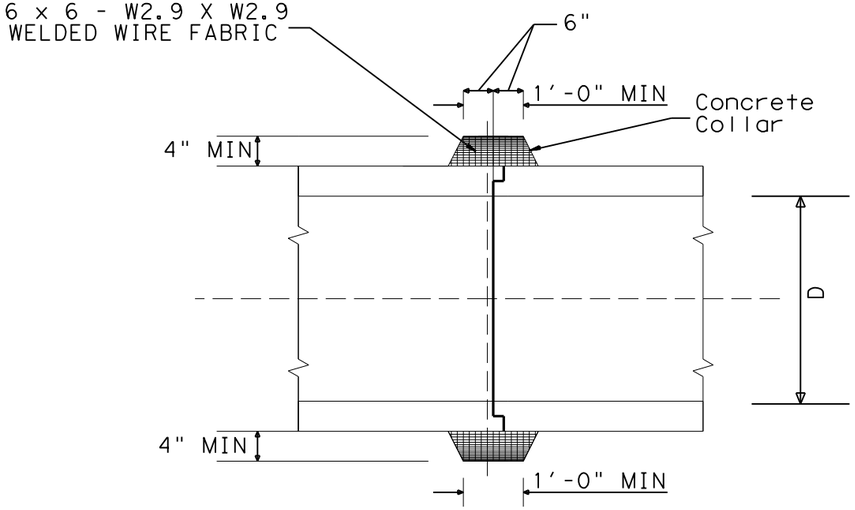
NOT TO SCALE

SHEET 4 OF 4

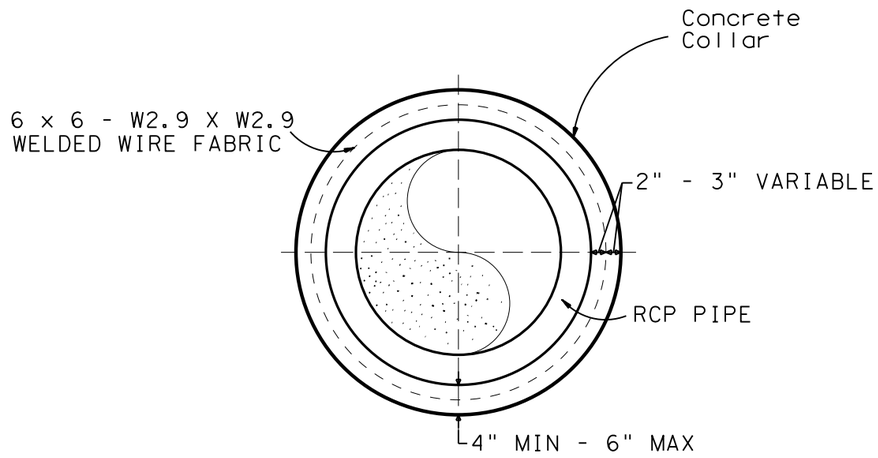
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	179
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	



PLAN



SECTION B-B



SECTION A-A

END TO END PIPE CONNECTION

NOTES:

1.) CONCRETE COLLAR FOR END TO END PIPE CONNECTIONS SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.

2.) CONCRETE SHALL BE; CL A, CL B, CL C OR CL D.

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Amanda McKittrick, P.E.

Texas Department of Transportation

FM 636
CONCRETE COLLAR DETAILS

NOT TO SCALE

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 636
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	DAL	NAVARRO	180
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

DATE:1/7/2021 TIME:11:46:28 AM
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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA. 13+15.70 (BOTH)	1~5'X4'	3.5'	SCP-5	PW-1	0°	2:1	6	6	1	10	N/A	N/A	20	6	N/A	0	2.4	50.8	800

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

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

Texas Department of Transportation | Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

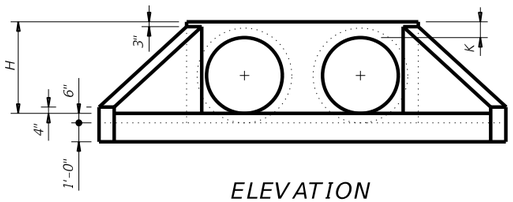
BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 181

DATE: 1/7/2021 11:46:34 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574020214 Design\Plan Set\5. Drainage\FM 636_BCS.dgn

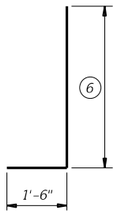
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' - 7 1/2"	2' - 6"	2' - 10"	3' - 3 1/4"	88	0.6	1' - 9"	20	0.2
	15"	5' - 5 3/4"	2' - 9 1/2"	3' - 4"	3' - 10 1/4"	103	0.7	2' - 2"	24	0.3
	18"	6' - 4 1/4"	3' - 1"	3' - 10"	4' - 5"	124	0.9	2' - 8"	32	0.3
	21"	7' - 2 3/4"	3' - 4 1/2"	4' - 4"	5' - 0"	143	1.1	3' - 1"	43	0.4
	24"	8' - 2 1/2"	3' - 9 1/2"	4' - 10"	5' - 7"	164	1.3	3' - 7"	50	0.5
	27"	9' - 1"	4' - 1"	5' - 4"	6' - 2"	179	1.5	3' - 11"	56	0.6
	30"	9' - 11 1/2"	4' - 4 1/2"	5' - 10"	6' - 8 3/4"	203	1.7	4' - 4"	65	0.8
	33"	10' - 10"	4' - 8"	6' - 4"	7' - 3 3/4"	224	2.0	4' - 8"	71	0.9
	36"	11' - 8 1/4"	4' - 11 1/2"	6' - 10"	7' - 10 3/4"	249	2.2	5' - 1"	81	1.0
	42"	13' - 5 1/4"	5' - 6 1/2"	7' - 10"	9' - 0 1/2"	298	2.8	5' - 10"	97	1.3
	48"	15' - 9"	6' - 1 1/2"	9' - 4"	10' - 9 1/4"	360	3.8	6' - 7"	117	1.7
	54"	17' - 5 3/4"	6' - 8 1/2"	10' - 4"	11' - 11 1/4"	427	4.5	7' - 6"	151	2.1
	60"	19' - 2 3/4"	7' - 3 1/2"	11' - 4"	13' - 1"	481	5.3	8' - 3"	174	2.5
	66"	20' - 11 1/2"	7' - 10 1/2"	12' - 4"	14' - 3"	544	6.2	8' - 9"	194	2.9
	72"	22' - 8 1/2"	8' - 5 1/2"	13' - 4"	15' - 4 3/4"	601	7.1	9' - 4"	213	3.3
3:1	12"	6' - 3"	2' - 6"	4' - 3"	4' - 11"	118	0.8	1' - 9"	22	0.2
	15"	7' - 5"	2' - 9 1/2"	5' - 0"	5' - 9 1/4"	137	1.1	2' - 2"	28	0.3
	18"	8' - 6 3/4"	3' - 1"	5' - 9"	6' - 7 3/4"	170	1.3	2' - 8"	37	0.5
	21"	9' - 8 3/4"	3' - 4 1/2"	6' - 6"	7' - 6"	195	1.6	3' - 1"	48	0.6
	24"	11' - 0"	3' - 9 1/2"	7' - 3"	8' - 4 1/2"	227	2.0	3' - 7"	58	0.7
	27"	12' - 2"	4' - 1"	8' - 0"	9' - 2 3/4"	251	2.3	3' - 11"	67	0.8
	30"	13' - 4"	4' - 4 1/2"	8' - 9"	10' - 1 1/4"	293	2.7	4' - 4"	77	1.0
	33"	14' - 5 3/4"	4' - 8"	9' - 6"	10' - 11 3/4"	318	3.1	4' - 8"	84	1.2
	36"	15' - 7 3/4"	4' - 11 1/2"	10' - 3"	11' - 10"	351	3.5	5' - 1"	96	1.4
	42"	17' - 11 1/2"	5' - 6 1/2"	11' - 9"	13' - 6 3/4"	432	4.5	5' - 10"	119	1.7
	48"	21' - 1 3/4"	6' - 1 1/2"	14' - 0"	16' - 2"	537	6.1	6' - 7"	146	2.3
	54"	23' - 5 1/2"	6' - 8 1/2"	15' - 6"	17' - 10 3/4"	630	7.3	7' - 6"	186	2.9
	60"	25' - 9 1/4"	7' - 3 1/2"	17' - 0"	19' - 7 1/2"	719	8.7	8' - 3"	219	3.4
	66"	28' - 1"	7' - 10 1/2"	18' - 6"	21' - 4 1/4"	811	10.1	8' - 9"	242	3.9
	72"	30' - 4 3/4"	8' - 5 1/2"	20' - 0"	23' - 1 1/4"	924	11.7	9' - 4"	272	4.4
4:1	12"	7' - 10 3/4"	2' - 6"	5' - 8"	6' - 6 1/2"	148	1.1	1' - 9"	24	0.3
	15"	9' - 4"	2' - 9 1/2"	6' - 8"	7' - 8 1/2"	181	1.5	2' - 2"	32	0.4
	18"	10' - 9 1/2"	3' - 1"	7' - 8"	8' - 10 1/4"	221	1.9	2' - 8"	42	0.5
	21"	12' - 2 3/4"	3' - 4 1/2"	8' - 8"	10' - 0"	260	2.3	3' - 1"	57	0.7
	24"	13' - 9 1/2"	3' - 9 1/2"	9' - 8"	11' - 2"	301	2.8	3' - 7"	67	0.9
	27"	15' - 3"	4' - 1"	10' - 8"	12' - 3 3/4"	334	3.3	3' - 11"	77	1.0
	30"	16' - 8 1/4"	4' - 4 1/2"	11' - 8"	13' - 5 3/4"	385	3.8	4' - 4"	89	1.3
	33"	18' - 1 3/4"	4' - 8"	12' - 8"	14' - 7 1/2"	425	4.5	4' - 8"	101	1.4
	36"	19' - 7"	4' - 11 1/2"	13' - 8"	15' - 9 1/4"	472	5.1	5' - 1"	115	1.7
	42"	22' - 5 3/4"	5' - 6 1/2"	15' - 8"	18' - 1"	583	6.5	5' - 10"	141	2.1
	48"	26' - 6 1/4"	6' - 1 1/2"	18' - 8"	21' - 6 3/4"	730	8.9	6' - 7"	175	2.8
	54"	29' - 5"	6' - 8 1/2"	20' - 8"	23' - 10 1/4"	875	10.7	7' - 6"	226	3.6
	60"	32' - 3 3/4"	7' - 3 1/2"	22' - 8"	26' - 2"	996	12.7	8' - 3"	264	4.3
	66"	35' - 2 1/2"	7' - 10 1/2"	24' - 8"	28' - 5 3/4"	1,140	14.9	8' - 9"	300	4.9
	72"	38' - 1 1/4"	8' - 5 1/2"	26' - 8"	30' - 9 1/2"	1,297	17.3	9' - 4"	334	5.6
6:1	12"	11' - 2"	2' - 6"	8' - 6"	9' - 9 3/4"	224	1.9	1' - 9"	28	0.4
	15"	13' - 2 1/4"	2' - 9 1/2"	10' - 0"	11' - 6 1/2"	268	2.5	2' - 2"	37	0.5
	18"	15' - 2 1/2"	3' - 1"	11' - 6"	13' - 3 1/4"	330	3.2	2' - 8"	50	0.7
	21"	17' - 2 3/4"	3' - 4 1/2"	13' - 0"	15' - 0 1/4"	387	3.9	3' - 1"	69	0.9
	24"	19' - 4 1/2"	3' - 9 1/2"	14' - 6"	16' - 9"	453	4.8	3' - 7"	80	1.2
	27"	21' - 4 3/4"	4' - 1"	16' - 0"	18' - 5 3/4"	512	5.7	3' - 11"	96	1.4
	30"	23' - 5 1/4"	4' - 4 1/2"	17' - 6"	20' - 2 1/2"	593	6.7	4' - 4"	110	1.7
	33"	25' - 5 1/2"	4' - 8"	19' - 0"	21' - 11 1/4"	675	7.8	4' - 8"	127	2.0
	36"	27' - 5 3/4"	4' - 11 1/2"	20' - 6"	23' - 8"	735	9.0	5' - 1"	144	2.3
	42"	31' - 6 1/4"	5' - 6 1/2"	23' - 6"	27' - 1 1/2"	922	11.5	5' - 10"	179	3.0
	48"	37' - 3 1/2"	6' - 1 1/2"	28' - 0"	32' - 4"	1,191	15.9	6' - 7"	231	4.0
	54"	41' - 4 1/4"	6' - 8 1/2"	31' - 0"	35' - 9 1/2"	1,424	19.2	7' - 6"	300	5.0
	60"	45' - 4 3/4"	7' - 3 1/2"	34' - 0"	39' - 3"	1,631	22.9	8' - 3"	353	6.0

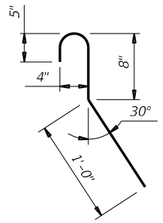


ELEVATION

(Showing dimensions.)



BARS V



BARS CL

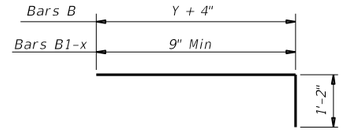
(Length = 2'-5")

TABLE OF (5) REINFORCING STEEL

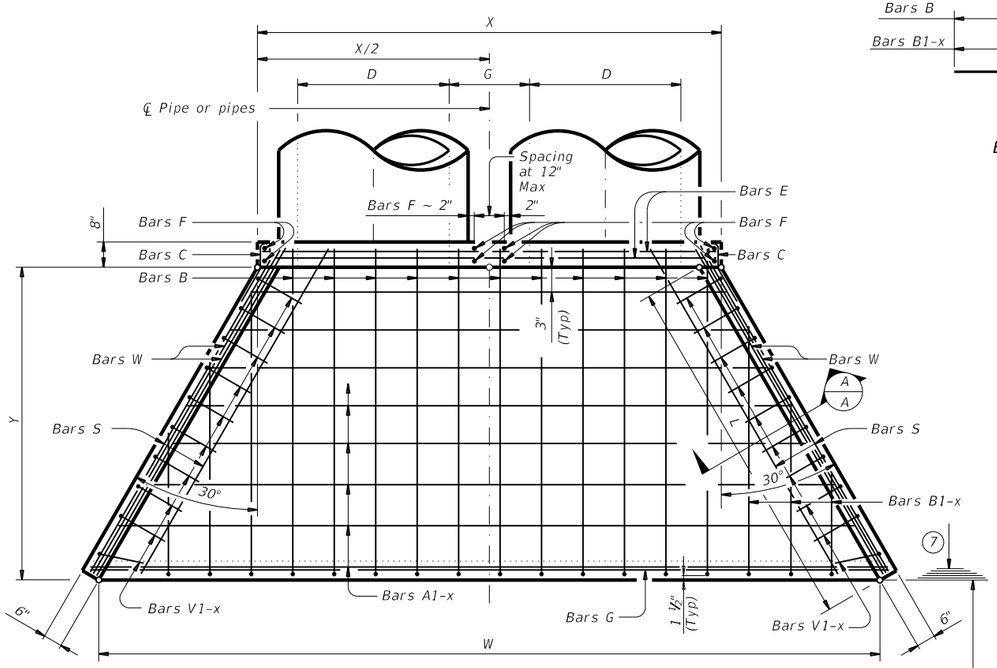
Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 6"	~
C	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' - 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

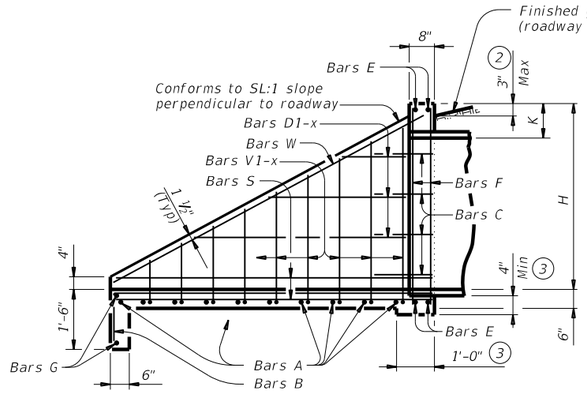
Dia of Pipe (D)	G	K (4)	H
12"	0' - 9"	1' - 0"	2' - 0"
15"	0' - 11"	1' - 0"	2' - 3"
18"	1' - 2"	1' - 0"	2' - 6"
21"	1' - 4"	1' - 0"	2' - 9"
24"	1' - 7"	1' - 0"	3' - 0"
27"	1' - 8"	1' - 0"	3' - 3"
30"	1' - 10"	1' - 0"	3' - 6"
33"	1' - 11"	1' - 0"	3' - 9"
36"	2' - 1"	1' - 0"	4' - 0"
42"	2' - 4"	1' - 0"	4' - 6"
48"	2' - 7"	1' - 3"	5' - 3"
54"	3' - 0"	1' - 3"	5' - 9"
60"	3' - 3"	1' - 3"	6' - 3"
66"	3' - 3"	1' - 3"	6' - 9"
72"	3' - 4"	1' - 3"	7' - 3"



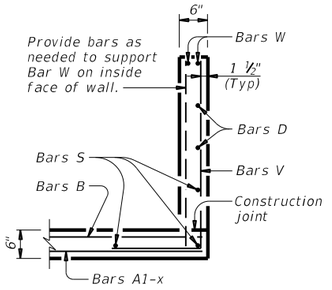
BARS B and B1-x



PLAN



TYPICAL WING ELEVATION



SECTION A-A

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Do not mount bridge rails of any type directly to these culvert headwalls.

This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

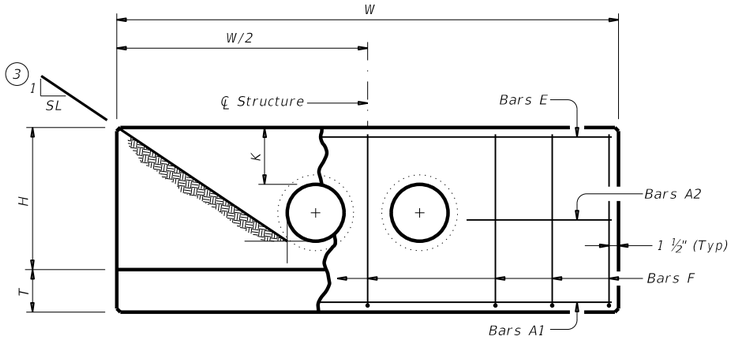
CH-FW-0

FILE: chfw00se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		182

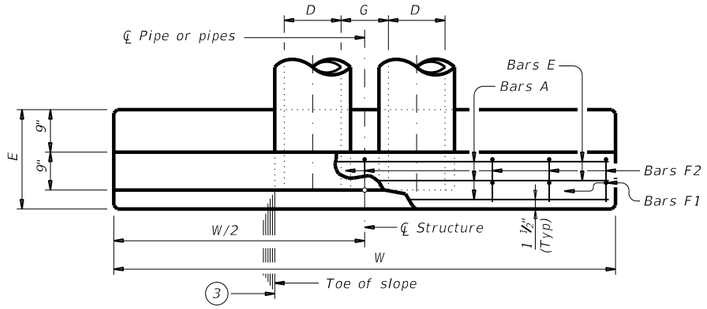
DATE: 1/7/2021 11:46:51 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\5. Drainage\Standards\chfw00se-20.dgn

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

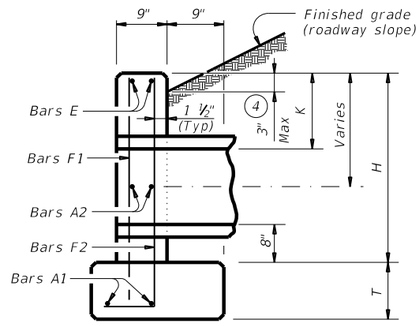
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3



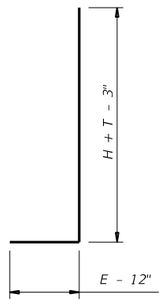
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		183

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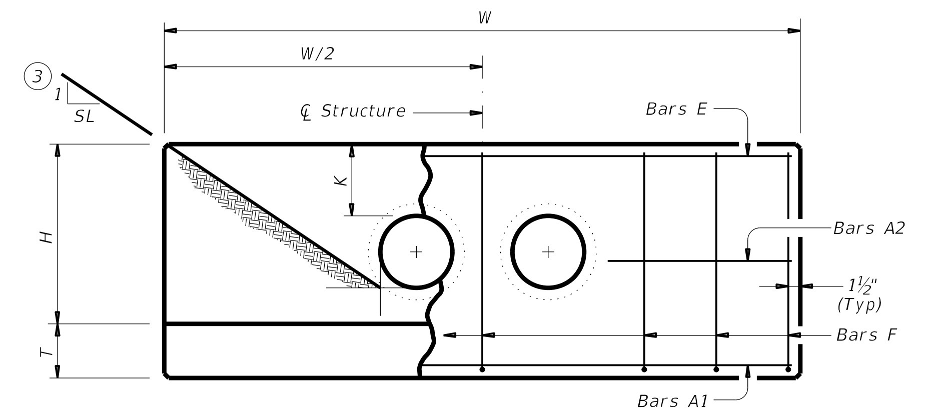
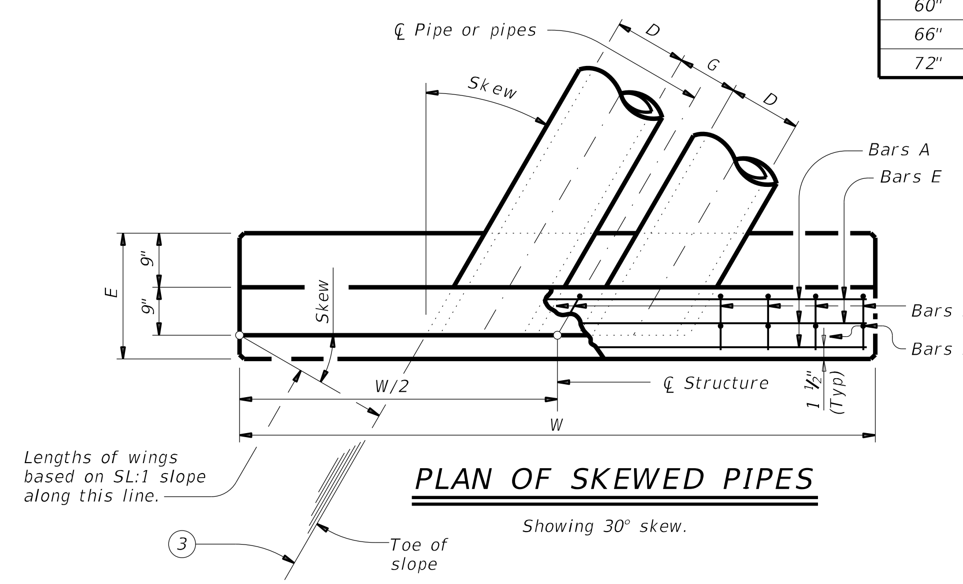
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

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

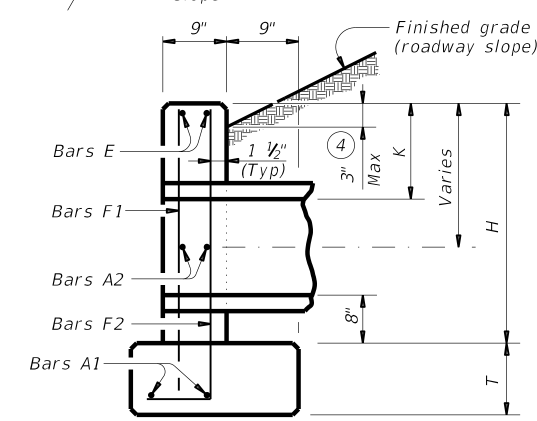


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° skew.



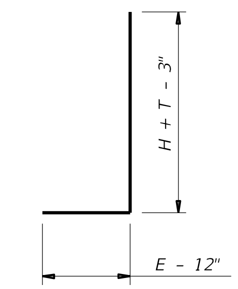
SECTION AT CENTER OF PIPE

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 (6) REINFORCING STEEL

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1'-6"	~
E	#5	~	2
F	#5	1'-0"	~



BARS F2

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 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 184

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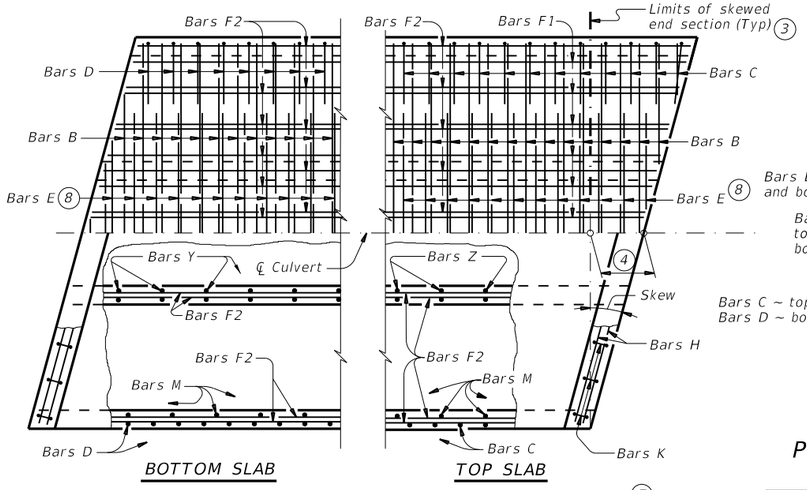
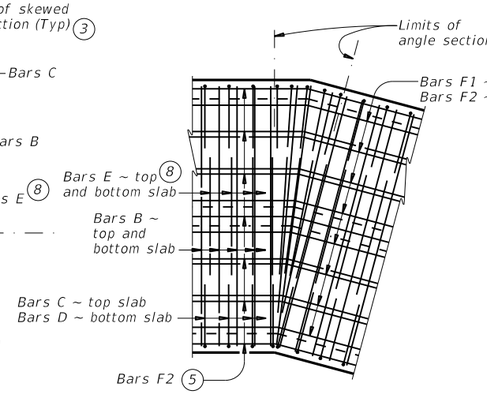
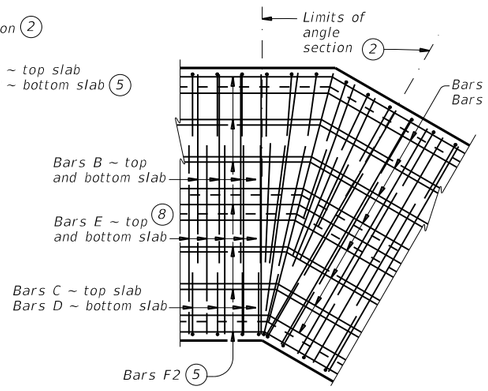


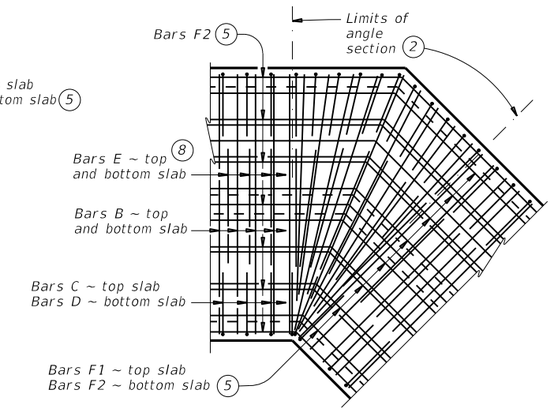
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



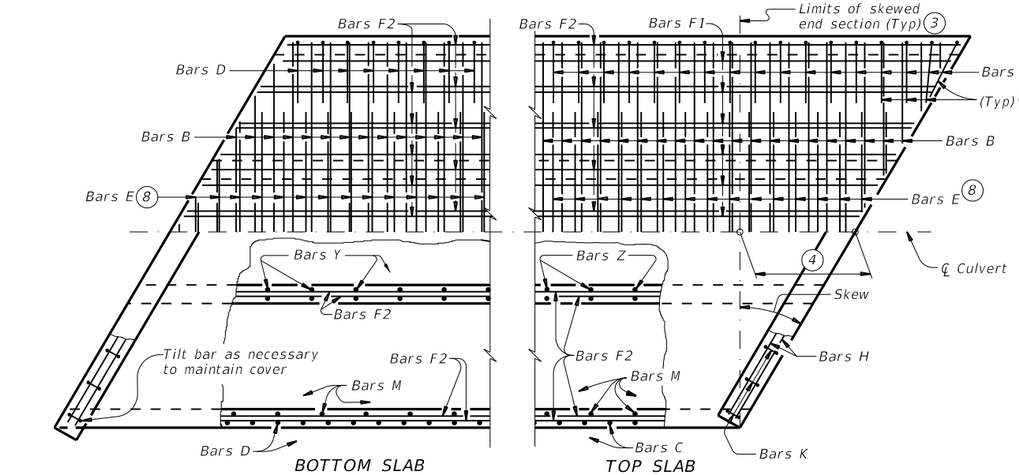
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



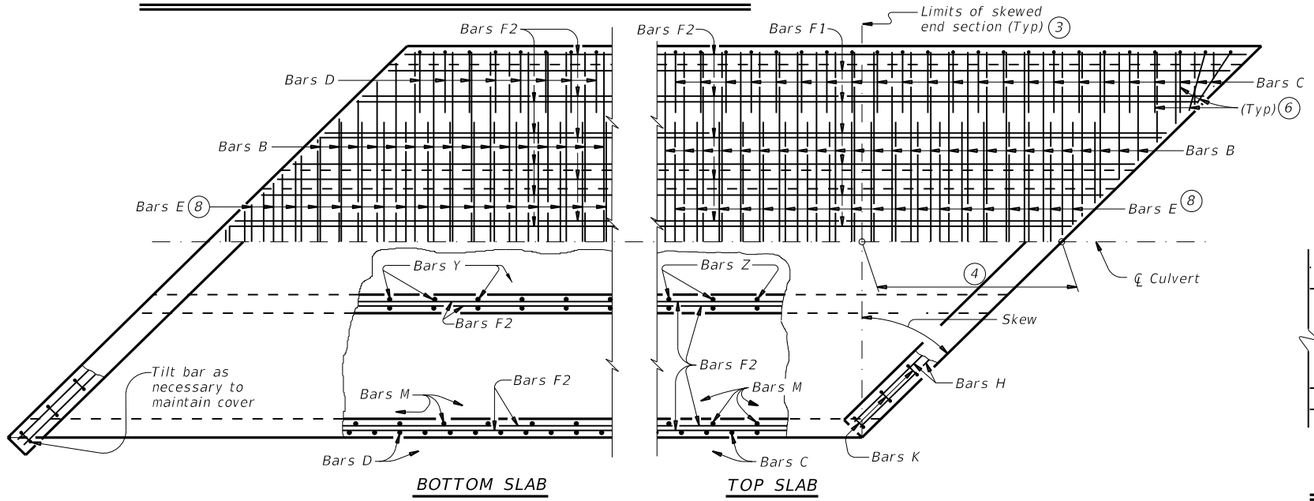
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

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

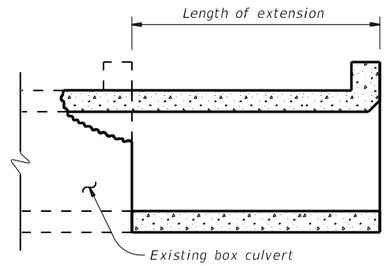
For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed,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

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

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

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

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



LENGTHENING DETAIL 1

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

GENERAL NOTES:

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		185

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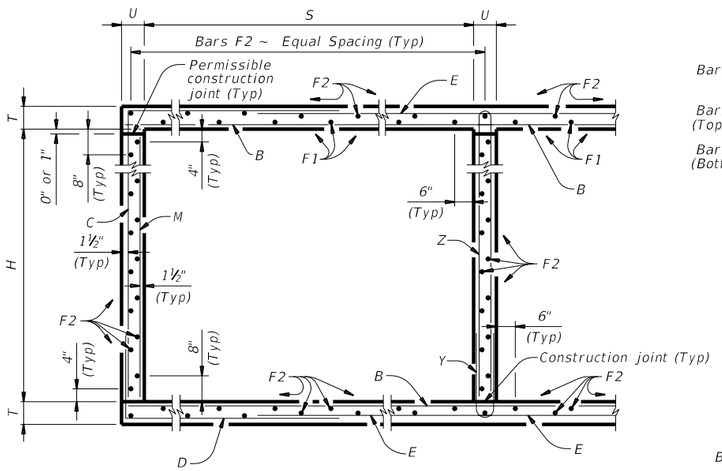
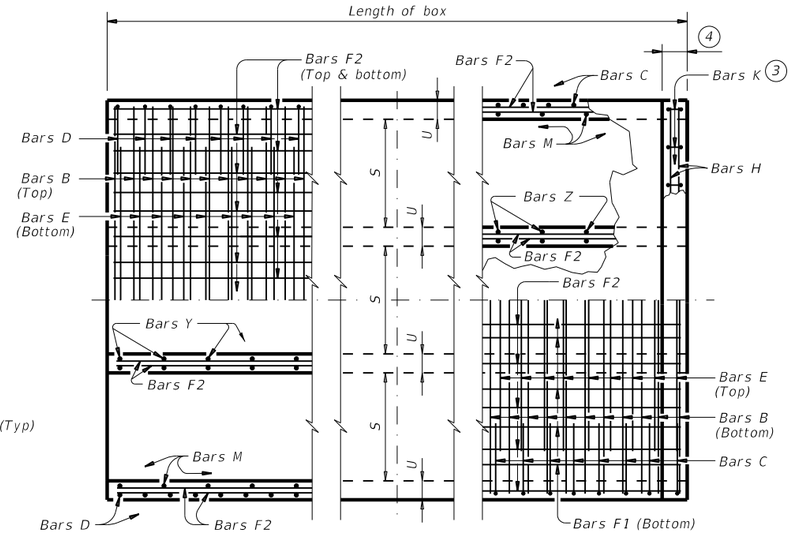
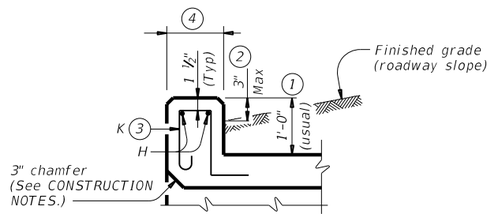


TYPICAL SECTION



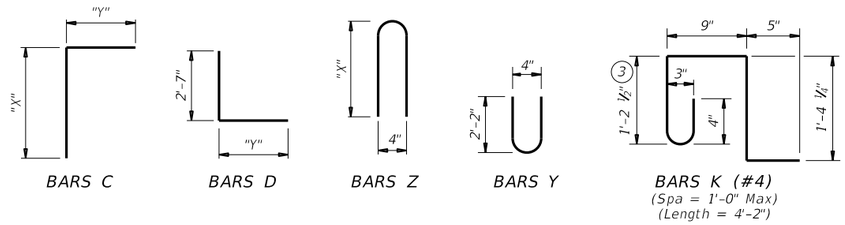
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-6 ½"	3'-8 ½"
3'-0"	3'-6 ½"	3'-8 ½"
4'-0"	4'-6 ½"	3'-8 ½"
5'-0"	5'-6 ½"	3'-8 ½"



BARS C BARS D BARS Z BARS Y BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

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

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
5'-0" SPAN
0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		186

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NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
												Bars C		Bars D																				Bars Y		Bars Z											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	5' – 0"	2' – 0"	8"	7"	108	#5	9"	11' – 6"	1,295	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	38	18"	39' – 9"	1,009	108	9"	2' – 0"	144	54	9"	4' – 7"	165	5' – 3"	189	11' – 6"	31	26	72	0.710	135.2	0.9	103	29.3	5,510
3	5' – 0"	2' – 0"	8"	7"	108	#5	9"	17' – 1"	1,924	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	54	18"	39' – 9"	1,434	108	9"	2' – 0"	144	108	9"	4' – 7"	331	5' – 3"	379	17' – 1"	46	38	106	1.029	188.8	1.3	152	42.4	7,705
4	5' – 0"	2' – 0"	8"	7"	108	#5	9"	22' – 8"	2,553	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	70	18"	39' – 9"	1,859	108	9"	2' – 0"	144	162	9"	4' – 7"	496	5' – 3"	568	22' – 8"	61	48	134	1.348	242.4	1.7	195	55.6	9,891
5	5' – 0"	2' – 0"	8"	7"	108	#5	9"	28' – 3"	3,182	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	86	18"	39' – 9"	2,284	108	9"	2' – 0"	144	216	9"	4' – 7"	661	5' – 3"	758	28' – 3"	75	60	167	1.667	296.0	2.1	242	68.8	12,082
6	5' – 0"	2' – 0"	8"	7"	108	#5	9"	33' – 10"	3,811	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	102	18"	39' – 9"	2,708	108	9"	2' – 0"	144	270	9"	4' – 7"	827	5' – 3"	947	33' – 10"	90	70	195	1.986	349.6	2.5	285	82.0	14,268
2	5' – 0"	3' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	44	18"	39' – 9"	1,168	108	9"	3' – 0"	216	54	9"	4' – 7"	165	7' – 3"	262	11' – 6"	31	26	72	0.775	159.9	0.9	103	31.9	6,497
3	5' – 0"	3' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	62	18"	39' – 9"	1,646	108	9"	3' – 0"	216	108	9"	4' – 7"	331	7' – 3"	523	17' – 1"	46	38	106	1.115	223.5	1.3	152	45.9	9,093
4	5' – 0"	3' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	80	18"	39' – 9"	2,124	108	9"	3' – 0"	216	162	9"	4' – 7"	496	7' – 3"	785	22' – 8"	61	48	134	1.456	287.2	1.7	195	59.9	11,682
5	5' – 0"	3' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	98	18"	39' – 9"	2,602	108	9"	3' – 0"	216	216	9"	4' – 7"	661	7' – 3"	1,046	28' – 3"	75	60	167	1.796	350.8	2.1	242	73.9	14,274
6	5' – 0"	3' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	116	18"	39' – 9"	3,080	108	9"	3' – 0"	216	270	9"	4' – 7"	827	7' – 3"	1,308	33' – 10"	90	70	195	2.137	414.5	2.5	285	88.0	16,863
2	5' – 0"	4' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	44	18"	39' – 9"	1,168	108	9"	4' – 0"	289	54	9"	4' – 7"	165	9' – 3"	334	11' – 6"	31	26	72	0.840	166.3	0.9	103	34.5	6,754
3	5' – 0"	4' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	62	18"	39' – 9"	1,646	108	9"	4' – 0"	289	108	9"	4' – 7"	331	9' – 3"	667	17' – 1"	46	38	106	1.202	231.8	1.3	152	49.4	9,422
4	5' – 0"	4' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	80	18"	39' – 9"	2,124	108	9"	4' – 0"	289	162	9"	4' – 7"	496	9' – 3"	1,001	22' – 8"	61	48	134	1.564	297.2	1.7	195	64.3	12,083
5	5' – 0"	4' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	98	18"	39' – 9"	2,602	108	9"	4' – 0"	289	216	9"	4' – 7"	661	9' – 3"	1,335	28' – 3"	75	60	167	1.926	362.7	2.1	242	79.1	14,748
6	5' – 0"	4' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	116	18"	39' – 9"	3,080	108	9"	4' – 0"	289	270	9"	4' – 7"	827	9' – 3"	1,668	33' – 10"	90	70	195	2.288	428.1	2.5	285	94.0	17,408
2	5' – 0"	5' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	50	18"	39' – 9"	1,328	108	9"	5' – 0"	361	54	9"	4' – 7"	165	11' – 3"	406	11' – 6"	31	26	72	0.904	176.7	0.9	103	37.0	7,171
3	5' – 0"	5' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	70	18"	39' – 9"	1,859	108	9"	5' – 0"	361	108	9"	4' – 7"	331	11' – 3"	812	17' – 1"	46	38	106	1.288	245.3	1.3	152	52.8	9,965
4	5' – 0"	5' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	90	18"	39' – 9"	2,390	108	9"	5' – 0"	361	162	9"	4' – 7"	496	11' – 3"	1,217	22' – 8"	61	48	134	1.672	313.9	1.7	195	68.6	12,750
5	5' – 0"	5' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	110	18"	39' – 9"	2,921	108	9"	5' – 0"	361	216	9"	4' – 7"	661	11' – 3"	1,623	28' – 3"	75	60	167	2.056	382.5	2.1	242	84.3	15,540
6	5' – 0"	5' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	130	18"	39' – 9"	3,452	108	9"	5' – 0"	361	270	9"	4' – 7"	827	11' – 3"	2,029	33' – 10"	90	70	195	2.439	451.0	2.5	285	100.1	18,326

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

5'-0" SPAN

0' TO 20' FILL

MC-5-20

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		187

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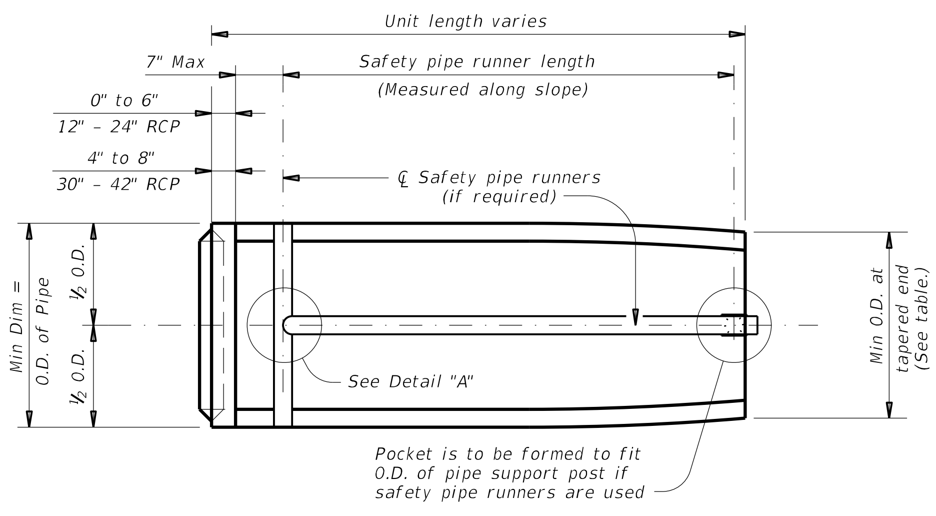
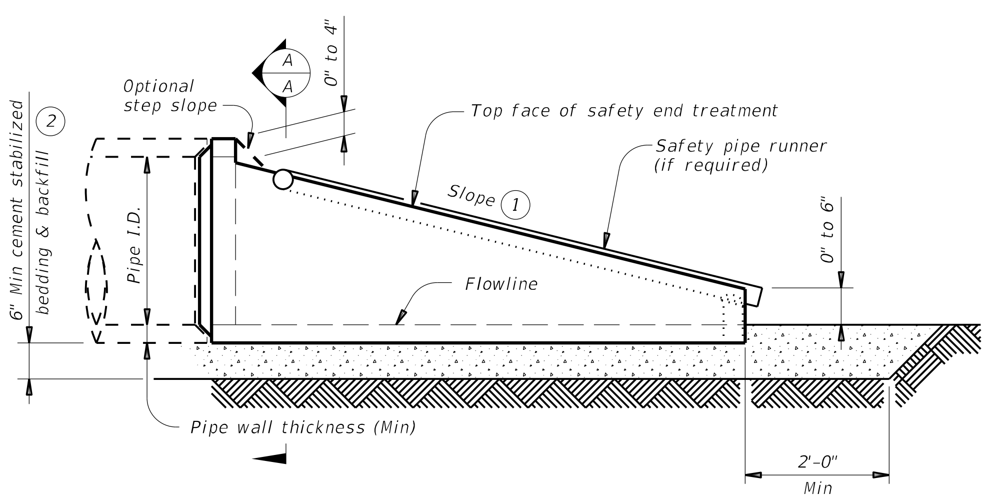


PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

(Showing spigot end connection.)

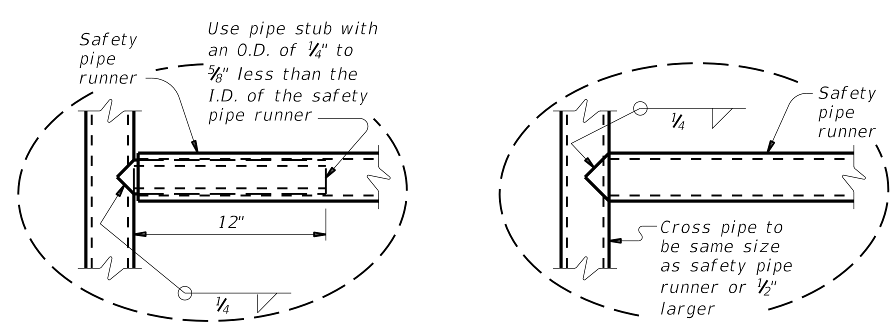
1. Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.
2. Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". 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.

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"

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' - 0"	≤ 45°	No	≤ 45°	No
					4:1	2' - 8"				
					6:1	4' - 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' - 10"	≤ 45°	No	≤ 45°	No
					4:1	3' - 9"				
					6:1	5' - 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
					4:1	4' - 10"				
					6:1	7' - 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' - 3"	≤ 45°	No	≤ 30°	No
					4:1	7' - 0"			> 30°	Yes
					6:1	10' - 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' - 3"	≤ 15°	No	≤ 15°	No
					4:1	8' - 2"	> 15°	Yes	> 15°	Yes
					6:1	12' - 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' - 10"	= 0°	No	≥ 0°	Yes
					4:1	10' - 4"	> 0°	Yes		
					6:1	15' - 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' - 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' - 6"				
					6:1	18' - 7"				



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".

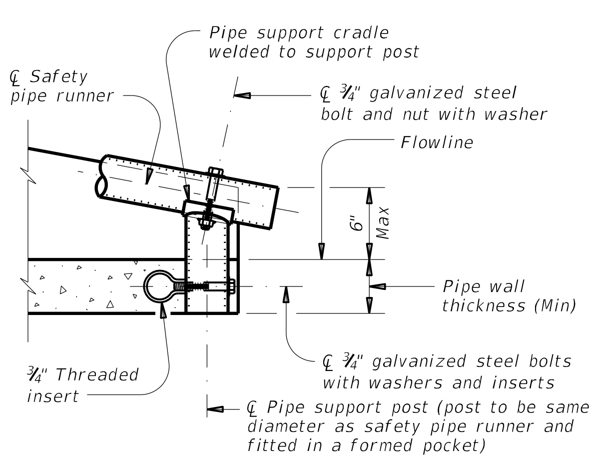
When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

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.

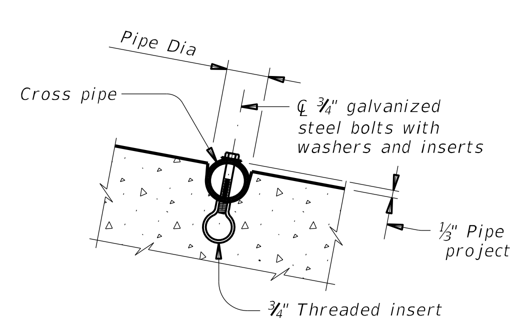
Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

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.



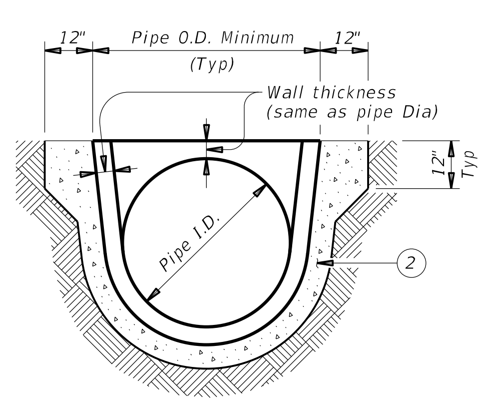
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

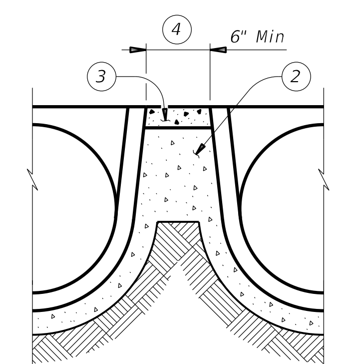


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

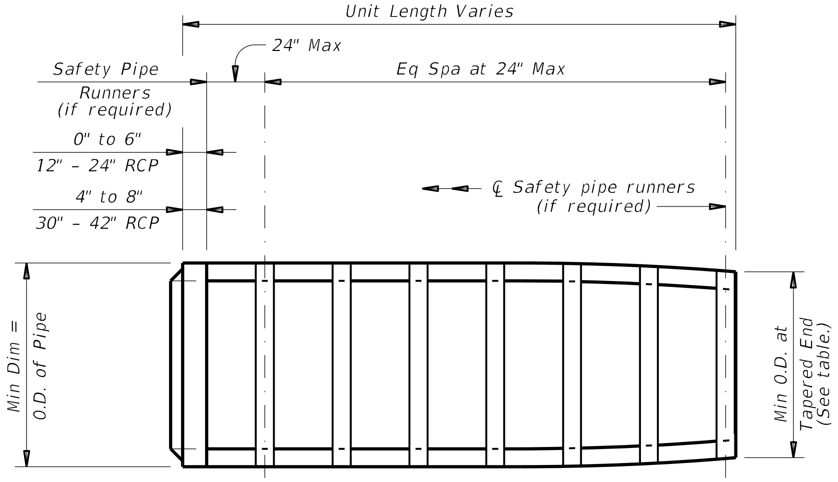
Texas Department of Transportation | Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

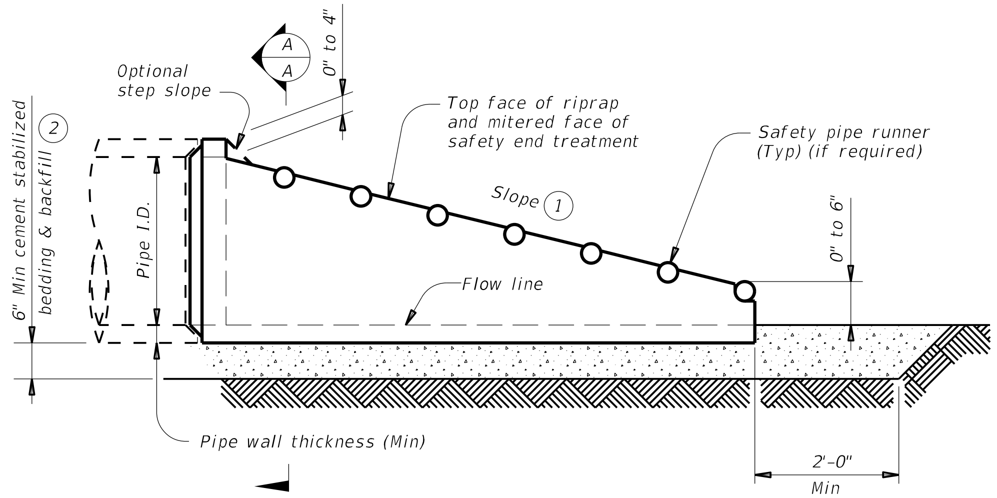
PSET-RC

FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL		COUNTY NAVARRO	SHEET NO. 188



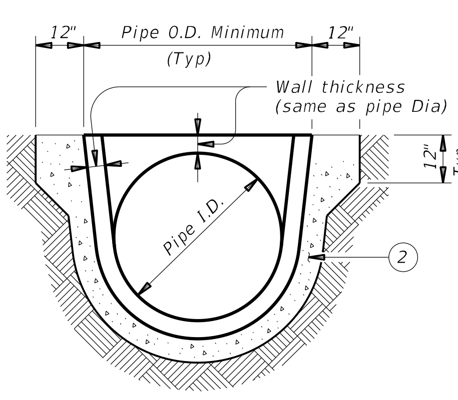
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

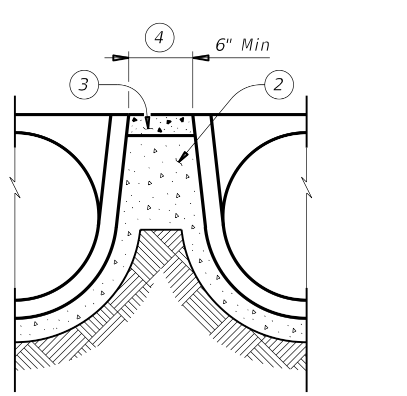


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

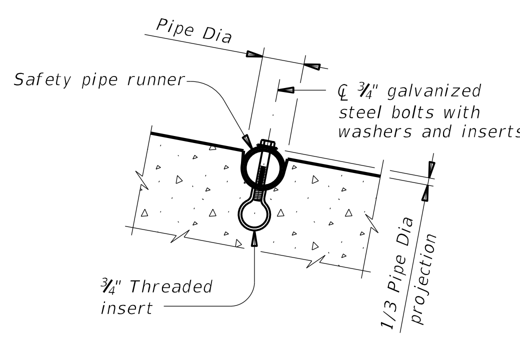
1. Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

   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".

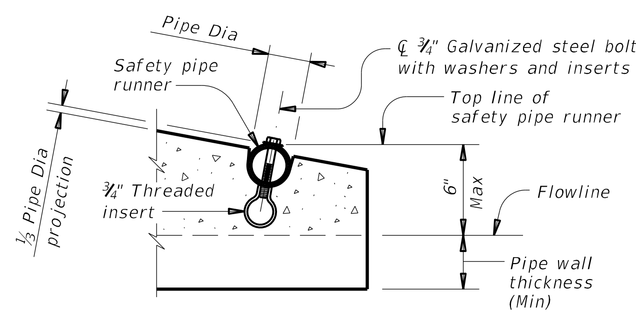
4. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

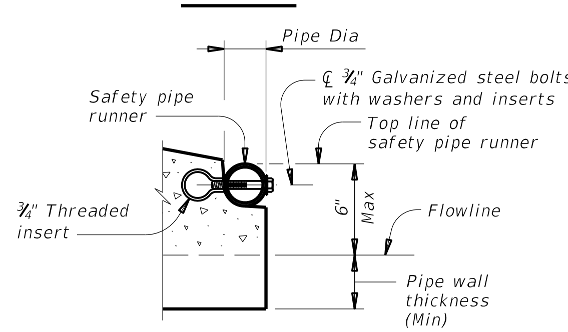


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	189

DATE: 1/7/2021 11:47:27 AM
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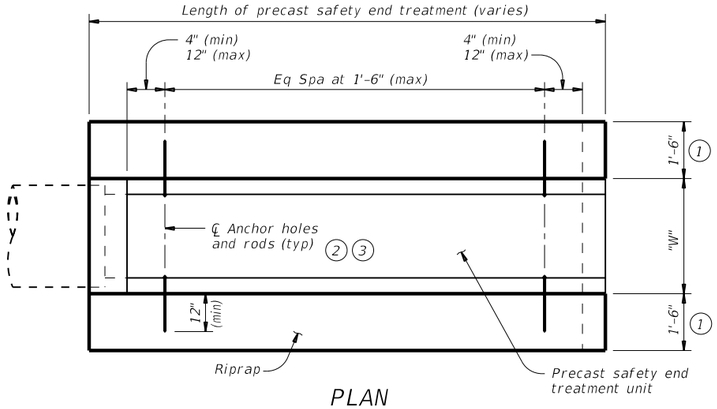
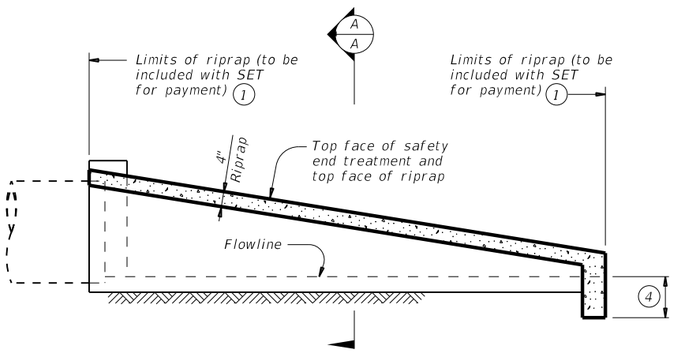
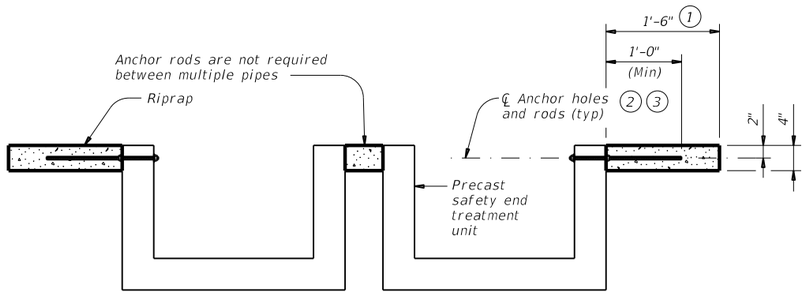


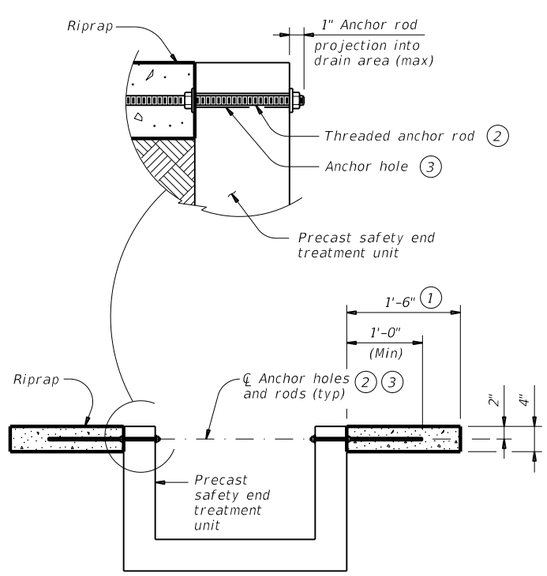
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

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

GENERAL NOTES:

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

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

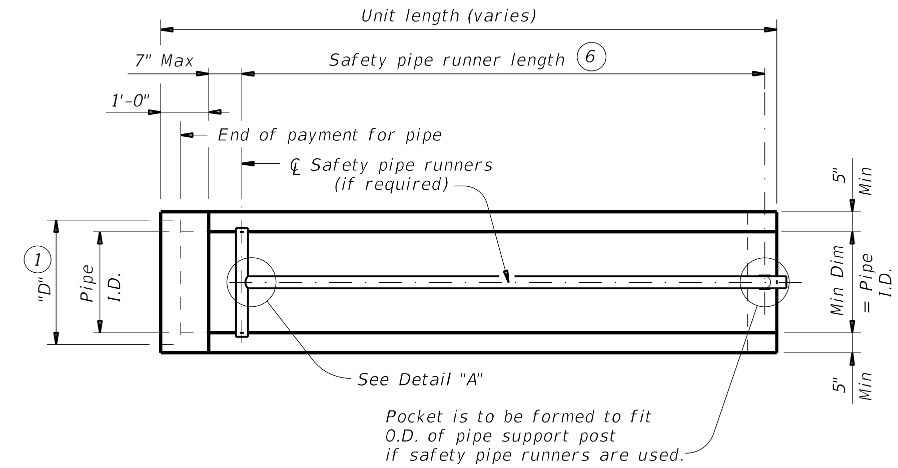
FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		190

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 1/4"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 1/2"	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 1/2"	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 1/2"	N/A	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				

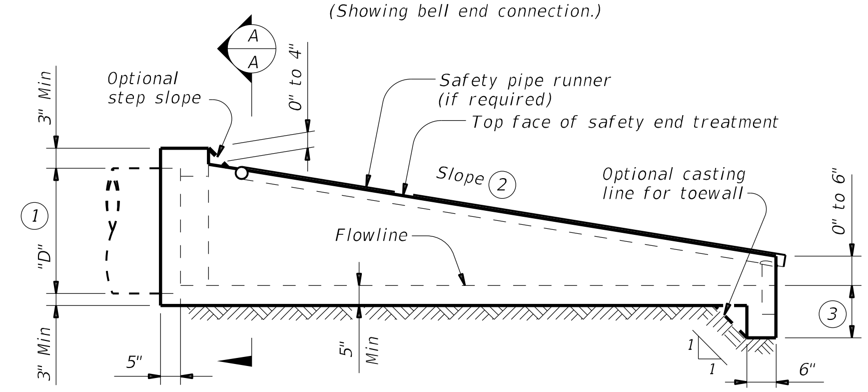
SAFETY PIPE RUNNER DIMENSIONS

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 1/2" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"



PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

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).

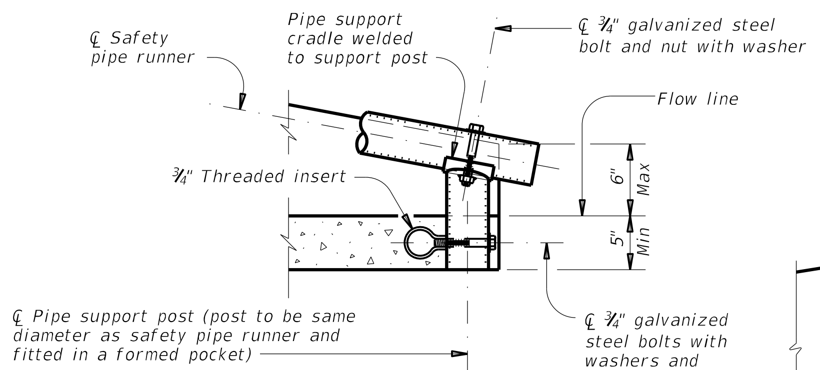
At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

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.

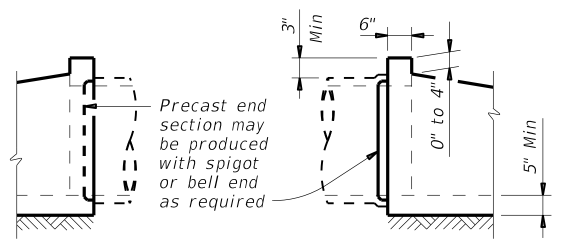
Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

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.



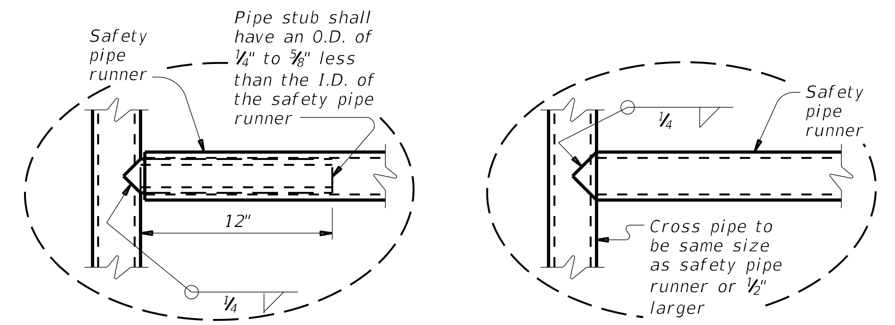
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



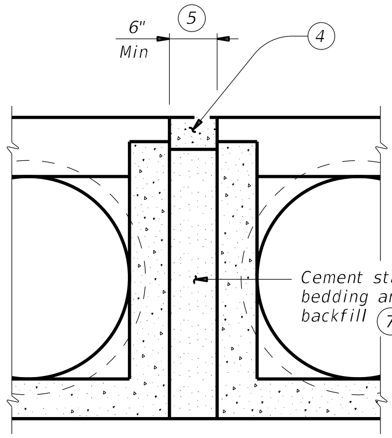
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)

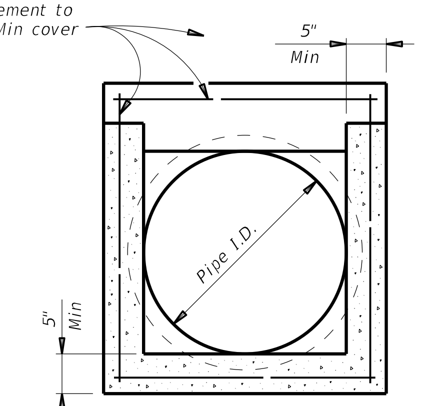


DETAIL A

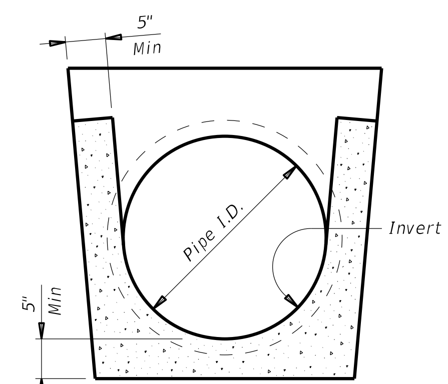
(If required)



MULTIPLE PIPE INSTALLATION

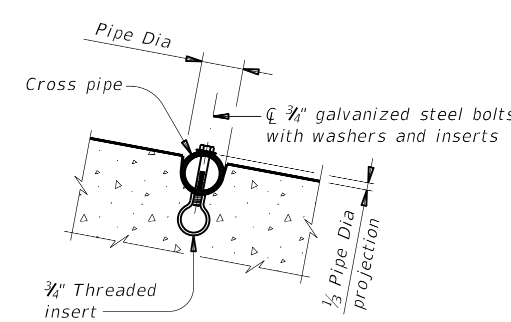


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

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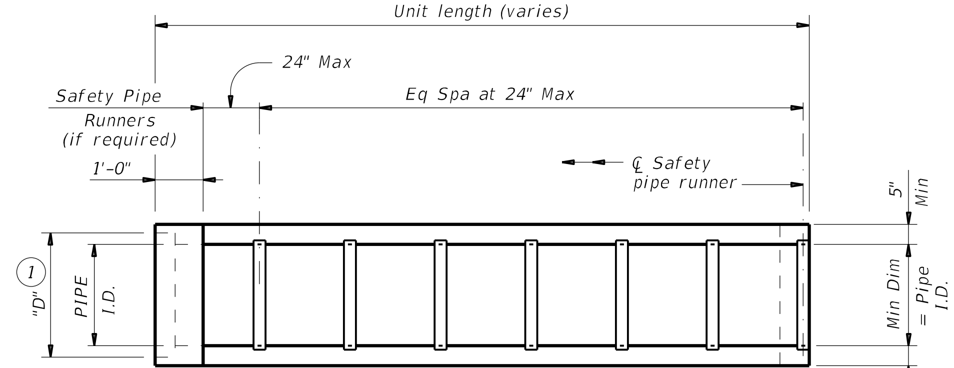
Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II ~ CROSS DRAINAGE

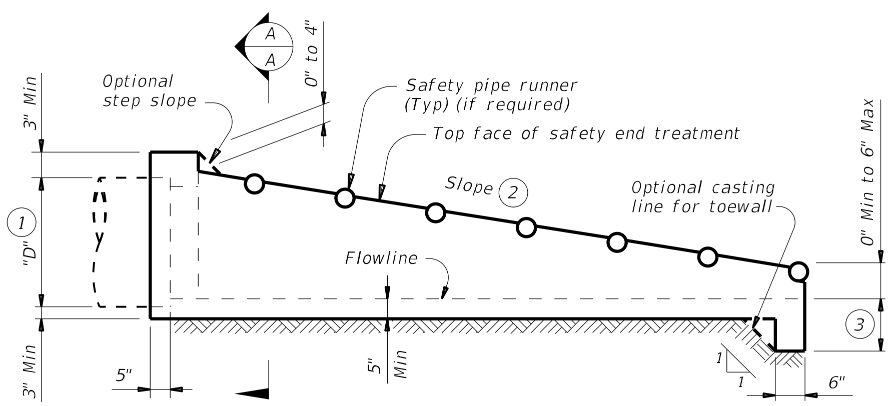
PSET-SC

FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 191



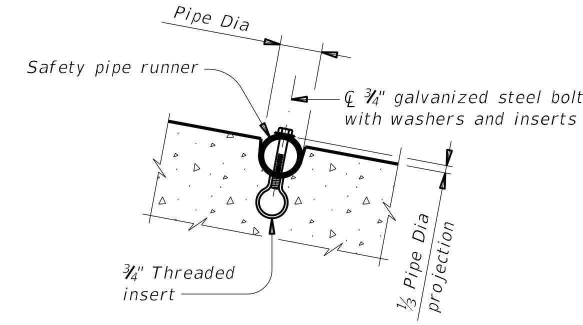
PLAN

(Showing bell end connection.)



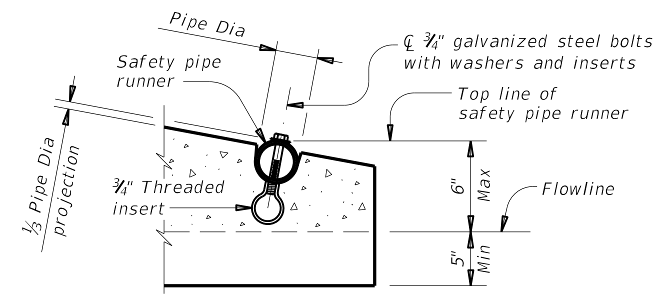
LONGITUDINAL ELEVATION

(Showing bell end connection.)

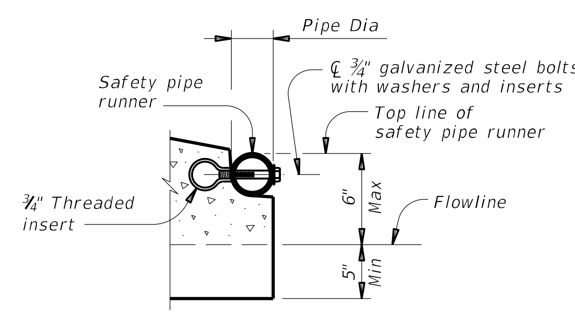


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



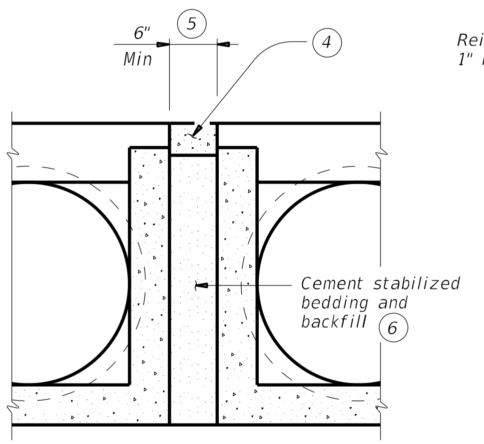
OPTION A



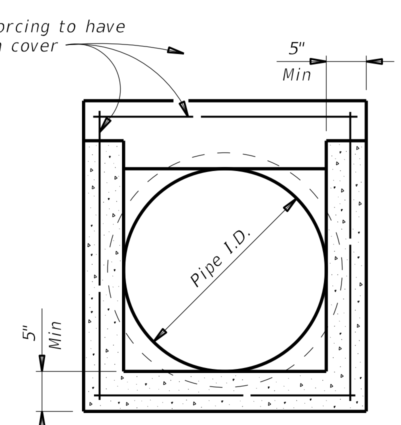
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

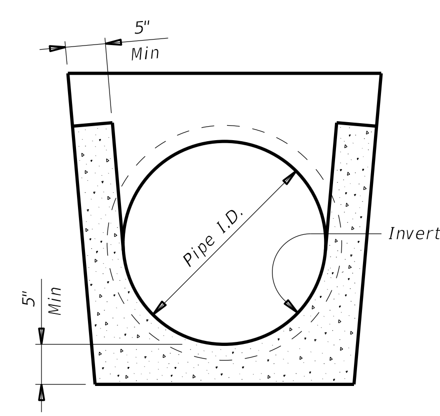
(If required)



MULTIPLE PIPE INSTALLATION

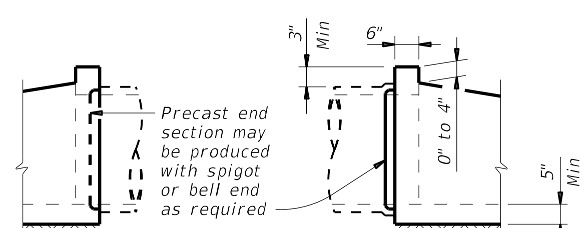


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

1. Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.
2. Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
3. Toewall to be used only when dimension is shown elsewhere in the plans.
4. Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".
5. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
6. Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
7. Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

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

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

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

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

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

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

Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
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REVISIONS	DIST DAL		COUNTY NAVARRO	SHEET NO. 192

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

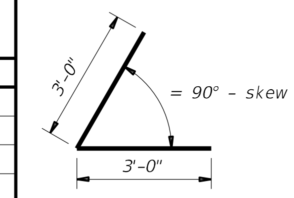
Maximum Wingwall Height Hw	Dimensions W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing (2~wings) (4) Reinf (Lb/Ft)	Conc (CY/Ft)	Estimated Quantities per ft of Toewall (1~toewall) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

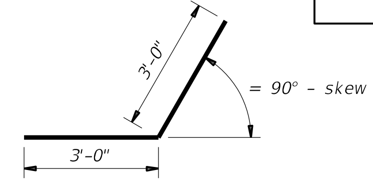
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

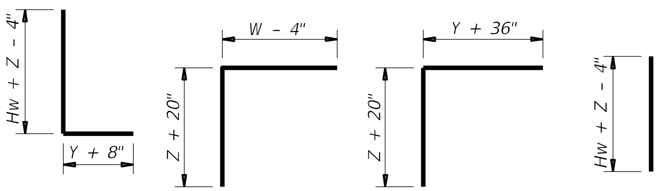
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

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

(1) Skew = 0°

(2) At discharge end, chamfer may be ¾" minimum.

(3) For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"

(4) Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.

(5) Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.

(6) Extend Bars E2 1'-6" minimum into the wingwall footing.

(7) Lap Bars M1 1'-6" minimum with Bars M2.

(8) Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.

(9) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

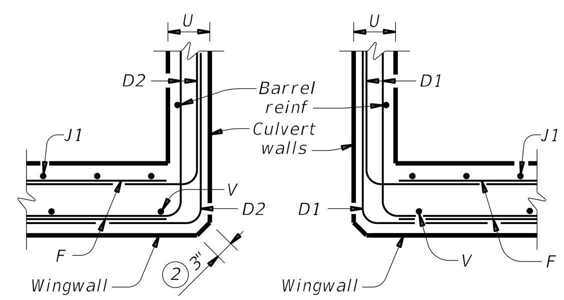
(10) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

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

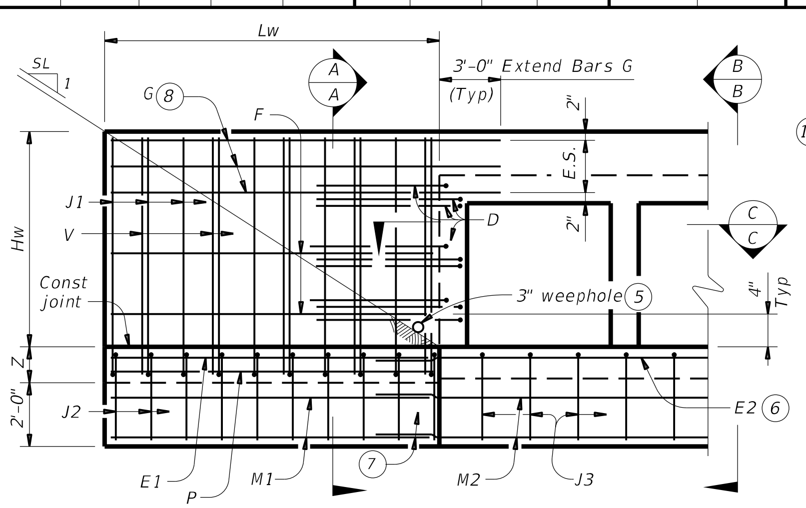
(11) 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.

(12) 3'-0" for Hw < 4'.

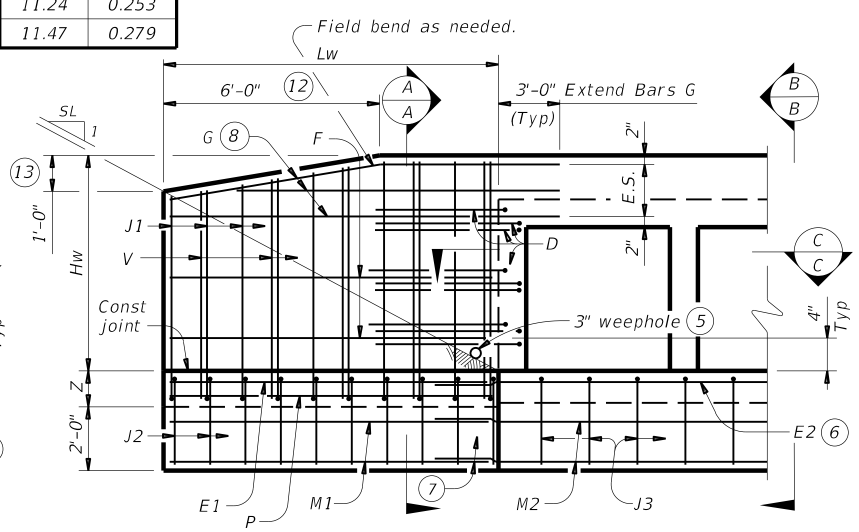
(13) 6" for Hw < 4'.



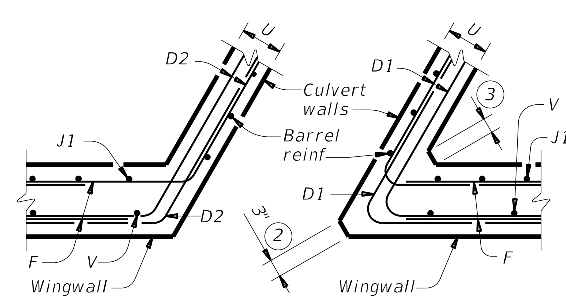
SECTION C-C - PW-1



PARTIAL ELEVATION - PW-1



PARTIAL ELEVATION - PW-2



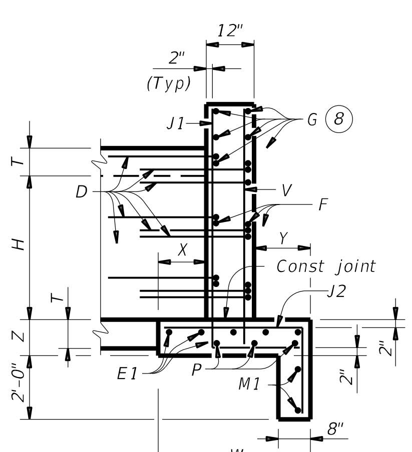
SECTION C-C - PW-2

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

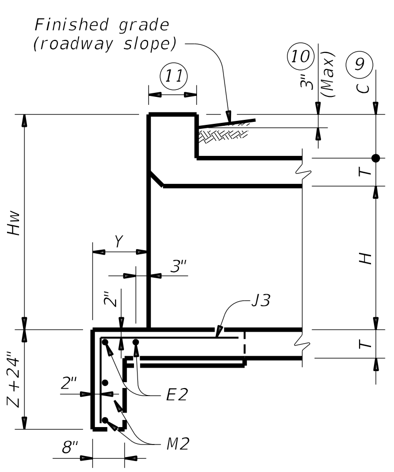
MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

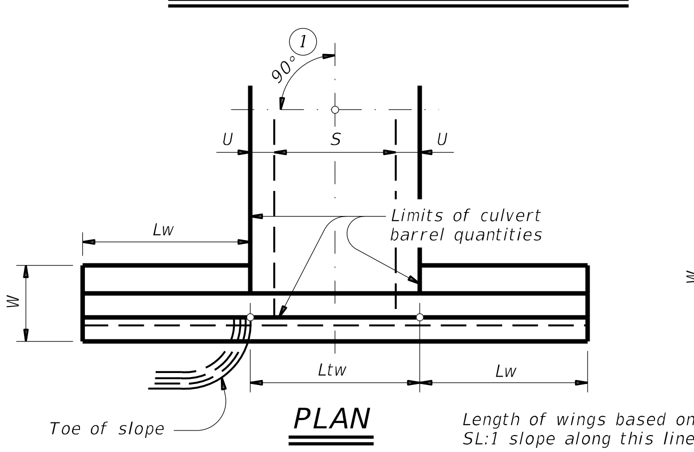
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



SECTION A-A
(Showing wing reinforcement.)



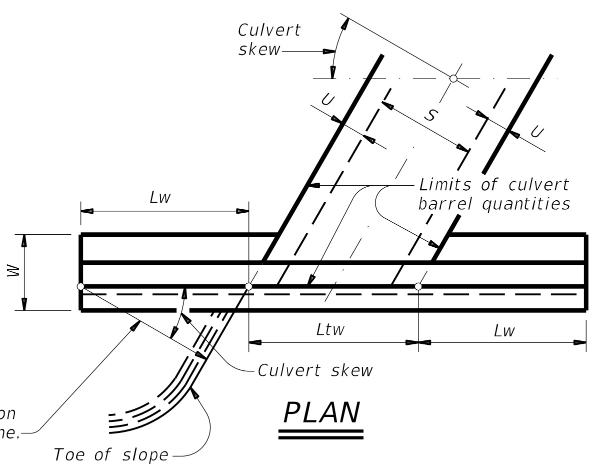
SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS

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



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

Texas Department of Transportation | Bridge Division Standard

CONCRETE WINGWALLS WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 193

DATE: 1/7/2021 11:47:53 AM
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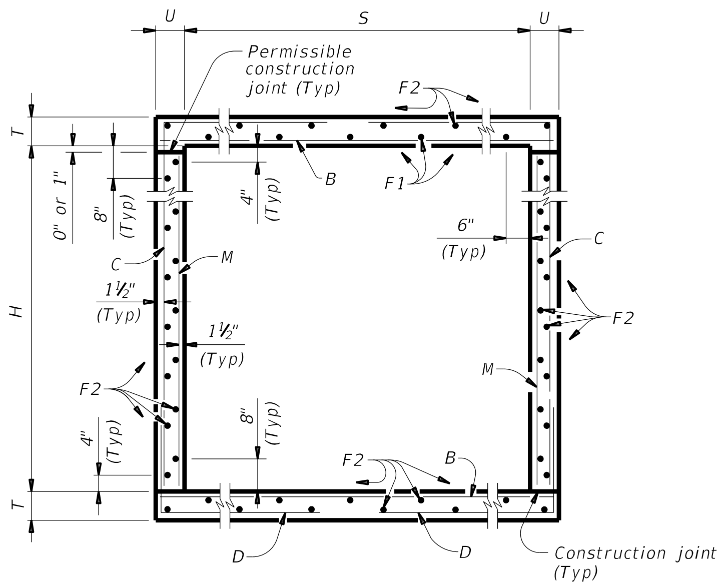
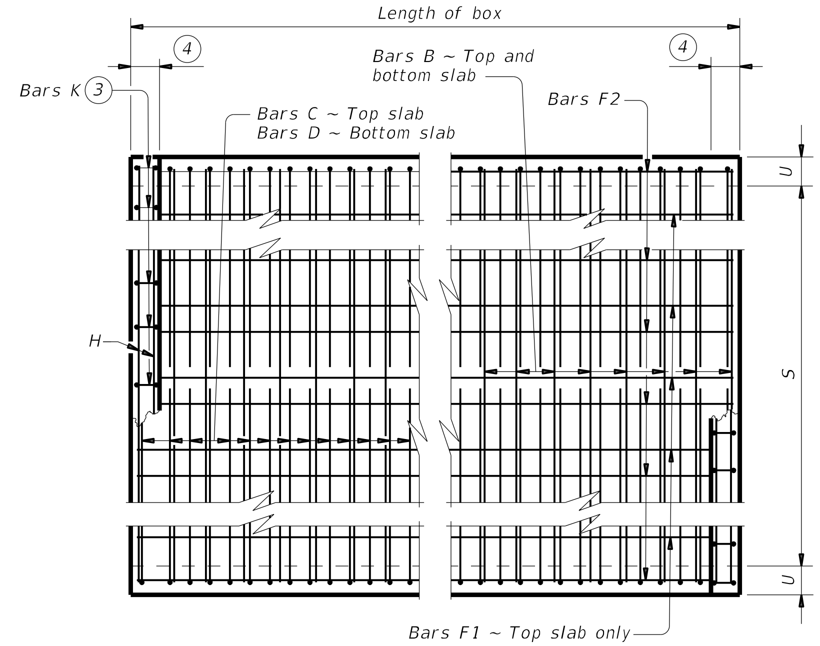
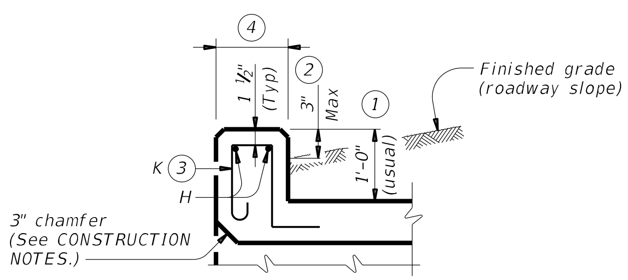


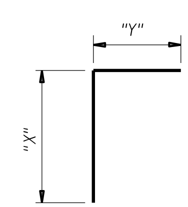
TYPICAL SECTION



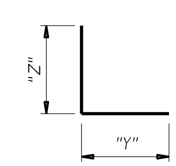
PLAN OF REINF STEEL



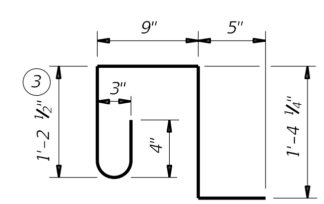
SECTION THRU CURB



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

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

GENERAL NOTES:

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

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

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-5 & 6

FILE: scc56ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		194

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
5' – 0"	2' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 4"	713	2' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.391	80.8	0.5	55	16.1	3,285
5' – 0"	2' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 5"	723	2' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.429	81.2	0.5	55	17.6	3,304
5' – 0"	3' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 4"	826	3' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.434	88.0	0.5	55	17.8	3,576
5' – 0"	3' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 5"	835	3' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.472	88.5	0.5	55	19.3	3,594
5' – 0"	4' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 4"	939	4' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.477	92.7	0.5	55	19.5	3,762
5' – 0"	4' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 5"	948	4' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.515	93.1	0.5	55	21.1	3,780
5' – 0"	5' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 4"	1,051	5' – 7"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.521	100.0	0.5	55	21.3	4,053
5' – 0"	5' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 5"	1,061	5' – 8"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.559	100.4	0.5	55	22.8	4,072
6' – 0"	2' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	6' – 8"	751	2' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.440	89.4	0.5	63	18.1	3,637
6' – 0"	2' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	6' – 9"	1,141	2' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.485	109.0	0.5	63	19.9	4,422
6' – 0"	2' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	6' – 11"	1,169	2' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	2' – 0"	110	5	39' – 9"	133	25	39' – 9"	664	7' – 1"	19	18	50	0.551	110.2	0.5	69	22.6	4,477
6' – 0"	3' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	7' – 8"	864	3' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.484	96.6	0.5	63	19.9	3,928
6' – 0"	3' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	7' – 9"	1,309	3' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.528	117.6	0.5	63	21.6	4,768
6' – 0"	3' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	7' – 11"	1,338	3' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	3' – 0"	164	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.601	118.4	0.5	69	24.6	4,806
6' – 0"	4' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	8' – 8"	976	4' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.527	101.3	0.5	63	21.6	4,113
6' – 0"	4' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	8' – 9"	1,478	4' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.571	123.7	0.5	63	23.4	5,010
6' – 0"	4' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	8' – 11"	1,507	4' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	4' – 0"	219	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.650	124.0	0.5	69	26.5	5,030
6' – 0"	5' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	9' – 8"	1,089	5' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.570	108.5	0.5	63	23.3	4,404
6' – 0"	5' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	9' – 9"	1,647	5' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.614	132.4	0.5	63	25.1	5,357
6' – 0"	5' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	9' – 11"	1,676	5' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	5' – 0"	274	5	39' – 9"	133	33	39' – 9"	876	7' – 1"	19	18	50	0.700	132.3	0.5	69	28.5	5,360
6' – 0"	6' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	10' – 8"	1,202	6' – 7"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.613	115.8	0.5	63	25.0	4,695
6' – 0"	6' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	10' – 9"	1,816	6' – 8"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.657	141.0	0.5	63	26.8	5,704
6' – 0"	6' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	10' – 11"	1,845	6' – 9"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	6' – 0"	329	5	39' – 9"	133	37	39' – 9"	982	7' – 1"	19	18	50	0.749	140.5	0.5	69	30.5	5,690

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-5 & 6

FILE: scc56ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		195

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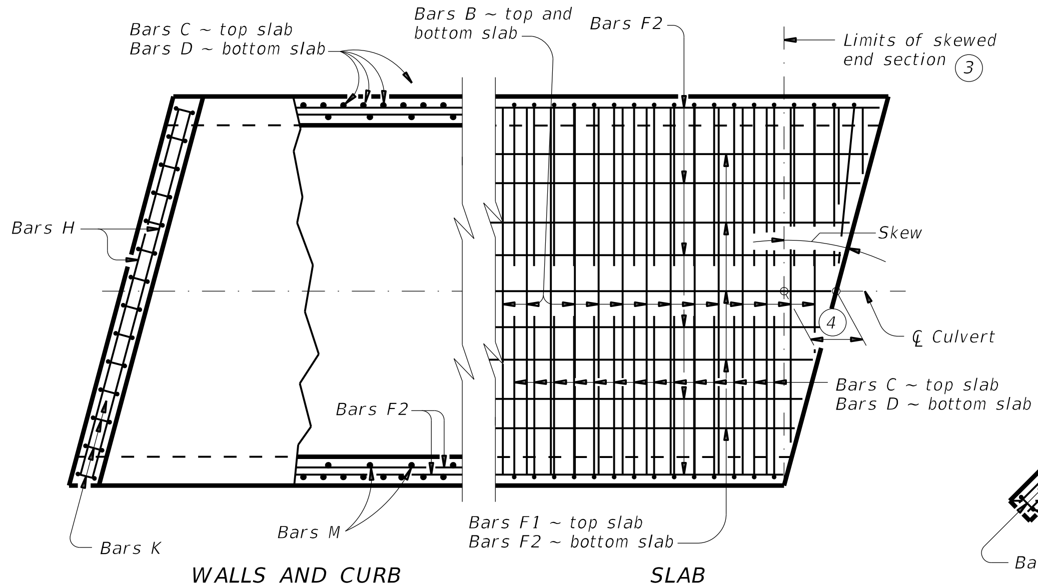
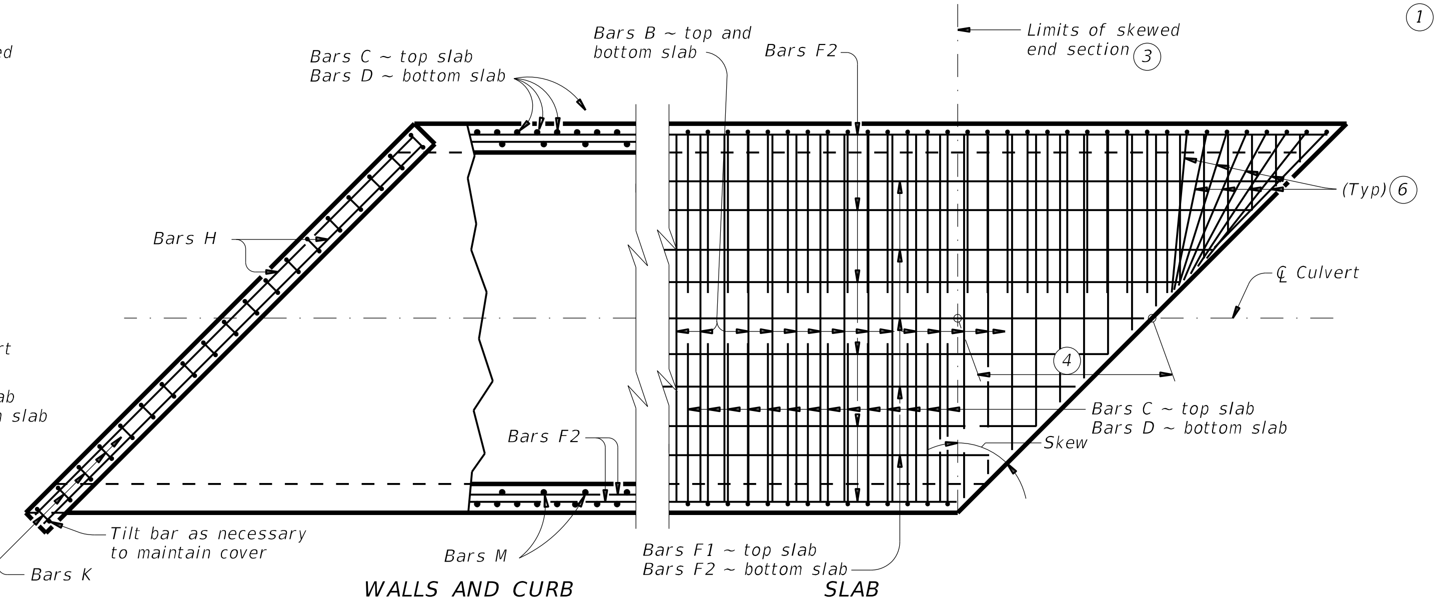
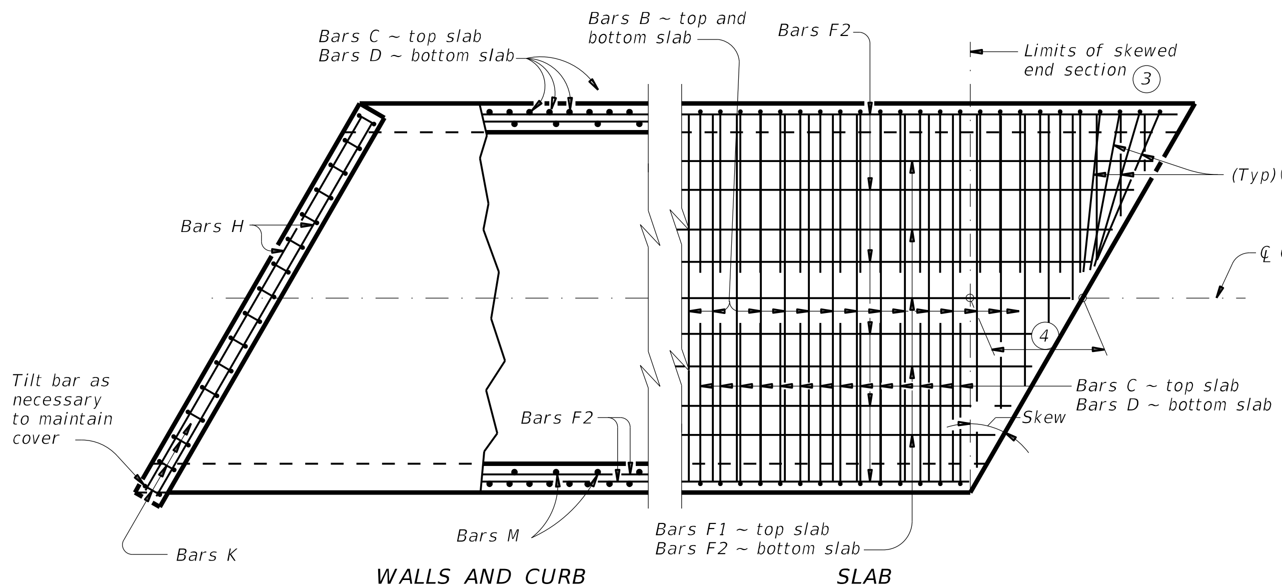


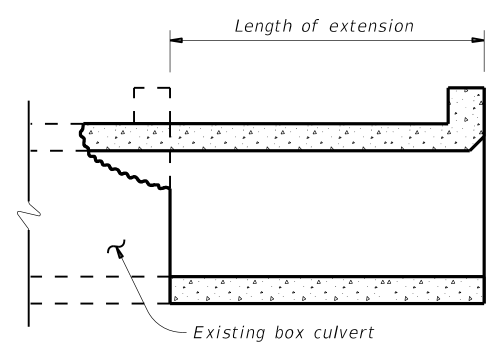
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



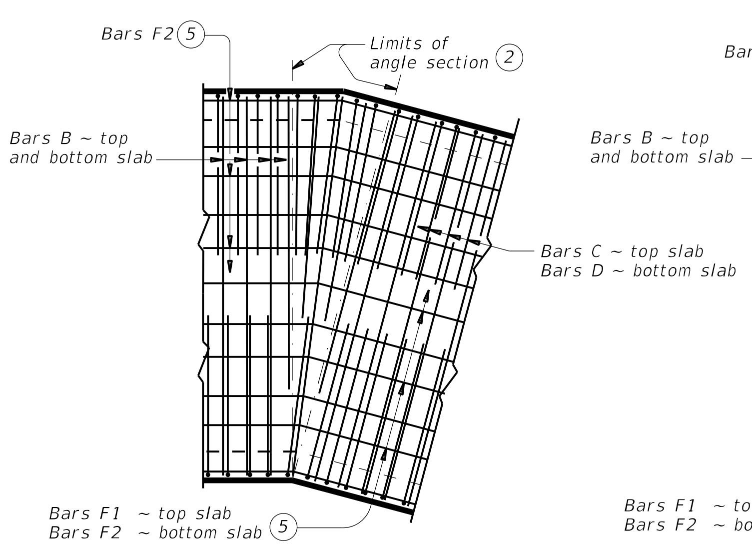
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



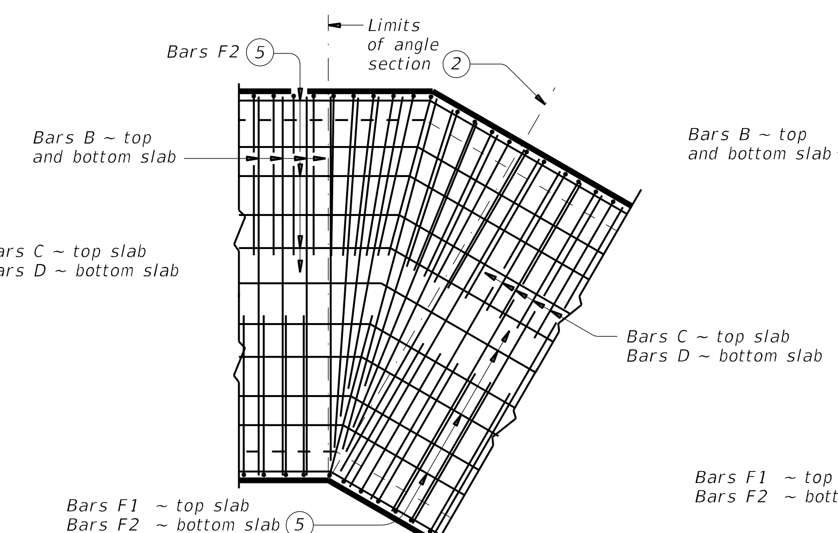
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



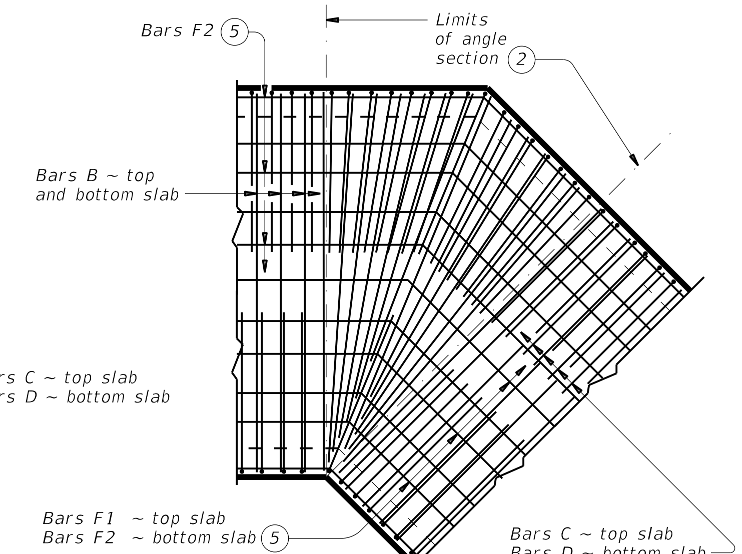
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.
For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D , E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.
Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

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

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

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

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

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

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS
CAST-IN-PLACE
MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 196

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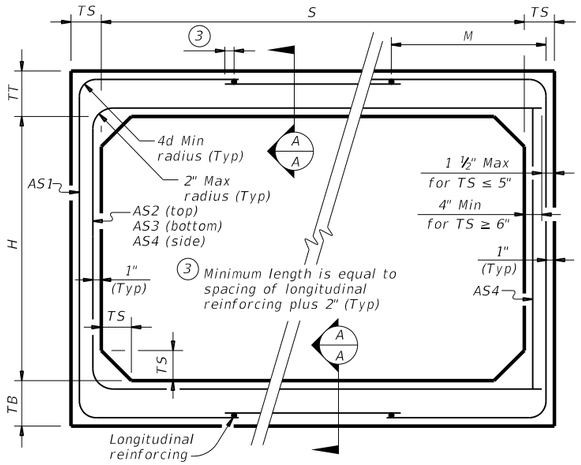
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9

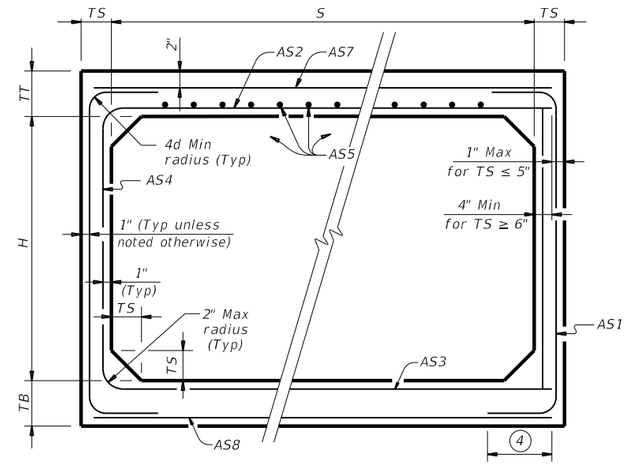
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

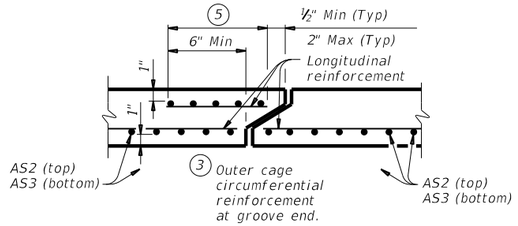
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		197

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

Slope	Dia of Pipe (D)	Values for One Pipe: W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	Values to be Added for Each Addt'l Pipe: X and W	Reinf (Lbs)	Conc (CY) (1)
3:1	33"	14' - 5 ¾"	4' - 8"	9' - 6"	10' - 11 ¾"	316	3.4	4' - 8"	84	1.2
	36"	15' - 7 ¾"	4' - 11 ½"	10' - 3"	11' - 10"	349	3.8	5' - 1"	96	1.4
	42"	17' - 11 ½"	5' - 6 ½"	11' - 9"	13' - 6 ¾"	430	4.9	5' - 10"	119	1.8
	48"	21' - 1 ¾"	6' - 1 ½"	14' - 0"	16' - 2"	535	6.5	6' - 7"	146	2.4
	54"	23' - 5 ½"	6' - 8 ½"	15' - 6"	17' - 10 ¾"	628	7.8	7' - 6"	186	3.0
	60"	25' - 9 ¼"	7' - 3 ½"	17' - 0"	19' - 7 ½"	717	9.2	8' - 3"	219	3.5
	66"	28' - 1"	7' - 10 ½"	18' - 6"	21' - 4 ¼"	809	10.7	8' - 9"	242	4.0
	72"	30' - 4 ¾"	8' - 5 ½"	20' - 0"	23' - 1 ¼"	922	12.3	9' - 4"	272	4.6
4:1	33"	18' - 1 ¾"	4' - 8"	12' - 8"	14' - 7 ½"	423	4.8	4' - 8"	101	1.5
	36"	19' - 7"	4' - 11 ½"	13' - 8"	15' - 9 ¼"	470	5.5	5' - 1"	115	1.7
	42"	22' - 5 ¾"	5' - 6 ½"	15' - 8"	18' - 1"	581	7.0	5' - 10"	141	2.2
	48"	26' - 6 ¼"	6' - 1 ½"	18' - 8"	21' - 6 ¾"	728	9.4	6' - 7"	175	3.0
	54"	29' - 5"	6' - 8 ½"	20' - 8"	23' - 10 ¼"	873	11.3	7' - 6"	226	3.7
	60"	32' - 3 ¾"	7' - 3 ½"	22' - 8"	26' - 2"	994	13.4	8' - 3"	264	4.4
	66"	35' - 2 ½"	7' - 10 ½"	24' - 8"	28' - 5 ¾"	1,138	15.6	8' - 9"	300	5.0
	72"	38' - 1 ¼"	8' - 5 ½"	26' - 8"	30' - 9 ½"	1,295	18.0	9' - 4"	334	5.7
6:1	33"	25' - 5 ½"	4' - 8"	19' - 0"	21' - 11 ¼"	673	8.3	4' - 8"	127	2.1
	36"	27' - 5 ¾"	4' - 11 ½"	20' - 6"	23' - 8"	733	9.5	5' - 1"	144	2.4
	42"	31' - 6 ¼"	5' - 6 ½"	23' - 6"	27' - 1 ½"	920	12.1	5' - 10"	179	3.1
	48"	37' - 3 ½"	6' - 1 ½"	28' - 0"	32' - 4"	1,189	16.6	6' - 7"	231	4.1
	54"	41' - 4 ¼"	6' - 8 ½"	31' - 0"	35' - 9 ½"	1,422	20.0	7' - 6"	300	5.1
	60"	45' - 4 ¾"	7' - 3 ½"	34' - 0"	39' - 3"	1,629	23.8	8' - 3"	353	6.1

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installation.

(2) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

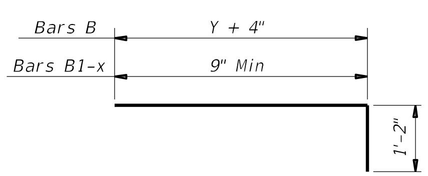
(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end. (One headwall)

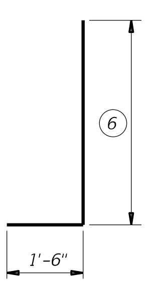
(6) Min Length = 6" + 3" x $\left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = 12 x H - 3" x $\left(\frac{12 \times H - 7}{12 \times L}\right)$ - 1"

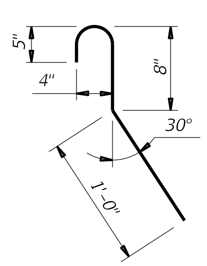
(7) Lengths of wings based on SL:1 slope along this line.



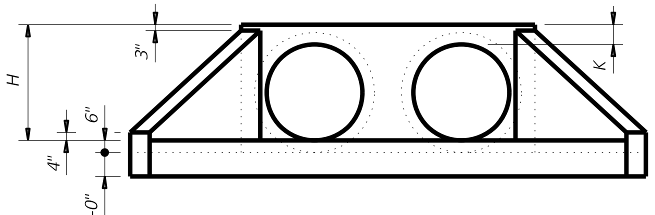
BARS B and B1-x



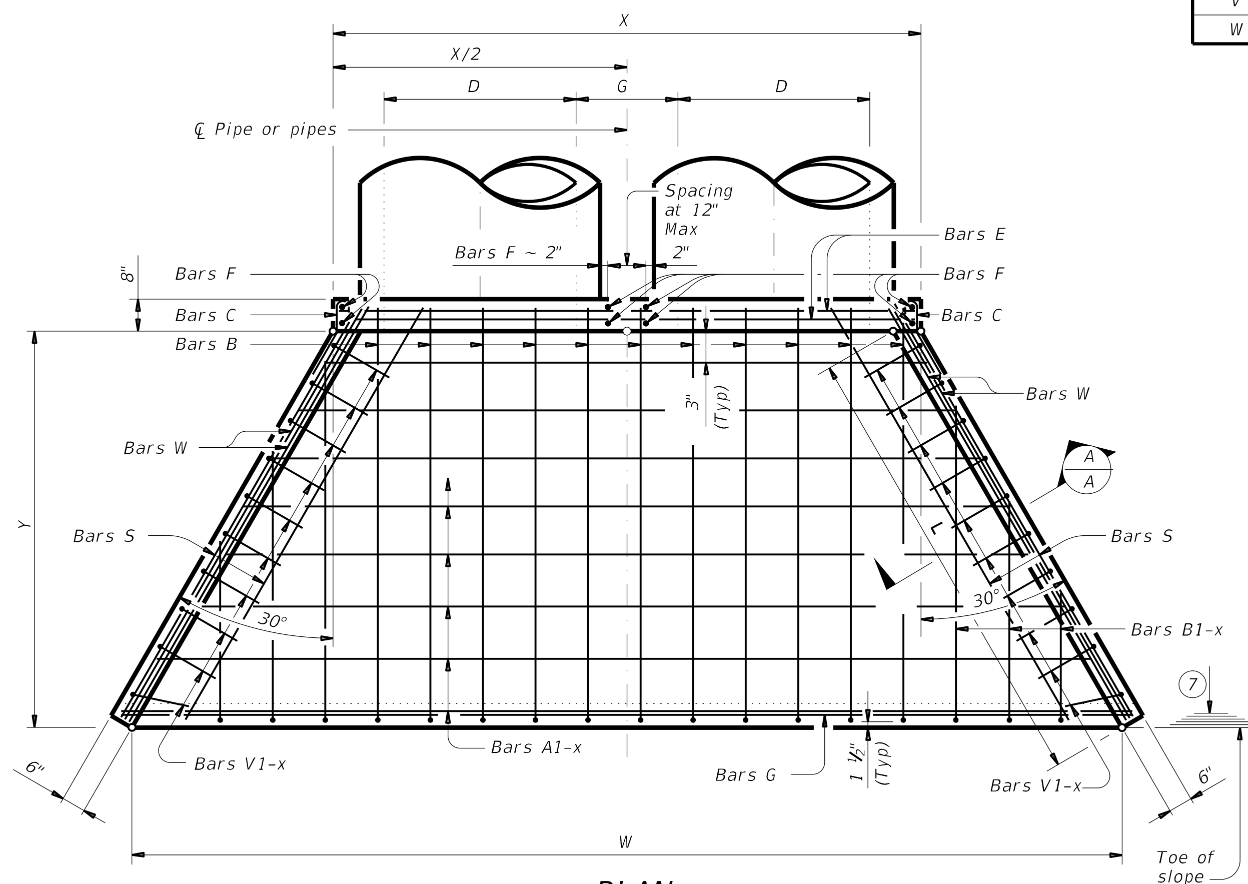
BARS V



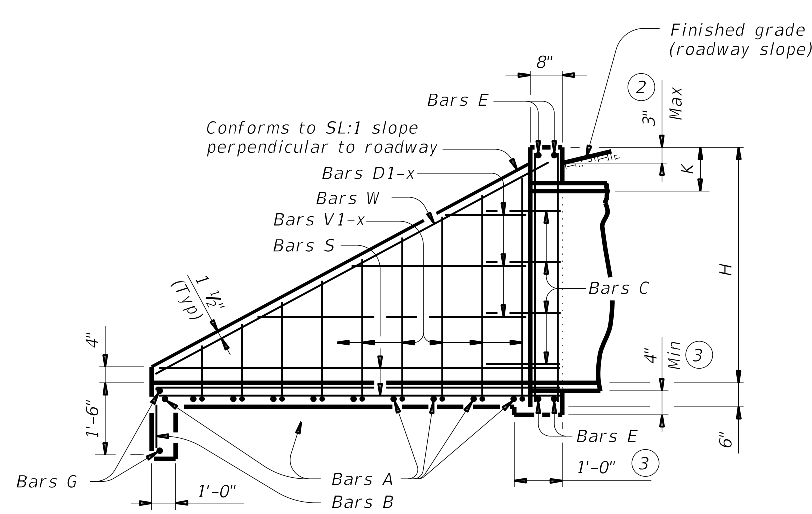
BARS C
(Length = 2'-5")



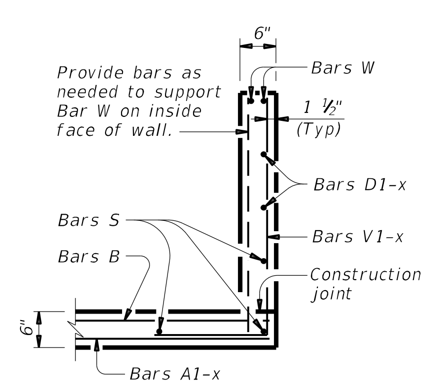
ELEVATION
(Showing dimensions.)



PLAN



TYPICAL WING ELEVATION



SECTION A-A

TABLE OF REINFORCING STEEL (5)

Bar	Size	Spa	No.
A	#4	1' - 0"	~
B	#3	1' - 6"	~
C	#4	1' - 0"	~
D	#3	1' - 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' - 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (4)	H
33"	1' - 11"	1' - 0"	3' - 9"
36"	2' - 1"	1' - 0"	4' - 0"
42"	2' - 4"	1' - 0"	4' - 6"
48"	2' - 7"	1' - 3"	5' - 3"
54"	3' - 0"	1' - 3"	5' - 9"
60"	3' - 3"	1' - 3"	6' - 3"
66"	3' - 3"	1' - 3"	6' - 9"
72"	3' - 4"	1' - 3"	7' - 3"

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galavanized reinforcing steel, if required elsewhere in the plans.

Adjust reinforcing bars, as neccessary, to provide a minimum clear cover of 1 ½".

Provide Class C concrete (f`c= 3,600 psi).

Provide pipe runners 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.

Provide ASTM A36 steel plates.

Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after lubrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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.

The safety 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.

All bolts, nuts, washers, brackets, angles and pipe runners are considered parts of the safety end treatment for payment.

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

SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW PIPE CULVERTS
TYPE I ~ CROSS DRAINAGE

SETP-FW-0

FILE: setpf0se-20.dgn	DN: GAF	CK: CAT	DW: BWH	CK: GAF
©TxDOT February 2020	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 198

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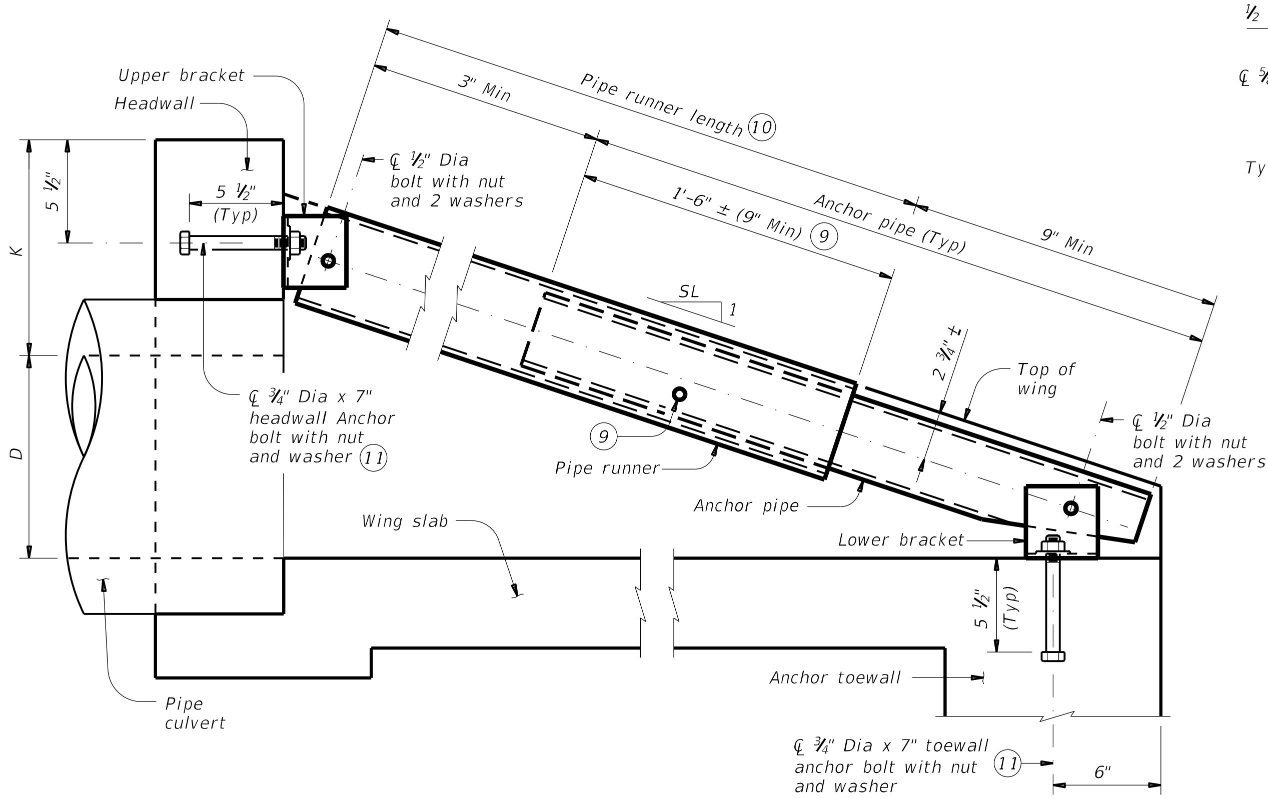
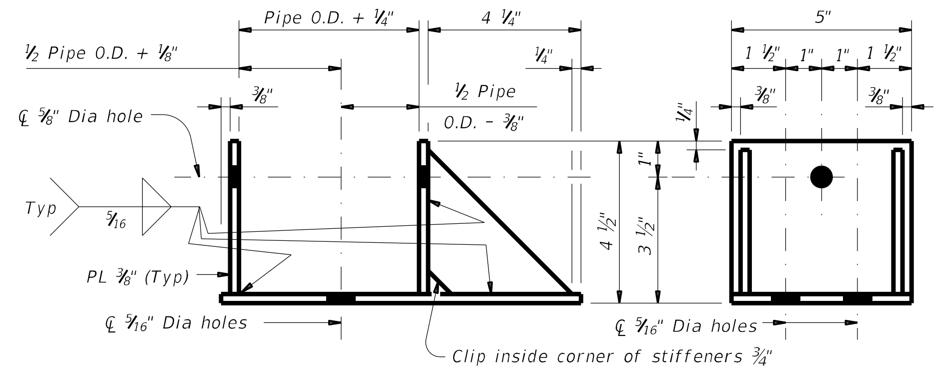


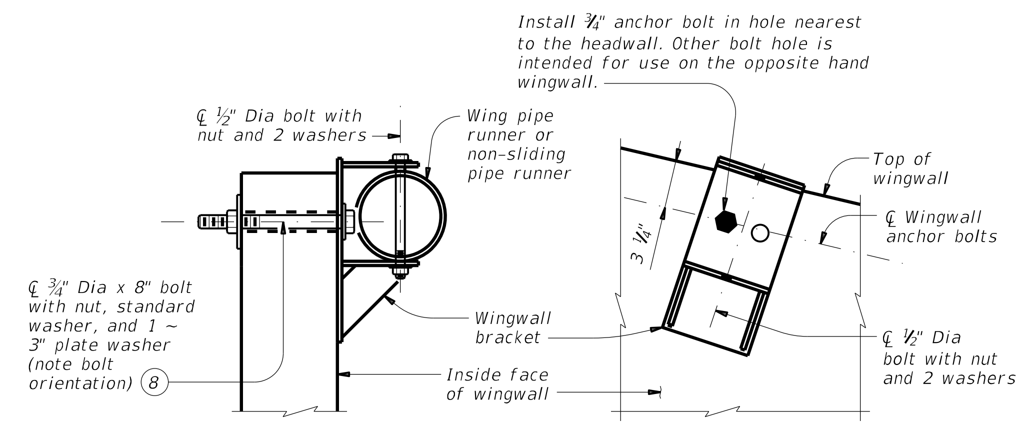
SECTION B-B

(Showing headwall pipe runner. Except for upper bracket, wingwall pipe runners are similar.)



ELEVATION

SIDE VIEW



SECTION C-C

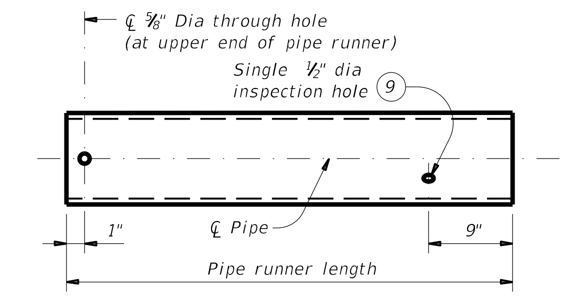
(Showing installed bracket.)

ELEVATION

(Showing installed bracket normal to wall. Pipe not shown for clarity.)

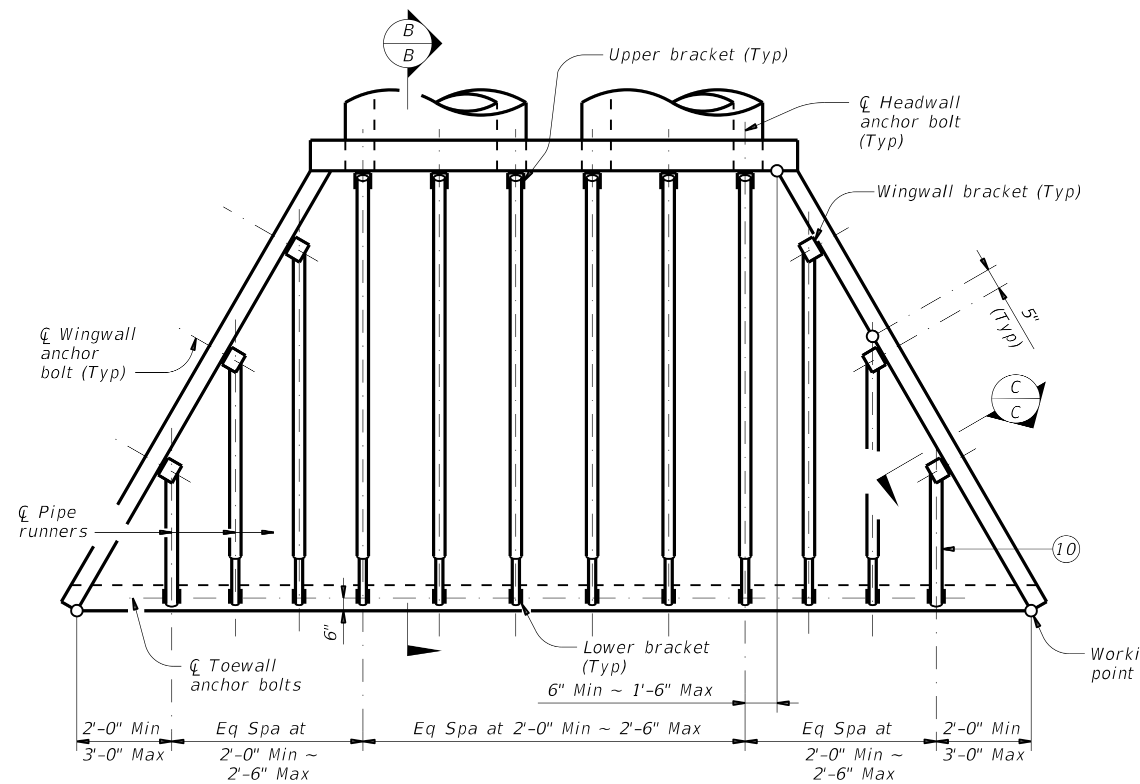
NOTE: Match the wingwall bracket to the upper bracket size.

WINGWALL BRACKET DETAILS

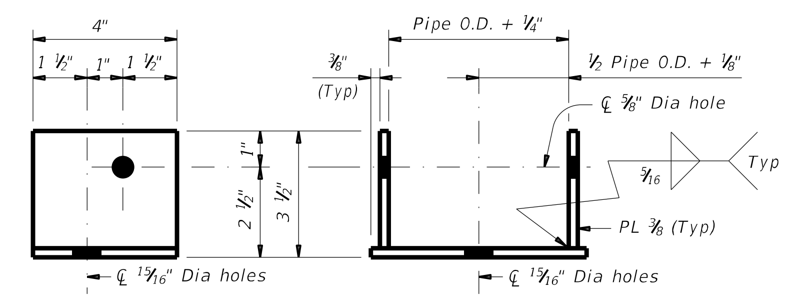


Note: Use pipe diameter required for headwall pipe runner and for wingwall pipe runner.

PIPE RUNNER DETAILS



PIPE RUNNER PLAN

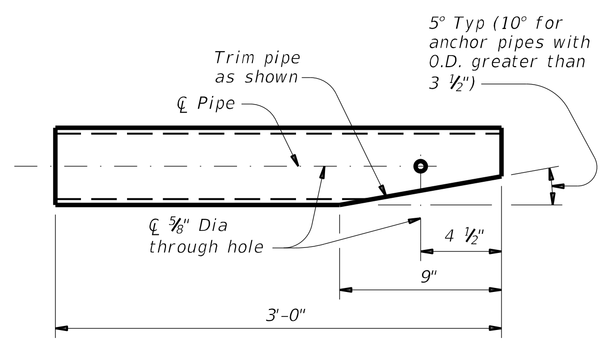


SIDE VIEW

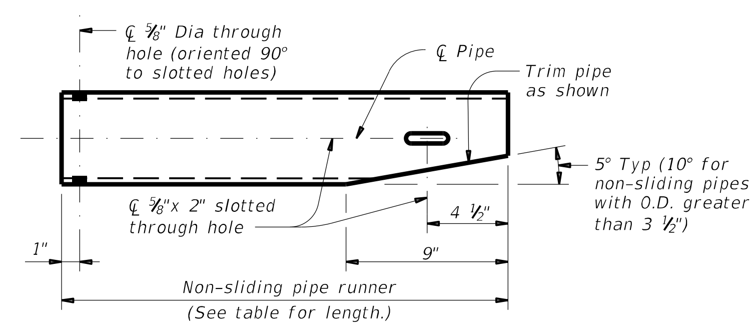
ELEVATION

NOTE: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, with the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for headwall pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS (10)

(8) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

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

(10) Non-sliding pipe runners are used for those installations that would require pipe runner lengths of 1'-9" or less. The non-sliding pipe runner, when required, replaces the outermost pipe runner and anchor pipe. See table on Sheet 3 of 3 to determine if the non-sliding pipe runner is required.

(11) At Contractor's option, an adhesive anchor may be used. Provide adhesive anchors that are ¾" Dia ASTM A307 Grade A fully threaded rods. Embed threaded rods into curb, wingwalls, and/or toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

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Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0 SKEW PIPE CULVERTS
TYPE I ~ CROSS DRAINAGE

SETP-FW-0

FILE: setpf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
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REVISIONS	DIST DAL		COUNTY NAVARRO	SHEET NO. 199

Side Slope	Pipe Culvert Dia	L1	P1	No. of Spaces in L3	L3 Overall Dimension	P2	No. of Spaces in L4	L4 Overall Dimension	Headwall Pipe Runner Length	No. of Wing Pipes (13)	Longest Wingwall Pipe Runner Length	Shortest Wingwall Pipe Runner Length	Non-Sliding Pipe Length	Pipe Runner Size (14)	Total Length of Wingwall Pipe Runners (13)
3:1	33"	0' - 9"	2' - 0"	2	4' - 2 ¾"	3' - 7"	1	4' - 2 ¾"	8' - 4"	4	5' - 5 ½"	N/A	3' - 1"	3" STD	17' - 1"
	36"	0' - 9"	2' - 0"	2	4' - 8"	3' - 7"	1	4' - 8"	9' - 1 ½"	4	5' - 10 ¼"	N/A	3' - 1"	3" STD	17' - 10 ½"
	42"	1' - 0"	3' - 0"	2	4' - 9 ½"	5' - 7"	1	4' - 9 ½"	10' - 8 ¼"	4	7' - 9 ½"	3' - 5"	N/A	4" STD	22' - 5"
	48"	1' - 3"	2' - 0"	3	7' - 4"	3' - 7"	2	9' - 9 ¼"	13' - 0 ¾"	6	10' - 6 ¼"	6' - 0 ¾"	3' - 1"	4" STD	39' - 4"
	54"	0' - 6"	2' - 0"	3	7' - 5 ½"	3' - 7"	2	9' - 11 ¼"	14' - 7 ¾"	6	10' - 8"	6' - 1 ½"	3' - 1"	4" STD	39' - 9"
	60"	0' - 9"	2' - 0"	4	8' - 6 ¾"	3' - 7"	3	12' - 10 ¼"	16' - 2 ¾"	8	13' - 3 ¾"	5' - 6"	3' - 1"	4" STD	62' - 7 ¼"
	66"	1' - 0"	2' - 0"	4	9' - 8 ¼"	3' - 7"	3	14' - 6 ¼"	17' - 9 ¾"	8	14' - 10 ¼"	6' - 0"	3' - 1"	4" STD	68' - 8 ¾"
	72"	1' - 3"	3' - 0"	4	9' - 9 ½"	5' - 7"	3	14' - 8 ¼"	19' - 4 ¾"	8	16' - 10"	3' - 5"	N/A	5" STD	81' - 0"
4:1	33"	0' - 9"	2' - 0"	3	6' - 0 ¾"	3' - 7"	2	8' - 1"	11' - 4 ½"	6	8' - 8 ¾"	5' - 1 ¼"	3' - 0"	4" STD	33' - 8"
	36"	0' - 9"	2' - 0"	3	6' - 7 ¾"	3' - 7"	2	8' - 10 ¼"	12' - 4 ¾"	6	9' - 5"	5' - 5 ½"	3' - 0"	4" STD	35' - 9"
	42"	1' - 0"	2' - 9"	3	7' - 3 ½"	5' - 1"	2	9' - 8 ¾"	14' - 5 ½"	6	11' - 6 ¼"	2' - 10 ¼"	N/A	4" STD	43' - 1 ½"
	48"	1' - 3"	2' - 3"	4	9' - 9 ¼"	4' - 1"	3	14' - 8"	17' - 6 ¾"	8	15' - 0 ½"	1' - 11 ½"	N/A	4" STD	68' - 0"
	54"	0' - 6"	2' - 6"	4	9' - 11 ¼"	4' - 7"	3	14' - 10 ¾"	19' - 7 ½"	8	15' - 8 ¼"	2' - 4 ¾"	N/A	5" STD	72' - 4"
	60"	0' - 9"	2' - 0"	5	11' - 10"	3' - 7"	4	18' - 11 ¼"	21' - 8 ¼"	10	18' - 5"	5' - 8 ¾"	3' - 0"	5" STD	102' - 7"
	66"	1' - 0"	2' - 9"	5	12' - 6"	5' - 1"	4	19' - 11 ¾"	23' - 9"	10	20' - 8 ¼"	2' - 10 ¼"	N/A	5" STD	117' - 8 ½"
	72"	1' - 3"	2' - 0"	6	14' - 7 ¾"	3' - 7"	5	24' - 5"	25' - 9 ¾"	12	23' - 3 ½"	5' - 10 ¼"	3' - 0"	5" STD	151' - 8 ¾"
6:1	33"	0' - 9"	2' - 0"	4	9' - 8 ¾"	3' - 7"	3	14' - 7"	17' - 7"	8	14' - 3"	5' - 8 ½"	2' - 11 ½"	4" STD	65' - 9 ½"
	36"	0' - 9"	2' - 9"	4	9' - 10"	5' - 1"	3	14' - 9"	19' - 1 ¼"	8	15' - 8 ¾"	2' - 9 ¼"	N/A	5" STD	74' - 0"
	42"	1' - 0"	2' - 3"	5	12' - 3 ¾"	4' - 1"	4	19' - 8 ½"	22' - 1 ¾"	10	19' - 2 ¼"	1' - 10 ¾"	N/A	5" STD	105' - 5"
	48"	1' - 3"	2' - 6"	6	14' - 11"	4' - 7"	5	24' - 10 ¼"	26' - 8 ½"	12	24' - 1 ¾"	2' - 4"	N/A	5" STD	158' - 10 ½"
	54"	0' - 6"	2' - 0"	7	16' - 4 ¾"	3' - 7"	6	28' - 1 ¼"	29' - 9"	14	26' - 1 ½"	5' - 6 ¾"	2' - 11 ½"	5" STD	196' - 0 ½"
	60"	0' - 9"	3' - 0"	7	17' - 4 ½"	5' - 7"	6	29' - 9 ½"	32' - 9 ½"	14	29' - 4 ¼"	3' - 2 ½"	N/A	5" STD	227' - 11 ¼"

(12) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner the shortest.

(13) Quantities shown include, if present, the non-sliding pipes.

(14) The anchor pipe size is the next smaller size than the pipe runner size.

STANDARD PIPE RUNNER AND ANCHOR PIPE SIZES (14)

Pipe Size	Pipe O.D.	Pipe I.D.
2" STD	2.375"	2.067"
3" STD	3.500"	3.068"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"

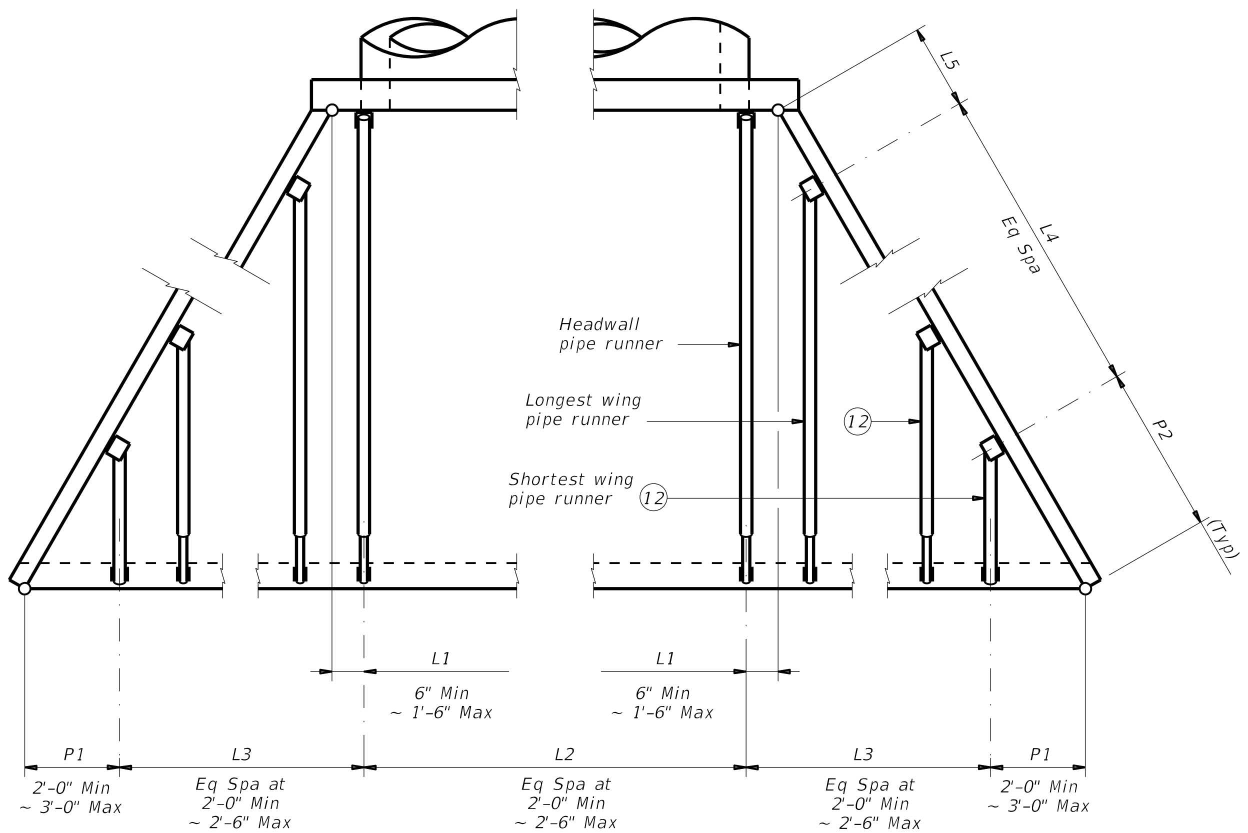
TOTAL PIPE LENGTHS FORMULAS:

Total Length of All Pipe Runners = Total Length of Wingwall Pipe Runners + (No. of Headwall Pipe Runners) (Headwall Pipe Runner Length)

Total Length of All Anchor Pipes = (3.000') (No. of Wing Pipe Runners + No. of Headwall Pipe Runners − No. of Non-Sliding Pipe Runners)

SPECIAL NOTE:

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, verify all dimensions in the field prior to fabrication of the safety end treatment components.



PIPE RUNNER LAYOUT

Pipe Culvert Dia	No. of Pipe Culverts	No. of L2 Spaces	L2 Overall Dimension	No. of Headwall Pipes
33"	1	1	2' - 0 ¼"	2
	2	3	6' - 8 ¼"	4
	3	5	11' - 4 ¼"	6
	4	7	16' - 0 ¼"	8
	5	9	20' - 8 ¼"	10
	6	11	25' - 4 ¼"	12
36"	1	1	2' - 3 ¾"	2
	2	3	7' - 4 ¾"	4
	3	5	12' - 5 ¾"	6
	4	7	17' - 6 ¾"	8
	5	10	22' - 7 ¾"	11
	6	12	27' - 8 ¾"	13
42"	1	1	2' - 4 ¾"	2
	2	4	8' - 2 ¾"	5
	3	6	14' - 0 ¾"	7
	4	8	19' - 10 ¾"	9
	5	11	25' - 8 ¾"	12
	6	13	31' - 6 ¾"	14
48"	1	1	2' - 5 ¾"	2
	2	4	9' - 0 ¾"	5
	3	7	15' - 7 ¾"	8
	4	9	22' - 2 ¾"	10
	5	12	28' - 9 ¾"	13
	6	15	35' - 4 ¾"	16
54"	1	2	4' - 6 ¾"	3
	2	5	12' - 0 ¾"	6
	3	8	19' - 6 ¾"	9
	4	11	27' - 0 ¾"	12
	5	14	34' - 6 ¾"	15
	6	17	42' - 0 ¾"	18
60"	1	2	4' - 7 ¾"	3
	2	6	12' - 10 ¾"	7
	3	9	21' - 1 ¾"	10
	4	12	29' - 4 ¾"	13
	5	16	37' - 7 ¾"	17
	6	19	45' - 10 ¾"	20
66"	1	2	4' - 8 ¾"	3
	2	6	13' - 5 ¾"	7
	3	9	22' - 2 ¾"	10
	4	13	30' - 11 ¾"	14
	5	16	39' - 8 ¾"	17
	6	20	48' - 5 ¾"	21
72"	1	2	4' - 9 ¾"	3
	2	6	14' - 1 ¾"	7
	3	10	23' - 5 ¾"	11
	4	14	32' - 9 ¾"	15
	5	17	42' - 1 ¾"	18
	6	21	51' - 5 ¾"	22

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW PIPE CULVERTS
TYPE I ~ CROSS DRAINAGE

SETP-FW-0

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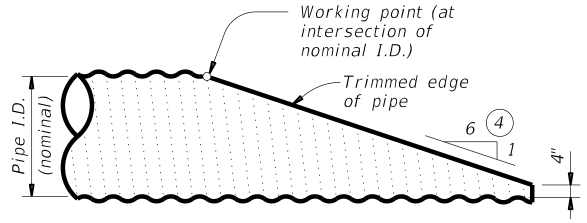
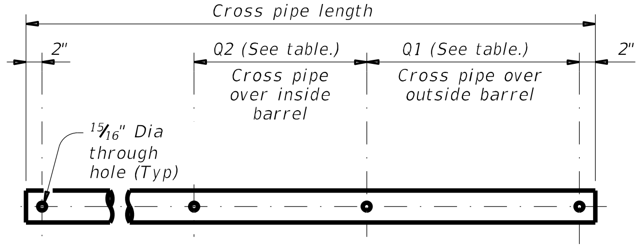


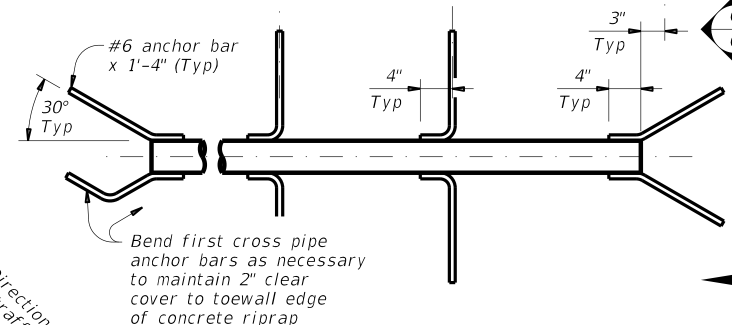
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

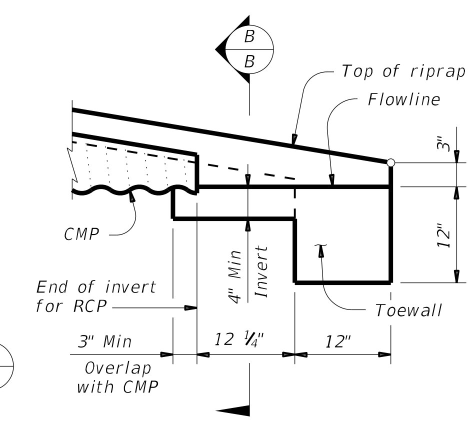
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



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.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)							
Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 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"		

(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.

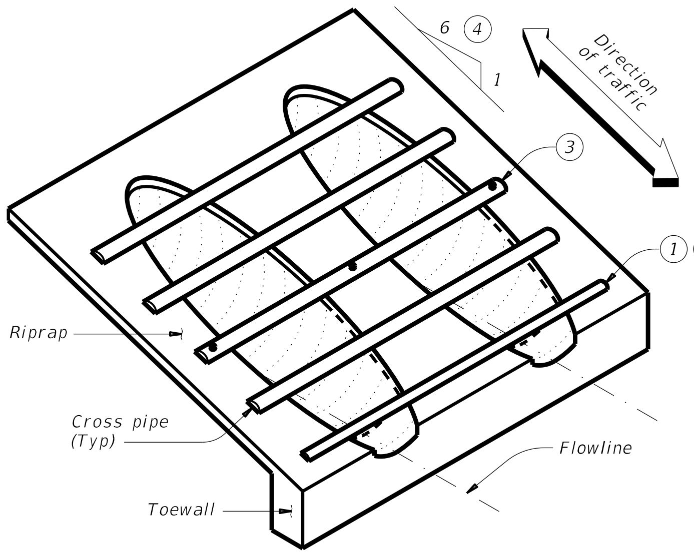
GENERAL NOTES:

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.

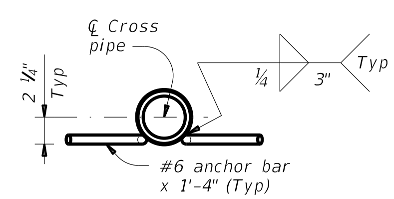
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

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.

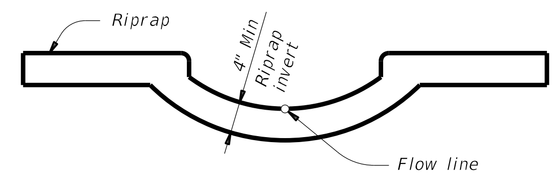


ISOMETRIC VIEW OF TYPICAL INSTALLATION



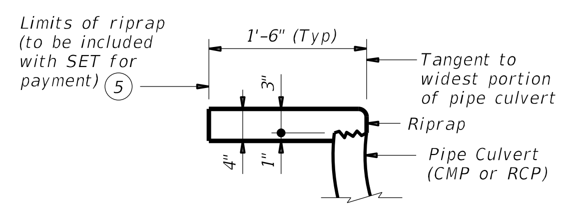
SECTION C-C

CROSS PIPE DETAILS

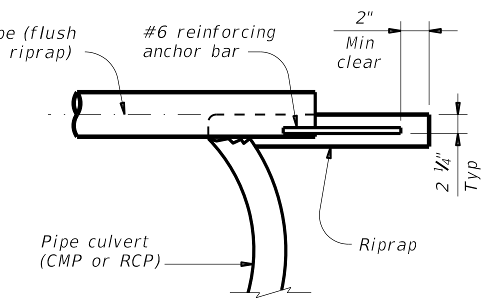


SECTION B-B

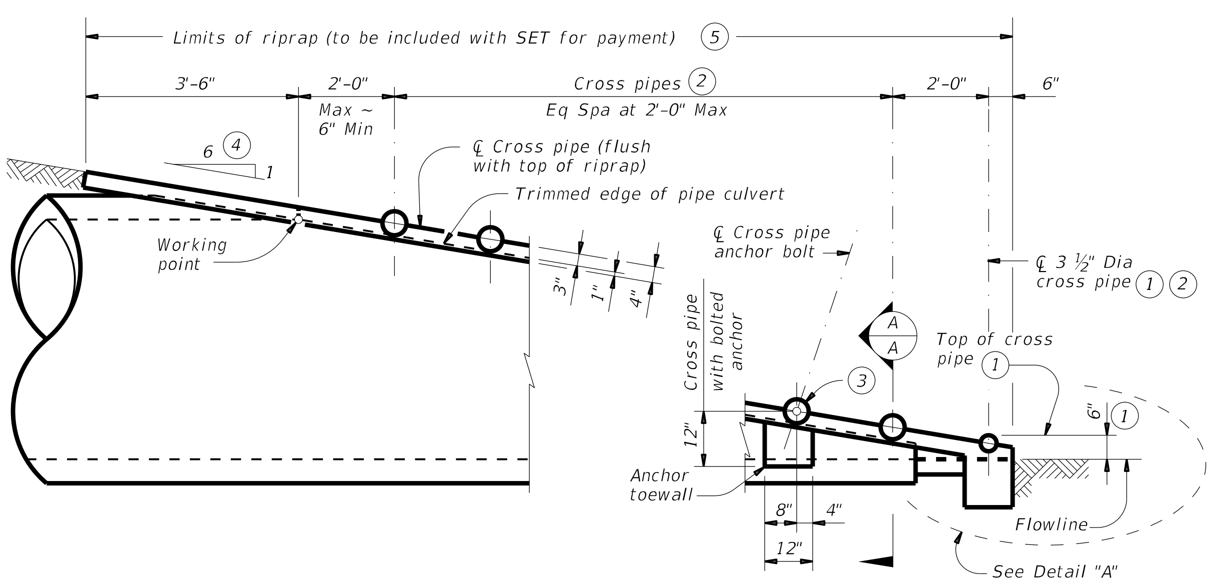
(Cross pipes not shown for clarity.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

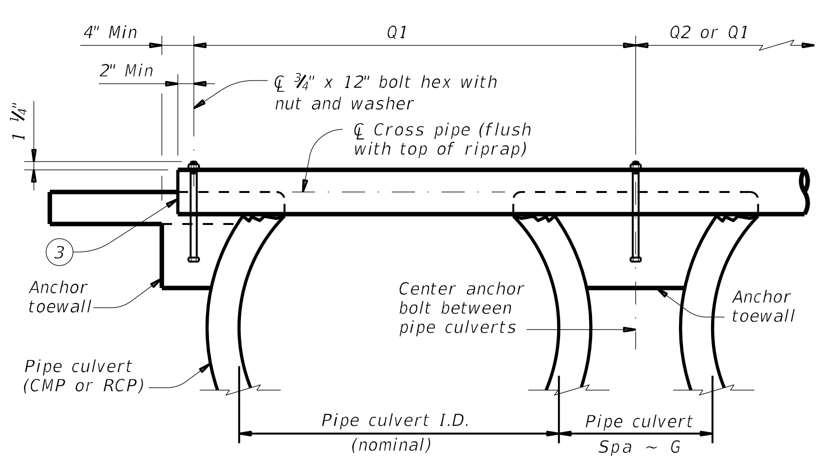


SHOWING CROSS PIPE WITH ANCHOR BAR



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

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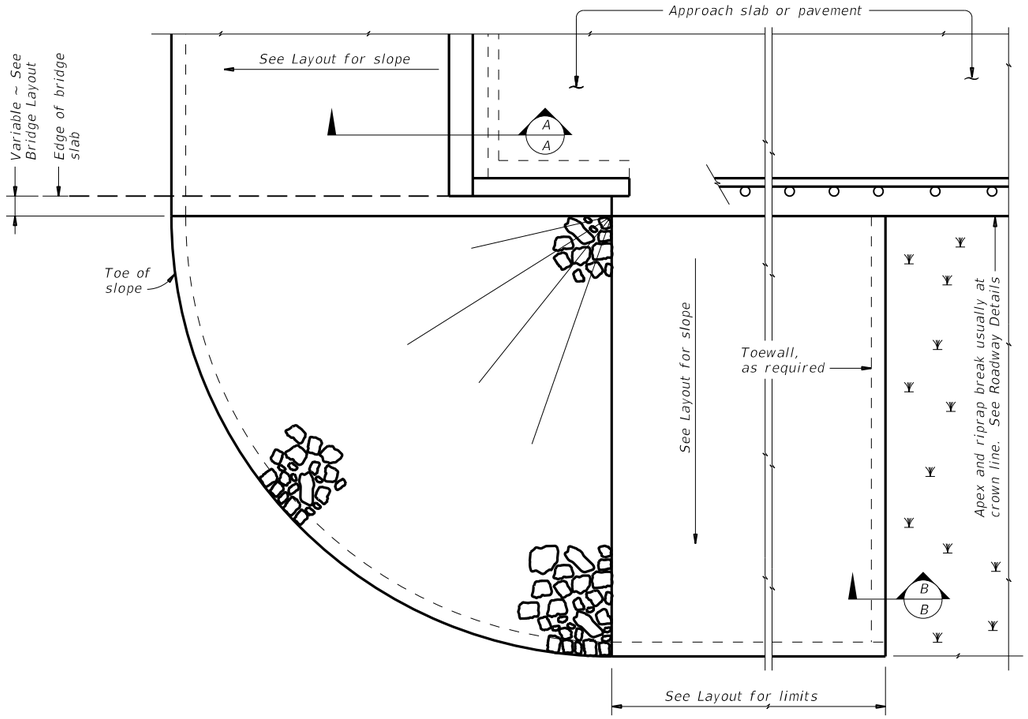
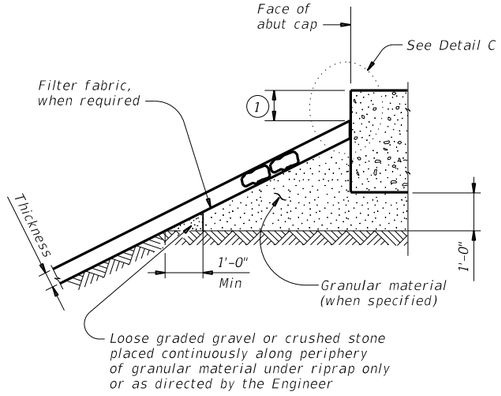
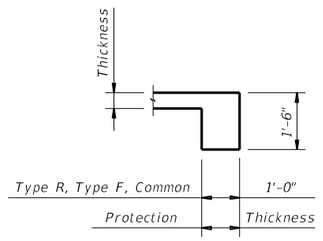


PLAN

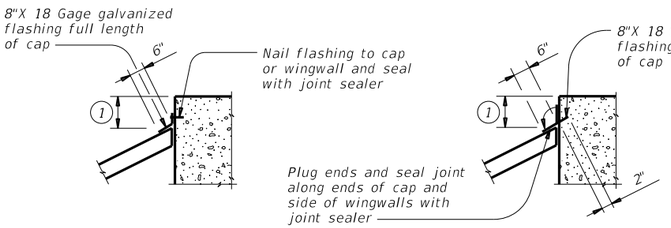


SECTION A-A AT CAP



SECTION B-B

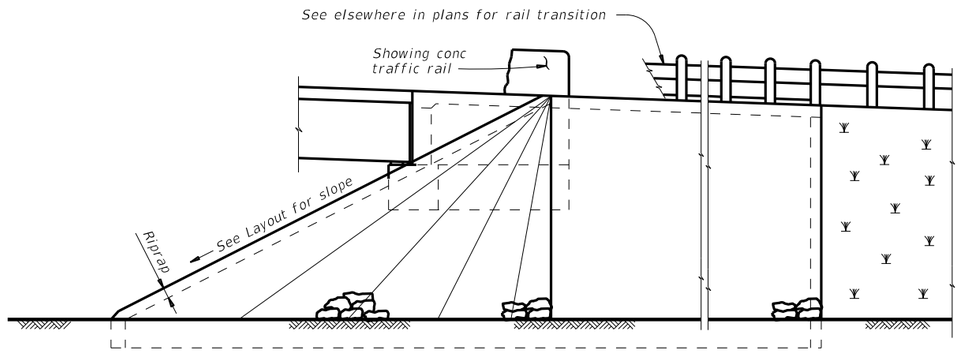
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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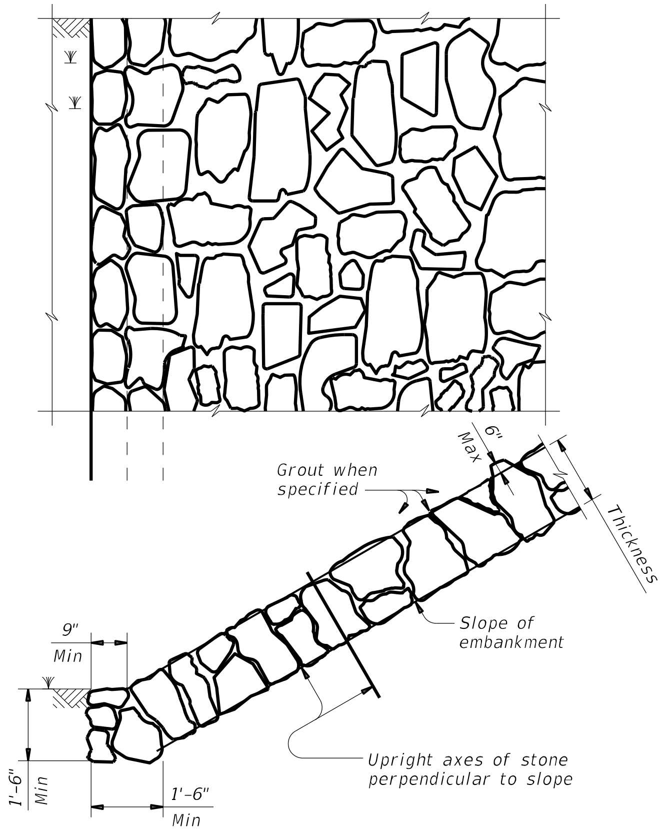


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

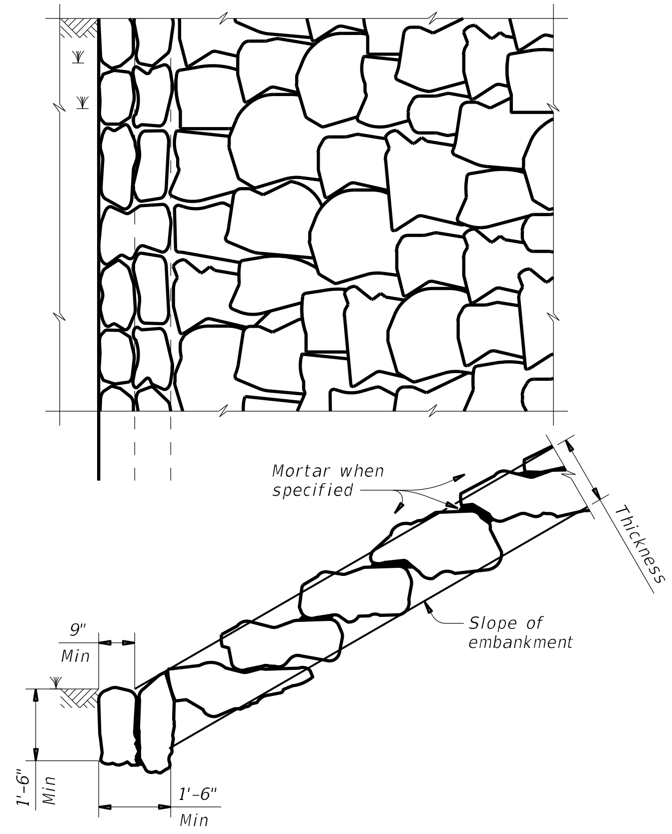


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

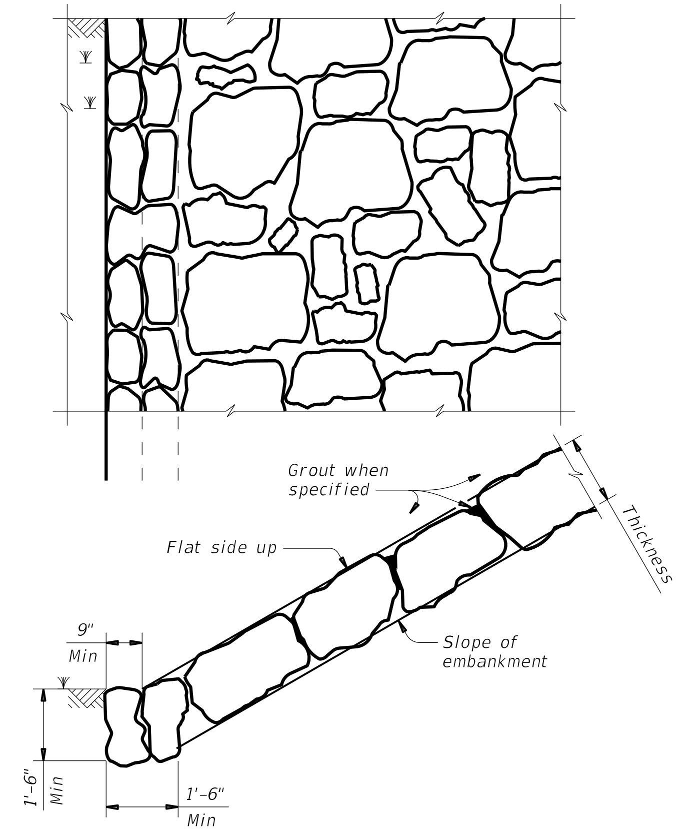


FIGURE 3 ~ TYPE F STONE RIPRAP

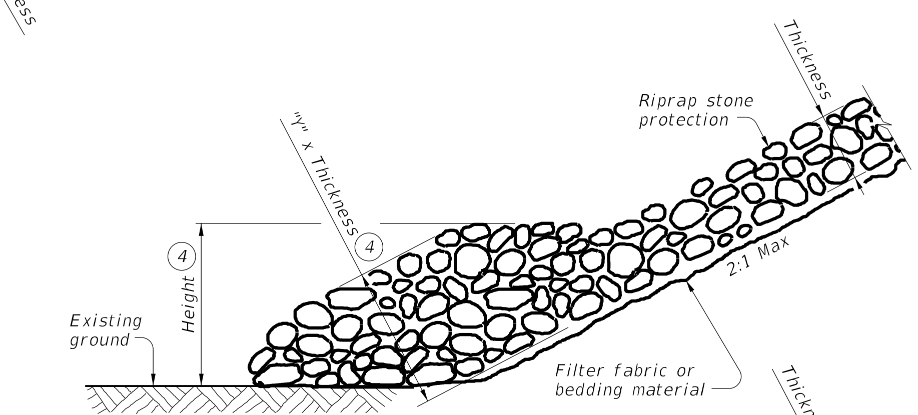
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

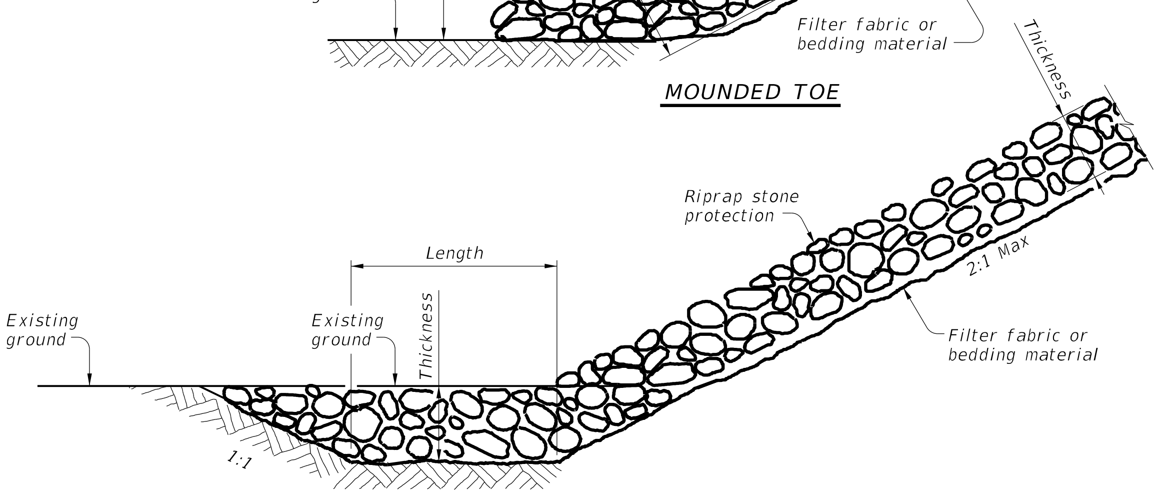
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

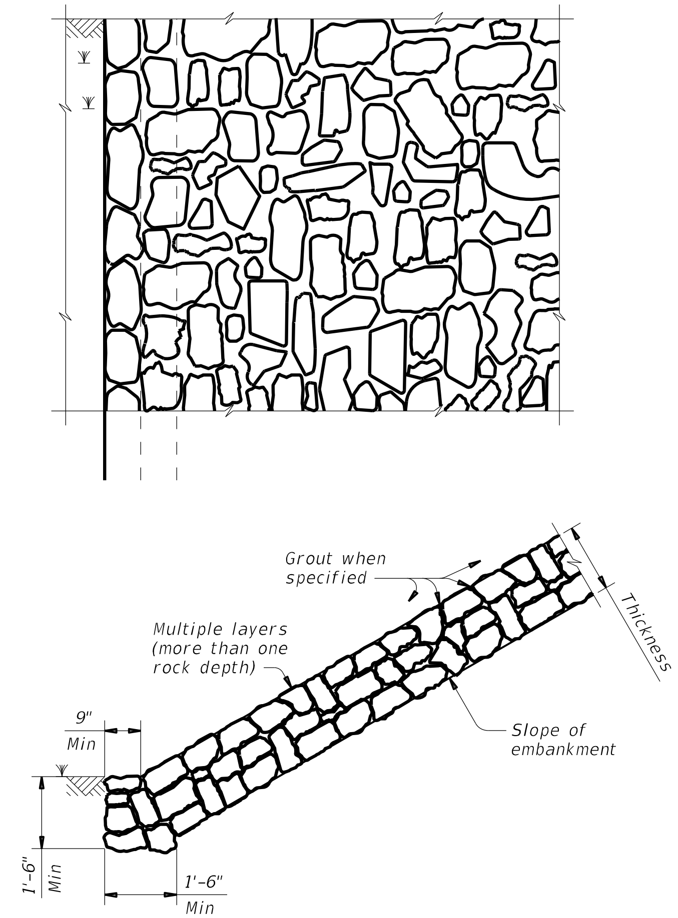


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

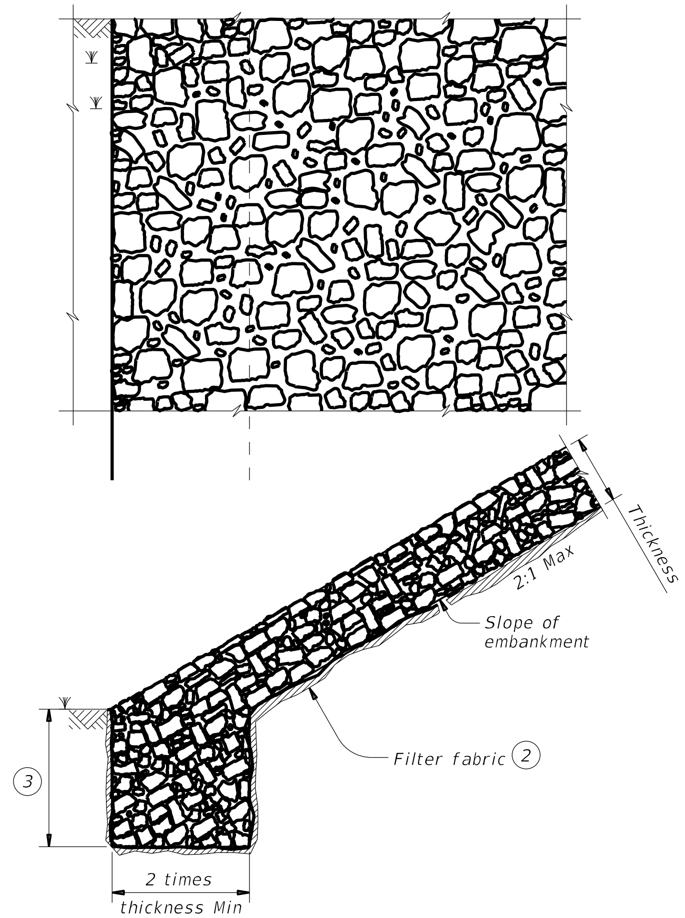


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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STONE RIPRAP

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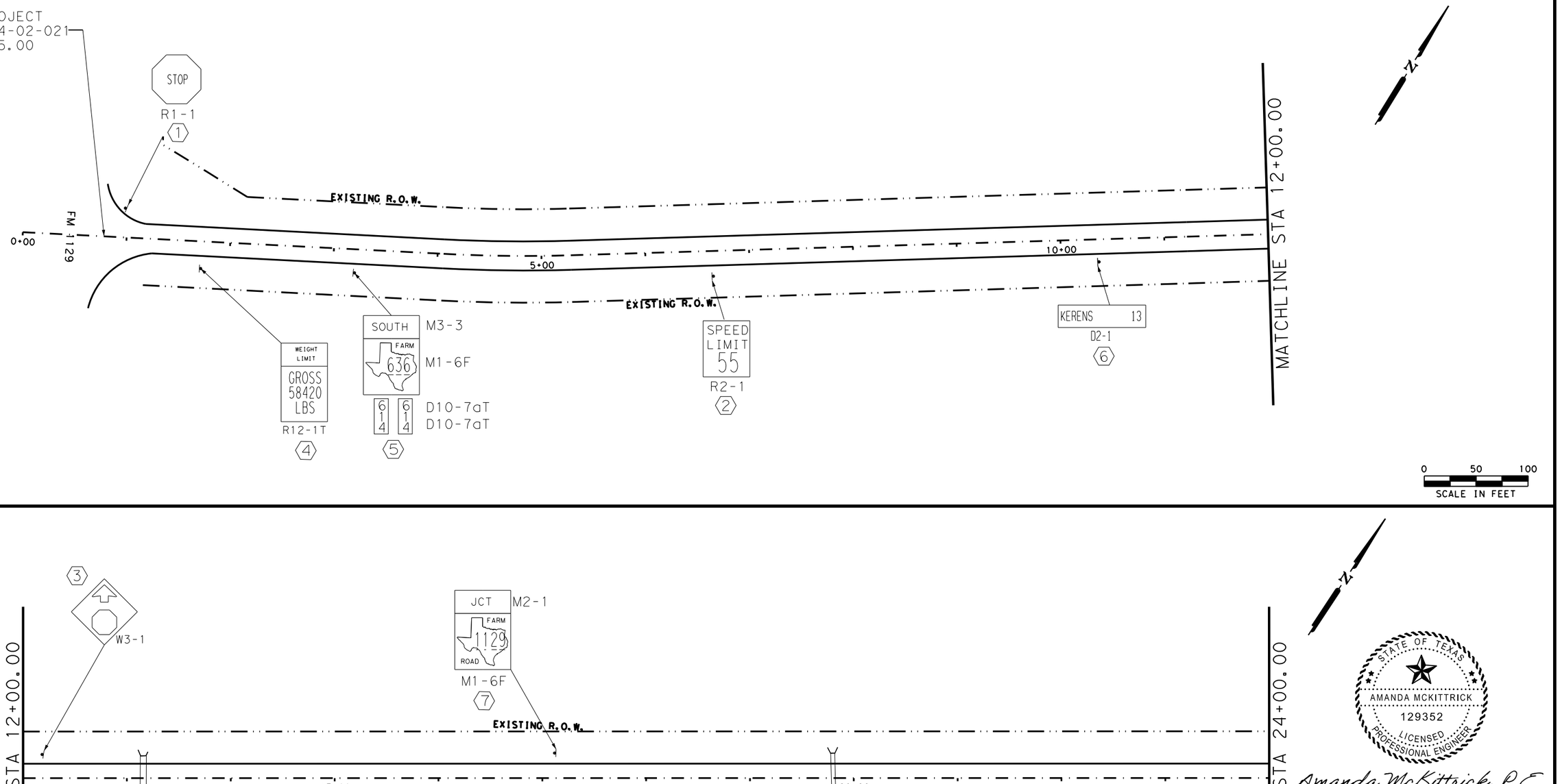

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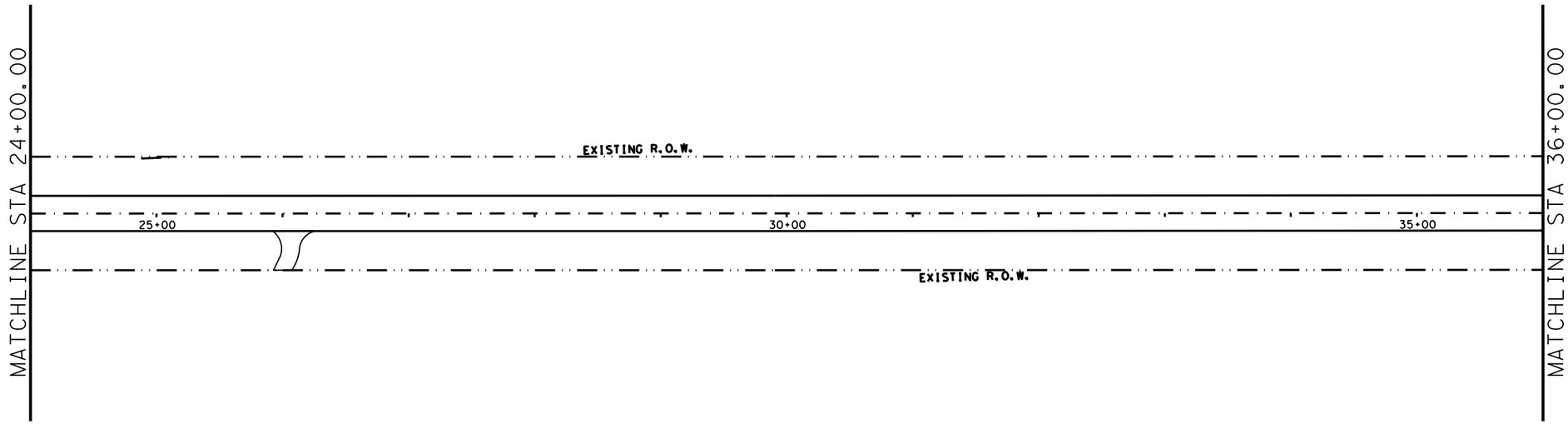

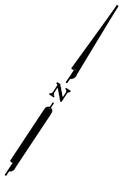

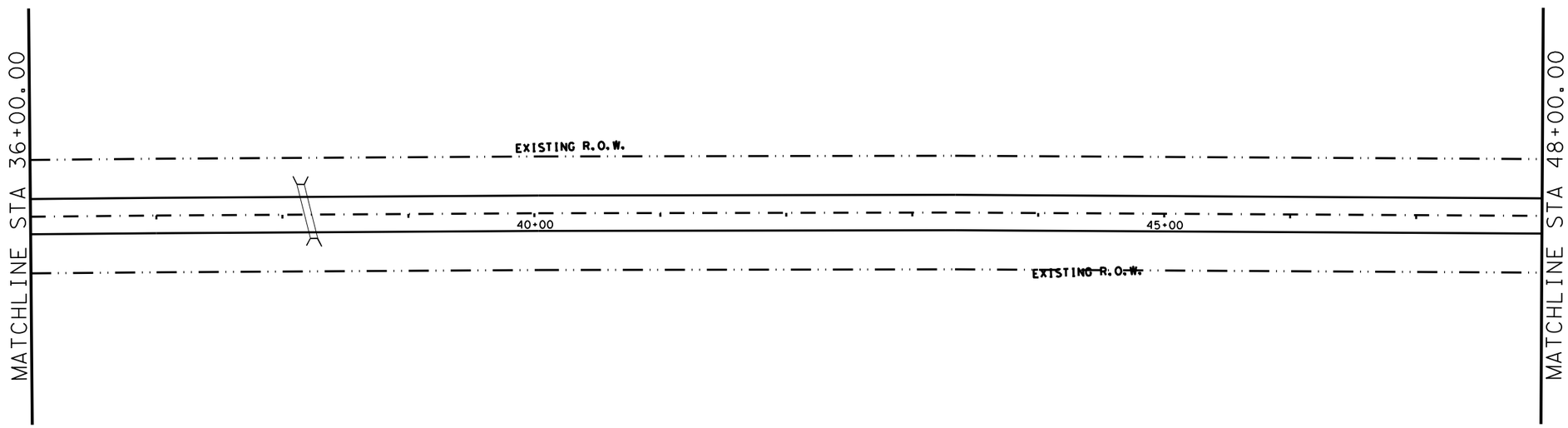

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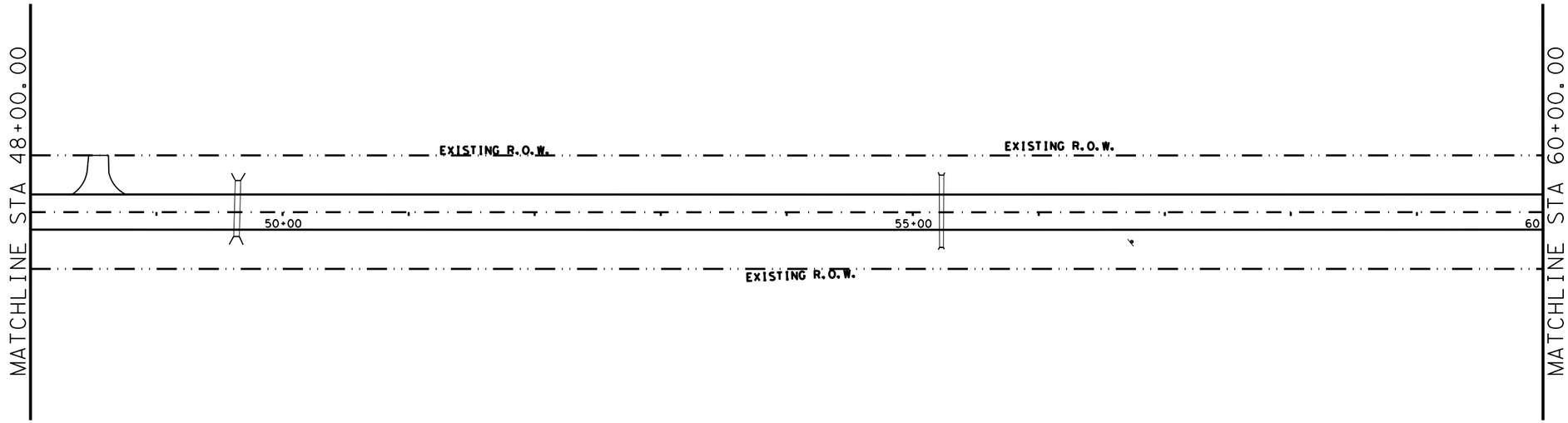

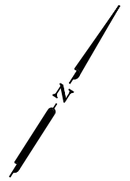

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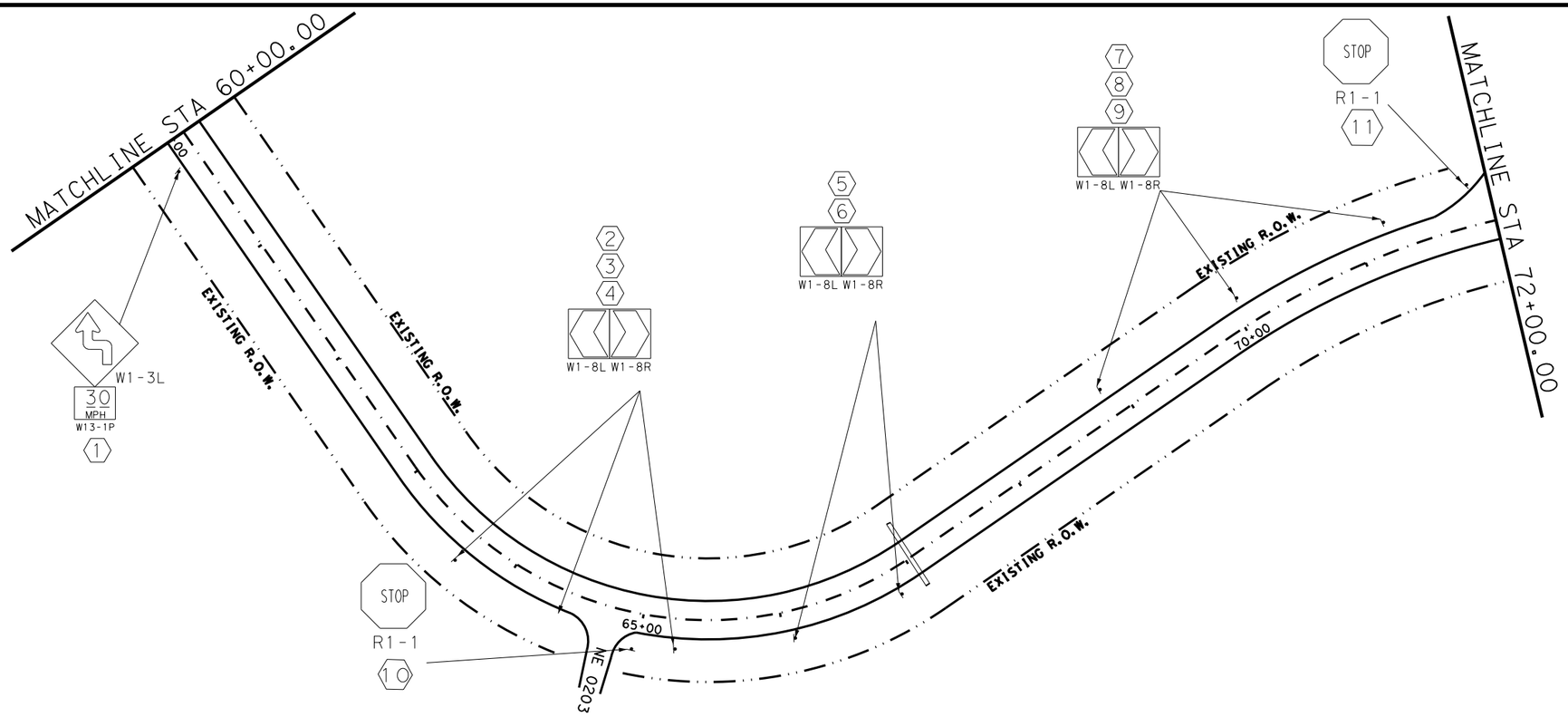

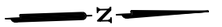

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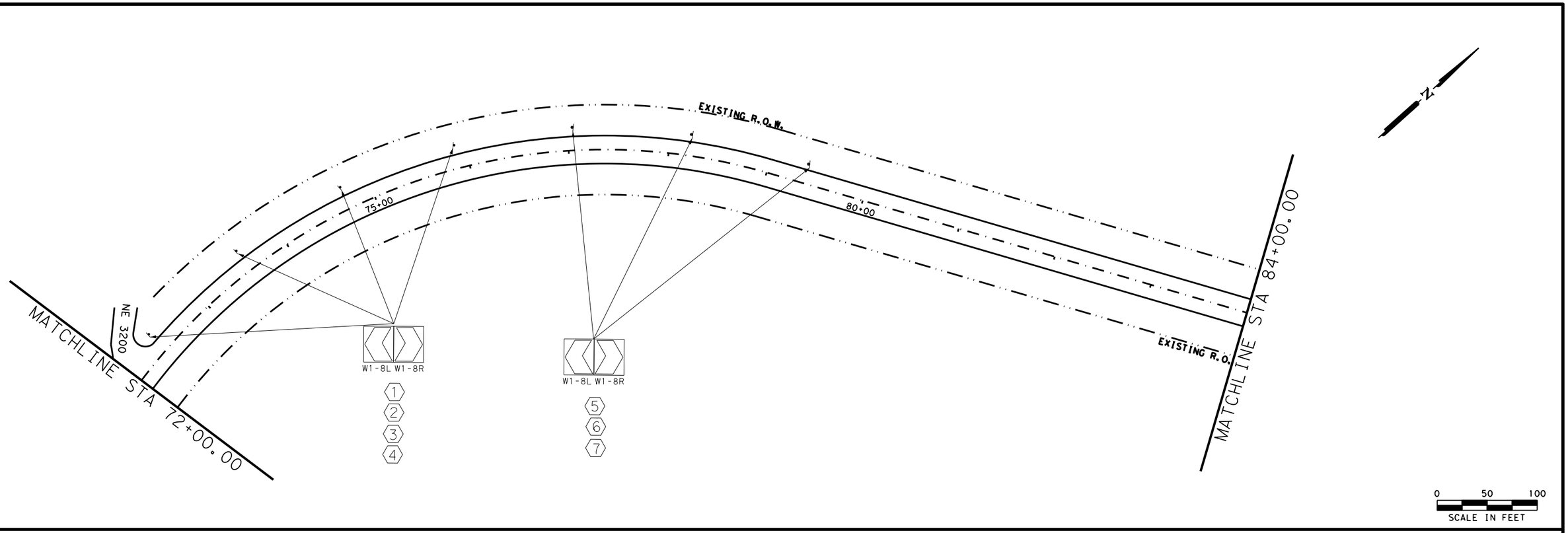

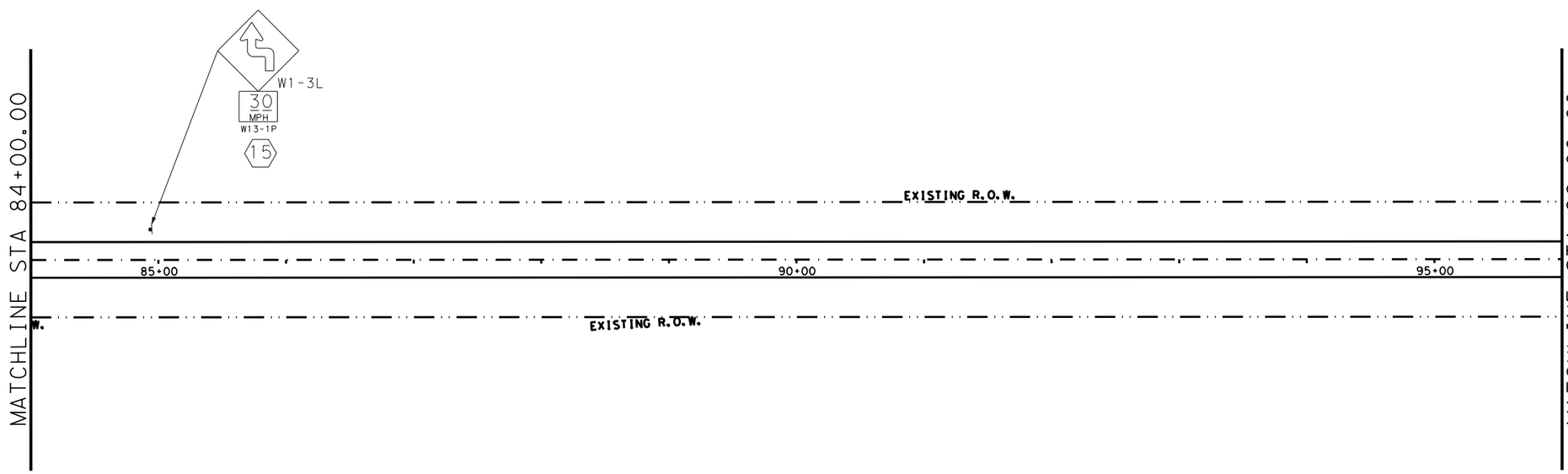

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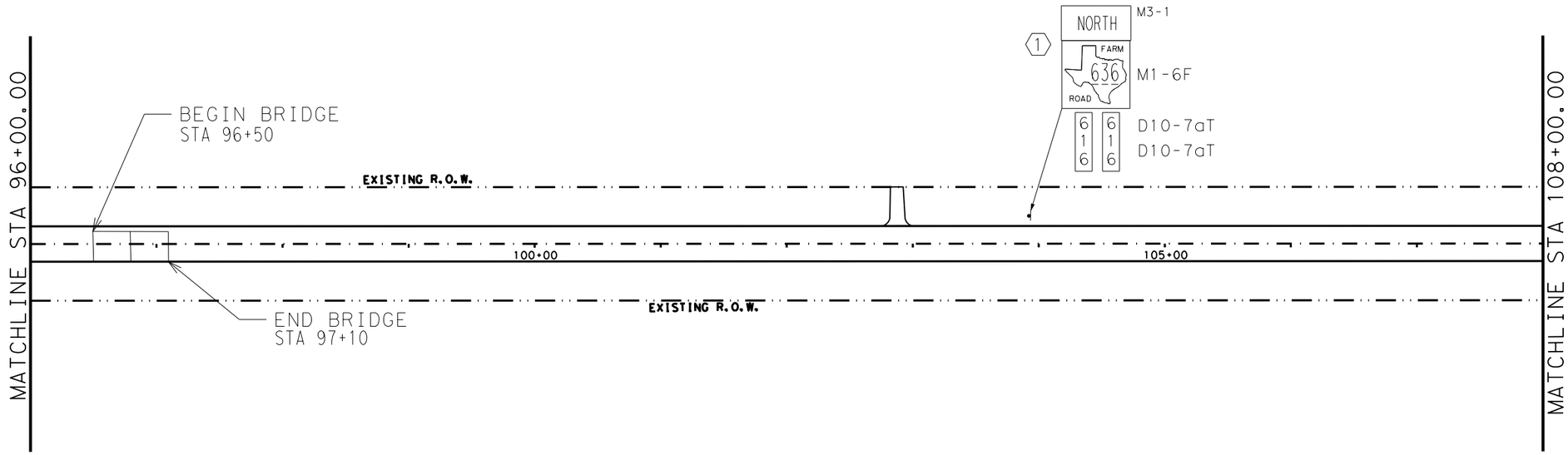

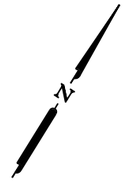

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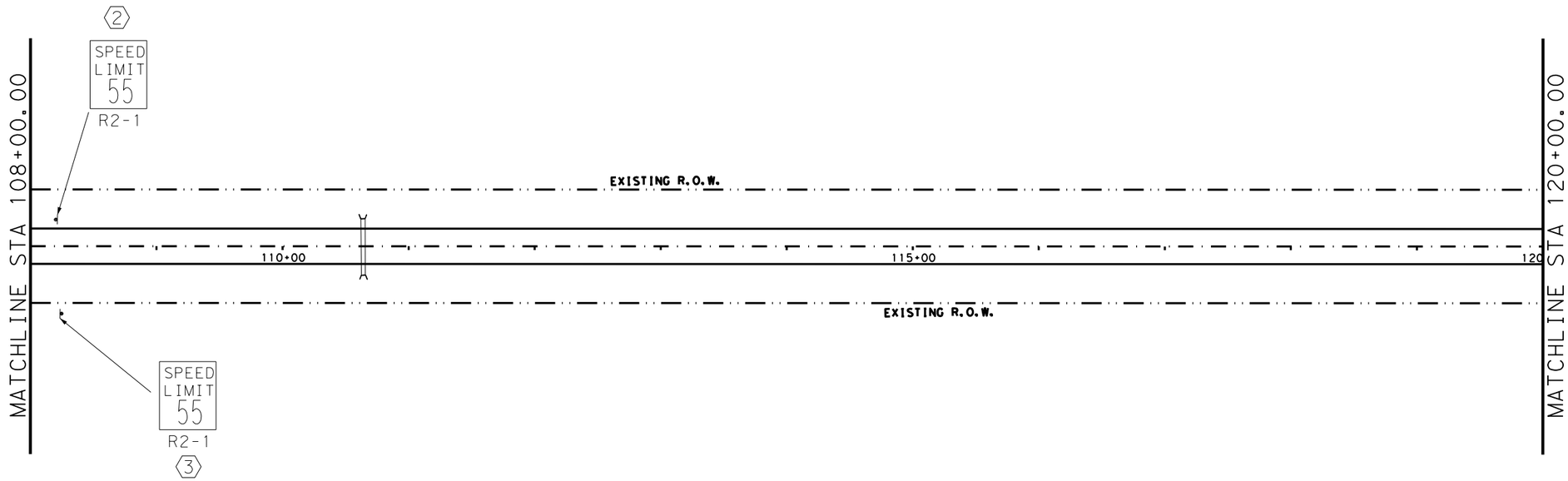

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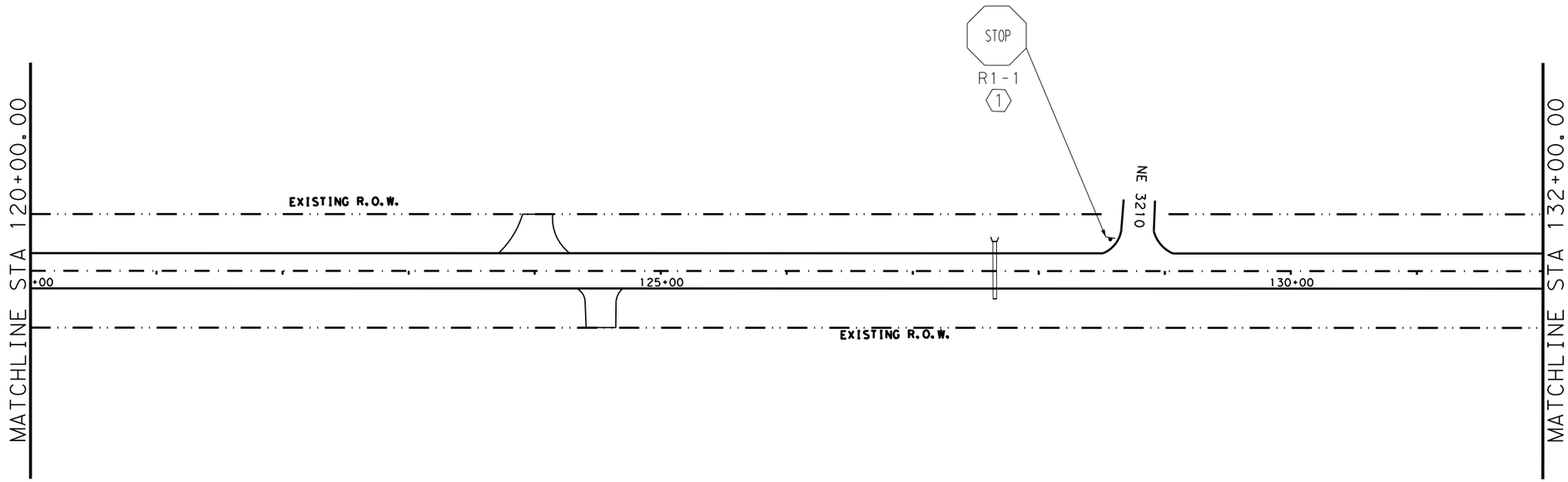

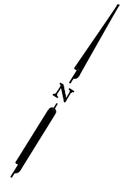

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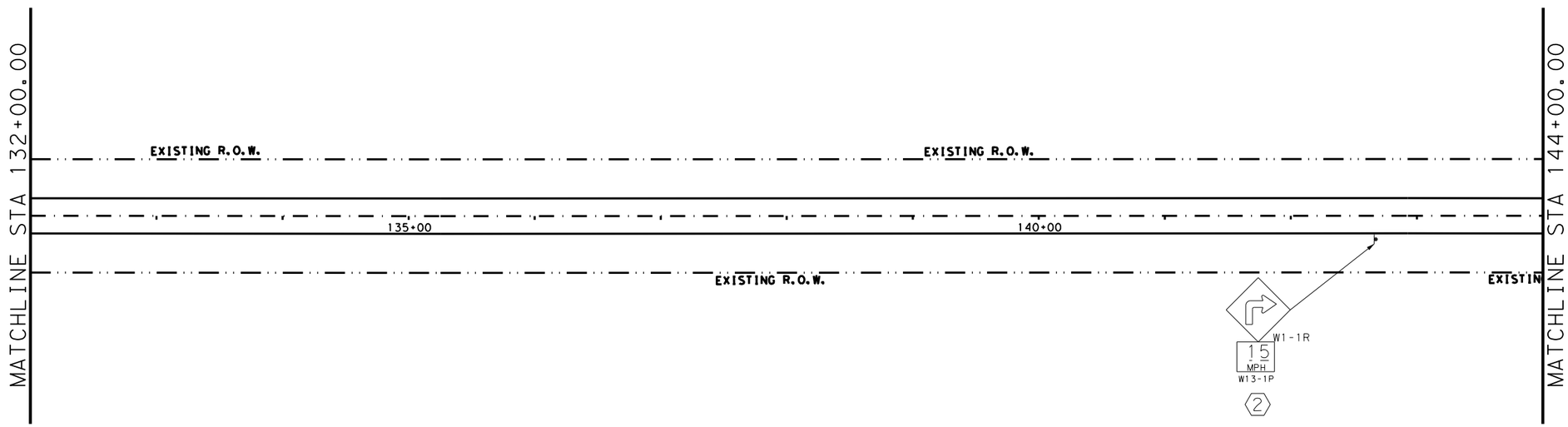

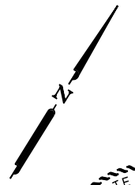

Amanda McKittrick, P.E.

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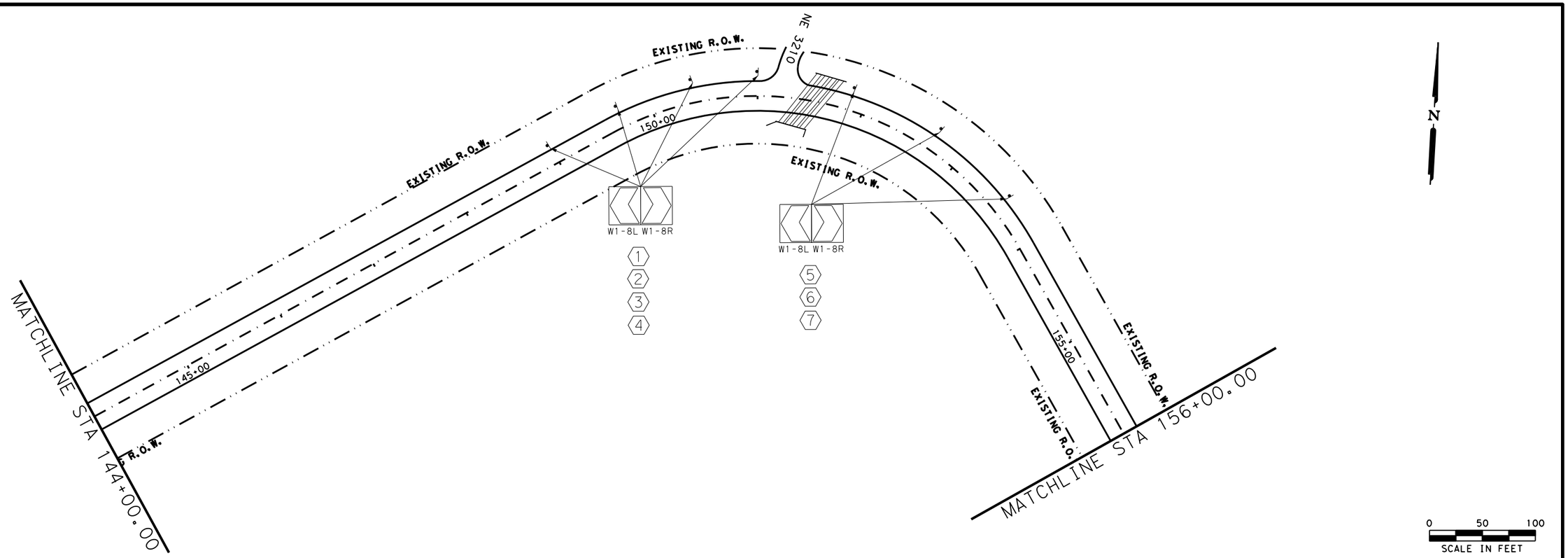
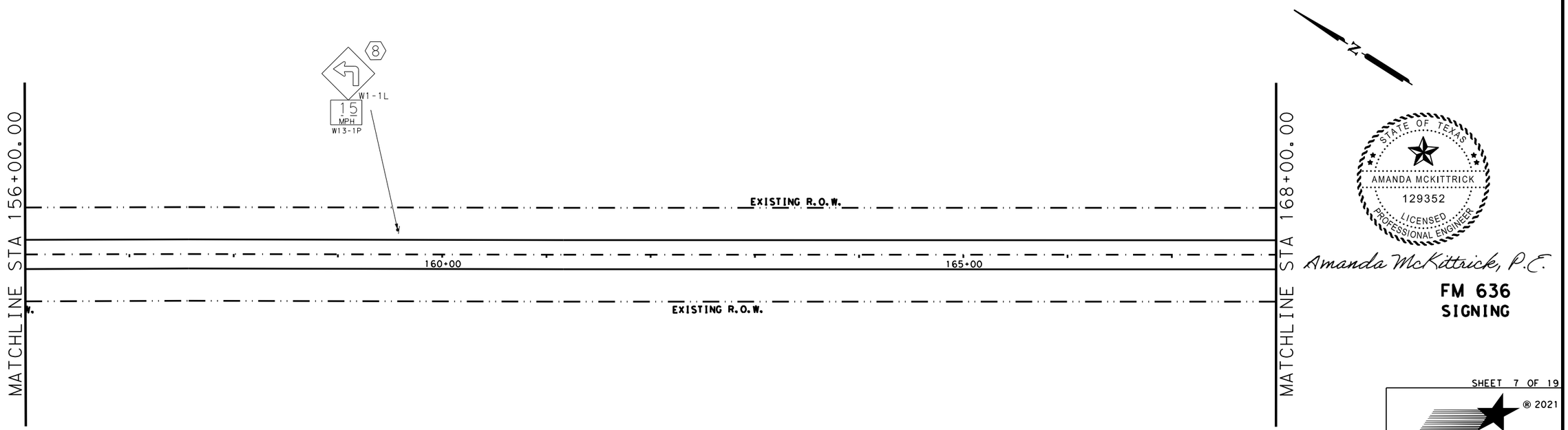
SHEET 6 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		209





STATE OF TEXAS
AMANDA MCKITTRICK
129352
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Amanda McKittrick, P.E.

FM 636
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SHEET 7 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		210

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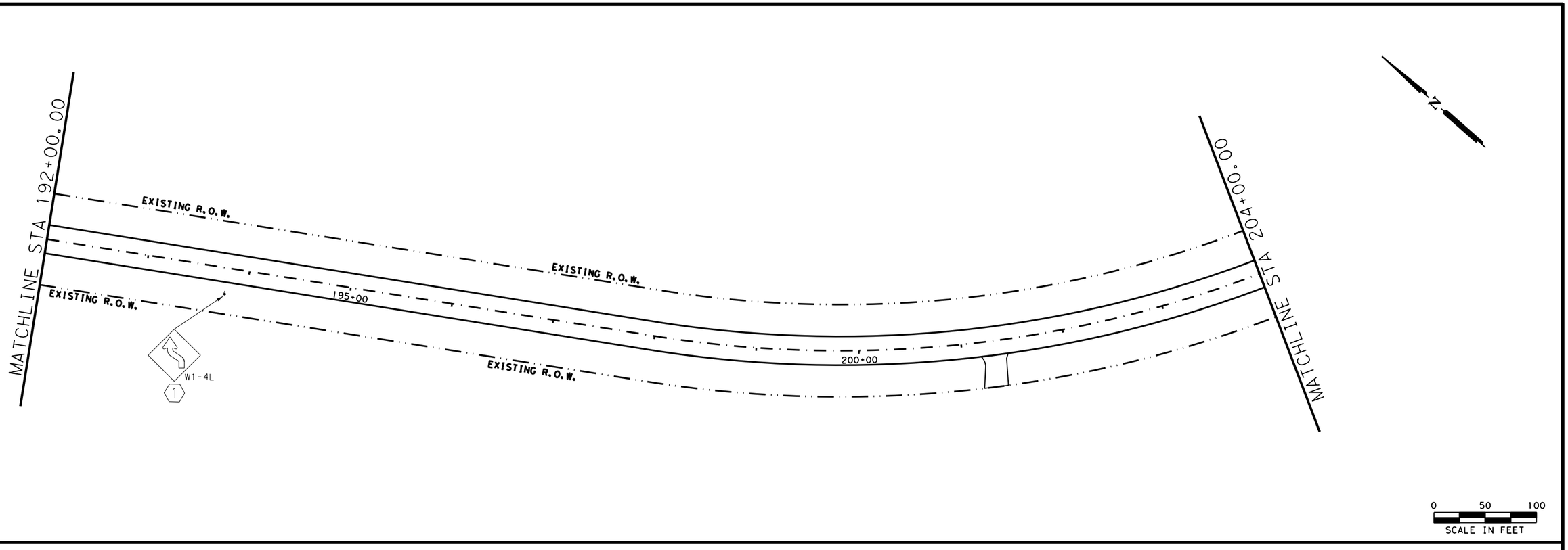

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CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		211

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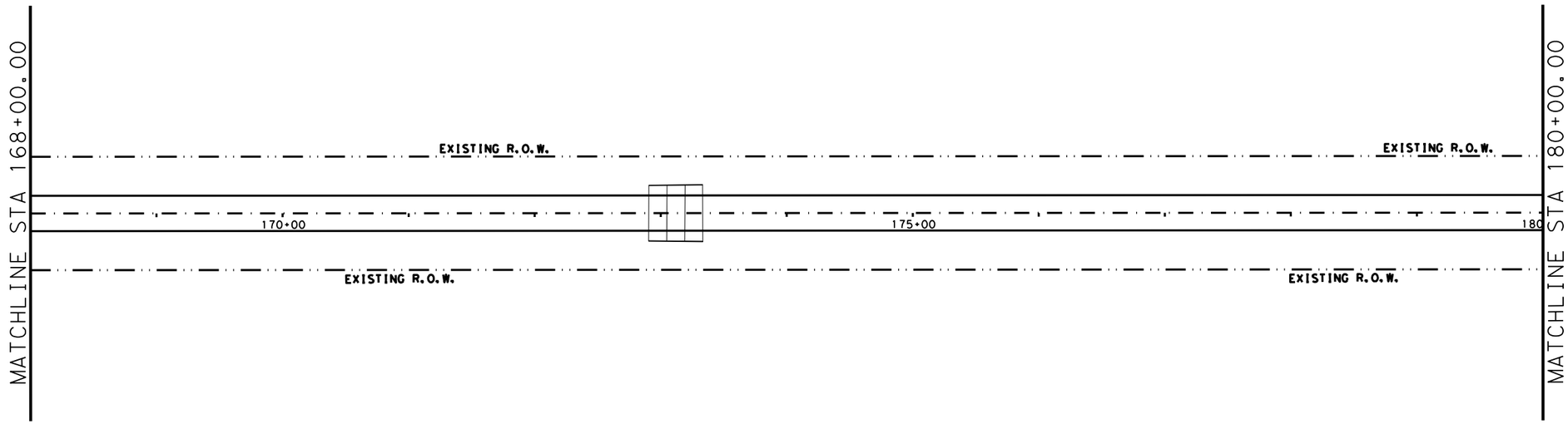

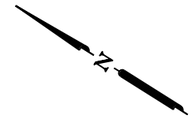

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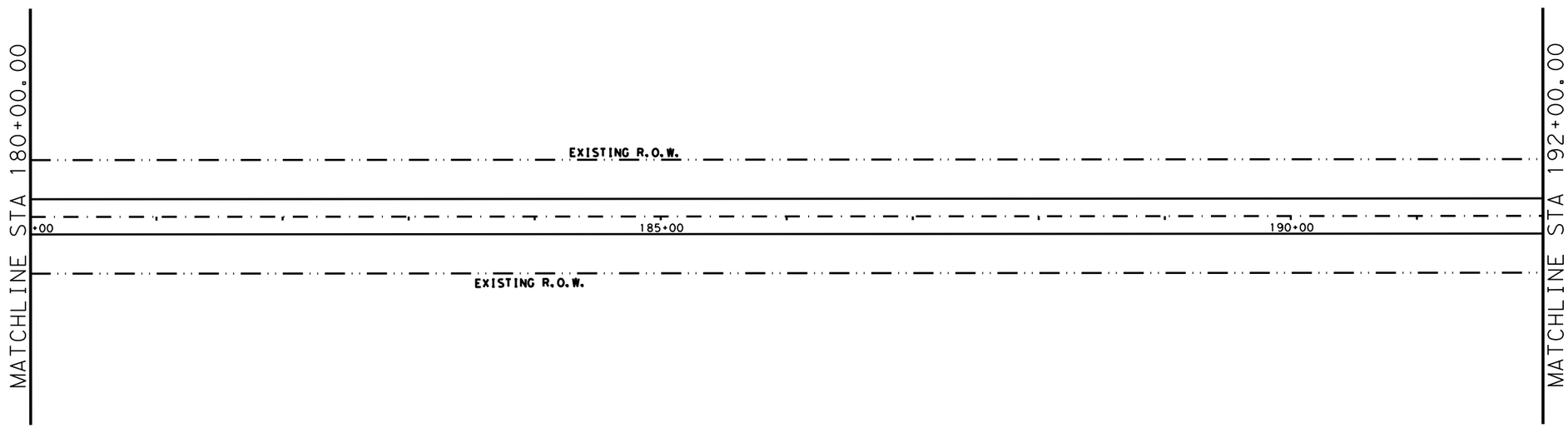

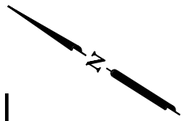

Amanda McKittrick, P.E.

FM 636
SIGNING

SHEET 8 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		212

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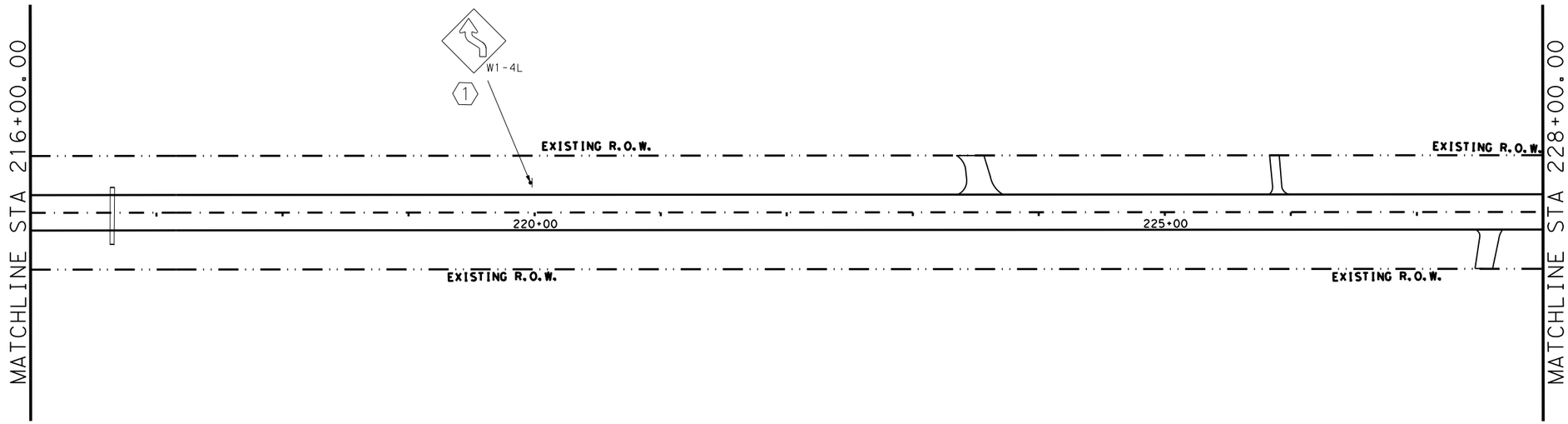

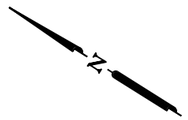

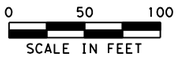

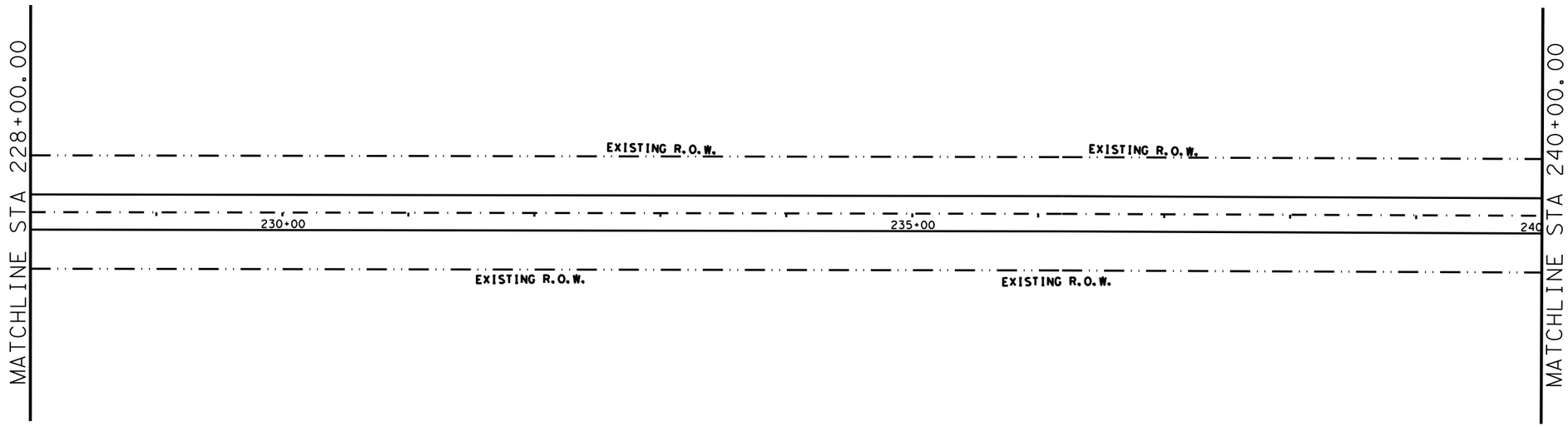

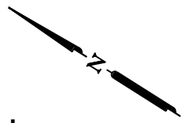

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Texas Department of Transportation

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0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		213

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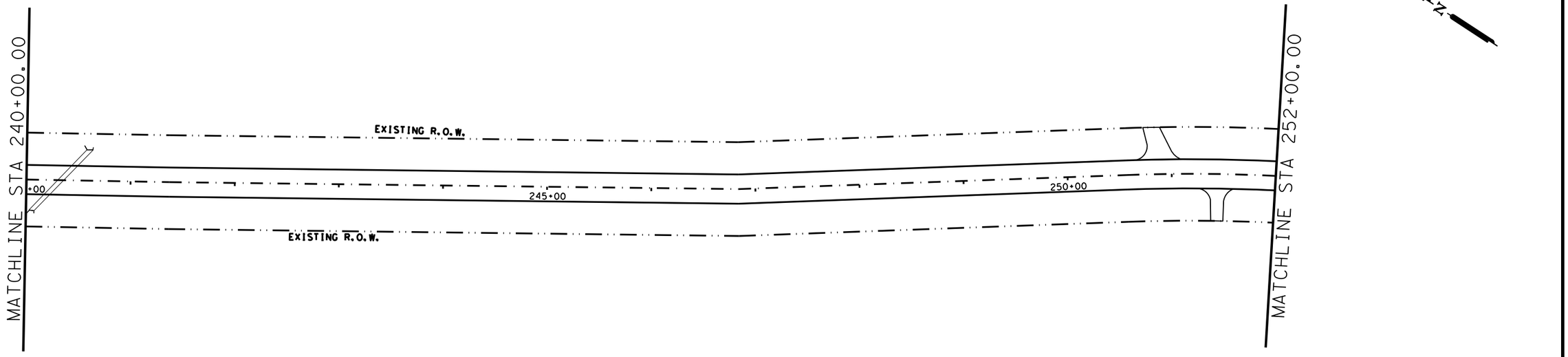

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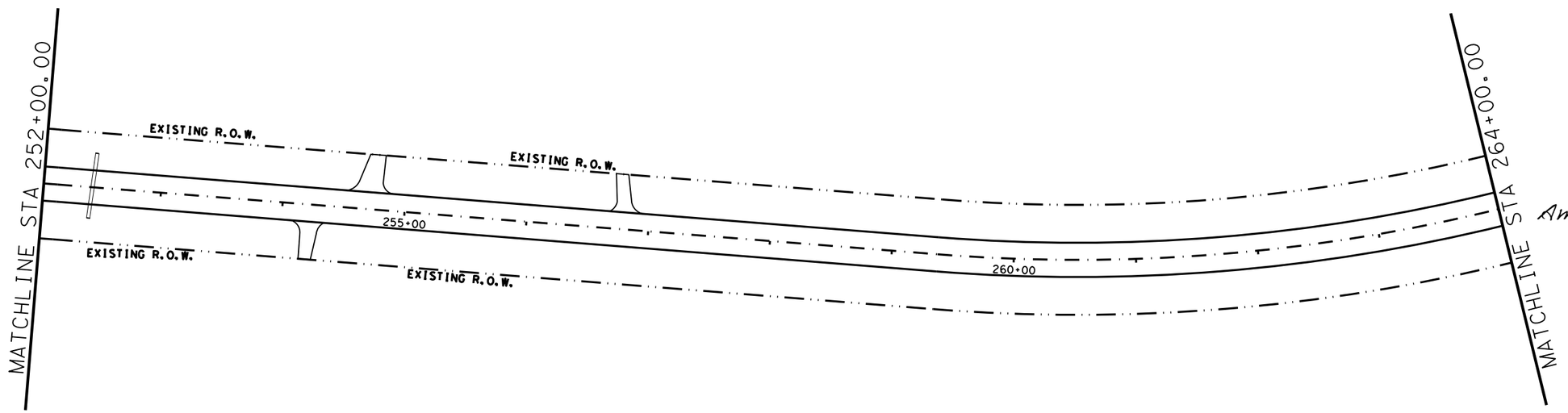

STATE OF TEXAS
AMANDA MCKITTRICK
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Amanda McKittrick, P.E.

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CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		214

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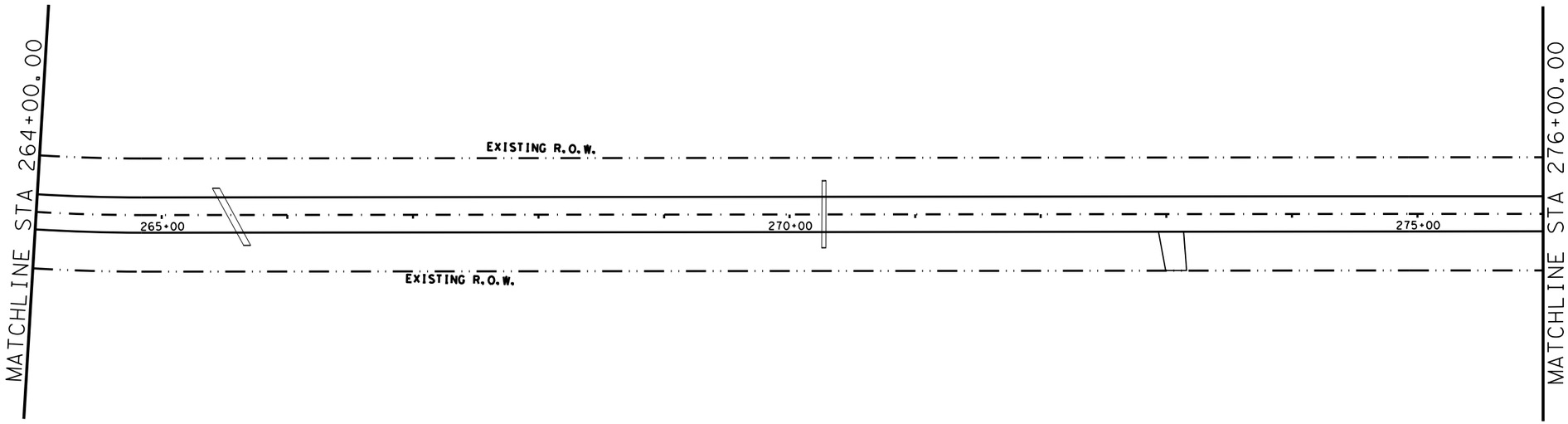

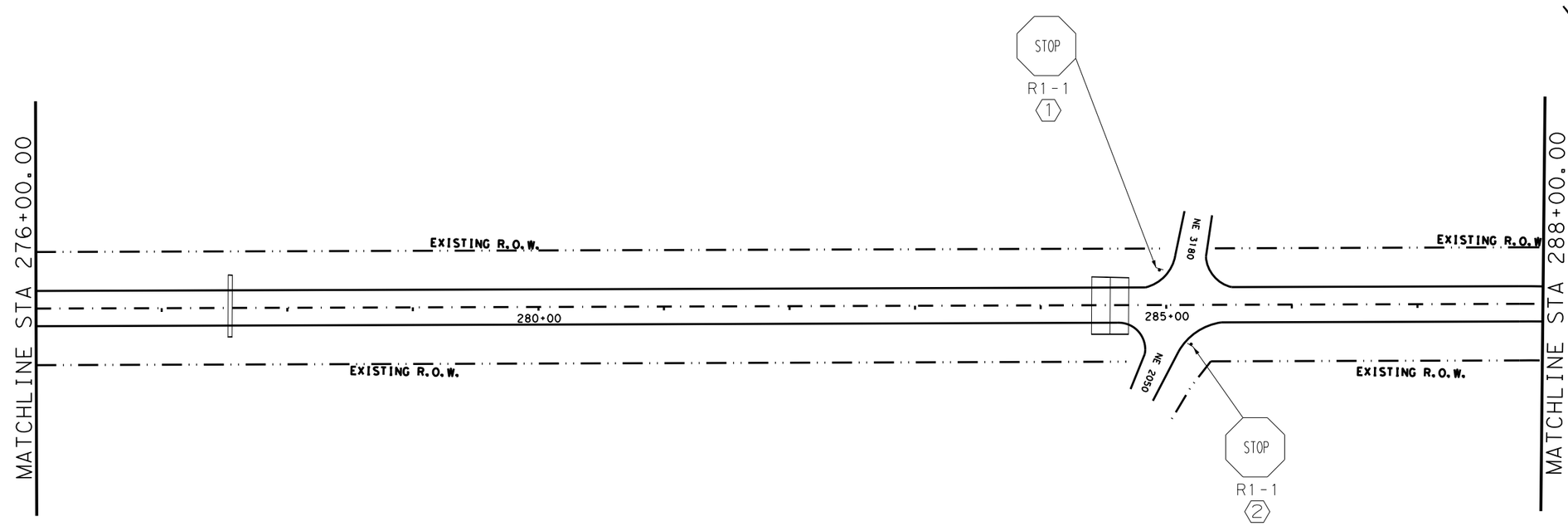

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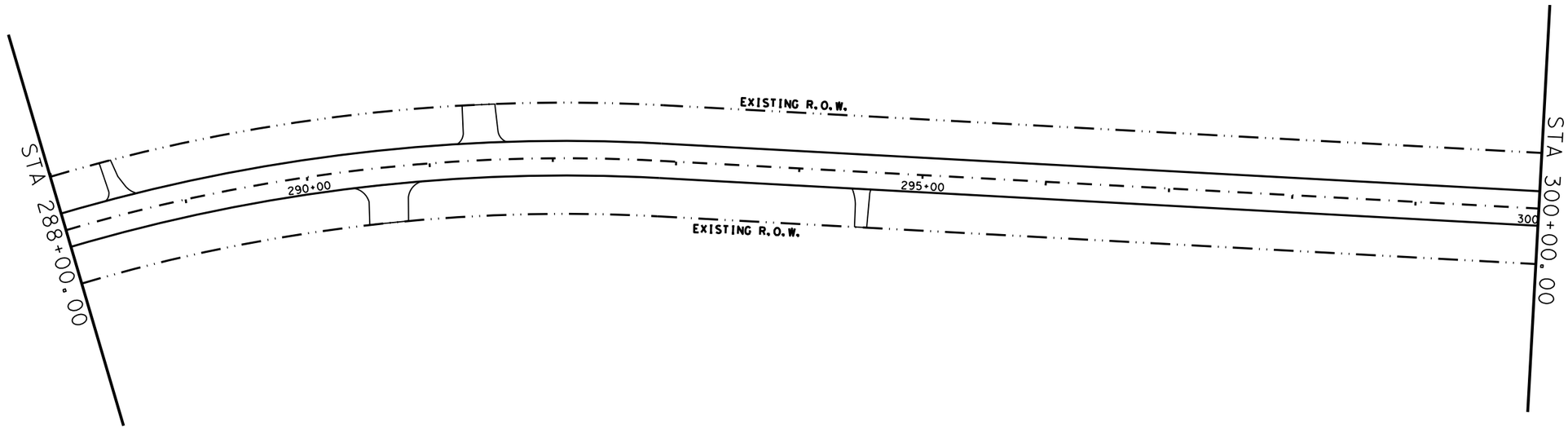
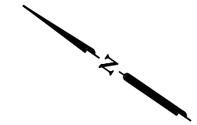
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		215





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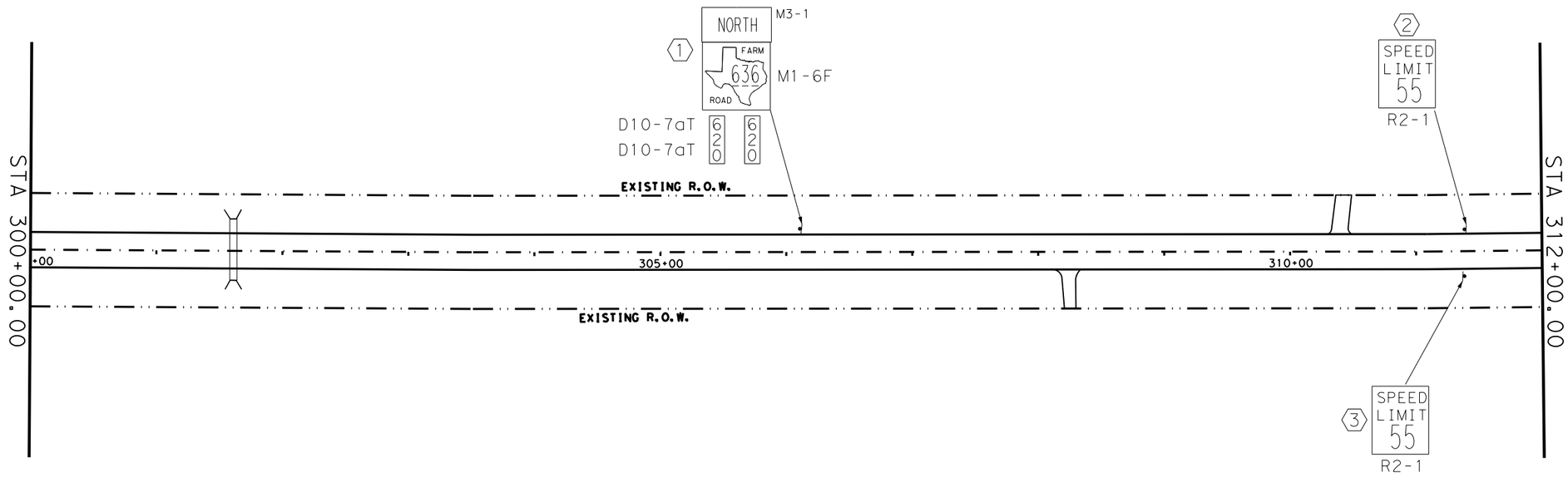

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SIGNING

SHEET 13 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		216

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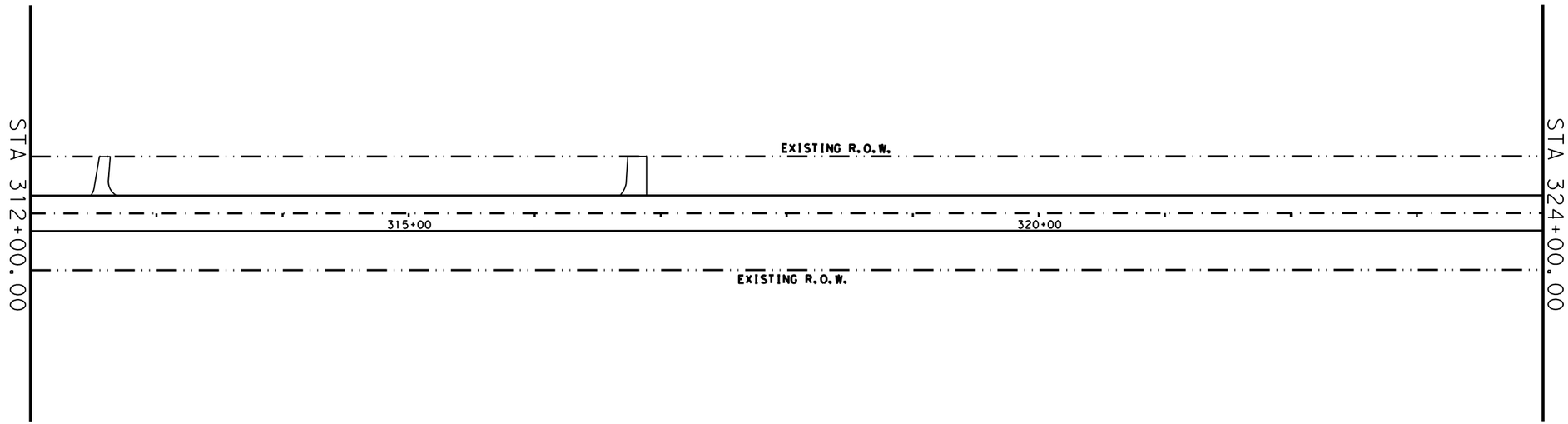

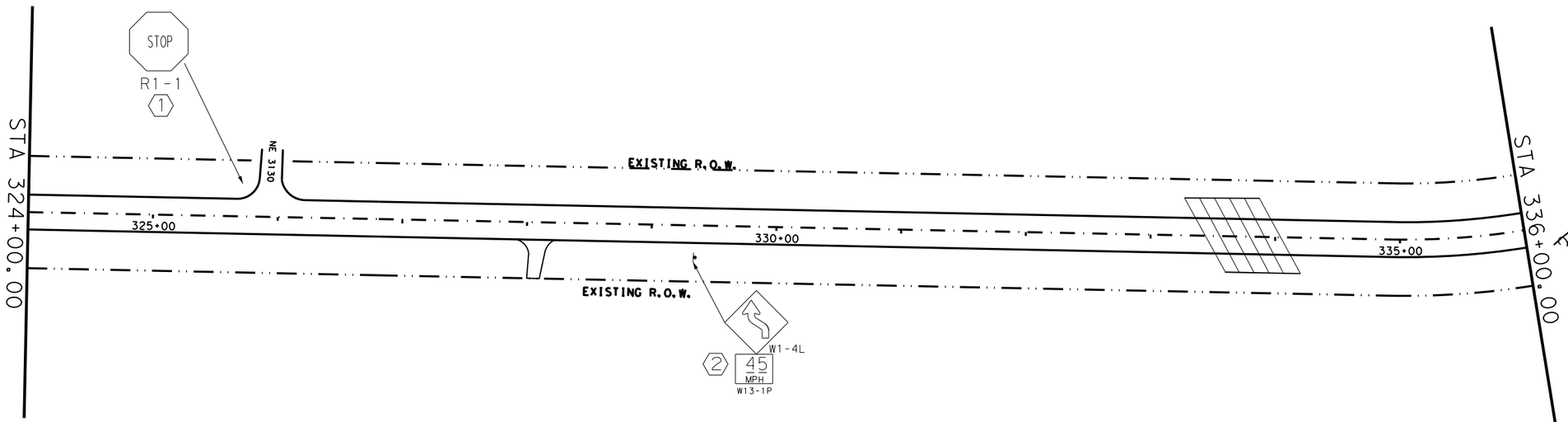

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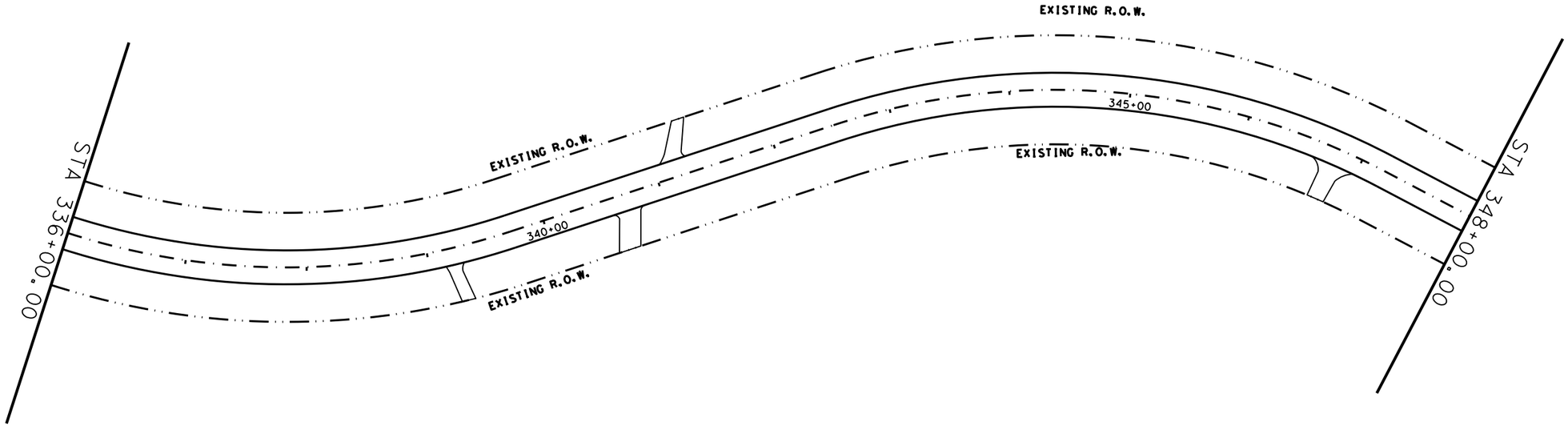
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		217



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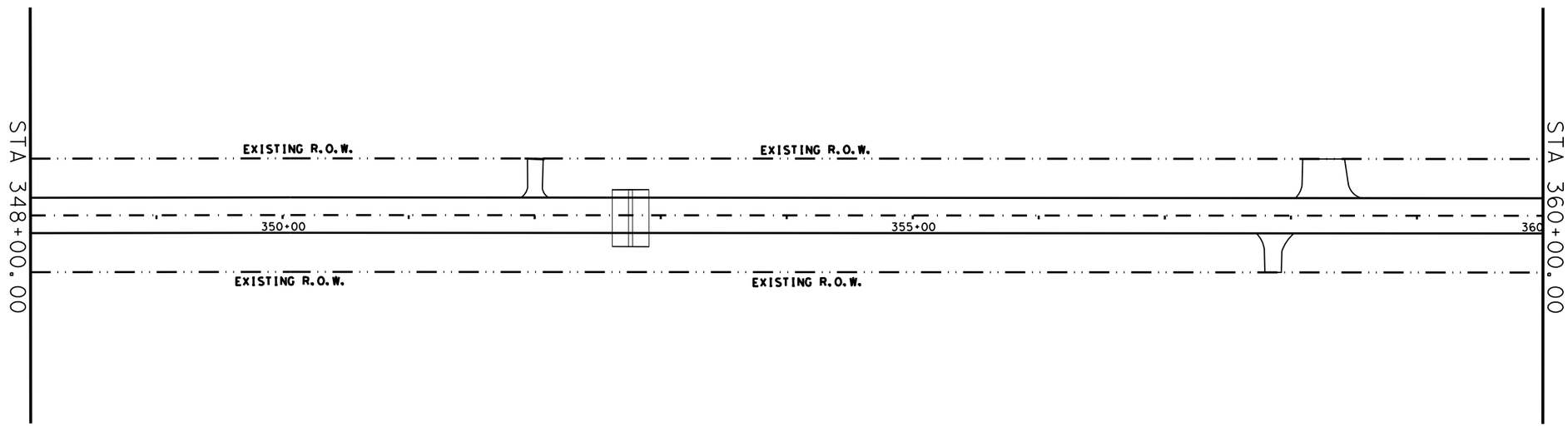

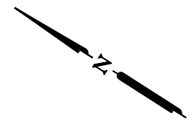

STATE OF TEXAS
AMANDA MCKITTRICK
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

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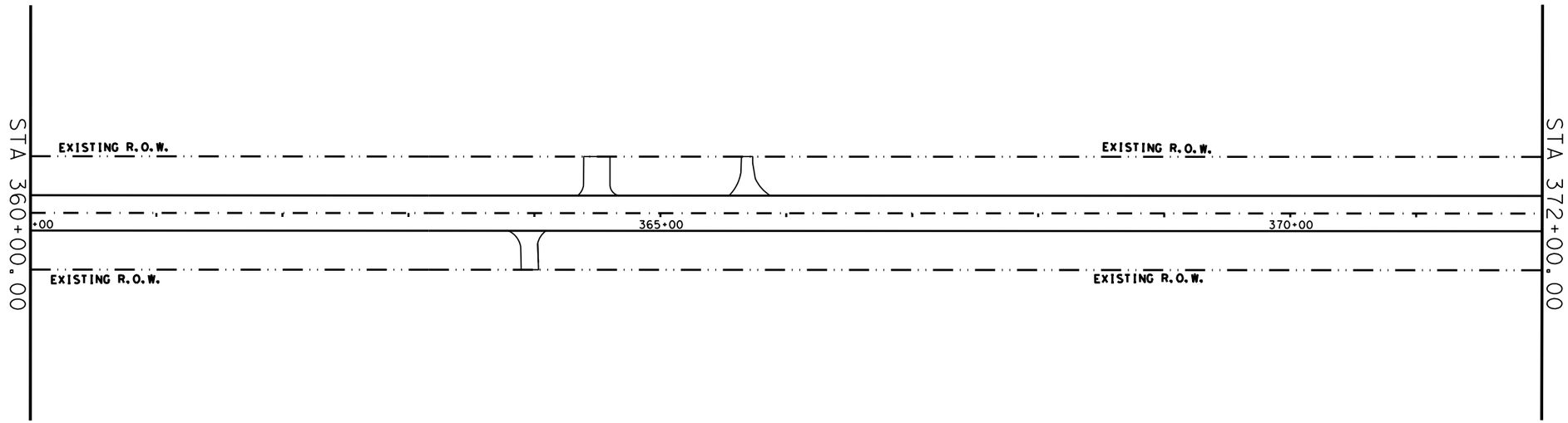
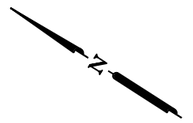
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		218





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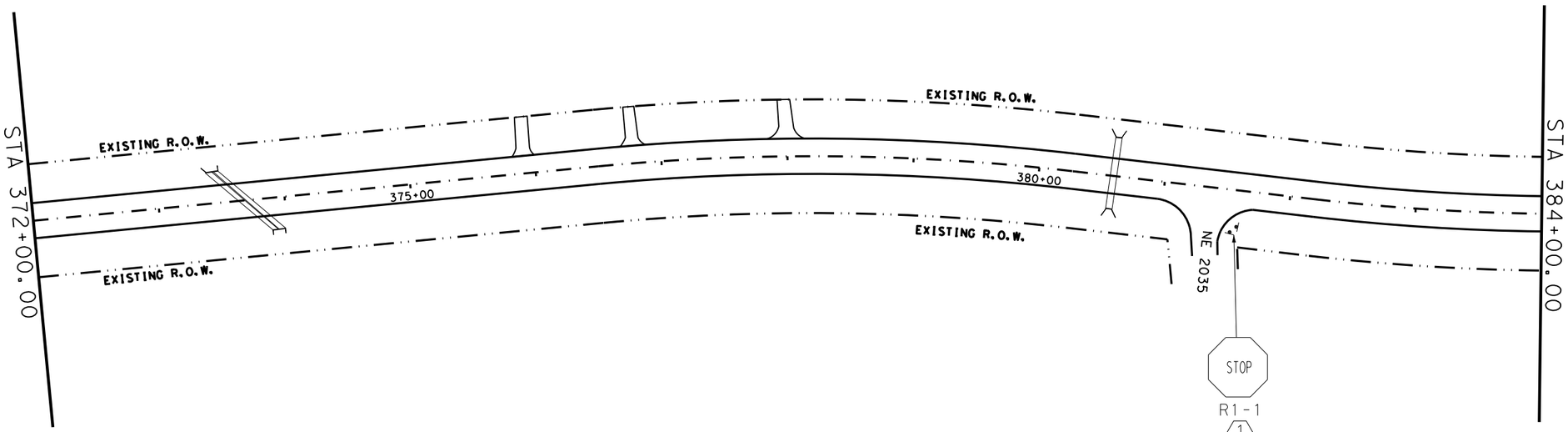

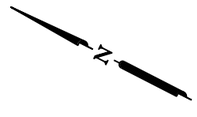

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Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		219

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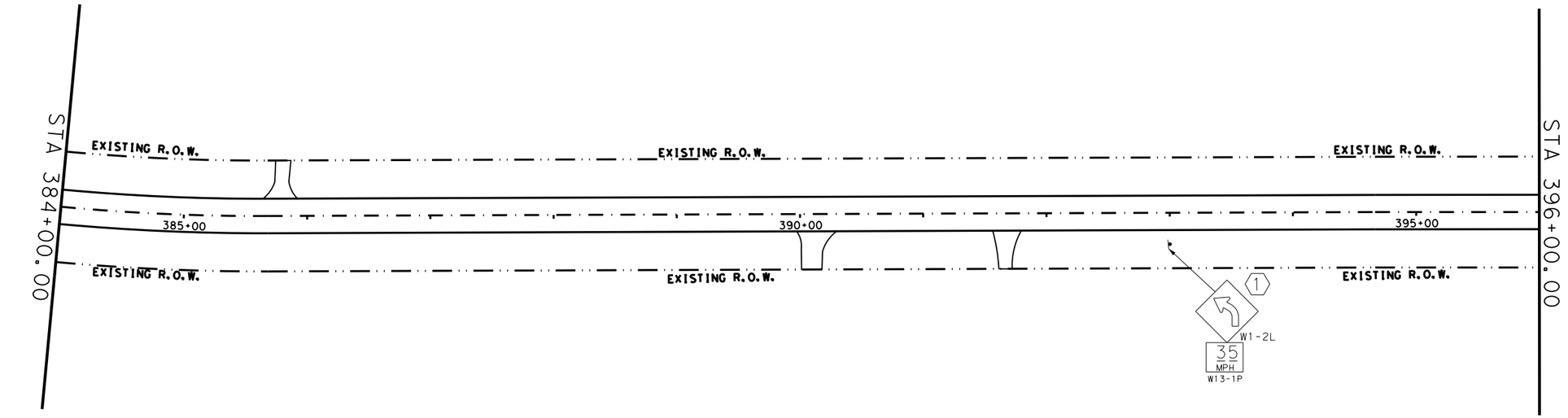

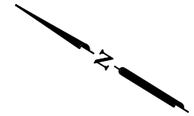

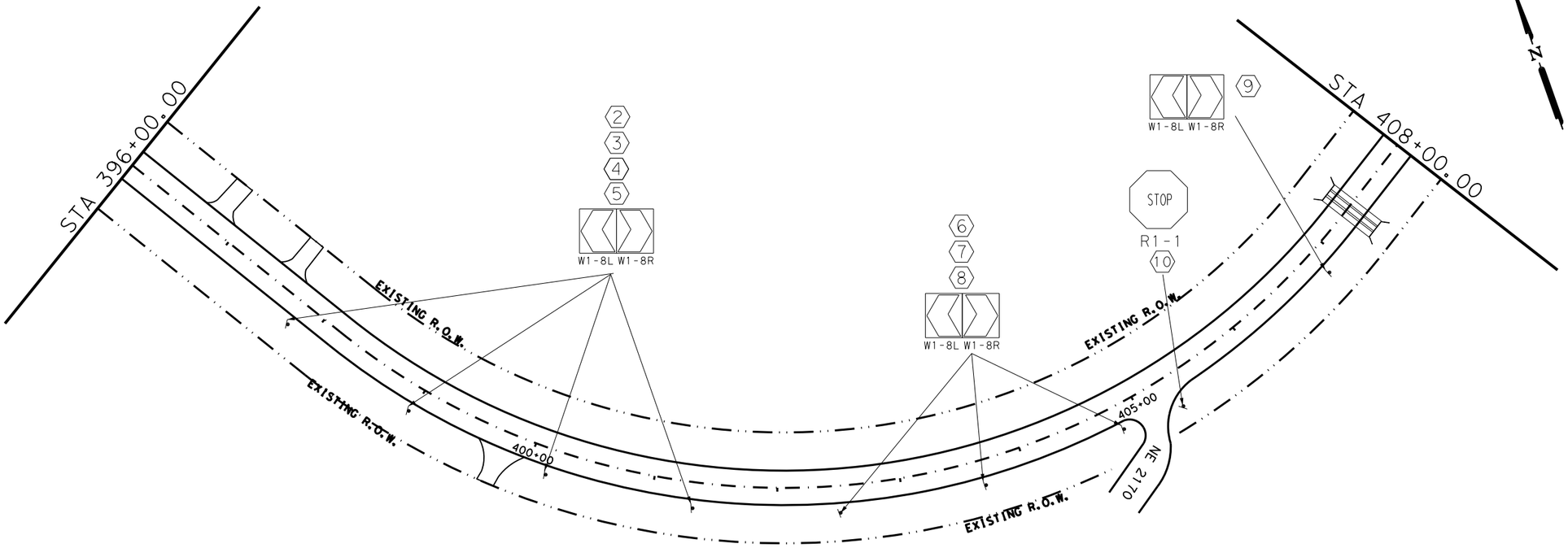

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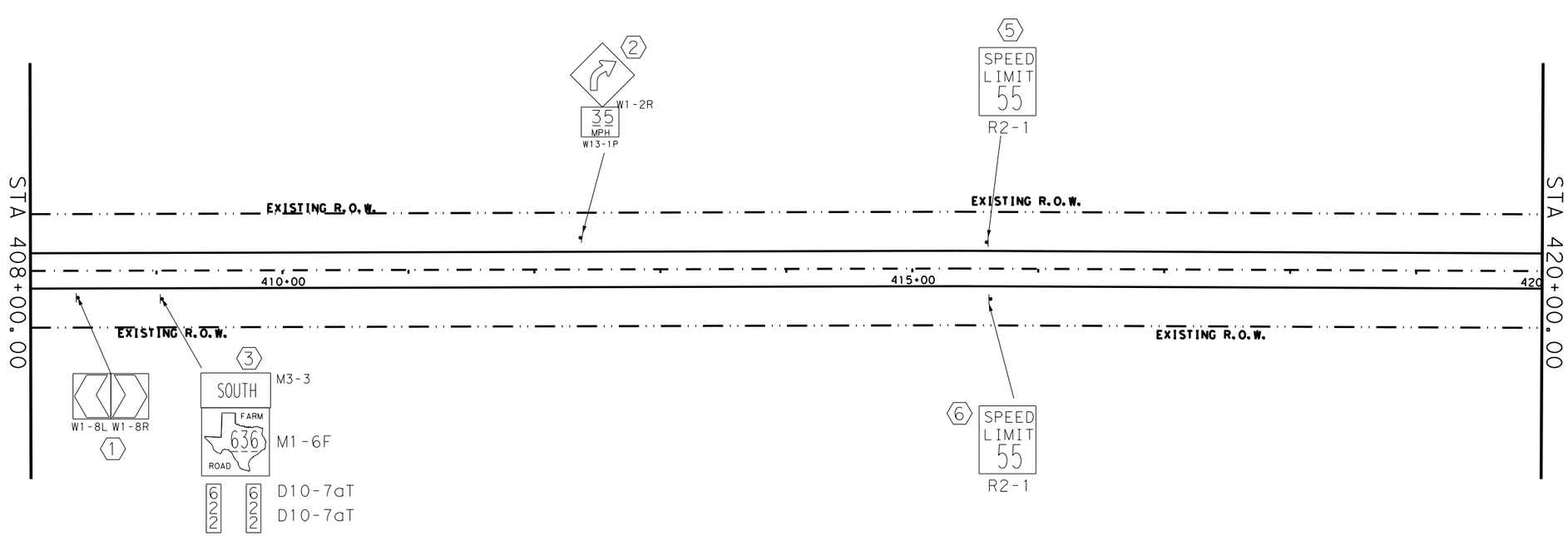
SIGNING

SHEET 17 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		220



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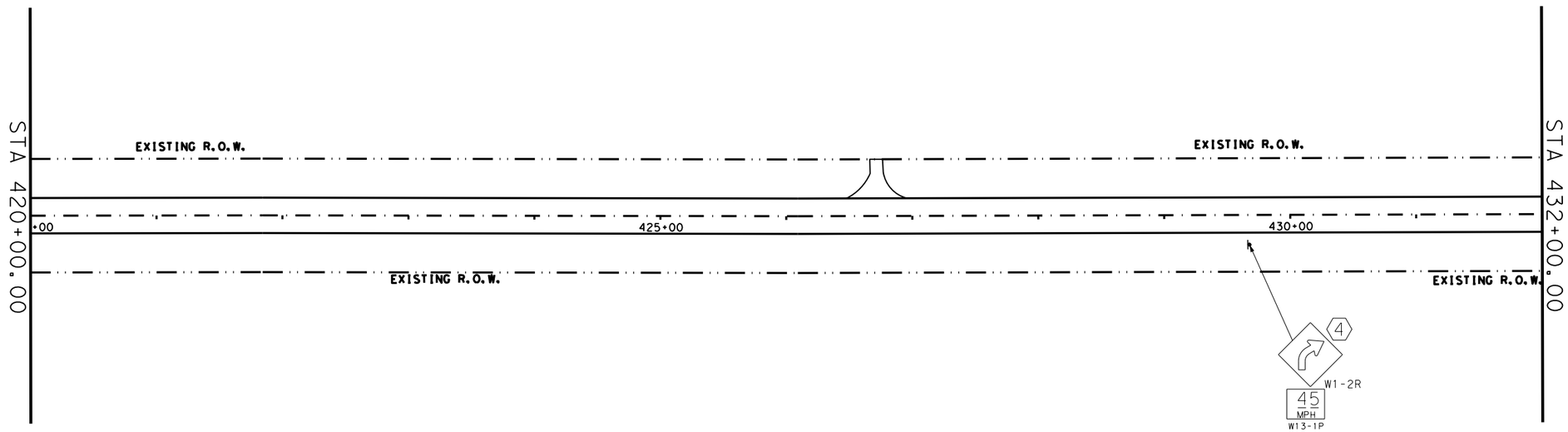

STATE OF TEXAS
AMANDA MCKITTRICK
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SHEET 18 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		221

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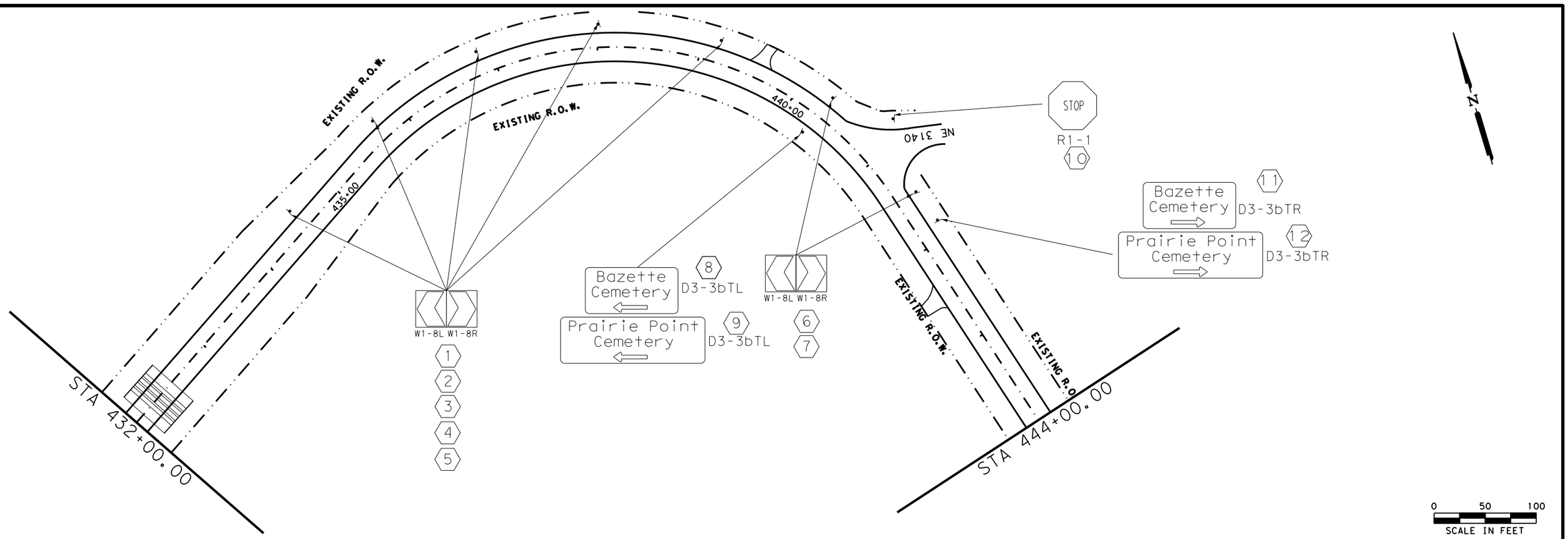

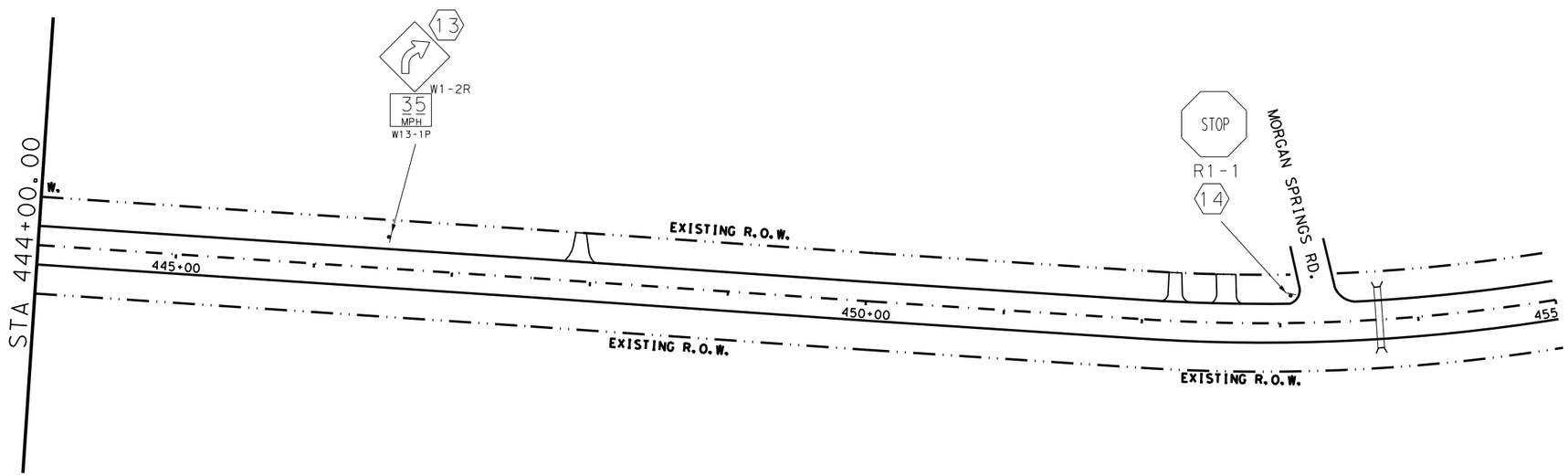

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Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		222

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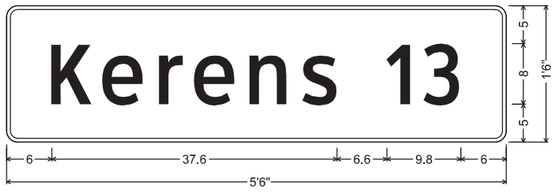
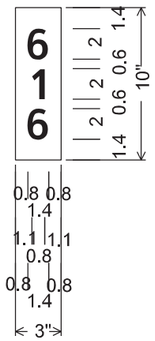


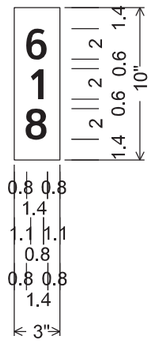
D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Kerens", ClearviewHwy-3-W; "13", ClearviewHwy-3-W;

SHEET 1 SIGN 7



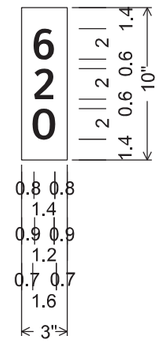
D10-7aT 3in;
No border, White on, Green;
"6", ClearviewHwy-4-W;
"1", ClearviewHwy-4-W;
"6", ClearviewHwy-4-W;

SHEET 5 SIGN 1



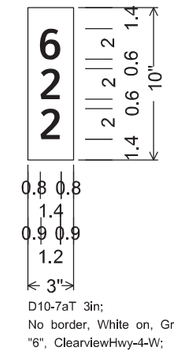
D10-7aT 3in;
No border, White on, Green;
"6", ClearviewHwy-4-W;
"1", ClearviewHwy-4-W;
"8", ClearviewHwy-4-W;

SHEET 9 SIGN 1



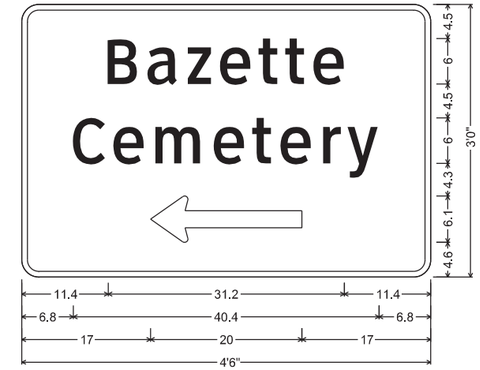
D10-7aT 3in;
No border, White on, Green;
"6", ClearviewHwy-4-W;
"2", ClearviewHwy-4-W;
"0", ClearviewHwy-4-W;

SHEET 13 SIGN 1



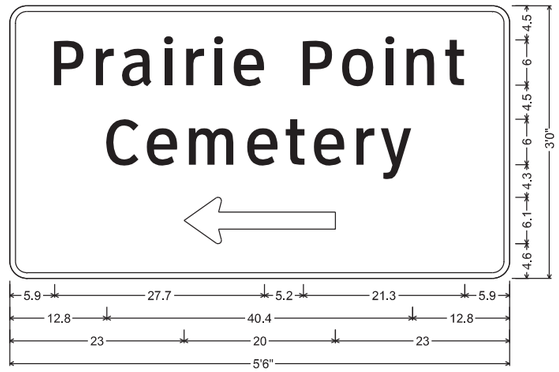
D10-7aT 3in;
No border, White on, Green;
"6", ClearviewHwy-4-W;
"2", ClearviewHwy-4-W;
"2", ClearviewHwy-4-W;

SHEET 18 SIGN 4



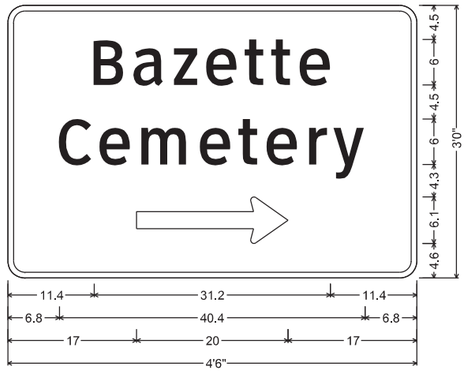
D3-3bTL_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Bazette", ClearviewHwy-3-W; "Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 180';

SHEET 19 SIGN 11



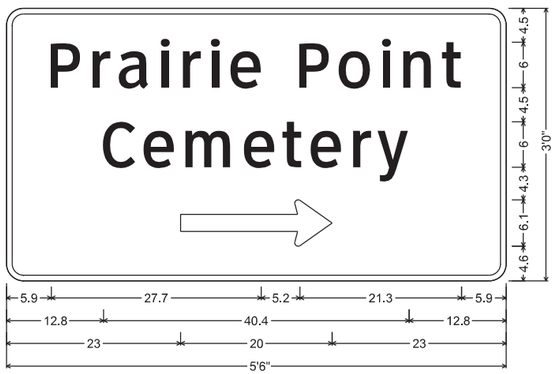
D3-3bTL_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Prairie Point", ClearviewHwy-3-W; "Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 180';

SHEET 19 SIGN 12



D3-3bTR_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Bazette", ClearviewHwy-3-W; "Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0';

SHEET 19 SIGN 18



D3-3bTR_VARx36;
2.3" Radius, 0.8" Border, White on, Green;
"Prairie Point", ClearviewHwy-3-W; "Cemetery", ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0';

SHEET 19 SIGN 19

STATE OF TEXAS
BRENDA L. SANCHEZ
107705
LICENSED
PROFESSIONAL ENGINEER

Brenda L. Sanchez, P.E. 01-05-21
Signature of Registrant & Date

Texas Department of Transportation

GUIDE SIGN DETAILS

SCALE: NTS SHEET 1 OF 1

DESIGN/CK	FED.RD. DIV.NO.	STATE FUNDED PROJECT		HIGHWAY NO.
BLS	6	(SEE TITLE SHEET)		FM 636
CHECK BA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK FRC	TEXAS	DALLAS	NAVARRO	223
CHECK ARO	CONTROL	SECTION	JOB	
	0574	02	021	

$FILE$

DATE: 1/7/2021 11:51:04 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\8. Traffic\Standards\smdgen.dgn

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)

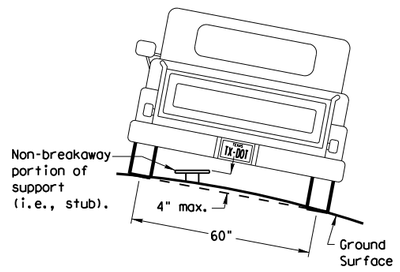
Anchor Type

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))

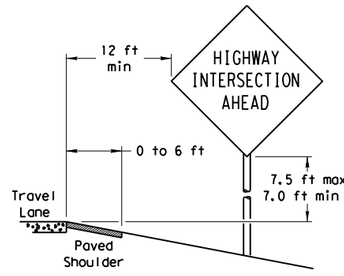
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

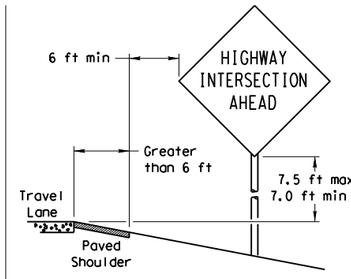
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

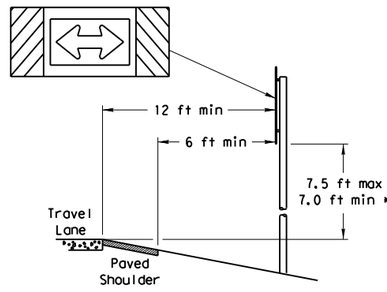
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



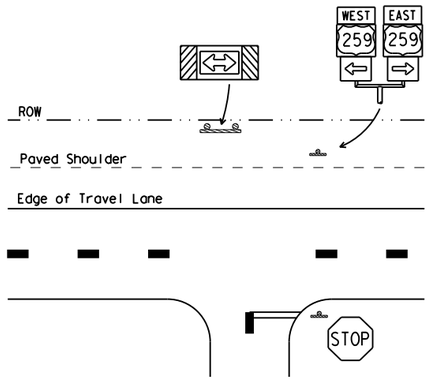
GREATER THAN 6 FT. WIDE

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.

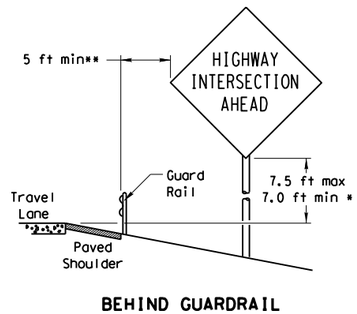
T-INTERSECTION



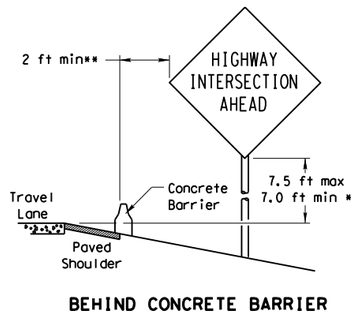
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

* 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

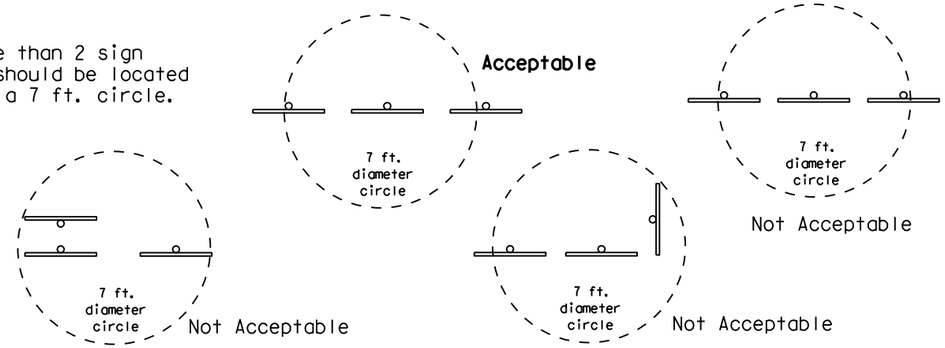
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

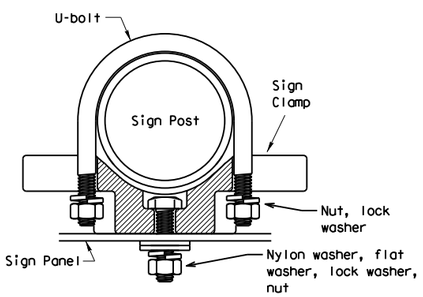
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

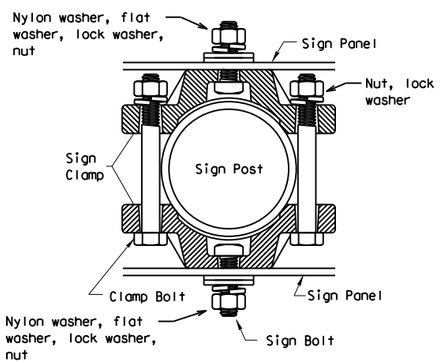


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

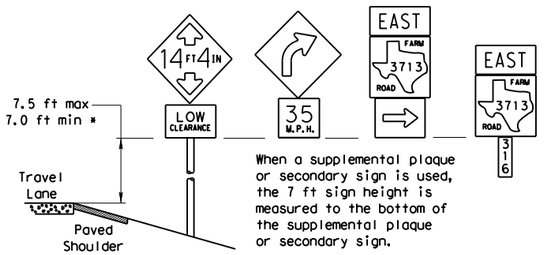
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



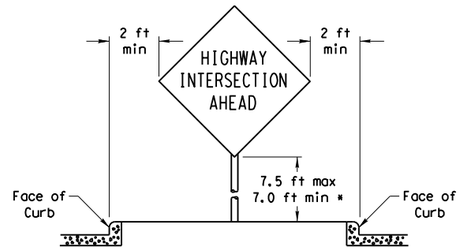
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



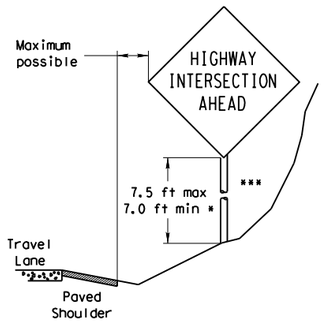
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

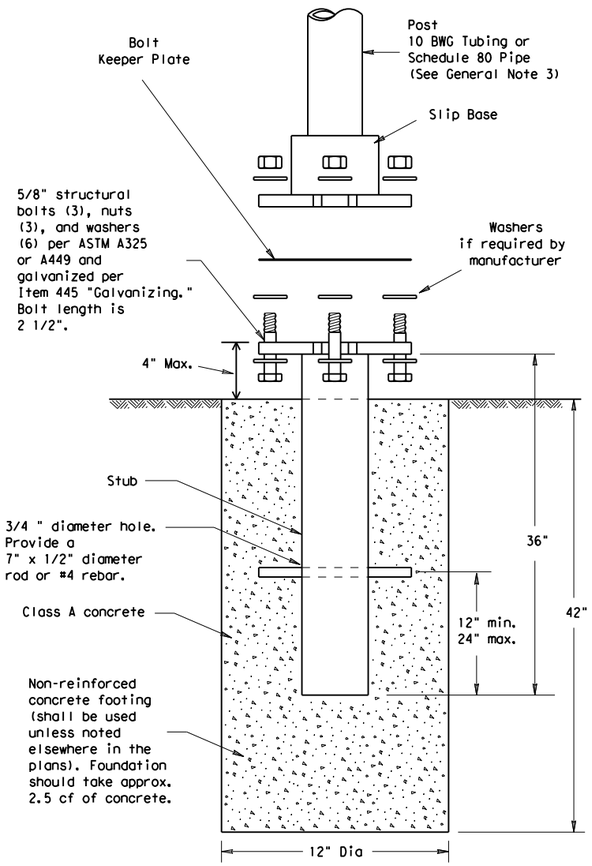
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636

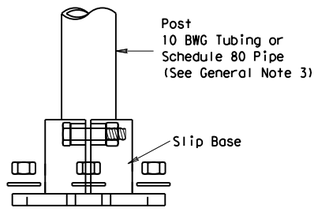
DIST	COUNTY	SHEET NO.
DAL	NAVARRO	224

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

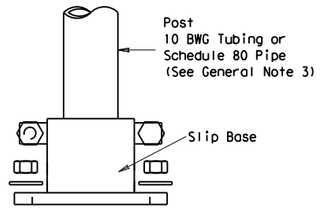


SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

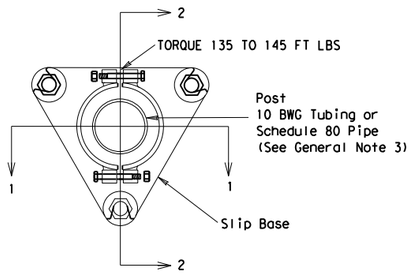
NOTE
The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.



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

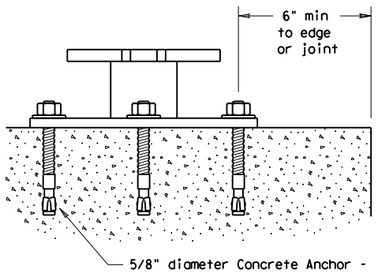
Foundation

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

DATE:
FILE:

Texas Department of Transportation
Dallas District Standard

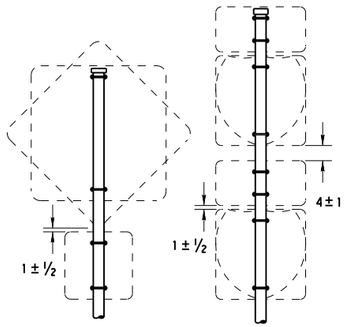
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08(DAL)

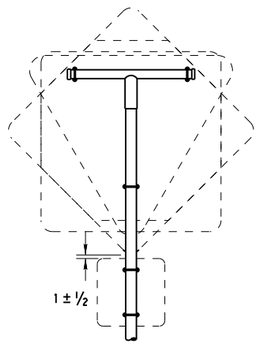
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
12-10 (DISTRICT) ADDED CLAMP BASE DETAIL FOR SLIP BASE INSTALLATION	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		225

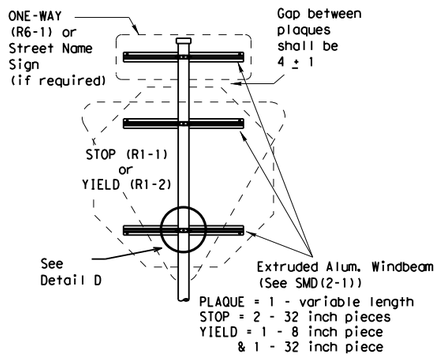
DATE: 1/7/2021 11:51:22 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574021\4 - Design\Plan Set\8. Traffic\Standards\smd82.dgn



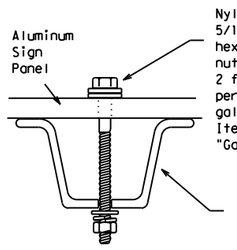
SM RD SGN ASSM TY XXXXX(1)XX(P)



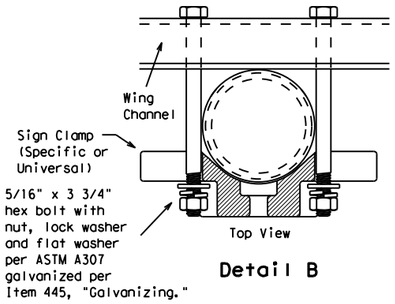
SM RD SGN ASSM TY XXXXX(1)XX(T)



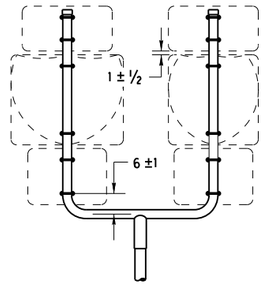
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



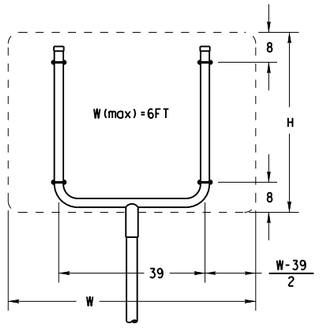
Detail A



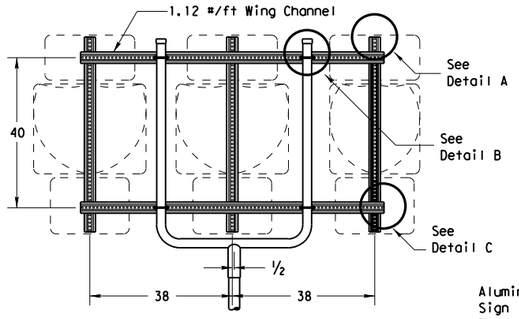
Detail B



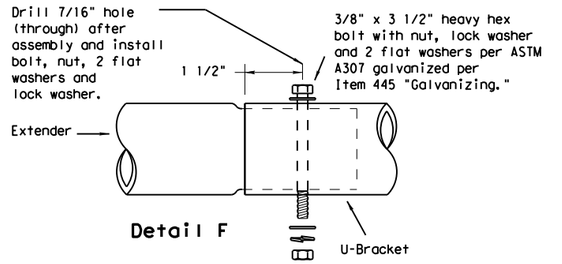
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

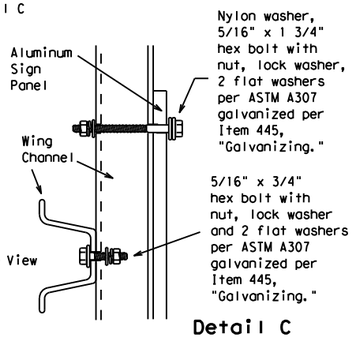


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

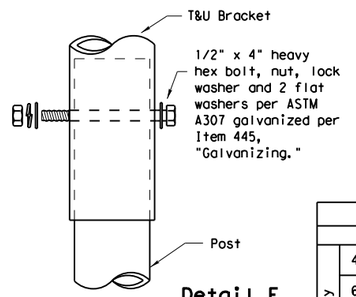


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



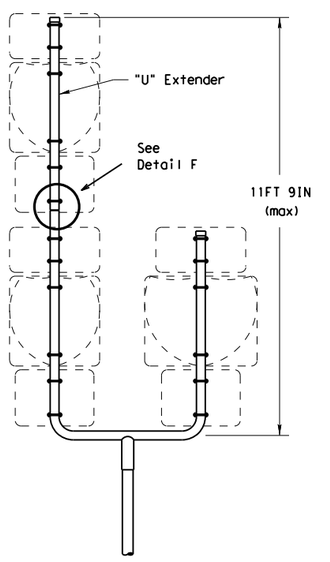
Detail E

GENERAL NOTES:

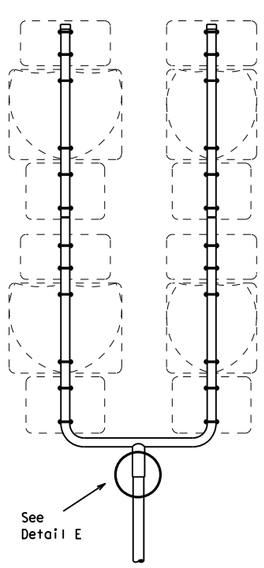
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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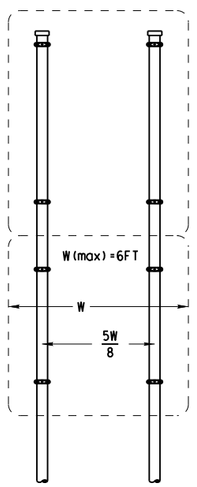
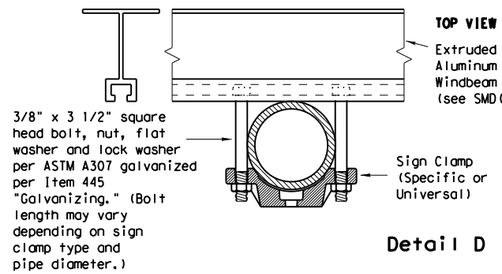
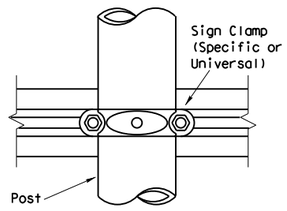


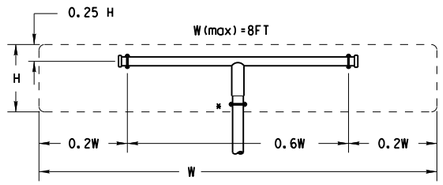
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



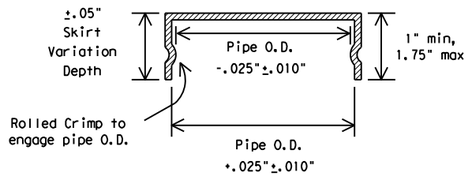
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		226

9-08 REVISIONS

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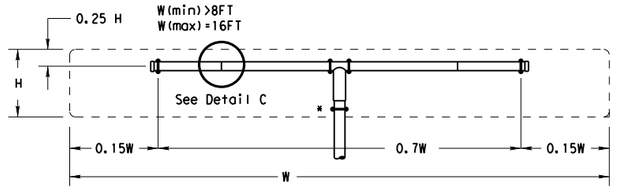
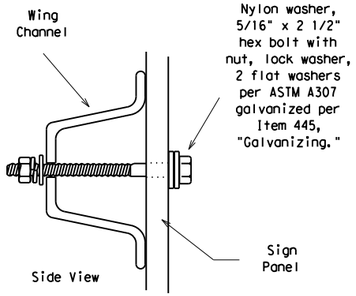
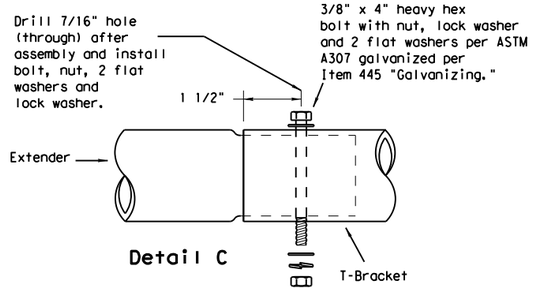


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



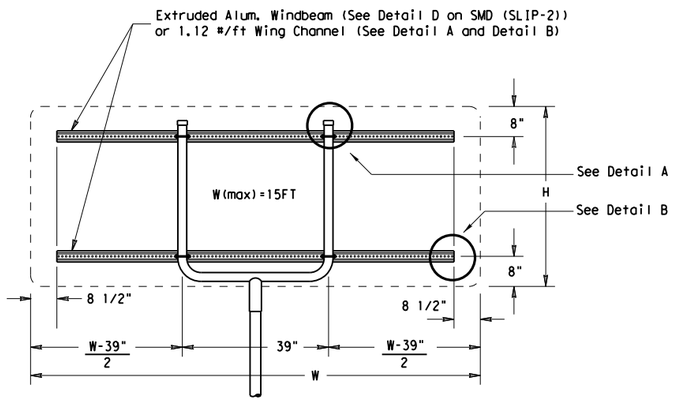
Detail C

Splices shall only be allowed behind the sign substrate.

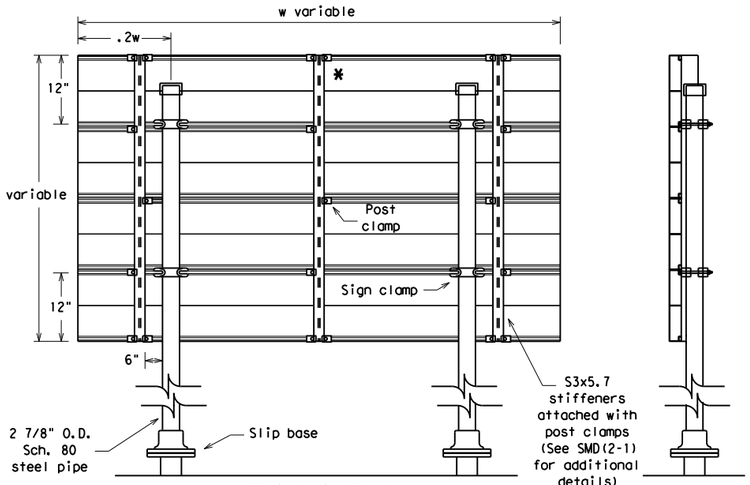
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.



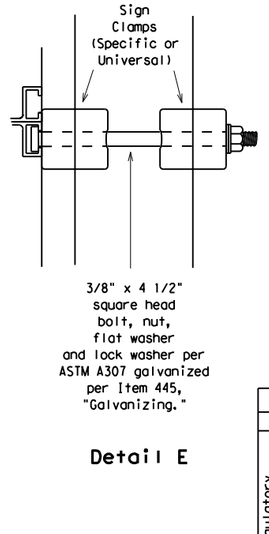
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

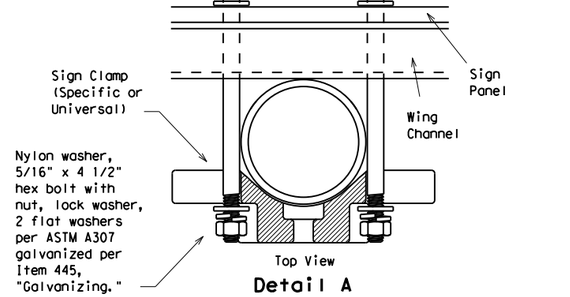
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



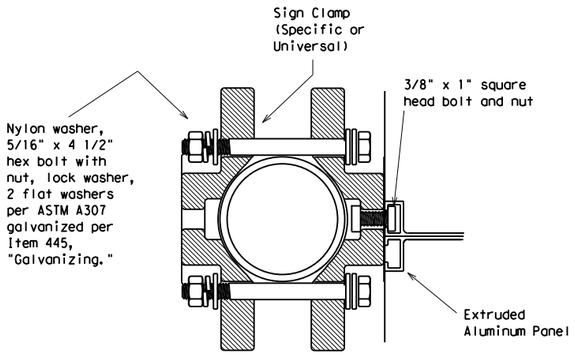
Detail E

See Detail E for clamp installation

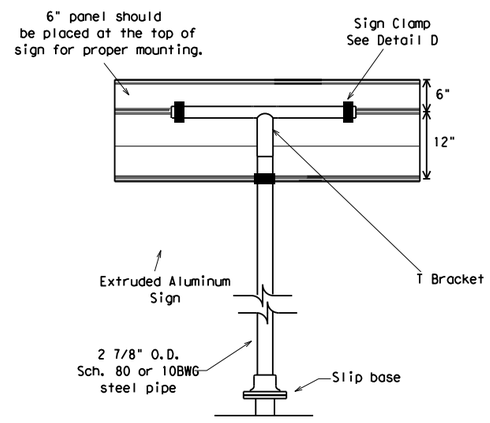


Top View

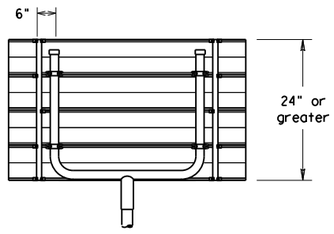
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		227

DATE: 1/7/2021 11:51:35 AM
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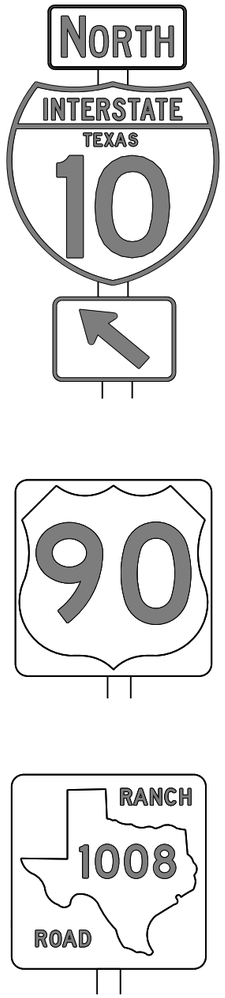
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

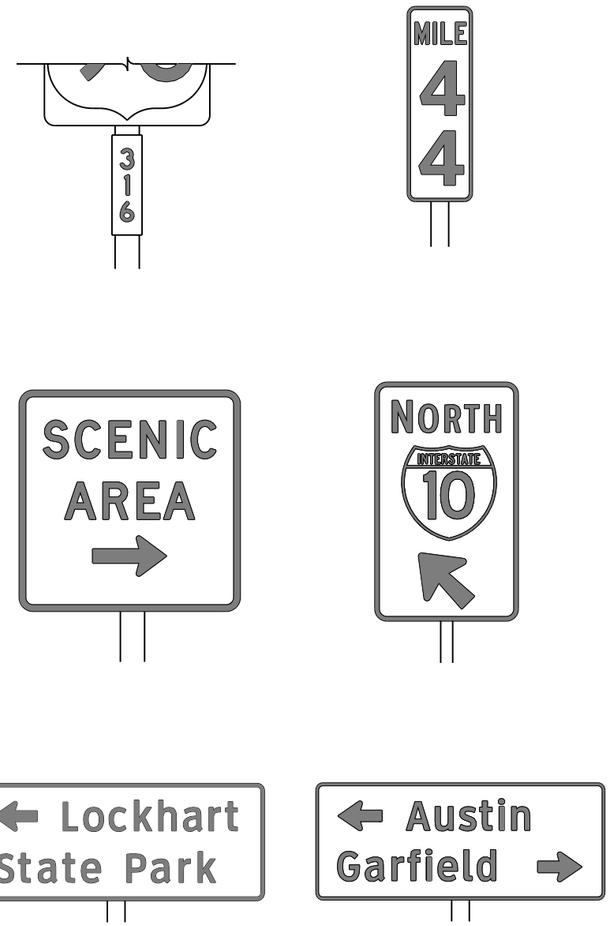
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

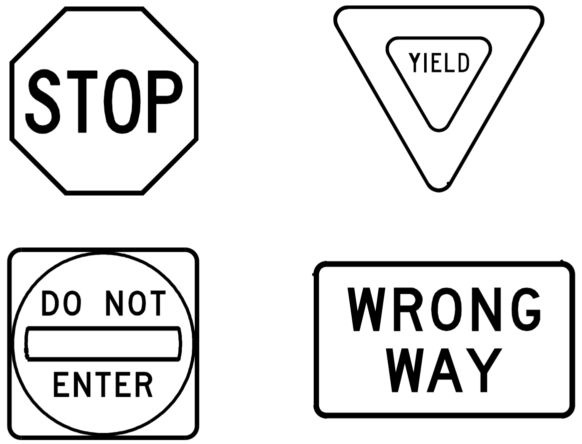
Traffic Operations Division Standard

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	0574	02	021	FM 636
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DAL	NAVARRO		228

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

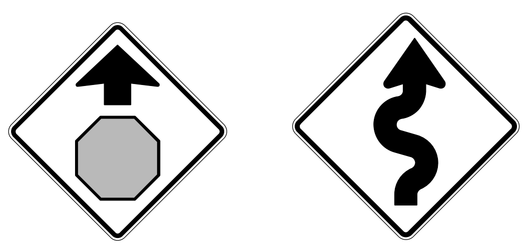
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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 12-03 7-13 9-08	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		229

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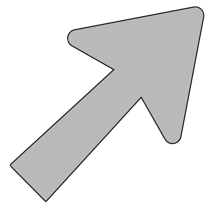
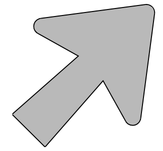
ARROW DETAILS

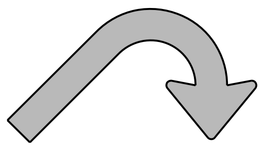
for Large Ground-Mounted and Overhead Guide Signs



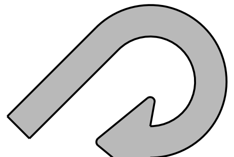
Type A



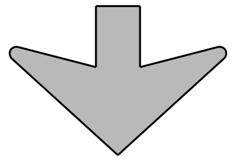
Type B



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

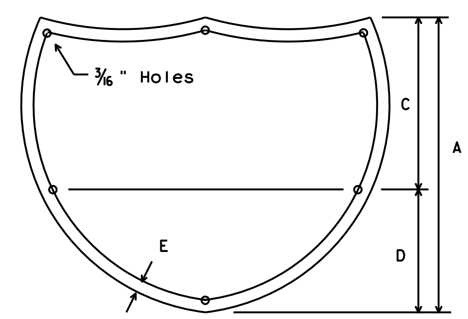
NOTE

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
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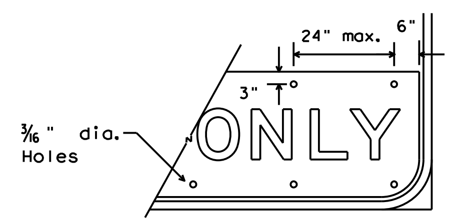
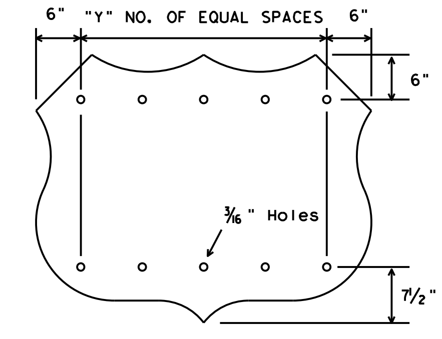
48	28	20	1 3/4

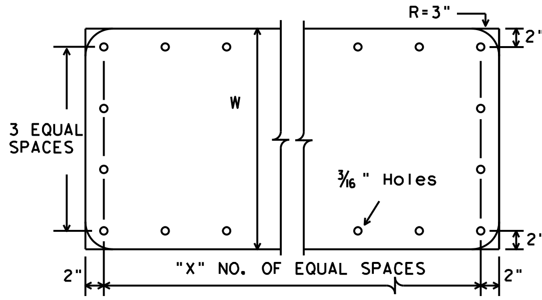


EXIT ONLY PANEL



U.S. ROUTE MARKERS

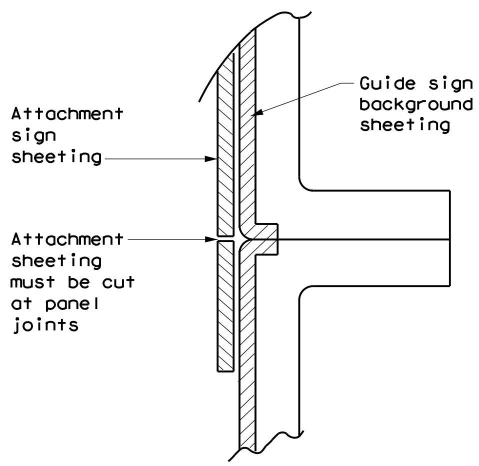
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



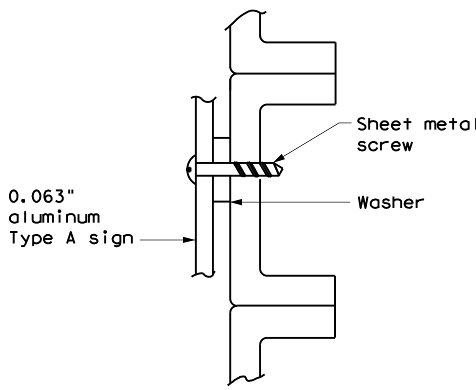
STATE ROUTE MARKERS

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

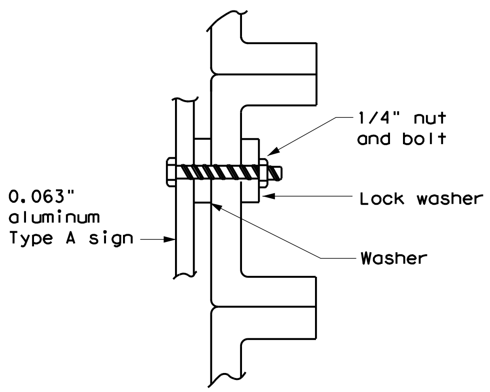
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

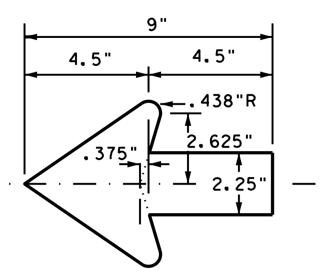
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

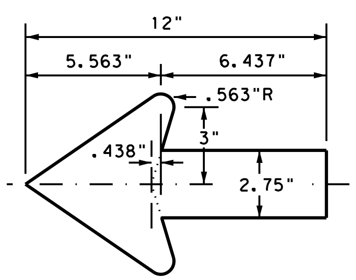
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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

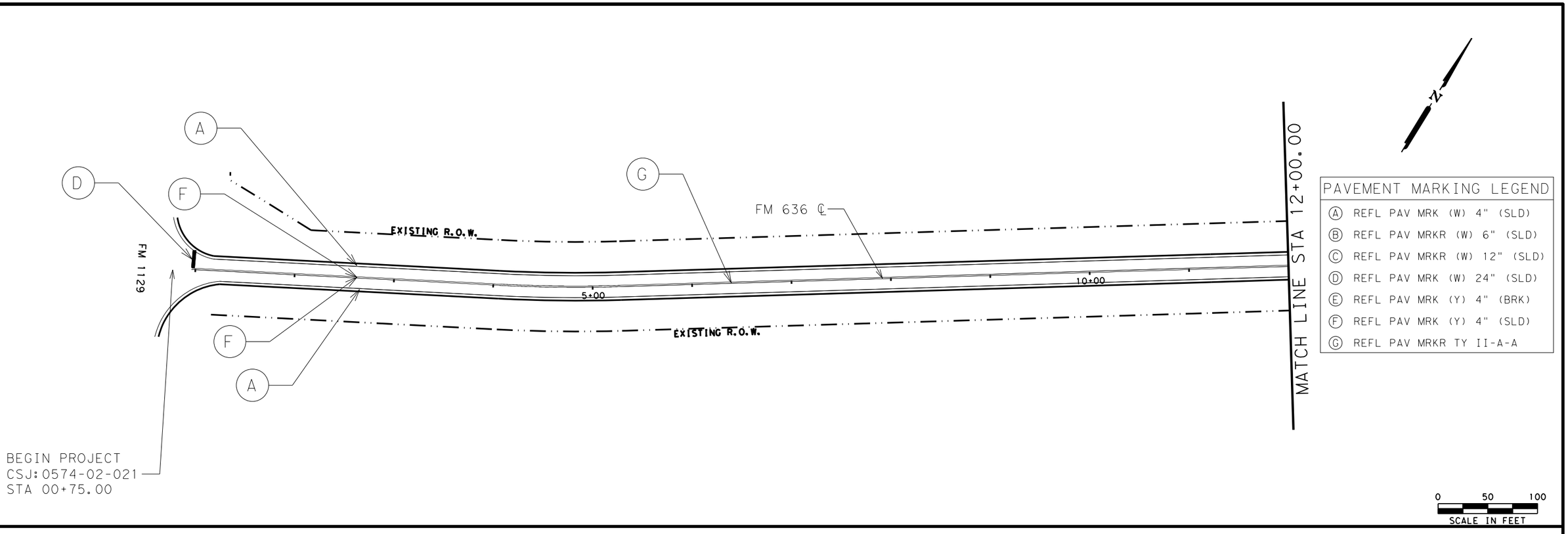
Traffic Operations Division Standard

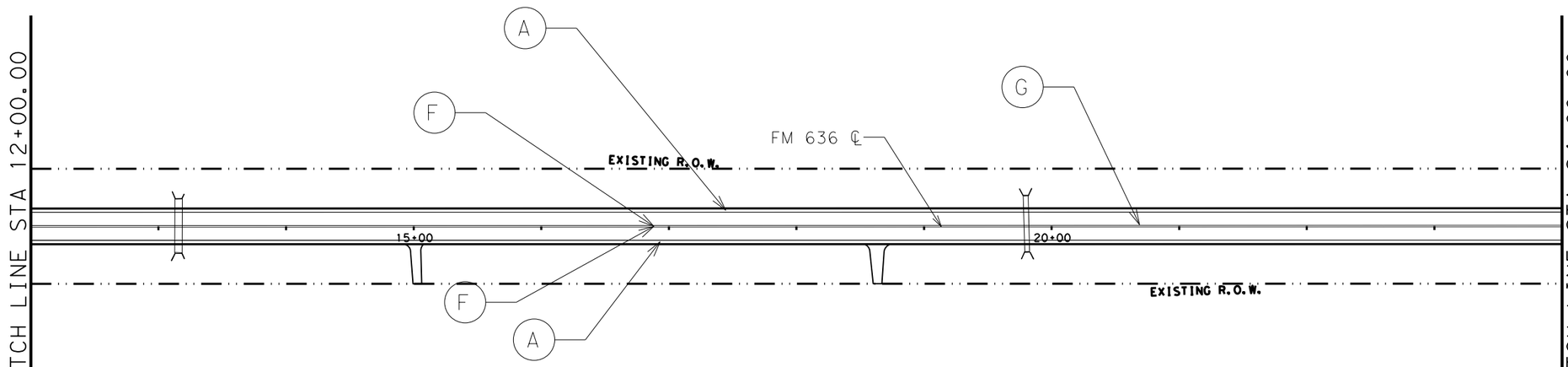
TYPICAL SIGN REQUIREMENTS

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	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	230

5





BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			BEGINNING TO STA 24+00.00

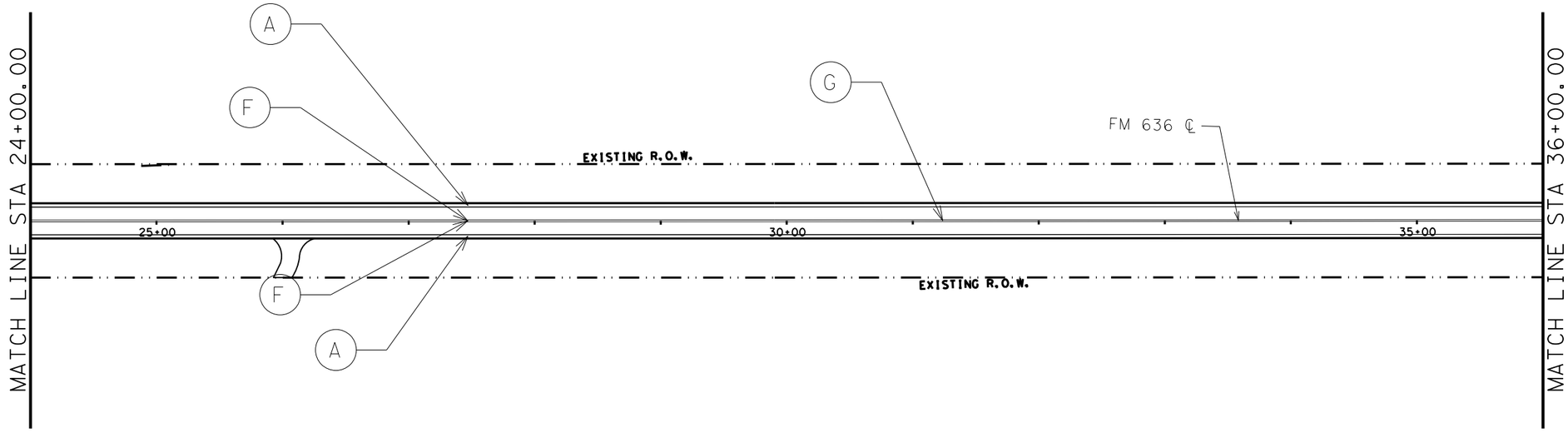
STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

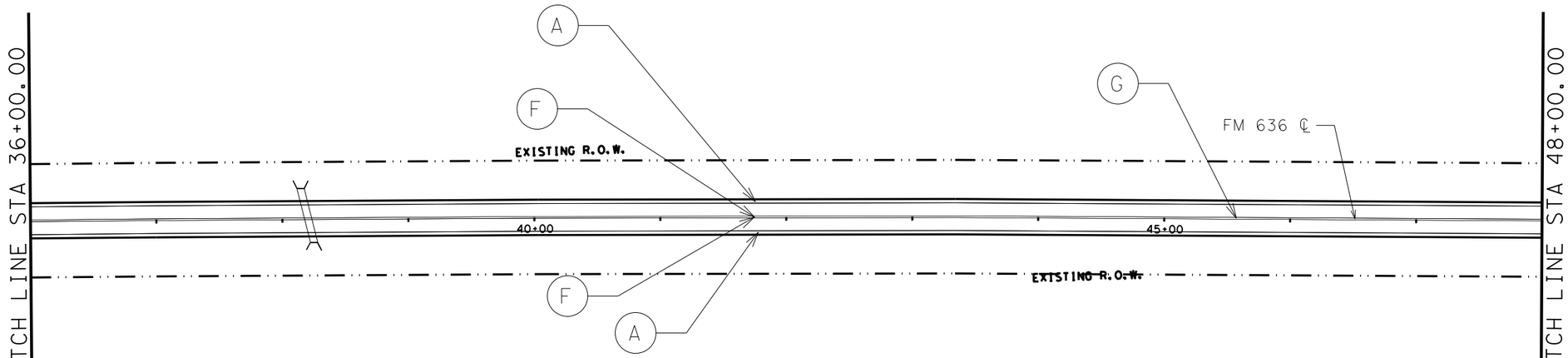
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		231



PAVEMENT MARKING LEGEND	
(A)	REFL PAV MRK (W) 4" (SLD)
(B)	REFL PAV MRKR (W) 6" (SLD)
(C)	REFL PAV MRKR (W) 12" (SLD)
(D)	REFL PAV MRK (W) 24" (SLD)
(E)	REFL PAV MRK (Y) 4" (BRK)
(F)	REFL PAV MRK (Y) 4" (SLD)
(G)	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			STA 24+00.00 TO STA 48+00.00

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 2 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		232

DN: CK: DW: CK:

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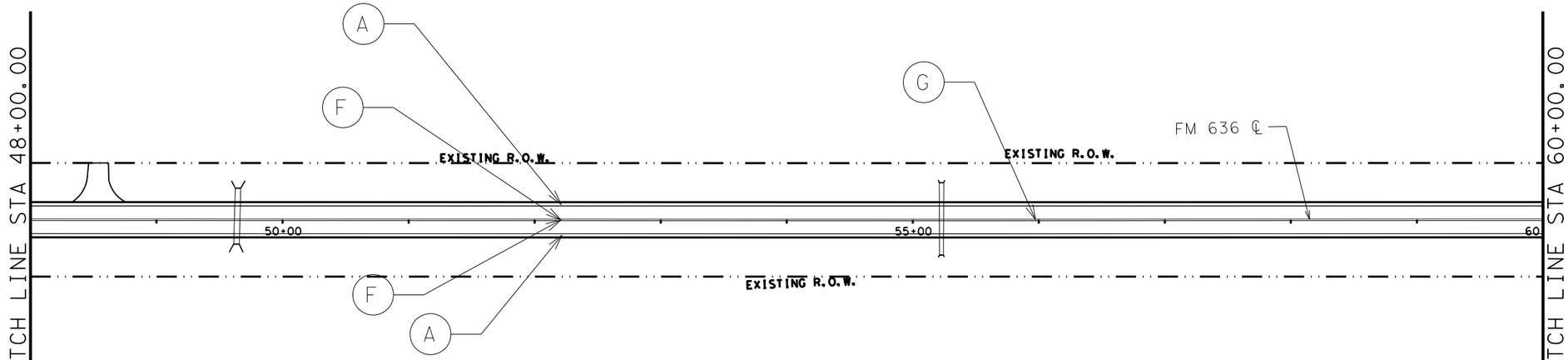


BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			STA 48+00.00 TO STA 72+00.00

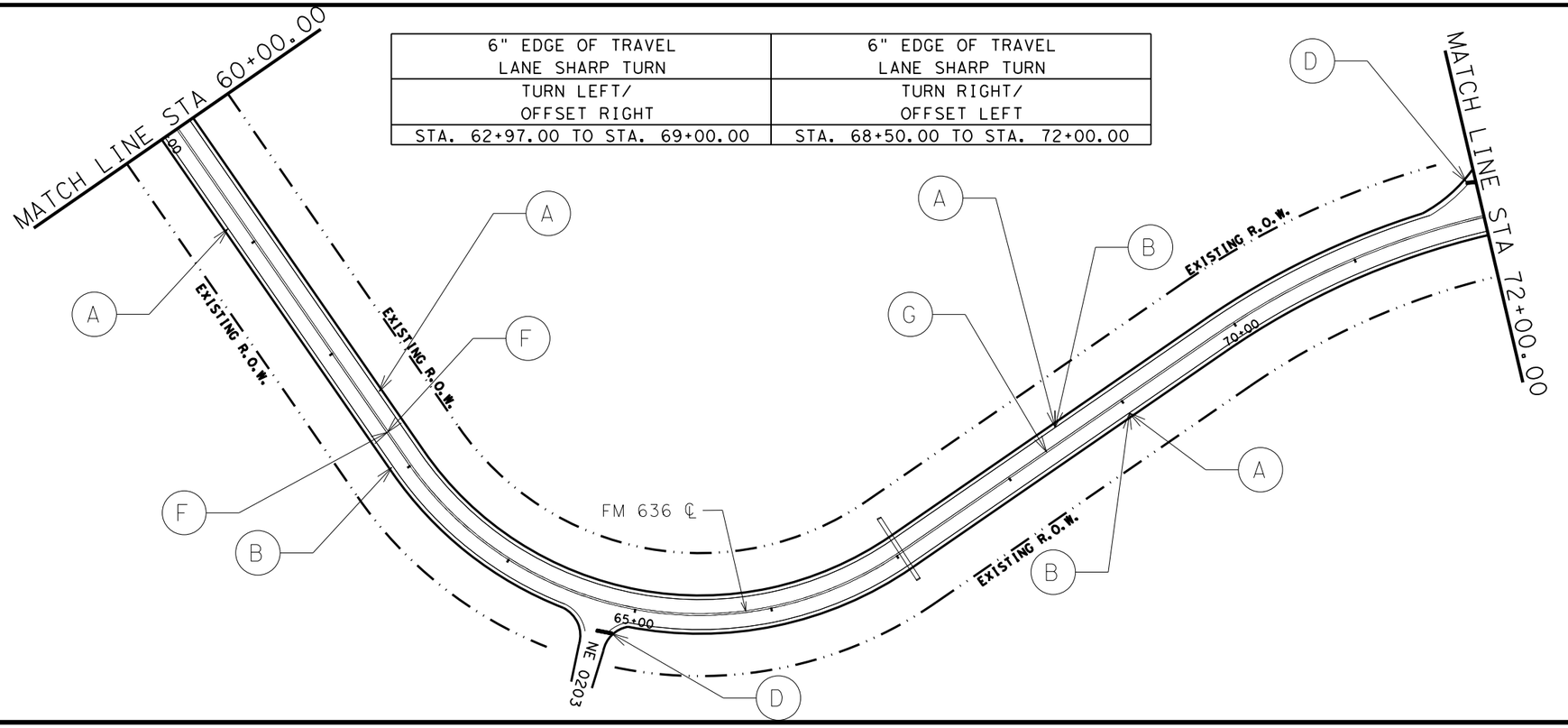
N

PAVEMENT MARKING LEGEND

- (A) REFL PAV MRK (W) 4" (SLD)
- (B) REFL PAV MRKR (W) 6" (SLD)
- (C) REFL PAV MRKR (W) 12" (SLD)
- (D) REFL PAV MRK (W) 24" (SLD)
- (E) REFL PAV MRK (Y) 4" (BRK)
- (F) REFL PAV MRK (Y) 4" (SLD)
- (G) REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET

6" EDGE OF TRAVEL LANE SHARP TURN	6" EDGE OF TRAVEL LANE SHARP TURN
TURN LEFT/ OFFSET RIGHT	TURN RIGHT/ OFFSET LEFT
STA. 62+97.00 TO STA. 69+00.00	STA. 68+50.00 TO STA. 72+00.00



N

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 3 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		233

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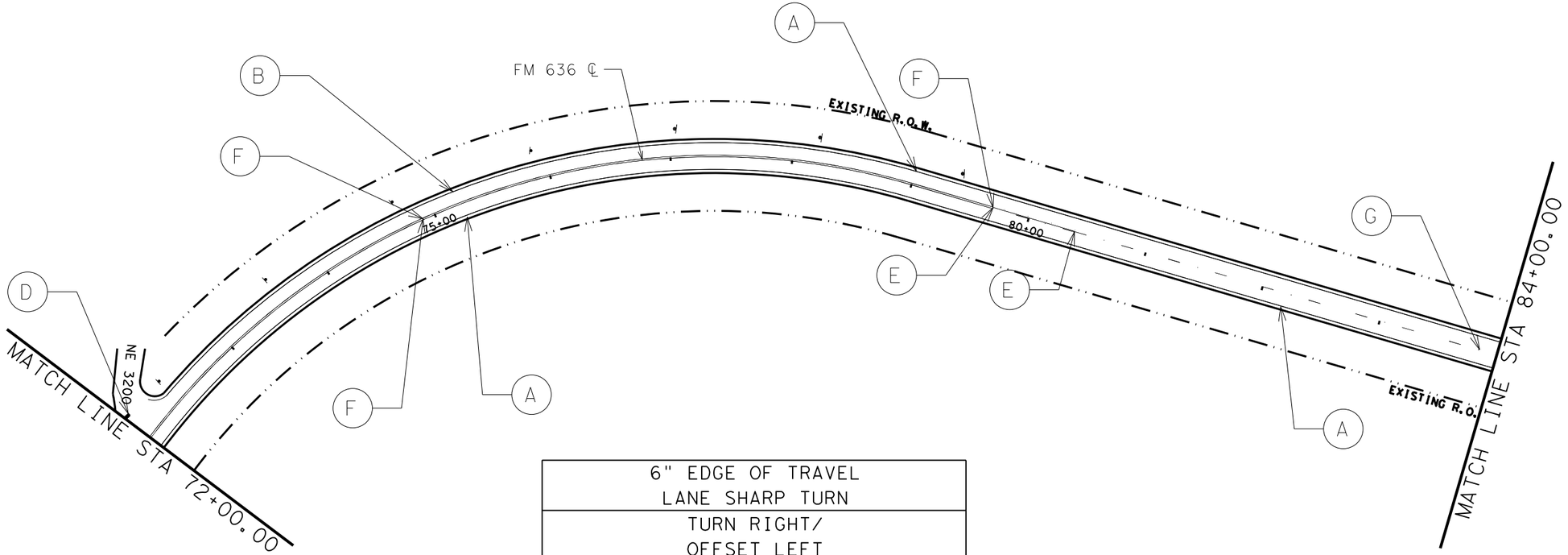
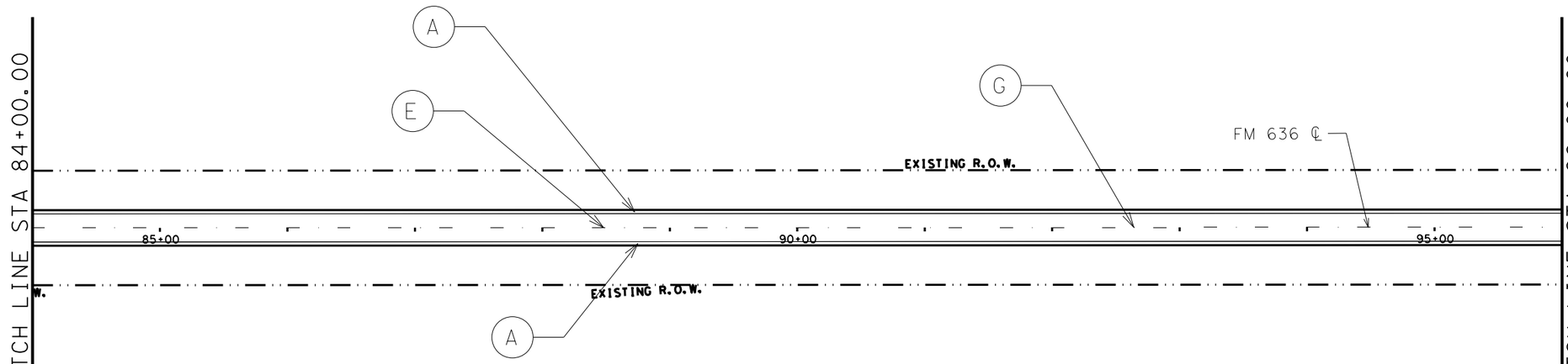


6" EDGE OF TRAVEL LANE SHARP TURN
TURN RIGHT/ OFFSET LEFT
STA. 72+00.00 TO STA. 79+01.00

PAVEMENT MARKING LEGEND	
(A)	REFL PAV MRK (W) 4" (SLD)
(B)	REFL PAV MRKR (W) 6" (SLD)
(C)	REFL PAV MRKR (W) 12" (SLD)
(D)	REFL PAV MRK (W) 24" (SLD)
(E)	REFL PAV MRK (Y) 4" (BRK)
(F)	REFL PAV MRK (Y) 4" (SLD)
(G)	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 80+39 TO STA 96+00	STA 79+69 TO STA 80+39		STA 72+00 TO STA 79+69

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 4 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		234

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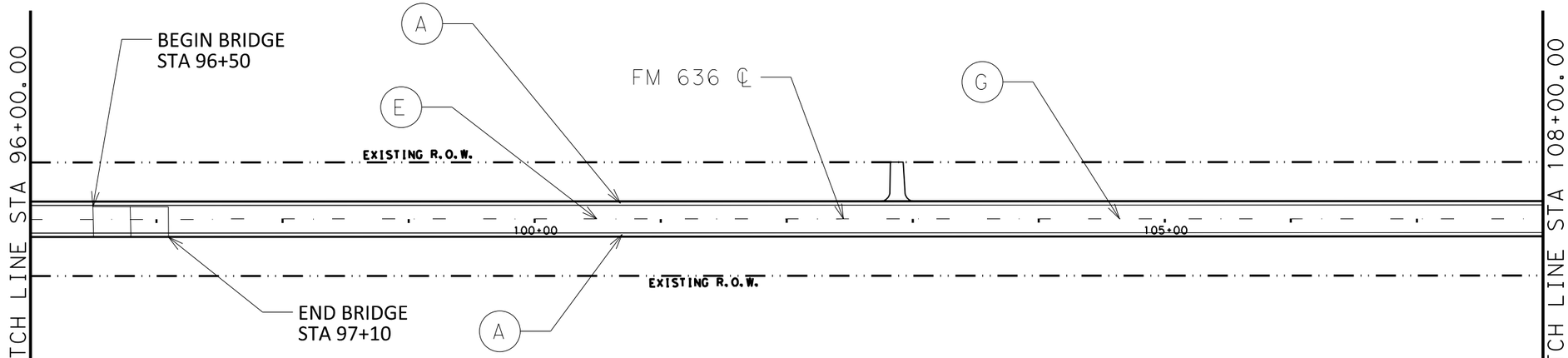
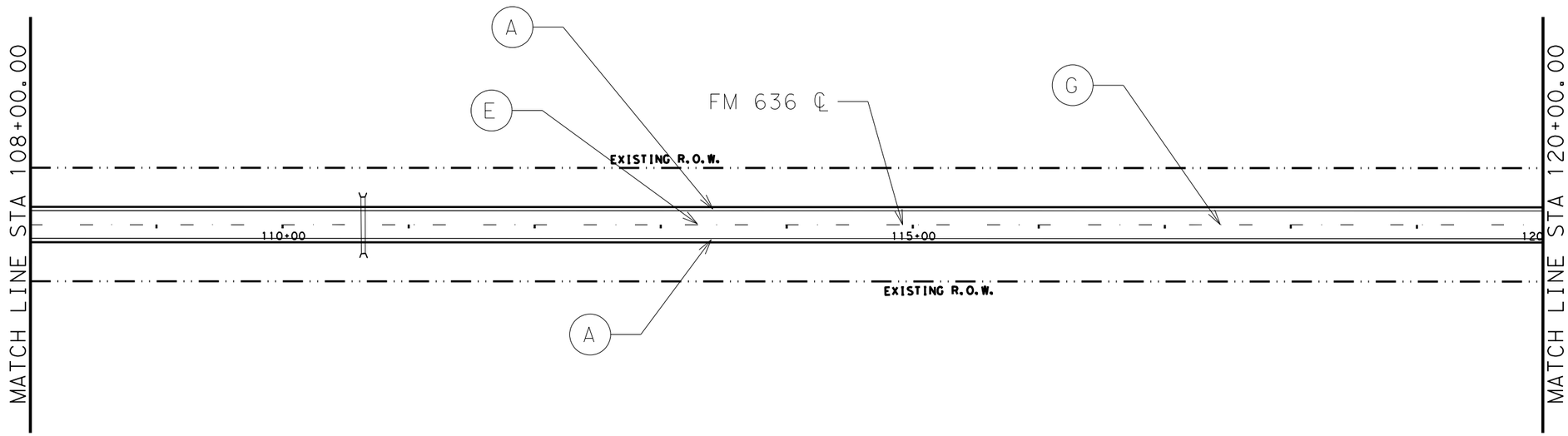


PAVEMENT MARKING LEGEND	
(A)	REFL PAV MRK (W) 4" (SLD)
(B)	REFL PAV MRKR (W) 6" (SLD)
(C)	REFL PAV MRKR (W) 12" (SLD)
(D)	REFL PAV MRK (W) 24" (SLD)
(E)	REFL PAV MRK (Y) 4" (BRK)
(F)	REFL PAV MRK (Y) 4" (SLD)
(G)	REFL PAV MRKR TY II-A-A

BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 96+00 TO STA 120+00			

0 50 100
SCALE IN FEET



STATE OF TEXAS
AMANDA MCKITTRICK
129352
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PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 5 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		235

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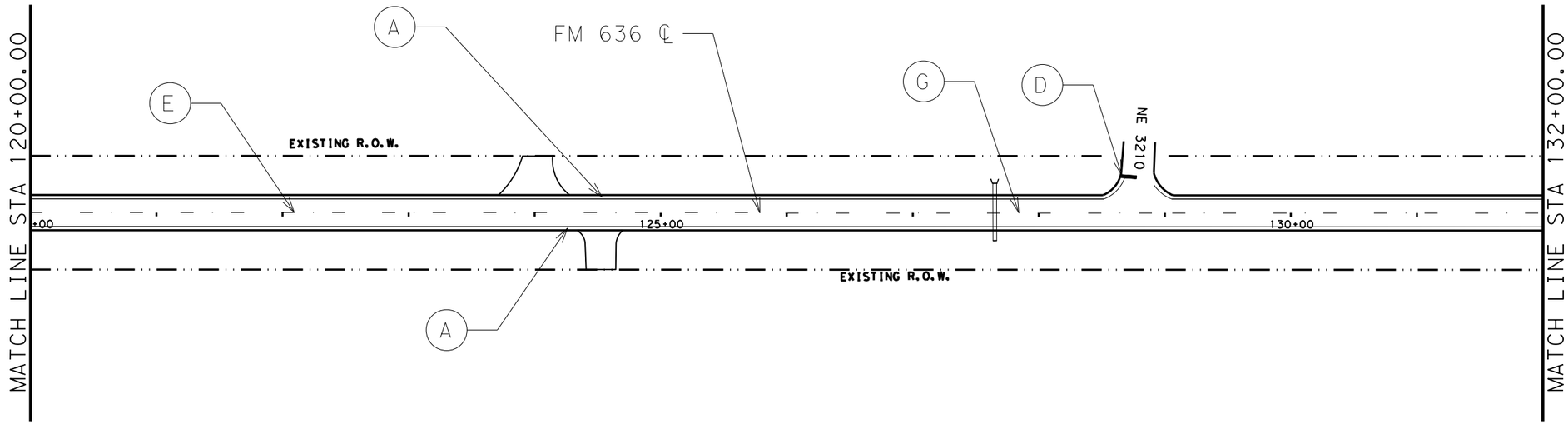
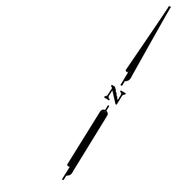
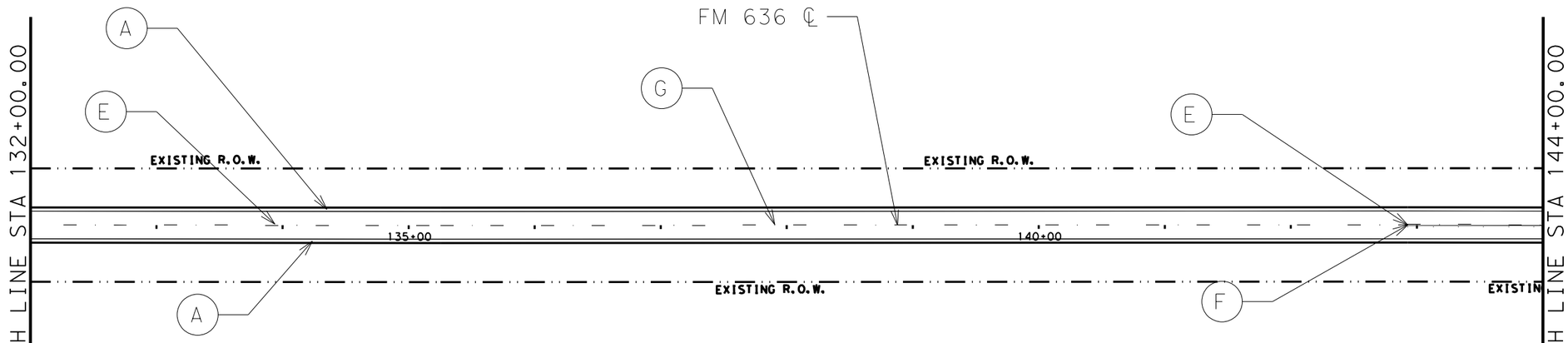
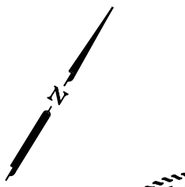




PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET





BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 120+00 TO STA 142+93		STA 142+93 TO STA 144+00	

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 6 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		236

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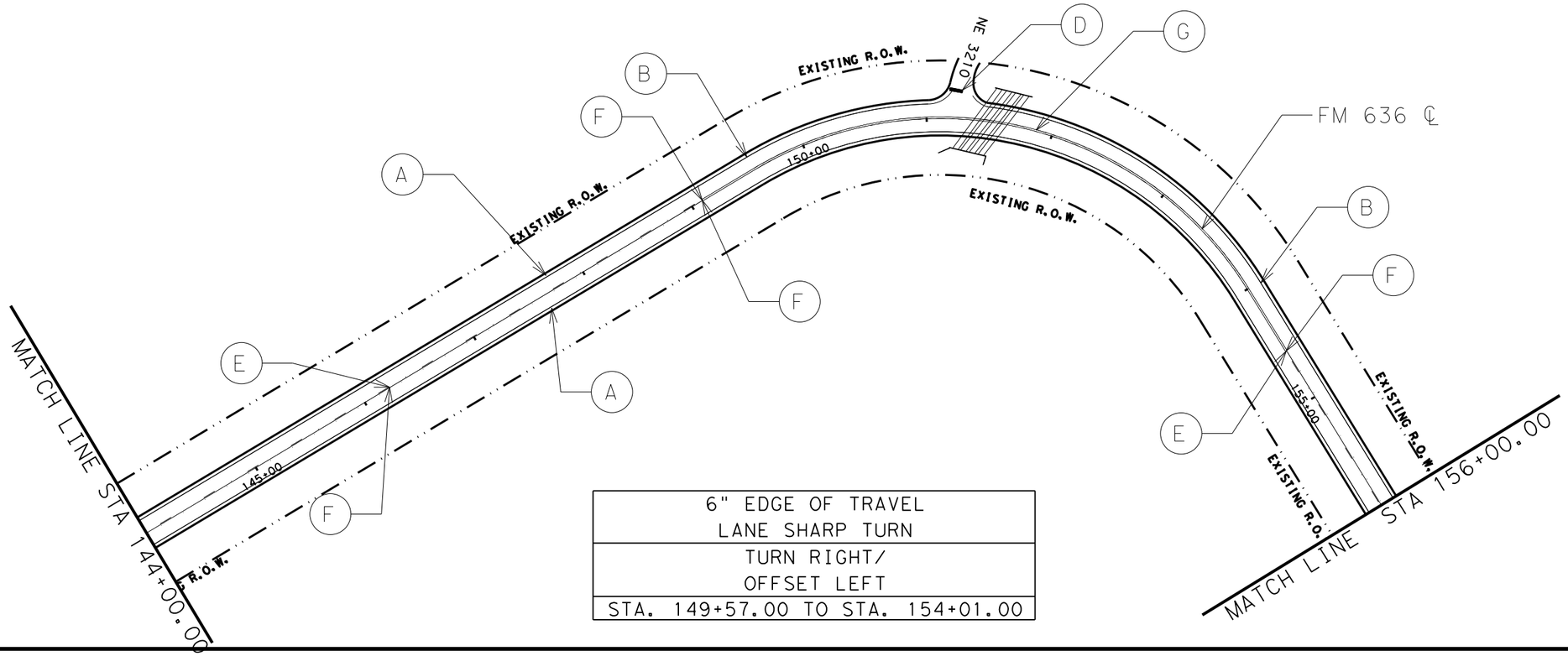
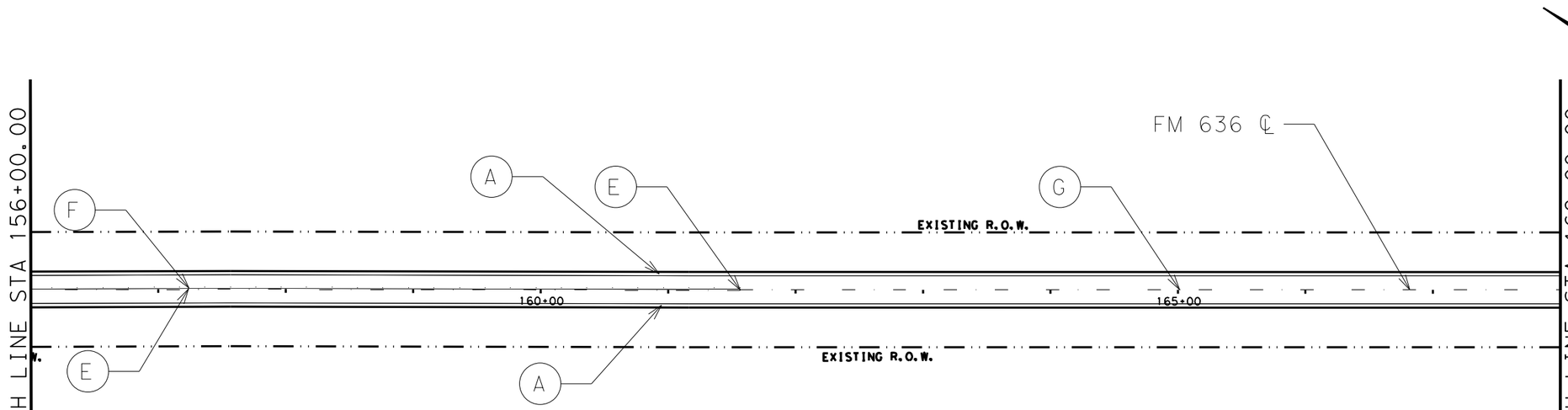


PAVEMENT MARKING LEGEND
(A) REFL PAV MRK (W) 4" (SLD)
(B) REFL PAV MRKR (W) 6" (SLD)
(C) REFL PAV MRKR (W) 12" (SLD)
(D) REFL PAV MRK (W) 24" (SLD)
(E) REFL PAV MRK (Y) 4" (BRK)
(F) REFL PAV MRK (Y) 4" (SLD)
(G) REFL PAV MRKR TY II-A-A

6" EDGE OF TRAVEL LANE SHARP TURN
TURN RIGHT/ OFFSET LEFT
STA. 149+57.00 TO STA. 154+01.00

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 161+56 TO STA 168+00	STA 154+58 TO STA 161+56	STA 144+00 TO STA 149+09	STA 149+09 TO STA 154+58

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 7 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		237

DATE: 01/06/2021 12:24 PM
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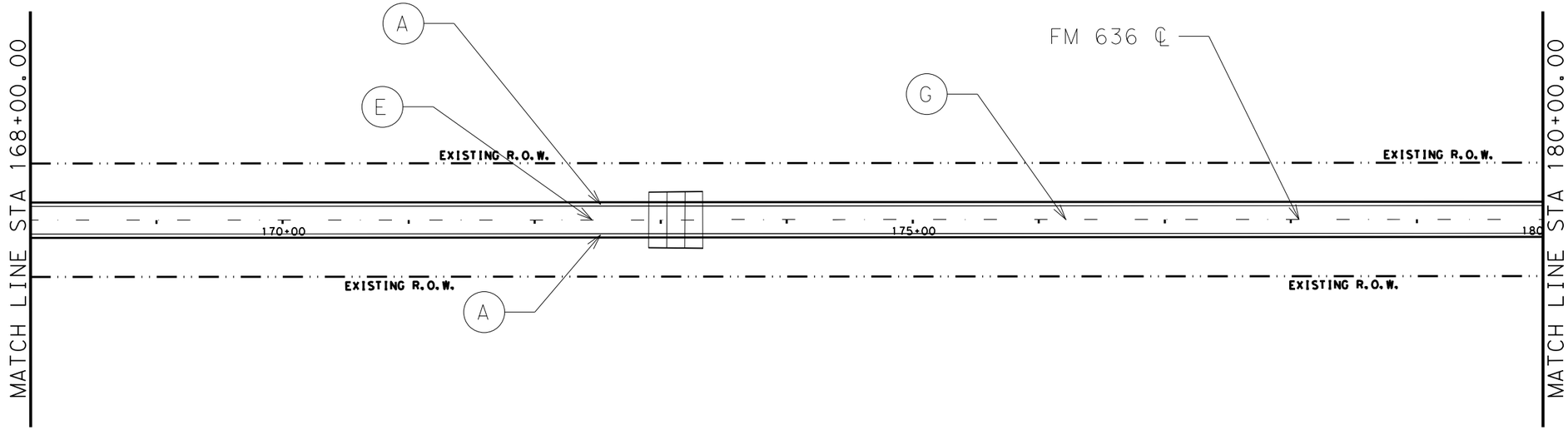
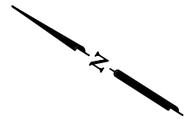
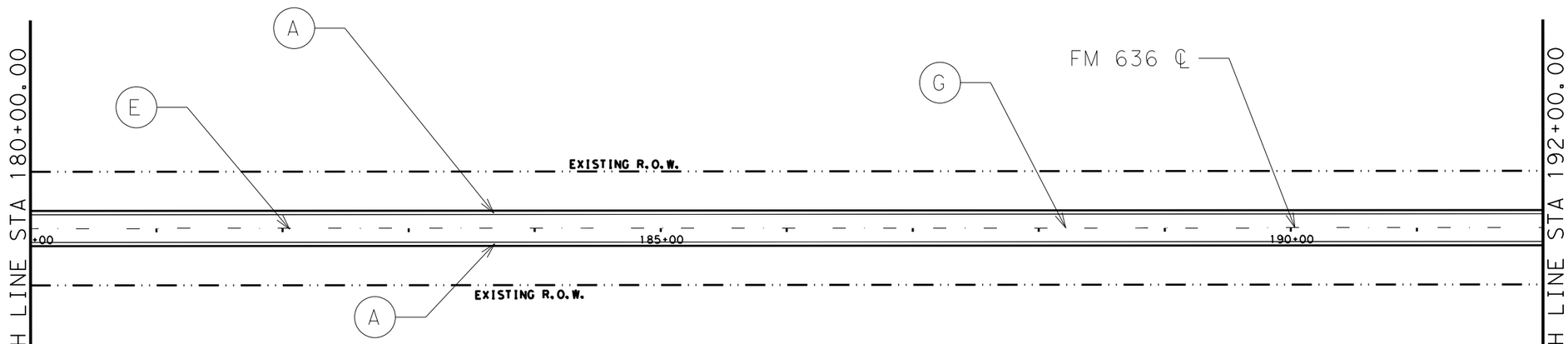
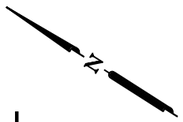




PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET





BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 168+00 TO STA 192+00			

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 8 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		238

DATE: 07/30/2021 10:45:29 AM
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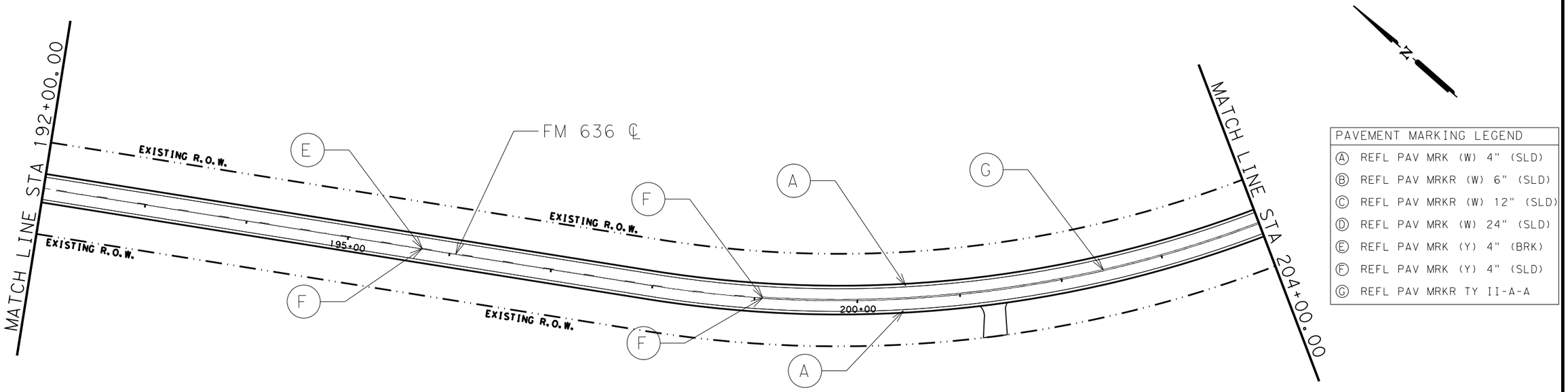
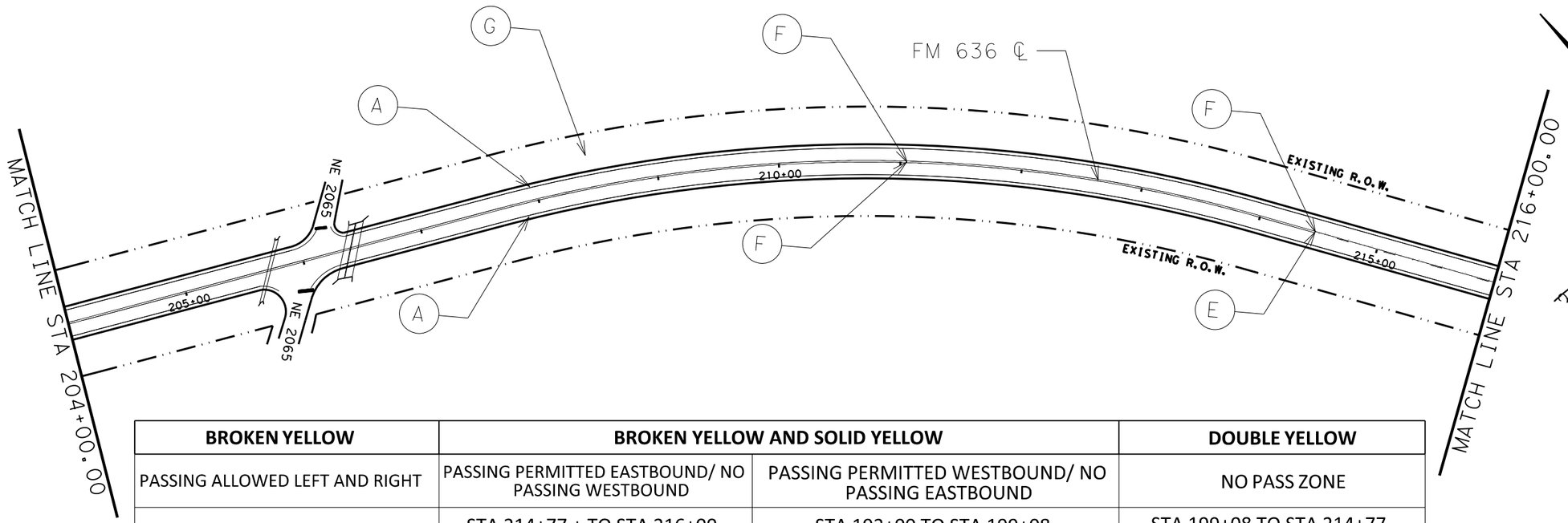


PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
	STA 214+77 + TO STA 216+00	STA 192+00 TO STA 199+08	STA 199+08 TO STA 214+77

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 9 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		239

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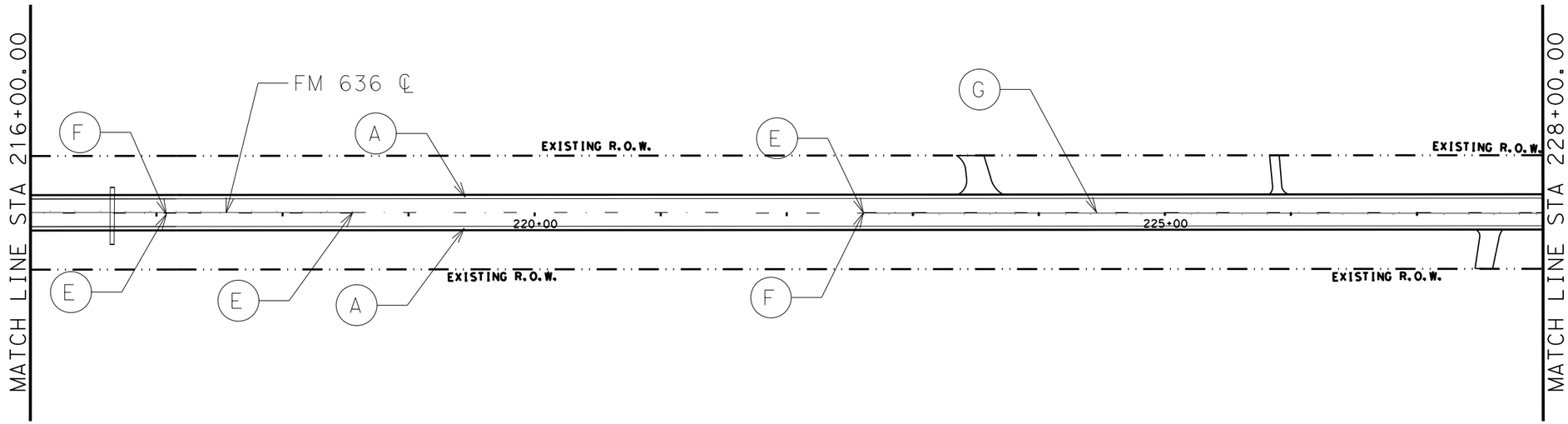
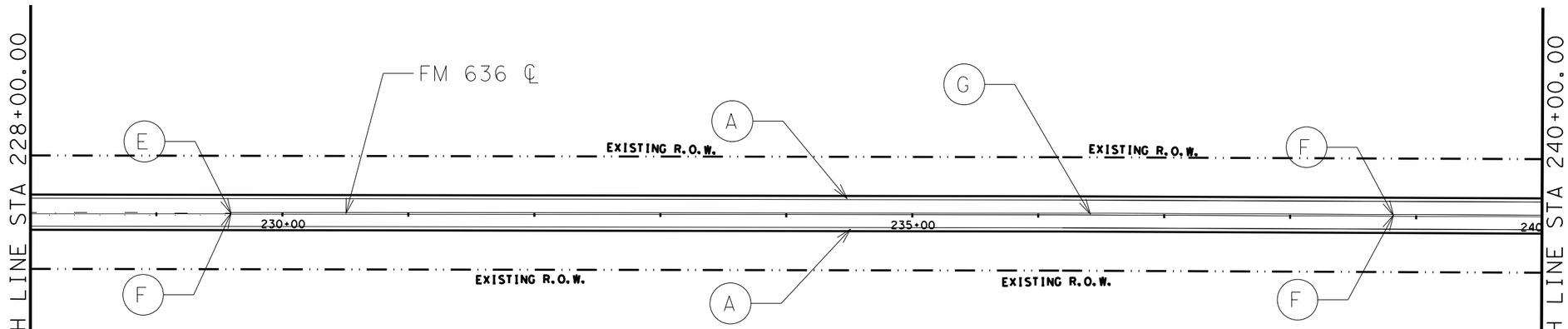
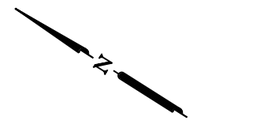


PAVEMENT MARKING LEGEND	
(A)	REFL PAV MRK (W) 4" (SLD)
(B)	REFL PAV MRKR (W) 6" (SLD)
(C)	REFL PAV MRKR (W) 12" (SLD)
(D)	REFL PAV MRK (W) 24" (SLD)
(E)	REFL PAV MRK (Y) 4" (BRK)
(F)	REFL PAV MRK (Y) 4" (SLD)
(G)	REFL PAV MRKR TY II-A-A





BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 218+56 TO STA 222+62	STA 216+00 TO STA 218+56	STA 222+62 TO STA 229+59	STA 229+59 TO STA 240+00

Amanda McKittrick, P.E.

FM 636
PAVEMENT MARKINGS

SHEET 10 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		240

DATE: 12/29/2020 10:42 AM
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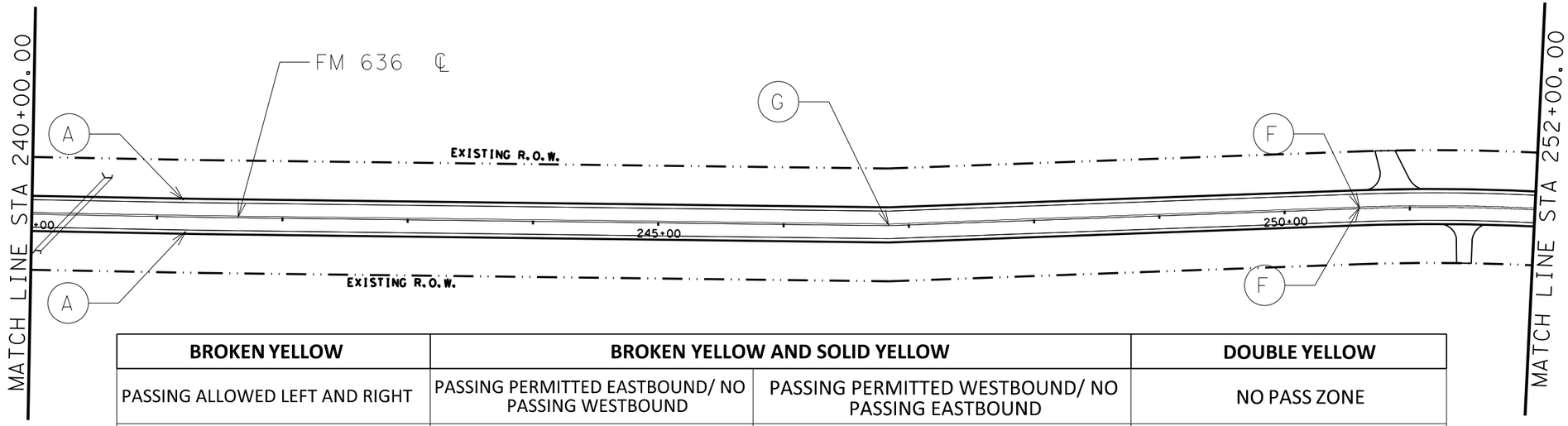
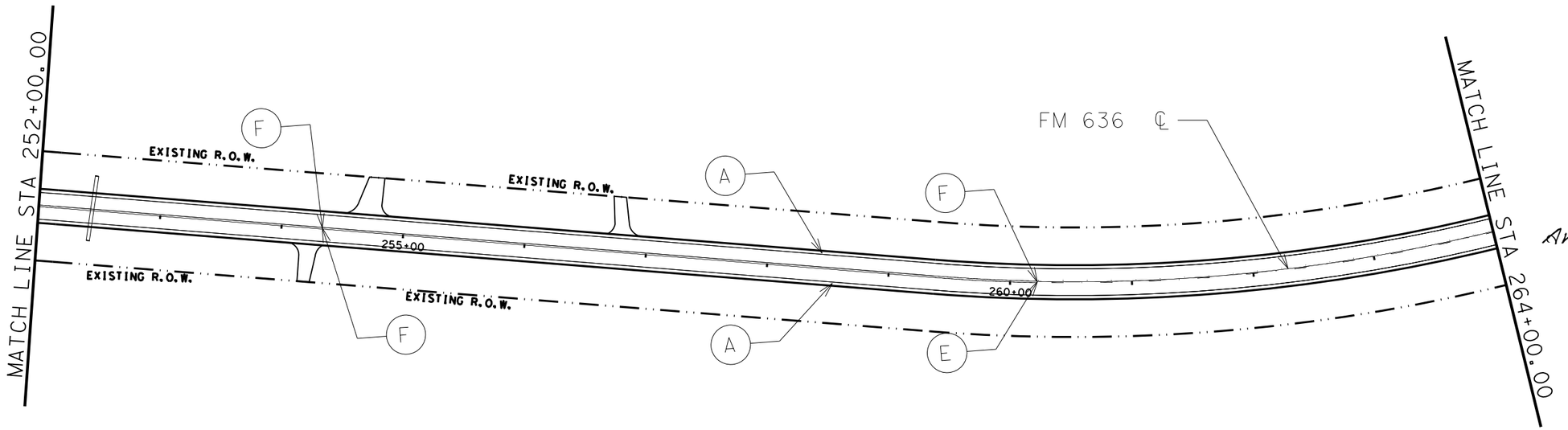


BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
	STA 260+22 TO STA 264+00		STA 240+00 TO STA 260+22

PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



STATE OF TEXAS
AMANDA MCKITTRICK
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PAVEMENT MARKINGS

SHEET 11 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		241

DATE: 01/06/2021 12:37 PM
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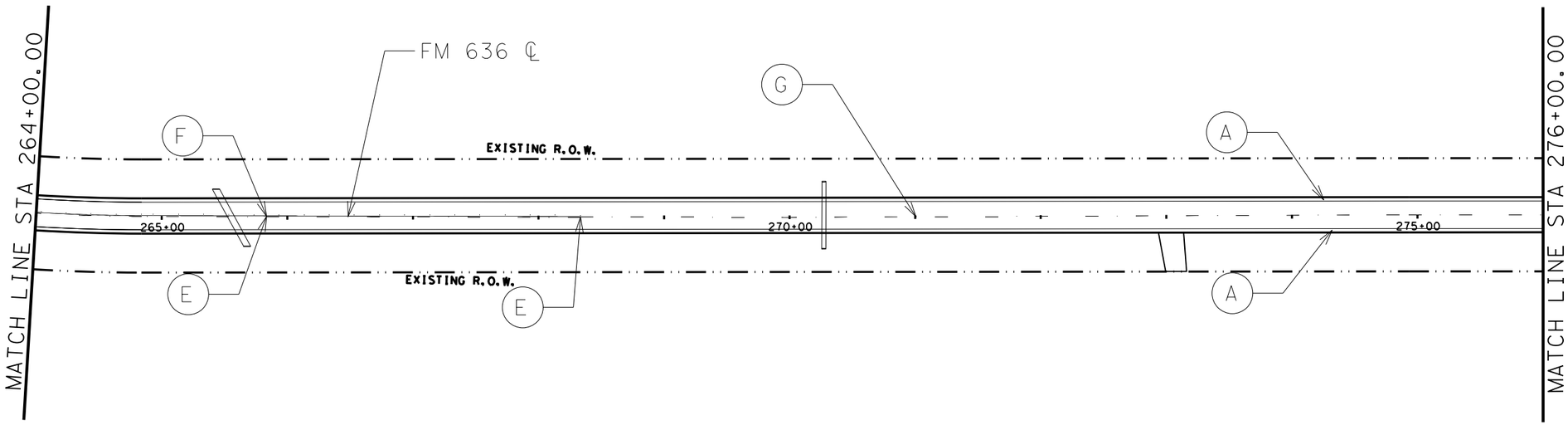

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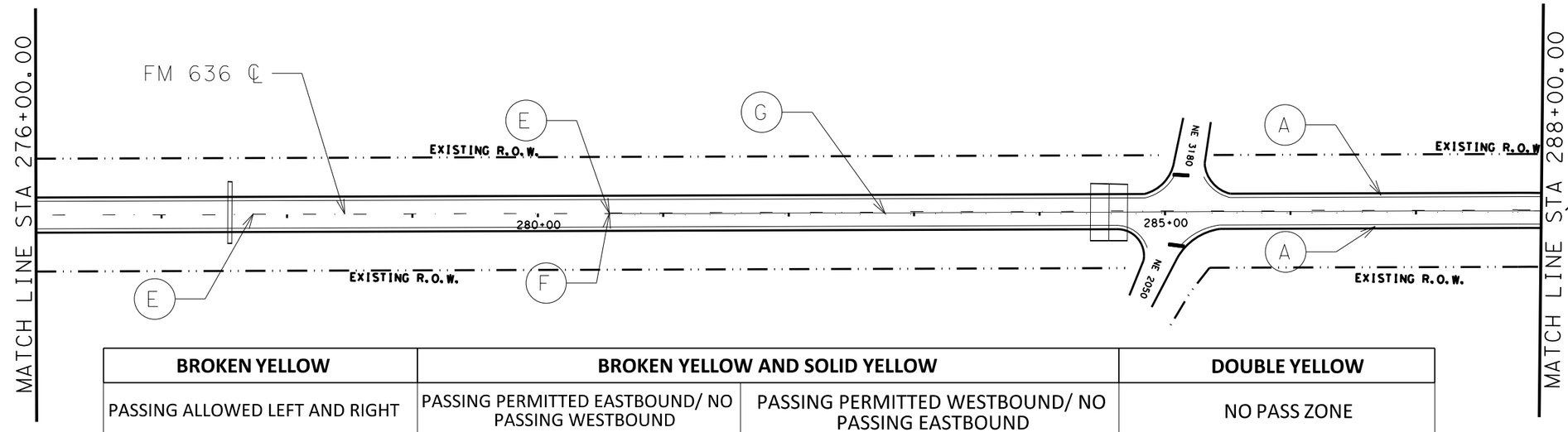
PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



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BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 268+34 TO STA 280+57	STA 264+00 TO STA 268+34	STA 280+57 TO STA 288+00	

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PAVEMENT MARKINGS

SHEET 12 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		242

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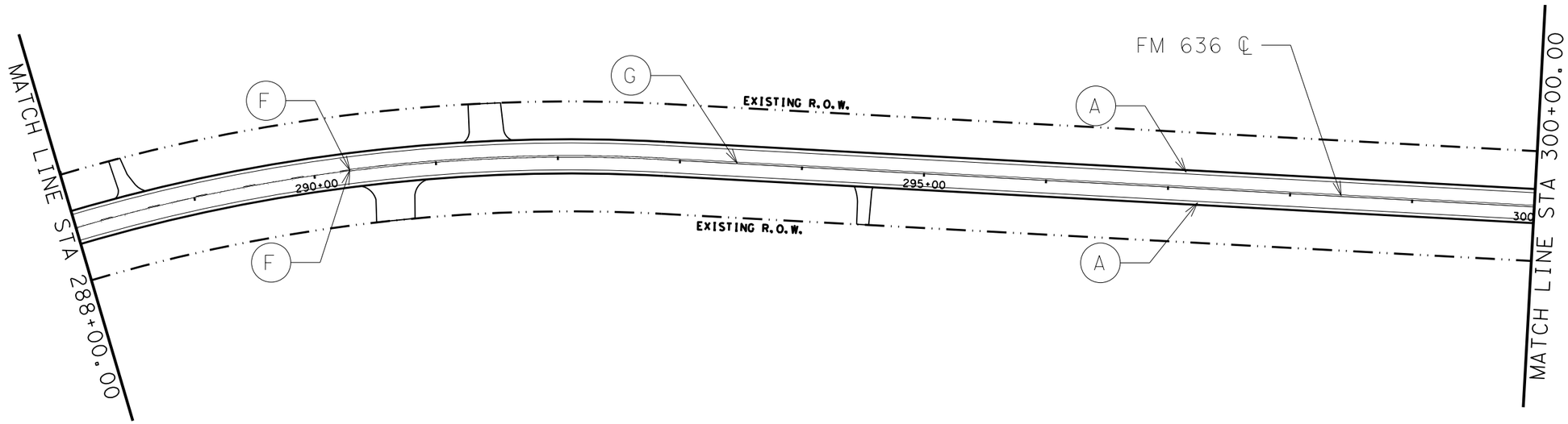
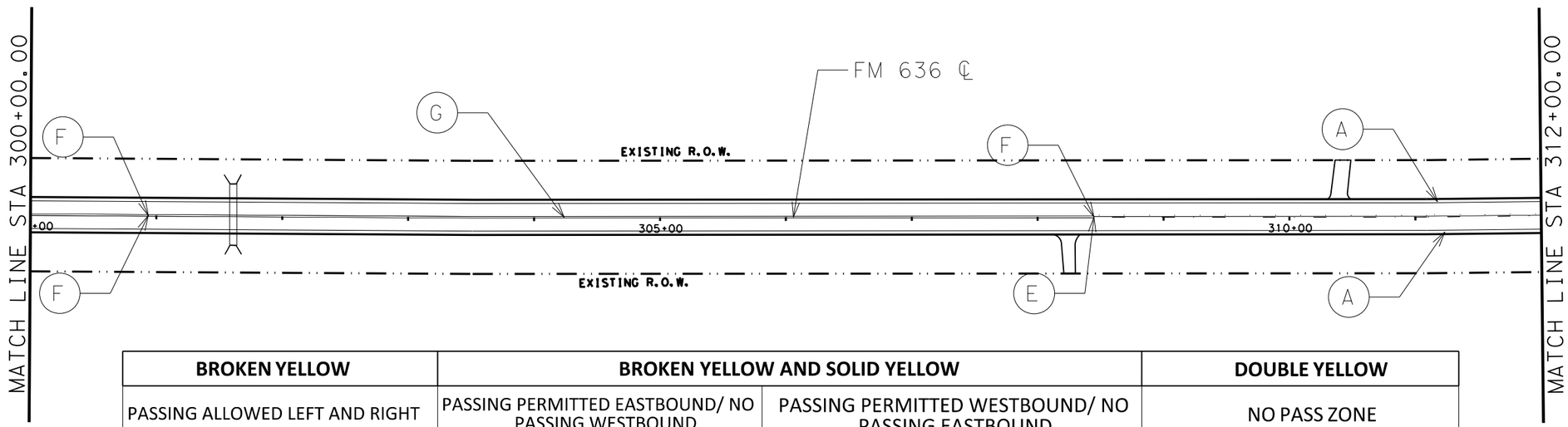


PAVEMENT MARKING LEGEND
Ⓐ REFL PAV MRK (W) 4" (SLD)
Ⓑ REFL PAV MRKR (W) 6" (SLD)
Ⓒ REFL PAV MRKR (W) 12" (SLD)
Ⓓ REFL PAV MRK (W) 24" (SLD)
Ⓔ REFL PAV MRK (Y) 4" (BRK)
Ⓕ REFL PAV MRK (Y) 4" (SLD)
Ⓖ REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
	STA 308+45 TO STA 312+00.00	STA 288+00 TO STA 290+29	STA 290+29 TO STA 308+45

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PAVEMENT MARKINGS

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Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		243

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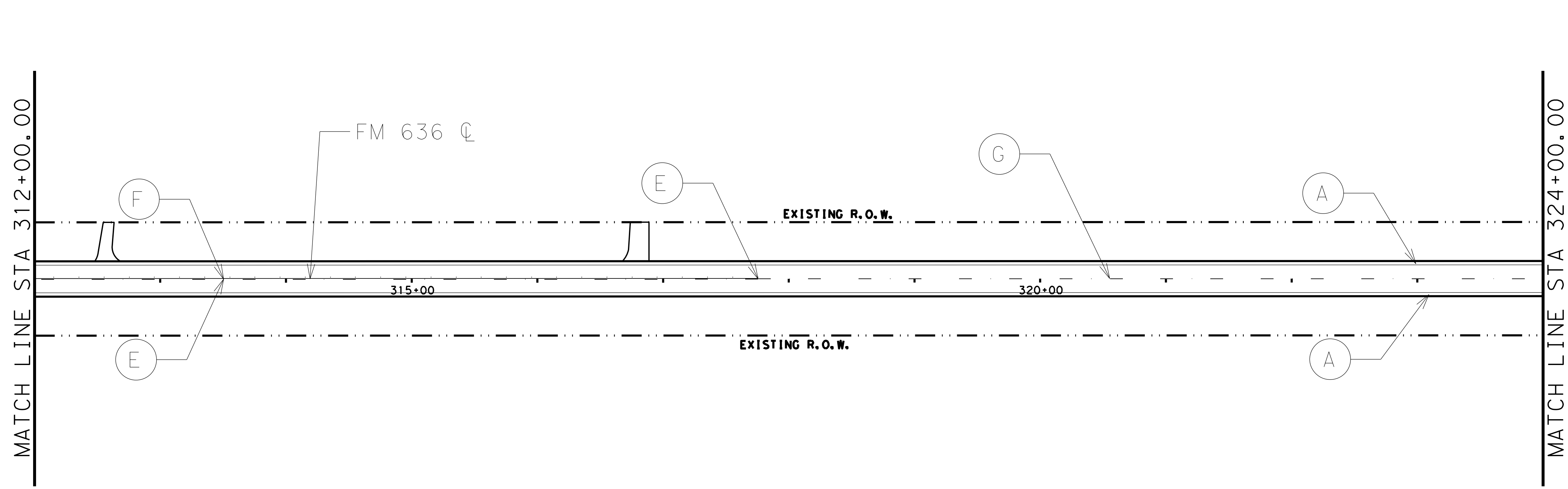
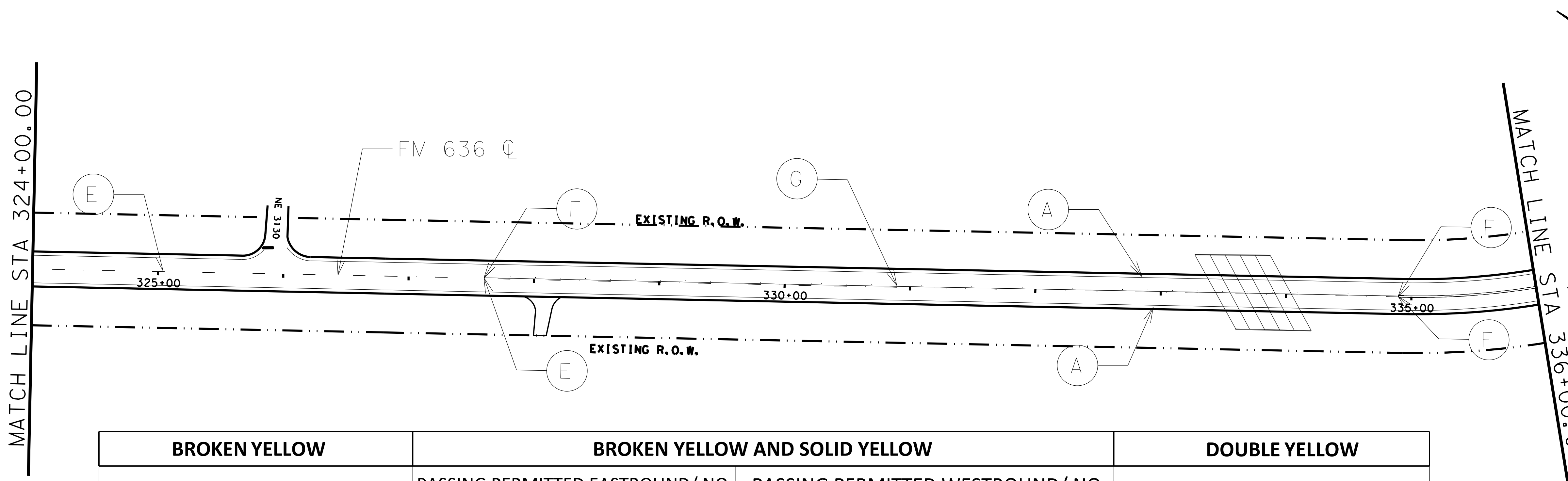


PAVEMENT MARKING LEGEND

- Ⓐ REFL PAV MRK (W) 4" (SLD)
- Ⓑ REFL PAV MRKR (W) 6" (SLD)
- Ⓒ REFL PAV MRKR (W) 12" (SLD)
- Ⓓ REFL PAV MRK (W) 24" (SLD)
- Ⓔ REFL PAV MRK (Y) 4" (BRK)
- Ⓕ REFL PAV MRK (Y) 4" (SLD)
- Ⓖ REFL PAV MRKR TY II-A-A



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PAVEMENT MARKINGS

BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
STA 317+76 TO STA 327+60	STA 312+00 TO STA 317+76		STA 334+90 TO STA 336+00
	STA 327+60 TO STA 334+90		

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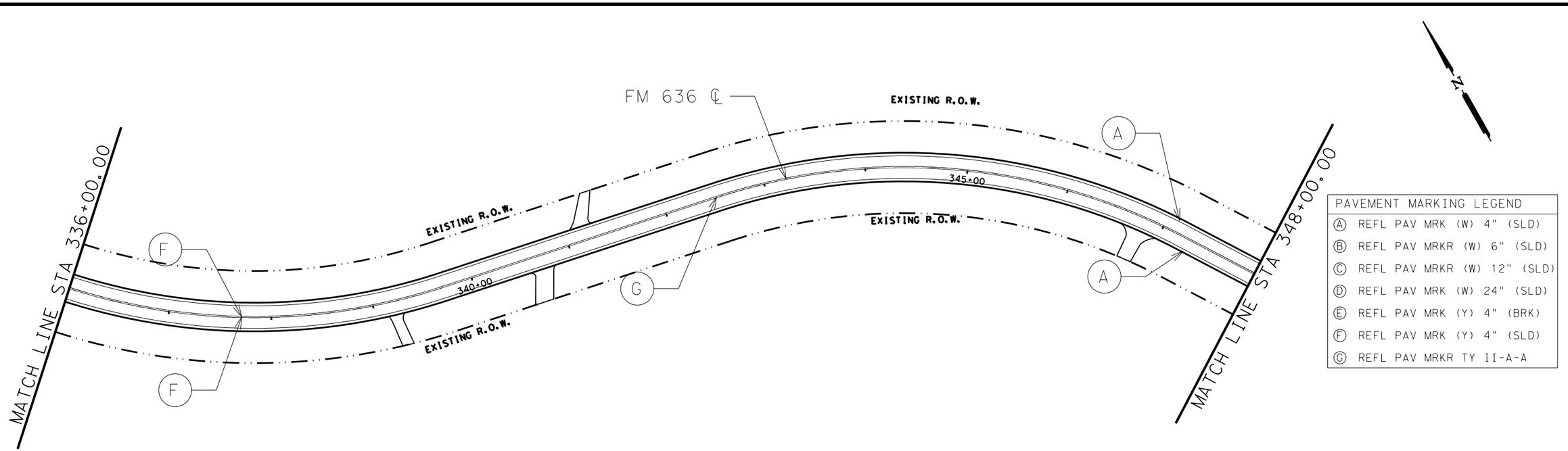
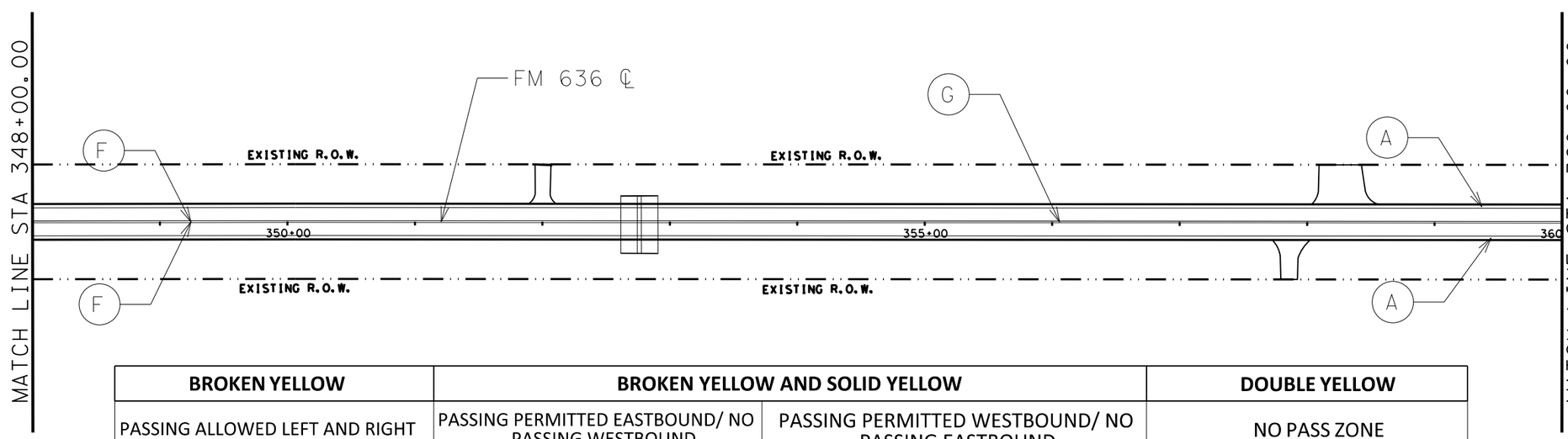
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST		COUNTY	SHEET NO.
DAL		NAVARRO	244



PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			STA 336+00 TO STA 360+00

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PAVEMENT MARKINGS

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CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		245

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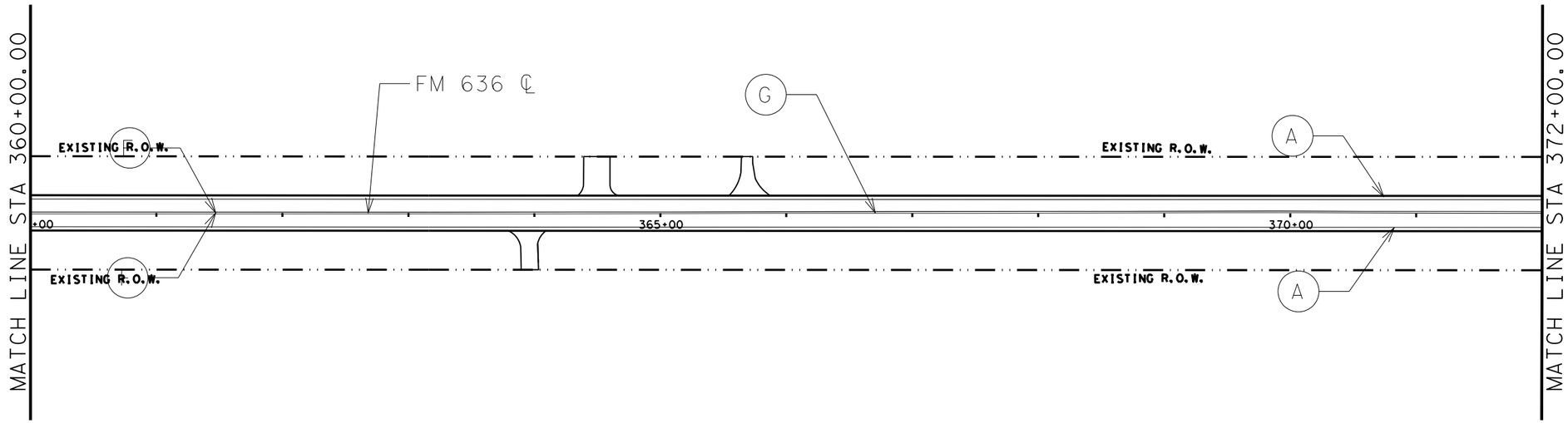
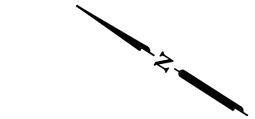
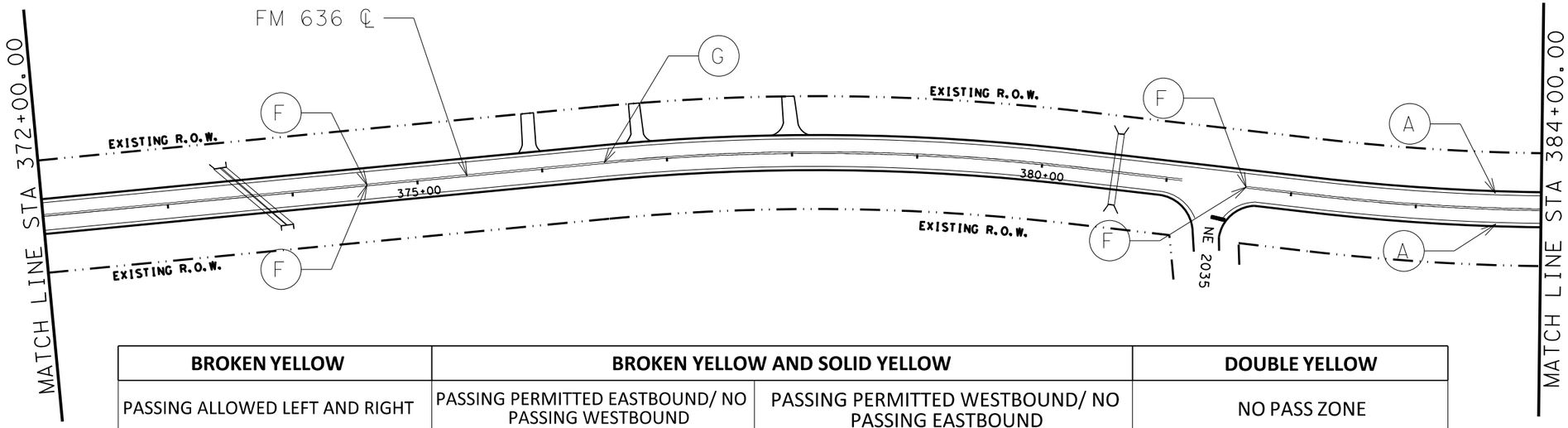




PAVEMENT MARKING LEGEND
(A) REFL PAV MRK (W) 4" (SLD)
(B) REFL PAV MRKR (W) 6" (SLD)
(C) REFL PAV MRKR (W) 12" (SLD)
(D) REFL PAV MRK (W) 24" (SLD)
(E) REFL PAV MRK (Y) 4" (BRK)
(F) REFL PAV MRK (Y) 4" (SLD)
(G) REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			STA 360+00 TO STA 381+12
			STA 381+64 TO STA 384+00

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PAVEMENT MARKINGS

SHEET 16 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		246

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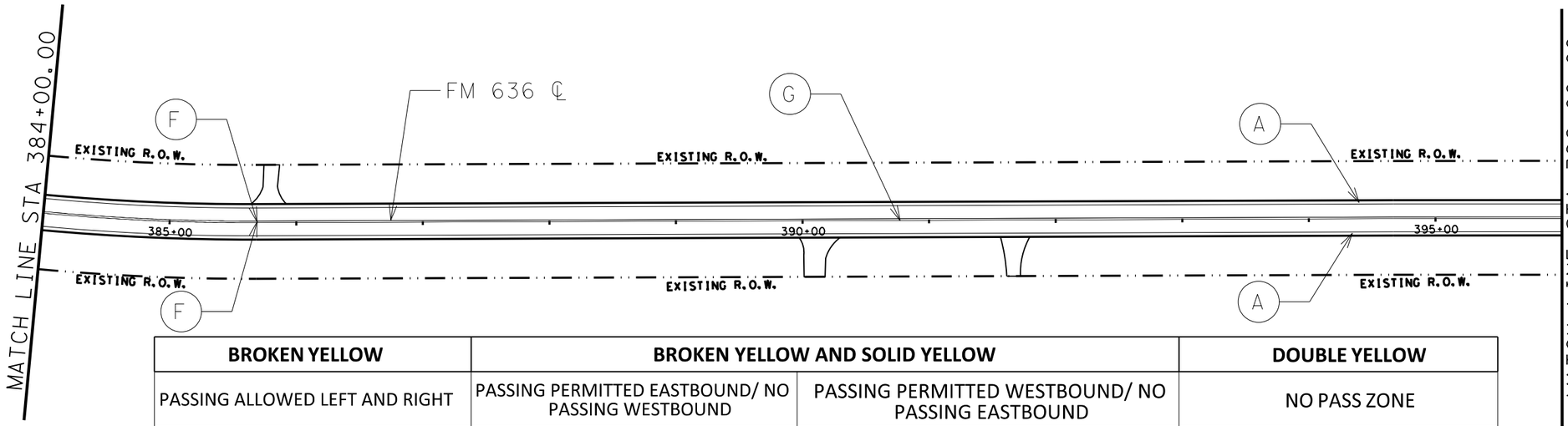


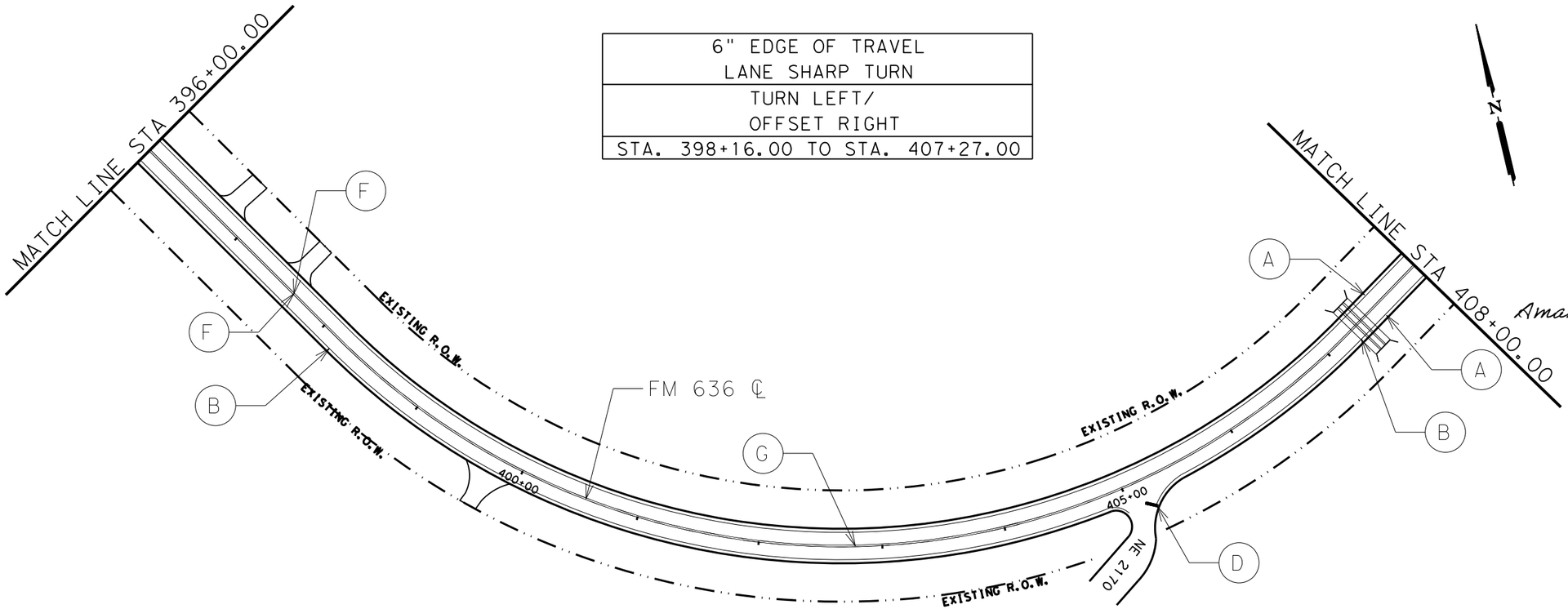
BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
			STA 384+00 TO STA 408+00

N

PAVEMENT MARKING LEGEND
(A) REFL PAV MRK (W) 4" (SLD)
(B) REFL PAV MRKR (W) 6" (SLD)
(C) REFL PAV MRKR (W) 12" (SLD)
(D) REFL PAV MRK (W) 24" (SLD)
(E) REFL PAV MRK (Y) 4" (BRK)
(F) REFL PAV MRK (Y) 4" (SLD)
(G) REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET

6" EDGE OF TRAVEL LANE SHARP TURN
TURN LEFT/ OFFSET RIGHT
STA. 398+16.00 TO STA. 407+27.00



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PAVEMENT MARKINGS

SHEET 17 OF 19

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		247

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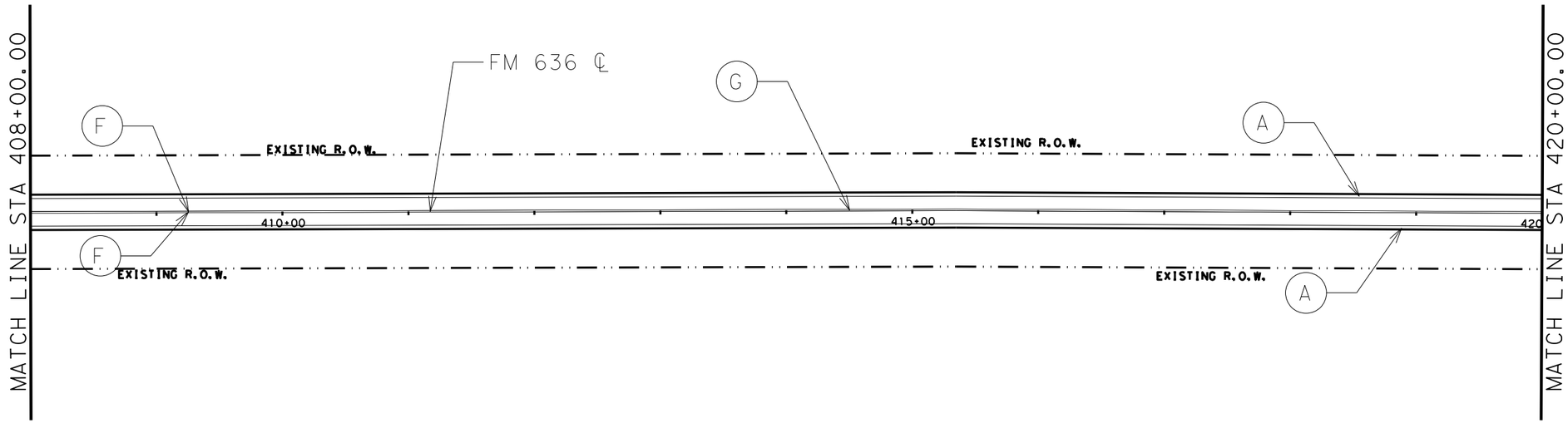
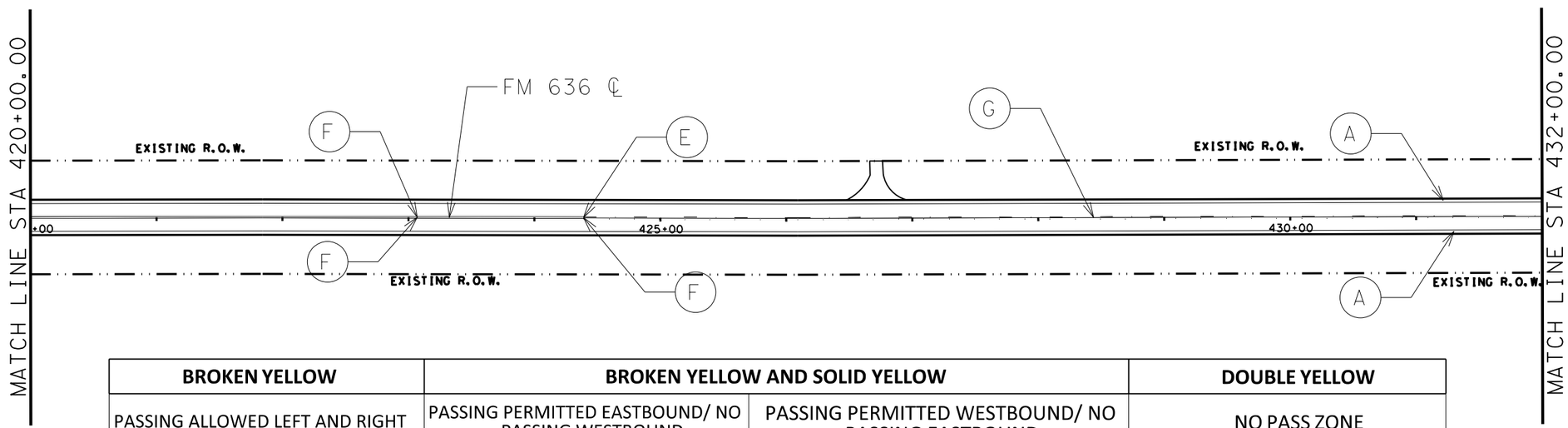


PAVEMENT MARKING LEGEND	
(A)	REFL PAV MRK (W) 4" (SLD)
(B)	REFL PAV MRKR (W) 6" (SLD)
(C)	REFL PAV MRKR (W) 12" (SLD)
(D)	REFL PAV MRK (W) 24" (SLD)
(E)	REFL PAV MRK (Y) 4" (BRK)
(F)	REFL PAV MRK (Y) 4" (SLD)
(G)	REFL PAV MRKR TY II-A-A

0 50 100
SCALE IN FEET



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
		STA 424+39 TO STA 432+00	STA 408+00 TO STA 424+39

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PAVEMENT MARKINGS

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Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		248

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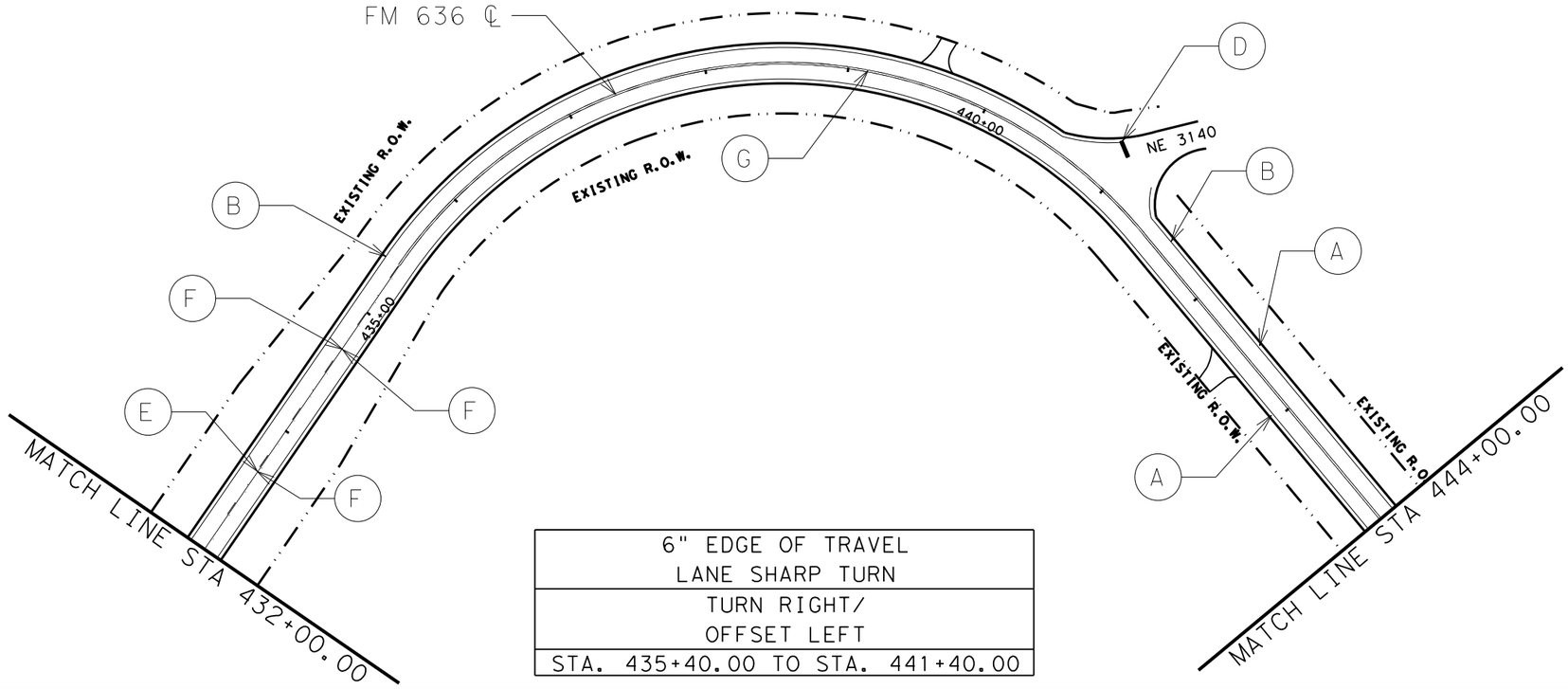
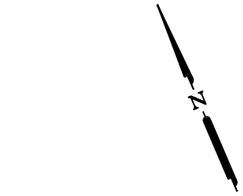
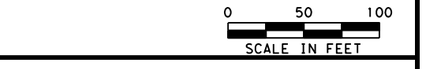


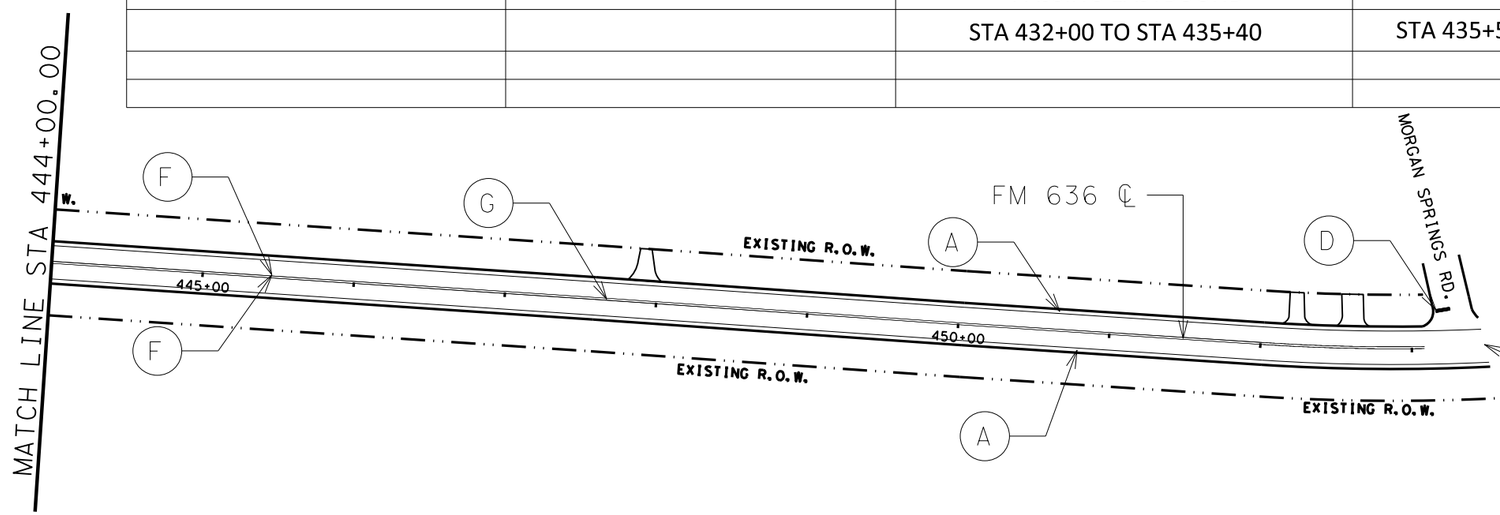
6" EDGE OF TRAVEL LANE SHARP TURN
TURN RIGHT/ OFFSET LEFT
STA. 435+40.00 TO STA. 441+40.00

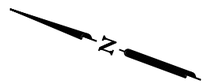


PAVEMENT MARKING LEGEND	
Ⓐ	REFL PAV MRK (W) 4" (SLD)
Ⓑ	REFL PAV MRKR (W) 6" (SLD)
Ⓒ	REFL PAV MRKR (W) 12" (SLD)
Ⓓ	REFL PAV MRK (W) 24" (SLD)
Ⓔ	REFL PAV MRK (Y) 4" (BRK)
Ⓕ	REFL PAV MRK (Y) 4" (SLD)
Ⓖ	REFL PAV MRKR TY II-A-A



BROKEN YELLOW	BROKEN YELLOW AND SOLID YELLOW		DOUBLE YELLOW
PASSING ALLOWED LEFT AND RIGHT	PASSING PERMITTED EASTBOUND/ NO PASSING WESTBOUND	PASSING PERMITTED WESTBOUND/ NO PASSING EASTBOUND	NO PASS ZONE
		STA 432+00 TO STA 435+40	STA 435+50 TO STA 453+08





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PAVEMENT MARKINGS

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CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		249

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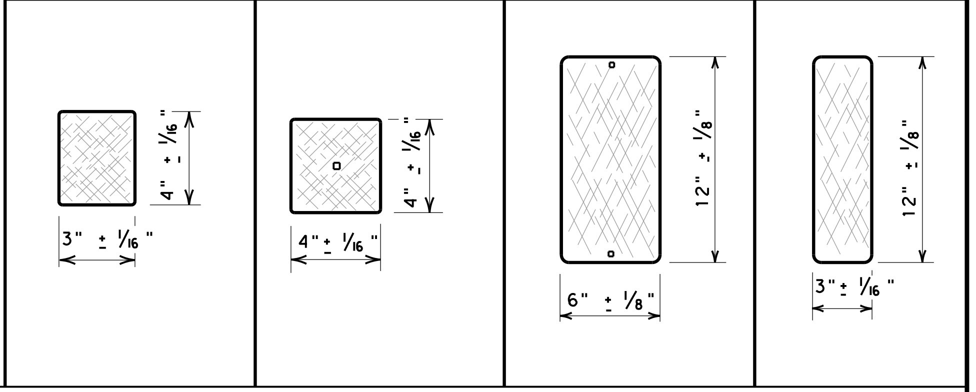
CK:	DW:	CK:	CK:

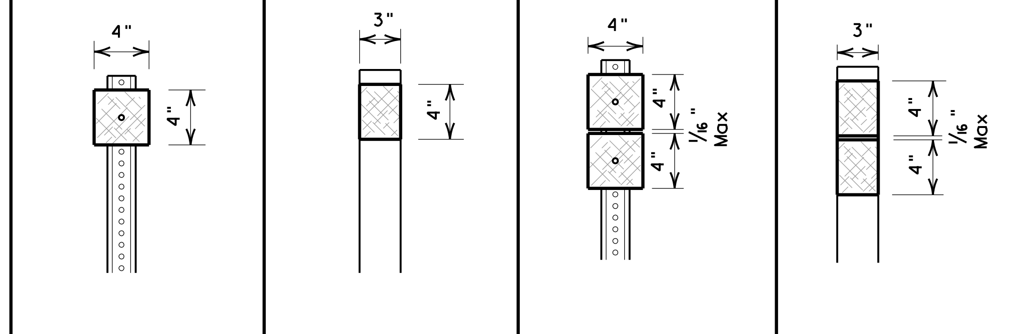
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE	3" ± 1/16" x 4" ± 1/16"	4" ± 1/16" x 4" ± 1/16"	6" ± 1/8" x 12" ± 1/8"	3" ± 1/16" x 12" ± 1/8"
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			



DELINEATORS

	SINGLE		DOUBLE	
DEVICE	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF



D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

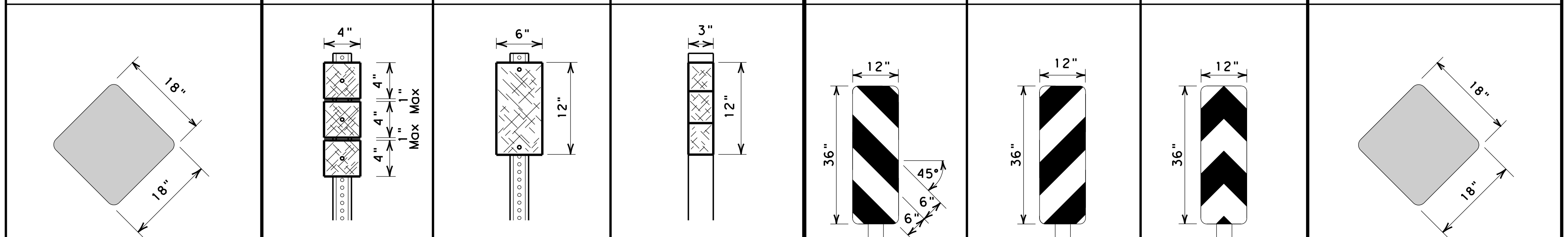
TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

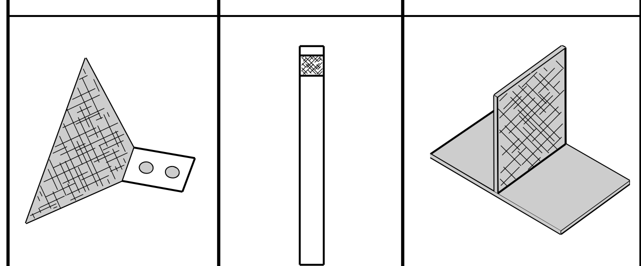


DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

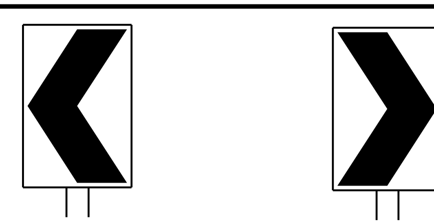
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		



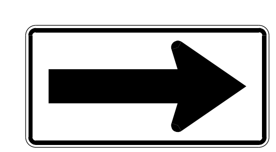
CHEVRONS

DEVICE	W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	



ONE DIRECTION LARGE ARROW

DEVICE	W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	



NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

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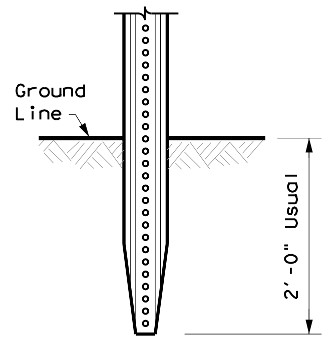
20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

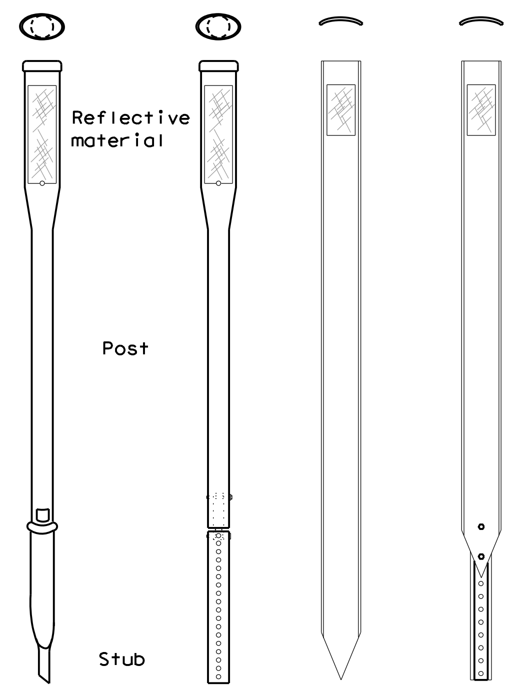


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

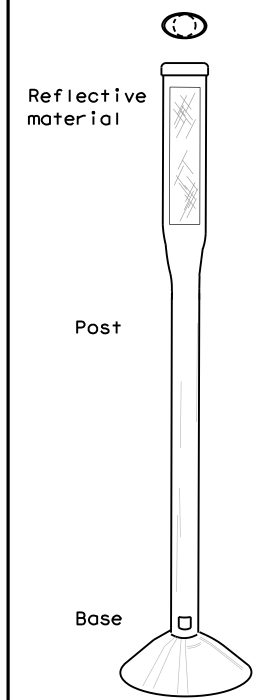
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



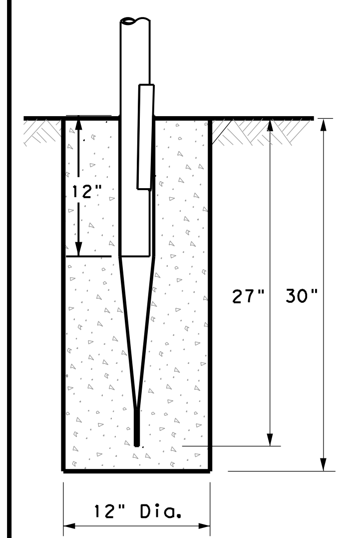
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

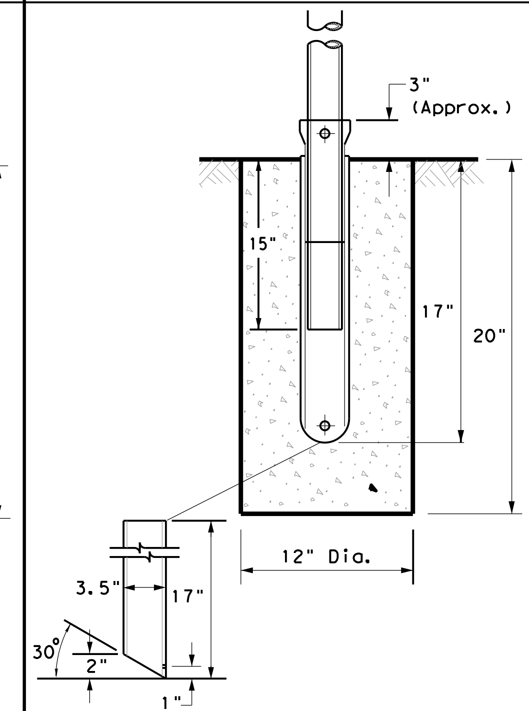
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

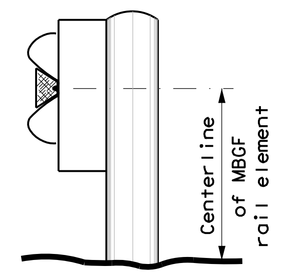
NOTE

1. Install per manufacturer's recommendations.

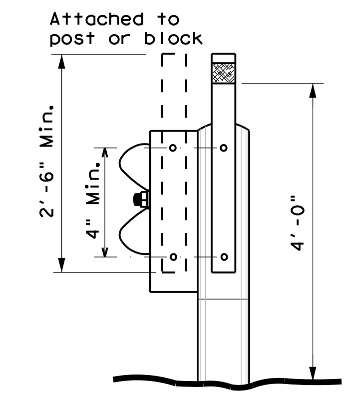
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

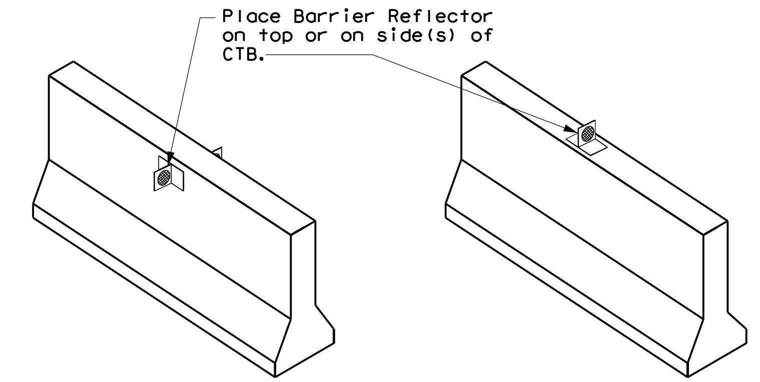
GF1



GF2



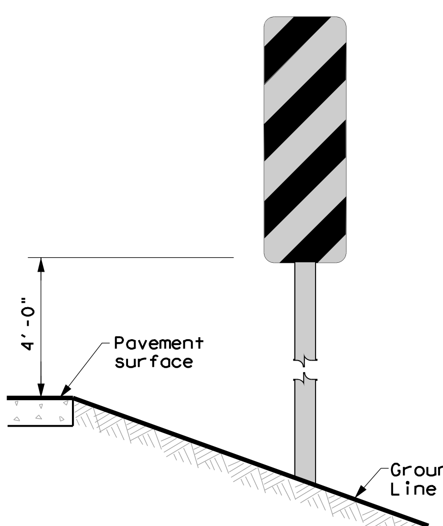
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

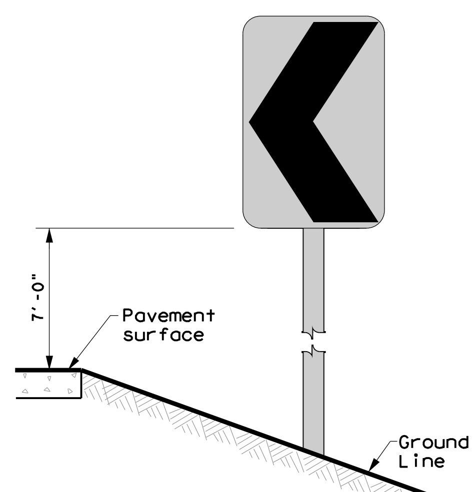
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

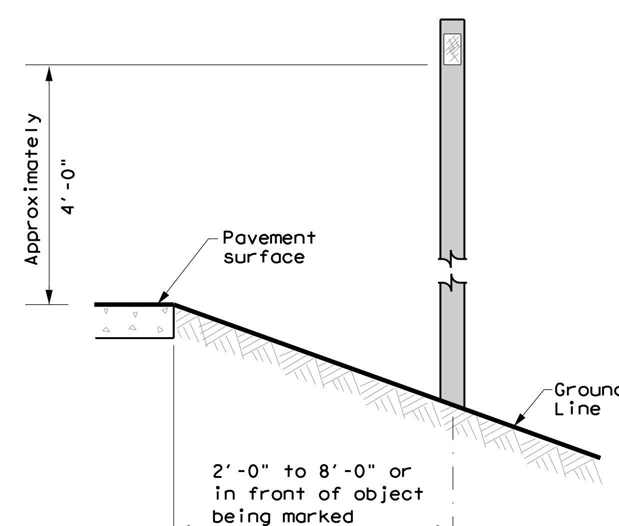
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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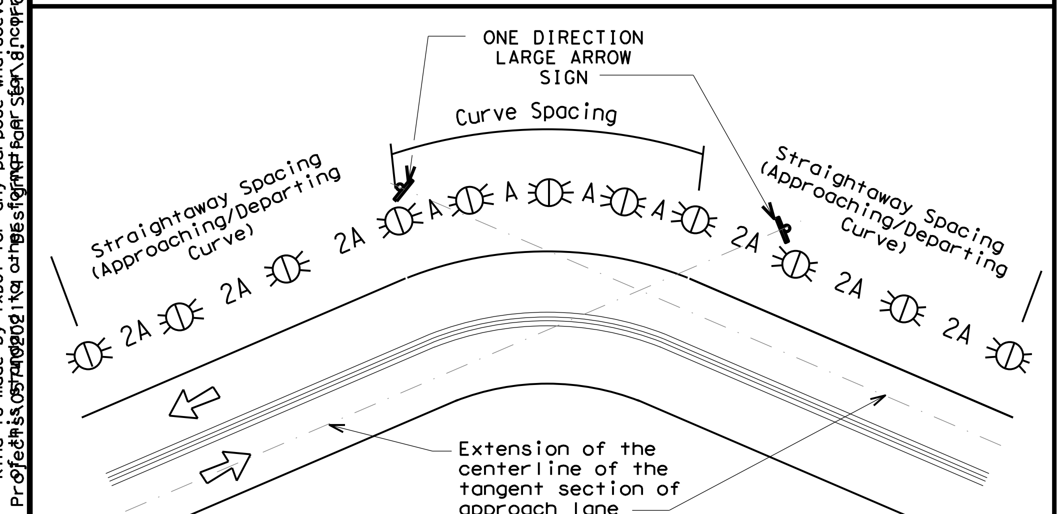
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

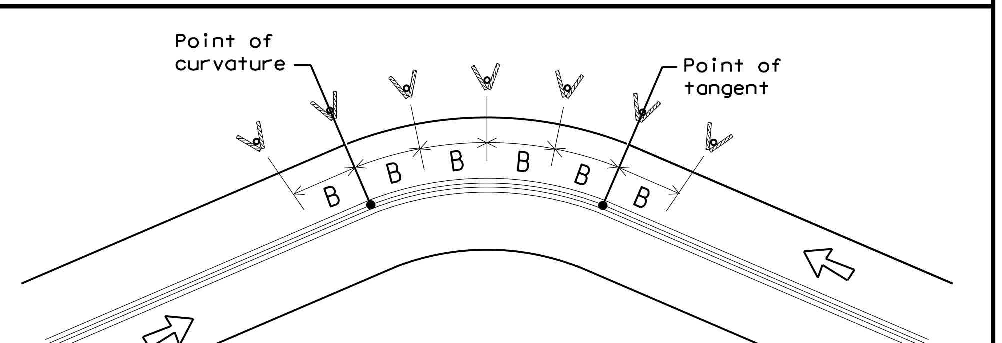
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	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 symbol)	Bi-directional Delineator
(delineator symbol)	Delineator
(sign symbol)	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

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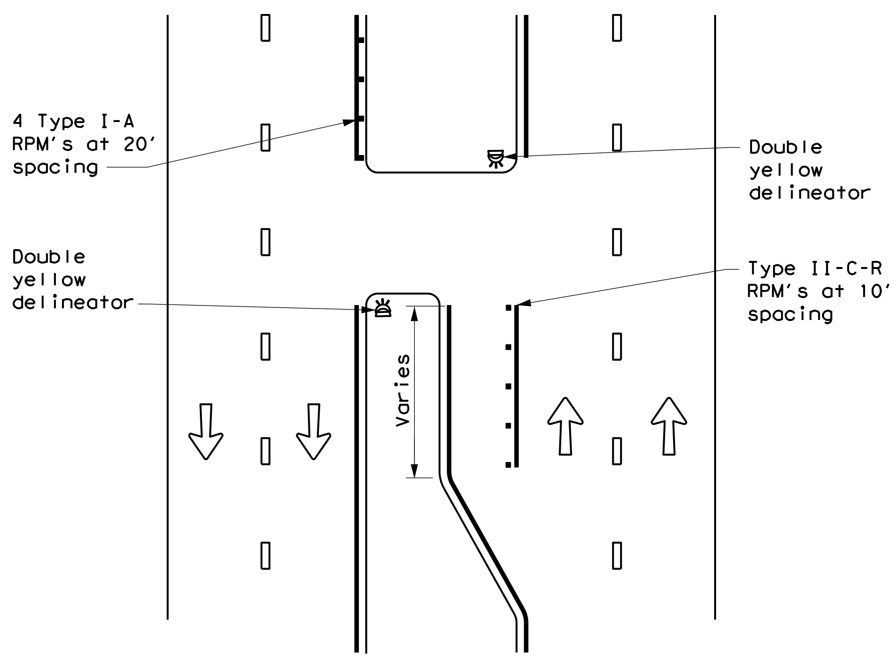
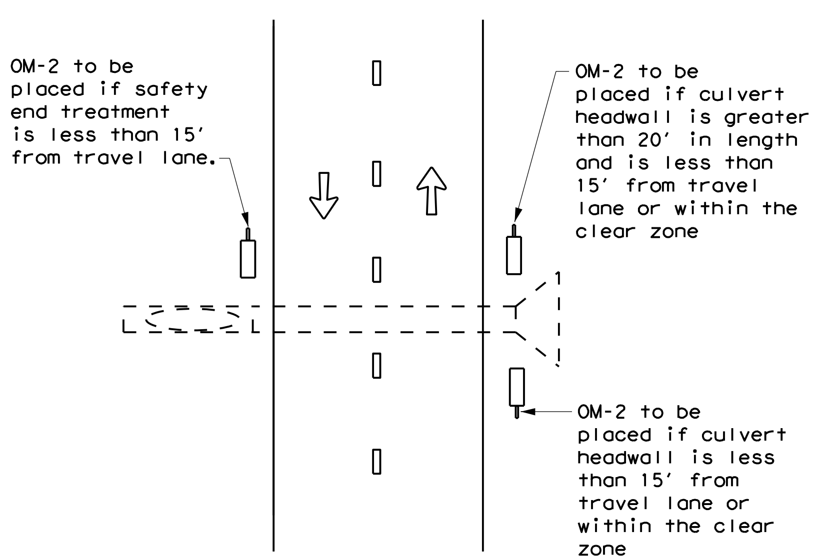
CROSSOVERS



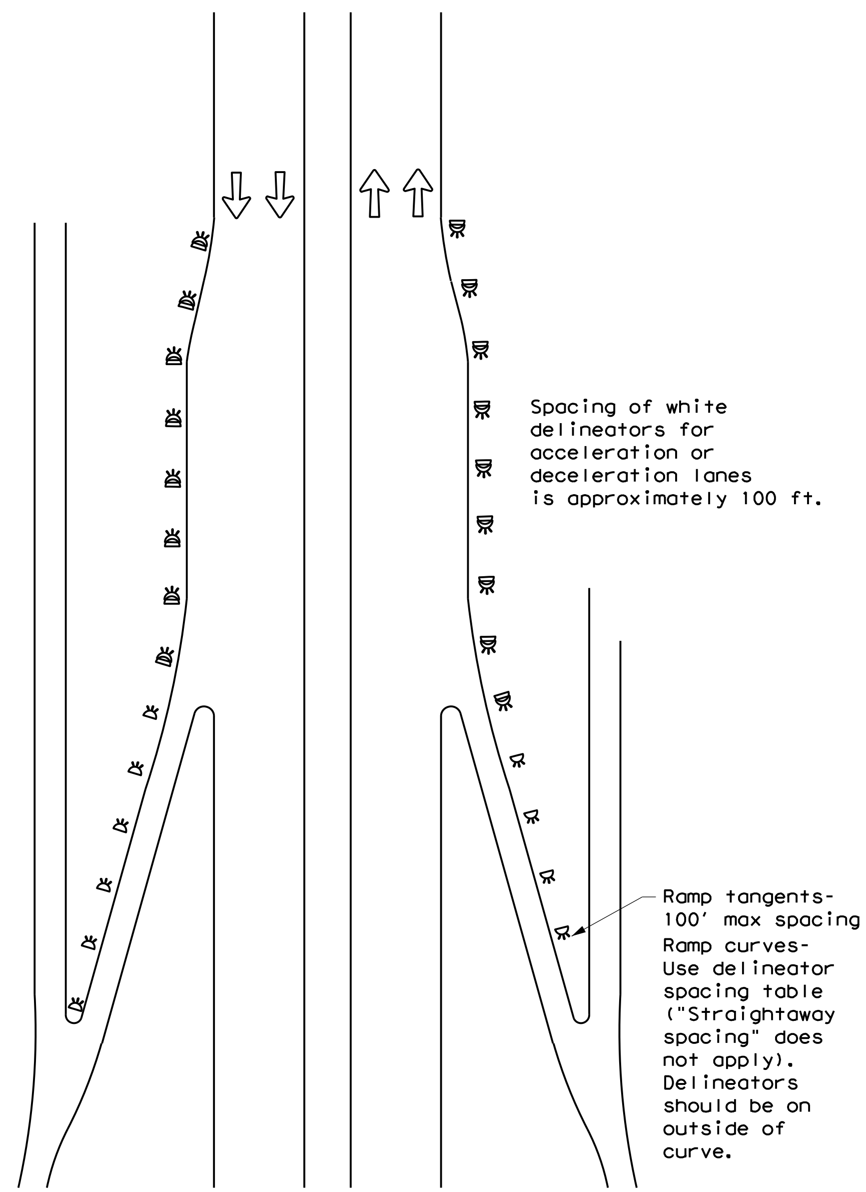
DETAIL 1

FOR CULVERTS WITHOUT MBGF



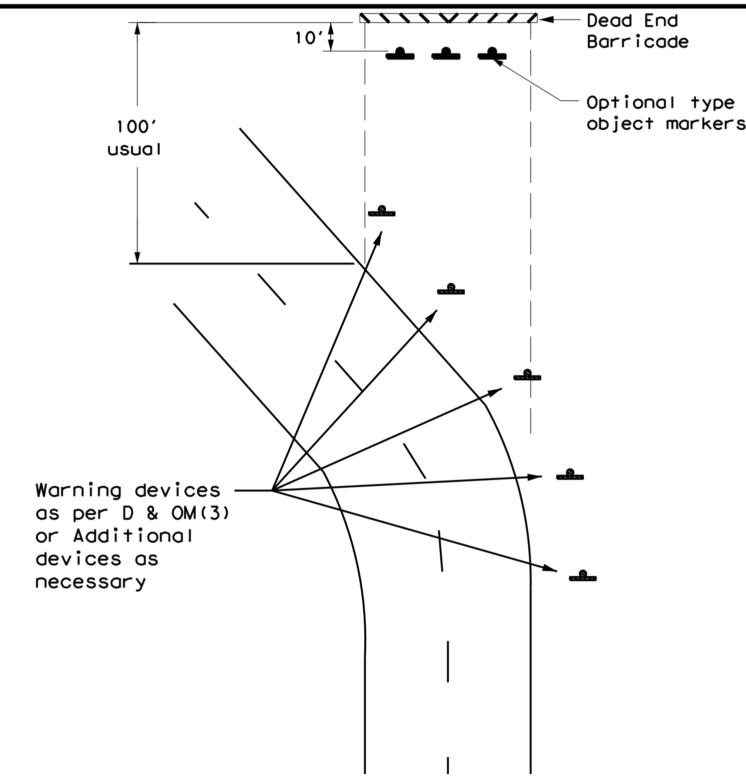
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



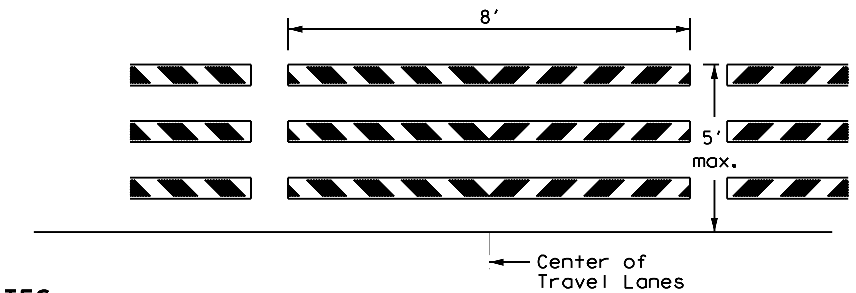
DETAIL 3

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

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	DIST		COUNTY		SHEET NO.	
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20D

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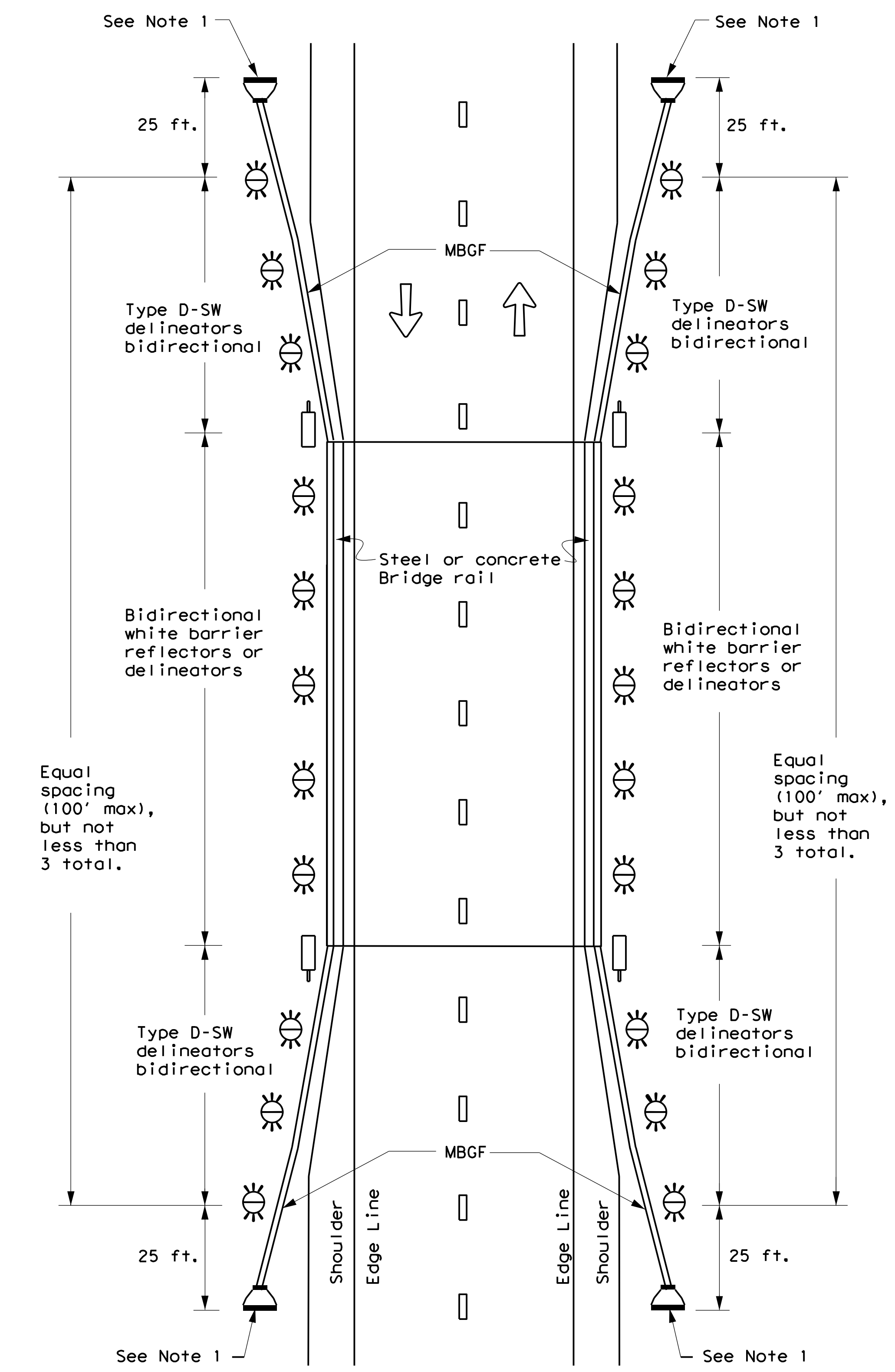
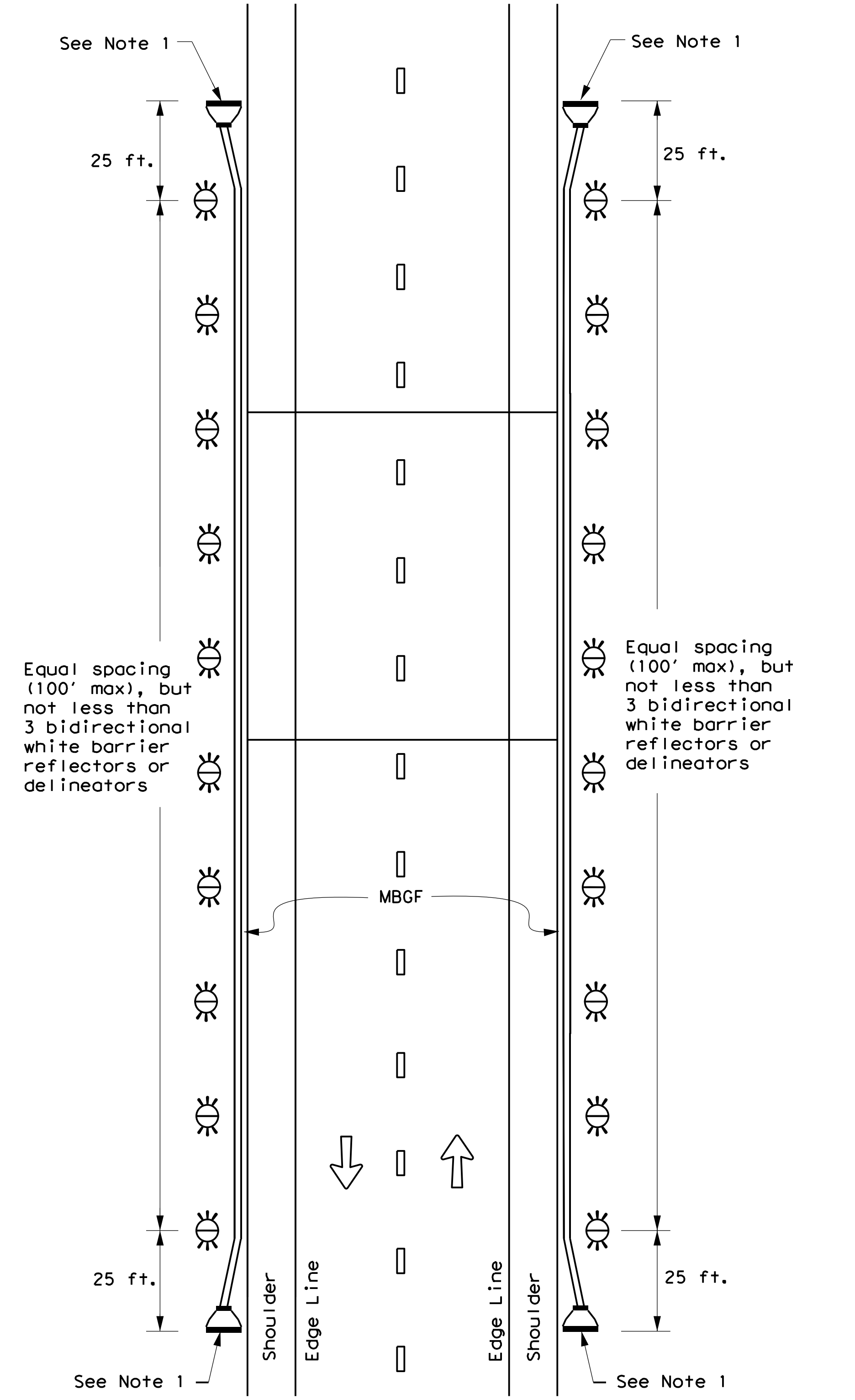
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

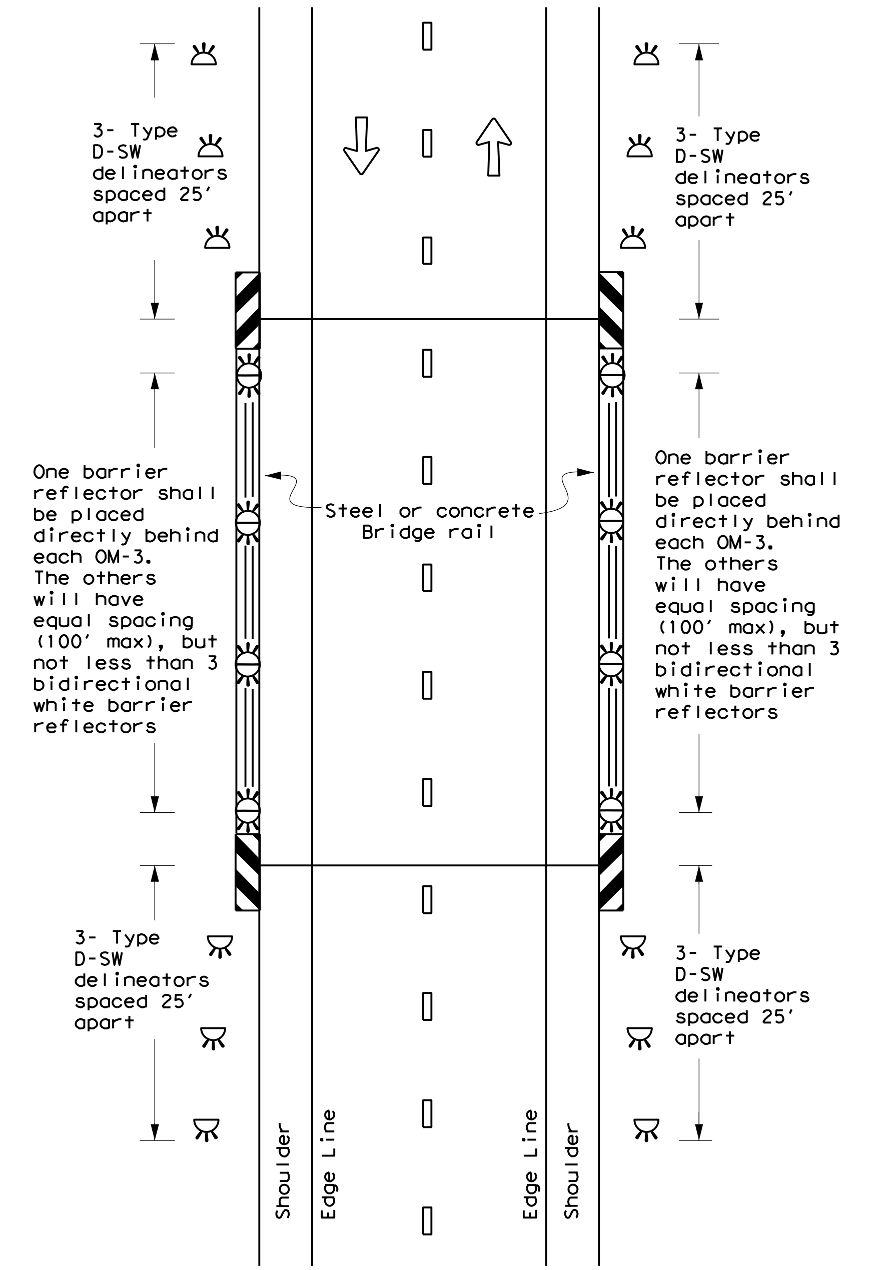
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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7-20	DIST		COUNTY	SHEET NO.
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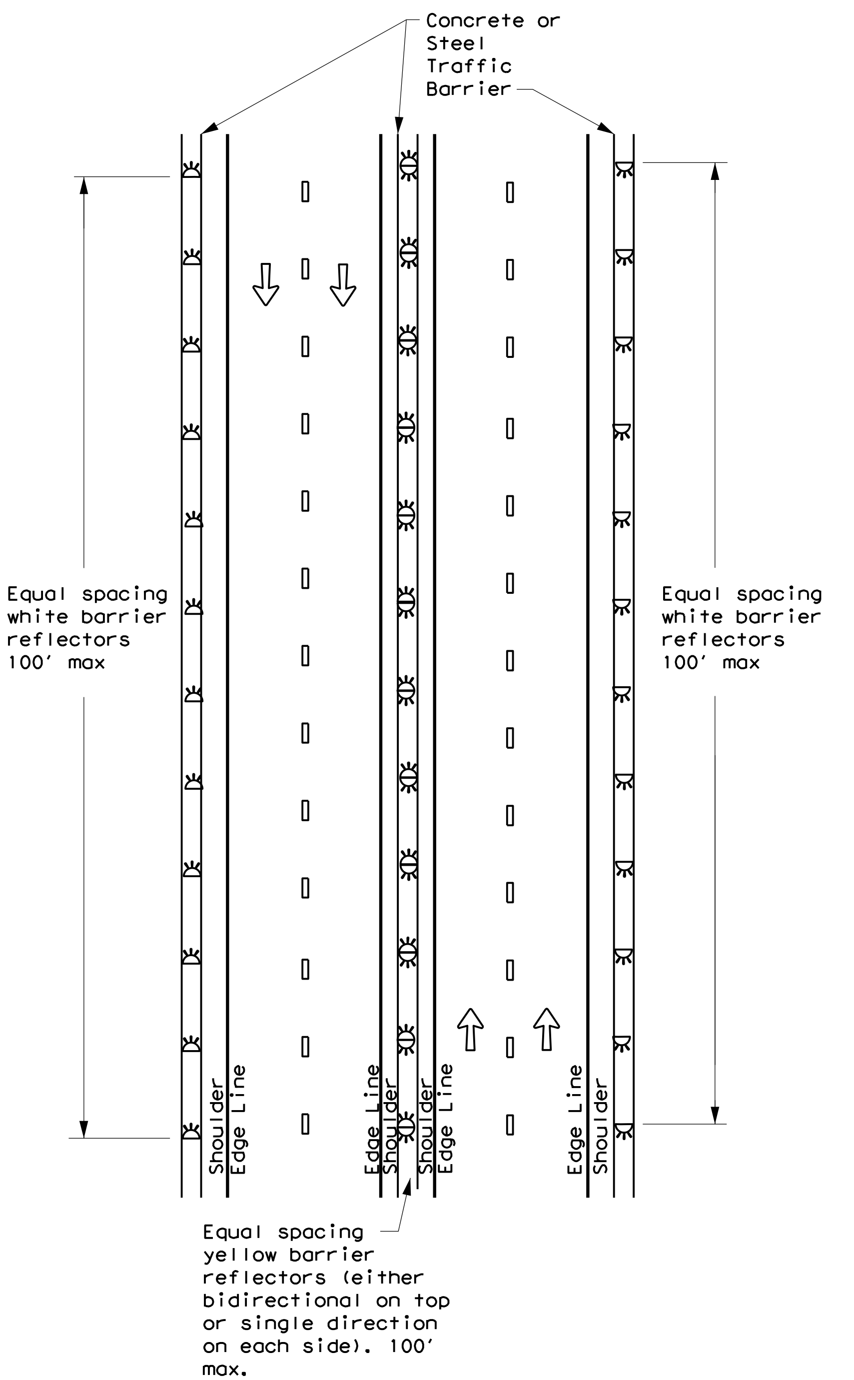
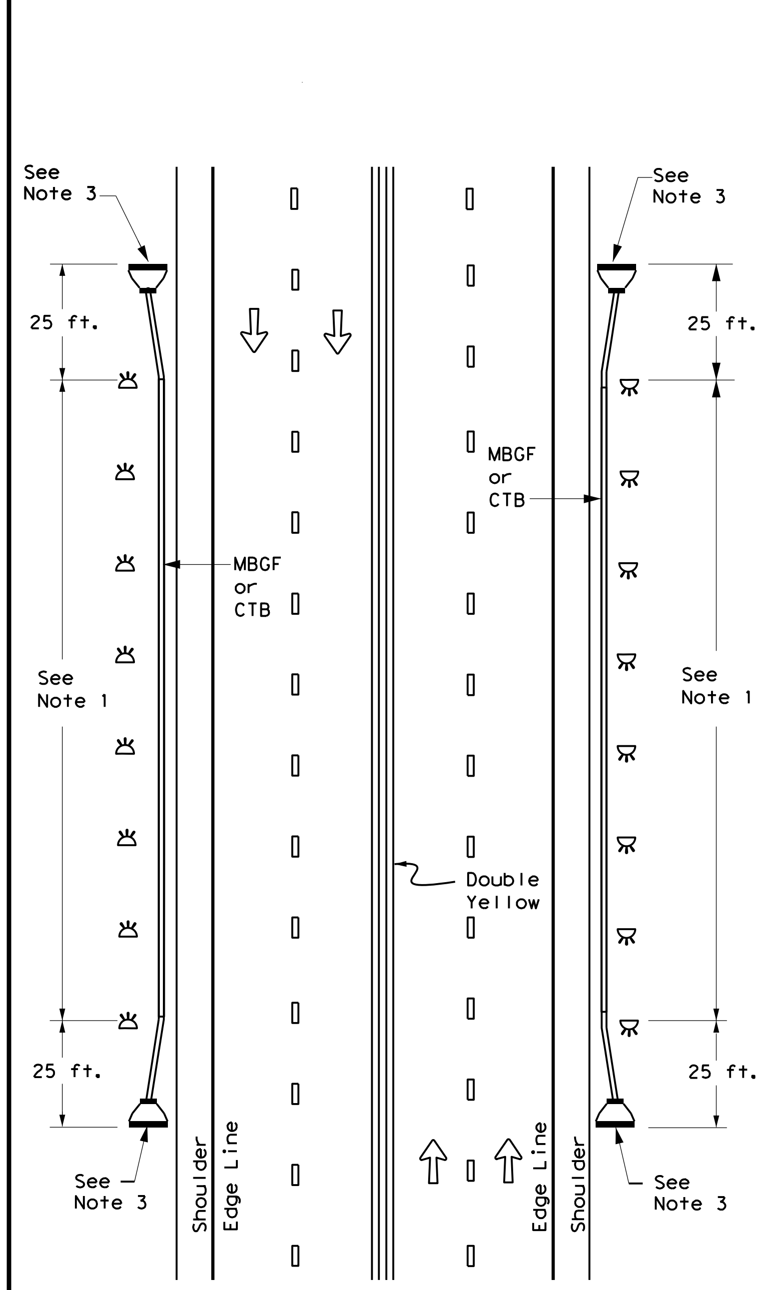
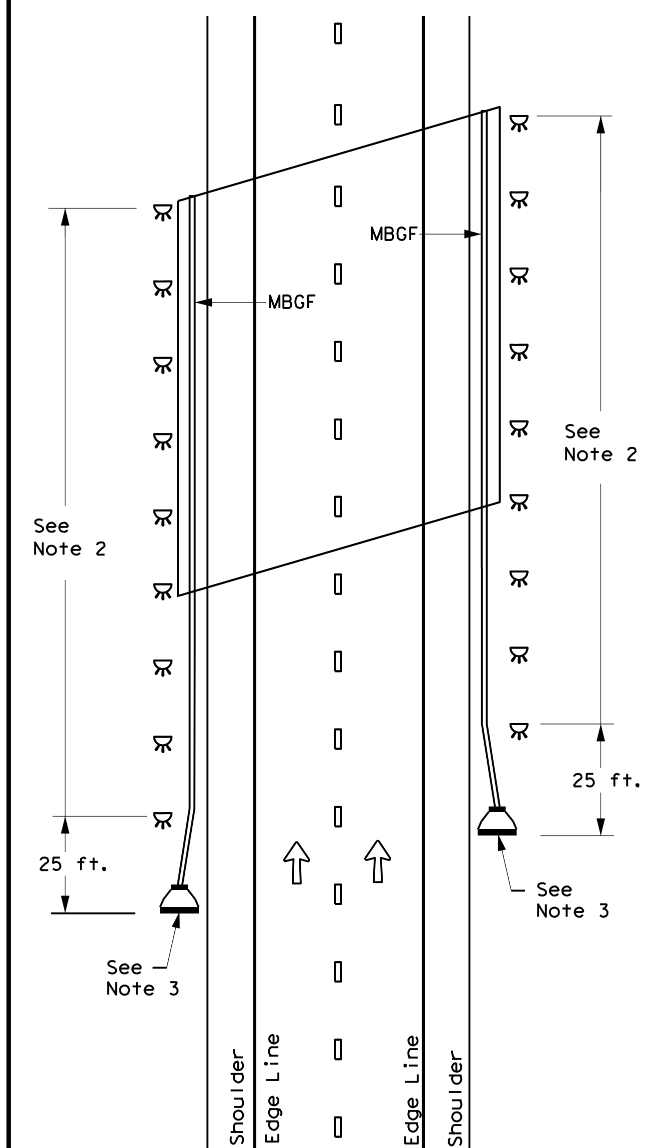
CONTINUOUS CONCRETE OR STEEL BARRIER



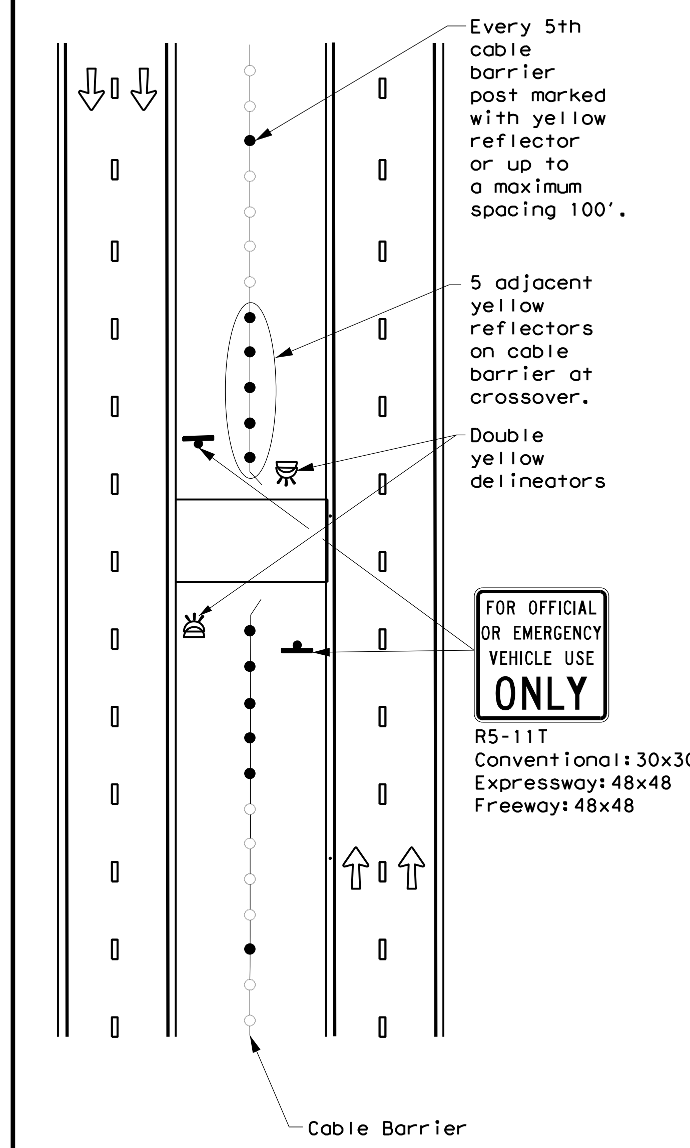
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)

2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.

3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

Symbol	Description
(symbol)	Bidirectional Delineator
(symbol)	Delineator
(symbol)	OM-3
(symbol)	OM-2
(symbol)	Terminal End
(symbol)	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
7-20	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	255

20F

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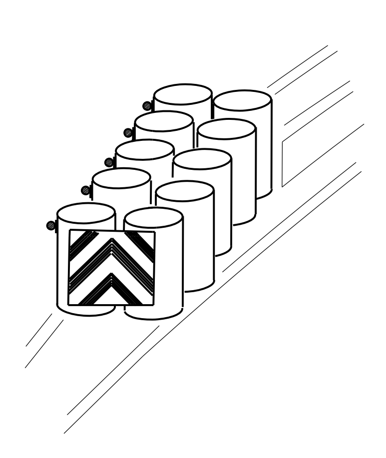
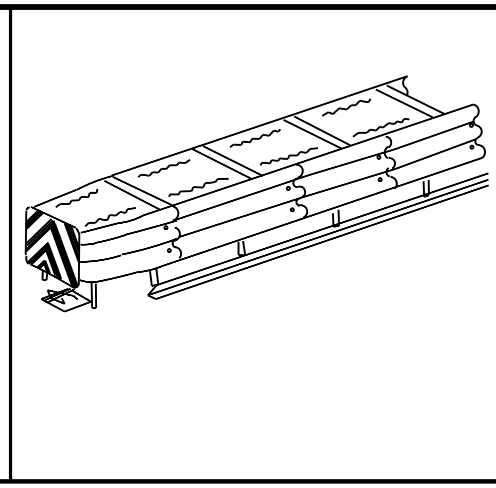
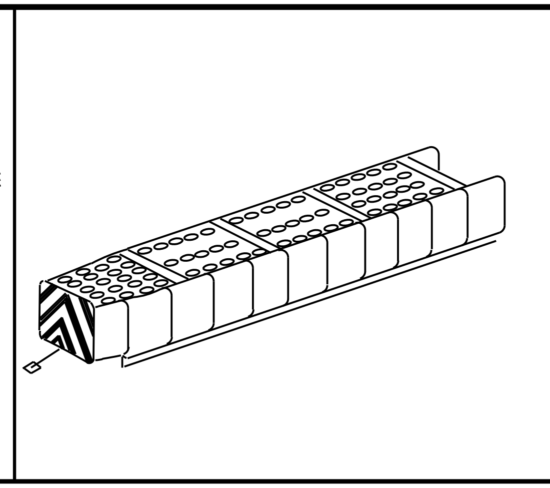
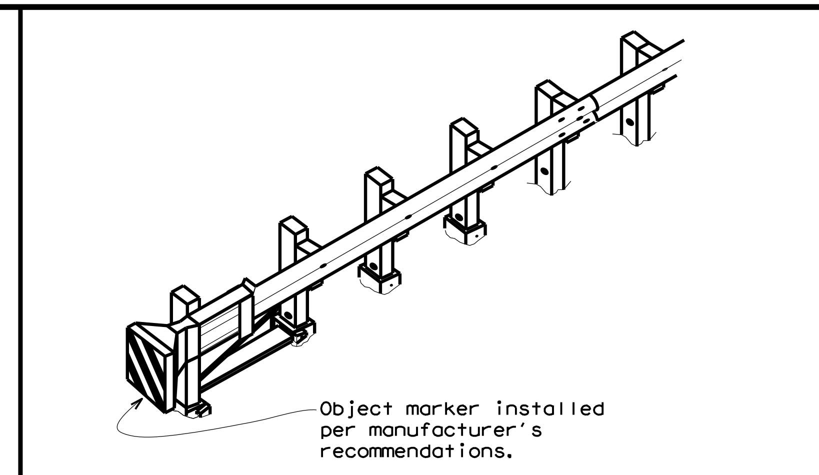
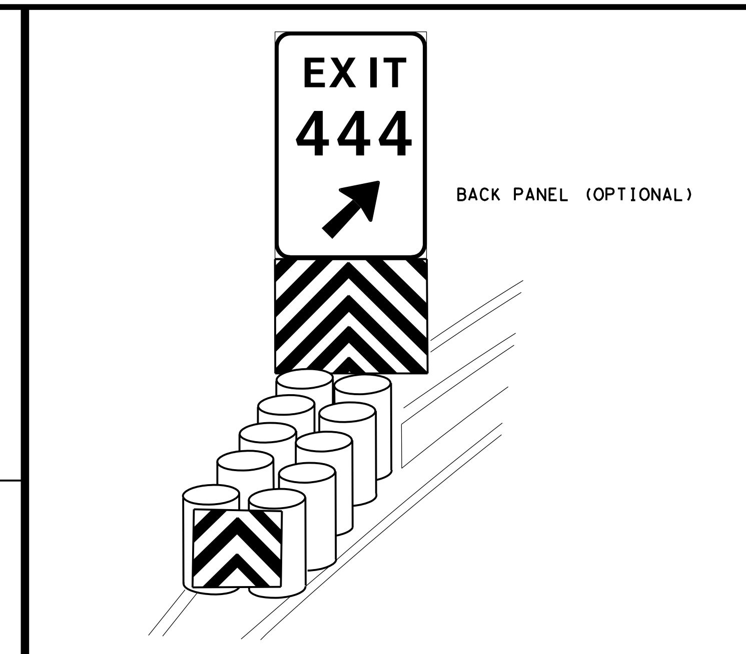
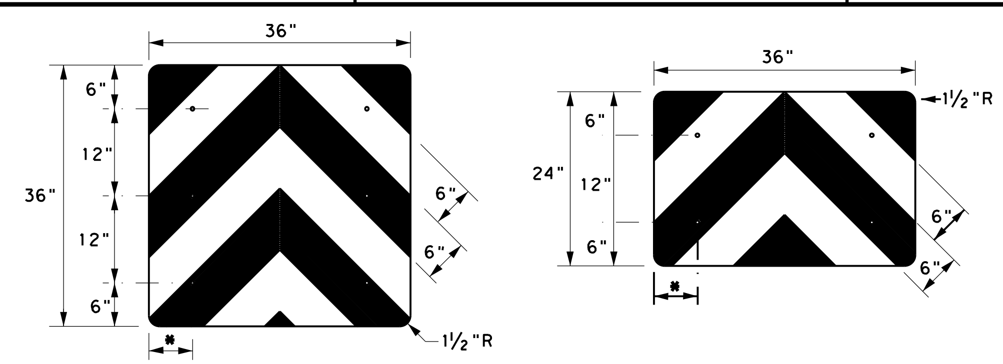




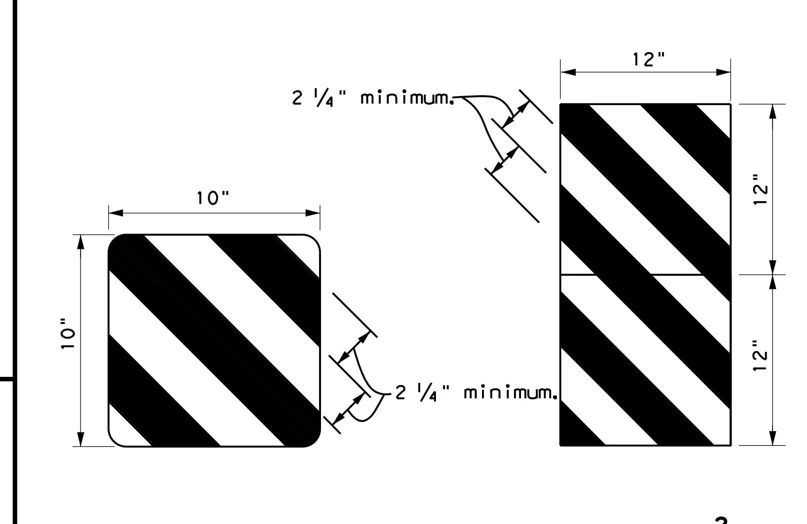




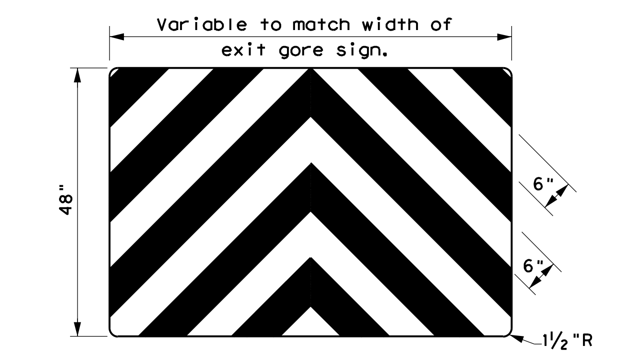


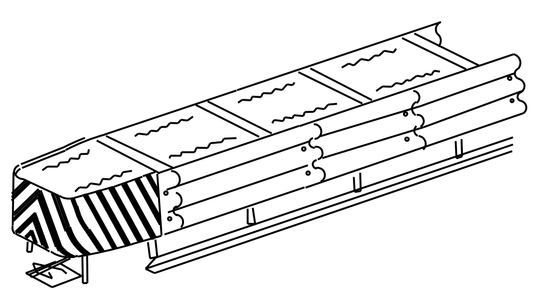


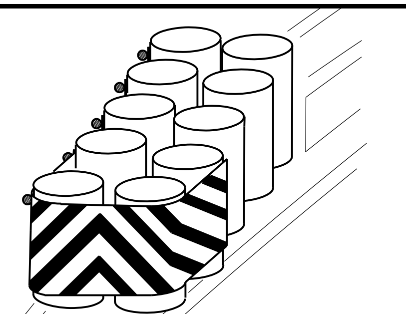
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

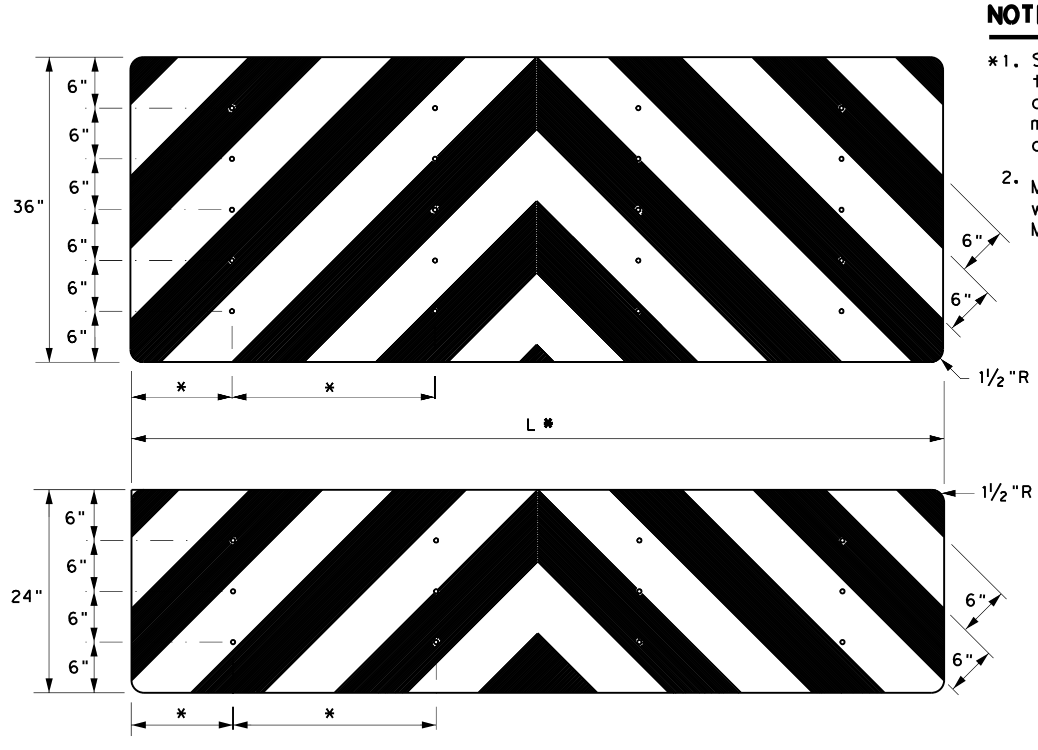


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation | Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn		DN: TXDOT	CK: TXDOT	DW: TXDOT		CK: TXDOT	
©TxDOT December 1989		CONT	SECT	JOB		HIGHWAY	
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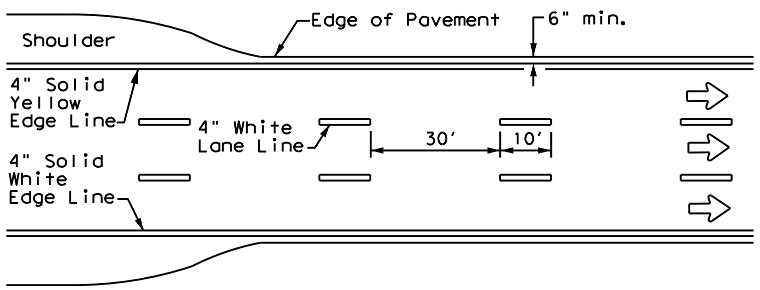
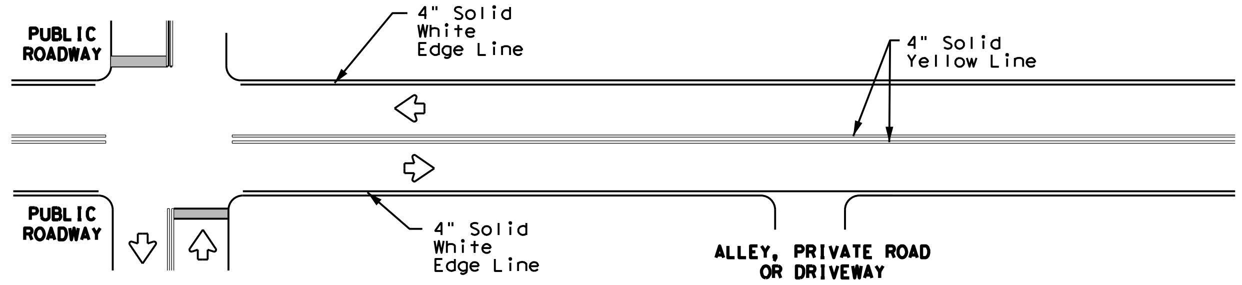
8-95 3-15		DAL		NAVARRO		256	
4-98 7-20							

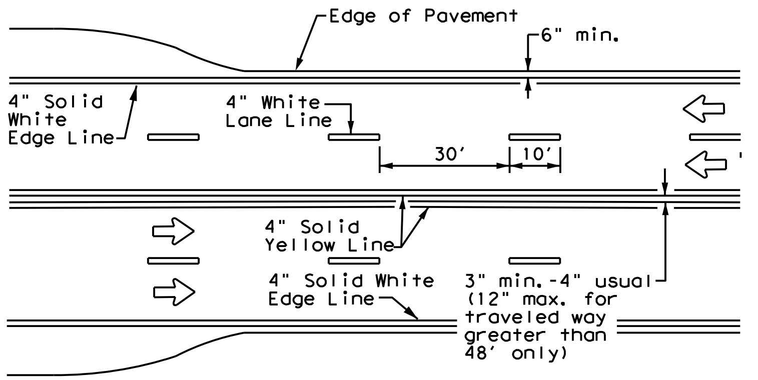
20G



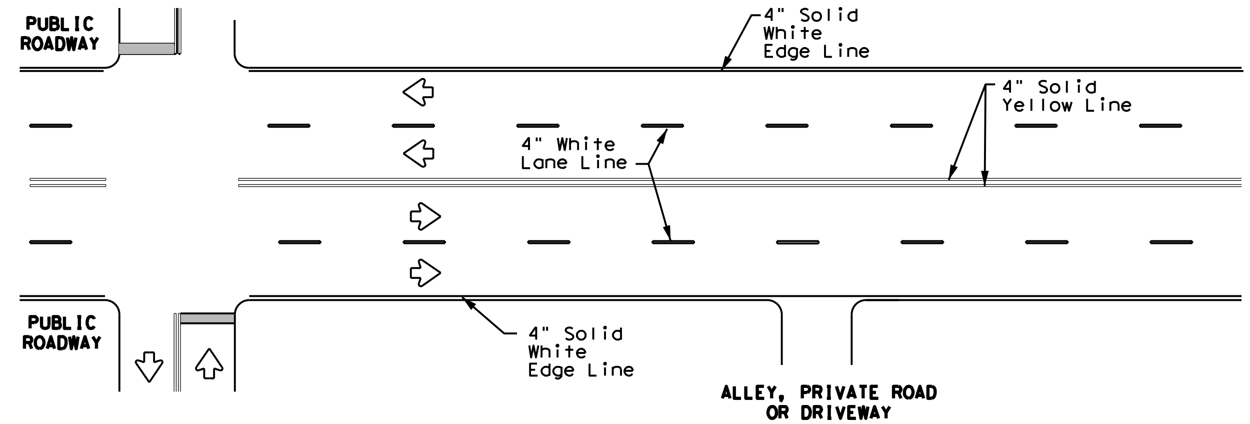
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



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

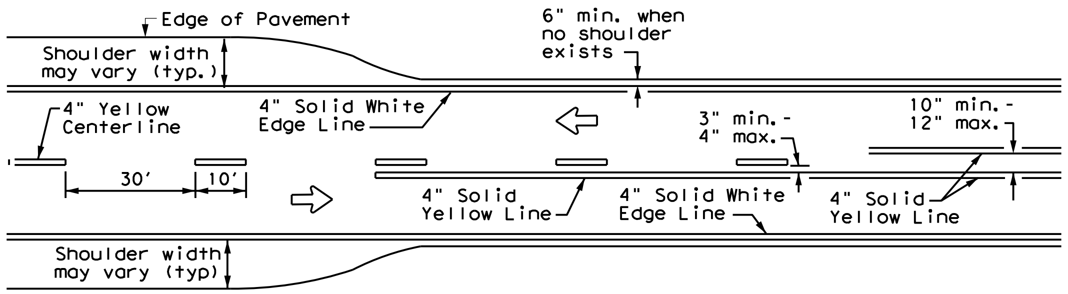
GENERAL NOTES

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.

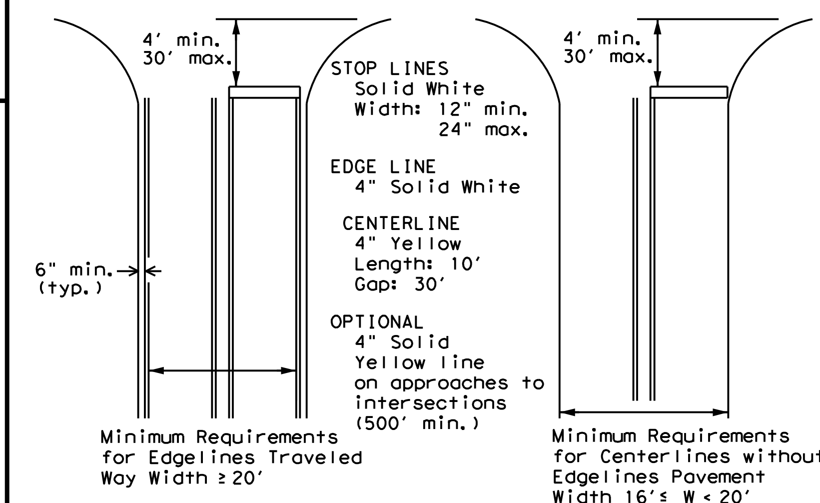


TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

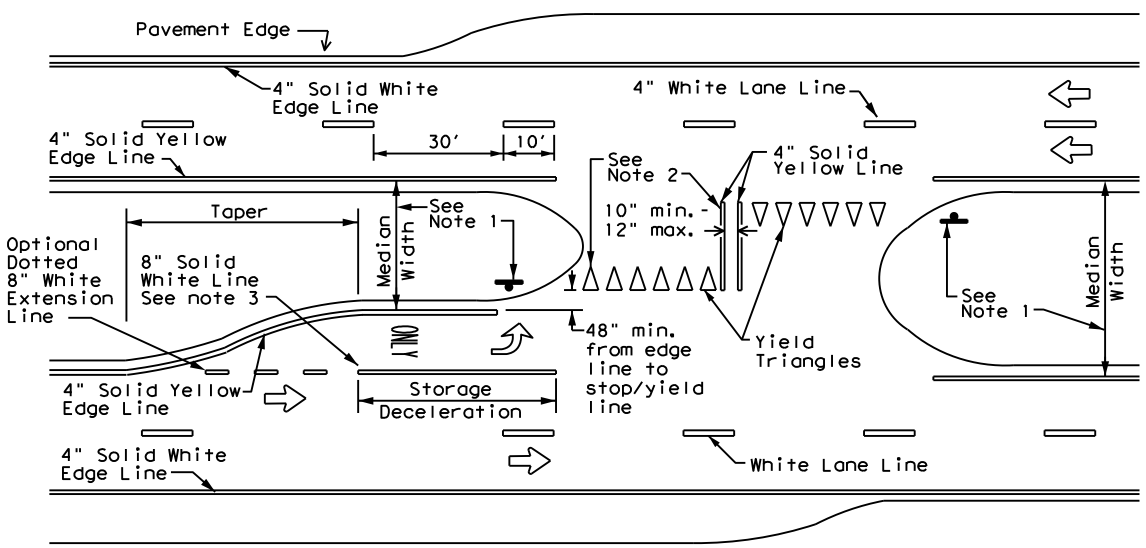
For posted speed on road being marked equal to or less than 40 MPH.

For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield troingles 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	0574	02	021	FM 636
	DIST		COUNTY	SHEET NO.
	DAL		NAVARRO	257

228

DATE: 1/7/2021 11:53:55 AM
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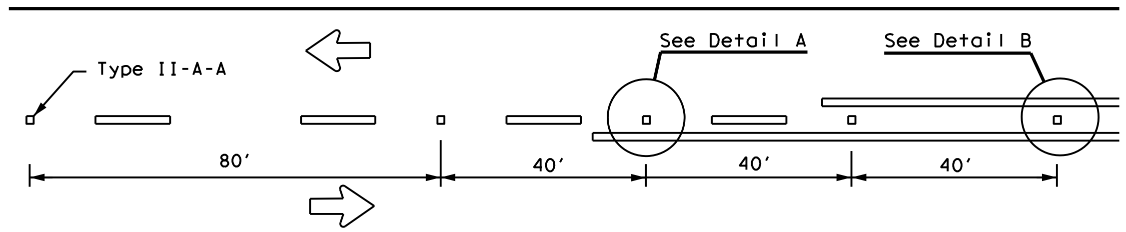
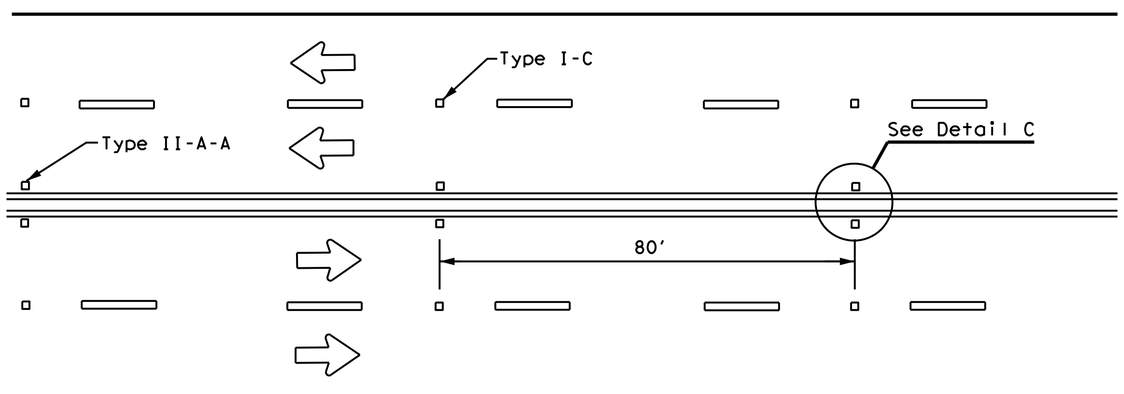
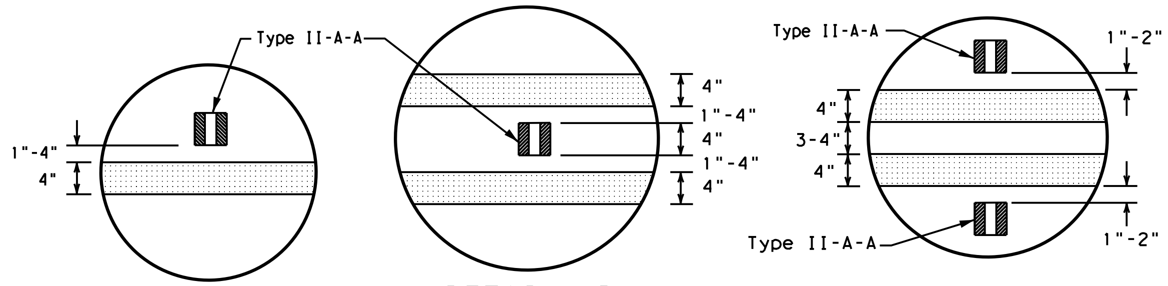
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



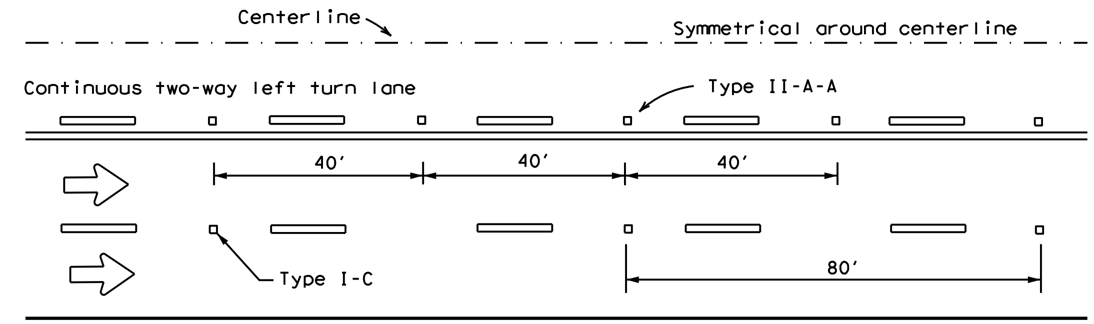
CENTERLINE FOR ALL TWO LANE ROADWAYS



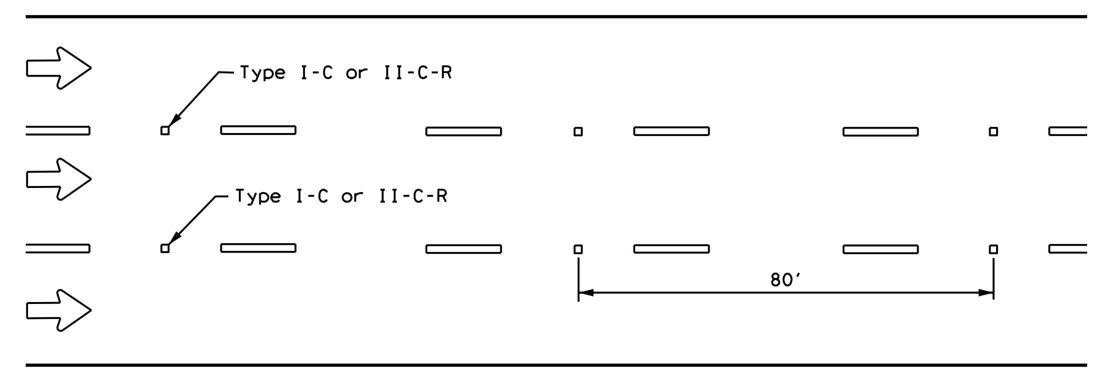
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

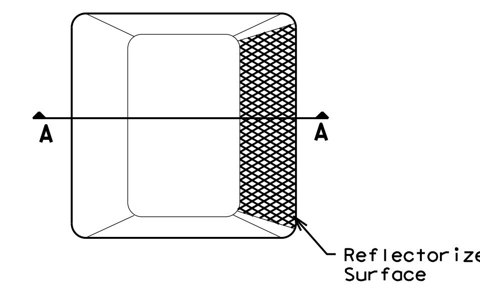


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

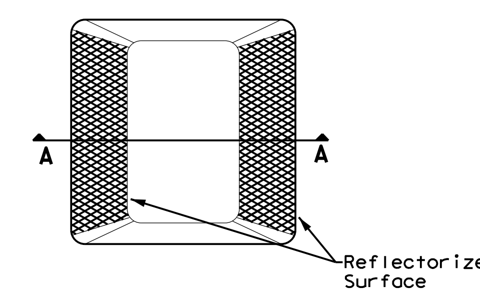
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

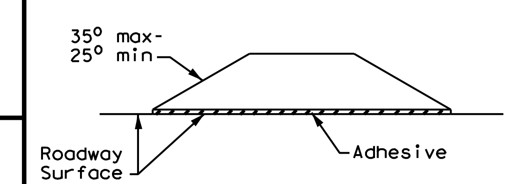
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

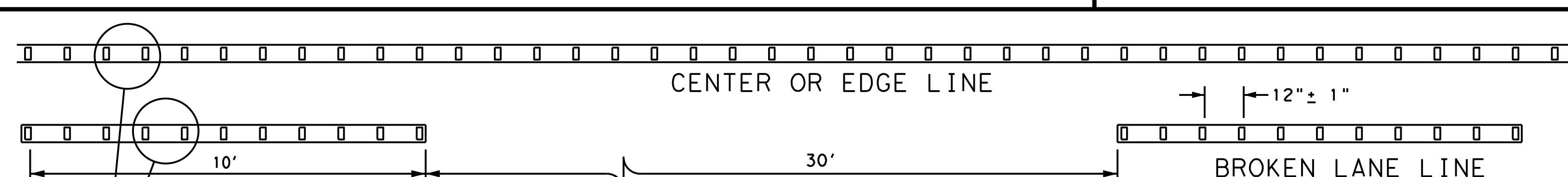


Type II (Top View)



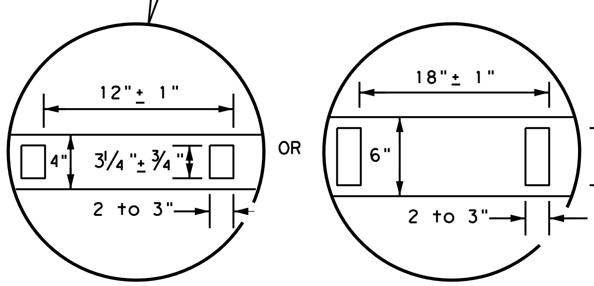
SECTION A

RAISED PAVEMENT MARKERS



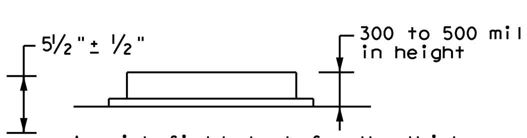
REFLECTORIZED PROFILE PATTERN DETAIL

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.

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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	0574	02	021	FM 636
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228

DATE: 1/7/2021 11:54:03 AM
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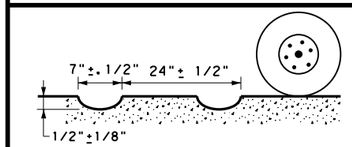
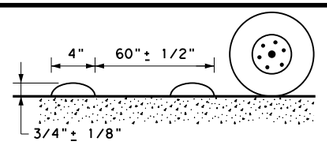
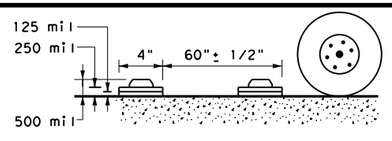
CENTERLINE RUMBLE STRIPS



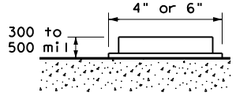
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

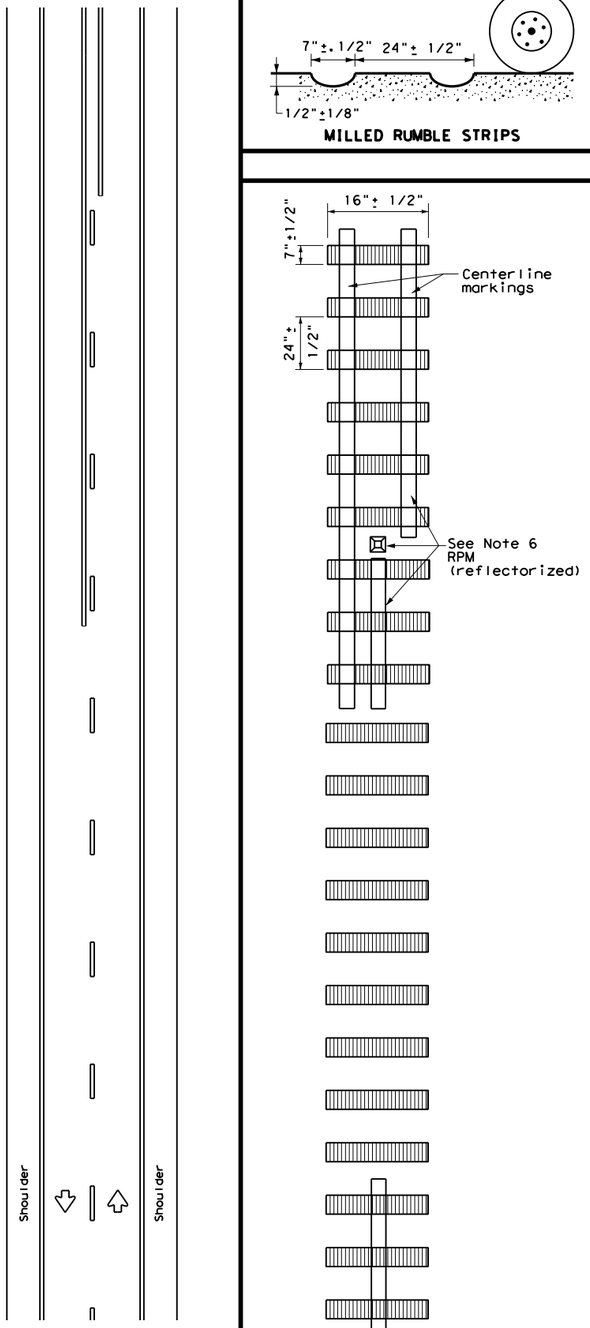


PREFORMED THERMOPLASTIC STRIPS



PROFILE MARKINGS

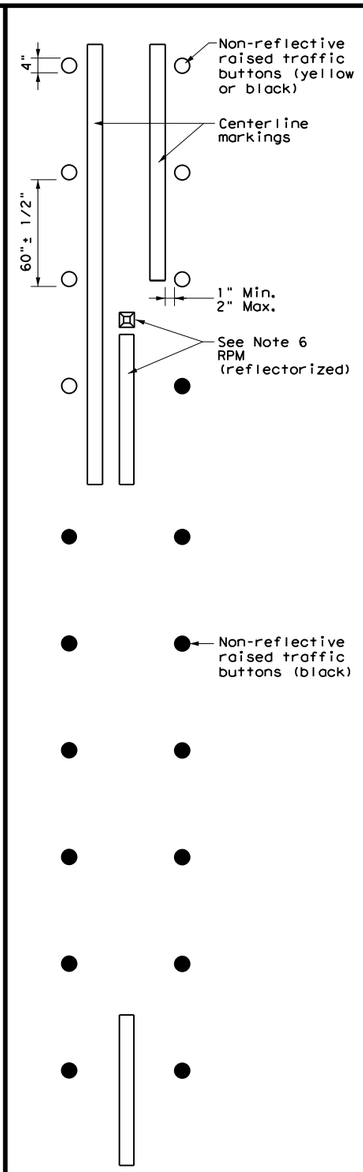
PROFILE VIEW



TWO LANE TWO-WAY ROADWAYS

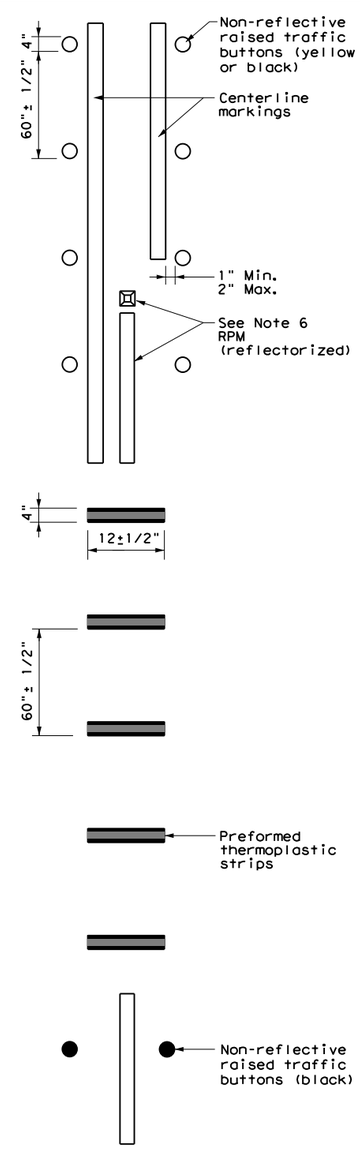
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



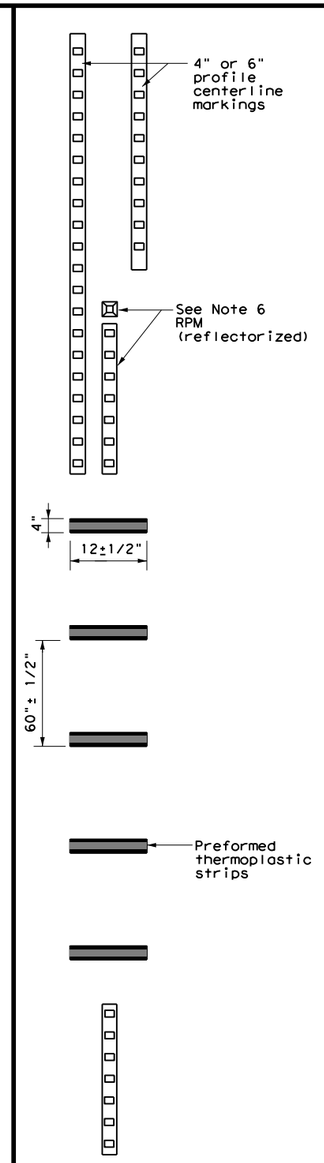
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

12. See standard sheet RS(4).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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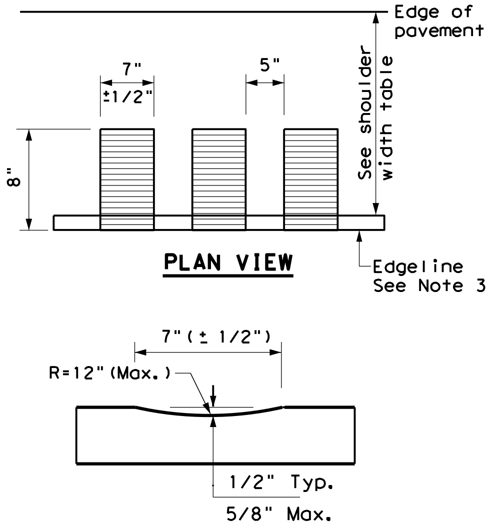
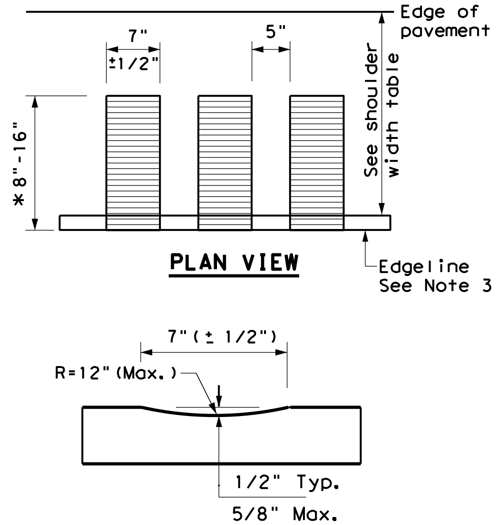
	DAL	NAVARRO		259



PROFILE VIEW

OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)

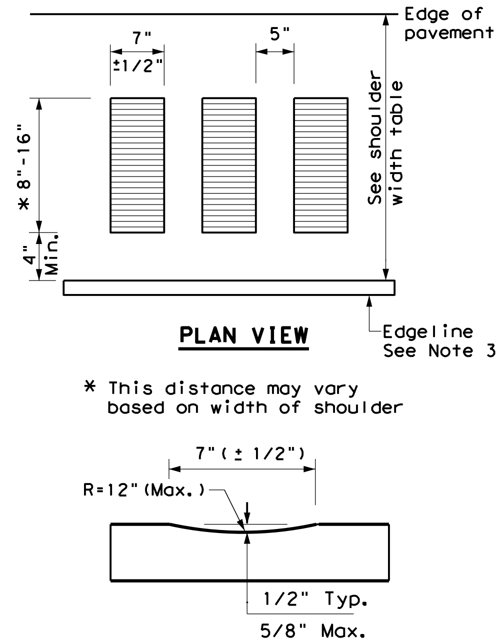


* This distance may vary based on width of shoulder

PROFILE VIEW

OPTION 2

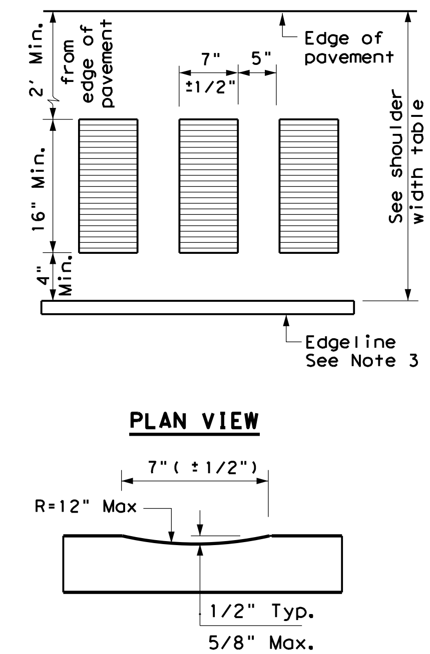
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



PROFILE VIEW

OPTION 3

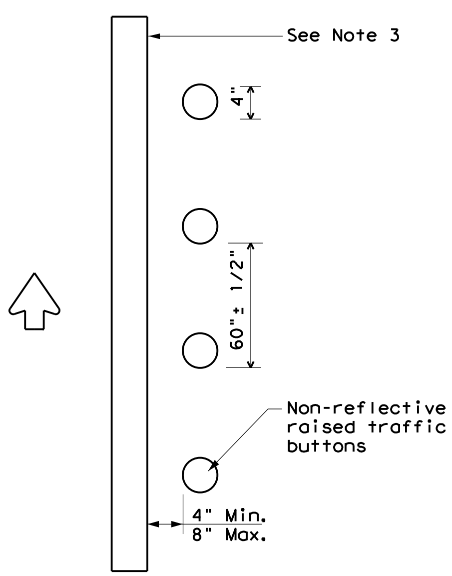
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW

OPTION 4

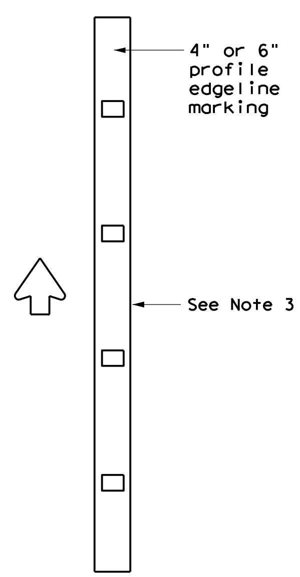
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW

OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW

OPTION 6

PROFILE EDGELINE MARKINGS

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

GENERAL NOTES

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

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

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

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

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

Texas Department of Transportation

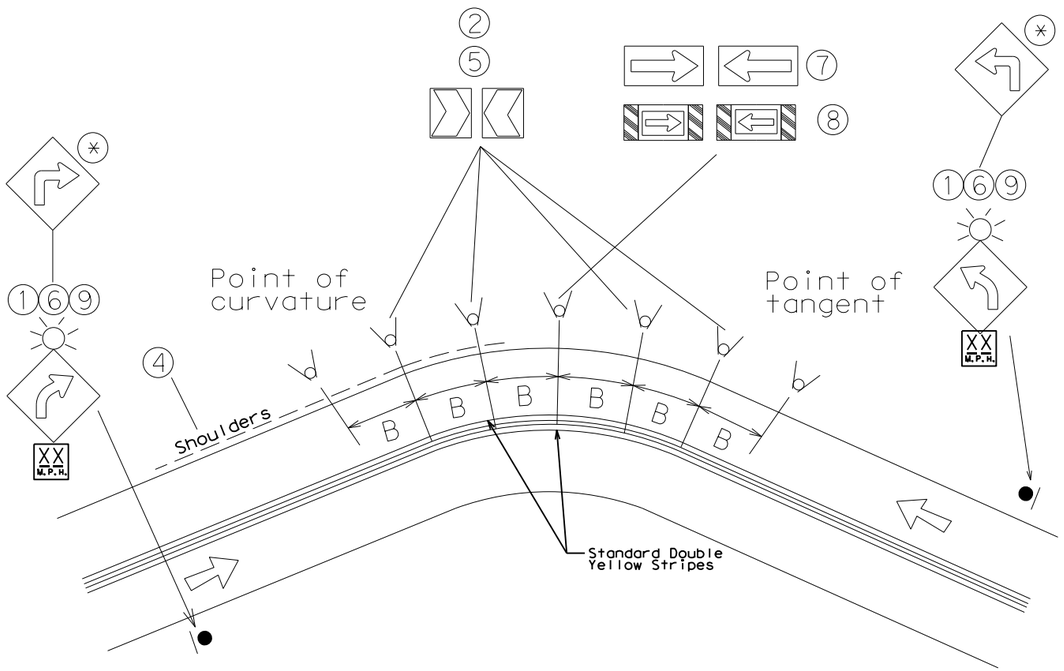
Traffic Operations Division Standard

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

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT 0574	SECT 02	JOB 021	HIGHWAY FM 636
REVISIONS	DIST DAL	COUNTY NAVARRO		SHEET NO. 260

DATE: 1/7/2021 11:54:07 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\0574-02-021

Dallas District Standard for Two-Lane Highway Curve Signing/Markings



Curve Safety Sequence

Applicable Minimum Measures

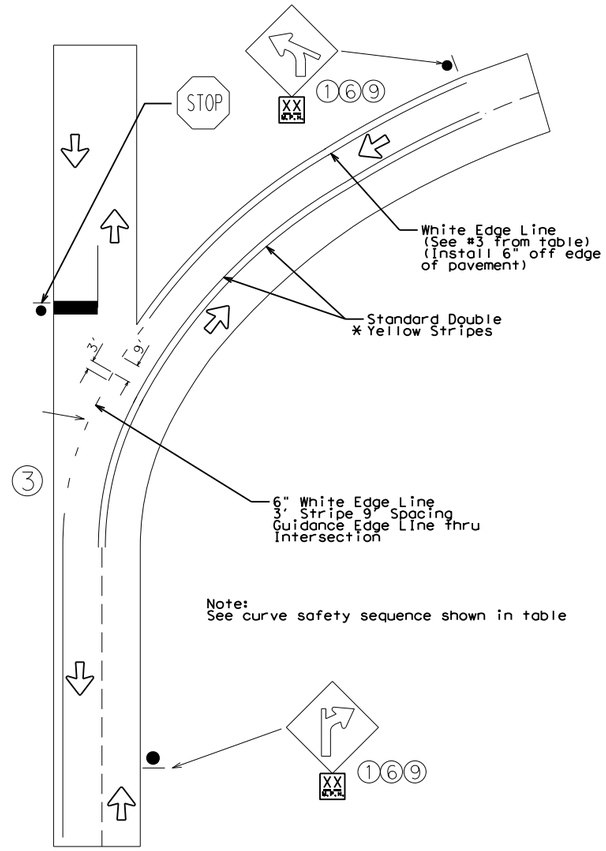
Advisory Speed 55 mph or higher	Advisory Speed 40-50 mph	Advisory speed 35 mph or less		Curve signing, delineation and pavement markings (listed in order from minimum to maximum level of treatment as needed)
+	+	+	1	Advance warning (36" x 36") and advisory mph (18" x 18")
+	+	+	2	Chevron alignment signs 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

\+ = required
\# = optional

Applications 4 - 10 are additional supplemental applications which may be added as directed by the Area Engineer.

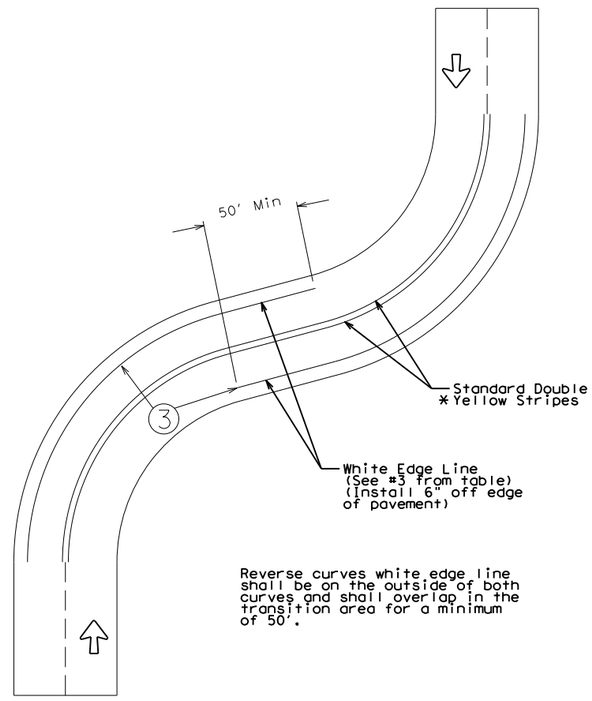
Note:
"B" - Chevron Spacing referenced from D&OM(3)-15B

Typical Curve Treatment with Intersection



Note:
See curve safety sequence shown in table

Typical Reverse Curve Edge Line Treatment



Reverse curves white edge line shall be on the outside of both curves and shall overlap in the transition area for a minimum of 50'.

* 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.

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

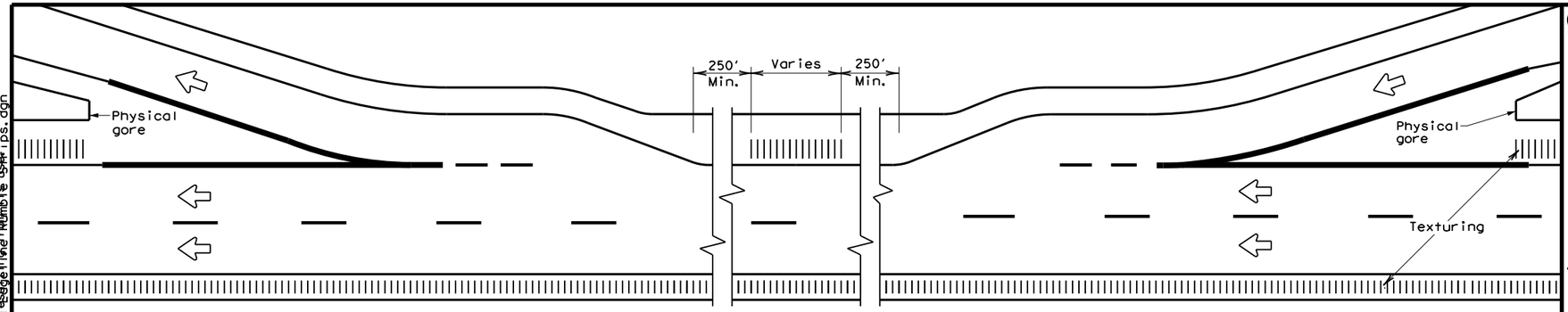
TWO-LANE HIGHWAY CURVE SIGNING & MARKINGS

DALLAS DISTRICT STANDARD

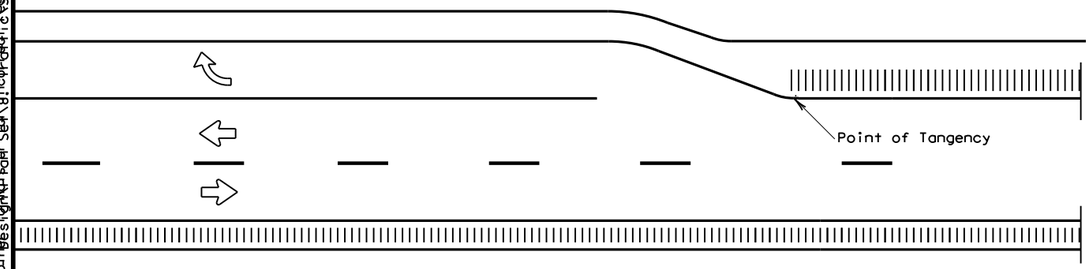
SCALE: NTS SHEET 1 OF 1

DESIGN/CK	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
BLS	6	SEE TITLE SHEET		FM 636
CHECK BLS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK FRC	TEXAS	DALLAS	NAVARRO	261
CHECK ARO	CONTROL	SECTION	JOB	
	0574	02	021	

DATE: 1/7/2021 11:54:14 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT5\Documents\18 - DAL\Design Projects\STANDARDS\Rumble Strips.dgn

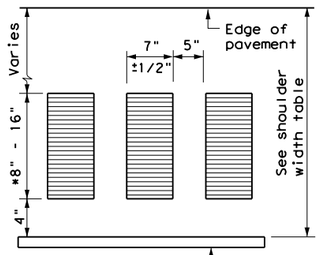


DIVIDED HIGHWAYS - TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



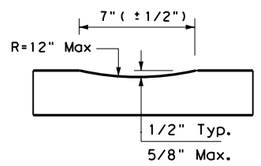
TYPICAL RUMBLE STRIP PLACEMENT AT TURNLANE BAYS

SHOULDER WIDTH TABLE	
GREATER THAN 3 FEET LESS THAN 10 FEET	EQUAL TO OR GREATER THAN 10 FEET
Option 3	Option 4



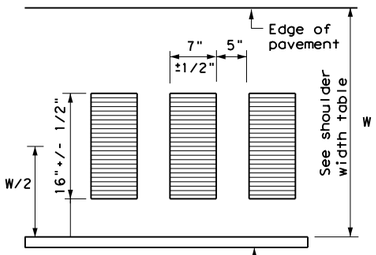
*This distance may vary based on width of shoulder

PLAN VIEW

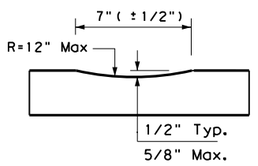


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

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 Dallas District Director of Operations.
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. Breaks in edgelines at turnlane bays shall occur at the tangent of the edgeline taper.
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. Use RS(1)-13 or RS(4)-14.

MON-YYYY
UPDATED NOTES
MON-YYYY
NOTE ADDED

MILLED EDGELINE RUMBLE STRIPS

DALLAS DISTRICT STANDARD

SCALE: NTS

DESIGN/CK	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
DP	6	SEE TITLE SHEET		FM 636
CHECK ARO	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK JDM	TEXAS	DALLAS	NAVARRO	262
CHECK JDH	CONTROL	SECTION	JOB	
	0574	02	021	

A. GENERAL SITE DATA

1. PROJECT LIMITS: *From FM 1129 to Morgan Springs Road*

Begin Project Coordinates : Latitude (N): 32.213286 Longitude (W): - 96.367361

End Project Coordinates : Latitude (N): 32.180594 Longitude (W): - 96.271289

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: Drainage Area Maps (Sheets 152-153)*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections (Sheets 11-12)*
- *Location of Erosion and Sediment Controls: SW3P Site Maps (Sheets 277-286)*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layouts (Sheets 160-185)*
- *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:

Reconstruct existing pavement and add shoulders

4. MAJOR SOIL DISTURBING ACTIVITIES:

Soil disturbing activities will include grading, backfill, erosion and sediment controls, and topsoil work for final planting and seeding.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

The soil along the project is 31.5% Houston Black clay, 16.3% Heiden clay, 8.8% Trinity clay, 7.4% Branyon clay, 6.9% Burleson clay, 4.1% Wilson clay loam, and parts of various other soils.

6. TOTAL PROJECT AREA: *93.40* Acres

7. TOTAL AREA TO BE DISTURBED: *93.40* Acres (*100 %*)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.45*
AFTER CONSTRUCTION: *0.45*

9. NAME OF RECEIVING WATERS:

Culvert 1, 2, 3, & 4: Tributary to SCS Site 8 Reservoir which flows to Hackberry Creek, Grays Creek and Trinity River (Segment 0805);

Culverts 5, 6, 7, 8, 9, 10, 11, & 12: Willow Creek and its tributaries, which flow to Westbrook Creek and Trinity River (Segment 0805)

Culverts 13, 14, 15, 16, 17, 18, & 19: Westbrook Creek and its tributaries, which flow to Trinity River (Segment 0805)

Culverts 20, 21, 23, 25, 26 & 27: Tributaries to Rush Creek (no Segment ID or water quality impairment within 5 miles).
[Segment 0805 is water quality impaired by bacteria in water (recreation use) and by dioxin and PCBs in edible tissue.]

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.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- *T* TEMPORARY SEEDING
- ___ MULCHING (Hay or Straw)
- ___ BUFFER ZONES
- ___ PLANTING
- *P* SEEDING
- *P* SODDING
- *T/P* PRESERVATION OF NATURAL RESOURCES
- ___ FLEXIBLE CHANNEL LINER
- ___ RIGID CHANNEL LINER
- ___ SOIL RETENTION BLANKET
- *P* COMPOST MANUFACTURED TOPSOIL
- *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. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4 :1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

1. *See construction progress schedule for schedules and duration of relevant grading/disturbances and stabilization activities.*
2. *To the extent practicable, preserve existing vegetation, maintain a vegetative buffer along receiving waters, and phase construction activities to minimize exposure of disturbed soils.*
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 SW3P control devices (BMPs) to protect receiving waters, downslope perimeters, and active roadways prior to soil disturbance and construction activities in their vicinity, per SW3P Site Map or as needed and as directed or authorized by Engineer. Do not install BMPs more than two weeks prior to the activities in their control area.*
5. *Begin phase construction as shown in the plans.*
6. *Update and maintain SW3P devices as shown in the plans and as directed during phase construction.*
7. *Install, update, and maintain SW3P devices during all subsequent phases of construction.*
8. *Where work has temporarily ceased in a disturbed area (i.e., will exceed 14 days before next soil disturbance activity or initiation of final stabilization measures), temporarily stabilize soils per TXR150000, with vertical tracking, temporary seeding and/or other soil cover, and velocity and downslope perimeter controls, as appropriate and/or as directed by Engineer.*
9. *Re-vegetate disturbed soils in completed project areas as soon as practicable or as directed by Engineer.*
10. *When construction activity is complete, project area is stabilized, and as directed or authorized by Engineer, remove all temporary SW3P controls.*
11. *TxDOT ROW for this project is too narrow to incorporate dedimentation basins. Other erosion control measures will be installed to meet storm water management requirements.*

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
AMANDA MCKITTRICK
129352
LICENSED PROFESSIONAL ENGINEER

Amanda McKittrick, P.E. P.E. 1/7/20
Signature of Registrant & Date

Texas Department of Transportation

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.
ALM	6	SEE TITLE SHEET		FM 636
GRAPHICS ALM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK LM	TEXAS	DALLAS	NAVARRO	263
CHECK	CONTROL	SECTION	JOB	
	0574	02	021	

FILE NAME
DATE
DESIGNER

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.

Notes To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.
3. All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.

Filled Out: XX/XX/XXXX
Prepared by: Name/Section

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.)

1.

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.

1.Culvert 21 unnamed Tributary of Rush Creek Station 333+74

2.Culvert 22 unnamed Tributary of Rush Creek Station 352+76

3.Culvert 25 unnamed Tributary of Rush Creek Station 407+35

4.Culvert 26 unnamed Tributary of Rush Creek Station 432+31

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.

3.

4.

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:

1. Southern crawfish frog: 1) Minimize impacts to wetland habitats including isolated ephemeral pools. 2) Water Quality BMPs. 3) Amphibian BMPs.

2. Strecker's chorus frog and Woodhouse's toad - Amphibian BMPs.

CONTINUED ON SHEET 2 OF 2

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.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action Number:

1.

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 636
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Navarro	
CONTROL	SECTION	JOB	SHEET NO.
0574	02	021	264

Notes To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.
3. All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.

Filed 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.

Continued from sheet 1 of 2

Action Number:

3. 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.

4. Amphibian BMPs: a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered. b)Minimize 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 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 revegatation 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 only 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, crayfish 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

5. Western burrowing owl-Bird BMPs: In addtion to complying with the Migratory Bird Treaty Act (MBTA) perform the following BMPs: a) Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed. b)Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season; c) Avoid the removal of unoccupied, inactive nests, as practicable; d) Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair; e) Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

6. Eastern spotted skunk - Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary imptacts to dens.

7. Long-tailed weasel and thirteen-lined ground squirrel - Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

8. Eastern box turtle, timber (canebrake) rattlesnake, western box turtle - 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 conditions, 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 of potential occurrence in the project area, and to avoid harming the species if encountered.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
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NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

GENERAL NOTE:

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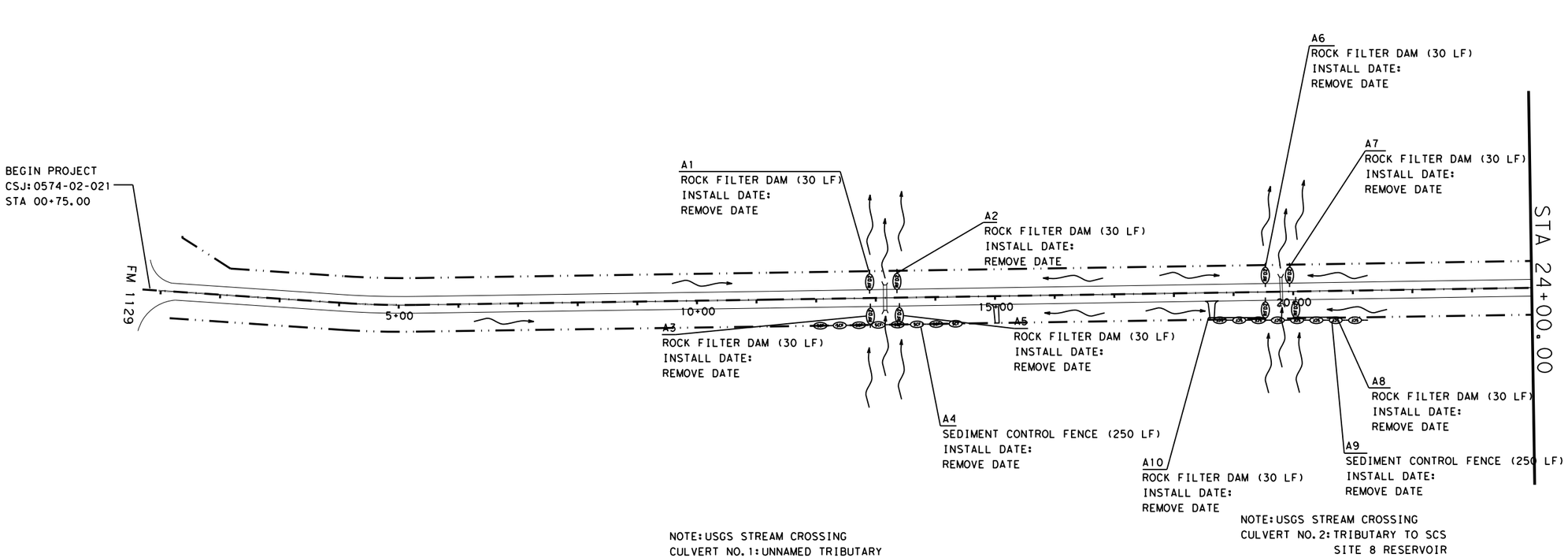
LAST REVISION: 1/15/15

 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 636
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Navarro	
CONTROL	SECTION	JOB	SHEET NO.
0574	02	021	265



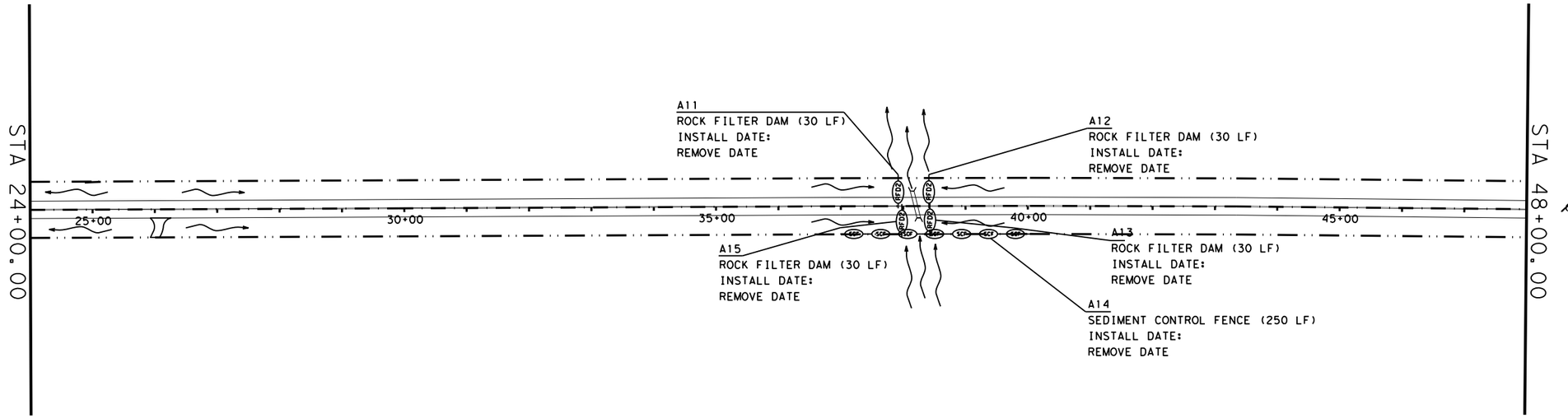
NOTES

BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER



STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
SW3P SITE PLAN

SHEET 1 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		266

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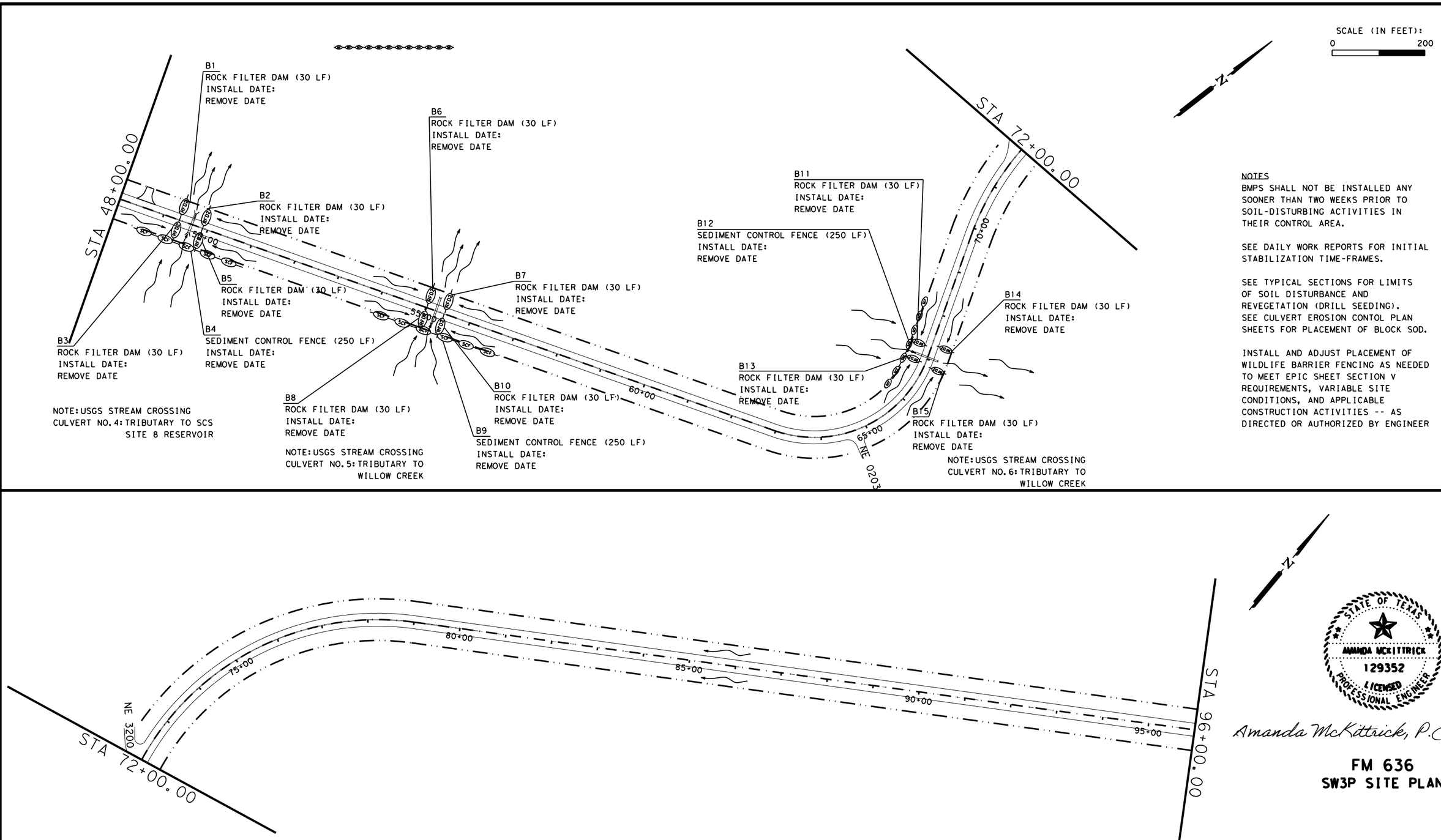

NOTES

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INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER

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Amanda McKittrick, P.E.

FM 636
SW3P SITE PLAN

SHEET 2 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		267

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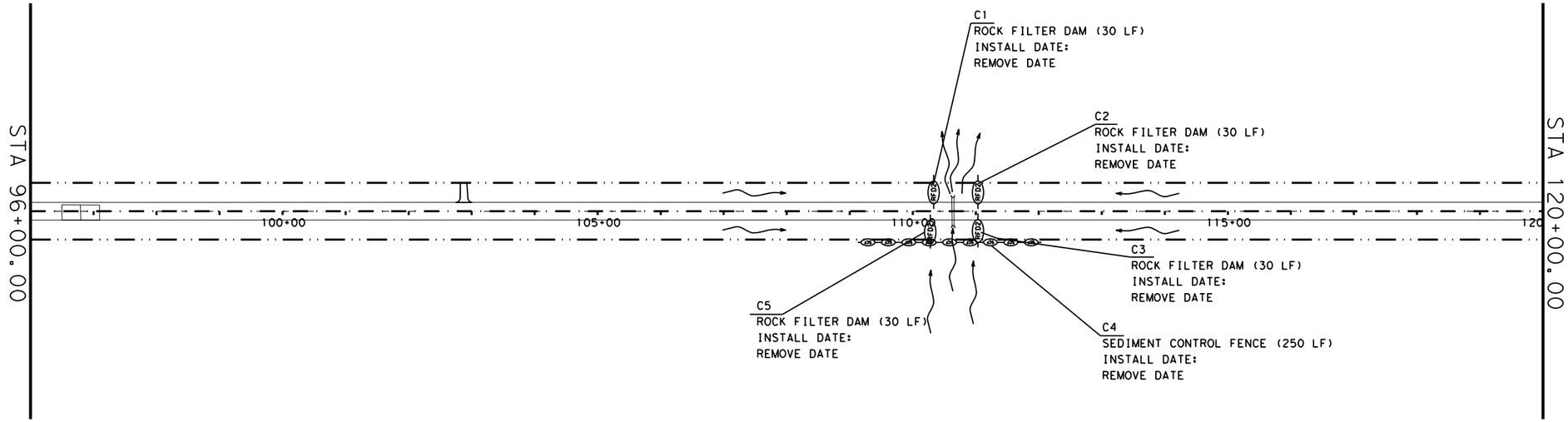


NOTE: USGS STREAM CROSSING
CULVERT NO. 7: WILLOW CREEK

SCALE (IN FEET):
0 200

N

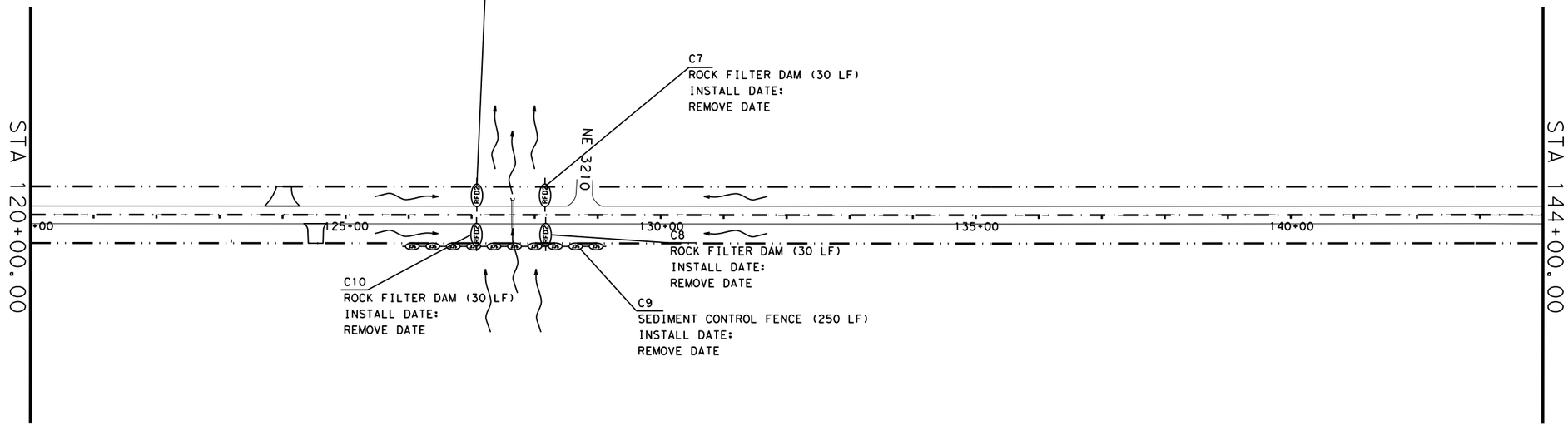
NOTES

BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER



NOTE: USGS STREAM CROSSING
CULVERT NO. 8: TRIBUTARY TO
WILLOW CREEK

N

LEGEND
- SEDIMENT CONTROL FENCE
- ROCK FILTER DAM (TYPE 2)
- FLOW ARROW

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FM 636
SW3P SITE PLAN

SHEET 3 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		268

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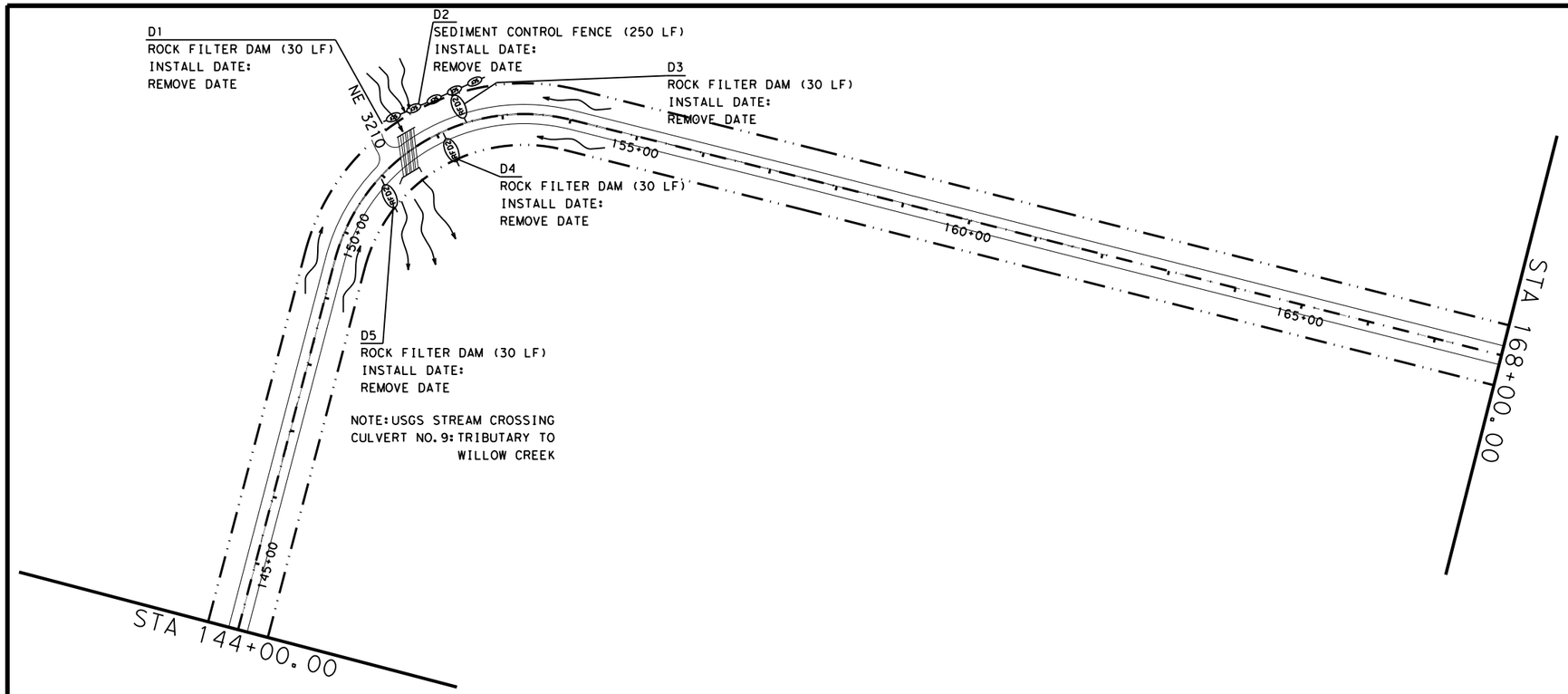

SCALE (IN FEET):
0 200

N

NOTES
BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

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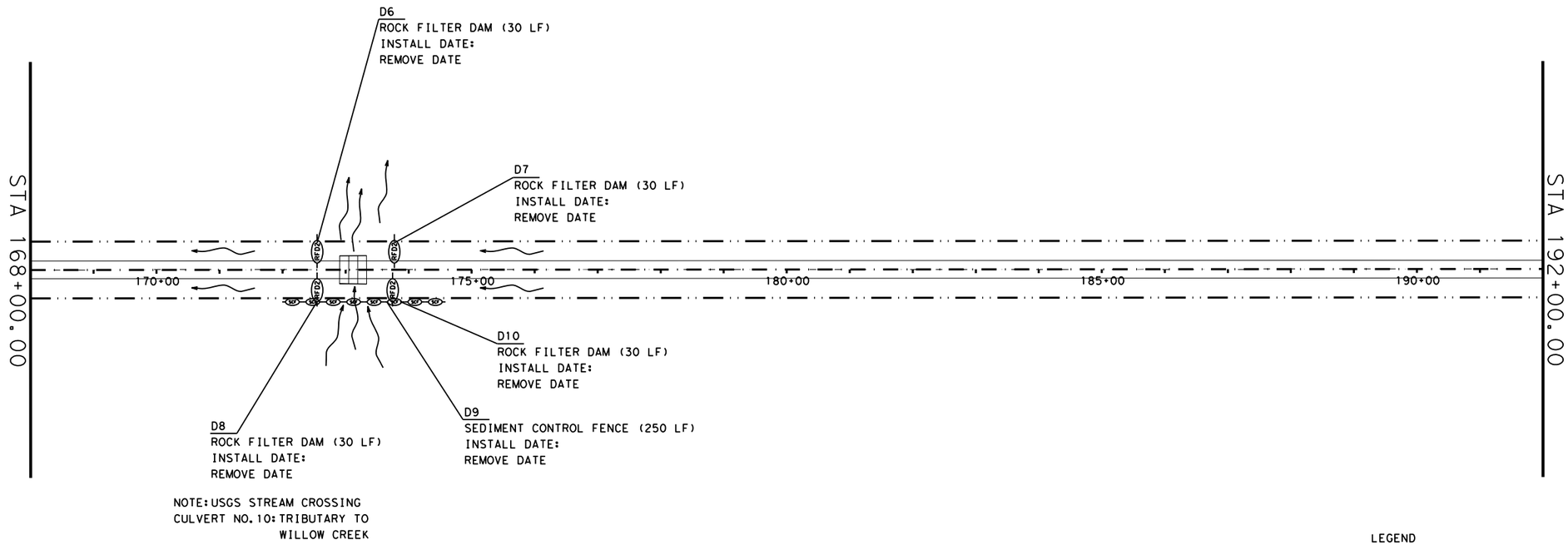
INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER



N

LEGEND
SEDIMENT CONTROL FENCE
ROCK FILTER DAM (TYPE 2)
FLOW ARROW

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SW3P SITE PLAN

SHEET 4 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		269

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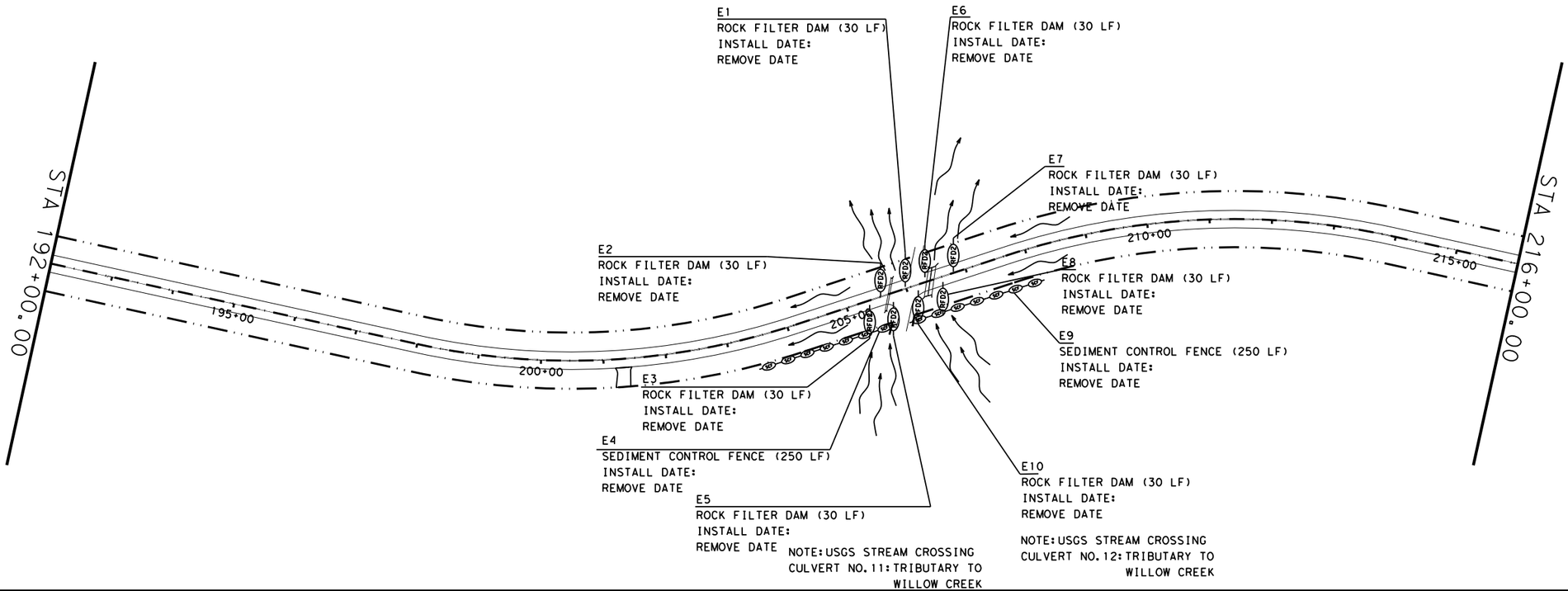

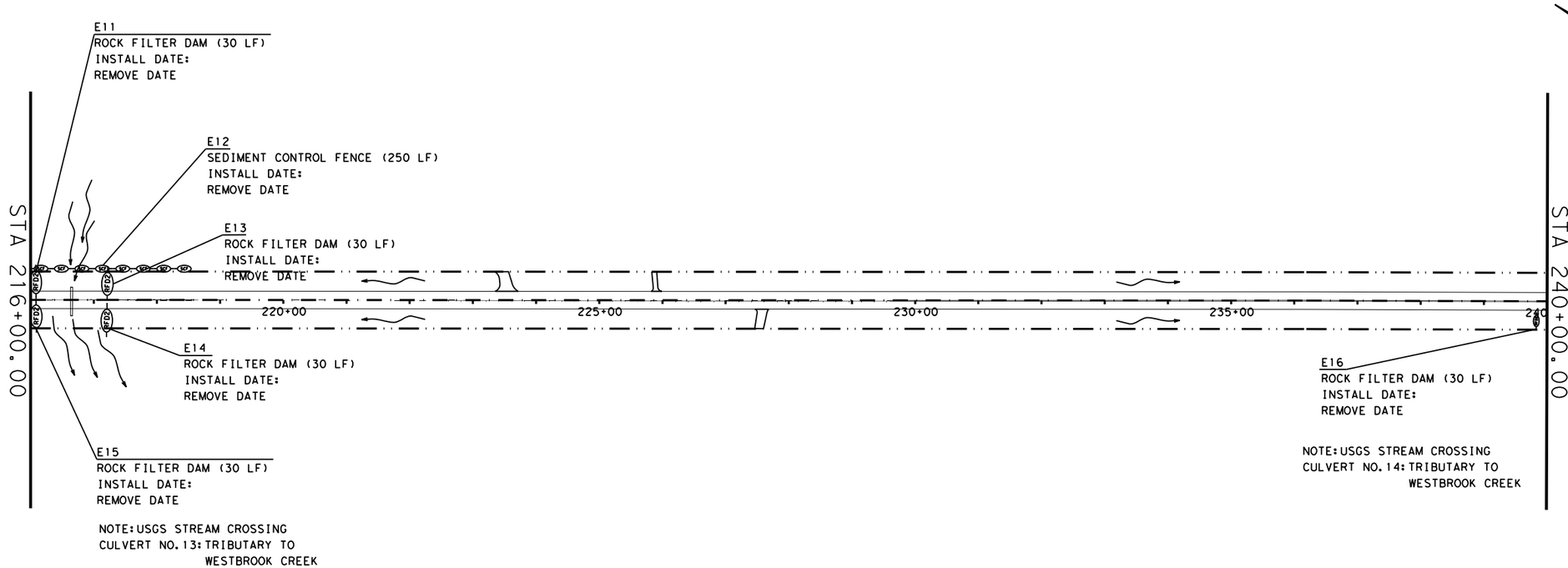

STATE OF TEXAS
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FM 636
SW3P SITE PLAN

SHEET 5 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		270

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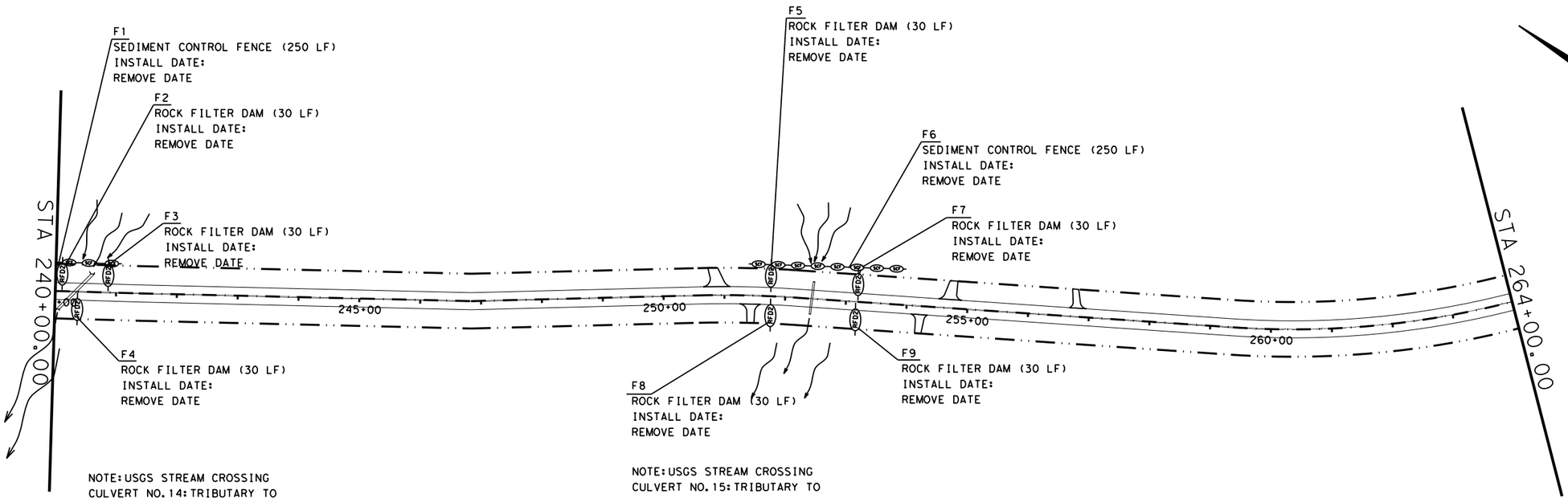


SCALE (IN FEET):
0 200

N

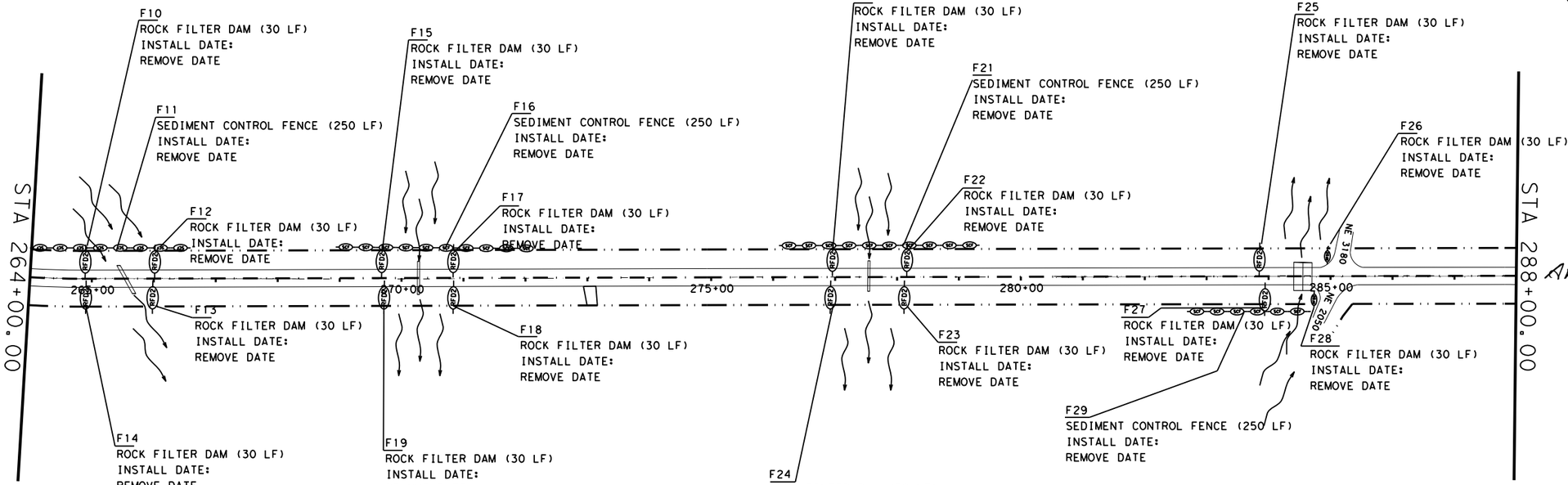
NOTES
BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER

LEGEND
SEDIMENT CONTROL FENCE
ROCK FILTER DAM (TYPE 2)
FLOW ARROW



STATE OF TEXAS
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FM 636
SW3P SITE PLAN

SHEET 6 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		271

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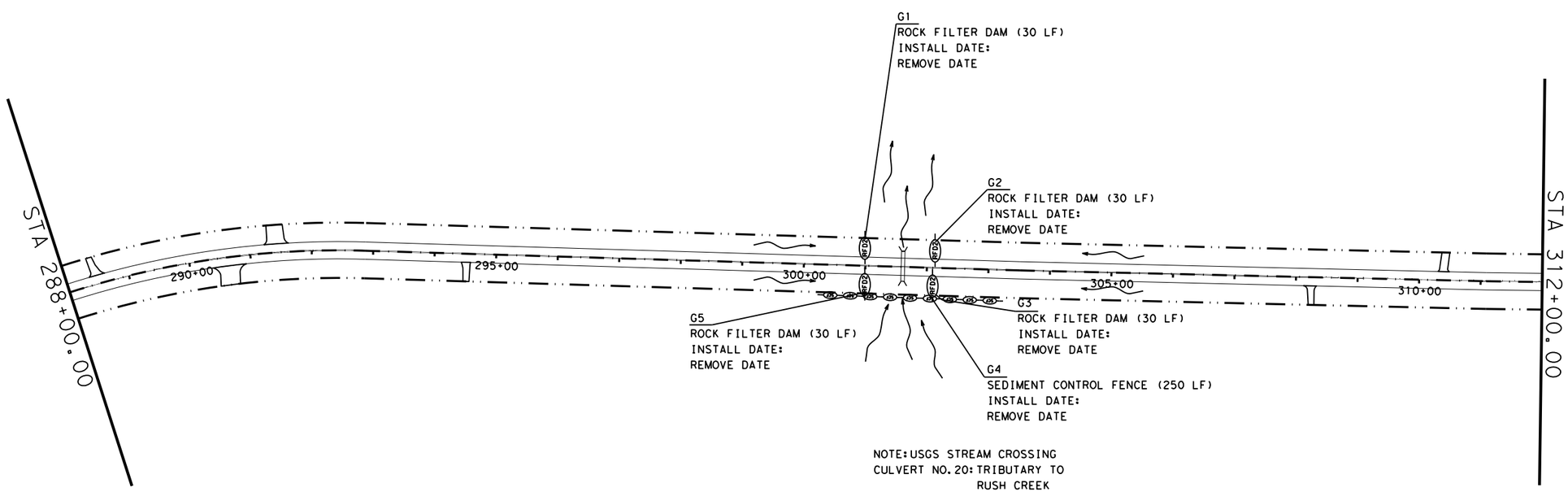

NOTE: USGS STREAM CROSSING CULVERT NO. 20: TRIBUTARY TO RUSH CREEK

SCALE (IN FEET):
0 200

N

NOTES
BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

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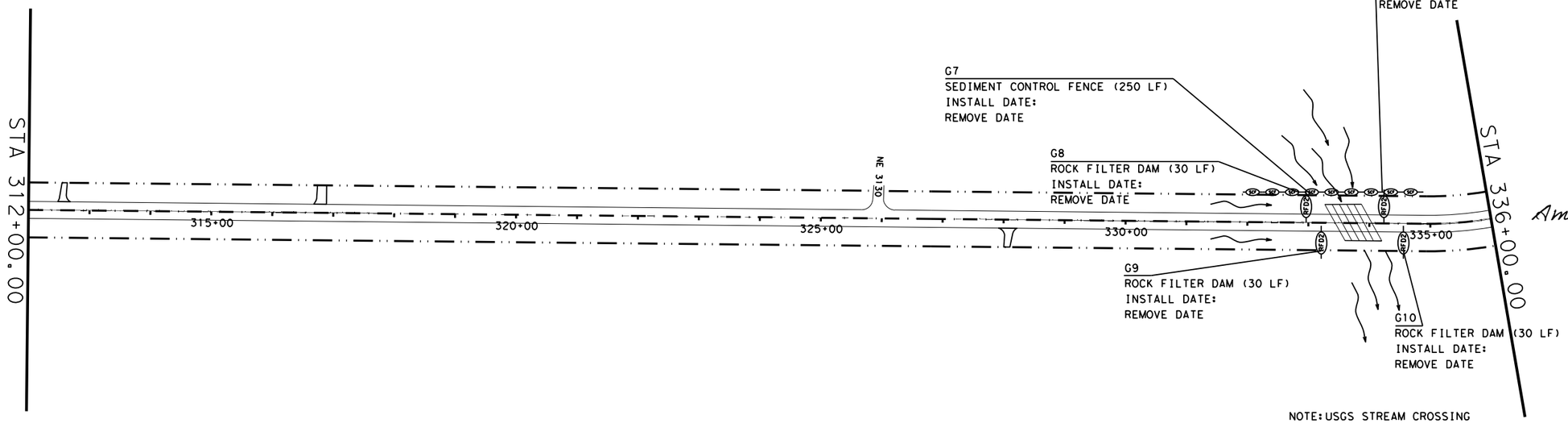

NOTE: USGS STREAM CROSSING CULVERT NO. 21: TRIBUTARY TO RUSH CREEK

N

LEGEND
SEDIMENT CONTROL FENCE
ROCK FILTER DAM (TYPE 2)
FLOW ARROW

STATE OF TEXAS
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FM 636
SW3P SITE PLAN

SHEET 7 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		272

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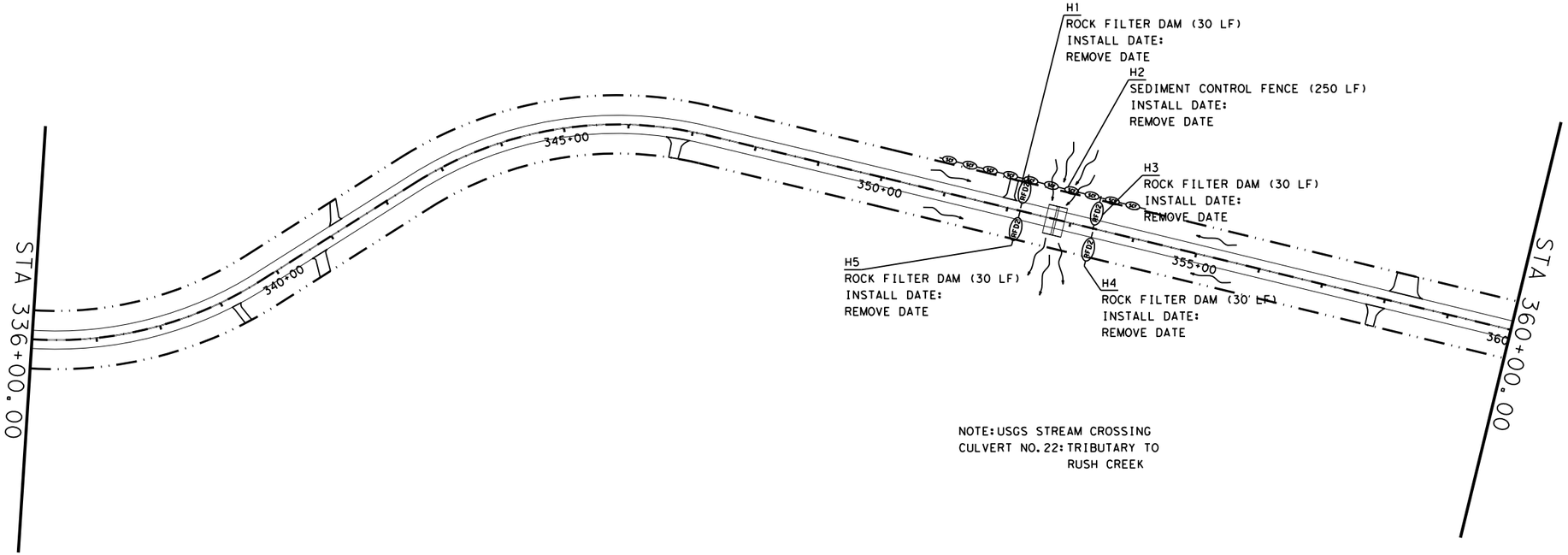

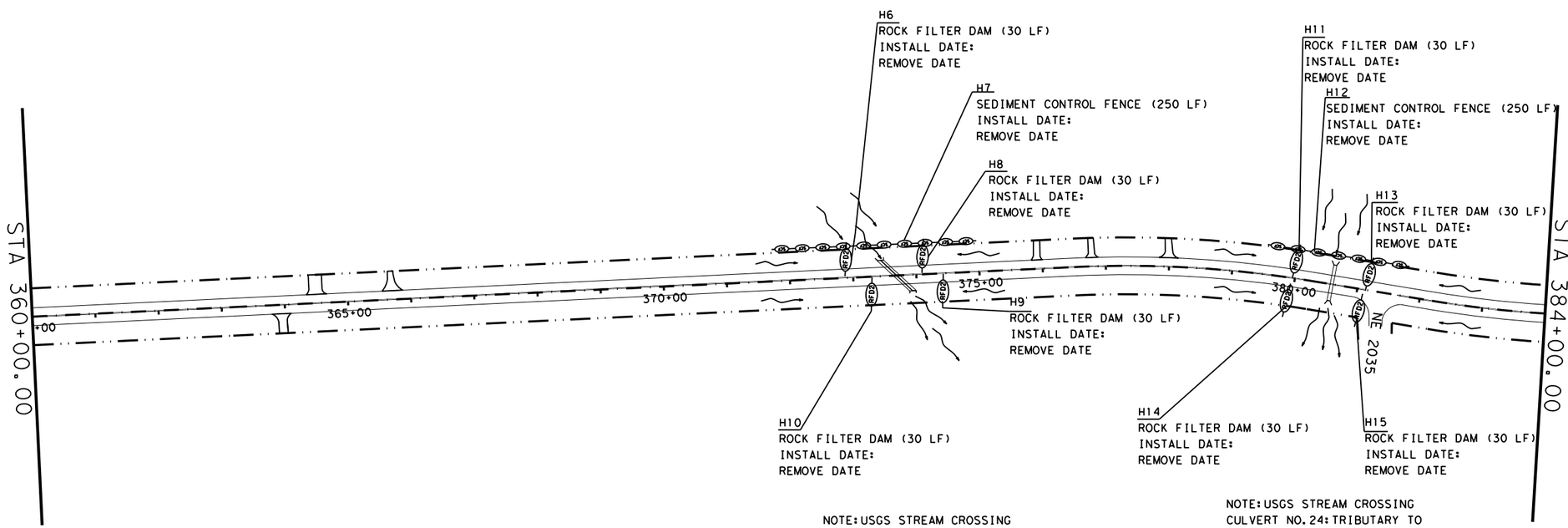

SCALE (IN FEET):
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N

NOTES
BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER

LEGEND
SEDIMENT CONTROL FENCE
ROCK FILTER DAM (TYPE 2)
FLOW ARROW

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
SW3P SITE PLAN

SHEET 8 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		273

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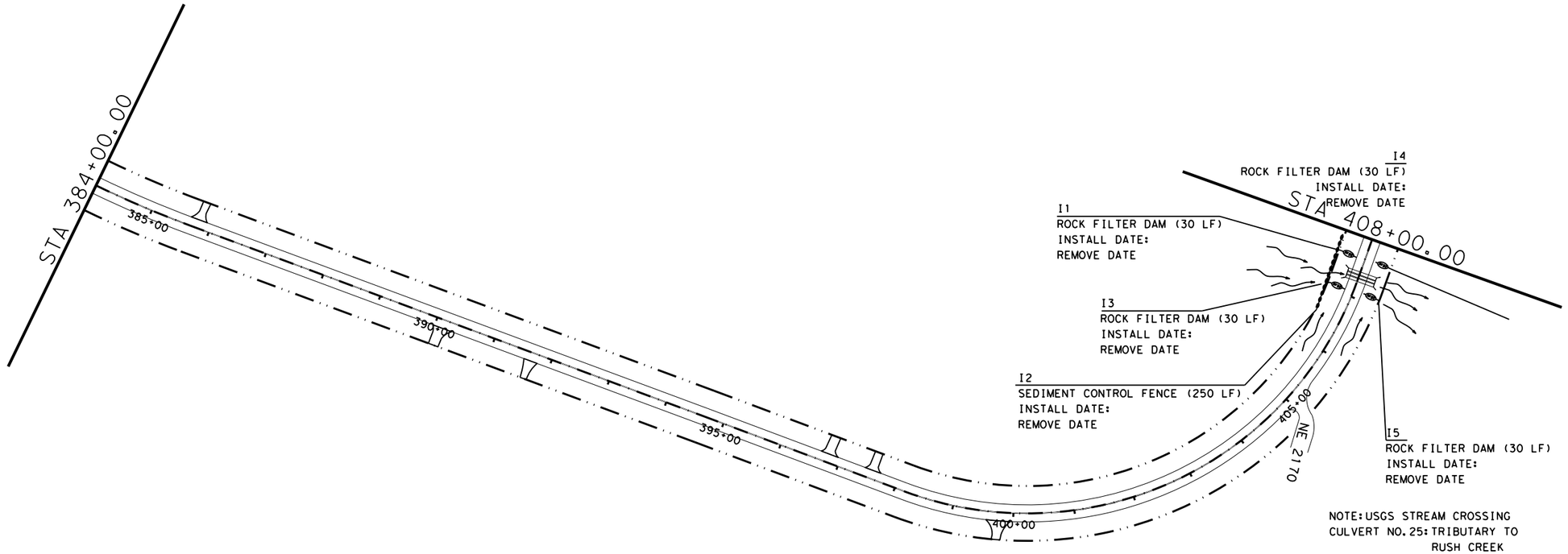

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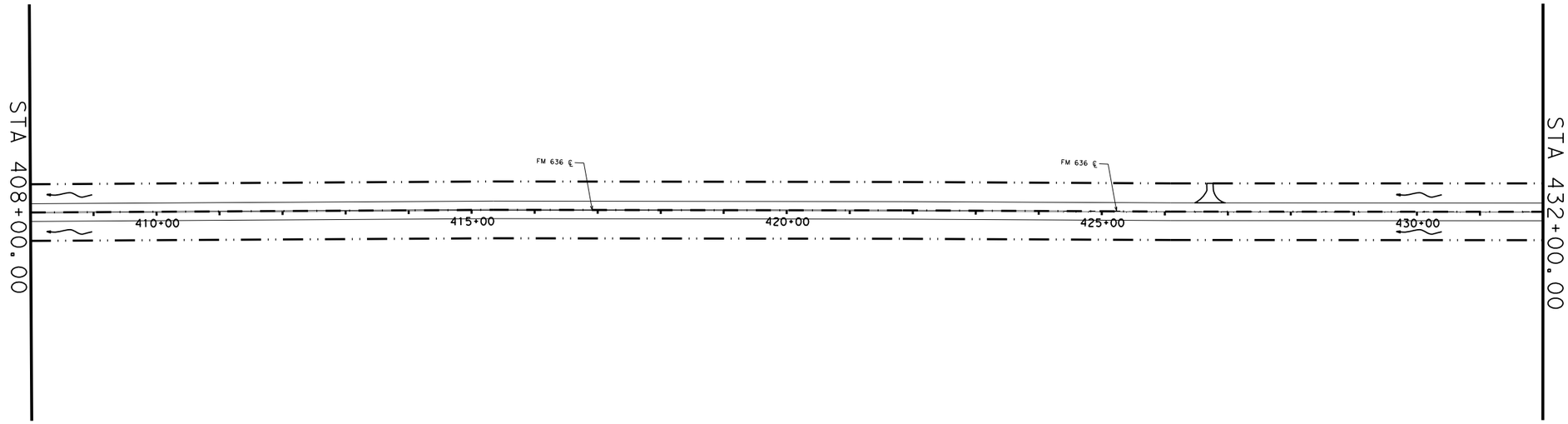
NOTES
BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER



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LEGEND
SEDIMENT CONTROL FENCE
ROCK FILTER DAM (TYPE 2)
FLOW ARROW

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
SW3P SITE PLAN

SHEET 9 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
DAL	NAVARRO		274

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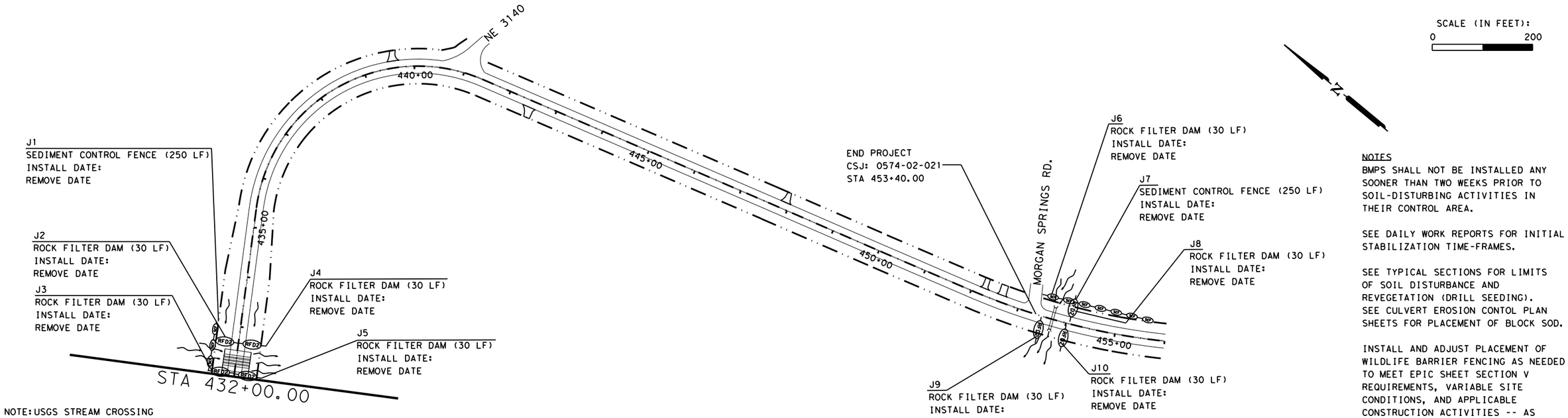

NOTE: USGS STREAM CROSSING CULVERT NO. 26: TRIBUTARY TO RUSH CREEK

NOTE: USGS STREAM CROSSING CULVERT NO. 27: TRIBUTARY TO RUSH CREEK

NOTES

BMPS SHALL NOT BE INSTALLED ANY SOONER THAN TWO WEEKS PRIOR TO SOIL-DISTURBING ACTIVITIES IN THEIR CONTROL AREA.

SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME-FRAMES.

SEE TYPICAL SECTIONS FOR LIMITS OF SOIL DISTURBANCE AND REVEGETATION (DRILL SEEDING). SEE CULVERT EROSION CONTOL PLAN SHEETS FOR PLACEMENT OF BLOCK SOD.

INSTALL AND ADJUST PLACEMENT OF WILDLIFE BARRIER FENCING AS NEEDED TO MEET EPIC SHEET SECTION V REQUIREMENTS, VARIABLE SITE CONDITIONS, AND APPLICABLE CONSTRUCTION ACTIVITIES -- AS DIRECTED OR AUTHORIZED BY ENGINEER

LEGEND

- SF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- FLOW ARROW

STATE OF TEXAS
AMANDA MCKITTRICK
129352
LICENSED
PROFESSIONAL ENGINEER

Amanda McKittrick, P.E.

FM 636
SW3P SITE PLAN

SHEET 10 OF 10

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0574	02	021	FM 636
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		275

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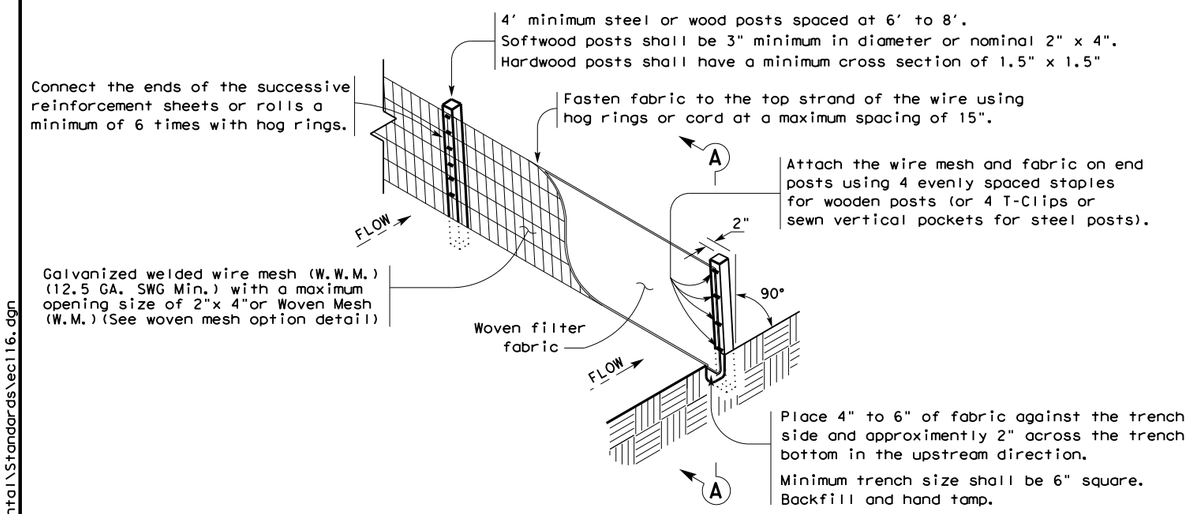
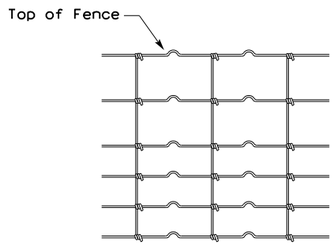
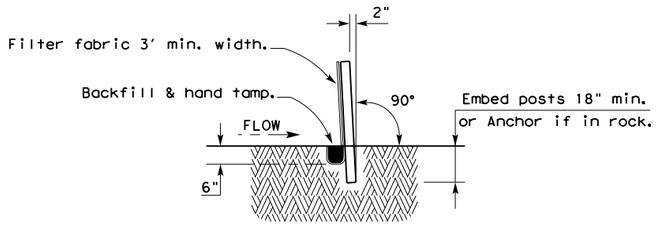


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

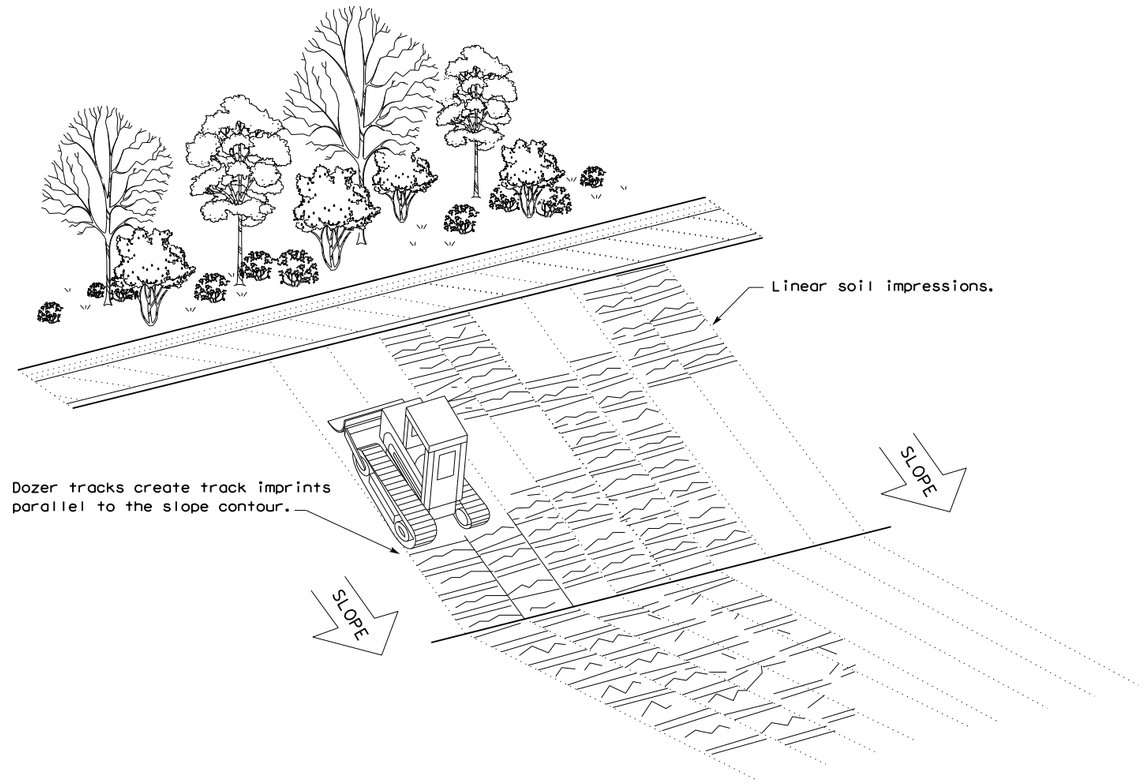
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0574	02	021		FM 636	
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	DAL	NAVARRO			276	

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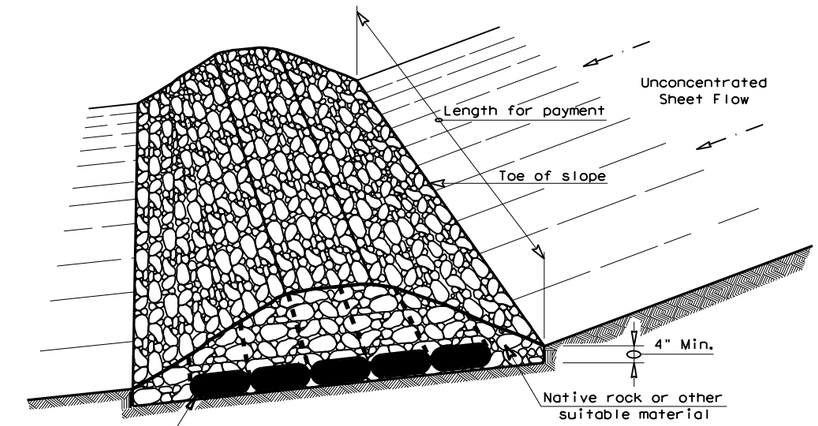
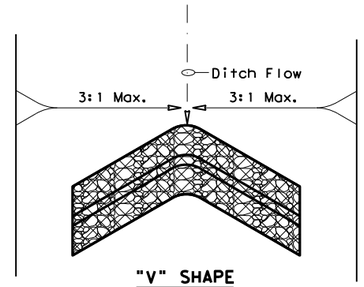
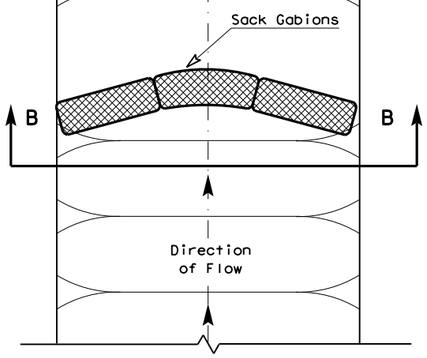


FILTER DAM AT TOE OF SLOPE

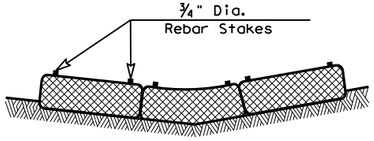
RFD1



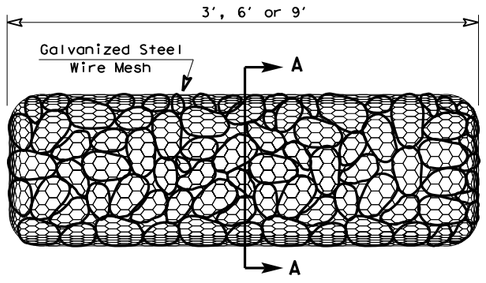
"V" SHAPE
PLAN VIEW



PLAN VIEW

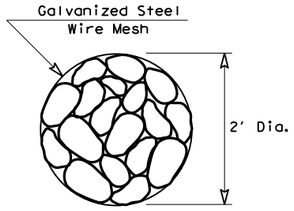


SECTION B-B

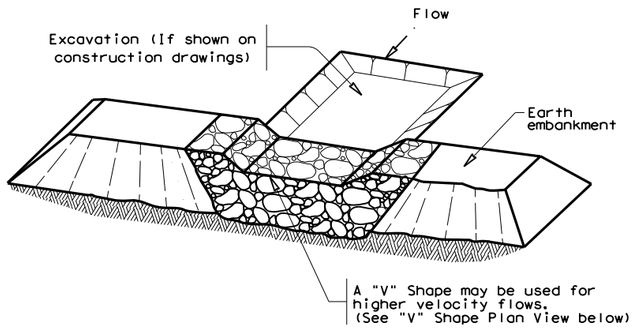


TYPE 4 (SACK GABIONS)

RFD4

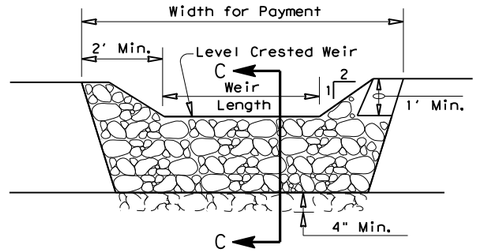


SECTION A-A



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



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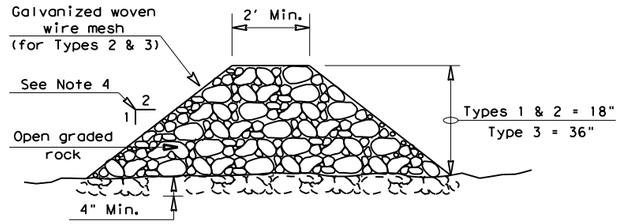
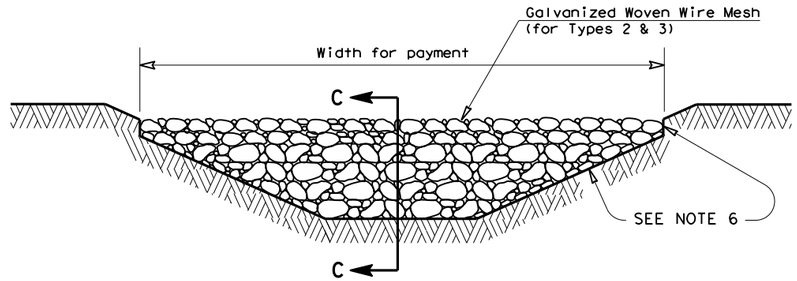


SECTION C-C



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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		277

DATE: 1/7/2021
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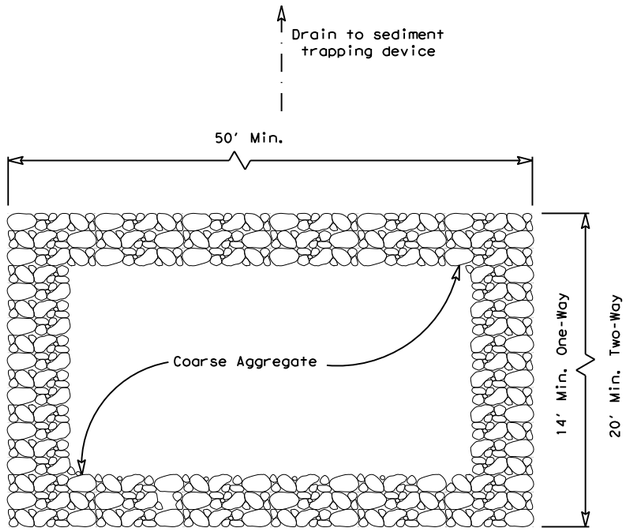

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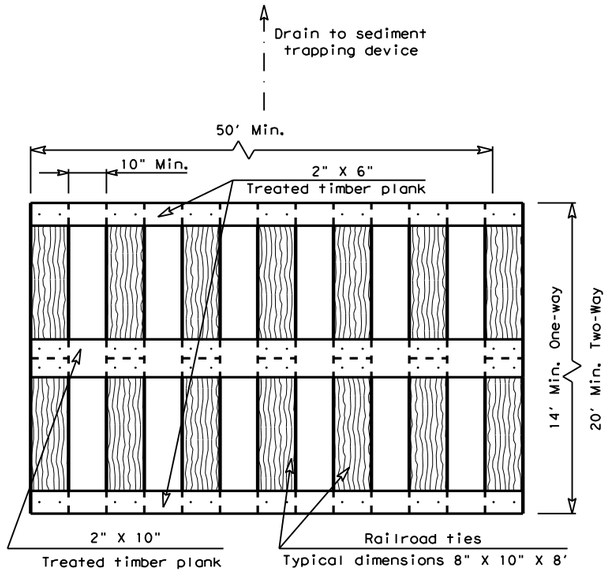

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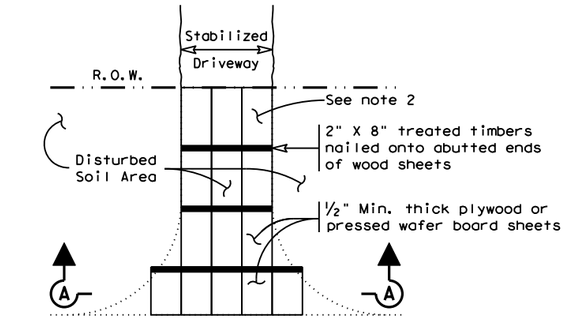

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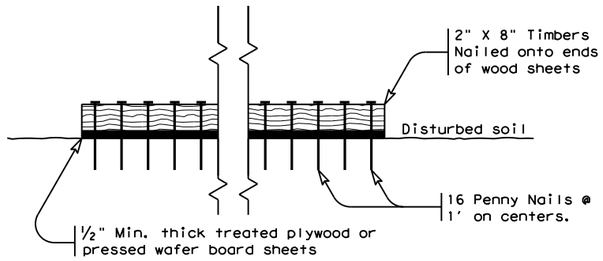
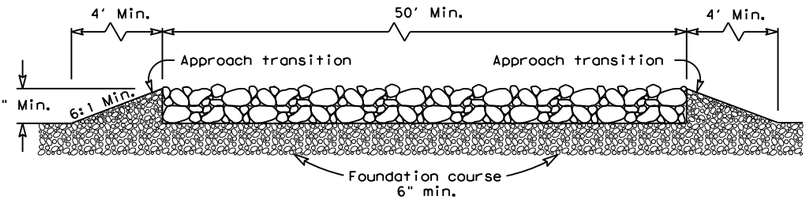


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

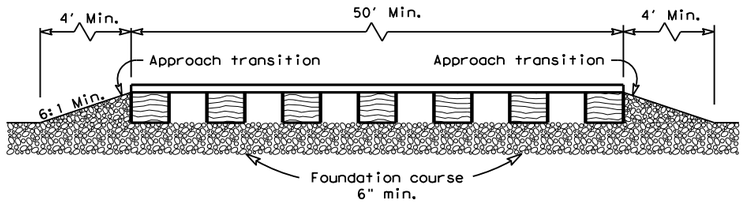
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		278

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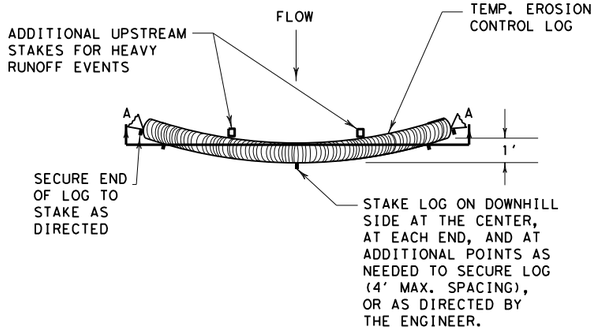

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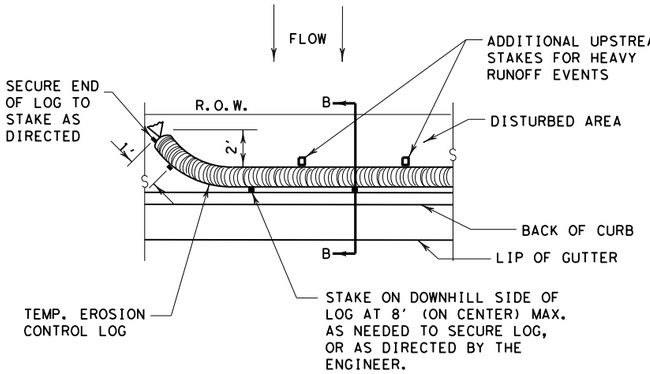

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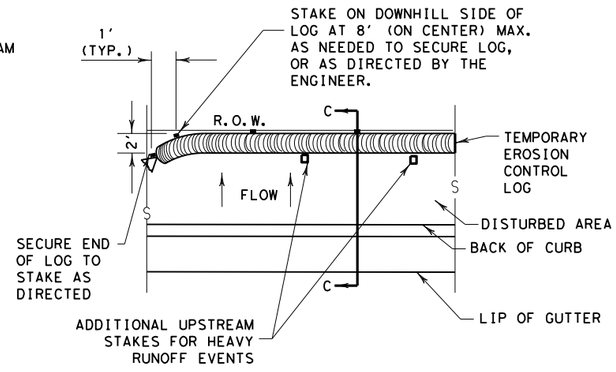

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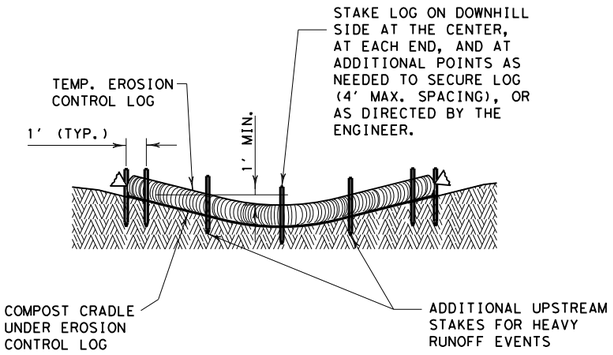
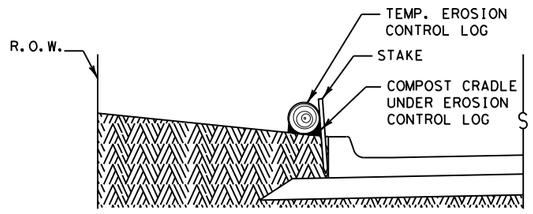


SECTION A-A

EROSION CONTROL LOG DAM

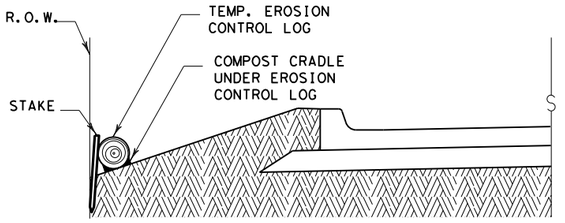
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

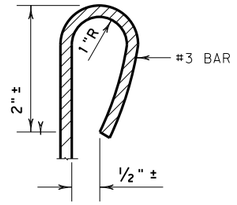
CL-BOC



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.

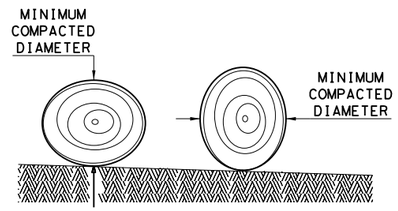
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

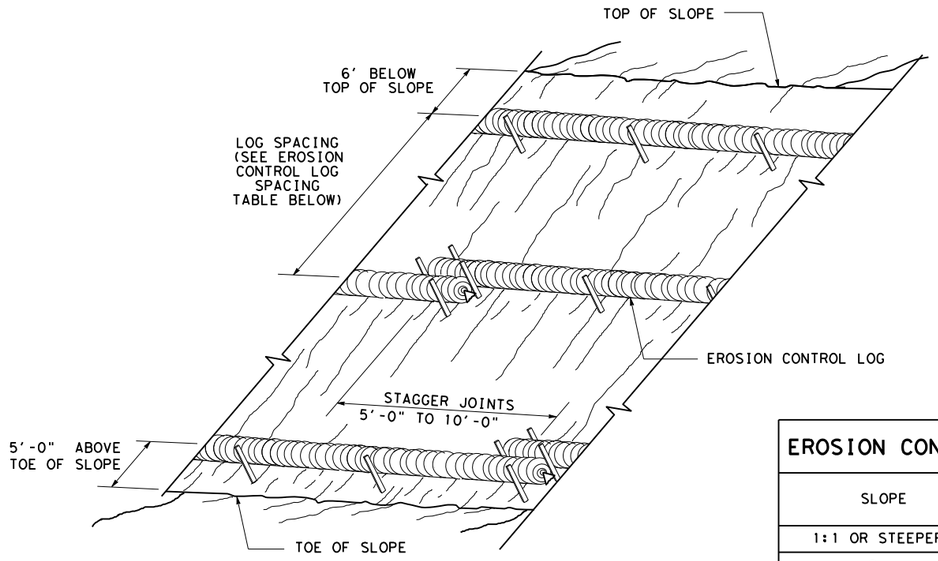
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

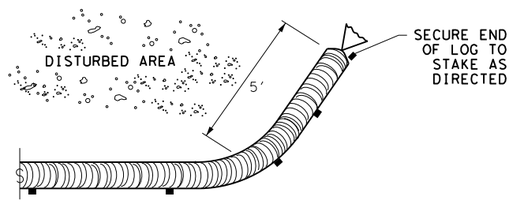
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0574	02	021		FM 636		
	DIST	COUNTY				SHEET NO.	
	DAL	NAVARRO				279	

DATE: 1/8/2021
FILE: pw:\\txdot.projectwiseonline.com:TxDOT5\Documents\18 - DAL\Design Projects\057402021\4 - Design\Plan Set\9. Environmental\Standards\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

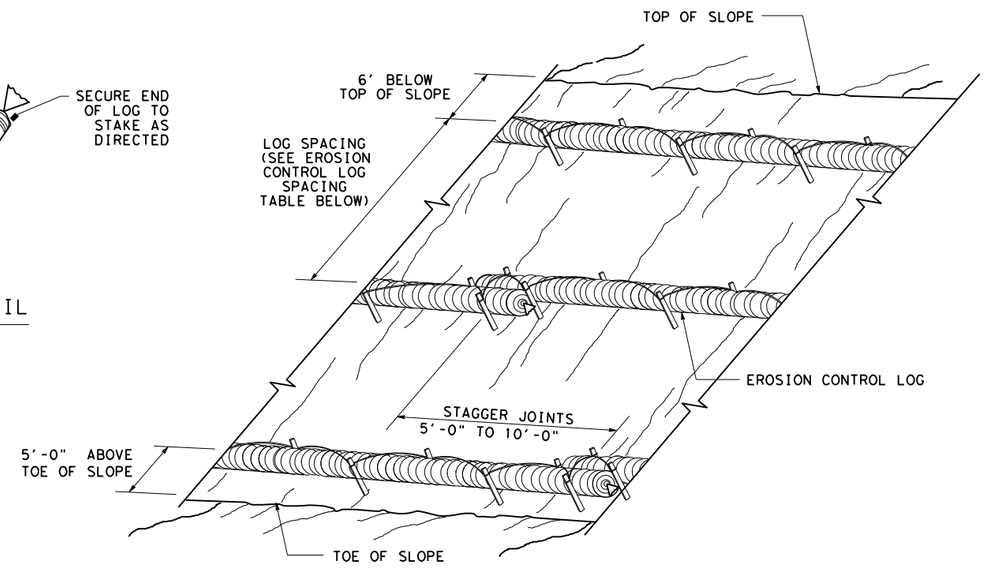
CL-SST



END SECTION RAP DETAIL

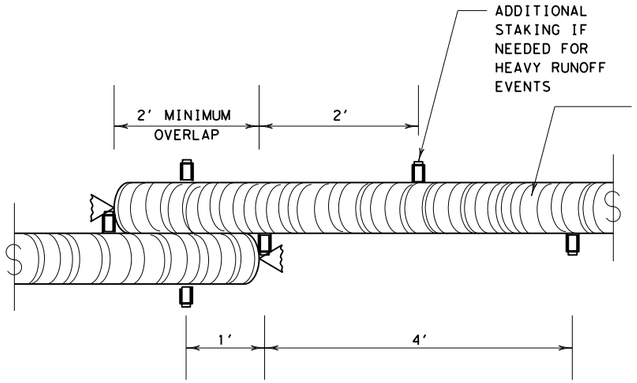
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

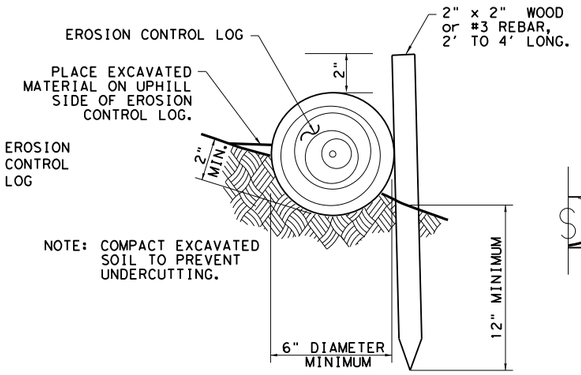
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

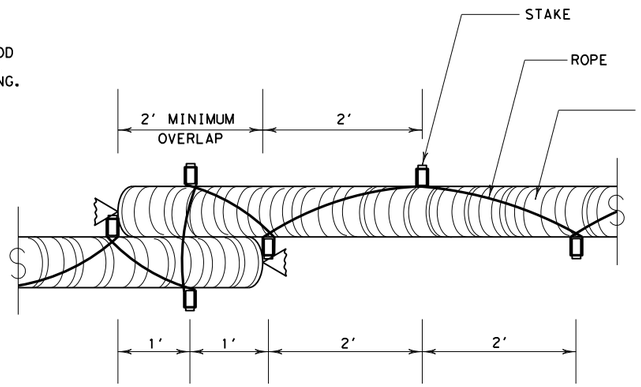


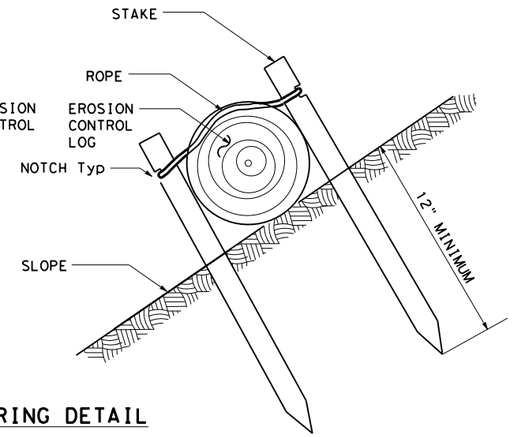


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

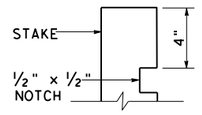
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		280

DATE: 1/8/2021
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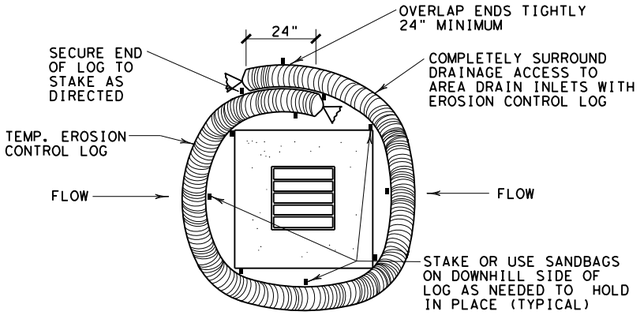
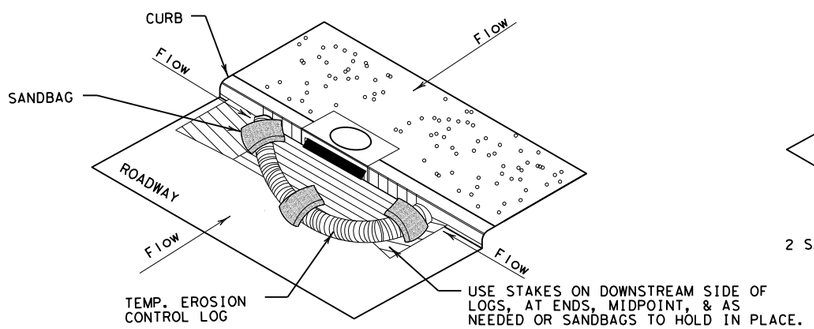


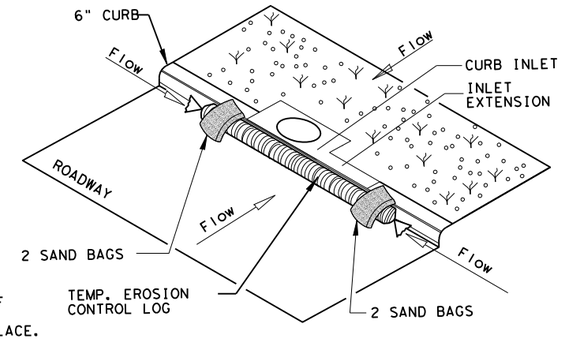
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

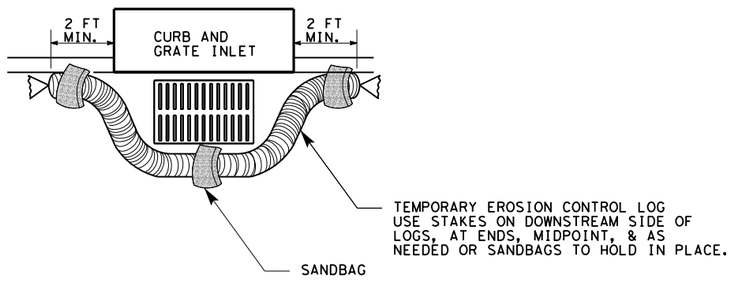
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

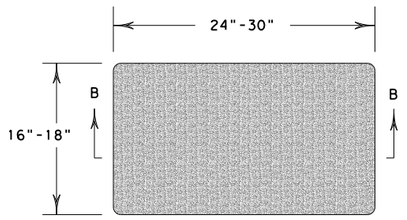
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0574	02	021	FM 636
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		281

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)	Pure Live Seed Rate**	PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN)(CLAY)	Pure Live Seed Rate**	TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)	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					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

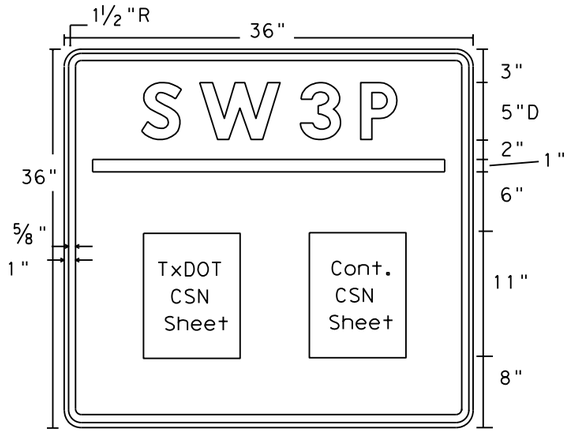
VEGETATION ESTABLISHMENT SHEET

(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		FM 636
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DALLAS	NAVARRO	
CHECK	CONTROL	SECTION	JOB	282
XXX	0574	02	021	
CHECK				
XXX				

DATE



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.

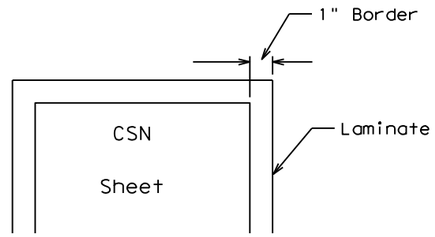
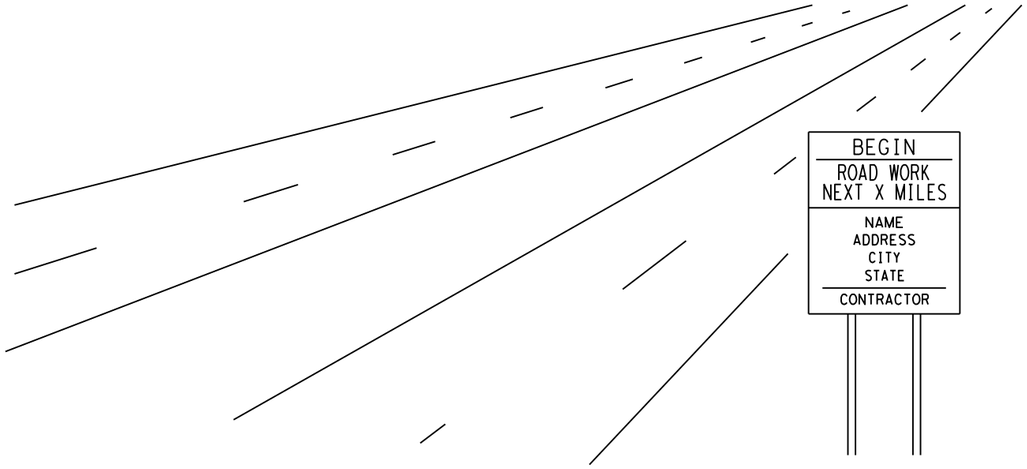
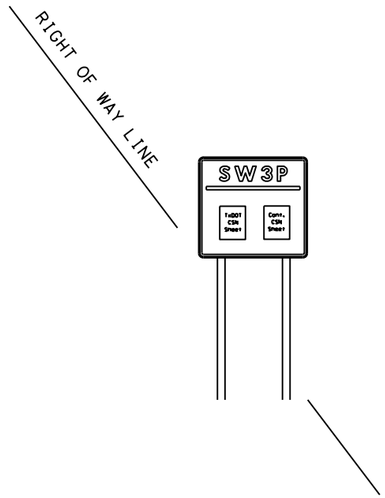


Figure 1





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
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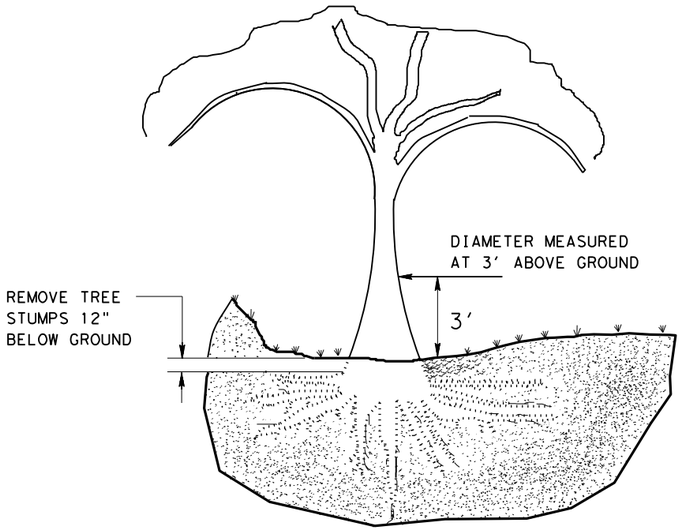
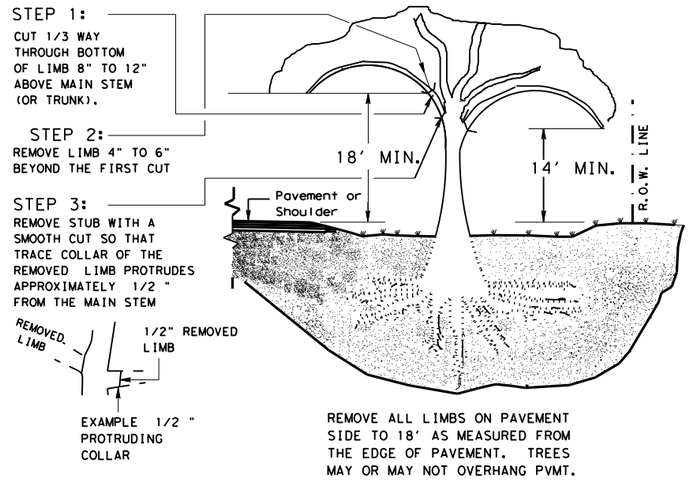
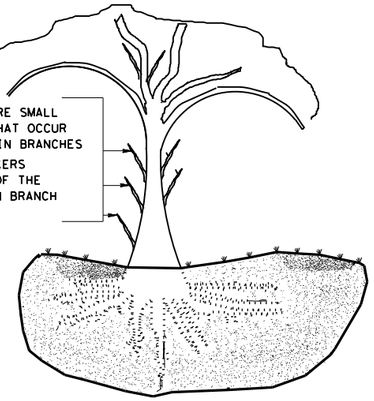
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	NAVARRO	0574	02	021	FM 636

LEVELS DISPLAYED
PATH:

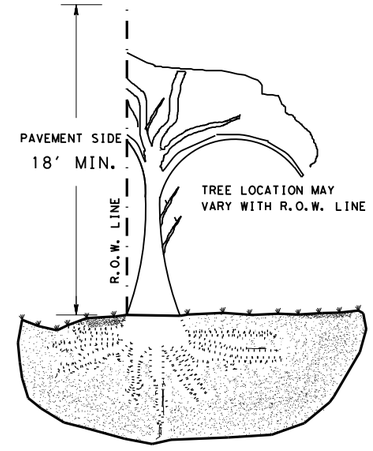


TREE REMOVAL



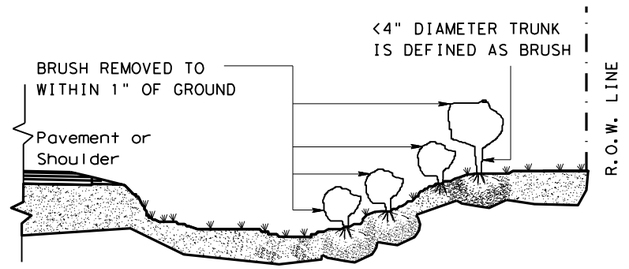


STEPS 1,2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.

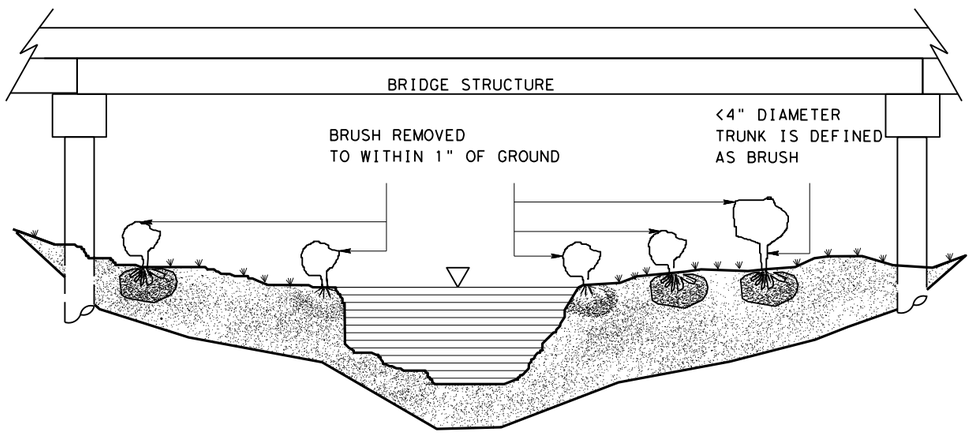


REMOVE ALL LIMBS ON PAVEMENT SIDE TO 18' ABOVE SURROUNDING NATURAL GROUND WHEN TREE IS AT R.O.W.

TREE TRIMMING



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, OVER HANGING THE ROADWAY OR NOT, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 14' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT ARE PRESENTED IN TABLE 1: RANGE FOR PAY ITEMS.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

PAY ITEM	RANGE FOR PAY ITEMS			
	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 6005	4	12	12 1/2	37 1/2
752 6006	12	18	37 1/2	56 1/2
752 6007	18	24	56 1/2	75 1/2
752 6008	24	30	75 1/2	94
752 6009	30	36	94	113
752 6010	36	42	113	132
752 6011	42	48	132	151
752 6012	48	60	151	188 1/2
752 6013	60	72	188 1/2	226
752 6019	72	84	226	264
	84	GREATER THAN 84	264	NOT APPLICABLE

*SEE GENERAL NOTE *3.

Texas Department of Transportation

Maintenance Division Standard

TREE AND BRUSH REMOVAL

TRB-15(1)(DAL)

FILE:	DN: JEO	CK: LJB	DW: JEO	CK:
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Revised to clarify work at the R.O.W. and General Note 1.	DIST	COUNTY		SHEET NO.
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