FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	F 2B23(028)	FM 937

STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
1191	05	009	1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

SEE SHEET 2
FOR INDEX OF SHEETS

DESIGN SPEED: 50 MPH

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NUMBER: F 2B23(028)

FM 937
ROBERTSON COUNTY

TOTAL LENGTH OF PROJECT = 29,103.70 FT= 5.512 MILES

FOR THE CONSTRUCTION OF AN EXISTING ROAD CONSISTING OF 12 FOOT LANES AND 4 FOOT SHOULDERS OF PAVEMENT REHABILITATION AND WIDENING

FINAL PLANS

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

LOCATION NO.	HIGHWAY	CONTROL NO.	LIMITS	2021/2041 ADT	STATION		REFERENCE MARKERS		TOTAL LENGTH (FT)	BRIDGE LENGTH (FT)	RDWY LENGTH (FT)
					FROM	TO	BEGIN	END			
1	FM 937	1191-05-009	FROM: LIMESTONE COUNTY LINE TO: SH 7	785 / 1,099	146+15.00	437+18.70	RM 370 370+0.006	RM 376 376+0.037	29,103.70	000.00	29,103.70

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: 6/2/2023
DocuSigned by: Jeff Miles
589D3E0B31FA4F4...
DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 6/2/2023
DocuSigned by: Doug Jamison, P.E.
DAA3B0B2A1E54F0...
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 6/2/2023
DocuSigned by: Chad Bohne
60E5537715D24EA...
DISTRICT ENGINEER

5/31/2023
STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER
Megan E. Houtchens

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT:
REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)

SHEET		GENERAL INFORMATION
1		TITLE SHEET
2		INDEX OF SHEETS
3		PROJECT LOCATION MAP
4 - 10		PROJECT LAYOUT
11		EXISTING TYPICAL SECTIONS
12 - 14		PROPOSED TYPICAL SECTIONS
15, 15A-15D		GENERAL NOTES
16,16A-16C		ESTIMATE AND QUANTITY
17		SUMMARY OF TCP QUANTITIES
18		SUMMARY OF ROADWAY QUANTITIES
19 - 20		SUMMARY OF DRAINAGE QUANTITIES
21		SUMMARY OF SW3P QUANTITIES
22		SUMMARY OF ILLUMINATION QUANTITIES
23		SUMMARY OF PAVEMENT MARKINGS QUANTITIES
24		SUMMARY OF SIGNING QUANTITIES
25 - 30		SUMMARY OF SMALL SIGNS
		TRAFFIC CONTROL
31		TCP NARRATIVE
32 - 35		TCP TYPICAL SECTIONS
36		TREATMENT FOR VARIOUS EDGE CONDITIONS
		TRAFFIC CONTROL STANDARDS
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49	>>	TCP(2-1)-18
50	>>	TCP(2-2)-18
51	>>	TCP(3-1)-13
52	>>	TCP(3-3)-14
53	>>	TCP(7-1)-13
54	>>	WZ(STPM)-13
55	>>	WZ(RS)-22
56	>>	WZ(UL)-13
57	>>	TCP(S-1)-08A
58	>>	TCP(S-2)-08A
59	>>	TCP(S-2c)-10
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67 - 69		HORIZONTAL & VERTICAL CONTROL
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97 - 99		SIDESTREET PLAN & PROFILE
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101		DRIVEWAY DETAIL
102		MAILBOX TURNOUT DETAIL
		ROADWAY STANDARDS
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104	>>	GF(31)DAT-19
105	>>	MBGF(MS)-19
106	>>	SGT(10S)31-16
107	>>	SGT(11S)31-18
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109	>>	SGT(15)31-20
110	>>	MB(1)-21
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114A	>>	WF(1)-10

SHEET		DRAINAGE
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118		HYDROLOGY DATA SHEET EXISTING CONDITIONS
119		HYDROLOGY DATA SHEET PROPOSED CONDITIONS
120		HYDRAULIC DATA SHEET EXISTING CONDITIONS
121		HYDRAULIC DATA SHEET PROPOSED CONDITIONS
122 - 139		CULVERT LAYOUT
		DRAINAGE STANDARDS
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142	>>	SETP-PD
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145	>>	PB
146	>>	PDD
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		TRAFFIC STANDARDS
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178	**	PM(2)-22
179	**	PM(3)-22
180	**	RS(2)-23
181	**	RS(4)-23
182	**	RS(5)-23
183	**	D&OM(1)-20
184	**	D&OM(2)-20
185	**	D&OM(3)-20
186	**	D&OM(4)-20
187	**	D&OM(5)-20
188	**	SMD(GEN)-08
189	**	SMD(SLIP-1)-08
190	**	SMD(SLIP-2)-08
191	**	SMD(SLIP-3)-08
192	**	TSR(3)-13
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202	**	ED(3)-14
203	**	ED(4)-14
204	**	ED(5)-14
205	**	ED(6)-14
206	**	ED(7)-14
207	**	ED(9)-14
208	**	RID(1)-20
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211	**	RIP(2)-19
212	**	RIP(3)-19
213	**	RIP(4)-19

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215		EPIC
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SHEET		ENVIRONMENTAL STANDARDS
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230	>>	EC(2)-16
231 - 233	>>	EC(9)-16

>> THE STANDARD SHEETS SPECIFALLY IDENTIFIED ABOVE HAVE BEEN SELETED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

MEGAN E. HOUTCHENS P.E. 6/29/2023
MEGAN E. HOUTCHENS DATE

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL, INC.
TBPE FIRM REG. F-2742

** THE STANDARD SHEETS SPECIFALLY IDENTIFIED ABOVE HAVE BEEN SELETED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

ZAHIDUL Q. SIDDIQUE P.E. 6/29/2023
ZAHIDUL Q. SIDDIQUE DATE

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

INDEX OF SHEETS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		2

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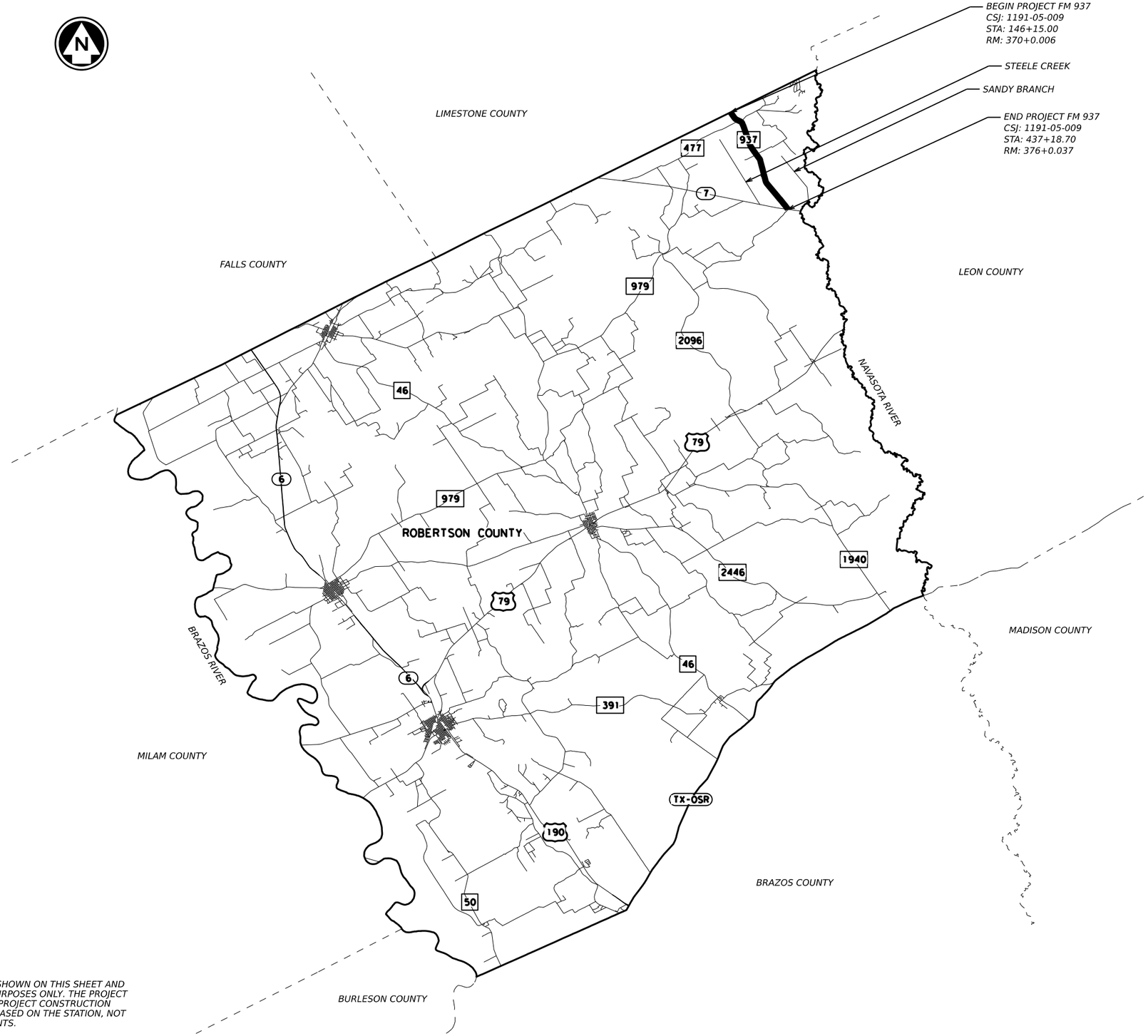

0 2 MI 4 MI

SCALE: 1" = 4 MI

NOTE:

REFERENCE MARKERS AND MILE POINTS SHOWN ON THIS SHEET AND THE TITLE SHEET ARE FOR REFERENCE PURPOSES ONLY. THE PROJECT LIMIT STATIONS SHOWN REPRESENT THE PROJECT CONSTRUCTION LENGTH. THE PROJECT QUANTITIES ARE BASED ON THE STATION, NOT THE REFERENCE MARKERS AND MILE POINTS.

6/21/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LOCATION MAP

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		3

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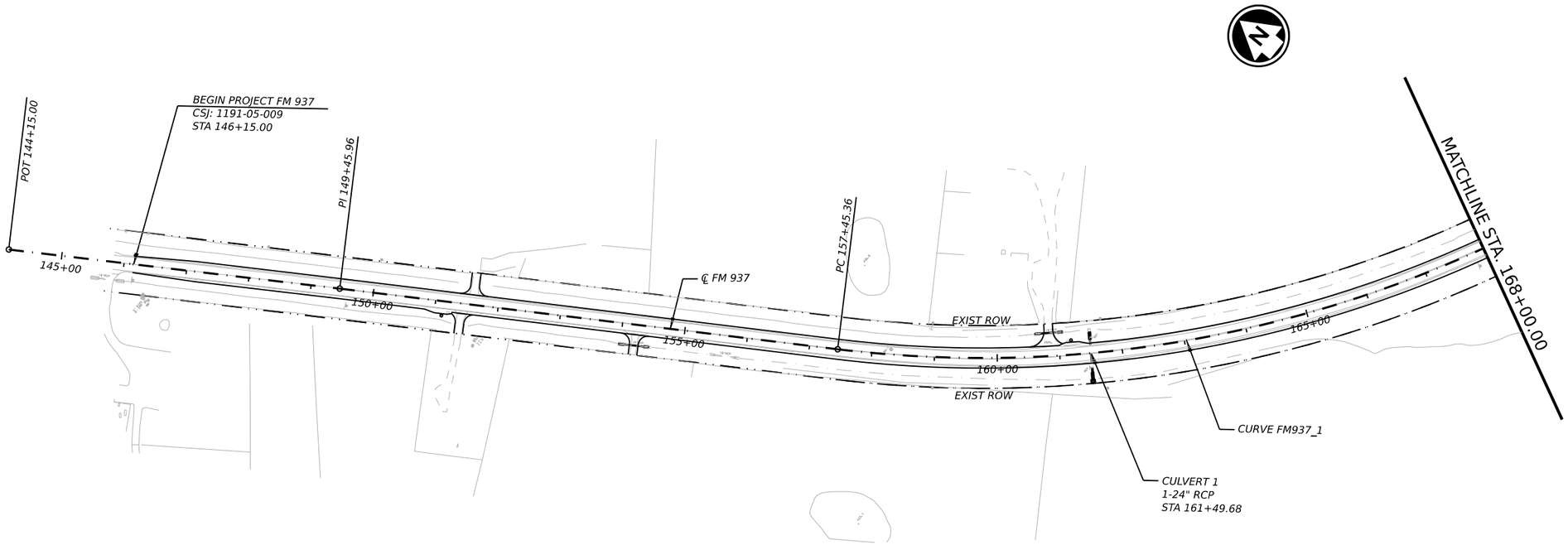

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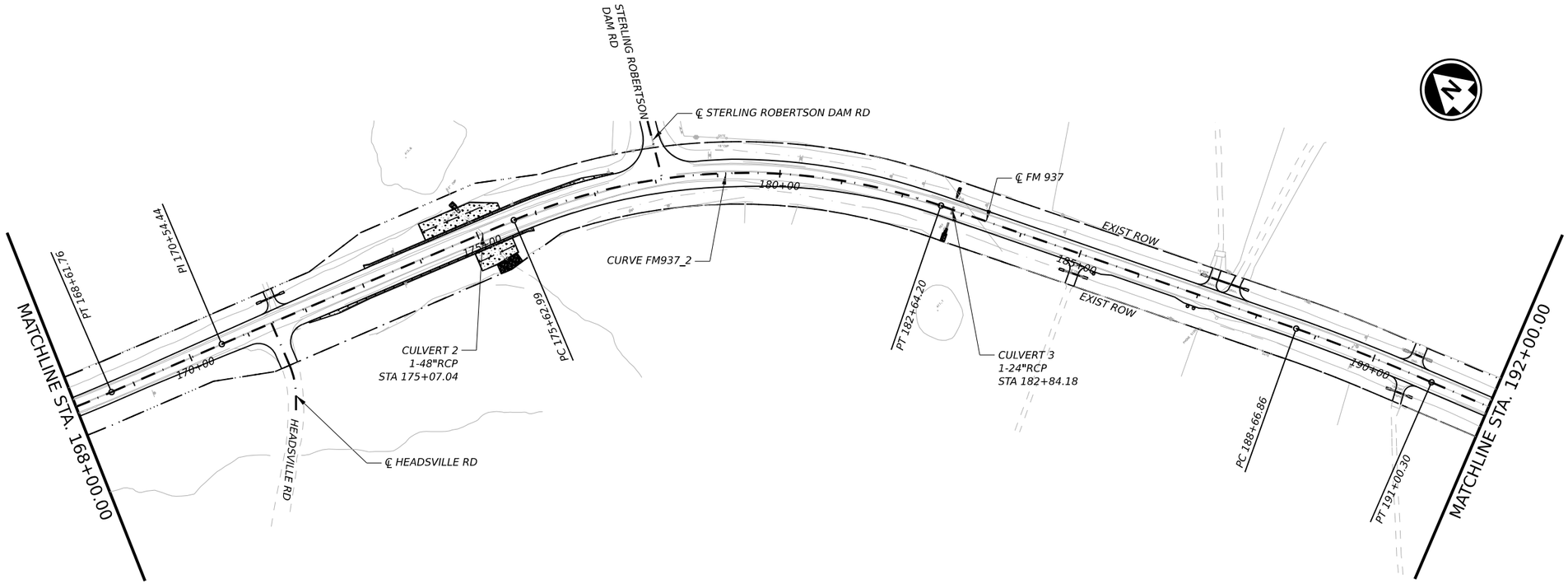

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LAYOUT

(BEGIN TO STA 192+00)

SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		4

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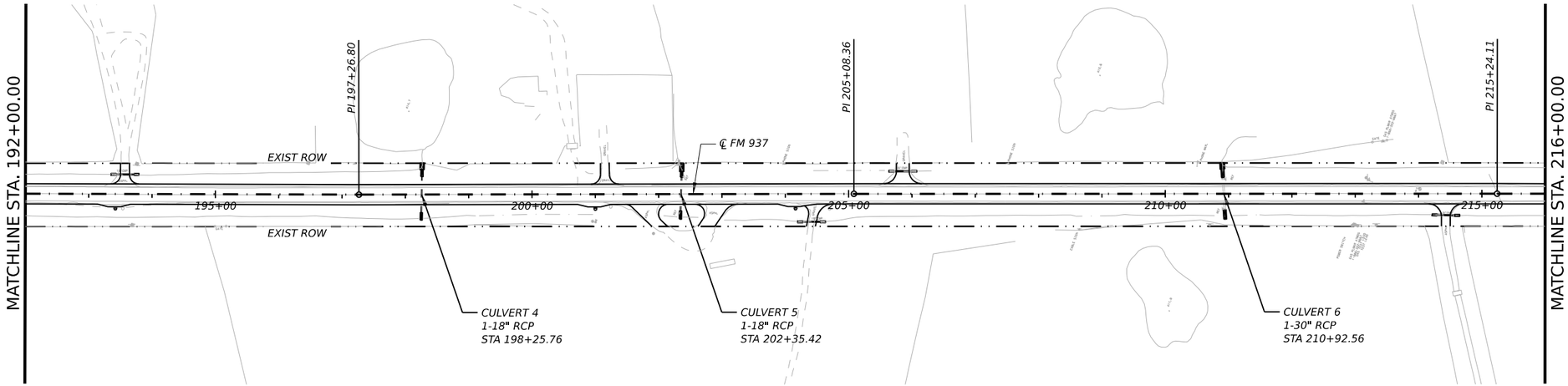

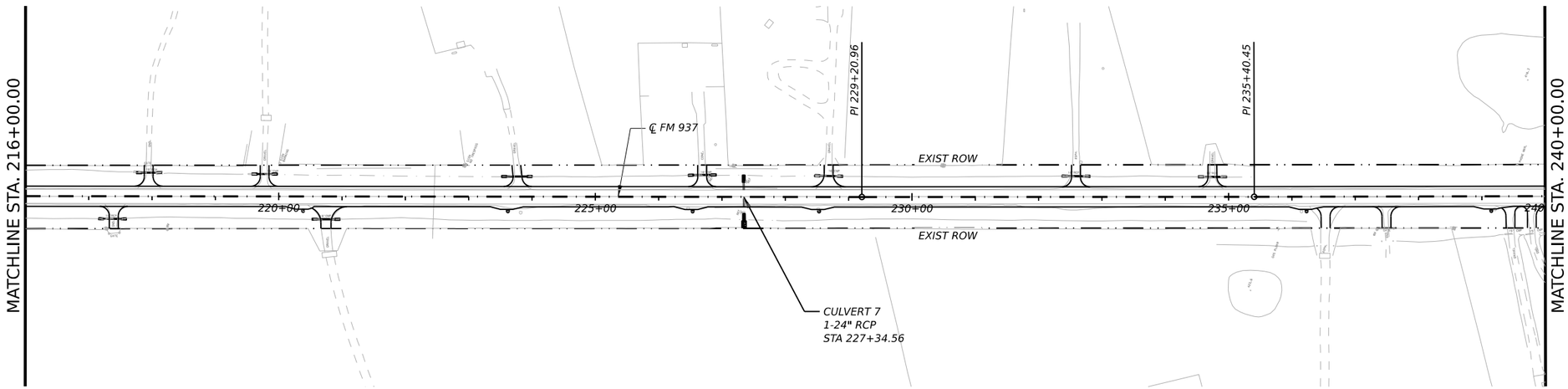

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SCALE: 1" = 200'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LAYOUT

(STA 192+00 TO STA 240+00)

SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		5

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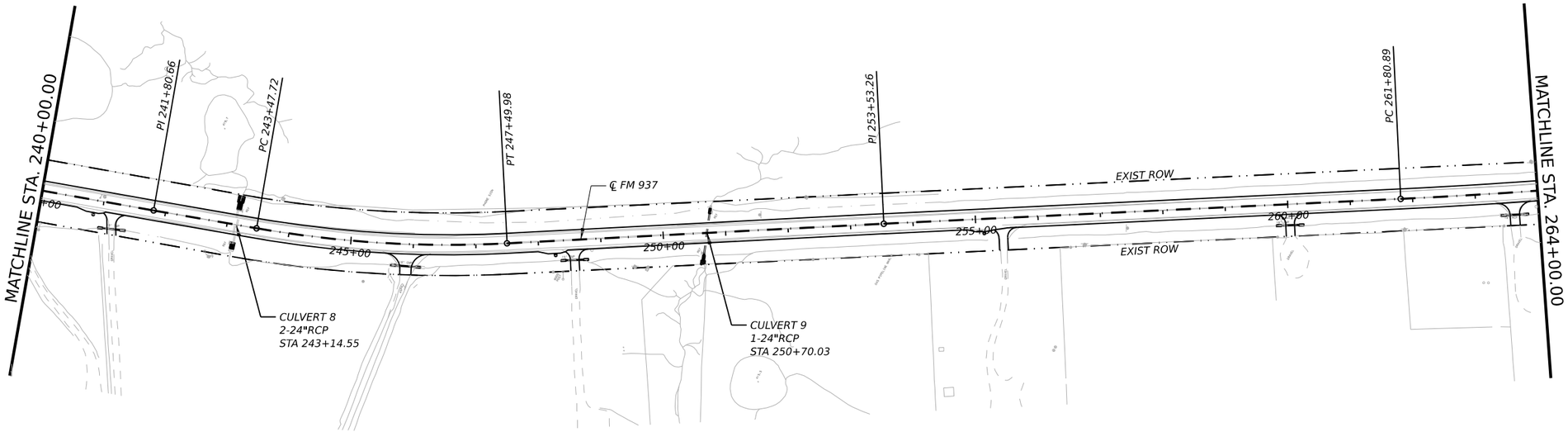

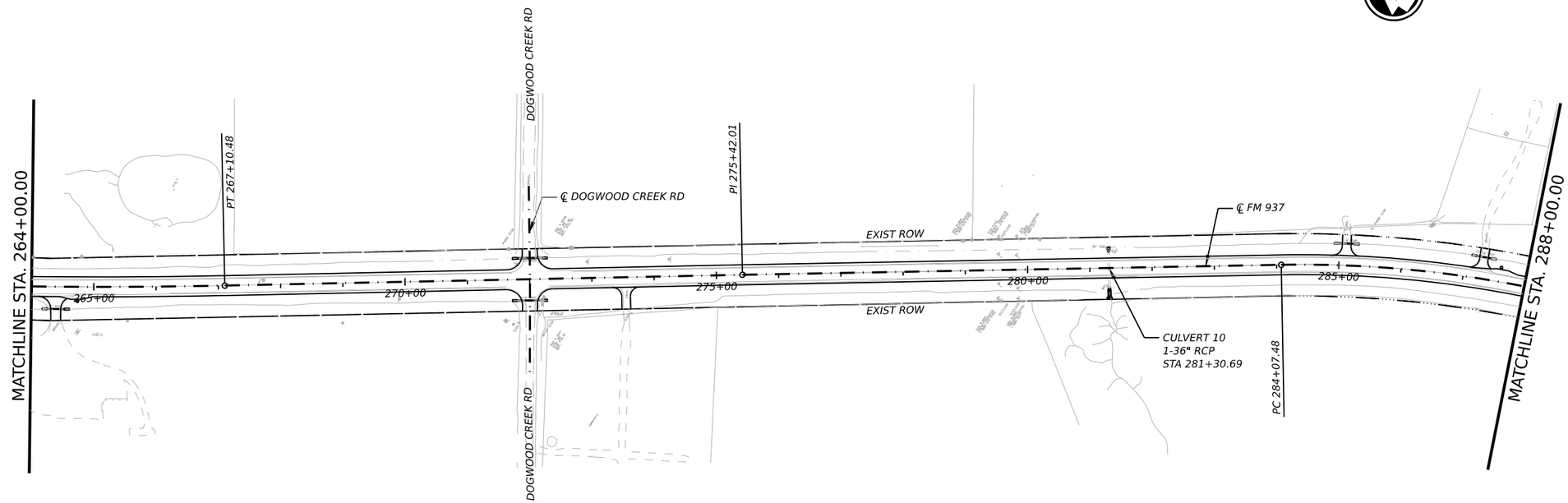

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SCALE: 1" = 200'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

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3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LAYOUT

(STA 240+00 TO STA 288+00)

SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		6

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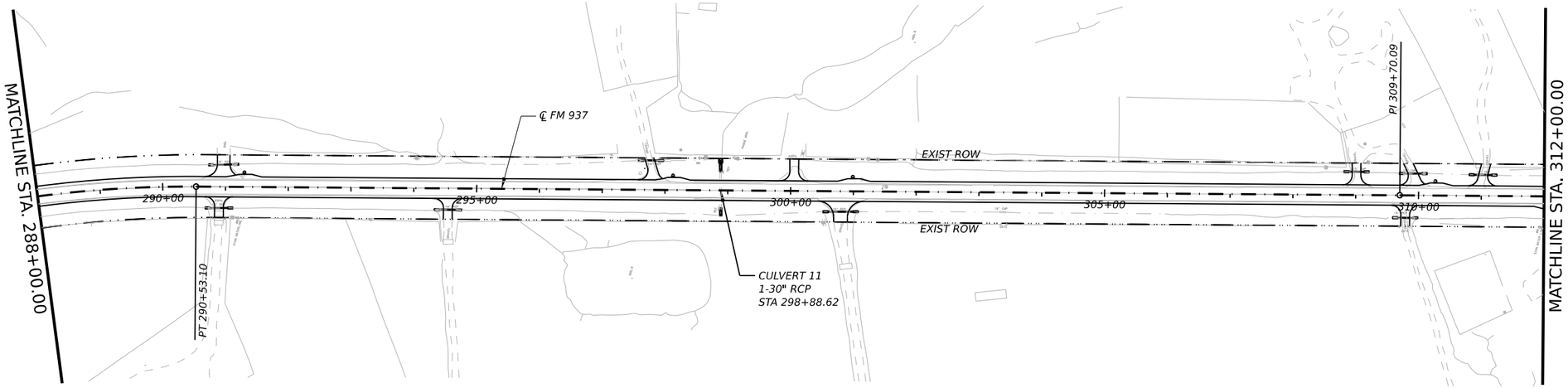

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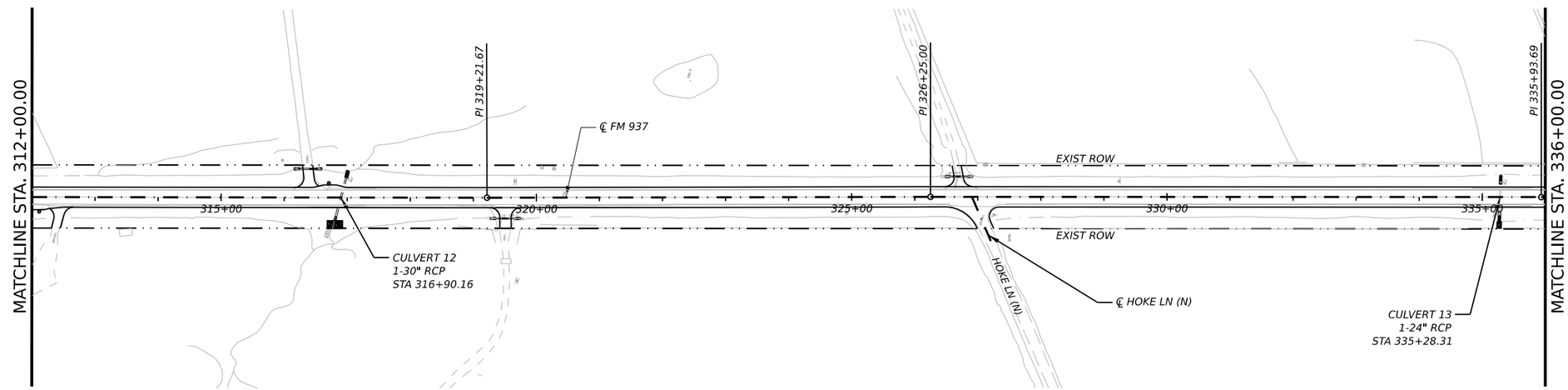

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
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(713) 622-1444

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PROJECT LAYOUT

(STA 288+00 TO STA 336+00)

SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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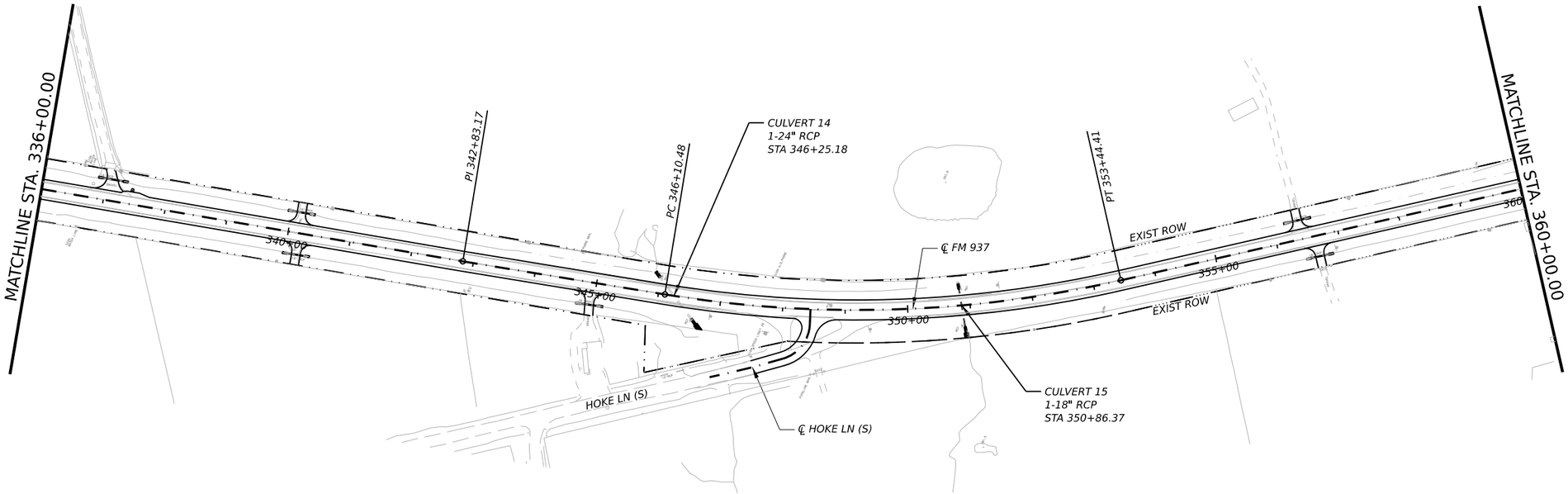

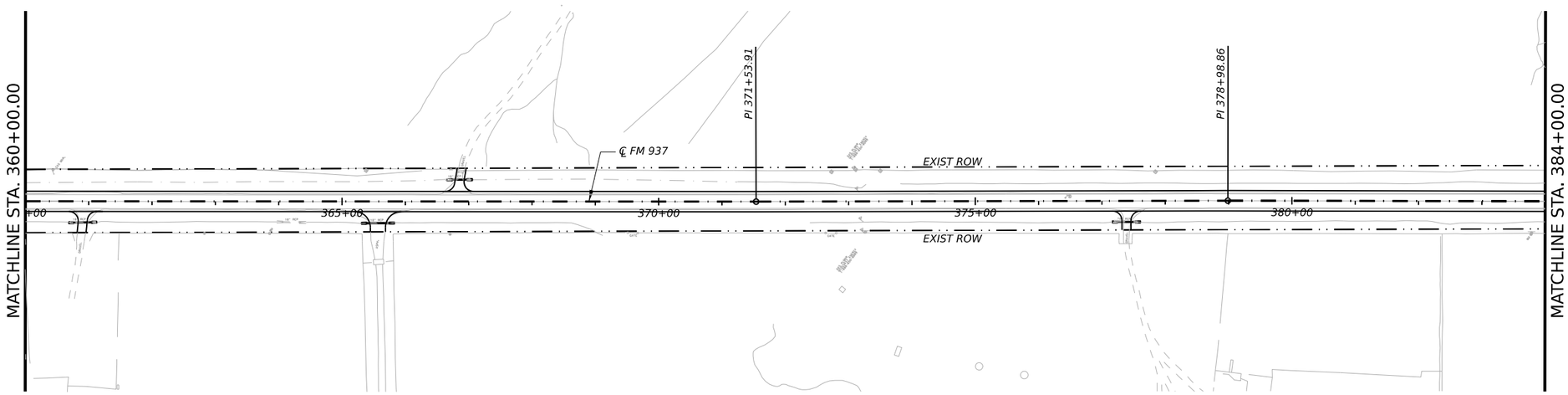

0 100 200

SCALE: 1" = 200'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
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3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LAYOUT

(STA 336+00 TO STA 384+00)

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		8

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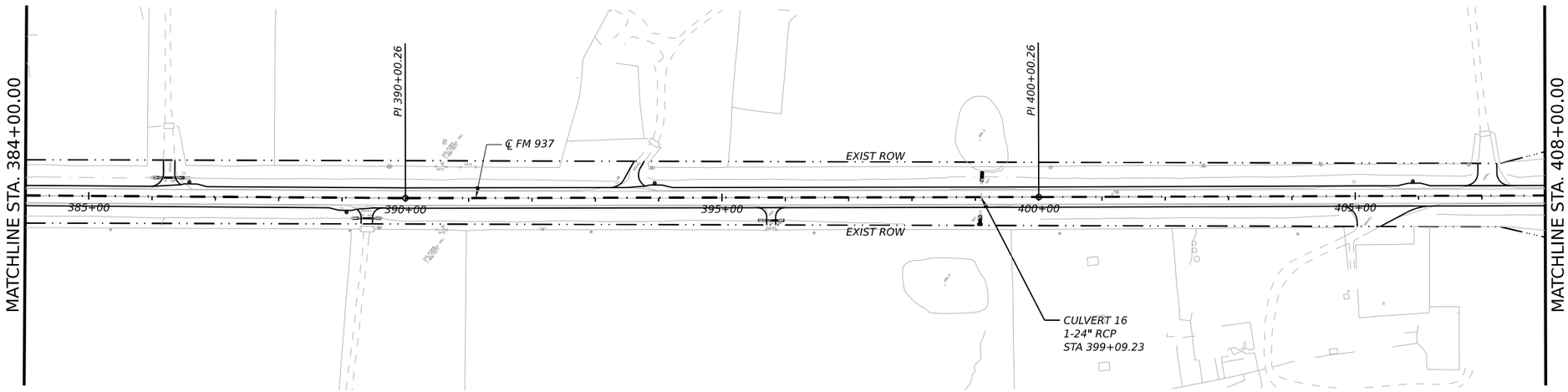

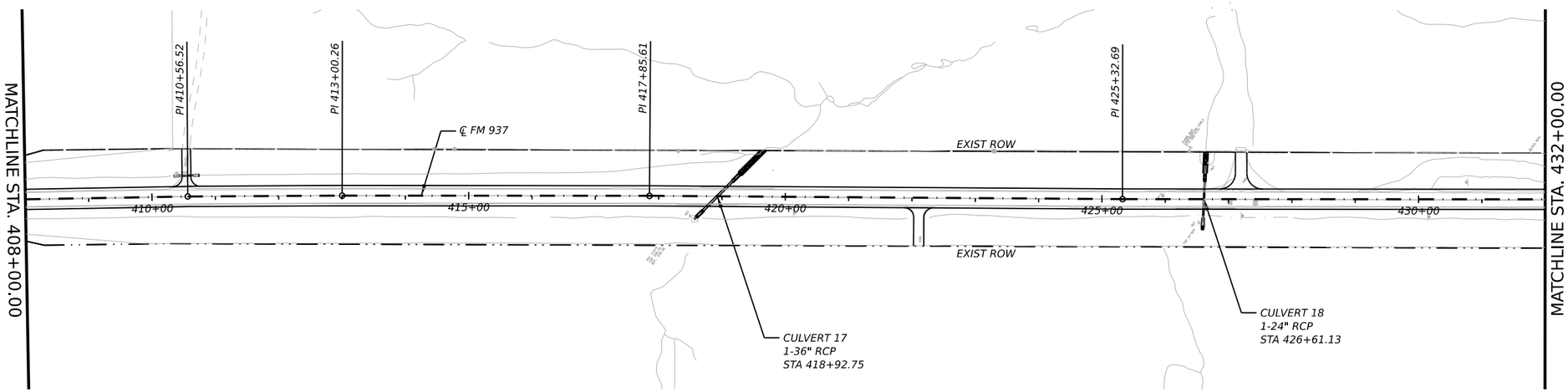

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SCALE: 1" = 200'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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FM 937

PROJECT LAYOUT

(STA 384+00 TO STA 432+00)

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		9

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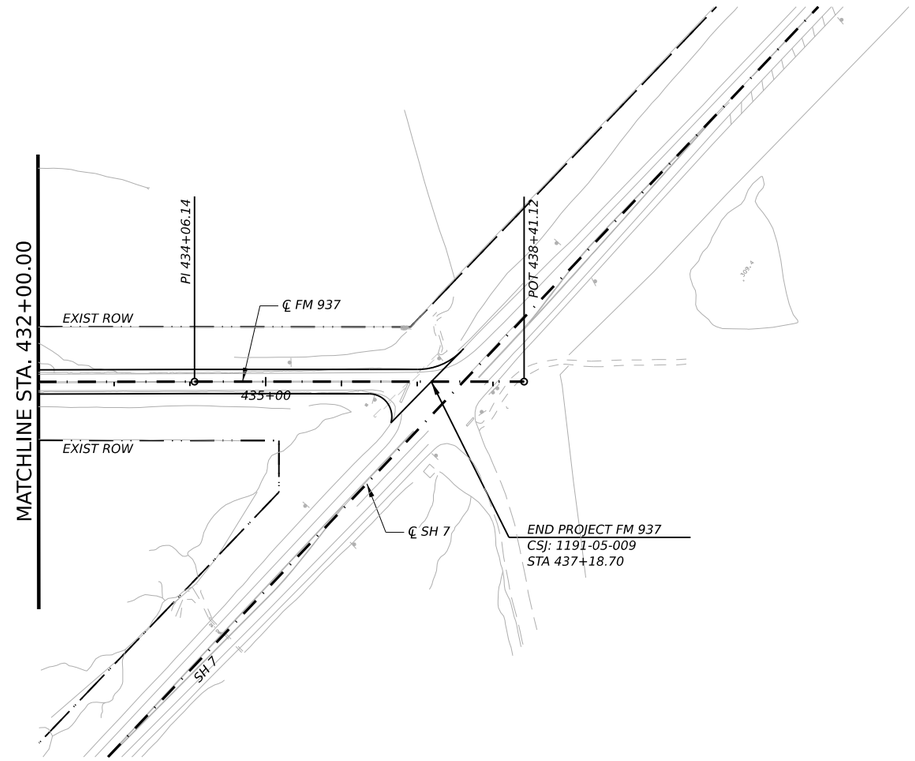

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SCALE: 1" = 200'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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Houston, Texas 77042
(713) 622-1444

FM 937

PROJECT LAYOUT

(STA 432+00 TO END)

SHEET 7 OF 7

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		10

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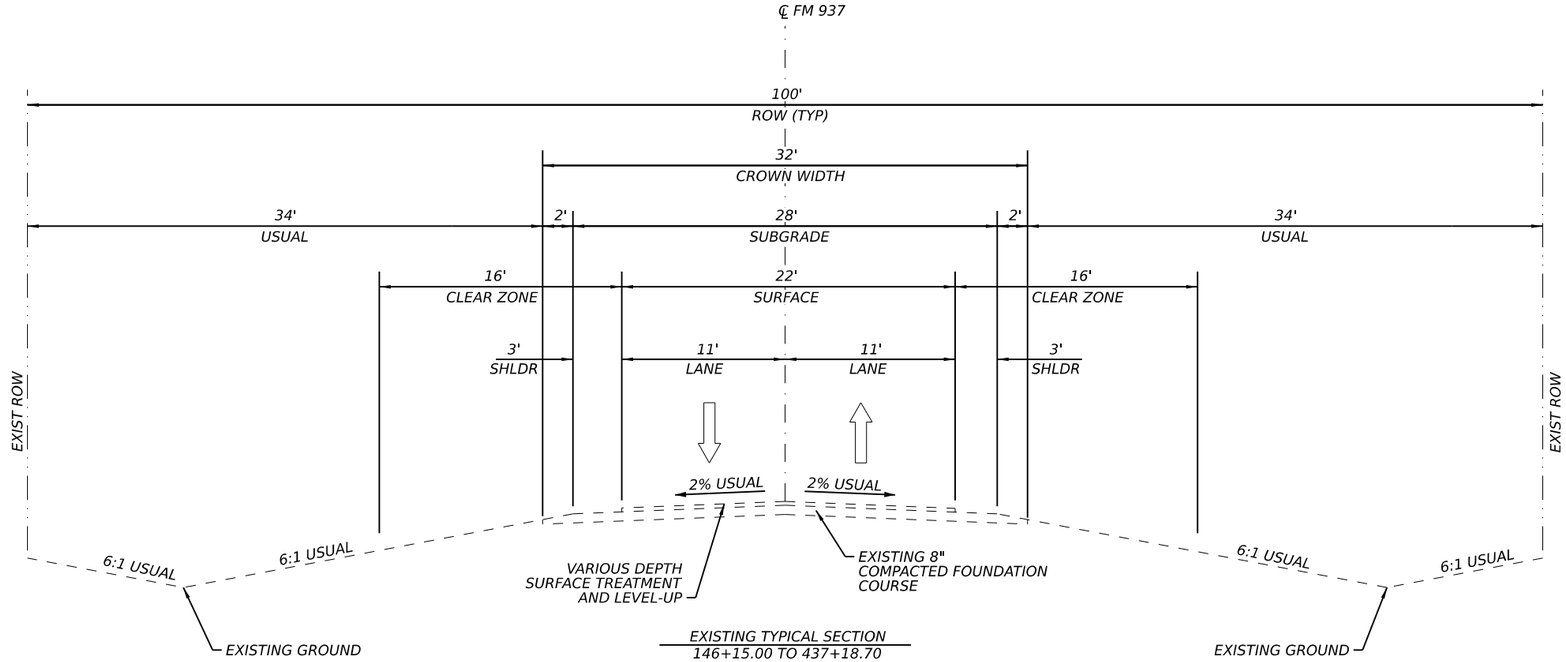

EXISTING TYPICAL SECTION
146+15.00 TO 437+18.70

NOT TO SCALE

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
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PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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(713) 622-1444

FM 937

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		11

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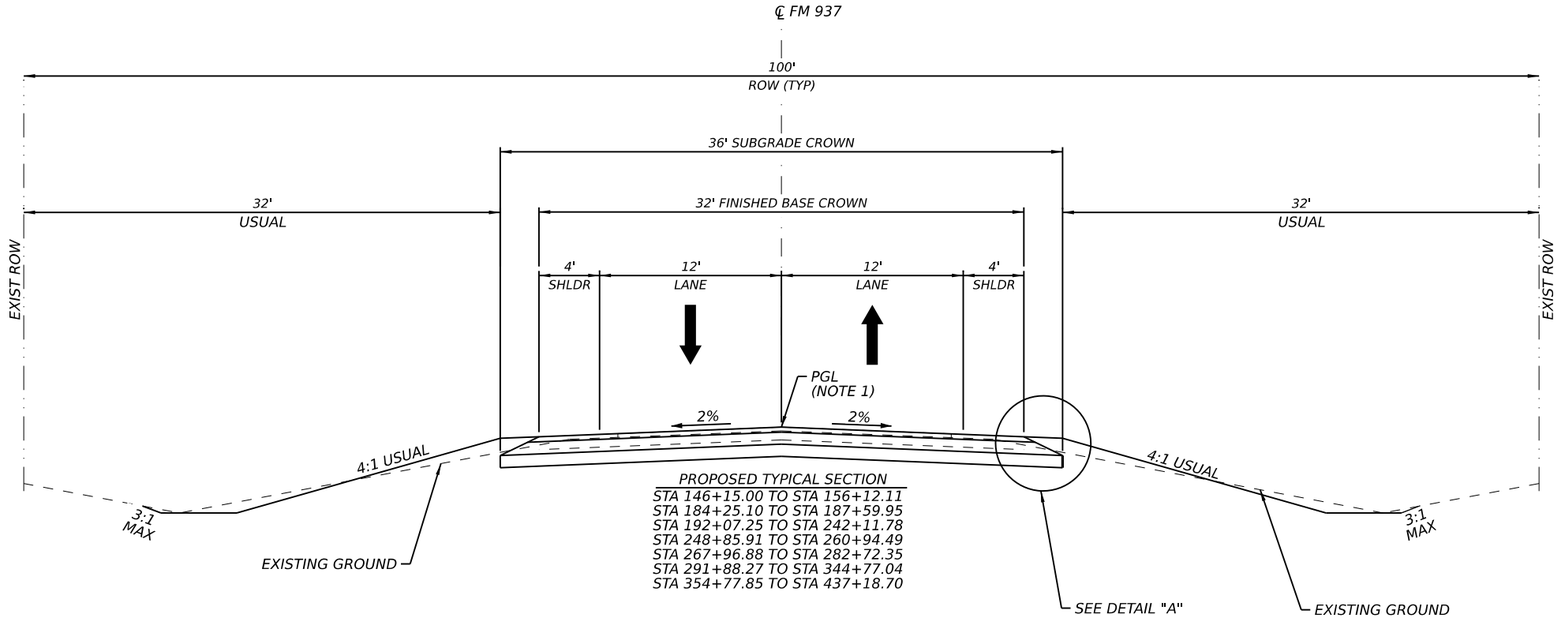
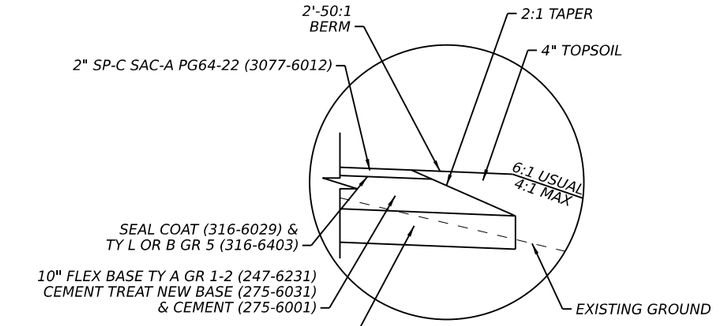


PROPOSED TYPICAL SECTION
STA 146+15.00 TO STA 156+12.11
STA 184+25.10 TO STA 187+59.95
STA 192+07.25 TO STA 242+11.78
STA 248+85.91 TO STA 260+94.49
STA 267+96.88 TO STA 282+72.35
STA 291+88.27 TO STA 344+77.04
STA 354+77.85 TO STA 437+18.70

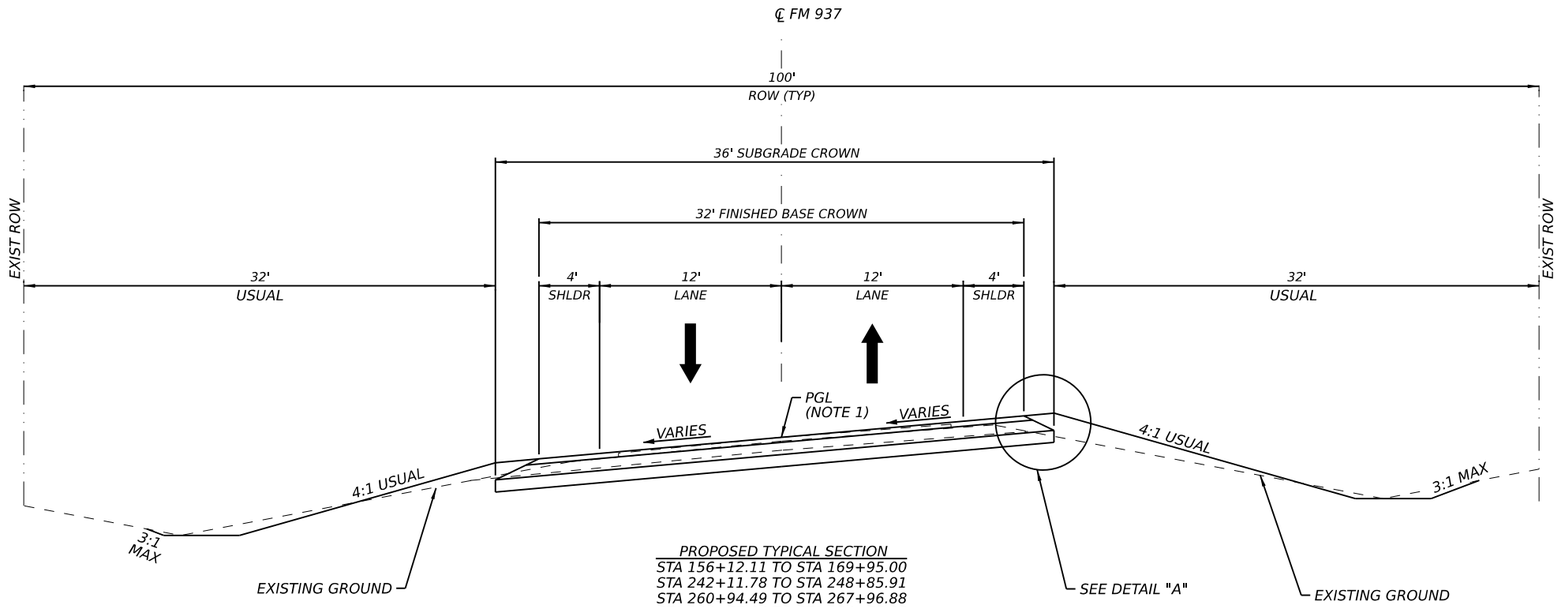
NOTES

1. THE PROPOSED PROFILE GRADE LINE (PGL) IS DESIGNED TO MATCH THE EXISTING PGL. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR PROFILE DATA.
2. USUAL ROADWAY CROSS SLOPES ARE 2%. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR SUPERELEVATION DATA AT CURVE LOCATIONS.
3. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.



DETAIL "A"
PROPOSED PAVEMENT

NOT TO SCALE



PROPOSED TYPICAL SECTION
STA 156+12.11 TO STA 169+95.00
STA 242+11.78 TO STA 248+85.91
STA 260+94.49 TO STA 267+96.88
STA 344+77.04 TO STA 354+77.85

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		12

DATE: 5/26/2023 9:49:25 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan_Set\1. General\009GTY01.dgn

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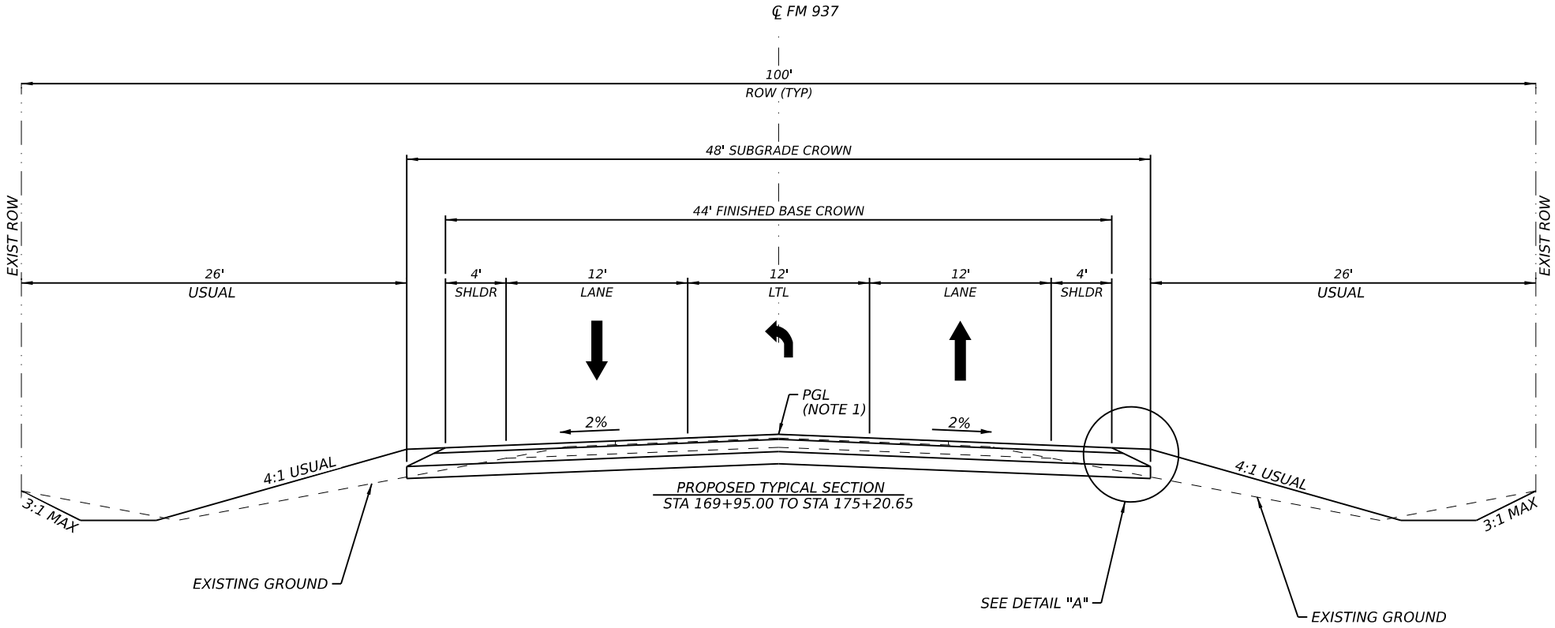
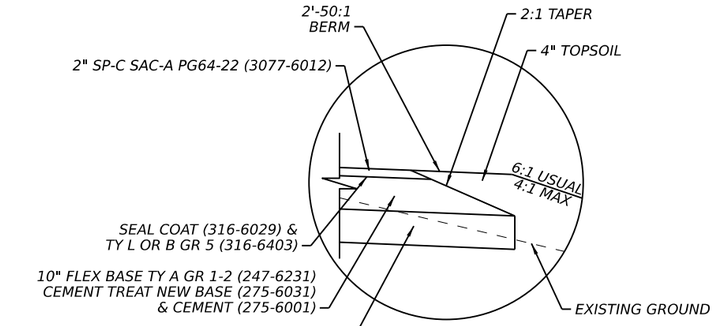
DW:
CK:
DN:



PROPOSED TYPICAL SECTION
STA 169+95.00 TO STA 175+20.65

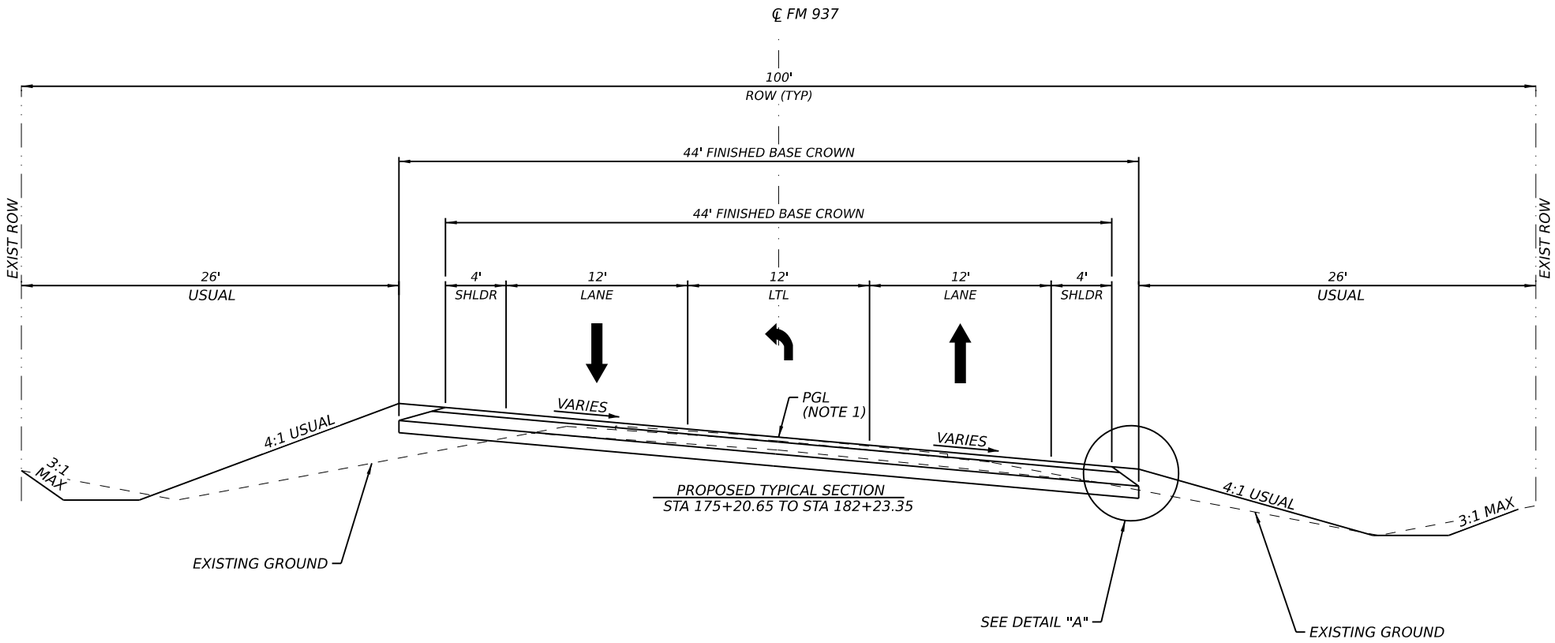
NOTES

1. THE PROPOSED PROFILE GRADE LINE (PGL) IS DESIGNED TO MATCH THE EXISTING PGL. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR PROFILE DATA.
2. USUAL ROADWAY CROSS SLOPES ARE 2%. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR SUPERELEVATION DATA AT CURVE LOCATIONS.
3. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.



DETAIL "A"
PROPOSED PAVEMENT

NOT TO SCALE



PROPOSED TYPICAL SECTION
STA 175+20.65 TO STA 182+23.35

5/26/2023

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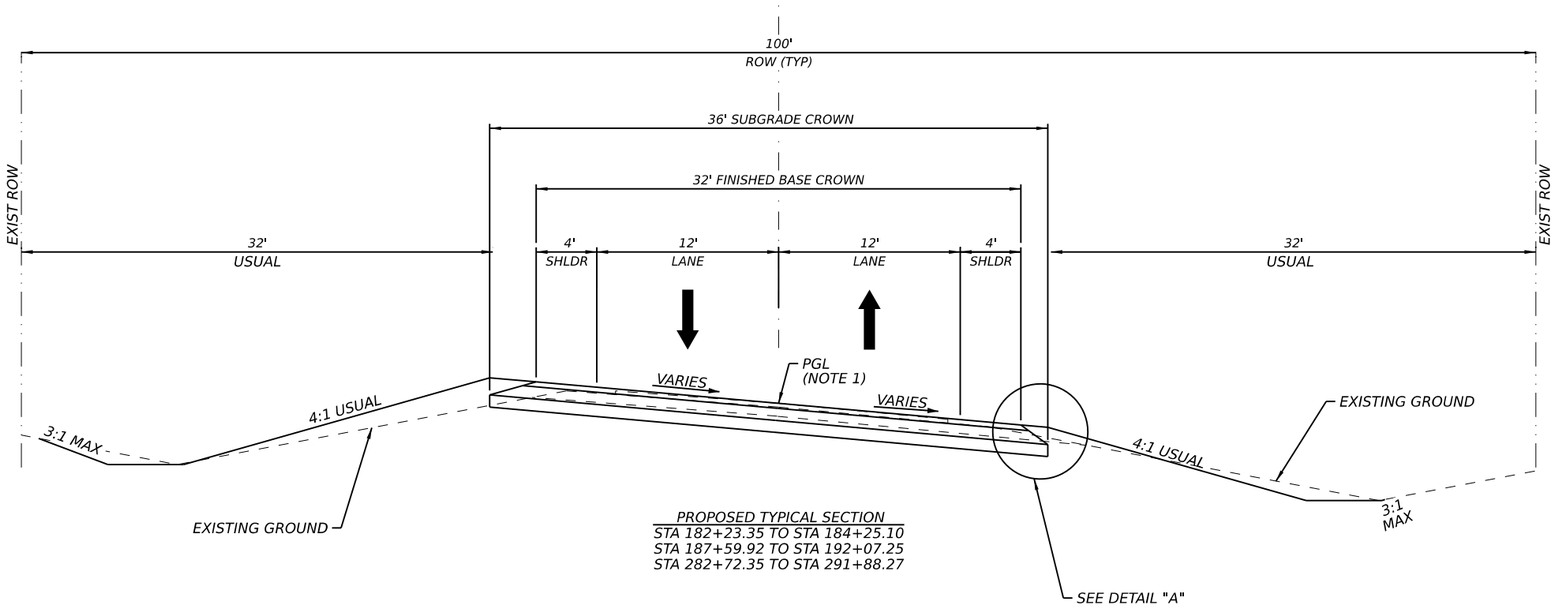
FM 937

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		13

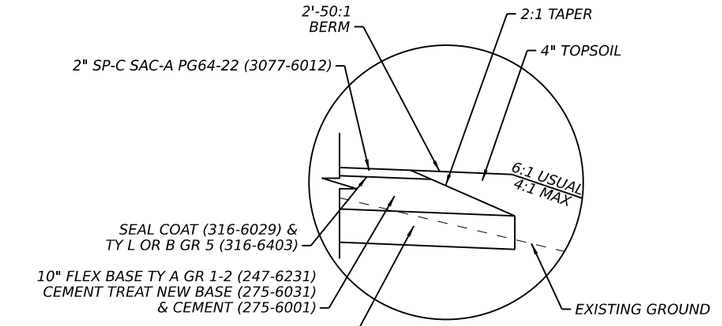
DATE: 5/26/2023 9:49:26 AM
FILE: R:\1005000-1005991\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan Set\1. General\009GTY02.dgn



PROPOSED TYPICAL SECTION
STA 182+23.35 TO STA 184+25.10
STA 187+59.92 TO STA 192+07.25
STA 282+72.35 TO STA 291+88.27

NOTES

1. THE PROPOSED PROFILE GRADE LINE (PGL) IS DESIGNED TO MATCH THE EXISTING PGL. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR PROFILE DATA.
2. USUAL ROADWAY CROSS SLOPES ARE 2%. REFER TO THE ROADWAY PLAN AND PROFILE SHEETS FOR SUPERELEVATION DATA AT CURVE LOCATIONS.
3. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.



DETAIL "A"
PROPOSED PAVEMENT

NOT TO SCALE

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PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		14

DATE: 5/26/2023 9:49:27 AM
FILE: R:\1005000-1005991\005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan Set\1. General\009GTY03.dgn

BASIS OF ESTIMATE					
ITEM	**DESCRIPTION**	**COURSE**	**RATE**	**AMOUNT**	**QUANTITY**
168	Vegetative Watering		10 GAL/SY	54,207 SY	543 MG
275	Cement	(10")(3%)	0.0124 TON/SY	234,874 SY	2,913 TON
316	Asphalt (RC 250)	1 ST	0.22 GAL/SY	109,836 SY	24,164 GAL
316	Aggregate (TY-B GR 5 or TY-L GR-5 SAC-B)	1 ST	1 CY/125 SY	110,089 SY	881 CY
3077	SP-C SAC-A PG64-22	2"	110 LB/SY/IN	111,456 SY	12,260 TON

GENERAL:

James Robbins, P.E., A.E., James.Robbins@txdot.gov
Joseph Greive, P.E., A.A.E., Joseph.Greive@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Wiring coding will be done in accordance with the NEC (National Electrical Code).

Send eligible shop plan submittals with PDF attachments directly to the reviewing office.

ITEM 5 "CONTROL OF THE WORK"

Prior to letting, earthwork construction cross-section data is available at the Area Engineer's office in ***Bryan*** for inspection by prospective bidders. In addition, bidders may request electronic earthwork construction cross-section data by sending an email to:
James.Robbins@txdot.gov

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County: Robertson

Earthwork files will be provided by email or by using TxDOT's FTP Service. These cross-sections are for non-construction purposes only, and it is the responsibility of the prospective bidder to validate the data for this project.

After letting, the Engineer will provide final earthwork construction cross-section data necessary for the contractor to establish and control the work.

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

ITEM 6 "CONTROL OF MATERIALS"

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

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

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

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

ITEM 7 "LEGAL RELATIONS AND RESPONSIBILITIES"

State contract mowers will mow the right of way during the growing season. The Contractor will be notified by the Engineer one week in advance of the anticipated time when mowers will be in the limits of the project. Clean the right of way to such a condition that allows the mowing contractors to safely mow.

In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

The following roadways are recognized evacuation routes in the Bryan District:

Primary Evacuation Routes: IH 45, US 290, SH 6, SH 36.

Secondary Evacuation Routes: US 79, US 84, SH 7, SH 30, SH 21, SH 105.

Other routes may be designated.

- No significant traffic generator events identified.

ITEM 8 "PROSECUTION AND PROGRESS"

No more than 2 miles of non-surfaced roadway will be allowed at any time without approval of the Engineer. The Engineer may consider extending the 2-mile limit or allow alternating 2-mile sections of concurrent work, only if the Contractor can demonstrate adequate workforce, equipment, material deliveries, work plan, and quality of work sufficient to handle the longer work zones. If the 2 miles of non-surfaced roadway are extended by the Engineer in writing, this will not exempt the Contractor from not exceeding the 5 minute delay and any additional signing/traffic control will be considered subsidiary to Item 502, Barricades, Signs, and Traffic Handling.

At the end of each work day, remove all grade differentials transverse to centerline.

At the end of each work day, provide 100 foot minimum grade tapers longitudinal to the centerline to transition differences in the profile grade line or roadway grade.

The following standard detail sheet(s) has(have) been modified.
MBP(1)-22

By noon of each Wednesday, provide the Engineer a written outline of the daily work schedule for the following week. Include in the outline the times and places for proposed traffic control changes, lane and shoulder closures, and moving operations or other operations that affect traffic on the roadway.

Prepare Progress Schedule in Bar Chart format.

Work in the travel lanes (including lane closures) is not allowed from (7 pm) to (7 am) Monday through Friday.

Equipment and material may be pre-staged at approved locations.

The 90-day delayed start allowed after authorization under SP008-003 is for Contractor time for material acquisition.

Sheet: 15A
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ITEM 100 "PREPARING RIGHT OF WAY"

During burn bans obtain written approval from the Commissioners Court prior to burning brush.

Prevent ashes from burned vegetation to be transported into any stream.

If burning is not allowed, all trees and brush will be disposed of by shredding, logging or other methods approved by the Engineer. Create a windrow, stockpile, or topdress biomass on disturbed areas along the project at locations approved by necessary permits and the Engineer.

ITEM 132 "EMBANKMENT"

Provide Embankment material for areas within the limits of the Pavement Structure that meet one of the following requirements:

- Sources outside the ROW provide material with a plasticity index between 10 and 25 and with less than 30% silt.
- Sources within the ROW provide material with a plasticity index between 10 and 25 and with less than 30% silt.

Provide Embankment material for areas outside the limits of the Pavement Structure with a plasticity index between 10 and 35.

ITEM 160 "TOPSOIL"

All slopes requiring topsoil will be tracked immediately upon final grading to prevent erosion per standard sheet EC(1)-16. Tracking slopes to prevent erosion will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Topsoil may be obtained from the right of way at sites of proposed excavation and embankment.

ITEM 168 "VEGETATIVE WATERING"

Vegetative watering is required for all areas of the project that are being seeded or sodded.

ITEM 247 "FLEXIBLE BASE"

Place flexible base in equal lifts of 4 to 8 in. in depth unless otherwise approved by the Engineer.

ITEM 275 "CEMENT TREATMENT (ROAD MIXED)"

Microcracking is required for this item.

ITEM 301 "ASPHALT ANTISTRIPPING AGENT"

When the Contractor adds lime as an anti-stripping agent (or an equivalent anti-stripping agent) the lime or equivalent shall be added to the asphaltic concrete in the methods specified in this item unless otherwise approved by the Engineer. If an alternate method is proposed, the Engineer's approval will be based on test method Tex-242-F performed on the asphaltic concrete produced through the plant.

ITEM 316 "SEAL COAT"

Remove vegetation and blade pavement edges.

When placing surface treatment on base material, prepare surface by sweeping or other approved methods. Before applying bituminous material, lightly sprinkle the surface with water. When directed, sweep the surface after sprinkling with water. Do not apply bituminous material when water is puddling on the surface.

Sweep excess aggregate no sooner than 2 hours after rolling or as directed.

Vehicles used to haul aggregate from the stockpile to the chip spreader will not be overloaded. Any damage to the roadway caused by the vehicles will be repaired by the Contractor at his expense and subsequent loads will be reduced so as not to cause further damage.

Transverse variance rates shall be used as directed. The nozzles outside the wheel paths will output up to 20% more asphalt by volume than the nozzles over the wheel paths.

The Contractor may be required to furnish and set string line to insure straight and uniform alignment as directed by the Engineer. The Contractor may use other methods subject to approval of the Engineer.

Surface treat the metal beam guard fence widening areas after placing the MBGF to ensure that the entire widened areas are properly sealed.

If electing to place the MBGF after placing the surface treatment, reseal the widened areas to the satisfaction of the Engineer.

Surface treat driveways before the roadway is surface treated (second course only).

Sheet: 15B
Highway: FM 937 Control: 1191-05-009
County: Robertson

Cure surface treatments placed with a cutback asphalt binder for 21 days before placing subsequent surface courses unless otherwise directed by the engineer.

Cure surface treatments placed with an emulsion asphalt binder for 7 days before placing subsequent surface courses unless otherwise directed by the engineer.

Air and surface temperature for asphalt material application will be in accordance with the specification and the manufacturer's recommendation. However, the engineer may limit the use of an asphalt material due to the time of year.

ITEM 320 "EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT"

Unless otherwise approved by the Engineer, provide a Material Transfer Device with remixing capabilities as specified in Item 320.2.3.3 Placement and Compaction Equipment for all asphaltic concrete pavement.

ITEM 416 "DRILLED SHAFT FOUNDATIONS"

Stake foundation locations and have them approved by the Engineer before installation. The Engineer together with the Contractor will calculate the vertical signal head clearance before placing any traffic signal pole foundation.

Notify the Engineer 48 hours prior to forming and placing concrete in any unit of all the Signal Pole and Controller Foundations. Do not place concrete without an Inspector present. Failure to inform the Engineer and provide adequate time to arrive on the job site may result in removing and replacing the foundation.

ITEM 432 "RIPRAP"

The fifty foot (50') approach taper to the MBGF end treatment will be concrete Mow Strip unless otherwise shown in the plans or otherwise directed by the Engineer.

ITEM 464 "REINFORCED CONCRETE PIPE"

Seal joints using cold applied plastic asphalt sewer compound or cold applied preformed plastic gaskets. When cohesionless material is used for backfill, wrap the joints prior to backfilling with sand proof tape following the manufacturer's recommendations or with an equivalent material and method.

ITEM 465 “JUNCTION BOXES, MANHOLES AND INLETS”

When furnishing precast Inlets, Manholes and Extensions, cast elements for specific project locations.

ITEM 467 “SAFETY END TREATMENTS”

All Type II SET’s shall have riprap aprons as shown on the plans. Riprap aprons are considered subsidiary to Type II SET’s.

ITEM 496 “REMOVING STRUCTURES”

The structure(s) to be removed have surface coatings which may contain hazardous materials. Provide for the safety and health of employees and abide by all OSHA Standards and Regulations.

ITEM 502 “BARRICADES, SIGNS AND TRAFFIC HANDLING”

Where shown on applicable TCP standards, channelizing devices on the centerline are required at all times; including when a pilot vehicle is used to lead traffic. Mount a G20-4 sign at a conspicuous location on the rear of the vehicle. Traffic delays caused by one-lane, two-way traffic control, will not be allowed to exceed 5 minutes unless approved by the Engineer.

One way traffic control operations are required when placing centerline profile markings on all two-lane roadways, unless otherwise approved by the Engineer. Work area is limited to a maximum of 2 miles for this work.

During one-way operations, station flaggers at all county roads and any other locations, such as private businesses, that may have traffic entering the work area.

Prior to beginning pulverization operations, place an approved channelizing device along both sides of the travelway the entire length of the operation in accordance with the BC standards. Do not remove the channelizing devices until permanent edge striping is placed.

Place "Pavement Ends" (CW8-3), "Slow Down On Wet Road" (CW8-5a), “No Centerline Stripe”, and “Loose Gravel” signs before pulverization of the existing pavement.

Removal of ground mounted temporary signs and supports as specified on standard sheet BC(5), shall include the immediate backfilling of support holes with Type B embankment material and the compaction of the backfill material.

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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.

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

ITEM 504 “FIELD OFFICE AND LABORATORY”

Furnish a Type D Structure (Asphalt Mix Control Laboratory).

ITEM 540 “METAL BEAM GUARD FENCE”

When the roadway is converted from two-way operation to one-way operation, the appropriate Metal Beam Guard Fence shall be relapped in the direction of travel. This will not be paid for directly but will be considered subsidiary to this Item

Furnish and Install only one type of timber post.

ITEM 544 “GUARDRAIL END TREATMENTS”

Furnish and install only MASH compliant guardrail end treatments.

ITEM 560 “MAILBOX ASSEMBLIES”

Notify the postmaster prior to installation for approval of type and temporary and permanent locations.

Retain and re-use newspaper holders removed or relocated during construction for placement on new mailbox assemblies in accordance with mailbox standard sheets.

ITEM 644 “SMALL ROADSIDE SIGN ASSEMBLIES”

Salvage and deliver all aluminum sign faces to the local TxDOT maintenance office.

ITEM 662 “WORK ZONE PAVEMENT MARKINGS”

Paint and beads may be used for non-removable work zone pavement markings.

All striping limits must be approved by the Engineer before striping operations may begin.

ITEM 666 “REFLECTORIZED PAVEMENT MARKINGS”

Unless authorized by the Engineer, the Contractor will not place the pavement markings on the resurfaced roadway until it has cured for 3 days.

All striping limits must be approved by the Engineer before striping operations may begin.

ITEM 672 “RAISED PAVEMENT MARKERS”

Use flexible bituminous adhesive for applications on all pavement types.

ITEM 3077 “SUPERPAVE MIXTURES”

Hydrated lime, commercial lime slurry or an equivalent anti-stripping agent may be used. If hydrated lime or commercial lime slurry is used up to 1.0 percent may be added. If an equivalent anti-stripping agent is used, add according to manufacturers recommendations. Provide hydrated lime or commercial lime slurry in accordance with DMS-6350, “Lime and Lime Slurry”. Add hydrated lime, commercial lime slurry, or an equivalent anti-stripping agent in accordance with Section 301.4.2.

Apply tack coat through a distributor spray bar in accordance with Section 316.3.1. Distributor. If residual from emulsion tack is not tacky, then the Engineer can require the use of PG binder.

RAS is not permitted in thin level-up courses.

Sheet: 15D
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County: Robertson

ITEM 6001 “PORTABLE CHANGEABLE MESSAGE SIGN”

Furnish, install, and operate up to 2 Portable Changeable Message Signs (PCMS) for this project. The signs can be used both on the project and within a ten (10) mile radius of the project. Locations, messages, and durations of use will be specified by the Engineer. The primary uses will be to inform the public of special events, lane and road closures, and changes in traffic control. Signs will be paid for only when used as directed by the Engineer.

ITEM 6185 “TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)”

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

provide 1 shadow vehicle(s) with TMA for TCP (2-1)-18 as detailed on General Note 4 of this standard sheet.

provide 1 shadow vehicle(s) with TMA for TCP (2-2)-18 as detailed on General Note 6 of this standard sheet.

provide 2 shadow vehicle(s) with TMA for TCP (3-1)-13 as detailed on General Note 3 of this standard sheet.

provide 2 shadow vehicle(s) with TMA for TCP (3-3)-14 as detailed on General Note 3 of this standard sheet.

Therefore, 6 total shadow vehicles with TMA will be required for this type of work. 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 needed for the project.

122 TMA(s) (days) are provided in the project estimate for stationary
12 TMA(s) (days) are provided in the project estimate for mobile operation.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1191-05-009 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY FM 937

			CONTROL SECTION JOB		**1191-05-009**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00127190**		
			COUNTY		**Robertson**		
			HIGHWAY		**FM 937**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	293.000		293.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	174.000		174.000	
	105-6045	REMOVING STAB BASE AND ASPH PAV (2"-8")	SY	84,336.000		84,336.000	
	110-6001	EXCAVATION (ROADWAY)	CY	16,813.000		16,813.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	5,060.000		5,060.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	54,207.000		54,207.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	54,207.000		54,207.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	27,106.000		27,106.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	27,106.000		27,106.000	
	168-6001	VEGETATIVE WATERING	MG	543.000		543.000	
	247-6231	FL BS (CMP IN PLACE)(TY A GR 1-2)(10")	SY	115,084.000		115,084.000	
	275-6001	CEMENT	TON	2,913.000		2,913.000	
	275-6006	CEMENT TREAT (EXIST MATL) (10")	SY	119,790.000		119,790.000	
	275-6031	CEMENT TREAT (NEW BASE) (10")	SY	115,084.000		115,084.000	
	316-6029	ASPH (RC-250)	GAL	24,164.000		24,164.000	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)	CY	881.000		881.000	
	400-6005	CEM STABIL BKFL	CY	61.000		61.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	32.000		32.000	
	403-6001	TEMPORARY SPL SHORING	SF	150.000		150.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	50.000		50.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	88.000		88.000	
	432-6024	RIPRAP (STONE COMMON)(DRY)(12 IN)	CY	20.000		20.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	167.000		167.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	38.000		38.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	1,589.000		1,589.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	98.000		98.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	16.000		16.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	8.000		8.000	
	464-6010	RC PIPE (CL III)(48 IN)	LF	11.000		11.000	
	465-6128	INLET (COMPL)(PSL)(FG)(4FTX4FT-4FTX4FT)	EA	1.000		1.000	
	465-6138	INLET (COMPL)(PSL)(FG)(5FTX6FT-4FTX4FT)	EA	1.000		1.000	
	466-6132	HEADWALL (CH - PW - S) (DIA= 30 IN)	EA	1.000		1.000	
	466-6136	HEADWALL (CH - PW - S) (DIA= 48 IN)	EA	1.000		1.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	4.000		4.000	
	467-6362	SET (TY II) (18 IN) (RCP) (6: 1) (C)	EA	2.000		2.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	108.000		108.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	4.000		4.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1191-05-009 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY FM 937

			CONTROL SECTION JOB		**1191-05-009**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00127190**		
			COUNTY		**Robertson**		
			HIGHWAY		**FM 937**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	14.000		14.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)	EA	2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	4.000		4.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)	EA	4.000		4.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	476-6013	JACK BOR OR TUN PIPE(24 IN)(RC)(CL III)	LF	68.000		68.000	
	476-6024	JACK BOR OR TUN PIPE(36 IN)(RC)(CL III)	LF	71.000		71.000	
	480-6001	CLEAN EXIST CULVERTS	EA	16.000		16.000	
	496-6002	REMOV STR (INLET)	EA	4.000		4.000	
	496-6004	REMOV STR (SET)	EA	108.000		108.000	
	496-6007	REMOV STR (PIPE)	LF	37.000		37.000	
	496-6050	REMOV STR (DRIVEWAY CULVERT)	EA	54.000		54.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000		9.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	5,160.000		5,160.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	5,160.000		5,160.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	4,020.000		4,020.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	4,020.000		4,020.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	2,610.000		2,610.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	2,610.000		2,610.000	
	530-6004	DRIVEWAYS (CONC)	SY	140.000		140.000	
	530-6005	DRIVEWAYS (ACP)	SY	5,695.000		5,695.000	
	530-6008	TURNOUTS (ACP)	SY	475.000		475.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	57,410.000		57,410.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	29,080.000		29,080.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	587.500		587.500	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	750.000		750.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	552-6001	WIRE FENCE (TY A)	LF	376.000		376.000	
	560-6001	MAILBOX INSTALL-S (TWG-POST) TY 1	EA	28.000		28.000	
	560-6002	MAILBOX INSTALL-D (TWG-POST) TY 1	EA	1.000		1.000	
	610-6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	5.000		5.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	590.000		590.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1191-05-009 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY FM 937

			CONTROL SECTION JOB		**1191-05-009**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00127190**		
			COUNTY		**Robertson**		
			HIGHWAY		**FM 937**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	270.000		270.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	2,580.000		2,580.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	8.000		8.000	
	628-6145	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)	EA	2.000		2.000	
	636-6002	ALUMINUM SIGNS (TY G)	SF	18.000		18.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	30.000		30.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	13.000		13.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	4.000		4.000	
	644-6031	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	EA	1.000		1.000	
	644-6075	RELOCATE SM RD SN SUP&AM(SIGN ONLY)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	39.000		39.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	12.000		12.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA	3.000		3.000	
	658-6101	INSTL OM ASSM (OM-2Z)(WFLX)SRF)SRF	EA	154.000		154.000	
	658-6102	INSTL OM ASSM (OM-3L)(WFLX)SRF)SRF	EA	2.000		2.000	
	658-6104	INSTL OM ASSM (OM-3R)(WFLX)SRF)SRF	EA	2.000		2.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	58,286.000		58,286.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	72.000		72.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	116,572.000		116,572.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	144.000		144.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	2,186.000		2,186.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	30.000		30.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	420.000		420.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	57,610.000		57,610.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	5,910.000		5,910.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	26,980.000		26,980.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	180.000		180.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	2.000		2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	4.000		4.000	
	672-6007	REFL PAV MRKR TY I-C	EA	22.000		22.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	804.000		804.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	1.000		1.000	
	685-6006	REMOV RDSD FLSH BCN AM (SOLAR PWRD)	EA	1.000		1.000	
	3077-6012	SP MIXESSP-CSAC-A PG64-22	TON	12,260.000		12,260.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6056-6001	PREFORMED IN-LANE(TRANS) RUMBLE STRIP	LF	80.000		80.000	
	6185-6002	TMA (STATIONARY)	DAY	122.000		122.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1191-05-009 **DISTRICT** Bryan **COUNTY** Robertson
HIGHWAY FM 937

		CONTROL SECTION JOB		**1191-05-009**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00127190**			
		COUNTY		**Robertson**			
		HIGHWAY		**FM 937**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6185-6005	TMA (MOBILE OPERATION)	DAY	12.000		12.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	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	

CK
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SUMMARY OF TCP QUANTITIES

ITEM	662	662	662	662	662	6001	6185	6185
DESCRIPTION	6004	6016	6034	6075	6111	6002	6002	6005
	WK ZN PAV MRK NON-REMOV	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	LF	EA	EA	DAY	DAY
PHASE 1								
PHASE 2				72				
PHASE 3	58,286	72	58,286		729			
PHASE 4			58,286	72	1,457			
TOTALS	58,286	72	116,572	144	2,186	2	122	12

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Texas Department of Transportation

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3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

SUMMARY OF TCP QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		17

SUMMARY OF ROADWAY QUANTITIES

ITEM	100	104	105	110	132	247	275	275	275	316	316	432
DESCRIPTION	6002	6017	6045	6001	6006	6231	6001	6006	6031	6029	6403	6045
	PREPARING ROW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE AND ASPH PAV (2"-8")	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY C)	FL BS (CMP IN PLACE)(TY A GR 1-2)(10")	CEMENT (1)	CEMENT TREAT (EXIST MATL) (10")	CEMENT TREAT (NEW BASE) (10")	ASPH (RC-250) (1)	AGGR (TY-B GR-5 OR TY-L GR-5) (1)	RIPRAP (MOW STRIP)(4 IN)
	STA	SY	SY	CY	CY	SY	SY	SY	SY	SY	SY	CY
ROADWAY P&P SHT 1 OF 25	10		2,491	466	128	3,776	7,716	3,940	3,776	3,612	3,612	
ROADWAY P&P SHT 2 OF 25	12		3,592	484	427	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 3 OF 25	12		4,201	805	787	6,902	13,884	6,982	6,902	6,477	6,582	38
ROADWAY P&P SHT 4 OF 25	12		3,686	504	512	4,923	10,021	5,098	4,923	4,698	4,698	
ROADWAY P&P SHT 5 OF 25	12		3,900	742	70	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 6 OF 25	12		3,643	897	45	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 7 OF 25	12	65	3,449	640	32	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 8 OF 25	12		3,785	555	66	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 9 OF 25	12		3,684	502	338	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 10 OF 25	12		3,291	848	38	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 11 OF 25	12		3,397	1,546	18	4,902	10,004	5,102	4,902	4,641	4,702	
ROADWAY P&P SHT 12 OF 25	12		3,360	779	158	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 13 OF 25	12		3,489	751	141	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 14 OF 25	12		3,309	405	76	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 15 OF 25	12	109	3,361	592	192	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 16 OF 25	12		3,248	472	257	4,774	9,748	4,974	4,774	4,539	4,574	
ROADWAY P&P SHT 17 OF 25	12		3,334	565	150	4,734	9,668	4,934	4,734	4,512	4,534	
ROADWAY P&P SHT 18 OF 25	12		3,276	603	221	4,885	9,970	5,085	4,885	4,655	4,685	
ROADWAY P&P SHT 19 OF 25	12		3,465	946	32	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 20 OF 25	12		3,235	744	136	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 21 OF 25	12		3,296	669	178	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 22 OF 25	12		3,549	471	574	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 23 OF 25	12		3,278	840	156	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 24 OF 25	12		3,344	774	181	4,600	9,400	4,800	4,600	4,400	4,400	
ROADWAY P&P SHT 25 OF 25	7		1,673	213	147	1,988	4,063	2,075	1,988	1,902	1,902	
TOTALS	293	174	84,336	16,813	5,060	115,084	234,874	119,790	115,084	109,836	110,089	38

NOTES:

1. FOR CONTRACTOR'S INFORMATION ONLY. SEE "BASIS OF ESTIMATE" FOR APPLICATION RATES

SUMMARY OF ROADWAY QUANTITIES

ITEM	530	530	530	540	540	542	544	544	552	560	560	3077
DESCRIPTION	6004	6005	6008	6001	6016	6001	6001	6003	6001	6001	6002	6012
	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	TURNOUTS (ACP)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	WIRE FENCE (TY A)	MAILBOX INSTALL-S (TWG-POST) TY 1	MAILBOX INSTALL-D (TWG-POST) TY 1	SP MIXES SP-C SAC-A PG64-22 (1)
	SY	SY	SY	LF	EA	LF	EA	EA	LF	EA	EA	SY
ROADWAY P&P SHT 1 OF 25		189	17							1		3,666
ROADWAY P&P SHT 2 OF 25		85	16							1		4,467
ROADWAY P&P SHT 3 OF 25		61		587.5	2	750	2	4	376			6,544
ROADWAY P&P SHT 4 OF 25		345	32							1	1	4,764
ROADWAY P&P SHT 5 OF 25		378	33							2		4,467
ROADWAY P&P SHT 6 OF 25		240	16							1		4,467
ROADWAY P&P SHT 7 OF 25	65	410	48							3		4,467
ROADWAY P&P SHT 8 OF 25		450	49							3		4,467
ROADWAY P&P SHT 9 OF 25		226	33							2		4,467
ROADWAY P&P SHT 10 OF 25		213	16							1		4,467
ROADWAY P&P SHT 11 OF 25		153	17							1		4,707
ROADWAY P&P SHT 12 OF 25		126	18							1		4,467
ROADWAY P&P SHT 13 OF 25		356	34							2		4,467
ROADWAY P&P SHT 14 OF 25		383	32							2		4,467
ROADWAY P&P SHT 15 OF 25	75	216	32							2		4,467
ROADWAY P&P SHT 16 OF 25		65										4,605
ROADWAY P&P SHT 17 OF 25		280	17							1		4,578
ROADWAY P&P SHT 18 OF 25		127										4,722
ROADWAY P&P SHT 19 OF 25		248										4,467
ROADWAY P&P SHT 20 OF 25		58										4,467
ROADWAY P&P SHT 21 OF 25		324	49							3		4,467
ROADWAY P&P SHT 22 OF 25		393	16							1		4,467
ROADWAY P&P SHT 23 OF 25		104										4,467
ROADWAY P&P SHT 24 OF 25		265										4,467
ROADWAY P&P SHT 25 OF 25												1,931
TOTALS	140	5,695	475	587.5	2	750	2	4	376	28	1	111,456

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FM 937

SUMMARY OF ROADWAY QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		18

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SUMMARY OF DRAINAGE QUANTITIES

ITEM		400	402	403	432	432	432	464	464	464	464	464	465
DESCRIPTION		6005	6001	6001	6001	6024	6033	6003	6005	6007	6008	6010	6128
		CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (CONC)(4 IN)	RIPRAP (STONE COMMON)(DRY)(12 IN)	RIPRAP (STONE PROTECTION)(18 IN)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(30 IN)	RC PIPE (CL III)(36 IN)	RC PIPE (CL III)(48 IN)	INLET (COMPL)(PSL)(FG) (4FTX4FT-4FTX4FT)
		CY	LF	SF	CY	CY	CY	LF	LF	LF	LF	LF	EA
ROADWAY P&P SHT 1 OF 25								32					
ROADWAY P&P SHT 2 OF 25	(1)	6					4	28	9				
ROADWAY P&P SHT 3 OF 25	(2)	15	17	150	85		53	32				11	
ROADWAY P&P SHT 4 OF 25	(3)	6					8	156	9				
ROADWAY P&P SHT 5 OF 25	(4) (5)	1					14	29					
ROADWAY P&P SHT 6 OF 25	(6)	6					6	84		7			
ROADWAY P&P SHT 7 OF 25	(7)	3					7	164	5				
ROADWAY P&P SHT 8 OF 25								84					
ROADWAY P&P SHT 9 OF 25	(8) (9)	7					13	88	11				
ROADWAY P&P SHT 10 OF 25								56					
ROADWAY P&P SHT 11 OF 25								68	40				
ROADWAY P&P SHT 12 OF 25	(10)	8	15		1		3	48			8		1
ROADWAY P&P SHT 13 OF 25	(11)						4	112					
ROADWAY P&P SHT 14 OF 25								144					
ROADWAY P&P SHT 15 OF 25	(12)	7					23	60		9			
ROADWAY P&P SHT 16 OF 25	(13)						7	28					
ROADWAY P&P SHT 17 OF 25	(14)						6	116					
ROADWAY P&P SHT 18 OF 25	(15)	2					5	60					
ROADWAY P&P SHT 19 OF 25								88					
ROADWAY P&P SHT 20 OF 25								28					
ROADWAY P&P SHT 21 OF 25								84					
ROADWAY P&P SHT 22 OF 25	(16)						2						
ROADWAY P&P SHT 23 OF 25	(17)				1	12	8		24				
ROADWAY P&P SHT 24 OF 25	(18)				1	8	4						
ROADWAY P&P SHT 25 OF 25													
TOTALS		61	32	150	88	20	167	1,589	98	16	8	11	1

(#) CROSS CULVERT SHEET

SUMMARY OF DRAINAGE QUANTITIES

ITEM		465	466	466	467	467	467	467	467	467	467	467	467
DESCRIPTION		6138	6132	6136	6358	6362	6363	6395	6388	6390	6394	6417	6419
		INLET (COMPL)(PSL)(FG)(5FTX6FT-4FTX4FT)	HEADWALL (CH - PW - S) (DIA= 30 IN)	HEADWALL (CH - PW - S) (DIA= 48 IN)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (18 IN) (RCP) (6: 1) (C)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (C)	SET (TY II) (30 IN) (RCP) (3: 1) (C)	SET (TY II) (30 IN) (RCP) (4: 1) (C)
		EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
ROADWAY P&P SHT 1 OF 25							2						
ROADWAY P&P SHT 2 OF 25	(1)						2			2			
ROADWAY P&P SHT 3 OF 25	(2)	1		1			2						
ROADWAY P&P SHT 4 OF 25	(3)						8		2				
ROADWAY P&P SHT 5 OF 25	(4) (5)				2	2	2						
ROADWAY P&P SHT 6 OF 25	(6)						6						2
ROADWAY P&P SHT 7 OF 25	(7)						12			2			
ROADWAY P&P SHT 8 OF 25							6						
ROADWAY P&P SHT 9 OF 25	(8) (9)						6		2	4			
ROADWAY P&P SHT 10 OF 25							4						
ROADWAY P&P SHT 11 OF 25							4	2					
ROADWAY P&P SHT 12 OF 25	(10)						4						
ROADWAY P&P SHT 13 OF 25	(11)						8						2
ROADWAY P&P SHT 14 OF 25							10						
ROADWAY P&P SHT 15 OF 25	(12)		1				4					1	
ROADWAY P&P SHT 16 OF 25	(13)						2			2			
ROADWAY P&P SHT 17 OF 25	(14)						8			2			
ROADWAY P&P SHT 18 OF 25	(15)				2		4						
ROADWAY P&P SHT 19 OF 25							6						
ROADWAY P&P SHT 20 OF 25							2						
ROADWAY P&P SHT 21 OF 25							6						
ROADWAY P&P SHT 22 OF 25	(16)									1	1		
ROADWAY P&P SHT 23 OF 25	(17)							2					
ROADWAY P&P SHT 24 OF 25	(18)									1	1		
ROADWAY P&P SHT 25 OF 25													
TOTALS		1	1	1	4	2	108	4	4	14	2	1	4

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PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

SUMMARY OF DRAINAGE QUANTITIES

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		19

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(#) CROSS CULVERT SHEET

SUMMARY OF DRAINAGE QUANTITIES

ITEM	467	467	476	476	480	496	496	496	496
	6448	6450	6013	6024	6001	6002	6004	6007	6050
DESCRIPTION	SET (TY II) (36 IN) (RCP) (3: 1) (C)	SET (TY II) (36 IN) (RCP) (4: 1) (C)	JACK BOR OR TUN PIPE(24 IN)(RC)(CL III)	JACK BOR OR TUN PIPE(36 IN)(RC)(CL III)	CLEAN EXIST CULVERTS	REMOV STR (INLET)	REMOV STR (SET)	REMOV STR (PIPE)	REMOV STR (DRIVEWAY CULVERT)
	EA	EA	LF	LF	EA	EA	EA	LF	EA
ROADWAY P&P SHT 1 OF 25							2		1
ROADWAY P&P SHT 2 OF 25 (1)					1		4	1	1
ROADWAY P&P SHT 3 OF 25 (2)					1	1			
ROADWAY P&P SHT 4 OF 25 (3)					1		7		4
ROADWAY P&P SHT 5 OF 25 (4)(5)					2		6		1
ROADWAY P&P SHT 6 OF 25 (6)					1		6		3
ROADWAY P&P SHT 7 OF 25 (7)					1		6		5
ROADWAY P&P SHT 8 OF 25							6		3
ROADWAY P&P SHT 9 OF 25 (8)(9)					2		12		3
ROADWAY P&P SHT 10 OF 25							2		2
ROADWAY P&P SHT 11 OF 25							1		3
ROADWAY P&P SHT 12 OF 25 (10)	1				1	1	5	4	2
ROADWAY P&P SHT 13 OF 25 (11)					1		10		4
ROADWAY P&P SHT 14 OF 25							4		5
ROADWAY P&P SHT 15 OF 25 (12)					1		5		2
ROADWAY P&P SHT 16 OF 25 (13)					1		4		1
ROADWAY P&P SHT 17 OF 25 (14)					1		6		4
ROADWAY P&P SHT 18 OF 25 (15)					1		4		2
ROADWAY P&P SHT 19 OF 25							6		3
ROADWAY P&P SHT 20 OF 25							2		1
ROADWAY P&P SHT 21 OF 25							6		3
ROADWAY P&P SHT 22 OF 25 (16)					1		2		
ROADWAY P&P SHT 23 OF 25 (17)		2		71		1	2	22	1
ROADWAY P&P SHT 24 OF 25 (18)			68			1		10	
ROADWAY P&P SHT 25 OF 25									
TOTALS	1	2	68	71	16	4	108	37	54

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
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FM 937

SUMMARY OF DRAINAGE QUANTITIES

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		20

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NOTES:

1. FOR CONTRACTOR'S INFORMATION ONLY. SEE "BASIS OF ESTIMATE" FOR APPLICATION RATES.

SUMMARY OF SW3P QUANTITIES

ITEM	160	164	164	164	168	506	506	506	506	506	506
DESCRIPTION	6003	6001	6009	6011	6001	6002	6011	6038	6039	6042	6043
	FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	VEGETATIVE WATERING (1)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	SY	SY	LF	LF	LF	LF	LF	LF
EROSION CONTROL LAYOUT 1 OF 13	5,474	5,474	2,737	2,737	5,474	420	420	90	90	60	60
EROSION CONTROL LAYOUT 2 OF 13	6,738	6,738	3,369	3,369	6,738	420	420	480	480	270	270
EROSION CONTROL LAYOUT 3 OF 13	3,296	3,296	1,648	1,648	3,296	540	540	720	720	240	240
EROSION CONTROL LAYOUT 4 OF 13	3,205	3,205	1,603	1,603	3,205	300	300	150	150	150	150
EROSION CONTROL LAYOUT 5 OF 13	4,512	4,512	2,256	2,256	4,512	420	420	420	420	150	150
EROSION CONTROL LAYOUT 6 OF 13	3,710	3,710	1,855	1,855	3,710	360	360	150	150	150	150
EROSION CONTROL LAYOUT 7 OF 13	4,003	4,003	2,002	2,002	4,003	360	360	150	150	330	330
EROSION CONTROL LAYOUT 8 OF 13	4,825	4,825	2,413	2,413	4,825	480	480	330	330	120	120
EROSION CONTROL LAYOUT 9 OF 13	4,073	4,073	2,037	2,037	4,073	360	360	810	810	120	120
EROSION CONTROL LAYOUT 10 OF 13	3,721	3,721	1,861	1,861	3,721	300	300			240	240
EROSION CONTROL LAYOUT 11 OF 13	4,864	4,864	2,432	2,432	4,864	300	300	240	240	120	120
EROSION CONTROL LAYOUT 12 OF 13	4,764	4,764	2,382	2,382	4,764	840	840	480	480	420	420
EROSION CONTROL LAYOUT 13 OF 13	1,022	1,022	511	511	1,022	60	60			240	240
TOTALS	54,207	54,207	27,106	27,106	54,208	5,160	5,160	4,020	4,020	2,610	2,610

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

SUMMARY OF SW3P QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		21

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CK
DW
CK
DW

SHEET DESCRIPTION	416	610	618	618	620	624	628
	6029	6214	6023	6024	6010	6010	6145
	DRILL SHAFT (RDWY ILL POLE) (30 IN)	IN RD IL (TY SA) 40T-8 (250W EQ) LED	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (2") (BORE)	ELEC CONDR (NO.6) INSULATED	GROUND BOX TY D (162922)W/APRON	ELC SRV TY D 120/240 060(NS)SS(E)SP(O)
	LF	EA	LF	LF	LF	EA	EA
CSJ: 1191-05-009							
FM 937 @ STERLING ROBERTSON DAM RD	20	2	205	80	855	3	1
FM 937 @ SH 7	30	3	385	190	1,725	5	1
PROJECT TOTAL	50	5	590	270	2,580	8	2

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Texas Department of Transportation

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Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF ILLUMINATION QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		22

SHEET NUMBER	533	533	666	666	666	666	666
	6001	6002	6030	6036	6309	6318	6321
	RUMBLE STRIPS (SHOULDER) OPTION 3	RUMBLE STRIPS (CENTERLINE) OPTION 1	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
	LF	LF	LF	LF	LF	LF	LF
CSJ: 1191-05-009							
SHEET 1 OF 13 (BEGIN TO STA 168+00)	4,180	2,190			4,380	350	2,700
SHEET 2 OF 13 (STA 168+00 TO STA 192+00)	4,590	2,620	30	420	4,590	180	5,500
SHEET 3 OF 13 (STA 192+00 TO STA 216+00)	4,800	2,400			4,800	600	1,100
SHEET 4 OF 13 (STA 216+00 TO STA 240+00)	4,800	2,400			4,800	610	1,350
SHEET 5 OF 13 (STA 240+00 TO STA 264+00)	4,800	2,400			4,800	400	3,200
SHEET 6 OF 13 (STA 264+00 TO STA 288+00)	4,650	2,320			4,650	610	1,380
SHEET 7 OF 13 (STA 288+00 TO STA 312+00)	4,800	2,400			4,800	600	1,200
SHEET 8 OF 13 (STA 312+00 TO STA 336+00)	4,715	2,315			4,715	600	
SHEET 9 OF 13 (STA 336+00 TO STA 360+00)	4,735	2,335			4,735	420	3,150
SHEET 10 OF 13 (STA 360+00 TO STA 384+00)	4,800	2,400			4,800	600	800
SHEET 11 OF 13 (STA 384+00 TO STA 408+00)	4,800	2,400			4,800	480	2,600
SHEET 12 OF 13 (STA 408+00 TO STA 432+00)	4,800	2,400			4,800	460	3,000
SHEET 13 OF 13 (STA 432+00 TO END)	940	500			940		1,000
PROJECT TOTAL	57,410	29,080	30	420	57,610	5,910	26,980

SHEET NUMBER	668	668	668	672	672	6056
	6076	6077	6085	6007	6009	6001
	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	PREFORMED IN-LANE(TRANS) RUMBLE STRIP
	LF	EA	EA	EA	EA	LF
CSJ: 1191-05-009						
SHEET 1 OF 13 (BEGIN TO STA 168+00)					55	
SHEET 2 OF 13 (STA 168+00 TO STA 192+00)	60	2	2	22	230	
SHEET 3 OF 13 (STA 192+00 TO STA 216+00)					48	
SHEET 4 OF 13 (STA 216+00 TO STA 240+00)					52	
SHEET 5 OF 13 (STA 240+00 TO STA 264+00)					60	
SHEET 6 OF 13 (STA 264+00 TO STA 288+00)	40				48	
SHEET 7 OF 13 (STA 288+00 TO STA 312+00)					45	
SHEET 8 OF 13 (STA 312+00 TO STA 336+00)	20				30	
SHEET 9 OF 13 (STA 336+00 TO STA 360+00)	15				60	
SHEET 10 OF 13 (STA 360+00 TO STA 384+00)					42	
SHEET 11 OF 13 (STA 384+00 TO STA 408+00)					58	
SHEET 12 OF 13 (STA 408+00 TO STA 432+00)			2		62	80
SHEET 13 OF 13 (STA 432+00 TO END)	45				14	
PROJECT TOTAL	180	2	4	22	804	80

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Texas Department of Transportation

infraTECH Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF PAVEMENT MARKINGS QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		23

SHEET NUMBER	636	644	644	644	644	644	644
	6002	6001	6004	6030	6031	6075	6076
	ALUMINUM SIGNS (TY G)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	RELOCATE SM RD SN SUP&AM(SIGN ONLY)	REMOVE SM RD SN SUP&AM
	SF	EA	EA	EA	EA	EA	EA
CSJ: 1191-05-009							
SHEET 1 OF 13 (BEGIN TO STA 168+00)		2	2				3
SHEET 2 OF 13 (STA 168+00 TO STA 192+00)		14	2			1	15
SHEET 3 OF 13 (STA 192+00 TO STA 216+00)		1	2				1
SHEET 4 OF 13 (STA 216+00 TO STA 240+00)							
SHEET 5 OF 13 (STA 240+00 TO STA 264+00)		2					2
SHEET 6 OF 13 (STA 264+00 TO STA 288+00)		3	2	2			5
SHEET 7 OF 13 (STA 288+00 TO STA 312+00)							
SHEET 8 OF 13 (STA 312+00 TO STA 336+00)		1	2	1	1		4
SHEET 9 OF 13 (STA 336+00 TO STA 360+00)		2	2				4
SHEET 10 OF 13 (STA 360+00 TO STA 384+00)							
SHEET 11 OF 13 (STA 384+00 TO STA 408+00)							
SHEET 12 OF 13 (STA 408+00 TO STA 432+00)		4	1	1			4
SHEET 13 OF 13 (STA 432+00 TO END)	18	1					1
PROJECT TOTAL	18	30	13	4	1	1	39

SHEET NUMBER	658	658	658	658	658	685	685
	6062	6081	6101	6102	6104	6004	6006
	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	INSTL OM ASSM (OM-2Z)(WFLX)SRF)SRF	INSTL OM ASSM (OM-3L)(WFLX)SRF)SRF	INSTL OM ASSM (OM-3R)(WFLX)SRF)SRF	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	REMOV RDSD FLSH BCN AM (SOLAR PWRD)
	EA	EA	EA	EA	EA	EA	EA
CSJ: 1191-05-009							
SHEET 1 OF 13 (BEGIN TO STA 168+00)			10				
SHEET 2 OF 13 (STA 168+00 TO STA 192+00)	12		14	2	2		
SHEET 3 OF 13 (STA 192+00 TO STA 216+00)			14				
SHEET 4 OF 13 (STA 216+00 TO STA 240+00)			20				
SHEET 5 OF 13 (STA 240+00 TO STA 264+00)			14				
SHEET 6 OF 13 (STA 264+00 TO STA 288+00)			12				
SHEET 7 OF 13 (STA 288+00 TO STA 312+00)			20				
SHEET 8 OF 13 (STA 312+00 TO STA 336+00)			10				
SHEET 9 OF 13 (STA 336+00 TO STA 360+00)			16				
SHEET 10 OF 13 (STA 360+00 TO STA 384+00)			10				
SHEET 11 OF 13 (STA 384+00 TO STA 408+00)			8				
SHEET 12 OF 13 (STA 408+00 TO STA 432+00)			6				
SHEET 13 OF 13 (STA 432+00 TO END)		3				1	1
PROJECT TOTAL	12	3	154	2	2	1	1

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Texas Department of Transportation

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TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SIGNING QUANTITIES

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		24

DATE: 5/25/2023 4:34:14 PM
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SUMMARY OF SMALL SIGNS

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

- XXXXX: POST TYPE — FRP = Fiberglass; TWT = Thin-Wall; 10BWG = 10 BWG; S80 = Sch 80
- XX: POSTS — 1 or 2
- (X): ANCHOR TYPE — UA=Universal Conc; UB=Universal Bolt; SA=Slipbase-Conc; SB=Slipbase-Bolt; WS=Wedge Steel; WP=Wedge Plastic
- (X-XXXX): 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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
										PREFABRICATED	1EXT or 2EXT = # of Ext	
CSJ: 1191-05-009 FM937												
1	1	I-2dT	Robertson COUNTY LINE	78 x 24	X		10BWG	1	SA	T		
		D10-7aT	370	3 x 10	X							
		D10-7aT	370	3 x 10	X							
	2	R2-1	SPEED LIMIT 70	30 x 36	X		10BWG	1	SA	P		
	3	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	X		10BWG	1	SA	T		
	4	W1-2R		36 x 36	X		10BWG	1	SA	P		
		W13-1P	55 MPH	18 x 18	X							
2	1	D20-1TR	CO RD 477 →	24 x 24	X		10BWG	1	SA	P		
	2	R1-1	STOP	36 x 36	X		10BWG	1	SA	P		
	3	D20-1TL	CO RD 477 ←	24 x 24	X		10BWG	1	SA	P		
	4	D26-3TL	← Sterling Robertson Dam Rd	42 x 24	X		10BWG	1	SA	P		
		R19-10bT *	ROBERTSON COUNTY BURN BAN IN EFFECT	36 x 36	X							

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).

* FOLDABLE SIGN TO BE RELOCATED.

Texas Department of Transportation

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TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SMALL SIGNS

SHEET 01 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		25

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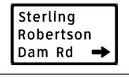
SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
CSJ: 1191-05-009 FM937												
2	**5**	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	6	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	7	**R1-1**		**36 x 36**	**X**		**10BWG**	**1**	**SA**	**P**		
	8	**W1-7**		**48 x 24**	**X**		**10BWG**	**1**	**SA**	**T**		
	9	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	10	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	11	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	12	**W1-8R**		**18 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		
		W1-8L		**18 x 24**	**X**							
	13	**D26-3TR**		**42 x 24**	**X**		**10BWG**	**1**	**SA**	**P**		

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

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

infraTECH Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SMALL SIGNS

SHEET 02 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		26

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
CSJ: 1191-05-009 FM937												
2	14	TX4-1T	REPORT POACHING CALL GAME WARDEN	36 x 18	X		10BWG	1	SA	P		
	15	D3-1G	Seale	48 x 18	X		10BWG	1	SA	T		
	16	W1-2L		36 x 36	X		10BWG	1	SA	P		
		W13-1P	55 MPH	18 x 18	X							
3	1	R2-1	SPEED LIMIT 70	30 x 36	X		10BWG	1	SA	P		
	2	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	X		10BWG	1	SA	T		
	3	D3-1G	Seale	48 x 18	X		10BWG	1	SA	T		
5	1	M1-6F	FARM 937 ROAD	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	372	3 x 10	X							
		D10-7aT	372	3 x 10	X							
	2	W11-8L		36 x 36	X		10BWG	1	SA	P		
6	1	D3-3bTR	Seale-Round Prairie Cemetery	84 x 36	X		S80	1	SA	T		
	2	D21-1aTDBL	Dogwood Creek Rd	66 x 24	X		10BWG	1	SA	T		

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).

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Texas Department of Transportation

infraTECH Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

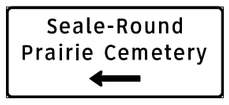
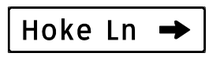
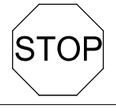
SUMMARY OF SMALL SIGNS

SHEET 03 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		27

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
CSJ: 1191-05-009 FM937												
6	3	W11-8R		36 x 36	X		10BWG	1	SA	P		
	4	R1-1		36 x 36	X		10BWG	1	SA	P		
	5	R1-1		36 x 36	X		10BWG	1	SA	P		
	6	D21-1aTDBL		66 x 24	X		10BWG	1	SA	T		
	7	D3-3bTL		84 x 36	X		S80	1	SA	T		
8	1	D7-1TR		108 x 24	X		S80	1	SA	T	2EXT	
	2	D7-1TL		96 x 24	X		S80	1	SA	T		
	3	D1-1R		78 x 18	X		10BWG	1	SA	T		
	4	R1-1		36 x 36	X		10BWG	1	SA	P		
	5	D1-1L		78 x 18	X		10BWG	1	SA	T		
9	1	D1-1R		78 x 18	X		10BWG	1	SA	T		
	2	R1-1		36 x 36	X		10BWG	1	SA	P		
	3	D1-1L		78 x 18	X		10BWG	1	SA	T		

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:

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

Texas Department of Transportation

infraTECH Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SMALL SIGNS

SHEET 04 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		28

DATE: 5/25/2023 4:34:16 PM
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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
CSJ: 1191-05-009 FM937												
9	4	M1-6F	FARM 937 ROAD	24 x 24	X		10BWG	1	SA	P		
		D10-7aT	374	3 x 10	X							
		D10-7aT	374	3 x 10	X							
12	1	W17-2T	RUMBLE STRIPS AHEAD	36 x 36	X		10BWG	1	SA	P		
	2	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	X		10BWG	1	SA	T		
3		M2-1	JCT	21 x 15	X		10BWG	1	SA	P		
		M1-6T	7 TEXAS	24 x 24	X							
4		W3-1		36 x 36	X		10BWG	1	SA	P		
5		D1-2	← Marquez Kosse →	78 x 30	X		S80	1	SA	T		
6		R2-1	SPEED LIMIT 70	30 x 36	X		10BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
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Less than 7.5	0.080"
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Greater than 15	0.125"

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Texas Department of Transportation

infraTECH Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SMALL SIGNS

SHEET 05 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		29

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)					BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	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	TY N TY S
CSJ: 1191-05-009 FM937												
13	**1**	**M3-1**	NORTH	**24 x 12**	**X**		**10BWG**	**1**	**SA**	**P**		
		M1-6F	FARM 937 ROAD	**24 x 24**	**X**							
		D10-7aT	376	**3 x 10**	**X**							
		D10-7aT	376	**3 x 10**	**X**							
	2	**R1-1**	STOP	**48 x 48**	**X**		**SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY**					
		W4-4P	CROSS TRAFFIC DOES NOT STOP	**24 x 12**	**X**							

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

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Texas Department of Transportation

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TBPE REGISTRATION NO. F-18368

FM 937

SUMMARY OF SMALL SIGNS

SHEET 06 OF 06

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		30

CK:
DW:
CK:
DW:

GENERAL NOTES

1. TRAFFIC CONTROL AND LANE CLOSURES WILL BE IN ACCORDANCE WITH THE PLANS, BC, TCP AND WZ STANDARDS, AND AS DIRECTED BY THE ENGINEER.
2. CONSTRUCT THE ROADWAY PAVEMENT IN SECTIONS OF APPROXIMATELY EQUAL LENGTH. NO SECTION IS TO EXCEED 2 MILES OF NON-SURFACED ROADWAY WITHOUT PRIOR APPROVAL FROM THE ENGINEER. DO NOT PROCEED TO THE NEXT ROADWAY SECTION WITHOUT APPROVAL FROM THE ENGINEER.
3. PRIOR TO THE END OF WORK EACH DAY, THE ROADWAY MUST BE RESTORED TO TWO-WAY, TWO-LANE TRAFFIC WITHIN THE ENTIRE PROJECT LIMITS. NO OVERNIGHT LANE CLOSURES ARE PERMITTED WITHOUT THE APPROVAL OF THE ENGINEER.
4. MAXIMUM SLOPE FOR THE TRANSITION BETWEEN TWO ROADWAY SECTIONS OF DIFFERENT PROFILE ELEVATIONS IS 0.25" VERTICAL PER 1' HORIZONTAL.
5. INCORPORATE 3:1 SAFETY WEDGES FOR ALL DROP OFFS GREATER THAN TWO (2) INCHES LEFT OVERNIGHT. CONSIDER THIS SUBSIDIARY TO THE VARIOUS ITEMS.
6. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT SITE TO REDUCE PONDING WHERE EVER POSSIBLE.
7. WINDROW EXISTING TOPSOIL AND PLACE AT A LOCATION APPROVED BY TXDOT.
8. CONTRACTOR SHALL PROVIDE ACCESS TO ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION UNLESS ARRANGEMENTS WITH THE PROPERTY OWNERS HAVE BEEN MADE IN WRITING. CONTRACTOR SHALL PROVIDE TXDOT THE WRITTEN AGREEMENTS AT LEAST TWO BUSINESS DAYS PRIOR TO PROCEEDING WITH THE DRIVEWAY CONSTRUCTION.
9. SPRINKLE FOR DUST CONTROL AS DIRECTED. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY.
10. CONTRACTOR SHALL MAINTAIN CLEAN TRAFFIC CONTROL DEVICES AT ALL TIMES.
11. CONTRACTOR SHALL NOT WORK IN ANY AFFECTED AREAS WHERE CONFLICTS HAVE NOT CLEARED.

SEQUENCE OF WORK

1. SETUP ADVANCED WARNING SIGNS ACCORDING TO BC STANDARDS.
2. INSTALL AND MAINTAIN EROSION CONTROLS PER PLANS OR AS DIRECTED BY ENGINEER.
3. PREPARE RIGHT-OF-WAY.
4. JACK OR BORE REPLACEMENT CULVERTS 17 AND 18 AND EXTEND EXISTING CULVERTS 1 - 16 AND INSTALL S.E.T.s PRIOR TO ROADWAY RECONSTRUCTION, UTILIZE BC(10)-21 AND TCP(2-1)-18.
5. EXCAVATE TO WIDTH OF PROPOSED SUBGRADE, LOWERING EXISTING PAVEMENT SECTION ONE LAYER AT A TIME.
6. CONSTRUCT CEMENT STABILIZED SUBGRADE, BOTH SIDES OF ROADWAY, ONE SIDE AT A TIME.
7. PLACE CEMENT TREATED FLEX BASE ON TOP OF TREATED SUBGRADE, BOTH SIDES OF ROADWAY, ONE SIDE AT A TIME.
8. PLACE SEAL COAT FOLLOWED BY SUPERPAVE, BOTH SIDES OF ROADWAY, ONE SIDE AT A TIME.
9. INSTALL PERMANENT PAVEMENT MARKINGS AND ANY REMAINING SIGNAGE.
10. PERFORM FINAL SITE CLEAN UP.

PHASE 1 - CLEARING, GRUBBING, CROSS DRAINAGE (PROJECT LIMITS)

1. PREPARE ROW. CLEAR ALL TREES AND SHRUBS INSIDE TXDOT ROW USING TCP(2-1)-18.
2. JACK OR BORE REPLACEMENT CULVERTS 17 AND 18 AND EXTEND CULVERTS 1 - 16 AND INSTALL S.E.T.s PRIOR TO ROADWAY RECONSTRUCTION, UTILIZE BC(10)-21 AND TCP(2-1)-18.

PHASE 2 - CEMENT TREATED SUBGRADE (PROJECT LIMITS)

1. EXCAVATE EXISTING MATERIAL ONE SIDE OF ROAD AT A TIME, WIDEN AND CONSTRUCT CEMENT TREATED SUBGRADE PER PROPOSED LIMITS.
2. USE ONE-LANE TWO-WAY TRAFFIC OPERATIONS USING TCP(2-2b)-18 WITH PILOT CAR. BOTH SIDES OF THE ROADWAY SHOULD BE WORKED ON DURING THIS STEP. DURING CONSTRUCTION, TRAFFIC SHOULD BE SHIFTED LEFT/RIGHT AFTER OPPOSITE IS COMPLETED. LIMIT WORK AREAS TO A MAXIMUM OF 1 MILE.
3. COMPACT AND FINISH SECTION TO CARRY TRAFFIC AT THE END OF DAILY OPERATION. COMPACT LONGITUDINAL TRANSITION FROM ADJACENT PAVEMENT (50:1 MAX GRADIENT) AND COMPACT 3:1 SAFETY WEDGE ALONG CENTERLINE PRIOR TO OPENING TO TRAFFIC.
4. MOVE CONES TO EDGE OF PAVEMENT AT THE END OF EACH DAYS OPERATIONS. (SEE BC(9)-21).
5. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.
6. REGRADE SIDE SLOPES AND DITCHES, REPLACE DRIVEWAY CULVERTS.

PHASE 3 - PROP FLEX BASE AND SEAL COAT (PROJECT LIMITS)

1. PLACE PROPOSED CEMENT TREATED FLEX BASE ON ONE SIDE OF THE ROADWAY BEFORE MOVING TO THE OPPOSITE SIDE FOR A LENGTH NOT TO EXCEED ONE (1) MILE.
2. PLACE EMBANKMENT.
3. PLACE SEAL COAT, NO MORE THAN 5 DAYS AFTER CEMENT TREATMENT, PRIOR TO CONTINUING ON TO THE NEXT SECTION OF ROADWAY. USE TCP(2-2b)-18 FOR TRAFFIC CONTROL.
4. PROVIDE A SMOOTH TRANSITION FROM CONSTRUCTED ROADWAY TO EXISTING ROADWAY.
5. MOVE DRUMS AND CONES TO OPPOSITE EDGES OF PAVEMENT AT THE END OF EACH DAYS OPERATION (SEE BC(9)-21).
6. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.

PHASE 4 - SUPERPAVE (PROJECT LIMITS)

1. PLACE THE SUPERPAVE NO LATER THAN FOURTEEN (14) DAYS AFTER PLACEMENT OF SEAL COAT, UNLESS OTHERWISE DIRECTED.
2. PLACE NON-REMOVEABLE WORK ZONE PAVEMENT MARKINGS TO DELINEATE CENTERLINE IF THE SUPERPAVE IS NOT PLACED WITHIN 14 DAYS.
3. PLACE CENTERLINE USING SHORT TERM PAVEMENT MARKINGS (TY Y-2), USING TCP(2-2b)-18 AND TCP(7-1)-13.
4. PLACE METAL BEAM GUARD FENCE AND CONCRETE MOWSTRIP, INSTALL PERMANENT SIGNING AND ILLUMINATION USING TCP(2-1)-18.
5. PLACE FINAL PAVEMENT MARKINGS, SIGNS, DELINEATIONS AND OBJECT MARKERS USING TCP(3-1)-13 AND TCP(3-3)-14.
6. ESTABLISH VEGETATION AND FINAL CLEAN UP.

NOT TO SCALE

6/30/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

TCP NARRATIVE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		31

DATE: 6/30/2023 9:19:09 AM
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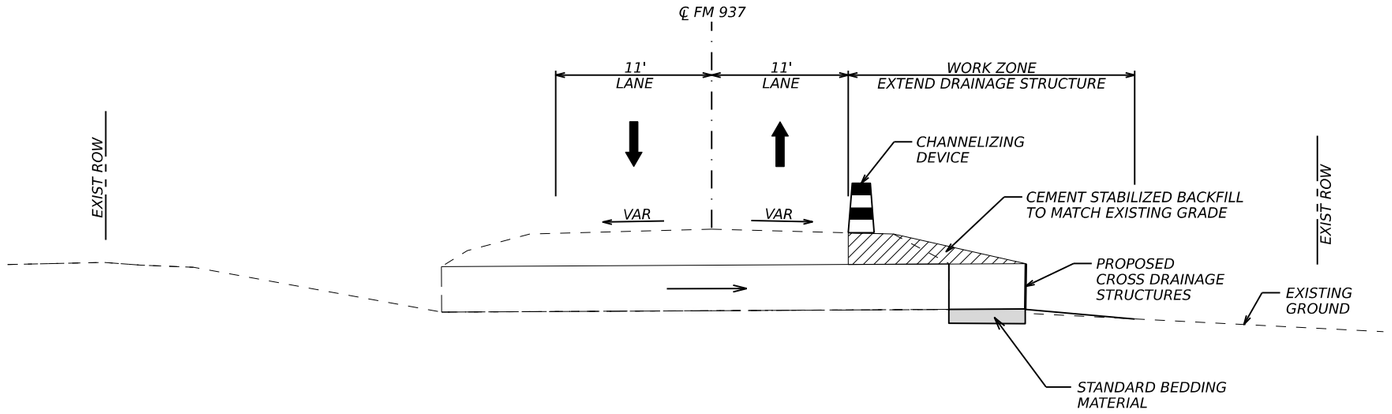
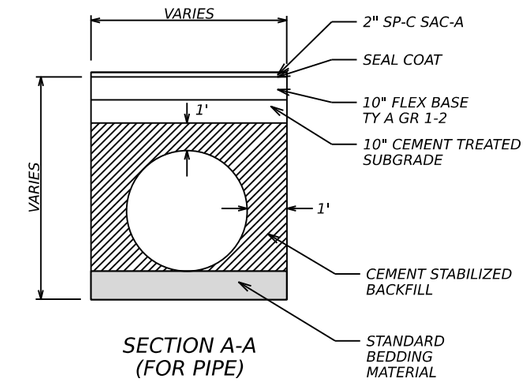
LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- PROPOSED WORK AREA
- PROPOSED COMPLETED AREA



PHASE 1A - EXTEND CROSS CULVERTS (DOWNSTREAM)

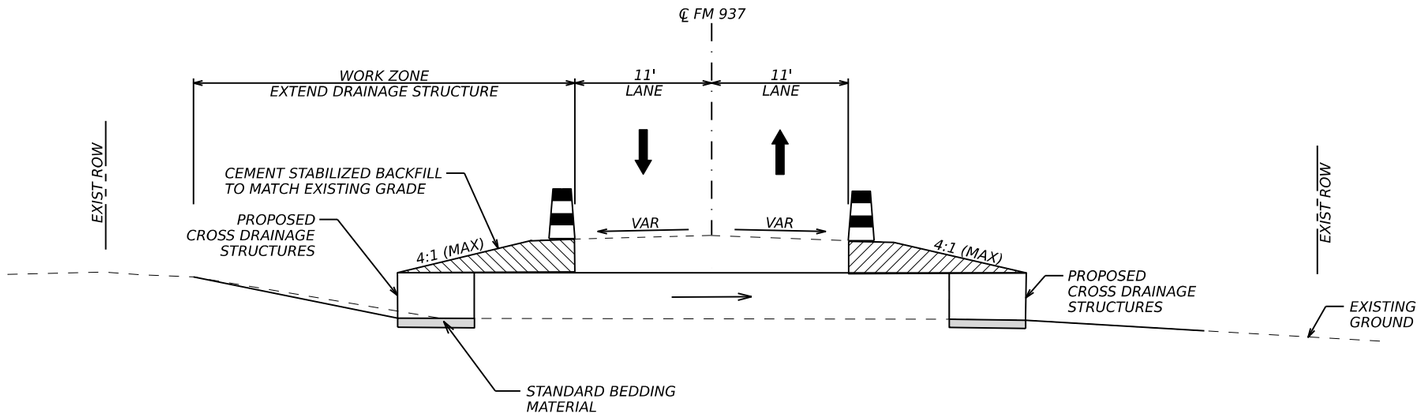
1. EXTEND CROSS CULVERTS ON THE DOWNSTREAM END.
2. USE TCP(2-1)-18 FOR TRAFFIC CONTROL (FOR SHOULDER CLOSURES).



SECTION A-A
(FOR PIPE)

LOCATIONS

CULVERT #1 - STA 161+49.68	CULVERT #9 - STA 250+70.03
CULVERT #2 - STA 175+07.04	CULVERT #10 - STA 281+30.69
CULVERT #3 - STA 182+84.18	CULVERT #12 - STA 316+90.16
CULVERT #4 - STA 198+25.76	CULVERT #15 - STA 350+86.37
CULVERT #6 - STA 210+92.56	CULVERT #17 - STA 418+92.75
CULVERT #7 - STA 227+34.56	CULVERT #18 - STA 426+61.13
CULVERT #8 - STA 243+14.55	



PHASE 1B - EXTEND CROSS CULVERTS (UPSTREAM)

1. EXTEND CROSS CULVERTS ON THE UPSTREAM END.
2. USE TCP(2-1)-18 FOR TRAFFIC CONTROL (FOR SHOULDER CLOSURES).

NOT TO SCALE

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742
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Houston, Texas 77042
(713) 622-1444

FM 937

TCP TYPICAL SECTIONS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		32

DATE: 5/26/2023 9:51:33 AM
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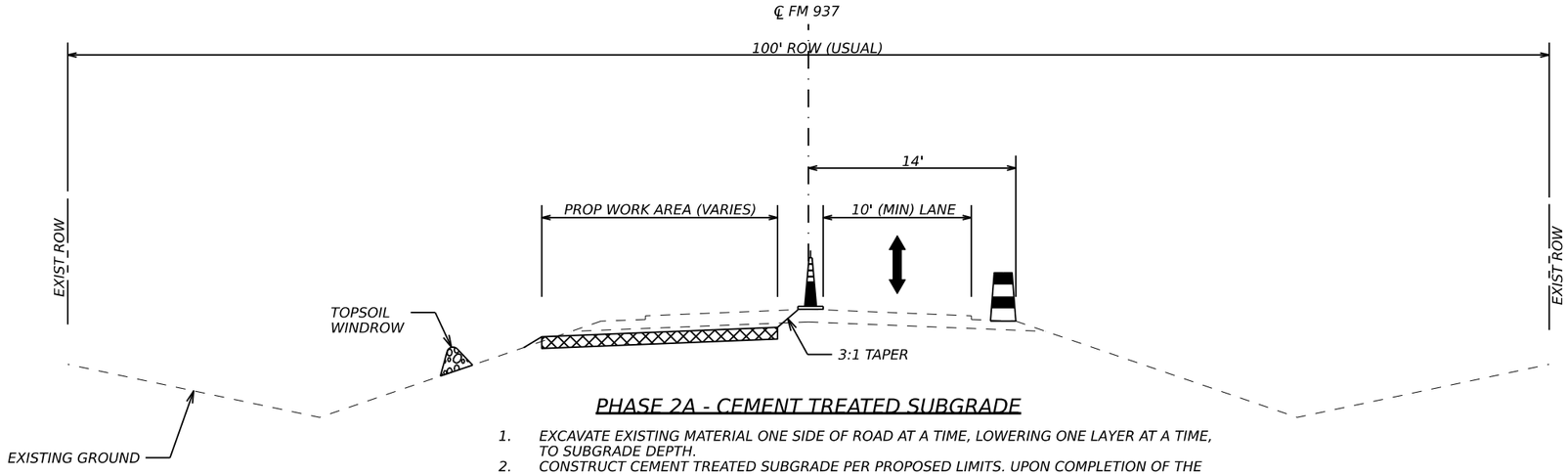
CK:
DW:
CK:
DN:

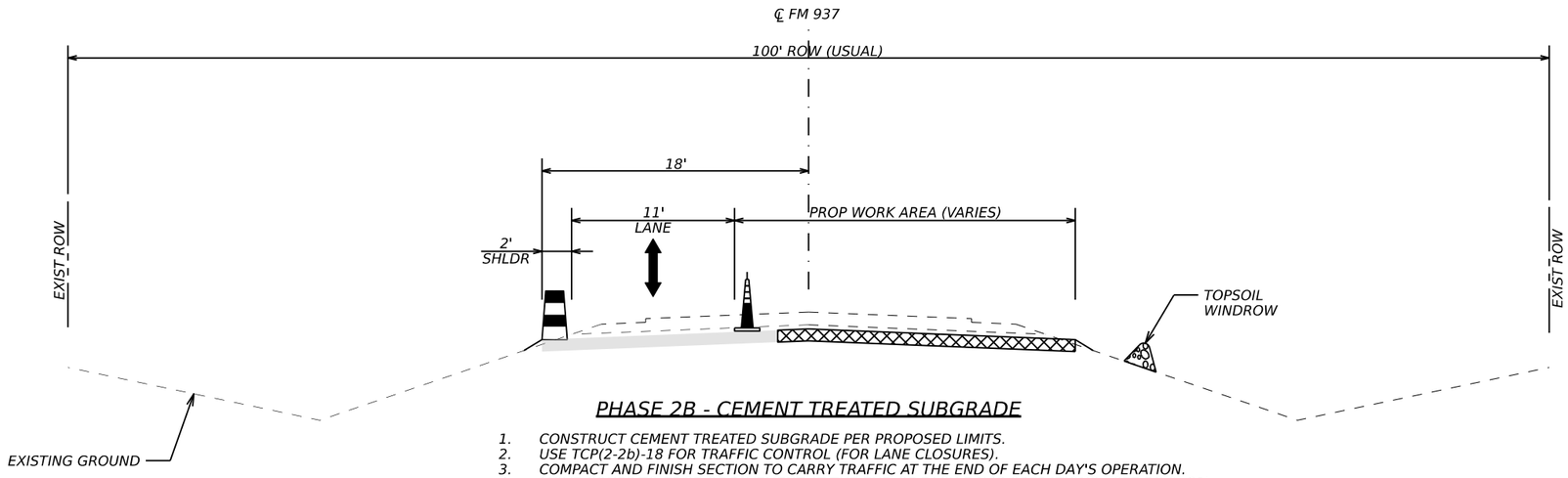
LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- PROPOSED WORK AREA
- PROPOSED COMPLETED AREA



PHASE 2A - CEMENT TREATED SUBGRADE

1. EXCAVATE EXISTING MATERIAL ONE SIDE OF ROAD AT A TIME, LOWERING ONE LAYER AT A TIME, TO SUBGRADE DEPTH.
2. CONSTRUCT CEMENT TREATED SUBGRADE PER PROPOSED LIMITS. UPON COMPLETION OF THE 1 MILE, CEMENT TREAT MATERIAL AS SHOWN IN THE TYPICAL SECTIONS NO MORE THAN 5 DAYS AFTER PLACEMENT.
3. USE TCP(2-2b)-18 FOR TRAFFIC CONTROL (FOR LANE CLOSURES).
4. COMPACT AND FINISH SECTION TO CARRY TRAFFIC AT THE END OF EACH DAY'S OPERATION.
5. MOVE CONES TO EDGE OF PAVEMENT AT THE END OF EACH DAY'S OPERATIONS. (SEE BC(9)-21).
6. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.



PHASE 2B - CEMENT TREATED SUBGRADE

1. CONSTRUCT CEMENT TREATED SUBGRADE PER PROPOSED LIMITS.
2. USE TCP(2-2b)-18 FOR TRAFFIC CONTROL (FOR LANE CLOSURES).
3. COMPACT AND FINISH SECTION TO CARRY TRAFFIC AT THE END OF EACH DAY'S OPERATION.
4. MOVE CONES TO EDGE OF PAVEMENT AT THE END OF EACH DAY'S OPERATIONS. (SEE BC(9)-21).
5. PLACE DRUM AT THE EDGE OF PAVEMENT AT THE END OF EACH DAY'S OPERATIONS. (SEE BC(8)-21).
6. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.

NOT TO SCALE

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742

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(713) 622-1444

FM 937

TCP TYPICAL SECTIONS

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		33

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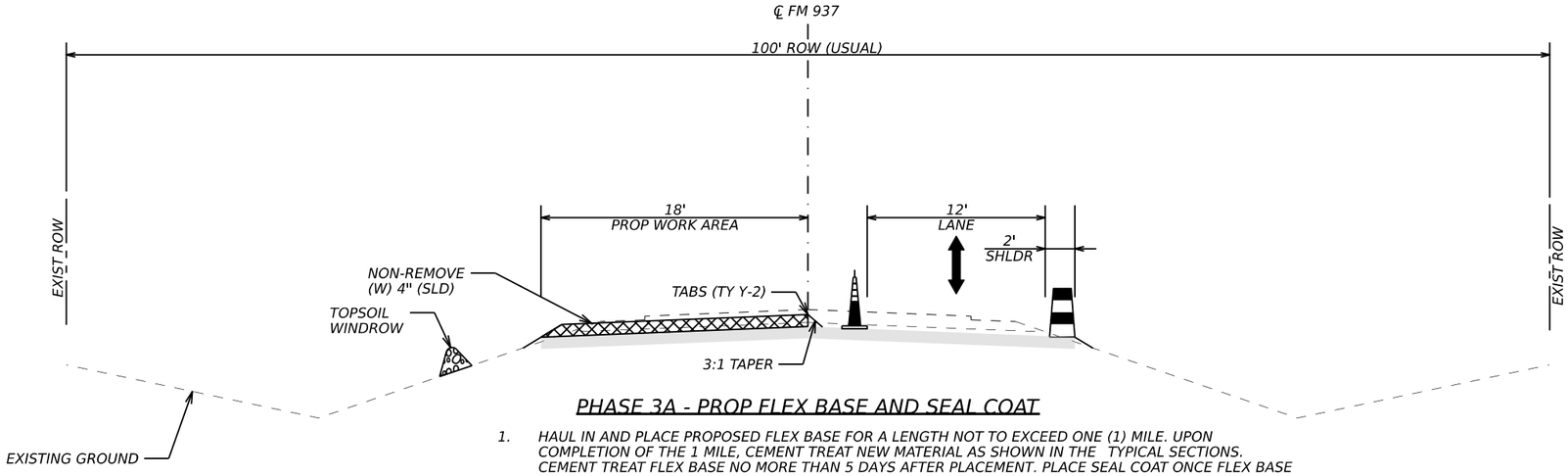
CK:
DW:
CK:
DW:

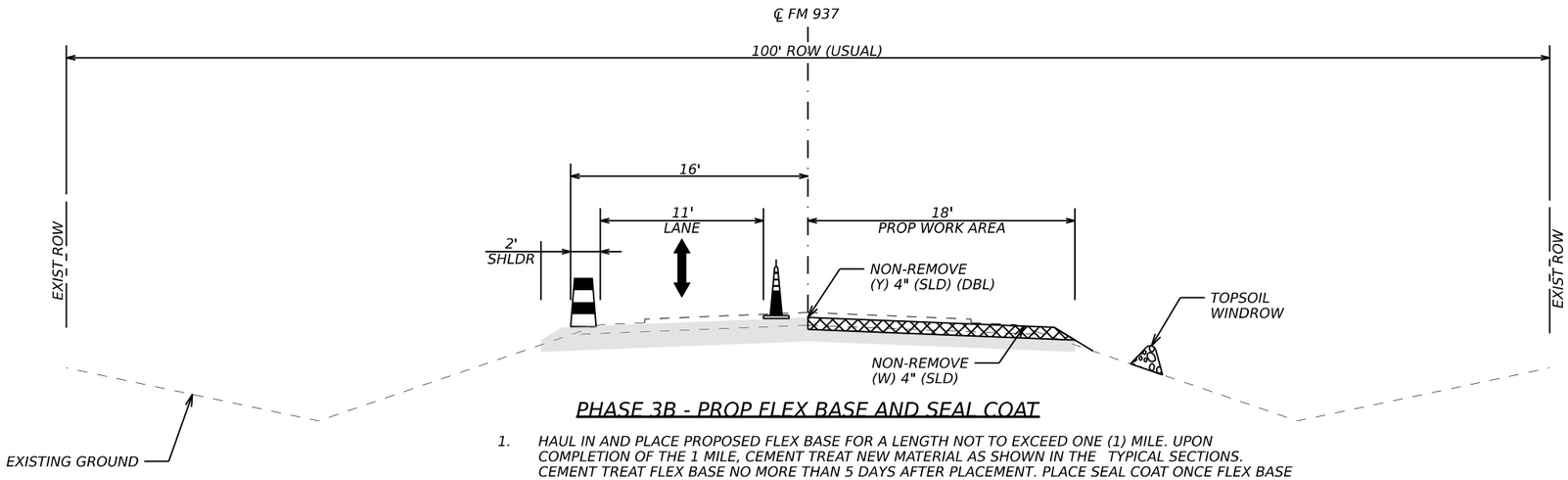
LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- PROPOSED WORK AREA
- PROPOSED COMPLETED AREA



PHASE 3A - PROP FLEX BASE AND SEAL COAT

1. HAUL IN AND PLACE PROPOSED FLEX BASE FOR A LENGTH NOT TO EXCEED ONE (1) MILE. UPON COMPLETION OF THE 1 MILE, CEMENT TREAT NEW MATERIAL AS SHOWN IN THE TYPICAL SECTIONS. CEMENT TREAT FLEX BASE NO MORE THAN 5 DAYS AFTER PLACEMENT. PLACE SEAL COAT ONCE FLEX BASE HAS BEEN TREATED, NO MORE THAN 5 DAYS AFTER CEMENT TREATMENT, PRIOR TO CONTINUING ON TO THE NEXT SECTION OF ROADWAY. PLACE WORK ZONE PAVEMENT MARKINGS ONCE SEAL COAT HAS BEEN PLACED. USE TCP(2-2b)-18 FOR TRAFFIC CONTROL.
2. PROVIDE A SMOOTH TRANSITION FROM CONSTRUCTED ROADWAY TO EXISTING ROADWAY. COMPACT 3:1 SAFETY WEDGE ALONG CENTERLINE PRIOR TO OPENING TO TRAFFIC.
3. MOVE DRUMS AND CONES TO OPPOSITE EDGES OF PAVEMENT AT THE END OF EACH DAY'S OPERATIONS. (SEE BC(9)-21).
4. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.



PHASE 3B - PROP FLEX BASE AND SEAL COAT

1. HAUL IN AND PLACE PROPOSED FLEX BASE FOR A LENGTH NOT TO EXCEED ONE (1) MILE. UPON COMPLETION OF THE 1 MILE, CEMENT TREAT NEW MATERIAL AS SHOWN IN THE TYPICAL SECTIONS. CEMENT TREAT FLEX BASE NO MORE THAN 5 DAYS AFTER PLACEMENT. PLACE SEAL COAT ONCE FLEX BASE HAS BEEN TREATED, NO MORE THAN 5 DAYS AFTER CEMENT TREATMENT, PRIOR TO CONTINUING ON TO THE NEXT SECTION OF ROADWAY. PLACE WORK ZONE PAVEMENT MARKINGS ONCE SEAL COAT HAS BEEN PLACED. USE TCP(2-2b)-18 FOR TRAFFIC CONTROL.
2. PROVIDE A SMOOTH TRANSITION FROM CONSTRUCTED ROADWAY TO EXISTING ROADWAY. COMPACT 3:1 SAFETY WEDGE ALONG CENTERLINE PRIOR TO OPENING TO TRAFFIC.
3. MOVE DRUMS AND CONES TO OPPOSITE EDGES OF PAVEMENT AT THE END OF EACH DAY'S OPERATIONS. (SEE BC(9)-21).
4. OPEN ROADWAY TO UNRESTRICTED THRU TRAFFIC AT THE END OF EACH DAY'S OPERATION.

NOTE:

REFERENCE MARKERS AND MILE POINTS SHOWN ON THIS SHEET AND THE TITLE SHEET ARE FOR REFERENCE PURPOSES ONLY. THE PROJECT LIMIT STATIONS SHOWN REPRESENT THE PROJECT CONSTRUCTION LENGTH. THE PROJECT QUANTITIES ARE BASED ON THE STATION, NOT THE REFERENCE MARKERS AND MILE POINTS.

NOT TO SCALE

6/21/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

TCP TYPICAL SECTIONS

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		34

DATE: 6/21/2023 10:55:30 AM
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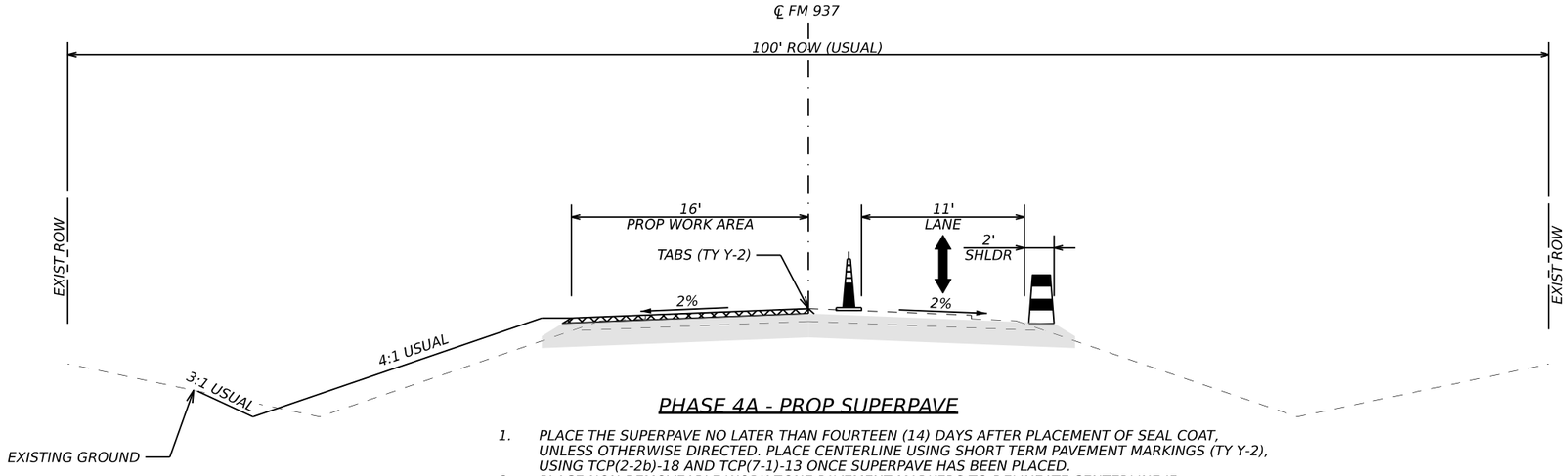
DW:
CK:
DW:

LEGEND

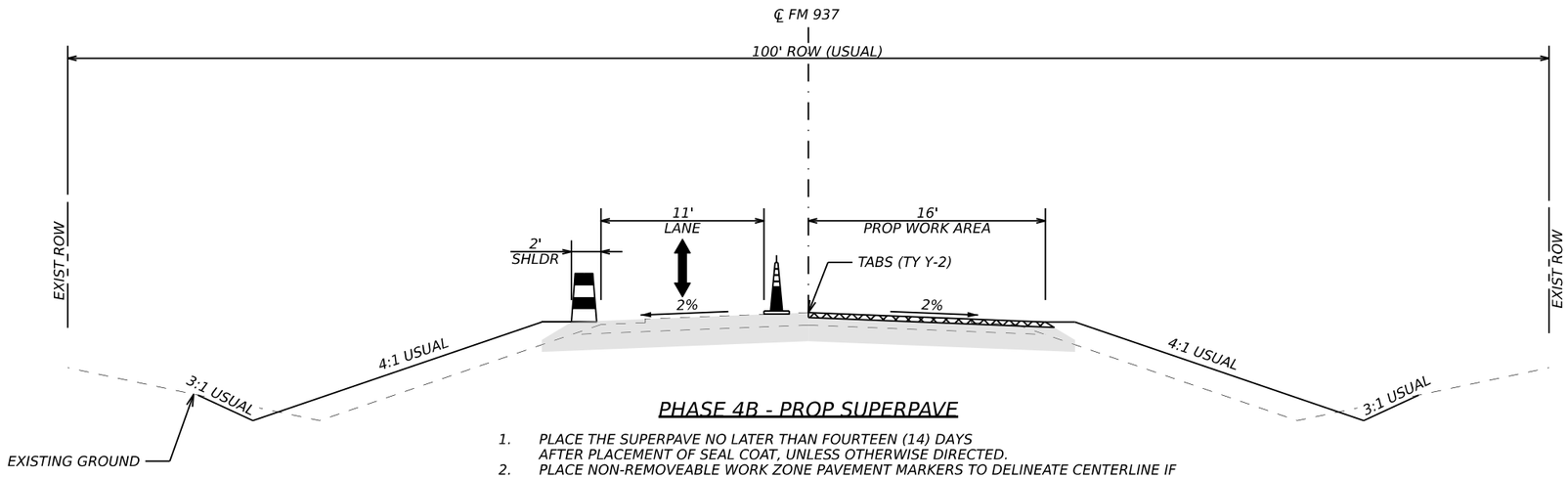
- PROPOSED TRAFFIC FLOW DIRECTION
- PROPOSED WORK AREA
- PROPOSED COMPLETED AREA



PHASE 4A - PROP SUPERPAVE

1. PLACE THE SUPERPAVE NO LATER THAN FOURTEEN (14) DAYS AFTER PLACEMENT OF SEAL COAT, UNLESS OTHERWISE DIRECTED. PLACE CENTERLINE USING SHORT TERM PAVEMENT MARKINGS (TY Y-2), USING TCP(2-2b)-18 AND TCP(7-1)-13 ONCE SUPERPAVE HAS BEEN PLACED.
2. PLACE NON-REMOVEABLE WORK ZONE PAVEMENT MARKERS TO DELINEATE CENTERLINE IF THE SUPERPAVE IS NOT PLACED WITHIN 14 DAYS.
3. FINAL GRADE AND PLACE TOPSOIL AFTER PLACEMENT OF THE SUPERPAVE IS COMPLETE.

NOT TO SCALE



PHASE 4B - PROP SUPERPAVE

1. PLACE THE SUPERPAVE NO LATER THAN FOURTEEN (14) DAYS AFTER PLACEMENT OF SEAL COAT, UNLESS OTHERWISE DIRECTED.
2. PLACE NON-REMOVEABLE WORK ZONE PAVEMENT MARKERS TO DELINEATE CENTERLINE IF THE SUPERPAVE IS NOT PLACED WITHIN 14 DAYS.
3. PLACE CENTERLINE USING SHORT TERM PAVEMENT MARKINGS (TY Y-2), USING TCP(2-2b)-18 AND TCP(7-1)-13 ONCE SUPERPAVE HAS BEEN PLACED.
4. PLACE FINAL PAVEMENT MARKINGS, SIGNS, DELINEATION AND OBJECT MARKERS WITHIN FOURTEEN (14) DAYS AFTER PLACEMENT OF SUPERPAVE USING TCP(3-1)-13 AND TCP(3-3)-14.
5. FINAL GRADE AND PLACE TOPSOIL AFTER PLACEMENT OF THE SUPERPAVE IS COMPLETE.
6. ESTABLISH VEGETATION AND FINAL CLEAN UP.

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742
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Houston, Texas 77042
(713) 622-1444

FM 937

TCP TYPICAL SECTIONS

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		35

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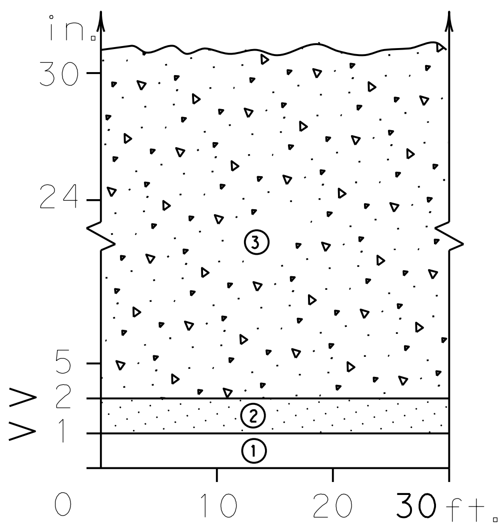
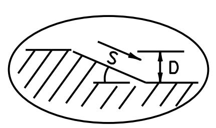
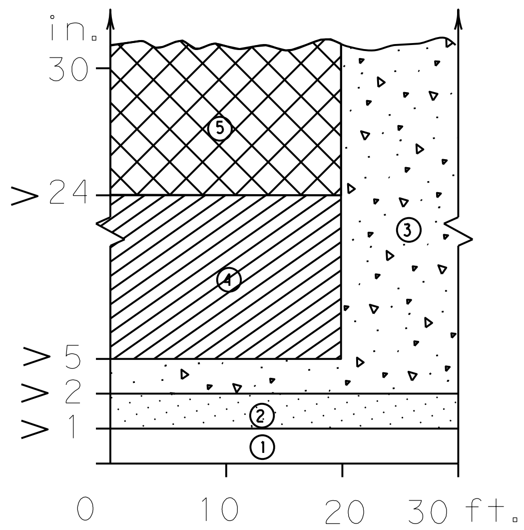
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

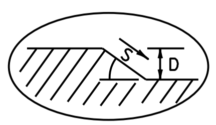


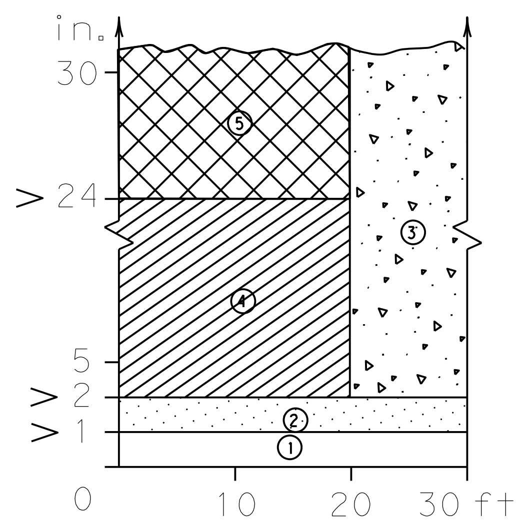
Edge Condition I
S = (3:1) (or flatter)





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





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

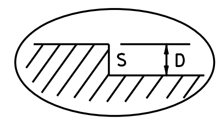
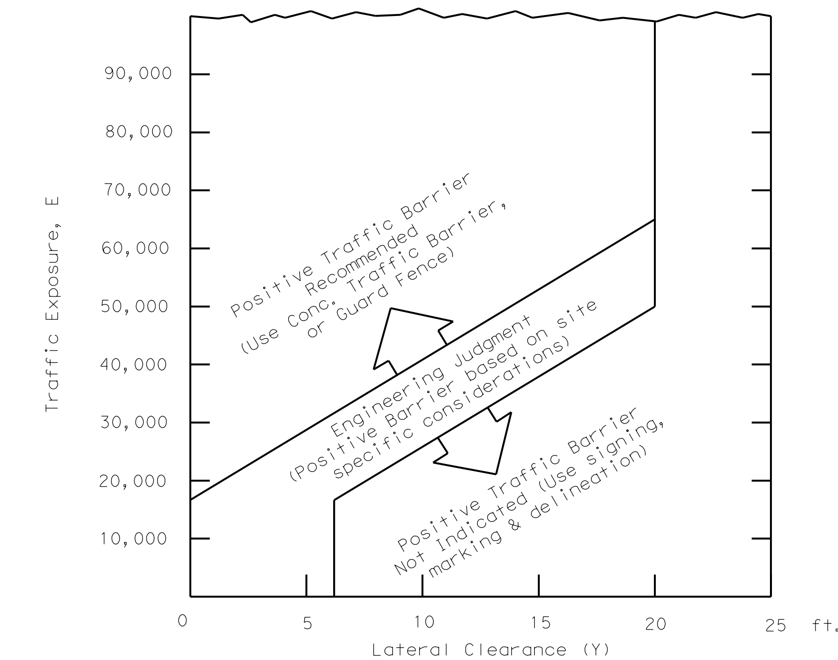
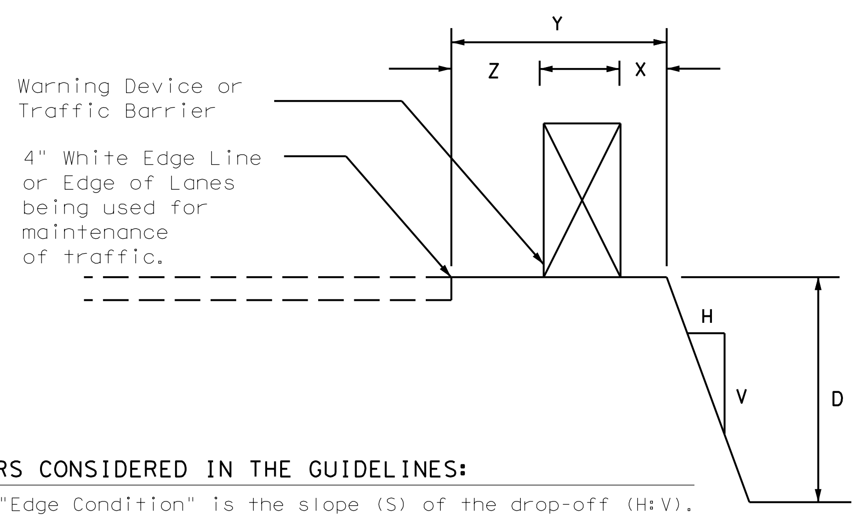


FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▩)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.
3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

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



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

FACTORS CONSIDERED IN THE GUIDELINES:

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

Edge Condition Notes:

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

Engineer's Seal

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

Date ____________

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT 1191	SECT 05	JOB 009	HIGHWAY FM 937
REVISIONS 03-01 08-01 9-21	DIST BRY		COUNTY ROBERTSON	SHEET NO. 36

DATE: 5/26/2023 9:51:36 AM
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DATE: 5/26/2023 9:51:37 AM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	BRY	ROBERTSON		37
5-10 5-21				

DATE: 5/26/2023 9:51:37 AM
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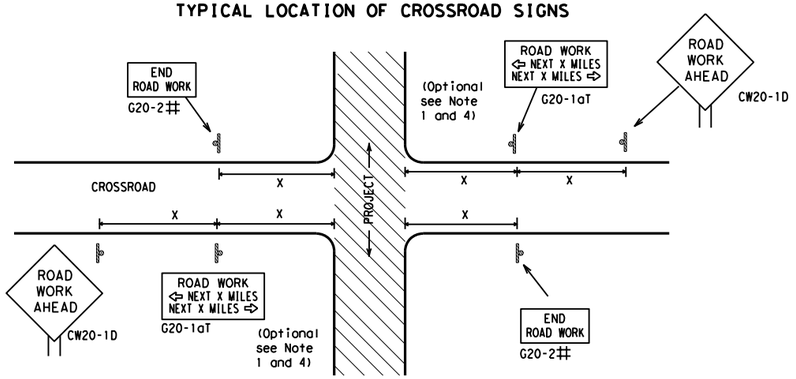
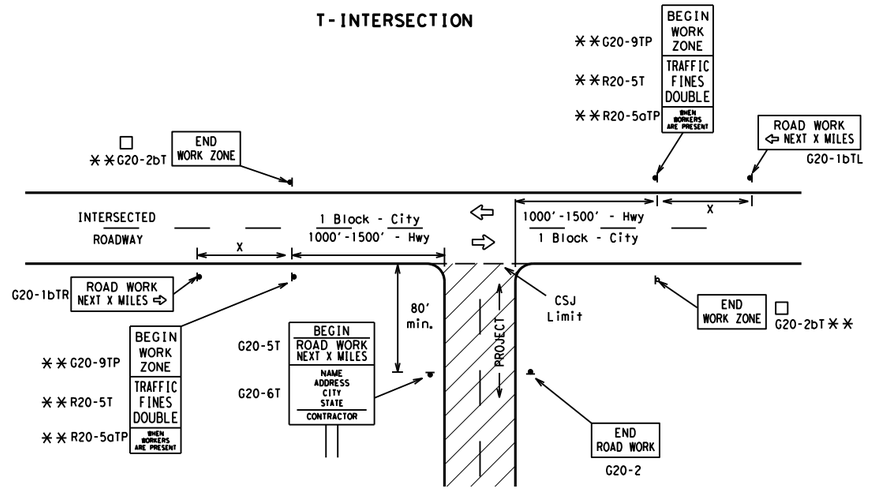
TYPICAL LOCATION OF CROSSROAD SIGNS



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 as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

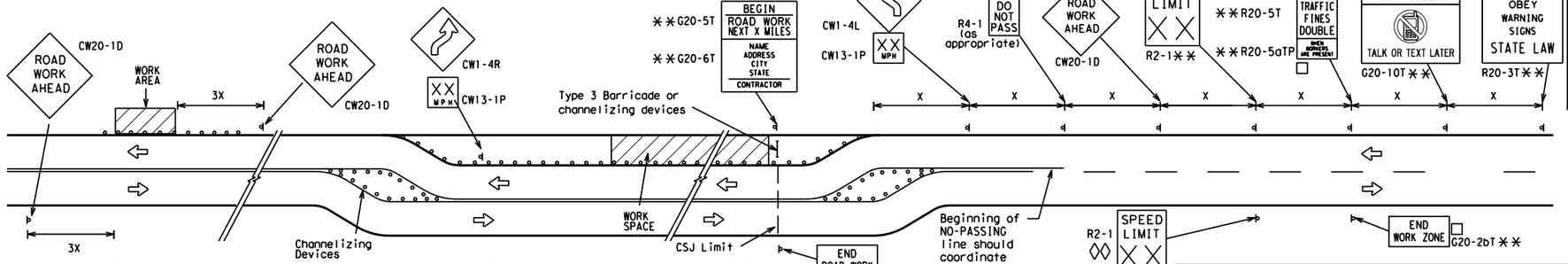
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

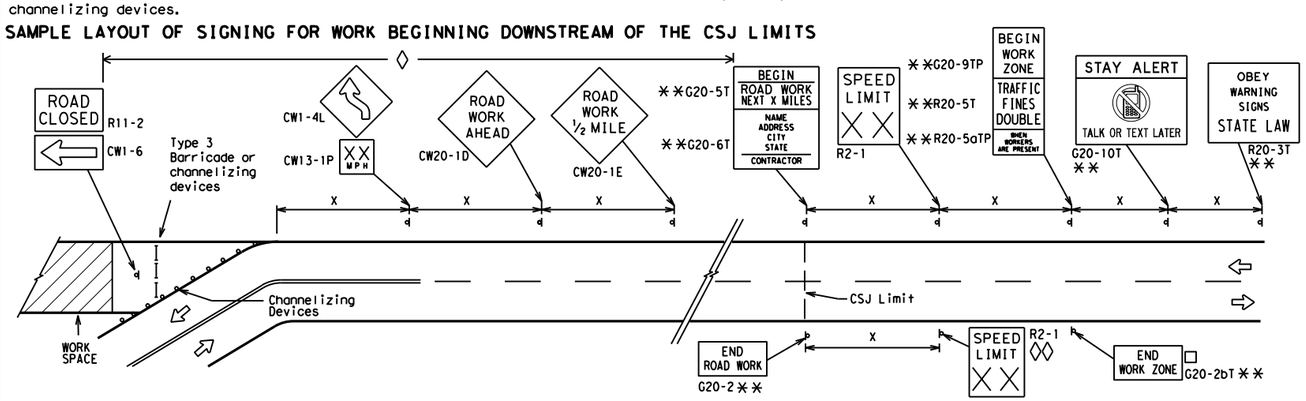
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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.

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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REVISIONS	1191	05	009	FM 937
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7-13 5-21	BRY	ROBERTSON		38

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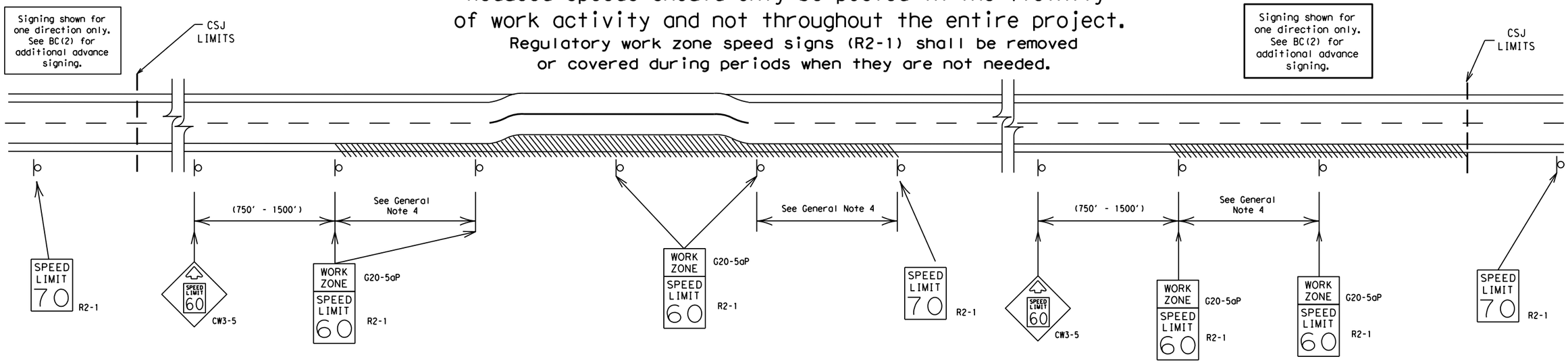
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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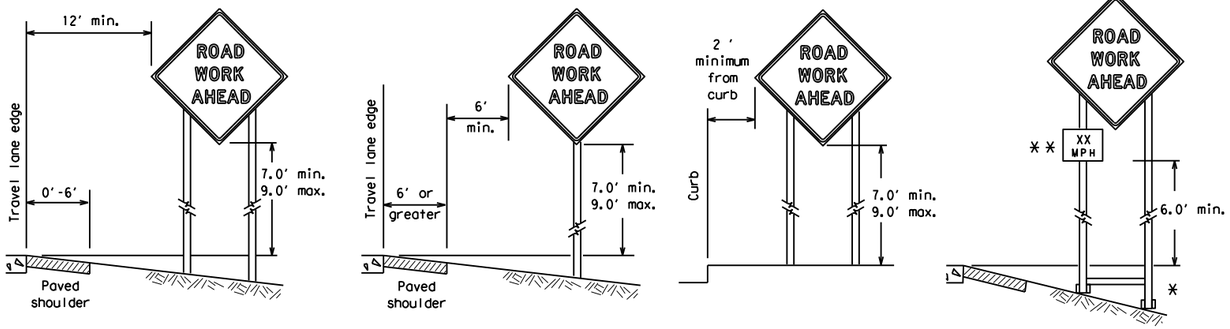
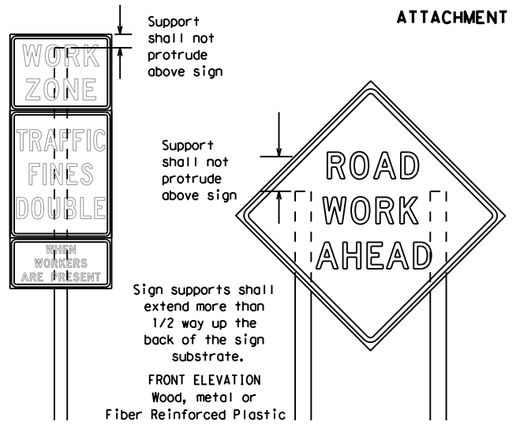
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

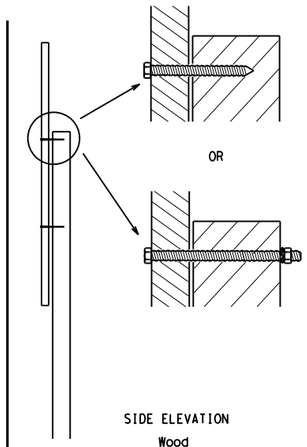


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





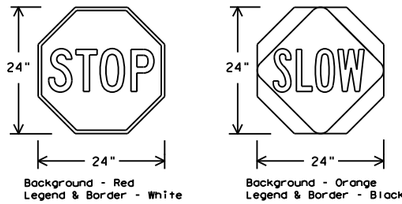
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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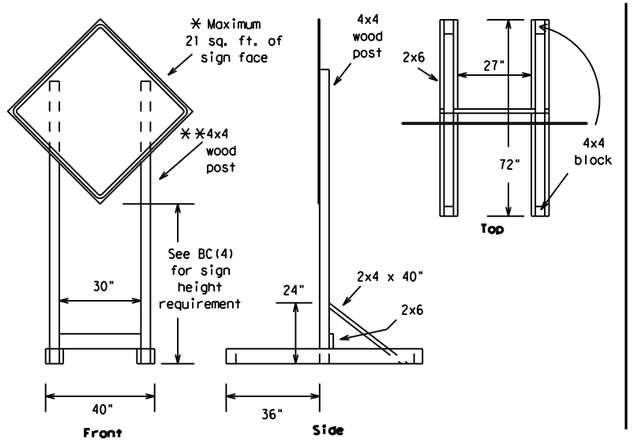
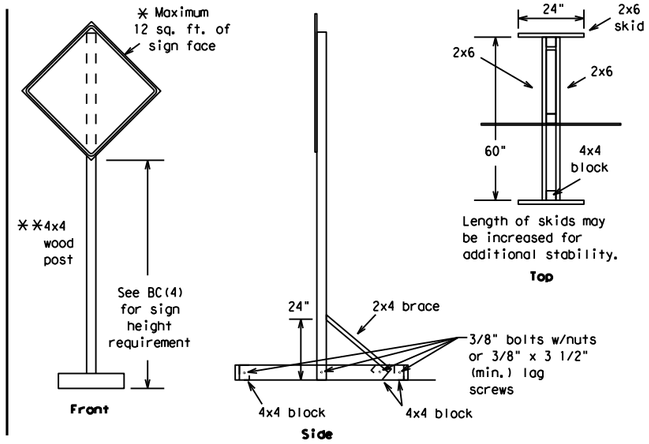
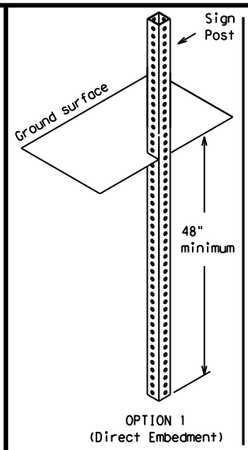
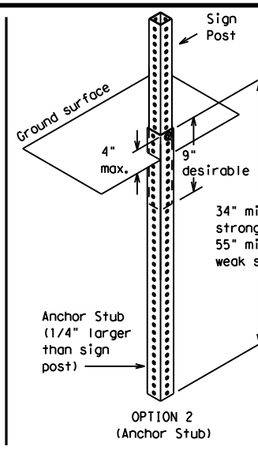


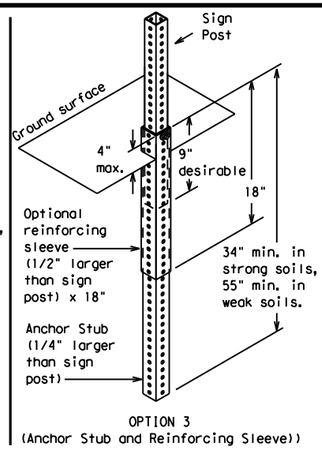


SKID MOUNTED WOOD SIGN SUPPORTS

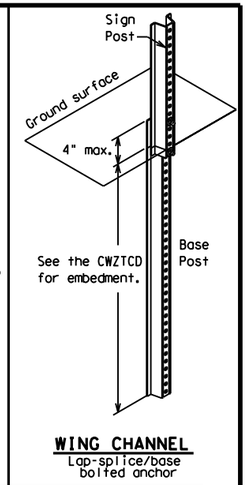
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







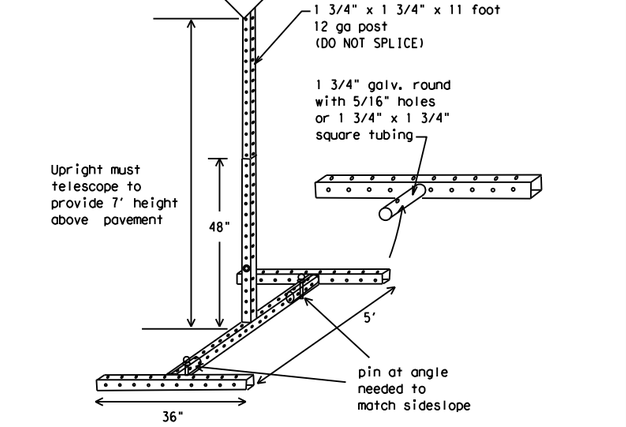
PERFORATED SQUARE METAL TUBING

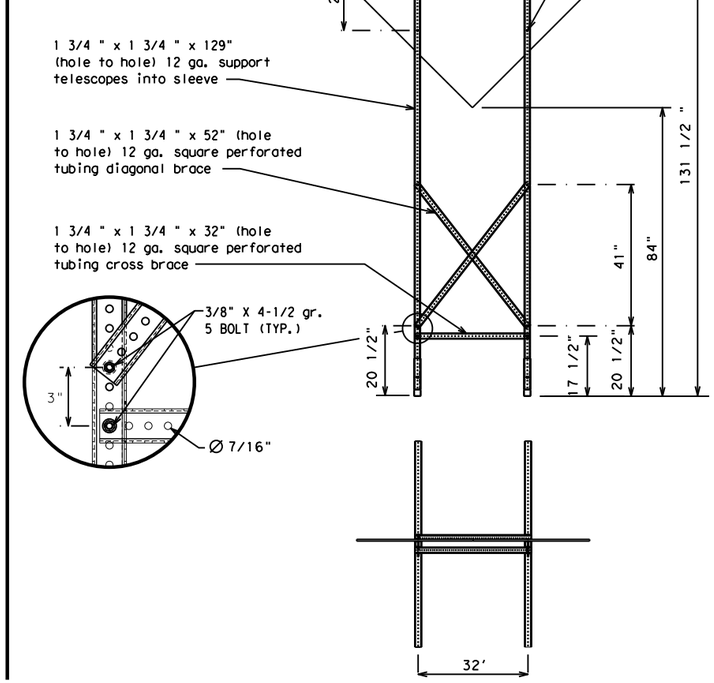


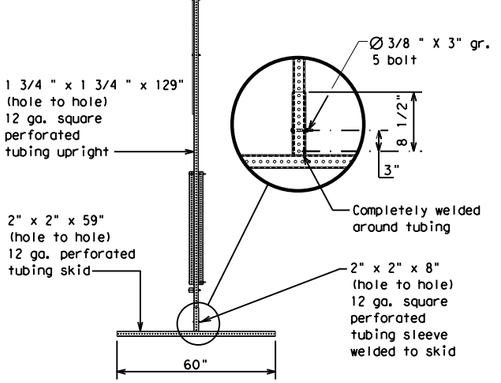
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

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

Other Condition List

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

Phase 2: Possible Component Lists

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

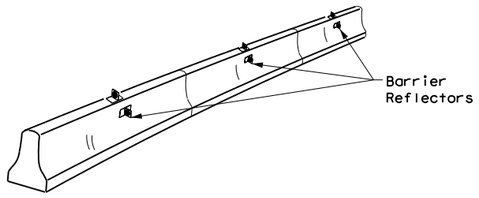
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	ROBERTSON		42

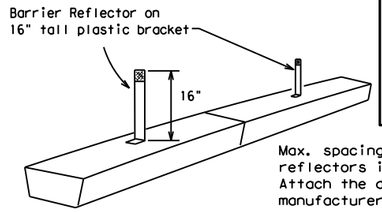
DATE: 5/26/2023 9:51:38 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\8. Traffic\009TD101.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

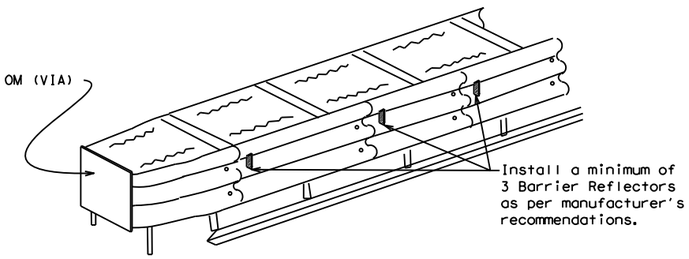


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

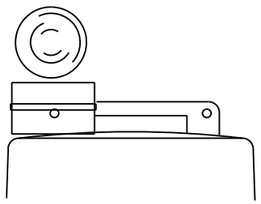


DELINEATION OF END TREATMENTS

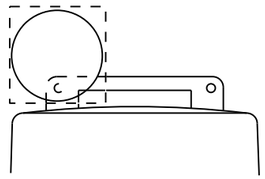
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

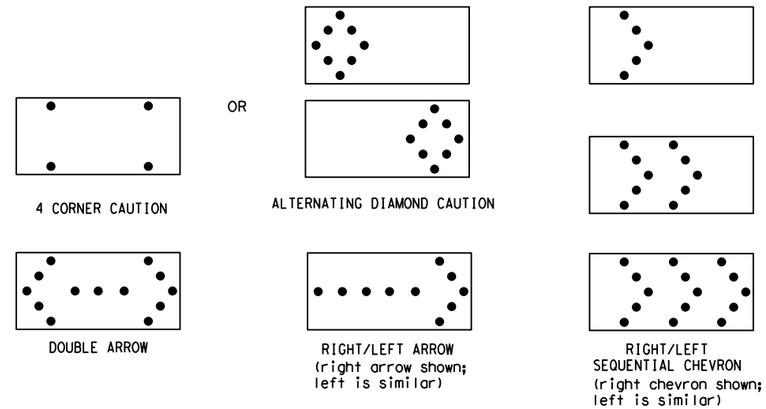
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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 Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BRY	ROBERTSON		43

DATE: 5/26/2023 9:51:38 AM
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

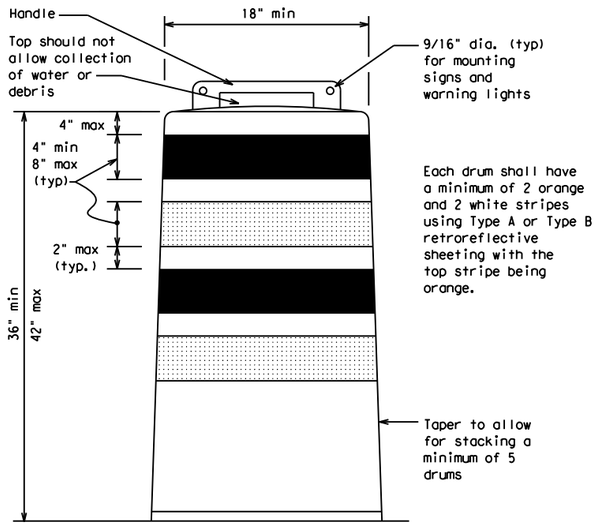
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

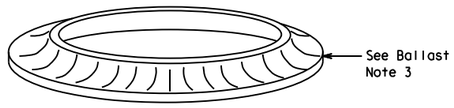
RETROREFLECTIVE SHEETING

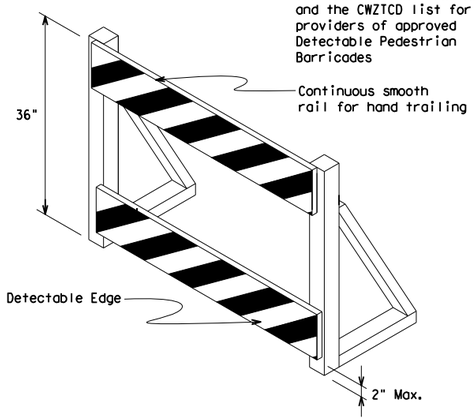
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

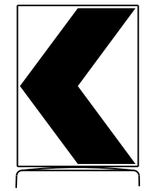




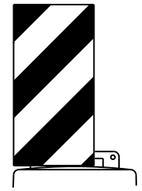


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	BRY	ROBERTSON		44
7-13				

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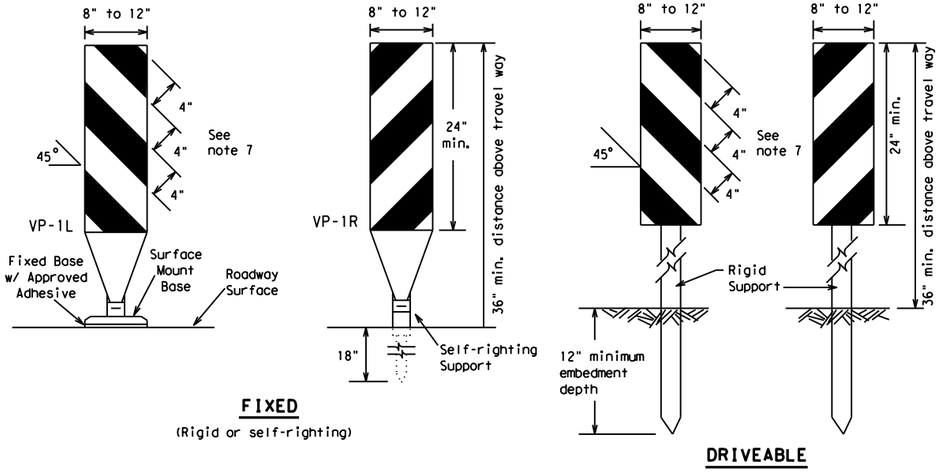
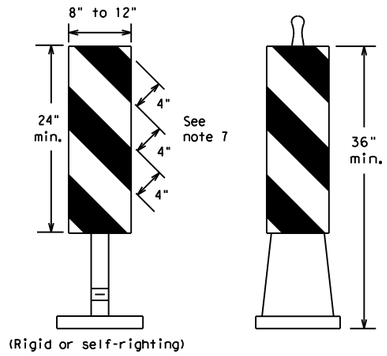


FIXED
(Rigid or self-righting)

DRIVEABLE

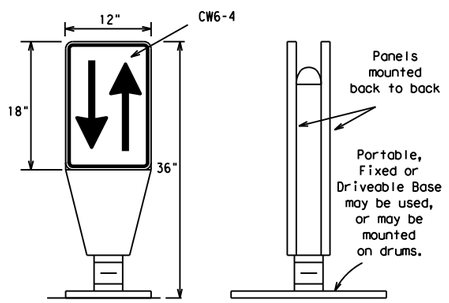


(Rigid or self-righting)

PORTABLE

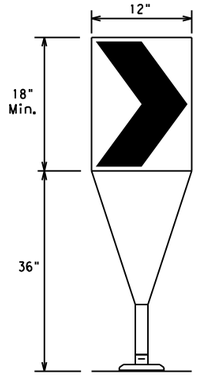
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



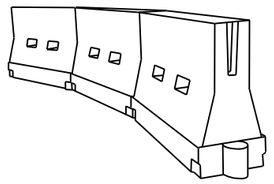
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

Posted Speed	Formula	Minimum Desirable Taper Lengths ** 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 Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
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7-13 5-21	BRY	ROBERTSON		45

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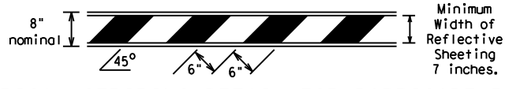
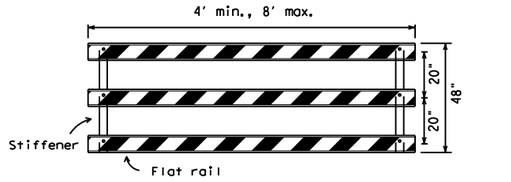
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



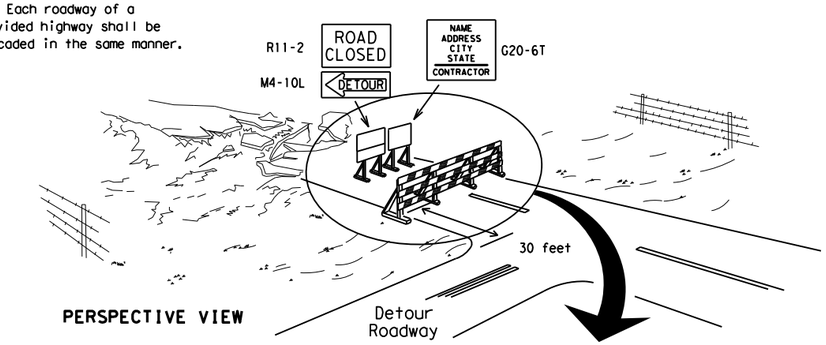
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

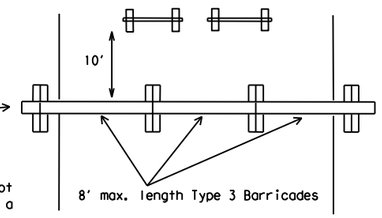
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

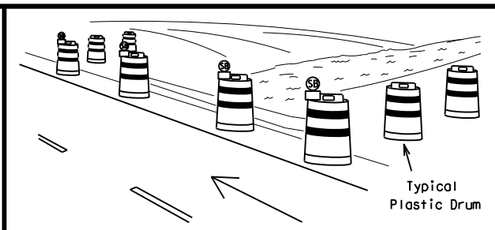
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

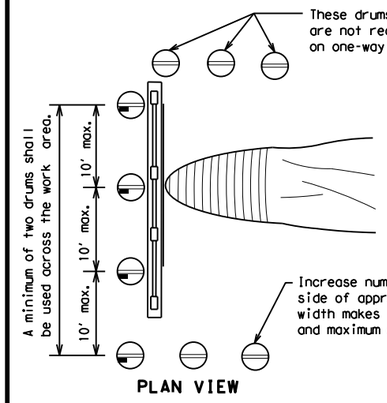
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

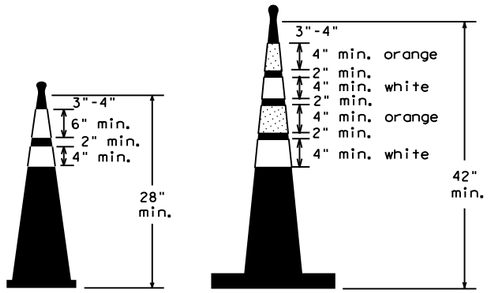
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

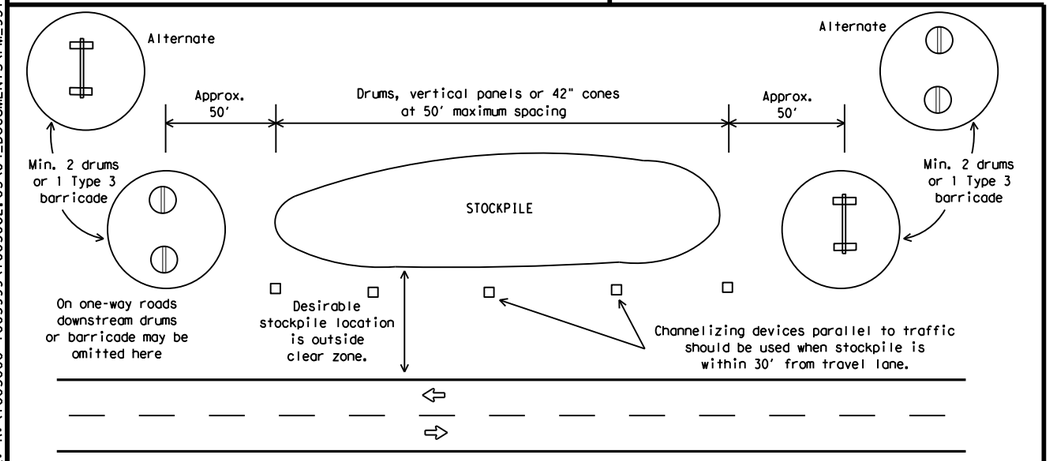
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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 shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

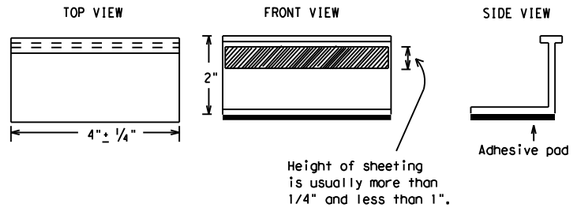
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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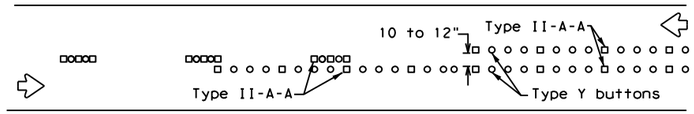
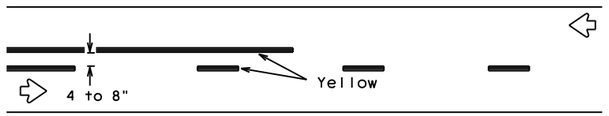
PAVEMENT MARKING PATTERNS

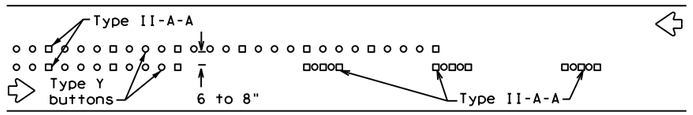
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



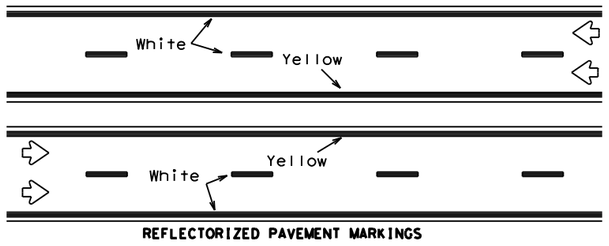
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



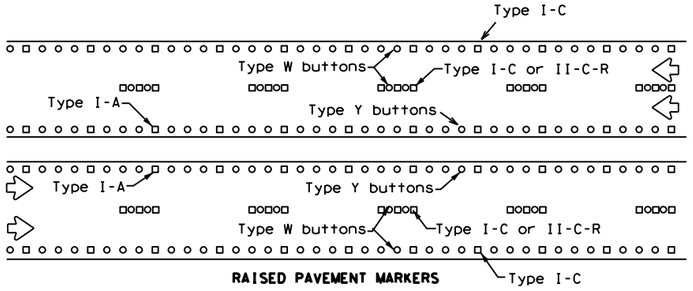
RAISED PAVEMENT MARKERS - PATTERN B

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

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



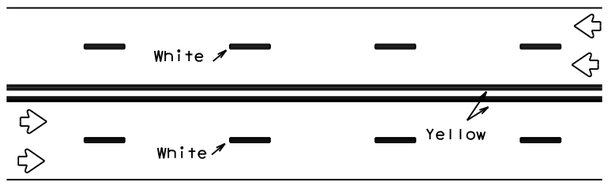
REFLECTORIZED PAVEMENT MARKINGS



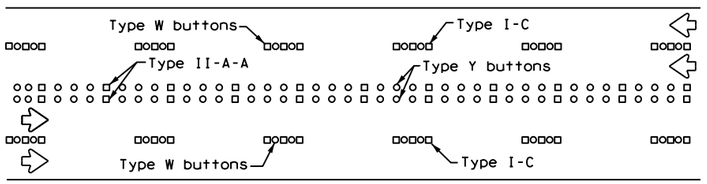
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



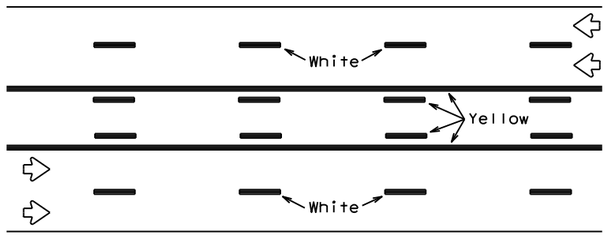
REFLECTORIZED PAVEMENT MARKINGS



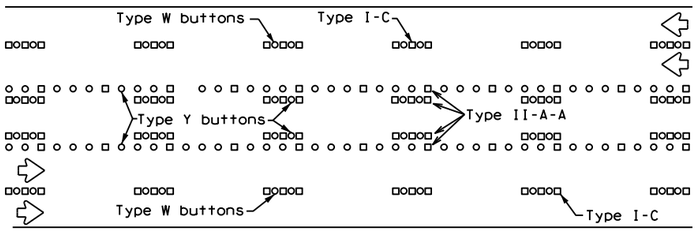
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

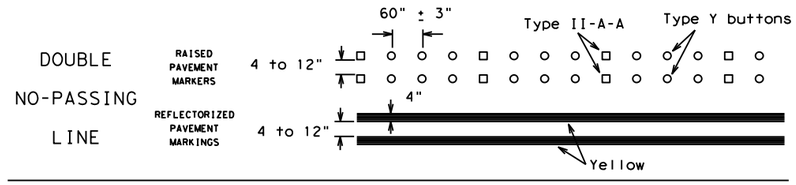
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

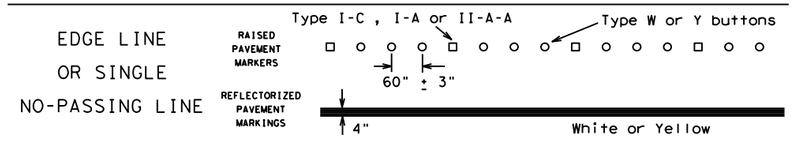
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

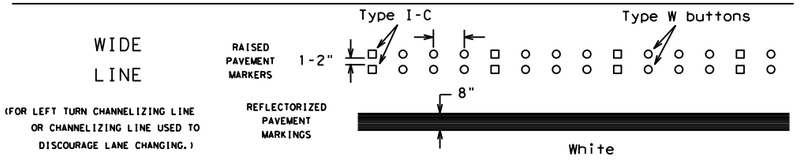


EDGE LINE OR SINGLE NO-PASSING LINE



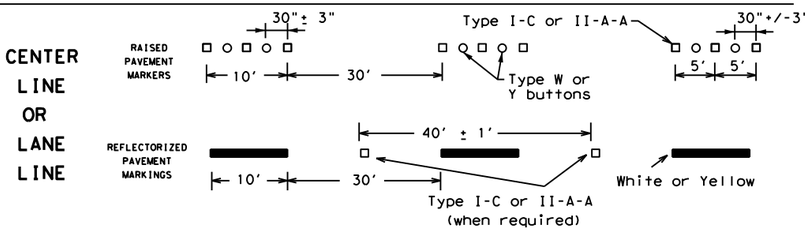
WIDE LINE

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

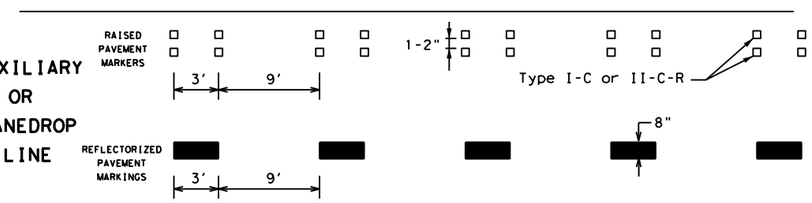


BROKEN LINES

CENTER LINE OR LANE LINE

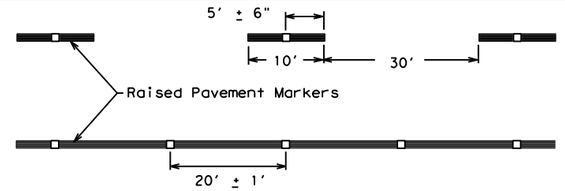


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

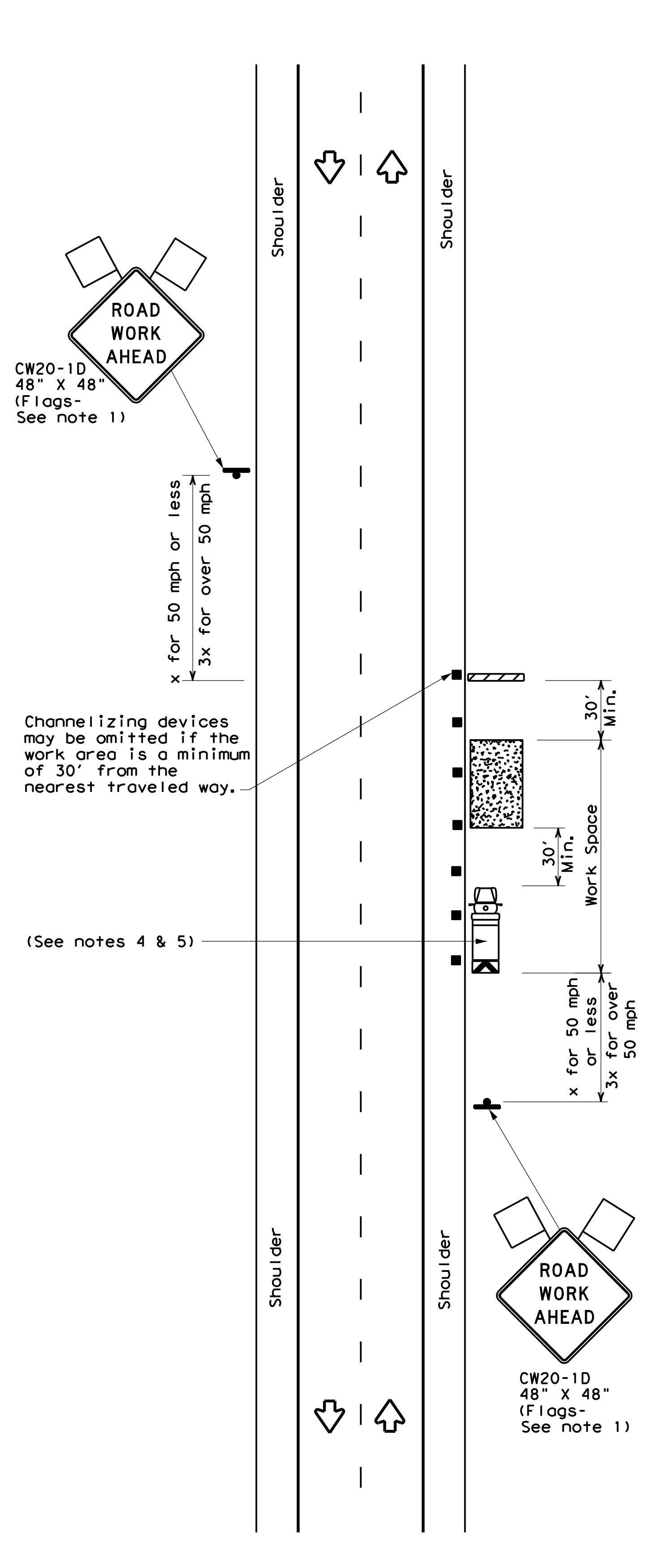
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

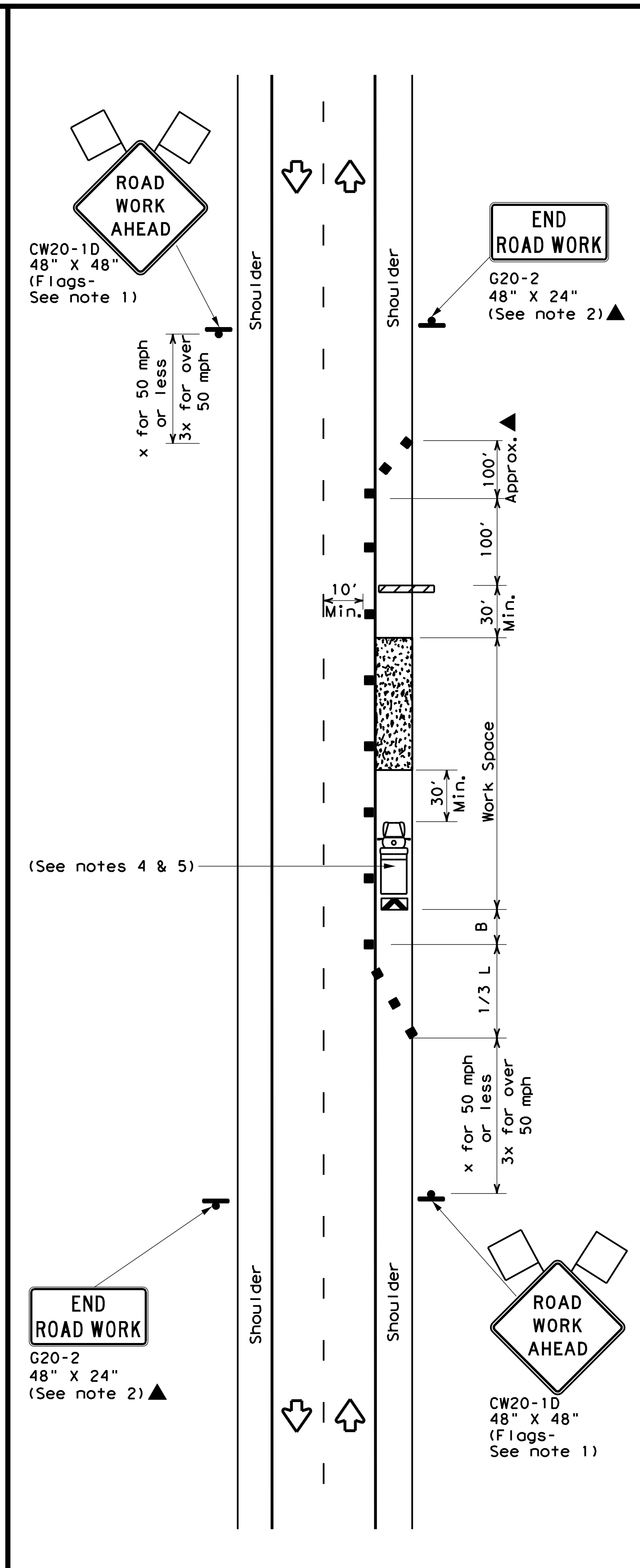
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		48



TCP (2-1a)

WORK SPACE NEAR SHOULDER

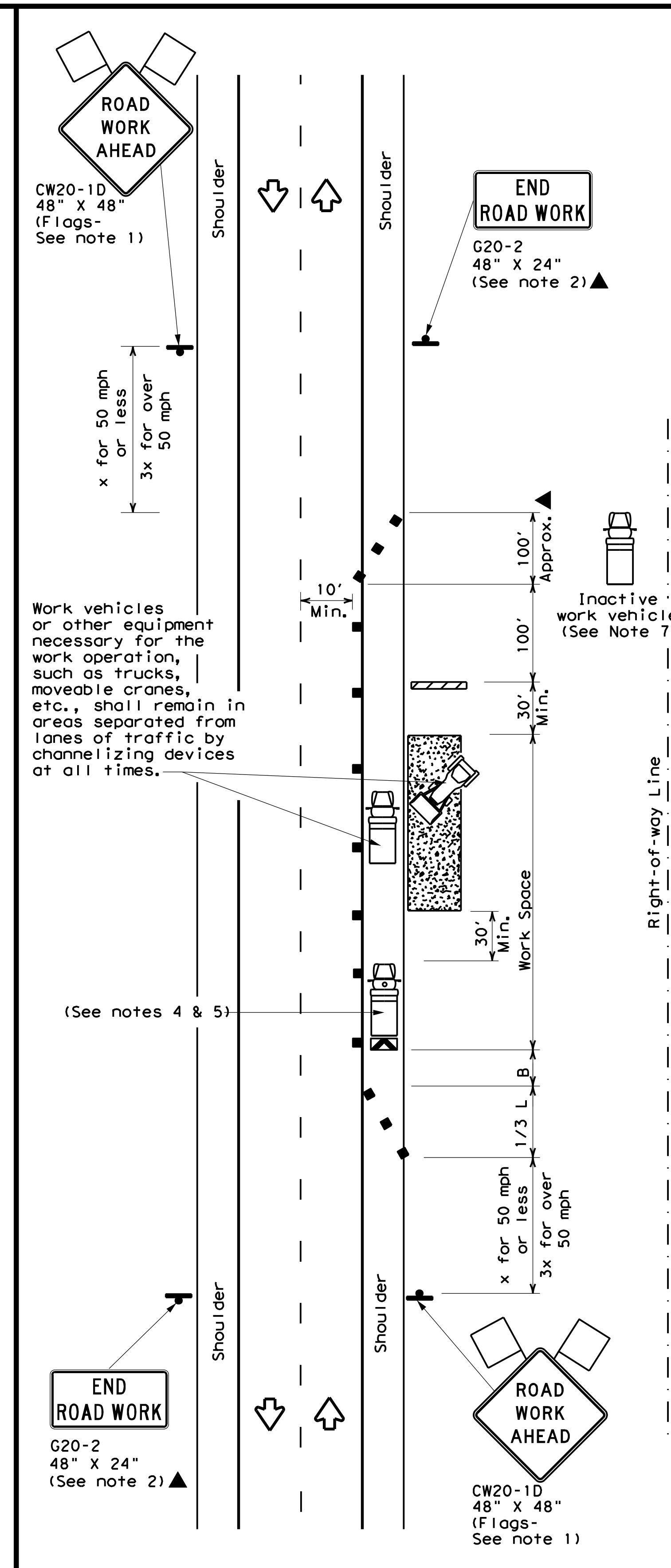
Conventional Roads



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.

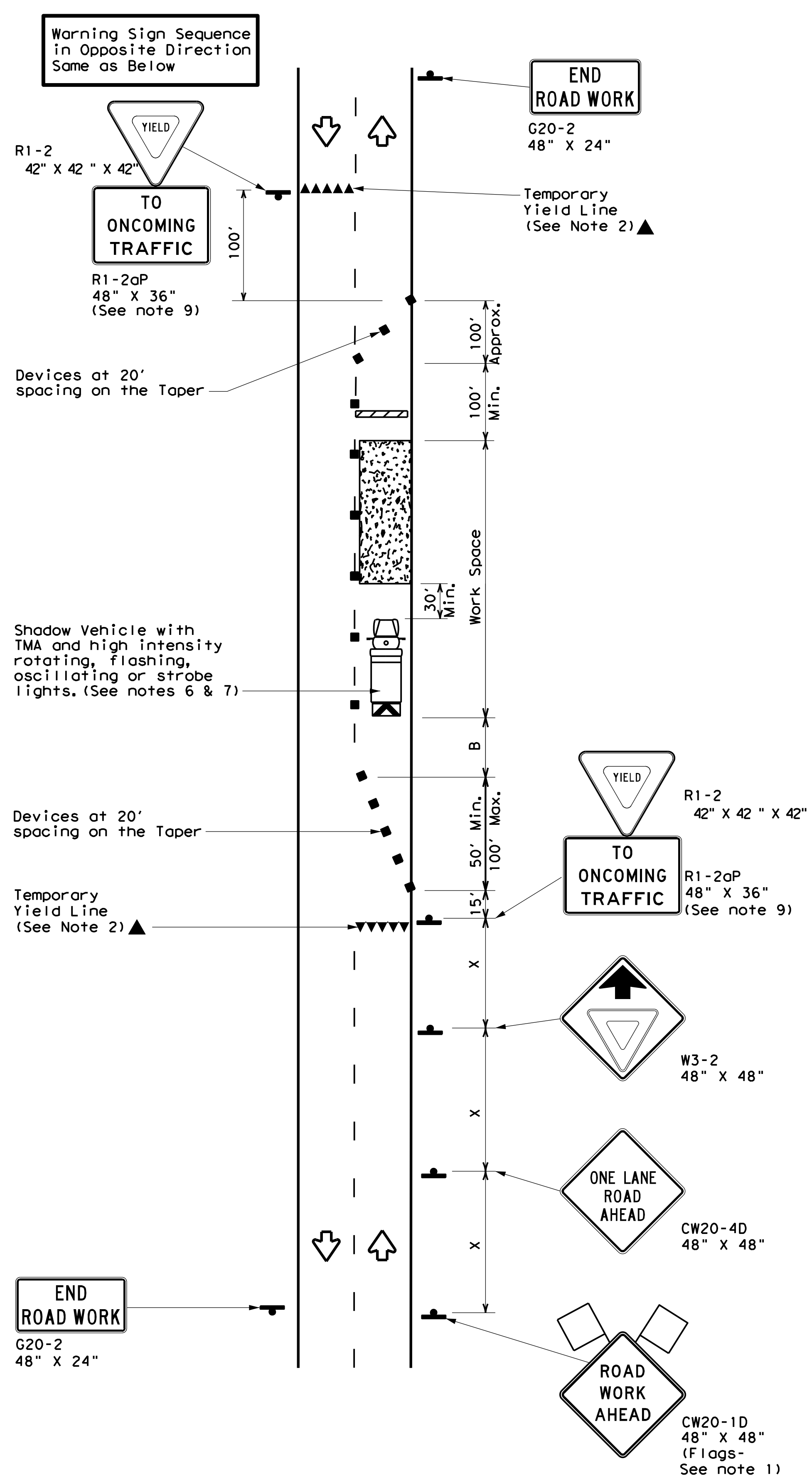
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
2-94 4-98	DIST		COUNTY	SHEET NO.
8-95 2-12 1-97 2-18	BRY		ROBERTSON	49



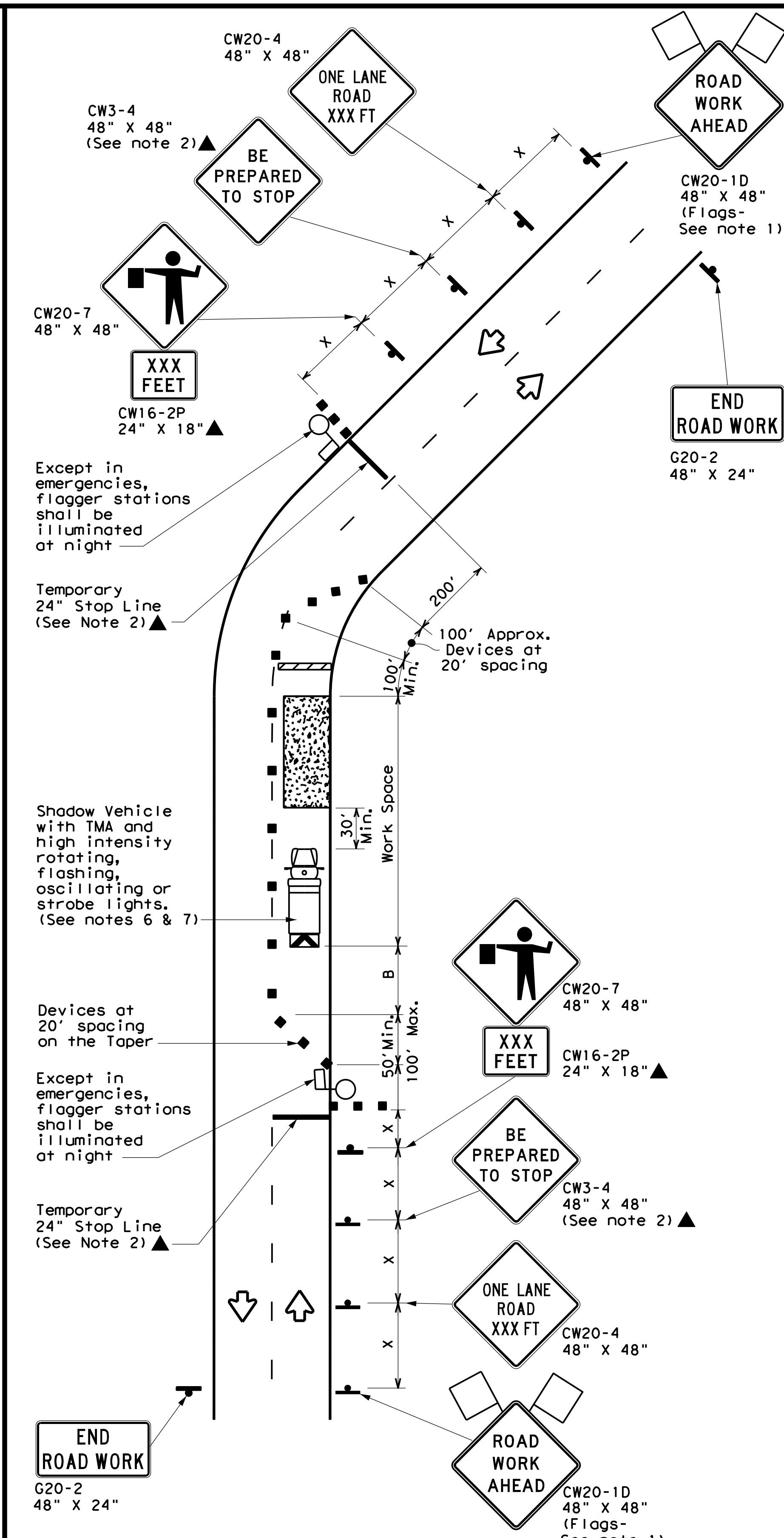
TCP (2-2a)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See Note 9)



TCP (2-2b)

2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH FLAGGERS

LEGEND

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

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

* Conventional Roads Only

** Taper lengths have been rounded off.

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		50

162

DATE: 5/26/2023 9:51:40 AM
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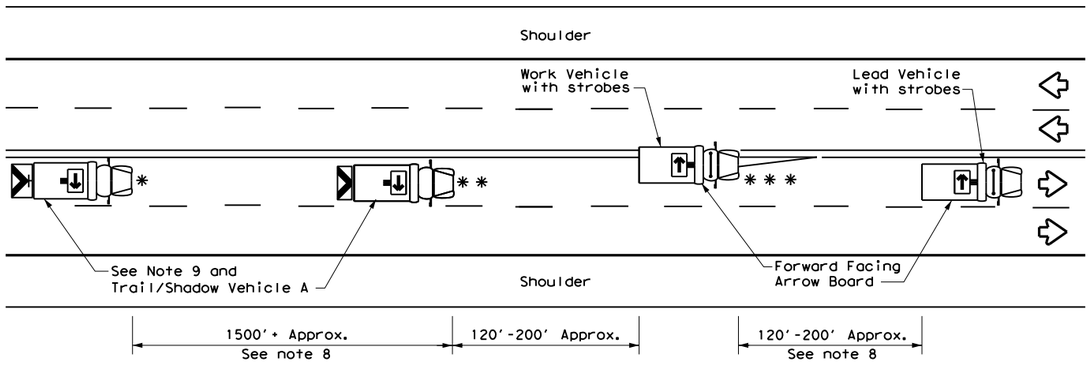
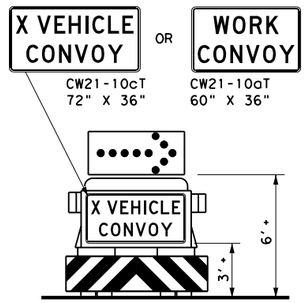


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

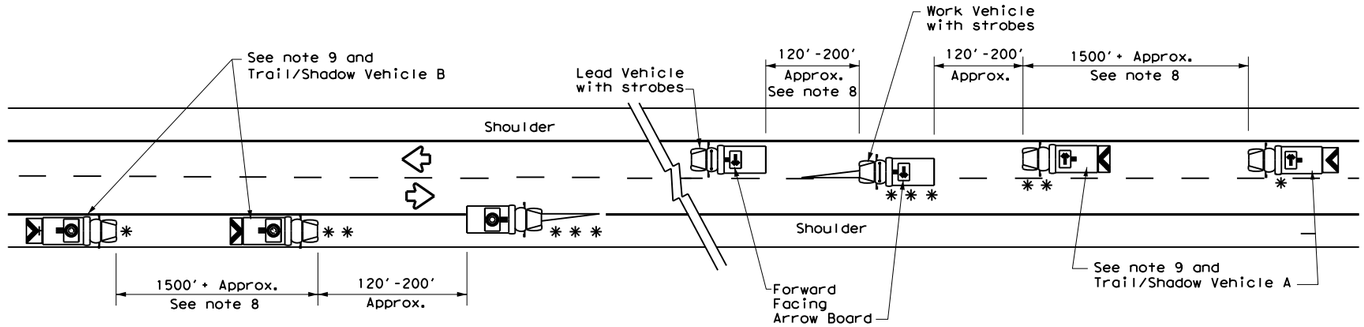
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

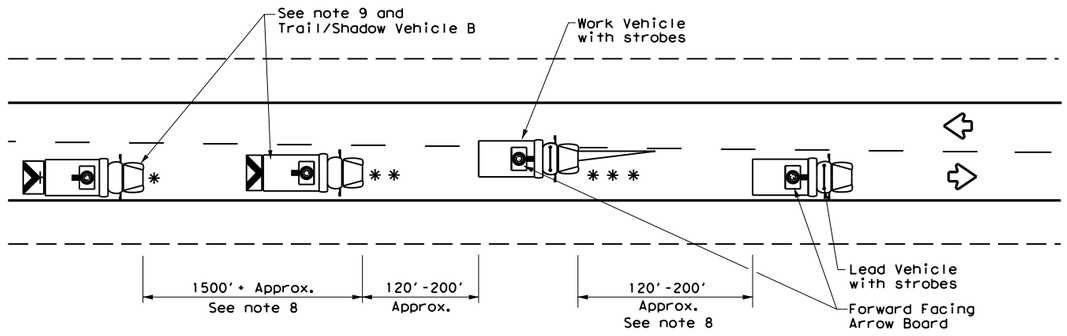


WORK ON SHOULDER

WORK ON TRAVEL LANE

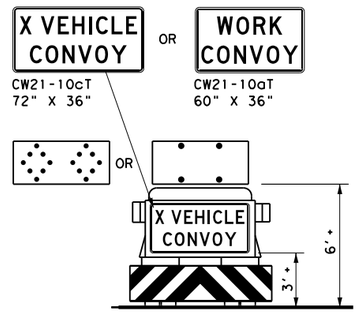
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



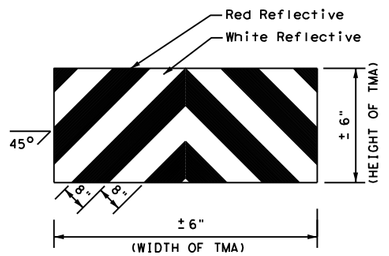
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
2-94 4-98 8-95 7-13 1-97	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		51

DATE: 5/26/2023 9:51:41 AM
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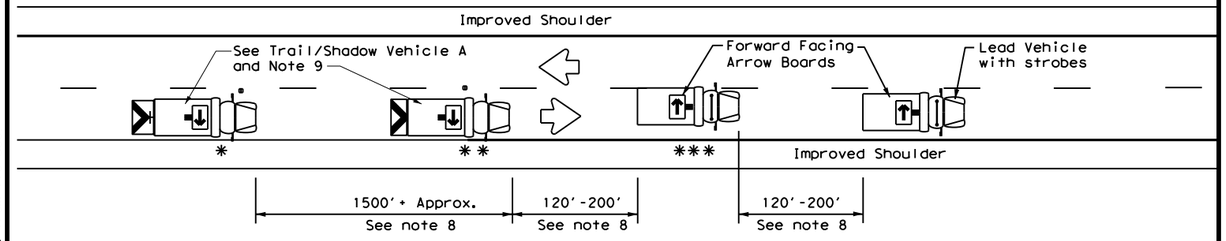
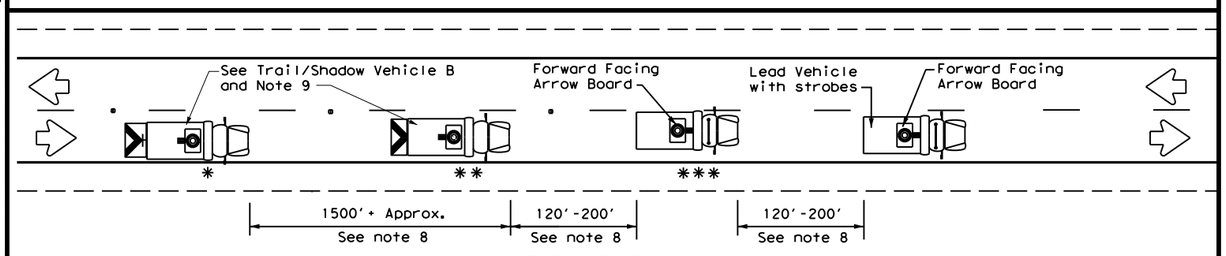


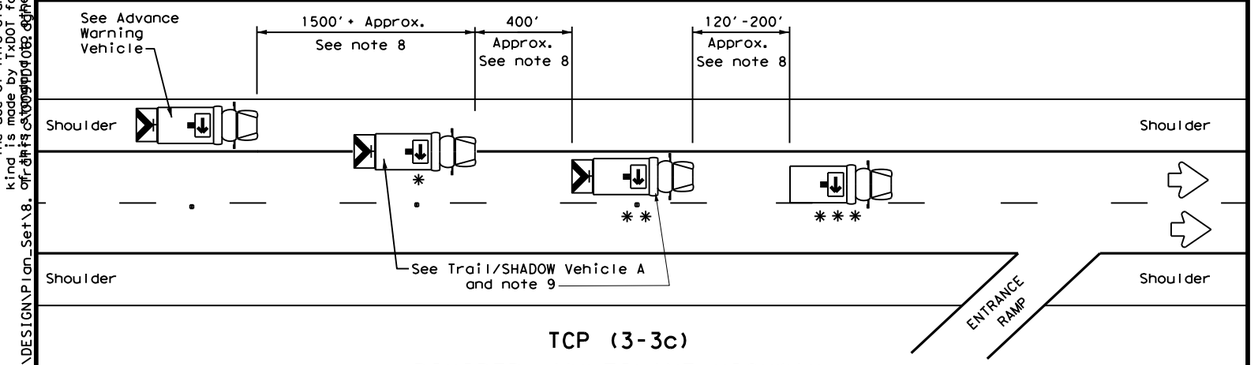
TCP (3-3a)

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



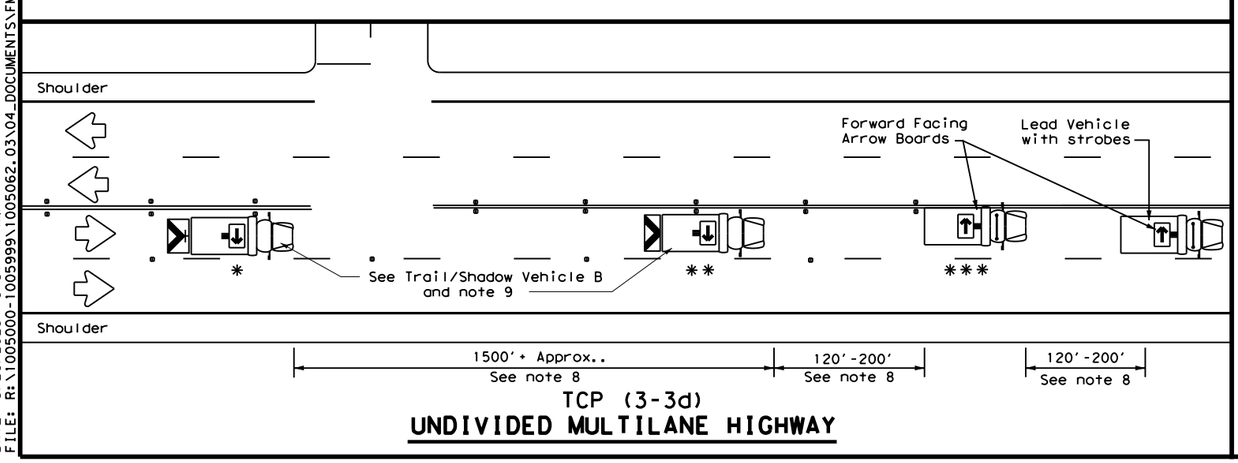
TCP (3-3b)

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



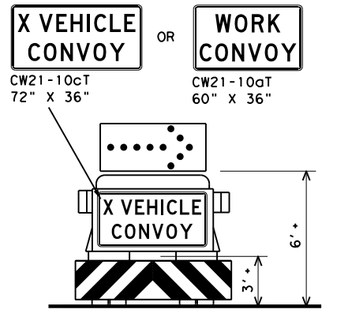
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



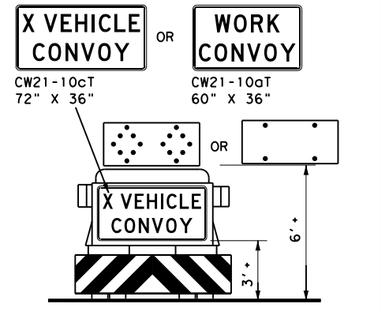
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



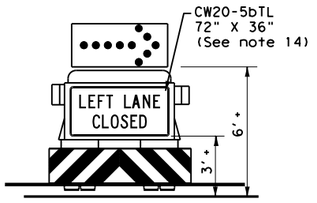
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

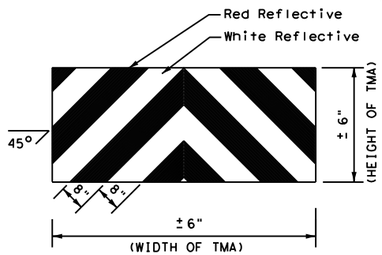


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	BRY	ROBERTSON		52
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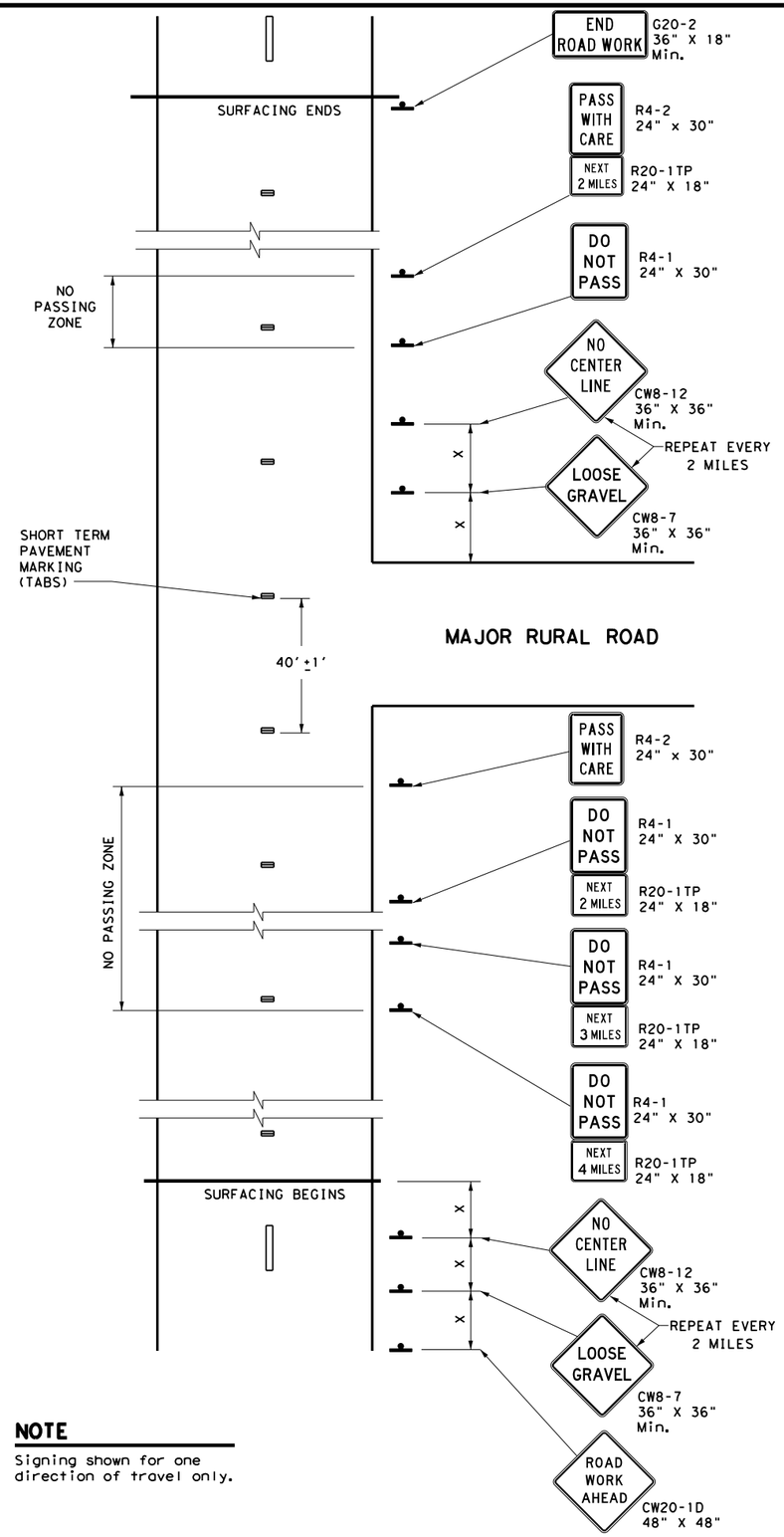
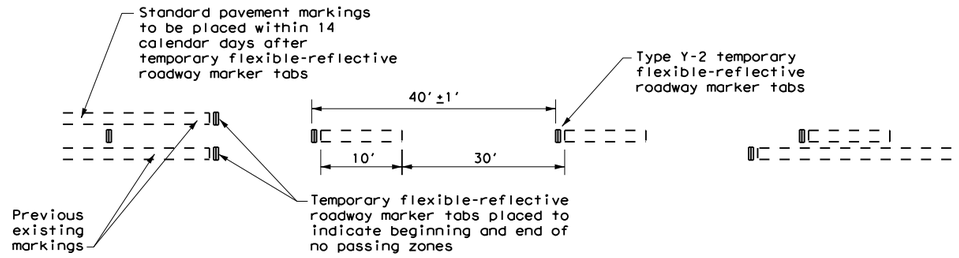


NOTE

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

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© TxDOT	March 1991	CONT	SECT	JOB	HIGHWAY
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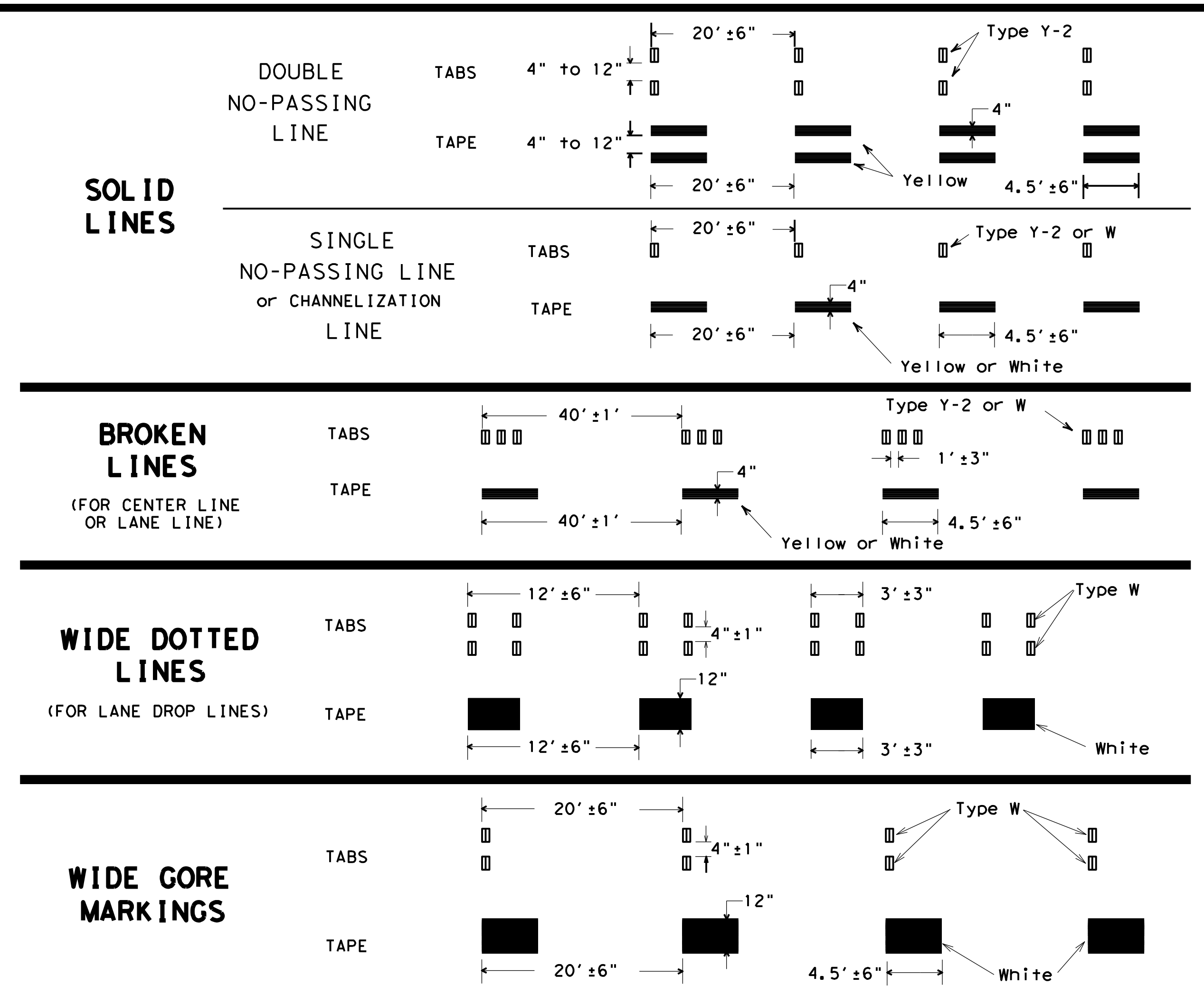
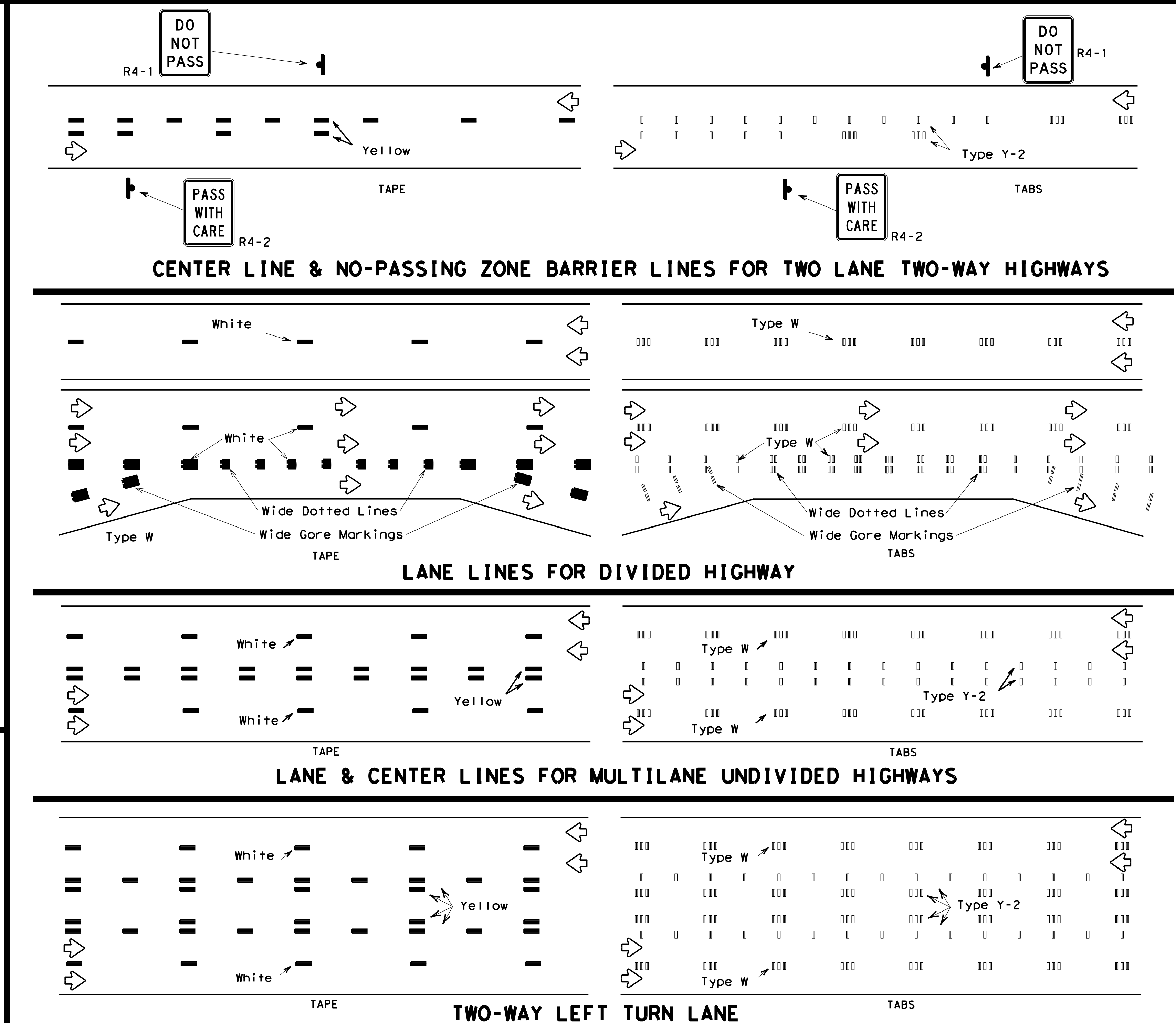
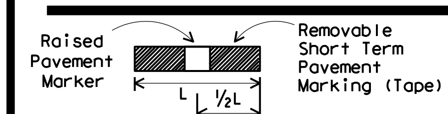
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



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

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Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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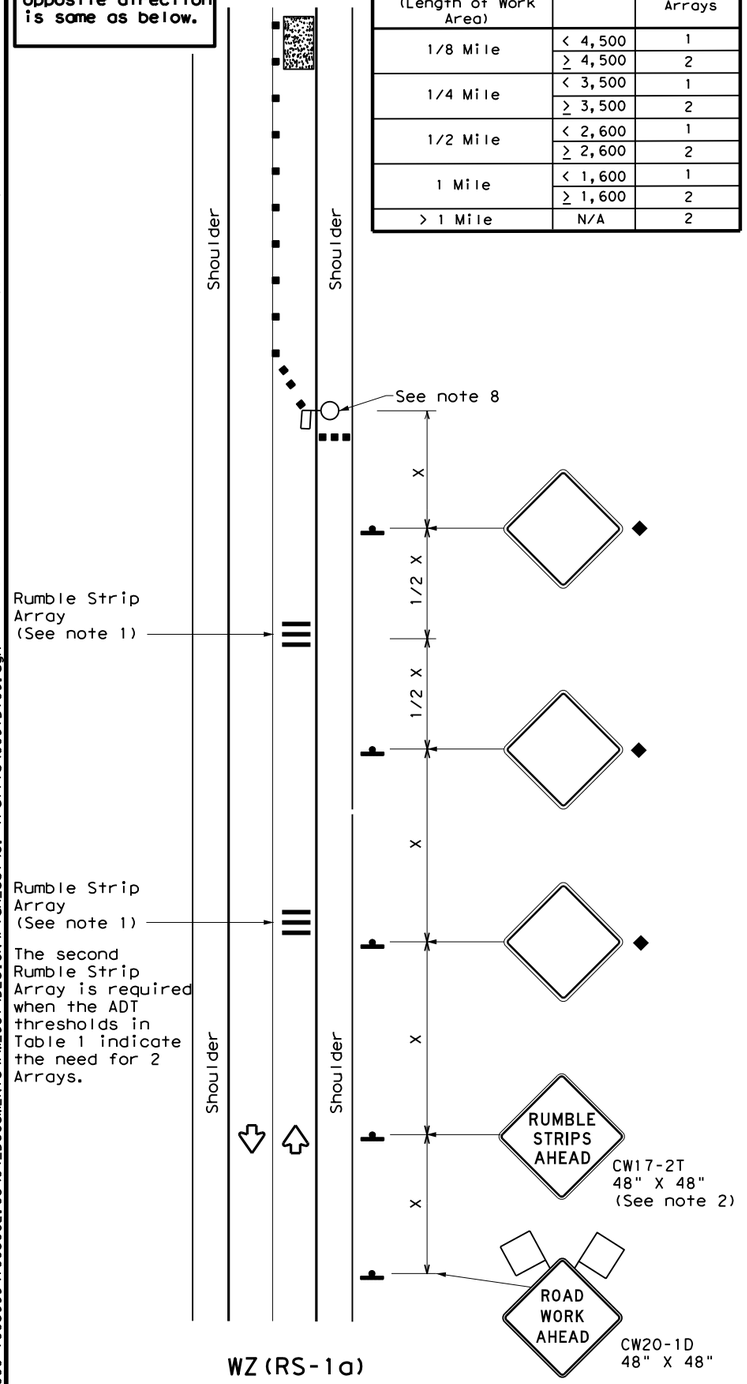
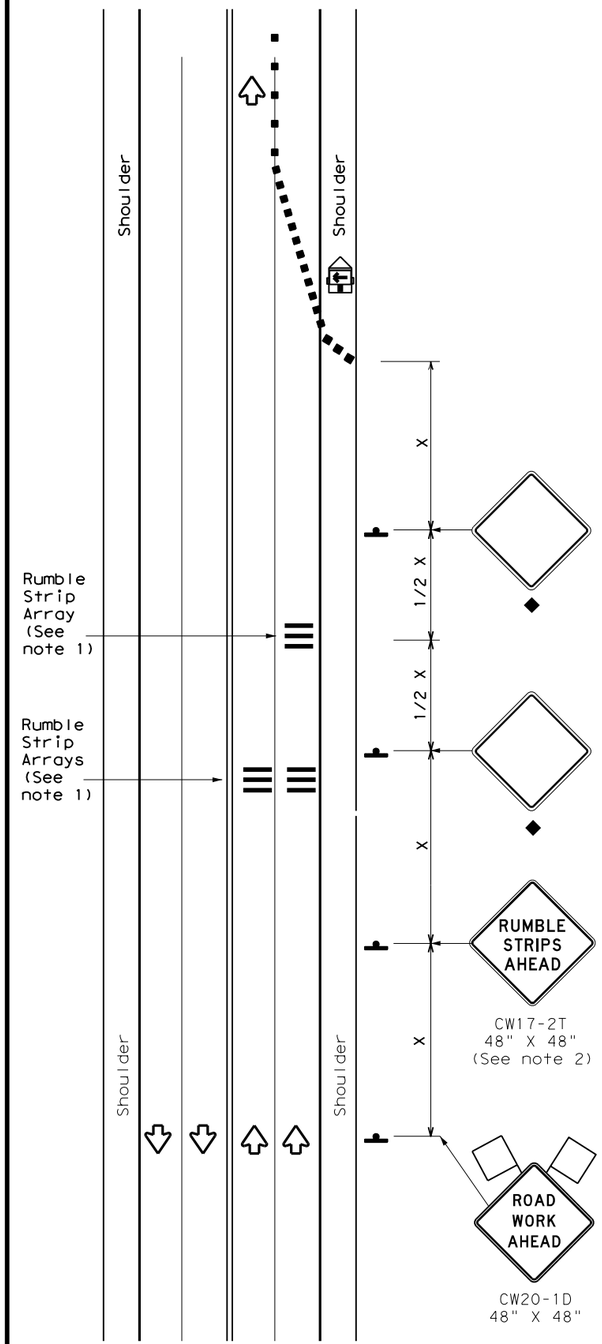
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

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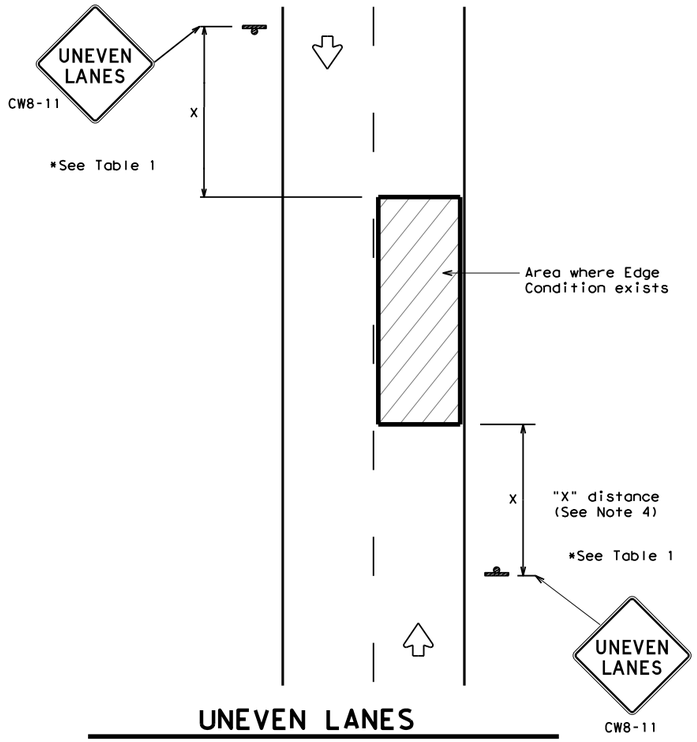
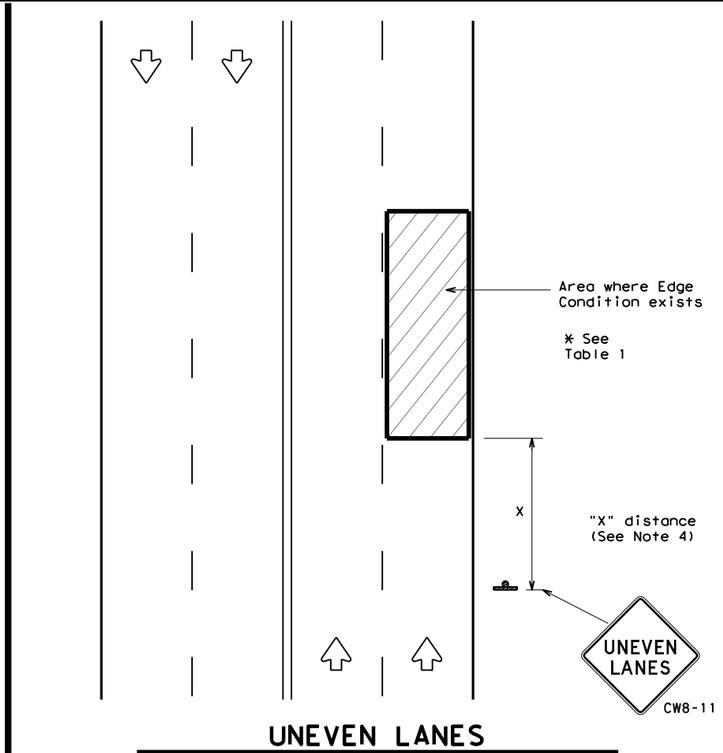
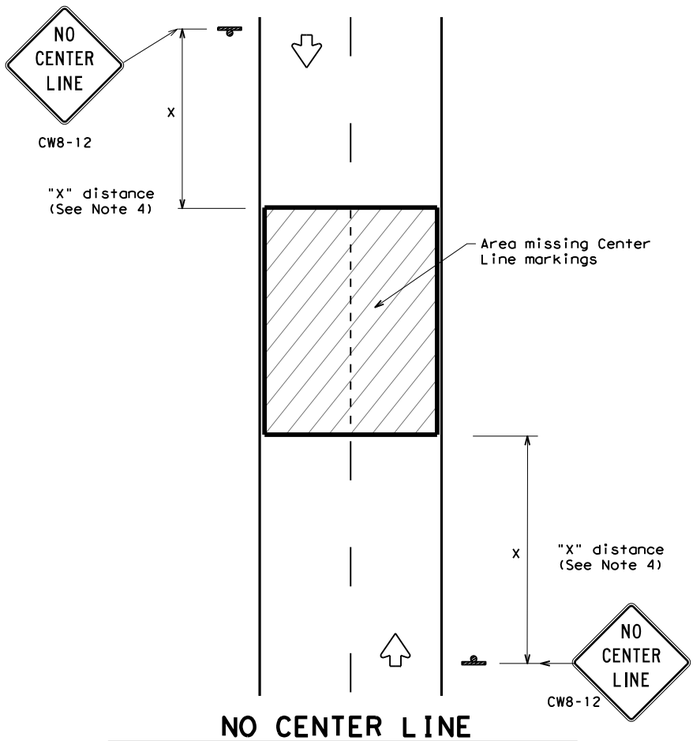


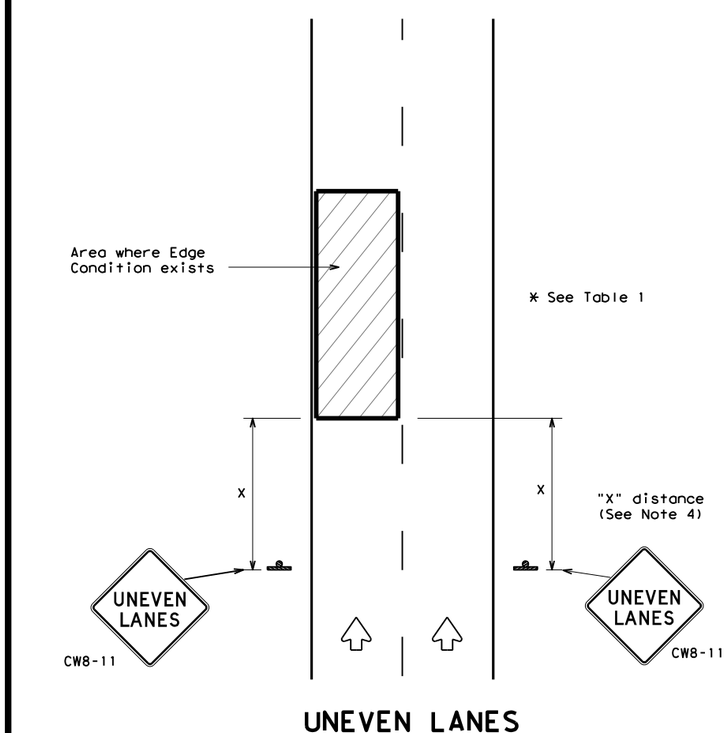
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

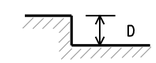
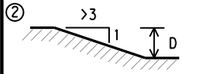
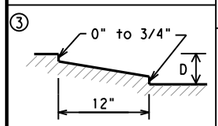
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

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	BRY	ROBERTSON		56

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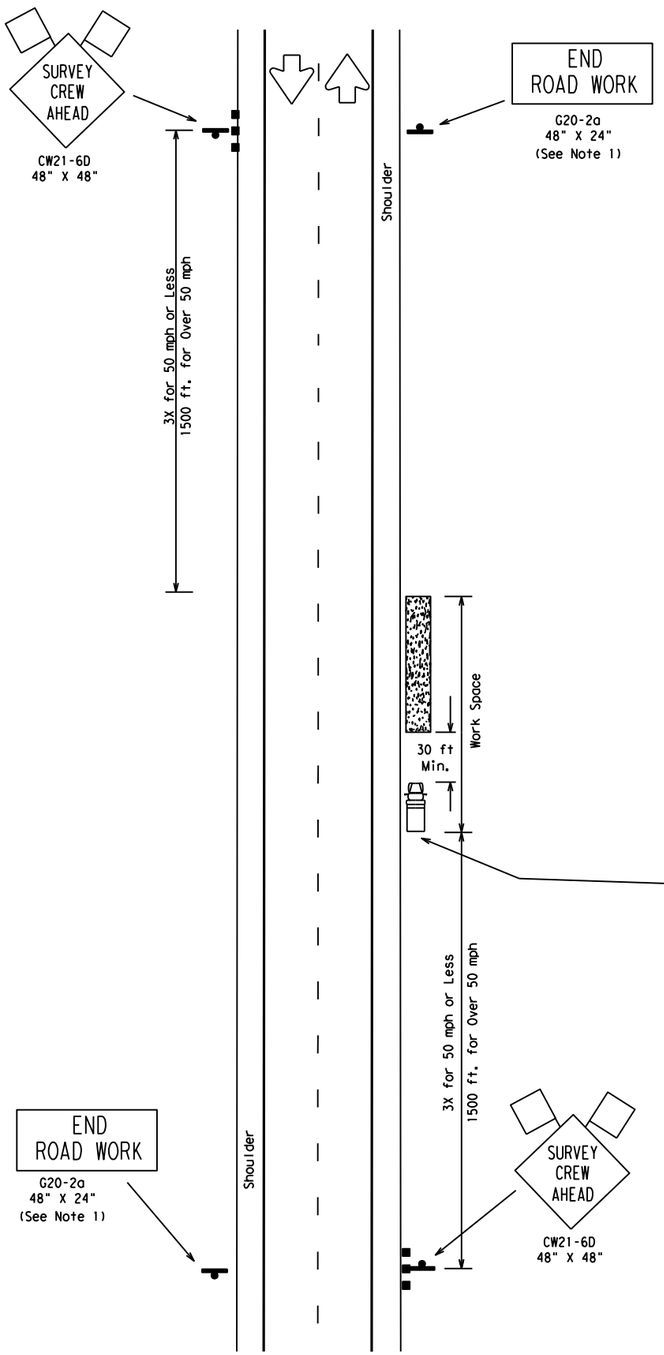
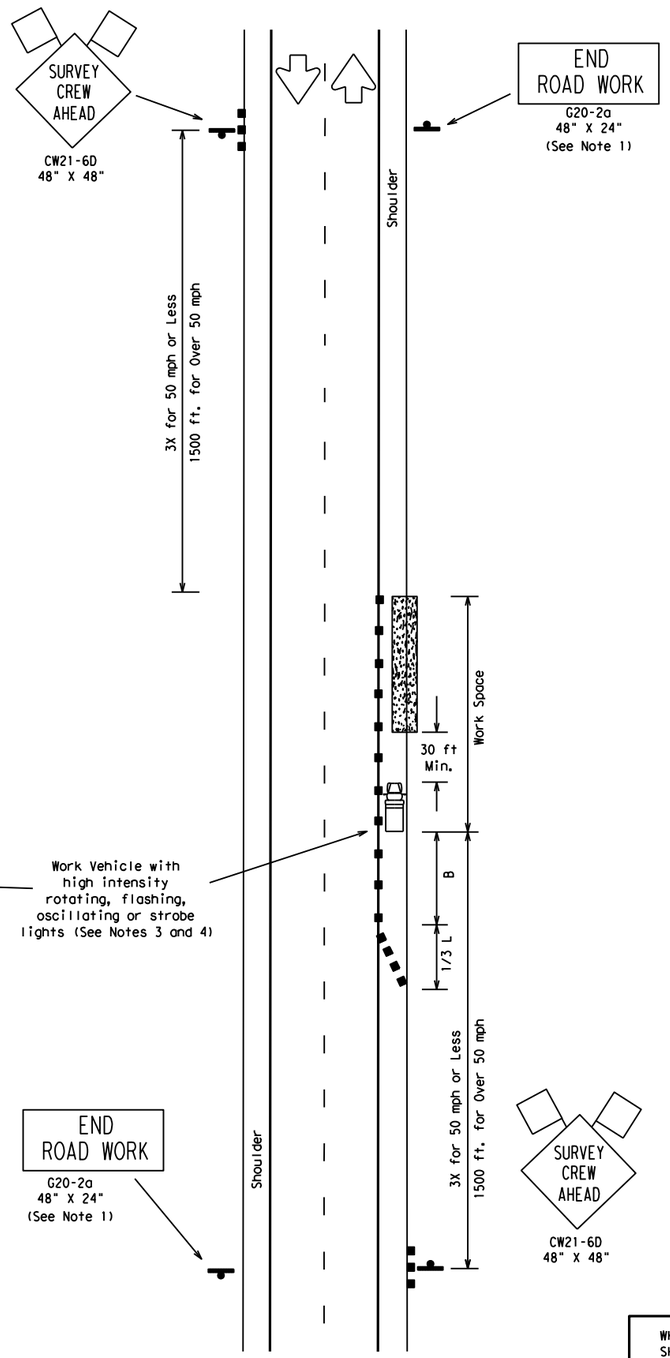


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel (M) Portable Changeable Message Sign (PCMS)
Flagger Sign Post

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

* Conventional Roads Only

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

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

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

GENERAL NOTES:

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

TCP(S-1a)

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

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

8-18-08 Revision
1 Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

REVISIONS
8-08

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

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937

DIST	COUNTY	SHEET NO.
BRY	ROBERTSON	57

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

DATE: 5/26/2023 9:51:44 AM
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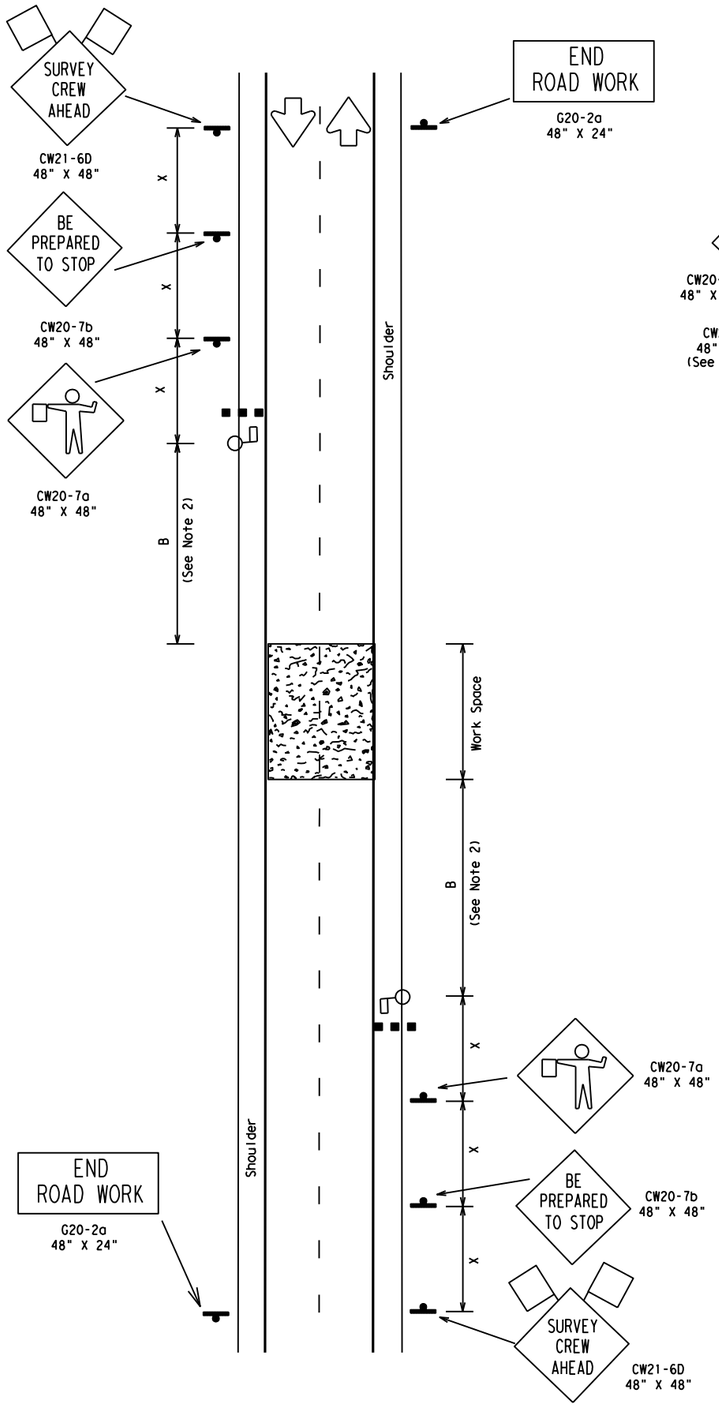
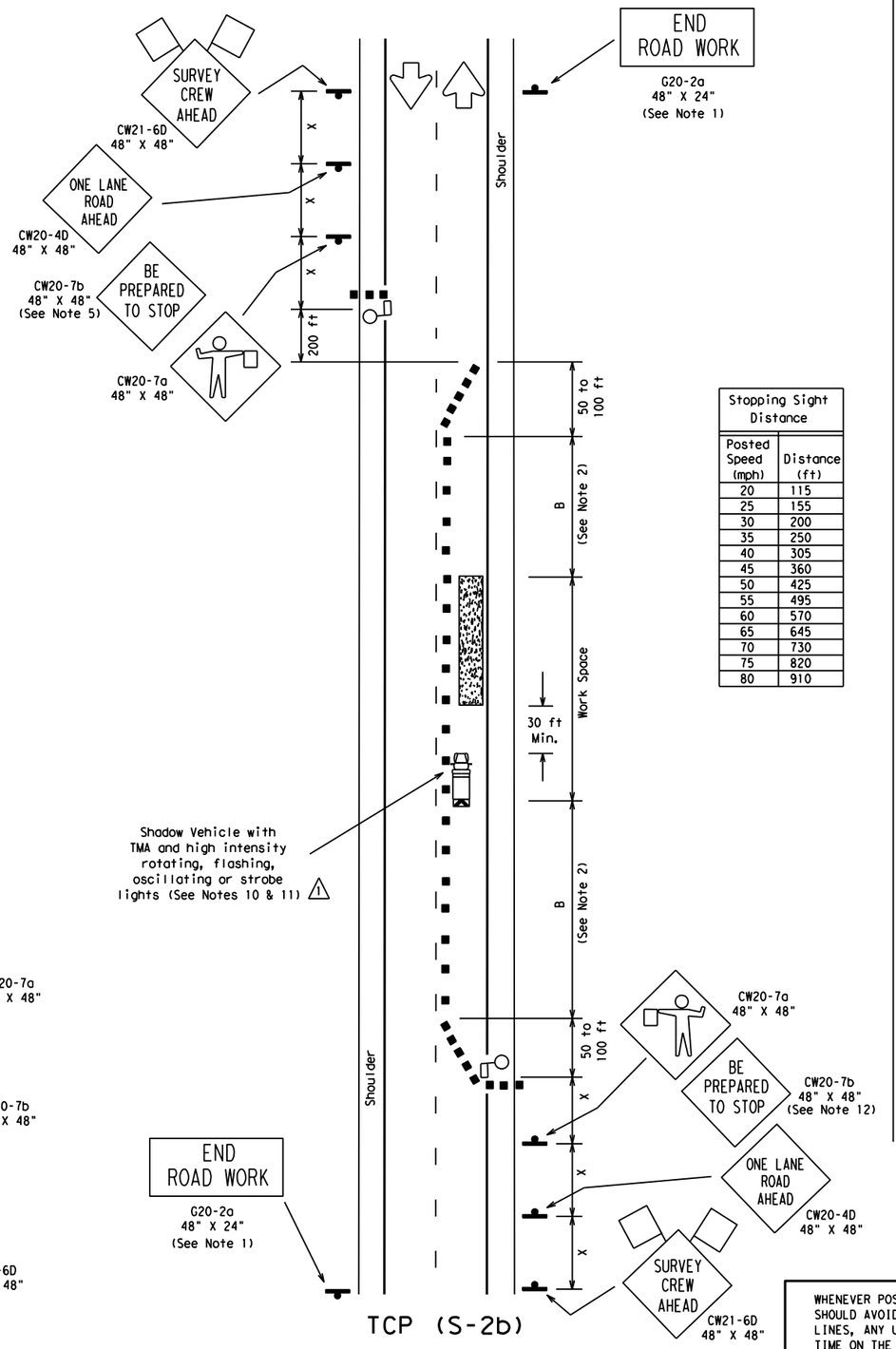


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

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

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel Portable Changeable Message Sign (PCMS)
Flagger Sign Post

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

✳ Conventional Roads Only

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

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

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

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

TCP(S-2a)

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

TCP (S-2B)

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
8-08	CONT	SECT	JOB	HIGHWAY
	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		58

DATE: 5/26/2023 9:51:44 AM
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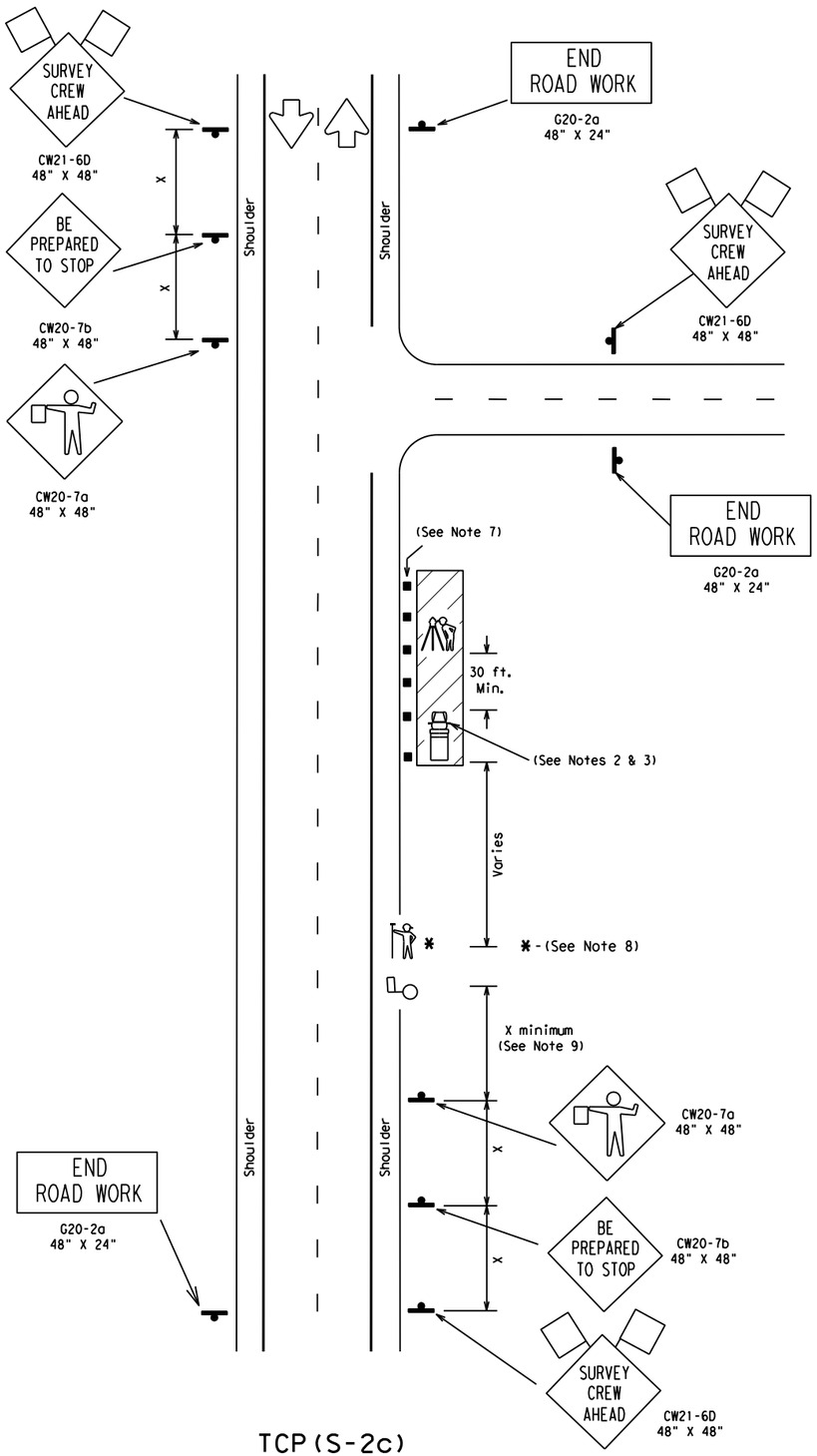


TCP(S-2c)

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

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Work Vehicle Truck Mounted Attenuator (TMA)
Flagger Sign Post Survey Rodman Instrument Person

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

* Conventional Roads Only

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

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

DEFINITIONS:

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

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

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

GENERAL NOTES:

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

REVISIONS

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

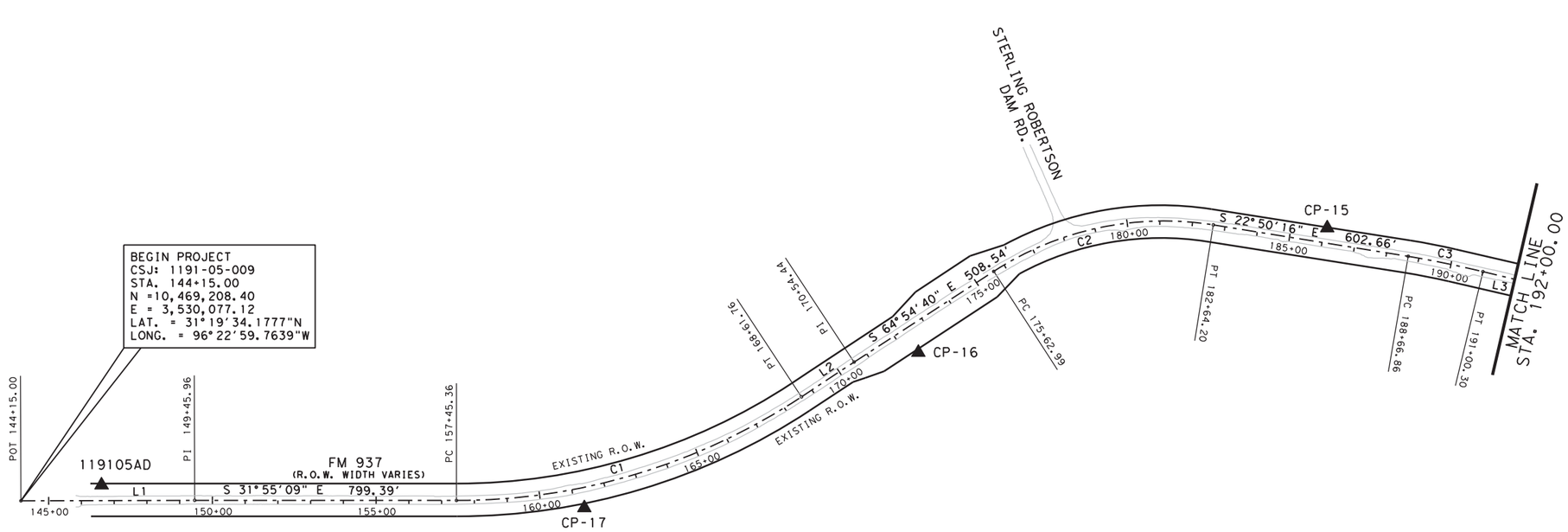
CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937

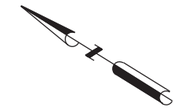
DIST	COUNTY	SHEET NO.
BRY	ROBERTSON	59

CURVE C1
PI STATION = 163+20.01
DELTA = 33° 29′ 31" (LT)
DEGREE OF CURVE = 03° 00′ 00"
TANGENT = 574.66
LENGTH = 1,116.40′
RADIUS = 1,909.86′
PC STATION = 157+45.36
PT STATION = 168+61.76

CURVE C2
PI STATION = 179+30.25
DELTA = 42° 04′ 23" (RT)
DEGREE OF CURVE = 06° 00′ 00"
TANGENT = 367.26
LENGTH = 701.22′
RADIUS = 954.93′
PC STATION = 175+62.99
PT STATION = 182+64.20

CURVE C3
PI STATION = 189+83.63
DELTA = 03° 57′ 47" (RT)
DEGREE OF CURVE = 1° 41′ 52"
TANGENT = 116.77
LENGTH = 233.44′
RADIUS = 3,375.00′
PC STATION = 188+66.86
PT STATION = 191+00.30





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SCALE: 1"=200′ (22" x 34" SHEET)
SCALE: 1"=400′ (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06′; 119105AB/397.76′; 119105AC/422.64′; 119105AD/436.22′ WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

LINE DATA		
LINE	BEARING	LENGTH
L1	S 32°07′31" E	530.96′
L2	S 65°24′40" E	192.69′
L3	S 18°41′22" E	626.50′

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
119105AD	S 29°16′17" E	1,476.37′	CP-17
CP-17	S 56°52′55" E	1,125.07′	CP-16
CP-16	S 48°52′32" E	1,305.80′	CP-15
CP-15	S 19°22′50" E	1,483.25′	CP-14

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
119105AD	10,469,024.66	3,530,248.13	436.22′	146+61.55	-47.12′	SET TXDOT ALUMINUM CAP IN CONCRETE
CP-17	10,467,736.80	3,530,969.99	433.93′	161+26.56	61.24′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-16	10,467,122.11	3,531,912.29	421.03′	172+34.94	82.28′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-15	10,466,263.28	3,532,895.92	424.83′	186+09.22	-46.21′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

SHEET 1 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	60

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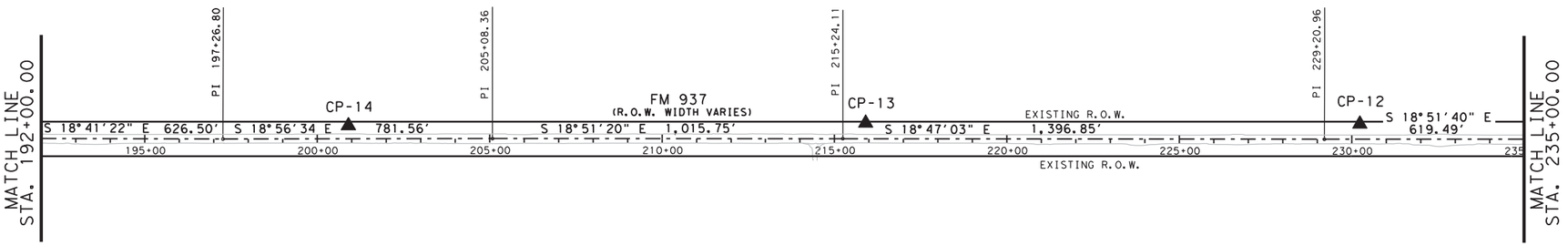

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SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.

2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE
   ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT PRIMARY CONTROL 119105AA/318.06';
   119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22'
   WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.

5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-15	S 19°22'50" E	1,483.25'	CP-14
CP-14	S 19°10'44" E	1,500.88'	CP-13
CP-13	S 18°45'28" E	1,433.03'	CP-12
CP-12	S 15°35'43" E	1,530.15'	119105AC

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-14	10,464,864.09	3,533,388.13	417.70'	200+90.00	-37.24'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-13	10,463,446.51	3,533,881.20	421.35'	215+90.74	-45.15'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-12	10,462,089.59	3,534,342.02	428.30'	230+23.83	-44.36'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

SHEET 2 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
12	ROBERTSON	1191	05	009	61	

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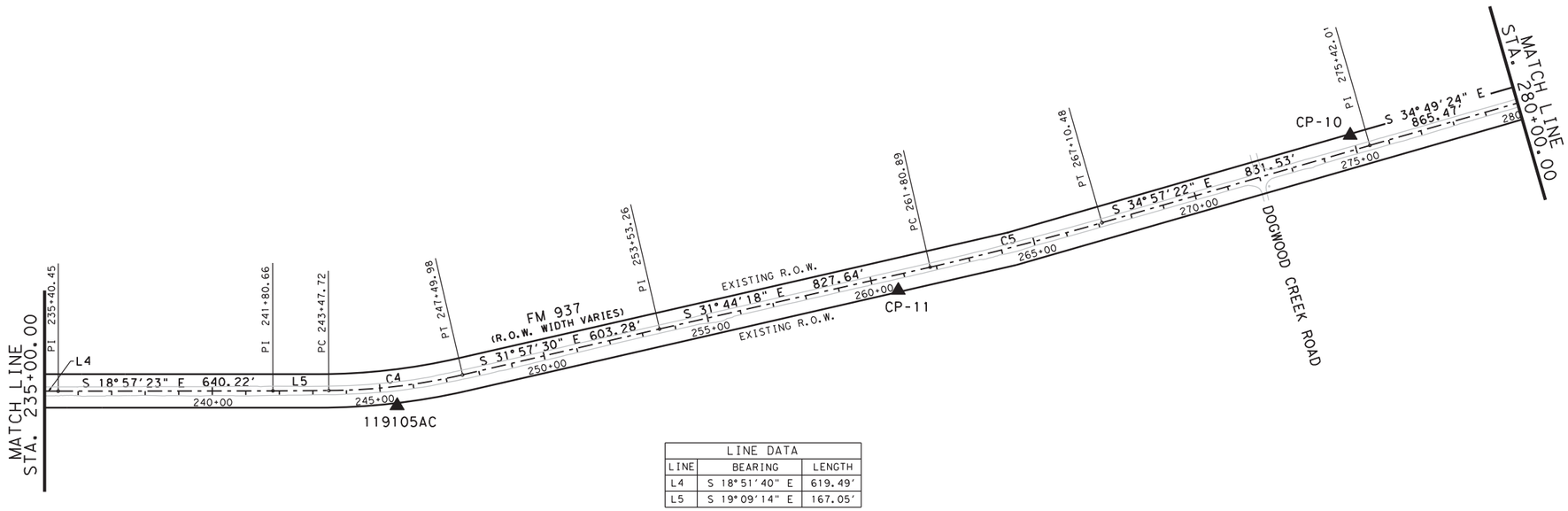
CURVE C4
PI STATION = 245+49.69
DELTA = 12° 48′ 16" (LT)
DEGREE OF CURVE = 03° 10′ 59"
TANGENT = 201.97
LENGTH = 402.26′
RADIUS = 1,800.00′
PC STATION = 243+47.72
PT STATION = 247+49.98

CURVE C5
PI STATION = 264+45.75
DELTA = 03° 13′ 04" (LT)
DEGREE OF CURVE = 00° 36′ 27"
TANGENT = 264.86
LENGTH = 529.58′
RADIUS = 9,430.00′
PC STATION = 261+80.89
PT STATION = 267+10.48



LINE DATA		
LINE	BEARING	LENGTH
L4	S 18°51′40" E	619.49′
L5	S 19°09′14" E	167.05′

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-12	S 15°35′43" E	1,530.15′	119105AC
119105AC	S 31°48′34" E	1,533.57′	CP-11
CP-11	S 37°48′41" E	1,424.96′	CP-10
CP-10	S 30°44′51" E	1,574.31′	CP-9

SURVEY CONTROL MONUMENTATION TABLE

POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
119105AC	10,460,615.77	3,534,753.39	422.64′	245+45.42	56.96′	SET TXDOT ALUMINUM CAP IN CONCRETE
CP-11	10,459,312.54	3,535,561.73	425.75′	260+73.15	46.20′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-10	10,458,186.78	3,536,435.32	415.12′	274+94.19	-45.78′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

0 200 400
SCALE: 1"=200′ (22" x 34" SHEET)
SCALE: 1"=400′ (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06′; 119105AB/397.76′; 119105AC/422.64′; 119105AD/436.22′ WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

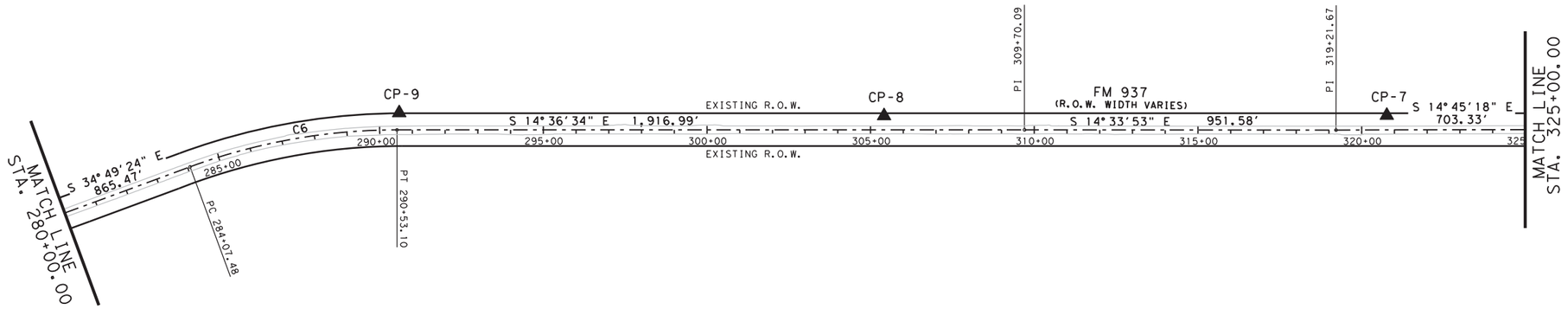
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	62

S:\2022\2220104\CADD\FM937\SCM\MRF1191O5009*SurveyControl Index*03.dgn

CURVE C6
PI STATION = 287+33.68
DELTA = 20° 12′ 50" (RT)
DEGREE OF CURVE = 03° 07′ 51"
TANGENT = 326.20
LENGTH = 645.62′
RADIUS = 1,830.00′
PC STATION = 284+07.48
PT STATION = 290+53.10



0 200 400
SCALE: 1"=200′ (22" x 34" SHEET)
SCALE: 1"=400′ (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.

2. TXDOT PRIMARY SURVEY CONTROL POINTS:
119105AA/N=10,444,180.22, E=3,544,021.91;
119105AB/N=10,451,084.26, E=3,538,657.69;
119105AC/N=10,460,615.77, E=3,534,753.39 AND
119105AD/N=10,469,024.66, E=3,530,248.13 WERE
ESTABLISHED FOR HORIZONTAL CONTROL.
HORIZONTAL SURVEY METHOD:
TXDOT RTN VRS AND BASE & ROVER RTK.

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT PRIMARY CONTROL 119105AA/318.06′;
119105AB/397.76′; 119105AC/422.64′; 119105AD/436.22′
WERE ESTABLISHED FOR VERTICAL CONTROL.
VERTICAL SURVEY METHOD: DIGITAL LEVELING.

5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-10	S 30°44′51" E	1,574.31′	CP-9
CP-9	S 14°14′40" E	1,480.70′	CP-8
CP-8	S 14°39′02" E	1,535.88′	CP-7
CP-7	S 14°46′27" E	1,412.37′	CP-6

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-9	10,456,833.76	3,537,240.20	410.41′	290+60.15	-52.13′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-8	10,455,398.59	3,537,604.53	406.23′	305+40.82	-42.69′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-7	10,453,912.64	3,537,992.99	408.51′	320+76.82	-44.14′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F:713-861-4131
TBPELS Registration No. 10019100

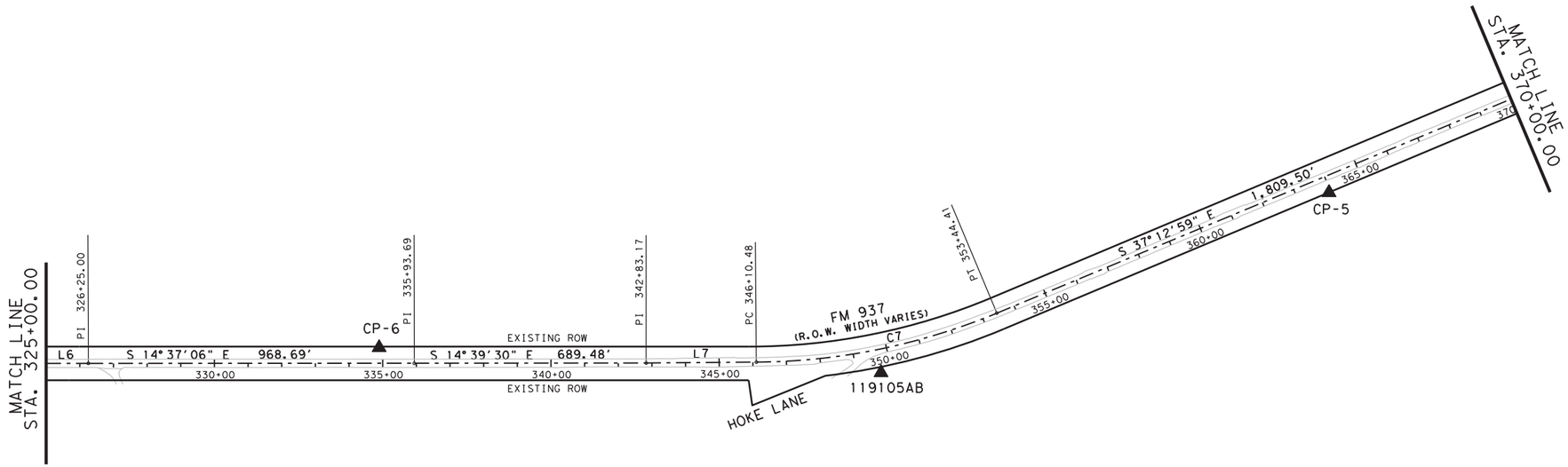
FM 937
SURVEY CONTROL INDEX

SHEET 4 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	63

S:\2022\2220104\CADD\FM937\SCM\MRF1191105009*SurveyControl Index*04.dgn

CURVE C7
PI STATION = 349+82.08
DELTA = 22° 07′ 56" (LT)
DEGREE OF CURVE = 03° 00′ 56"
TANGENT = 371.60
LENGTH = 733.93′
RADIUS = 1,900.00′
PC STATION = 346+10.48
PT STATION = 353+44.41



LINE DATA		
LINE	BEARING	LENGTH
L6	S 14° 45′ 18" E	703.33′
L7	S 15° 05′ 03" E	327.30′

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-7	S 14° 46′ 27" E	1,412.37′	CP-6
CP-6	S 11° 45′ 38" E	1,494.07′	119105AB
119105AB	S 36° 30′ 38" E	1,434.78′	CP-5
CP-5	S 37° 20′ 36" E	1,371.73′	CP-4

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-6	10,452,546.97	3,538,353.16	406.81′	334+89.08	-46.68′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
119105AB	10,451,084.26	3,538,657.69	397.76′	349+70.17	69.15′	SET TXDOT ALUMINUM CAP IN CONCRETE
CP-5	10,449,931.06	3,539,511.35	400.75′	363+93.73	48.75′	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

0 200 400
SCALE: 1"=200′ (22" x 34" SHEET)
SCALE: 1"=400′ (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06′; 119105AB/397.76′; 119105AC/422.64′; 119105AD/436.22′ WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

STATE OF TEXAS REGISTERED HONG YANG 6557 PROFESSIONAL LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

SHEET 5 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
12	ROBERTSON	1191	05	009	64	

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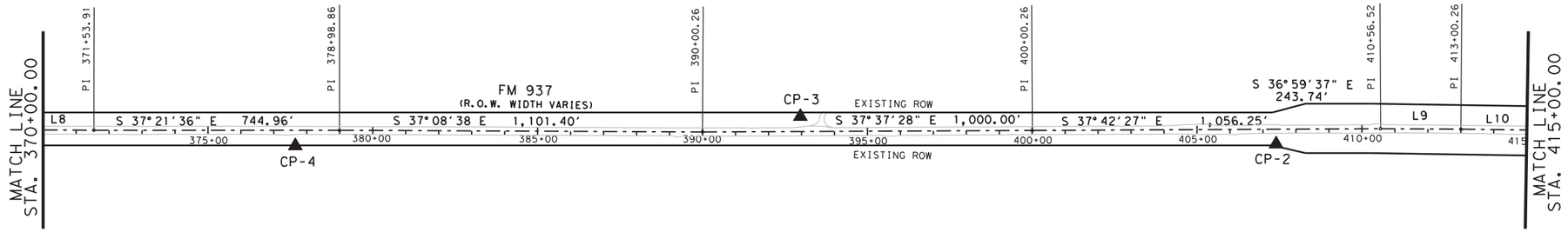

0 200 400

SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.

2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE
   ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.

3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

4. TXDOT PRIMARY CONTROL 119105AA/318.06';
   119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22'
   WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.

5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

LINE DATA		
LINE	BEARING	LENGTH
L8	S 37°12'59" E	1,809.50'
L9	S 36°59'37" E	243.74'
L10	S 36°37'36" E	485.35'

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-5	S 37°20'36" E	1,371.73'	CP-4
CP-4	S 40°43'31" E	1,534.21'	CP-3
CP-3	S 34°02'53" E	1,445.14'	CP-2
CP-2	S 41°03'09" E	1,528.56'	CP-1

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-4	10,448,840.52	3,540,343.42	394.91'	377+65.33	47.24'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-3	10,447,677.82	3,541,344.40	397.43'	392+97.12	-45.61'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
CP-2	10,446,480.43	3,542,153.51	396.04'	407+39.38	45.61'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F:713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

SHEET 6 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	65

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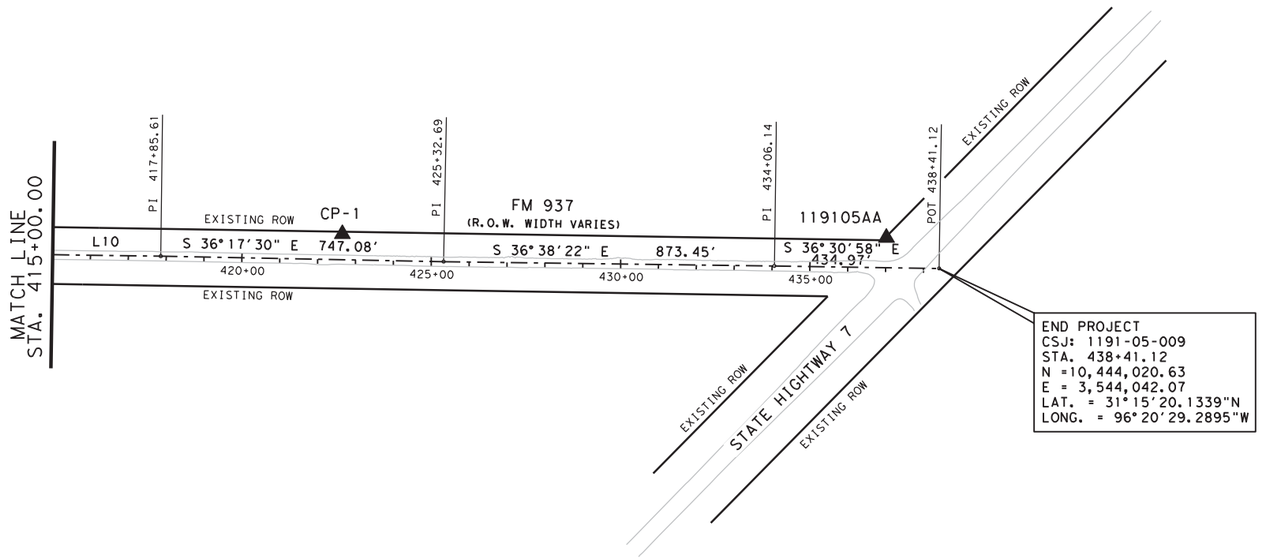

END PROJECT
CSJ: 1191-05-009
STA. 438+41.12
N =10,444,020.63
E = 3,544,042.07
LAT. = 31°15'20.1339"N
LONG. = 96°20'29.2895"W

0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS:
   119105AA/N=10,444,180.22, E=3,544,021.91;
   119105AB/N=10,451,084.26, E=3,538,657.69;
   119105AC/N=10,460,615.77, E=3,534,753.39 AND
   119105AD/N=10,469,024.66, E=3,530,248.13 WERE
   ESTABLISHED FOR HORIZONTAL CONTROL.
   HORIZONTAL SURVEY METHOD:
   TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06'; 119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22' WERE ESTABLISHED FOR VERTICAL CONTROL.
   VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.
SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

LINE DATA		
LINE	BEARING	LENGTH
L10	S 36°37'36" E	485.35'

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
CP-2	S 41°03'09" E	1,528.56'	CP-1
CP-1	S 36°59'38" E	1,436.73'	119105AA

SURVEY CONTROL MONUMENTATION TABLE						
POINT	NORTHING(Y)	EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-1	10,445,327.73	3,543,157.39	344.46'	422+63.91	-67.61'	SET 5/8"I.R. W/TXDOT CAP IN CONCRETE
119105AA	10,444,180.22	3,544,021.91	318.06'	437+00.86	-78.77'	SET TXDOT ALUMINUM CAP IN CONCRETE

(-) DENOTES OFFSET LEFT

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
SURVEY CONTROL INDEX

SHEET 7 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	66

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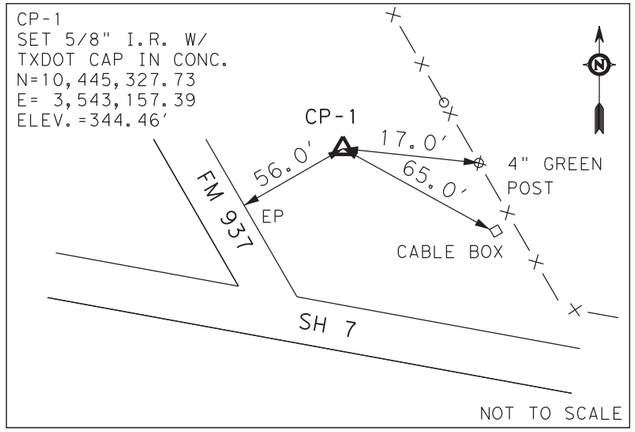
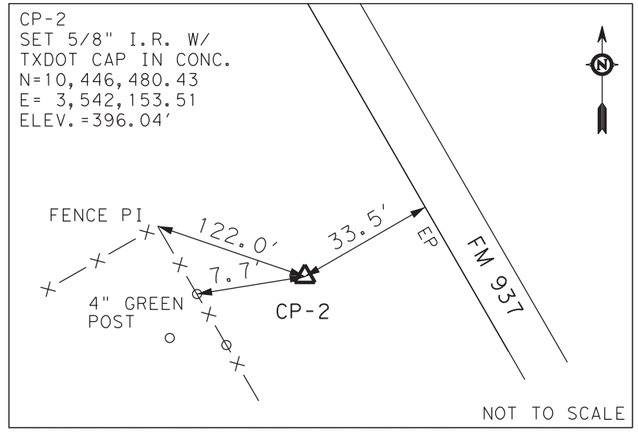
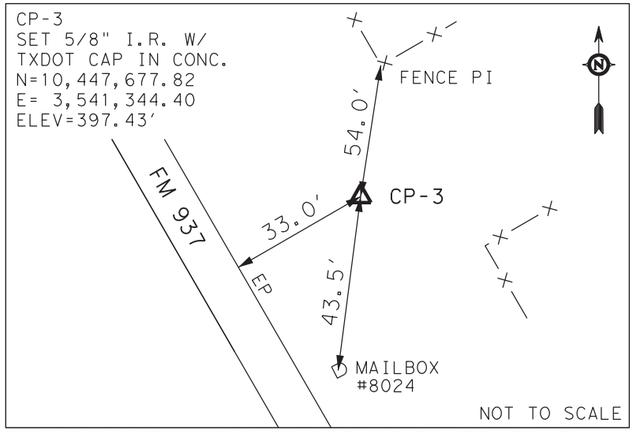


FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 1500 FEET TO THE MONUMENT ON THE RIGHT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 0.5 MILE TO THE MONUMENT ON THE LEFT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 0.85 MILE TO THE MONUMENT ON THE RIGHT.

NOTES:

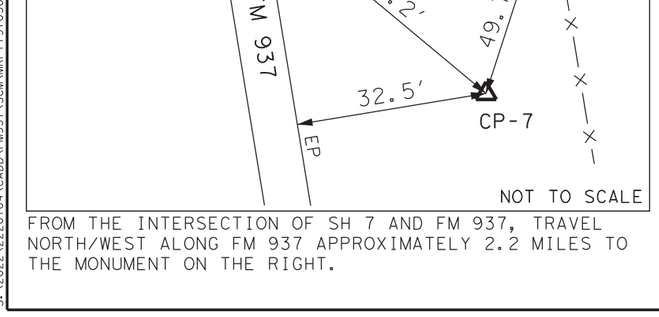
1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS: 119105AA/N=10,444,180.22, E=3,544,021.91; 119105AB/N=10,451,084.26, E=3,538,657.69; 119105AC/N=10,460,615.77, E=3,534,753.39 AND 119105AD/N=10,469,024.66, E=3,530,248.13 WERE ESTABLISHED FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06'; 119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22' WERE ESTABLISHED FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: AUGUST, 2022

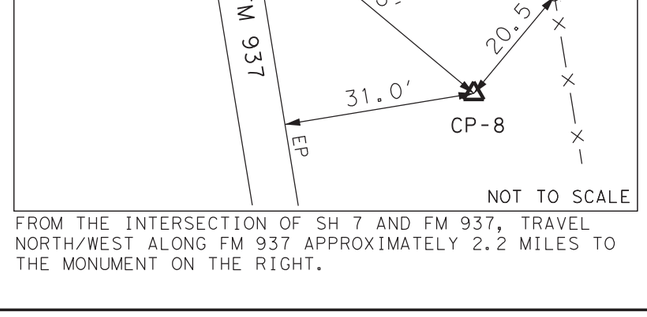
STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

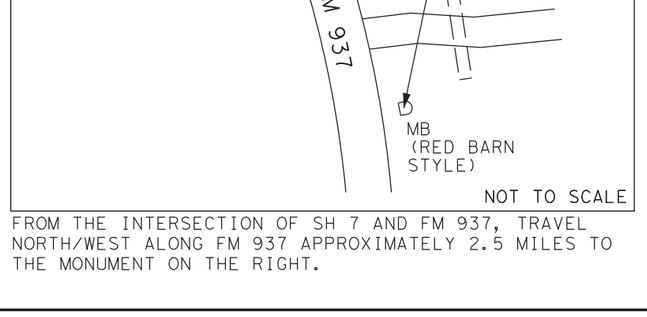
HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 1.1 MILE TO THE MONUMENT ON THE LEFT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 1.4 MILE TO THE MONUMENT ON THE LEFT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 2.0 MILES TO THE MONUMENT ON THE RIGHT.

FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 2.2 MILES TO THE MONUMENT ON THE RIGHT.

FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 2.2 MILES TO THE MONUMENT ON THE RIGHT.

FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 2.5 MILES TO THE MONUMENT ON THE RIGHT.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 1 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
12	ROBERTSON	1191	05	009		67

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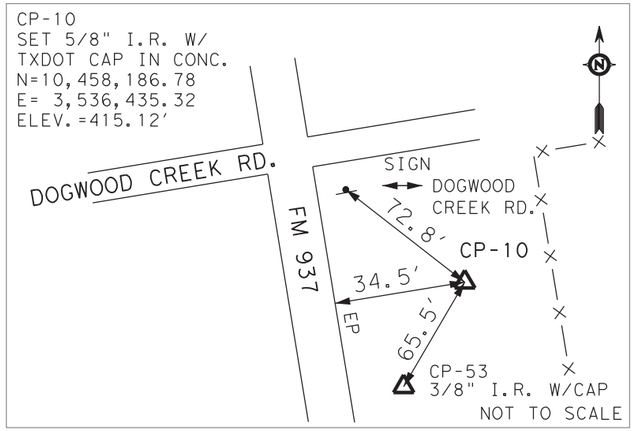
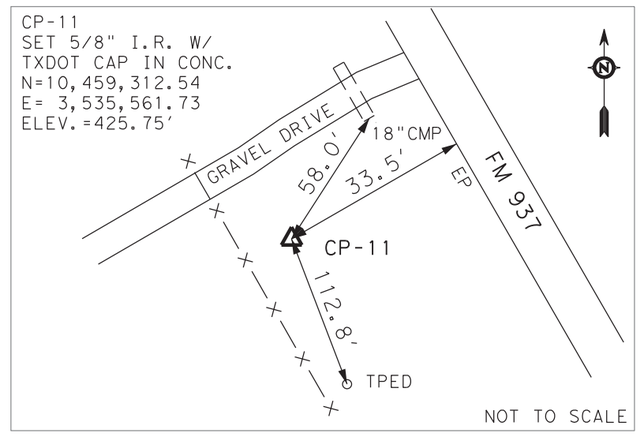
CP-10
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,458,186.78
E= 3,536,435.32
ELEV.=415.12'



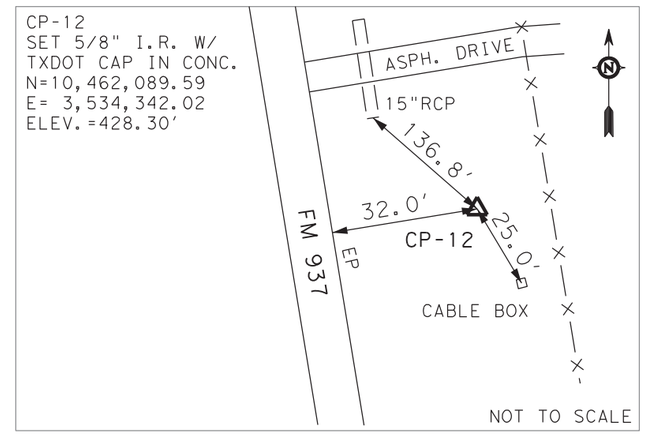
FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 3.0 MILES TO THE MONUMENT ON THE RIGHT.

CP-11
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,459,312.54
E= 3,535,561.73
ELEV.=425.75'



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 3.3 MILES TO THE MONUMENT ON THE LEFT.

CP-12
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,462,089.59
E= 3,534,342.02
ELEV.=428.30'



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 3.9 MILES TO THE MONUMENT ON THE RIGHT.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
2. TXDOT PRIMARY SURVEY CONTROL POINTS: 119105AA/N=10,444,180.22, E=3,544,021.91; 119105AB/N=10,451,084.26, E=3,538,657.69; 119105AC/N=10,460,615.77, E=3,534,753.39 AND 119105AD/N=10,469,024.66, E=3,530,248.13 WERE ESTABLISHED FOR HORIZONTAL CONTROL. HORIZONTAL SURVEY METHOD: TXDOT RTN VRS AND BASE & ROVER RTK.
3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06'; 119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22' WERE ESTABLISHED FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

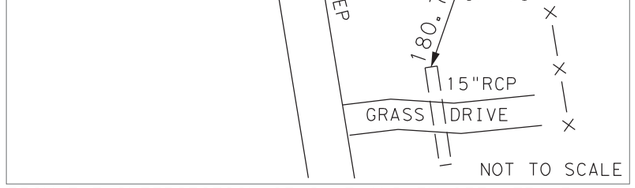
THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

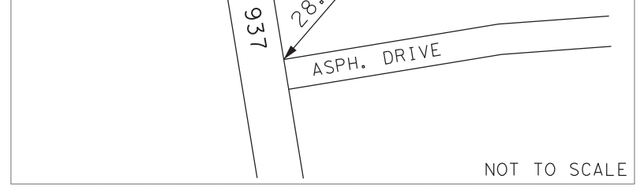
HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

CP-13
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,463,446.51
E= 3,533,881.2
ELEV.=421.35'



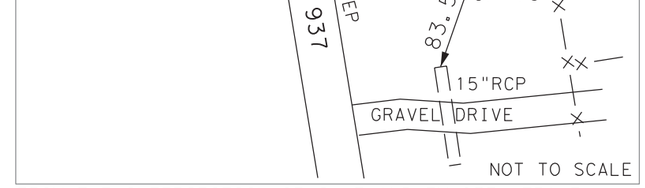
FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 4.2 MILES TO THE MONUMENT ON THE RIGHT.

CP-14
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,464,864.09
E= 3,533,388.13
ELEV.=417.70'



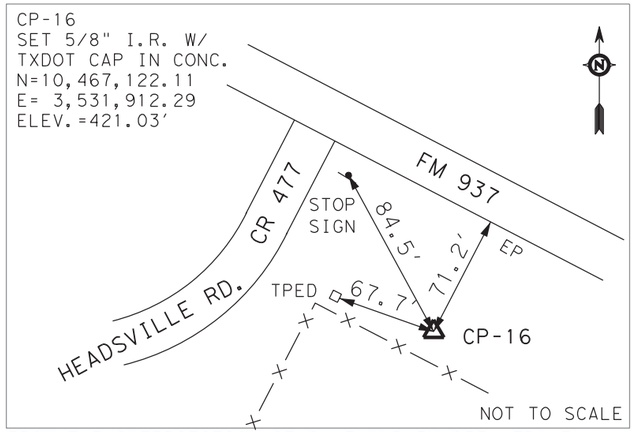
FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 4.5 MILES TO THE MONUMENT ON THE RIGHT.

CP-15
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,466,263.28
E= 3,532,895.92
ELEV.=424.83'



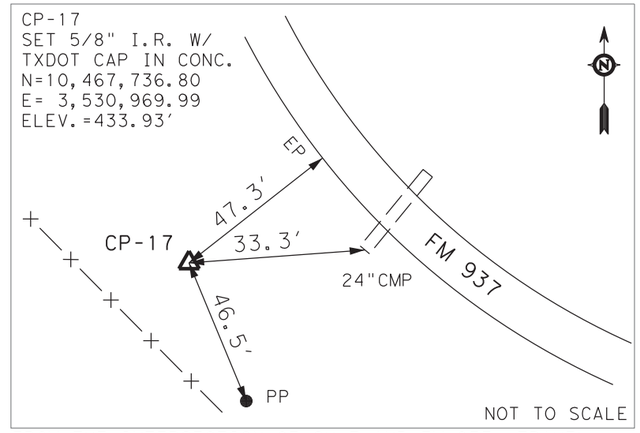
FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 4.8 MILES TO THE MONUMENT ON THE RIGHT.

CP-16
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,467,122.11
E= 3,531,912.29
ELEV.=421.03'



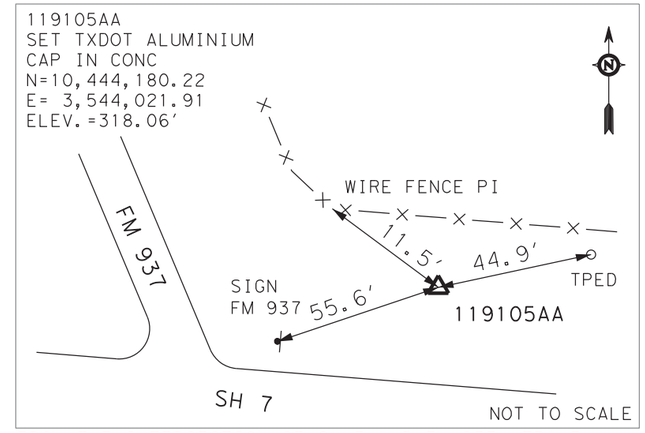
FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 5.1 MILES TO THE MONUMENT ON THE LEFT.

CP-17
SET 5/8" I.R. W/
TXDOT CAP IN CONC.
N=10,467,736.80
E= 3,530,969.99
ELEV.=433.93'



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 5.3 MILES TO THE MONUMENT ON THE LEFT.

119105AA
SET TXDOT ALUMINIUM
CAP IN CONC
N=10,444,180.22
E= 3,544,021.91
ELEV.=318.06'



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 50 FEET TO THE MONUMENT ON THE RIGHT.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 2 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
12	ROBERTSON	1191	05	009		68

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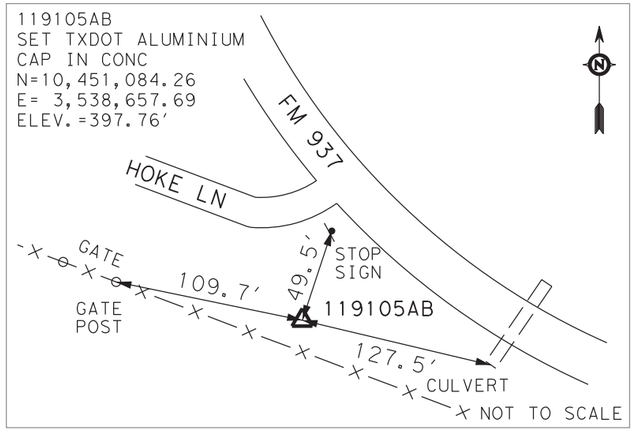
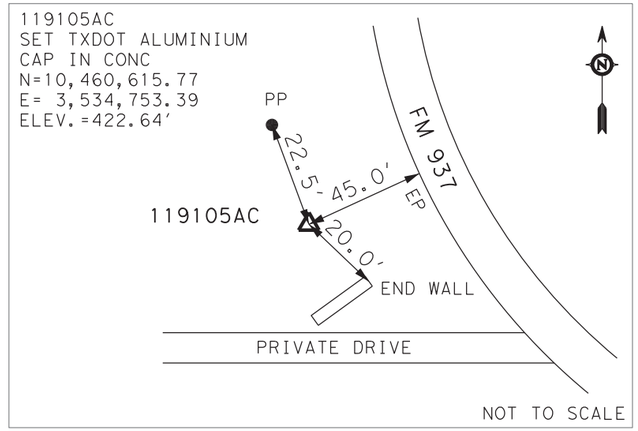
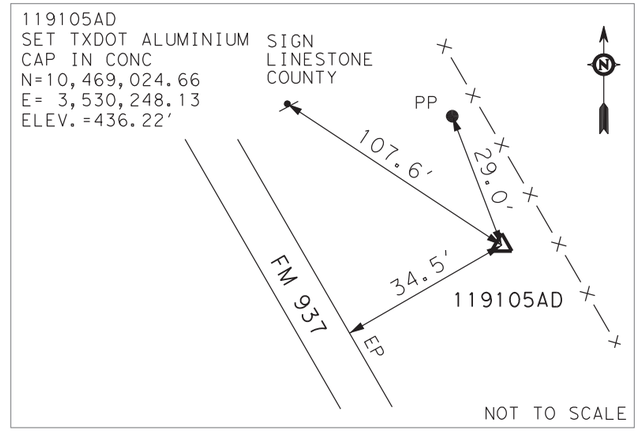


FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 1.7 MILE TO THE MONUMENT ON THE LEFT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 3.6 MILES TO THE MONUMENT ON THE LEFT.



FROM THE INTERSECTION OF SH 7 AND FM 937, TRAVEL NORTH/WEST ALONG FM 937 APPROXIMATELY 5.6 MILES TO THE MONUMENT ON THE RIGHT.

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, (4203), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.000120 FOR ROBERTSON COUNTY.
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3. ALL ELEVATIONS HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. TXDOT PRIMARY CONTROL 119105AA/318.06'; 119105AB/397.76'; 119105AC/422.64'; 119105AD/436.22' WERE ESTABLISHED FOR VERTICAL CONTROL. VERTICAL SURVEY METHOD: DIGITAL LEVELING.
5. UNIT OF MEASURE: U.S. SURVEY FEET

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: AUGUST, 2022

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/18/23

HONG YANG DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6557

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPELS Registration No. 10019100

FM 937
HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 3 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				FM 937
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
12	ROBERTSON	1191	05	009	69

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℄ FM 937

STATION	X	Y
POT 14415.000 R1	3530077.117	10469208.405
PI 14945.964 R1	3530359.469	10468758.739
Tangential Direction:	S32.125°E	
Tangential Length:	530.964	

PI 14945.964 R1	3530359.469	10468758.739
PC 15745.357 R1	3530782.125	10468080.217
Tangential Direction:	S31.919°E	
Tangential Length:	799.394	

PC 15745.357 R1	3530782.125	10468080.217
PI 16320.014 R1	3531085.957	10467592.450
CC	3532403.206	10469089.998
PT 16861.756 R1	3531608.501	10467353.332
Radius:	1909.860	
Delta:	33.492°Left	
Degree of Curvature(Arc):	3.000°	
Length:	1116.399	
Tangent:	574.656	
Chord:	1100.572	
Middle Ordinate:	80.994	
External:	84.581	
Tangent Back Direction:	S31.919°E	
Radial Direction:	S58.081°W	
Chord Direction:	S48.665°E	
Radial Direction:	S24.589°W	
Tangent Ahead Direction:	S65.411°E	

PT 16861.756 R1	3531608.501	10467353.332
PI 17054.443 R1	3531783.715	10467273.154
Tangential Direction:	S65.411°E	
Tangential Length:	192.688	

PI 17054.443 R1	3531783.715	10467273.154
PC 17562.985 R1	3532244.276	10467057.519
Tangential Direction:	S64.911°E	
Tangential Length:	508.542	

PC 17562.985 R1	3532244.276	10467057.519
PI 17930.248 R1	3532576.887	10466901.790
CC	3531839.361	10466192.686
PT 18264.204 R1	3532719.431	10466563.319
Radius:	954.930	
Delta:	42.073°Right	
Degree of Curvature(Arc):	6.000°	
Length:	701.218	
Tangent:	367.262	
Chord:	685.570	
Middle Ordinate:	63.645	
External:	68.189	
Tangent Back Direction:	S64.911°E	
Radial Direction:	S25.089°W	
Chord Direction:	S43.874°E	
Radial Direction:	S67.162°W	
Tangent Ahead Direction:	S22.838°E	

PT 18264.204 R1	3532719.431	10466563.319
PC 18866.863 R1	3532953.338	10466007.904
Tangential Direction:	S22.838°E	
Tangential Length:	602.659	

PC 18866.863 R1	3532953.338	10466007.904
PI 18983.629 R1	3532997.582	10465899.845
CC	3529830.002	10464729.077
PT 19100.302 R1	3533034.252	10465788.986
Radius:	3375.000	
Delta:	3.963°Right	
Degree of Curvature(Arc):	1.698°	
Length:	233.439	
Tangent:	116.766	
Chord:	233.393	
Middle Ordinate:	2.018	
External:	2.019	
Tangent Back Direction:	S22.266°E	
Radial Direction:	S67.734°W	
Chord Direction:	S20.285°E	
Radial Direction:	S71.697°W	
Tangent Ahead Direction:	S18.303°E	

PT 19100.302 R1	3533034.252	10465788.986
PI 19726.801 R1	3533235.007	10465195.522
Tangential Direction:	S18.689°E	
Tangential Length:	626.500	

PI 19726.801 R1	3533235.007	10465195.522
PI 20508.358 R1	3533488.720	10464456.293
Tangential Direction:	S18.943°E	
Tangential Length:	781.556	

PI 20508.358 R1	3533488.720	10464456.293
PI 21524.109 R1	3533816.992	10463495.050
Tangential Direction:	S18.855°E	
Tangential Length:	1015.751	

PI 21524.109 R1	3533816.992	10463495.050
PI 22920.957 R1	3534266.783	10462172.601
Tangential Direction:	S18.784°E	
Tangential Length:	1396.848	

PI 22920.957 R1	3534266.783	10462172.601
PI 23540.448 R1	3534467.050	10461586.374
Tangential Direction:	S18.861°E	
Tangential Length:	619.491	

PI 23540.448 R1	3534467.050	10461586.374
PI 24180.663 R1	3534675.023	10460980.880
Tangential Direction:	S18.956°E	
Tangential Length:	640.215	

PI 24180.663 R1	3534675.023	10460980.880
PC 24347.715 R1	3534729.833	10460823.076
Tangential Direction:	S19.154°E	
Tangential Length:	167.052	

PC 24347.715 R1	3534729.833	10460823.076
PI 24549.687 R1	3534796.101	10460632.285
CC	3536430.187	10461413.666
PT 24749.976 R1	3534903.005	10460460.925
Radius:	1800.000	
Delta:	12.804°Left	
Degree of Curvature(Arc):	3.183°	
Length:	402.261	
Tangent:	201.972	
Chord:	401.424	
Middle Ordinate:	11.225	
External:	11.296	
Tangent Back Direction:	S19.154°E	
Radial Direction:	S70.846°W	
Chord Direction:	S25.556°E	
Radial Direction:	S58.042°W	
Tangent Ahead Direction:	S31.958°E	

PT 24749.976 R1	3534903.005	10460460.925
PI 25353.257 R1	3535222.322	10459949.081
Tangential Direction:	S31.958°E	
Tangential Length:	603.281	

PI 25353.257 R1	3535222.322	10459949.081
PC 26180.894 R1	3535657.692	10459245.209
Tangential Direction:	S31.738°E	
Tangential Length:	827.636	

PC 26180.894 R1	3535657.692	10459245.209
PI 26445.755 R1	3535797.020	10459019.955
CC	3543677.527	10464205.769
PT 26710.477 R1	3535948.772	10458802.877
Radius:	9430.000	
Delta:	3.218°Left	
Degree of Curvature(Arc):	0.608°	
Length:	529.583	
Tangent:	264.861	
Chord:	529.514	
Middle Ordinate:	3.717	
External:	3.719	

STATION	X	Y
Tangent Back Direction:	S31.738°E	
Radial Direction:	S58.262°W	
Chord Direction:	S33.347°E	
Radial Direction:	S55.044°W	
Tangent Ahead Direction:	S34.956°E	

PT 26710.477 R1	3535948.772	10458802.877
PI 27542.011 R1	3536425.197	10458121.359
Tangential Direction:	S34.956°E	
Tangential Length:	831.534	

PI 27542.011 R1	3536425.197	10458121.359
PC 28407.483 R1	3536919.422	10457410.877
Tangential Direction:	S34.823°E	
Tangential Length:	865.472	

PC 28407.483 R1	3536919.422	10457410.877
PI 28733.684 R1	3537105.698	10457143.093
CC	3535417.144	10456365.861
PT 29053.105 R1	3537187.976	10456827.439
Radius:	1830.000	
Delta:	20.214°Right	
Degree of Curvature(Arc):	3.131°	
Length:	645.621	
Tangent:	326.201	
Chord:	642.278	
Middle Ordinate:	28.398	
External:	28.846	
Tangent Back Direction:	S34.823°E	
Radial Direction:	S55.177°W	
Chord Direction:	S24.716°E	
Radial Direction:	S75.391°W	
Tangent Ahead Direction:	S14.609°E	

PT 29053.105 R1	3537187.976	10456827.439
PI 30970.091 R1	3537671.494	10454972.432
Tangential Direction:	S14.609°E	
Tangential Length:	1916.987	

PI 30970.091 R1	3537671.494	10454972.432
PI 31921.670 R1	3537910.792	10454051.434
Tangential Direction:	S14.565°E	
Tangential Length:	951.579	

PI 31921.670 R1	3537910.792	10454051.434
PI 32625.002 R1	3538089.923	10453371.295
Tangential Direction:	S14.755°E	
Tangential Length:	703.332	

PI 32625.002 R1	3538089.923	10453371.295
PI 33593.691 R1	3538334.400	10452433.965
Tangential Direction:	S14.618°E	
Tangential Length:	968.689	

PI 33593.691 R1	3538334.400	10452433.965
PI 34283.175 R1	3538508.878	10451766.922
Tangential Direction:	S14.658°E	
Tangential Length:	689.484	

PI 34283.175 R1	3538508.878	10451766.922
PC 34610.479 R1	3538594.055	10451450.896
Tangential Direction:	S15.084°E	
Tangential Length:	327.304	

PC 34610.479 R1	3538594.055	10451450.896
PI 34982.075 R1	3538690.759	10451092.103
CC	3540428.590	10451945.348
PT 35344.407 R1	3538915.510	10450796.180
Radius:	1900.000	
Delta:	22.132°Left	
Degree of Curvature(Arc):	3.016°	
Length:	733.928	
Tangent:	371.596	
Chord:	729.374	
Middle Ordinate:	35.328	

STATION	X	Y
External:	35.997	
Tangent Back Direction:	S15.084°E	
Radial Direction:	S74.916°W	
Chord Direction:	S26.150°E	
Radial Direction:	S52.784°W	
Tangent Ahead Direction:	S37.216°E	

PT 35344.407 R1	3538915.510	10450796.180
PI 37153.907 R1	3540009.941	10449355.170
Tangential Direction:	S37.216°E	
Tangential Length:	1809.500	

PI 37153.907 R1	3540009.941	10449355.170
PI 37898.865 R1	3540461.997	10448763.049
Tangential Direction:	S37.360°E	
Tangential Length:	744.957	

PI 37898.865 R1	3540461.997	10448763.049
PI 39000.265 R1	3541127.045	10447885.101
Tangential Direction:	S37.144°E	
Tangential Length:	1101.400	

PI 39000.265 R1	3541127.045	10447885.101
PI 40000.263 R1	3541737.528	10447093.073
Tangential Direction:	S37.625°E	
Tangential Length:	999.998	

PI 40000.263 R1	3541737.528	10447093.073
PI 41056.518 R1	3542383.564	10446257.423
Tangential Direction:	S37.707°E	
Tangential Length:	1056.255	

PI 41056.518 R1	3542383.564	10446257.423
PI 41300.263 R1	3542530.232	10446062.744
Tangential Direction:	S36.994°E	
Tangential Length:	243.745	

PI 41300.263 R1	3542530.232	10446062.744
PI 41785.609 R1	3542819.790	10445673.234
Tangential Direction:	S36.627°E	
Tangential Length:	485.347	

PI 41785.609 R1	3542819.790	10445673.234
PI 42532.693 R1	3543261.985	10445071.073
Tangential Direction:	S36.292°E	
Tangential Length:	747.084	

PI 42532.693 R1	3543261.985	10445071.073
PI 43406.144 R1	3543783.241	10444370.210
Tangential Direction:	S36.639°E	
Tangential Length:	873.451	

PI 43406.144 R1	3543783.241	10444370.210
POT 43841.117 R1	3544042.071	10444020.627
Tangential Direction:	S36.516°E	
Tangential Length:	434.973	

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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Megan E. Houtchens

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Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
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(713) 622-1444

FM 937

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		70

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℄ HEADSVILLE RD

	STATION	X	Y
POT	1000.000 R1	3531862.128	10467236.441
PC	1073.813 R1	3531831.087	10467169.472
Tangential Direction:	S24.869°W		
Tangential Length:	73.813		

PC	1073.813 R1	3531831.087	10467169.472
PI	1099.009 R1	3531820.491	10467146.612
CC		3531717.678	10467222.040
PT	1123.539 R1	3531801.866	10467129.642
Radius:	125.000		
Delta:	22.793°Right		
Degree of Curvature(Arc):	45.837°		
Length:	49.726		
Tangent:	25.196		
Chord:	49.399		
Middle Ordinate:	2.465		
External:	2.514		
Tangent Back Direction:	S24.869°W		
Radial Direction:	N65.131°W		
Chord Direction:	S36.265°W		
Radial Direction:	N42.338°W		
Tangent Ahead Direction:	S47.662°W		

PT	1123.539 R1	3531801.866	10467129.642
POT	1147.045 R1	3531784.492	10467113.811
Tangential Direction:	S47.662°W		
Tangential Length:	23.505		

℄ STERLING ROBERTSON RD

	STATION	X	Y
POT	1000.000 R1	3532523.019	10467030.059
PC	1126.752 R1	3532452.729	10466924.582
Tangential Direction:	N33.877°E		
Tangential Length:	69.353		

PI	1069.353 R1	3532491.387	10466982.161
POT	1126.753 R1	3532523.019	10467030.059
Tangential Direction:	S33.680°W		
Tangential Length:	126.752		

℄ DOGWOOD CREEK RD

	STATION	X	Y
POT	1000.000 R1	3536353.322	10458485.978
PC	1150.005 R1	3536229.688	10458401.031
Tangential Direction:	S55.508°W		
Tangential Length:	150.005		

PI	1150.005 R1	3536229.688	10458401.031
POT	1300.046 R1	3536104.726	10458317.983
Tangential Direction:	S56.393°W		
Tangential Length:	150.042		

℄ HOKE LN (N)

	STATION	X	Y
POT	999.970 R1	3538106.542	10453307.577
POT	1080.000 R1	3538043.188	10453258.679
Tangential Direction:	S52.338°W		
Tangential Length:	80.030		

℄ HOKE LN (S)

	STATION	X	Y
POT	1000.000 R1	3538668.707	10451229.238
PC	1023.890 R1	3538646.579	10451220.234
Tangential Direction:	S67.858°W		
Tangential Length:	23.890		

PC	1023.890 R1	3538646.579	10451220.234
PI	1067.579 R1	3538606.112	10451203.767
CC		3538623.965	10451275.809
PT	1099.414 R1	3538578.017	10451237.225
Radius:	60.000		
Delta:	72.120°Right		
Degree of Curvature(Arc):	95.493°		
Length:	75.524		
Tangent:	43.689		
Chord:	70.636		
Middle Ordinate:	11.496		
External:	14.221		
Tangent Back Direction:	S67.858°W		
Radial Direction:	N22.142°W		
Chord Direction:	N76.082°W		
Radial Direction:	N49.979°E		
Tangent Ahead Direction:	N40.021°W		

PT	1099.414 R1	3538578.017	10451237.225
PI	1149.417 R1	3538545.861	10451275.517
Tangential Direction:	N40.021°W		
Tangential Length:	50.003		

PI	1149.417 R1	3538545.861	10451275.517
PI	1187.863 R1	3538522.192	10451305.814
Tangential Direction:	N37.999°W		
Tangential Length:	38.446		

PI	1187.863 R1	3538522.192	10451305.814
POT	1219.600 R1	3538503.129	10451331.187
Tangential Direction:	N36.917°W		
Tangential Length:	31.737		

5/26/2023

STATE OF TEXAS
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FM 937

HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		71

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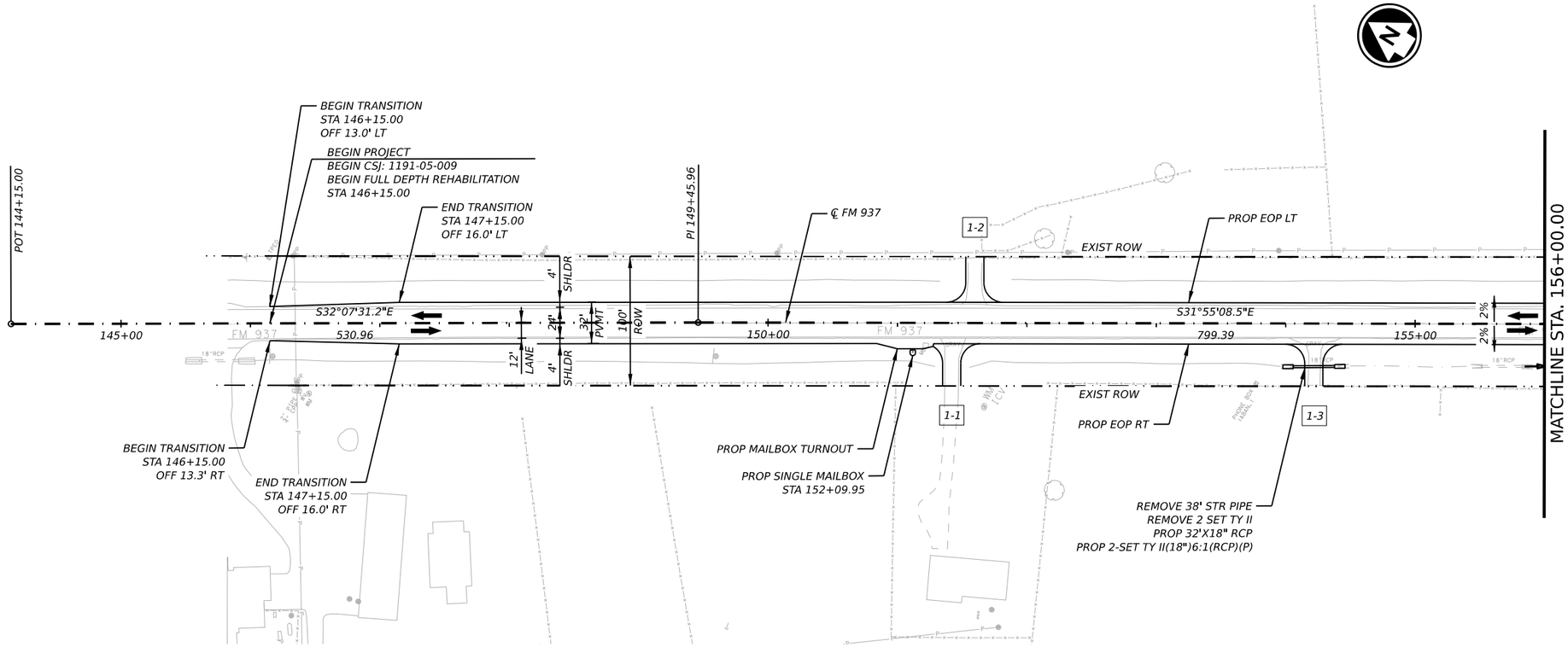

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA AND SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCHMARK DATA.
2. REFER TO TYPICAL SECTIONS FOR MORE INFORMATION.
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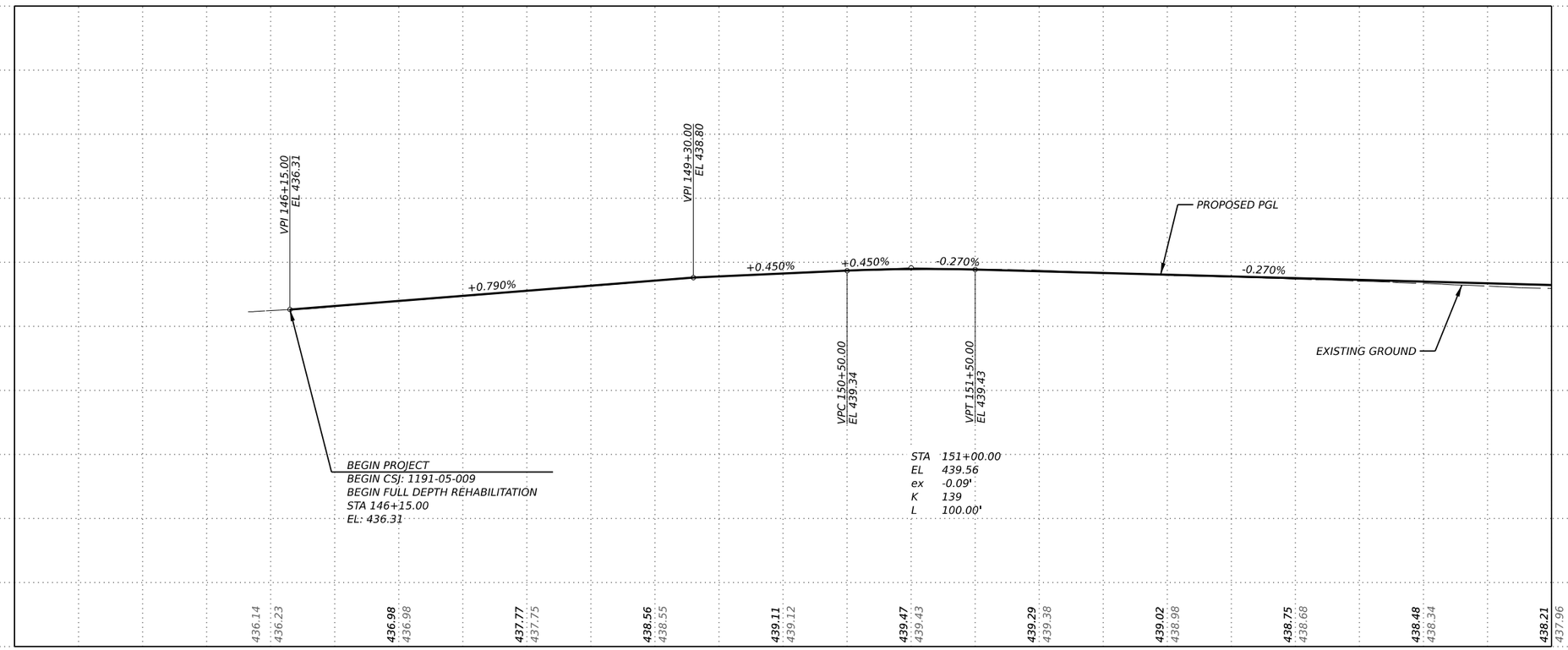
6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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



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FM 937

ROADWAY PLAN & PROFILE

(BEGIN TO STA 156+00)

SHEET 1 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		72

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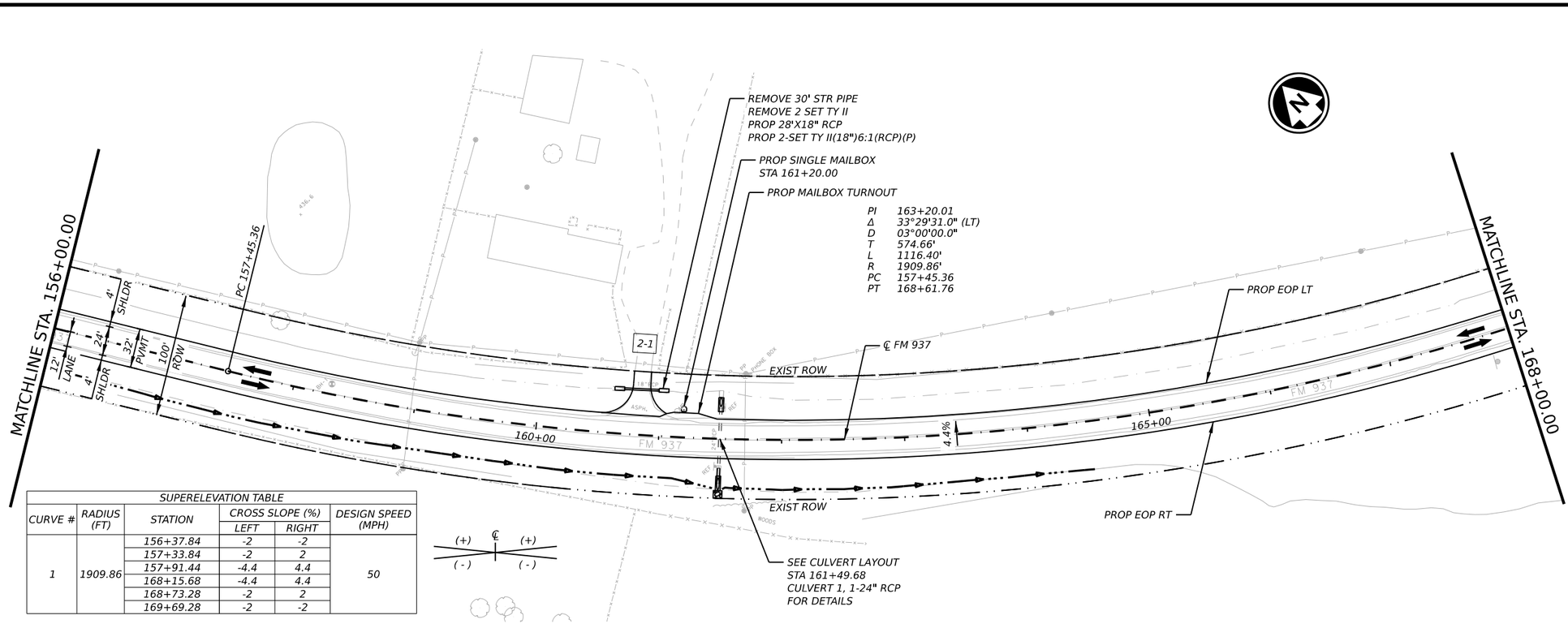

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
1	1909.86	156+37.84	-2	-2	50
		157+33.84	-2	2	
		157+91.44	-4.4	4.4	
		168+15.68	-4.4	4.4	
		168+73.28	-2	2	
		169+69.28	-2	-2	

NOTES

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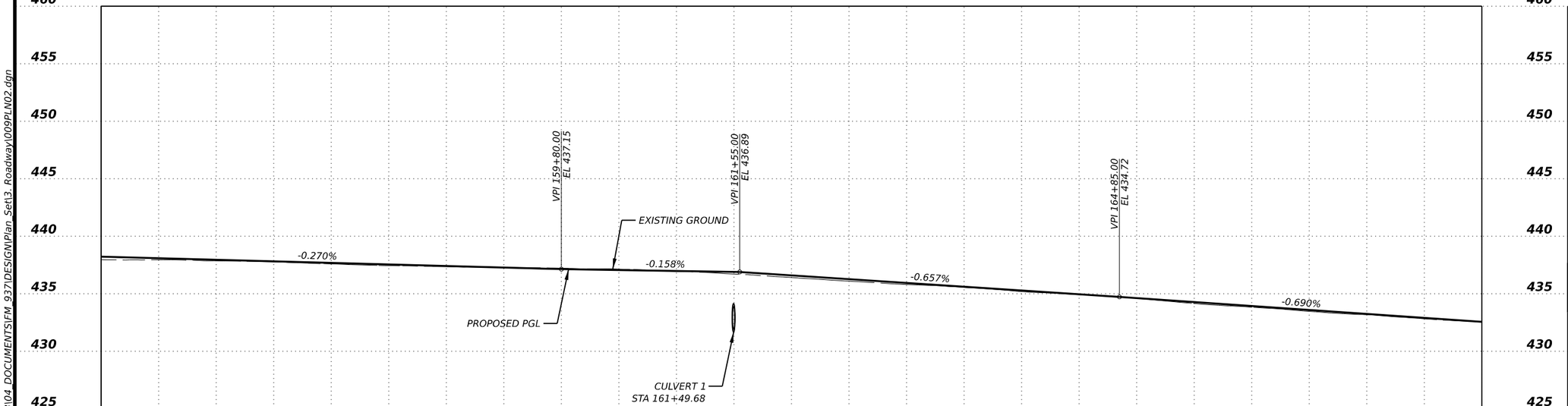
6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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3131 Briarpark Dr, Suite 200
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(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 156+00 TO STA 168+00)

SHEET 2 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		73

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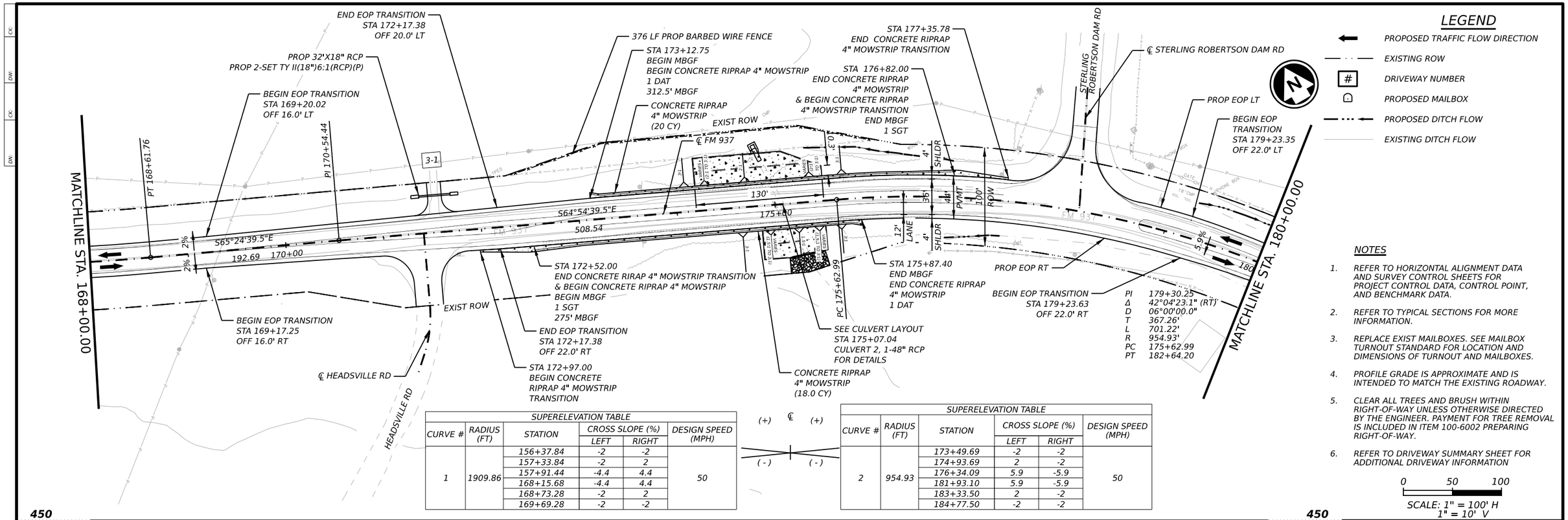


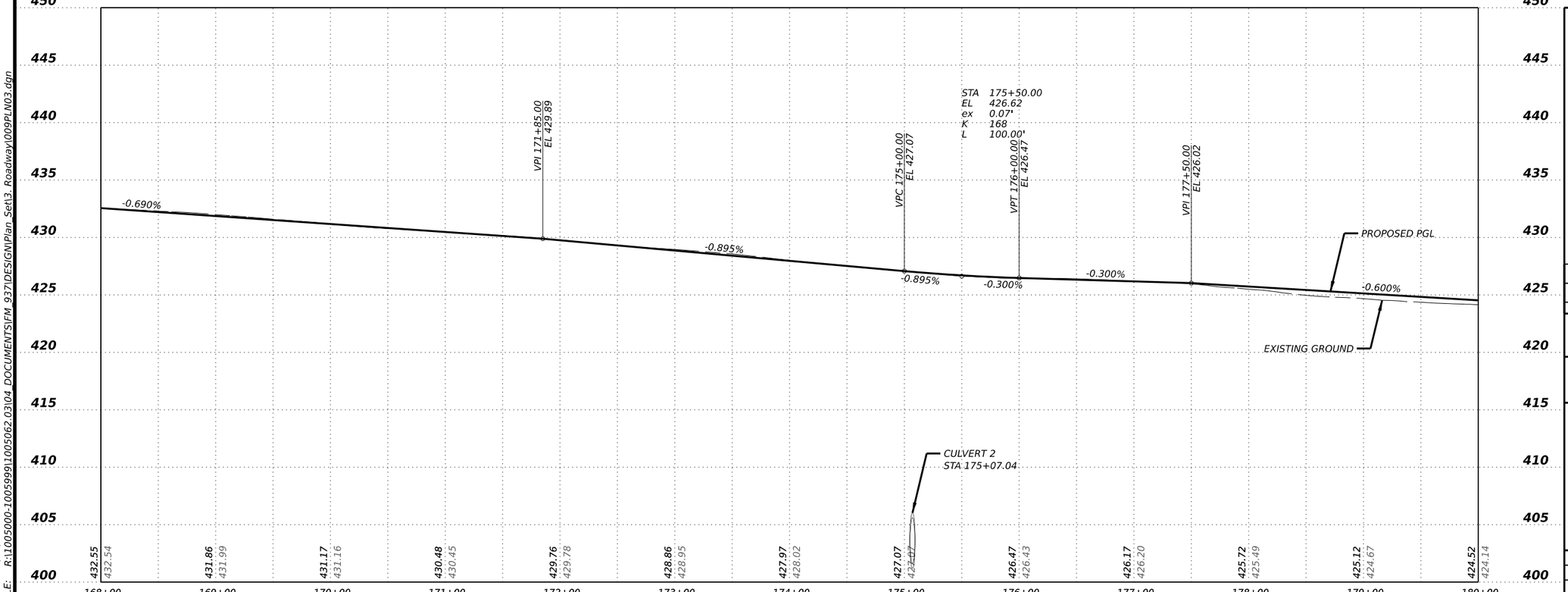
SUPERELEVATION TABLE

CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
1	1909.86	156+37.84	-2	-2	50
		157+33.84	-2	2	
		157+91.44	-4.4	4.4	
		168+15.68	-4.4	4.4	
		168+73.28	-2	2	
		169+69.28	-2	-2	

(+) ℄ (+)
(-) (-)

SUPERELEVATION TABLE

CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
2	954.93	173+49.69	-2	-2	50
		174+93.69	2	-2	
		176+34.09	5.9	-5.9	
		181+93.10	5.9	-5.9	
		183+33.50	2	-2	
		184+77.50	-2	-2	



6/21/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
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NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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ROADWAY PLAN & PROFILE

(STA 168+00 TO STA 180+00)

SHEET 3 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		74

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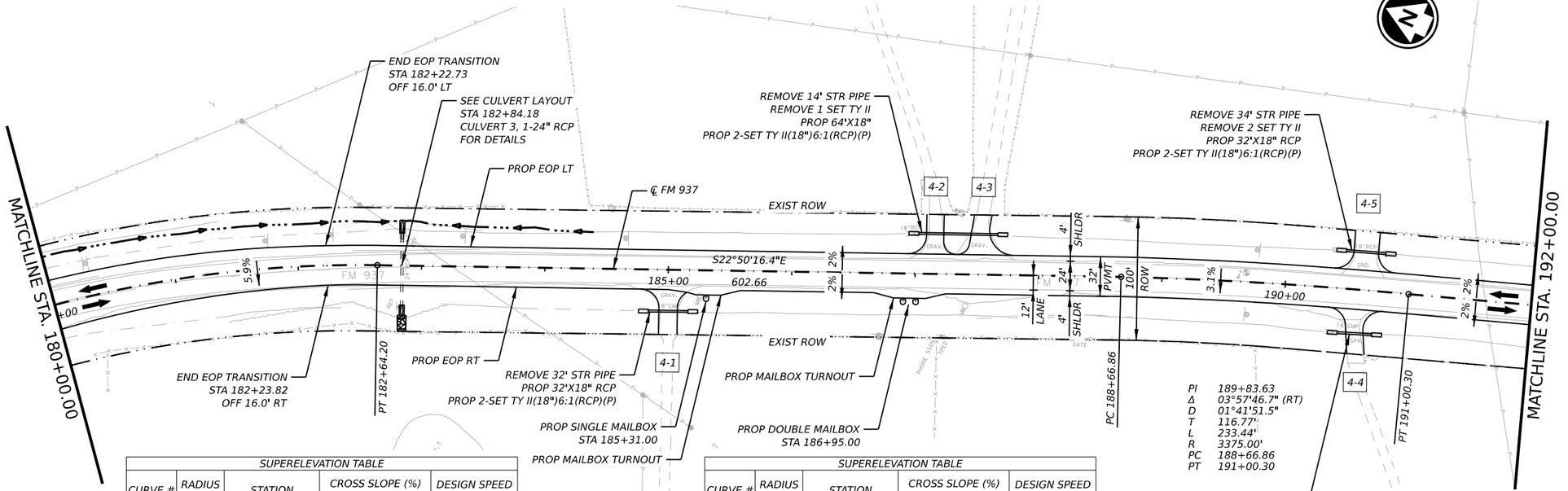

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
2	954.93	173+49.69	-2	-2	50
		174+93.69	2	-2	
		176+34.09	5.9	-5.9	
		181+93.10	5.9	-5.9	
		183+33.50	2	-2	
		184+77.50	-2	-2	

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
3	3375	187+81.18	-2	-2	50
		188+77.18	2	-2	
		189+03.58	3.1	-3.1	
		190+63.58	3.1	-3.1	
		190+89.98	2	-2	
		191+85.95	-2	-2	

NOTES

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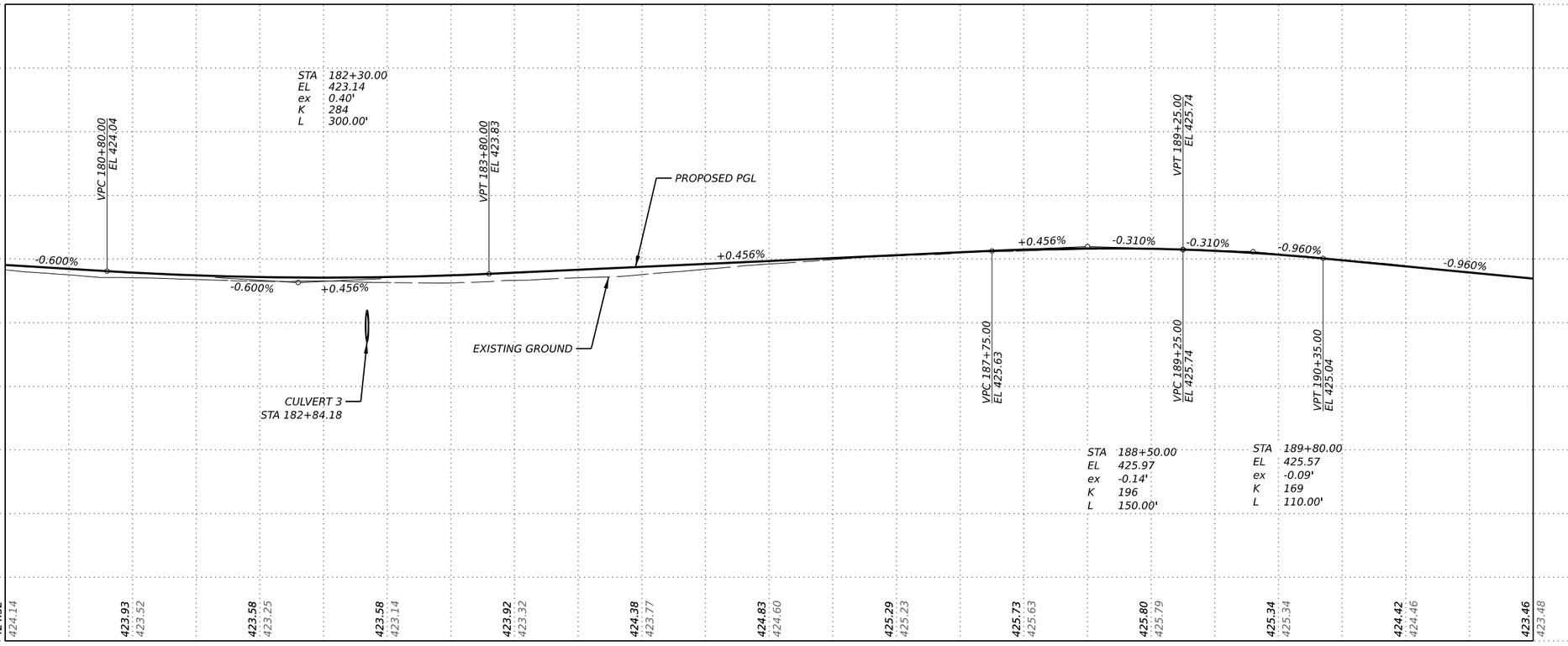
0 50 100

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



6/21/2023

STATE OF TEXAS
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ROADWAY PLAN & PROFILE

(STA 180+00 TO STA 192+00)

SHEET 4 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		75

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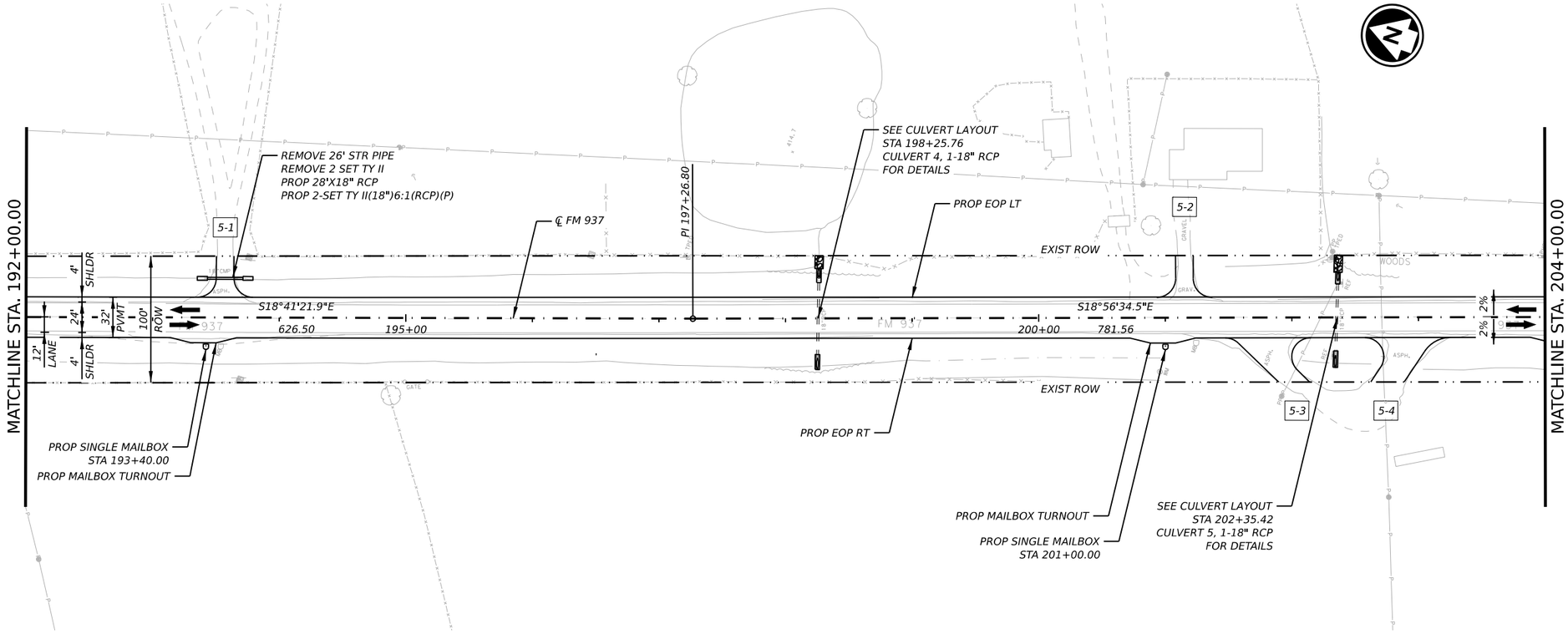

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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0 50 100

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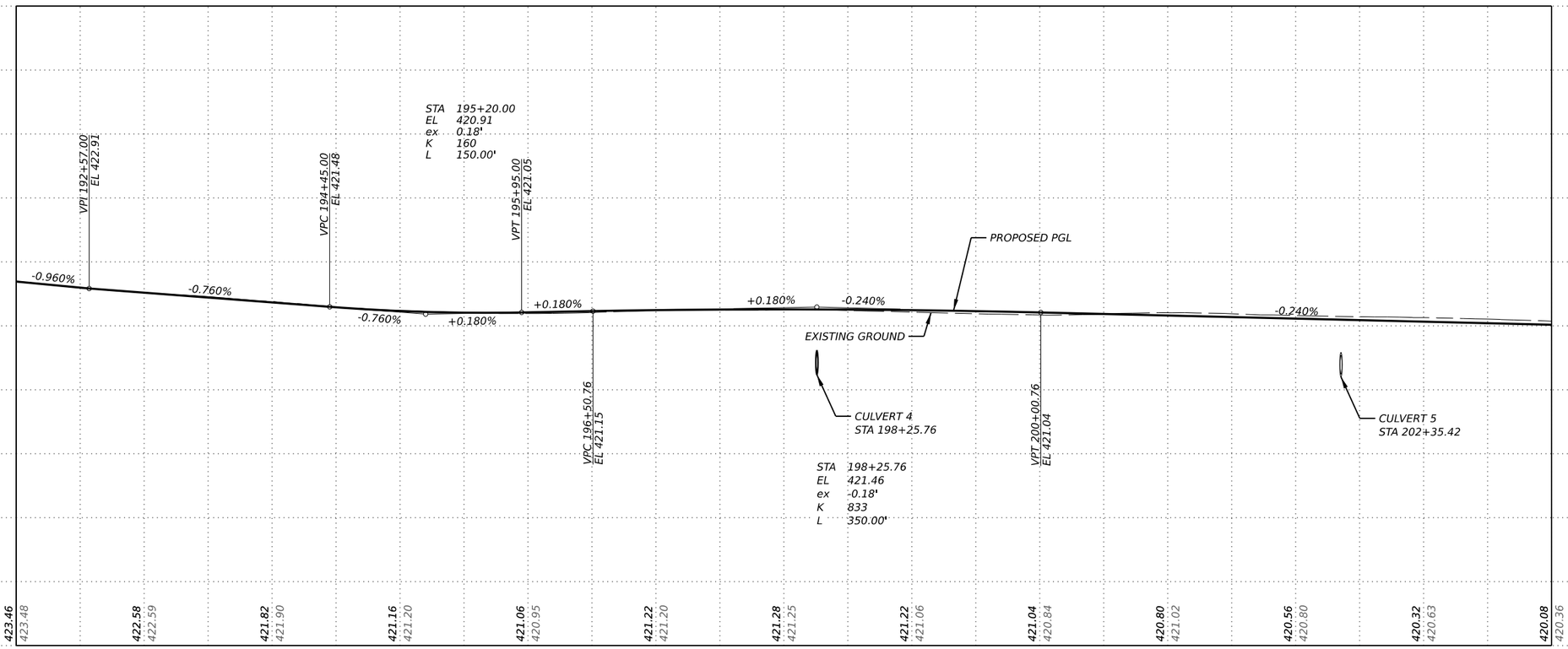

5/26/2023

STATE OF TEXAS
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FM 937

ROADWAY PLAN & PROFILE

(STA 192+00 TO STA 204+00)

SHEET 5 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		76

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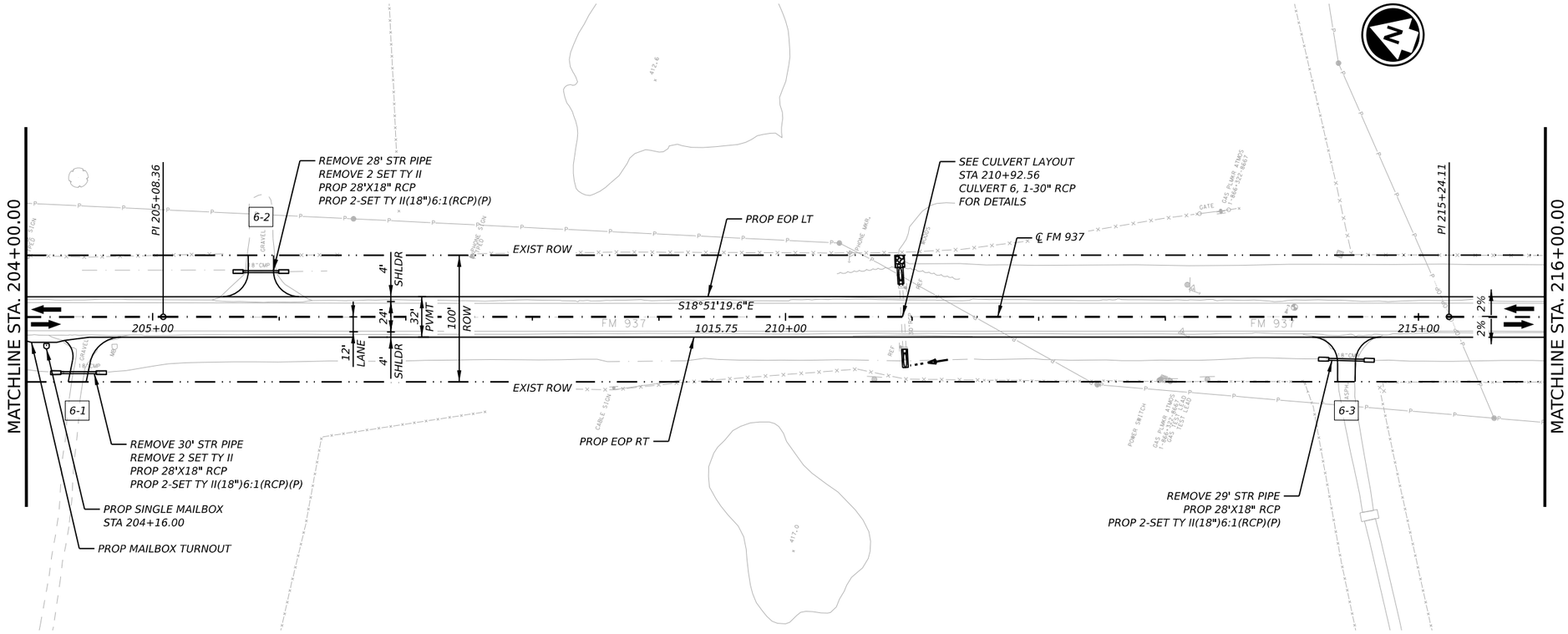

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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0 50 100

SCALE: 1" = 100' H
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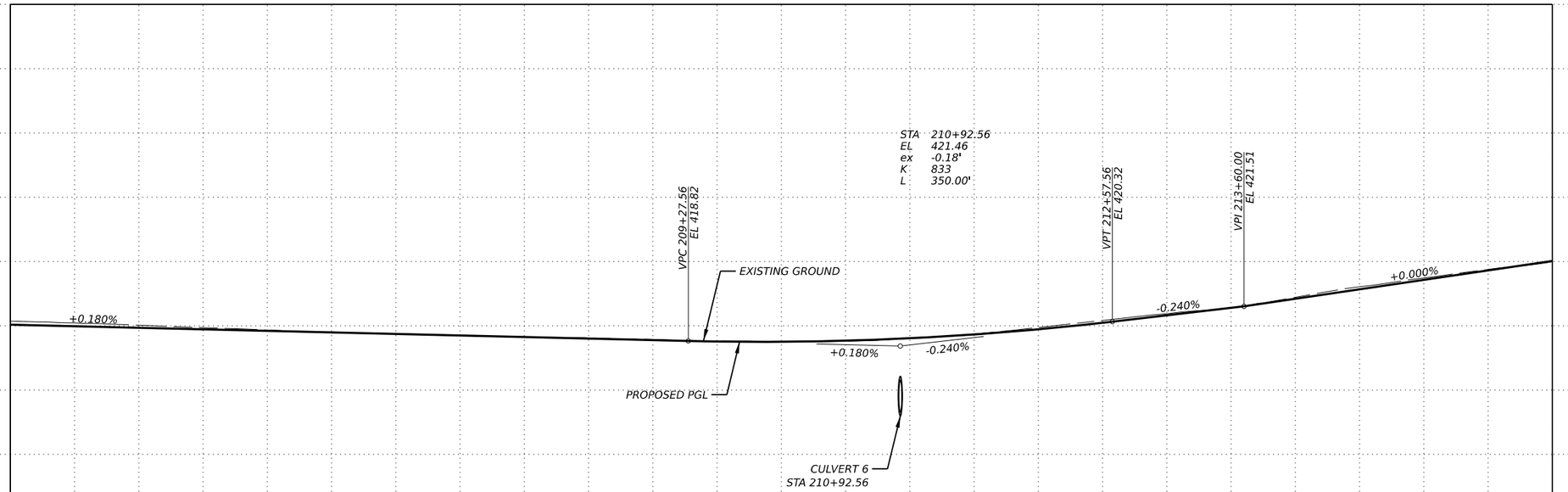

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FM 937

ROADWAY PLAN & PROFILE

(STA 204+00 TO STA 216+00)

SHEET 6 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		77

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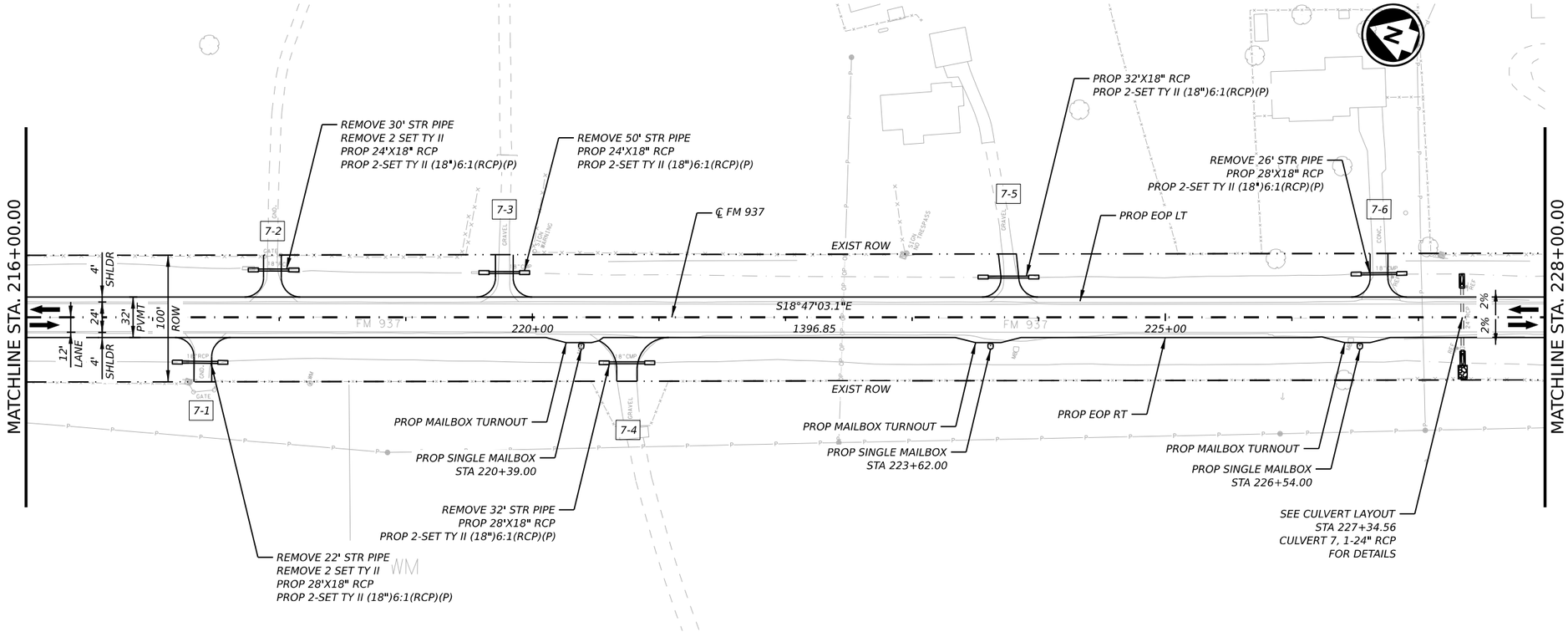


LEGEND

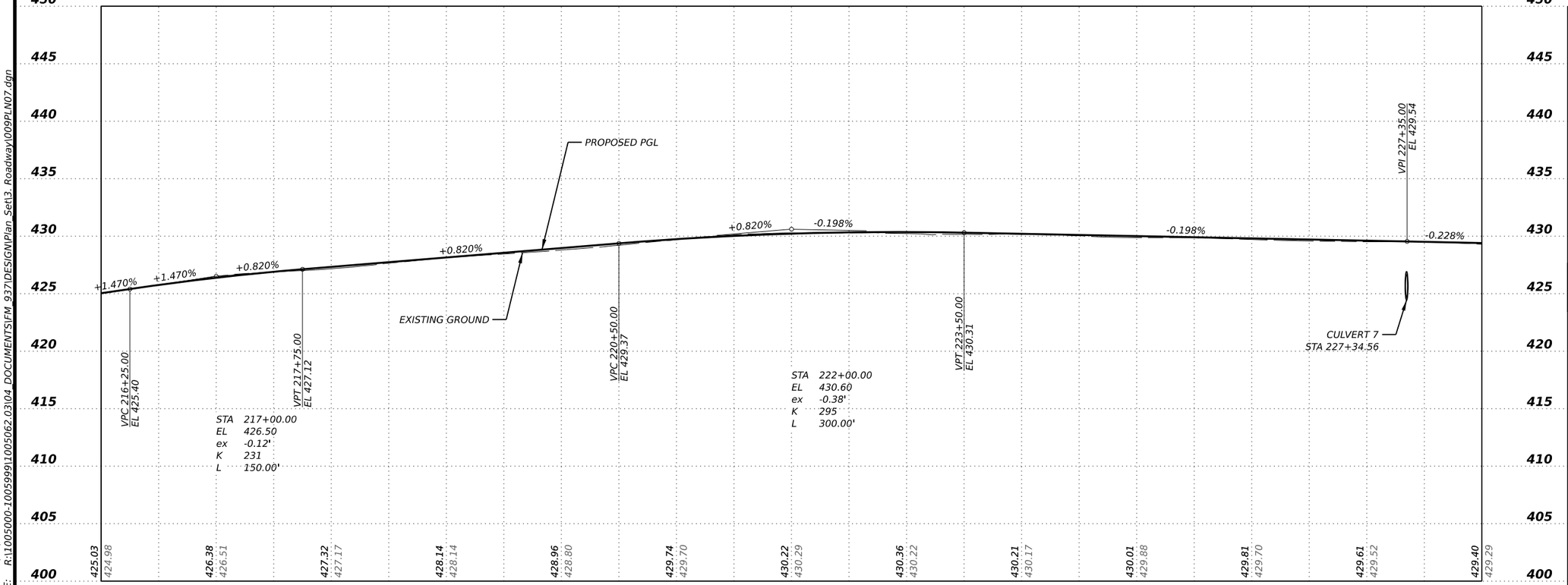
- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA AND SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCHMARK DATA.
2. REFER TO TYPICAL SECTIONS FOR MORE INFORMATION.
3. REPLACE EXIST MAILBOXES. SEE MAILBOX TURNOUT STANDARD FOR LOCATION AND DIMENSIONS OF TURNOUT AND MAILBOXES.
4. PROFILE GRADE IS APPROXIMATE AND IS INTENDED TO MATCH THE EXISTING ROADWAY.
5. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.
6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

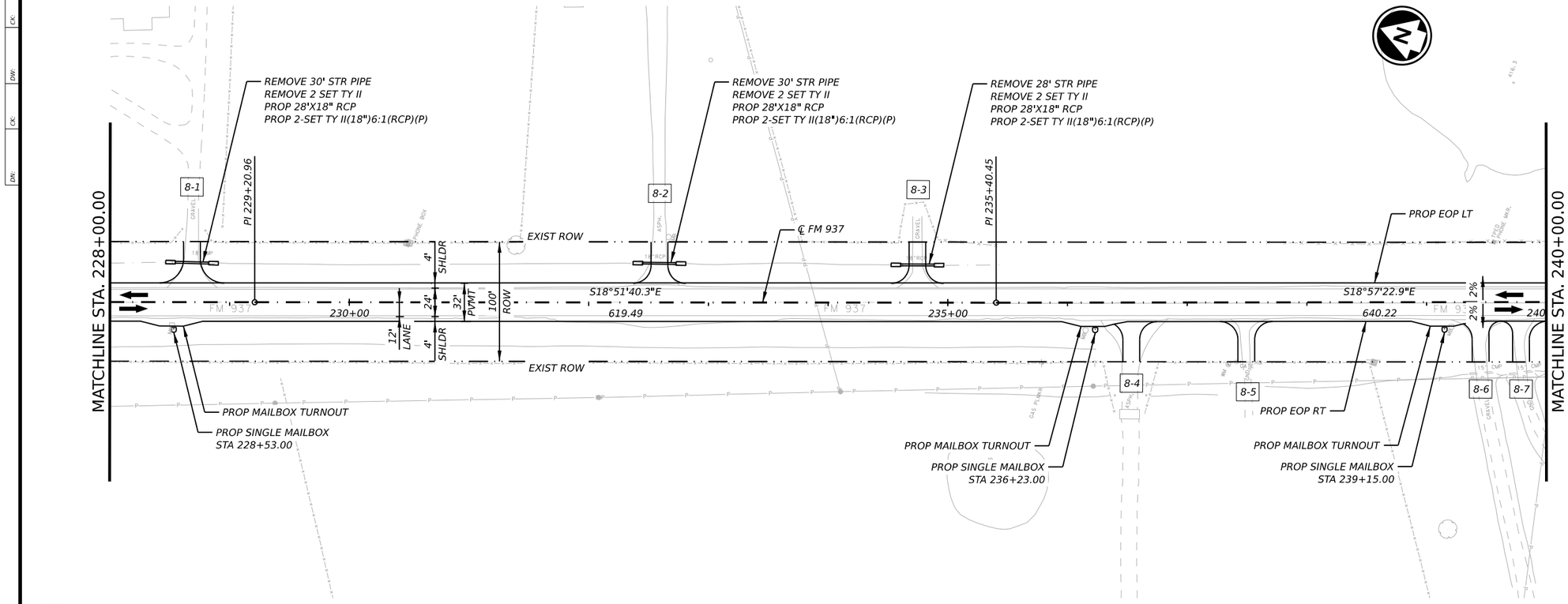
ROADWAY PLAN & PROFILE

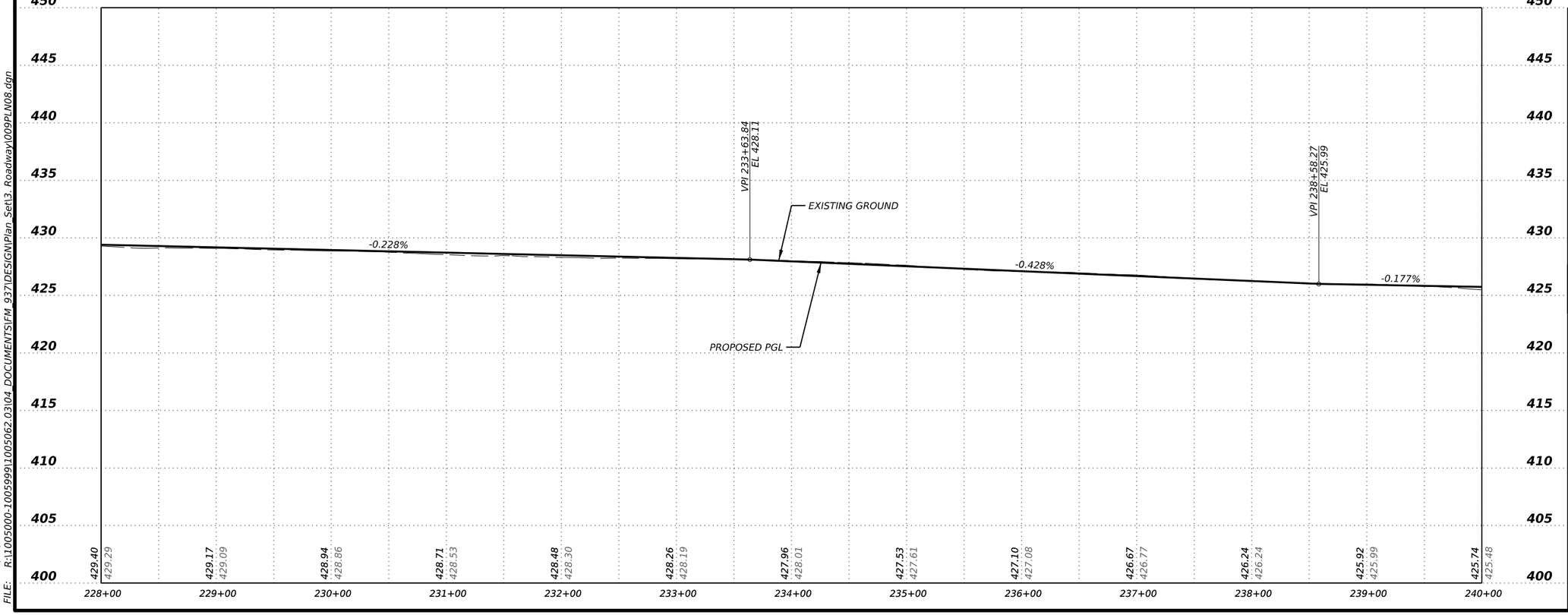
(STA 216+00 TO STA 228+00)

SHEET 7 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		78

DATE: 5/26/2023 9:54:46 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009PLN07.dgn





LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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0 50 100

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

5/26/2023

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FM 937

ROADWAY PLAN & PROFILE

(STA 228+00 TO STA 240+00)

SHEET 8 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		79

DATE: 5/26/2023 9:54:46 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009PLN08.dgn

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
4	1800	242+36.83	-2	-2	50
		243+32.83	-2	2	
		243+95.23	-4.6	4.6	
		247+02.46	-4.6	4.6	
		247+64.86	-2	2	
		248+60.86	-2	-2	

(+) ℄ (+)
(-) (-)

PI 245+49.69
Δ 12°48'15.7" (LT)
D 03°10'59.2"
T 201.97'
L 402.26'
R 1800.00'
PC 243+47.72
PT 247+49.98

MATCHLINE STA. 240+00.00

MATCHLINE STA. 252+00.00

PI 241+80.66

PC 243+47.72

PT 247+49.98

PROP EOP LT

℄ FM 937

EXIST ROW

S19°09'13.8"E
167.05

240+00

245+00

250+00

FM 937

4.6%

4' SHLDR

24' PVMT

32'

100' ROW

12' LANE

4' SHLDR

EXIST ROW

S31°57'29.5"E
603.28

2%

2%

SEE CULVERT LAYOUT
STA 250+70.03
CULVERT 9, 1-24" RCP
FOR DETAILS

REMOVE 26' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP SINGLE MAILBOX
STA 240+87.00

PROP MAILBOX TURNOUT

SEE CULVERT LAYOUT
STA 243+14.55
CULVERT 8, 2-24" RCP
FOR DETAILS

PROP EOP RT

REMOVE 46' STR PIPE
REMOVE 2 SET TY II
PROP 32'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP MAILBOX TURNOUT

PROP SINGLE MAILBOX
STA 248+27.00

REMOVE 22' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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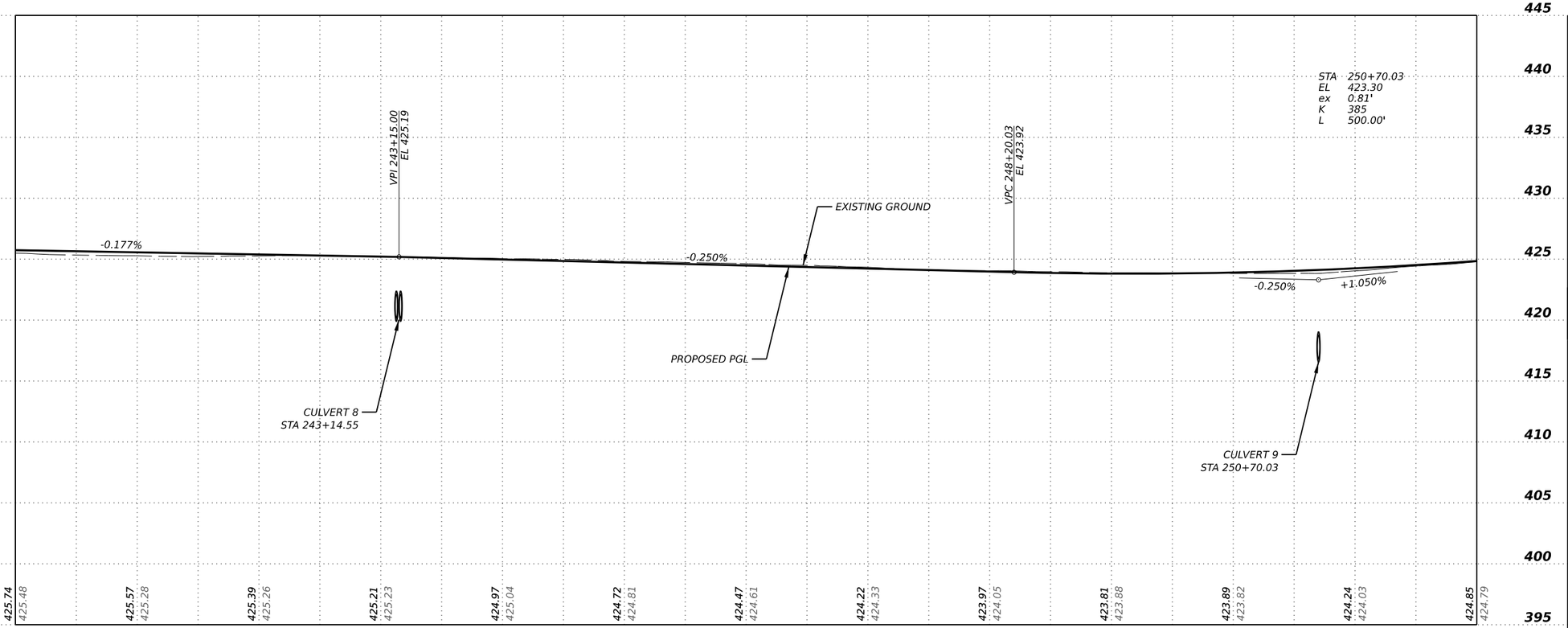
0 50 100
SCALE: 1" = 100' H
1" = 10' V



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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Texas Department of Transportation

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FM 937

ROADWAY PLAN & PROFILE

(STA 240+00 TO STA 252+00)

SHEET 9 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		80

DATE: 5/26/2023 9:54:47 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009PLN09.dgn

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
5	9430	261+13.69	-2	-2	50
		262+09.69	-2	2	
		266+81.68	-2	2	
		267+77.68	-2	-2	

(+) ℄ (+)
(-) (-)

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

MATCHLINE STA. 252+00.00

PI 253+53.26
PROP EOP LT
EXIST ROW
℄ FM 937
PC 261+80.89
S31°44'17.9"E
827.64
FM 937
255+00
260+00
2% 2%
2%
4' SHLDR
24' 12' LANE
32' PVMT
4' SHLDR
100' ROW
EXIST ROW
PROP EOP RT
PROP MAILBOX TURNOUT
PROP SINGLE MAILBOX
STA 255+13.00
10-1
10-2
10-3
REMOVE 26' STR PIPE
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)
REMOVE 30' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

MATCHLINE STA. 264+00.00

NOTES

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0 50 100
SCALE: 1" = 100' H
1" = 10' V

STA 252+60.02
EL 423.30
ex 0.81'
K 385
L 500.00'
VPT 253+20.03
EL 425.92
EXISTING GROUND
+1.050%
+1.050%
-0.602%
-0.602%
PROPOSED PGL
VPC 255+65.00
EL 428.49
VPT 257+15.00
EL 428.83
STA 256+40.00
EL 429.28
ex -0.31'
K 91
L 150.00'

424.85	425.72	426.76	427.81	428.79	428.91	428.32	427.72	427.11	426.51	425.91	425.31	424.71
424.79	425.85	427.01	428.02	428.80	428.87	428.21	427.82	427.16	426.72	425.97	425.31	424.94

450 445 440 435 430 425 420 415 410 405 400

252+00 253+00 254+00 255+00 256+00 257+00 258+00 259+00 260+00 261+00 262+00 263+00 264+00

5/26/2023

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Houston, Texas 77042
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FM 937

ROADWAY PLAN & PROFILE

(STA 252+00 TO STA 264+00)

SHEET 10 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		81

DATE: 5/26/2023 9:54:48 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan_Set\3. Roadway\009PLN10.dgn

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
5	9430	261+13.69	-2	-2	50
		262+09.69	-2	2	
		266+81.68	-2	2	
		267+77.68	-2	-2	

(+) ℄ (+)
(-) (-)

PI 264+45.75
Δ 03°13'03.7" (LT)
D 00°36'27.3"
T 264.86'
L 529.58'
R 9430.00'
PC 261+80.89
PT 267+10.48

MATCHLINE STA. 264+00.00

PT 267+10.48

EXIST ROW

℄ FM 937

PROP EOP RT

S34°57'21.6"E
831.53

265+00 270+00

2%

FM 937

EXIST ROW

11-1

PROP MAILBOX TURNOUT

PROP SINGLE MAILBOX
STA 264+74.00

REMOVE 30' STR PIPE
REMOVE 1 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP EOP LT

REMOVE 40' STR PIPE
PROP 40'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

DOGWOOD CREEK RD

℄ DOGWOOD CREEK RD

REMOVE 40' STR PIPE
PROP 40'X24" RCP
PROP 2-SET TY II(24")6:1(RCP)(P)

DOGWOOD CREEK RD

PI 275+42.01

4' SHLDR
24' 32' PVMT 100' ROW
4' SHLDR
12' LANE

275+00

2% 2%

11-2

MATCHLINE STA. 276+00.00

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA AND SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCHMARK DATA.
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0 50 100
SCALE: 1" = 100' H
1" = 10' V

445 440 435 430 425 420 415 410 405 400 395

-0.602%

EXISTING GROUND

PROPOSED PGL

264+00	265+00	266+00	267+00	268+00	269+00	270+00	271+00	272+00	273+00	274+00	275+00	276+00
424.71	424.10	423.50	422.90	422.30	421.69	421.09	420.49	419.89	419.29	418.68	418.08	417.48
424.94	424.56	423.73	423.14	422.68	421.99	421.40	420.85	420.25	419.57	419.00	418.45	417.59

5/26/2023

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Houston, Texas 77042
(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 264+00 TO STA 276+00)

SHEET 11 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		82

DATE: 5/26/2023 9:54:48 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009PLN11.dgn

CK: DW: CK: DW:

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
6	1830	282+98.28	-2	-2	50
		283+94.28	2	-2	
		284+54.28	4.5	-4.5	
		290+06.31	4.5	-4.5	
		290+66.31	2	-2	
		291+62.31	-2	-2	

(+) ℄ (+)
(-) (-)

MATCHLINE STA. 276+00.00

4' SHLDR
12' LANE
24' PVMT
4' SHLDR
32'
100' ROW
2%
2%

S34°49'23.8"E
865.47

FM 937
280+00

SEE CULVERT LAYOUT
STA 281+30.69
CULVERT 10, 1-36" RCP
FOR DETAILS

℄ FM 937
EXIST ROW
PROP EOP LT
EXIST ROW
PROP EOP RT

REMOVE 26' STR PIPE
REMOVE 2 SET TY II
PROP 24'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP MAILBOX TURNOUT
PROP SINGLE MAILBOX
STA 287+59.00

REMOVE 30' STR PIPE
REMOVE 2 SET TY II
PROP 24'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

12-1
12-2

PC 284+07.48

285+00

4.5%

MATCHLINE STA. 288+00.00

PI	287+33.68
Δ	20°12'49.9" (RT)
D	03°07'51.3"
T	326.20'
L	645.62'
R	1830.00'
PC	284+07.48
PT	290+53.10

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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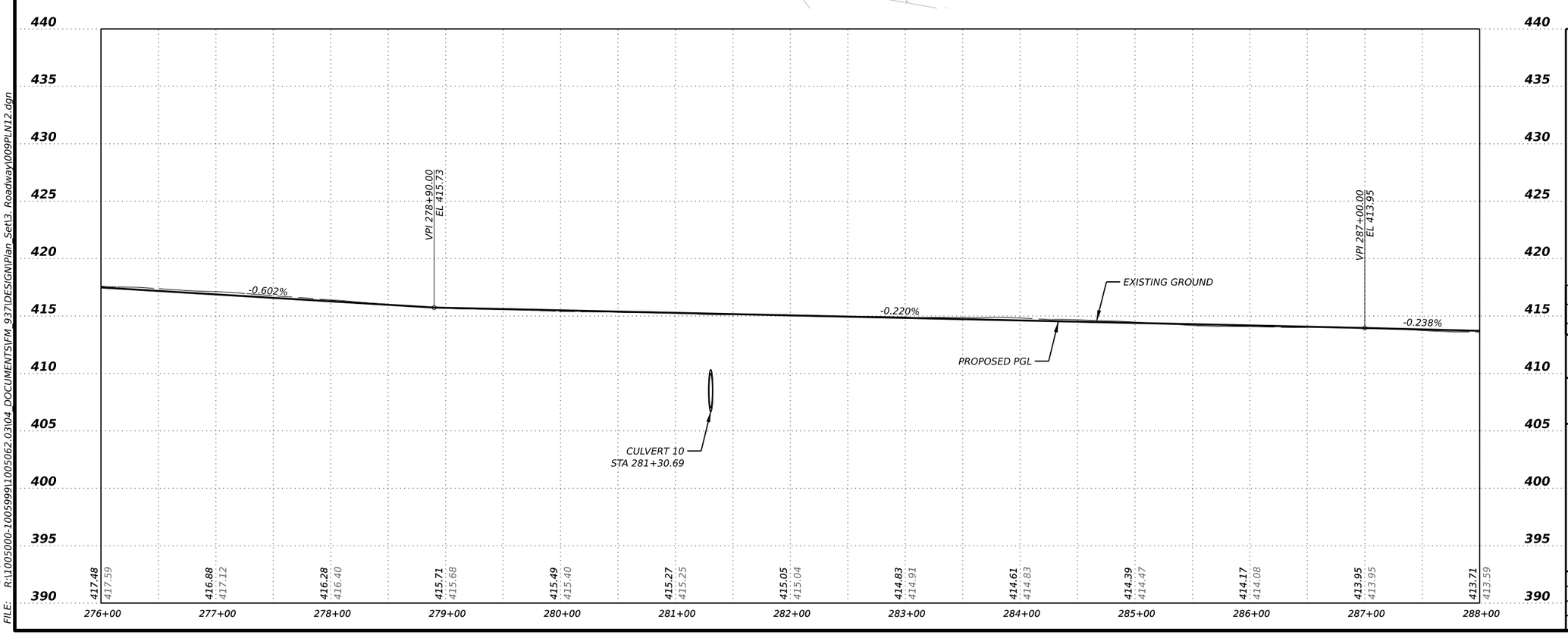
0 50 100
SCALE: 1" = 100' H
1" = 10' V



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STATE OF TEXAS
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FM 937

ROADWAY PLAN & PROFILE

(STA 276+00 TO STA 288+00)

SHEET 12 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		83

DATE: 5/26/2023 9:54:49 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan_Set\3. Roadway\009PLN12.dgn

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
6	1830	282+98.28	-2	-2	50
		283+94.28	2	-2	
		284+54.28	4.5	-4.5	
		290+06.31	4.5	-4.5	
		290+66.31	2	-2	
		291+62.31	-2	-2	

(+) ℄ (+)
(-) (-)

MATCHLINE STA. 288+00.00

4' SHLDR
12' LANE
24' 32' PVMT
4' SHLDR
100' ROW
4.5%
290+00
295+00
2% 2%
S14°36'33.9"E
1916.99
300

MATCHLINE STA. 300+00.00

REMOVE 26' STR PIPE
REMOVE 2 SET TY II
PROP 32'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP SINGLE MAILBOX
STA 291+30.00

PROP MAILBOX TURNOUT

℄ FM 937

EXIST ROW

PROP EOP LT

REMOVE 41' STR PIPE
REMOVE 2 SET TY II
PROP 24'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP SINGLE MAILBOX
STA 298+12.00

PROP MAILBOX TURNOUT

13-1 13-2 13-3 13-4

PT 290+53.10

REMOVE 22' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

REMOVE 30' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

EXIST ROW

PROP EOP RT

SEE CULVERT LAYOUT
STA 298+88.62
CULVERT 11, 1-30" RCP
FOR DETAILS

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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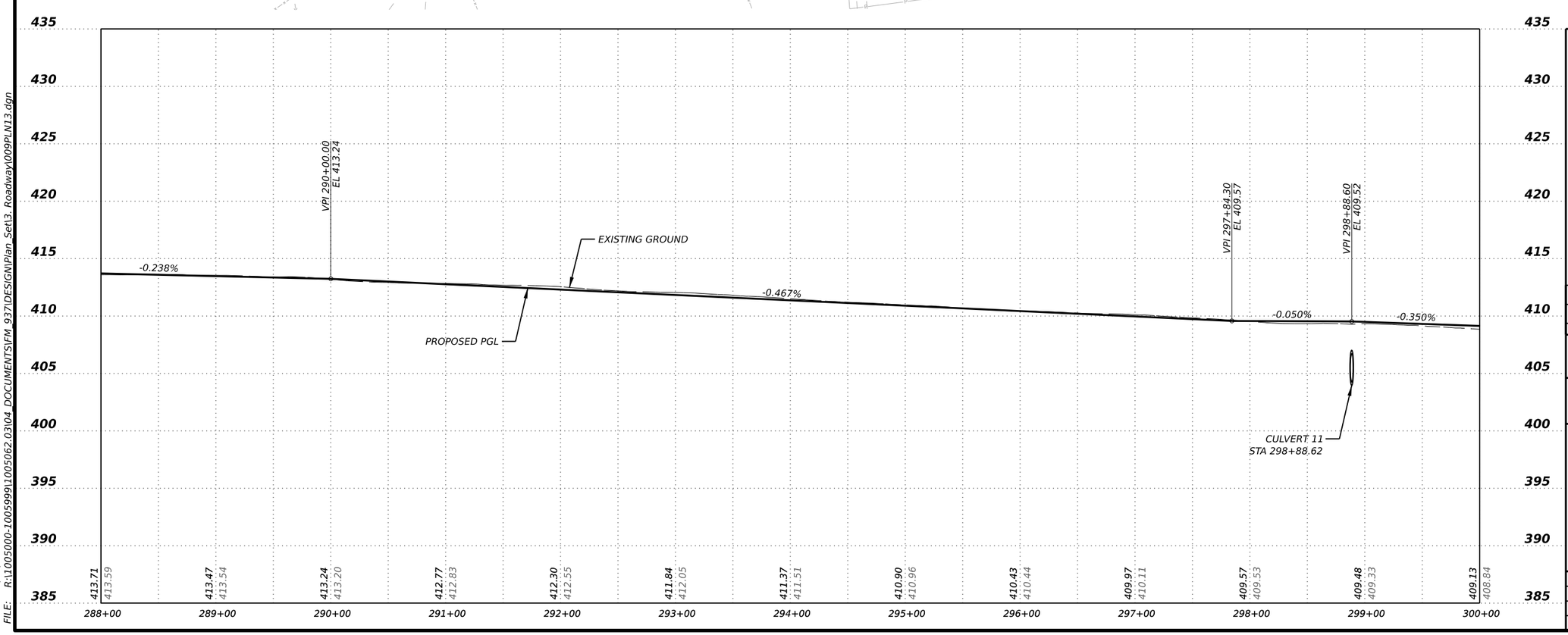
0 50 100
SCALE: 1" = 100' H
1" = 10' V



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FM 937

ROADWAY PLAN & PROFILE

(STA 288+00 TO STA 300+00)

SHEET 13 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		84

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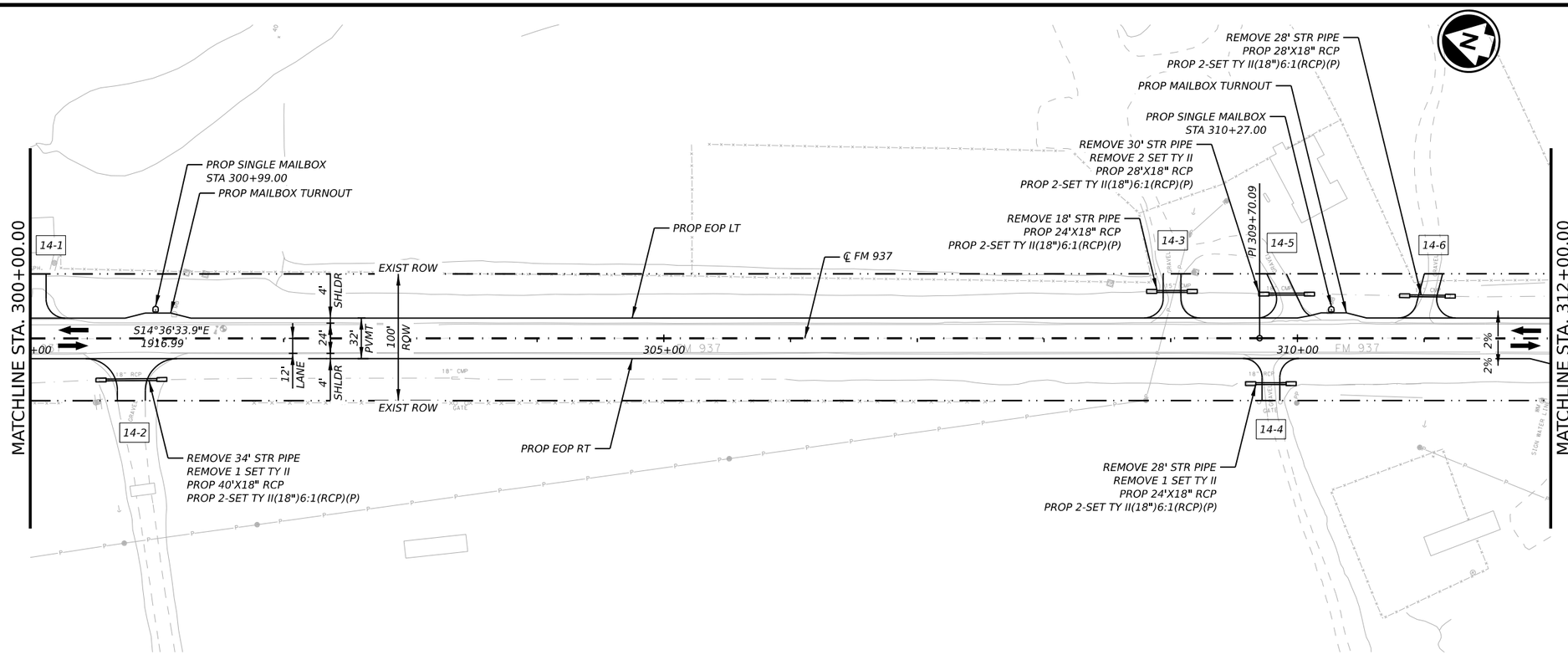


LEGEND

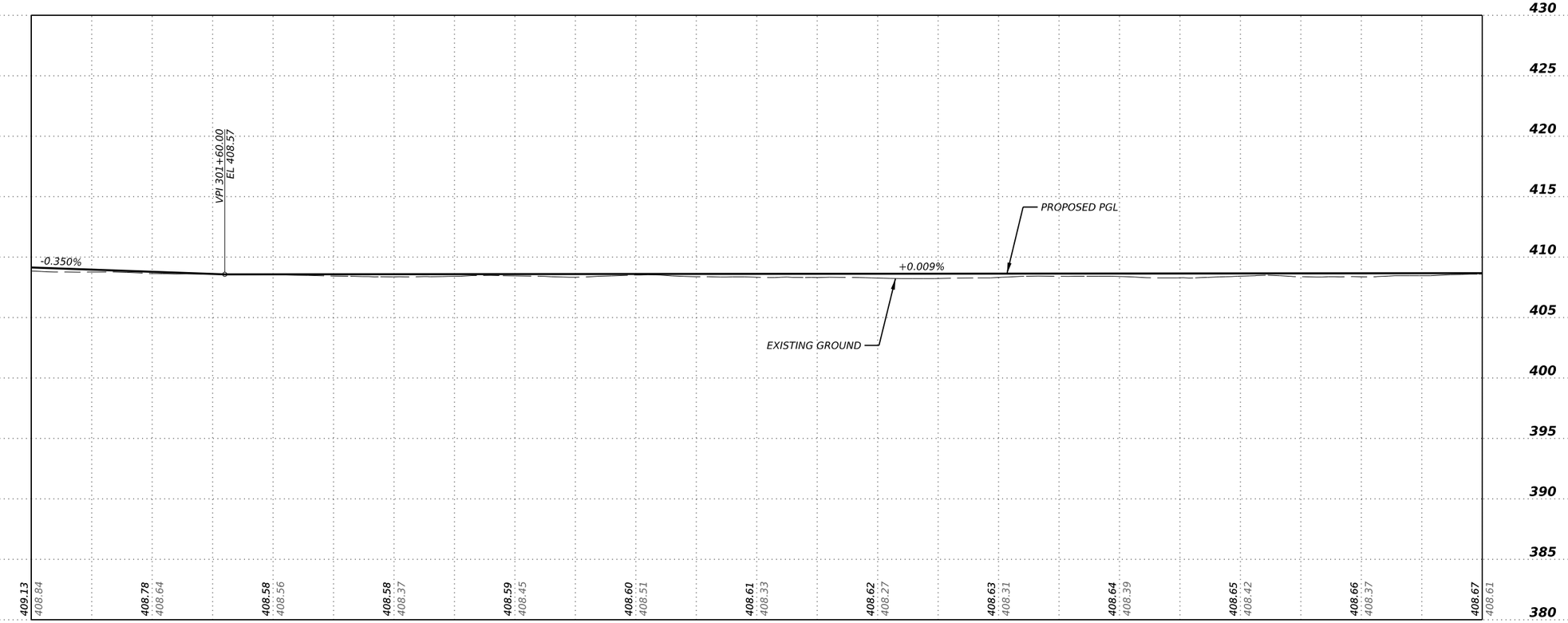
- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA AND SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCHMARK DATA.
2. REFER TO TYPICAL SECTIONS FOR MORE INFORMATION.
3. REPLACE EXIST MAILBOXES. SEE MAILBOX TURNOUT STANDARD FOR LOCATION AND DIMENSIONS OF TURNOUT AND MAILBOXES.
4. PROFILE GRADE IS APPROXIMATE AND IS INTENDED TO MATCH THE EXISTING ROADWAY.
5. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.
6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 300+00 TO STA 312+00)

SHEET 14 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		85

DATE: 5/26/2023 9:54:50 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009PLN14.dgn

CK:
DW:
CK:
DW:

REMOVE 22' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP MAILBOX TURNOUT

PROP SINGLE MAILBOX
STA 315+68.19

SEE CULVERT LAYOUT
STA 316+90.16
CULVERT 12, 1-30" RCP
FOR DETAILS

15-2

EXIST ROW

4' SHLDR
24' 32' PVMT 100' ROW
12' LANE
4' SHLDR

PI 319+21.67

℄ FM 937

PROP EOP LT

MATCHLINE STA. 312+00.00

S14°33'53.3"E
951.58
315+00
FM 937

320+00
FM 937
S14°45'18.4"E
703.33

2% 2%
2% 2%

PROP MAILBOX TURNOUT

15-1

PROP SINGLE MAILBOX
STA 312+11.50

EXIST ROW

REMOVE 46' STR PIPE
REMOVE 2 SET TY II
PROP 32'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

15-3

PROP EOP RT

MATCHLINE STA. 324+00.00

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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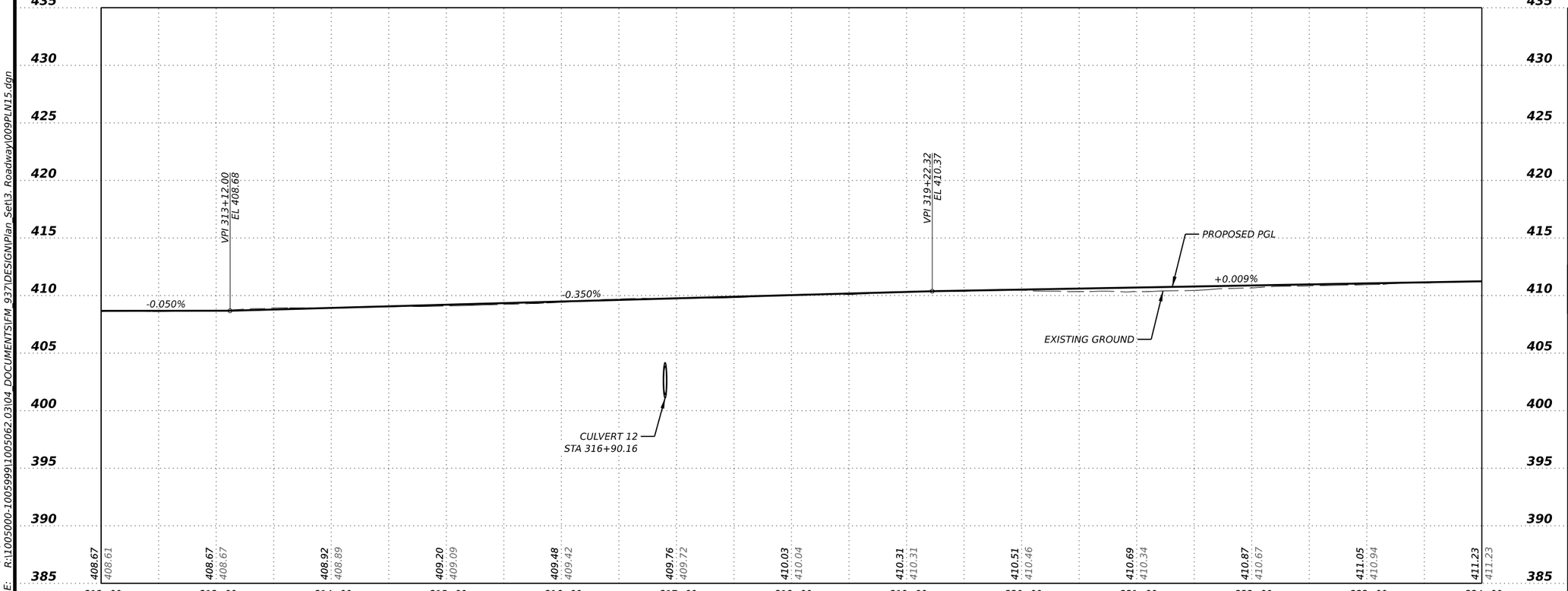
0 50 100
SCALE: 1" = 100' H
1" = 10' V



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

ROADWAY PLAN & PROFILE

(STA 312+00 TO STA 324+00)

SHEET 15 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		86

DATE: 5/26/2023 9:54:51 AM
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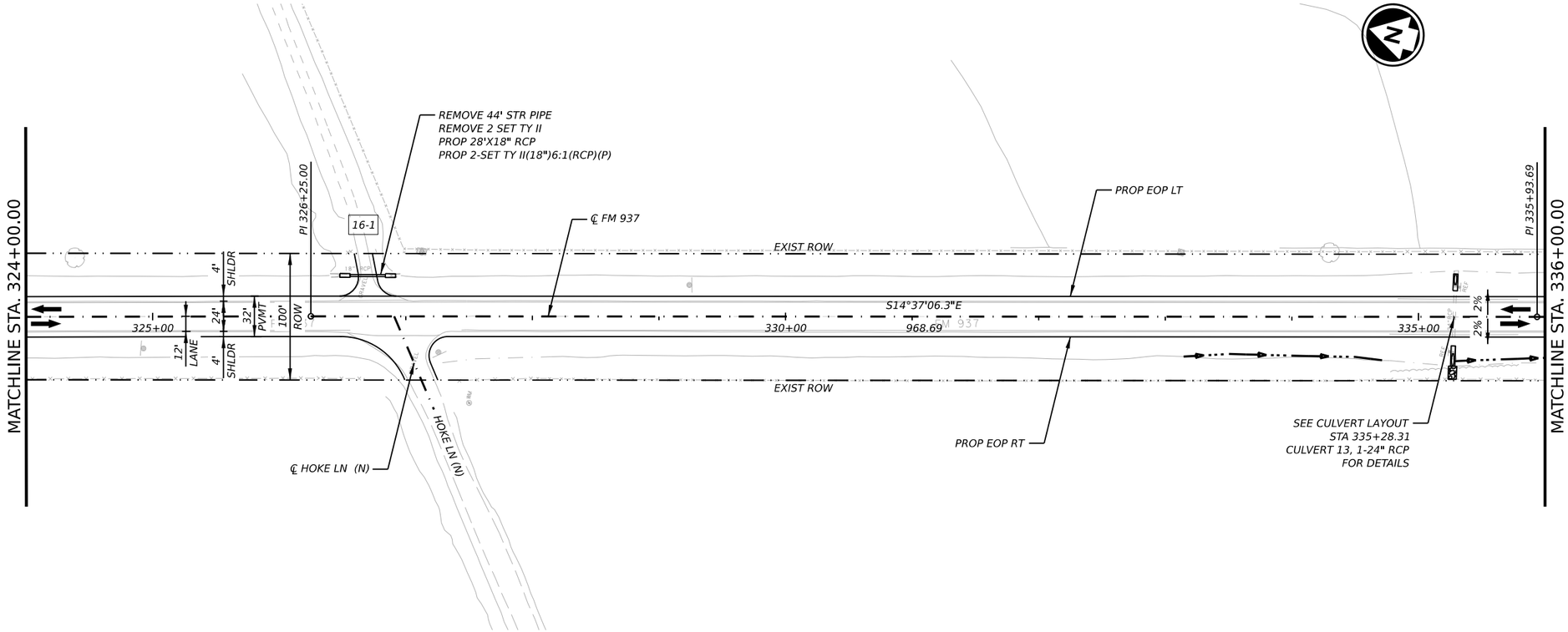

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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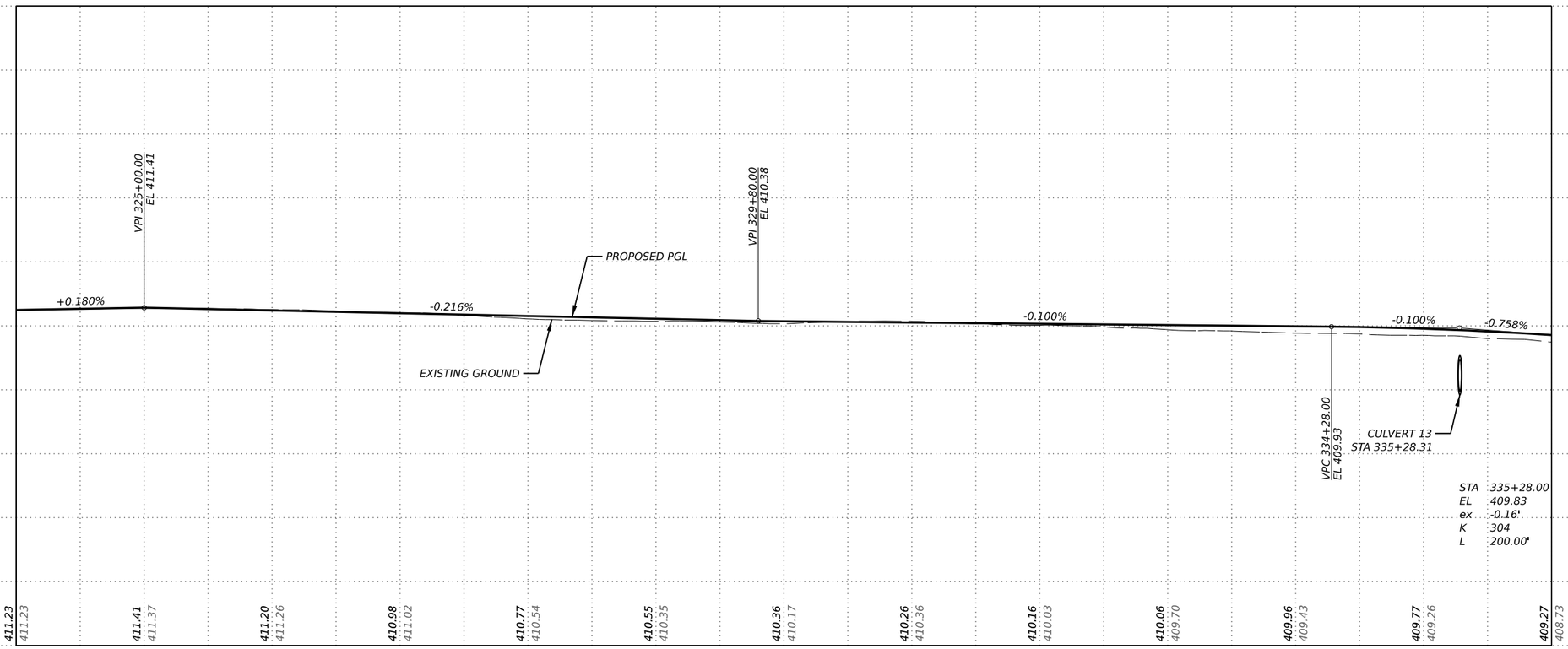
1" = 10' V



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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Houston, Texas 77042
(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 324+00 TO STA 336+00)

SHEET 16 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		87

DATE: 5/26/2023 9:54:52 AM
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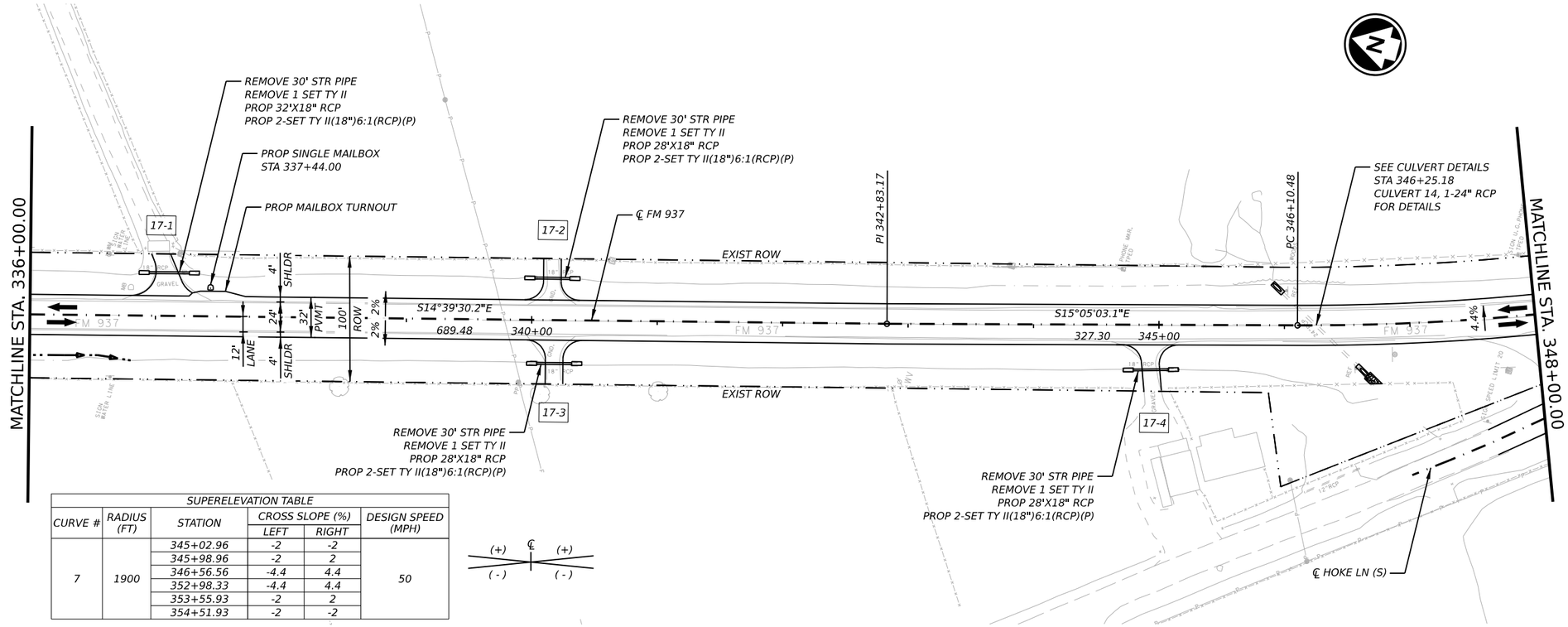

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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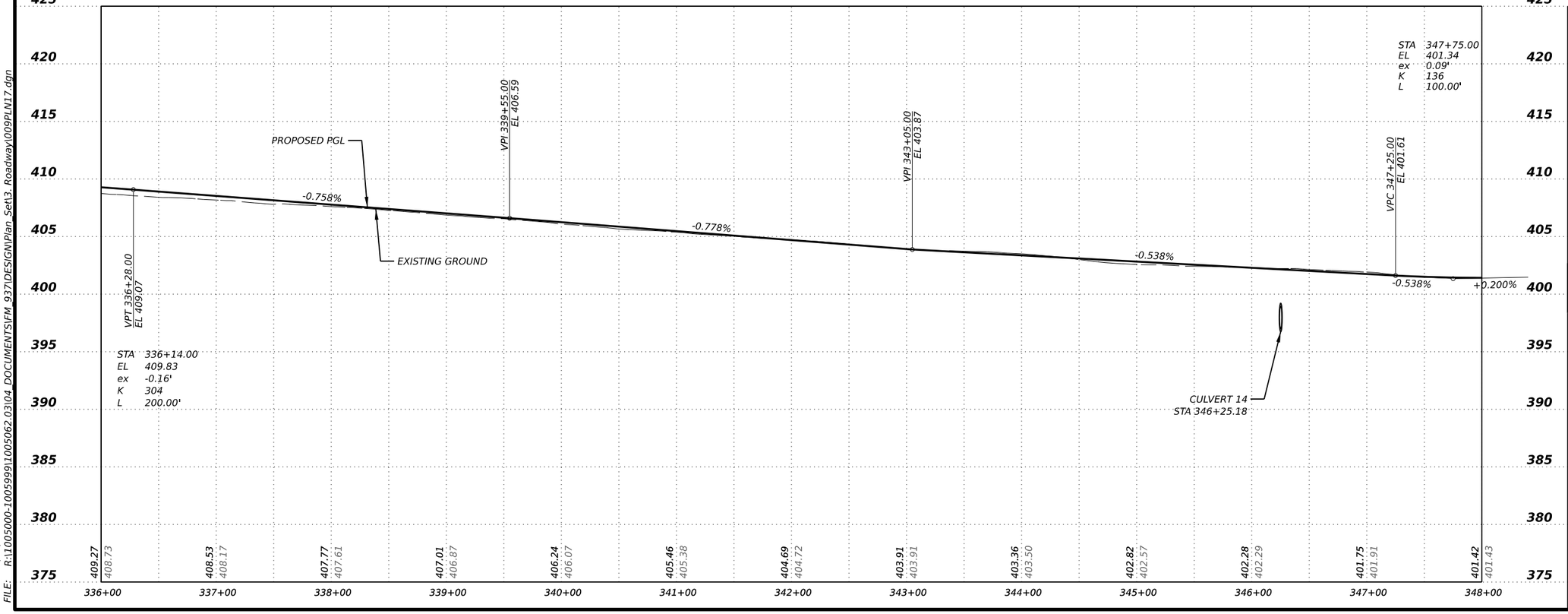
0 50 100

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

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%) LEFT	CROSS SLOPE (%) RIGHT	DESIGN SPEED (MPH)
7	1900	345+02.96	-2	-2	50
		345+98.96	-2	2	
		346+56.56	-4.4	4.4	
		352+98.33	-4.4	4.4	
		353+55.93	-2	2	
		354+51.93	-2	-2	

(+) ℄ (+)
(-) (-)



5/26/2023

STATE OF TEXAS
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FM 937

ROADWAY PLAN & PROFILE

(STA 336+00 TO STA 348+00)

SHEET 17 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		88

DATE: 5/26/2023 9:54:52 AM
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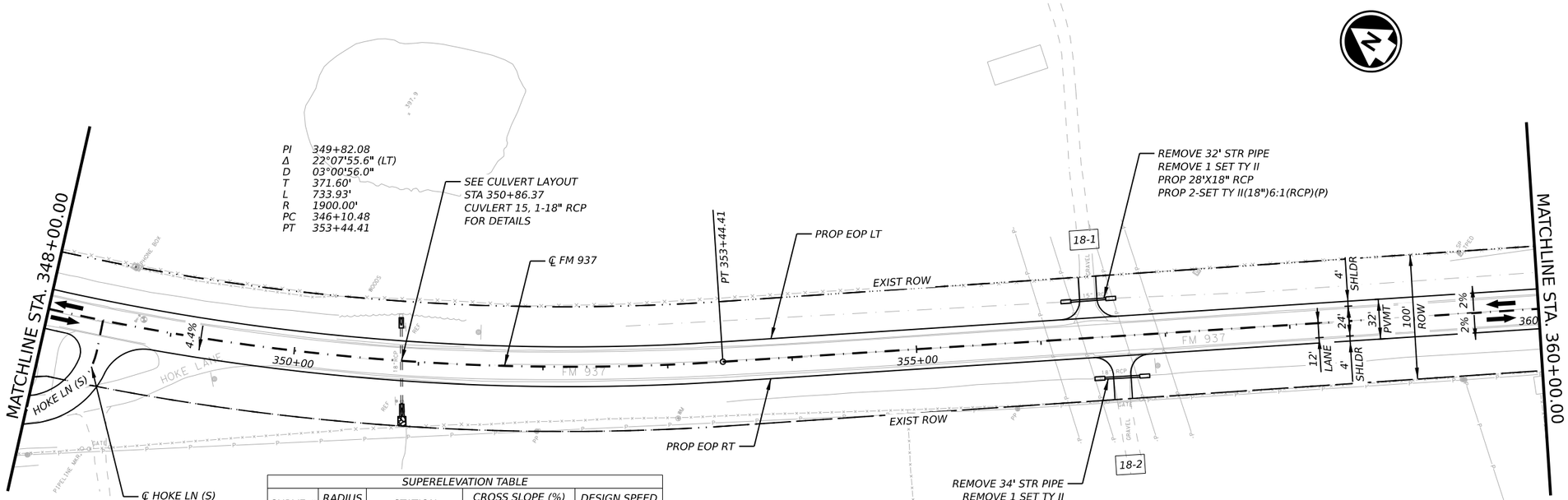

SUPERELEVATION TABLE					
CURVE #	RADIUS (FT)	STATION	CROSS SLOPE (%)		DESIGN SPEED (MPH)
			LEFT	RIGHT	
7	1900	345+02.96	-2	-2	50
		345+98.96	-2	2	
		346+56.56	-4.4	4.4	
		352+98.33	-4.4	4.4	
		353+55.93	-2	2	
		354+51.93	-2	-2	

(+) ℄ (+)
(-) (-)

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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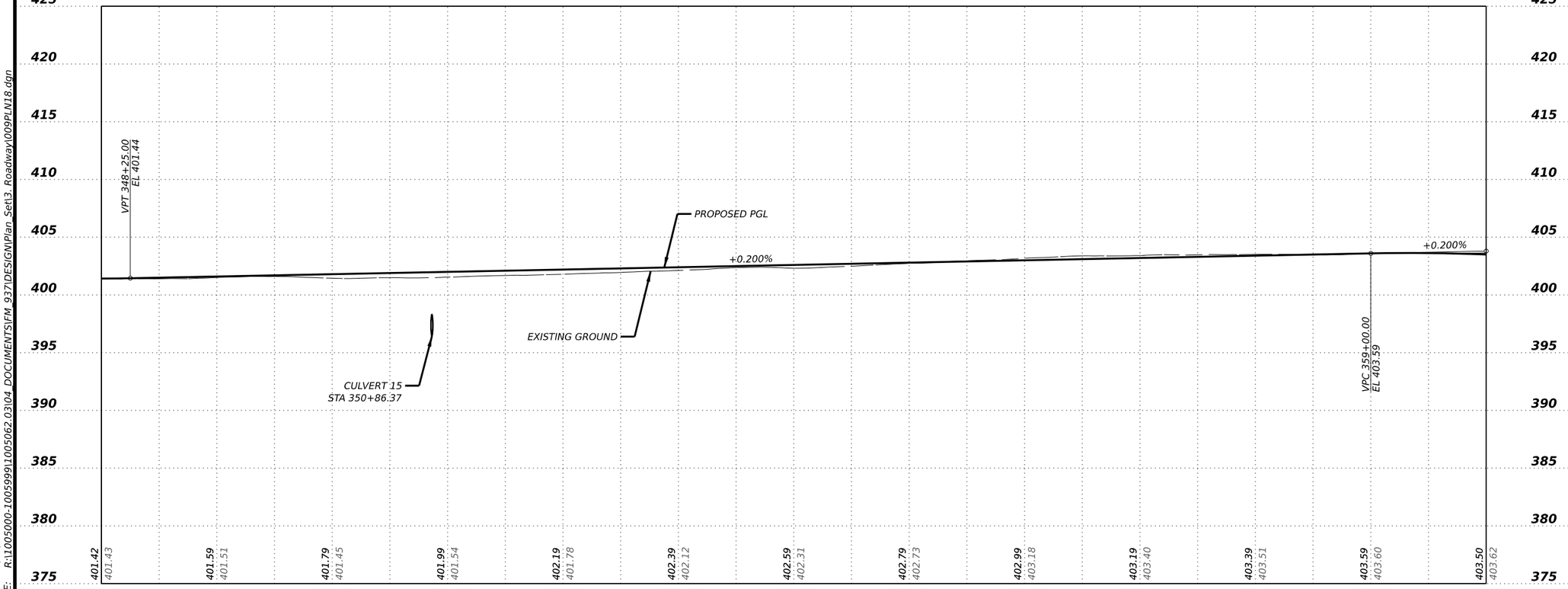

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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FM 937

ROADWAY PLAN & PROFILE

(STA 348+00 TO STA 360+00)

SHEET 18 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		89

DATE: 5/26/2023 9:54:53 AM
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CK:
DW:
CK:
DN:

MATCHLINE STA. 360+00.00

MATCHLINE STA. 372+00.00

EXIST ROW

℄ FM 937

S37°12'58.7"E

FM 937 1809.50

365+00

370+00

EXIST ROW

19-1

19-2

19-3

REMOVE 29' STR PIPE
REMOVE 2 SET TY II
PROP 28'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

REMOVE 30' STR PIPE
REMOVE 2 SET TY II
PROP 36'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

REMOVE 32' STR PIPE
REMOVE 2 SET TY II
PROP 24'X18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)

PROP EOP LT

PROP EOP RT

PI 371+53.91

4" SHLDR
24'
32' PVMT
100' ROW
2% 2%
12' LANE
4" SHLDR

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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0 50 100

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

425 420 415 410 405 400 395 390 385 380 375

STA 360+00.00
EL 403.79
ex -0.30'
K 167
L 200.00'

VPT 361+00.00
EL 402.80

VPI 364+00.00
EL 399.82

VPC 365+85.00
EL 398.58

VPT 366+85.00
EL 398.20

STA 366+35.00
EL 398.24
ex 0.07'
K 169
L 100.00'

-0.994%
-0.994%
-0.670%
-0.670%
-0.080%
-0.080%

PROPOSED PGL

EXISTING GROUND

403.50 403.62
402.80 403.11
401.81 402.23
400.81 401.03
399.82 399.85
399.15 399.03
398.48 398.54
398.19 398.16
398.11 398.12
398.03 397.80
397.95 397.83
397.87 397.90
397.79 397.87

360+00 361+00 362+00 363+00 364+00 365+00 366+00 367+00 368+00 369+00 370+00 371+00 372+00

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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Texas Department of Transportation

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TBPE REG. NO. F-2742

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Houston, Texas 77042
(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 360+00 TO STA 372+00)

SHEET 19 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		90

DATE: 5/26/2023 9:54:54 AM
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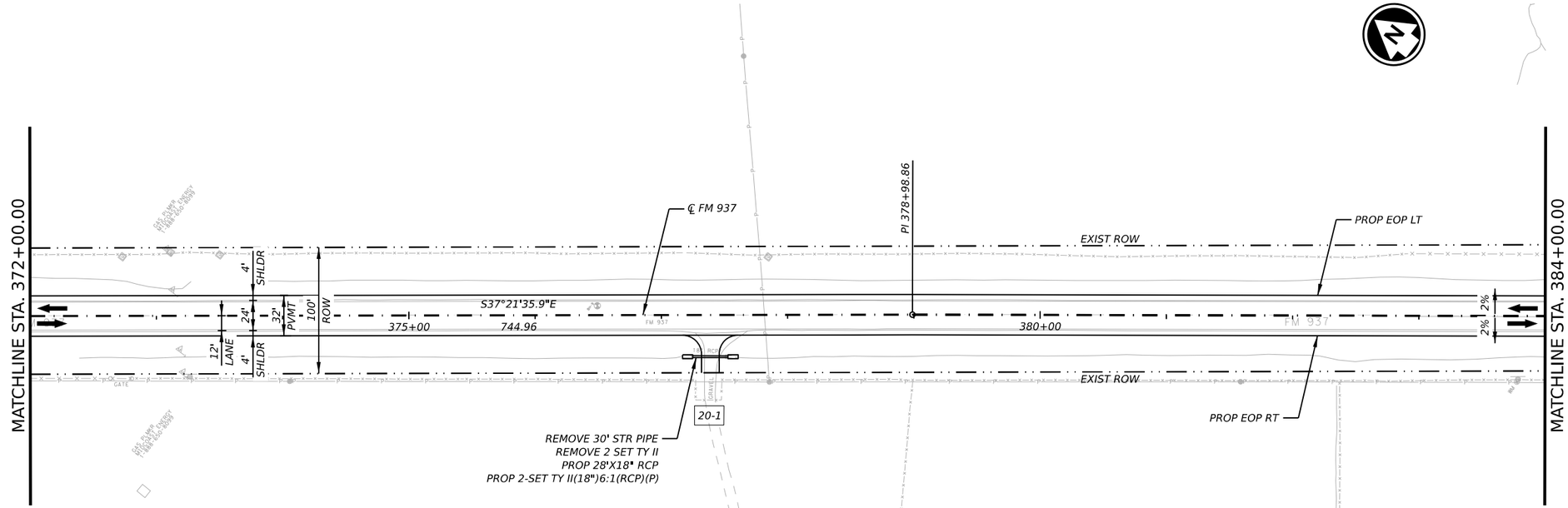

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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0 50 100

SCALE: 1" = 100' H
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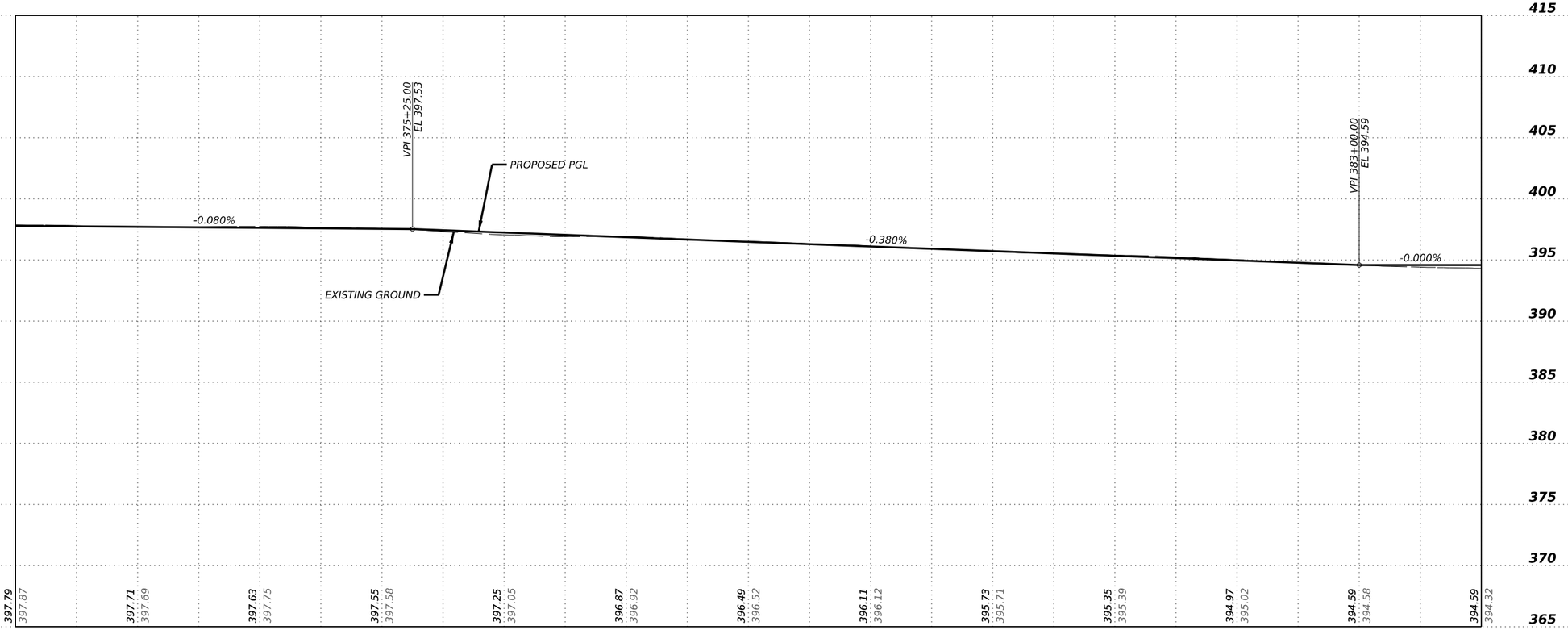

5/26/2023

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FM 937

ROADWAY PLAN & PROFILE

(STA 372+00 TO STA 384+00)

SHEET 20 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		91

DATE: 5/26/2023 9:54:54 AM
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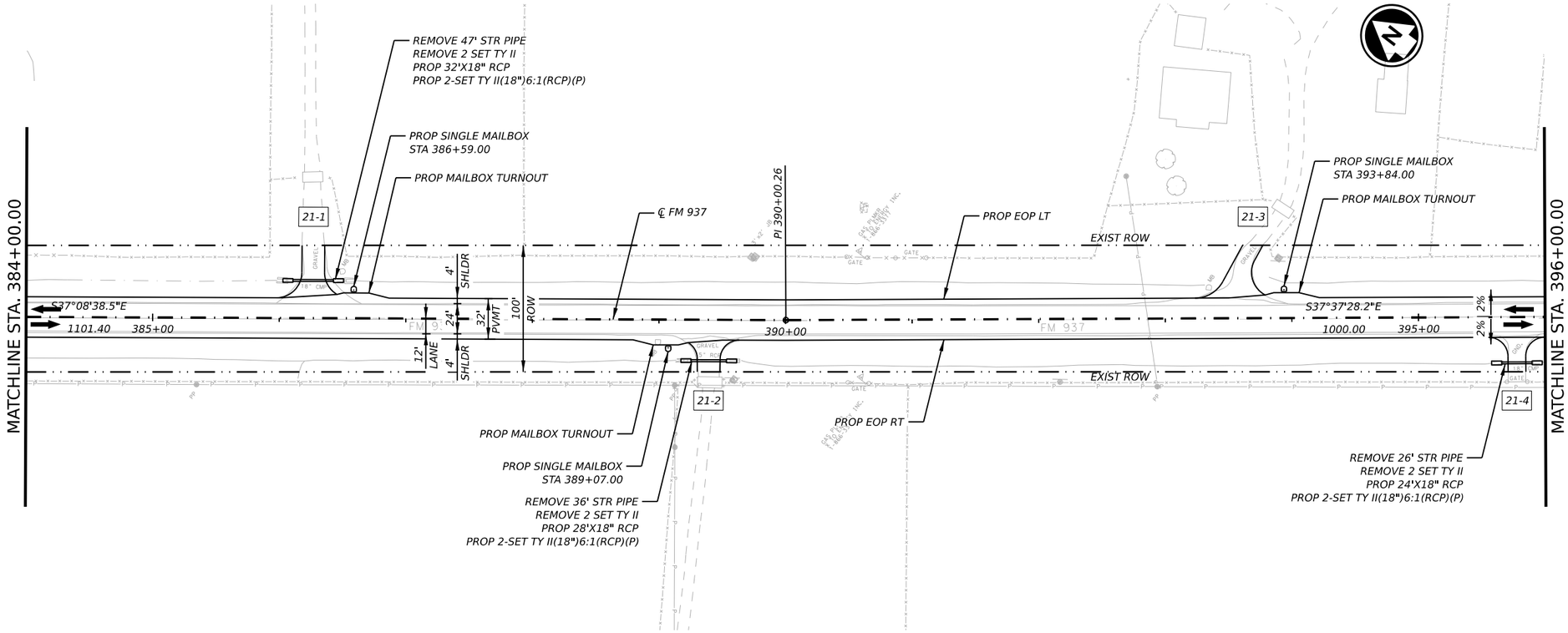

LEGEND

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- PROPOSED DITCH FLOW
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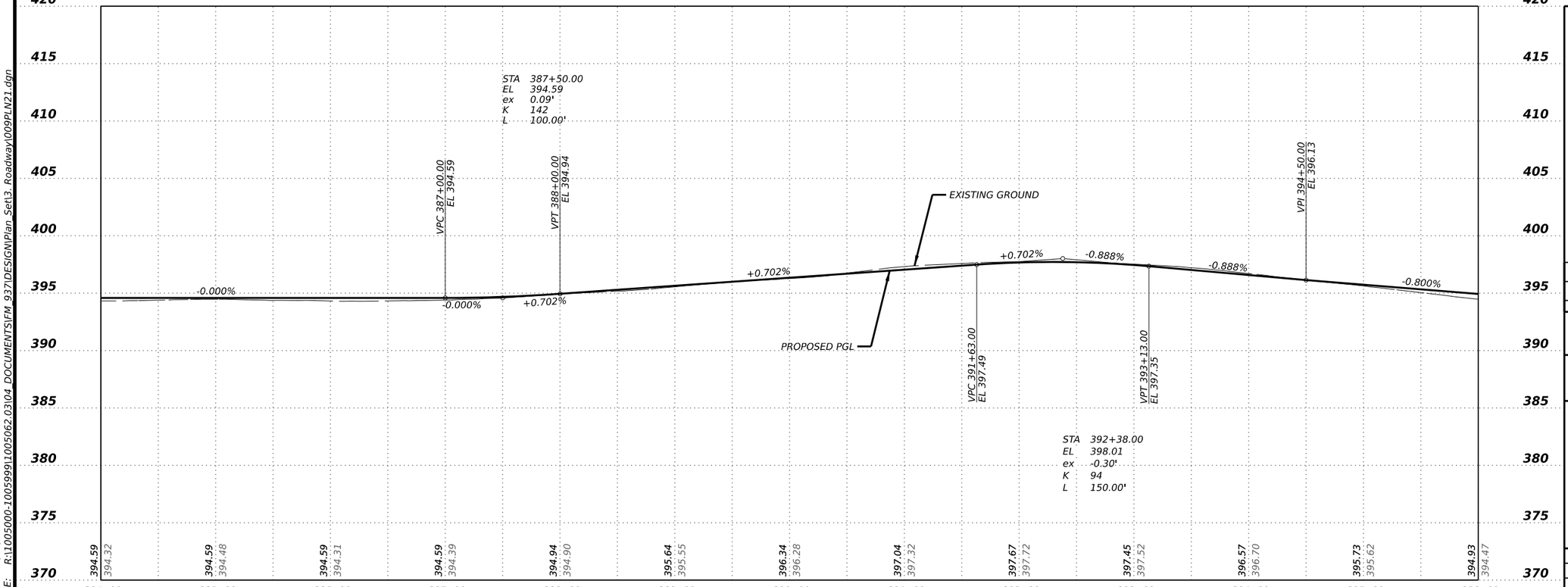
SCALE: 1" = 100' H
1" = 10' V



5/26/2023

STATE OF TEXAS
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FM 937

ROADWAY PLAN & PROFILE

(STA 384+00 TO STA 396+00)

SHEET 21 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		92

DATE: 5/26/2023 9:54:55 AM
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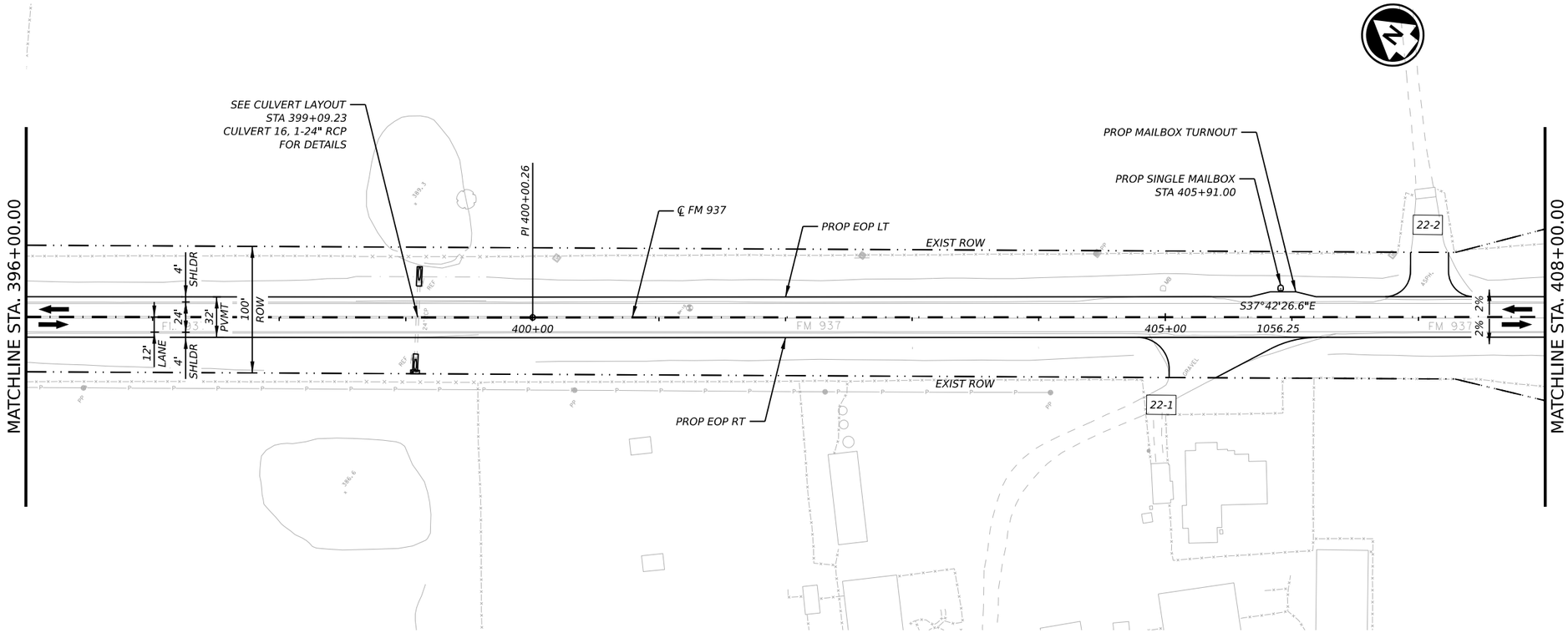

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

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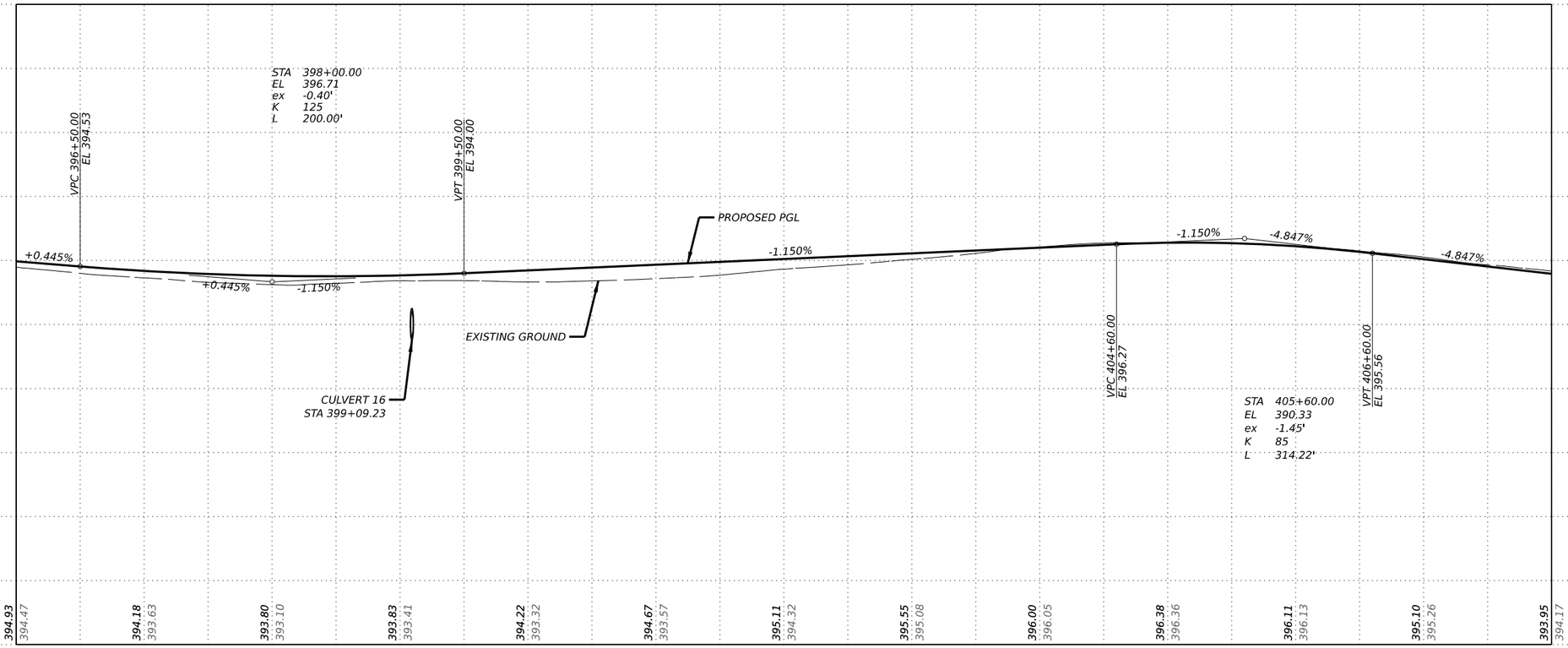
5. CLEAR ALL TREES AND BRUSH WITHIN RIGHT-OF-WAY UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PAYMENT FOR TREE REMOVAL IS INCLUDED IN ITEM 100-6002 PREPARING RIGHT-OF-WAY.
6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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



6/21/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

ROADWAY PLAN & PROFILE

(STA 396+00 TO STA 408+00)

SHEET 22 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		93

DATE: 6/21/2023 11:21:54 AM
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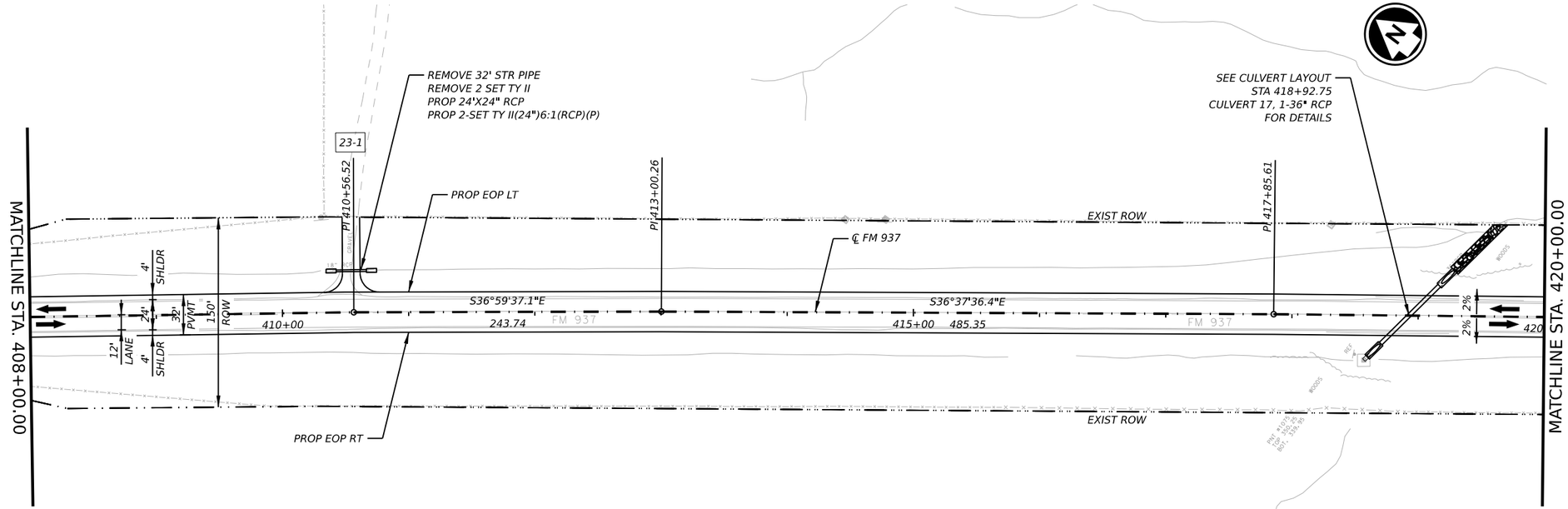

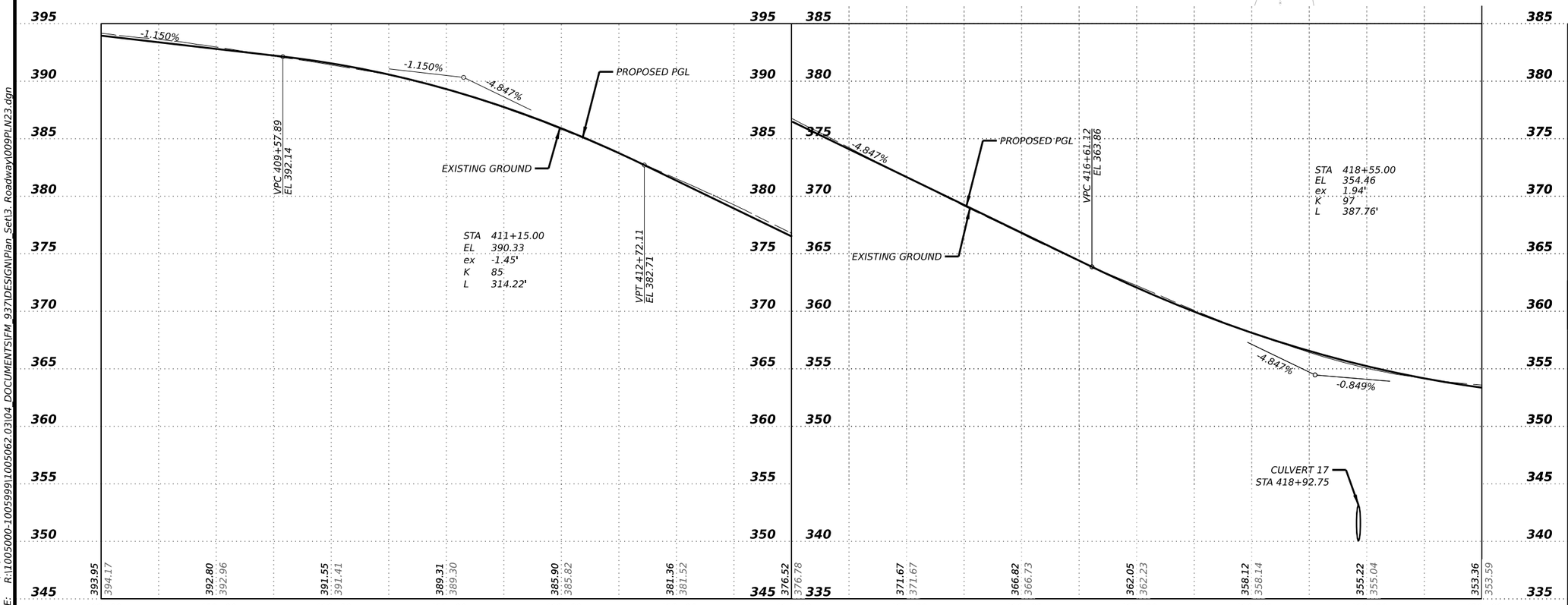

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

1. REFER TO HORIZONTAL ALIGNMENT DATA AND SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCHMARK DATA.
2. REFER TO TYPICAL SECTIONS FOR MORE INFORMATION.
3. REPLACE EXIST MAILBOXES. SEE MAILBOX TURNOUT STANDARD FOR LOCATION AND DIMENSIONS OF TURNOUT AND MAILBOXES.
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6. REFER TO DRIVEWAY SUMMARY SHEET FOR ADDITIONAL DRIVEWAY INFORMATION

0 50 100

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

5/26/2023

STATE OF TEXAS
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ROADWAY PLAN & PROFILE

(STA 408+00 TO STA 420+00)

SHEET 23 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		94

DATE: 5/26/2023 9:54:57 AM
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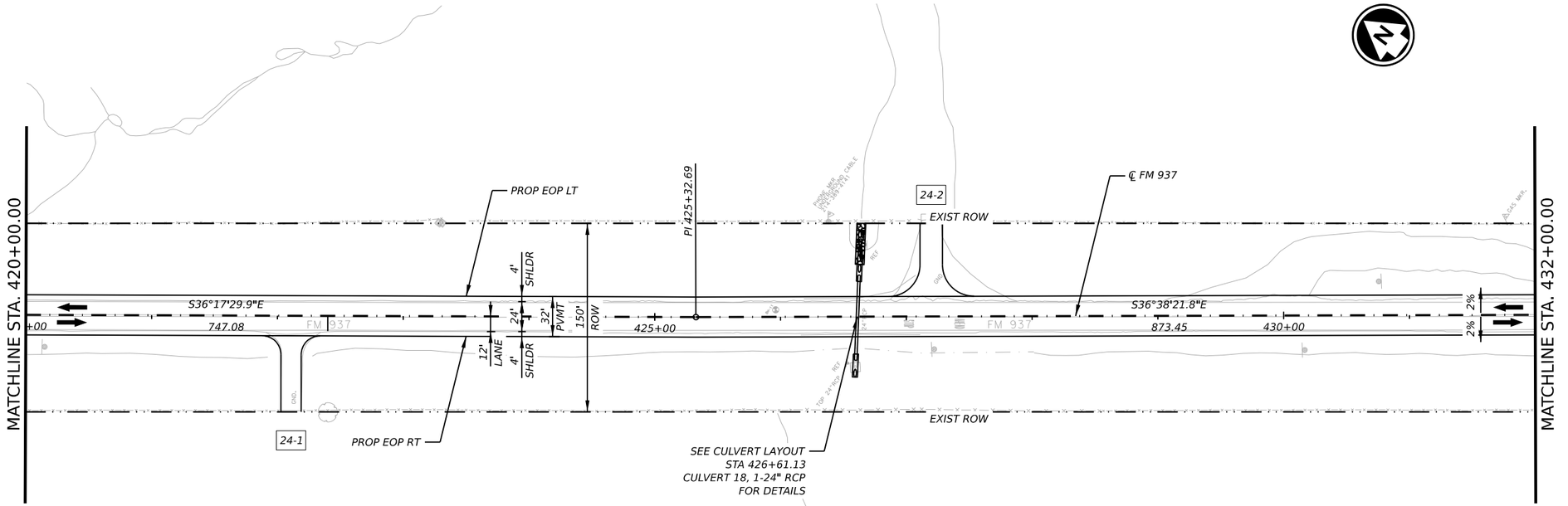
DW:
CK:
DW:



LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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0 50 100

SCALE: 1" = 100' H
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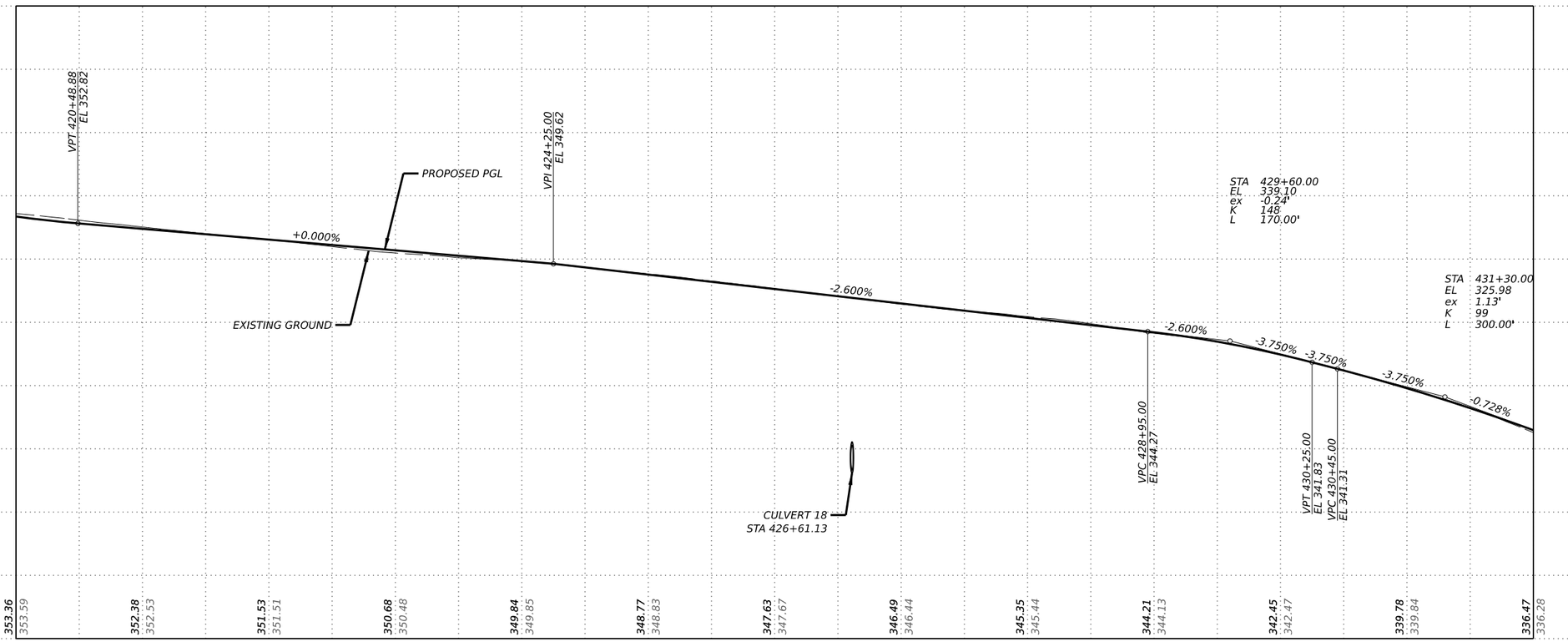

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5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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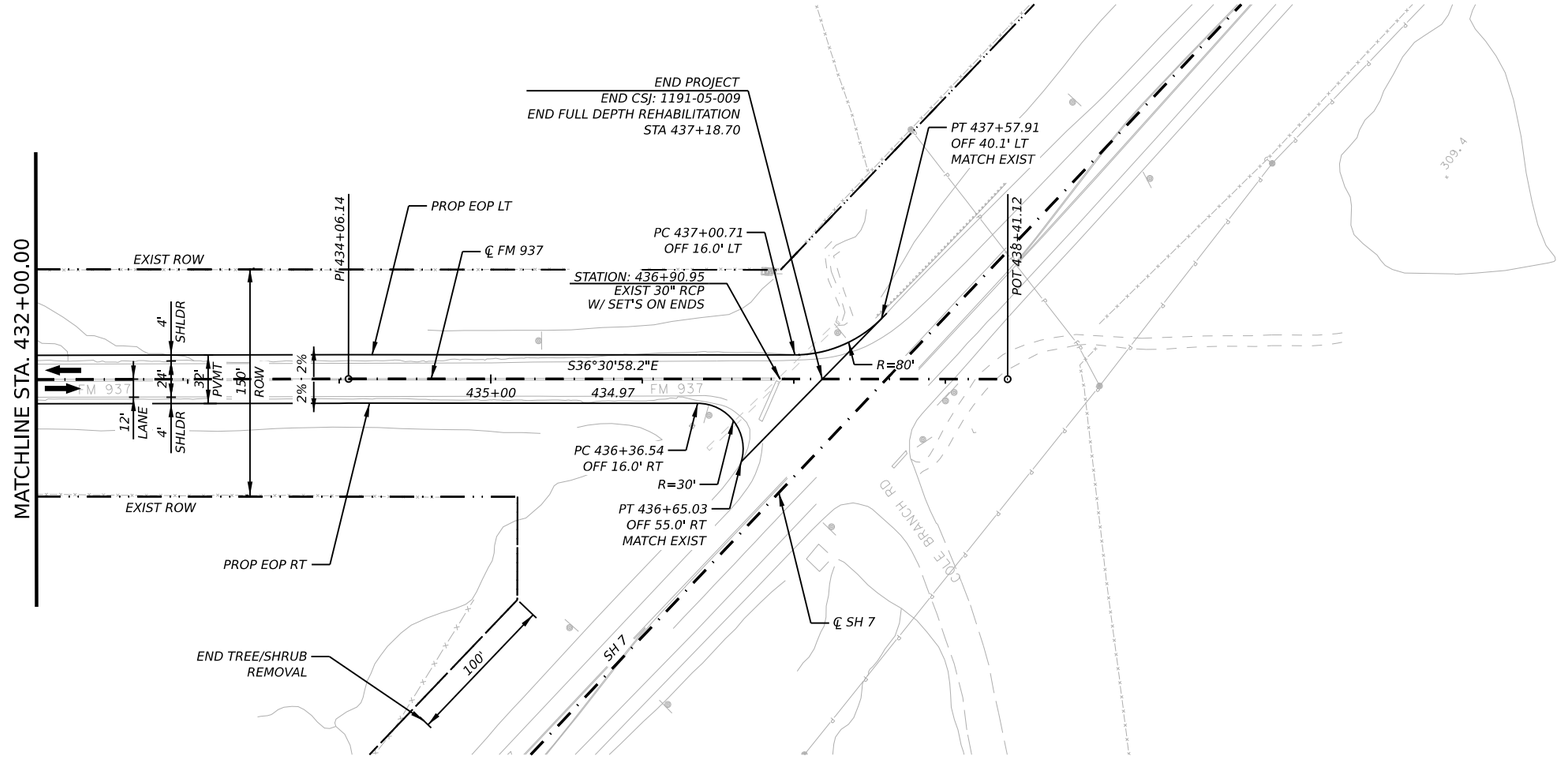
ROADWAY PLAN & PROFILE

(STA 420+00 TO STA 432+00)

SHEET 24 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		95



LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

NOTES

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2. REFER TO TYPICAL SECTIONS FOR MORE INFORMATION.
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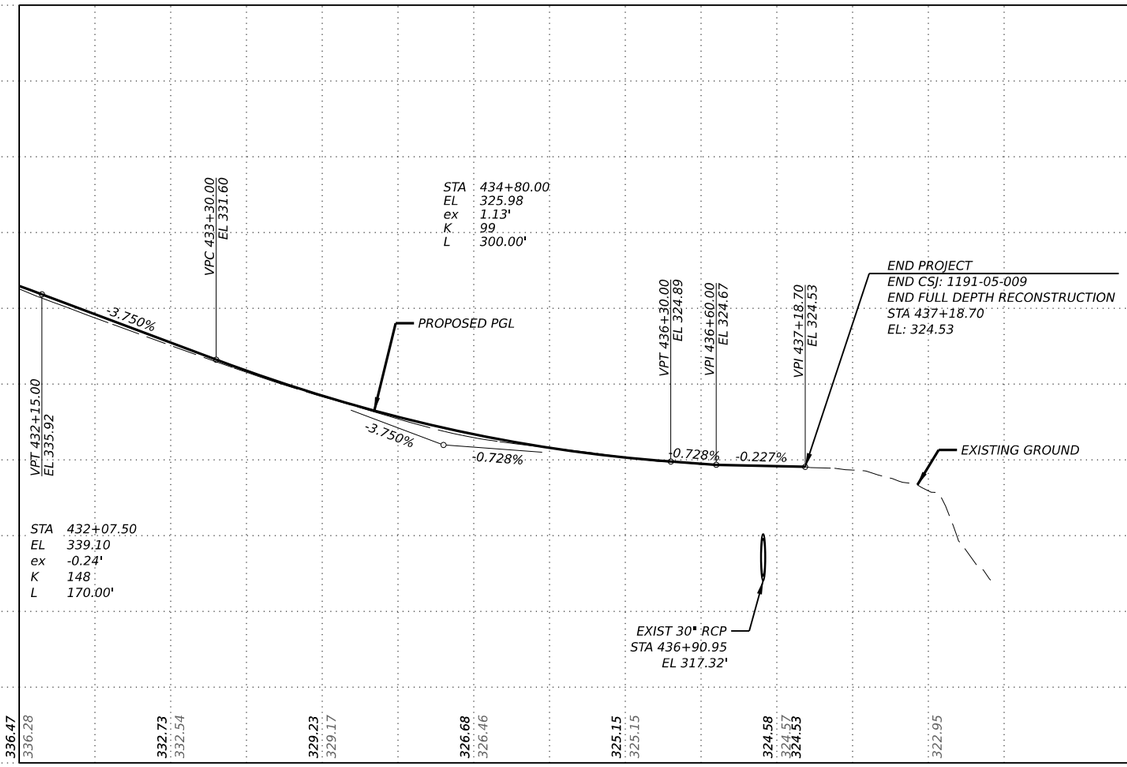
0 50 100

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



5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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Megan E. Houtchens

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ROADWAY PLAN & PROFILE

(STA 432+00 TO END)

SHEET 25 OF 25

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		96

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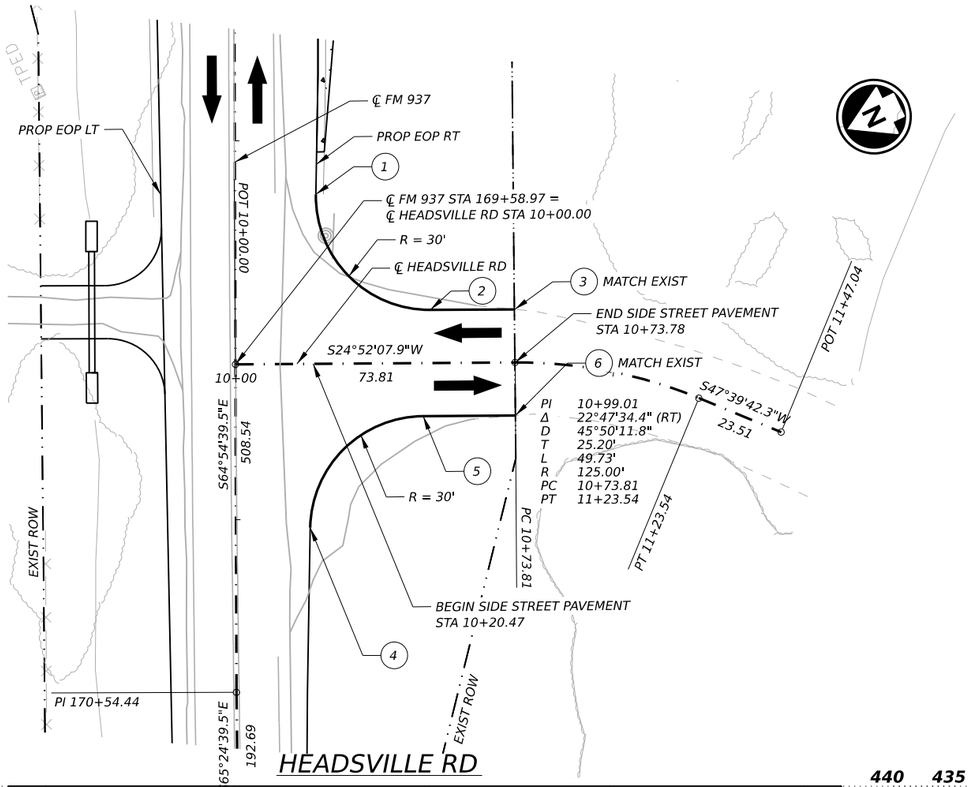
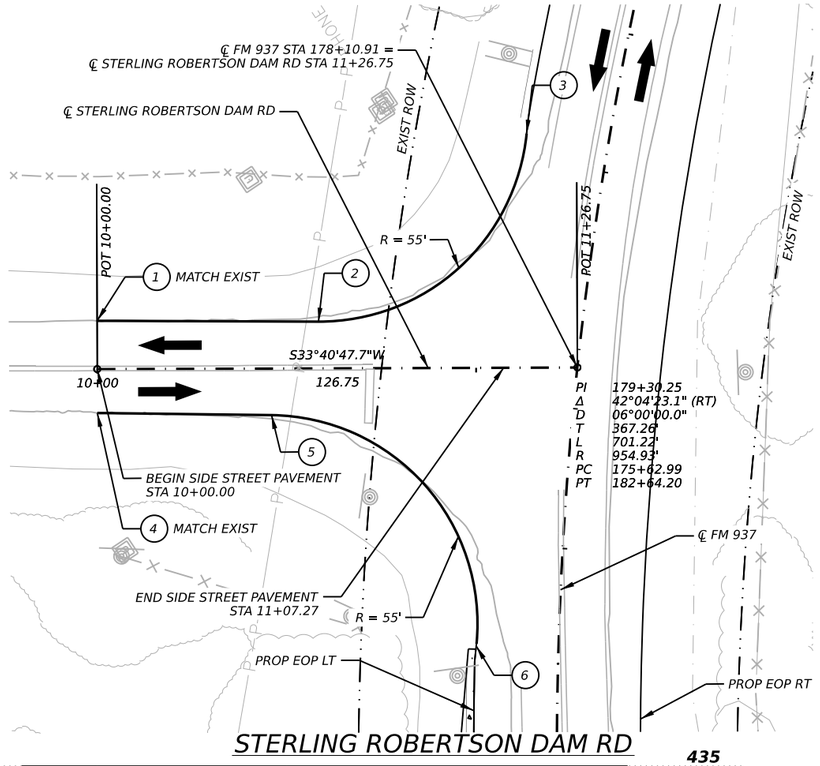


HEADSVILLE RD



STERLING ROBERTSON DAM RD

LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

HEADSVILLE RD

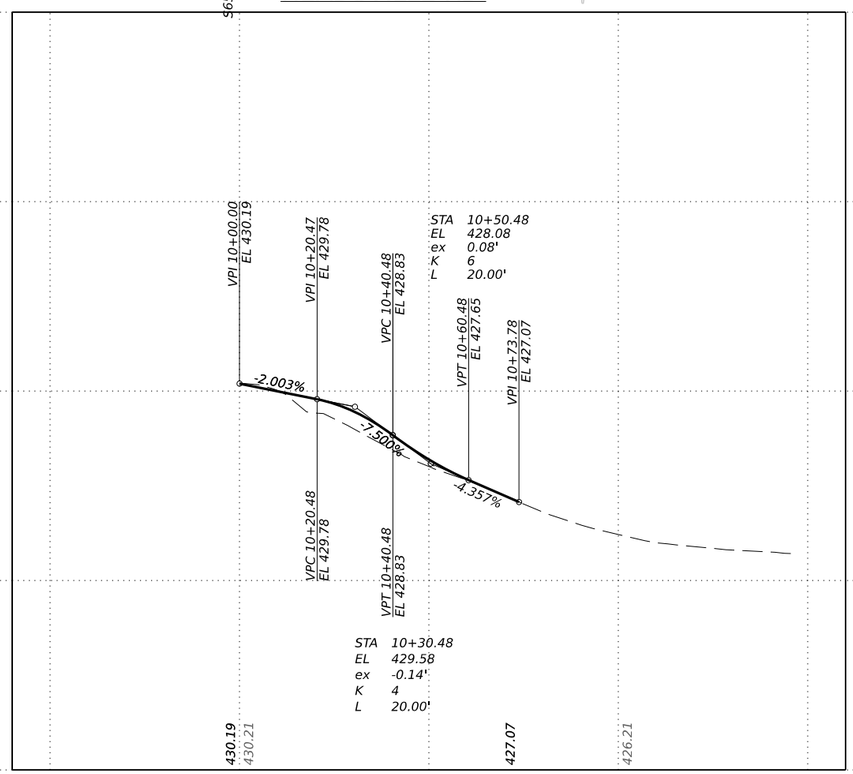
NO.	POINT	STATION	OFFSET (FT)	LT/RT
1	PC	10+21.54	44.72	LT
2	PT	10+51.53	14.00	LT
3		10+73.81	14.00	LT
4	PC	10+19.44	43.28	RT
5	PT	10+49.43	14.00	RT
6		10+73.81	14.00	RT

STERLING ROBERTSON DAM RD

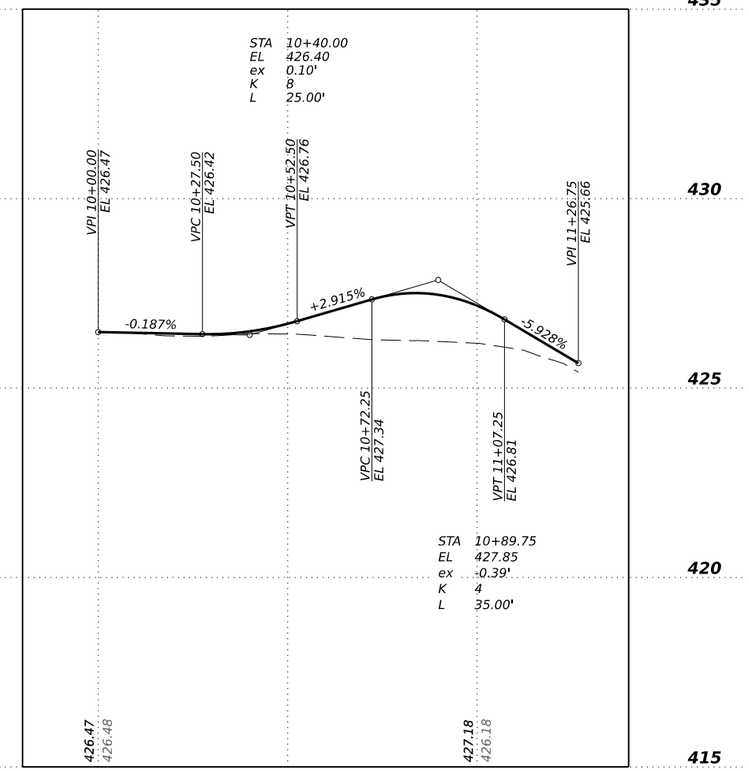
NO.	POINT	STATION	OFFSET (FT)	LT/RT
1		10+00.00	12.74	LT
2	PC	10+58.46	12.34	LT
3	PT	11+13.55	61.77	LT
4		10+00.00	11.60	RT
5	PC	10+45.97	12.28	RT
6	PT	10+99.86	72.84	RT

0 20 40

SCALE: 1" = 40' H
1" = 4' V



HEADSVILLE RD



STERLING ROBERTSON DAM RD

6/21/2023

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SIDESTREET PLAN & PROFILE

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		97

DATE: 6/21/2023 11:03:17 AM
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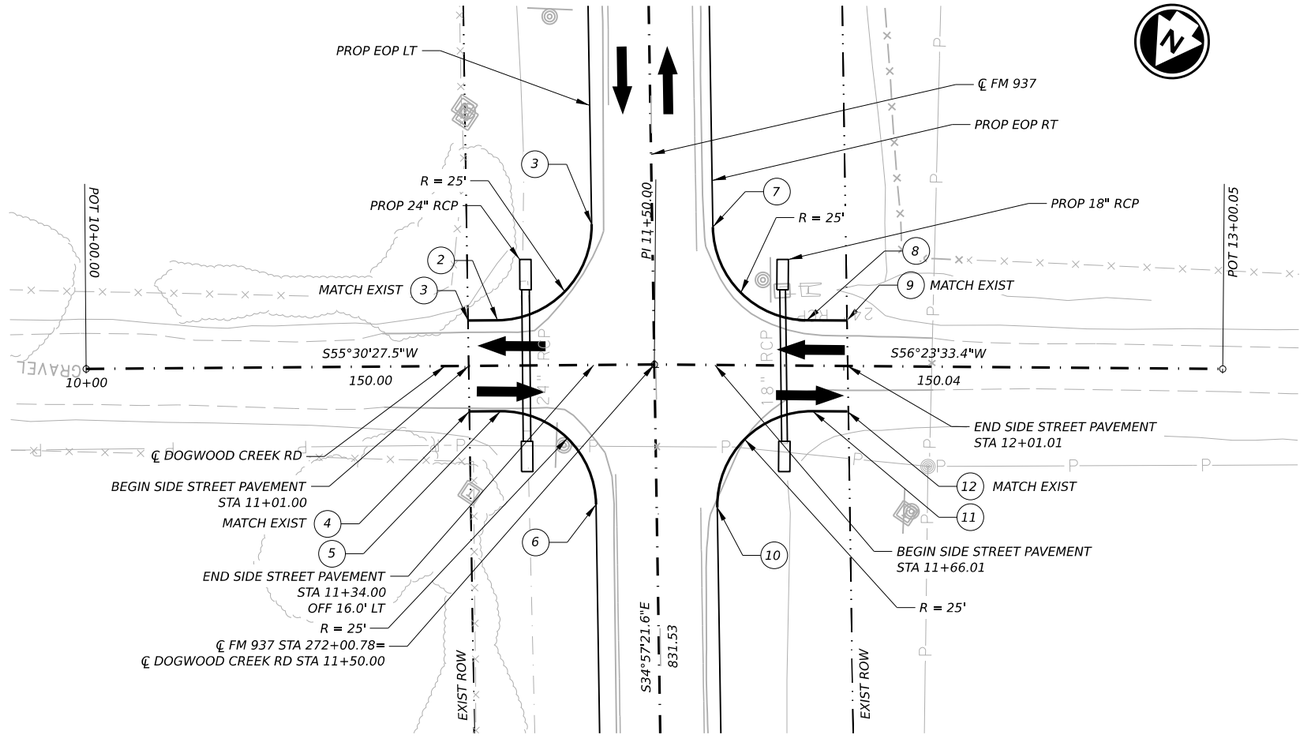


LEGEND

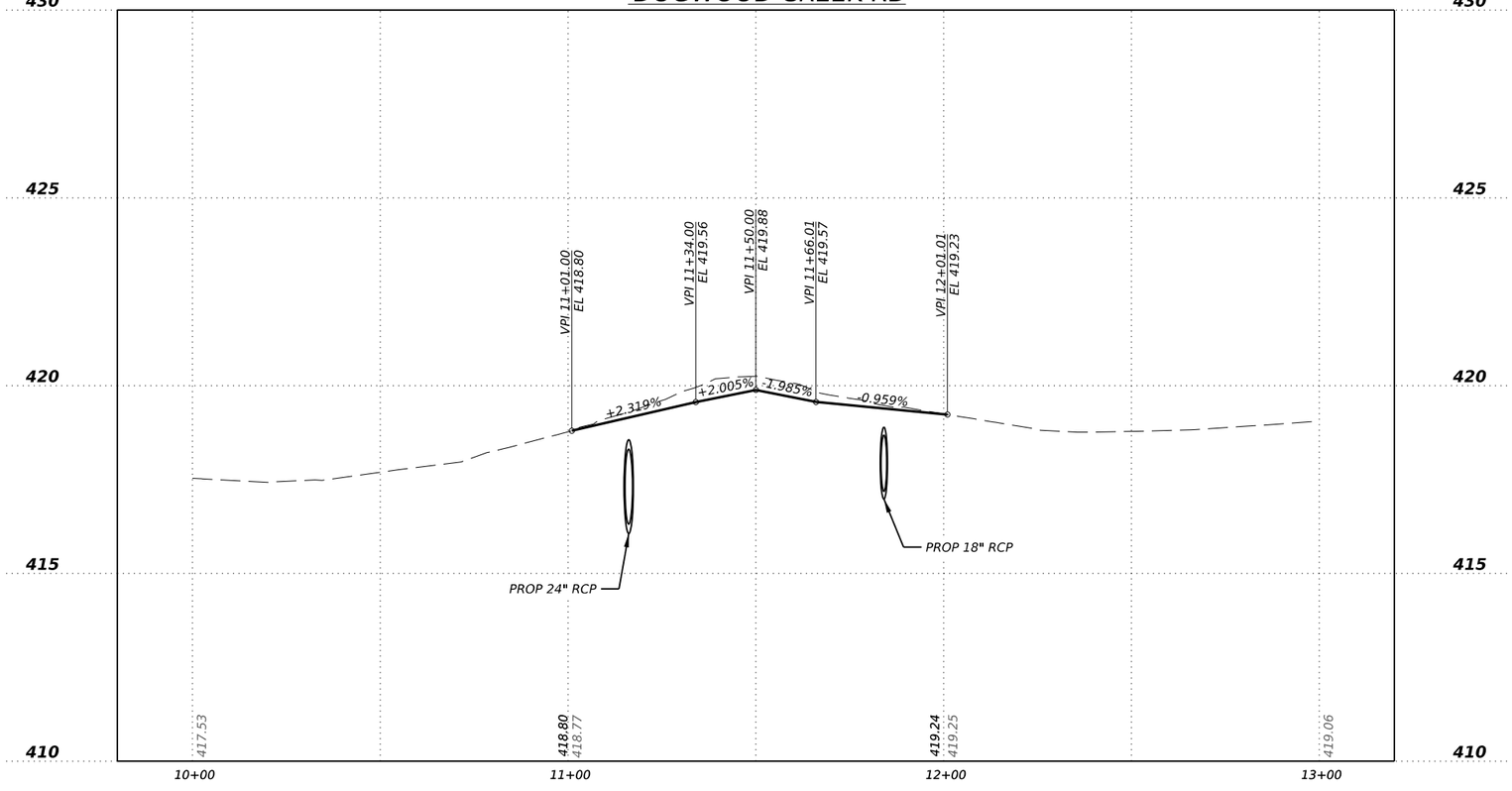
- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

DOGWOOD CREEK RD				
NO.	POINT	STATION	OFFSET (FT)	LT/RT
1		11+00.91	12.00	LT
2	PC	11+08.70	12.00	LT
3	PT	11+33.70	37.20	LT
4		11+01.08	12.00	RT
5	PC	11+09.30	12.00	RT
6	PT	11+34.30	36.80	RT
7	PC	11+65.15	36.41	LT
8	PT	11+90.15	12.00	LT
9		12+00.74	12.00	LT
10	PC	11+66.89	37.59	RT
11	PT	11+91.89	12.00	RT
12		12+01.03	12.00	RT

0 20 40

SCALE: 1" = 40' H
1" = 4' V

DOGWOOD CREEK RD



6/21/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
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FM 937

SIDESTREET PLAN & PROFILE

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		98

DATE: 6/21/2023 11:03:57 AM
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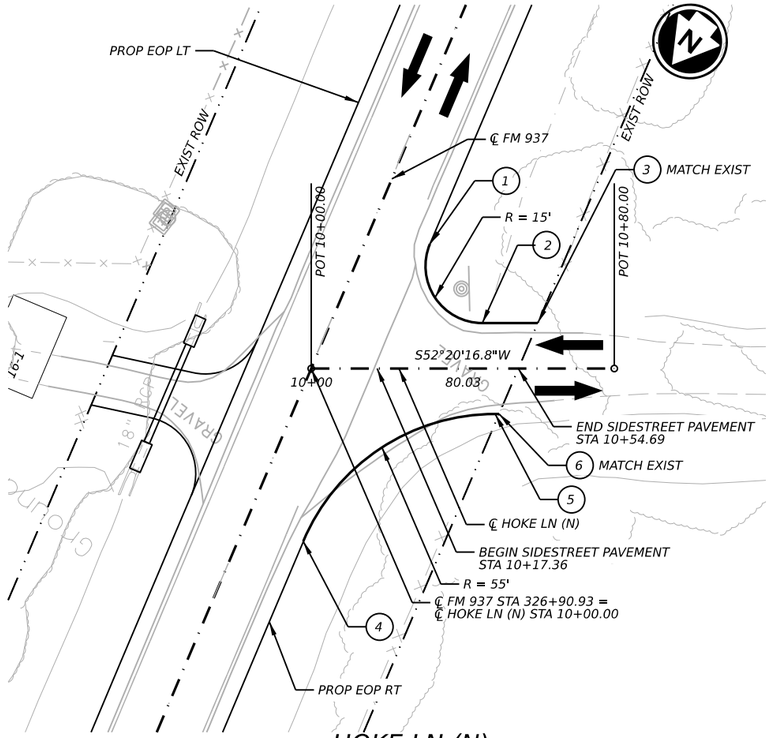
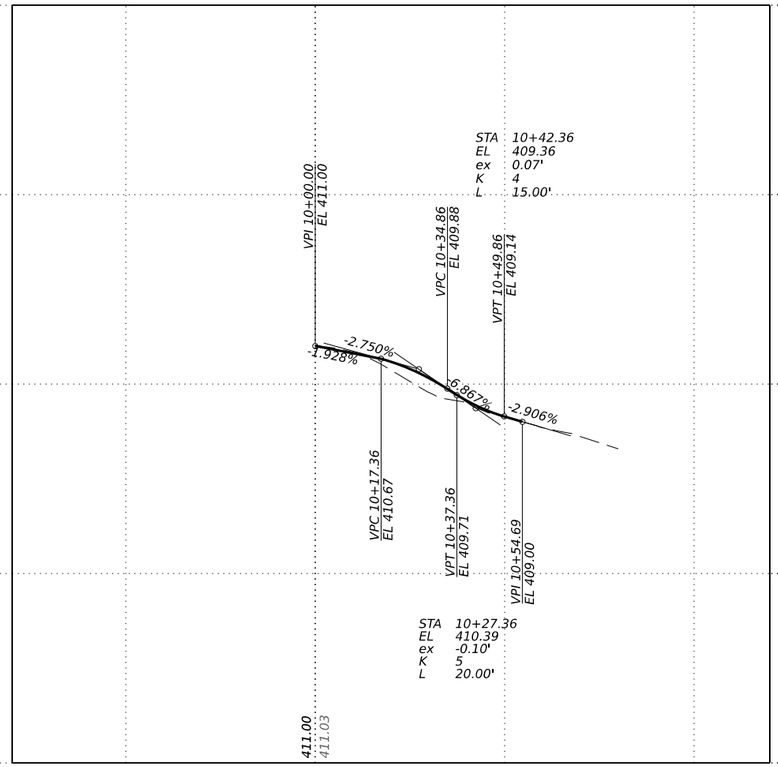
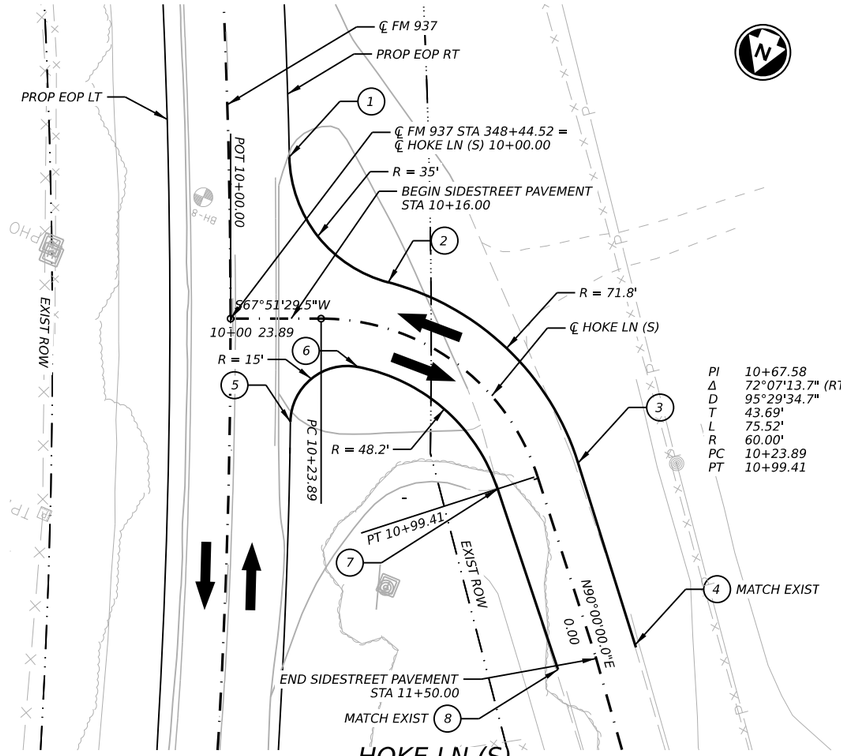
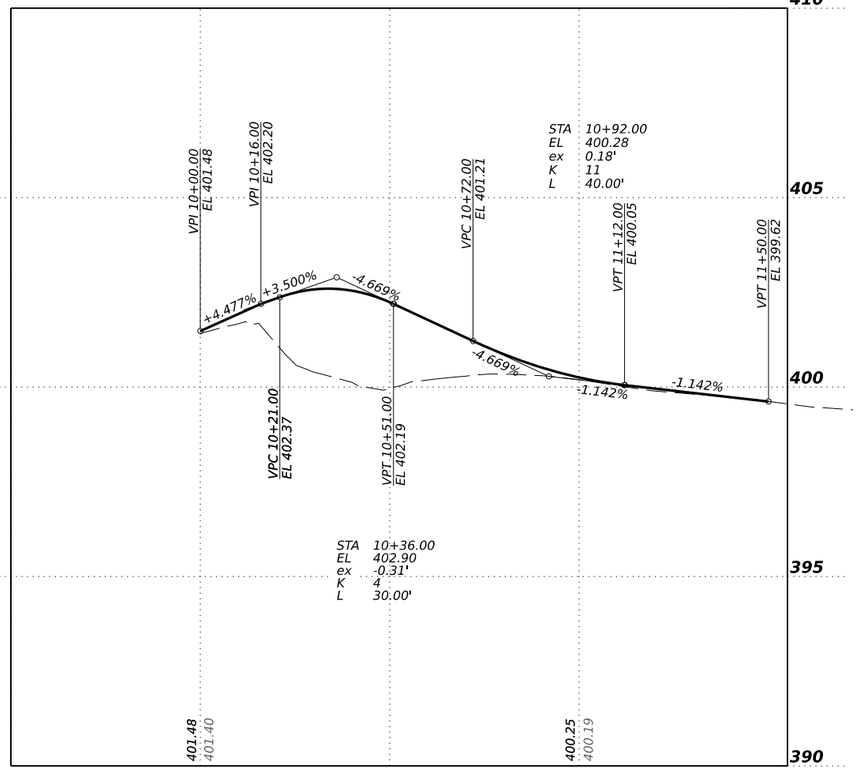


HOKE LN (N)





HOKE LN (S)



LEGEND

- PROPOSED TRAFFIC FLOW DIRECTION
- EXISTING ROW
- # DRIVEWAY NUMBER
- PROPOSED MAILBOX
- PROPOSED DITCH FLOW
- EXISTING DITCH FLOW

HOKE LN (N)

NO.	POINT	STATION	OFFSET (FT)	LT/RT
1	PC	10+31.34	32.87	LT
2	PT	10+45.14	12.00	LT
3		10+59.79	12.00	LT
4	PC	9+97.90	45.59	RT
5	PT	10+48.57	12.00	RT
6		10+49.58	12.00	RT

HOKE LN (S)

NO.	POINT	STATION	OFFSET (FT)	LT/RT
1	PC	10+15.53	42.66	LT
2	PT/PC	10+38.87	11.81	LT
3	PT	10+99.41	11.32	LT
4		11+49.42	10.91	LT
5	PC	10+15.81	27.28	RT
6	PT/PC	10+36.07	11.77	RT
7	PT	10+99.41	11.04	RT
8		11+49.72	10.45	RT

0 20 40

SCALE: 1" = 40' H
1" = 4' V

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SIDESTREET PLAN & PROFILE

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		99

DATE: 5/26/2023 9:55:00 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3_Roadway\009INTPP03.dgn

P&P SHEET NO.	DRIVEWAY NO.	EXISTING DRIVEWAY TYPE	PROPOSED DRIVEWAY TYPE	STATION	SIDE (LT/RT)	DWY LENGTH L (FT)	DWY WIDTH @ MOUTH (FT)	DWY WIDTH @ THROAT (FT)	SURFACE AREA (SY)	RADIUS R (FT)	RADIUS R (FT)	MAILBOX TURNOUT (SY)	PIPE LENGTH (FT)	NO. OF BARRELS	PIPE SIZE (IN)	S.E.T. SIDE SLOPE	CULVERT (UPSTREAM)		CULVERT (DOWNSTREAM)	
																	STATION	ELEV. (FT)	STATION	ELEV. (FT)
1	1-1	GRAVEL	ASPHALT	151+41.91	RT	32.7	44.0	14.0	61.6	15.0	15.0	16.0	-	-	-	-	-	-	-	-
	1-2	GRAVEL	ASPHALT	151+59.74	LT	35.3	44.0	14.0	65.7	15.0	15.0	-	-	-	-	-	-	-	-	-
	1-3	GRAVEL	ASPHALT	154+21.82	RT	32.5	44.0	14.0	61.2	15.0	15.0	-	32	1	18" RCP	6:1	154+05.85	435.49	154+37.82	434.87
2	2-1	ASPHALT	ASPHALT	160+84.17	LT	35.6	65.0	14.0	84.8	25.0	25.0	15.2	28	1	18" RCP	6:1	160+98.25	433.01	160+69.80	432.90
3	3-1	GRAVEL	ASPHALT	171+54.92	LT	35.3	44.0	14.0	60.9	15.0	15.0	-	32	1	18" RCP	6:1	171+38.88	427.94	171+70.88	426.59
4	4-1	GRAVEL	ASPHALT	185+00.31	RT	36.6	45.0	15.0	71.7	15.0	15.0	16.0	32	1	18" RCP	6:1	185+16.32	421.11	184+84.32	421.01
	4-2	GRAVEL	ASPHALT	187+15.76	LT	32.1	39.0	14.0	57.8	15.0	10.0	16.0	64	1	18" RCP	6:1	187+66.52	424.01	187+02.52	423.13
	4-3	GRAVEL	ASPHALT	187+46.63	LT	32.3	46.2	14.0	66.2	10.0	20.0	-								
	4-4	ASPHALT	ASPHALT	190+54.62	RT	36.3	44.5	14.0	68.0	15.0	15.0	-	28	1	18" RCP	6:1	190+44.11	422.02	190+72.33	421.98
	4-5	GROUND	ASPHALT	190+63.55	LT	31.6	49.8	20.0	81.2	15.0	15.0	-	32	1	18" RCP	6:1	190+47.49	422.41	190+79.22	422.09
5	5-1	ASPHALT	ASPHALT	193+57.23	LT	32.6	59.0	14.0	61.4	15.0	15.0	16.1	28	1	18" RCP	6:1	193+43.26	419.12	193+71.24	419.06
	5-2	GRAVEL	ASPHALT	201+15.19	LT	33.1	44.0	14.0	62.3	15.0	15.0	-	-	-	-	-	-	-	-	-
	5-3	ASPHALT	ASPHALT	201+50.91	RT	35.0	67.6	24.5	127.6	15.0	15.0	-	-	-	-	-	-	-	-	-
	5-4	ASPHALT	ASPHALT	203+08.37	RT	35.1	67.8	26.5	125.8	25.0	15.0	16.0	-	-	-	-	-	-	-	-
6	6-1	GRAVEL	ASPHALT	204+50.84	RT	35.3	53.1	14.0	73.7	25.0	15.0	15.9	28	1	18" RCP	6:1	204+27.37	417.28	204+55.37	416.89
	6-2	GRAVEL	ASPHALT	205+85.54	LT	32.6	60.0	20.0	91.5	20.0	20.0	-	28	1	18" RCP	6:1	205+71.54	416.80	205+99.54	416.76
	6-3	ASPHALT	ASPHALT	214+43.11	RT	35.3	54.0	14.0	74.0	20.0	20.0	-	28	1	18" RCP	6:1	214+57.06	420.50	214+29.06	419.59
7	7-1	GROUND	ASPHALT	217+39.64	RT	35.0	44.0	14.0	65.1	15.0	15.0	-	28	1	18" RCP	6:1	217+53.63	423.60	217+25.64	423.36
	7-2	GROUND	ASPHALT	217+94.68	LT	33.1	44.0	14.0	62.2	15.0	15.0	-	24	1	18" RCP	6:1	218+06.67	423.81	217+82.67	423.49
	7-3	GRAVEL	ASPHALT	219+77.76	LT	33.3	44.0	14.0	62.6	15.0	15.0	-	24	1	18" RCP	6:1	219+89.77	425.87	219+56.77	425.56
	7-4	GRAVEL	ASPHALT	220+74.71	RT	34.5	66.0	16.0	91.2	25.0	25.0	16.0	28	1	18" RCP	6:1	220+88.71	426.68	220+60.71	426.57
	7-5	GRAVEL	ASPHALT	223+80.58	LT	34.0	44.2	14.0	64.0	15.0	15.0	16.0	32	1	18" RCP	-	-	-	-	-
	7-6	CONCRETE	CONCRETE	226+68.81	LT	34.3	44.0	14.0	64.1	15.0	15.0	16.0	28	1	18" RCP	6:1	226+54.77	426.50	226+82.77	426.33
8	8-1	GRAVEL	ASPHALT	228+68.50	LT	34.5	54.0	14.0	72.8	20.0	20.0	16.0	28	1	18" RCP	6:1	228+54.49	426.62	228+82.48	426.43
	8-2	ASPHALT	ASPHALT	232+59.05	LT	34.6	44.0	14.0	64.6	15.0	15.0	-	28	1	18" RCP	6:1	232+45.04	425.25	232+73.04	424.94
	8-3	GRAVEL	ASPHALT	234+74.57	LT	34.6	44.0	14.0	64.6	15.0	15.0	-	28	1	18" RCP	6:1	234+60.55	424.58	234+88.53	423.96
	8-4	ASPHALT	ASPHALT	236+53.21	RT	33.5	44.0	14.0	62.9	15.0	15.0	16.0	-	-	-	-	-	-	-	-
	8-5	GROUND	ASPHALT	237+49.24	RT	33.7	44.0	14.0	63.1	15.0	15.0	-	-	-	-	-	-	-	-	-
	8-6	GRAVEL	ASPHALT	239+44.99	RT	34.0	39.0	14.0	60.6	10.0	15.0	-	-	-	-	-	-	-	-	-
	8-7	GROUND	ASPHALT	239+78.75	RT	34.0	39.0	14.0	60.8	15.0	10.0	16.1	-	-	-	-	-	-	-	-
9	9-1	GRAVEL	ASPHALT	241+11.49	RT	34.3	44.8	14.0	65.9	15.0	15.0	16.4	28	1	18" RCP	6:1	241+04.92	421.29	241+32.86	421.08
	9-2	ASPHALT	ASPHALT	245+88.88	RT	33.3	67.0	18.0	97.0	25.0	25.0	-	32	1	18" RCP	6:1	246+04.55	421.83	245+73.19	421.67
	9-3	GRAVEL	ASPHALT	248+56.71	RT	33.6	44.0	14.0	62.9	15.0	15.0	16.0	28	1	18" RCP	6:1	248+42.80	420.84	248+70.80	420.26
10	10-1	GRAVEL	ASPHALT	255+43.27	RT	35.4	44.0	14.0	65.7	15.0	15.0	15.9	-	-	-	-	-	-	-	-
	10-2	GRAVEL	ASPHALT	260+02.38	RT	35.3	44.0	14.0	65.6	15.0	15.0	-	28	1	18" RCP	6:1	259+88.37	424.39	260+16.37	424.36
	10-3	GRAVEL	ASPHALT	263+61.91	RT	37.0	54.9	15.0	80.8	20.0	20.0	-	28	1	18" RCP	6:1	263+47.64	422.85	263+75.55	422.66
11	11-1	GRAVEL	ASPHALT	264+39.11	RT	38.3	55.9	16.0	87.4	20.0	20.0	16.6	28	1	18" RCP	6:1	264+25.18	421.81	264+53.09	421.35
	11-2	ASPHALT	ASPHALT	273+54.47	RT	35.1	44.0	14.0	65.3	15.0	15.0	-	-	-	-	-	-	-	-	-
12	12-1	GROUND	ASPHALT	285+11.18	LT	33.6	44.0	14.0	63.1	15.0	15.0	-	24	1	18" RCP	6:1	285+23.12	411.78	284+99.49	411.49
	12-2	GRAVEL	ASPHALT	287+29.02	LT	33.3	44.0	14.0	62.6	15.0	15.0	17.4	24	1	18" RCP	6:1	287+17.21	410.50	287+40.79	409.95
13	13-1	ASPHALT	ASPHALT	290+89.78	RT	33.1	44.0	14.0	62.3	15.0	15.0	-	28	1	18" RCP	6:1	290+75.81	409.20	291+03.79	408.93
	13-2	GROUND	ASPHALT	290+96.86	LT	34.9	60.0	20.0	96.6	20.0	20.0	17.0	32	1	18" RCP	6:1	290+78.86	409.63	291+14.86	409.40
	13-3	GRAVEL	ASPHALT	294+54.29	RT	33.1	44.0	14.0	62.3	15.0	15.0	-	28	1	18" RCP	6:1	294+68.30	407.02	294+40.30	406.82
	13-4	GRAVEL	ASPHALT	297+90.46	LT	34.8	46.1	14.0	69.9	15.0	15.0	16.0	24	1	18" RCP	6:1	297+91.38	405.01	297+67.38	404.82
14	14-1	ASPHALT	ASPHALT	300+05.55	LT	34.8	44.0	14.0	64.9	15.0	15.0	16.0	-	-	-	-	-	-	-	-
	14-2	GRAVEL	ASPHALT	300+79.78	RT	33.2	72.0	22.0	110.9	25.0	25.0	-	40	1	18" RCP	6:1	301+03.75	406.04	300+55.77	405.90
	14-3	GRAVEL	ASPHALT	309+01.01	LT	34.8	44.0	14.0	64.8	15.0	15.0	-	24	1	18" RCP	6:1	309+13.00	404.73	308+89.00	404.34
	14-4	GRAVEL	ASPHALT	309+79.08	RT	33.2	44.0	14.0	62.4	15.0	15.0	-	24	1	18" RCP	6:1	309+91.08	404.97	309+67.05	404.63
	14-5	GRAVEL	ASPHALT	310+07.50	LT	34.8	48.6	14.0	75.9	15.0	15.0	16.0	28	1	18" RCP	6:1	310+04.32	404.95	309+76.32	403.35
	14-6	GRAVEL	ASPHALT	310+94.07	LT	34.9	45.5	14.0	68.5	15.0	15.0	-	28	1	18" RCP	6:1	311+15.66	405.39	310+87.66	405.35
15	15-1	GRAVEL	ASPHALT	312+51.25	RT	33.0	45.6	14.0	65.7	15.0	15.0	16.0	-	-	-	-	-	-	-	-
	15-2	CONCRETE	CONCRETE	316+43.12	LT	35.3	46.3	16.0	74.2	15.0	15.0	16.0	28	1	18" RCP	6:1	316+23.74	405.13	316+51.74	404.90
	15-3	ASPHALT	ASPHALT	319+50.98	RT	32.6	48.0	18.0	75.9	15.0	15.0	-	32	1	18" RCP	6:1	319+66.99	407.26	319+34.99	406.83
16	16-1	GRAVEL	ASPHALT	326+76.02	LT	33.7	44.8	14.0	65.0	15.0	15.0	-	28	1	18" RCP	6:1	326+55.83	407.81	326+83.82	407.78
17	17-1	GRAVEL	ASPHALT	337+25.01	LT	33.4	58.7	14.0	83.3	20.0	20.0	16.0	32	1	18" RCP	6:1	336+88.44	405.74	337+28.44	405.41
	-17-2	GROUND	ASPHALT	340+16.11	LT	33.1	44.0	14.0	62.2	15.0	15.0	-	28	1	18" RCP	6:1	340+02.11	403.10	340+30.11	402.80
	17-3	GROUND	ASPHALT	340+18.22	RT	34.9	44.0	14.0	65.0	15.0	15.0	-	28	1	18" RCP	6:1	340+04.23	402.64	340+32.23	402.48
	17-4	GRAVEL	ASPHALT	344+90.54	RT	36.9	44.2	14.0	68.6	15.0	15.0	-	28	1	18" RCP	6:1	344+79.32	399.64	345+07.31	399.30
18	18-1	GRAVEL	ASPHALT	356+39.88	LT	33.1	44.0	14.0	62.2	15.0	15.0	-	28	1	18" RCP	6:1	356+54.02	400.63	356+26.02	400.45
	18-2	GRAVEL	ASPHALT	356+63.38	RT	34.7	44.0	14.0	64.7	15.0	15.0	-	28	1	18" RCP	6:1	356+77.36	400.91	356+49.36	400.86
19	19-1	GRAVEL	ASPHALT	360+93.80	RT	33.4	44.2	14.0	63.2	15.0	15.0	-	28	1	18" RCP	6:1	360+77.06	400.50	361+05.05	400.45
	19-2	ASPHALT	ASPHALT	365+56.71	RT	32.0	74.0	24.0	115.0	25.0	25.0	-	36	1	18" RCP	6:1	365+34.71	395.88	365+78.71	395.61
	19-3	GRAVEL	ASPHALT	366+89.11	LT	36.5	44.7	14.0	69.1	15.0	15.0	-	24	1	18" RCP	6:1	366+73.50	394.90	366+97.46	394.25
20	20-1	GRAVEL	ASPHALT	377+38.73	RT	29.8	44.0	14.0	57.1	15.0	15.0	-	28	1	18" RCP	6:1	377+24.72	393.79	377+52.72	393.48
21	21-1	GRAVEL	ASPHALT	386+26.69	LT	41.4	58.0	18.0	102.0	20.0	20.0	15.9	32	1	18" RCP	6:1	386+46.71	391.97	386+06.71	391.86
	21-2	GRAVEL	ASPHALT	389+39.67	RT	25.2	48.0	18.0	61.1	15.0	15.0	16.4	28	1	18" RCP	6:1	389+53.49	393.03	389+25.49	392.88
	21-3	GRAVEL	ASPHALT	393+37.29	LT	41.5	64.6	14.0	107.0	15.0	20.0	16.2	-	-	-	-	-	-	-	-
	21-4	GROUND	ASPHALT	395+77.58	RT	27.3	44.0	14.0	53.2	15.0	15.0	-	24	1	18" RCP	6:1	395+65.62	391.77	395+89.62	391.39
22	22-1	GRAVEL	ASPHALT	405+21.09	RT	31.9	142.5	36.6	256.3	25.0	80.0	16.0	-	-	-	-	-	-	-	-
	22-2	ASPHALT	ASPHALT	407+08.74	LT	35.1	70.0	30.0	136.1	20.0	20.0	-	-	-	-	-	-	-	-	-
23	23-1	GRAVEL	ASPHALT	410+54.83	LT	59.4	44.0	14.0	103.3	15.0	15.0	-	24	1	24" RCP	6:1	410+42.99	387.56	410+66.62	386.64
24	24-1	GROUND	ASPHALT	422+10.81	RT	60.5	46.0	16.0	118.3	15.0	15.0	-	-	-	-	-	-	-	-	-
	24-2	GROUND	ASPHALT	427+19.76	LT	58.1	68.0	18.0	146.0	25.0	25.0	-	-	-	-	-	-	-	-	-

NOT TO SCALE

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
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FM 937

DRIVEWAY SUMMARY SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		100

DATE: 5/26/2023 9:55:01 AM
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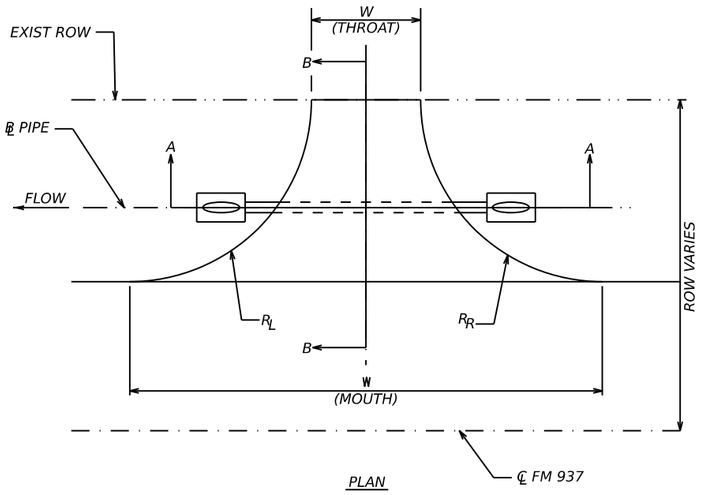
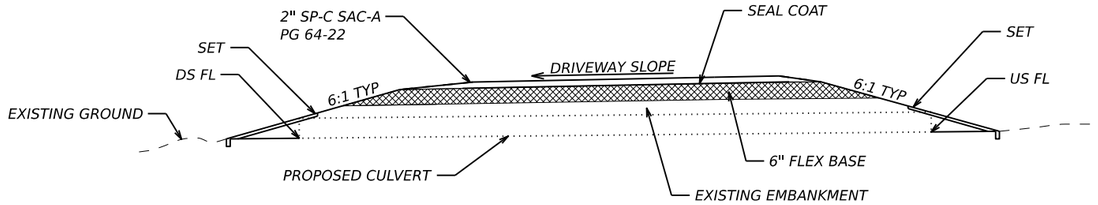
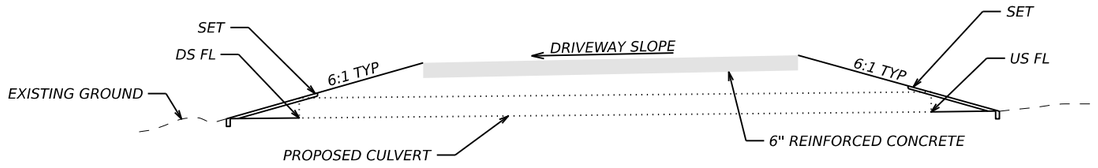


PLAN

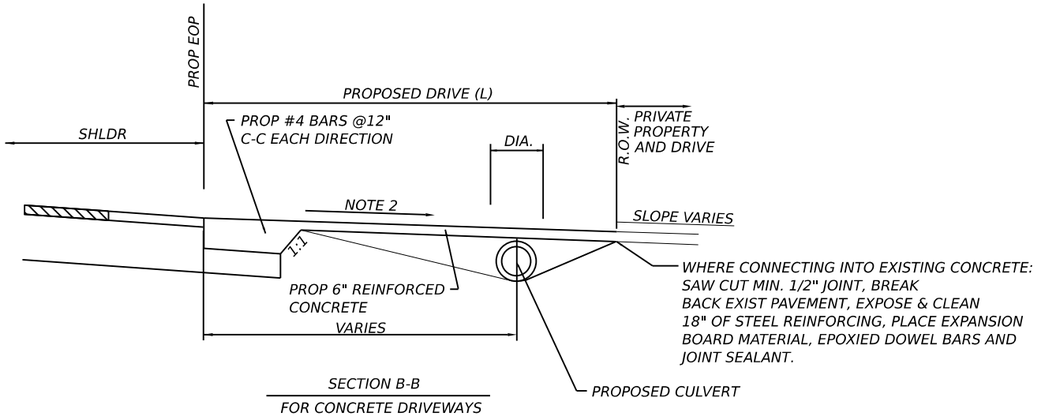
DRIVEWAY WITH CULVERT



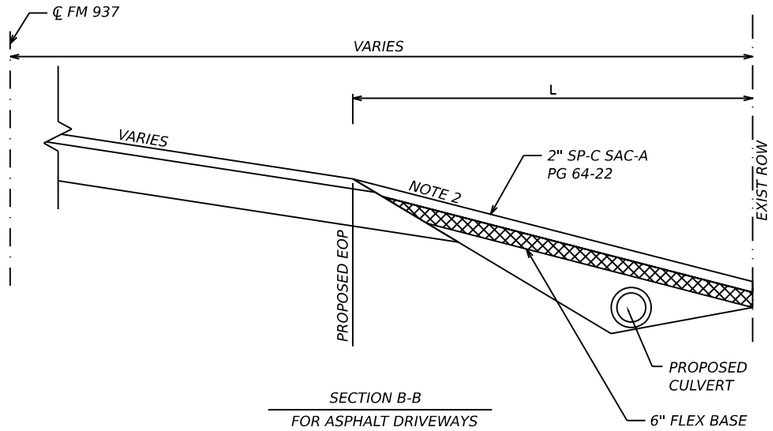
SECTION A-A
FOR ASPHALT DRIVEWAYS



SECTION A-A
FOR CONCRETE DRIVEWAYS



SECTION B-B
FOR CONCRETE DRIVEWAYS



SECTION B-B
FOR ASPHALT DRIVEWAYS

NOTES:

1. GRADE ALL DRIVEWAYS TO DRAIN.
2. MAXIMUM SLOPE IS: 12% RESIDENTIAL
   8% OTHERS.
3. THE DRIVEWAY DETAILS ON THIS
   SHEET REPRESENT THE TYPICAL
   SCENARIO FOR EACH TYPE OF
   DRIVEWAY.

NOT TO SCALE

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742
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Houston, Texas 77042
(713) 622-1444

FM 937

DRIVEWAY DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		101

DATE: 5/26/2023 9:55:02 AM
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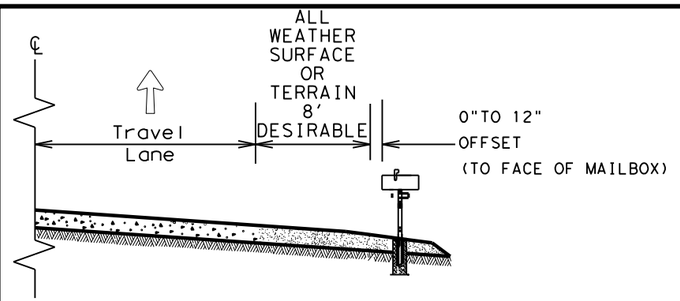
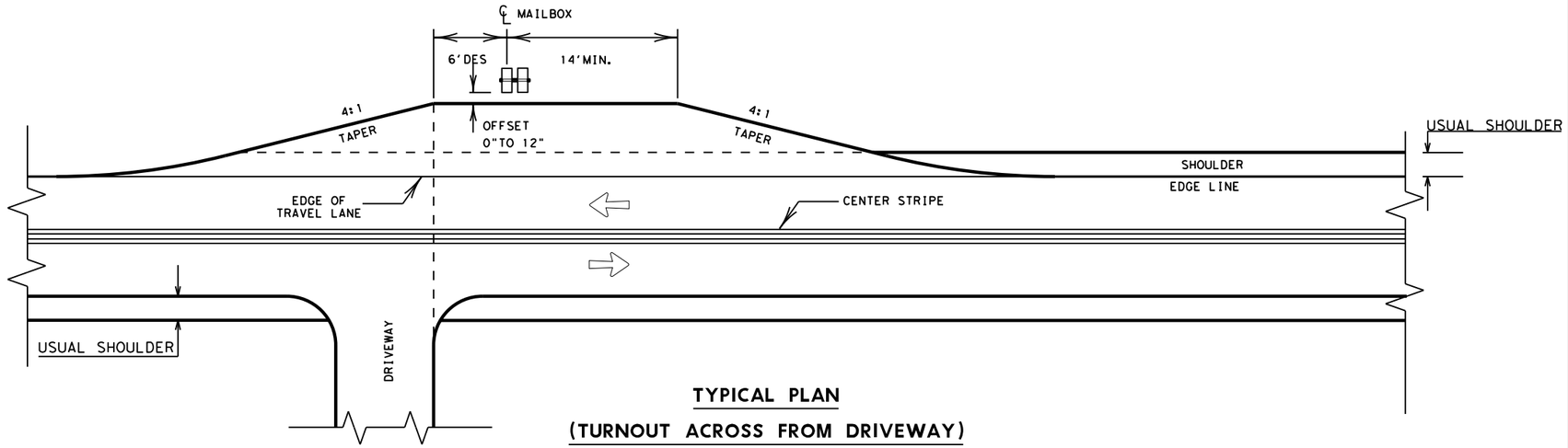
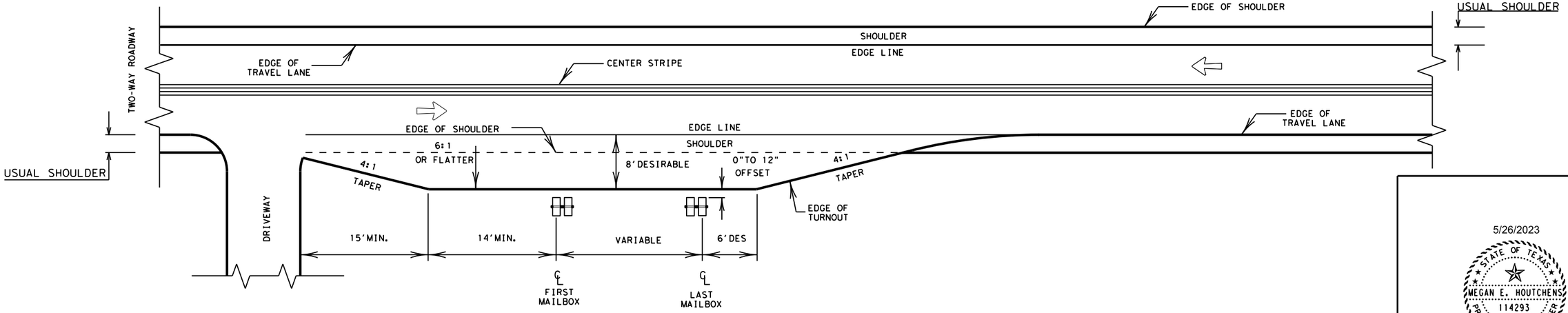


OFF TRAVEL WAY DELIVERY



TYPICAL PLAN

(TURNOUT ACROSS FROM DRIVEWAY)

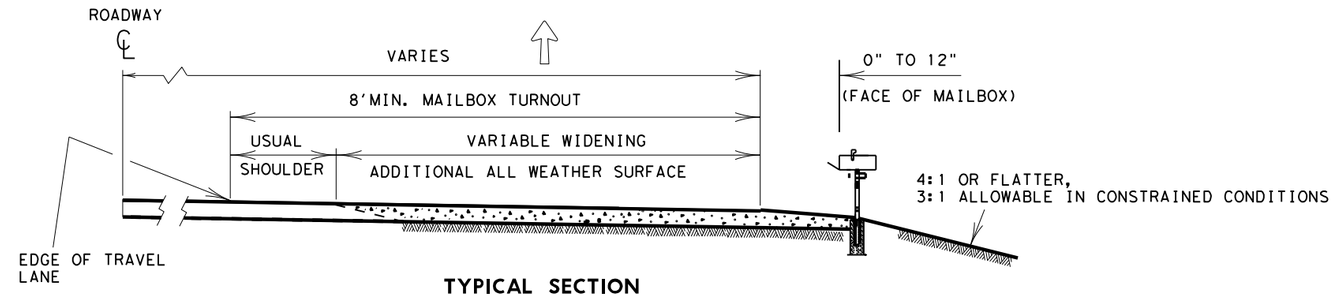


TYPICAL PLAN

(TURNOUT ON SAME SIDE AS DRIVEWAY)

GENERAL NOTES:

1. MAILBOX TURNOUTS CAN BE LOCATED EITHER BEFORE OR AFTER THE DRIVEWAY WHEN ON SAME SIDE.



TYPICAL SECTION

*NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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Houston, Texas 77042
(713) 622-1444

FM 937

MAILBOX TURNOUT DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		102

DATE: 5/26/2023 9:55:03 AM
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DATE: 5/26/2023
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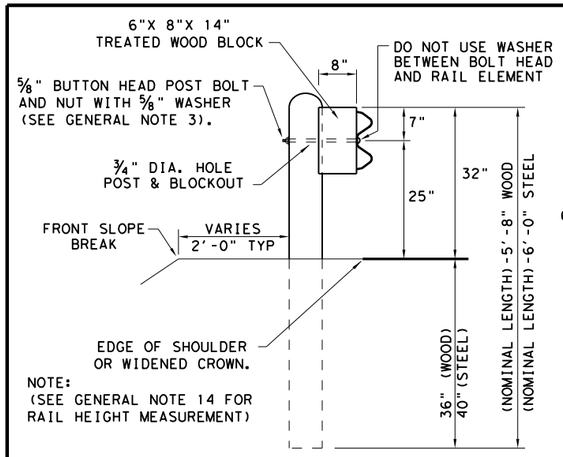
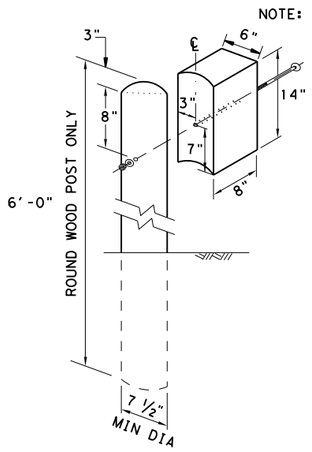
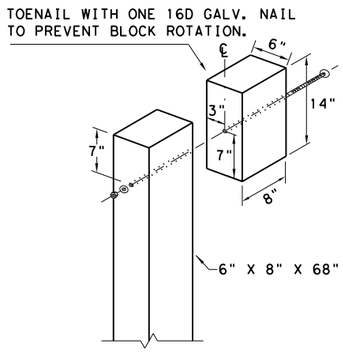


TYPICAL POST PLACEMENT

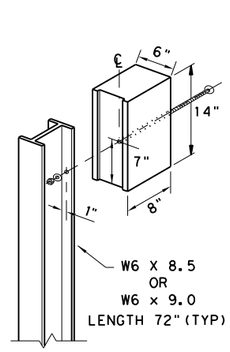


WOOD BLOCK TO ROUND WOOD POST

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

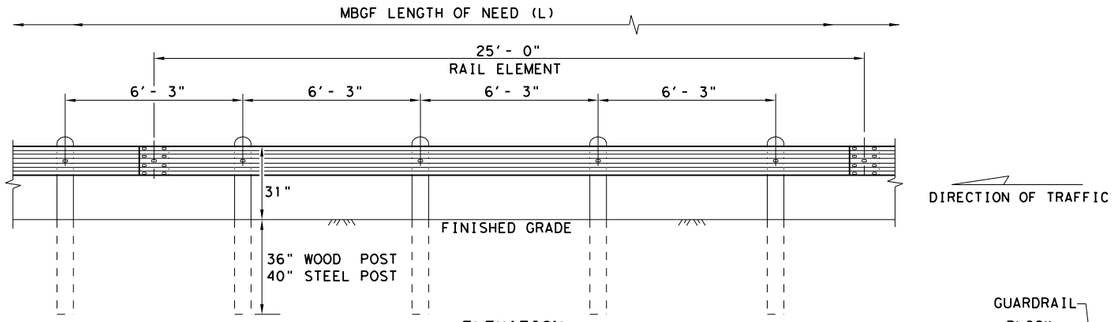


WOOD BLOCK TO RECTANGULAR WOOD POST



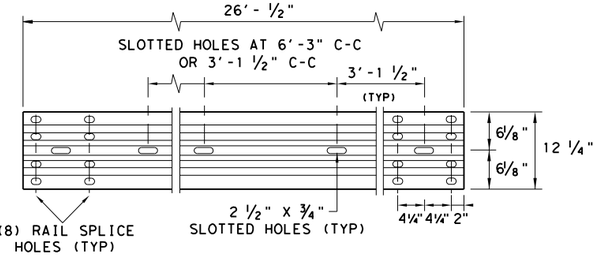
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

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



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

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

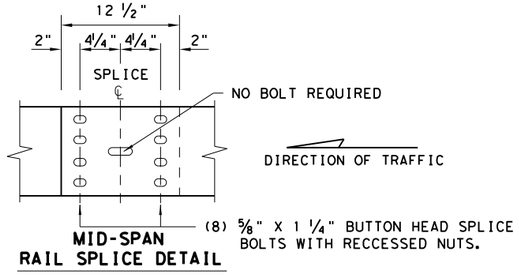
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBBO1 = 1 ¼"
FBBO2 = 2"
⅝"

POST & BLOCK LENGTH
FBBO3 = 10"
FBBO4 = 18"

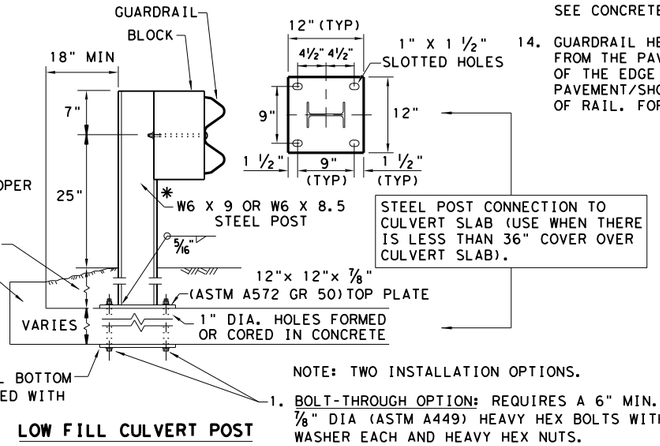
BUTTON HEAD BOLT

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.



12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

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	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		103

DATE: 5/26/2023
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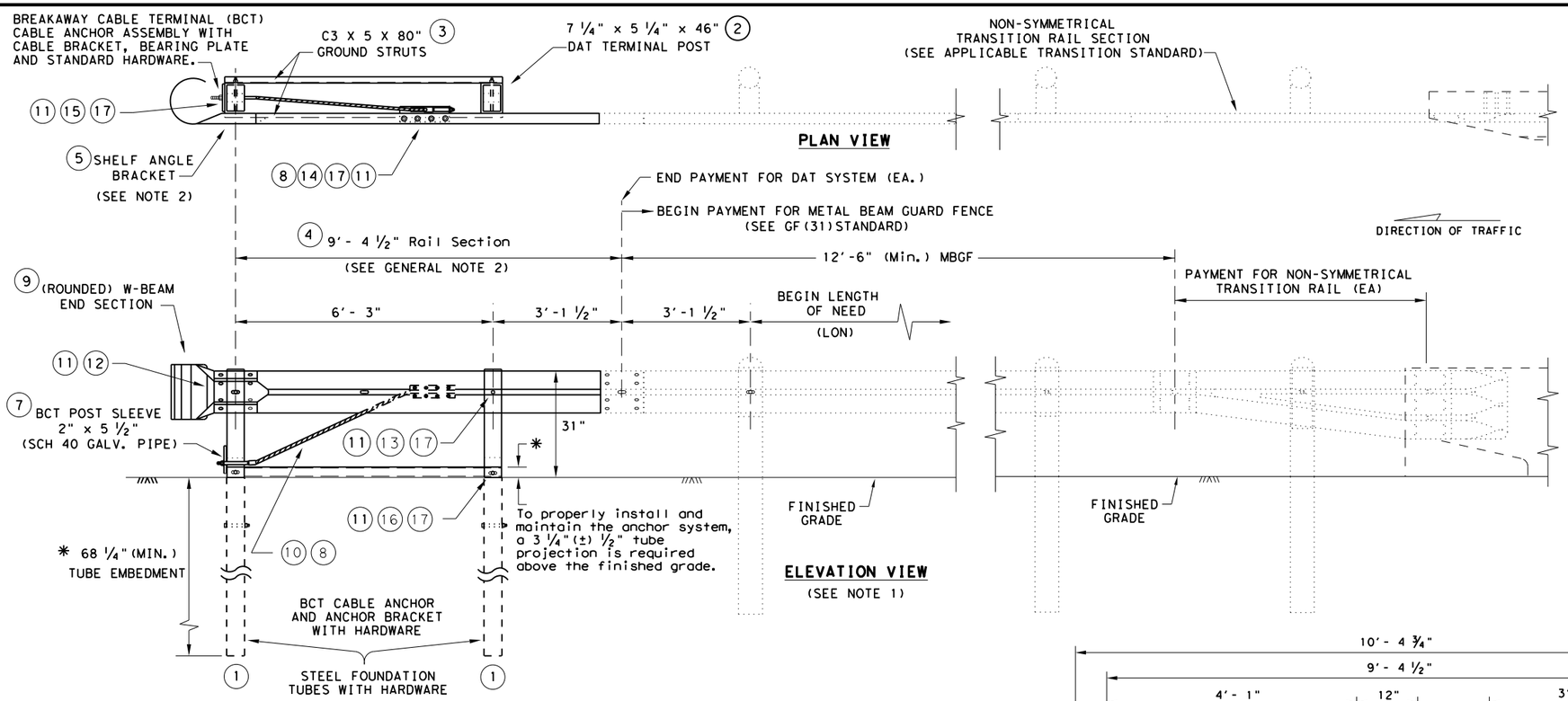


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

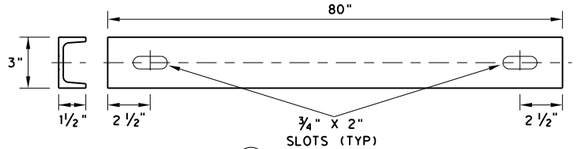
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

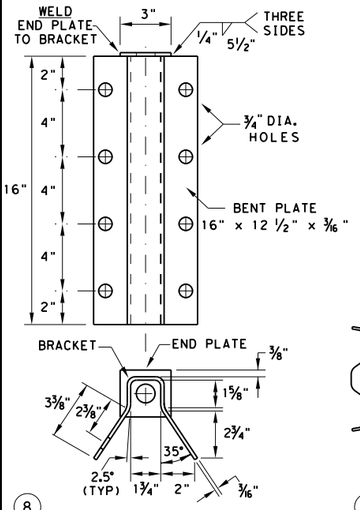
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

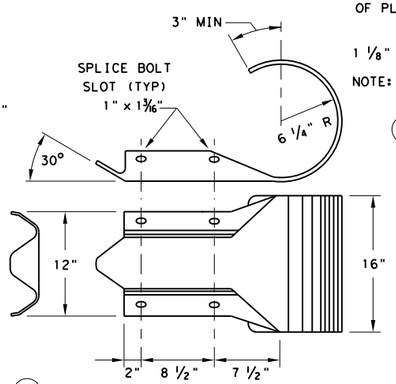
(4) TERMINAL RAIL ELEMENT FOR DAT



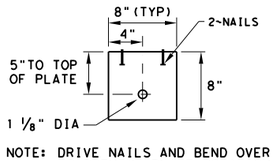
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

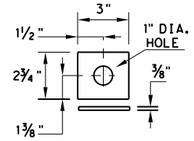


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

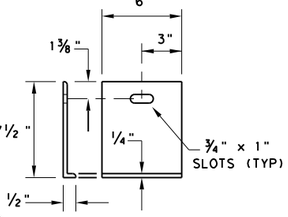


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

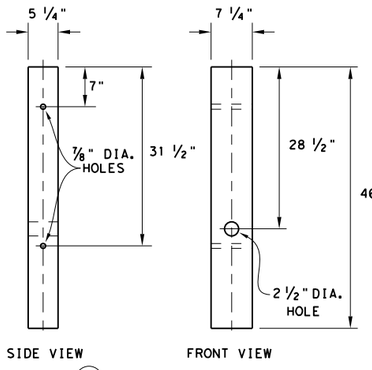
(6) BEARING PLATE
8"x 8"x 5/8" R



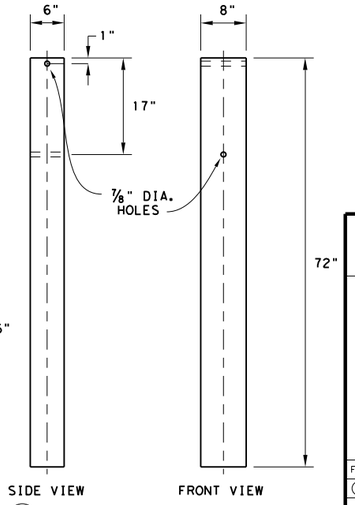
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

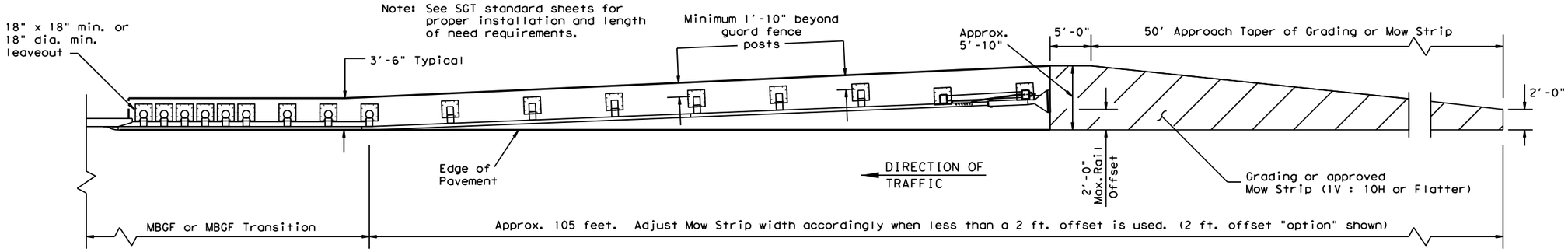
Texas Department of Transportation — Design Division Standard

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

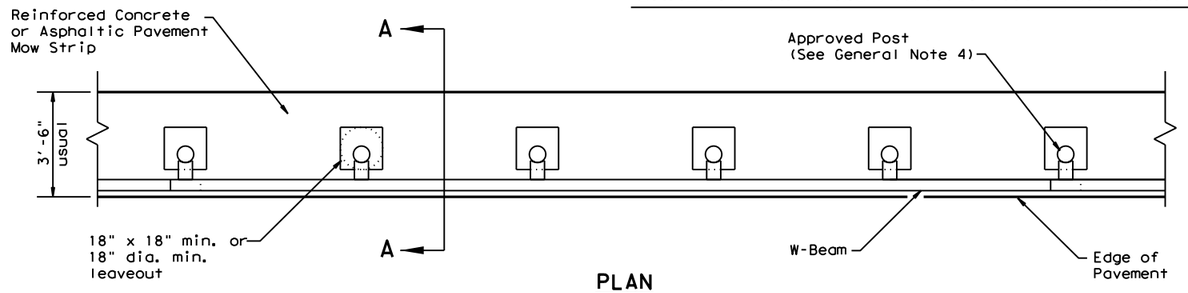
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1191	05	009	FM 937	
	DIST	COUNTY		SHEET NO.	
	BRY	ROBERTSON		104	

DATE: 5/26/2023
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3. Roadway\009RDT11.dgn

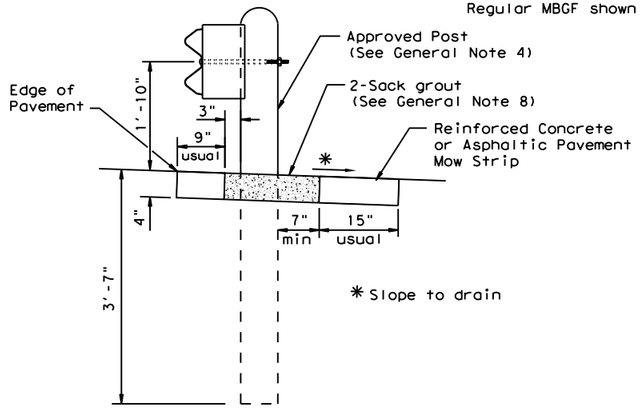


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



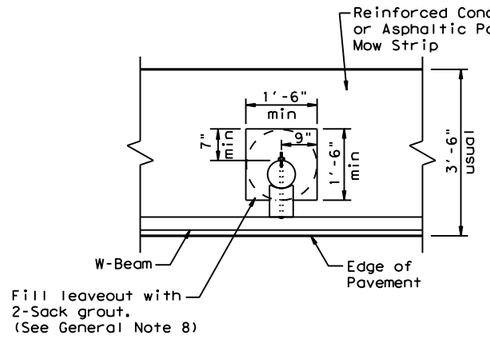
PLAN

Regular MBGF shown with Mow Strip



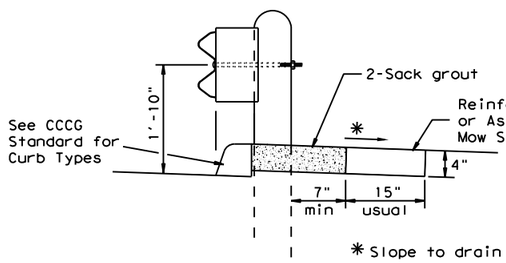
SECTION A-A

Typical



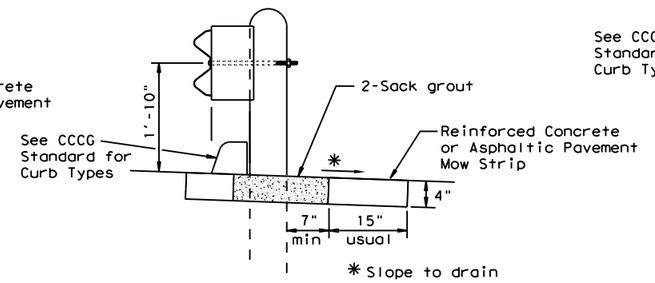
MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leaveout.



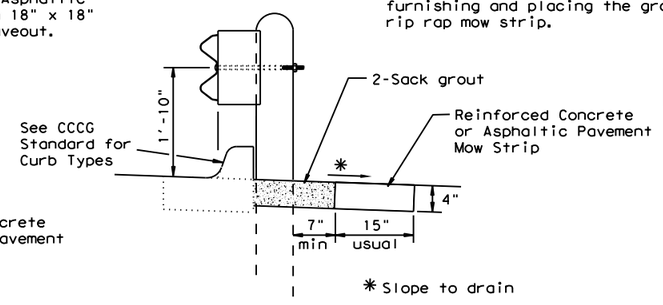
CURB OPTION (1)

This option will increase the post embedment through out 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 SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item of work. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown on the plans. 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 leaveout behind the post shall be a minimum of 7".
4. The type of approved post will be shown elsewhere in the plans. See the applicable standard sheets for additional details and information.
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. Depth of mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leaveouts for posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completly 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 rip rap mow strip.

ONLY FOR USE IN MAINTENANCE REPAIRS.

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE

(MOW STRIP)

MBGF (MS) - 19

FILE: mbgfms19.dgn	DN: TxDOT	CK: KM	DW: TXDOT	CK: CL		
© TxDOT NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1191	05	009		FM 937	
	DIST	COUNTY			SHEET NO.	
	BRY	ROBERTSON			105	

DATE: 5/26/2023
FILE: R:\1005000-1005999\1005062_03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3. Roadway\009RDT03.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

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

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"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

31" RAIL HEIGHT

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

POST 40" DEPTH (TYP 1-8)

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

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)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

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

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1191	05	009	FM 937		
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	BRY	ROBERTSON		106		

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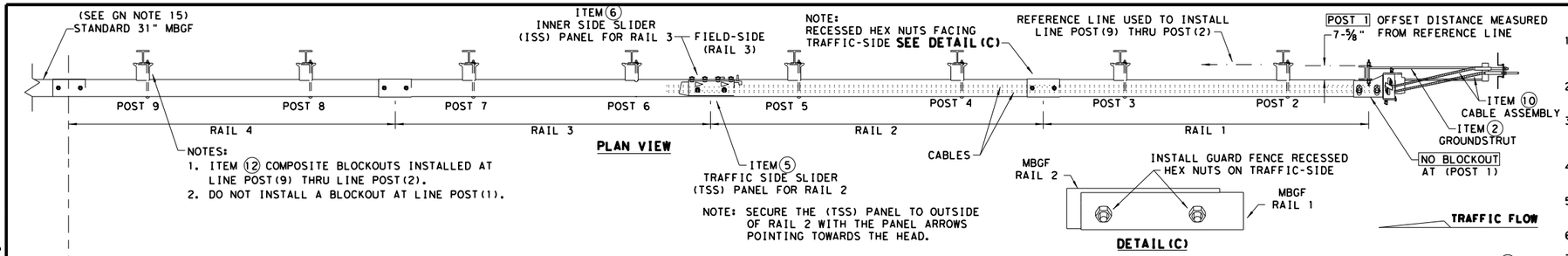

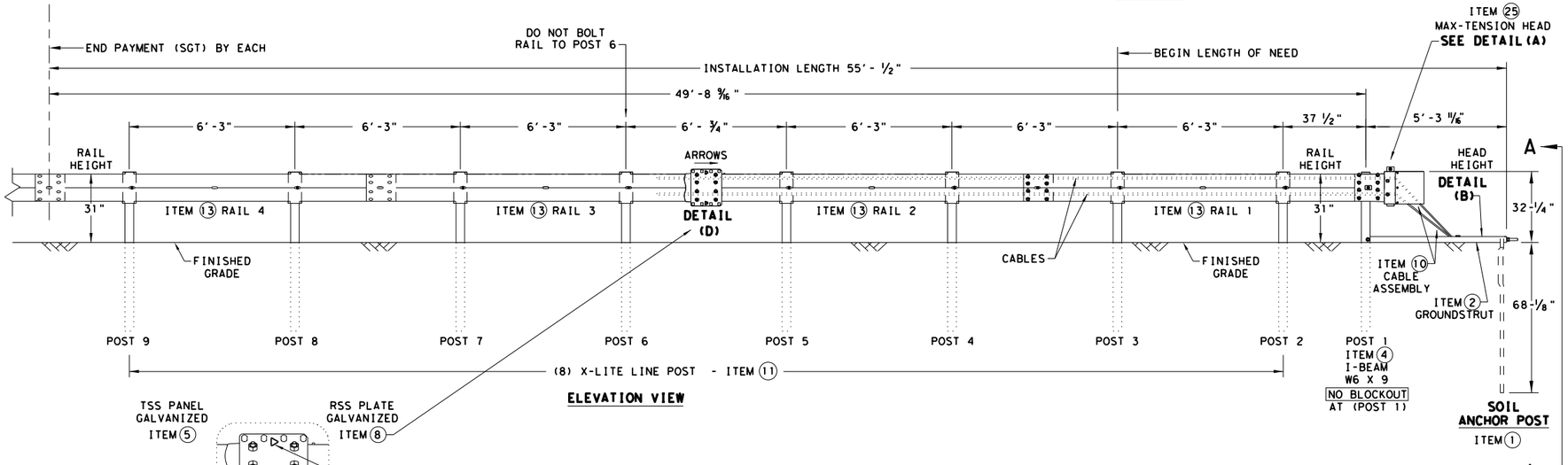

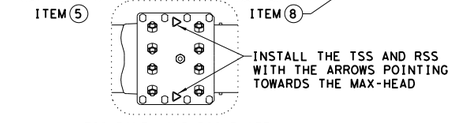

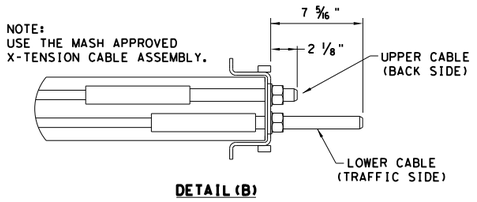

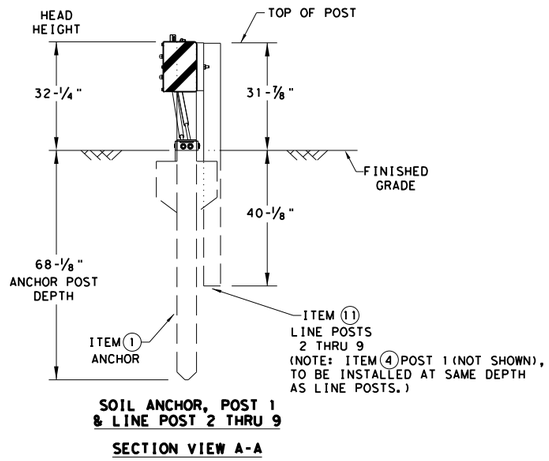

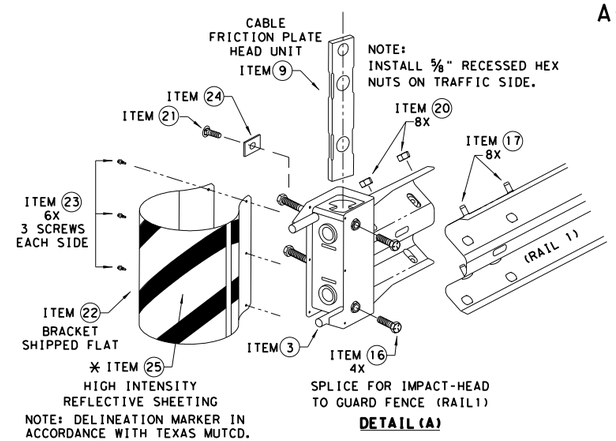

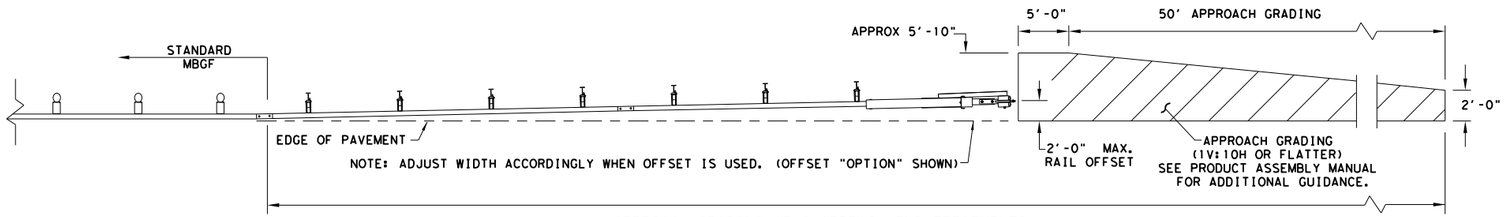

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		107

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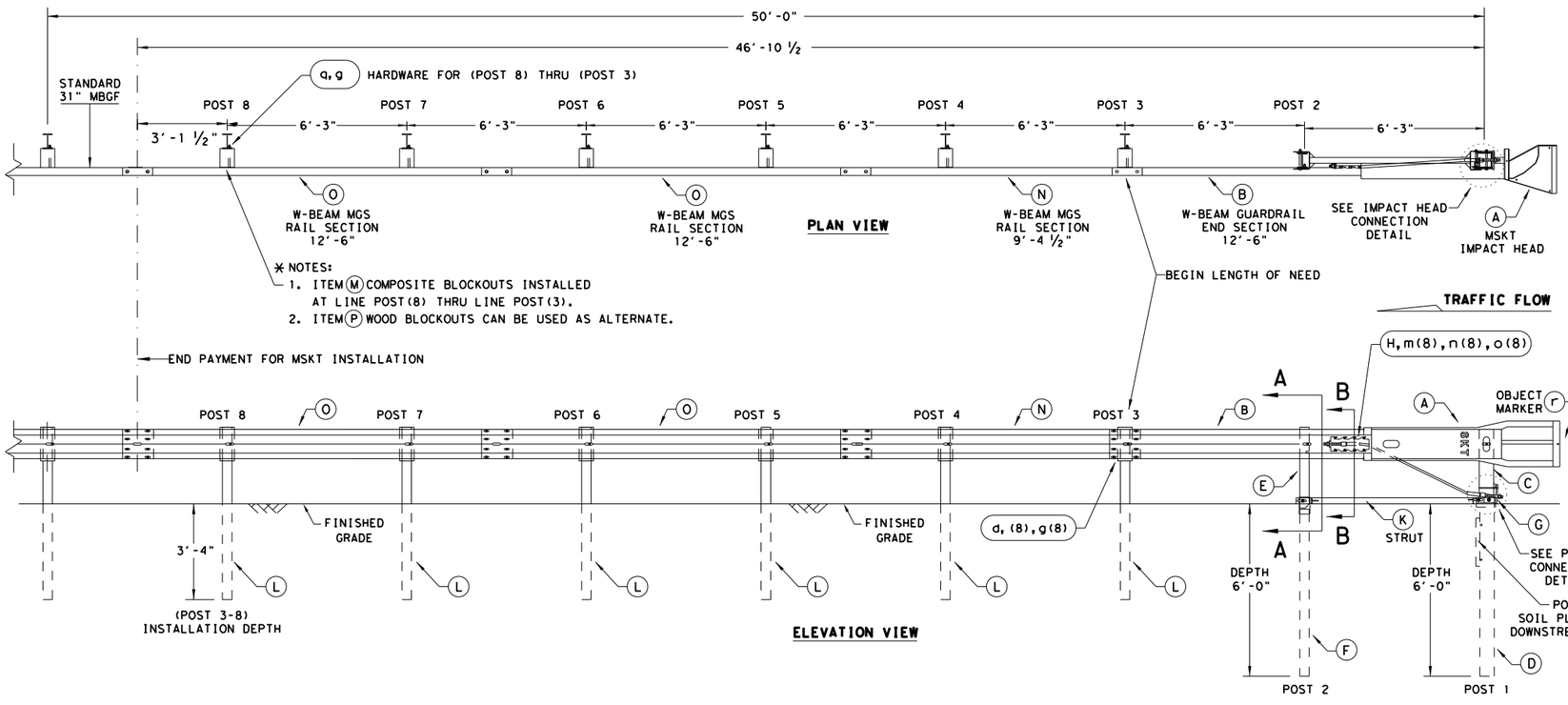
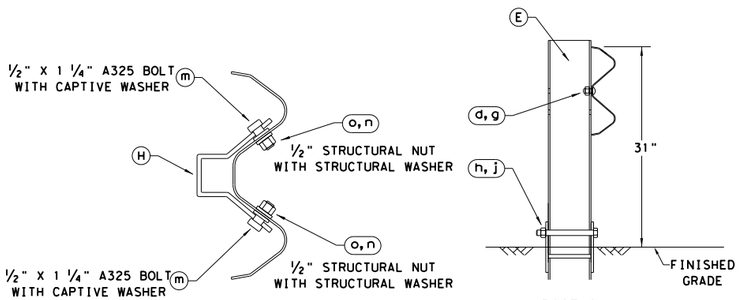
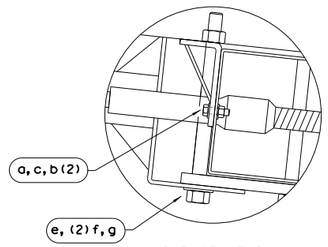


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

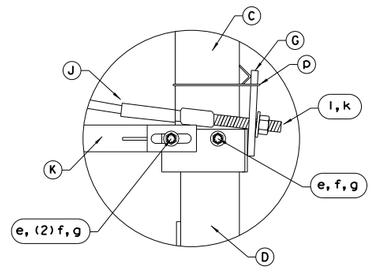


SECTION B-B
ANCHOR BRACKET

POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

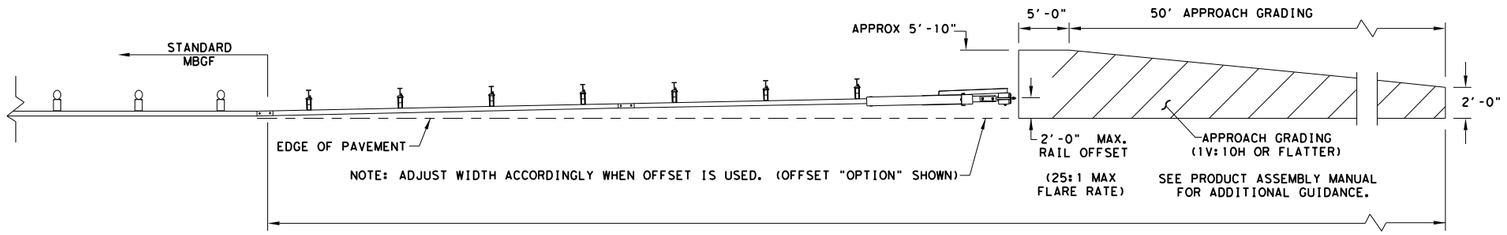
SEE NOTES: *

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

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 ⅛" 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 ½")	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	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



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	
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	DIST	COUNTY		SHEET NO.	
	BRY	ROBERTSON		108	

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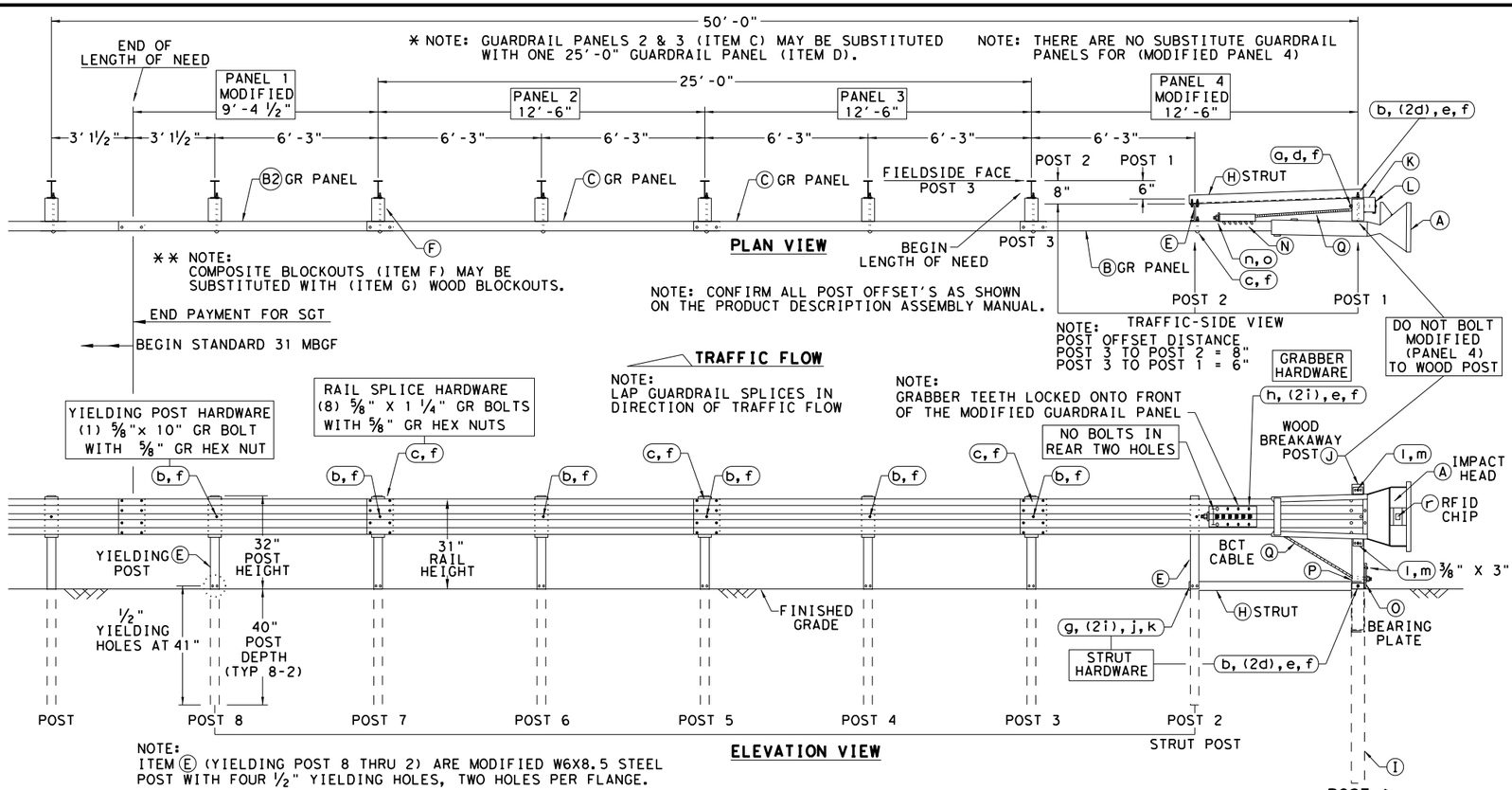
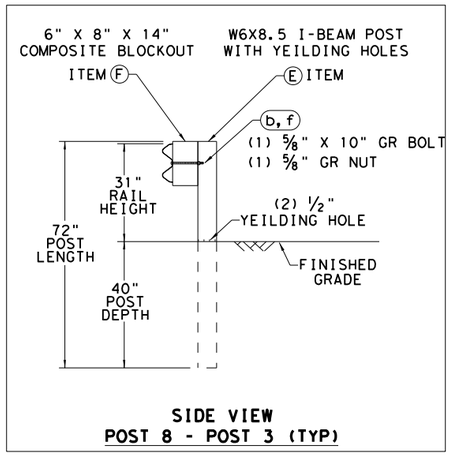


GENERAL NOTES

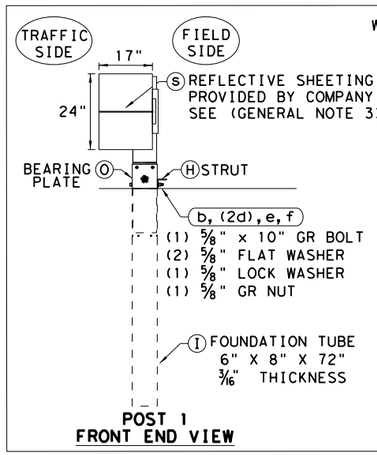
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

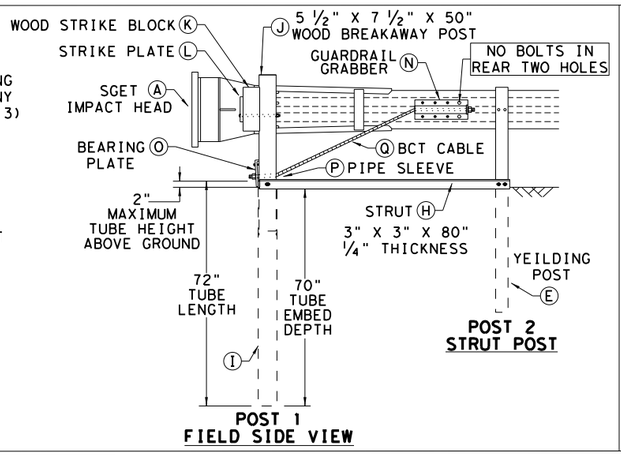
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



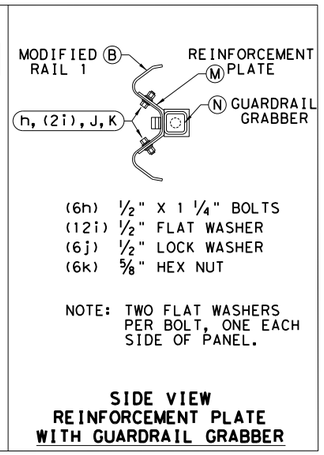
SIDE VIEW
POST 8 - POST 3 (TYP)



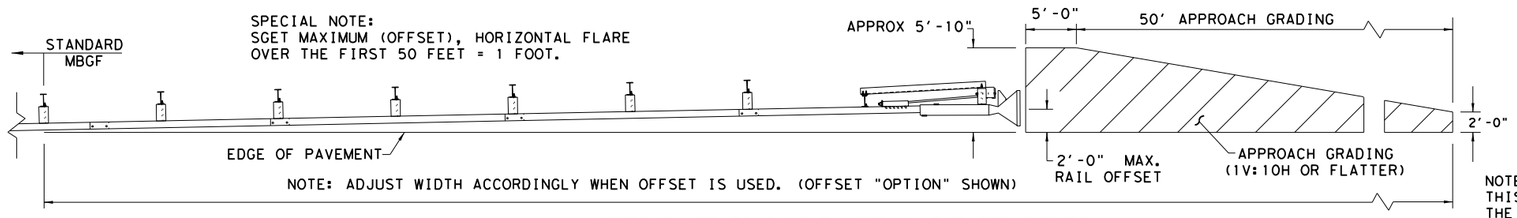
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



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.

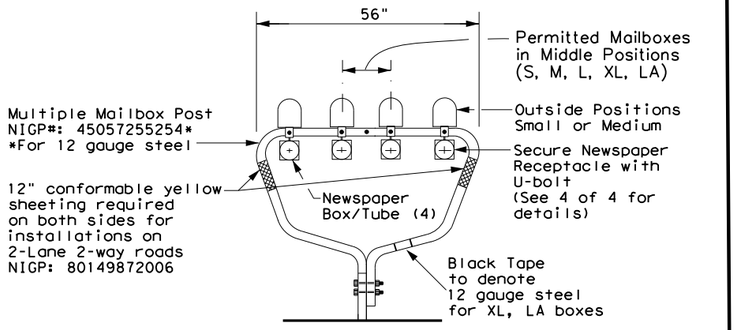
Texas Department of Transportation
Design Division Standard

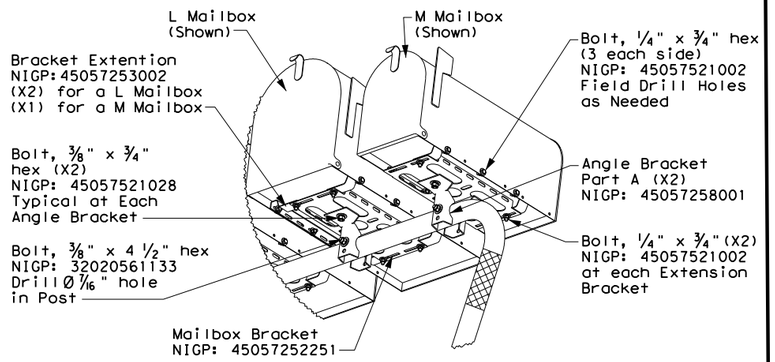
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	1191	05	009	FM 937		
	DIST	COUNTY		SHEET NO.		
	BRY	ROBERTSON		109		

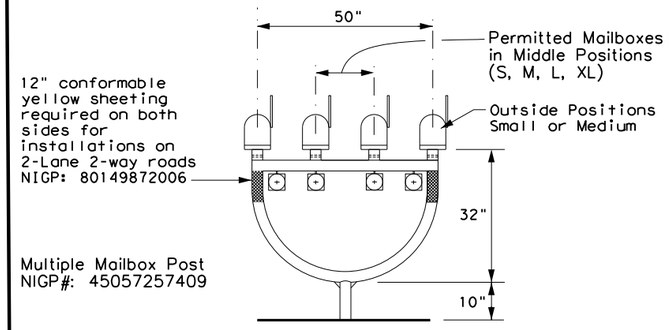
DATE:
FILE:

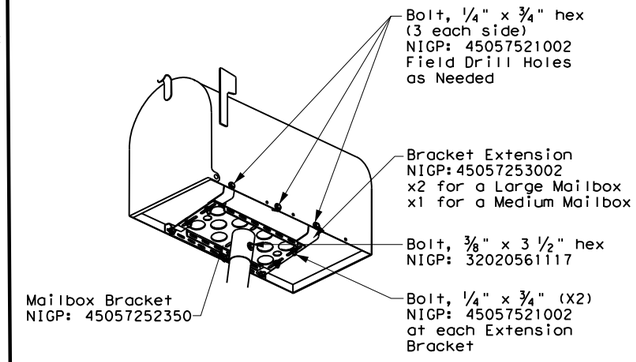
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

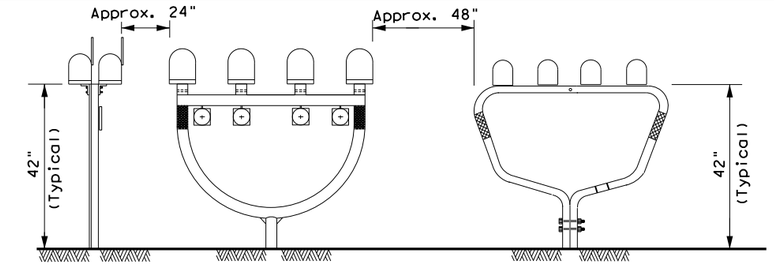
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

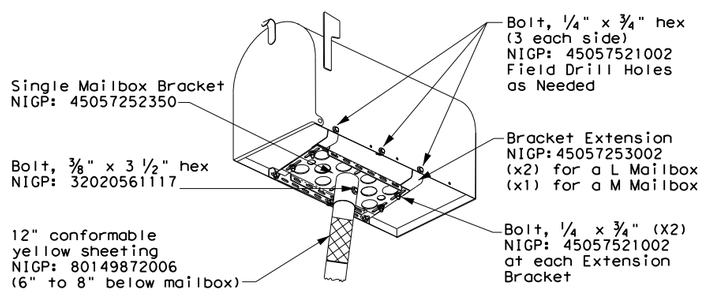
TYPICAL INSTALLATION MEASUREMENTS

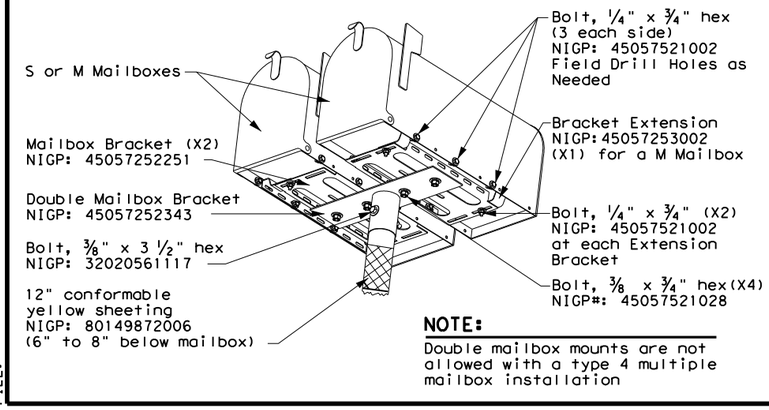


NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

TYPE 2 and 4 - SINGLE/DOUBLE

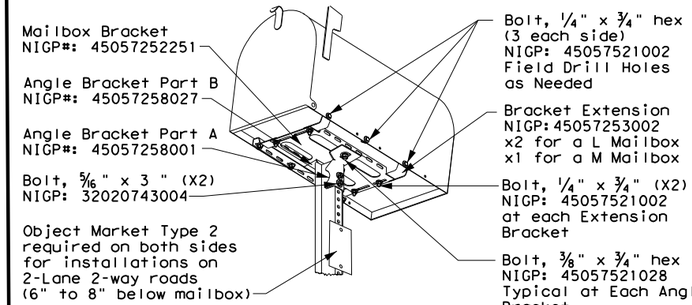


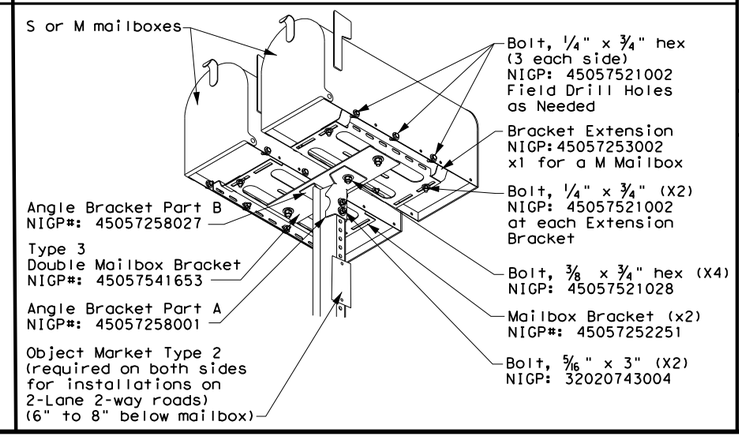


NOTE:

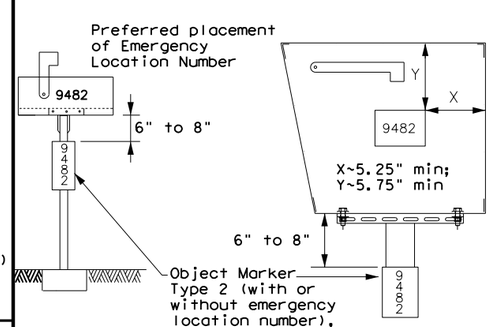
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

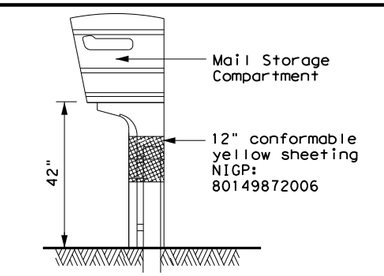


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

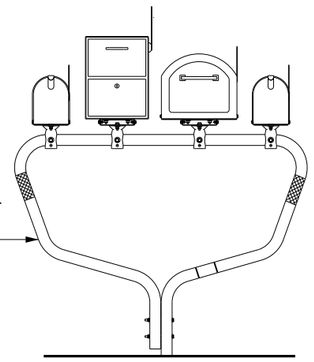
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

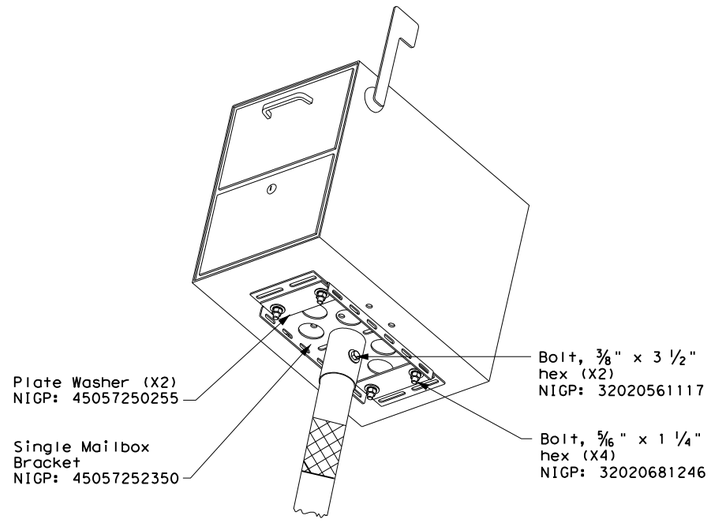
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		110

DATE:
FILE:

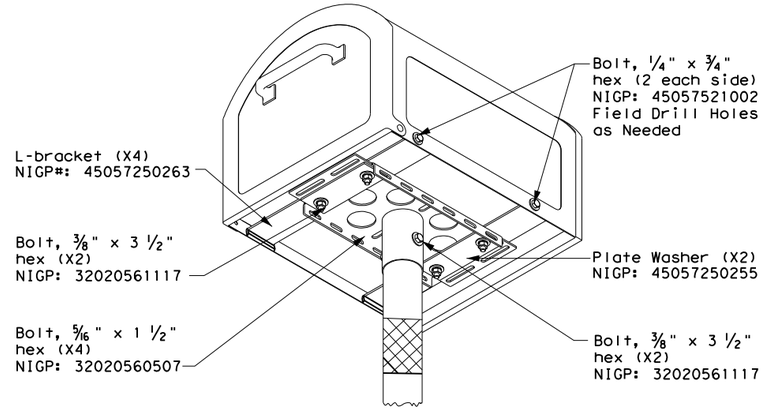
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

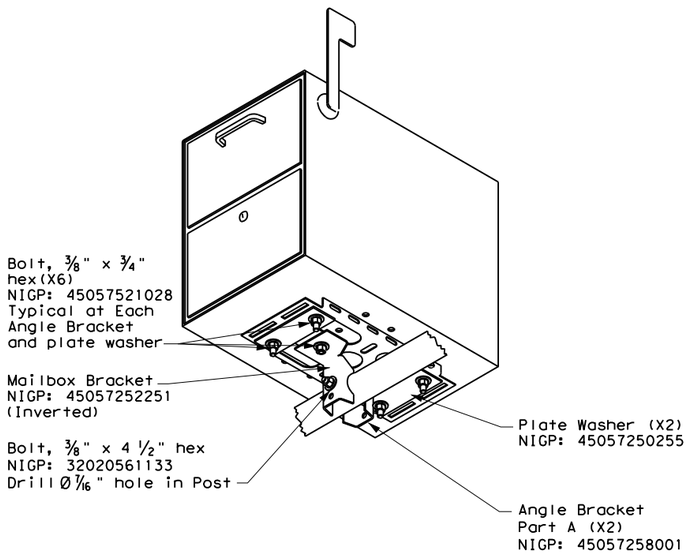


TYPE 2/4 - SINGLE XL MAILBOX

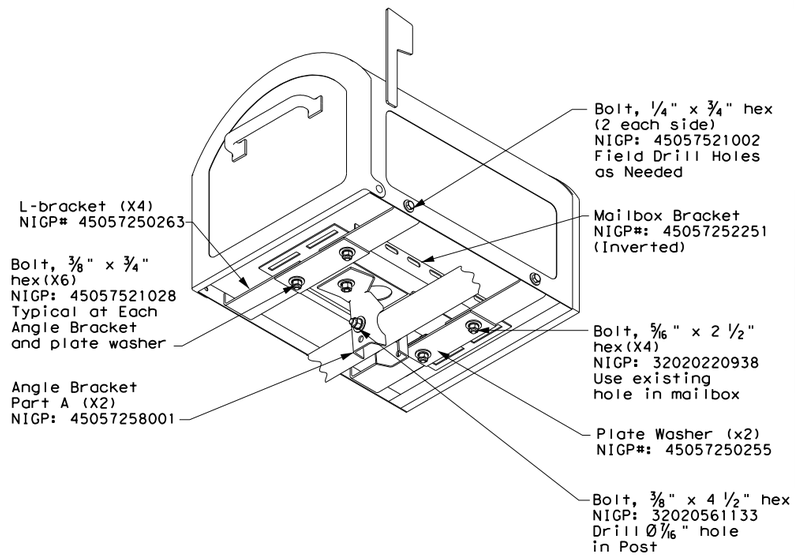


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

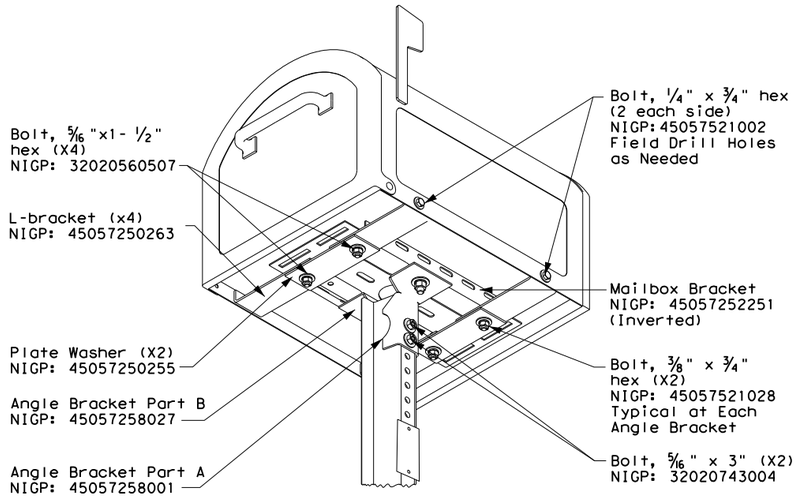
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

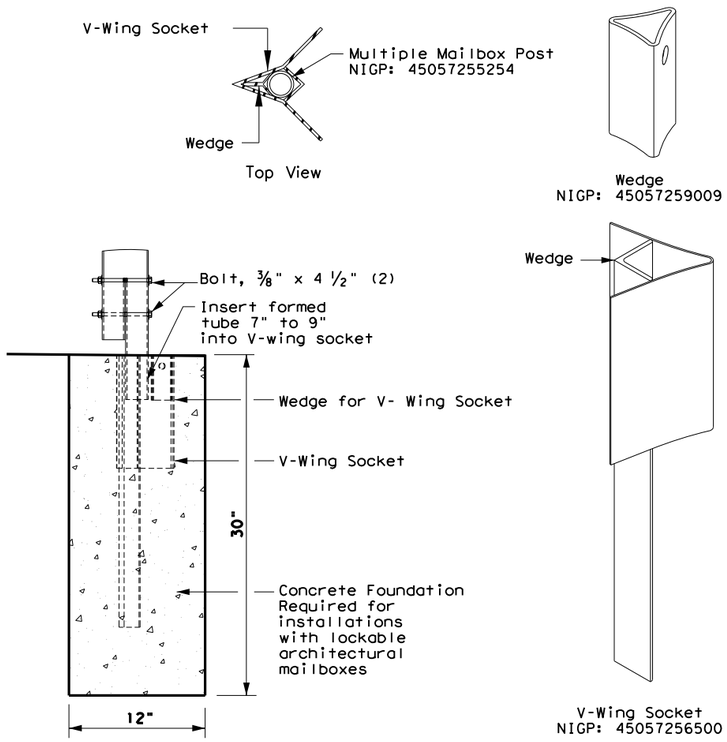
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		111

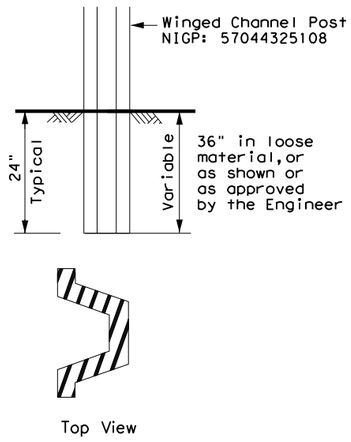
DATE: 5/26/2023 9:55:08 AM
FILE: R:\[illegible]

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



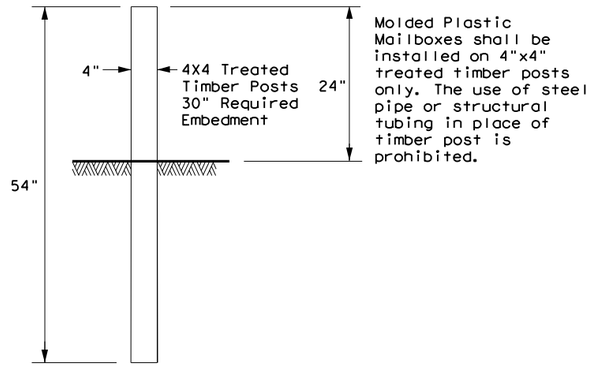
TYPE 3 - SUPPORT/FOUNDATION



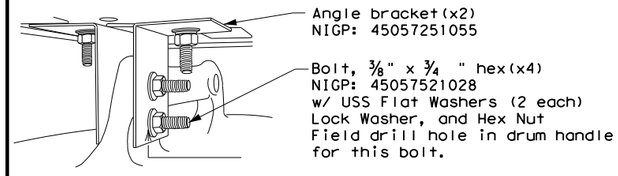
NOTES:

1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

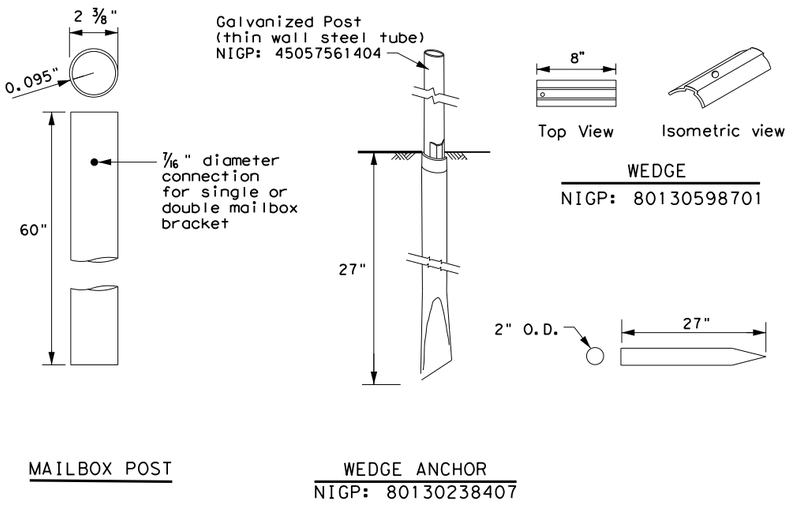
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

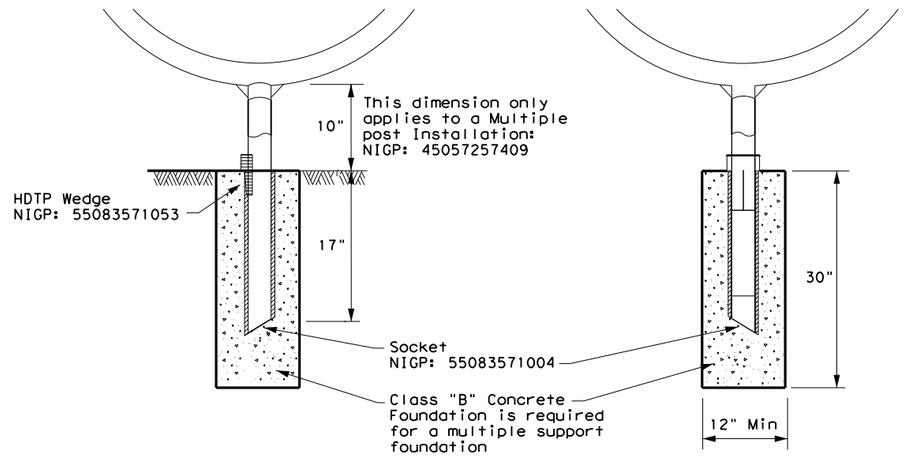


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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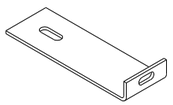
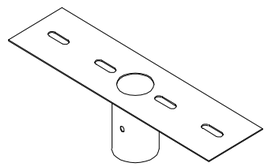
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		112

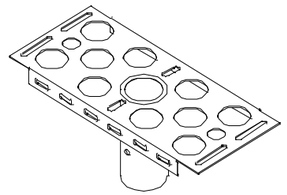
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



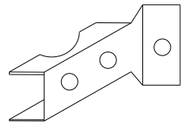
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



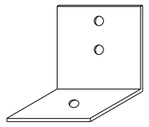
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



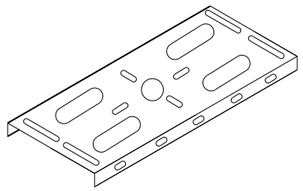
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



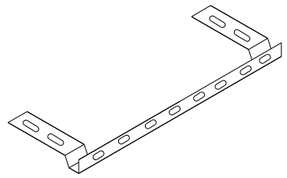
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



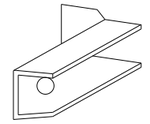
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



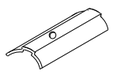
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



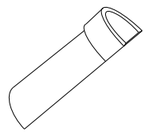
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



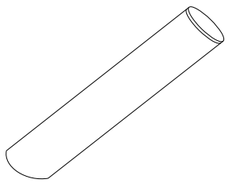
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

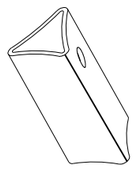


NIGP: 55083571053
Type 4 Mailbox Wedge

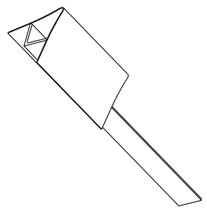


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

DATE: 5/26/2023 9:55:08 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\3. Roadway\A009MD02.dgn

SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		113

DATE: 5/26/2023
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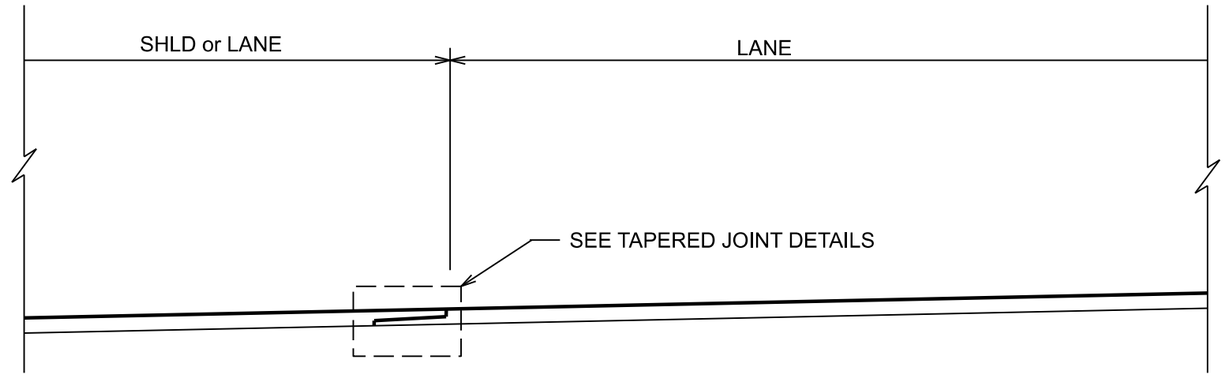
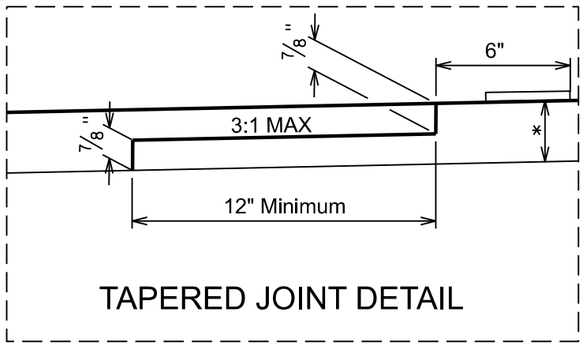
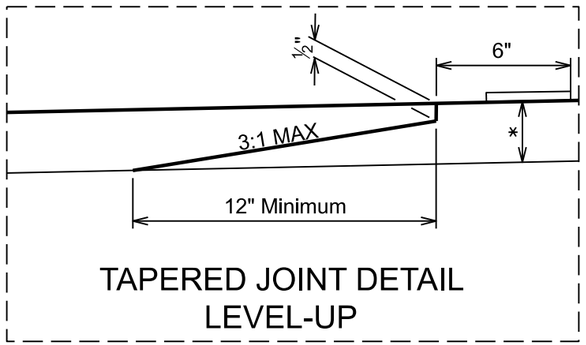




TAPERED JOINT DETAIL



TAPERED JOINT DETAIL
LEVEL-UP

* SEE TYPICAL SECTION FOR DEPTH AND TYPE OF HMA.

NOTES:

LONGITUDINAL JOINTS SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL EXTEND BEYOND THE NORMAL LANE WIDTH. 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. TACK COAT SHALL BE APPLIED TO THE IN-PLACE TAPER 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.

08-28-2013

Texas Department of Transportation | Design Division Standard

HOT MIX LONGITUDINAL JOINT DETAILS

FILE:	DN: TxDOT	CK:	DW:	CK:
© TxDOT:	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		114

DATE: 5/26/2023
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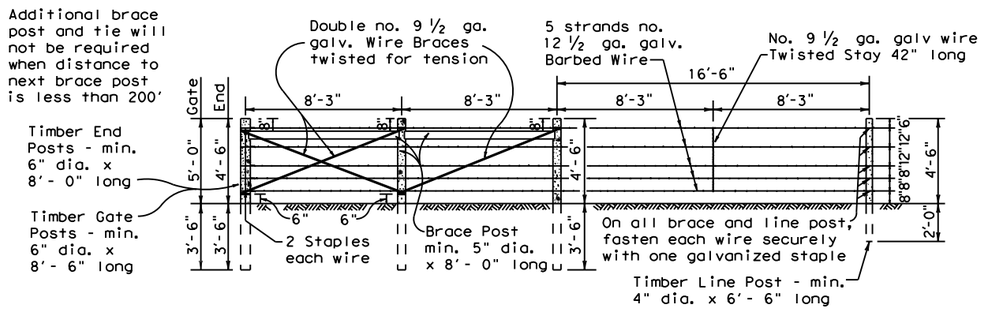
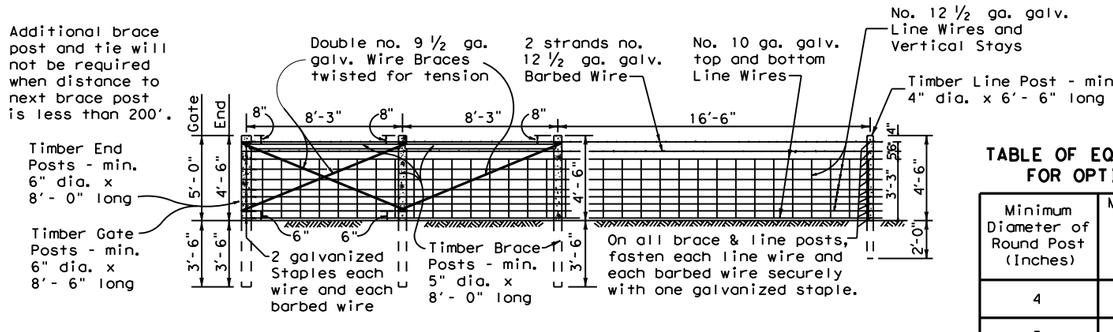


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

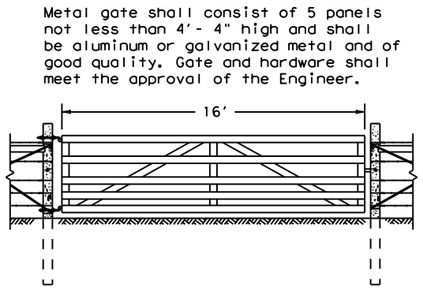
Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

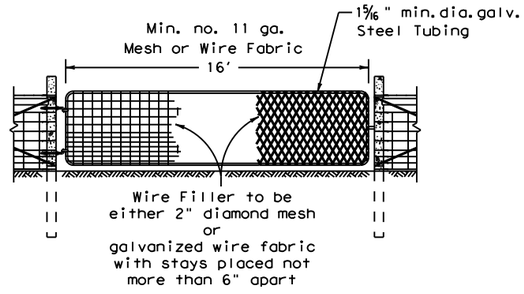
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

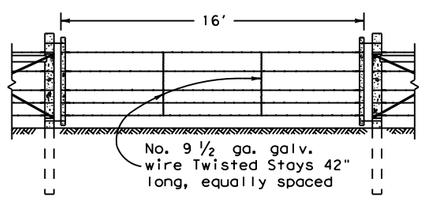
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

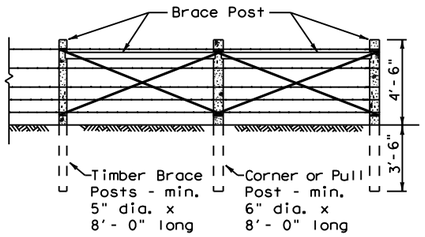


DETAIL TYPE 3 GATE

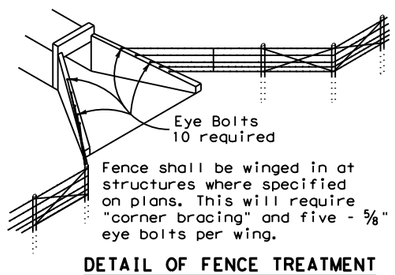
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'- 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'- 6" below the ground surface, the holes shall be drilled a minimum of 2'- 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

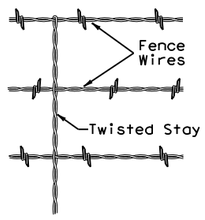
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



CORNER OR PULL POST ASSEMBLY

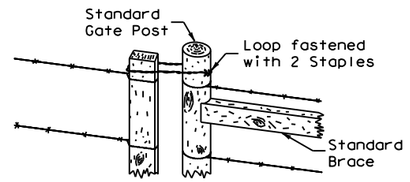


DETAIL OF FENCE TREATMENT AT STRUCTURES

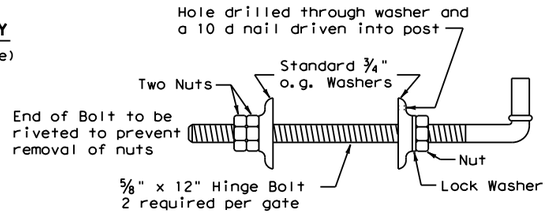


DETAIL OF STAY

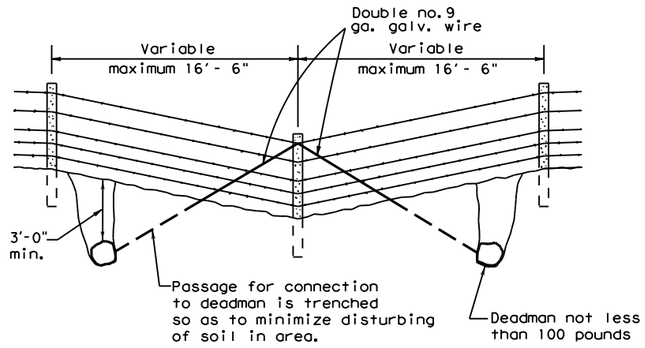
(Barbed wire fence)



DETAIL FASTENER TYPE 3 GATE

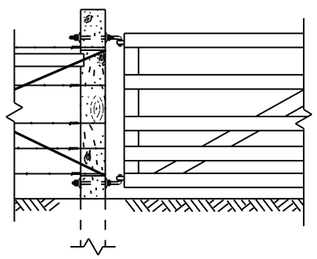


DETAIL OF GATE HINGE BOLT ASSEMBLY

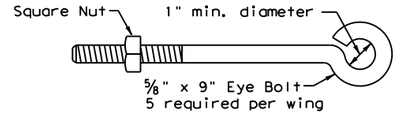


DETAIL OF FENCE SAG

(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS)

WF(1)-10

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© TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		114A

LEGEND

- DRAINAGE AREA ID
- AREA (AC)
- DRAINAGE FLOW DIRECTION
- DRAINAGE DIVIDE
- LONGEST WATER COURSE

NOTES:

1. TOPOGRAPHIC CONTOUR FROM USGS QUADRANGLE MAPS:

   PETTIBONE, TX

2. HYDROLOGIC CALCULATIONS LOCATED ON HYDROLOGY DATA SHEETS.
3. HYDRAULIC CALCULATIONS LOCATED ON HYDRAULIC DATA SHEETS.
4. DRAINAGE AREA FOR CULVERT 7 CONTRIBUTES TO DRAINAGE AREA FOR CULVERT 8.

0 400 800

SCALE: 1" = 800'

STATE OF TEXAS
PAULA N. PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2023.05.23 01:03:39 -06'00'

Texas Department of Transportation

P&D Professional Services, Inc. TBPE REG. NO. F-14117
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
(281) 743-4475

FM 937

DRAINAGE AREA MAP

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		115

DATE: 5/23/2023 12:48:26 AM
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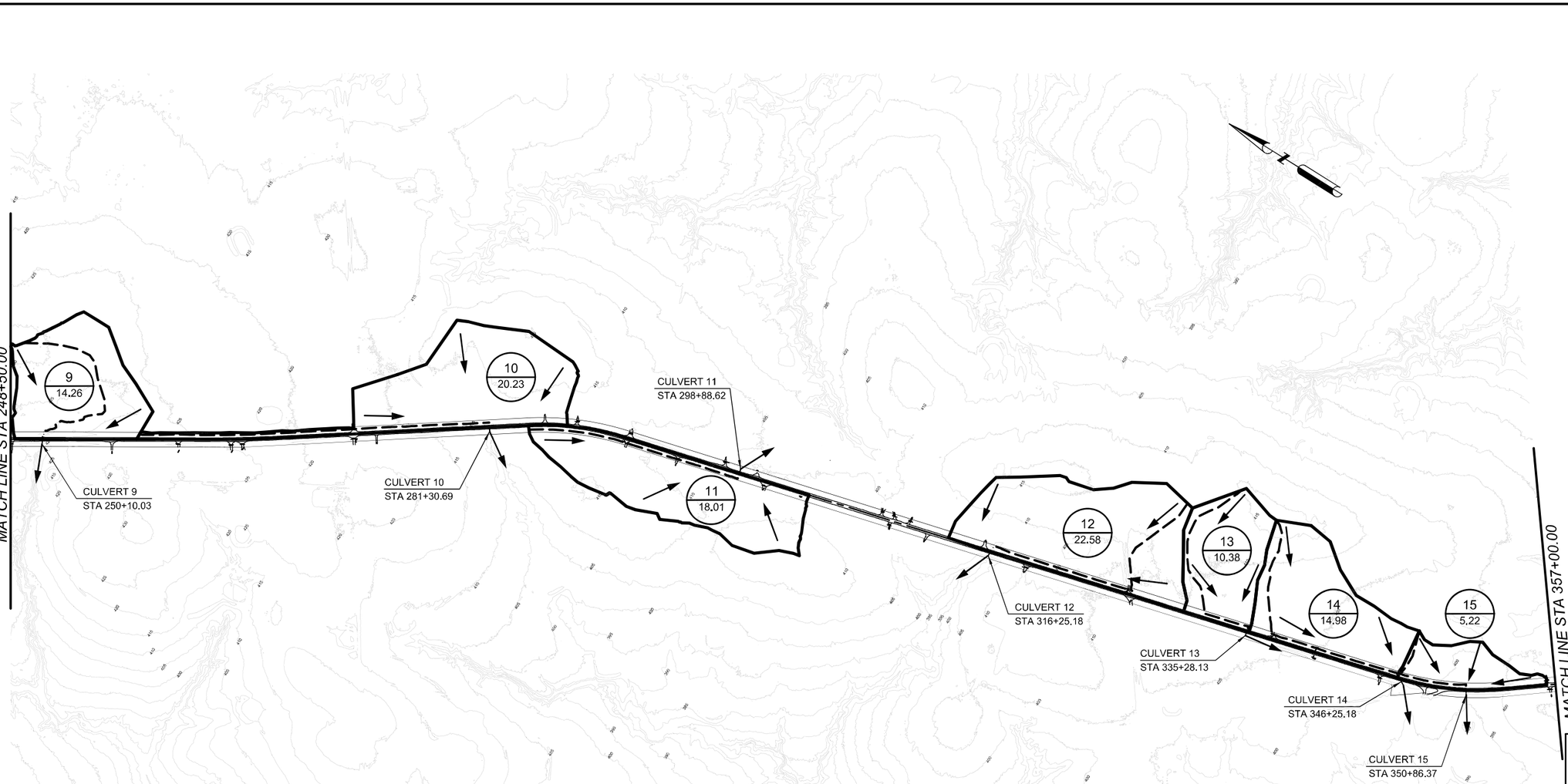

LEGEND

- DRAINAGE AREA ID
- AREA (AC)
- DRAINAGE FLOW DIRECTION
- DRAINAGE DIVIDE
- LONGEST WATER COURSE

NOTES:

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   PETTIBONE, TX

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3. HYDRAULIC CALCULATIONS LOCATED ON HYDRAULIC DATA SHEETS.

0 400 800

SCALE: 1" = 800'

STATE OF TEXAS
PAULA N. PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

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DRAINAGE AREA MAP

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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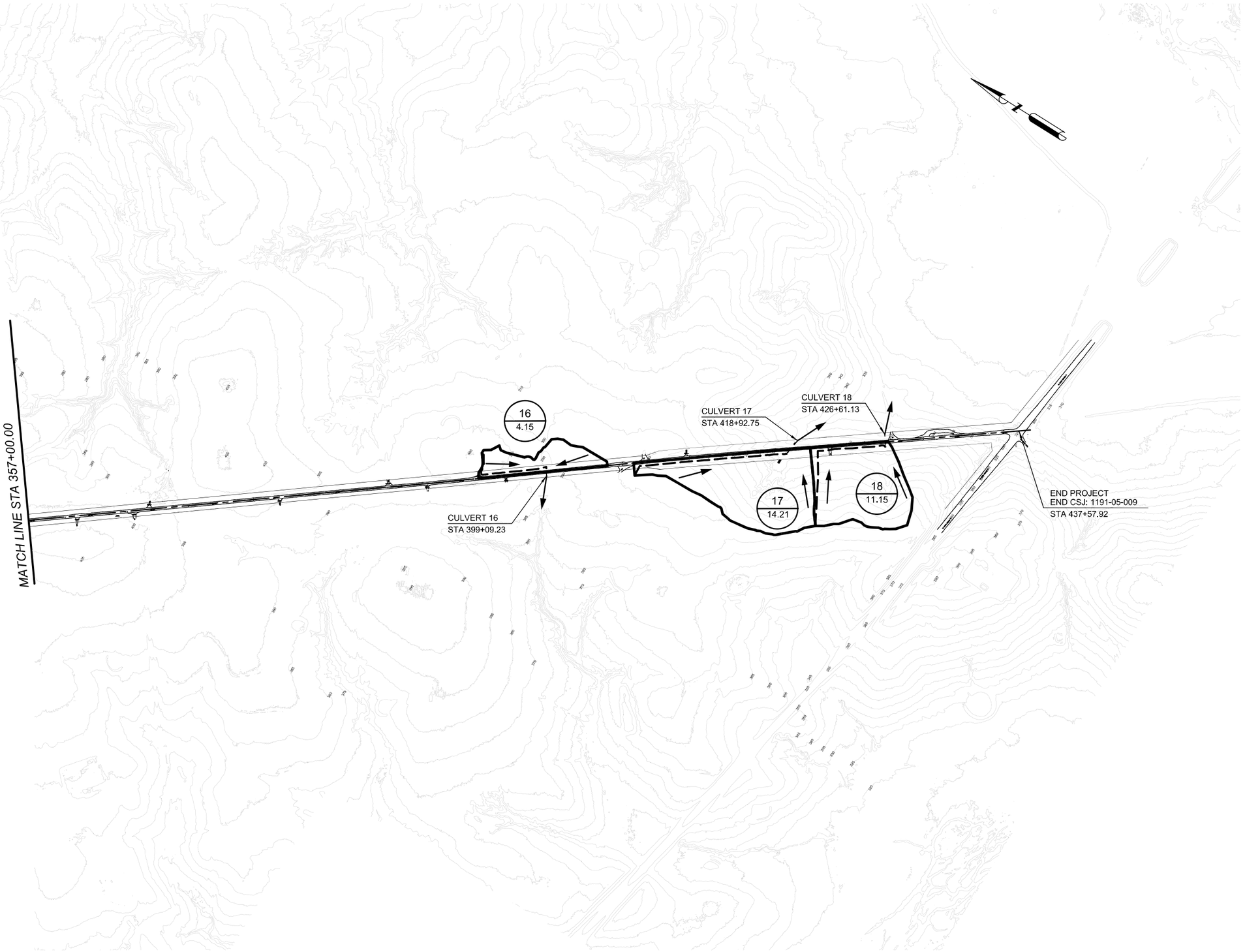

LEGEND

- DRAINAGE AREA ID
- AREA (AC)
- DRAINAGE FLOW DIRECTION
- DRAINAGE DIVIDE
- LONGEST WATER COURSE

NOTES:

1. TOPOGRAPHIC CONTOUR FROM USGS QUADRANGLE MAPS:

   PETTIBONE, TX

2. HYDROLOGIC CALCULATIONS LOCATED ON HYDROLOGY DATA SHEETS.
3. HYDRAULIC CALCULATIONS LOCATED ON HYDRAULIC DATA SHEETS.

0 400 800

SCALE: 1" = 800'

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PAULA N. PRICE
90265
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(281) 743-4475

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DRAINAGE AREA MAP

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		117

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HYDROLOGIC SUMMARY TABLE - EXISTING CONDITIONS

DRAINAGE AREA ID	STATION	DRAINAGE AREA (ACRES)	RUNOFF COEF	Tc (MIN)	INTENSITY (In/Hr) - ATLAS 14						PEAK FLOW (CFS)					
					2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
CC-1	161+49.68	10.55	0.32	32.4	2.82	3.47	4.00	4.74	5.31	5.89	9.5	11.6	13.4	15.9	17.8	19.7
CC-2	175+07.04	33.37	0.31	23.8	3.36	4.11	4.74	5.60	6.25	6.92	34.6	42.4	48.8	57.7	64.4	71.3
CC-3	182+84.18	9.48	0.32	15.7	4.13	5.04	5.80	6.83	7.61	8.40	12.5	15.2	17.5	20.6	23.0	25.4
CC-4	198+25.76	10.27	0.32	39.1	2.52	3.10	3.58	4.25	4.76	5.29	8.3	10.2	11.8	14.0	15.7	17.5
CC-5	202+35.42	3.97	0.32	19.3	3.75	4.58	5.27	6.22	6.94	7.67	4.8	5.8	6.7	7.9	8.8	9.7
CC-6	210+92.56	19.34	0.32	29.0	3.01	3.69	4.26	5.04	5.64	6.25	18.5	22.7	26.1	30.9	34.6	38.4
CC-7	227+34.56	5.43	0.32	20.2	3.66	4.48	5.15	6.08	6.79	7.51	6.4	7.8	9.0	10.6	11.8	13.1
CC-8	243+14.55	23.94	0.32	38.2	2.56	3.14	3.64	4.32	4.83	5.37	19.8	24.4	28.2	33.5	37.5	41.7
CC-9	250+70.03	14.26	0.31	30.6	2.92	3.58	4.13	4.89	5.48	6.07	12.9	15.8	18.3	21.6	24.2	26.9
CC-10	281+30.69	20.23	0.33	45.1	2.30	2.84	3.28	3.90	4.38	4.87	15.2	18.7	21.6	25.7	28.8	32.1
CC-11	298+88.62	18.01	0.32	38.4	2.55	3.13	3.62	4.30	4.82	5.35	14.7	18.0	20.8	24.7	27.7	30.8
CC-12	316+90.16	22.58	0.31	46.8	2.25	2.77	3.21	3.82	4.28	4.77	15.9	19.5	22.6	26.9	30.2	33.6
CC-13	335+28.31	10.38	0.31	32.6	2.81	3.45	3.99	4.73	5.29	5.87	9.0	11.0	12.7	15.1	16.9	18.7
CC-14	346+25.18	14.98	0.31	26.0	3.20	3.92	4.52	5.34	5.97	6.62	14.9	18.3	21.1	25.0	27.9	30.9
CC-15	350+86.37	5.22	0.33	25.7	3.22	3.95	4.55	5.38	6.01	6.66	5.6	6.8	7.9	9.3	10.4	11.6
CC-16	399+09.23	4.15	0.34	20.6	3.62	4.43	5.10	6.02	6.72	7.43	5.1	6.3	7.2	8.5	9.5	10.5
CC-17	418+92.75	14.21	0.31	16.9	3.99	4.88	5.61	6.61	7.37	8.14	17.8	21.8	25.1	29.5	32.9	36.4
CC-18	426+61.13	11.15	0.31	16.0	4.09	4.99	5.74	6.76	7.53	8.32	14.1	17.3	19.9	23.4	26.1	28.8

TIME OF CONCENTRATION - KERBY KIRPICH METHOD - EXISTING CONDITIONS

DRAINAGE AREA ID	STATION	Tc (HR)	Tc (MIN)	OVERLAND FLOW							CHANNEL FLOW						
				T_{ov} (MIN)	K_{ov}	L_{ov} (FT)	N	S (FT/FT)	Adj S (FT/FT)	ELEV START	ELEV END	T_{CH} (MIN)	K_{CH}	L_{CH} (FT)	S (FT/FT)	Adj S (FT/FT)	ELEV START	ELEV END
CC-1	161+49.68	0.54	32.36	17.43	0.828	178	0.4	0.0112	0.0112	440.0	438.0	14.93	0.0078	1258	0.0047	0.0047	438.0	432.05
CC-2	175+07.04	0.40	23.82	14.18	0.828	143	0.4	0.0175	0.0175	446.5	444.0	9.64	0.0078	1650	0.0253	0.0253	444.0	402.24
CC-3	182+84.18	0.26	15.69	5.54	0.828	37	0.4	0.0649	0.0649	432.4	430.0	10.15	0.0078	1113	0.0101	0.0101	430.0	418.79
CC-4	198+25.76	0.65	39.14	30.18	0.828	354	0.4	0.0042	0.0042	423.5	422.0	8.96	0.0078	762	0.0065	0.0065	422.0	417.01
CC-5	202+35.42	0.32	19.26	13.83	0.828	116	0.4	0.0129	0.0129	426.5	425.0	5.42	0.0078	589	0.0144	0.0144	425.0	416.55
CC-6	210+92.56	0.48	29.01	19.02	0.828	231	0.4	0.0130	0.0130	429.0	426.0	9.98	0.0078	1146	0.0112	0.0112	426.0	413.20
CC-7	227+34.56	0.34	20.16	15.10	0.828	156	0.4	0.0160	0.0160	432.5	430.0	5.07	0.0078	466	0.0107	0.0107	430.0	425.00
CC-8	243+14.55	0.64	38.16	15.10	0.828	156	0.4	0.0160	0.0160	432.5	430.0	23.06	0.0078	2167	0.0045	0.0045	430.0	420.18
CC-9	250+70.03	0.51	30.61	20.36	0.828	239	0.4	0.0104	0.0104	431.5	429.0	10.25	0.0078	1132	0.0102	0.0102	429.0	417.49
CC-10	281+30.69	0.75	45.10	26.96	0.828	263	0.4	0.0038	0.0038	426.0	425.0	18.14	0.0078	2135	0.0082	0.0082	425.0	407.47
CC-11	298+88.62	0.64	38.38	22.90	0.828	165	0.4	0.0030	0.0030	411.5	411.0	15.48	0.0078	1325	0.0048	0.0048	411.0	404.68
CC-12	316+90.16	0.78	46.82	31.43	0.828	348	0.4	0.0035	0.0035	411.2	410.0	15.40	0.0078	1441	0.0057	0.0057	410.0	401.74
CC-13	335+28.31	0.54	32.59	19.28	0.828	241	0.4	0.0133	0.0133	415.2	412.0	13.31	0.0078	1180	0.0057	0.0057	412.0	405.23
CC-14	346+25.18	0.43	26.02	13.08	0.828	122	0.4	0.0180	0.0180	417.2	415.0	12.94	0.0078	1602	0.0111	0.0111	415.0	397.17
CC-15	350+86.37	0.43	25.69	18.83	0.828	181	0.4	0.0083	0.0083	403.5	402.0	6.86	0.0078	606	0.0083	0.0083	402.0	397.00
CC-16	399+09.23	0.34	20.61	15.03	0.828	122	0.4	0.0099	0.0099	399.2	398.0	5.58	0.0078	605	0.0141	0.0141	398.0	389.46
CC-17	418+92.75	0.28	16.88	10.80	0.828	85	0.4	0.0199	0.0199	395.5	393.8	6.07	0.0078	1193	0.0439	0.0439	393.8	341.40
CC-18	426+61.13	0.27	16.05	10.93	0.828	139	0.4	0.0503	0.0503	392.0	385.0	5.12	0.0078	1021	0.0503	0.0503	385.0	333.68

RATIONAL METHOD RUNOFF COEFFICIENT (C) (PERVIOUS COVER)

LAND USE	CLASSIFICATION / SOIL TYPE (DESCRIPTION)	RANGE	USED
RELIEF (Cr)	LOW - RELEATIVELY FLAT LAND (SLOPE 0-5%)	0.08-0.14	0.11
SOIL INFILTRATION (Ci)	NORMAL - WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS	0.06 - 0.08	0.07
VEGETAL COVER (Cv)	LOW - GOOD TO EXCELLENT GRASSLAND (COVERAGE 90%)	0.04 - 0.06	0.05
SURFACE STORAGE (Cs)	NORMAL - CONSIDERABLE SURFACE DEPRESSIONS	0.06 - 0.08	0.07
CALCULATED 'C'			0.30

RATIONAL METHOD COMPOSITE RUNOFF COEFFICIENT (C) EXISTING CONDITIONS

DRAINAGE AREA ID	DRAINAGE AREA (AC)	PAVED AREAS (AC)	RUNOFF COEFFICIENT		COMPOSITE C
			PERVIOUS AREA	PAVED AREA	
CC-1	10.55	0.31	0.30	0.9	0.32
CC-2	33.37	0.49	0.30	0.9	0.31
CC-3	9.48	0.29	0.30	0.9	0.32
CC-4	10.27	0.37	0.30	0.9	0.32
CC-5	3.97	0.13	0.30	0.9	0.32
CC-6	19.34	0.56	0.30	0.9	0.32
CC-7	5.43	0.19	0.30	0.9	0.32
CC-8	23.94	0.96	0.30	0.9	0.32
CC-9	14.26	0.24	0.30	0.9	0.31
CC-10	20.23	0.85	0.30	0.9	0.33
CC-11	18.01	0.58	0.30	0.9	0.32
CC-12	22.58	0.46	0.30	0.9	0.31
CC-13	10.38	0.13	0.30	0.9	0.31
CC-14	14.98	0.29	0.30	0.9	0.31
CC-15	5.22	0.28	0.30	0.9	0.33
CC-16	4.15	0.29	0.30	0.9	0.34
CC-17	14.21	0.34	0.30	0.9	0.31
CC-18	11.15	0.19	0.30	0.9	0.31

RAINFALL INTENSITY COEFFICIENTS (e, b, d)

ROBERTSON COUNTY, (ZONE 1) - ATLAS 14

COEFFICIENT	2-YR	5-YR	10-YR	25-YR	50-YR	100-yr
e	0.8054	0.7942	0.7847	0.7724	0.7629	0.7534
b (in)	59.7860	70.4058	78.4432	88.7984	95.8176	102.6852
d (min)	11.9019	11.9415	11.9635	11.9977	11.9836	12.0470

HYDROLOGIC NOTES

1. PEAK FLOW CALCULATED USING RATIONAL METHOD [Q=CIA]
2. COMPOSITED RUNOFF COEFFICIENT (C) FROM PERVIOUS AREA 'C' VALUE 0.33 AND IMPERVIOUS AREA 'C' VALUE OF 0.90.
3. PERVIOUS AREA 'C' VALUE BASED ON CALCULATED VALUE FROM RUNOFF COEFFICIENTS FOR RURAL WATERSHEDS, TxDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.
4. RAINFALL INTENSITY (I) BASED ON "e,b,d" COEFFICIENTS FROM TxDOT TOOL "EBDLKUP-2019-vC6,2,10.XLS" FOR ROBERTSON COUNTY - ZONE 1. [**I =** b/(Tc + d)^e]
5. TIME OF CONCENTRATION CALCULATED WITH KERBY-KIRPICH METHOD.

STATE OF TEXAS
RICHARD A. KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
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Texas Department of Transportation

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617 CAROLINE ST. SUITE 11
HOUSTON, TEXAS 77002
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FM 937

HYDROLOGY DATA SHEET

EXISTING CONDITIONS

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		118

DATE: 5/23/2023 12:57:53 AM
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HYDROLOGIC SUMMARY TABLE - PROPOSED CONDITIONS

DRAINAGE AREA ID	STATION	DRAINAGE AREA (ACRES)	RUNOFF COEF	Tc (MIN)	INTENSITY (In/Hr) - ATLAS 14						PEAK FLOW (cfs) - ATLAS 14					
					2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
CC-1	161+49.68	10.55	0.32	32.3	2.82	3.47	4.01	4.75	5.31	5.89	9.6	11.8	13.6	16.2	18.1	20.1
CC-2	175+07.04	33.37	0.31	23.8	3.36	4.12	4.74	5.60	6.26	6.93	34.9	42.8	49.3	58.2	65.0	72.0
CC-3	182+84.18	9.48	0.32	15.7	4.13	5.04	5.80	6.83	7.61	8.40	12.7	15.5	17.8	20.9	23.3	25.8
CC-4	198+25.76	10.27	0.33	39.1	2.52	3.10	3.58	4.25	4.76	5.29	8.5	10.4	12.1	14.3	16.0	17.8
CC-5	202+35.42	3.97	0.33	19.3	3.75	4.58	5.27	6.22	6.94	7.67	4.8	5.9	6.8	8.0	9.0	9.9
CC-6	210+92.56	19.34	0.32	29.0	3.01	3.69	4.26	5.04	5.64	6.26	18.8	23.1	26.6	31.5	35.2	39.1
CC-7	227+34.56	5.43	0.33	20.1	3.66	4.48	5.16	6.08	6.79	7.51	6.5	8.0	9.2	10.8	12.1	13.4
CC-8	243+14.55	23.94	0.33	38.2	2.56	3.14	3.64	4.32	4.83	5.37	20.3	24.9	28.8	34.2	38.3	42.6
CC-9	250+70.03	14.26	0.31	30.6	2.92	3.58	4.13	4.89	5.48	6.07	13.0	16.0	18.5	21.9	24.5	27.1
CC-10	281+30.69	20.23	0.33	45.1	2.30	2.84	3.28	3.90	4.38	4.87	15.5	19.1	22.1	26.3	29.5	32.9
CC-11	298+88.62	18.01	0.33	38.4	2.55	3.13	3.62	4.30	4.82	5.35	14.9	18.4	21.2	25.2	28.2	31.4
CC-12	316+90.16	22.58	0.32	46.8	2.25	2.77	3.21	3.82	4.28	4.76	16.1	19.8	22.9	27.3	30.6	34.0
CC-13	335+28.31	10.38	0.31	32.6	2.81	3.45	3.99	4.73	5.29	5.87	9.0	11.1	12.8	15.2	17.0	18.9
CC-14	346+25.18	14.98	0.32	26.0	3.20	3.92	4.52	5.34	5.97	6.62	15.1	18.5	21.4	25.3	28.2	31.3
CC-15	350+86.37	5.22	0.34	25.7	3.22	3.95	4.55	5.38	6.01	6.66	5.8	7.1	8.1	9.6	10.8	11.9
CC-16	399+09.23	4.15	0.36	20.6	3.62	4.43	5.10	6.02	6.72	7.43	5.3	6.5	7.5	8.9	9.9	11.0
CC-17	418+92.75	14.21	0.32	16.9	3.99	4.88	5.61	6.61	7.37	8.14	18.2	22.2	25.5	30.1	33.5	37.0
CC-18	426+61.13	11.15	0.34	16.0	4.09	4.99	5.74	6.76	7.53	8.32	15.3	18.7	21.5	25.3	28.2	31.1

TIME OF CONCENTRATION - KERBY KIRPICH METHOD - PROPOSED CONDITIONS

DRAINAGE AREA ID	STATION	Tc (HR)	Tc (MIN)	OVERLAND FLOW							CHANNEL FLOW						
				T_{ov} (MIN)	K_{ov}	L_{ov} (FT)	N	S (FT/FT)	Adj S (FT/FT)	ELEV START	ELEV END	T_{CH} (MIN)	K_{CH}	L_{CH} (FT)	S (FT/FT)	Adj S (FT/FT)	ELEV START	ELEV END
CC-1	161+49.68	0.54	32.35	17.43	0.828	178	0.4	0.0112	0.0112	440.0	438.0	14.92	0.0078	1258	0.0047	0.0047	438.0	432.04
CC-2	175+07.04	0.40	23.77	14.18	0.828	143	0.4	0.0175	0.0175	446.5	444.0	9.59	0.0078	1641	0.0254	0.0254	444.0	402.34
CC-3	182+84.18	0.26	15.70	5.54	0.828	37	0.4	0.0649	0.0649	432.4	430.0	10.16	0.0078	1113	0.0101	0.0101	430.0	418.81
CC-4	198+25.76	0.65	39.14	30.18	0.828	354	0.4	0.0042	0.0042	423.5	422.0	8.96	0.0078	762	0.0065	0.0065	422.0	417.01
CC-5	202+35.42	0.32	19.26	13.83	0.828	116	0.4	0.0129	0.0129	426.5	425.0	5.42	0.0078	589	0.0144	0.0144	425.0	416.55
CC-6	210+92.56	0.48	28.97	19.02	0.828	231	0.4	0.0130	0.0130	429.0	426.0	9.95	0.0078	1143	0.0112	0.0112	426.0	413.19
CC-7	227+34.56	0.34	20.15	15.10	0.828	156	0.4	0.0160	0.0160	432.5	430.0	5.05	0.0078	464	0.0107	0.0107	430.0	425.03
CC-8	243+14.55	0.64	38.16	15.10	0.828	156	0.4	0.0160	0.0160	432.5	430.0	23.06	0.0078	2167	0.0045	0.0045	430.0	420.18
CC-9	250+70.03	0.51	30.61	20.36	0.828	239	0.4	0.0104	0.0104	431.5	429.0	10.25	0.0078	1132	0.0102	0.0102	429.0	417.49
CC-10	281+30.69	0.75	45.10	26.96	0.828	263	0.4	0.0038	0.0038	426.0	425.0	18.14	0.0078	2135	0.0082	0.0082	425.0	407.47
CC-11	298+88.62	0.64	38.38	22.90	0.828	165	0.4	0.0030	0.0030	411.5	411.0	15.48	0.0078	1325	0.0048	0.0048	411.0	404.68
CC-12	316+90.16	0.78	46.83	31.43	0.828	348	0.4	0.0035	0.0035	411.2	410.0	15.40	0.0078	1439	0.0057	0.0057	410.0	401.78
CC-13	335+28.31	0.54	32.59	19.28	0.828	241	0.4	0.0133	0.0133	415.2	412.0	13.31	0.0078	1189	0.0057	0.0057	412.0	405.23
CC-14	346+25.18	0.43	26.02	13.08	0.828	122	0.4	0.0180	0.0180	417.2	415.0	12.94	0.0078	1602	0.0111	0.0111	415.0	397.17
CC-15	350+86.37	0.43	25.69	18.83	0.828	181	0.4	0.0083	0.0083	403.5	402.0	6.86	0.0078	606	0.0083	0.0083	402.0	397.00
CC-16	399+09.23	0.34	20.61	15.03	0.828	122	0.4	0.0099	0.0099	399.2	398.0	5.58	0.0078	605	0.0141	0.0141	398.0	389.46
CC-17	418+92.75	0.28	16.88	10.80	0.828	85	0.4	0.0199	0.0199	395.5	393.8	6.07	0.0078	1193	0.0439	0.0439	393.8	341.40
CC-18	426+61.13	0.27	16.05	10.93	0.828	139	0.4	0.0503	0.0503	392.0	385.0	5.12	0.0078	1021	0.0503	0.0503	385.0	333.68

RATIONAL METHOD RUNOFF COEFFICIENT (C) (PERVIOUS COVER)

LAND USE	CLASSIFICATION / SOIL TYPE (DESCRIPTION)	RANGE	USED
RELIEF (Cr)	LOW - RELEATIVELY FLAT LAND (SLOPE 0-5%)	0.08-0.14	0.11
SOIL INFILTRATION (Ci)	NORMAL - WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS	0.06 - 0.08	0.07
VEGETAL COVER (Cv)	LOW - GOOD TO EXCELLENT GRASSLAND (COVERAGE 90%)	0.04 - 0.06	0.05
SURFACE STORAGE (Cs)	NORMAL - CONSIDERABLE SURFACE DEPRESSIONS	0.06 - 0.08	0.07
CALCULATED 'C'			0.30

RATIONAL METHOD COMPOSITE RUNOFF COEFFICIENT (C) PROPOSED CONDITIONS

DRAINAGE AREA ID	DRAINAGE AREA (AC)	PAVED AREAS (AC)	RUNOFF COEFFICIENT		COMPOSITE C
			PERVIOUS AREA	PAVED AREA	
CC-1	10.55	0.40	0.30	0.9	0.32
CC-2	33.37	0.64	0.30	0.9	0.31
CC-3	9.48	0.37	0.30	0.9	0.32
CC-4	10.27	0.47	0.30	0.9	0.33
CC-5	3.97	0.17	0.30	0.9	0.33
CC-6	19.34	0.73	0.30	0.9	0.32
CC-7	5.43	0.25	0.30	0.9	0.33
CC-8	23.94	1.24	0.30	0.9	0.33
CC-9	14.26	0.32	0.30	0.9	0.31
CC-10	20.23	1.12	0.30	0.9	0.33
CC-11	18.01	0.76	0.30	0.9	0.33
CC-12	22.58	0.62	0.30	0.9	0.32
CC-13	10.38	0.17	0.30	0.9	0.31
CC-14	14.98	0.39	0.30	0.9	0.32
CC-15	5.22	0.37	0.30	0.9	0.34
CC-16	4.15	0.39	0.30	0.9	0.36
CC-17	14.21	0.47	0.30	0.9	0.32
CC-18	11.15	0.25	0.30	1.9	0.34

RAINFALL INTENSITY COEFFICIENTS (e, b, d)

ROBERTSON COUNTY, (ZONE 1) - ATLAS 14

COEFFICIENT	2-YR	5-YR	10-YR	25-YR	50-YR	100-yr
e	0.8054	0.7942	0.7847	0.7724	0.7629	0.7534
b (in)	59.7860	70.4058	78.4432	88.7984	95.8176	102.6852
d (min)	11.9019	11.9415	11.9635	11.9977	11.9838	12.0470

HYDROLOGIC NOTES

1. PEAK FLOW CALCULATED USING RATIONAL METHOD [Q=CIA]
2. COMPOSITED RUNOFF COEFFICIENT (C) FROM PERVIOUS AREA 'C' VALUE 0.33 AND IMPERVIOUS AREA 'C' VALUE OF 0.90.
3. PERVIOUS AREA 'C' VALUE BASED ON CALCULATED VALUE FROM RUNOFF COEFFICIENTS FOR RURAL WATERSHEDS, TxDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.
4. RAINFALL INTENSITY (I) BASED ON "e,b,d" COEFFICIENTS FROM TxDOT TOOL "EBDLKUP-2019-vC6.2.10.XLS" FOR ROBERTSON COUNTY - ZONE 1. [I = b/(Tc + d)^e]
5. TIME OF CONCENTRATION CALCULATED WITH KERBY-KIRPICH METHOD.

STATE OF TEXAS
RICHARD A. KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
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Date: 2023.05.23 23:17:15 -06'00'

Texas Department of Transportation

P&D PROFESSIONAL SERVICES, INC. TBPE REG. NO. F-14117
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
(281) 743-4475

FM 937

HYDROLOGY DATA SHEET

PROPOSED CONDITIONS

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		119

DATE: 5/23/2023 12:58:43 AM
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HYDRAULIC SUMMARY TABLE - EXISTING CONDITIONS

CROSSING NUMBER	STATION	STRUCTURE DESCRIPTION *SPAN - SIZE CULV TYPE W/ LT / RT	ALLOW HW ELEV (FT)	CULVERT SLOPE (% - UPSTRM TO DNSTRM)	DESIGN YEAR ANALYSIS (SEE NOTES)									100 YEAR ANALYSIS					REMARKS
					DESIGN FREQ (YR)	Q (CFS)	HW DEPTH/ ELEV (FT)	TW DEPTH/ ELEV (FT)	CONTROL TYPE	NORMAL DEPTH (FT)	CRITICAL DEPTH (FT)	OUTLET VELOCITY (FT/S)	Q OVER RDWY (CFS)	Q (CFS)	HW DEPTH/ ELEV (FT)	TW DEPTH/ ELEV (FT)	OUTLET VELOCITY (FT/S)	Q OVER RDWY (CFS)	
CC-1	161+49.68	1 - 24" X 51' RCP W/ SET / SET	435.98	0.53%	10	13.4	2.07 / 434.12	0.96 / 432.74	INLET	1.29	1.32	6.28	0	19.7	2.89 / 434.94	1.15 / 432.93	7.33	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0074 ft/ft)
CC-2	175+07.04	1 - 48" X 111' RCP W/ DROP / HW	427.33	1.16%	10	48.8	3.15 / 405.39	1.16 / 402.11	INLET	1.48	2.09	10.79	0	71.3	4.08 / 406.32	1.43 / 402.38	11.79	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0284 ft/ft)
CC-3	182+84.18	1 - 24" X 57' RCP W/ SET / SET	423.61	0.27%	10	17.5	2.62 / 421.41	0.47 / 419.11	OUTLET	2.00	1.51	6.89	0	25.4	3.92 / 422.71	0.58 / 419.22	8.63	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0168 ft/ft)
CC-4	198+25.76	1 - 18" X 64' RCP W/ SET / SET	420.91	2.04%	10	11.8	2.75 / 419.76	0.30 / 416.02	INLET	0.95	1.31	9.62	0	17.5	3.91 / 420.92	0.37 / 416.09	10.15	2.2	TW elevation determined by normal depth computation (approx. channel slope = 0.0556 ft/ft) 100-YR FLOW OVER ROADWAY
CC-5	202+35.42	1 - 18" X 63' RCP W/ SET / SET	420.12	1.05%	10	6.7	1.58 / 418.13	0.27 / 416.16	INLET	0.81	1.00	6.75	0	9.7	2.19 / 418.74	0.33 / 416.22	7.33	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0263 ft/ft)
CC-6	210+92.56	1 - 30" X 51' RCP W/ SET / SET	418.64	-0.30%	10	26.1	3.08 / 416.28	0.55 / 413.90	OUTLET	N/A	1.74	7.15	0	38.4	4.09 / 417.29	0.67 / 414.02	8.75	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0282 ft/ft)
CC-7	227+34.56	1 - 24" X 50' RCP W/ SET / SET	429.14	1.30%	10	9.0	1.59 / 426.59	0.55 / 424.90	INLET	0.78	1.07	7.53	0	13.1	2.03 / 427.03	0.67 / 425.02	8.23	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0047 ft/ft)
CC-8	243+14.55	2 - 24" X 56' RCP W/ SET / SET	425.52	0.22%	10	28.2	2.25 / 422.43	0.62 / 420.68	OUTLET	2.00	1.35	6.24	0	41.7	3.13 / 423.31	0.76 / 420.82	7.58	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0208 ft/ft)
CC-9	250+70.03	1 - 24" X 69' RCP W/ SET / SET	423.93	2.02%	10	18.3	2.67 / 420.16	0.49 / 416.60	INLET	1.03	1.54	10.46	0	26.9	4.22 / 421.71	0.59 / 416.70	11.44	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0577 ft/ft)
CC-10	281+30.69	1 - 36" X 62' RCP W/ DROP/ SET	414.82	1.50%	10	21.6	2.24 / 409.71	0.62 / 407.13	INLET	1.01	1.49	9.42	0	32.1	2.89 / 410.36	0.77 / 407.28	10.32	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0465 ft/ft)
CC-11	298+88.62	1 - 30" X 63' RCP W/ SET / SET	409.17	1.38%	10	20.8	2.37 / 407.05	0.62 / 404.43	INLET	1.09	1.55	9.32	0	30.8	3.23 / 407.91	0.75 / 404.56	10.22	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0117 ft/ft)
CC-12	316+90.16	1 - 30" X 66' RCP W/ SET / HW	409.38	1.91%	10	22.6	2.50 / 404.24	0.51 / 401.00	INLET	1.05	1.62	10.45	0	33.6	3.51 / 405.25	0.62 / 401.11	11.45	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0606 ft/ft)
CC-13	335+28.31	1 - 24" X 55' RCP W/ SET / SET	408.66	1.33%	10	12.7	1.98 / 407.21	0.58 / 405.08	INLET	0.94	1.28	8.28	0	18.7	2.73 / 407.96	0.70 / 405.20	9.10	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0057 ft/ft)
CC-14	346+25.18	1 - 24" X 89' RCP W/ SET / SET	401.73	0.52%	10	21.1	3.12 / 400.29	0.57 / 397.28	INLET	2.00	1.64	7.63	0	30.9	4.85 / 402.02	0.69 / 397.40	9.74	1.2	TW elevation determined by normal depth computation (approx. channel slope = 0.0385 ft/ft) 100-YR FLOW OVER ROADWAY
CC-15	350+86.37	1 - 18" X 63' RCP W/ SET / SET	401.25	1.38%	10	7.9	1.80 / 398.80	0.27 / 396.40	INLET	0.83	1.09	7.69	0	11.6	2.69 / 399.69	0.33 / 396.46	8.37	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0377 ft/ft)
CC-16	399+09.23	1 - 24" X 63' RCP W/ SET / SET	392.91	1.24%	10	7.2	1.38 / 390.84	0.25 / 388.93	INLET	0.70	0.95	7.12	0	10.5	1.75 / 391.21	0.30 / 388.98	7.81	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0417 ft/ft)
CC-17	418+92.75	1 - 36" X 140' RCP W/ SET / DROP	355.91	2.02%	10	25.1	2.46 / 343.86	0.53 / 339.10	INLET	1.01	1.62	11.50	0	36.4	3.20 / 344.60	0.65 / 339.22	12.60	0	TW elevation determined by normal depth computation (approx. channel slope = 0.1000 ft/ft)
CC-18	426+61.13	1 - 24" X 102' RCP W/ SET / DROP	346.58	1.00%	10	19.9	3.26 / 336.94	0.68 / 333.34	INLET	1.37	1.60	8.63	0	28.8	5.44 / 339.12	0.82 / 333.48	9.51	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0556 ft/ft)

HYDRAULIC NOTES

1. FHWA HY-8 VERSION 7.70 USED FOR THE ANALYSIS OF CULVERT CROSSINGS FOR EXISTING AND PROPOSED CONDITIONS.
2. CROSS CULVERT CROSSING NUMBER CORRESPONDS TO THE DRAINAGE AREA ID. FOR EXAMPLE, CROSSING NUMBER CC-1 CORRESPONDS TO DRAINAGE AREA ID 1 ON DRAINAGE AREA MAP.
3. ALLOWABLE HEADWATER ELEVATION BASED ON ROADWAY EDGE OF PAVEMENT ELEVATIONS.
4. FLOW OVER ROADWAY BASED ON ROADWAY CENTERLINE ELEVATION.
5. DESIGN FREQUENCY IS 10-YR FOR ALL CULVERTS.
6. ENTRANCE LOSS COEFFICIENT FOR SAFETY END TREATMENTS SET TO 0.5. ENTRANCE LOSS COEFFICIENT FOR DROP INLETS SET TO 0.70.
7. CROSS CULVERT SLOPE IS MEASURED AND LISTED FROM UPSTREAM TO DOWNSTREAM. CROSS CULVERT 6 HAS A REVERSE GRADE WHERE THE DOWNSTREAM OUTLET ELEVATION IS HIGHER THAN THE UPSTREAM INLET ELEVATION.

STATE OF TEXAS
RICHARD A. KRAUS
57390
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PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2023.05.23 23:14:10 -06'00'

Texas Department of Transportation

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617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
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FM 937

HYDRAULIC DATA SHEET

EXISTING CONDITIONS

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		120

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HYDRAULIC SUMMARY TABLE - PROPOSED CONDITIONS

CROSSING NUMBER	STATION	STRUCTURE DESCRIPTION *SPAN - SIZE CULV TYPE W/ LT / RT	ALLOW HW ELEV (FT)	CULVERT SLOPE (% - UPSTRM TO DNSTRM)	DESIGN YEAR ANALYSIS (SEE NOTES)									100 YEAR ANALYSIS					REMARKS
					DESIGN FREQ (YR)	Q (CFS)	HW DEPTH/ ELEV (FT)	TW DEPTH/ ELEV (FT)	CONTROL TYPE	NORMAL DEPTH (FT)	CRITICAL DEPTH (FT)	OUTLET VELOCITY (FT/S)	Q OVER RDWY (CFS)	Q (CFS)	HW DEPTH/ ELEV (FT)	TW DEPTH/ ELEV (FT)	OUTLET VELOCITY (FT/S)	Q OVER RDWY (CFS)	
CC-1	161+49.68	1 - 24" X 58' RCP W/ SET / SET	435.98	0.53%	10	13.6	2.09 / 434.13	0.97 / 432.70	INLET	1.30	1.33	6.28	0	20.1	2.95 / 434.99	1.16 / 432.89	7.42	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0074 ft/ft)
CC-2	175+07.04	1 - 48" X 120' RCP W/ DROP / HW	427.33	1.16%	10	49.3	3.17 / 405.51	1.17 / 402.12	INLET	1.49	2.11	10.90	0	72.0	4.11 / 406.45	1.43 / 402.38	´1.88	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0284 ft/ft)
CC-3	182+84.18	1 - 24" X 66' RCP W/ SET / SET	423.61	0.27%	10	17.8	2.67 / 421.48	0.48 / 419.12	OUTLET	2.00	1.52	6.95	0	25.8	4.02 / 422.83	0.58 / 419.22	8.73	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0168 ft/ft)
CC-4	198+25.76	1 - 18" X 65' RCP W/ SET / SET	420.91	2.04%	10	12.1	2.84 / 419.85	0.30 / 416.00	INLET	0.96	1.32	9.68	0	17.8	3.92 / 420.93	0.38 / 416.08	´0.16	2.5	TW elevation determined by normal depth computation (approx. channel slope = 0.0556 ft/ft) 100-YR FLOW OVER ROADWAY
CC-5	202+35.42	1 - 18" X 63' RCP W/ SET / SET	420.12	1.05%	10	6.8	1.59 / 418.14	0.27 / 416.16	INLET	0.82	1.01	6.77	0	9.9	2.24 / 418.79	0.33 / 416.22	7.36	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0263 ft/ft)
CC-6	210+92.56	1 - 30" X 58' RCP W/ SET / SET	418.64	-0.30%	10	26.6	3.16 / 416.35	0.56 / 413.92	OUTLET	N/A	1.76	7.21	0	39.1	4.18 / 417.37	0.68 / 414.04	8.85	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0282 ft/ft)
CC-7	227+34.56	1 - 24" X 55' RCP W/ SET / SET	429.14	1.30%	10	9.2	1.61 / 426.64	0.56 / 424.87	INLET	0.79	1.08	7.64	0	13.4	2.06 / 427.09	0.67 / 424.98	8.35	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0047 ft/ft)
CC-8	243+14.55	2 - 24" X 59' RCP W/ SET / SET	425.52	0.22%	10	28.8	2.28 / 422.46	0.63 / 420.68	OUTLET	2.00	1.37	6.29	0	42.6	3.22 / 423.40	0.77 / 420.82	7.68	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0208 ft/ft)
CC-9	250+70.03	1 - 24" X 74' RCP W/ SET / SET	423.93	2.02%	10	18.5	2.70 / 420.19	0.49 / 416.50	INLET	1.03	1.55	10.52	0	27.1	4.26 / 421.75	0.59 / 416.60	´1.51	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0577 ft/ft)
CC-10	281+30.69	1 - 36" X 66' RCP W/ DROP/ SET	414.82	1.50%	10	22.1	2.27 / 409.74	0.63 / 407.08	INLET	1.02	1.51	9.52	0	32.9	2.94 / 410.41	0.78 / 407.23	´0.46	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0465 ft/ft)
CC-11	298+88.62	1 - 30" X 63' RCP W/ SET / SET	409.17	1.38%	10	21.2	2.40 / 407.08	0.62 / 404.43	INLET	1.10	1.56	9..36	0	31.4	3.29 / 407.97	0.76 / 404.57	´0.27	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0117 ft/ft)
CC-12	316+90.16	1 - 30" X 75' RCP W/ SET / HW	409.38	1.91%	10	22.9	2.53 / 404.31	0.51 / 400.87	INLET	1.06	1.63	10.66	0	34.0	3.55 / 405.33	0.62 / 400.98	´1.66	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0606 ft/ft)
CC-13	335+28.31	1 - 24" X 55' RCP W/ SET / SET	408.66	1.33%	10	12.8	1.99 / 407.22	058/ 405.08	INLET	0.94	1.29	8.30	0	18.9	2.76 / 407.99	0.71 / 405.21	9.12	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0057 ft/ft)
CC-14	346+25.18	1 - 24" X 89' RCP W/ SET / SET	401.73	0.52%	10	21.4	3.17 / 400.34	0.57 / 397.28	INLET	2.00	1.66	7.70	0	31.3	4.72 / 401.91	0.69 / 397.40	9.61	2.1	TW elevation determined by normal depth computation (approx. channel slope = 0.0385 ft/ft) 100-YR FLOW OVER ROADWAY
CC-15	350+86.37	1 - 18" X 67' RCP W/ SET / SET	401.25	1.38%	10	8.1	1.84 / 398.84	0.27 / 396.34	INLET	0.84	1.10	7.77	0	11.9	2.78 / 399.78	0.34 / 396.41	8.45	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0377 ft/ft)
CC-16	399+09.23	1 - 24" X 63' RCP W/ SET / SET	392.91	1.24%	10	7.5	1.42 / 390.88	0.25 / 388.93	INLET	0.72	0.97	7.19	0	11.0	1.80 / 391.26	0.31 / 388.99	7.90	0	TW elevation determined by normal depth computation (approx. channel slope = 0.0417 ft/ft)
CC-17	418+92.75	1 - 36" X 71' RCP W/ SET / SET	355.91	2.00%	10	25.5	2.41 / 352.40	0.54 / 339.14	INLET	1.02	1.63	10.77	0	37.0	3.09 / 353.08	0.66 / 339.26	´1.71	0	TW elevation determined by normal depth computation (approx. channel slope = 0.1000 ft/ft)
CC-18	426+61.13	1 - 24" X 68' RCP W/ SET / SET	346.92	1.00%	10	21.5	3.18 / 344.64	0.71 / 333.33	INLET	1.45	1.66	8.68	0	31.1	5.22 / 346.68	0.86 / 333.48	´0.15	0.0	TW elevation determined by normal depth computation (approx. channel slope = 0.0556 ft/ft)

HYDRAULIC NOTES

1. FHWA HY-8 VERSION 7.70 USED FOR THE ANALYSIS OF CULVERT CROSSINGS FOR EXISTING AND PROPOSED CONDITIONS.
2. CROSS CULVERT CROSSING NUMBER CORRESPONDS TO THE DRAINAGE AREA ID. FOR EXAMPLE, CROSSING NUMBER CC-1 CORRESPONDS TO DRAINAGE AREA ID 1 ON DRAINAGE AREA MAP.
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4. FLOW OVER ROADWAY BASED ON ROADWAY CENTERLINE ELEVATION.
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STATE OF TEXAS
RICHARD A. KRAUS
57390
LICENSED
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Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2023.05.24 23:21:19 -06'00'

Texas Department of Transportation

P&D PROFESSIONAL SERVICES, INC. TBPE REG. NO. F-14117
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
(281) 743-4475

FM 937

HYDRAULIC DATA SHEET

PROPOSED CONDITIONS

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRYAN	ROBERTSON		121

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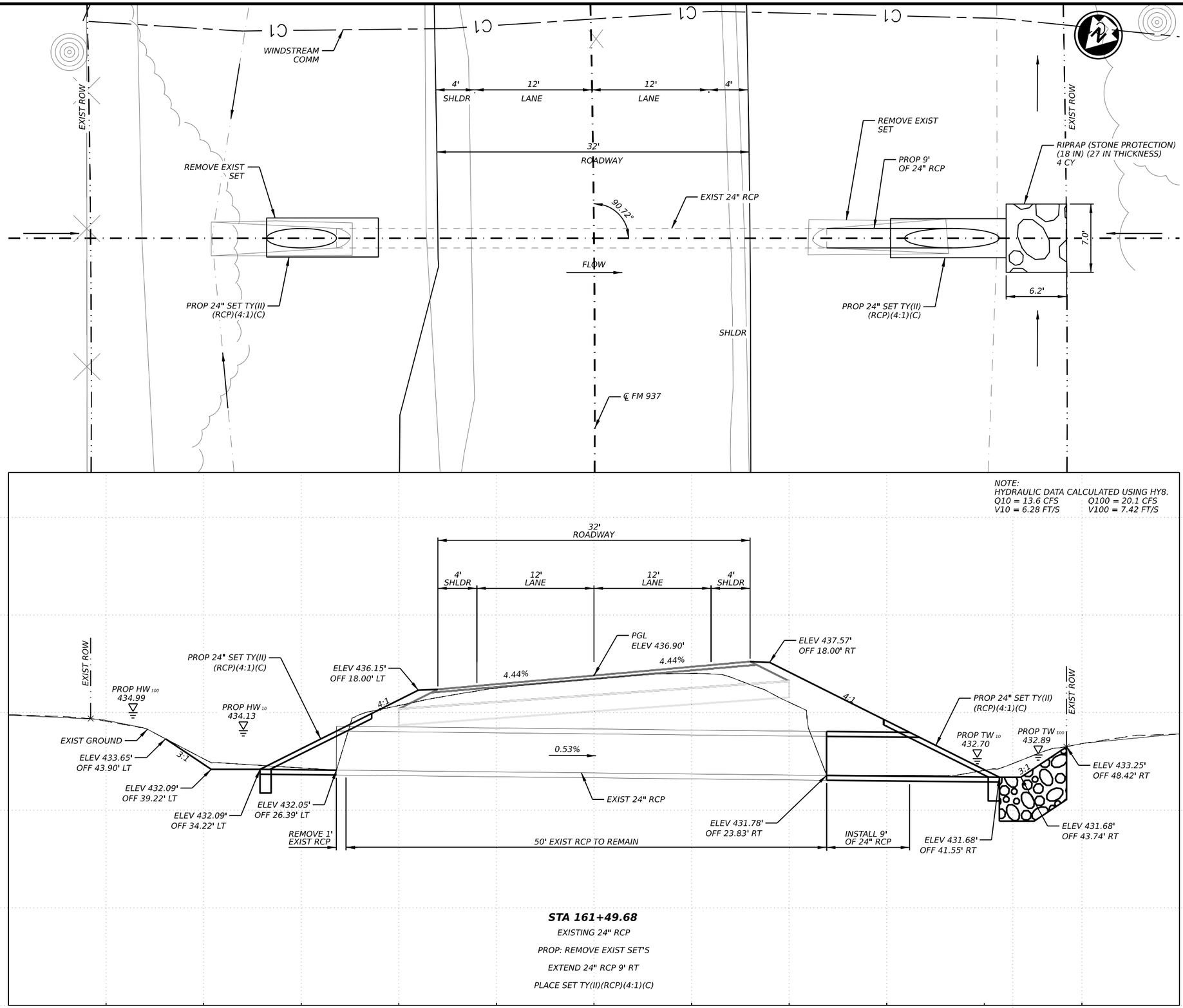

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5/26/2023

MEGAN E. HOUTCHENS 114293 LICENSED PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL TBPE REG. NO. F-2742

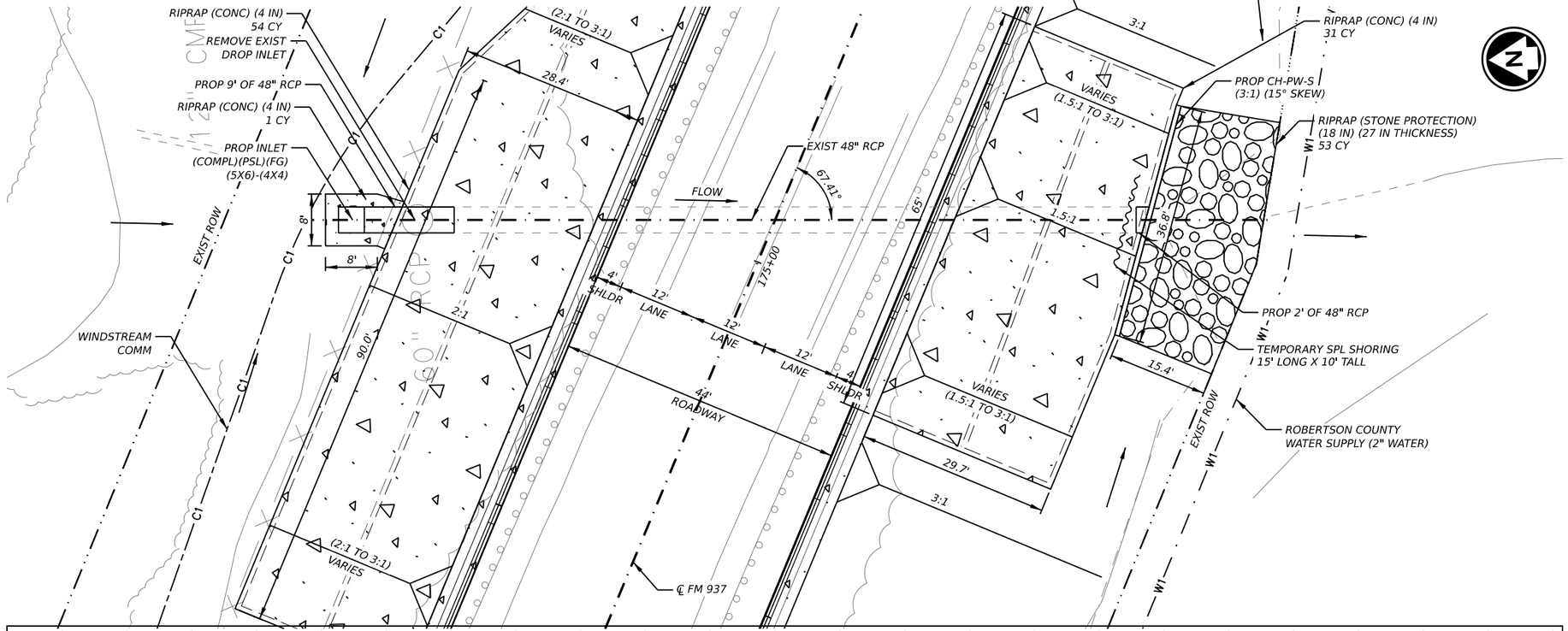
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

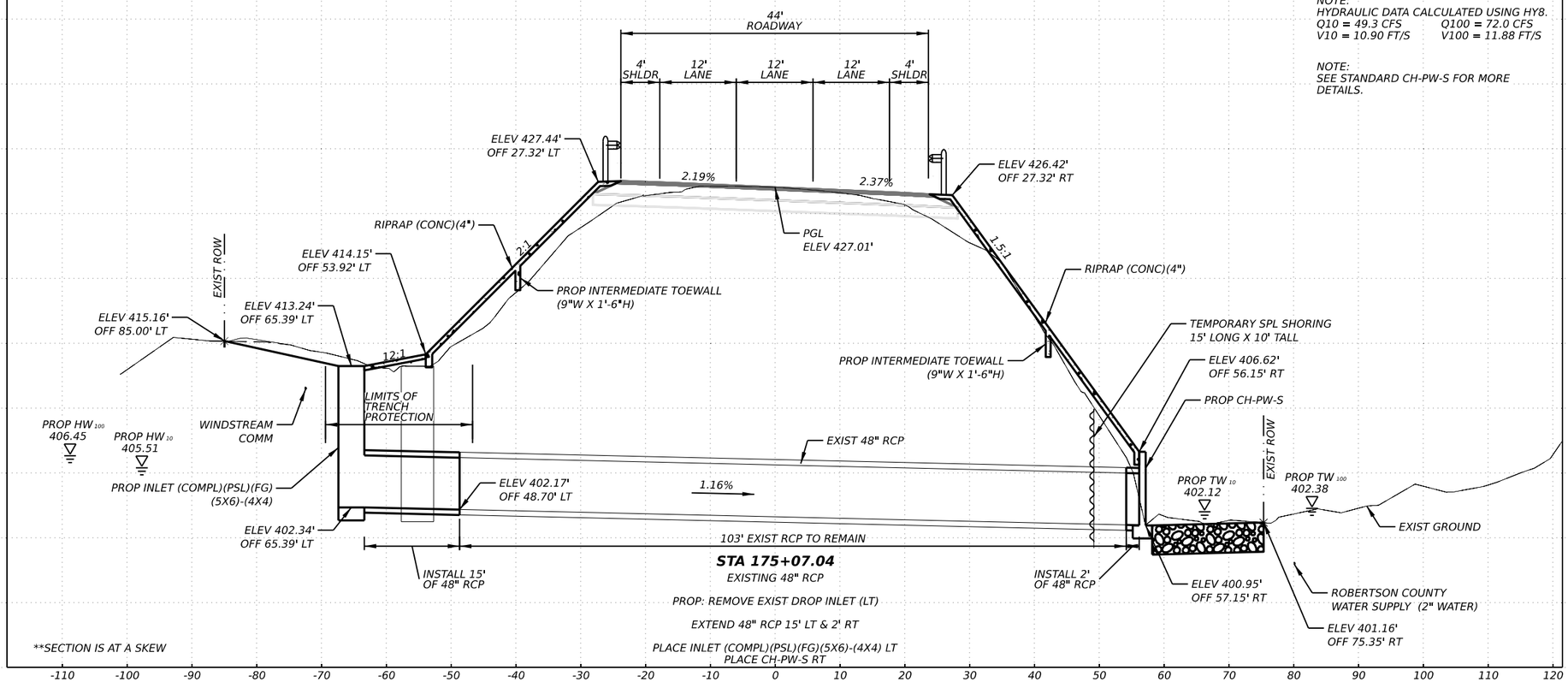
FM 937

CULVERT 1 LAYOUT STA 161+49.68

SHEET 1 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		122





NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 49.3 CFS Q100 = 72.0 CFS
V10 = 10.90 FT/S V100 = 11.88 FT/S

NOTE:
SEE STANDARD CH-PW-S FOR MORE DETAILS.

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742

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FM 937

CULVERT 2 LAYOUT STA 175+07.04

SHEET 2 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		123

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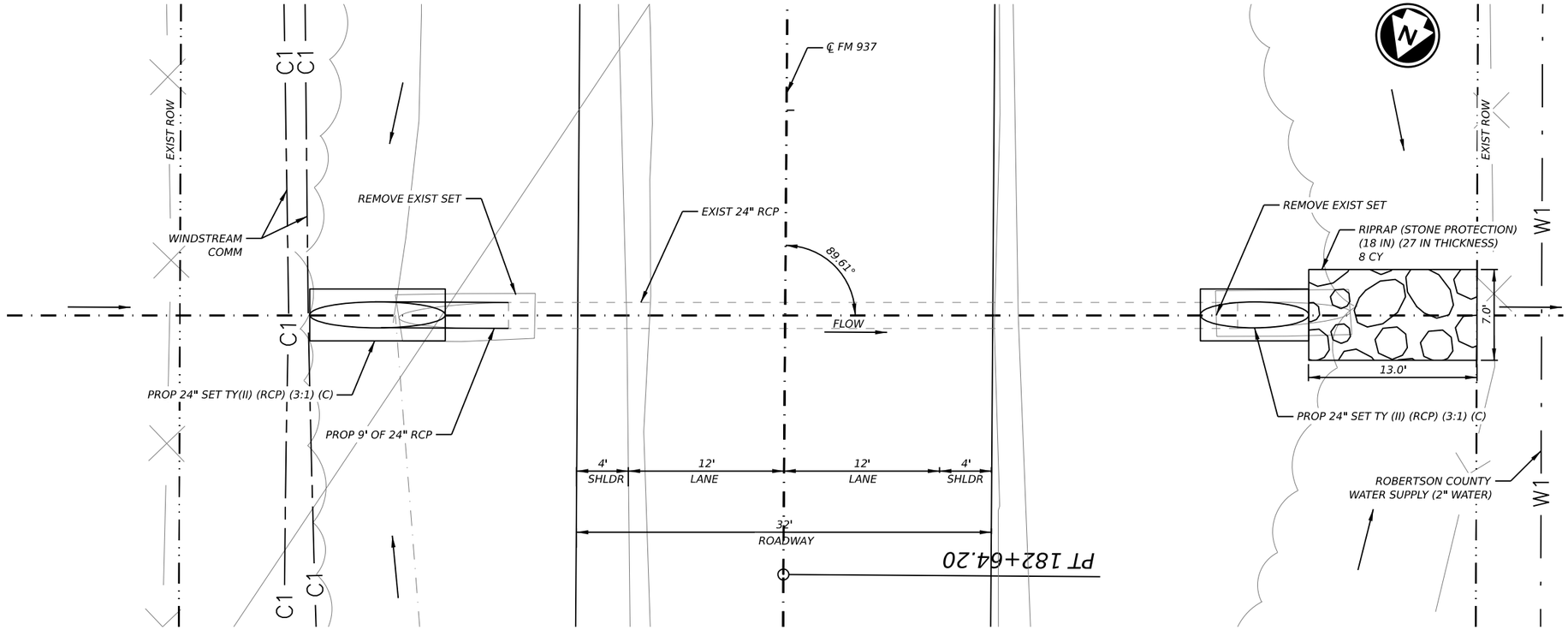

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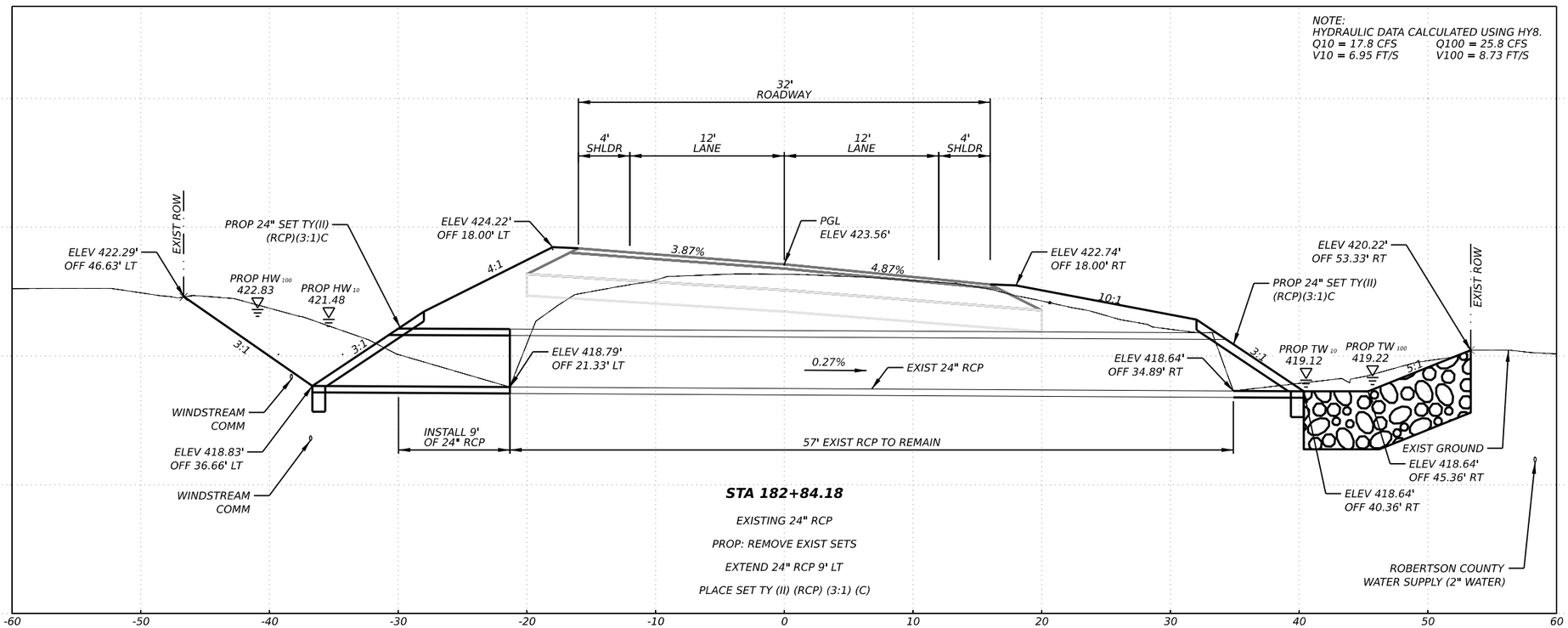

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

CULVERT 3 LAYOUT STA 182+84.18

SHEET 3 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		124

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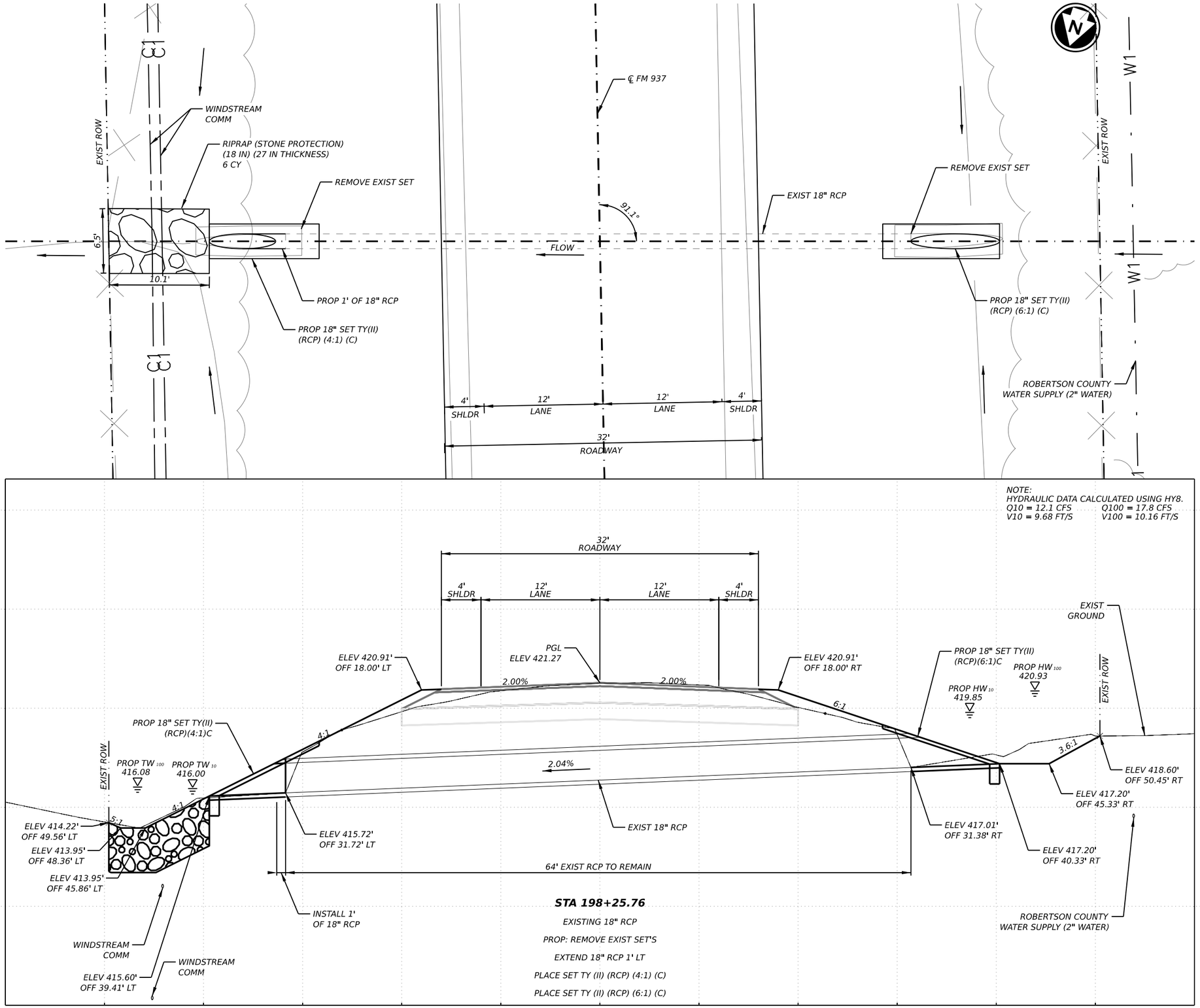

0 5 10

SCALE: 1" = 10' H
1" = 5' V

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

CULVERT 4 LAYOUT STA 198+25.76

SHEET 4 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		125

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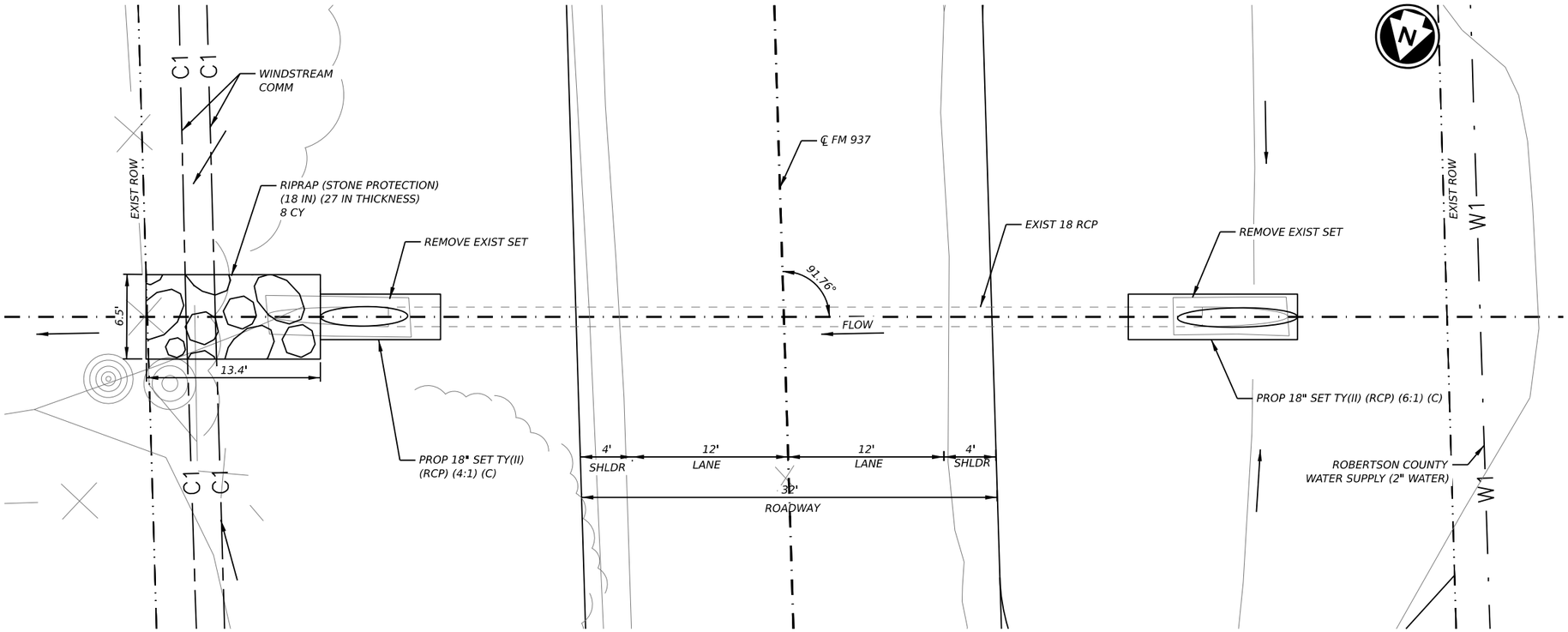

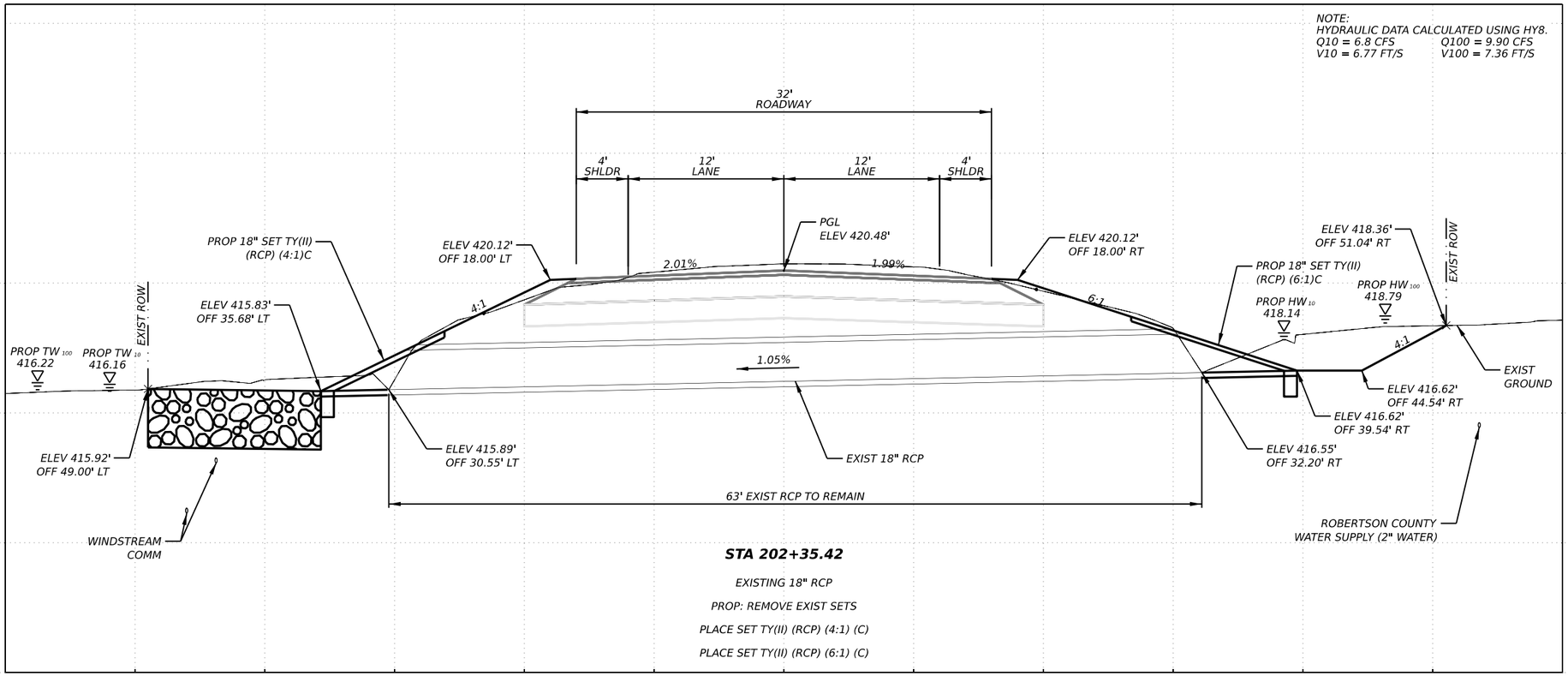

0 5 10

SCALE: 1" = 10' H
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5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

CULVERT 5 LAYOUT STA 202+35.42

SHEET 5 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		126

DATE: 5/26/2023 10:05:42 AM
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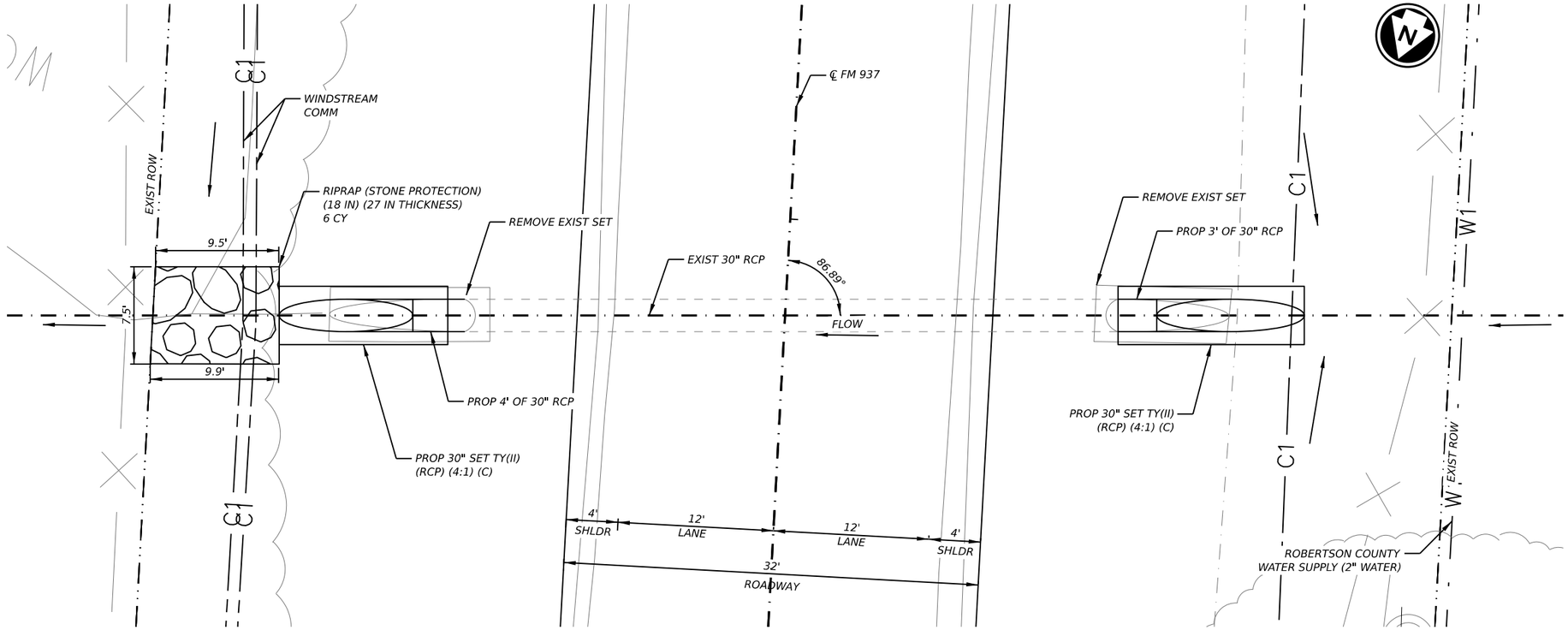
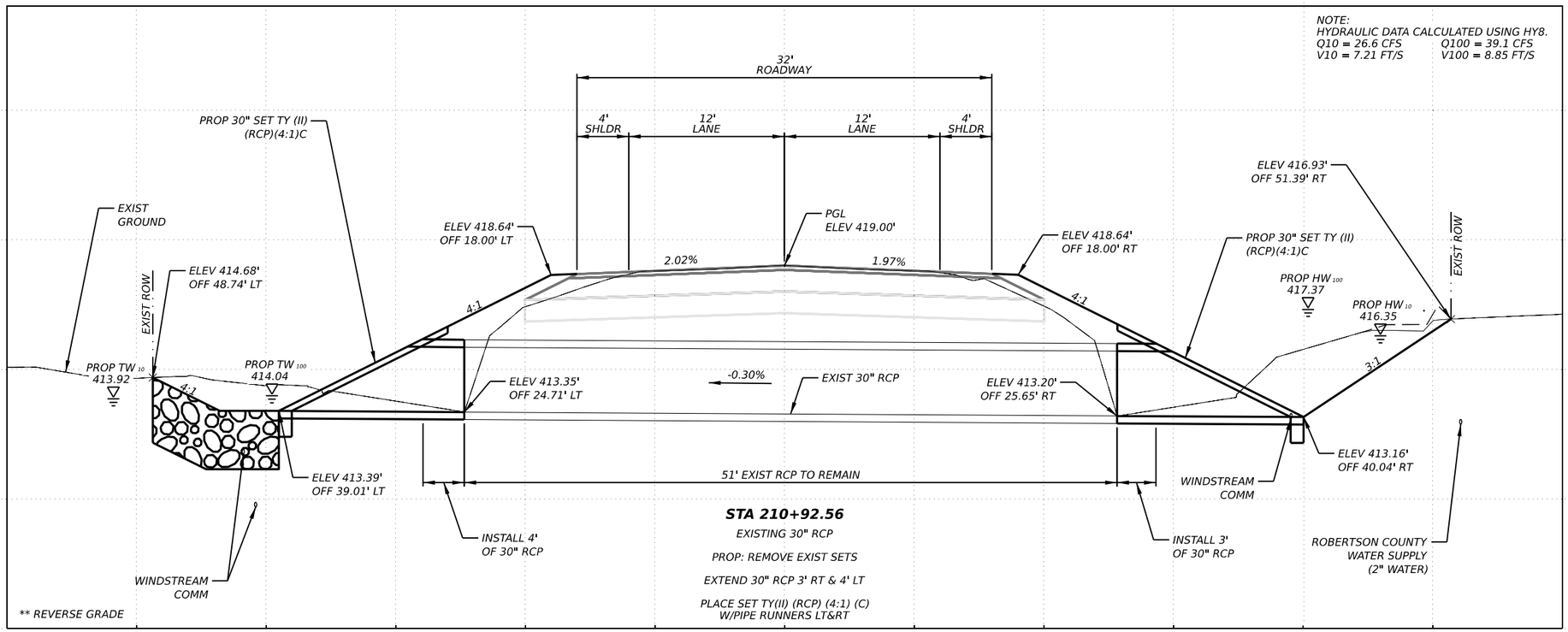


0 5 10

SCALE: 1" = 10' H
1" = 5' V



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114293
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FM 937

CULVERT 6 LAYOUT STA 210+92.56

SHEET 6 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		127

DATE: 5/26/2023 10:05:43 AM
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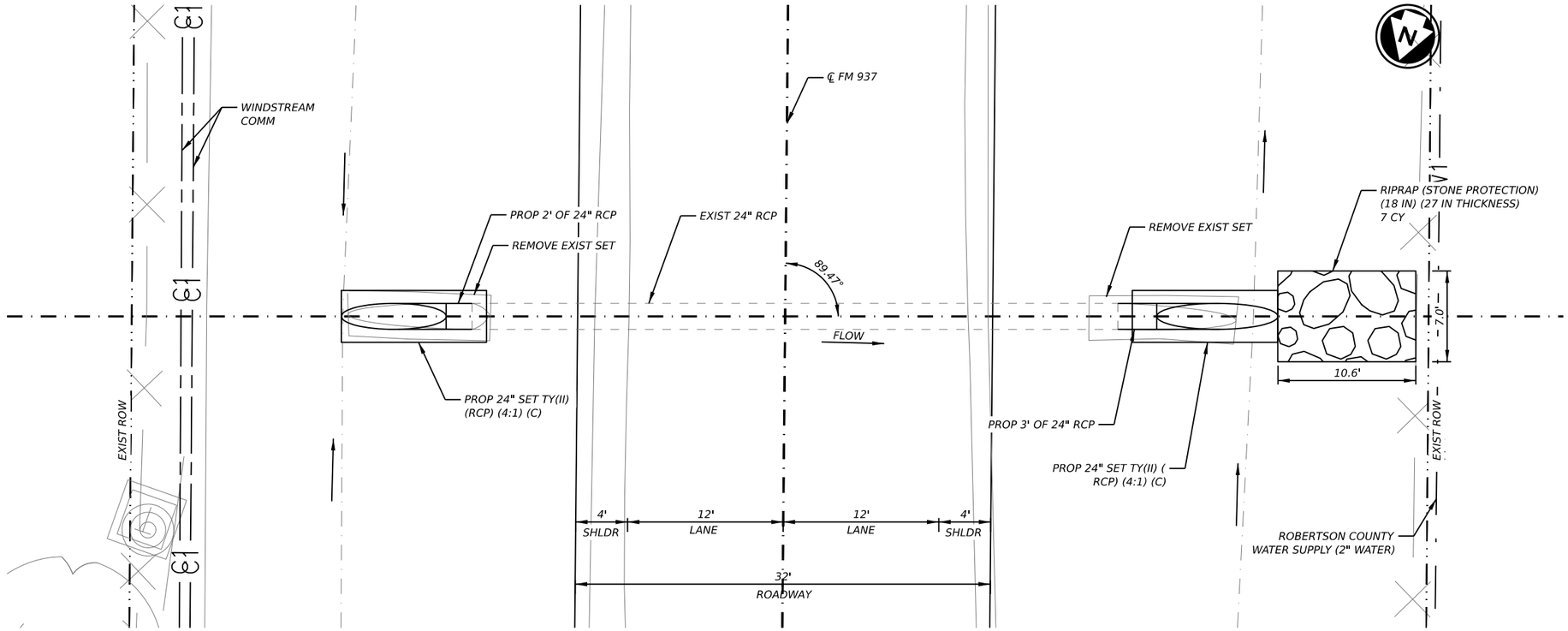

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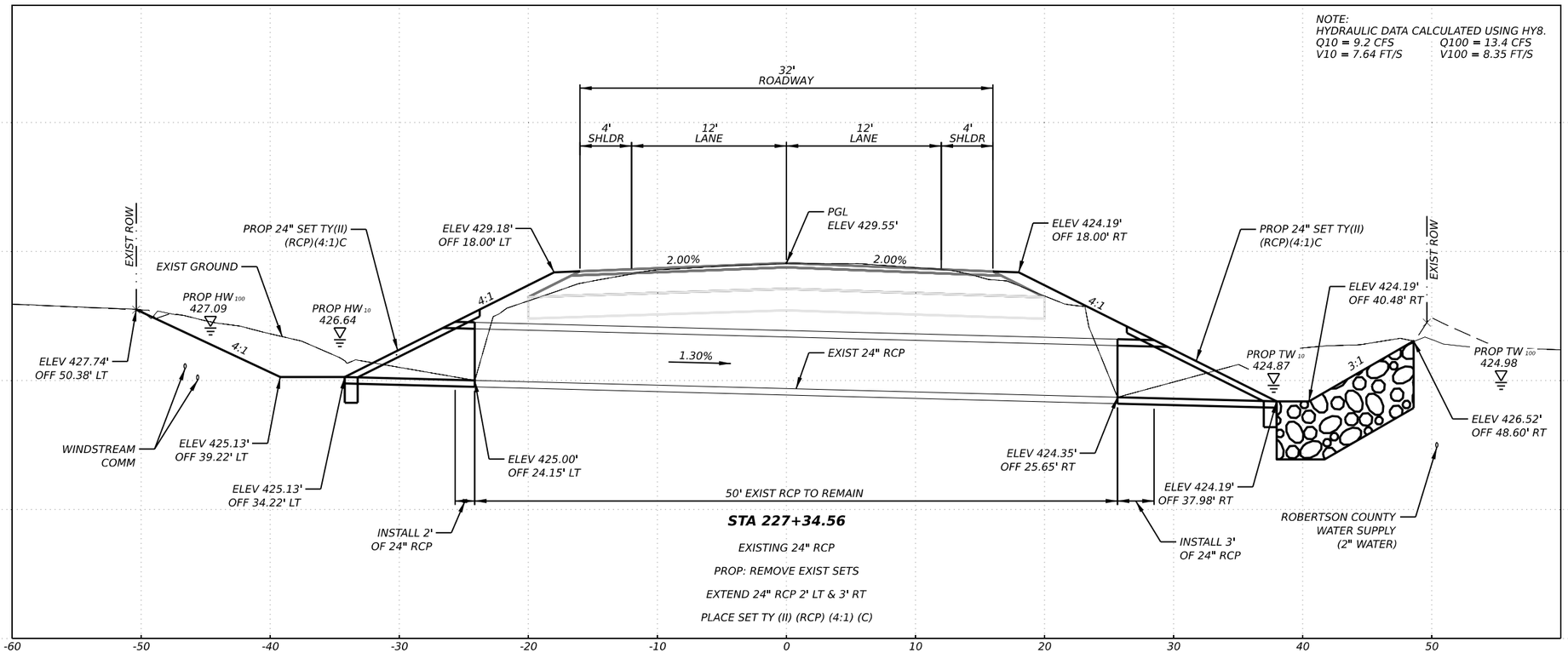
SCALE: 1" = 10' H
1" = 5' V



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CULVERT 7 LAYOUT STA 227+34.56

SHEET 7 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		128

DATE: 5/26/2023 10:05:44 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan Set\5. Drainage\009CPP07.dgn

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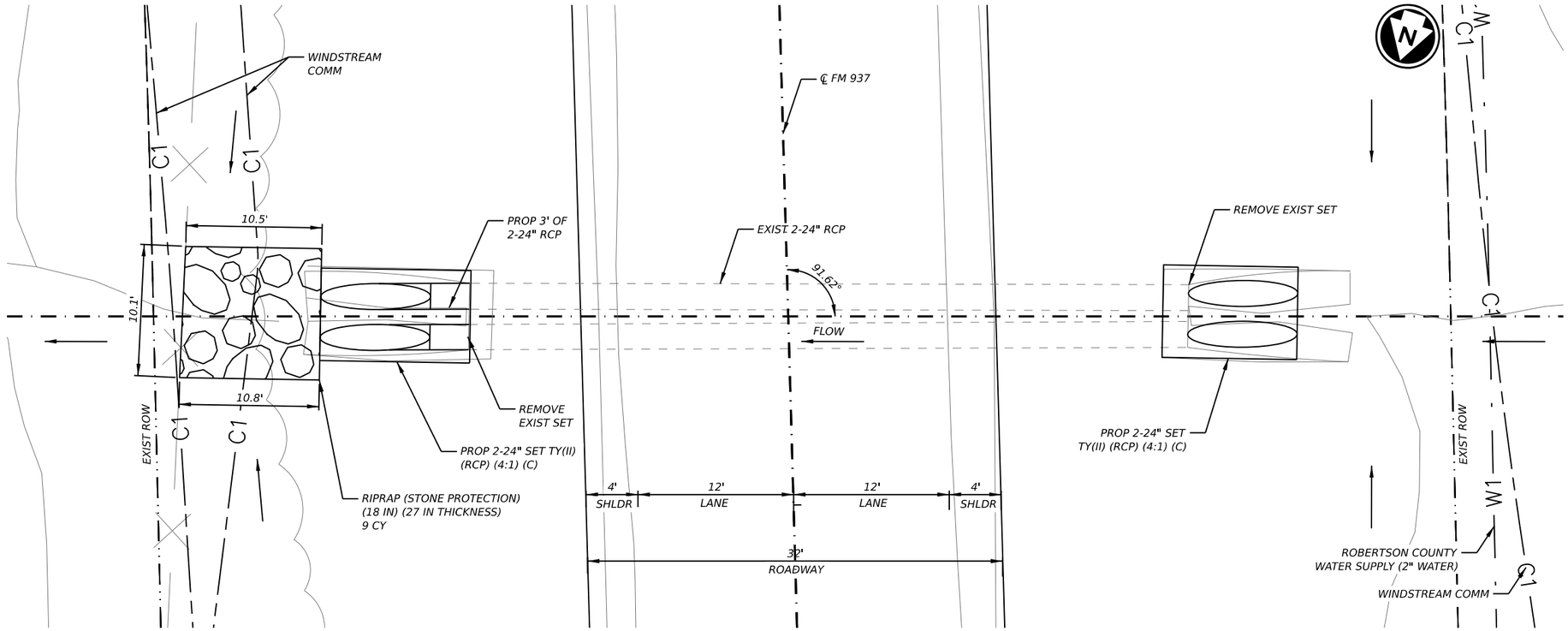
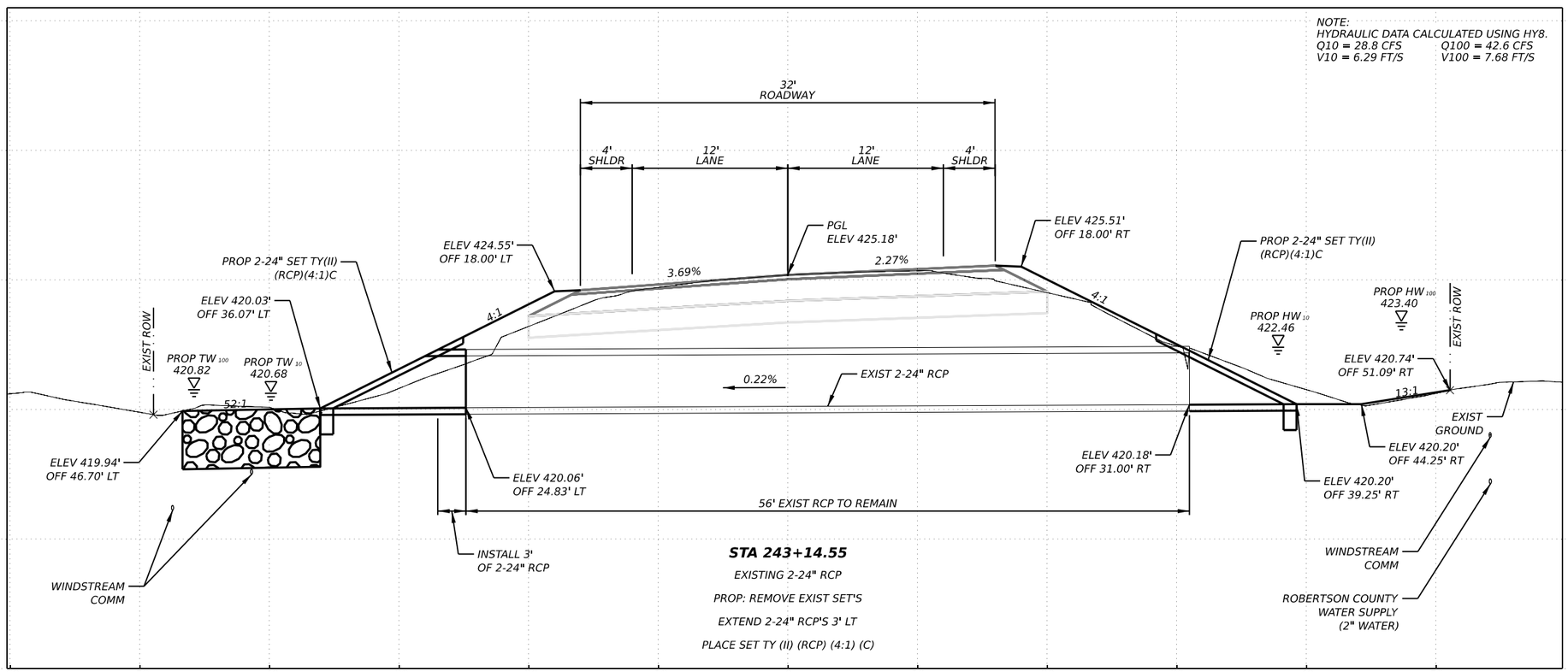


SCALE: 1" = 10' H
1" = 5' V



STA 243+14.55

EXISTING 2-24" RCP

PROP: REMOVE EXIST SET'S

EXTEND 2-24" RCP'S 3' LT

PLACE SET TY (II) (RCP) (4:1) (C)

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CULVERT 8 LAYOUT STA 243+14.55

SHEET 8 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		129

DATE: 5/26/2023 10:05:45 AM
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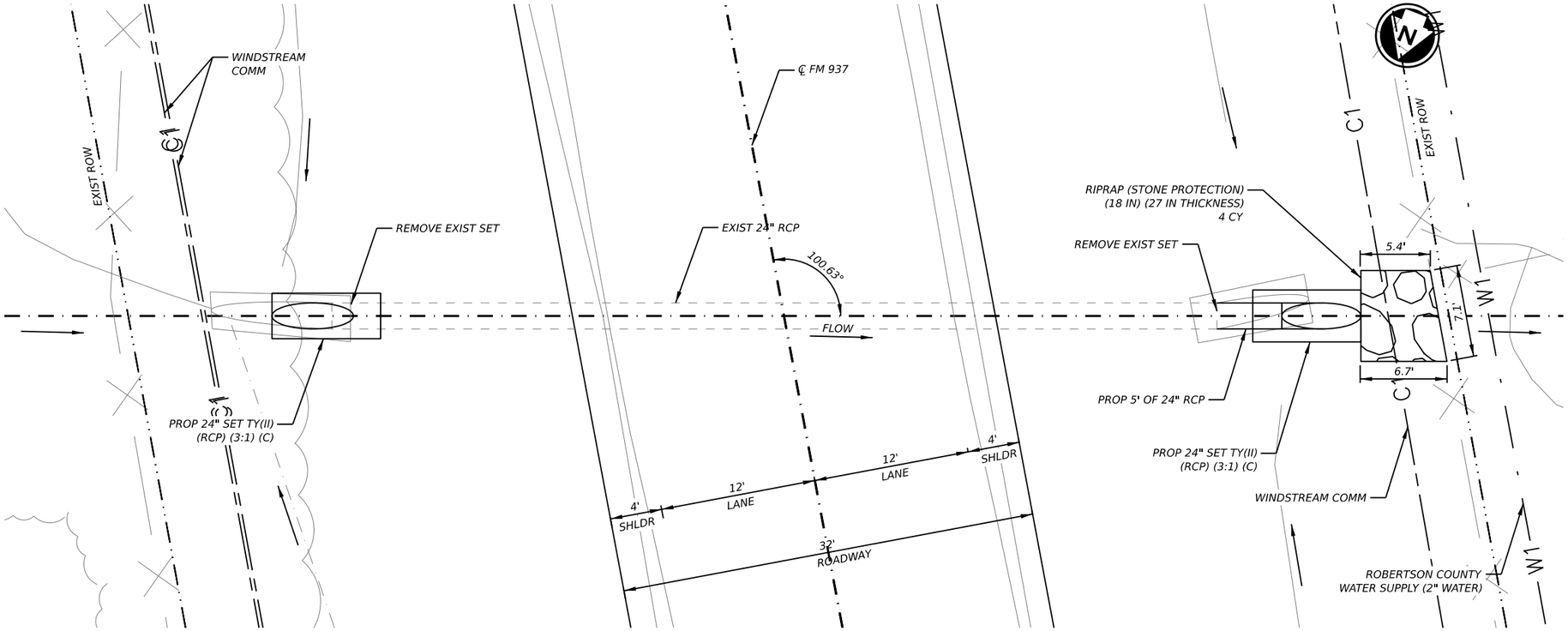

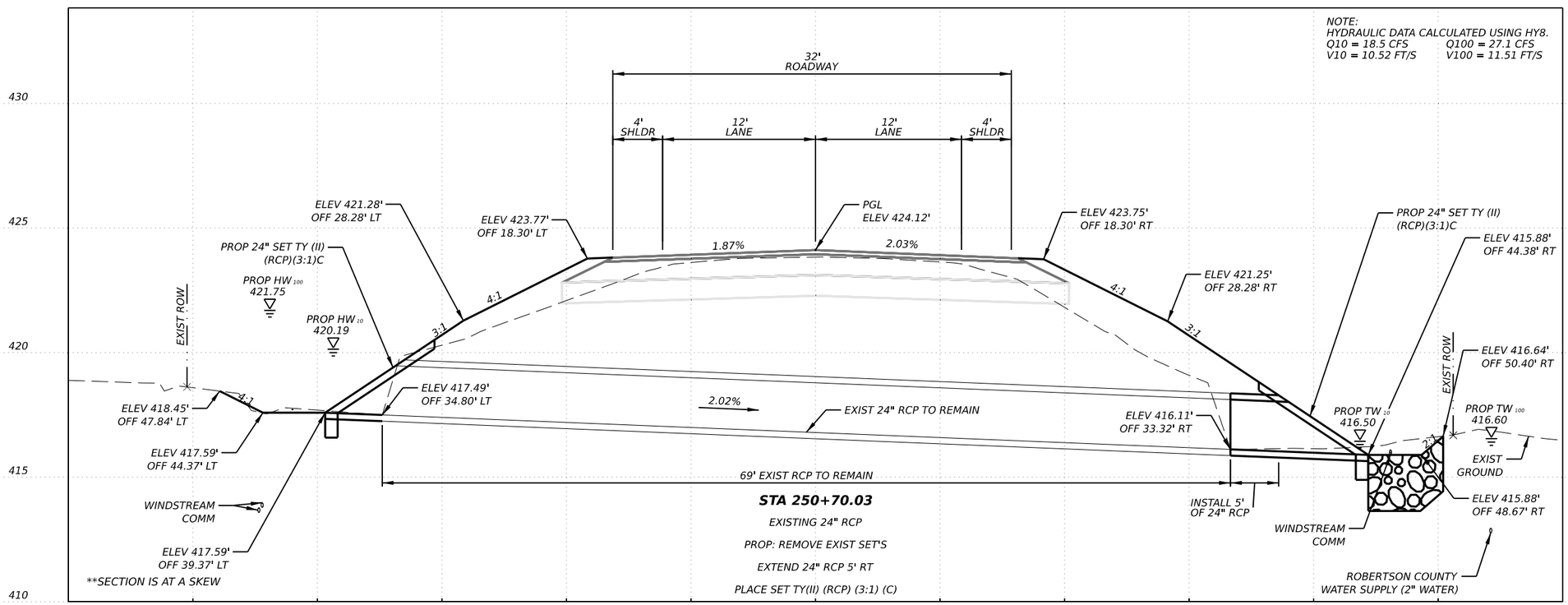

DATE: 5/26/2023 10:05:46 AM
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CULVERT 9 LAYOUT STA 250+70.03

SHEET 9 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		130

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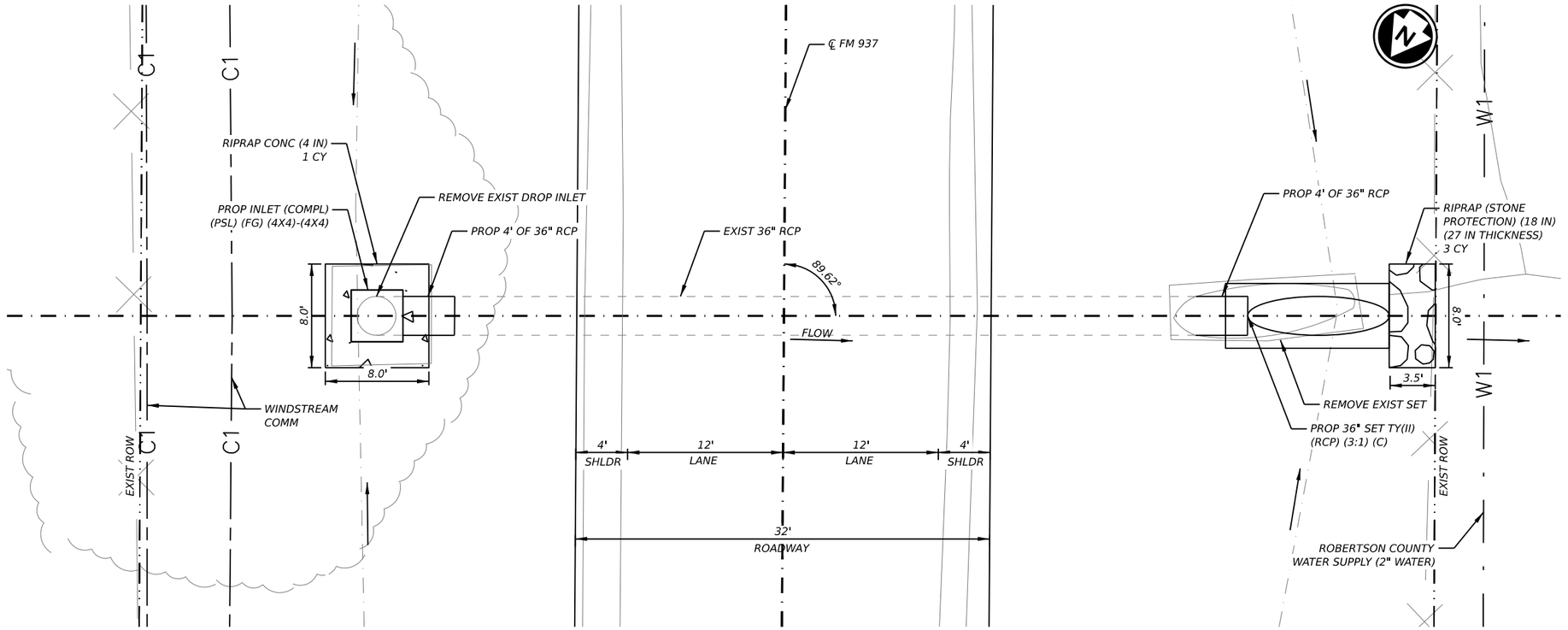

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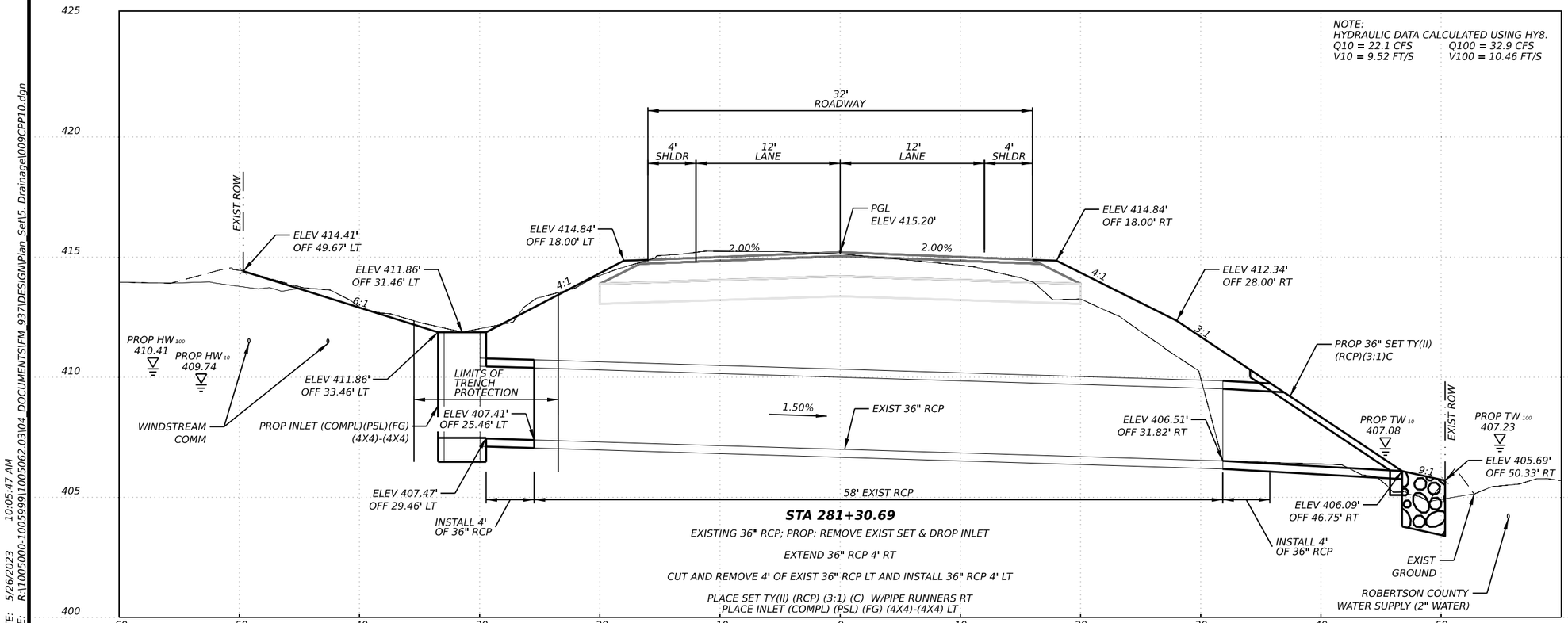
SCALE: 1" = 10' H
1" = 5' V



STA 281+30.69

EXISTING 36" RCP; PROP: REMOVE EXIST SET & DROP INLET

EXTEND 36" RCP 4' RT

CUT AND REMOVE 4' OF EXIST 36" RCP LT AND INSTALL 36" RCP 4' LT

PLACE SET TY(II) (RCP) (3:1) (C) W/PIPE RUNNERS RT

PLACE INLET (COMPL) (PSL) (FG) (4X4)-(4X4) LT

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CULVERT 10 LAYOUT STA 281+30.69

SHEET 10 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		131

DATE: 5/26/2023 10:05:47 AM
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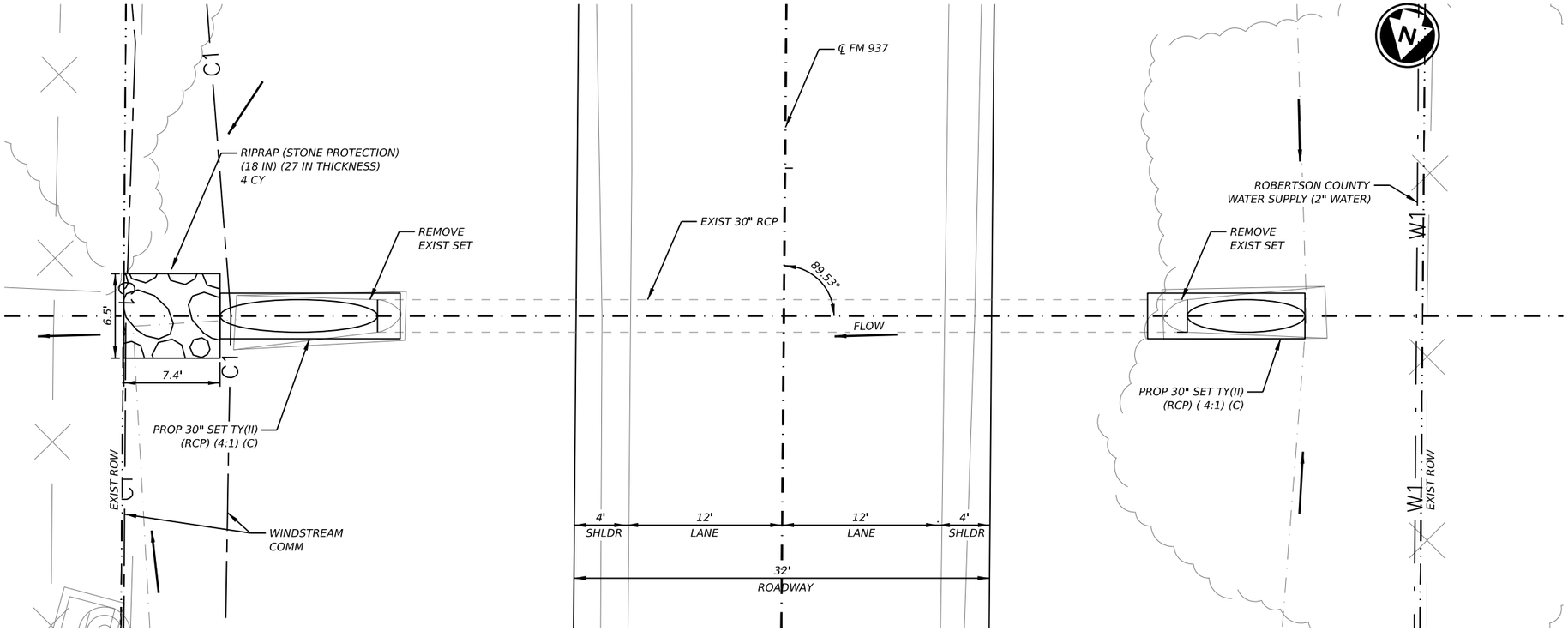
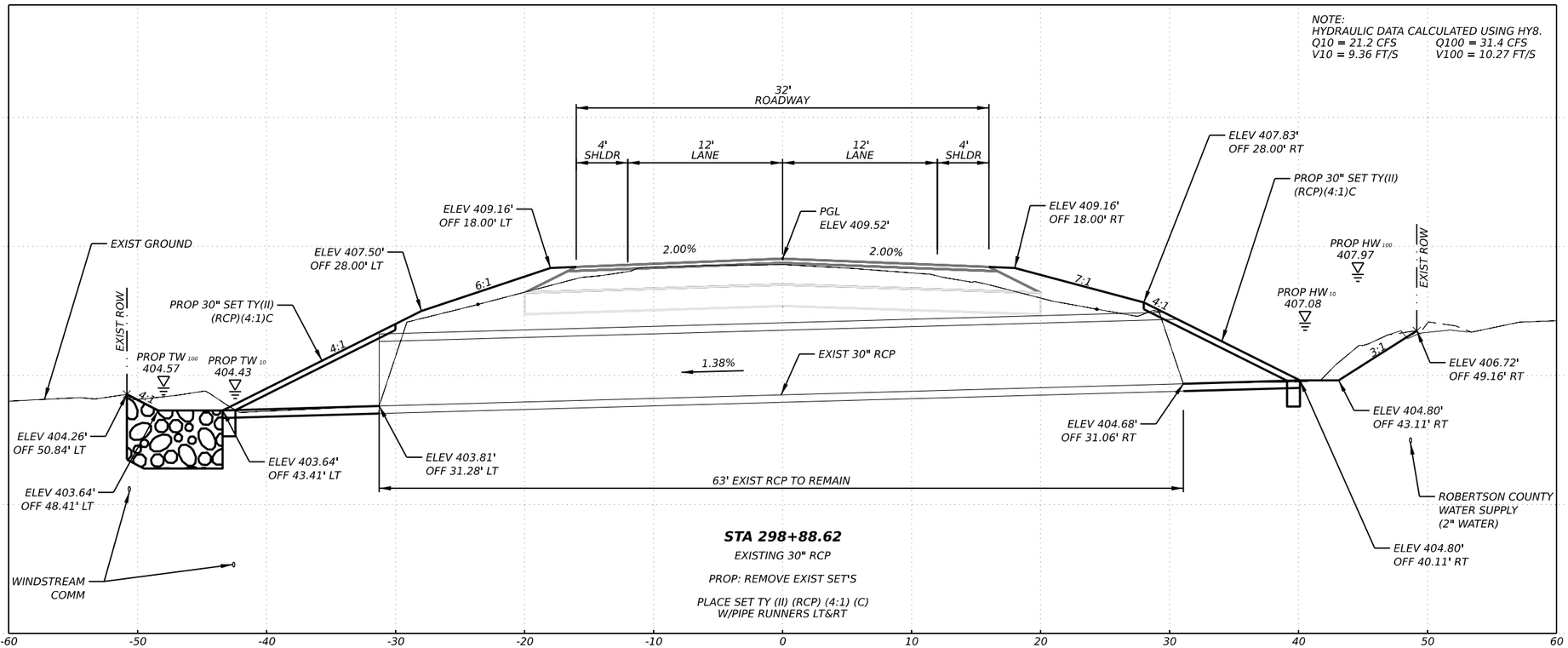


0 5 10

SCALE: 1" = 10' H
1" = 5' V



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CULVERT 11 LAYOUT STA 298+88.62

SHEET 11 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		132

DATE: 5/26/2023 10:05:48 AM
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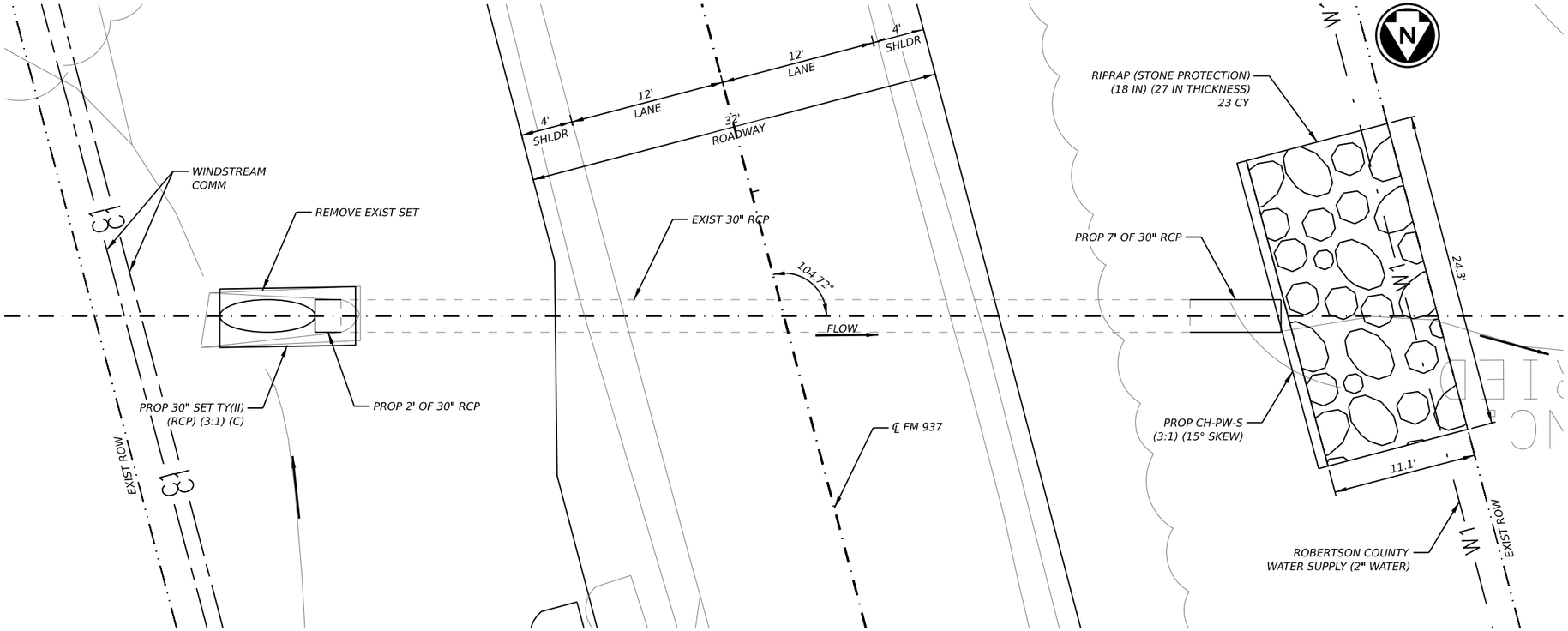
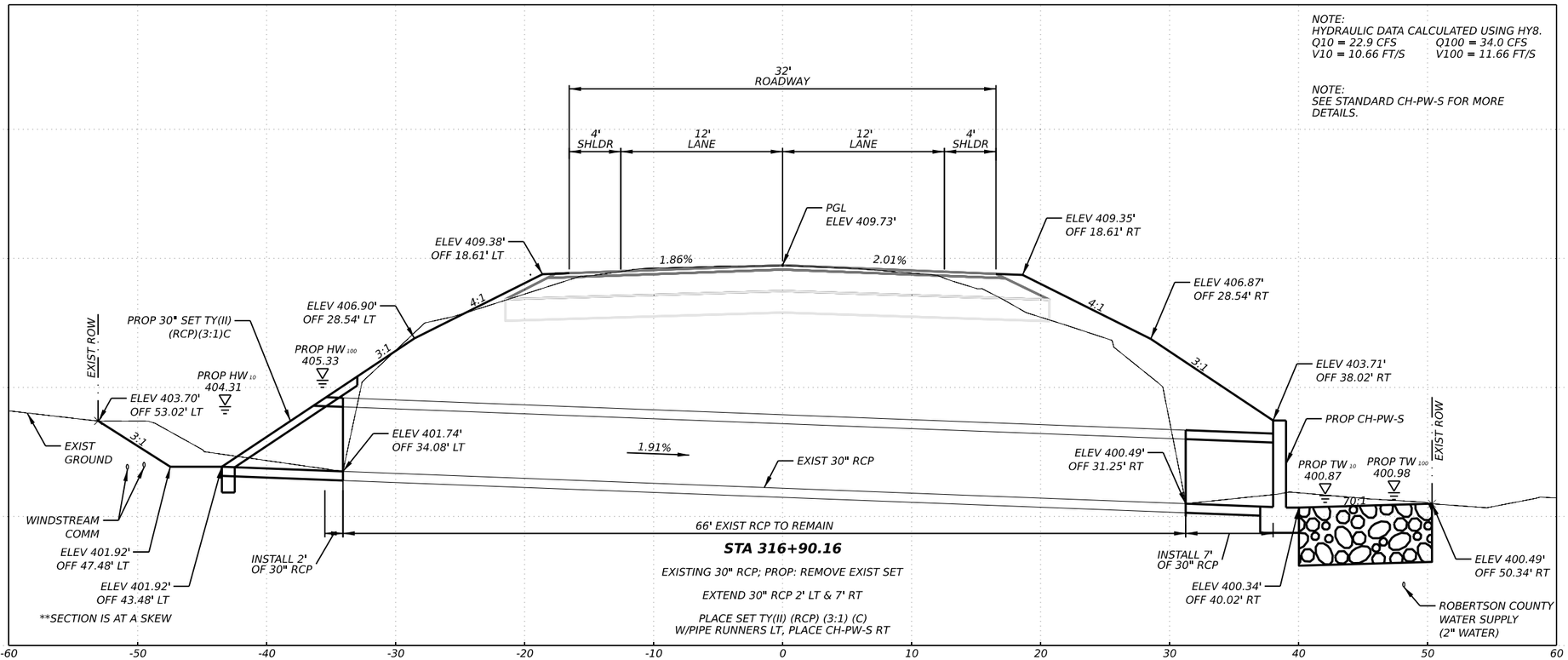


0 5 10

SCALE: 1" = 10' H
1" = 5' V



NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 22.9 CFS Q100 = 34.0 CFS
V10 = 10.66 FT/S V100 = 11.66 FT/S

NOTE:
SEE STANDARD CH-PW-S FOR MORE DETAILS.

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CULVERT 12 LAYOUT STA 316+90.16

SHEET 12 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		133

DATE: 5/26/2023 10:05:49 AM
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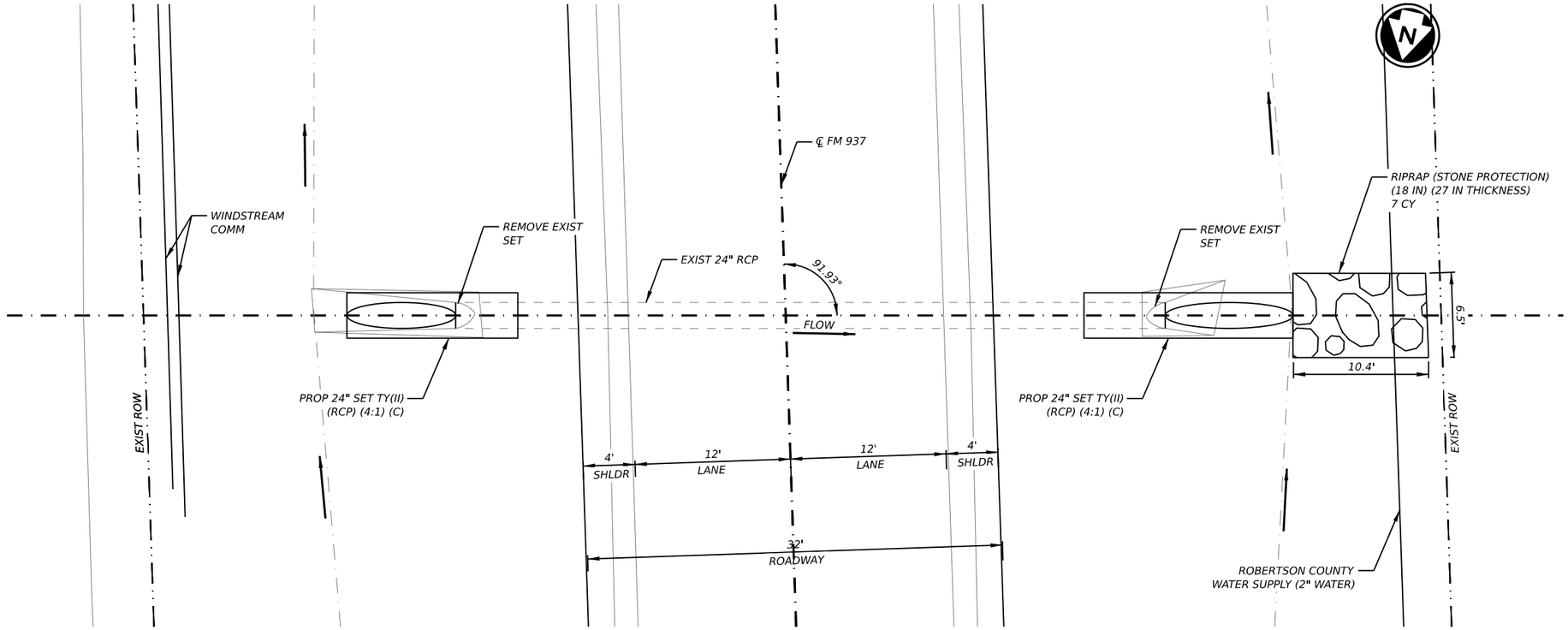
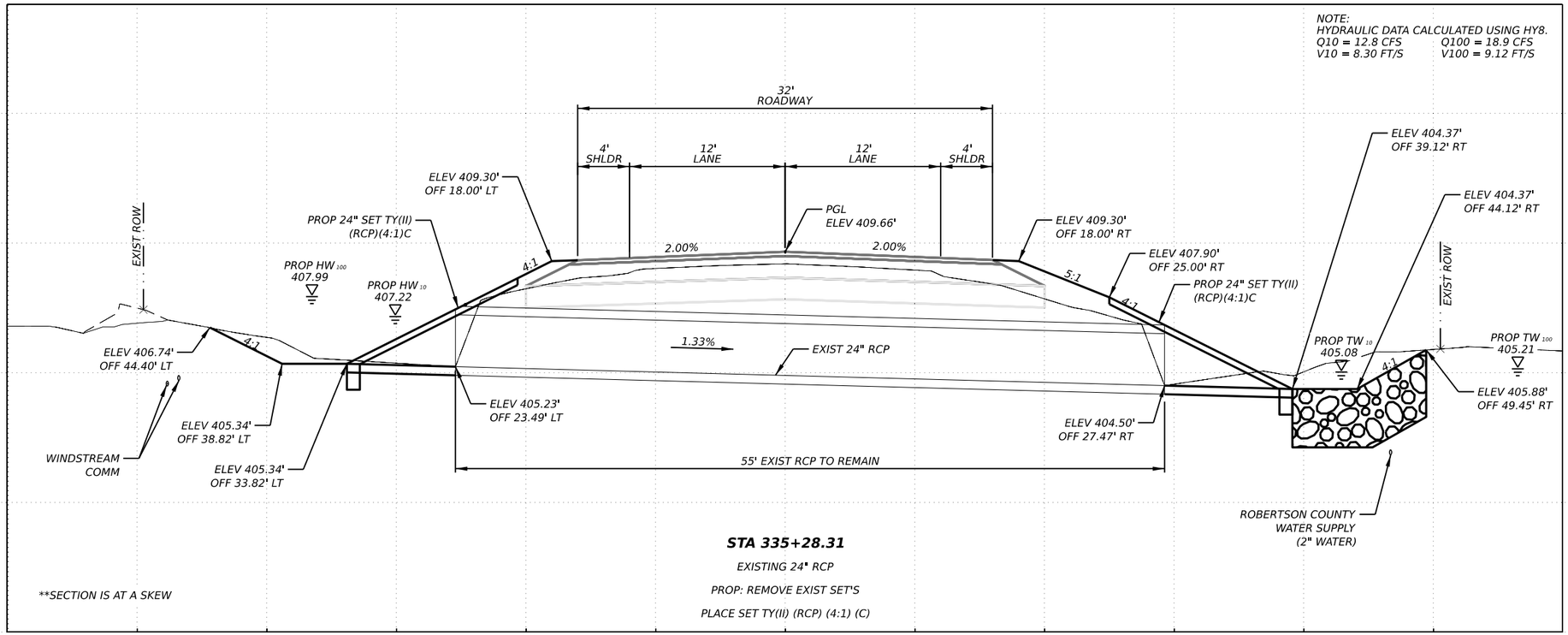


0 5 10

SCALE: 1" = 10' H
1" = 5' V

NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 12.8 CFS Q100 = 18.9 CFS
V10 = 8.30 FT/S V100 = 9.12 FT/S



STA 335+28.31

EXISTING 24" RCP

PROP: REMOVE EXIST SET'S

PLACE SET TY(II) (RCP) (4:1) (C)

**SECTION IS AT A SKEW

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CULVERT 13 LAYOUT
STA 335+28.31

SHEET 13 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		134

DATE: 5/26/2023 10:05:50 AM
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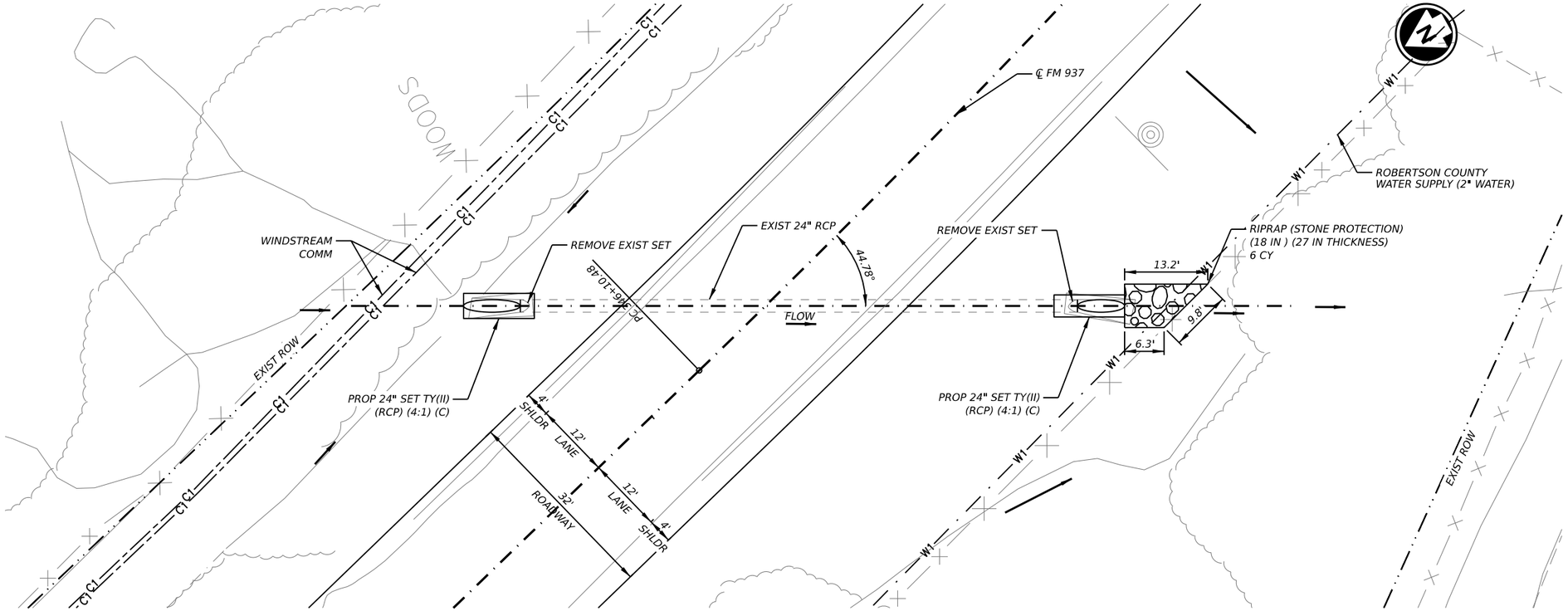

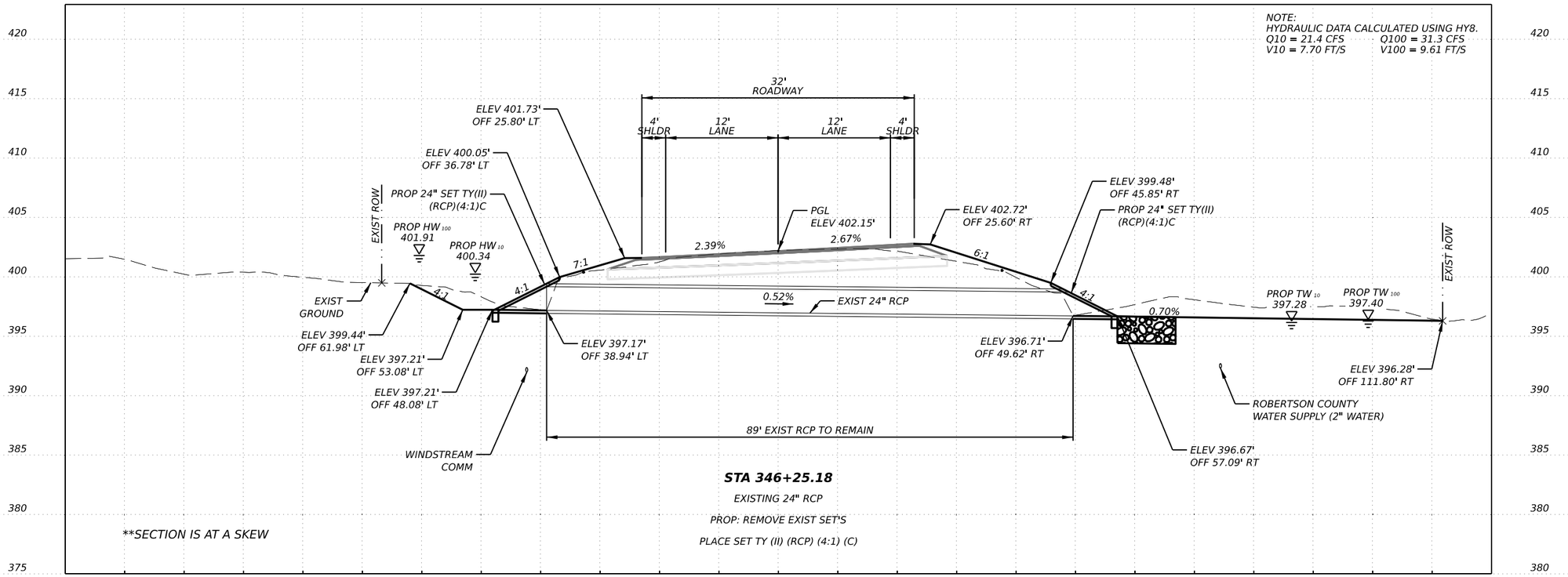

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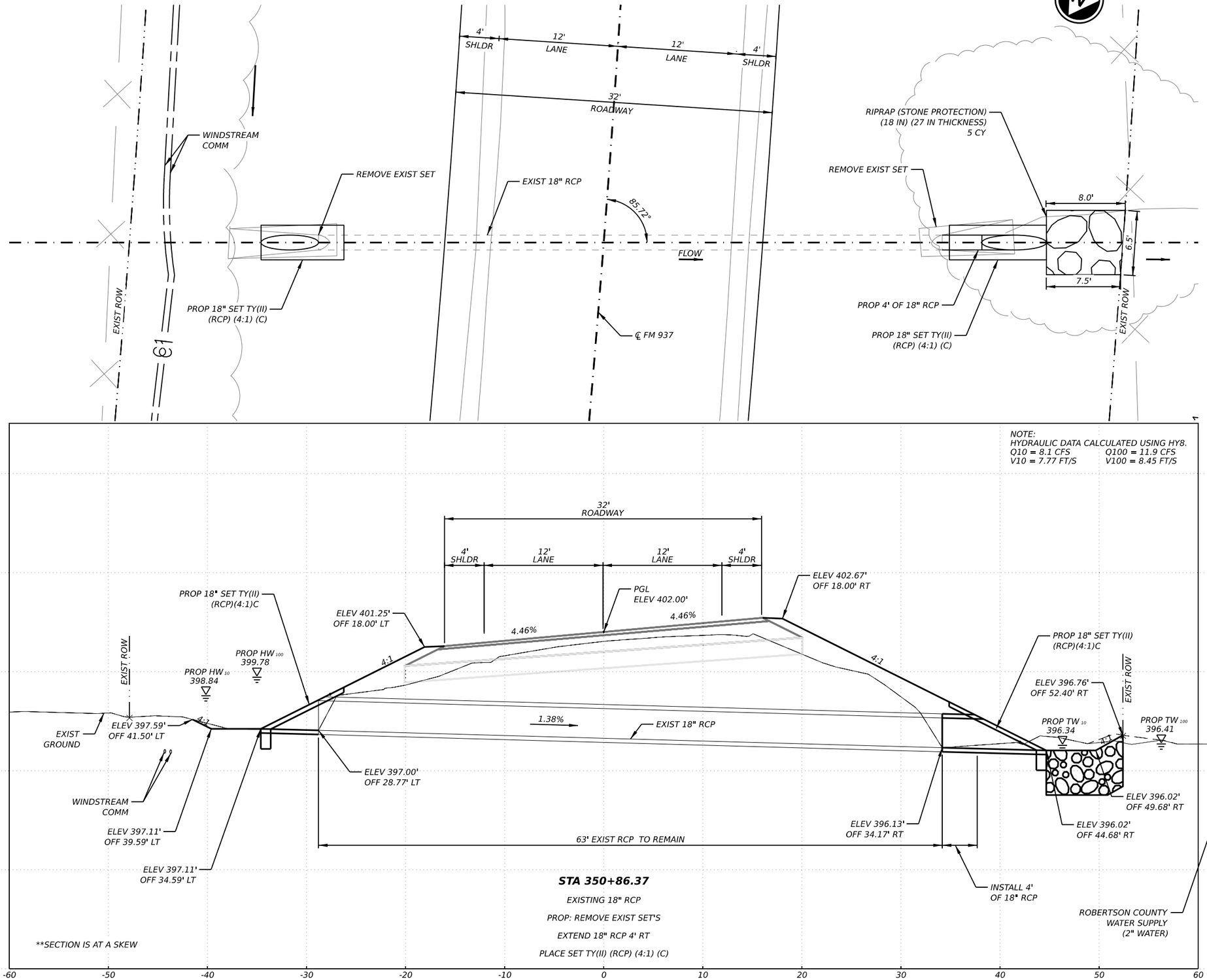
CULVERT 14 LAYOUT STA 346+25.18

SHEET 14 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		135



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CULVERT 15 LAYOUT
STA 350+86.37

SHEET 15 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		136

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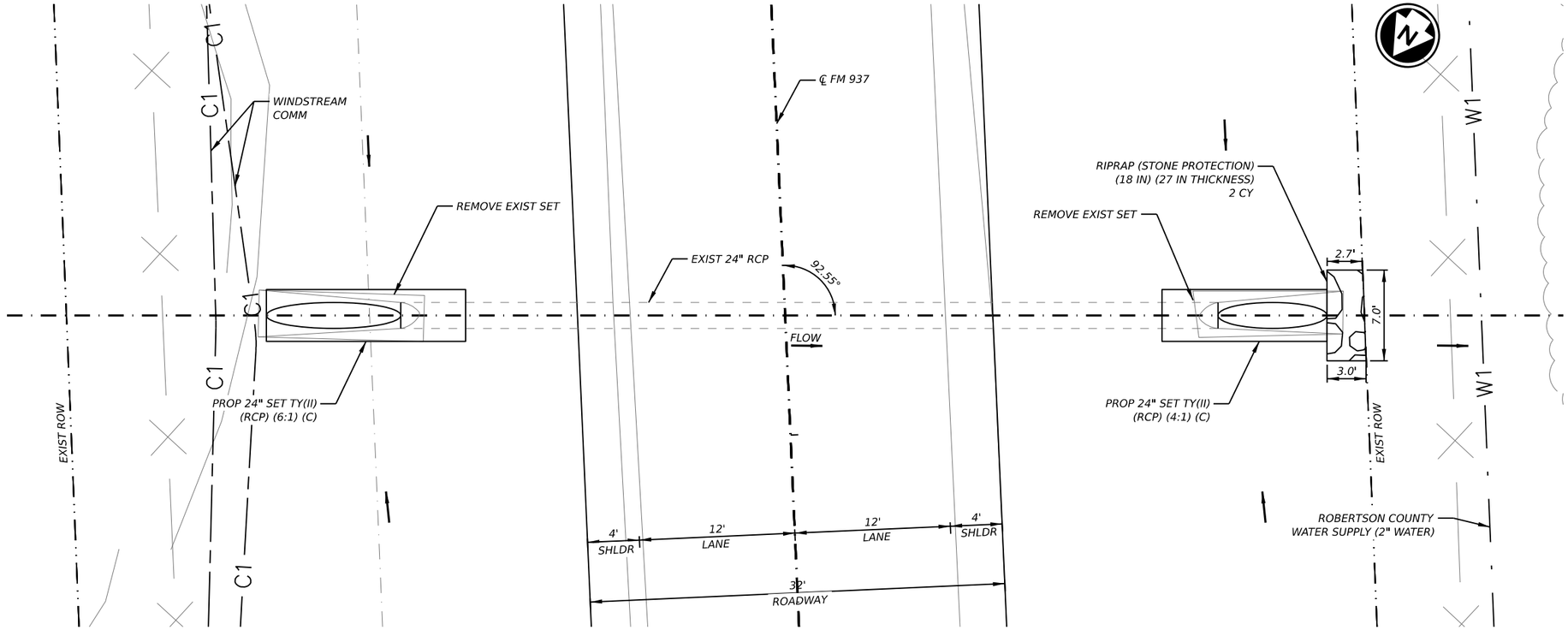
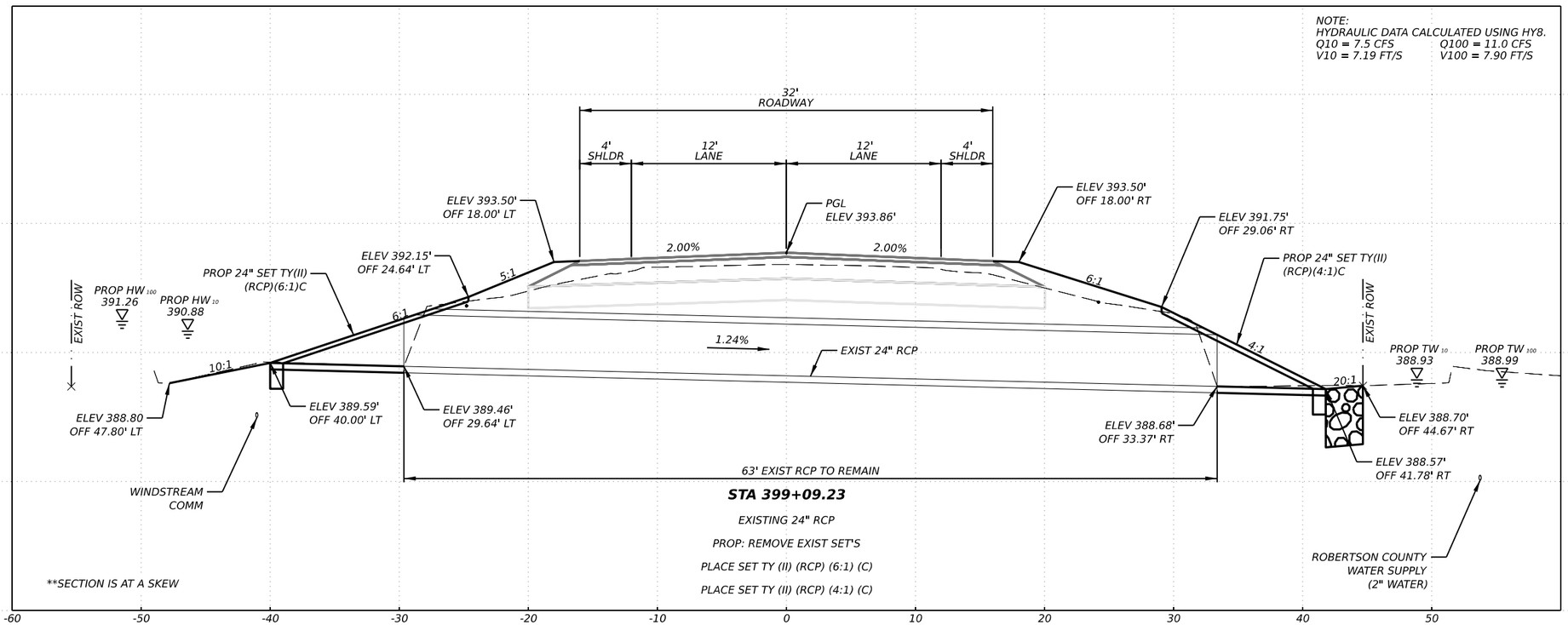


0 5 10

SCALE: 1" = 10' H
1" = 5' V



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CULVERT 16 LAYOUT STA 399+09.23

SHEET 16 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		137

DATE: 5/26/2023 10:05:54 AM
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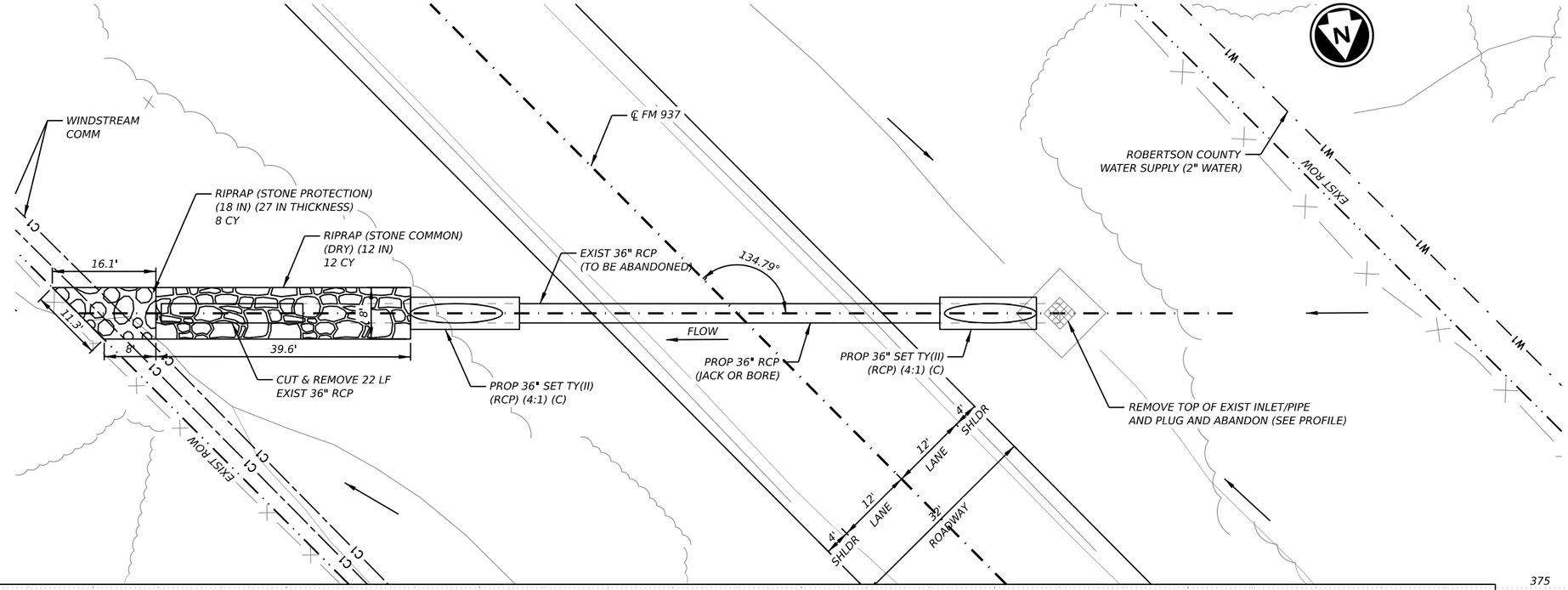
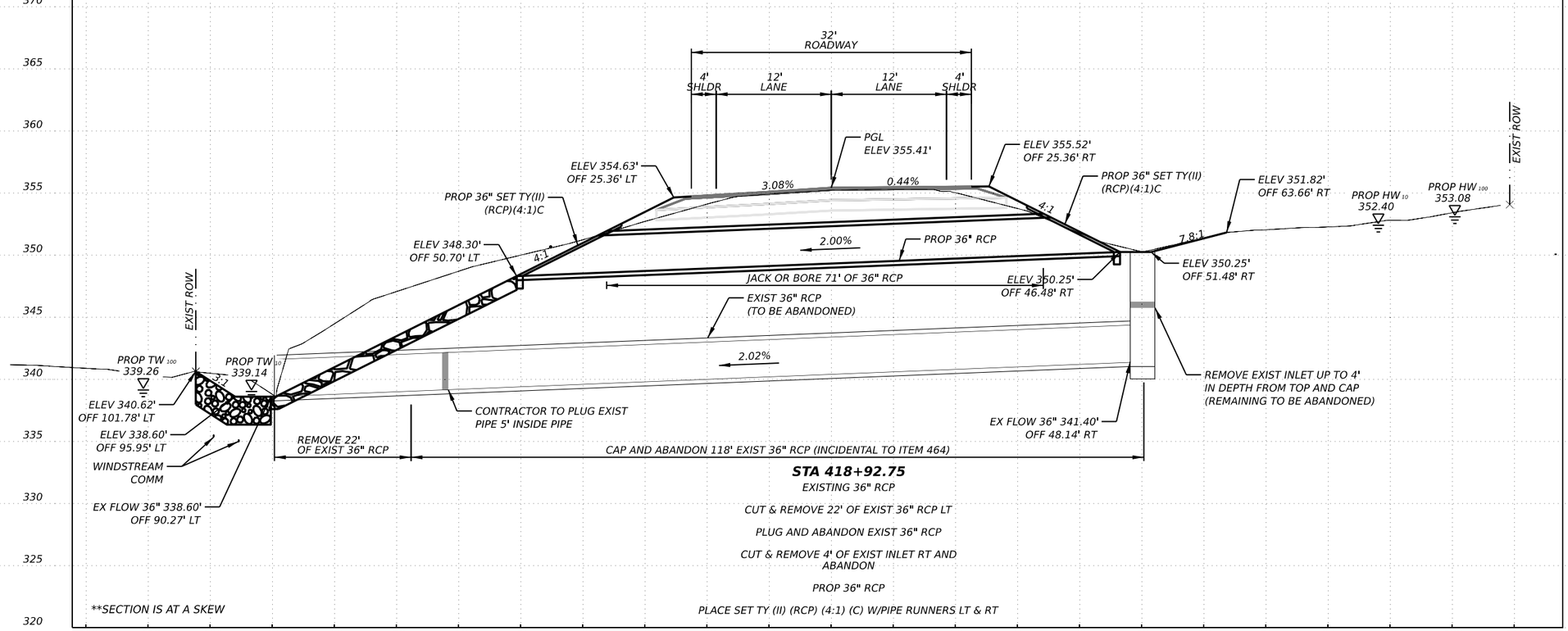


NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 25.5 CFS Q100 = 37.0 CFS
V10 = 10.77 FT/S V100 = 11.71 FT/S

0 10 20
SCALE: 1" = 20' H
1" = 2' V



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CULVERT 17 LAYOUT STA 418+92.75

SHEET 17 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		138

DATE: 5/26/2023 10:05:55 AM
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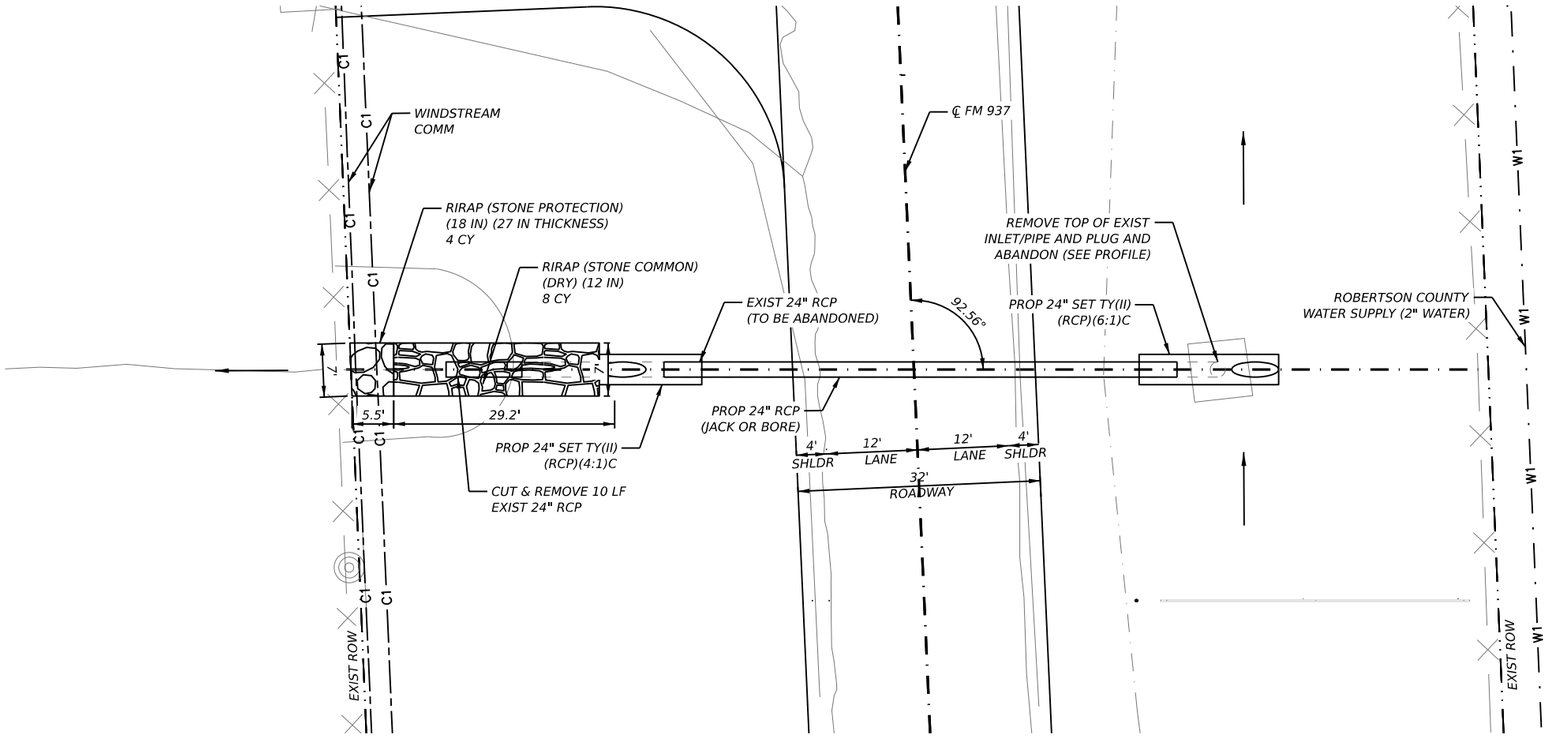

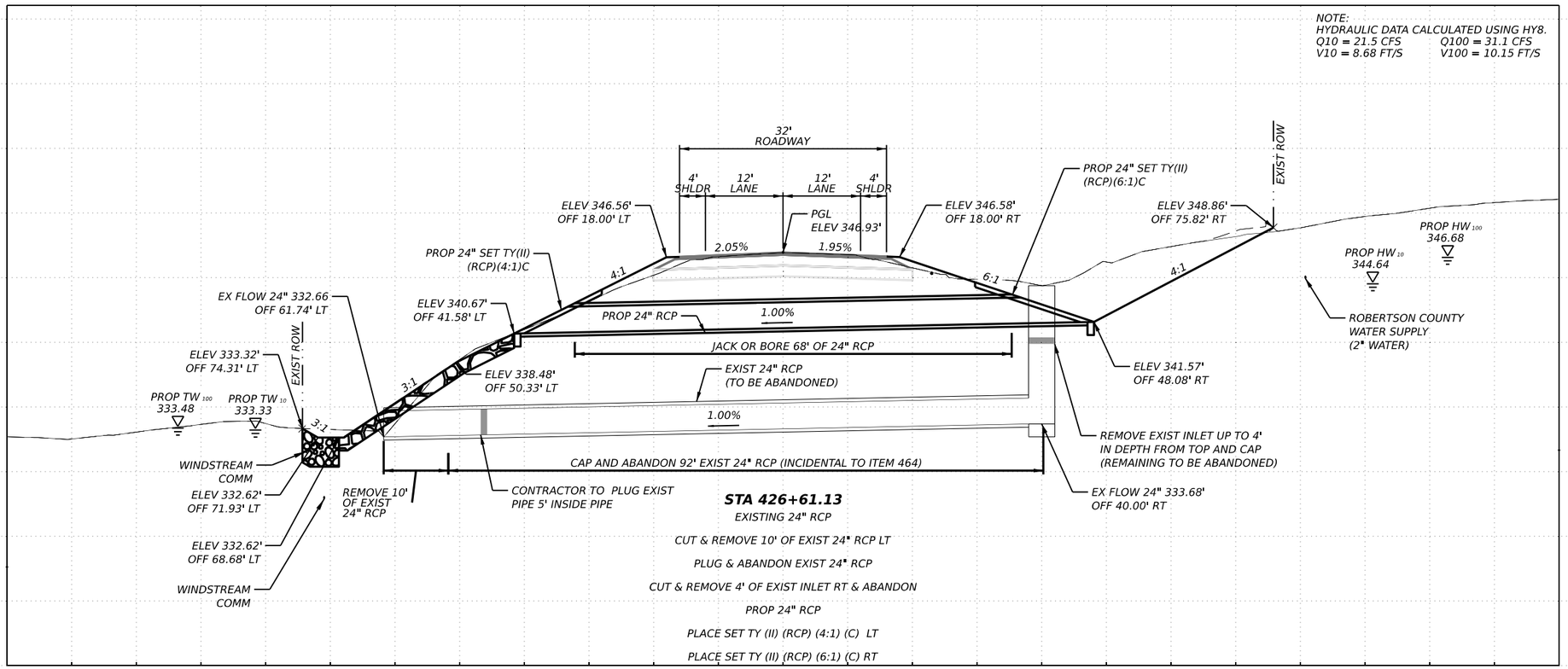

0 10 20

SCALE: 1" = 20' H
1" = 10' V

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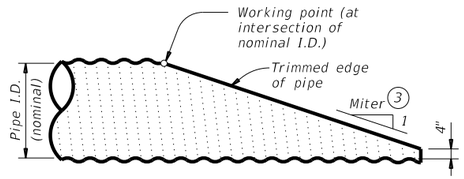
CULVERT 18 LAYOUT STA 426+61.13

SHEET 18 OF 18

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		139

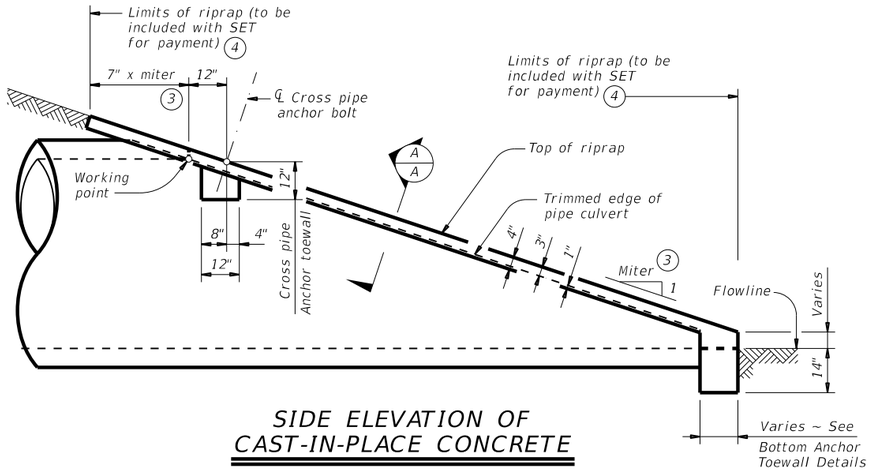
DATE: 5/26/2023 10:05:55 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM 937\DESIGN\Plan Set\5. Drainage\009CPP18.dgn



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

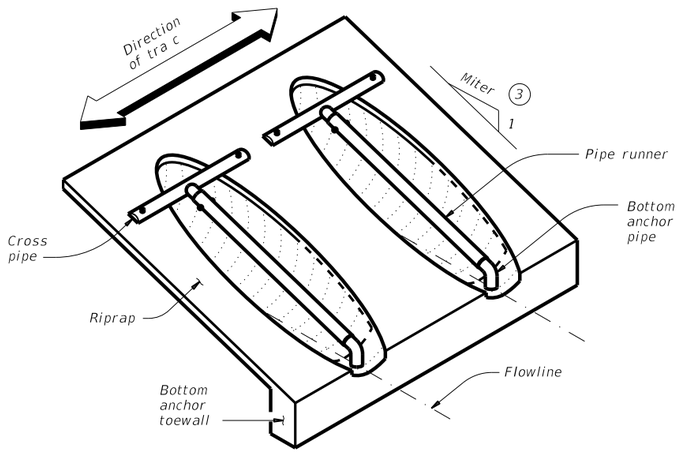
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert.
Details of corrugated metal pipe (CMP) culvert
are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' – 7"	3' – 5"	N/A	N/A	N/A	5' – 10"	N/A	N/A	N/A	8' – 1"	N/A	N/A	N/A	12' – 9"
27"	1' – 8"	3' – 8"	N/A	N/A	5' – 5"	6' – 11"	N/A	N/A	7' – 7"	9' – 7"	N/A	N/A	11' – 11"	14' – 11"
30"	1' – 10"	3' – 11"	N/A	N/A	6' – 4"	8' – 0"	N/A	N/A	8' – 9"	11' – 0"	N/A	N/A	13' – 8"	17' – 0"
33"	1' – 11"	4' – 2"	6' – 2"	6' – 5"	7' – 3"	9' – 1"	8' – 6"	8' – 10"	10' – 0"	12' – 5"	13' – 3"	13' – 9"	15' – 5"	19' – 2"
36"	2' – 1"	4' – 5"	6' – 11"	7' – 3"	8' – 2"	10' – 2"	9' – 6"	9' – 11"	11' – 2"	13' – 10"	14' – 9"	15' – 3"	17' – 2"	21' – 3"
42"	2' – 4"	4' – 11"	8' – 6"	8' – 10"	9' – 11"	12' – 4"	11' – 7"	12' – 0"	13' – 6"	16' – 8"	17' – 9"	18' – 5"	20' – 8"	25' – 7"
48"	2' – 7"	5' – 5"	10' – 1"	10' – 5"	11' – 9"	N/A	13' – 7"	14' – 2"	15' – 10"	N/A	20' – 9"	21' – 6"	24' – 2"	N/A
54"	3' – 0"	5' – 11"	11' – 8"	12' – 1"	N/A	N/A	15' – 8"	16' – 3"	N/A	N/A	23' – 10"	24' – 8"	N/A	N/A
60"	3' – 3"	6' – 5"	13' – 3"	N/A	N/A	N/A	17' – 9"	N/A	N/A	N/A	26' – 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with ared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

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

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

DATE: 5/26/2023 10:05:57 AM
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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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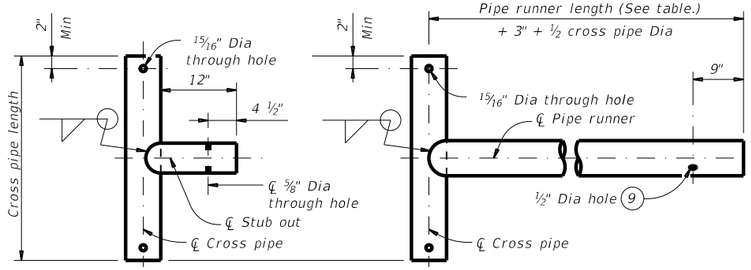
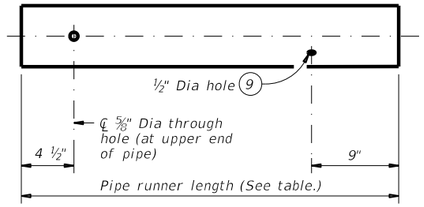
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		140



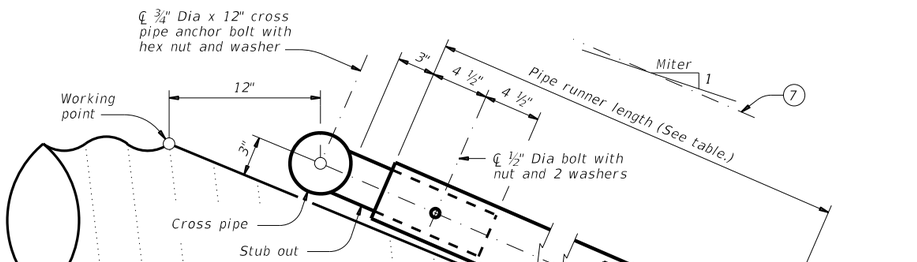
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



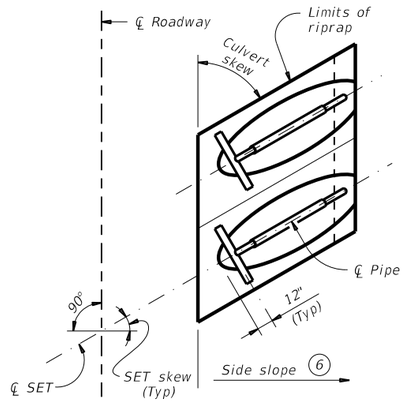
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

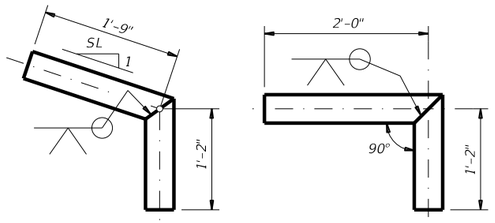


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

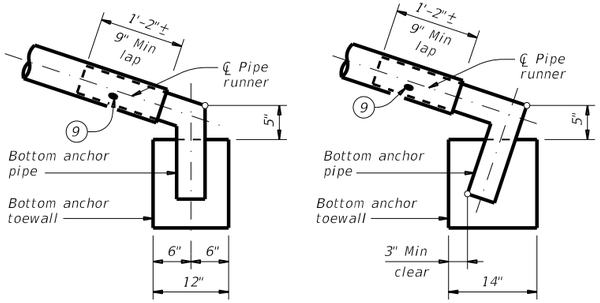


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

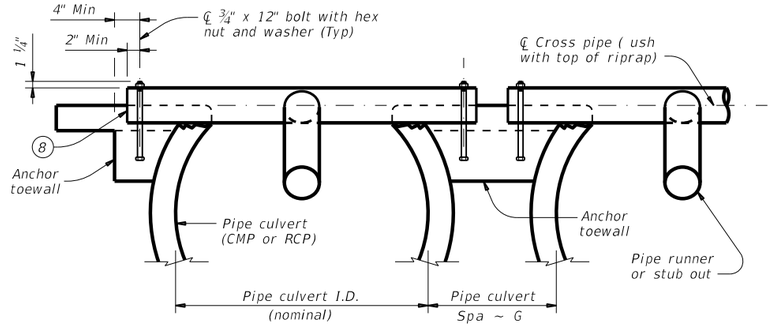
BOTTOM ANCHOR PIPE DETAILS (10)



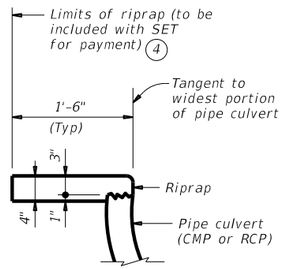
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

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

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

MATERIAL NOTES:

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

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the speci cations.

GENERAL NOTES:

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

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

Payment for riprap and toewall is included in the price bid for each safety end treatment.

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

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
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	BRY	ROBERTSON		141

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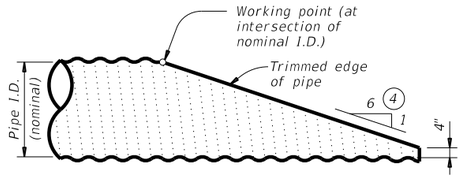
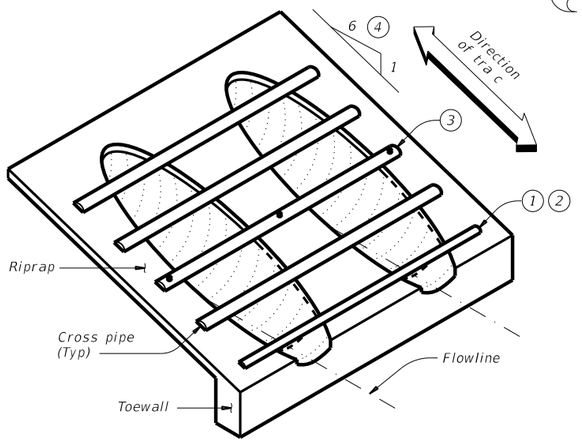


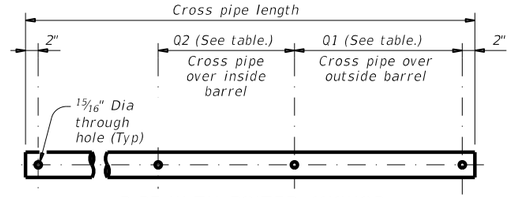
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

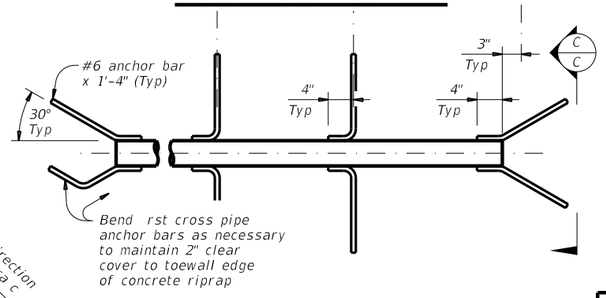
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



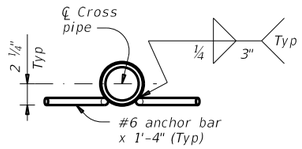
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

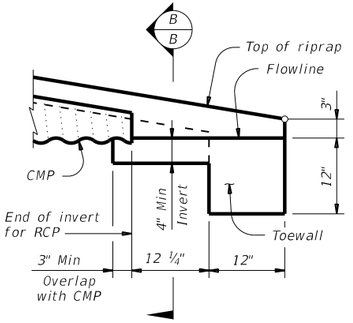


PIPE WITH ANCHOR BARS



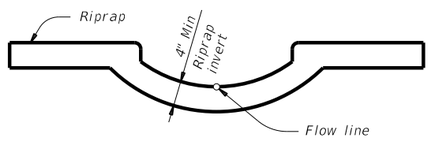
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

(1) The proper installation of the rst cross pipe is critical for vehicle safety. Place the top of the rst cross pipe no more than 6" above the ow line.

(2) Provide cross pipes, except the rst bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the rst bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not ow 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 atter 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 bers 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 speci cations.

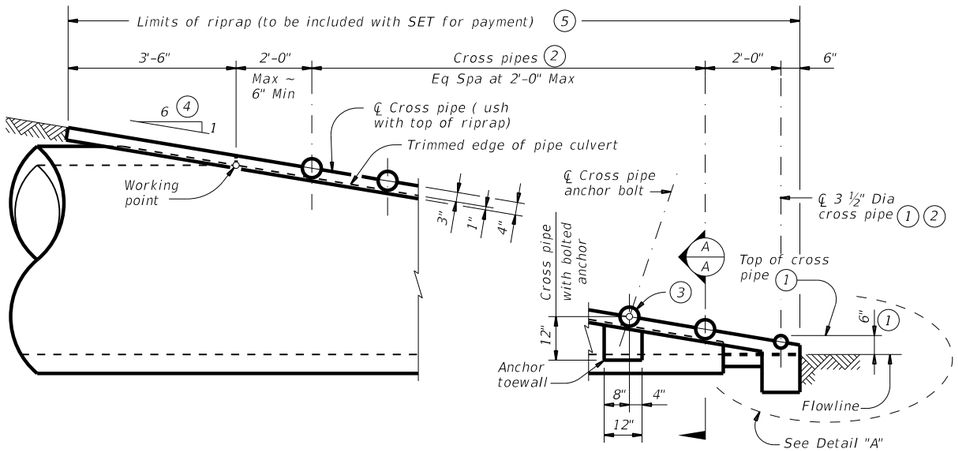
GENERAL NOTES:

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.

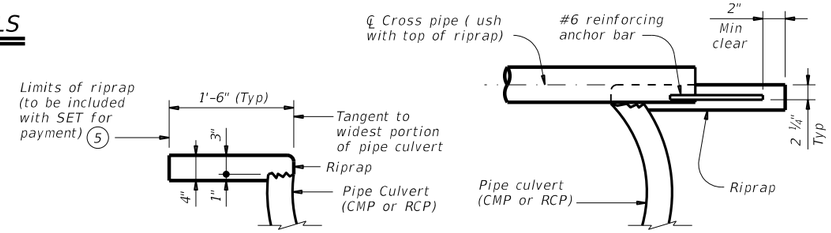
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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

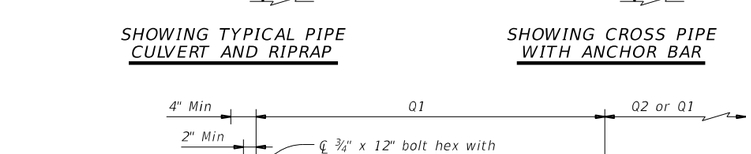


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

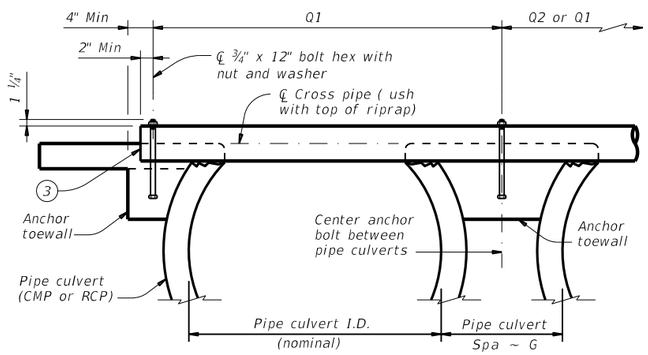
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



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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	BRY	ROBERTSON		142

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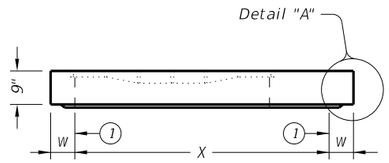
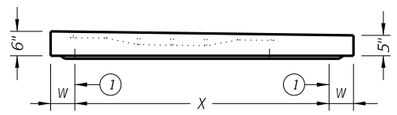
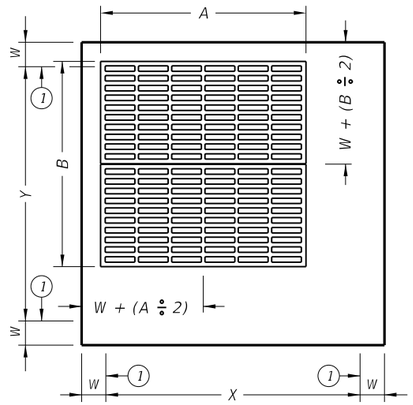


STYLE 'FG'

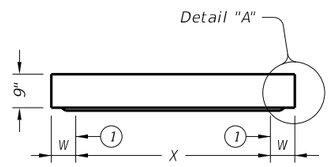
ORIENT TAPER TO CORRESPOND WITH ROADWAY CROSS-SLOPE.



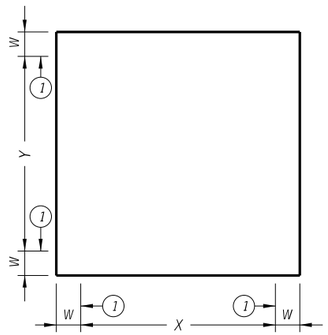
STYLE 'SFG'
ELEVATION VIEW



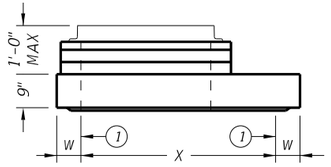
PLAN VIEW
CAST-IN FRAME & GRATE
STYLES 'FG' & 'SFG'



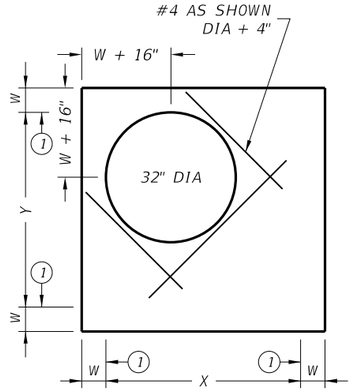
ELEVATION VIEW
STYLE 'SL'



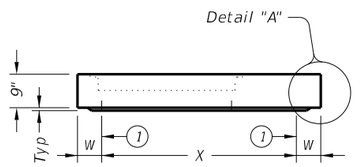
PLAN VIEW
NO OPENINGS
STYLE 'SL'



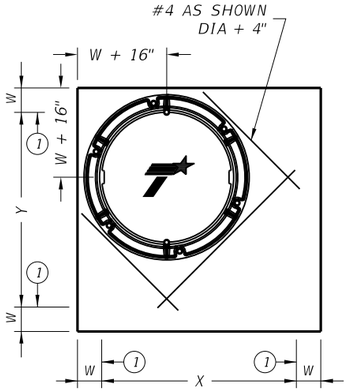
ELEVATION VIEW
STYLE 'RH'



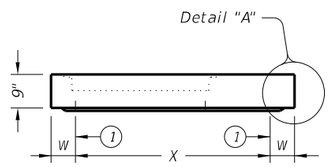
PLAN VIEW
SHIP LOOSE RING & COVER
STYLE 'RH'



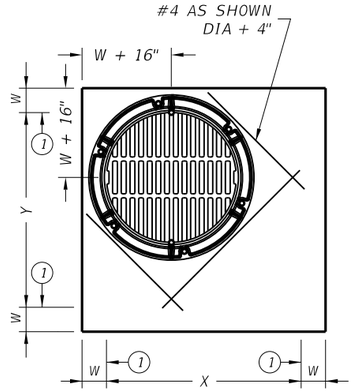
ELEVATION VIEW
STYLE 'RC'



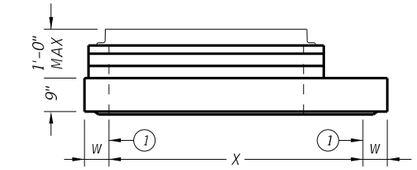
PLAN VIEW
32" DIA CAST-IN RING & COVER
STYLE 'RC'



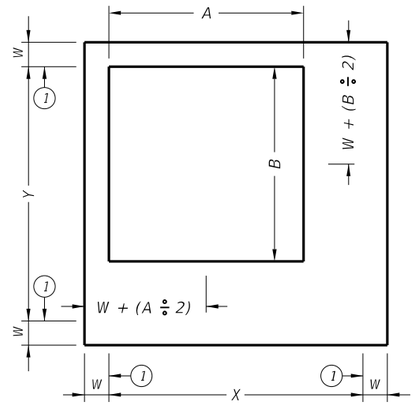
ELEVATION VIEW
STYLE 'RG'



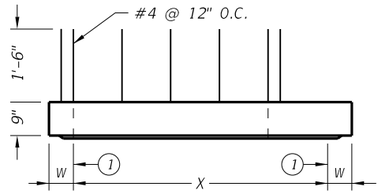
PLAN VIEW
32" DIA CAST-IN RING & GRATE
STYLE 'RG'



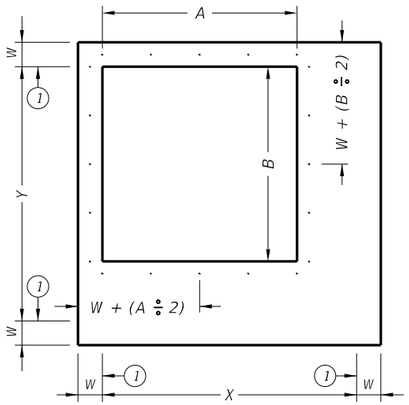
ELEVATION VIEW
STYLE 'SH'



PLAN VIEW
SHIP LOOSE FRAME & GRATE
STYLE 'SH'



ELEVATION VIEW
STYLE 'S1'



PLAN VIEW
EXPOSED REBAR
STYLE 'S1'

(1) Matches inside face of wall of precast base or riser below inlet.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

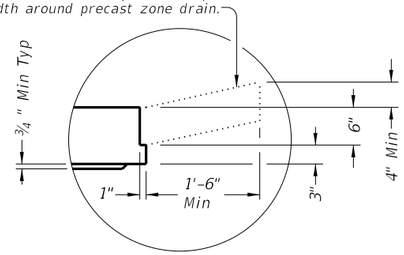
FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		143

DATE: 5/26/2023 10:05:59 AM
FILE: R:\1005000-1005999\1005062_03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\5_Drainage\009PDT03.dgn

Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in²/ft	0.37 in²/ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in²/ft	0.37 in²/ft
SFG	3'x3'	6"	3'x3'	0.32 in²/ft	0.32 in²/ft
SL	4'x4'	6"	n/a	0.34 in²/ft	0.34 in²/ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in²/ft	0.41 in²/ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in²/ft	0.41 in²/ft
SFG	4'x4'	6"	4'x4'	0.32 in²/ft	0.32 in²/ft
SL	3'x5'	6"	n/a	0.39 in²/ft	0.39 in²/ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in²/ft	0.48 in²/ft
SFG	3'x5'	6"	3'x5'	0.32 in²/ft	0.32 in²/ft
SL	4'x5'	6"	n/a	0.42 in²/ft	0.42 in²/ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in²/ft	0.42 in²/ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in²/ft	0.66 in²/ft
SL	5'x5'	6"	n/a	0.36 in²/ft	0.36 in²/ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in²/ft	0.43 in²/ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in²/ft	0.63 in²/ft
SL	5'x6'	6"/8"	n/a	0.48 in²/ft	0.48 in²/ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in²/ft	0.60 in²/ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in²/ft	0.60 in²/ft
SL	6'x6'	6"/8"	n/a	0.43 in²/ft	0.43 in²/ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in²/ft	0.59 in²/ft
SL	8'x8'	8"/10"	n/a	0.45 in²/ft	0.45 in²/ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in²/ft	0.45 in²/ft

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of ¾" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct tra c and may be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction a ects nal grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to tra c, unless noted otherwise on plans

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for lid is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

PRECAST SLAB LID

PSL

FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		144

DATE: 5/26/2023 10:05:59 AM
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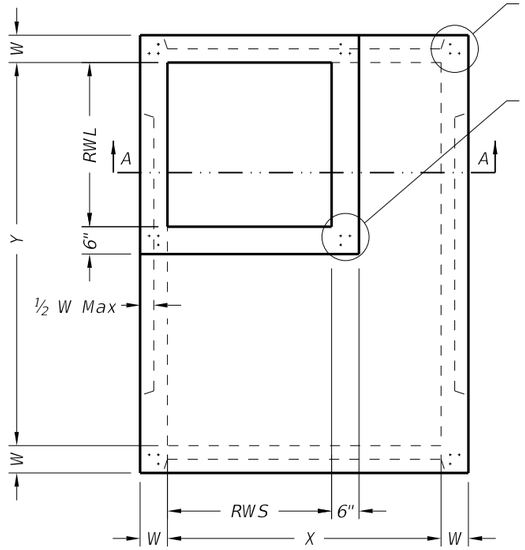
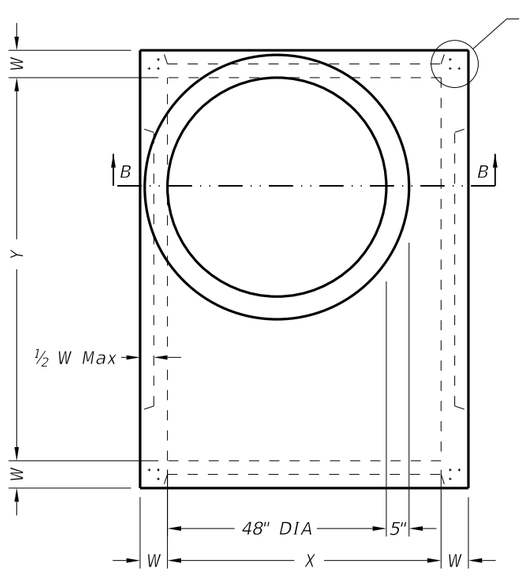


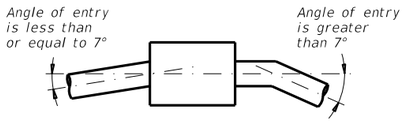
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



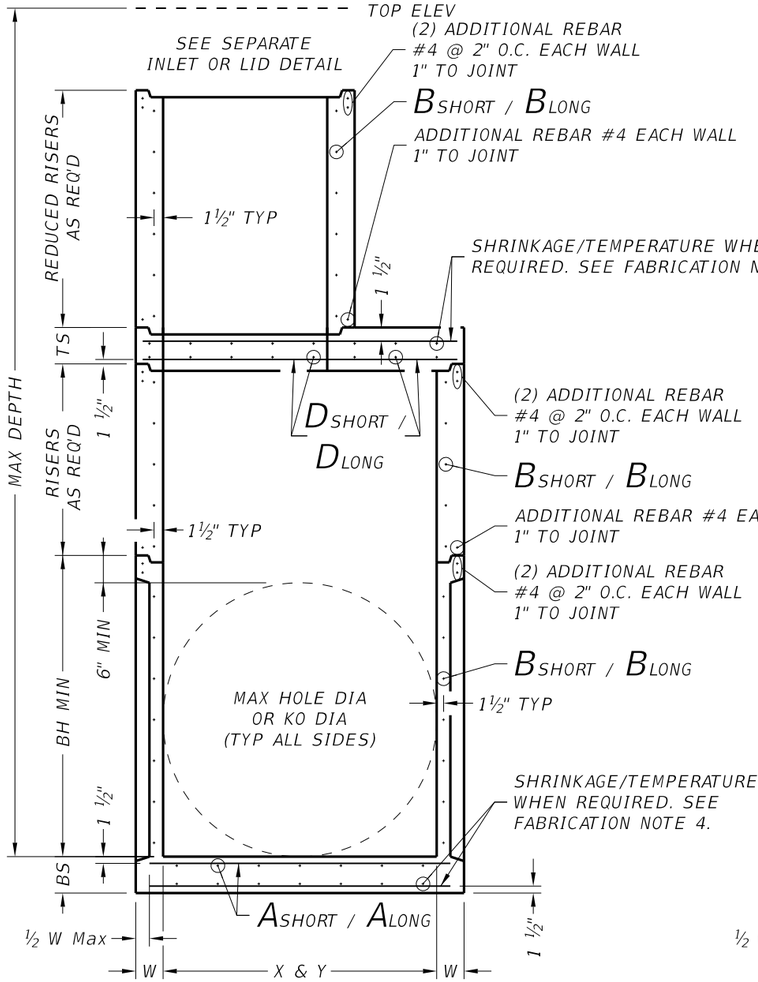
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



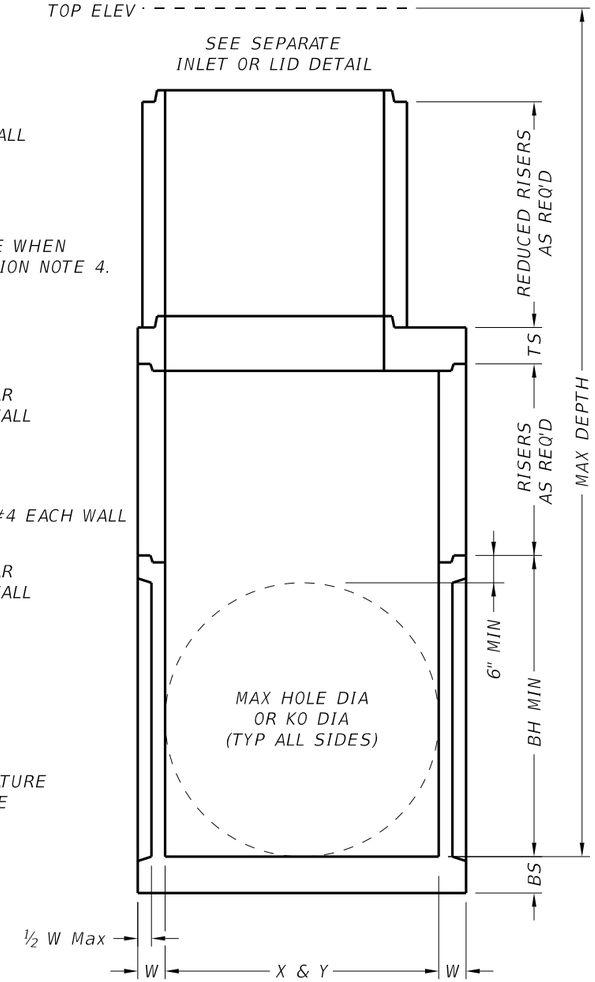
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved
approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to speci ed inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For exible pipe, consult boot/seal Manufacturer's speci cation for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's speci cation.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the speci ed inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST BASE

PB

FILE: prestd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		145

	Size	MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB										Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)						
		Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72

** Unless otherwise indicated.

FABRICATION NOTES:
1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

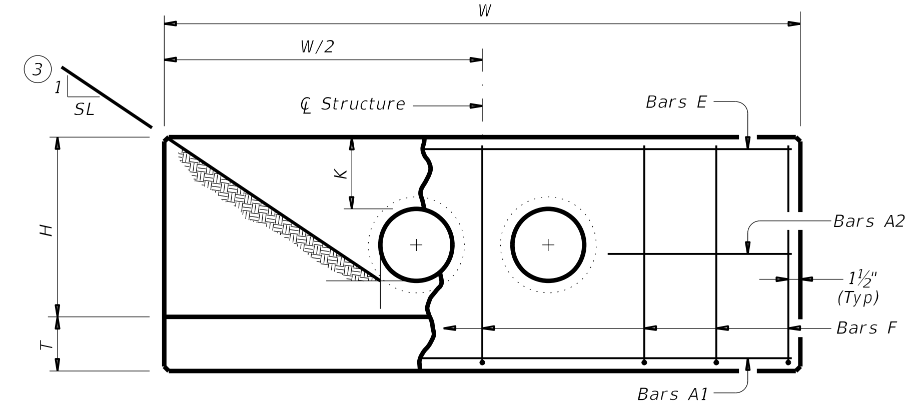
PDD

FILE: prestd10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		146

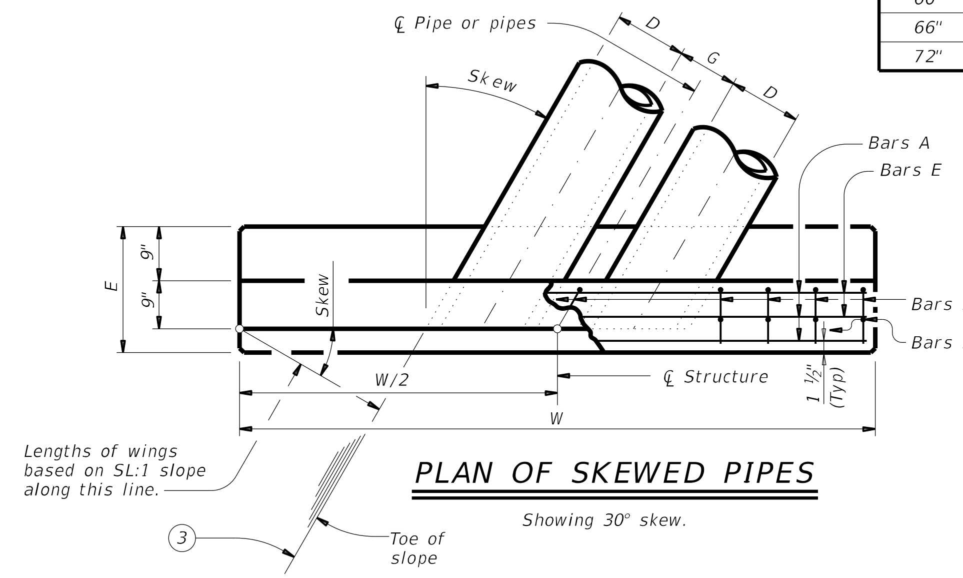
DATE: 5/26/2023 10:06:00 AM
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\5. Bridge\0090DT09.dgn

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

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

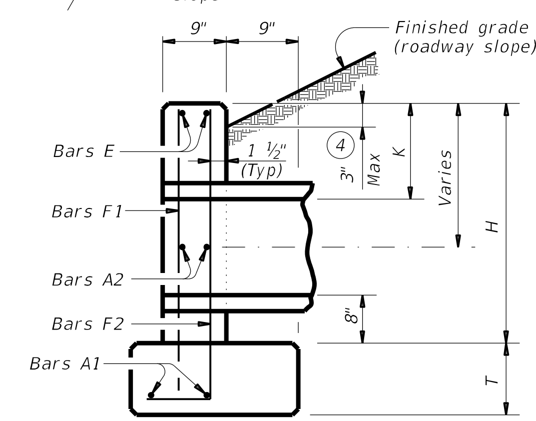


ELEVATION



PLAN OF SKEWED PIPES

Showing 30° skew.



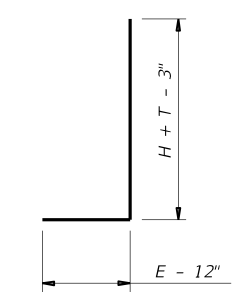
SECTION AT CENTER OF PIPE

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"	0' - 9"	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"	~



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 Speci cations.
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 nished 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).

DATE: 5/26/2023 10:06:00 AM
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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 1191	SECT 05	JOB 009	HIGHWAY FM 937
REVISIONS	DIST BRY	COUNTY ROBERTSON		SHEET NO. 147

DATE: 5/26/2023 10:06:01 AM
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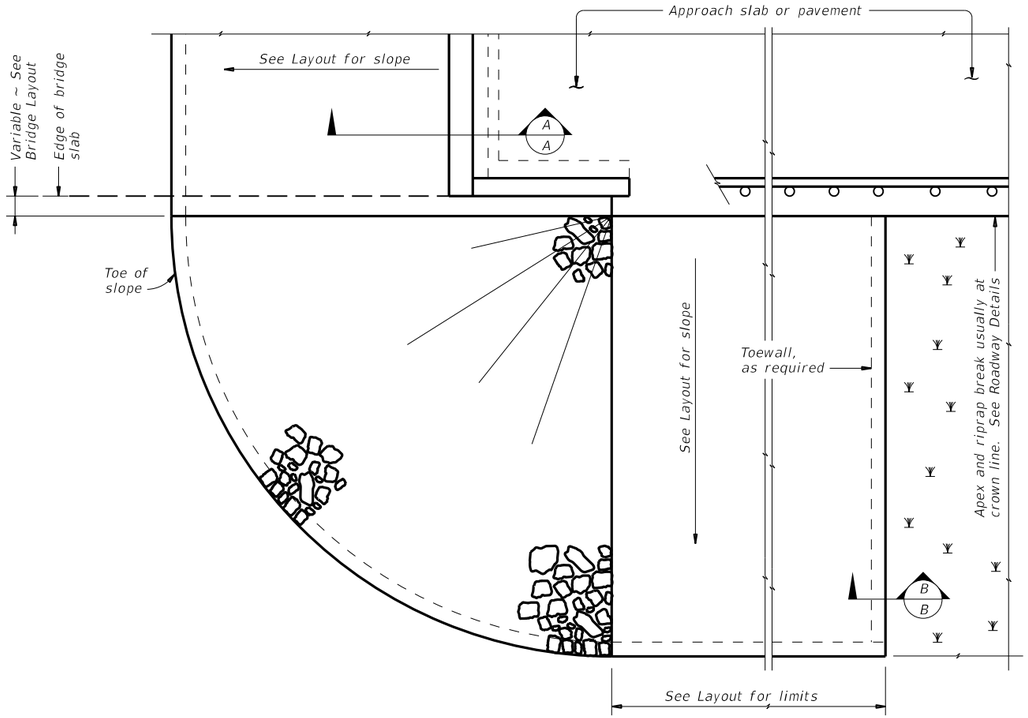
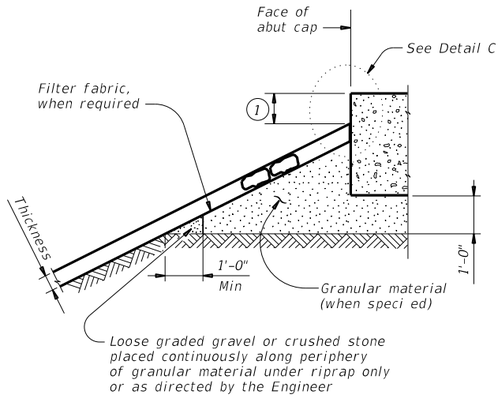
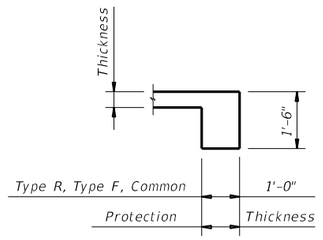


PLAN

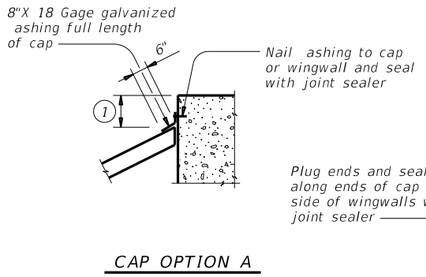


SECTION A-A AT CAP

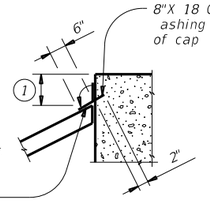


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

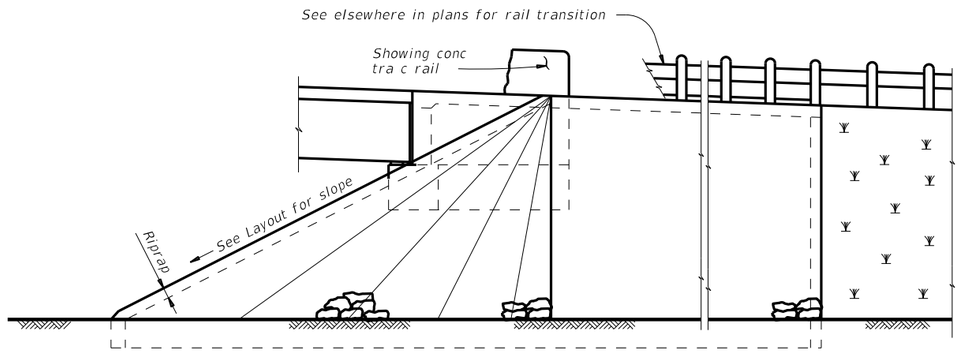


CAP OPTION A



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 speci ed.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		148

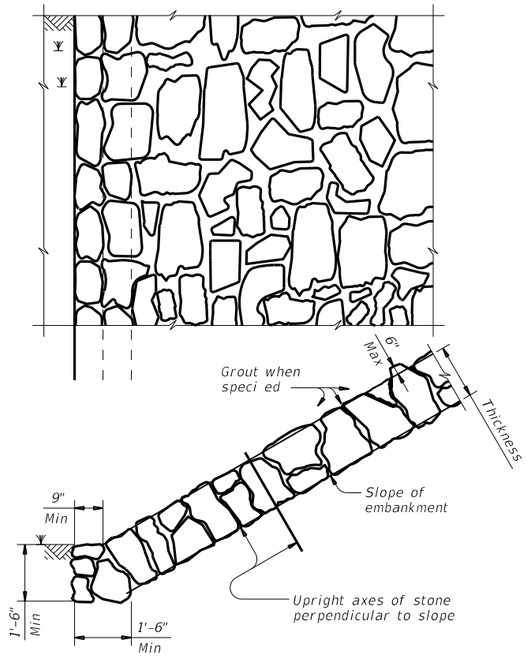


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

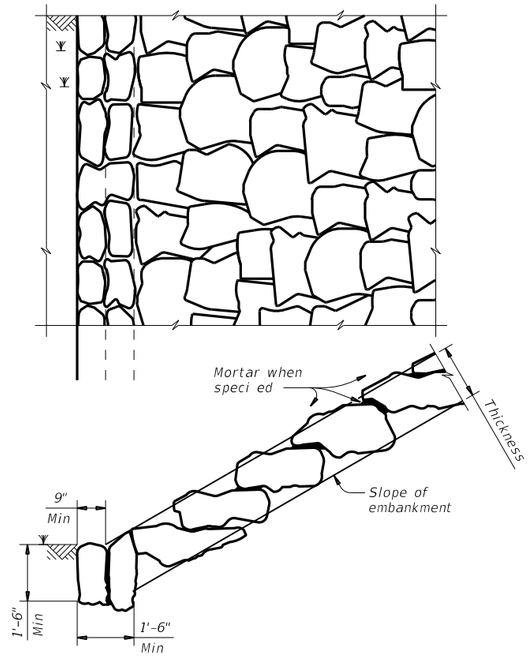


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

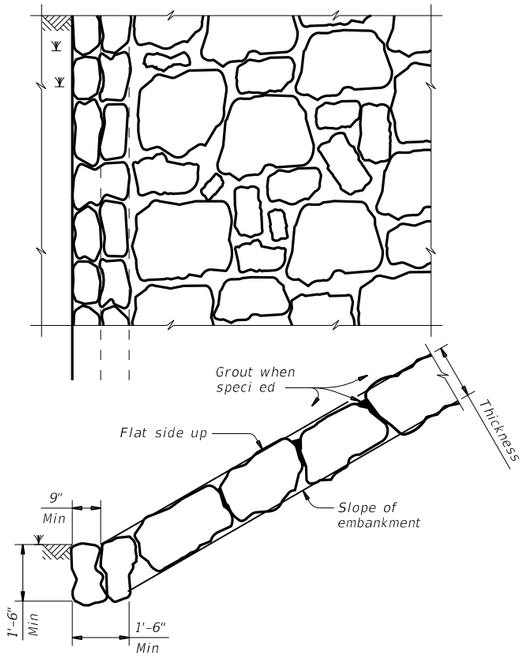


FIGURE 3 ~ TYPE F STONE RIPRAP

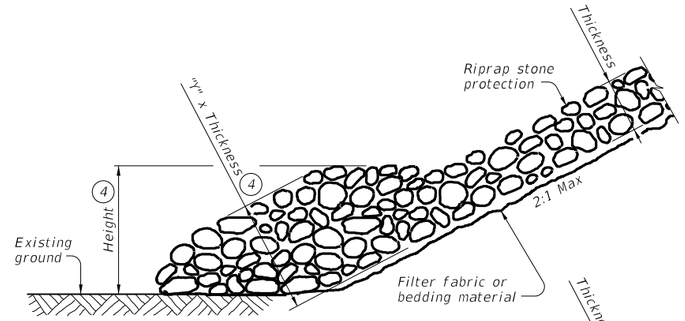
grouted

2 Provide bedding material instead of liter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

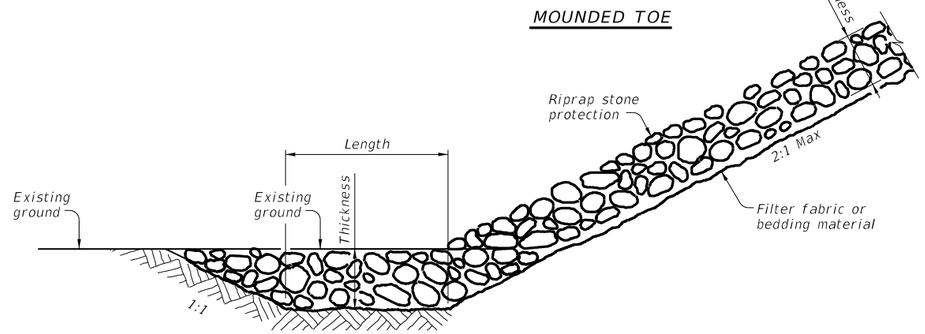
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

4 "Y" and Height need to be de ned. 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

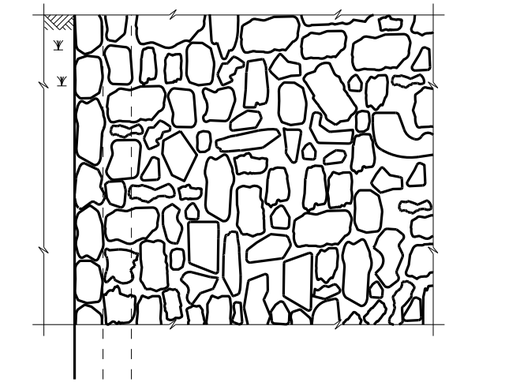


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

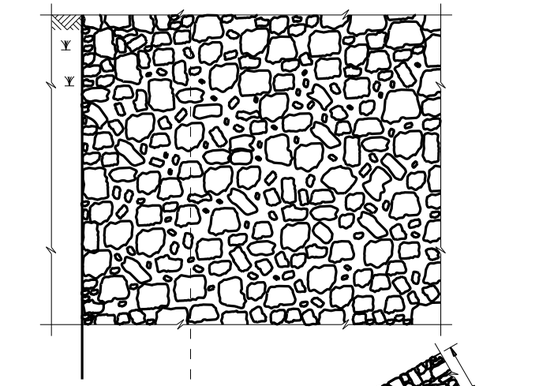


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		149

DATE: 5/26/2023 10:06:01 AM
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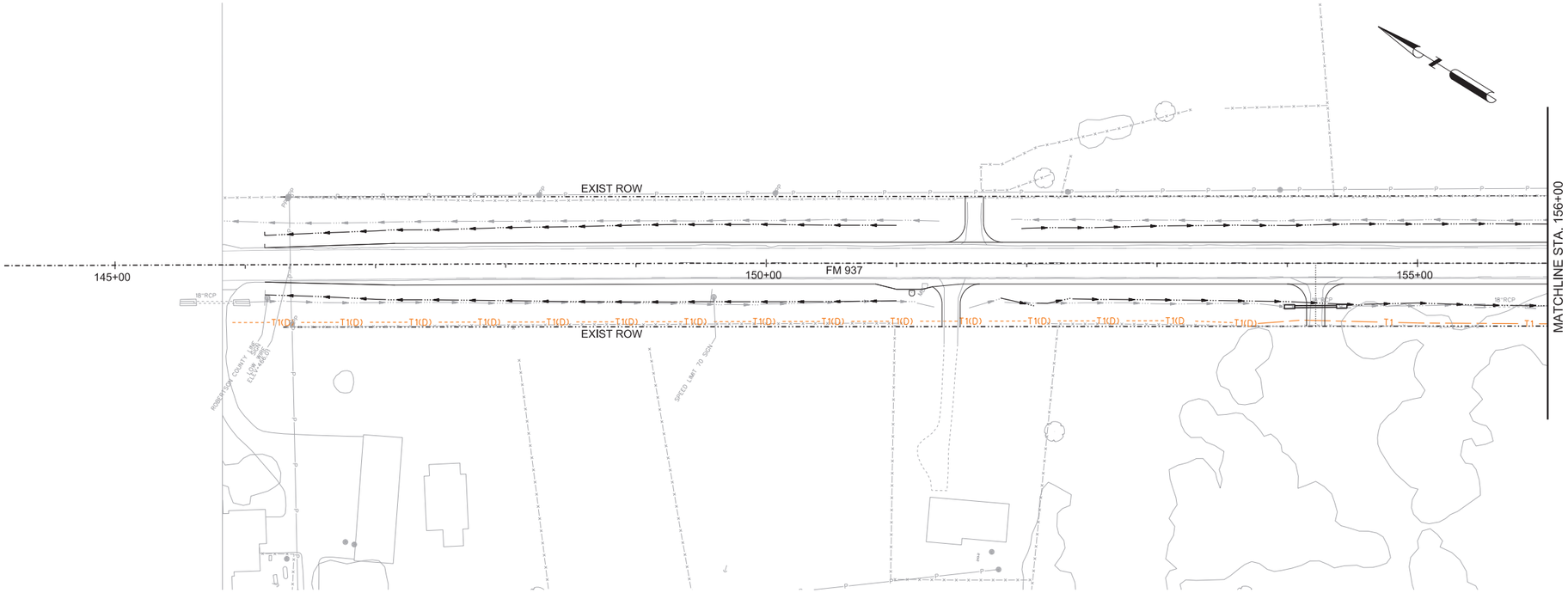
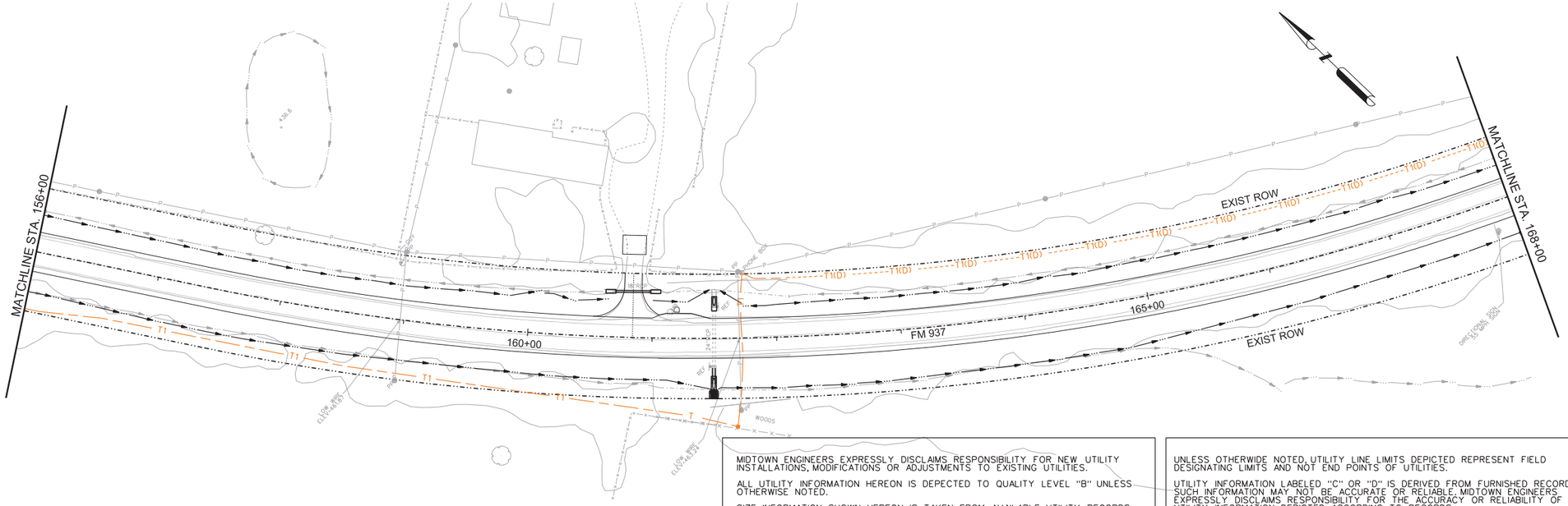
CRC
DW
CRC
DN





UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100
SCALE: 1" = 100'

NOTE:

THE INFORMATION PROVIDED ON THIS DRAWING IS BASED ON ENGINEERING JUDGEMENT AND QUALITY LEVEL B DATA, UNLESS NOTED OTHERWISE. THE INFORMATION IS INTENDED TO BE USED AS A GUIDE FOR UTILITY OWNERS AND DESIGN ENGINEERS ASSOCIATED WITH THE PROJECT. LINE SIZES ARE FROM BEST AVAILABLE RECORDS. THE INFORMATION IS NOT INTENDED TO BE UTILIZED AS A MAP FOR EXCAVATIONS OR IN PLACE OF A TEXAS 811 NOTIFICATION.

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ALL UTILITY INFORMATION HEREON IS DEPECTED TO QUALITY LEVEL "B" UNLESS OTHERWISE NOTED.

SIZE INFORMATION SHOWN HEREON IS TAKEN FROM AVAILABLE UTILITY RECORDS:
LEVEL "B" INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE
(B) SURFACE GEOPHYSICAL METHODS TO DETERMINETHE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF UTILITIES.

LEVEL "C" DEPICTED ACCORDING TO RECORD INFORMATION AND EXISTING
(C) ASSOCIATED UTILITY STRUCTURES.
NO ELECTRONIC INFORMATION WAS OBTAINED.

LEVEL "D" DEPICTED ACCORDING TO RECORD INFORMATION, NO ELECTRONIC
(D) INFORMATION WAS OBTAINED.

UNLESS OTHERWIDE NOTED, UTILITY LINE LIMITS DEPICTED REPRESENT FIELD DESIGNATING LIMITS AND NOT END POINTS OF UTILITIES.

UTILITY INFORMATION LABELED "C" OR "D" IS DERIVED FROM FURNISHED RECORDS. SUCH INFORMATION MAY NOT BE ACCURATE OR RELIABLE. MIDTOWN ENGINEERS EXPRESSLY DISCLAIMS RESPONSIBILITY FOR THE ACCURACY OR RELIABILITY OF UTILITY INFORMATION DEPICTED ACCORDING TO RECORDS.

WITHOUT VISUAL VERIFICATION, UTILITIES LOCATED BY MEANS OF TRACER WIRE MAY NOT DEPICT THE ACTUAL LOCATION OF THE UTILITY AS THE TRACER WIRE MAY NOT BE DIRECTLY ON OR ABOVE THE UTILITY.

THE ROADWAY AND ROW FILES WERE PROVIDED TO MIDTOWN ENGINEERS BY OTHERS AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

THE INFORMATION IS NOT TO BE UTILIZED AS A MAP FOR EXCAVATIONS OR IN PLACE OF A TEXAS 811 NOTIFICATION.

SEAL 5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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3131 Briarpark Dr, Suite 200
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(713) 622-1444

Midtown Engineers, LLC
5225 Katy Freeway, Suite 400 Houston, Texas 77007
Office (713) 862-8848 TBPE No. F-8934

FM 937

UTILITY LAYOUT

SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		150

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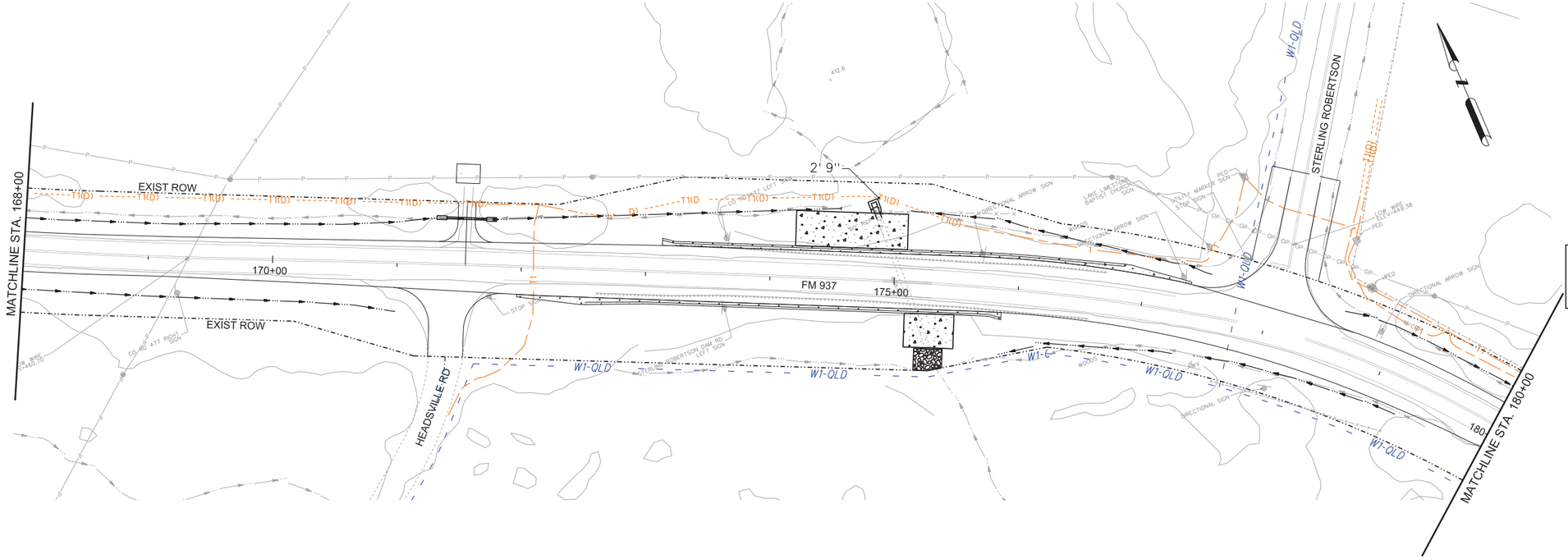

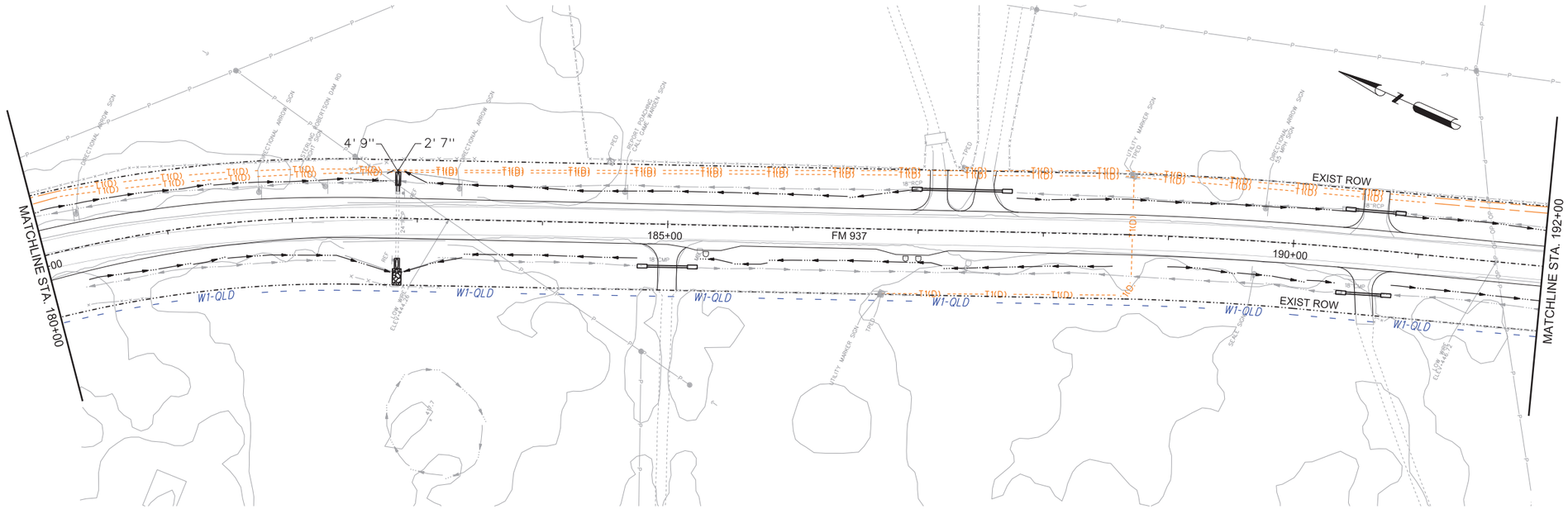

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100
SCALE: 1" = 100'

SEAL 5/26/2023

STATE OF TEXAS
GERARDO C. MATA
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UTILITY LAYOUT

SHEET 2 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		151

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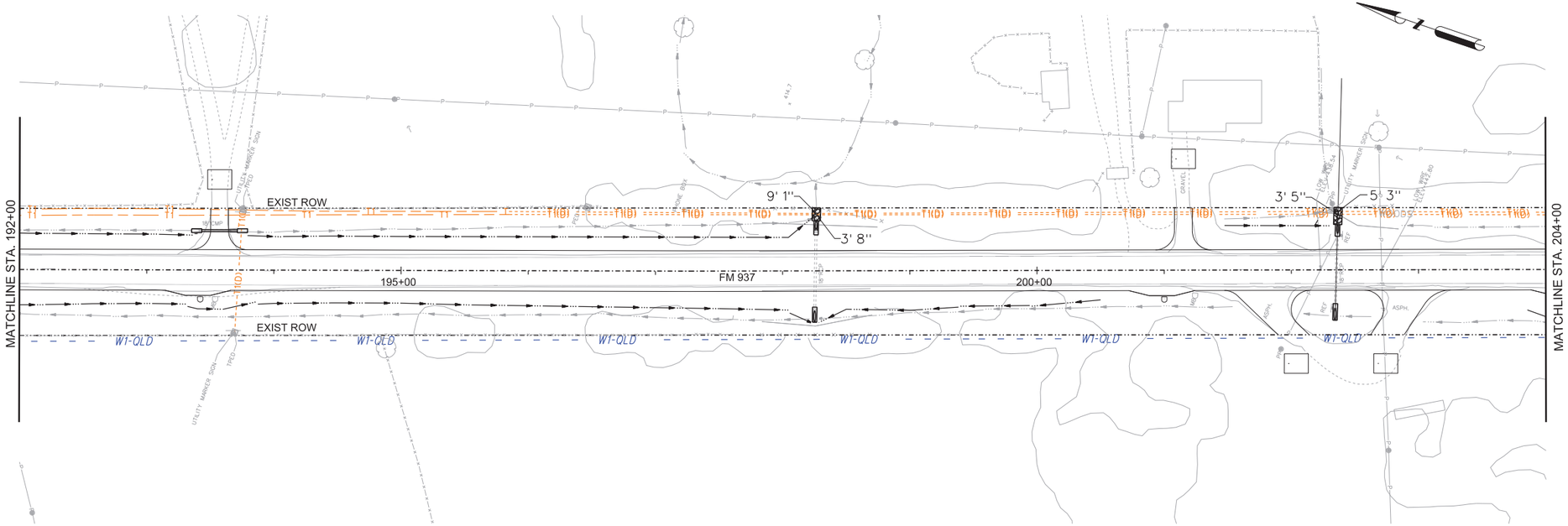

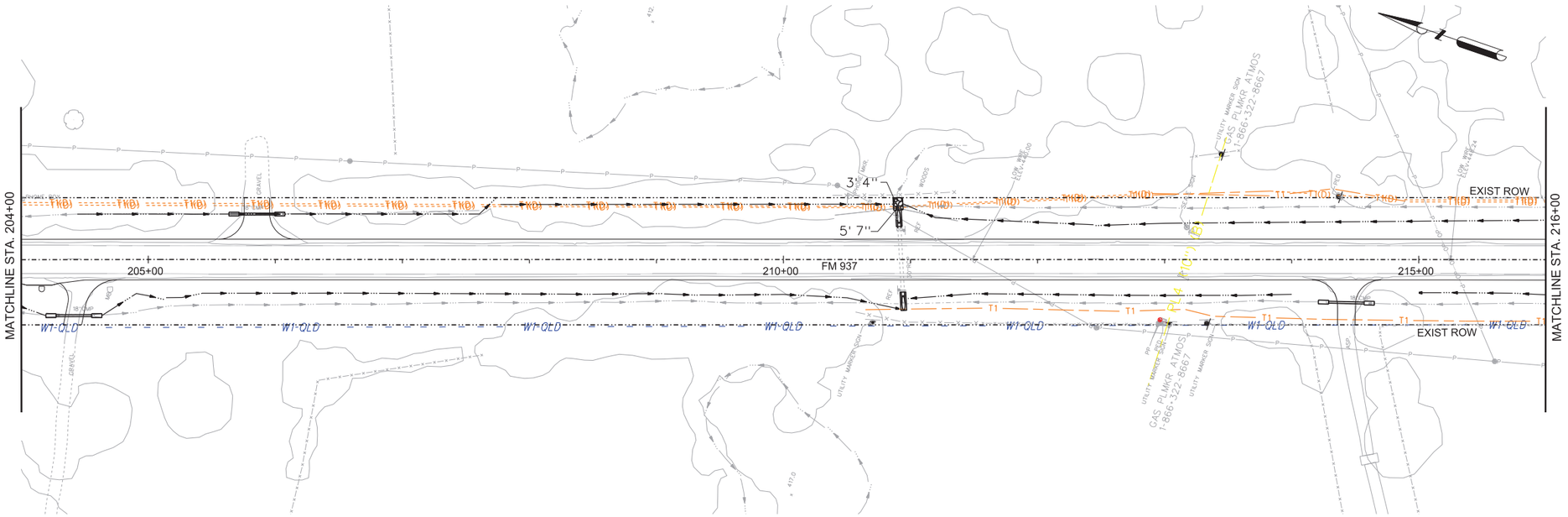

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-OLD

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0 50 100

SCALE: 1" = 100'

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5/26/2023

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UTILITY LAYOUT

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		152

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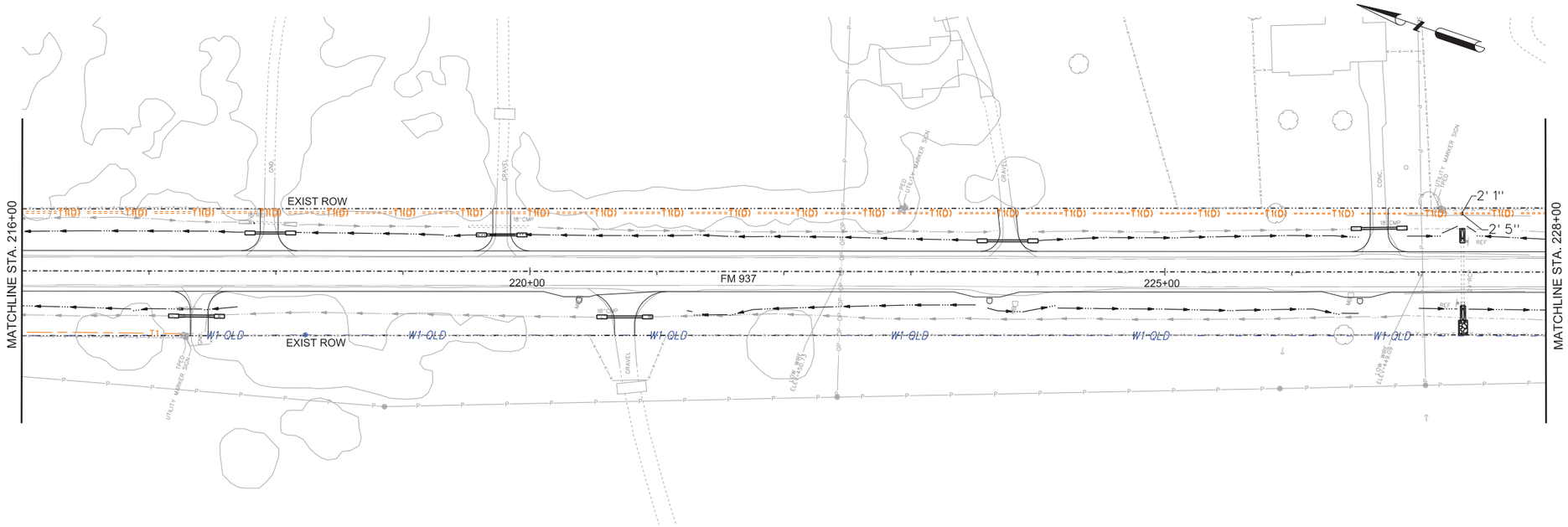

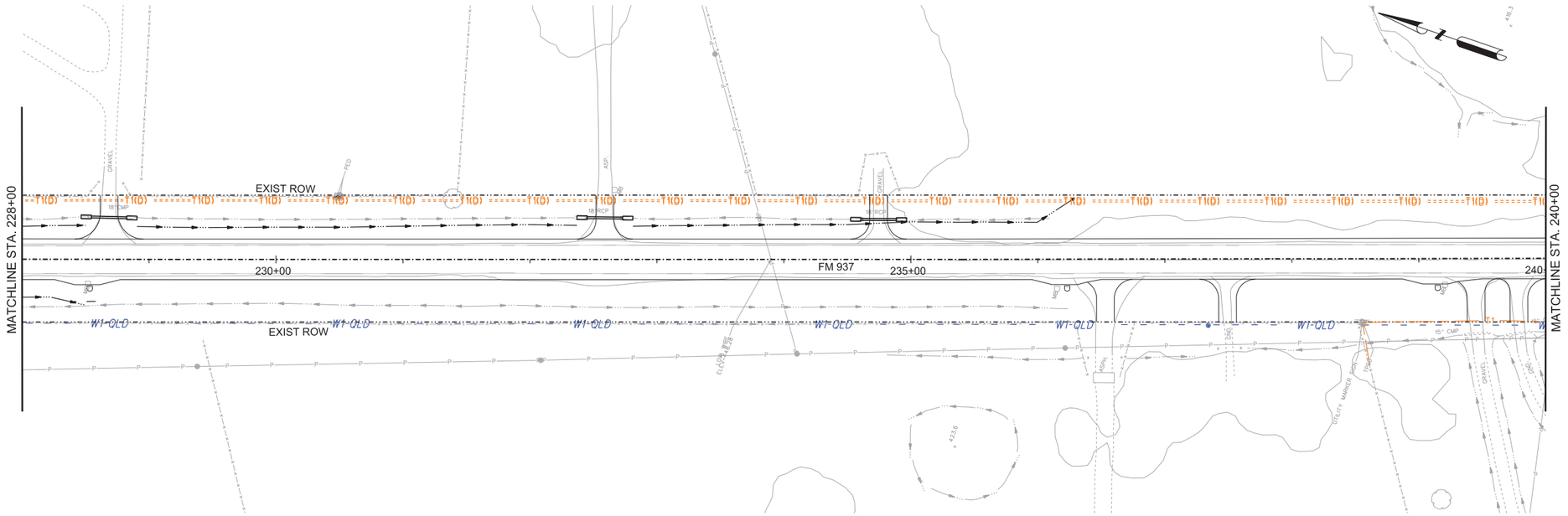

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
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0 50 100

SCALE: 1" = 100'

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UTILITY LAYOUT

SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
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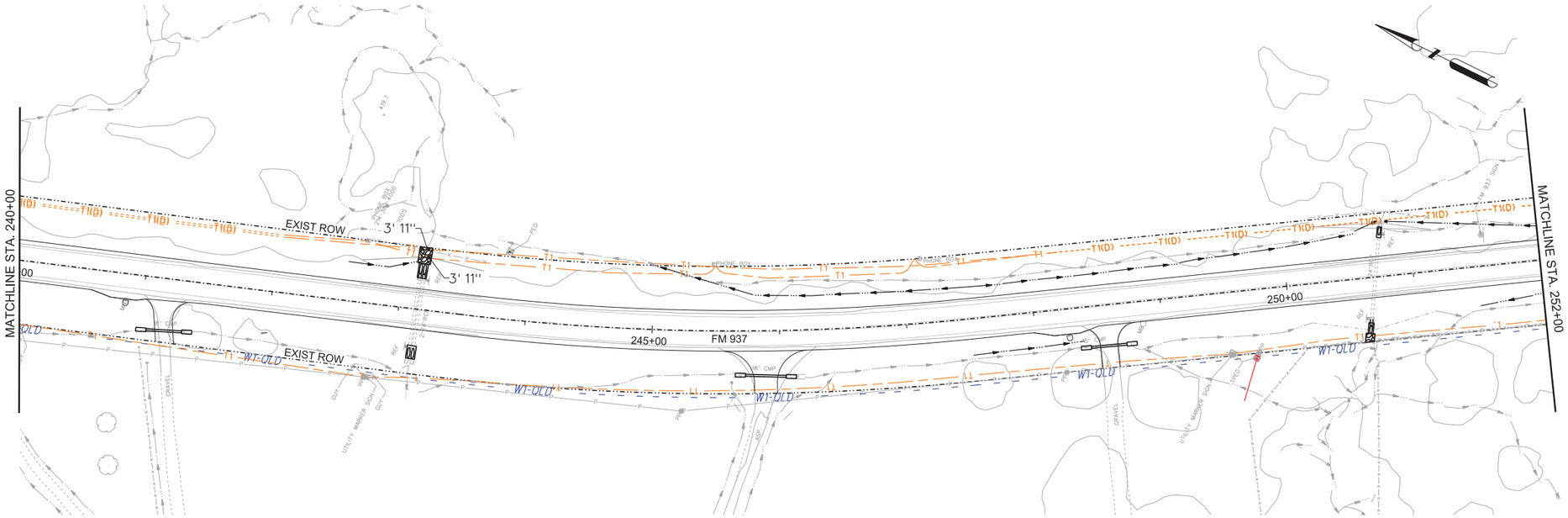

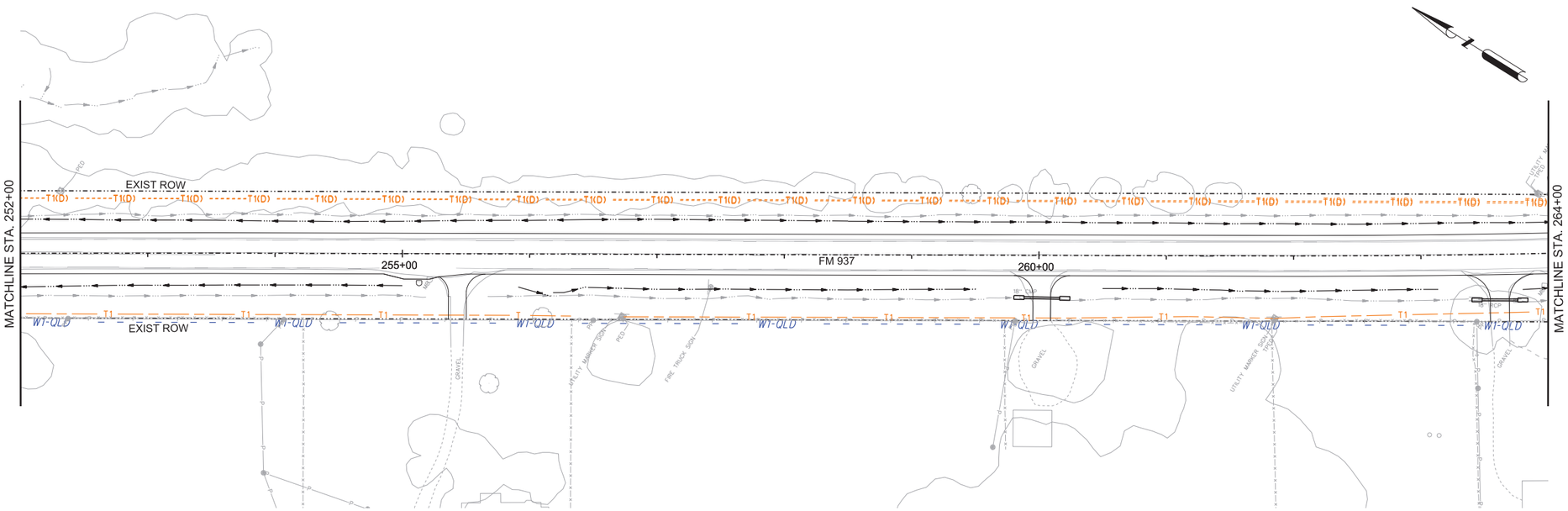

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
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ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-OLD

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0 50 100
SCALE: 1" = 100'

SEAL 5/26/2023

STATE OF TEXAS
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UTILITY LAYOUT

SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		154

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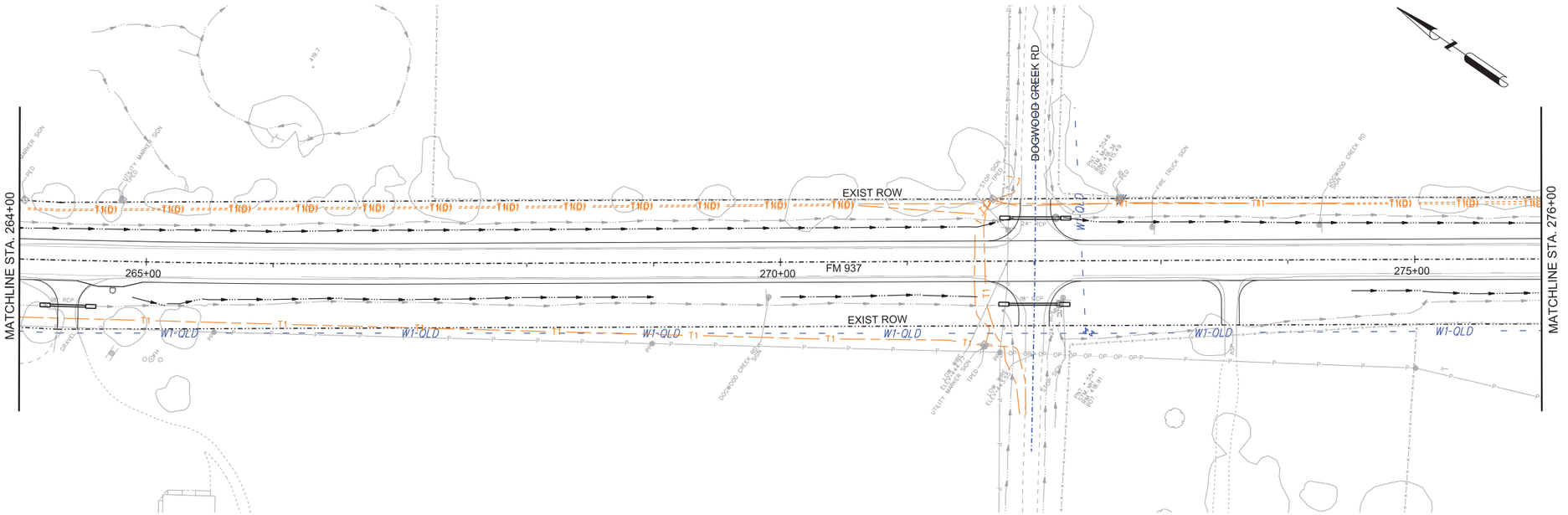

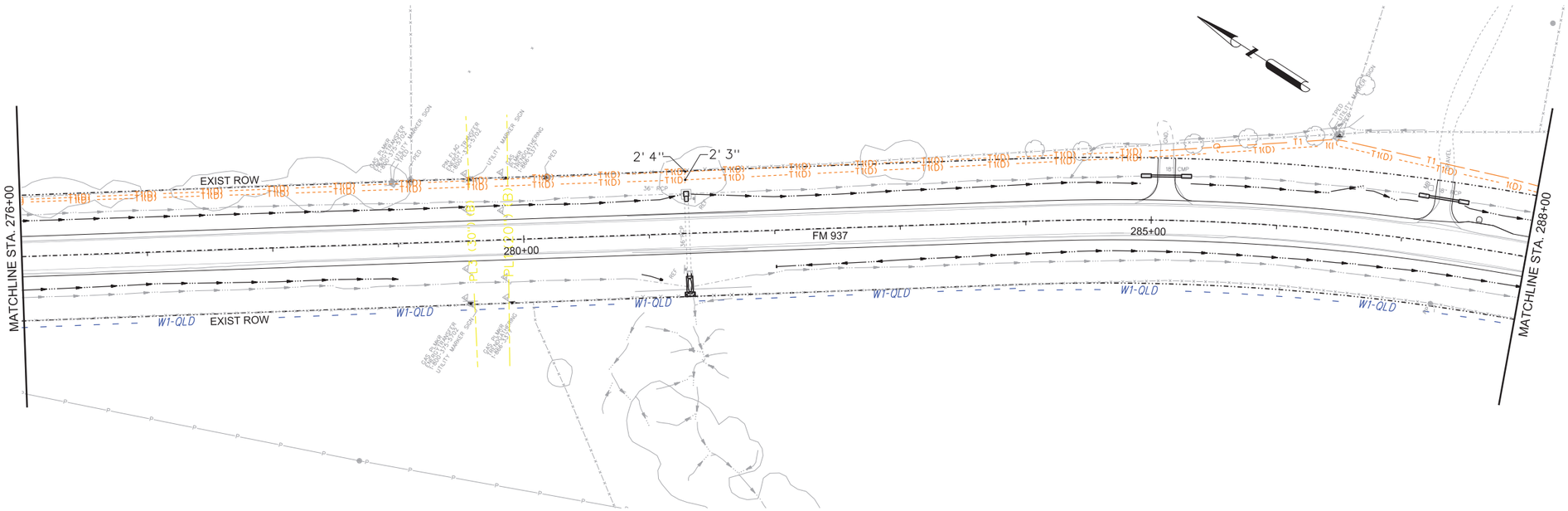

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
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ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100

SCALE: 1" = 100'

SEAL

5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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UTILITY LAYOUT

SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		155

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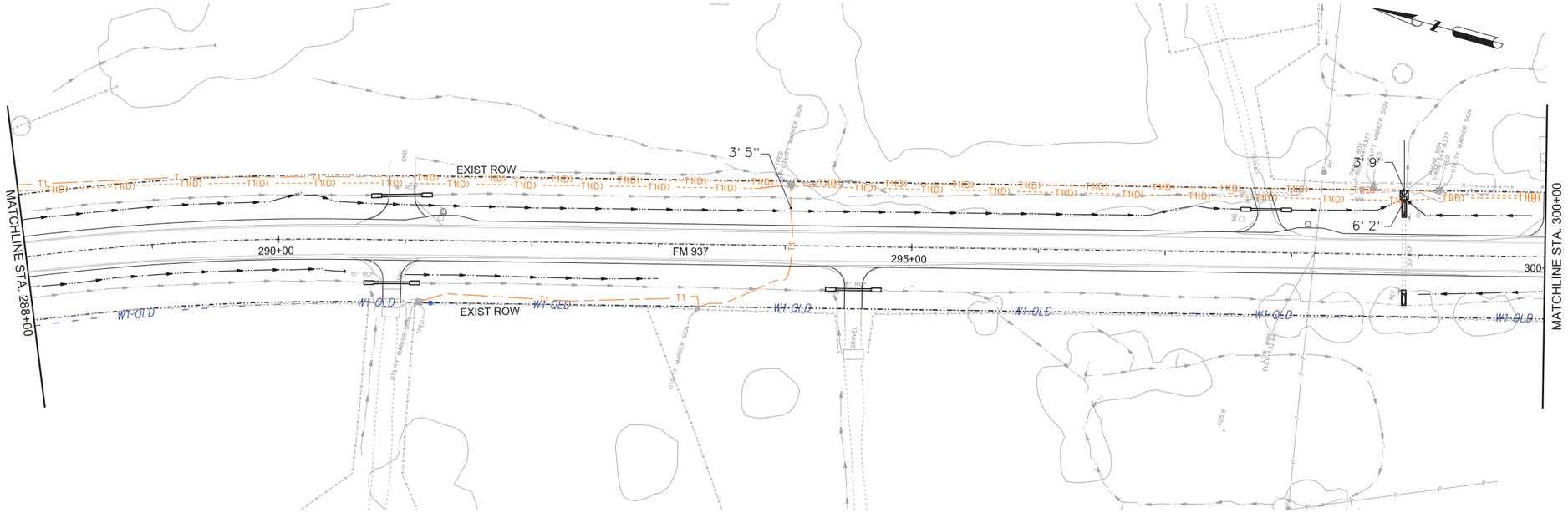

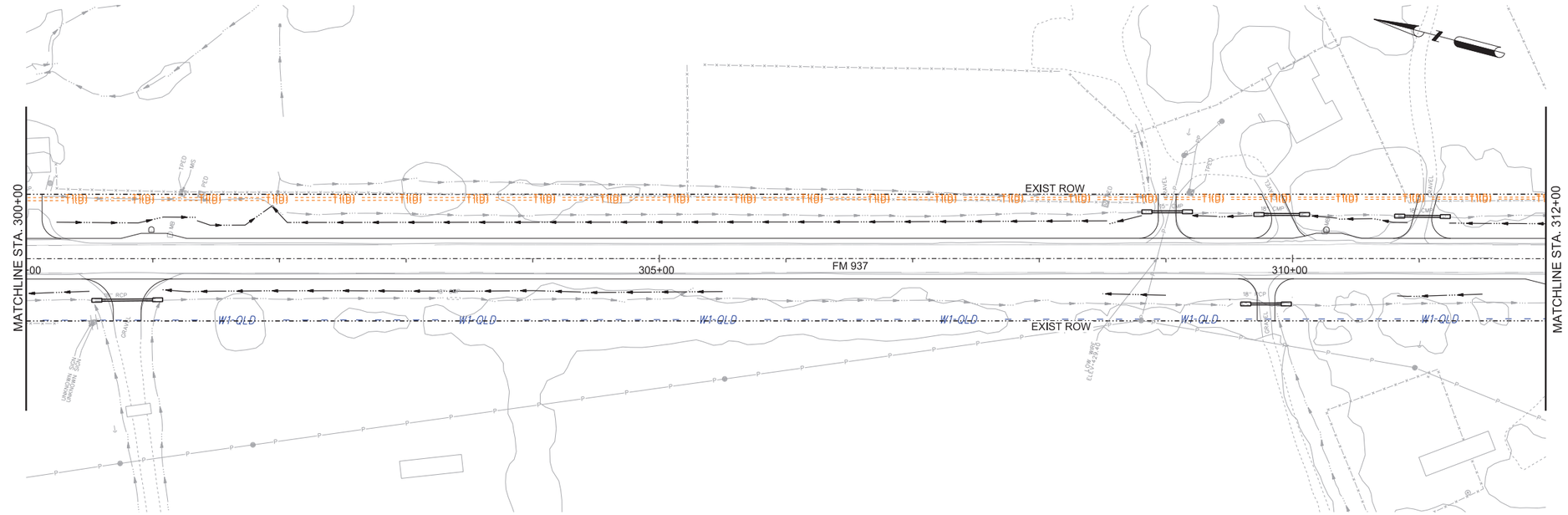

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100
SCALE: 1" = 100'

SEAL
5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Midtown Engineers, LLC
5225 Katy Freeway, Suite 400 Houston, Texas 77007
Office (713) 862-8848 TBPE No. F-8934

FM 937

UTILITY LAYOUT

SHEET 7 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		156

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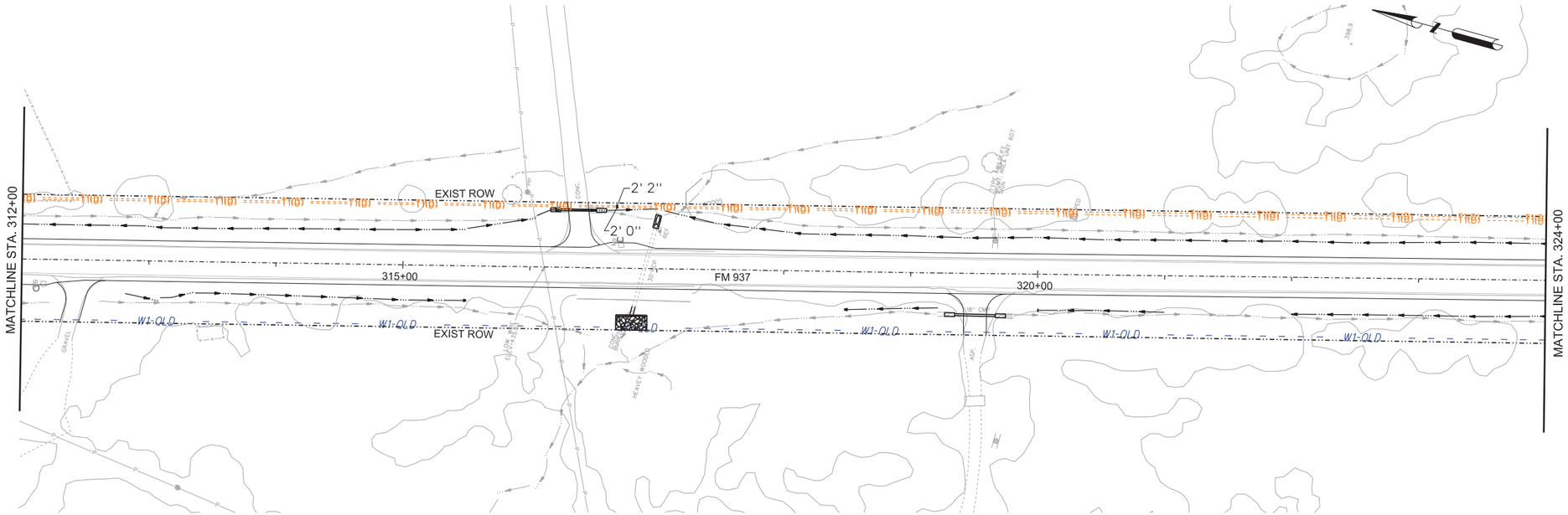

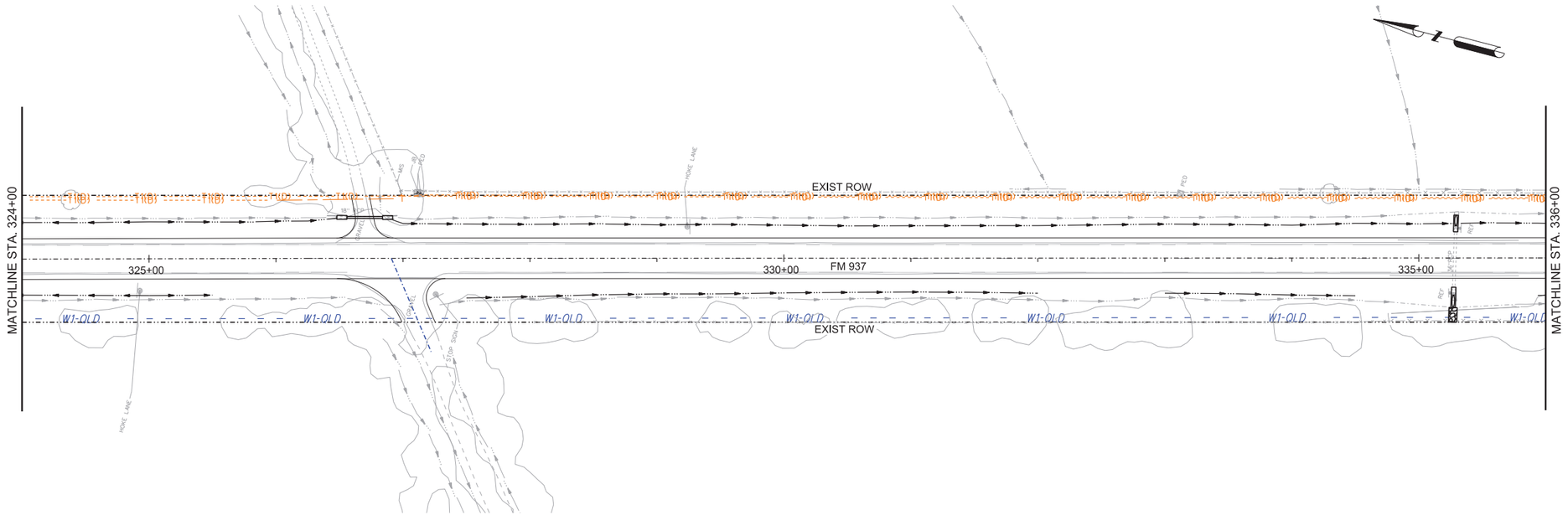

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100

SCALE: 1" = 100'

SEAL

5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

UTILITY LAYOUT

SHEET 8 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		157

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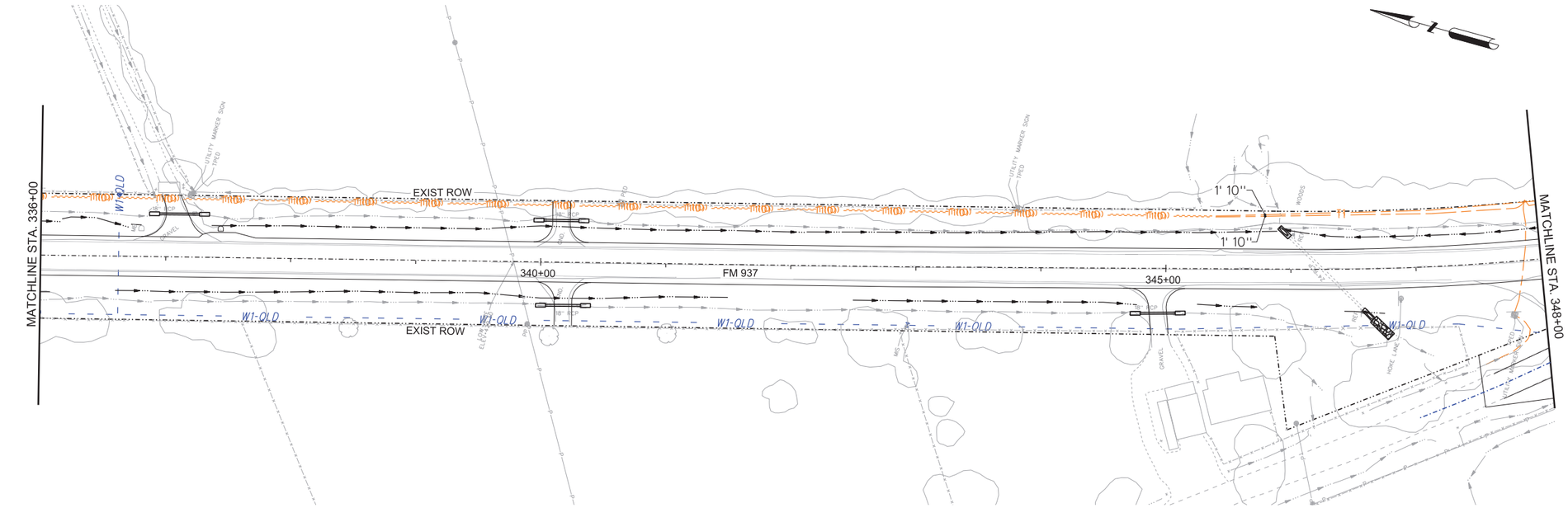

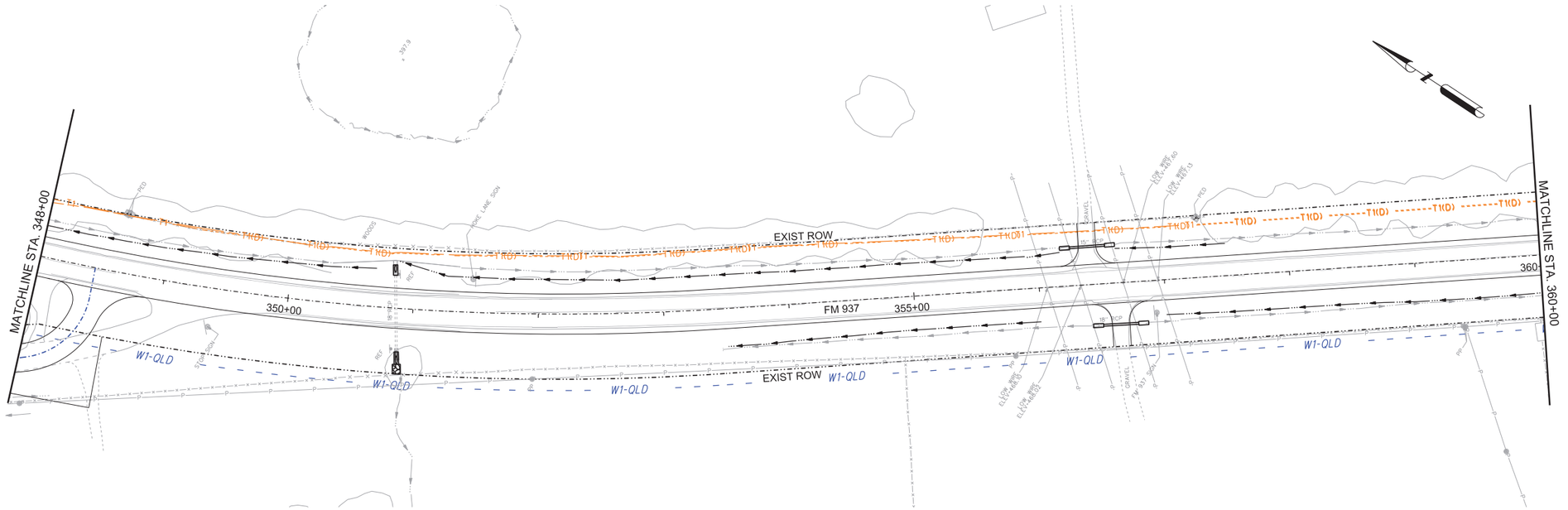

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100

SCALE: 1" = 100'

SEAL

5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

UTILITY LAYOUT

SHEET 9 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		158

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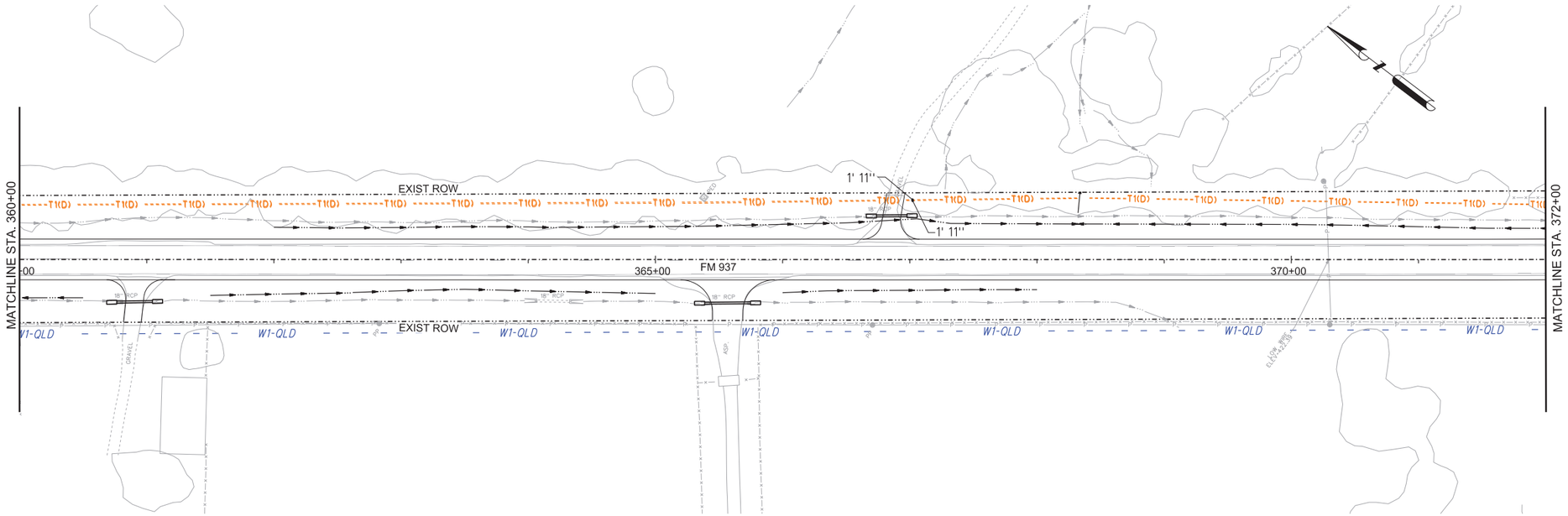

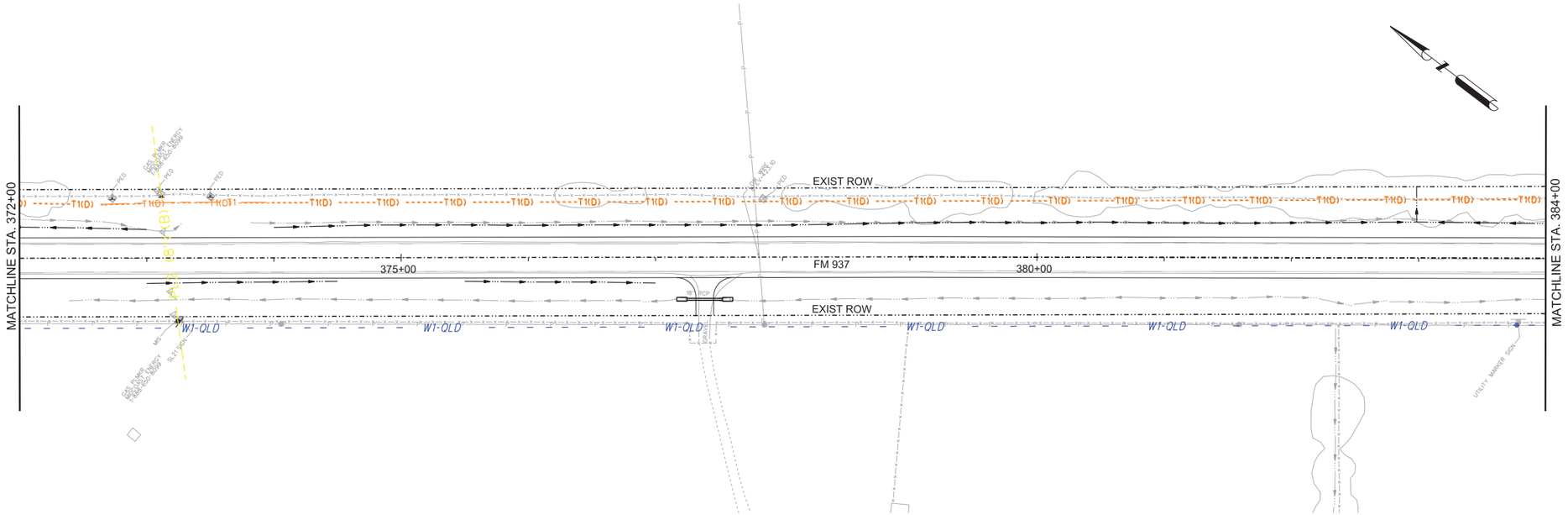

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100
SCALE: 1" = 100'

SEAL
5/26/2023

STATE OF TEXAS
GERARDO C. MATA
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LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

UTILITY LAYOUT

SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		159

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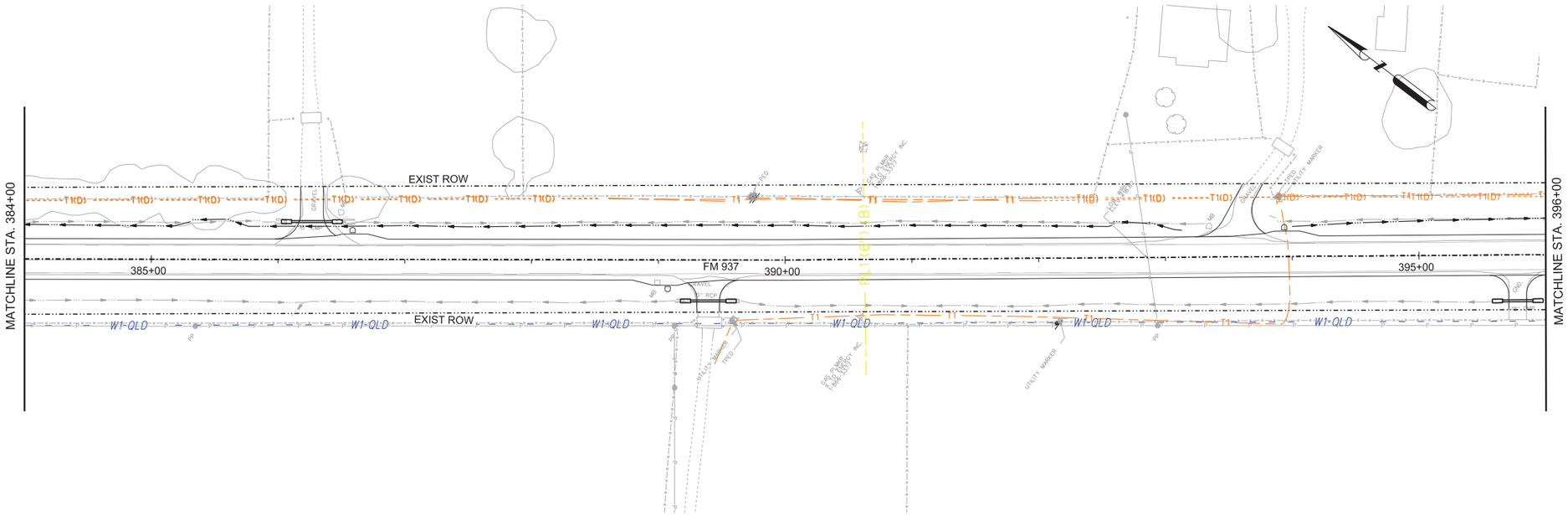

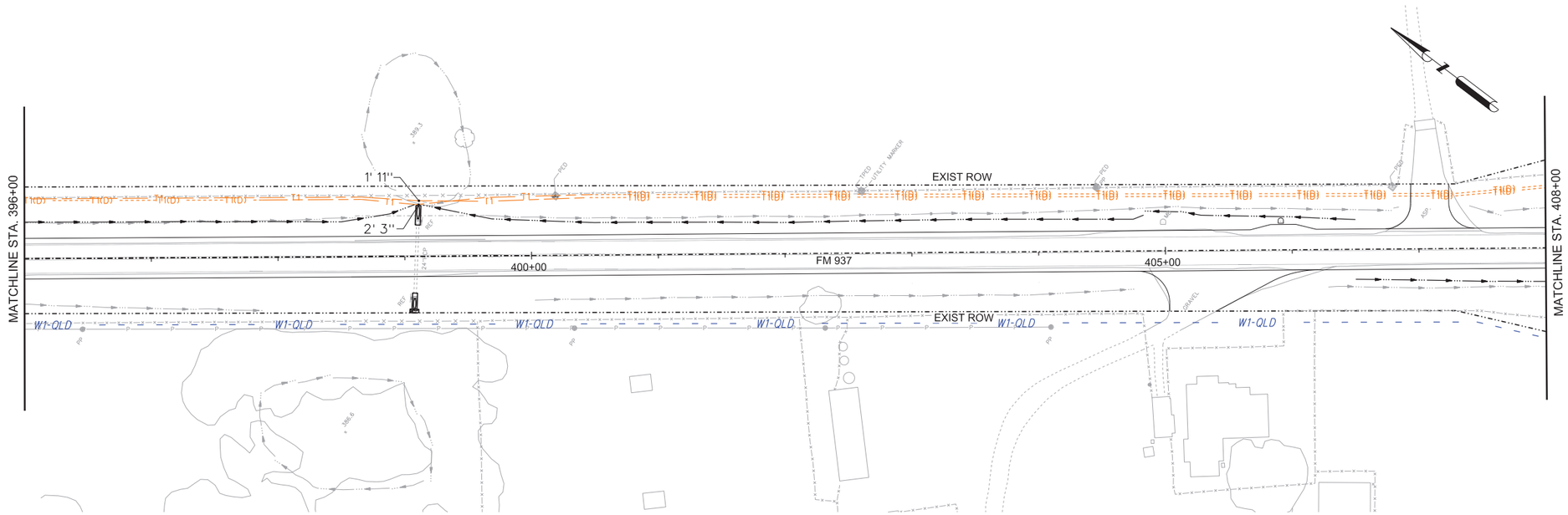

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100
SCALE: 1" = 100'

SEAL 5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

UTILITY LAYOUT

SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		160

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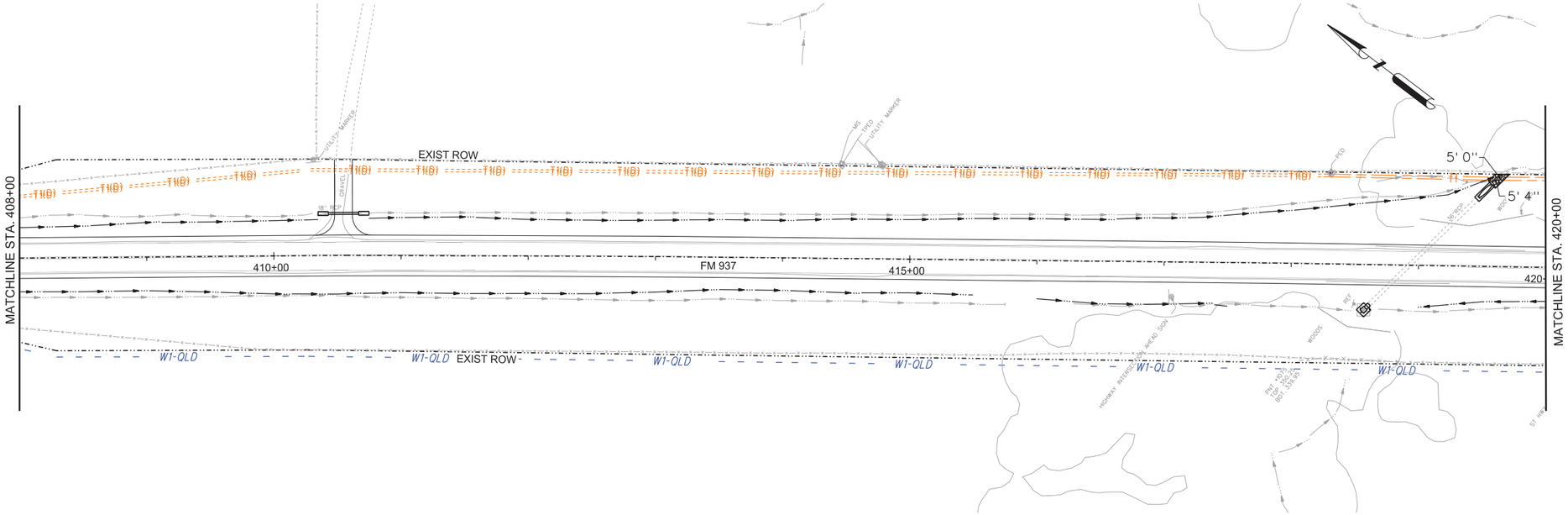

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100

SCALE: 1" = 100'

SEAL

5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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FM 937

UTILITY LAYOUT

SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		161

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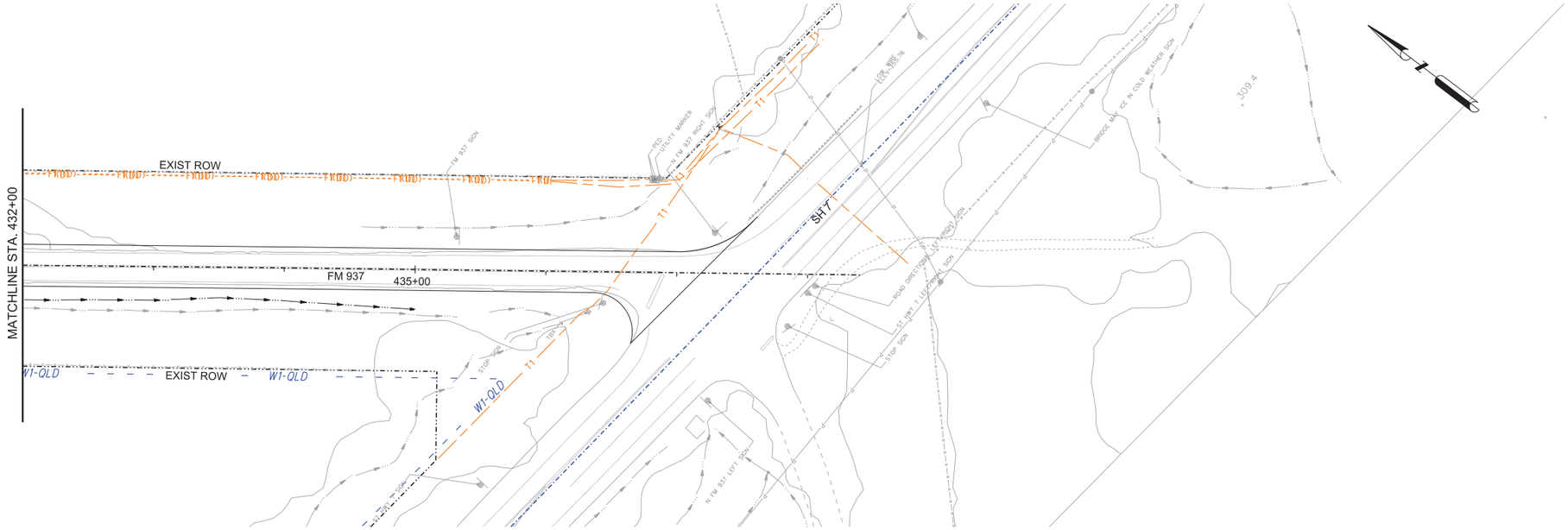

UTILITY LEGEND

WINDSTREAM COMM - QLB	T1
WINDSTREAM COMM - QLC/D	T1(D)
TREND GATHERING 6" PIPELINE - QLB	PL1 (6") (B)
TREND GATHERING 20" PIPELINE - QLB	PL1 (20") (B)
MIDCOAST 8" PIPELINE - QLB	PL2 (8") (B)
ENERGY TRANSFER 30" PIPELINE - QLB	PL3 (6") (B)
ATMOS 10" PIPELINE - QLB	PL4 (10") (B)
ROBERTSON COUNTY WATER SUPPLY 2" WATER - QLC/D	W1-QLD

NOTE:
CONTRACTOR SHALL ENSURE PROTECTION OF EXISTING UTILITIES AT ALL TIMES DURING CONSTRUCTION.

0 50 100

SCALE: 1" = 100'

NOTE:

THE INFORMATION PROVIDED ON THIS DRAWING IS BASED ON ENGINEERING JUDGEMENT AND QUALITY LEVEL B DATA, UNLESS NOTED OTHERWISE. THE INFORMATION IS INTENDED TO BE USED AS A GUIDE FOR UTILITY OWNERS AND DESIGN ENGINEERS ASSOCIATED WITH THE PROJECT. LINE SIZES ARE FROM BEST AVAILABLE RECORDS. THE INFORMATION IS NOT INTENDED TO BE UTILIZED AS A MAP FOR EXCAVATIONS OR IN PLACE OF A TEXAS 811 NOTIFICATION.

MIDTOWN ENGINEERS EXPRESSLY DISCLAIMS RESPONSIBILITY FOR NEW UTILITY INSTALLATIONS, MODIFICATIONS OR ADJUSTMENTS TO EXISTING UTILITIES.

ALL UTILITY INFORMATION HEREON IS DEPECTED TO QUALITY LEVEL "B" UNLESS OTHERWISE NOTED.

SIZE INFORMATION SHOWN HEREON IS TAKEN FROM AVAILABLE UTILITY RECORDS:
LEVEL "B" INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE (B) SURFACE GEOPHYSICAL METHODS TO DETERMINETHE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF UTILITIES.

LEVEL "C" DEPICTED ACCORDING TO RECORD INFORMATION AND EXISTING (C) ASSOCIATED UTILITY STRUCTURES. NO ELECTRONIC INFORMATION WAS OBTAINED.

LEVEL "D" DEPICTED ACCORDING TO RECORD INFORMATION, NO ELECTRONIC (D) INFORMATION WAS OBTAINED.

UNLESS OTHERWIDE NOTED, UTILITY LINE LIMITS DEPICTED REPRESENT FIELD DESIGNATING LIMITS AND NOT END POINTS OF UTILITIES.

UTILITY INFORMATION LABELED "C" OR "D" IS DERIVED FROM FURNISHED RECORDS. SUCH INFORMATION MAY NOT BE ACCURATE OR RELIABLE. MIDTOWN ENGINEERS EXPRESSLY DISCLAIMS RESPONSIBILITY FOR THE ACCURACY OR RELIABILITY OF UTILITY INFORMATION DEPICTED ACCORDING TO RECORDS.

WITHOUT VISUAL VERIFICATION, UTILITIES LOCATED BY MEANS OF TRACER WIRE MAY NOT DEPICT THE ACTUAL LOCATION OF THE UTILITY AS THE TRACER WIRE MAY NOT BE DIRECTLY ON OR ABOVE THE UTILITY.

THE ROADWAY AND ROW FILES WERE PROVIDED TO MIDTOWN ENGINEERS BY OTHERS AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

THE INFORMATION IS NOT TO BE UTILIZED AS A MAP FOR EXCAVATIONS OR IN PLACE OF A TEXAS 811 NOTIFICATION.

SEAL 5/26/2023

STATE OF TEXAS
GERARDO C. MATA
135347
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
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Midtown Engineers, LLC
5225 Katy Freeway, Suite 400 Houston, Texas 77007
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FM 937

UTILITY LAYOUT

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937

DIST	COUNTY	SHEET NO.
BRY	ROBERTSON	162

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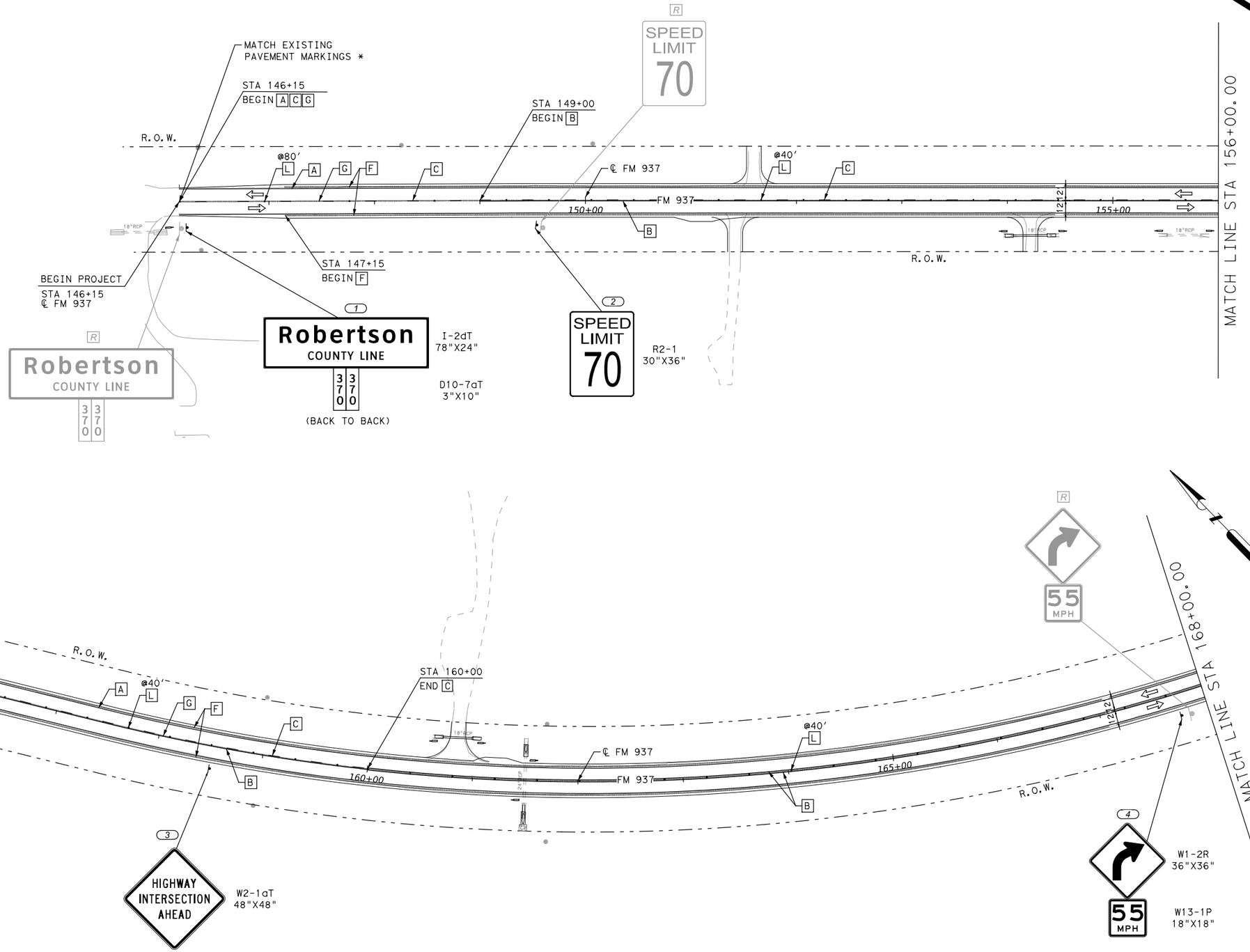

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
- EXISTING SIGN
- R EXISTING SIGN TO BE REMOVED

NOTES:

1. ALL STATIONS REFERENCE FM 937 CENTERLINE UNLESS NOTED OTHERWISE.
2. ALL PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED, AS APPROVED BY THE ENGINEER.
3. FM 937 CENTERLINE IS NOT SHOWN FOR CLARITY.

* MATCH INSIDE EDGE OF THE PROPOSED EDGE LINE WITH THE INSIDE EDGE OF THE EXISTING EDGE LINE.

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

BEGIN TO STA 168+00.00

SHEET 01 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		163

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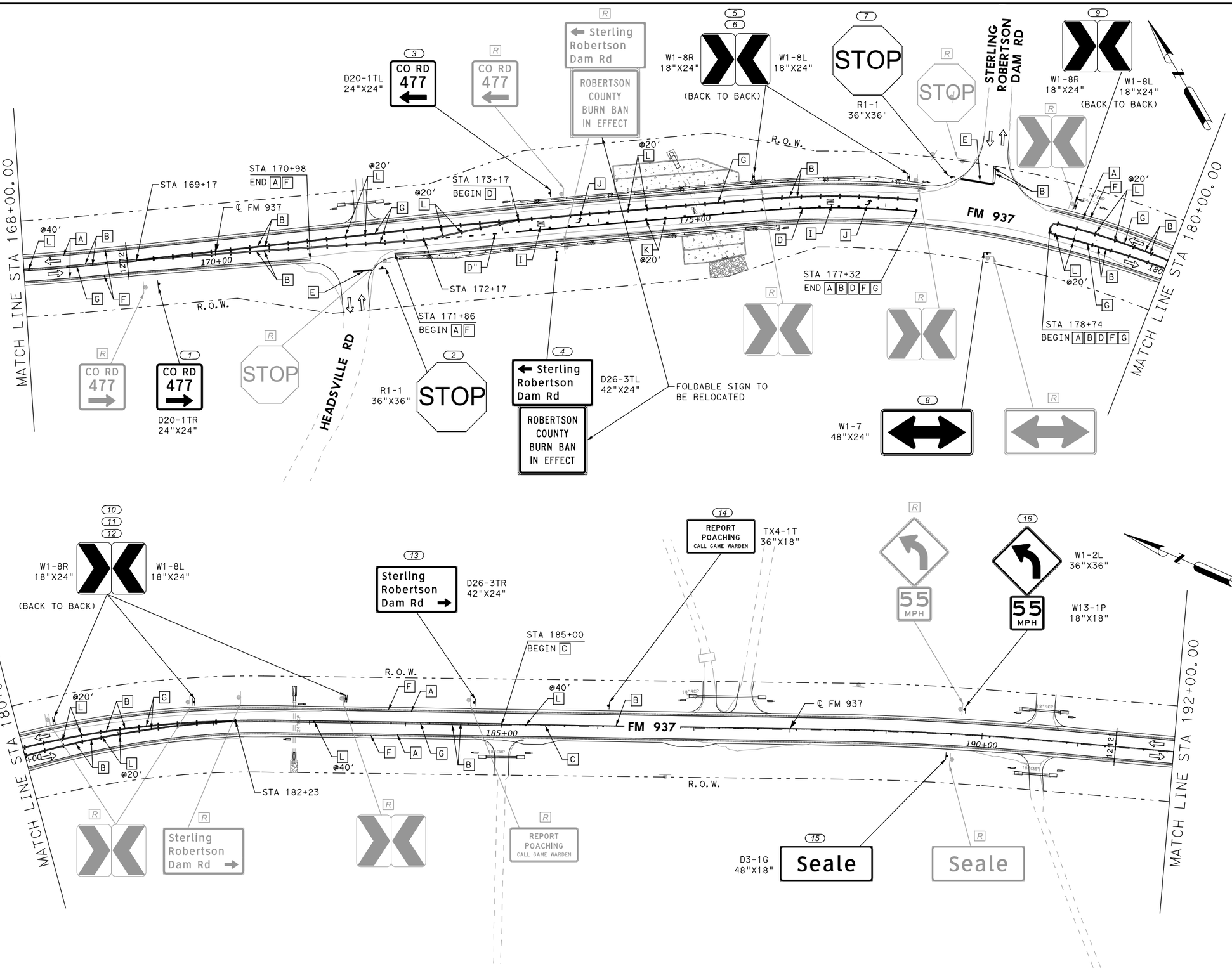

LEGEND

- [A] RE PM W/RET REQ TY I (W) 6"(SLD)
- [B] RE PM W/RET REQ TY I (Y) 6"(SLD)
- [C] RE PM W/RET REQ TY I (Y) 6"(BRK)
- [D] REFL PAV MRK TY I (W) 8"(SLD)
- [D"] REFL PAV MRK TY I (W) 8"(DOT)
- [E] PREF PAV MRK TY C (W) 24"(SLD)
- [F] RUMBLE STRIPS(EDGELINE)(OPTION 3)
- [G] RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- [H] RUMBLE STRIPS(TRANSVERSE)
- [I] PREF PAV MRK TY C (W) (WORD)
- [J] PREF PAV MRK TY C (W) (ARROW)
- [K] REFL PAV MAKR TY I-C
- [L] REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- (##) SIGN NUMBER
- EXISTING SIGN
- [R] EXISTING SIGN TO BE REMOVED

NOTES:

1. ALL STATIONS REFERENCE FM 937 CENTERLINE UNLESS NOTED OTHERWISE.
2. ALL PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED, AS APPROVED BY THE ENGINEER.
3. FM 937 CENTERLINE IS NOT SHOWN FOR CLARITY.

SCALE: 1" = 100'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 168+00.00 TO STA 192+00.00

SHEET 02 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		164

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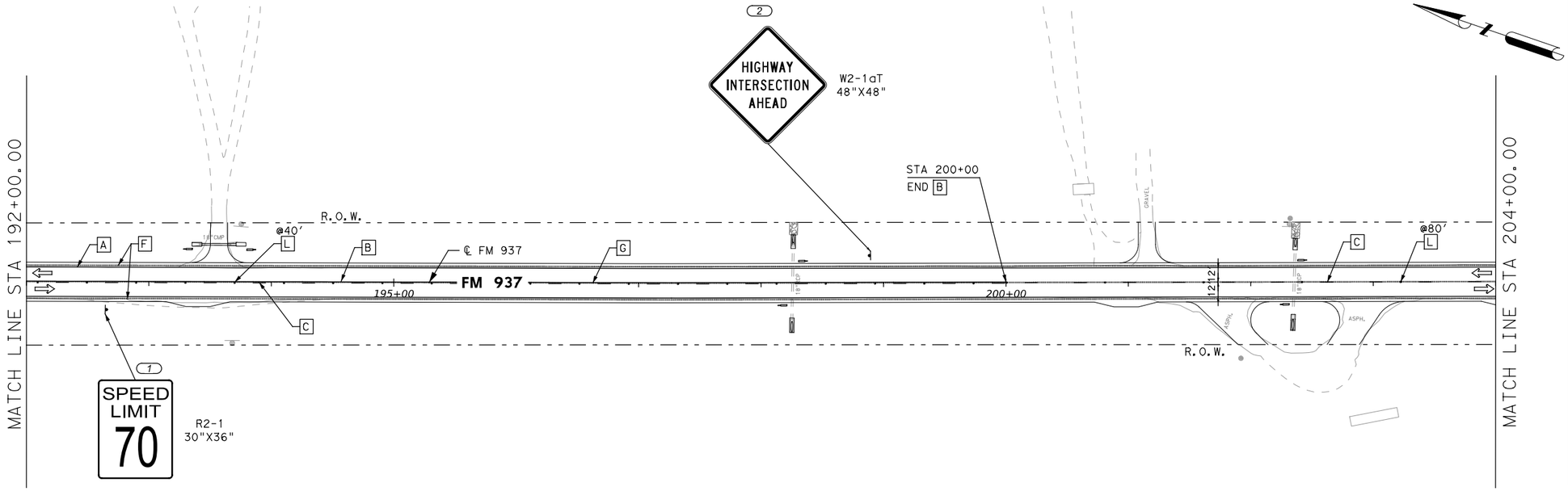

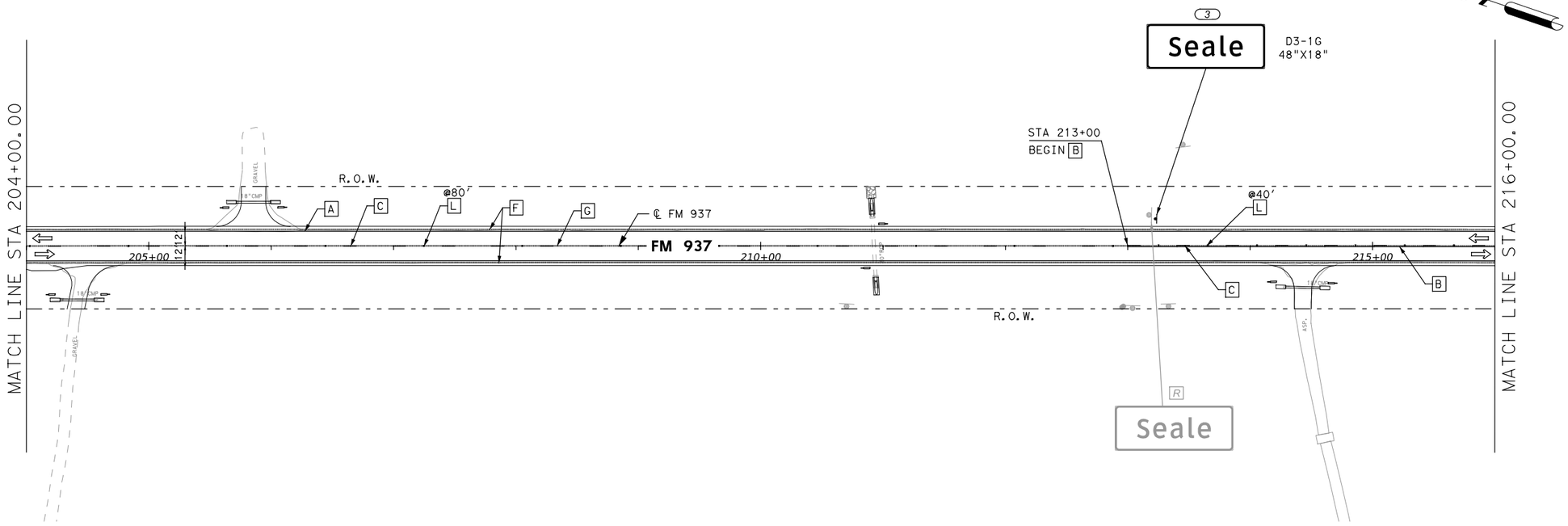

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D' REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
- EXISTING SIGN
- R EXISTING SIGN TO BE REMOVED

NOTES:

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3. FM 937 CENTERLINE IS NOT SHOWN FOR CLARITY.

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
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LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 192+00.00 TO STA 216+00.00

SHEET 03 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		165

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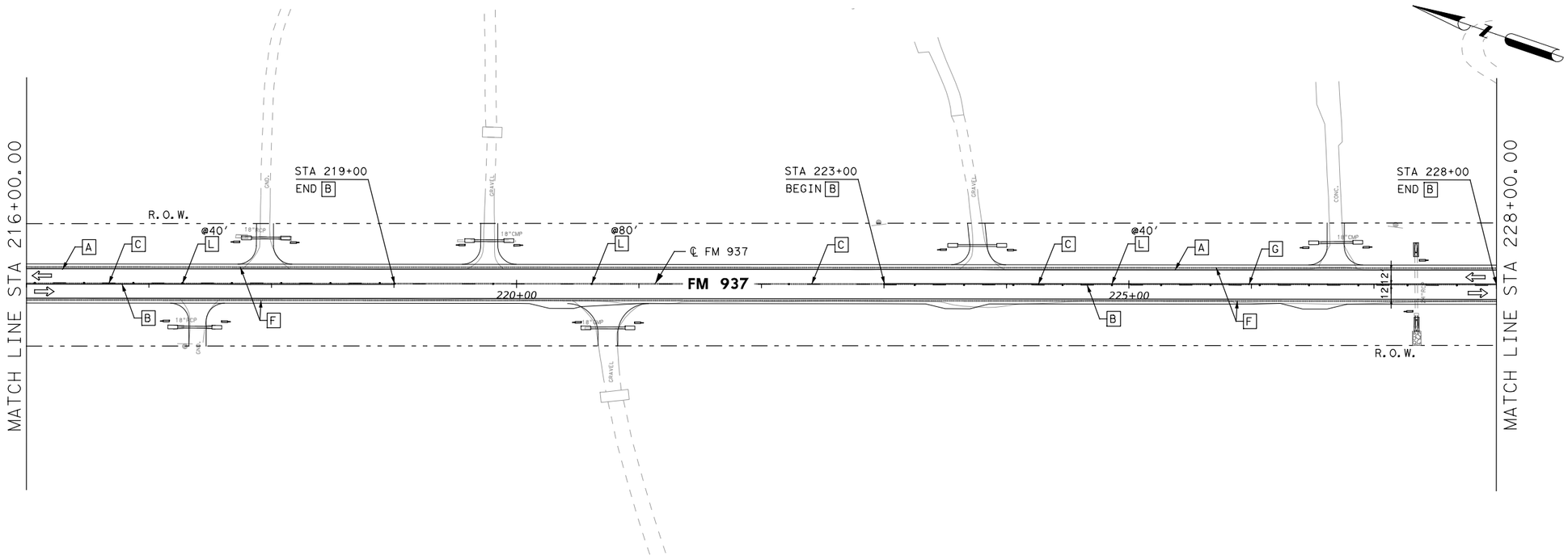

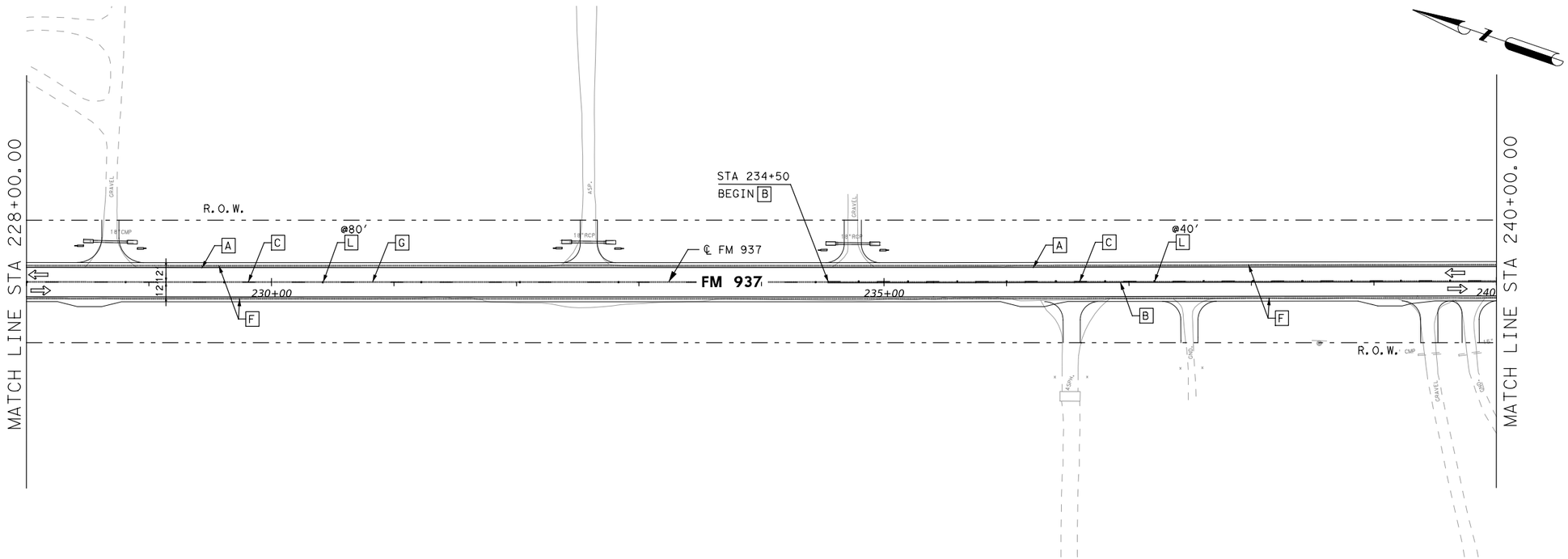

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
- EXISTING SIGN
- R EXISTING SIGN TO BE REMOVED

NOTES:

1. ALL STATIONS REFERENCE FM 937 CENTERLINE UNLESS NOTED OTHERWISE.
2. ALL PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED, AS APPROVED BY THE ENGINEER.
3. FM 937 CENTERLINE IS NOT SHOWN FOR CLARITY.

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 216+00.00 TO STA 240+00.00

SHEET 04 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		166

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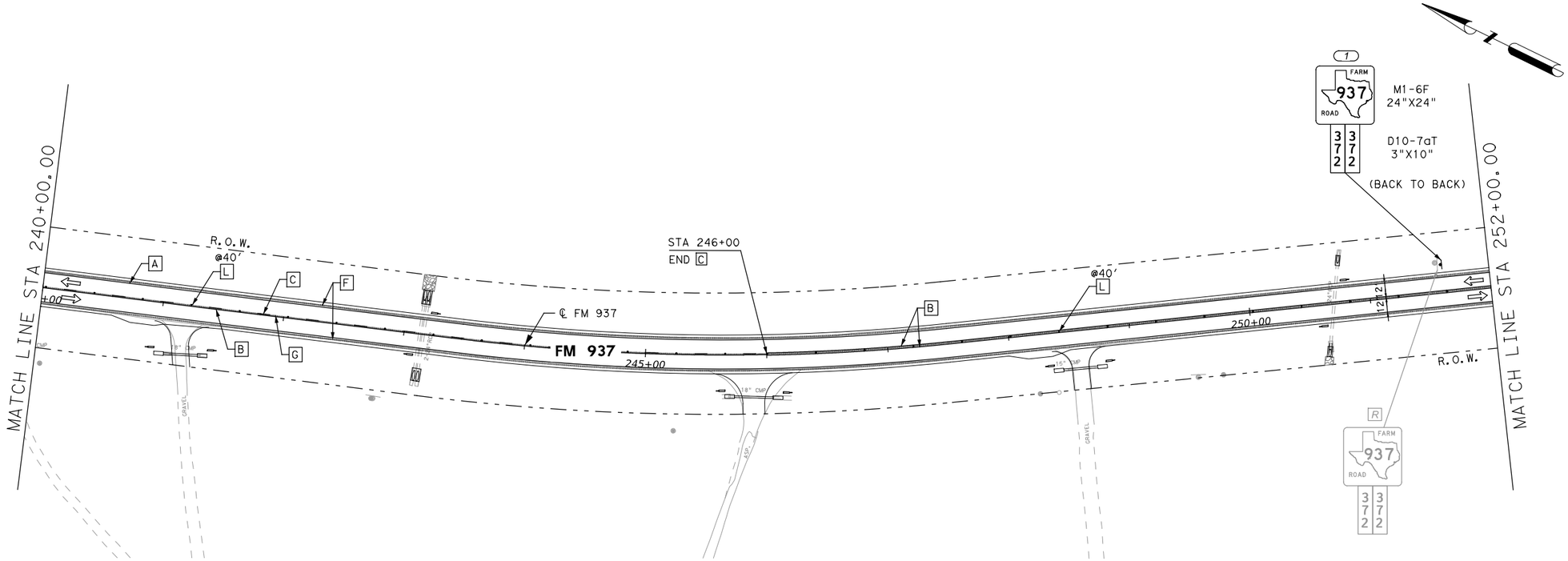

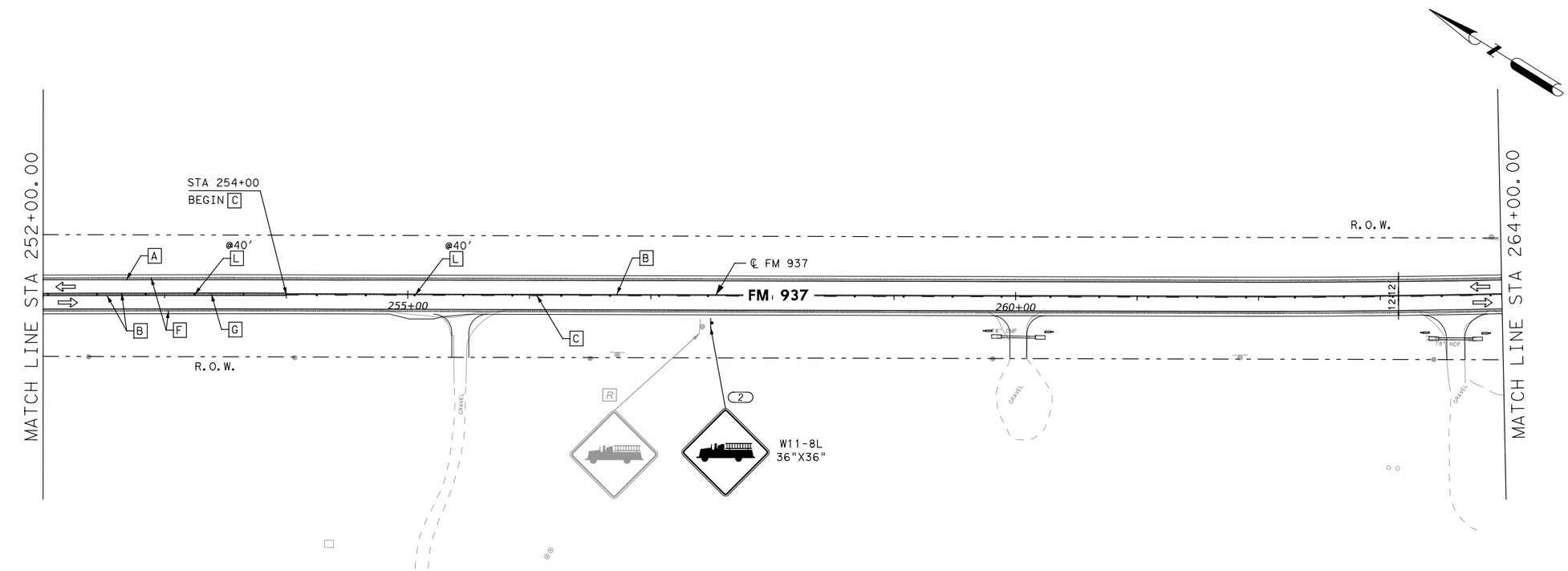

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
- EXISTING SIGN
- R EXISTING SIGN TO BE REMOVED

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0 50 100

SCALE: 1" = 100'

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 240+00.00 TO STA 264+00.00

SHEET 05 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		167

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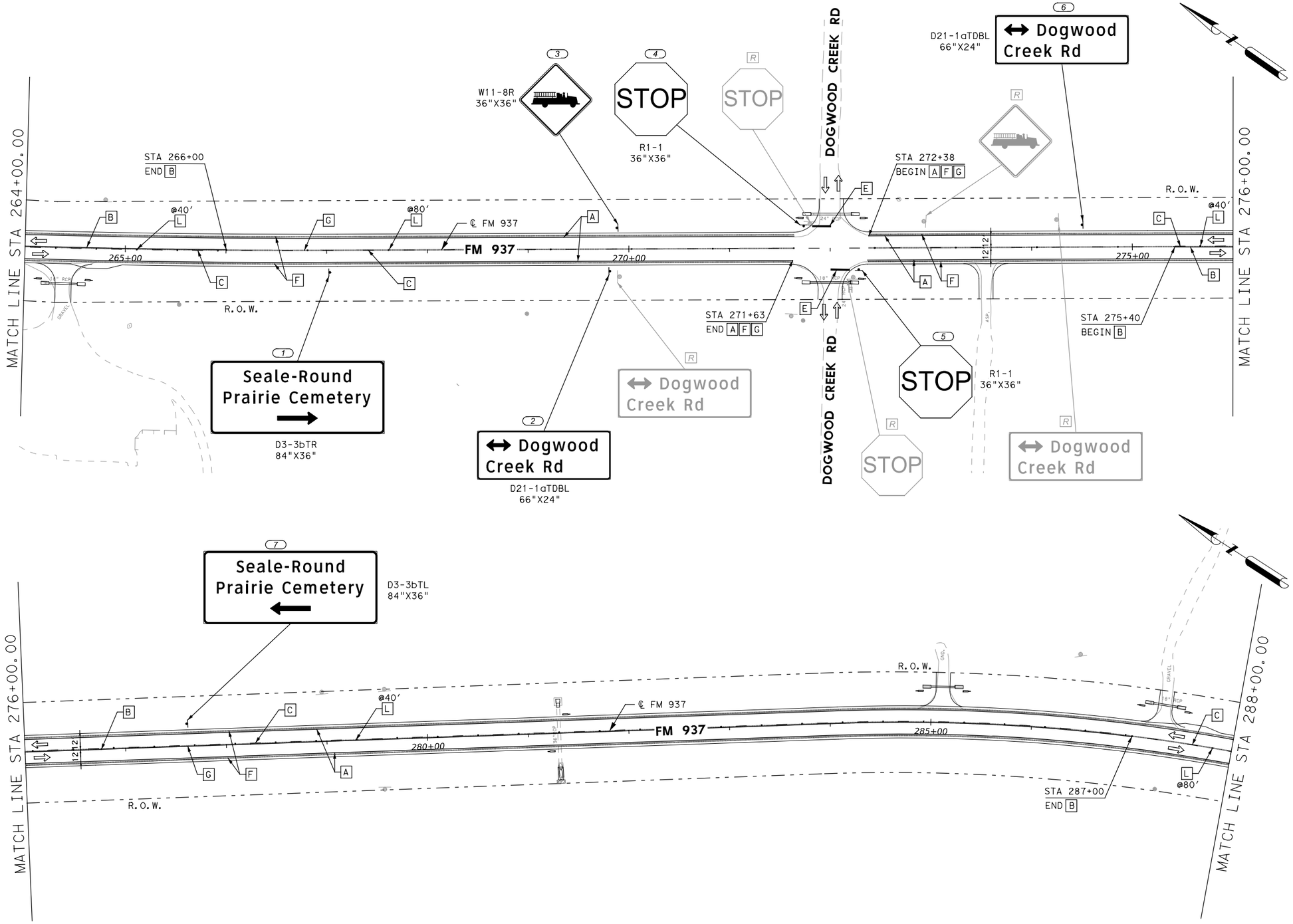

LEGEND

- [A] RE PM W/RET REQ TY I (W) 6"(SLD)
- [B] RE PM W/RET REQ TY I (Y) 6"(SLD)
- [C] RE PM W/RET REQ TY I (Y) 6"(BRK)
- [D] REFL PAV MRK TY I (W) 8"(SLD)
- [D"] REFL PAV MRK TY I (W) 8"(DOT)
- [E] PREF PAV MRK TY C (W) 24"(SLD)
- [F] RUMBLE STRIPS(EDGELINE)(OPTION 3)
- [G] RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- [H] RUMBLE STRIPS(TRANSVERSE)
- [I] PREF PAV MRK TY C (W) (WORD)
- [J] PREF PAV MRK TY C (W) (ARROW)
- [K] REFL PAV MAKR TY I-C
- [L] REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- (##) SIGN NUMBER
- EXISTING SIGN
- [R] EXISTING SIGN TO BE REMOVED

NOTES:

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0 50 100

SCALE: 1" = 100'

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 264+00.00 TO STA 288+00.00

SHEET 06 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		168

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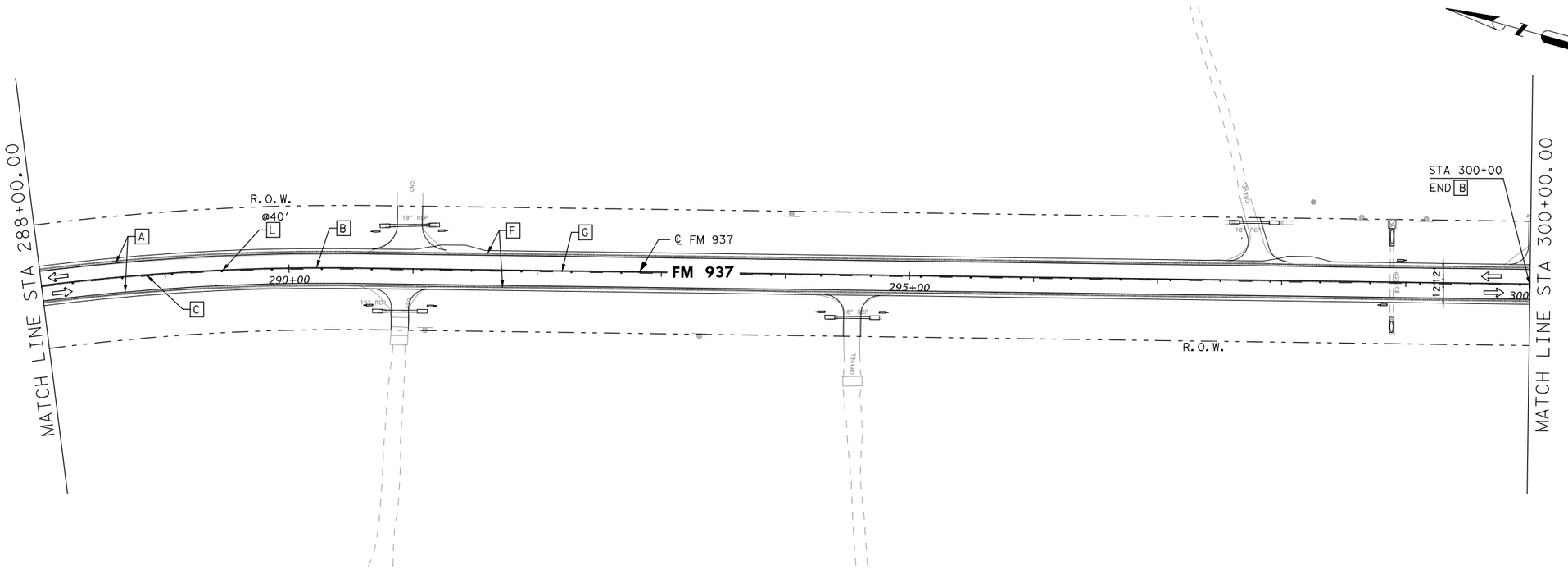

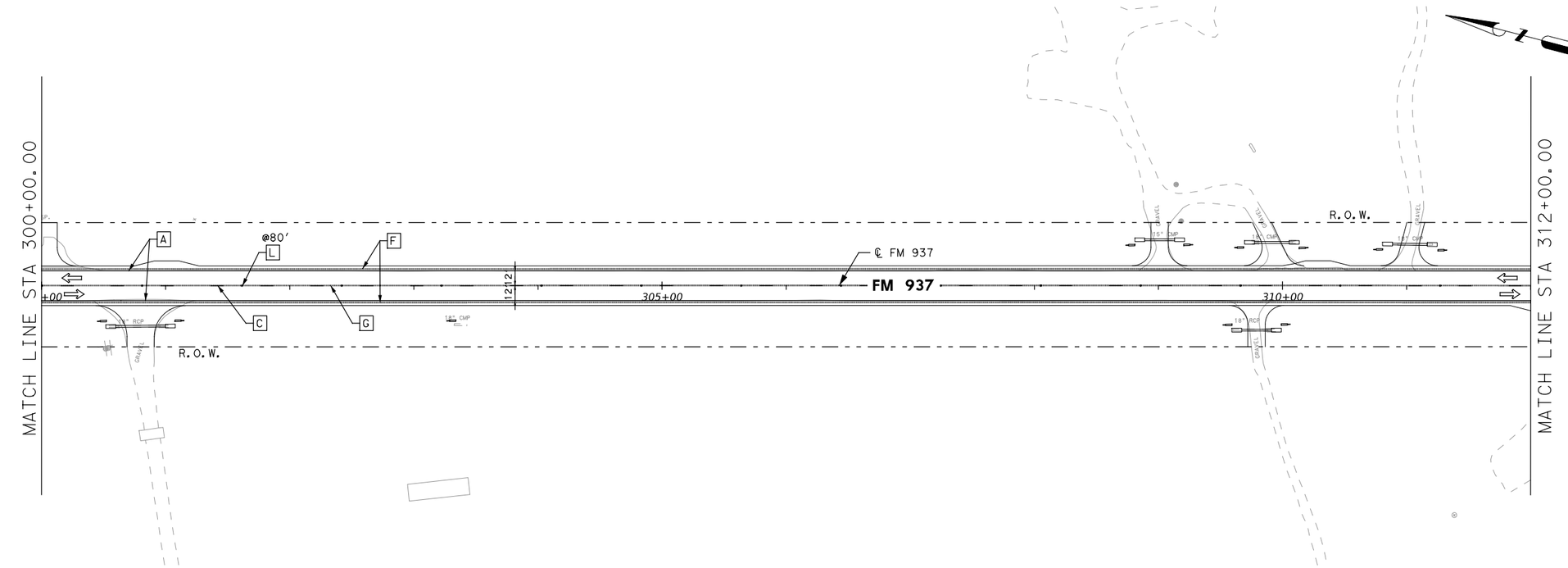

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
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0 50 100

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 288+00.00 TO STA 312+00.00

SHEET 07 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		169

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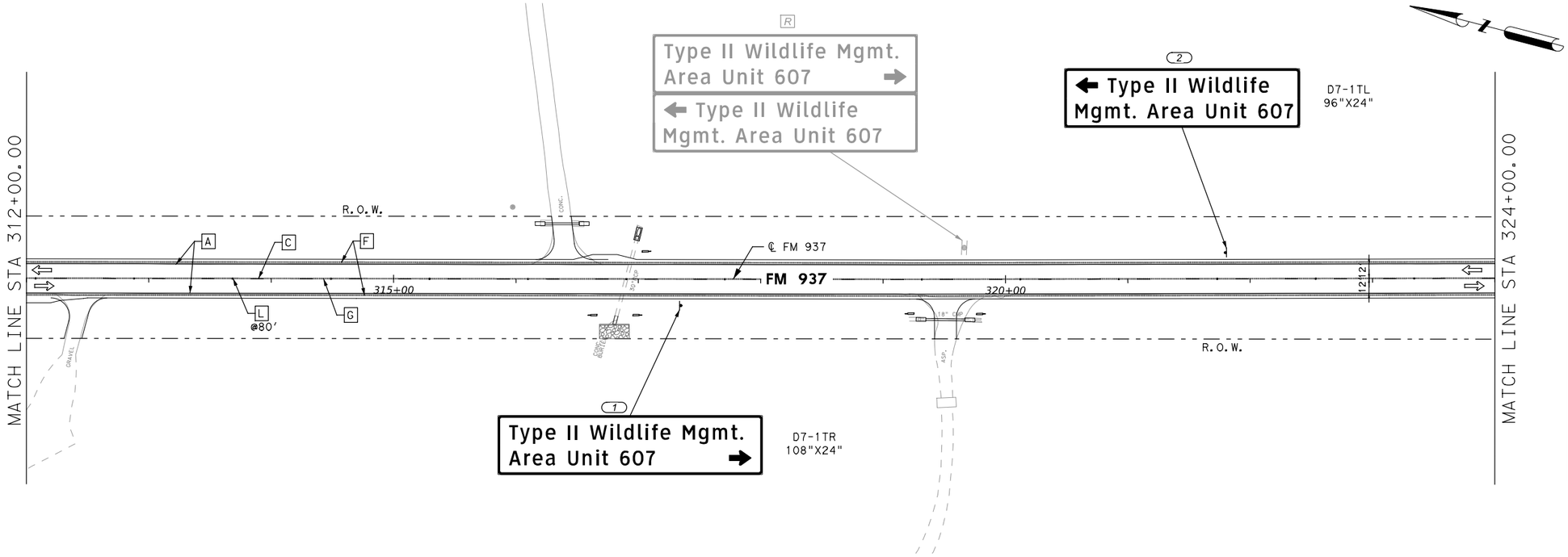

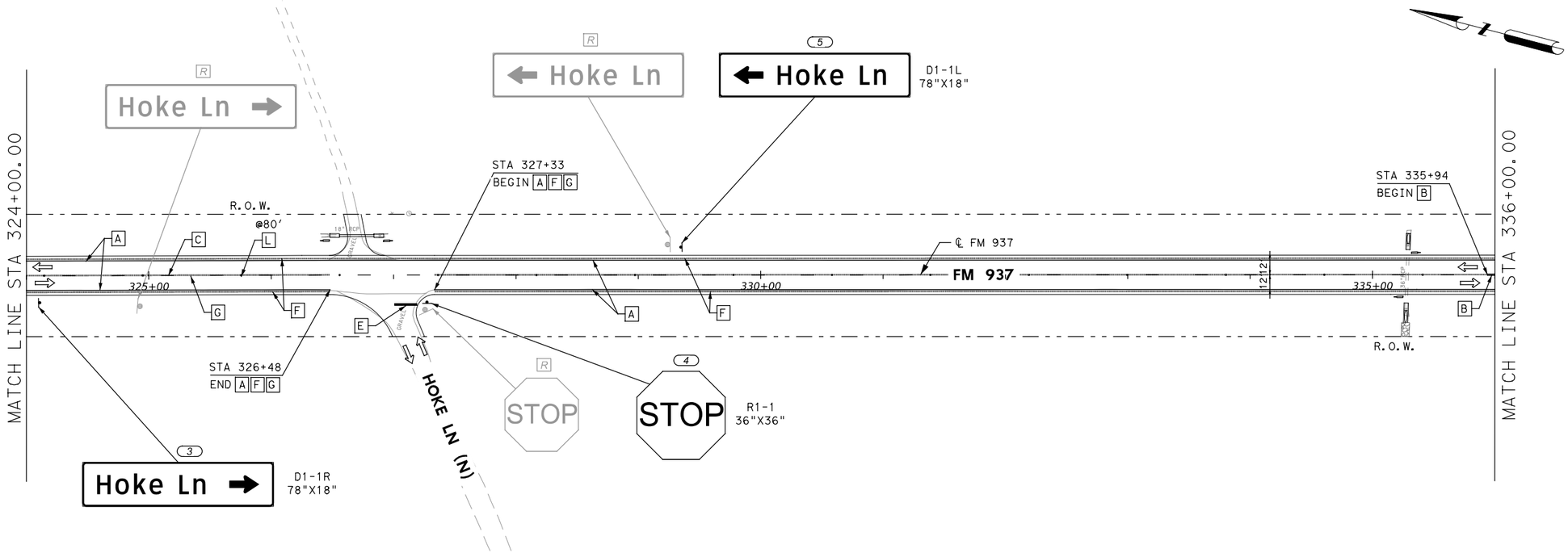

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
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0 50 100

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 312+00.00 TO STA 336+00.00

SHEET 08 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		170

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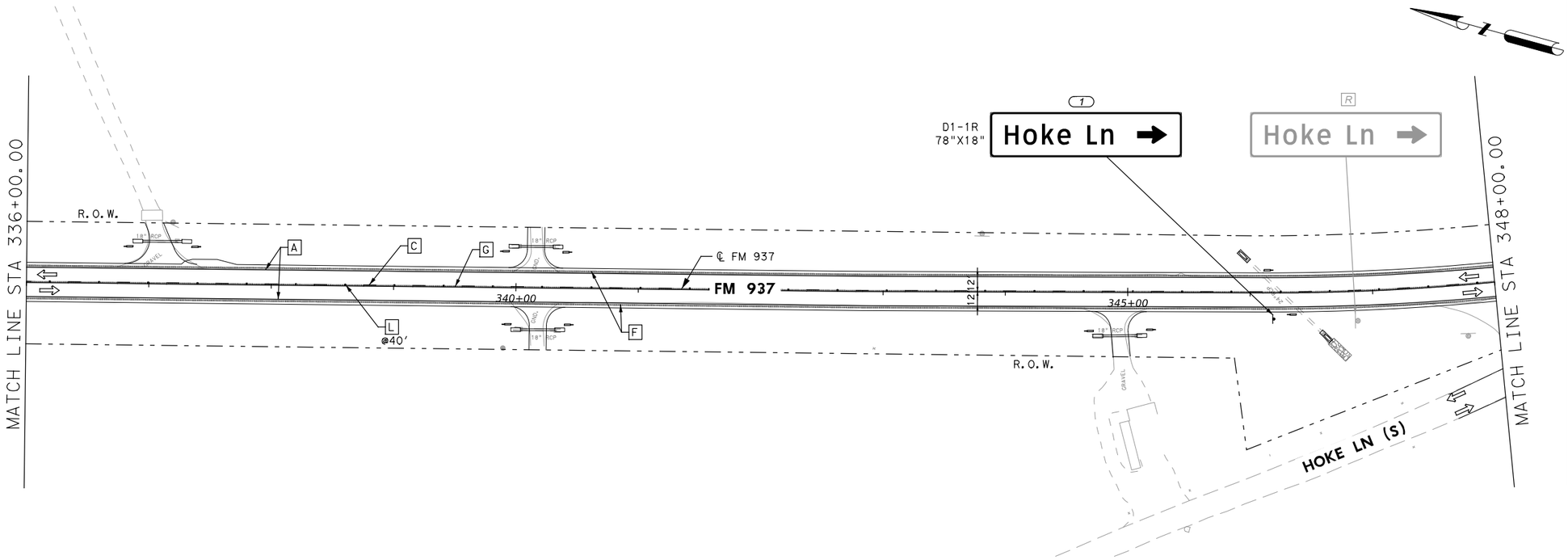

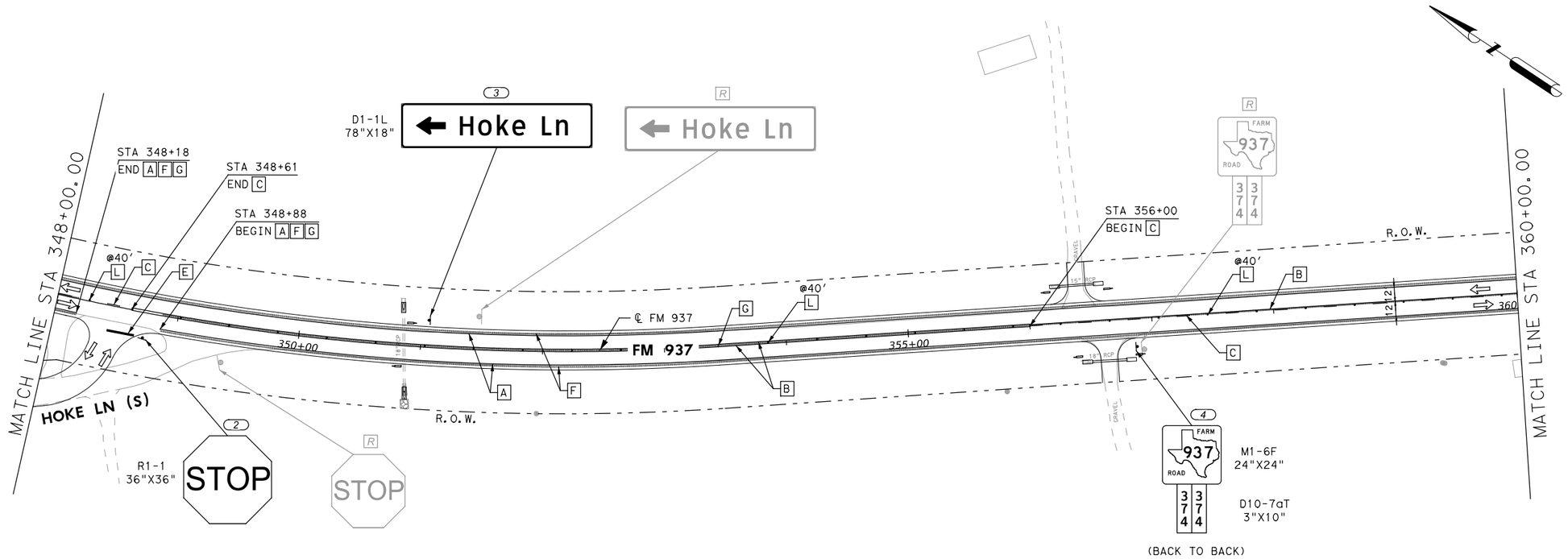

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
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0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
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infraTECH
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TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 336+00.00 TO STA 360+00.00

SHEET 09 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		171

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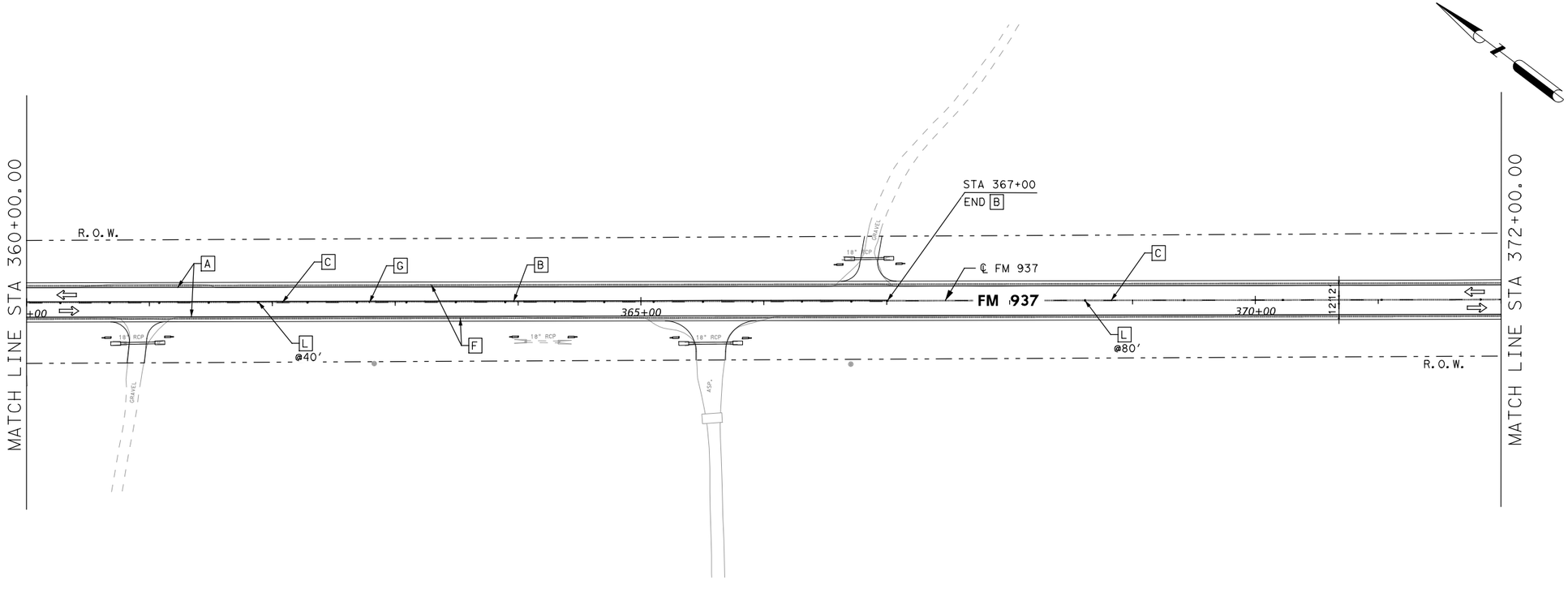

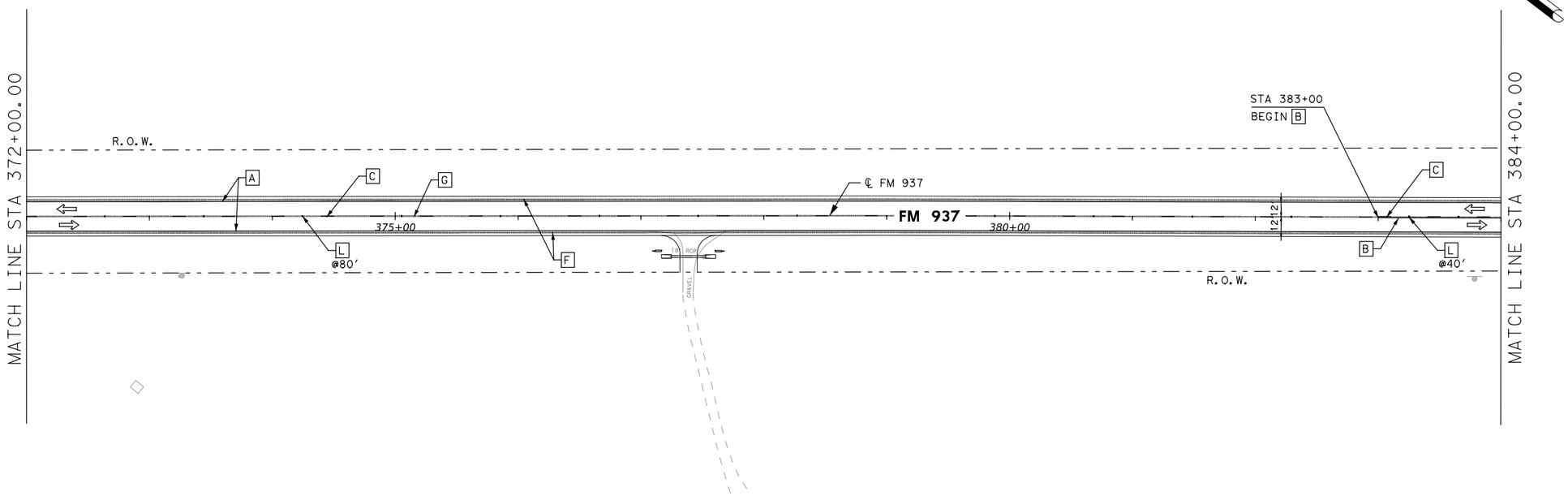

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
- H RUMBLE STRIPS(TRANSVERSE)
- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
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0 50 100

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 360+00.00 TO STA 384+00.00

SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		172

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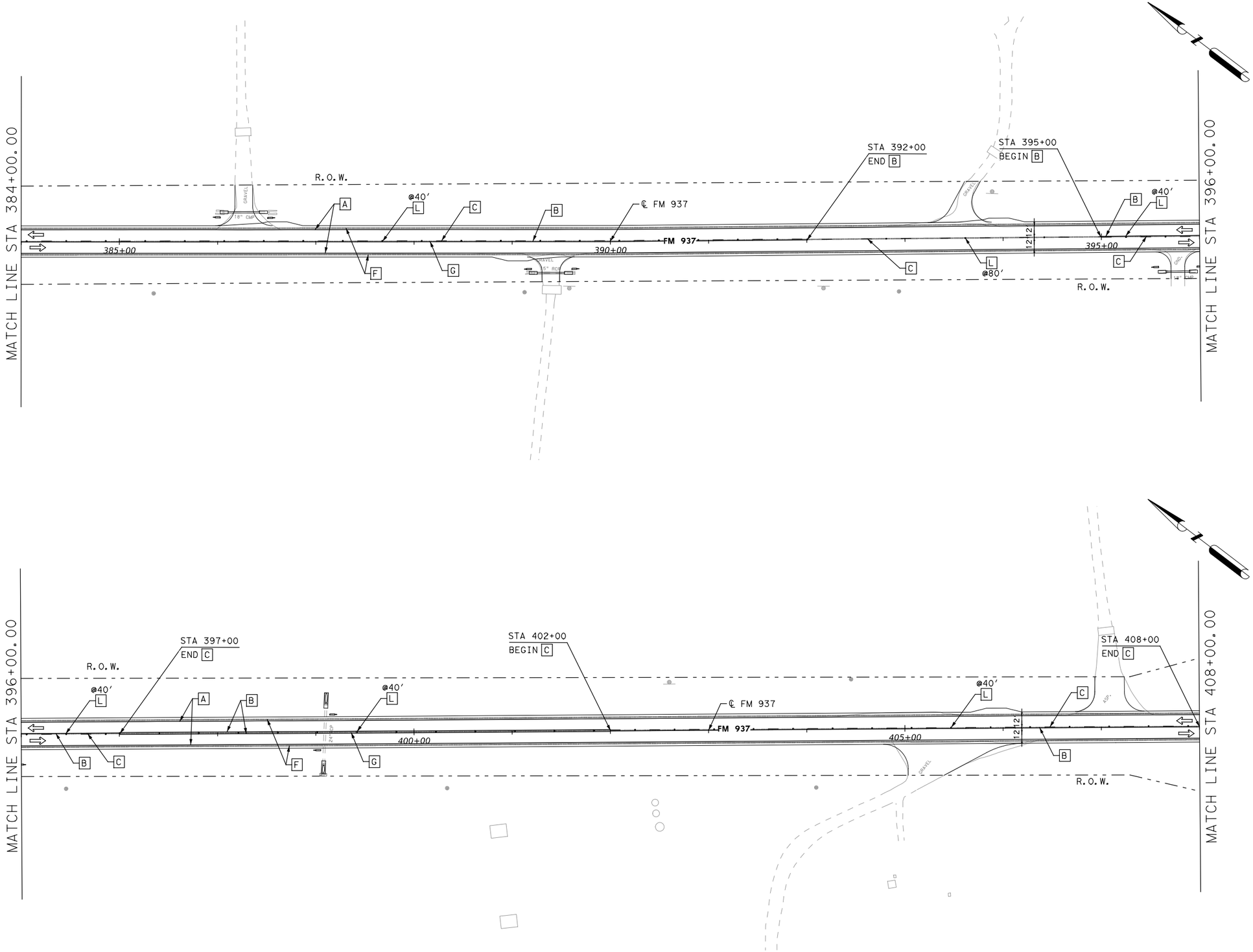

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D' REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
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- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
- PROPOSED SIGN
- ## SIGN NUMBER
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0 50 100

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 384+00.00 TO STA 408+00.00

SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		173

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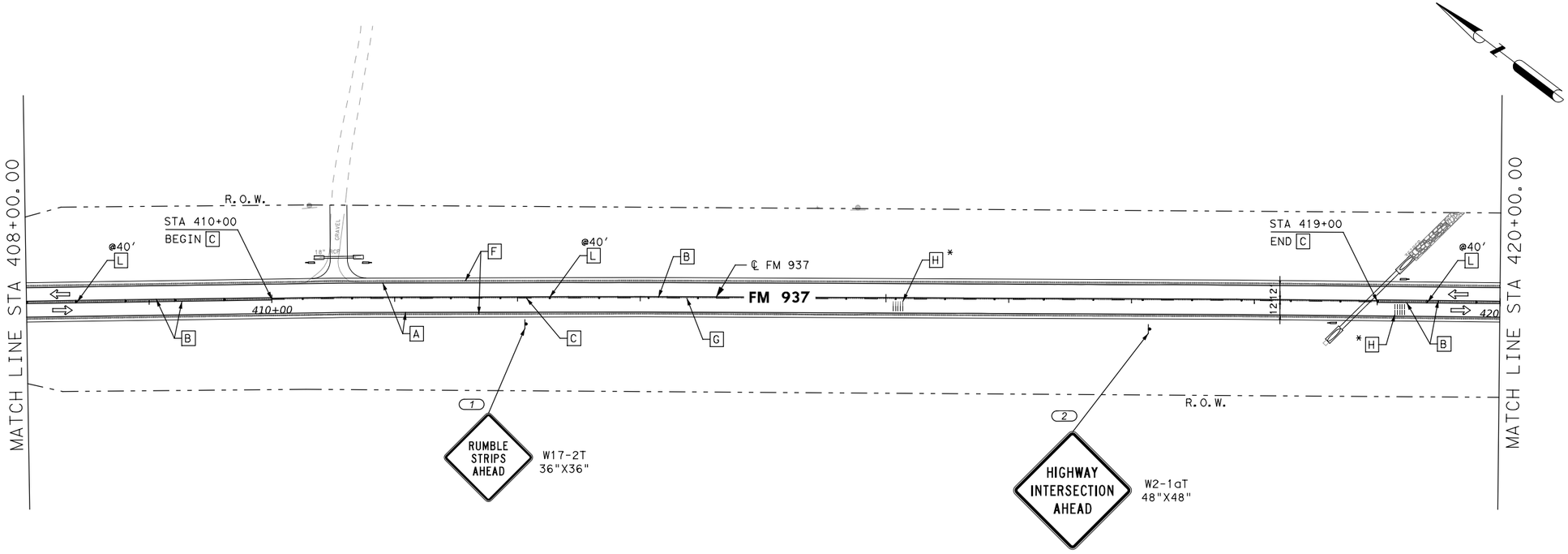

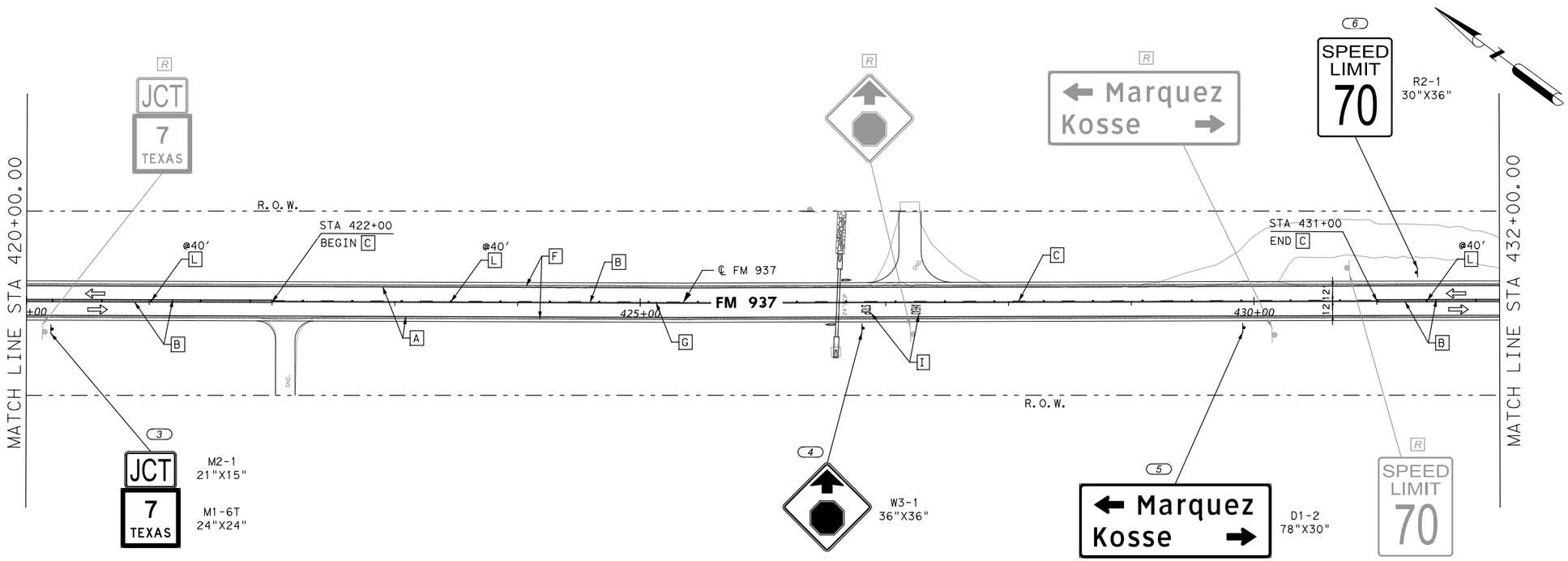

* USE STANDARD PATTERN FOR TRANSVERSE RUMBLE STRIPS.

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
- G RUMBLE STRIPS(CENTERLINE)(OPTION 1)
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- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
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- OBJECT MARKER
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0 50 100

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FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 408+00.00 TO STA 432+00.00

SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		174

DATE: 5/25/2023 4:35:29 PM
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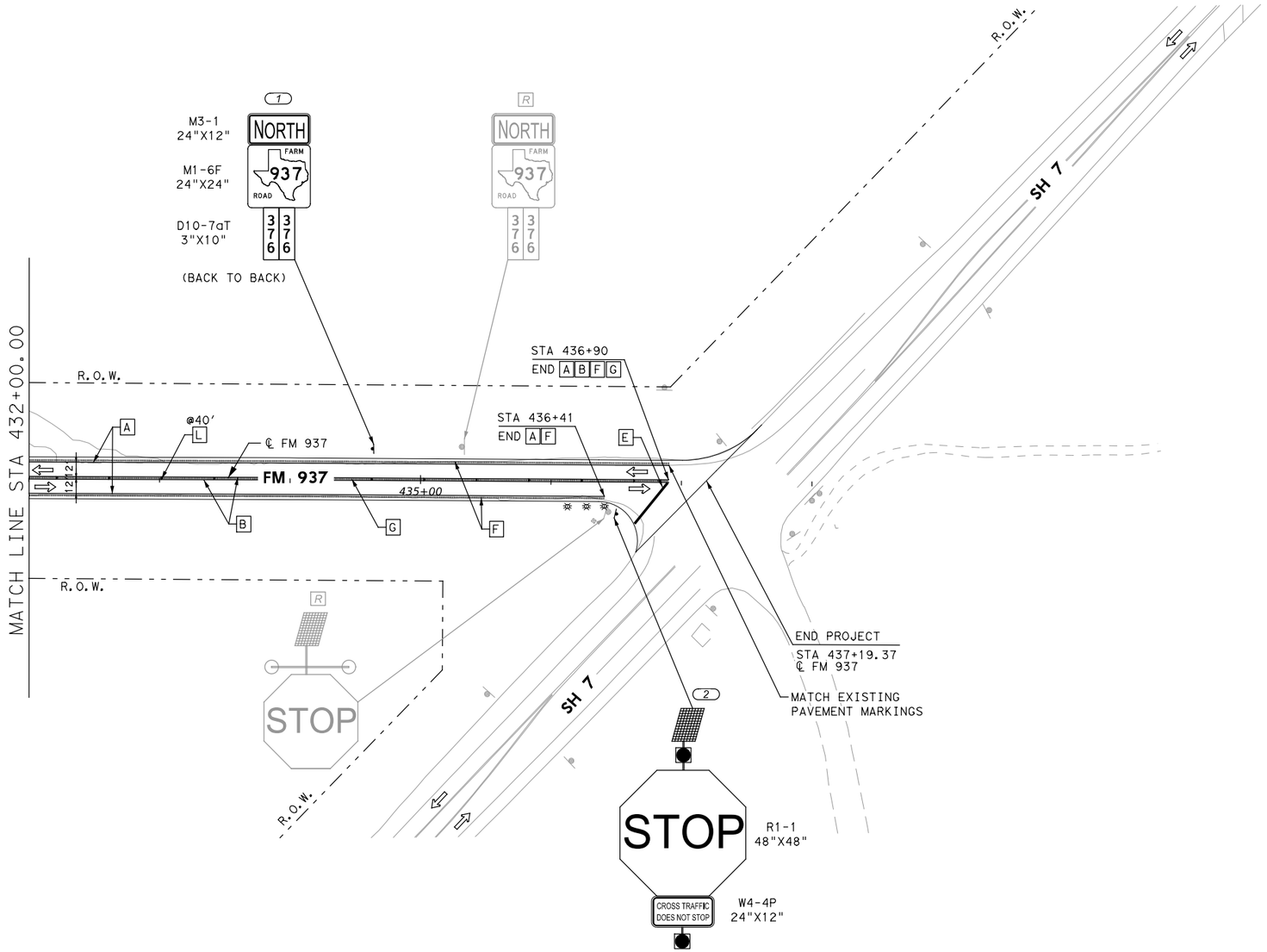

LEGEND

- A RE PM W/RET REQ TY I (W) 6"(SLD)
- B RE PM W/RET REQ TY I (Y) 6"(SLD)
- C RE PM W/RET REQ TY I (Y) 6"(BRK)
- D REFL PAV MRK TY I (W) 8"(SLD)
- D" REFL PAV MRK TY I (W) 8"(DOT)
- E PREF PAV MRK TY C (W) 24"(SLD)
- F RUMBLE STRIPS(EDGELINE)(OPTION 3)
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- I PREF PAV MRK TY C (W) (WORD)
- J PREF PAV MRK TY C (W) (ARROW)
- K REFL PAV MAKR TY I-C
- L REFL PAV MAKR TY II-A-A
- OBJECT MARKER
- DELINEATOR
- DIRECTION OF TRAFFIC
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0 50 100

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Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SIGNING AND PAVEMENT MARKINGS LAYOUT

STA 432+00.00 TO END

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		175

DATE: 5/25/2023 4:35:35 PM
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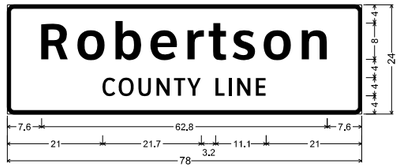
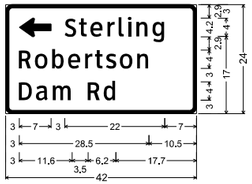
(1)
SHEET 01 OF 13



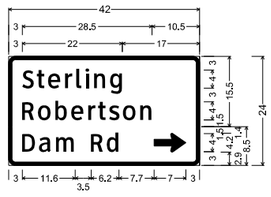
I-2dT
1.5" Radius, 0.5" Border, White on, Green;
"Robertson" ClearviewHwy-5-W-R; "COUNTY LINE" ClearviewHwy-3-W;

(4)
SHEET 02 OF 13



D26-3TL
1.5" Radius, 0.5" Border, White on, Green;
Standard Arrow Custom 7.0" X 4.1" 180';
"Sterling" ClearviewHwy-3-W;
"Robertson" ClearviewHwy-3-W;
"Dam Rd" ClearviewHwy-3-W;

(13)
SHEET 02 OF 13



D26-3TR
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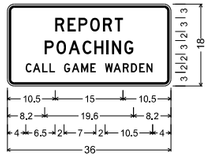
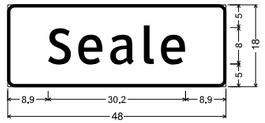
"Sterling" ClearviewHwy-3-W;
"Robertson" ClearviewHwy-3-W;
"Dam Rd" ClearviewHwy-3-W;
Standard Arrow Custom 7.0" X 4.1" 0';

(14)
SHEET 02 OF 13



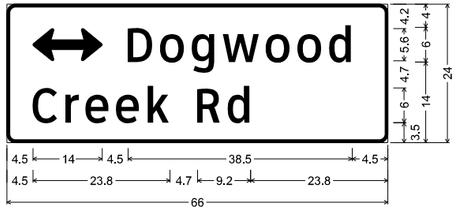
TX4-1T MOD
1.5" Radius, 0.5" Border, 0.5" Indent, Black on, White;
"REPORT" D; "POACHING" D;
"CALL GAME WARDEN" D;

(15)
SHEET 02 OF 13
(3)
SHEET 03 OF 13



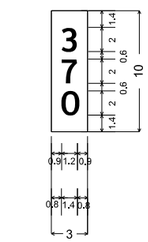
D3-1G
1.5" Radius, 0.5" Border, White on, Green;
"Seale" ClearviewHwy-3-W;

(2)
SHEET 06 OF 13
(6)
SHEET 06 OF 13



D21-1aTL;
1.5" Radius, 0.5" Border, White on, Green;
Double Headed Arrow 1 - 12.0" 0';
"Dogwood" ClearviewHwy-3-W; "Creek Rd" ClearviewHwy-3-W;

(1)
SHEET 01 OF 13



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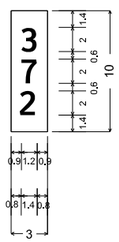

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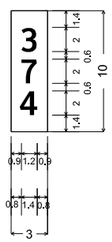

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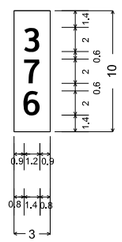
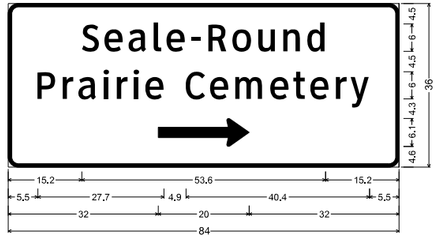


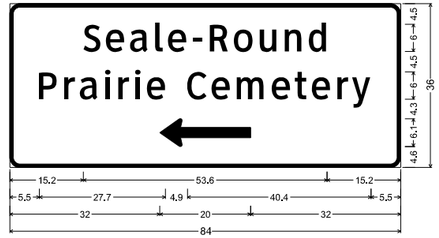
D10-7aT
No border, White on, Green;
"3" ClearviewHwy-4-W; "7" ClearviewHwy-4-W; "0" ClearviewHwy-4-W; "2" ClearviewHwy-4-W; "4" ClearviewHwy-4-W; "6" ClearviewHwy-4-W;

(1)
SHEET 06 OF 13



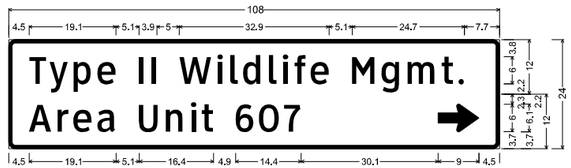
D3-3bTR
1.5" Radius, 0.5" Border, White on, Green;
"Seale-Round" ClearviewHwy-3-W; "Prairie Cemetery" ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 0';

(7)
SHEET 06 OF 13



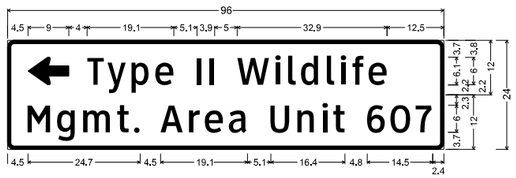
D3-3bTL
1.5" Radius, 0.5" Border, White on, Green;
"Seale-Round" ClearviewHwy-3-W; "Prairie Cemetery" ClearviewHwy-3-W;
Standard Arrow Custom 20.0" X 6.1" 180';

(1)
SHEET 08 OF 13



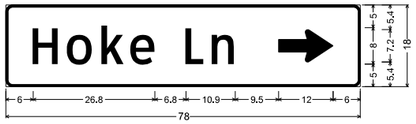
D7-1TR
1.5" Radius, 0.5" Border, White on, Brown;
"Type II Wildlife Mgmt." ClearviewHwy-3-W;
"Area Unit 607" ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0';

(2)
SHEET 08 OF 13



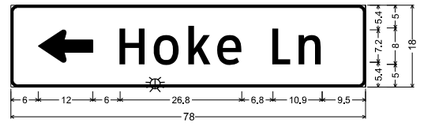
D7-1TL
1.5" Radius, 0.5" Border, White on, Brown;
Standard Arrow Custom 9.0" X 6.1" 180'; "Type II Wildlife" ClearviewHwy-3-W;
"Mgmt. Area Unit 607" ClearviewHwy-3-W;

(3)
SHEET 08 OF 13
(1)
SHEET 09 OF 13



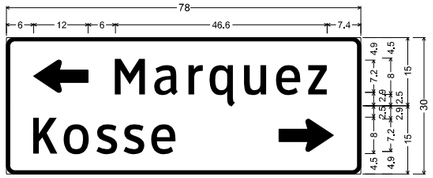
D1-1R
1.5" Radius, 0.5" Border, White on, Green;
"Hoke Ln" ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';

(5)
SHEET 08 OF 13
(3)
SHEET 09 OF 13



D1-1L
1.5" Radius, 0.5" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Hoke Ln" ClearviewHwy-3-W;

(4)
SHEET 12 OF 13



D1-2
1.5" Radius, 0.5" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Marquez" ClearviewHwy-3-W;
"Kosse" ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';

NOT TO SCALE

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

SMALL SIGN DETAILS

SHEET 01 OF 01

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		176

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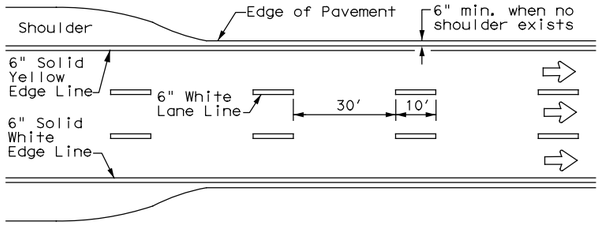
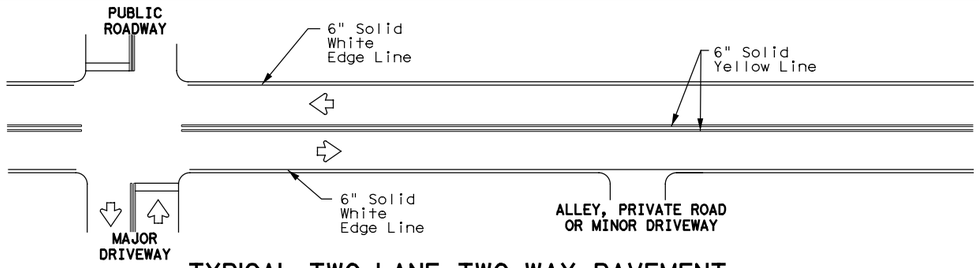
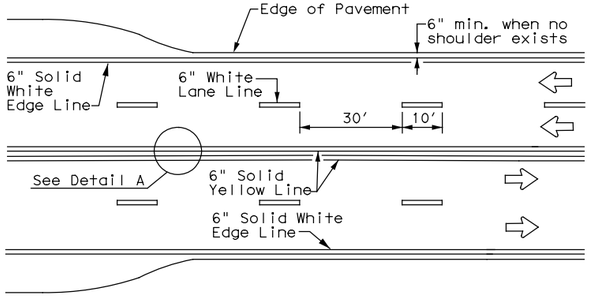
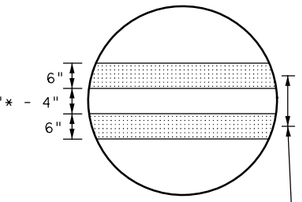


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





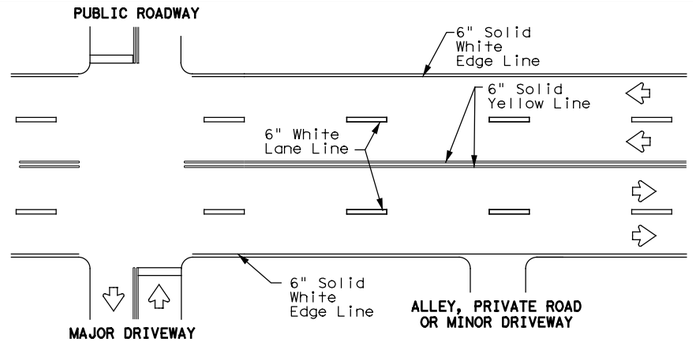
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

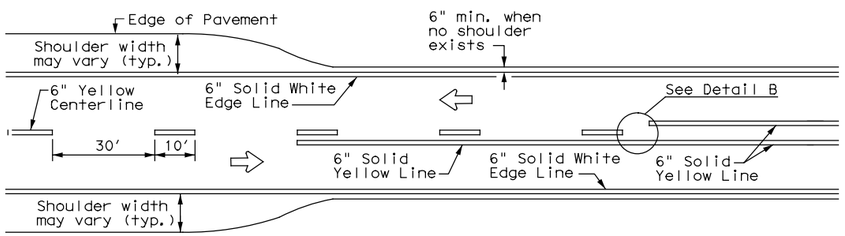
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

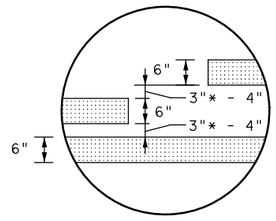
** 8" minimum for restripe projects when approved by the Engineer.



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



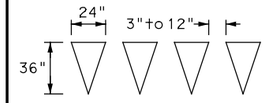
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

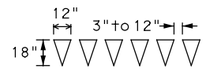
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

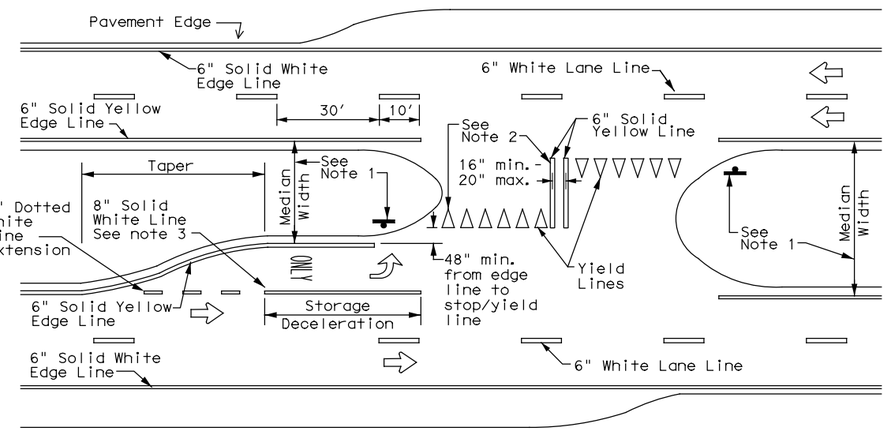


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

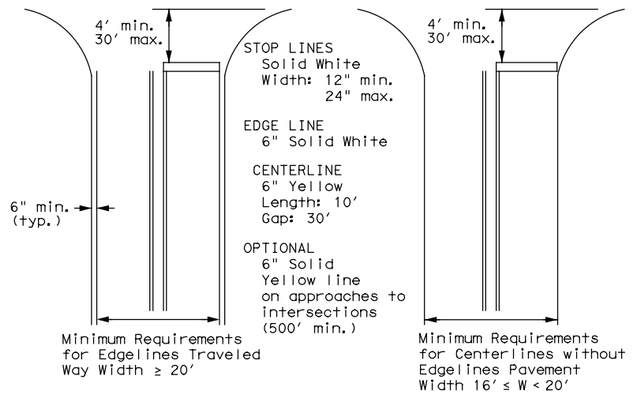
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		177

22A

DATE: 5/25/2023 4:35:45 PM
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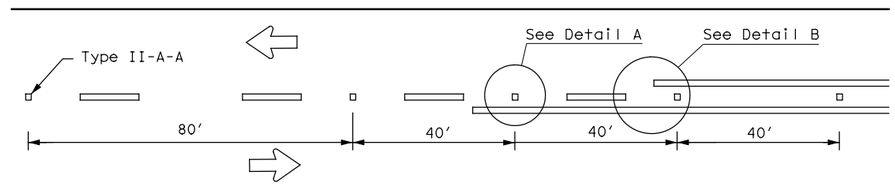
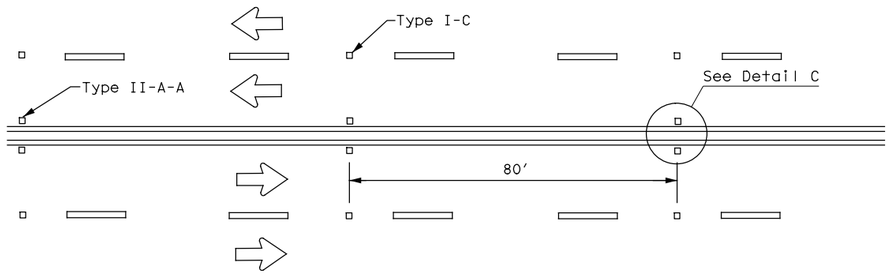
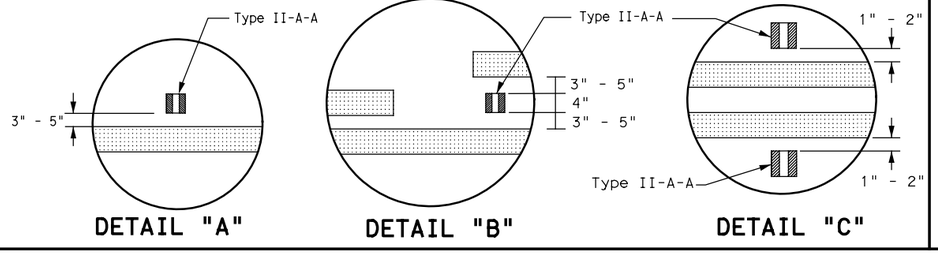
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

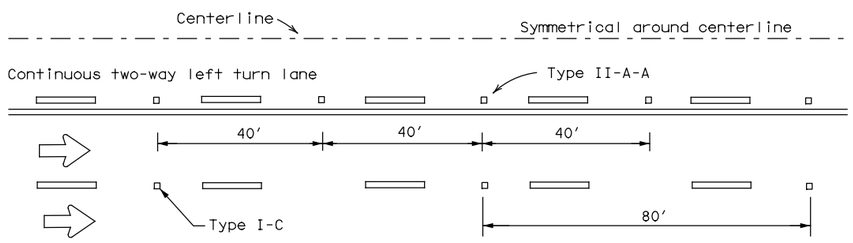


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

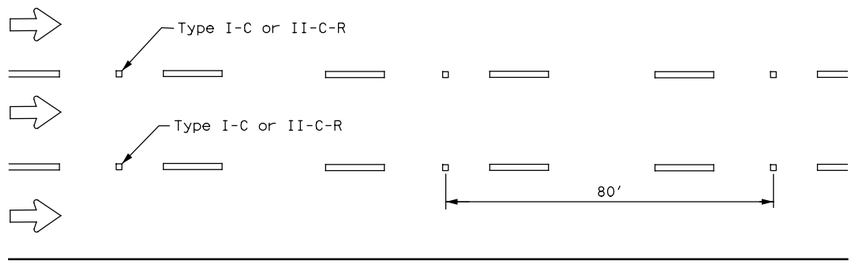


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



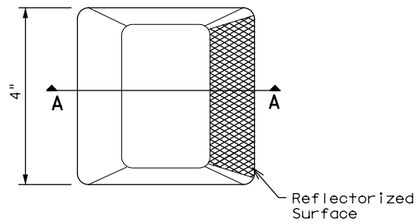
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

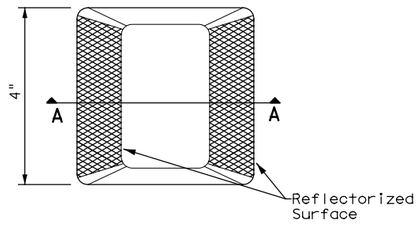
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

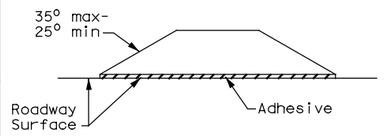
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

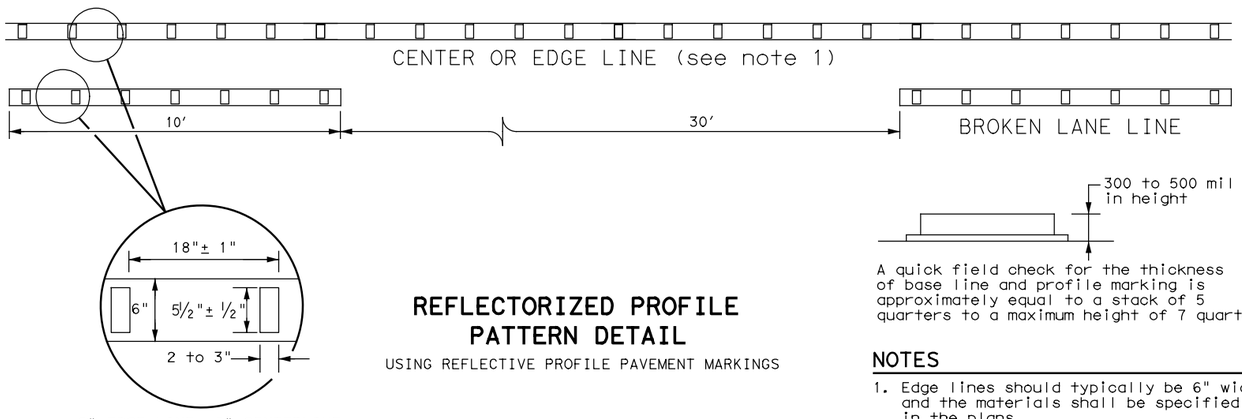


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		178

22B

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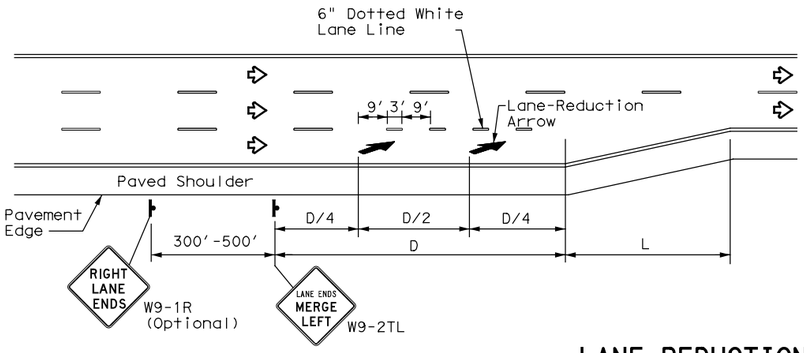
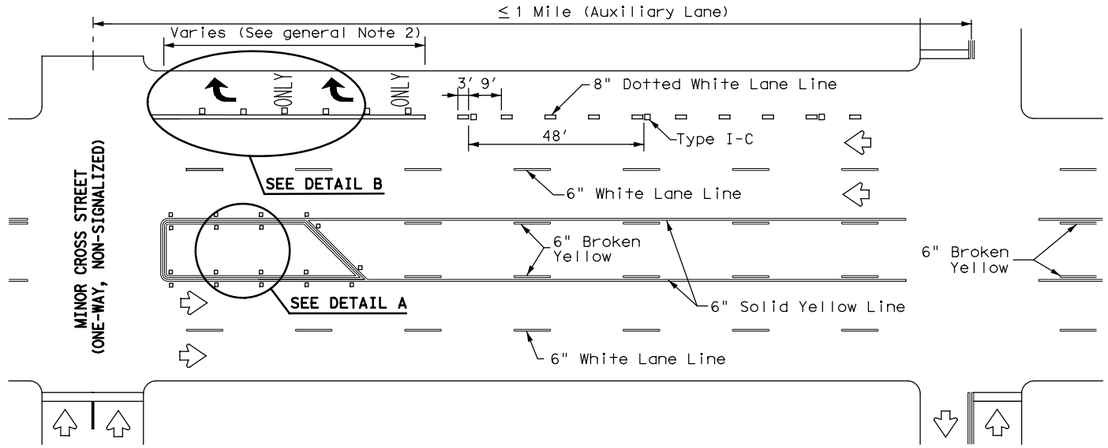


LANE REDUCTION

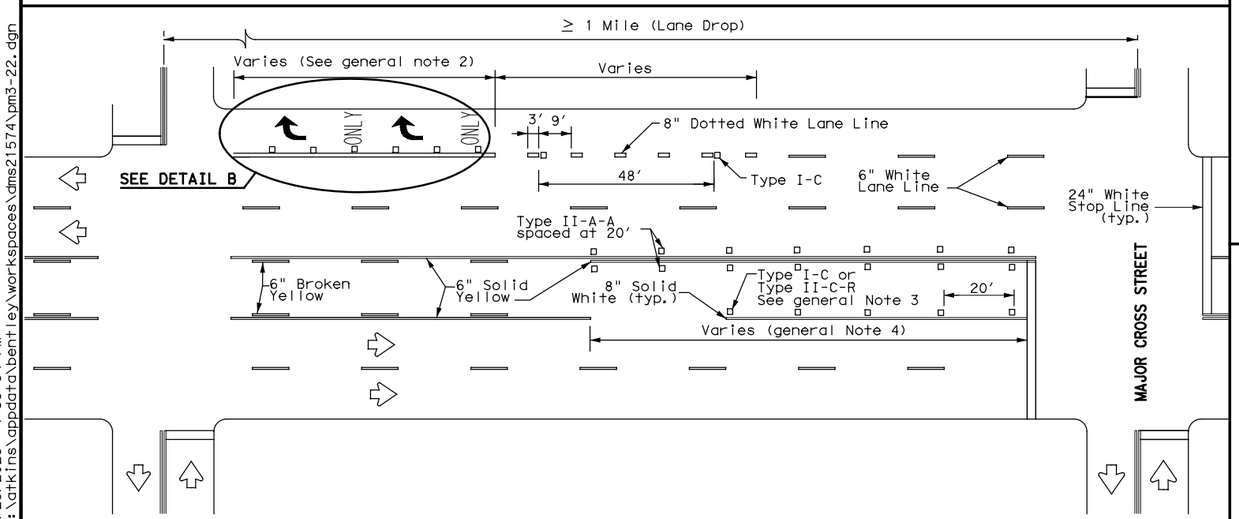
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

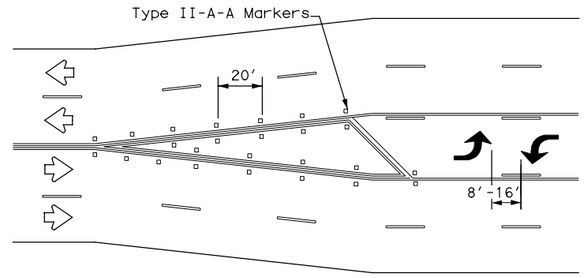
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

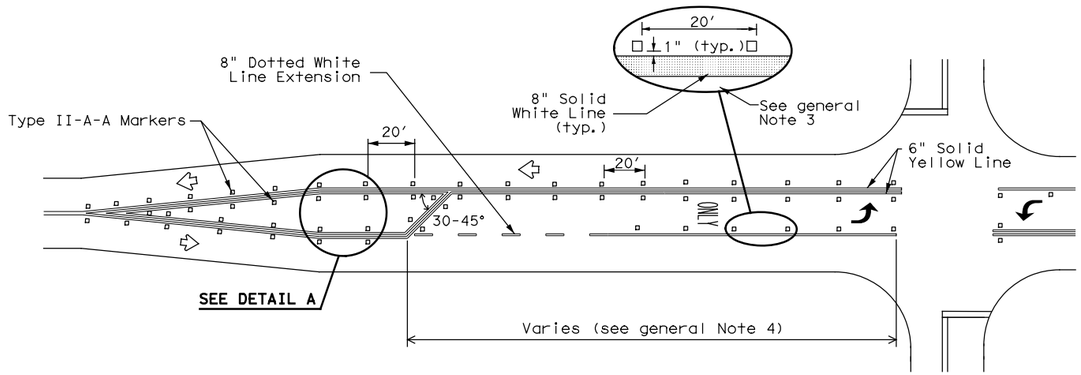
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

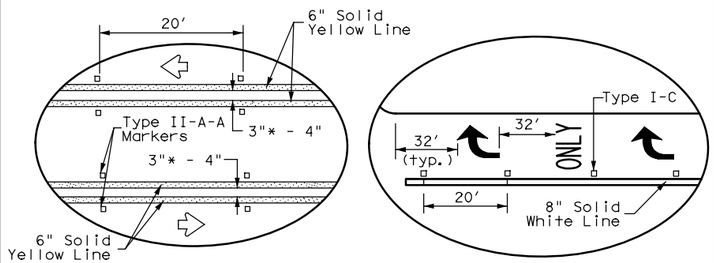
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		179

22C

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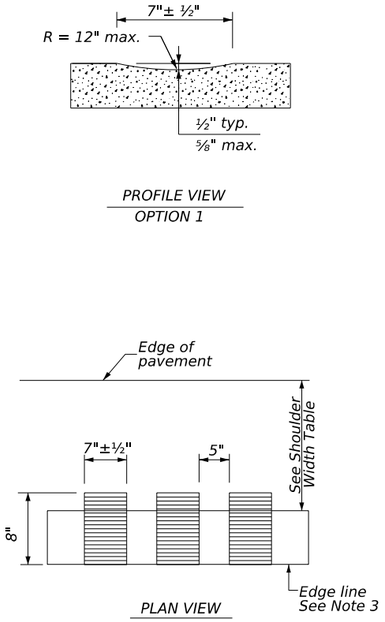
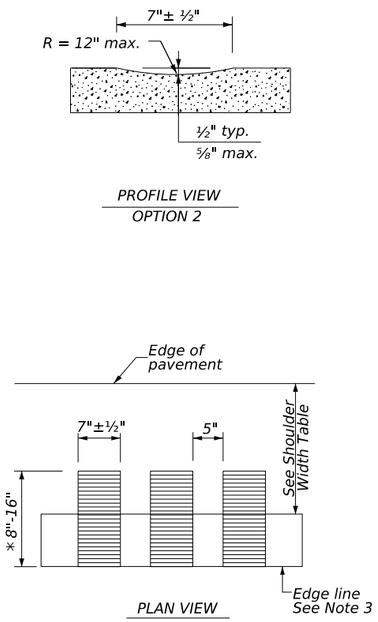
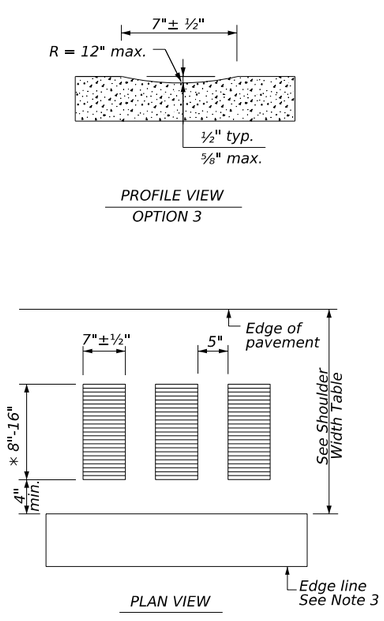


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



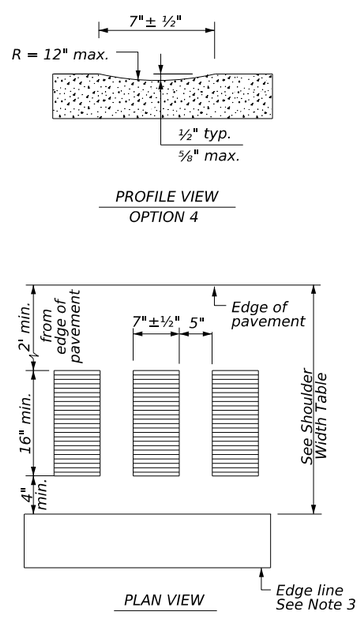
∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

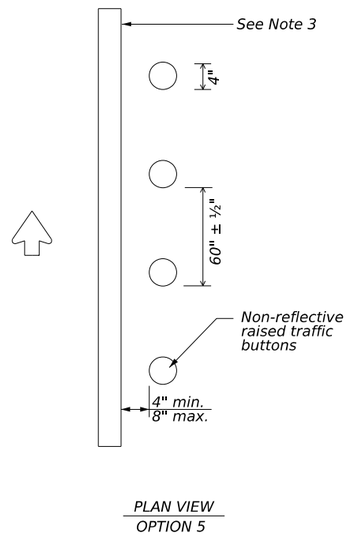


∗ This distance may vary based on width of shoulder

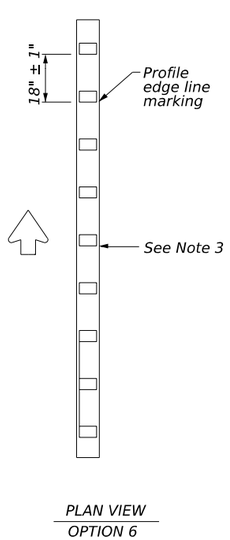
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



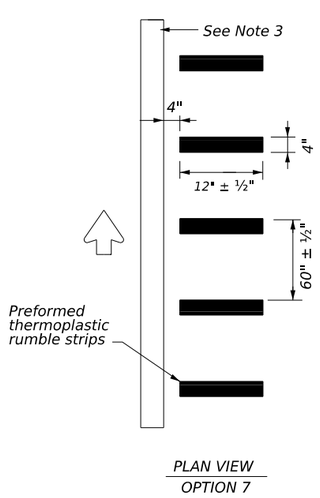
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



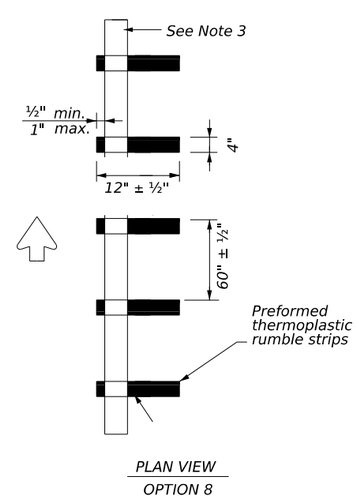
RAISED EDGE LINE (Rumble Strips)



PROFILE EDGE LINE MARKINGS (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

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, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

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) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE 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 edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line 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. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

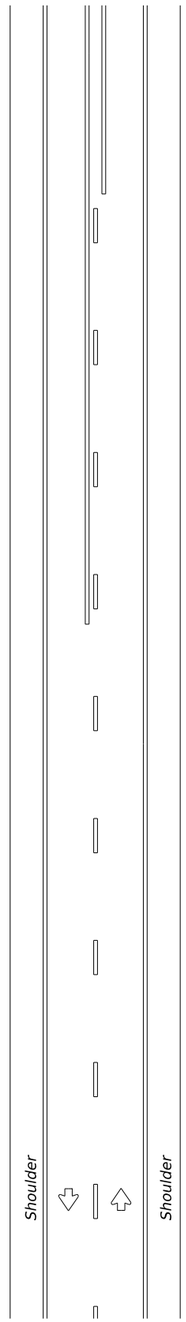
Texas Department of Transportation

Traffic Safety Division Standard

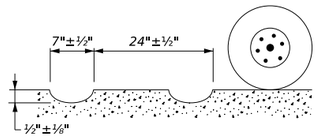
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
10-13 1-23	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		180

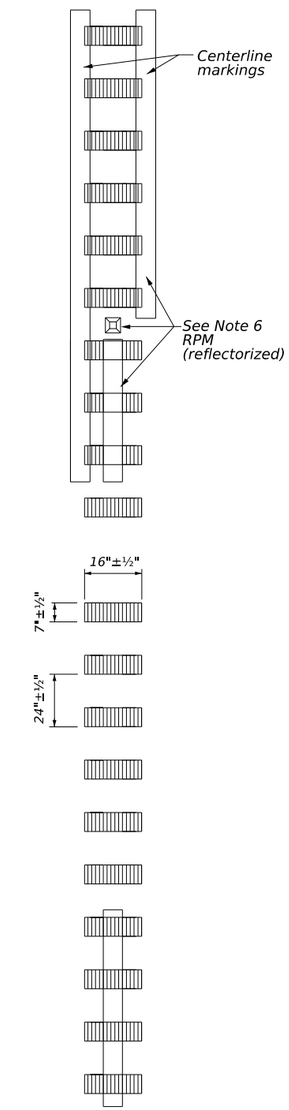
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

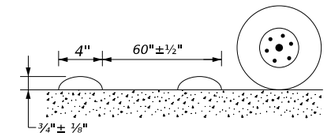


PROFILE VIEW

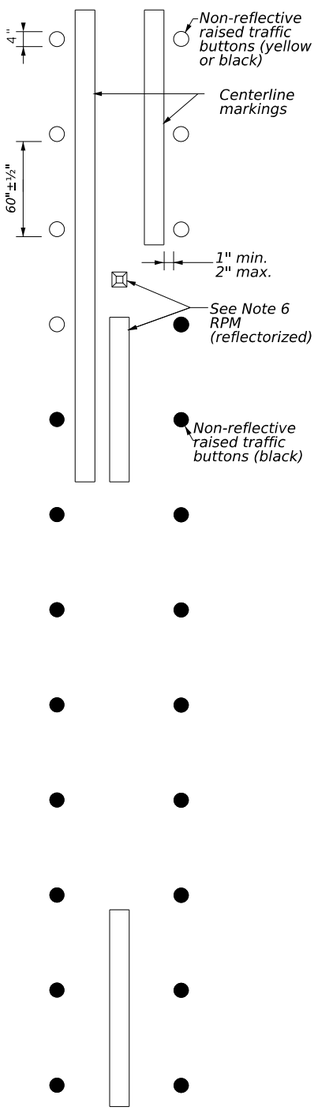


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

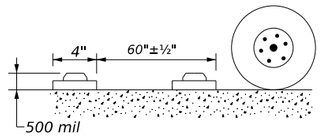


PROFILE VIEW

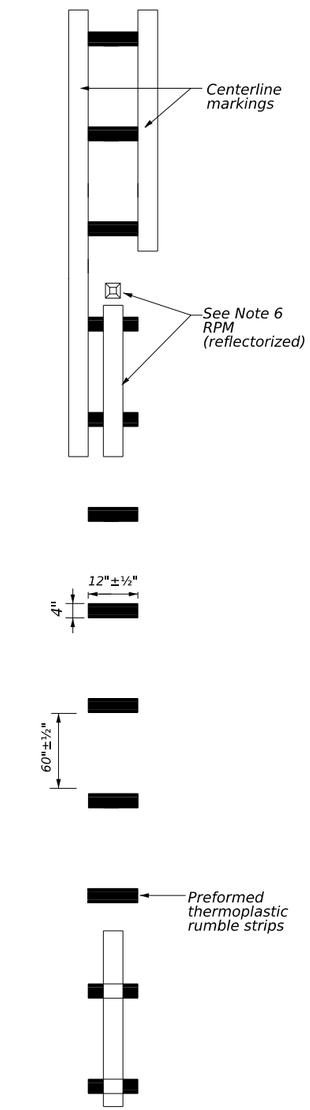


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

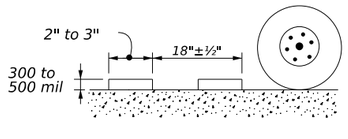


PROFILE VIEW

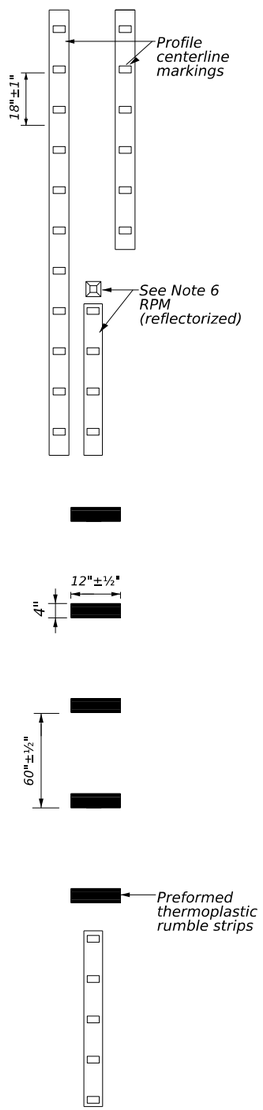


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE 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 edge line 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 Safety 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 or driveways with high usage of large trucks.*
6. *Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.*
7. *Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) 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.*
12. *Consideration shall be given to bicyclists. See RS(6).*

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

13. *See standard sheet RS(2).*

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Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
10-13 1-23	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		181

DATE: 5/25/2023 4:36:08 PM
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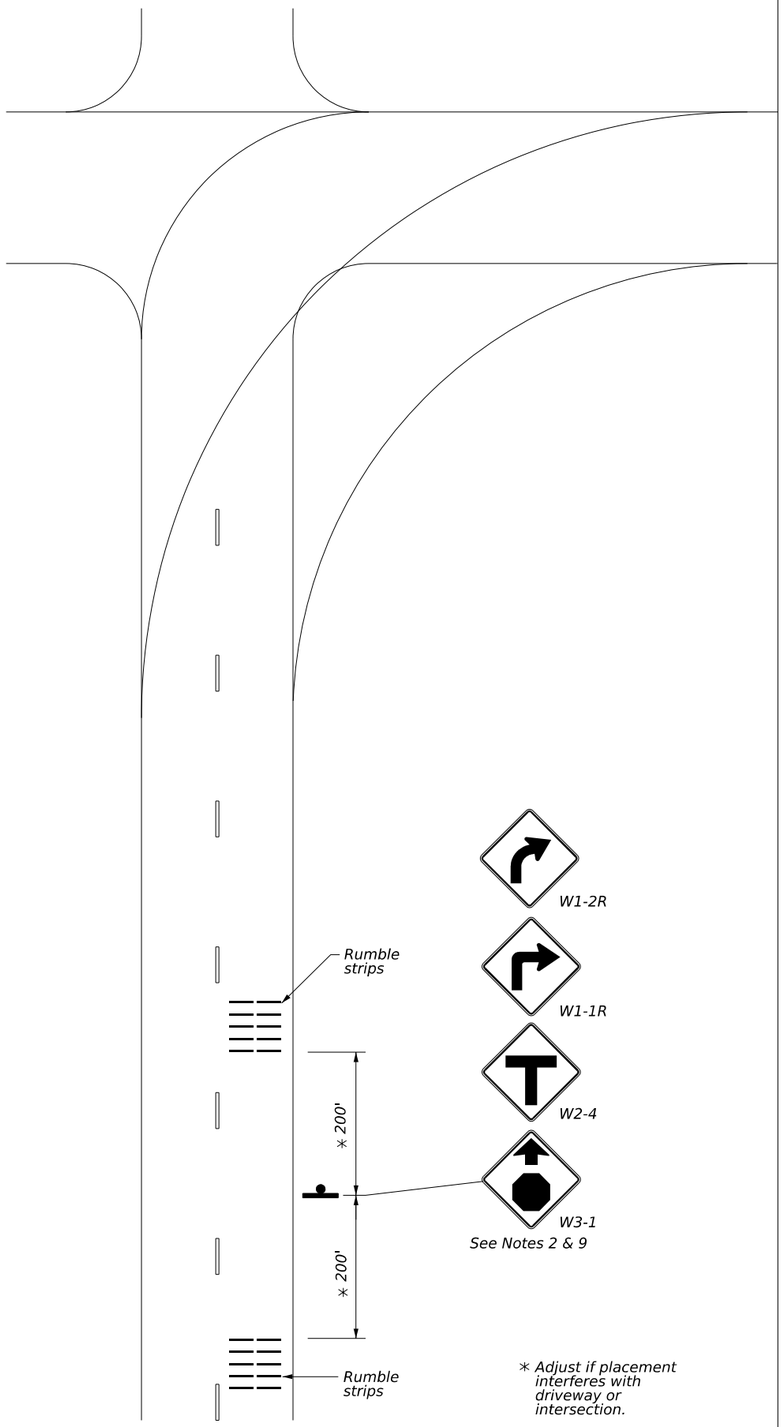
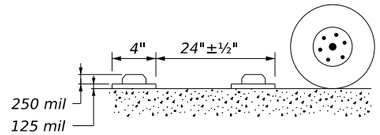
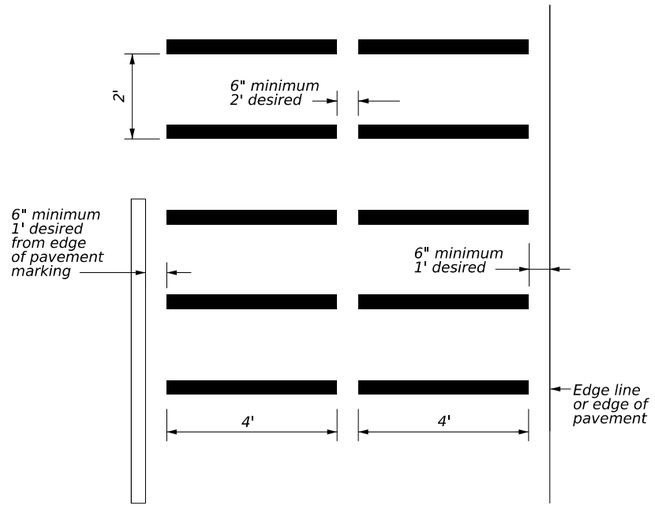
RUMBLE STRIP TYPICAL APPLICATION





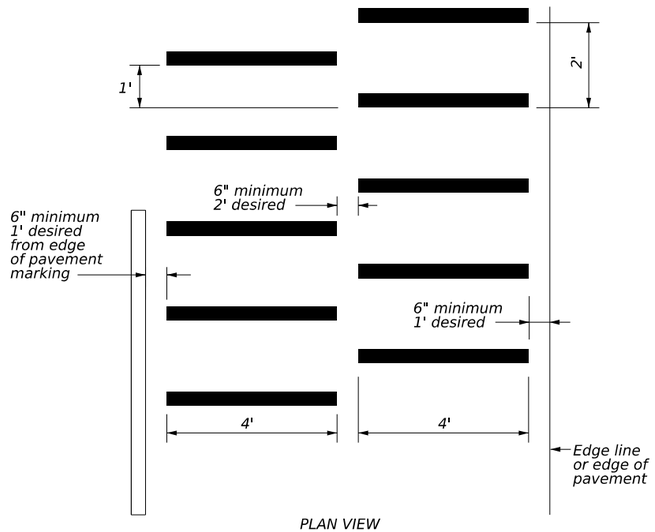
PROFILE VIEW

RUMBLE STRIP STANDARD PATTERN



PLAN VIEW

RUMBLE STRIP ALTERNATIVE PATTERN



PLAN VIEW

GENERAL NOTES

1. *Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.*
2. *When used, the rumble strips shall be placed 200 feet upstream and downstream of the warning sign.*
3. *The use of rumble strips should not be widespread or indiscriminate.*
4. *Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.*
5. *Please reference the TxDOT Material Producers List for approved rumble strips (transverse): http://www.txdot.gov/*
6. *Consideration should be given to noise levels when in-lane or transverse rumble strips are to be installed near residential areas, schools, churches, etc.*
7. *The RUMBLE STRIPS AHEAD (W17-2T) sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the Guidelines for Advance Placement of Warning Signs table of the Texas Manual on Uniform Traffic Control Devices.*

W17-2T

8. *Consideration shall be given to bicyclists. See RS(6).*
9. *Other signs can be used as conditions warrant.*

Texas Department of Transportation

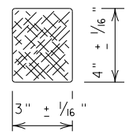
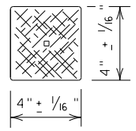
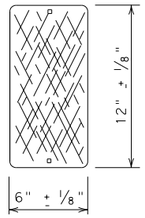
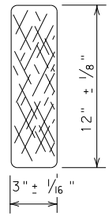
Traffic Safety Division Standard

TRANSVERSE OR IN-LANE RUMBLE STRIPS

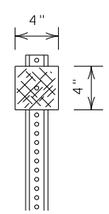
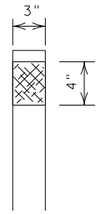
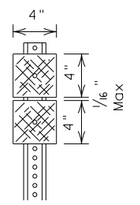
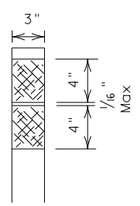
RS(5)-23

FILE: rs(5)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-06 1-12 2-10 10-13	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		182

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

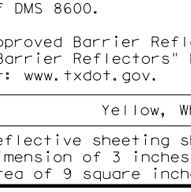
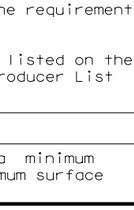
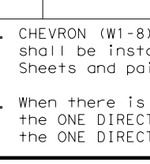
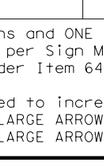
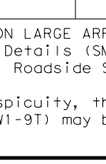
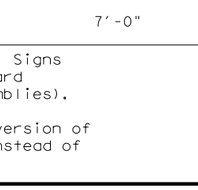
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

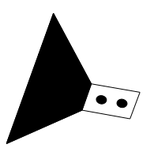
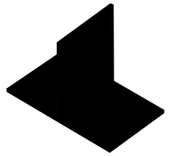
DIRECTION
- If Required
- BI = Bi-Directional

OBJECT MARKERS

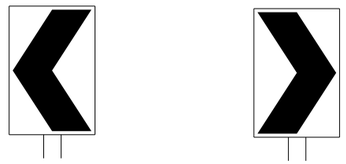
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

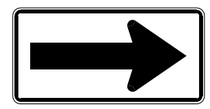
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BRY	ROBERTSON		183

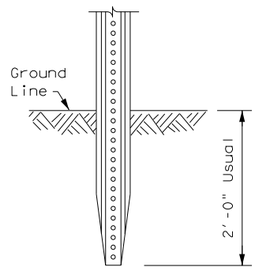
20A

DATE: 5/25/2023 4:36:13 PM
FILE: c:\arkins\appdata\bentley\workspaces\dms21574\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

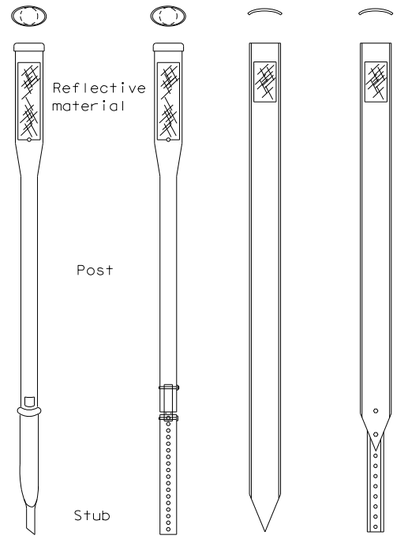


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

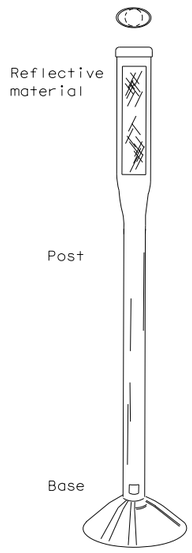
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



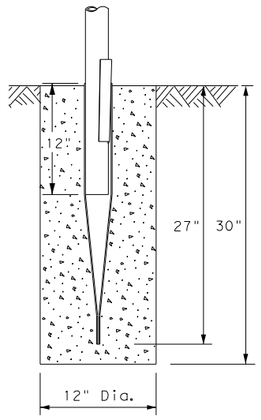
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

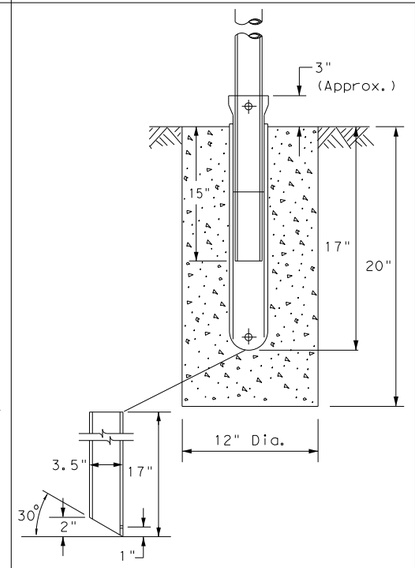
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

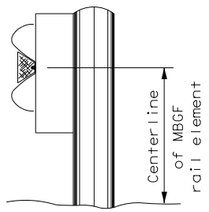
NOTE

1. Install per manufacturer's recommendations.

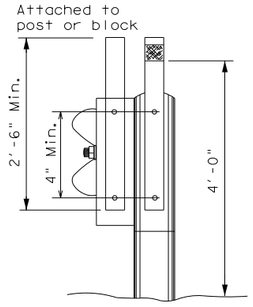
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

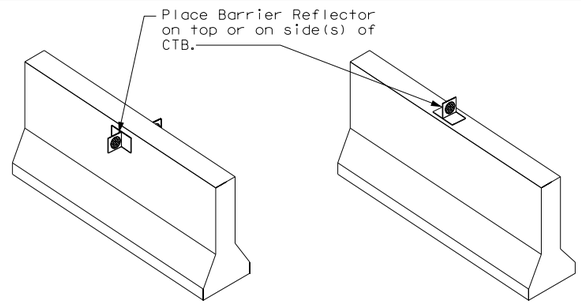
GF1



GF2



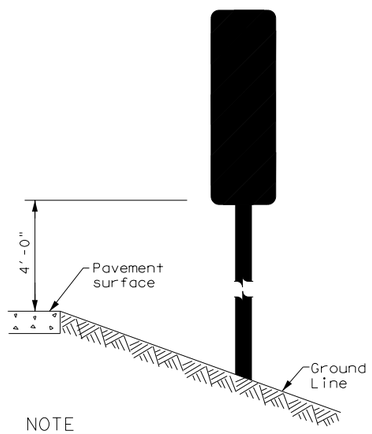
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

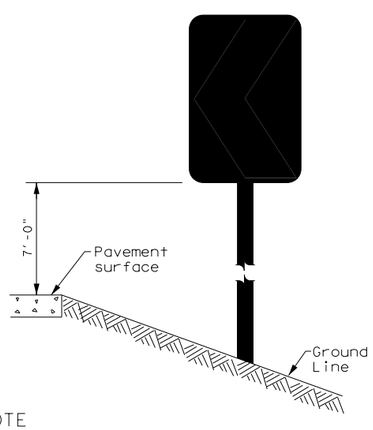
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

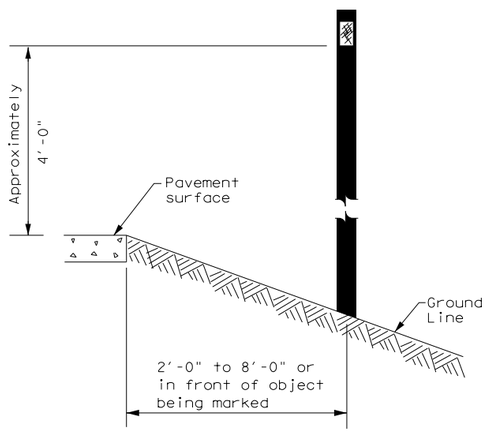
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BRY	ROBERTSON		184

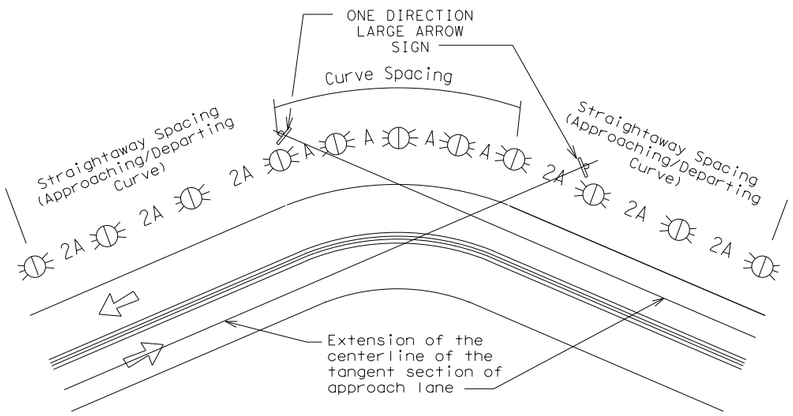
20B

DATE: 5/25/2023 4:36:18 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms21574\dom2-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

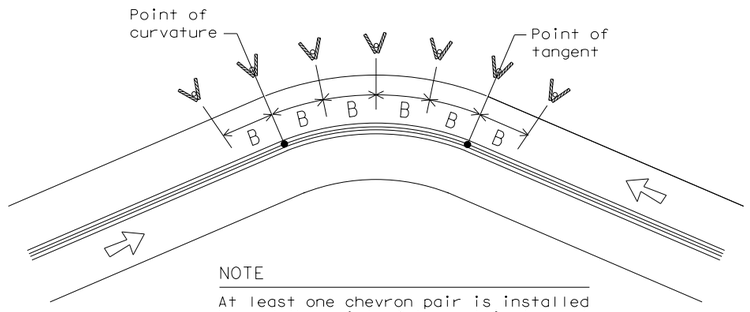
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	BRY	ROBERTSON		185

20C

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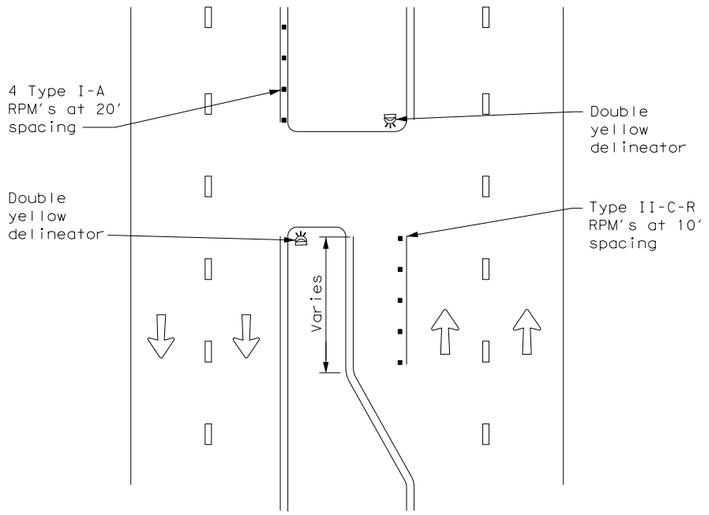
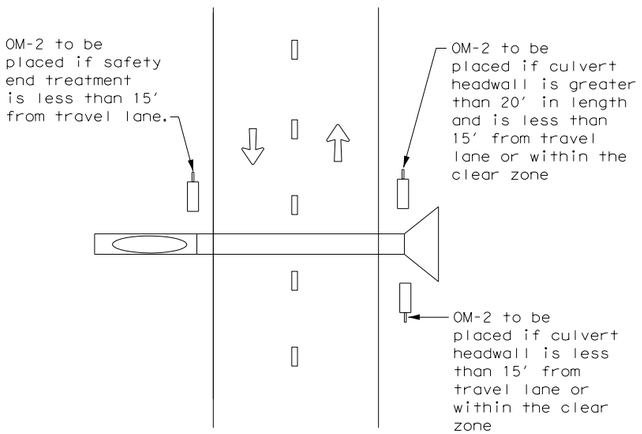
CROSSOVERS



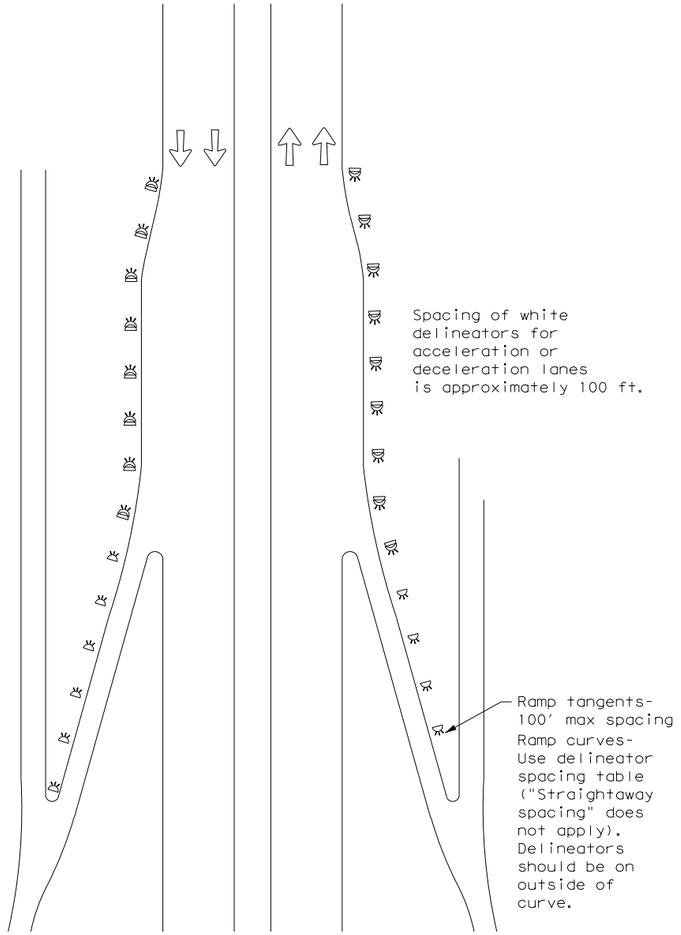
DETAIL 1

FOR CULVERTS WITH MBGF



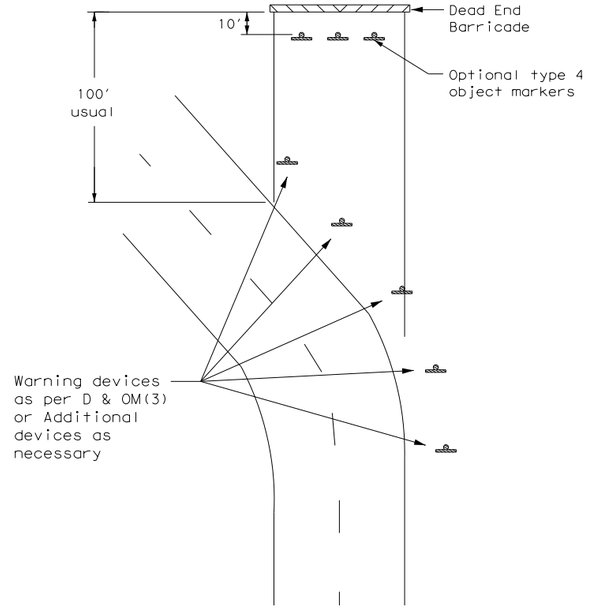
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



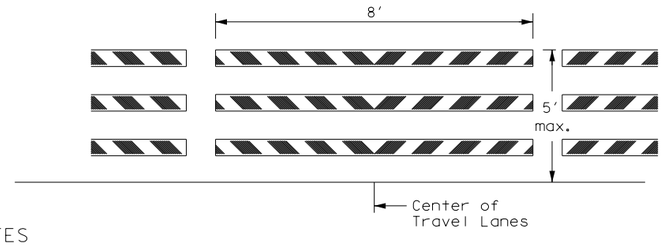
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
3-15 7-20	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		186

20D

DATE: 5/25/2023 4:36:27 PM
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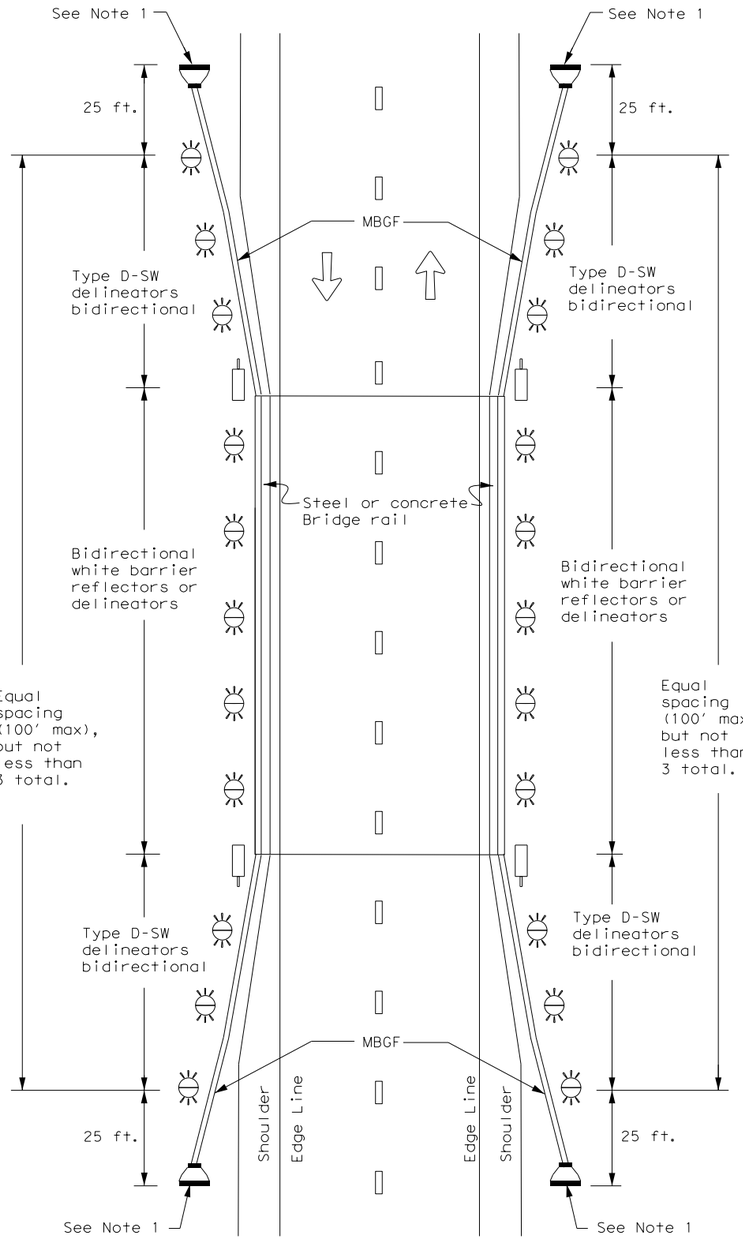
DATE: 5/25/2023 4:36:32 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms21574\dom5-20.dgn

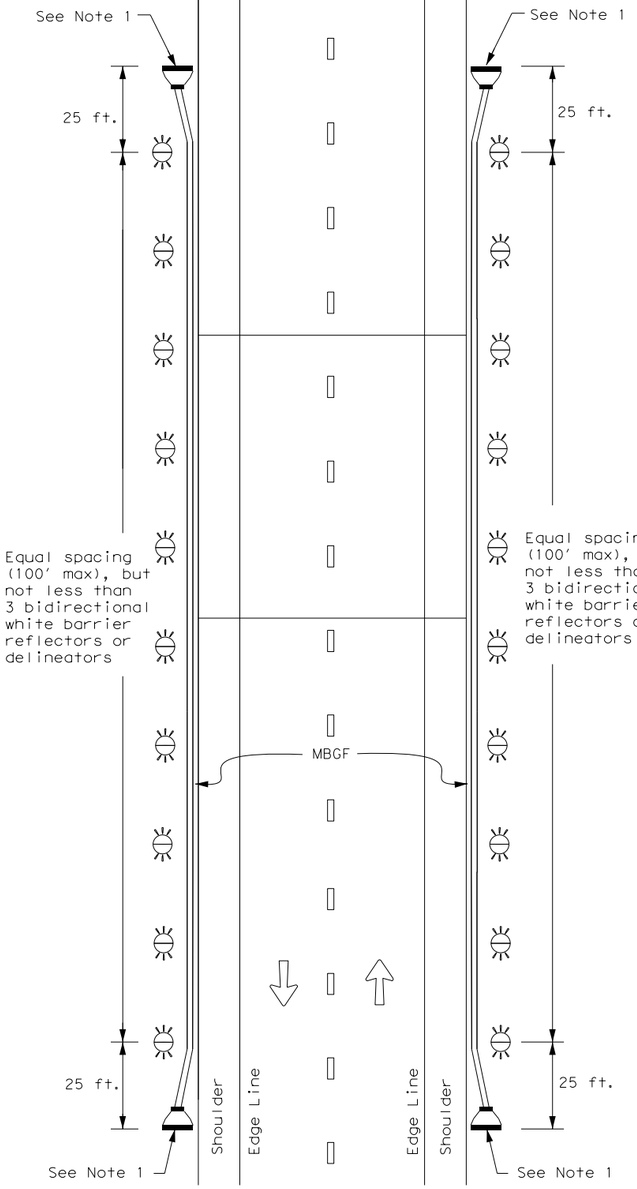
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

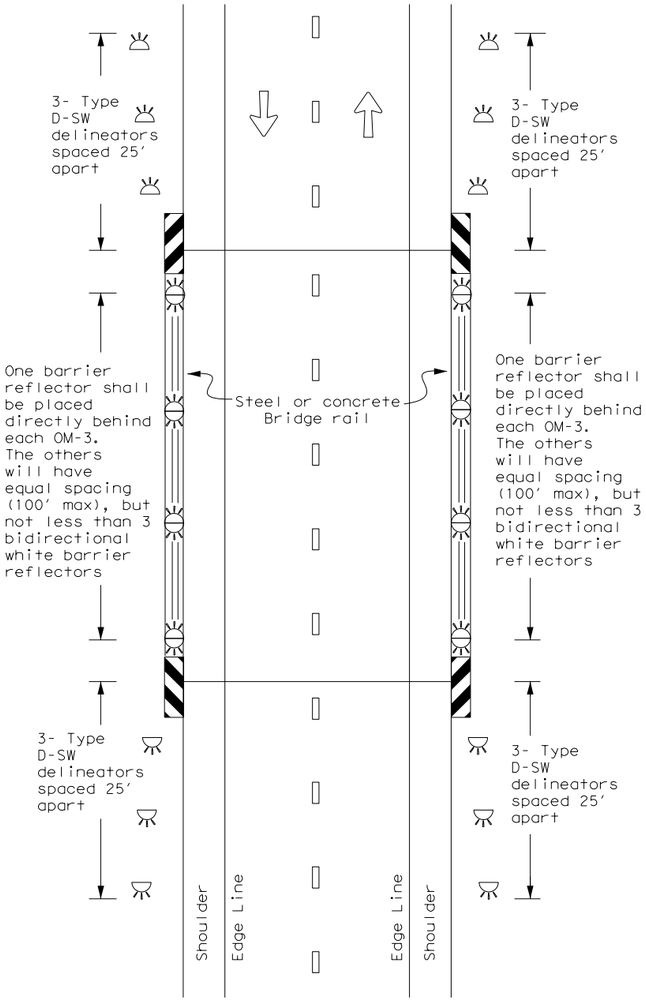
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
7-20	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		187

20E

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

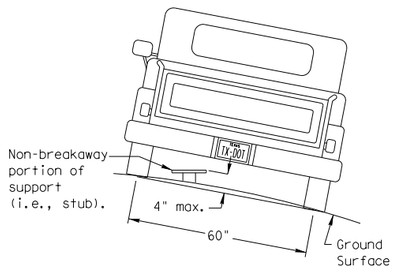
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

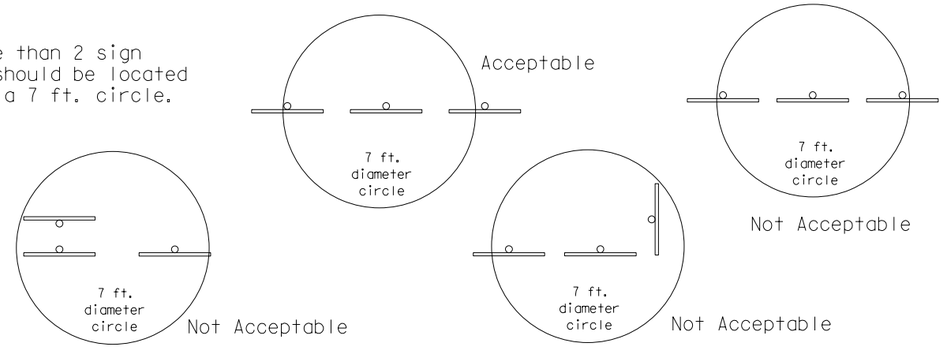
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



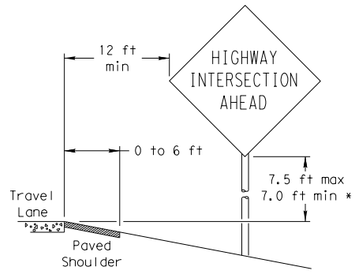
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



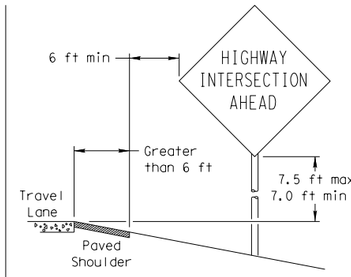
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

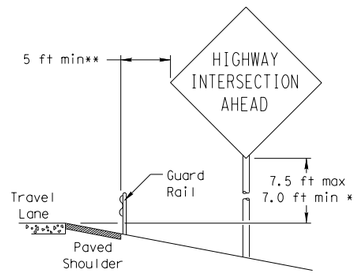
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



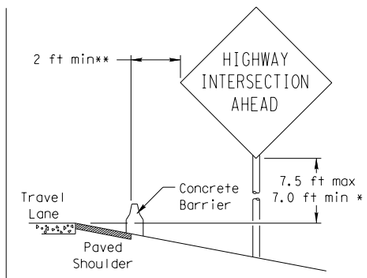
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



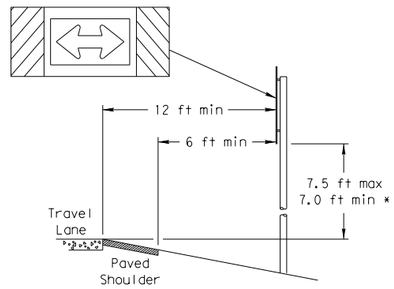
BEHIND GUARDRAIL



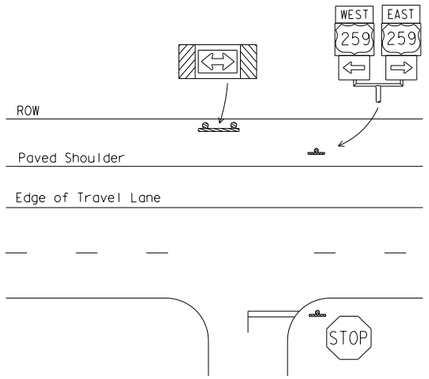
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

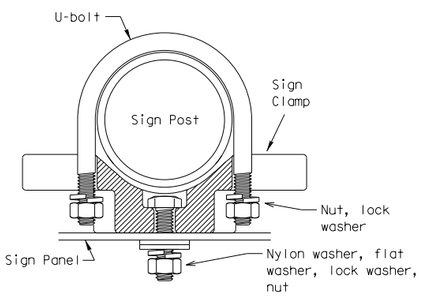
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

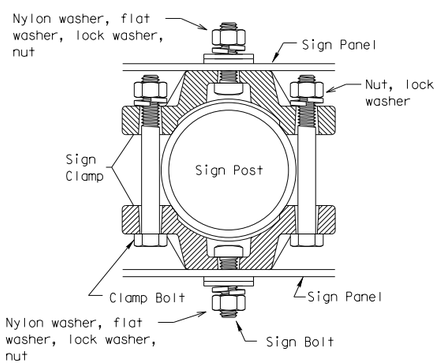


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

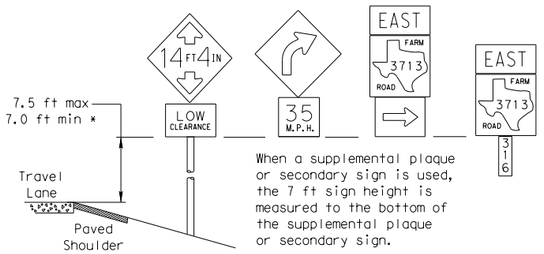
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



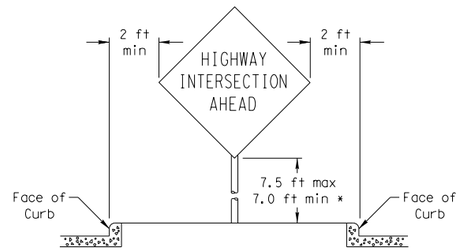
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



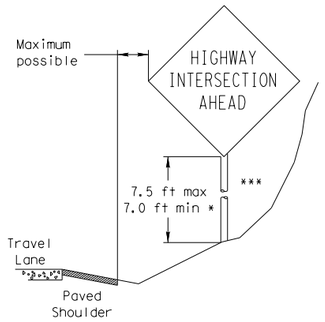
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		188

26A

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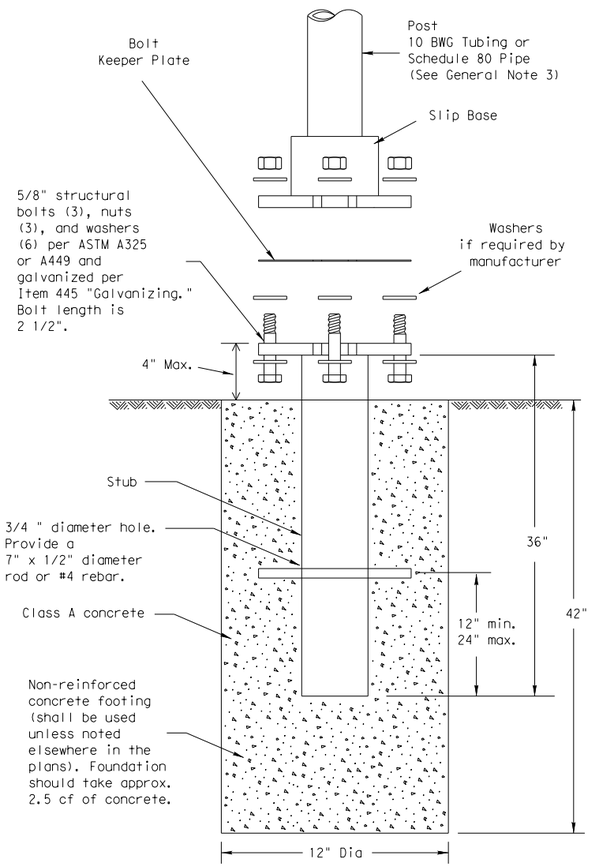
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

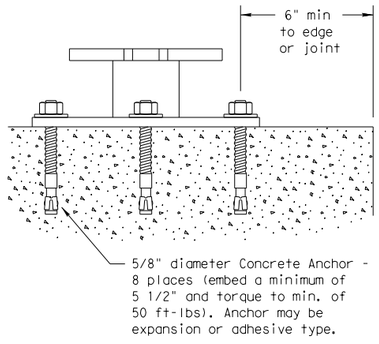
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937

DIST	COUNTY	SHEET NO.
BRY	ROBERTSON	189

26B

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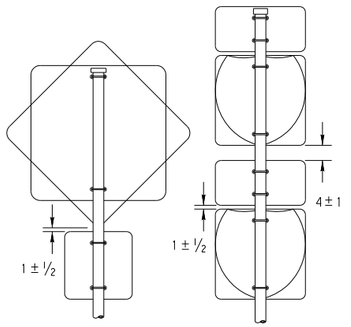
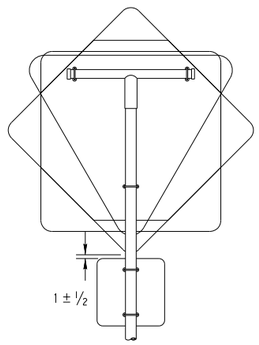


SM RD SGN ASSM TY XXXXX(1)XX(P)



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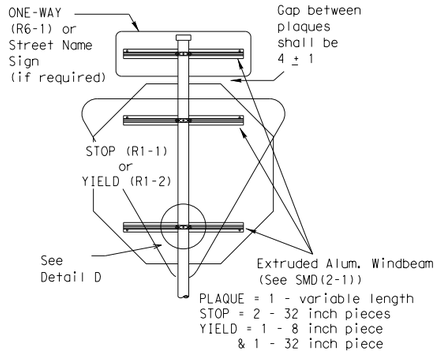
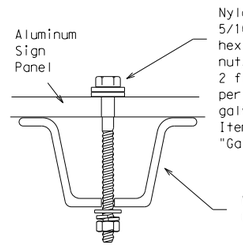
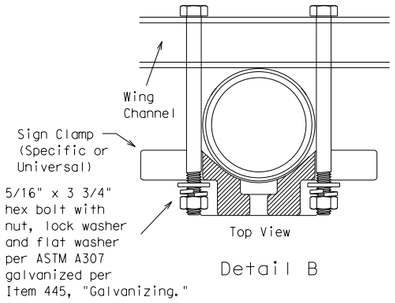


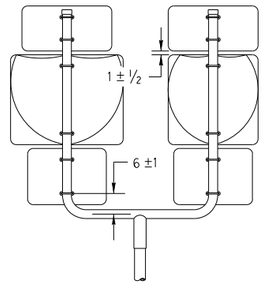
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



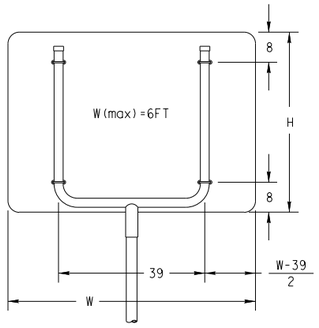
Detail A



Detail B



SM RD SGN ASSM TY XXXXX(1)XX(U)



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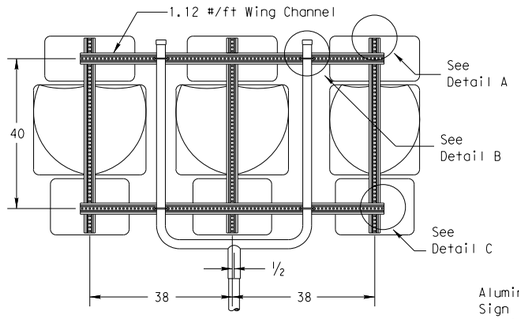
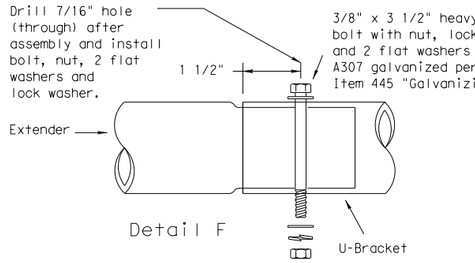
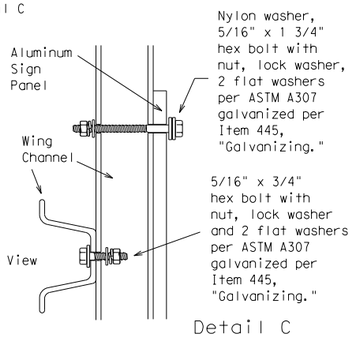


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

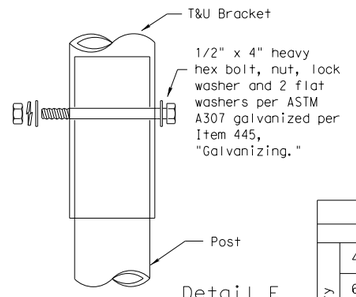


Detail F

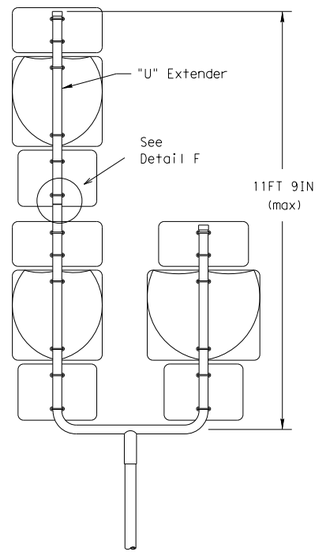
Splices shall only be allowed behind the sign substrate.



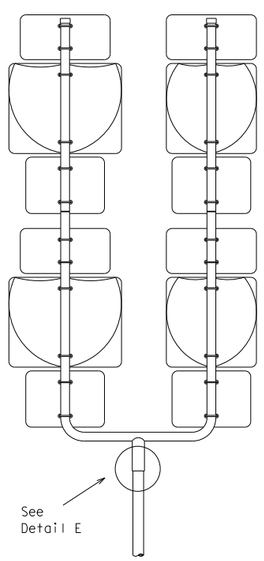
Detail C



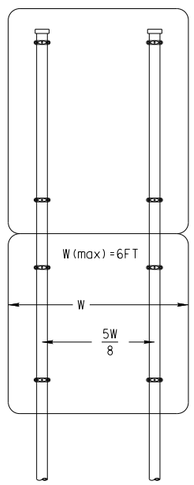
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

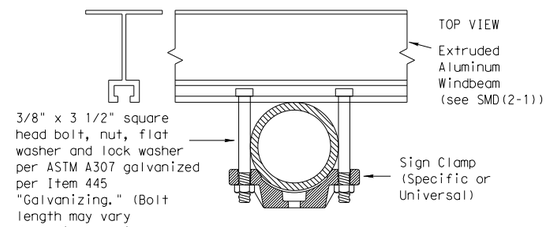


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

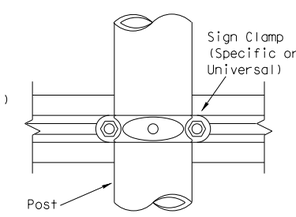


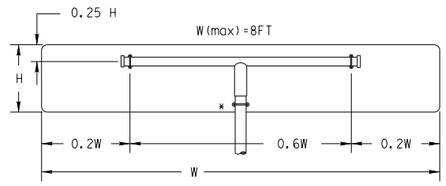
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

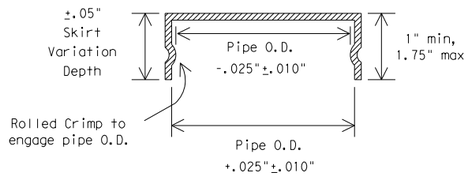




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		190

26C

DATE: 5/25/2023 4:36:46 PM
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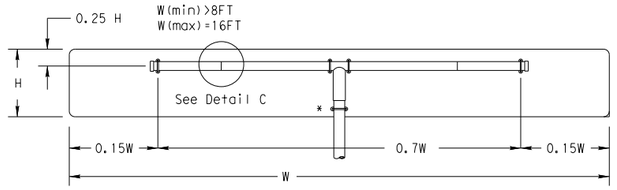
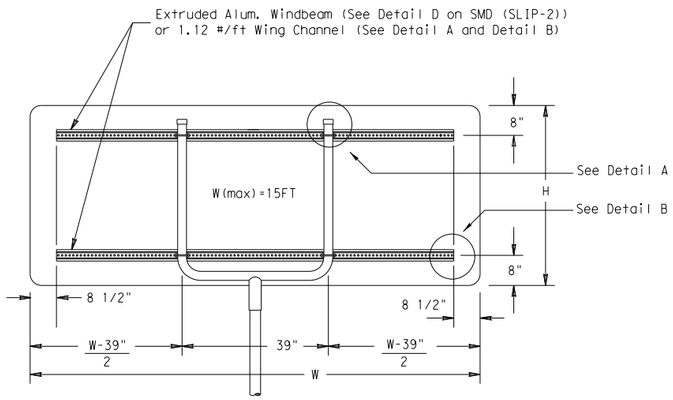
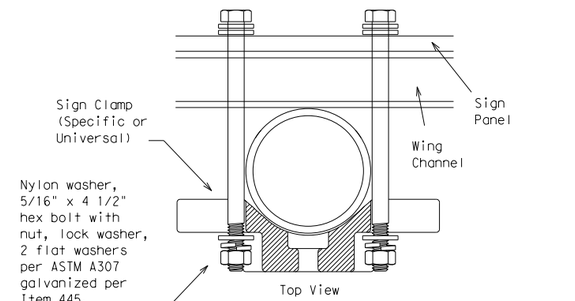


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

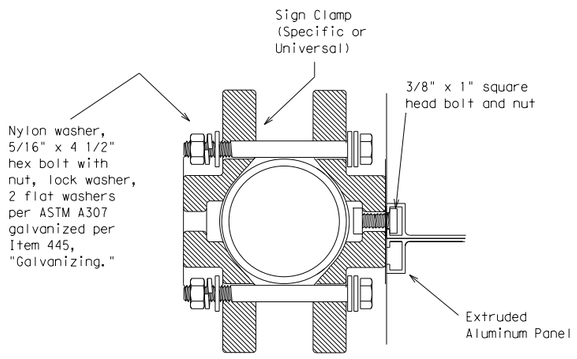
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

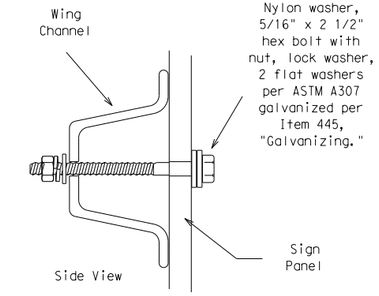


Detail A

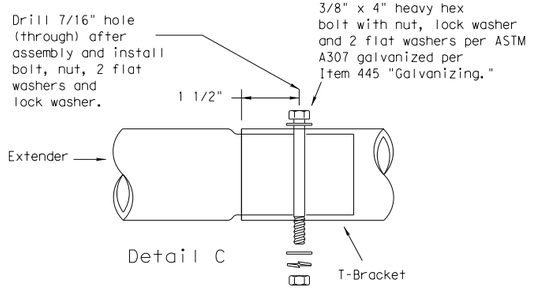


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

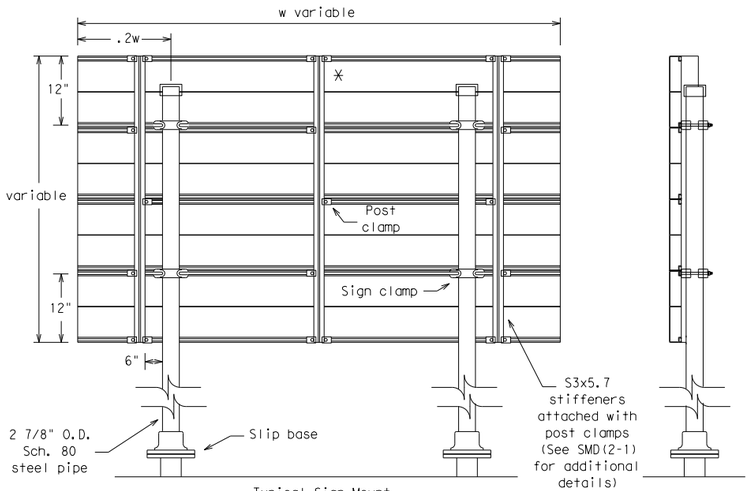


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

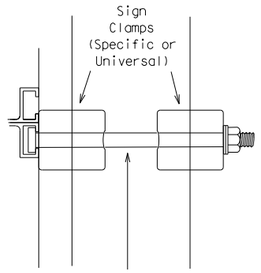


Typical Sign Mount

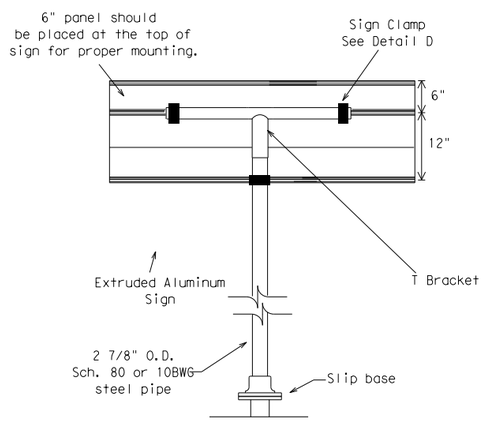
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

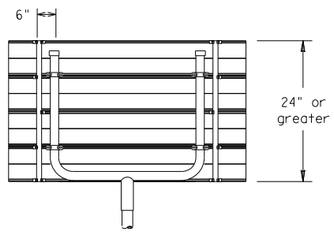
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

9-08

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

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937

DIST	COUNTY	SHEET NO.
BRY	ROBERTSON	191

26D

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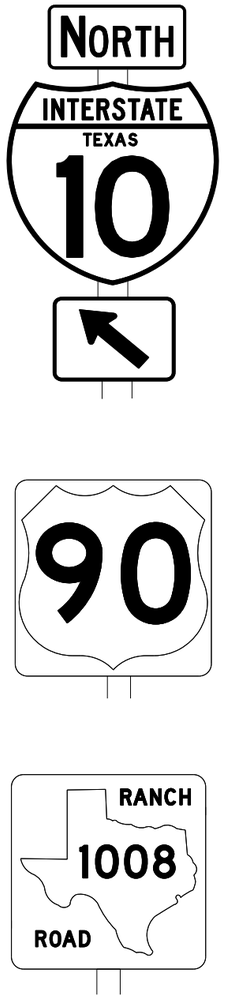
DATE: 5/25/2023 4:36:56 PM
FILE: c:\arkins\appdata\bentley\workspaces\dms21574\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

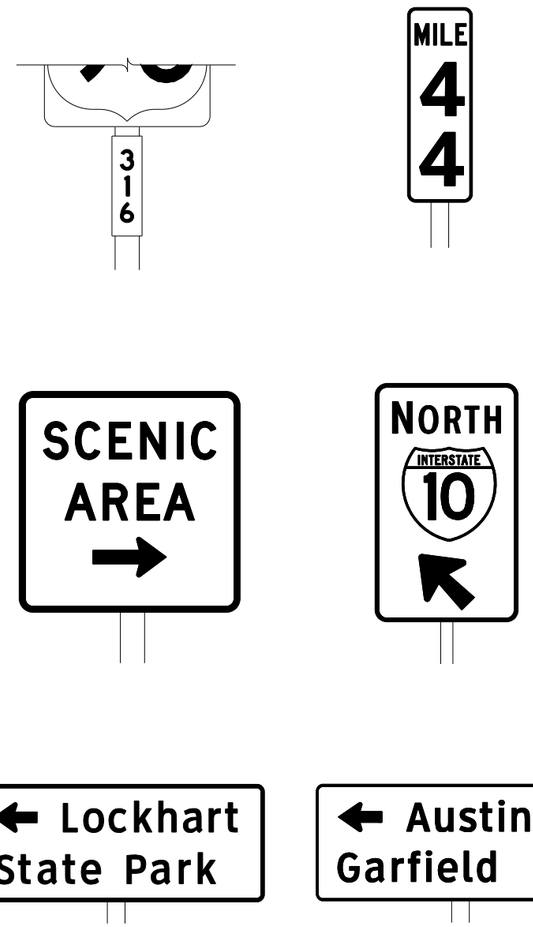
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

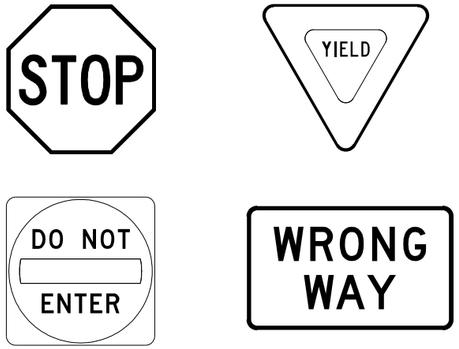
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BRY	ROBERTSON		192

DATE: 5/25/2023 4:37:00 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms21574\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

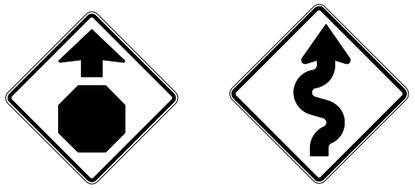
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		193

DATE: 5/25/2023 4:37:04 PM
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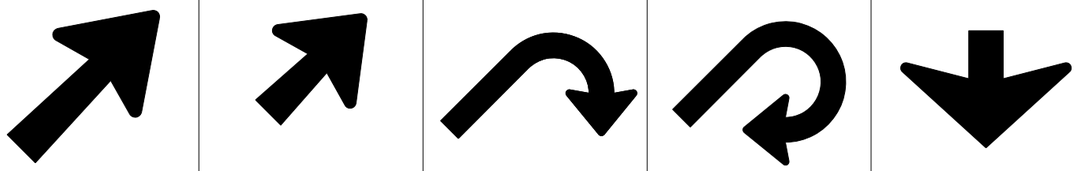
ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

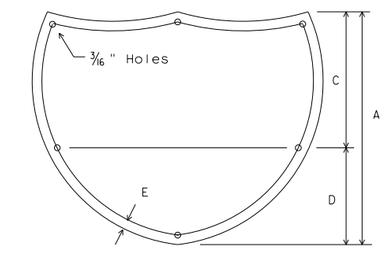
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

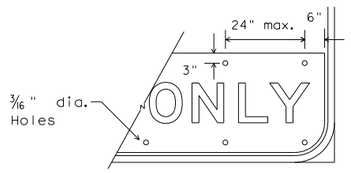
http://www.txdot.gov/

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

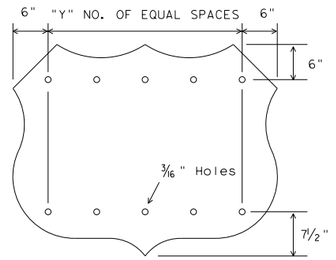


INTERSTATE ROUTE MARKERS

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

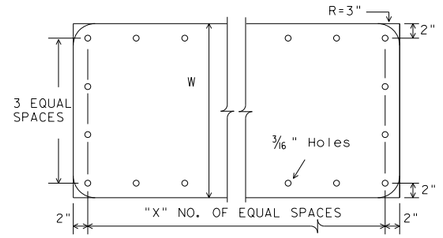


EXIT ONLY PANEL



U.S. ROUTE MARKERS

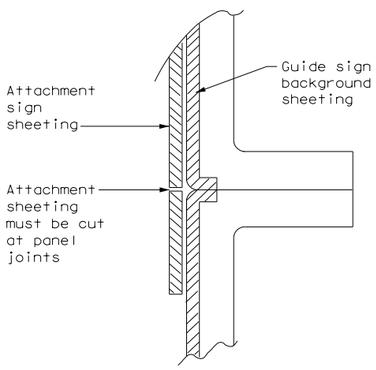
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

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

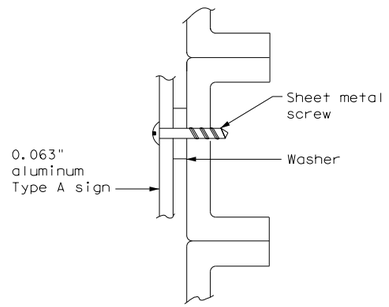
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



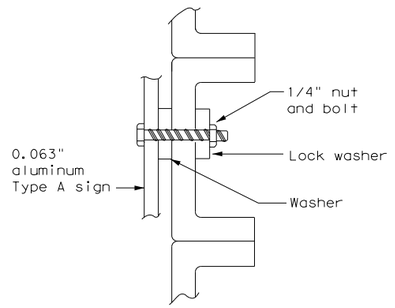
DIRECT APPLIED ATTACHMENT

NOTE:

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



SCREW ATTACHMENT



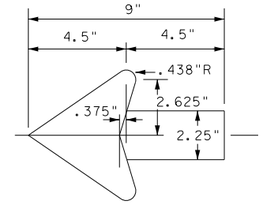
NUT/BOLT ATTACHMENT

NOTE:

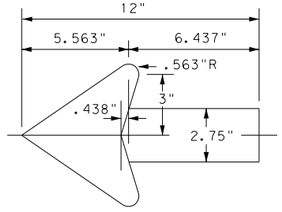
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

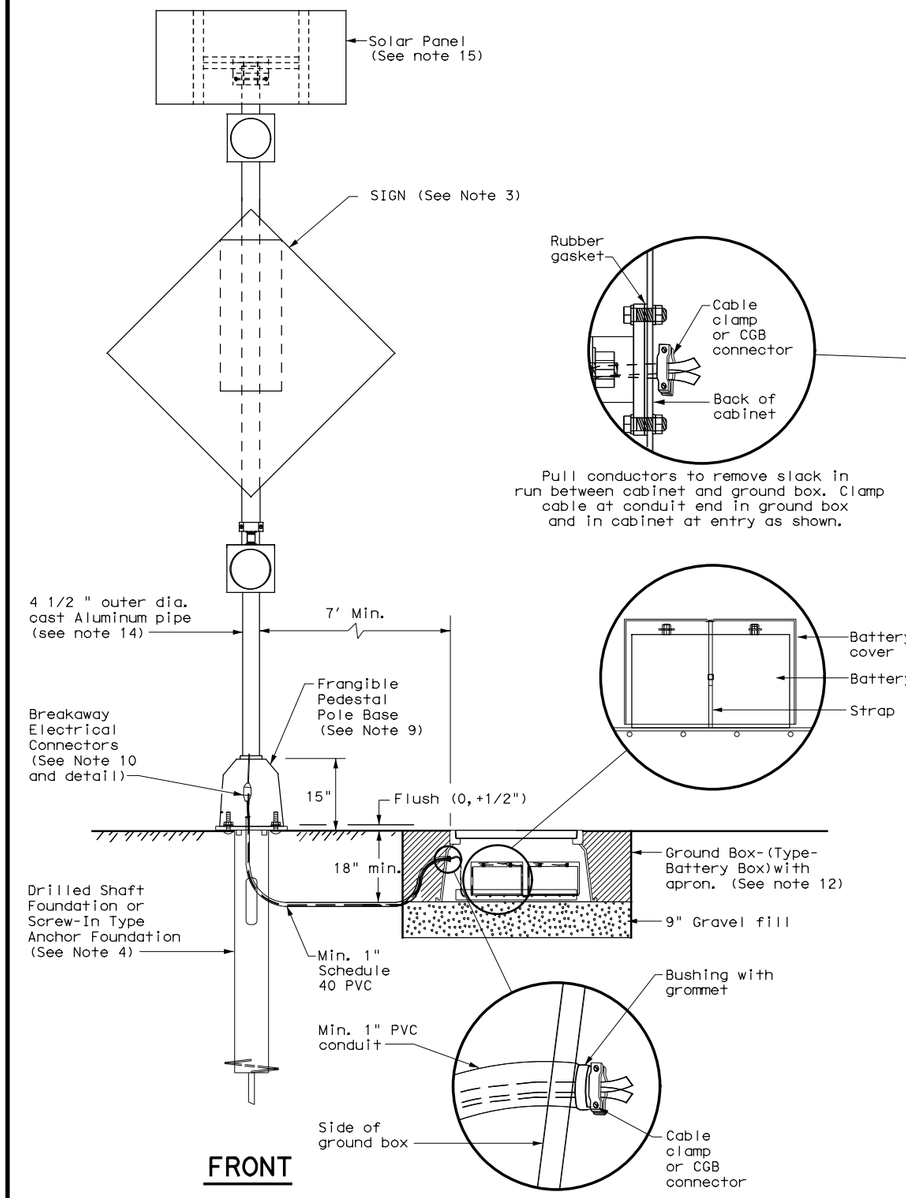
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BRY	ROBERTSON		194

5

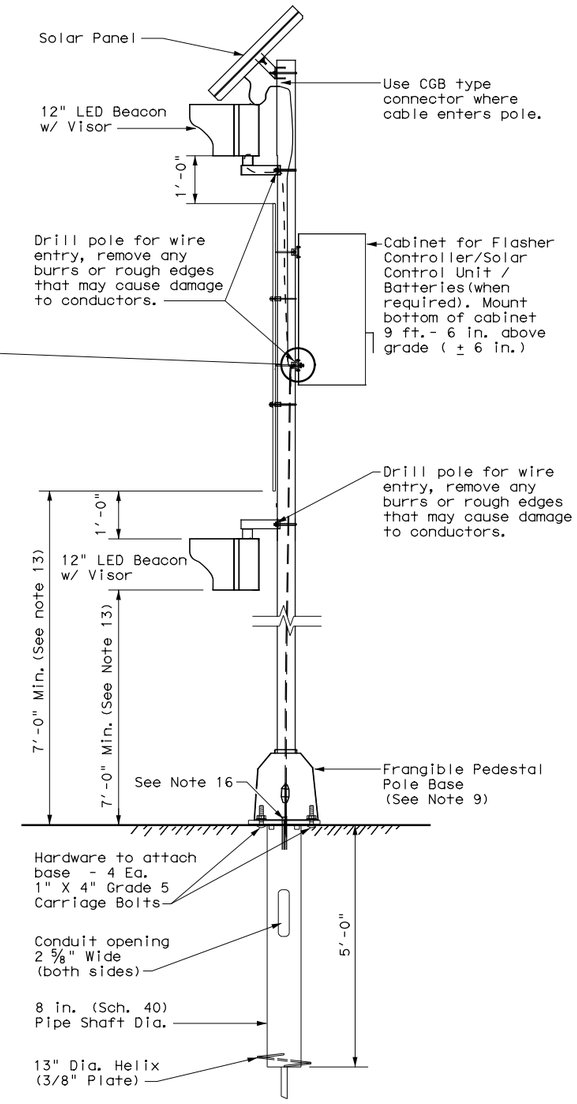
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.

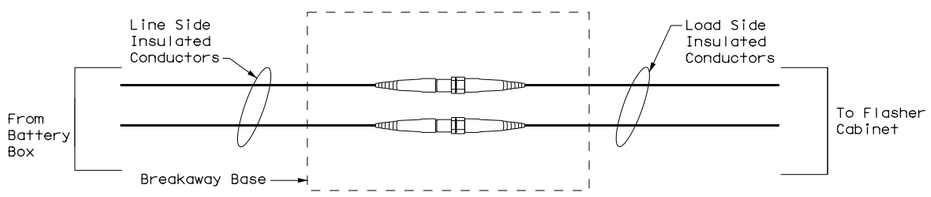


FRONT

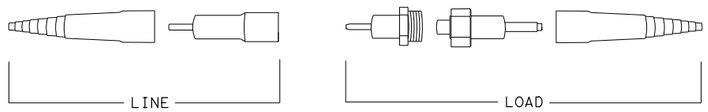
Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

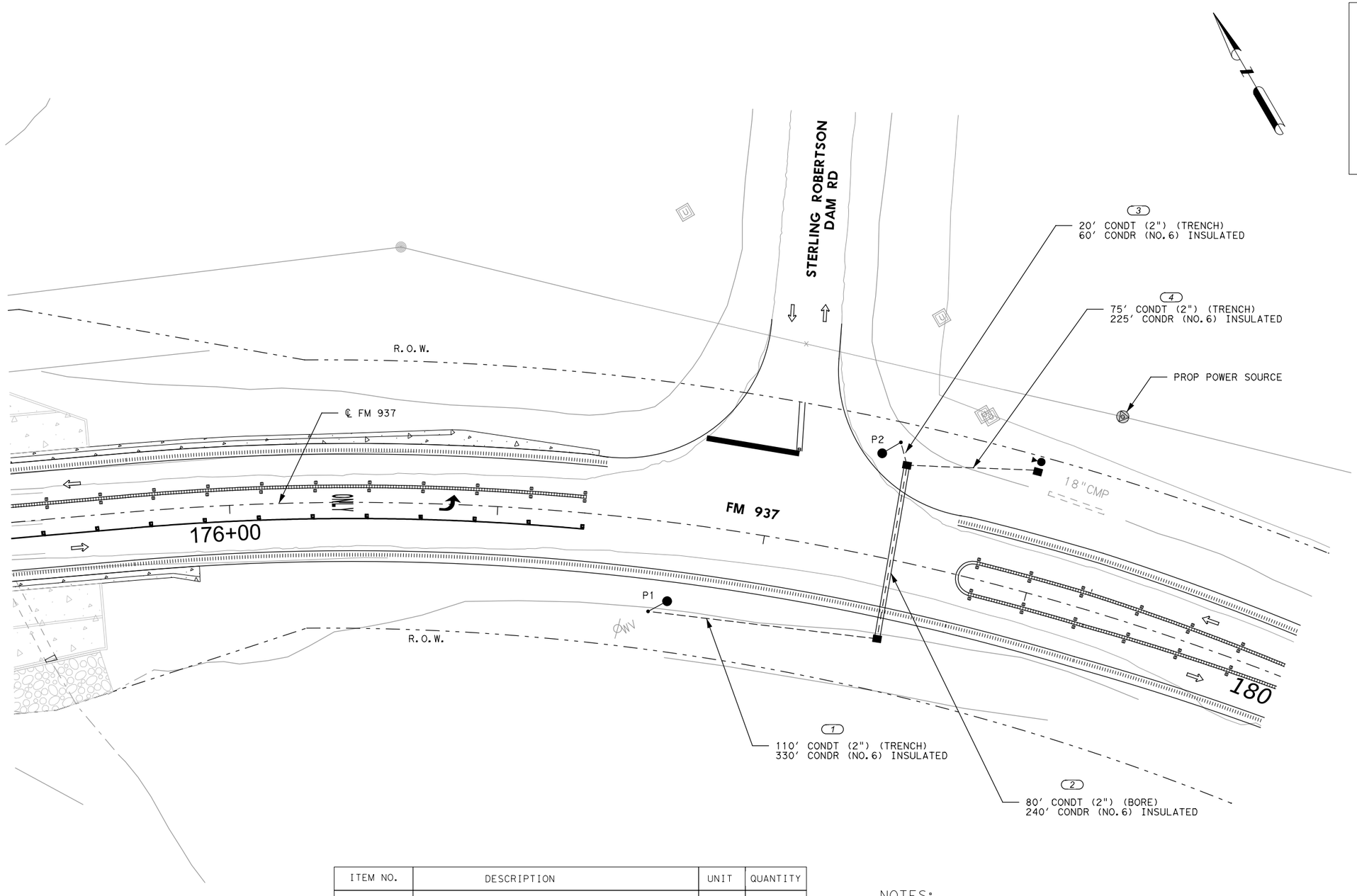
SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
12-04 3-13	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		195

75A

DATE: 5/25/2023 4:37:09 PM
FILE: c:\arkins\appdata\bentley\workspaces\dms21574\spb1-13.dgn



ILLUMINATION POLE NO.	P1	P2
STATION	177+58	178+46
OFFSET	34' RT	44' LT

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0416 6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	20
0610 6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	2
0618 6023	CONDT (PVC) (SCH 40) (2")	LF	205
0618 6024	CONDT (PVC) (SCH 40) (2")(BORE)	LF	80
0620 6010	ELEC CONDR (NO.6) INSULATED	LF	855
0624 6010	GROUND BOX TY D (162922) W/APRON	EA	3
0628 6145	ELC SRV TY D 120/240 060 (NS) SS (E) SP (O)	EA	1

NOTES:

1. ALL PROPOSED ILLUMINATION ASSEMBLIES SHALL BE TY SA 40T-8 250W EQ LED.
2. PROPOSED ASSEMBLIES ARE SHOWN AT APPROXIMATE LOCATIONS. FINAL LOCATION TO BE DETERMINED BY FIELD ENGINEER.
3. VERIFY THE LOCATIONS OF ALL UTILITIES AND UNDERGROUND STRUCTURES BEFORE ANY EXCAVATIONS OR BORES.
4. COORDINATE WITH NAVASOTA VALLEY ELECTRIC COOPERATIVE AT 800-443-9462 TO VERIFY THE PROPOSED POWER SOURCE.
5. PERFORM ALL ELECTRICAL WORKS FOLLOWING THE LATEST NEC CODES.
6. REFER TO SHEET 2 OF 2 FOR ELECTRICAL DETAILS.

0 20 40
SCALE: 1" = 40'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

PROPOSED ILLUMINATION LAYOUT
FM 937 @ STERLING ROBERTSON DAM RD

SHEET 01 OF 02

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		196

DATE: 5/25/2023 4:38:02 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms13478\FM937_MDF_LUM_SHEET_01.dgn

ELEC. SERVICE NO.	628-6145	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	LIGHTING CONTRACTOR AMPS	PANDLBD. / LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
FM 937 @ STERLING ROBERTSON DAM RD	ELC SRV TY D 120/240 060 (NS)SS(E)SP(O)	2"	3/#6	N/A	2P/60	2P/60	N/A	SAFETY LIGHT	2P/15	1.42	0.3

1. THE 240V AC BRANCH CIRCUITS SHALL OPERATE THROUGH THE TWO-POLE LIGHTING CONTRACTOR AND THE 911 ADDRESS SHALL BE MARKED ON THE INSIDE OF THE ELECTRICAL SERVICE DOOR.
2. VERIFY WITH NAVASOTA VALLEY ELECTRIC COOPERATIVE THE LOCATION OF THE SERVICE, THE TRANSFORMAR, ANY INSTALLATION REQUIREMENTS, AND OBTAIN THE APPROPRIATE METER ENCLOSURE TO INSTALL ON THE NEW SERVICE POLE.
3. PERFORM ALL ELECTRICAL WORKS FOLLOWING THE LATEST NEC CODES.

CONDUIT TABLE					
RUN NO	CONDUIT LENGTH	# 6 COND (INSULATED)	CONDUIT SIZE	CONDUIT SCHEDULE	BORE/TRENCH
1	110	3	2 INCH	40	T
2	80	3	2 INCH	40	B
3	20	3	2 INCH	40	T
4	75	3	2 INCH	40	T
TOTAL		855			T:205/B:80

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

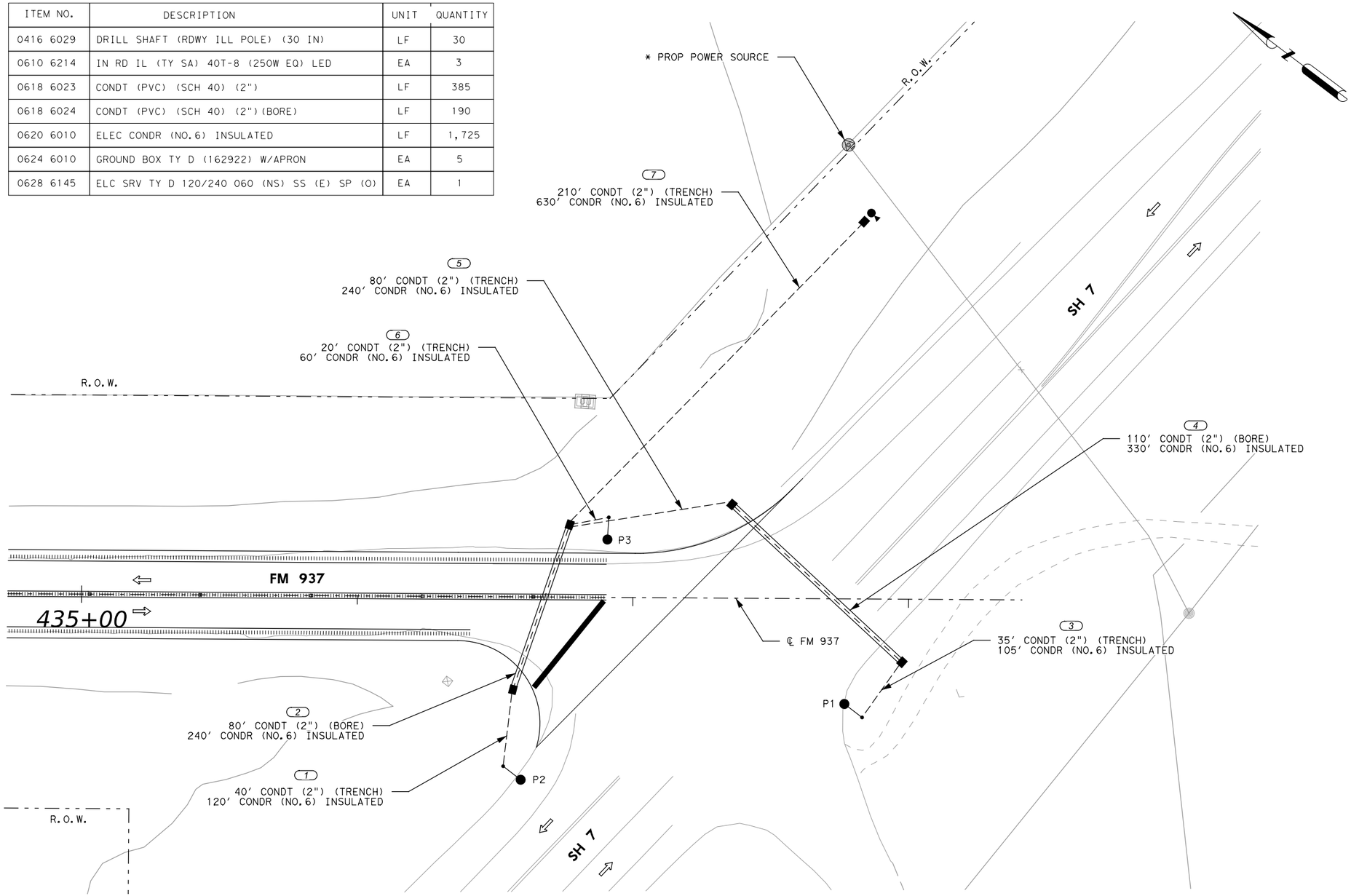
PROPOSED ILLUMINATION ELECTRICAL DETAILS

SHEET 02 OF 02

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		197

DATE: 5/25/2023 4:38:07 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms13478\FM937_MDF_LUM_SHEET_01 (ELECTRICAL DETAILS).dgn

ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0416 6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	30
0610 6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	3
0618 6023	CONDT (PVC) (SCH 40) (2")	LF	385
0618 6024	CONDT (PVC) (SCH 40) (2")(BORE)	LF	190
0620 6010	ELEC CONDR (NO.6) INSULATED	LF	1,725
0624 6010	GROUND BOX TY D (162922) W/APRON	EA	5
0628 6145	ELC SRV TY D 120/240 060 (NS) SS (E) SP (O)	EA	1



LEGEND

- PROP ILLUMINATION ASSEMBLY
- PROP SERVICE METER
- PROP GROUND BOX
- PROP CONDUIT (BORE)
- PROP CONDUIT (TRENCH)
- (##) PROP RUN NUMBER
- DIRECTION OF TRAFFIC

ILLUMINATION POLE NO.	P1	P2	P3
STATION	437+83	436+53	436+91
OFFSET	43' RT	62' RT	29' LT

* THE LOCATION OF PROPOSED POWER SOURCE IS APPROXIMATE.

NOTES:

1. ALL PROPOSED ILLUMINATION ASSEMBLIES SHALL BE TY SA 40T-8 250W EQ LED.
2. PROPOSED ASSEMBLIES ARE SHOWN AT APPROXIMATE LOCATIONS. FINAL LOCATION TO BE DETERMINED BY FIELD ENGINEER.
3. VERIFY THE LOCATIONS OF ALL UTILITIES AND UNDERGROUND STRUCTURES BEFORE ANY EXCAVATIONS OR BORES.
4. COORDINATE WITH NAVASOTA VALLEY ELECTRIC COOPERATIVE AT 800-443-9462 TO VERIFY THE PROPOSED POWER SOURCE.
5. PERFORM ALL ELECTRICAL WORKS FOLLOWING THE LATEST NEC CODES.
6. REFER TO SHEET 2 OF 2 FOR ELECTRICAL DETAILS.

0 20 40

SCALE: 1" = 40'

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

infraTECH
Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

PROPOSED ILLUMINATION LAYOUT
FM 937 @ SH 7

SHEET 01 OF 02

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		198

DATE: 5/25/2023 4:38:14 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms13478\FM937_MDF_LUM_SHEET_02.dgn

ELEC. SERVICE NO.	628-6145	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN CKT. BKR. POLE/AMP	LIGHTING CONTRACTOR AMPS	PANDLBD. / LOADCENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
FM 937 @ SH 7	ELC SRV TY D 120/240 060 (NS)SS(E)SP(O)	2"	3/#6	N/A	2P/60	2P/60	N/A	SAFETY LIGHT	2P/15	2.13	0.5

1. THE 240V AC BRANCH CIRCUITS SHALL OPERATE THROUGH THE TWO-POLE LIGHTING CONTRACTOR AND THE 911 ADDRESS SHALL BE MARKED ON THE INSIDE OF THE ELECTRICAL SERVICE DOOR.
2. VERIFY WITH NAVASOTA VALLEY ELECTRIC COOPERATIVE THE LOCATION OF THE SERVICE, THE TRANSFORMAR, ANY INSTALLATION REQUIREMENTS, AND OBTAIN THE APPROPRIATE METER ENCLOSURE TO INSTALL ON THE NEW SERVICE POLE.
3. PERFORM ALL ELECTRICAL WORKS FOLLOWING THE LATEST NEC CODES.

CONDUIT TABLE					
RUN NO	CONDUIT LENGTH	# 6 COND (INSULATED)	CONDUIT SIZE	CONDUIT SCHEDULE	BORE/TRENCH
1	40	3	2 INCH	40	T
2	80	3	2 INCH	40	B
3	35	3	2 INCH	40	T
4	110	3	2 INCH	40	B
5	80	3	2 INCH	40	T
6	20	3	2 INCH	40	T
7	210	3	2 INCH	40	T
TOTAL		1,725			T:385/B:190

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

Texas Department of Transportation

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Engineers & Innovators, LLC
TBPE REGISTRATION NO. F-18368

FM 937

PROPOSED ILLUMINATION ELECTRICAL DETAILS

SHEET 02 OF 02

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		199

DATE: 5/25/2023 4:38:18 PM
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DATE: 5/25/2023 4:38:23 PM
FILE: c:\atkins\appdata\bentley\workspaces\dms21573\ed1-14.dgn

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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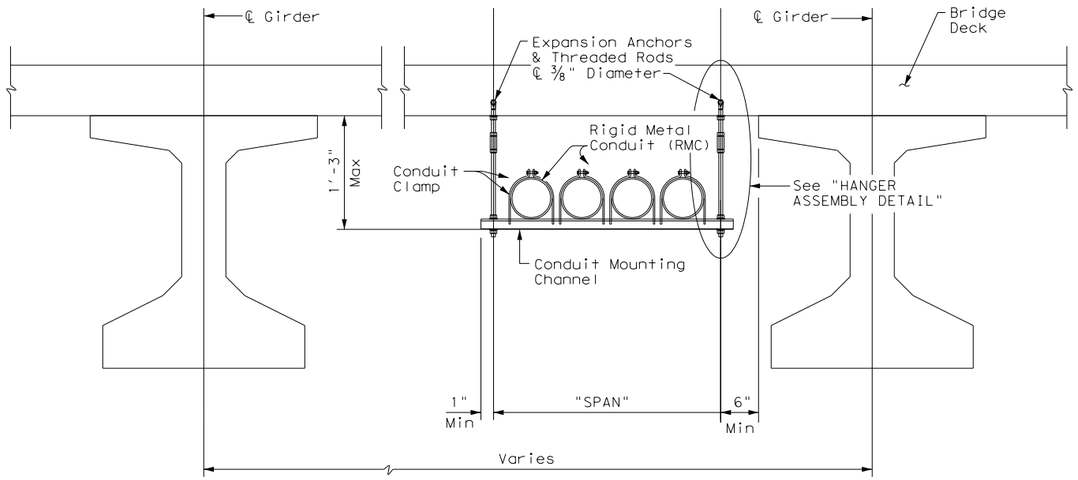
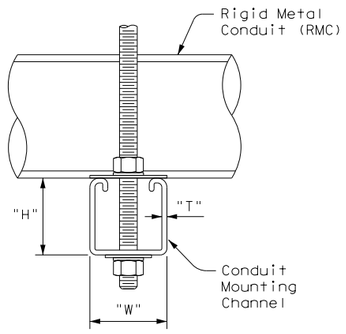
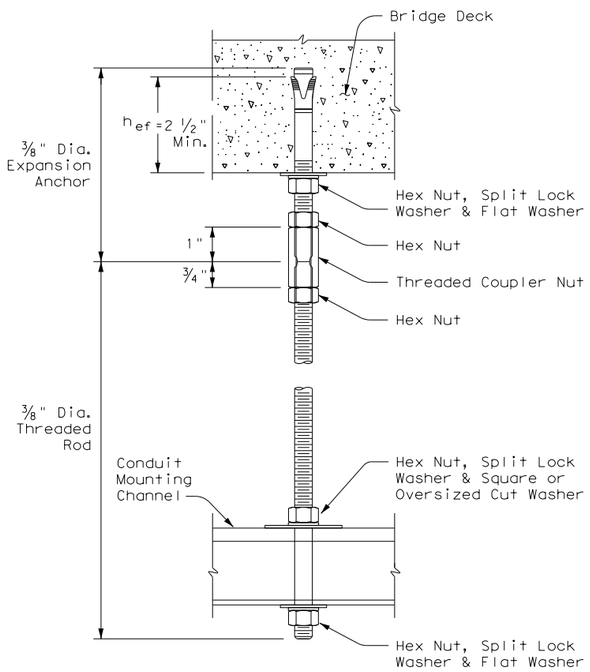


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

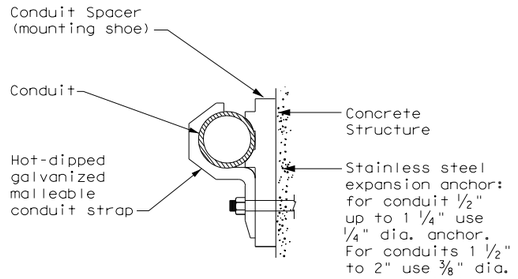
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

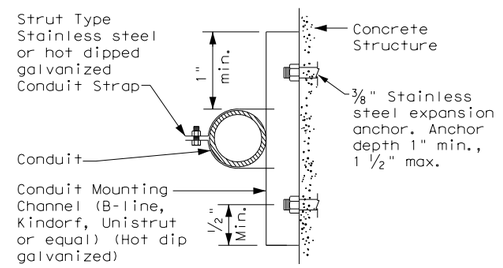




HANGER ASSEMBLY DETAIL

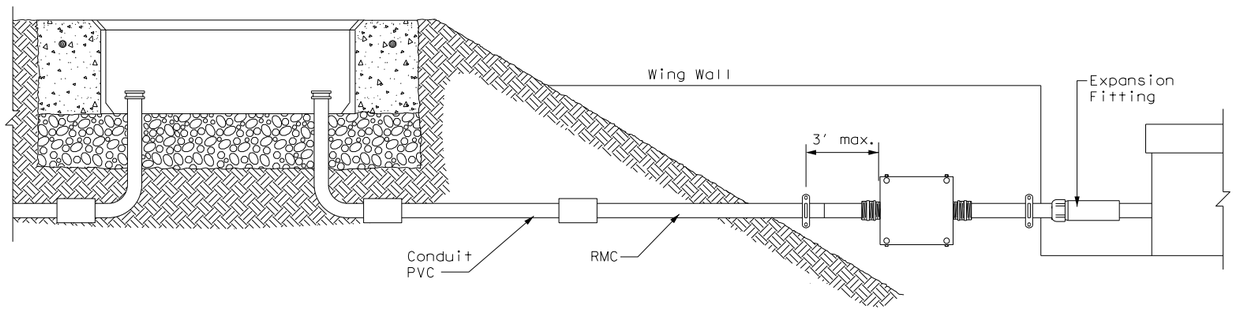
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

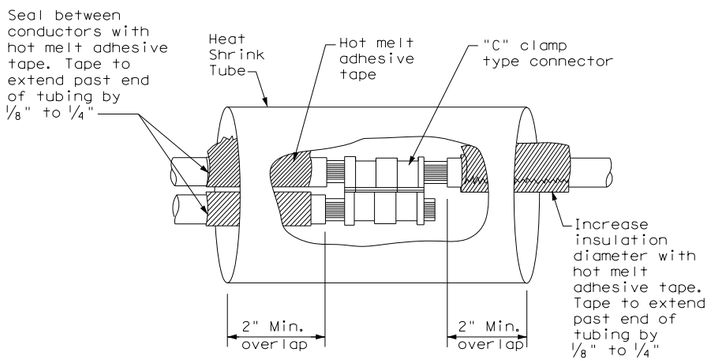
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

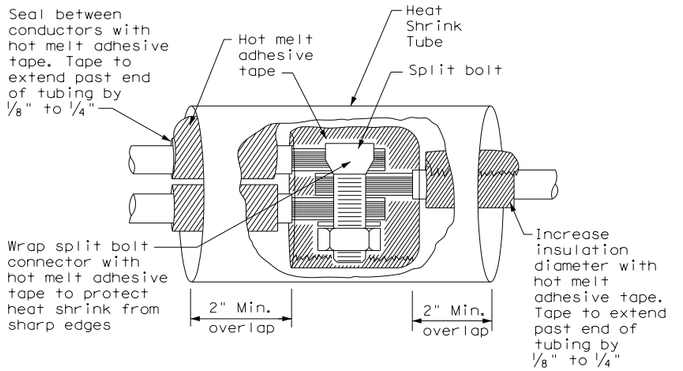
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

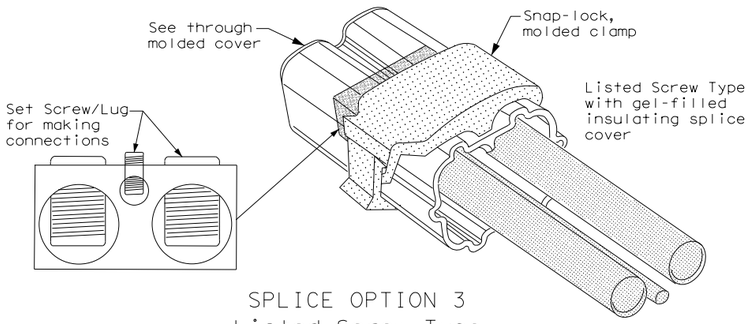
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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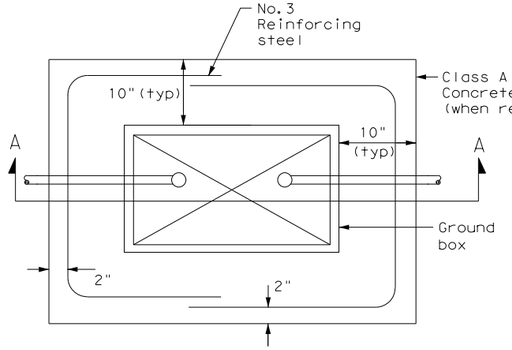
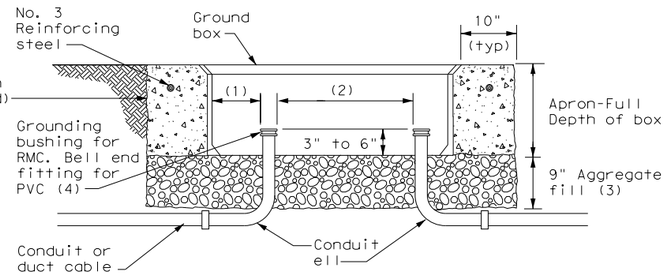


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

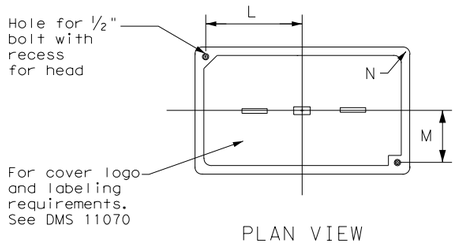
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



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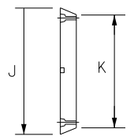

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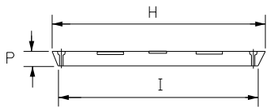

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

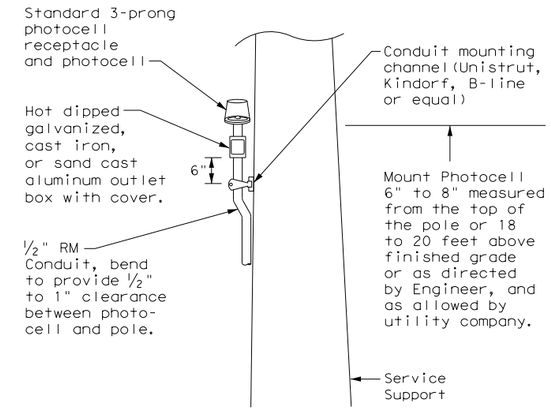
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel("off the shelf")
  SS= Stainless steel(Custom Enclosure)See MPL
  AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  (E)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire mounted
  (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  GC= Granite concrete
  OC= Other concrete
  TP= Timber pole
  SP= Steel pole
  SF= Steel frame
  OT= Pole by others or paid for separately
  EX= Existing pole
  TS= Service on traffic signal pole
  PS= Pedestal Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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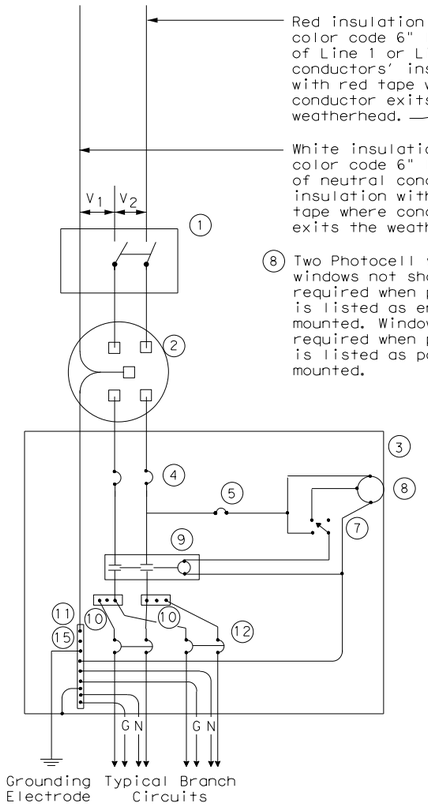
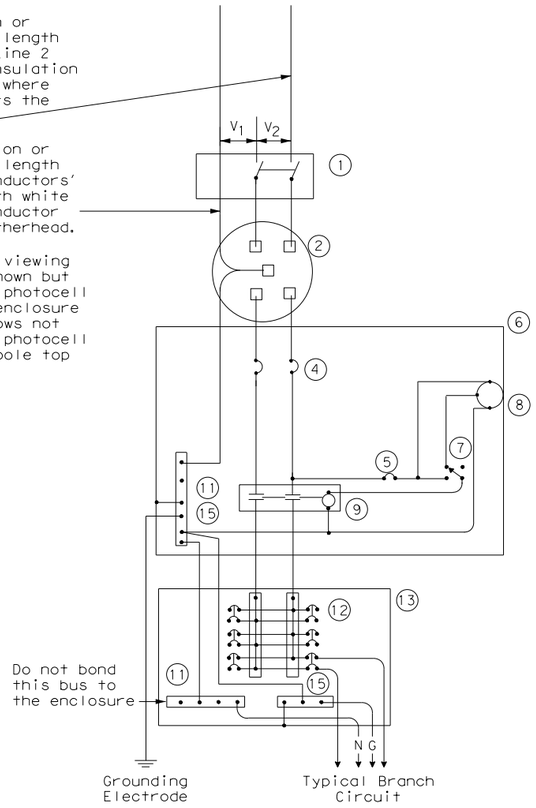
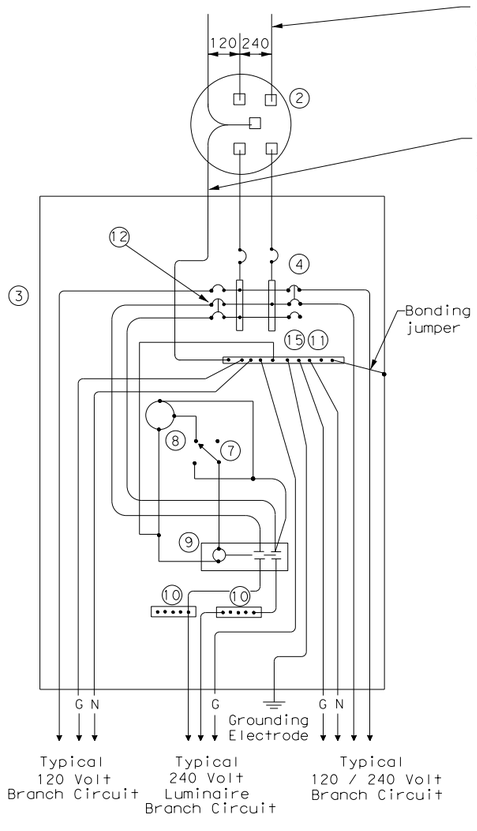


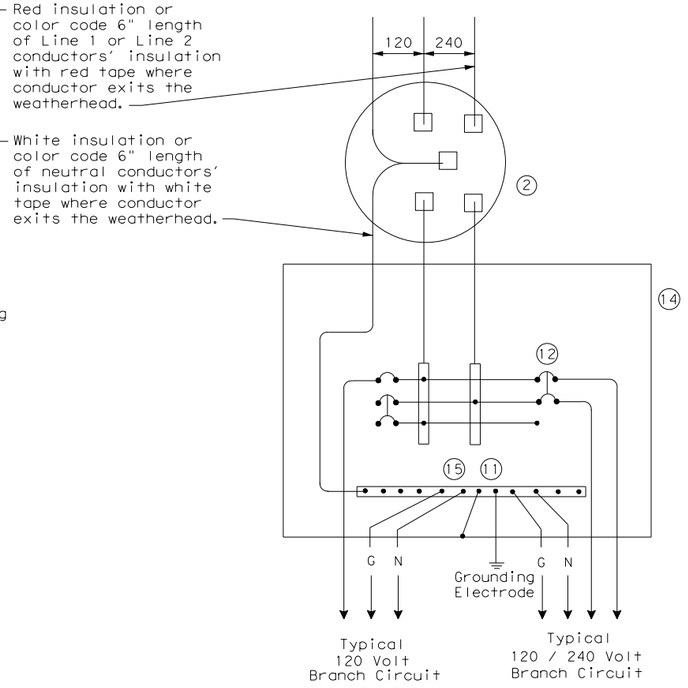
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
———	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

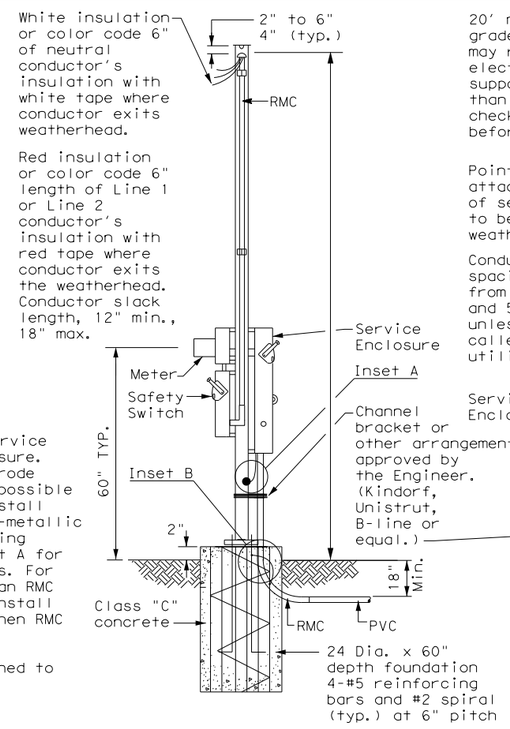
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

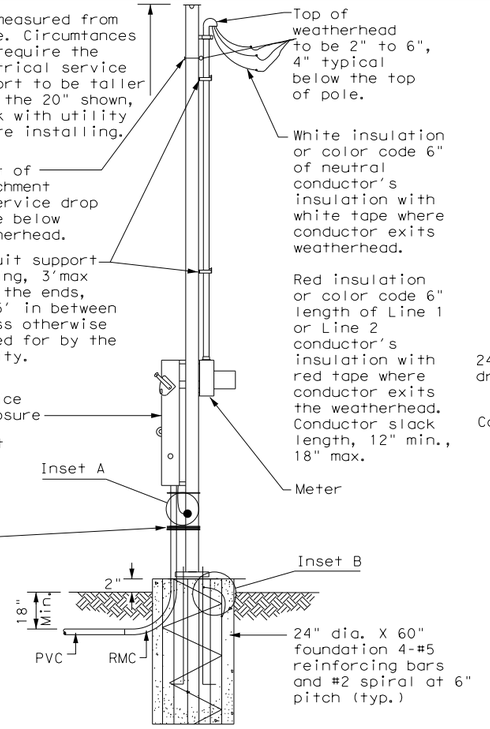
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

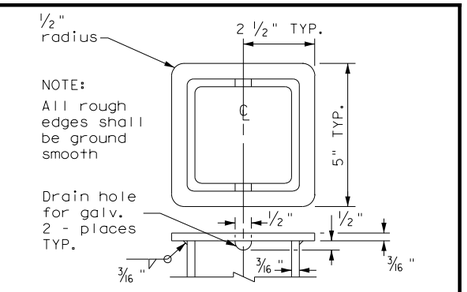


WITH SAFETY SWITCH

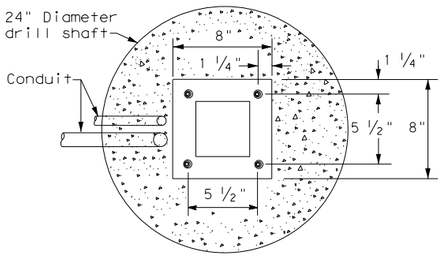


WITHOUT SAFETY SWITCH

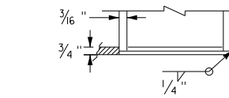
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

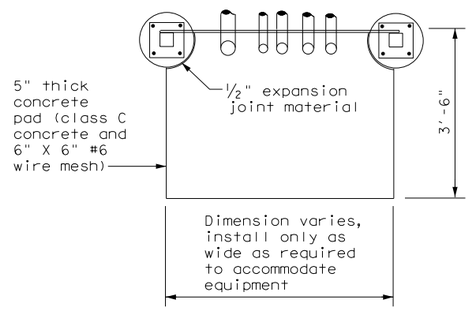


BASE PLATE DETAIL



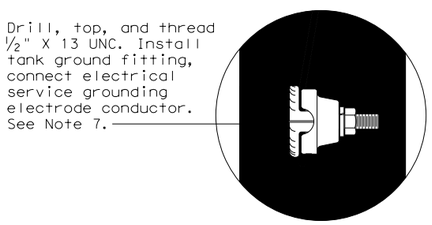
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP

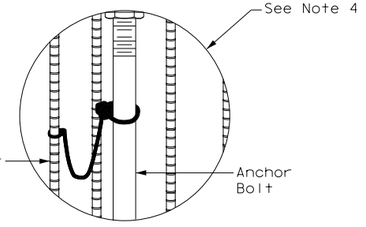


TOP VIEW

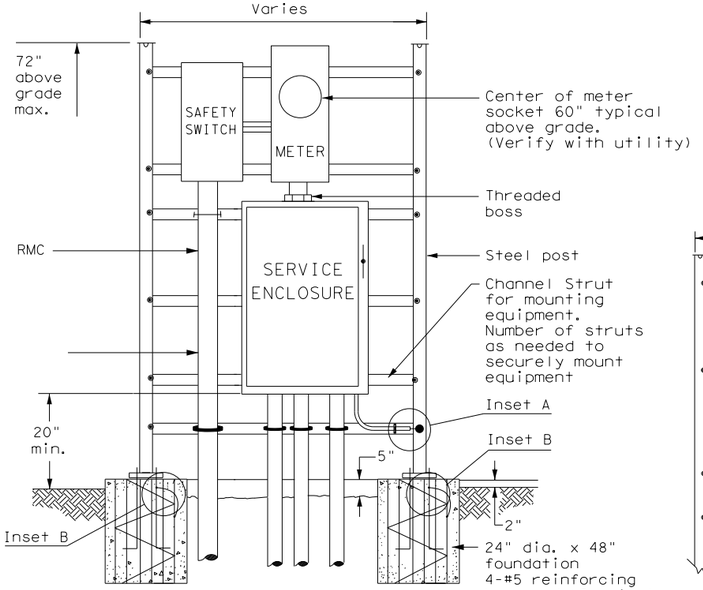
SERVICE SUPPORT TY SF (O) & SF (U)



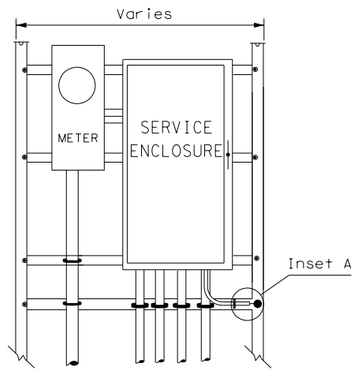
FRONT VIEW
INSET A



INSET B

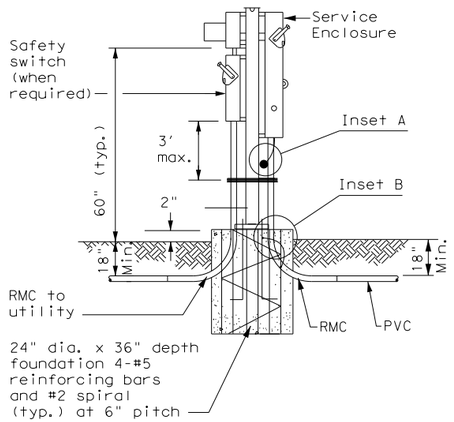


WITH SAFETY SWITCH
FRONT VIEW

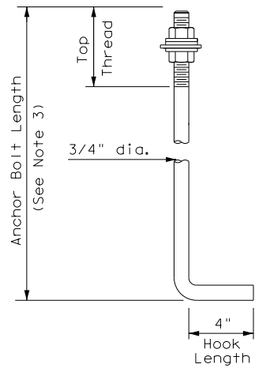


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.

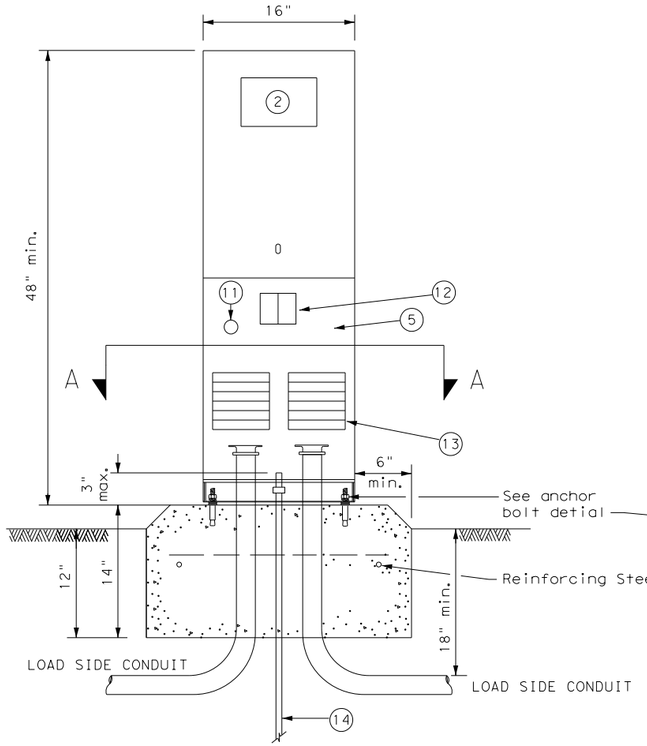
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⁷⁄₁₆ in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

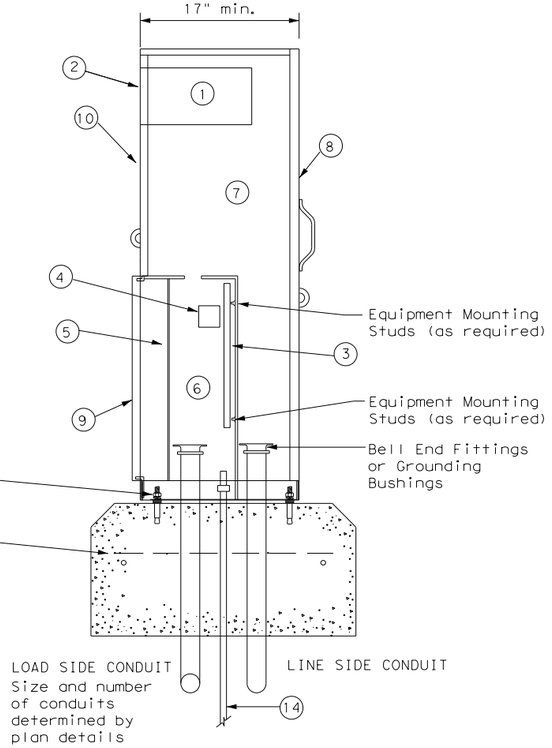
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ in. Repair rocking or movement of the service enclosure at no additional cost to the department.

7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.

8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.

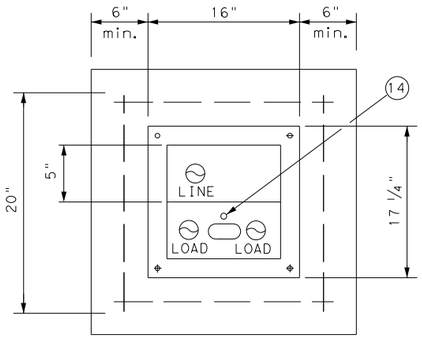


FRONT VIEW

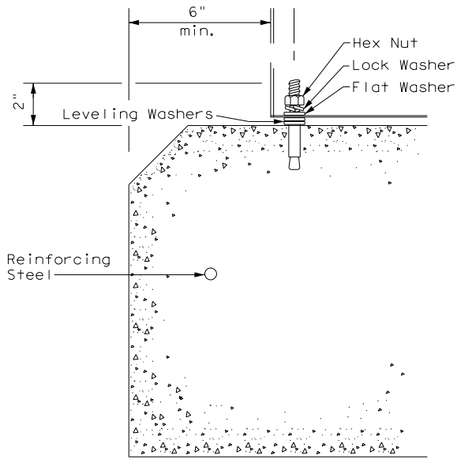


SIDE VIEW

TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A



ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS
ED(9)-14

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

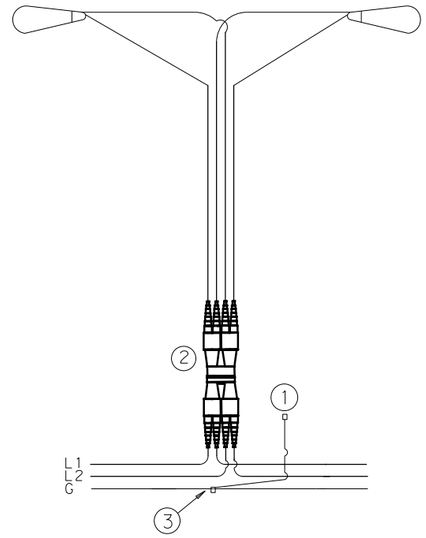
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

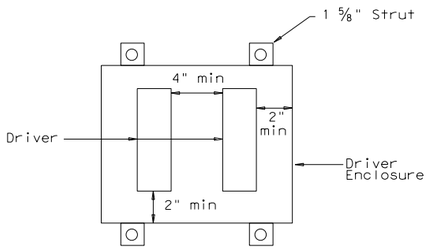
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

FILE: rid1-20.dgn	DN:	CK:	DW:	CK:
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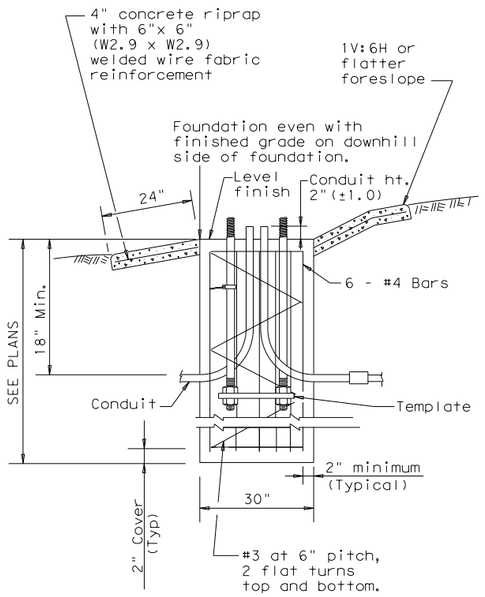
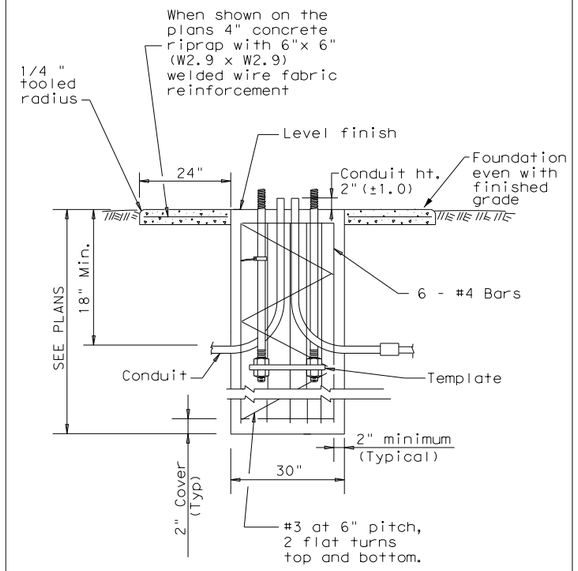
12-20	BRY	ROBERTSON		208

72A



SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

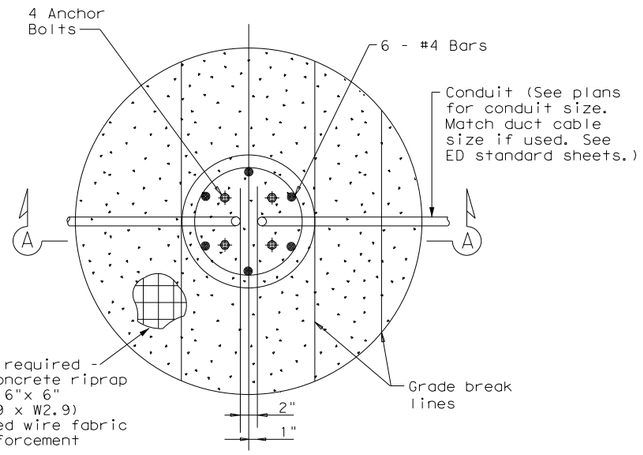
TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

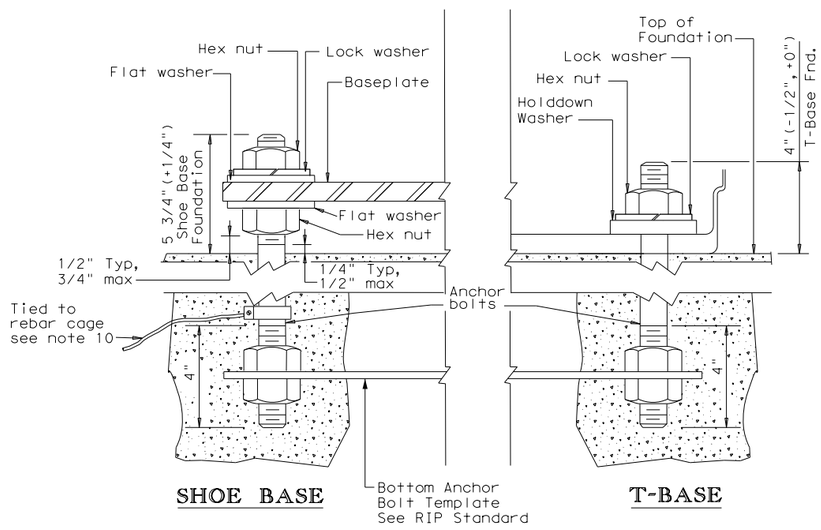
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS (RDWY ILLUM FOUNDATIONS)

RID(2)-20

FILE: rid2-20.dgn	DN:	CK:	DW:	CK:
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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation Pole	A1	A2	Luminaire	Quantity	T-Base Designation Pole	A1	A2	Luminaire	Quantity	CSB/SSCB Mounted Designation Pole	A1	A2	Luminaire	Quantity
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED	5	(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
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	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation Pole	A1	A2	Luminaire	Quantity

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

STATE OF TEXAS
ZAHIDUL Q. SIDDIQUE
98635
LICENSED
PROFESSIONAL ENGINEER
5/25/2023

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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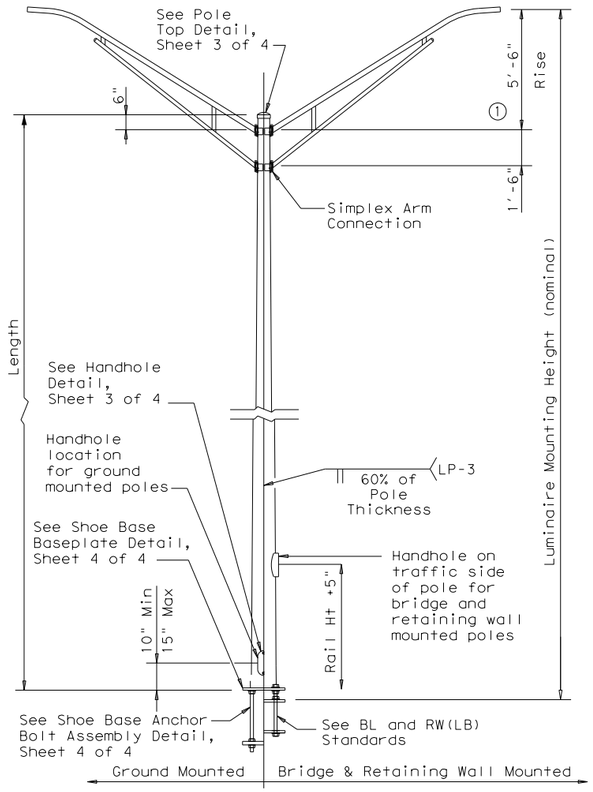
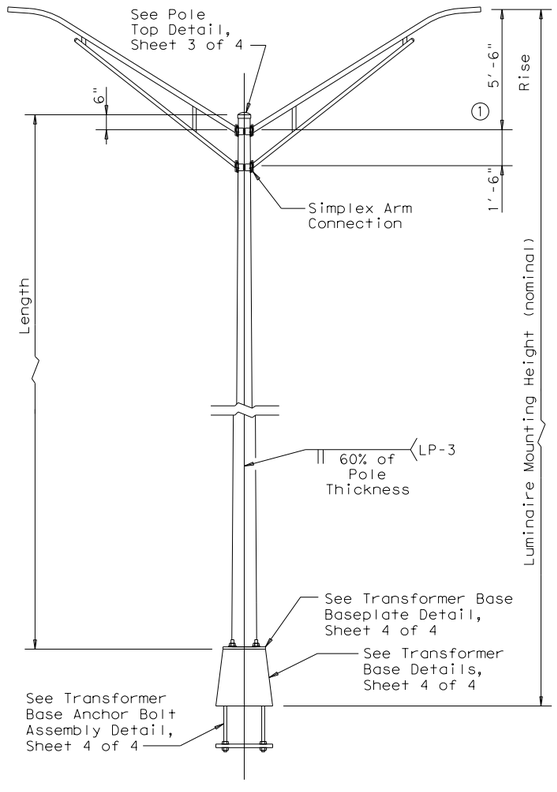


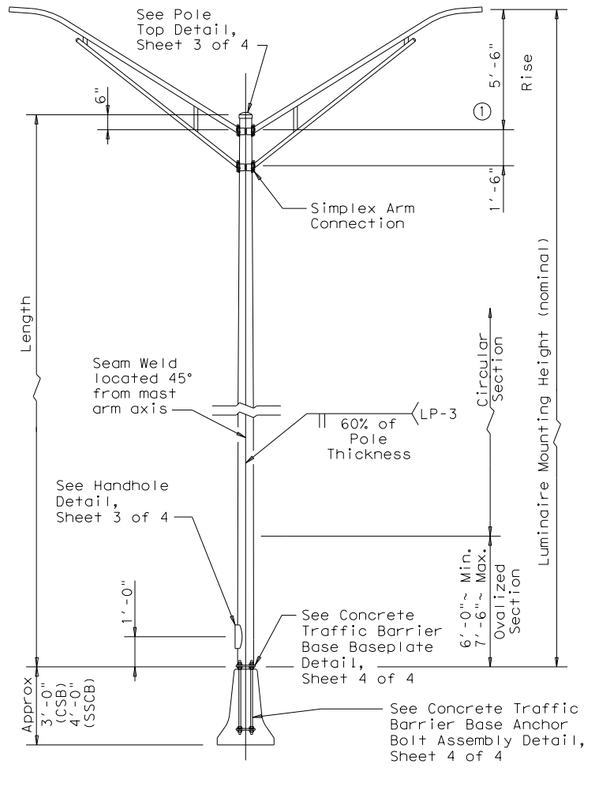
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
7-17	DIST	COUNTY		SHEET NO.
12-19	BRY	ROBERTSON		211

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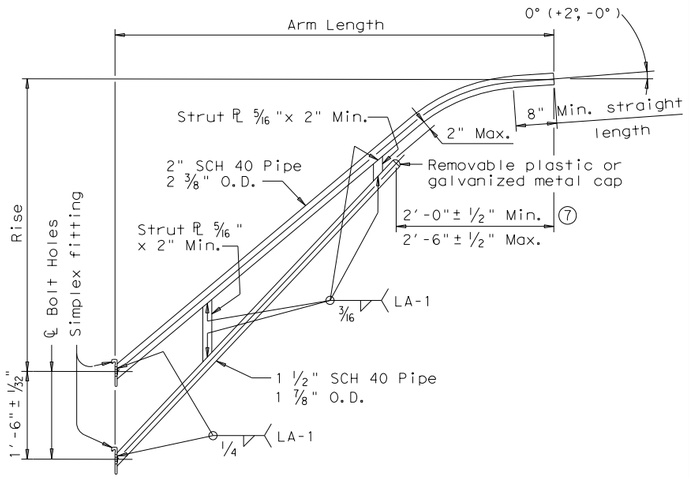
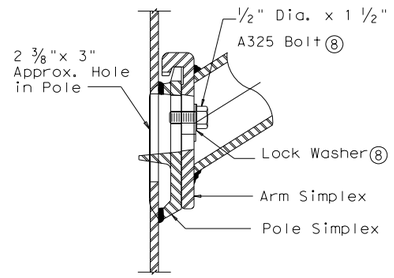


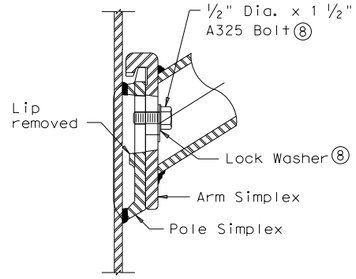
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"

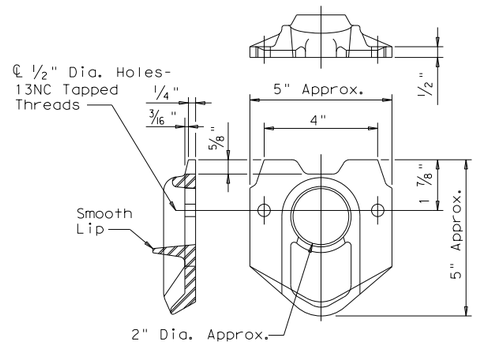


UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

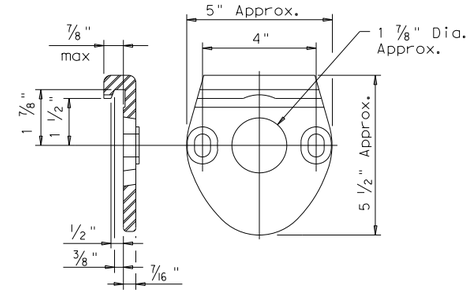


LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



POLE SIMPLEX DETAIL ⑨



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

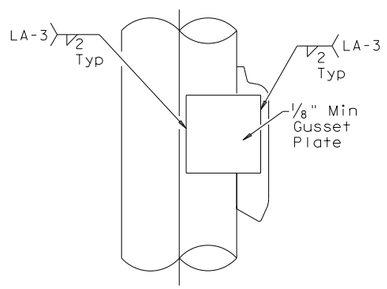
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

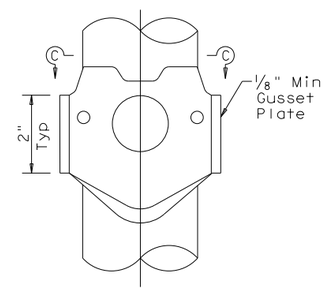
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE



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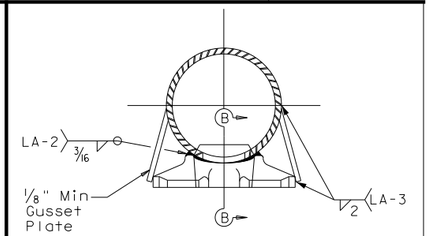
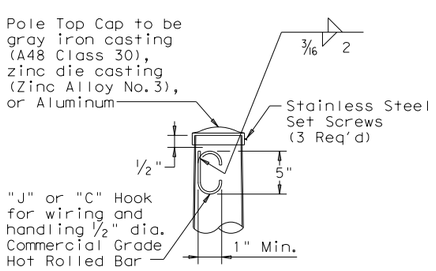
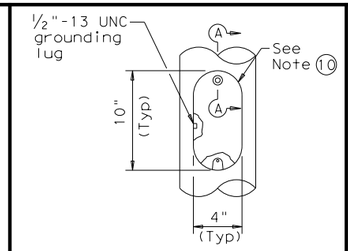


SECTION C-C

SIMPLEX ATTACHMENT DETAIL



POLE TOP



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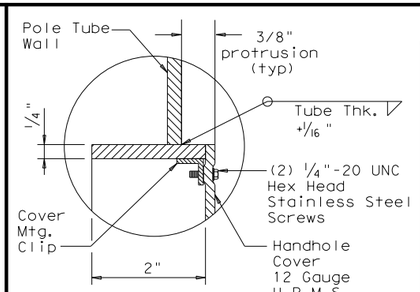

SECTION A-A

HANDHOLE

SHEET 3 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
7-17	DIST	COUNTY		SHEET NO.
12-19	BRY	ROBERTSON		212

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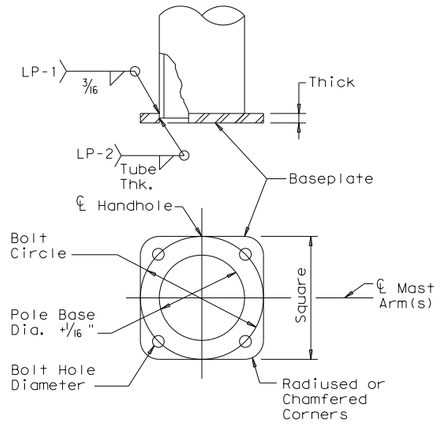
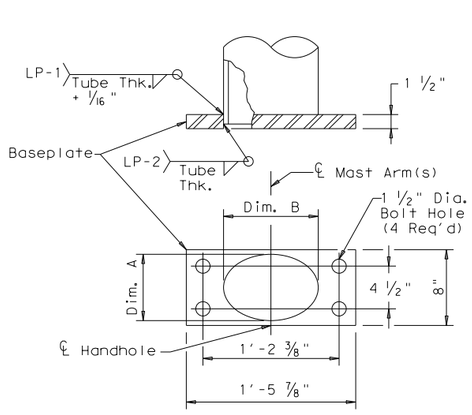


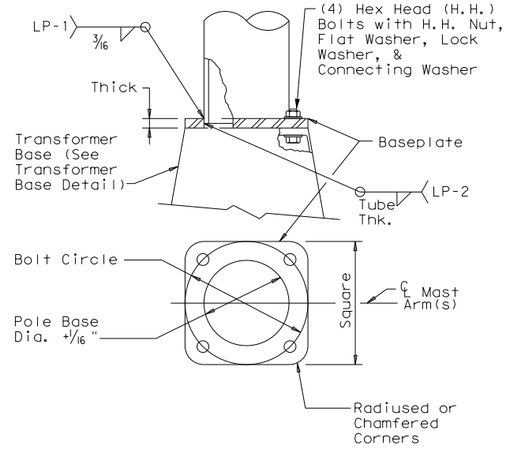
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



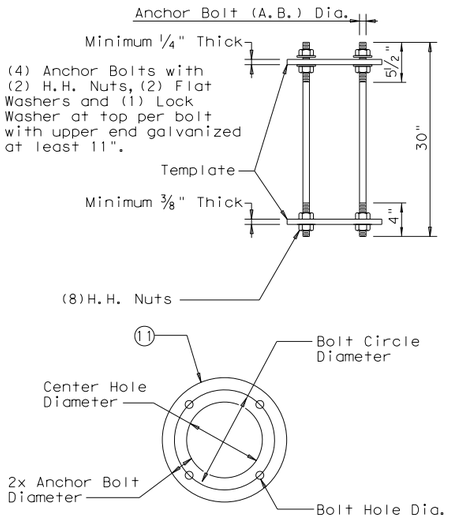
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′ - 38′	9"	7"± 1/4"	10"± 1/4"
48′	10 1/2"	7"± 1/4"	13"± 1/4"



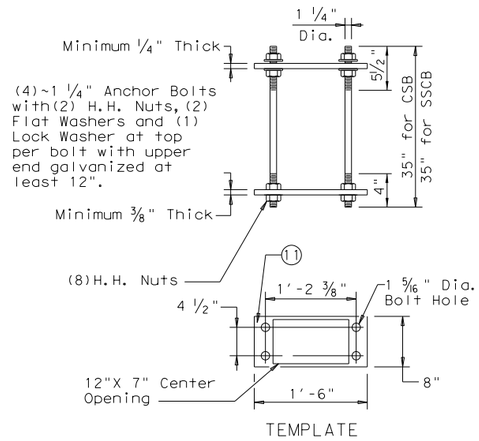
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



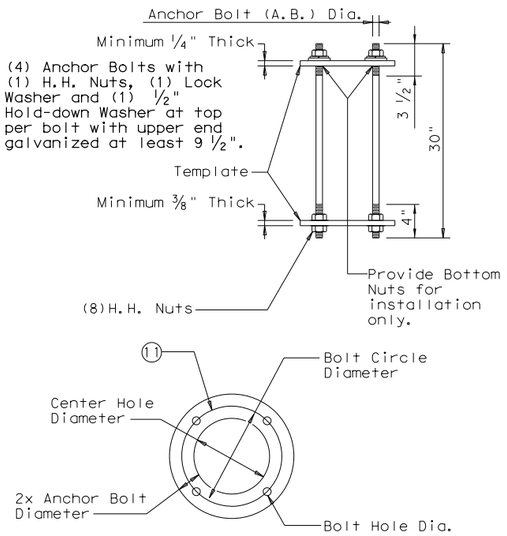
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



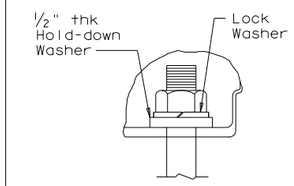
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

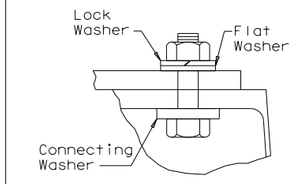


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

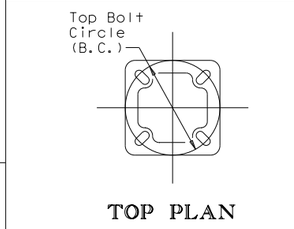
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



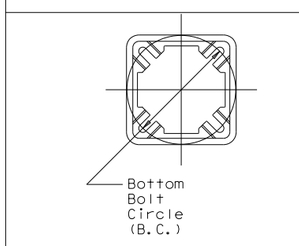
DETAIL A



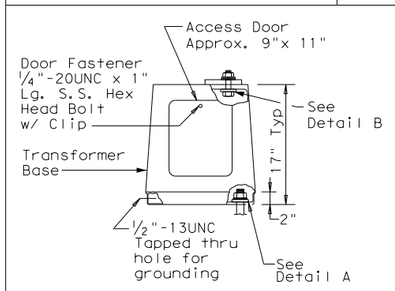
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
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REVISIONS 7-17 12-19	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		213

730

SITE DESCRIPTION

PROJECT LIMITS:

CSJ 1191-05-009- From: LIMESTONE COUNTY LINE
Latitude 31.3256128, Longitude -96.3829087
To:SH 7
Latitude 31.2558306, Longitude -96.3417055

PROJECT DESCRIPTION:

Consisting of 12 foot lanes and 4 foot shoulders of pavement rehabilitation and widening.

SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES:

1. Preparing ROW (topsoil, shrub and tree removal).

2. Extension of cross culverts.

3. Regrading of roadside slopes and ditches.

TOTAL PROJECT AREA: 70.6 AC

TOTAL AREA TO BE DISTURBED: 34.8 AC - 49%

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

Grass slopes 100%

NAME OF RECEIVING WATERS:

Steele Creek
Sandy Branch
Navasota River

ANTICIPATED EFFECT OF STORM WATER ON THREATENED AND ENDANGERED SPECIES AND WILDLIFE HABITAT:

See Environmental Permits, Issues and Commitments (EPIC) sheet.

EROSION AND SEDIMENT CONTROLS AND TCEQ 401 CERTIFICATION

I. SOIL STABILIZATION PRACTICES AND EROSION CONTROL:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES
- [ ] SUBSURFACE DRAINS

OTHER:

II. STRUCTURAL PRACTICES AND SEDIMENTATION CONTROL: (T/P) *

- [T] SEDIMENT CONTROL FENCES
- [ ] HAY BALES
- [ ] ROCK BERMS
- [ ] STORM SEWERS
- [ ] CURBS AND GUTTERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] SAND BAG BERM
- [ ] GRAVEL BAG BERM
- [ ] BRUSH BERMS
- [ ] TRIANGULAR FILTER DIKE
- [ ] STONE OUTLET SEDIMENT TRAPS
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [T] ROCK FILTER DAMS
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES

* T means Temporary - P means Permanent

OTHER:
EROSION CONTROL LOGS

III. POST CONSTRUCTION: (IF COE PERMIT IS ISSUED)

- [ ] RETENTION/IRRIGATION
- [ ] EXTENDED DETENTION BASINS
- [ ] VEGETATION FILTER STRIPS
- [ ] CONSTRUCTION WETLANDS
- [ ] WET BASINS
- [ ] VEGETATION LINED DRAINAGE DITCHES
- [ ] GRASSY SWALES
- [ ] SAND FILTER SYSTEMS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

All work to be performed by the Contractor.
The order of activities will be as follows:

1. Install temporary erosion control devices. Sediment control fence as shown in erosion control plans.

2. Set up traffic control & advanced warning signs.

3. Excavate and prepare subgrade for placement of new pavement section.

4. Construct new pavement as per the project layout and typical sections.

5. Complete topsoil/seed on slopes.

6. Establish grass growth on permanent slopes utilizing topsoil/seed.

7. When all construction activity is complete and the site is established and approved by the project engineer, then remove all temporary structural controls and reseed any areas disturbed by their removal.

STORM WATER MANAGEMENT:

Install silt fence and rock filter dams on downstream side of ditches and cross culverts.
Install erosion control logs around inlets.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:

All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainageways shall have priority. Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.

INSPECTION:

A TxDOT inspector will perform an inspection every 7 days.

DESCRIPTION OF CONSTRUCTION MATERIALS TO BE STORED ON-SITE AND CONTROLS TO PREVENT THESE FROM ENTERING STORM WATER:

Store all construction materials (wood, flex base, aggregate, etc.) in locations where they will not enter storm water runoff. Structural controls may be required for flex base, aggregate and earth stockpiles.

WASTE MATERIALS:

A TxDOT inspector will perform an inspection every 7 days.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

At a minimum, any products in the following categories are considered to be hazardous: paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, chemical additives for soil stabilization or concrete curing compounds and additives. In the event of a spill which may be hazardous, the Engineer should be contacted immediately.

SANITARY WASTE:

All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management director.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [ ] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [ ] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

REMARKS:

Disposal areas, stockpilesand haul roads shall be constructed in a manner that will minimize and control sediment from entering receiving waters. Disposal areas shall not be located in an water body or streambed.

Construction staging areas and vehicle maintenance areas shall be constructed to minimize the runoff of pollutants.

PRINT DATE	REVISION DATE
6/21/2023	

Texas Department of Transportation
Bryan District
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TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER
6	FPN	FM 937
STATE	DISTRICT	COUNTY
TEXAS	BRY	ROBERTSON
CONTROL	SECTION	JOB / SHEET NO.
1191	05	009 / 214

CSJ: XXXX-XX-XXX FILENAME: R:\1005000-1005999\1005662.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\9_Environmental\009SWN01.dgn

During the planning phase of project development the following environmental permits, issues and commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities. As additional environmental clearances may be required.

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☒ Required Action ☐ No Action Required

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

Refer to 2014 TxDOT Standard Specification Items:
7.7.2 Texas Pollutant Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention PLans (SWP3)
506 Temporary Erosion, Sedimentation and Environmental Controls
734 Litter Removal
735 Debris Removal
738 Cleaning and Sweeping Highways

II. WORK IN OR NEAR STREAMS, WATER BODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.
The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP#

Required Actions: List locations of waters of the US.

Information regarding the USACE Nationwide Permit Program can be found at:
http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/GeneralPermits.aspx

Refer to 2014 TxDOT Standard Specification Items:
7.7.3 Work in Waters of the United States
7.7.6 Project Specific Locations
496 Removing Structures
506 Temporary Erosion, Sedimentation and Environmental Controls
506.4.3.4 Restricted Activities and Required Precautions

III. CULTURAL RESOURCES

Refer to 2014 TxDOT Standard Specification Item 7.7.1 Cultural Resources, in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) immediately cease work in the vicinity and contact the Engineer.

☐ Required Action ☒ No Action Required

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.

☒ Required Action ☐ No Action Required

Action No.

1. Tree removal to be done in accordance with the Migratory Bird Treaty Act (see Section V)

Refer to 2014 TxDOT Standard Specification Items:
160 Topsoil
161 Compost
162 Sodding for Erosion Control
164 Seeding for Erosion Control
166 Fertilizer
168 Vegetative Watering
169 Soil Retention Blankets
170 Irrigation System
180 Wildflower Seeding
192 Landscape Planting
193 Landscape Establishment
506 Temporary Erosion, Sedimentation, and Environmental Controls
730 Roadside Mowing
751 Landscape Maintenance
752 Tree and Brush Removal

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ Required Action ☐ No Action Required

Action No.

1. Do not kill snakes or other animals!
2. Do not destroy nests on structures within the project limits.

   Temporarily prevent the building of nests on any structures that require work within the project limits during the construction timeframe.

   This can be accomplished by application of bird repellant gel, netting, or removal by hand every 3-4 days.

   The nesting/breeding season for migratory birds is March 1 - September 1.

Under the Migratory Bird Treaty Act (MBTA), it is unlawful by any means or manner, to pursue, hunt, take, capture, [or] kill any migratory birds except as permitted by regulation (16 U.S.C. 703-704). Neither the statute nor its implementing regulations (Title 50, Code of Federal Regulations, Parts 10, 13, 21) exempt unintentional take of migratory birds. The unauthorized take (e.g. killing, capturing, or collecting) of migratory birds is a strict liability criminal offense that does not require knowledge or specific intent on the part of the offender. Even when engaged in an otherwise lawful activity for which the intent is not the killing of migratory birds, a violation may be committed.

3. If caves or sinkholes are discovered, cease work in the immediate area to verify the presence or absence of wildlife.
4. BMPs for T and E species will be discussed at the preconstruction meeting.

The Bryan District Environmental Section can be contacted at (979) 778-9766 to assist with the removal of wildlife that will not leave on their own with gentle persuasion.

Refer to 2014 TxDOT Standard Specification Item:
7.7.6 Project Specific Locations

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 appropiate for any hazardous materials used.
Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.
Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the Engineerimmediately. The Contractor shall be responsiblefor the proper containment and cleanup of all product spills.

Contact the Engineer if any of the follwing are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notifiy 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 discoverd on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ Required Action ☐ No Action Required

Action No.

1. The Clean Water Act, in part, requires that any spill of oil that could enter a waterway, as defined by the Act, and that violates applicable water quality standards or causes a film or sheen on water require reporting to the TCEQ and local authorities.
   Contact the Bryan District Environmental Section at 979-778-9766.

   If potentially hazardous material and/or contaminated media (i.e. soil, groudwater, surface water, sediment, building materials) are unexpectedly encountered during construction, immediately cease work in the vicinity and contact the Engineer.

   Refer to 2014 TxDOT Standard Specification Items:
   6.10 Hazardous Materials
   7.12 Responsibility for Hazardous Materials

VII. OTHER ENVIRONMENTAL ISSUES

☐ Required Action ☒ No Action Required

Action No.

Refer to 2014 TxDOT Standard Specification Items:
7.7.6 Project Specific Locations
751 Landscape Maintenance

Contacts:

Mr. John D. Moravec
Environmental Coordinator
Texas Department of Transportation
Bryan District
2591 N. Earl Rudder Freeway
Bryan, TX 77803
Phone: (979) 778-9766
Fax: (979) 778-9702
e-mail: John.Moravec@txdot.gov

PRINT DATE	REVISION DATE
5/26/2023	02/12/2015

Texas Department of Transportation
Bryan District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	PROJECT NUMBER		HIGHWAY NUMBER
6			FM 937
STATE	DISTRICT	COUNTY	
TEXAS	BRY	ROBERTSON	
CONTROL	SECTION	JOB	SHEET NO.
1191	05	009	215

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CSJ: 1191-05-009
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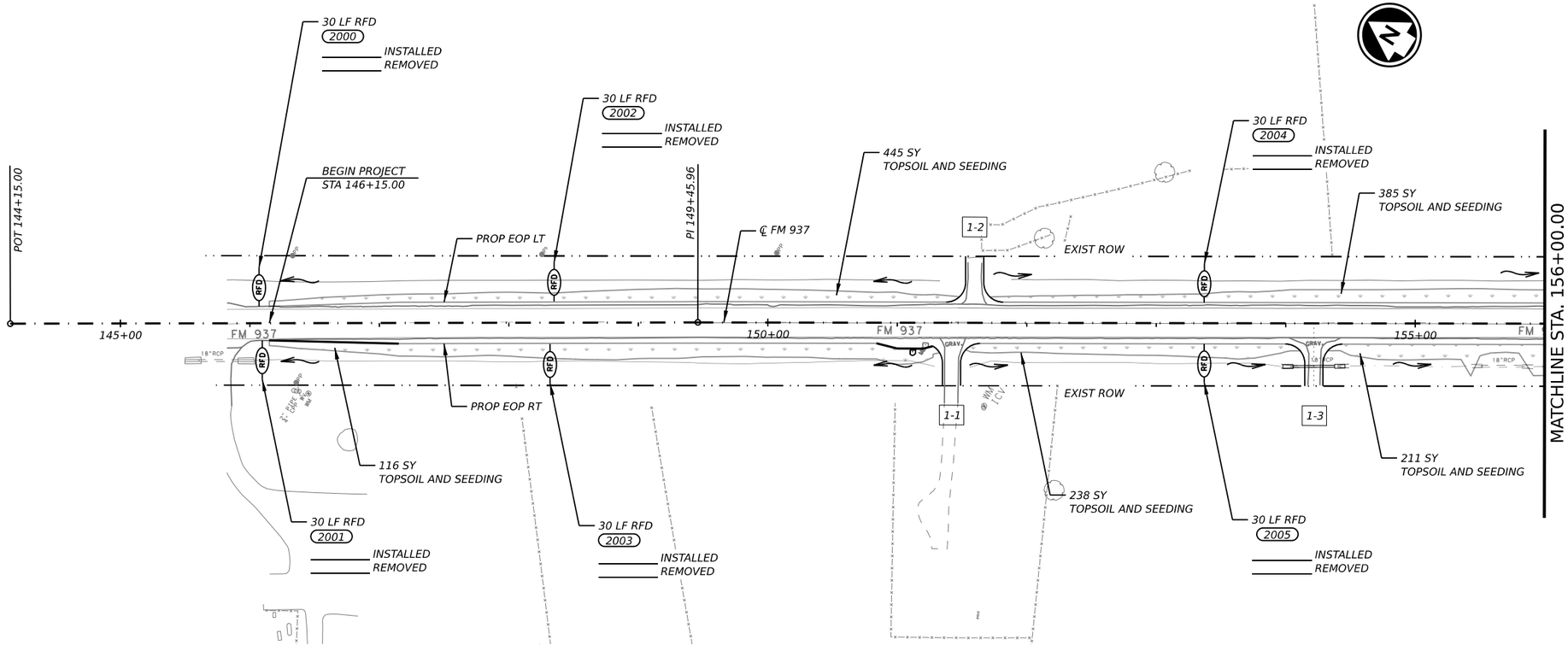

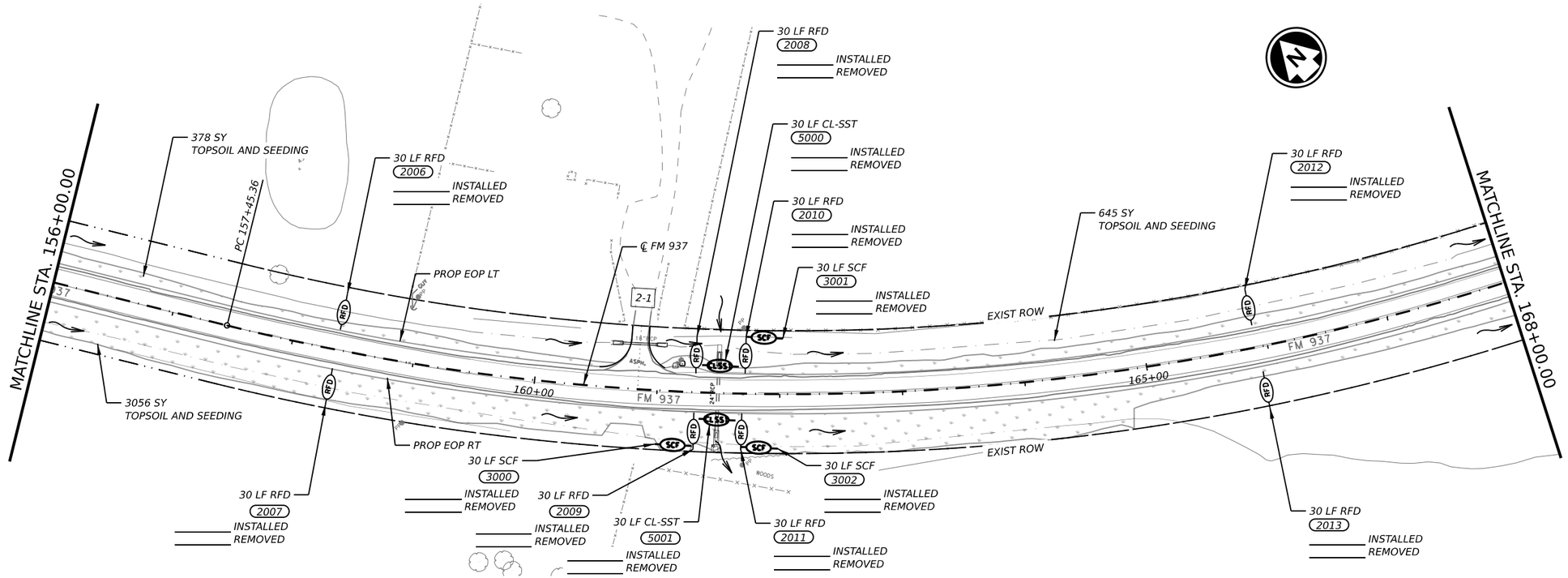

LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

SW3P LAYOUT

(BEGIN TO STA 168+00)

SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		216

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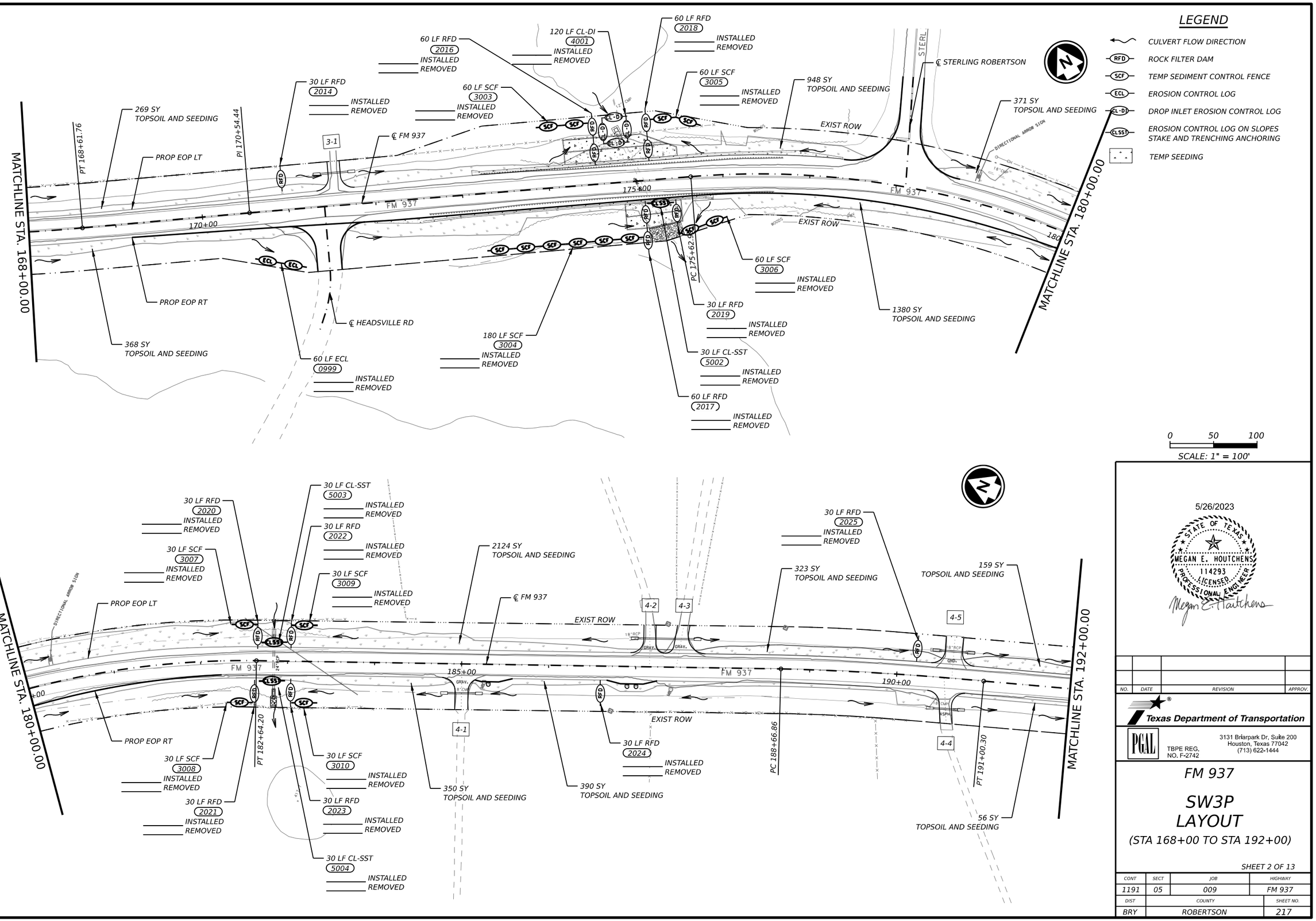

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5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
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PROFESSIONAL ENGINEER

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Texas Department of Transportation

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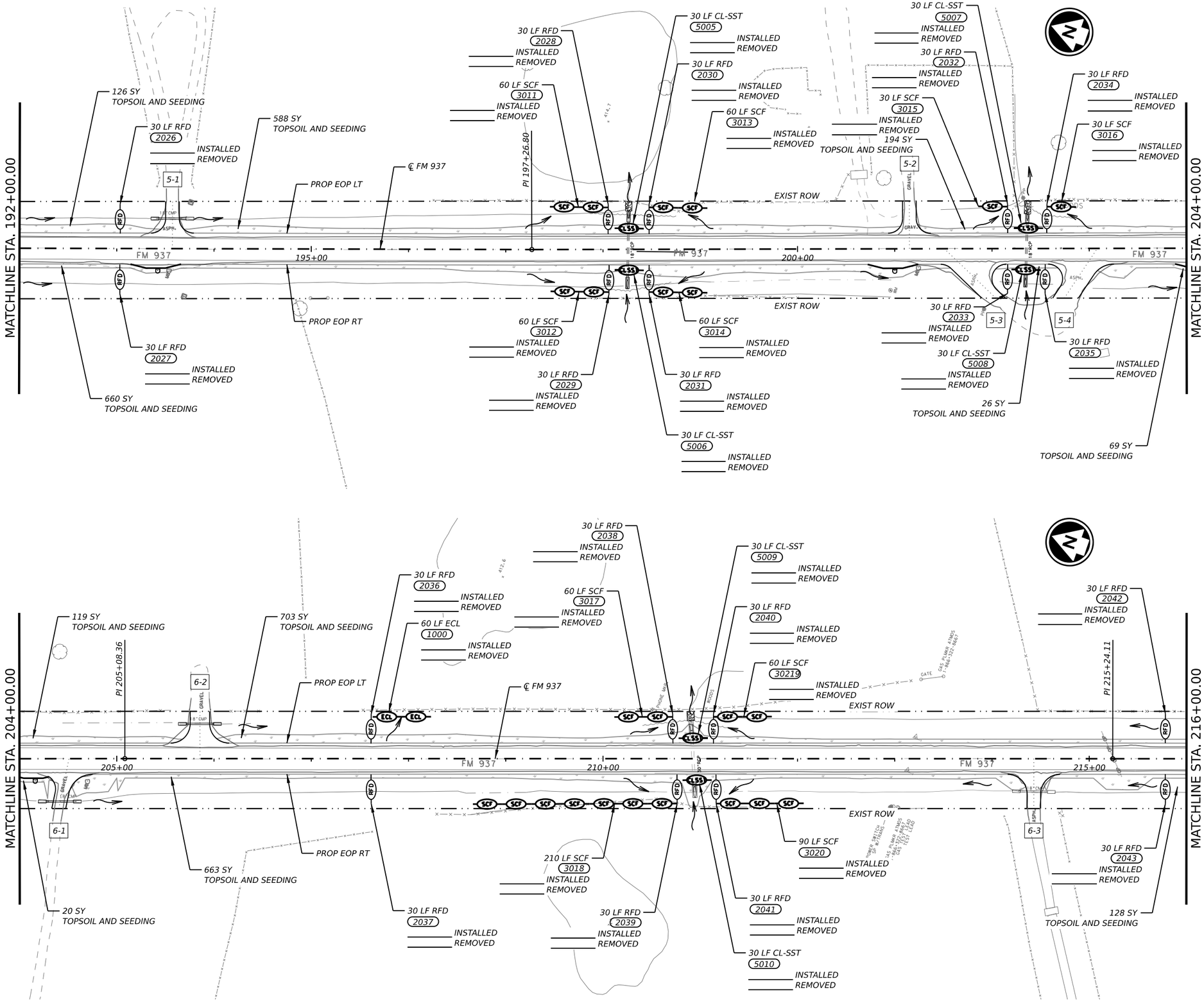
FM 937

SW3P LAYOUT

(STA 168+00 TO STA 192+00)

SHEET 2 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		217



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SW3P LAYOUT

(STA 192+00 TO STA 216+00)

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		218

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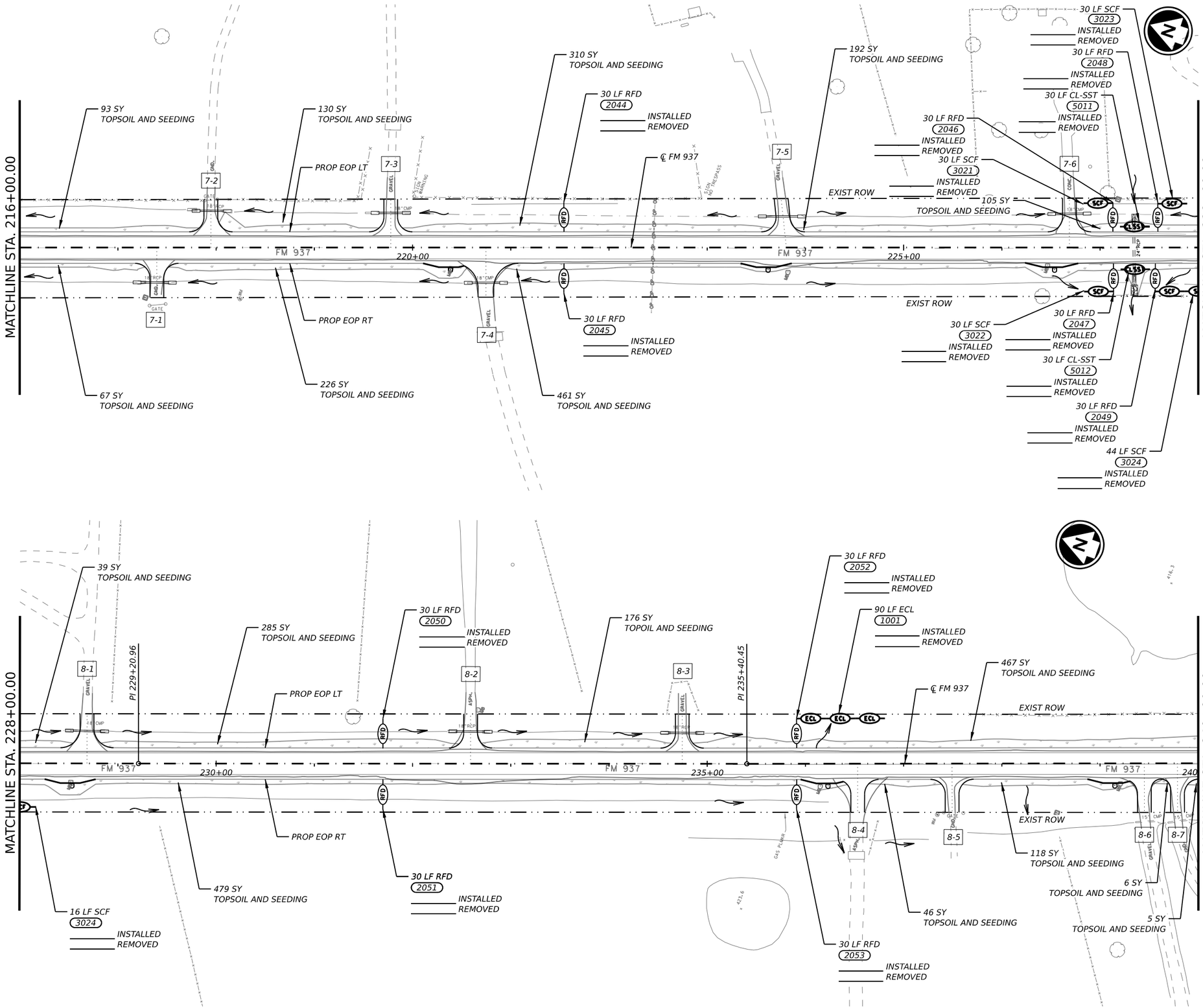
DW:
CK:
DW:



LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

5/26/2023

STATE OF TEXAS
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SW3P LAYOUT

(STA 216+00 TO STA 240+00)

SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		219

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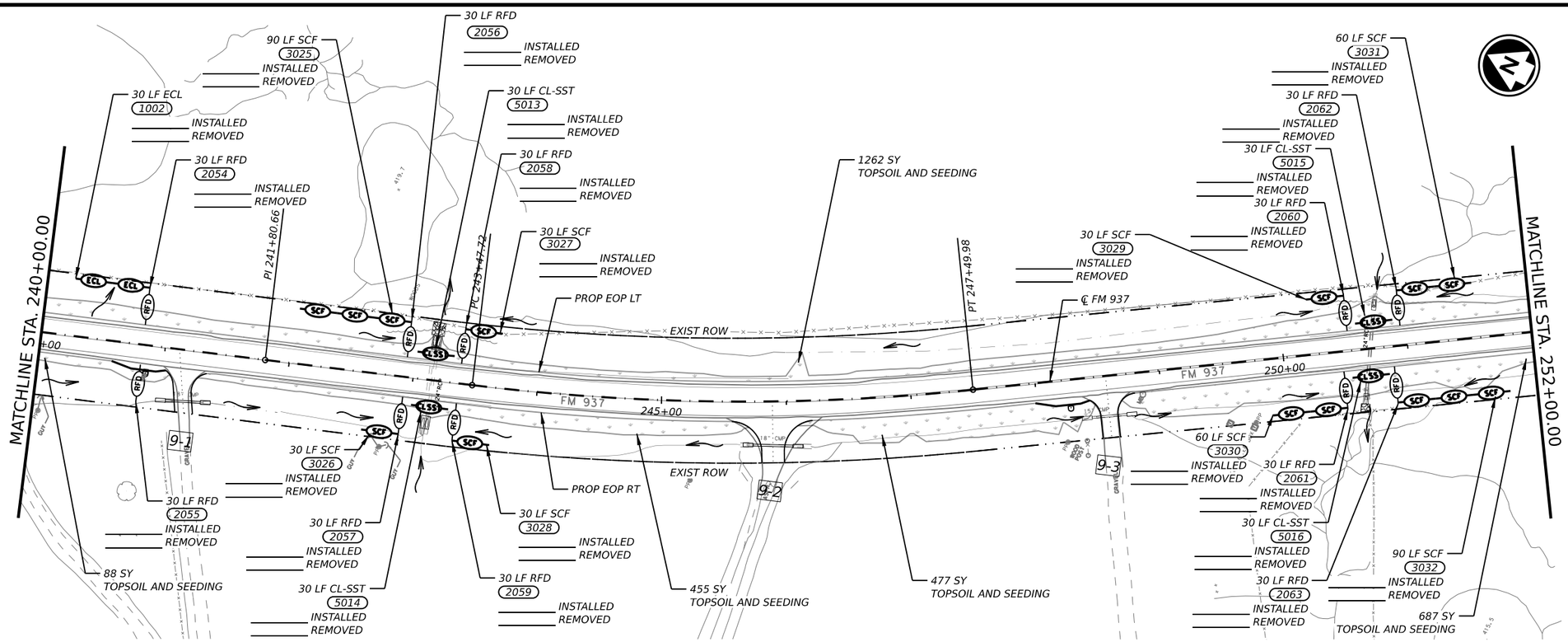

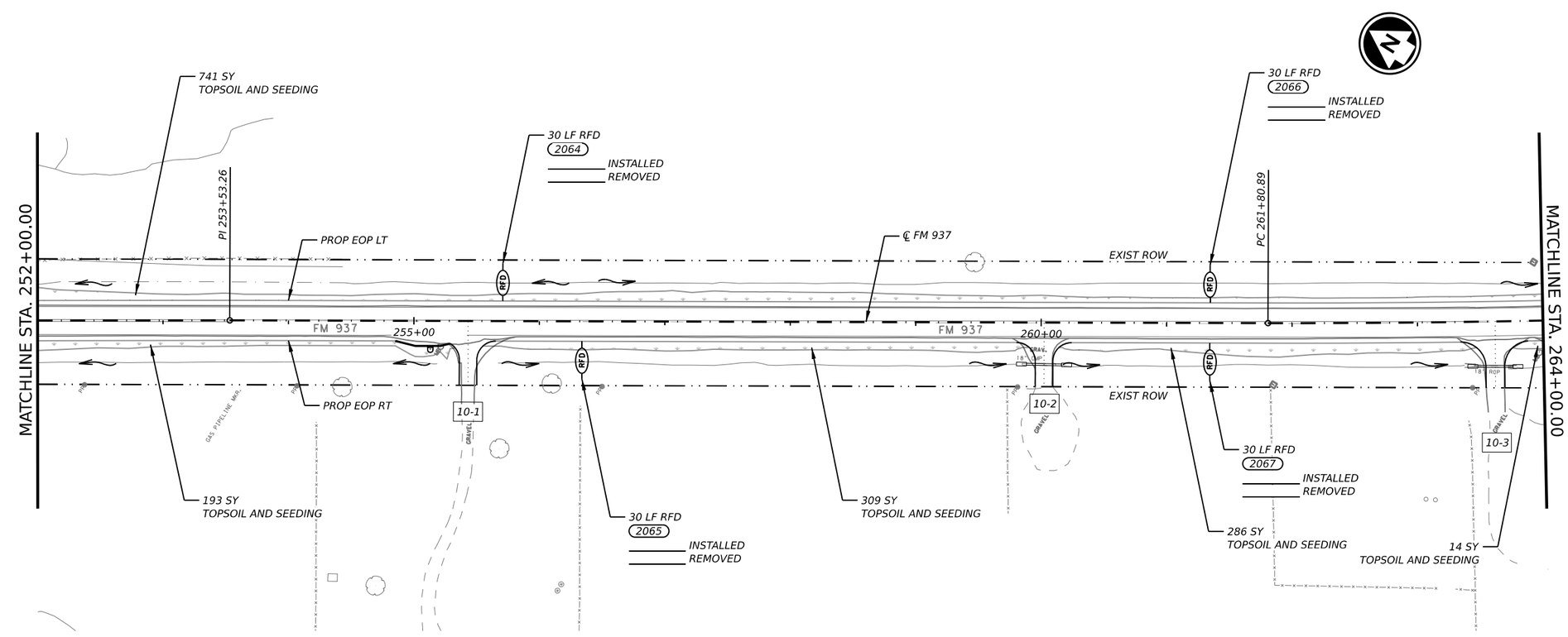

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SW3P LAYOUT

(STA 240+00 TO STA 264+00)

SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		220

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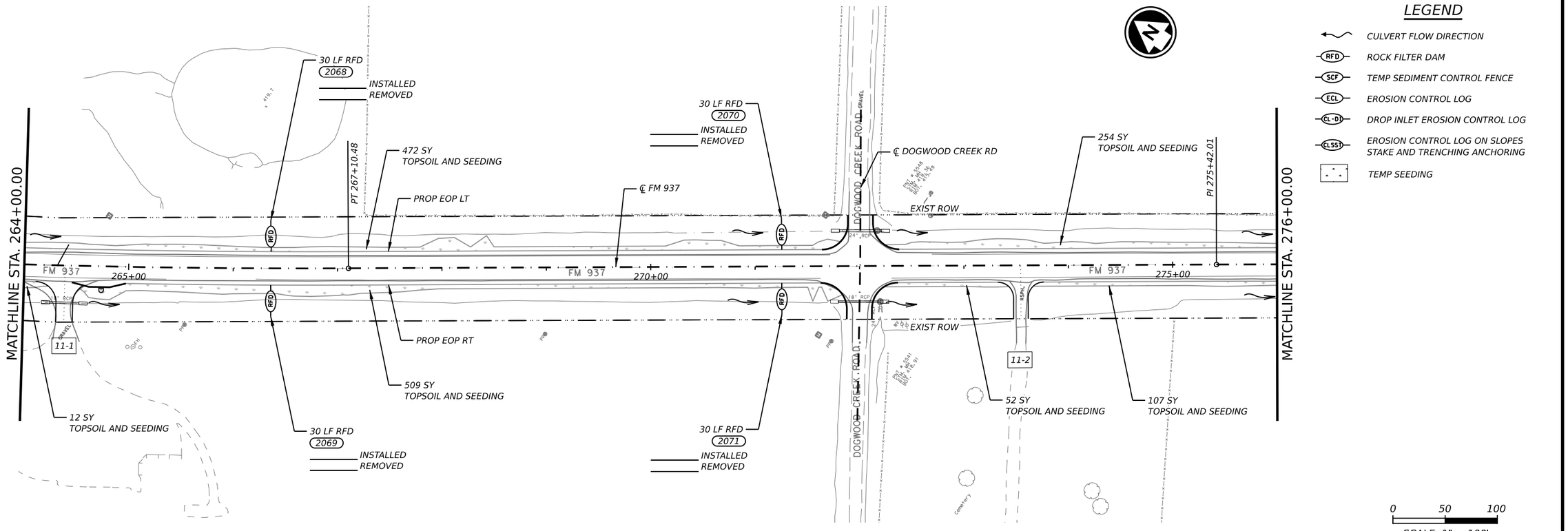

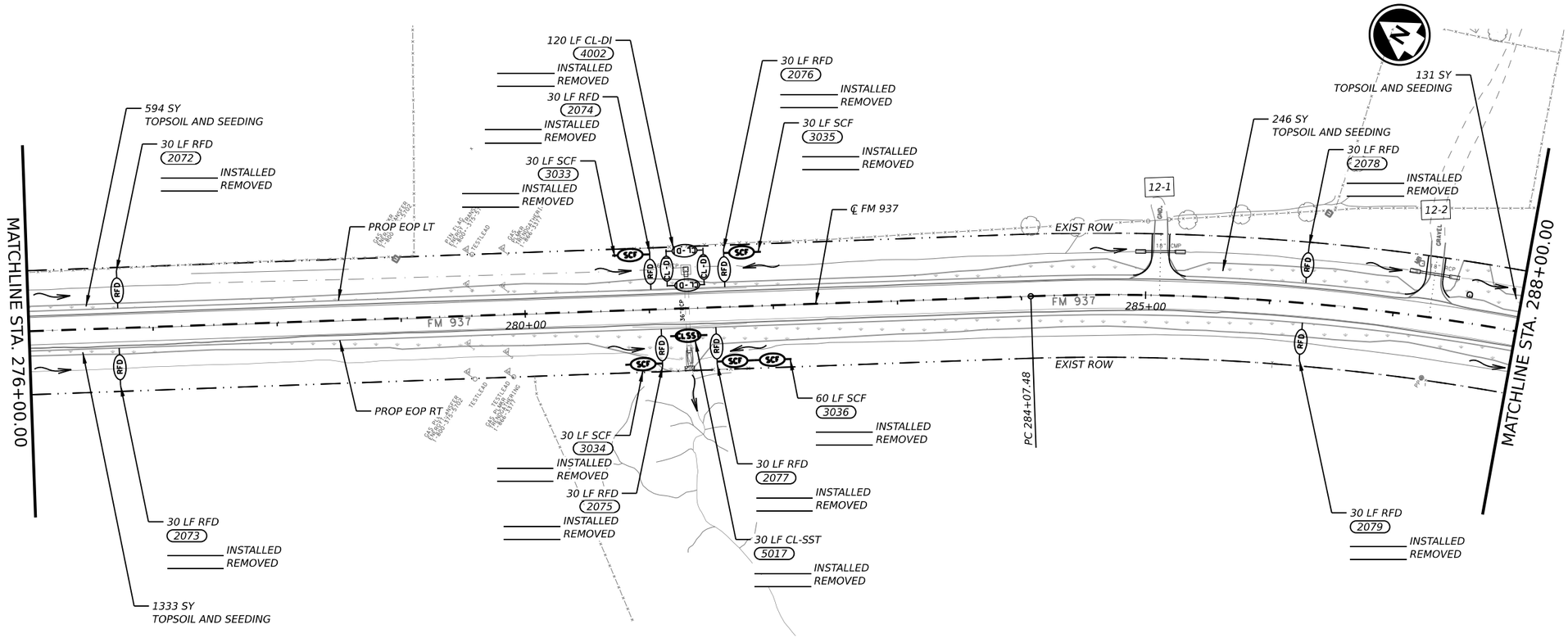

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SW3P LAYOUT

(STA 264+00 TO STA 288+00)

SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		221

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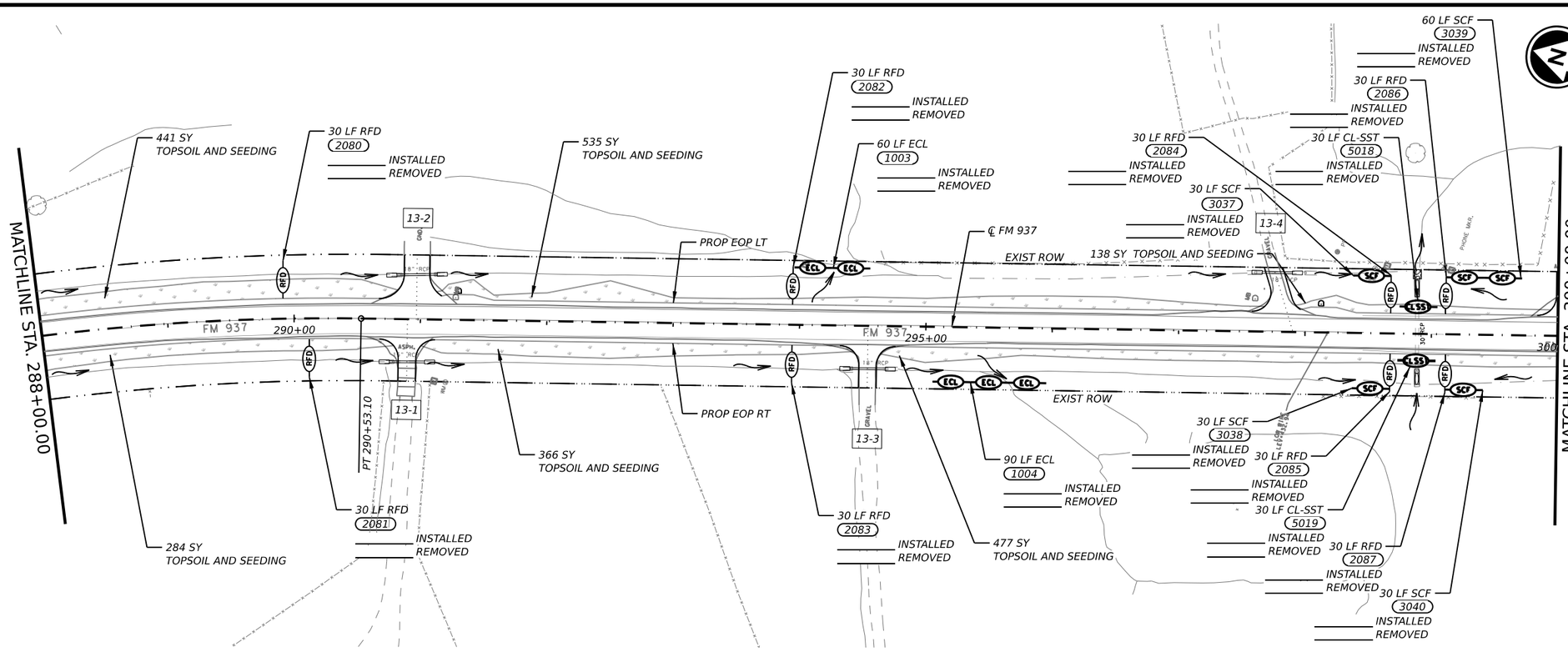

5/26/2023

STATE OF TEXAS
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Texas Department of Transportation

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FM 937

SW3P LAYOUT

(STA 288+00 TO STA 312+00)

SHEET 7 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		222

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CK:
DW:
CK:
DW:

MATCHLINE STA. 312+00.00

MATCHLINE STA. 324+00.00

207 SY
TOPSOIL AND SEEDING

30 LF RFD
2092
INSTALLED
REMOVED

PROP EOP LT

30 LF RFD
2094
INSTALLED
REMOVED

30 LF CL-SST
5020
INSTALLED
REMOVED

30 LF RFD
2096
INSTALLED
REMOVED

60 LF SCF
3042
INSTALLED
REMOVED

15-2

PI 319+21.67

℄ FM 937

30 LF RDF
2098
INSTALLED
REMOVED

650 SY
TOPSOIL AND SEEDING

EXIST ROW

315+00

FM 937

320+00

FM 937

EXIST ROW

15-1

PROP EOP RT

60 LF SCF
3041
INSTALLED
REMOVED

969 SY
TOPSOIL AND SEEDING

15-3

90 LF SCF
3043
INSTALLED
REMOVED

431 SY
TOPSOIL AND SEEDING

30 LF RFD
2093
INSTALLED
REMOVED

30 LF RFD
2095
INSTALLED
REMOVED

30 LF RFD
2097
INSTALLED
REMOVED

30 LF RFD
2099
INSTALLED
REMOVED

28 SY
TOPSOIL AND SEEDING

30 LF CL-SST
5021
INSTALLED
REMOVED

LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

MATCHLINE STA. 324+00.00

MATCHLINE STA. 336+00.00

30 LF RFD
2100
INSTALLED
REMOVED

280 SY
TOPSOIL AND SEEDING

PI 326+25.00

16-1

911 SY
TOPSOIL AND SEEDING

PROP EOP LT

℄ FM 937

EXIST ROW

30 LF RFD
2102
INSTALLED
REMOVED

30 LF SCF
3044
INSTALLED
REMOVED

30 LF SCF
3046
INSTALLED
REMOVED

30 LF RFD
2106
INSTALLED
REMOVED

30 LF CL-SST
5022
INSTALLED
REMOVED

30 LF RFD
2104
INSTALLED
REMOVED

PI 335+93.69

325+00

FM 937

330+00

FM 937

335+00

EXIST ROW

PROP EOP RT

241 SY
TOPSOIL AND SEEDING

℄ HOKE LN N

30 LF SCF
3045
INSTALLED
REMOVED

30 LF RFD
2105
INSTALLED
REMOVED

30 LF CL-SST
5023
INSTALLED
REMOVED

30 LF RFD
2101
INSTALLED
REMOVED

30 LF RFD
2103
INSTALLED
REMOVED

30 LF RFD
2107
INSTALLED
REMOVED

30 LF SCF
3047
INSTALLED
REMOVED

1108 SY
TOPSOIL AND SEEDING

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

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(713) 622-1444

FM 937

SW3P LAYOUT

(STA 312+00 TO STA 336+00)

SHEET 8 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		223

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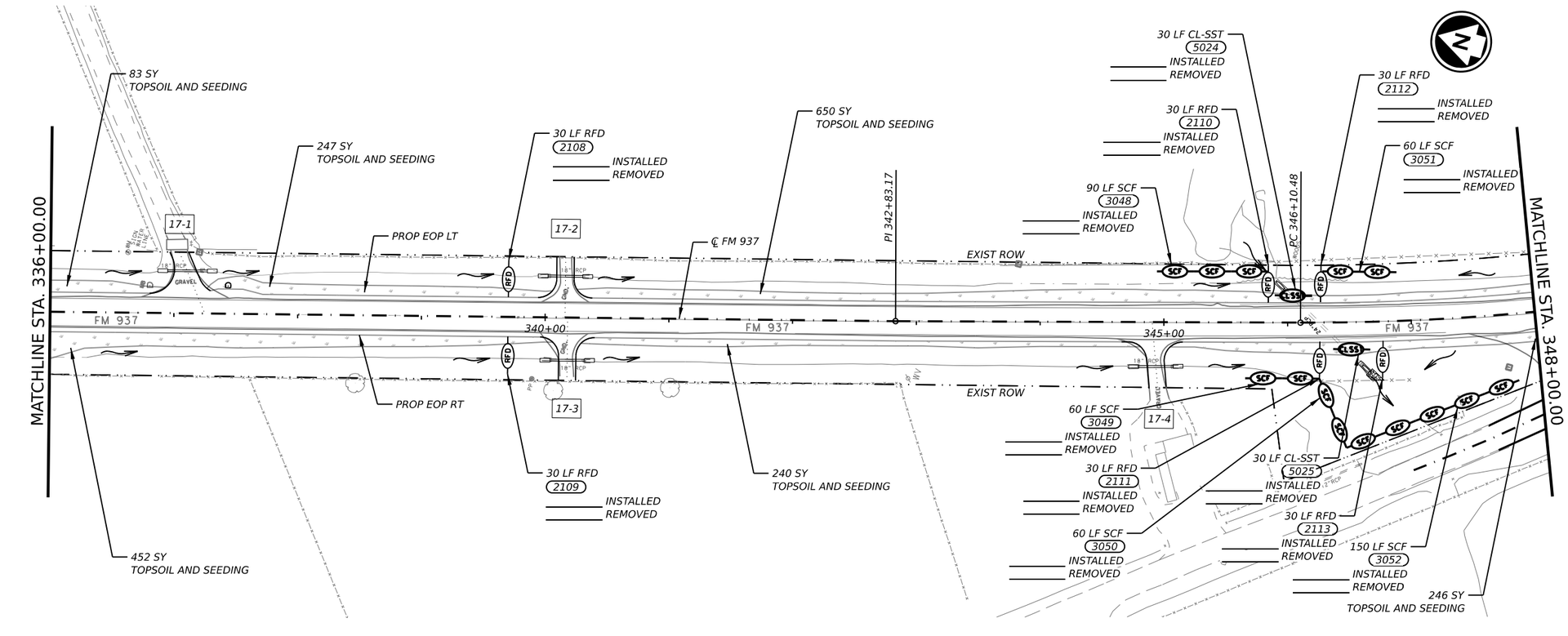

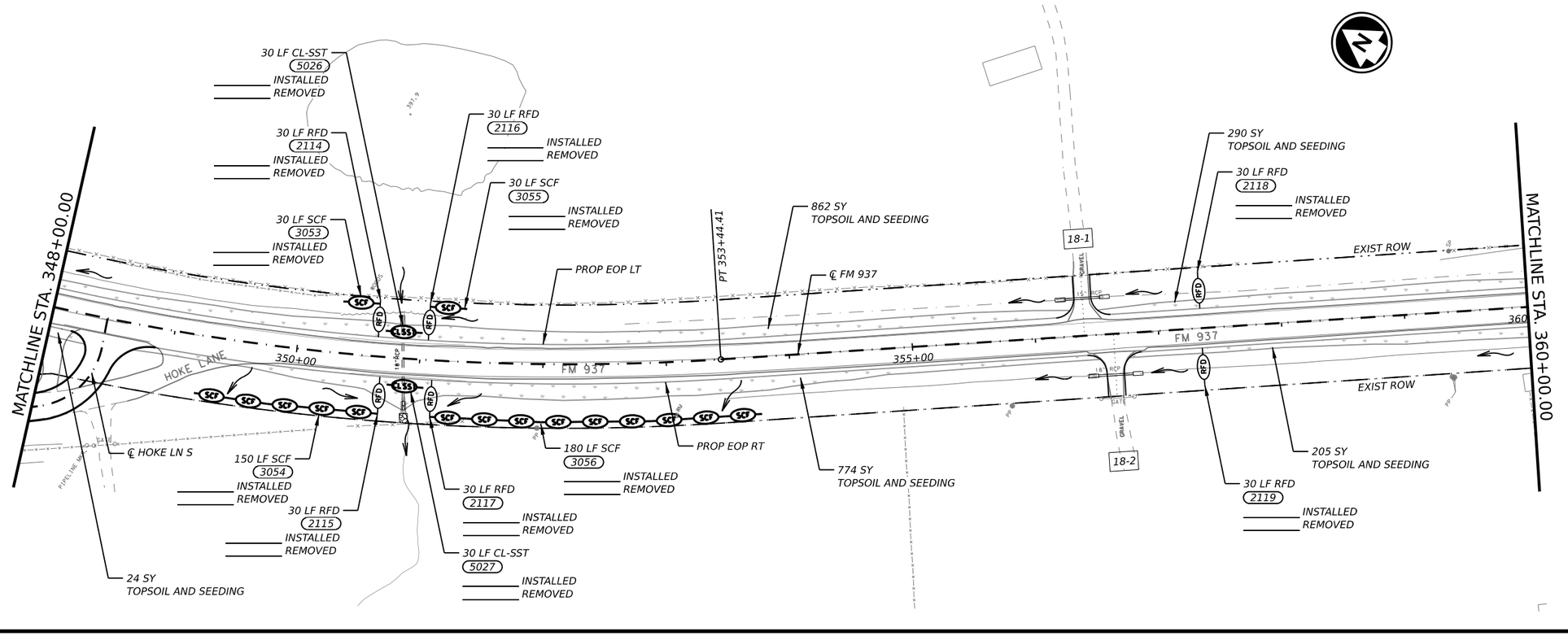

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5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

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PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

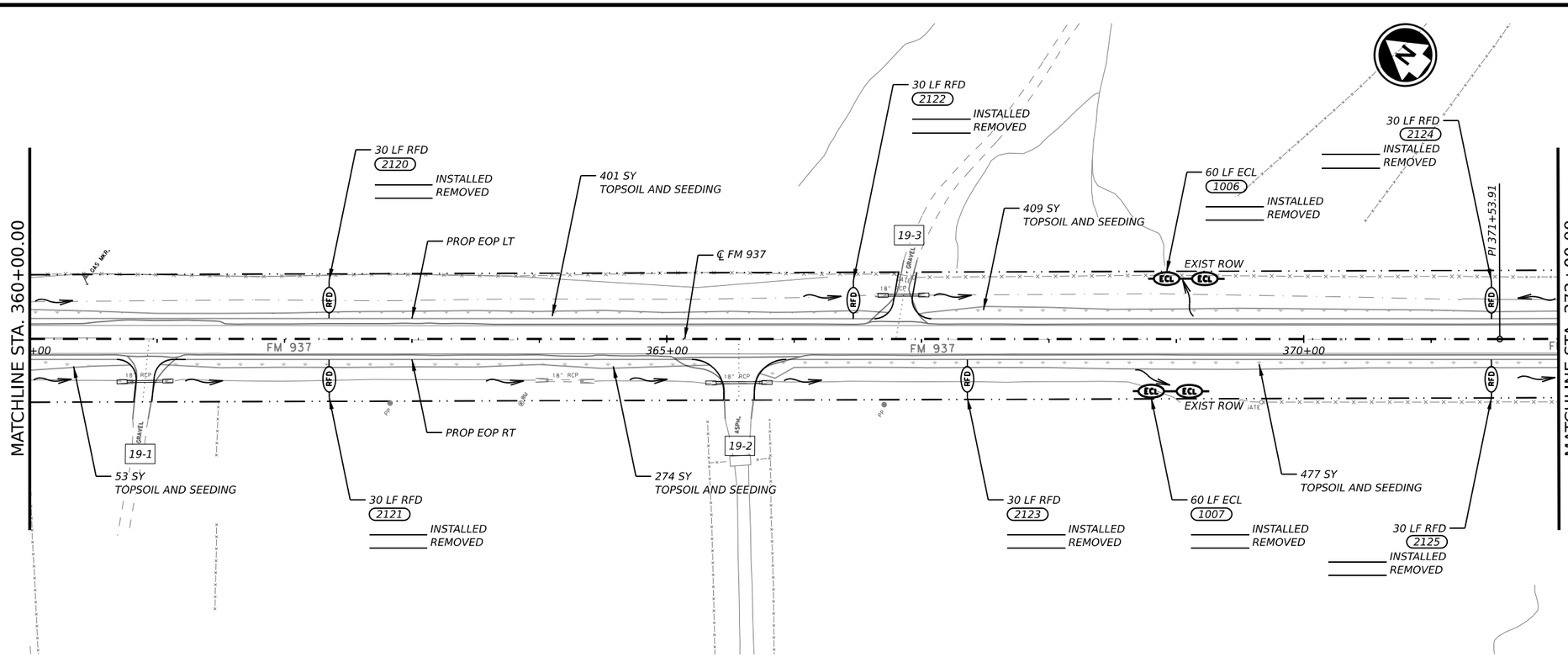
SW3P LAYOUT

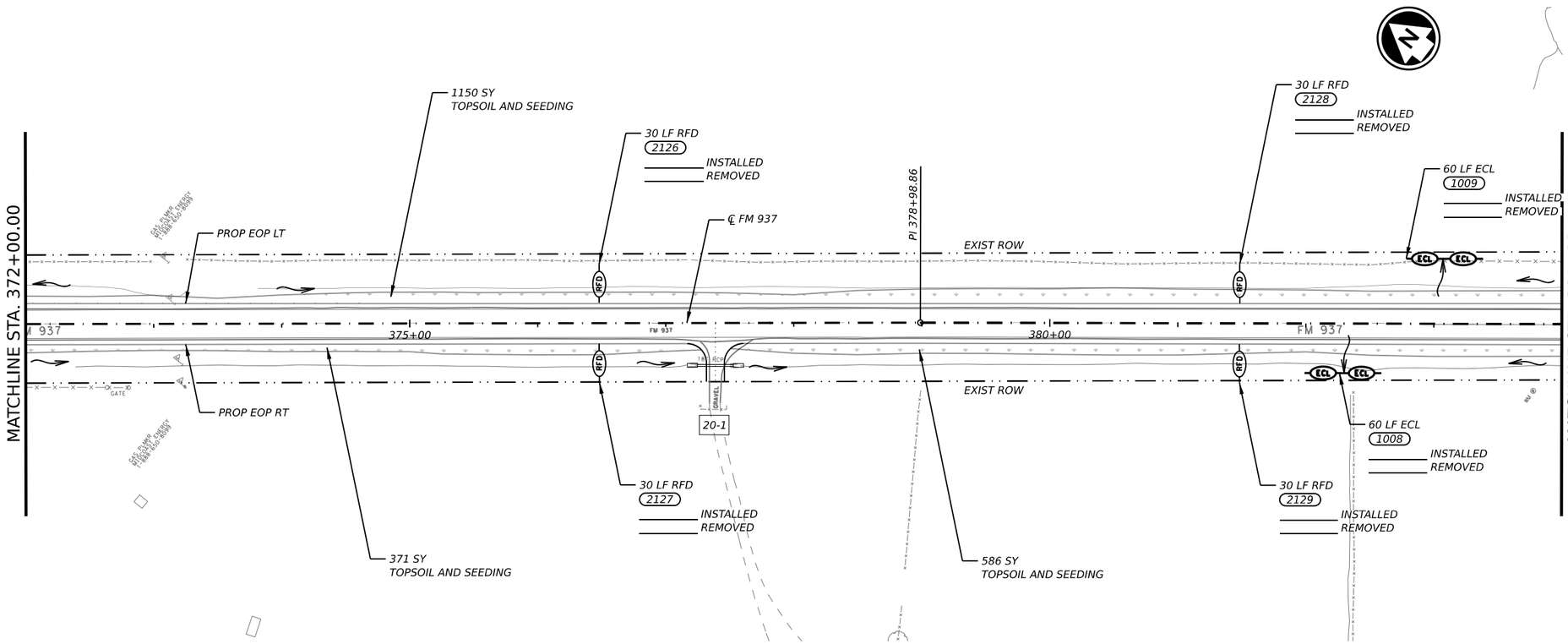
(STA 336+00 TO STA 360+00)

SHEET 9 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		224

CK:
DW:
CK:
DW:





LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

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FM 937

SW3P LAYOUT

(STA 360+00 TO STA 384+00)

SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		225

DATE: 5/26/2023 10:11:00 AM
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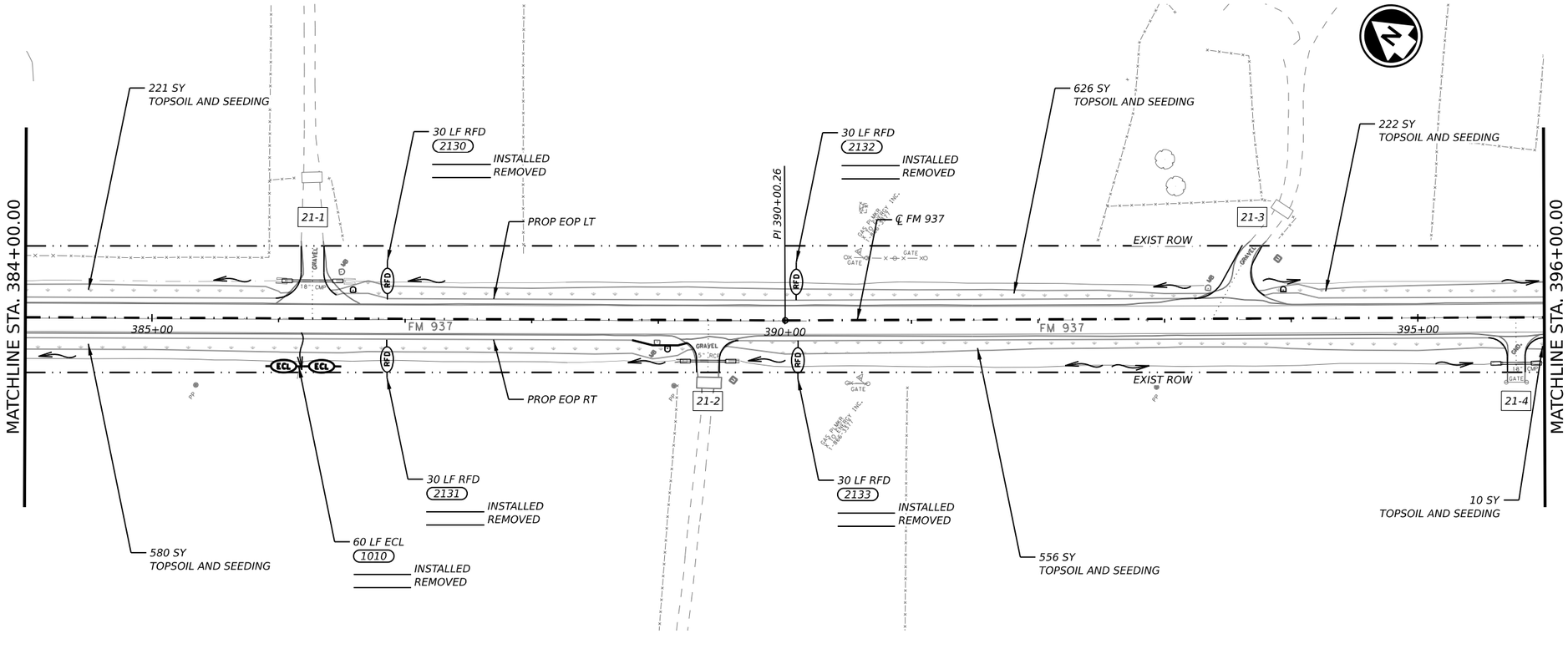

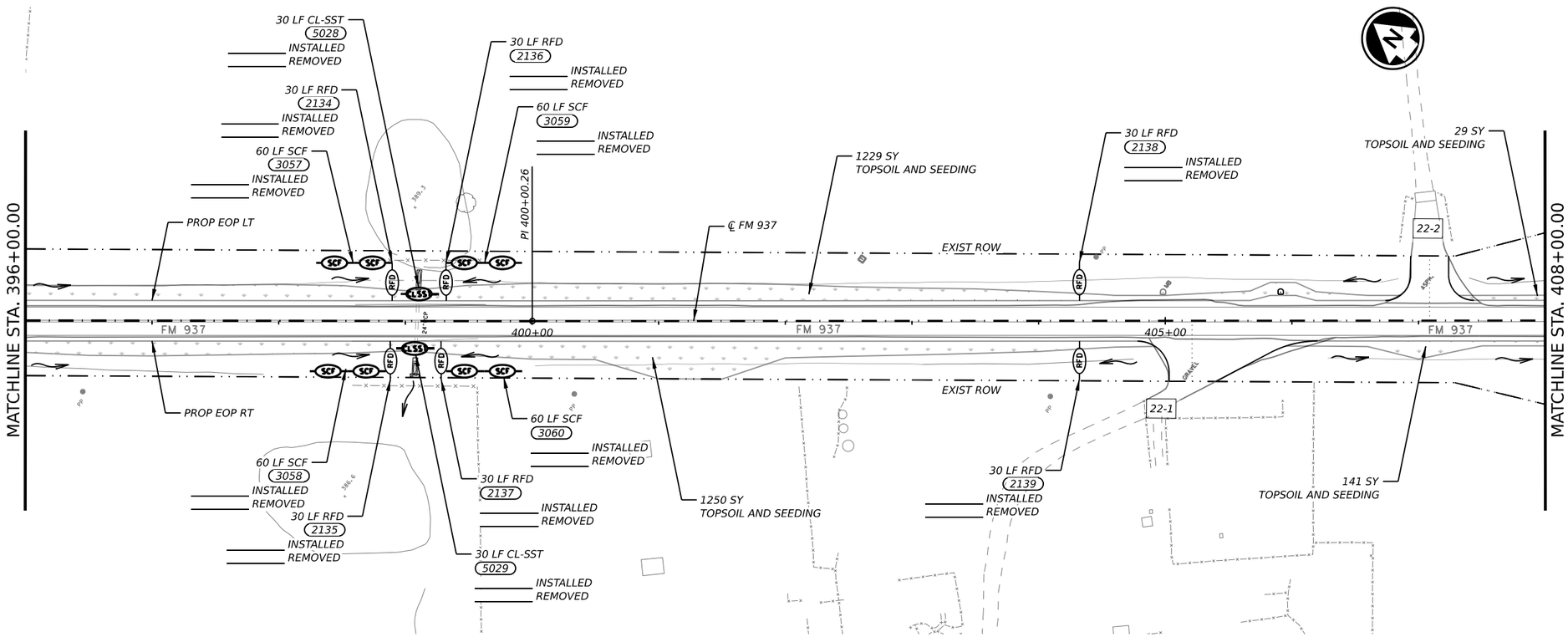

LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

5/26/2023

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

PGAL
TBPE REG. NO. F-2742

3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

FM 937

SW3P LAYOUT

(STA 384+00 TO STA 408+00)

SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
1191	05	009	FM 937
DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		226

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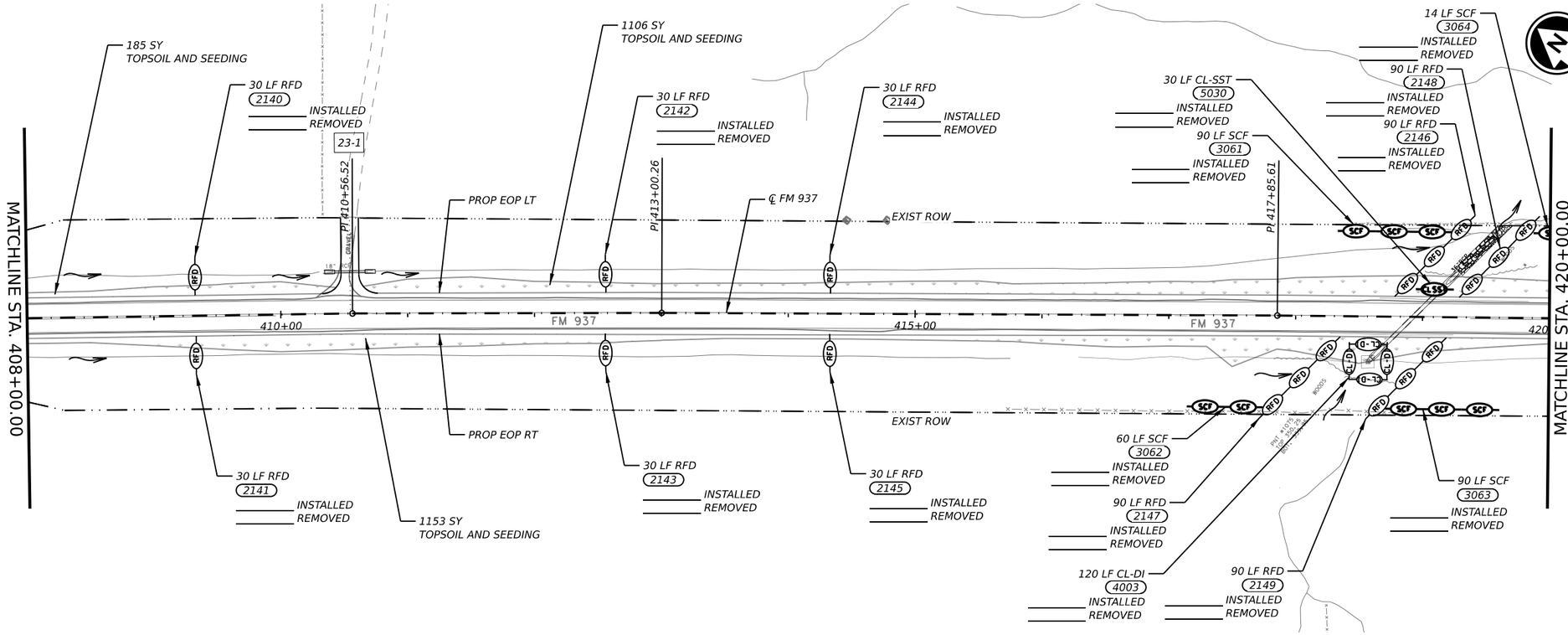

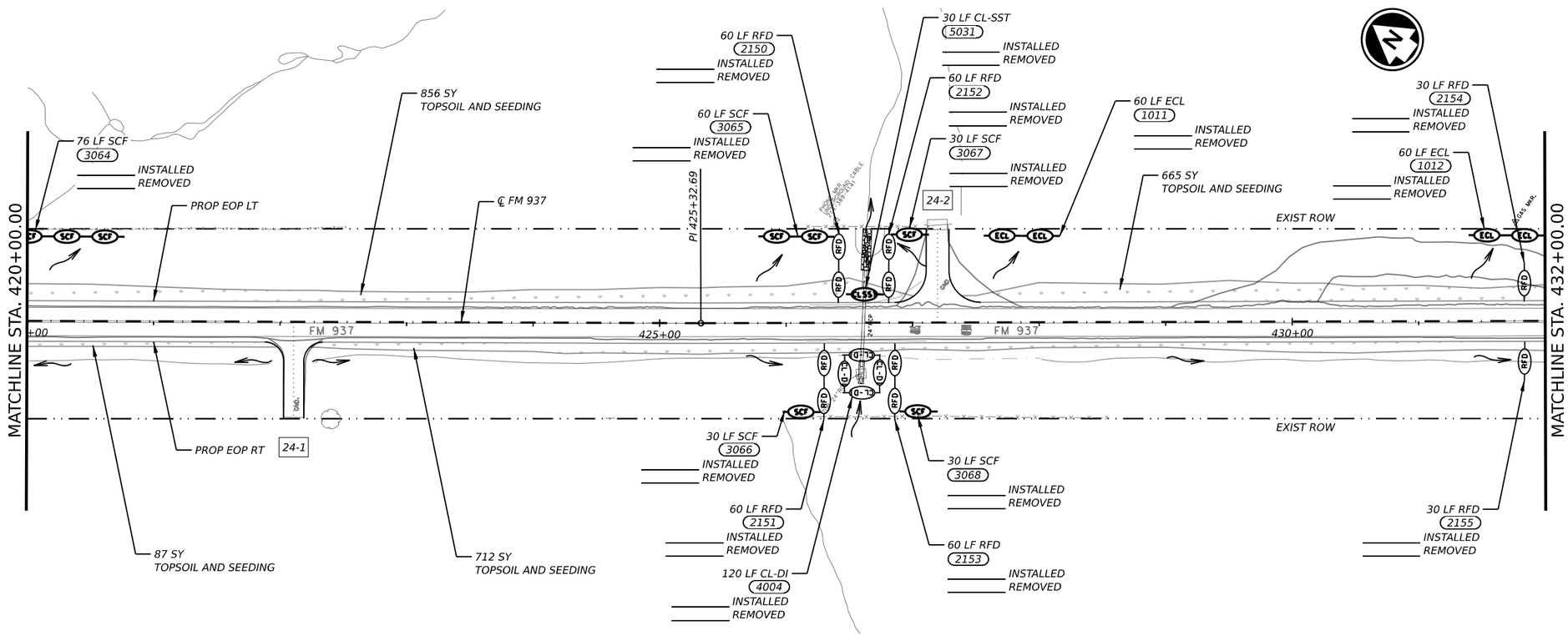

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FM 937

SW3P LAYOUT

(STA 408+00 TO STA 432+00)

SHEET 12 OF 13

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DIST	COUNTY		SHEET NO.
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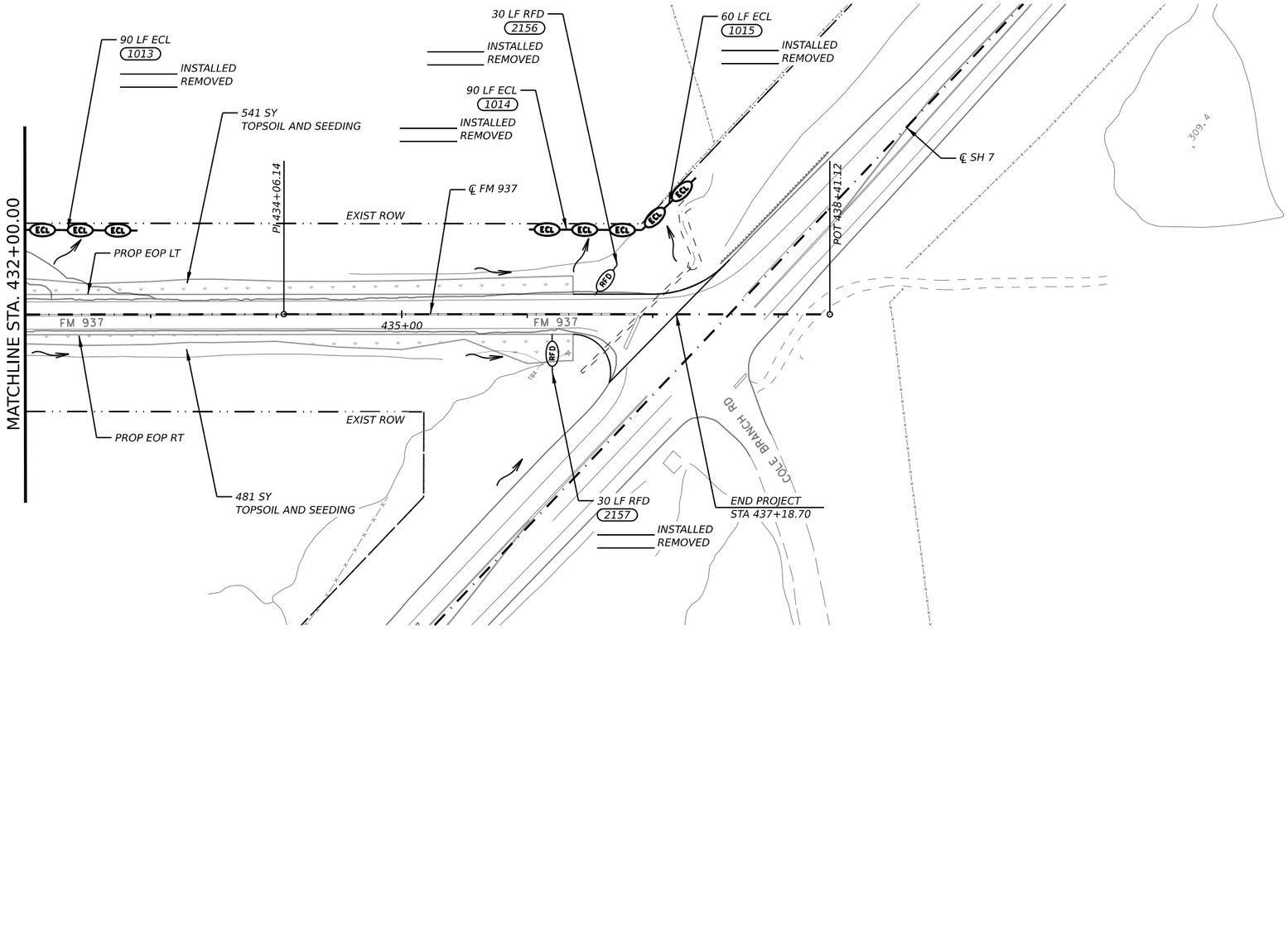

LEGEND

- CULVERT FLOW DIRECTION
- RFD — ROCK FILTER DAM
- SCF — TEMP SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- CL-DI — DROP INLET EROSION CONTROL LOG
- CLSST — EROSION CONTROL LOG ON SLOPES STAKE AND TRENCHING ANCHORING
- TEMP SEEDING

0 50 100

SCALE: 1" = 100'

5/26/2023

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SW3P LAYOUT

(STA 432+00 TO END)

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
BRY	ROBERTSON		228

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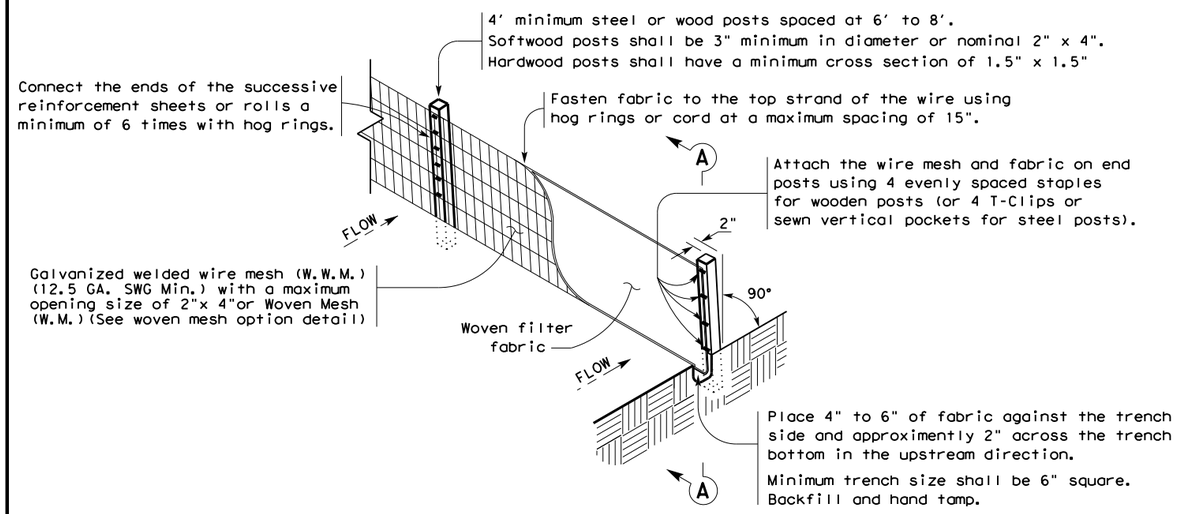
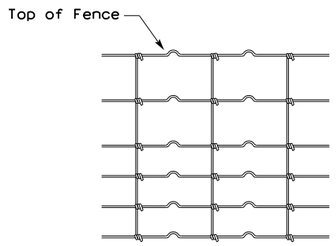
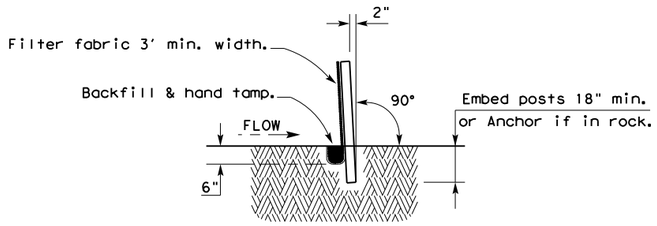


TEMPORARY SEDIMENT CONTROL FENCE

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.

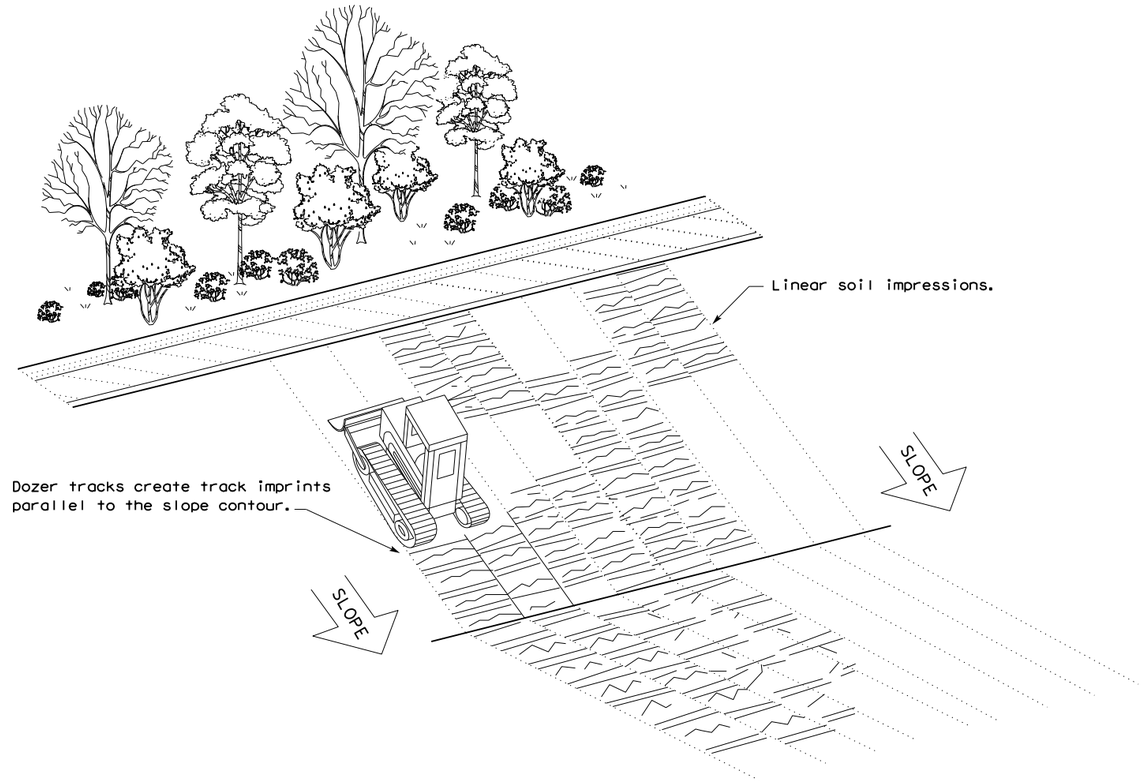
LEGEND

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	1191	05	009		FM 937	
	DIST	COUNTY			SHEET NO.	
	BRY	ROBERTSON			229	

5/2/2023
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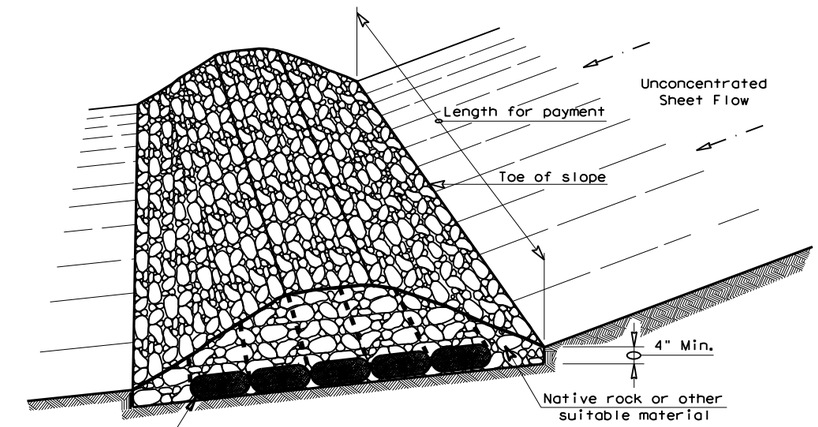
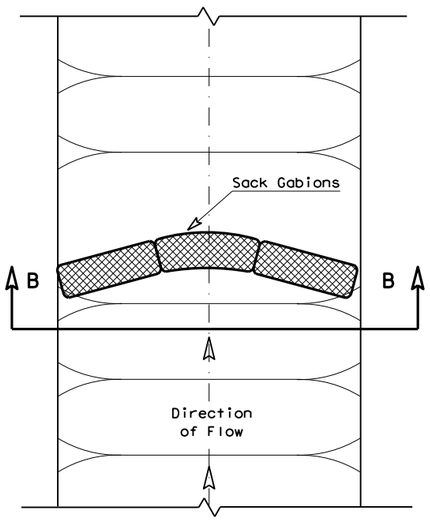
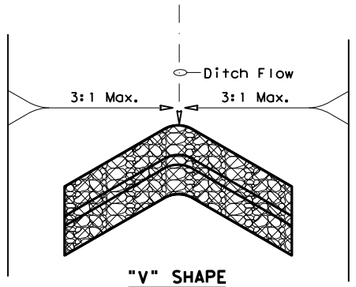


FILTER DAM AT TOE OF SLOPE

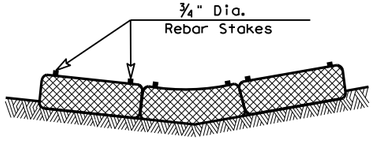
RFD1



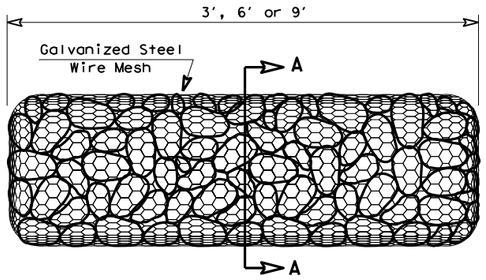
PLAN VIEW



"V" SHAPE PLAN VIEW

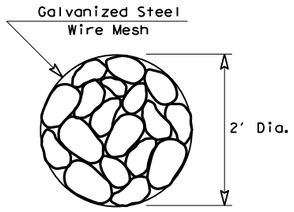


SECTION B-B

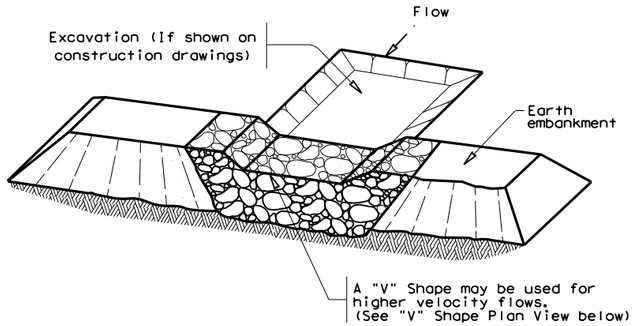


TYPE 4 (SACK GABIONS)

RFD4

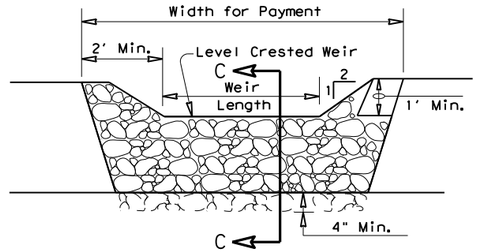


SECTION A-A

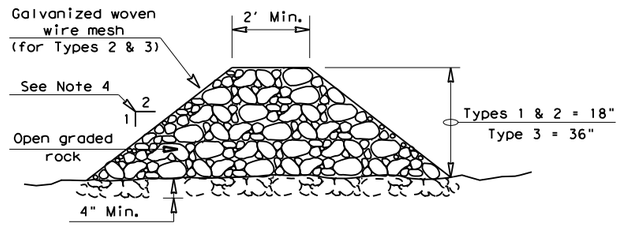


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

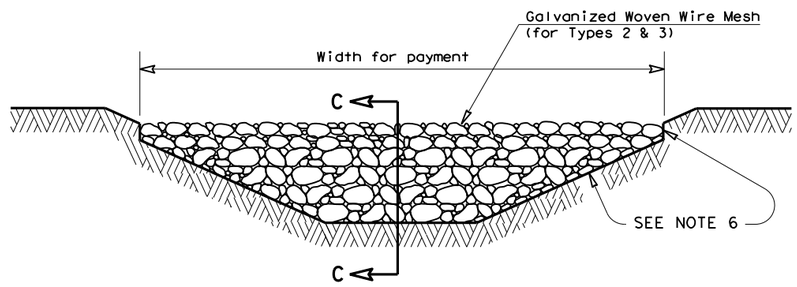
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		230

DATE: 5/26/2023
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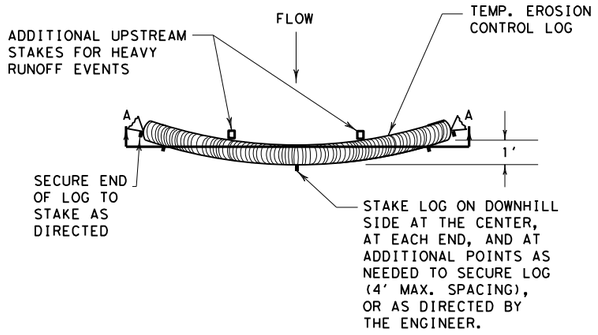
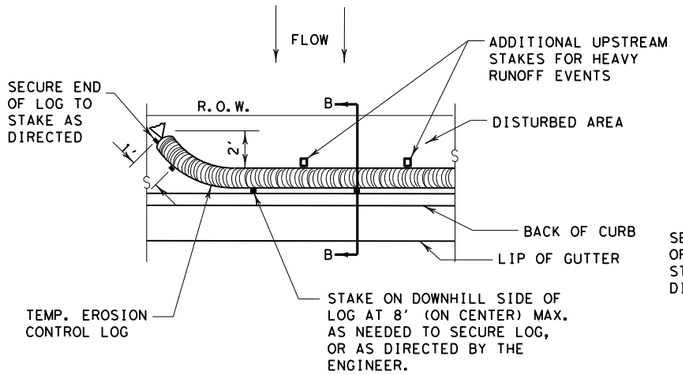


PLAN VIEW



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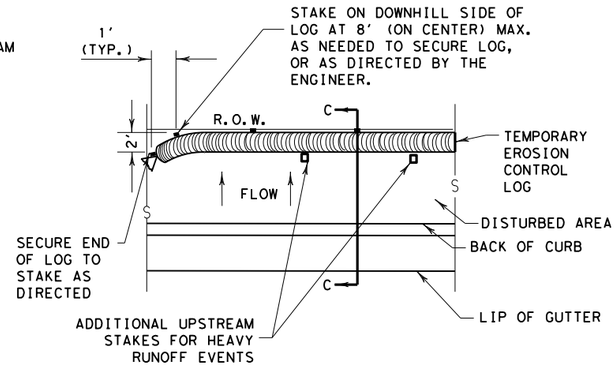

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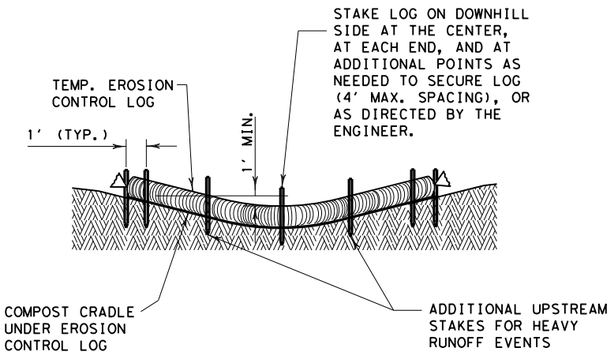
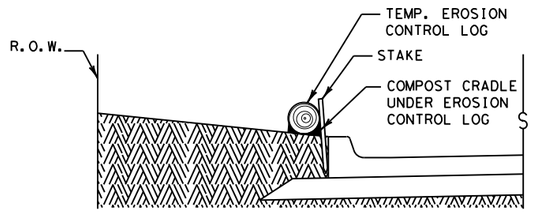


SECTION A-A

EROSION CONTROL LOG DAM

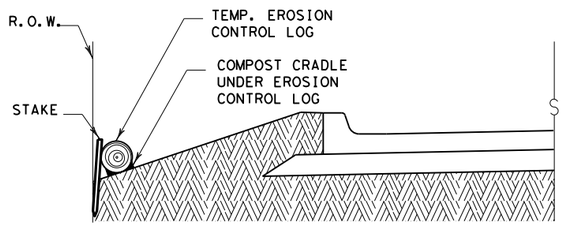
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

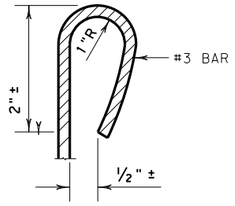
CL-BOC



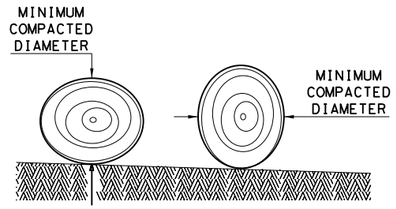
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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.

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		231

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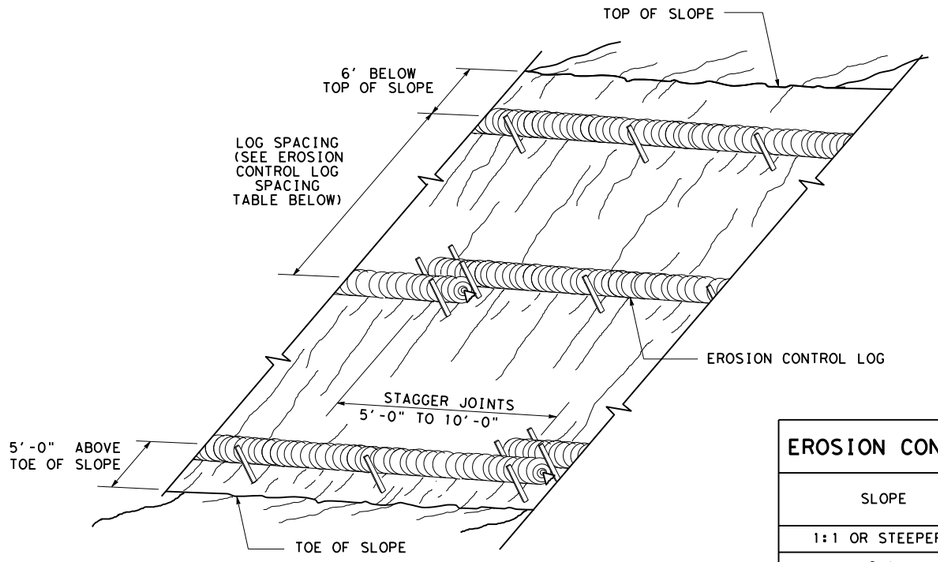
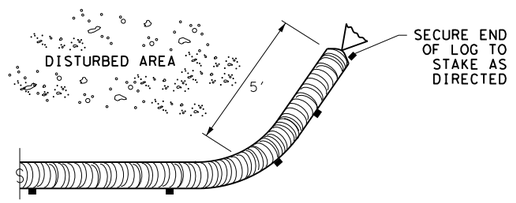


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

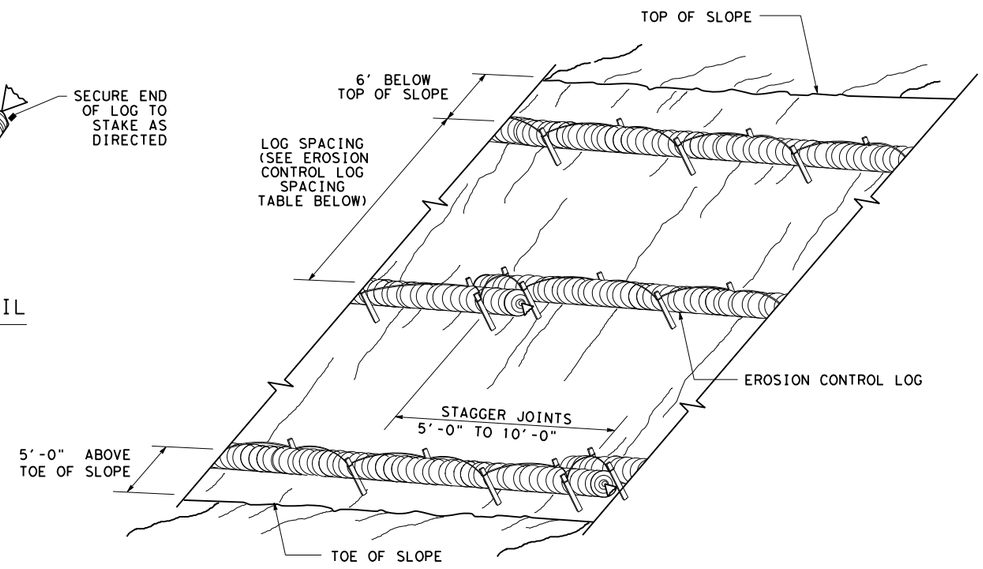
CL-SST



END SECTION RAP DETAIL

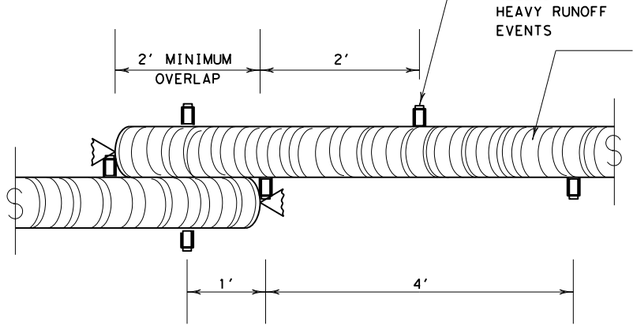
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

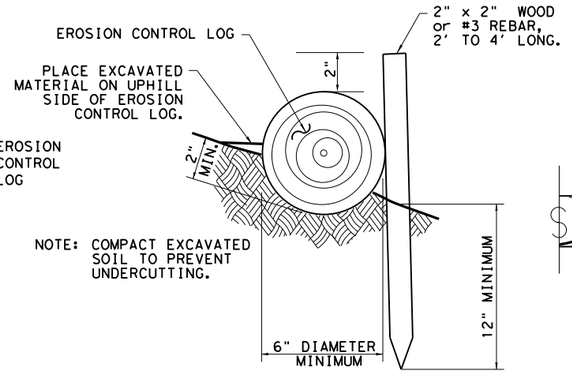
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

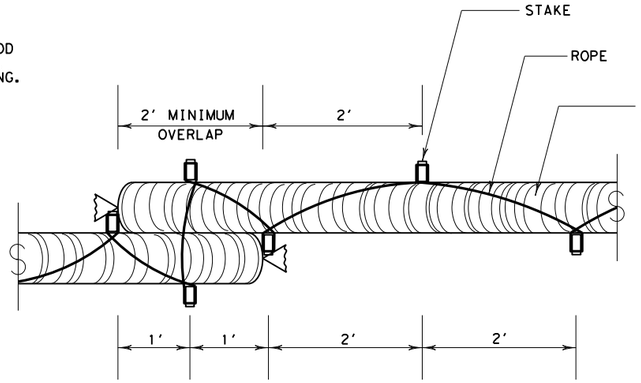


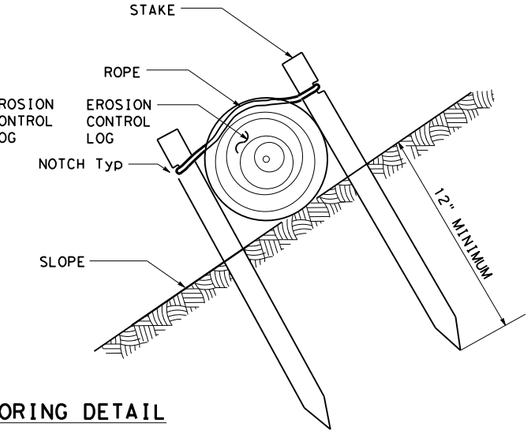


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

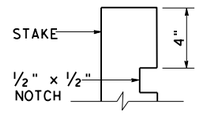
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

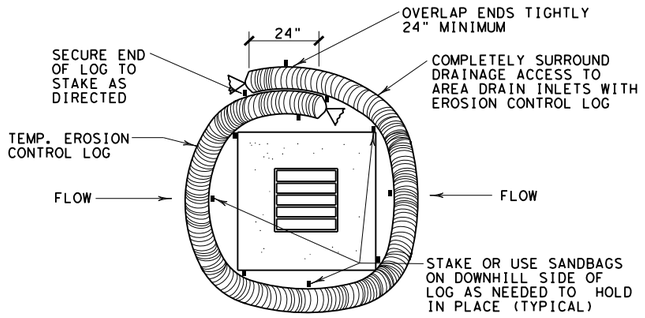
SHEET 2 OF 3

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

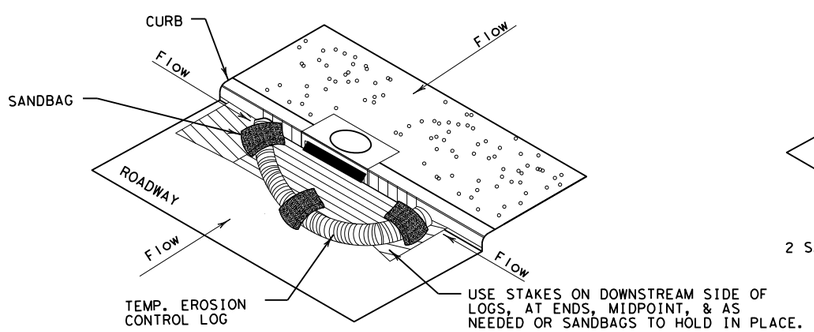
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1191	05	009	FM 937
	DIST	COUNTY		SHEET NO.
	BRY	ROBERTSON		232

DATE: 5/26/2023
FILE: R:\1005000-1005999\1005062.03\04_DOCUMENTS\FM_937\DESIGN\Plan_Set\V9. Environmental\009EDT03.dgn



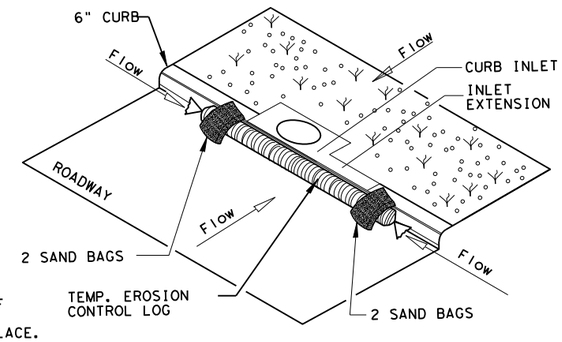
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

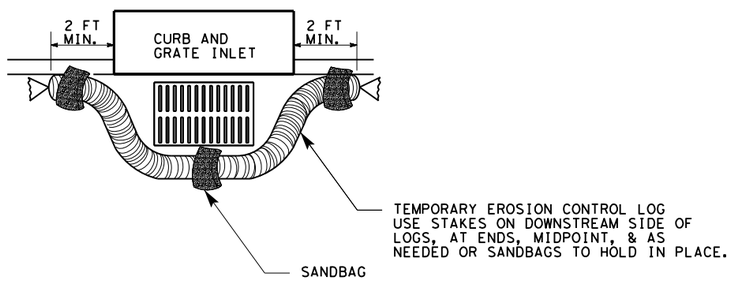
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

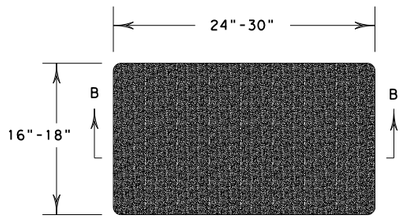
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	1191	05	009		FM 937	
	DIST	COUNTY				SHEET NO.
	BRY	ROBERTSON				233