PROJECT NO.			
BR (2024)854			
CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		1

INDEX OF SHEETS

SHEET NO. DESCRIPTION

SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. BR (2024)854
CCSJ: 1109-01-026, ETC.

CSJ	ROADWAY LENGTH FT	ROADWAY LENGTH MI	BRIDGE LENGTH FT	BRIDGE LENGTH MI	TOTAL LENGTH FT	TOTAL LENGTH MI
1109-01-022	26,302.00	4.981	46.00	0.009	26,348.00	4.990
BRIDGE REPLACEMENT 1109-01-026	400.00	0.076	130.00	0.025	530.00	0.100
TOTAL	26,702.00	5.057	176.00	0.033	26,878.00	5.091

DESIGN CRITERIA (CSJ 1109-01-026)
RURAL MINOR COLLECTOR, 4R
DESIGN SPEED = 50 MPH
A.D.T. (2023)= 700
A.D.T. (2043)= 1,000

DESIGN CRITERIA (CSJ 1109-01-022)
RURAL MINOR COLLECTOR, 3R
DESIGN SPEED = 30 MPH
A.D.T. (2023)= 700
A.D.T. (2043)= 1,000

FINAL PLANS

LETTING DATE: ____________

DATE CONTRACTOR BEGAN WORK: ____________

DATE WORK WAS COMPLETED & ACCEPTED: ____________

FINAL CONTRACT COST: $ ____________

CONTRACTOR : ____________

FM 777
JASPER COUNTY

LIMITS: FROM 4.9 MI S OF US 190 TO US 190 AT AIRPORT

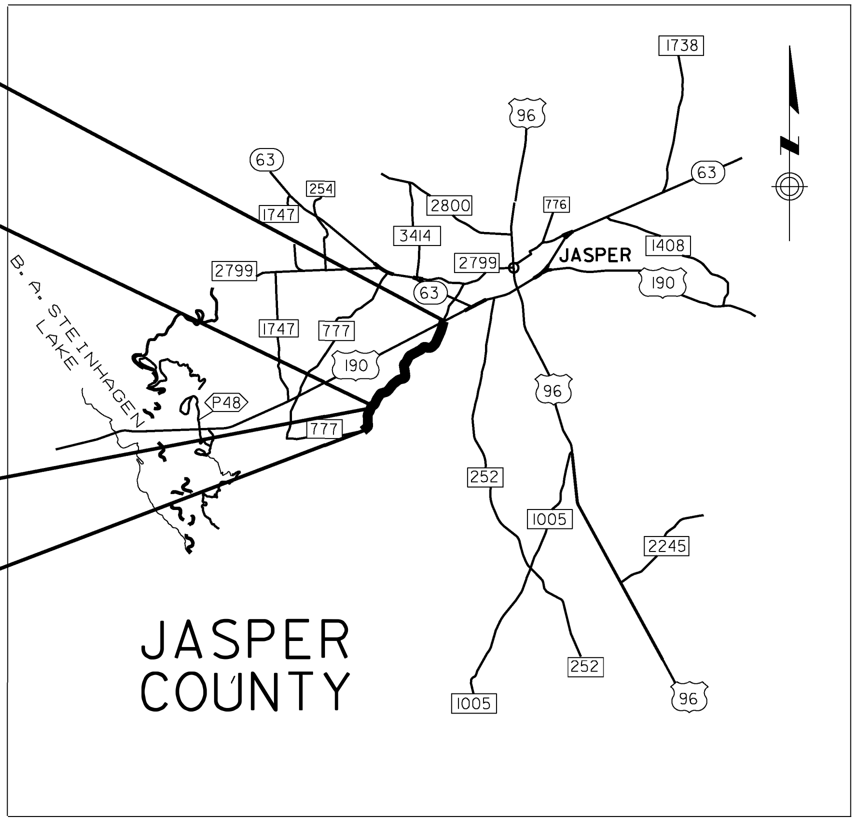
FOR THE CONSTRUCTION OF A ROADWAY WIDEN PROJECT CONSISTING OF SUBGRADE WIDENING, FULL DEPTH RECLAMATION, OVERLAY, STRUCTURE, AND BRIDGE REPLACEMENT

END PROJECT
END CSJ: 1109-01-022
STA: 471+16.00
REF MRK: 400+0.140

BEGIN CSJ: 1109-01-022
END CSJ: 1109-01-026
STA: 272+62.15
REF MRK: 395+5.910

BEGIN CSJ: 1109-01-026
END CSJ: 1109-01-022
STA: 271+32.15
REF MRK: 395+5.620

BEGIN PROJECT
BEGIN CSJ: 1109-01-022
STA: 206+38.00
REF MRK: 394+1.153



0 MI 5 MI
SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

REQUIRED TCP SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONRACTS (FORM FHWA 1273, OCTOBER 2023)

Texas Department of Transportation

SUBMITTED FOR LETTING: 1/23/2024
DocuSigned by:
DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 1/23/2024
DocuSigned by:
Lisa Collins
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 1/23/2024
DocuSigned by:
Martin N. Gorby, P.E.
DISTRICT ENGINEER

DATE: 1/19/2024 5:09:09 PM
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CK:
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SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3 - 8		PROJECT LAYOUT
9 - 12		TYPICAL SECTIONS
13, 13A - 13G		GENERAL NOTES
14, 14A - 14B		ESTIMATE & QUANTITY SHEET
15 - 29		MISCELLANEOUS SUMMARIES
30 - 31		SUMMARY OF SMALL SIGNS
		TRAFFIC CONTROL PLAN
32		SEQUENCE OF WORK
33		DETOUR PLAN
34 - 45	*	BC(1)-21 THRU BC(12)-21
46	*	WZ(STPM)-23
47	*	WZ(UL)-13
48	*	WZ(RCD)-13
49	*	WZ(RS)-22
50	*	TCP(1-2)-18
51	*	TCP(2-1)-18
52	*	TCP(2-2)-18
53	*	TCP(3-1)-13
54	*	TCP(3-3)-14
55	*	TREATMENT FOR VARIOUS EDGE CONDITIONS
		ROADWAY DETAILS
56 - 66		HORIZONTAL ALIGNMENT DATA
67 - 78		ROADWAY LAYOUTS
79		INTERSECTION DETAILS
80		TYPICAL DRIVEWAY & SIDEROAD DETAILS
81 - 92		REMOVAL LAYOUTS
93 - 94		SUPERELEVATION AND VERTICAL DATA
95		CLEARING DETAIL
96		HOT MIX LONGITUDINAL AND PAVEMENT EDGE JOINT DETAILS
97	*	RS(2)-23
98	*	RS(4)-23
99	*	TE(HMAC)-11
100	*	GF(31)-19
101	*	GF(31)MS-19
102 - 103	*	GF(31)TR TL3-20
104	*	BED-14
105	*	SGT(10S)31-16
106	*	SGT(12S)31-18
107, 107A-107B	*	SRG(TL-3)-21
108	*	PBGC
		DRAINAGE DETAILS
109 - 127		CROSS-CULVERT LAYOUT
128		CROSS-CULVERT HYDRAULIC DATA
129	*	CH-PW-0
130	*	PSET-RC
131	*	PSET-SC
132	*	PSET-SP
133	*	PSET-RP

SHEET NO.		DESCRIPTION
		BRIDGE DETAILS
134		BRIDGE DRAINAGE AREA MAP
135 - 137		BRIDGE HYDRAULIC DATA
138		BRIDGE LAYOUT
139		BRIDGE TYPICAL SECTION
140		SCOUR DATA
141		ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS
142		BORING LOGS
143	#	AJ
144 - 145	#	AXB-32
146	#	BAS-A
147	#	BXB-32
148 - 149	#	CSAB
150 - 151	#	FD
152 - 153	#	SRR
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162	#	XBBR-MS
163	#	XBCS
164	#	XBEB
165	#	XBSD-32
166	#	XBSK
167	#	XBTS
		BRIDGE CLASS CULVERTS
168 - 169		BRIDGE CLASS CROSS-CULVERT LAYOUT
170 - 171		BRIDGE CLASS CROSS-CULVERT HYDRAULIC DATA
172	*	BCS
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176 - 177	*	SETB-CD
		TRAFFIC STANDARDS
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179 - 190		PAVEMENT MARKING & SIGN LAYOUTS
191	*	SMD (GEN)-08
192	*	SMD (SLIP-1)-08
193	*	SMD (SLIP-2)-08
194	*	SMD (SLIP-3)-08
195	*	TSR (3)-13
196	*	TSR (4)-13
197	*	TSR (5)-13
198 - 201	*	MB-(1)-21 THRU MB-(4)-21
202	*	MBP(1)-22
203	*	MBP(2)-22
204	*	PM(1)-22
205	*	PM(2)-22
206	*	D&OM(1)-20
207	*	D&OM(2)-20
208	*	D&OM(3)-20
209	*	D&OM(4)-20
210	*	D&OM(5)-20
211	*	D&OM(VIA)-20
		ENVIRONMENTAL ISSUES
212 - 223		SW3P LAYOUT
224		EPIC SHEET
225 - 226	*	SW3P
227	*	SW3P-B
228	*	EC(1)-16
229	*	EC(2)-16
230	*	EC(3)-16
231 - 233	*	EC(9)-16

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

STATE OF TEXAS · JESSE L. LOFTIN · 106140 · LICENSED · PROFESSIONAL ENGINEER

Jesse L. Loftin — 2/18/2024

JESSE L. LOFTIN, P.E. — DATE

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

STATE OF TEXAS · ARTHUR VIDALES · 127233 · LICENSED · PROFESSIONAL ENGINEER

Arthur Vidales — 2/18/2024

ARTHUR VIDALES, P.E. — DATE

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
INDEX OF SHEETS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		2

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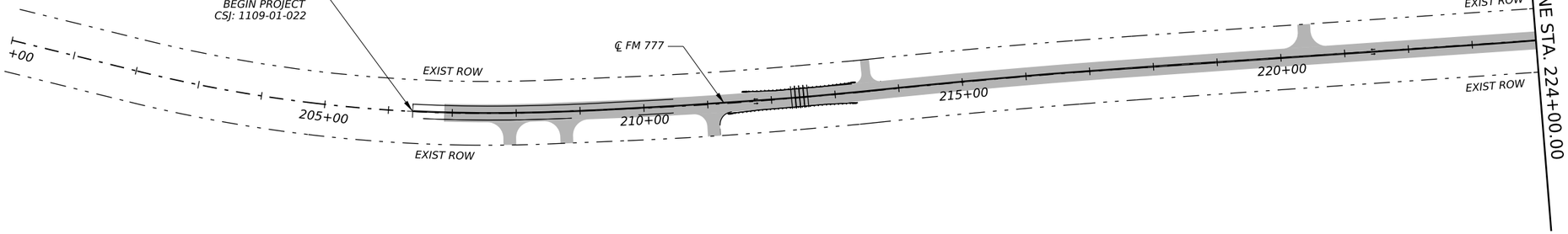
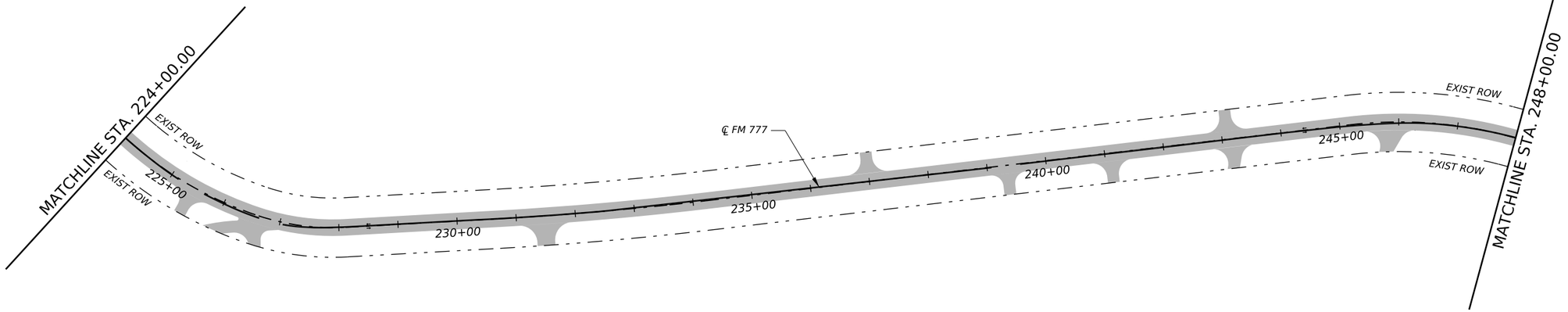
PROPOSED ROADWAY





0' 100' 200'

SCALE: 1"= 200'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

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PROJECT LAYOUT

SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		3

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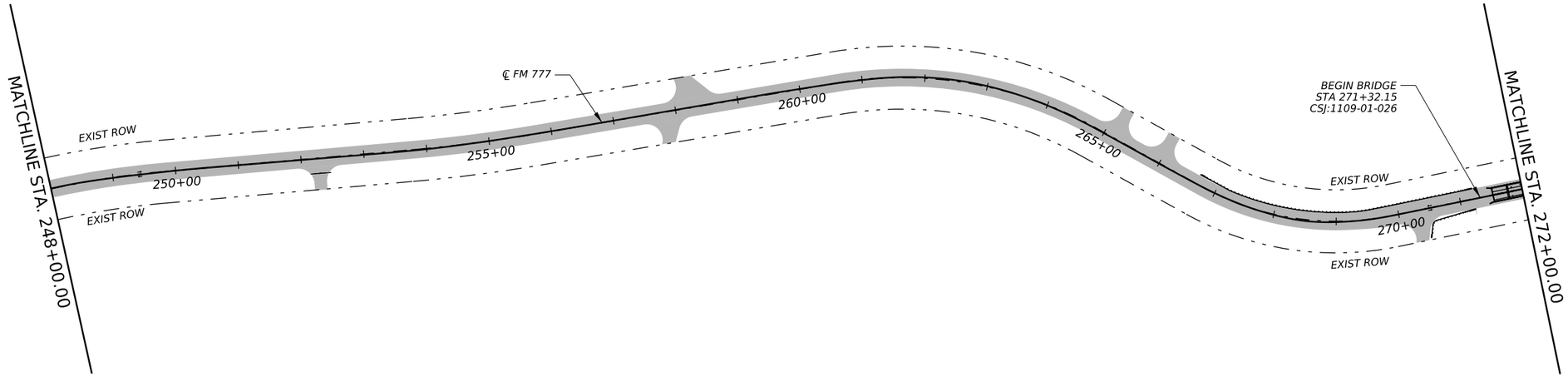
PROPOSED ROADWAY



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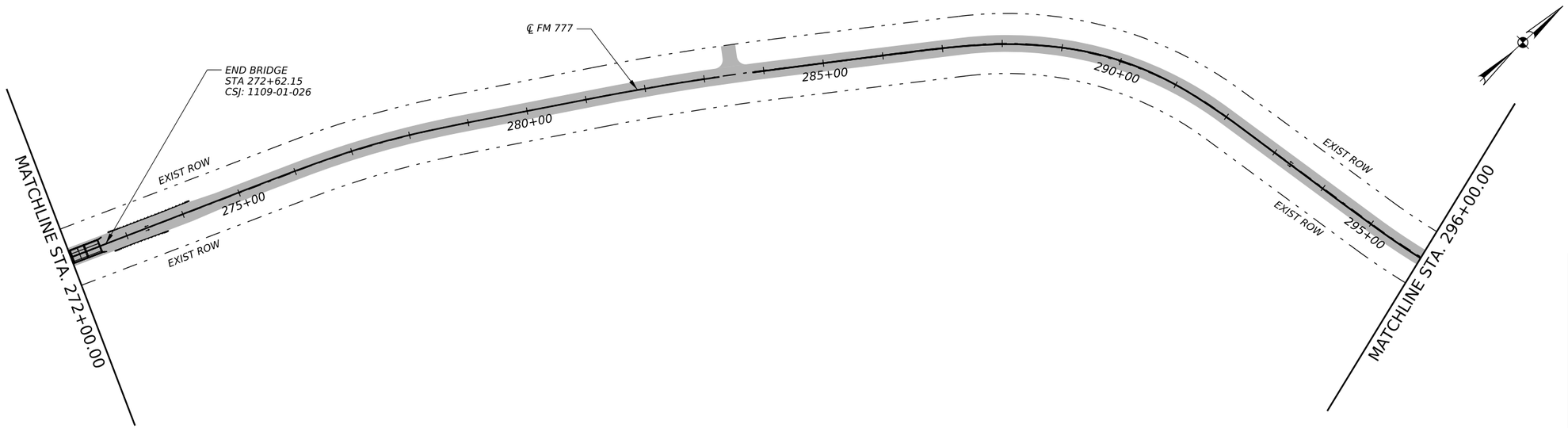

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PROJECT LAYOUT

SHEET 2 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		4

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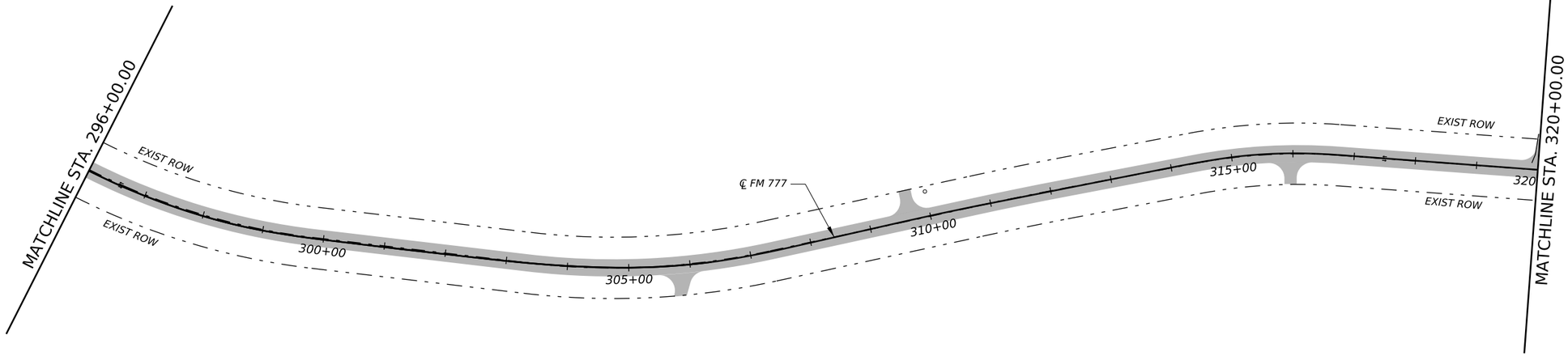
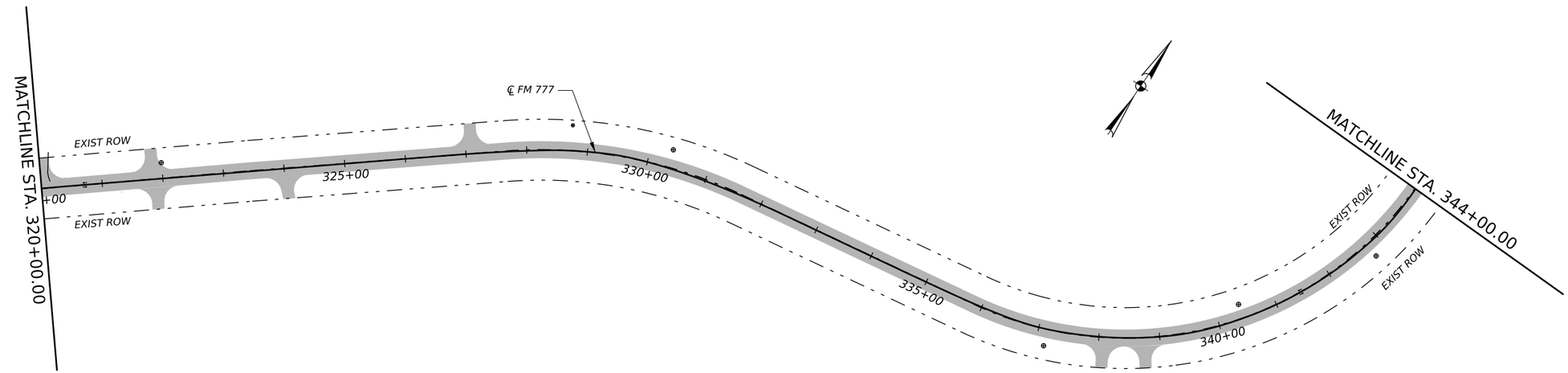
LEGEND:

EXIST ROW

PROPOSED ROADWAY





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SCALE: 1"= 200'

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PROJECT LAYOUT

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		5

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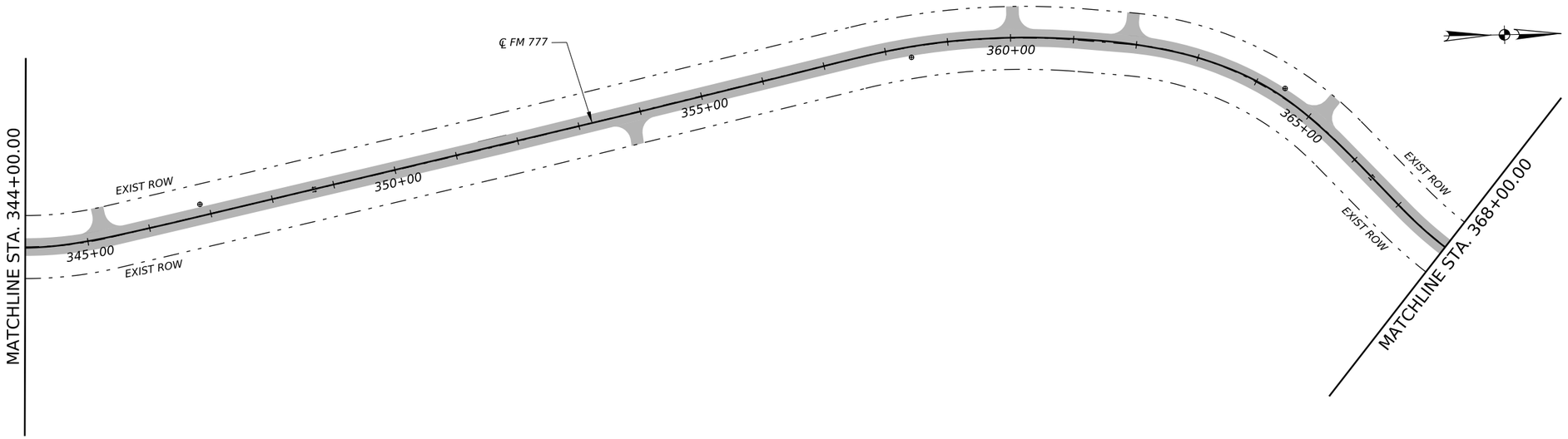
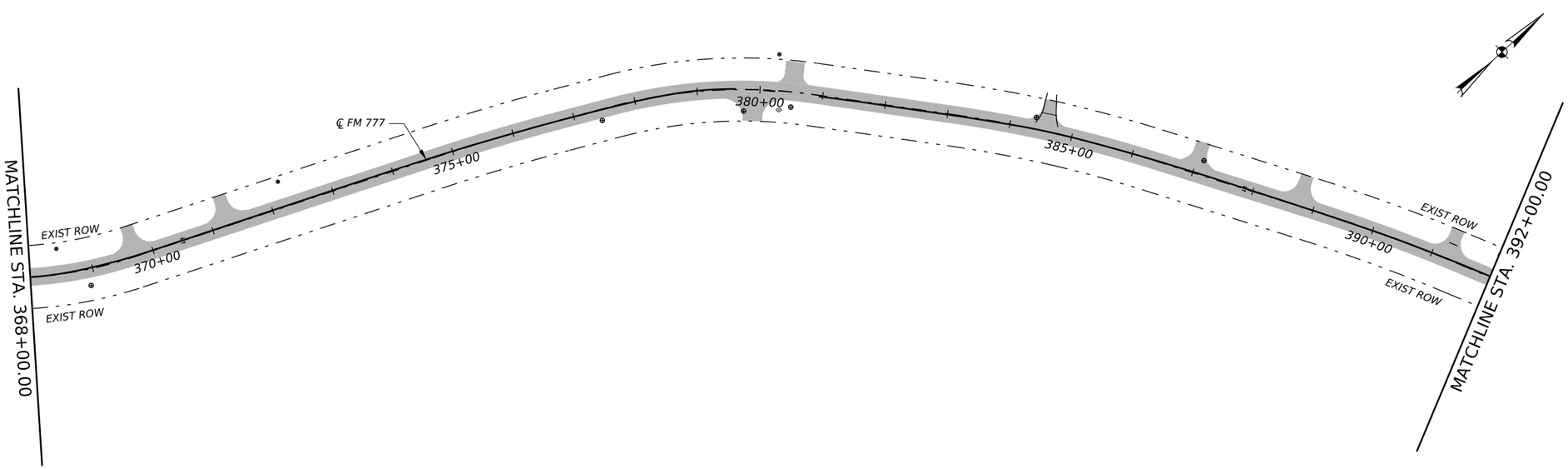
LEGEND:

EXIST ROW

PROPOSED ROADWAY





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SCALE: 1"= 200'

STATE OF TEXAS
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PROJECT LAYOUT

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		6

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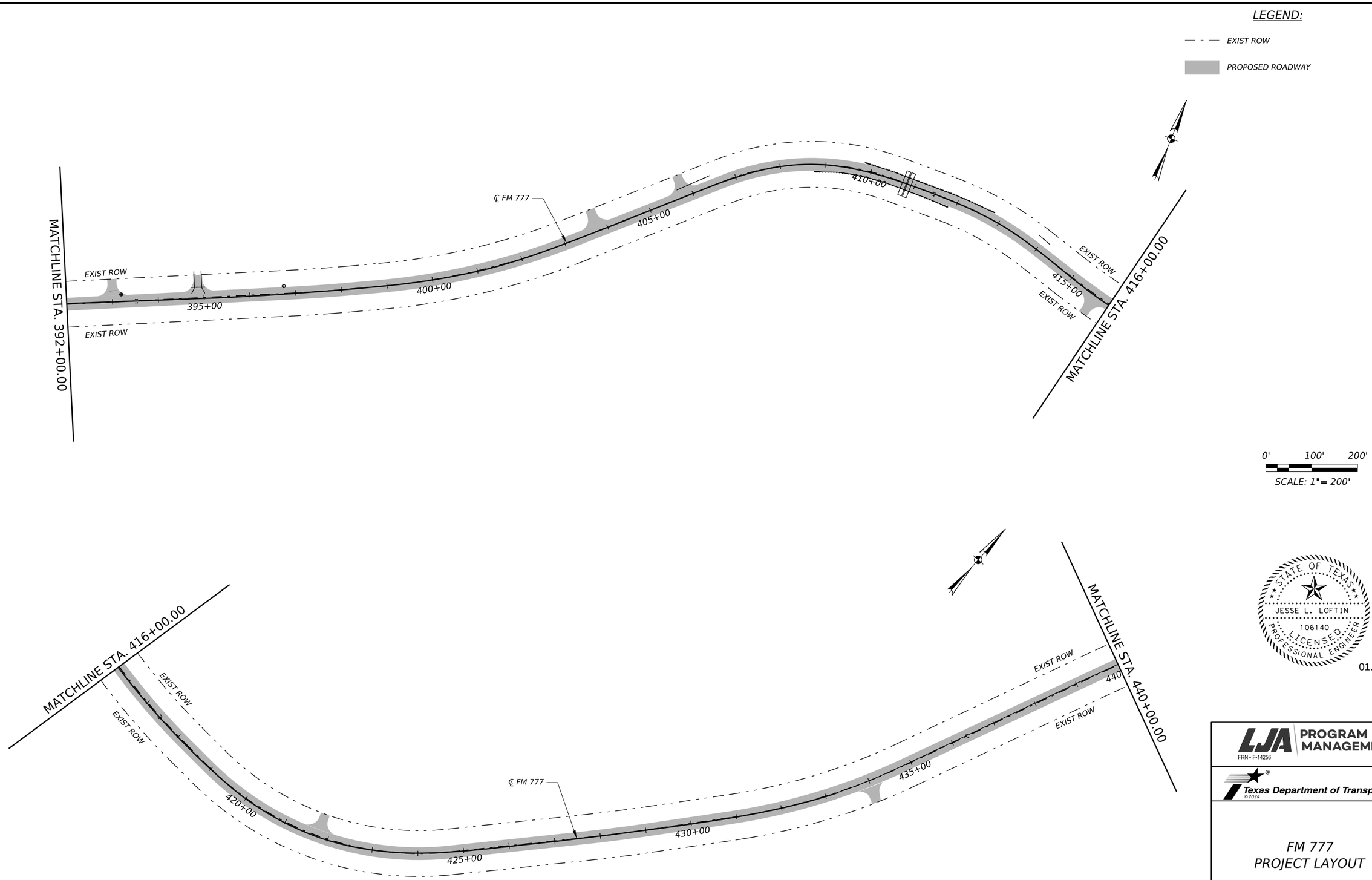

STATE OF TEXAS
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FRN - F-14256

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PROJECT LAYOUT

SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		7

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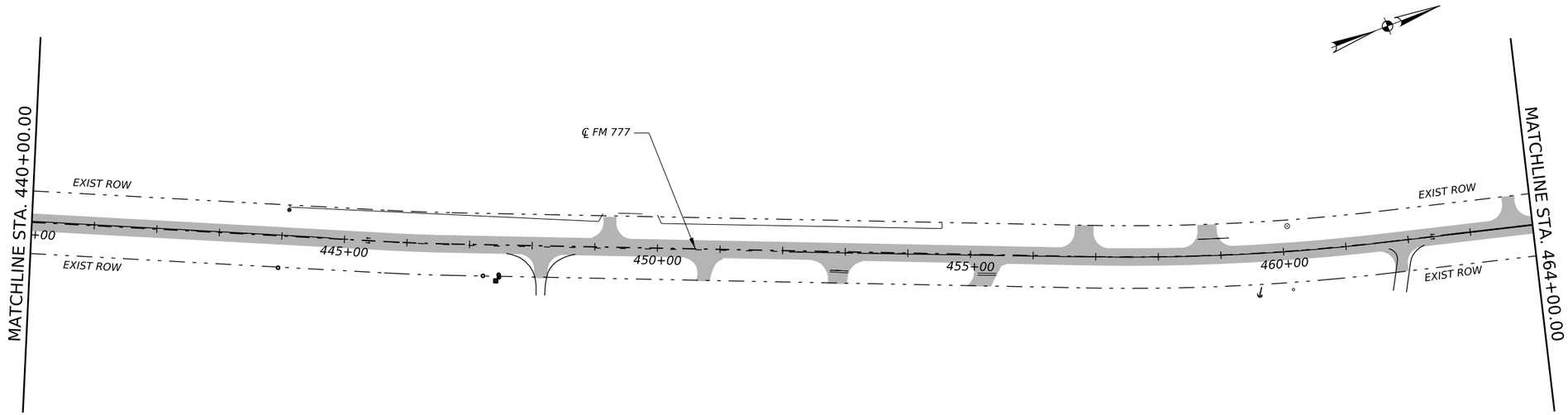
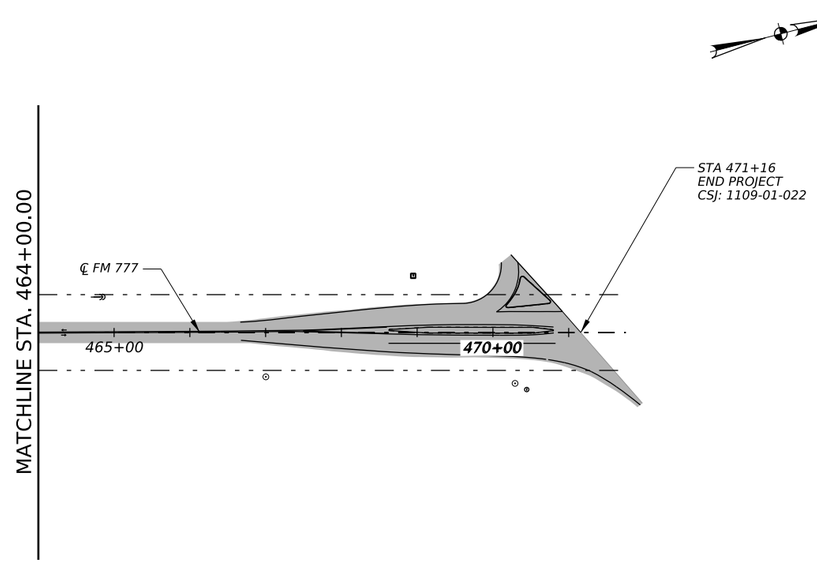
LEGEND:

EXIST ROW

PROPOSED ROADWAY





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SCALE: 1"= 200'

01.30.24

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PROJECT LAYOUT

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		8

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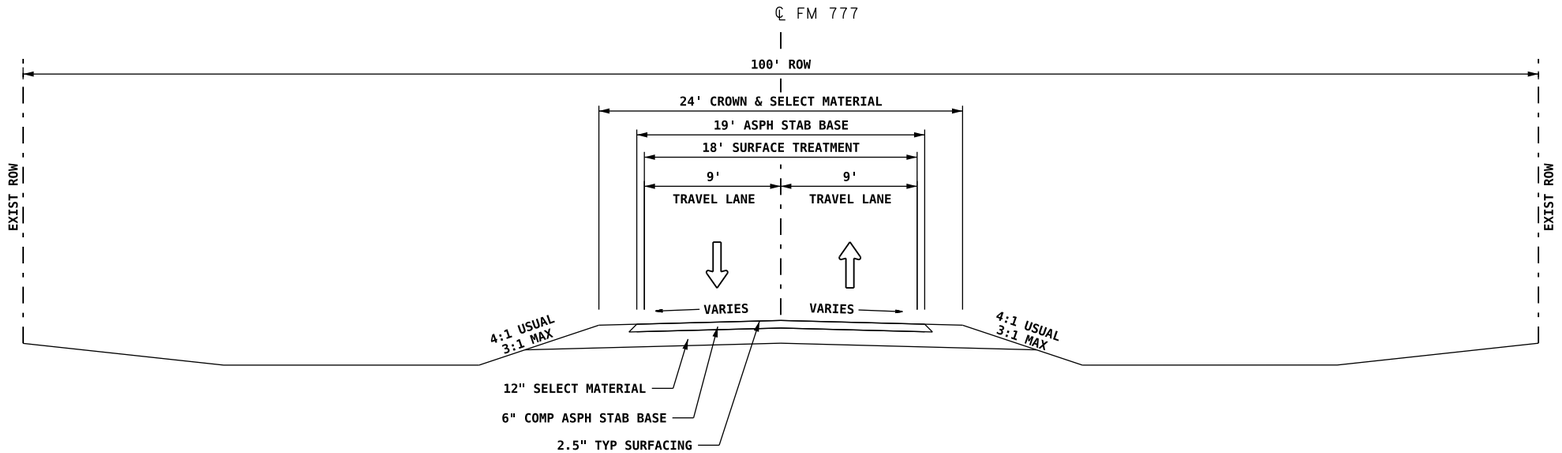

EXISTING TYPICAL SECTION

STA 205+86.72 TO STA 466+48 LT
STA 205+86.72 TO STA 466+79 RT

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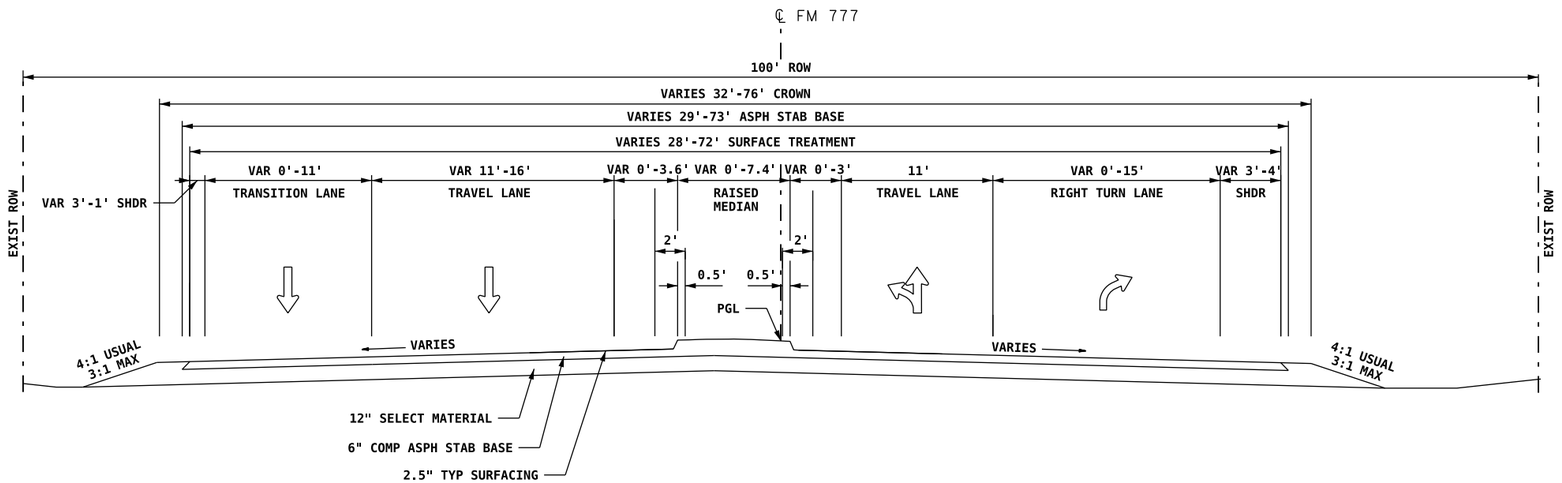

EXISTING TYPICAL SECTION

STA 466+48 TO STA 471+16 LT
STA 466+79 TO STA 471+16 RT

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FM 777
EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		9

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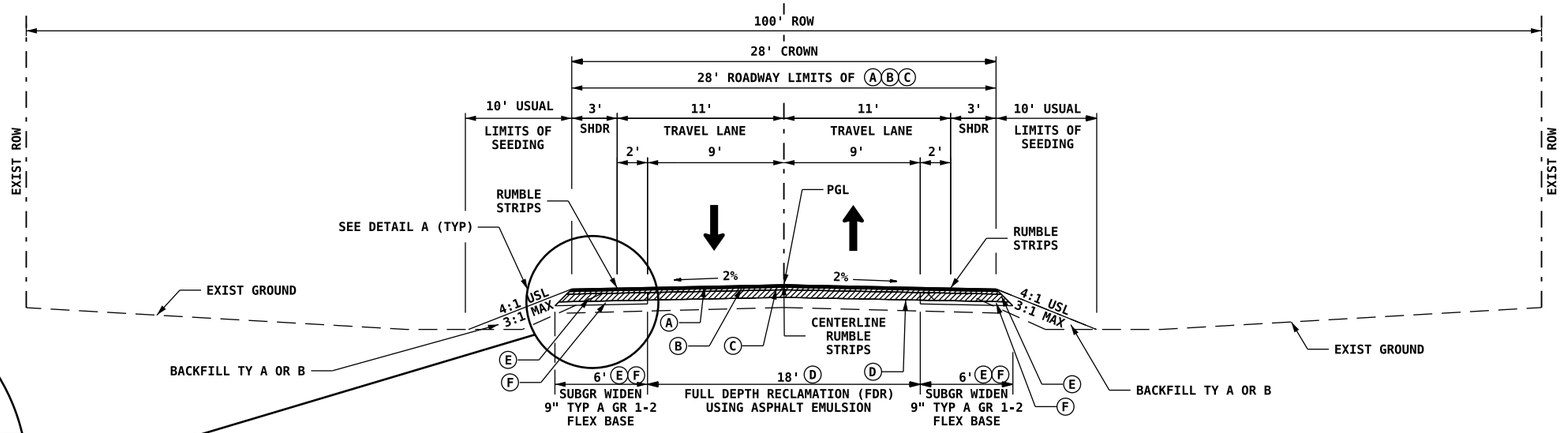
STA 206+38 TO STA 206+88 TRANSITION TO B (FROM EXISTING)

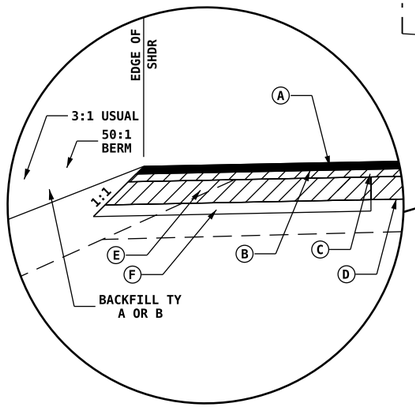


A PROPOSED TYPICAL SECTION

STA 215+39 TO STA 222+65
STA 229+24 TO STA 229+50
STA 235+41 TO STA 243+80
STA 250+89 TO STA 252+62
STA 256+87 TO STA 259+38
STA 271+01 TO STA 274+95
STA 285+30 TO STA 286+04
STA 293+23 TO STA 293+84
STA 301+06 TO STA 302+13
STA 308+52 TO STA 309+70
STA 318+04 TO STA 326+29

STA 332+99 TO STA 334+58
STA 346+65 TO STA 356+36
STA 371+04 TO STA 373+91
STA 392+61 TO STA 395+80
STA 404+29 TO STA 405+45
STA 426+06 TO STA 426+51
STA 435+92 TO STA 444+72
STA 448+06 TO STA 455+72
STA 462+77 TO STA 466+79 RT
STA 462+77 TO STA 466+49 LT

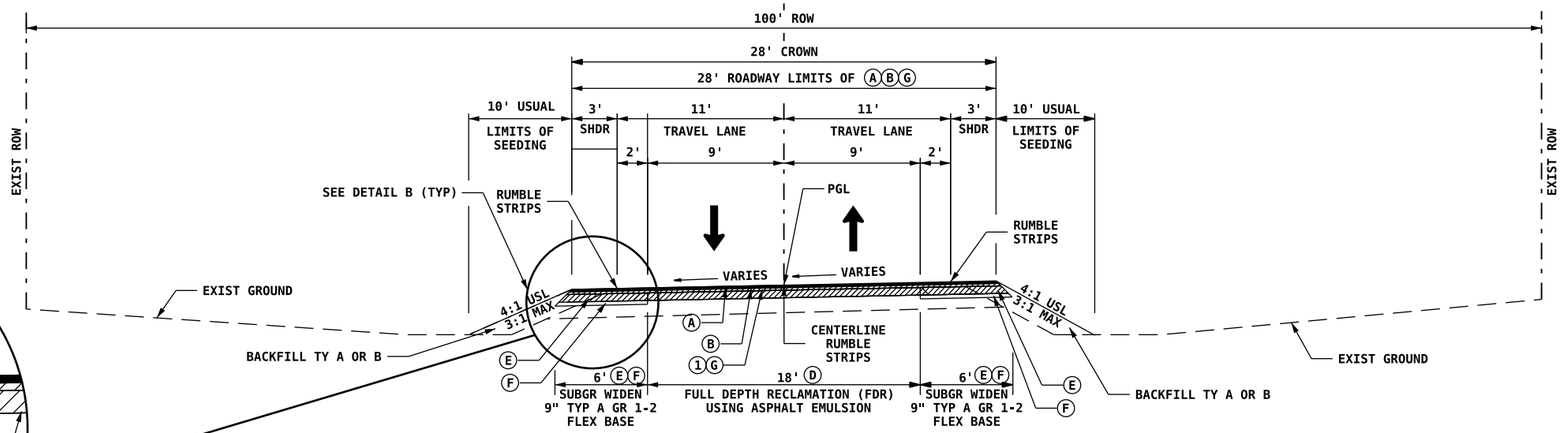
DETAIL A
NTS (TYP)



LEGEND:

- (A) 2" SUPERPAVE HOT MIX (SP-C PG 76-22)
- (B) FOG SEAL (CSS-1H)
- (C) 2" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (D) 6" FULL DEPTH RECLAMATION (FDR) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (E) 6" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (F) 4" FLEX BASE (TY A) (GR 1-2)
- (G) VARIES FLEX BASE (TY A) (GR 1-2) W / 1 % CEMENT TREATMENT + 4.2 % EMULSION TREATMENT BY WEIGHT

NOT TO SCALE

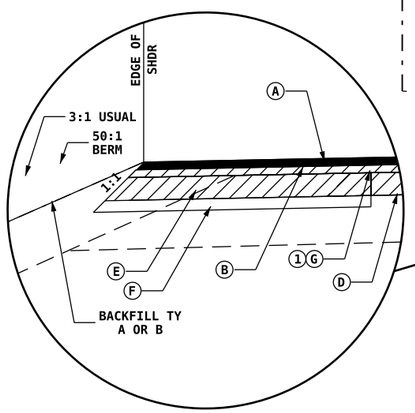


B PROPOSED TYPICAL SECTION

STA 206+88 TO STA 215+39
STA 222+65 TO STA 229+24
STA 229+50 TO STA 235+41
STA 243+80 TO STA 250+89
STA 252+62 TO STA 256+87
STA 259+38 TO STA 268+42
STA 275+20 TO STA 285+30
STA 286+04 TO STA 293+23
STA 293+84 TO STA 301+06
STA 302+13 TO STA 308+52

STA 309+70 TO STA 318+04
STA 326+29 TO STA 332+99
STA 334+58 TO STA 346+65
STA 356+36 TO STA 371+04
STA 373+91 TO STA 392+61
STA 395+80 TO STA 404+29
STA 405+45 TO STA 426+06
STA 426+51 TO STA 435+92
STA 444+72 TO STA 448+06
STA 455+72 TO STA 462+77

DETAIL B
NTS (TYP)



(1) ADD FLEX BASE TO ADJUST FOR CROSS SLOPES

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED PROFESSIONAL ENGINEER
01.30.24

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FM 777
PROPOSED TYPICAL SECTIONS

SHEET 1 OF 3

CONT.	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		10

DATE: 1/30/2024 8:05:23 AM
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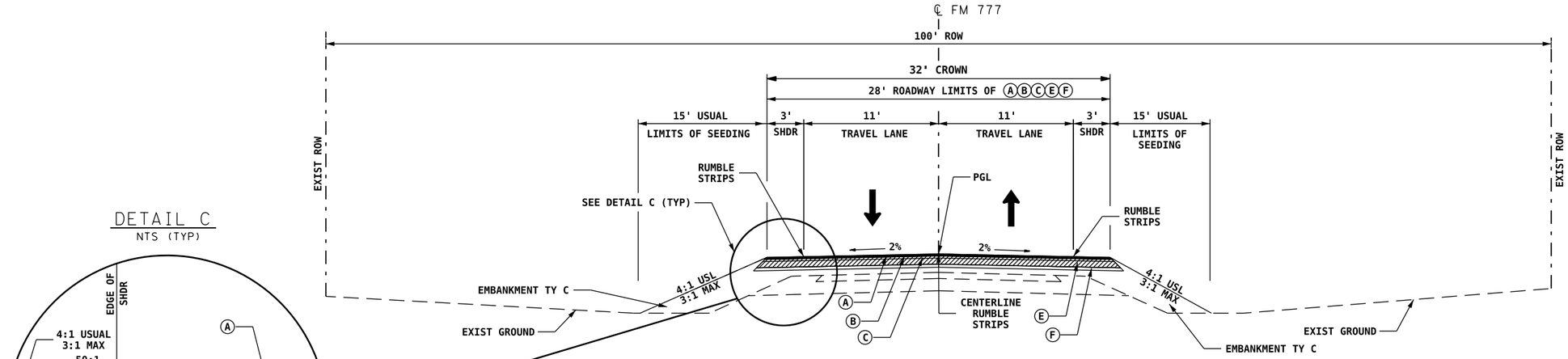
LEGEND:

- (A) 2" SUPERPAVE HOT MIX (SP-C PG 76-22)
- (B) FOG SEAL (CSS-1H)
- (C) 2" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (D) 6" FULL DEPTH RECLAMATION (FDR) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (E) 6" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (F) 4" FLEX BASE (TY A) (GR 1-2)
- (G) VARIES FLEX BASE (TY A) (GR 1-2) W / 1 % CEMENT TREATMENT + 4.2 % EMULSION TREATMENT BY WEIGHT

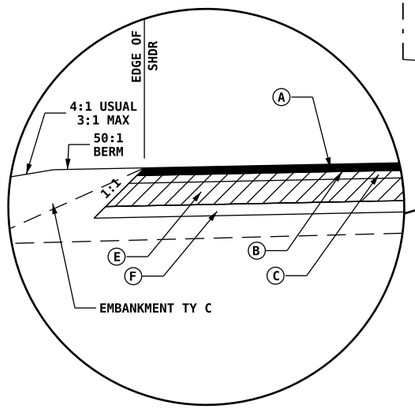


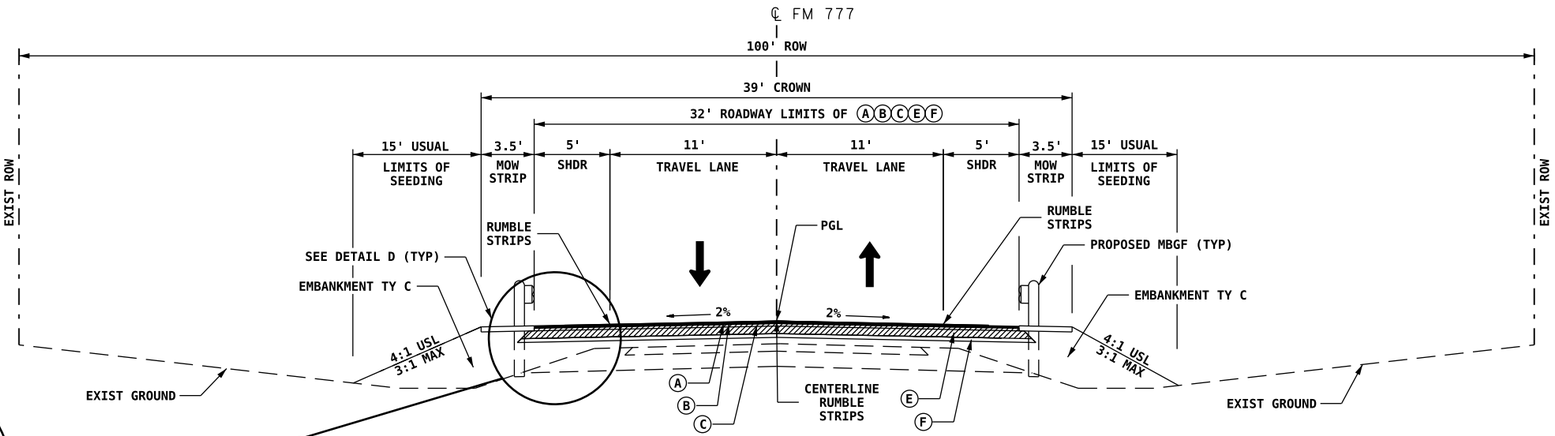
C PROPOSED TYPICAL SECTION

STA 268+42 TO STA 269+32
STA 274+62 TO STA 275+20

STA 269+32 TO STA 269+82 TRANSITION TO D
STA 274+12 TO STA 274+62 TRANSITION TO D

DETAIL C
NTS (TYP)

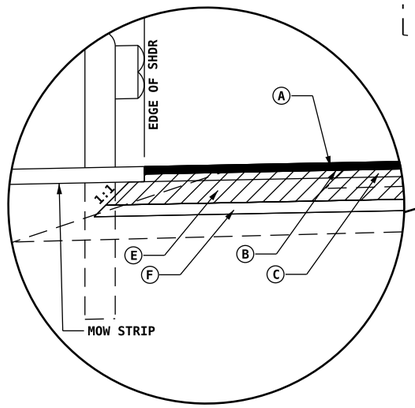




D PROPOSED TYPICAL SECTION

STA 269+82 TO STA 271+32
STA 272+62 TO STA 274+12

DETAIL D
NTS (TYP)



BRIDGE TYPICAL SECTION
(SEE BRIDGE TYPICAL SECTION SHEET)

STA 271+32 TO STA 272+62

(1) ADD FLEX BASE TO ADJUST FOR CROSS SLOPES

NOT TO SCALE

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777
PROPOSED TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		11

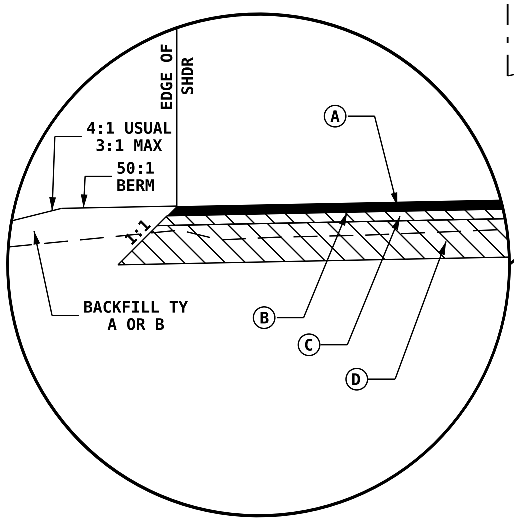
DATE: 1/30/2024 8:05:23 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha varshney\dms8454010022_TYT_LJA.dgn

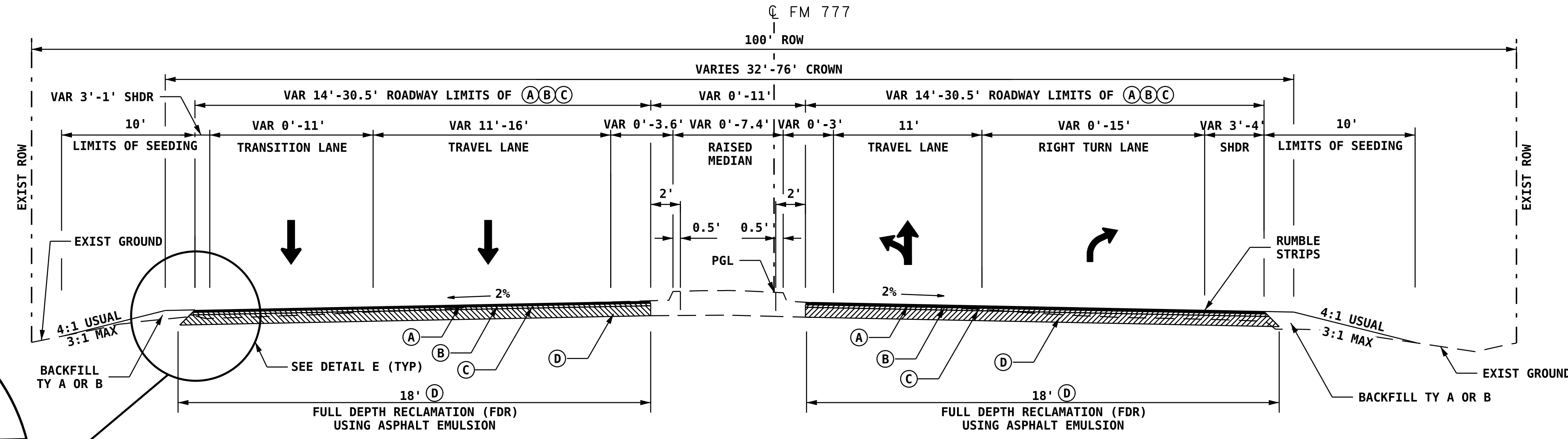
LEGEND:

- (A) 2" SUPERPAVE HOT MIX (SP-C PG 76-22)
- (B) FOG SEAL (CSS-1H)
- (C) 2" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (D) 6" FULL DEPTH RECLAMATION (FDR) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (E) 6" FLEX BASE (TY A) (GR 1-2) W/ 1% CEMENT TREATMENT + 4.2% EMULSION TREATMENT BY WEIGHT
- (F) 4" FLEX BASE (TY A) (GR 1-2)
- (G) VARIES FLEX BASE (TY A) (GR 1-2) W / 1 % CEMENT TREATMENT + 4.2 % EMULSION TREATMENT BY WEIGHT

DETAIL E

NTS (TYP)





E PROPOSED TYPICAL SECTION

STA 466+48 TO STA 471+16 LT

STA 466+79 TO STA 471+16 RT

NOT TO SCALE

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

(1) ADD FLEX BASE TO ADJUST FOR CROSS SLOPES

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
©2024

FM 777
PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		12

DATE: 1/30/2024 8:05:23 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha varshney\dms84540\022_TYT_LJA.dgn

DN: CK: DW: CK:

GENERAL NOTES:

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

Name Bryce Broussard, PE

Phone (409) 883-3476

Email Bryce.Broussard@txdot.gov

Name Jim Grissom, PE

Phone (409) 224-7274

Email Jim.Grissom@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.

Assume full responsibility for the preservation of all sod, shrubbery, and trees at the site during construction. Carefully preserve and replace, in their original position, all sod and shrubbery removed. Replace all Contractor damaged sod or shrubbery at the Contractor's own expense.

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

Provide a weekly a list of equipment, including idle equipment, used on the project each week.

Item 000 Utilities

Consider the locations of underground utilities depicted on the plans as approximate and employ responsible care to avoid damaging, or accommodate utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities. If utility damage (breaks, leaks, nicks, dents, gouges, etc.)

occurs, contact the utility facility owner or operator immediately. In the event utility lines needing unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others.

Item 4 Scope of Work

It is the contractors responsibility to field verify all drainage structure's shown in the plans.

It is the contractors responsibility to mark the location of all existing striping and place proposed striping back in the same location or as shown in the plans.

Item 5 Control of the Work

Station the project before commencing work. Mark the stations every 100 feet. Maintain stationing throughout the duration of the project. Remove the station markings at the completion of the project. Consider this work to be subsidiary to the various bid items of the contract.

Verify all horizontal and vertical control, approach grades to structures and driveways before beginning work. Notify the Engineer immediately if discrepancies are discovered.

Furnish, to the Engineer, a list of the final centerline elevations based on the alignment stationing shown on the plans.

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. Impact 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

Flammable/combustible materials must be stored at a designated location as approved.

Do not store flammable/combustible materials under or adjacent to Bridge class structures. Daily removal of these materials will be considered incidental work.

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a 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.

Mixing of materials, storing of materials, storing of equipment, or repairing of equipment on top of concrete pavement or bridge decks will not be permitted unless specifically authorized.

Item 7 Legal Relations and Responsibilities

Furnish all materials, labor and incidentals required to provide for traffic across the highway and for temporary ingress and egress to private property in accordance with article 7.2.4 of the standard specifications at no additional cost to the state. Maintain ingress and egress to the adjacent property at all times. Consider this work to be subsidiary to the various bid items of the contract.

The Contractor will be completely responsible for the immediate removal of any material that gets upon any vehicle as a result of their operation.

Personal vehicles of the contractor's employees will not be parked within the right of way at any time including any section closed to public traffic, unless the vehicle is being used for construction procedures. However, the Contractor's employees may park on the right of way at sites where the contractor has their office, equipment and materials storage yard.

The Contractor will be familiar with the right of way map and the location of all the right of way monumentation. Care will be taken by the Contractor and its subcontractors to protect and avoid disturbance to the right of way monumentation. Any monument disturbed by the Contractor will be repaired and/or replaced to the satisfaction of the Engineer. This work will be corrected at the contractor's expense.

No significant traffic generator events have been identified in the project limits.

Item 8 Prosecution and Progress

SP008-059 (150-day Delay) has been added to this project for fabrication of bridge beams.

Compute and charge working days in accordance with Section 8.3.1.4 Standard Workweek.

Adjoining projects may be in progress during the construction of a portion of this project. Plan and prosecute the sequence of construction and the traffic control plan with adjacent construction projects, if applicable. Manage construction of all phases to minimize disruption to traffic.

Notify the Engineer 72 hours in advance of any temporary or permanent lane affected by closures, detours, or restrictions to lane widths, alterations to vertical clearances or modifications to alignment/radii. Any other modification to the roadway that may adversely affect the mobility of oversized/overweight trucks will require 5 business day advance written notice to the Engineer.

No lane closures will be allowed at any time during the following unless approved in writing: on Good Friday until midnight Easter Sunday, after 7 AM Tuesday before Thanksgiving Day through midnight Sunday after Thanksgiving, after 7 AM December 23 through January 2. One lane in each direction of each travel way is to remain open at all times.

For all travel lanes, provide information regarding dates, times, typical work hours, type of closure, reason for closure, and expected project duration to the Orange Area Office. This information will be provided 72 hours in advance of the closure to the Orange Area Office. If approved, the Orange Area Office will forward the information to the Public Information Officer for the Beaumont District.

Maintain one lane open to traffic during construction, unless otherwise approved.

Schedule work so that all travel lanes are open during non-working hours, nights and weekends, unless otherwise approved.

Limit lane closures to ***1*** mile unless otherwise approved.

The Contractor will be expected to schedule this work so that the base placement operations will follow the subgrade work as closely as practical in order to reduce the hazard to the traveling public and prevent undue delay from wet weather.

All edges must be backfilled by the end of the day with a 3:1 or flatter slope. No drop offs will be left overnight.

Submit a work schedule to the Engineer at the preconstruction meeting indicating completion dates for each location, and the number of crews required for the

completion of the contract within the contract time period. If at any time during the contract the work progress is behind the initial schedule, submit documentation indicating how the project will be accelerated to ensure project completion in the remaining contract time.

Provide a sequence of work with an estimated project schedule to the Engineer at the preconstruction meeting. By noon of each Wednesday, provide the Engineer a written outline of the proposed work schedule for the following week. This outline will also list the times and places for any proposed traffic control changes.

Work will not be permitted when impending bad weather or low temperatures may impair the quality of work.

The construction sequence may be modified as directed and approved.

Where road closures or detours around structures are necessary to accomplish proposed work, the removal of existing structures and/or cutting of existing pavement will not be permitted until all pre-cast members for the proposed structure have been cast, tested and approved for use.

HURRICANE

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.

In addition to lane closures, cease work 3 days before hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Prohibit the Contractor's, sub-Contractors' or material suppliers' vehicles from entering or exiting the stream of traffic including material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

Item 100 Preparing Right of Way

When bridge demolition, tree trimming or tree/brush removal is required from February 15 to September 30, the contractor will provide a qualified biologist with a Bachelor's Degree in biology and demonstrated bird nest survey experience to conduct nesting surveys before work can begin and until vegetation work is

completed to ensure compliance with the Migratory Bird Treaty Act (MBTA). See EPIC sheet for details.

Chipping and disposal on right of way of smaller debris will be allowed. Depth of the chipped material will not exceed 2 inches. Direct discharge of chipped material towards the right of way line in non-residential areas only. Chipping will not be allowed in front of residences.

Heavy equipment rutting will be graded to the existing terrain profile. Consider this work to be subsidiary to the various bid items of the contract.

The Contractor's attention is directed to potential regulations against burning within the project limits. Abide by all local ordinances and county imposed burn bans. When burning is prohibited, dispose of material in accordance with regulations set forth by other regulatory agencies including the Texas Commission for Environmental Quality. The cost of burning disposal of any product is subsidiary to various bid items. During burn bans obtain written approval from the Commissioners Court before burning brush.

Do not burn trash, debris, etc. within the City limits.

Item 112 Subgrade Widening

Remove excess material daily unless otherwise directed. Fill all excavated areas by the end of the work day.

Subgrade widening will be used to excavate material from earth shoulders and to correct minor deficiencies, such as adding embankment on high sides of horizontal curves. It is not expected that additional embankment will be required.

No buildup of material that impedes drainage from the roadway will be allowed.

Item 132 Embankment

Compaction method specified as ***ordinary*** compaction.

It is the Contractor's responsibility to advise the Engineer of the location of the material source enough in advance to avoid delay due to testing requirements.

Any earthwork cross-sections, computer printouts, data files and any other information provided is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the data with the appropriate

plans, specifications and estimates for the projects. Contact the Area Office for information on availability.

Embankment Type C will conform to the following specification requirements:

1. Liquid Limit – 40 maximum
2. Plasticity Index – 25 maximum, 8 minimum
3. A cohesionless sand will not be permitted

All slopes requiring embankment will be tracked immediately upon final grading to prevent erosion. Tracking consists of operating a tracked vehicle or equipment up and down the slopes leaving track marks perpendicular to the direction of the slope. See the EC(1) standard for tracking details. Tracking slopes to prevent erosion will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Item 134 Backfilling Pavement Edges

Backfilling pavement edges quantity by station includes both sides of the roadway. No deduction in payment will be made when in the opinion of the Engineer only one side of a roadbed section requires backfilling.

As base is placed, backfill the pavement edges daily so that no drop-off conditions exist. Type A or B material will meet one of the following requirements:

1. Item 132, Type C
    - Liquid Limit – 40 maximum
    - Plasticity Index = 25 maximum, 8 minimum
    - A cohesionless sand will not be permitted
2. Use material from subgrade widening for backfilling pavement edges.

Item 150 Blading

Use blading to consolidate soft spots or reshape ditches. Quantity by the hour includes both sides of the roadway.

Item 158 Specialized Excavation Work

Use Specialized Excavation to reshape ditches and tie into proposed drainage structures. Quantity by the hour includes both sides of the roadway.

Item 164 Seeding for Erosion Control

Final grading and stabilization (seeding) will be achieved as soon as possible and not scheduled only for the end of the project. Final grading and stabilization should be initiated as the overall work progresses.

Multiple mobilizations of the seeding crews will be expected to comply with the Construction General Permit of the Texas Pollution Elimination Discharge System requirements for re- vegetating disturbed soils.

Eliminate seeding in areas of natural growth determined to have enough cover.

Item 168 Vegetative Watering

Equip water trucks with sprinkler systems capable of covering the entire area to be seeded or sodded from the roadway.

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

Mechanical watering may not be required during periods of adequate moisture as determined.

Furnish and apply water at a rate of 6.788 Mega gallons per acre per cycle or as directed on the plans.

Comply with stabilization requirements for 70% grass coverage; uniform vegetative coverage is required. During this period, meter and operate water equipment under pumping pressure capable of delivering the required quantities of water necessary. For Permanent seeding each cycle will be executed weekly for 12 weeks, unless directed otherwise. For Temporary seeding each cycle will be executed weekly for 6 weeks, unless directed otherwise.

Provide a log book showing daily water usage and receipts of water applied, in addition to metering the water equipment.

Item 247 Flexible Base

Use Type A, Grade1-2 flexible base.

The minimum plasticity index for this material will be 4.

Do not damage existing or proposed structures during base operations.

Transition the thickness of the proposed base from the existing grade to the proposed grade at each end of the project or days production over a minimum of three hundred (300) feet length.

Item 251 Reworking Base Courses

The type of work is Type C .

Use ordinary compaction.

Furnish Type A, Grade 1-2 base material.

Transition the thickness of the proposed base from the existing grade to the proposed grade at each end of the project or days production over a minimum of three hundred (300) feet length.

This item is used with the intent of pre-scarifying and cross blending each half-section prior to treating in order to homogenize the material as directed by the Engineer.

There are numerous D-GR HMA patches within the project limits. Reworking these areas are considered subsidiary to this bid item.

Item 315 Fog Seal

Dilute the CSS-1H material as directed by the Engineer. The mixture should be in the range of 60%-70% water and 30%-40% emulsion.

Item 320 Equipment for Asphalt Concrete Pavement

Material Transfer Device is required. Remixing equipment is required.

Item 420 Concrete Substructures

Paint the Control Section (CSS) Number on a location approved by the Engineer using black exterior paint and stencils that result in two (2) inch high numbers. All numbers should be legible and free of smears or drips. The painting of these numbers will not be paid for directly but will be considered subsidiary to the various bid items.

Item 427 Surface Finishes for Concrete

Provide the following surface finish for the listed elements: T223 Rail, Deck, Beams, Abutments, Bents, and columns.

Provide Cap Option “C” as shown on the Standard Sheet “CRR” for new bridge construction.

Item 467 Safety End Treatment

At driveway locations where the contract requires modifying pipe installations, provide a 6:1 maximum embankment slope from the edge of the driveway to the top of the SET.

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

Item 502 Barricades, Signs, and Traffic Handling

Construct all work zone signs, sign supports, and barricades from material other than wood unless approved otherwise. Metal posts, if used, are to be galvanized. Aluminum signs, if used, will meet the following minimum thickness requirements:

Square Feet	Minimum Thickness
Less than 7.5	0.080 inches
7.5 to 15	0.100 inches
Greater than 15	0.125 inches

The Contractor Force Account “Safety Contingency” that has been established for this project is intended to be used 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.

Arrange asphalt laydown schedule to meet plan striping requirements. Limit length of lane closures to 1 miles unless otherwise approved.

Restrict work to one side of the roadway at a time.

The following roadways have been determined to be high volume for the purpose identified in Note 4 of the "Typical Location of Crossroad Signs" on the BC(2) standard sheet: US 190

The following roadways have been determined to be low volume for the purpose identified in

Note 2 of the "Typical Location of Crossroad Signs" on the BC(2) standard sheet: CR 145, CR 317, CR 298, CR 144, CR 138, and CR 300

Use drums and 42" cones as channelizing devices.

Remove all traffic control devices from the right of way when they are not in use. Devices scheduled to be used within 3 days may be placed along the shoulder of the roadway or along the right of way when not in use, or stored in other approved areas on the project. Cover any construction signs that are not in effect and are installed in a fashion that will not allow them to be removed from the right of way easily.

Arrange construction operations to prevent the hauling of materials through the completed pavement sections unless otherwise approved.

Provide all flaggers and pilot vehicle drivers with two-way radio communication capability.

Provide flaggers at each side road intersection.

Provide a pilot vehicle where two-way traffic is restricted to one lane during work hours and when direct line of sight is impaired from one end of the work zone to the other, or when required by the Engineer. Equip pilot vehicle with a portable mounted sign type G20-4 with two revolving or strobe type lights.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

Construct all side slopes on rock filter dams with 6:1 slopes.

The Contractor is prohibited from removing grass vegetation throughout the entire project limits and then ceasing construction for long periods, typically over three weeks. The Contractor schedule will be developed based on staged vegetation removal, limiting disturbed soil to no more than 25 percent at one time, unless otherwise approved. Should the Contractor not be able to adequately control sediment and erosion for areas disturbed, the Department will substantially reduce the size of areas that the Contractor may disturb soil.

Should the project be evaluated to have sediment control problems as a result of the Contractor disturbing excessive amounts of soil, the Contractor will be required to immediately re-vegetate (seed and water) those disturbed areas at no cost to the Department.

When specified, the Contractor will implement storm water pollution prevention plan measures using the Items listed below as specified in Item 506 and as directed:

Earthwork for Erosion Control or Temporary Sediment Control Fence or Erosion Control Logs

The Contractor will designate a clean out area for concrete trucks. No other area will be allowed without approval of the Engineer.

Item 530 Intersections, Driveways, and Turnouts

Use D-GR HM conforming with Item 3076-6071 D-GR HMA TY-D PG 64-22 (EXEMPT) for driveway and intersection operations.

Item 540 Metal Beam Guard Fence

Provide Type II galvanization metal beam rail elements.

Provide round timber posts.

Provide timber posts on all metal beam guard fence installations except where CRT low-fill culvert posts are required in accordance with details shown on the Long Span Metal Beam Guard Fence standard sheet.

Field fabricate low-fill culvert posts to insure proper metal beam guard fence height.

At the close of work each day, protect the ends of metal beam guard fence in an approved manner, so that no blunt ends are exposed to approaching traffic.

Accept ownership of removed metal beam guard fence and terminal anchors.

Item 542 Removing Metal Beam Guard Fence

Accept ownership of removed metal beam guard fence and terminal anchors.

Item 560 Mailbox Assemblies

Retain and reuse or, if necessary, replace newspaper holders removed, relocated, or damaged by construction operations for placement on new mailbox assemblies in accordance with mailbox standard sheets. Consider this work subsidiary to this Item.

Coordinate and verify temporary and final mailbox locations with the Department and the US Postmaster.

Item 585 Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule ***2*** to evaluate ride quality of the travel lanes in accordance with Item 585, “Ride Quality for Pavement Surfaces.”

Submit quality control results to the Department the next working day after each day’s paving.

Item 644 Small Roadside Sign Assemblies

Erect Reference Marker signs at the same station as they were located before removal.

Item 658 Delineator and Object Marker Assemblies

Use Type A reflector unit (sheeting) on delineator assemblies attached to concrete barrier.

Use bolt-on attachment for delineator assemblies attached to guard fence.

Install delineators when directed. This may require installation of delineators on portions of guardrail and bridge rail that is not being repaired in order to maintain consistency with adjacent sections.

MBGF will receive GF2 delineators installed on 100’ maximum spacing.

Type C delineators will be installed using Adhesive 795A manufactured by Davidson Traffic Control Products or an equivalent approved in writing.

Item 666 Retroreflectorized Pavement Markings

Furnish Type II drop-on glass beads.

Item 3077 Superpave Mixtures

Provide a separate Laboratory space, building or testing area, large enough to accommodate TxDOT equipment and testing on site at the Hot Mix Plant near or within the area of Contractor’s testing equipment. The contractor will provide the SGC” Superpave Gyratory Compactor” and TGC “Texas Gyratory Compactor”. All other equipment must be provided by TxDOT. TxDOT will be responsible for maintaining state provided equipment. The Contractor will provide TxDOT with the Calibration paperwork on the shared equipment that they provide.

Provide an all-weather parking area for the sole use of at least 2 State-owned vehicles. Situate the parking area near the Laboratory area at an acceptable location. Maintain the parking area until the project is completed and restore the area to a condition acceptable to the Engineer upon project completion.

Laboratory area shall have a roof, floor, doors, and screened windows. Ensure the floor is strong enough to support testing equipment and has an impervious floor covering. Ensure that the Laboratory area is tied down, weatherproof, piped for water and fuel, and electrically wired by personnel meeting the requirements of Article 7.18., “Electrical Requirements.”

Provide secured and controlled access to the Laboratory area through security measures such as bars, locks, alarms, or security fencing for the Laboratory area.

Furnish and install adequate equipment, outlets, lighting, air-conditioning, heating, and ventilation for the Laboratory area. Heating and Air Conditioning shall maintain the Laboratory working area temperature within a range of (68^{O}F through 72^{O}F).

Provide partitioned restroom furnished with restroom supplies, a lavatory, and a flush toilet connected to a sewer or septic tank within the Laboratory area.

Laboratory area will have the use of an internet service provider (ISP) that can provide more than one computer access to ISP account at one time. ISP provider must be able to supply a minimum 100 gigabyte download speed per account.

Required appurtenances within the Laboratory Area:

1. A 10lb ABC fire extinguisher with up-to-date inspection tag and a working smoke detector.
2. Additional workbench and tables at least 3 ft. wide, 6 ft. long, and 3 ft. high.
3. Minimum two chairs and one desk, filing cabinets, solar screen blinds or shades.
4. An operational telephone system.

5. Water fountain or bottled water fountain able to provide cold water and have cup dispenser and cups.
6. Water (for testing purposes) from an approved source
7. Adequately power ventilate the room for the ignition oven. Provide a NEMA 6-50R (208/240 volt, 50 amp) outlet within 2.25 ft. of the ignition oven location and an independent exhaust outlet to the outside located a maximum of 8 ft. from the oven. Provide a level, sturdy and
8. fireproof surface for the ignition oven with a minimum of 6 in. clearance between the furnace and other vertical surfaces. Vent the ignition oven to the outside.
9. A minimum of 20 ft. of total work counter length at least 3 ft. wide and 3 ft. above the floor and strong enough to support required testing equipment
10. A laboratory sink measuring 24 × 30 in. and 12 in. deep
11. Door openings for the Laboratory area must be 48-inches minimum width. If steps are required to gain access to the facility's then a landing dock will be provided with minimum dimensions of 60 inches wide by 60 inches deep. The strong floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations acceptable to the Engineer.

- Provide multifunction color printer/fax/scanner/copier capable of reproducing 11 X 17

For the Laboratory area the work performed, materials furnished, utilities, and utility services (including phone and internet), appurtenances including office equipment testing equipment, labor, tools, and incidentals will not be paid measured or paid for directly but will be subsidiary to pertinent items.

Use aggregate that meets the SAC requirement of class A for all surface mixes. RAP aggregate must meet the requirements of Table 1.

Aggregates used on shoulders and ramps are required to meet SAC requirements.

Provide mix designs. Mix designs must be verified and approved.

Remove all vegetation from pavement edges, intersections, curbs and gutters and driveways before planning or ACP operations. This work will not be paid for directly but will be subsidiary to the various bid items.

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

A material transfer device (MTD) will be required for all surface courses of HMA on this project. An MTD is defined as a self-propelled, wheel-mounted vehicle capable of receiving HMA from the haul trucks separate from the paver. The MTD will have a minimum storage capacity of approximately 25 tons and will be equipped with a pivoting discharge conveyor and a means of completely remixing the HMA before placement. The Engineer may approve an alternative device on a trial basis for the surface course. This device will be capable of receiving HMA separate from the paver and must have remixing capabilities. For all other courses of HMA, other than the surface, an alternative device may be used as long as it is capable of receiving HMA separate from the paver.

Item 3089 Emulsion Treatment

Use the following rates for the Full Depth Reclamation Process: Cement 7.6 lb/sy and Emulsion 3.73 gal/sy.

The Maximum Dry Density (pcf) and Optimum Moisture (%) vary between the non-widened pavement and the widened pavement with 100% new base. The Orange Area Office will provide this information upon request.

Use care over culverts, pipes or other conduits that may be damaged by the proposed work.

Item 6185

Shadow vehicles with TMA and high intensity rotating, flashing, oscillating or strobe lights are required. Use one TMA preceding every stationary work zone and two TMA's for mobile operations.

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required for this project, provide **2** additional shadow vehicle(s) as detailed on General Notes **4 & 5 on TCP(2-1)-18 and 6 & 7 on TCP(2-1)-18** standard sheet.

Therefore, 2 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 TMA's needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1109-01-026 **DISTRICT** Beaumont **COUNTY** Jasper
HIGHWAY FM 777

			CONTROL SECTION JOB		**1109-01-022**		**1109-01-026**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00043894**		**A00196364**			
			COUNTY		**Jasper**		**Jasper**			
			HIGHWAY		**FM 777**		**FM 777**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW		STA	262.000				262.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)		STA	258.000				258.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)		CY	217.000		857.000		1,074.000	
	134-6004	BACKFILL (TY A OR B)		STA	258.000				258.000	
	150-6002	BLADING		HR	60.000				60.000	
	158-6002	SPEC EXCAV WORK (BACKHOE)		HR	80.000				80.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)		SY	21,942.000				21,942.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)		SY	21,942.000				21,942.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)		SY	43,881.000				43,881.000	
	168-6001	VEGETATIVE WATERING		MG	610.000				610.000	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)		CY	11,630.000		396.000		12,026.000	
	251-6062	RWRK BS MTL(TY C)(8")(ORD CMP)(ORG POS)		CY	11,298.000				11,298.000	
	275-6014	CEMENT TREAT (MX EXST MTL & NW BS)(8")		SY	83,494.000		1,430.000		84,924.000	
	315-6004	FOG SEAL (CSS-1H)		GAL	5,845.000		100.000		5,945.000	
	400-6005	CEM STABIL BKFL		CY	108.900		93.000		201.900	
	400-6015	CEM STABIL BKFL (SPL)		CY	1,299.000				1,299.000	
	416-6004	DRILL SHAFT (36 IN)		LF			840.000		840.000	
	420-6013	CL C CONC (ABUT)		CY			37.700		37.700	
	420-6029	CL C CONC (CAP)		CY			30.700		30.700	
	420-6037	CL C CONC (COLUMN)		CY			17.400		17.400	
	422-6005	REINF CONC SLAB (BOX BEAM)		SF			4,420.000		4,420.000	
	422-6015	APPROACH SLAB		CY			51.400		51.400	
	425-6020	PRESTR CONC BOX BEAM (5XB20)		LF			514.000		514.000	
	432-6002	RIPRAP (CONC)(5 IN)		CY	4.300				4.300	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)		CY			690.000		690.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY	80.000		33.000		113.000	
	450-6006	RAIL (TY T223)		LF			300.000		300.000	
	454-6004	ARMOR JOINT (SEALED)		LF			67.000		67.000	
	462-6013	CONC BOX CULV (6 FT X 6 FT)		LF	44.000				44.000	
	464-6003	RC PIPE (CL III)(18 IN)		LF	148.000				148.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF	166.000				166.000	
	464-6008	RC PIPE (CL III)(36 IN)		LF	16.000				16.000	
	464-6009	RC PIPE (CL III)(42 IN)		LF	8.000				8.000	
	466-6107	HEADWALL (CH - PW - 0) (DIA= 72 IN)		EA	2.000				2.000	
	467-6227	SET (TY I)(S= 6 FT)(HW= 7 FT)(3:1) (C)		EA	8.000				8.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)		EA	8.000				8.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)		EA	82.000				82.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1109-01-026 **DISTRICT** Beaumont **COUNTY** Jasper
HIGHWAY FM 777

			CONTROL SECTION JOB		**1109-01-022**		**1109-01-026**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00043894**		**A00196364**			
			COUNTY		**Jasper**		**Jasper**			
			HIGHWAY		**FM 777**		**FM 777**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)		EA	36.000				36.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)		EA	1.000				1.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)		EA	13.000				13.000	
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)		EA	3.000				3.000	
	467-6453	SET (TY II) (36 IN) (RCP) (6: 1) (C)		EA	1.000				1.000	
	467-6463	SET (TY II) (42 IN) (RCP) (4: 1) (C)		EA	2.000				2.000	
	496-6004	REMOV STR (SET)		EA	25.000				25.000	
	496-6005	REMOV STR (WINGWALL)		EA	2.000				2.000	
	496-6006	REMOV STR (HEADWALL)		EA	1.000				1.000	
	496-6007	REMOV STR (PIPE)		LF	576.000				576.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)		EA			1.000		1.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	10.000				10.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)		LF	120.000				120.000	
	506-6011	ROCK FILTER DAMS (REMOVE)		LF	120.000				120.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")		LF	2,700.000				2,700.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	2,700.000				2,700.000	
	530-6005	DRIVEWAYS (ACP)		SY	6,265.000				6,265.000	
	530-6008	TURNOUTS (ACP)		SY	501.000				501.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT		LF	49,850.000				49,850.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT		LF	24,925.000				24,925.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF	800.000		225.000		1,025.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA			4.000		4.000	
	540-6048	TL-3 31" SHORT RADIUS (COMPLETE)		EA			1.000		1.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	250.000				250.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	9.000		3.000		12.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	4.000				4.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4		EA	22.000				22.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA	58.000				58.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA	5.000				5.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)		EA	1.000				1.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA	84.000				84.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2		EA	24.000				24.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND		EA	42.000				42.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)		LF	57,120.000				57,120.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)		LF	48.000				48.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)		LF	57,120.000				57,120.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1109-01-026 **DISTRICT** Beaumont **COUNTY** Jasper
HIGHWAY FM 777

			CONTROL SECTION JOB		**1109-01-022**		**1109-01-026**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00043894**		**A00196364**			
			COUNTY		**Jasper**		**Jasper**			
			HIGHWAY		**FM 777**		**FM 777**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2		EA	24.000				24.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)		LF	224.000				224.000	
	666-6101	REF PAV MRK TY I(W)36"(YLD TRI)(090MIL)		EA	8.000				8.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)		LF	53,298.000				53,298.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)		LF	6,192.000				6,192.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)		LF	11,008.000				11,008.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)		LF	46.000				46.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	590.000				590.000	
	730-6002	FULL - WIDTH MOWING		AC	15.000				15.000	
	3077-6065	SP MIXES SP-D SAC-A PG76-22		TON	18,159.000		313.000		18,472.000	
	3077-6075	TACK COAT		GAL	4,953.000		85.000		5,038.000	
	3089-6002	CEMENT		TON	317.300		5.400		322.700	
	3089-6003	EMULSION		GAL	311,433.000		5,334.000		316,767.000	
	3089-6004	EMUL TRTMNT (MX EXST MTRL) 8"		SY	83,494.000		1,430.000		84,924.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	4.000				4.000	
	6185-6002	TMA (STATIONARY)		DAY	160.000				160.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	5.000				5.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS			1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS			1.000		1.000	
1	464-6085	RC PIPE (CL III) (24 IN) (ALT)		LF	590.000				590.000	
2	464-6087	RC PIPE (CL III)(18 IN)(ALT)		LF	2,654.000				2,654.000	
2A	4216-6007	THERMOPLASTIC PIPE (HDPE) (18")		LF	2,654.000				2,654.000	
1A	4216-6008	THERMOPLASTIC PIPE (HDPE) (24")		LF	590.000				590.000	

SUMMARY OF ROADWAY ITEMS

ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	LENGTH (FT)	** AVG WIDTH (FT)	TOTAL AREA (SF)	100 6002 PREPARING ROW (STA)	112 6001 SUBGRADE WIDENING (ORD COMP) (STA)	132 6005 EMBANKMENT (FINAL)(ORD COMP)(TY C) (CY)	134 6004 BACKFILL (TY A OR B) (STA)	150 6002 BLADING (HR)	247 6041 FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS) (CY)	251 6034 REWORK BS MTL (TY C) (8") (ORD COMP) (SY)
CSJ 1109-01-026												
4	269+37	271+37	200	32	6400	2		399			198	
	272+57	274+57	200	32	6400	2		458			198	
CSJ 1109-01-026 SUBTOTAL						4	0	857	0	0	396	0
CSJ 1109-01-022												
1	206+38	221+00	1462	28	40936	15	15		15	5	674	673
2	221+00	245+00	2400	28	67200	24	24		24	5	1,069	1,067
3	245+00	268+42	2342	28	65576	23	23		23	5	1,043	1,041
	268+42	269+00	58	32	1856	1	1	8	1		51	
4	269+00	269+37	37	32	1184	0	0	61	0	5	37	
	274+57	275+20	63	32	2016	1	1	148	1		63	
	275+20	293+00	1780	28	49840	18	18		18		793	791
5	293+00	317+00	2400	28	67200	24	24		24	5	1,069	1,067
6	317+00	341+00	2400	28	67200	24	24		24	5	1,069	1,067
7	341+00	365+00	2400	28	67200	24	24		24	5	1,069	1,067
8	365+00	389+00	2400	28	67200	24	24		24	5	1,069	1,067
9	389+00	413+00	2400	28	67200	24	24		24	5	1,069	1,067
10	413+00	437+00	2400	28	67200	24	24		24	5	1,069	1,067
11	437+00	461+00	2400	28	67200	24	24		24	5	1,069	1,067
12	461+00	469+18	818	28	22904	8	8		8	5	417	257
CSJ 1109-01-022 SUBTOTAL						**258**	**258**	**217**	**258**	**60**	**11,630**	**11,298**
PROJECT TOTALS						**262**	**258**	**1,074**	**258**	**60**	**12,026**	**11,298**

BASIS OF ESTIMATE

ITEM	DESCRIPTION	RATE	CSJ: 1109-01-026 # OF UNITS	UNIT	QUANTITY	UNIT	CSJ: 1109-01-022 # OF UNITS	UNIT	QUANTITY	UNIT	PROJECT TOTAL # OF UNITS	UNIT	QUANTITY	UNIT
168-6001	VEGETATIVE WATERING	6.788 MG/AC/CYCLE X 6 CYCLES	2	AC	81	MG	13	AC	529	MG	15	AC	610	MG
315-6004	FOG SEAL (CSS-1H)	.07 GAL/SY	1,430	SY	100	GAL	83,494	SY	5,845	GAL	84924	SY	5,945	GAL
3077-6065	SP MIXES SP-D SAC-A PG76-22	220 LBS/SY/IN	1,422	SY	313	TON	82,542	SY	18,159	TON	83964	SY	18,472	TON
3077-6075	TACK COAT	.06 GAL/SY	1,422	SY	85	GAL	82,542	SY	4,953	GAL	83964	SY	5,038	GAL
3089-6002	CEMENT	7.6 LBS/SY	1,430	SY	5.4	TON	83,494	SY	317.3	TON	84924	SY	322.7	TON
3089-6003	EMULSION	3.73 GAL/SY	1,430	SY	5,334	GAL	83,494	SY	311,433	GAL	84924	SY	316,767	GAL

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777
MISCELLANEOUS SUMMARIES

SHEET 1 OF 15

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		15

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SUMMARY OF ROADWAY ITEMS

ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	LENGTH (FT)	** AVG WIDTH (FT)	TOTAL AREA (SF)	275 6014 CEMENT TREAT (MX EXST MTL & NW BS)(8")	* 315 6004 FOG SEAL (CSS-1H)	432 6045 RIPRAP (MOW STRIP)(4 IN)	533 6003 RUMBLE STRIPS (SHOULDER) ASPHALT	533 6004 RUMBLE STRIPS (CENTERLINE) ASPHALT	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)
						SY	SY	CY	LF	LF	LF	EA
CSJ 1109-01-026												
4	269+37	271+37	200	32	6400	715	715	16			175	2
	272+57	274+57	200	32	6400	715	715	17			50	2
CSJ 1109-01-026 SUBTOTAL						1,430	1,430	33	0	0	225	4
CSJ 1109-01-022												
1	206+38	221+00	1462	28	40936	4,766	4,766	25	2,924	1,462	175	
2	221+00	245+00	2400	28	67200	7,556	7,556		3,800	1,900		
3	245+00	268+42	2342	28	65576	7,371	7,371	11	4,800	2,400	150	
	268+42	269+00	58	32	1856	182	182	2			50	
4	269+00	269+37	37	32	1184	133	133	1	3,800	1,900	25	
	274+57	275+20	63	32	2016	224	224	1				
	275+20	293+00	1780	28	49840	5,604	5,604					
5	293+00	317+00	2400	28	67200	7,556	7,556		4,800	2,400		
6	317+00	341+00	2400	28	67200	7,556	7,556		4,800	2,400		
7	341+00	365+00	2400	28	67200	7,556	7,556		4,800	2,400		
8	365+00	389+00	2400	28	67200	7,556	7,556		4,200	2,100		
9	389+00	413+00	2400	28	67200	7,556	7,556	39	4,800	2,400	400	
10	413+00	437+00	2400	28	67200	7,556	7,556	1	4,800	2,400		
11	437+00	461+00	2400	28	67200	7,556	7,556		4,800	2,400		
12	461+00	469+18	818	28	22904	4,766	4,766		1,526	763		
CSJ 1109-01-022 SUBTOTAL						**83,494**	**83,494**	**80**	**49,850**	**24,925**	**800**	**0**
PROJECT TOTALS						**84,924**	**84,924**	**113**	**49,850**	**24,925**	**1,025**	**4**

** FOR CONTRACTORS INFORMATION ONLY, SEE BASIS OF ESTIMATE FOR ITEM QUANTITIES.*

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777
MISCELLANEOUS SUMMARIES

SHEET 2 OF 15

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		16

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SUMMARY OF ROADWAY ITEMS

ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	LENGTH (FT)	** AVG WIDTH (FT)	TOTAL AREA (SF)	540 6048	544 6001	* 3077 6065	* 3077 6075	* 3089 6002	* 3089 6003	3089 6004
						TL-3 31" SHORT RADIUS (COMPLETE)	GUARDRAIL END TREATMENT (INSTALL)	SP MIXES SP-D SAC-A PG76-22	TACK COAT	CEMENT	EMULSION	EMUL TRTMNT (MX EXST MTRL) 8"
						EA	EA	SY	SY	SY	SY	SY
CSJ 1109-01-026												
4	269+37	271+37	200	32	6400	1	1	711	711.0	715	715	715
	272+57	274+57	200	32	6400		2	711	711.0	715	715	715
CSJ 1109-01-026 SUBTOTAL						1	3	1,422	1,422	1,430	1,430	1,430
CSJ 1109-01-022												
1	206+38	221+00	1462	28	40936		4	4710	4710.0	4,766	4,766	4,766
2	221+00	245+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
3	245+00	268+42	2342	28	65576		1	7286	7286.0	7,371	7,371	7,371
	268+42	269+00	58	32	1856			180	180.0	182	182	182
4	269+00	269+37	37	32	1184			132	132.0	133	133	133
	274+57	275+20	63	32	2016			223	223.0	224	224	224
	275+20	293+00	1780	28	49840			5538	5538.0	5,604	5,604	5,604
5	293+00	317+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
6	317+00	341+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
7	341+00	365+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
8	365+00	389+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
9	389+00	413+00	2400	28	67200		4	7466	7466.0	7,556	7,556	7,556
10	413+00	437+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
11	437+00	461+00	2400	28	67200			7466	7466.0	7,556	7,556	7,556
12	461+00	469+18	818	28	22904			4745	4745.0	4,766	4,766	4,766
CSJ 1109-01-022 SUBTOTAL						**0**	**9**	**82,542**	**82,542**	**83,494**	**83,494**	**83,494**
PROJECT TOTALS						**1**	**12**	**83,964**	**83,964**	**84,924**	**84,924**	**84,924**

* FOR CONTRACTORS INFORMATION ONLY, SEE BASIS OF ESTIMATE FOR ITEM QUANTITIES

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MISCELLANEOUS SUMMARIES

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1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		17

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		SUMMARY OF PAVEMENT MARKING ITEMS								
ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	666 6035	666 6101	666 6308	666 6317	666 6320	668 6076	672 6009
			REFL PAV MRK TY I (W)8"(SLD) (090MIL)	REF PAV MRK TY I(W)36"(YLD TRI)(090MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	REFL PAV MRKR TY II-A-A
			LF	EA	LF	LF	LF	LF	EA
CSJ 1109-01-026									
4	269+37	271+37			400	50			3
	272+57	274+57			400	50			3
CSJ 1109-01-026 SUBTOTAL			0	0	800	100	0	0	6
CSJ 1109-01-022									
1	206+38	221+00			3021	378			19
2	221+00	245+00			4795	600	1700		73
3	245+00	269+00			4800	438	2100		75
4	269+00	269+37			74	10			1
	27457	29300			3926	428	1750		66
5	269+00	317+00			4801	600	150		34
6	317+00	341+00			4787	600	1200		60
7	341+00	365+00			4794	600	500		43
8	365+00	389+00			4800	600	700		48
9	389+00	413+00			4793	600	100		33
10	413+00	437+00			4801	600	701		48
11	437+00	461+00			4785	600			30
12	461+00	469+18	224	8	2321	38	2107	46	54
CSJ 1109-01-022 SUBTOTAL			224	8	52498	6092	11008	46	584
PROJECT TOTALS			**224**	**8**	**53298**	**6192**	**11008**	**46**	**590**

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BMT	JASPER		18

SUMMARY OF SIGNING ITEMS

ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	636 6001	644 6001	644 6004	644 6007	658 6061	658 6099
			ALUMINUM SIGNS (TY A)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	INSTL OM ASSM (OM-2Z)(WF LX)GND
			SF	EA	EA	EA	EA	EA
CSJ 1109-01-026								
4	269+37	271+37					8	2
	272+57	274+57	7	1			8	
CSJ 1109-01-026 SUBTOTAL			7	1	0	0	16	2
CSJ 1109-01-022								
1	206+38	221+00	4	1			4	2
2	221+00	245+00	68	10	2			4
3	245+00	269+00	52	10				
4	269+00	269+37	6	1				
	27457	29300	52	9				4
5	293+00	317+00	37	7				2
6	317+00	341+00	7	1				4
7	341+00	365+00	9	2				6
8	365+00	389+00	37	1	2			6
9	389+00	413+00					4	2
10	413+00	437+00						4
11	437+00	461+00	21	1	1			2
12	461+00	469+18	128	14		1		4
CSJ 1109-01-022 SUBTOTAL			421	57	5	1	8	40
PROJECT TOTALS			**428**	**58**	**5**	**1**	**24**	**42**

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SUMMARY OF CROSS CULVERT

LOCATION	158 6002	400 6005	432 6002	462 6013	464 6003	464 6005	464 6008	464 6009	466 6107	467 6227
	SPEC EXCAV WORK (BACKHOE)	CEM STABIL BKFL	RIPRAP (CONC)(5 IN)	CONC BOX CULV (6 FT X 6 FT)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(36 IN)	RC PIPE (CL III)(42 IN)	HEADWALL (CH - PW - 0) (DIA= 72 IN)	SET (TY I)(S= 6 FT)(HW= 7 FT)(3:1) (C)
	HR	CY	CY	LF	LF	LF	LF	LF	EA	EA
CSJ 1109-01-022										
BRIDGE CLASS CULVERT 1 - STA 212+44		8.2		44						8
BRIDGE CLASS CULVERT 18 - STA 410+82										
CULVERT 2 - STA 221+17		4.8					12			
CULVERT 3 - STA 235+27		3.3				8				
CULVERT 4 - STA 269+76		5.7	4.3					4	2	
CULVERT 5 - STA 275+40		11.3						4		
CULVERT 6 - STA 286+03		6.7				24				
CULVERT 7 - STA 310+75		2.7			10					
CULVERT 8 - STA 323+02		3.3				14				
CULVERT 9 332+31		3.3				10				
CULVERT 10 - STA 348+31		4.8					4			
CULVERT 11 - STA 353+46		3.3				8				
CULVERT 12 - STA 363+98		4.8			138					
CULVERT 13 - STA 375+46		3.3				10				
CULVERT 14 - STA 381+04		6.7				16				
CULVERT 15 - STA 385+83		6.7				8				
CULVERT 16 - STA 398+66		3.3				14				
CULVERT 17 - STA 406+58		3.3				8				
CULVERT 19 - STA 429+89		10.0				30				
CULVERT 20 - STA 439+53		6.7				8				
CULVERT 21 - STA 451+19		6.7				8				
CSJ 1109-01-022 SUBTOTAL	**80**	**108.9**	**4.3**	**44**	**148**	**166**	**16**	**8**	**2**	**8**
PROJECT TOTALS	**80**	**108.9**	**4.3**	**44**	**148**	**166**	**16**	**8**	**2**	**8**

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MISCELLANEOUS SUMMARIES

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DIST	COUNTY		SHEET NO.
BMT	JASPER		20

SUMMARY OF CROSS CULVERT

LOCATION	467 6358	467 6390	467 6394	467 6450	467 6453	467 6463	496 6004	496 6005	496 6006	496 6007
	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (C)	SET (TY II) (36 IN) (RCP) (4: 1) (C)	SET (TY II) (36 IN) (RCP) (6: 1) (C)	SET (TY II) (42 IN) (RCP) (4: 1) (C)	REMOV STR (SET)	REMOV STR (WINGWALL)	REMOV STR (HEADWALL)	REMOV STR (PIPE)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
CSJ 1109-01-022										
BRIDGE CLASS CULVERT 1- STA 212+44								2		
BRIDGE CLASS CULVERT 18 - STA 410+82										
CULVERT 2 - STA 221+17				2			1		1	8
CULVERT 3 - STA 235+27		1					1			4
CULVERT 4 - STA 269+76										
CULVERT 5 - STA 275+40						2				
CULVERT 6 - STA 286+03		4								
CULVERT 7 - STA 310+75	2									
CULVERT 8 - STA 323+02		2								
CULVERT 9 332+31		1	1							
CULVERT 10 - STA 348+31				1	1					
CULVERT 11- STA 353+46		2								
CULVERT 12 - STA 363+98	6									40
CULVERT 13 - STA 375+46		2								
CULVERT 14 - STA 381+04		4								
CULVERT 15 - STA 385+83		2								
CULVERT 16 - STA 398+66		2								
CULVERT 17 - STA 406+58		2								
CULVERT 19 - STA 429+89		6								
CULVERT 20 - STA 439+53		4								
CULVERT 21- STA 451+19		4								
CSJ 1109-01-022 SUBTOTAL	**8**	**36**	**1**	**3**	**1**	**2**	**2**	**2**	**1**	**52**
PROJECT TOTALS	**8**	**36**	**1**	**3**	**1**	**2**	**2**	**2**	**1**	**52**

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BMT	JASPER		21

DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								104 6017	105 6045	400 6005	464 6003	464 6005	467 6363	467 6395
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE AND ASPH PAV (2"-8")	CEM STABIL BKFL	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)
						FT	FT	FT	FT	FT	DEG	SY	SY	CY	LF	LF	EA	EA
1	1	207+89.32	RT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90		48		60		2	
	2	208+77.34	RT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90		54		60		2	
	3	211+07.18	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		45		64		2	
	4	213+51.25	LT	ASPHALT	RESIDENTIAL	15	14			18" RCP TO REMAIN			78					
	5	220+38.91	LT	ASPHALT	RESIDENTIAL	25	20	70	20	64	90		106		64		2	
2	6	225+42.77	RT	ASPHALT	RESIDENTIAL	25	20	68	25	37	90		124					
	7	226+55.27	RT	ASPHALT	RESIDENTIAL	25	21		15				235					
	8	227+13.79	RT	ASPHALT	RESIDENTIAL	25	34	73			167		26					
	9	231+48.85	RT	ASPHALT	RESIDENTIAL	30	30	90	30	84	90		184			84		2
	10	236+99.34	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		92		72		2	
	11	239+34.03	RT	ASPHALT	CR 298								123					
	12	241+09.99	RT	ASPHALT	RESIDENTIAL	25	20	70	25	48	90		69		56		2	
	13	243+09.49	LT	ASPHALT	RESIDENTIAL	25	20	70	25	16	90		186		16		1	
	14	243+28.50	RT	ASPHALT	RESIDENTIAL	25	20	73	25	48	106		53		48		2	
3	15	246+09.18	RT	ASPHALT	RESIDENTIAL	25	25	86	25	84	119		49		84		2	
	16	252+28.25	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	70		67		64		2	
	17	258+03.47	RT	ASPHALT	RESIDENTIAL	25	20	77	25	32	114		51		68			2
	18	258+64.35	LT	ASPHALT	RESIDENTIAL	25	28	94	25	96	132		63		96		2	
	19	265+16.80	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		81		64		2	
	20	265+99.63	LT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90		59		60		2	
4	21	270+44.46	RT	ASPHALT	RESIDENTIAL	25	20	73	25	68	107		137		68		2	
	22	283+46.95	LT	ASPHALT	CR 144	15	24	54	15	52	90		160		52		2	

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BMT	JASPER		22

DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								496 6004	496 6007	530 6005	530 6008	560 6011
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW	REMOV STR (SET)	REMOV STR (PIPE)	DRIVEWAYS (ACP)	TURNOUTS (ACP) 4" ACP	MAILBOX INSTALL-S (TWW-POST) TY 4 *
						FT	FT	FT	FT	FT	DEG	EA	LF	SY	SY	EA
1	1	207+89.32	RT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90	2	22	108		
	2	208+77.34	RT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90	2	22	110		
	3	211+07.18	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90	2	22	107	23	1
	4	213+51.25	LT	ASPHALT	RESIDENTIAL	15	14			18" RCP TO REMAIN				68	26	2
	5	220+38.91	LT	ASPHALT	RESIDENTIAL	25	20	70	20	64	90	2	30	107	23	1
2	6	225+42.77	RT	ASPHALT	RESIDENTIAL	25	20	68	25	37	90			106		
	7	226+55.27	RT	ASPHALT	RESIDENTIAL	25	21		15					220		
	8	227+13.79	RT	ASPHALT	RESIDENTIAL	25	34	73			167		19	87		
	9	231+48.85	RT	ASPHALT	RESIDENTIAL	30	30	90	30	84	90			163	23	1
	10	236+99.34	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90	2	47	109	23	1
	11	239+34.03	RT	ASPHALT	CR 298							2	35			
	12	241+09.99	RT	ASPHALT	RESIDENTIAL	25	20	70	25	48	90	2	22	112	65	2
	13	243+09.49	LT	ASPHALT	RESIDENTIAL	25	20	70	25	16	90	1		108		
	14	243+28.50	RT	ASPHALT	RESIDENTIAL	25	20	73	25	48	106	2		121		
3	15	246+09.18	RT	ASPHALT	RESIDENTIAL	25	25	86	25	84	119			161		
	16	252+28.25	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	70	2	32	111	23	1
	17	258+03.47	RT	ASPHALT	RESIDENTIAL	25	20	77	25	32	114	2	39	130		
	18	258+64.35	LT	ASPHALT	RESIDENTIAL	25	28	94	25	96	132			187		
	19	265+16.80	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90			109		
	20	265+99.63	LT	ASPHALT	RESIDENTIAL	25	20	70	25	60	90			109		
4	21	270+44.46	RT	ASPHALT	RESIDENTIAL	25	20	73	25	68	107			121		
	22	283+46.95	LT	ASPHALT	CR 144	15	24	54	15	52	90			105		

* EXISTING MAILBOX REMOVAL SUBSIDIARY TO PROPOSED MAILBOX

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DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								104 6017	105 6045	400 6005	464 6003	464 6005	467 6363	467 6395
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE AND ASPH PAV (2"-8")	CEM STABIL BKFL	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)
						FT	FT	FT	FT	FT	DEG	SY	SY	CY	LF	LF	EA	EA
5	23	305+98.73	RT	ASPHALT	RESIDENTIAL	25	20	73	25	52	111		75			52		2
	24	309+67.26	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		84		68		2	
	25	315+96.10	RT	ASPHALT	RESIDENTIAL	25	20	72	25	68	90		51		68		2	
6	26	320+05.71	LT	ASPHALT	RESIDENTIAL	25	20	70	25	44	90		85		64		2	
	27	321+83.58	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		62		64		2	
	28	321+91.61	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	93		53		64		2	
	29	323+97.99	RT	ASPHALT	RESIDENTIAL	25	20	70	25	48	82		47			48		2
	30	327+08.82	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		148		68		2	
	31	338+07.34	RT	ASPHALT	RESIDENTIAL	25	20	67	25	64	90		105		64		1	
	32	338+74.60	RT	ASPHALT	RESIDENTIAL	25	20	67	25	64	90		162		64		1	
7	33	345+25.66	LT	ASPHALT	RESIDENTIAL	25	20	72	25	64	90		53		64		2	
	34	353+88.61	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	95		83		64		2	
	35	360+03.84	LT	ASPHALT	RESIDENTIAL	25	20	68	25	64	90		93		64		2	
	36	361+90.62	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		116		64		2	
8	37	365+13.92	LT	ASPHALT	RESIDENTIAL	25	20	67	25	48	90		54		64		2	
	38	369+71.93	LT	ASPHALT	RESIDENTIAL	25	20	71	25	68	90		70		68		2	
	39	371+26.39	LT	ASPHALT	RESIDENTIAL	25	20	70	25	76	90		47		76		2	
	40	379+88.84	RT	ASPHALT	CR 300	30	30	94	30	88	90		185		88		2	
	41	380+51.36	LT	ASPHALT	CR 138E	15	30	59	15	56	90		184		60		2	
	42	384+55.93	LT	ASPHALT	RESIDENTIAL	25	20	69	25	56	90		103		56		2	
	43	387+01.60	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		113		65		2	
	44	388+75.07	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		66		64		2	

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DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								496 6004	496 6007	530 6005	530 6008	560 6011
												REMOV STR (SET)	REMOV STR (PIPE)	DRIVEWAYS (ACP)	TURNOUTS (ACP)	MAILBOX INSTALL-S (TWW-POST) TY 4 *
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW				4" ACP	
						FT	FT	FT	FT	FT	DEG	EA	LF	SY	SY	EA
5	23	305+98.73	RT	ASPHALT	RESIDENTIAL	25	20	73	25	52	111		38	124	22	1
	24	309+67.26	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90			112	23	1
	25	315+96.10	RT	ASPHALT	RESIDENTIAL	25	20	72	25	68	90			111	23	1
6	26	320+05.71	LT	ASPHALT	RESIDENTIAL	25	20	70	25	44	90		26	110	23	1
	27	321+83.58	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		26	111		
	28	321+91.61	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	93			109	23	1
	29	323+97.99	RT	ASPHALT	RESIDENTIAL	25	20	70	25	48	82		26	113		
	30	327+08.82	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90			110	22	1
	31	338+07.34	RT	ASPHALT	RESIDENTIAL	25	20	67	25	64	90			105		
	32	338+74.60	RT	ASPHALT	RESIDENTIAL	25	20	67	25	64	90			106		
7	33	345+25.66	LT	ASPHALT	RESIDENTIAL	25	20	72	25	64	90		17	114		
	34	353+88.61	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	95			112	23	1
	35	360+03.84	LT	ASPHALT	RESIDENTIAL	25	20	68	25	64	90			109	22	1
	36	361+90.62	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90			109		
8	37	365+13.92	LT	ASPHALT	RESIDENTIAL	25	20	67	25	48	90		17	106		
	38	369+71.93	LT	ASPHALT	RESIDENTIAL	25	20	71	25	68	90			112		
	39	371+26.39	LT	ASPHALT	RESIDENTIAL	25	20	70	25	76	90			327		
	40	379+88.84	RT	ASPHALT	CR 300	30	30	94	30	88	90			166		
	41	380+51.36	LT	ASPHALT	CR 138E	15	30	59	15	56	90			125		
	42	384+55.93	LT	ASPHALT	RESIDENTIAL	25	20	69	25	56	90	2	24	110	23	1
	43	387+01.60	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90	2	32	114		
	44	388+75.07	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		18	111		

*EXISTING MAILBOX REMOVAL SUBSIDIARY TO PROPOSED MAILBOX

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation

FM 777
MISCELLANEOUS SUMMARIES

SHEET 11 OF 15

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		25

DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								104 6017	105 6045	400 6005	464 6003	464 6005	467 6363	467 6395
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE AND ASPH PAV (2"-8")	CEM STABIL BKFL	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)
						FT	FT	FT	FT	FT	DEG	SY	SY	CY	LF	LF	EA	EA
9	45	391+25.31	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		54		64		2	
	46	393+00.79	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		60		68		2	
	47	394+88.11	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		82		68		2	
	48	403+77.83	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		68		68		2	
	49	405+81.48	LT	ASPHALT	RESIDENTIAL	25	20	70	25	96	90		52		96		2	
10	50	415+64.57	RT	ASPHALT	RESIDENTIAL	25	20	69	25	64	90		166		64		2	
	51	421+76.65	LT	ASPHALT	RESIDENTIAL	25	20	73	25	68	90		61		68		2	
	52	434+09.01	RT	ASPHALT	RESIDENTIAL	25	20	70	25	28	103		71		54		2	
11	53	448+14.59	RT	CONCRETE	RESIDENTIAL	25	20	70	25	64	90	185			64		2	
	54	449+23.18	LT	ASPHALT	RESIDENTIAL	25	20	70	25	72	90		116		72		2	
	55	450+86.02	RT	ASPHALT	RESIDENTIAL	25	20	72	25	68	104		96		68		2	
	56	452+90.27	RT	ASPHALT	RESIDENTIAL	30	30	90	30	168	92		124			168		4
	57	455+41.35	RT	ASPHALT	RESIDENTIAL	15	30	69	15	128	117		116			128		4
	58	456+80.54	LT	ASPHALT	RESIDENTIAL	25	30	80	25	76	90		172		76		2	
	59	458+79.13	LT	ASPHALT	RESIDENTIAL	25	30	80	25	76	90		154		76		2	
12	60	461+85.04	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90		117			64		2
	61	463+65.74	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		91		68		2	

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MISCELLANEOUS SUMMARIES

SHEET 12 OF 15

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		26

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DRIVEWAYS & PARALLEL CULVERT SUMMARY

LAYOUT SHEET NO.	DRIVEWAY NO.	STATION	LT / RT	DESCRIPTION								496 6004	496 6007	530 6005	530 6008	560 6011
												REMOV STR (SET)	REMOV STR (PIPE)	DRIVEWAYS (ACP)	TURNOUTS (ACP)	MAILBOX INSTALL-S (TWW-POST) TY 4 *
				MATERIAL	USE	R1	W1	W2	R2	L	SKEW				4" ACP	
						FT	FT	FT	FT	FT	DEG	EA	LF	SY	SY	EA
9	45	391+25.31	LT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90	2	14	112		
	46	393+00.79	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90	2	14	113		
	47	394+88.11	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		30	108	23	1
	48	403+77.83	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90			109		
	49	405+81.48	LT	ASPHALT	RESIDENTIAL	25	20	70	25	96	90			110		
10	50	415+64.57	RT	ASPHALT	RESIDENTIAL	25	20	69	25	64	90			113		
	51	421+76.65	LT	ASPHALT	RESIDENTIAL	25	20	73	25	68	90			108	23	1
	52	434+09.01	RT	ASPHALT	RESIDENTIAL	25	20	70	25	28	103			117	22	1
11	53	448+14.59	RT	CONCRETE	RESIDENTIAL	25	20	70	25	64	90			114		
	54	449+23.18	LT	ASPHALT	RESIDENTIAL	25	20	70	25	72	90			106		
	55	450+86.02	RT	ASPHALT	RESIDENTIAL	25	20	72	25	68	104		43	120		
	56	452+90.27	RT	ASPHALT	RESIDENTIAL	30	30	90	30	168	92		60	168	23	1
	57	455+41.35	RT	ASPHALT	RESIDENTIAL	15	30	69	15	128	117		60	157		
	58	456+80.54	LT	ASPHALT	RESIDENTIAL	25	30	80	25	76	90			147		
	59	458+79.13	LT	ASPHALT	RESIDENTIAL	25	30	80	25	76	90			149		
12	60	461+85.04	RT	ASPHALT	RESIDENTIAL	25	20	70	25	64	90	2	53	111		
	61	463+65.74	LT	ASPHALT	RESIDENTIAL	25	20	70	25	68	90		27	110		

*EXISTING MAILBOX REMOVAL SUBSIDIARY TO PROPOSED MAILBOX

LJA PROGRAM MANAGEMENT
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FM 777
MISCELLANEOUS SUMMARIES

SHEET 13 OF 15

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		27

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SUMMARY OF TCP ITEMS										
ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	502 6001	662 6004	662 6016	662 6034	662 6111	6001 6002	6185 6002	6185 6005
			BARRICADES, SIGNS AND TRAFFIC HANDLING	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
			MO	LF	LF	LF	EA	EA	DAY	DAY
CSJ 1109-01-026										
4	269+37	271+37		400		400	11			
	272+57	274+57		400		400	11			
CSJ 1109-01-026 SUBTOTAL			**5**	**800**	**0**	**800**	**22**	**2**	80	0
CSJ 1109-01-022										
1	206+38	221+00		2924		2924	75			
2	221+00	245+00		4800		4800	121			
3	245+00	269+00		4800		4800	121			
4	269+00	269+37		74		74	3			
	27457	29300		3686		3686	94			
5	269+00	317+00		9600		9600	241			
6	317+00	341+00		4800		4800	121			
7	341+00	365+00		4800		4800	121			
8	365+00	389+00		4800		4800	121			
9	389+00	413+00		4800		4800	121			
10	413+00	437+00		4800		4800	121			
11	437+00	461+00		4800		4800	121			
12	461+00	469+18		1636	48	1636	42			
CSJ 1109-01-022 SUBTOTAL			**6**	**56320**	**48**	**56320**	**2**	2	96	5
PROJECT TOTALS			**11**	**57120**	**48**	**57120**	**24**	**4**	**176**	**5**

SUMMARY OF REMOVAL ITEMS						
ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	542 6001	544 6003	644 6076	677 6001
			REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM	ELIM EXT PAV MRK & MRKS (4")
			LF	EA	EA	LF
CSJ 1109-01-026						
4	269+37	271+37	75	2	1	400
	272+57	274+57	175	2	2	400
CSJ 1109-01-026 SUBTOTAL			250	4	3	800
CSJ 1109-01-022						
1	206+38	221+00			1	3641
2	221+00	245+00			13	2315
3	245+00	269+00			9	4800
4	269+00	269+37				74
	274+57	293+00			13	2672
5	293+00	317+00			8	4800
6	317+00	341+00			4	4800
7	341+00	365+00			6	4800
8	365+00	389+00			4	4800
9	389+00	413+00				4800
10	413+00	437+00			1	4517
11	437+00	461+00			6	2200
12	461+00	469+18			16	1722
CSJ 1109-01-022 SUBTOTAL			0	0	81	45941
PROJECT TOTALS			**250**	**4**	**84**	**46,741**

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LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
MISCELLANEOUS SUMMARIES

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		28

SUMMARY OF EROSION CONTROL ITEMS

ROADWAY LAYOUT NO.	BEGIN STATION	END STATION	164 6009 BROADCAST SEED (TEMP) (WARM) SY	164 6011 BROADCAST SEED (TEMP) (COOL) SY	164 6021 CELL FBR MLCH SEED(PERM)(RURAL)(SANDY) SY	* 168 6001 VEGETATIVE WATERING AC	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2) LF	506 6011 ROCK FILTER DAMS (REMOVE) LF	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF	506 6043 BIODEG EROSN CONT LOGS (REMOVE) LF	730 6002 FULL - WIDTH MOWING AC
CSJ 1109-01-026											
4	269+37	272+57	267	267	533	1	60	60	270	270	1
	272+57	274+57	167	167	333	1	60	60	180	180	1
CSJ 1109-01-026 SUBTOTAL			434	434	866	2	120	120	450	450	2
CSJ 1109-01-022									150	150	
1	205+89	221+00	1259	1259	2518	1			210	210	1
2	221+00	245+00	2000	2000	4000	1					1
3	245+00	269+00	2000	2000	4000	1					1
4	269+00	269+37	31	31	62	1					1
	274+57	293+00	1536	1536	3072	1			240	240	1
5	293+00	317+00	2000	2000	4000	1			120	120	1
6	317+00	341+00	2000	2000	4000	1			240	240	1
7	341+00	365+00	2000	2000	4000	1			360	360	1
8	365+00	389+00	2000	2000	4000	1			360	360	1
9	389+00	413+00	2000	2000	4000	1			360	360	1
10	413+00	437+00	2000	2000	4000	1			120	120	1
11	437+00	461+00	2000	2000	4000	1			240	240	1
12	461+00	469+18	682	682	1363	1			0	0	1
CSJ 1109-01-022 SUBTOTAL			21508	21508	43015	13	0	0	2250	2250	13
PROJECT TOTALS			**21942**	**21942**	**43881**	**15**	**120**	**120**	**2700**	**2700**	**15**

* *FOR CONTRACTORS INFORMATION ONLY, SEE BASIS OF ESTIMATE FOR ITEM QUANTITIES.*

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation

FM 777
MISCELLANEOUS SUMMARIES

CONT	SECT	JOB	HIGHWAY
1109	01	026, etc	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		29

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	D20-1TR	CO RD 317	24 X 24	X		10BWG	1	SA	P		
2	1	W1-2L	HORIZONTAL ALIGNMENT	30 X 30	X		10BWG	1	SA	P		
	1.1	W13-1P	ADVISORY SPEED (PLAQUE)	18 X 18	X		10BWG	1	SA	P		
2	2	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
2	3	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	3.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
2	4	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
2	5	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	5.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
2	6	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	6.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
2	7	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
2	8	D20-1TL	CO RD 317	24 X 24	X		10BWG	1	SA	P		
2	9	D21-1TDBR	COUNTY RD 298	90 X 12	X		10BWG	1	SA	T		
2	10	R2-1	SPEED LIMIT 50	24 X 30	X		10BWG	1	SA	P		
2	11	D21-1TDBL	COUNTY RD 298	90 X 12	X		10BWG	1	SA	T		
2	12	R2-1	SPEED LIMIT 50	24 X 30	X		10BWG	1	SA	P		
3	1	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
3	2	W1-4R	HORIZONTAL ALIGNMENT	30 X 30	X		10BWG	1	SA	P		
	2.1	W13-1P	ADVISORY SPEED (PLAQUE)	18 X 18	X		10BWG	1	SA	P		
3	3	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	4	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	4.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	5	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	5.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	6	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	6.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	7	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	8	W7-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	X		10BWG	1	SA	P		
3	9	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
3	10	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	10.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	1	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	1.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	2	I-3	WALNUT RUN	VAR X 36	X		10BWG	1	SA	P		
4	3	W7-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	X		10BWG	1	SA	P		
4	4	W1-4R	HORIZONTAL ALIGNMENT	30 X 30	X		10BWG	1	SA	P		
	4.1	W13-1P	ADVISORY SPEED (PLAQUE)	18 X 18	X		10BWG	1	SA	P		
4	5	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
4	6	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	7	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	7.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	8	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	8.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	9	D20-1TR	CO RD 144	24 X 24	X		10BWG	1	SA	P		
4	10	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	10.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
4	11	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	1	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	2	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	2.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	3	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	3.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	4	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	4.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	5	W1-8L	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
	5.1	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	6	W1-8R	CHEVRON ALIGNMENT	18 X 24	X		10BWG	1	SA	P		
5	7	S3-1T	SCHOOL BUS STOP AHEAD	30 X 30	X		10BWG	1	SA	P		
6	1	W1-2R	HORIZONTAL ALIGNMENT	30 X 30	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

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS		1109	01	026, ETC	FM 777
4-16		DIST	COUNTY		SHEET NO.
8-16		BMT	JASPER		30

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
7	1	R2-1	SPEED LIMIT 50	24 X 30	X		10BWG	1	SA	P		
7	2	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
8	1	D21-1TL	COUNTY ROAD 138	90 X 12	X		10BWG	1	SA	T		
	1.1	D21-1TR	COUNTY ROAD 300	90 X 12	X		10BWG	1	SA	T		
8	2	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
8	3	D21-1TL	COUNTY ROAD 300	90 X 12	X		10BWG	1	SA	T		
	3.1	D21-1TR	COUNTY ROAD 138	90 X 12	X		10BWG	1	SA	T		
11	1	R2-1	SPEED LIMIT 50	24 X 30	X		10BWG	1	SA	P		
11	2	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	X		10BWG	1	SA	T		
12	1	I-5	AIRPORT	24 X 24	X		10BWG	1	SA	P		
	1.1	M6-1R	DIRECTIONAL ARROW	21 X 15	X		10BWG	1	SA	P		
	1.2	I-5	AIRPORT	24 X 24	X		10BWG	1	SA	P		
	1.3	M6-1L	DIRECTIONAL ARROW	21 X 15	X		10BWG	1	SA	P		
12	2	R12-1	WEIGHT LIMIT 12 TONS	24 X 30	X		10BWG	1	SA	P		
	2.1	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
12	3	W3-1	ADVANCED TRAFFIC CONTROL	30 X 30	X		10BWG	1	SA	P		
12	4	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
12	5	R2-1	SPEED LIMIT 45	24 X 30	X		10BWG	1	SA	P		
12	6	D1-2	WOODVILLE	24 X 66	X		10BWG	1	SA	U		
	6.1	D1-2	JASPER	24 X 66	X		10BWG	1	SA	U		
12	7	R12-1T	WEIGHT LIMIT GROSS 58,420 LBS	24 X 36	X		10BWG	1	SA	P		
12	8	M3-3	CARDINAL DIRECTION	24 X 12	X		10BWG	1	SA	P		
	8.1	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
12	9	R1-2	YIELD	36 X 36 X 36	X		10BWG	1	SA	P		
12	10	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
	10.1	MG-4G	DIRECTIONAL ARROW	21 X 15	X		10BWG	1	SA	P		
12	11	M1-6F	FARM ROAD 777	24 X 24	X		10BWG	1	SA	P		
	11.1	M6-3G	DIRECTIONAL ARROW	21 X 15	X		10BWG	1	SA	P		
	11.2	M1-4	190	30 X 24	X		10BWG	1	SA	P		
	11.3	M6-4G	DIRECTIONAL ARROW	21 X 15	X		10BWG	1	SA	P		
12	12	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
	12.1	W4-4P	CROSS TRAFFIC DOES NOT STOP (PLAQUE)	24 X 12	X		10BWG	1	SA	P		
12	13	R1-1	STOP	30 X 30	X		10BWG	1	SA	P		
	13.1	W4-4P	CROSS TRAFFIC DOES NO STOP (PLAQUE)	24 X 12	X		10BWG	1	SA	P		
12	14	R7-1R	NO PARKING ANY TIME	12 X 18	X		10BWG	1	SA	P		
12	15	M3-2	CARDINAL DIRECTION	18 X 24	X		10BWG	1	SA	P		
	15.1	M1-4	190	30 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

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
4-16 8-16	DIST	COUNTY		SHEET NO.
	BMT	JASPER		31

CK
DW
CK
DW

SEQUENCE OF WORK

PHASE 1

1. PLACE ADVANCED WARNING SIGNS AS SHOWN IN THE BC STANDARDS.

2. PLACE TEMPORARY EROSION CONTROL DEVICES AS SHOWN IN THE PLANS AND AS DIRECTED BY THE ENGINEER PRIOR TO THE BEGINNING OF ANY OTHER WORK.

3. CLOSE FM 777 BETWEEN STA 268+55 AND STA 275+55 ACCORDING TO FM 777 DETOUR AND WZ(RCD)-13 STANDARD.
   A. DEMOLISH EXISTING BRIDGE AT BIG WALNUT RUN.
   B. CONSTRUCT BRIDGE AT BIG WALNUT RUN.
   C. CONSTRUCT APPROACH ROADWAY FOR PROFILE ADJUSTMENT.

4. CONSTRUCT CROSS CULVERTS AS SHOWN IN THE PLANS USING TCP(2-1)-18.

PHASE 2

1. SHIFT NORTHBOUND AND SOUTHBOUND TRAFFIC TO NORTHBOUND LANE USING ONE-LANE TWO WAY OPERATION CONTROLLED BY FLAGGER PER TCP(2-2)-18 STANDARD. CONSTRUCT SOUTHBOUND SUBGRADE WIDENING, FULL DEPTH RECLAMATION (FDR), AND 2" FLEX BASE LAYER.
   A. FOR A MAXIMUM OF 1 MILE IN LENGTH, MAINTAIN ONE-LANE TWO-WAY OPERATION USING FLAGGERS AND ESCORT VEHICLES. CONTRACTOR SHALL ONLY CONSTRUCT AS MUCH AS CAN BE DONE IN ONE DAY TO RETURN TRAFFIC TO TWO-LANE OPERATION DURING NON-CONSTRUCTION HOURS.

2. PLACE CHANNELIZING DEVICES ALONG EDGE OF PAVEMENT.

PHASE 3

1. SHIFT NORTHBOUND AND SOUTHBOUND TRAFFIC TO SOUTHBOUND LANE USING ONE-LANE TWO WAY OPERATION CONTROLLED BY FLAGGER PER TCP(2-2)-18 STANDARD. CONSTRUCT NORTHBOUND SUBGRADE WIDENING, FULL DEPTH RECLAMATION (FDR), AND 2" FLEX BASE LAYER.
   A. FOR A MAXIMUM OF 1 MILE IN LENGTH, MAINTAIN ONE-LANE TWO-WAY OPERATION USING FLAGGERS AND ESCORT VEHICLES. CONTRACTOR SHALL ONLY CONSTRUCT AS MUCH AS CAN BE DONE IN ONE DAY TO RETURN TRAFFIC TO TWO-LANE OPERATION DURING NON-CONSTRUCTION HOURS.

2. PLACE CHANNELIZING DEVICES ALONG EDGE OF PAVEMENT.

PHASE 4

1. SHIFT NORTHBOUND AND SOUTHBOUND TRAFFIC TO NORTHBOUND LANE USING ONE-LANE TWO WAY OPERATION CONTROLLED BY FLAGGER PER TCP(2-2)-18 STANDARD. INSTALL CEMENT AND EMULSION TREATMENT TO FLEX BASE AND PLACE FOG SEAL ON SOUTHBOUND SIDE OF ROADWAY AS PER THE TYPICAL SECTION.
   A. FOR A MAXIMUM OF 1 MILE IN LENGTH, MAINTAIN ONE-LANE TWO-WAY OPERATION USING FLAGGERS AND ESCORT VEHICLES. CONTRACTOR SHALL ONLY CONSTRUCT AS MUCH AS CAN BE DONE IN ONE DAY TO RETURN TRAFFIC TO TWO-LANE OPERATION DURING NON-CONSTRUCTION HOURS.

PHASE 5

1. SHIFT NORTHBOUND AND SOUTHBOUND TRAFFIC TO SOUTHBOUND LANE USING ONE-LANE TWO WAY OPERATION CONTROLLED BY FLAGGER PER TCP(2-2)-18 STANDARD. INSTALL CEMENT AND EMULSION TREATMENT TO FLEX BASE AND PLACE FOG SEAL ON NORTHBOUND SIDE OF ROADWAY AS PER THE TYPICAL SECTION.
   A. FOR A MAXIMUM OF 1 MILE IN LENGTH, MAINTAIN ONE-LANE TWO-WAY OPERATION USING FLAGGERS AND ESCORT VEHICLES. RETURN TRAFFIC TO TWO-LANE OPERATION DURING NON-CONSTRUCTION HOURS.

2. PLACE WORKZONE PAVEMENT MARKINGS AT CENTERLINE.

PHASE 2 THROUGH 5 NOTES:

EACH PHASE SHALL BE COMPLETED AT THE END OF EACH DAY. CONTRACTOR SHALL COMPLETE PHASES 2 THROUGH 5 BEFORE MOVING ON TO NEXT SECTION OF ROADWAY. REPEAT PHASES 2 THROUGH 5 FOR ENTIRE LENGTH OF ROADWAY.

PHASE 6A & 6B

1. PLACE ADVANCE WARNING SIGNS AS SHOWN IN THE BC STANDARDS.

2. PLACE SUPER PAVE MIXTURE USING ONE-LANE TWO-WAY OPERATION AS STATED IN PHASES 2 THROUGH 5 UNLESS OTHERWISE APPROVED BY THE ENGINEER AND PLACE SHORT TERM TYPE Y-2 TABS PER TXDOT STANDARDS.
   A. LIMIT WORK ACTIVITIES TO ONE MILE OR AS APPROVED BY THE ENGINEER. CONTRACTOR SHALL ONLY CONSTRUCT AS MUCH AS CAN BE DONE IN ONE DAY TO RETURN TRAFFIC TO TWO-LANE OPERATION DURING NON-CONSTRUCTION HOURS.

PHASE 7

1. PLACE MILLED RUMBLE STRIPS.

2. PLACE FINAL PAVEMENT MARKINGS AND ALL OTHER APPURTENANCES REQUIRED TO COMPLETE FM 777 TO THE FINAL CONFIGURATION AS SHOWN IN THE PLANS AND STANDARDS.

GENERAL NOTES

1. REFER TO THE GENERAL NOTES & PLAN FOR ADDITIONAL DIRECTION.

2. PREPARE THE BID FOLLOWING THE PROPOSED SEQUENCE OF WORK. THE ENGINEER MAY APPROVE ADJUSTMENTS TO THE SEQUENCE OF WORK AFTER LETTING.

3. ALL SIGNS, BARRICADES AND PAVEMENT MARKINGS SHALL CONFORM WITH THE BC STANDARD SHEET, TCP SHEETS, AND THE LATEST EDITION OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (T.M.U.T.C.D.).

4. LIMIT WORK SECTIONS SO THAT NO MORE THAN ONE (1) MILE OF ROADWAY IS UNSURFACED. DAILY WORK SEGMENTS NOT TO EXCEED THE LENGTH OF WORK THAT CAN BE COMPLETED DURING DAYLIGHT HOURS.

5. PLACE WORKZONE PAVEMENT MARKINGS AFTER PLACING THE FOG SEAL. PLACE SHORT TERM TABS AFTER THE OVERLAY. SHORT TERM TABS SHALL BE USED TO DELINEATE THE CENTERLINE FOR A MAXIMUM OF 14 DAYS. PERMANENT OR TEMPORARY WORKZONE STRIPING SHALL THEN BE PLACED. USE CHANNELIZING DEVICES TO TO MARK THE EDGE LINES ONCE THE SURFACES IS SCARIFIED (UNTIL THE WORKZONE MARKINGS ARE PLACED).

6. MAINTAIN ALL EXISTING DRAINAGE CONDITIONS DURING ALL CONSTRUCTION PHASES UNTIL THE PERMANENT DRAINAGE FACILITIES ARE CONSTRUCTED AND OPERATIONAL. HANDLE EXCAVATED AND STOCKPILED MATERIAL IN SUCH A WAY THAT IT WILL NOT BLOCK DRAINAGE.

7. A PILOT CAR AND RADIO EQUIPPED FLAGGERS ARE REQUIRED AT ALL ROADWAY LOCATIONS AND AS DIRECTED BY THE ENGINEER. THE PILOT CAR WITH NECESSARY FLAGGERS AND RADIO EQUIPPED FLAGGERS AND ALL SIGNS, EQUIPMENT, LABOR, AND INCIDENTALS REQUIRED FOR THIS METHOD OF TRAFFIC CONTROL WILL NOT BE PAID FOR DIRECTLY AND IS . SUBSIDIARY TO ITEM 502.

8. MOVING AN EXISTING SIGN TO A TEMPORARY LOCATION IS SUBSIDIARY TO ITEM 502. INSTALLATIONS WITH PERMANENT SUPPORT AT PERMANENT LOCATIONS WILL BE PAID FOR UNDER THE APPLICABLE BID ITEMS.

9. CONTRACTOR SHALL TEMPORARILY RELOCATE MAILBOXES AS NEEDED OR AS DIRECTED BY THE ENGINEER. TEMPORARY RELOCATION WILL BE SUBSIDIARY TO ITEM 502. PERMANENT RELOCATION WILL BE PAID FOR UNDER ITEM 560. CONTRACTOR SHALL COORDINATE RELOCATION WITH THE POSTMASTER.

10. USE TCP STANDARDS ON US 190 AS NECESSARY WHILE WORKING ADJACENT TO THE INTERSECTION.

11. CHANGES TO PROPOSED SEQUENCE OF WORK ARE ALLOWED AS APPROVED BY THE ENGINEER.

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777
SEQUENCE OF WORK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		32

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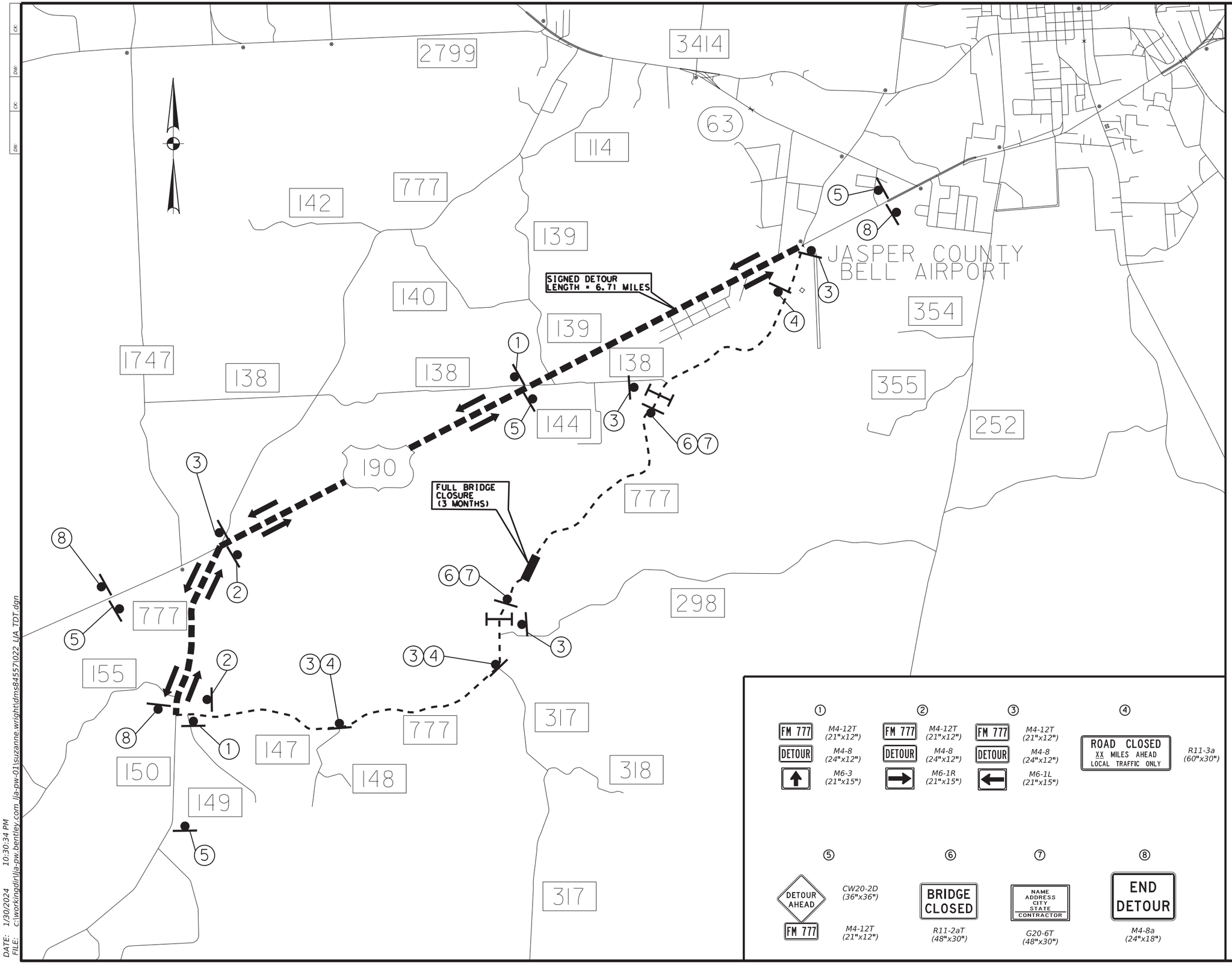

LEGEND:

- *FM 777 EXISTING ROUTE*
- *DETOUR*
- *DETOUR TRAFFIC ROUTE*
- *SIGN*
- *TYPE III BARRICADE*

SIGNED DETOUR
LENGTH = 6.71 MILES
NORMAL LENGTH = 7.43 MILES
DIFFERENCE = -0.72 MILES

NOT TO SCALE

① FM 777 *M4-12T (21"x12")*; DETOUR *M4-8 (24"x12")*; ↑ *M6-3 (21"x15")*

② FM 777 *M4-12T (21"x12")*; DETOUR *M4-8 (24"x12")*; → *M6-1R (21"x15")*

③ FM 777 *M4-12T (21"x12")*; DETOUR *M4-8 (24"x12")*; ← *M6-1L (21"x15")*

④ ROAD CLOSED / XX MILES AHEAD / LOCAL TRAFFIC ONLY *R11-3a (60"x30")*

⑤ DETOUR AHEAD *CW20-2D (36"x36")*; FM 777 *M4-12T (21"x12")*

⑥ BRIDGE CLOSED *R11-2aT (48"x30")*

⑦ NAME / ADDRESS / CITY / STATE / CONTRACTOR *G20-6T (48"x30")*

⑧ END DETOUR *M4-8a (24"x18")*

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER
01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
DETOUR PLAN

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		33

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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 4-03 7-13 9-07 8-14 5-10 5-21	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		34

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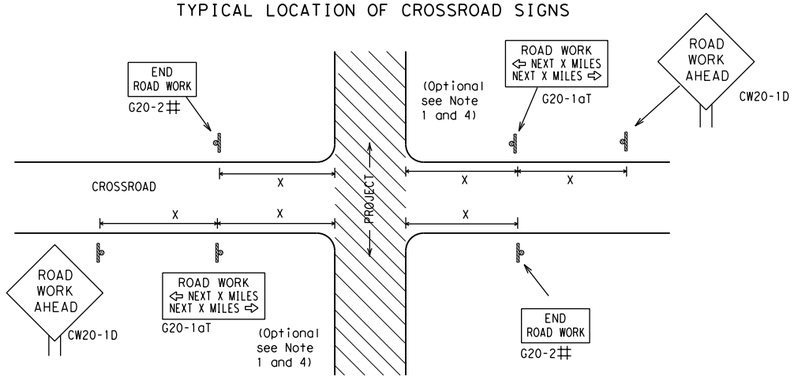
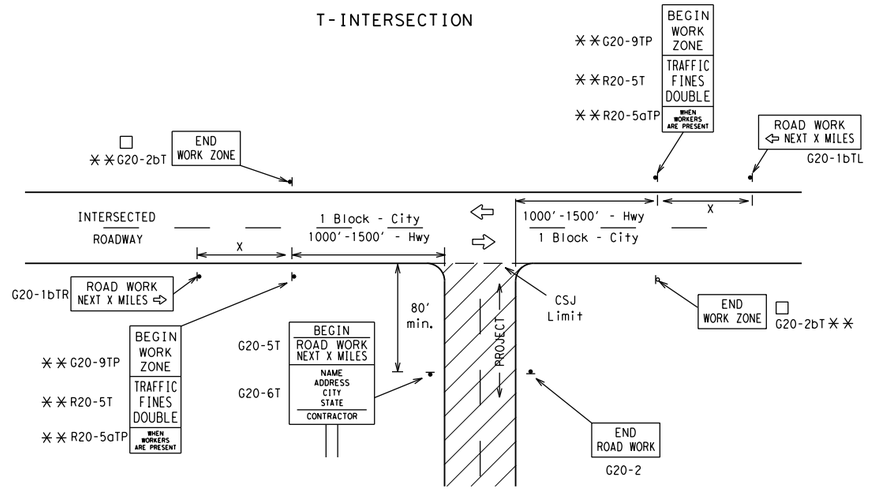
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

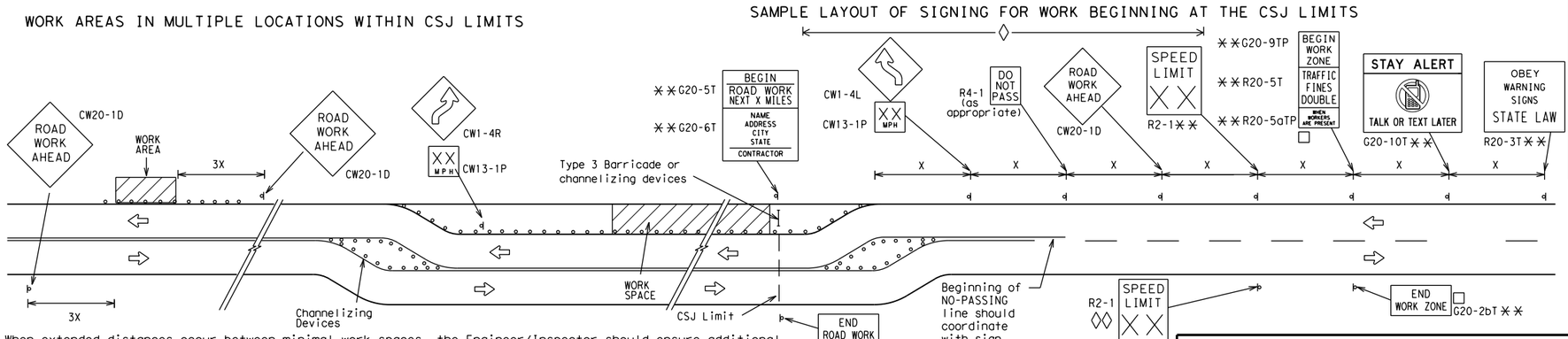
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

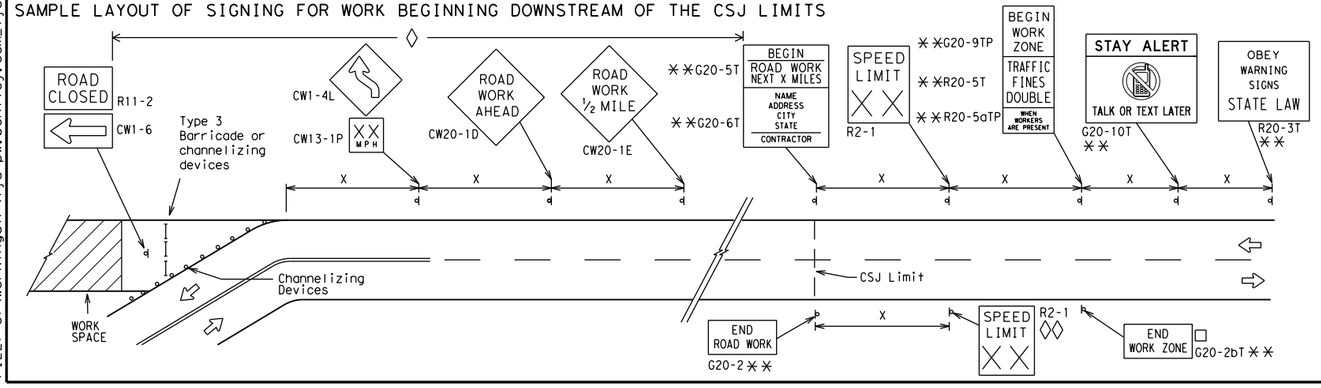
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	JASPER		35

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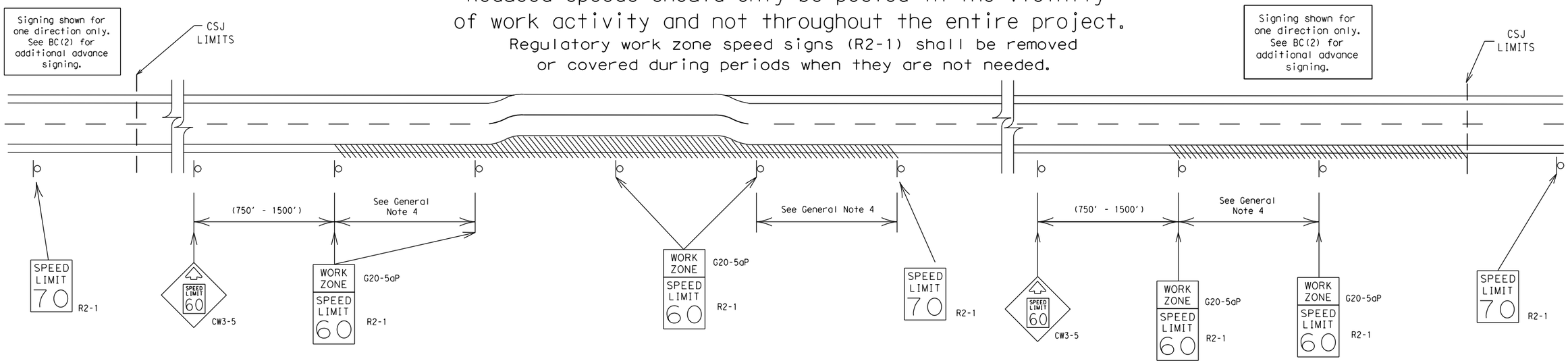
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		36

DATE: 1/30/2024 8:09:42 AM
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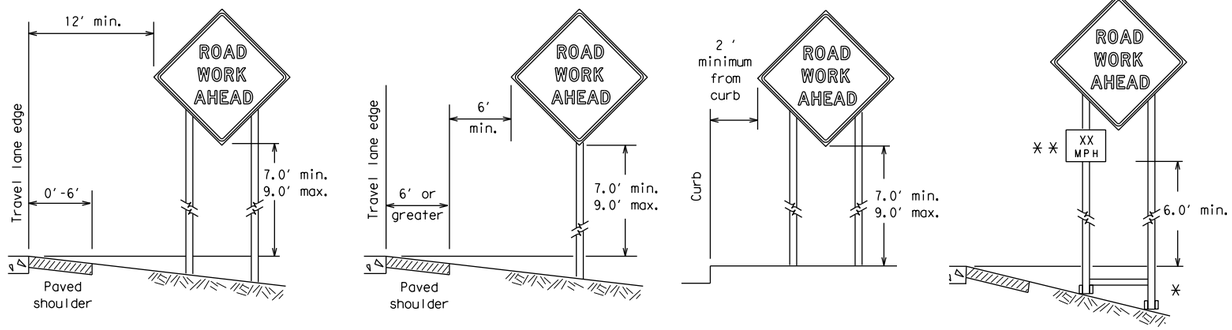
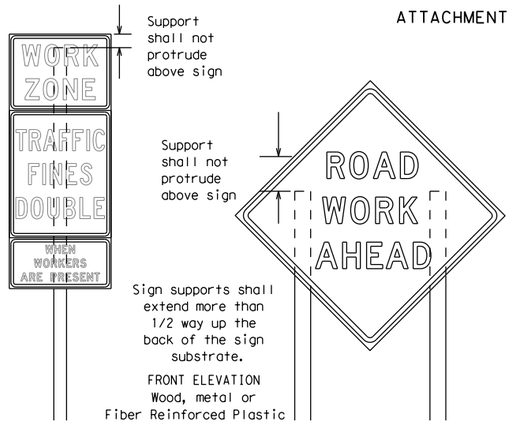
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

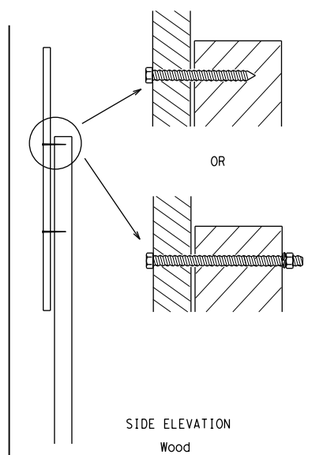


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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





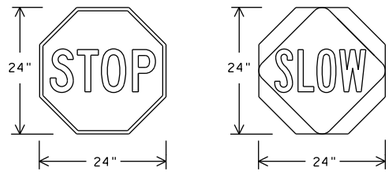
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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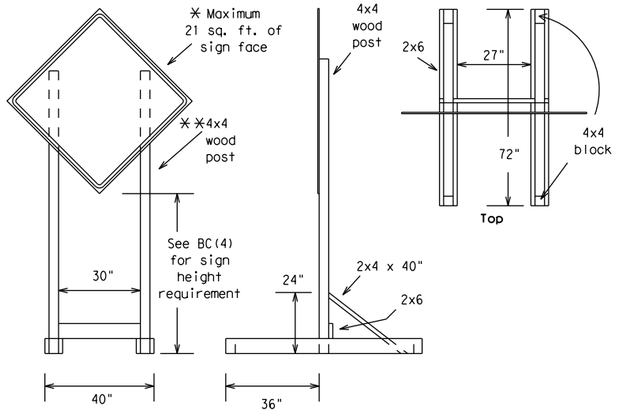
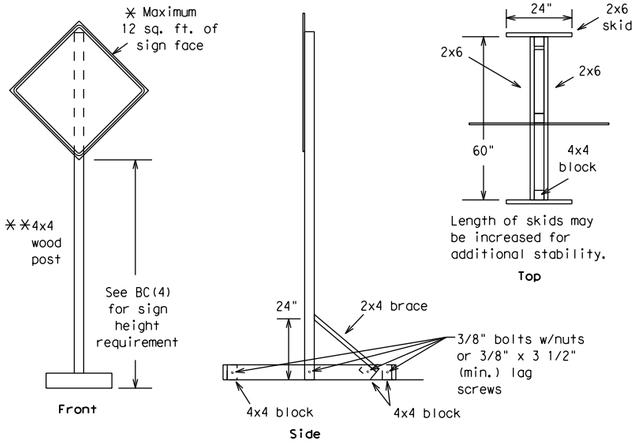
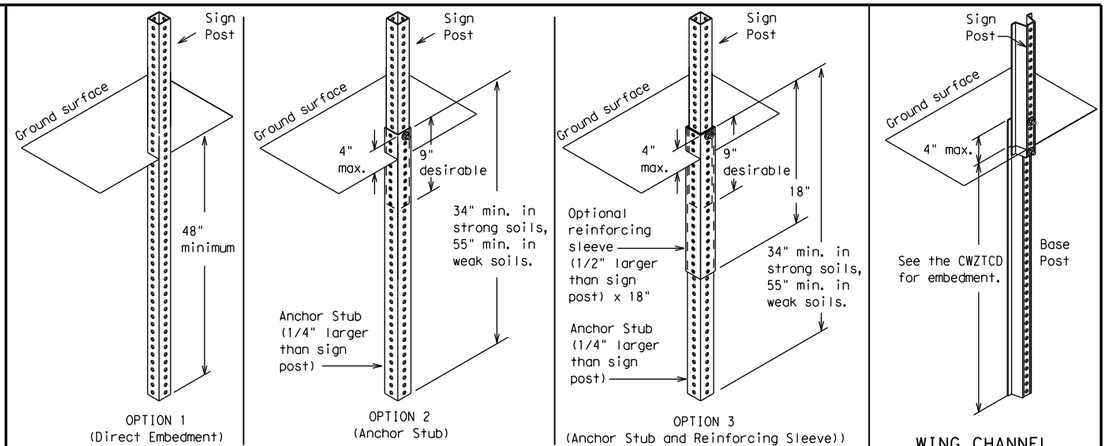
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	JASPER		37





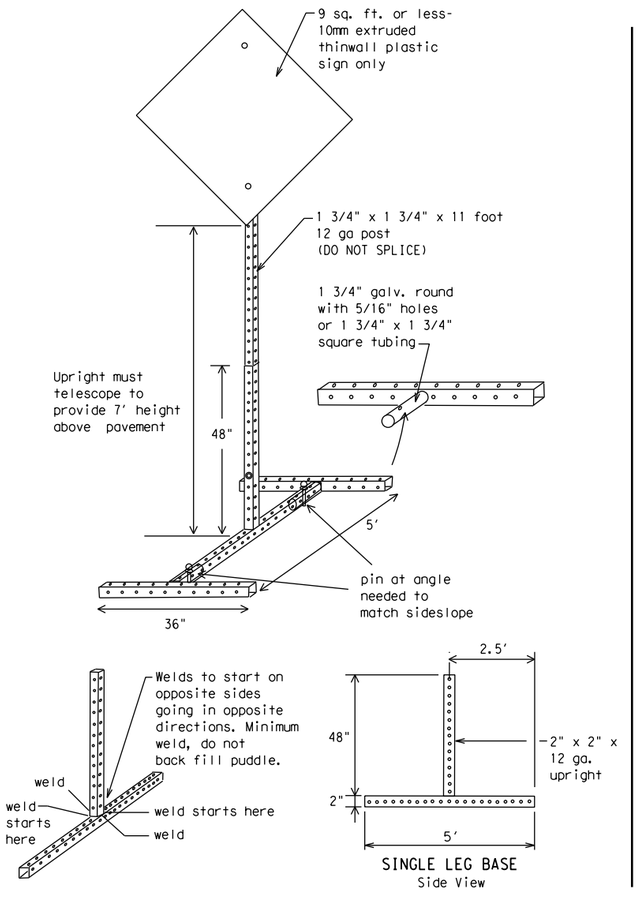
SKID MOUNTED WOOD SIGN SUPPORTS

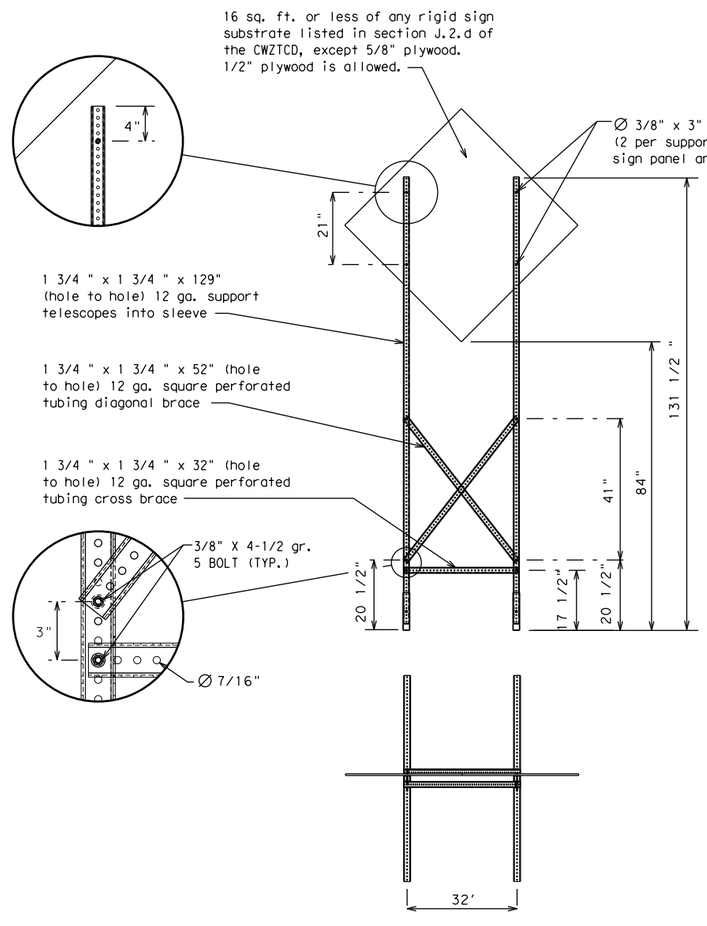
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

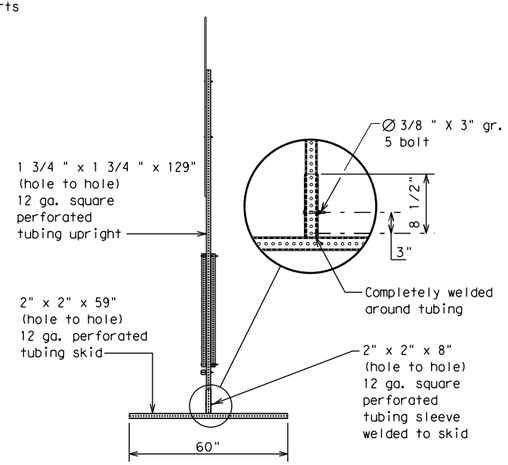


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** 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

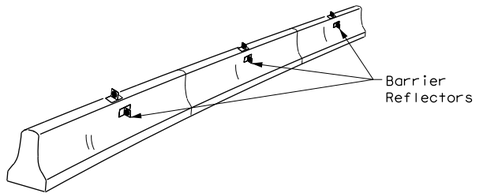
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		1109	01	026, ETC	FM 777
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		BMT	JASPER		39

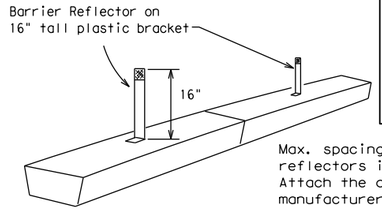
100

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.

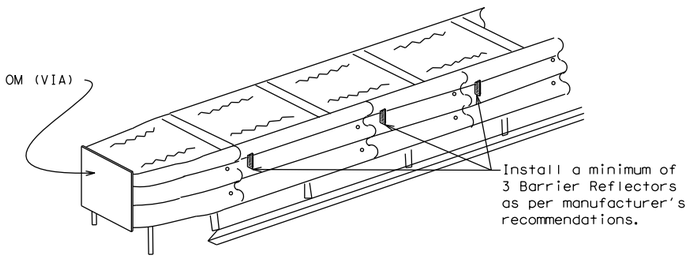


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

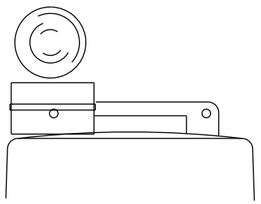


DELINEATION OF END TREATMENTS

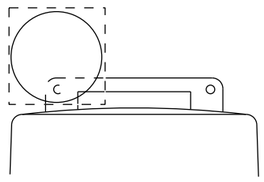
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

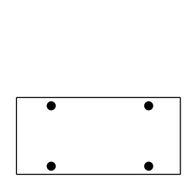
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

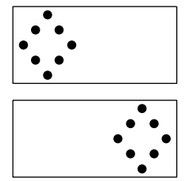
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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:

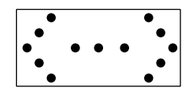


4 CORNER CAUTION

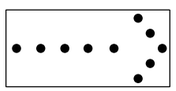
OR



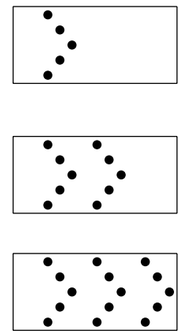
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



RIGHT/LEFT ARROW
(right arrow shown; left is similar)



RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

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	1109	01	026, ETC	FM 777
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	JASPER		40

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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:

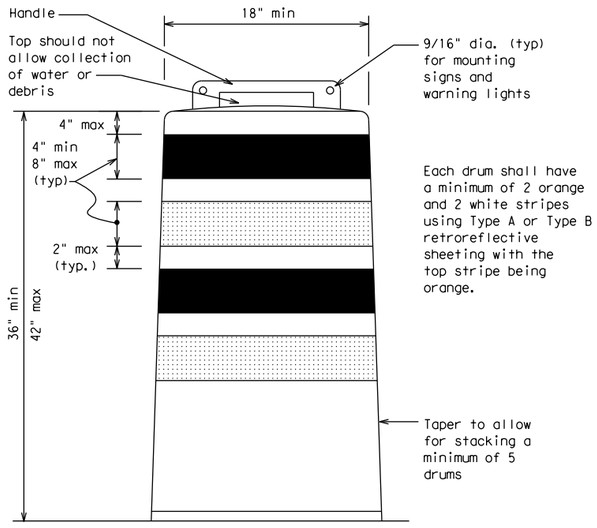
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

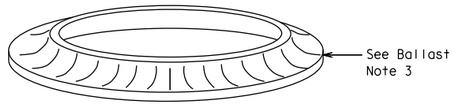
RETROREFLECTIVE SHEETING

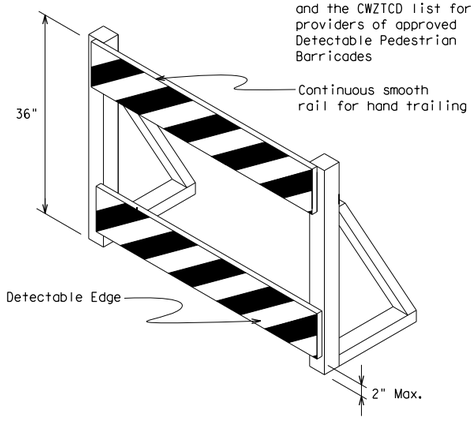
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

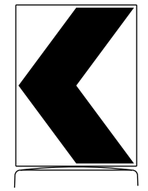




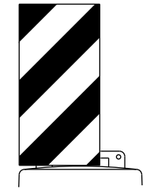


DETECTABLE PEDESTRIAN BARRICADES

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

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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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	BMT	JASPER		41
7-13				

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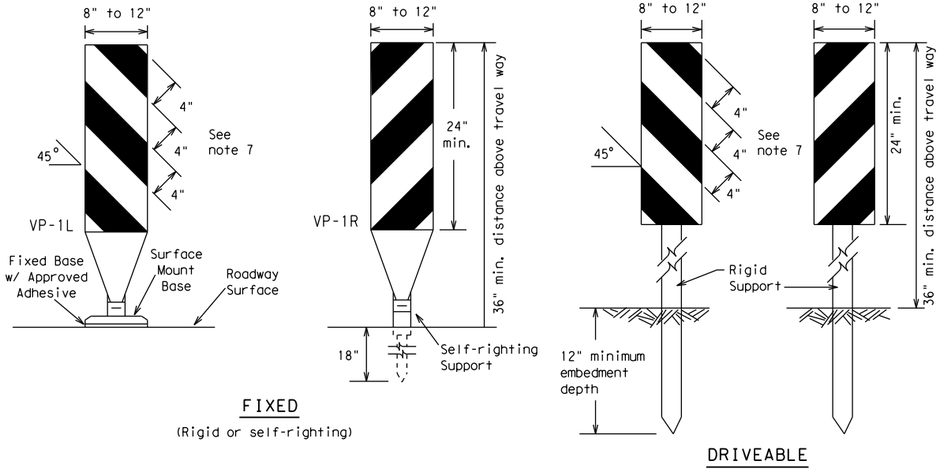
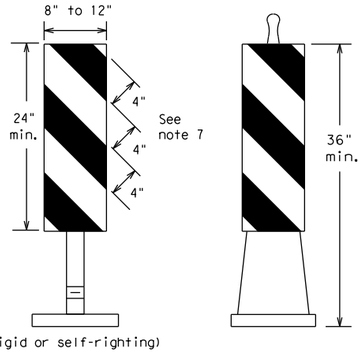


FIXED
(Rigid or self-righting)

DRIVEABLE

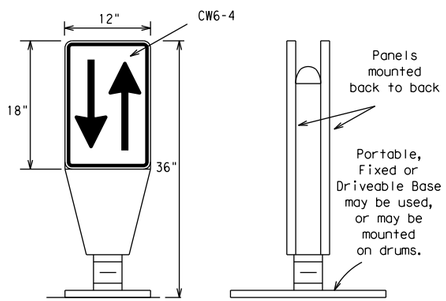


(Rigid or self-righting)

PORTABLE

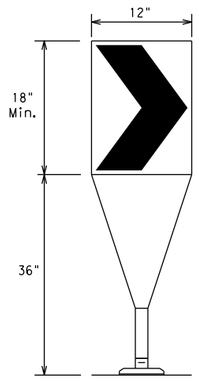
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



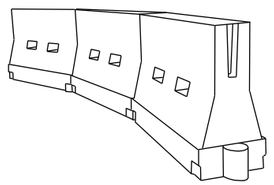
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

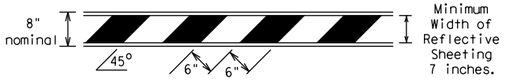
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	JASPER		42

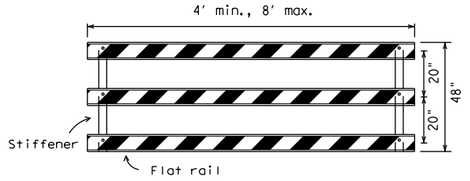
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



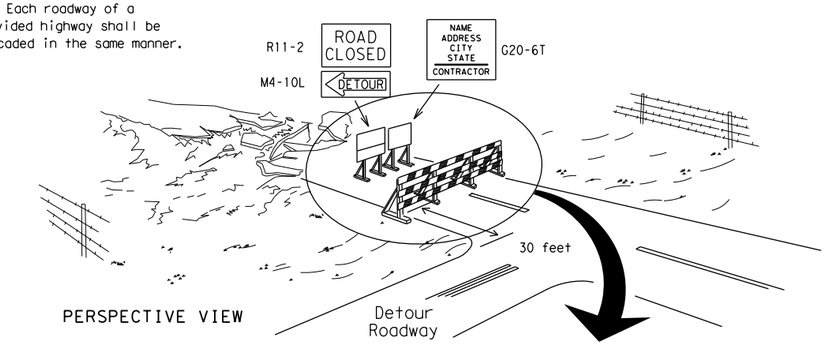
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

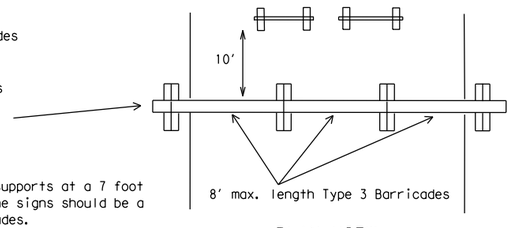
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

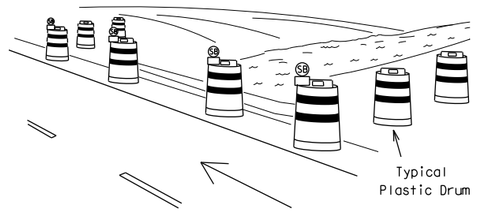
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

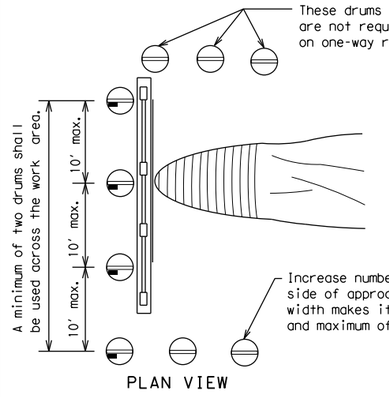
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

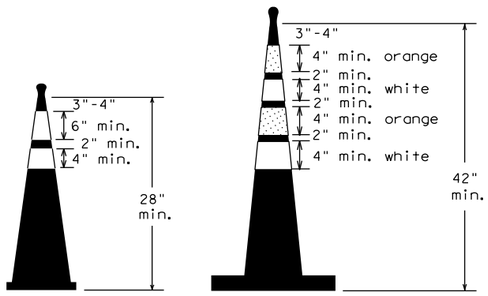
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



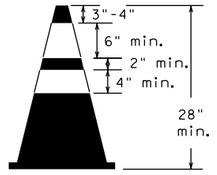
PLAN VIEW

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

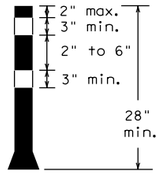
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

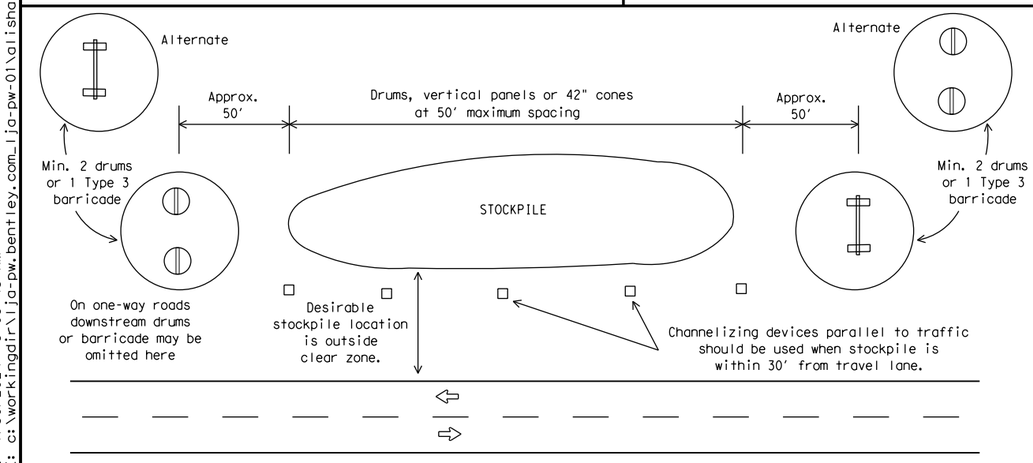


Tubular Marker

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

SHEET 10 OF 12

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.

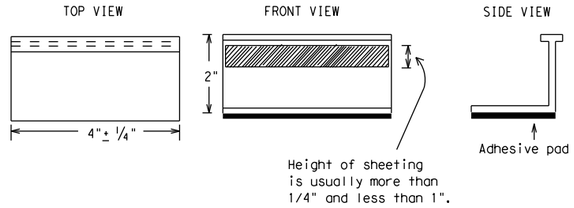
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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1-02 7-13	BMT	JASPER		44
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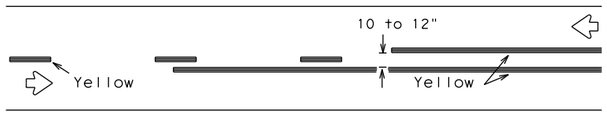
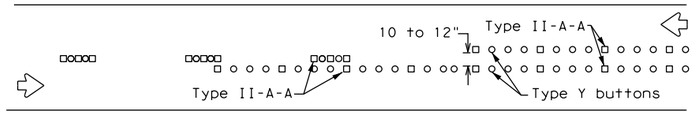
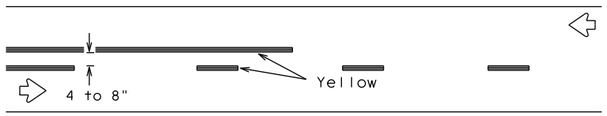
PAVEMENT MARKING PATTERNS



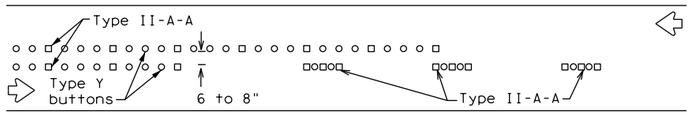
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



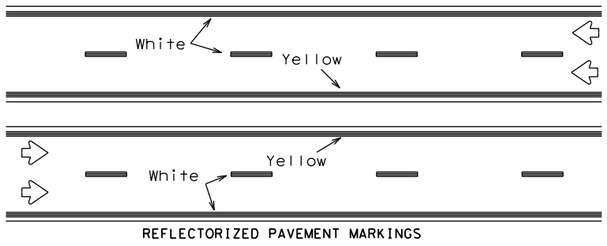
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



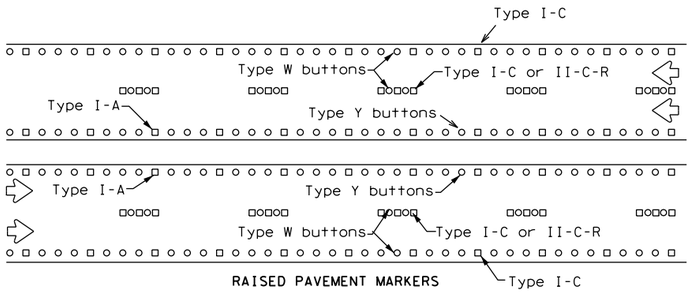
RAISED PAVEMENT MARKERS - PATTERN B

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



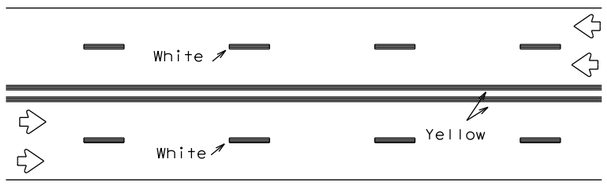
REFLECTORIZED PAVEMENT MARKINGS



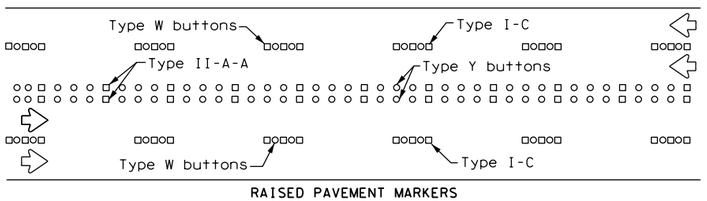
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



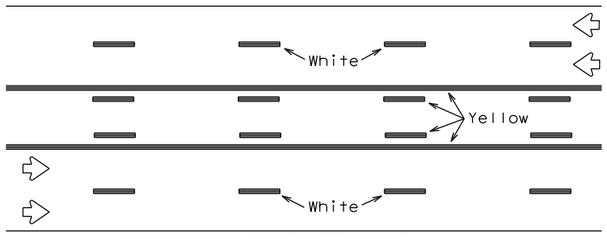
REFLECTORIZED PAVEMENT MARKINGS



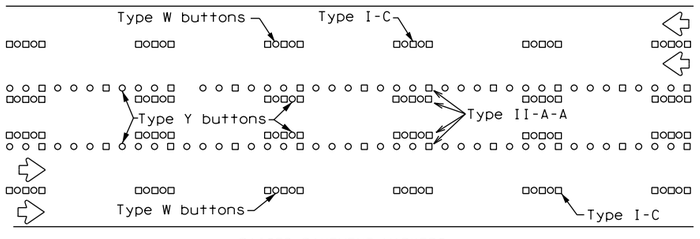
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

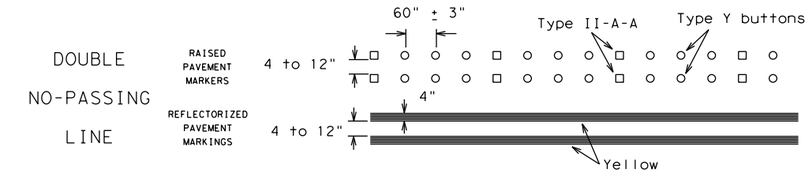
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

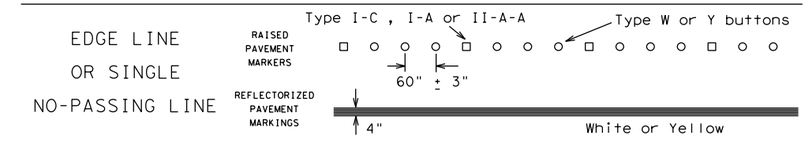
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

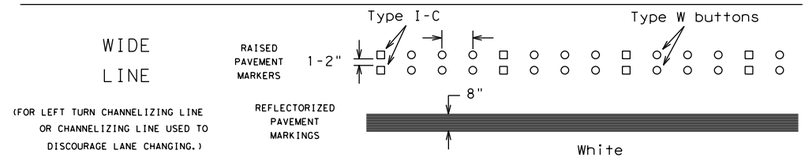


EDGE LINE OR SINGLE NO-PASSING LINE



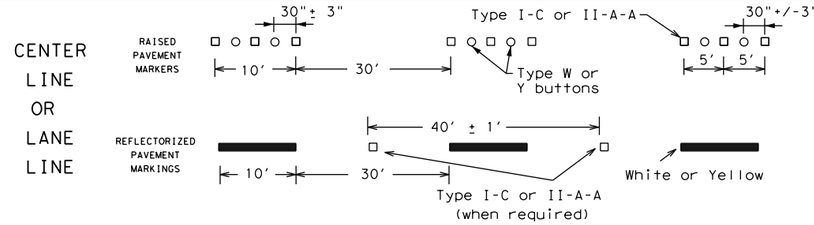
WIDE LINE

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

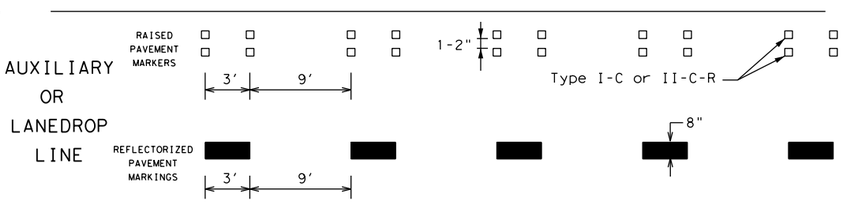


BROKEN LINES

CENTER LINE OR LANE LINE

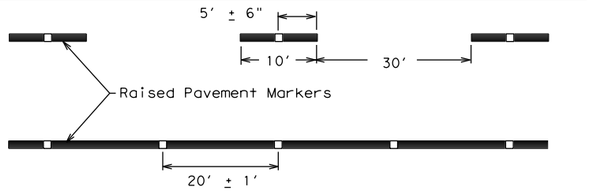


AUXILIARY OR LANEDROP LINE



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

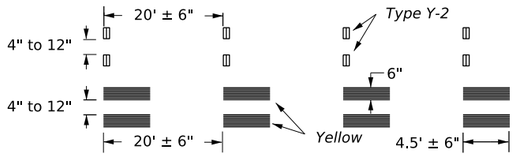
BC(12)-21

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	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		45

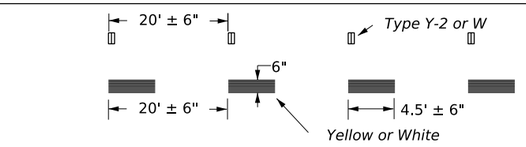
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

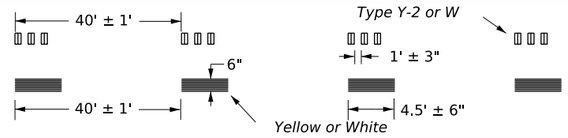


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



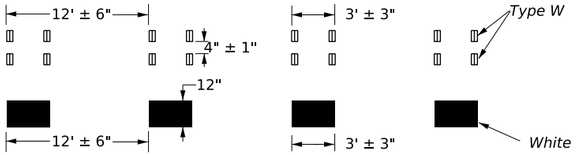
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

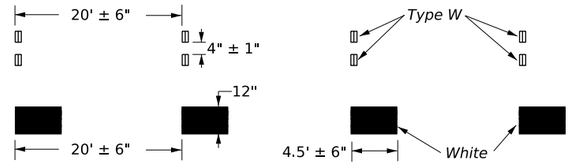


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



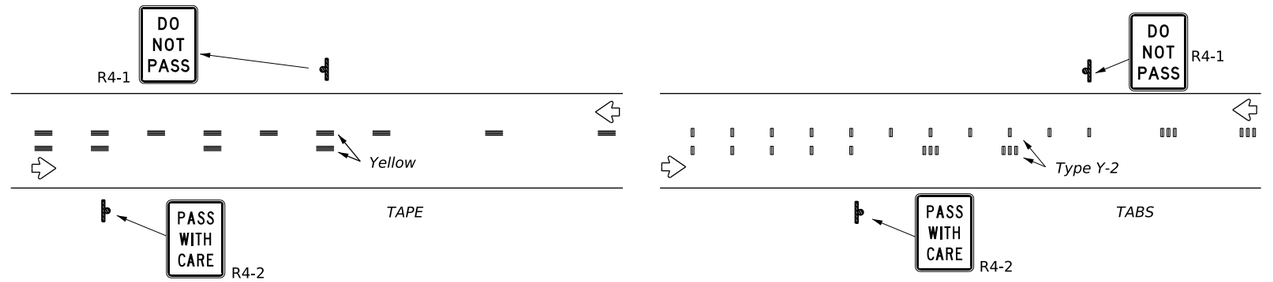
NOTES:

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

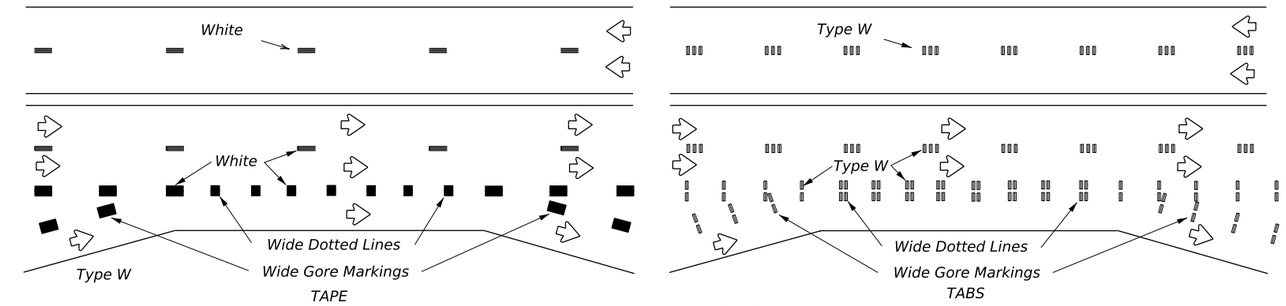
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

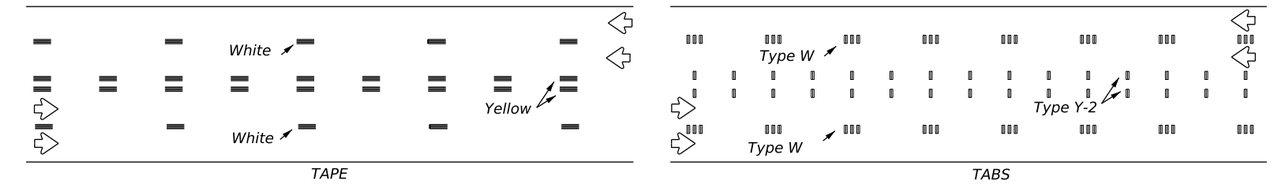
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



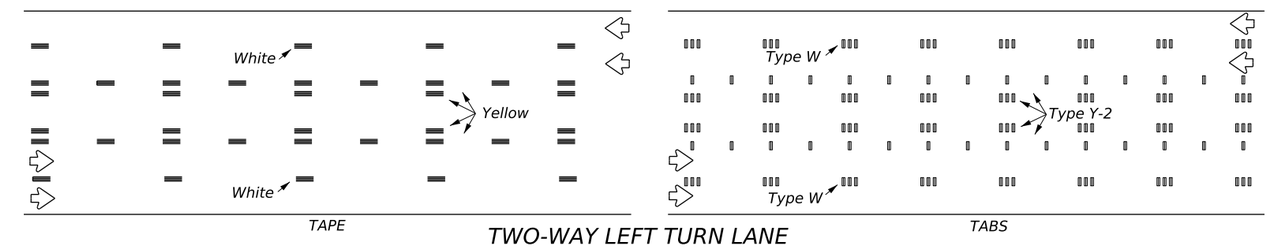
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



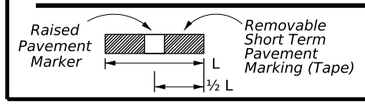
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	BMT	JASPER		46

111

DATE: 1/30/2024 8:09:49 AM
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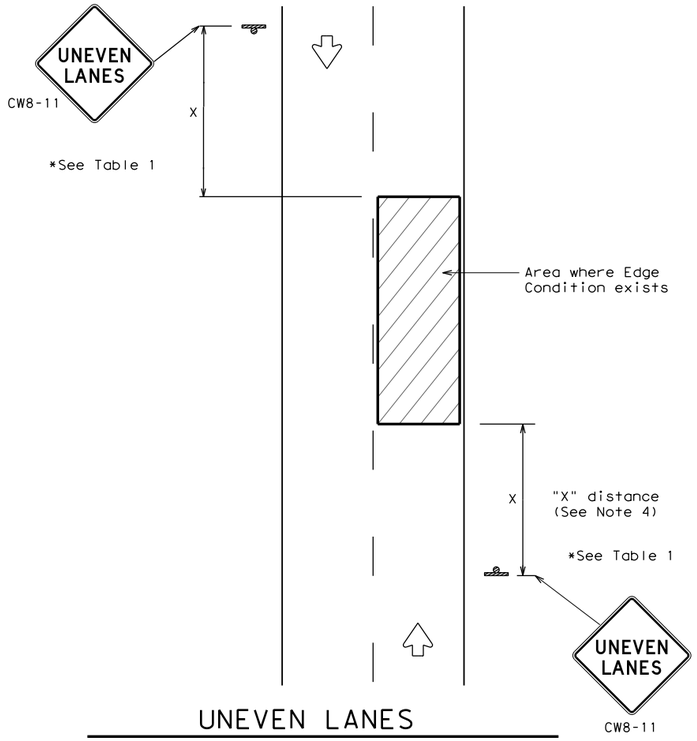
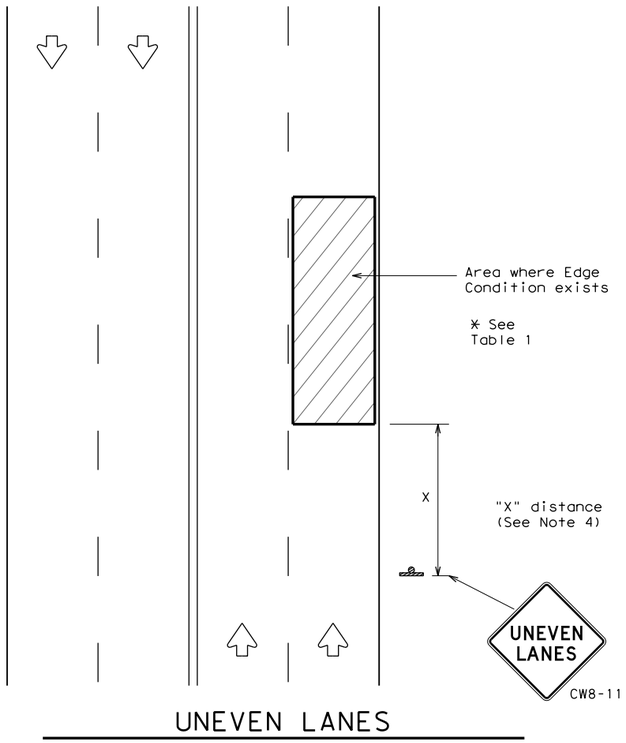
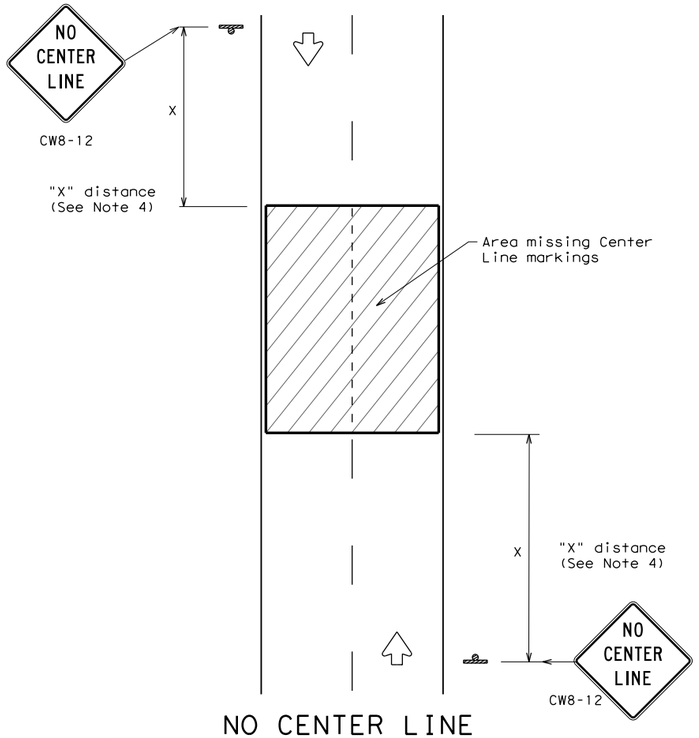


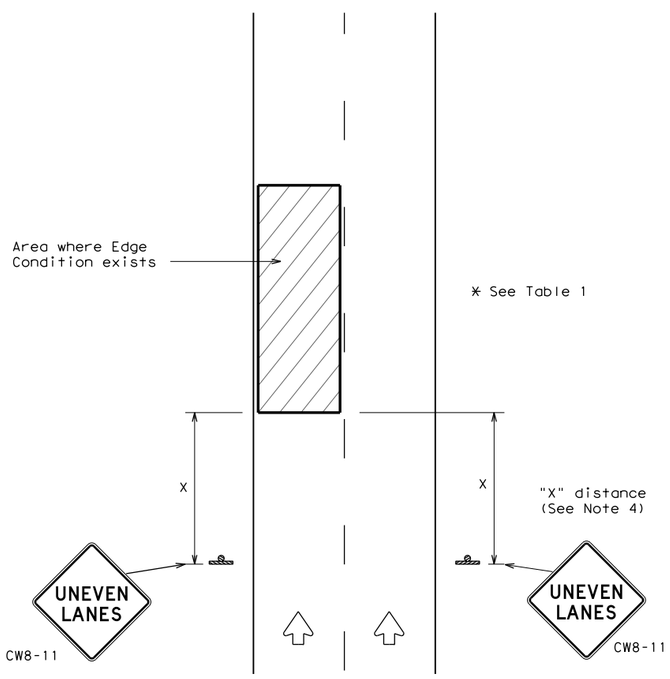
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

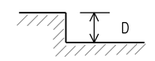
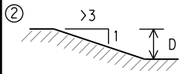
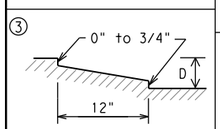
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE:	wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		1109	01	026, ETC	FM 777
8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		BMT	JASPER		47

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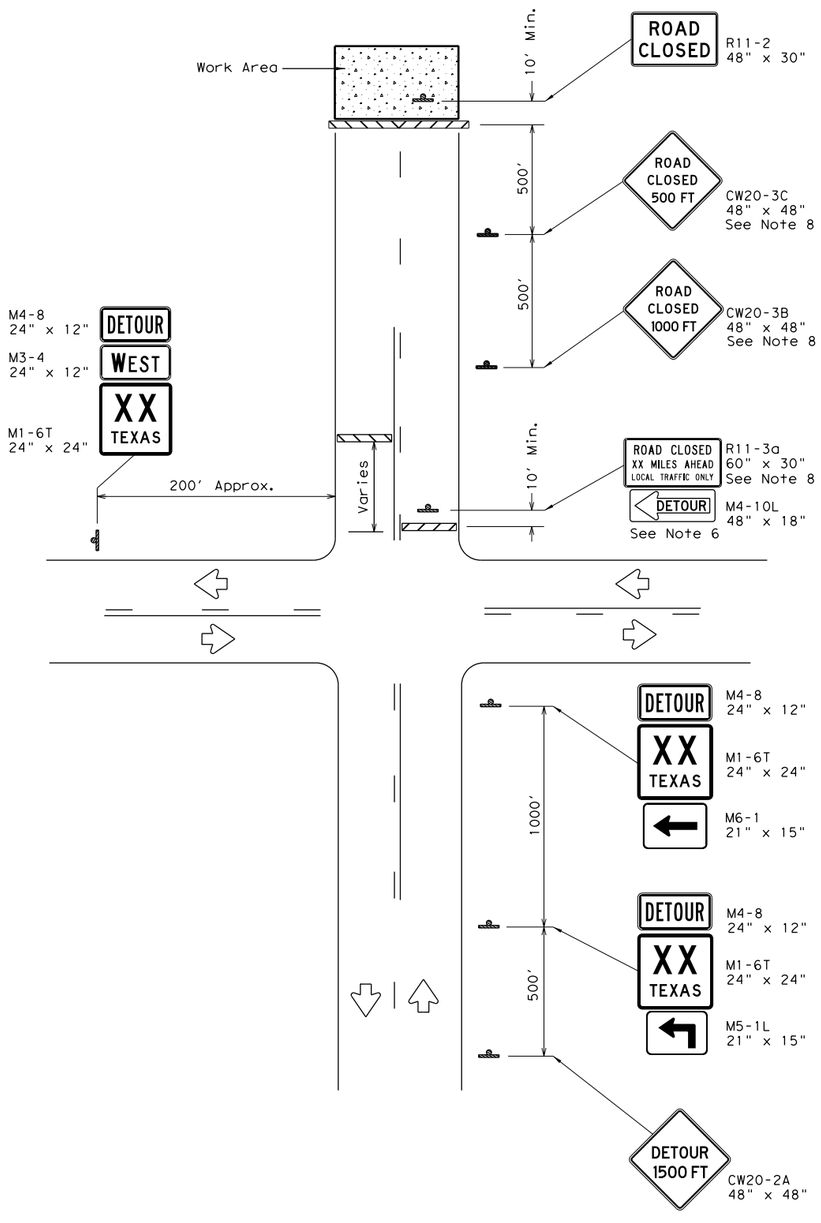
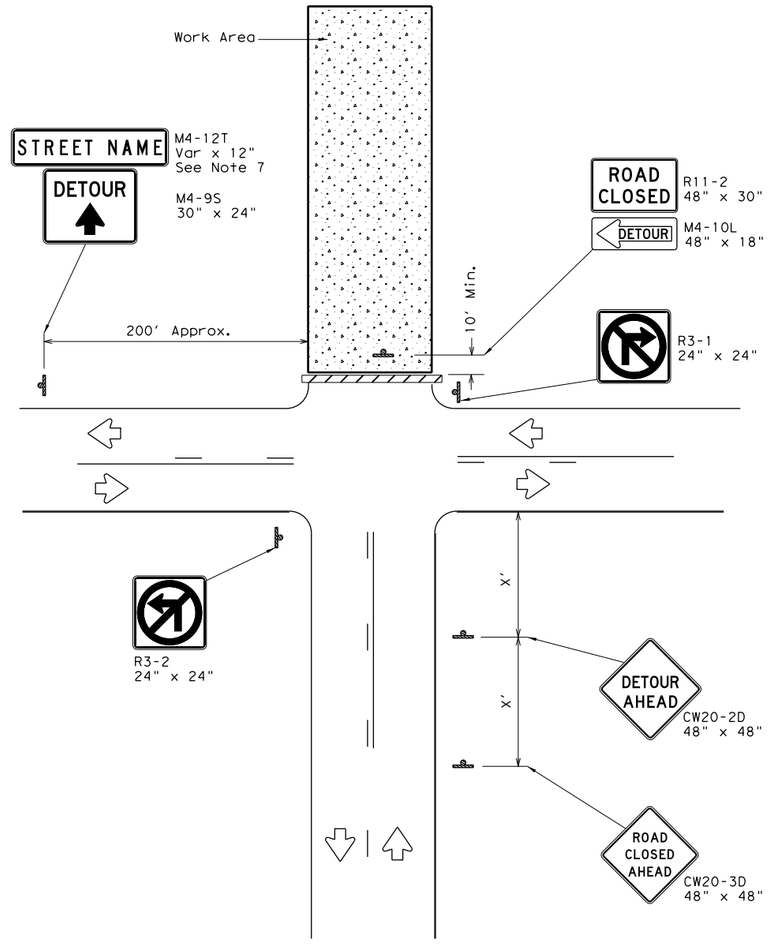


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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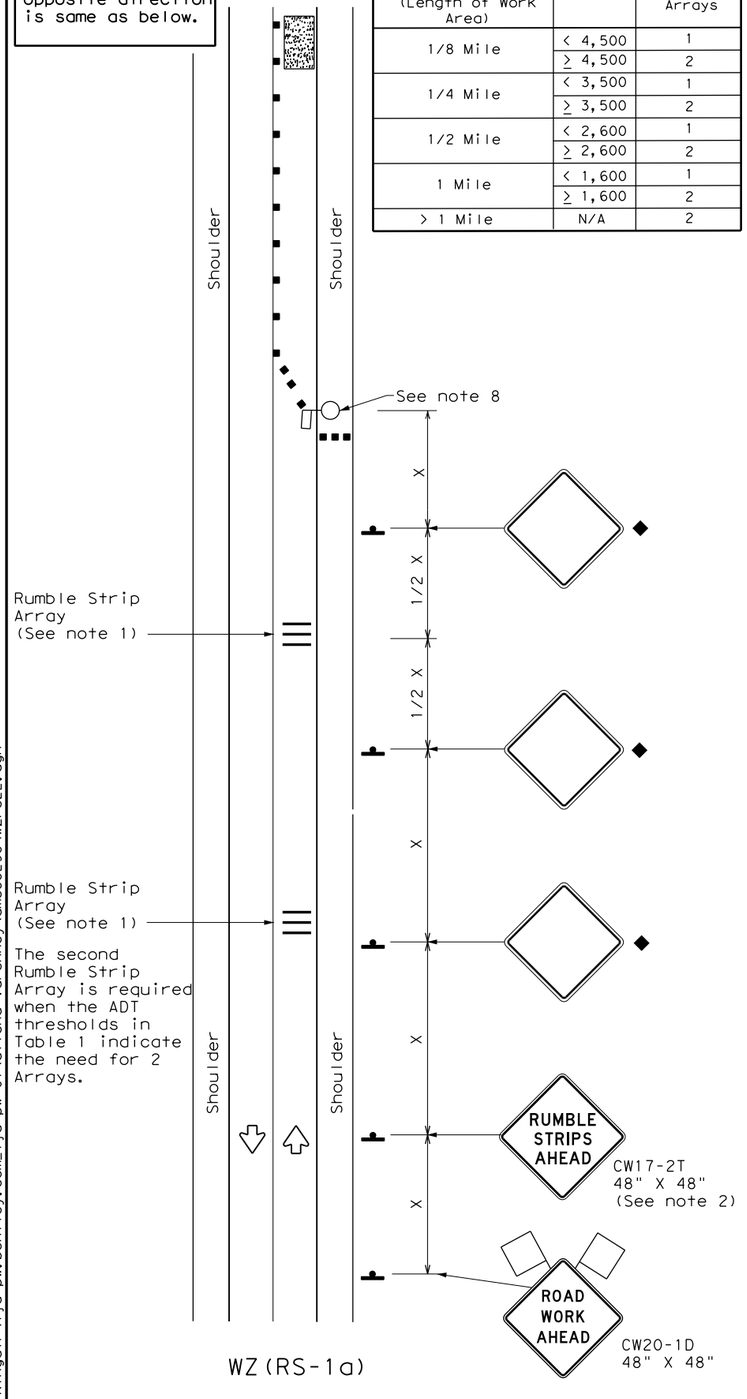
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	BMT	JASPER		48

113

DATE: 1/30/2024 8:09:57 AM
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\alisha.varshney\dms88298\wzrcd-13.dgn

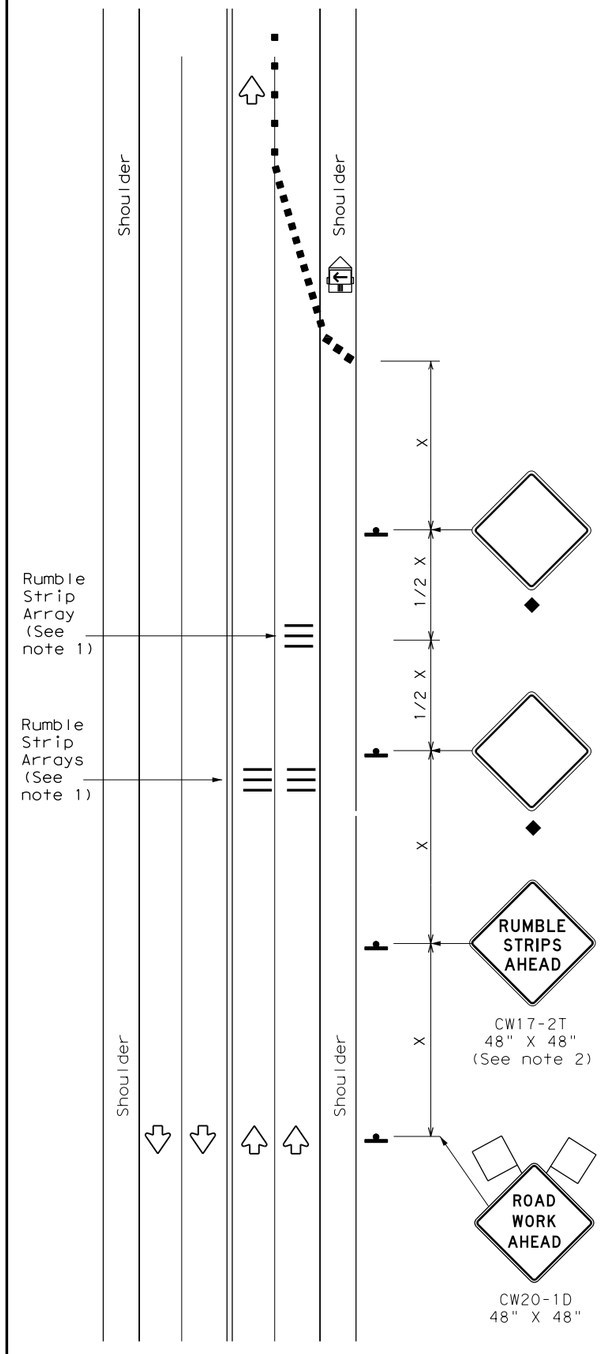
Warning sign and rumble strip sequence in opposite direction is same as below.

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

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		49

117

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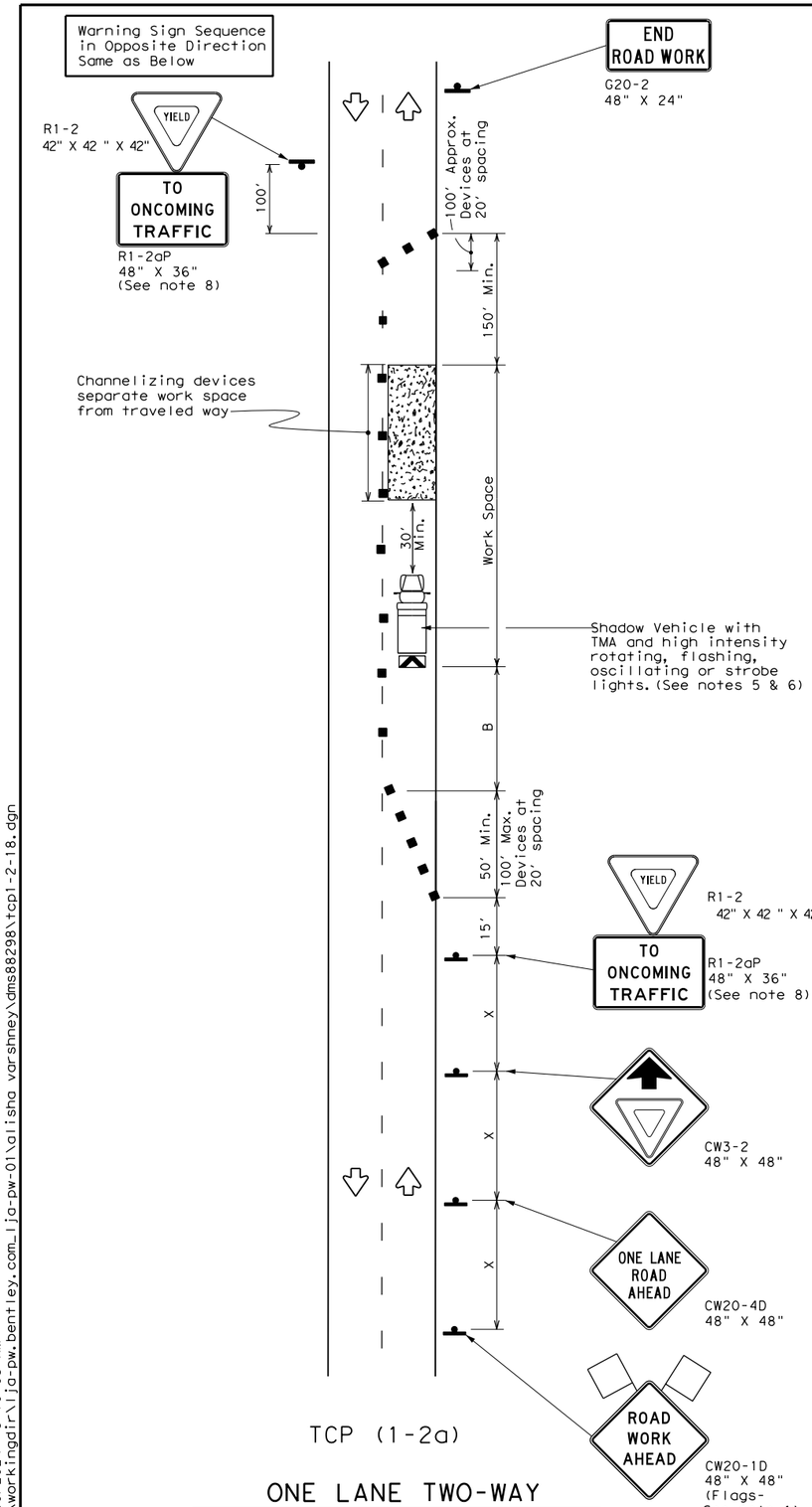
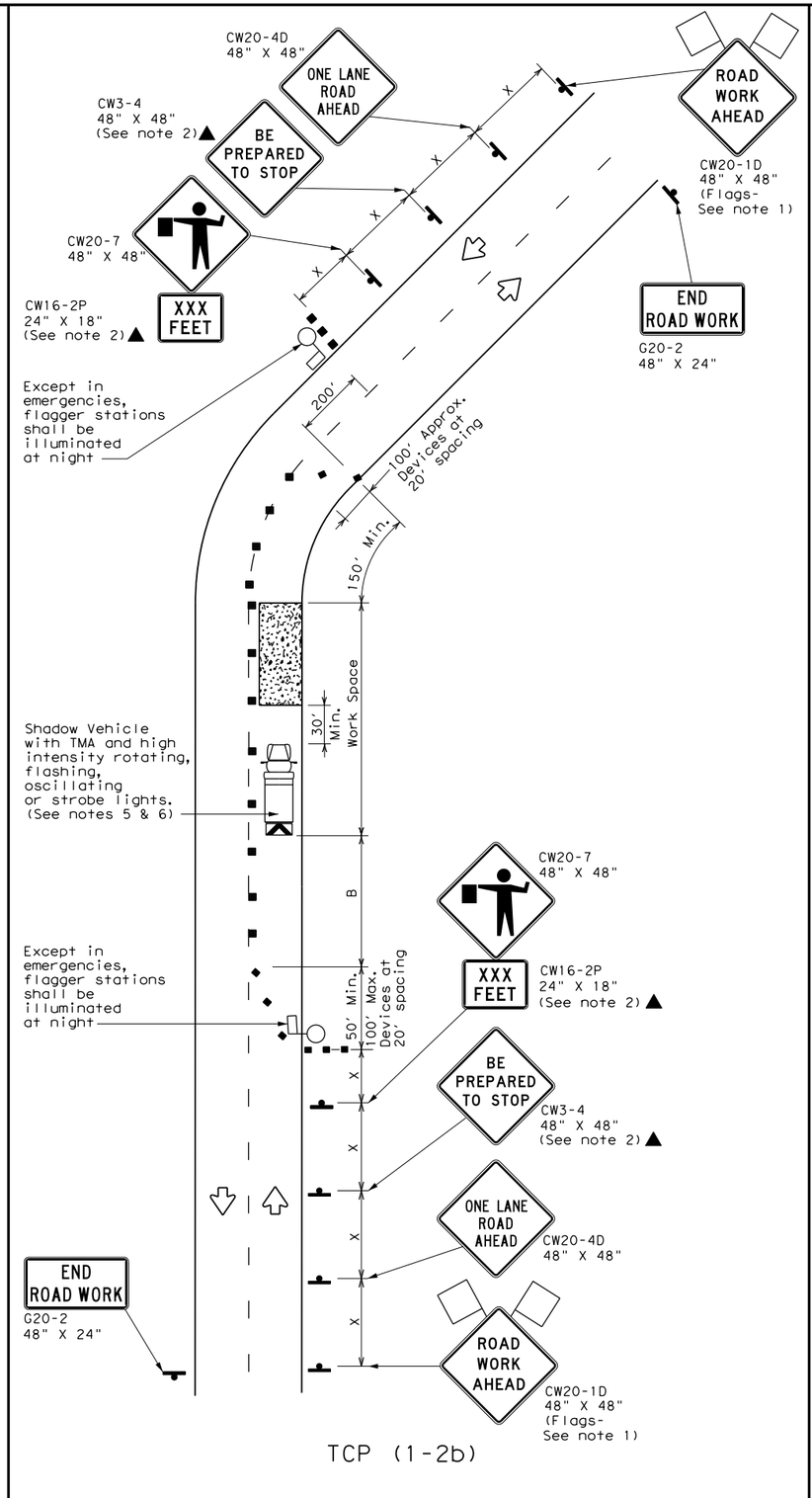


TCP (1-2a)

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



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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	BMT	JASPER		50

152

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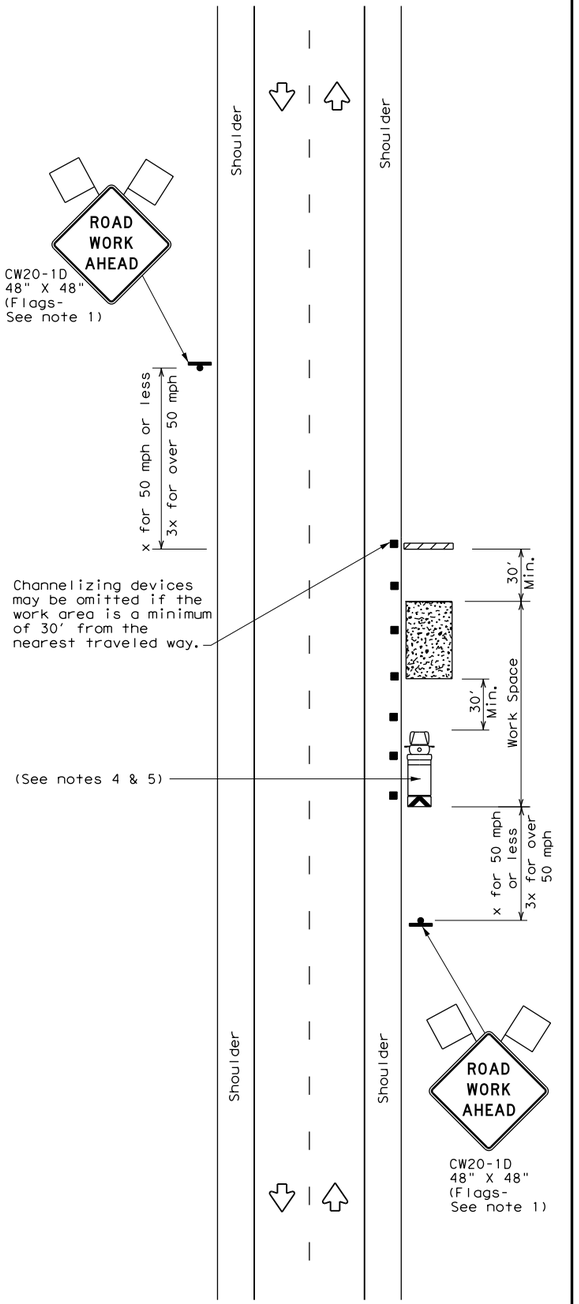
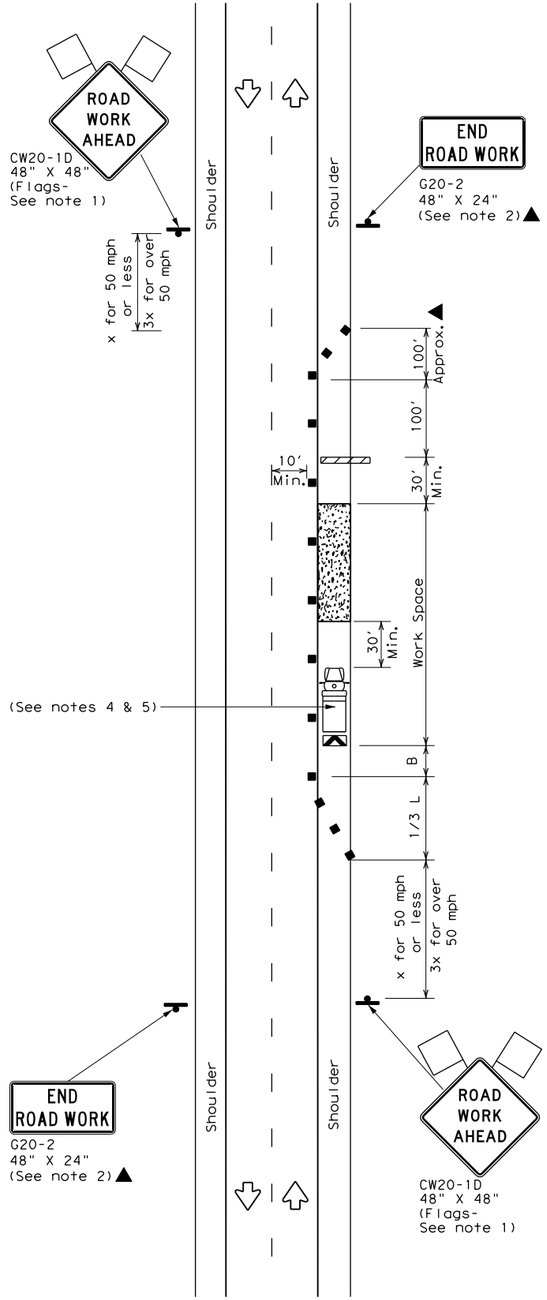


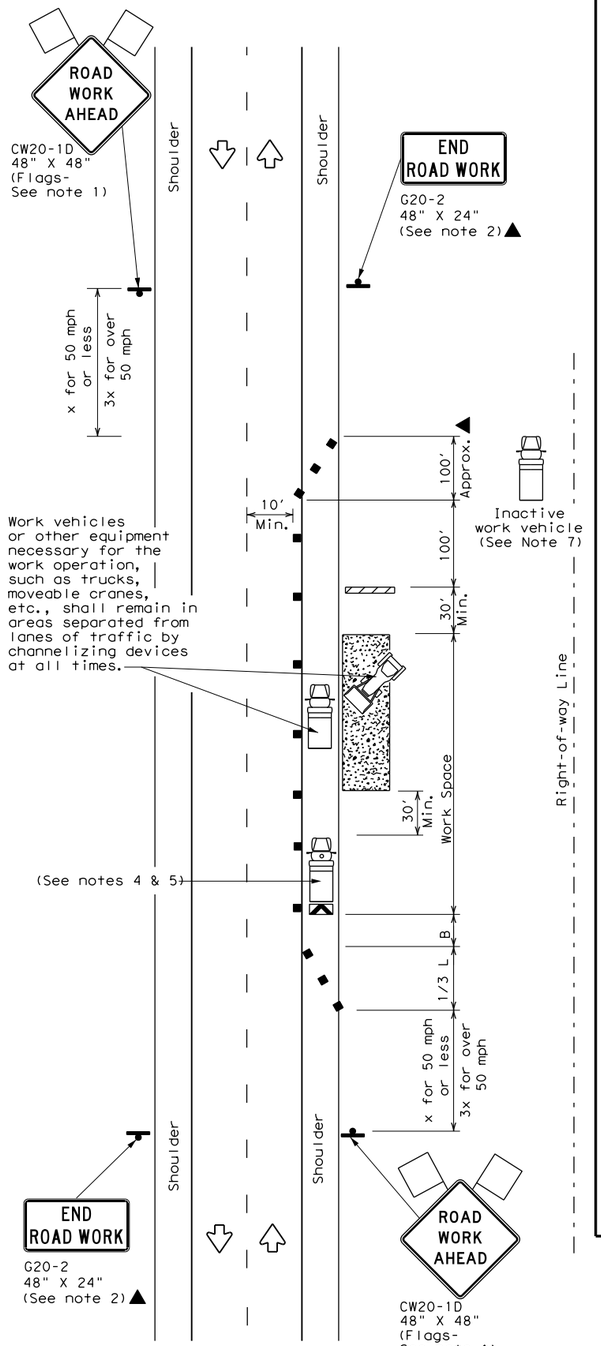
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	BMT	JASPER		51
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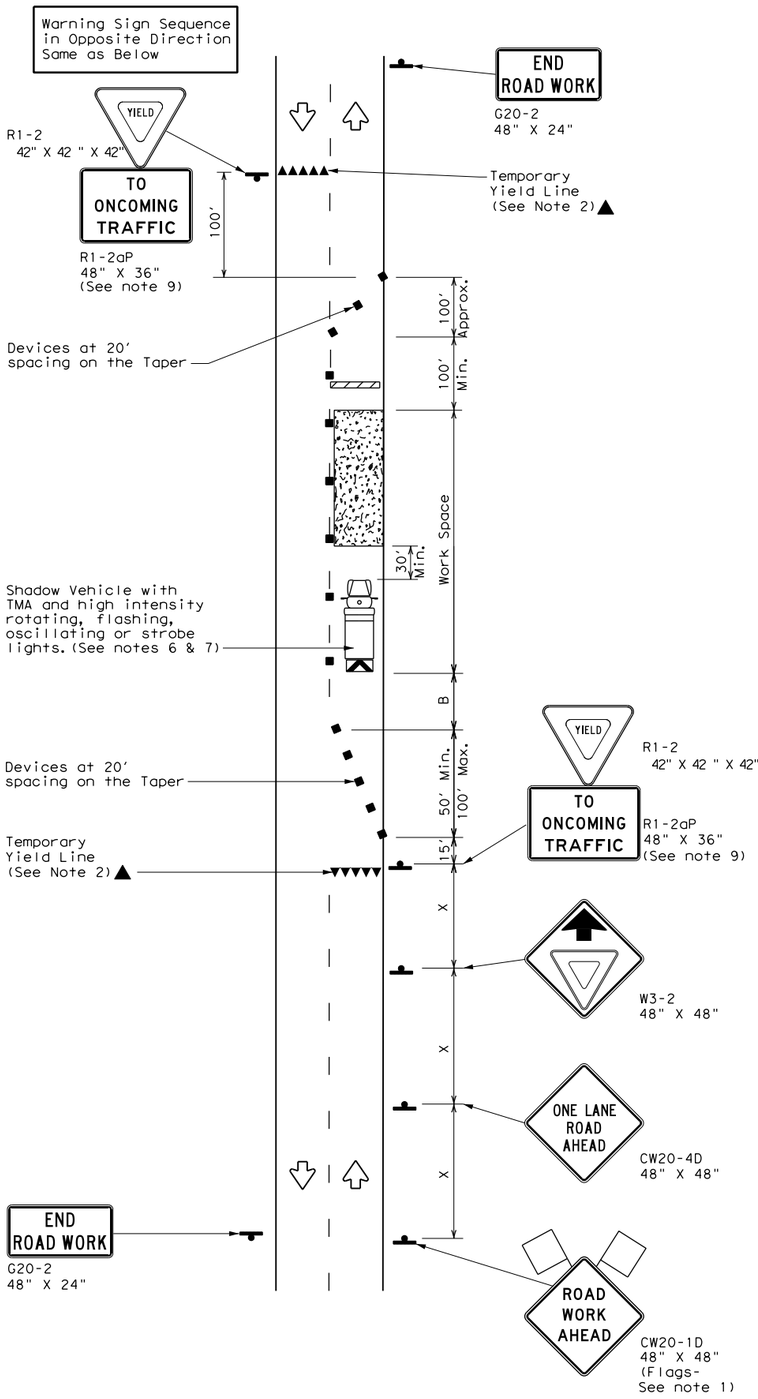
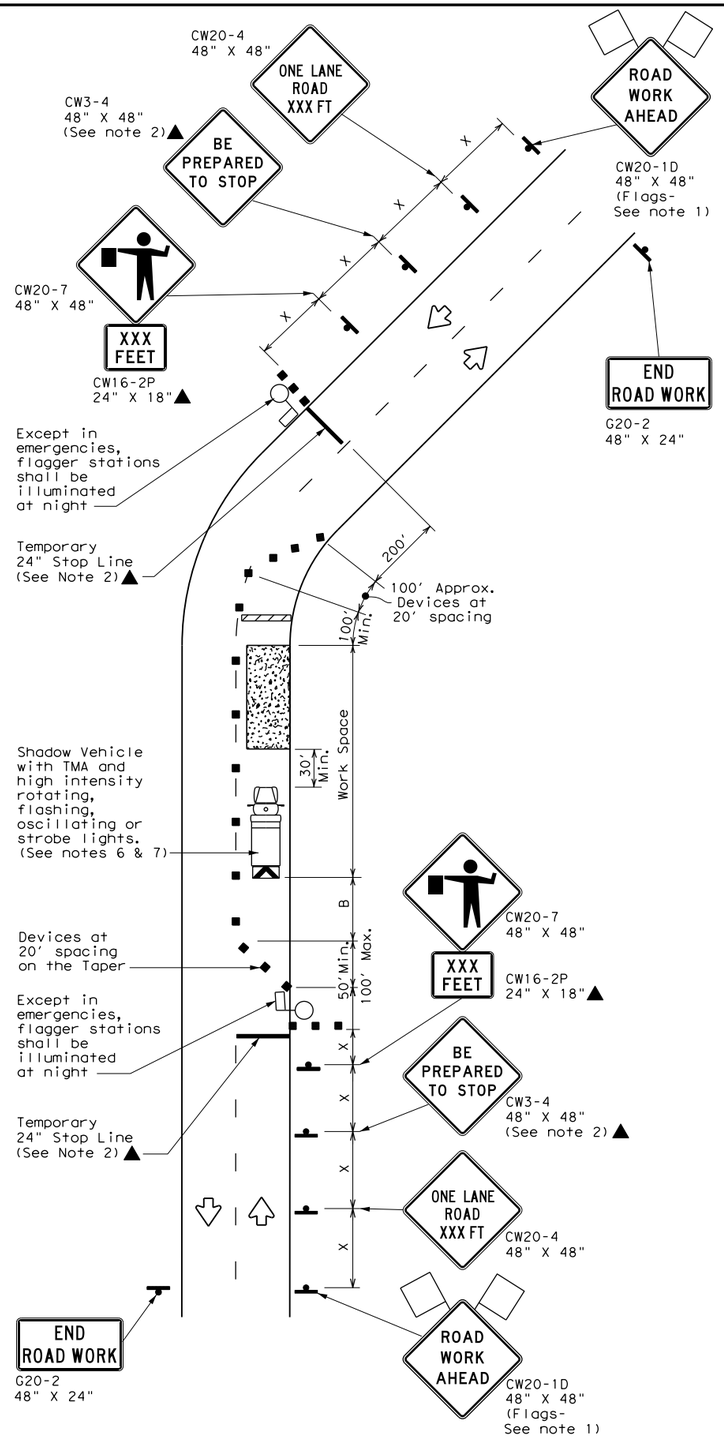


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

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4-98 2-18	BMT	JASPER		52

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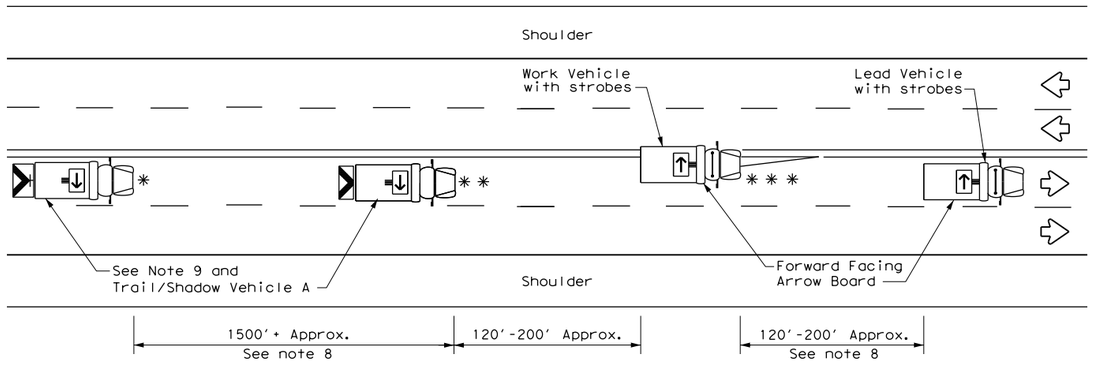
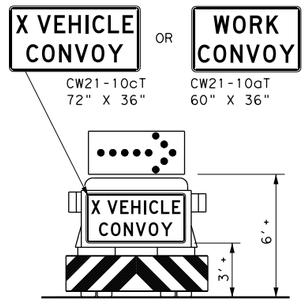


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

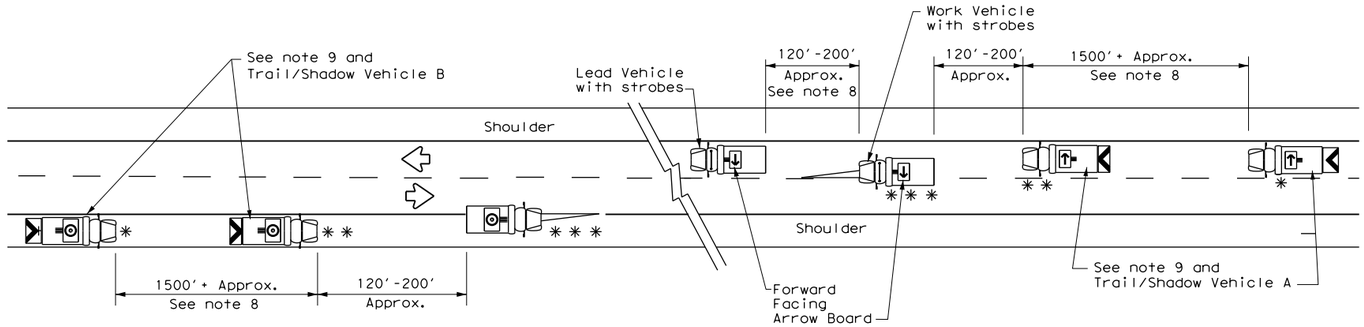
with RIGHT Directional display Flashing Arrow Board

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.

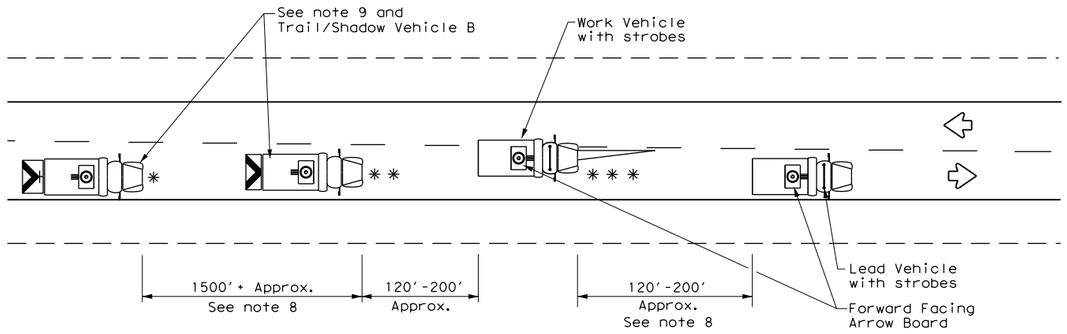


WORK ON SHOULDER

WORK ON TRAVEL LANE

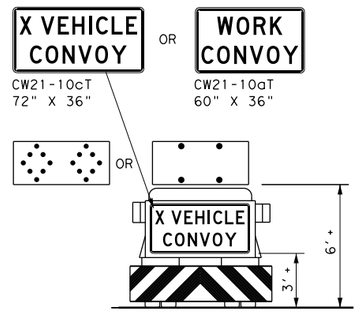
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



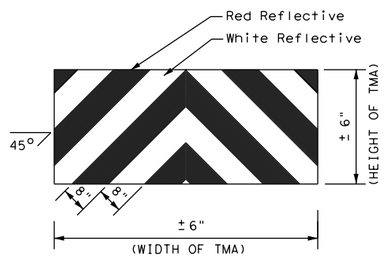
TCP (3-1c)

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

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		53

175

DATE: 1/30/2024 8:10:17 AM
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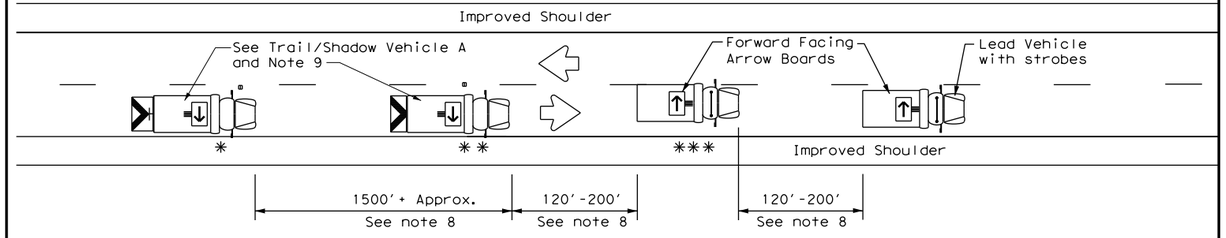
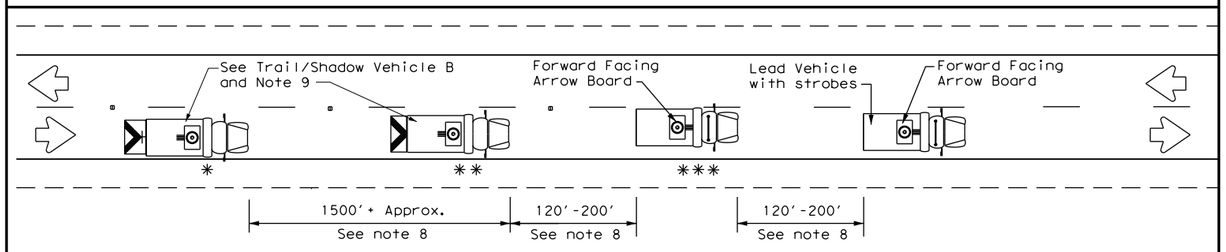


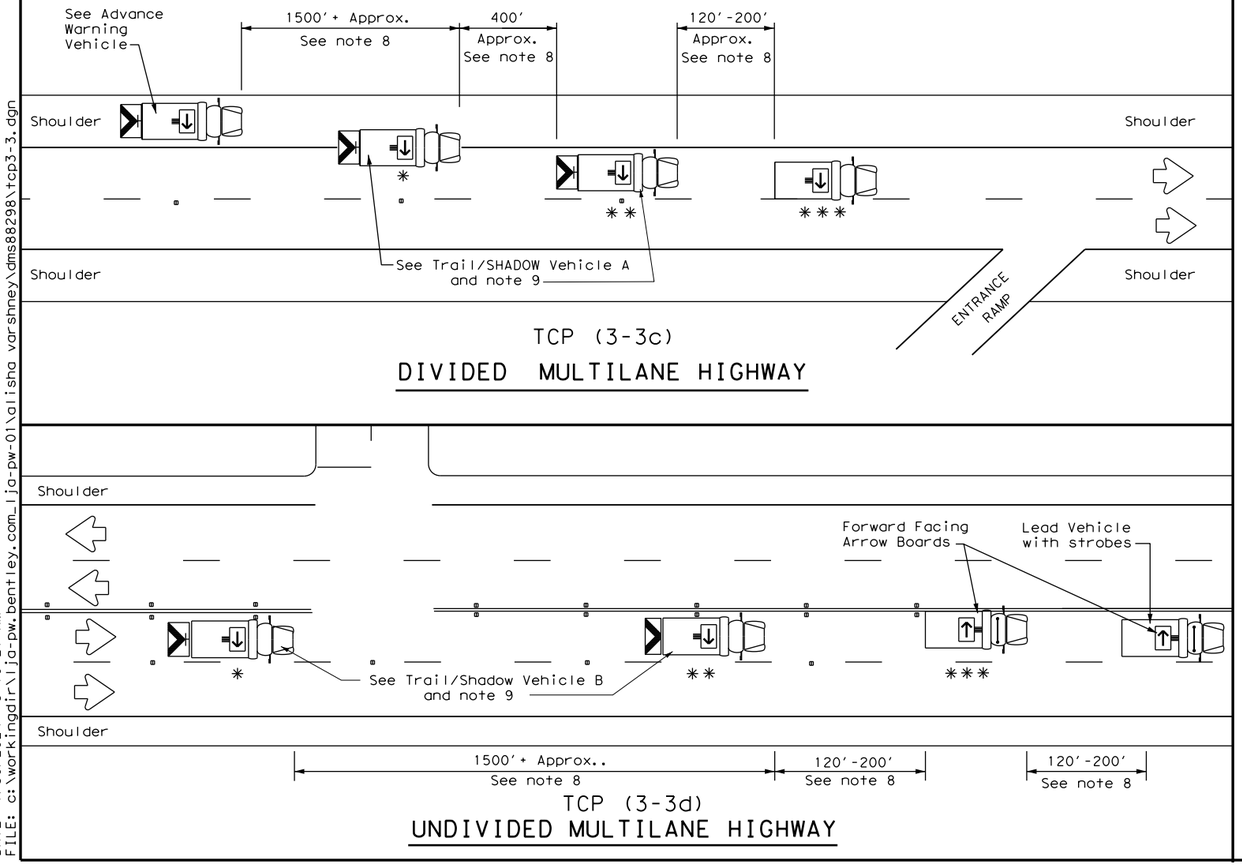
TCP (3-3a)

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



TCP (3-3b)

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

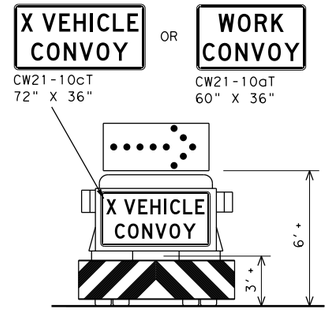


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

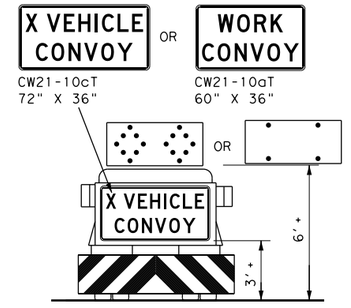
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



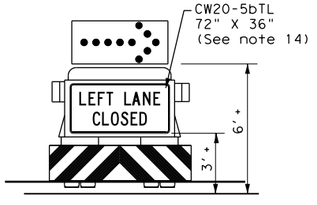
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

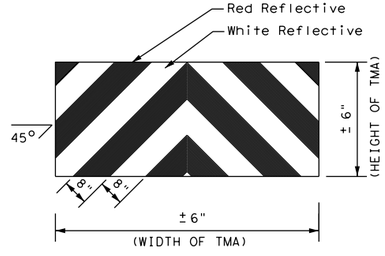


TRAIL/SHADOW VEHICLE B

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

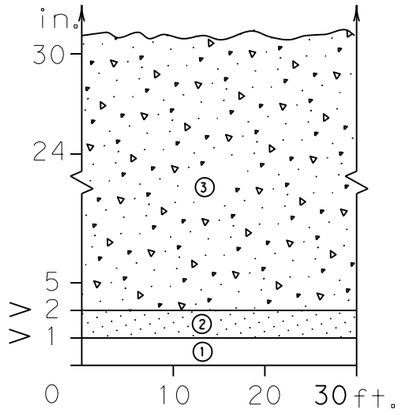
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	BMT	JASPER		54
1-97 7-14				

177

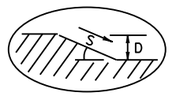
DATE: 1/30/2024 8:10:21 AM
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\alisha varshney\dms88298\tcp3-3.dgn

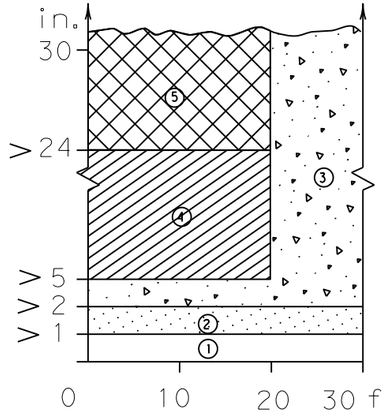
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

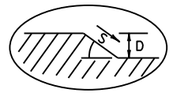


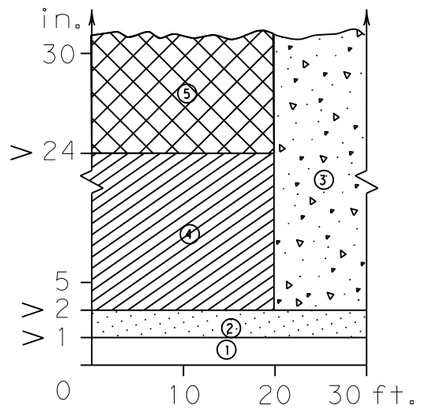
Edge Condition I
S = (3:1) (or flatter)



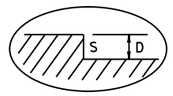


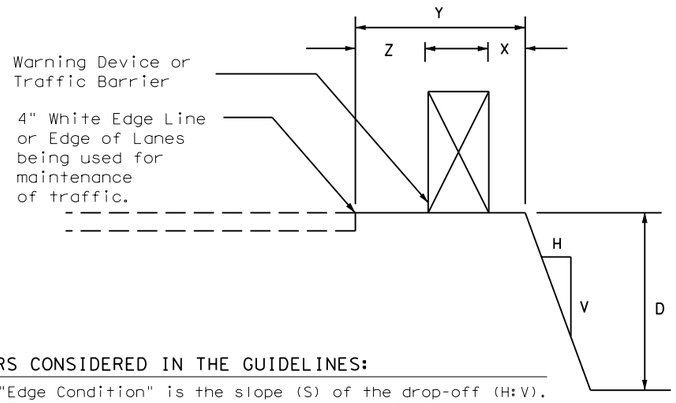
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	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.

Edge Condition Notes:

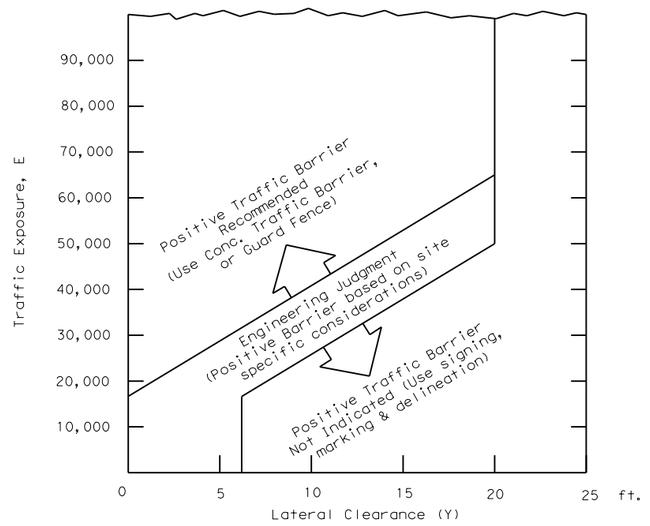
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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.

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.

Engineer's Seal

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

Date 01.30.24

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	BMT	JASPER		55

DATE: 1/30/2024 2:54:42 PM
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Horizontal Alignment Review Report

Report Created: Thursday, January 4, 2024
Time: 1:59:25 PM

Project: Default
Description:
File Name: c:\workingdir\lja-pw.bentley.com_lja-pw-01\michelle hc\dms34540\022_HALN_LJA.cgn
Last Revised: 1/4/2024 13:57:50

Note: All units in this report are in feet unless specified otherwise.

Alignment Name: FM 777 BL1
Alignment Description:
Alignment Style: Alignment\Baseline

		Station	Northing	Easting
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PI	( )	205+27.63	10327879.4736	4255557.8399
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PT	( )	208+49.46	10328089.7674	4255807.1732
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Degree of Curvature (Arc):		02°30'00.00"		
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Tangent:		326.1757		
Chord:		645.8433		
Middle Ordinate:		22.8641		
External:		23.0945		
Back Tangent Direction:		N66°03'17.60"E		
Back Radial Direction:		S23°56'42.40"E		
Chord Direction:		N57°57'17.60"E		
Ahead Radial Direction:		S40°03'42.40"E		
Ahead Tangent Direction:		N49°51'17.60"E		
Element: Linear				
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PC	( )	209+72.44	10328159.0583	4255901.1838
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Tangential Length:		122.9839		
Element: Circular				
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PI	( )	211+06.59	10328255.5499	4257003.7319
CC	( )		10332602.6597	4253161.7749
PT	( )	212+40.70	10328346.6902	4257102.1713
Radius:		5800.0000		
Delta:		02°39'00.00" Left		
Degree of Curvature (Arc):		00°59'16.29"		
Length:		268.2571		
Tangent:		134.1525		
Chord:		268.2332		
Middle Ordinate:		1.5508		
External:		1.5512		
Back Tangent Direction:		N49°51'17.60"E		
Back Radial Direction:		S40°08'42.40"E		
Chord Direction:		N48°31'47.60"E		
Ahead Radial Direction:		S42°47'42.40"E		
Ahead Tangent Direction:		N47°12'17.60"E		
Element: Linear				
PT	( )	212+40.70	10328346.6902	4257102.1713
PI	( )	213+33.74	10328409.9003	4257170.4437
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PI	( )	213+33.74	10328409.9003	4257170.4437
PC	( )	213+57.29	10328426.1853	4257187.4581
Tangential Direction:		N46°15'17.60"E		
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PC	( )	213+57.29	10328426.1853	4257187.4581
PI	( )	215+63.26	10328568.6029	4257336.2549
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PT	( )	217+69.19	10328705.8301	4257489.8515
Radius:		12000.0000		
Delta:		01°58'00.00" Right		
Degree of Curvature (Arc):		00°28'38.87"		
Length:		411.8977		

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
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BMT	JASPER		56

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Chord:	411.8775			
Middle Ordinate:	1.7672			
External:	1.7675			
Back Tangent Direction:	N46°15'17.60"E			
Back Radial Direction:	S43°44'42.40"E			
Chord Direction:	N47°14'17.60"E			
Ahead Radial Direction:	S41°46'42.40"E			
Ahead Tangent Direction:	N48°13'17.60"E			

Element: Linear

PT	( )	217+69.19	10328705.8301	4257489.8515
PI	( )	219+94.47	10328855.9247	4257657.8503
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Element: Linear

PI	( )	219+94.47	10328855.9247	4257657.8503
PC	( )	223+92.88	10329120.8798	4257955.3808
Tangential Direction:		N48°13'52.14"E		
Tangential Length:		398.4038		

Element: Circular

PC	( )	223+92.88	10329120.8798	4257955.3808
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PCC	( )	226+62.42	10329337.6147	4258112.0398
Radius:		620.0000		
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Length:		269.5425		
Tangent:		136.9349		
Chord:		267.4249		
Middle Ordinate:		14.5902		
External:		14.9419		
Back Tangent Direction:		N48°13'52.14"E		
Back Radial Direction:		S41°41'07.86"E		
Chord Direction:		N35°51'35.74"E		
Ahead Radial Direction:		S66°35'40.67"E		
Ahead Tangent Direction:		N23°24'19.33"E		

Element: Circular

PCC	( )	226+62.42	10329337.6147	4258112.0398
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CC	( )		10329496.5043	4257744.9620
PT	( )	228+11.58	10329482.2782	4258144.6989
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Length:		149.1671		
Tangent:		75.4601		
Chord:		148.3042		
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Back Radial Direction:		S66°35'40.67"E		
Chord Direction:		N12°43'13.47"E		
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Ahead Tangent Direction:		N02°02'17.60"E		

Element: Linear

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Element: Circular

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Tangent:		175.8886		
Chord:		351.6116		
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External:		2.6991		
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Back Radial Direction:		S87°57'42.40"E		
Chord Direction:		N00°16'47.60"E		
Ahead Radial Direction:		N88°31'17.60"E		
Ahead Tangent Direction:		N01°26'42.40"W		

Element: Linear

PT	( )	234+21.84	10330092.3062	4258155.6134
PC	( )	245+16.79	10331186.8993	4258127.3625
Tangential Direction:		N01°26'42.40"W		

STATE OF TEXAS
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FM 777
HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		57

DATE: 1/30/2024 2:55:48 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms845581022_HAL102_LJA.dgn

Tangential Length:	1094.9575			

Element: Circular

PC	( )	245+16.79	10331186.8993	4258127.3625
PI	( )	246+51.32	10331321.3846	4258123.8916
CC	( )		10331205.4759	4258847.1229
PCC	( )	247+82.79	10331448.0497	4258169.2158
Radius:		720.0000		
Delta:		21°10'01.38" Right		
Degree of Curvature (Arc):		07°57'27.89"		
Length:		265.9930		
Tangent:		134.5301		
Chord:		264.4829		
Middle Ordinate:		12.2485		
External:		12.4605		
Back Tangent Direction:		N01°26'42.40"W		
Back Radial Direction:		N88°31'17.60"E		
Chord Direction:		N09°06'13.29"E		
Ahead Radial Direction:		S70°13'41.02"E		
Ahead Tangent Direction:		N19°41'13.98"E		

Element: Circular

PCC	( )	247+82.79	10331448.0497	4258169.2158
PI	( )	248+80.27	10331539.8315	4258202.0578
CC	( )		10330989.8582	4259449.6975
PT	( )	249+77.42	10331625.9910	4258247.6543
Radius:		1359.9900		
Delta:		08°11'58.62" Right		
Degree of Curvature (Arc):		04°12'46.64"		
Length:		194.6285		
Tangent:		97.4807		
Chord:		194.4626		
Middle Ordinate:		3.4802		
External:		3.4891		
Back Tangent Direction:		N19°41'13.98"E		
Back Radial Direction:		S70°13'41.02"E		
Chord Direction:		N23°47'13.29"E		
Ahead Radial Direction:		S62°06'42.40"E		
Ahead Tangent Direction:		N27°53'17.60"E		

Element: Linear

PT	( )	249+77.42	10331625.9910	4258247.6543
PC	( )	253+74.60	10331977.0466	4258433.4363
Tangential Direction:		N27°53'17.60"E		

Tangential Length:	397.1838			

Element: Circular

PC	( )	253+74.60	10331977.0466	4258433.4363
PI	( )	254+74.65	10332065.4736	4258480.2327
CC	( )		10333146.4169	4256223.7818
PT	( )	255+74.58	10332157.3573	4258519.8133
Radius:		2500.0000		
Delta:		04°35'00.00" Left		
Degree of Curvature (Arc):		02°17'30.59"		
Length:		199.9858		
Tangent:		100.0462		
Chord:		199.9323		
Middle Ordinate:		1.9994		
External:		2.0010		
Back Tangent Direction:		N27°53'17.60"E		
Back Radial Direction:		S62°06'42.40"E		
Chord Direction:		N25°35'47.60"E		
Ahead Radial Direction:		S66°41'42.40"E		
Ahead Tangent Direction:		N23°18'17.60"E		

Element: Linear

PT	( )	255+74.58	10332157.3573	4258519.8133
PC	( )	260+58.71	10332601.9828	4258711.3443
Tangential Direction:		N23°18'17.60"E		
Tangential Length:		484.1239		

Element: Circular

PC	( )	260+58.71	10332601.9828	4258711.3443
PI	( )	262+79.13	10332804.4167	4258798.5466
CC	( )		10332352.7397	4259289.9443
PT	( )	264+82.77	10332908.3323	4258992.9309
Radius:		630.0000		
Delta:		38°34'00.00" Right		
Degree of Curvature (Arc):		09°05'40.45"		
Length:		424.0626		
Tangent:		220.4171		
Chord:		416.1022		
Middle Ordinate:		35.3449		
External:		37.4457		
Back Tangent Direction:		N23°18'17.60"E		
Back Radial Direction:		S66°41'42.40"E		
Chord Direction:		N42°35'17.60"E		
Ahead Radial Direction:		S28°07'42.40"E		

STATE OF TEXAS
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HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		58

DATE: 1/30/2024 2:55:52 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558\022_HAL\03_LJA.dgn

Ahead Tangent Direction:	N61°52'17.60"E			
Element: Linear				
PT	( )	264+82.77	10332908.3323	4259992.9309
PC	( )	266+77.10	10332999.9477	4259164.3066
Tangential Direction:	N61°52'17.60"E			
Tangential Length:	194.3271			
Element: Circular				
PC	( )	266+77.10	10332999.9477	4259164.3066
PI	( )	268+39.93	10333076.7157	4259307.9085
CC	( )		10333387.9806	4258956.8688
PT	( )	269+89.01	10333228.4729	4259366.9386
Radius:	440.0000			
Delta:	40°37'00.00" Left			
Degree of Curvature (Arc):	13°01'18.37"			
Length:	311.9136			
Tangent:	162.8337			
Chord:	305.4234			
Middle Ordinate:	27.3511			
External:	29.1640			
Back Tangent Direction:	N61°52'17.60"E			
Back Radial Direction:	S28°07'42.40"E			
Chord Direction:	N41°33'47.60"E			
Ahead Radial Direction:	S68°44'42.40"E			
Ahead Tangent Direction:	N21°15'17.60"E			
Element: Linear				
PT	( )	269+89.01	10333228.4729	4259366.9386
PC	( )	276+07.82	10333805.1854	4259591.2665
Tangential Direction:	N21°15'17.60"E			
Tangential Length:	618.8055			
Element: Circular				
PC	( )	276+07.82	10333805.1854	4259591.2665
PI	( )	277+45.45	10333933.4601	4259641.1624
CC	( )		10333225.1573	4261082.4296
PT	( )	278+82.42	10334051.3290	4259712.2324
Radius:	1600.0000			
Delta:	09°50'00.00" Right			
Degree of Curvature (Arc):	03°34'51.55"			
Length:	274.5985			
Tangent:	137.6372			
Chord:	274.2616			
Middle Ordinate:	5.8873			
External:	5.9091			
Back Tangent Direction:	N21°15'17.60"E			
Back Radial Direction:	S68°44'42.40"E			
Chord Direction:	N26°10'17.60"E			
Ahead Radial Direction:	S58°54'42.40"E			
Ahead Tangent Direction:	N31°05'17.60"E			
Element: Linear				
PT	( )	278+82.42	10334051.3290	4259712.2324
PC	( )	281+20.10	10334254.8748	4259834.9620
Tangential Direction:	N31°05'17.60"E			
Tangential Length:	237.6836			
Element: Circular				
PC	( )	281+20.10	10334254.8748	4259834.9620
PI	( )	282+69.21	10334382.5718	4259911.9580
CC	( )		10332086.1742	4263431.7297
PT	( )	284+18.20	10334504.4870	4259997.8160
Radius:	4200.0000			
Delta:	04°04'00.00" Right			
Degree of Curvature (Arc):	01°21'51.07"			
Length:	298.1022			
Tangent:	149.1137			
Chord:	298.0397			
Middle Ordinate:	2.6445			
External:	2.6462			
Back Tangent Direction:	N31°05'17.60"E			
Back Radial Direction:	S58°54'42.40"E			
Chord Direction:	N33°07'17.60"E			
Ahead Radial Direction:	S54°50'42.40"E			
Ahead Tangent Direction:	N35°09'17.60"E			
Element: Linear				
PT	( )	284+18.20	10334504.4870	4259997.8160
PC	( )	287+33.01	10334751.8718	4260179.0777
Tangential Direction:	N35°09'17.60"E			
Tangential Length:	314.8059			
Element: Circular				
PC	( )	287+33.01	10334751.8718	4260179.0777
PI	( )	289+75.55	10334960.1746	4260318.7312
CC	( )		10334410.6407	4260677.8128
PT	( )	291+94.71	10335008.4405	4260556.4233
Radius:	610.0000			
Delta:	43°22'00.00" Right			

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HORIZONTAL ALIGNMENT DATA

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		59

DATE: 1/30/2024 2:55:56 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558\022_HALI04_LJA.dgn

Degree of Curvature (Arc):	09°23'33.90"			
Length:	461.7036			
Tangent:	242.5430			
Chord:	450.7613			
Middle Ordinate:	43.1635			
External:	46.4504			
Back Tangent Direction:	N35°09'17.60"E			
Back Radial Direction:	S54°50'42.40"E			
Chord Direction:	N56°50'17.60"E			
Ahead Radial Direction:	S11°28'42.40"E			
Ahead Tangent Direction:	N78°31'17.60"E			

Element: Linear

PT	( )	291+94.71	10335008.4405	4260556.4233
PC	( )	295+04.70	10335070.1287	4260860.2155
Tangential Direction:		N78°31'17.60"E		
Tangential Length:		309.9922		

Element: Circular

PC	( )	295+04.70	10335070.1287	4260860.2155
PI	( )	297+49.41	10335118.8245	4261100.0249
CC	( )		10336148.1283	4260641.3163
PT	( )	299+86.27	10335264.5918	4261296.5744
Radius:		1100.0000		
Delta:		25°05'00.00" Left		
Degree of Curvature (Arc):		05°12'31.35"		
Length:		481.5654		
Tangent:		244.7035		
Chord:		477.7290		
Middle Ordinate:		26.2478		
External:		26.8894		
Back Tangent Direction:		N78°31'17.60"E		
Back Radial Direction:		S11°28'42.40"E		
Chord Direction:		N65°58'47.60"E		
Ahead Radial Direction:		S36°33'42.40"E		
Ahead Tangent Direction:		N53°26'17.60"E		

Element: Linear

PT	( )	299+86.27	10335264.5918	4261296.5744
PC	( )	303+34.27	10335471.8932	4261576.0955
Tangential Direction:		N53°26'17.60"E		
Tangential Length:		348.0027		

Element: Circular

PC	( )	303+34.27	10335471.8932	4261576.0955
PI	( )	305+35.08	10335591.5142	4261737.3900
CC	( )		10336435.7513	4260861.2684
PT	( )	307+32.21	10335757.1305	4261850.9522
Radius:		1200.0000		
Delta:		19°00'00.00" Left		
Degree of Curvature (Arc):		04°46'28.73"		
Length:		397.9351		
Tangent:		200.8111		
Chord:		396.1143		
Middle Ordinate:		16.4573		
External:		16.6861		
Back Tangent Direction:		N53°26'17.60"E		
Back Radial Direction:		S36°33'42.40"E		
Chord Direction:		N43°56'17.60"E		
Ahead Radial Direction:		S55°33'42.40"E		
Ahead Tangent Direction:		N34°26'17.60"E		

Element: Linear

PT	( )	307+32.21	10335757.1305	4261850.9522
PC	( )	310+75.77	10336040.4789	4262045.2426
Tangential Direction:		N34°26'17.60"E		
Tangential Length:		343.5623		

Element: Circular

PC	( )	310+75.77	10336040.4789	4262045.2426
PI	( )	311+47.45	10336099.5950	4262085.7782
CC	( )		10332873.5819	4266663.7666
PT	( )	312+19.12	10336157.6542	4262127.8136
Radius:		5600.0000		
Delta:		01°28'00.00" Right		
Degree of Curvature (Arc):		01°01'23.30"		
Length:		143.3497		
Tangent:		71.6788		
Chord:		143.3458		
Middle Ordinate:		0.4587		
External:		0.4587		
Back Tangent Direction:		N34°26'17.60"E		
Back Radial Direction:		S55°33'42.40"E		
Chord Direction:		N35°10'17.60"E		
Ahead Radial Direction:		S54°05'42.40"E		
Ahead Tangent Direction:		N35°54'17.60"E		

Element: Linear

PT	( )	312+19.12	10336157.6542	4262127.8136

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HORIZONTAL ALIGNMENT DATA

SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		60

DATE: 1/30/2024 2:56:01 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558\022_HAL\05_LJA.dgn

PC	( )	314+38.14	10336335.0567	4262256.2547
Tangential Direction:		N35°54'17.60"E		
Tangential Length:		219.0178		

Element: Circular

PC	( )	314+38.14	10336335.0567	4262256.2547
PI	( )	315+56.77	10336431.1512	4262325.8280
CC	( )		10335807.2594	4262985.2472
PT	( )	316+74.05	10336505.9345	4262417.9261
Radius:		900.0000		
Delta:		15°01'07.20" Right		
Degree of Curvature (Arc):		06°21'58.31"		
Length:		235.9127		
Tangent:		118.6364		
Chord:		235.2378		
Middle Ordinate:		7.7188		
External:		7.7855		
Back Tangent Direction:		N35°54'17.60"E		
Back Radial Direction:		S54°05'42.40"E		
Chord Direction:		N43°24'51.20"E		
Ahead Radial Direction:		S39°04'35.20"E		
Ahead Tangent Direction:		N50°55'24.80"E		

Element: Linear

PT	( )	316+74.05	10336505.9345	4262417.9261
PI	( )	323+43.72	10336928.0691	4262937.7992
Tangential Direction:		N50°55'24.80"E		
Tangential Length:		669.6758		

Element: Linear

PI	( )	323+43.72	10336928.0691	4262937.7992
PC	( )	327+64.83	10337191.0945	4263266.6619
Tangential Direction:		N51°20'49.47"E		
Tangential Length:		421.1093		

Element: Circular

PC	( )	327+64.83	10337191.0945	4263266.6619
PI	( )	329+68.65	10337318.3971	4263425.8294
CC	( )		10336589.7677	4263747.6049
PT	( )	331+63.32	10337350.2851	4263627.1335
Radius:		770.0000		
Delta:		29°39'05.97" Right		
Degree of Curvature (Arc):		07°26'27.64"		
Length:		398.4897		
Tangent:		203.8142		
Chord:		394.0576		
Middle Ordinate:		25.6347		
External:		26.5176		
Back Tangent Direction:		N51°20'49.47"E		
Back Radial Direction:		S38°39'10.53"E		
Chord Direction:		N66°10'22.45"E		
Ahead Radial Direction:		S09°00'04.56"E		
Ahead Tangent Direction:		N80°59'55.44"E		

Element: Linear

PT	( )	331+63.32	10337350.2851	4263627.1335
PC	( )	335+85.63	10337416.3574	4264044.2376
Tangential Direction:		N80°59'55.44"E		
Tangential Length:		422.3048		

Element: Circular

PC	( )	335+85.63	10337416.3574	4264044.2376
PI	( )	342+04.14	10337513.1272	4264655.1311
CC	( )		10337994.1530	4263952.7106
PT	( )	345+37.11	10338117.6895	4264524.5181
Radius:		585.0000		
Delta:		93°11'23.50" Left		
Degree of Curvature (Arc):		09°47'38.94"		
Length:		951.4849		
Tangent:		618.5105		
Chord:		850.0212		
Middle Ordinate:		183.0162		
External:		266.3403		
Back Tangent Direction:		N80°59'55.44"E		
Back Radial Direction:		S09°00'04.56"E		
Chord Direction:		N34°24'13.69"E		
Ahead Radial Direction:		N77°48'31.94"E		
Ahead Tangent Direction:		N12°11'28.06"W		

Element: Linear

PT	( )	345+37.11	10338117.6895	4264524.5181
PI	( )	351+73.12	10338739.3540	4264390.2102
Tangential Direction:		N12°11'28.06"W		
Tangential Length:		636.0074		

Element: Linear

PI	( )	351+73.12	10338739.3540	4264390.2102
PC	( )	357+55.82	10339307.8013	4264262.1369
Tangential Direction:		N12°41'49.00"W		
Tangential Length:		582.6964		

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HORIZONTAL ALIGNMENT DATA

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		61

DATE: 1/30/2024 2:56:05 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558022_HAL106_LJA.dgn

Element: Circular				
PC	( )	357+55.82	10339307.8013	4264262.1369
PI	( )	359+34.82	10339482.4243	4264222.7937
CC	( )		10339549.5749	4265335.2378
PT	( )	361+10.71	10339660.5118	4264240.8462
Radius:		1100.0000		
Delta:		18°29'06.60" Right		
Degree of Curvature (Arc):		05°12'31.35"		
Length:		354.8897		
Tangent:		179.0002		
Chord:		353.3526		
Middle Ordinate:		14.2811		
External:		14.4690		
Back Tangent Direction:		N12°41'49.00"W		
Back Radial Direction:		N77°18'11.00"E		
Chord Direction:		N03°27'15.70"W		
Ahead Radial Direction:		S84°12'42.40"E		
Ahead Tangent Direction:		N05°47'17.60"E		

Element: Linear				
PT	( )	361+10.71	10339660.5118	4264240.8462
PC	( )	361+84.93	10339734.3542	4264248.3315
Tangential Direction:		N05°47'17.60"E		
Tangential Length:		74.2208		

Element: Circular				
PC	( )	361+84.93	10339734.3542	4264248.3315
PI	( )	363+82.82	10339931.2406	4264268.2896
CC	( )		10339680.9027	4264775.6293
PT	( )	365+63.73	10340066.8647	4264412.4029
Radius:		530.0000		
Delta:		40°57'00.00" Right		
Degree of Curvature (Arc):		10°48'37.89"		
Length:		378.7975		
Tangent:		197.8953		
Chord:		370.7866		
Middle Ordinate:		33.4828		
External:		35.7407		
Back Tangent Direction:		N05°47'17.60"E		
Back Radial Direction:		S84°12'42.40"E		
Chord Direction:		N26°15'47.60"E		
Ahead Radial Direction:		S43°15'42.40"E		
Ahead Tangent Direction:		N46°44'17.60"E		

Element: Linear				
PT	( )	365+63.73	10340066.8647	4264412.4029
PC	( )	367+11.47	10340188.1223	4264519.9987
Tangential Direction:		N46°44'17.60"E		
Tangential Length:		147.7496		

Element: Circular				
PC	( )	367+11.47	10340188.1223	4264519.9987
PI	( )	368+40.63	10340256.6365	4264614.0532
CC	( )		10340641.4719	4264074.5324
PT	( )	369+66.46	10340374.3844	4264667.1235
Radius:		650.0000		
Delta:		22°28'35.73" Left		
Degree of Curvature (Arc):		08°48'53.05"		
Length:		254.9889		
Tangent:		129.1550		
Chord:		253.3570		
Middle Ordinate:		12.4637		
External:		12.7073		
Back Tangent Direction:		N46°44'17.60"E		
Back Radial Direction:		S43°15'42.40"E		
Chord Direction:		N35°29'59.73"E		
Ahead Radial Direction:		S65°44'13.13"E		
Ahead Tangent Direction:		N24°15'41.87"E		

Element: Linear				
PT	( )	369+66.46	10340374.3844	4264667.1235
PC	( )	374+66.04	10340829.8381	4264872.4017
Tangential Direction:		N24°15'41.87"E		
Tangential Length:		499.5770		

Element: Circular				
PC	( )	374+66.04	10340829.8381	4264872.4017
PI	( )	375+73.28	10340927.6048	4264916.4662
CC	( )		10339391.6744	4263063.2770
PT	( )	376+80.45	10341022.4904	4264966.4336
Radius:		3500.0000		
Delta:		03°30'35.73" Right		
Degree of Curvature (Arc):		01°38'13.26"		
Length:		214.4092		
Tangent:		107.2381		
Chord:		214.3756		
Middle Ordinate:		1.6417		
External:		1.6425		

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
HORIZONTAL ALIGNMENT DATA

SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		62

DATE: 1/30/2024 2:56:10 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558\022_HAL\07_LJA.dgn

Back Tangent Direction:	N24°15'41.87"E			
Back Radial Direction:	S65°44'13.13"E			
Chord Direction:	N26°00'59.73"E			
Ahead Radial Direction:	S62°13'42.40"E			
Ahead Tangent Direction:	N27°46'17.60"E			

Element: Linear

PT	( )	376+80.45	10341022.4904	4264966.4336
PC	( )	377+65.05	10341097.3464	4265005.8532
Tangential Direction:		N27°46'17.60"E		
Tangential Length:		84.6010		

Element: Circular

PC	( )	377+65.05	10341097.3464	4265005.8532
PI	( )	379+27.21	10341240.8241	4265081.4094
CC	( )		10340724.5885	4265713.7031
PT	( )	380+85.03	10341343.5565	4265206.8712
Radius:		800.0000		
Delta:		22°55'00.00" Right		
Degree of Curvature (Arc):		07°09'43.10"		
Length:		319.9770		
Tangent:		162.1561		
Chord:		317.8484		
Middle Ordinate:		15.9445		
External:		16.2687		
Back Tangent Direction:		N27°46'17.60"E		
Back Radial Direction:		S62°13'42.40"E		
Chord Direction:		N39°13'47.60"E		
Ahead Radial Direction:		S39°13'42.40"E		
Ahead Tangent Direction:		N50°41'17.60"E		

Element: Linear

PT	( )	380+85.03	10341343.5565	4265206.8712
PC	( )	383+09.52	10341485.7820	4265380.5640
Tangential Direction:		N50°41'17.60"E		
Tangential Length:		224.4935		

Element: Circular

PC	( )	383+09.52	10341485.7820	4265380.5640
PI	( )	384+72.19	10341588.8418	4265506.4257
CC	( )		10339938.3621	4263647.6439
PT	( )	386+34.15	10341670.2073	4265647.2878
Radius:		2000.0000		
Delta:		09°18'00.00" Right		
Degree of Curvature (Arc):		02°51'53.24"		
Length:		324.6312		
Tangent:		162.6729		
Chord:		324.2750		
Middle Ordinate:		6.5830		
External:		6.6047		
Back Tangent Direction:		N50°41'17.60"E		
Back Radial Direction:		S39°18'42.40"E		
Chord Direction:		N55°20'17.60"E		
Ahead Radial Direction:		S30°00'42.40"E		
Ahead Tangent Direction:		N59°59'17.60"E		

Element: Linear

PT	( )	386+34.15	10341670.2073	4265647.2878
PC	( )	388+96.35	10341801.3531	4265874.3314
Tangential Direction:		N59°59'17.60"E		
Tangential Length:		262.1984		

Element: Circular

PC	( )	388+96.35	10341801.3531	4265874.3314
PI	( )	390+21.50	10341853.9481	4265982.6975
CC	( )		10339453.3621	4267224.8120
PT	( )	391+46.46	10341916.2506	4266096.3892
Radius:		2700.0000		
Delta:		05°18'27.12" Right		
Degree of Curvature (Arc):		02°07'19.44"		
Length:		250.1116		
Tangent:		125.1453		
Chord:		250.0222		
Middle Ordinate:		2.8956		
External:		2.8987		
Back Tangent Direction:		N59°59'17.60"E		
Back Radial Direction:		S30°00'42.40"E		
Chord Direction:		N62°38'31.16"E		
Ahead Radial Direction:		S24°42'15.28"E		
Ahead Tangent Direction:		N65°17'44.72"E		

Element: Linear

PT	( )	391+46.46	10341916.2506	4266096.3892
PC	( )	396+83.67	10342140.7690	4266584.4319
Tangential Direction:		N65°17'44.72"E		
Tangential Length:		537.2096		

Element: Circular

PC	( )	396+83.67	10342140.7690	4266584.4319
PI	( )	397+50.60	10342168.7390	4266645.2311

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FM 777
HORIZONTAL ALIGNMENT DATA

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		63

DATE: 1/30/2024 2:56:14 PM
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CC	( )		10345320.4392	4265121.6615
PT	( )	398+17.50	10342199.0128	4265704.9167
Radius:		3500.0000		
Delta:		02°11'27.12" Left		
Degree of Curvature (Arc):		01°38'13.28"		
Length:		133.8324		
Tangent:		66.9243		
Chord:		133.8242		
Middle Ordinate:		0.6397		
External:		0.6398		
Back Tangent Direction:		N65°17'44.72"E		
Back Radial Direction:		S24°42'15.28"E		
Chord Direction:		N64°12'01.16"E		
Ahead Radial Direction:		S26°53'42.40"E		
Ahead Tangent Direction:		N63°06'17.60"E		

Element: Linear

PT	( )	398+17.50	10342199.0128	4265704.9167
PC	( )	398+85.62	10342229.8248	4265765.6633
Tangential Direction:		N63°06'17.60"E		
Tangential Length:		68.1141		

Element: Circular

PC	( )	398+85.62	10342229.8248	4265765.6633
PI	( )	401+03.11	10342328.2081	4265959.6284
CC	( )		10343567.5789	4265087.1253
PT	( )	403+17.59	10342477.6290	4267117.6636
Radius:		1500.0000		
Delta:		16°30'00.00" Left		
Degree of Curvature (Arc):		03°49'10.99"		
Length:		431.9690		
Tangent:		217.4896		
Chord:		430.4779		
Middle Ordinate:		15.5229		
External:		15.6852		
Back Tangent Direction:		N63°06'17.60"E		
Back Radial Direction:		S26°53'42.40"E		
Chord Direction:		N54°51'17.60"E		
Ahead Radial Direction:		S43°23'42.40"E		
Ahead Tangent Direction:		N46°36'17.60"E		

Element: Linear

PT	( )	403+17.59	10342477.6290	4267117.6636
PC	( )	406+73.65	10342722.2556	4267376.3932
Tangential Direction:		N46°36'17.60"E		
Tangential Length:		356.0662		

Element: Circular

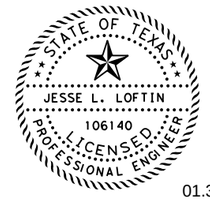
PC	( )	406+73.65	10342722.2556	4267376.3932
PI	( )	408+73.87	10342859.8097	4267521.8775
CC	( )		10342344.4063	4267733.6465
PT	( )	410+55.89	10342854.2768	4267722.0446
Radius:		520.0000		
Delta:		42°07'00.00" Right		
Degree of Curvature (Arc):		11°01'06.31"		
Length:		382.2387		
Tangent:		200.2170		
Chord:		373.6910		
Middle Ordinate:		34.7282		
External:		37.2135		
Back Tangent Direction:		N46°36'17.60"E		
Back Radial Direction:		S43°23'42.40"E		
Chord Direction:		N67°39'47.60"E		
Ahead Radial Direction:		S01°16'42.40"E		
Ahead Tangent Direction:		N88°43'17.60"E		

Element: Linear

PT	( )	410+55.89	10342854.2768	4267722.0446
PC	( )	411+77.30	10342856.9856	4267843.4214
Tangential Direction:		N88°43'17.60"E		
Tangential Length:		121.4070		

Element: Circular

PC	( )	411+77.30	10342856.9856	4267843.4214
PI	( )	412+88.33	10342859.4629	4267954.4268
CC	( )		10342147.1648	4267859.4855
PT	( )	413+97.63	10342838.3835	4268061.0214
Radius:		720.0000		
Delta:		17°32'00.00" Right		
Degree of Curvature (Arc):		07°57'27.89"		
Length:		220.3304		
Tangent:		111.0330		
Chord:		219.4717		
Middle Ordinate:		8.4116		
External:		8.5110		
Back Tangent Direction:		N88°43'17.60"E		
Back Radial Direction:		S01°16'42.40"E		
Chord Direction:		S82°30'42.40"E		



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FRN - F-14256

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HORIZONTAL ALIGNMENT DATA

SHEET 9 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		64

DATE: 1/30/2024 2:56:18 PM
FILE: c:\workingdir\lja-pw.bentley.com:lja-pw-01\alisha.varshney\dms845581022_HAL109_LJA.dgn

Ahead Radial Direction:	S16°15'17.60"W			
Ahead Tangent Direction:	S73°44'42.40"E			
Element: Linear				
PT	( )	413+97.63	10342838.3835	4263061.0214
PC	( )	414+88.51	10342812.9442	4263148.2720
Tangential Direction:	S73°44'42.40"E			
Tangential Length:	90.8836			
Element: Circular				
PC	( )	414+88.51	10342812.9442	4263148.2720
PI	( )	416+56.10	10342756.0341	4263309.1620
CC	( )		10344252.9832	4263568.1384
PT	( )	418+22.31	10342755.7888	4263476.4378
Radius:	1500.0000			
Delta:	12°45'00.00" Left			
Degree of Curvature (Arc):	03°49'10.99"			
Length:	333.7942			
Tangent:	167.5893			
Chord:	333.1059			
Middle Ordinate:	9.2753			
External:	9.3330			
Back Tangent Direction:	S73°44'42.40"E			
Back Radial Direction:	S16°15'17.60"W			
Chord Direction:	S80°07'12.40"E			
Ahead Radial Direction:	S03°30'17.60"W			
Ahead Tangent Direction:	S86°29'42.40"E			
Element: Linear				
PT	( )	418+22.31	10342755.7888	4263476.4378
PC	( )	418+92.43	10342751.5021	4263546.4267
Tangential Direction:	S86°29'42.40"E			
Tangential Length:	70.1200			
Element: Circular				
PC	( )	418+92.43	10342751.5021	4263546.4267
PI	( )	422+02.23	10342732.5627	4263855.6493
CC	( )		10343400.2863	4263586.1636
PT	( )	424+70.63	10342960.8331	4263065.1008
Radius:	650.0000			
Delta:	50°58'00.00" Left			
Degree of Curvature (Arc):	08°48'53.05"			
Length:	578.1985			
Tangent:	309.8020			
Chord:	559.3231			
Middle Ordinate:	63.2382			
External:	70.0537			
Back Tangent Direction:	S86°29'42.40"E			
Back Radial Direction:	S03°30'17.60"W			
Chord Direction:	N68°01'17.60"E			
Ahead Radial Direction:	S47°27'42.40"E			
Ahead Tangent Direction:	N42°32'17.60"E			
Element: Linear				
PT	( )	424+70.63	10342960.8331	4263065.1008
PC	( )	427+64.40	10343177.2935	4263263.7161
Tangential Direction:	N42°32'17.60"E			
Tangential Length:	293.7739			
Element: Circular				
PC	( )	427+64.40	10343177.2935	4263263.7161
PI	( )	428+35.68	10343229.8126	4263311.9055
CC	( )		10345543.5801	4263684.8234
PT	( )	429+06.94	10343284.2501	4263357.9167
Radius:	3500.0000			
Delta:	02°20'00.00" Left			
Degree of Curvature (Arc):	01°38'13.26"			
Length:	142.5352			
Tangent:	71.2775			
Chord:	142.5254			
Middle Ordinate:	0.7256			
External:	0.7257			
Back Tangent Direction:	N42°32'17.60"E			
Back Radial Direction:	S47°27'42.40"E			
Chord Direction:	N41°22'17.60"E			
Ahead Radial Direction:	S48°47'42.40"E			
Ahead Tangent Direction:	N40°12'17.60"E			
Element: Linear				
PT	( )	429+06.94	10343284.2501	4263357.9167
PC	( )	430+90.60	10343424.5231	4263476.4771
Tangential Direction:	N40°12'17.60"E			
Tangential Length:	183.6657			
Element: Circular				
PC	( )	430+90.60	10343424.5231	4263476.4771
PI	( )	432+91.03	10343577.6011	4263605.8604
CC	( )		10344295.9790	4263445.4268
PT	( )	434+88.56	10343761.6661	4263685.1888
Radius:	1350.0000			

STATE OF TEXAS
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HORIZONTAL ALIGNMENT DATA

SHEET 10 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		65

DATE: 1/30/2024 2:56:23 PM
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Delta:	16°53'23.28" Left			
Degree of Curvature (Arc):	04°14'38.87"			
Length:	397.9566			
Tangent:	200.4318			
Chord:	396.5172			
Middle Ordinate:	14.6373			
External:	14.7978			
Back Tangent Direction:	N40°12'17.60"E			
Back Radial Direction:	S49°47'42.40"E			
Chord Direction:	N31°45'35.96"E			
Ahead Radial Direction:	S66°41'05.68"E			
Ahead Tangent Direction:	N23°18'54.32"E			

Element: Linear

PT	( )	434+88.56	10343761.6661	4269685.1888
PI	( )	439+67.37	10344201.3797	4269874.6967
Tangential Direction:		N23°18'54.32"E		
Tangential Length:		478.8125		

Element: Linear

PI	( )	439+67.37	10344201.3797	4269874.6967
PC	( )	445+66.11	10344747.2246	4270120.7593
Tangential Direction:		N24°15'55.74"E		
Tangential Length:		598.7432		

Element: Circular

PC	( )	445+66.11	10344747.2246	4270120.7593
PI	( )	446+18.32	10344794.8184	4270142.2143
CC	( )		10345980.1203	4267385.8063
PT	( )	446+70.52	10344843.1299	4270162.0002
Radius:		3000.0000		
Delta:		01°59'38.14" Left		
Degree of Curvature (Arc):		01°54'35.49"		
Length:		104.4019		
Tangent:		52.2062		
Chord:		104.3966		
Middle Ordinate:		0.4541		
External:		0.4542		
Back Tangent Direction:		N24°15'55.74"E		
Back Radial Direction:		S65°44'04.26"E		
Chord Direction:		N23°16'05.67"E		
Ahead Radial Direction:		S67°43'42.40"E		
Ahead Tangent Direction:		N22°16'17.60"E		

Element: Linear

PT	( )	446+70.52	10344843.1299	4270162.0002
PC	( )	456+85.56	10345782.4496	4270546.6986
Tangential Direction:		N22°16'17.60"E		
Tangential Length:		1015.0439		

Element: Circular

PC	( )	456+85.56	10345782.4496	4270546.6986
PI	( )	459+25.70	10346004.6750	4270637.7111
CC	( )		10347108.9383	4267307.8057
PT	( )	461+65.09	10346237.2484	4270697.5191
Radius:		3500.0000		
Delta:		07°51'00.00" Left		
Degree of Curvature (Arc):		01°38'13.28"		
Length:		479.5292		
Tangent:		240.1404		
Chord:		479.1542		
Middle Ordinate:		8.2092		
External:		8.2285		
Back Tangent Direction:		N22°16'17.60"E		
Back Radial Direction:		S67°43'42.40"E		
Chord Direction:		N18°20'47.60"E		
Ahead Radial Direction:		S75°34'42.40"E		
Ahead Tangent Direction:		N14°25'17.60"E		

Element: Linear

PT	( )	461+65.09	10346237.2484	4270697.5191
POT	( )	471+75.54	10347215.8594	4270949.1761
Tangential Direction:		N14°25'17.60"E		
Tangential Length:		1010.4508		

STATE OF TEXAS
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106140
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FM 777
HORIZONTAL ALIGNMENT DATA

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		66

DATE: 1/30/2024 2:56:27 PM
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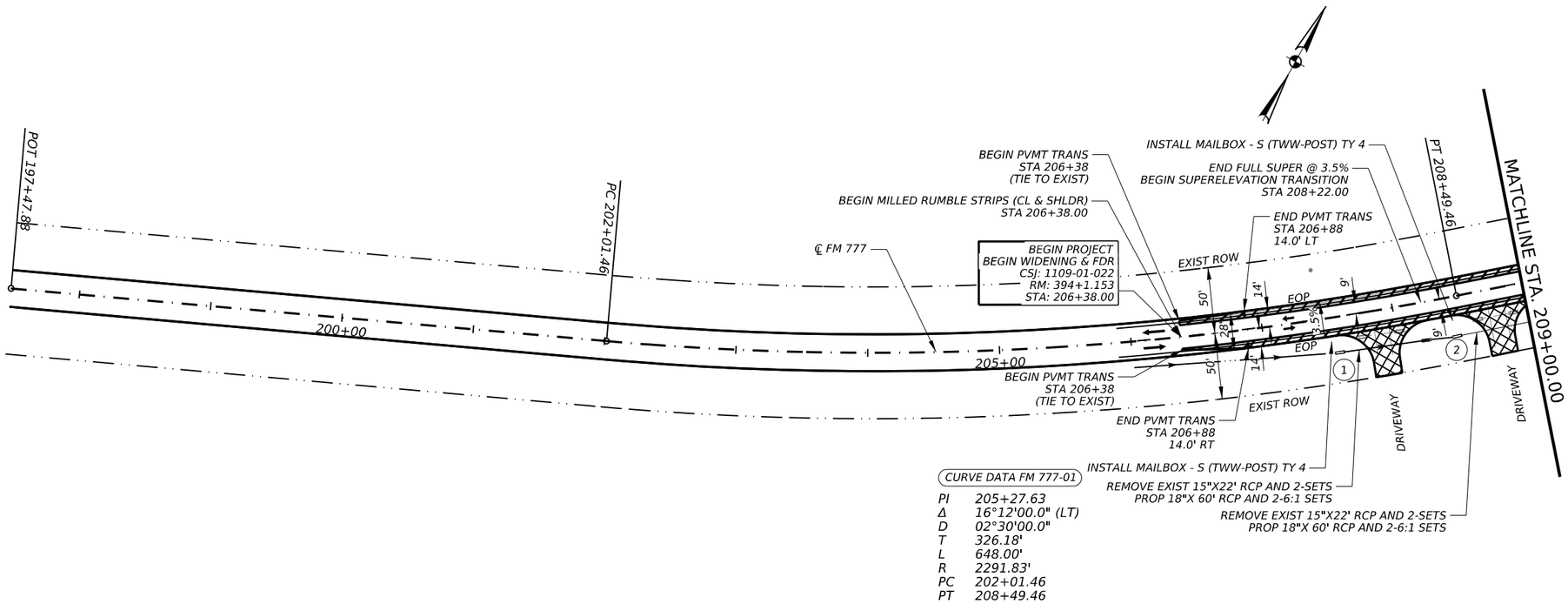


CURVE DATA FM 777-01

PI	205+27.63
Δ	16°12'00.0" (LT)
D	02°30'00.0"
T	326.18'
L	648.00'
R	2291.83'
PC	202+01.46
PT	208+49.46

LEGEND:

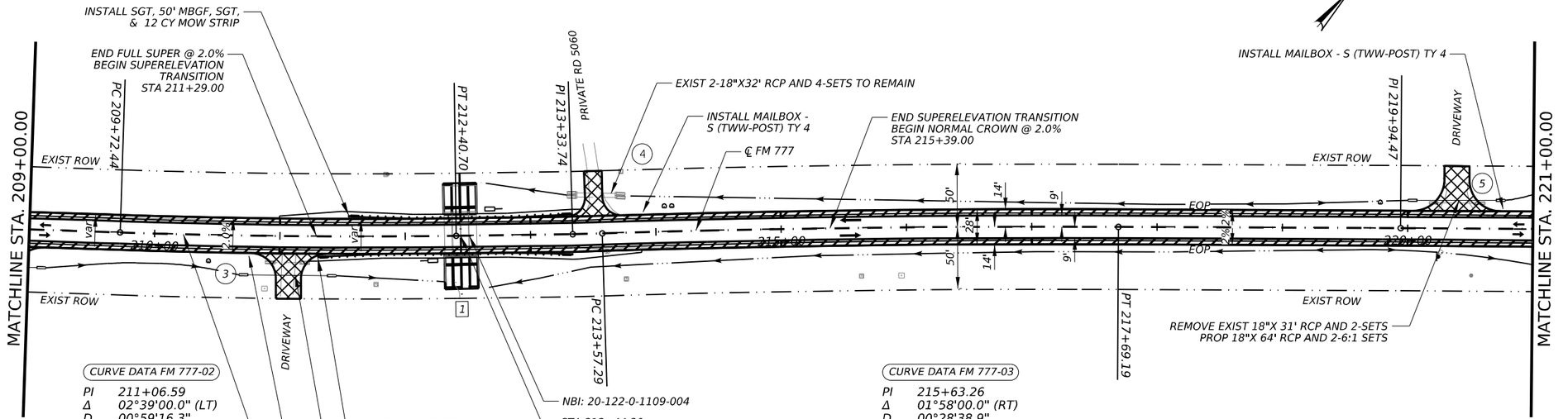
ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'



CURVE DATA FM 777-02

PI	211+06.59
Δ	02°39'00.0" (LT)
D	00°59'16.3"
T	134.15'
L	268.26'
R	5800.00'
PC	209+72.44
PT	212+40.70

CURVE DATA FM 777-03

PI	215+63.26
Δ	01°58'00.0" (RT)
D	00°28'38.9"
T	205.97'
L	411.90'
R	12000.00'
PC	213+57.29
PT	217+69.19

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

BEGIN TO STA 221+00

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		67

DATE: 2/1/2024 10:49:21 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns84558\022 PP 01.dgn

CK:
DW:
CK:
DN:

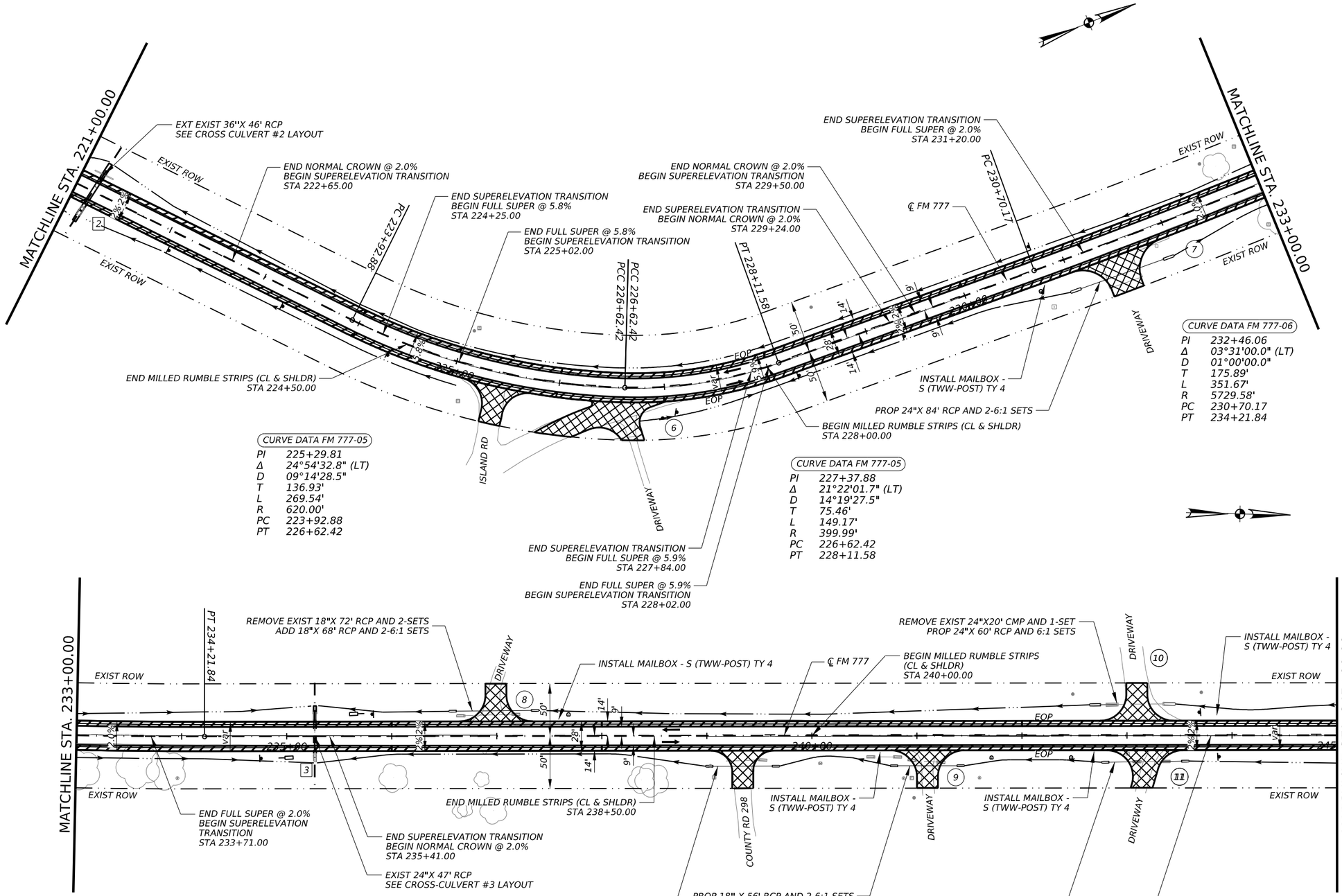
CK:
DW:
CK:
DN:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.



CURVE DATA FM 777-05

PI	225+29.81
Δ	24°54'32.8" (LT)
D	09°14'28.5"
T	136.93'
L	269.54'
R	620.00'
PC	223+92.88
PT	226+62.42

CURVE DATA FM 777-05

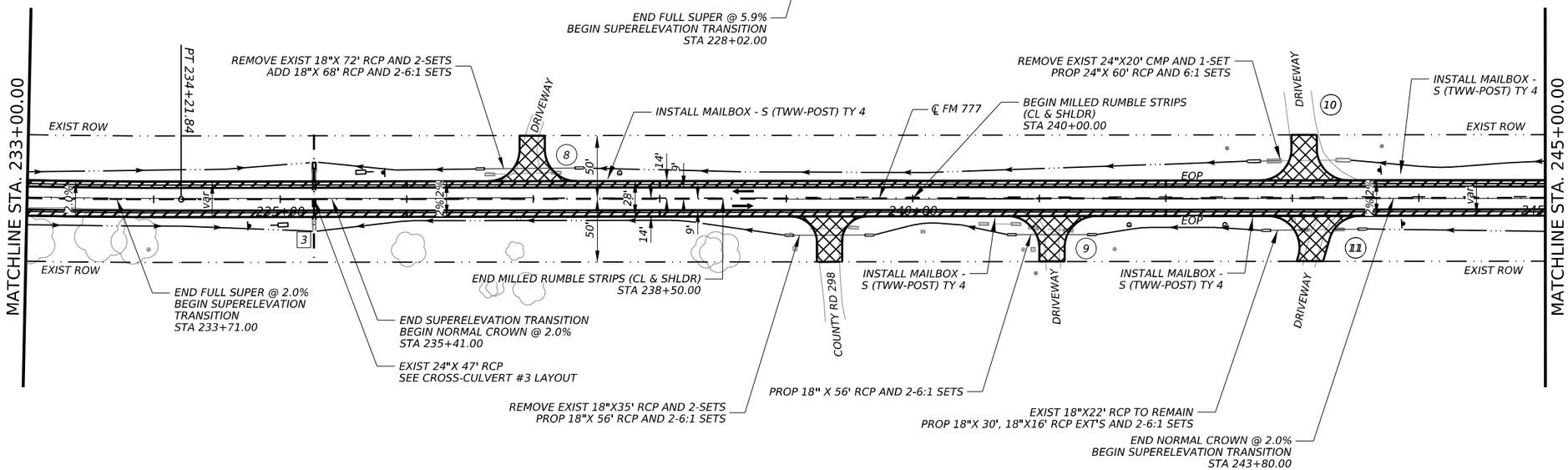
PI	227+37.88
Δ	21°22'01.7" (LT)
D	14°19'27.5"
T	75.46'
L	149.17'
R	399.99'
PC	226+62.42
PT	228+11.58

CURVE DATA FM 777-06

PI	232+46.06
Δ	03°31'00.0" (LT)
D	01°00'00.0"
T	175.89'
L	351.67'
R	5729.58'
PC	230+70.17
PT	234+21.84

0' 50' 100'

SCALE: 1"= 100'



02.01.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
ROADWAY LAYOUTS

STA 221+00 TO STA 245+00

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		68

DATE: 2/1/2024 10:49:35 AM
FILE: c:\workingdir\la-pw.bentley.com_lja-pw-01\guadalupe.escobedo\dms845581\022_PP_02.dgn

CK:
DW:
CK:
DW:

CURVE DATA FM 777-07

PI	246+51.32
Δ	21°10'01.4" (RT)
D	07°57'27.9"
T	134.53'
L	265.99'
R	720.00'
PC	245+16.79
PT	247+82.79

CURVE DATA FM 777-08

PI	248+80.27
Δ	08°11'58.6" (RT)
D	04°12'46.6"
T	97.48'
L	194.63'
R	1359.99'
PC	247+82.79
PT	249+77.42

CURVE DATA FM 777-09

PI	254+74.65
Δ	04°35'00.0" (LT)
D	02°17'30.6"
T	100.05'
L	199.99'
R	2500.00'
PC	253+74.60
PT	255+74.58

CURVE DATA FM 777-10

PI	262+79.13
Δ	38°34'00.0" (RT)
D	09°05'40.4"
T	220.42'
L	424.06'
R	630.00'
PC	260+58.71
PT	264+82.77

CURVE DATA FM 777-11

PI	268+39.93
Δ	40°37'00.0" (LT)
D	13°01'18.4"
T	162.83'
L	311.91'
R	440.00'
PC	266+77.10
PT	269+89.01

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

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FRN - F-14256

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FM 777
ROADWAY LAYOUTS

STA 245+00 TO 269+00

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		69

DATE: 2/1/2024 10:49:47 AM
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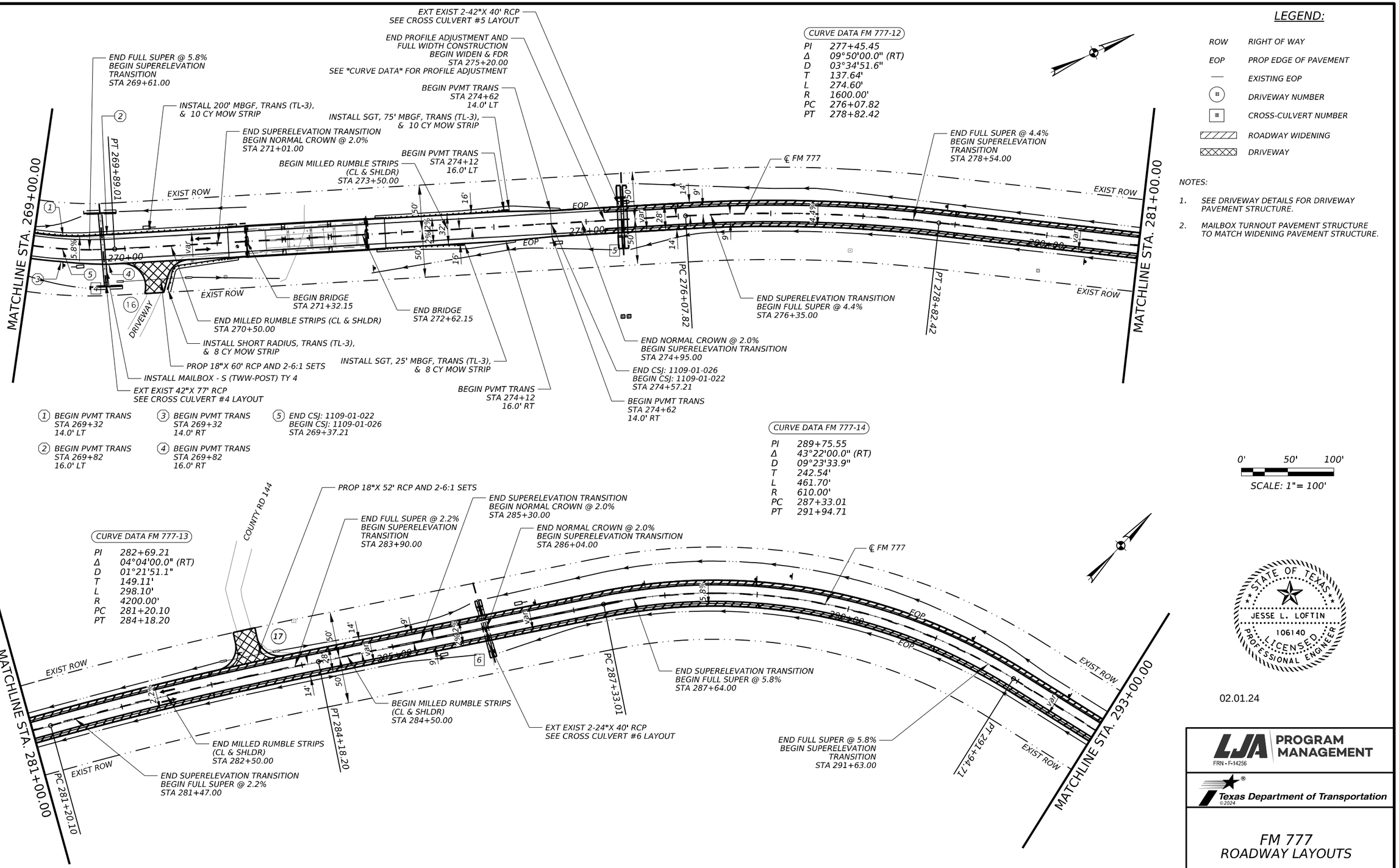

CURVE DATA FM 777-12

PI	277+45.45
Δ	09°50'00.0" (RT)
D	03°34'51.6"
T	137.64'
L	274.60'
R	1600.00'
PC	276+07.82
PT	278+82.42

CURVE DATA FM 777-14

PI	289+75.55
Δ	43°22'00.0" (RT)
D	09°23'33.9"
T	242.54'
L	461.70'
R	610.00'
PC	287+33.01
PT	291+94.71

CURVE DATA FM 777-13

PI	282+69.21
Δ	04°04'00.0" (RT)
D	01°21'51.1"
T	149.11'
L	298.10'
R	4200.00'
PC	281+20.10
PT	284+18.20

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

02.01.24

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FM 777
ROADWAY LAYOUTS

STA 269+00 TO 296+00

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		70

DATE: 2/1/2024 10:49:59 AM
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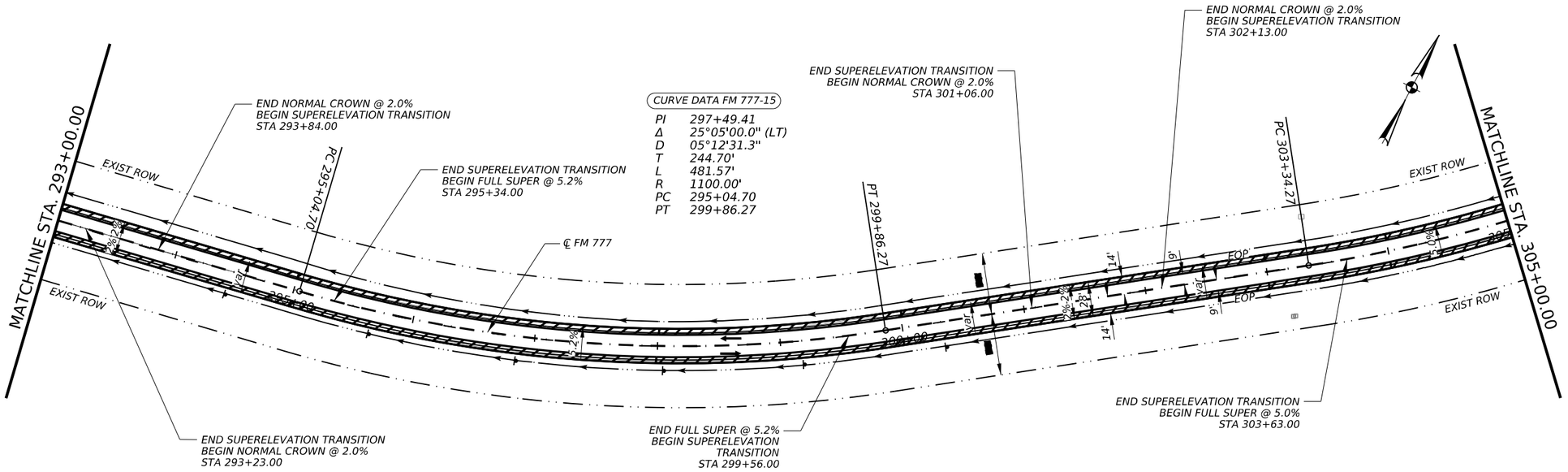


CURVE DATA FM 777-15

PI	297+49.41
Δ	25°05'00.0" (LT)
D	05°12'31.3"
T	244.70'
L	481.57'
R	1100.00'
PC	295+04.70
PT	299+86.27

LEGEND:

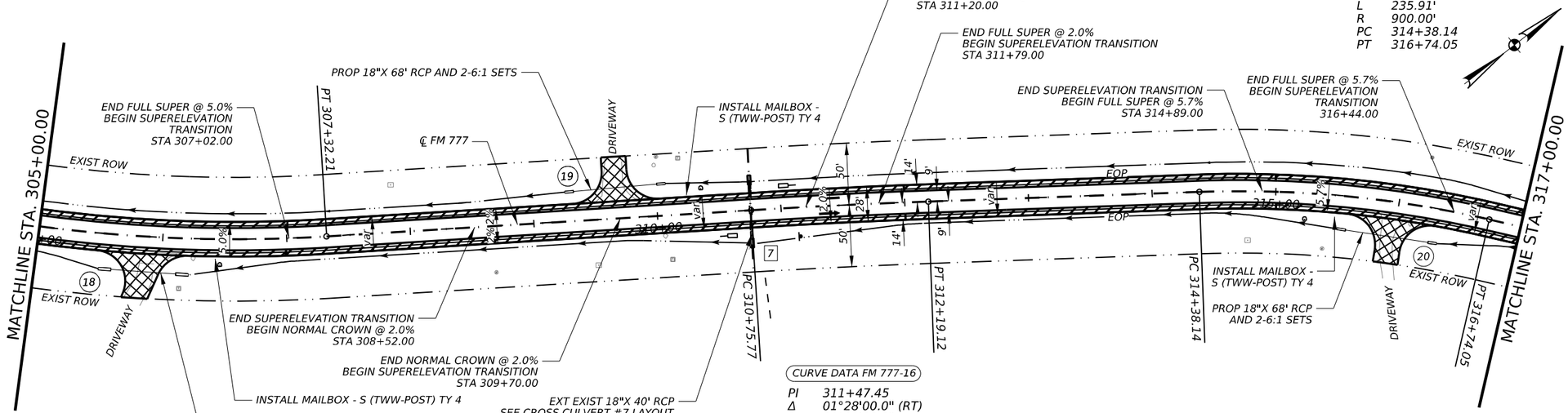
ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'



CURVE DATA FM 777-17

PI	315+56.77
Δ	15°01'07.2" (RT)
D	06°21'58.3"
T	118.64'
L	235.91'
R	900.00'
PC	314+38.14
PT	316+74.05

CURVE DATA FM 777-16

PI	311+47.45
Δ	01°28'00.0" (RT)
D	01°01'23.3"
T	71.68'
L	143.35'
R	5600.00'
PC	310+75.77
PT	312+19.12

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

STA 293+00 TO STA 317+00

SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		71

DATE: 2/1/2024 10:50:11 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns8455822_PP_05.dgn

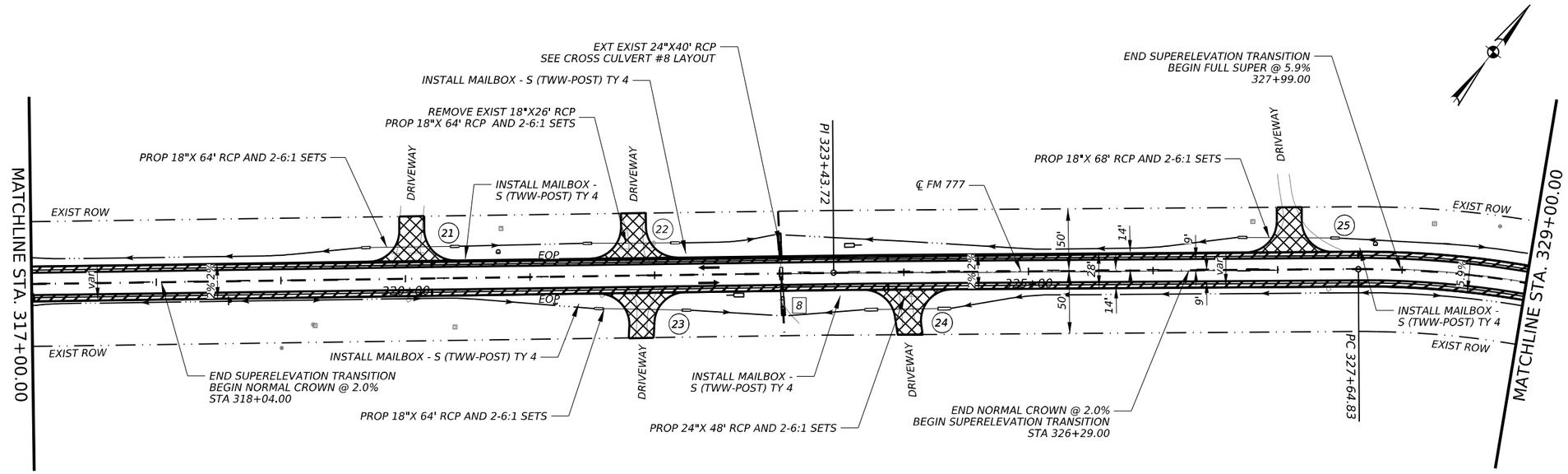
CK:
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
(#)	DRIVEWAY NUMBER
[#]	CROSS-CULVERT NUMBER
//////	ROADWAY WIDENING
XXXXXX	DRIVEWAY

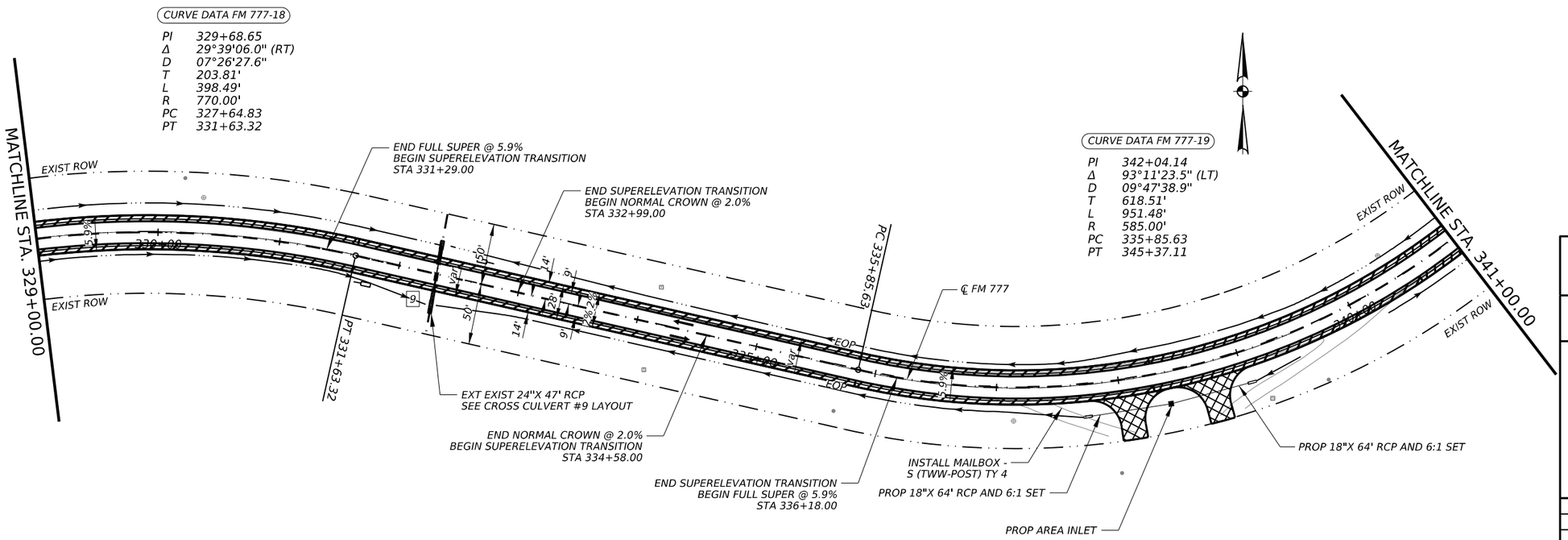
NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.



0' 50' 100'

SCALE: 1"= 100'



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FM 777
ROADWAY LAYOUTS

STA 317+00 TO STA 341+00

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		72

DATE: 2/1/2024 10:50:23 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe.escobedoldms\84558\022_PP_06.dgn

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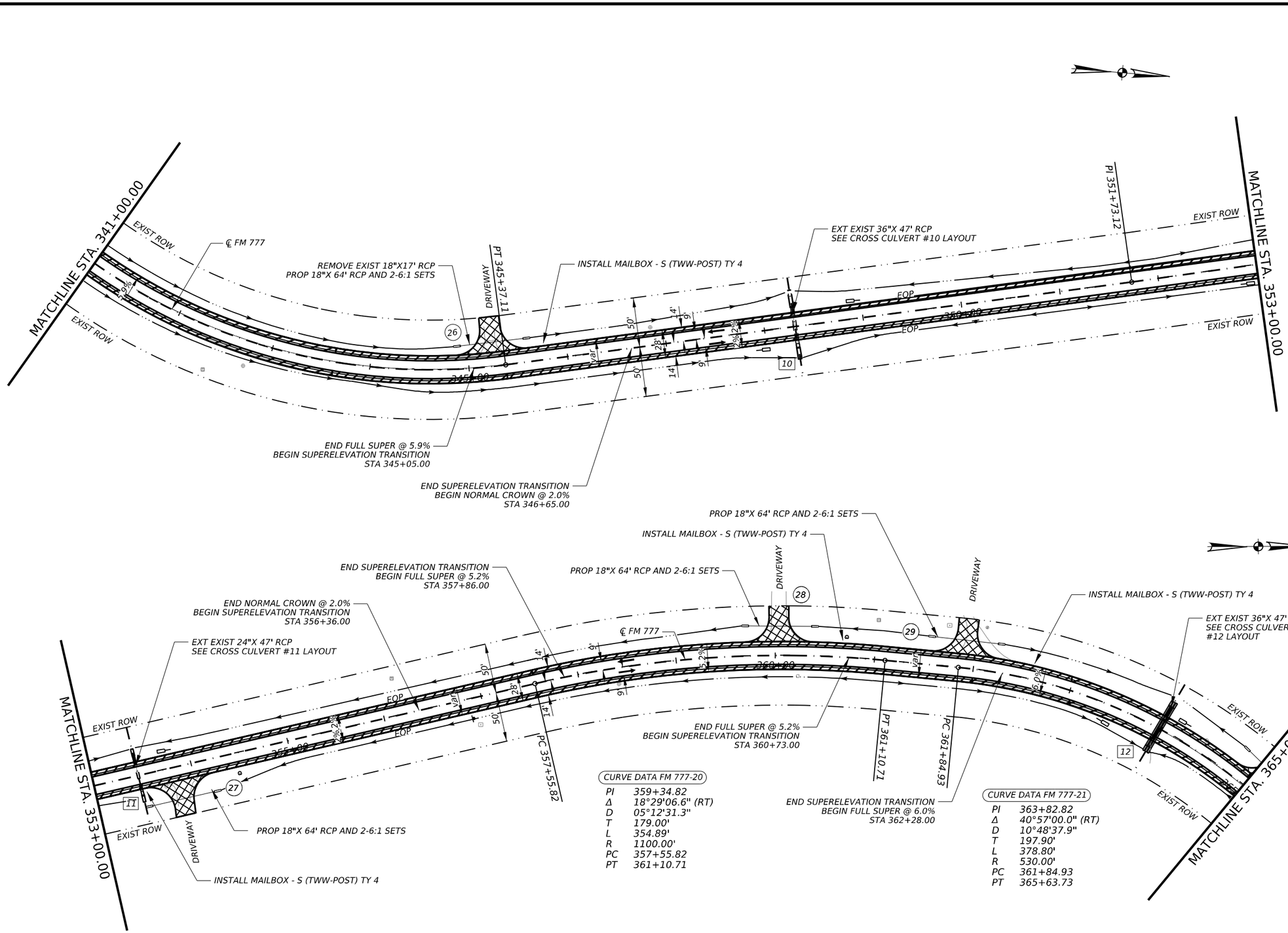
DW:
CK:
DW:



LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

CURVE DATA FM 777-20

PI	359+34.82
Δ	18°29'06.6" (RT)
D	05°12'31.3"
T	179.00'
L	354.89'
R	1100.00'
PC	357+55.82
PT	361+10.71

CURVE DATA FM 777-21

PI	363+82.82
Δ	40°57'00.0" (RT)
D	10°48'37.9"
T	197.90'
L	378.80'
R	530.00'
PC	361+84.93
PT	365+63.73

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

STA 341+00 TO STA 365+00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		73

DATE: 2/1/2024 10:50:34 AM
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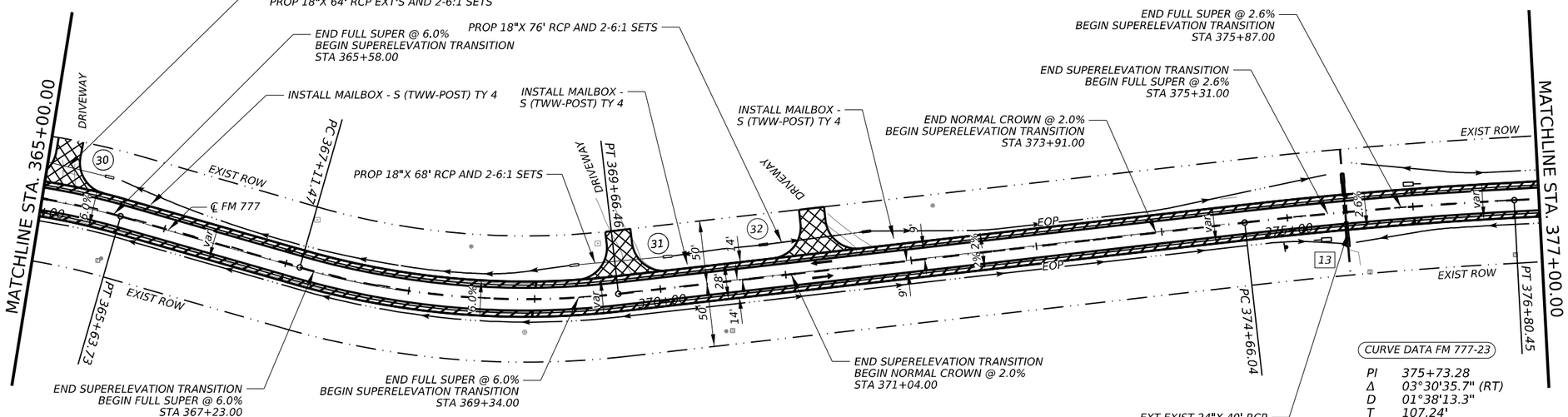
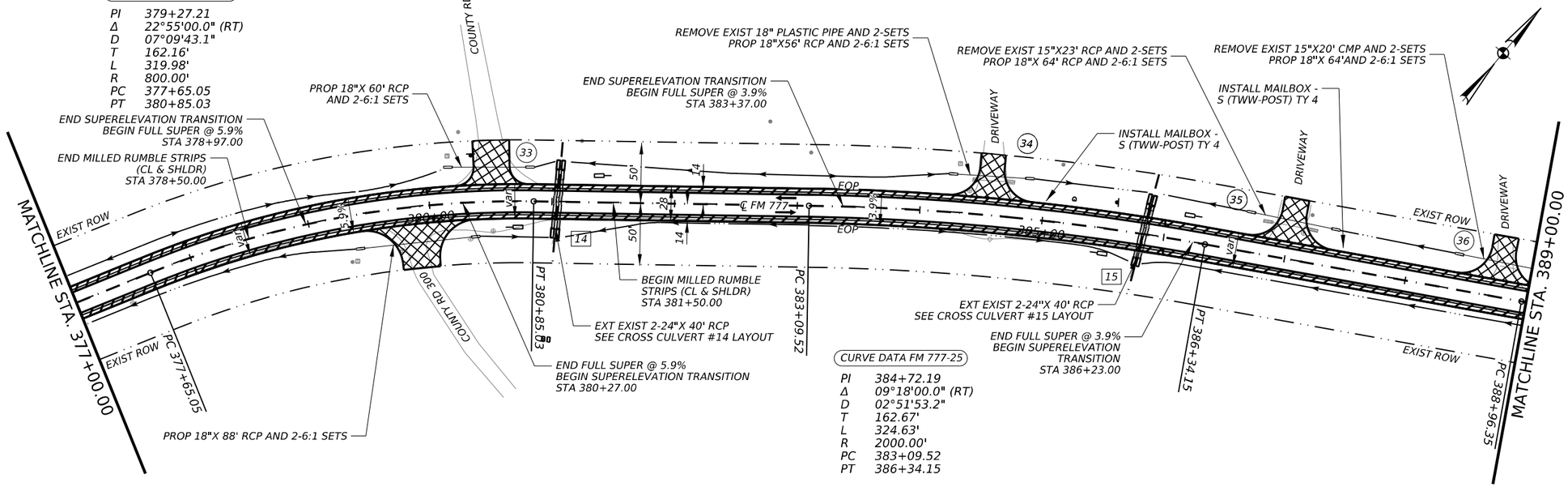


CURVE DATA FM 777-22

PI	368+40.63
Δ	22°28'35.7" (LT)
D	08°48'53.0"
T	129.16'
L	254.99'
R	650.00'
PC	367+11.47
PT	369+66.46

CURVE DATA FM 777-23

PI	375+73.28
Δ	03°30'35.7" (RT)
D	01°38'13.3"
T	107.24'
L	214.41'
R	3500.00'
PC	374+66.04
PT	376+80.45



CURVE DATA FM 777-25

PI	384+72.19
Δ	09°18'00.0" (RT)
D	02°51'53.2"
T	162.67'
L	324.63'
R	2000.00'
PC	383+09.52
PT	386+34.15

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

STA 365+00 TO STA 389+00

SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		74

DATE: 2/1/2024 10:50:46 AM
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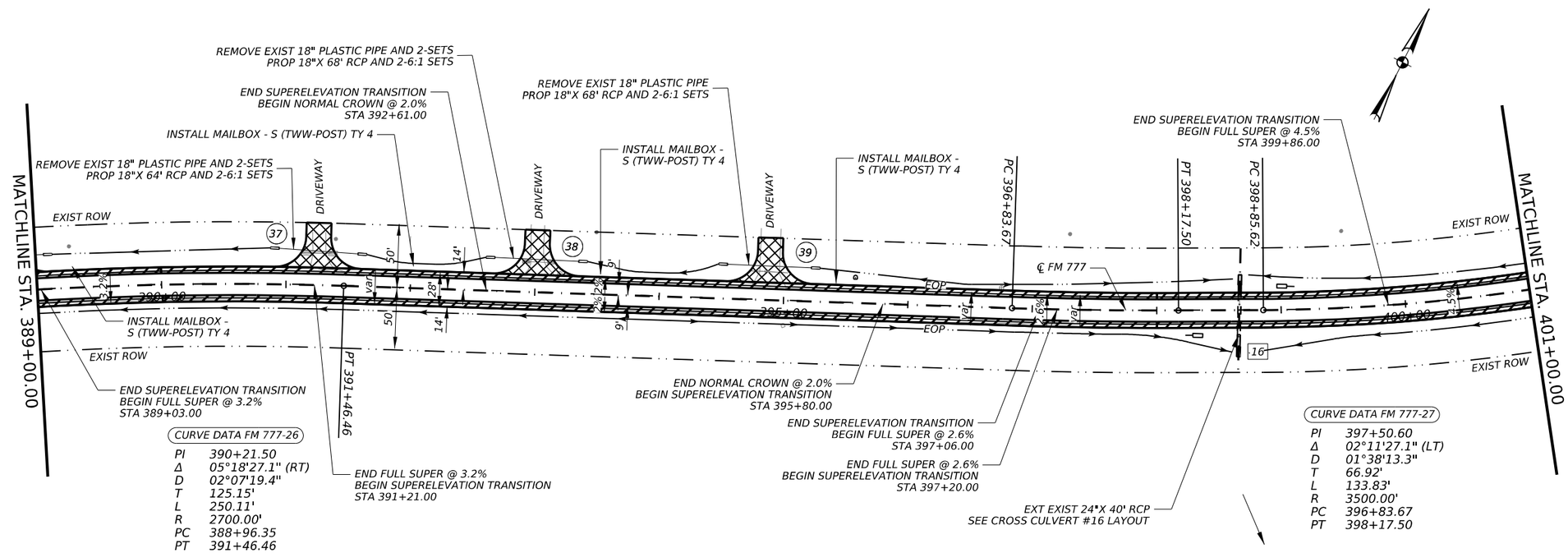

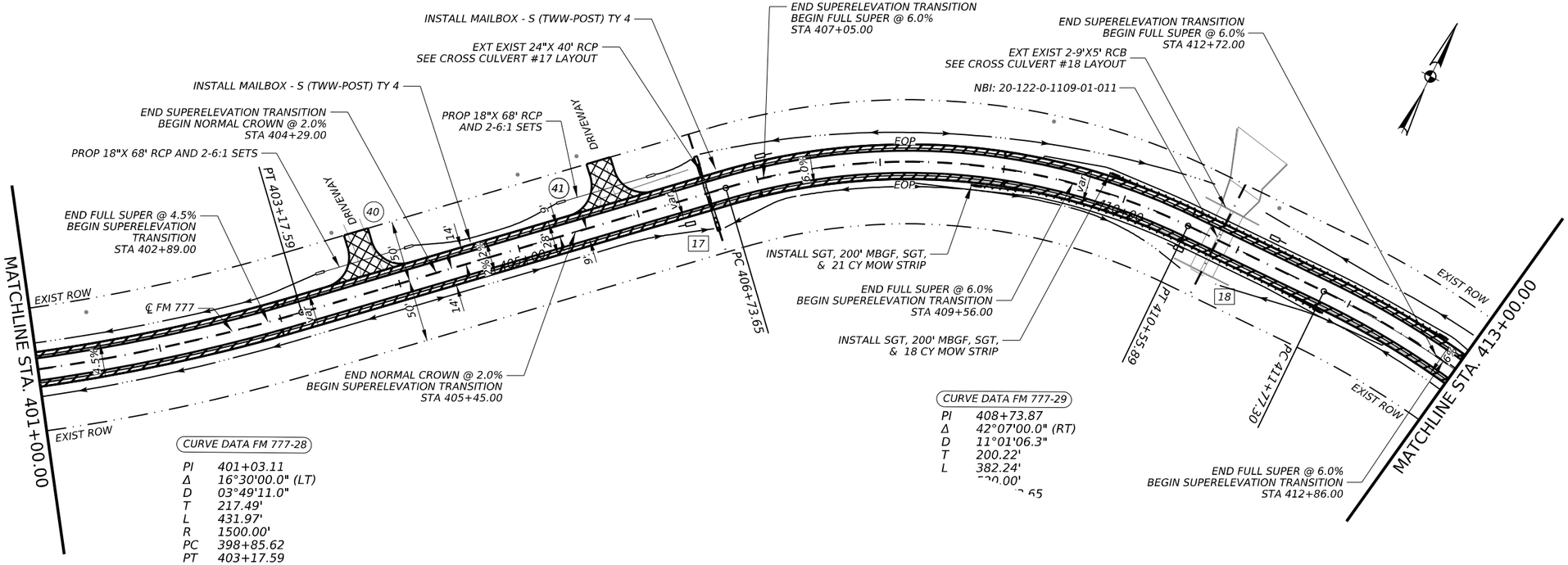

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
(#)	DRIVEWAY NUMBER
[#]	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

STA 389+00 TO STA 413+00

SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		75

DATE: 2/1/2024 10:50:57 AM
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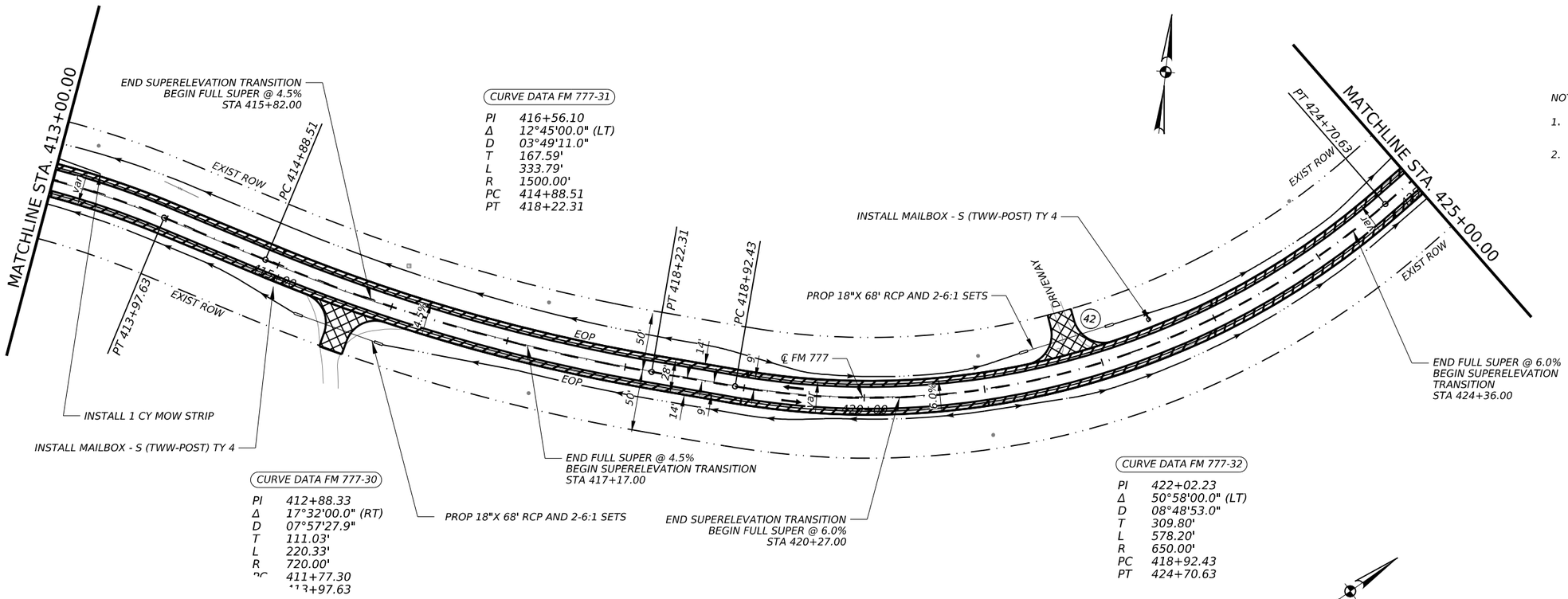

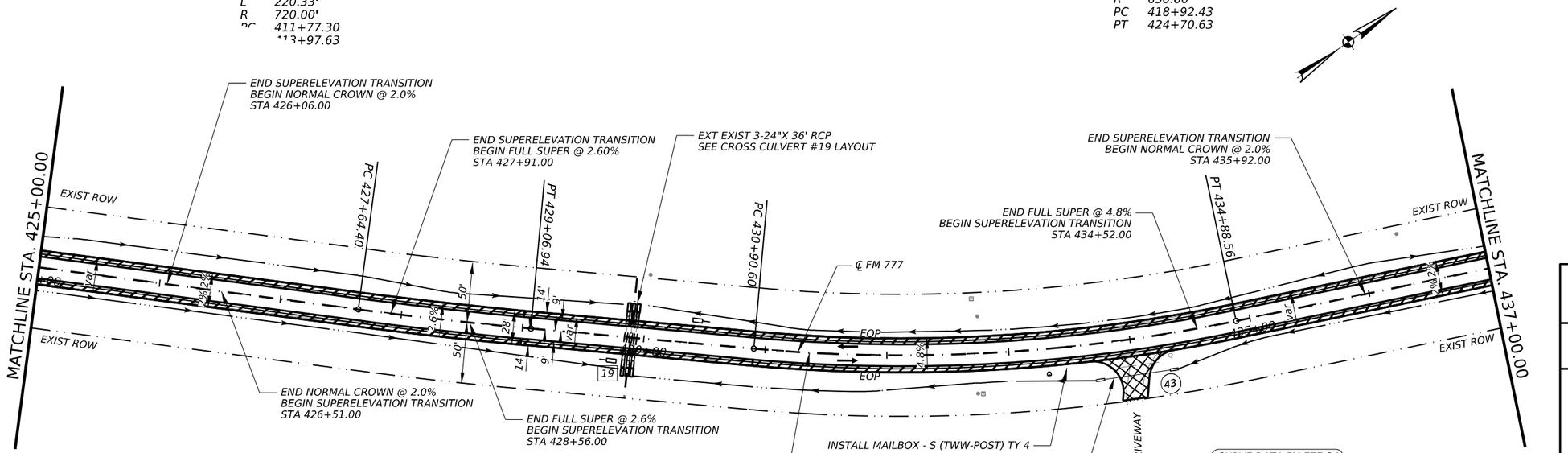

STATE OF TEXAS
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FM 777
ROADWAY LAYOUTS

STA 413+00 TO STA 437+00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		76

DATE: 2/1/2024 10:51:14 AM
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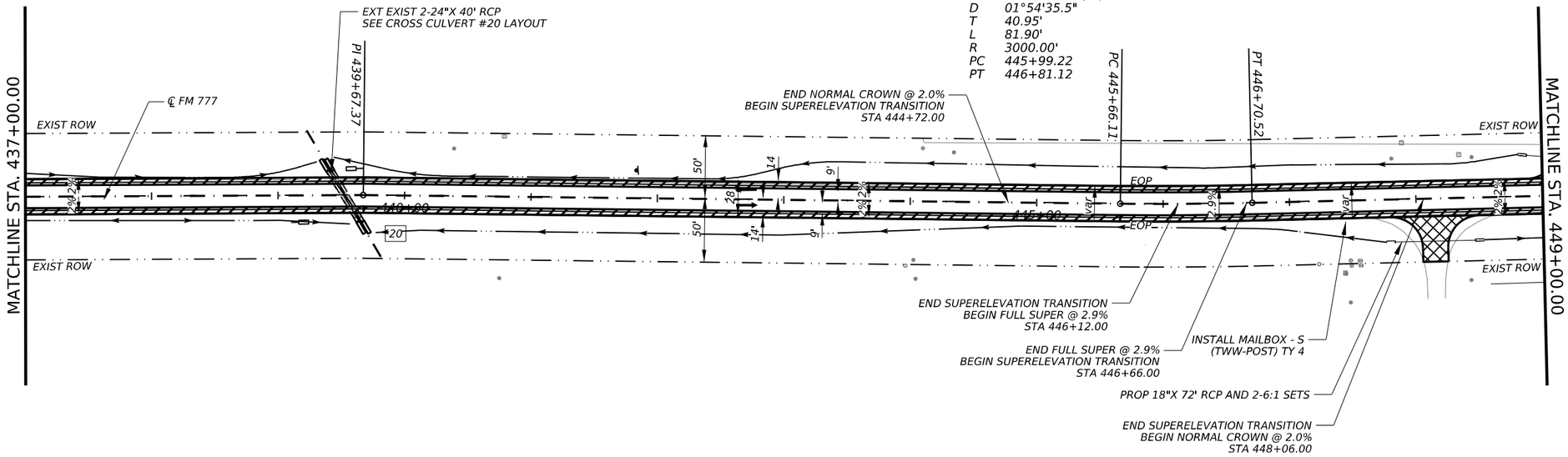

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
	ROADWAY WIDENING
	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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02.01.24

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FM 777
ROADWAY LAYOUTS

STA 437+00 TO STA 461+00

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		77

DATE: 2/1/2024 10:51:31 AM
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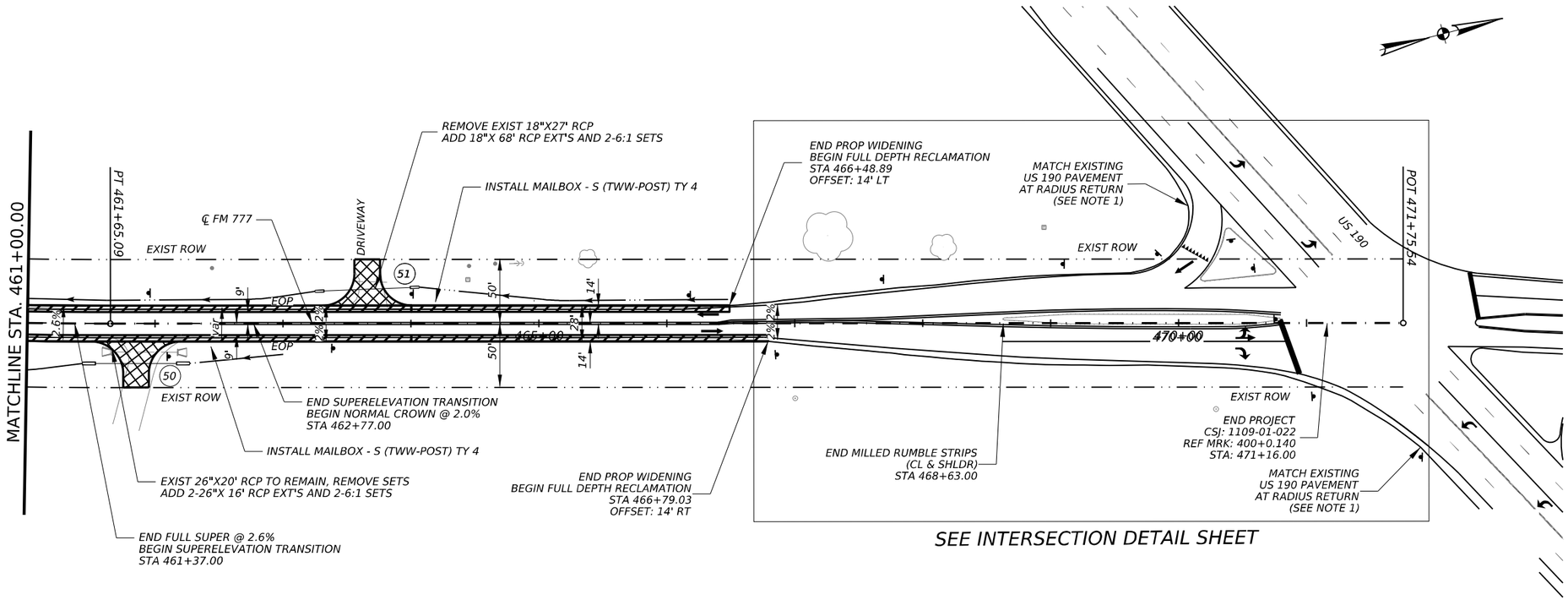
CK:
DW:
CK:



SEE INTERSECTION DETAIL SHEET

LEGEND:

ROW	RIGHT OF WAY
EOP	PROP EDGE OF PAVEMENT
——	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS-CULVERT NUMBER
▨	ROADWAY WIDENING
▨	DRIVEWAY

NOTES:

1. SEE DRIVEWAY DETAILS FOR DRIVEWAY PAVEMENT STRUCTURE.
2. MAILBOX TURNOUT PAVEMENT STRUCTURE TO MATCH WIDENING PAVEMENT STRUCTURE.
3. CONTRACTOR TO MATCH EXISTING EDGE OF PAVEMENT.

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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106140
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FM 777
ROADWAY LAYOUTS

STA 461+00 TO END

SHEET 12 OF 12

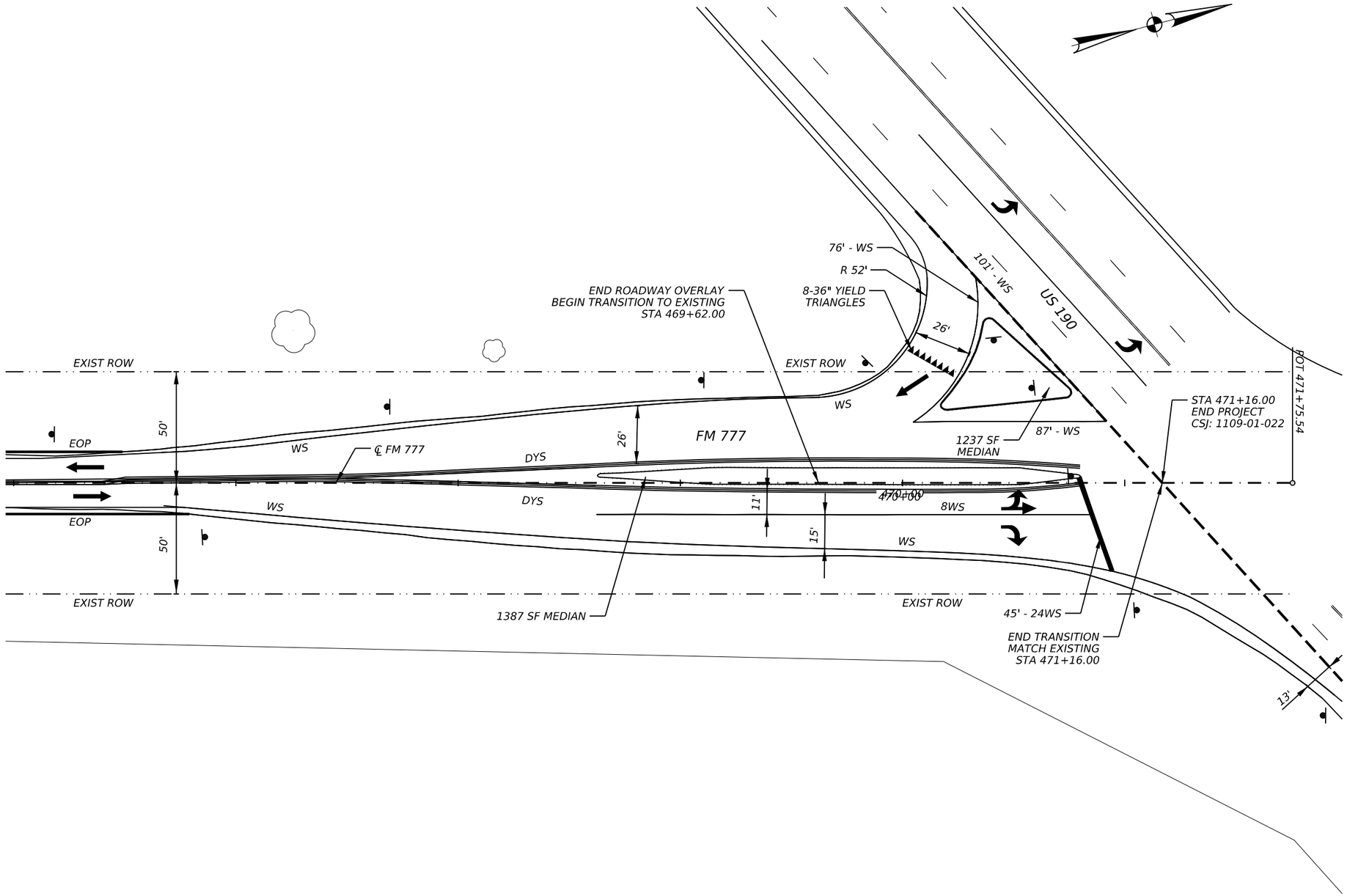
CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		78

DATE: 2/1/2024 10:51:47 AM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns84558\022_PP_12.dgn

CK:
DW:
CK:
DN:

LEGEND:

→	TRAFFIC DIRECTION
EOP	PROP EDGE OF PAVEMENT
– —	EXISTING EOP
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
8WS	8" WHITE SOLID
24WS	24" WHITE SOLID



0' 25' 50'

SCALE: 1"= 50'

STATE OF TEXAS
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01.30.24

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FRN - F-14256

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INTERSECTION DETAILS
FM 777
(CSJ: 1109-01-022)

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		79

DATE: 1/30/2024 2:57:53 PM
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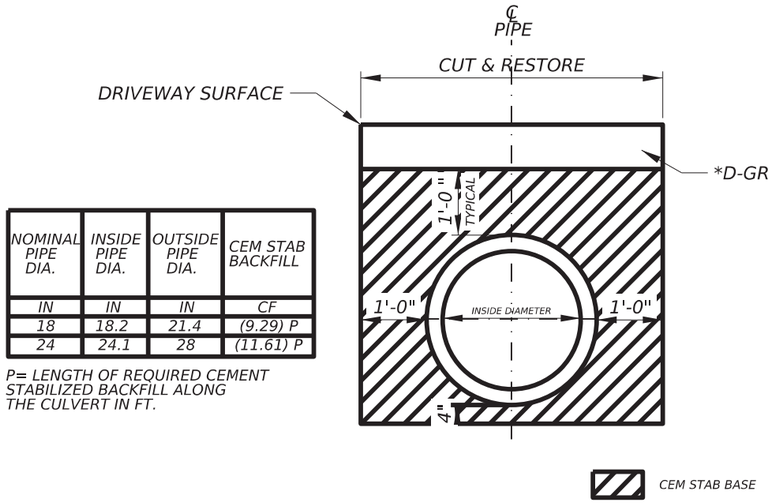
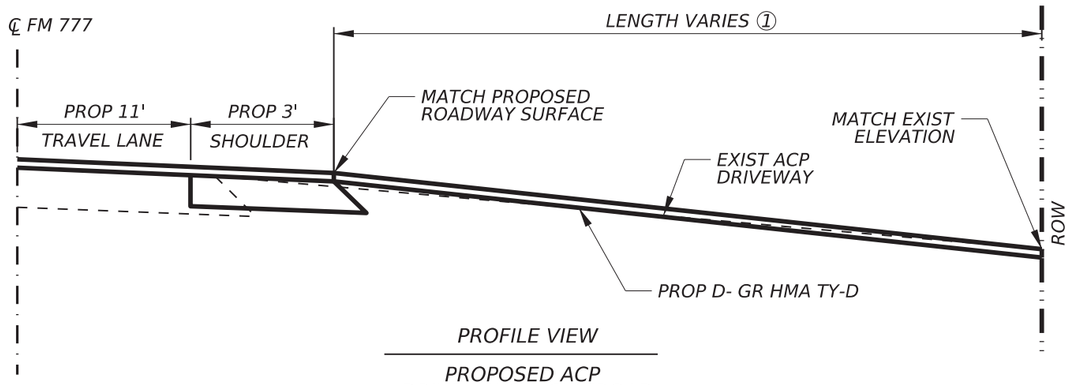


NOMINAL PIPE DIA.	INSIDE PIPE DIA.	OUTSIDE PIPE DIA.	CEM STAB BACKFILL
IN	IN	IN	CF
18	18.2	21.4	(9.29) P
24	24.1	28	(11.61) P

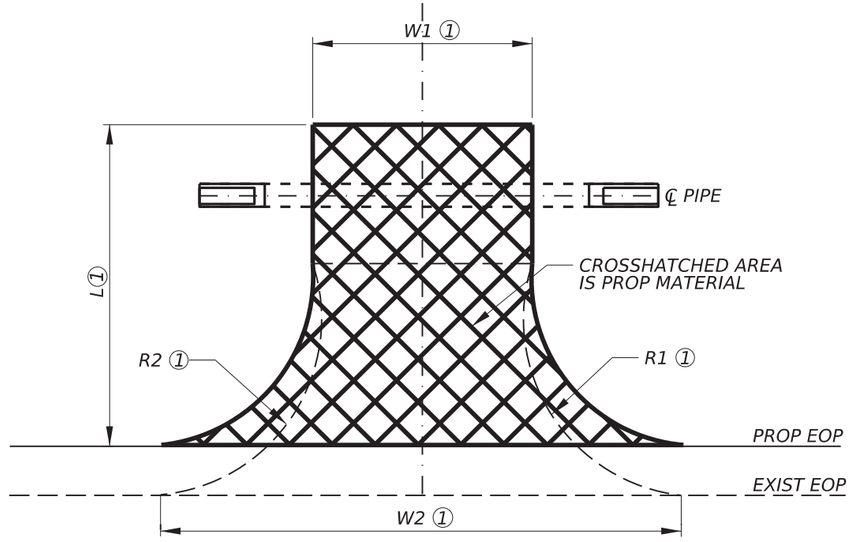
P= LENGTH OF REQUIRED CEMENT STABILIZED BACKFILL ALONG THE CULVERT IN FT.

CEMENT BACKFILL DETAILS AT DRIVEWAY



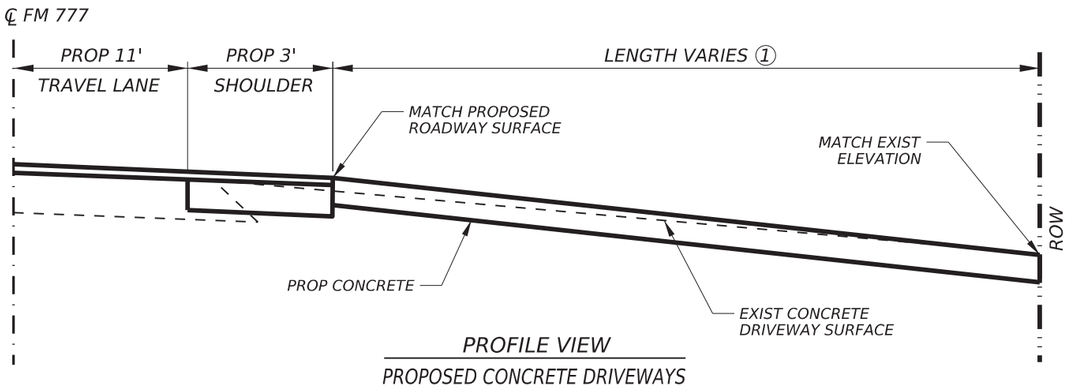
PROFILE VIEW

PROPOSED ACP DRIVEWAYS & SIDEROAD



PLAN VIEW

ACP & CONCRETE DRIVEWAYS & SIDEROADS



PROFILE VIEW

PROPOSED CONCRETE DRIVEWAYS

NOTES:

① SEE DRIVEWAY SUMMARY

STATE OF TEXAS
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TYPICAL DRIVEWAY & SIDEROAD DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		80

DATE: 1/30/2024 9:37:47 PM
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CK:
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CK:
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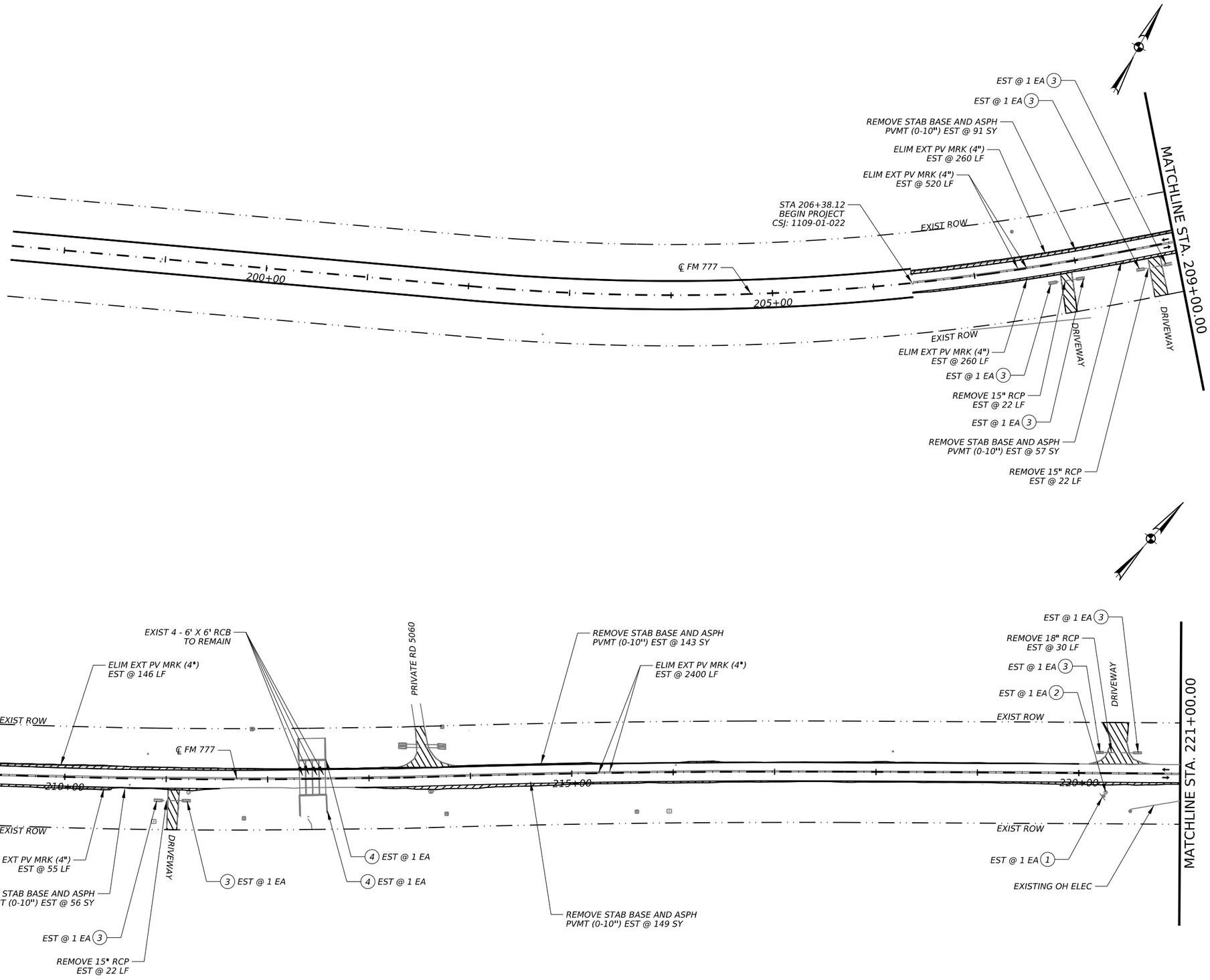
LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112



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FM 777
REMOVAL LAYOUTS

BEGIN TO STA 221+00

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		81

DATE: 1/30/2024 2:58:02 PM
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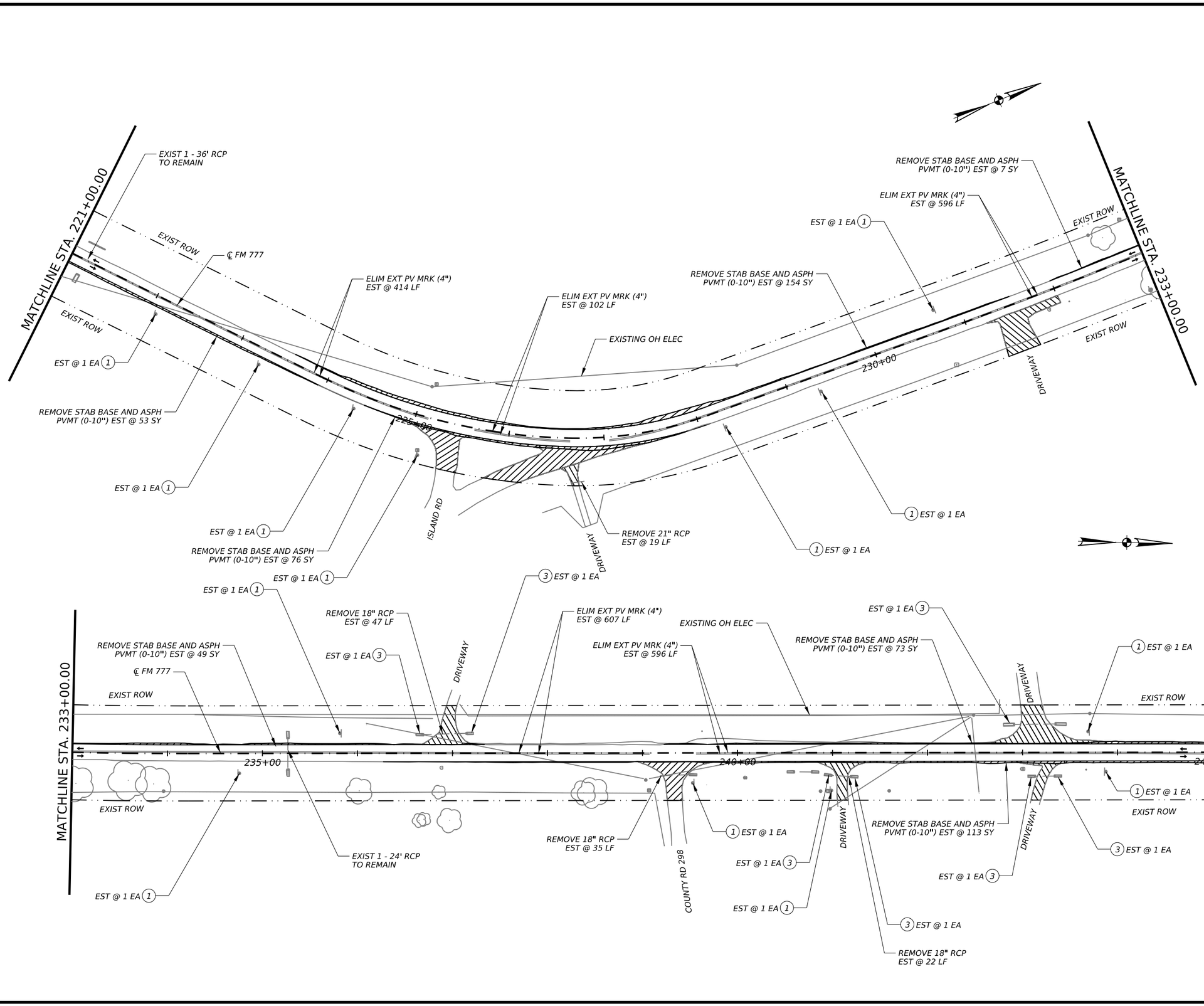

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

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REMOVAL LAYOUTS

STA 221+00 TO 245+00

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		82

DATE: 1/30/2024 2:58:07 PM
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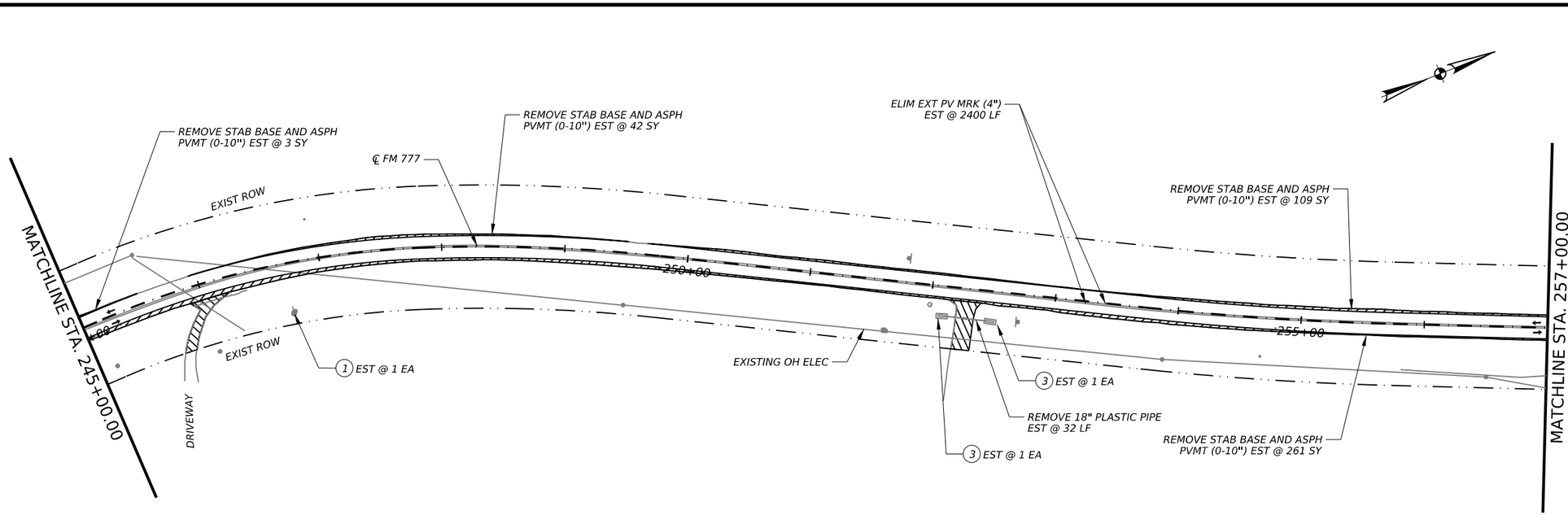

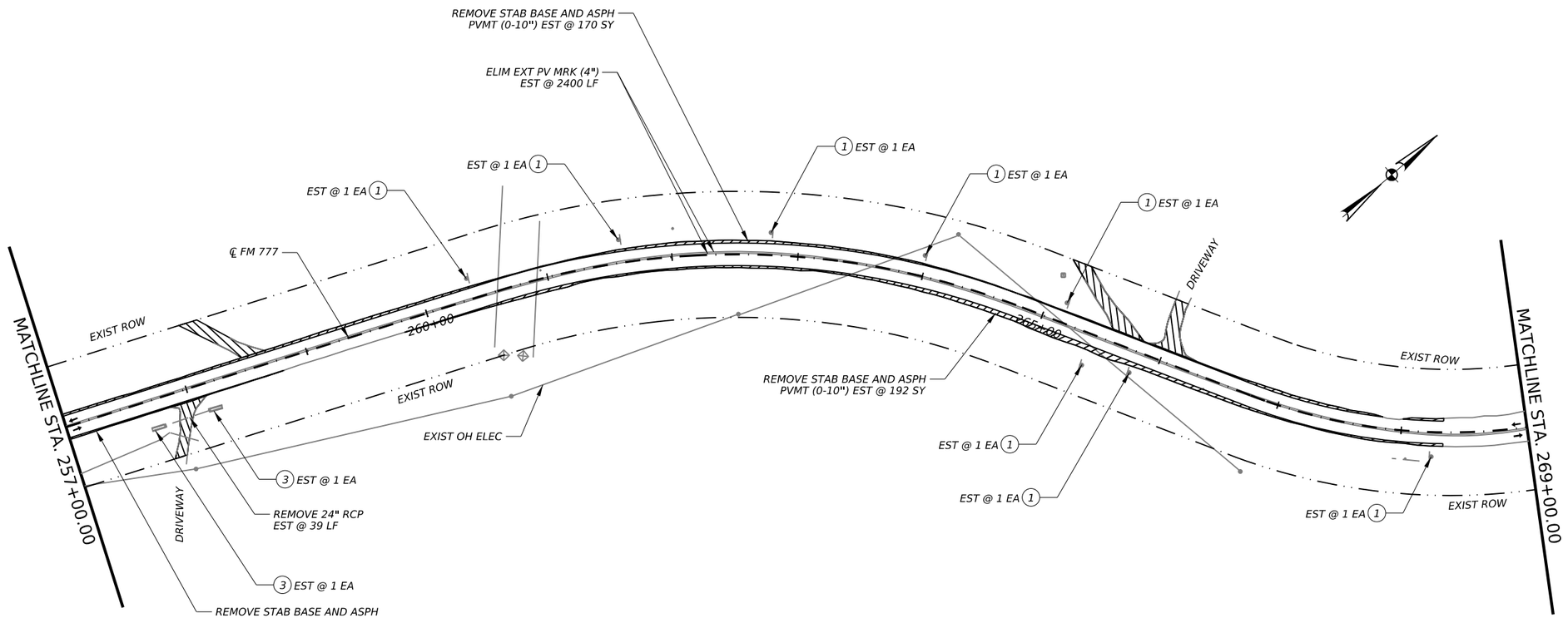

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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REMOVAL LAYOUTS

STA 245+00 TO STA 269+00

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		83

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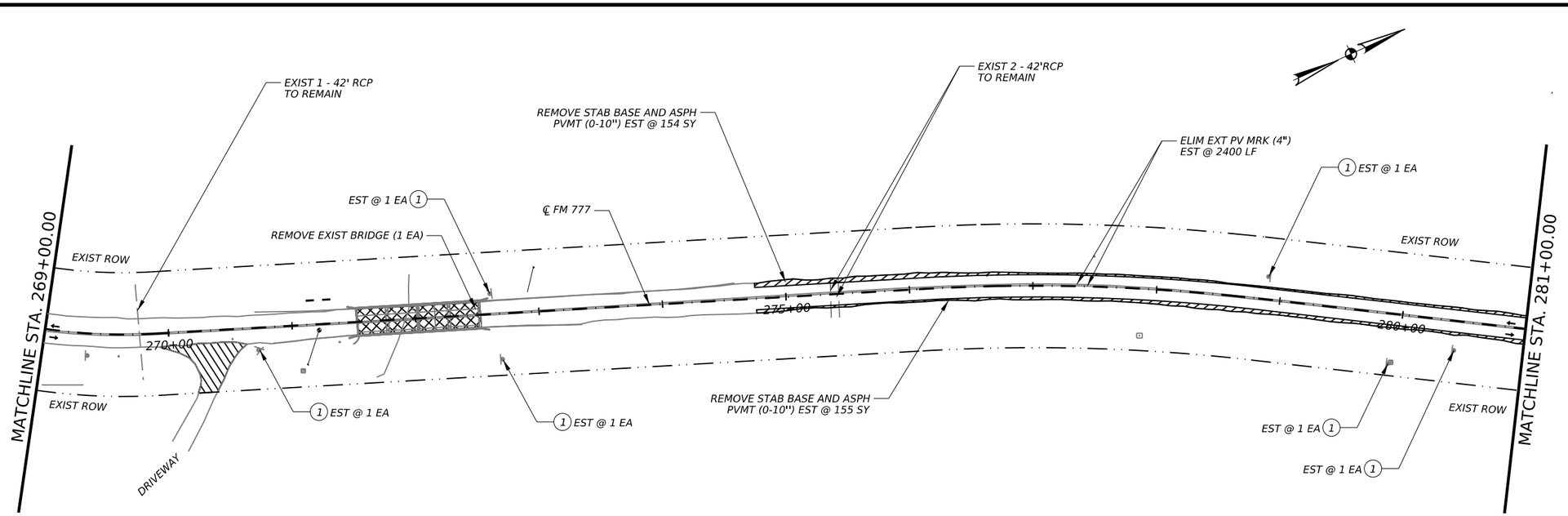
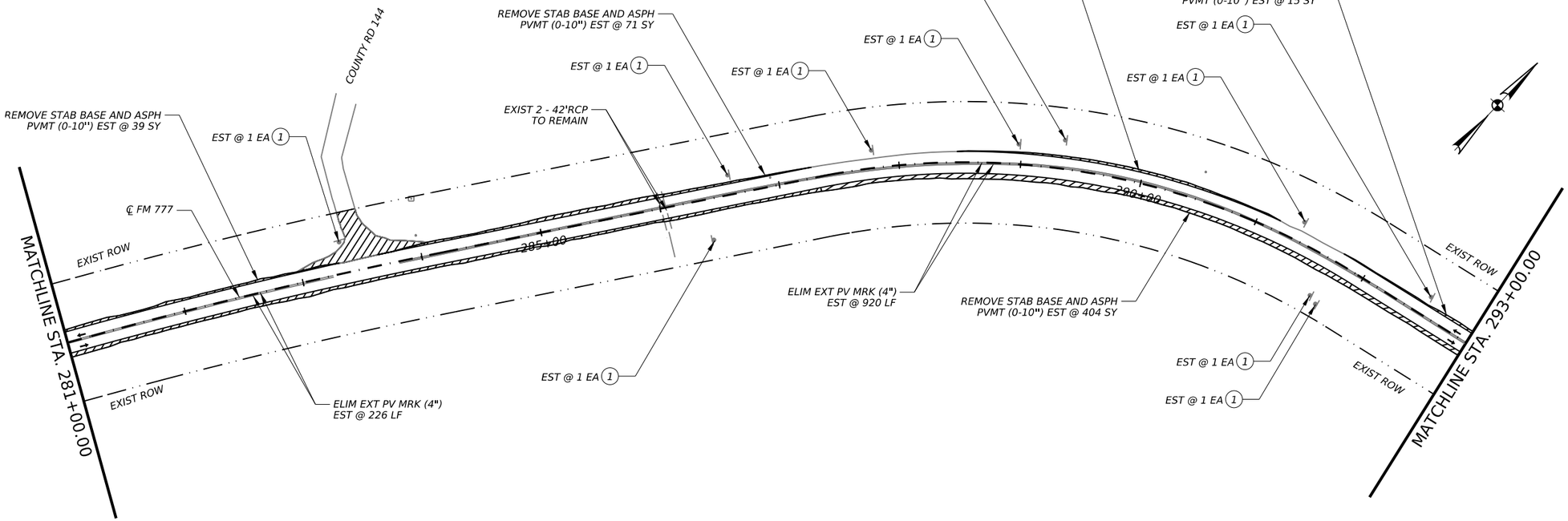


LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112



0' 50' 100'

SCALE: 1"= 100'

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REMOVAL LAYOUTS

STA 269+00 TO STA 293+00

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		84

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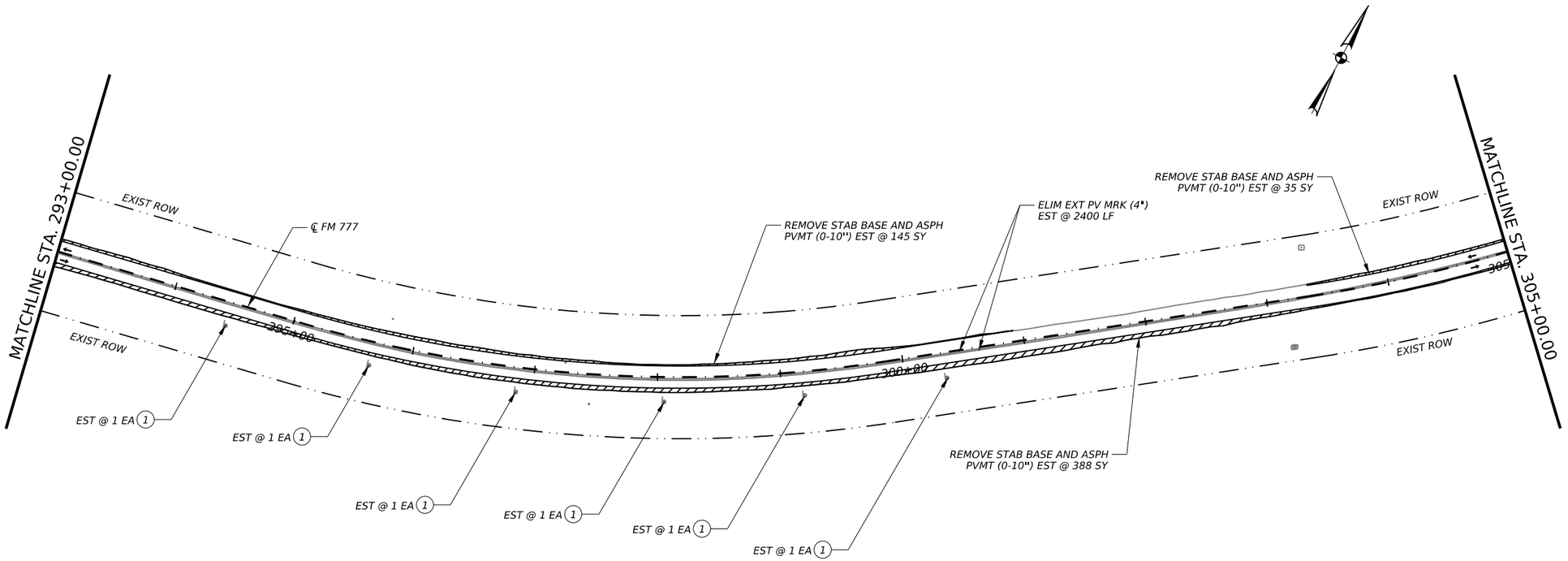
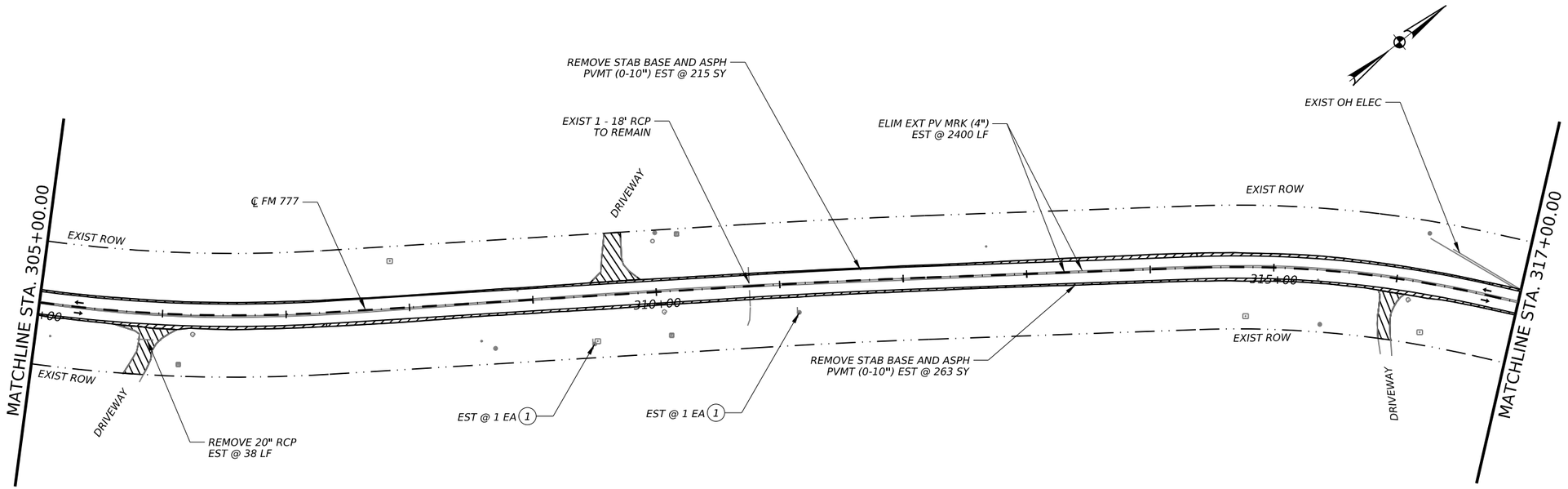
LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112



0' 50' 100'

SCALE: 1"= 100'



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REMOVAL LAYOUTS

STA 293+00 TO STA 317+00

SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		85

DATE: 1/30/2024 2:58:20 PM
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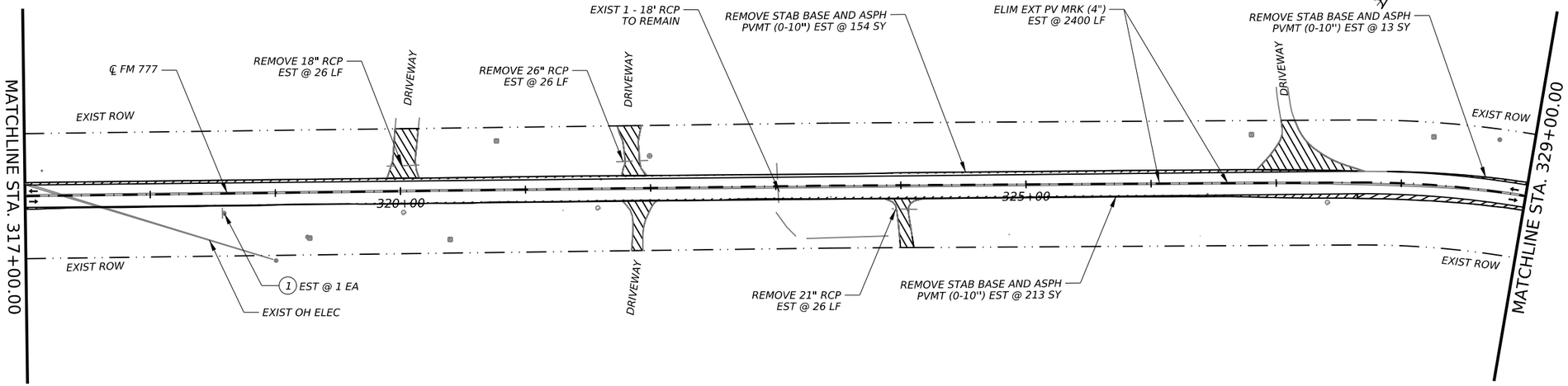
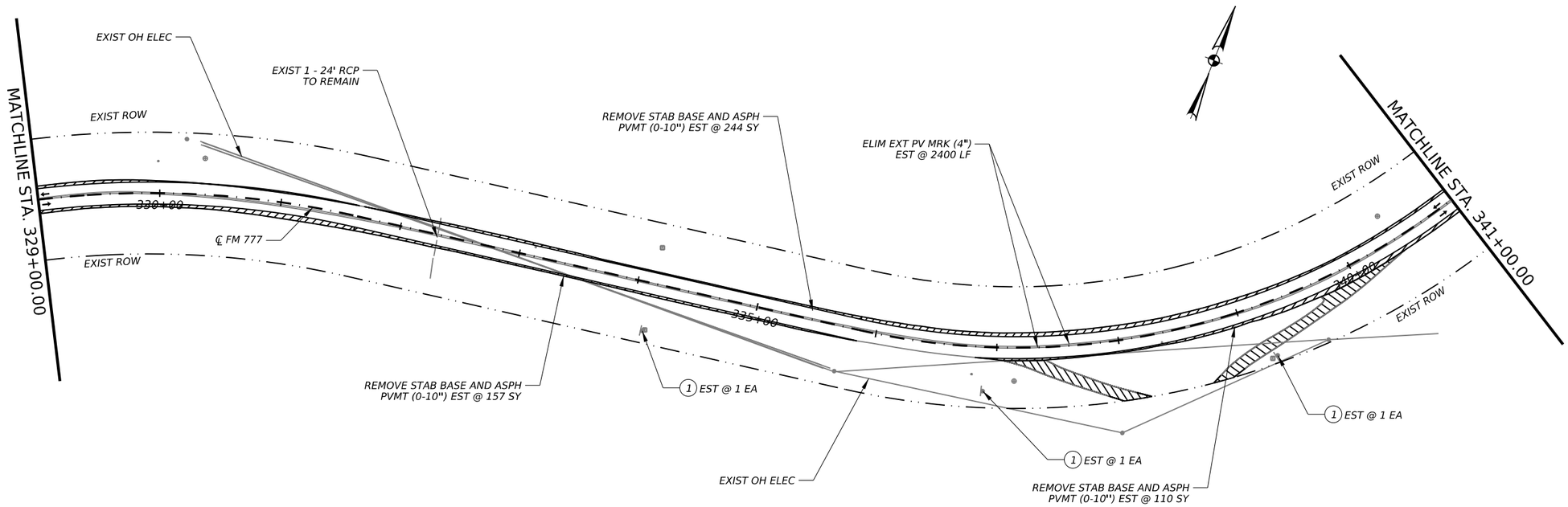


LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'



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STA 317+00 TO 341+00

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		86

DATE: 1/30/2024 2:58:24 PM
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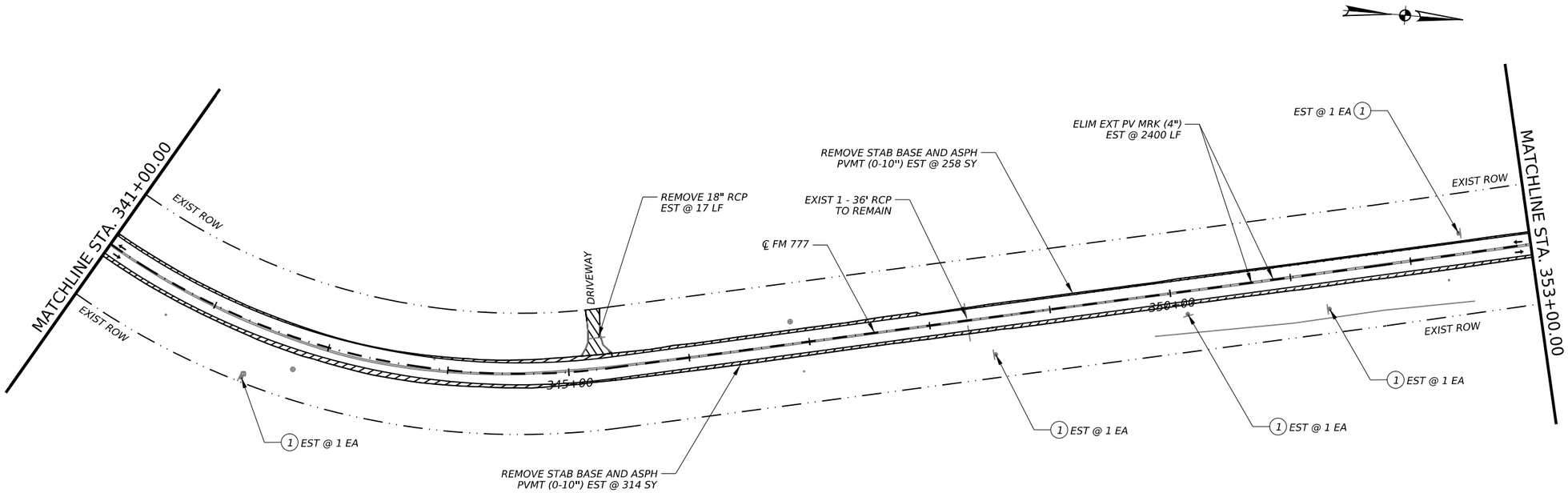
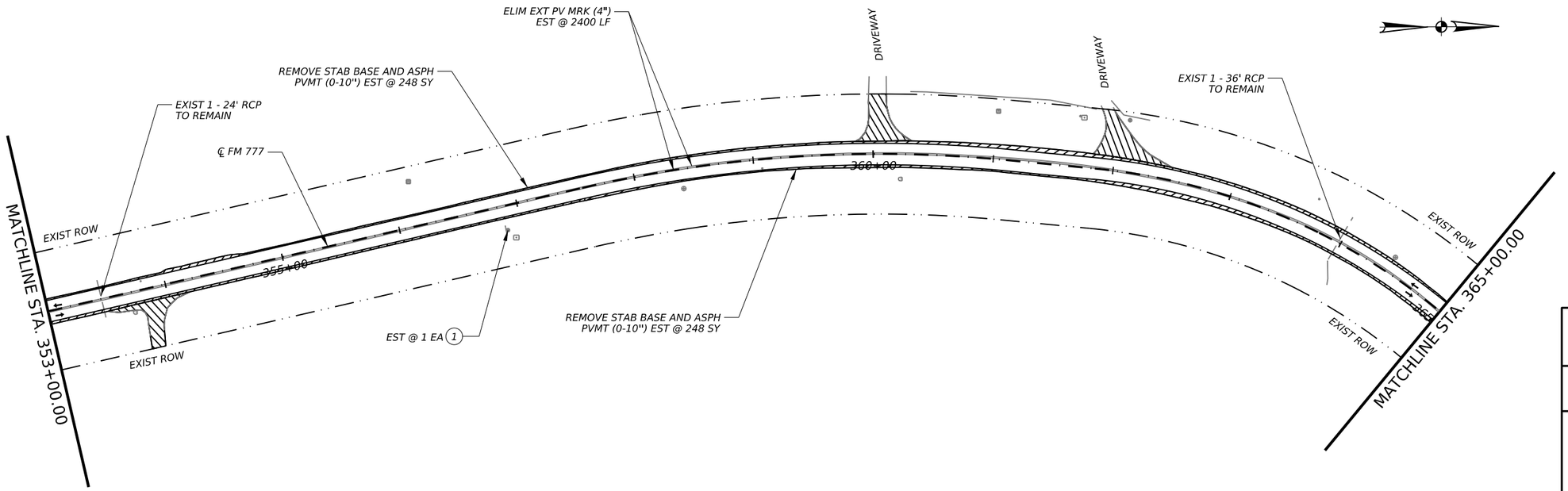
LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112



0' 50' 100'

SCALE: 1"= 100'



STATE OF TEXAS
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FM 777
REMOVAL LAYOUTS

STA 341+00 TO STA 365+00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		87

DATE: 1/30/2024 2:58:28 PM
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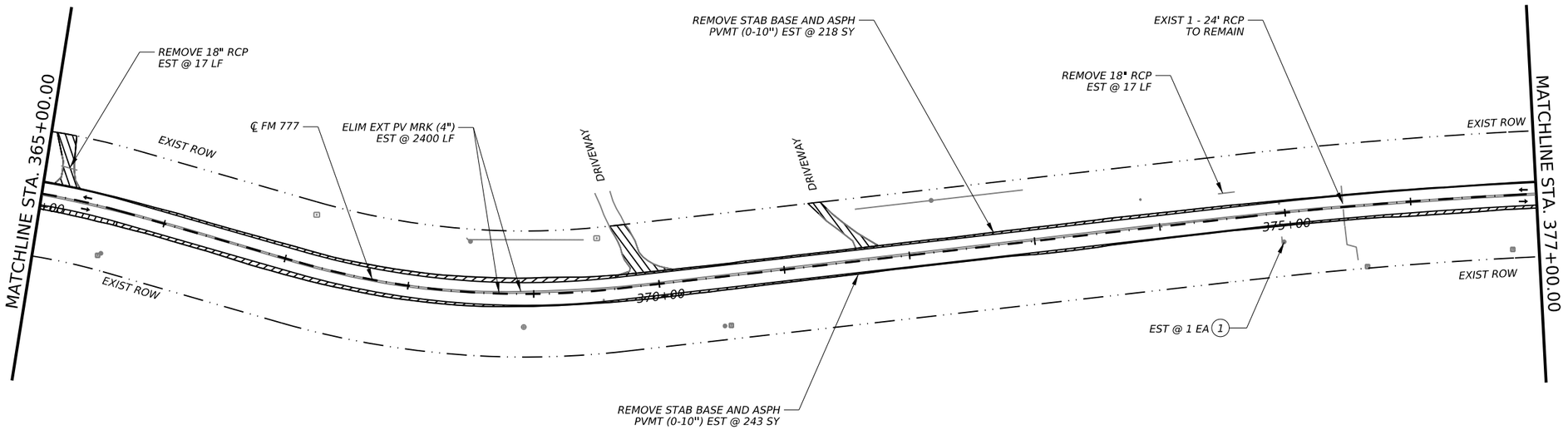
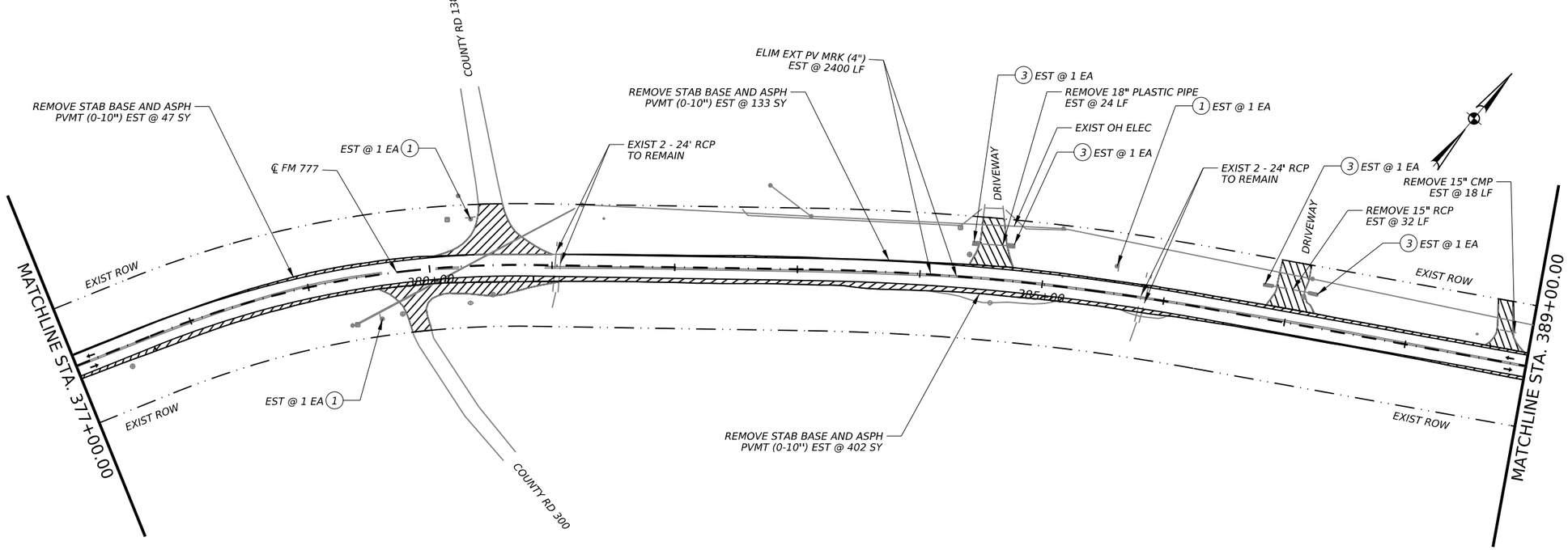
LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
- REMOVE STR (BRIDGE 0-99 FT LENGTH)
- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112





0' 50' 100'

SCALE: 1"= 100'

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REMOVAL LAYOUTS

STA 365+00 TO STA 389+00

SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		88

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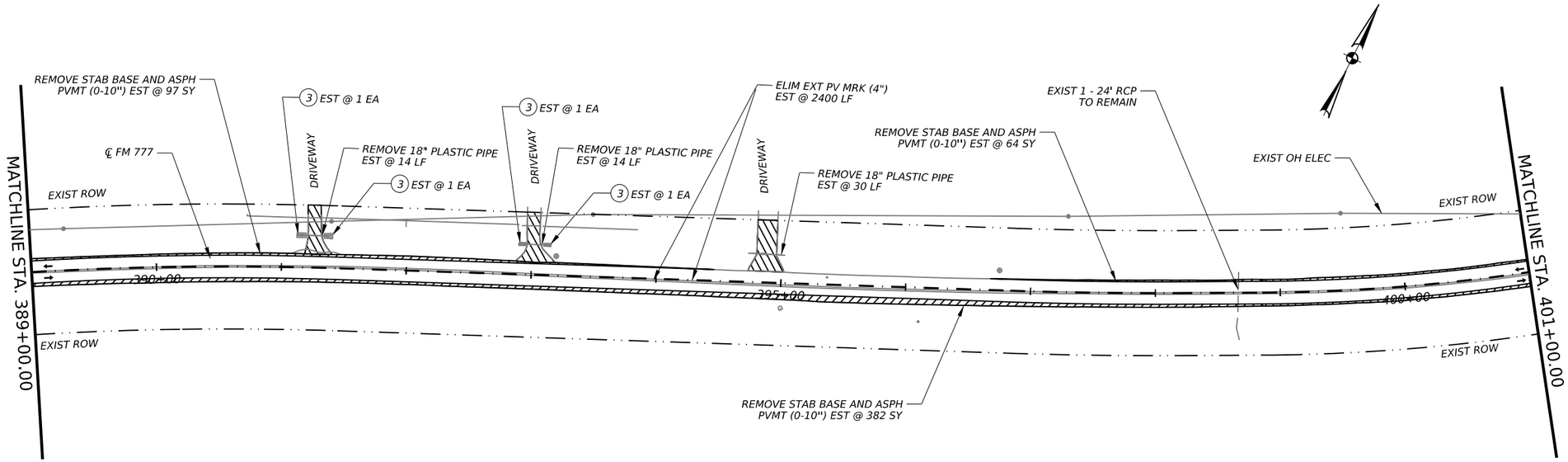

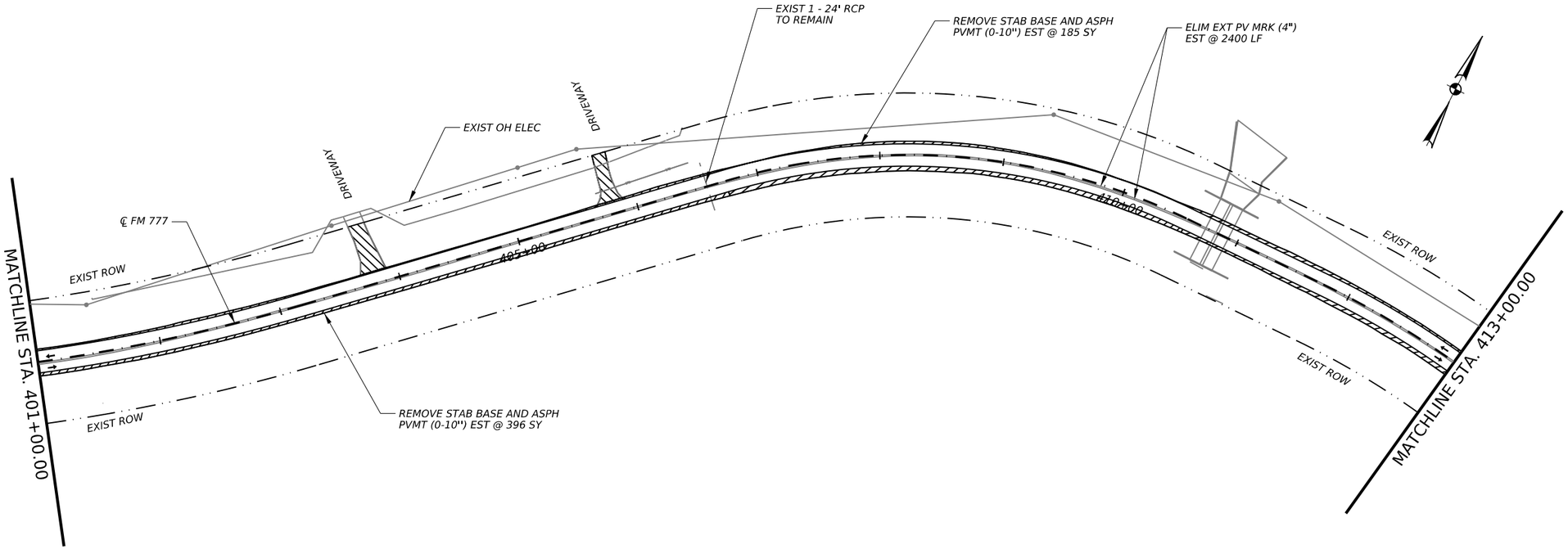

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
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- (1) REMOVE SM RD SN SUP & AM
- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

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REMOVAL LAYOUTS

STA 398+00 TO STA 413+00

SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		89

DATE: 1/30/2024 2:58:37 PM
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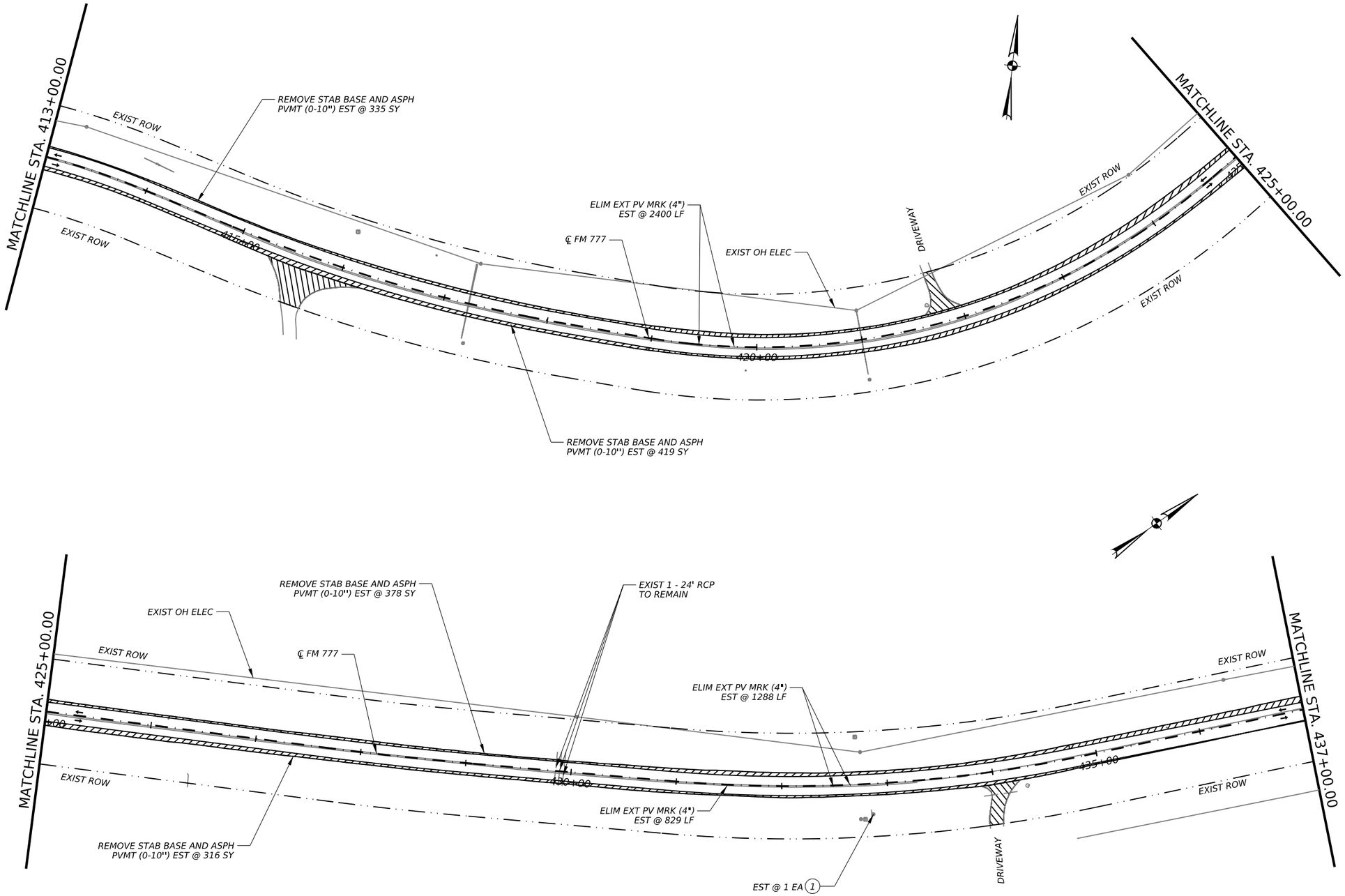

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
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- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

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REMOVAL LAYOUTS

STA 413+00 TO STA 437+00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		90

DATE: 1/30/2024 2:58:41 PM
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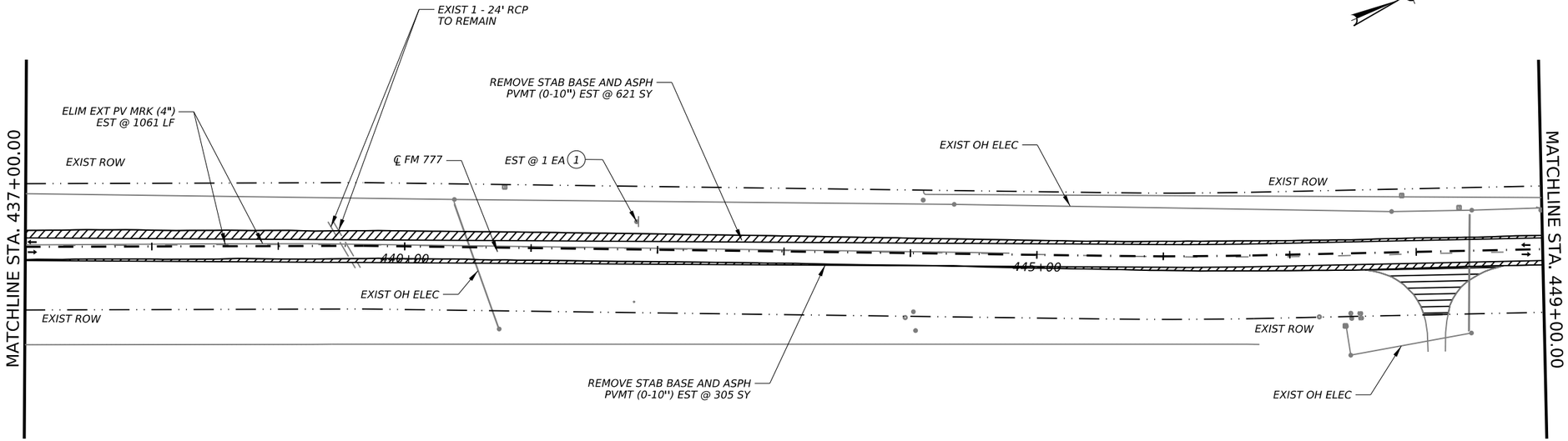

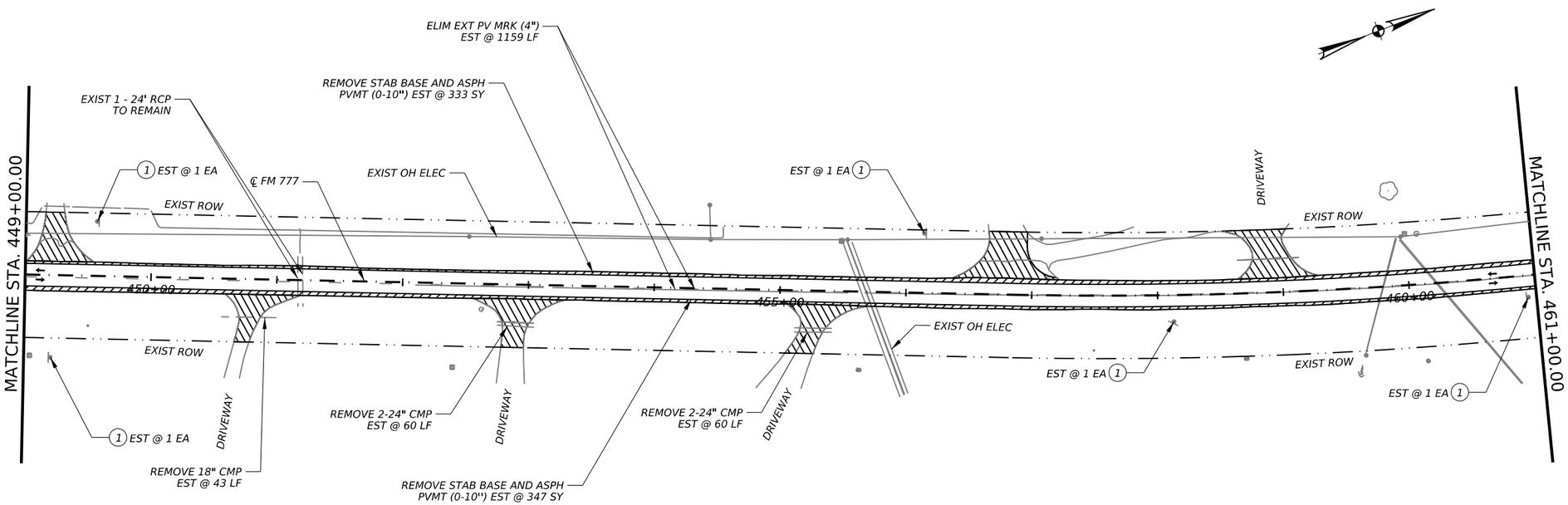

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
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- (2) REMOVE MAILBOX
- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
REMOVAL LAYOUTS

STA 437+00 TO STA 461+00

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		91

DATE: 1/30/2024 2:58:46 PM
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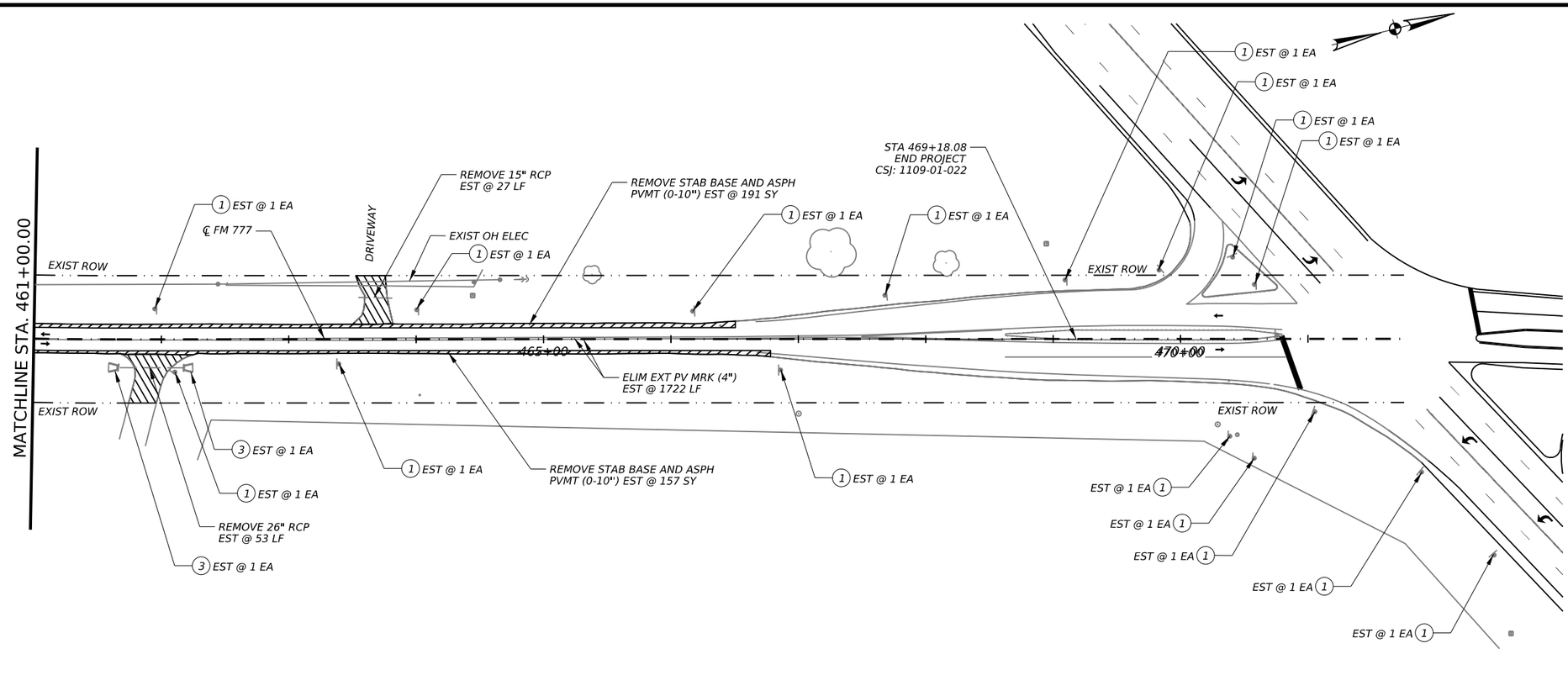

LEGEND:

- EXIST ASPHALT PAVEMENT (TO BE REMOVED) (A)
- EXIST DIRT / GRAVEL DRIVEWAY (TO BE REMOVED) (A)
- EXIST CONC DRIVEWAY (TO BE REMOVED)
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- (3) REMOVE STRUCTURE (SET)
- (4) REMOVE STRUCTURE (WINGWALL)
- (A) REMOVAL QUANTITIES ARE INCLUDED IN ITEM 112

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
REMOVAL LAYOUTS

STA 461+00 TO END

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		92

DATE: 1/30/2024 2:58:50 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms84558\022_RM_12.dgn

HORIZONTAL CURVE DATA

CURVE NO	PC	PI	PT	DESIGN SPEED (MPH)	DELTA	DEGREE	RADIUS (FT)	L (FT)	T (FT)	SUPERELEVATION RATE, e (%)		BEGIN TRANSITION (FT)	FULL SUPERELEVATION LIMITS	END TRANSITION (FT)
										EXISTING	PROPOSED			
1	202+01.46	205+27.63	208+49.46	45	16°12'00.00"	02°30'00.00"	2,291.83	648.00	326.18	5.50%	3.50%	n/a	206+38.00 to 208+22.00	210+23.00
2	209+72.44	211+06.59	212+04.07	45	02°39'00.00"	00°59'16.29"	5,800.00	268.26	134.15	5.10%	2.00%	208+22.00	210+23.00 to 211+29.00	215+39.00
3	213+57.29	215+63.26	217+69.19	45	01°58'00.00"	00°28'38.87"	12,000.00	411.90	205.97	normal crown	normal crown	n/a	n/a	n/a
4	233+92.88	225+29.81	226+62.42	40	24°54'32.81"	09°14'28.52"	620.00	269.54	136.93	4.30%	5.80%	222+65.00	224+25.00 to 225+02.00	227+84.00
5	226+62.42	227+37.88	228+11.58	35	21°22'01.73"	14°19'27.49"	400.00	149.17	75.46	4.80%	5.90%	225+02.00	227+84.00 to 228+02.00	229+24.00
6	230+07.17	232+46.06	234+21.84	45	03°31'00.00"	01°00'00.00"	5,729.58	351.67	175.89	normal crown	2.00%	229+50.00	231+20.00 to 233+71.00	235+41.00
7	245+16.79	246+51.32	247+82.79	45	21°10'01.38"	07°57'27.89"	720.00	265.99	134.53	5.10%	6.00%	243+80.00	245+50.00 to 246+12.00	249+22.00
8	247+82.79	248+80.27	249+77.42	45	08°11'58.62"	04°12'46.64"	1,360.00	194.63	97.48	4.70%	4.70%	246+12.00	249+22.00 to 249+49.00	250+89.00
9	253+74.60	254+74.65	255+74.58	45	04°35'00.00"	02°17'30.59"	2,500.00	199.99	100.05	normal crown	3.30%	252+62.00	254+02.00 to 255+47.00	256+87.00
10	260+58.71	262+79.13	264+82.77	40	38°34'00.00"	09°05'40.45"	630.00	424.06	220.42	4.60%	5.80%	259+38.00	260+88.00 to 264+29.00	267+19.00
11	266+77.10	268+39.93	269+89.01	35	40°37'00.00"	13°01'18.37"	440.00	311.91	162.83	5.60%	5.80%	264+29.00	267+19.00 to 269+61.00	271+01.00
12	276+07.82	277+45.45	278+82.42	45	09°50'00.00"	03°34'51.55"	1,600.00	274.60	137.64	3.80%	4.40%	274+95.00	276+35.00 to 278+54.00	281+47.00
13	281+20.01	282+69.21	284+18.20	45	04°04'00.00"	01°21'51.07"	4,200.00	298.10	149.11	4.50%	2.20%	278+54.00	281+47.00 to 283+90.00	285+30.00
14	287+33.01	289+75.55	291+94.71	40	43°22'00.00"	09°23'33.90"	610.00	461.70	242.54	5.50%	5.80%	286+04.00	287+64.00 to 291+63.00	293+23.00
15	295+04.70	297+49.41	299+86.27	45	25°05'00.00"	05°12'31.35"	1,100.00	481.57	244.70	4.20%	5.20%	293+84.00	295+34.00 to 299+56.00	301+06.00
16	303+34.27	305+35.08	307+32.21	45	19°00'00.00"	04°46'28.73"	1,200.00	397.94	200.81	4.60%	5.00%	302+13.00	303+63.00 to 307+02.00	308+52.00
17	310+75.77	311+47.45	312+19.12	45	01°28'00.00"	01°01'23.30"	5,600.00	143.35	71.68	normal crown	2.00%	309+70.00	311+20.00 to 311+79.00	314+89.00
18	314+38.14	315+56.77	316+74.05	45	15°01'07.20"	06°21'58.31"	900.00	235.91	118.64	5.70%	5.70%	311+79.00	314+89.00 to 316+44.00	318+04.00
19	327+64.83	329+68.65	331+63.32	45	29°39'05.97"	07°26'27.64"	770.00	398.49	203.81	6.00%	5.90%	326+29.00	327+99.00 to 331+29.00	332+99.00
20	335+85.63	342+04.14	345+37.11	40	93°11'23.50"	09°47'38.94"	585.00	951.48	618.51	6.00%	5.90%	334+58.00	336+18.00 to 345+05.00	346+65.00
21	357+55.82	359+34.82	361+01.71	45	18°29'06.60"	05°12'31.35"	1,100.00	354.89	179.00	6.00%	5.20%	356+36.00	357+86.00 to 360+73.00	362+28.00
22	361+84.93	363+82.82	365+63.73	40	40°57'00.00"	10°48'37.89"	530.00	378.80	197.90	6.00%	6.00%	360+73.00	362+28.00 to 365+58.00	367+23.00
23	367+11.47	368+40.63	369+66.46	45	22°28'35.73"	08°48'53.05"	650.00	254.99	129.16	6.00%	6.00%	365+58.00	367+23.00 to 369+34.00	371+04.00
24	374+66.04	375+73.28	376+80.45	45	03°30'35.73"	01°38'13.28"	3,500.00	214.41	107.24	6.00%	2.60%	373+91.00	375+31.00 to 375+87.00	378+97.00
25	377+65.05	379+27.21	380+85.03	45	22°55'00.00"	07°09'43.10"	800.00	319.98	162.16	6.00%	5.90%	375+87.00	378+97.00 to 380+27.00	383+37.00
26	383+09.52	384+72.19	386+34.15	45	09°18'00.00"	02°51'53.24"	2,000.00	324.63	162.67	4.40%	3.90%	380+27.00	383+37.00 to 386+23.00	389+03.00
27	388+96.35	390+21.50	391+46.46	45	05°18'27.12"	02°07'19.44"	2,700.00	250.11	125.15	3.40%	3.20%	386+23.00	389+03.00 to 391+21.00	397+06.00
28	396+83.67	35+00.00	398+17.50	45	02°11'27.12"	01°38'13.28"	3,500.00	133.83	66.92	2.30%	2.60%	395+80.00	397+06.00 to 397+20.00	399+86.00
29	398+85.62	401+03.11	403+17.59	45	16°30'00.00"	03°49'10.99"	1,500.00	431.97	217.49	4.30%	4.50%	397+20.00	399+86.00 to 402+89.00	404+29.00
30	406+73.65	408+73.87	410+55.89	40	11°01'06.31"	11°01'06.31"	520.00	382.24	200.22	6.00%	6.00%	405+45.00	407+05.00 to 409+56.00	412+72.00
31	411+77.30	412+88.33	413+97.63	45	17°32'00.00"	07°57'27.89"	720.00	220.33	111.03	4.00%	6.00%	409+56.00	412+72.00 to 412+86.00	415+82.00
32	414+88.51	416+56.10	418+22.31	45	12°45'00.00"	03°49'10.99"	1,500.00	333.79	167.59	6.00%	4.50%	412+86.00	415+82.00 to 417+17.00	420+27.00
33	418+92.43	422+02.23	424+70.63	45	50°58'00.00"	08°48'53.05"	650.00	578.20	309.80	4.70%	6.00%	417+17.00	420+27.00 to 424+36.00	426+06.00
34	427+64.40	428+35.68	429+06.94	45	02°20'00.00"	01°38'13.28"	3,500.00	142.54	71.28	normal crown	2.60%	426+51.00	427+91.00 to 428+56.00	431+36.00
35	430+90.60	432+91.03	434+88.56	45	16°53'23.28"	04°14'38.87"	1,350.00	397.96	200.43	5.00%	4.80%	428+56.00	431+36.00 to 434+52.00	435+92.00
36	445+66.11	446+18.32	446+70.52	45	01°59'38.14"	01°54'35.49"	3,000.00	104.40	52.21	normal crown	2.90%	444+72.00	446+12.00 to 446+66.00	448+06.00
37	456+85.56	459+25.70	461+65.09	45	07°51'00.00"	01°38'13.28"	3,500.00	479.53	240.14	2.30%	2.60%	455+72.00	457+12.00 to 461+37.00	462+77.00

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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SUPERELEVATION AND VERTICAL CURVE DATA

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		93

DATE: 1/30/2024 2:58:54 PM
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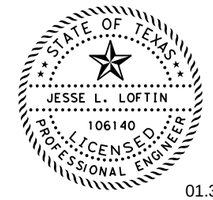
VERTICAL CURVE DATA								
PI	DESIGN SPEED (MPH)	ELEV. (EXIST)	ELEV. (PROP)	LENGTH	e	G 1 (%)	G 2 (%)	K
206+38.00			128.77					
207+72.46	45	129.23	129.80	120	-0.19	0.77	-0.48	96
210+55.89	45	128.14	128.44	100	0.07	-0.48	0.08	180
212+50.40	45	128.27	128.59	41	-0.02	0.08	-0.37	92
212+92.27	45	128.14	128.44	40	0.02	-0.37	0.02	102
214+58.64	45	128.15	128.47	100	0.04	0.02	0.35	306
215+67.52	45	128.50	128.85	50	-0.03	0.35	-0.13	105
216+57.24	45	128.42	128.74	100	0.05	-0.13	0.30	230
220+58.27	45	129.76	129.95	300	0.27	0.30	1.01	422
224+19.62	45	134.18	133.62	300	0.93	1.01	3.50	121
226+83.33	45	142.14	142.85	200	-0.25	3.50	2.50	199
231+85.00	45	153.94	155.40	244	-1.21	2.50	-1.47	61
236+33.69	45	151.53	148.80	500	2.98	-1.47	3.31	105
241+30.48	45	164.67	165.22	200	-0.10	3.31	2.89	483
243+53.24	45	170.87	171.66	200	-0.29	2.89	1.72	170
246+43.13	45	173.93	176.64	330	-2.23	1.72	-3.68	61
249+63.00	45	165.76	164.86	300	1.35	-3.68	-0.09	83
253+90.00	40	159.51	164.50	390	-4.20	-0.09	-8.69	45
257+50.00	30	135.87	133.20	330	3.52	-8.69	-0.15	39
262+80.00	45	131.57	132.40	210	-0.43	-0.15	-1.70	135
265+85.17	45	127.51	127.20	160	0.42	-1.70	0.22	83
269+40.00	50	127.62	127.99	170	0.36	0.22	2.00	96
271+94.00	50	109.74	133.07	310	-1.43	2.00	-1.70	84
274+55.00	50	128.21	128.64	200	0.50	-1.70	0.30	100
276+68.67	45	128.98	129.28	135	0.09	0.30	0.86	240
283+14.25	45	134.08	134.85	170	-0.59	0.86	-1.92	61
286+39.27	45	129.13	128.61	270	1.17	-1.92	1.54	78
288+26.82	45	130.89	131.50	100	-0.20	1.54	-0.09	61
289+50.00	45	131.27	131.39	110	0.18	-0.09	1.26	82
292+78.99	45	135.16	135.53	100	0.06	1.26	1.72	218
294+01.20	45	137.22	137.62	100	-0.09	1.72	0.98	136
296+84.78	45	139.74	140.40	100	-0.18	0.98	-0.45	70
298+56.31	45	139.35	139.63	100	0.08	-0.45	0.19	157
300+56.97	45	139.76	140.01	100	0.08	0.19	0.85	153
302+48.26	45	141.25	141.63	100	-0.07	0.85	0.30	185
304+55.14	45	141.96	142.26	100	0.07	0.30	0.87	175
306+28.70	45	143.20	143.78	100	-0.14	0.87	-0.25	89
307+71.93	45	143.14	143.42	100	0.08	-0.25	0.38	158
309+20.96	45	143.52	143.99	100	-0.11	0.38	-0.46	118
310+95.75	45	143.12	143.19	200	0.26	-0.46	0.56	196
314+09.32	45	144.38	144.94	100	-0.09	0.56	-0.18	135
315+36.70	45	144.42	144.71	100	0.08	-0.18	0.46	156
317+03.61	45	145.17	145.48	100	0.03	0.46	0.72	388
319+08.95	45	145.91	146.96	200	-0.57	0.72	-1.56	88
322+52.49	45	141.70	141.59	160	0.41	-1.56	0.51	77
324+55.32	45	142.29	142.61	100	0.13	0.51	1.51	99
327+08.21	45	145.95	146.43	100	-0.12	1.51	0.58	108
328+29.72	45	146.71	147.14	100	-0.15	0.58	-0.64	82
331+70.00	45	144.60	144.96	100	0.05	-0.64	-0.22	235
333+43.87	45	144.37	144.58	100	0.11	-0.22	0.64	117
334+89.34	45	145.14	145.52	100	-0.05	0.64	0.21	230
335+78.04	45	145.39	145.70	60	0.05	0.21	0.81	100

VERTICAL CURVE DATA								
PI	DESIGN SPEED (MPH)	ELEV. (EXIST)	ELEV. (PROP)	LENGTH	e	G 1 (%)	G 2 (%)	K
340+38.05	45	148.70	149.41	120	-0.28	0.81	-1.03	65
344+63.58	45	145.14	145.03	300	0.39	-1.03	0.00	292
351+86.98	45	144.61	145.02	300	0.26	0.00	0.69	433
358+22.42	45	149.06	149.40	100	-0.08	0.69	0.08	163
359+42.81	45	149.23	149.49	100	0.09	0.08	0.77	144
360+94.71	45	150.16	150.66	100	-0.10	0.77	-0.01	128
363+13.01	45	150.25	150.64	50	0.04	-0.01	0.60	82
363+80.28	45	150.62	151.04	50	-0.04	0.60	0.02	86
365+59.34	45	150.72	151.08	100	0.06	0.02	0.49	214
367+54.84	45	151.74	152.03	100	0.08	0.49	1.13	155
370+01.27	45	154.04	154.82	120	-0.27	1.13	-0.67	67
372+58.94	45	152.77	153.10	100	0.05	-0.67	-0.23	230
374+48.04	45	152.30	152.66	100	0.03	-0.23	0.05	358
376+79.52	45	152.53	152.78	100	0.08	0.05	0.68	159
378+32.64	45	153.37	153.82	100	-0.10	0.68	-0.12	125
379+27.76	45	153.38	153.70	50	0.03	-0.12	0.33	112
380+77.54	45	153.85	154.19	100	-0.04	0.33	0.01	316
382+79.93	45	153.85	154.21	100	-0.04	0.01	-0.28	346
385+18.91	45	153.39	153.55	200	0.21	-0.28	0.56	240
393+40.45	45	157.30	158.11	200	-0.24	0.56	-0.42	205
397+38.66	45	156.17	156.45	100	0.09	-0.42	0.29	141
398+88.24	45	156.52	156.88	100	-0.07	0.29	-0.27	177
399+95.70	45	156.37	156.59	100	0.07	-0.27	0.26	186
401+48.55	45	156.68	156.99	100	0.07	0.26	0.78	192
403+38.22	45	157.96	158.48	100	-0.06	0.78	0.29	200
405+08.74	45	158.60	158.97	100	-0.04	0.29	0.00	350
406+15.07	45	158.62	158.97	100	0.05	0.00	0.38	260
407+80.00	45	159.39	159.60	80	-0.06	0.38	-0.22	133
409+10.00	45	159.12	159.32	144	0.14	-0.22	0.57	184
412+75.00	30	162.73	161.40	230	1.53	0.57	5.90	43
415+30.00	40	175.02	176.43	190	-0.94	5.90	1.93	48
419+73.41	45	183.49	185.00	204	-0.84	1.93	-1.34	62
421+49.34	45	182.37	182.64	100	0.14	-1.34	-0.22	89
423+27.19	45	181.98	182.25	100	0.10	-0.22	0.61	121
425+15.09	45	182.79	183.40	100	-0.18	0.61	-0.81	70
427+00.40	45	181.77	181.91	200	0.22	-0.81	0.09	223
430+83.89	45	181.95	182.25	100	0.06	0.09	0.58	204
431+80.05	45	182.46	182.81	50	-0.02	0.58	0.31	184
433+22.63	45	183.01	183.24	200	0.15	0.31	0.90	338
435+33.87	45	184.81	185.15	200	0.12	0.90	1.40	402
444+49.64	45	197.55	197.95	100	-0.07	1.40	0.83	175
447+79.75	45	200.14	200.68	100	-0.11	0.83	-0.04	115
450+07.19	45	200.35	200.58	100	0.06	-0.04	0.45	202
451+34.11	45	200.79	201.16	100	-0.07	0.45	-0.13	172
452+53.22	45	200.77	201.00	100	0.10	-0.13	0.70	121
455+39.84	45	202.72	203.00	200	0.12	0.70	1.19	404
457+74.46	45	205.47	205.80	100	-0.05	1.19	0.82	266
459+49.95	45	206.89	207.24	100	0.03	0.82	1.03	480
463+11.65	45	210.89	210.95	200	0.27	1.03	2.11	184
470+12.25	40	225.13	225.75	100	-0.26	2.11	0.00	47
471+16.00		225.75	225.75					



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LJA PROGRAM MANAGEMENT
FRN - F-14256

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SUPERELEVATION AND VERTICAL CURVE DATA

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		94

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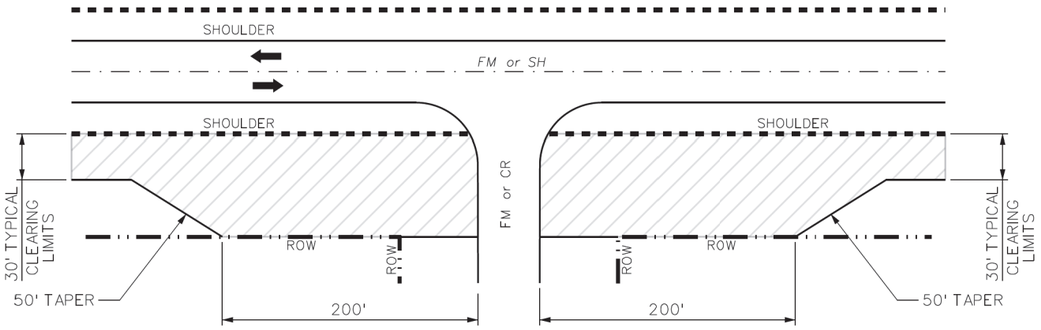
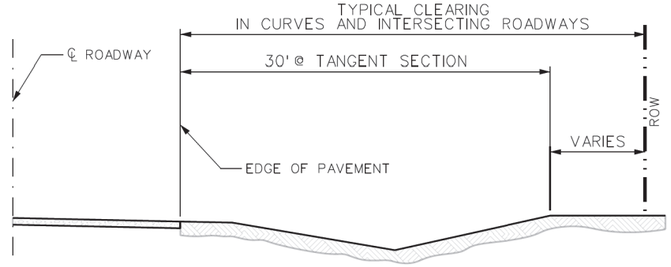
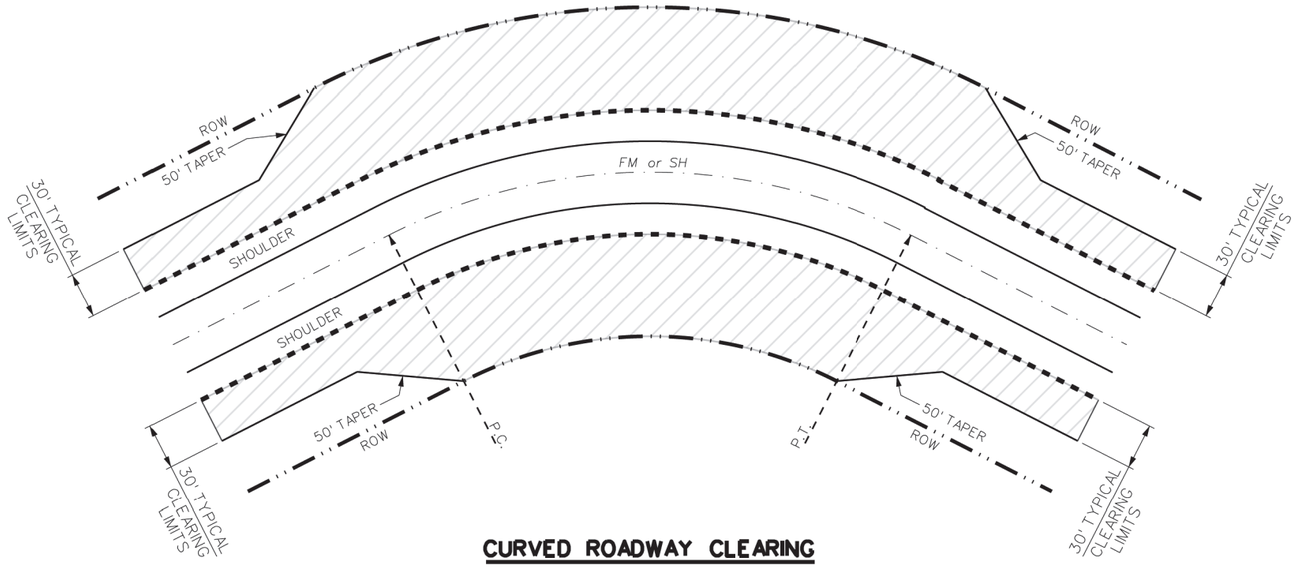


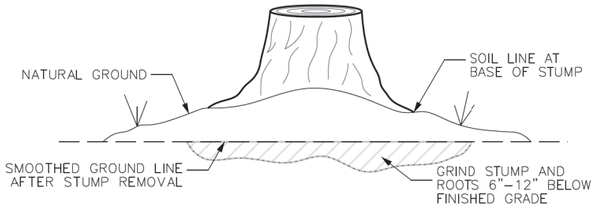
INTERSECTING ROADWAY CLEARING



TYPICAL CLEARING SECTION



CURVED ROADWAY CLEARING

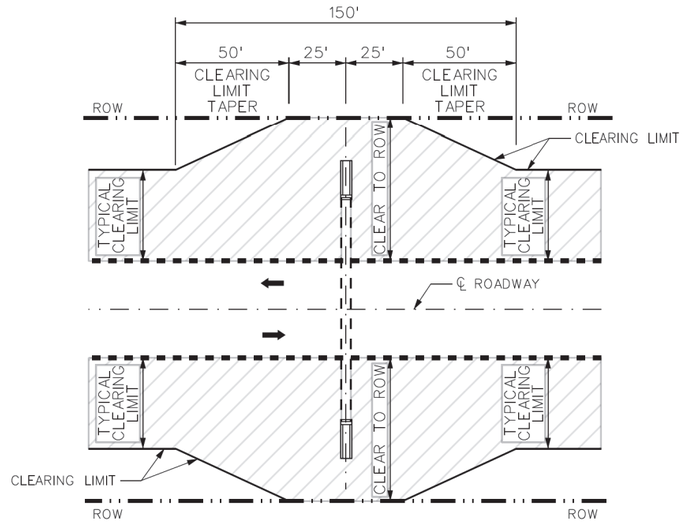


STUMP GRINDING DETAIL

LIMITS CLEARING LIMIT

NOTES:

1. ALL TREE LIMBS EXTENDING INTO THE CLEARING LIMITS WILL BE REMOVED TO A MINIMUM HEIGHT OF SIXTEEN FEET (16') ABOVE THE ADJACENT PAVEMENT EDGE ELEVATION.
2. CLEARING OPERATIONS SHALL BE PERFORMED IN ACCORDANCE WITH ITEM 100, "PREPARING THE RIGHT OF WAY", EXCEPT THOSE SHOWN BY THESE DETAILS.
3. ALL STUMPS WITHIN THE CLEARING LIMITS SHALL BE REMOVED BY GRUBBING, EXCEPT IN AREAS NEAR UNDERGROUND UTILITIES.
4. WHERE CLEARING IS REQUIRED NEAR EXISTING UNDERGROUND UTILITIES, TREES AND STUMPS ARE NOT TO BE GRUBBED. FOR THOSE CONDITIONS, THE RIGHT OF WAY SHALL BE PREPARED BY CUTTING AND GRINDING OF STUMPS AND ROOTS AS DIRECTED.
5. ON AREAS TO BE COVERED BY AT LEAST THREE (3) FEET OF EMBANKMENT, TREES AND STUMPS MAY BE CUT OFF AS CLOSE TO NATURAL GROUND AS PRACTICABLE.
6. WHERE STEEP SLOPES MAKE GRINDING OPERATIONS IMPRACTICAL, AND THE ENGINEER AGREES IN WRITING, THE CONTRACTOR MAY CUT STUMPS OFF EVEN WITH THE GROUND.
7. AT ALL INTERSECTING ROADWAYS, CLEARING SHALL EXTEND TO THE RIGHT OF WAY LINE FOR 200'.



TYPICAL CROSS-CULVERT DETAIL

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED PROFESSIONAL ENGINEER

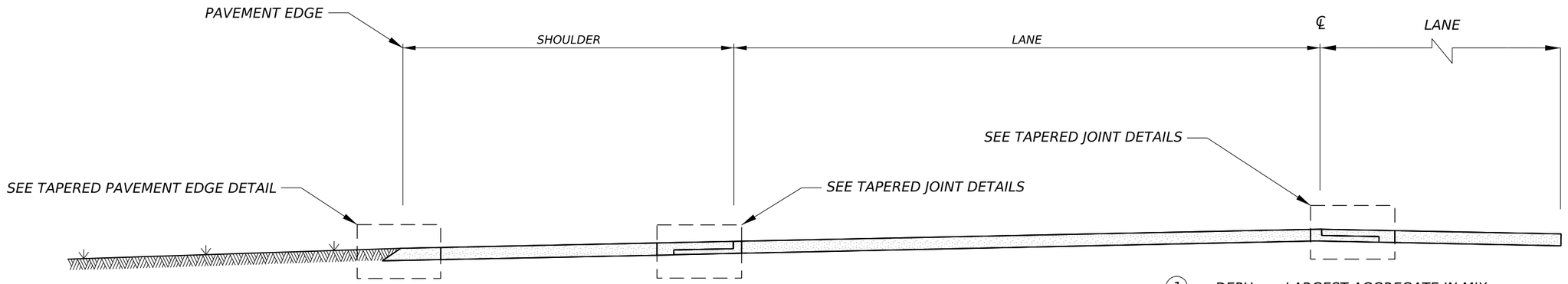
01.30.24

CLEARING DETAIL

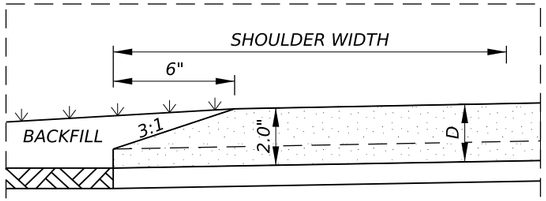
Texas Department of Transportation

FHWA TEXAS DIVISION			SHEET NO.
			95
STATE	DISTRICT	COUNTY	
	BMT	JASPER	
CONTROL	SECTION	JOB	HIGHWAY NO.
1109	01	026,etc	FM 777

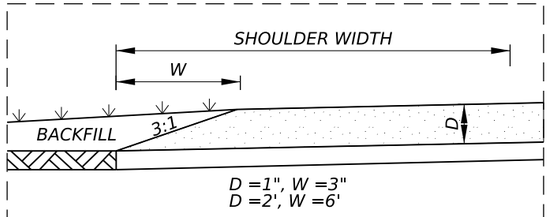
NTS



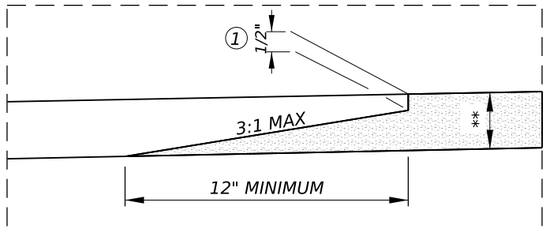
(1) DEPH >= LARGEST AGGREGATE IN MIX



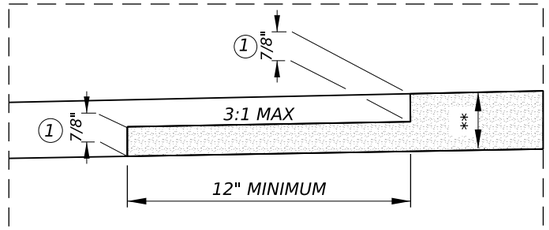
TAPERED PAVEMENT EDGE DETAIL "SAFETY EDGE" WHEN D IS > 2.0"



TAPERED PAVEMENT EDGE DETAIL "SAFETY EDGE" WHEN D IS 2.0" OR LESS



TAPERED JOINT DETAIL HMA LIFT THICKNESS 2"OR LESS



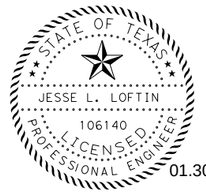
TAPERED JOINT DETAIL HMA LIFT THICKNESS MORE THAN 2"

** SEE LAYOUT SHEETS 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 SCREED ATTACHMENT WHICH WILL PRODUCE THE DESIRED SHAPE WITH THE MAIN SCREED. USE OF AN EXTERNAL STRIKE-OFF DEVICE TO MODIFY THE MAT SHAPE AFTER PASSING OF THE SCREED WILL NOT BE ALLOWED. 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.

PAVEMENT EDGES SHALL BE CONSTRUCTED BY TAPPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL BE PLACED WITHIN THE NORMAL LANE WIDTH UNLESS OTHERWISE SHOWN ON THE PLANS. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED SCREED ATTACHMENT WHICH WILL PRODUCE THE DESIRE SHAPE WITH THE MAIN SCREED. USE OF AN EXTERNAL STRIKE-OFF DEVICE TO MODIFY THE MAT SHAPE AFTER PASSING OF THE SCREED WILL NOT BE ALLOWED. COMPACTION OF THE PAVEMENT EDGE TAPER WILL BE REQUIRED TO AS NEAR TO FINAL DENSITY AS POSSIBLE.



LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation ©2024

HOT MIX LONGITUDINAL AND PAVEMENT EDGE JOINT DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		96

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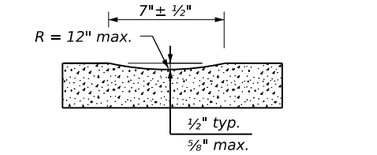
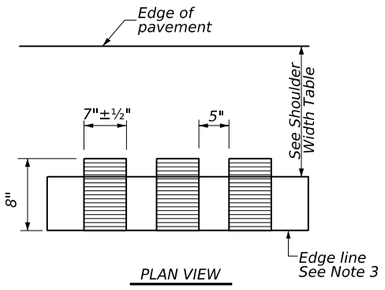
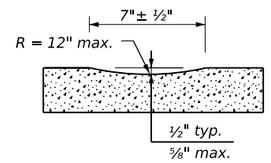


PROFILE VIEW
OPTION 1

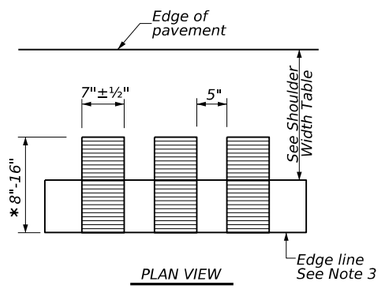


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



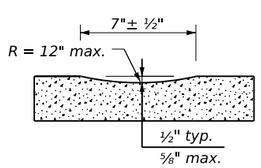
PROFILE VIEW
OPTION 2



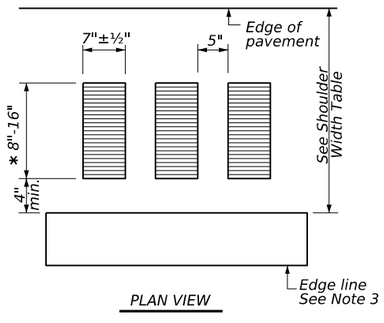
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



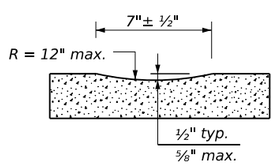
PROFILE VIEW
OPTION 3



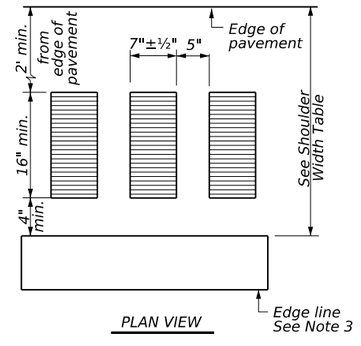
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

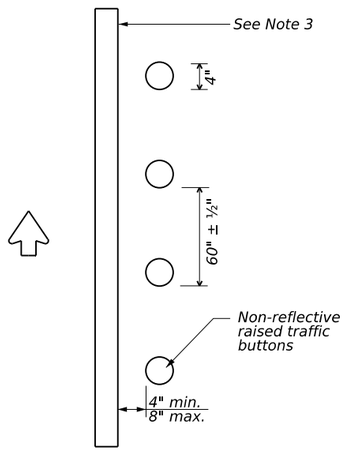


PROFILE VIEW
OPTION 4



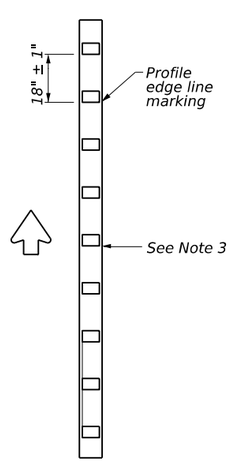
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



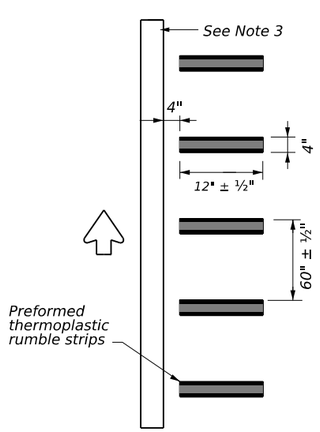
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



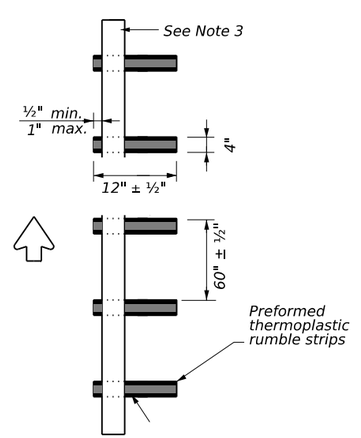
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

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 10-13 1-23	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		97

DATE: 1/30/2024 2:59:37 PM
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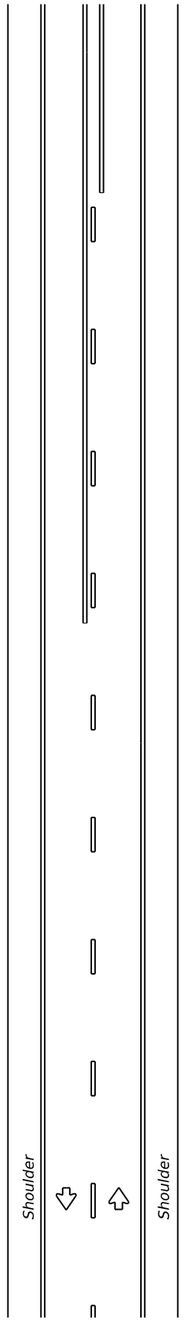
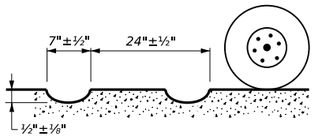
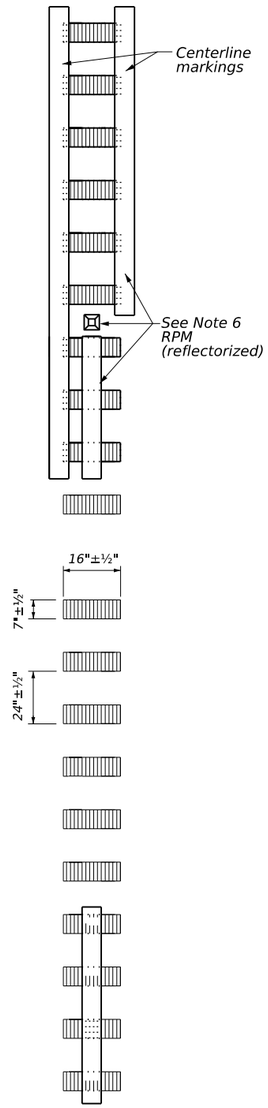
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

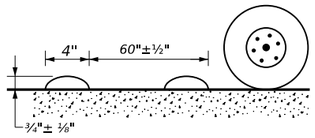


PROFILE VIEW

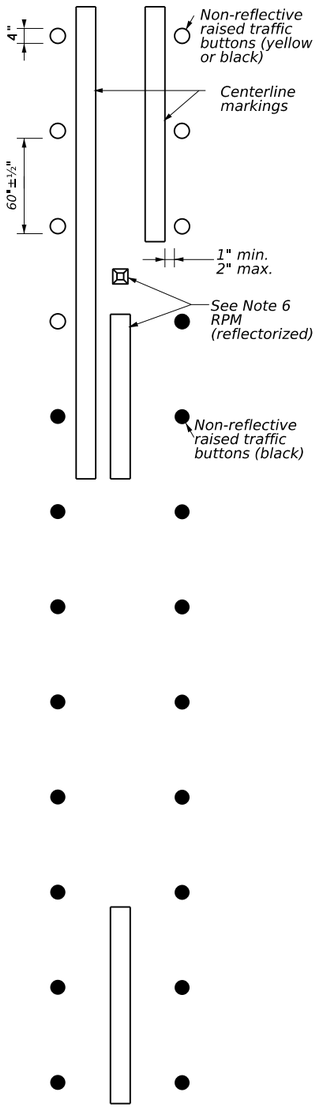


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

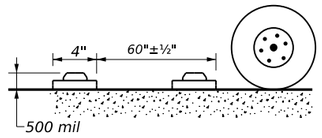


PROFILE VIEW

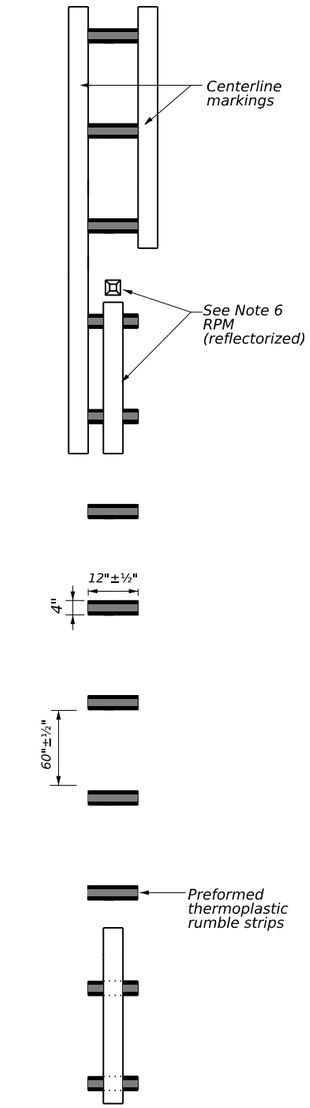


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

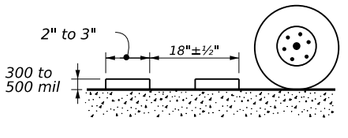


PROFILE VIEW

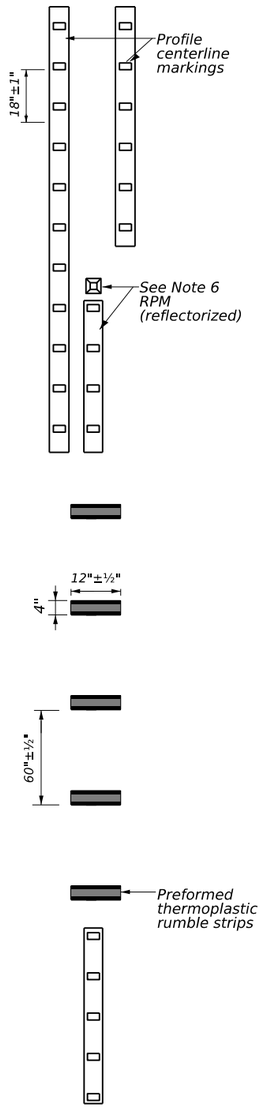


PLAN VIEW
OPTION 3

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).

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	1109	01	026, ETC	FM 777
10-13 1-23	DIST	COUNTY		SHEET NO.
	BMT	JASPER		98

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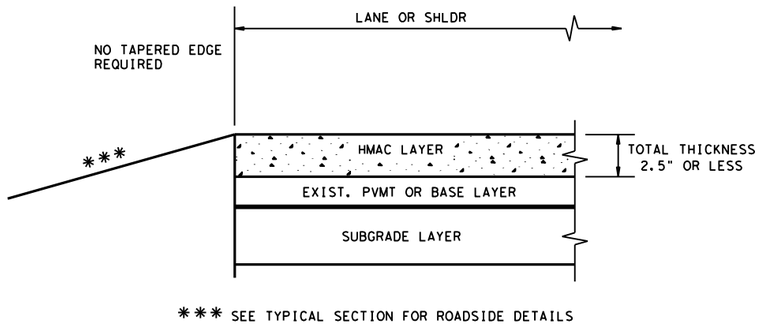
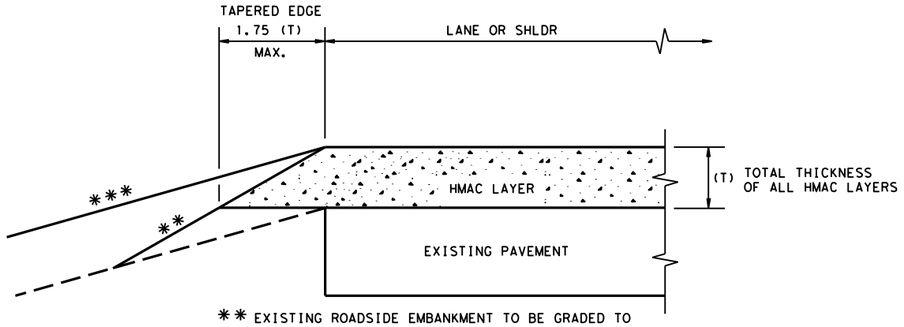


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

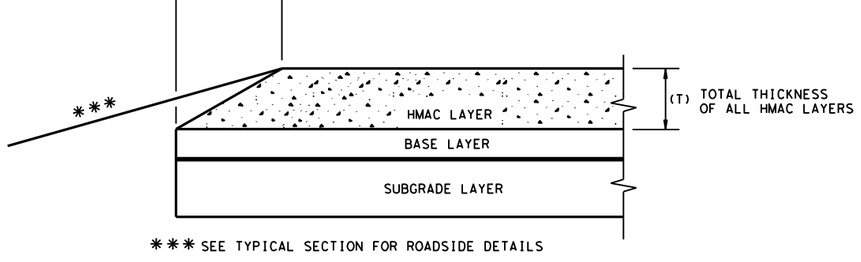
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



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

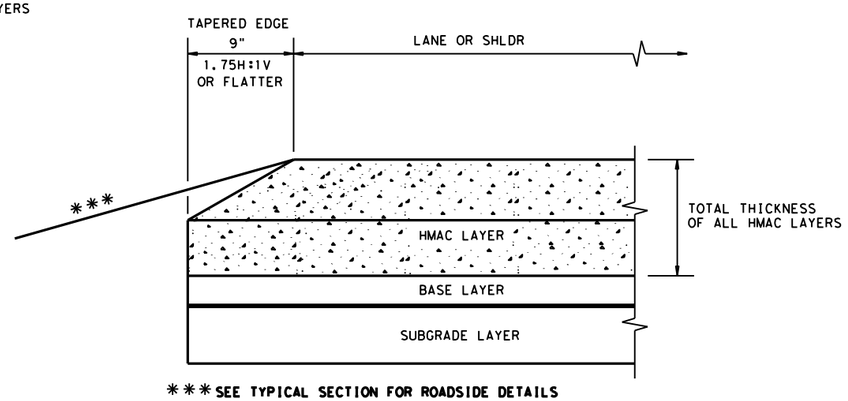
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:	
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1109	01	026, ETC	FM 777	
	DIST	COUNTY		SHEET NO.	
	BMT	JASPER		99	

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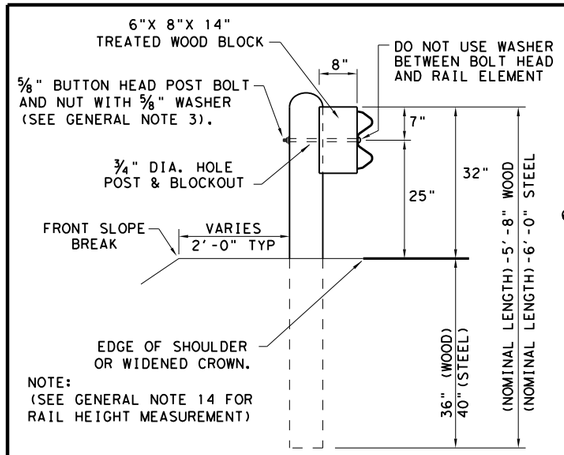
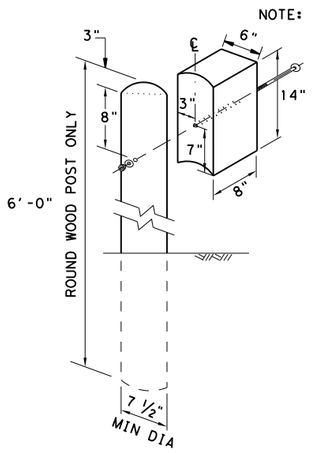
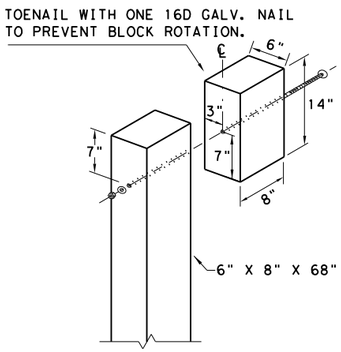


TYPICAL POST PLACEMENT

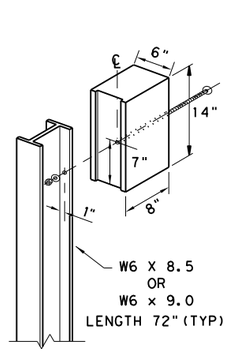


WOOD BLOCK TO ROUND WOOD POST

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

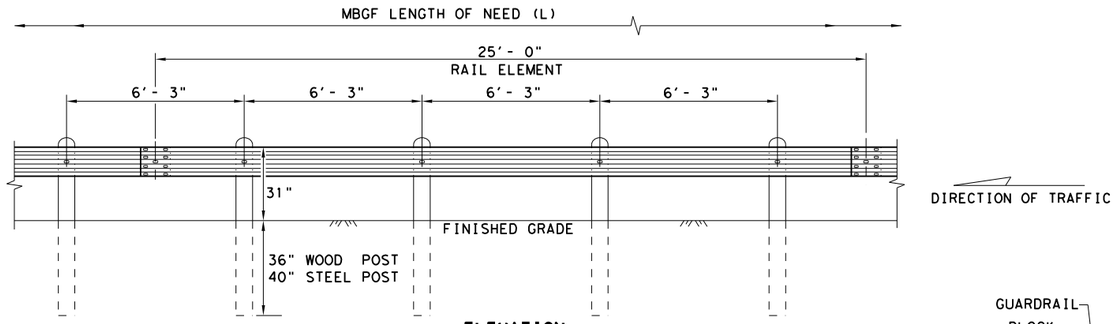


WOOD BLOCK TO RECTANGULAR WOOD POST



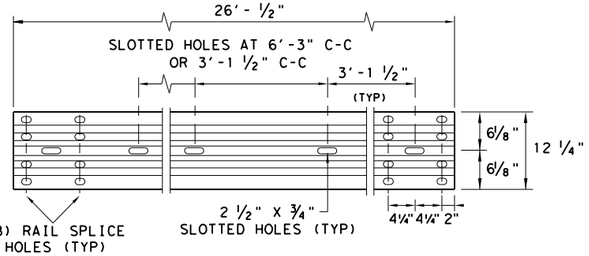
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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.

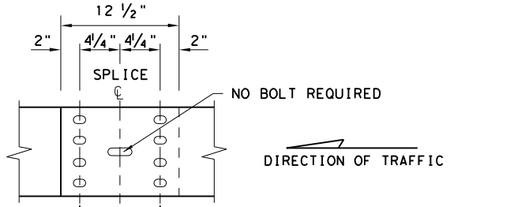
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

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

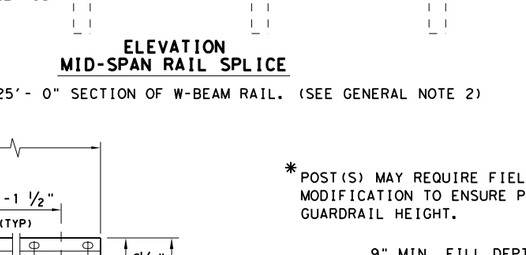
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

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.

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.

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
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	BMT	JASPER		100	

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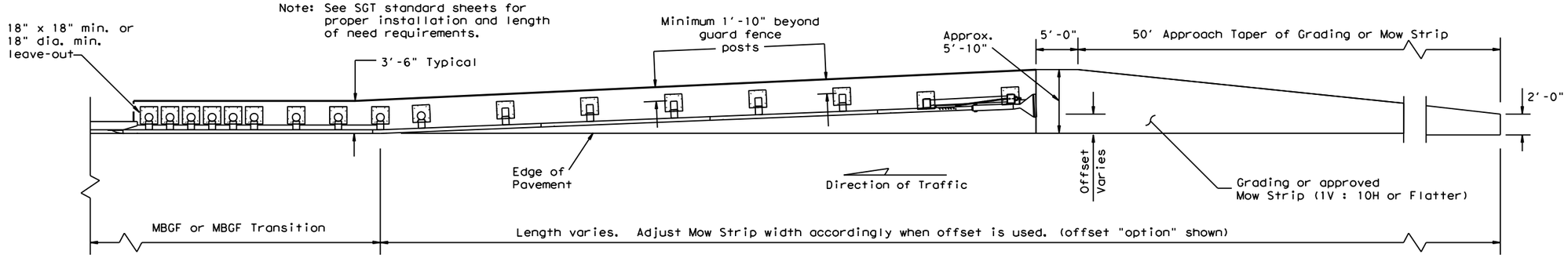
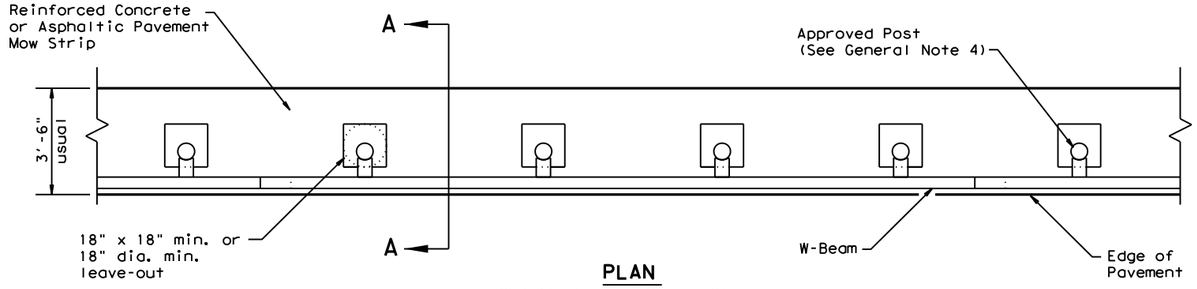
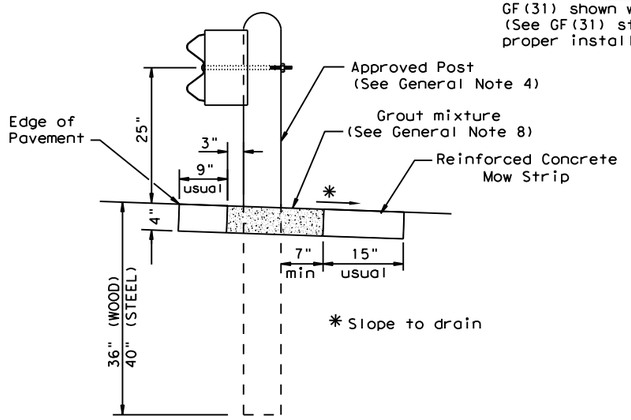


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



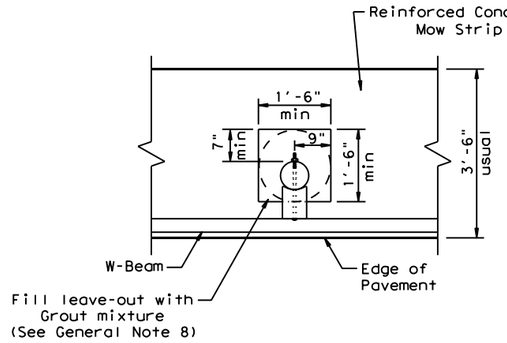
PLAN

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



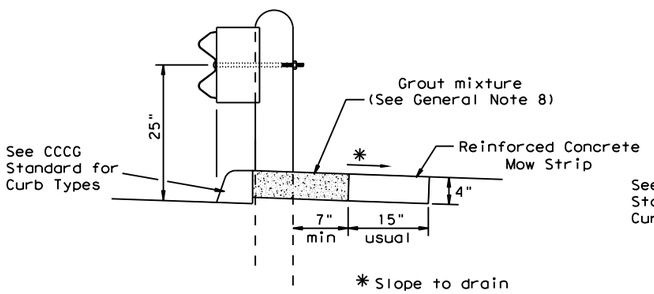
SECTION A-A

Typical



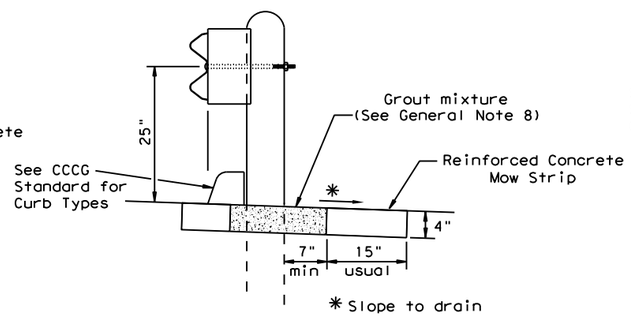
MOW STRIP DETAIL

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



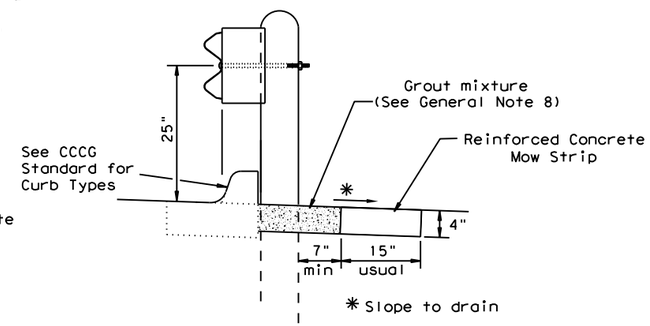
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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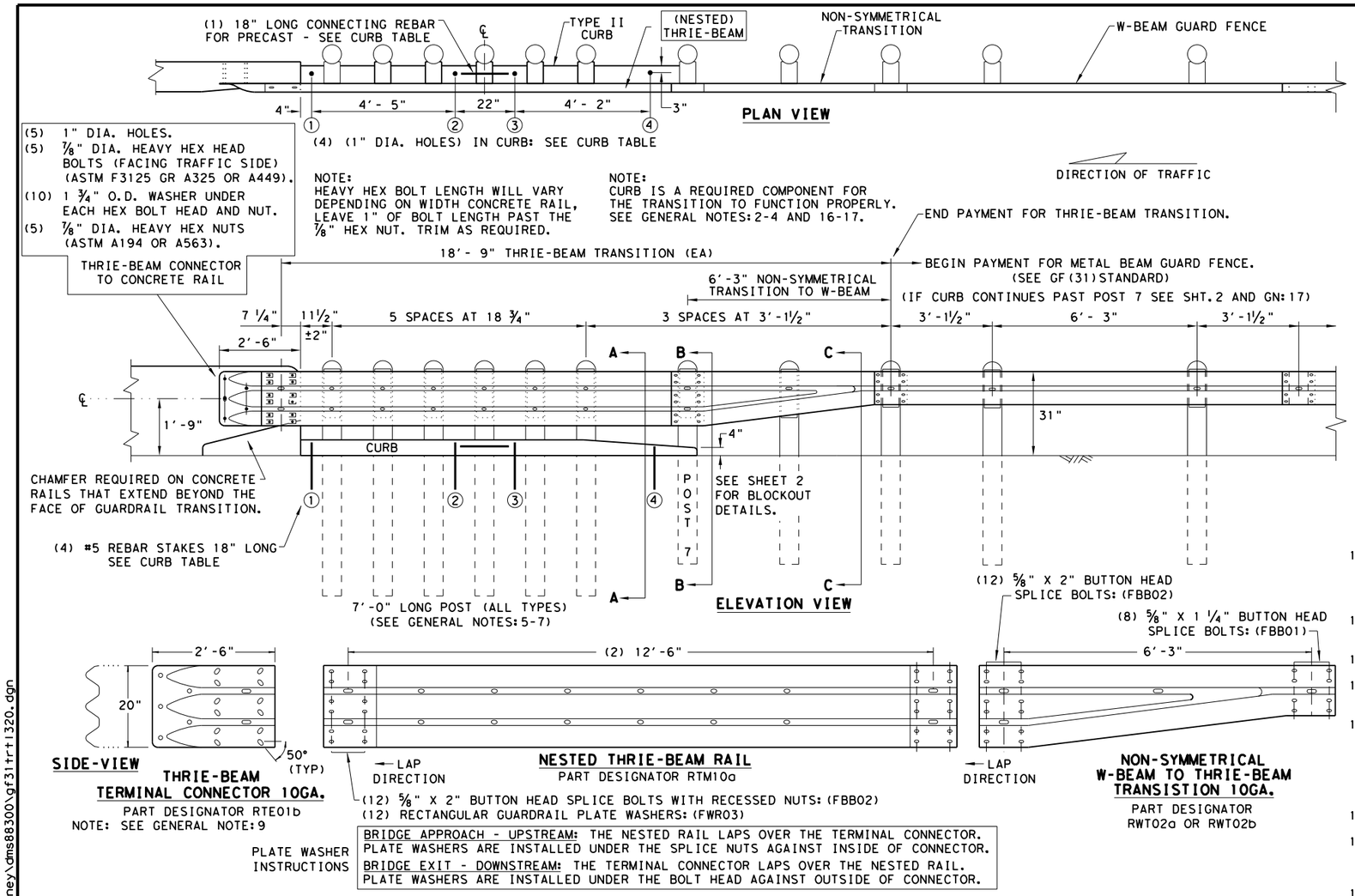


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

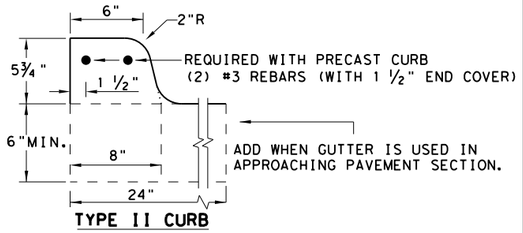
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

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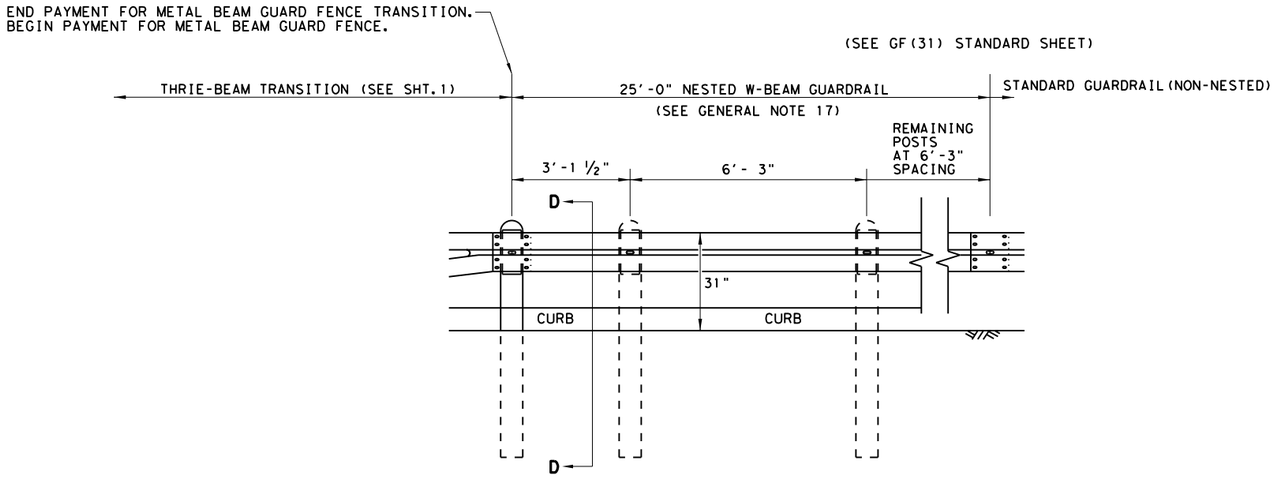
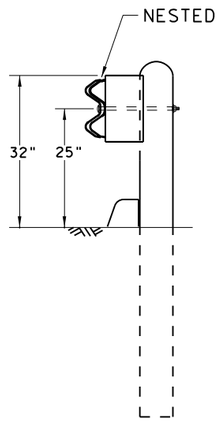
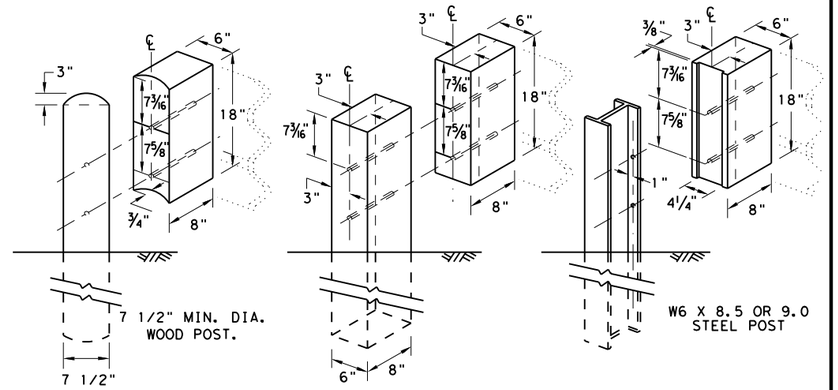
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

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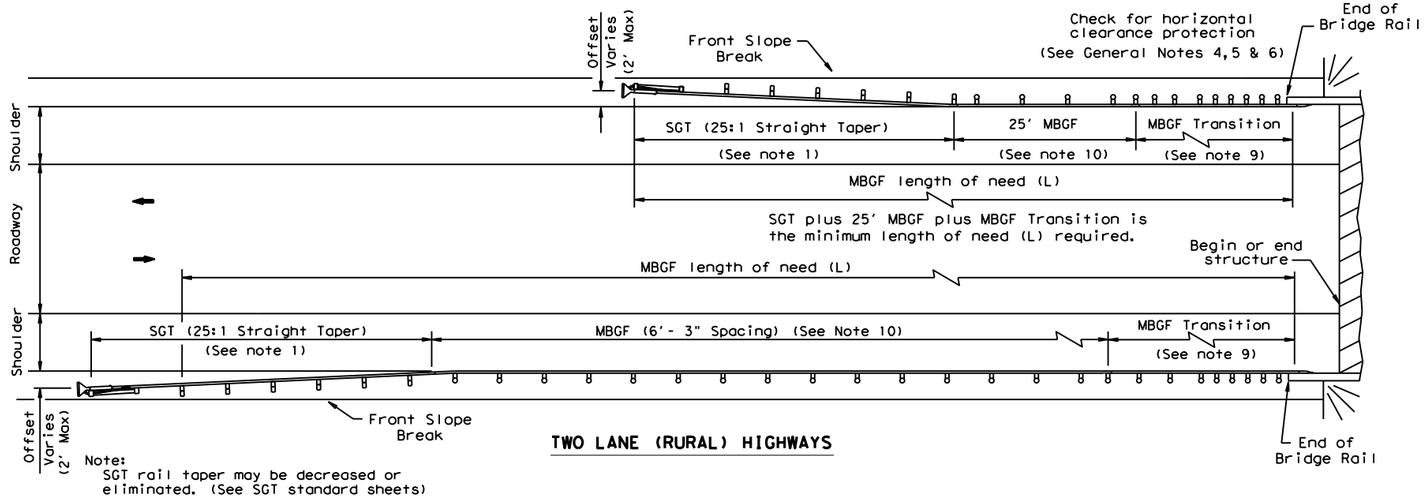
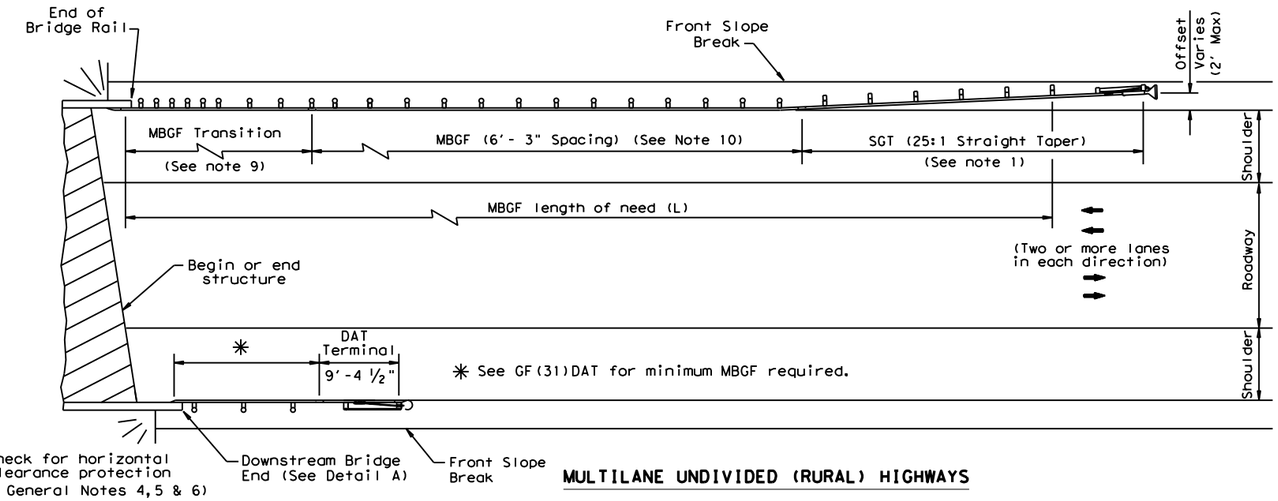
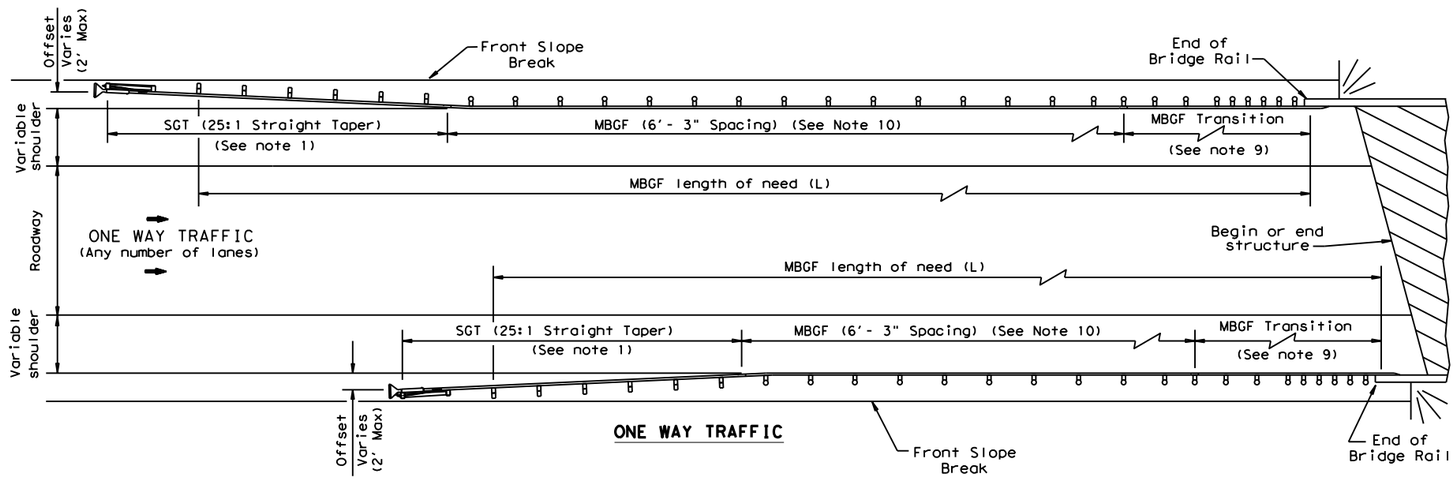


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



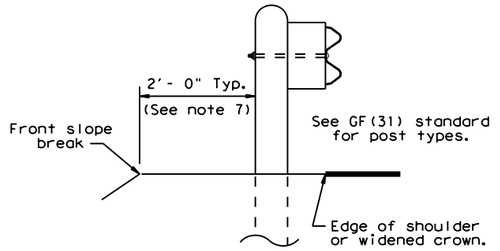
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



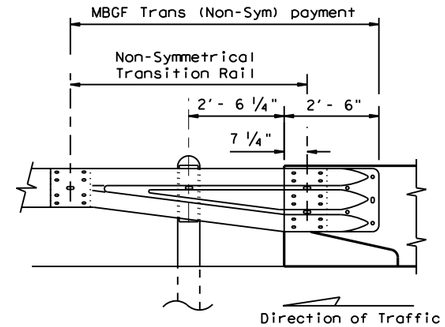
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation | Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		104

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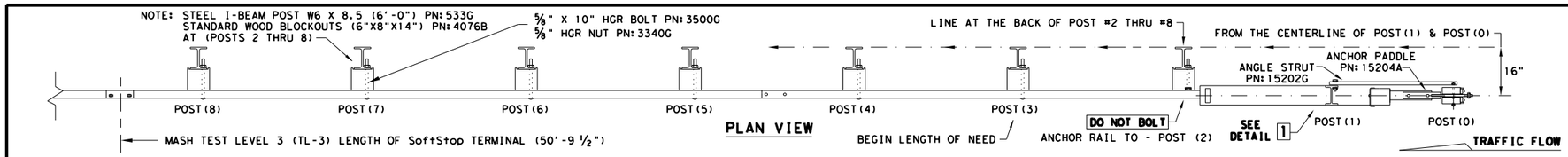
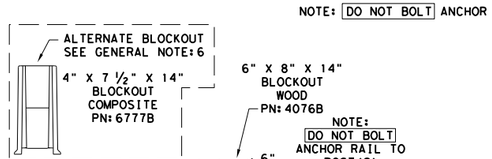
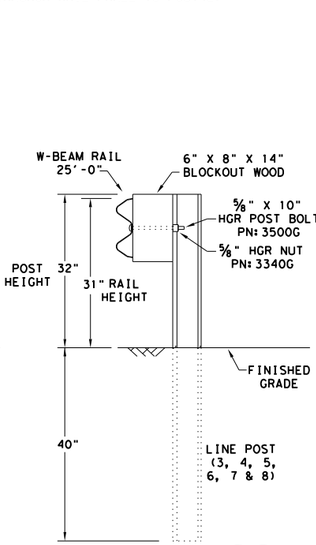




ISOMETRIC VIEW POST(1 & 2)

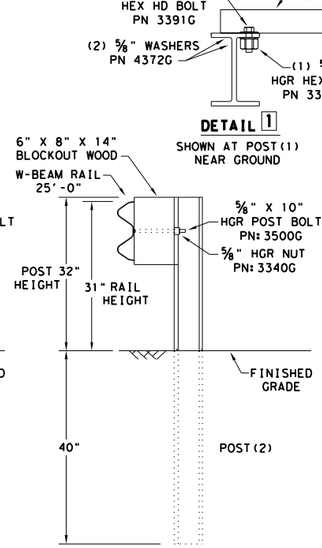
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B

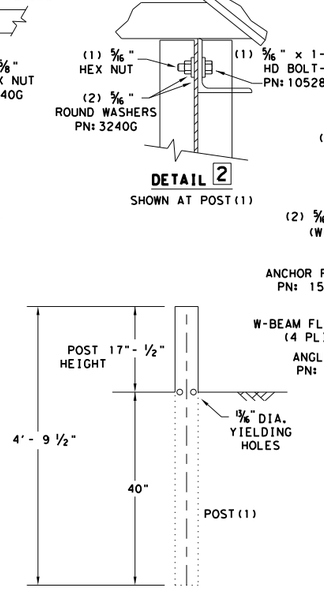
6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

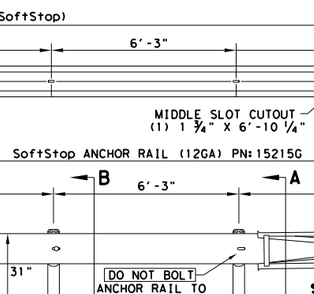


SECTION VIEW A-A

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

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

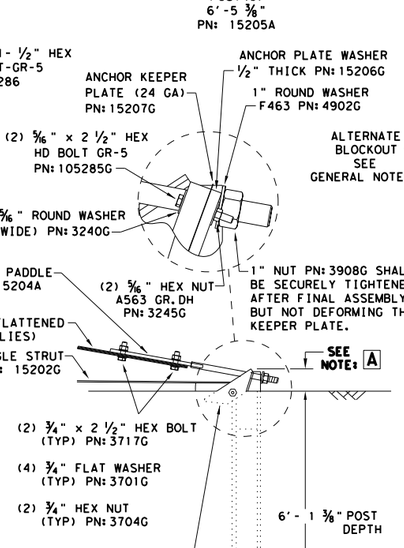




FRONT VIEW POST(1)

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

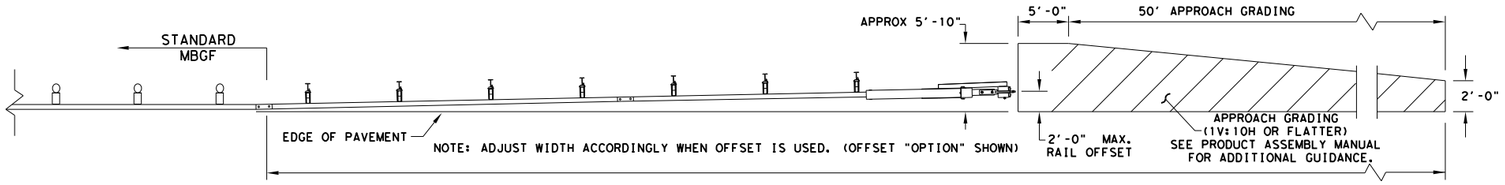
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



DETAIL 3 AT POST(0)

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

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

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

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

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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
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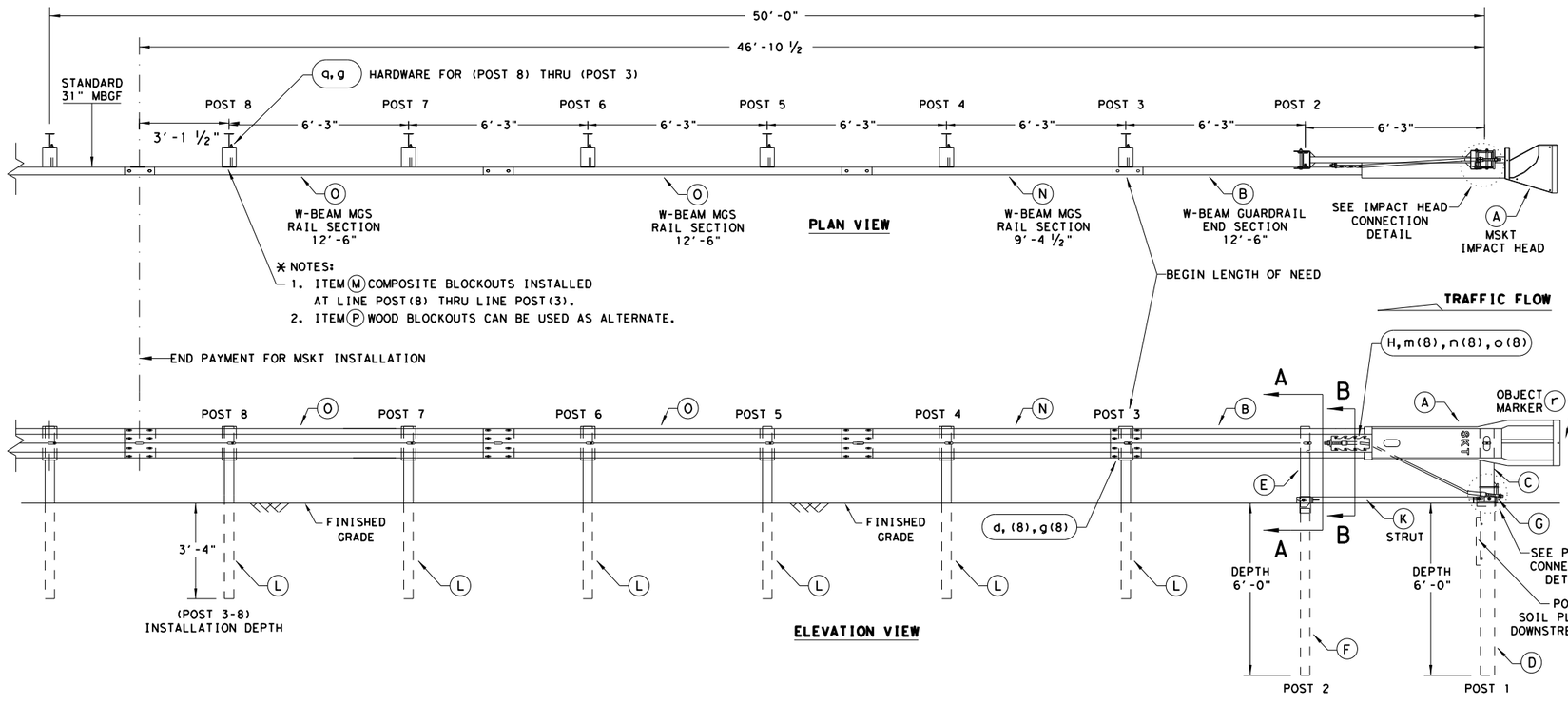
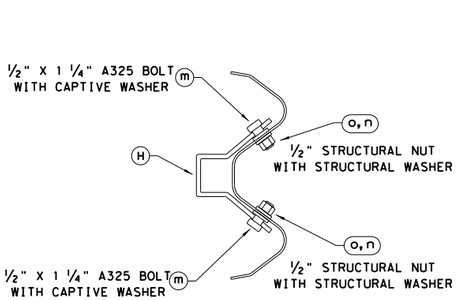
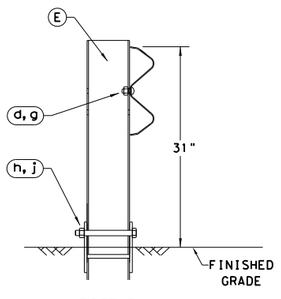


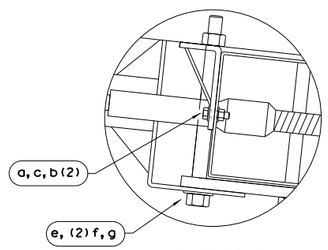
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



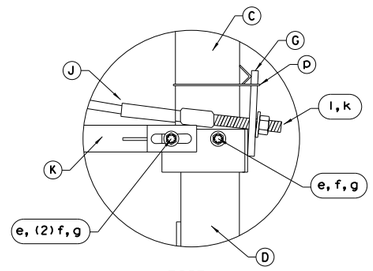
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

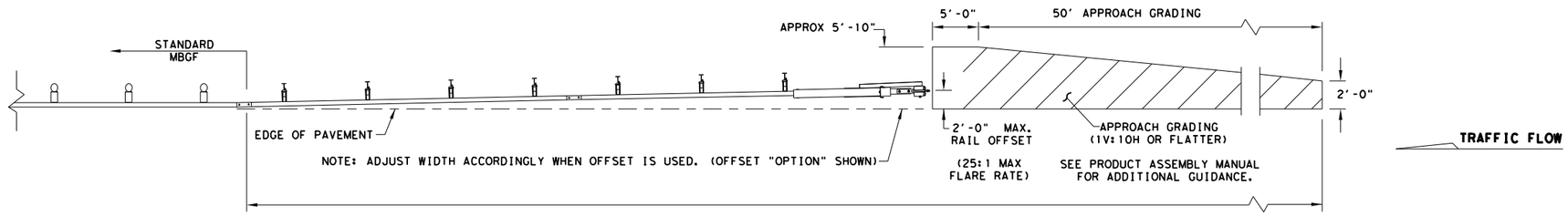
SEE NOTES: *

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

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	DIST	COUNTY		SHEET NO.	
	BMT	JASPER		106	

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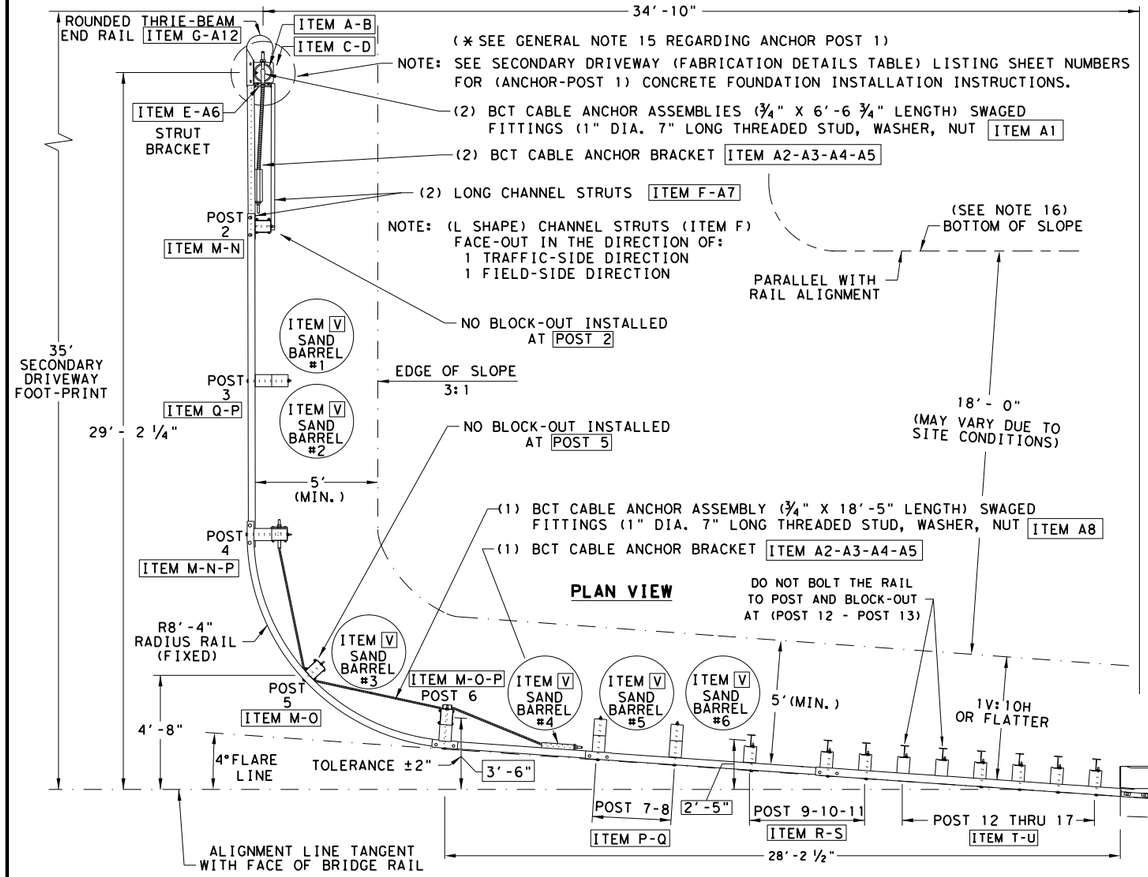
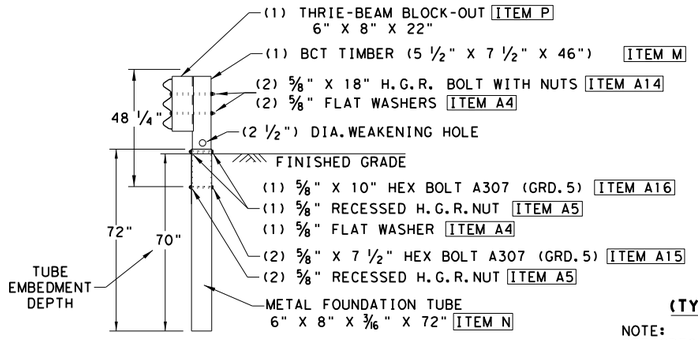
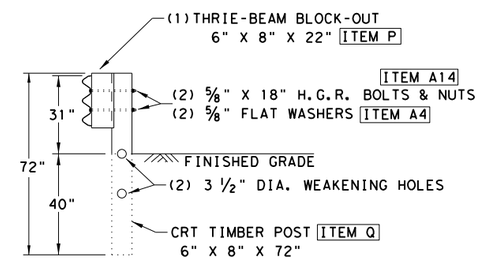




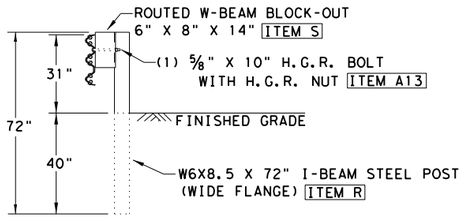
SECTION VIEW (A-A)
TIMBER POST WITH METAL FOUNDATION TUBE
(TYP) BCT POSTS 2-4-5-6

NOTE:
NO BLOCK-OUTS INSTALLED AT BCT POST 2 - POST 5

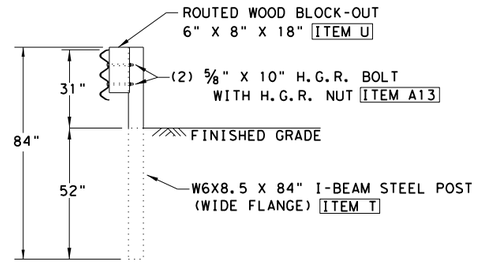


SECTION VIEW (B-B)
(TYP) CRT TIMBER POSTS 3-7-8

NOTE:
SEE SPECIAL APPLICATION NOTES ON SHEET 3 OF 3.
CRT POST WILL REQUIRE AN ADDITIONAL ¾" HOLE TO ACCOMMODATE THE 22" LONG BLOCKOUT.



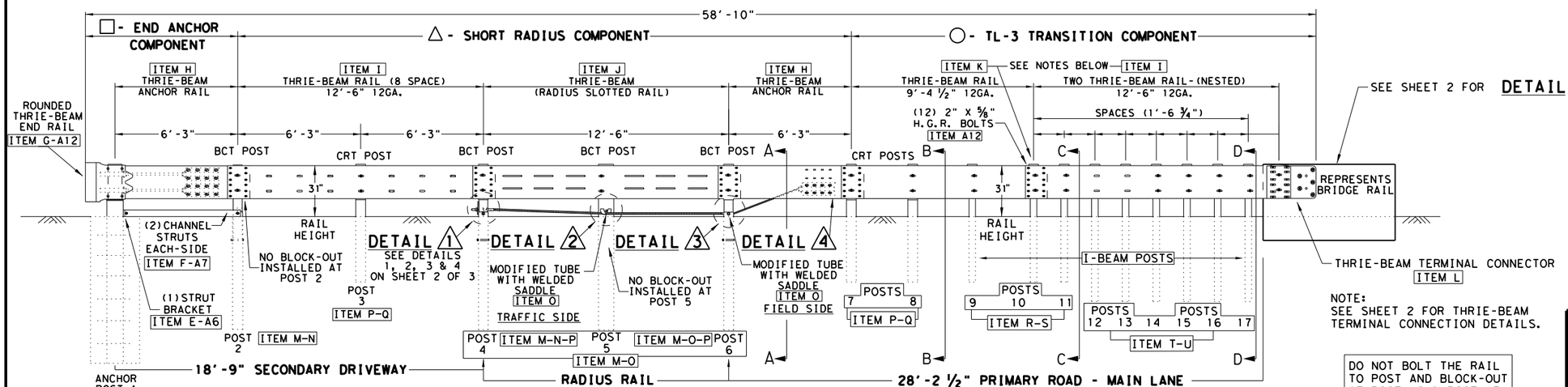
SECTION VIEW C-C
(TYP) AT POSTS 9-10-11



*** SECTION VIEW D-D**
(TYP) AT POSTS 12-13-14-15-16-17

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13



NOTE:
SEE SHEET 2 FOR THRIE-BEAM TERMINAL CONNECTION DETAILS.

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13

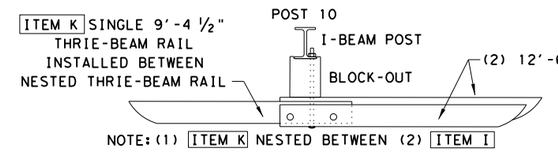
(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

ANCHOR POST 1 FABRICATION DETAILS	
SHEET DESCRIPTION	SHEET NUMBER
ANCHOR POST	SHEET 1 OF 8
ANCHOR SLEAVE	SHEET 2 OF 8
RADIUS RAIL	SHEET 3 OF 8
THRIE-BEAM RAILS	SHEET 4 OF 8
BCT TIMBER POST	SHEET 5 OF 8
STRUT RADIUS ANCHOR	SHEET 6 OF 8
FOUNDATION TUBE	SHEET 7 OF 8
ANCHOR CABLE	SHEET 8 OF 8

FULL-LENGTH ELEVATION VIEW

NOTE: ALL CABLE BRACKET ASSEMBLIES ARE LOCATED ON THE FIELD-SIDE. SHOWN HERE FOR CLARITY.

NOTE: FOR BCT POSTS 2-4-5-6 INSTALL (1) OR (2) ITEM A15-A4-A5 BOLT ASSEMBLIES TO PREVENT TIMBER POST SLIDING DOWN FOUNDATION TUBE.



NOTE: (1) ITEM K NESTED BETWEEN (2) ITEM I

NESTED-GUARDRAIL SPLICE AT POST 10

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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	BMT	JASPER		107

DATE:
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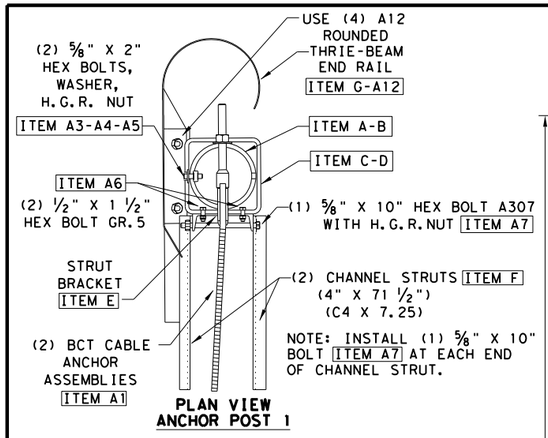
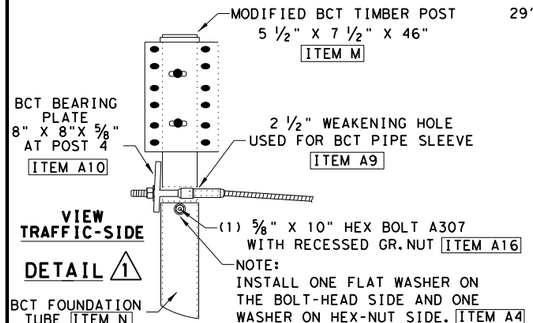
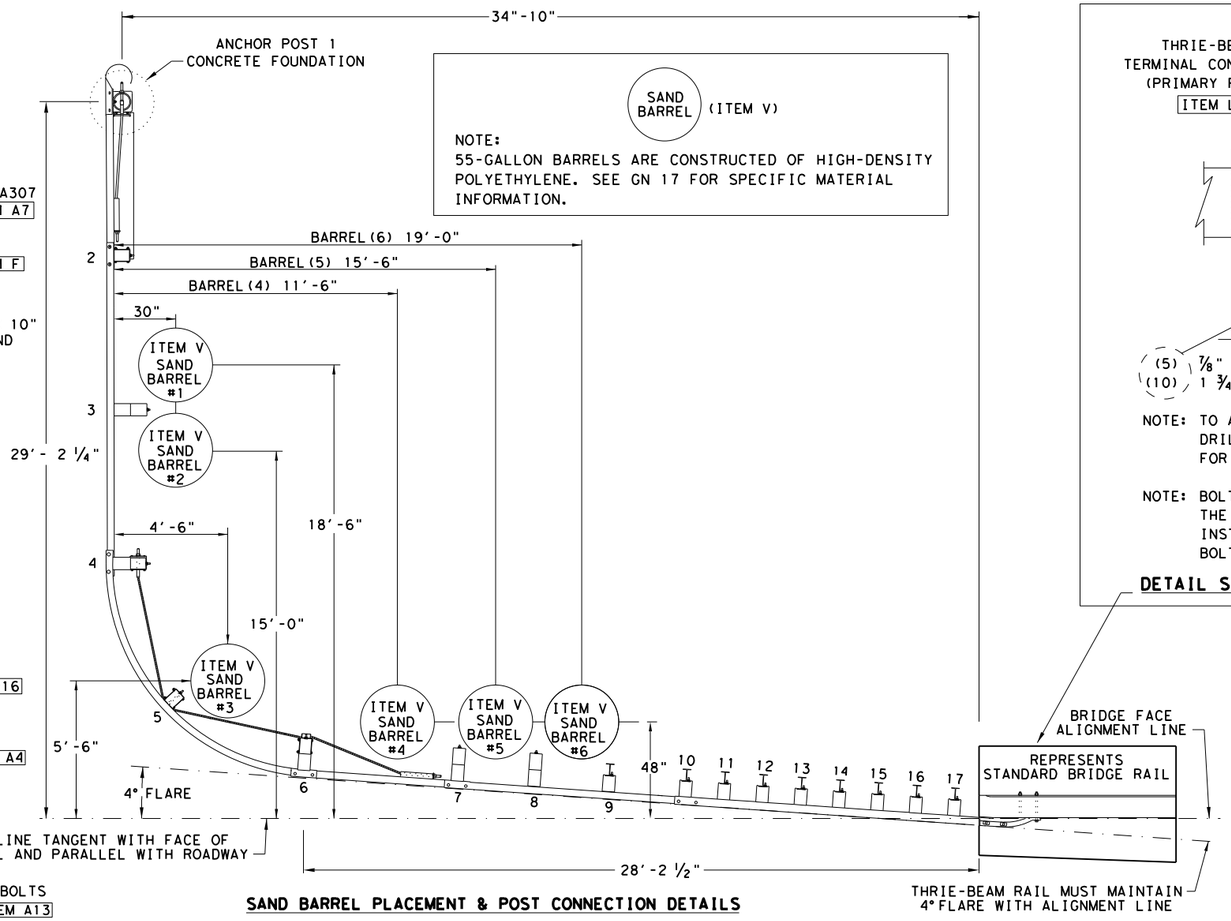


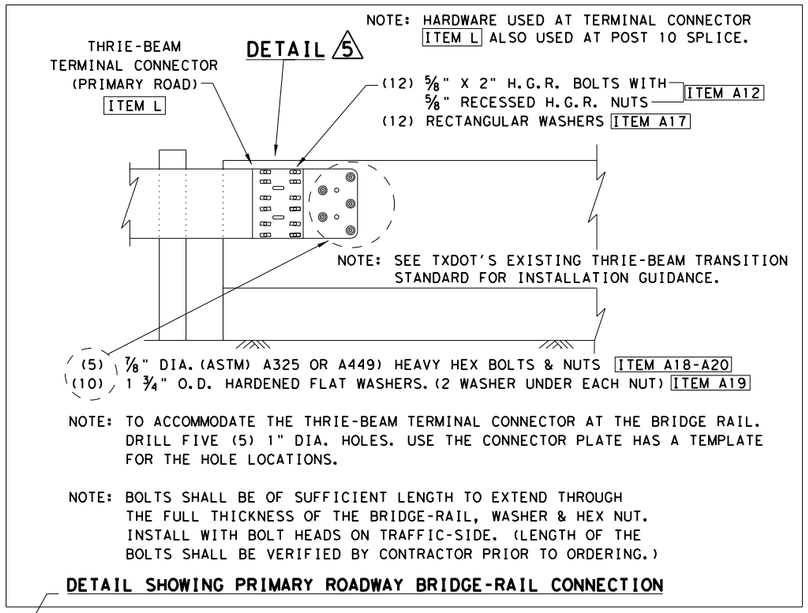
PLAN VIEW ANCHOR POST 1



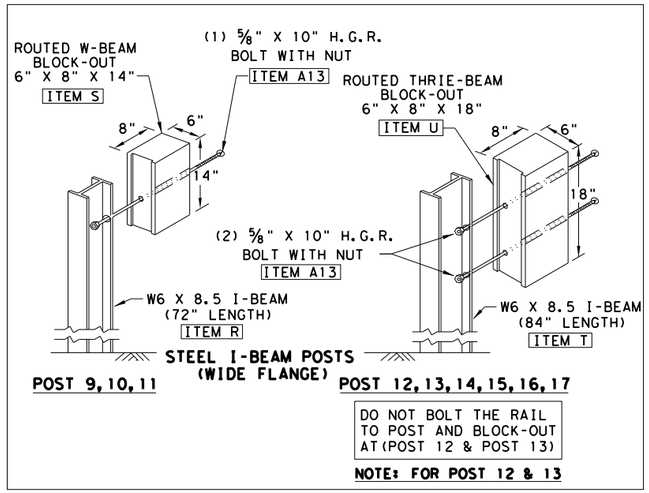
BCT (POST 4) TIMBER POST WITH METAL FOUNDATION TUBE

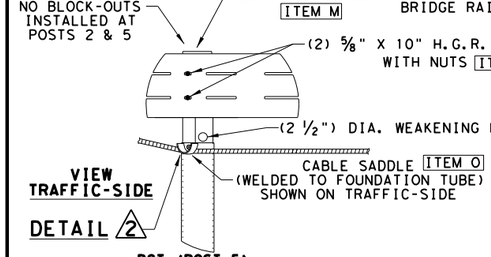


SAND BARREL PLACEMENT & POST CONNECTION DETAILS

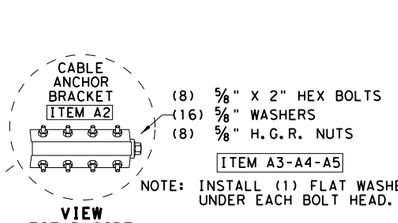


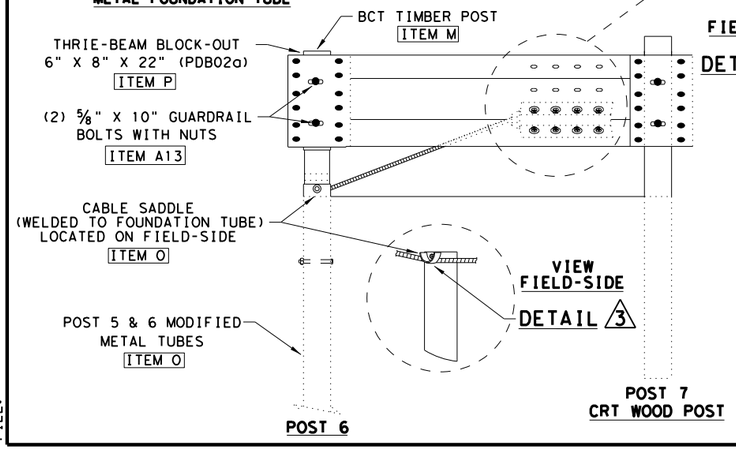
DETAIL SHOWING PRIMARY ROADWAY BRIDGE-RAIL CONNECTION

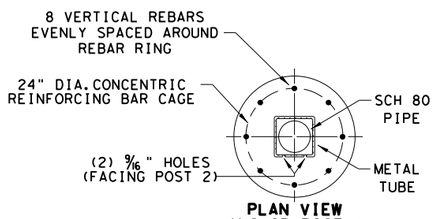




BCT (POST 5) TIMBER POST WITH METAL FOUNDATION TUBE

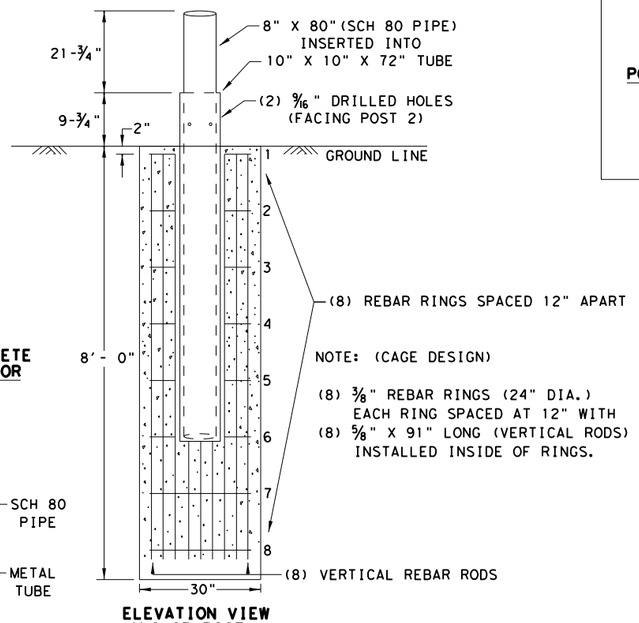






POST 1 REINFORCED CONCRETE FOUNDATION ANCHOR

PLAN VIEW ANCHOR POST 1



ELEVATION VIEW ANCHOR POST 1

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

Texas Department of Transportation

Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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DATE:
FILE:

ITEM	ALL LARGE & SMALL COMPONENT DESCRIPTIONS	END ANCHOR (POST 1 & POST 2) □ ITEM	END ANCHOR (POST 1 & POST 2) □ QTY	TL-3 SHORT RADIUS (POST 2 TO POST 7) △ ITEM	TL-3 SHORT RADIUS (POST 2 TO POST 7) △ QTY	TL-3 TRANSITION (POST 7 TO POST 17) ○ ITEM	TL-3 TRANSITION (POST 7 TO POST 17) ○ QTY	TL-3 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM ITEM	TL-3 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM TOTAL QTY
A	POST 1 TOP (SCH.80 PIPE) (8" X 80" LENGTH)	A	1					A	1
B	POST 1 TOP (WELDED SUPPORT COLLAR 10" X 10" X ½" ASTM A36)	B	1					B	1
C	POST 1 TUBE (HSS 10" X 10" X ½" X 72" LENGTH) A500 GR.B	C	1					C	1
D	POST 1 (WELDED PLATE 9 ¼" X 9 ¼" X ⅛") A36	D	1					D	1
E	POST 1 STRUT BRACKET (C8 X 11.50 A36)	E	1					E	1
F	(POST 1 & 2) CHANNEL STRUTS (4" X 71 ½")(C4 X 7.25)A36	F	2					F	2
G	THRIE-BEAM RAIL (END ANCHOR - ROUNDED TYPE) 12GA. (RTE02a)	G	1					G	1
H	THRIE-BEAM RAIL (ANCHOR) (6'-3" LENGTH) 12GA. (RWM14a)	H	1	H	1			H	2
I	THRIE-BEAM RAIL (8 SPACE) (12'-6" LENGTH) 12GA. (RTM08)			I	1	I	2	I	3
J	THRIE-BEAM RAIL (RADIUS 8'-4 ½") (SLOTTED) 12GA.			J	1			J	1
K	THRIE-BEAM RAIL (3 SPACE) (9'-4 ½" LENGTH) 12GA.					K	1	K	1
L	THRIE BEAM RAIL (TERMINAL CONNECTOR) (BRIDGE-RAIL) (RTE01b)					L	1	L	1
M	POST 2,4,5,6 BCT TIMBER (5 ½" X 7 ½" X 46") (PDF04)			M	4			M	4
N	POST 2,4, BCT TUBE (6" X 8" X 3/16" X 72" LENGTH) (PTE05)			N	2			N	2
O	POST 5,6 MODIFIED BCT TUBES (FOR WELDED CABLE SADDLES)			O	2			O	2
P	POST 3,4,6,7,8 THRIE-BEAM BLOCK-OUT (6" X 8" X 22")(PDB02a)			P	4	P	1	P	5
Q	POST 3,7,8 CRT TIMBER POSTS (6" X 8" X 72" LENGTH)(PDE09)			Q	2	Q	1	Q	3
R	POST 9,10,11 I-BEAM POSTS (W6X8.5 X 72" LENGTH) (PWE01)					R	3	R	3
S	POST 9,10,11 ROUTED W-BEAM BLOCK-OUT(6" X 8" X 14")(PDB01b)					S	3	S	3
T	POST 12 THRU 17 I-BEAM POSTS (W6X8.5 X 84" LENGTH) (PWE07)					T	6	T	6
U	POST 12 THRU 17 ROUTED BLOCK-OUT (6" X 8" X 18") (PDB??)					U	6	U	6
V	SAND BARRELS 700-715 LBS							V	6
A1	BCT CABLE ANCHOR ASSEMBLIES (¾" X 6'-6 ¾" LENGTH) (FCA01)	A1	2					A1	2
A2	BCT CABLE ANCHOR BRACKET (FPA01)	A2	2	A2	1			A2	3
A3	⅝" X 2" HEX BOLT A307 GRD.5 (FOR CABLE BRACKETS)	A3	18	A3	8			A3	26
A4	⅝" FLAT WASHER A307 GRD.5 (1 WASHER UNDER BOLT HEAD & 1 NUT)	A4	36	A4	40			A4	76
A5	⅝" RECESSED H.G.R NUT (NUTS FOR HEX BOLTS)	A5	22	A5	20			A5	42
A6	STRUT BRACKET HARDWARE (½" X 1 ½") HEX BOLT A307 GRD.5	A6	2					A6	2
A7	CHANNEL STRUT HARDWARE (⅝" X 10") HEX BOLT A307 GRD.5	A7	2					A7	2
A8	BCT CABLE ANCHOR ASSEMBLY (FCA02) (¾" X 18'-5" LENGTH)			A8	1			A8	1
A9	BCT POST SLEEVE (FMM02a) (POST 4 ONLY)			A9	1			A9	1
A10	BCT CABLE BEARING PLATE (⅝" X 8" X 8" (FPB01) (POST 4 ONLY)			A10	1			A10	1
A11	⅝" X 1 ¼" H.G.R. BOLTS (FBB01) (SPLICES AT POST 2,4,6,7)			A11	48			A11	48
A12	⅝" X 2" H.G.R. BOLTS (FBB02)(ROUND TERM-POST 10-END SPLICE)	A12	4			A12	24	A12	28
A13	⅝" X 10" H.G.R. BOLTS (FBB03) (I-BEAM POSTS RAIL & BLOCKOUT)					A13	18	A13	18
A14	⅝" X 18" H.G.R. BOLTS (FBB04) (POSTS 3,4,6,7,8)			A14	8	A14	2	A14	10
A15	⅝" X 7 ½" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A15	8			A15	8
A16	⅝" X 10" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A16	4			A16	4
A17	RECTANGULAR WASHERS (FWR03) (FOR TERMINAL CONNECTOR RTE01b)					A17	12	A17	12
A18	⅞" X (LENGTH VARIES) HEX BOLTS A325 OR A449 GR.5					A18	5	A18	5
A19	1 ¾" O.D. HARDENED FLAT WASHER A325					A19	10	A19	10
A20	⅞" HEX NUT GR.5 A325					A20	5	A20	5

GENERAL NOTES

1. FOR ADDITIONAL INSTALLATION INFORMATION AND GUIDANCE CONTACT: TEXAS DEPARTMENT OF TRANSPORTATION, (TXDOT'S DESIGN DIVISION). (512) 416-2678. THE EXACT POSITION OF MBGF SHALL BE SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE SIGHT DISTANCE OF THE INSTALLATION WILL NEED TO BE VERIFIED WITH RESPECT TO THE SPECIFIC SITE PLACEMENT.
2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT POST POSITIONS.
3. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12 ½" OR 25 FOOT NOMINAL LENGTHS.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
7. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A SLOPE RATE OF NOT MORE THAN 1V:10H.
8. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.
9. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
10. SPECIAL FABRICATION WILL BE REQUIRED FOR THRIE BEAM RAIL RADIUS (ITEM J).
11. ALL MATERIAL AND WORK INVOLVED IS SUBSIDIARY TO SHORT RADIUS BID ITEM, INCLUDING, BUT NOT LIMITED TO FOUNDATIONS, GRADING, THRIE BEAM RAIL, SAND BARRELS, AND OTHER PARTS.
12. ALL CABLE ASSEMBLIES SHOULD BE TAUT AFTER INSTALLATION. WHEN CABLES ARE MANIPULATED BY HAND THE CABLES SHOULD NOT MOVE MORE THAN 1" IN ANY DIRECTION PERPENDICULAR TO THE CABLE.
13. THE BCT BEARING PLATE INSTALLED AT POST 4 SHOULD BE ORIENTED SUCH THAT THE 3" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE BOTTOM AND 5" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE TOP.
14. FOUNDATION AT POST 1 SHALL BE CLASS C CONCRETE.
- *15. POST (1) IS NOT A CRASHWORTHY TERMINAL. THE DESIGN AND PLACEMENT OF POST (1) MUST BE OUTSIDE OF THE CLEAR ZONE OF THE SECONDARY ROADWAY USING THE RESPECTIVE CLEAR ZONE CRITERIA. PLEASE CONTACT THE DESIGN DIVISION (512) 416-2678 FOR ASSISTANCE IN DETERMINING THE APPROPRIATE USE AND/OR PLACEMENT OF THE SYSTEM IN CONSTRAINED LOCATIONS. THE PAYMENT OF THE COMPLETE SYSTEM WILL BE WITH BID ITEMS: 540 XXXX TL-3 31" SHORT RADIUS (COMPLETE).
16. TESTED TO MASH WITH A 3:1 SLOPE OR SHALLOWER IS PREFERABLE IN THE LIMITS OF THE TOP AND BOTTOM OF THE SLOPE AS SHOWN IN THE PLAN VIEW. IF FIELD CONDITIONS REQUIRE A STEEPER SLOPE, THIS MAY BE ALLOWABLE UP TO A 2:1 SLOPE. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE.
17. THE BARRELS ARE ENERGY ABSORPTION ENERGITE III, MODEL 640 FILLED WITH 715 LB (+/-15) SAND; OR AN APPROVED EQUIVALENT. THE APPROXIMATE HEIGHT OF THE BARREL IS 41" (+/-).
18. ALTERNATE METHODS TO TERMINATE THE SRG ALONG THE PRIMARY ROADWAY ARE AVAILABLE WHEN SITE CONDITIONS DICTATE. CONTACT DESIGN DIVISION FOR DETAILS: 512 416-2678

NOTE: SEE SHEET 1 OF 3.

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

SPECIAL APPLICATION NOTES.

1. THIS IS A MASH COMPLIANT TL-3 SHORT RADIUS GUARDRAIL SYSTEM WITH A TOP RAIL HEIGHT OF 31". AVAILABLE FOR USE ON ANY SPEED ROADWAY. THE SYSTEM REQUIRES A MINIMUM PLACEMENT FOOTPRINT OF 34'-10" ALONG THE PRIMARY ROAD AND A 35'-0" ALONG SECONDARY DRIVEWAY.
2. IT IS CRITICAL THAT THE PRIMARY GUARDRAIL MAINTAIN A (4 DEGREE FLARE) WITH THE SECONDARY DRIVEWAY.
3. THE SYSTEM REQUIRES A MINIMUM 5' WIDE (WORK ZONE) DIRECTLY BEHIND THE GUARDRAIL SYSTEM WITH A SLOPE AT 1V:10H OR FLATTER FROM THERE A MAXIMUM 3:1 SLOPE IS RECOMMENDED. SEE SHEET 1 OF 3 FOR FLARE AND SLOPE DETAILS.
4. NOTE FOR INSTALLER: THE THREE (3) CRT POSTS ITEM (Q), AT POST LOCATIONS, 3, 7, & 8.), REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A ¾" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-⅞" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

   OPTION FOR ADDITIONAL ¾" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO ¾" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM ¾" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM ¾" HOLE.

Texas Department of Transportation — Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN:VP	CK:CGL
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	BMT	JASPER		107B

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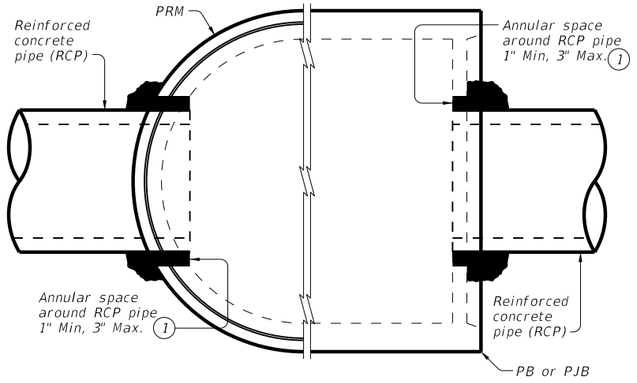
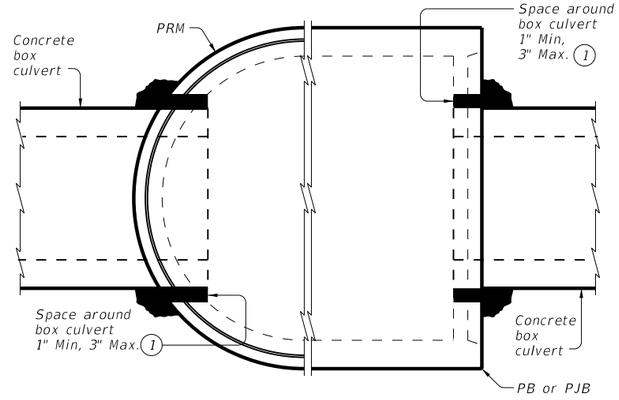


PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

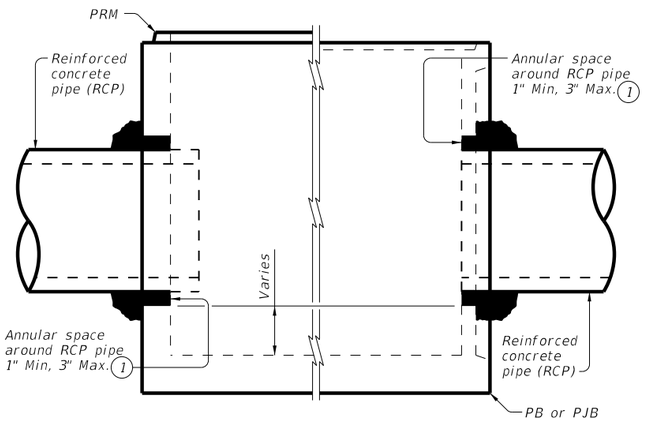
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

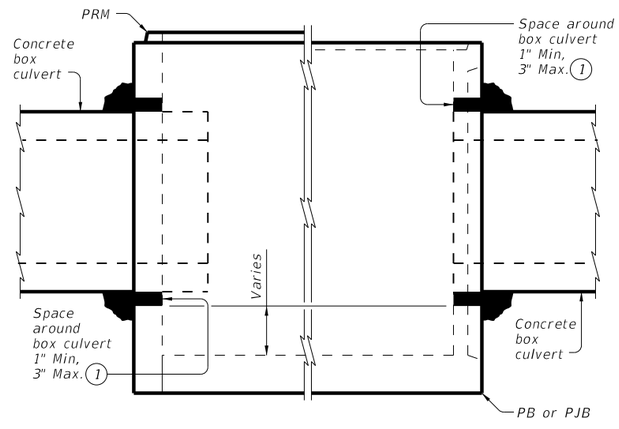
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

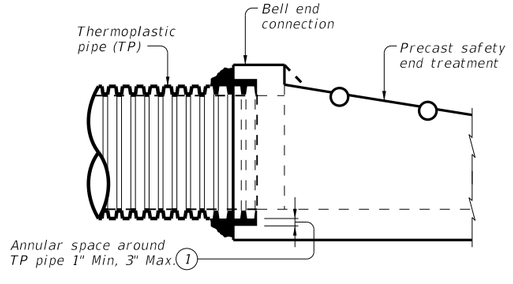
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application."

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application."

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains."

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe."

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

PBGC

FILE: CD-PBGC-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
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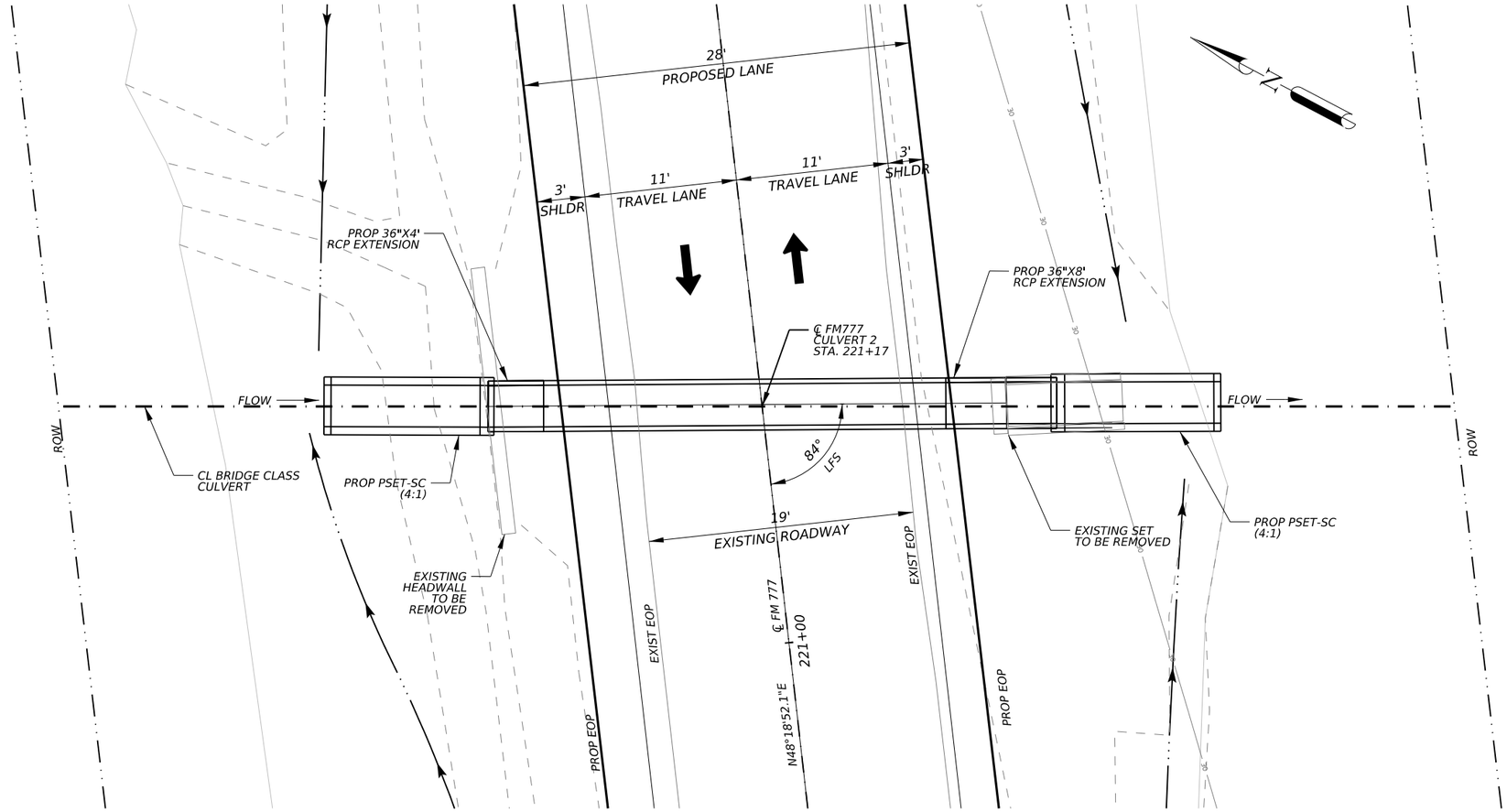
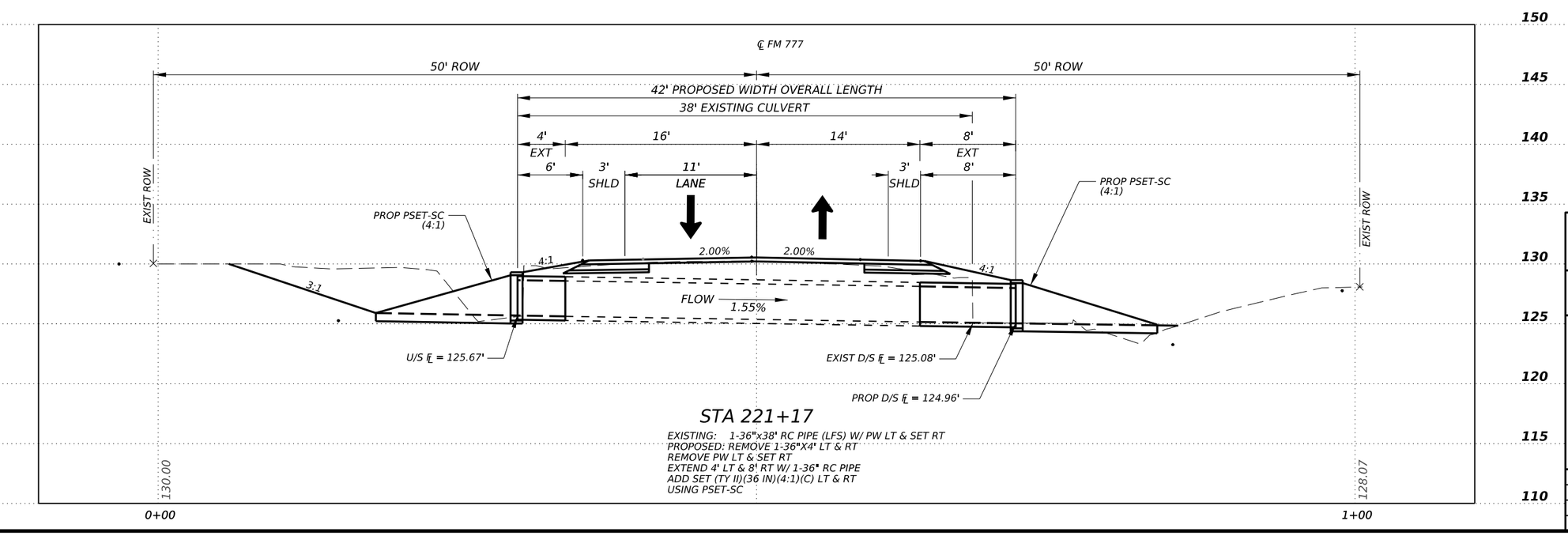
	BMT	JASPER		108





STA 221+17

EXISTING: 1-36"x38' RC PIPE (LFS) W/ PW LT & SET RT
PROPOSED: REMOVE 1-36"X4' LT & RT
REMOVE PW LT & SET RT
EXTEND 4' LT & 8' RT W/ 1-36" RC PIPE
ADD SET (TY II)(36 IN)(4:1)(C) LT & RT
USING PSET-SC

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER
01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
CROSS CULVERT #2
LAYOUT

SHEET 1 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		109

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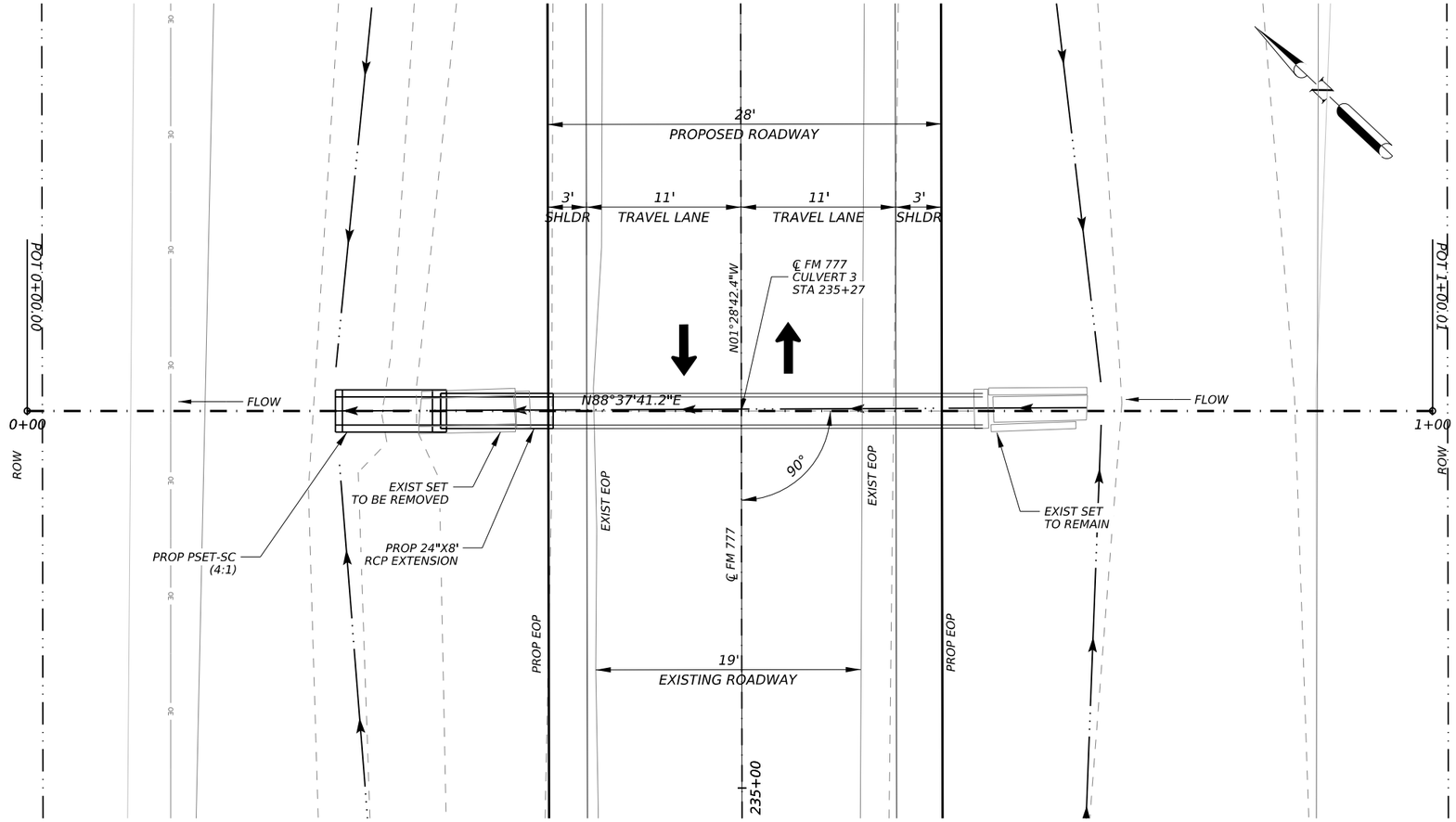
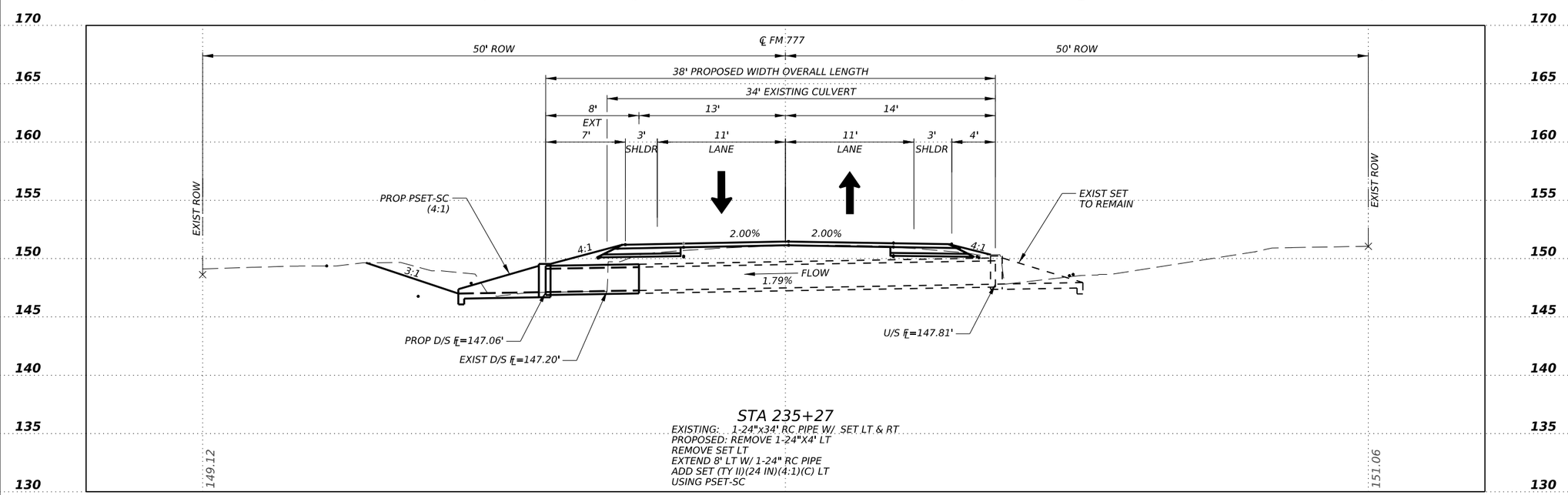


0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 235+27

EXISTING: 1-24"x34' RC PIPE W/ SET LT & RT
PROPOSED: REMOVE 1-24"X4' LT
REMOVE SET LT
EXTEND 8' LT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT
USING PSET-SC

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CROSS CULVERT #3
LAYOUT

SHEET 2 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		110

DATE: 1/30/2024 3:01:52 PM
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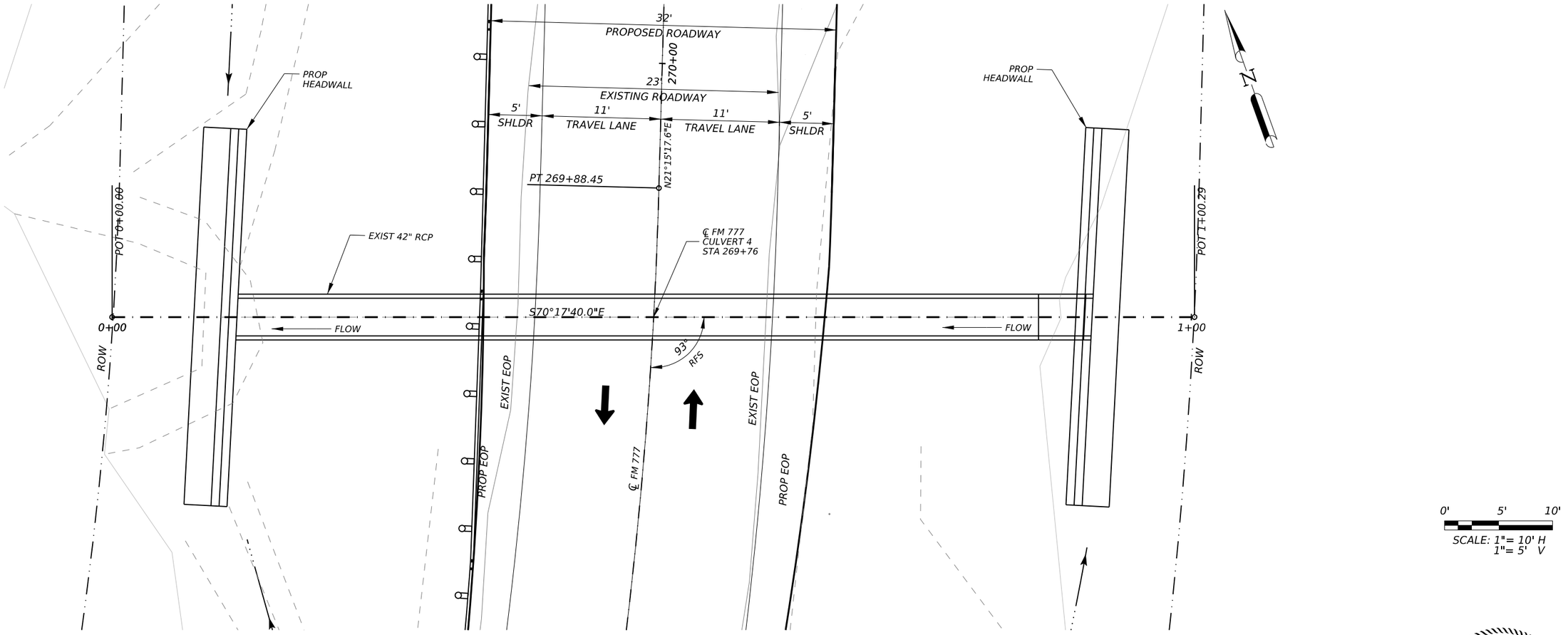

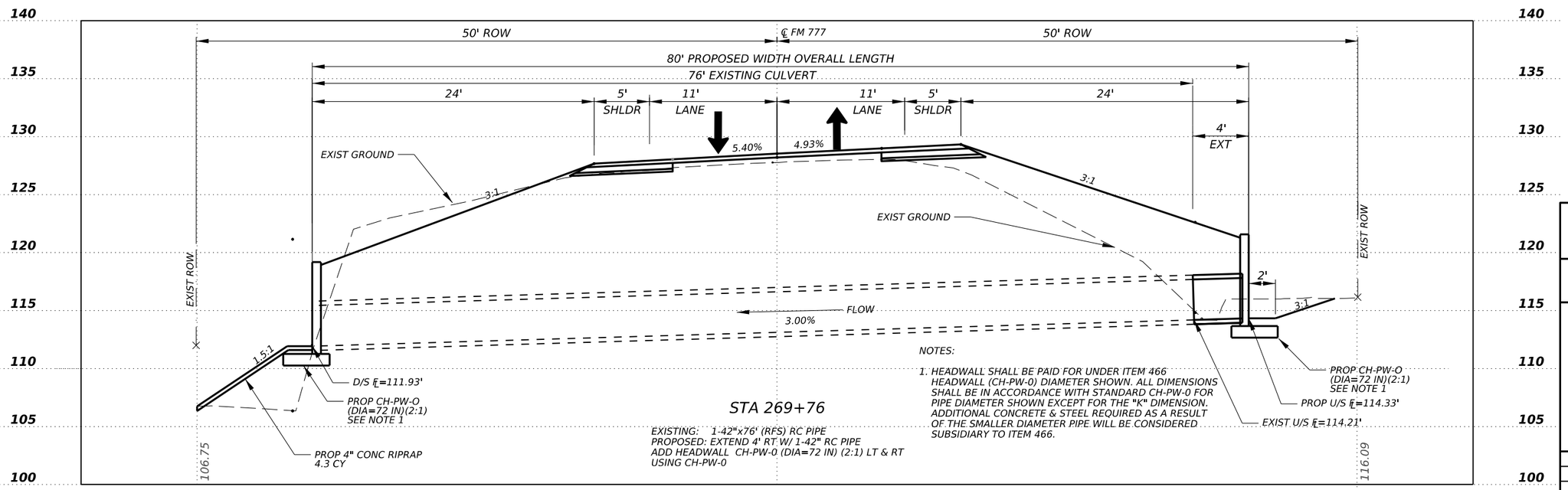

STA 269+76

EXISTING: 1-42"x76' (RFS) RC PIPE
PROPOSED: EXTEND 4' RT W/ 1-42" RC PIPE
ADD HEADWALL CH-PW-0 (DIA=72 IN) (2:1) LT & RT
USING CH-PW-0

NOTES:

1. HEADWALL SHALL BE PAID FOR UNDER ITEM 466 HEADWALL (CH-PW-0) DIAMETER SHOWN. ALL DIMENSIONS SHALL BE IN ACCORDANCE WITH STANDARD CH-PW-0 FOR PIPE DIAMETER SHOWN EXCEPT FOR THE "K" DIMENSION. ADDITIONAL CONCRETE & STEEL REQUIRED AS A RESULT OF THE SMALLER DIAMETER PIPE WILL BE CONSIDERED SUBSIDIARY TO ITEM 466.

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CROSS CULVERT #4
LAYOUT

SHEET 3 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		111

DATE: 1/30/2024 3:01:58 PM
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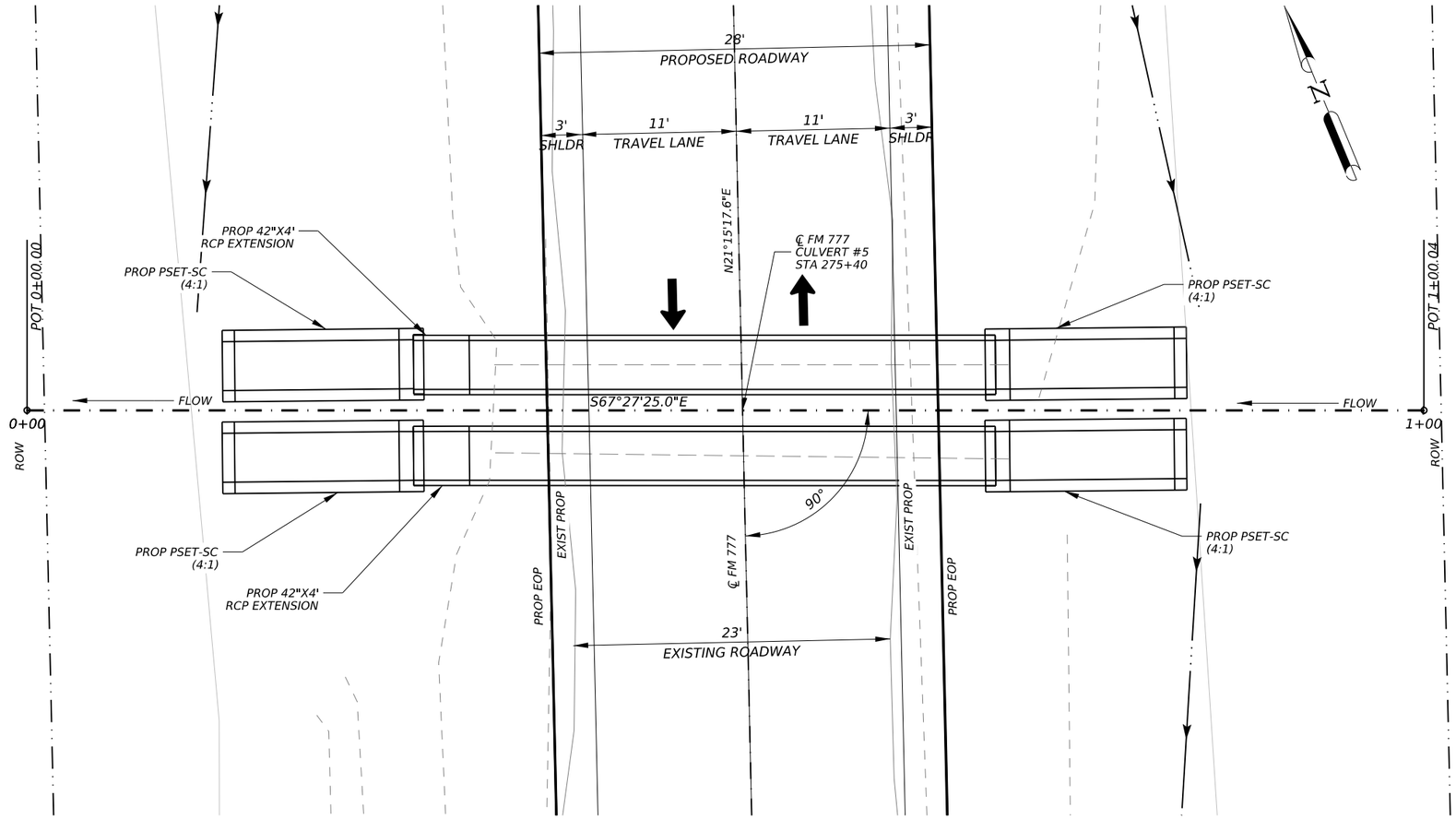
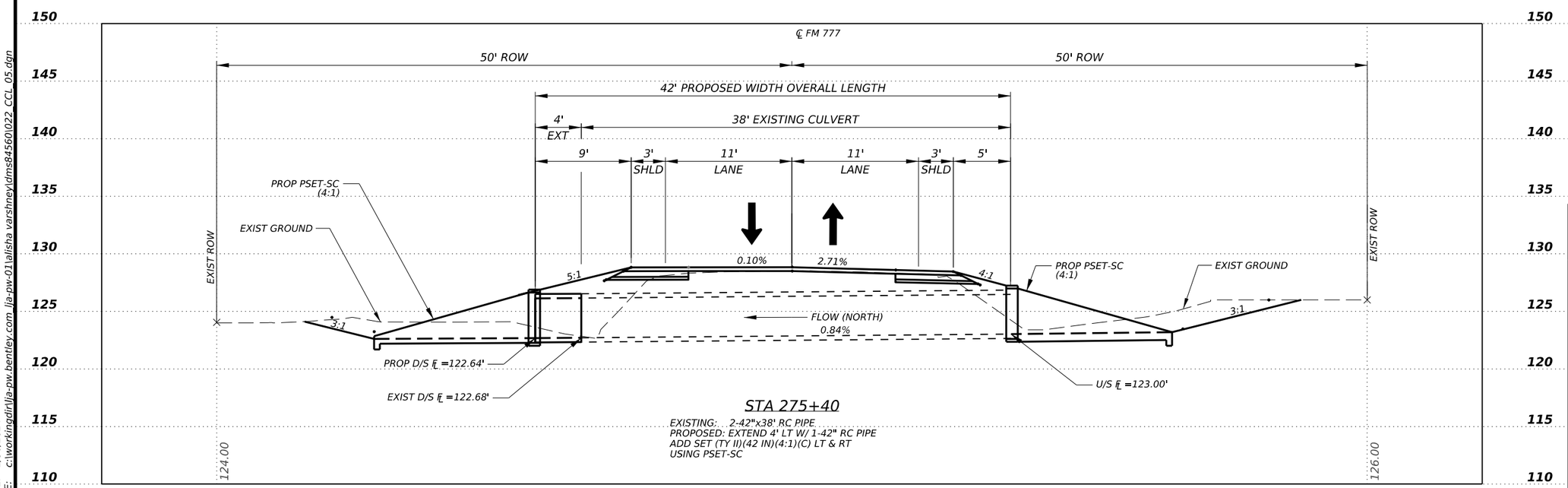


0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 275+40

EXISTING: 2-42"x38' RC PIPE
PROPOSED: EXTEND 4' LT W/ 1-42" RC PIPE
ADD SET (TY II)(42 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #5
LAYOUT

SHEET 4 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		112

DATE: 1/30/2024 3:02:20 PM
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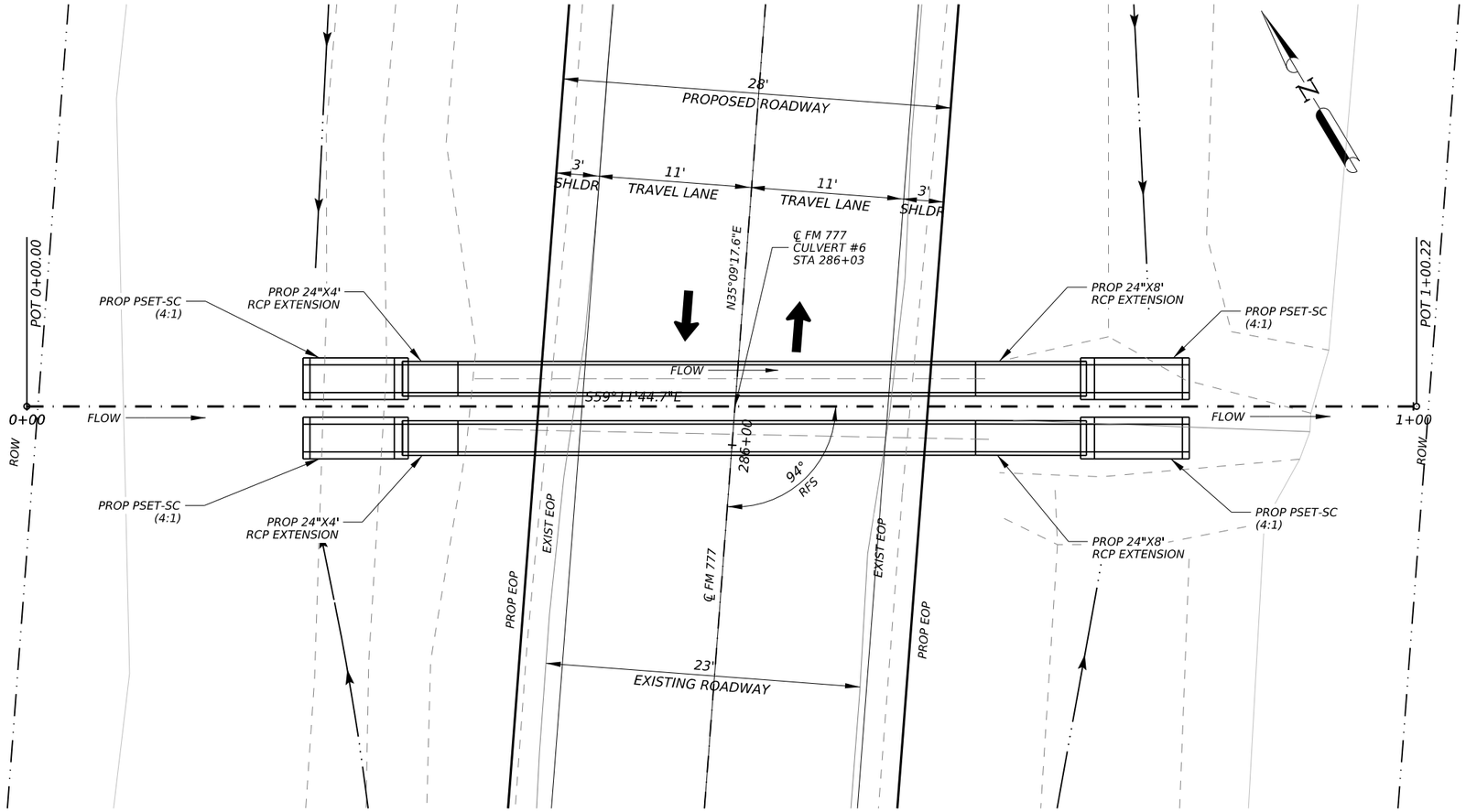
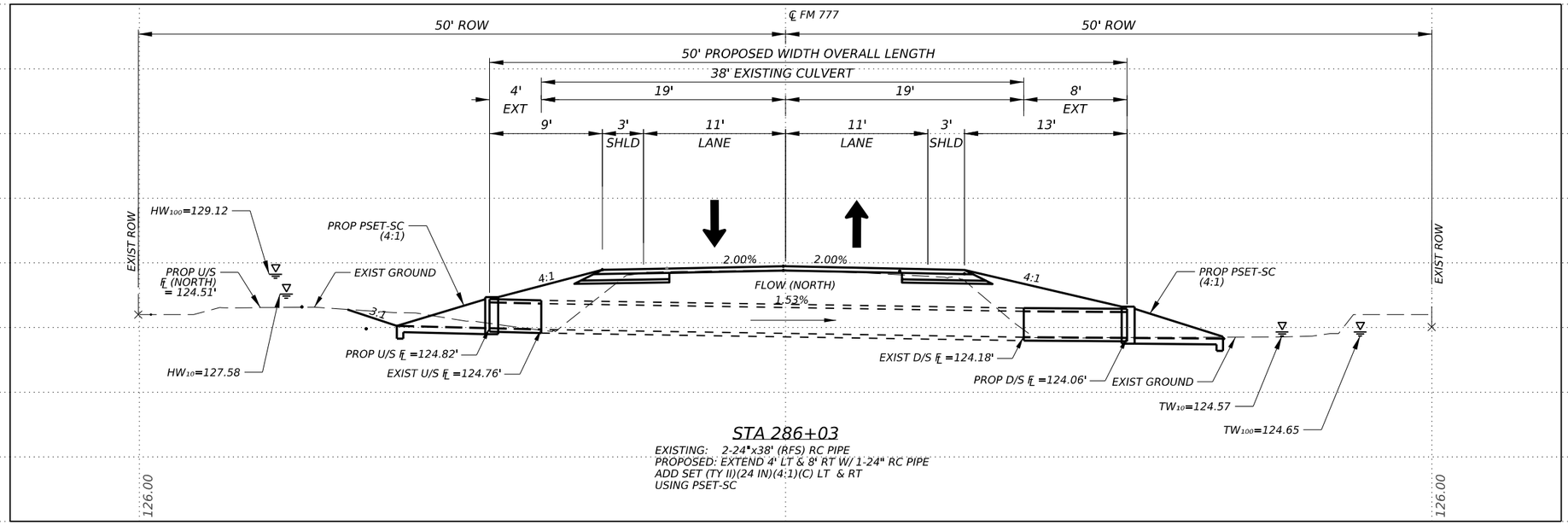


CULVERT HYDRAULIC DATA					
CULV-06	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	36.93	127.58	124.57	9.43
	100	53.99	129.12	124.65	10.41
EXISTING	10	36.93	127.46	124.57	9.15
	100	53.99	129.00	124.65	10.22

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 286+03

EXISTING: 2-24"x38' (RFS) RC PIPE
PROPOSED: EXTEND 4' LT & 8' RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #6
LAYOUT

SHEET 5 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		113

DATE: 1/30/2024 3:02:27 PM
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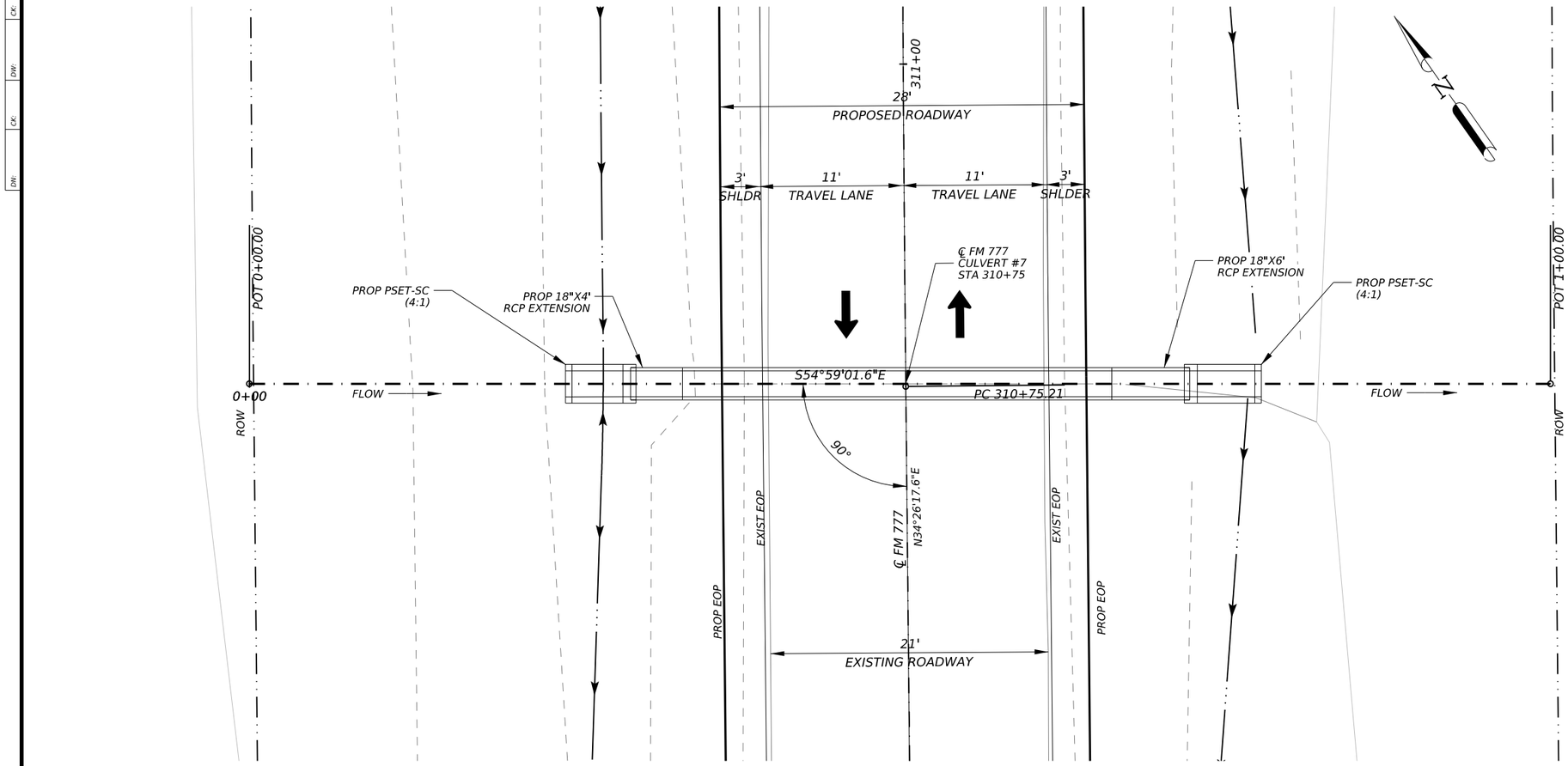
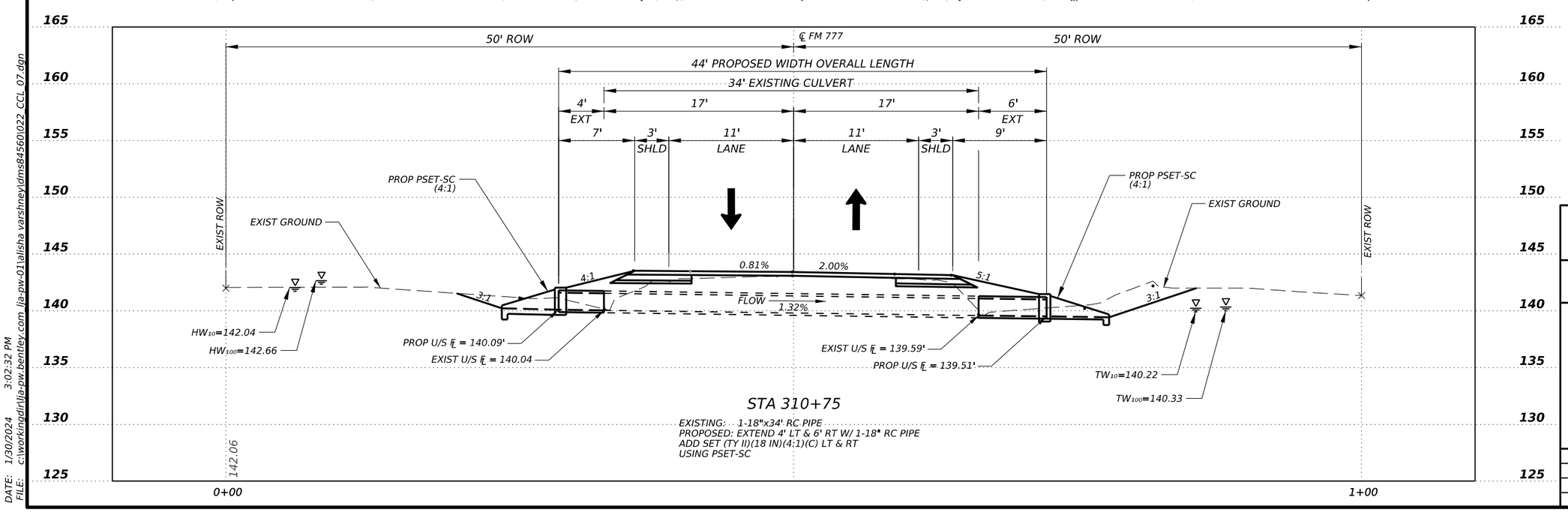


CULVERT HYDRAULIC DATA					
CULV-07	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	11.87	142.04	140.22	8.1
	100	17.12	142.66	140.33	8.85
EXISTING	10	11.87	141.93	14.22	7.82
	100	17.12	142.55	140.33	8.58

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 310+75

EXISTING: 1-18"x34' RC PIPE
PROPOSED: EXTEND 4' LT & 6' RT W/ 1-18" RC PIPE
ADD SET (TY II)(18 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #7
LAYOUT

SHEET 6 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		114

DATE: 1/30/2024 3:02:32 PM
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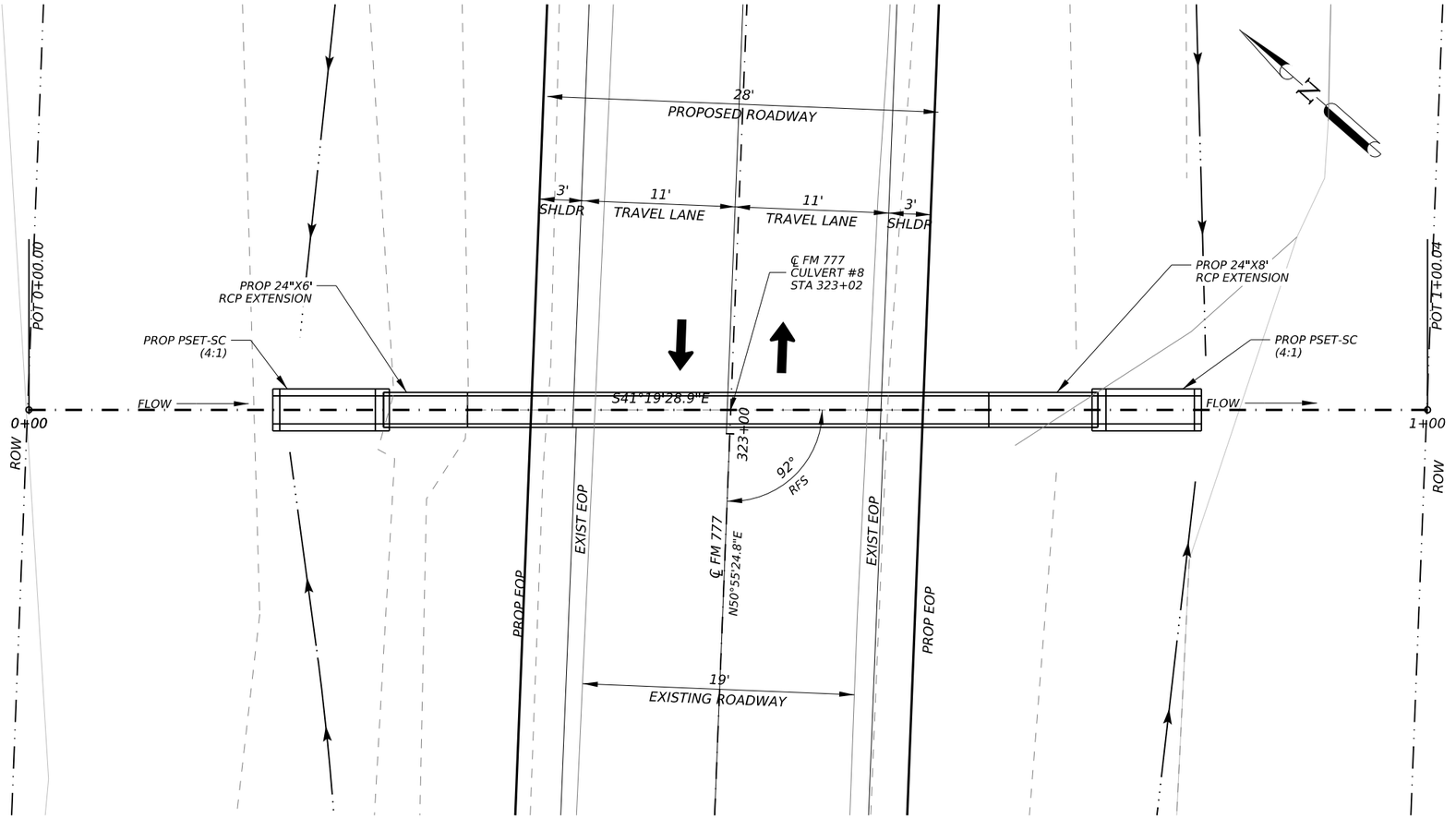
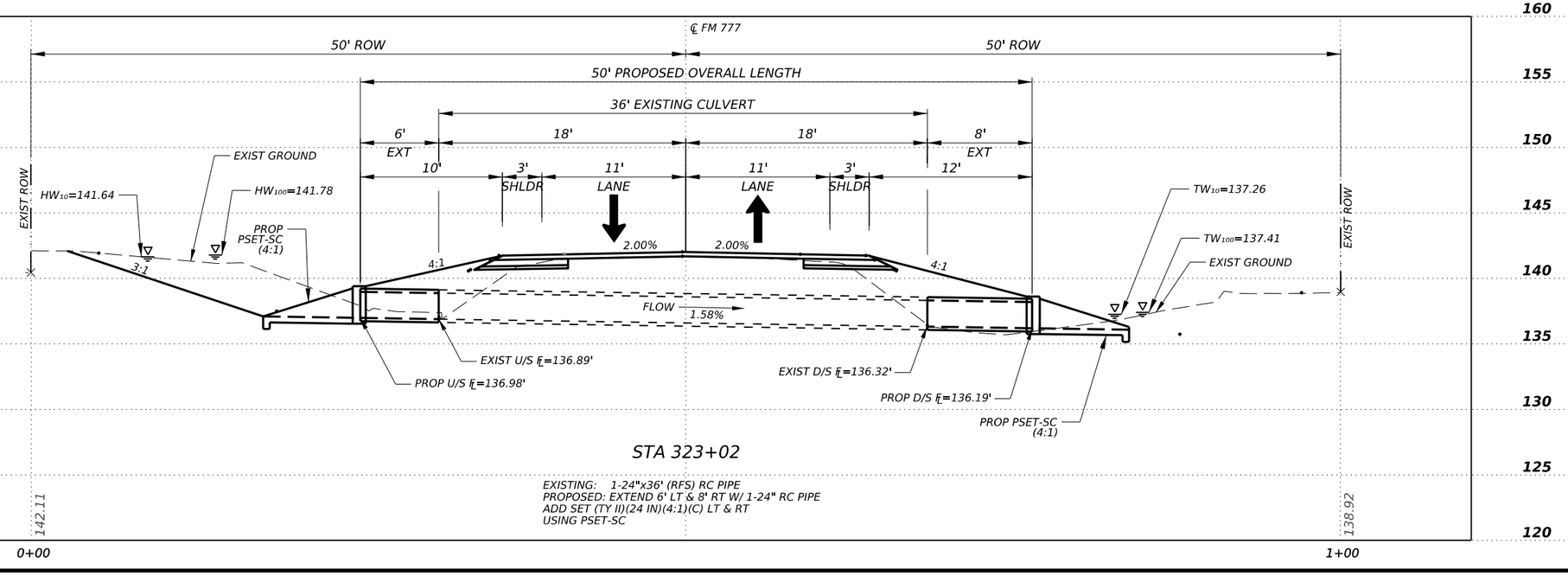


CULVERT HYDRAULIC DATA					
CULV-08	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	28.95	141.64	137.26	10.29
	100	41.30	141.78	137.41	10.33
EXISTING	10	28.95	141.58	137.26	10.52
	100	41.30	141.78	137.41	10.63

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 323+02

EXISTING: 1-24"x36' (RFS) RC PIPE
PROPOSED: EXTEND 6' LT & 8' RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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SHEET 7 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		115

DATE: 1/30/2024 3:02:39 PM
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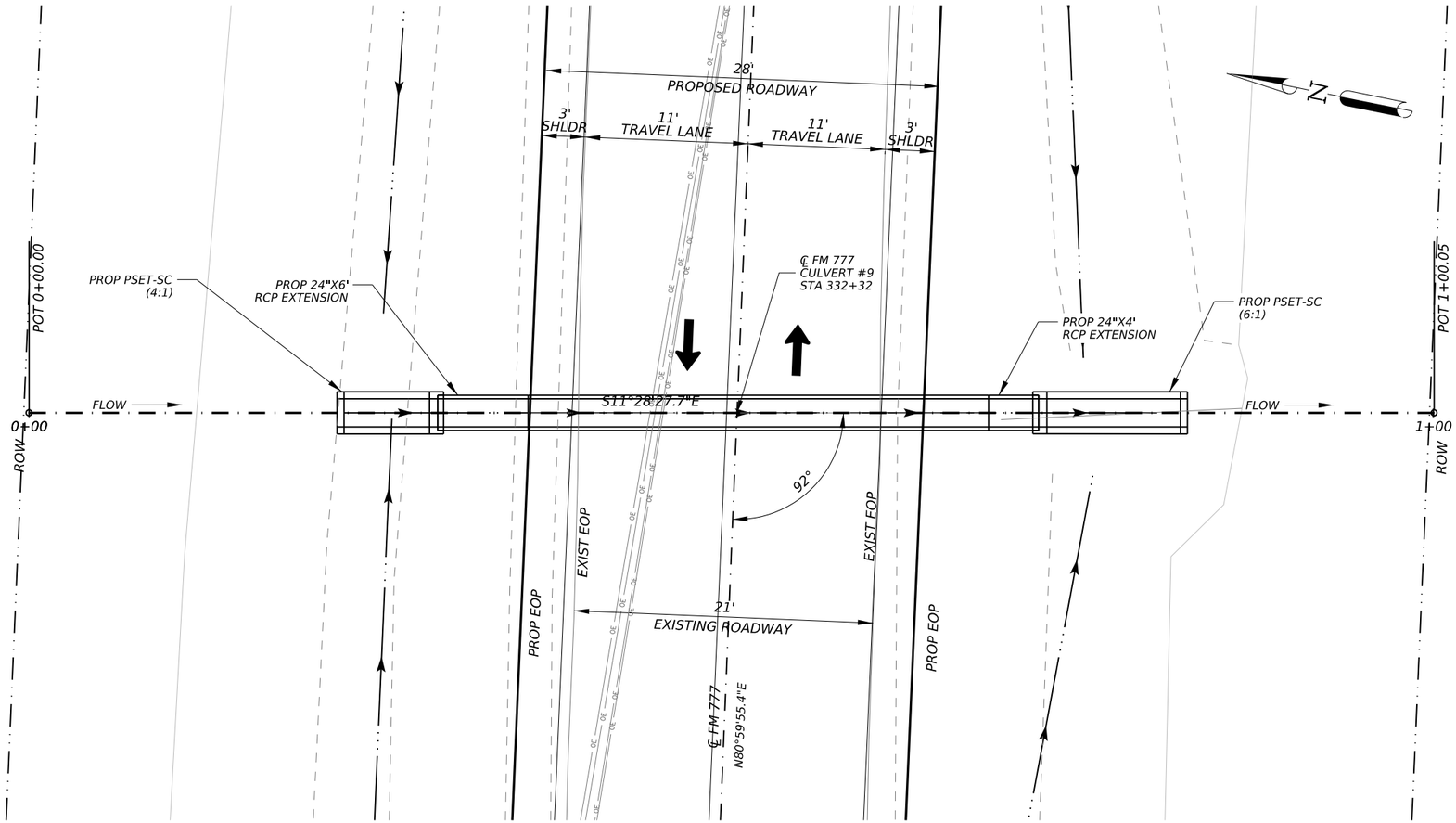
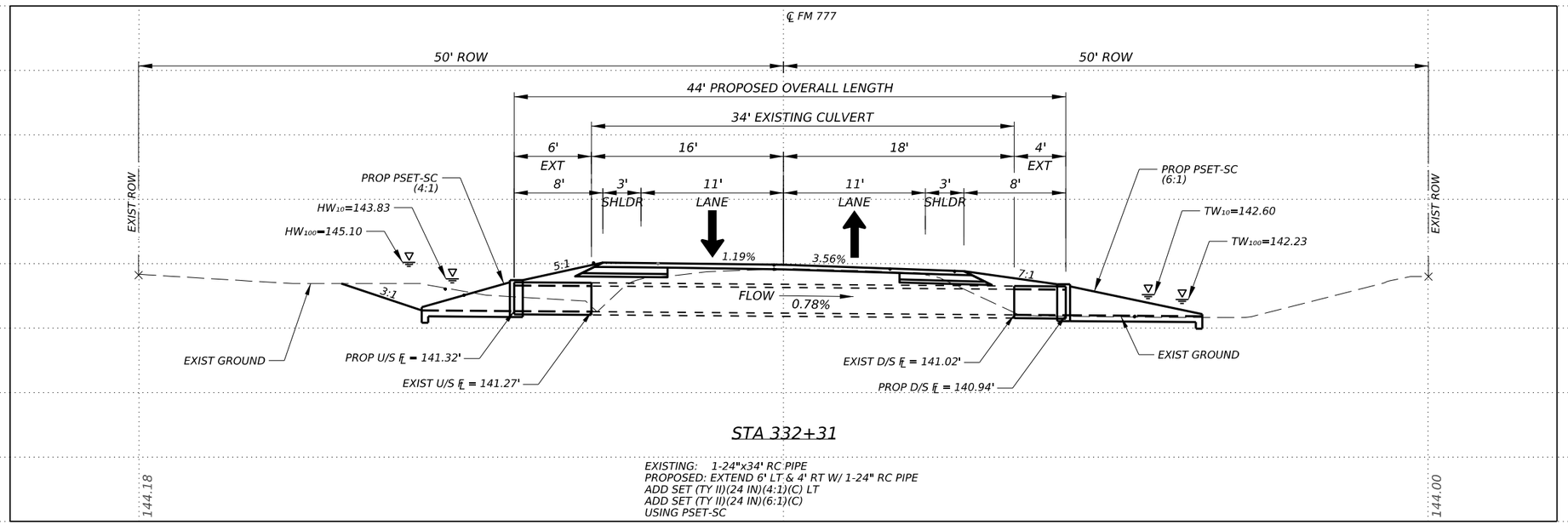


CULVERT HYDRAULIC DATA					
CULV-09	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	17.15	143.83	142.6	7.53
	100	24.79	145.10	142.23	8.48
EXISTING	10	17.15	143.79	142.60	7.37
	100	24.79	145.06	142.23	8.48

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



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CROSS CULVERT #9
LAYOUT

SHEET 8 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		116

DATE: 1/30/2024 3:02:44 PM
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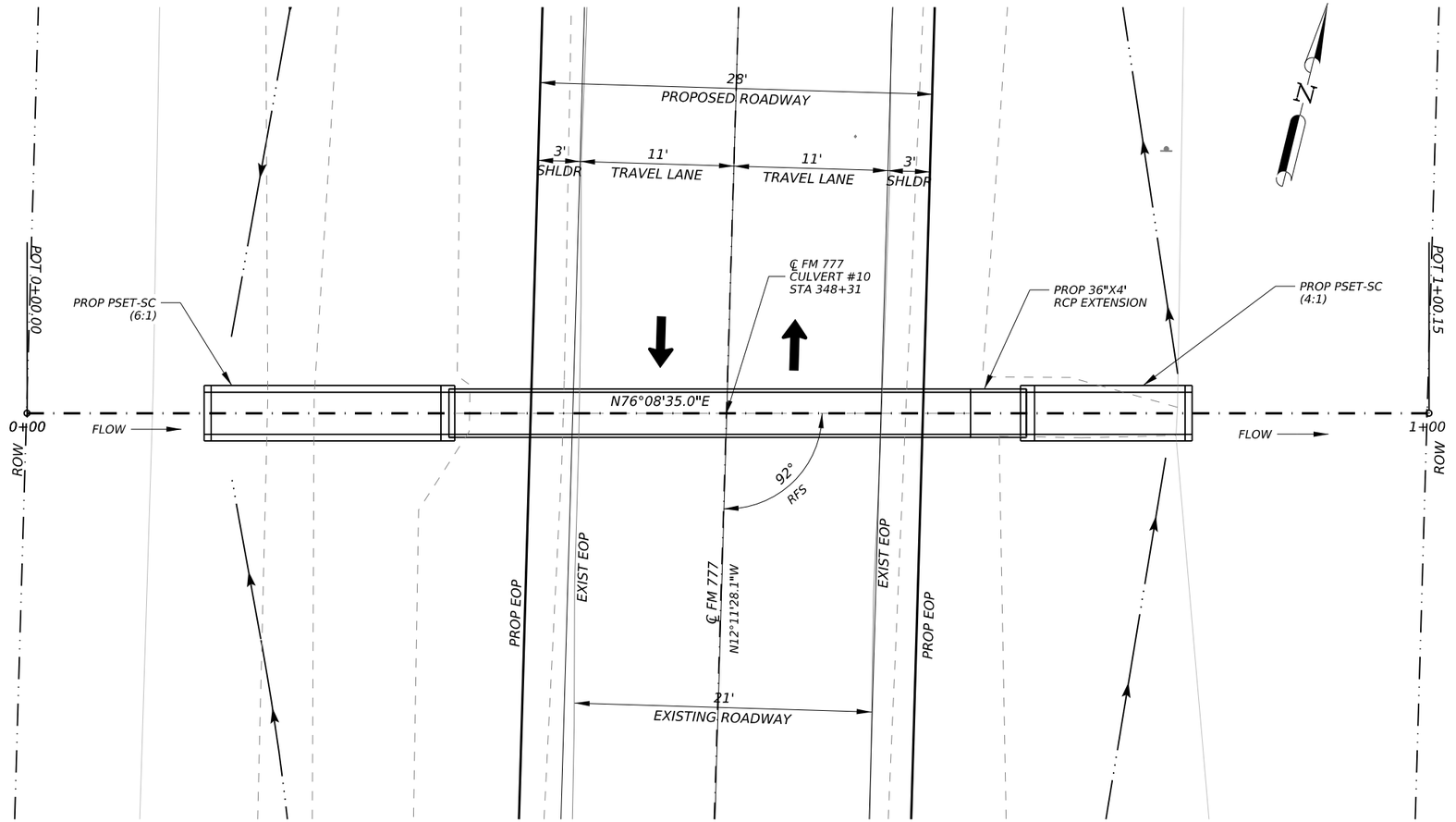

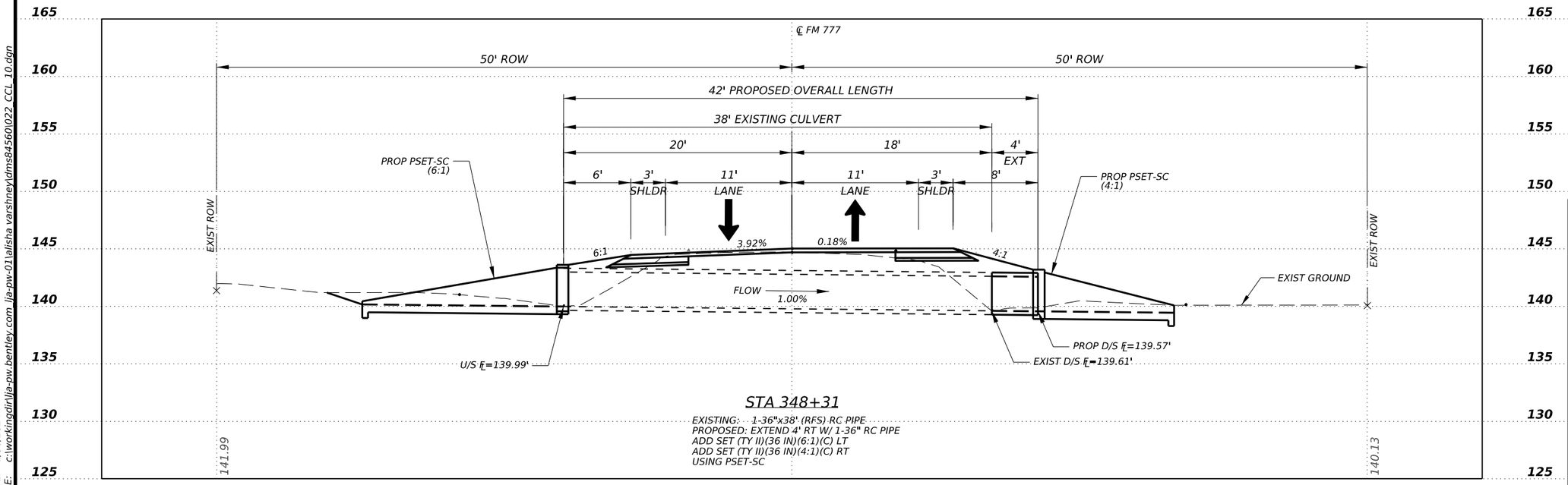

STA 348+31

EXISTING: 1-36"x38' (RFS) RC PIPE
PROPOSED: EXTEND 4' RT W/ 1-36" RC PIPE
ADD SET (TY II)(36 IN)(6:1)(C) LT
ADD SET (TY II)(36 IN)(4:1)(C) RT
USING PSET-SC

0' 5' 10'
SCALE: 1"= 10' H
1"= 5' V

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CROSS CULVERT #10
LAYOUT

SHEET 9 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		117

DATE: 1/30/2024 3:02:49 PM
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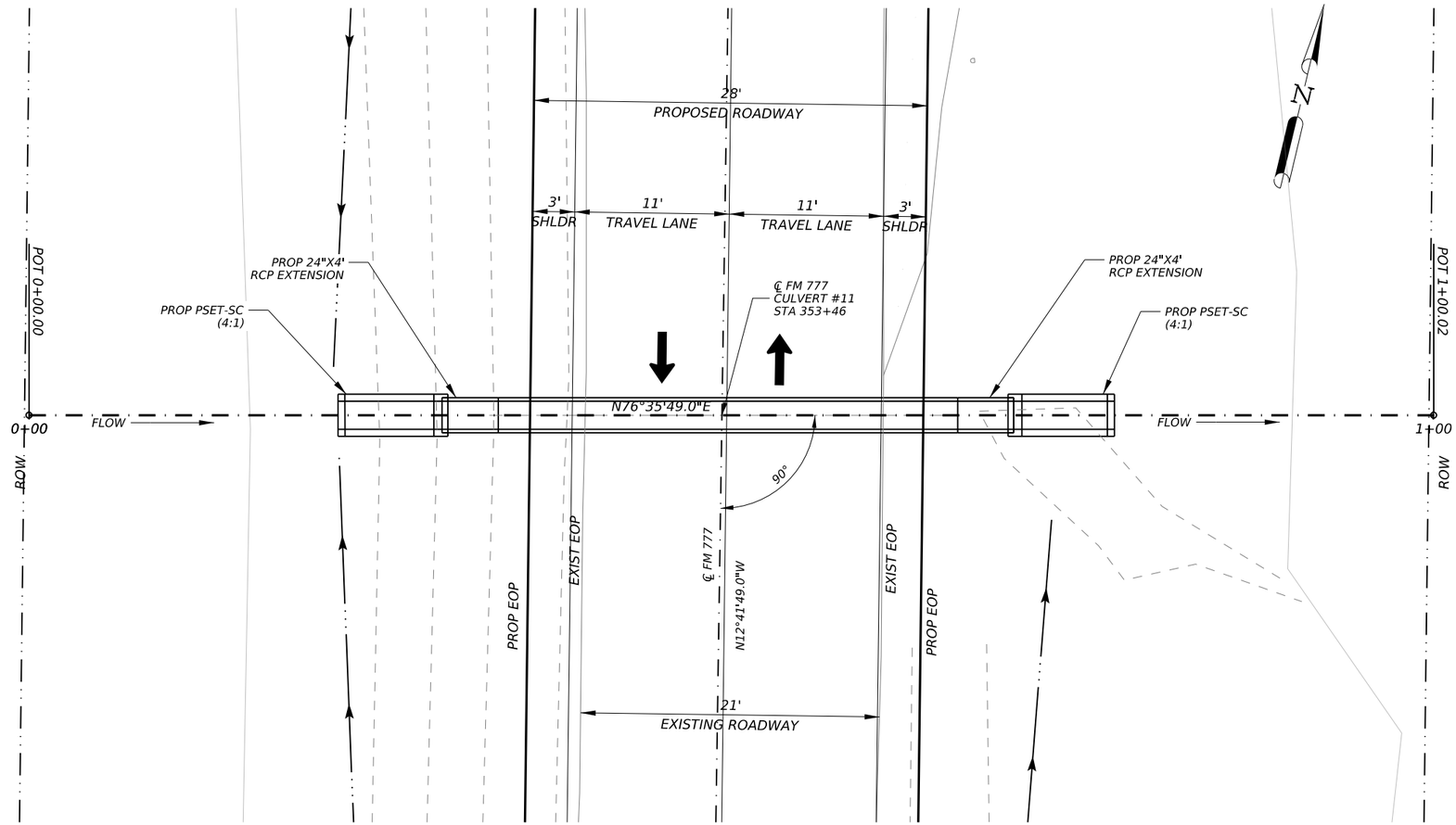
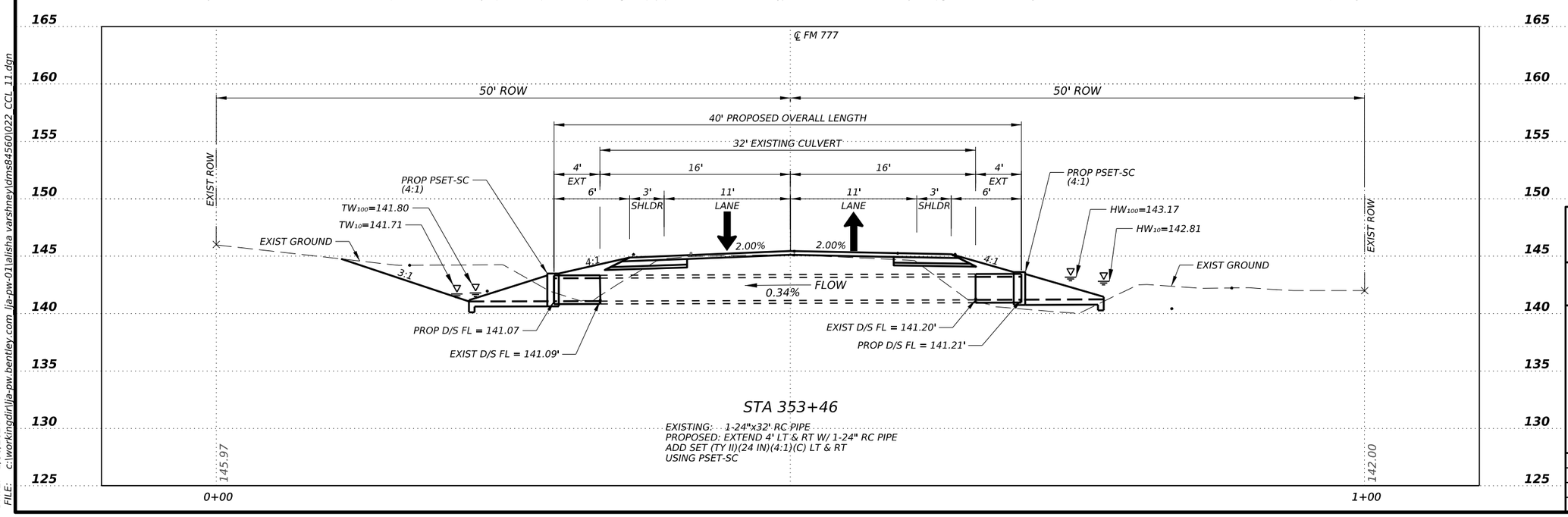


CULVERT HYDRAULIC DATA					
CULV-11	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	7.98	142.81	141.71	5.05
	100	11.39	143.17	141.80	5.72
EXISTING	10	7.98	142.78	141.71	5.05
	100	11.39	143.15	141.80	5.72

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 353+46

EXISTING: 1-24"x32' RC PIPE
PROPOSED: EXTEND 4' LT & RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #11
LAYOUT

SHEET 10 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		118

DATE: 1/30/2024 3:02:54 PM
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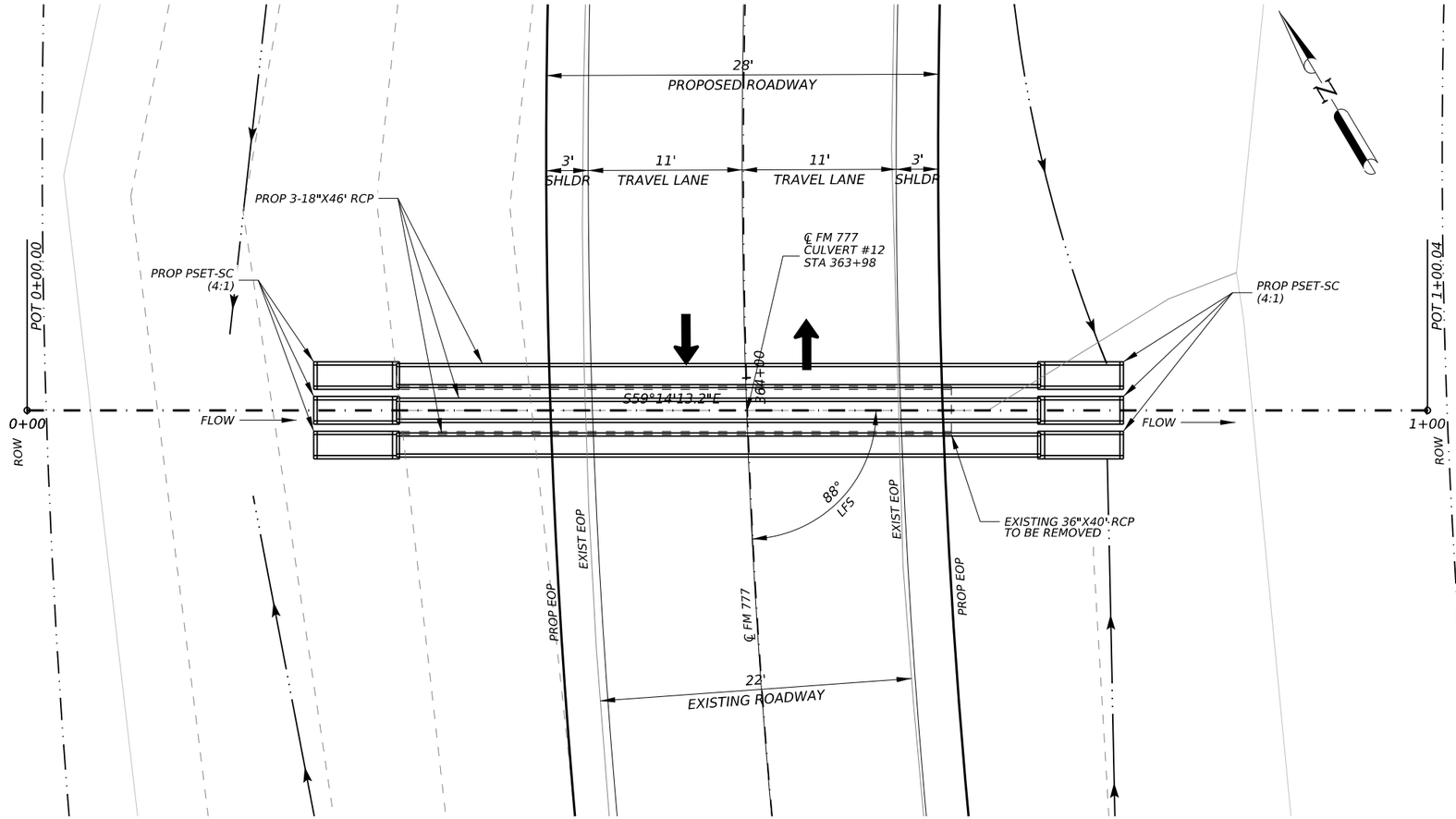
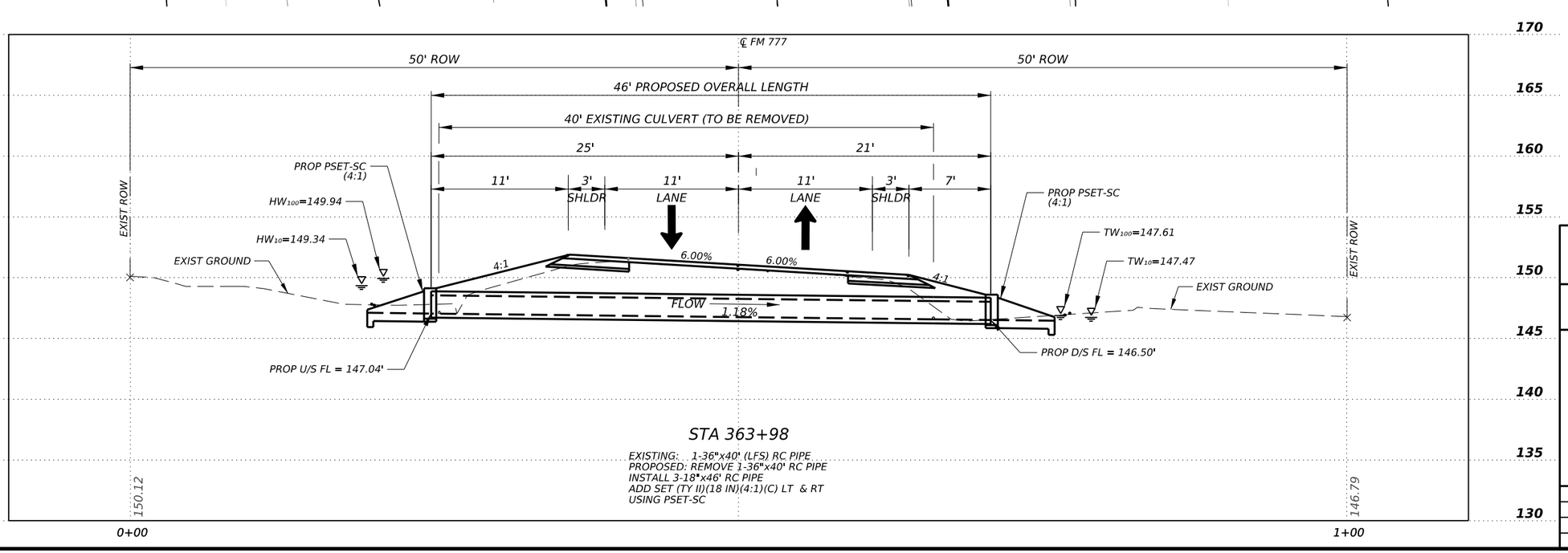


CULVERT HYDRAULIC DATA					
CULV-12	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	23.47	149.34	147.47	8.67
	100	33.75	149.94	147.61	9.47
EXISTING	10	23.47	149.34	147.47	8.58
	100	33.75	149.94	147.61	9.37

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 363+98

EXISTING: 1-36"x40' (LFS) RC PIPE
PROPOSED: REMOVE 1-36"x40' RC PIPE
INSTALL 3-18"x46' RC PIPE
ADD SET (TY II)(18 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #12
LAYOUT

SHEET 11 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		119

DATE: 1/30/2024 3:02:59 PM
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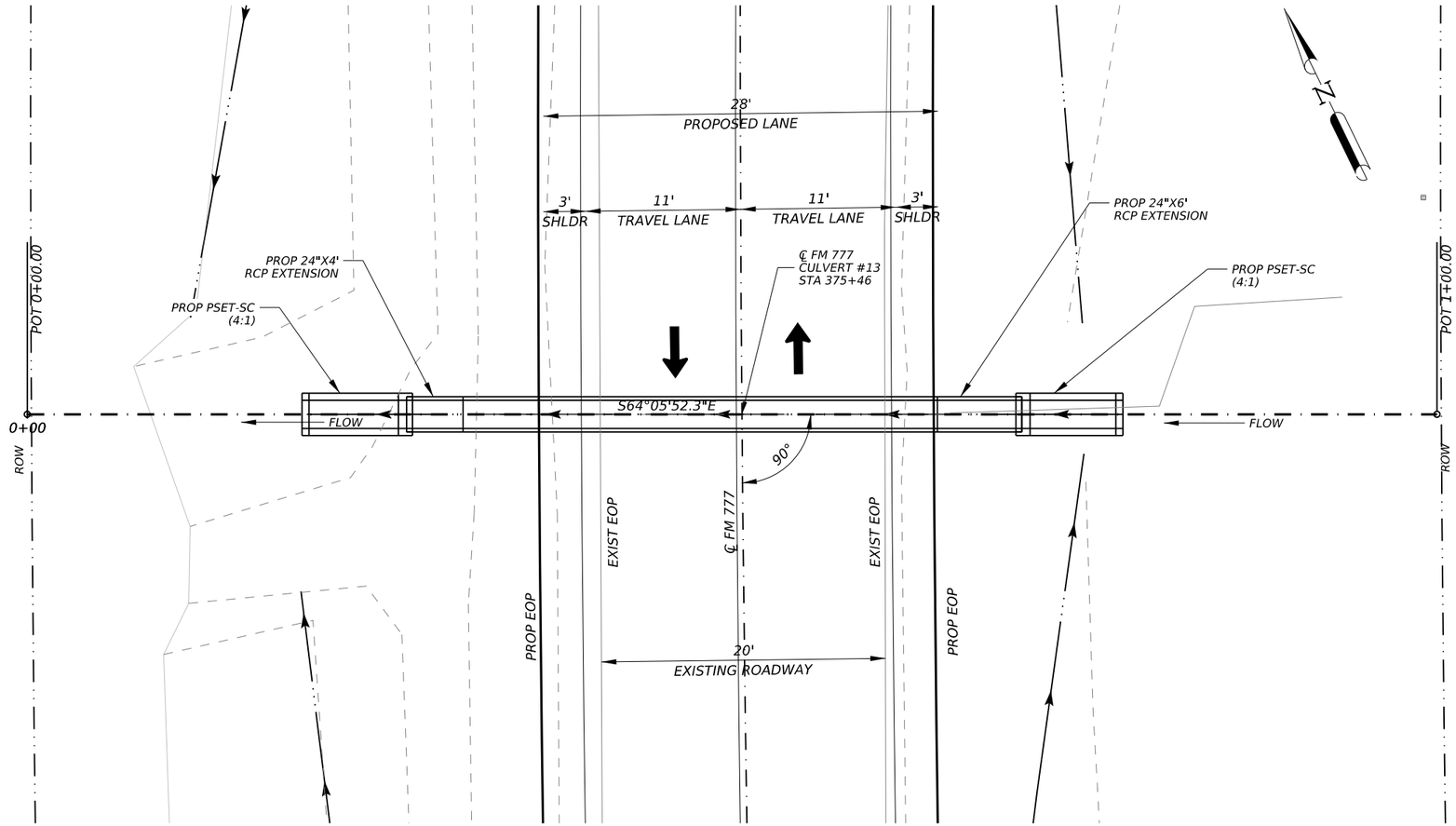
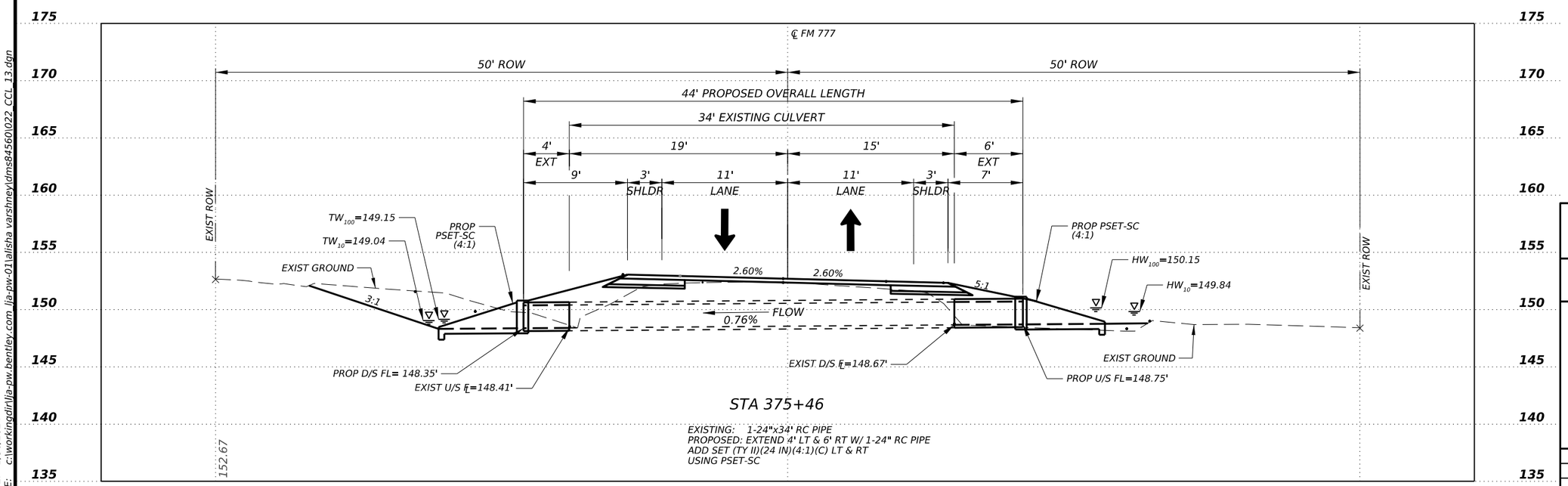


CULVERT HYDRAULIC DATA					
CULV-13	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	9.93	149.84	149.04	5.44
	100	14.58	150.15	149.15	6.02
EXISTING	10	9.93	149.77	149.04	5.34
	100	14.58	150.07	149.15	5.90

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



STA 375+46

EXISTING: 1-24"x34' RC PIPE
PROPOSED: EXTEND 4' LT & 6' RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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LAYOUT

SHEET 12 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		120

DATE: 1/30/2024 3:03:04 PM
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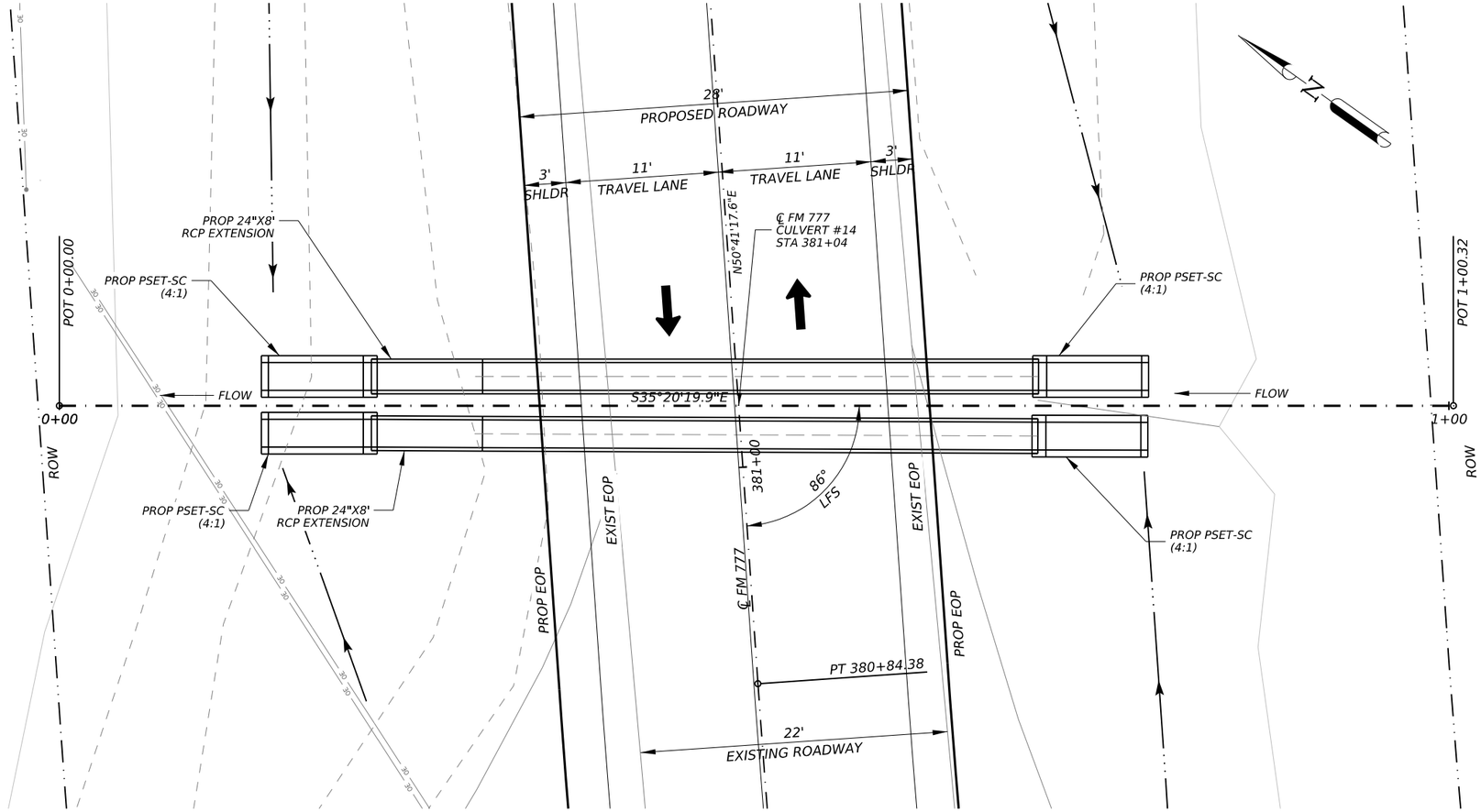

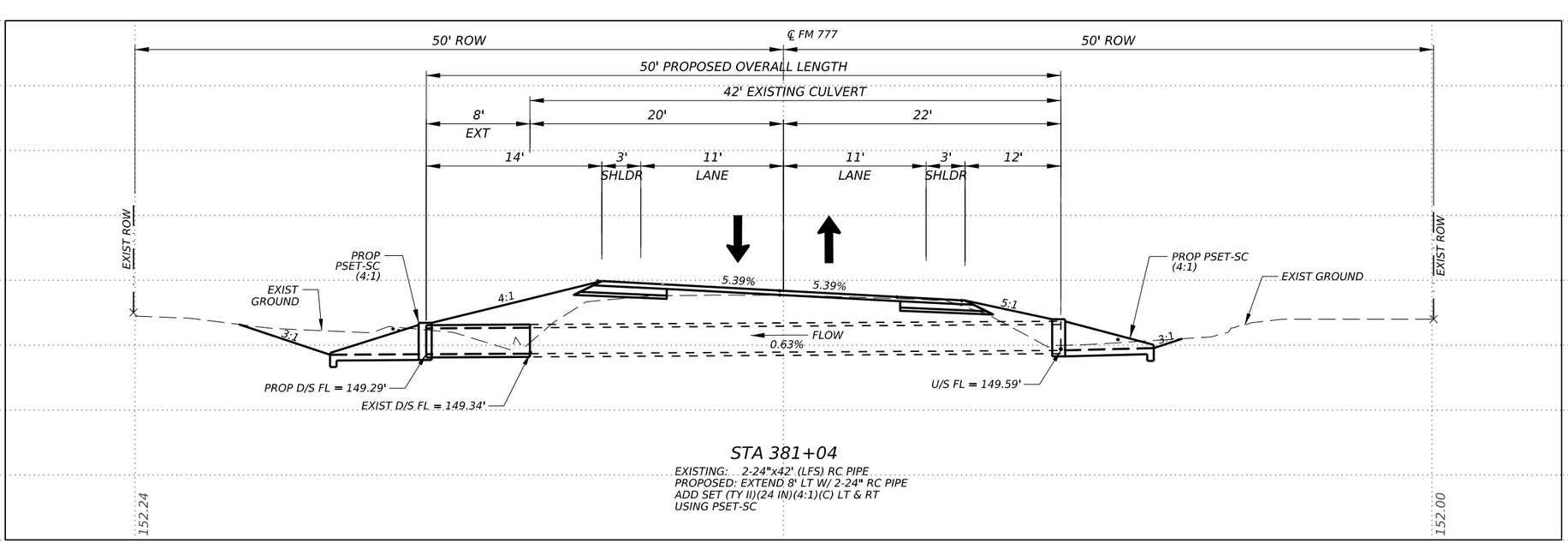

STA 381+04

EXISTING: 2-24"x42' (LFS) RC PIPE
PROPOSED: EXTEND 8' LT W/ 2-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #14
LAYOUT

SHEET 13 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		121

DATE: 1/30/2024 3:03:09 PM
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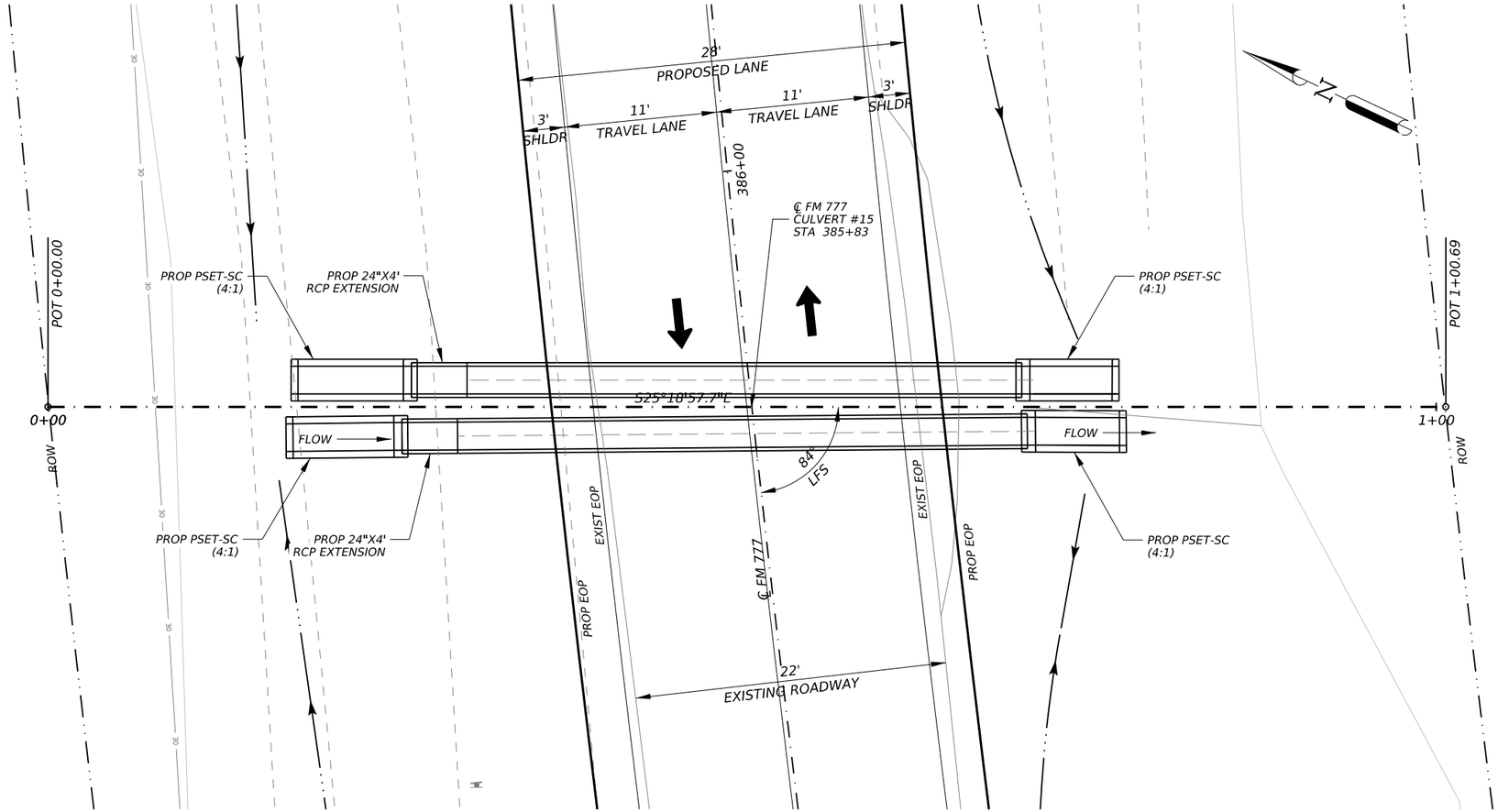

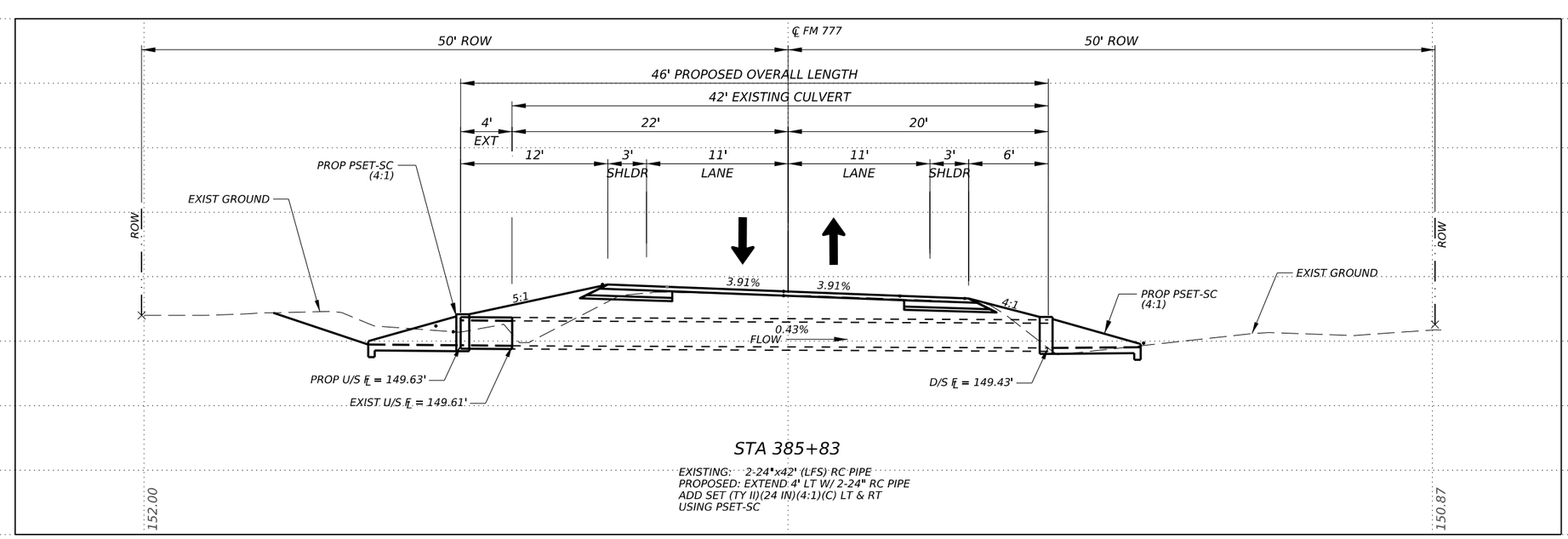

STA 385+83

EXISTING: 2-24"x42' (LFS) RC PIPE
PROPOSED: EXTEND 4' LT W/ 2-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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CROSS CULVERT #15
LAYOUT

SHEET 14 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		122

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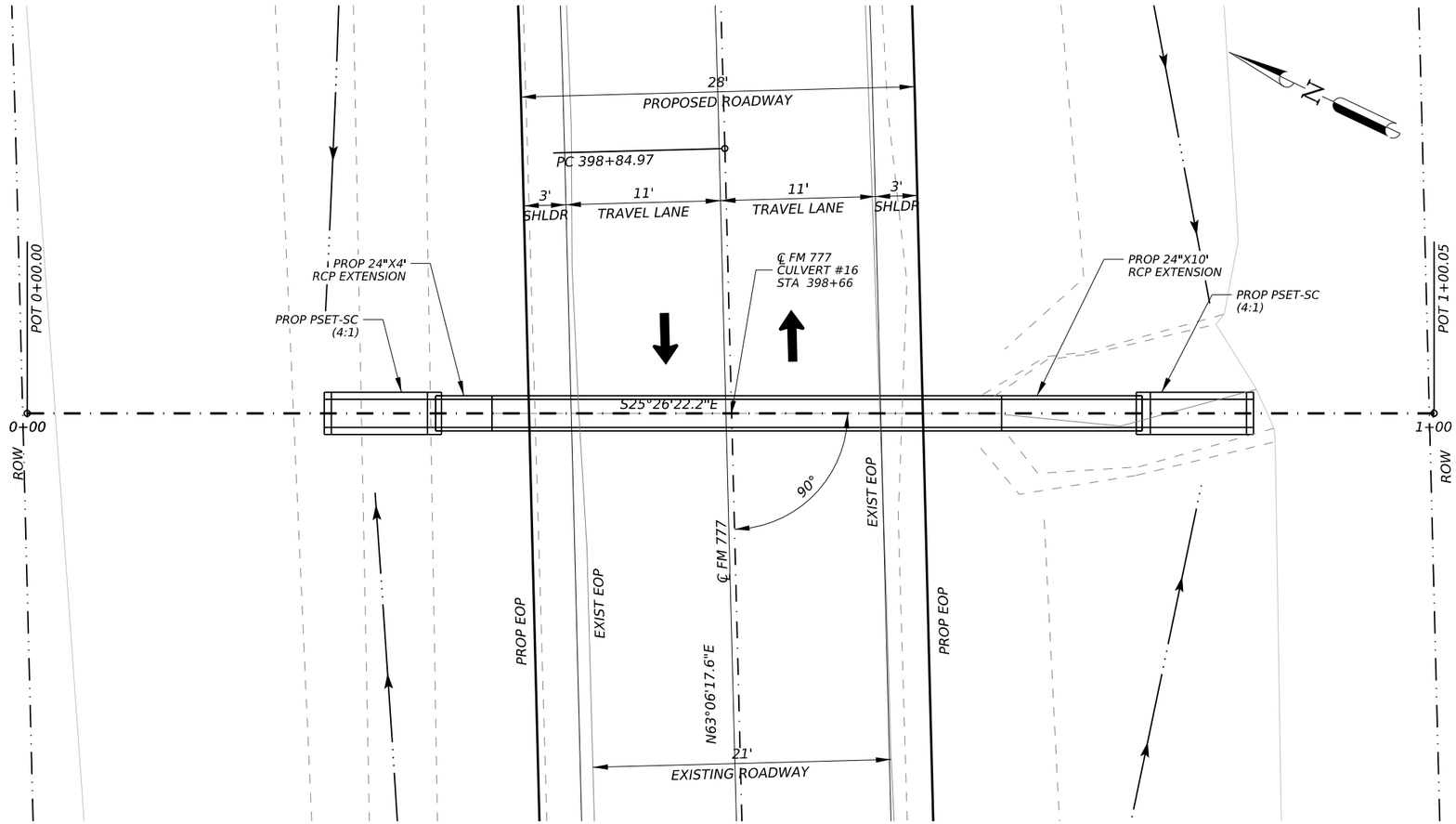
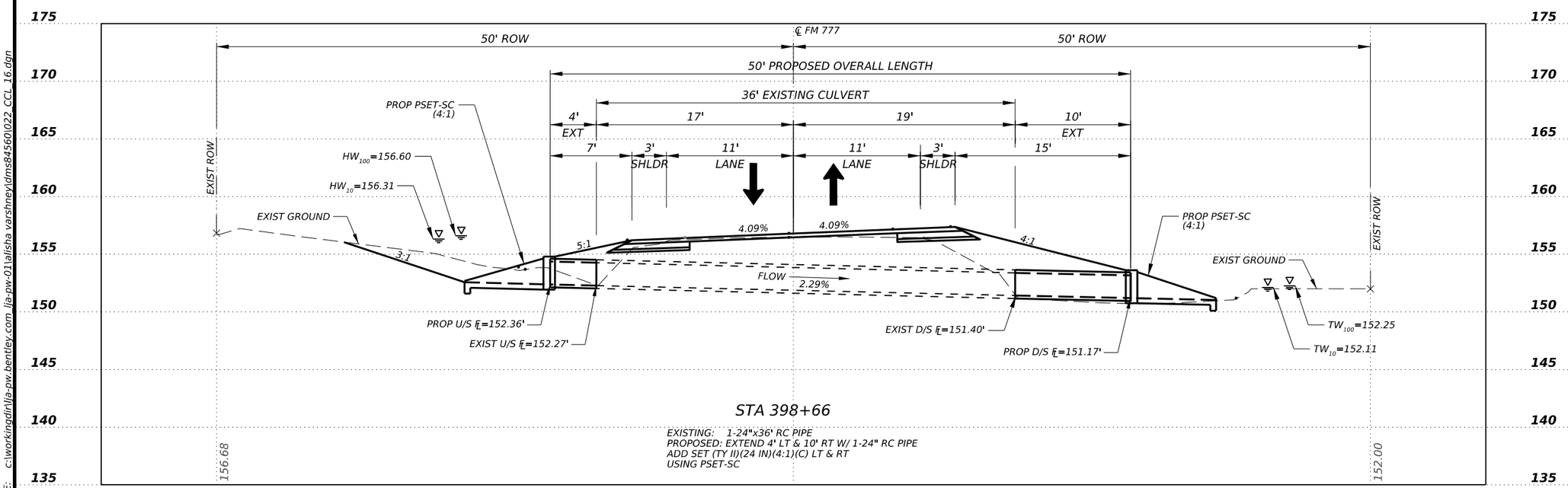




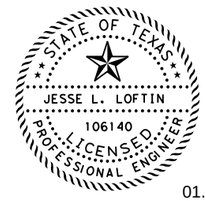
STA 398+66

EXISTING: 1-24"x36' RC PIPE
PROPOSED: EXTEND 4' LT & 10' RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

CULVERT HYDRAULIC DATA					
CULV-16	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	25.40	156.31	152.11	11.50
	100	36.25	156.60	152.25	11.64
EXISTING	10	25.40	156.17	152.11	11.08
	100	36.25	156.60	152.25	11.35

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V



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FRN - F-14256

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FM 777
CROSS CULVERT #16
LAYOUT

SHEET 15 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		123

DATE: 1/30/2024 3:03:19 PM
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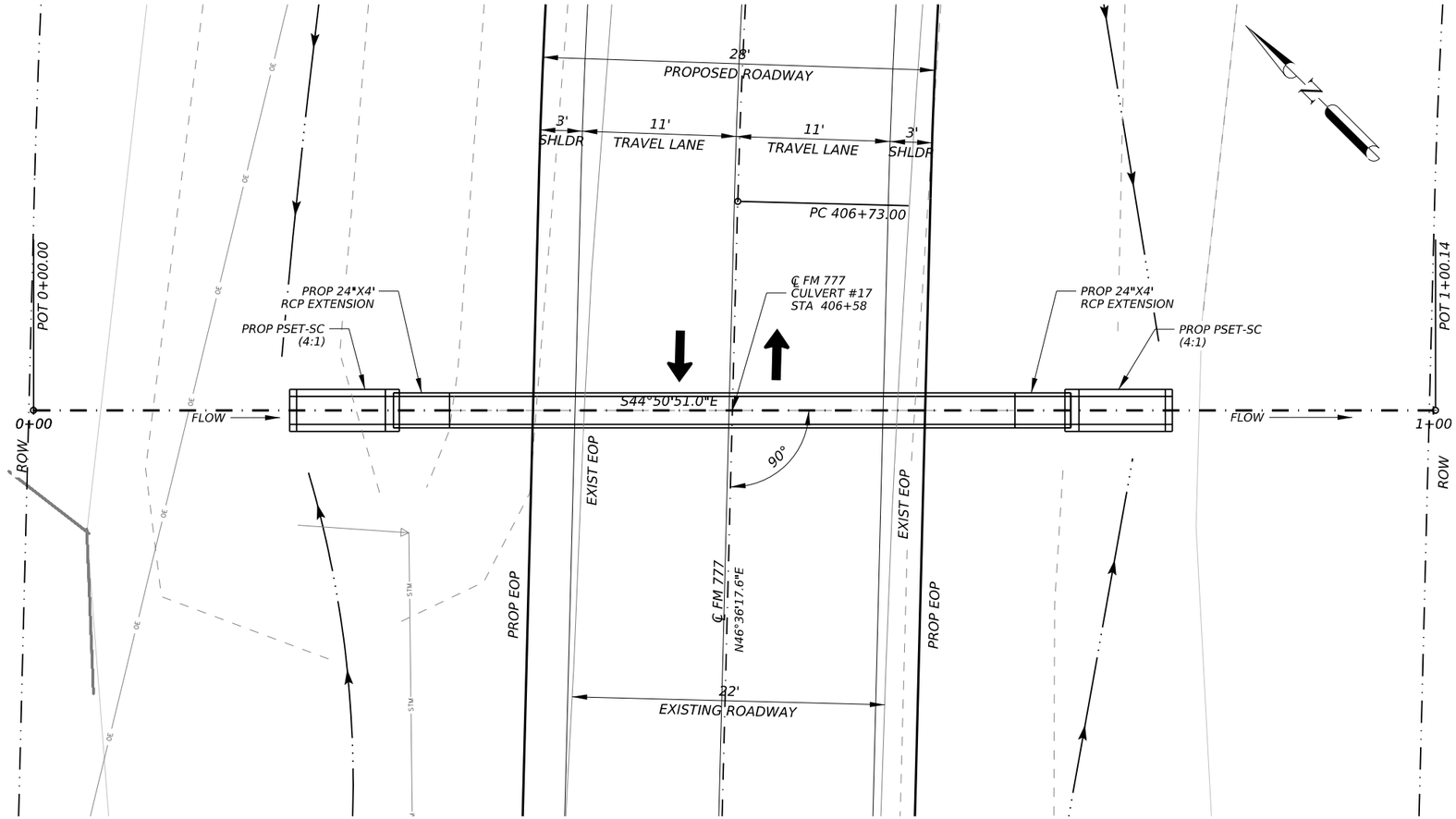

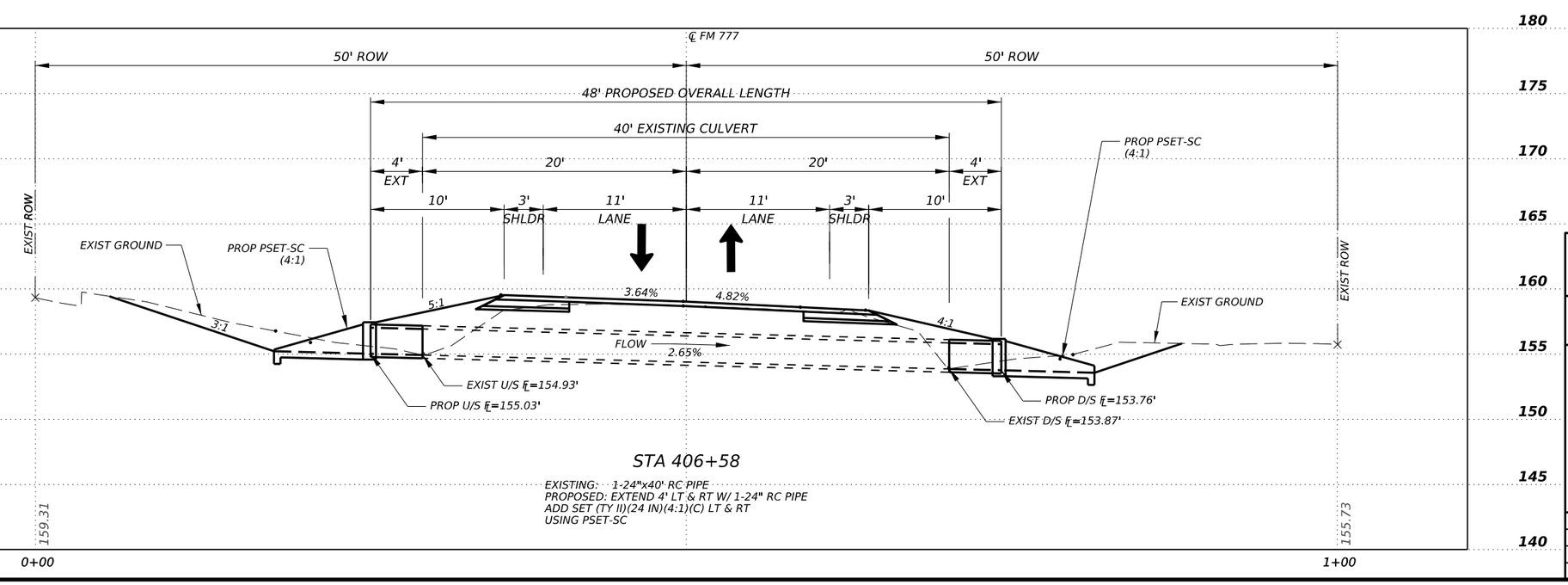

STA 406+58

EXISTING: 1-24"x40' RC PIPE
PROPOSED: EXTEND 4' LT & RT W/ 1-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

0' 5' 10'
SCALE: 1"= 10' H
1"= 5' V

STATE OF TEXAS
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FM 777
CROSS CULVERT #17
LAYOUT

SHEET 16 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		124

DATE: 1/30/2024 3:03:25 PM
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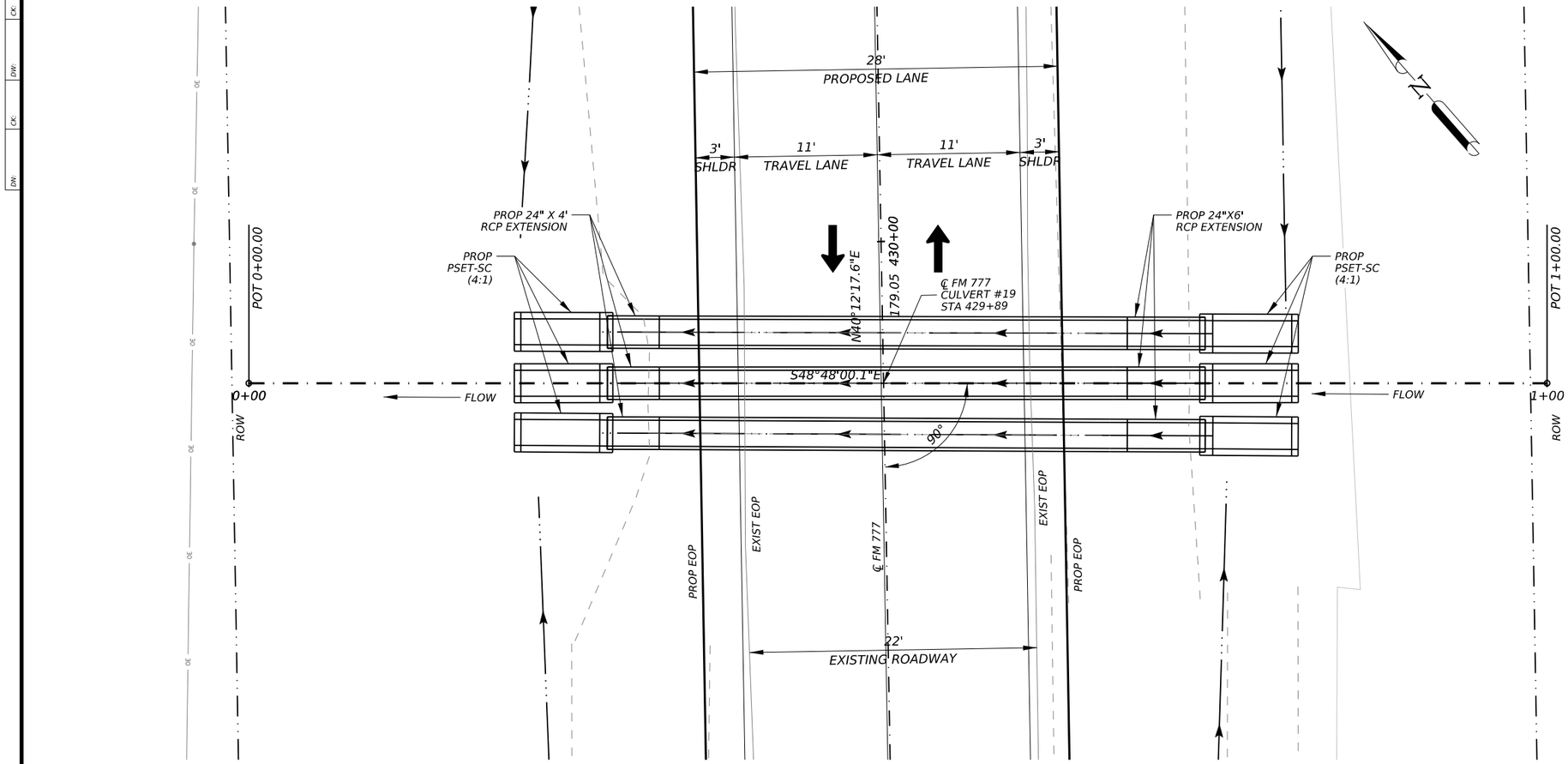

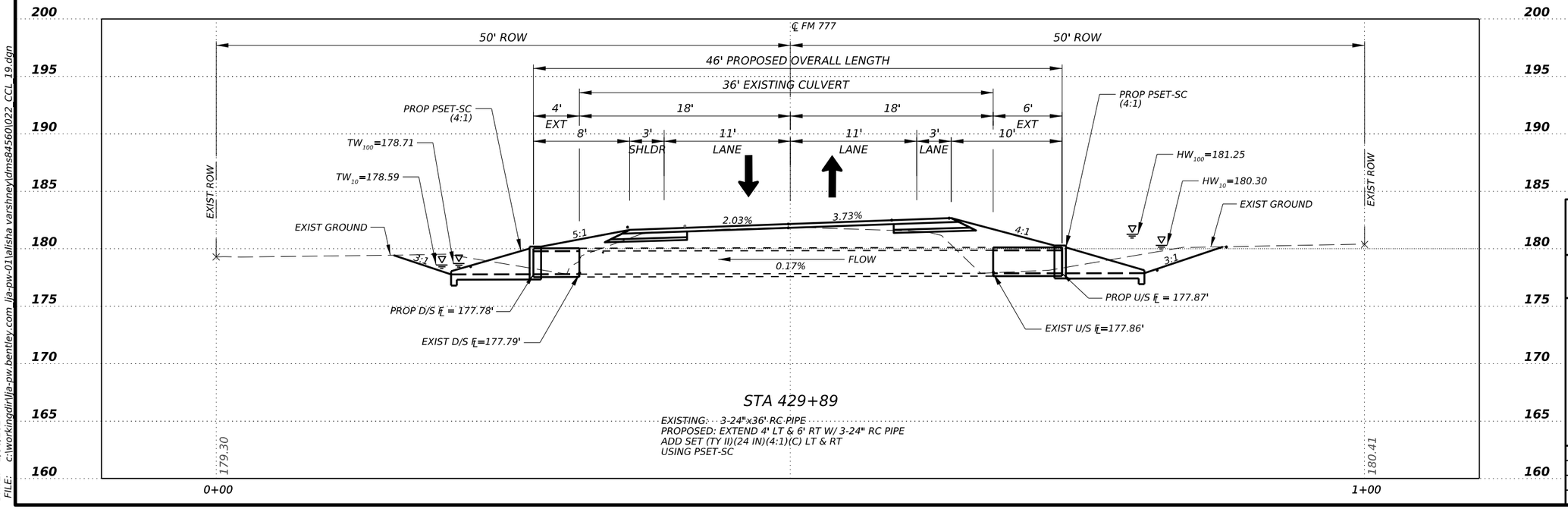

STA 429+89

EXISTING: 3-24"x36' RC PIPE
PROPOSED: EXTEND 4' LT & 6' RT W/ 3-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

CULVERT HYDRAULIC DATA					
CULV-19	FREQ (YRS)	Q (CFS)	HW (ELEV)	TW (ELEV)	V (FPS)
PROPOSED	10	15.60	180.30	178.59	6.52
	100	22.29	181.25	178.71	7.89
EXISTING	10	15.60	180.26	178.59	6.52
	100	22.29	181.18	178.71	7.89

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V

STATE OF TEXAS
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FM 777
CROSS CULVERT #19
LAYOUT

SHEET 17 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		125

DATE: 1/30/2024 3:03:30 PM
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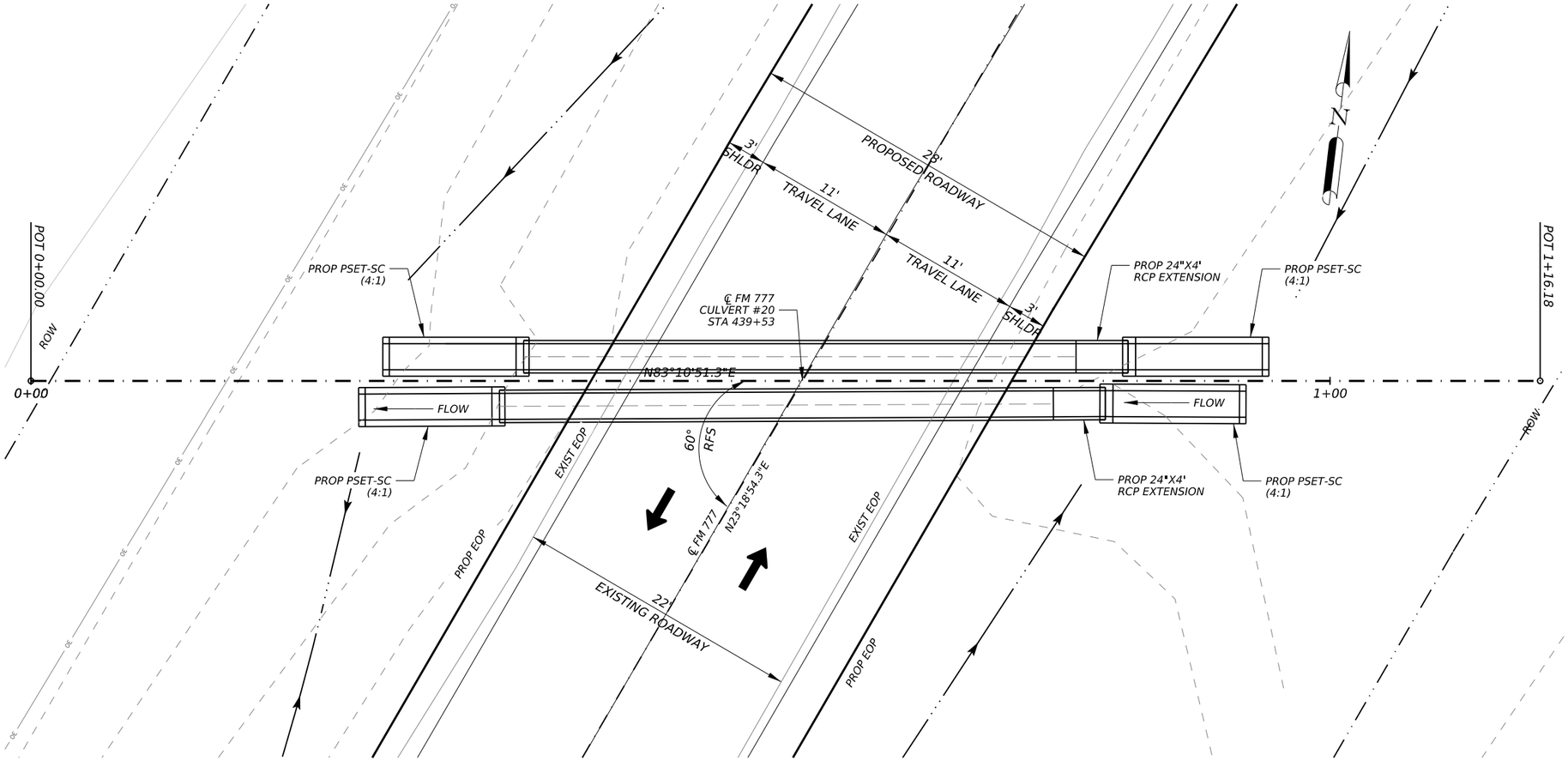

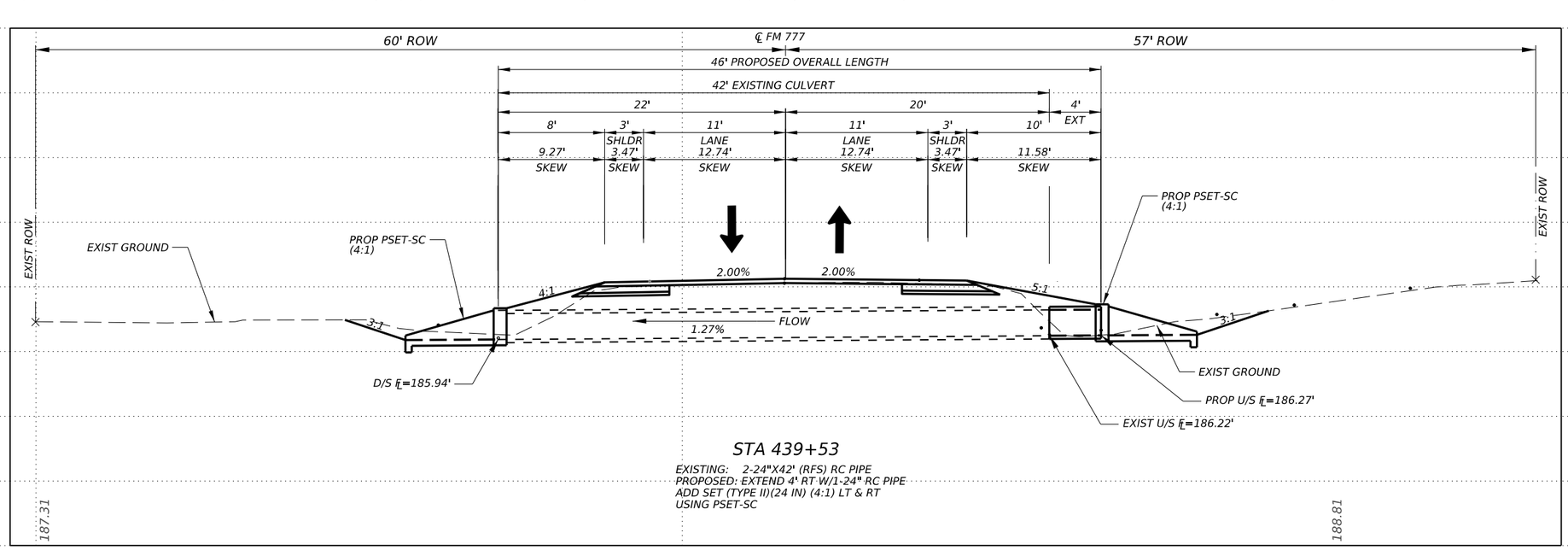

STA 439+53

EXISTING: 2-24"X42' (RFS) RC PIPE
PROPOSED: EXTEND 4' RT W/1-24" RC PIPE
ADD SET (TYPE II)(24 IN) (4:1) LT & RT
USING PSET-SC

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FM 777
CROSS CULVERT #20
LAYOUT

SHEET 18 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		126

DATE: 1/30/2024 3:03:36 PM
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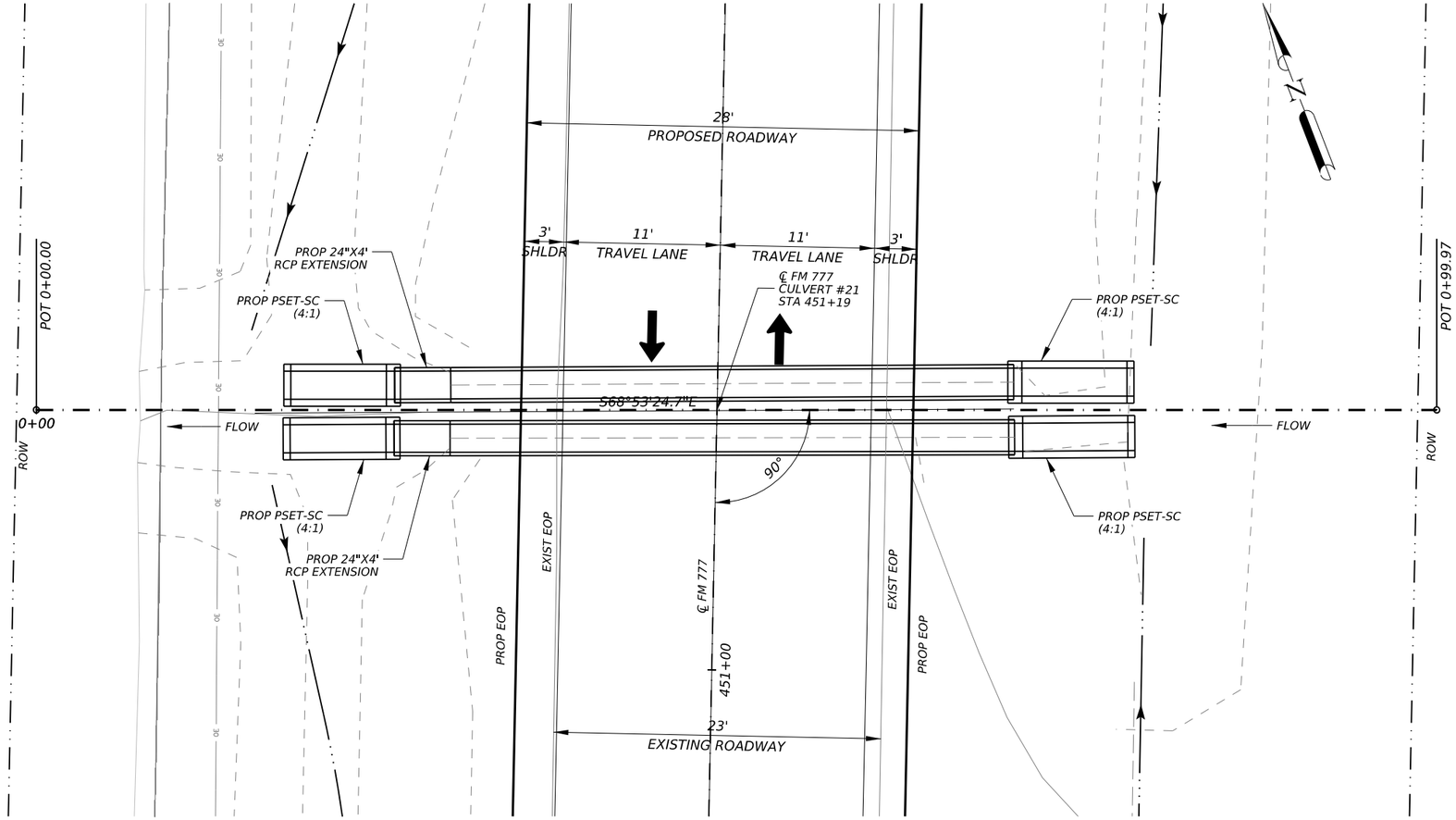

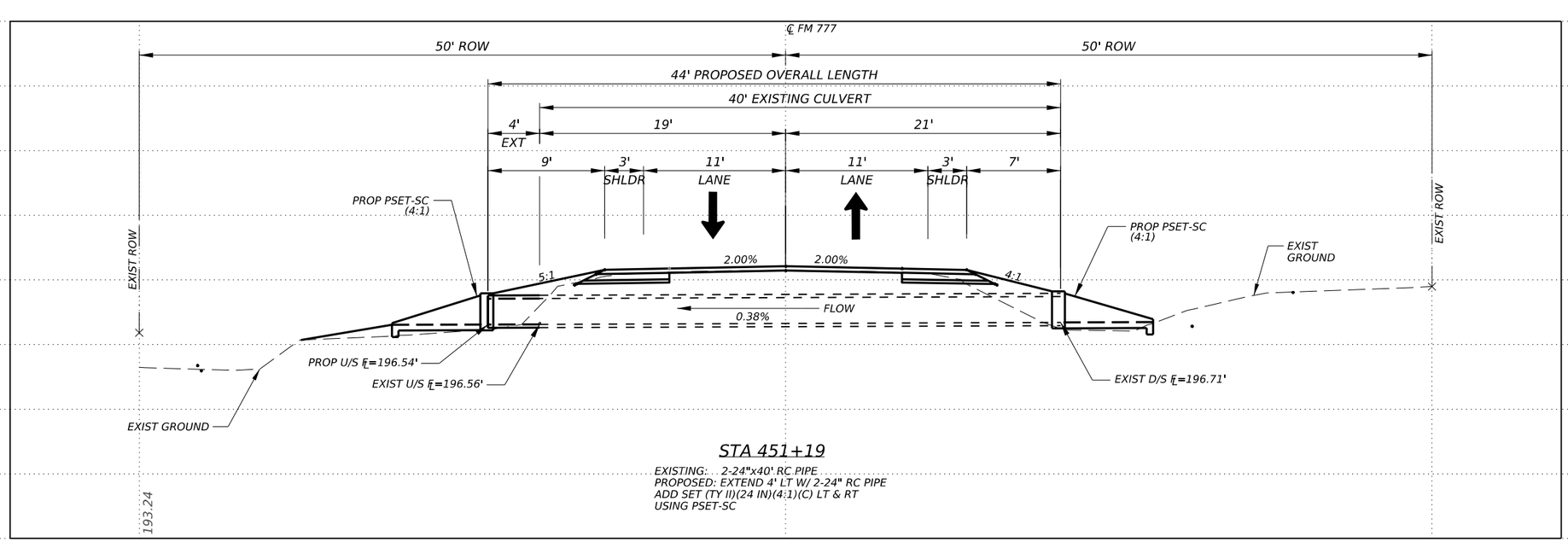

STA 451+19

EXISTING: 2-24"x40' RC PIPE
PROPOSED: EXTEND 4' LT W/ 2-24" RC PIPE
ADD SET (TY II)(24 IN)(4:1)(C) LT & RT
USING PSET-SC

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FM 777
CROSS CULVERT #21
LAYOUT

SHEET 19 OF 19

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		127

DATE: 1/30/2024 3:03:43 PM
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HYDRAULIC DATA CULV-02		
	PROPOSED	EXISTING
Q10 (CFS)	32.75	32.75
Q100 (CFS)	47.03	47.03
V10 (FT/S)	10.08	9.85
V100 (FT/S)	10.31	10.81
HW10 (FT)	128.51	128.51
HW100 (FT)	129.43	129.43
TW10 (FT)	125.86	125.86
TW100 (FT)	126.00	126.00

HYDRAULIC DATA CULV-03		
	PROPOSED	EXISTING
Q10 (CFS)	33.52	33.52
Q100 (CFS)	48.04	48.04
V10 (FT/S)	10.27	10.12
V100 (FT/S)	10.31	10.17
HW10 (FT)	151.37	151.37
HW100 (FT)	151.44	151.44
TW10 (FT)	147.90	147.90
TW100 (FT)	148.01	148.01

HYDRAULIC DATA CULV-04		
	PROPOSED	EXISTING
Q10 (CFS)	133.88	133.88
Q100 (CFS)	190.67	190.67
V10 (FT/S)	17.86	17.80
V100 (FT/S)	19.40	19.40
HW10 (FT)	124.32	124.19
HW100 (FT)	128.98	128.98
TW10 (FT)	112.97	112.97
TW100 (FT)	113.12	113.12

HYDRAULIC DATA CULV-05		
	PROPOSED	EXISTING
Q10 (CFS)	5.69	5.69
Q100 (CFS)	8.10	8.10
V10 (FT/S)	4.52	4.50
V100 (FT/S)	5.00	4.97
HW10 (FT)	123.71	123.68
HW100 (FT)	123.84	123.81
TW10 (FT)	122.93	122.93
TW100 (FT)	122.97	122.97

HYDRAULIC DATA CULV-06		
	PROPOSED	EXISTING
Q10 (CFS)	36.93	36.93
Q100 (CFS)	53.99	53.99
V10 (FT/S)	9.43	9.15
V100 (FT/S)	10.41	10.22
HW10 (FT)	127.58	127.46
HW100 (FT)	129.12	129.00
TW10 (FT)	124.57	124.57
TW100 (FT)	124.65	124.65

HYDRAULIC DATA CULV-07		
	PROPOSED	EXISTING
Q10 (CFS)	11.87	11.87
Q100 (CFS)	17.12	17.12
V10 (FT/S)	8.10	7.82
V100 (FT/S)	8.85	8.58
HW10 (FT)	142.04	141.93
HW100 (FT)	142.66	142.55
TW10 (FT)	140.22	14.22
TW100 (FT)	140.33	140.33

HYDRAULIC DATA CULV-08		
	PROPOSED	EXISTING
Q10 (CFS)	28.95	28.95
Q100 (CFS)	41.30	41.30
V10 (FT/S)	10.25	10.52
V100 (FT/S)	10.33	10.63
HW10 (FT)	141.64	141.58
HW100 (FT)	141.78	141.78
TW10 (FT)	137.26	137.25
TW100 (FT)	137.41	137.41

HYDRAULIC DATA CULV-09		
	PROPOSED	EXISTING
Q10 (CFS)	17.15	17.15
Q100 (CFS)	24.79	24.79
V10 (FT/S)	7.53	7.37
V100 (FT/S)	8.48	8.48
HW10 (FT)	143.83	143.79
HW100 (FT)	145.10	145.06
TW10 (FT)	142.60	142.60
TW100 (FT)	142.23	142.23

HYDRAULIC DATA CULV-10		
	PROPOSED	EXISTING
Q10 (CFS)	23.42	23.42
Q100 (CFS)	34.43	34.43
V10 (FT/S)	7.27	6.96
V100 (FT/S)	7.97	7.63
HW10 (FT)	141.56	141.48
HW100 (FT)	141.97	141.89
TW10 (FT)	140.48	140.48
TW100 (FT)	140.69	140.63

HYDRAULIC DATA CULV-11		
	PROPOSED	EXISTING
Q10 (CFS)	7.98	7.98
Q100 (CFS)	11.39	11.39
V10 (FT/S)	5.05	5.05
V100 (FT/S)	5.72	5.72
HW10 (FT)	142.81	142.78
HW100 (FT)	143.17	143.15
TW10 (FT)	141.71	141.71
TW100 (FT)	141.80	141.80

HYDRAULIC DATA CULV-12		
	PROPOSED	EXISTING
Q10 (CFS)	23.47	23.47
Q100 (CFS)	33.75	33.75
V10 (FT/S)	8.67	8.58
V100 (FT/S)	9.47	9.37
HW10 (FT)	149.34	149.34
HW100 (FT)	149.94	149.94
TW10 (FT)	147.47	147.47
TW100 (FT)	147.61	147.61

HYDRAULIC DATA CULV-13		
	PROPOSED	EXISTING
Q10 (CFS)	9.93	9.93
Q100 (CFS)	14.58	14.58
V10 (FT/S)	5.44	5.34
V100 (FT/S)	6.02	5.90
HW10 (FT)	149.84	149.77
HW100 (FT)	150.15	150.07
TW10 (FT)	149.04	149.04
TW100 (FT)	149.15	149.15

HYDRAULIC DATA CULV-14		
	PROPOSED	EXISTING
Q10 (CFS)	56.15	56.15
Q100 (CFS)	80.57	80.57
V10 (FT/S)	7.95	6.84
V100 (FT/S)	8.11	7.06
HW10 (FT)	152.11	152.18
HW100 (FT)	152.24	152.28
TW10 (FT)	149.67	149.67
TW100 (FT)	149.87	149.87

HYDRAULIC DATA CULV-15		
	PROPOSED	EXISTING
Q10 (CFS)	101.53	101.53
Q100 (CFS)	146.05	146.05
V10 (FT/S)	10.04	10.07
V100 (FT/S)	10.18	10.25
HW10 (FT)	154.76	154.76
HW100 (FT)	154.92	154.92
TW10 (FT)	151.04	151.04
TW100 (FT)	151.28	151.28

HYDRAULIC DATA CULV-16		
	PROPOSED	EXISTING
Q10 (CFS)	25.40	25.40
Q100 (CFS)	36.25	36.25
V10 (FT/S)	11.50	11.08
V100 (FT/S)	12.01	11.35
HW10 (FT)	156.31	156.17
HW100 (FT)	156.60	156.60
TW10 (FT)	152.11	152.11
TW100 (FT)	152.25	152.25

HYDRAULIC DATA CULV-17		
	PROPOSED	EXISTING
Q10 (CFS)	18.23	18.23
Q100 (CFS)	26.06	26.06
V10 (FT/S)	11.10	10.61
V100 (FT/S)	12.01	11.66
HW10 (FT)	157.74	157.58
HW100 (FT)	159.01	158.90
TW10 (FT)	154.48	154.48
TW100 (FT)	154.60	154.60

HYDRAULIC DATA CULV-19		
	PROPOSED	EXISTING
Q10 (CFS)	15.60	15.60
Q100 (CFS)	22.29	22.29
V10 (FT/S)	6.52	6.52
V100 (FT/S)	7.89	7.89
HW10 (FT)	180.30	180.26
HW100 (FT)	181.25	181.18
TW10 (FT)	178.59	178.59
TW100 (FT)	178.71	178.71

HYDRAULIC DATA CULV-20		
	PROPOSED	EXISTING
Q10 (CFS)	23.36	23.36
Q100 (CFS)	33.25	33.25
V10 (FT/S)	6.54	6.53
V100 (FT/S)	7.09	7.10
HW10 (FT)	188.15	188.10
HW100 (FT)	188.72	188.67
TW10 (FT)	186.45	186.45
TW100 (FT)	186.59	186.59

HYDRAULIC DATA CULV-21		
	PROPOSED	EXISTING
Q10 (CFS)	28.30	28.30
Q100 (CFS)	40.62	40.62
V10 (FT/S)	6.25	6.25
V100 (FT/S)	7.46	7.46
HW10 (FT)	198.96	198.94
HW100 (FT)	199.72	199.70
TW10 (FT)	197.56	197.56
TW100 (FT)	197.71	197.71

STATE OF TEXAS
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145862
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HYDRAULIC DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		128

DATE: 1/30/2024 3:03:48 PM
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DATE: 1/30/2024 3:04:12 PM
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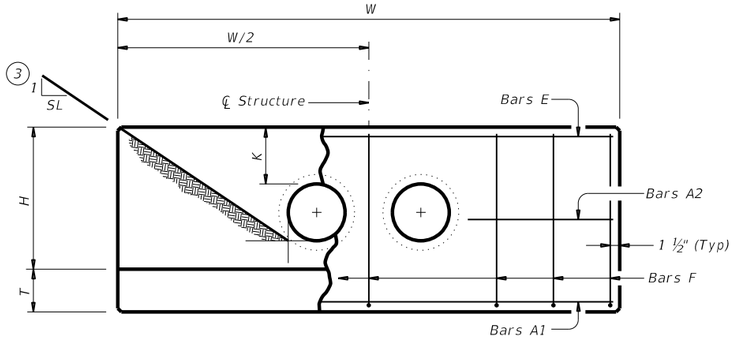
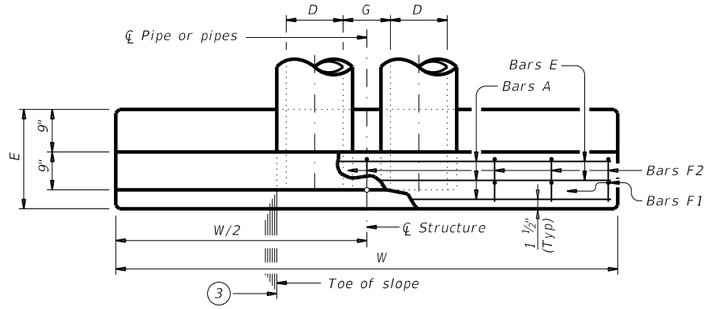
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

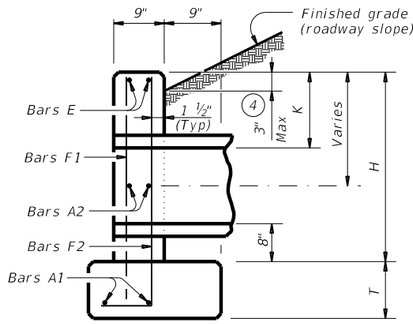
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3



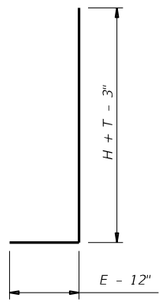
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'–1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'_c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

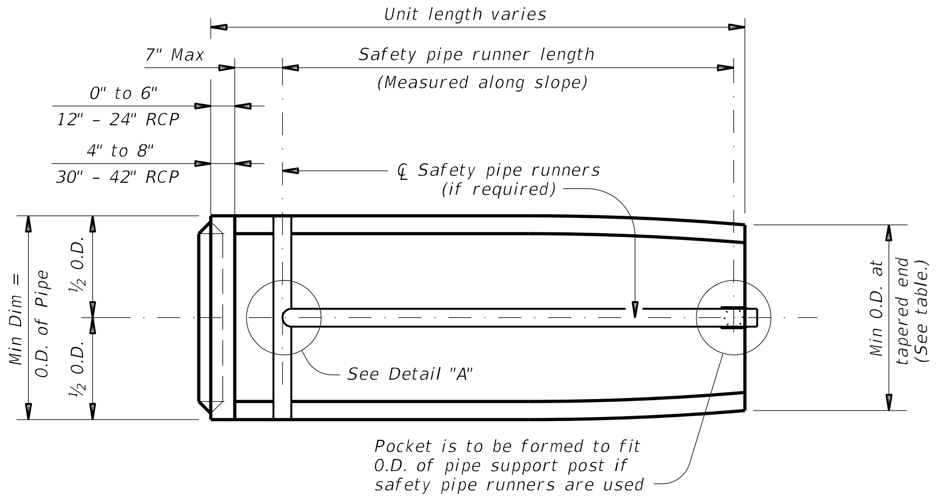
Bridge Division Standard

CONCRETE HEADWALLS
WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

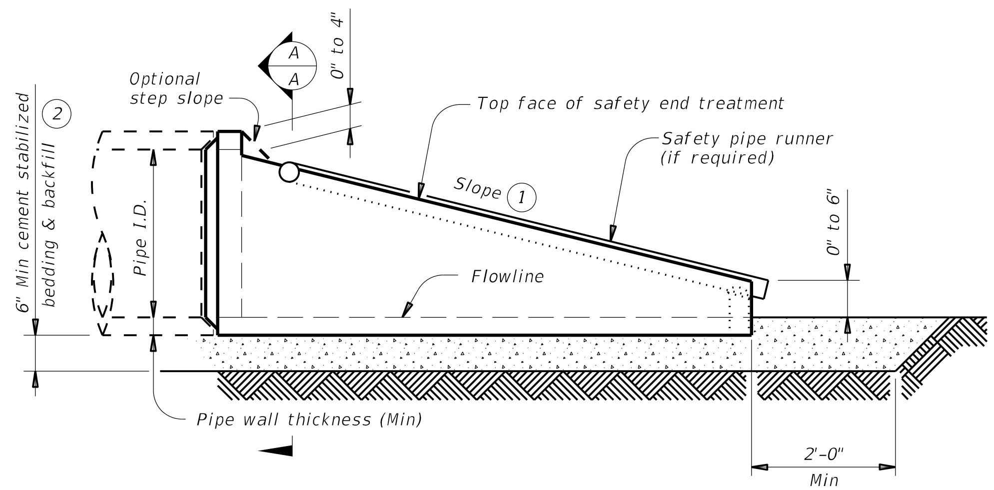
FILE: CD-CH-PW0-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		129

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.



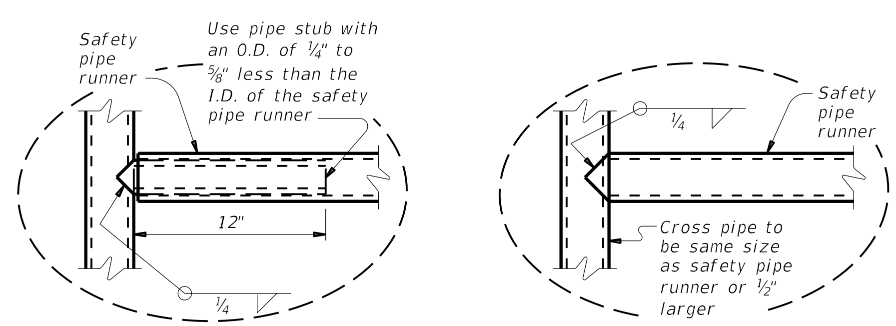
PLAN VIEW

(Showing spigot end connection.)

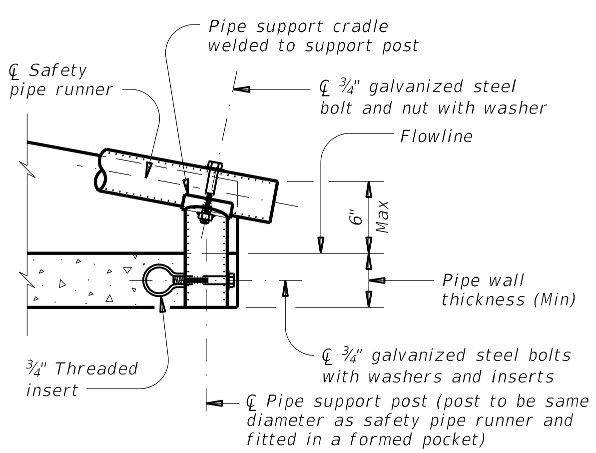


LONGITUDINAL ELEVATION

(Showing spigot end connection.)

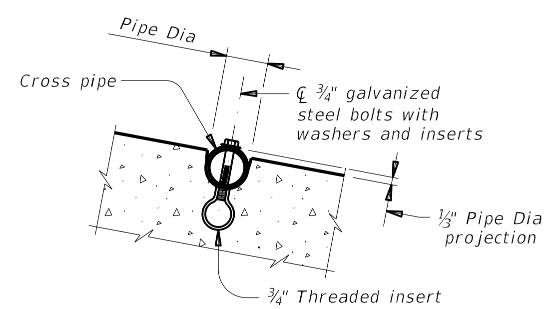


DETAIL A



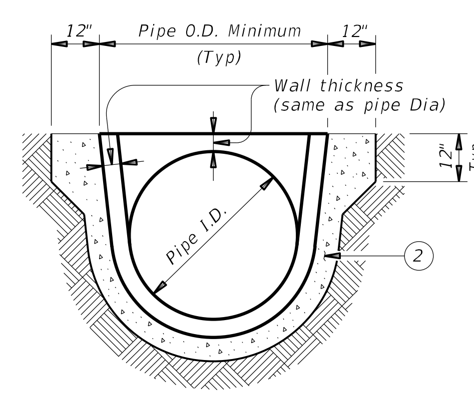
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

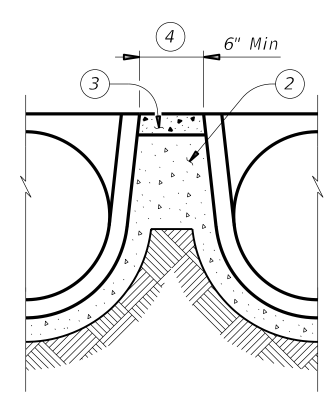


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	$3\frac{1}{2}$" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

1. Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.
2. Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
3. Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment."
4. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' - 0"	≤ 45°	No	≤ 45°	No
					4:1	2' - 8"				
					6:1	4' - 0"				
15"	$2\frac{1}{4}$"	$19\frac{1}{2}$"	19"	0.07 Circ.	3:1	2' - 10"	≤ 45°	No	≤ 45°	No
					4:1	3' - 9"				
					6:1	5' - 8"				
18"	$2\frac{1}{2}$"	23"	$21\frac{1}{2}$"	0.07 Circ.	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
					4:1	4' - 10"				
					6:1	7' - 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' - 3"	≤ 45°	No	≤ 30°	No
					4:1	7' - 0"			> 30°	Yes
					6:1	10' - 6"				
30"	$3\frac{1}{2}$"	37"	31"	0.18 Circ.	3:1	6' - 3"	≤ 15°	No	≤ 15°	No
					4:1	8' - 2"	> 15°	Yes	> 15°	Yes
					6:1	12' - 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' - 10"	= 0°	No	≥ 0°	Yes
					4:1	10' - 4"	> 0°	Yes		
					6:1	15' - 4"				
42"	$4\frac{1}{2}$"	51"	$41\frac{1}{2}$"	0.23 Ellip.	3:1	9' - 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' - 6"				
					6:1	18' - 7"				

MATERIAL NOTES:

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

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

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

GENERAL NOTES:

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

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

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

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

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

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation | Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

FILE: CD-PSET-RC-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 1109	SECT 01	JOB 026, ETC	HIGHWAY FM 777
REVISIONS	DIST BMT	COUNTY JASPER		SHEET NO. 130

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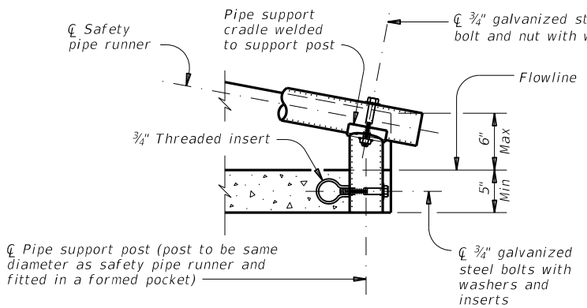
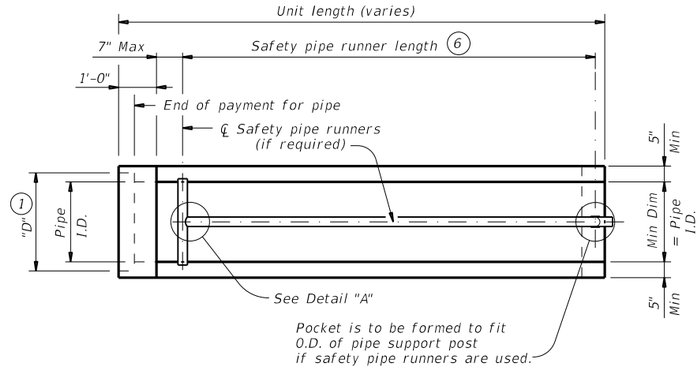
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



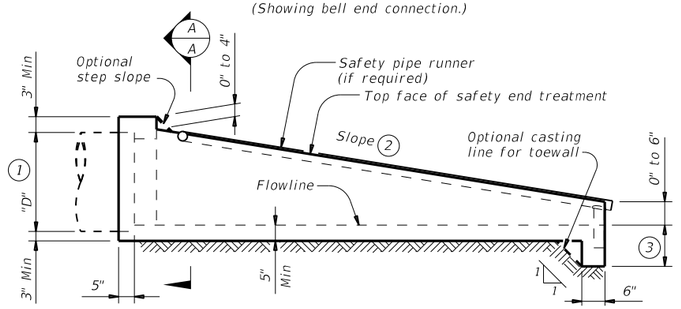
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



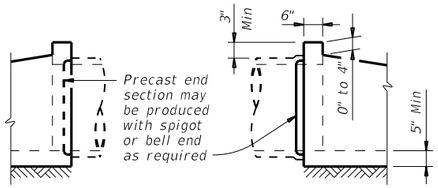
PLAN

(Showing bell end connection.)



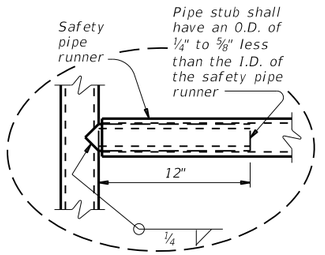
LONGITUDINAL ELEVATION

(Showing bell end connection.)



OPTIONAL JOINT FOR RCP

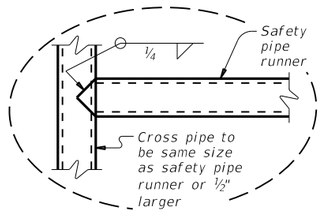
(Showing joint between RCP and precast safety end treatment)



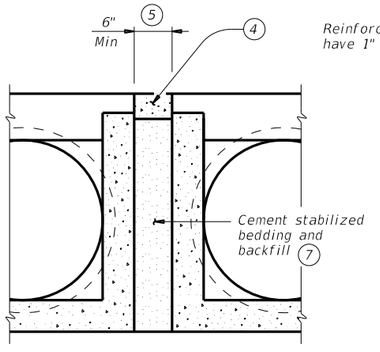
OPTION A

DETAIL A

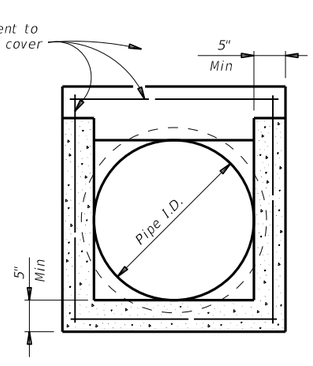
(If required)



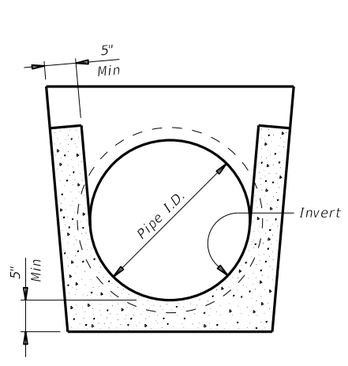
OPTION B



MULTIPLE PIPE INSTALLATION

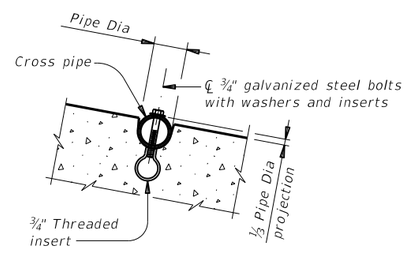


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

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

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: CD-PSET-SC-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		131

DATE: 1/30/2024 3:04:47 PM
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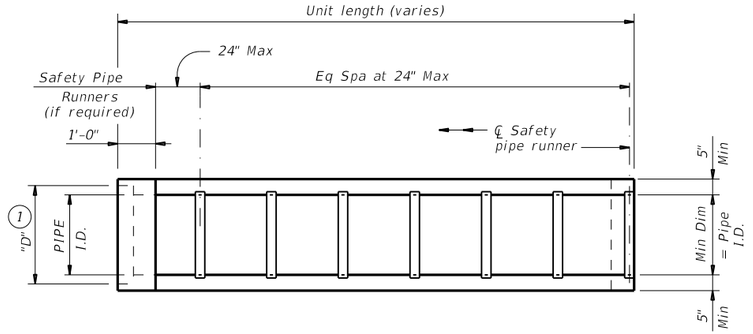
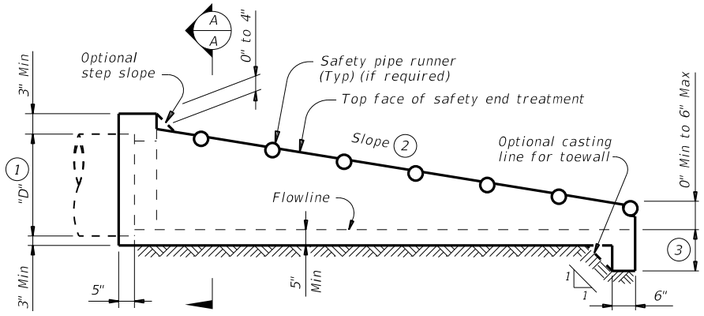


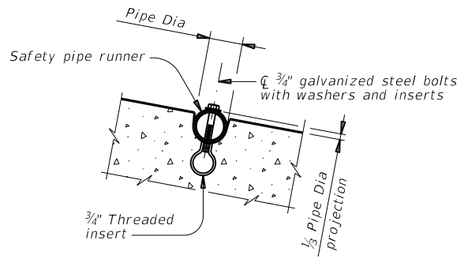
PLAN

(Showing bell end connection.)



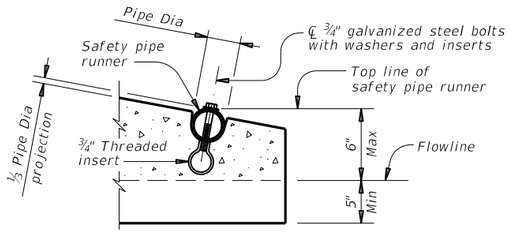
LONGITUDINAL ELEVATION

(Showing bell end connection.)

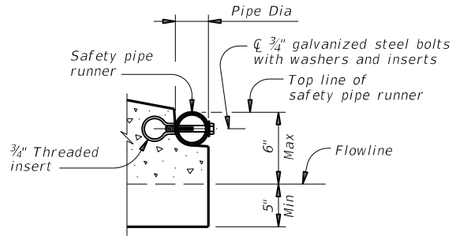


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



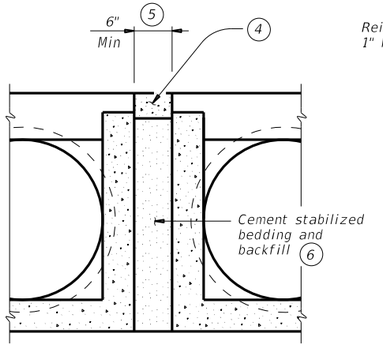
OPTION A



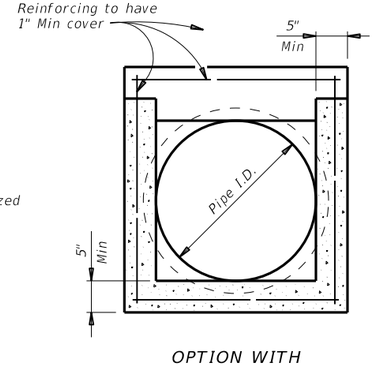
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

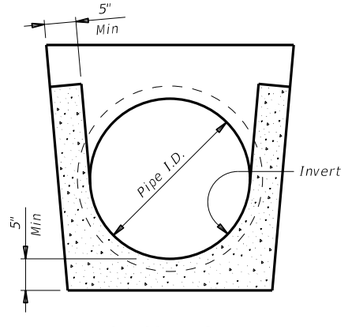
(If required)



MULTIPLE PIPE INSTALLATION

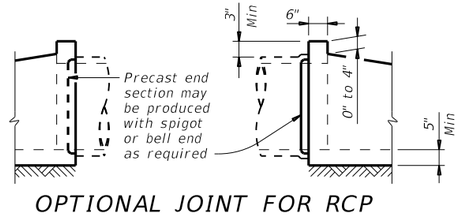


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

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

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

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

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

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

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

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

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

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

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

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

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: CD-PSET-SP-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		132

DATE: 1/30/2024 3:04:51 PM
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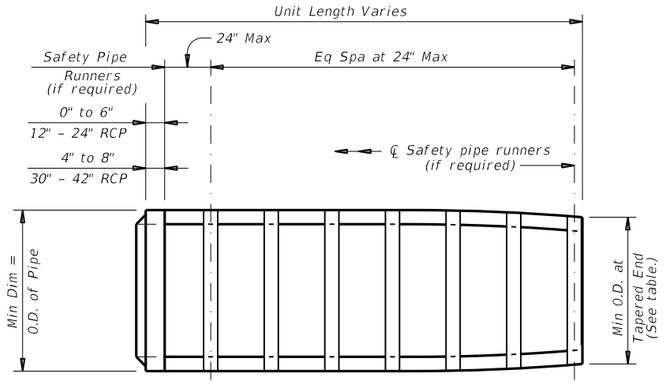
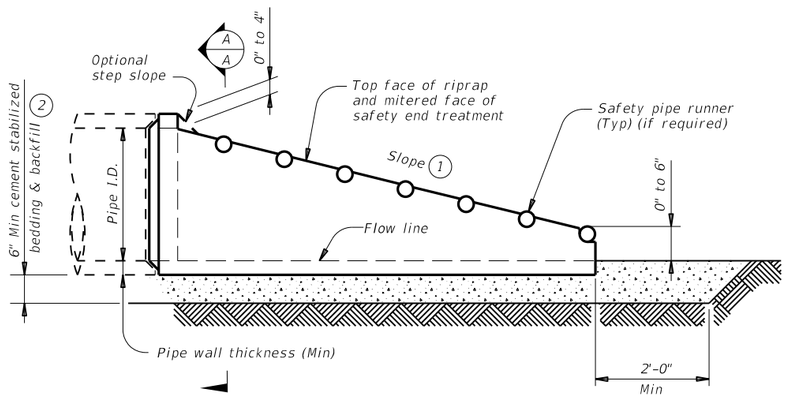


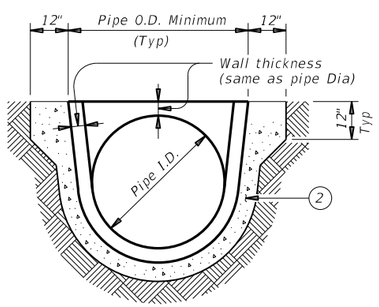
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

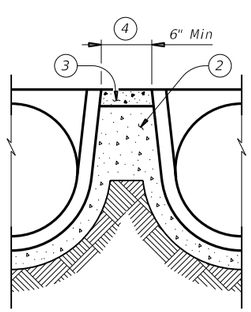


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

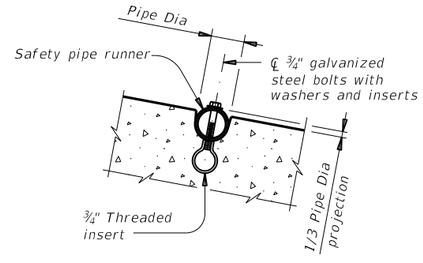
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

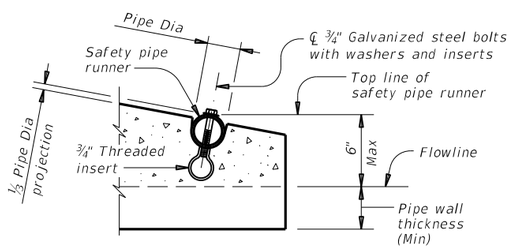
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

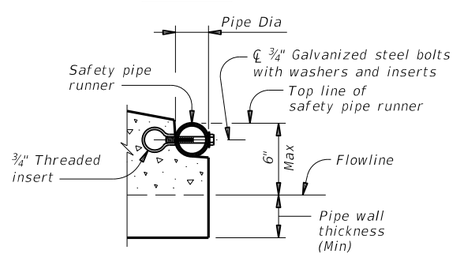


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation

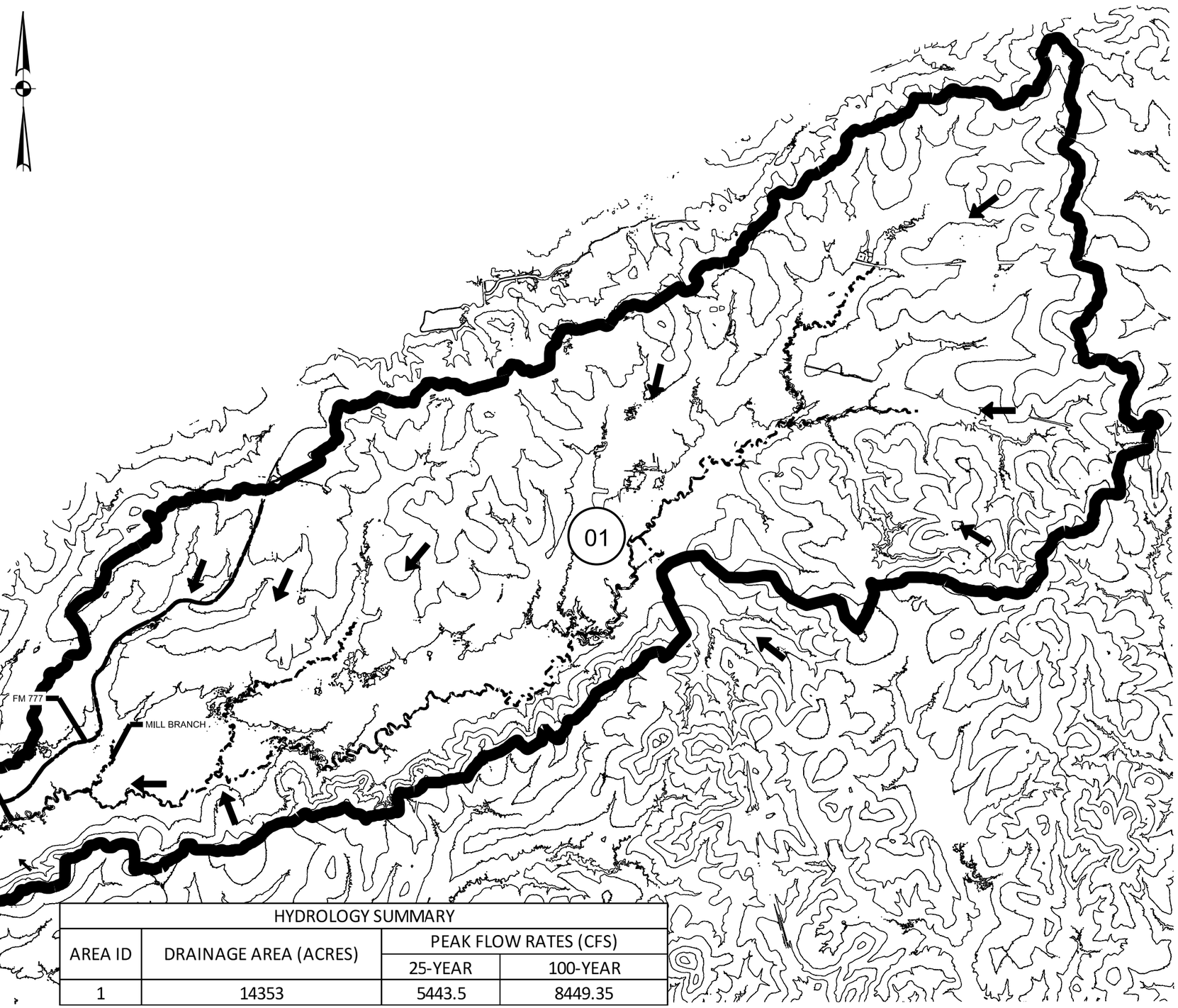
Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: CD-PSET-RP-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		133



LEGEND:

XX DRAINAGE AREA ID

DRAINAGE AREA BOUNDARY

RIVERS

FLOW ARROW

NOTES:

1. DRAINAGE AREA DELINEATED USING HEC-HMS 4.5
2. DRAINAGE AREA DELINEATED BASED ON LIDAR DATED MARCH 3,2016 & FEBUARY 22, 2017
3. DISCHARGES WERE DETERMINED USING NRC HYDROGRAPH METHOD APPLYING THE SCS STORM, RUNOFF CURVE NUMBER LOSS METHOD AND ATLAS 14 24 HOUR RAINFALL DATA.
4. DOWNSTREAM BOUNDARY CONDITION IS SET TO THE NORMAL DEPTH OF SLOPE OF 0.00140 (FT/FT) FOR ALL STORM EVENTS.
5. JASPER COUNTY FLOODPLAIN ADMINISTRATOR WAS CONTACTED ON 01/29/2024

0' 25000' 50000'

SCALE: 1"= 50000'

HYDROLOGY SUMMARY

AREA ID	DRAINAGE AREA (ACRES)	PEAK FLOW RATES (CFS)	
		25-YEAR	100-YEAR
1	14353	5443.5	8449.35

STATE OF TEXAS
D'ANDRE R. JAMES
145862
LICENSED
PROFESSIONAL ENGINEER

2.12.24

D'Andre James

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
©2024

FM 777
DRAINAGE AREA MAP

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		134

DATE: 2/12/2024 11:16:21 AM
FILE: pw://lja-pw.bentley.com:lja-pw-01/Documents/TxDOT/PM80116-2301 CEC WA4/FM 777/400 Production/4 - Design/Plan Set/5. Drainage/022_DAM_01.dgn

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	38159	25	Existing	5443.5	115.06	131.2	125.73	131.38	0.000791	4.47	2401.29	1098.79	0.25
Reach-1	38159	25	proposed	5443.5	115.06	131.2	125.73	131.38	0.000789	4.46	2404.68	1099.34	0.25
Reach-1	38159	100	Existing	8449.35	115.06	132.32	129.52	132.48	0.000709	4.55	3749.23	1301.52	0.24
Reach-1	38159	100	proposed	8449.35	115.06	132.32	129.52	132.48	0.00071	4.55	3747.55	1301.4	0.24
Reach-1	37740	25	Existing	5443.5	114.73	130.87	124.97	130.93	0.000332	2.57	3209.74	821.13	0.16
Reach-1	37740	25	proposed	5443.5	114.73	130.88	124.97	130.94	0.000331	2.56	3212.97	821.17	0.16
Reach-1	37740	100	Existing	8449.35	114.73	131.93	127.54	132.02	0.000406	3.08	4120.72	897.08	0.18
Reach-1	37740	100	proposed	8449.35	114.73	131.93	127.54	132.01	0.000405	3.08	4119.21	897.75	0.18
Reach-1	37313	25	Existing	5443.5	114.16	129.4	124.64	130.49	0.003367	8.4	648.12	81.36	0.52
Reach-1	37313	25	proposed	5443.5	114.16	129.41	124.64	130.5	0.003365	8.39	648.66	81.41	0.52
Reach-1	37313	100	Existing	8449.35	114.16	130.58	127.73	131.52	0.004275	8.75	1445.27	723.54	0.57
Reach-1	37313	100	proposed	8449.35	114.16	130.51	127.73	131.51	0.004511	8.93	1398.42	677.38	0.58
Reach-1	36467	25	Existing	5443.5	113.47	128.91	123.66	129.06	0.000704	4.05	2664.3	1271.68	0.23
Reach-1	36467	25	proposed	5443.5	113.47	128.94	123.66	129.08	0.000689	4.01	2697.08	1276.57	0.23
Reach-1	36467	100	Existing	8449.35	113.47	130.14	126.44	130.25	0.000559	3.92	4335.94	1437.71	0.21
Reach-1	36467	100	proposed	8449.35	113.47	129.98	126.44	130.1	0.000639	4.15	4104.94	1416.51	0.23
Reach-1	35823	25	Existing	5443.5	112.55	128.2	120.02	128.54	0.000852	4.92	1425	437.12	0.27
Reach-1	35823	25	proposed	5443.5	112.55	128.03	120.02	128.51	0.001043	5.52	985.86	89.8	0.29
Reach-1	35823	100	Existing	8449.35	112.55	129.53	122.2	129.8	0.000817	4.98	2851.27	949.48	0.26
Reach-1	35823	100	proposed	8449.35	112.55	129.25	122.2	129.58	0.000985	5.38	2598.71	856.47	0.29
Reach-1	34043	25	Existing	5443.5	111.12	127.58	119.09	127.68	0.000773	2.55	2824.48	1147.18	0.15
Reach 1	34043	25	proposed	5443.5	111.12	127.26	119.09	127.4	0.000354	3.01	1939.7	324.92	0.17
Reach-1	34043	100	Existing	8449.35	111.12	128.82	120.57	128.93	0.000299	3.05	4458.1	1497.94	0.15
Reach 1	34043	100	proposed	8449.35	111.12	128.28	120.57	128.43	0.000419	3.46	3695.48	1307.2	0.19
Reach-1	33170	25	Existing	5443.5	110.75	126.66	119.92	127.19	0.001275	5.03	971.78	867.92	0.32
Reach 1	33170	25	proposed	5443.5	110.75	126.47	119.94	126.93	0.000758	5.74	1064.29	826.23	0.31
Reach-1	33170	100	Existing	8449.35	110.75	128.59	122.57	128.67	0.000285	3.18	5885.42	1857.06	0.16
Reach-1	33170	100	proposed	8449.35	110.75	128.04	122.7	128.13	0.000249	3.01	4394	1539.29	0.15
Reach-1	33085			Mult Open									
Reach-1	33034	25	Existing	5443.5	110.43	126.76	114.58	126.79	0.000141	1.89	4266	1024.94	0.11
Reach-1	33034	25	proposed	5443.5	110.43	126.55	114.59	126.58	0.000057	1.48	4056.08	1005.71	0.08
Reach-1	33034	100	Existing	8449.35	110.43	127.92	115.87	127.96	0.000186	2.34	5515.03	1131.22	0.12
Reach-1	33034	100	proposed	8449.35	110.43	127.68	115.88	127.73	0.000087	1.97	5247.73	1107.01	0.11
Reach-1	32480	25	Existing	5443.5	109.67	125.96	120.45	126.29	0.000955	5.38	1799.83	772.62	0.28
Reach-1	32480	25	proposed	5443.5	109.67	125.96	120.45	126.29	0.000955	5.38	1799.83	772.62	0.28
Reach-1	32480	100	Existing	8449.35	109.67	126.99	123.84	127.35	0.001105	6.12	2658.64	849.38	0.31
Reach-1	32480	100	proposed	8449.35	109.67	126.99	123.84	127.35	0.001105	6.12	2658.69	849.39	0.31
Reach-1	31630	25	Existing	5443.5	109.17	120.56	120.56	123.92	0.014477	14.72	369.87	54.97	1
Reach-1	31630	25	proposed	5443.5	109.17	120.56	120.56	123.92	0.014477	14.72	369.87	54.97	1
Reach-1	31630	100	Existing	8449.35	109.17	126.02	123.3	126.25	0.001402	5.28	3313.89	1697.91	0.33
Reach-1	31630	100	proposed	8449.35	109.17	126.02	123.3	126.25	0.001402	5.28	3313.89	1697.91	0.33

Reach	River Sta	Profile	Plan	Q Total (cfs)	Flow Area (sq ft)	E.G. US. (ft)	W.S. US. (ft)	Top Width Act (ft)	Vel Total (ft/s)	Crit W.S. (ft)	Left Stage (ft)	Right Stage (ft)
Reach 1	33085 Culv Group#1	25	Existing	36.98	862.57	127.21	127.21	431.49	0.04		50	878.61
Reach-1	33085 Bridge #1	25	Existing	5332.63	872.69	127.19	126.57	100.68	6.11	119.03	878.61	1278.61
Reach-1	33085 Culv Group#2	25	Existing	73.89	63.78	127.38	127.36	68.84	1.16		1278.61	1580.38
Reach-1	33085 Culv Group#1	25	proposed	31.59	109.67	126.9	126.9	10.46	0.29		669.99	878.61
Reach-1	33085 Bridge #1	25	proposed	5342.48	941.23	126.93	126.34	129.7	5.68	119.94	878.61	1278.61
Reach-1	33085 Culv Group#2	25	proposed	69.43	11.59	128.13	127.57	10.46	5.99		1278.61	1582.54
Reach-1	33085 Culv Group#1	100	Existing	2032.02	2170.95	128.67	128.66	828.61	0.94		50	878.61
Reach-1	33085 Bridge #1	100	Existing	5874.34	2202.06	128.67	128.5	400	2.67	120.54	878.61	1278.61
Reach-1	33085 Culv Group#2	100	Existing	542.99	1554.86	128.66	128.65	640.05	0.35		1278.61	1583.16
Reach-1	33085 Culv Group#1	100	proposed	505.17	1776.51	128.18	128.18	828.61	0.28		50	878.61
Reach 1	33085 Bridge #1	100	proposed	7856.28	1302.18	128.13	127.37	176.27	6.03	122.72	878.61	1278.61
Reach-1	33085 Culv Group#2	100	proposed	87.9	747.12	128.14	128.14	312.14	0.12		1278.61	1582.45

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777

HYDRAULIC DATA

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		135

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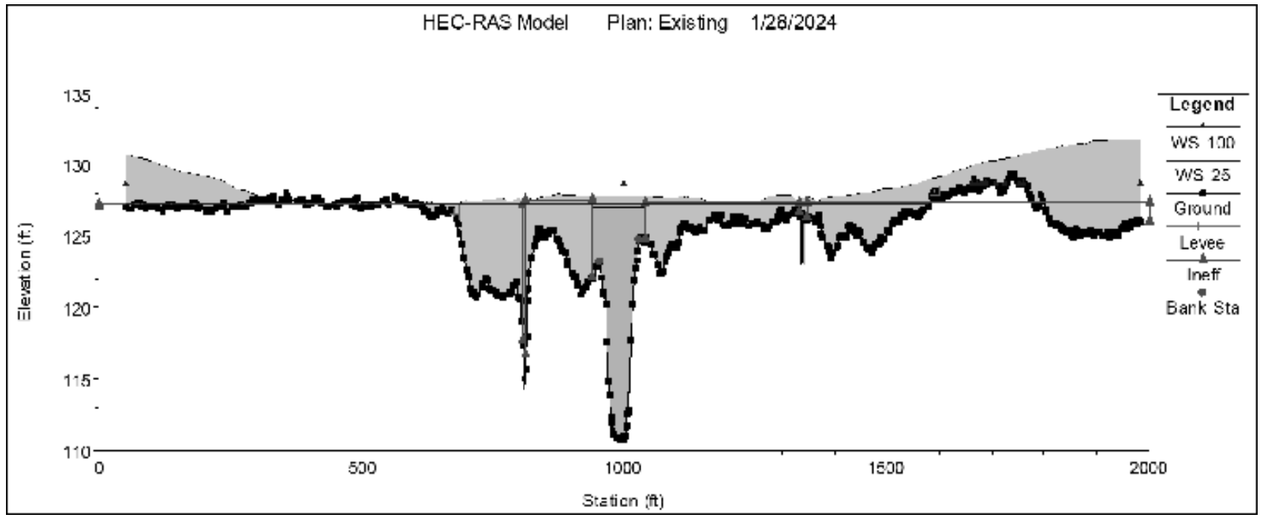

NOTES:

1. HEC-RAS VERSION 6.3.1 WAS USED FOR THE HYDRAULIC ANALYSIS AND DESIGN OF THE CULVERT.
2.DRAINAGE AREA DELINEATED BASED ON SURVEY AND TOPOGRAPHIC DATA.
3.DISCHARGES WERE DETERMINED USING NRS HYDROGRAPH METHOD, APPLYING THE SCS STORM, RUNOFF CURVE NUMBER LOSS METHOD, AND ATLAS 14 24 HOUR RAINFALL DATA.
4. BOUNDARY CONDITION IS NORMAL DEPTH FOR ALL STORM EVENTS

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#1: Culvert #2 Profile: 25			
Q Culv Group (cfs)	35.08	Culv Full Len (ft)	85.08
# Barrels	1	Culv Vel US (ft/s)	3.75
Q Barrel (cfs)	35.08	Culv Vel DS (ft/s)	3.75
E.G. US. (ft)	127.21	Culv Inv El Up (ft)	114.21
W.S. US. (ft)	127.21	Culv Inv El Dn (ft)	111.93
E.G. DS (ft)	126.79	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	126.79	Culv Exit Loss (ft)	0.22
Delta EG (ft)	0.42	Culv Entr Loss (ft)	0.11
Delta WS (ft)	0.42	Q Weir (cfs)	3.27
E.G. IC (ft)	115.95	Weir Sta Lft (ft)	390.11
E.G. OC (ft)	127.21	Weir Sta Rgt (ft)	658.61
Culvert Control	Outlet	Weir Submerg	0
Culv WS Inlet (ft)	117.71	Weir Max Depth (ft)	0.25
Culv WS Outlet (ft)	115.43	Weir Avg Depth (ft)	0.08
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	4.04
Culv Crt Depth (ft)	1.86	Min El Weir Flow (ft)	127.21

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#2: Bridge Profile: 25				
E.G. US. (ft)	127.19	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	126.57	E.G. Elev (ft)	127.22	127.04
Q Total (cfs)	5332.63	W.S. Elev (ft)	126.42	126.23
Q Bridge (cfs)	5332.63	Crit W.S. (ft)	119.95	121.16
Q Weir (cfs)		Max Chl Dpth (ft)	15.72	15.8
Weir Sta Lft (ft)		Vel Total (ft/s)	6.2	7.51
Weir Sta Rgt (ft)		Flow Area (sq ft)	860.57	709.09
Weir Submerg		Froude # Chl	0.29	0.42
Weir Max Depth (ft)		Specif Force (cu ft)	6282.54	5544.5
Min El Weir Flow (ft)	127.36	Hydr Depth (ft)	8.59	7.6
Min El Prs (ft)	127	W.P. Total (ft)	112.56	115.45
Delta EG (ft)	0.81	Conv. Total (cfs)	168781.1	177481.5
Delta WS (ft)	0.36	Top Width (ft)	100.25	100.1
BR Open Area (sq ft	887.36	Frctn Loss (ft)	0.08	0.14
BR Open Vel (ft/s)	6.01	C & E Loss (ft)	0.06	0.11
BR Sluice Coef		Shear Total (lb/sq ft	0.48	0.56
BR Sel Method	Energy only	Power Total (lb/ft s	2.96	4.22

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#3: Culvert #1 Profile: 25			
Q Culv Group (cfs)	73.89	Culv Full Len (ft)	48.77
# Barrels	2	Culv Vel US (ft/s)	3.84
Q Barrel (cfs)	36.94	Culv Vel DS (ft/s)	3.84
E.G. US. (ft)	127.19	Culv Inv El Up (ft)	123
W.S. US. (ft)	127.36	Culv Inv El Dn (ft)	122.68
E.G. DS (ft)	126.79	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	126.79	Culv Exit Loss (ft)	0.23
Delta EG (ft)	0.4	Culv Entr Loss (ft)	0.11
Delta WS (ft)	0.57	Q Weir (cfs)	
E.G. IC (ft)	125.78	Weir Sta Lft (ft)	
E.G. OC (ft)	127.19	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	126.5	Weir Max Depth (ft)	
Culv WS Outlet (ft)	126.18	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.89	Min El Weir Flow (ft)	127.51

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#1: Culvert #2 Profile: 100			
Q Culv Group (cfs)	46.95	Culv Full Len (ft)	85.08
# Barrels	1	Culv Vel US (ft/s)	4.88
Q Barrel (cfs)	46.95	Culv Vel DS (ft/s)	4.88
E.G. US. (ft)	128.67	Culv Inv El Up (ft)	114.21
W.S. US. (ft)	128.66	Culv Inv El Dn (ft)	111.93
E.G. DS (ft)	127.96	Culv Frctn Ls (ft)	0.16
W.S. DS (ft)	127.96	Culv Exit Loss (ft)	0.36
Delta EG (ft)	0.71	Culv Entr Loss (ft)	0.19
Delta WS (ft)	0.7	Q Weir (cfs)	1994.1
E.G. IC (ft)	128.62	Weir Sta Lft (ft)	245.45
E.G. OC (ft)	128.67	Weir Sta Rgt (ft)	878.61
Culvert Control	Outlet	Weir Submerg	0.4
Culv WS Inlet (ft)	117.71	Weir Max Depth (ft)	1.71
Culv WS Outlet (ft)	115.43	Weir Avg Depth (ft)	1.12
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	706.27
Culv Crt Depth (ft)	2.14	Min El Weir Flow (ft)	127.21

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#2: Bridge Profile: 100				
E.G. US. (ft)	128.67	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	128.5	E.G. Elev (ft)	128.46	128.32
Q Total (cfs)	5874.34	W.S. Elev (ft)	127.77	127.53
Q Bridge (cfs)	5842.98	Crit W.S. (ft)	120.54	121.78
Q Weir (cfs)		Max Chl Dpth (ft)	17.02	17.1
Weir Sta Lft (ft)		Vel Total (ft/s)	6.08	6.77
Weir Sta Rgt (ft)		Flow Area (sq ft)	969.54	860.48
Weir Submerg		Froude # Chl	0.28	0.3
Weir Max Depth (ft		Specif Force (cu ft)	7577.58	6704.57
Min El Weir Flow (f	127.36	Hydr Depth (ft)	2.76	10.24
Min El Prs (ft)	127	W.P. Total (ft)	567.34	298.73
Delta EG (ft)	0.7	Conv. Total (cfs)	99801.1	81718.3
Delta WS (ft)	0.86	Top Width (ft)	351.18	84.94
BR Open Area (sq ft	887.36	Frctn Loss (ft)	0.1	0.17
BR Open Vel (ft/s)	6.58	C & E Loss (ft)	0.03	0.24
BR Sluice Coef		Shear Total (lb/sq f	0.42	0.87
BR Sel Method	Energy only	Power Total (lb/ft s	2.54	5.87

Plan: Existing BigWalnut Reach-1 RS: 33085 Open#3: Culvert #1 Profile: 100			
Q Culv Group (cfs)	97.77	Culv Full Len (ft)	48.77
# Barrels	2	Culv Vel US (ft/s)	5.08
Q Barrel (cfs)	48.88	Culv Vel DS (ft/s)	5.08
E.G. US. (ft)	128.66	Culv Inv El Up (ft)	123
W.S. US. (ft)	128.65	Culv Inv El Dn (ft)	122.68
E.G. DS (ft)	127.96	Culv Frctn Ls (ft)	0.1
W.S. DS (ft)	127.96	Culv Exit Loss (ft)	0.33
Delta EG (ft)	0.69	Culv Entr Loss (ft)	0.2
Delta WS (ft)	0.7	Q Weir (cfs)	445.22
E.G. IC (ft)	128.58	Weir Sta Lft (ft)	1278.61
E.G. OC (ft)	128.66	Weir Sta Rgt (ft)	1549.91
Culvert Control	Outlet	Weir Submerg	0.18
Culv WS Inlet (ft)	126.5	Weir Max Depth (ft)	1.23
Culv WS Outlet (ft)	126.18	Weir Avg Depth (ft)	0.7
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	189.86
Culv Crt Depth (ft)	2.18	Min El Weir Flow (ft)	127.51

STATE OF TEXAS
D'ANDRE R. JAMES
145862
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777

HYDRAULIC DATA

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		136

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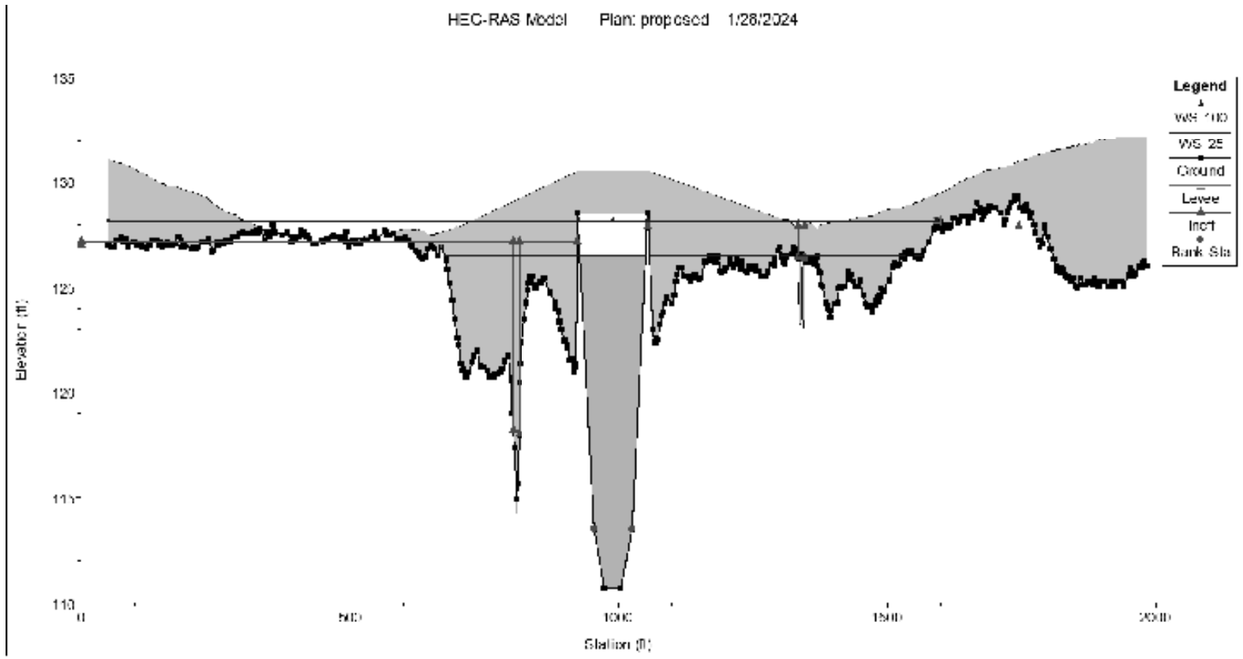

NOTES:

1. HEC-RAS VERSION 6.3.1 WAS USED FOR THE HYDRAULIC ANALYSIS AND DESIGN OF THE CULVERT.
2.DRAINAGE AREA DELINEATED BASED ON SURVEY AND TOPOGRAPHIC DATA.
3.DISCHARGES WERE DETERMINED USING NRS HYDROGRAPH METHOD, APPLYING THE SCS STORM, RUNOFF CURVE NUMBER LOSS METHOD, AND ATLAS 14 24 HOUR RAINFALL DATA.
4. BOUNDARY CONDITION IS NORMAL DEPTH FOR ALL STORM EVENTS

Plan: proposed	BigWalnut	Reach-1	RS: 33085	Open#1: Culvert #2	Profile: 25	
Q Culv Group (cfs)		31.59	Culv Full Len (ft)			85.08
# Barrels		1	Culv Vel US (ft/s)			3.28
Q Barrel (cfs)		31.59	Culv Vel DS (ft/s)			3.28
E.G. US. (ft)		126.9	Culv Inv El Up (ft)			124.21
W.S. US. (ft)		126.9	Culv Inv El Dn (ft)			124.63
E.G. DS (ft)		126.58	Culv Frctn Ls (ft)			0.07
W.S. DS (ft)		126.58	Culv Exit Loss (ft)			0.17
Delta EG (ft)		0.32	Culv Entr Loss (ft)			0.08
Delta WS (ft)		0.32	Q Weir (cfs)			
E.G. IC (ft)		116.69	Weir Sta Lft (ft)			
E.G. OC (ft)		126.9	Weir Sta Rgt (ft)			
Culvert Control	Outlet		Weir Submerg			
Culv WS Inlet (ft)		117.71	Weir Max Depth (ft)			
Culv WS Outlet (ft)		115.43	Weir Avg Depth (ft)			
Culv Nml Depth (ft)			Weir Flow Area (sq ft)			
Culv Crt Depth (ft)		1.74	Min El Weir Flow (ft)			127.21

Plan: proposed	BigWalnut	Reach-1	RS: 33085	Open#2: Bridge	Profile: 25	
E.G. US. (ft)	126.93	Element		Inside BR US		Inside BR DS
W.S. US. (ft)	126.34	E.G. Elev (ft)		126.74		126.73
Q Total (cfs)	5342.48	W.S. Elev (ft)		126.5		126.5
Q Bridge (cfs)	5342.48	Crit W.S. (ft)		117.21		116.59
Q Weir (cfs)		Max Chl Dpth (ft)		15.75		16.07
Weir Sta Lft (ft)		Vel Total (ft/s)		3.86		3.73
Weir Sta Rgt (ft)		Flow Area (sq ft)		1385.67		1444.75
Weir Submerg		Froude # Chl		0.18		0.17
Weir Max Depth (ft		Specif Force (cu ft)		5977.74		10572.39
Min El Weir Flow (f	128.49	Hydr Depth (ft)		11.36		12.87
Min El Prs (ft)	128.5	W.P. Total (ft)		128.52		131.47
Delta EG (ft)	0.35	Conv. Total (cfs)		385183.3		412290.5
Delta WS (ft)	0.37	Top Width (ft)		122		122.84
BR Open Area (sq ft	1637.86	Frctn Loss (ft)		0		0.02
BR Open Vel (ft/s)	3.86	C & E Loss (ft)		0.01		0.12
BR Sluice Coef		Shear Total (lb/sq ft		0.12		0.11
BR Sel Method	Energy only	Power Total (lb/ft s		0.47		0.41

Plan: proposed	BigWalnut	Reach 1	RS: 33085	Open#3: Culvert #1	Profile: 25	
Q Culv Group (cfs)		99.48	Culv Full Len (ft)			48.77
# Barrels		2	Culv Vel US (ft/s)			3.61
Q Barrel (cfs)		34.71	Culv Vel DS (ft/s)			3.61
E.G. US. (ft)		126.93	Culv Inv El Up (ft)			123
W.S. US. (ft)		127.57	Culv Inv El Dn (ft)			122.68
E.G. DS (ft)		126.58	Culv Frctn Ls (ft)			0.05
W.S. DS (ft)		126.58	Culv Exit Loss (ft)			0.2
Delta EG (ft)		0.35	Culv Entr Loss (ft)			0.1
Delta WS (ft)		0.99	Q Weir (cfs)			
E.G. IC (ft)		127.67	Weir Sta Lft (ft)			
E.G. OC (ft)		126.93	Weir Sta Rgt (ft)			
Culvert Control	Outlet		Weir Submerg			
Culv WS Inlet (ft)		126.5	Weir Max Depth (ft)			
Culv WS Outlet (ft)		126.18	Weir Avg Depth (ft)			
Culv Nml Depth (ft)			Weir Flow Area (sq ft)			
Culv Crt Depth (ft)		1.83	Min El Weir Flow (ft)			128.1

01.30.24

Plan: proposed	BigWalnut	Reach-1	RS: 33085	Open#1: Culvert #2	Profile: 100	
Q Culv Group (cfs)		37.2	Culv Full Len (ft)			85.08
# Barrels		1	Culv Vel US (ft/s)			3.87
Q Barrel (cfs)		37.2	Culv Vel DS (ft/s)			3.87
E.G. US. (ft)		128.18	Culv Inv El Up (ft)			124.21
W.S. US. (ft)		128.18	Culv Inv El Dn (ft)			124.63
E.G. DS (ft)		127.73	Culv Frctn Ls (ft)			0.1
W.S. DS (ft)		127.73	Culv Exit Loss (ft)			0.23
Delta EG (ft)		0.45	Culv Entr Loss (ft)			0.12
Delta WS (ft)		0.45	Q Weir (cfs)			467.97
E.G. IC (ft)		128.02	Weir Sta Lft (ft)			305.74
E.G. OC (ft)		128.18	Weir Sta Rgt (ft)			725.93
Culvert Control	Outlet		Weir Submerg			0.36
Culv WS Inlet (ft)		117.71	Weir Max Depth (ft)			1.05
Culv WS Outlet (ft)		115.43	Weir Avg Depth (ft)			0.54
Culv Nml Depth (ft)			Weir Flow Area (sq ft)			228.13
Culv Crt Depth (ft)		1.89	Min El Weir Flow (ft)			127.21

Plan: proposed	BigWalnut	Reach-1	RS: 33085	Open#2: Bridge	Profile: 100	
E.G. US. (ft)	128.13	Element		Inside BR US		Inside BR DS
W.S. US. (ft)	127.37	E.G. Elev (ft)		127.94		127.92
Q Total (cfs)	7856.28	W.S. Elev (ft)		127.51		127.52
Q Bridge (cfs)	7856.28	Crit W.S. (ft)		118.28		118.21
Q Weir (cfs)		Max Chl Dpth (ft)		16.76		17.09
Weir Sta Lft (ft)		Vel Total (ft/s)		5.2		5.04
Weir Sta Rgt (ft)		Flow Area (sq ft)		1511.22		1559.08
Weir Submerg		Froude # Chl		0.24		0.22
Weir Max Depth (ft		Specif Force (cu ft)		12078.36		12807.76
Min El Weir Flow (f	128.49	Hydr Depth (ft)		12.59		12.33
Min El Prs (ft)	128.5	W.P. Total (ft)		138.56		140.56
Delta EG (ft)	0.4	Conv. Total (cfs)		440360.4		472476.3
Delta WS (ft)	0.58	Top Width (ft)		126.55		126.48
BR Open Area (sq ft	1637.86	Frctn Loss (ft)		0.01		0.04
BR Open Vel (ft/s)	5.2	C & E Loss (ft)		0.01		0.16
BR Sluice Coef		Shear Total (lb/sq ft		0.22		0.19
BR Sel Method	Energy only	Power Total (lb/ft s		1.13		0.96

Plan: proposed	BigWalnut	Reach 1	RS: 33085	Open#3: Culvert #1	Profile: 100	
Q Culv Group (cfs)		74.19	Culv Full Len (ft)			48.77
# Barrels		2	Culv Vel US (ft/s)			3.86
Q Barrel (cfs)		37.09	Culv Vel DS (ft/s)			3.86
E.G. US. (ft)		128.14	Culv Inv El Up (ft)			123
W.S. US. (ft)		128.14	Culv Inv El Dn (ft)			122.68
E.G. DS (ft)		127.73	Culv Frctn Ls (ft)			0.06
W.S. DS (ft)		127.73	Culv Exit Loss (ft)			0.23
Delta EG (ft)		0.4	Culv Entr Loss (ft)			0.12
Delta WS (ft)		0.4	Q Weir (cfs)			13.71
E.G. IC (ft)		126.12	Weir Sta Lft (ft)			1317.38
E.G. OC (ft)		128.14	Weir Sta Rgt (ft)			1410.78
Culvert Control	Outlet		Weir Submerg			0
Culv WS Inlet (ft)		126.5	Weir Max Depth (ft)			0.43
Culv WS Outlet (ft)		126.18	Weir Avg Depth (ft)			0.14
Culv Nml Depth (ft)			Weir Flow Area (sq ft)			13.04
Culv Crt Depth (ft)		1.99	Min El Weir Flow (ft)			128.1

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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FM 777

HYDRAULIC DATA

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		137

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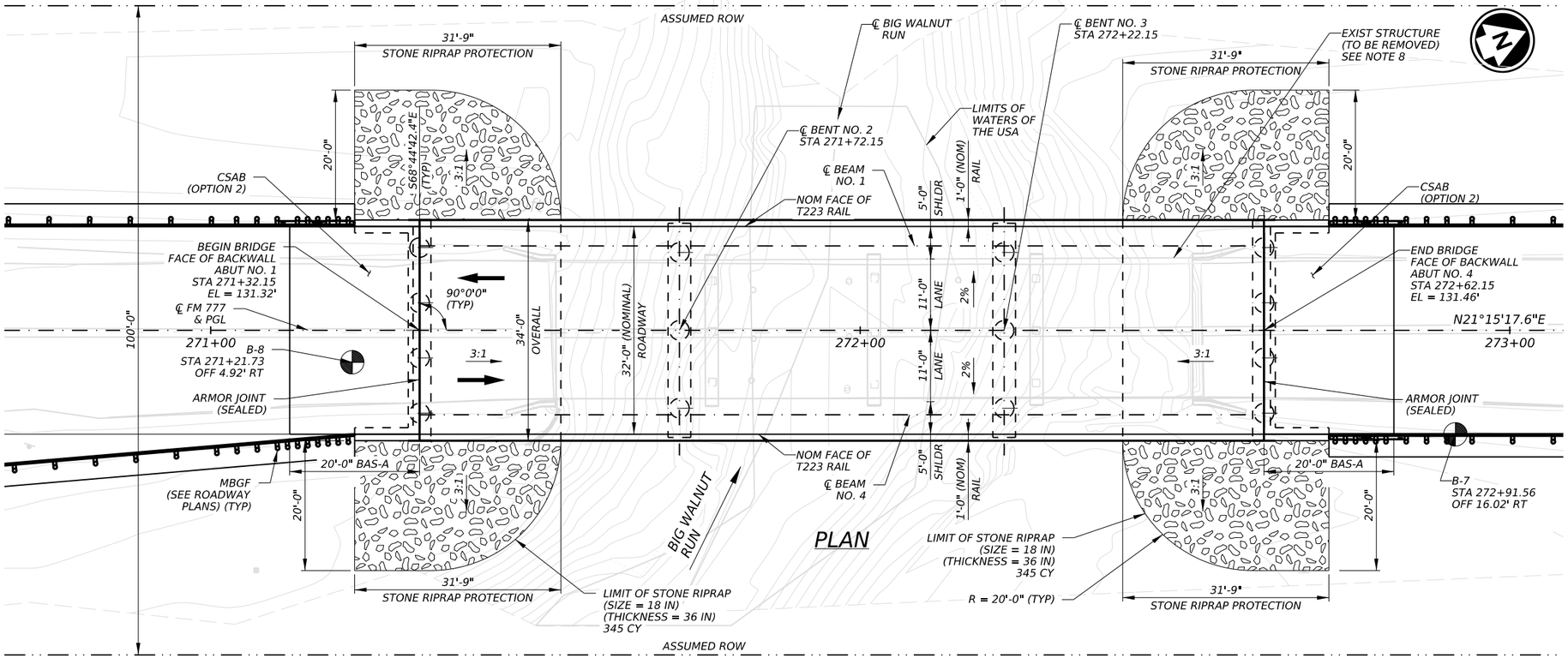
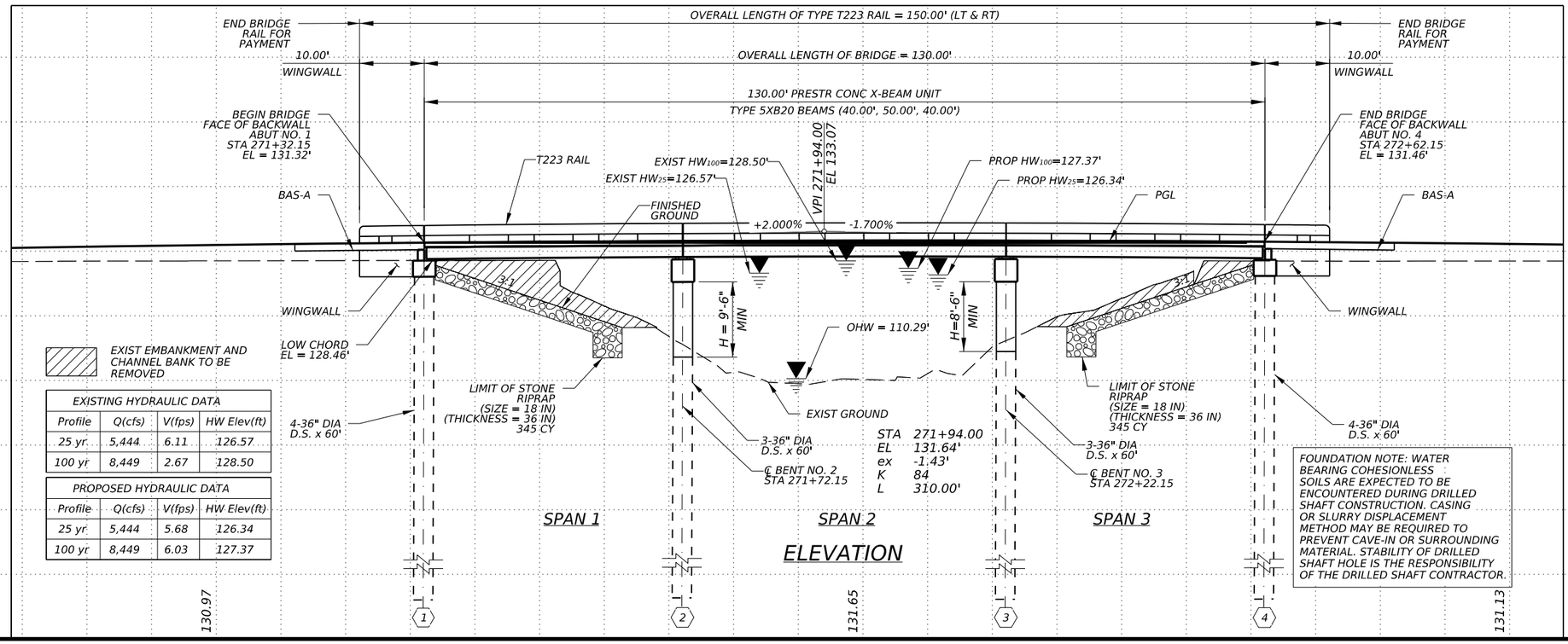


NOTES:

1. *DESIGNED ACCORDING TO AASHTO LRFD BRIDGE SPECIFICATIONS 2020, 9TH EDITION AND CURRENT INTERIM REVISIONS AS MODIFIED BY THE TXDOT BRIDGE DESIGN MANUAL.*
2. *HORIZONTAL AND VERTICAL DIMENSIONS ARE SHOWN. LENGTHS MUST BE CORRECTED FOR GRADE OR CROSS SLOPE WHERE APPROPRIATE.*
3. *CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.*
4. *REFER TO THE TXDOT STONE RIPRAP (SRR) STANDARD FOR RIPRAP DETAILS.*
5. *SEE CSAB STANDARD FOR CEMENT STABILIZED BACKFILL DETAILS AND LIMITS.*
6. *SEE BRIDGE BORING LOG SHEET FOR GEOTECHNICAL INFORMATION. BORING LOCATIONS ARE APPROXIMATE.*
7. *FOR TYPICAL SECTION SEE BRIDGE TYPICAL SECTION.*
8. *THE EXISTING FOUR SPAN BRIDGE TO BE REMOVED BY THE CONTRACTOR. THE BRIDGE IS 23'-4" WIDE BY APPROXIMATELY 100' LONG WITH A CONCRETE SUPERSTRUCTURE AND SUBSTRUCTURE. THE BRIDGE IS TO BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH STANDARD SPECIFICATION ITEM 496.*
9. *THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATING ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.*
10. *BRIDGE NOT DESIGNED FOR FUTURE OVERLAY.*
11. *SHEAR KEYS REQUIRED AT ABUTMENTS AND BENTS. PLACE SHEAR KEYS ON UPSTREAM SIDE OF STRUCTURE BETWEEN OUTSIDE BEAM AND NEXT ADJACENT BEAM. SEE "XBSK" STANDARD AND DETAILS.*

DESIGN SPEED: 50 MPH
ADT(2023): 700
ADT(2043): 1000
FUNCTION CLASS: RURAL MINOR COLLECTOR
EXISTING NBI: 20-122-0-1109-01-003
PROPOSED NBI: 20-122-0-1109-01-012

LOAD RATING	INV	OP
STRENGTH I	1.21	1.57
SERVICE III	1.11	



EXISTING HYDRAULIC DATA			
Profile	Q(cfs)	V(fps)	HW Elev(ft)
25 yr	5,444	6.11	126.57
100 yr	8,449	2.67	128.50

PROPOSED HYDRAULIC DATA			
Profile	Q(cfs)	V(fps)	HW Elev(ft)
25 yr	5,444	5.68	126.34
100 yr	8,449	6.03	127.37

FOUNDATION NOTE: WATER BEARING COHESIONLESS SOILS ARE EXPECTED TO BE ENCOUNTERED DURING DRILLED SHAFT CONSTRUCTION. CASING OR SLURRY DISPLACEMENT METHOD MAY BE REQUIRED TO PREVENT CAVE-IN OR SURROUNDING MATERIAL. STABILITY OF DRILLED SHAFT HOLE IS THE RESPONSIBILITY OF THE DRILLED SHAFT CONTRACTOR.

STATE OF TEXAS
ARTHUR VIDALES
127233
LICENSED
PROFESSIONAL ENGINEER

1/29/2024
DATE

0' 10' 20'
SCALE: 1"=20'

HL-93 LOADING

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

DALLAS I SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH
6105 TENNYSON PKWY, STE 210 I PLANO, TX 75024 I 214.420.8494
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10194390

FM 777 AT BIG WALNUT RUN

BRIDGE LAYOUT

DESIGNED:	AJG	CONT	SECT	JOB	HIGHWAY
CHECKED:	JHG	1109	01	026, ETC	FM 777
DRAWN:	AMS	DIST	COUNTY		SHEET NO.
CHECKED:	JHG	BMT	JASPER		138

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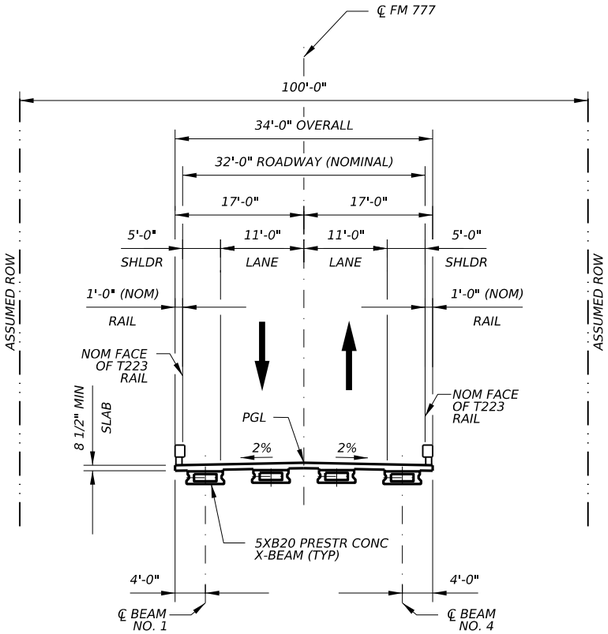

TYPICAL SECTION

N.T.S.
STA 271+32.15 TO STA 272+62.15

ARTHUR VIDALES
127233
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

1/26/2024
DATE

NOT TO SCALE

HL-93 LOADING

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS

DALLAS I SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH
6105 TENNYSON PKWY, STE 210 I PLANO, TX 75024 I 214.420.8494
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10194390

Texas Department of Transportation

FM 777 AT BIG WALNUT RUN

BRIDGE TYPICAL SECTION

DESIGNED:	AJG	CONT	SECT	JOB	HIGHWAY
CHECKED:	JHG	1109	01	026, ETC	FM 777
DRAWN:	CT	DIST	COUNTY		SHEET NO.
CHECKED:	JHG	BMT	JASPER		139

DATE: 1/26/2024 9:48:25 AM
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SCOUR ANALYSIS - 100-YR (DESIGN)
SCOUR ANALYSIS DETERMINED BY UTILIZING EQUATIONS FROM HEC-18 MANUAL.
COMPUTED USING HYDRAULIC TOOLBOX VERSION 5.2

LIVE-BED CONTRACTION SCOUR EQUATIONS (EQNS. 6.1 & 6.2)

D50 = 0.200 MM
K1 = 0.69
SCOUR DEPTH Y (CHANNEL) = 5.73 FT

NOTES:

1. SCOUR ANALYSIS IS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL AND HEC-18
2. ABUTMENTS TO BE PROTECTED WITH RIPRAP (STONE PROTECTION). ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
3. 18" STONE PROTECTION SIZE IS RECOMMENDED WITH A 36" THICKNESS

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

Texas Department of Transportation
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SCOUR DATA
FM 777
AT BIG WALNUT RUN

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, etc	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		140

DATE: 1/30/2024 5:36:43 PM
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CK:
DW:
CK:
DW:

NOTES:

1. SIGNING AND SEALING ONLY FOR BEARING SEAT ELEVATIONS.

SUMMARY OF ESTIMATED QUANTITIES - FM 777 AT BIG WALNUT RUN

BID ITEM	400 6005	416 6004	420 6013	420 6029	420 6037	422 6005	422 6015	425 6020	432 6033	450 6006	454 6004	496 6010
BID ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (BOX BEAM)	APPROACH SLAB	PRESTR CONC BOX BEAM (5XB20)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 100-499 FT LENGTH)
BRIDGE ELEMENT	CY	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF	EA
2 - ABUTMENTS	93	480	37.7				51.4		690	40	67	1
2 - INTERIOR BENTS		360		30.7	17.4							
1 - 130.00' PRESTR CONCRETE X-BEAM UNIT						4420		514.00		260		
TOTAL	93	840	37.7	30.7	17.4	4420	51.4	514.00	690	300	67	1

BEARING SEAT ELEVATIONS

	BEAM 1		BEAM 2		BEAM 3		BEAM 4		DIST BETWN BRNG ELEVS ALONG CL BRNG (FT)
	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	
ABUT 1 (FWD)	128.236	128.356	128.409	128.529	128.529	128.409	128.356	128.236	6.000
BENT 2 (BACK)	128.482	128.602	128.656	128.776	128.776	128.656	128.602	128.482	6.000
(FWD)	128.491	128.611	128.664	128.784	128.784	128.664	128.611	128.491	6.000
BENT 3 (BACK)	128.545	128.665	128.718	128.838	128.838	128.718	128.665	128.545	6.000
(FWD)	128.541	128.661	128.714	128.834	128.834	128.714	128.661	128.541	6.000
ABUT 4 (BACK)	128.380	128.500	128.553	128.673	128.673	128.553	128.500	128.380	6.000

STATE OF TEXAS
ARTHUR VIDALES
127233
LICENSED
PROFESSIONAL ENGINEER

1/26/2024
DATE

NOT TO SCALE

HL-93 LOADING

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
DALLAS I SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH
6105 TENNYSON PKWY, STE 210 I PLANO, TX 75024 I 214.420.8494
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10194390

Texas Department of Transportation

FM 777 AT BIG WALNUT RUN

ESTIMATED QUANTITIES
AND
BEARING SEAT ELEVATIONS

DESIGNED:	AJG	CONT	SECT	JOB	HIGHWAY
CHECKED:	JHG	1109	01	026, ETC	FM 777
DRAWN:	AMS	DIST	COUNTY		SHEET NO.
CHECKED:	JHG	BMT	JASPER		141

DATE: 1/26/2024 9:46:36 AM
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NOTES:

1. BORE HOLES REPLICATED FROM HVJ ASSOCIATES, INC. BORINGS TAKEN ON OCTOBER 9 AND 11 OF 2023.

2. WATER BEARING COHESIONLESS SOILS ARE EXPECTED DURING DRILLED SHAFT CONSTRUCTION. CASING OR SLURRY DISPLACEMENT METHOD MAY BE REQUIRED TO PREVENT THE CAVE-IN OF SURROUNDING MATERIAL. STABILITY OF DRILLED SHAFT HOLE IS THE RESPONSIBILITY OF THE DRILLED SHAFT CONTRACTOR.

3. DRILLED SHAFT EXCAVATIONS SHOULD BE INSPECTED FOR VERTICALITY AND SIDE SLOUGHING. VERTICALITY IS SPECIFIED AT ONE INCH IN TEN FEET OF THE SHAFT LENGTH, AND SHOULD BE CHECKED TO THE FULL DEPTH OF DRY AUGERING PRIOR TO INTRODUCING DRILLING MUD.

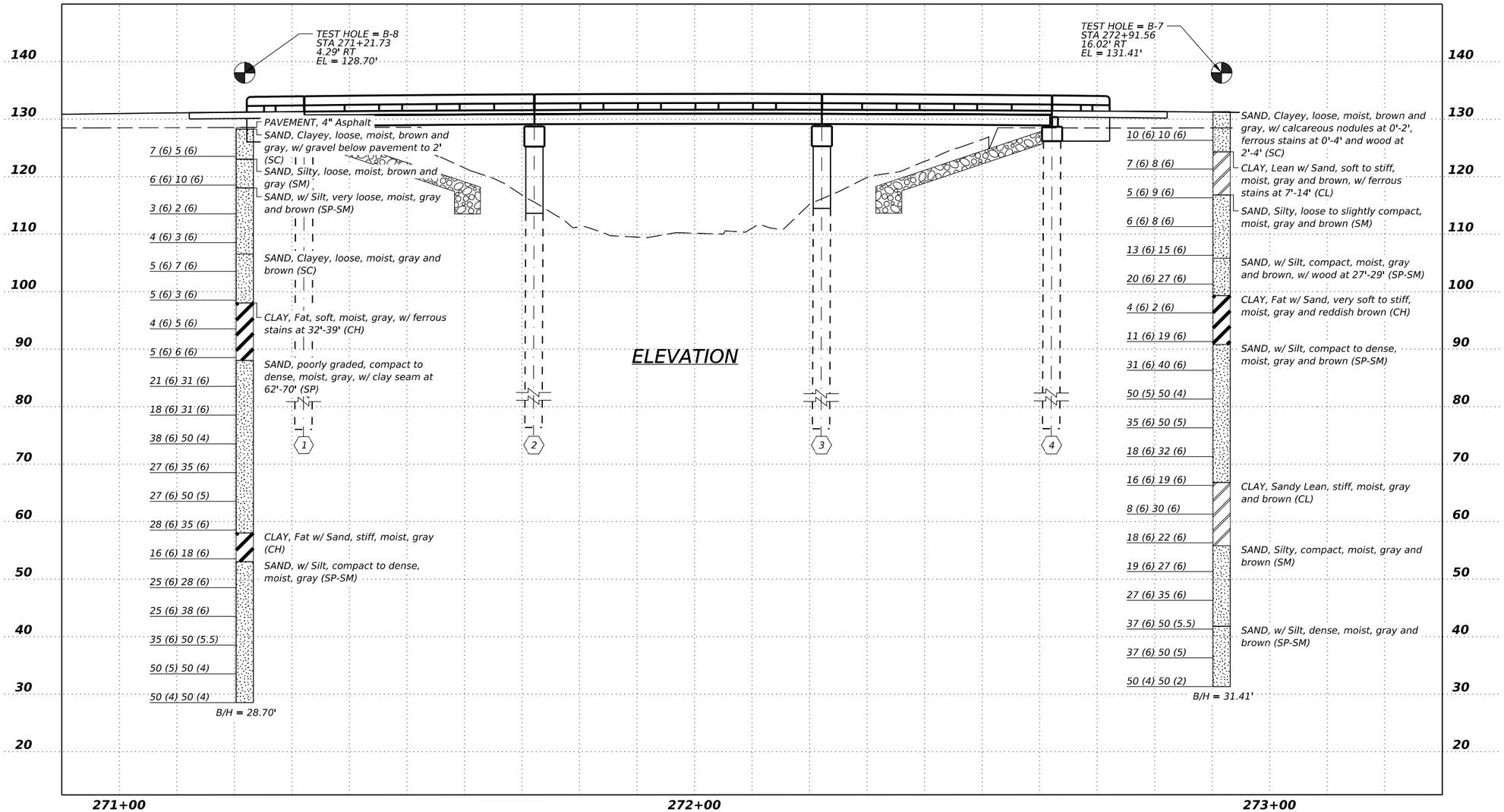
4. BEFORE PLACING CONCRETE, THE SHAFT BOTTOM SHOULD BE CLEANED OUT WITH A DRILLING BUCKET IN ORDER TO REMOVE ANY SEDIMENTS THAT MAY NOT BE DISPLACED BY THE CONCRETE. THE SHAFT BOTTOMS SHOULD BE CLEANED WITH A "CLEAN-OUT" BUCKET UNTIL ROTATION ON THE BOTTOM WITHOUT CROWD (I.E. PENETRATION UNDER FORCE) PRODUCES LITTLE SPOIL. PROBING AFTER CLEAN OUT IS ESSENTIAL TO VERIFY THE CONDITION OF THE BASE OF THE SHAFT.

5. CONCRETE PLACEMENT SHOULD BE ACCOMPLISHED AS DIRECTED IN TXDOT STANDARD SPECIFICATION ITEM 416.3.6. THE TREMIE PIPE DIAMETER SHOULD BE AT LEAST 6 TIMES THE MAXIMUM SIZE OF AGGREGATE IN THE CONCRETE MIX.

6. A COMPUTATION OF THE FINAL CONCRETE VOLUME FOR EACH SHAFT SHOULD BE MADE. SHAFTS TAKING AN UNREASONABLY HIGH OR LOW VOLUME OF CONCRETE SHOULD BE CORED TO CHECK THEIR INTEGRITY.

7. CASING WHICH CAN BE USED TO OVERCOME CAVING BECAUSE OF THE SANDS SHOULD BE EXTRACTED SLOWLY AND SMOOTHLY WITH A VIBRATORY HAMMER. THE CASING SHOULD ALWAYS REMAIN AT LEAST FIVE FEET BELOW THE LEVEL OF THE CONCRETE DURING PLACEMENT. GEOTECHNICAL ENGINEER'S ANALYSES ASSUME NO CASING WILL BE LEFT IN PLACE. GEOTECHNICAL ENGINEER SHOULD BE INFORMED IF CASING WILL BE LEFT IN PLACE SO GEOTECHNICAL ENGINEER MAY PROVIDE REVISED SHAFT CAPACITY CALCULATIONS.

8. SHAFT EXCAVATIONS SHOULD NOT BE MADE WITHIN TWO SHAFT DIAMETERS (EDGE TO EDGE) OF SHAFTS THAT HAVE BEEN CONCRETED WITHIN THE LAST 24 HOURS OR FROM OPEN SHAFT EXCAVATIONS.



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STATE OF TEXAS
ARTHUR VIDALES
127233
LICENSED
PROFESSIONAL ENGINEER

1/26/2024
DATE

0' 10' 20'
SCALE: 1"=20'

HL-93 LOADING

REV. NO.	DATE	DESCRIPTION	BY

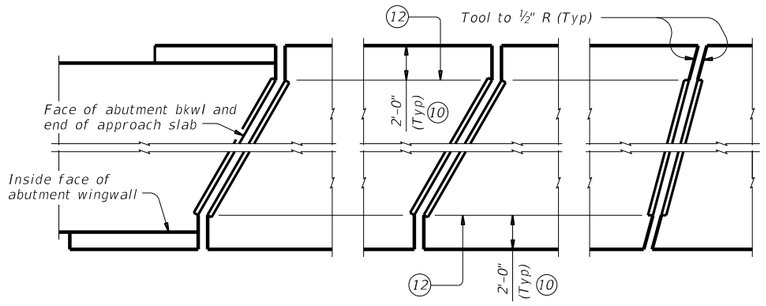
PAPE-DAWSON ENGINEERS
DALLAS I SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH
6105 TENNYSON PKWY, STE 210 I PLANO, TX 75024 I 214.420.8494
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10194390

Texas Department of Transportation

FM777 AT BIG WALNUT RUN

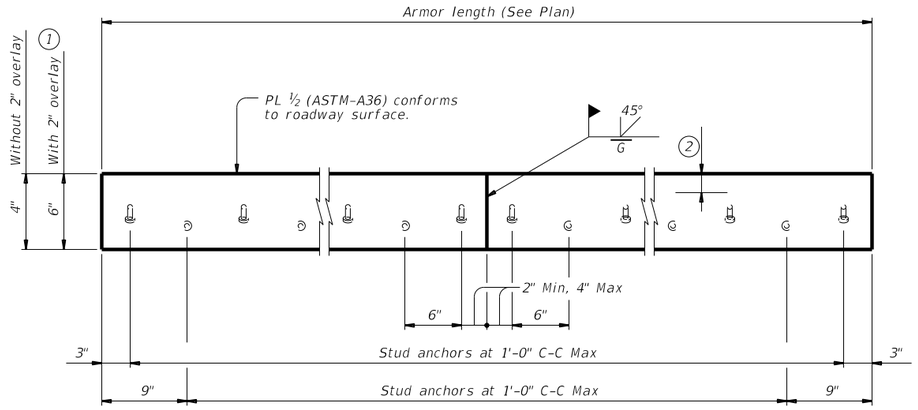
BORING LOGS

DESIGNED:	AJG	CONT	SECT	JOB	HIGHWAY
CHECKED:	JHG	1109	01	026, ETC	FM 777
DRAWN:	AMS	DIST	COUNTY		SHEET NO.
CHECKED:	JHG	BMT	JASPER		142



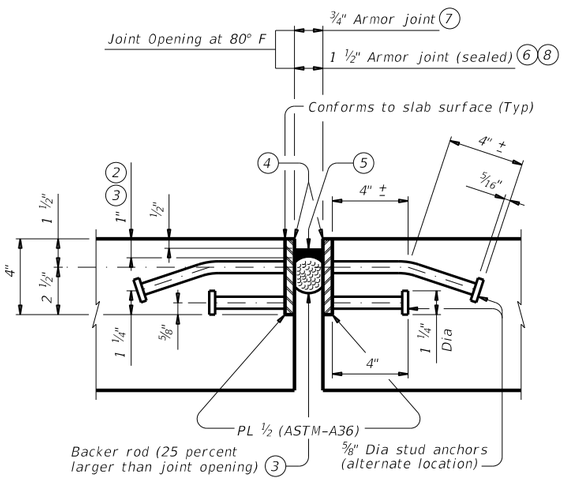
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

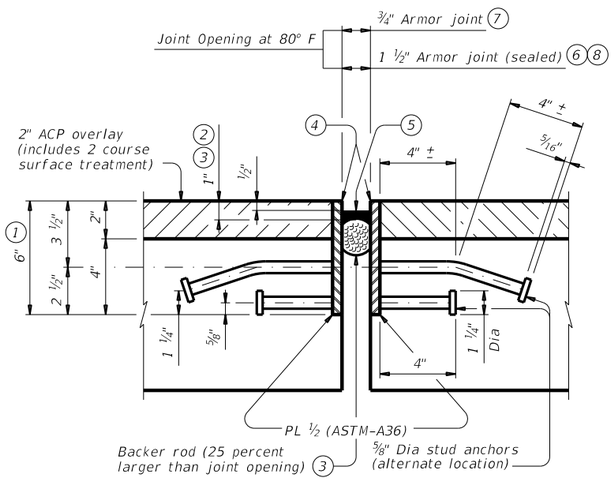


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



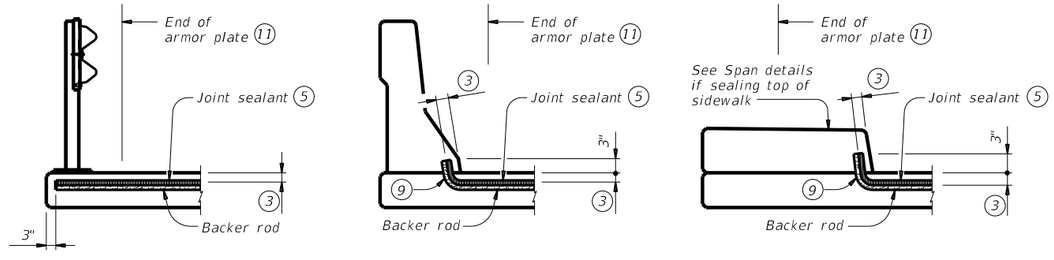
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)



JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

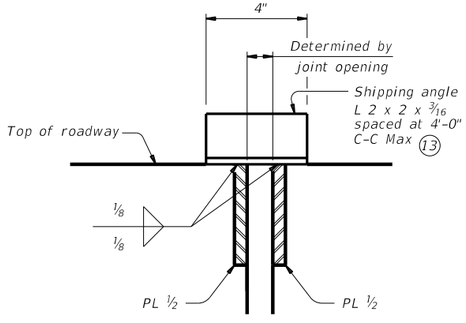
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.

These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY 1	22.90 plf

Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: MS-AJ-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		143

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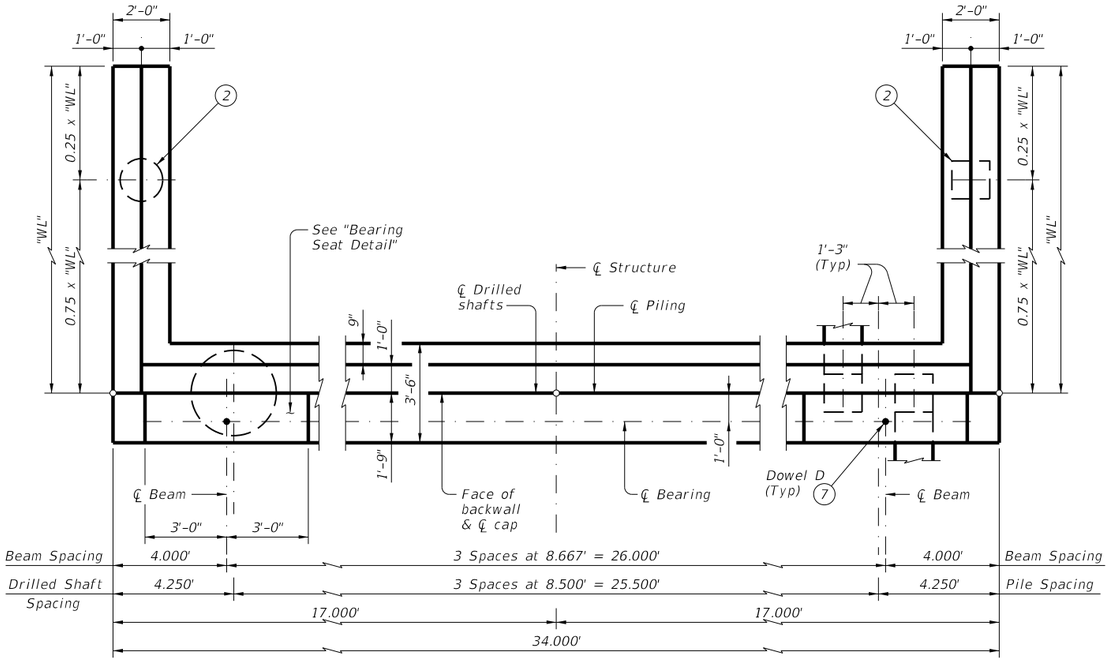
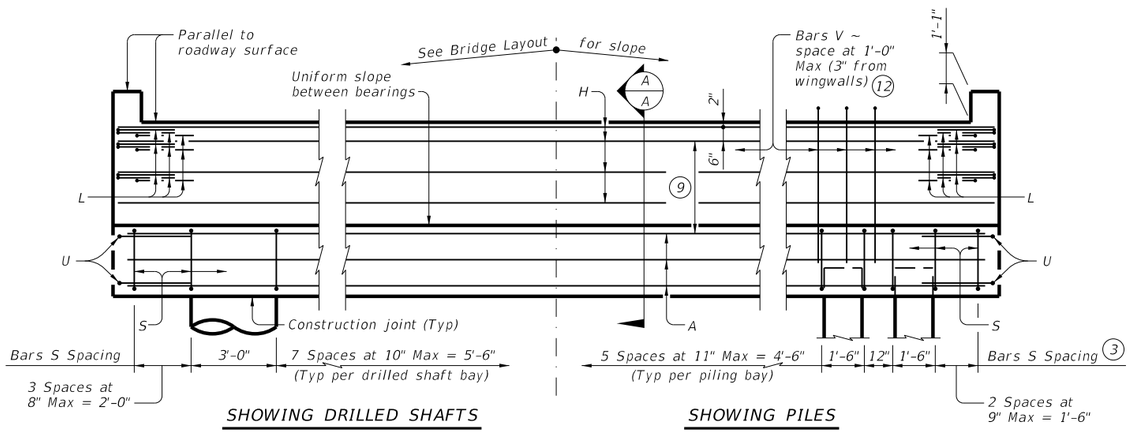


SHOWING DRILLED SHAFTS SHOWING PILES

PLAN (1)

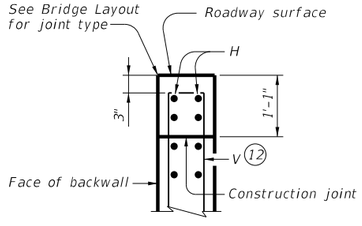


SHOWING DRILLED SHAFTS SHOWING PILES

ELEVATION

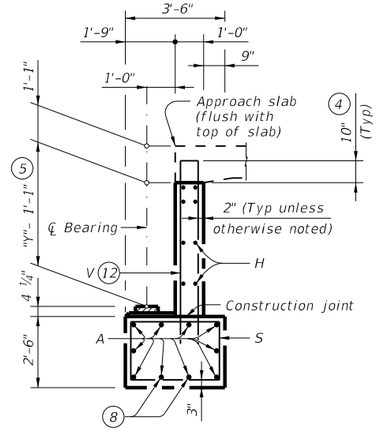
TABLE A

Header Slope	Beam Type	Wingwall Type	Wingwall Length "WL"
2:1	XB20	Cantilevered	7.000'
	XB28	Cantilevered	8.000'
	XB34	Cantilevered	9.000'
	XB40	Cantilevered	10.000'
3:1	XB20	Cantilevered	10.000'
	XB28	Cantilevered	12.000'
	XB34	Founded	13.000'
	XB40	Founded	15.000'



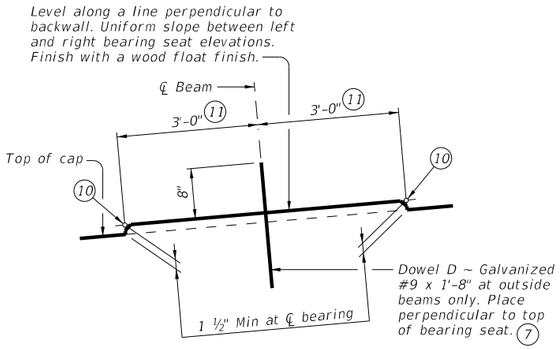
BACKWALL DETAIL

(Without approach slab) (6)



SECTION A-A

(With approach slab) (6)



BEARING SEAT DETAIL

(Remove all loose material and clean bearing surface before placing the bearing pad.)

(1) See Table A for variable dimensions based on header slope and beam type.

(2) See Table A to determine if wingwall foundations are required.

(3) For piling larger than 16" adjust Bars S spacing as required to avoid piling.

(4) Increase as required to maintain 3" from finished grade.

(5) See Span Details for "Y" value.

(6) See Bridge Layout to determine if approach slab is present.

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(8) With pile foundations, move Bars A shown to clear piles.

(9) Spacing based on beam type:
XB20 ~ 2 spaces at 1'-0" Max
XB28 ~ 3 spaces at 1'-0" Max
XB34 ~ 3 spaces at 1'-0" Max
XB40 ~ 3 spaces at 1'-0" Max

(10) Right and left elevations and locations are provided elsewhere.

(11) Measured along ℄ of bearing.

(12) Field bend as needed to clear piles.

TABLE OF FOUNDATION LOADS

Span Length	Drilled Shaft Load	Battered Pile Load
Ft	Tons/DS	Tons/Pile
40	56	45
45	61	47
50	64	49
55	68	51
60	72	53
65	76	55
70	80	57
75	84	59
80	87	61
85	91	63
90	95	65
95	98	67
100	102	68
105	106	70

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi.)
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Galvanize dowel bars D.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
See Bridge Layout for header slope and foundation type, size and length.
See Common Foundation Details (FD) standard for all foundation details and notes.
See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.
See Shear Key Details (XBSK) standard sheet for all shear key details and notes if applicable.
See applicable rail details for rail anchorage details in wingwalls.
These abutment details may be used with standard SXB-32 only.

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

ABUTMENTS PRESTR CONC X-BEAMS (TYPE 5XB20 THROUGH 5XB40) 32' ROADWAY AXB-32

FILE: XB-AXB3200-22.dgn	DN: BMP	CK: EFC	DW: JER	CK: BMP
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		144

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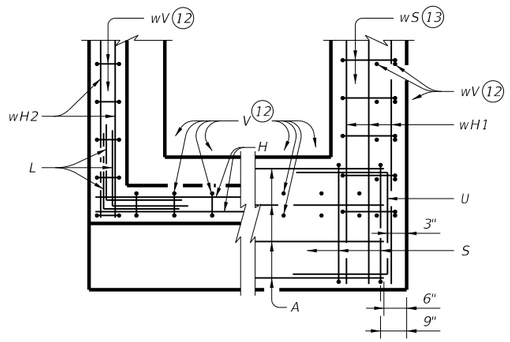
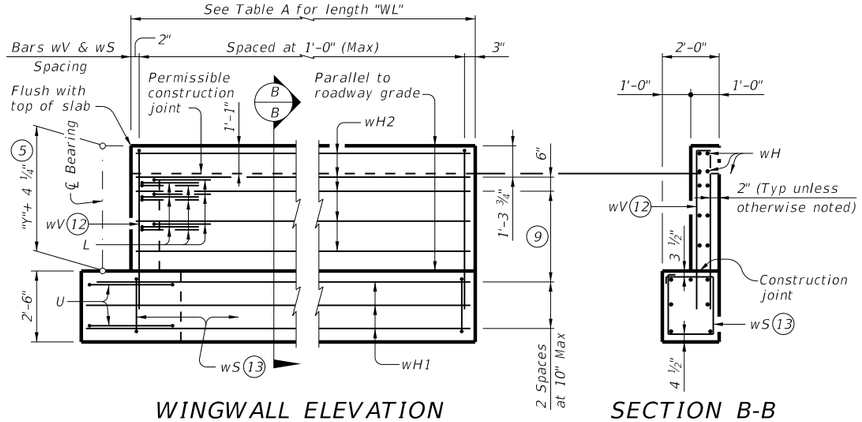


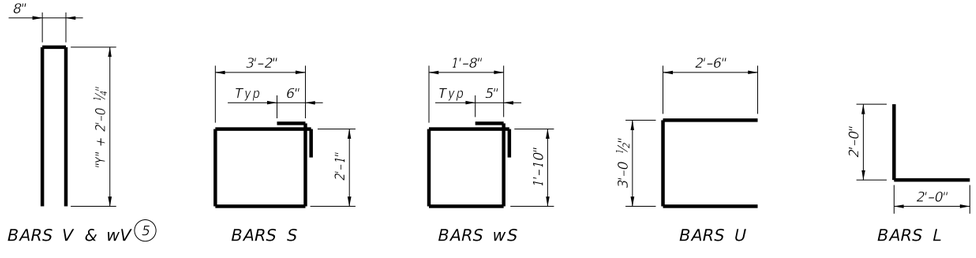
BACKWALL CAP

CORNER DETAILS



WINGWALL ELEVATION

SECTION B-B



BARS V & wV (5) BARS S BARS wS BARS U BARS L

TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (14)

TYPE 5XB20 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	6	#6	33'-8"	303
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	10'-0"	344
wH1	14	#6	8'-5"	177
wH2	16	#6	6'-8"	160
wS	16	#4	7'-10"	84
wV	16	#5	10'-0"	167
Reinforcing Steel			Lb	3,540
Class "C" Concrete			CY	17.0

TYPE 5XB28 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	11'-4"	390
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
Reinforcing Steel			Lb	3,835
Class "C" Concrete			CY	18.7

TYPE 5XB34 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	12'-4"	424
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-4"	257
Reinforcing Steel			Lb	3,975
Class "C" Concrete			CY	20.3

TYPE 5XB40 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	13'-4"	459
wH1	14	#6	11'-5"	240
wH2	20	#6	9'-8"	290
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306
Reinforcing Steel			Lb	4,120
Class "C" Concrete			CY	21.9

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE (14)

TYPE 5XB20 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	6	#6	33'-8"	303
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	10'-0"	344
wH1	14	#6	11'-5"	240
wH2	16	#6	9'-8"	232
wS	22	#4	7'-10"	115
wV	22	#5	10'-0"	229
Reinforcing Steel			Lb	3,768
Class "C" Concrete			CY	18.7

TYPE 5XB28 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	11'-4"	390
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307
Reinforcing Steel			Lb	4,175
Class "C" Concrete			CY	21.3

TYPE 5XB34 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	12'-4"	424
wH1	14	#6	14'-5"	303
wH2	20	#6	12'-8"	381
wS	28	#4	7'-10"	147
wV	28	#5	12'-4"	360
Reinforcing Steel			Lb	4,325
Class "C" Concrete			CY	23.0

TYPE 5XB40 BEAMS

Bar	No.	Size	Length	Weight
A	10	#11	33'-0"	1,753
D (7)	2	#9	1'-8"	11
H	8	#6	33'-8"	405
L	18	#6	4'-0"	108
S	32	#5	11'-6"	384
U	4	#6	8'-1"	49
V	33	#5	13'-4"	459
wH1	14	#6	16'-5"	345
wH2	20	#6	14'-8"	441
wS	32	#4	7'-10"	167
wV	32	#5	13'-4"	445
Reinforcing Steel			Lb	4,567
Class "C" Concrete			CY	25.5

(5) See Span Details for "Y" value.

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(9) Spacing based on beam type:
XB20 ~ 2 spaces at 1'-0" Max
XB28 ~ 3 spaces at 1'-0" Max
XB34 ~ 3 spaces at 1'-0" Max
XB40 ~ 3 spaces at 1'-0" Max

(12) Field bend as needed to clear piles.

(13) Adjust as required to avoid piling.

(14) Quantities shown are for one abutment only (with approach slab.) With no approach slab, add 1.3 CY Class C concrete and 202 lbs of reinforcing steel for 4 additional H bars.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

ABUTMENTS PRESTR CONC X-BEAMS

(TYPE 5XB20 THROUGH 5XB40)

32' ROADWAY

AXB-32

FILE: XB-AXB3200-22.dgn	DN: BMP	CK: EFC	DW: JER	CK: BMP
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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	BMT	JASPER		145

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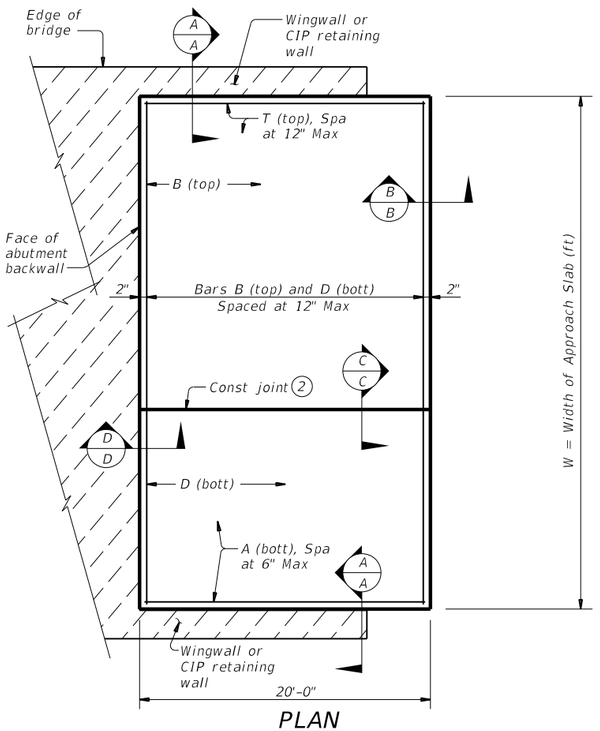
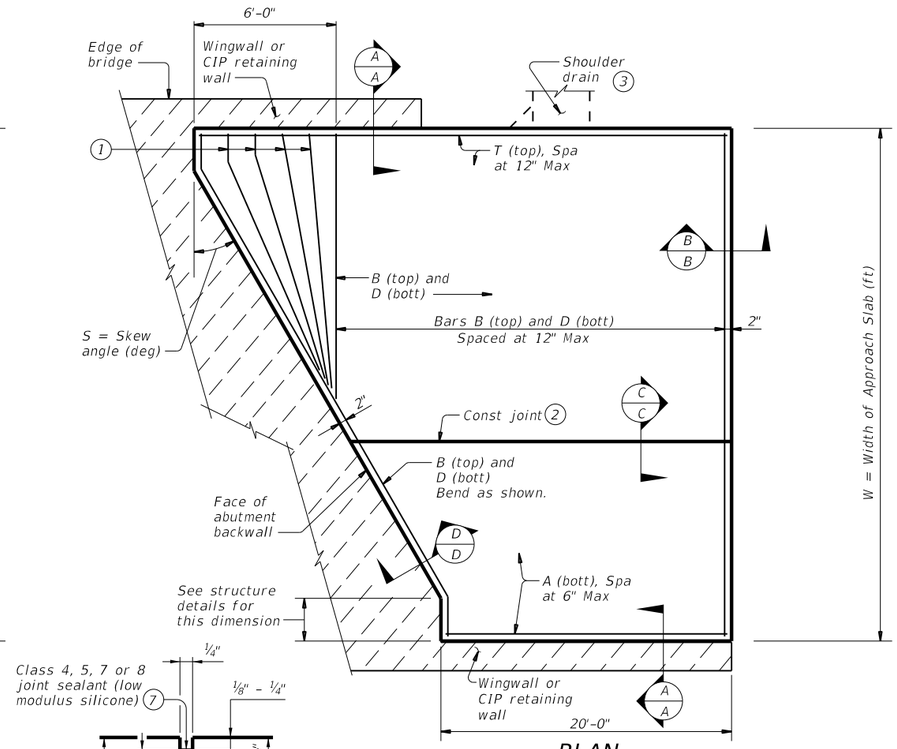


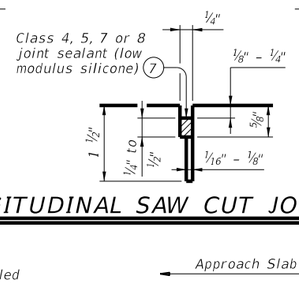
PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

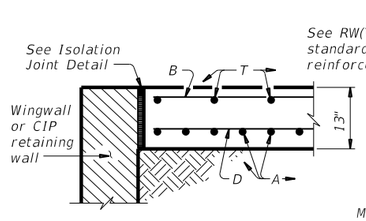
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

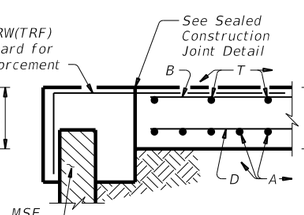
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

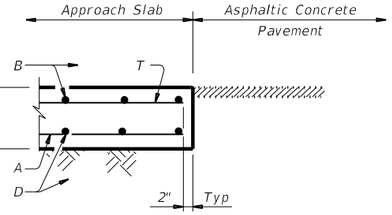
Cover dimensions are clear dimensions, unless noted otherwise.



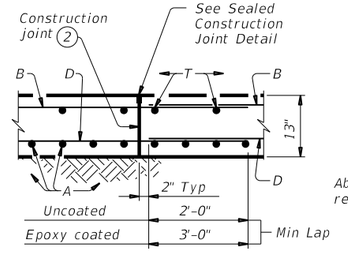
SHOWING WINGWALL OR CIP RETAINING WALL



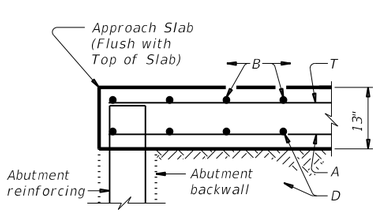
SHOWING MSE WALL



SECTION A-A

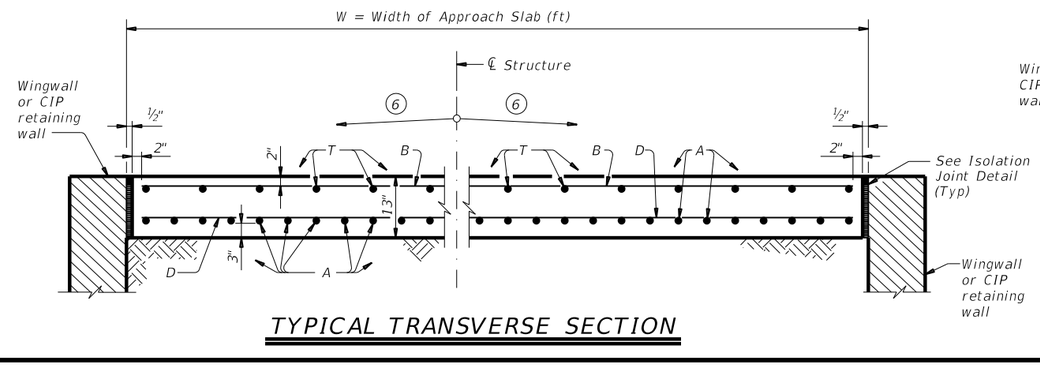


SECTION B-B

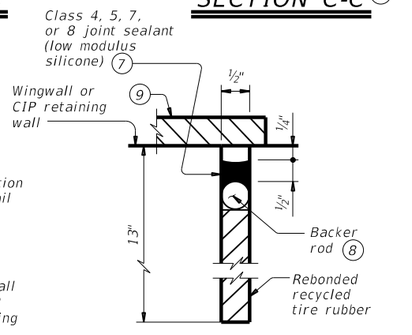


SECTION C-C (5)

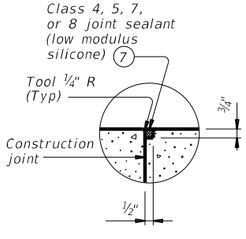
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOIN DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT

BAS-A

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	BMT	JASPER		146

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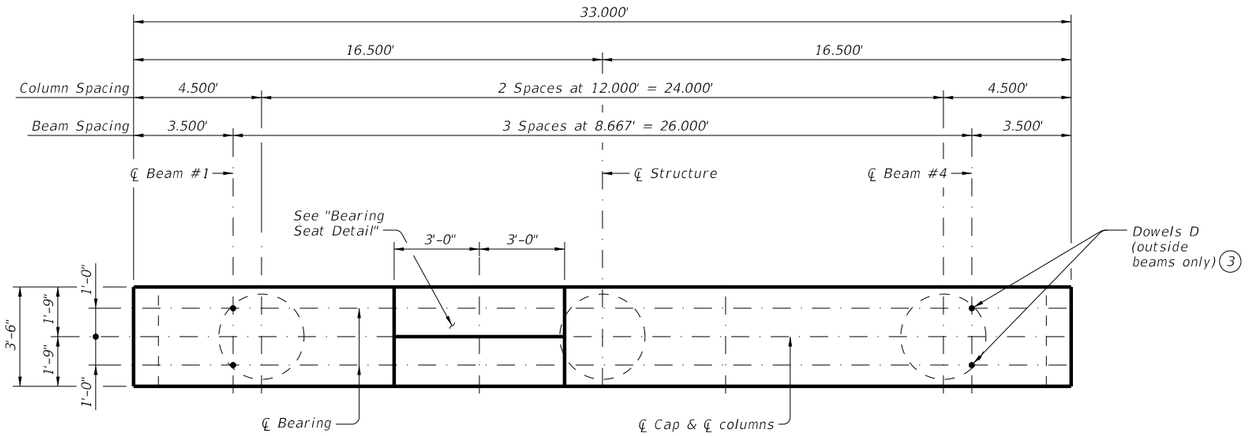
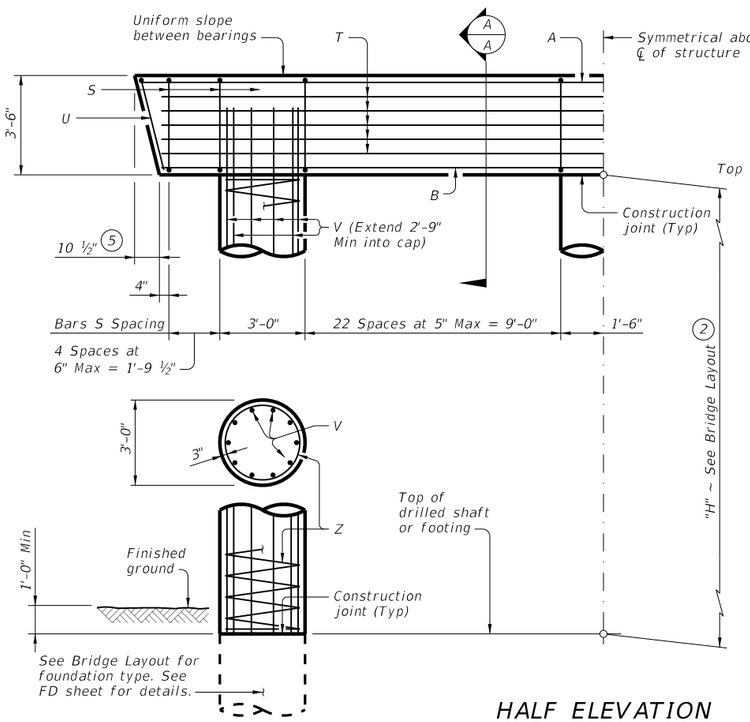
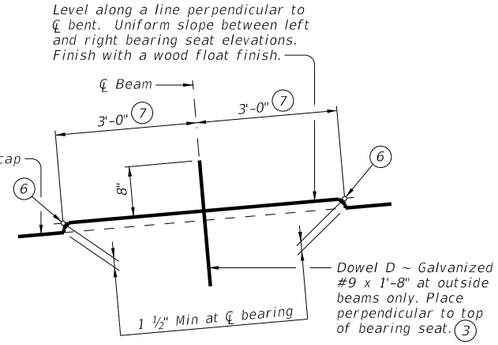


PLAN

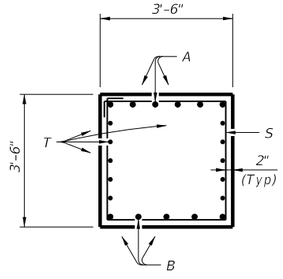


HALF ELEVATION

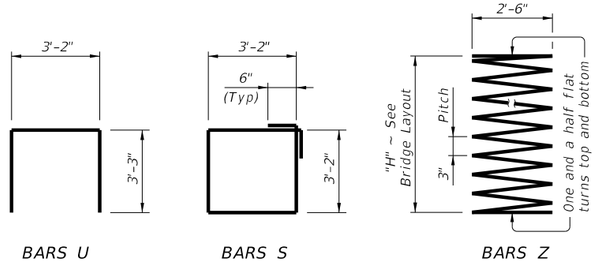


BEARING SEAT DETAIL

(Remove all loose material and clean bearing surface before placing the bearing pad.)



SECTION A-A



BARS U BARS S BARS Z

(1) Quantities shown are based on an "H" value of 36'. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing Steel, 165 lb
Class C Concrete (Col), 0.78 CY

(2) This standard may not be used for "H" heights exceeding 36'. In areas of very soft soil or where scour is anticipated, allowable "H" heights must be evaluated by the Engineer prior to the use of this standard.

(3) Omit Dowels D at end of multi-span units. Adjust reinforcing steel total accordingly.

(4) Foundation Loads based on "H" = 36'.

(5) Measured parallel to top of cap cross-slope.

(6) Right and left elevations and locations are provided elsewhere.

(7) Measured along ℄ of bearing.

TABLE OF ESTIMATED QUANTITIES (1)

Bar	No.	Size	Length	Weight
A	6	#11	32'-6"	1,036
B	5	#11	31'-0"	824
D (3)	4	#9	1'-8"	23
S	56	#5	13'-8"	798
T	10	#5	31'-0"	323
U	2	#5	9'-8"	20
V	30	#9	38'-9"	3,953
Z	3	#4	1154'-7"	2,314
Reinforcing Steel			Lb	9,291
Class "C" Concrete (Cap)			CY	15.0
Class "C" Concrete (Col)			CY	28.3

FOUNDATION LOADS (4)

Span Average	Drilled Shaft Loads	Pile Load (Tons/Pile)		
		3 Pile Ftg	4 Pile Ftg	5 Pile Ftg
Ft	Tons/Shaft			
40	124	45	35	28
45	134	49	37	30
50	144	52	39	32
55	153	55	42	34
60	163	58	44	36
65	173	62	47	38
70	182	65	49	40
75	192	68	52	42
80	202	71	54	44
85	211	74	56	46
90	221	77	59	48
95	230	81	61	50
100	240	84	63	52
105	249	87	66	53

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi.)
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Galvanize dowel bars D.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details (FD) standard for all foundation details and notes.
See Shear Key Details (XBSK) standard sheet for all shear key details and notes if applicable.
Bent selected must be based on the average span length, rounded up to the next 5-foot increment.
These bent details may be used with standard SXB-32 only.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS PRESTR CONC X-BEAMS

(TYPE 5XB20 THROUGH 5XB40)

32' ROADWAY

BXB-32

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©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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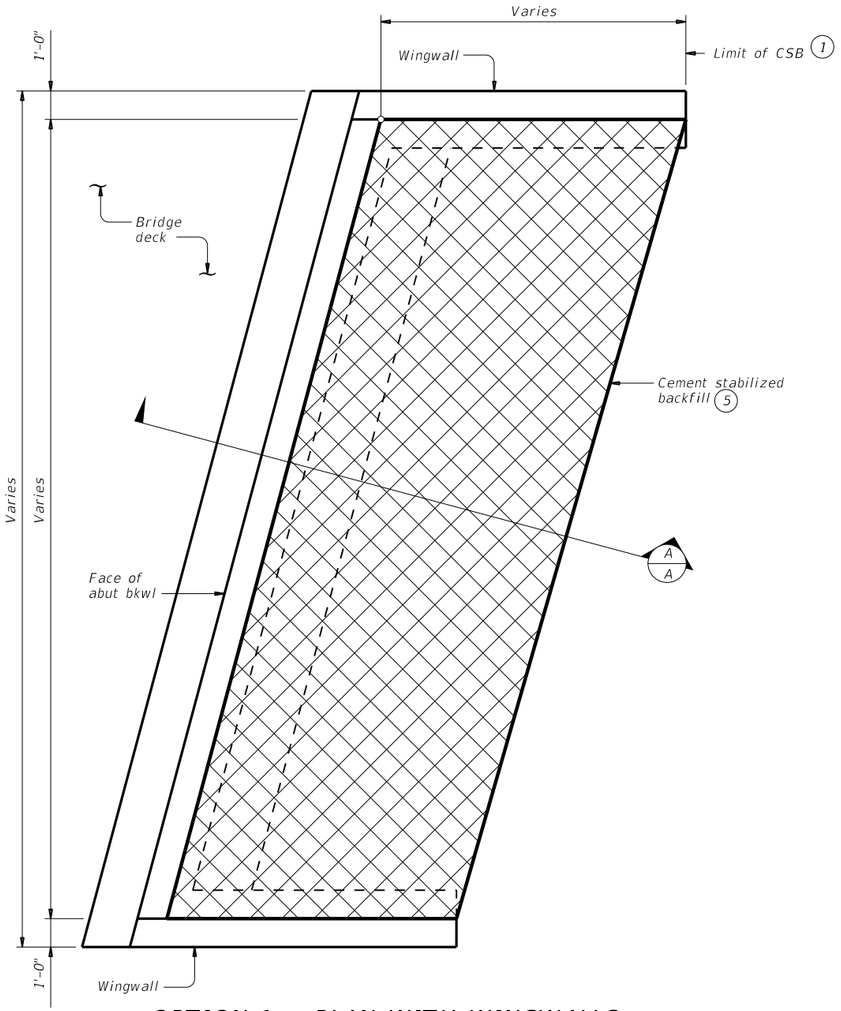
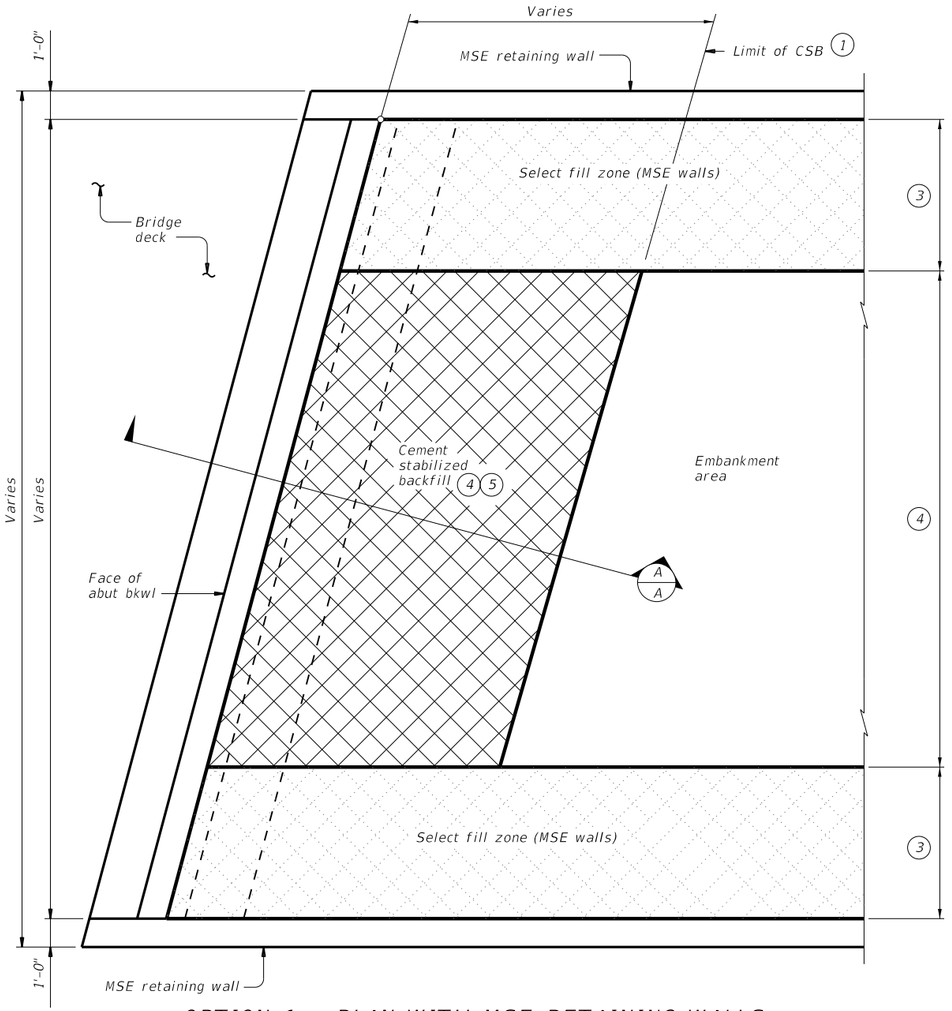


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

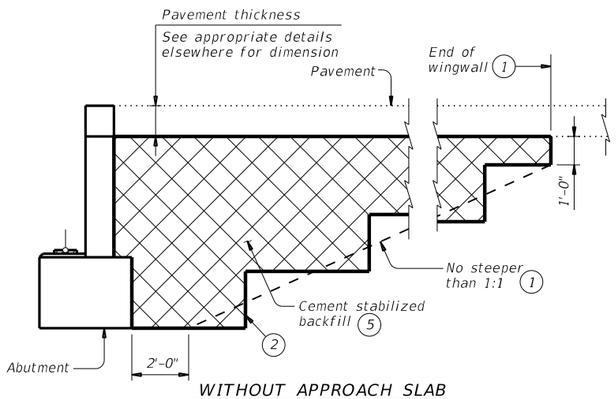
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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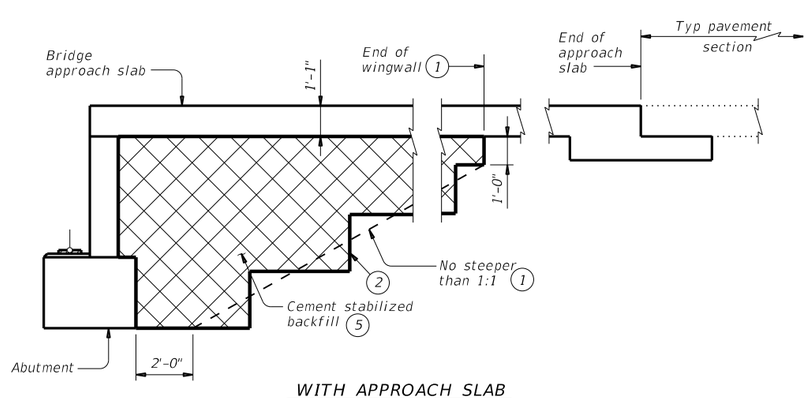

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	BMT	JASPER		148

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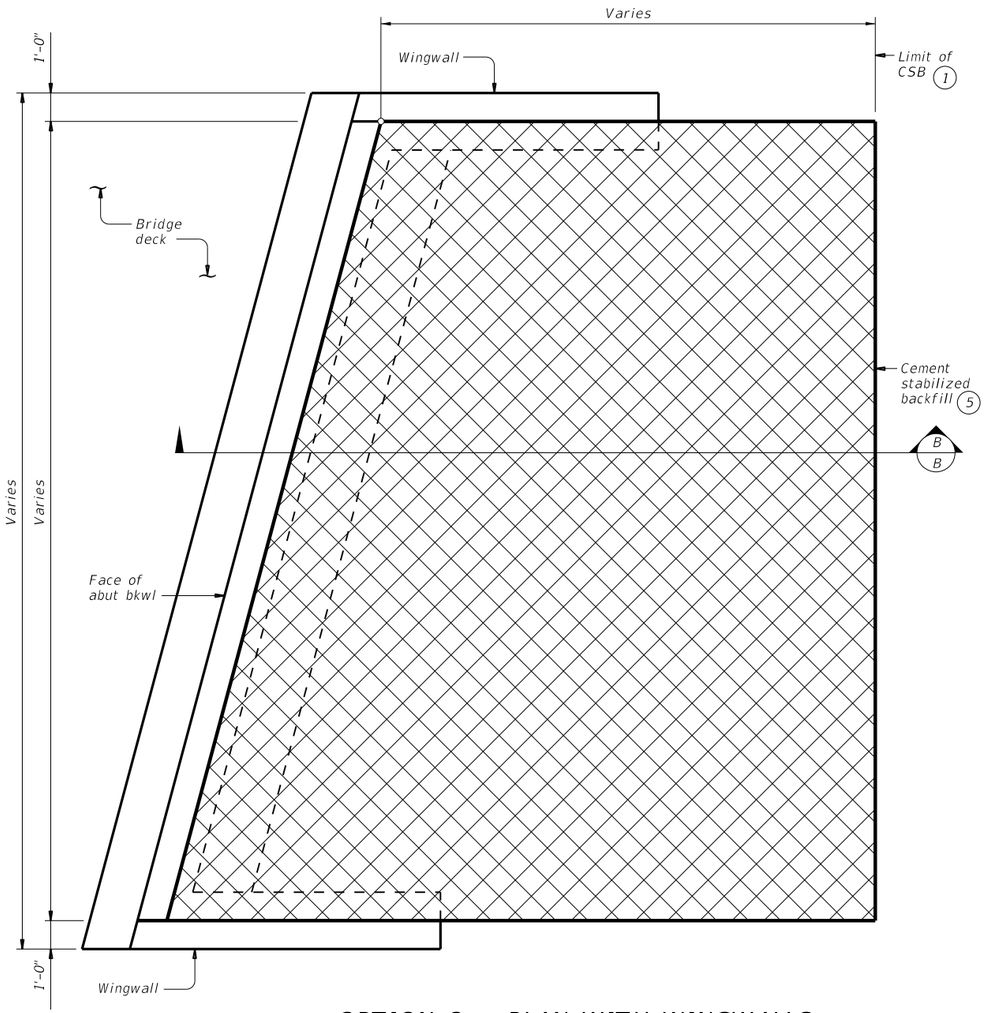
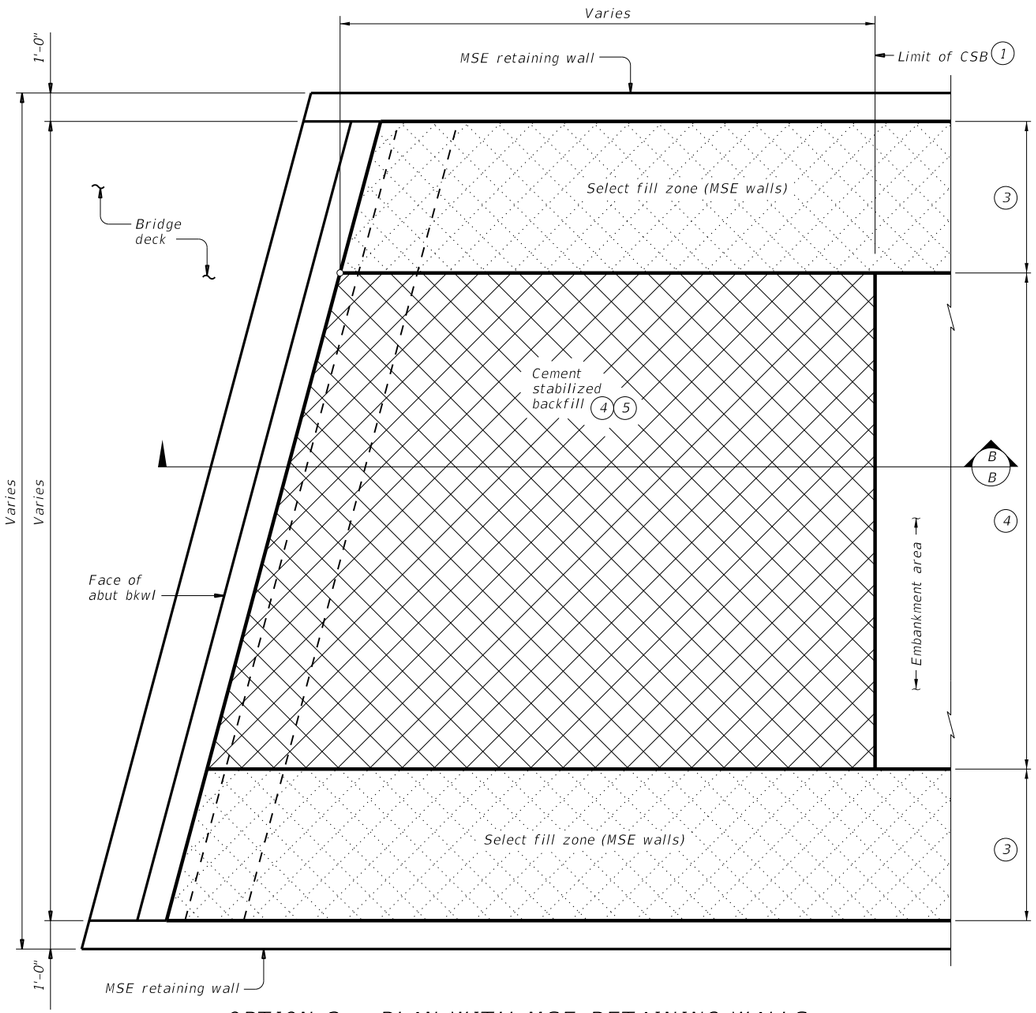


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

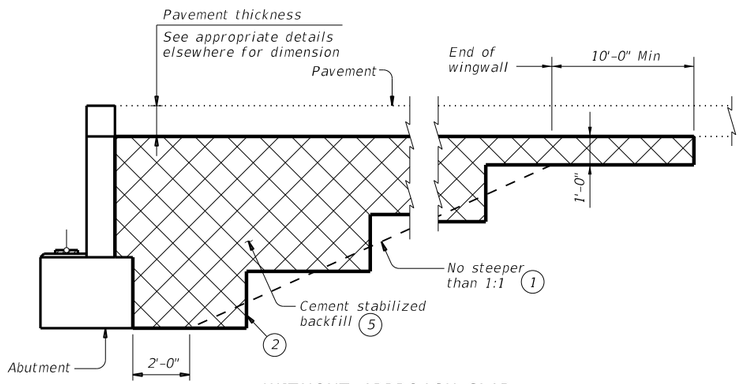
(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



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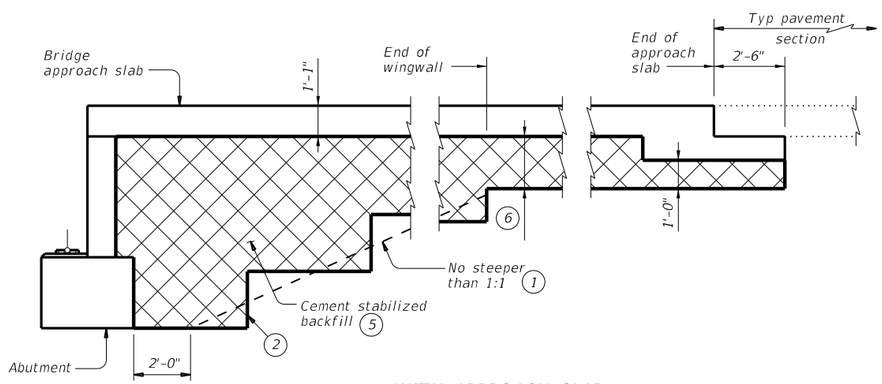

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
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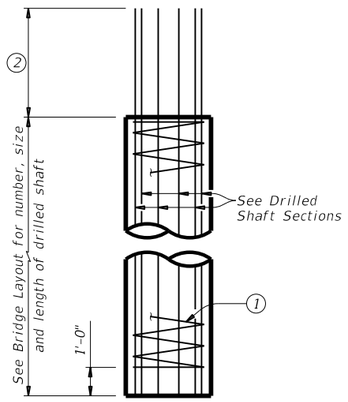
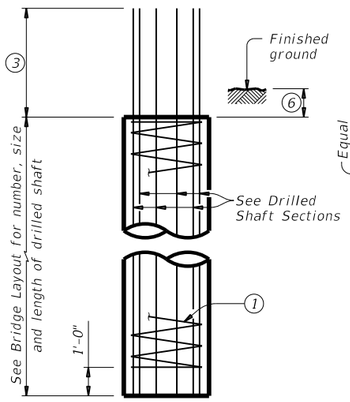
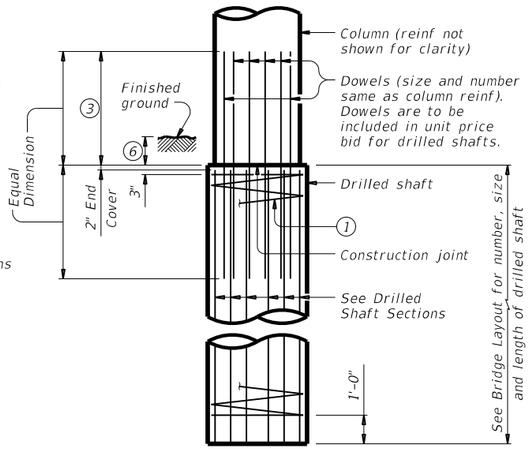


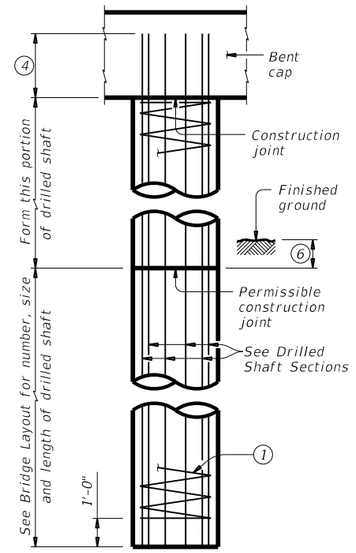
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



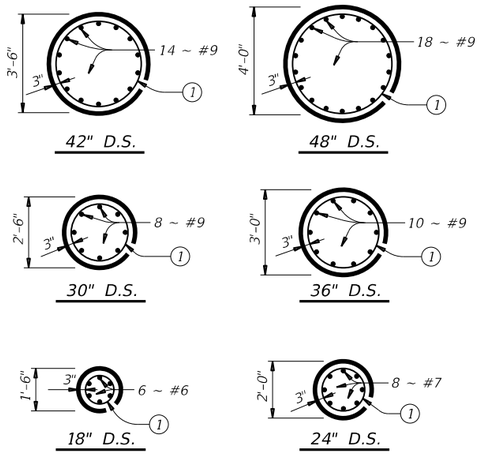
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

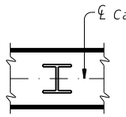


DRILLED SHAFT SECTIONS

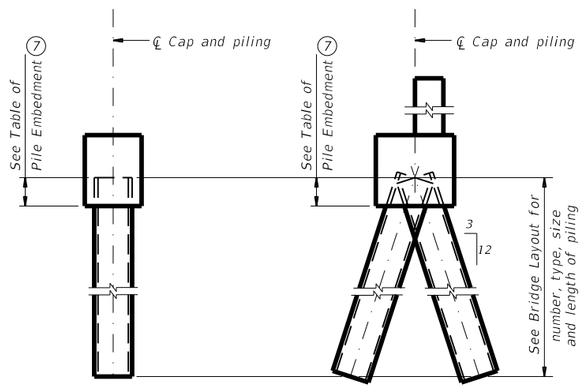
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

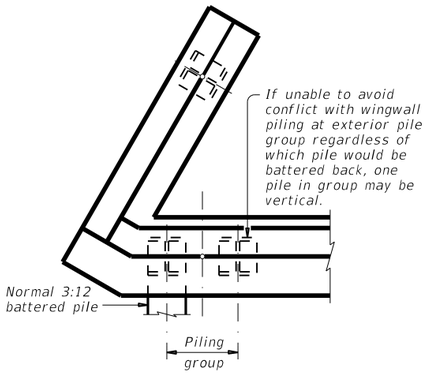
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



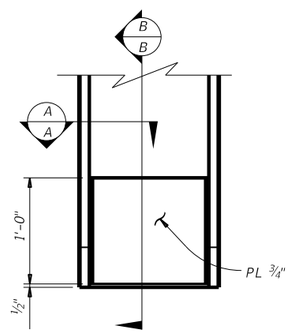
ORIENTATION OF STEEL H-PILING



PILING DETAILS
(Concrete or steel H)



DETAIL "A"
(Showing plan view of a 30° skewed abutment)



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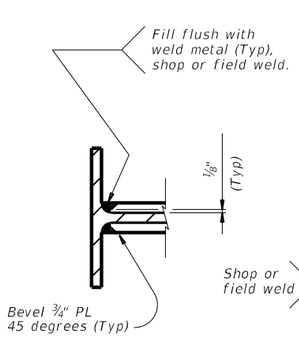
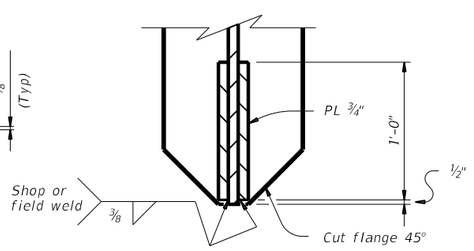


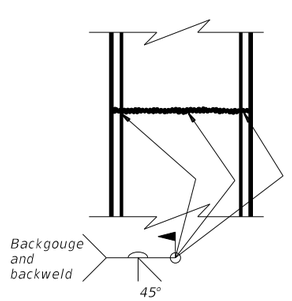
SECTION A-A

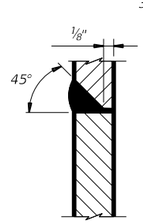


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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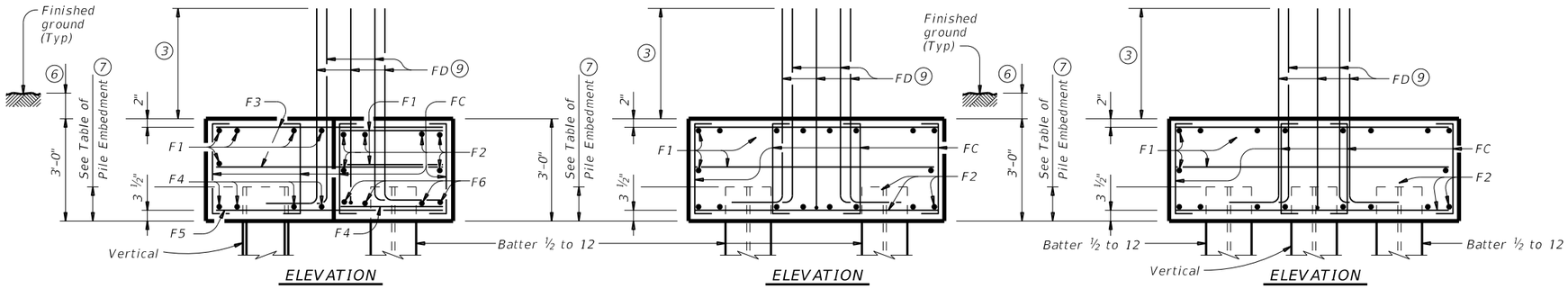
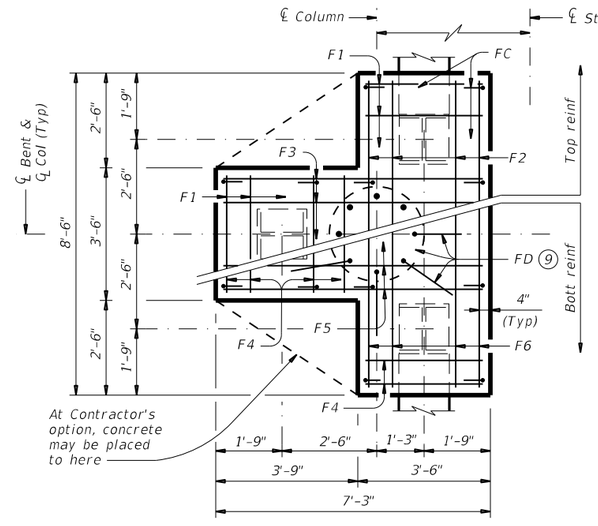
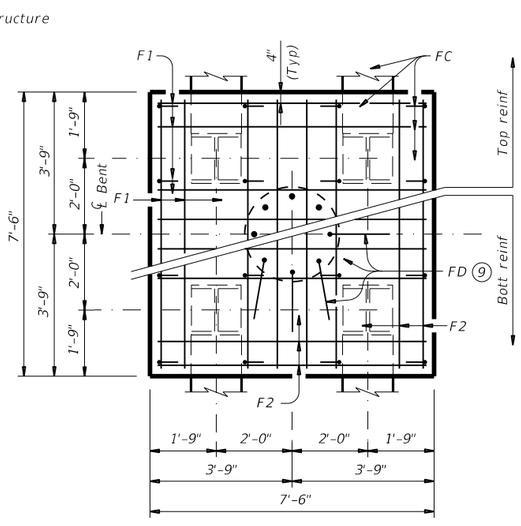




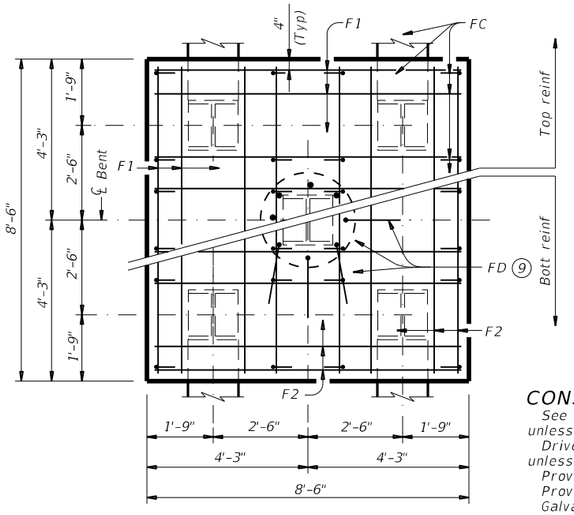
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



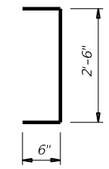
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

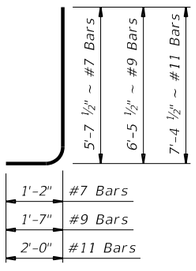


FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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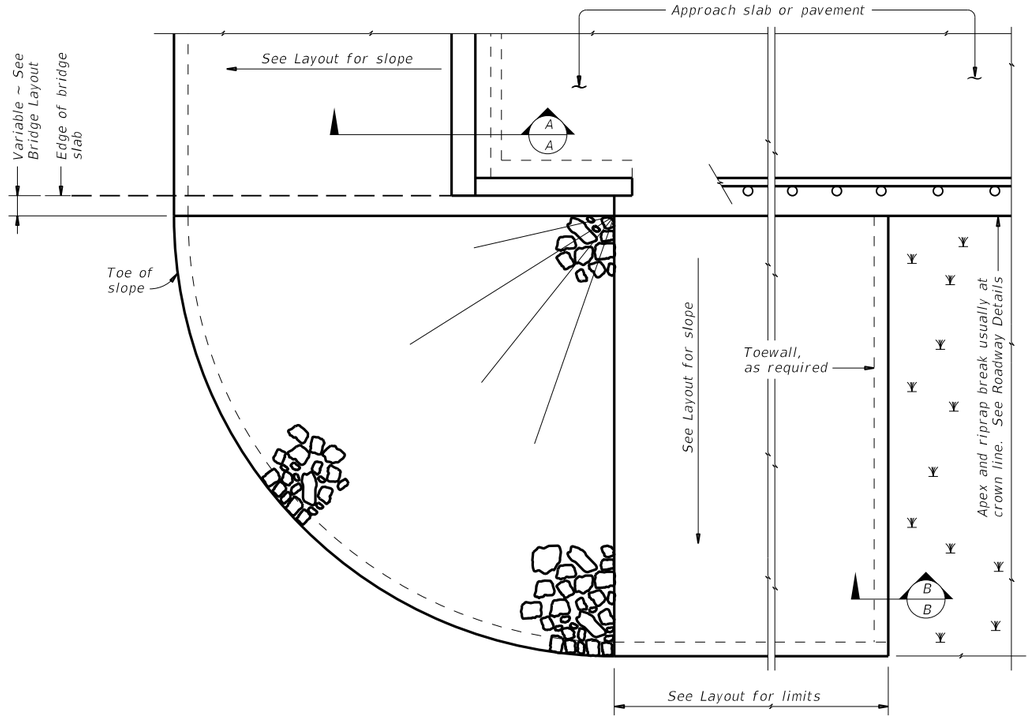
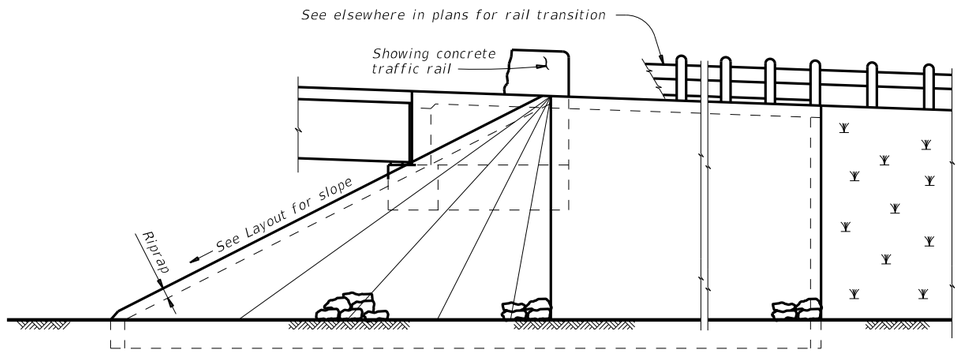


PLAN



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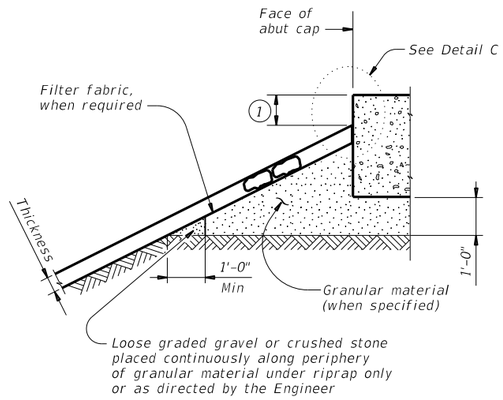
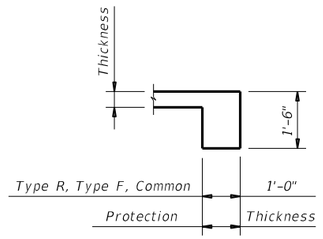
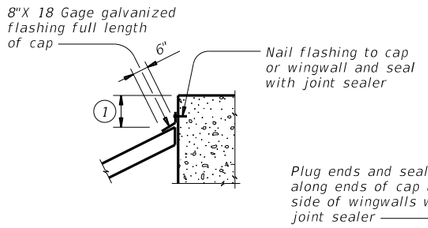


SECTION A-A AT CAP

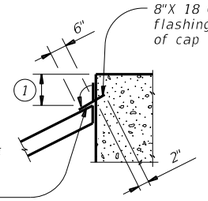


SECTION B-B

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

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: MS-SRR-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
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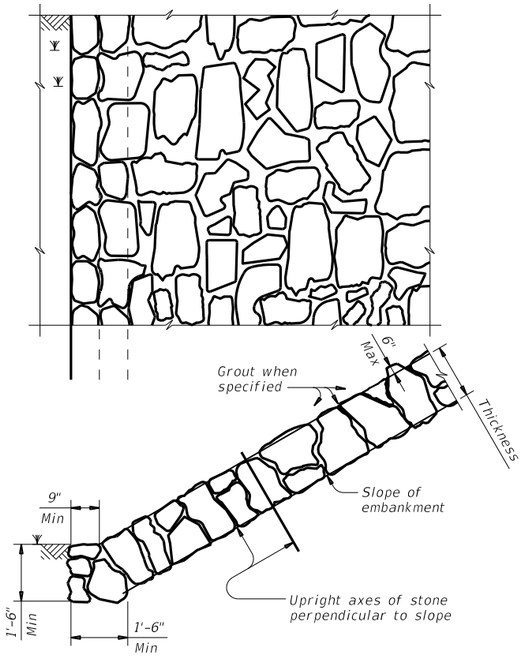


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

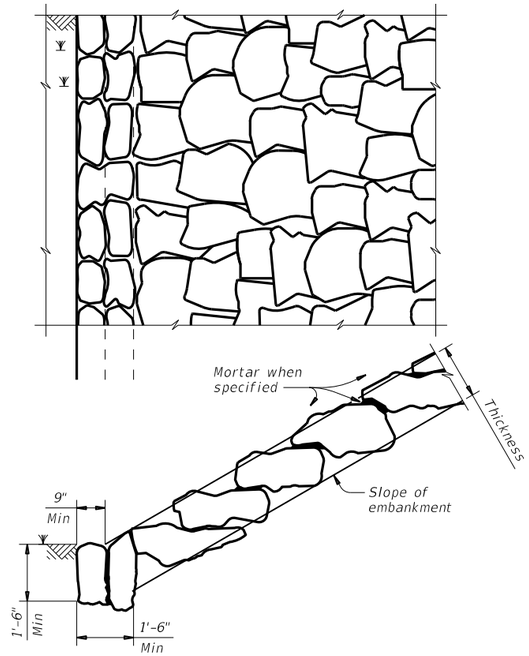


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

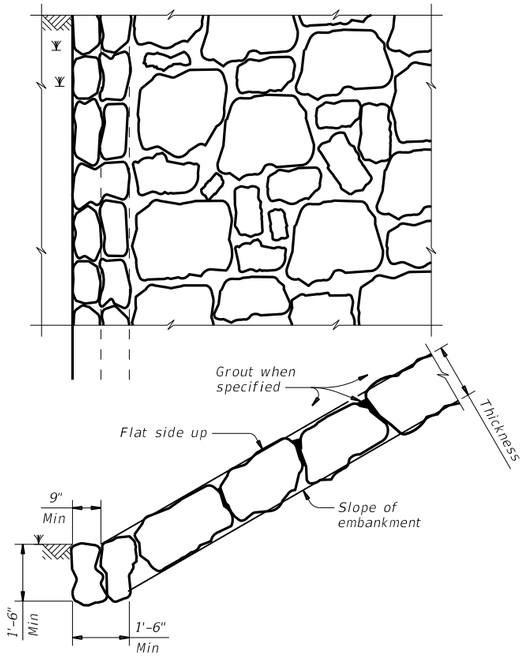


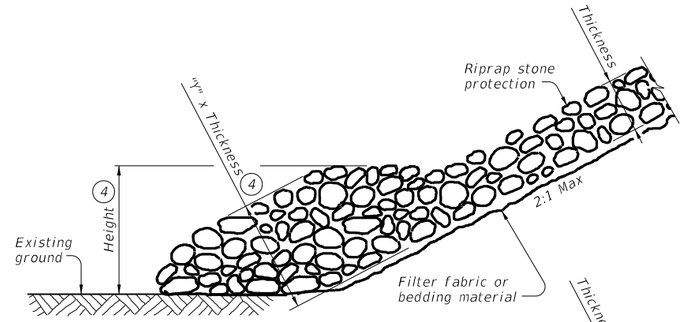
FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

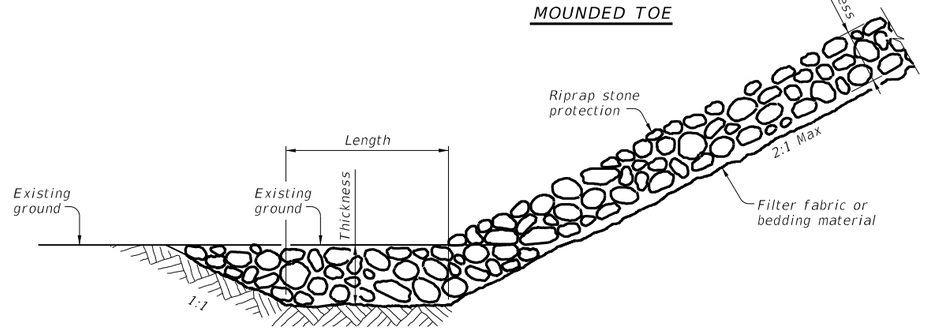
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

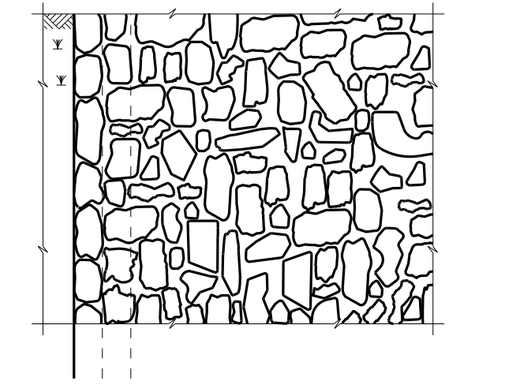


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

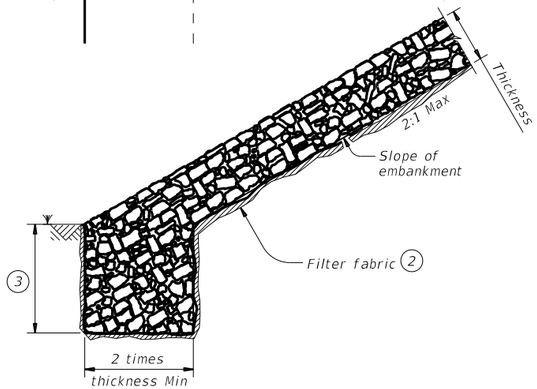


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

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STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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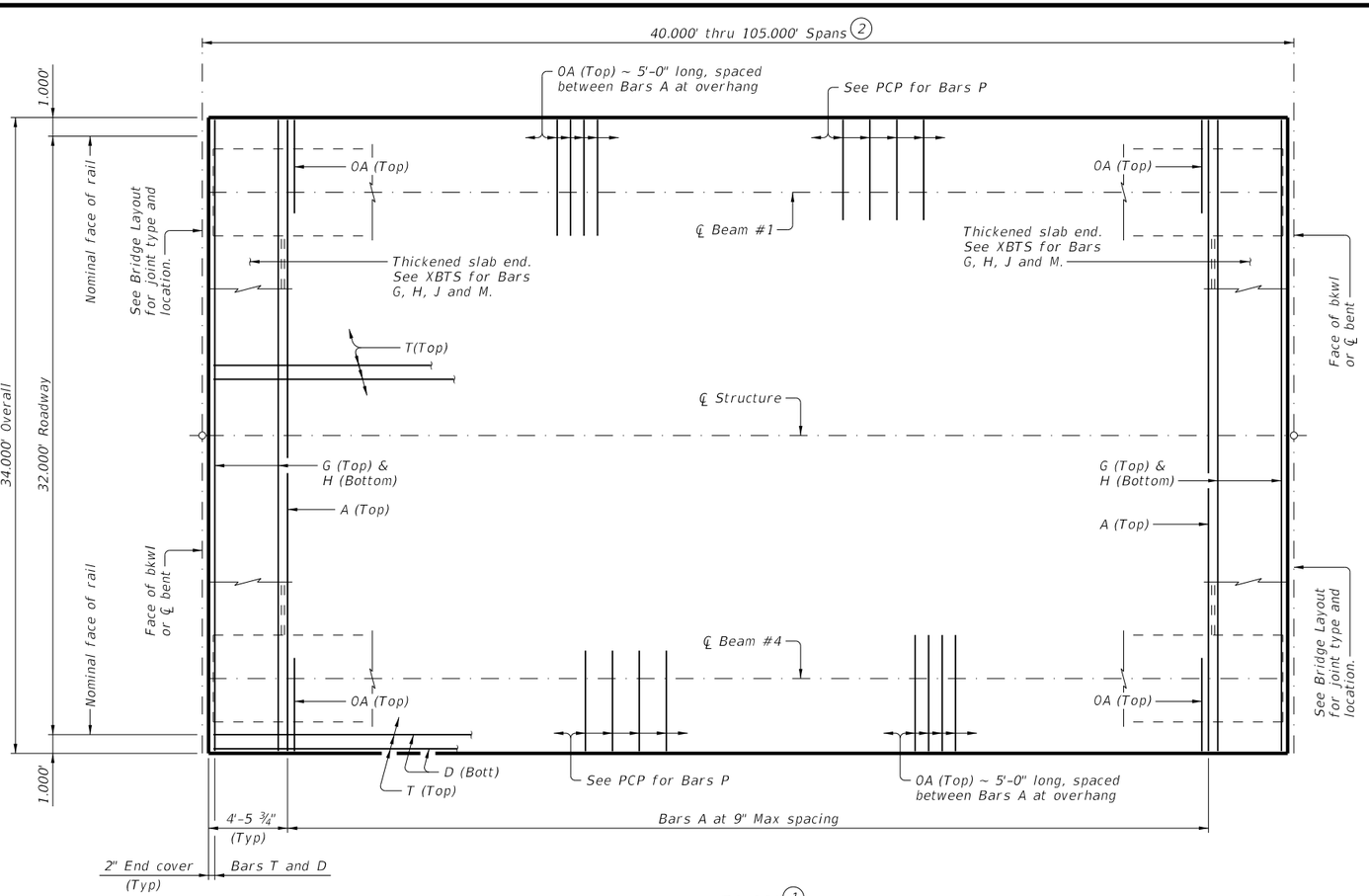
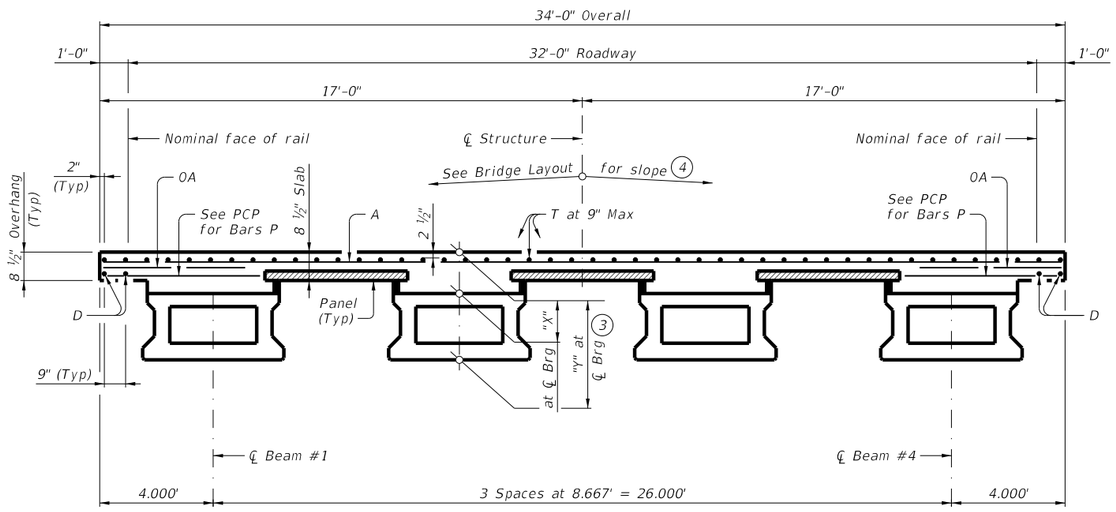


PLAN (1)



TYPICAL TRANSVERSE SECTION

(Showing Beam Type 5XB28)

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see X-Beam Continuous Slab Details (XBCS) standard for adjustment to slab reinforcement and quantities.

(2) Span lengths for Prestressed Concrete X-Beam type:
Type 5XB20 for spans lengths 40.000' through 65.000'.
Type 5XB28 for spans lengths 40.000' through 80.000'.
Type 5XB34 for spans lengths 40.000' through 95.000'.
Type 5XB40 for spans lengths 40.000' through 105.000'.

(3) "Y" value shown is based on theoretical beam camber, dead load deflection from an 8 ½" concrete slab, a constant roadway grade, and using precast concrete panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve.

(4) This standard does not provide for changes in roadway cross-slopes within the structure.

TABLE OF SECTION DEPTHS

Span Length	Beam Type 5XB20		Beam Type 5XB28		Beam Type 5XB34		Beam Type 5XB40	
	"X"	"Y" (3)	"X"	"Y" (3)	"X"	"Y"	"X"	"Y" (3)
Ft	In	Ft/In	In	Ft/In	In	Ft/In	In	Ft/In
40	10 ½"	2'-6 ½"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
45	10 ½"	2'-6 ½"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
50	10 ½"	2'-6 ½"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
55	11"	2'-7"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
60	11 ¼"	2'-7 ¼"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
65	11 ½"	2'-7 ½"	10 ½"	3'-2 ½"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
70	---	---	10 ¾"	3'-2 ¾"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
75	---	---	11 ¼"	3'-3 ¼"	10 ½"	3'-8 ½"	10 ½"	4'-2 ½"
80	---	---	11 ¾"	3'-3 ¾"	10 ¾"	3'-8 ¾"	10 ½"	4'-2 ½"
85	---	---	---	---	11"	3'-9"	10 ½"	4'-2 ½"
90	---	---	---	---	11 ¼"	3'-9 ½"	10 ¾"	4'-2 ¾"
95	---	---	---	---	11 ¾"	3'-9 ¾"	11 ½"	4'-3 ½"
100	---	---	---	---	---	---	11 ½"	4'-3 ½"
105	---	---	---	---	---	---	11 ½"	4'-3 ½"

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM SPANS (TYPE 5XB20 THRU 5XB40)

32' ROADWAY

SXB-32

FILE: XB-SXB3200-22.dgn	DN: BMP	CK: EFC	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		154

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TABLE OF DEAD LOAD DEFLECTIONS

TYPE 5XB20 BEAMS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.014	0.020
45	0.023	0.032
50	0.035	0.050
55	0.052	0.074
60	0.075	0.107
65	0.105	0.149

TYPE 5XB28 BEAMS

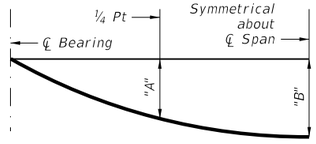
Span Length	"A"	"B"
Ft	Ft	Ft
40	0.006	0.008
45	0.009	0.013
50	0.014	0.020
55	0.021	0.030
60	0.030	0.043
65	0.042	0.060
70	0.057	0.081
75	0.076	0.108
80	0.099	0.141

TYPE 5XB34 BEAMS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.004	0.005
45	0.005	0.008
50	0.008	0.012
55	0.013	0.018
60	0.018	0.026
65	0.025	0.036
70	0.034	0.048
75	0.045	0.064
80	0.059	0.084
85	0.075	0.107
90	0.095	0.136
95	0.119	0.169

TYPE 5XB40 BEAMS

Span Length	"A"	"B"
Ft	Ft	Ft
40	0.003	0.004
45	0.004	0.005
50	0.006	0.008
55	0.008	0.012
60	0.012	0.017
65	0.016	0.023
70	0.022	0.032
75	0.030	0.042
80	0.039	0.055
85	0.049	0.070
90	0.062	0.089
95	0.078	0.111
100	0.096	0.136
105	0.117	0.166



DEAD LOAD DEFLECTION DIAGRAM

Calculated deflections shown are due to the concrete slab on interior beams only (Ec = 5,000 ksi). Adjust values as required for exterior beams and if optional slab forming is used. These values may require field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	PRESTR CONCRETE X-BEAMS (5)	TOTAL REINF STEEL (6)
Ft	SF	LF	Lb
40	1,360	158.00	3,128
45	1,530	178.00	3,519
50	1,700	198.00	3,910
55	1,870	218.00	4,301
60	2,040	238.00	4,692
65	2,210	258.00	5,083
70	2,380	278.00	5,474
75	2,550	298.00	5,865
80	2,720	318.00	6,256
85	2,890	338.00	6,647
90	3,060	358.00	7,038
95	3,230	378.00	7,429
100	3,400	398.00	7,820
105	3,570	418.00	8,211

(5) Fabricator will adjust lengths for beam slopes as required.

(6) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi.)
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~#4 = 1'-7"
Epoxy coated ~#4 = 2'-5"
Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P, or T unless noted elsewhere.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and the X-Beam Continuous Slab Details (XBCS) standard.
See X-Beam Thickened Slab End Details (XBTS) standard for details and quantity adjustments.
See Prestressed Concrete Panels (PCP) standard and Prestressed Concrete Panel Fabrication Details (PCP-FAB) standard for panel details not shown.
See X-Beam Minimum Erection and Bracing Requirements with Miscellaneous Slab Details (XBBR-MS) standard for miscellaneous details.
See applicable rail details for rail anchorage in slab.
See Permanent Metal Deck Forms (PMDF) standard for details and quantity adjustments if this option is used.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM SPANS (TYPE 5XB20 THRU 5XB40)

32' ROADWAY

SXB-32

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©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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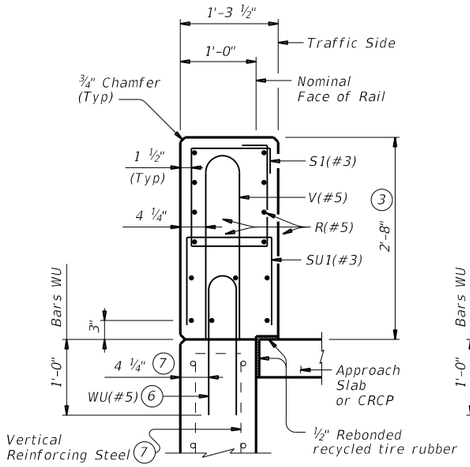
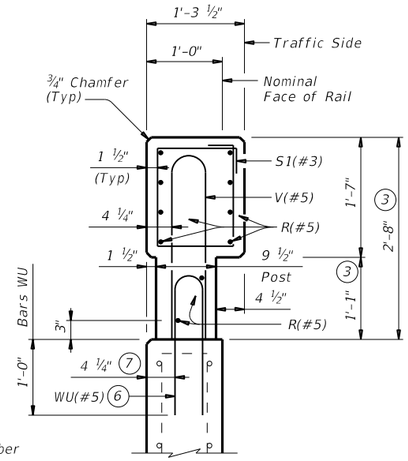
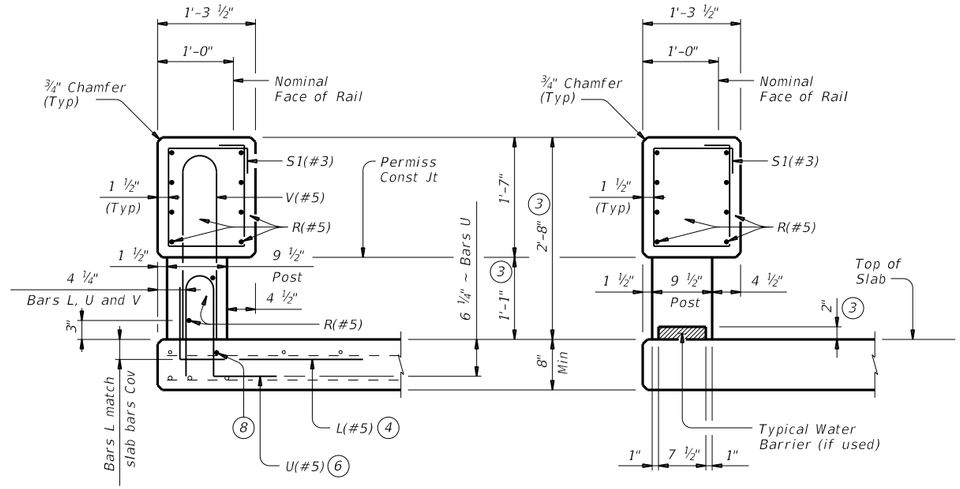


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

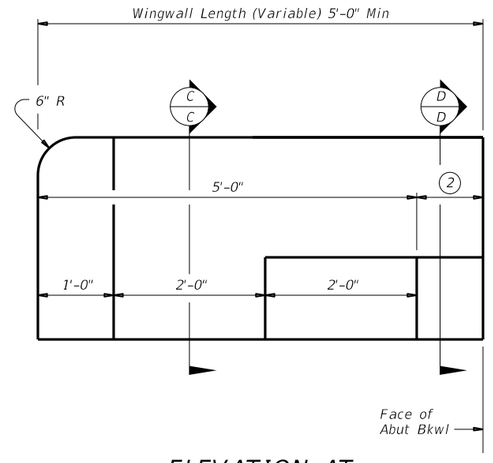


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

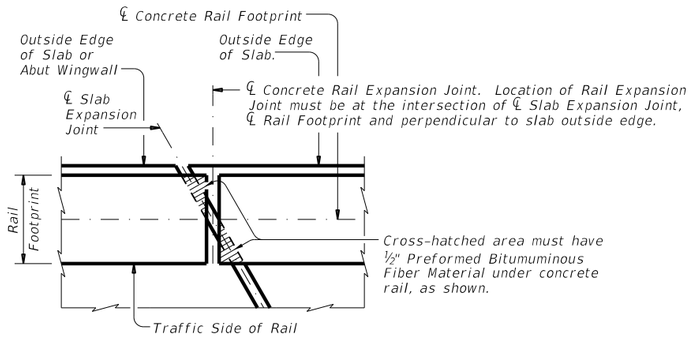
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

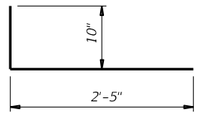
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

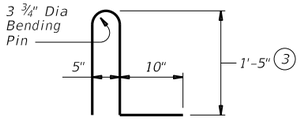
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

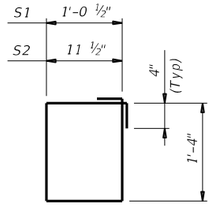
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



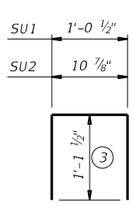
BARS L (#5)



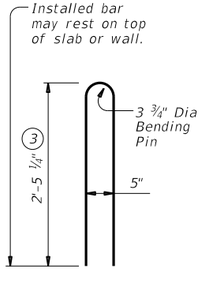
BARS U (#5) (9)



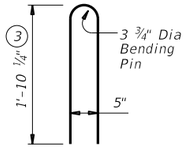
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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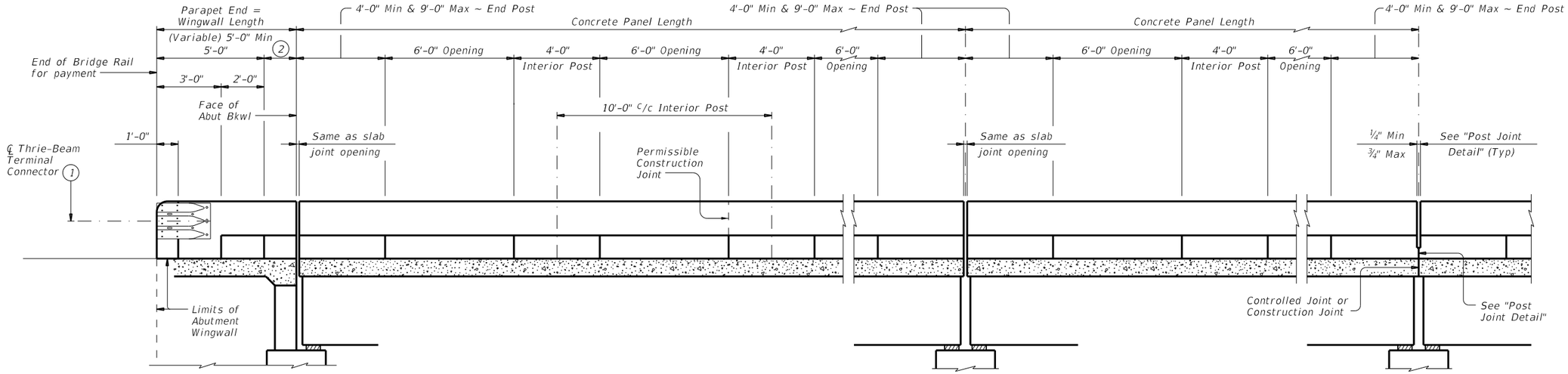
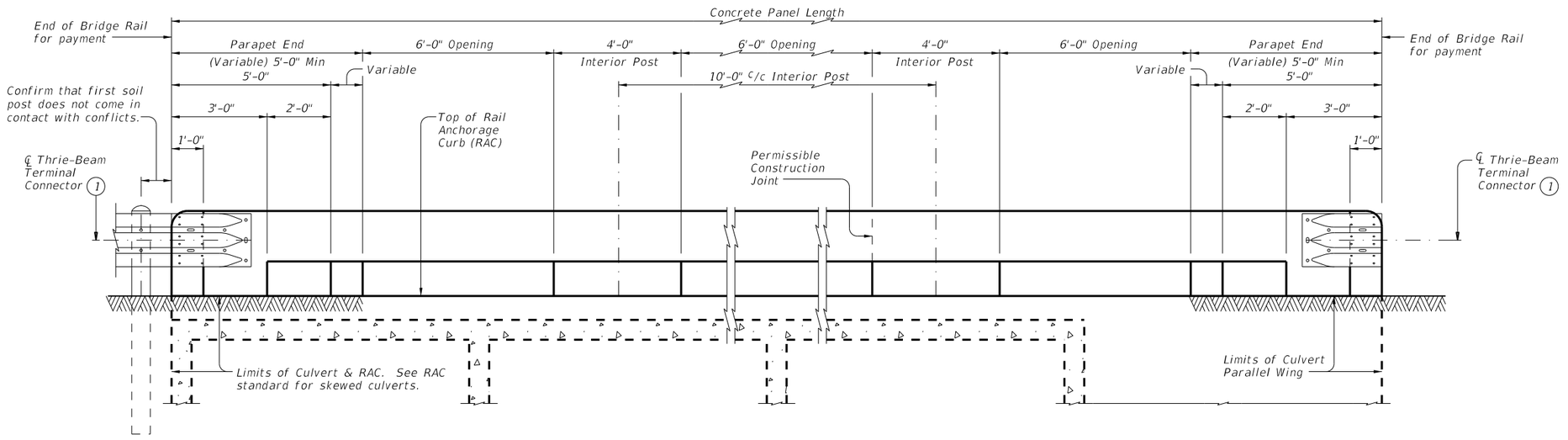


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *Wingwall Length minus 5'-0" (Varies)*

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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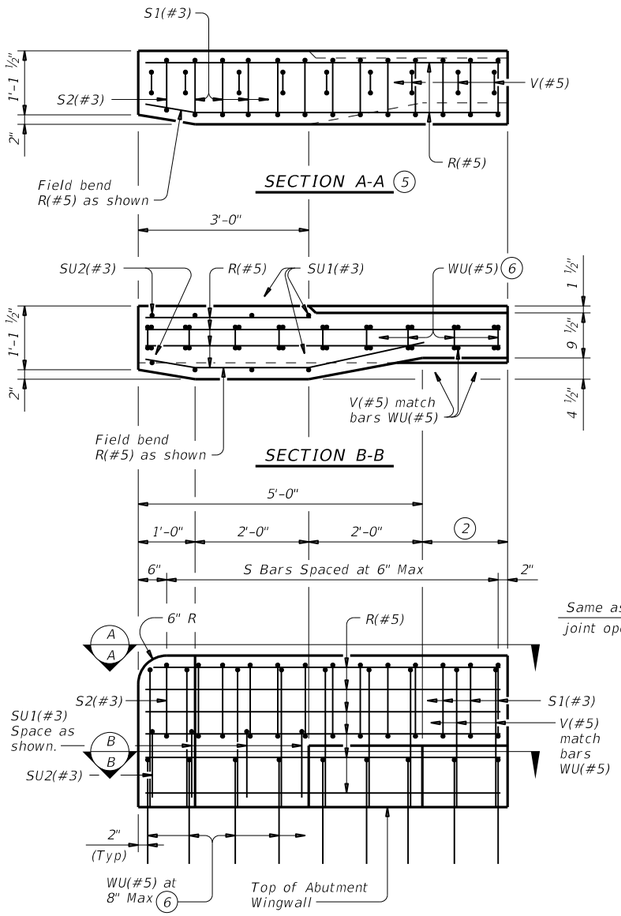
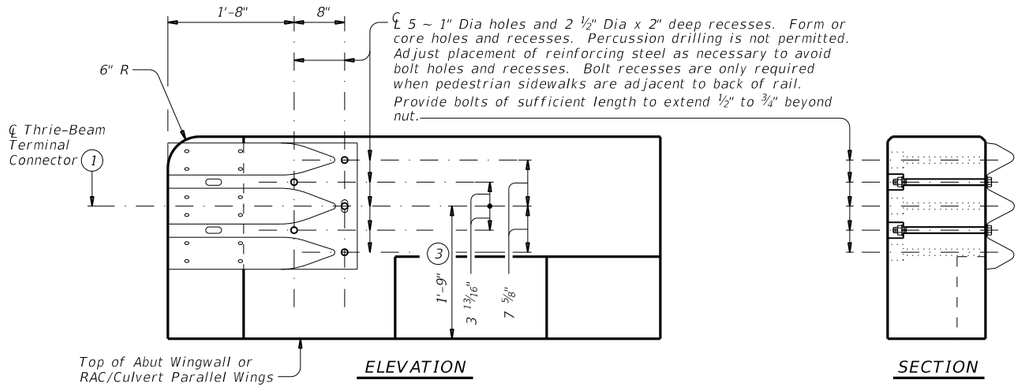
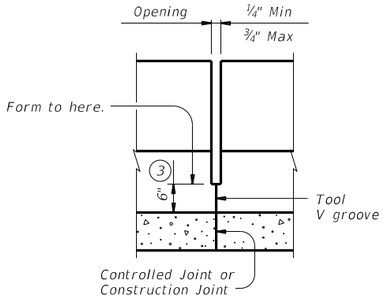


PARAPET END AT ABUT WINGWALL (6)

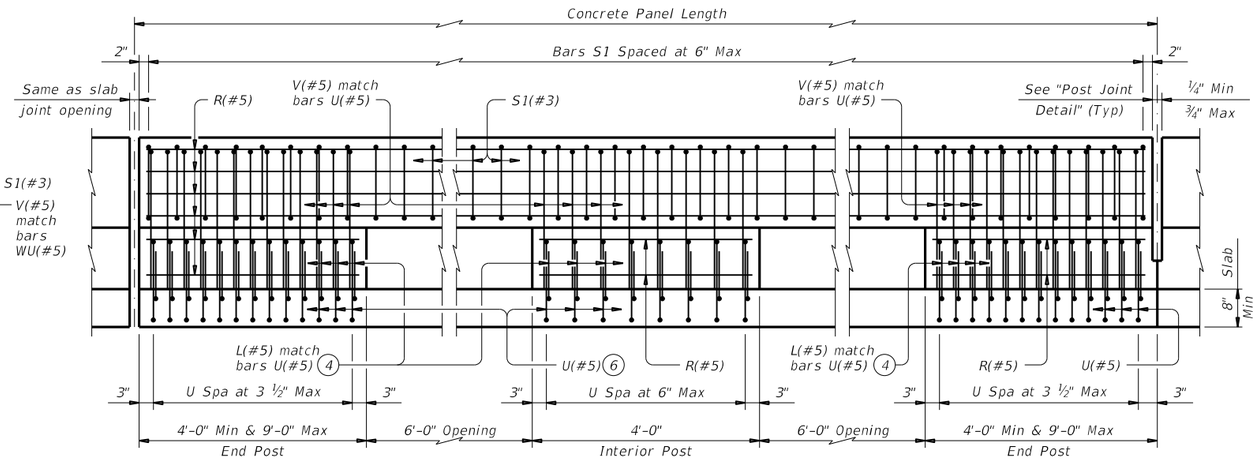


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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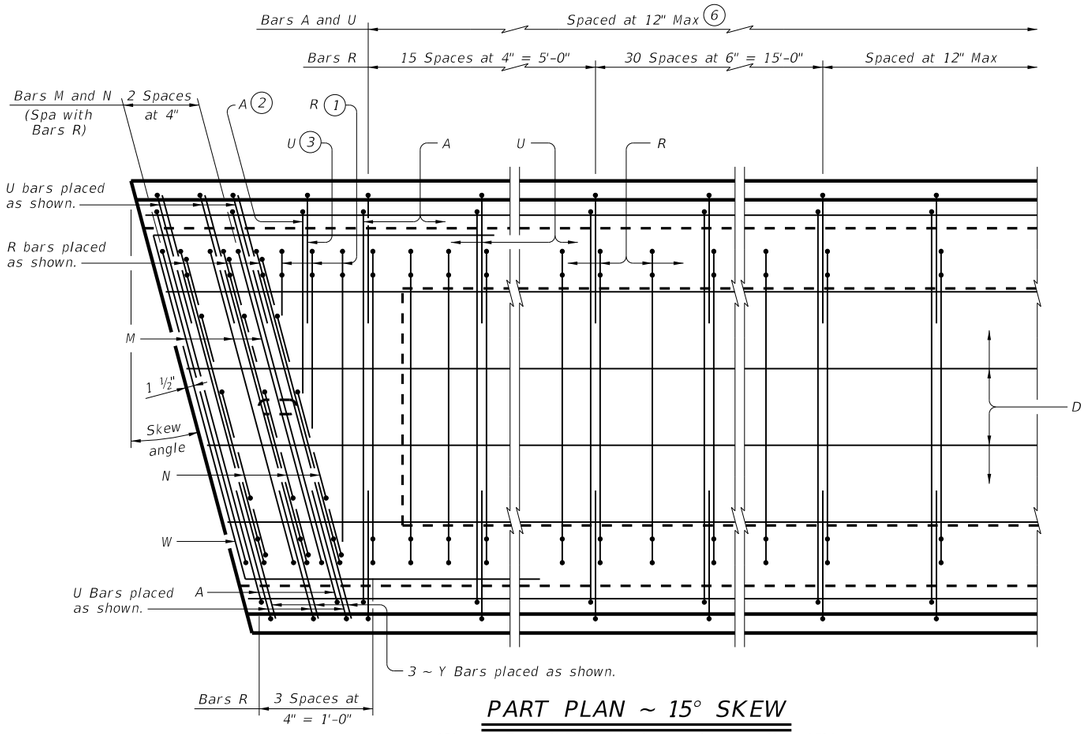
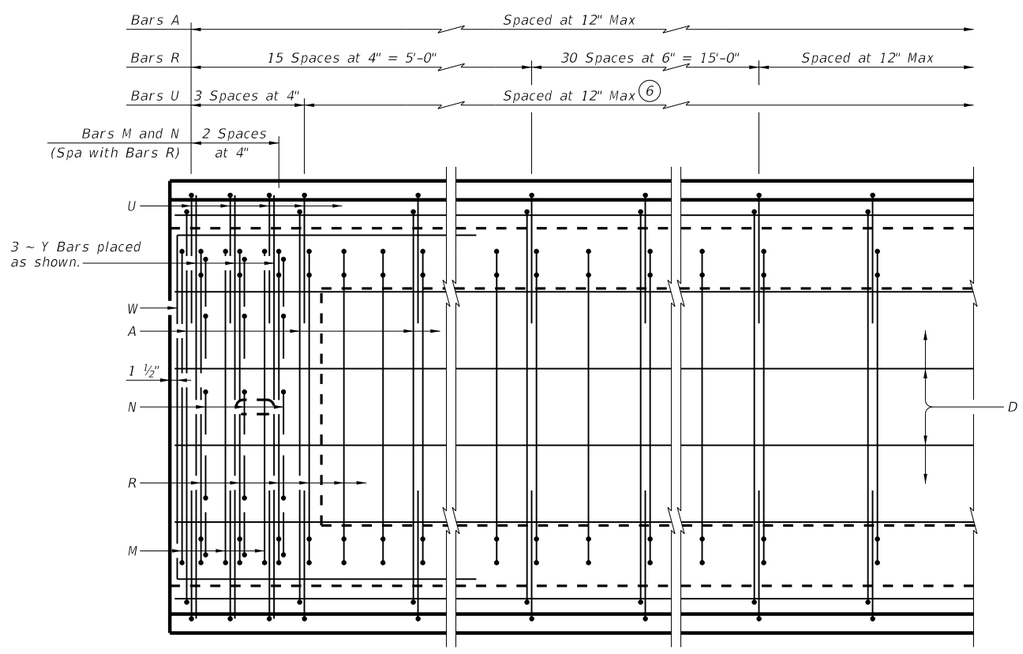


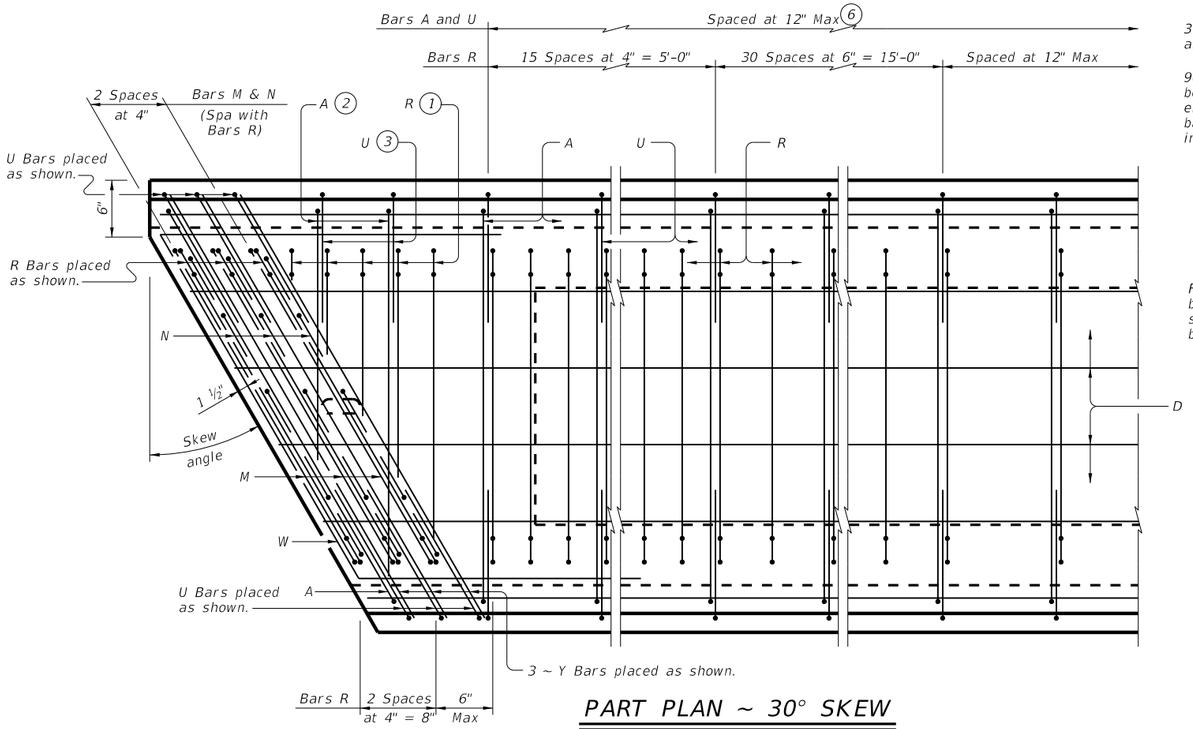
PART PLAN ~ 15° SKEW

(Showing Type 4XB20 with skew angles over 0° to 15°.)



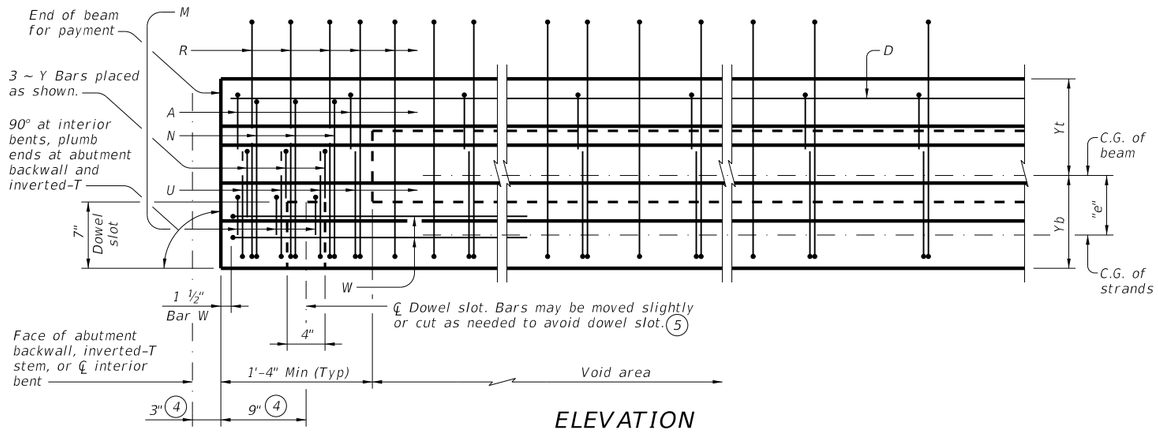
PART PLAN

(Showing Type 4XB20.)



PART PLAN ~ 30° SKEW

(Showing Type 4XB20 with skew angles over 15° to 30°.)



ELEVATION

(1) Bars R spaced at 4" Max. Cut Bars R as necessary to provide 2" clear between adjacent bars as shown.

(2) Bars A spaced with Bars U. Cut Bars A as necessary to provide 2" clear between adjacent bars as shown.

(3) Bars U spaced at 8" Max as shown.

(4) Measured perpendicular to ℄ interior bents, abutment backwall, or inverted-T stem.

(5) ℄ 4" x 1 ½" Vertical slotted hole at doweled beam end (labeled [D] on Bridge Layout.) Required for outside beam only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

(6) Terminate Bars U 5' from beam ends or 3' beyond the last debonded strands, whichever is greater.

HL93 LOADING

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS

(TYPE XB20)

XB20

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©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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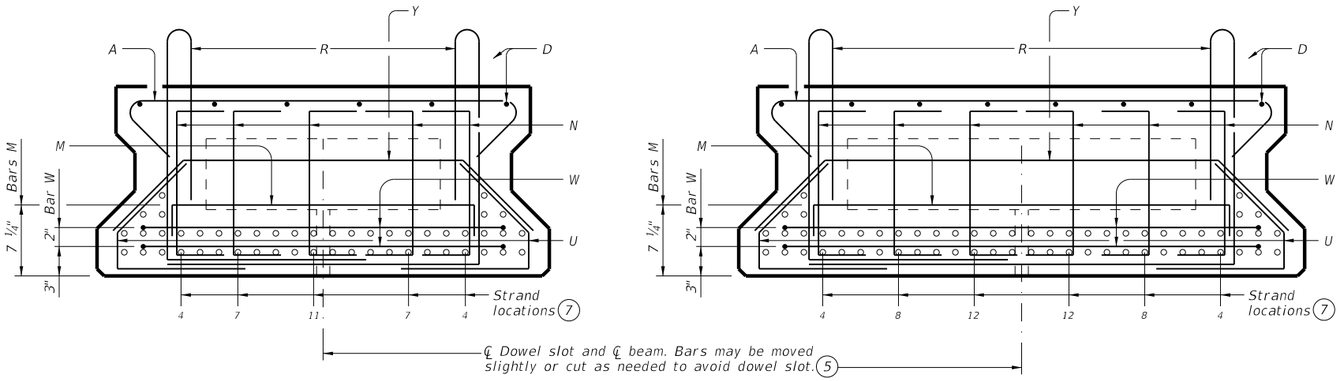
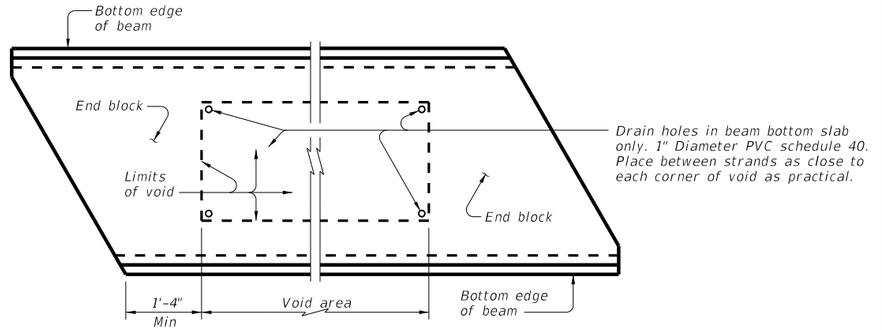


END BLOCK SECTION ~ TYPE 4XB20

END BLOCK SECTION ~ TYPE 5XB20



PLAN OF VOID

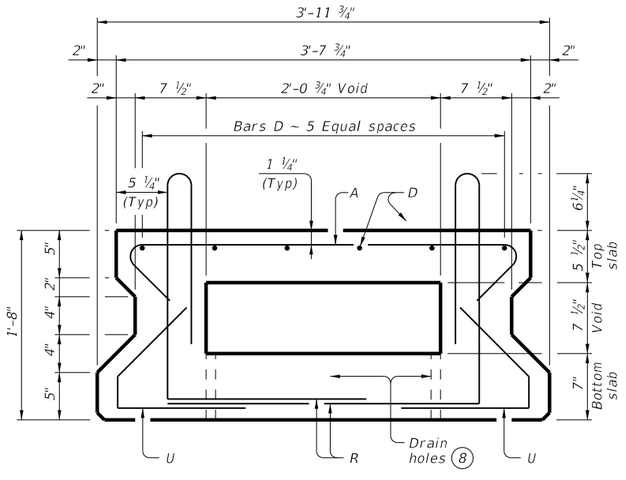
(Showing 30° skew.)

(5) ℄ 4" x 1 ½" Vertical slotted hole at doweled beam end (labeled [D] on Bridge Layout.) Required for outside beam only or as shown on substructure details. Anchorage hole may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

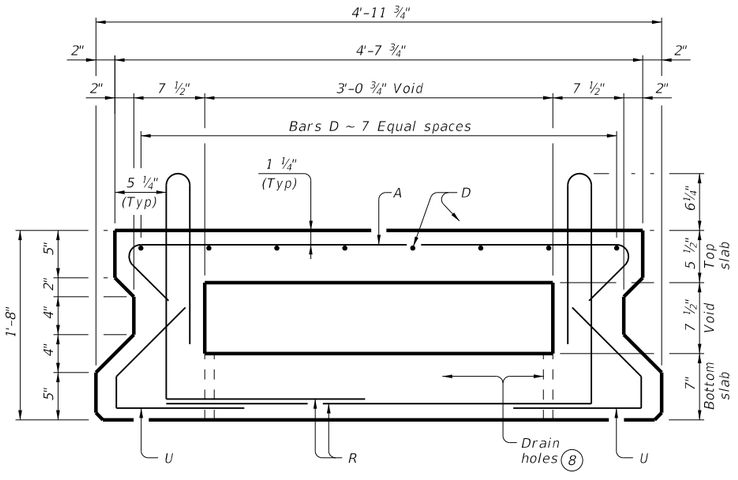
(7) See Prestressed Concrete X-Beam Designs (Non-Standard Spans) (XBND) standard or the appropriate Prestressed Concrete X-Beam Standard Designs (XBSD-##) standard sheet for locations of pretensioning strands.

(8) Drain holes 1" diameter PVC schedule 40 pipe as shown between strands in all beam void corners. See "Plan of Void."

(9) Based on 155 pcf weight density of concrete. Weight of end blocks is not included.



TYPICAL SECTION ~ TYPE 4XB20



TYPICAL SECTION ~ TYPE 5XB20

BEAM PROPERTIES

		Type 4XB20	Type 5XB20
Area	in^2	689	839
Y Top	in	10.47	10.47
Y Bottom	in	9.53	9.53
I	in^4	29,124	36,621
Weight (9)	lb/ft	742	903

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS

(TYPE XB20)

XB20

FILE: XB-XB20-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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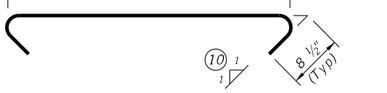
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		160

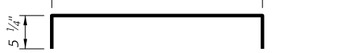
DATE: 1/30/2024 3:11:27 PM
FILE: c:\workingdir\ljo-pw.bentley.com_ljo-pw-01\alisha.varshney\dms90195\XB-XB20-22.dgn

Type 4XB20	3'-5 ¼"	Normal
Type 5XB20	4'-5 ¼"	Normal
Type 4XB20	3'-5 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	4'-5 ¼" ÷ Cos skew	At Skewed Beam Ends



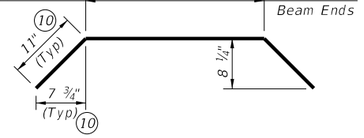
BARS A (#4)

Type 4XB20	2'-9 ¼"	Normal
Type 5XB20	3'-9 ¼"	Normal
Type 4XB20	2'-9 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-9 ¼" ÷ Cos skew	At Skewed Beam Ends

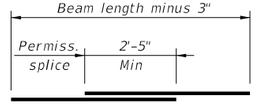


BARS M (#5)

Type 4XB20	2'-4 ¼"	Normal
Type 5XB20	3'-4 ¼"	Normal
Type 4XB20	2'-4 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-4 ¼" ÷ Cos skew	At Skewed Beam Ends

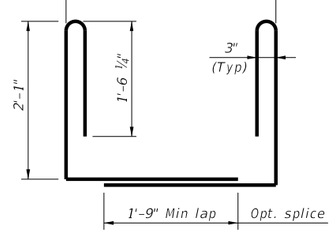


BARS Y (#5)

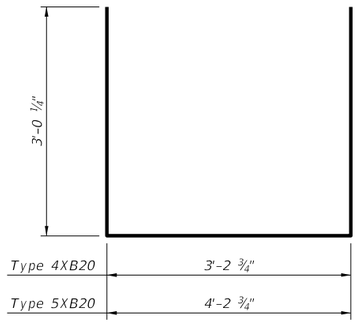


BARS D (#5)
(Place splices in middle third of span.)

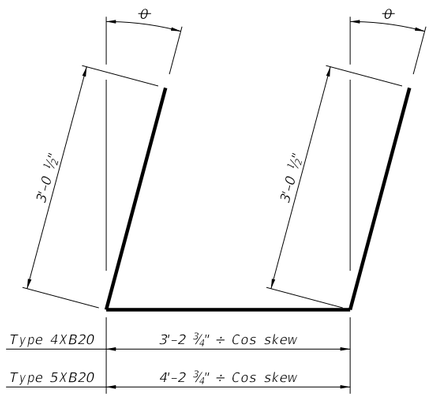
Type 4XB20	2'-9 ¼"	Normal
Type 5XB20	3'-9 ¼"	Normal
Type 4XB20	2'-9 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-9 ¼" ÷ Cos skew	At Skewed Beam Ends



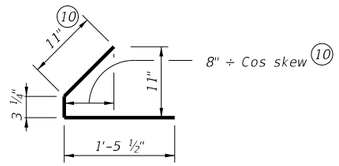
BARS R (#4)



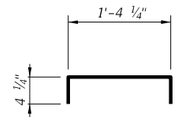
BARS W (#5)
(For square beam ends)



BARS W (#5)
(For skewed beam ends)



BARS U (#4)



BARS N (#4)

10 Dimension will vary slightly with skew. Adjust as necessary.

MATERIAL NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed welded wire reinforcement (WWR) (ASTM A1064) may be substituted for all or some of Bars A, D, R, and U.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two-stage monolithic casting is required when conventional concrete is used. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
When approved by the Engineer, self-consolidating concrete may be placed in a one-stage monolithic casting.
1 ¼" clear cover to reinforcement is required unless noted otherwise.
These details are applicable for skews up to 30 degrees only.
Chamfer bottom beam corners ¾" or round to a ¾" radius.
Punch through all drain holes, removing any blockage, before beams are shipped.

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

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS
(TYPE XB20)

XB20

FILE: XB-XB20-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		161

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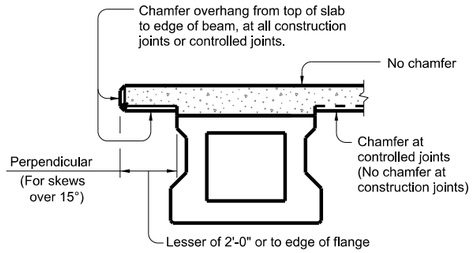
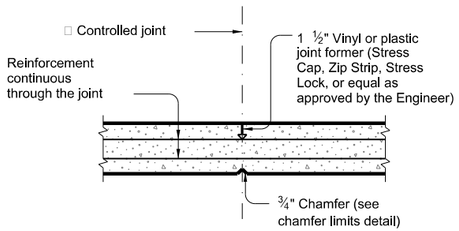
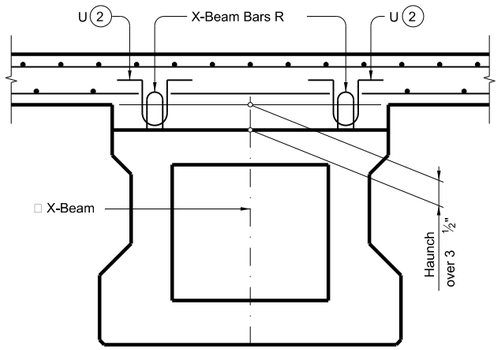


CHAMFER LIMITS DETAIL (1)

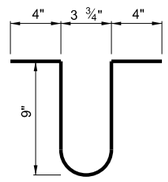


CONTROLLED JOINT DETAIL

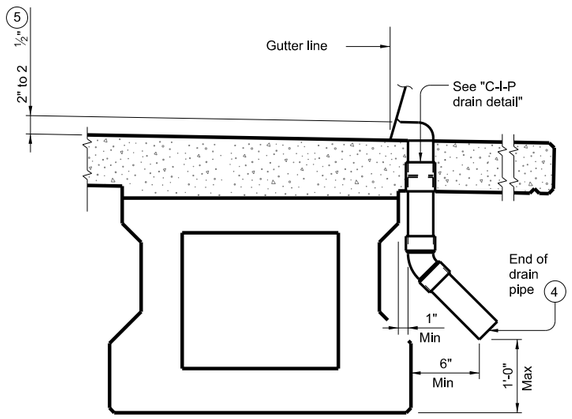
(Saw-cutting is not allowed)



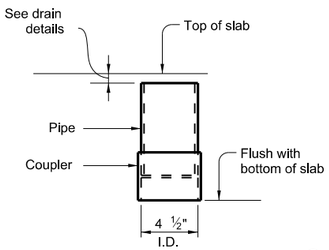
HAUNCH REINFORCING DETAIL



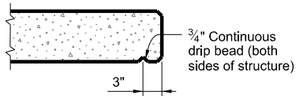
BARS U (#4)



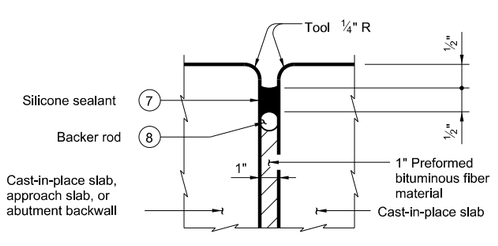
DRAIN DETAIL (6)



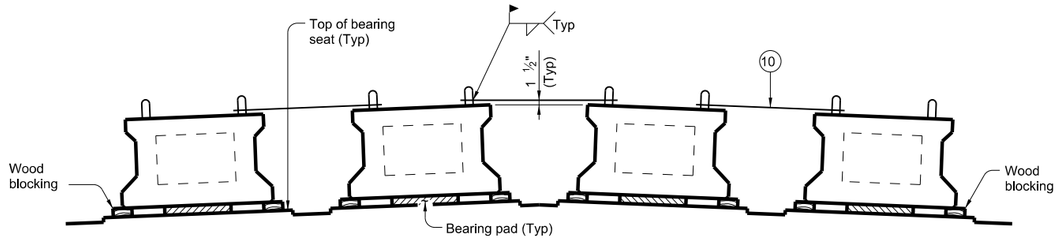
C-I-P DRAIN DETAIL (3)



DRIP BEAD DETAIL

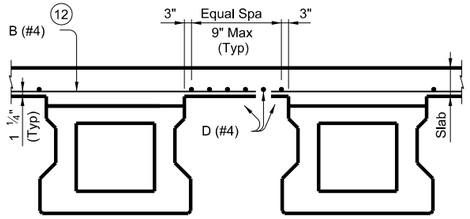


TYPE A JOINT DETAIL (9)



MINIMUM BEAM BLOCKING & BRACING DETAIL

Provide blocking at both sides of all beam ends supported by one bearing pad.
Leave blocking in place for at least 4 days after slab is cast and afterwards remove at the Contractor's convenience.



TYPICAL TRANSVERSE SLAB SECTION WITHOUT PCP (11)

Top reinforcing steel not shown for clarity.

1. See span details for type of joint and joint locations.
2. Space Bars U with beam Bars R in all areas where measured haunch exceeds 3 ½".
3. Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
4. Water may not be discharged onto beams.
5. Drain entrance formed in rail or sidewalk.
6. All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481, "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside beam face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.
7. Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.
8. 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
9. The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.
10. Weld a (#5) bar at each beam end as shown immediately after erection and prior to PCP placement. These bars are in addition to slab reinforcement.
11. Provide Grade 60 reinforcing steel. Provide laps, where required, as follows:
    Uncoated ~ #4 = 1'-7"
    Epoxy coated ~ #4 = 2'-5"
12. Bars B (#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor may end alternating Bars B (#4) at centerline outside girder.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, joint formers, etc.) shown on this sheet are subsidiary to other bid items.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems and/or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS WITH MISC. SLAB DETAILS

PRESTRESSED CONCRETE X-BEAMS

XBBR-MS

FILE: XB-XBBRMS-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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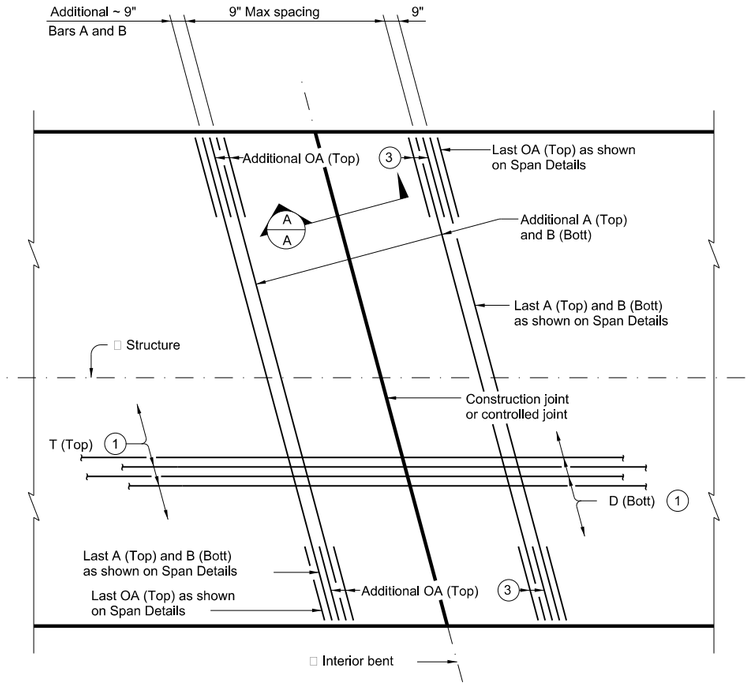
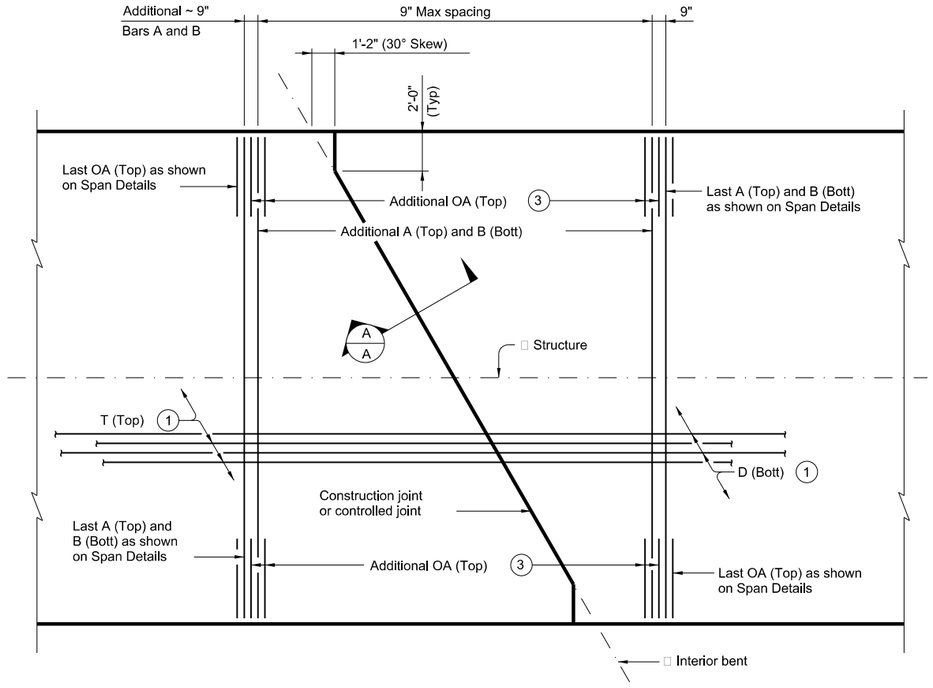
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		162



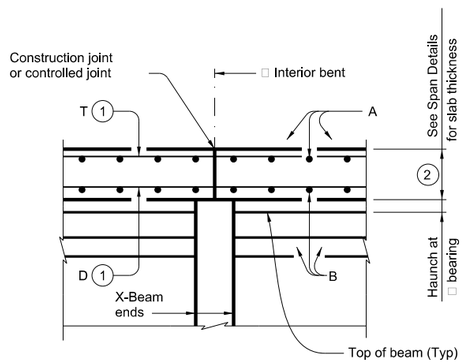
PLAN FOR SKEW ANGLES 0° TO 15°

(Showing 15° skew)



PLAN FOR SKEW ANGLES OVER 15° TO 30°

(Showing 30° skew)



SECTION A-A

Bars OA (Top) not shown for clarity.

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant 8 ½" slab thickness over the bent.
3. Bars OA (Top) at 9" Max spacing between Bars A (Top.)
4. Values in table assume a temperature change of 70°F after erection when calculating thermal movement in one direction (not total.)

TABLE OF ALLOWABLE UNIT LENGTH (4)

Max. Rdwy Grade, Percent	Unit Length Factor
0.00	4.4
1.00	4.3
2.00	4.1
3.00	3.8
4.00	3.5
5.00	3.2

Unit length must not exceed the length of the shortest end span times the Unit Length Factor shown in table or 370', whichever is less.

BAR TABLE

BAR	SIZE
A	#4
B	#4
D	#4
T	#4
OA	#5

CONSTRUCTION NOTES:

Where multi-span units are indicated on the Bridge Layout, the thickened slab end details and reinforcement shown on XBTS standard (Bars AA, G, H, J, K, and M) and on the span details will be omitted where slabs are continuous over interior bents. At these locations, the slab details and reinforcement will be as shown on this sheet or on Prestressed Concrete Panels (PCP) standard (if using this option.)

Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units.)

See span details for remainder of slab reinforcement and details.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide Class S Concrete (f'c = 4,000 psi.)
Provide Class S (HPC) if shown elsewhere on plans.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

The details shown on this sheet are only applicable for use with the Prestressed Concrete X-Beam Standard Designs shown on standards XBSD-32, XBSD-38, XBSD-40, and XBSD-44.

The details shown on this sheet are applicable for two and three span units comprised of the same x-beam type. Units may be comprised of different span lengths. See "Table of Allowable Unit Length."

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

CONTINUOUS SLAB DETAILS
PRESTRESSED CONCRETE X-BEAM SPANS
XBCS

FILE: XB-XBCS-22.dgn	DN: JMH		CK: TAR	DW: JER		CK: TAR
©TxDOT August 2022	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1109	01	026, ETC		FM 777	
	DIST	COUNTY			SHEET NO.	
	BMT	JASPER			163	

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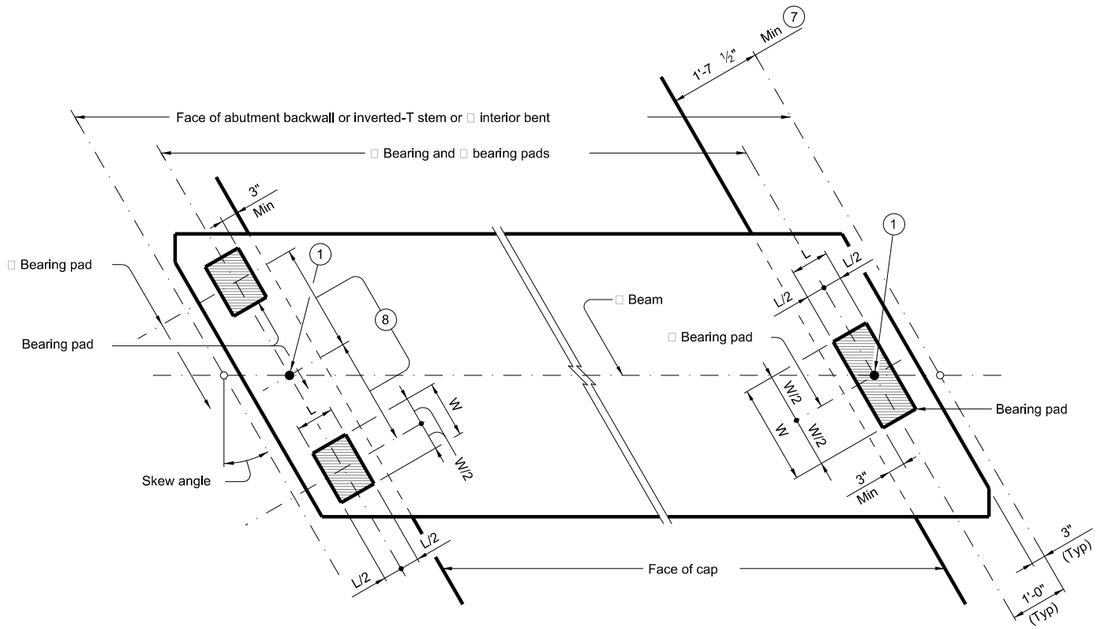
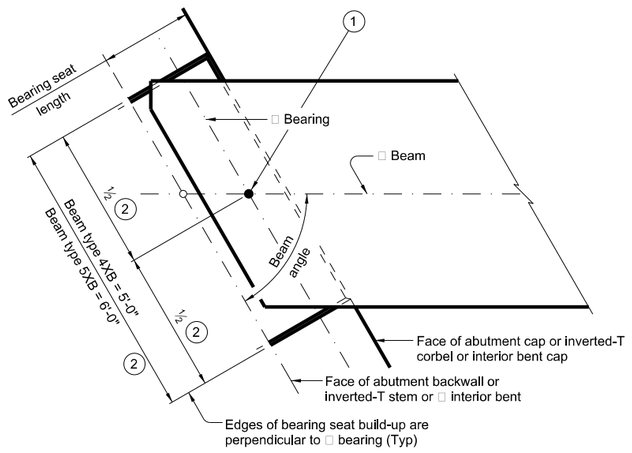


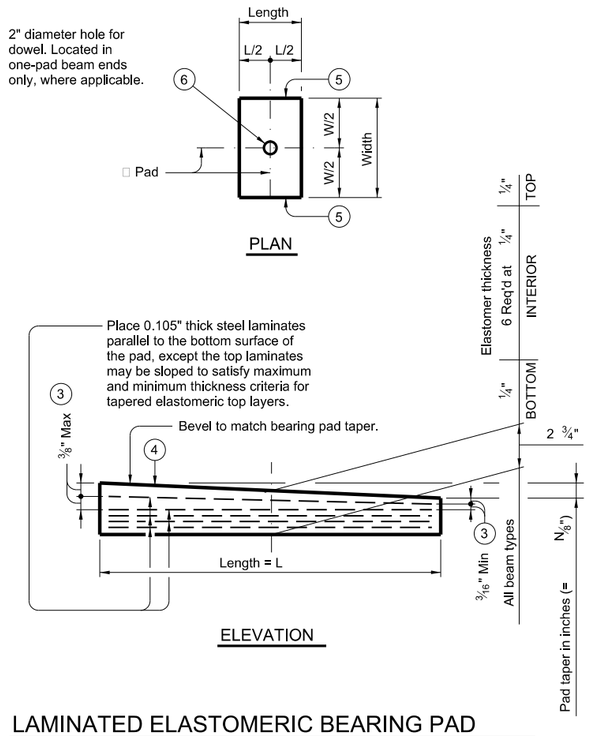
BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



BEARING SEAT DIMENSIONS

Used when shown on abutment and/or bent details.



LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

TABLE OF BEARING PAD DIMENSIONS					
BEARING TYPE (4)	BEAM TYPE	ONE PAD		TWO PADS	
		L	W	L	W
XB20-"N"	4XB20	7"	18"	7"	9"
	5XB20	7"	18"	7"	9"
XB28-"N"	4XB28	7"	18"	7"	10"
	5XB28	7"	18"	7"	10"
XB34-"N"	4XB34	7"	21"	7"	11"
	5XB34	7"	21"	7"	11"
XB40-"N"	4XB40	7"	21"	7"	12"
	5XB40	7"	21"	7"	12"

(1) Dowel at doweled beam end [labeled (D) on Bridge Layout.] Required for outside beam only or as shown on substructure details.

(2) Measured along □ of bearing.

(3) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(4) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. Include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625}{\text{Length}}\right)$ IN/IN.

(5) Locate permanent mark here.

(6) Provide 2" diameter hole only at locations required. See substructure details for location.

(7) Minimum dimension required for the bearings shown on this standard.

(8) 4XB beams = 1'-2" along □ bearing (Typ.)
5XB beams = 1'-8" along □ bearing (Typ.)

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal □ bearing as possible within limits shown.

Constant thickness bearings may be used for moderate pad tapers up to 0.008 ft/ft.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. Provide copy of the bearing layout to the Engineer.

See Bearing Pad Taper Report sheet for Fabricator's Report of bearing pad taper.

Cost of furnishing and installing elastomeric bearings is to be included in unit price bid for "Prestressed Concrete X-Beams."

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTRESSED CONCRETE X-BEAMS

XBEB

FILE: XB-XBEB-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR	
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1109	01	026, ETC	FM 777	
	DIST	COUNTY		SHEET NO.	
	BMT	JASPER		164	

DATE: 1/26/2024 9:58:12 AM
FILE: v:\bentley\dms\lfg production\cris trejo\dms90195\XB-XBSD32-22.dgn

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																		OPTIONAL DESIGN					LOAD RATING FACTORS			
				PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW								CONCRETE								
	SPAN LENGTH	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e"	"e" END	TOT NO. DEB	DIST FROM BOTTOM	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRENGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
												TOTAL	DE-BONDED	3	6	9	12	15						Moment	Shear	Inv	Opr	Inv
	(ft)					(in)	fpu (ksi)	(in)	(in)		(in)								f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(ft-kips)			Inv		
Type 5XB20	40	ALL	5XB20		12	0.6	270	7.03	7.03	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.321	-1.709	1299	0.688	0.903	1.21	1.57	1.18
X-BEAMS	45	ALL	5XB20		16	0.6	270	7.03	7.03	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.676	-2.113	1553	0.667	0.897	1.39	1.80	1.17
32' Roadway	50	ALL	5XB20		20	0.6	270	7.03	7.03	0	2.50	20	0	0	0	0	0	0	4.000	5.000	2.029	-2.534	1838	0.649	0.891	1.48	1.92	1.11
8.5" Slab	55	ALL	5XB20		26	0.6	270	7.03	7.03	6	2.50	26	6	4	0	2	0	0	4.000	5.000	2.466	-3.034	2155	0.633	0.887	1.62	2.14	1.13
	60	ALL	5XB20		32	0.6	270	6.78	6.72	6	2.50	28	6	2	2	2	0	0	4.700	5.000	2.961	-3.586	2493	0.619	0.883	1.52	2.00	1.09
	65	ALL	5XB20		38	0.6	270	6.51	6.41	6	2.50	28	6	2	2	0	2	0	5.400	5.500	3.503	-4.184	2849	0.606	0.879	1.47	1.95	1.01
Type 5XB28	40	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.853	-1.077	1806	0.719	0.948	1.68	2.18	2.33
X-BEAMS	45	ALL	5XB28		12	0.6	270	10.63	10.63	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.075	-1.324	1798	0.697	0.942	1.31	1.70	1.65
32' Roadway	50	ALL	5XB28		14	0.6	270	10.63	10.63	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.328	-1.611	1940	0.678	0.937	1.28	1.66	1.38
8.5" Slab	55	ALL	5XB28		16	0.6	270	10.63	10.63	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.605	-1.921	2272	0.661	0.933	1.22	1.59	1.14
	60	ALL	5XB28		20	0.6	270	10.63	10.63	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.888	-2.237	2610	0.647	0.929	1.34	1.79	1.16
	65	ALL	5XB28		24	0.6	270	10.63	10.63	2	2.50	24	2	2	0	0	0	0	4.000	5.000	2.213	-2.588	2973	0.633	0.926	1.48	1.92	1.11
	70	ALL	5XB28		28	0.6	270	10.63	10.63	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.551	-2.955	3347	0.621	0.923	1.53	1.99	1.04
	75	ALL	5XB28		34	0.6	270	10.28	10.20	6	2.50	28	6	2	0	2	2	0	4.200	5.000	2.931	-3.360	3752	0.611	0.921	1.57	2.08	1.05
	80	ALL	5XB28		40	0.6	270	10.03	9.88	8	2.50	28	8	2	2	2	0	2	4.800	5.100	3.337	-3.788	4174	0.601	0.919	1.44	1.94	1.07
Type 5XB34	40	ALL	5XB34		12	0.6	270	13.11	13.11	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.678	-0.811	1877	0.736	0.976	2.00	2.60	3.18
X-BEAMS	45	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	0.877	-1.006	2248	0.714	0.971	1.95	2.53	2.75
32' Roadway	50	ALL	5XB34		14	0.6	270	13.11	13.11	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.081	-1.224	2496	0.695	0.966	1.55	2.01	2.02
8.5" Slab	55	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.305	-1.459	2650	0.678	0.962	1.50	1.94	1.74
	60	ALL	5XB34		16	0.6	270	13.11	13.11	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.549	-1.712	2737	0.663	0.958	1.20	1.56	1.21
	65	ALL	5XB34		20	0.6	270	13.11	13.11	0	2.50	20	0	0	0	0	0	0	4.000	5.000	1.813	-1.982	3120	0.649	0.956	1.39	1.80	1.26
	70	ALL	5XB34		22	0.6	270	13.11	13.11	0	2.50	22	0	0	0	0	0	0	4.000	5.000	2.077	-2.253	3507	0.637	0.953	1.33	1.73	1.07
	75	ALL	5XB34		26	0.6	270	13.11	13.11	2	2.50	26	2	2	0	0	0	0	4.000	5.000	2.377	-2.556	3927	0.626	0.951	1.45	1.88	1.03
	80	ALL	5XB34		32	0.6	270	12.86	12.80	6	2.50	28	6	2	4	0	0	0	4.000	5.000	2.687	-2.868	4354	0.615	0.949	1.66	2.15	1.13
	85	ALL	5XB34		36	0.6	270	12.66	12.54	8	2.50	28	8	2	4	0	2	0	4.000	5.000	3.015	-3.196	4802	0.606	0.947	1.59	2.12	1.03
	90	ALL	5XB34		42	0.6	270	12.44	12.23	10	2.50	28	10	2	4	2	0	2	4.400	5.000	3.379	-3.556	5281	0.597	0.946	1.47	1.97	1.06
	95	ALL	5XB34		48	0.6	270	12.27	12.00	12	2.50	28	12	4	4	0	2	2	5.000	5.700	3.780	-3.948	5795	0.589	0.945	1.44	1.93	1.10
Type 5XB40	40	ALL	5XB40		12	0.6	270	15.70	15.70	0	2.50	12	0	0	0	0	0	0	4.000	5.000	0.576	-0.657	1947	0.752	1.001	2.32	3.00	3.95
X-BEAMS	45	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	0.743	-0.815	2334	0.729	0.996	2.26	2.93	3.46
32' Roadway	50	ALL	5XB40		14	0.6	270	15.70	15.70	0	2.50	14	0	0	0	0	0	0	4.000	5.000	0.915	-0.991	2792	0.709	0.991	1.82	2.36	2.63
8.5" Slab	55	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.104	-1.182	3268	0.692	0.988	1.76	2.29	2.32
	60	ALL	5XB40		16	0.6	270	15.70	15.70	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.309	-1.387	3202	0.676	0.984	1.43	1.86	1.72
	65	ALL	5XB40		18	0.6	270	15.70	15.70	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.530	-1.606	3381	0.662	0.982	1.41	1.82	1.50
	70	ALL	5XB40		18	0.6	270	15.70	15.70	0	2.50	18	0	0	0	0	0	0	4.000	5.000	1.768	-1.840	3669	0.650	0.980	1.14	1.48	1.03
	75	ALL	5XB40		22	0.6	270	15.70	15.70	0	2.50	22	0	0	0	0	0	0	4.000	5.000	2.005	-2.073	4088	0.638	0.978	1.34	1.73	1.12
	80	ALL	5XB40		26	0.6	270	15.70	15.70	2	2.50	26	2	2	0	0	0	0	4.000	5.000	2.274	-2.334	4549	0.628	0.976	1.47	1.91	1.11
	85	ALL	5XB40		30	0.6	270	15.57	15.54	6	2.50	28	6	4	2	0	0	0	4.000	5.000	2.536	-2.590	5002	0.618	0.975	1.58	2.05	1.10
	90	ALL	5XB40		36	0.6	270	15.26	15.13	8	2.50	28	8	2	6	0	0	0	4.000	5.000	2.825	-2.869	5486	0.609	0.974	1.72	2.29	1.19
	95	ALL	5XB40		40	0.6	270	15.10	14.90	10	2.50	28	10	2	6	0	2	0	4.000	5.000	3.192	-3.214	6062	0.601	0.973	1.59	2.11	1.03
	100	ALL	5XB40		46	0.6	270	14.92	14.58	14	2.50	28	14	2	6	2	2	2	4.300	5.000	3.496	-3.507	6568	0.593	0.972	1.50	1.99	1.10
	105	ALL	5XB40		50	0.6	270	14.82	14.48	14	2.50	28	14	2	6	2	2	2	4.700	5.600	3.846	-3.839	7129	0.586	0.971	1.47	1.96	1.05

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = 0.24 f'ci $\sqrt{\ }$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 8 ½" concrete slabs without overlay and 0 through 30 degree skews.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.

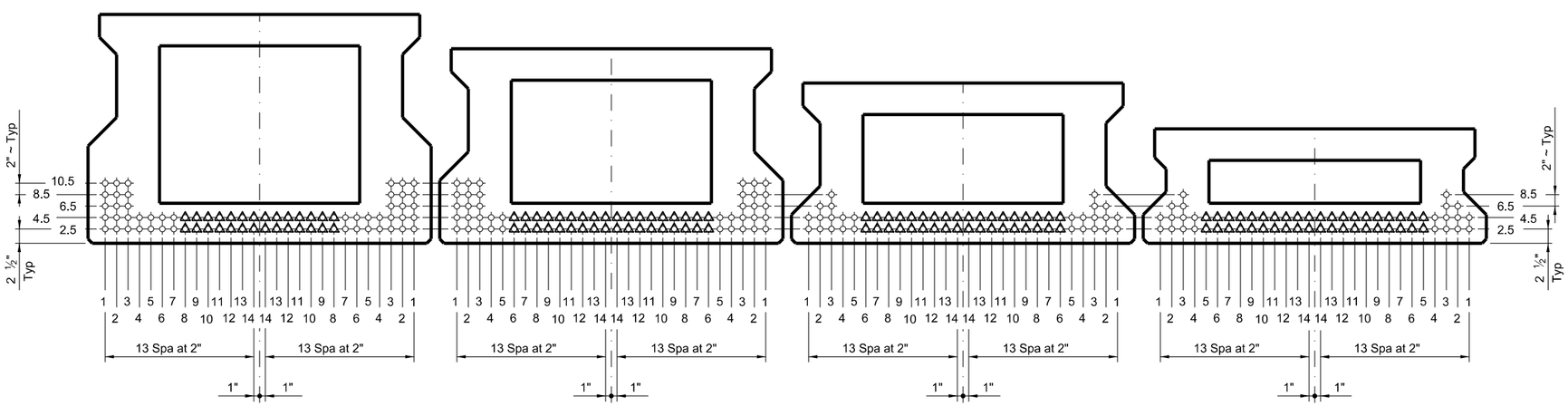
2) Place strand symmetrically about vertical centerline of box.

3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked . Double wrap full-length debonded strands.



TxDOT 5XB40 BEAMS | TxDOT 5XB34 BEAMS | TxDOT 5XB28 BEAMS | TxDOT 5XB20 BEAMS

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM STANDARD DESIGNS

32' ROADWAY

XBSD-32

FILE: XB-XBSD32-22.dgn	DN: TAR	CK: EFC	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		165

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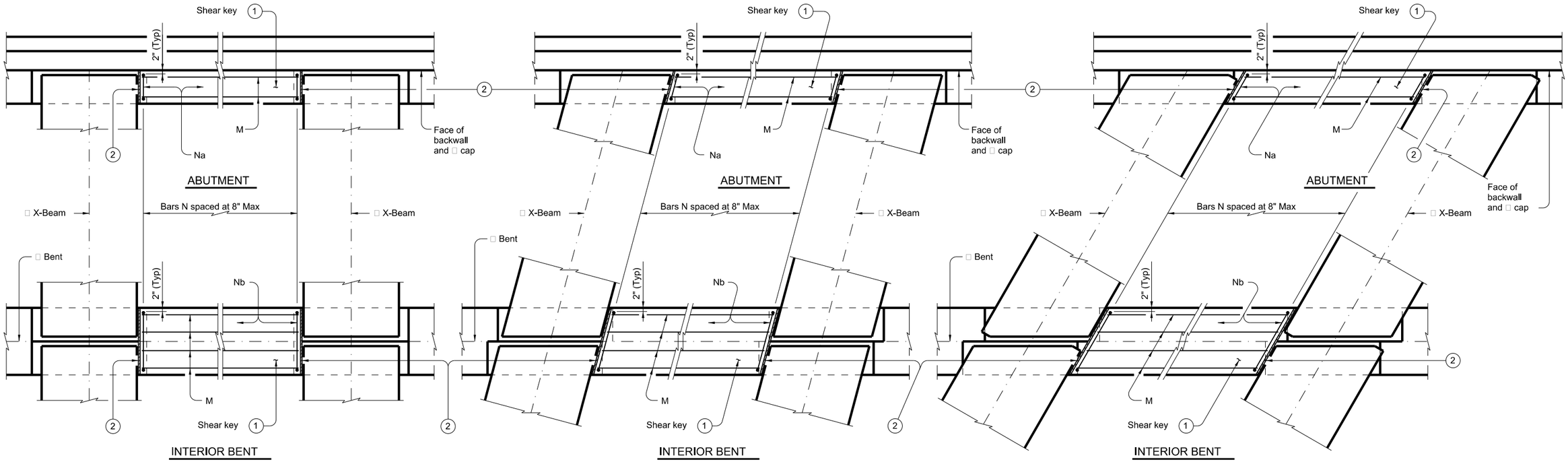


PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps.

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps.

PARTIAL PLANS WITH 30° SKEW

Showing shear keys on 3'-6" wide caps.

(1) Place shear keys on the upstream side of structure between outside beam and next adjacent beam, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad (Typ.)

(3) Leave a ¼" gap plus or minus between beam and face of wear pad. Cast wear pad with shear key, smooth side facing beam. Care must be taken to keep concrete from flowing under beam. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

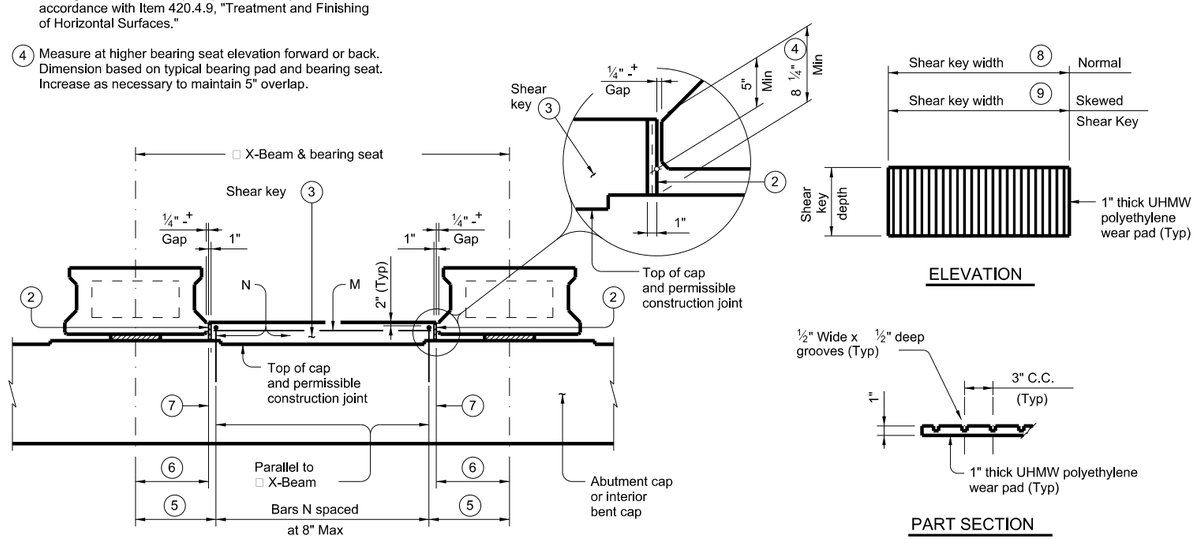
(5) With no skew = 2'-10", measured along □ cap.
With skew = 2'-10" ÷ Cos skew, measured along □ cap.

(6) With no skew = 2'-6 ¼", measured along □ cap.
With skew = 2'-6 ¼" ÷ Cos skew, measured along □ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of polyethylene wear pad facing beam.

(8) Abutments = ½ cap width.
Interior bents = cap width.

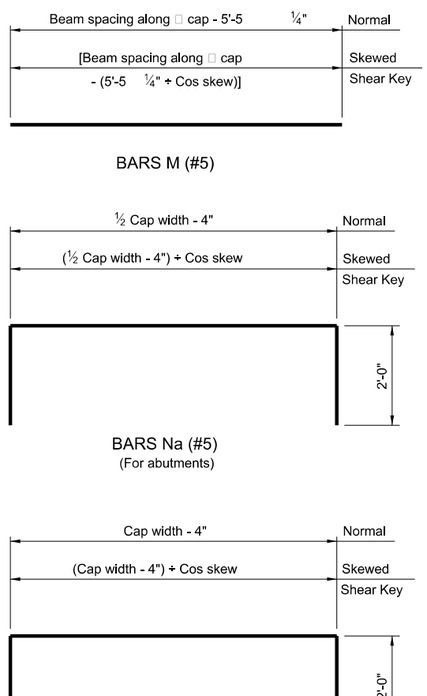
(9) Abutments = ½ cap width ÷ Cos skew.
Interior bents = cap width ÷ Cos skew.



PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

Showing shear key with beam Type 5XB28.
Other XB beam types similar.

ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



CONSTRUCTION NOTES:

Provide Class C concrete (f'c = 3,600 psi.) Provide Class C (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 30 degrees and less.
This standard is only applicable for 5XB X-Beams.
Modify details for bearing conditions, beam type, and beam spacing not shown on this standard. Details do not account for pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class C concrete.

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

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTRESSED CONCRETE X-BEAMS

XBSK

FILE: XB-XBSK-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BMT	JASPER		166

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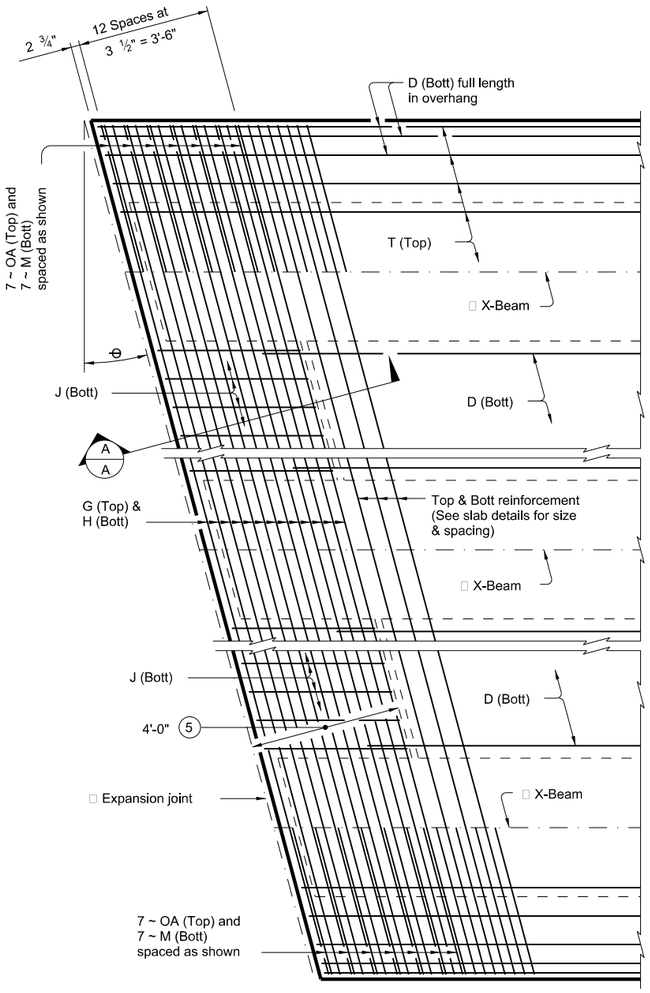
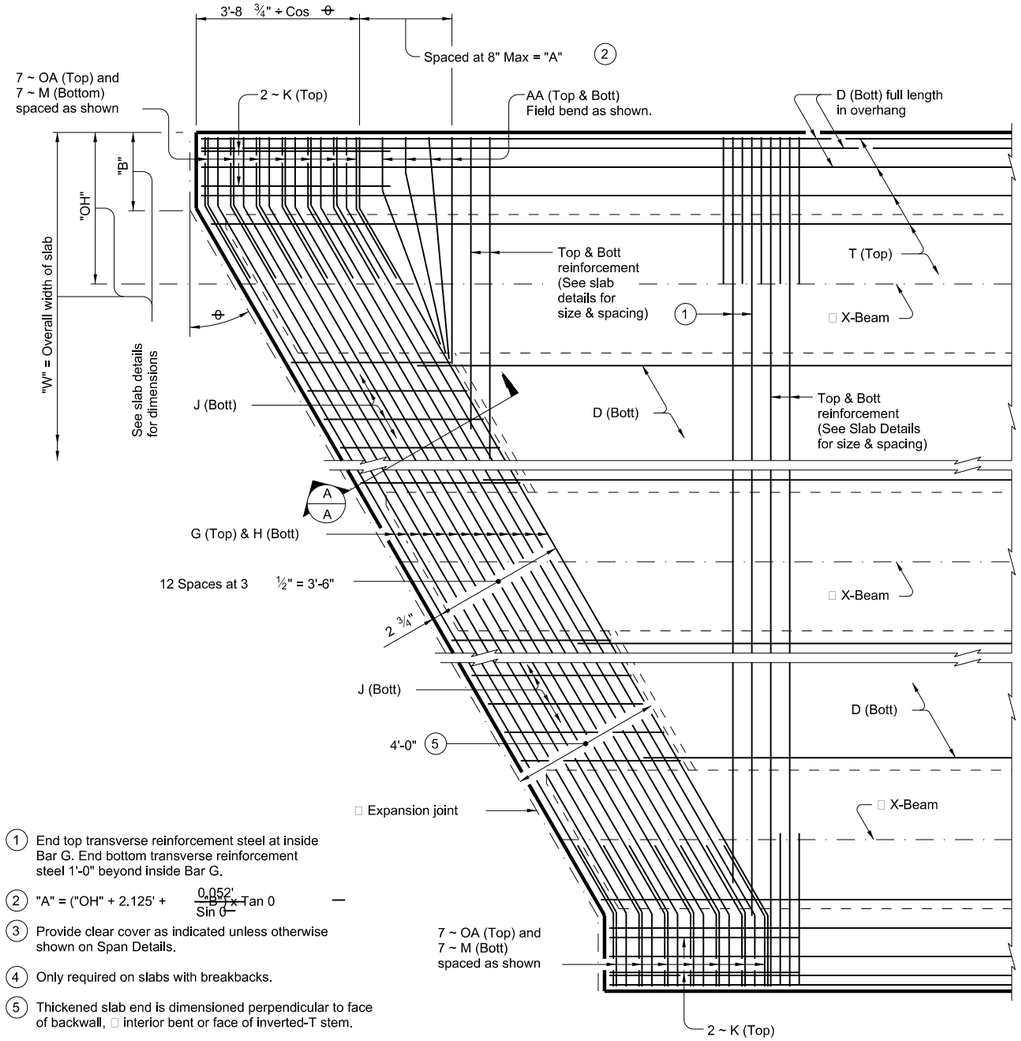




(1) End top transverse reinforcement steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A" = ("OH" + 2.125' + $\frac{0.052' \times \text{"B"} \times \text{Tan } \theta}{\text{Sin } \theta}$) —

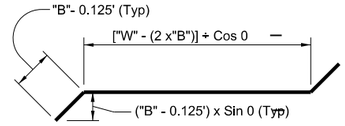
(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

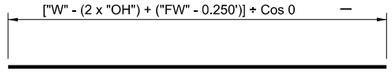
(5) Thickened slab end is dimensioned perpendicular to face of backwall, ▯ interior bent or face of inverted-T stem.

BARS G (#4)
(For slabs without breakbacks)

BARS K (#4) (4)

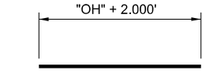


BARS G (#4)
(For slabs with breakbacks)

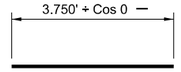


"FW" = beam top flange width (ft)

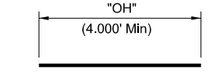
BARS H (#4)



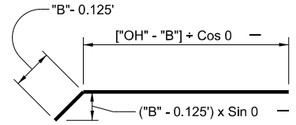
BARS AA (#5) (4)



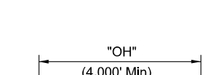
BARS J (#4)



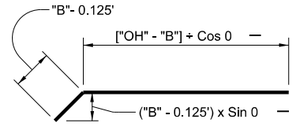
BARS OA (#5)
(For slabs without breakbacks)



BARS OA (#5)
(For slabs with breakbacks)



BARS M (#4)
(For slabs without breakbacks)



BARS M (#4)
(For slabs with breakbacks)

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel on the slab details is shown to be epoxy coated, then Bars AA, G, K, H, J, M, and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7" Epoxy Coated ~ #4 = 2'-5"

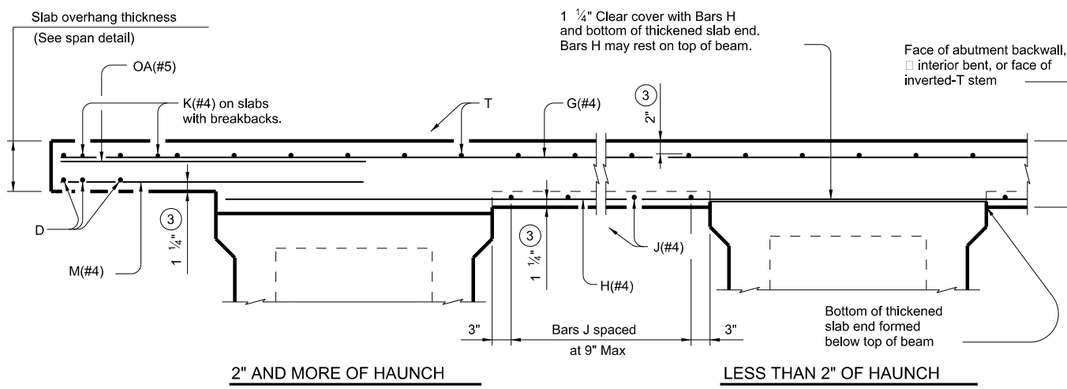
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete X-Beam Spans.
Use these details in conjunction with the span details and Prestressed Concrete Panels (PCP) standard (if prestressed conc. panels are used).

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

HL93 LOADING

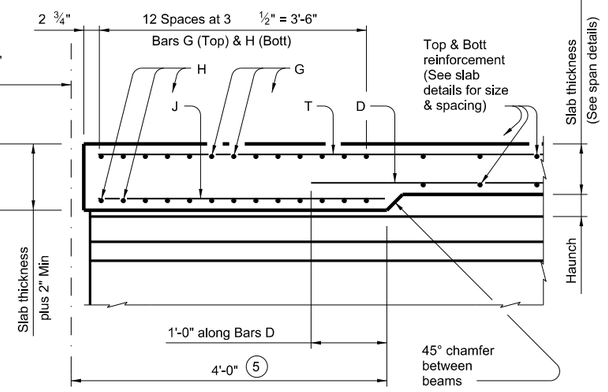
PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



TYPICAL TRANSVERSE SECTION

(Showing prestressed concrete X-Beams at ▯ bearing)

PARTIAL PLAN FOR SLABS WITH BREAKBACK



SECTION A-A

(Showing with 2" and more of haunch)

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS
PRESTRESSED CONCRETE X-BEAM SPANS
XBTS

FILE: XB-XBTS-22.dgn	DN: JMH		CK: TAR	DW: JER		CK: TAR	
©TxDOT August 2022	CONT	SECT	JOB		HIGHWAY		
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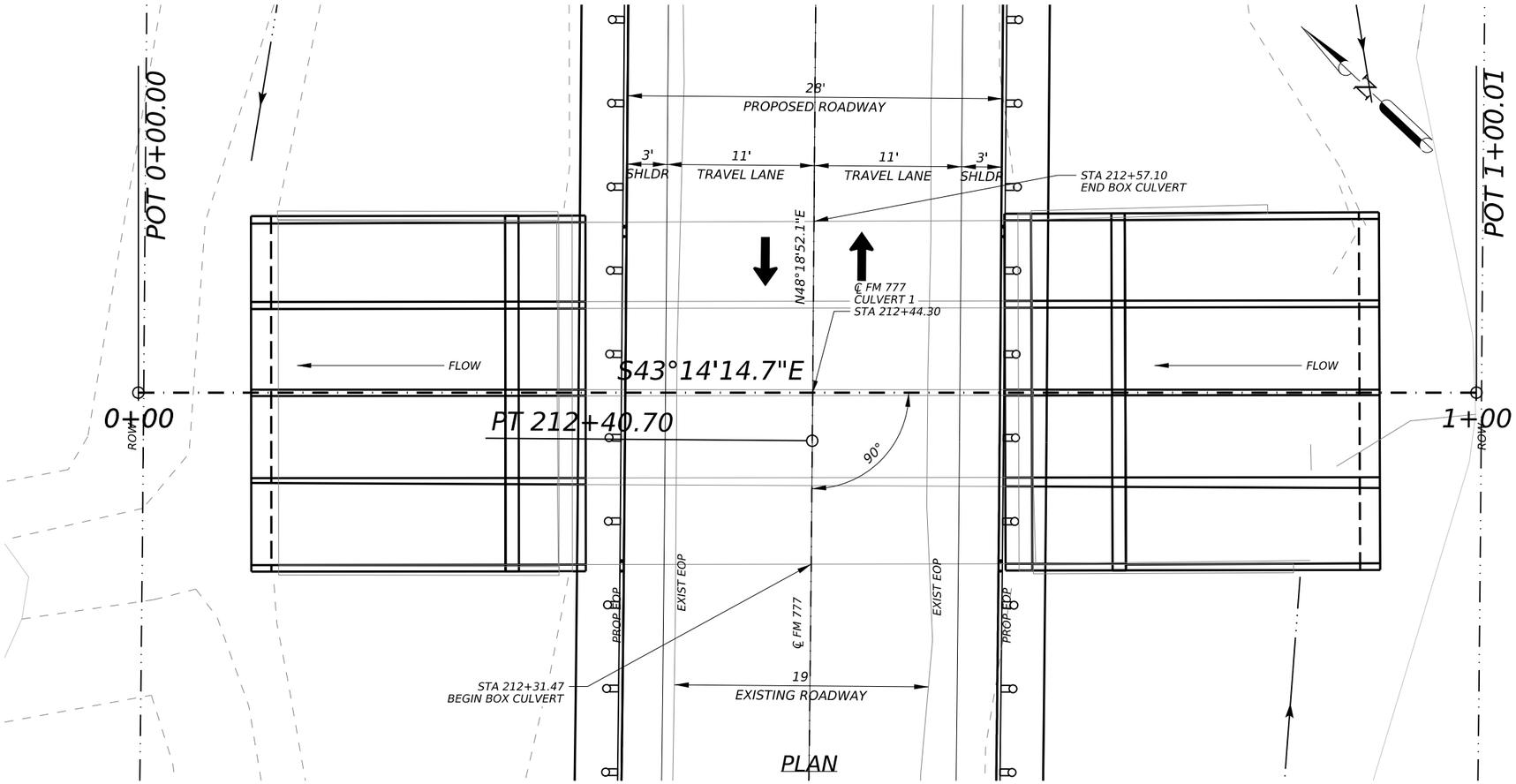
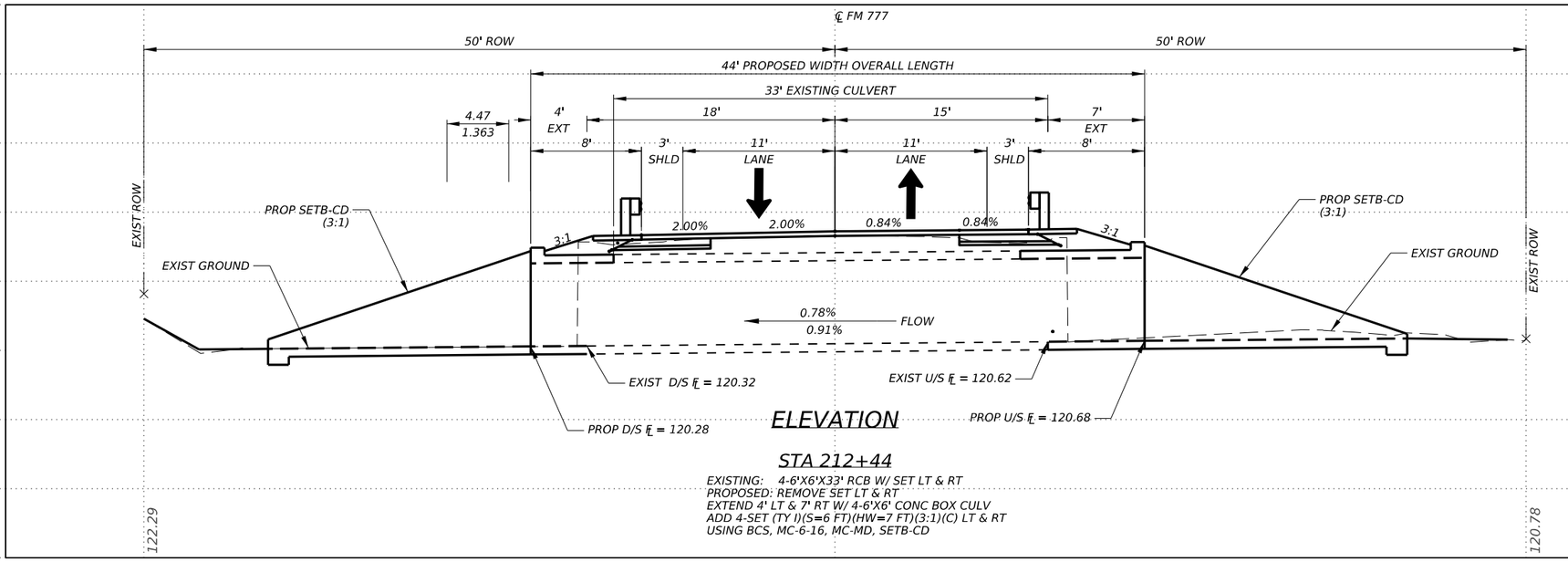
	DIST	COUNTY				SHEET NO.	
	BMT	JASPER				167	



PLAN



ELEVATION

STA 212+44

EXISTING: 4-6'X6'X33' RCB W/ SET LT & RT
PROPOSED: REMOVE SET LT & RT
EXTEND 4' LT & 7' RT W/ 4-6'X6' CONC BOX CULV
ADD 4-SET (TY I)(S=6 FT)(HW=7 FT)(3:1)(C) LT & RT
USING BCS, MC-6-16, MC-MD, SETB-CD

GENERAL NOTES
DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (NOV 2021).

DESIGN SPEED = 45 MPH
FUNCTIONAL CLASS = MAJOR COLLECTOR
ADT (2023) = 700
ADT (2043) = 1000

0' 5' 10'
SCALE: 1"= 10' H
1"= 5' V

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER
01.30.24

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FRN - F-14256

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FM 777
BRIDGE CLASS
CROSS CULVERT #1 LAYOUT

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		168

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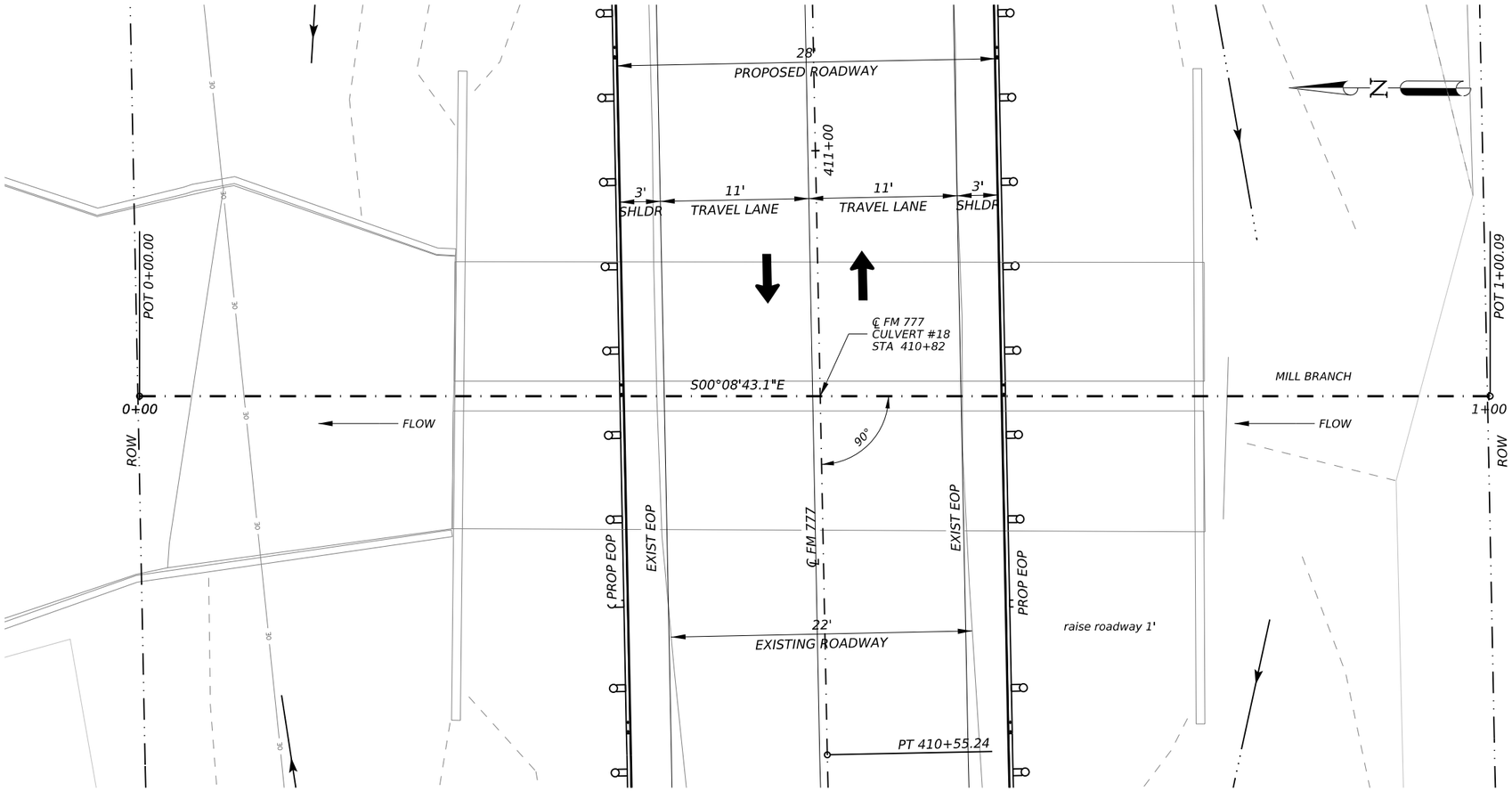

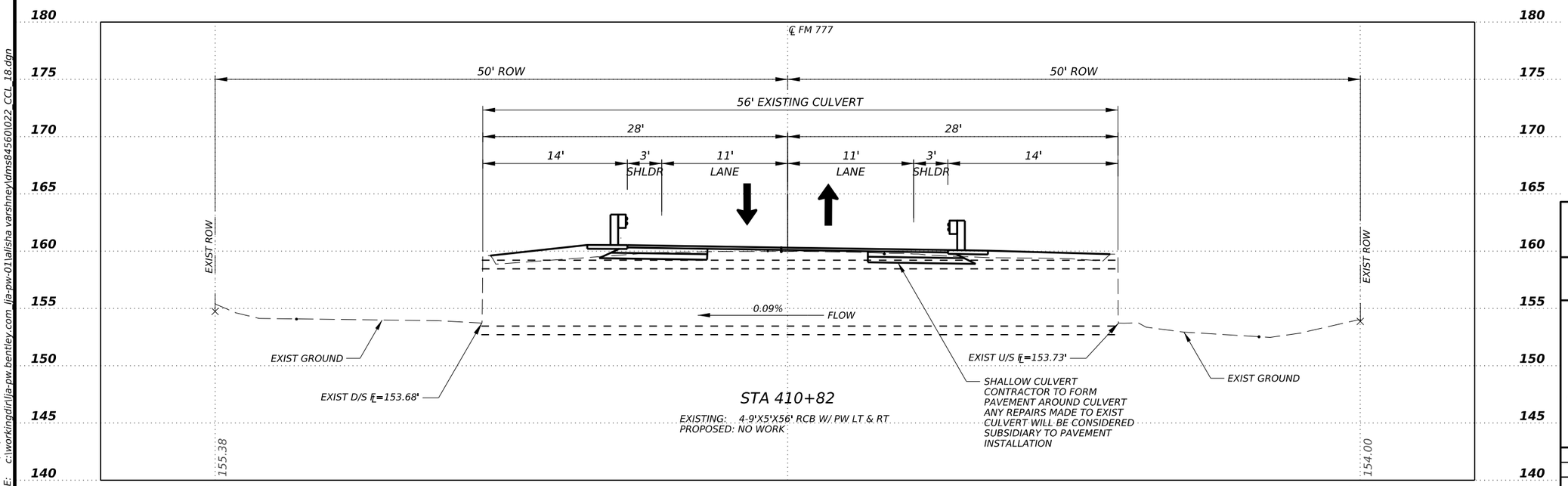

STA 410+82

EXISTING: 4-9'X5'X56' RCB W/ PW LT & RT
PROPOSED: NO WORK

NOTE:

CONTRACTOR TO ADJUST SUBGRADE WIDENING AND PAVEMNT STRUCTURE TO ACCOUNT FOR LOW FILL CULVERT. CONTRACTOR TO USE CEMENT STABILIZED BACKFILL BETWEEN CULVERT AND PAVEMENT AS NEEDED, PAYMENT FOR THIS WORK IS SUBSIDIARY TO VARIOUS BID ITEMS

0' 5' 10'

SCALE: 1"= 10' H
1"= 5' V

STATE OF TEXAS
JESSE L. LOFTIN
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BRIDGE CLASS
CROSS CULVERT #18 LAYOUT

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		169

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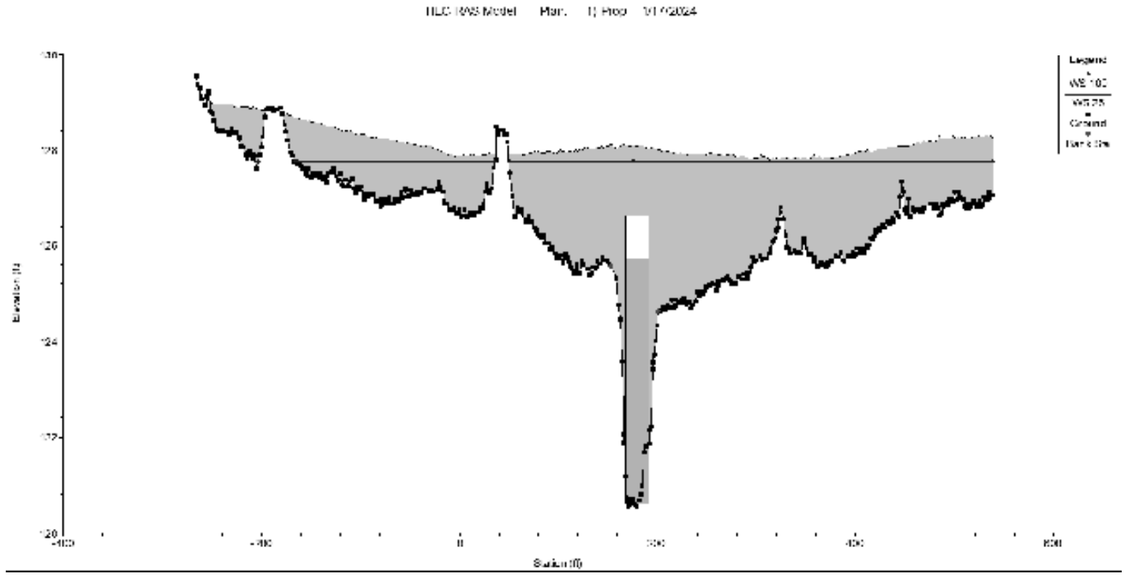

Plan: Prop culv-01 culv-01 RS: 8197 Culv Group: Culvert #1 Profile: 25			
Q Culv Group (cfs)	733.45	Culv Full Len (ft)	
# Barrels	4	Culv Vel US (ft/s)	6.06
Q Barrel (cfs)	183.36	Culv Vel DS (ft/s)	5.56
E.G. US. (ft)	126.58	Culv Inv El Up (ft)	120.68
W.S. US. (ft)	126.49	Culv Inv El Dn (ft)	120.28
E.G. DS (ft)	125.82	Culv Frctn Ls (ft)	0.04
W.S. DS (ft)	125.77	Culv Exit Loss (ft)	0.43
Delta EG (ft)	0.76	Culv Entr Loss (ft)	0.29
Delta WS (ft)	0.72	Q Weir (cfs)	
E.G. IC (ft)	125.59	Weir Sta Lft (ft)	
E.G. OC (ft)	126.58	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	125.72	Weir Max Depth (ft)	
Culv WS Outlet (ft)	125.77	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.21	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.07	Min El Weir Flow (ft)	127.06

Plan: LX culv-01 culv-01 RS: 8197 Culv Group: Culvert #1 Profile: 25			
Q Culv Group (cfs)	733.45	Culv Full Len (ft)	
# Barrels	4	Culv Vel US (ft/s)	5.89
Q Barrel (cfs)	183.36	Culv Vel DS (ft/s)	5.53
E.G. US. (ft)	126.62	Culv Inv El Up (ft)	120.62
W.S. US. (ft)	126.54	Culv Inv El Dn (ft)	120.32
E.G. DS (ft)	125.89	Culv Frctn Ls (ft)	0.03
W.S. DS (ft)	125.85	Culv Exit Loss (ft)	0.43
Delta EG (ft)	0.73	Culv Entr Loss (ft)	0.27
Delta WS (ft)	0.69	Q Weir (cfs)	
E.G. IC (ft)	125.53	Weir Sta Lft (ft)	
E.G. OC (ft)	126.62	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	125.81	Weir Max Depth (ft)	
Culv WS Outlet (ft)	125.85	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.21	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.07	Min El Weir Flow (ft)	127.06

Plan: Prop culv-01 culv-01 RS: 8197 Culv Group: Culvert #1 Profile: 100			
Q Culv Group (cfs)	1098.62	Culv Full Len (ft)	
# Barrels	4	Culv Vel US (ft/s)	8.33
Q Barrel (cfs)	274.65	Culv Vel DS (ft/s)	7.64
E.G. US. (ft)	127.79	Culv Inv El Up (ft)	120.68
W.S. US. (ft)	127.75	Culv Inv El Dn (ft)	120.28
E.G. DS (ft)	126.32	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	126.27	Culv Exit Loss (ft)	0.85
Delta EG (ft)	1.47	Culv Entr Loss (ft)	0.54
Delta WS (ft)	1.48	Q Weir (cfs)	0.13
E.G. IC (ft)	127.17	Weir Sta Lft (ft)	538.45
E.G. OC (ft)	127.79	Weir Sta Rgt (ft)	538.53
Culvert Control	Outlet	Weir Submerg	0
Culv WS Inlet (ft)	126.17	Weir Max Depth (ft)	0.74
Culv WS Outlet (ft)	126.27	Weir Avg Depth (ft)	0.74
Culv Nml Depth (ft)	2.97	Weir Flow Area (sq ft)	0.06
Culv Crt Depth (ft)	4.02	Min El Weir Flow (ft)	127.06

Plan: EX culv-01 culv-01 RS: 8197 Culv Group: Culvert #1 Profile: 100			
Q Culv Group (cfs)	1098.6	Culv Full Len (ft)	4.22
# Barrels	4	Culv Vel US (ft/s)	8.06
Q Barrel (cfs)	274.65	Culv Vel DS (ft/s)	7.63
E.G. US. (ft)	127.81	Culv Inv El Up (ft)	120.62
W.S. US. (ft)	127.78	Culv Inv El Dn (ft)	120.32
E.G. DS (ft)	126.4	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	126.35	Culv Exit Loss (ft)	0.86
Delta EG (ft)	1.42	Culv Entr Loss (ft)	0.5
Delta WS (ft)	1.43	Q Weir (cfs)	0.15
E.G. IC (ft)	127.11	Weir Sta Lft (ft)	292.96
E.G. OC (ft)	127.81	Weir Sta Rgt (ft)	538.53
Culvert Control	Outlet	Weir Submerg	0
Culv WS Inlet (ft)	126.3	Weir Max Depth (ft)	0.76
Culv WS Outlet (ft)	126.32	Weir Avg Depth (ft)	0.01
Culv Nml Depth (ft)	2.97	Weir Flow Area (sq ft)	0.11
Culv Crt Depth (ft)	4.02	Min El Weir Flow (ft)	127.06

STATE OF TEXAS
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HYDRAULIC DATA

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		170

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Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
culv-01	10000	25	EX	733.45	128.33	130.97		131.19	0.004975	5.05	237.78	204.93	0.64
culv-01	10000	25	Prop	733.45	128.33	130.97		131.19	0.004975	5.05	237.78	204.93	0.64
culv 01	10000	100	EX	1098.75	128.33	131.34		131.6	0.004893	5.63	314.99	212.31	0.65
culv-01	10000	100	Prop	1098.75	128.33	131.34		131.6	0.00494	5.65	313.98	211.81	0.66
culv-01	9401	25	EX	733.45	124	129.25		129.44	0.001906	4.2	299.7	255.55	0.42
culv-01	9401	25	Prop	733.45	124	129.25		129.44	0.001906	4.2	299.7	255.55	0.42
culv 01	9401	100	EX	1098.75	124	129.77		129.96	0.001718	4.43	437.23	267.56	0.41
culv-01	9401	100	Prop	1098.75	124	129.78		129.97	0.001687	4.4	440.28	267.73	0.41
culv 01	9058	25	EX	733.45	123.71	128.77		128.87	0.001316	3.45	364.58	237.4	0.35
culv-01	9058	25	Prop	733.45	123.71	128.77		128.87	0.001316	3.45	364.58	237.4	0.35
culv-01	9058	100	EX	1098.75	123.71	129.31		129.43	0.001281	3.8	500.03	255.78	0.35
culv-01	9058	100	Prop	1098.75	123.71	129.34		129.45	0.001235	3.75	506.56	256.26	0.35
culv 01	8599	25	EX	733.45	122.28	127.02	127.02	127.68	0.006187	7.17	149.94	125.12	0.73
culv-01	8599	25	Prop	733.45	122.28	127.02	127.02	127.68	0.006187	7.17	149.94	125.12	0.73
culv-01	8599	100	EX	1098.75	122.28	127.51	127.45	128.24	0.006513	8	222.58	176.23	0.77
culv-01	8599	100	Prop	1098.75	122.28	127.45	127.45	128.25	0.007143	8.3	212.45	172.06	0.8
culv-01	8223	25	EX	733.45	120.55	126.54	123.95	126.62	0.000528	2.67	480.22	364.21	0.23
culv-01	8223	25	Prop	733.45	120.55	126.49	123.95	126.57	0.000565	2.75	462.92	358.13	0.24
culv-01	8223	100	EX	1098.75	120.55	127.78	125.01	127.81	0.000202	1.98	1184.51	695.4	0.15
culv-01	8223	100	Prop	1098.75	120.55	127.76	125.01	127.79	0.000209	2	1168.35	692.53	0.15
culv-01	8197			Culvert									
culv-01	8166	25	EX	733.45	120.17	125.85		125.89	0.000292	2.28	682.89	561.41	0.18
culv-01	8166	25	Prop	733.45	120.17	125.77		125.82	0.000324	2.38	641.81	529.42	0.18
culv-01	8166	100	EX	1098.75	120.17	126.35		126.4	0.000324	2.55	983.85	631.52	0.19
culv-01	8166	100	Prop	1098.75	120.17	126.27		126.32	0.000361	2.67	935.4	622.58	0.2
culv-01	7920	25	EX	733.45	119.21	125.11	124.8	125.58	0.004725	5.99	175.62	153.71	0.63
culv-01	7920	25	Prop	733.45	119.21	125.11	124.8	125.58	0.004725	5.99	175.62	153.71	0.63
culv-01	7920	100	EX	1098.75	119.21	125.56	125.44	126.06	0.005253	6.55	266.09	265.68	0.67
culv-01	7920	100	Prop	1098.75	119.21	125.56	125.44	126.06	0.005253	6.55	266.09	265.68	0.67
culv-01	7599	25	EX	733.45	119.05	124.36	123.78	124.5	0.00215	3.86	327.81	263.36	0.43
culv 01	7599	25	Prop	733.45	119.05	124.36	123.78	124.5	0.00215	3.86	327.81	263.36	0.43
culv-01	7599	100	EX	1098.75	119.05	124.78	124.11	124.93	0.002151	4.27	439.59	274.92	0.44
culv-01	7599	100	Prop	1098.75	119.05	124.78	124.11	124.93	0.002151	4.27	439.59	274.92	0.44

STATE OF TEXAS
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HYDRAULIC DATA

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		171

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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA 212+44 (BOTH)	4 ~ 6' x 6'	2'	MC-MD, MC-6-16	SETB-CD	45°	3:1	9"	7"	0.5'	7'	N/A	N/A	20.000'	N/A	29.617'	0.0	40.4	X.XX	N/A

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		172

DATE: 1/30/2024 3:12:34 PM
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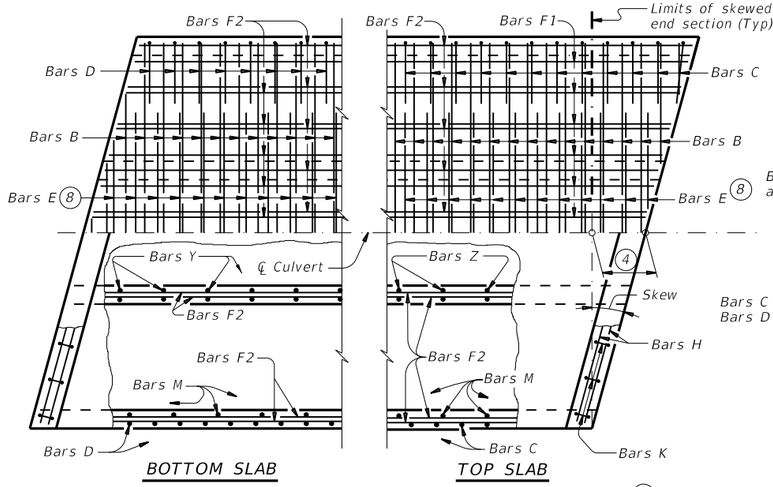
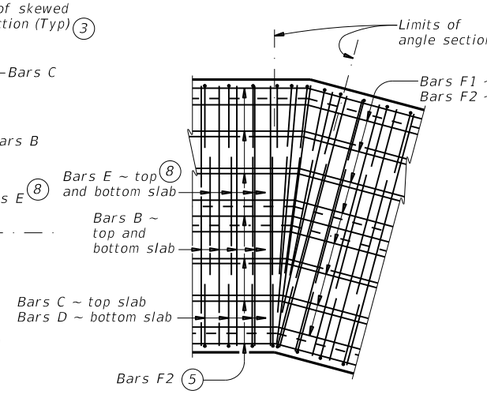
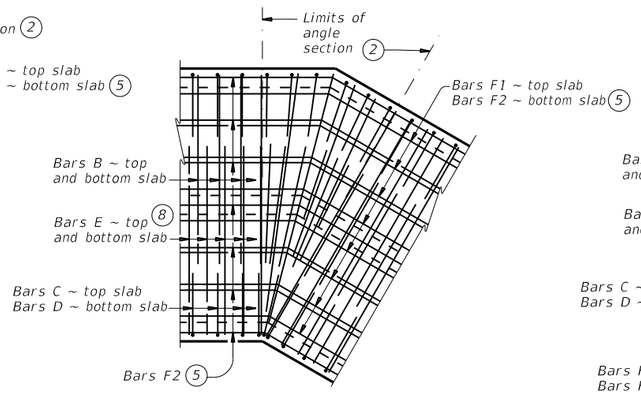


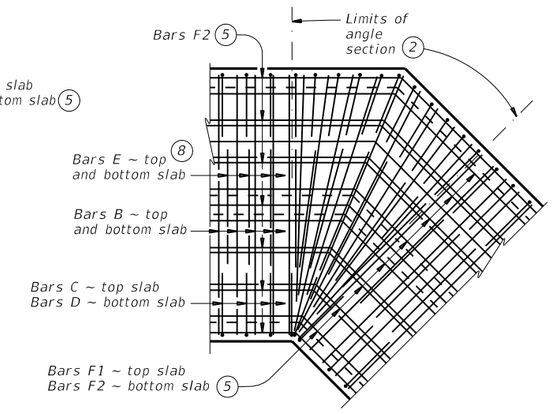
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



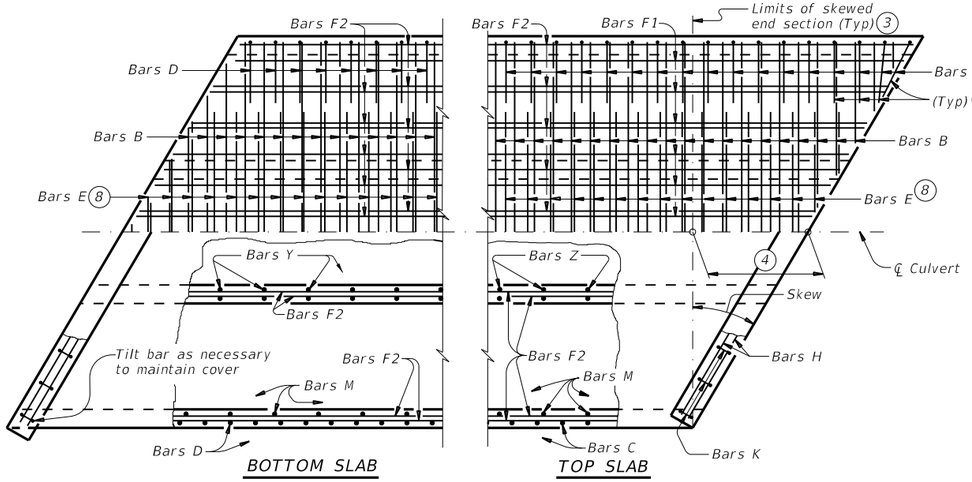
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



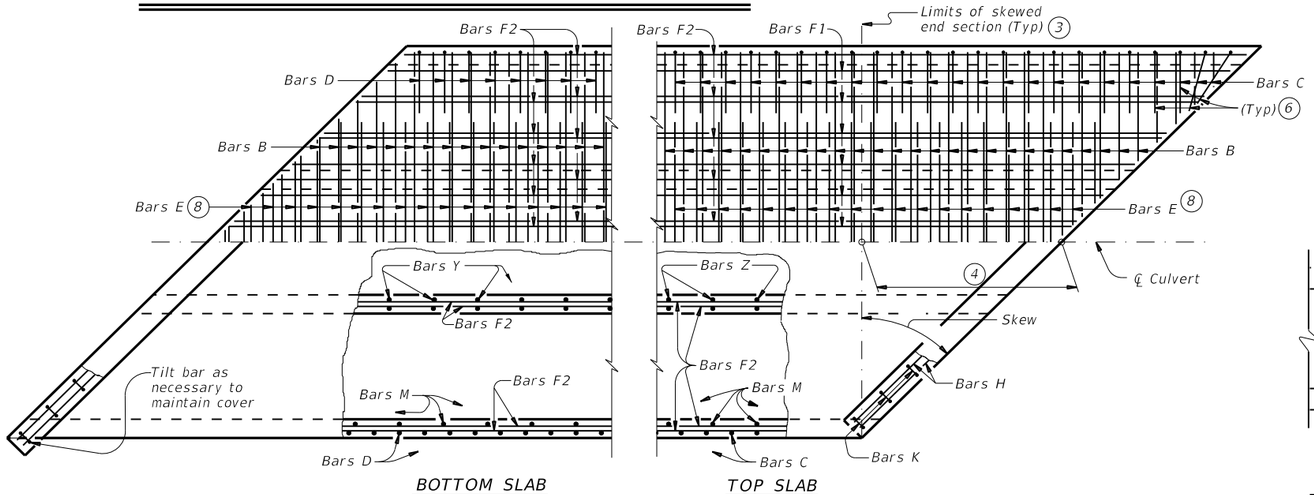
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

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

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

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

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

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

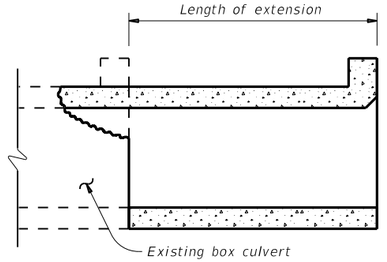
(4) [One half of overall width] x [tangent of the skew angle]

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

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

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

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



LENGTHENING DETAIL (1)

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

GENERAL NOTES:

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: CD-MC-MD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		173

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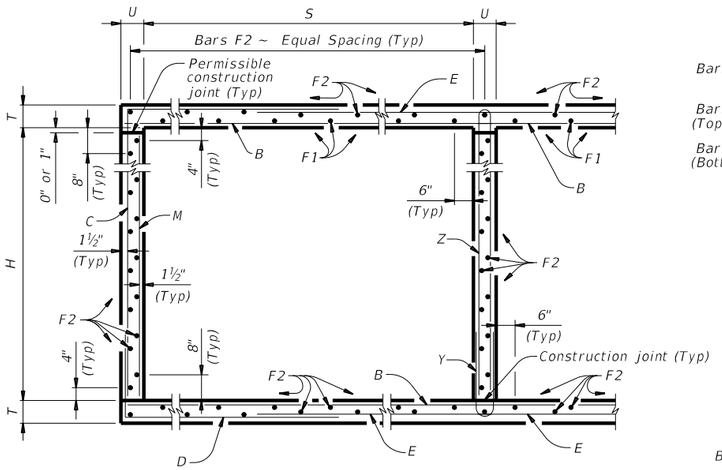
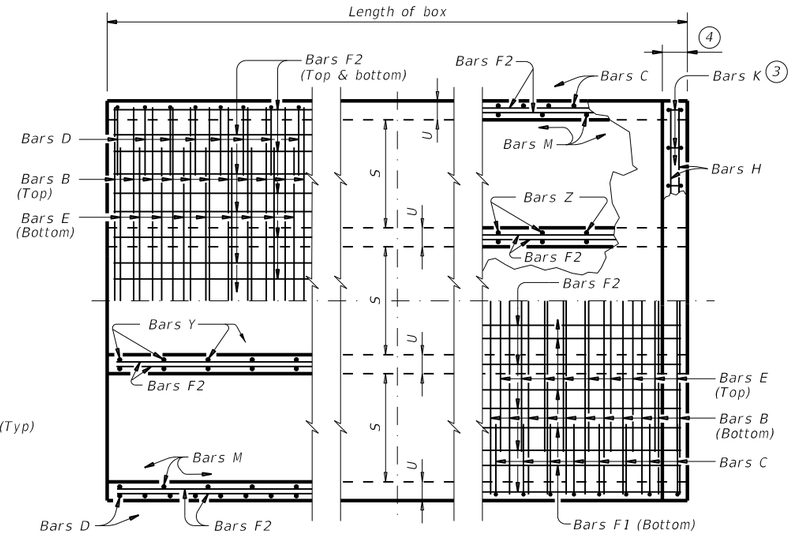
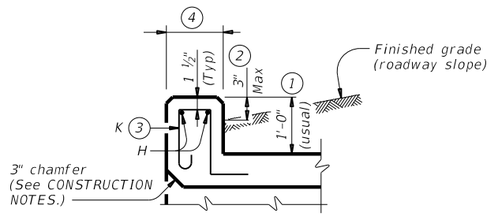


TYPICAL SECTION



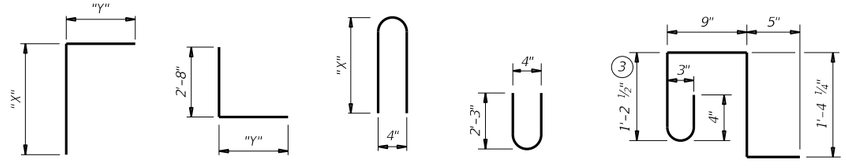
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

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



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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

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

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

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

FILE: CD-MC616-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	BMT	JASPER		174

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BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

6'-0" SPAN
0' TO 16' FILL

MC-6-16

FILE: CD-MC616-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
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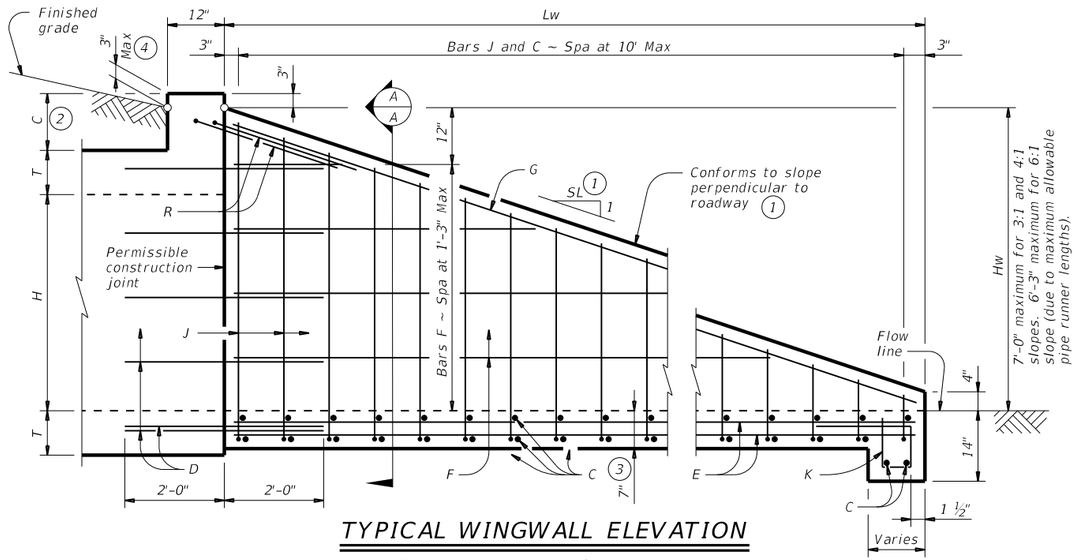
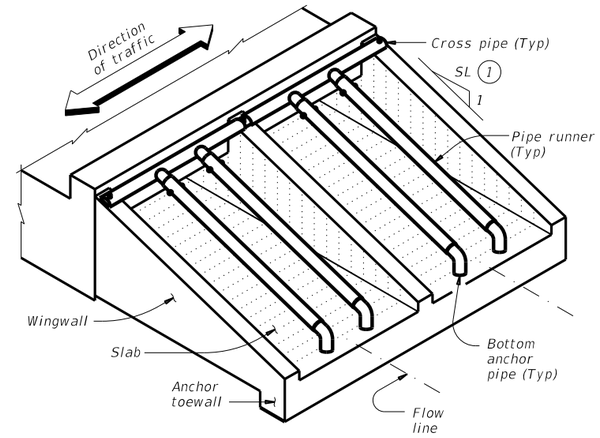


TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

Hw = H + T + C – 0.250'
Lw = (Hw – 0.333') (SL)

For cast–in–place culverts:
Atw = (N) (S) + (N + 1) (U)
For precast culverts:
Atw = (N) (2U + S) + (N – 1) (0.500')

Total Wingwall Area (SF)
= (0.5) (Hw + 0.333') (Lw) (N + 1)
Total Concrete Volume (CY)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' – 0.583')] ÷ (27)

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
= (Lw) (K1) – (1.917')
Total Reinforcing (Lb)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K2) (Hw) (N + 1) (√Lw)

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.

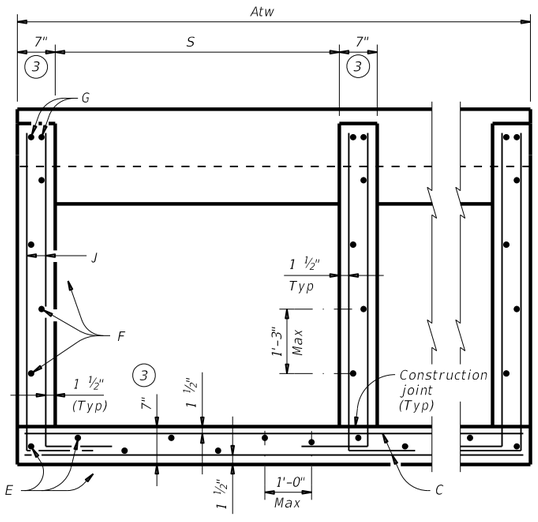
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide Class "C" concrete (f`c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing."

GENERAL NOTES:

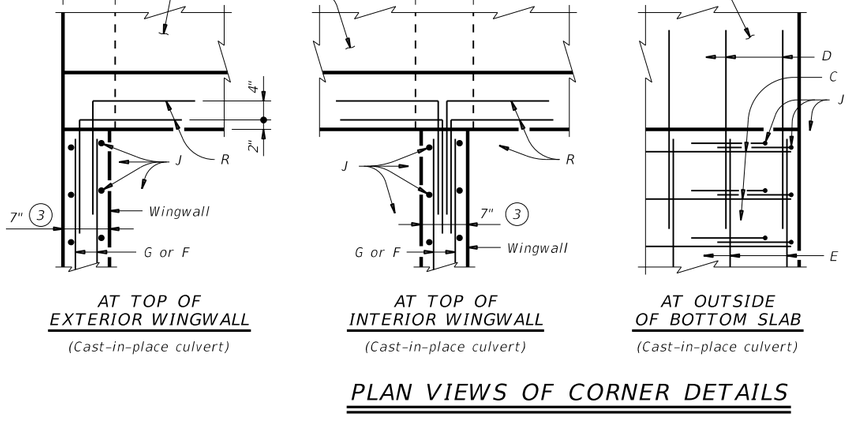
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing 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.
The quantities for pipe runners, reinforcing steel, and concrete resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

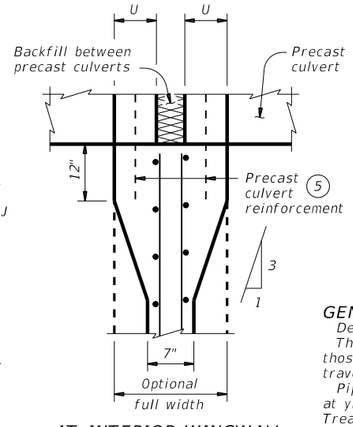
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out–to–out of bars.



SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)





PLAN VIEWS OF CORNER DETAILS

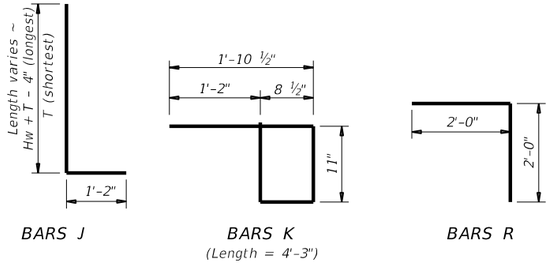


TABLE OF REINFORCING BAR SIZES AND SPACING		
Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'–0" Max
F	#4	1'–3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'–0" Max
R	#4	As shown

(1) *Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.*

(2) *0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'–0", refer to the Extended Curb Details (ECD) standard sheet.*

(3) *Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.*

(4) *For vehicle safety, reduce curb height, if necessary, to provide a maximum 3" projection. No changes will be made in quantities and no additional compensation will be allowed for this work.*

(5) *For culverts with C = 0", the precast culvert reinforcing may extend 1'–0" minimum into wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP–MD) standard sheet.*

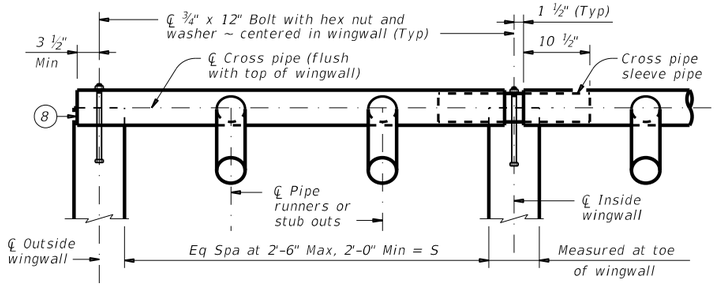
Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

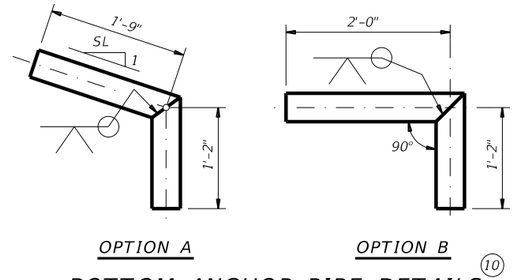
SETB-CD

FILE: CD-SETBCD-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		176



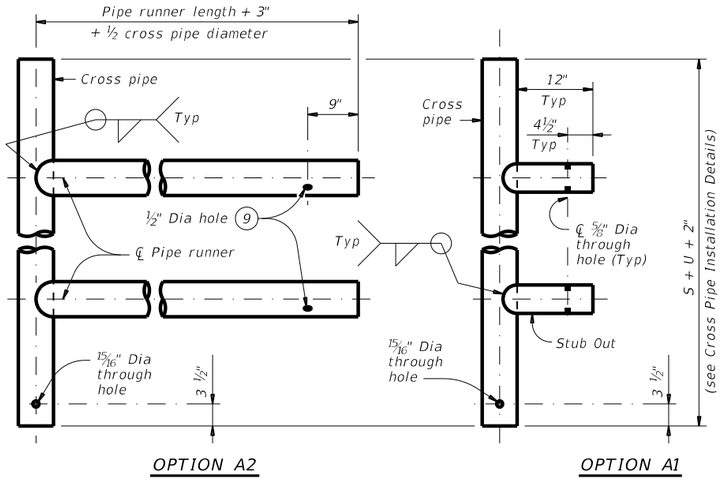
NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a $^{15}/_{16}$" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS



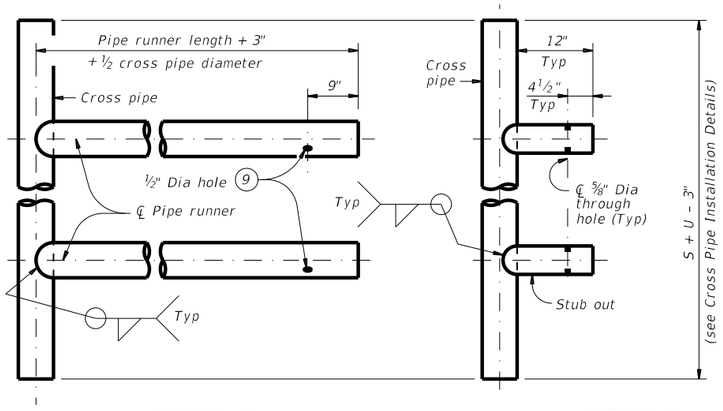
OPTION A OPTION B

BOTTOM ANCHOR PIPE DETAILS (10)



OPTION A2 OPTION A1

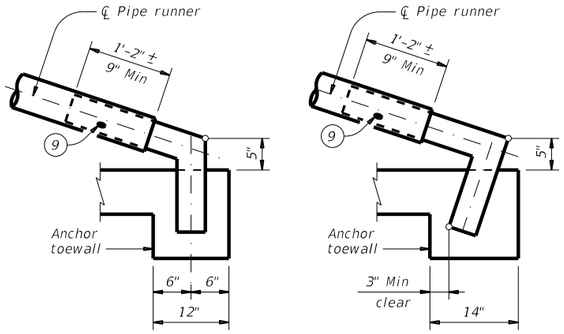
FOR USE IN OUTSIDE CULVERT BAY



OPTION A2 OPTION A1

FOR USE IN INSIDE CULVERT BAY

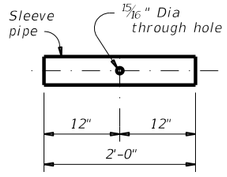
CROSS PIPE AND CONNECTIONS DETAILS



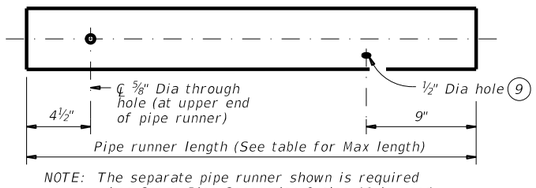
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)



CROSS PIPE SLEEVE PIPE DETAILS



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

PIPE RUNNER DETAILS

(6) Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

(7) Note that actual slope of safety pipe runner may vary slightly from side slope.

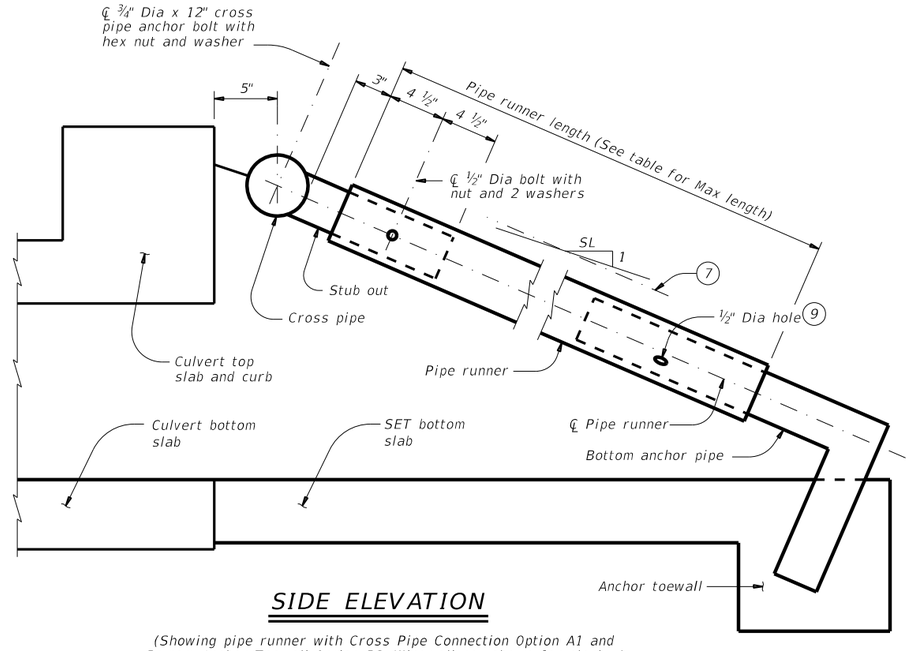
(8) Take care to ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1#2" hole to ensure that the lap of the safety 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.

MAXIMUM PIPE RUNNER LENGTHS AND (6) REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES

Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10'- 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'- 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
34'- 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS (MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE
SETB-CD

FILE: CD-SETBCD-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		177

DATE: 1/30/2024 3:12:49 PM
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D2-3 6in;

2.3" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on Green;
"307", ClearviewHwy-3-W;

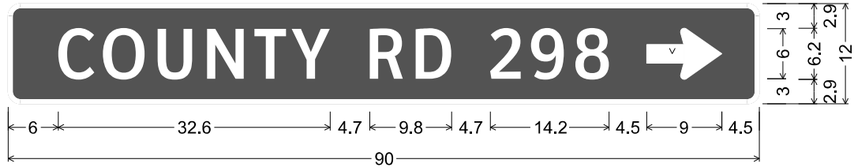
2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 13.4" X 8.1" 180°;

D2-3 6in;

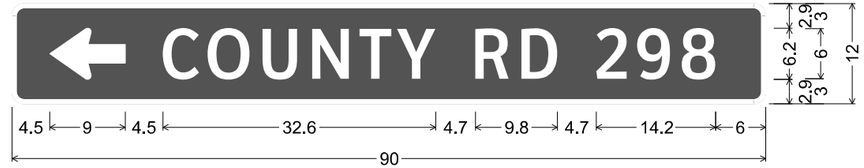
2.3" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on Green;
"307", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 13.4" X 8.1" 180°;



D21-1TR_VARx12;
1.5" Radius, 0.5" Border, White on Green;
"COUNTY RD 298", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0°;



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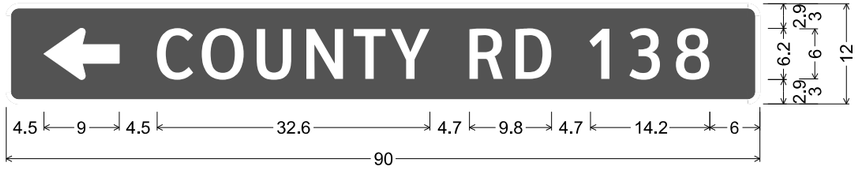
Standard Arrow Custom 9.0" X 6.1" 180°; "COUNTY RD 298", ClearviewHwy-3-W;



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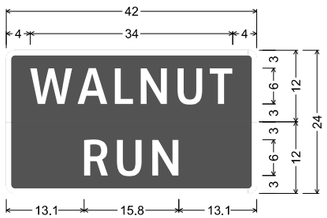
Standard Arrow Custom 9.0" X 6.1" 180°; "COUNTY RD 138", ClearviewHwy-3-W;

D21-1TR_VARx12;
1.5" Radius, 0.5" Border, White on Green;
"COUNTY RD 298", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0°;



I-3 6in;

1.5" Radius, 0.8" Border, White on Green;
"WALNUT", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
"RUN", ClearviewHwy-3-W;

D20-1TR 6in;

2.3" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on Green;
"144", ClearviewHwy-3-W;

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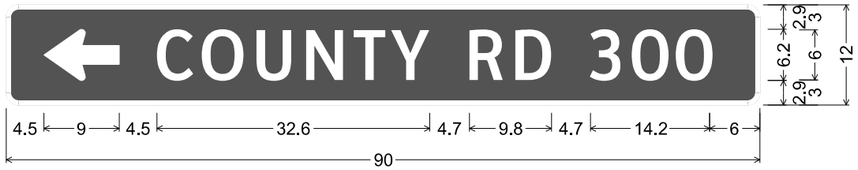

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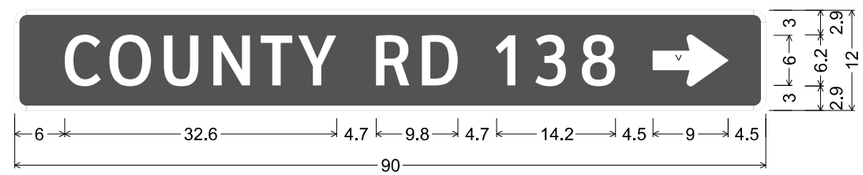

D21-1TR_VARx12;
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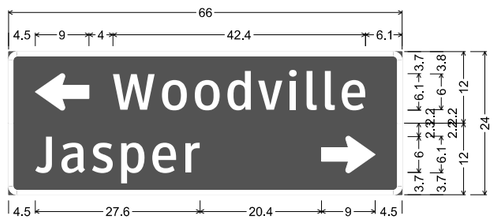
"COUNTY RD 138", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0°;



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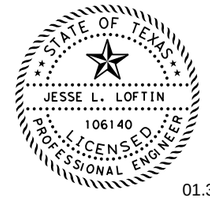
Standard Arrow Custom 9.0" X 6.1" 180°;
"Woodville", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
"Jasper", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777 SMALL SIGN DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		178

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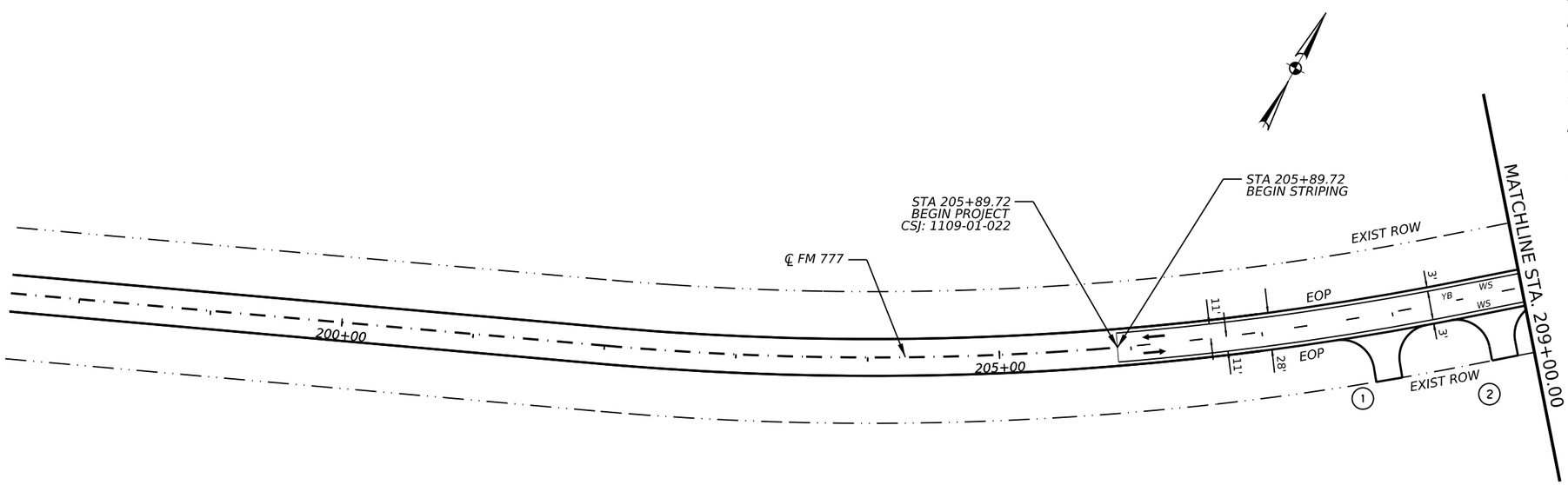
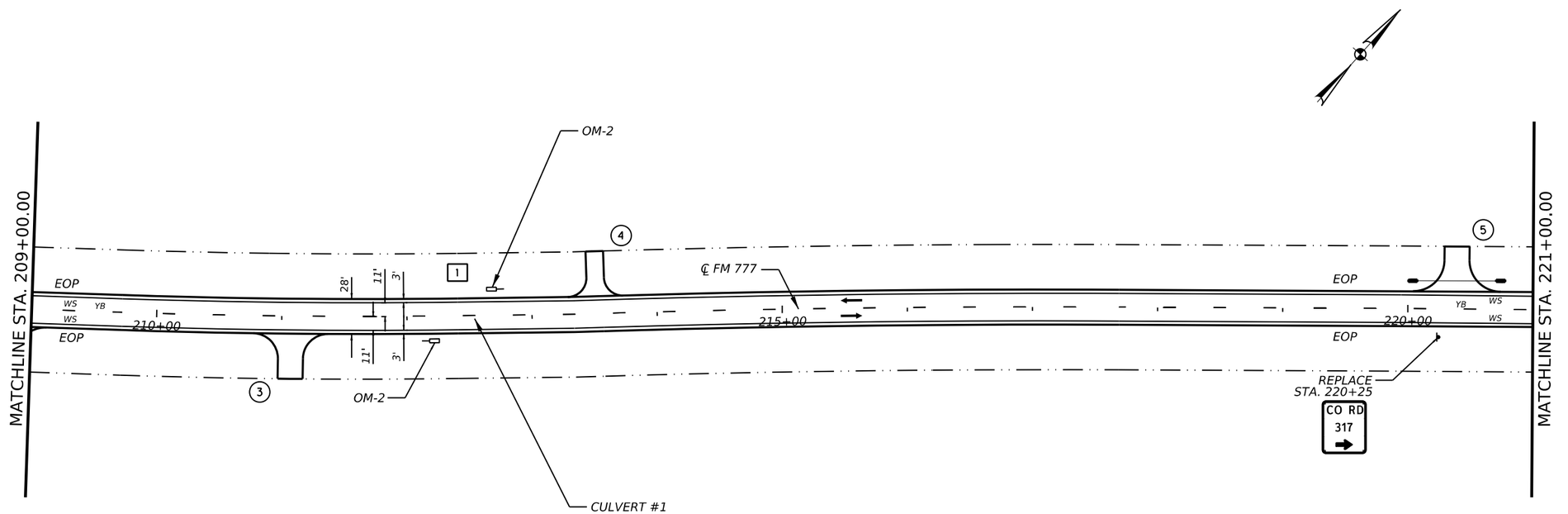
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION





0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
BEGIN TO STA 221+00

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		179

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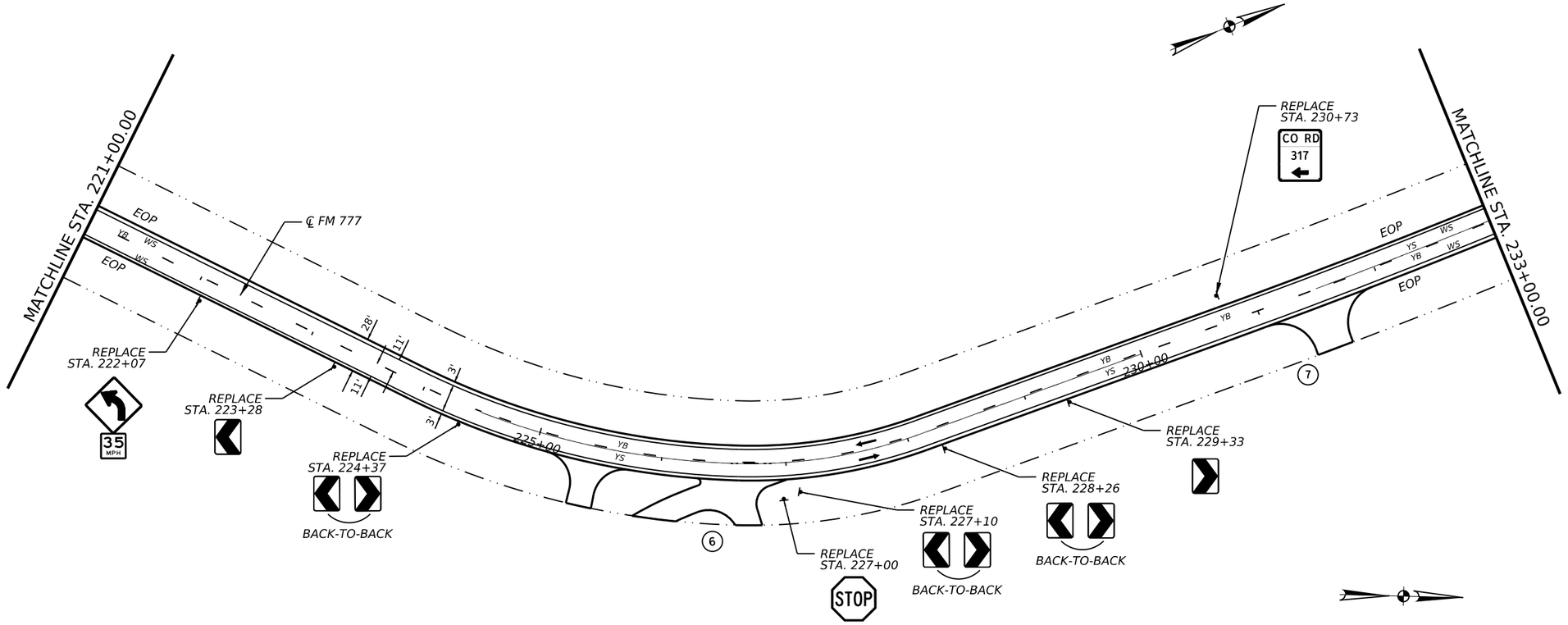
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION



0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

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FRN - F-14256

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 221+00 TO STA 245+00

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
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BMT	JASPER		180

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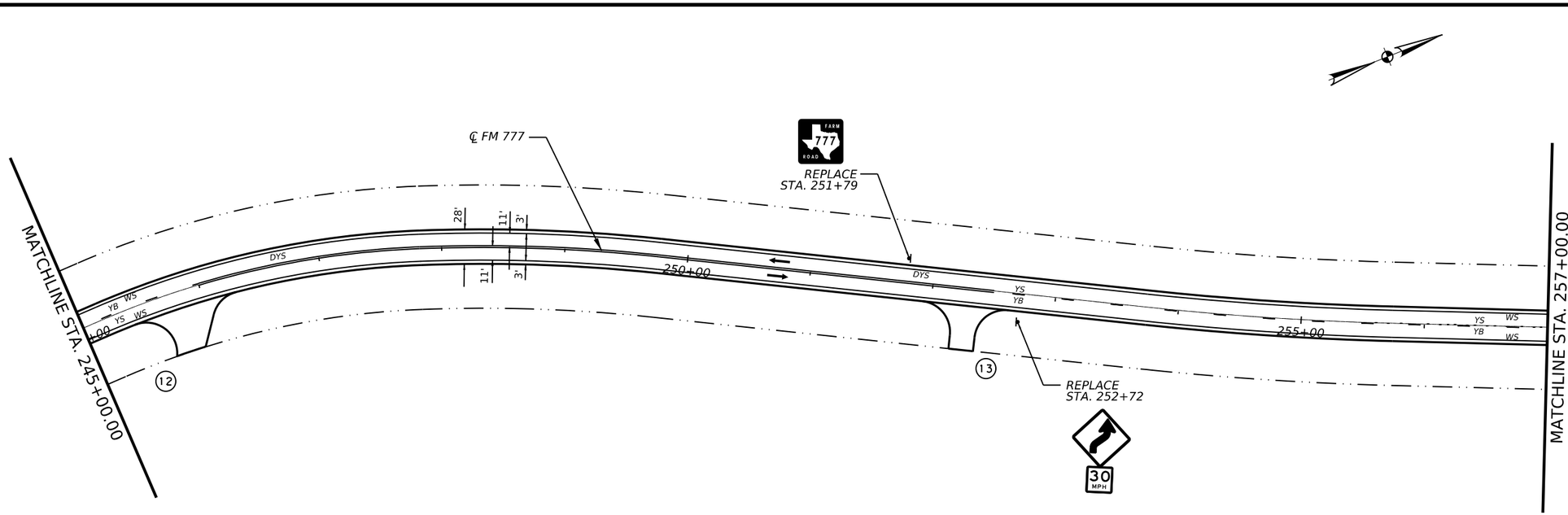

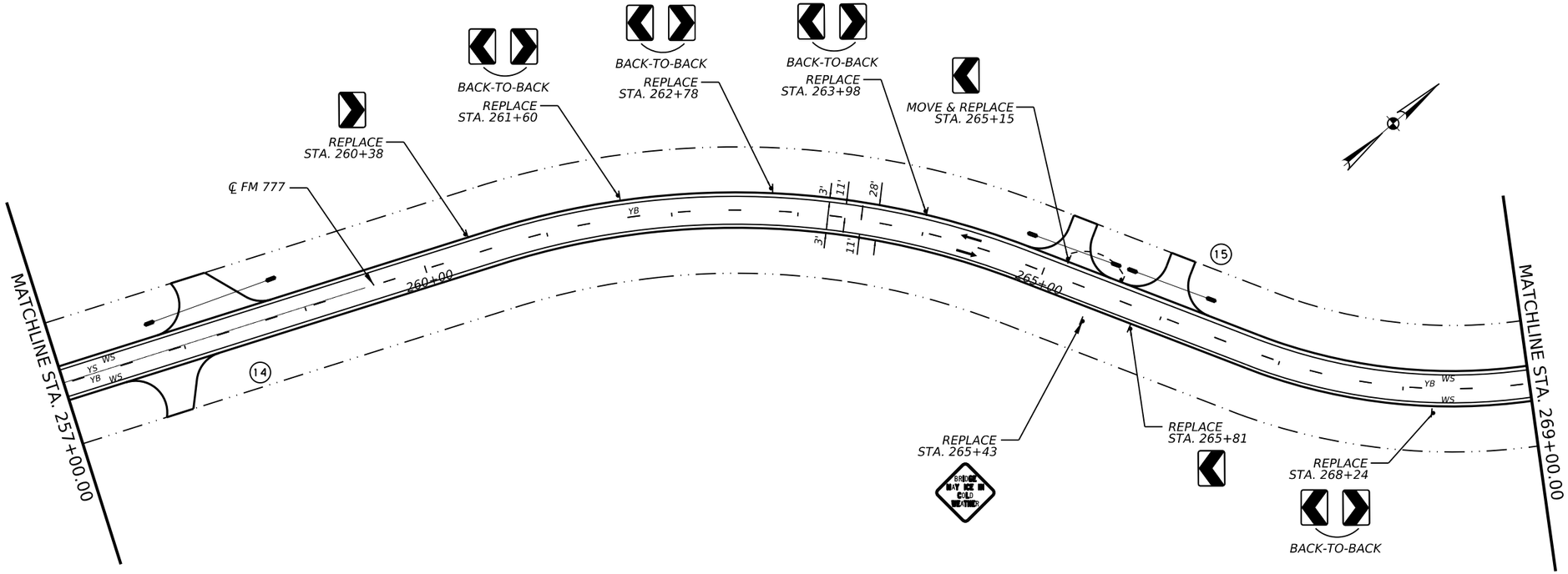

0' 50' 100'

SCALE: 1"= 100'

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION

STATE OF TEXAS
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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 245+00 TO STA 269+00

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
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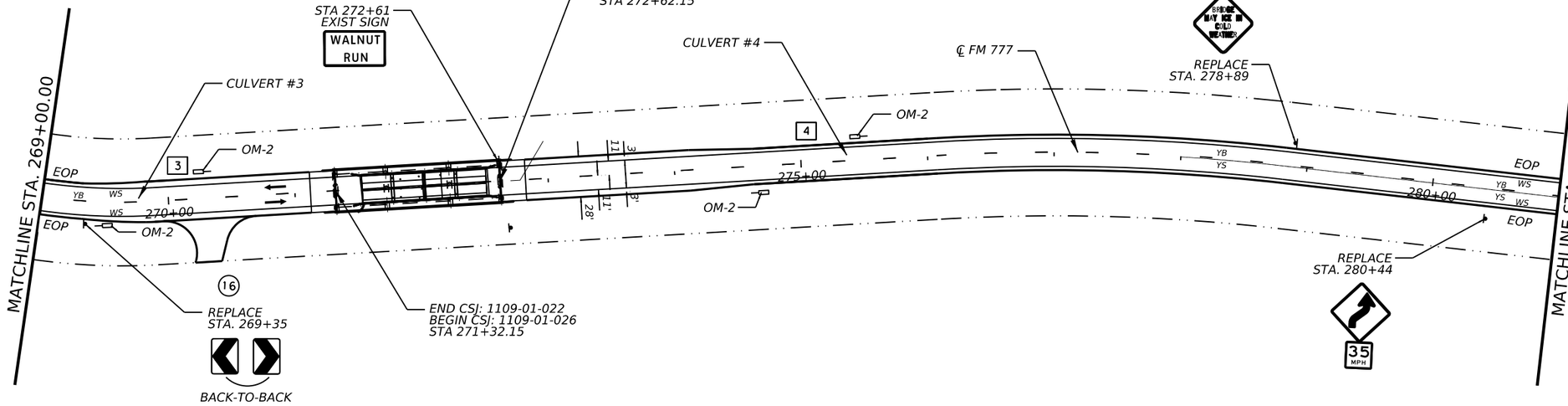
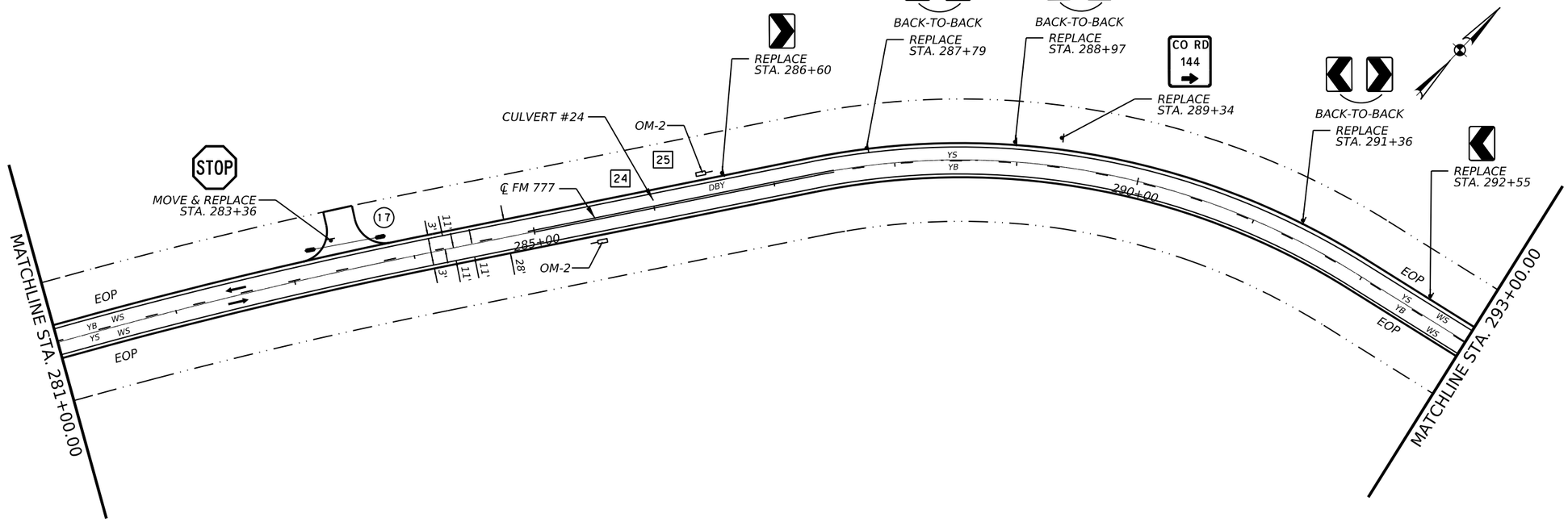
CK:
DW:
CK:
DW:

LEGEND:

→	TRAFFIC DIRECTION
EOP	PROP EDGE OF PAVEMENT
– – —	EXISTING EOP
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
8WS	8" WHITE SOLID
24WS	24" WHITE SOLID





0' 5' 10'

SCALE: 1"= 10'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

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FRN - F-14256

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 269+00 TO STA 293+00

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
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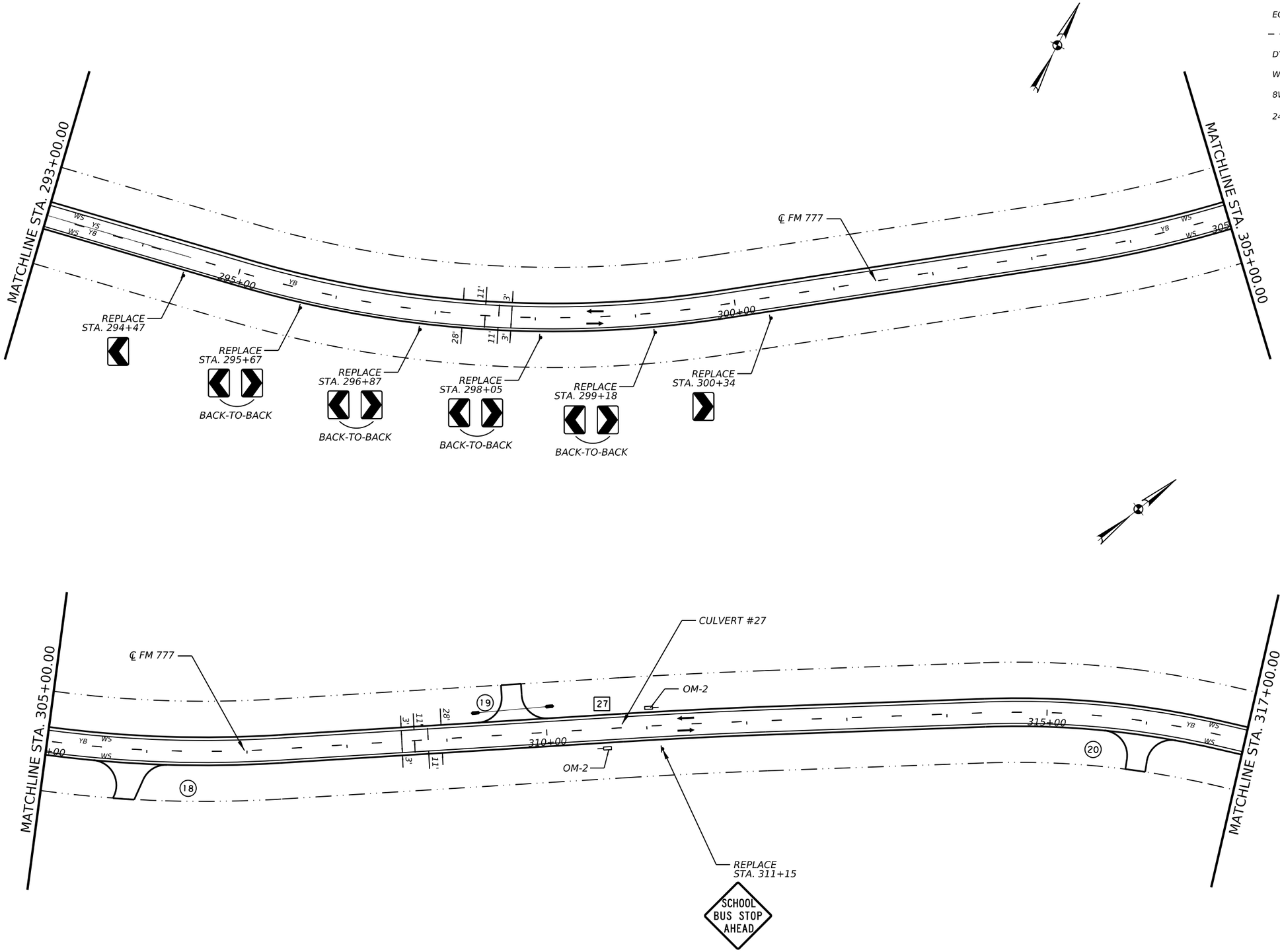
WS	6" WHITE SOLID
8WS	8" WHITE SOLID
24WS	24" WHITE SOLID



STATE OF TEXAS
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FRN - F-14256

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 293+00 TO STA 317+00

SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
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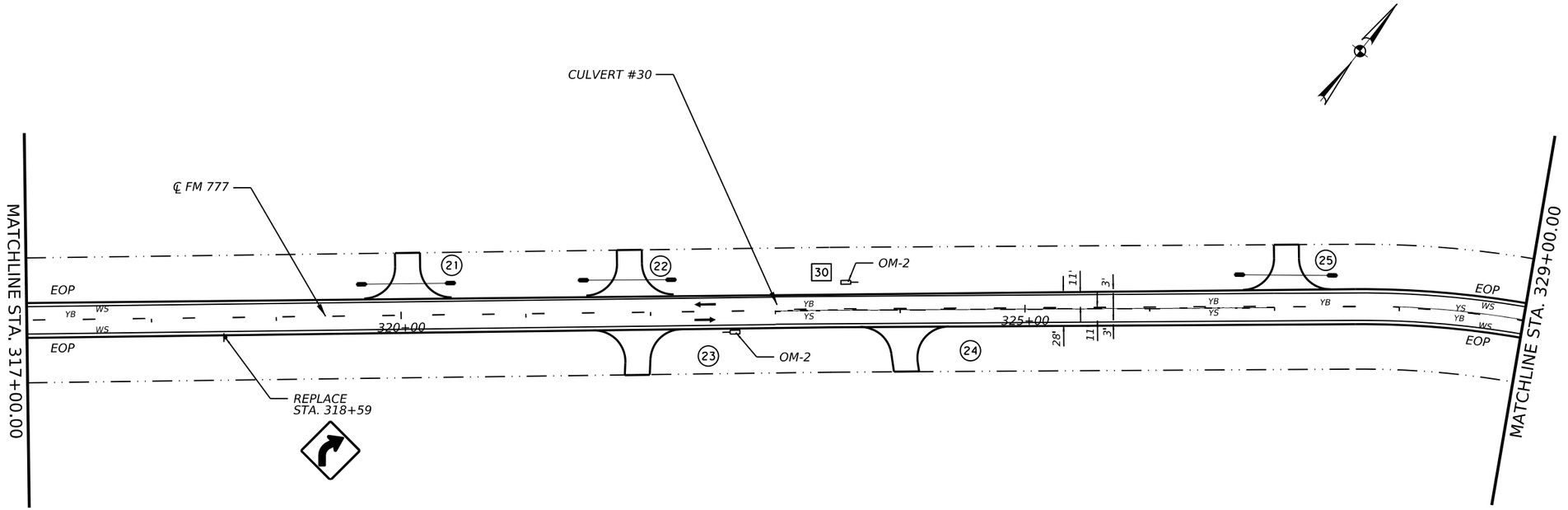

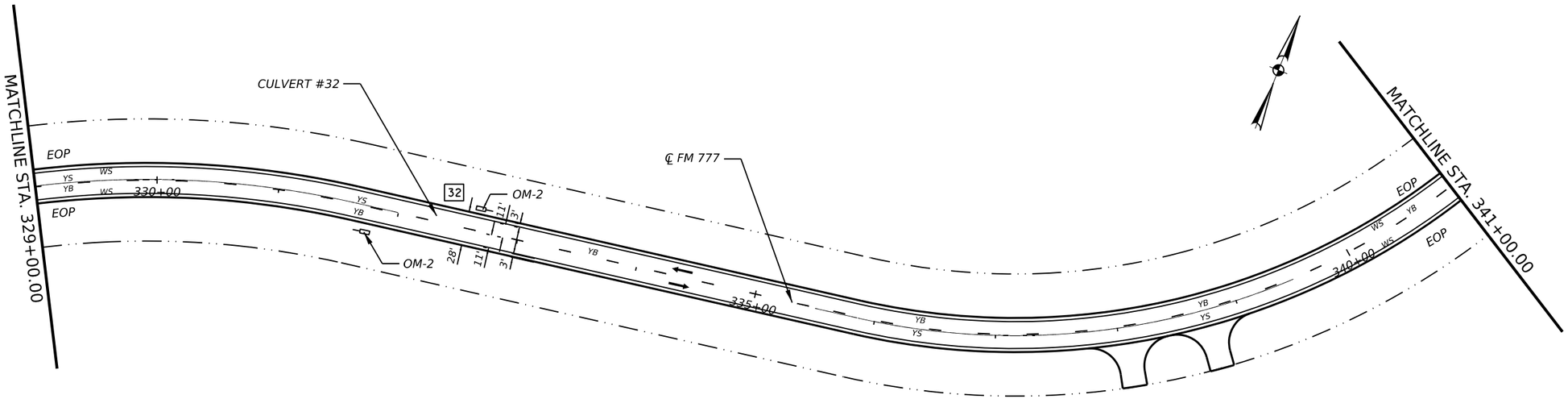

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
(#)	DRIVEWAY NUMBER
[#]	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 317+00 TO STA 341+00

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		184

DATE: 1/30/2024 3:20:26 PM
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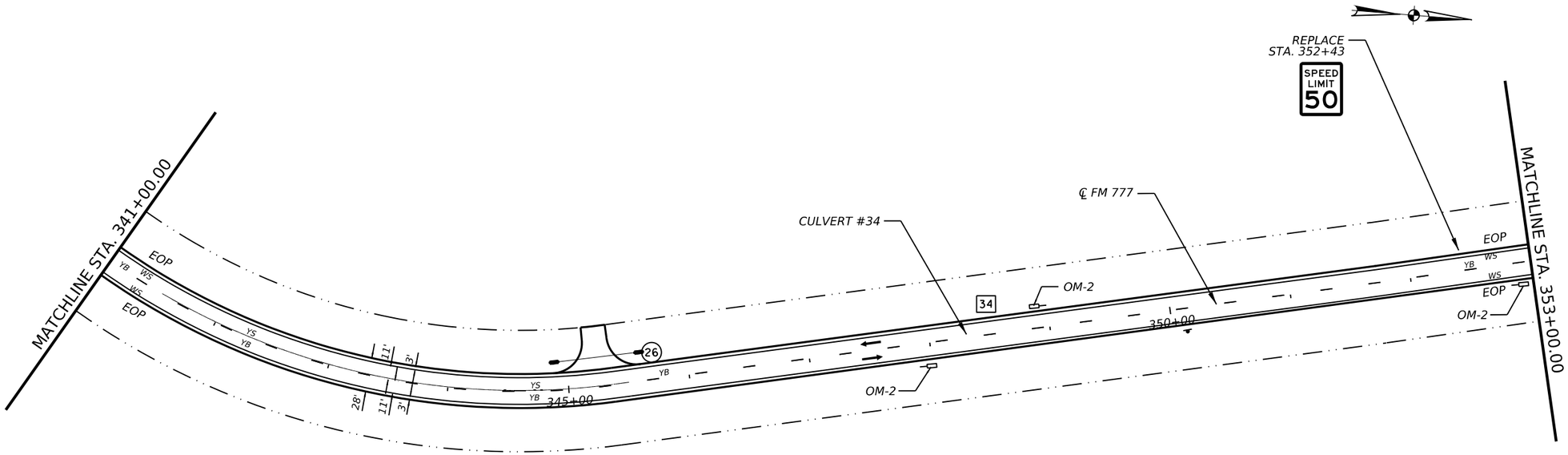
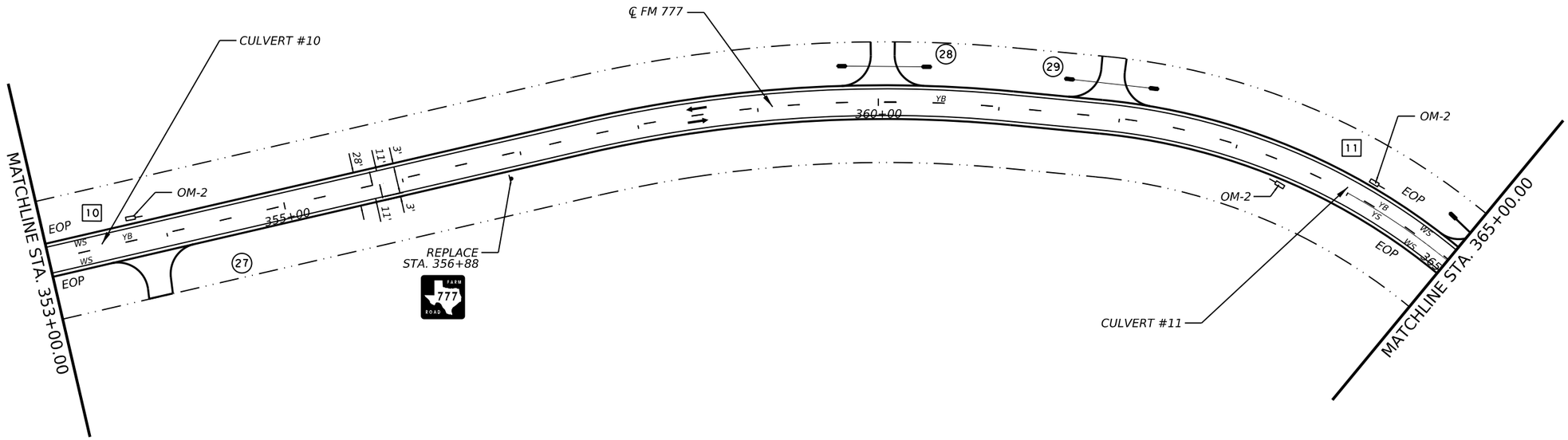
CK:
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION





0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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PROFESSIONAL ENGINEER

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 341+00 TO STA 365+00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		185

DATE: 1/30/2024 3:20:32 PM
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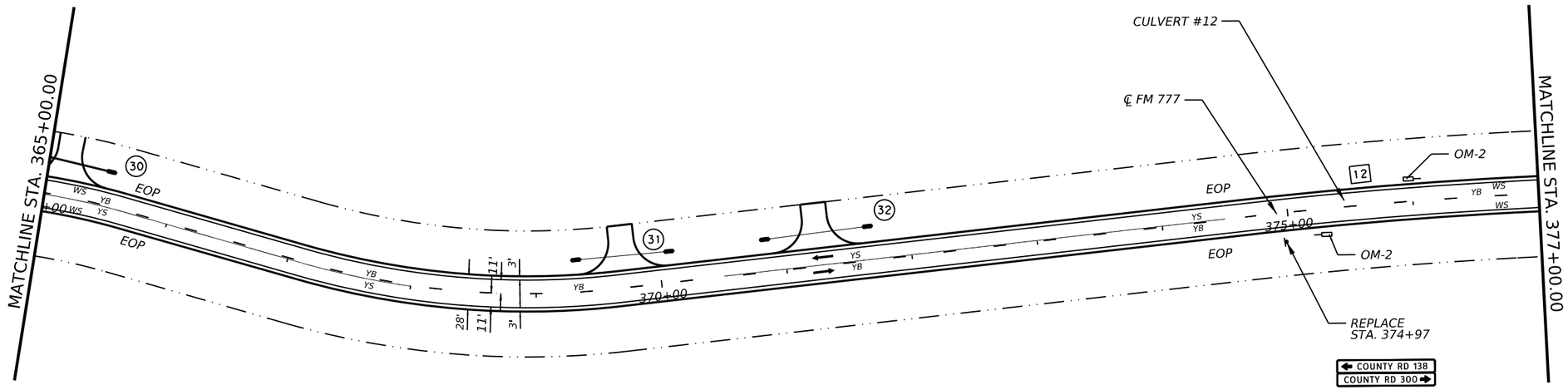
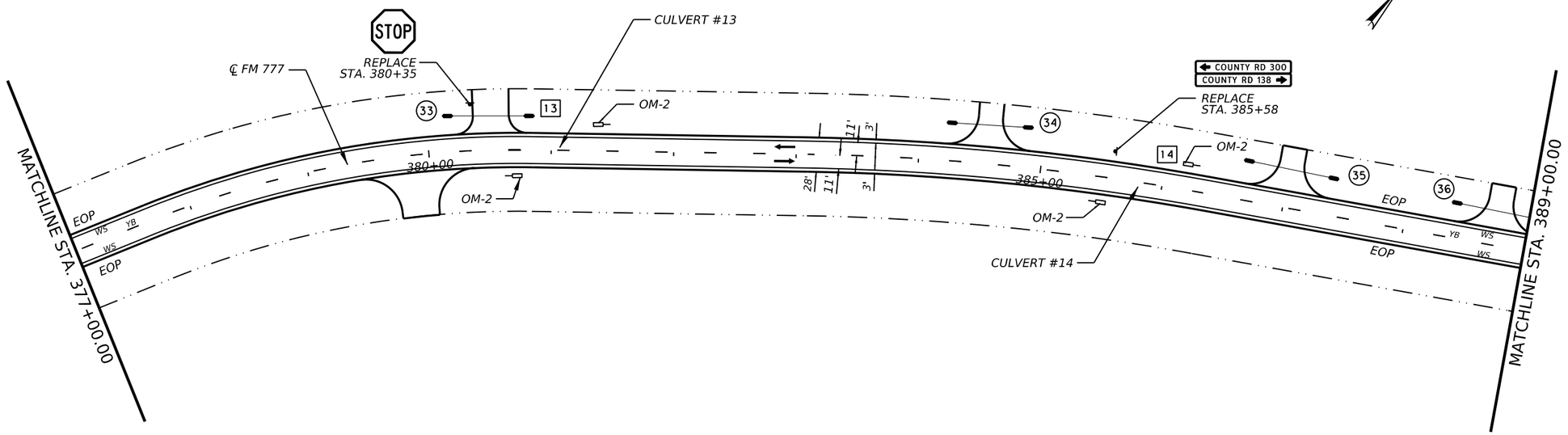
CK:
DW:
CK:
DW:

LEGEND:

→	TRAFFIC DIRECTION
EOP	PROP EDGE OF PAVEMENT
– —	EXISTING EOP
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
8WS	8" WHITE SOLID
24WS	24" WHITE SOLID





0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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PROFESSIONAL ENGINEER

01.30.24

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 365+00 TO STA 389+00

SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		186

DATE: 1/30/2024 3:20:37 PM
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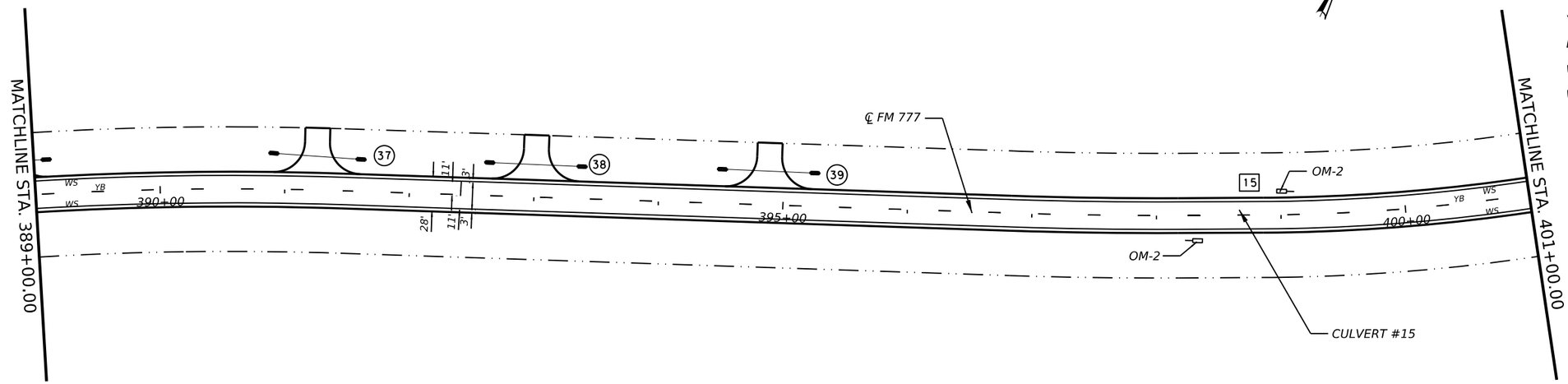
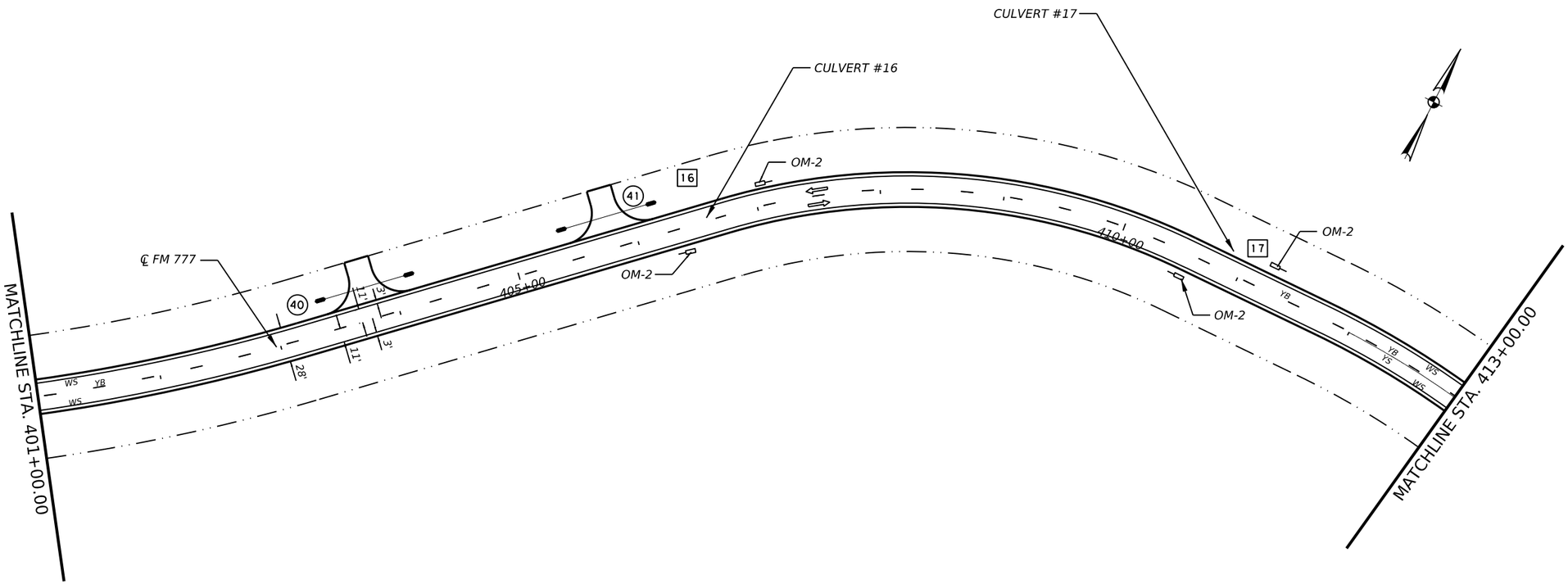
CK:
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION





0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 389+00 TO STA 413+00

SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		187

DATE: 1/30/2024 3:20:41 PM
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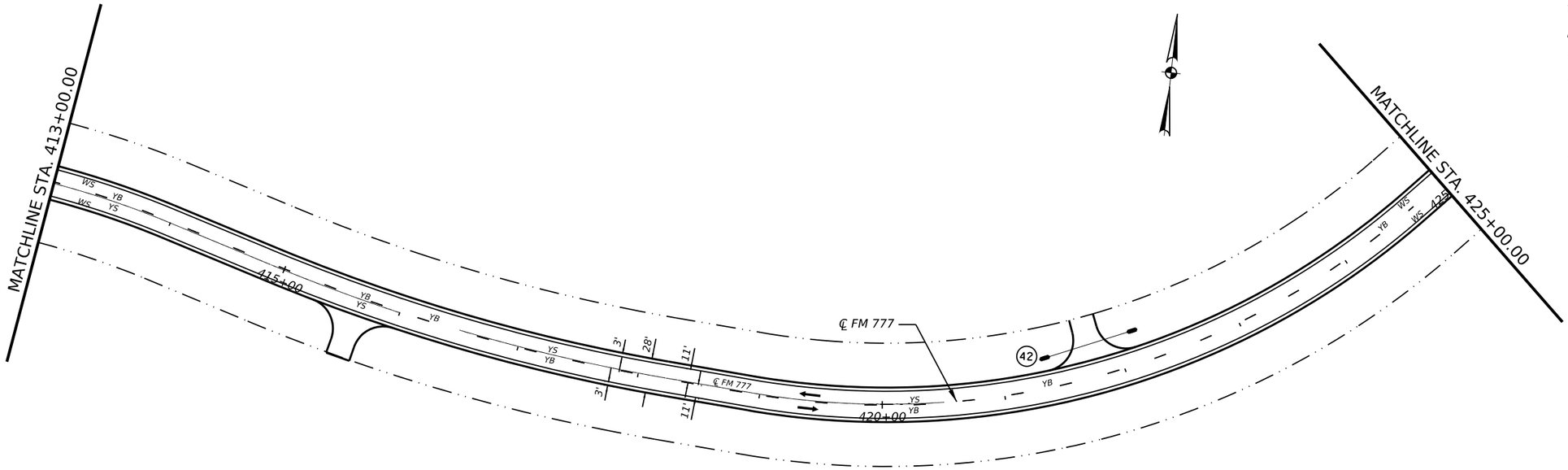
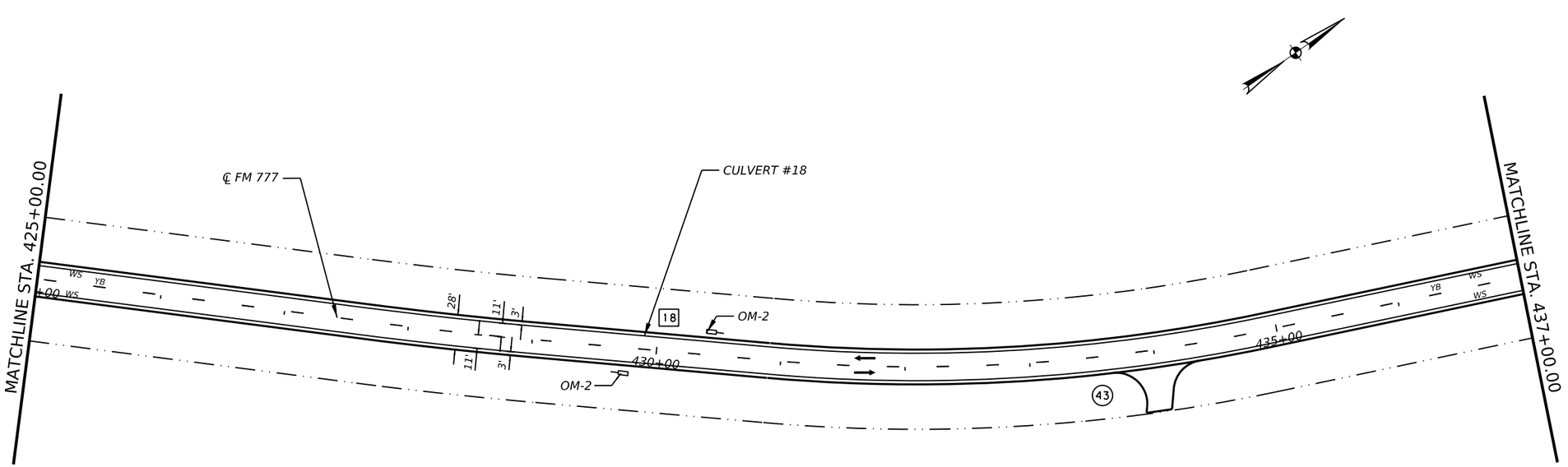
CK:
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION





0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
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PAVEMENT MARKINGS & SIGN LAYOUTS
STA 413+00 TO STA 437+00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		188

DATE: 1/30/2024 3:20:45 PM
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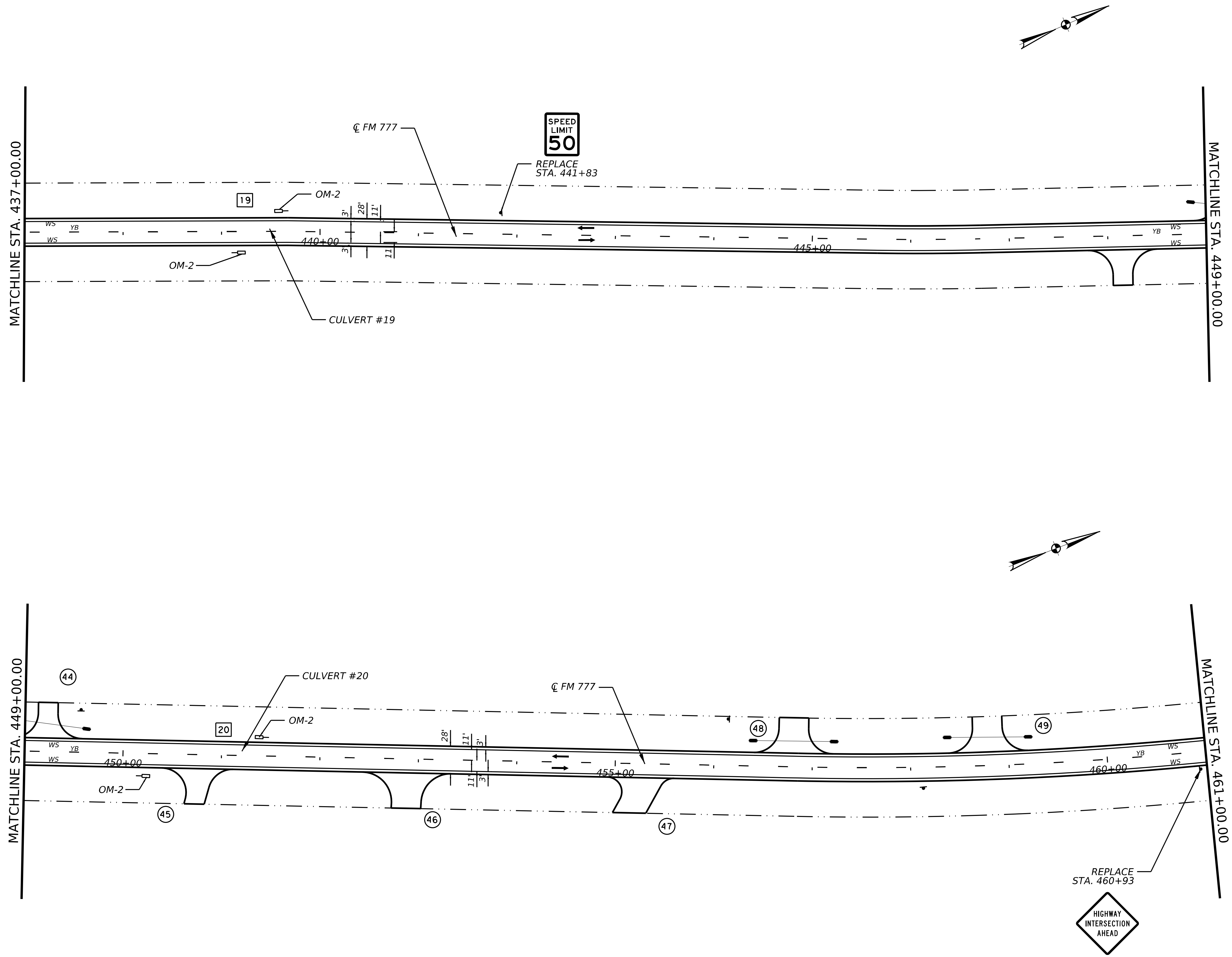

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
—	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
(#)	DRIVEWAY NUMBER
[#]	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

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FM 777
PAVEMENT MARKINGS & SIGN LAYOUTS
STA 437+00 TO STA 461+00

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		189

DATE: 1/30/2024 3:20:49 PM
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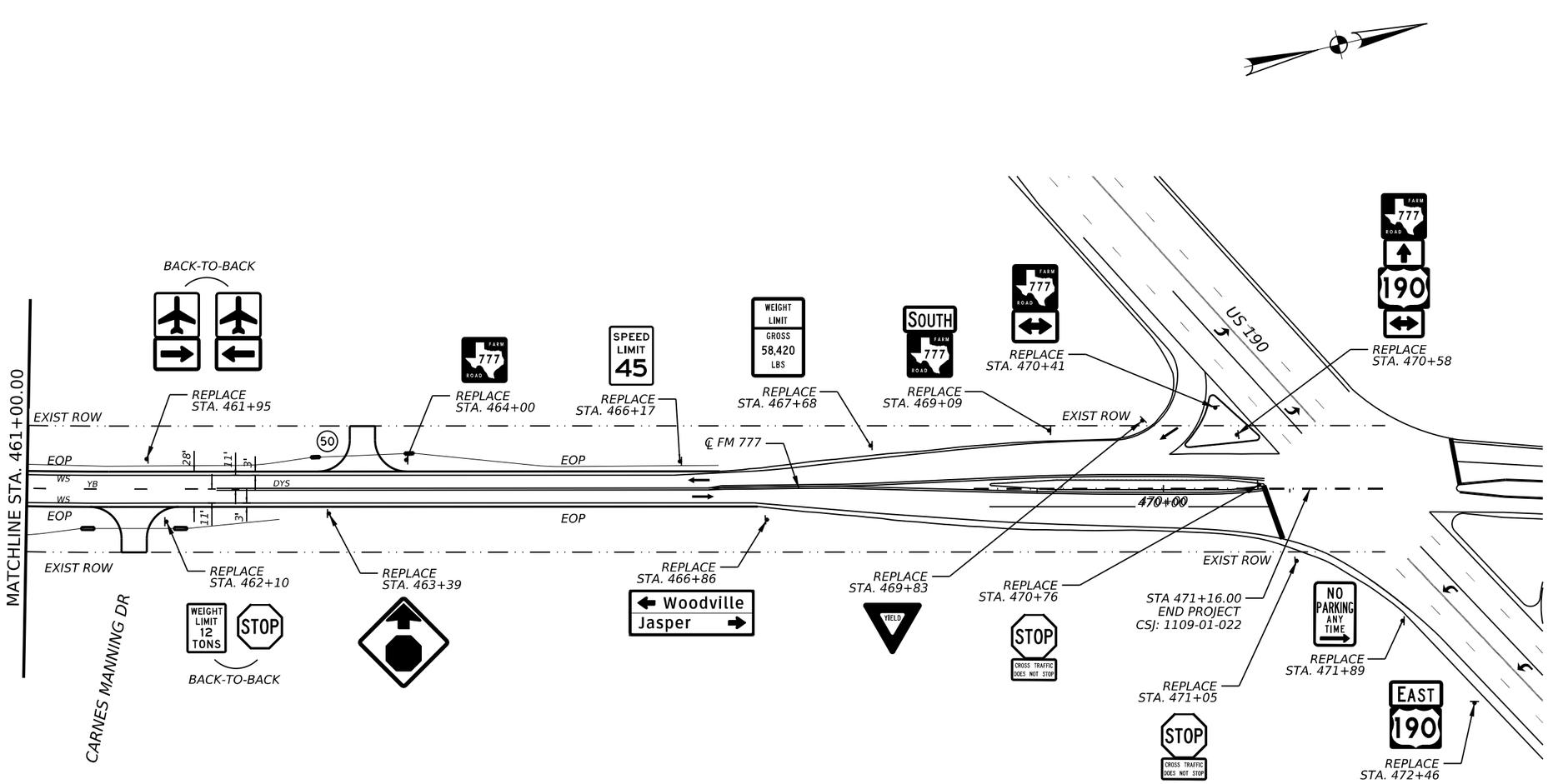
CK:
DW:
CK:
DW:

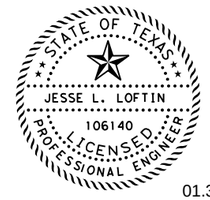
LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
——	EXISTING EOP
YS	6" YELLOW SOLID
YB	6" YELLOW BROKEN
DYS	6" DOUBLE YELLOW SOLID
WS	6" WHITE SOLID
WB	6" WHITE BROKEN
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
←	TRAFFIC DIRECTION



0' 50' 100'

SCALE: 1"= 100'



01.30.24

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FRN - F-14256

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FM 777
PAVEMENT MARKING & SIGN LAYOUTS
STA 461+00 to END

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		190

DATE: 1/30/2024 3:20:54 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha varshneyldms871241022_SPM_12.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type

- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

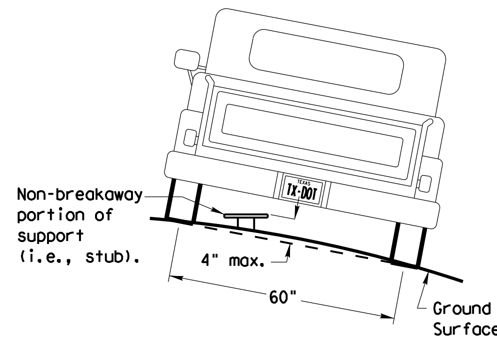
Sign Mounting Designation

- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

IF REQUIRED

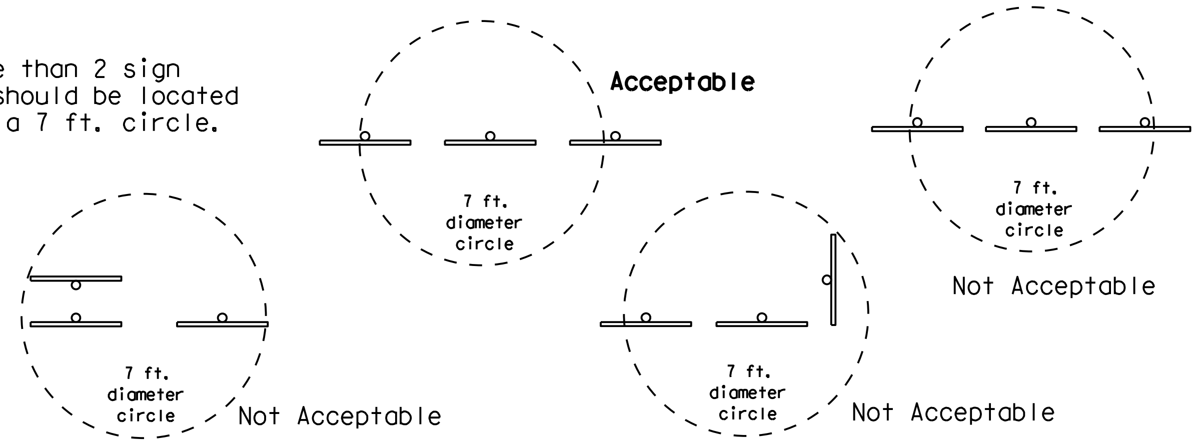
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



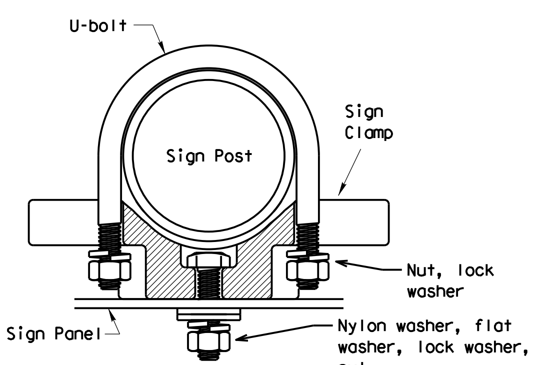
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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

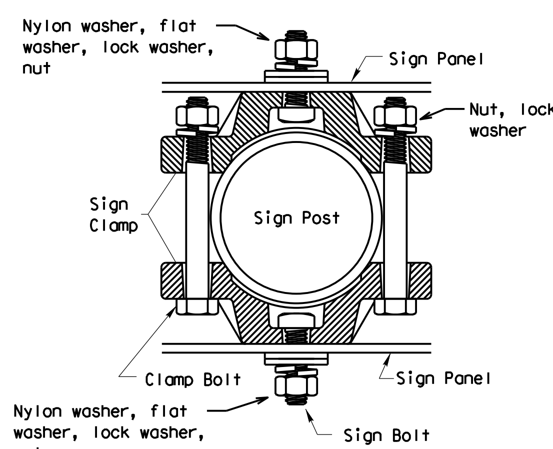


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back 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.

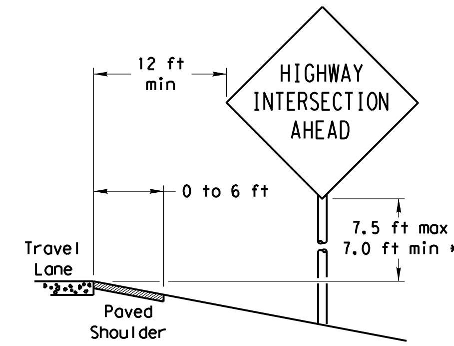
When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

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"

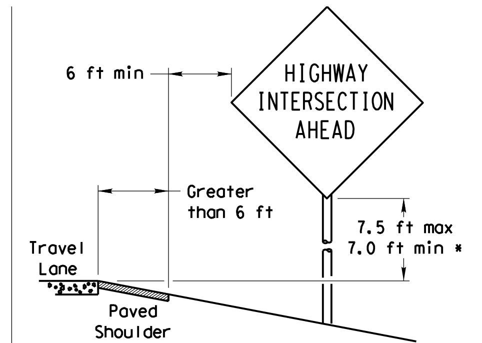
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

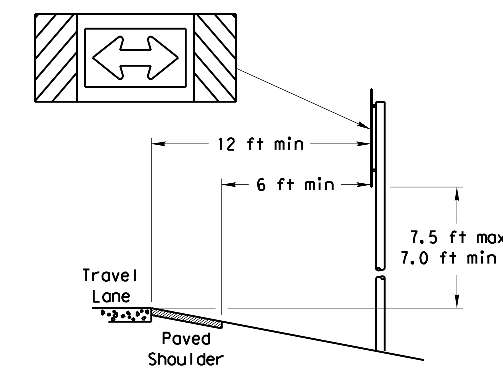
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



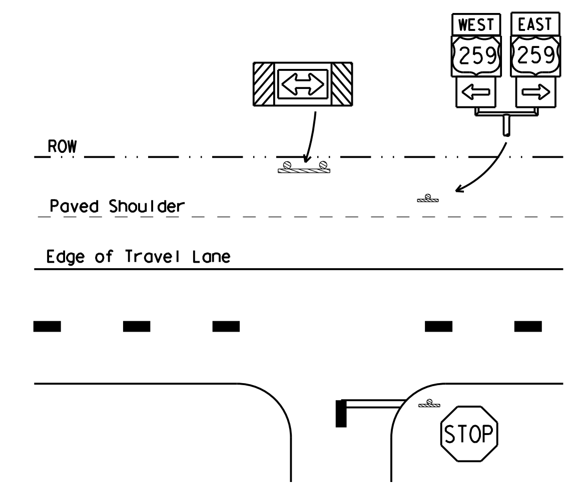
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

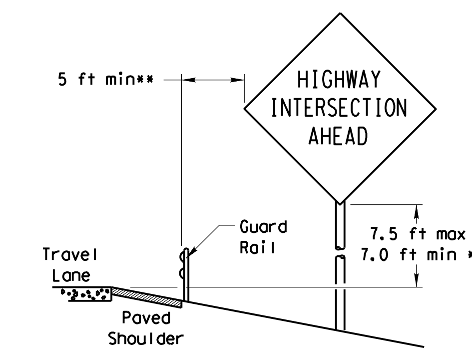
T-INTERSECTION



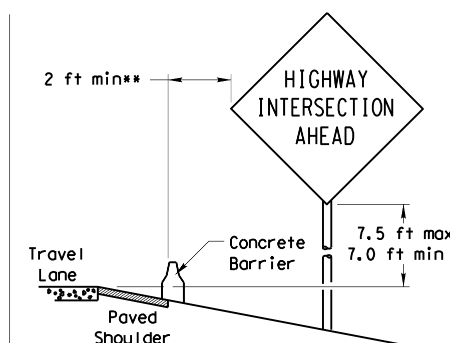
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

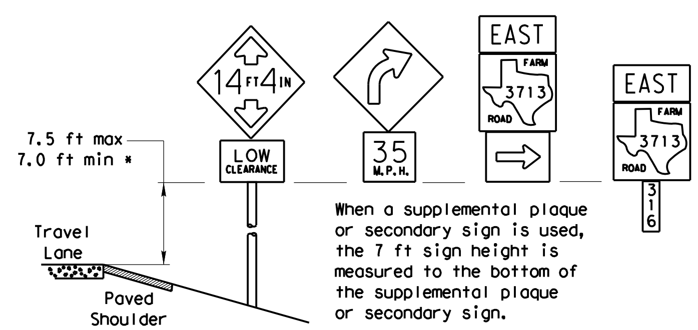
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

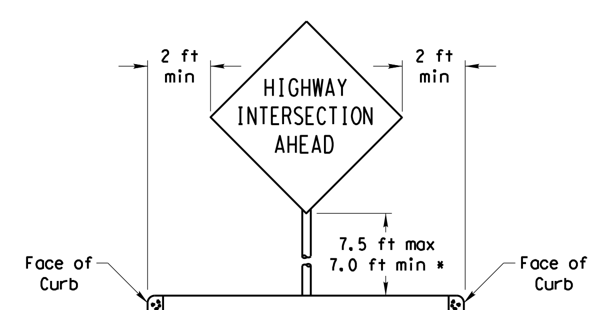
The website address is:
http://www.txdot.gov/publications/traffic.htm

SIGNS WITH PLAQUES



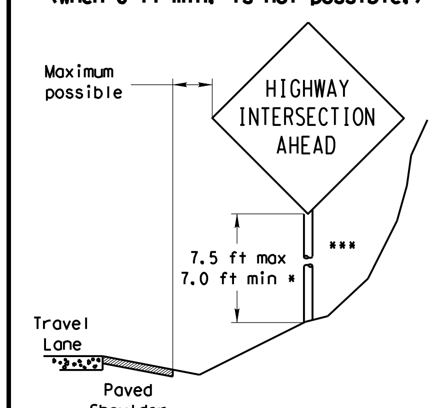
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

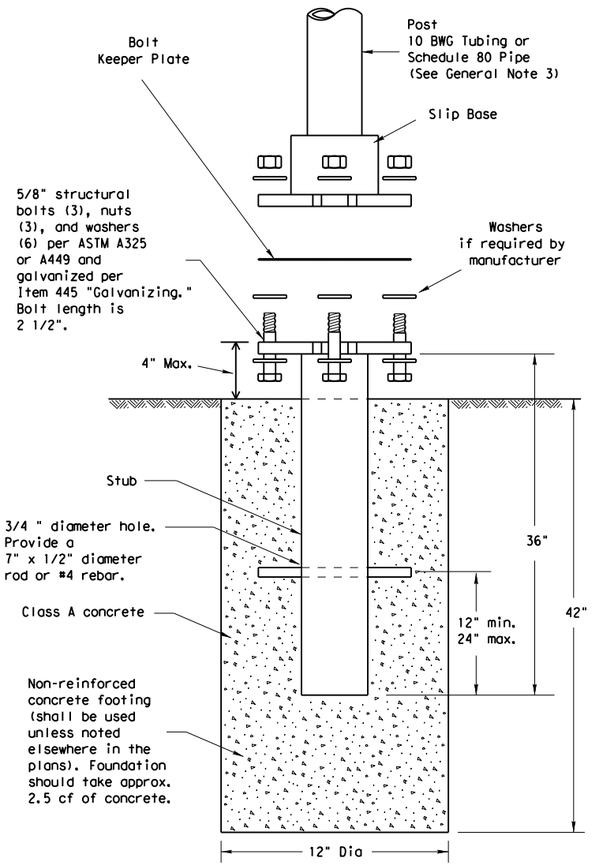
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	1109	01	026, ETC	FM 777
	DIST		COUNTY	SHEET NO.
	BMT		JASPER	191

26A

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.

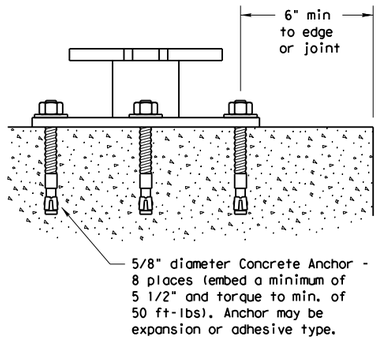
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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
1109	01	026, ETC	FM 777

DIST	COUNTY	SHEET NO.
BMT	JASPER	192

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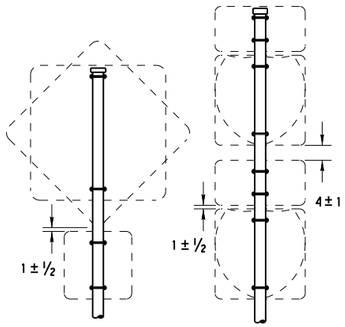
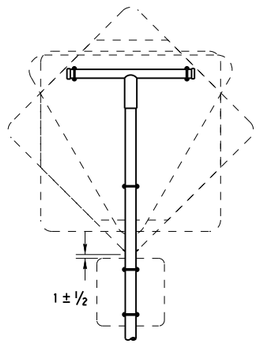
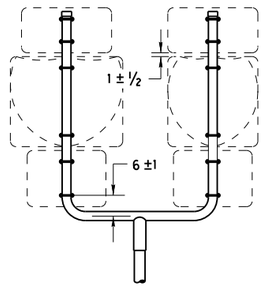


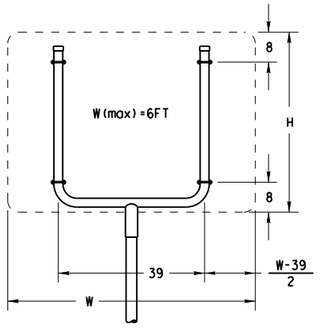
SM RD SGN ASSM TY XXXXX(1)XX(P)



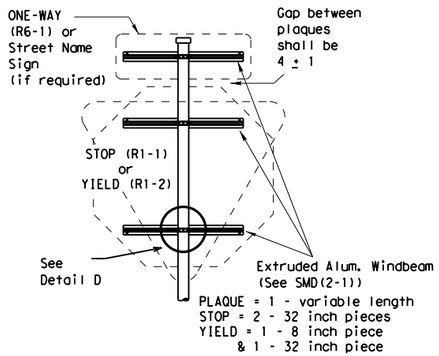
SM RD SGN ASSM TY XXXXX(1)XX(T)



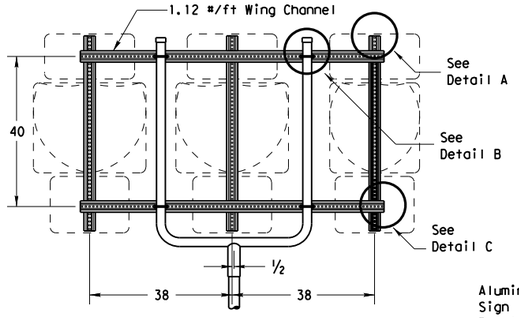
SM RD SGN ASSM TY XXXXX(1)XX(U)



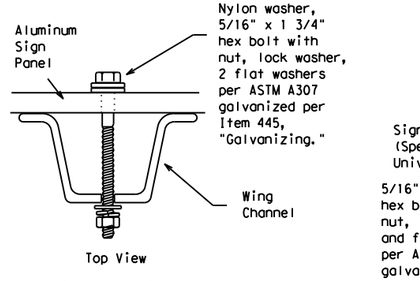
SM RD SGN ASSM TY XXXXX(1)XX(U)



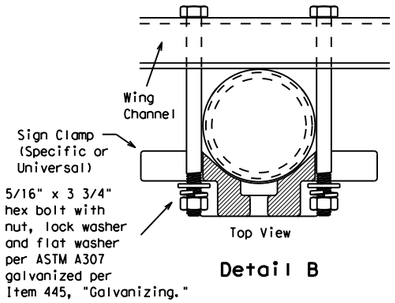
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



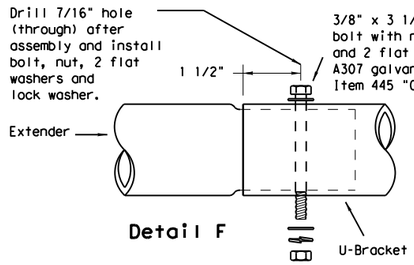
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

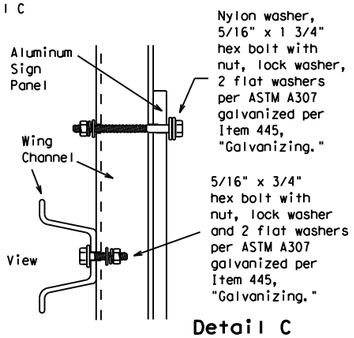


Detail B

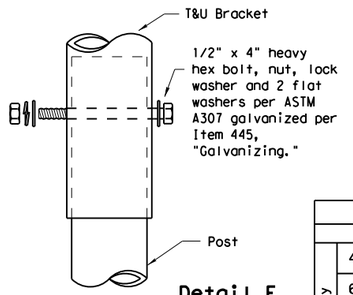


Detail F

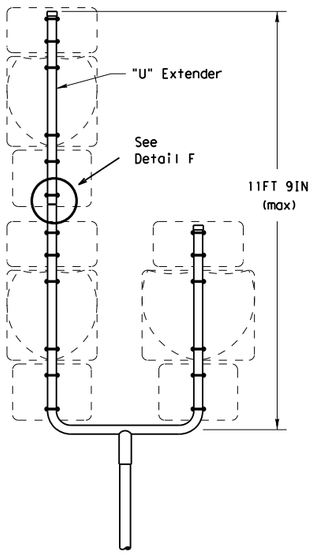
Splices shall only be allowed behind the sign substrate.



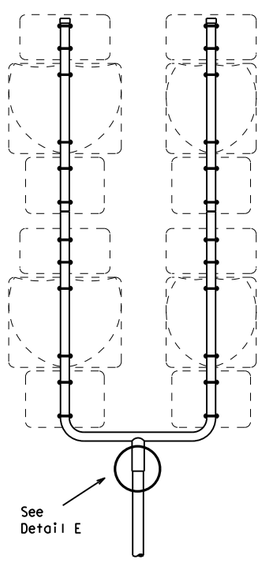
Detail C



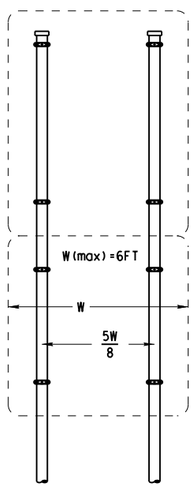
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

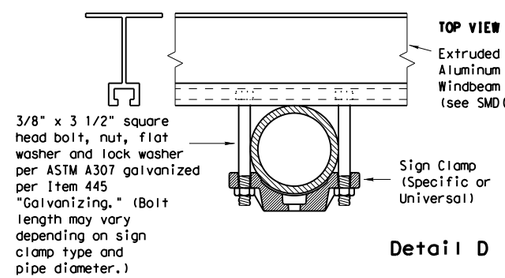


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

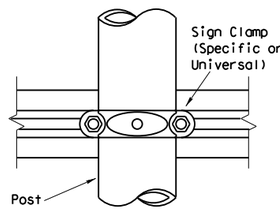


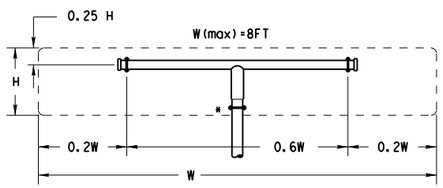
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

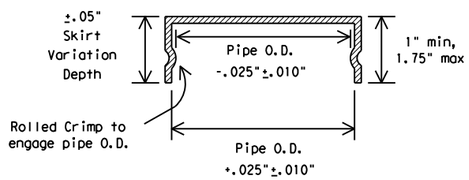




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		193

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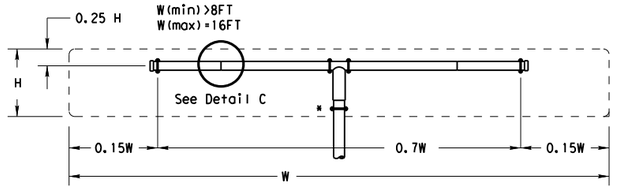
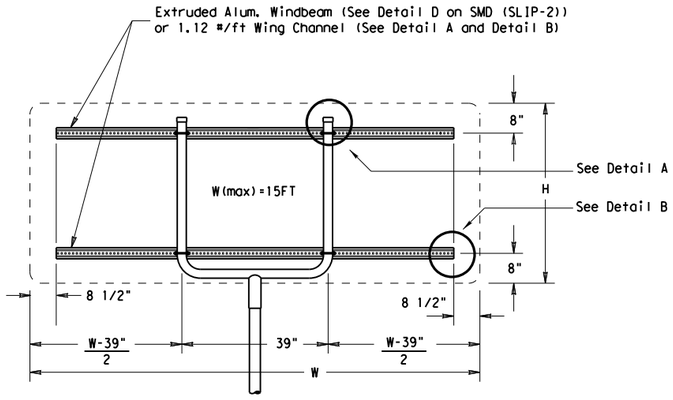
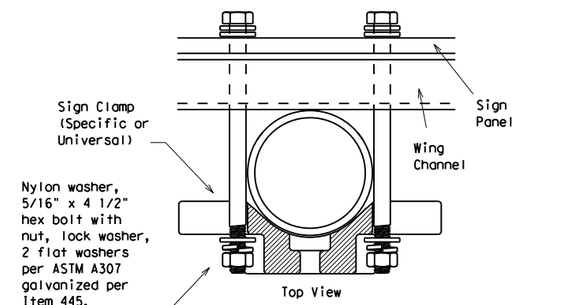


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

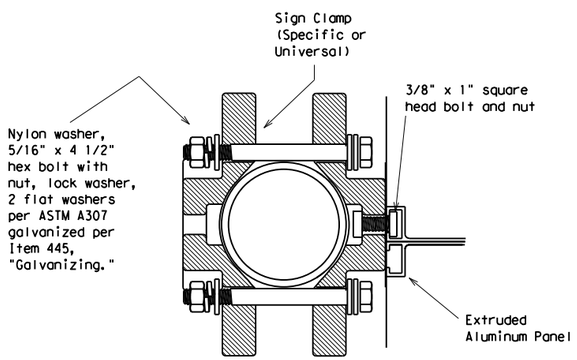
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

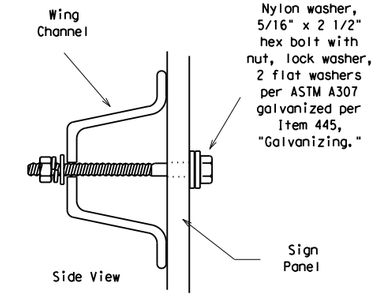


Detail A

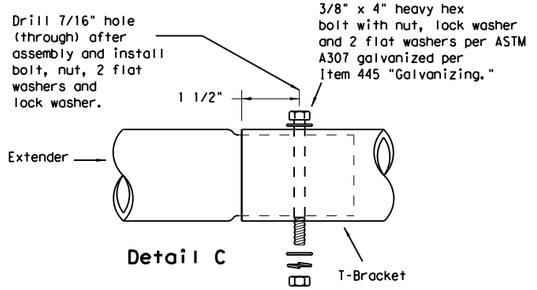


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

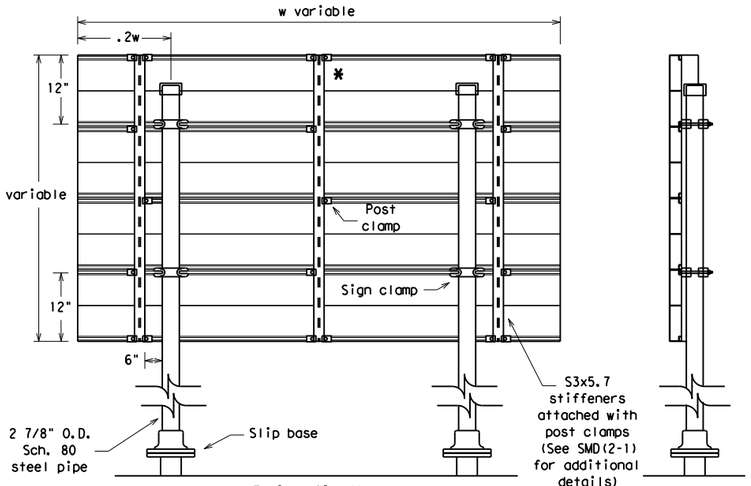


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

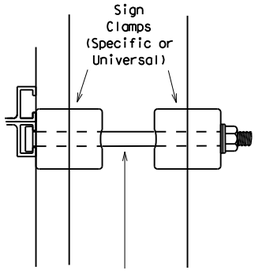


Typical Sign Mount

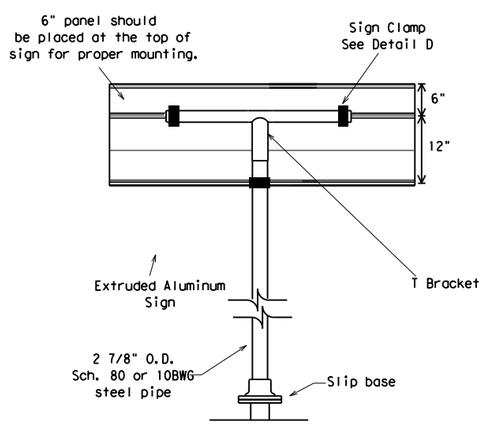
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

✱ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

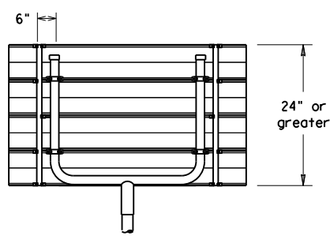
See Detail E
for clamp installation



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

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS

9-08

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

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777

DIST	COUNTY	SHEET NO.
BMT	JASPER	194

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DATE: 1/30/2024 3:21:34 PM
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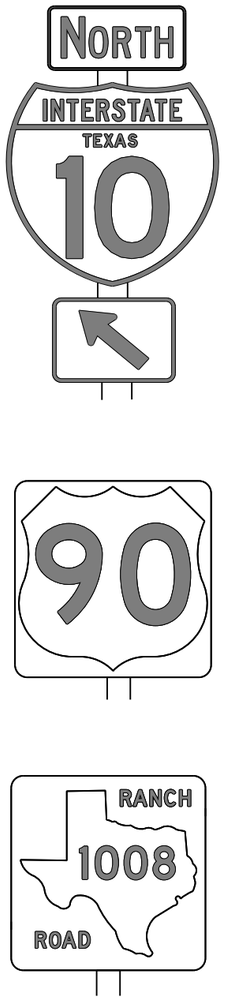
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

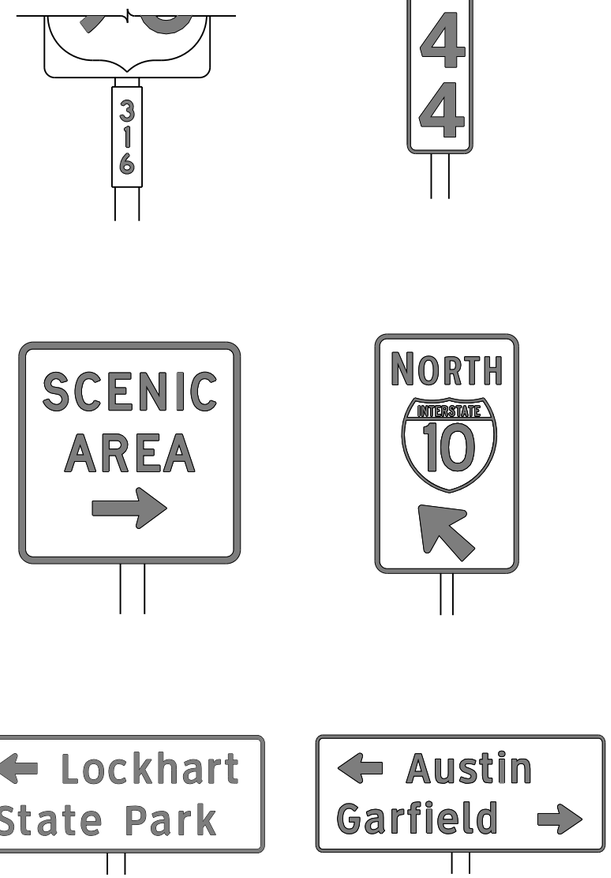
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

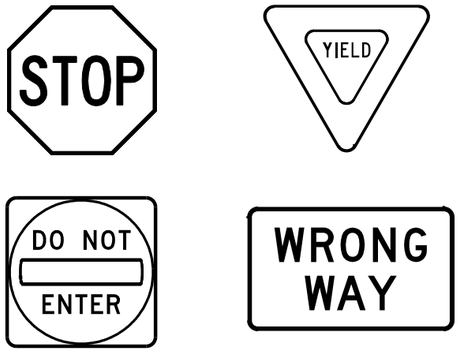
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BMT	JASPER		195

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

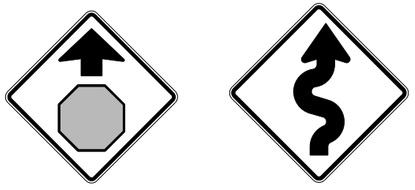
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

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
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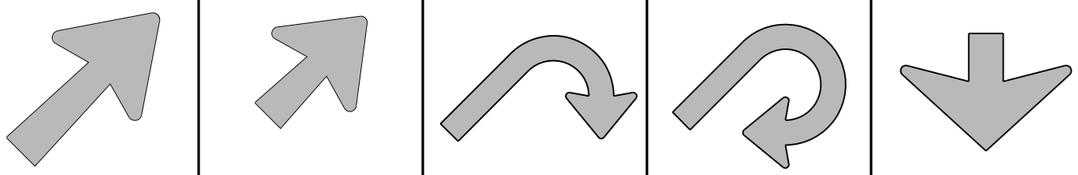
DATE: 1/30/2024 3:21:38 PM
FILE: c:\workingdir\ljo-pw.bentley.com_ljo-pw-01\alisha vorshney\dms88299\tsr4-13.dgn

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

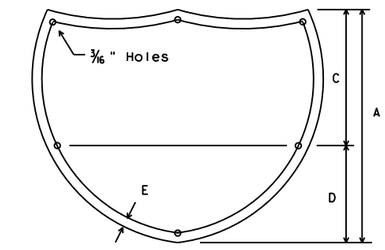
NOTE

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.

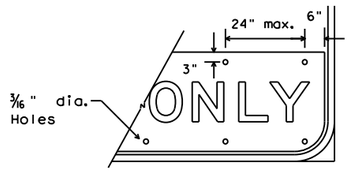
http://www.txdot.gov/

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

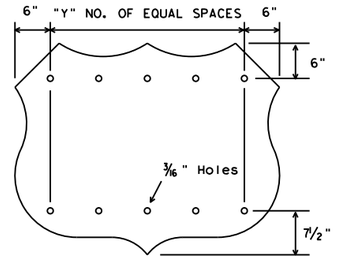


INTERSTATE ROUTE MARKERS

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

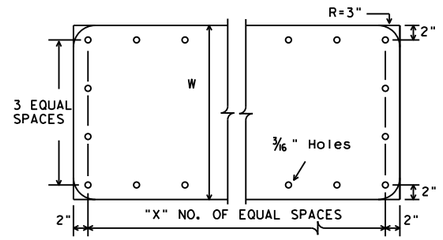


EXIT ONLY PANEL



U.S. ROUTE MARKERS

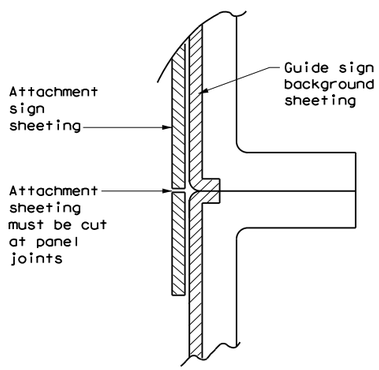
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



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

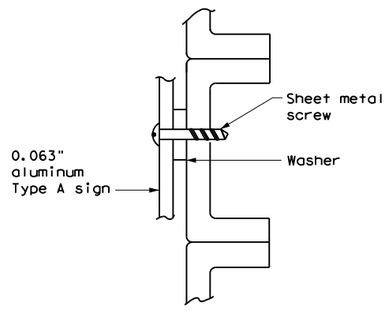
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



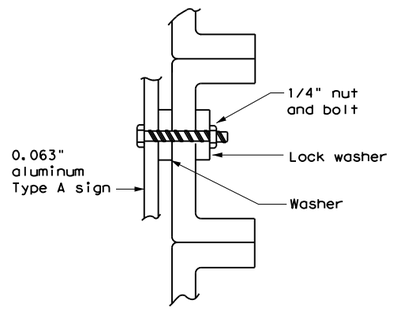
DIRECT APPLIED ATTACHMENT

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



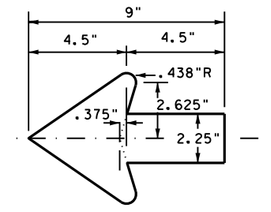
NUT/BOLT ATTACHMENT

NOTE:

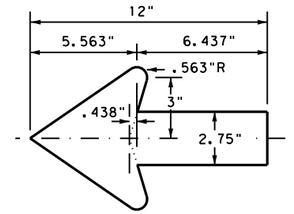
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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
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12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BMT	JASPER		197

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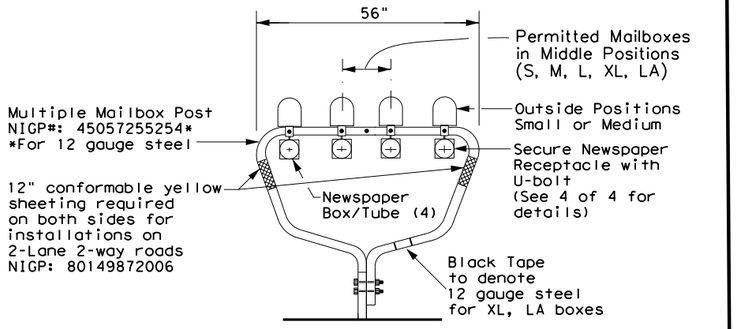
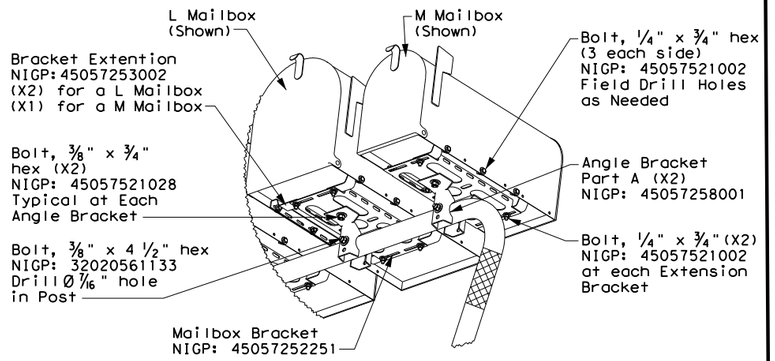
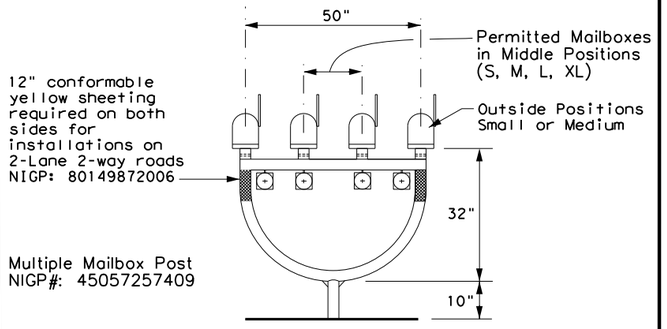
DATE: 1/30/2024 3:21:45 PM
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\alisha.varshney\dms88299\mb-21(1).dgn

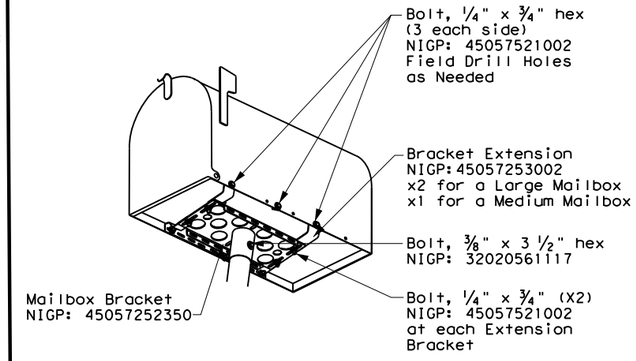
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

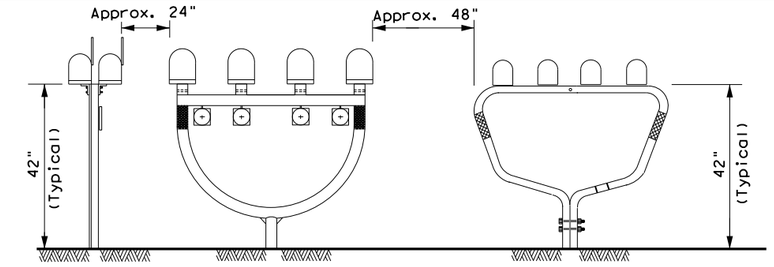
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

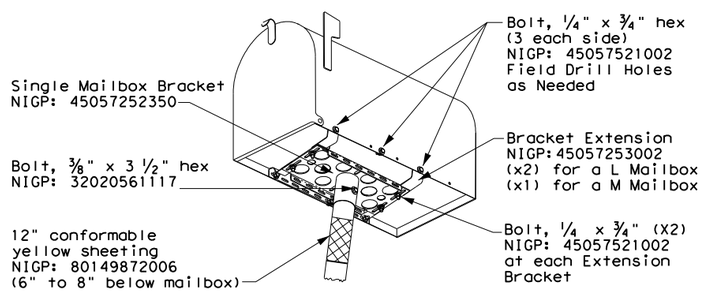
TYPICAL INSTALLATION MEASUREMENTS

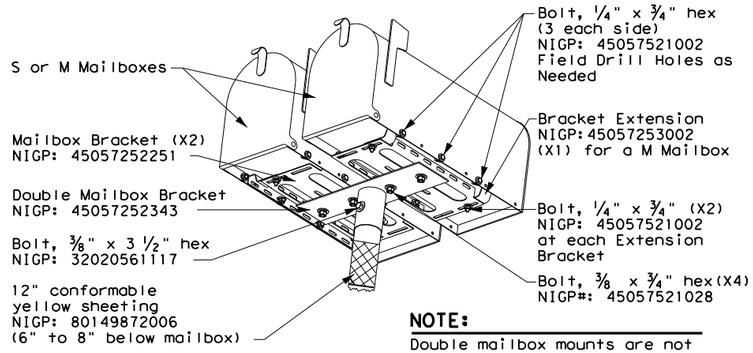


NOTE:

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

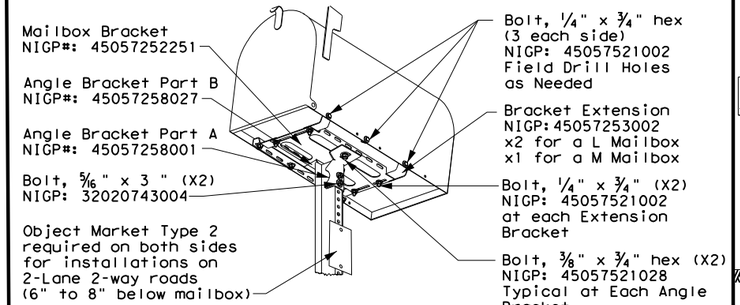


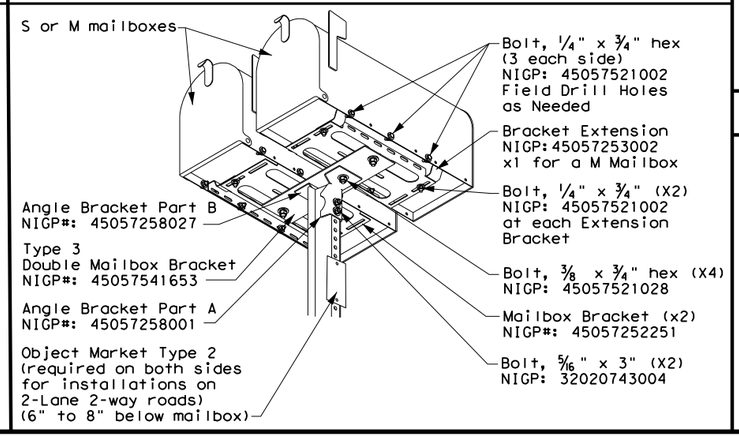


NOTE:

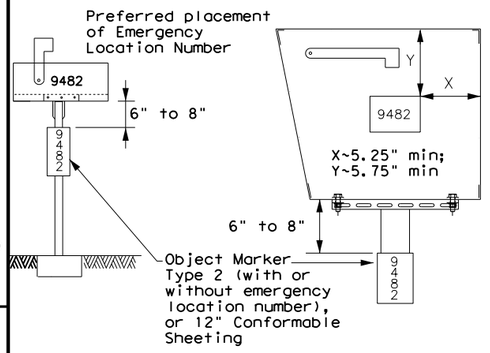
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

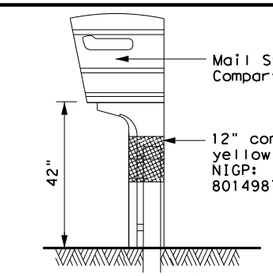


NOTES:

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
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REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		198

DATE: 1/30/2024 3:21:45 PM
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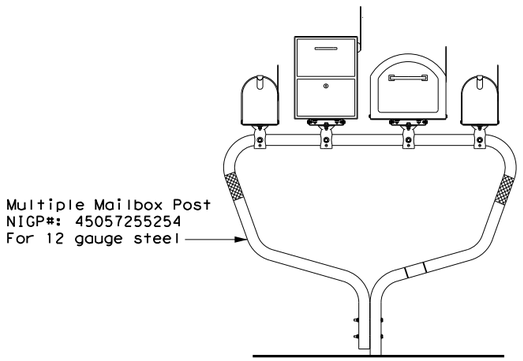
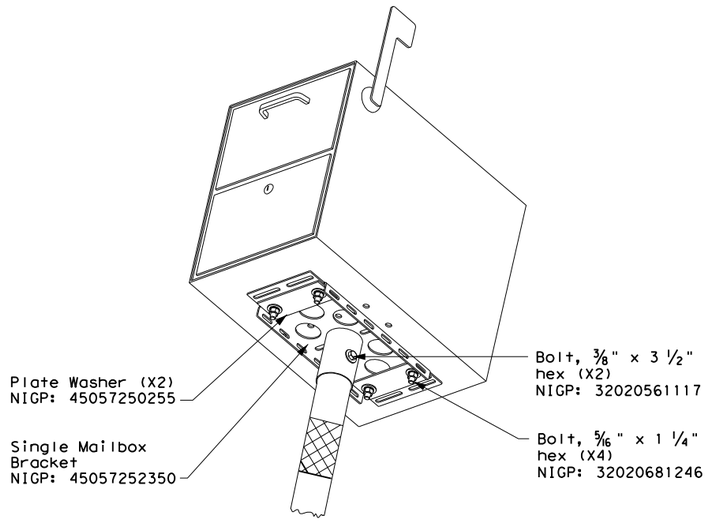
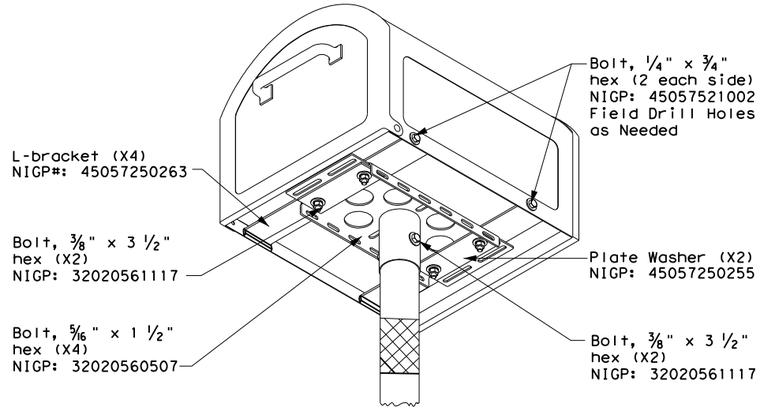
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

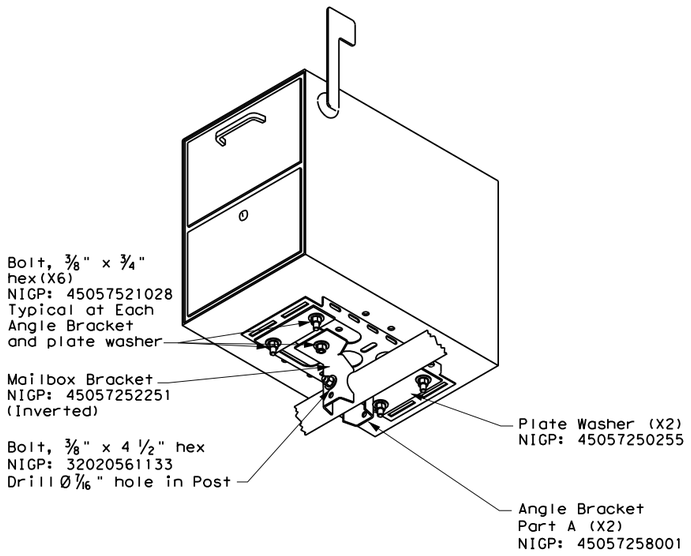


TYPE 2/4 - SINGLE XL MAILBOX

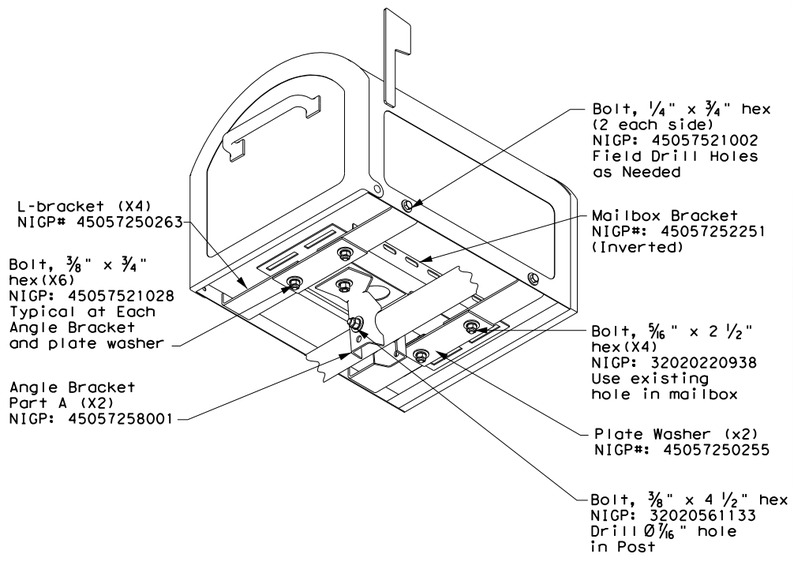


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

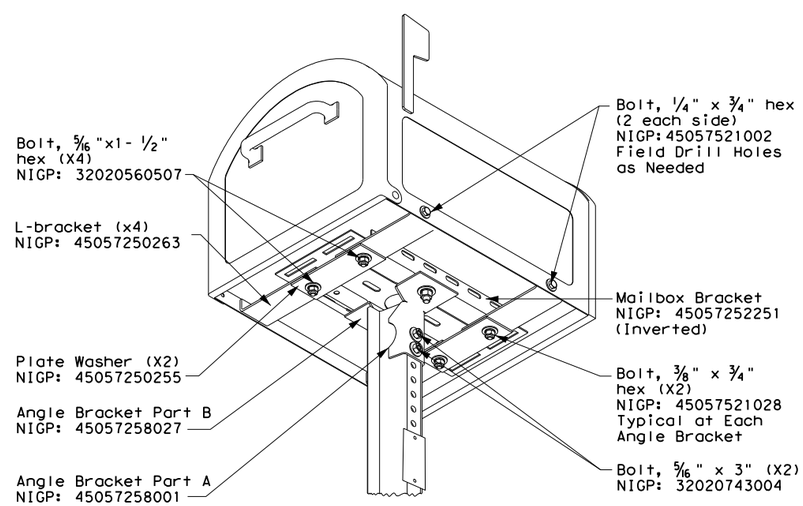
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



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
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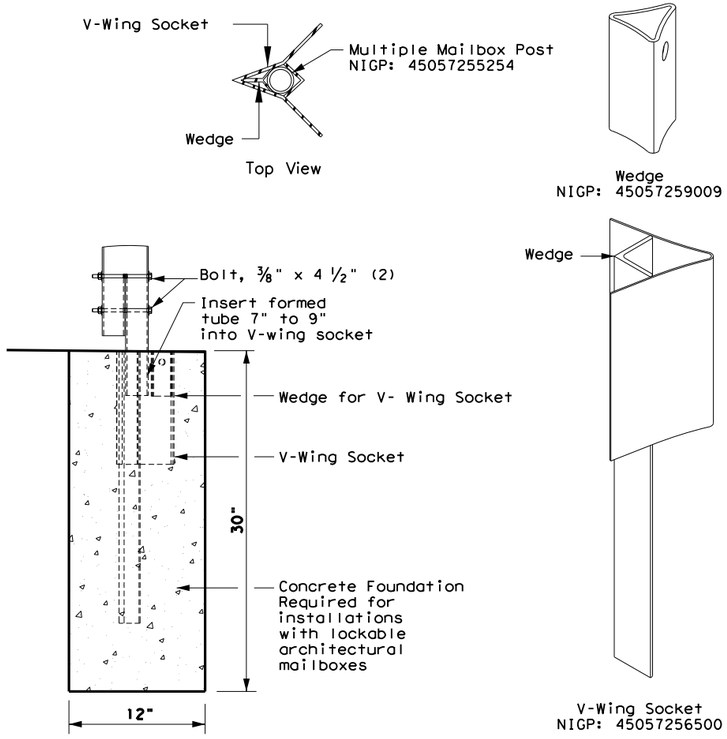
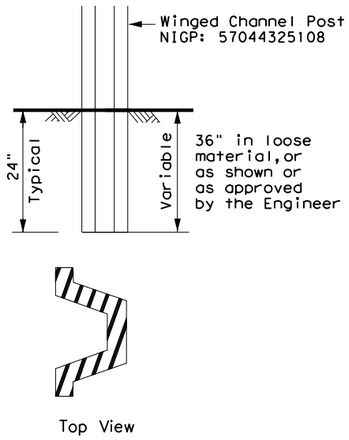
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		199

DATE: 1/30/2024 3:21:46 PM
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\alisha.varshney\dms88299\mb-21(1).dgn

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

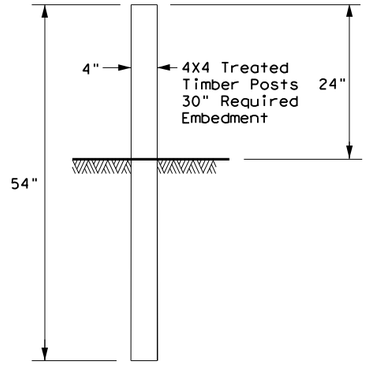


TYPE 3 - SUPPORT/FOUNDATION

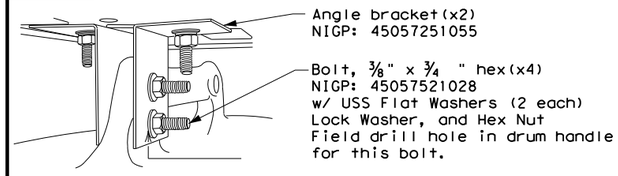


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

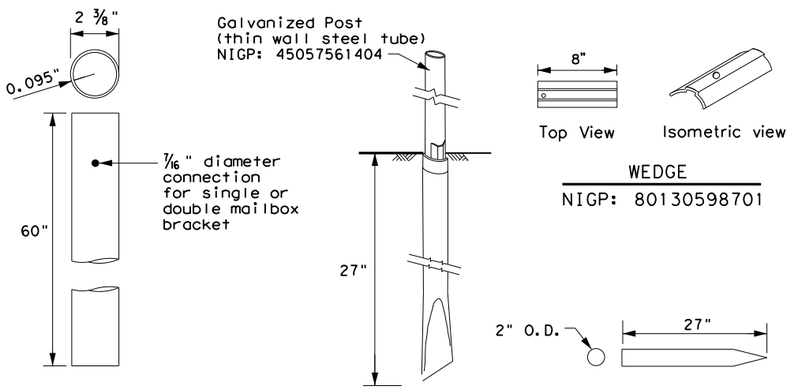


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

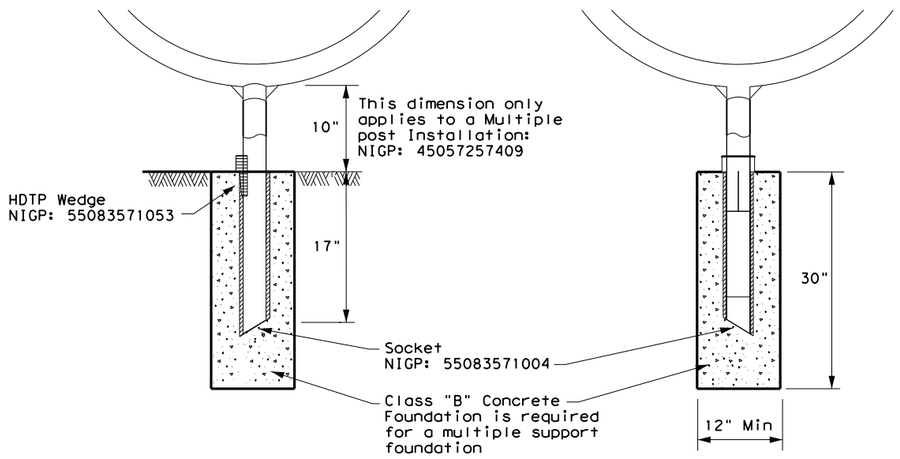
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



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

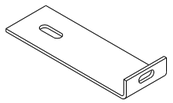
Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

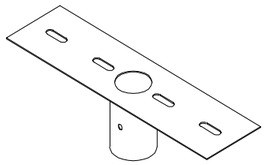
MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		200

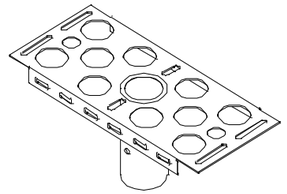
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



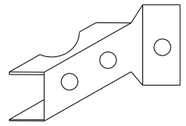
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



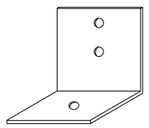
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



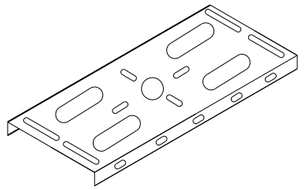
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



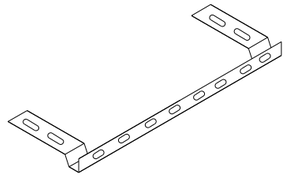
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



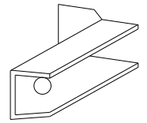
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



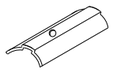
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



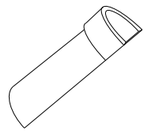
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



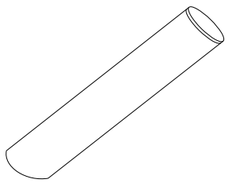
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

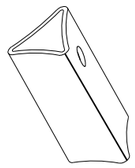


NIGP: 55083571053
Type 4 Mailbox Wedge

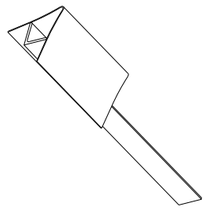


NIGP: 55083571004
Type 4 Mailbox Socket

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

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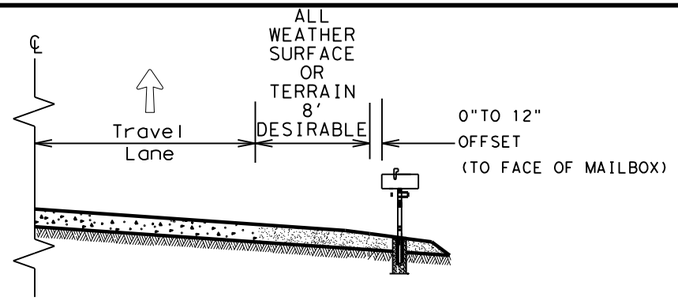
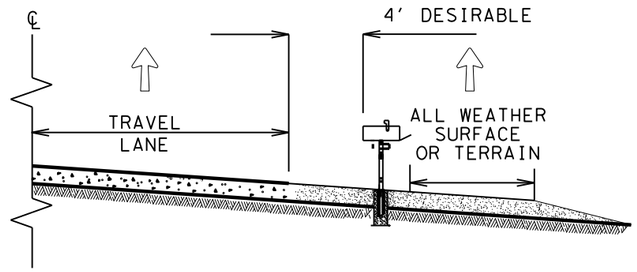
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

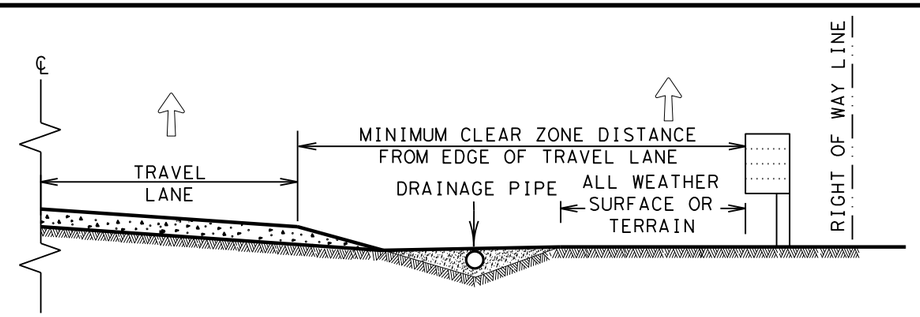
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		201



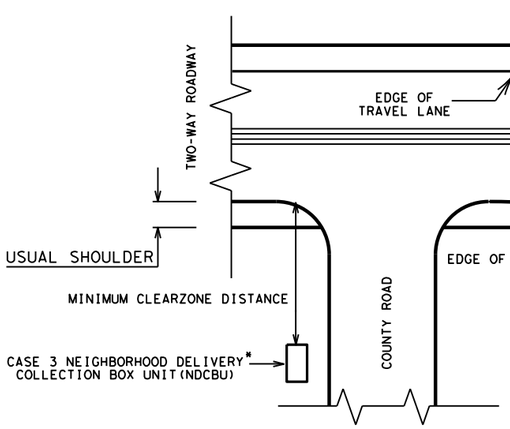
CASE 1. OFF TRAVEL WAY DELIVERY

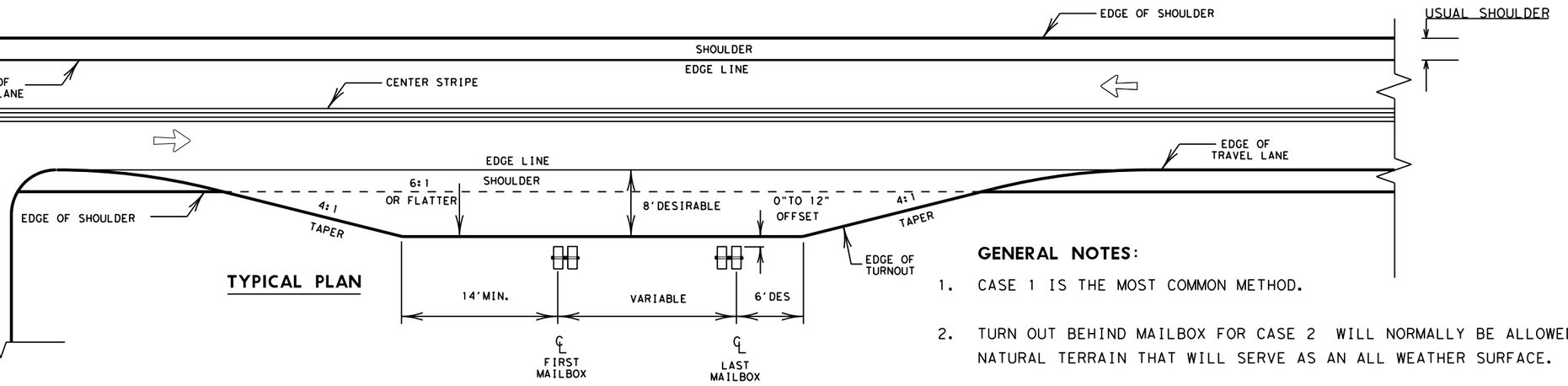


CASE 2. BACK SIDE DELIVERY

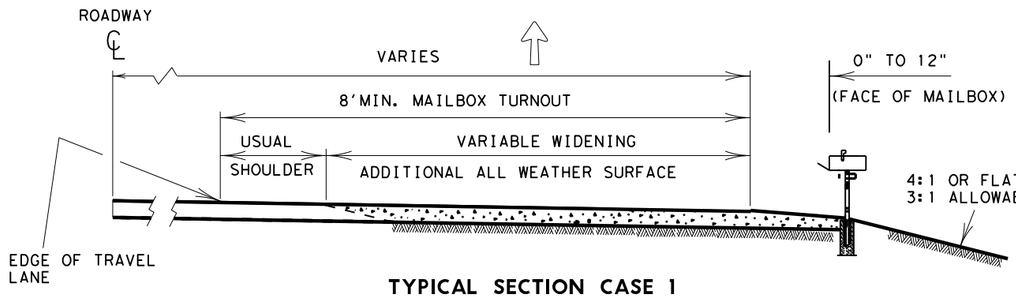


CASE 3. DELIVERY NEAR RIGHT OF WAY LINE





TYPICAL PLAN



TYPICAL SECTION CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. WHEN 3 OR MORE MULTI-RACKS ARE ANTICIPATED, THE USE OF AN NDCBU IS RECOMMENDED. ONLY RURAL PATRONS LOCATED ON STATE MAINTAINED HIGHWAYS MAY HAVE A MAILBOX OR NDCBU SLOT ON TXDOT RIGHT OF WAY.

*NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

Texas Department of Transportation | *Maintenance Division Standard*

Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS

MBP(1)-22

FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		202

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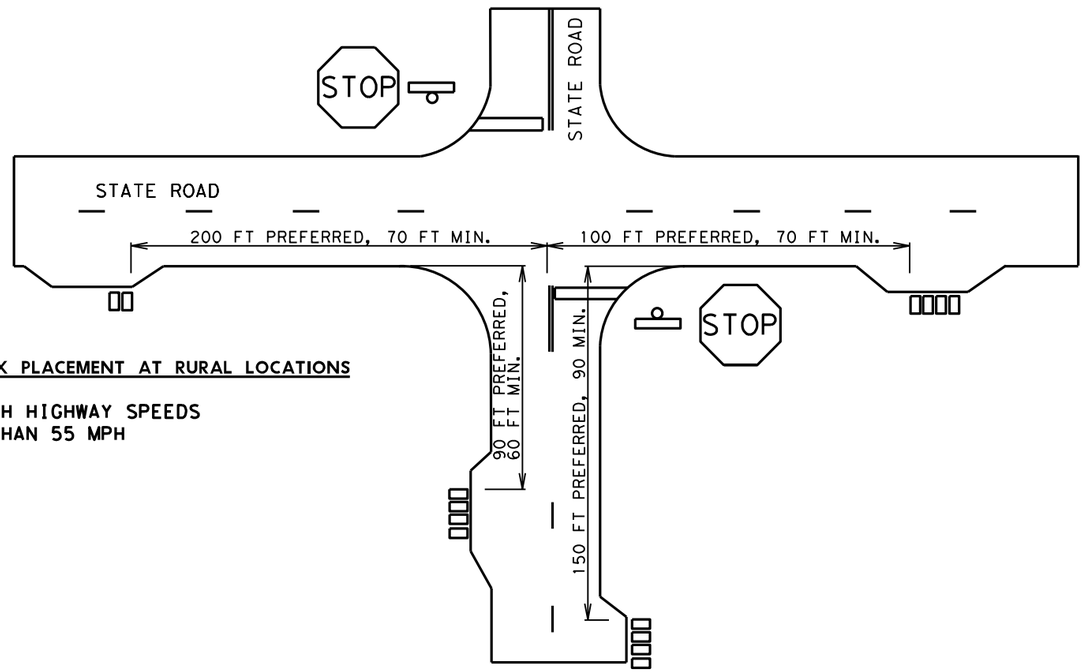
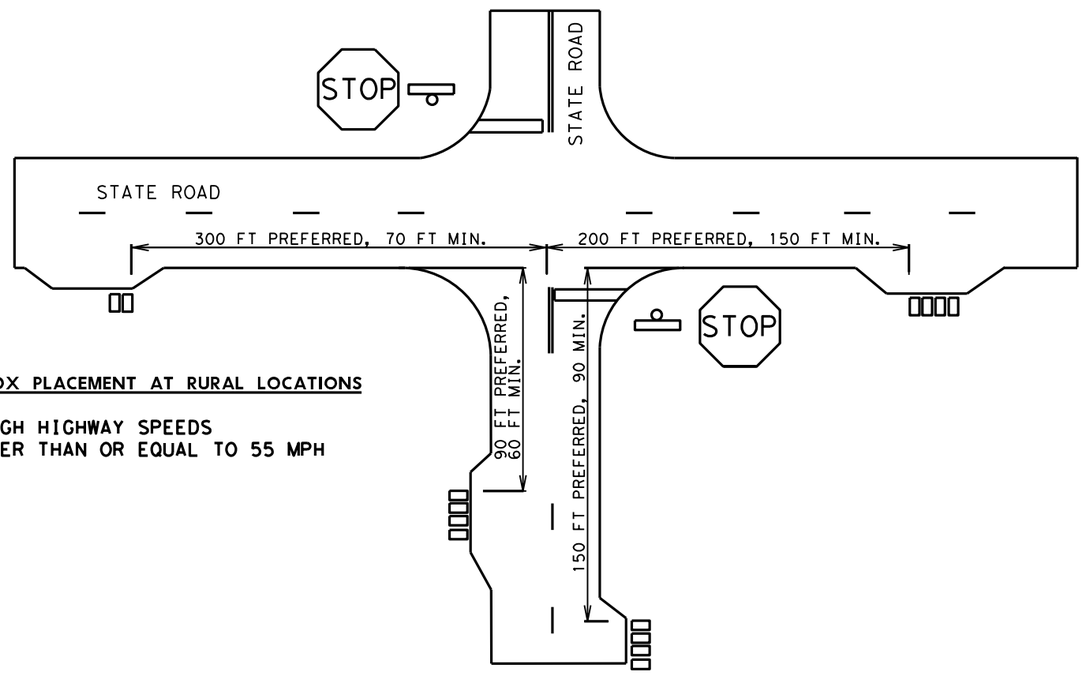


MAILBOX PLACEMENT AT RURAL LOCATIONS

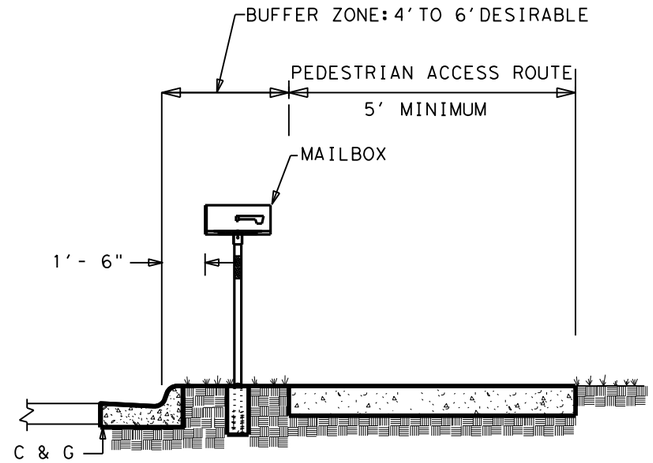
THROUGH HIGHWAY SPEEDS
LESS THAN 55 MPH



MAILBOX PLACEMENT AT RURAL LOCATIONS

THROUGH HIGHWAY SPEEDS
GREATER THAN OR EQUAL TO 55 MPH

CURB AND GUTTER MAILBOX INSTALLATION



NOTES:
1. A NON-TRAVERSABLE SURFACE MUST BE INSTALLED NEAR THE MAILBOX (NATURAL VEGETATION OR OTHER) IN THE BUFFER ZONE. ALTERNATIVELY, A BASE WITH A MINIMUM HEIGHT OF 2.5 INCHES MAY BE INSTALLED SO THAT THE EDGE OF THE MAILBOX DOES NOT EXTEND OUT MORE THAN 4 INCHES HORIZONTALLY BEYOND THE BASE.

2. THE SIDEWALK WIDTH MAY BE REDUCED TO 4 FOOT FOR SHORT DISTANCES AROUND THE MAILBOX IF NEEDED.

3. MAINTAIN A MINIMUM OF 5 FEET BETWEEN OBSTRUCTIONS IN THE PEDESTRIAN ACCESS ROUTE.

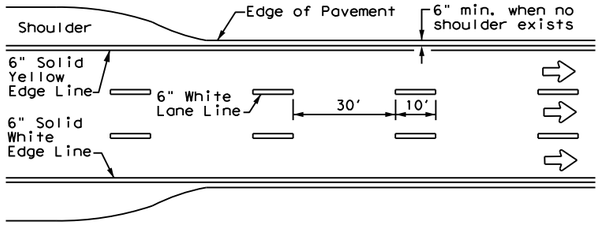
Texas Department of Transportation

Maintenance Division Standard

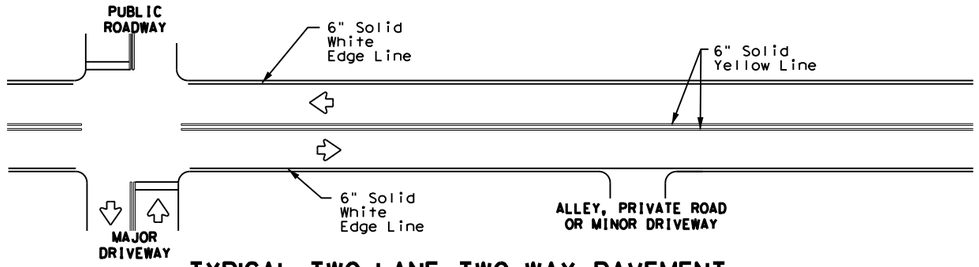
MAILBOX PLACEMENT CURBS & INTERSECTIONS

MBP(2)-22

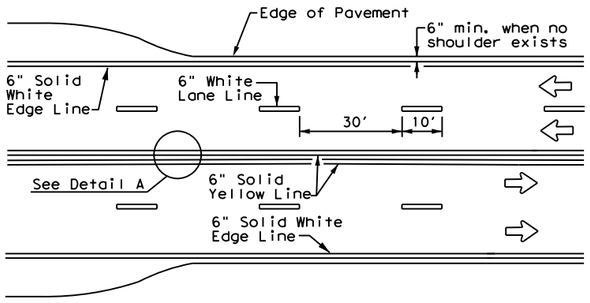
FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		203

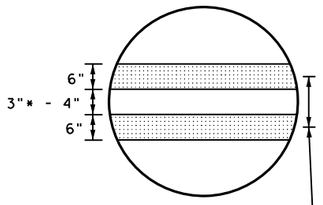


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





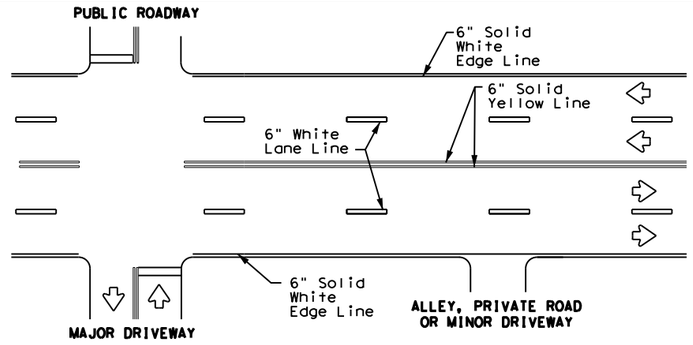
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

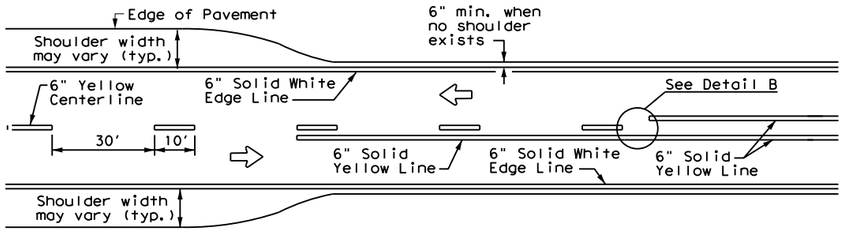
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

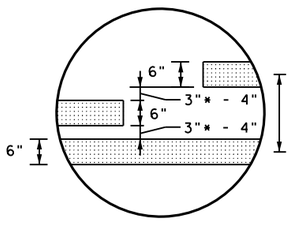
** 8" minimum for restripe projects when approved by the Engineer.



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

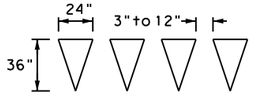


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

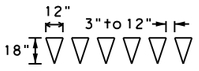


DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

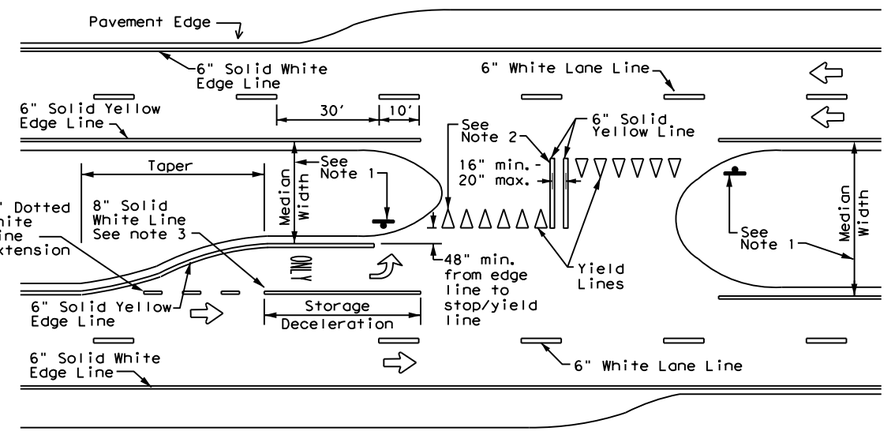


For posted speed on road being marked equal to or greater than 45 MPH.



For posted speed on road being marked equal to or less than 40 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs 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.

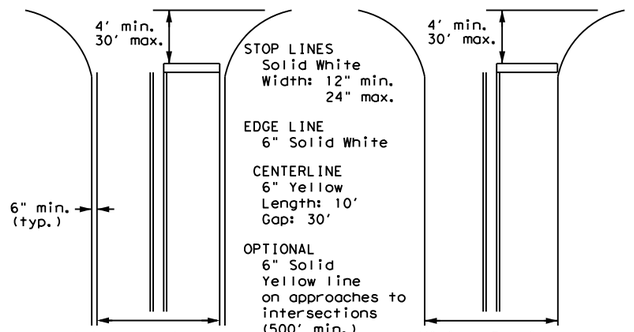
GENERAL NOTES

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	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		204

22A

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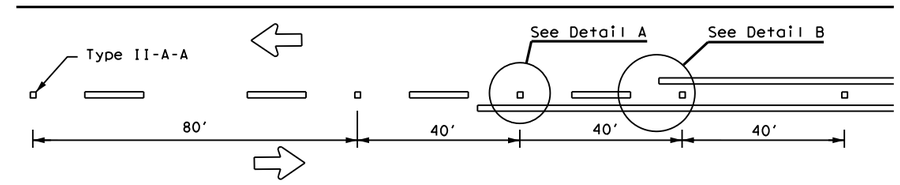
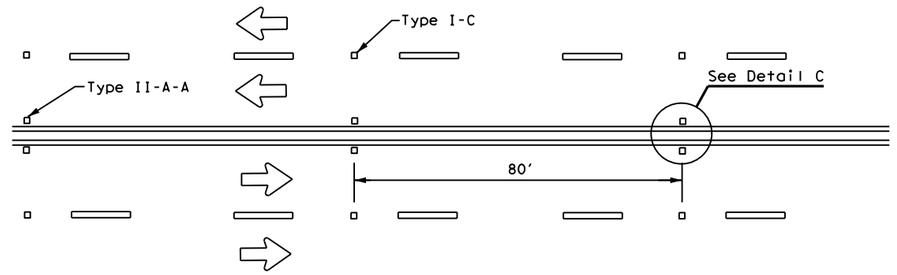
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\alisha.varshney\dms88299\pm1-22.dgn

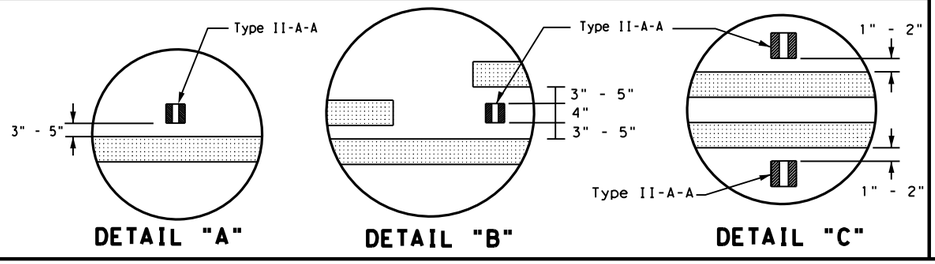
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

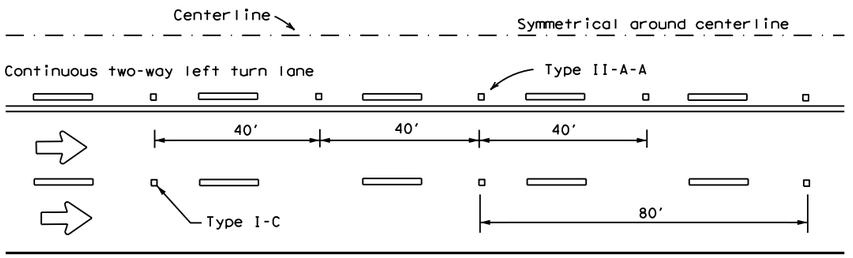


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

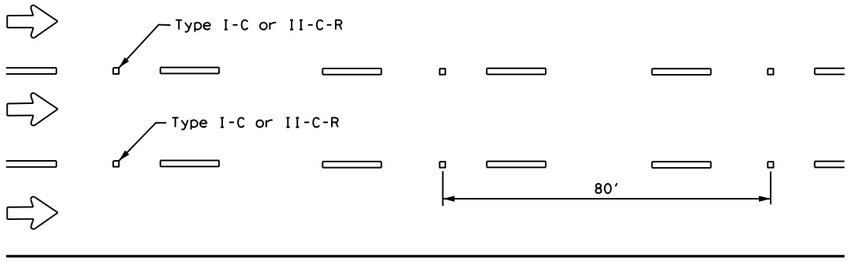


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



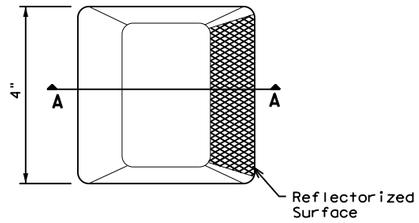
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

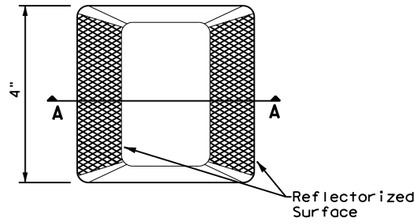
See Note 3.

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

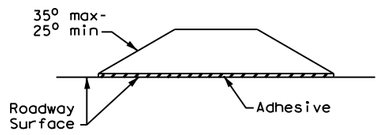
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

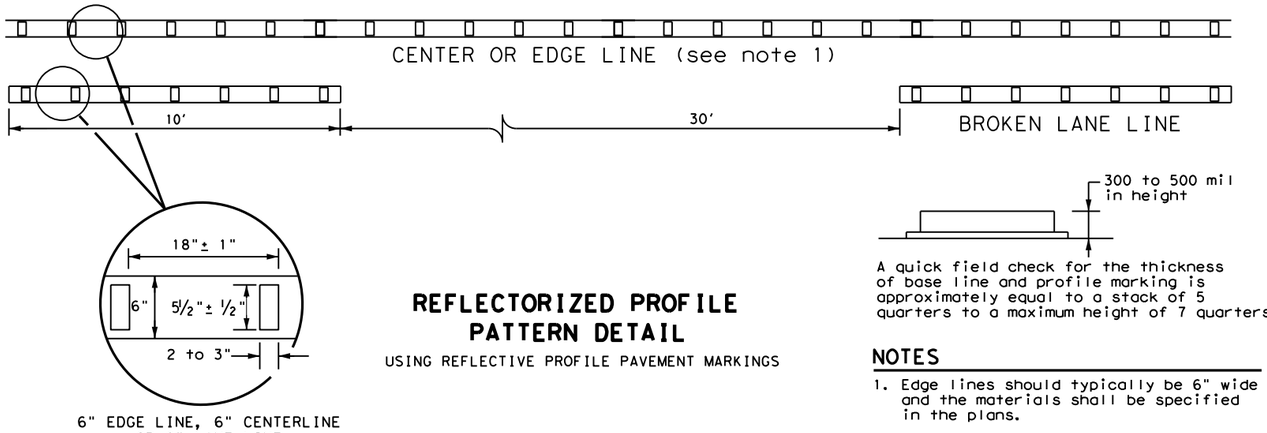


Type II (Top View)



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

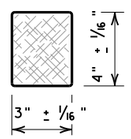
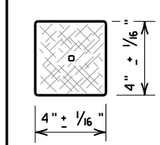
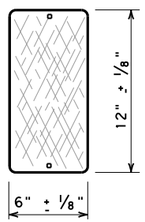
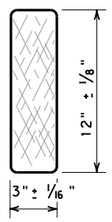
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

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	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		205

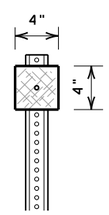
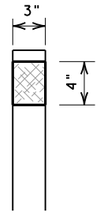
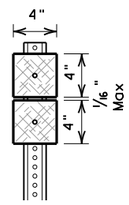
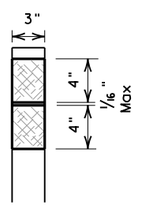
22B

DATE: 1/30/2024 3:21:57 PM
FILE: c:\workingdir\lja-pw.bentley.com_ljc-pw-01\alisha.varshney\dms88299\pm2-22.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

DEVICE	SINGLE		DOUBLE	
				
	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

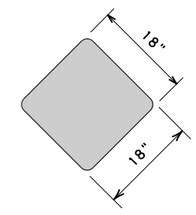
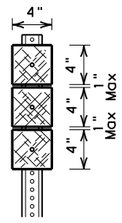
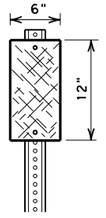
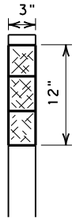
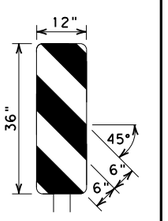
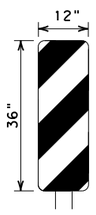
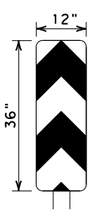
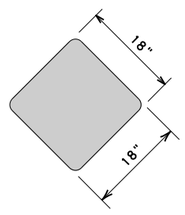
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

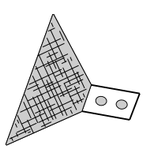
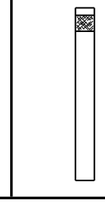
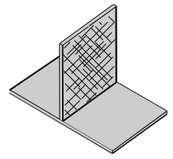
OBJECT MARKERS

DEVICE	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
								
		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

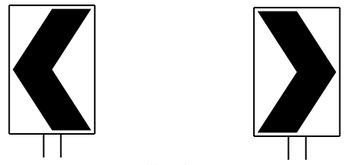
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

DEVICE	GF1	GF2	CTB
			
	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



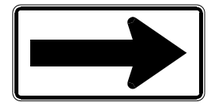
W1-8

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.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BMT	JASPER		206

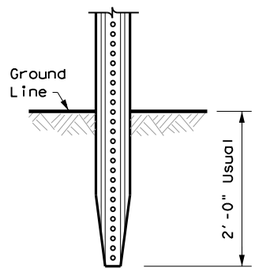
20A

DATE: 1/30/2024 3:22:01 PM
FILE: c:\workingdir\ljg-pw.bentley.com_ljg-pw-01\alisha.varsh.ney\dms8829\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

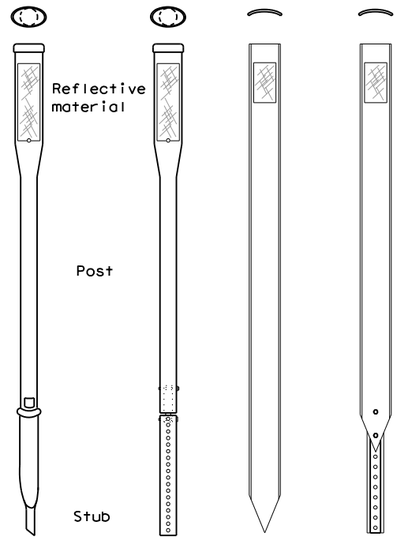


NOTES

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.

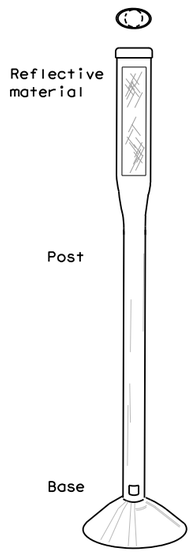
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



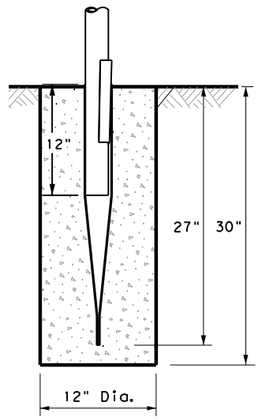
SURFACE MOUNT

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.

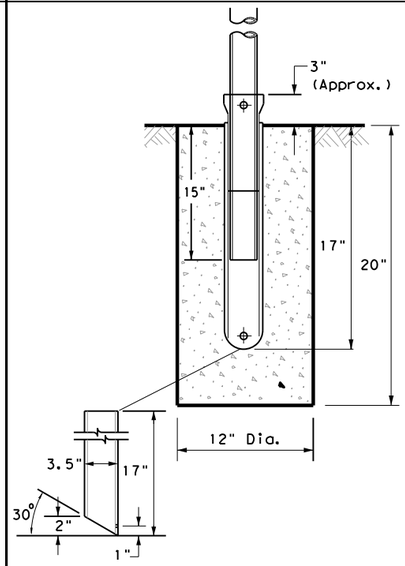
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

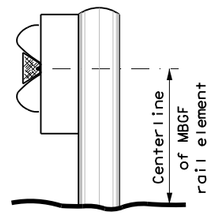
NOTE

1. Install per manufacturer's recommendations.

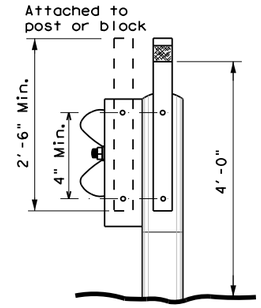
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

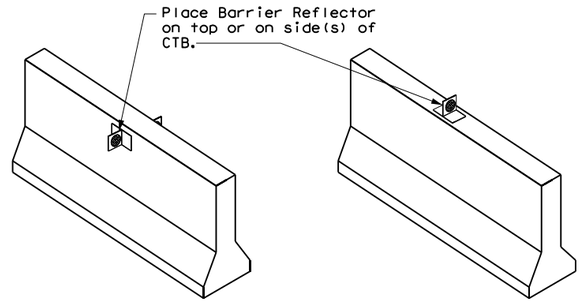
GF1



GF2



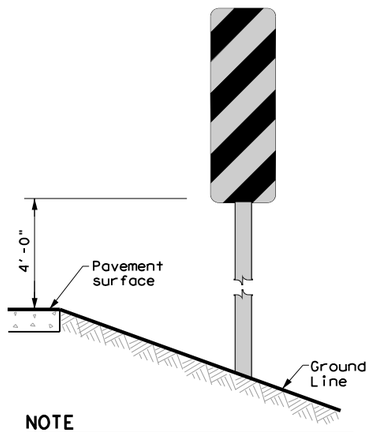
CONCRETE TRAFFIC BARRIER (CTB)



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.

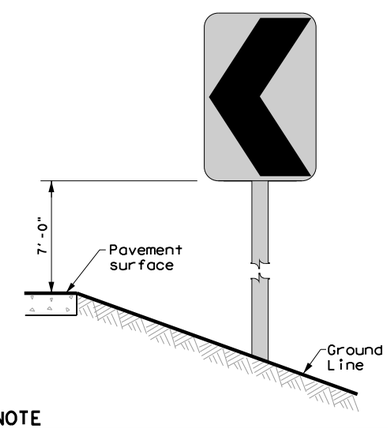
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

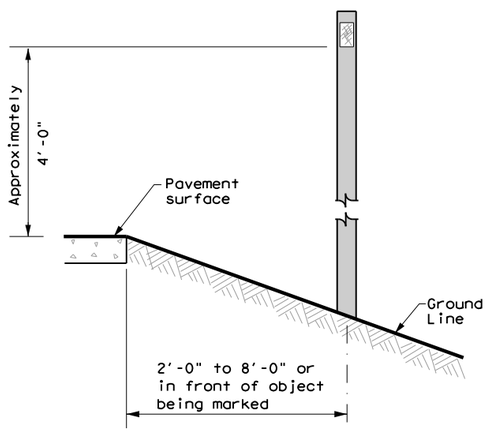
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	1109	01	026, ETC	FM 777
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BMT	JASPER		207

20B

DATE: 1/30/2024 3:22:05 PM
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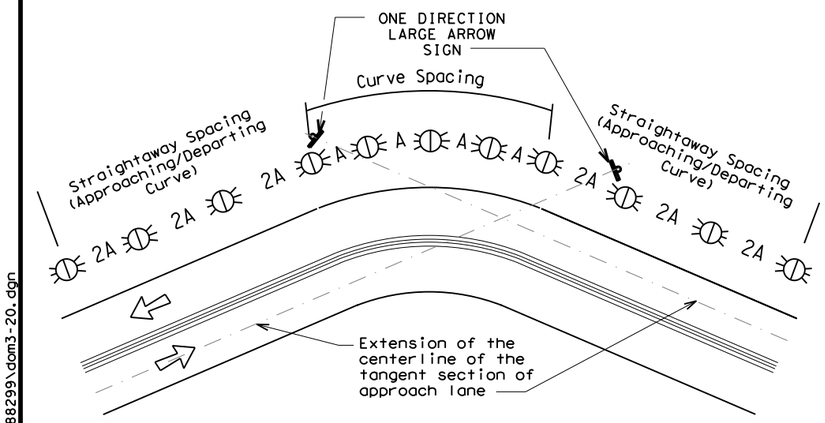
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

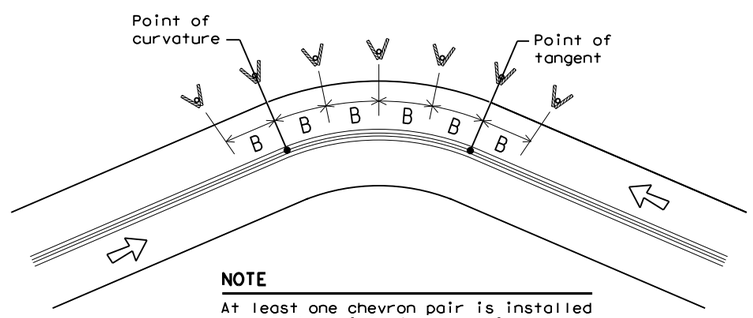
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	1109	01	026, ETC	FM 777
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	BMT	JASPER		208

20C

DATE: 1/30/2024 3:22:21 PM
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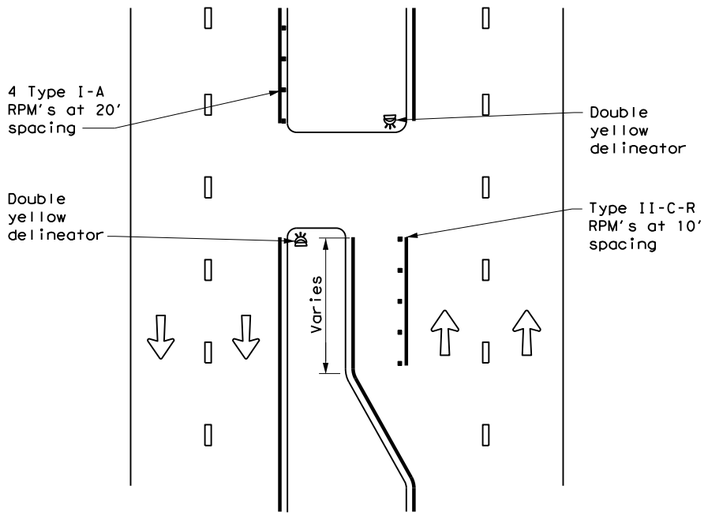
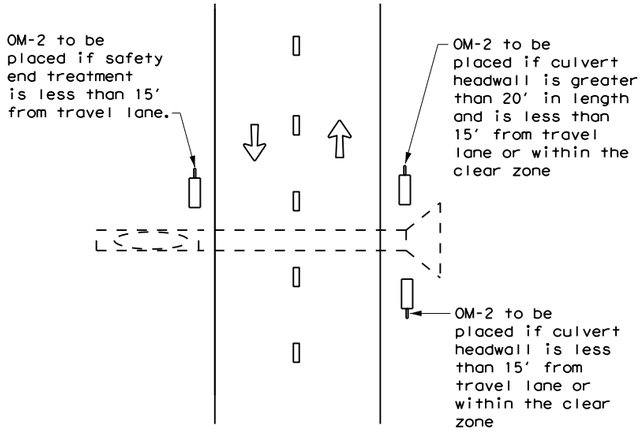
CROSSOVERS



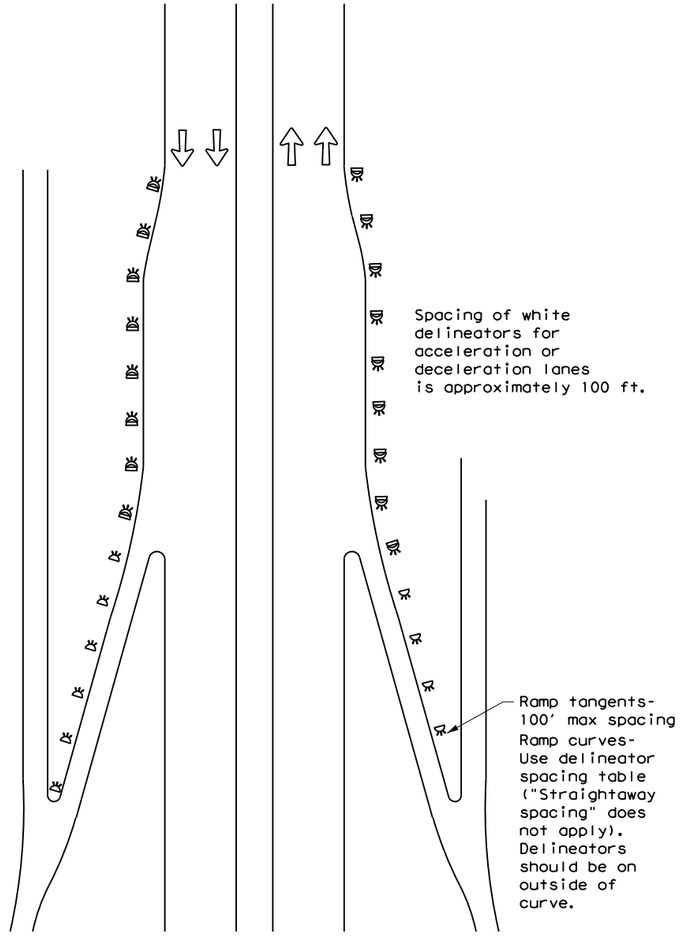
DETAIL 1

FOR CULVERTS WITHOUT MBGF



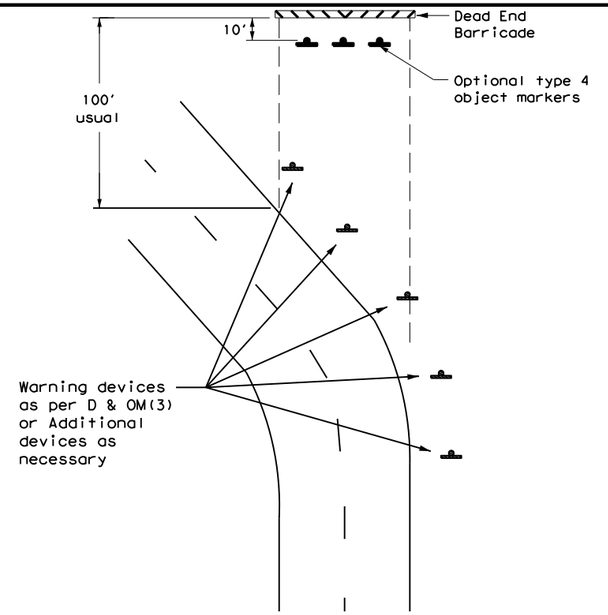
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



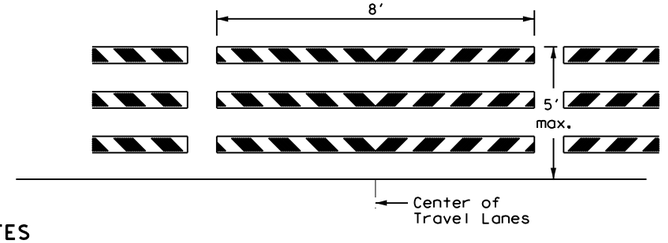
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

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© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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3-15	DIST	COUNTY		SHEET NO.
7-20	BMT	JASPER		209

20D

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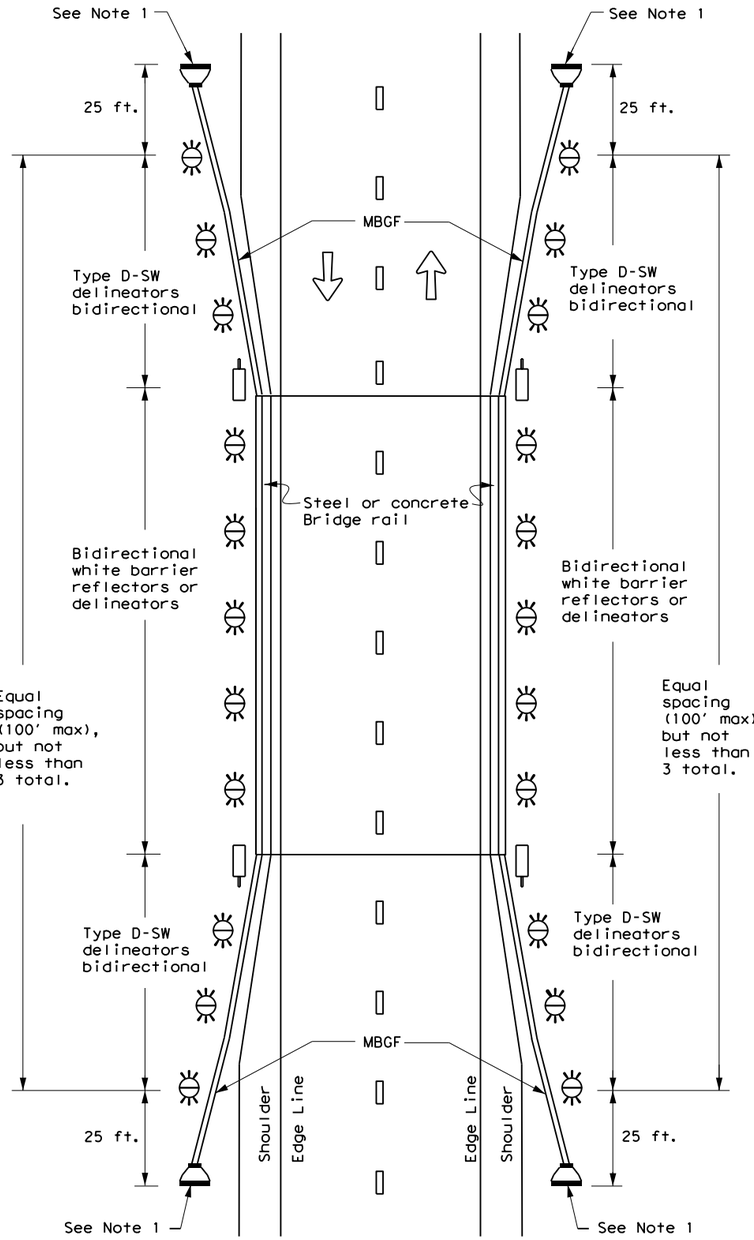
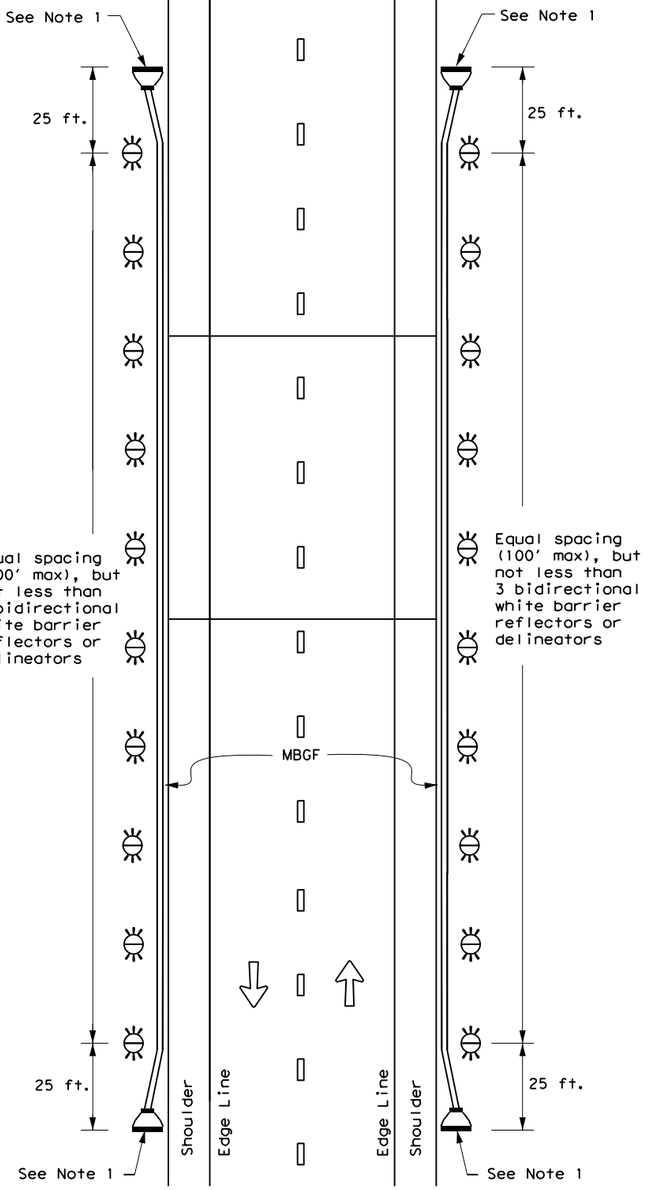
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

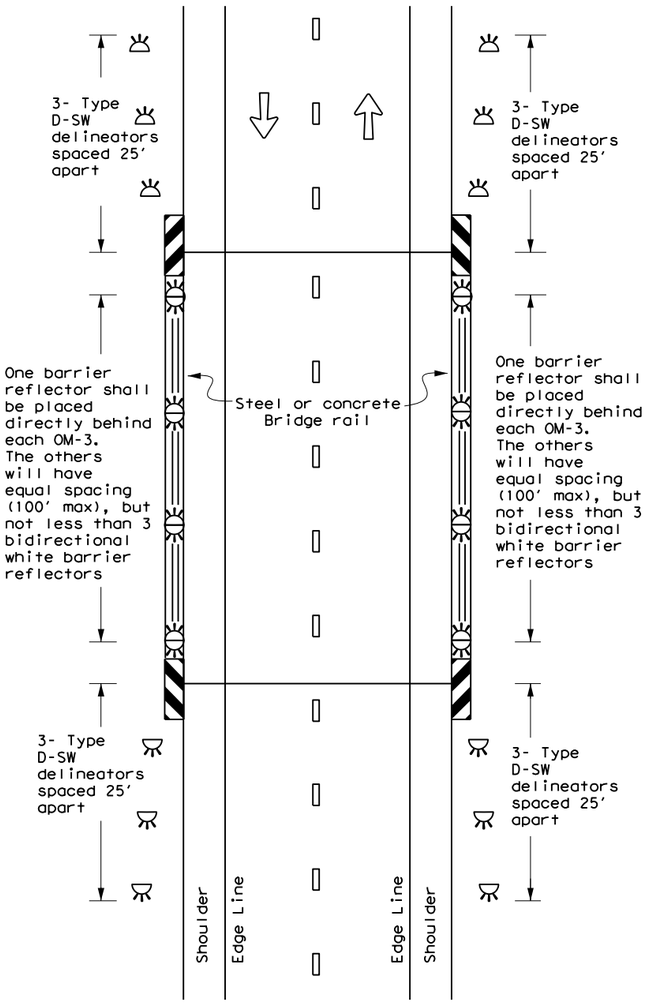
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

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© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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20E

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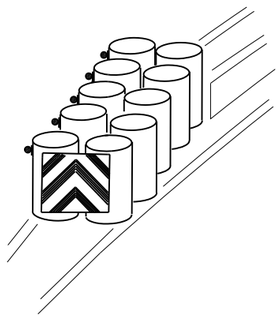
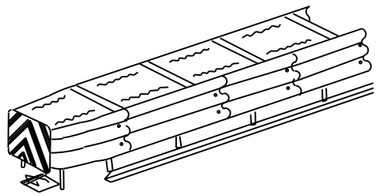
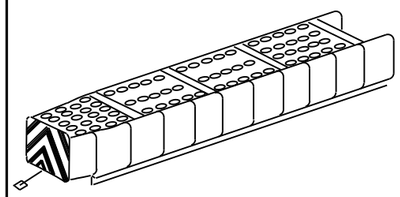
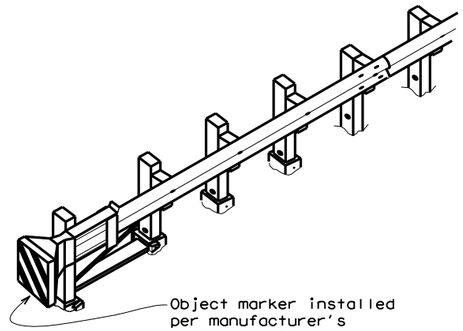
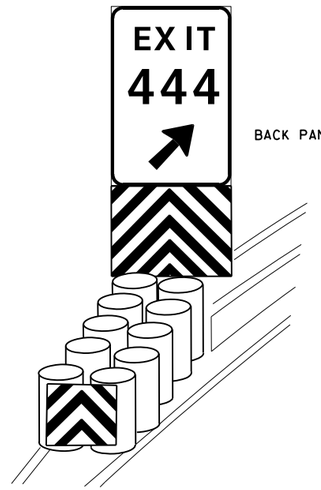




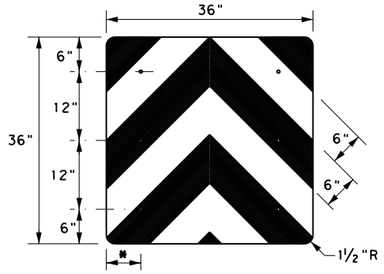


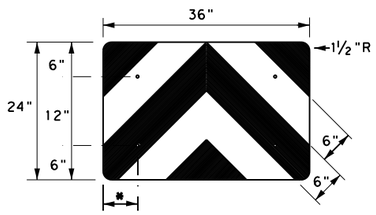


Object marker installed per manufacturer's recommendations.

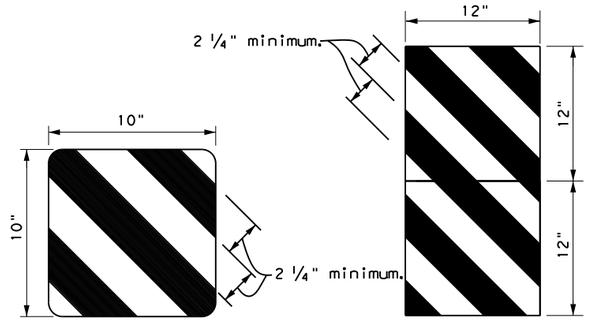


BACK PANEL (OPTIONAL)

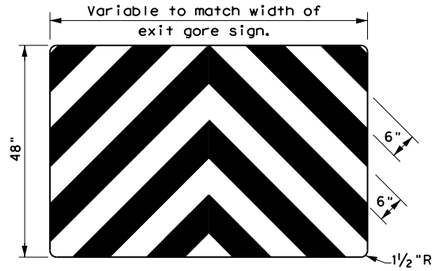


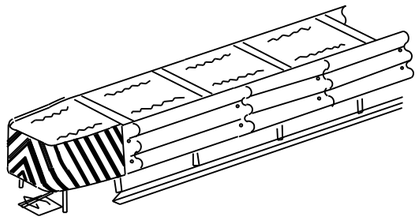


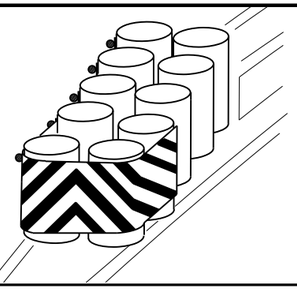
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

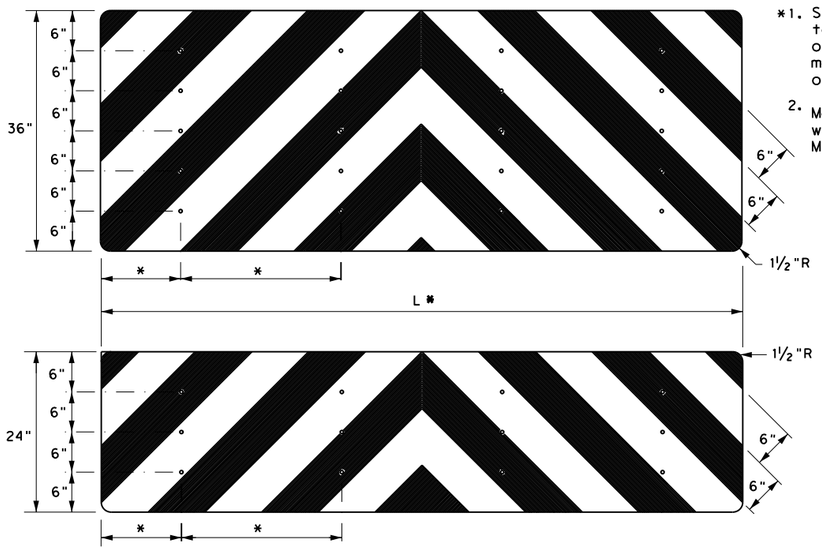


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

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©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
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4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	BMT	JASPER		211
4-98 7-20				

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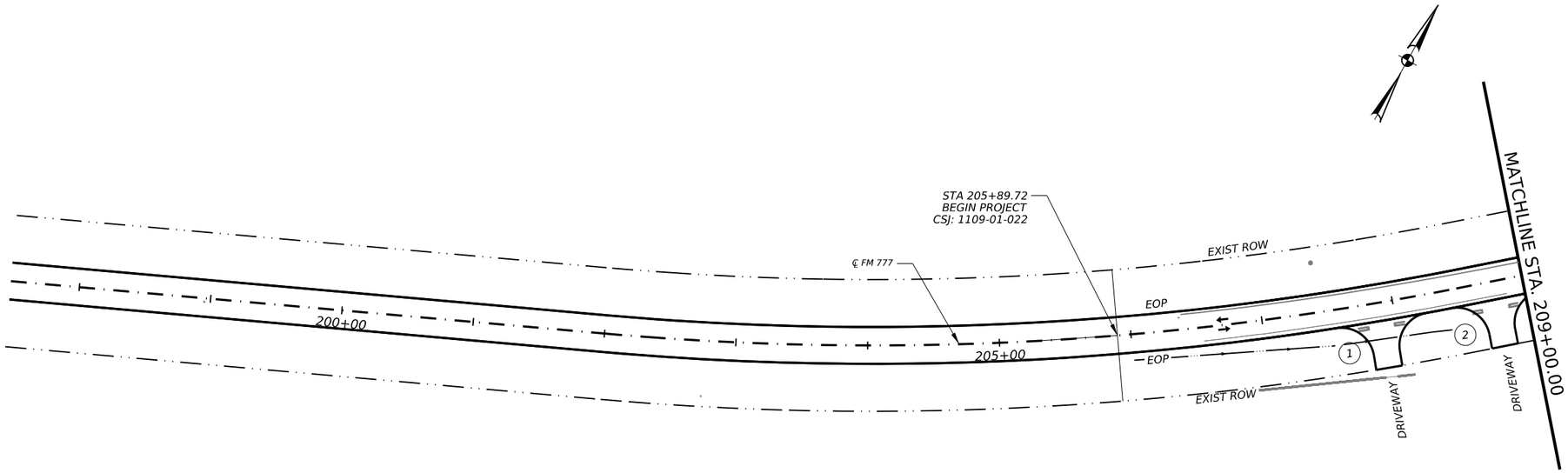
DATE: 1/30/2024 3:22:33 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\alisha.varshney\dms88299\domvia-20.dgn

CK:
DW:
CK:
DW:

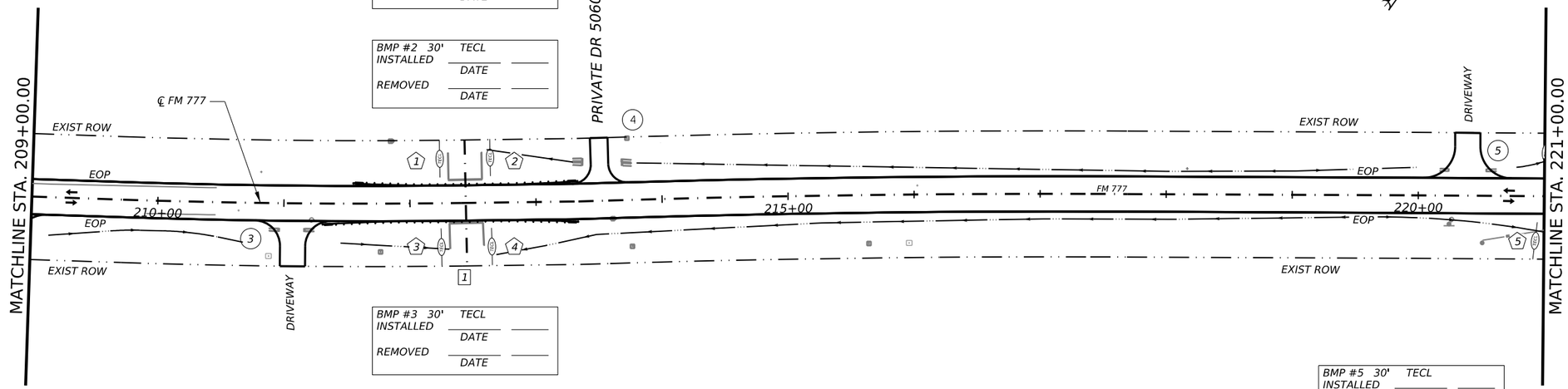
LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS - CULVERT NUMBER
#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING



0' 50' 100'

SCALE: 1"= 100'



BMP #1 30'	INSTALLED	DATE
	REMOVED	DATE
BMP #2 30'	INSTALLED	DATE
	REMOVED	DATE
BMP #3 30'	INSTALLED	DATE
	REMOVED	DATE
BMP #4 30'	INSTALLED	DATE
	REMOVED	DATE
BMP #5 30'	INSTALLED	DATE
	REMOVED	DATE

TECL

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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SW3P LAYOUT

BEGIN TO STA 221+00

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		212

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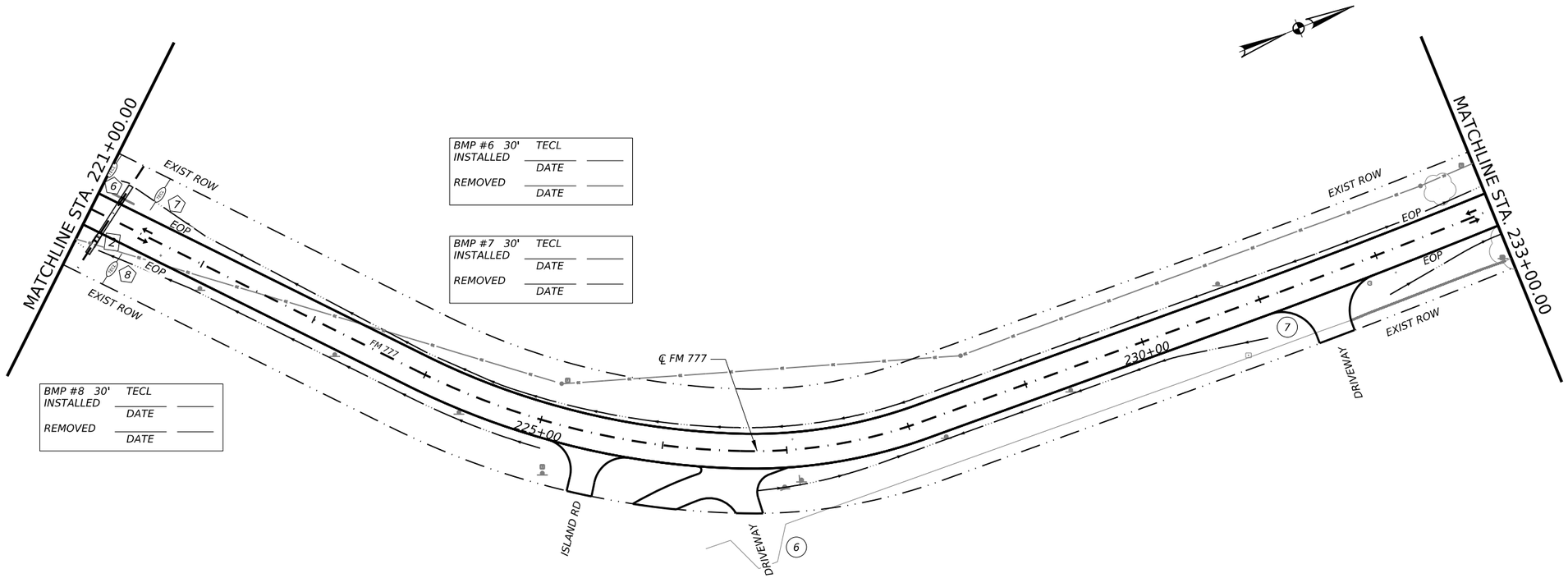
CK:
DW:
CK:
DW:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS - CULVERT NUMBER
#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING



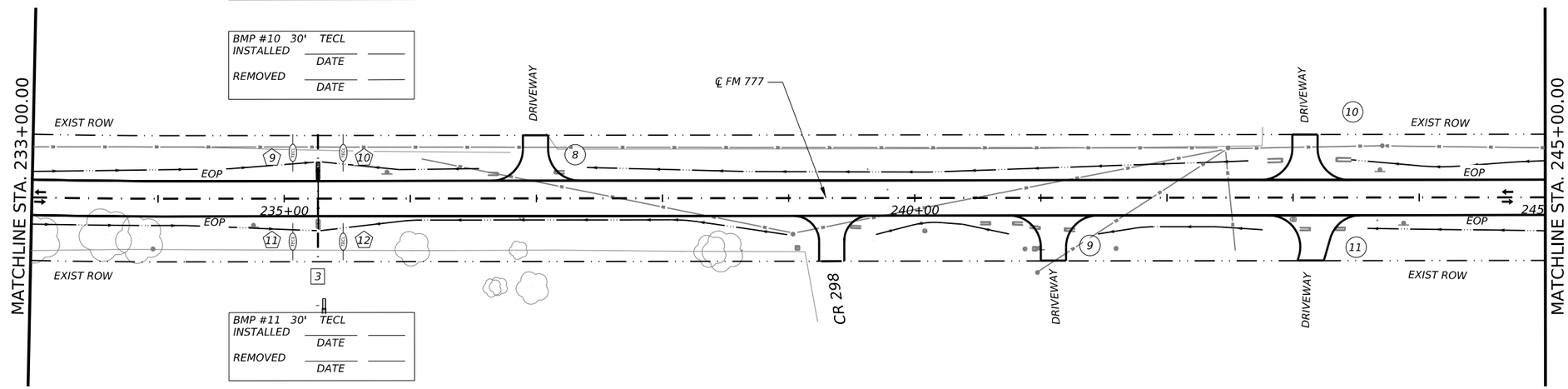
BMP #6 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #7 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #8 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

0' 50' 100'

SCALE: 1"= 100'



BMP #9 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #10 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #11 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #12 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

STATE OF TEXAS
JESSE L. LOFTIN
106140
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PROFESSIONAL ENGINEER

01.30.24

LJA PROGRAM MANAGEMENT
FRN - F-14256

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FM 777
SW3P LAYOUT

STA 221+00 TO STA 245+00

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		213

DATE: 1/30/2024 5:11:22 PM
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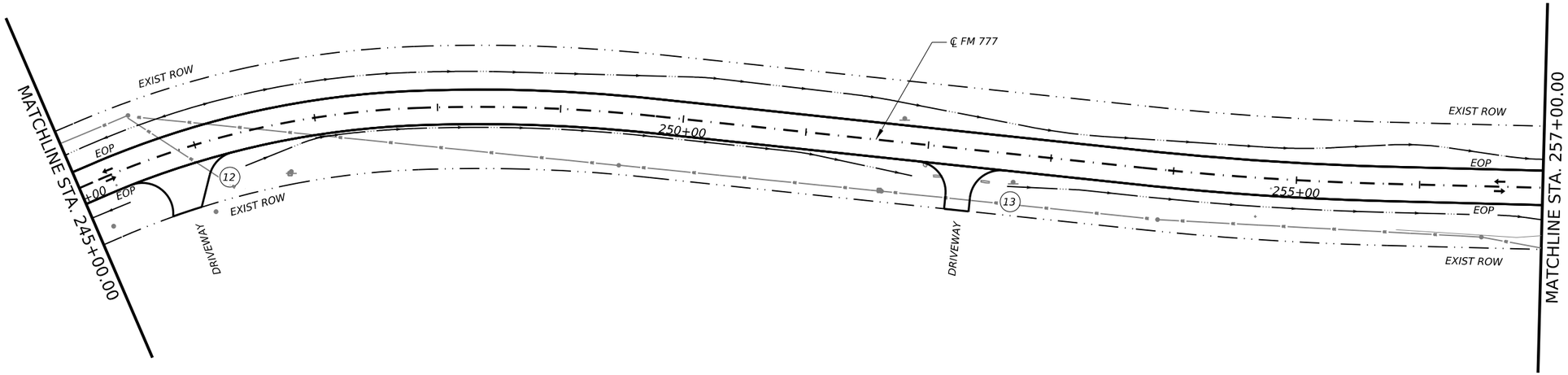

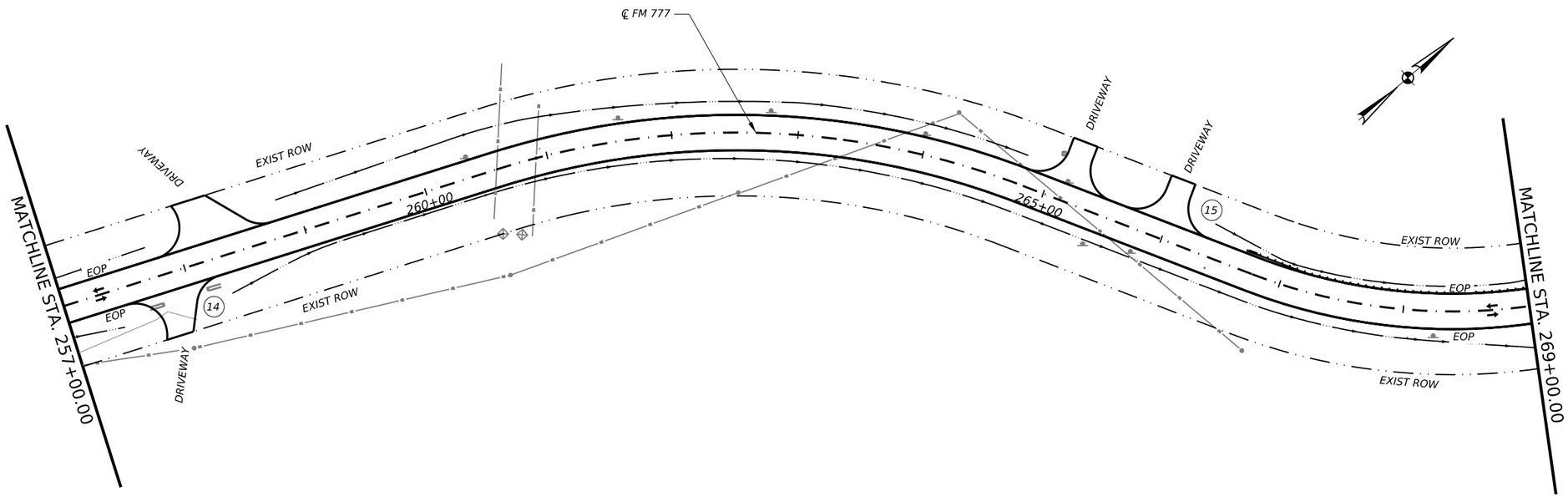

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
⌗	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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PROFESSIONAL ENGINEER

01.30.24

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FRN - F-14256

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FM 777
SW3P LAYOUT

STA 245+00 TO STA 269+00

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		214

DATE: 1/30/2024 5:11:33 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe.escobedo\dms84564\022 SW3P 03.dgn

CK:
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CK:
DW:

BMP #13 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #14 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #17 90' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

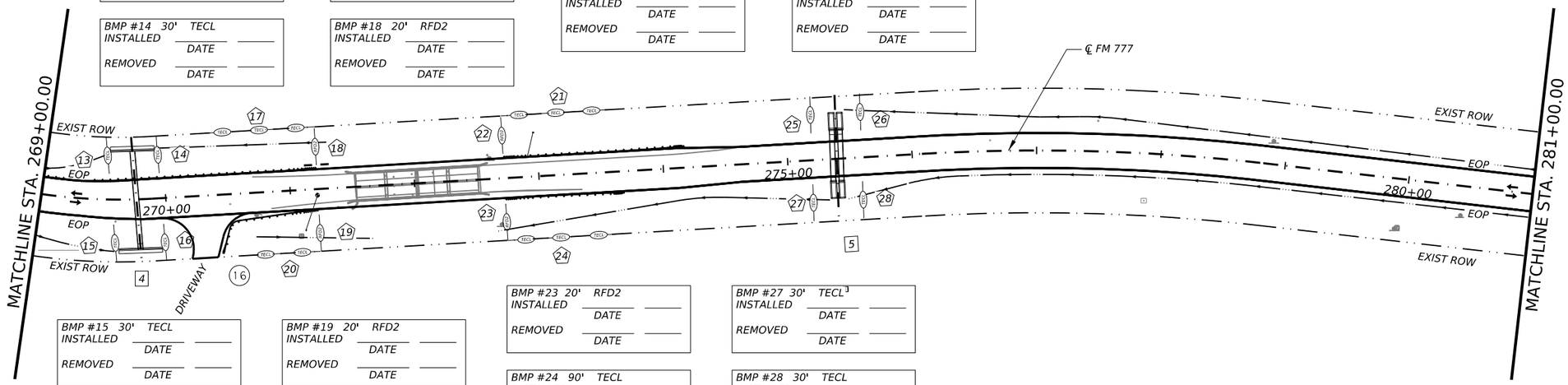
BMP #18 20' RFD2
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #21 90' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #22 20' RFD2
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #25 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #26 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____



BMP #15 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #16 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #19 20' RFD2
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #20 60' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #23 20' RFD2
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #24 90' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #27 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #28 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

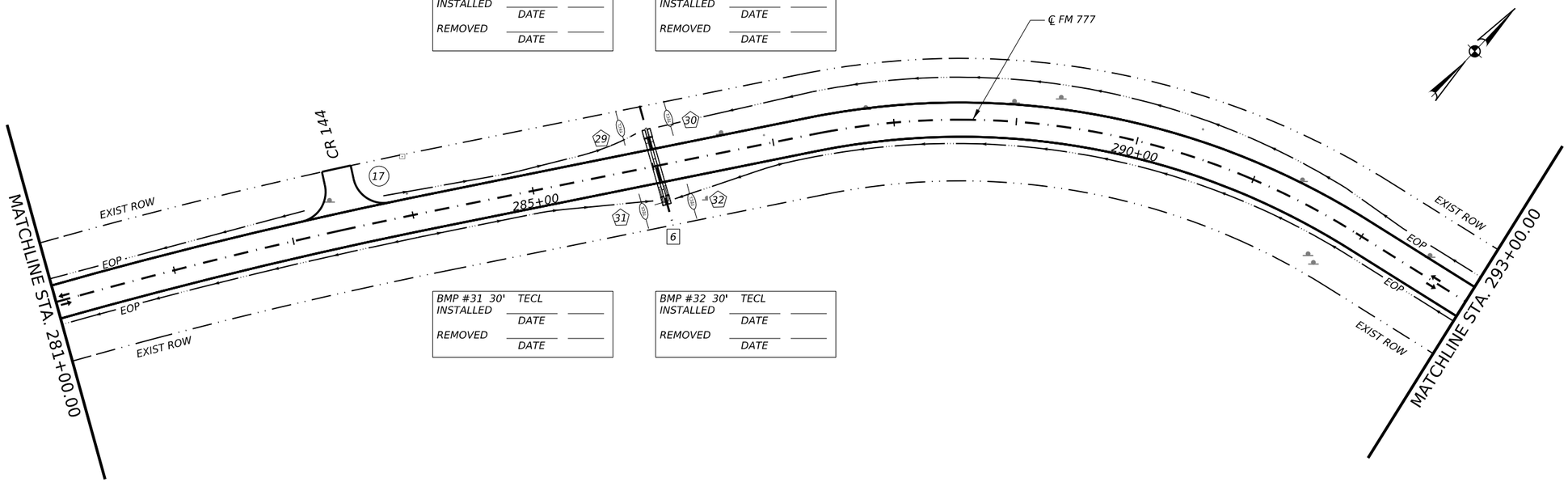
LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
(#)	DRIVEWAY NUMBER
[#]	CROSS - CULVERT NUMBER
⬠#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'
SCALE: 1"= 100'

BMP #29 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #30 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____



BMP #31 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #32 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

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SW3P LAYOUT

STA 269+00 TO STA 293+00

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		215

DATE: 1/30/2024 5:11:47 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns845641022 SW3P 04.dgn

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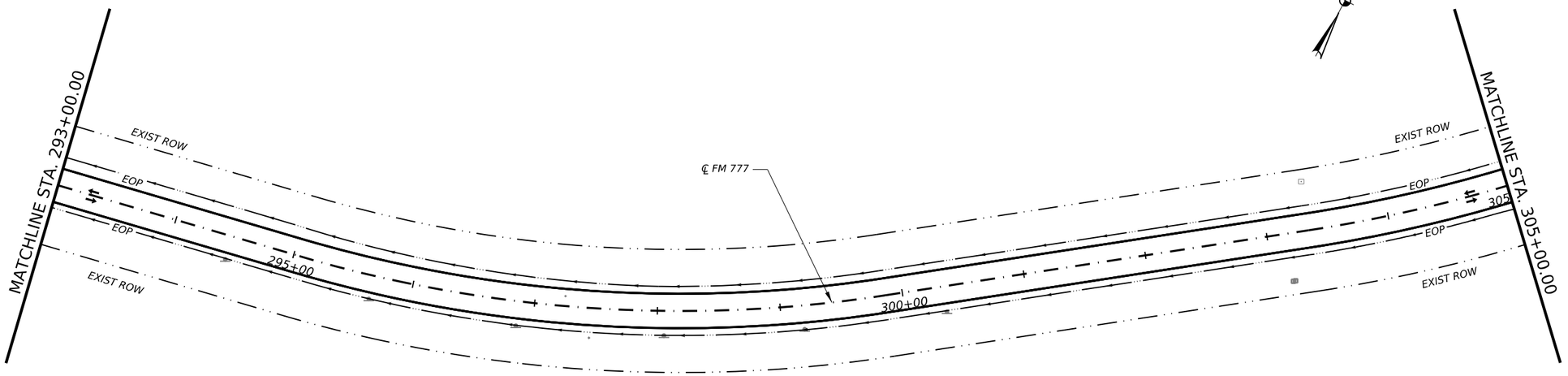
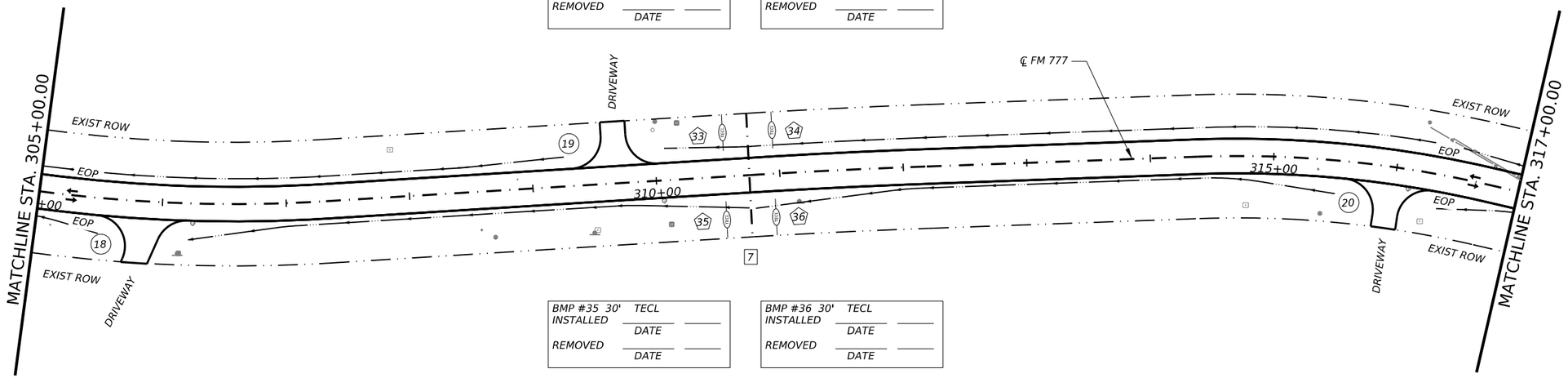


LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
⌗	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'

SCALE: 1"= 100'



BMP #33 30' TECL		BMP #34 30' TECL	
INSTALLED	DATE	INSTALLED	DATE
REMOVED	DATE	REMOVED	DATE

BMP #35 30' TECL		BMP #36 30' TECL	
INSTALLED	DATE	INSTALLED	DATE
REMOVED	DATE	REMOVED	DATE

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SW3P LAYOUT

STA 293+00 TO STA 317+00

SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		216

DATE: 1/30/2024 5:12:00 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns845641022 SW3P 05.dgn

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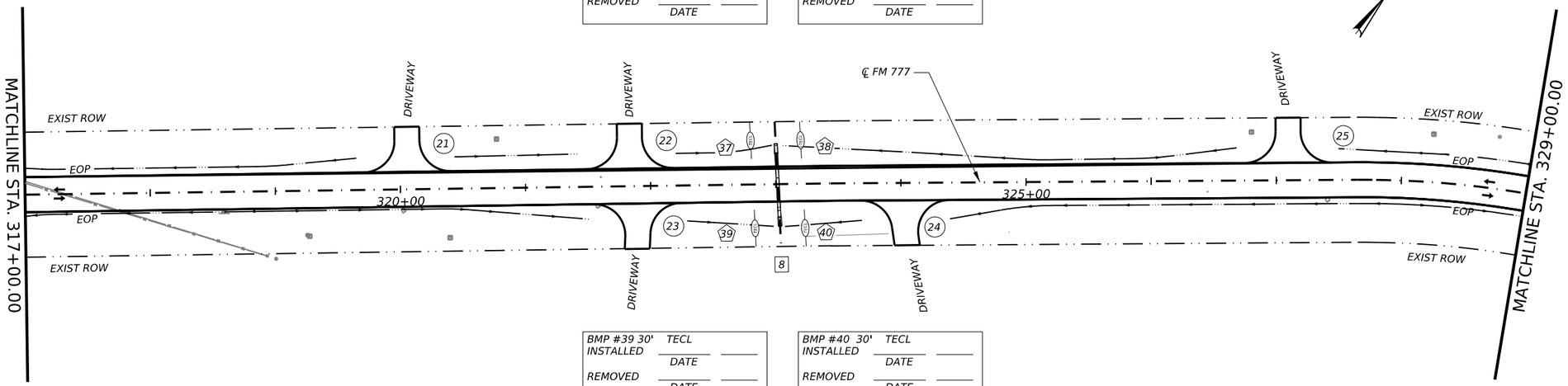
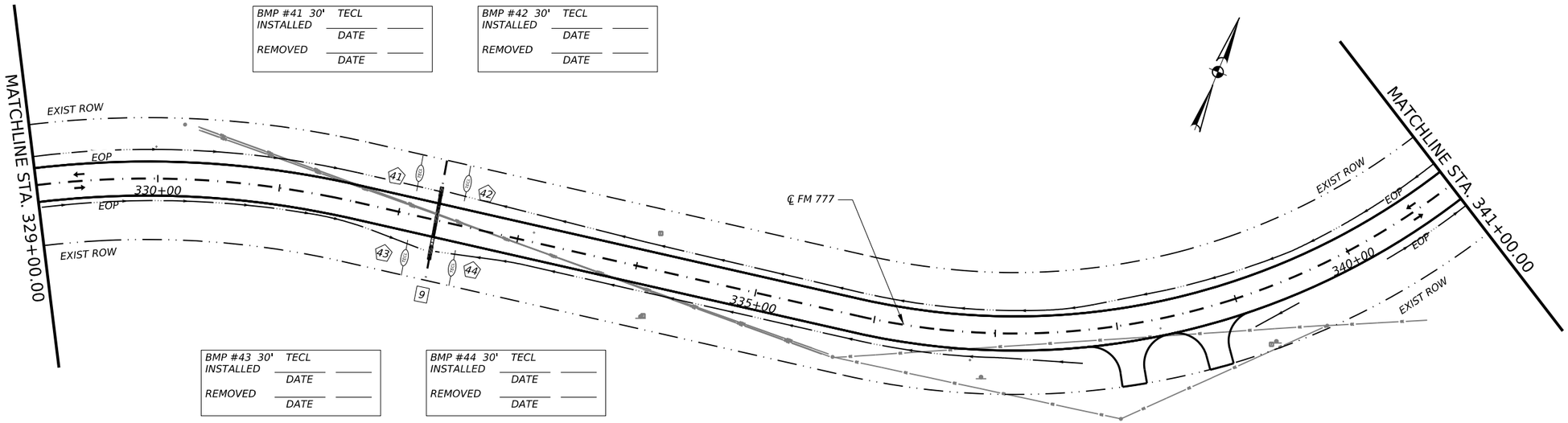


LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS - CULVERT NUMBER
#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'

SCALE: 1"= 100'



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SW3P LAYOUT

STA 317+00 TO STA 341+00

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		217

DATE: 1/30/2024 5:12:12 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldms\84564022 SW3P 06.dgn

CK:
DW:
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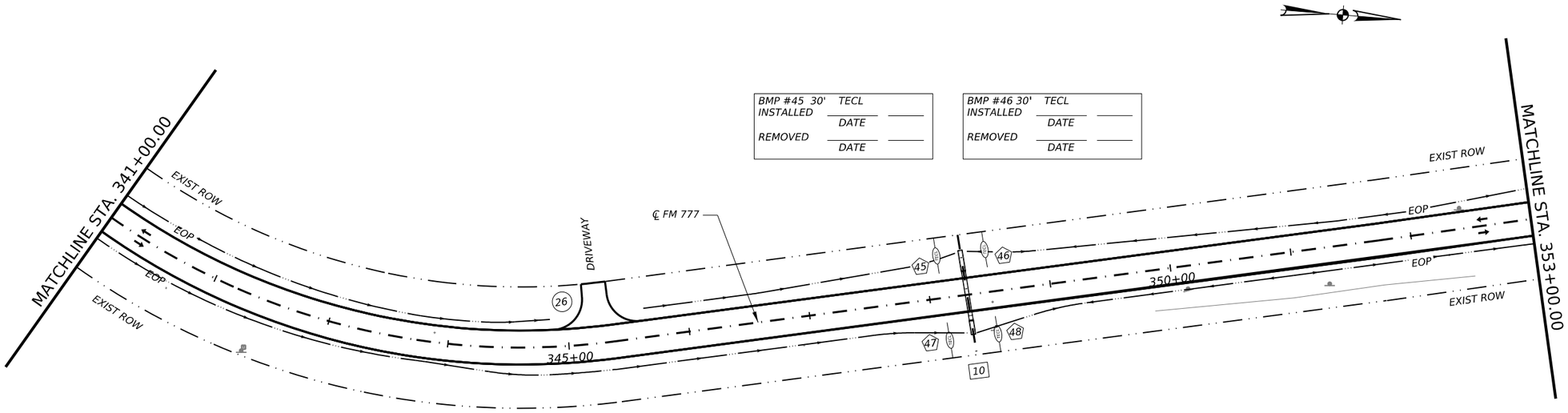
DN:

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
(#)	DRIVEWAY NUMBER
[#]	CROSS - CULVERT NUMBER
⬠#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING



BMP #45 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #46 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

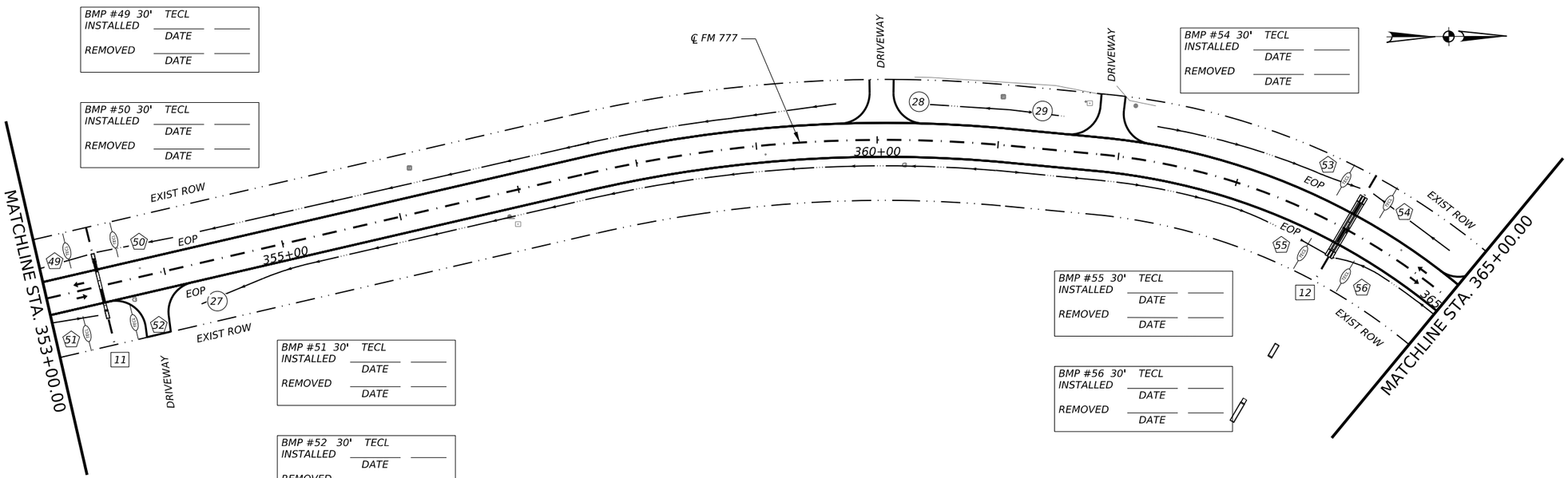
BMP #47 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #48 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #53 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

0' 50' 100'

SCALE: 1"= 100'



BMP #49 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #50 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #51 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #52 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #54 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #55 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

BMP #56 30' TECL INSTALLED ____ DATE ____ REMOVED ____ DATE ____

STATE OF TEXAS
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SW3P LAYOUT

STA 341+00 TO STA 365+00

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		218

DATE: 1/30/2024 5:12:29 PM
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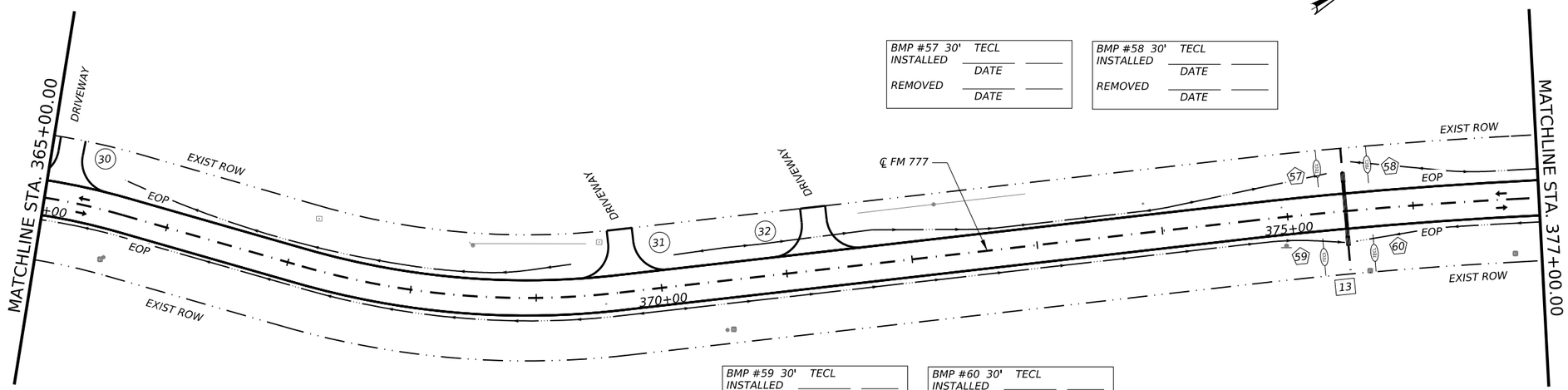


BMP #57 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

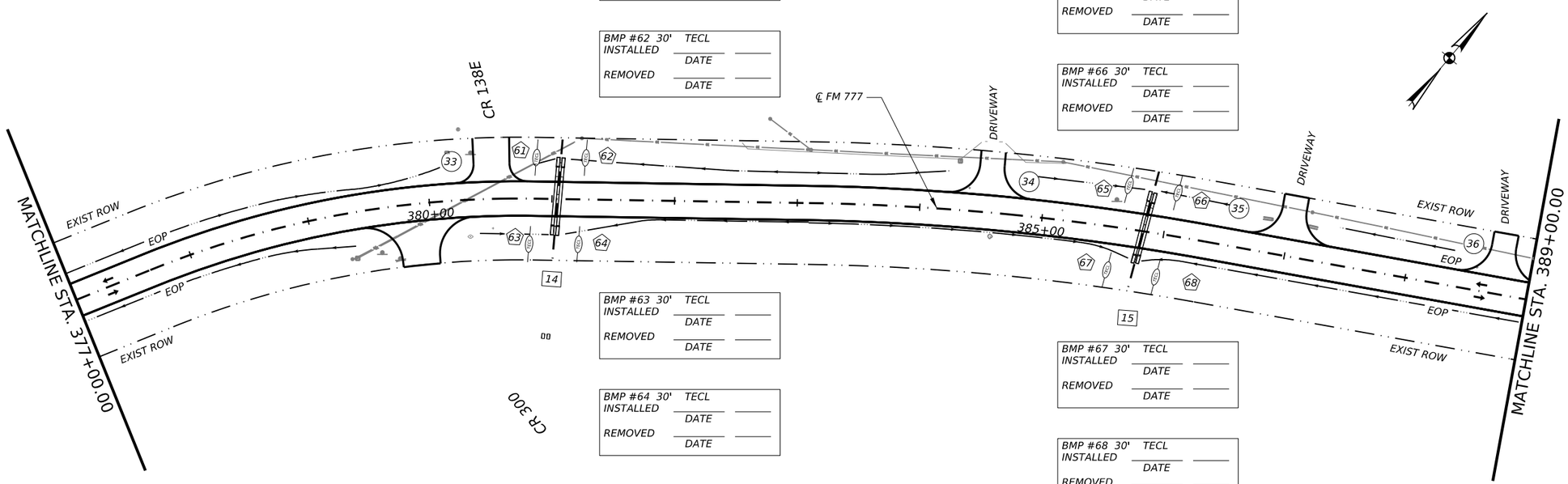
BMP #58 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #59 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #60 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
⌗	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING



BMP #61 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #62 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #63 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #64 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #65 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #66 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #67 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #68 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

0' 50' 100'
SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
SW3P LAYOUT

STA 365+00 TO STA 389+00

SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		219

DATE: 1/30/2024 5:12:44 PM
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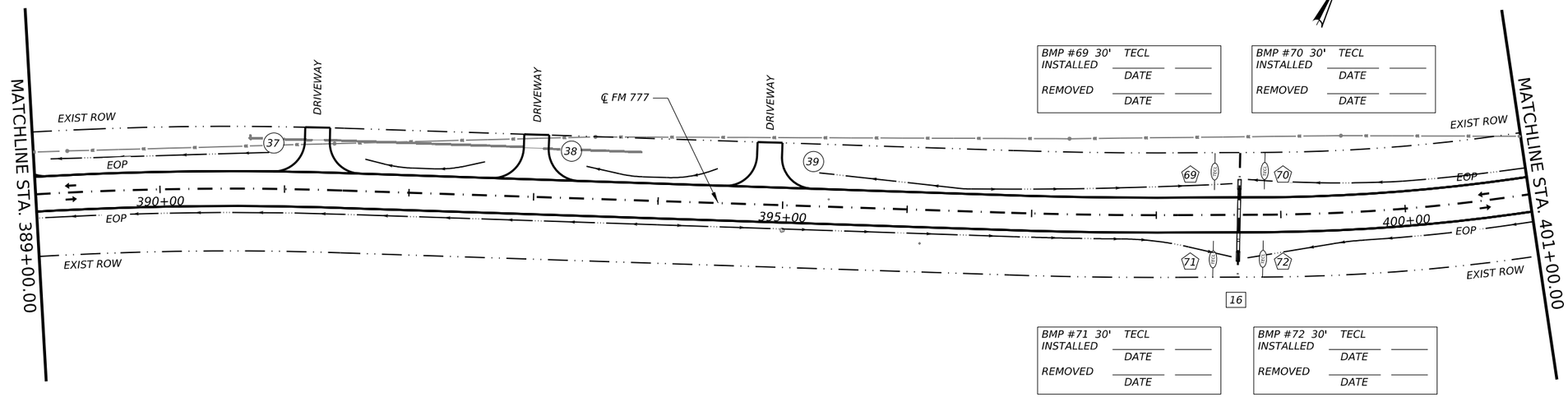


BMP #69 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #70 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #71 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #72 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #73 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #74 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #75 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

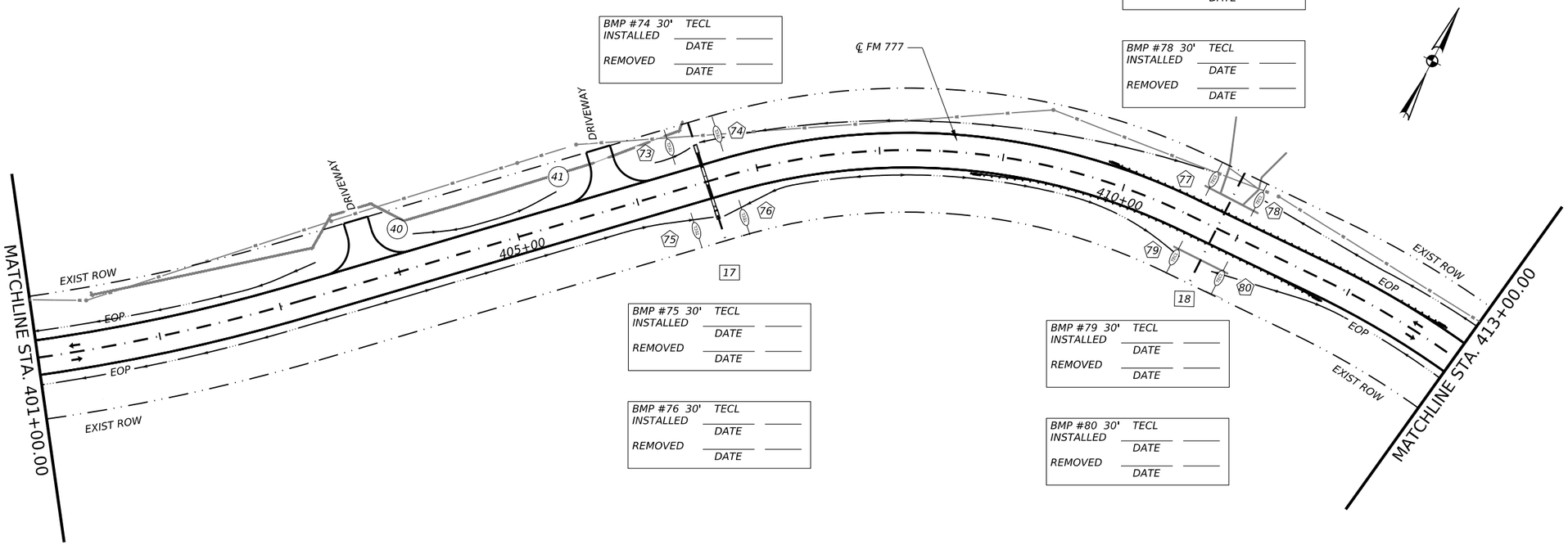
BMP #76 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #77 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #78 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #79 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____

BMP #80 30' TECL
INSTALLED ____ DATE ____
REMOVED ____ DATE ____



LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
⌗	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'
SCALE: 1"= 100'

STATE OF TEXAS
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SW3P LAYOUT

STA 389+00 TO STA 413+00

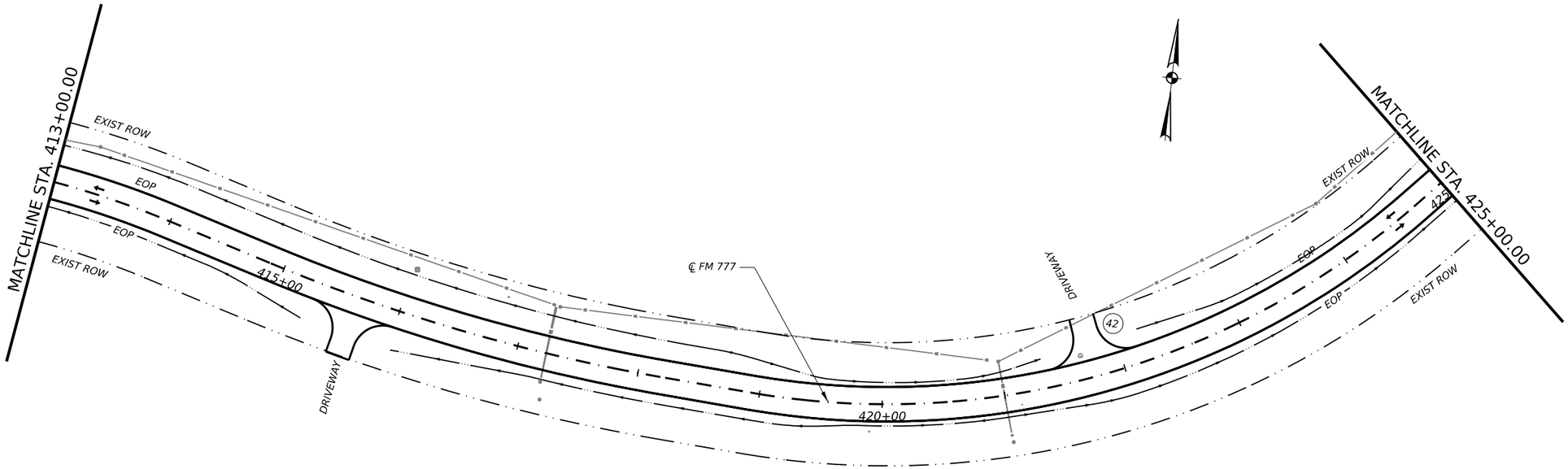
SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		220

DATE: 1/30/2024 5:13:02 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldms8455641022_SW3P_09.dgn

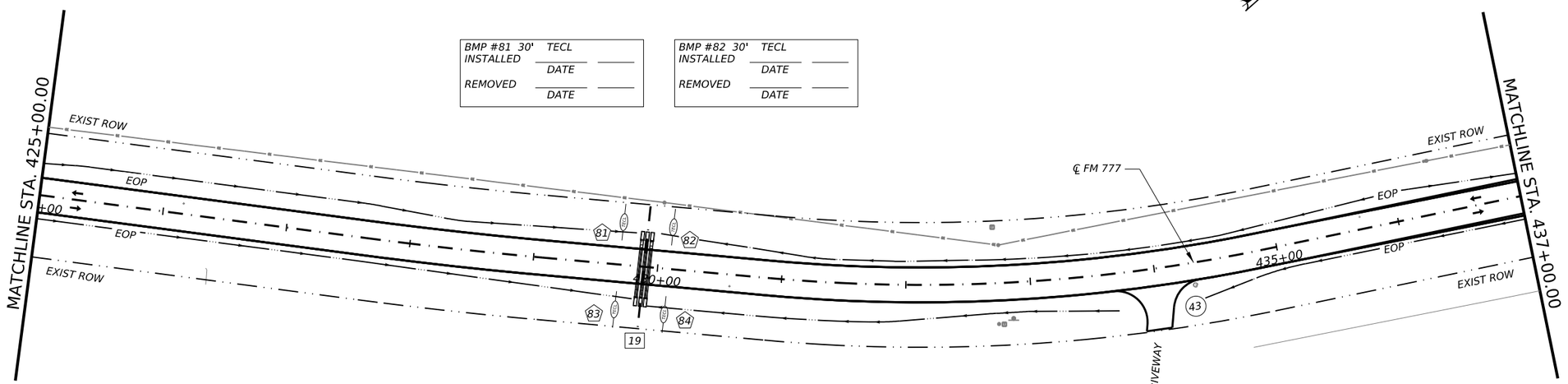
LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
⌗	DRIVEWAY NUMBER
⌗	CROSS - CULVERT NUMBER
⌗	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING



0' 50' 100'

SCALE: 1"= 100'



BMP #81 30' TECL		BMP #82 30' TECL	
INSTALLED	DATE	INSTALLED	DATE
REMOVED	DATE	REMOVED	DATE

BMP #83 30' TECL		BMP #84 30' TECL	
INSTALLED	DATE	INSTALLED	DATE
REMOVED	DATE	REMOVED	DATE

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SW3P LAYOUT

STA 413+00 TO STA 437+00

SHEET 10 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		221

DATE: 1/30/2024 5:13:20 PM
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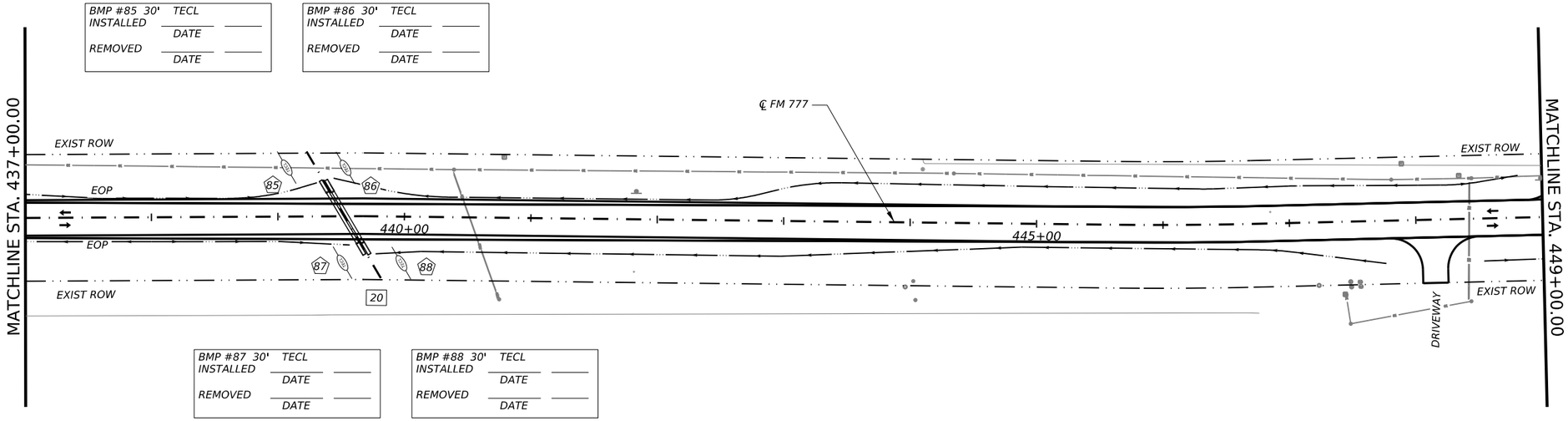

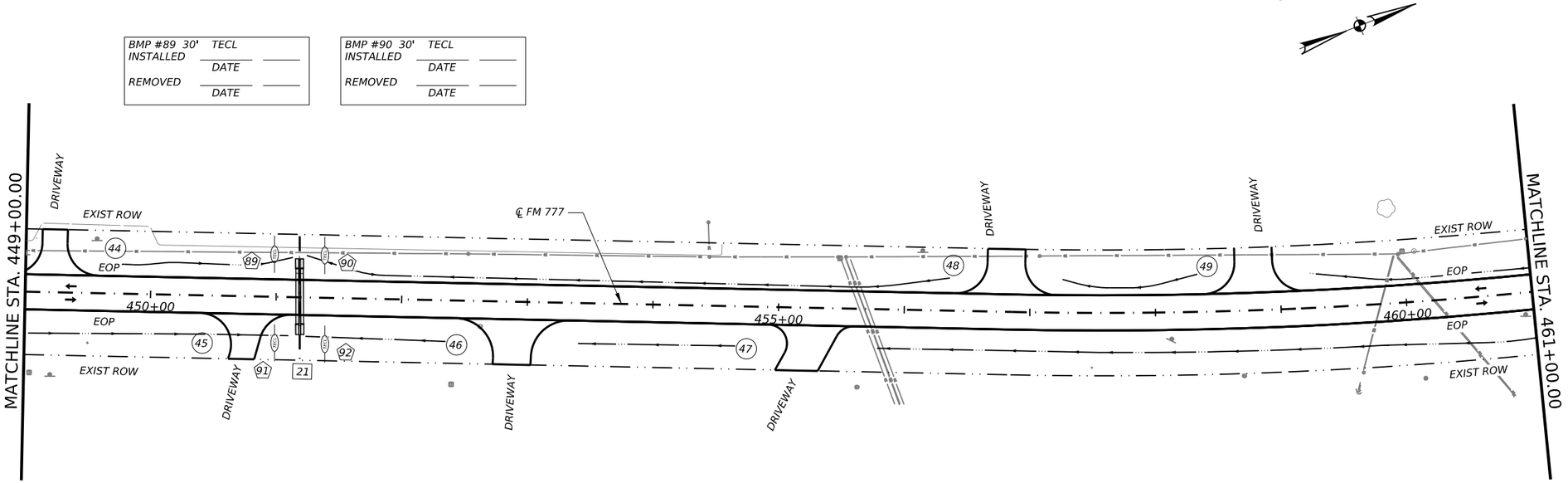

LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS - CULVERT NUMBER
#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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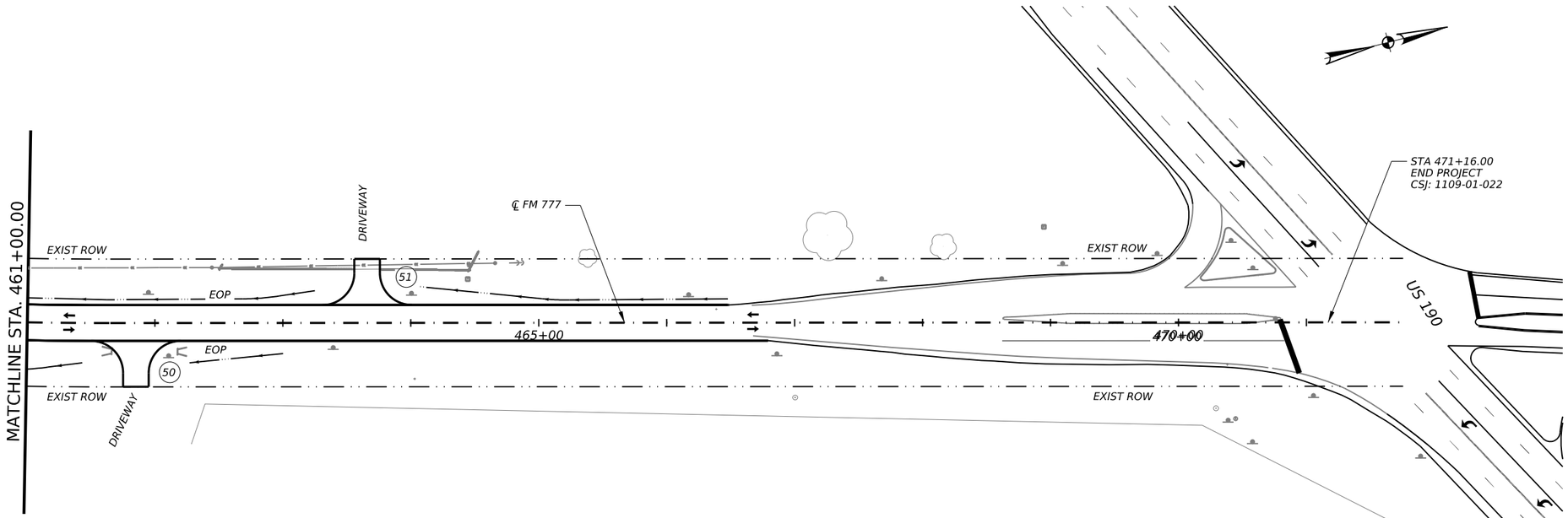
FM 777
SW3P LAYOUT

STA 437+00 TO STA 461+00

SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		222

DATE: 1/30/2024 5:13:36 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns845641022 SW3P 11.dgn



LEGEND:

ROW	RIGHT OF WAY
EOP	PROPOSED EDGE OF PAVEMENT
— —	EXISTING EOP
#	DRIVEWAY NUMBER
#	CROSS - CULVERT NUMBER
#	BMP NUMBER
←	TRAFFIC DIRECTION
TECL	TEMP EROS CONTROL LOG
RFD2	ROCK FILTER DAM (TY 2)
	PERMANENT SEEDING

0' 50' 100'

SCALE: 1"= 100'

STATE OF TEXAS
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FM 777
SW3P LAYOUT

STA 461+00 TO END

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
1109	01	026, ETC	FM 777
DIST	COUNTY		SHEET NO.
BMT	JASPER		223

DATE: 1/30/2024 5:13:53 PM
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\guadalupe escobedoldns845641022 SW3P 12.dgn

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DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. TxDOT - Beaumont District

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or as required by the Engineer.
3. Comply with TCEQ Permit 150000 as this project is estimated to disturb more than five acres. TxDOT will file for an NOI first under TCEQ Permit 150000 as the Primary Operator. Contractor will be supplied a copy of the NOI and TCEQ Authorization Certificate. Contractor must use the TxDOT information to complete their own NOI per SP 506-003/SP 007-004. Contractor files a NOI as the Primary Operator for Day-to-Day Operational Control and provides copies of thier NOI, TCEQ Authorization Certificate, and Contractor Site Notice to the District. To ensure the Permit reflects a single construction site, the Regulated Entity Number (RN) must be the same for TxDOT and the Contractor. Contact the Beaumont District Construction Office with questions regarding TCEQ Permit 150000.
4. Take measures to prevent construction materials and debris including, but not limited to wastewater (i.e., cooling liquid, etc.) associated with concrete removal from entering any inlets, ditches, or waterways.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions, including Regional conditions for the State of Texas, 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: Permit # _____

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Maintain a neat and clean worksite next to the water and do not allow any debris to fall into the water.
2. Comply with "Work In or Near Waters/Wetlands Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	

III. CULTURAL RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

IV. VEGETATION RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.
2. Comply with "Vegetation and Habitat Impacts: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
3. Any equipment that comes into contact with water is required to follow TPWD Clean, Drain, and Dry procedures to protect against the spreading of invasive aquatic species. See https://tpwd.texas.gov/fishboat/boat/protect_water or contact District environmental staff for guidance.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. This project contains potential habitat for the Southern Crawfish Frog, Spotted Dusky Salamander, Strecker's Chorus Frog, Woodhouse's Toad, Sprague's Pipit, Blackbelted Crayfish, Western Creek Chubsucker, American Eel, Blackspot Shiner, Mississippi Silvery Minnow, Sabine Shiner, Western Sand Darter, Phylocentropus harrisi, Texas Emerald Dragonfly, Rafinesque's Big-eared Bat, Eastern Spotted Skunk, Long-tailed Weasel, Southeastern Myotis Bat, Swamp Rabbit, Long-sepaled False Dragon-head, Scarlet Catchfly, Smooth Indigobush, Sutherland Hawthorn, Northern Scarlet Snake, Eastern Box Turtle, Pygmy Rattlesnake, Slender Glass Lizard, Timber (Canebrake) Rattlesnake, Timber (Canebrake), and the Western Chicken Turtle. If any animal enters the work area, do not harm, harass, or attempt to handle: let the animal leave on its own. Avoid unnecessary impacts to dens.
2. If caves or sinkholes are discovered on site, cease work in the area and contact the TxDOT Inspector or DEQC for guidance.
3. Comply with "Wildlife: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
4. Contractor shall maintain compliance with the Migratory Bird Treaty Act (MBTA) and (TPW) Code Section 64.002. For compliance with MBTA and TPW Code, bridge demolition, clearing of vegetation, and tree trimming activities are to be scheduled from October 1 to February 14 (outside of migratory bird nesting season). Contractor is responsible for securing a qualified biologist to conduct a nest survey for any bridge demolition, tree trimming, or vegetation clearing that occurs during migratory bird nesting season. The qualified biologist must submit a survey protocol for approval by District environmental staff prior to construction. A nesting survey will remain valid up to five days. Any activity not completed within 5 days of nesting survey will require another survey. Migratory bird nesting season is from February 15 to September 30. No removal of active nests is allowed during migratory bird nesting season: therefore, any structure or vegetation containing an active nest may not be disturbed, cleared, or trimmed. No removal of inactive nests is allowed during migratory bird nesting season except by an approved, qualified biologist. Contractor is responsible for ensuring all nests on bridge structures are removed prior to the start of nesting season. The full TxDOT MBTA guidance may be found here: https://ftp.txdot.gov/pub/txdot-info/env/toolkit/350-01-gui.pdf
5. Contractor shall comply with TPWD MOU for General Design and Construction, Vegetation BMP, Invasive Species, Water Quality, Stream Crossings, Rare Plant, Bird, Fish, Aquatic Invertebrate, Crayfish, Small Mammal, Bat, Aquatic Amphibian and Reptile, and Terrestrial Amphibian and Reptile. https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

☐ No Action Required ☒ Required Action

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Points, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances
- Any other evidence indicating possible hazardous materials or contamination discovered on site.

List below any bridge class structure(s), not including box culverts, being replaced, rehabilitated, removed, extended or modified as part of this project, or state "None", if applicable.
If "None", then no further action is required. Otherwise TxDOT is responsible for completing asbestos assessment/inspection and evaluation for presence of lead.

Provide results below:

Structure Location	PSN	Element	Lead	Asbestos
Big Walnut Creek	201220110901003	Varies	N/A	N/A

If Asbestos is present, then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary.

If Asbestos is not present, then TxDOT is still required to notify DSHS 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.

Hazardous Materials or Contamination Issues Specific to this Project:

Action No.

1. Comply with TxDOT Standard Specification 7.12 and Special Provision 006-012 if evidence of hazardous materials or contamination is noted during construction.
2. Notify TxDOT Inspector or DEQC of any hazardous materials spills including fuel, hydraulic fluid, etc.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. Comply with "General Construction" section found in the Beaumont District Environmental Field Guide.

Johnny J Darcey Jr
APPROVED BY

1/29/2024
DATE

DISTRICT ENVIRONMENTAL DEPARTMENT

Texas Department of Transportation

Beaumont District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR
©TxDOT February 2019	CONT	SECT	JOB	HIGHWAY
	1109	01	026	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		224

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
1109-01-026, ETC

1.2 PROJECT LIMITS:
From: 4.9 MI S OF US 190

To: US 190 AT AIRPORT

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 30.8609981 ,(Long) -94.0756983

END: (Lat) 30.8615276 ,(Long) -94.0754180

1.4 TOTAL PROJECT AREA (Acres): 61

1.5 TOTAL AREA TO BE DISTURBED (Acres): 6

1.6 NATURE OF CONSTRUCTION ACTIVITY:
ROADWAY WIDENING, ROADWAY OVERLAY, AND REPLACEMENT OF EXISTING BRIDGE.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
PINETUCKY - SHANKLER - DOUCETTE 1% TO 8% SLOPES	70 - 80% PINETUCKY SOILS; 5 - 15% DOUCETTE SOILS; 15 - 30% SHANKLER SOILS. DEEP, LOAMY AND SANDY SOILS ON BROAD RIDGES AND SIDE SLOPES ON UPLANDS.
IUKA - MANTACHIE 0% TO 2% SLOPES	5 - 10% IUKA SOILS; 40 - 65% MANTACHIE SOILS; 5 - 10% OTHER SOILS. DEEP, LOAMY SOILS ON BOTTOM LANDS ALONG FLOOD PLAINS AND MAJOR RIVERS AND STREAMS.
BESNER - BERNALDO 0% TO 3% SLOPES	20 - 35% BESNER SOILS; 40 - 45% BERNALDO SOILS; 20 - 30% OTHER SOILS. DEEP, LOAMY SOILS ON TERRACES OF MAJOR RIVER SYSTEMS.
WOODVILLE - REDCO 0% TO 5% SLOPES	70 - 80% WOODVILLE SOILS; 5 - 15% REDCO SOILS; 5 - 15% OTHER SOILS. DEEP, LOAMY AND CLAYEY SOILS ON BROAD RIDGES AND SIDE SLOPES ON UPLANDS.

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☐ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
BIG WALNUT RUN	UNCLASSIFIED

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED PROFESSIONAL ENGINEER

02.01.24

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			225
STATE	STATE DIST.	COUNTY	
TEXAS	BMT	JASPER	
CONT.	SECT.	JOB	HIGHWAY NO.
1109	01	026, ETC	FM 777

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [X] [ ] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [ ] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [ ] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [ ] [ ] Inlet Protection
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [ ] [ ] Sediment Control Fence
- [ ] [ ] Stabilized Construction Exit
- [ ] [ ] Floating Turbidity Barrier
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Vegetated Filter Strips
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- [ ] [ ] Sediment Trap
  - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - [ ] 3,600 cubic feet of storage per acre drained
- [ ] [ ] Sedimentation Basin
  - [ ] Not required (<10 acres disturbed)
  - [ ] Required (>10 acres) and implemented.
    - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - [ ] 3,600 cubic feet of storage per acre drained
  - [ ] Required (>10 acres), but not feasible due to:
    - [ ] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [ ] Public safety
    - [ ] Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [ ] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [ ] Stabilized construction exit
- [ ] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [X] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [ ] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
JESSE L. LOFTIN
106140
LICENSED
PROFESSIONAL ENGINEER

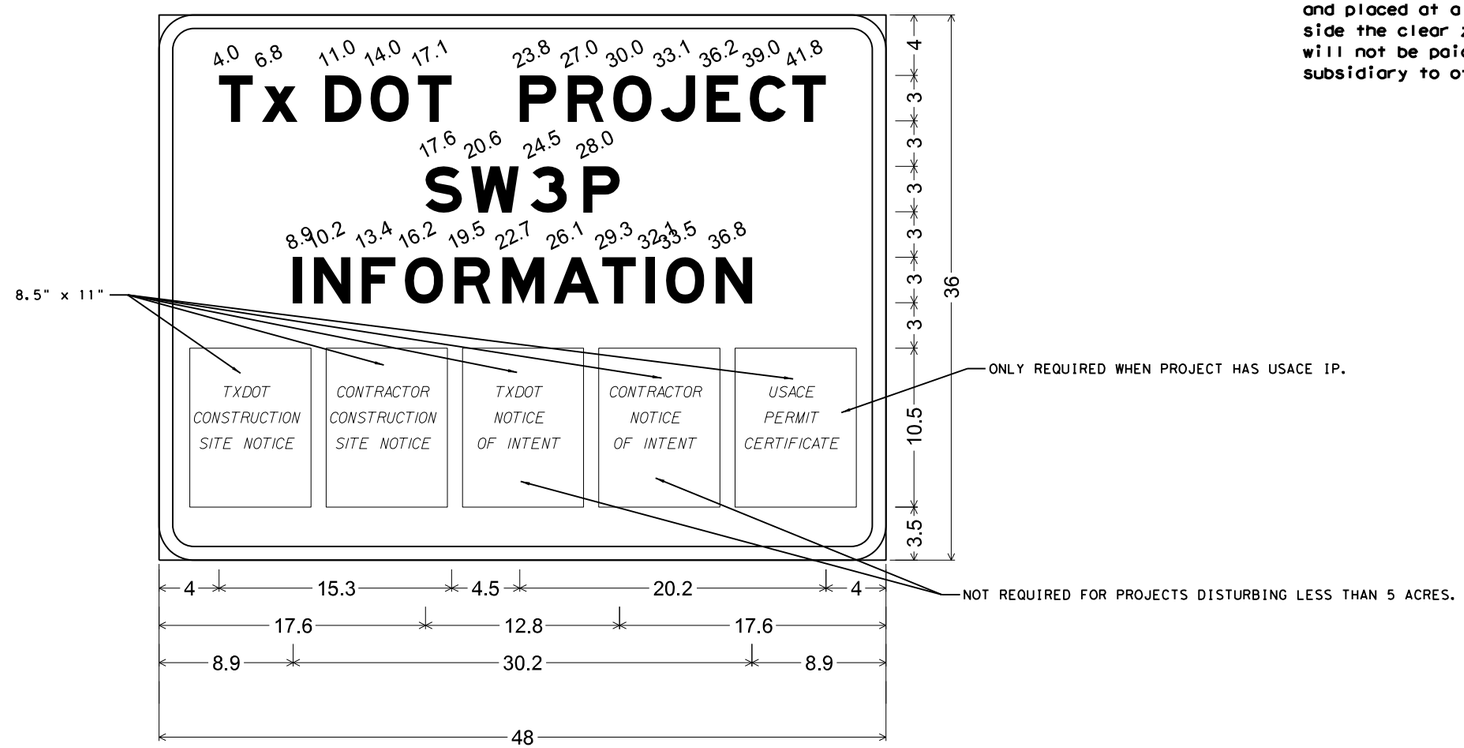
01.30.24

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			226
STATE	STATE DIST.	COUNTY	
TEXAS	BMT	JASPER	
CONT.	SECT.	JOB	HIGHWAY NO.
1109	01	026, ETC	FM 777



2.3" Radius, 0.9" Border, White on Blue;
[TxDOT PROJECT] E Mod; [SW3P] E Mod; [INFORMATION] E Mod;

NOTES:

For projects disturbing 5 or more acres, place laminated copies of the TxDOT and Contractor Construction Site Notices and the TxDOT and Contractor Notices of Intent on the SW3P Notification Board.

For projects disturbing between 1 and 5 acres, place laminated copies of the TxDOT and Contractor Construction Site Notices on the SW3P Notification Board.

For projects with an Individual Permit with the US Army Corp of Engineer, place a laminated copy of the Permit Certificate on the Notification Board.

Center all postings.

Notification Boards are to be constructed from chloroplast and placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.

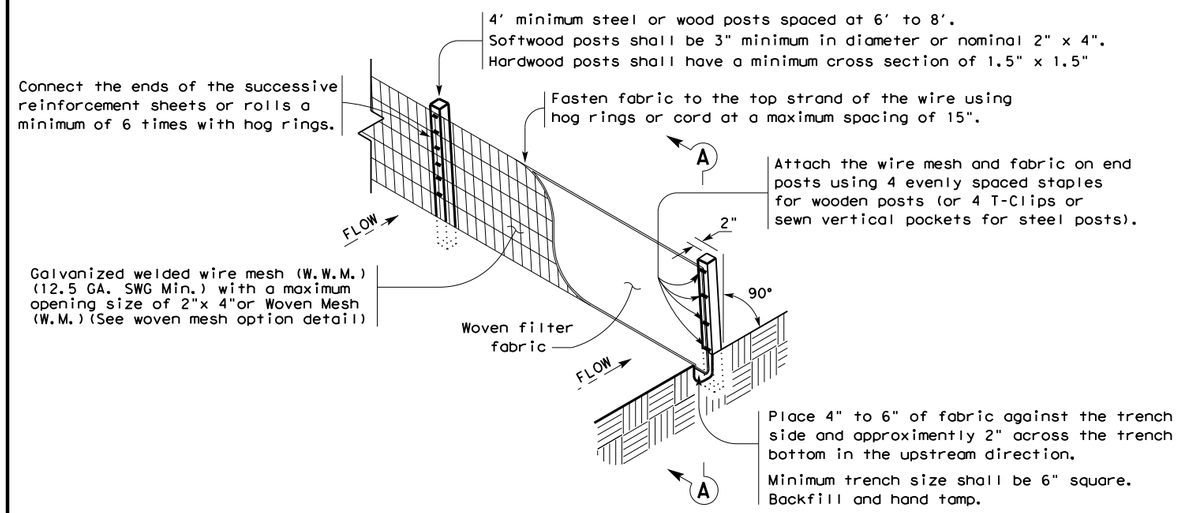
Texas Department of Transportation

BEAUMONT DISTRICT

SW3P NOTIFICATION BOARD DETAIL

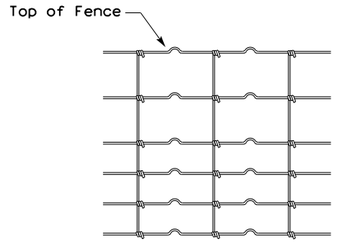
(SW3P-B)

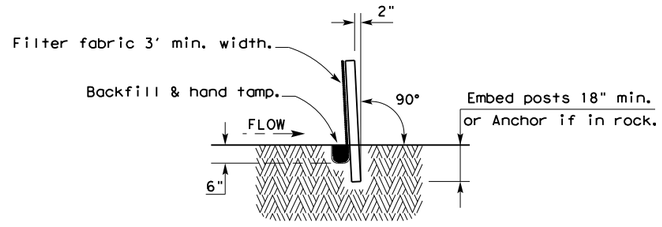
REVISIONS	FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
© 2019				227
	STATE	DISTRICT	COUNTY	
	TEXAS	BMT	JASPER	
	CONTROL	SECTION	JOB	HIGHWAY NO.
	1109	01	ADD. ETC.	FM 777



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.

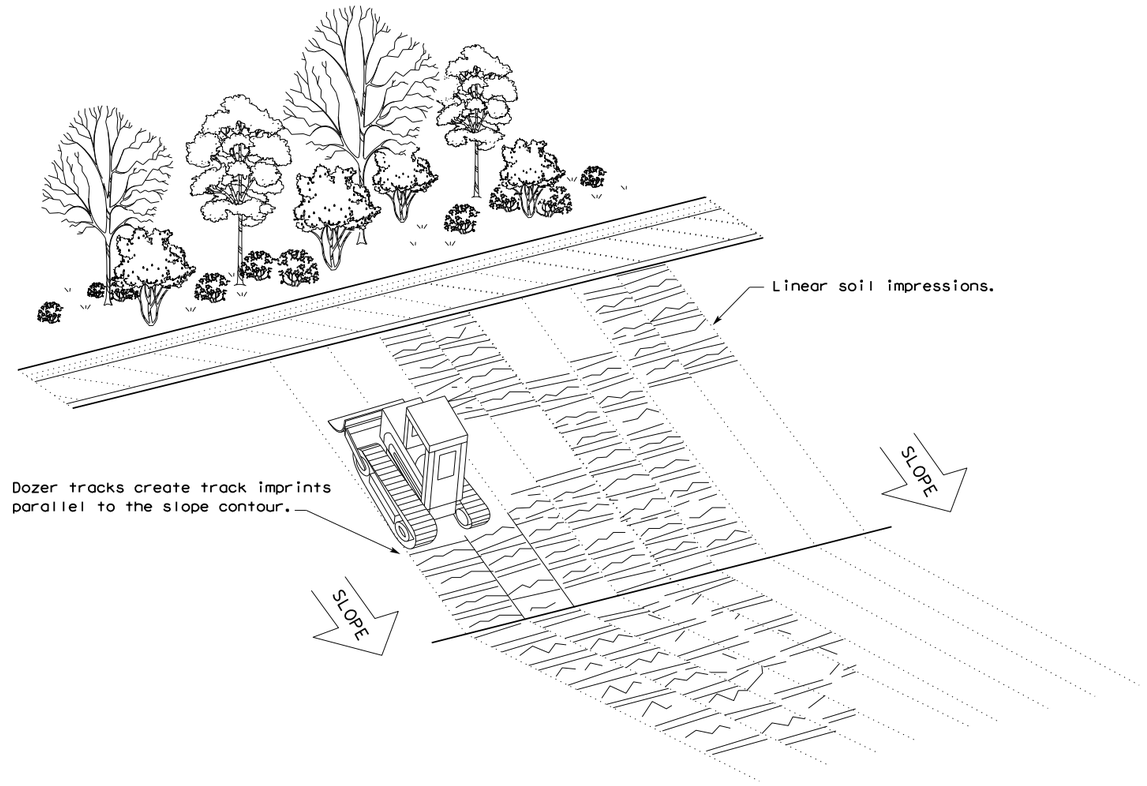
LEGEND

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	1109	01	026, ETC		FM 777	
	DIST	COUNTY			SHEET NO.	
	BMT	JASPER			228	

10/30/2024
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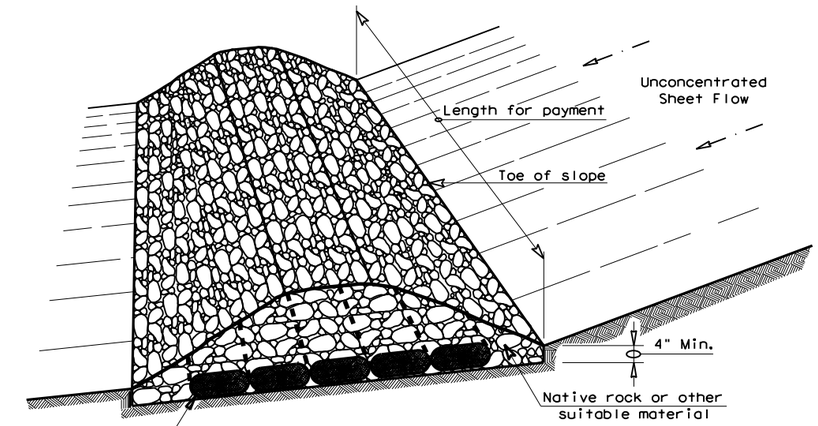
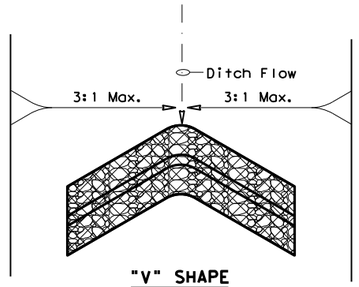
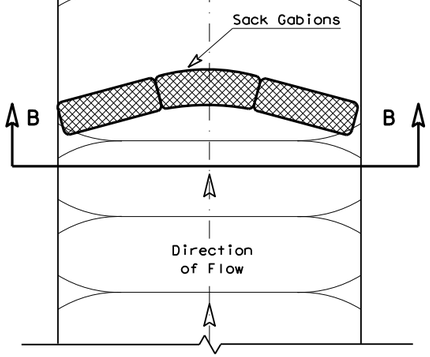


FILTER DAM AT TOE OF SLOPE

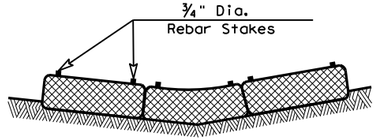
RFD1



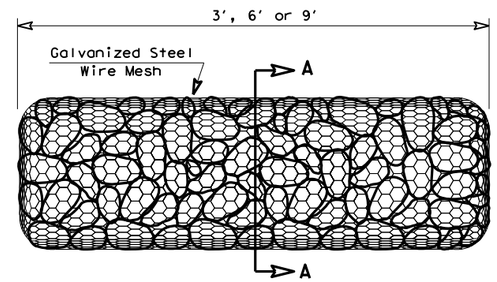
"V" SHAPE PLAN VIEW



PLAN VIEW

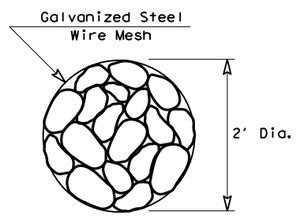


SECTION B-B

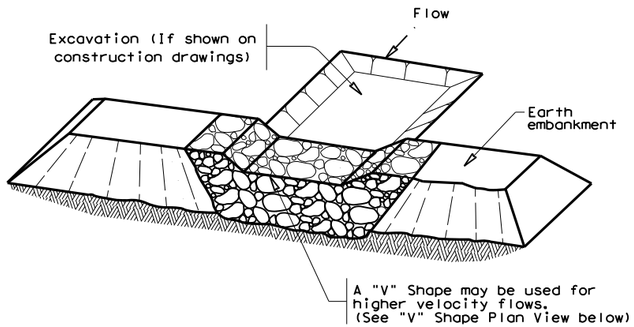


TYPE 4 (SACK GABIONS)

RFD4

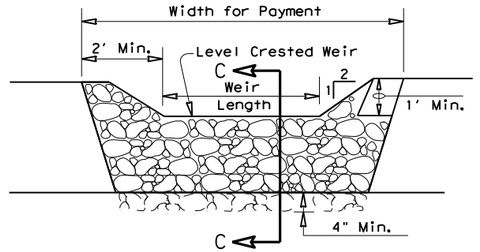


SECTION A-A

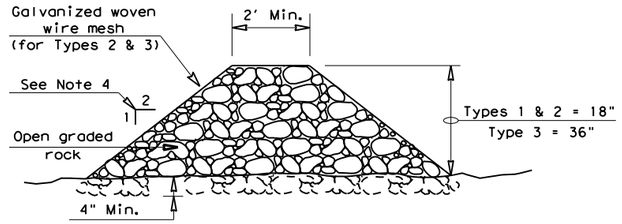


FILTER DAM AT SEDIMENT TRAP

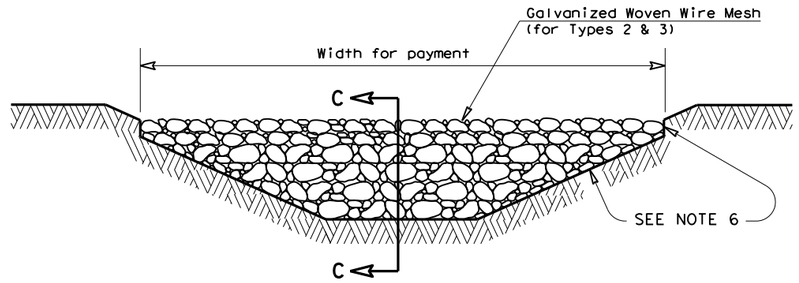
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1109	01	026, ETC	FM 777
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		229

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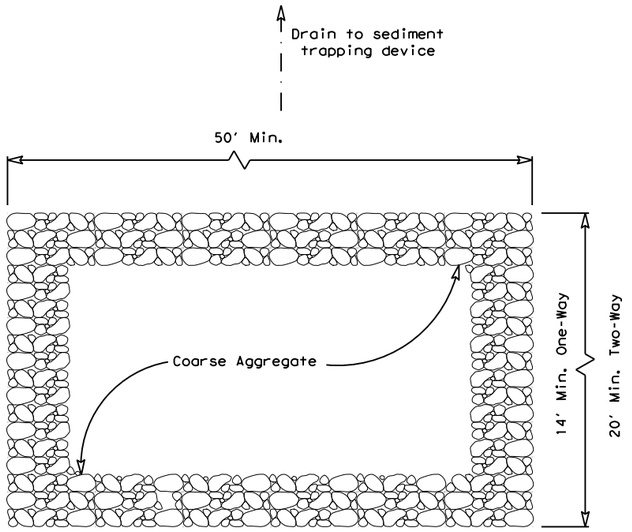
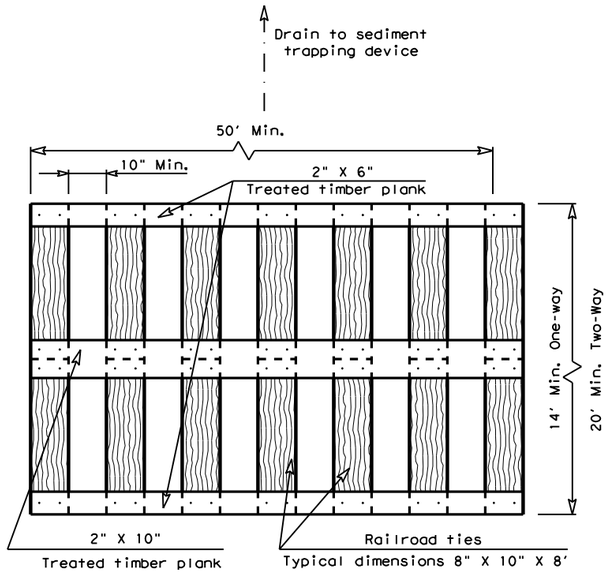


PLAN VIEW



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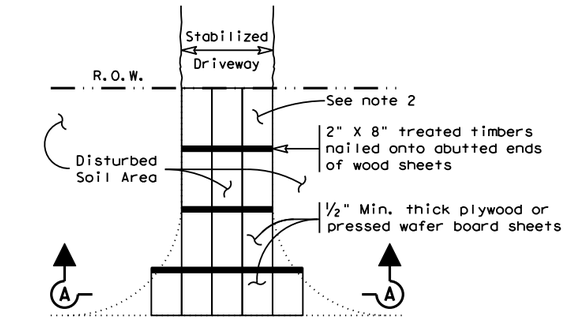
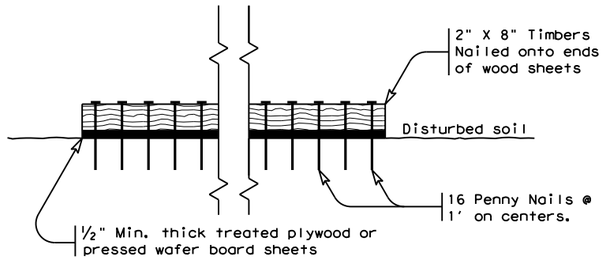


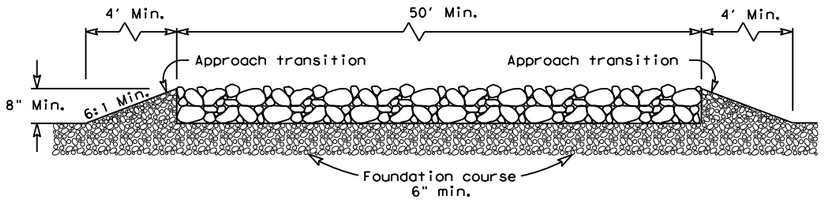
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

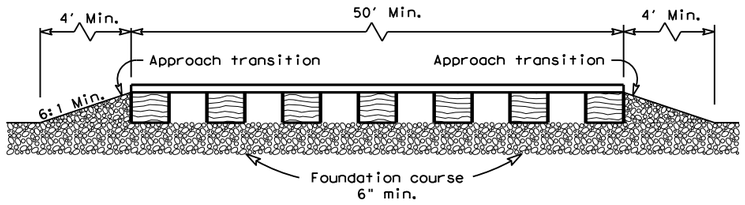
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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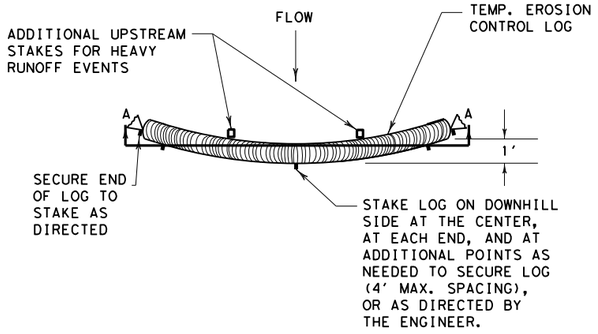
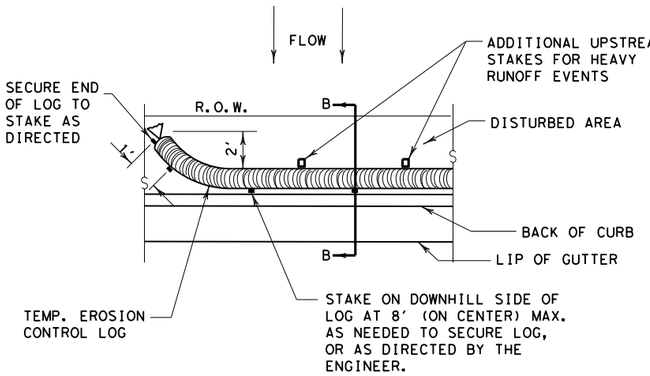
	DIST	COUNTY		SHEET NO.
	BMT	JASPER		230



PLAN VIEW



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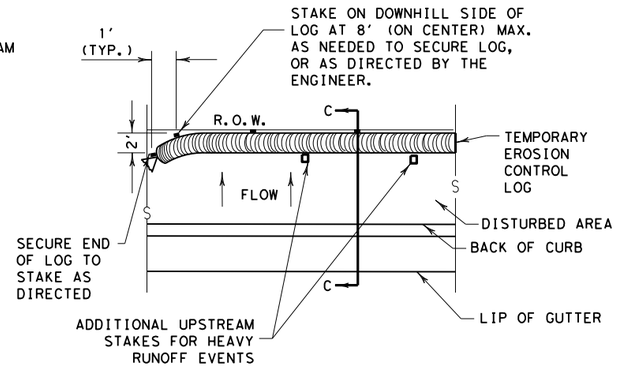

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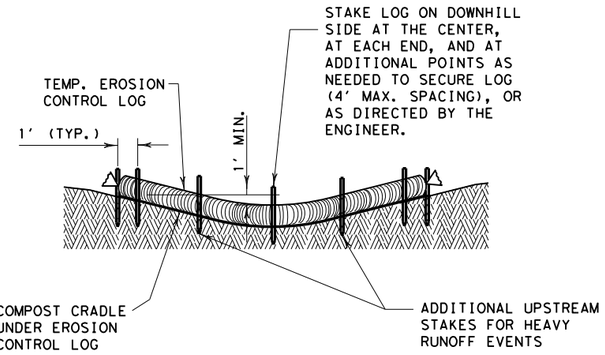
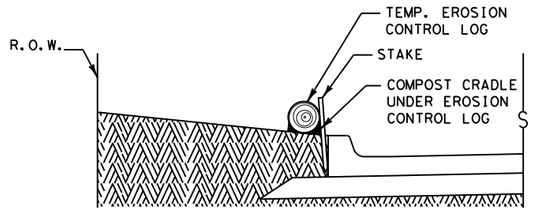


SECTION A-A

EROSION CONTROL LOG DAM

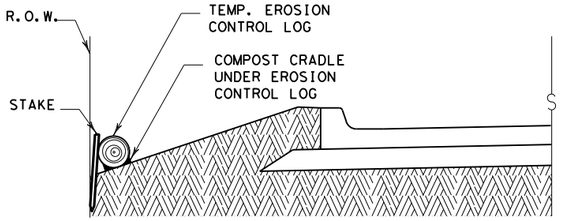
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

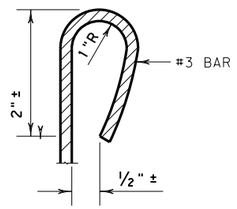
CL-BOC



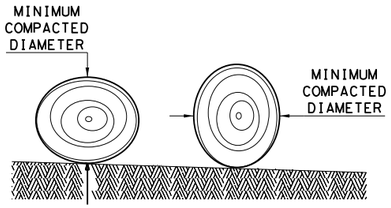
SECTION C-C

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.

SHEET 1 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
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	BMT	JASPER		231

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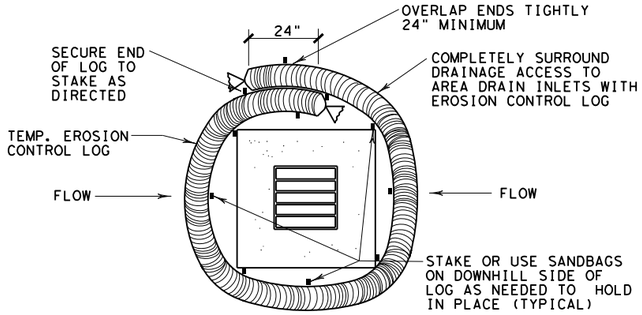
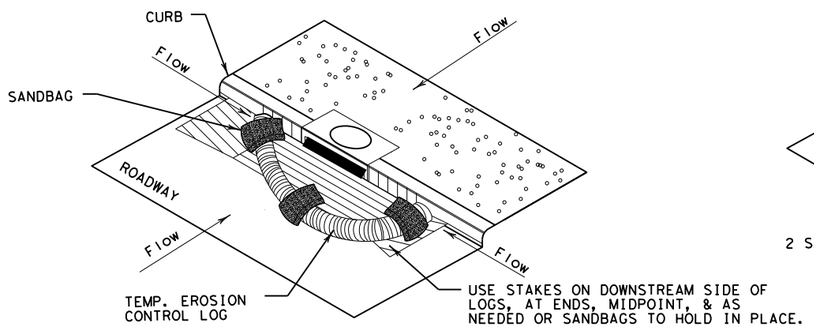


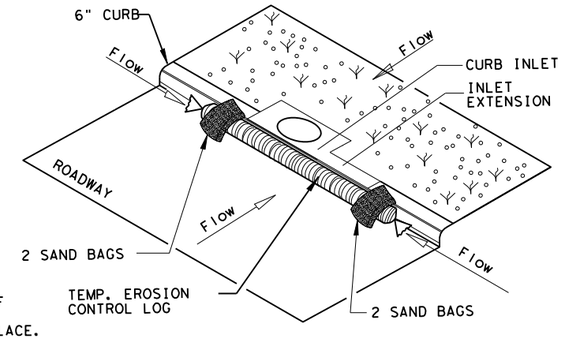
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

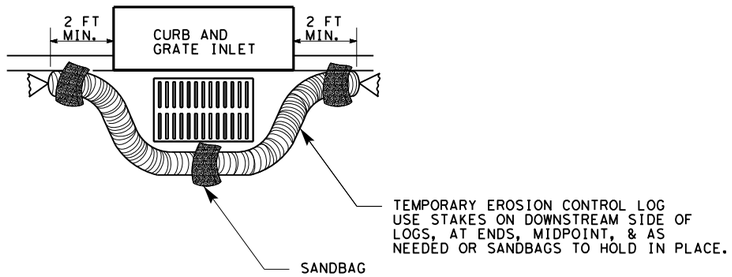
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

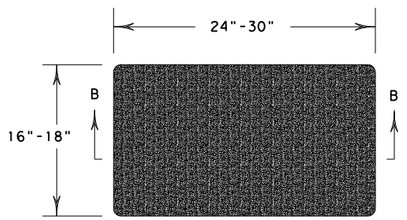
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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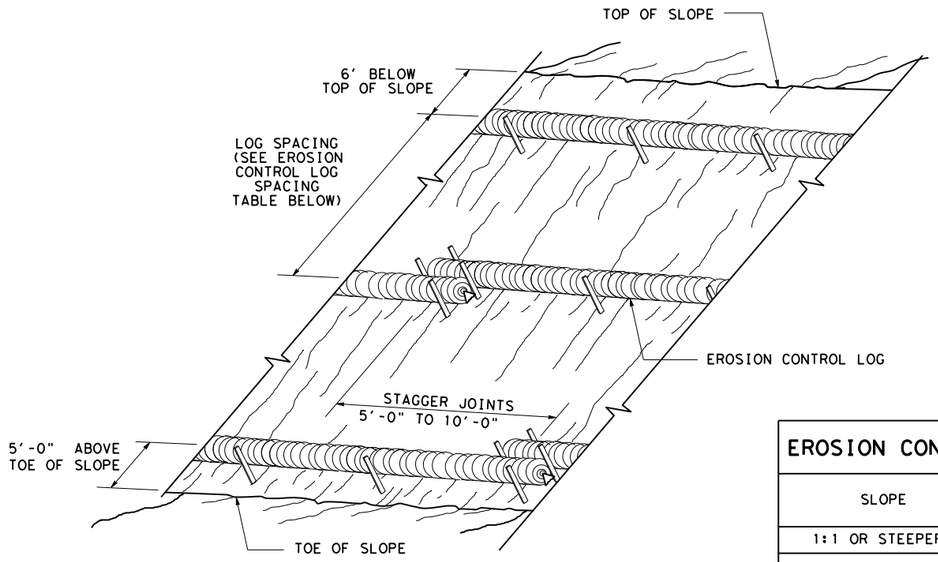
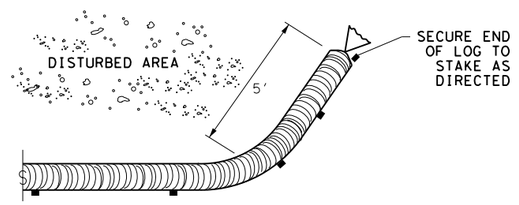


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

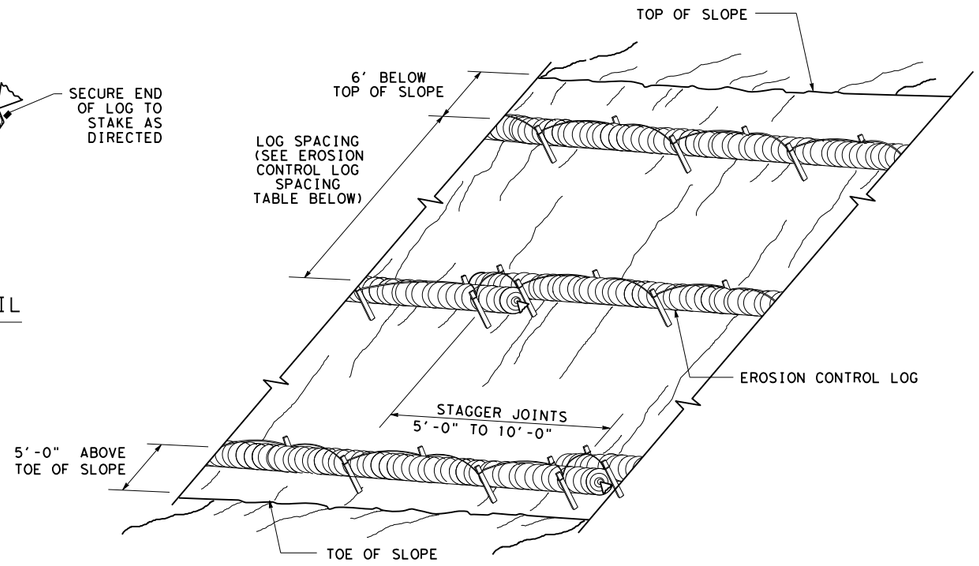
CL-SST



END SECTION RAP DETAIL

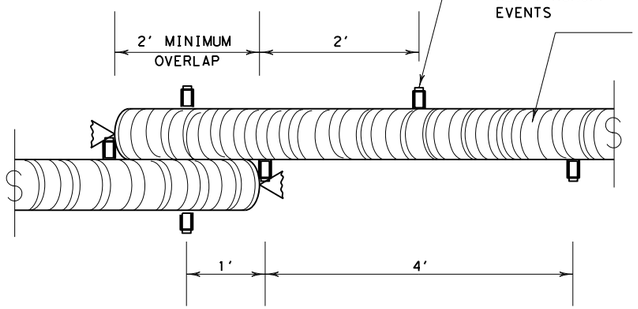
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

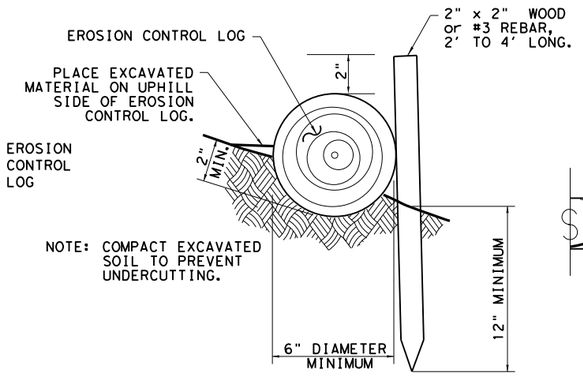
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

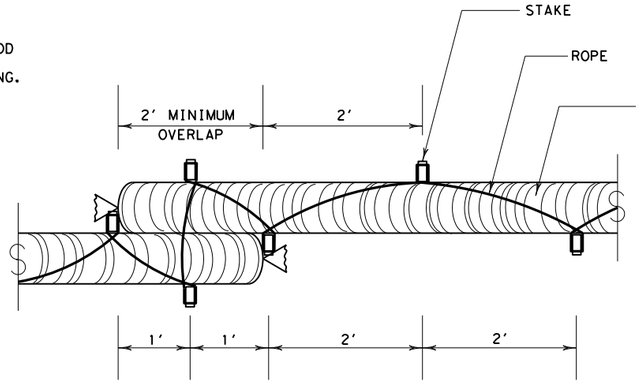


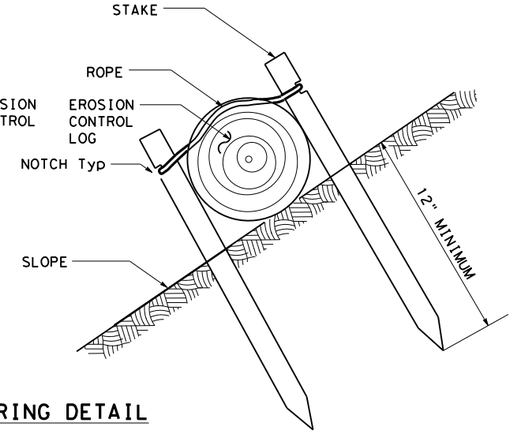


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

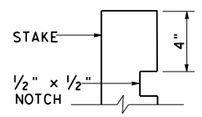
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1109	01	026, ETC		FM 777	
	DIST	COUNTY			SHEET NO.	
	BMT	JASPER			233	