FED.RD. DIV.NO.			HIGHWAY NO.
6			FM 81
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	CRP	KARNES	1
CONTROL	SECTION	JOB	
0691	01	044	

INDEX OF SHEETS
SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

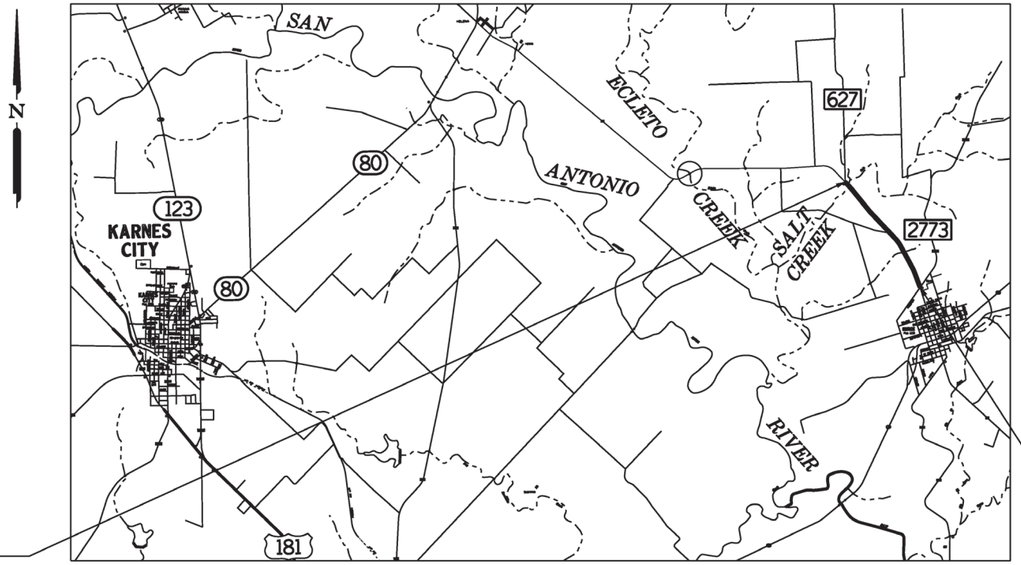
PROJECT NUMBER: F2023 (101)

NET LENGTH OF PROJECT = 10,206.74 FEET = 1.933 MILES
- ROADWAY = 9,998.24 FT. = 1.894 MI.
- BRIDGE = 208.50 FT. = 0.039 MI.

KARNES COUNTY
FM 81

LIMITS: FROM FM 627 TO FM 2773

FOR THE CONSTRUCTION OF REHALILITATION AND WIDENING OF THE EXISTING ROADWAY, CONSISTING OF GRADING, BASE, SURFACE AND STRUCTURES.



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

BEGIN PROJECT
CSJ: 0691-01-044
STA 340+78.26
REF MRKR: 546+1.431
MILE PT: 7.422

END PROJECT
CSJ: 0691-01-044
STA 442+85.00
REF MRKR: 548+1.362
MILE PT: 9.345

STATE OF TEXAS
JEFFREY E. WESANEN
117522
LICENSED
PROFESSIONAL ENGINEER
6/29/2022

Stantec
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Texas Registered Engineering Firm F-6324

DESIGN DATA

ADT 2020: 3,100
ADT 2040: 4,340
FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN CRITERIA: 3R - STA 340+78.26 TO STA 343+00.00
4R - STA 343+00.00 TO STA 349+00.00
3R - STA 349+00.00 TO STA 350+40.00
2R - STA 350+40.00 TO STA 442+85.00
MIN DESIGN SPEED: 40 MPH

CONSTRUCTION SPEED ZONE HAS BEEN REQUESTED

TDLR INSPECTION NOT REQUIRED

FINAL PLANS

DATE OF LETTING: _____

CONTRACTOR: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

CONTRACT AMOUNT: _____

FINAL CONTRACT AMOUNT: _____

WORKING DAYS ALLOTTED: _____

WORKING DAYS USED: _____

FINAL PLANS STATEMENT

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL PLANS AND SPECIFICATIONS

_____
AREA ENGINEER DATE

RECOMMENDED FOR LETTING: 6/29/2022
DocuSigned by: Paula Sales-Evans, P.E.
5975450A18CC435...
TRANSPORTATION, PLANNING & DEVELOPMENT

APPROVED FOR LETTING: 6/30/2022
DocuSigned by: Valente Olivarez
303F64E8A9B44E0...
DIRECTOR ENGINEER

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

Texas Department of Transportation

I. GENERAL

SHEET NO		DESCRIPTION
1		TITLE SHEET
2		INDEX OF SHEETS
3 - 6		PROJECT LAYOUT AND ADVANCE WARNING SIGNS
7		EXISTING TYPICAL SECTIONS
8 - 10		PROPOSED TYPICAL SECTIONS
11, 11A - 11H		GENERAL NOTES
12, 12A - 12C		ESTIMATE AND QUANTITY SHEET
13		SUMMARY OF QUANTITIES - TRAFFIC CONTROL PLAN
14 - 15		SUMMARY OF QUANTITIES - ROADWAY
16		SUMMARY OF QUANTITIES - EARTHWORK
17		SUMMARY OF QUANTITIES - DRIVEWAY AND MAILBOX
18		SUMMARY OF QUANTITIES - DRAINAGE
19		SUMMARY OF QUANTITIES - BRIDGE
20		SUMMARY OF QUANTITIES - SIGNING AND PAVEMENT MARKING
21		SUMMARY OF QUANTITIES - SW3P
22		SUMMARY OF QUANTITIES - REMOVAL
23		CRASH CUSHION SUMMARY SHEET

II. TRAFFIC CONTROL PLAN

SHEET NO		DESCRIPTION
24		TRAFFIC CONTROL PLAN GENERAL NOTES
25		TRAFFIC CONTROL PLAN SEQUENCE OF CONSTRUCTION
26 - 28		TRAFFIC CONTROL PLAN TYPICAL SECTIONS
29 - 30		TRAFFIC CONTROL PLAN
31		TRAFFIC CONTROL PLAN TEMPORARY SPECIAL SHORING
32		TRAFFIC CONTROL PLAN SPECIAL TRAFFIC BARRIER LAYOUT

STANDARDS

SHEET NO		DESCRIPTION
33 - 44	#A	BC(1)-21 THRU BC(12)-21
45	#A	TCP(1-1)-18
46	#A	TCP(1-2)-18
47	#A	TCP(2-1)-18
48	#A	TCP(2-2)-18
49	#A	TCP(2-8)-18
50	#A	TCP(3-1)-13
51	#A	TCP(3-3)-14
52	#A	TCP(7-1)-13
53	#A	WZ(STPM)-13
54	#A	WZ(UL)-13
55	#A	WZ(RS)-22
56 - 57	#A	CSB(1)-10
58	#A	CSB(7)-10
59	#A	ABSORB(M)-19
60	#A	SLED-19
61	#A	DTCP(1-1)-03

III. ROADWAY DETAILS

SHEET NO		DESCRIPTION
62 - 68		SURVEY CONTROL
69 - 70		HORIZONTAL ALIGNMENT DATA
71 - 80		PLAN AND PROFILE
81		CROSS STREET PLAN AND PROFILE
82		INTERSECTION LAYOUT
83		DRIVEWAY DATA AND DETAILS
84		RIPRAP LAYOUT
85		MISCELLANEOUS ROADWAY DETAILS

STANDARDS

SHEET NO		DESCRIPTION
86	#A	GF(31)-19
87	#A	GF(31)LS-19
88 - 89	#A	GF(31)TRTL3-20
90	#A	BED-14
91	#A	SGT(10S)31-16
92	#A	SGT(12S)31-18
93	#A	TE(HMAC)-11
94	#A	WF(2)-10
95 - 98	#A	MB(1)-21 THRU MB(4)-21
99	#A	MB-14(2)
100	#A	MB-14(2A)
101	#A	MB-14(2B)
102 - 103	#A	TRB-15 (MOD)
104	#A	CRP-GF(31)MS-19

IV. RETAINING WALL DETAILS

NONE

V. DRAINAGE DETAILS

SHEET NO		DESCRIPTION
105		OVERALL DRAINAGE AREA MAP
106		DRAINAGE AREA MAP
107 - 108		HYDARULIC DATA - BRIDGE CLASS CULVERT B14
109		CULVERT HYDRAULIC DATA
110 - 112		CULVERT LAYOUT
113 - 114		TEMPORARY SPECIAL SHORING PROFILE
115		MISCELLANEOUS DRAINAGE DETAILS
116		BCS

STANDARDS

SHEET NO		DESCRIPTION
117	#A	SCC-MD
118 - 119	#A	SCC-3 & 4
120	#A	SCP-MD
121	#A	SCP-4
122	#A	SCP-5
123	#A	SCP-12
124	#A	ECD
125	#A	PW
126 - 127	#A	SETB-CD
128	#A	SETP-PD
129	#A	PSET-SP
130	#A	PSET-RP
131	#A	PSET-RR

VI. UTILITIES

SHEET NO		DESCRIPTION
132		EXISTING UTILITY LEGEND
133 - 138		EXISTING UTILITY PLAN

VII. BRIDGES

SALT CREEK

SHEET NO		DESCRIPTION
139		DRAINAGE AREA
140 - 141		HYDRAULIC DATA
142		BRIDGE LAYOUT
143		TYPICAL SECTION
144		ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS
145 - 147		BORING LOGS
148		FOUNDATION LAYOUT
149 - 150		ABUTMENT 1 DETAILS
151 - 152		ABUTMENT 4 DETAILS
153 - 154		BENTS DETAILS
155		BEAM LAYOUT
156		180.00' PRESTRESSED CONCRETE X-BEAM UNIT 1
157		SLAB DETAILS
158		FLAT SLAB TEMPORARY TRAFFIC BARRIER SLAB SUPPORT DETAIL
159		XBND

STANDARDS

SHEET NO		DESCRIPTION
160	#B	XBEB(MOD)
161	#B	CRR
162 - 163	#B	CSAB
164 - 165	#B	FD
166 - 169	#B	PCP
170	#B	PCP-FAB
171 - 172	#B	PMDF
173	#B	SEJ-M
174 - 175	#B	SRR
176 - 178	#B	TYPE T223
179 - 180	#B	XB20
181	#B	XBBR-MS
182	#B	XBCS
183	#B	XBSK
184	#B	XBTS

VIII. TRAFFIC ITEMS

SHEET NO		DESCRIPTION
185 - 190		SIGNING AND PAVEMENT MARKING PLAN
191 - 192		SUMMARY OF SMALL SIGNS
193		SIGN DETAILS
194		REFLECTIVE WRAP DETAIL

STANDARDS

SHEET NO		DESCRIPTION
195 - 197	#C	TSR(3)-13 THRU TSR(5)-13
198 - 202	#C	D & OM(1)-20 THRU D & OM(5)-20
203	#C	D & OM(VIA)-20
204 - 206	#C	PM(1)-20 THRU PM(3)-20
207	#C	SMD(GEN)-08
208 - 210	#C	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
211	#C	SMD(2-1)-08
212	#C	RS(3)-13
213	#C	RS(4)-13

IX. ENVIRONMENTAL ISSUES

SHEET NO		DESCRIPTION
214 - 215		ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
216		STORM WATER POLLUTION PREVENTION PLAN (SW3P)
217 - 222		SW3P LAYOUT

STANDARDS

SHEET NO		DESCRIPTION
223	#A	EC(1)-16
224	#A	EC(2)-16
225	#A	EC(3)-16

X. MISCELLANEOUS ITEMS

SHEET NO		DESCRIPTION
226 - 231		REMOVAL PLAN

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER

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

WEIYIH TEE, P.E., P.E. & 6/28/2022 Date

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER

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

LAUREN N. C. BROD, P.E., P.E. & 6/28/2022 Date

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED
PROFESSIONAL ENGINEER

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

ANAMARIA E. TORRES, P.E., P.E. & 6/28/2022 Date

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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

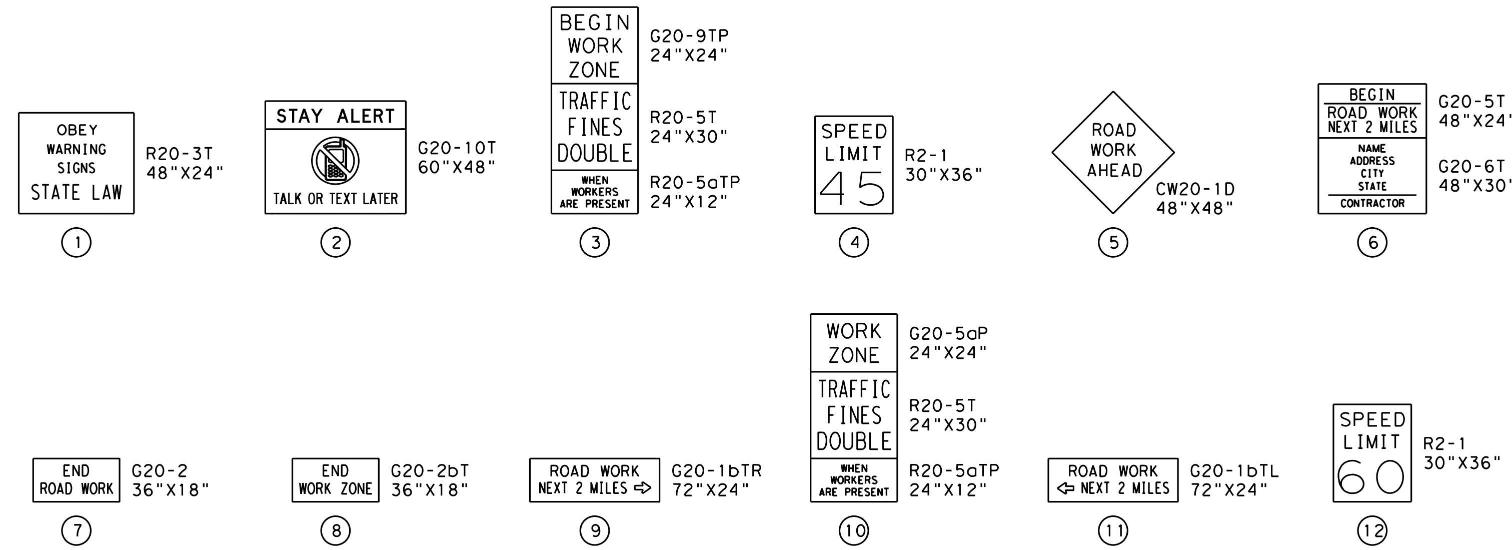
FM 81
INDEX OF SHEETS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	2
CONTROL	SECTION	JOB	
0691	01	044	

LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- FEMA FLOOD PLAIN
- EXISTING ROW
- EXISTING FENCE
- OVERHEAD POWERLINE



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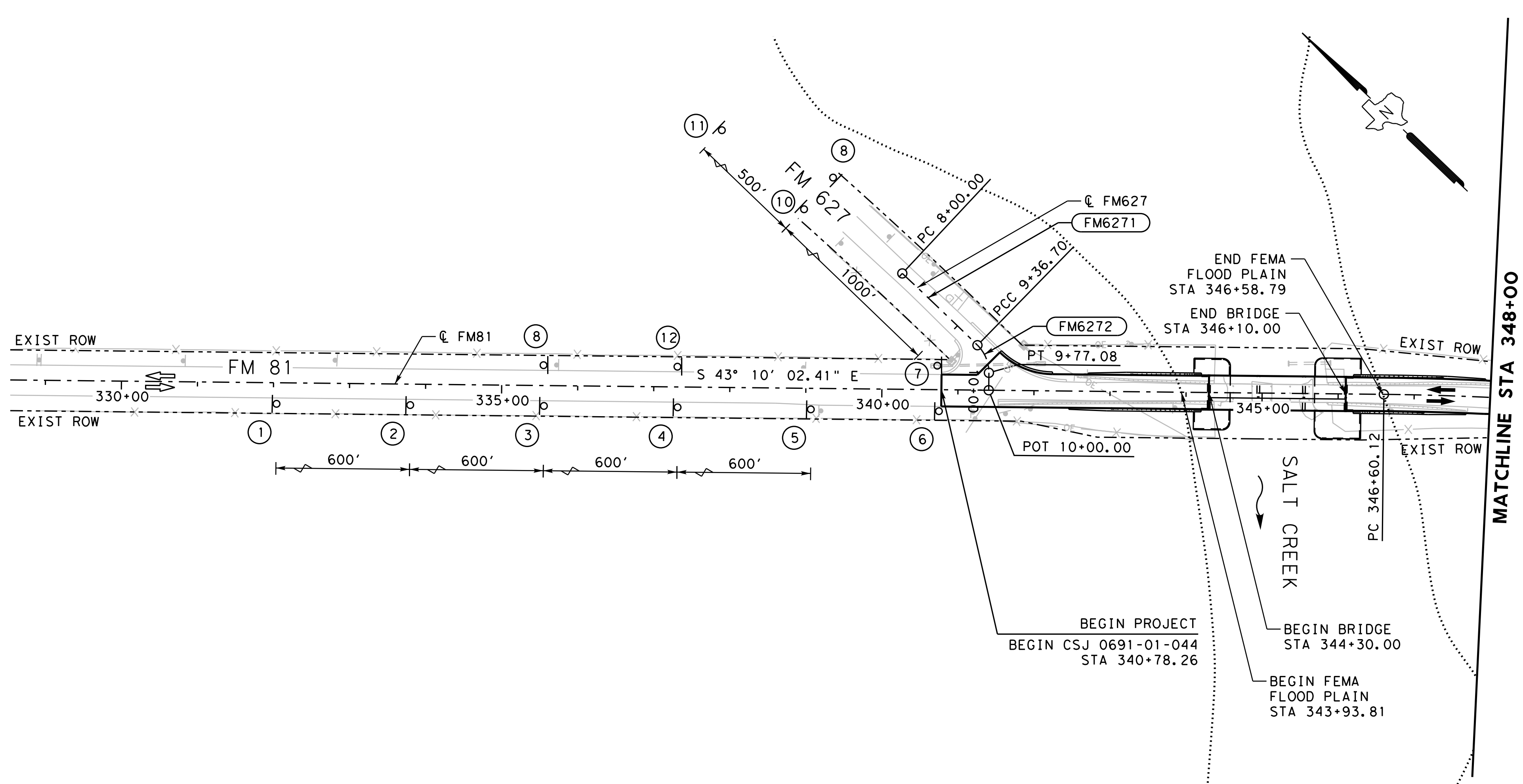

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

BEGIN PROJECT TO STA 348+00

SCALE: 1"=200' SHEET 1 OF 4

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	3
CONTROL	SECTION	JOB	
0691	01	044	

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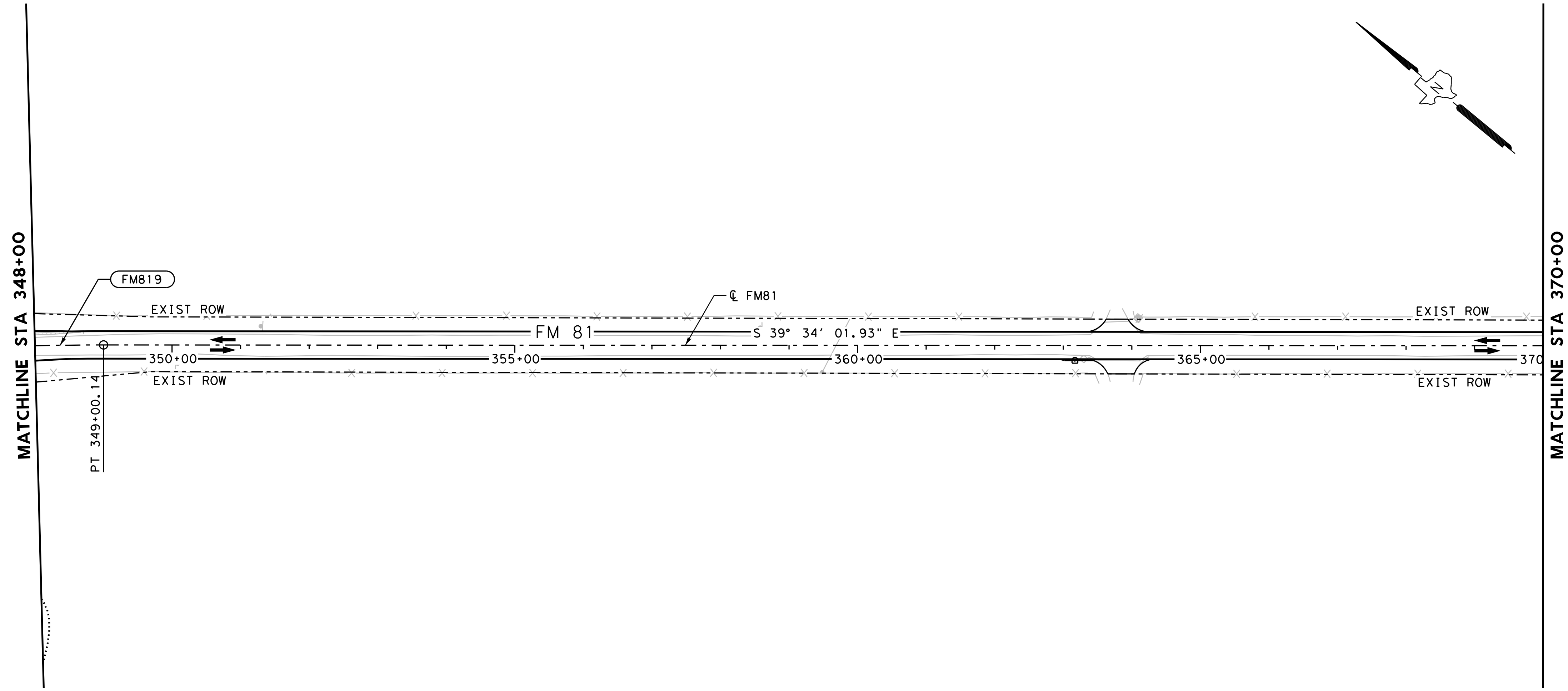

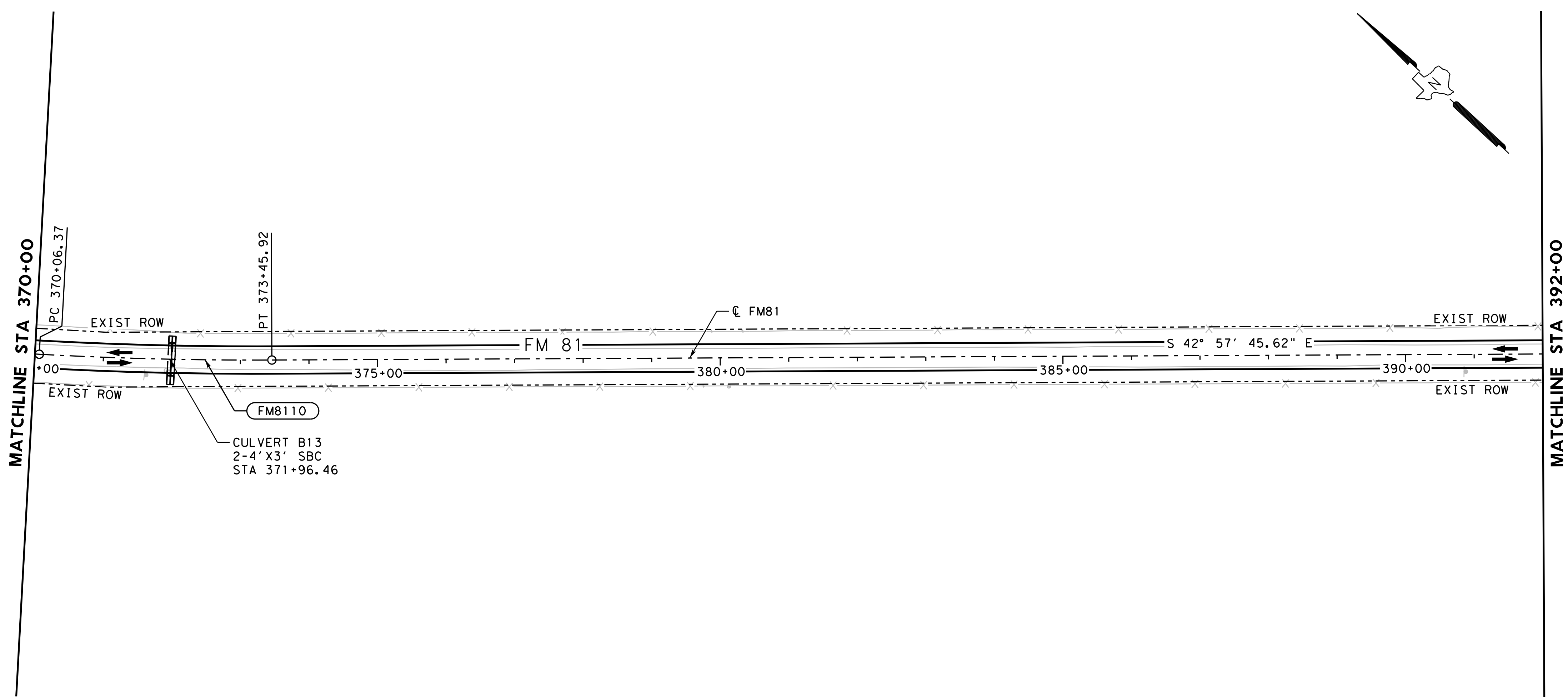

LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- FEMA FLOOD PLAIN
- EXISTING ROW
- EXISTING FENCE
- OE1 — OE1 OVERHEAD POWERLINE

0 100 200
SCALE: 1"=200'

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

STA 348+00 TO STA 392+00

SCALE: 1"=200' SHEET 2 OF 4

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	4
CONTROL	SECTION	JOB	
0691	01	044	

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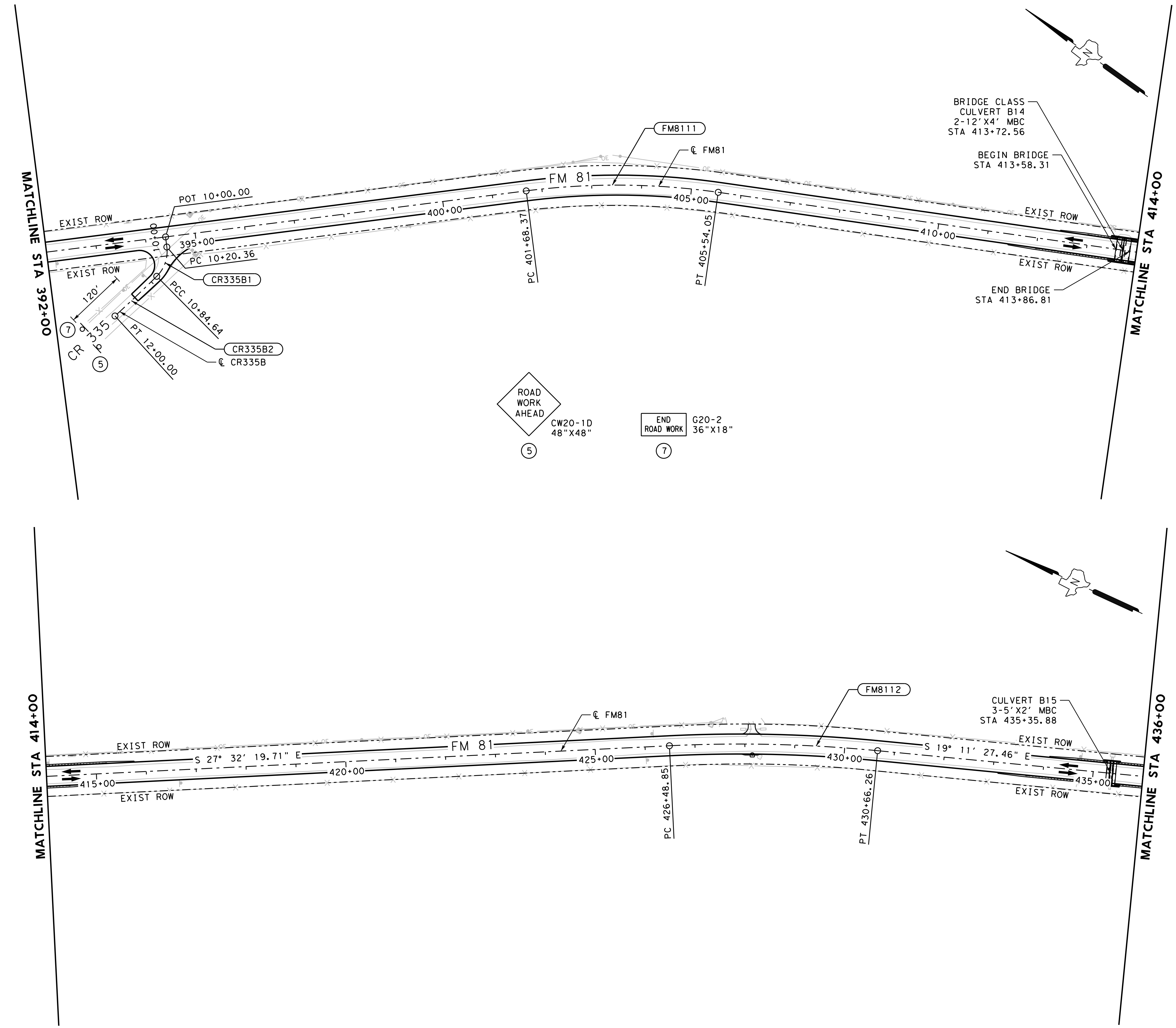

LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- FEMA FLOOD PLAIN
- EXISTING ROW
- EXISTING FENCE
- OE1——OE1 OVERHEAD POWERLINE

0 100 200
SCALE: 1"=200'

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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Texas Registered Engineering Firm F-6324

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PROJECT LAYOUT AND ADVANCE WARNING SIGNS

STA 392+00 TO STA 436+00

SCALE: 1"=200' SHEET 3 OF 4

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	5
CONTROL	SECTION	JOB	
0691	01	044	

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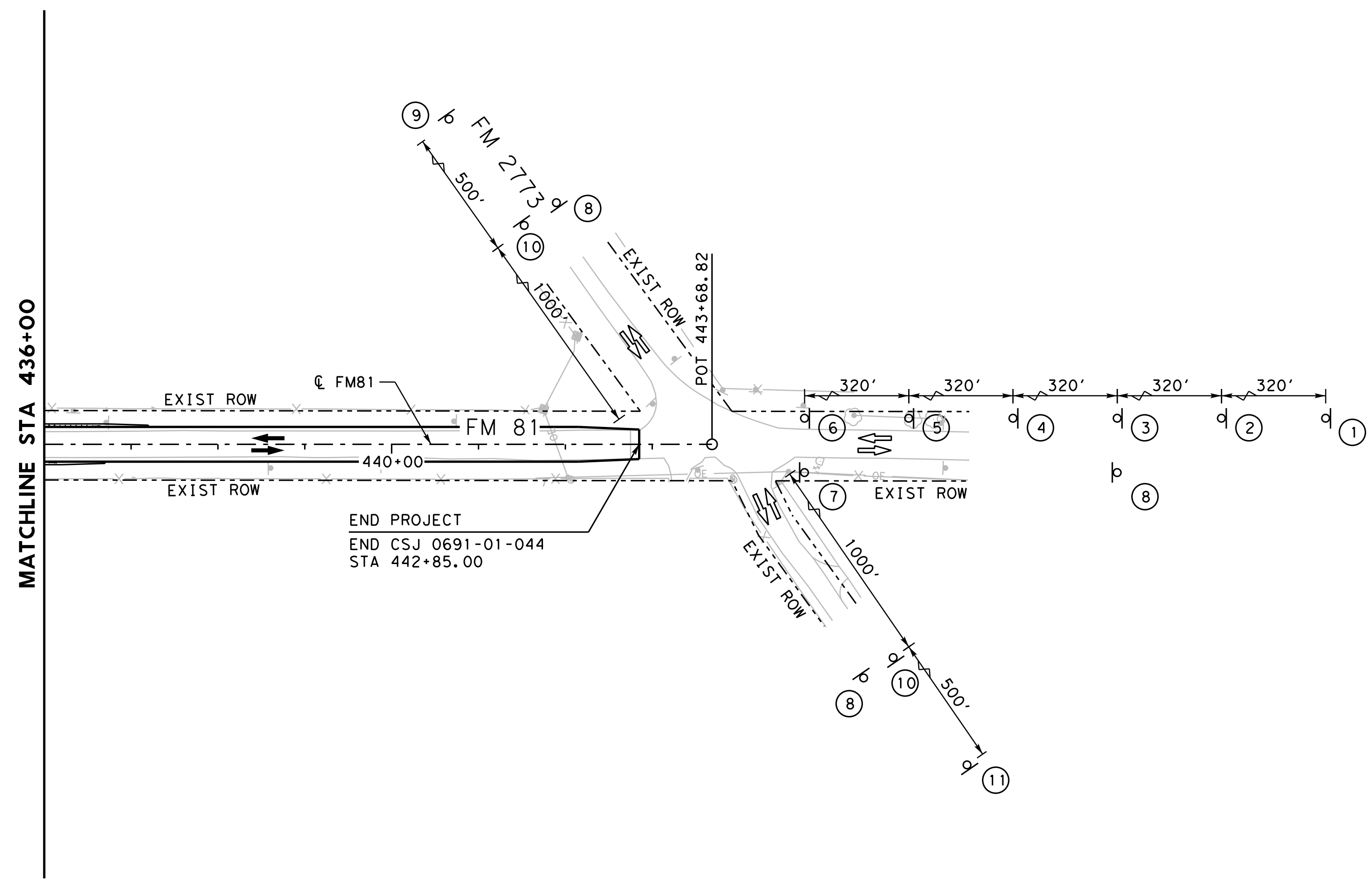
LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- FEMA FLOOD PLAIN
- EXISTING ROW
- EXISTING FENCE
- OE1 —— OE1 OVERHEAD POWERLINE



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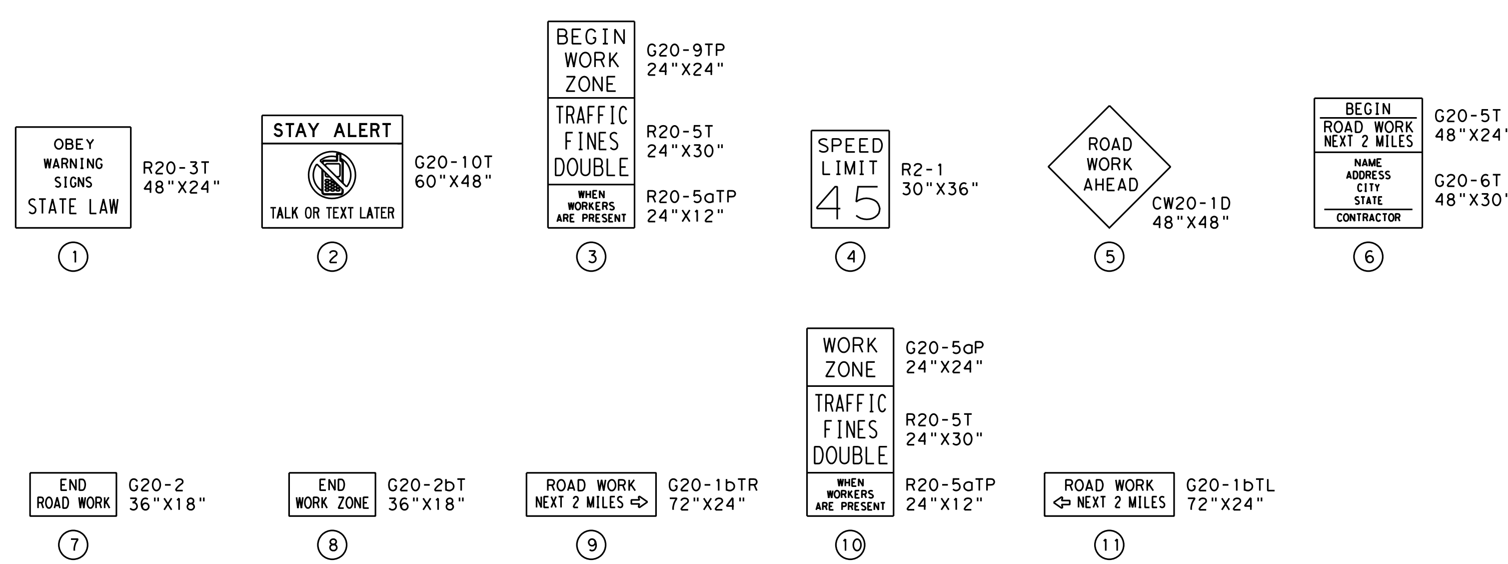

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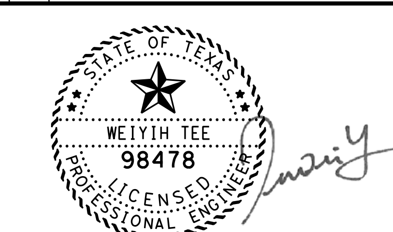

6/17/2022

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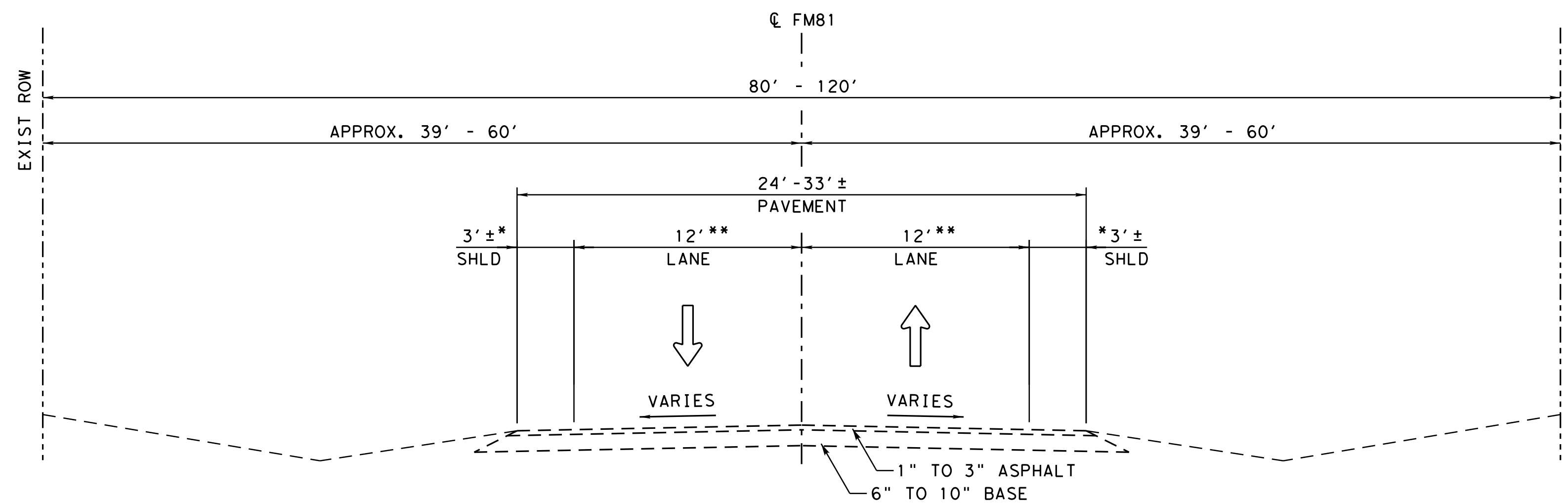
FM 81

PROJECT LAYOUT AND ADVANCE WARNING SIGNS

STA 436+00 TO END PROJECT

SCALE: 1"=200' SHEET 4 OF 4

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	6
CONTROL	SECTION	JOB	
0691	01	044	



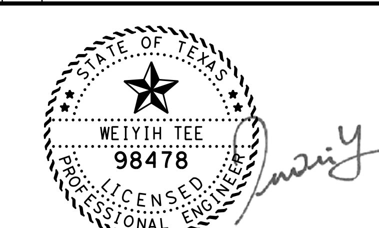
FM 81 EXISTING TYPICAL SECTION

STA 340+78.26 TO STA 344+36.95
STA 345+86.95 TO STA 442+85.00

BRIDGE STA 344+36.95 TO STA 345+86.95

* STA 340+78.26 TO STA 341+53.00: 10'±
* STA 342+30.00 TO STA 344+36.95: 1'±
* STA 345+86.95 TO STA 349+30.00: 1'±
* STA 438+80.00 TO STA 442+85.00: 5'±
** STA 342+30.00 TO STA 344+36.95: 11'±
** STA 345+86.95 TO STA 349+30.00: 11'±

DATE	BY	REV	REVISION



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FM 81

EXISTING TYPICAL SECTIONS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	7
CONTROL	SECTION	JOB	
0691	01	044	

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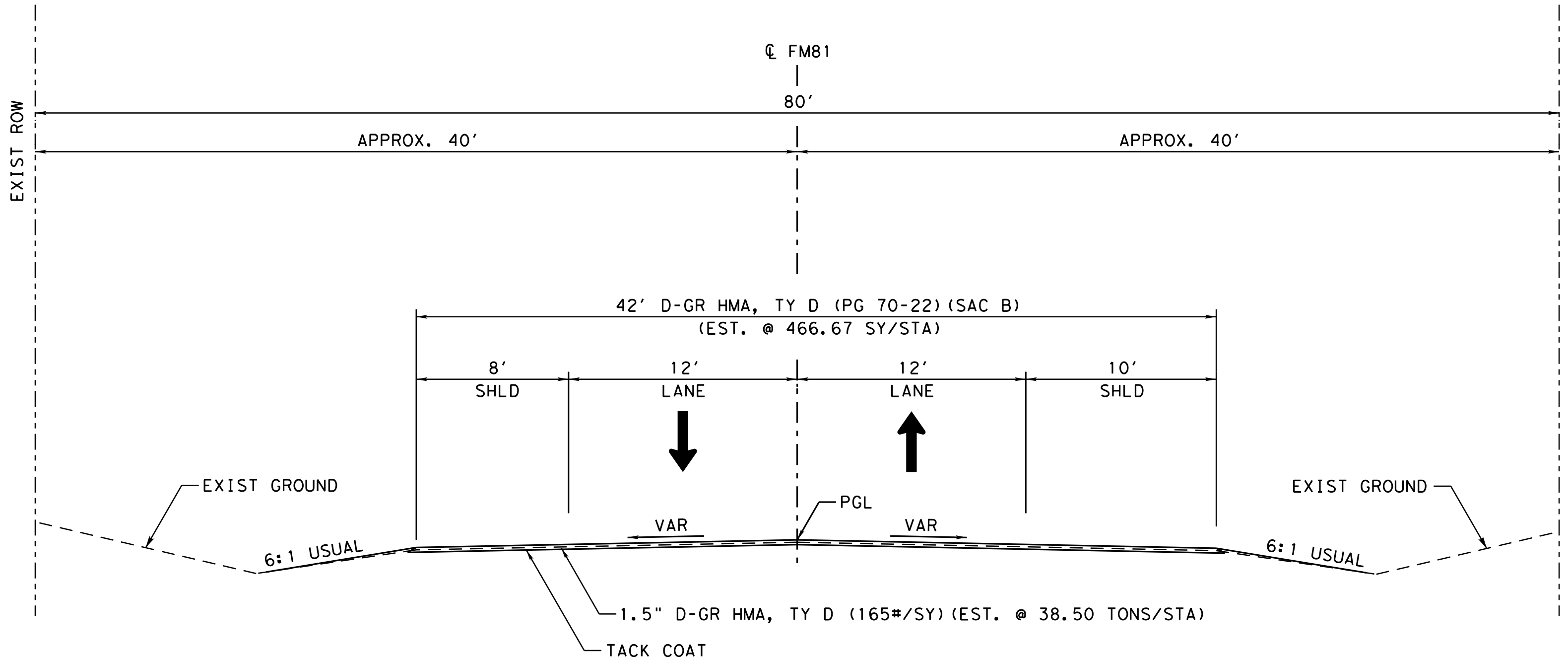
LEGEND

(solid fill)	8" EXIST HMA & BASE (EXISTING POSITION)
(cross-hatch)	SCARIFIED & SPREAD 8" HMA & BASE (FINAL POSITION)

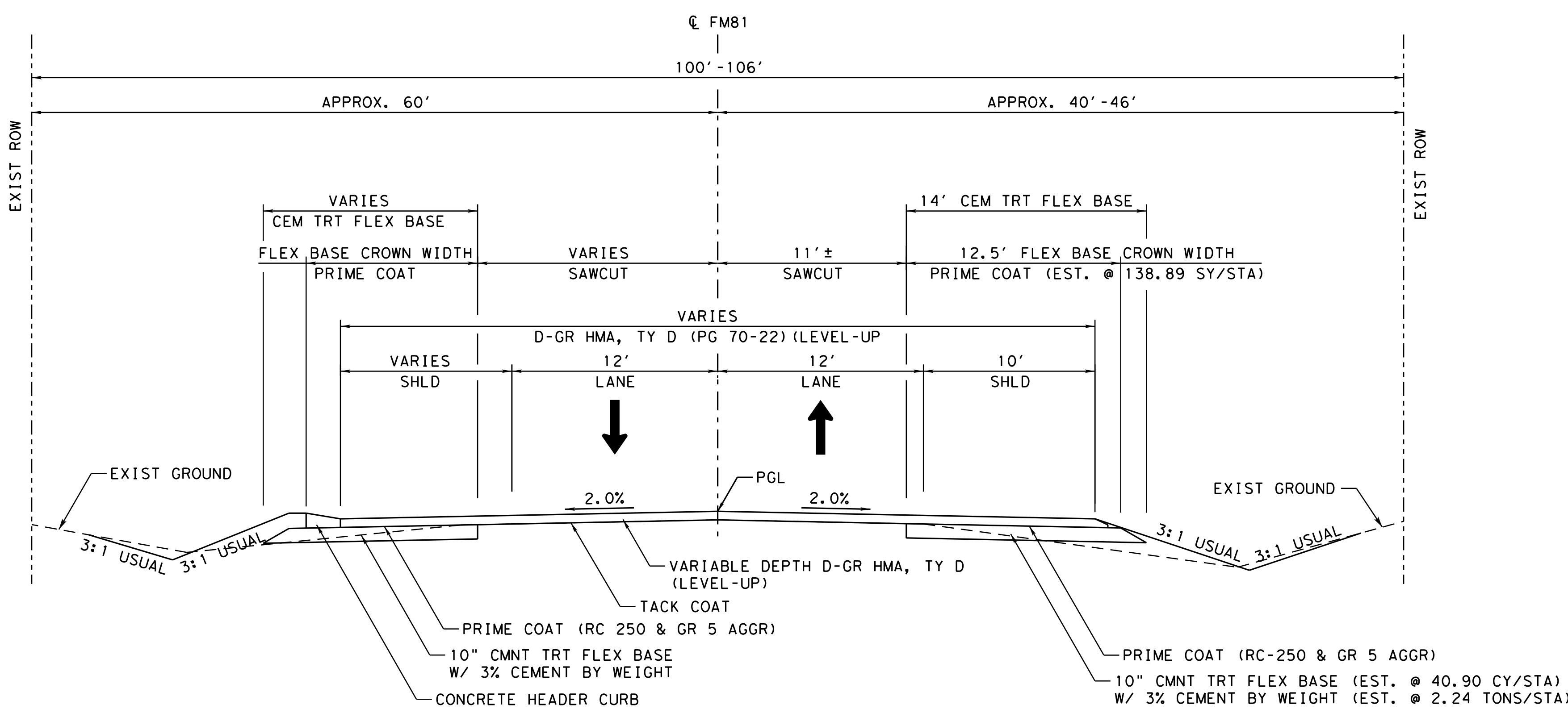
ONE COURSE UNDERSEAL:
ASPH: AC-10, AC-15P, HFRS-2P OR CRS-2P
AGGR: TY-PB GR 4S OR 4 (SAC B)



FM 81 PROPOSED TYPICAL SECTION

OVERLAY

STA 340+78.26 TO 341+53.00 42'

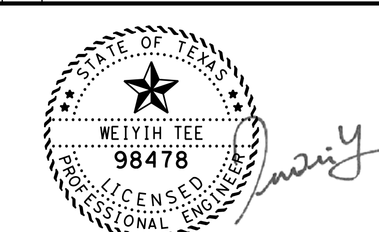


FM 81 PROPOSED TYPICAL SECTION

LEVEL-UP

STA 341+53.00 TO 342+12.52

DATE	BY	REV	REVISION



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FM 81

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	8
CONTROL	SECTION	JOB	
0691	01	044	

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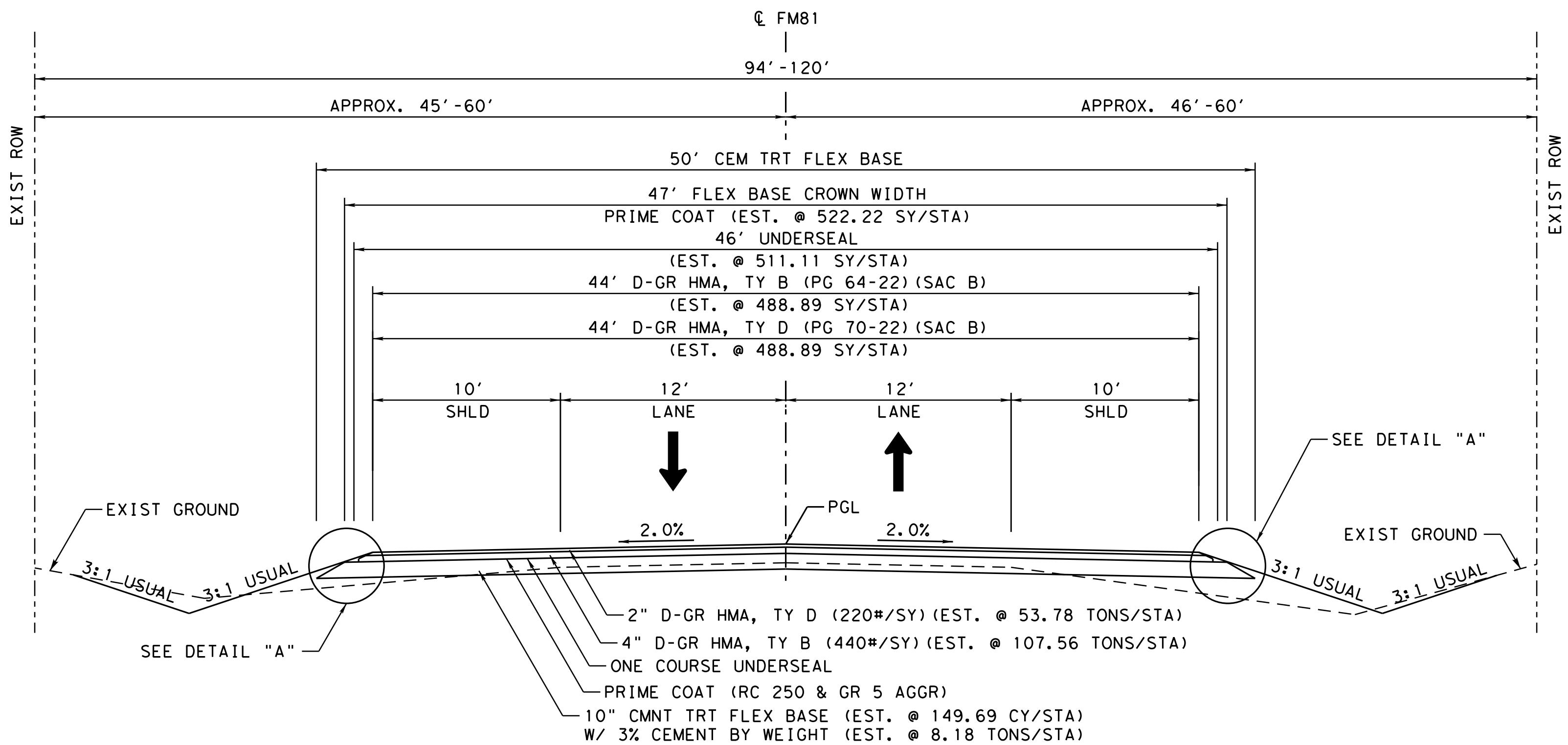
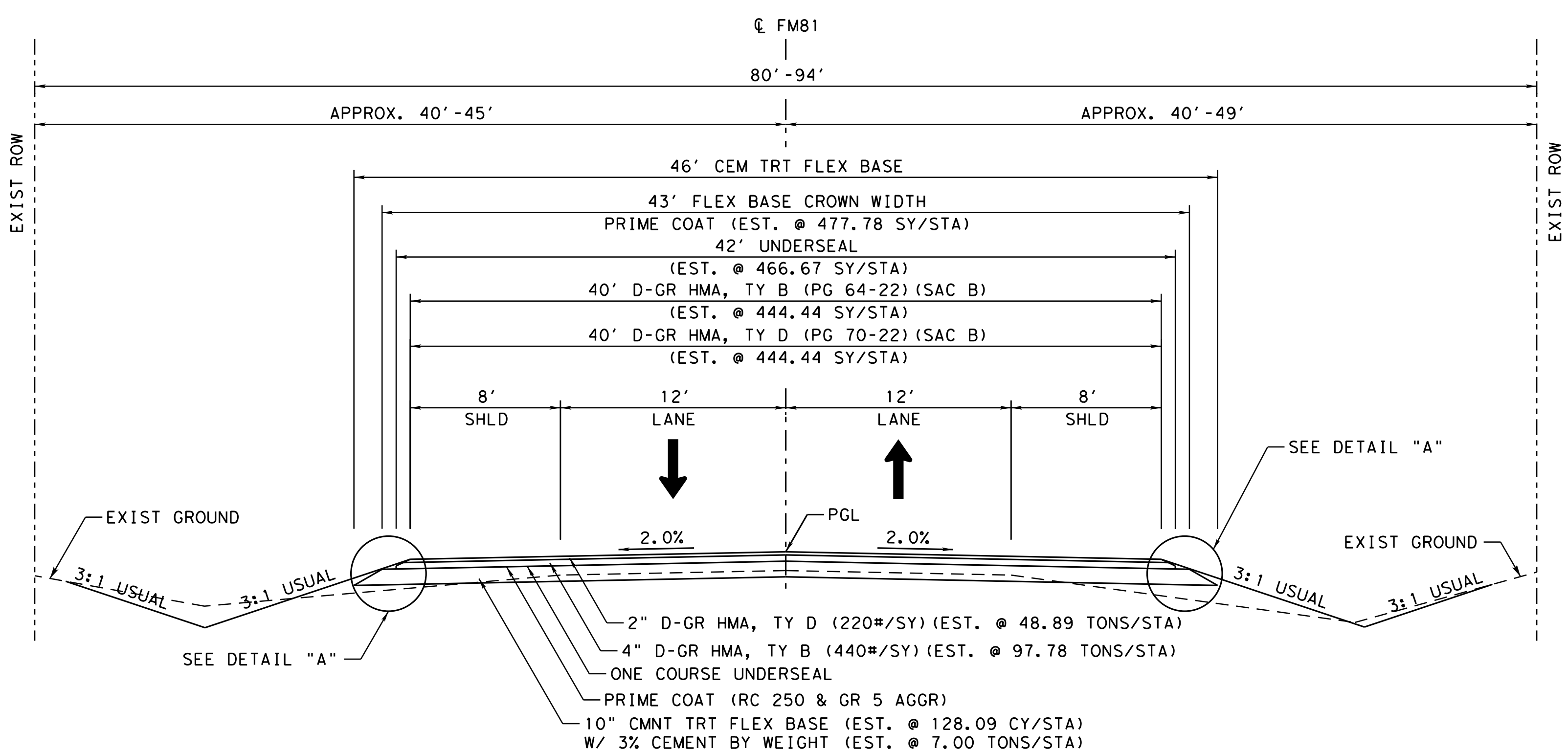


FM 81 PROPOSED TYPICAL SECTION

PGL HIGHER THAN EXISTING GROUND

STA 342+12.52 TO STA 344+30.00 44'
STA 346+10.00 TO STA 347+93.00 44'
STA 347+93.00 TO STA 348+53.00 44' - 40'

BRIDGE STA 344+30.00 TO STA 346+10.00



FM 81 PROPOSED TYPICAL SECTION

PGL HIGHER THAN EXISTING GROUND

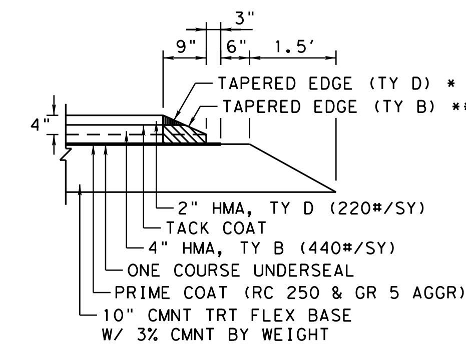
STA 348+53.00 TO 350+40.00 40'

LEGEND

8" EXIST HMA & BASE (EXISTING POSITION)

SCARIFIED & SPREAD 8" HMA & BASE (FINAL POSITION)

ONE COURSE UNDERSEAL:
ASPH: AC-10, AC-15P, HFRS-2P OR CRS-2P
AGGR: TY-PB GR 4S OR 4 (SAC B)



DETAIL "A"

TAPERED EDGE QUANTITIES

* HMA, TY D (PG 70-22) - (EST. @ 0.23 TONS/STA PER EDGE)
** HMA, TY B (PG 64-22) - (EST. @ 1.60 TONS/STA PER EDGE)

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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Texas Registered Engineering Firm F-6324

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FM 81

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	9
CONTROL	SECTION	JOB	
0691	01	044	

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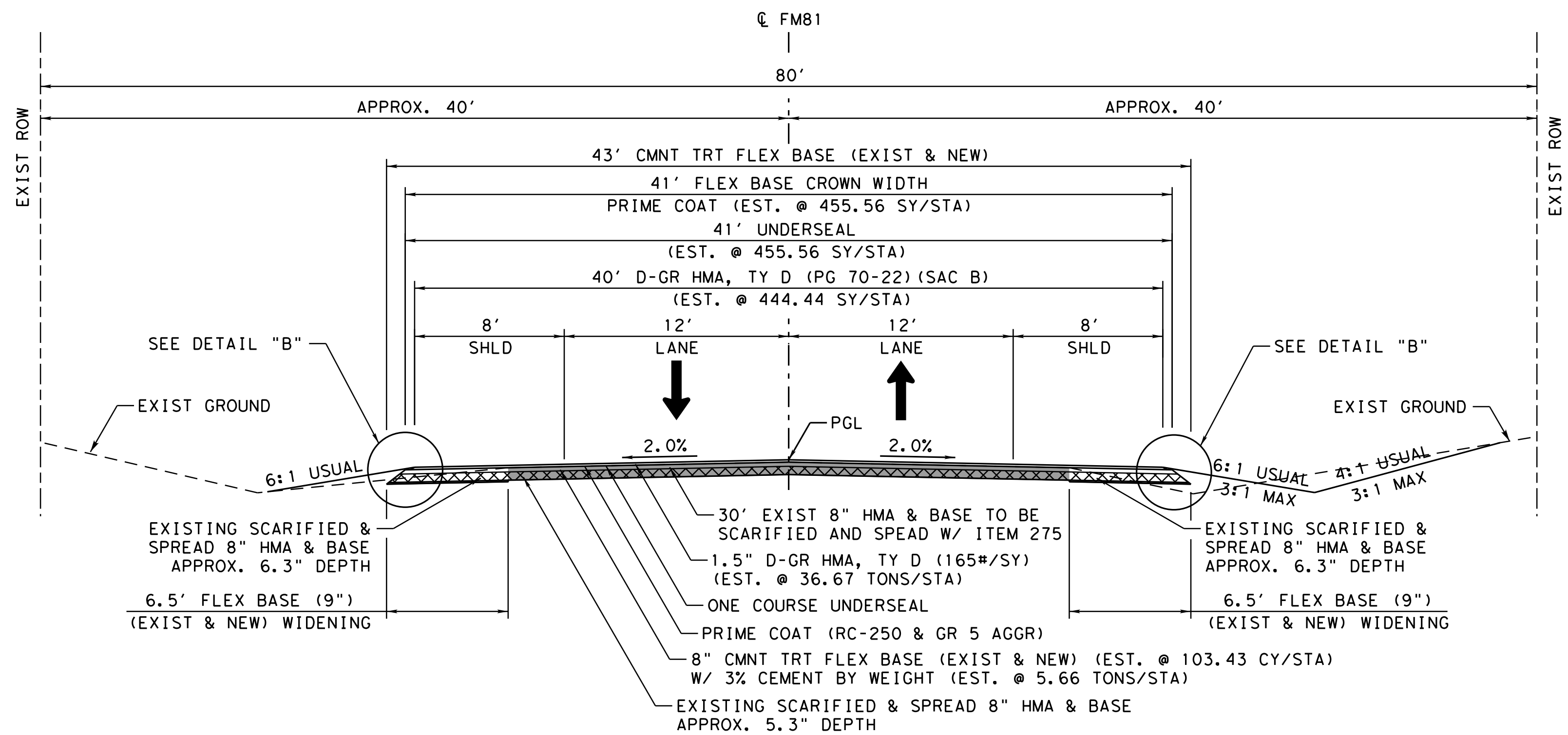
LEGEND

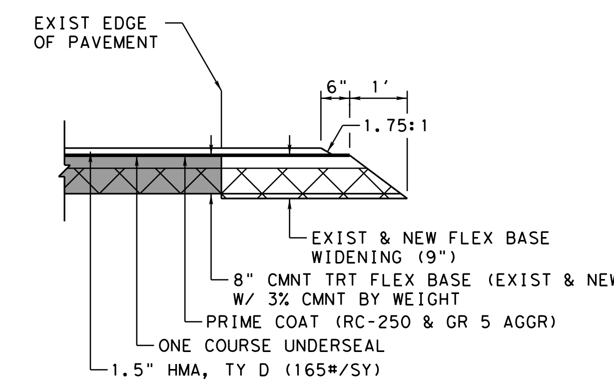
- 8" EXIST HMA & BASE (EXISTING POSITION)
- SCARIFIED & SPREAD 8" HMA & BASE (FINAL POSITION)

ONE COURSE UNDERSEAL:
ASPH: AC-10, AC-15P, HFRS-2P OR CRS-2P
AGGR: TY-PB GR 4S OR 4 (SAC B)

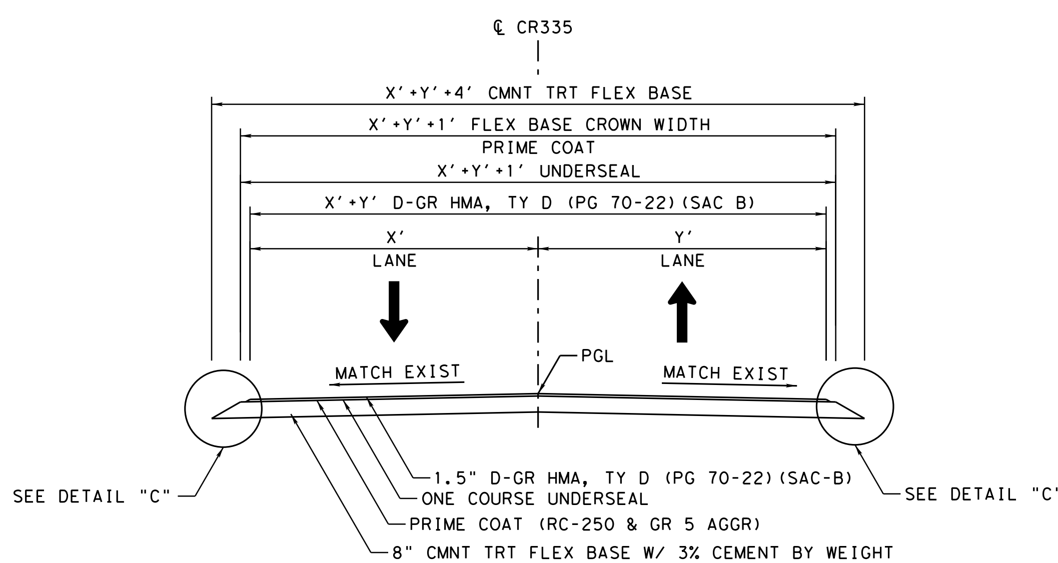


FM 81 PROPOSED TYPICAL SECTION

STA 350+40.00 TO STA 442+15.00 40'
STA 442+15.00 TO STA 442+85.00 40' - 34'

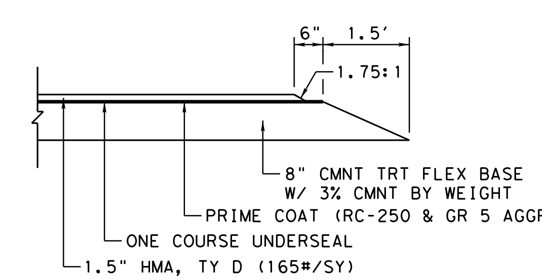


DETAIL "B"



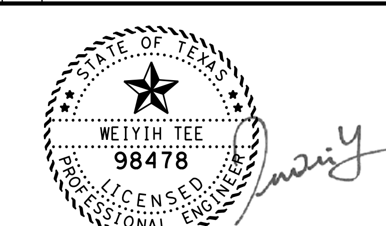
CR 335 TYPICAL SECTION

NOTE: SEE CROSS STREET PLAN AND PROFILE FOR X AND Y DIMENSION



DETAIL "C"

DATE	BY	REV	REVISION



6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

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GENERAL NOTES:

Find, for your information and convenience, tools such as forms, software, materials, and various other information provided by the Department at https://www.txdot.gov/business.html. Please note that these tools are updated periodically and your attention is directed to the latest edition.

In the event of a called evacuation, emergencies, impending adverse weather or as directed, do not perform any work without written authorization. The District reserves the right to suspend all work in support of evacuations or emergencies occurring from other parts of the state. Any work performed, other than work directed by the Department, is unauthorized work in accordance with Item 5.

Sweep, clean and remove any construction waste, surplus materials or debris from the roadway and right of way at the end of each day unless otherwise approved. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Asphalt application season will be established in accordance with Item 316.4.4 Adverse Weather Conditions or as directed by the Engineer.

Cut existing pavement using a saw or other approved method to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new pavement. Cut to a minimum depth of the final lift thickness. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Promptly pick up and properly dispose of paper and other materials used for pavement joints.

Stencil the National Bridge Inventory (NBI) number on each bridge and bridge class culvert. Use 3" letters or numbers. Use stain and color as approved. Paint will not be permitted. Locate the NBI number on the outside beam immediately adjacent to the abutment on the downstream end, on the outside headwall upper right-hand corner, or as directed. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All pavement markings shall be in accordance with the latest edition of Texas MUTCD.

In an effort to control the broomrape plant, clean all soil moving equipment with high-pressure water at an approved site before removing the equipment from the project.

The following standards have been modified; TRB-15, XBEB

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

Nick Novosad, P.E.	Nick.Novosad@txdot.gov
Roberto Jimenez, P.E.	Roberto.A.Jimenez@txdot.gov

County: Karnes **Control:** 0691-01-044

Highway: FM 81

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

ITEM 2

It is recommended that prospective bidders examine the specified work locations with the Engineer to view the nature of the work, the need for close coordination with the various utilities, traffic control considerations, and other factors influencing the prosecution of the work.

ITEM 5

Field verify all dimensions and notify Engineer prior to initiating any work.

Verify the locations of utilities, underground or overhead, shown within the limits of the right-of-way. Adhere to OSHA Standards when working within the vicinity of overhead power lines. Coordinate with the utility companies and notify the Engineer of any possible conflicts. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

The 811 call services for a utility location does not include TxDOT facilities. Provide notification to the District Traffic Signal Shop by email at CRP_Utility_Locate@txdot.gov or call 361-739-6044 when planning, drilling, or excavating in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 48 hours in advance of performing the work, but no earlier than 72 business hours before the work will commence. Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work.

Notify the Engineer immediately of utility conflicts in accordance with Item 5.6. Refer to Item 4.5 for consideration of differing site conditions.

The responsibility for the construction surveying on this contract will be in accordance with Item 5.9.1, "Method A".

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This project was developed using 3D design software and tools. A proposed 3D model of the project In Extensible Markup Language (XML) format is available upon request. These models are specifically intended to aid the contractor in preparing bids and in the use of automated machine guidance equipment for the project construction. If discrepancies are found, numerical dimensions in the cross-sections and plan sheets govern over the 3D model.

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

ITEM 6

Inspection at Precast Concrete Fabrication Plants is as follows: TxDOT's Materials and Pavements Section will inspect any precast units at commercial fabrication yards and staging areas. The Area Engineer will inspect all other precast units.

For Department-furnished material, contact the Engineer or his designated representative to request material a minimum of one workday prior to pick up. Load material with contract personnel. Materials are to be stored in a safe location outside TXDOT property or right-of-way, {unless otherwise approved.} Use material furnished by the Department only on the project(s) intended. Return any unused material as soon as possible.

ITEM 7

The work performed for Item 7.2.4, "Public Safety and Convenience" will not be measured or paid for directly, but will be subsidiary to pertinent Items.

When working at street, farm-to-market, state highway, and county road intersections, schedule work to minimize intersection closures. During nonworking hours, all public road intersections will be open to the traveling public.

The total disturbed area for this project is 16.87 acres. The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer.

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Establish uniform perennial vegetative coverage with a density of at least 70% of the native background vegetative cover to achieve final stabilization.

Comply with the Texas Aggregate Quarry and Pit Safety Act for waste areas or material source areas resulting from this project.

No significant traffic generator events identified.

Law Enforcement Notes (to be used with force account item):
Submit charge summary and invoices for Law Enforcement Personnel using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles. No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site.

If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

ITEM 8

Prepare the progress schedule using the Critical Path Method (CPM). Submit (2) two 11" x 17" hard copies and an electronic file of the original or updated progress schedule. Submit the original progress schedule seven (7) days before the Preconstruction Conference.

Submit an updated progress schedule as directed to show proposed major changes, changes affecting compliance with the contract requirements, or changes affecting the critical path/controlling item of work.

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Working days will be computed and charge in accordance with Article 8.3.1.4, "Standard Workweek".

Work above traffic is not allowed.

Nighttime work may be allowable, if approved in writing by the Engineer.

Notify the Engineer at least 48 hours in advance of weekend or nighttime work.

ITEM 9

Monthly progress payments will be made for items of work completed by the 28th day of each month. Any work completed after the 28th will be included for payment in the subsequent monthly progress estimate.

Submit signed request for compensation of material-on-hand (MOH), including any requests from subcontractors, suppliers, or fabricators for MOH, at least two (2) working days prior to the end of the month on the Departments approved forms.

ITEM 100

Coordinate all right of way preparation activities with the project's Storm Water Pollution Prevention Plan (SWP3) and Environmental Permit Issues, and Commitments Sheet (EPIC) or as approved.

Prune trees and shrubs as directed. Use accepted pruning practices in accordance with Item 192 and Item 752, and as defined by the National Arborist Association. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Trim trees and remove brush from right-of-way line to right-of-way line along the roadway. Trees less than 4 inches in diameter shall be considered brush. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Contractor shall coordinate and verify removal of trees 4 inches or greater in diameter with the Engineer prior to removing the trees along the roadway. Removal of trees along the roadway shall be paid for by pertinent bid items.

Contractor shall remove trees and brush under bridges, in and along channels and easements for the areas designated on the plans and shall be paid for by pertinent bid items.

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ITEM 110

For earth cuts, manipulate and compact subgrade in accordance with Item 132.3.4.2, "Compaction Methods, Ordinary compaction".

Existing stone riprap at the Salt Creek bridge shall be removed and salvaged. The work performed will not be measured or paid for directly, but will be considered subsidiary to Item 110. The stone riprap being salvaged shall be stockpiled at the Northeast corner of the intersection of FM 81 and FM 2773, within TxDOT ROW and at a minimum distance of 30 feet from edge of pavement.

ITEM 132

Use embankment material with a plasticity index (PI) ranging from 10 to 40. Blend or treat approved materials to achieve the desired PI and pulverize the material so that 100% passes the 3 inch sieve. Retest materials as borrow sources change or when the material changes significantly. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Obtain approval to incorporate existing salvaged asphaltic surface and flexible base materials in the surface layer. If approved, incorporate existing materials no larger than 2 inches in the surface layer. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

The estimated quantities for embankments adjacent to culverts and bridges were calculated using the average-end-area method.

Windrow the existing topsoil and grass along the edge of the grading operations or as directed. After grading operations are completed, spread the topsoil and grass uniformly on all slopes and ditch lines. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

ITEM 164

Restore and seed areas not shown in the plans disturbed by the Contractor's operations. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Notify the Engineer of the unavailability of any seed mix. Make changes to the seed mix as approved.

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Use a tacking agent of 50% SS-1 and 50% water and apply the agent at a rate of 0.10 gal/sy or as directed. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer's recommendations when approved. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

ITEM 166

Furnish and apply slow-release nitrogen fertilizer with a rate of 60 pounds of nitrogen per acre.

ITEM 168

Distribute water to only those areas shown in the plans or as directed. Excessive overspray will not be permitted.

Water all areas of the project to be seeded or sodded every two (2) days for 90 days or as directed. Apply water in a manner to ensure adequate moisture but not to erode the soil in-place. During periods of adequate moisture, mechanical watering may not be required as approved. Upon final stabilization, the Engineer may require to continue watering as specified for a period not to exceed 30 days.

The Basis of Estimate below establishes the approximate quantity of water required to complete the 90-day watering cycle:

Rate	Water (Gal/Acre/Day)	Area (Acre)	Total Gallons (Min)
0.25 inch/week	1961	1	88,245

ITEM 169

Contractor shall use Roll type product, as approved, in the Approved Product List that meets Class I Type A requirements. Blanket shall be pinned down on the slope to prevent soil erosion. Hydraulically Applied Mulches or Spray On type product is not allowed.

ITEM 247

For Table 1, "Material Requirements" a minimum plasticity index (PI) of 4 is required for Ty A Gr 1-2 Flex Base.

Stake with blue tops, at 100-foot intervals, the lines and grade shown in the plans.

All manipulation of roadway delivered material prior to cement treatment, including spreading, rolling, and maintaining an acceptable riding surface, will be subsidiary to this Item.

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ITEM 275

Cement and/or asphalt stabilized base may be encountered in the existing pavement structure. Pulverize or scarify the existing material after shaping so that 100% passes a 2-1/2 inch sieve.

Use a mechanical mixer to mix the cement with the existing base material.

The three (3) day curing period is waived for roadways required to be opened to traffic the same day.

ITEM 302

Provide aggregates with a minimum surface aggregate classification (SAC) of "B" unless otherwise shown. The SAC for sources on the Department's Aggregate Quality Monitoring Program (AQMP) is listed in the Department's Bituminous Rated Source Quality Catalogue (BRSQC). SAC requirements apply to aggregates used on all final roadway surfaces, including shoulders.

For precoated aggregate Type PB crushed gravel will not be used.

ITEM 316

Do not place surface treatment on exposed concrete structures unless directed.

Furnish a distributor equipped with a working hand hose.

Material rates shown are for estimating purposes only. Adjust actual rates based on the material used, the existing condition and type of roadway surface, and as approved.

When using asphalt emulsion, a minimum 24-hour curing period is required before placing any subsequent asphalt courses.

Remove vegetation and blade pavement edges prior to surfacing operations. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Broom and clean sealed sections of roadway and all adjacent paved surfaces, including the gutter line, of any surplus aggregate before opening to traffic or as directed.

A vacuum sweeper will be required for this project. This shall be considered subsidiary to Item 316. Vacuum sweeper must perform a test strip before use.

Allowable options for asphalt material are AC-10, AC-15P, HFRS-2P or CRS-2P.

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ITEM 320

Provide the type of windrow pick-up equipment for approval prior to beginning paving operations.

Use of motor grader will not be permitted unless approved.

ITEM 354

The Contractor shall retain ownership of the planed materials.

ITEM 400

Compact each layer to meet the density and consolidation of the adjacent undisturbed material.

Use cement-stabilized backfill for culvert and storm drains located beneath the pavement structure.

ITEM 420

Set a Department-furnished brass disk on all bridge abutments and culvert headwalls as directed. The work performed will not be measured or paid directly, but will be subsidiary to pertinent Items.

Bent concrete will be a plans quantity item.

ITEM 421

The Engineer will provide strength-testing equipment for acceptance testing.

Furnish curing facilities adequately sized for this project as approved.

Furnish test molds for cylindrical concrete specimens measuring four (4") inches in diameter by eight (8") inches in length.

ITEM 422

Power-wash the surface of the precast panels before placement of concrete deck concrete to the satisfaction of the Engineer.

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ITEM 427

Provide a rub finish for Surface Area II unless otherwise directed.

ITEM 432

Saw cut the existing riprap to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new riprap. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Use Cap Option C for the joint between the face of the abutment and riprap as shown on the standard sheet “Concrete Riprap (CRR)".

Use intermediate toewalls as shown on the standard sheet “Concrete Riprap (CRR)".

Reinforce concrete riprap with flat sheets of welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

Weep holes shall be required unless otherwise directed by engineer.

ITEM 462

Use cold-applied, plastic asphalt sewer joint compound for all joints. Provide sandproof tape for all pipe placed in cohesionless backfill material as approved, or provide gaskets that conform to Item 464.2.7.3.

Cement stabilized backfill is not considered cohesionless for this item.

The work performed for concrete collars will not be measured or paid for directly, but will be subsidiary to pertinent Items.

ITEM 464

The work performed for concrete collars will not be measured or paid for directly, but will be subsidiary to pertinent Items.

ITEM 467

The flowline of the safety end treatment shall match the flowline of the culvert.

Reinforce concrete riprap with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

The work performed for concrete collars will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All safety end treatments shall include riprap to the dimensions shown on PSET-RR. This riprap shall be subsidiary to Item 467.

ITEM 496

Contractor shall provide a demolition plan to engineer for approval.

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

Coordinate and identify the locations where the structure(s) will be cut at least 30 days prior to the demolition of the structure(s). If the surface coatings contain hazardous materials, the Department will arrange by separate Contract for the removal of a 4 inch wide strip around bearing attachments, at the anchor bolts, and as approved. Provide traffic control for the paint removal operations. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Notify the Engineer no later than 30 calendar days prior to the demolition of the structure(s) for coordination with the Texas Department of State Health Services.

Provide for approval a method of removal to prevent any materials from falling into water or traffic. The method used and work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

ITEM 500

"Materials on Hand" payments are not considered when determining partial payments.

ITEM 502

Furnish additional barricades, signs, and traffic handling as directed. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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Traffic control for daytime lane closures shall be in accordance with applicable standards. Traffic control shall include temporary rumble strips in accordance with WZ (RS)-22.

When advanced warning flashing arrow panels are specified, furnish one (1) standby unit in good condition at the job site for immediate use.

Attach stop/slow paddle to a staff with a minimum length of 6 feet to the bottom of the sign.

The use of a pilot vehicle in conjunction with flaggers will be permitted. If used, provide positive and unrestricted communication between the driver of the pilot vehicle and the flaggers. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Contractors attention is directed to a construction speed zone, signage is subsidiary to Item 502.

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

All items marked as optional on all traffic control standards shall be required unless otherwise approved by an Engineer.

Trail vehicle shall be required on all mobile traffic control operations.

ITEM 504

No field office will be required for this project.

Apply for and secure permits necessary for the buildings, and pay all utility meter deposits and service bills. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Provide one (1) Type D Structure (Asphalt Mix Control Laboratory). This laboratory shall be for TxDOT use only and shall be a separate structure from the Contractor's facilities.

Portable toilets will not be allowed.

Secure all exterior openings with bars.

Provide 2 sets of keys for all facilities.

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Provide 2 standard size office desk, 4 office chairs, 2 bookcases, and 2 filing cabinets as approved. Provide solar screens, blinds, or shades.

Provide high speed internet connectivity, a printer/fax/scan/copier, and a telephone.

Provide hot water or a hot water dispenser capable of generating one (1) gallon of water at 140 degrees Fahrenheit with acceptable water pressure.

Provide Safety Equipment as follows:
(1) ONE EYE WASH STATION
(2) ONE FIRST AID KIT

Provide doors with a minimum width of 36 inches and 80 inches in height. Secure all exterior openings with bars.

Asphalt content will be measured by Ignition Method.

ITEM 506

Designate in writing a Contractor Responsible Person (CRP) for implementing, maintaining, and reviewing environmental requirements.

Upon removal of rock filter dams, the rock shall be salvaged and stockpiled at the Northeast corner of the intersection of FM 81 and FM 2773, within TxDOT ROW and at a minimum distance of 30 feet from edge of pavement. Salvaging of this rock will not be measured or paid for directly, but considered subsidiary to pertinent Items.

ITEM 510

Portable traffic signal shall include integrated lighting and wait time display.

ITEM 512

Contractor will not be allowed to mix match between the two types of barriers unless approved by the Engineer.

The Contractor will retain ownership of precast concrete barrier at the end of the project, unless as directed by the Engineer.

The Contractor shall submit a rail layout for approval, prior to casting the traffic barrier used for Flat Slab Temporary Traffic Barrier Slab Support on the existing Salt Creek Bridge.

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ITEM 529

Construct an expansion joint at a depth equal to the depth of the curb, gutter, and combined curb and gutter every 40 feet. Construct a tooled joint every 10 feet. When sidewalks are constructed next to curb or curb and gutter, place sidewalk expansion joints at the same location as the curb and gutter expansion joints.

ITEM 530

If conditions warrant, driveway locations, widths, or lengths may be adjusted as directed.

ITEM 533

Construct centerline texturing in accordance to RS(3)-13 Option 1.

Construct shoulder texturing at a distance of 4 inches from the edgeline in accordance to RS(4)-13 Option 4.

ITEM 540

Complete each location during the working day. No exposed bridge rail or guard fence ends will be permitted at the end of the working day or unattended during the working day.

Mixing of wood post types and shapes will not be permitted at the same location.

Type II Galvanization coatings will be used.

ITEM 560

Coordinate with the local United States Postal Service to mark the location of the temporary mailboxes. Permanent mailbox locations may be adjusted as directed.

ITEM 585

Use Surface Test Type B and Pay Adjustment Schedule 2 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

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ITEM 644

Use crash worthy supports as shown on the BC sheets, the CWZTCD, or as directed for signs relocated using temporary supports. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

All slip bases and hardware including but not limited to nuts, bolts, screws and washers will be galvanized. All sign and housing components will be galvanized. Slip bases shall be clamp-style.

Any abandoned slip base footings, in the vicinity of the existing sign, shall be removed and will be subsidiary to ITEM 644-6076.

Sign Post Wraps shall be installed on Stop, Yield, Do Not Enter, and Wrong Way signs as well as Chevrons and One-Direction large arrow signs. Post wraps shall be retroreflective with high intensity and pressure sensitive sheeting.

The color of the post wraps shall be red for the Stop, Yield, Do Not Enter and Wrong Way signs and yellow for the Chevrons and One-Direction large arrow signs. Sheeting shall be approved by the Engineer prior to installation.

Retroreflective sheeting wrapped around a sign has a height on the post of at least 12 inches. The bottom of the retroreflective sheeting wrapped around a sign is approximately 4 feet above the edge of travel lane. Please refer to the detail included in this plan set for the wrap details with respect to warning signs such as chevrons where 3 wraps are requested.

Sign Post Wraps shall be subsidiary to ITEM 644.

ITEM 658

Furnish round GF2 and CTB delineators.

ITEM 662

Use temporary flexible-reflective roadway marker tabs at the beginning and end of no passing zones as shown on the TCP (7-1)-13 for seal coats and WZ(STPM)-13 for hot mix overlays.

ITEM 666

Establish and mark the location of existing standard pavement markings including but not limited to edge lines, transitions, passing and no passing zones, gore areas, etc.

County: Karnes **Control:** 0691-01-044

Highway: FM 81

ITEM 677

Eliminate all conflicting pavement markings as work progresses or as directed.

Removal method must be approved by the Engineer.

No Surface Treatment Method on concrete surfaces.

When using Surface Treatment Method for asphaltic pavements, use a PB Grade 5 aggregate at an application rate of 1 cy/130 sy and asphalt AC-10, CRS-2 or HFRS-2 at a application rate of 0.39 Gal/sy.

ITEM 3076

SAC requirements apply to aggregates used on all surfaces.

Construct longitudinal joints with a joint maker providing a maximum one (1) inch vertical edge (1/2 inch desirable) with an adjacent 6:1 taper. Backfill edges within the same day.

The Engineer reserves the right to test all sources even if the source is listed in the Bituminous Source Rated Quality Catalog

Provide the testing lab samples to calibrate the ignition oven no later than five (5) working days prior to mix design verification.

Place HMA utilizing an automatic, dual, longitudinal-grade control system and automatic transverse-grade control system as specified under Item 320, unless otherwise approved by the Engineer.

Contractor shall temporarily cover all inlets during the milling and paving operations. Inlets shall be uncovered when milling and paving operations are complete. This shall be subsidiary to Item 3076 and not paid for directly.

ITEM 6001

Furnish the portable changeable message signs displaying the correct message at least seven (7) days prior to beginning work or as directed.

The Contractor's Responsible Person (CRP) will maintain full control of messages at all times.

The Engineer will provide the sign message text to use at each sign.

Texas Department of Transportation

GENERAL NOTES

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	CRP	KARNES	
CONTROL	SECTION	JOB	
0691	01	044	11G

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Each PCMS shall have a cellular phone connection.

Standby time will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Portable changeable message signs may be moved, and message changed, at any time as deemed necessary by the Engineer. This will be considered subsidiary to Item 6001.

ITEM 6185

A minimum of 2 TMAS will be required. However, additional units may be necessary depending on the work in progress

Provide manufacturer's curb weight or certified scales weight ticket to the Engineer for approval.

County: Karnes **Control:** 0691-01-044

Highway: FM 81

****

SPECIFICATION DATA

UNIT WEIGHT ESTIMATES

ITEM 247 – FL BS (TY A GR 1-2)(FINAL POS) ---------- 135 LBS/CF
ITEM 275 – CEMENT (3%) ---------- 135 LBS/CF
ITEM 3076 – 4" D-GR HMA TY-B PG 64-22 ---------- 440 LBS/SY
ITEM 3076 – 2" D-GR HMA TY-D SAC-B PG 70-22 ---------- 220 LBS/SY
ITEM 3076 – 1.5" D-GR HMA TY-D SAC-B PG 70-22 ---------- 165 LBS/SY
ITEM 3076 – D-GR HMA TY-D PG 70-22 (LEVEL-UP) ---------- 146.67 LBS/CF

MATERIAL PROPERTIES

ITEM 132 – EMBANKMENT (FINAL)(ORD COMP)(TY C)
PLASTICITY INDEX ---------- 40 MAX
PLASTICITY INDEX ---------- 10 MIN

COMPACTION REQUIREMENTS FOR BASE COURSE

ITEM 275 – CEMENT TREATMENT (ROAD-MIXED)
DENSITY ---------- 100% MIN
LIFTS ---------- ALL

PRIME COAT

ASPHALT TYPE ---------- RC-250
AVERAGE ASPHALT RATE (GAL/SY) ---------- 0.20 GAL/SY
AGGREGATE RATE (CY/SY) ---------- 1/135
AGGREGATE TYPE ---------- B
AGGREGATE GRADE ---------- 5 SAC B

ONE COURSE SURFACE UNDERSEAL

ASPHALT TYPE ---------- AC-10, AC-15P, HFRS-2P OR CRS-2P
AVERAGE ASPHALT RATE (GAL/SY) ---------- 0.40 GAL/SY
AGGREGATE RATE (CY/SY) ---------- 1/110
AGGREGATE TYPE ---------- PB
AGGREGATE GRADE ---------- 4S OR 4 SAC B

Texas Department of Transportation

GENERAL NOTES

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	CRP	KARNES	
CONTROL	SECTION	JOB	
0691	01	044	11H

Estimate Quantity Sheet

CONTROLLING PROJECT ID 0691-01-044 **DISTRICT** Corpus Christi **COUNTY** Karnes
HIGHWAY FM 81

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0691-01-044**			
		PROJECT ID		**A00135038**			
		COUNTY		**Karnes**			
		HIGHWAY		**FM 81**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	102.000		102.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	774.000		774.000	
	110-6001	EXCAVATION (ROADWAY)	CY	5,325.000		5,325.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	4,039.000		4,039.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	44,062.000		44,062.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	11,017.000		11,017.000	
	168-6001	VEGETATIVE WATERING	MG	1,003.000		1,003.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	11,646.000		11,646.000	
	247-6508	FL BS (RDWY DEL)(TYA GR 1, 2 OR 5)F POS	CY	4,176.000		4,176.000	
	275-6001	CEMENT	TON	586.000		586.000	
	275-6009	CEMENT TREAT (NEW BASE) (8")	SY	615.000		615.000	
	275-6014	CEMENT TREAT (MX EXST MTL & NW BS)(8")	SY	42,068.000		42,068.000	
	275-6031	CEMENT TREAT (NEW BASE) (10")	SY	3,394.000		3,394.000	
	316-6001	ASPH (MULTI OPTION)	GAL	18,328.000		18,328.000	
	316-6029	ASPH (RC-250)	GAL	9,188.000		9,188.000	
	316-6177	AGGR(TY-B GR-5 SAC-B)	CY	344.000		344.000	
	316-6427	AGGR(TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	CY	419.000		419.000	
	354-6051	PLANE ASPH CONC PAV (0" TO 1 1/2")	SY	386.000		386.000	
	400-6005	CEM STABIL BKFL	CY	275.000		275.000	
	400-6008	CUT & RESTORE ASPH PAVING	SY	204.000		204.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	119.000		119.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,253.000		1,253.000	
	416-6004	DRILL SHAFT (36 IN)	LF	835.000		835.000	
	420-6013	CL C CONC (ABUT)	CY	50.800		50.800	
	420-6029	CL C CONC (CAP)	CY	42.600		42.600	
	420-6037	CL C CONC (COLUMN)	CY	32.700		32.700	
	422-6001	REINF CONC SLAB	SF	8,280.000		8,280.000	
	425-6020	PRESTR CONC BOX BEAM (5XB20)	LF	1,249.500		1,249.500	
	32-6001	RIPRAP (CONC)(4 IN)	CY	120.000		120.000	
	32-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	146.000		146.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	476.000		476.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	83.000		83.000	
	450-6006	RAIL (TY T223)	LF	400.000		400.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	92.000		92.000	
	462-6004	CONC BOX CULV (4 FT X 3 FT)	LF	49.000		49.000	
	462-6006	CONC BOX CULV (5 FT X 2 FT)	LF	150.000		150.000	
	462-6040	CONC BOX CULV (12 FT X 4 FT)	LF	100.000		100.000	

Estimate Quantity Sheet

CONTROLLING PROJECT ID 0691-01-044 **DISTRICT** Corpus Christi **COUNTY** Karnes
HIGHWAY FM 81

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0691-01-044**			
		PROJECT ID		**A00135038**			
		COUNTY		**Karnes**			
		HIGHWAY		**FM 81**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	462-6048	CONC BOX CULV (4 FT X 3 FT)(EXTEND)	LF	13.000		13.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	32.000		32.000	
	466-6178	WINGWALL (PW - 1) (HW=3 FT)	EA	1.000		1.000	
	466-6180	WINGWALL (PW - 1) (HW=5 FT)	EA	1.000		1.000	
	466-6181	WINGWALL (PW - 1) (HW=6 FT)	EA	2.000		2.000	
	467-6143	SET (TY I)(S= 4 FT)(HW= 4 FT)(3:1) (C)	EA	2.000		2.000	
	467-6148	SET (TY I)(S= 4 FT)(HW= 5 FT)(3:1) (C)	EA	2.000		2.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	1.000		1.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	496-6016	REMOV STR (PIPE)	EA	2.000		2.000	
	496-6043	REMOV STR (SMALL FENCE)	LF	384.000		384.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	180.000		180.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	100.000		100.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	280.000		280.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	311.000		311.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	311.000		311.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	6,220.000		6,220.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	6,220.000		6,220.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	7.000		7.000	
	512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	1,230.000		1,230.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	900.000		900.000	
	512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	1,230.000		1,230.000	
	529-6036	CONCRETE CURB (SPECIAL)	LF	77.000		77.000	
	530-6005	DRIVEWAYS (ACP)	SY	235.000		235.000	
	530-6006	DRIVEWAYS (SURF TREAT)	SY	42.000		42.000	
	530-6008	TURNOUTS (ACP)	SY	18.000		18.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	20,281.000		20,281.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	10,075.000		10,075.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	525.000		525.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	50.000		50.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	700.000		700.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	

Estimate Quantity Sheet

CONTROLLING PROJECT ID 0691-01-044 **DISTRICT** Corpus Christi **COUNTY** Karnes
HIGHWAY FM 81

				CONTROL SECTION JOB	0691-01-044		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00135038			
				COUNTY	Karnes			
				HIGHWAY	FM 81			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**		EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA		12.000		12.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA		4.000		4.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA		2.000		2.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA		2.000		2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA		2.000		2.000	
	552-6003	WIRE FENCE (TY C)	LF		214.000		214.000	
	552-6005	GATE (TY 1)	EA		2.000		2.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA		2.000		2.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA		20.000		20.000	
	644-6028	IN SM RD SN SUP&AM TYS80(1)SA(P-BM)	EA		1.000		1.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA		4.000		4.000	
	644-6036	IN SM RD SN SUP&AM TYS80(1)SA(U-BM)	EA		3.000		3.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA		22.000		22.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA		14.000		14.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA		18.000		18.000	
	658-6069	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	EA		4.000		4.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF		1,995.000		1,995.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF		1,920.000		1,920.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA		144.000		144.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF		2,525.000		2,525.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF		36.000		36.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF		3,840.000		3,840.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA		1,021.000		1,021.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA		1,021.000		1,021.000	
	666-6302	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	LF		20,389.000		20,389.000	
	666-6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF		2,411.000		2,411.000	
	666-6314	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)	LF		6,993.000		6,993.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF		52.000		52.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA		205.000		205.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF		2,560.000		2,560.000	
	752-6015	TREE AND BRUSH REMOVAL	AC		0.400		0.400	
	3076-6001	D-GR HMA TY-B PG64-22	TON		697.000		697.000	
	3076-6042	D-GR HMA TY-D SAC-B PG70-22	TON		3,792.000		3,792.000	
	3076-6043	D-GR HMA TY-D PG70-22 (LEVEL-UP)	TON		102.000		102.000	
	3076-6066	TACK COAT	GAL		350.000		350.000	
	5129-6001	INSTALL FTB	LF		183.000		183.000	
	5129-6002	REMOVE FTB	LF		183.000		183.000	

Estimate Quantity Sheet

CONTROLLING PROJECT ID 0691-01-044 **DISTRICT** Corpus Christi **COUNTY** Karnes
HIGHWAY FM 81

			CONTROL SECTION JOB	**0691-01-044**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00135038**			
			COUNTY	**Karnes**			
			HIGHWAY	**FM 81**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	160.000		160.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	232.000		232.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS										
LOCATION	403 6001	510 6003	512 6005	512 6029	512 6053	545 6003	545 6005	545 6019	662 6004	662 6034
	TEMPORARY SPL SHORING	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST) (F-SHAPE) (TY 1)	PORT CTB (MOVE) (F-SHAPE) (TY 1)	PORT CTB (REMOVE) (F-SHAPE) (TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL) (S) (N) (TL3)	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	WK ZN PAV MRK NON-REMOV (Y) 4" (SLD)
	SF	MO	LF	LF	LF	EA	EA	EA	LF	LF
PHASE 1	284	7	1,230	900	1,230	2	2	2	1,995	1,920
PHASE 2										
PHASE 3										
PHASE 4										
PROJECT TOTALS	284	7	1,230	900	1,230	2	2	2	1,995	1,920

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS										
LOCATION	662 6050	662 6063	662 6075	662 6095	662 6109	662 6111	677 6001	6001 6002	6185 6002	6185 6003
	WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (W) 24" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (SLD)	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	LF	LF	LF	EA	EA	LF	EA	DAY	HR
PHASE 1	144	2,525	36	3,840			2,560	2	160	232
PHASE 2										
PHASE 3					1,021	1,021				
PHASE 4										
PROJECT TOTALS	144	2,525	36	3,840	1,021	1,021	2,560	2	160	232

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SUMMARY OF QUANTITIES

TRAFFIC CONTROL PLAN

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	13
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF ROADWAY ITEMS

LOCATION	100 6002 PREPARING ROW	432 6045 RIPRAP (MOW STRIP)(4 IN)	529 6036 CONCRETE CURB (SPECIAL)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 6020 MTL W - BEAM GD FEN (LOW FILL CULVERT)	540 6033 MTL BM GD FEN (LONG SPAN SYSTEM)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	552 6003 WIRE FENCE (TY C)	552 6005 GATE (TY 1)
	STA	CY	LF	LF	EA	LF	EA	EA	LF	EA
BEGIN PROJECT TO STA 348+00 (SHEET 1 OF 10)	7	26	77	150	4			4	214	2
STA 348+00 TO STA 359+00 (SHEET 2 OF 10)	11									
STA 359+00 TO STA 370+00 (SHEET 3 OF 10)	11									
STA 370+00 TO STA 381+00 (SHEET 4 OF 10)	11									
STA 381+00 TO STA 392+00 (SHEET 5 OF 10)	11									
STA 392+00 TO STA 403+00 (SHEET 6 OF 10)	11									
STA 403+00 TO STA 414+00 (SHEET 7 OF 10)	11	29		225		50		4		
STA 414+00 TO STA 425+00 (SHEET 8 OF 10)	11									
STA 425+00 TO STA 436+00 (SHEET 9 OF 10)	11	28		150			2	4		
STA 436+00 TO END PROJECT (SHEET 10 OF 10)	7									
PROJECT TOTALS	102	83	77	525	4	50	2	12	214	2

NOTES:

1. TRIM TREES AND REMOVE BRUSH FROM ROW TO ROW OR FENCE LINE TO FENCE LINE FOR ENTIRE PROJECT IN ACCORDANCE WITH ITEM 752, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100. SEE REMOVAL SUMMARY OF QUANTITIES AND REMOVAL PLANS FOR TREE REMOVAL (4 INCHES OR GREATER) WITHIN SALT CREEK.

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SUMMARY OF QUANTITIES

ROADWAY

SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	14
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF ROADWAY ITEMS

DESCRIPTION	STA	TO	STA	EXIST REWORK WIDTH	BEGIN WIDTH	END WIDTH	AVG WIDTH	LENGTH	ROADWAY SURFACE AREA	EXIST HMA & BASE VOLUME	FL BS (EXIST & NEW) (CMP IN PLACE)	247-6508 FL BS (RDWY DEL)(TYA GR 1, 2 OR 5)F POS	247-6508 FL BS (RDWY DEL)(TYA GR 1, 2 OR 5)F POS	247-6508 FL BS (RDWY DEL)(TYA GR 1, 2 OR 5)F POS	275-6001 CEMENT	275-6009 CEMENT TREAT (NEW BASE) (8")	275-6014 CEMENT TREAT (MX EXST MTL & NW BS)(8")	275-6031 CEMENT TREAT (NEW BASE) (10")
Unit	---->			FT	FT	FT	FT	FT	SY	CY	CY	CY	CY	CY	TON	SY	SY	SY
Depth	---->									3"	3" / 9"		8"	10"				
Rate	---->											135 LB/CF	135 LB/CF	135 LB/CF	3% FL BS WT			
										[A]	[B]	[B] - [A]						
FM 81:																		
BEGIN PROJECT (FM 627)	340+78.26	TO	341+53.00	0.00	40.00	72.04	50.91	74.74	423									
	341+53.00	TO	342+12.52	0.00	72.04	44.00	50.40	59.52	333					37	2	119		
	342+12.52	TO	344+30.00	0.00	44.00	44.00	44.00	217.48	1,063					326	18			1,172
ECLETO CREEK BRIDGE	344+30.00	TO	346+10.00		44.00	44.00	44.00	180.00	880									
	346+10.00	TO	347+93.00	0.00	44.00	44.00	44.00	183.00	895					274	15			987
	347+93.00	TO	348+53.00	0.00	44.00	40.00	42.00	60.00	280					87	5			310
	348+53.00	TO	350+40.00	0.00	40.00	40.00	40.00	187.00	831					257	15			925
	350+40.00	TO	442+15.00	30.00	40.00	40.00	40.00	9,175.00	40,778	2,549	5,607	3,058			519		41,741	
END PROJECT (FM 2773)	442+15.00	TO	442+85.00	30.00	40.00	42.00	41.00	70.00	319	19	45	26			5		327	
CR 335:	10+20.00	TO	11+45.70	N/A	19.00	19.00	32.96	125.70	460				111		7	496		
PROJECT TOTAL								**10,332.44**	**46,262**	**2,568**	**5,652**		**4,176**		**586**	**615**	**42,068**	**3,394**

SUMMARY OF ROADWAY ITEMS

DESCRIPTION	STA	TO	STA	316-6001 ASPH (MULTI OPTION)	316-6029 ASPH (RC-250)	316-6177 AGGR(TY-B GR-5 SAC-B)	316-6427 AGGR(TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	354-6051 PLANE ASPH CONC PAV (0" TO 1 1/2")	3076-6001 D-GR HMA TY-B PG64-22	3076-6042 D-GR HMA TY-D SAC-B PG70-22	3076-6042 D-GR HMA TY-D SAC-B PG70-22	3076-6043 D-GR HMA TY-D PG70-22 (LEVEL-UP)	3076-6066 TACK COAT
Unit	---->			GAL	GAL	CY	CY	SY	TON	TON	TON	TON	GAL
Depth	---->								4"	2"	1.5"	SEE NOTE 4	
Rate	---->			0.40 GAL/SY	0.2 GAL/SY	1 CY/ 135 SY	1 CY/ 110 SY		110 LB /SY/IN	110 LB/SY/IN		110 LB /SY/IN	0.08 GAL/SY
FM 81:													
BEGIN PROJECT (FM 627)	340+78.26	TO	341+53.00					386				34	34
	341+53.00	TO	342+12.52		22	1						68	27
	342+12.52	TO	344+30.00	445	223	9	11		241	118			87
ECLETO CREEK BRIDGE	344+30.00	TO	346+10.00										
	346+10.00	TO	347+93.00	375	188	7	9		203	100			73
	347+93.00	TO	348+53.00	118	59	3	3		64	32			23
	348+53.00	TO	350+40.00	350	175	7	8		189	93			68
	350+40.00	TO	442+15.00	16,719	8,360	310	380				3,383		
END PROJECT (FM 2773)	442+15.00	TO	442+85.00	131	66	3	3				27		
CR 335:	10+20.00	TO	11+45.70	190	95	4	5				39		38
PROJECT TOTAL				**18,328**	**9,188**	**344**	**419**	**386**	**697**	**3,792**		**102**	**350**

NOTES:

1. TACK COAT QUANTITY IS FOR PLACEMENT BETWEEN TY B AND TY D COURSES AND BETWEEN TY D COURSE AND EXISTING/WIDENED FLEX BASE.
2. PRIME COAT (RC-250 & GR 5 AGGR) WILL BE USED FOR THIS PROJECT, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. CONTRACTOR SHALL ALLOW A MINIMUM OF 7 DAY CURE TIME FOR PRIME COAT (RC-250 & GR 5 AGGR), OR AS DIRECTED BY THE ENGINEER, BEFORE INSTALLING ONE COURSE UNDERSEAL.
4. LEVEL-UP QUANTITY IS FOR THE TIE-IN AT THE FM 627 INTERSECTION TO MATCH PROPOSED PROFILE GRADES FOR THE SALT CREEK BRIDGE.

LEVEL-UP END AREA CALCULATIONS

STATION	3076-6043 D-GR HMA TY-D PG70-22 (LEVEL-UP) AREA	WEIGHT	CUMM. WEIGHT
	(SF)	(TON)	(TON)
340+78.26	5.15	0	0
340+85.00	5.36	3	3
341+05.00	5.46	8	11
341+25.00	5.35	8	19
341+45.00	7.72	10	29
341+53.00	9.59	5	34
341+65.00	12.11	10	44
341+85.00	16.20	21	65
342+05.00	19.25	26	91
342+12.52	20.64	11	102
PROJECT TOTAL		102	

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FM 81
SUMMARY OF QUANTITIES
ROADWAY

SHEET 2 OF 2

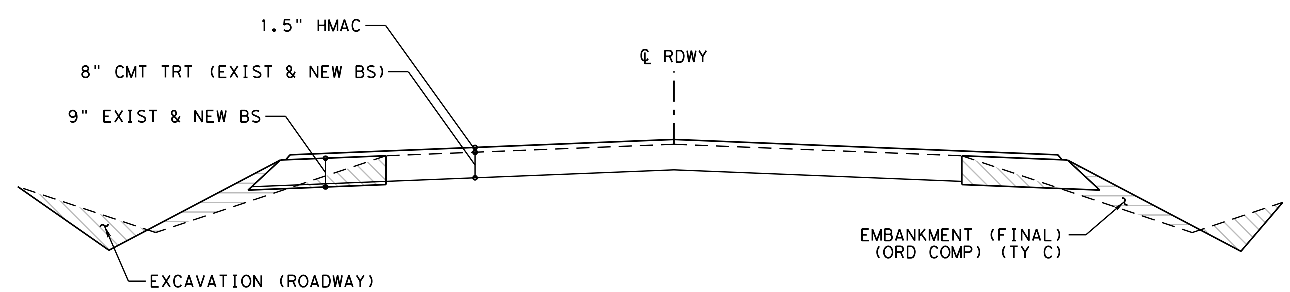
FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	15
CONTROL	SECTION	JOB	
0691	01	044	

STATION	110-6001 EXCAVATION (ROADWAY)			132-6005 EMBANKMENT (FINAL) (ORD COMP) (TY C)		
	AREA	VOLUME	CUMM. VOLUME	AREA	VOLUME	CUMM. VOLUME
	(SF)	(CY)	(CY)	(SF)	(CY)	(CY)
342+12.52	34.77			20.17		
343+00.00	7.90	69	69	50.76	115	115
344+00.00	5.78	25	94	177.86	423	538
344+30.00	5.43	6	100	186.58	202	740
STA 344+30.00 TO STA 346+10.00: SALT CREEK BRIDGE						
346+10.00	0.00		100	234.62		740
347+00.00	2.53	4	104	102.33	562	1302
348+00.00	27.06	55	159	30.80	247	1549
349+00.00	44.60	133	292	12.12	79	1628
350+00.00	50.24	176	468	4.23	30	1658
351+00.00	8.01	108	576	4.91	17	1675
352+00.00	10.79	35	611	6.85	22	1697
353+00.00	13.41	45	656	4.94	22	1719
354+00.00	12.32	48	704	5.16	19	1738
355+00.00	10.17	42	746	5.24	19	1757
356+00.00	9.70	37	783	5.89	21	1778
357+00.00	10.88	38	821	4.30	19	1797
358+00.00	11.88	42	863	5.39	18	1815
359+00.00	11.01	42	905	4.83	19	1834
360+00.00	8.70	37	942	4.98	18	1852
361+00.00	9.81	34	976	4.23	17	1869
362+00.00	12.72	42	1018	3.78	15	1884
363+00.00	11.08	44	1062	3.76	14	1898
364+00.00	38.68	92	1154	0.00	7	1905
365+00.00	10.19	91	1245	5.87	11	1916
366+00.00	10.31	38	1283	9.02	28	1944
367+00.00	11.02	40	1323	10.89	37	1981
368+00.00	10.31	40	1363	9.03	37	2018
369+00.00	12.16	42	1405	6.54	29	2047
370+00.00	13.94	48	1453	6.77	25	2072
371+00.00	6.75	38	1491	10.81	33	2105
372+00.00	8.83	29	1520	13.14	44	2149
373+00.00	8.78	33	1553	10.72	44	2193
374+00.00	12.08	39	1592	8.67	36	2229
375+00.00	9.51	40	1632	6.43	28	2257
376+00.00	9.51	35	1667	6.49	24	2281
377+00.00	9.36	35	1702	8.79	28	2309
378+00.00	11.89	39	1741	6.62	29	2338
379+00.00	10.41	41	1782	7.83	27	2365
380+00.00	10.65	39	1821	5.22	24	2389
381+00.00	11.98	42	1863	5.28	19	2408
382+00.00	11.89	44	1907	4.52	18	2426
383+00.00	9.74	40	1947	7.62	22	2448
384+00.00	9.96	36	1983	8.13	29	2477
385+00.00	9.19	35	2018	7.93	30	2507
386+00.00	9.19	34	2052	8.19	30	2537
387+00.00	8.78	33	2085	8.19	30	2567
388+00.00	9.36	34	2119	4.91	24	2591
389+00.00	7.97	32	2151	6.61	21	2612
390+00.00	7.06	28	2179	10.38	31	2643
391+00.00	7.43	27	2206	9.36	37	2680
392+00.00	9.59	32	2238	11.84	39	2719

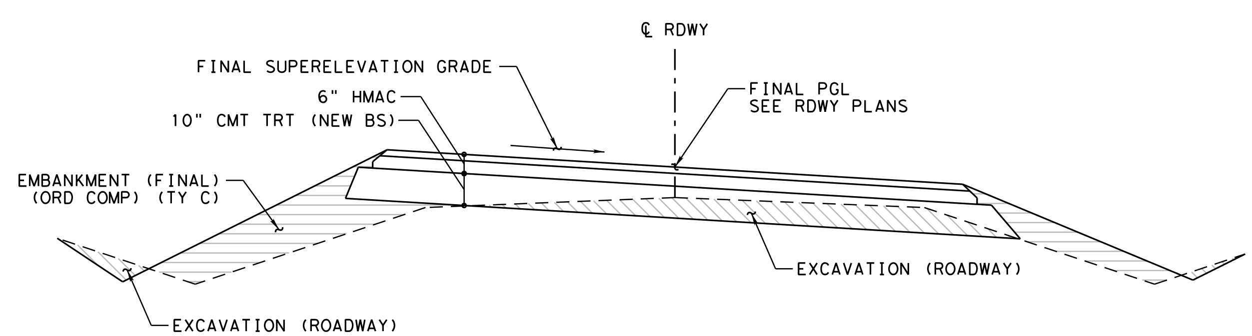
STATION	110-6001 EXCAVATION (ROADWAY)			132-6005 EMBANKMENT (FINAL) (ORD COMP) (TY C)		
	AREA	VOLUME	CUMM. VOLUME	AREA	VOLUME	CUMM. VOLUME
	(SF)	(CY)	(CY)	(SF)	(CY)	(CY)
393+00.00	8.04	33	2271	10.98	42	2761
394+00.00	8.15	30	2301	7.78	35	2796
395+00.00	9.72	33	2334	1.75	18	2814
396+00.00	7.17	31	2365	13.99	29	2843
397+00.00	6.38	25	2390	15.75	55	2898
398+00.00	5.60	22	2412	15.62	58	2956
399+00.00	8.26	26	2438	19.34	65	3021
400+00.00	9.92	34	2472	14.77	63	3084
401+00.00	13.05	43	2515	15.05	55	3139
402+00.00	11.19	45	2560	7.26	41	3180
403+00.00	15.81	50	2610	4.47	22	3202
404+00.00	7.70	44	2654	7.94	23	3225
405+00.00	11.70	36	2690	3.62	21	3246
406+00.00	8.95	38	2728	10.90	27	3273
407+00.00	7.93	31	2759	13.68	46	3319
408+00.00	8.42	30	2789	14.75	53	3372
409+00.00	10.03	34	2823	11.91	49	3421
410+00.00	10.75	38	2861	11.09	43	3464
411+00.00	11.78	42	2903	6.98	33	3497
412+00.00	11.66	43	2946	7.37	27	3524
413+00.00	19.28	57	3003	7.54	28	3552
414+00.00	8.25	51	3054	9.56	32	3584
415+00.00	10.34	34	3088	11.03	38	3622
416+00.00	14.75	46	3134	6.33	32	3654
417+00.00	13.60	53	3187	3.44	18	3672
418+00.00	8.28	41	3228	4.82	15	3687
419+00.00	8.75	32	3260	5.19	19	3706
420+00.00	6.61	28	3288	9.08	26	3732

STATION	110-6001 EXCAVATION (ROADWAY)			132-6005 EMBANKMENT (FINAL) (ORD COMP) (TY C)		
	AREA	VOLUME	CUMM. VOLUME	AREA	VOLUME	CUMM. VOLUME
	(SF)	(CY)	(CY)	(SF)	(CY)	(CY)
421+00.00	10.00	31	3319	6.07	28	3760
422+00.00	13.37	43	3362	4.84	20	3780
423+00.00	16.43	55	3417	4.19	17	3797
424+00.00	11.42	52	3469	2.04	12	3809
425+00.00	8.83	38	3507	5.22	13	3822
426+00.00	15.59	45	3552	2.76	15	3837
427+00.00	13.92	55	3607	2.60	10	3847
428+00.00	19.96	63	3670	3.77	12	3859
429+00.00	14.94	65	3735	1.62	10	3869
430+00.00	19.39	64	3799	0.67	4	3873
431+00.00	21.56	76	3875	0.75	3	3876
432+00.00	21.04	79	3954	0.77	3	3879
433+00.00	9.37	56	4010	1.15	4	3883
434+00.00	11.79	39	4049	3.62	9	3892
435+00.00	8.81	38	4087	15.63	36	3928
436+00.00	12.90	40	4127	7.39	43	3971
437+00.00	12.05	46	4173	6.35	25	3996
438+00.00	15.83	52	4225	1.85	15	4011
439+00.00	15.36	58	4283	2.89	9	4020
440+00.00	14.58	55	4338	3.08	11	4031
441+00.00	15.47	56	4394	0.50	7	4038
442+00.00	15.45	57	4451	0.01	1	4039
442+85.00	6.06	34	4485	0.00	0	4039
PROJECT TOTAL		4,485			4,039	

SUMMARY OF EARTHWORK ITEMS		
LOCATION	110	132
	6001	6005
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)
	CY	(CY)
FM 81	4,485	4,039
CR 335	138	0
SALT CREEK GRADING	702	0
TOTALS	**5,325**	**4,039**



TYPICAL EARTHWORK DETAIL
STA 350+40.00 TO STA 442+85.00



TYPICAL EARTHWORK DETAIL
STA 342+12.52 TO STA 344+30.00
STA 346+10.00 TO STA 350+40.00

STATE OF TEXAS
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PROFESSIONAL ENGINEER
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FM 81

SUMMARY OF QUANTITIES

EARTHWORK

SHEET 1 OF 1

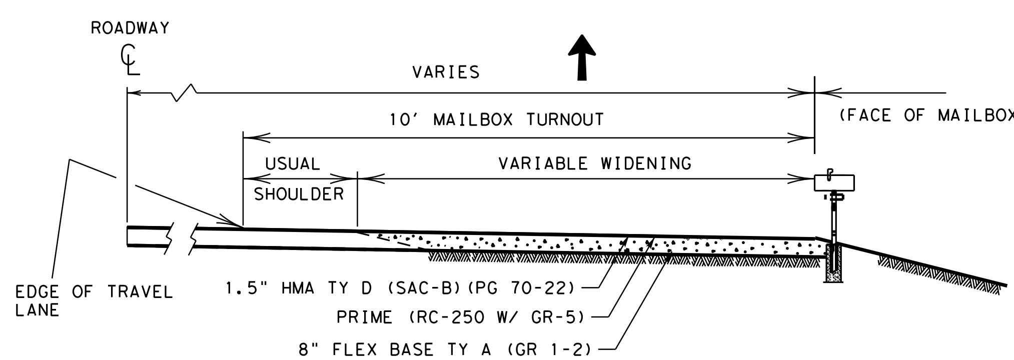
FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	16
CONTROL	SECTION	JOB	
0691	01	044	

SUMMARY OF DRIVEWAY ITEMS							
				464 6003	467 6363	530 6005	530 6006
SHEET	DRIVEWAY #	STATION	LT/RT	RC PIPE (CL III)(18 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	DRIVEWAYS (ACP)	DRIVEWAYS (SURF TREAT)
				LF	EA	SY	SY
3 OF 10	1	363+79	LT			103	
3 OF 10	2	363+84	RT			132	
9 OF 10	3	428+14	LT	32	2		42
PROJECT TOTALS				32	2	235	42

NOTE: SEE DRIVEWAY DATA AND DETAILS SHEET FOR DRIVEWAY PAVEMENT DETAILS

SUMMARY OF MAILBOX											
						530 6008	247* 6236	316* 6029	316* 6177	3076* 6042	560 6011
SHEET	STATION	OFFSET TO FACE OF MAILBOX	TYPE OF MAILBOX	TYPE OF POST	TYPE OF FOUNDATION	TURNOUTS (ACP)	FL BS (RDWY DEL)(TY A GR 1-2)(FNAL POS)	ASPH (RC-250)	AGGR(TY-B GR-5 SAC-B)	D-GR HMA TY-D SAC-B PG70-22	MAILBOX INSTALL-S (TWW-POST) TY 4
						SY	CY	GAL	CY	TON	EA
3 OF 10	363+17.00	22.00' RT	SINGLE	TWW	TY 4	10	3	2	1	1	1
9 OF 10	428+15.00	22.00' RT	SINGLE	TWW	TY 4	8	2	2	1	1	1
PROJECT TOTALS						**18**	**5**	**4**	**2**	**2**	**2**

* FOR CONTRACTOR'S INFOMRATION ONLY



TYPICAL MAILBOX TURNOUT DETAIL

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FM 81
SUMMARY OF QUANTITIES
DRIVEWAY AND MAILBOX

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	17
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF DRAINAGE ITEMS								
	400 6005	400 6008	402 6001	403 6001	432 6001	462 6004	462 6006	462 6048
LOCATION	CEM STABIL BKFL	CUT & RESTORE ASPH PAVING	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (CONC)(4 IN)	CONC BOX CULV (4 FT X 3 FT)	CONC BOX CULV (5 FT X 2 FT)	CONC BOX CULV (4 FT X 3 FT)(EXTEND)
	CY	SY	LF	SF	CY	LF	LF	LF
CULVERT B13	29	23	36			49		13
CULVERT B15	70	74	36	294	57		150	
PROJECT TOTALS	**99**	**97**	**72**	**294**	**57**	**49**	**150**	**13**

SUMMARY OF DRAINAGE ITEMS					
	466 6178	466 6180	467 6143	467 6148	480 6001
LOCATION	WINGWALL (PW - 1) (HW=3 FT)	WINGWALL (PW - 1) (HW=5 FT)	SET (TY I)(S= 4 FT)(HW= 4 FT)(3:1)(C)	SET (TY I)(S= 4 FT)(HW= 5 FT)(3:1)(C)	CLEAN EXIST CULVERTS
	EA	EA	EA	EA	EA
CULVERT B13			2	2	1
CULVERT B15	1	1			
PROJECT TOTALS	**1**	**1**	**2**	**2**	**1**

SUMMARY OF BRIDGE CLASS CULVERT ITEMS	NBI: 161290069101017						
	400 6005	400 6008	402 6001	403 6001	432 6001	462 6040	466 6181
LOCATION	CEM STABIL BKFL	CUT & RESTORE ASPH PAVING	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (CONC)(4 IN)	CONC BOX CULV (12 FT X 4 FT)	WINGWALL (PW - 1) (HW=6 FT)
	CY	SY	LF	SF	CY	LF	EA
CULVERT B14	76	107	47	675	63	100	2
PROJECT TOTALS	**76**	**107**	**47**	**675**	**63**	**100**	**2**

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FM 81

SUMMARY OF QUANTITIES

DRAINAGE

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	18
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF BRIDGE ITEMS (SALT CREEK)	NBI: 161290069101018									
	400 6005	416 6004	420 6013	420 6029	420 6037	422 6001	425 6020	432 6008	432 6033	450 6006	454 6018
LOCATION	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC BOX BEAM (5XB20)	RIPRAP (CONC)(CL B)(RR8&RR9)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	CY	LF	CY	CY	CY	SF	LF	CY	CY	LF	LF
SALT CREEK	100	835	50.8	42.6	32.7	8,280	1,249.5	146	476	400	92
PROJECT TOTALS	**100**	**835**	**50.8**	**42.6**	**32.7**	**8,280**	**1,249.5**	**146**	**476**	**400**	**92**

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Texas Department of Transportation

FM 81

SUMMARY OF QUANTITIES

BRIDGE

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	19
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF SIGNING ITEMS

LOCATION	644 6027 IN SM RD SN SUP&AM TYS80(1)SA(P)	644 6028 IN SM RD SN SUP&AM TYS80(1)SA(P -BM)	644 6030 IN SM RD SN SUP&AM TYS80(1)SA(T)	644 6036 IN SM RD SN SUP&AM TYS80(1)SA(U -BM)	644 6076 REMOVE SM RD SN SUP&AM	658 6047 INSTL OM ASSM (OM-2Y)(WC) GND	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	658 6069 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)
	EA	EA	EA	EA	EA	EA	EA	EA
BEGIN PROJECT TO STA 348+00 (SHEET 1 OF 6)	4			1	5	4	6	4
STA 348+00 TO STA 370+00 (SHEET 2 OF 6)	1		1	1	3			
STA 370+00 TO STA 392+00 (SHEET 3 OF 6)	2				2	2		
STA 392+00 TO STA 414+00 (SHEET 4 OF 6)	6	1	2		2	2	3	
STA 414+00 TO STA 436+00 (SHEET 5 OF 6)	3			1	6	6	8	
STA 436+00 TO END PROJECT (SHEET 6 OF 6)	4		1		4		1	
PROJECT TOTALS	20	1	4	3	22	14	18	4

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	533 6001 RUMBLE STRIPS (SHOULDER)	533 6002 RUMBLE STRIPS (CENTERLINE)	666 6302 RE PM W/RET REQ TY I (W)4"(SLD) (090MIL)	666 6311 RE PM W/RET REQ TY I (Y)4"(BRK) (090MIL)	666 6314 RE PM W/RET REQ TY I (Y)4"(SLD) (090MIL)	668 6076 PREFAB PAV MRK TY C (W) (24") (SLD)	672 6009 REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	LF	LF	EA
BEGIN PROJECT TO STA 348+00 (SHEET 1 OF 6)	1,444	722	1,552	144	150	32	10
STA 348+00 TO STA 370+00 (SHEET 2 OF 6)	4,400	2,200	4,400	550	1,355		45
STA 370+00 TO STA 392+00 (SHEET 3 OF 6)	4,400	2,200	4,400	550	1,130		42
STA 392+00 TO STA 414+00 (SHEET 4 OF 6)	4,267	2,068	4,267	445	1,538	20	35
STA 414+00 TO STA 436+00 (SHEET 5 OF 6)	4,400	2,200	4,400	550	2,135		55
STA 436+00 TO END PROJECT (SHEET 6 OF 6)	1,370	685	1,370	172	685		18
PROJECT TOTALS	20,281	10,075	20,389	2,411	6,993	52	205

NOTES:

1. CONTRACTOR SHALL OBTAIN APPROVAL OF THE NEED FOR CURVE WARNING SIGNS, ADVISORY SPEED LEGEND AND PLACEMENT/QUANTITY OF CHEVRONS BY THE ENGINEER/CORPUS CHRISTI DISTRICT TRAFFIC PRIOR TO ORDERING SIGNS.

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SUMMARY OF QUANTITIES

SIGNING AND PAVEMENT MARKING

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	20
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF SW3P ITEMS

LOCATION	164 6035 DRILL SEEDING (PERM) (RURAL) (CLAY)	164 6051 DRILL SEED (TEMP) (WARM OR COOL)	166* 6002 FERTILIZER	168 6001 VEGETATIVE WATERING	169 6001 SOIL RETENTION BLANKETS (CL 1) (TY A)	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6003 ROCK FILTER DAMS (INSTALL) (TY 3)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	5129 6001 INSTALL FTB	5129 6002 REMOVE FTB
	SY	SF	TON	MG	SY	LF	LF	LF	SY	SY	LF	LF	LF	LF
BEGIN PROJECT TO STA 348+00 (SHEET 1 OF 6)	3,648	912	0.1	83	1,578	80		80			385	385	183	183
STA 348+00 TO STA 370+00 (SHEET 2 OF 6)	9,712	2,428	0.1	221	2,009	40		40						
STA 370+00 TO STA 392+00 (SHEET 3 OF 6)	9,751	2,438	0.1	222	3,206	40	20	60	311	311	1,785	1,785		
STA 392+00 TO STA 414+00 (SHEET 4 OF 6)	9,023	2,256	0.1	206	2,477	20	45	65			1,150	1,150		
STA 414+00 TO STA 436+00 (SHEET 5 OF 6)	8,926	2,232	0.1	203	2,137		35	35			2,010	2,010		
STA 436+00 TO END PROJECT (SHEET 6 OF 6)	3,002	751	0.1	68	239						890	890		
PROJECT TOTALS	44,062	11,017	0.6	1,003	11,646	180	100	280	311	311	6,220	6,220	183	183

* FOR CONTRACTOR'S INFORMATION ONLY

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FM 81
SUMMARY OF QUANTITIES
SW3P

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	21
CONTROL	SECTION	JOB	
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SUMMARY OF REMOVAL ITEMS								
LOCATION	104 6009	496 6010	496 6016	496 6043	542 6001	542 6004	544 6003	752 6015
	REMOVING CONC (RIPRAP)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOV STR (PIPE)	REMOV STR (SMALL FENCE)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (REMOVE)	TREE AND BRUSH REMOVAL
	SY	EA	EA	LF	LF	EA	EA	AC
BEGIN PROJECT TO STA 348+00 (SHEET 1 OF 6)	744	1	1	384	700	4	3	0.4
STA 348+00 TO STA 370+00 (SHEET 2 OF 6)							1	
STA 370+00 TO STA 392+00 (SHEET 3 OF 6)								
STA 392+00 TO STA 414+00 (SHEET 4 OF 6)	23							
STA 414+00 TO STA 436+00 (SHEET 5 OF 6)	7		1					
STA 436+00 TO END PROJECT (SHEET 6 OF 6)								
PROJECT TOTALS	**774**	**1**	**2**	**384**	**700**	**4**	**4**	**0.4**

NOTES:

1. TRIM TREES AND REMOVE BRUSH FROM ROW TO ROW OR FENCE LINE TO FENCE LINE FOR ENTIRE PROJECT IN ACCORDANCE WITH ITEM 752, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 100.

2. REMOVE TREES AND BRUSH UNDER SALT CREEK BRIDGE AND ALONG CHANNEL IN ACCORDANCE WITH THE PLANS. MEASUREMENT AND PAYMENT FOR THIS WORK SHALL BE BY THE ACRE PER ITEM 752.

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FM 81

SUMMARY OF QUANTITIES

REMOVAL

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
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STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	22
CONTROL	SECTION	JOB	
0691	01	044	

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	P1-S1	29	FM 81	STA 339+87	TL-3	BI	ASPHALT	N/A	CONCRETE TRAFFIC BARRIER	24"	32"	> 50'	1								1	
2	P1-S1	29	FM 81	STA 352+17	TL-3	BI	ASPHALT	N/A	CONCRETE TRAFFIC BARRIER	24"	32"	> 50'	1								1	
3	P1-S2	30	FM 81	STA 342+45	TL-3	BI	ASPHALT	N/A	CONCRETE TRAFFIC BARRIER	24"	32"	> 50'		1	1	1					1	
4	P1-S2	30	FM 81	STA 351+45	TL-3	BI	ASPHALT	N/A	CONCRETE TRAFFIC BARRIER	24"	32"	> 50'		1	1	2					1	
												TOTALS	2	2	2							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

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CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY	
	CRP	KARNES	
	FEDERAL AID PROJECT		SHEET NO.
			23

GENERAL NOTES

1. FURNISH AND INSTALL ALL TRAFFIC CONTROL DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, AND WORK ZONE MARKINGS, IN COMPLIANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD), THE STATE STANDARD TRAFFIC CONTROL PLANS (TCP), AND THE BARRICADES AND CONSTRUCTION (BC) SHEETS. REFER TO THE PROJECT GENERAL NOTES AND ITEM 8 "PROSECUTION AND PROGRESS" FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.

2. CULVERT WORK SHALL BE COMPLETED ON ONE SIDE PRIOR TO STARTING WORK ON THE OPPOSITE SIDE OF THE ROADWAY, UNLESS THERE IS PRIOR APPROVAL FROM THE ENGINEER.

3. THE CONTRACTOR SHALL PROVIDE QUALIFIED FLAGGERS EQUIPPED WITH TWO-WAY COMMUNICATION TO HANDLE TRAFFIC THROUGH THE WORK AREAS. THE COST SHALL BE SUBSIDIARY TO ITEM 502.

4. PRIOR TO THE END OF WORK EACH DAY,THE ROADWAY MUST BE REOPENED TO TWO WAY, TWO LANE TRAFFIC WITHIN THE ENTIRE PROJECT LIMITS, UNLESS A PORTABLE TRAFFIC SIGNAL IS IN PLACE. UNDER NO CIRCUMSTANCES SHALL ANY SECTION OF THE ROADWAY BE RESTRICTED TO ONE LANE WITHOUT QUALIFIED FLAGGERS PRESENT AT BOTH ENDS OF THE LANE CLOSURE, EQUIPPED WITH TWO-WAY COMMUNICATION DEVICES TO PROVIDE SAFE TRAFFIC CONTROL.

5. VERIFY THE LOCATION AND SPACING OF SIGNS, BARRICADES, AND CHANNELIZING DEVICES PRIOR TO THEIR PLACEMENT ALONG VERTICAL CURVES, HORIZONTAL CURVES, AND OTHER GEOMETRIC CONSTRAINTS TO ENSURE VISIBILITY TO ALL MOTORISTS.

6. PLACE THE TRAFFIC CONTROL DEVICES ONLY WHILE WORK IS ACTUALLY IN PROGRESS OR A DEFINITE NEED EXISTS. REPLACE ANY DAMAGED BARRICADES, CHANNELIZING DEVICES OR SIGNS.

7. COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN AND UNCOVER DURING NON-WORKING HOURS OR AS DIRECTED BY THE ENGINEER. PARTIAL COVERAGE OF THE SIGN OR COVERAGE BY MATERIAL THAT WILL NOT COVER THE ENTIRE SIGN ALL THE TIME IS NOT PERMITTED.

8. VARY THE SPACING OF SIGNS TO MEET TRAFFIC CONDITIONS OR AS DIRECTED BY THE ENGINEER AND ENSURE THAT ALL TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS ARE KEPT IN A HIGHLY VISIBLE CONDITION (CLEAN, UPRIGHT AND AT PROPER LOCATIONS).

9. MAINTAIN THE ROADWAY SURFACE AND WORK ZONE PAVEMENT MARKING WITHIN THE PROJECT WHILE THE TRAFFIC CONTROL PLAN IS IN EFFECT. PLACE AND BE RESPONSIBLE FOR ALL WORK ZONE PAVEMENT MARKINGS IN ACCORDANCE WITH STANDARD SHEETS WZ(STPM)-13, BC(11), BC(12) AND THE TXMUTCD.

10. CONDUCT CONSTRUCTION OPERATIONS SO AS TO PROVIDE THE LEAST POSSIBLE INTERFERENCE TO TRAFFIC AND TO PERMIT THE CONTINUOUS MOVEMENT OF TRAFFIC IN ALL ALLOWABLE DIRECTIONS AT ALL TIMES OR AS PERMITTED BY THE SEQUENCE OF CONSTRUCTION. PROVIDE FOR SAFE AND CONVENIENT ACCESS TO ABUTTING PROPERTY, HIGHWAYS, PUBLIC ROADS, AND STREET CROSSINGS EXCEPT AS OTHERWISE SHOWN ON THE SEQUENCE OF CONSTRUCTION. THE CONTRACTOR WILL MAINTAIN AT ALL TIMES TWO-WAY TRAFFIC OR A MINIMUM OF ONE LANE USING TCP(1-2B)-18 OR PORTABLE TRAFFIC SIGNAL UNIT USING TCP(2-8B)-18.

11. CONTRACTOR TO PROVIDE ACCESS TO ADJACENT PROPERTIES AT ALL TIMES DURING CONSTRUCTION UNLESS ARRANGEMENTS WITH THE PROPERTY OWNERS HAVE BEEN MADE IN WRITING. CONTRACTOR TO PROVIDE TXDOT THE WRITTEN AGREEMENTS AT LEAST TWO BUSINESS DAYS PRIOR TO PROCEEDING WITH THE DRIVEWAY CONSTRUCTION.

12. REGULATE ALL CONSTRUCTION TRAFFIC SO AS TO CAUSE A MINIMAL INCONVENIENCE TO THE TRAVELING PUBLIC. AT THE TIMES WHEN IT IS NECESSARY FOR TRUCKS TO STOP, UNLOAD OR CROSS ROADWAYS UNDER TRAFFIC, PROVIDE WARNING SIGNS AND FLAGGERS AS NEEDED TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.

13. FOR CULVERT REPLACEMENTS, LANE CLOSURES SHALL BE PER GENERAL NOTES 1 & 4. FOR CULVERT WORK THAT CANNOT BE INSTALLED IN ONE DAY, CONTRACTOR SHALL:

    A. PROVIDE LONG TERM ONE-LANE TWO-WAY TRAFFIC CONTROLL. INSTALL PORTABLE TRAFFIC SIGNALS PER TXDOT STANDARD TCP (2-8B)-18. CONTRACTOR SHALL MAINTAIN A MINIMUM OF ONE TWO-WAY 11-FT LANE WITH VERTICAL PANELS AT THE END OF DAILY CONSTRUCTION ACTIVITIES. PORTABLE TRAFFIC SIGNALS WILL BE USED OVERNIGHT.

    B. COVER OPEN TRENCHES WITH TRAFFIC RATED PLATES FOR SMALLER TRENCH OPENINGS AT THE END OF EACH WORK DAY TO ALLOW TWO WAY TRAFFIC.

14. PLACE ALL STOCKPILED MATERIAL, WASTE MATERIAL, SIGNS, BARRICADES, CHANNELIZING DEVICES AND WORK VEHICLES NOT IN USE, AT A MINIMUM OF 16 FEET FROM THE OUTER EDGE OF THE NEAREST TRAVEL LANE.

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

16. ALL PAVEMENT EDGE DROP-OFFS USED BY THE TRAVELING PUBLIC SHALL BE BACK FILLED WITH A SUITABLE MATERIAL TO FORM A STABLE 3:1 SLOPE AT THE END OF EACH WORK DAY PER WZ(UL)-13.

17. MAXIMUM SLOPE FOR THE TRANSITION BETWEEN TWO ROADWAY SECTIONS OF DIFFERENT PROFILE ELEVATIONS IS 0.25" VERTICAL PER 1' HORIZONTAL.

18. REMOVE FROM THE WORK AREA ALL LOOSE MATERIALS AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS AT THE END OF EACH WORK DAY.

19. MAINTAIN A MINIMUM OF ONE THROUGH LANE OPEN IN EACH DIRECTION DURING WORKING HOURS EXCEPT AS DIRECTED BY THE ENGINEER.

20. IMPLEMENT ALL REQUIRED EROSION CONTROL MEASURES AS SHOWN IN THE PLANS DURING THE VARIOUS STAGES OF CONSTRUCTION.

21. MOVING AN EXISTING SIGN TO A TEMPORARY LOCATION IS SUBSIDIARY TO ITEM 502. INSTALLATIONS WITH PERMANENT SUPPORTS AT PERMANENT LOCATIONS WILL BE PAID FOR UNDER THE APPLICABLE BID ITEM(S).

22. USE OF PORTABLE CHANGEABLE MESSAGE SIGN AS ADVANCE NOTICE OF LANE CLOSURES WILL BE REQUIRED, AS DIRECTED BY THE ENGINEER.

23. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS AT LOCATIONS REQUIRING LANE CLOSURES FOR ONE WEEK BEFORE THE CLOSURES OR AS DIRECTED BY THE ENGINEER.

24. REFER TO BC(6)-14 PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) STANDARDS FOR A LISTING OF ABBREVIATED WORDS AND TWO-WORD PHRASES THAT ARE ACCEPTABLE FOR USE ON PCMS. SUBMIT THE SUGGESTED MESSAGE FOR THE SIGN TO THE ENGINEER FOR APPROVAL.

25. ADDITIONAL SIGNS, BARRICADES AND CHANNELIZING DEVICES MAY BE REQUIRED TO MAINTAIN TRAFFIC DURING CONSTRUCTION, AS SHOWN ON TCP STANDARDS. ADDITIONAL SIGNS, BARRICADES, ETC. (IF ANY), WILL BE SUBSIDIARY TO ITEMS 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".

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

27. CONTRACTOR SHALL PROVIDE A BACKUP TEMPORARY TRAFFIC SIGNAL AND SHALL STORE IT ONSITE FOR EMERGENCIES. THE COST OF THE BACKUP TEMPORARY TRAFFIC SIGNAL IS SUBSIDIARY TO ITEM 510.

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FM 81

TRAFFIC CONTROL PLAN
GENERAL NOTES

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	24
CONTROL	SECTION	JOB	
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SEQUENCE OF CONSTRUCTION

1. INSTALL PROJECT LIMIT AND ADVANCE WARNING SIGNS AS SHOWN IN THE PLANS, BC, TCP, AND WZ STANDARDS, AND AS DIRECTED BY THE ENGINEER.
2. PLACE AND MAINTAIN SW3P DEVICES AS SHOWN IN THE SW3P LAYOUTS AND AS DIRECTED BY THE ENGINEER.
3. FOLLOW PHASE NARRATIVE APPROPRIATE FOR WORK AS DESCRIBED ON THIS SHEET.
4. PERFORM FINAL SITE CLEANUP AS DIRECTED BY THE ENGINEER.
5. REMOVE SW3P DEVICES UPON FINAL ESTABLISHMENT OF VEGETATIVE COVER.
6. REMOVE PROJECT LIMIT/ADVANCE WARNING SIGNS.

PHASE NARRATIVE-ROADWAY RESTORATION

PHASE 1:

1. INSTALL BARRICADES, WARNINGS SIGNS, REMOVABLE PAVEMENT MARKINGS, AND TRAFFIC CONTROL DEVICES AS SHOWN ON THE PLANS.
2. CONSTRUCT NEW CULVERT, CULVERT REPLACEMENTS, AND CULVERT EXTENSIONS USING TCP(2-1)-18, TCP(2-2)-18, AND TCP(2-8B)-18.

   USE SIGNING, MARKING AND DELINEATORS TO DENOTE WORK AREA. PROTECT VEHICLES FROM PAVEMENT DROP-OFFS PER TXDOT GUIDELINES FOR TREATMENT OF PAVEMENT DROP-OFFS IN WORK ZONES.

   CULVERT WORK SHALL BE COMPLETED ON ONE SIDE PRIOR TO STARTING WORK ON THE OPPOSITE SIDE OF THE ROADWAY.
3. EXISTING PAVEMENT SURFACE SHALL BE RESTORED PER CUT AND RESTORE DETAILS WHERE NEW CULVERT STRUCTURE IS BEING CONSTRUCTED OR ADDITIONAL BARRELS ARE BEING INSTALLED. FOR AREAS WHERE SECTION OF CULVERT INSTALLATION CANNOT BE COMPLETED IN A SINGLE DAY, SEE GENERAL NOTE 13.
4. CONSTRUCT NEW BRIDGE IN SECTIONS ACCORDING TO THE BRIDGE TYPICAL SECTIONS, ONE SIDE AT A TIME. PAVEMENT WORK IN SEGMENT WHERE THE BRIDGE IS LOCATED SHALL MATCH WITH THE SIDE OF BRIDGE CONSTRUCTION.

   LONG TERM ONE-LANE TWO-WAY TRAFFIC CONTROL SHALL BE USED. INSTALL PORTABLE TRAFFIC SIGNALS PER TXDOT STANDARD TCP(2-8B)-18. CONTRACTOR SHALL MAINTAIN A MINIMUM OF ONE TWO-WAY 11-FT LANE AT ALL TIMES.

   FOLLOW THE BELOW STEPS FOR ROADWAY CONSTRUCTION AT THE BRIDGE (STA 340+78.26 TO STA 350+40.00):

   A. EXCAVATE AND PLACE EMBANKMENT TO WIDTHS SHOWN ON THE TYPICAL SECTIONS.
   B. INSTALL 10" OF FLEX BASE TO WIDTHS SHOWN IN THE TYPICAL SECTIONS.
   C. CEMENT TREAT 10" OF NEW FLEX BASE MATERIAL.
   D. INSTALL MBGF, MOW STRIP, TEMPORARY SEEDING, PRIME COAT, ONE COURSE UNDERSEAL AND 4" HMA TY B. CONTRACTOR SHALL ALLOW 7 DAYS CURE TIME, OR AS DIRECTED BY ENGINEER, AFTER INSTALLING PRIME COAT BEFORE PROCEEDING TO ONE COURSE UNDERSEAL. PLACE EMBANKMENT ALONG PAVEMENT EDGES.

PHASE 2 (EXCAVATION/EMBANKMENT, FLEX BASE WIDENING, AND CEMENT TREATMENT):

PHASE 2 WORK MAY BEGIN ONCE ALL CULVERT EXTENSION AND REPLACEMENT HAVE BEEN COMPLETED.

PHASE 2 STAGE 1:

1. PREPARE ROW, BLADE EXISTING TOPSOIL INTO NEAT WINDROWS AT RIGHT OF WAY LINE. KEEP CLEAN AND DO NOT CONTAMINATE WITH CEMENT TREATED CLIPPINGS, ETC. TOP SOIL TO BE REDISTRIBUTED ACROSS EMBANKMENT TO HELP REESTABLISH VEGETATION.
2. PLACE CHANNELIZATION DEVICES THROUGHOUT WORK AREAS.
3. THE WORK ZONE IS RESTRICTED TO THE LENGTH OF ROADWAY THAT CAN BE ACCOMPLISHED IN ONE WORK DAY. AT THE END OF EACH WORK DAY, MOVE CHANNELIZING DEVICES TO THE EDGE OF ROADWAY AND ADD OTLD'S, CW8-12 "NO CENTERLINE" SIGNS, AND CW8-11 "UNEVEN LANES" SIGNS.
4. USING DAILY LANE CLOSURES AS SHOWN ON THE TCP TYPICAL SECTIONS, FOLLOW THE BELOW STEPS:

   A. EXCAVATE AND PLACE EMBANKMENT FOR THE WIDENED PAVEMENT SHOWN IN THE TYPICAL SECTIONS.
   B. SCARIFY 8" OF EXISTING HMA & BASE AND SPREAD TO WIDTHS SHOWN IN THE TYPICAL SECTIONS TO AN APPROX. DEPTH OF 5.3" AND 6.3" FOR THE WIDENED PAVEMENT SECTION.
   C. PLACE APPORX. 2.7" NEW FLEX BASE ACROSS ENTIRE PAVEMENT WIDTH, THEN CEMENT TREAT 8" OF NEW/EXIST BASE.
   D. INSTALL MBGF, MOW STRIP, TEMPORARY SEEDING, PRIME COAT AND ONE COURSE UNDERSEAL. CONTRACTOR SHALL ALLOW 7 DAYS CURE TIME, OR AS DIRECTED BY ENGINEER, AFTER INSTALLING PRIME COAT BEFORE PLACEMENT OF ONE COURSE UNDERSEAL. PLACE EMBANKMENT ALONG PAVEMENT EDGES.
5. RECONSTRUCT DRIVEWAYS AND DRIVEWAY DRAINAGE STRUCTURES. ALL DRIVEWAY CONSTRUCTION SHALL BE COMPLETED PRIOR TO PLACEMENT OF HMA TY D SURFACE COURSE (PHASE 3).

PHASE 2 STAGE 2:

1. REPEAT PHASE 2 STAGE 1 FOR OPPOSITE DIRECTION OF TRAFFIC.

PHASE 3 (HMA TY D SURFACE COURSE - ENTIRE PROJECT LIMIT):

PHASE 3 STAGE 1:

1. PLACE CHANNELIZING DEVICES THROUGHOUT WORK AREAS.
2. THE WORK ZONE IS RESTRICTED TO THE LENGTH OF ROADWAY THAT CAN BE ACCOMPLISHED IN ONE WORK DAY. AT THE END OF EACH WORK DAY, MOVE CHANNELIZING DEVICES TO THE EDGE OF ROADWAY AND ADD OTLD'S, CW8-12 "NO CENTERLINE" SIGNS, AND CW8-11 "UNEVEN LANES" SIGNS.
3. USING THE DAILY LANE CLOSURES AS SHOWN ON THE TCP TYPICAL SECTIONS, PHASE 3 STAGE 1 FOR THE FOLOWING WORK:

   A. CONSTRUCT HMA TY D LEVEL-UP FOR THE FM 627 INTERSECTION PER TXDOT STANDARD TCP(1-2B)-18.
   B. APPLY 1.5"/2" TY D HMA SURFACE COURSE AND PLACE EMBANKMENT ALONG PAVEMENT EDGES.
   C. APPLY TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS.

PHASE 3 STAGE 2:

1. REPEAT PHASE 3 STAGE 1 FOR OPPOSITE DIRECTION OF TRAFFIC.

PHASE 4:

1. EVENLY REDISTRIBUTE WINDROWED TOPSOIL AND STABILIZE DISTURBED AREAS.
2. INSTALL NEW SIGNS, DELINEATORS AND OBJECT MARKERS.
3. APPLY PERMANENT PAVEMENT MARKINGS.
4. APPLY PERMANENT SEEDING.

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FM 81

TRAFFIC CONTROL PLAN
SEQUENCE OF CONSTRUCTION

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	25
CONTROL	SECTION	JOB	
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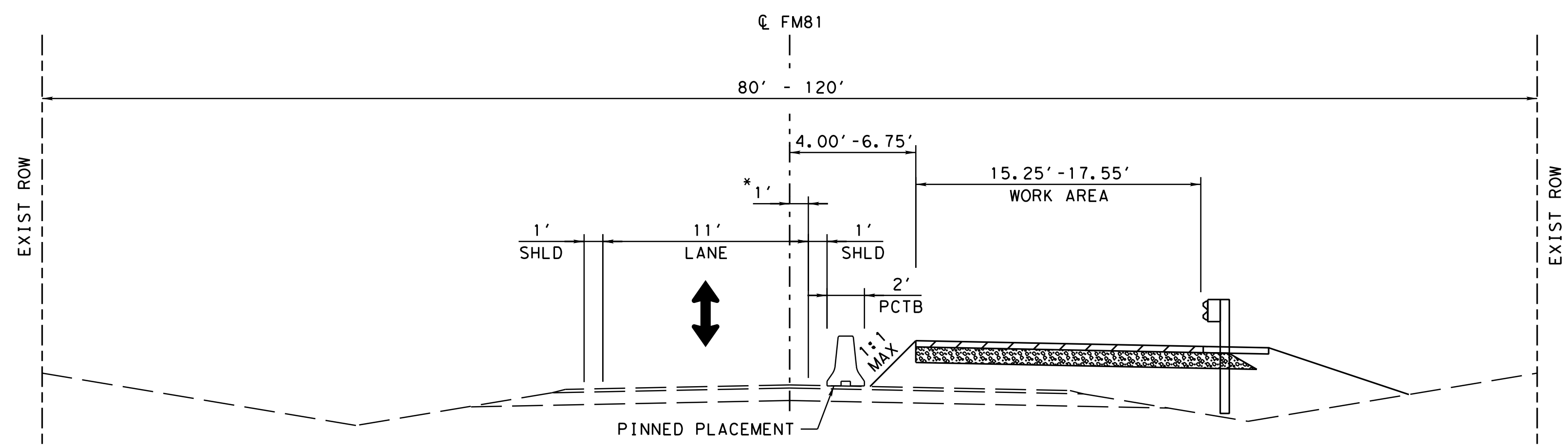
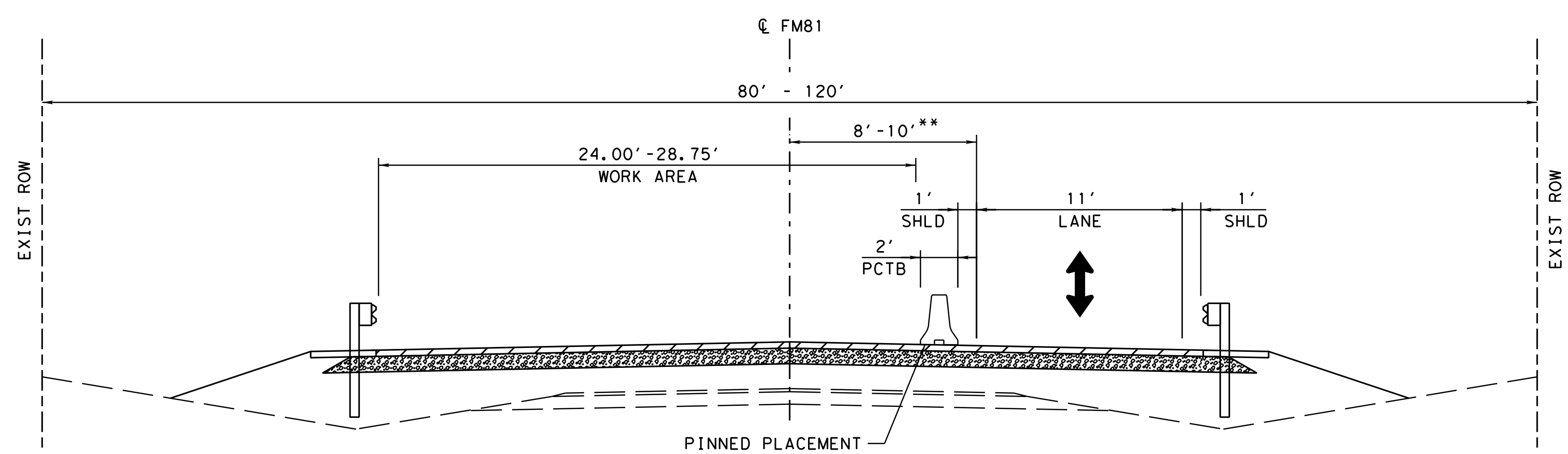


PHASE 1 STAGE 1:
EXCAVATION/EMBANKMENT, FLEX BASE,
CEMENT TREATMENT, TY B HMA

* STA 340+70.00 TO STA 344+30.00 SHIFT LANE FROM 0' LT TO 1' RT
STA 346+60.12 TO STA 349+53.51 SHIFT LANE FROM 1' RT TO 2' LT



PHASE 1 STAGE 2:
EXCAVATION/EMBANKMENT, FLEX BASE,
CEMENT TREATMENT, TY B HMA

** STA 346+60.12 TO STA 348+94.23 SHIFT LANE FROM 10' RT TO 8' RT

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 1 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	26
CONTROL	SECTION	JOB	
0691	01	044	

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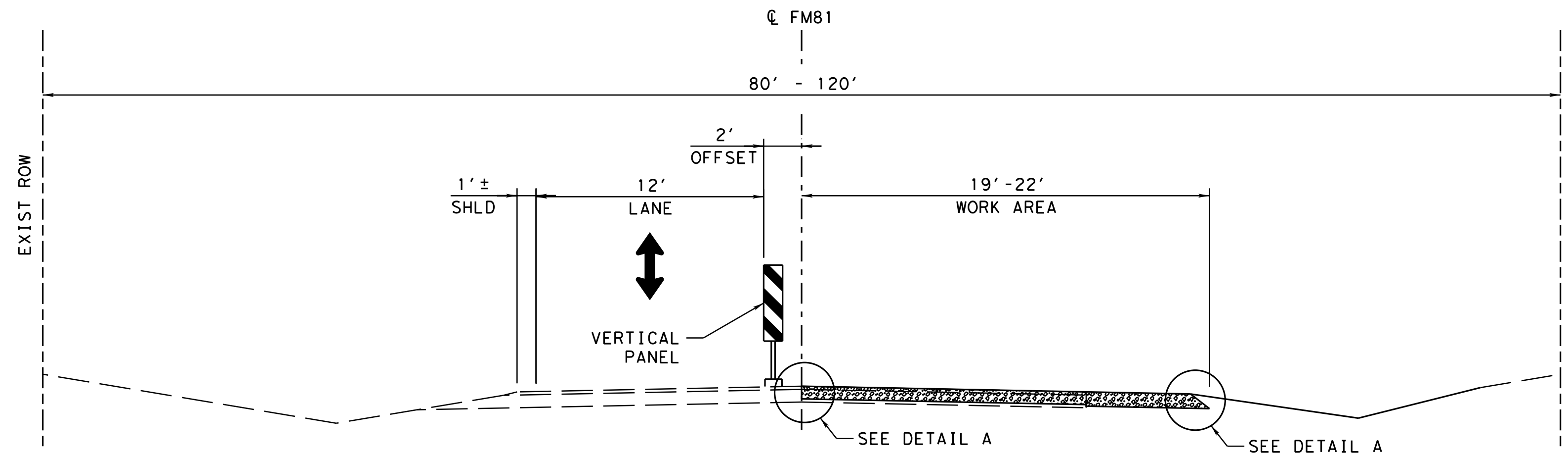
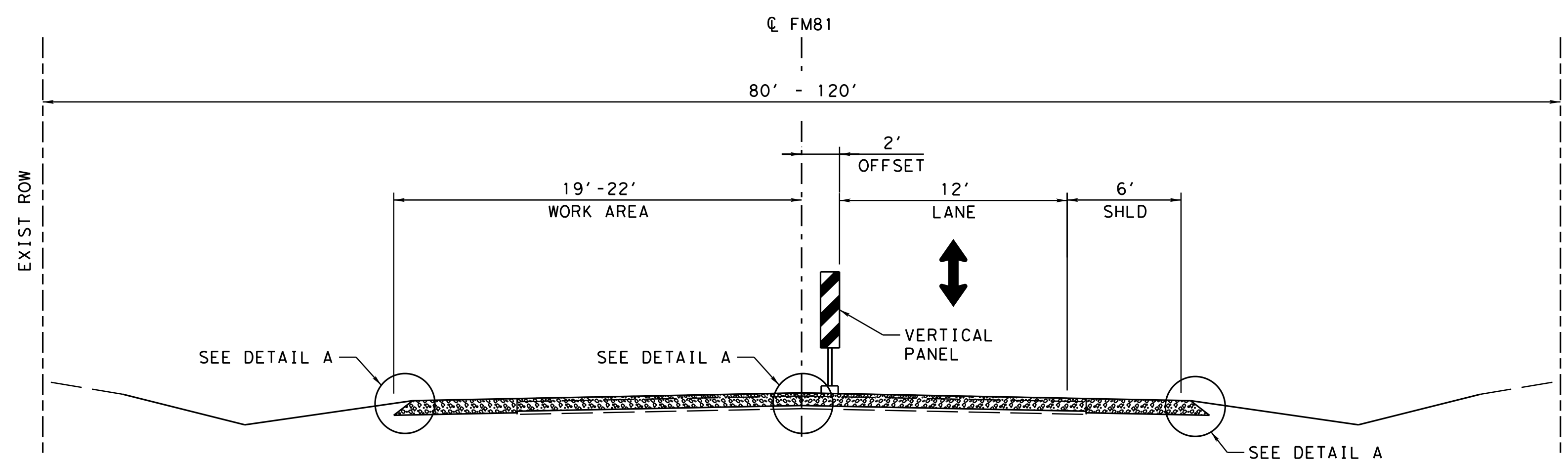
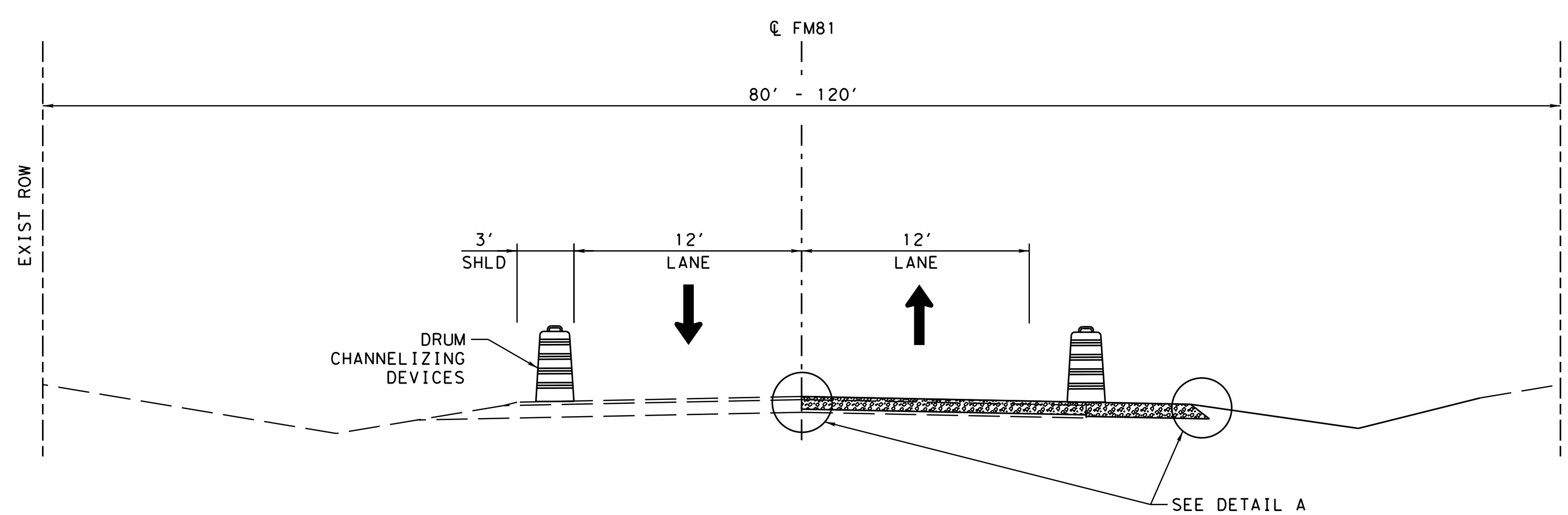


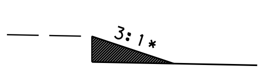
PHASE 2 STAGE 1:
EXCAVATION/EMBANKMENT, FLEX BASE,
CEMENT TREATMENT, PRIME COAT, UNDERSEAL



PHASE 2 STAGE 2:
EXCAVATION/EMBANKMENT, FLEX BASE,
CEMENT TREATMENT, PRIME COAT, UNDERSEAL



PHASE 2: NON-WORK HOURS, OPEN BOTH LANES FOR TRAFFIC



DETAIL A

* REQUIRED DURING NON-WORKING HOURS

DURING NON-WORKING HOURS, CONTRACTOR WILL BE REQUIRED TO PROVIDE 3:1 OR FLATTER SLOPES WHERE VERTICAL CUTS EXIST ADJACENT TO EDGE OF PAVEMENTS. MATERIAL USED FOR SLOPE PROTECTION WILL BE SUBSIDIARY TO VARIOUS BID ITEMS OF THIS CONTRACT.

DATE	BY	REV	REVISION

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98478
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
6/17/2022

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FM 81

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 2 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	27
CONTROL	SECTION	JOB	
0691	01	044	

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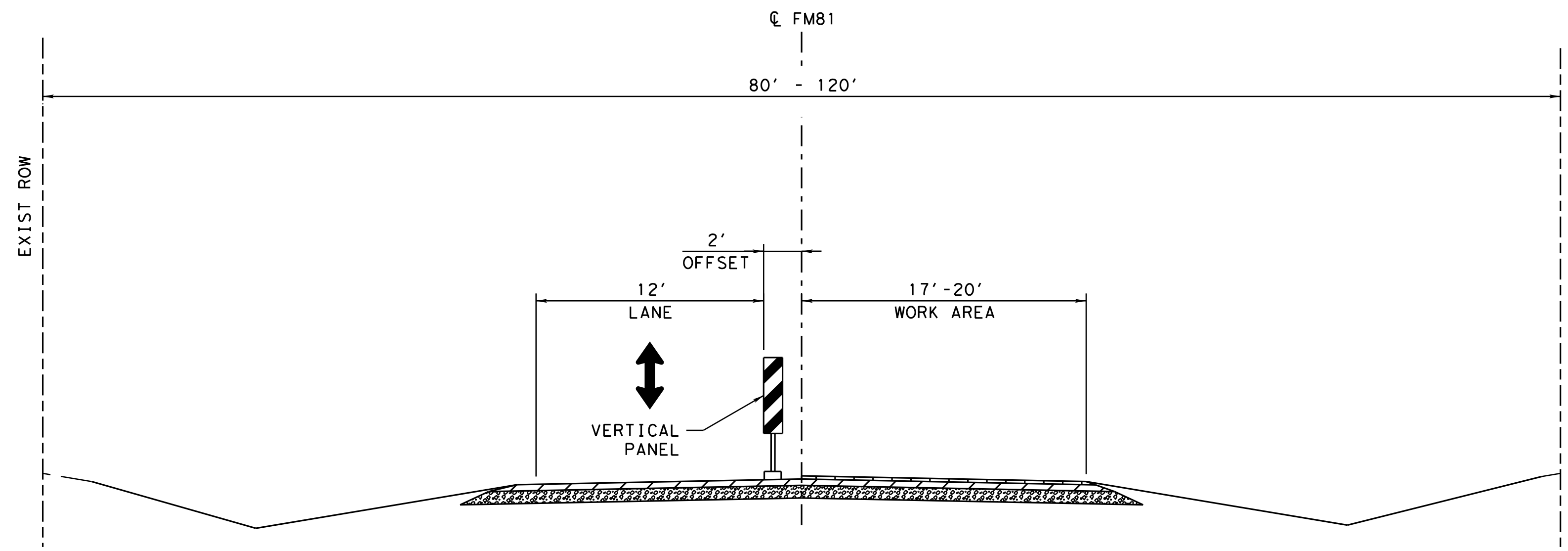
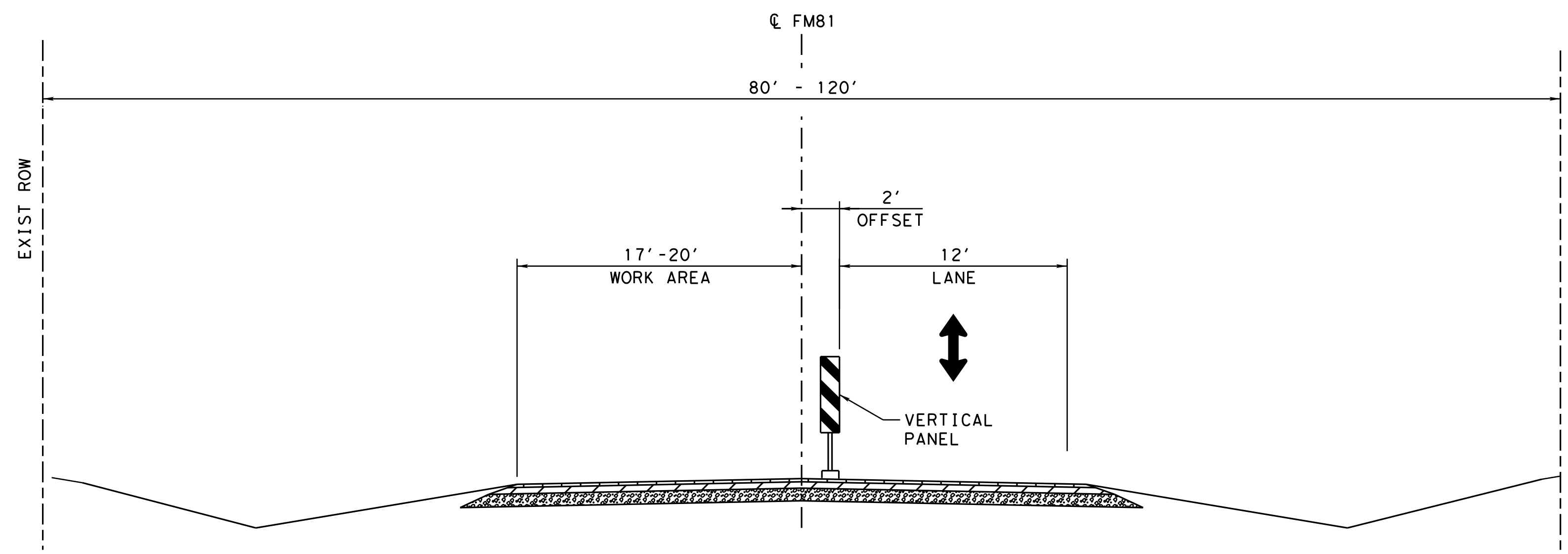
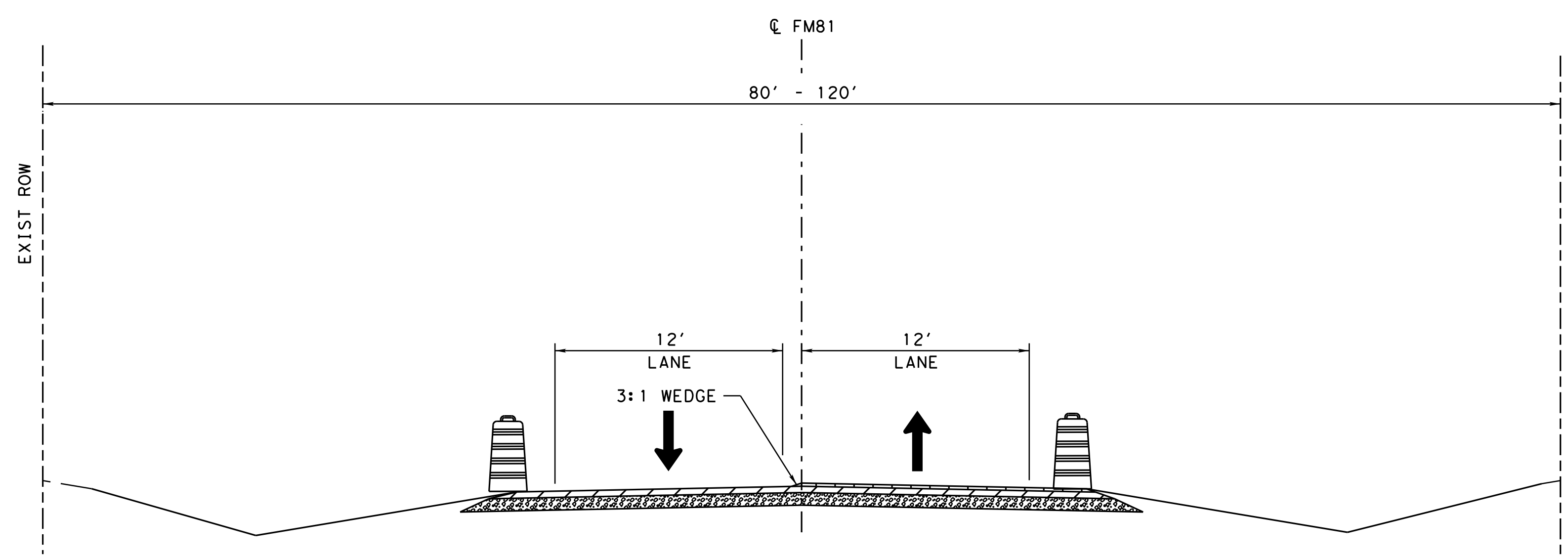


PHASE 3 STAGE 1: PLACE TY D HMA SURFACE COURSE



PHASE 3 STAGE 2: PLACE TY D HMA SURFACE COURSE



PHASE 3: NON-WORK HOURS, OPEN BOTH LANES FOR TRAFFIC

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
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LICENSED PROFESSIONAL ENGINEER
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FM 81

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 3 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	28
CONTROL	SECTION	JOB	
0691	01	044	

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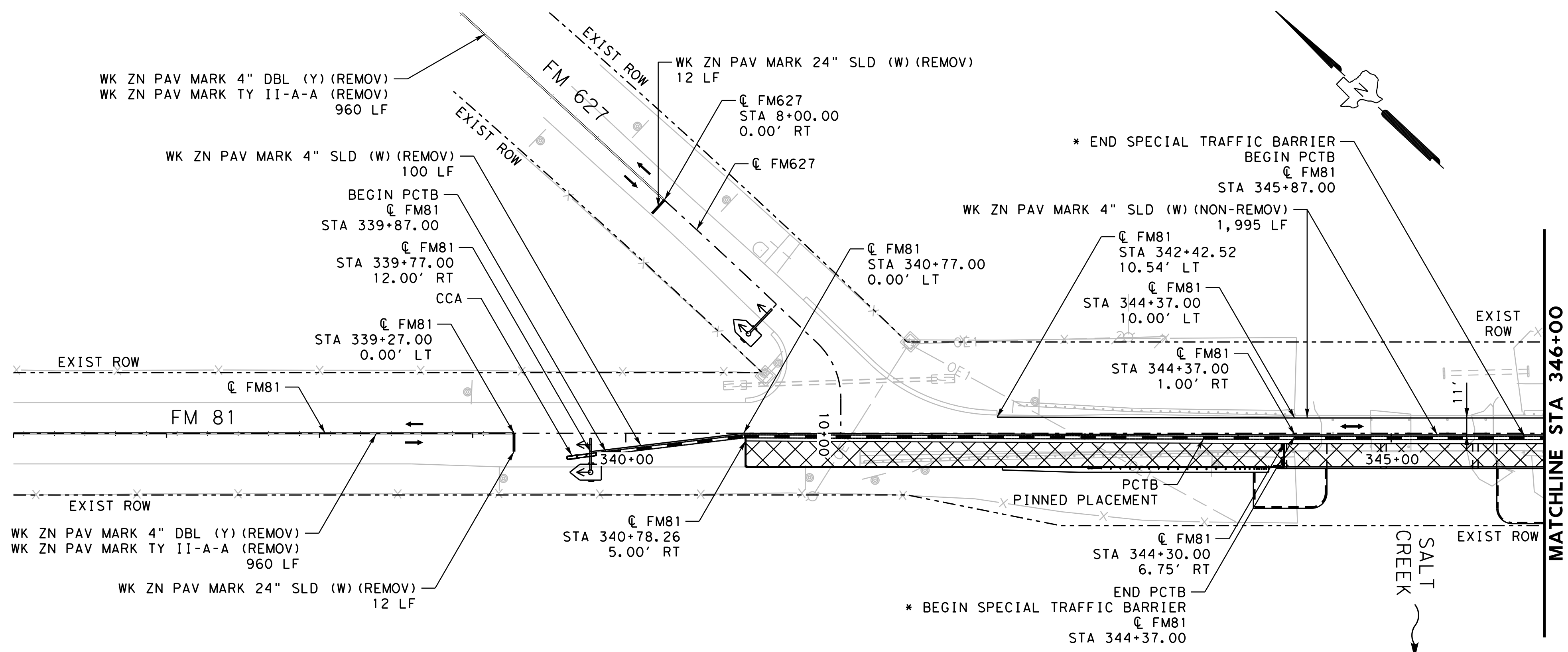
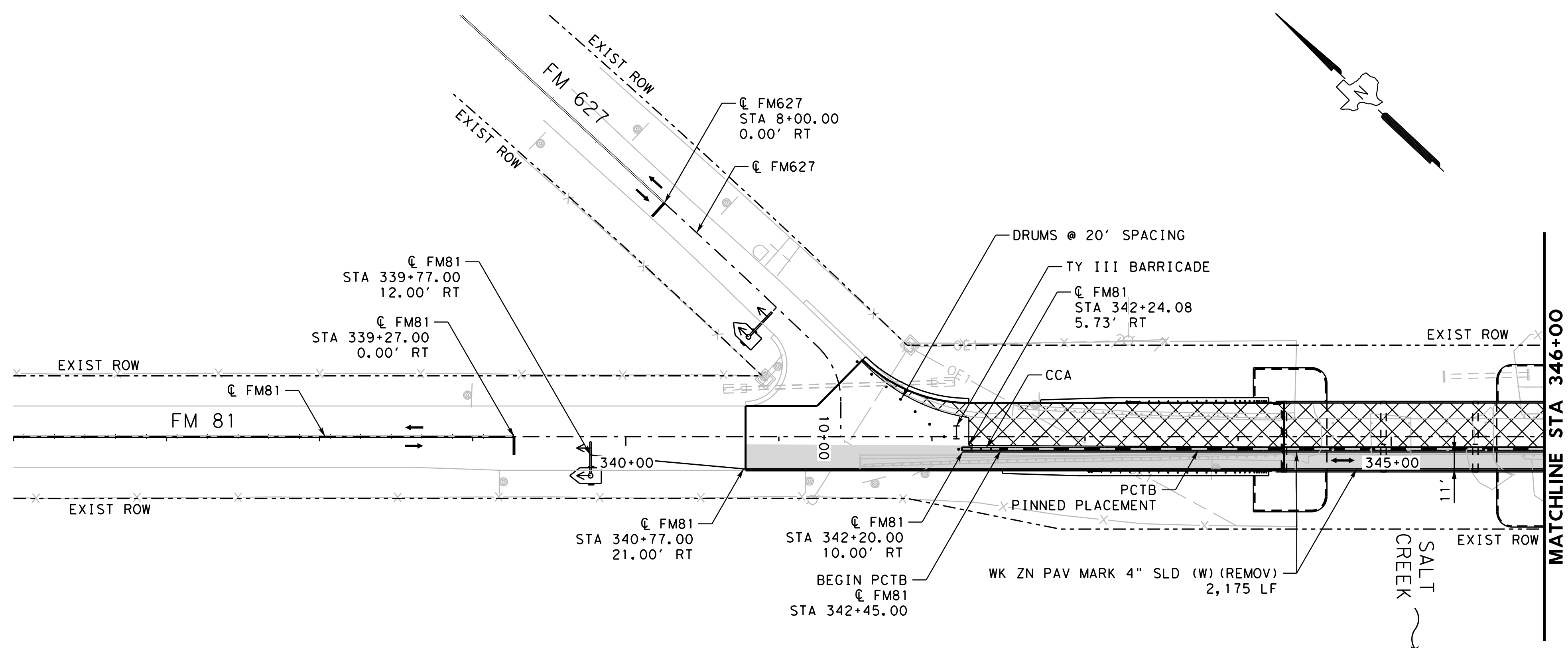


PHASE 1 STAGE 1



PHASE 1 STAGE 2

LEGEND

- DIRECTION OF TRAVEL
- EXISTING ROW
- PROPOSED ROW
- EXISTING FENCE
- OVERHEAD POWERLINE
- CONC. TRAFFIC BARRIER
- CRASH CUSHION ATTENUATOR (CCA)
- TY III BARRICADE
- CHANNELIZING DEVICE
- PERMANENT PAVEMENT (THIS STAGE)
- PERMANENT PAVEMENT (PREVIOUS STAGE)
- TEMPORARY TRAFFIC SIGNAL

NOTES:

1. FOR TEMPORARY TRAFFIC SIGNAL SETUPS, CONTRACTOR SHALL PLACE STOP BAR AND OTHER TRAFFIC CONTROL DEVICES PER TCP(2-8B)-18.
2. TEMPORARY TRAFFIC SIGNAL SHALL INCLUDE INTEGRATED LIGHTING AND WAIT TIME DISPLAY. INTEGRATED LIGHTING AND WAIT TIME DISPLAY ARE NOT PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO ITEM 510.
3. CONTRACTOR SHALL HAVE A WORKING BACKUP TEMPORARY TRAFFIC SIGNAL ON SITE. COST OF BACKUP TEMPORARY TRAFFIC SIGNAL IS SUBSIDIARY TO ITEM 510.

* INSTALL SPECIAL TRAFFIC BARRIER PER FLAT SLAB TEMPORARY TRAFFIC BARRIER SLAB SUPPORT DETAIL. BEGIN/END LIMITS SHALL BE FIELD VERIFIED PRIOR TO PLACING ANY PCTB.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81
TRAFFIC CONTROL PLAN
BEGIN PROJECT TO STA 346+00

SCALE: 1"=100' SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	29
CONTROL	SECTION	JOB	
0691	01	044	

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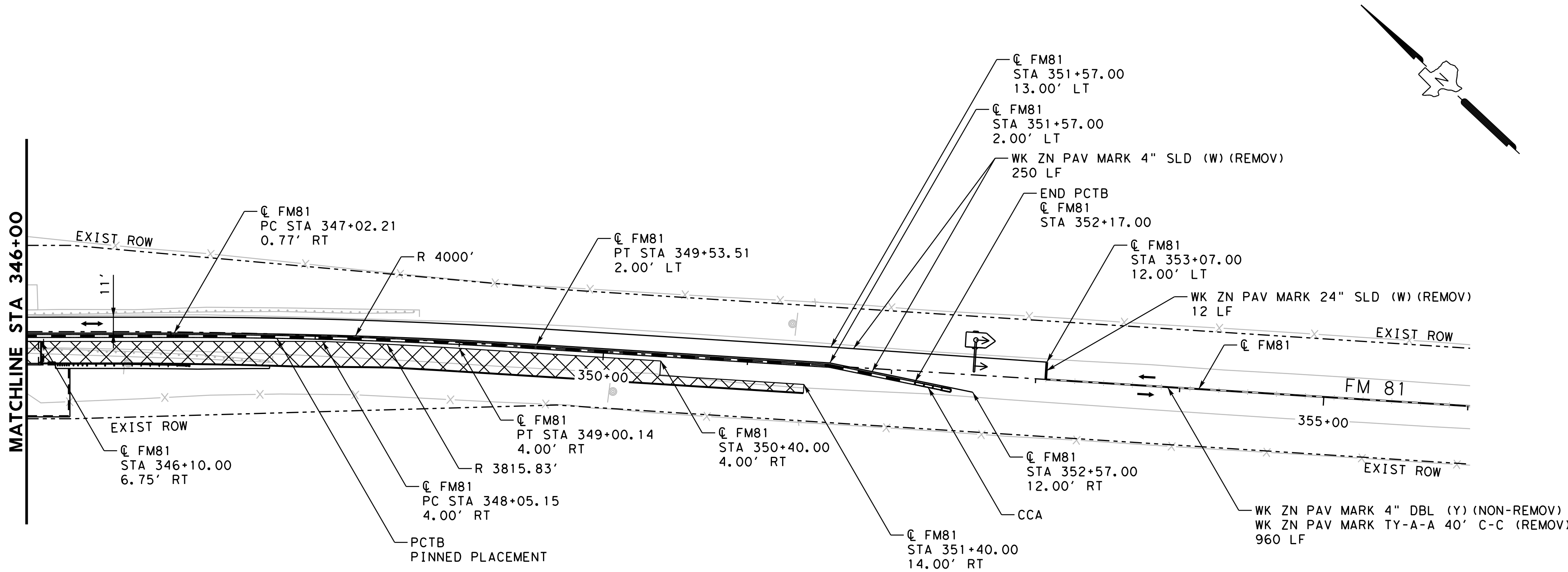
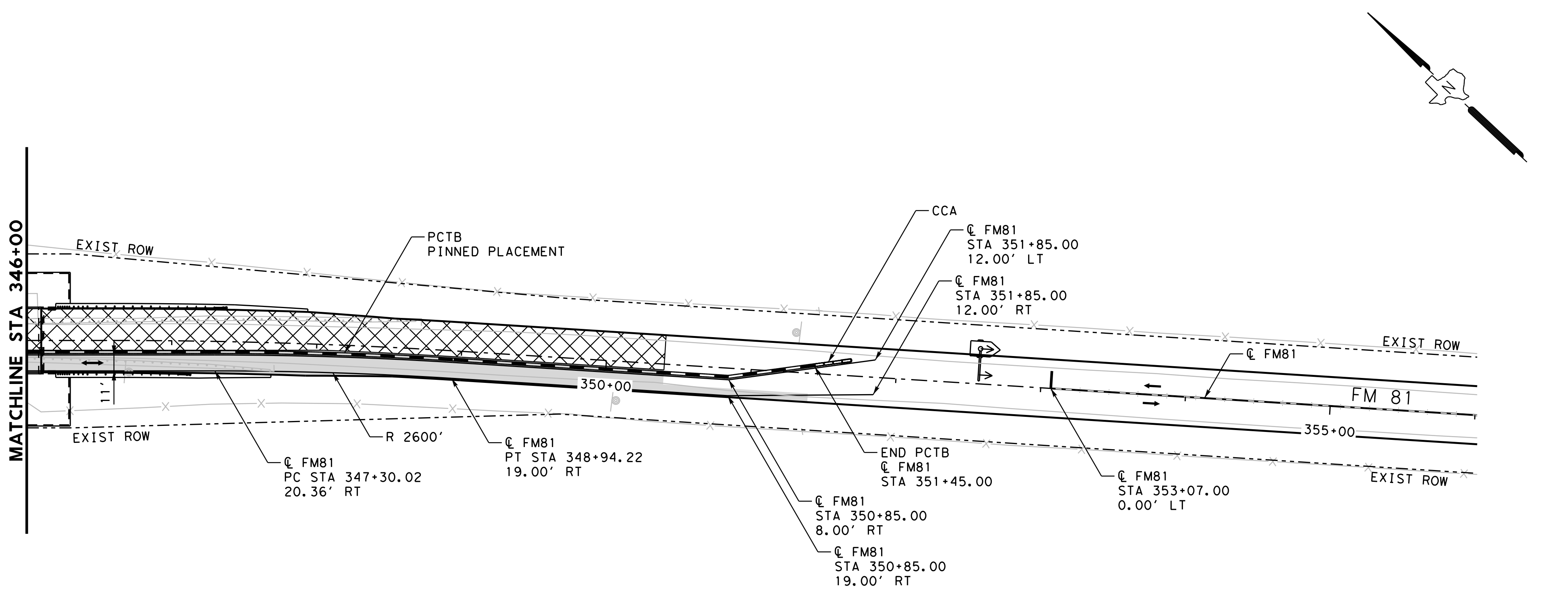


PHASE 1 STAGE 1



PHASE 1 STAGE 2

LEGEND

- DIRECTION OF TRAVEL
- EXISTING ROW
- PROPOSED ROW
- EXISTING FENCE
- OE1 — OE1 OVERHEAD POWERLINE
- CONC. TRAFFIC BARRIER
- CRASH CUSHION ATTENUATOR (CCA)
- TY III BARRICADE
- CHANNELIZING DEVICE
- PERMANENT PAVEMENT (THIS STAGE)
- PERMANENT PAVEMENT (PREVIOUS STAGE)
- TEMPORARY TRAFFIC SIGNAL

NOTES:

1. FOR TEMPORARY TRAFFIC SIGNAL SETUPS, CONTRACTOR SHALL PLACE STOP BAR AND OTHER TRAFFIC CONTROL DEVICES PER TCP(2-8B)-18.
2. TEMPORARY TRAFFIC SIGNAL SHALL INCLUDE INTEGRATED LIGHTING AND WAIT TIME DISPLAY. INTEGRATED LIGHTING AND WAIT TIME DISPLAY ARE NOT PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO ITEM 510.
3. CONTRACTOR SHALL HAVE A WORKING BACKUP TEMPORARY TRAFFIC SIGNAL ON SITE. COST OF BACKUP TEMPORARY TRAFFIC SIGNAL IS SUBSIDIARY TO ITEM 510.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

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FM 81
TRAFFIC CONTROL PLAN
STA 346+00 TO END PROJECT

SCALE: 1"=100' SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	30
CONTROL	SECTION	JOB	
0691	01	044	

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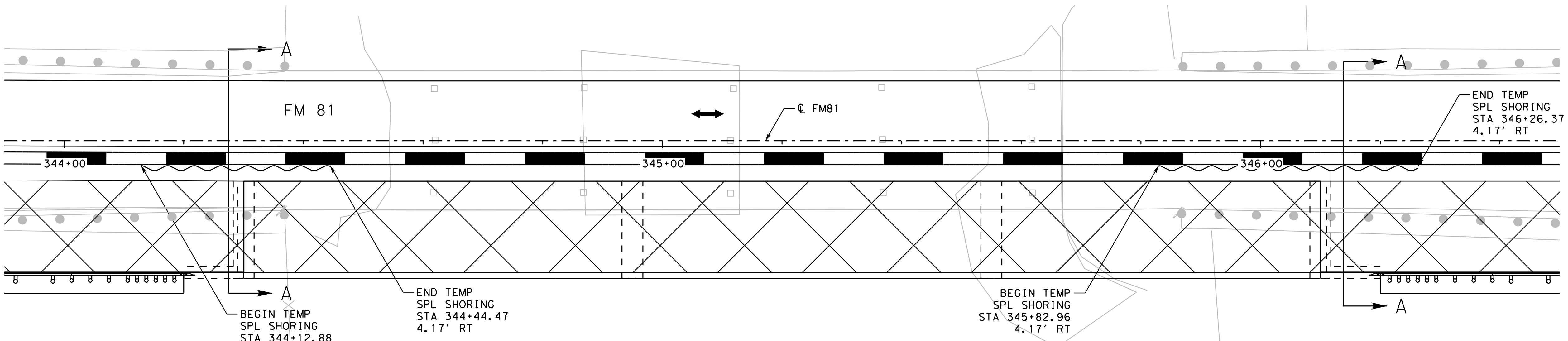
LEGEND

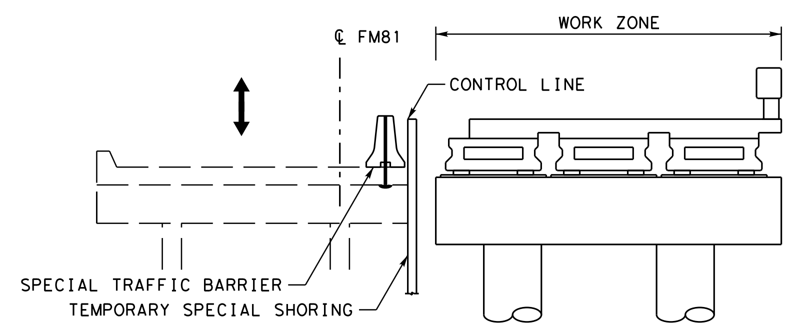
- DIRECTION OF TRAVEL
- TEMPORARY SPL SHORING
- WORK ZONE

NOTES:

1. CONTRACTOR SHALL PROVIDE TEMPORARY SPECIAL SHORING TO HOLD BACK EXISTING ROADWAY EMBANKMENT DURING PHASE 1 STAGE 1 AND PROPOSED ROADWAY EMBANKMENT DURING PHASE 1 STAGE 2.
2. SEE BRIDGE LAYOUT AND TYPICAL SECTION FOR ADDITIONAL INFORMATION.



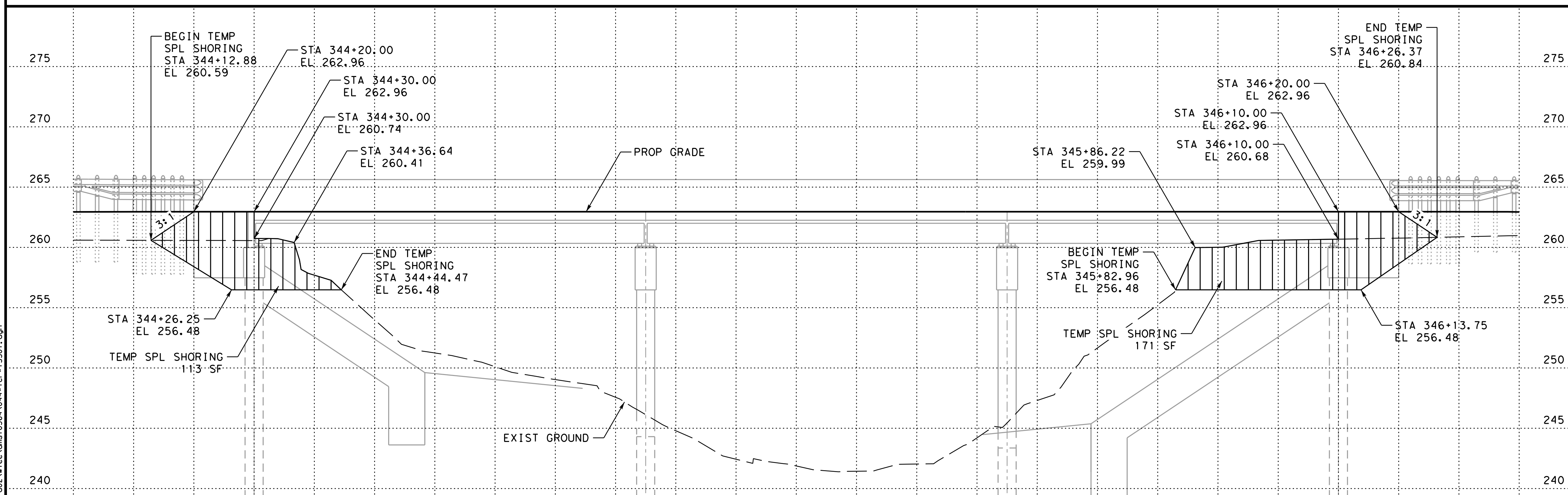
PHASE 1 STAGE 1



SECTION A-A

SCALE: 1"=20' H 1"=10' V

DATE	BY	REV	REVISION



TEMPORARY SPL SHORING PROFILE

STATE OF TEXAS
WEIYIH TEE
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6/17/2022

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FM 81
TRAFFIC CONTROL PLAN
TEMPORARY SPECIAL SHORING

SCALE: 1"=20' H/10' V — SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	31
CONTROL	SECTION	JOB	
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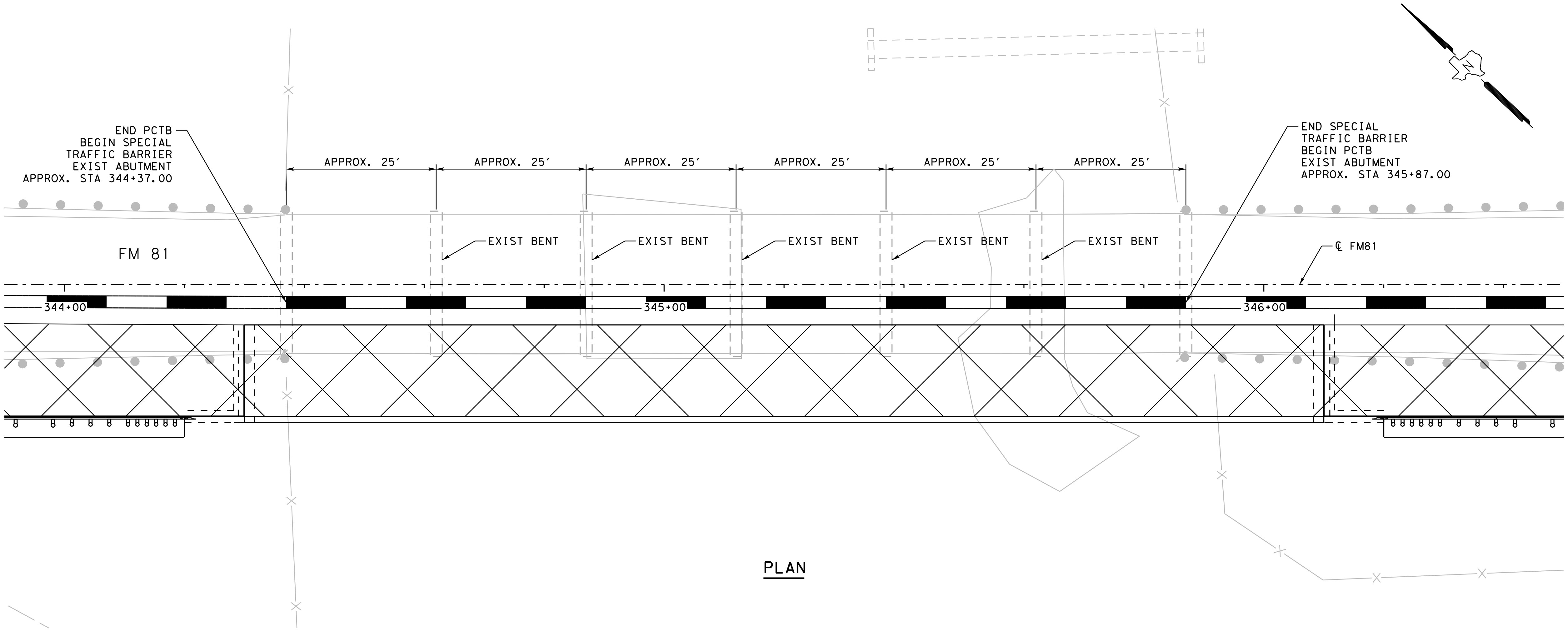
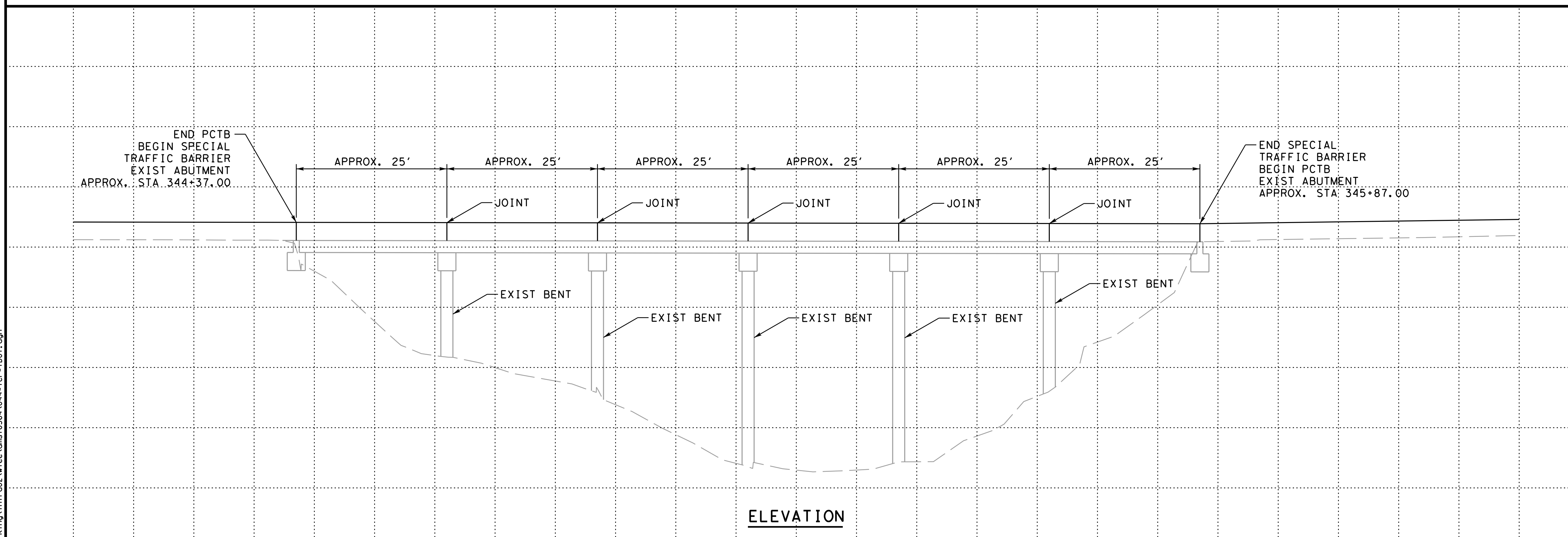


PLAN

NOTES:

1. SEE OTHER TRAFFIC CONTROL PLAN SHEETS FOR ADDITIONAL INFORMATION.
2. CONTRACTOR SHALL INSTALL SPECIAL TRAFFIC BARRIER PER FLAT SLAB TEMPORARY TRAFFIC BARRIER SLAB SUPPORT DETAIL.
3. JOINT LOCATIONS ON THIS SHEET ARE PROVIDED FOR REFERENCE ONLY. CONTRACTOR SHALL FIELD VERIFY LOCATION OF EXISTING ABUTMENT AND BENT LOCATIONS TO DETERMINE BARRIER LENGTH AND JOINT LOCATIONS.
4. TRAFFIC BARRIER SHALL BE PRECAST ONLY AND SHALL NOT BE CAST UNTIL LENGTH OF SPAN HAS BEEN DETERMINED.
5. CONTRACTOR SHALL SUBMIT A RAIL LAYOUT FOR APPROVAL PRIOR TO CASTING TRAFFIC BARRIER.



ELEVATION

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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Texas Department of Transportation

FM 81
TRAFFIC CONTROL PLAN
SPECIAL TRAFFIC BARRIER LAYOUT
SALT CREEK BRIDGE

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

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	32
CONTROL	SECTION	JOB	
0691	01	044	

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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

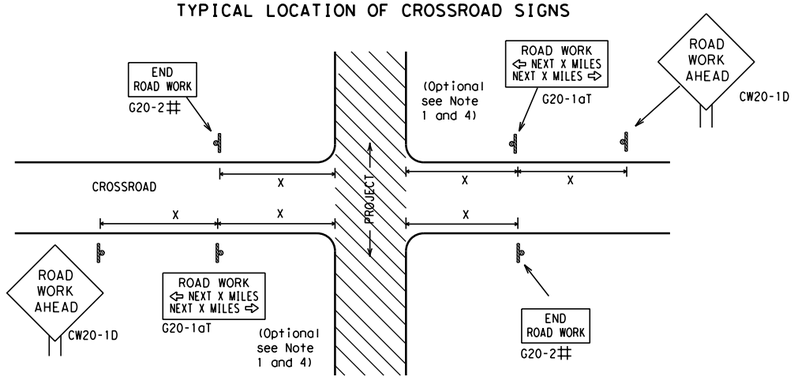
Traffic Safety Division Standard

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	0691	01	044	FM 81
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	CRP	KARNES		33

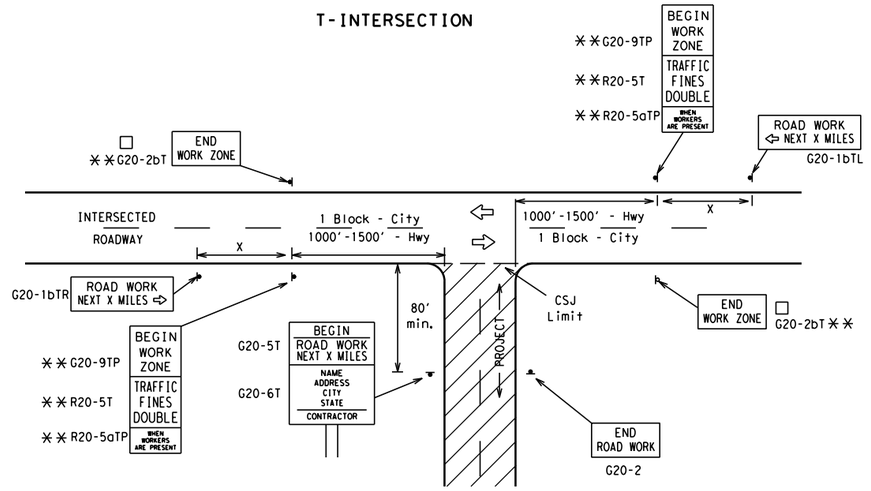
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

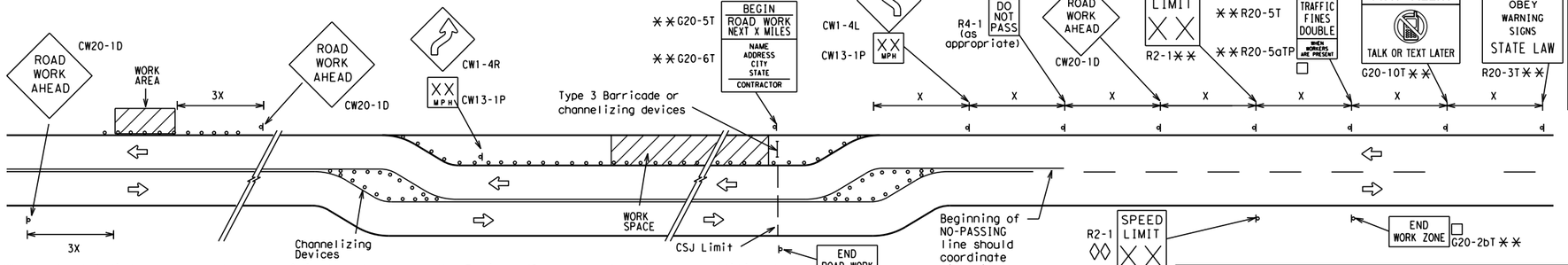
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

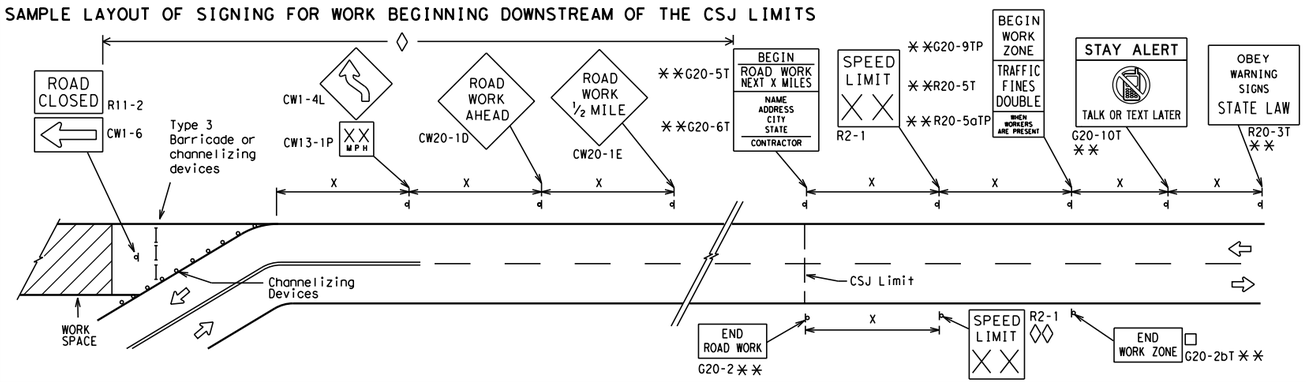
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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
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REVISIONS	0691	01	044	FM 81
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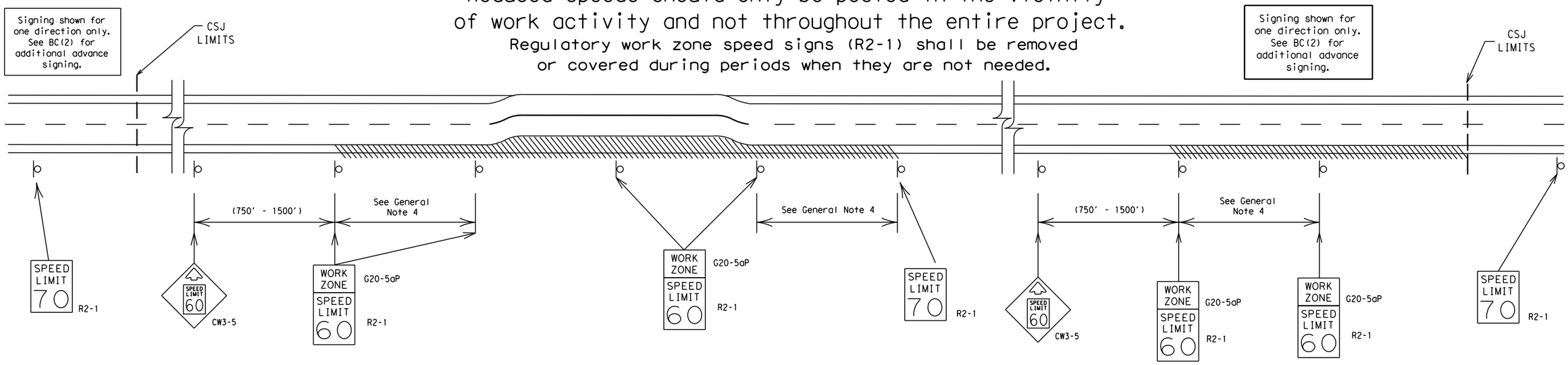
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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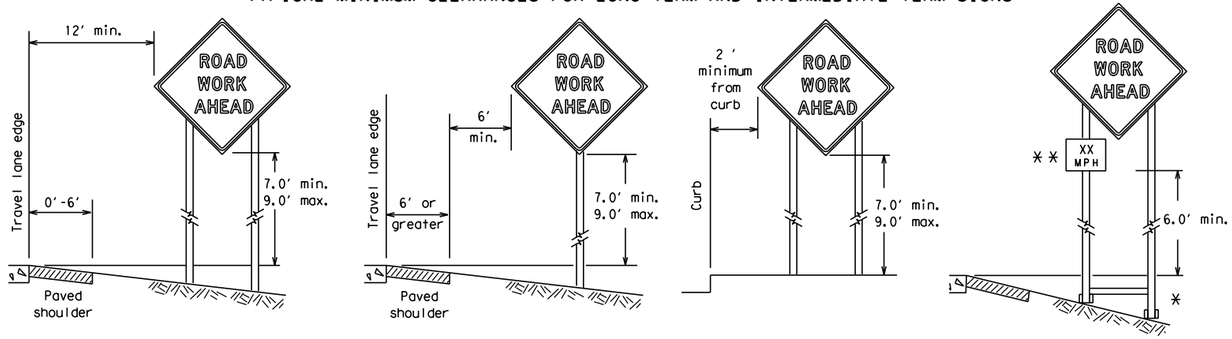
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		35

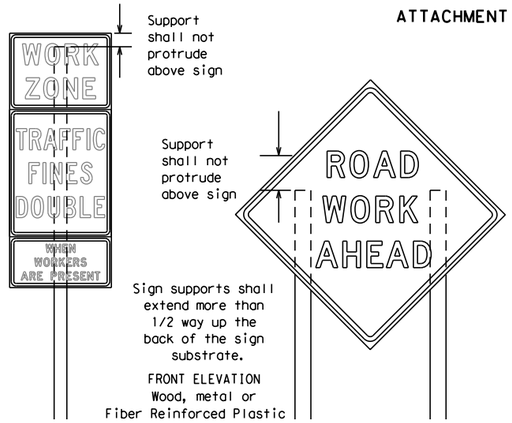
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

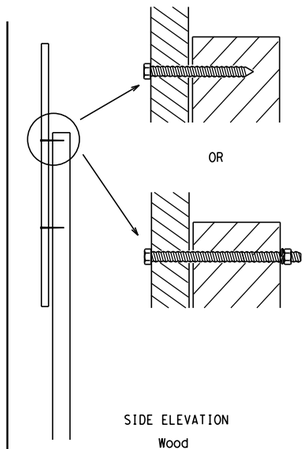


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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





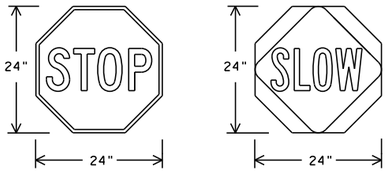
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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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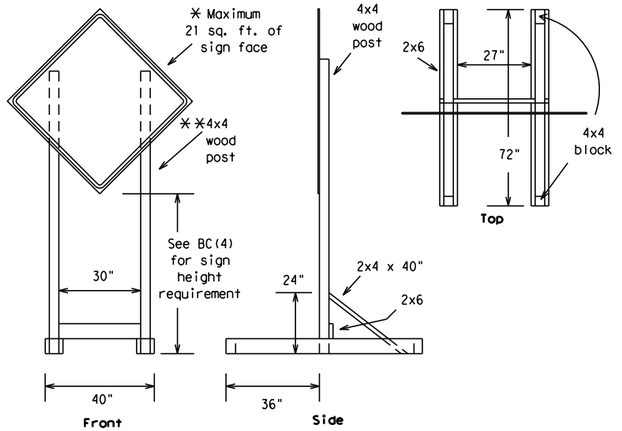
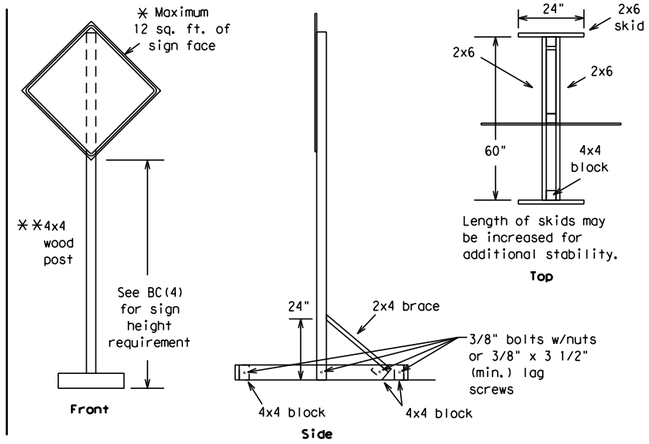
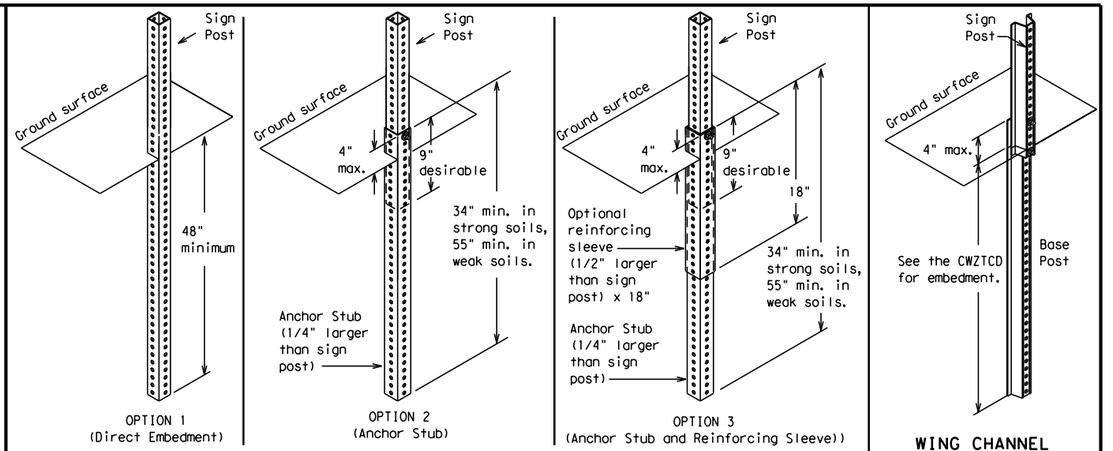




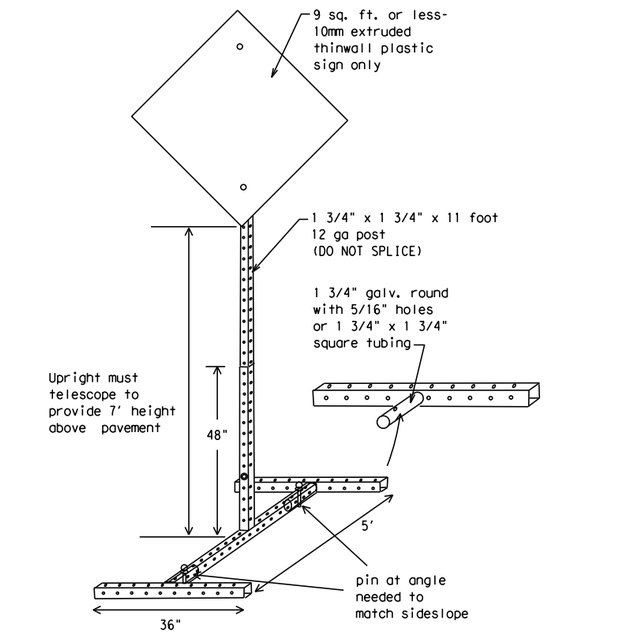
SKID MOUNTED WOOD SIGN SUPPORTS

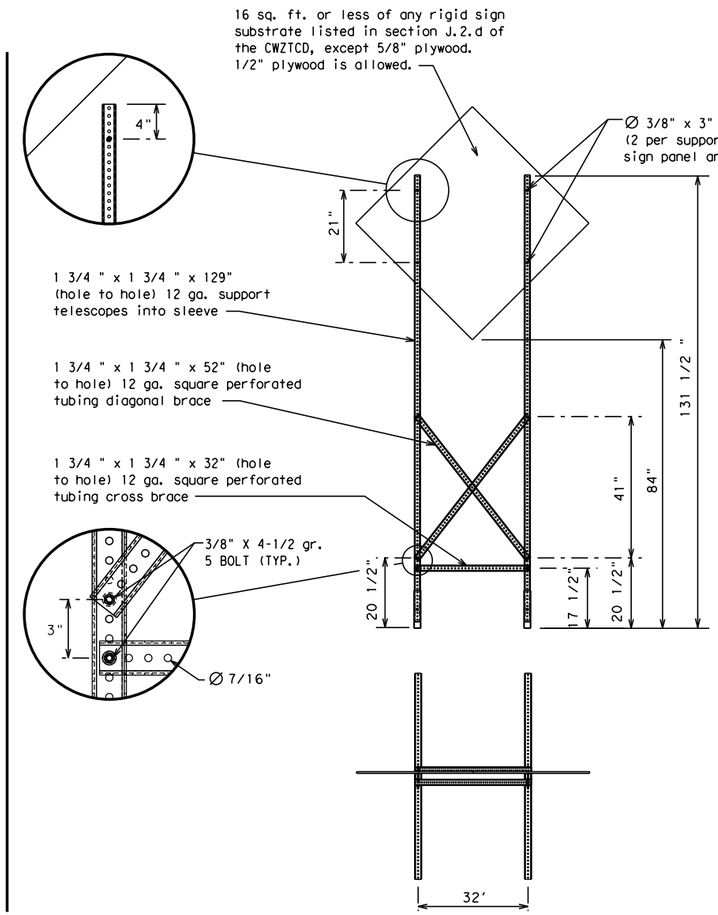
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

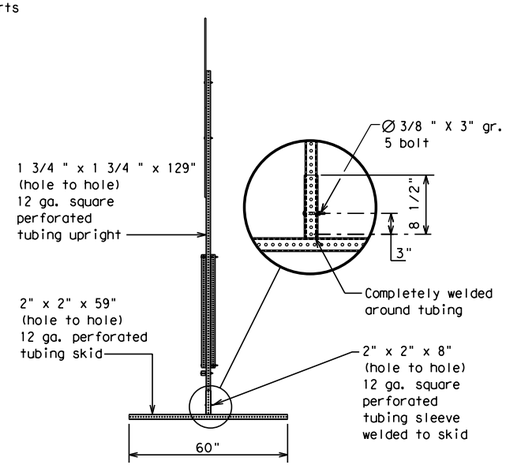


GROUND MOUNTED SIGN SUPPORTS

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic 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	0691	01	044	FM 81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	KARNES		38

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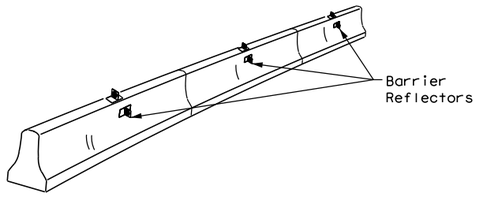
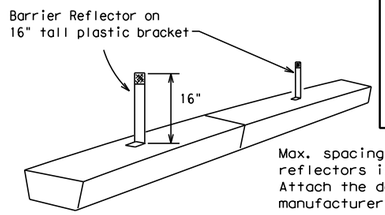
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



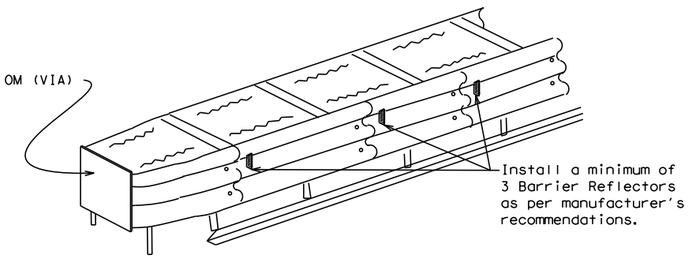
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

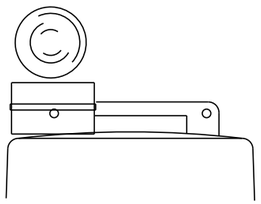
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

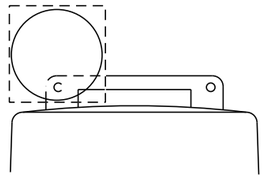
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

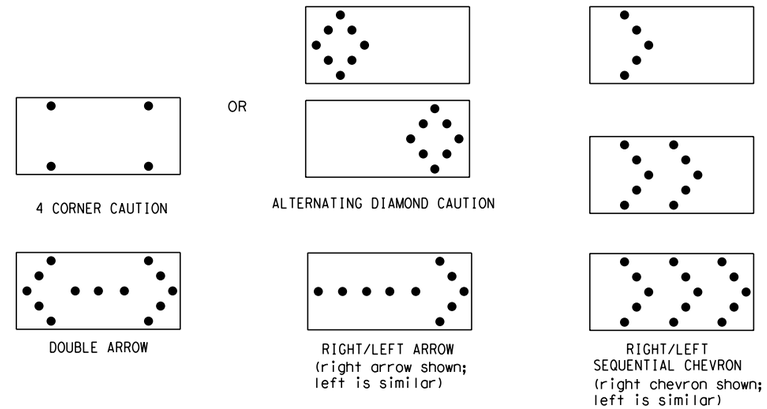
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	KARNES		39

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

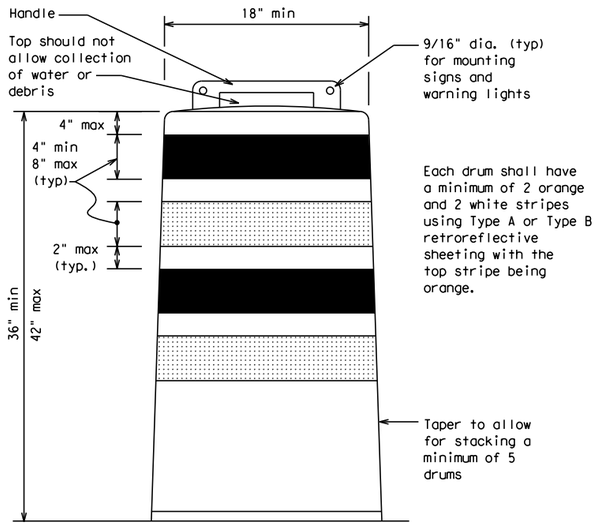
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

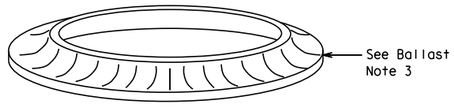
RETROREFLECTIVE SHEETING

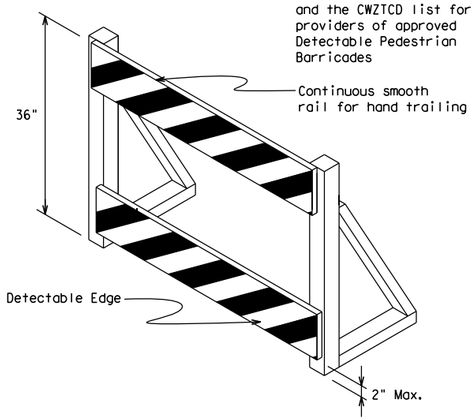
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

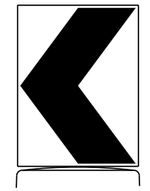




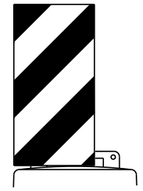


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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
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9-07 5-21	CRP	KARNES		40
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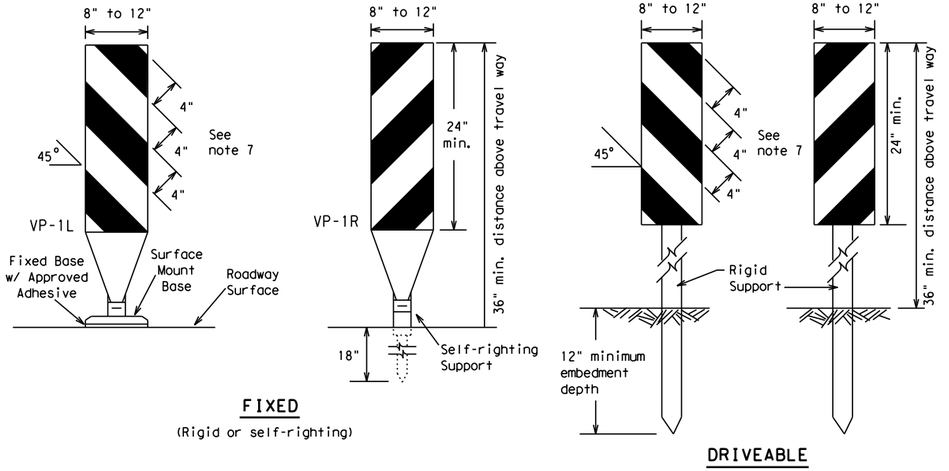
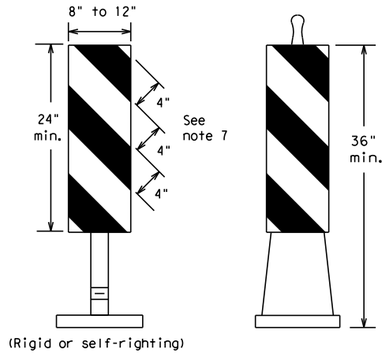


FIXED

(Rigid or self-righting)

DRIVEABLE

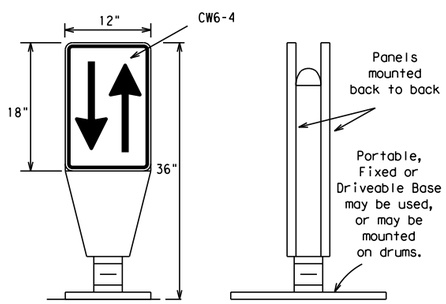


(Rigid or self-righting)

PORTABLE

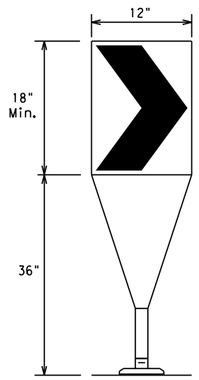
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



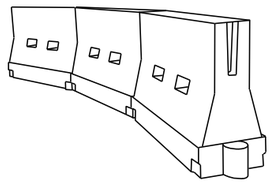
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0691	01	044	FM 81
9-07 8-14	DIST	COUNTY		SHEET NO.
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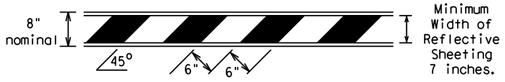
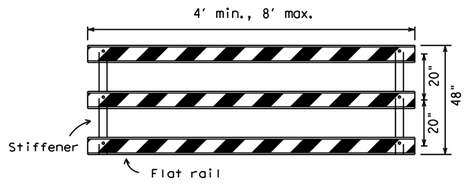
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



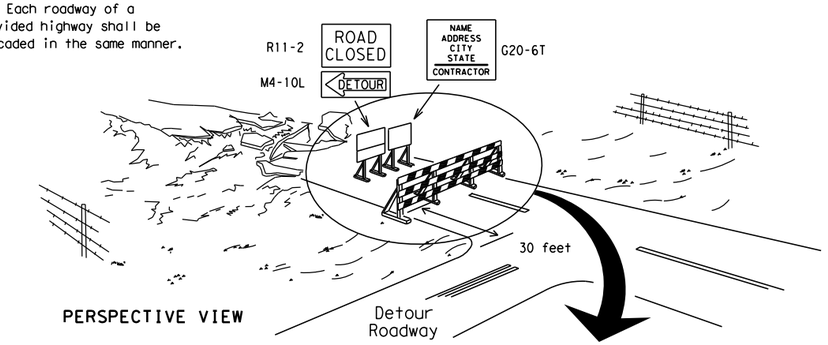
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

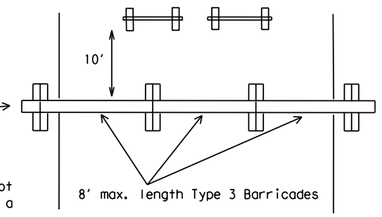
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

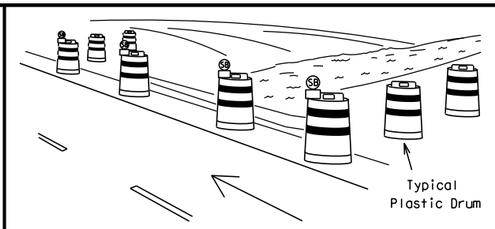
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

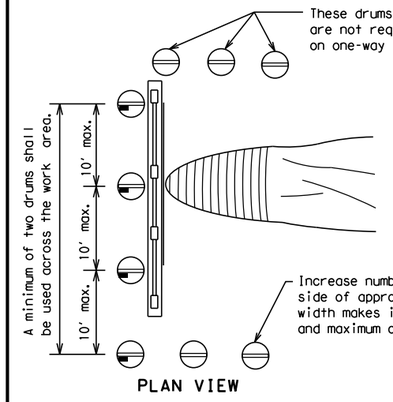
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

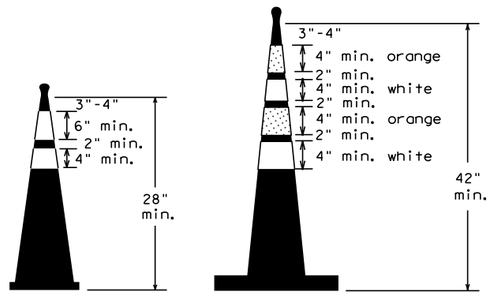
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

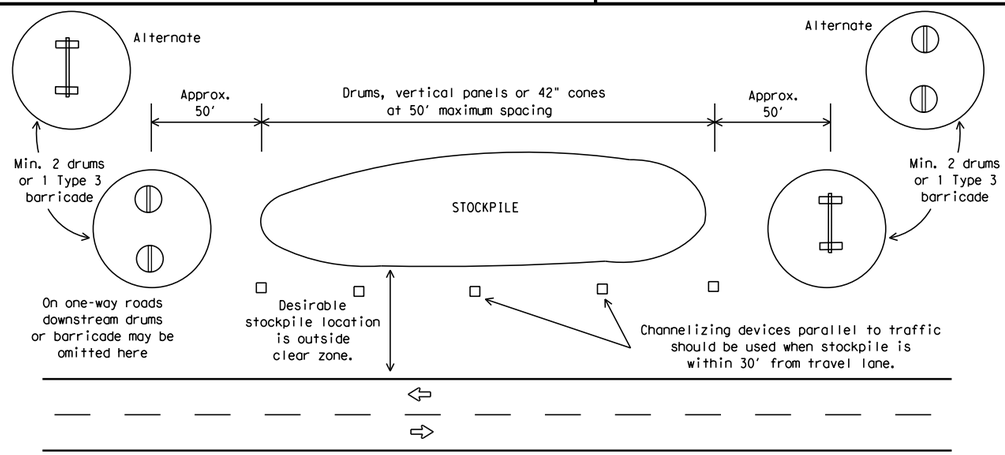
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0691	01	044	FM 81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	KARNES		42

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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.

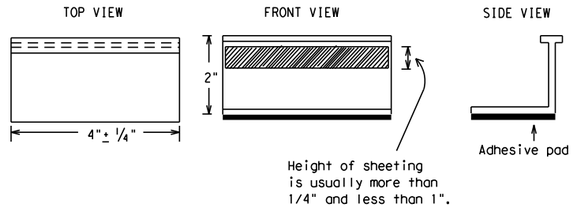
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0691	01	044	FM 81
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	CRP	KARNES		43

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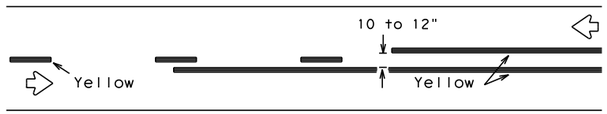
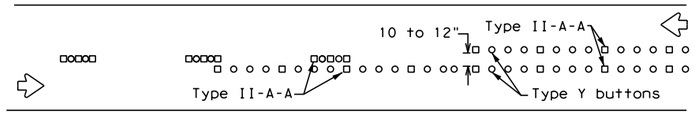
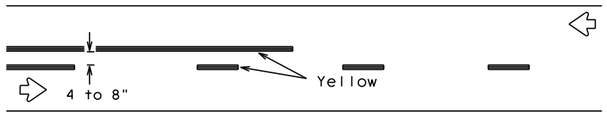
PAVEMENT MARKING PATTERNS



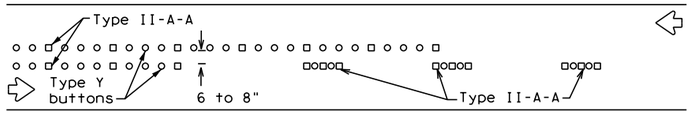
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



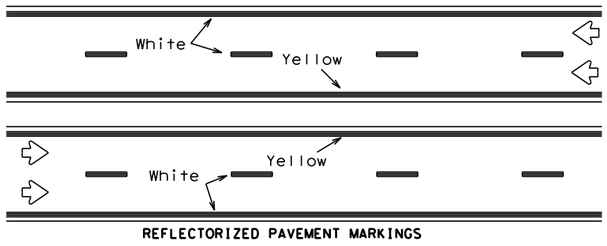
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



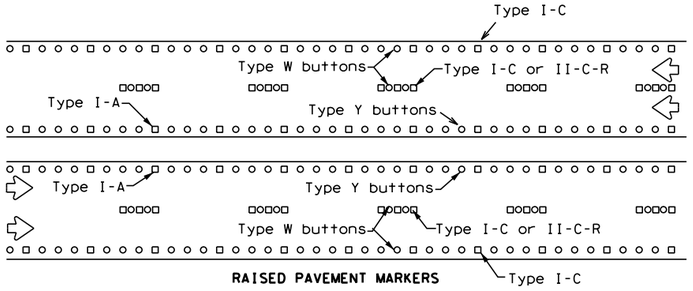
RAISED PAVEMENT MARKERS - PATTERN B

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



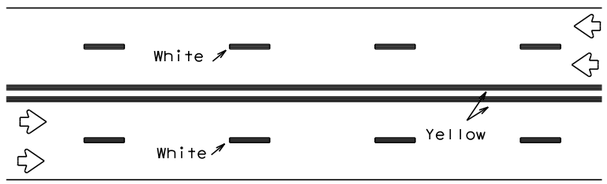
REFLECTORIZED PAVEMENT MARKINGS



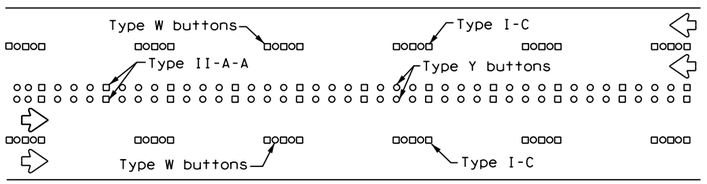
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



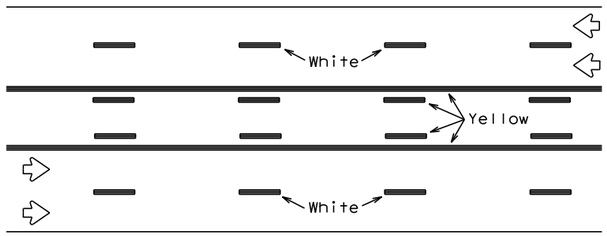
REFLECTORIZED PAVEMENT MARKINGS



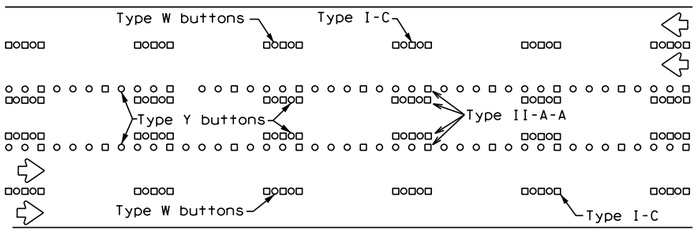
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

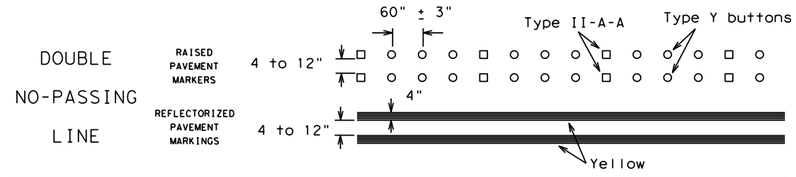
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

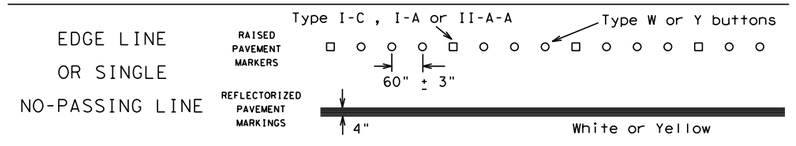
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

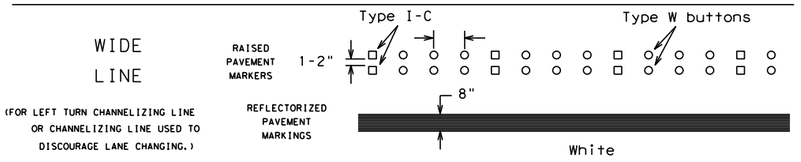


EDGE LINE OR SINGLE NO-PASSING LINE



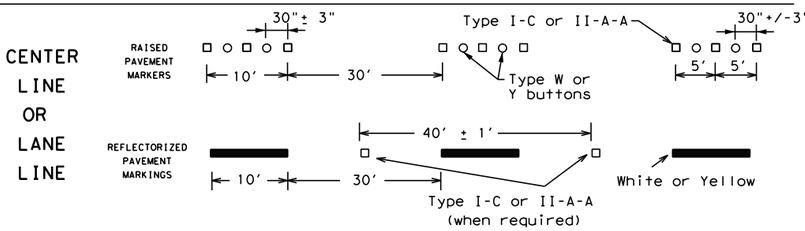
WIDE LINE

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

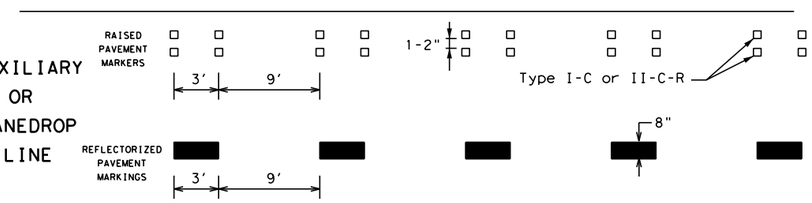


BROKEN LINES

CENTER LINE OR LANE LINE

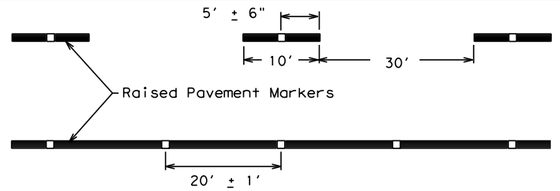


AUXILIARY OR LANEDROP LINE



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

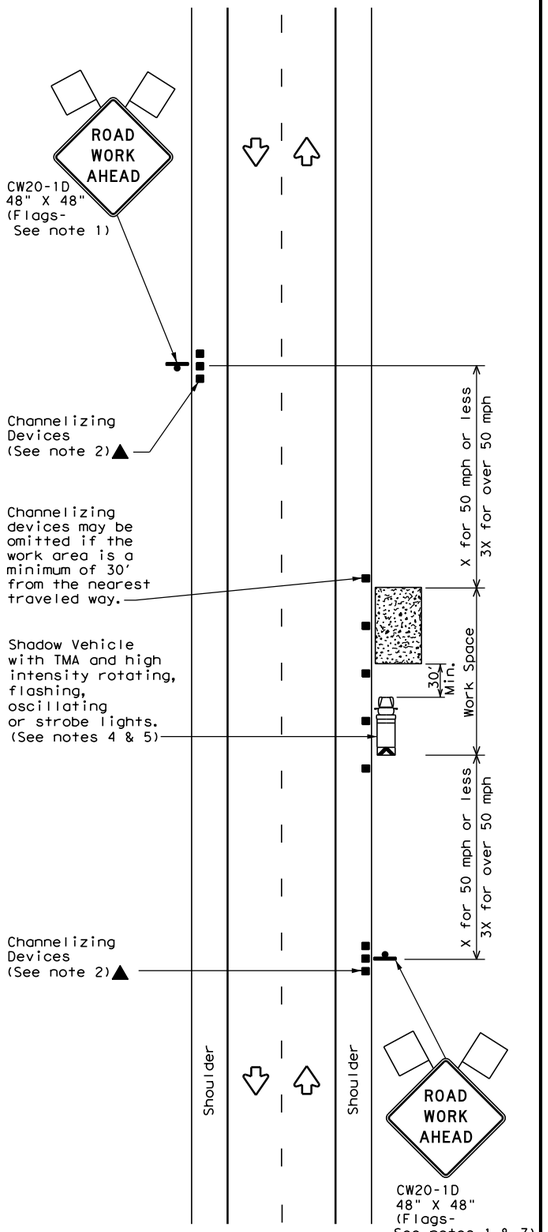
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

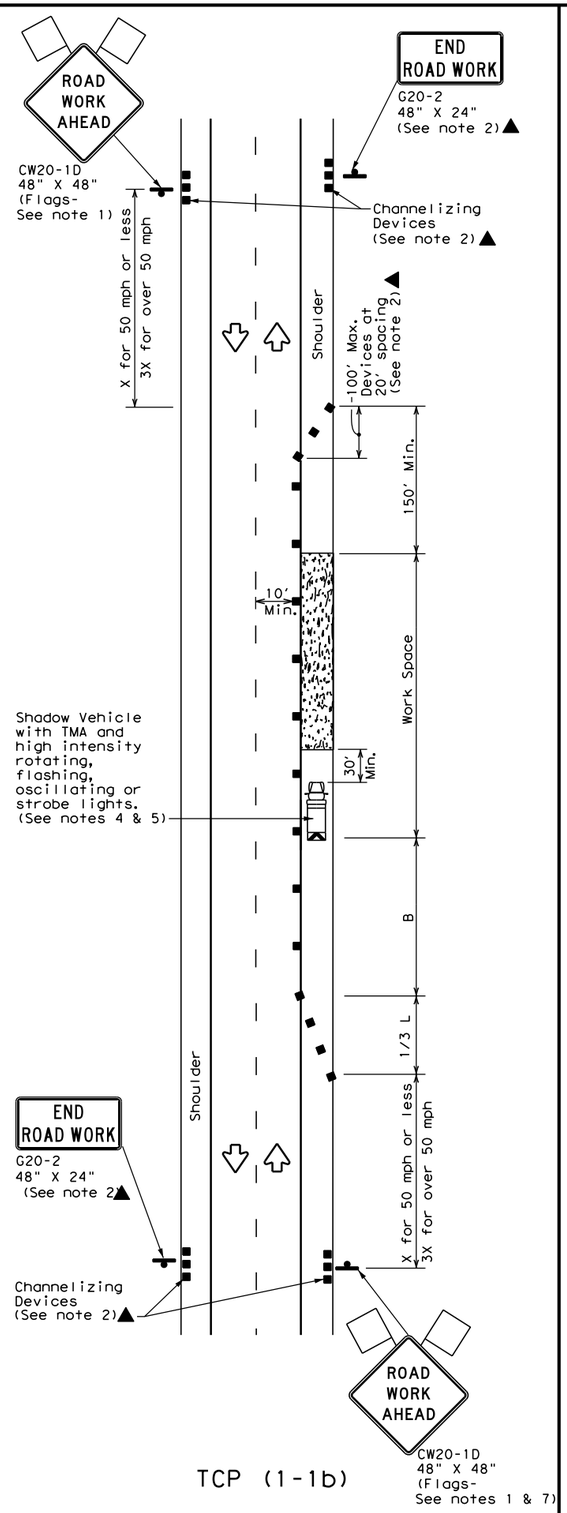
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		44

106



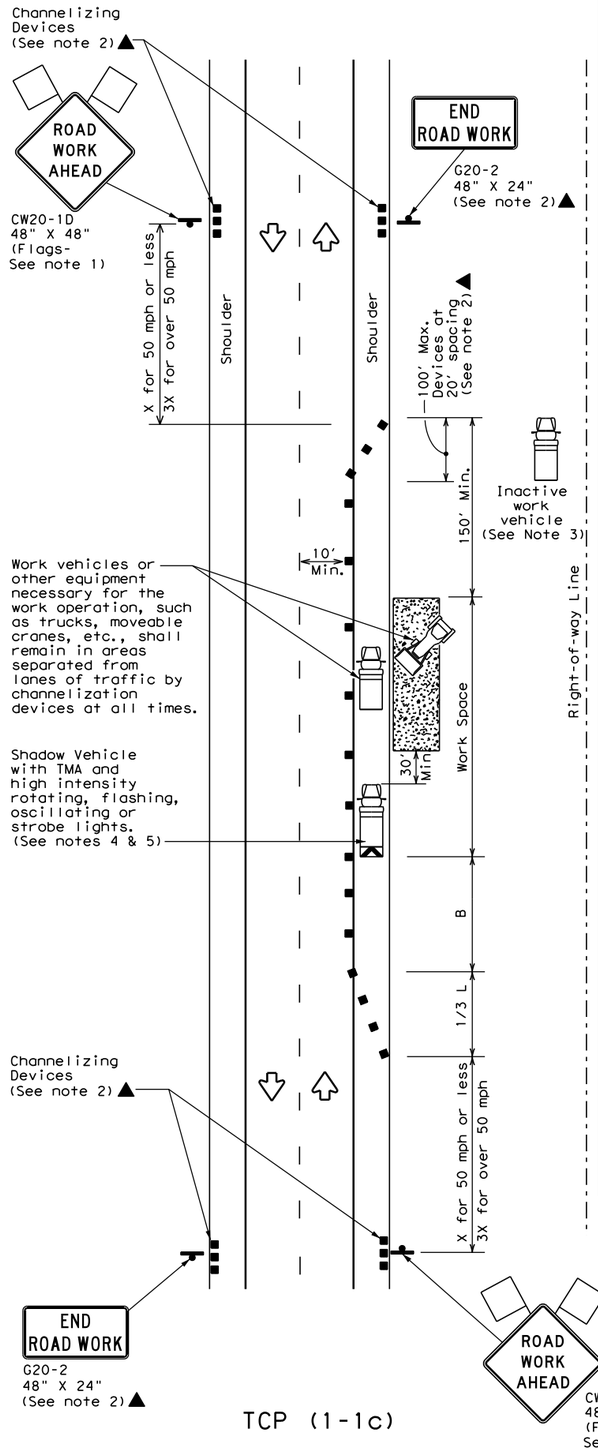
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	CRP	KARNES		45
1-97 2-18				

151

DATE: 6/17/2022 1:02:11 PM
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DATE: 6/17/2022 1:02:22 PM
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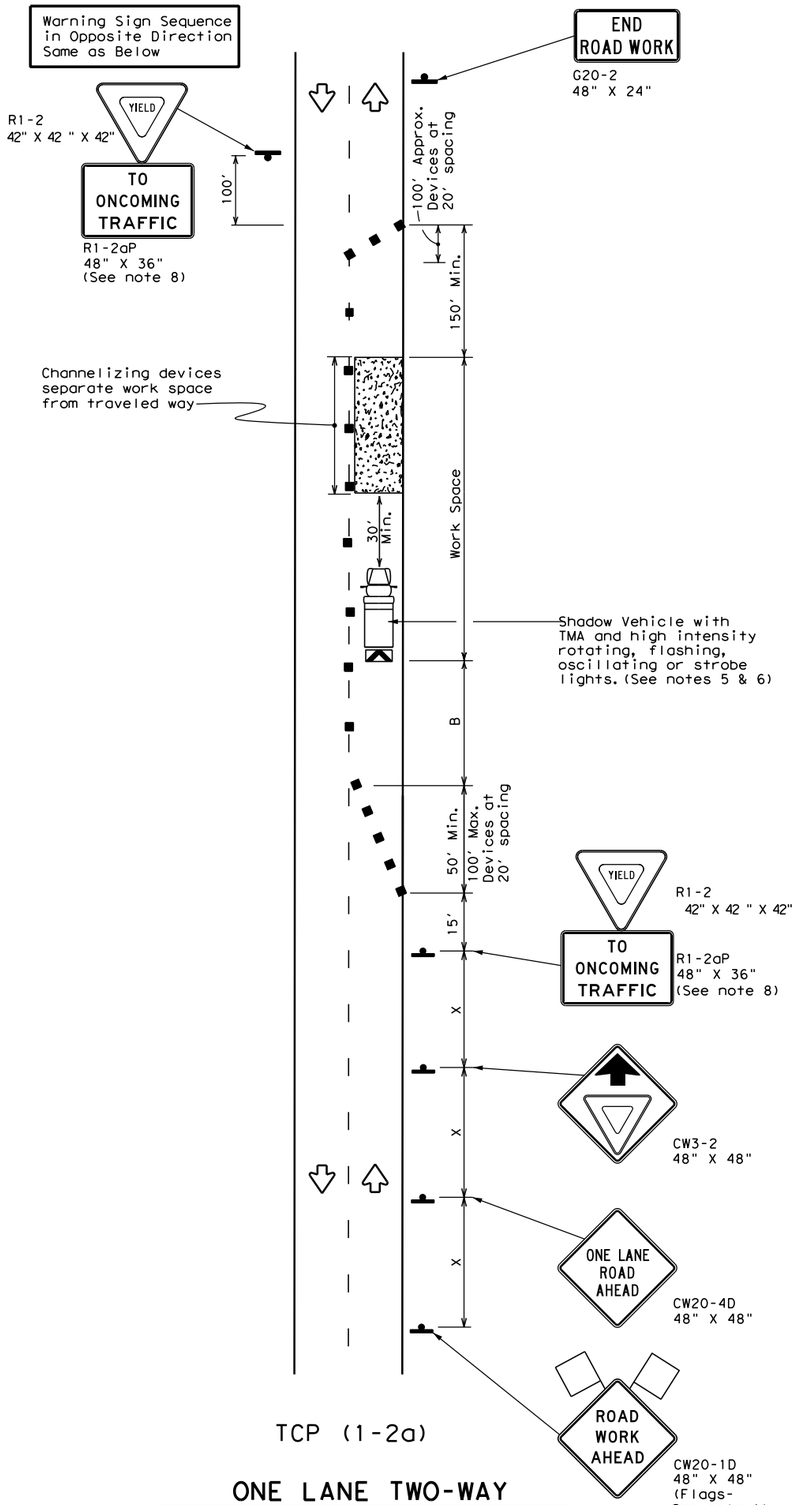
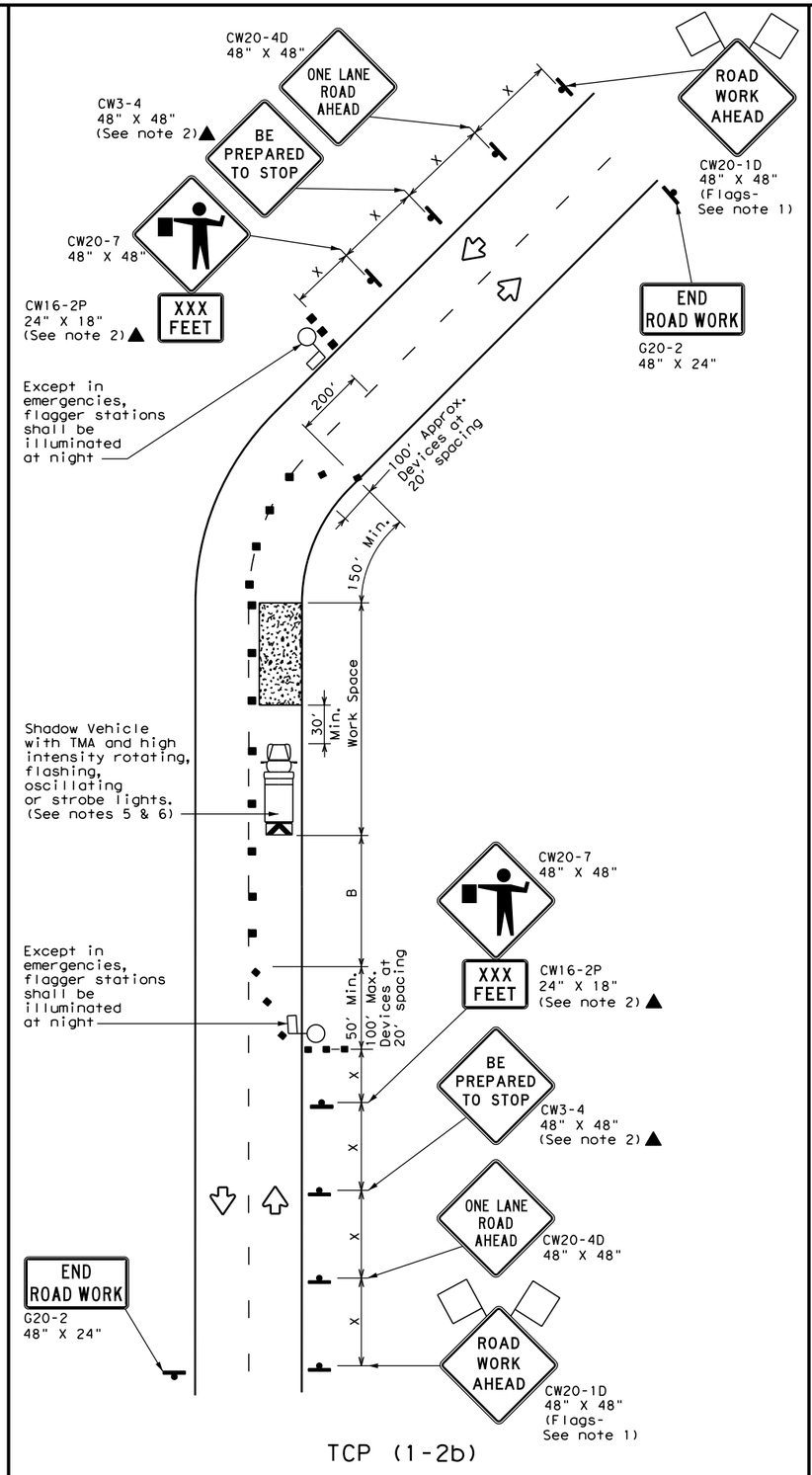


TCP (1-2a)

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



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

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

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		46

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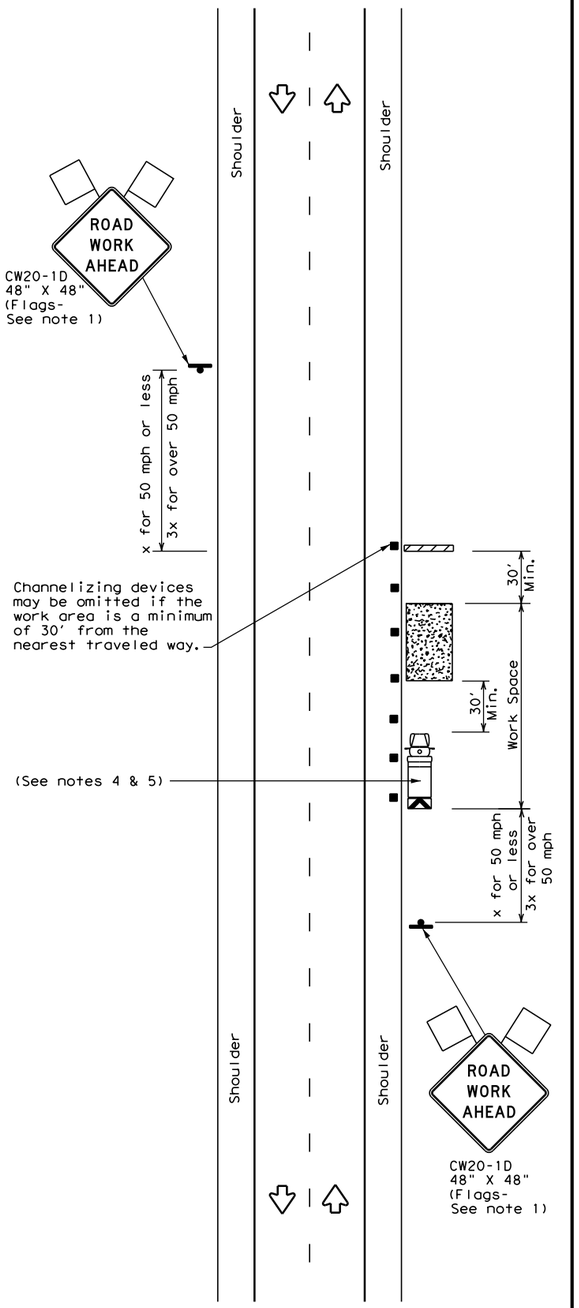
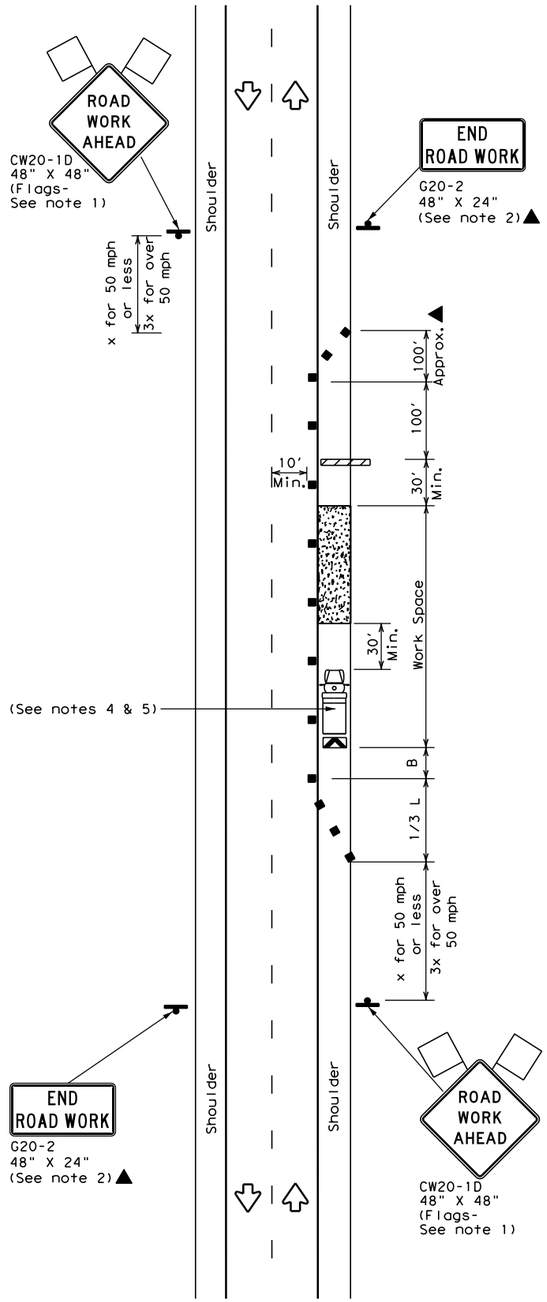


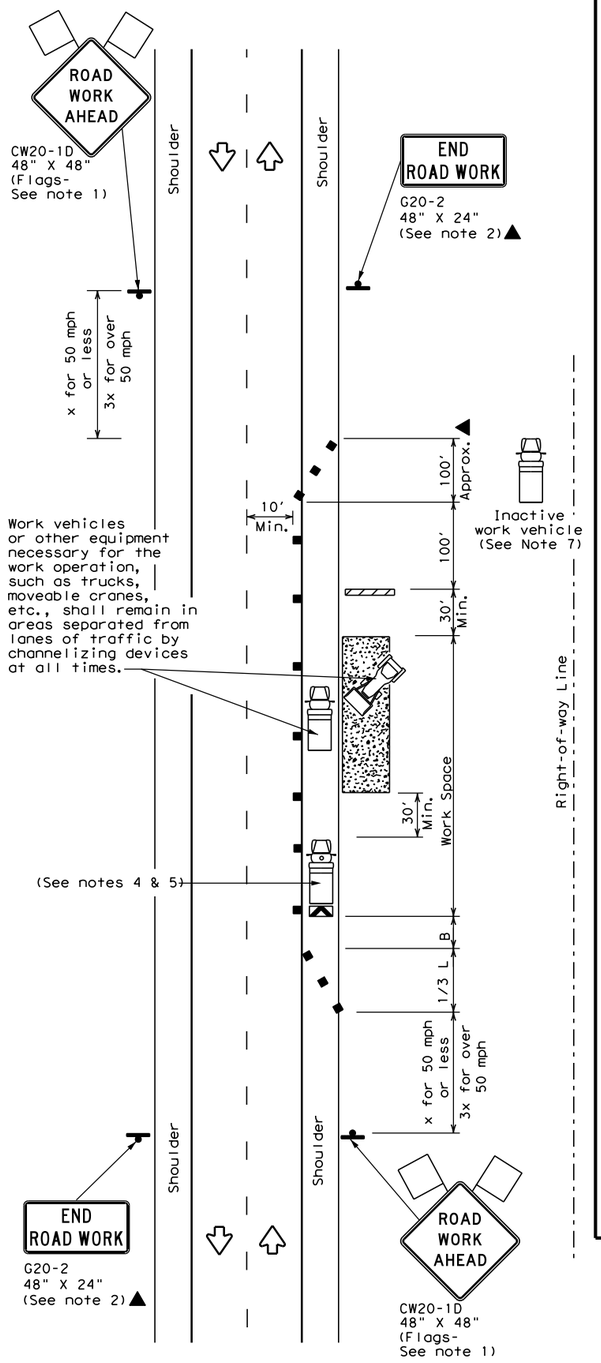
TCP (2-1a)

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.

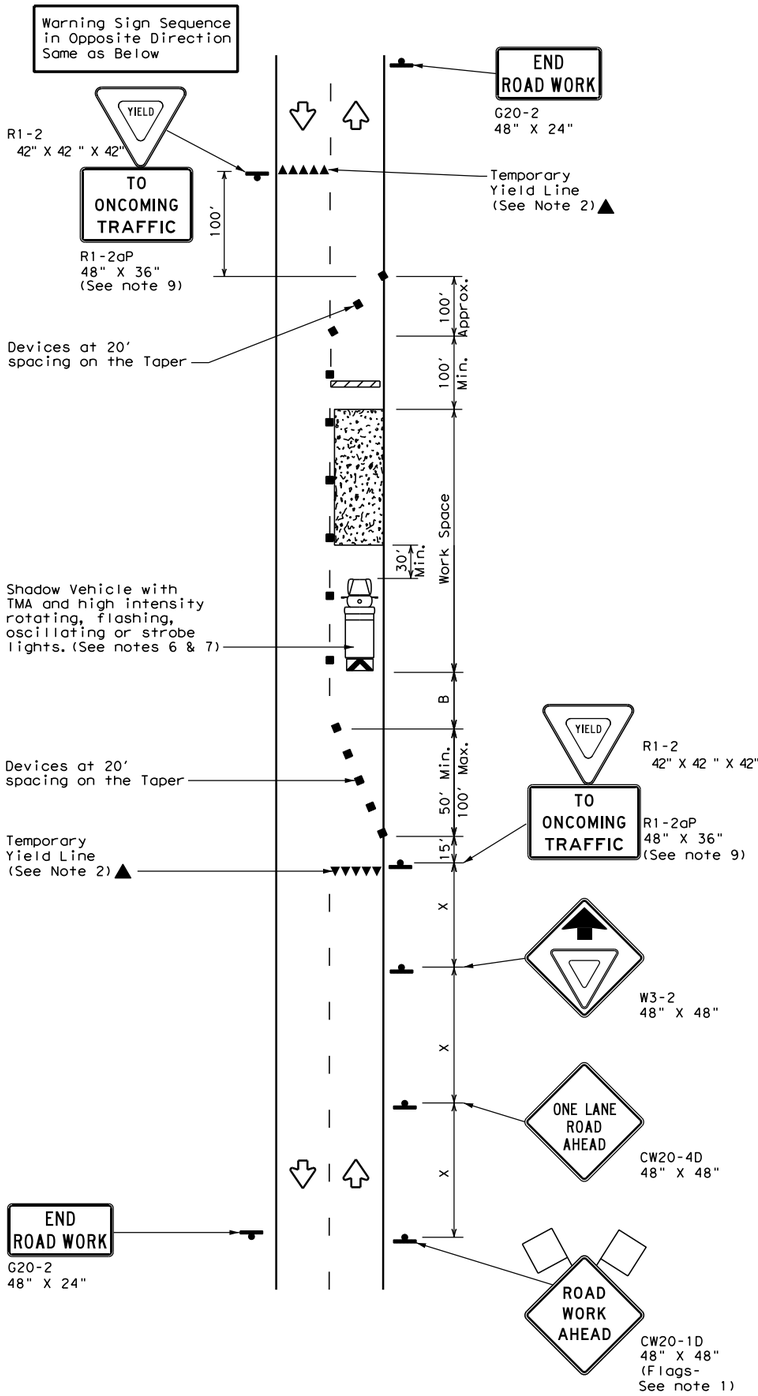
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	CRP	KARNES		47
1-97 2-18				



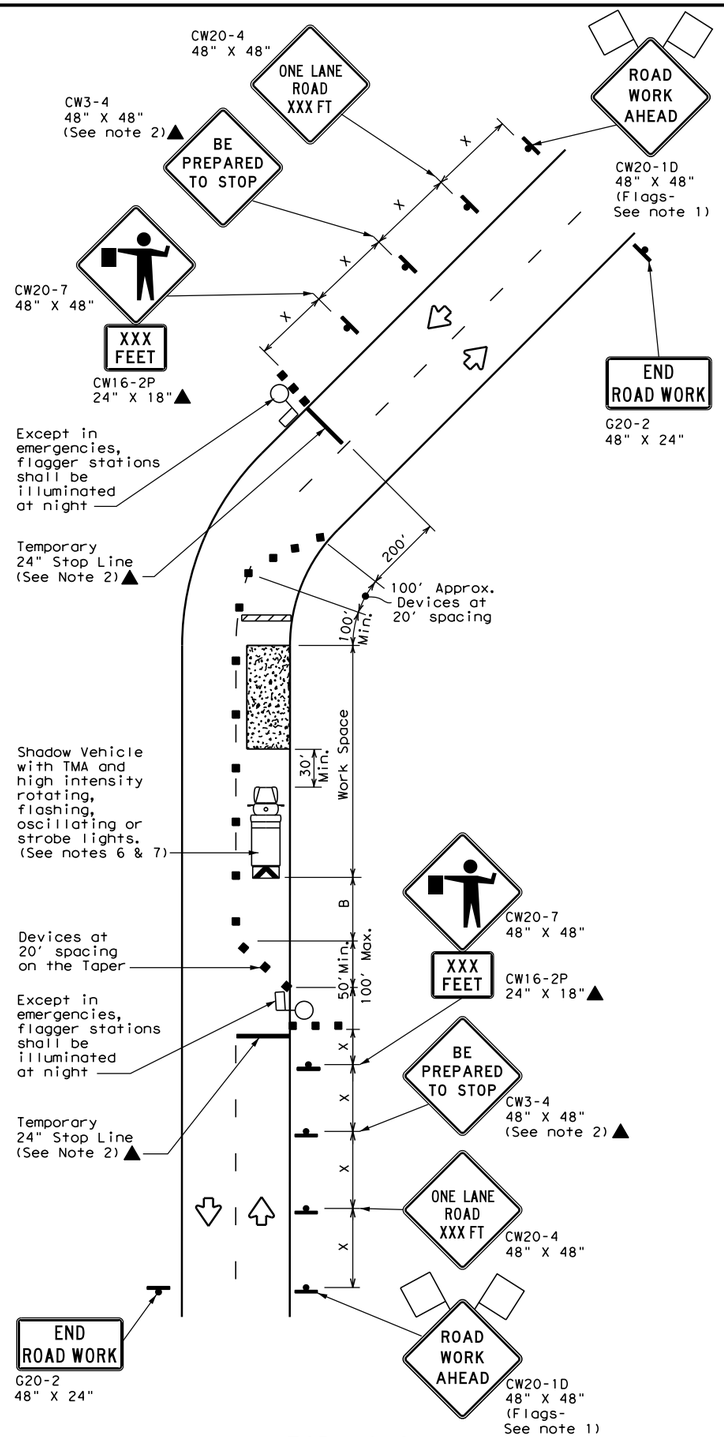
TCP (2-2a)

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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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		48

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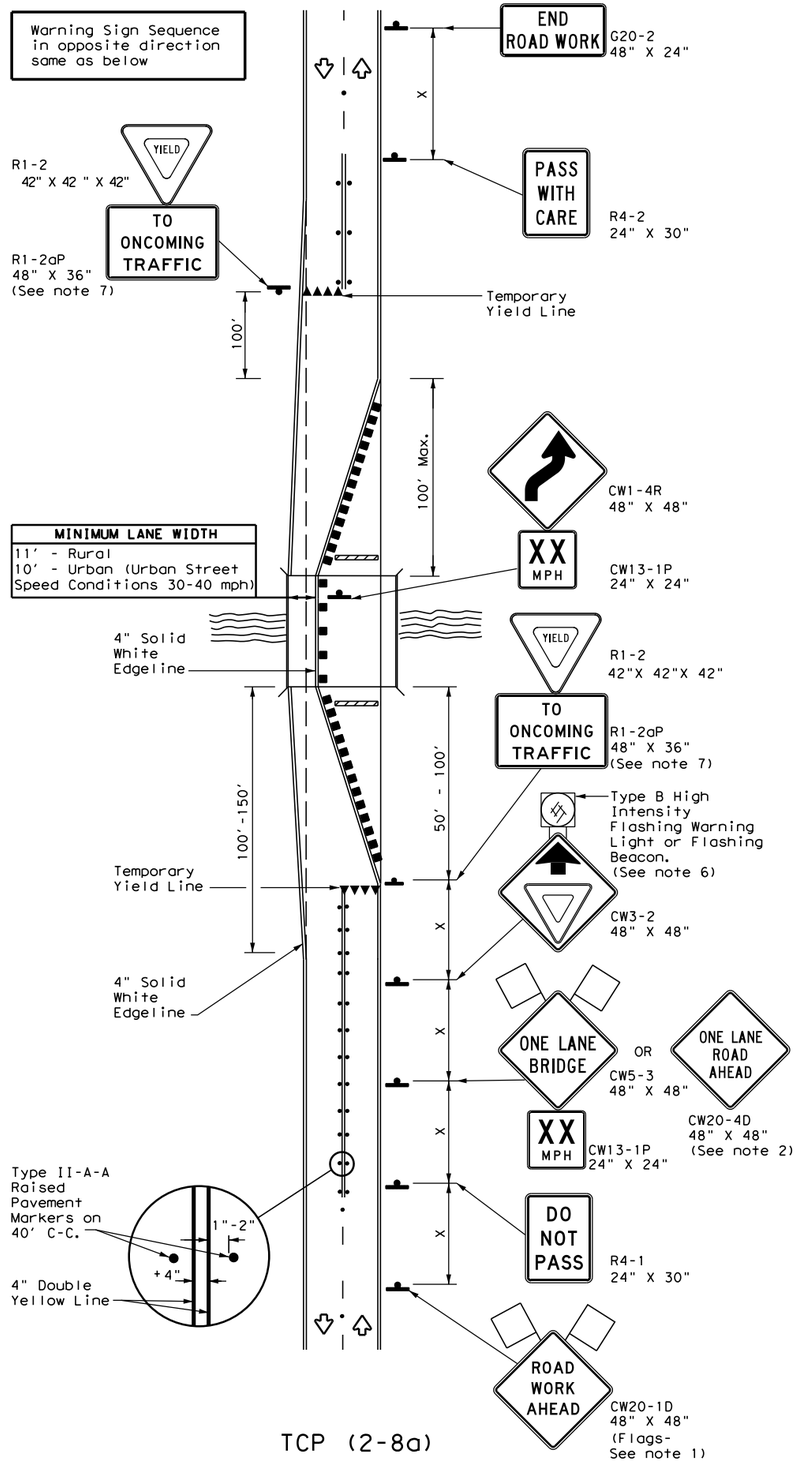
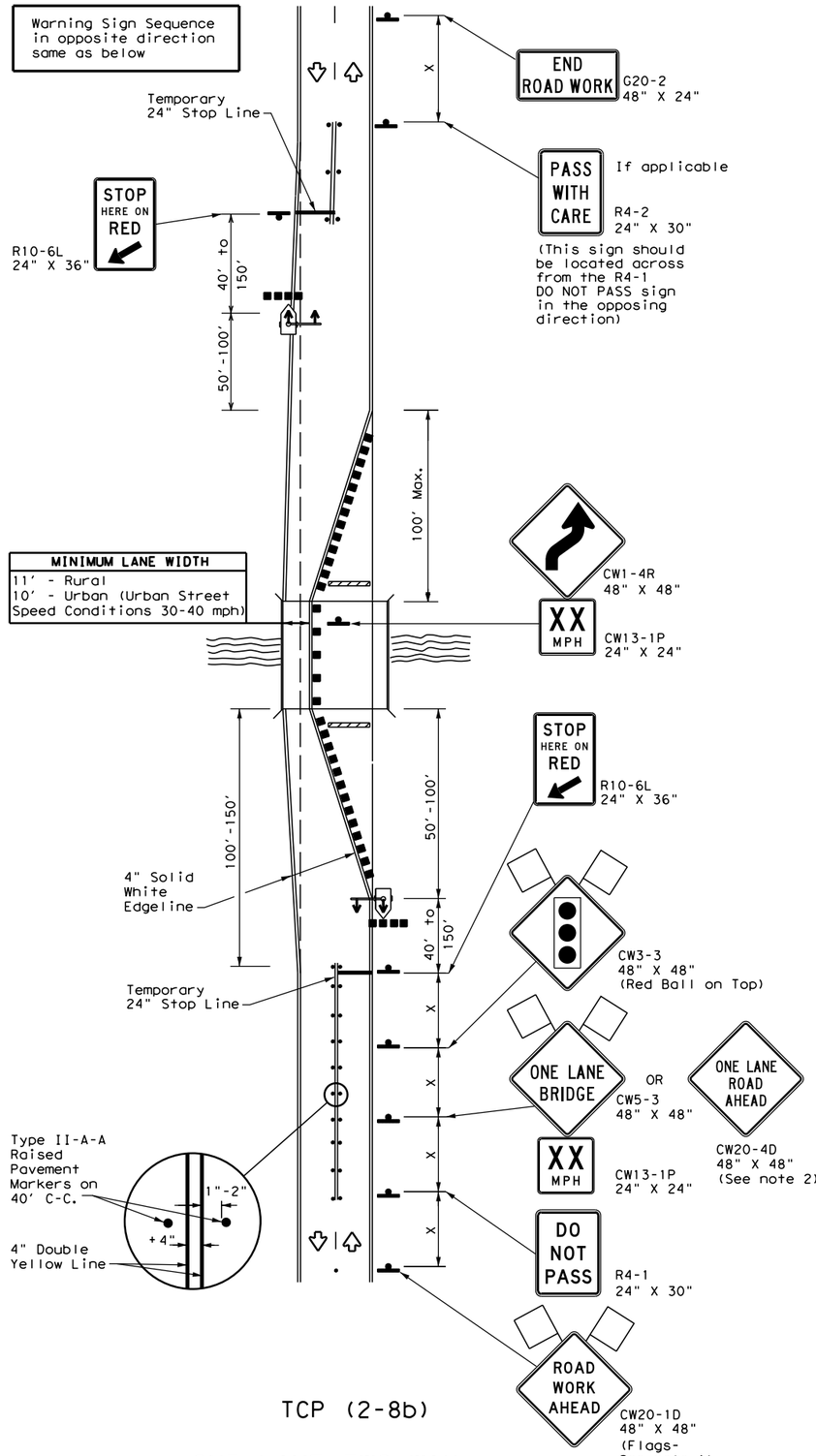


TCP (2-8a)

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



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

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

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

TCP (2-8a)

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

TCP (2-8b)

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

Texas Department of Transportation

Traffic Operations Division Standard

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

TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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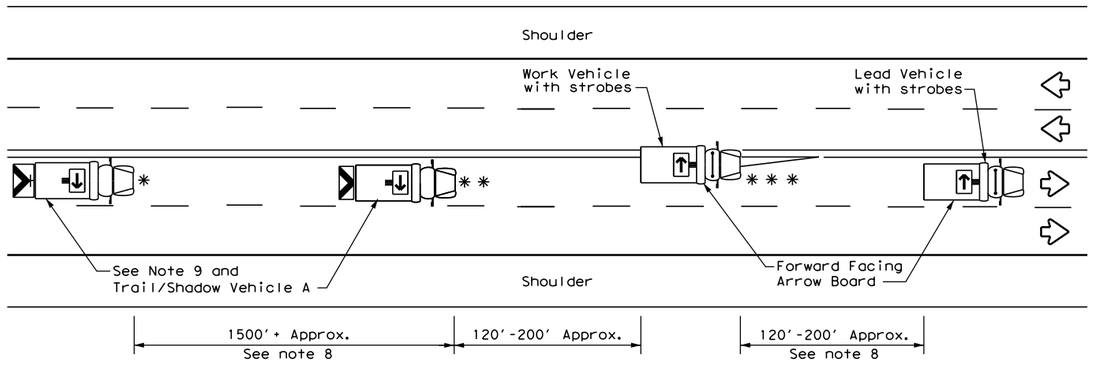
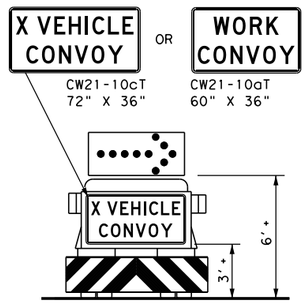
1-97 2-12	CRP	KARNES		49
4-98 2-18				



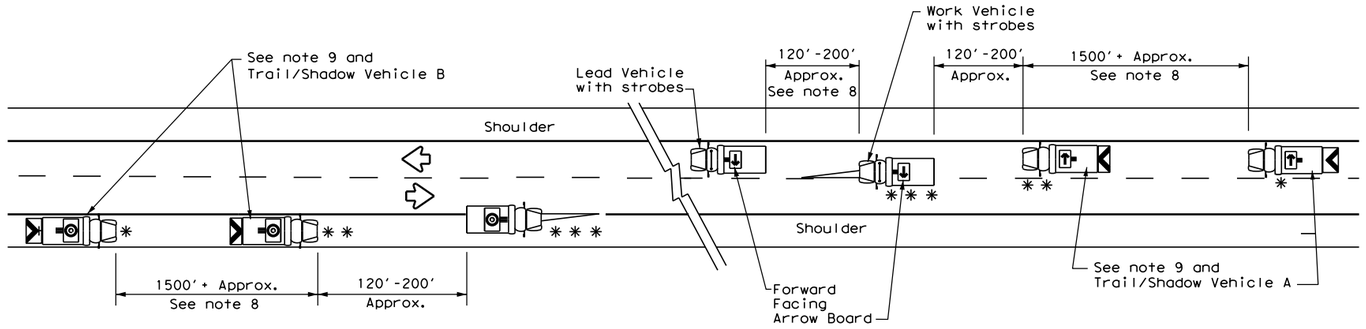
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

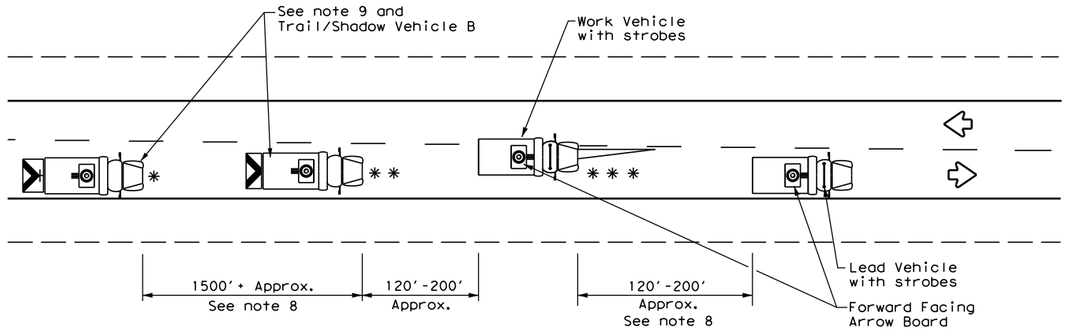


WORK ON SHOULDER

WORK ON TRAVEL LANE

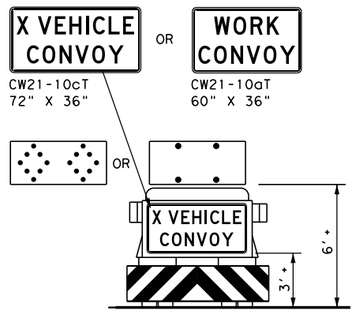
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

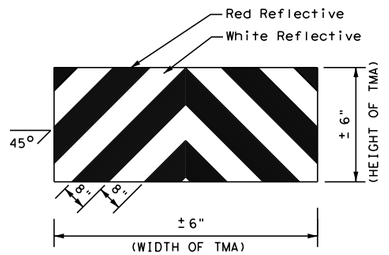
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
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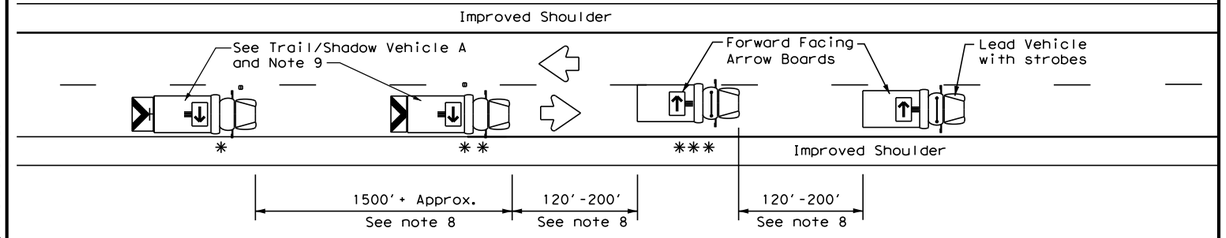
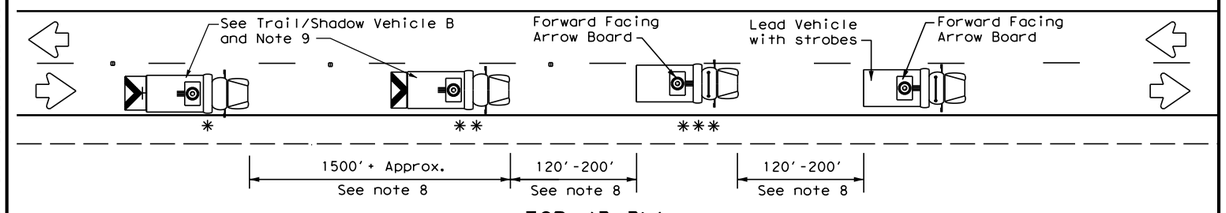


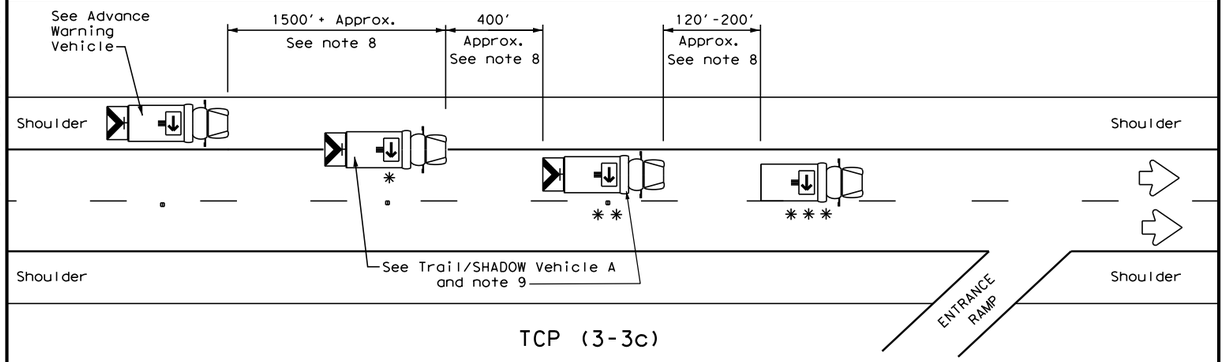
TCP (3-3a)

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



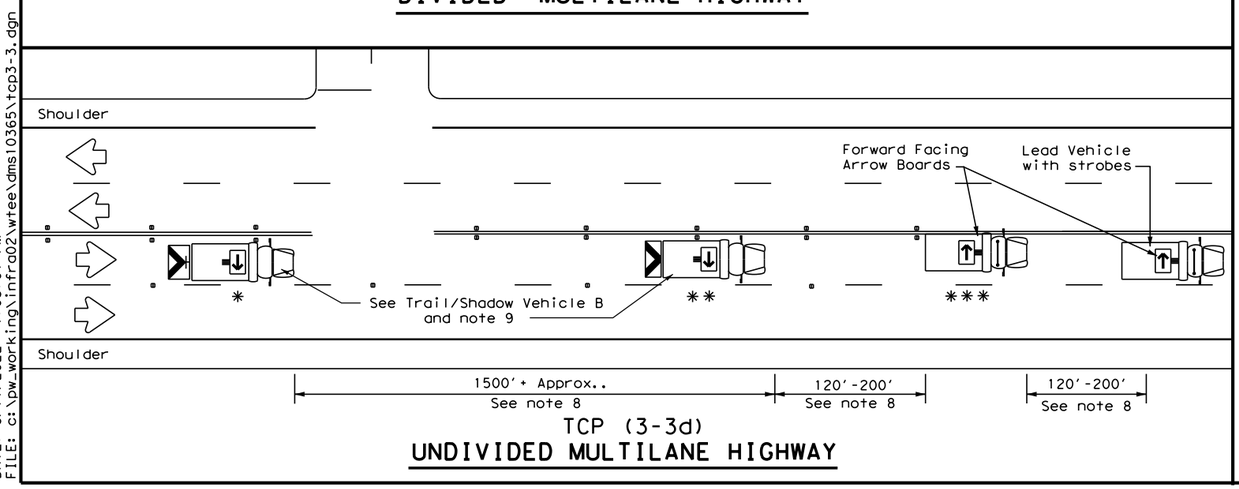
TCP (3-3b)

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



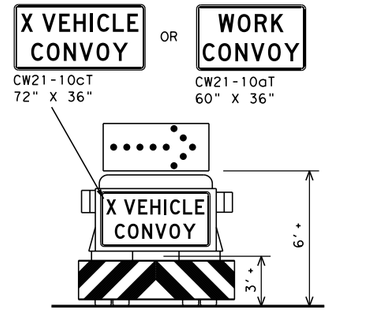
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



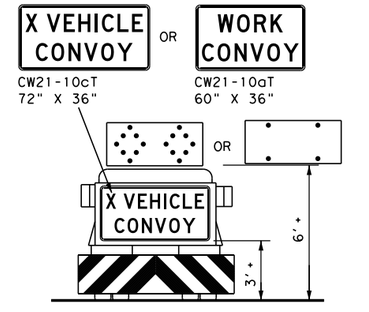
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



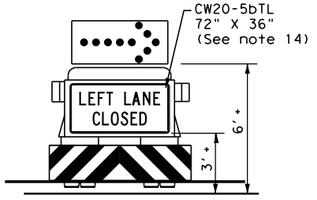
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

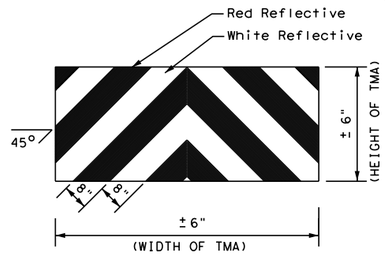


TRAIL/SHADOW VEHICLE B

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

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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177

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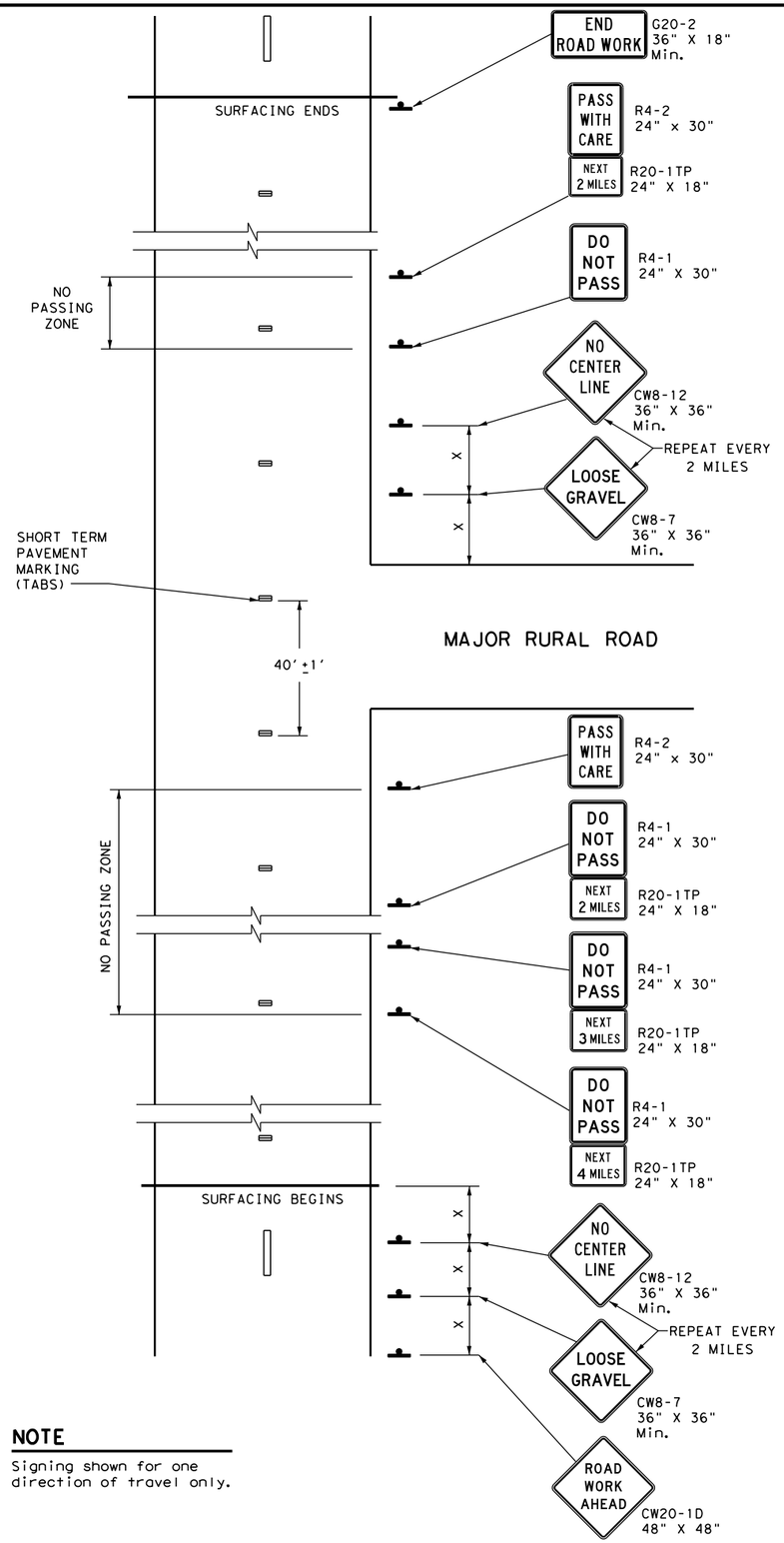
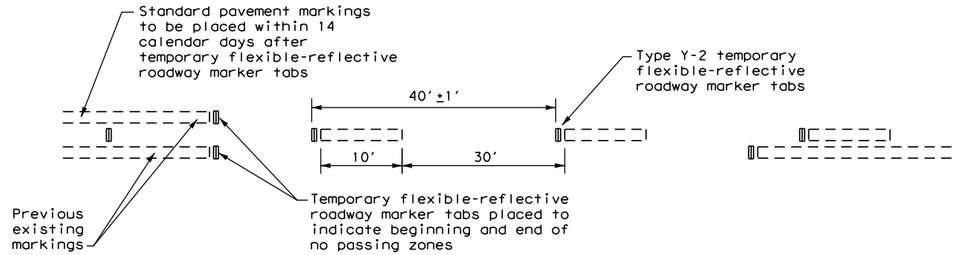


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

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©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	CRP	KARNES		52

210

DATE: 6/17/2022 1:03:25 PM
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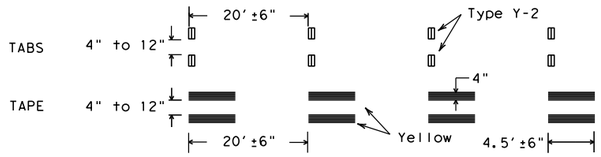
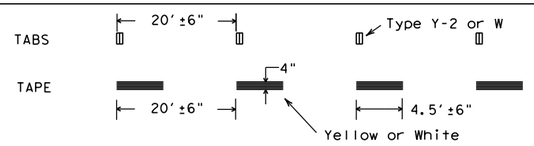
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

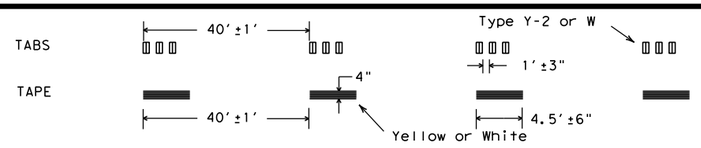


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



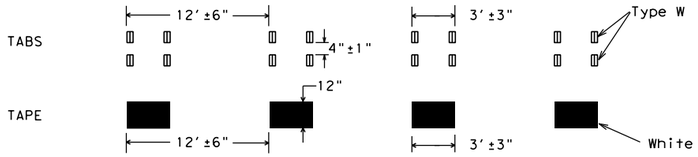
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

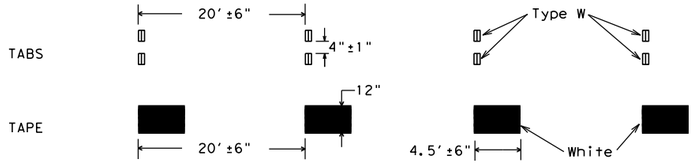


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



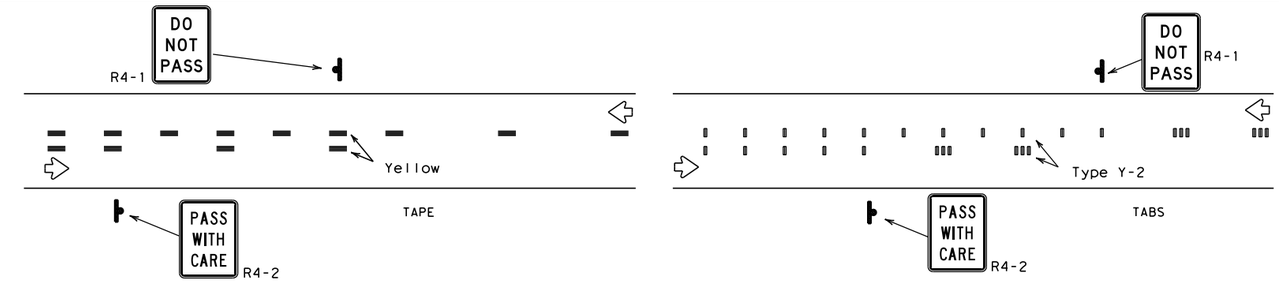
NOTES:

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.

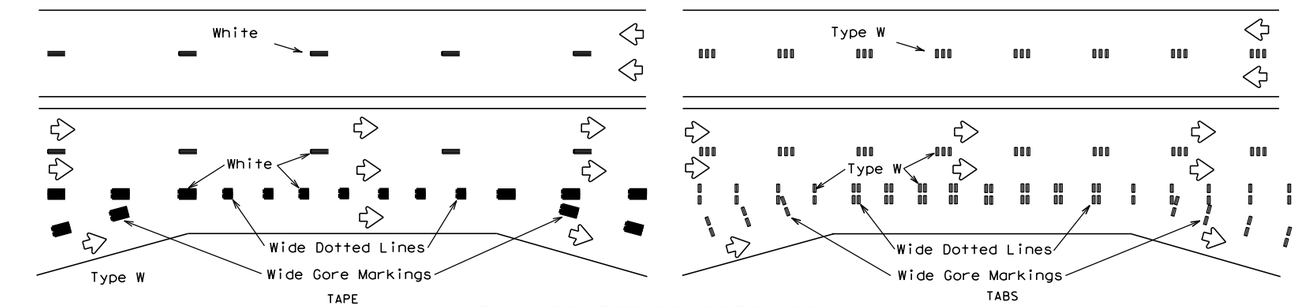
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

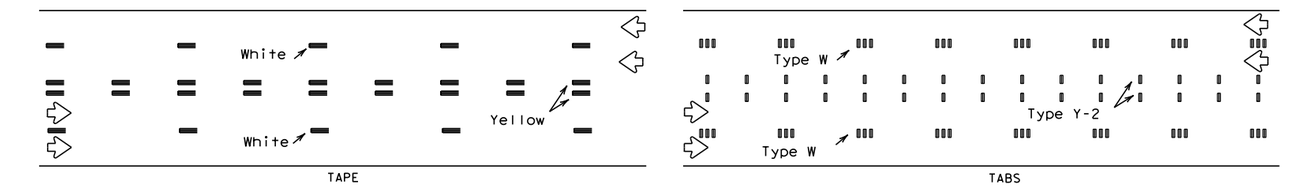
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



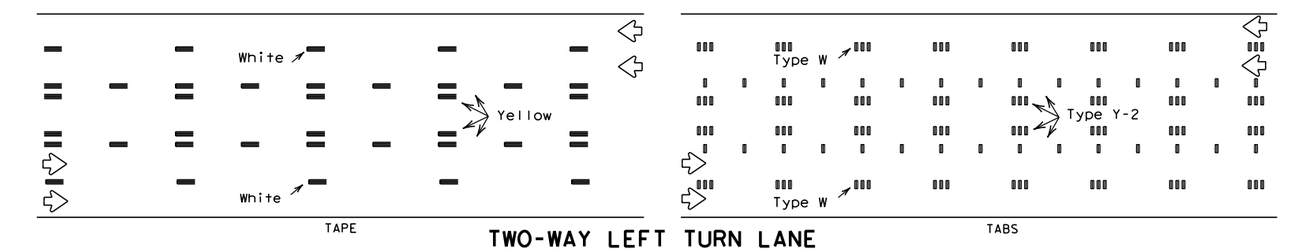
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



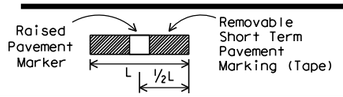
LANE LINES FOR DIVIDED HIGHWAY



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

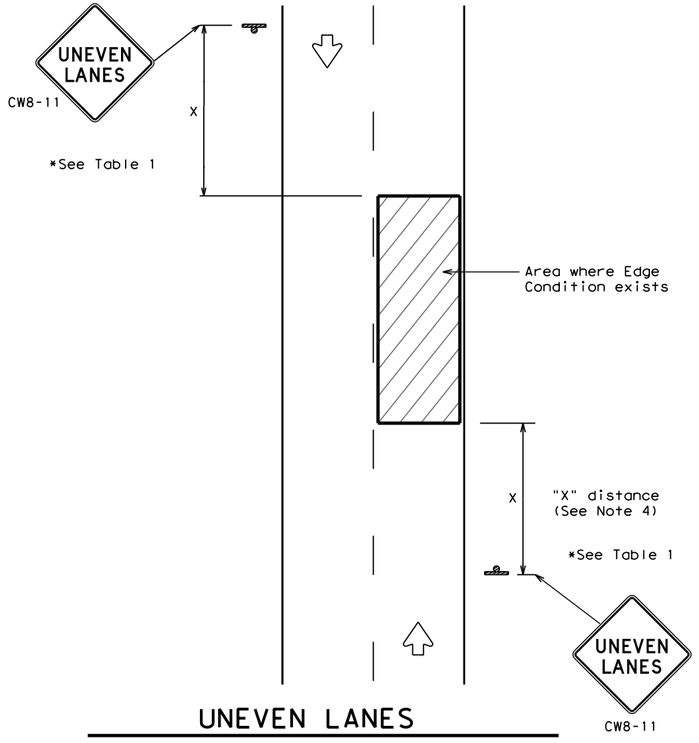
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

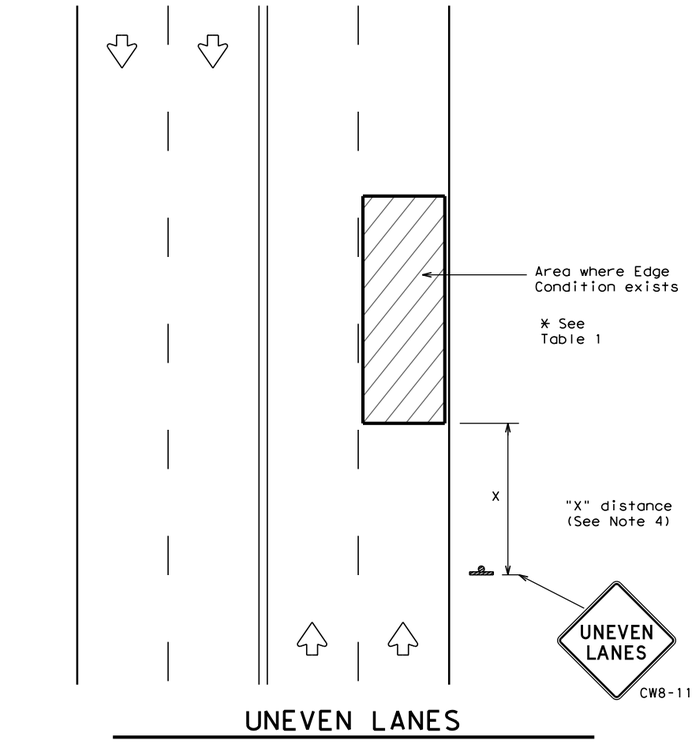
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0691	01	044	FM 81
1-97		DIST	COUNTY		SHEET NO.
3-03		CRP	KARNES		53
7-13					

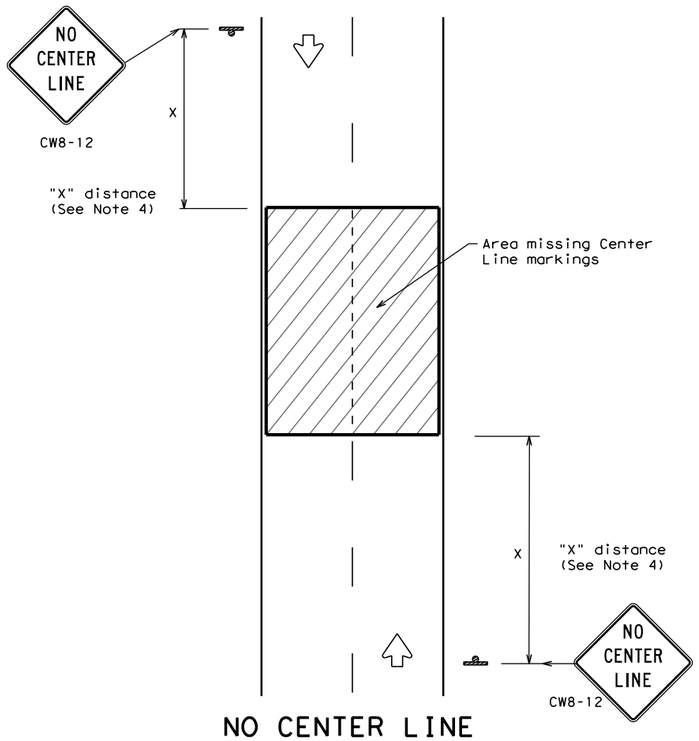
111



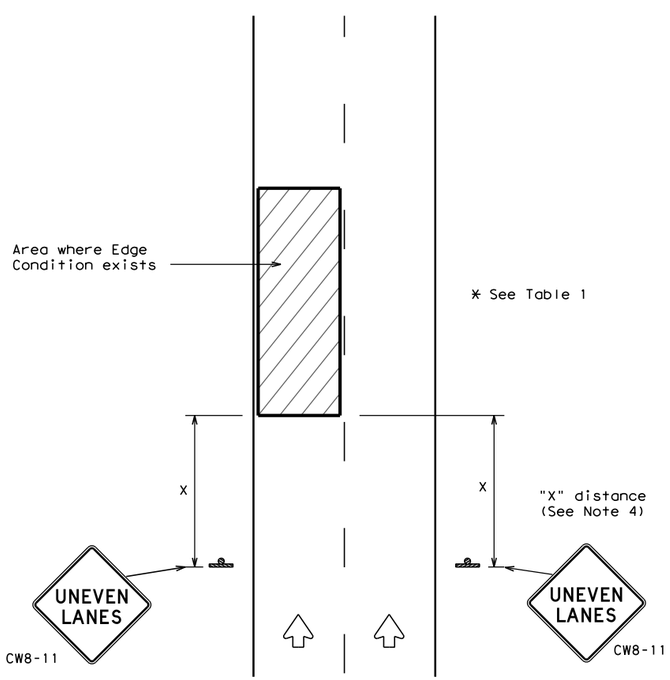
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

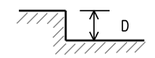
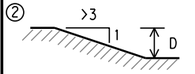
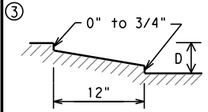
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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	0691	01	044	FM 81
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	CRP	KARNES		54

112

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DATE: 6/17/2022 1:03:45 PM
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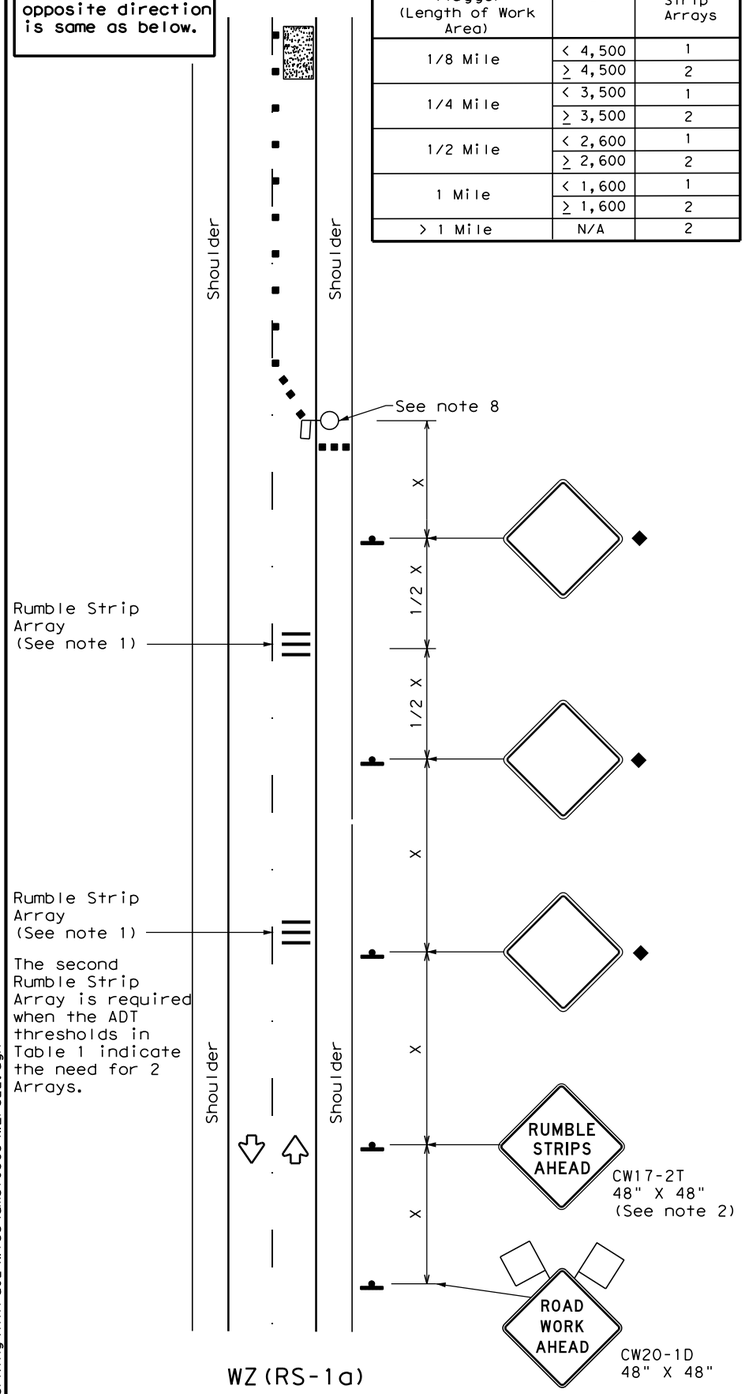
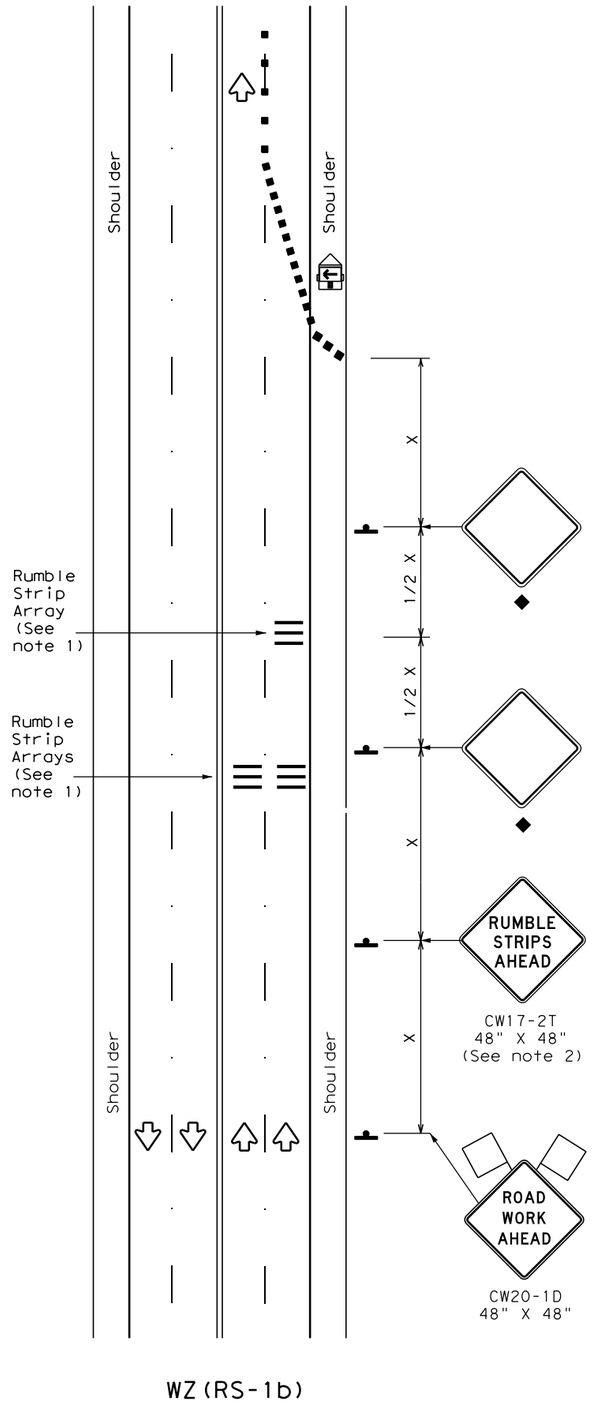
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

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	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		55

117

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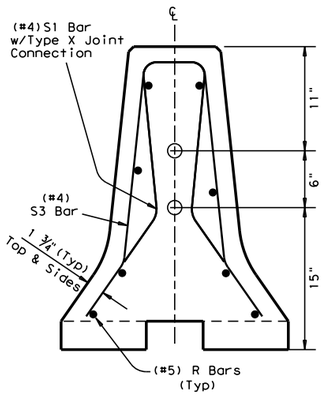
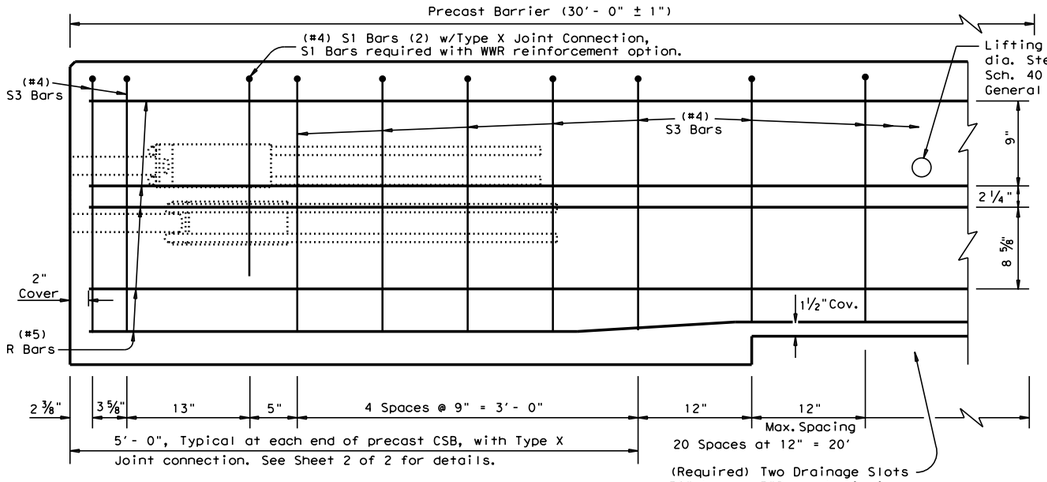


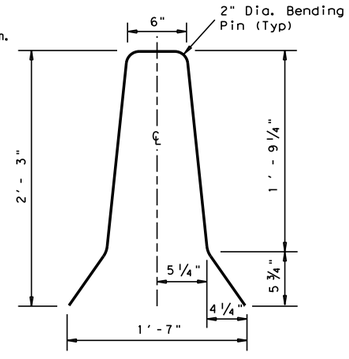
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



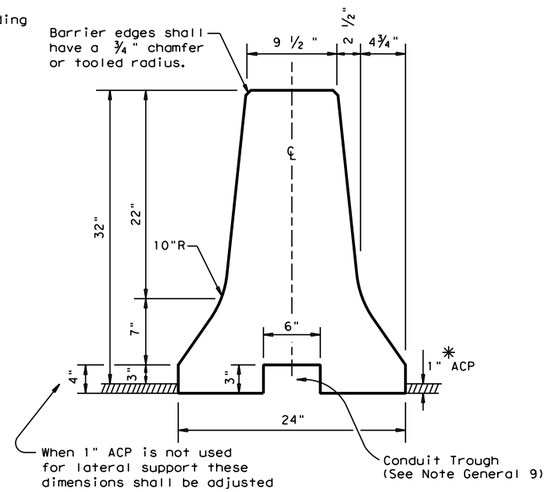
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



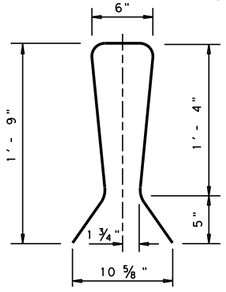
S3 Bar

#4 Bar



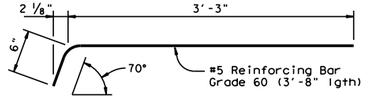
Concrete Safety Barrier

✳ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.



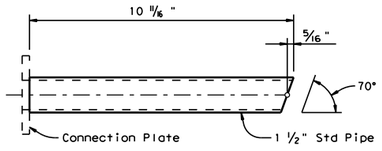
S1 Bar

#4 Bar (2) (Joint Type X)



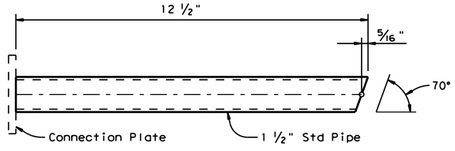
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



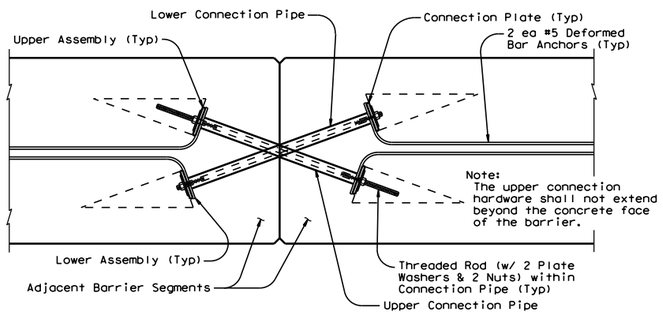
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

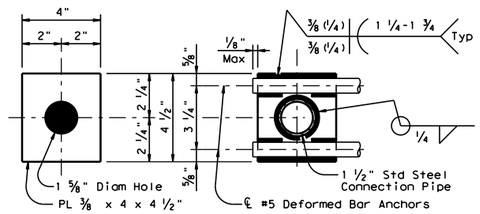
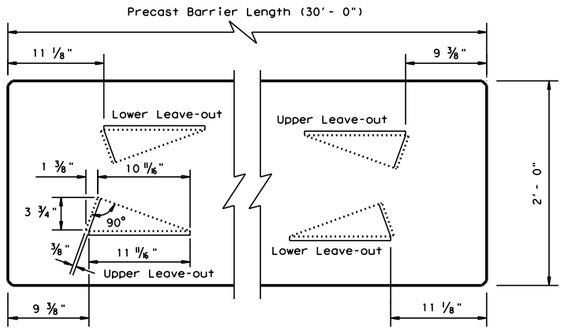


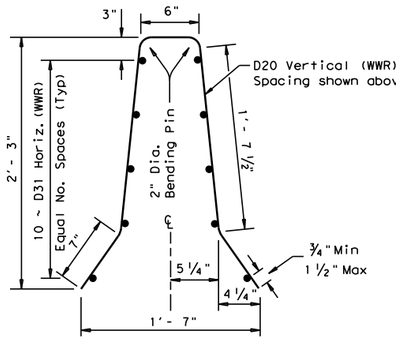
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



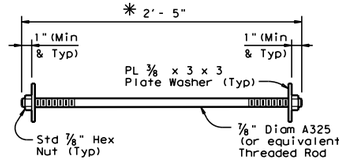
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

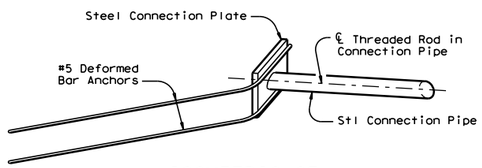
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

GENERAL NOTES

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.

Texas Department of Transportation — Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
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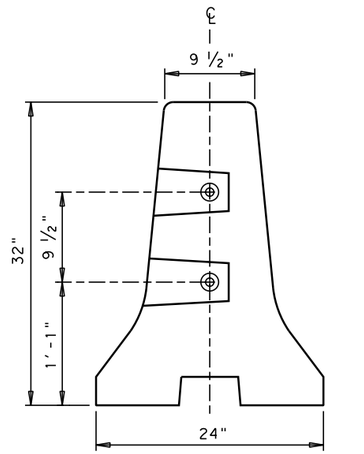
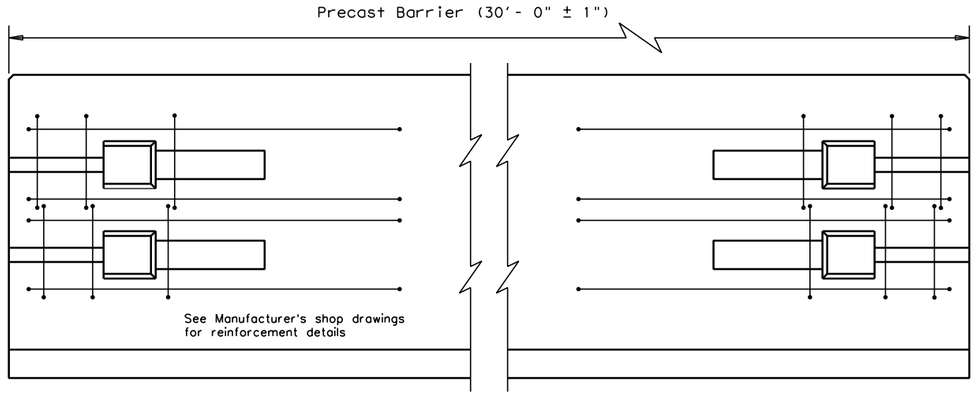
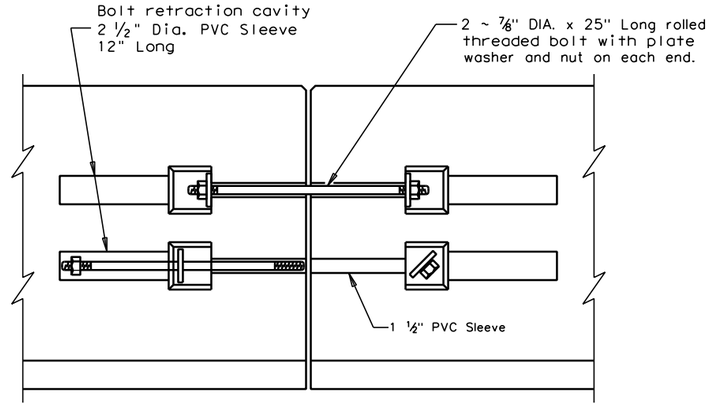


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

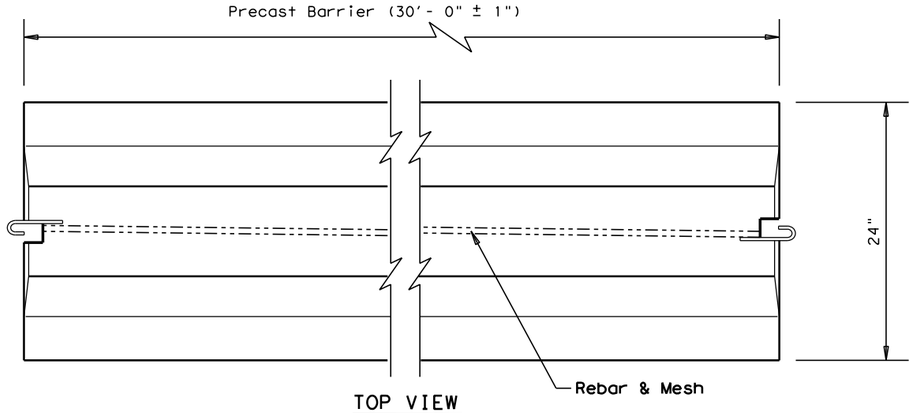


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

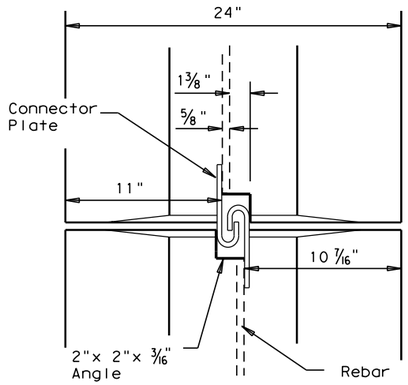


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

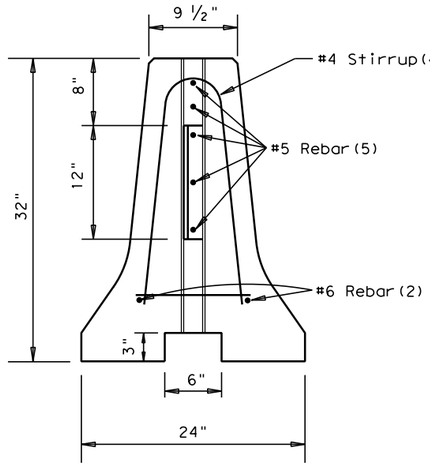
Joint Connection (Type Q)



TOP VIEW
PRECAST (CSB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

Texas Department of Transportation
Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
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	CRP	KARNES		57

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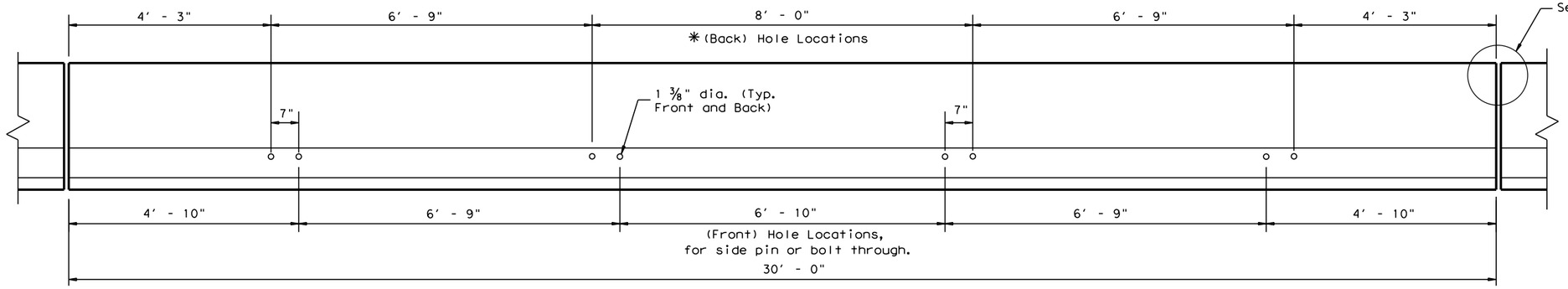
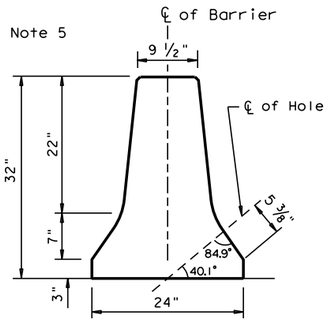
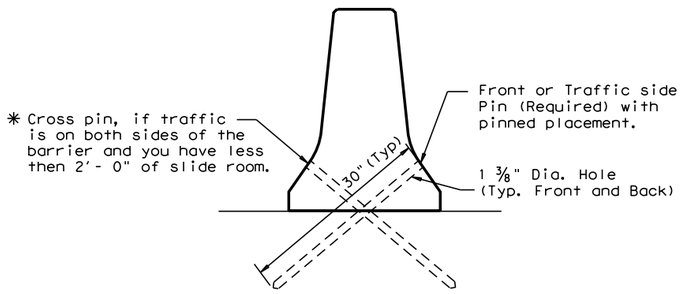


DETAIL 1

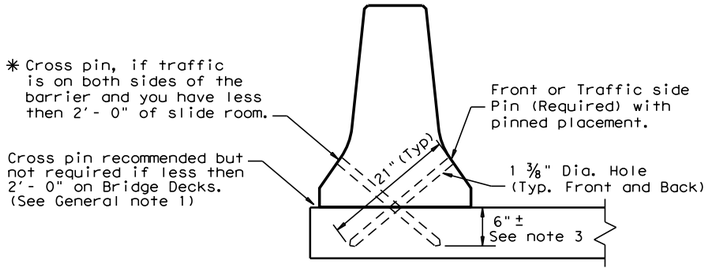


HOLE LOCATION DETAIL



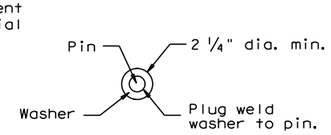
DETAIL 2

Placement on (ACP)
Asphalt Concete Pavement
or Treated Base Material
(30" Pin required)

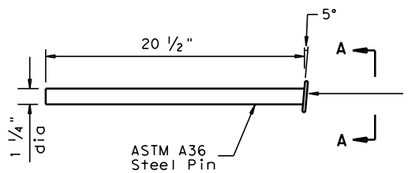


DETAIL 3

Bridge Deck or CRCP
(21" pin required)



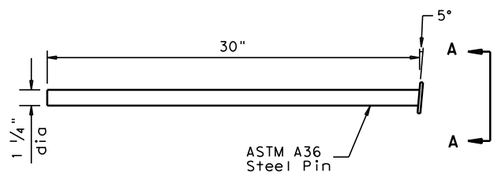
VIEW A-A



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

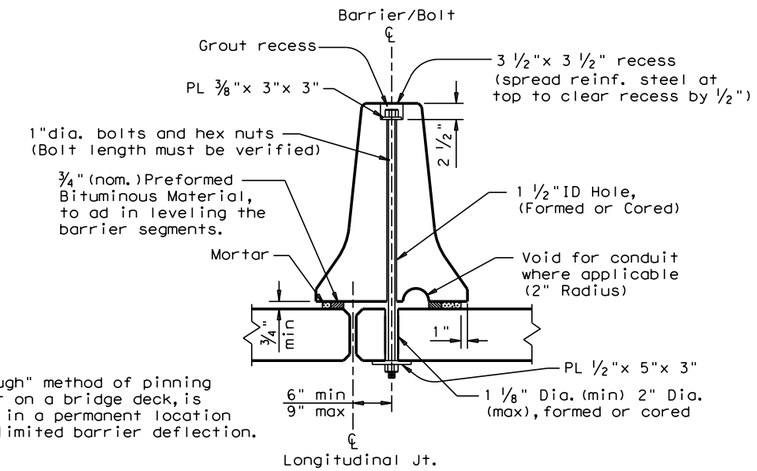
(21") PIN DETAIL

See Detail 3



(30") PIN DETAIL

See Detail 2



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

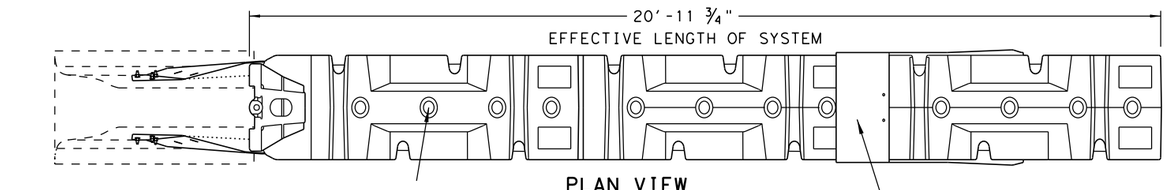
PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

CSB(7)-10

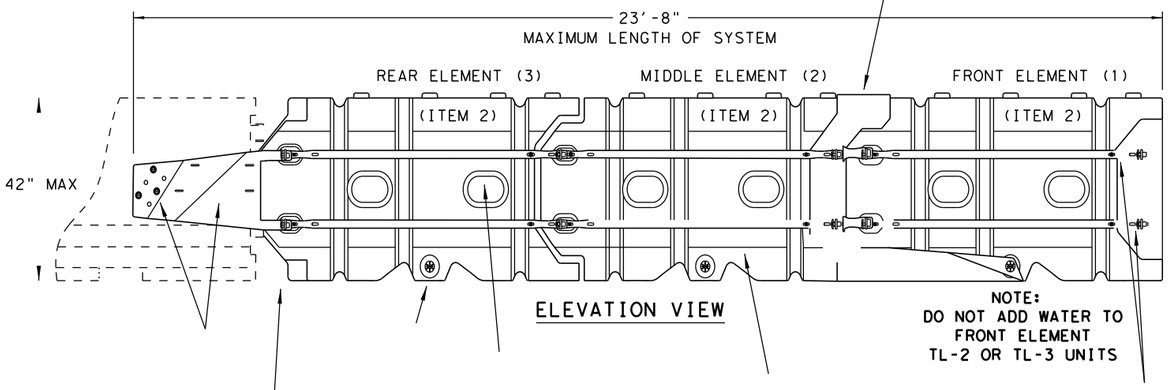
FILE: csb710.dgn	DN: TxDOT	CK: AM	DW: BD	CK:	
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0691	01	044	FM 81	
	DIST	COUNTY		SHEET NO.	
	CRP	KARNES		58	

DATE: 6/17/2022
FILE: c:\pw_working\infra02\wtree\dms10365\absorbm19.dgn

SYSTEM SHOWN - ABSORB-M TL-3



PLAN VIEW

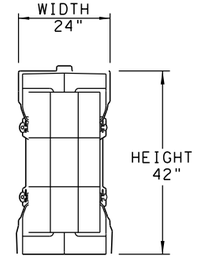


ELEVATION VIEW

NOTE:
DO NOT ADD WATER TO
FRONT ELEMENT
TL-2 OR TL-3 UNITS

TRAFFIC FLOW

TRAFFIC FLOW



SECTION A-A

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

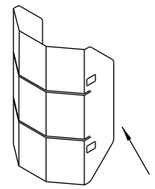
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
3	BSI-4004598	FILL CAPS	8	12
4	BSI-4004599	DRAIN PLUGS	2	3
5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

* COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER

** APPLY DECAL



NOSE PLATE

** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS

CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
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	CRP	KARNES		59

DATE: 6/17/2022
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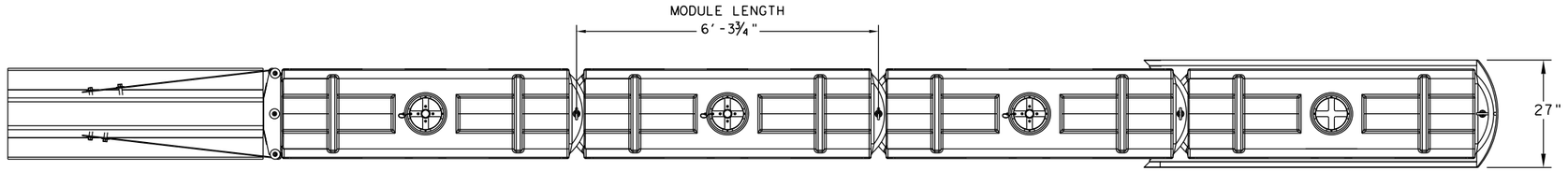
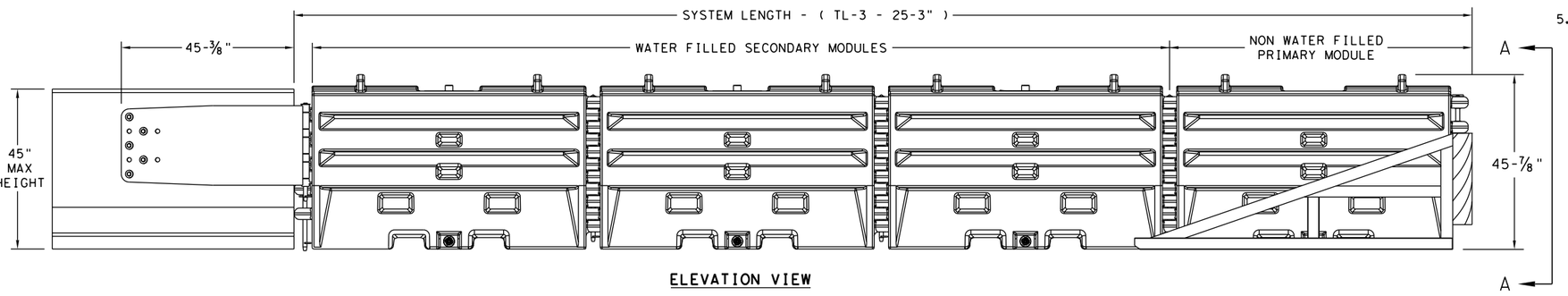


PLAN VIEW



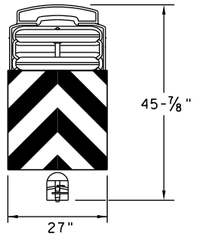
ELEVATION VIEW

GENERAL NOTES

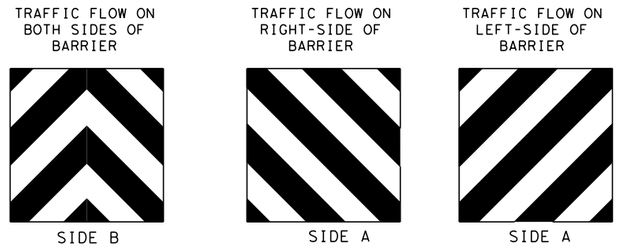
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25' 3"

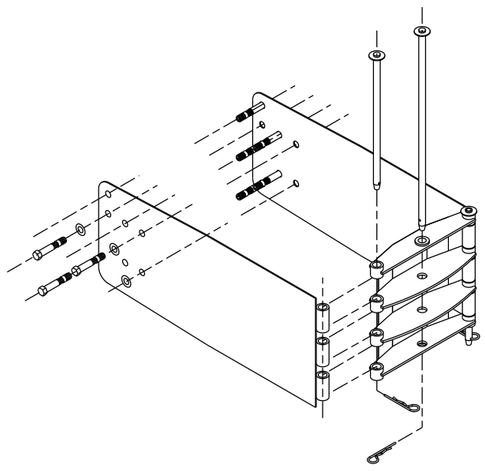


SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

BILL OF MATERIAL

PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1

Texas Department of Transportation — Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
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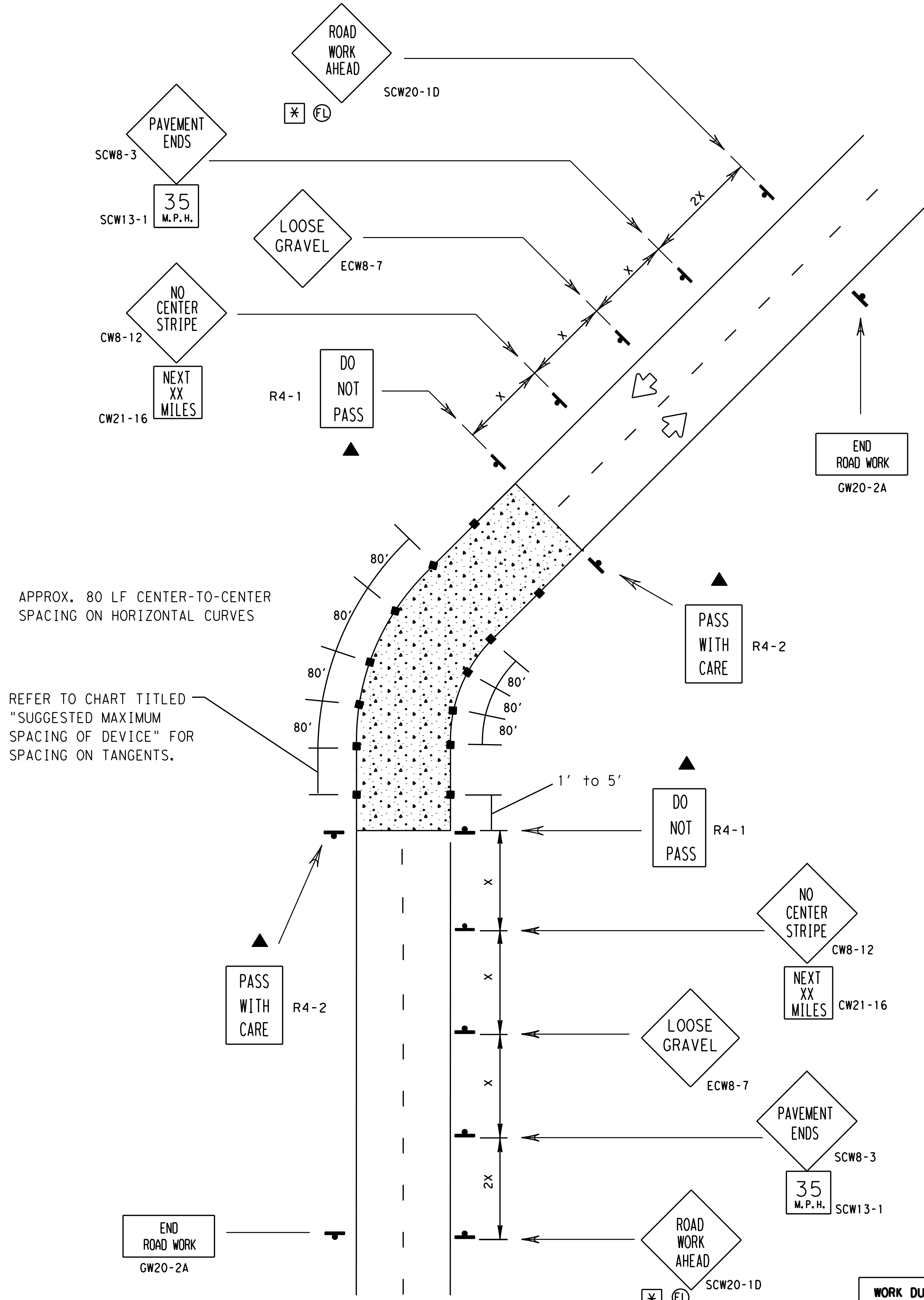
	CRP	KARNES		60



TCP

2-Lane UNSURFACED Roadway for Non-working Hours

(FOR UNSURFACED ROADWAY LENGTH > 250')

[*] The Type A Warning Lights shall not be used with signs manufactured with Type E Sheeting (Fluorescent Prismatic) meeting the requirements of Departmental Material Specification DMS-8300.

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

Prior to the beginning of construction, all currently striped no-passing zones should be signed with the DO NOT PASS sign (R4-1) and PASS WITH CARE sign (R4-2) placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined and signed as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES sign (R20-1) may be used at the beginning of such zones. The DO NOT PASS to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of a no-passing zone may be signed with a PASS WITH CARE and NEXT XX MILES sign.

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

"LOOSE GRAVEL" SIGN (ECW8-7)

When construction begins, a LOOSE GRAVEL sign (ECW8-7) should be erected at each end of the work area LOOSE GRAVEL sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The LOOSE GRAVEL sign should be erected as detailed on BC Standards. They should remain in place until the loose gravel condition no longer exists.

"NO CENTER STRIPE" SIGN (CW8-12)

At the time construction activity obliterates the existing centerline (low volume roads may not have an existing centerline), a NO CENTER STRIPE sign (CW8-12) should be erected at each end of the work area and just beyond major rural intersections and other location deemed necessary by the Engineer. Where possible, the signs erected at each end of the work area should be located in such a manner that drivers can read the sign and immediately see the change to no centerline. The NO CENTER STRIPE sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The NO CENTER STRIPE sign should be erected as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.
"NO CENTER STRIPE" SIGN (CW8-12)

WORK DURATION TERMINOLOGY-(as defined by the "Texas Manual on Uniform Traffic Control Devices" Part VI)
Long-term Stationary = occupies a location 3 or more days;
Intermediate-term Stationary = occupies a location from overnight to 3 days;
Short-term Stationary = daylight work that occupies a location from 1 to 12 hours;
Short Duration = occupies a location up to 1 hour.

SUPPORTS AND MOUNTING HEIGHT
The bottom of Long-term / Intermediate-term signs shall be at least 7 feet above the paved surface. The bottom of any supplementary plaques shall be at least 6 feet above the paved surface.
Regulatory signs shall be mounted at least 7 feet above the paved surface regardless of work duration.
Wood sign supports shall be painted white.

LEGEND

Type III Barricade; Edgeline Channelizing Devices; Flag; Heavy Work Vehicle; Truck Mounted Attenuator; Trailer Mounted Flashing Arrow Panel; Portable Changeable Message Sign; Flagger; Sign Post; Unsurfaced Roadway; (FL) Flashing Type A-Low Intensity Warning Light

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

* 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. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where the surfacing operation has covered or obliterated existing pavement markings. These traffic control devices are to be used to supplement those required by BC Standards.
3. R4-1 and R4-2 signs should be mounted on fixed supports as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARD@mailgw.dot.state.tx.us

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
CRPTRAFF

TRAFFIC CONTROL PLAN

2-LANE, 2-WAY NON-WORKING HOURS

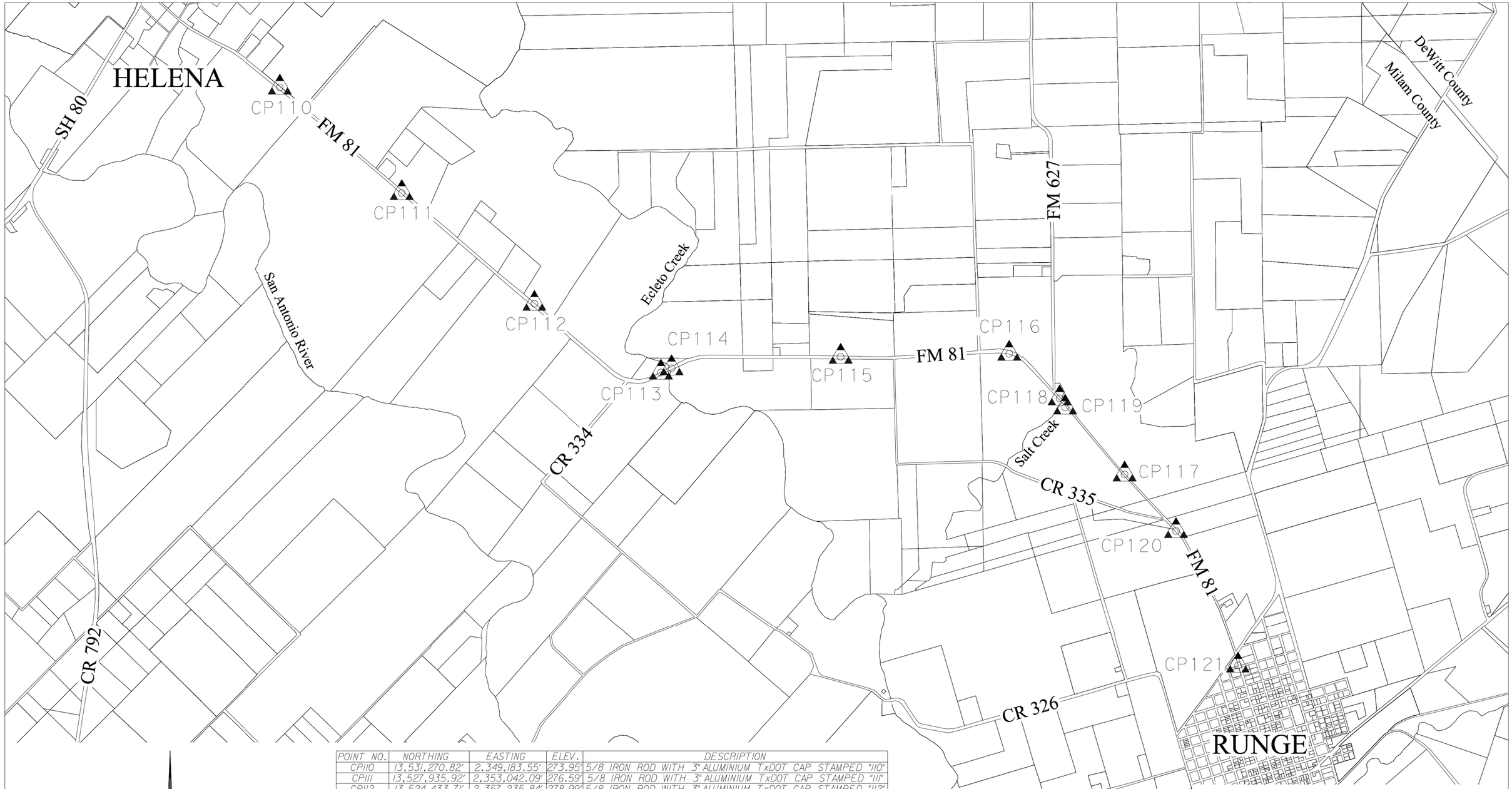
(CORPUS CHRISTI DISTRICT STANDARD)

DTCP (1-1)-03

 DN:-TxDOT CK:-TxDOT DW:-TxDOT CK:-TxDOT NEG NO.:

REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
	CRP	6	SEE TITLE SHEET	61

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
KARNES	0691	01	044	FM 81



POINT NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
CP110	13,531,270.82'	2,349,183.55'	273.95'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "110"
CP111	13,527,935.92'	2,353,042.09'	276.59'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "111"
CP112	13,524,433.71'	2,357,235.84'	278.99'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "112"
CP113	13,522,255.24'	2,361,248.05'	244.70'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "113"
CP114	13,522,393.99'	2,361,587.64'	245.29'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "114"
CP115	13,522,755.60'	2,366,924.61'	261.55'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "115"
CP116	13,522,851.74'	2,372,271.03'	304.78'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "116"
CP117	13,519,036.72'	2,375,920.58'	295.77'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "117"
CP118	13,521,440.35'	2,373,867.18'	260.30'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "118"
CP119	13,521,202.73'	2,374,038.71'	261.08'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "119"
CP120	13,517,298.45'	2,377,547.85'	319.02'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "120"
CP121	13,513,032.27'	2,379,525.22'	348.98'	5/8 IRON ROD WITH 3" ALUMINIUM TxDOT CAP STAMPED "121"

N

SCALE: 1" = 3,000'

0 1,500 3,000 6,000 9,000

WHEN PLOTTED ON 11"X17" PAPER

DATUM STATEMENT:
HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE (4204) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983, NAD83 (NA 2011) EPOCH DATE 2010 WITH A KARNES COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00013. (GRID X 1.00013 = SURFACE) VALUES WERE DERIVED FROM UTILIZING THE STATE VIRTUAL REFERENCE NETWORK IN JANUARY OF 2020.

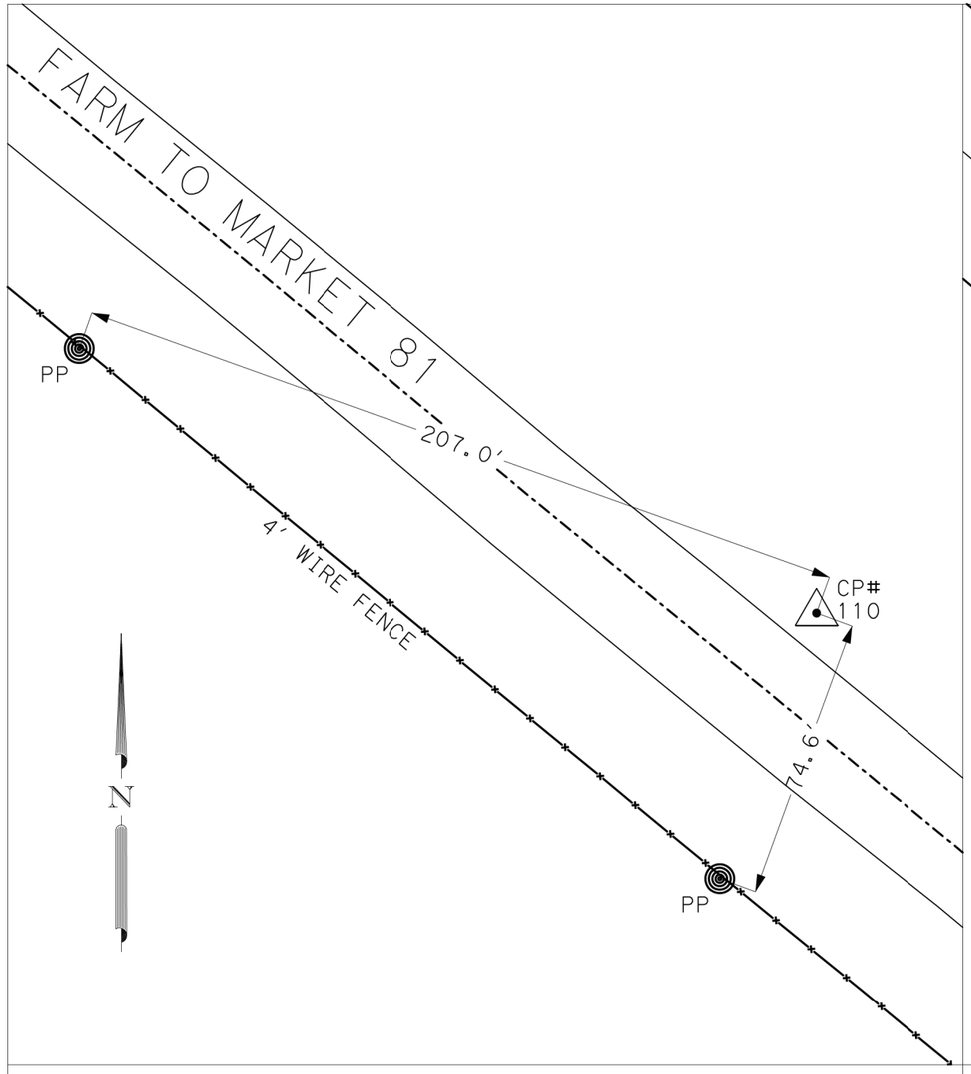
VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), GEOID 12B AND DERIVED FROM TXDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

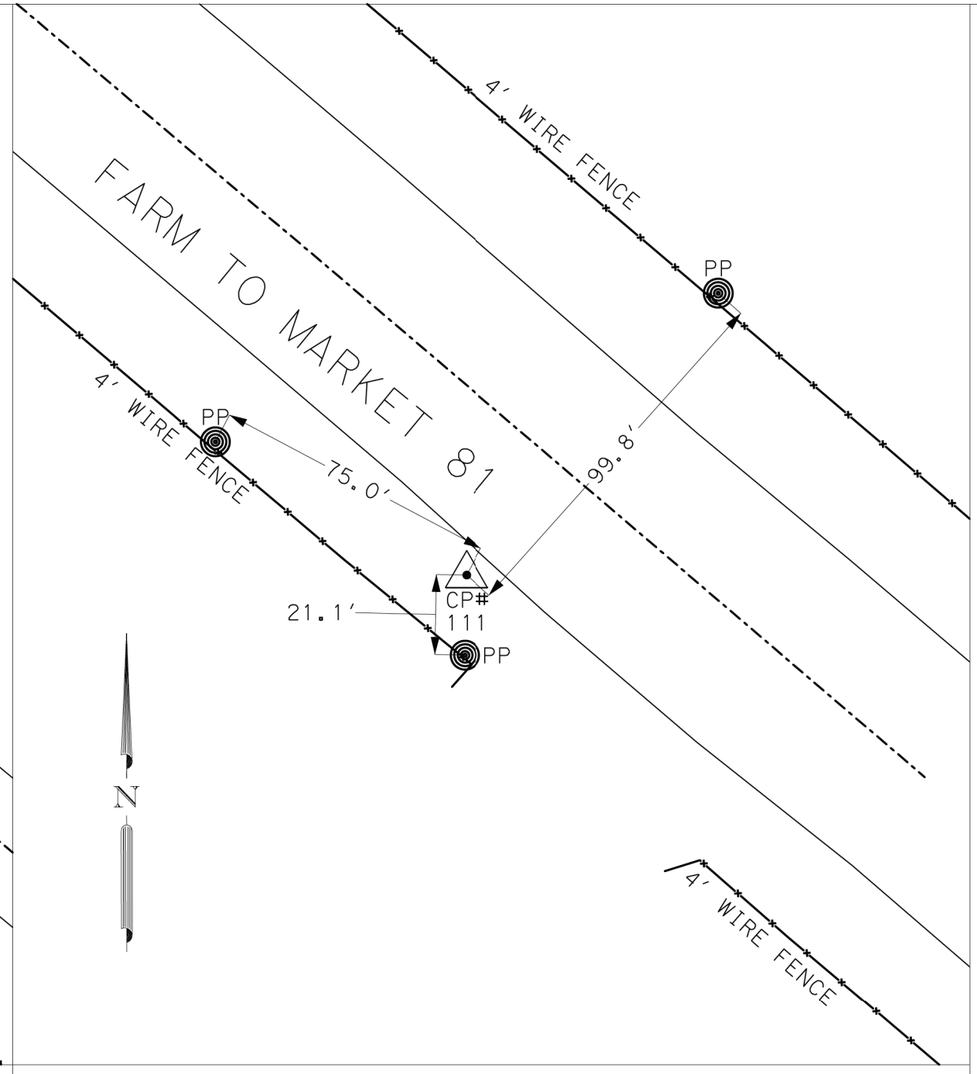
Texas Department of Transportation

SURVEY CONTROL

SCALE: 1" = 3,000' SHEET 1 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	62
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





NOTES:

HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE (4204) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983, NAD 83 (NA 2011) EPOCH DATE 2010 WITH A KARNES COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00013. (GRID x 1.00013 = SURFACE) VALUES WERE DERIVED FROM UTILIZING THE STATE VIRTUAL REFERENCE NETWORK IN JANUARY 2020.

VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

05/26/2020

S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

Texas Department of Transportation

CONTROL POINT # 110

APPROXIMATE LOCATION:
ON THE NORTHEAST SIDE OF FM 81 APPROXIMATELY 5,342 FEET SOUTHEAST OF THE INTERSECTION OF FM 81 AND SH 80.

US SURVEY FEET
NAVD 88 ELEVATION: 273.95'
DATE SET: 01/27/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "110" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,531,270.82'
EASTING: 2,349,183.55'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 111

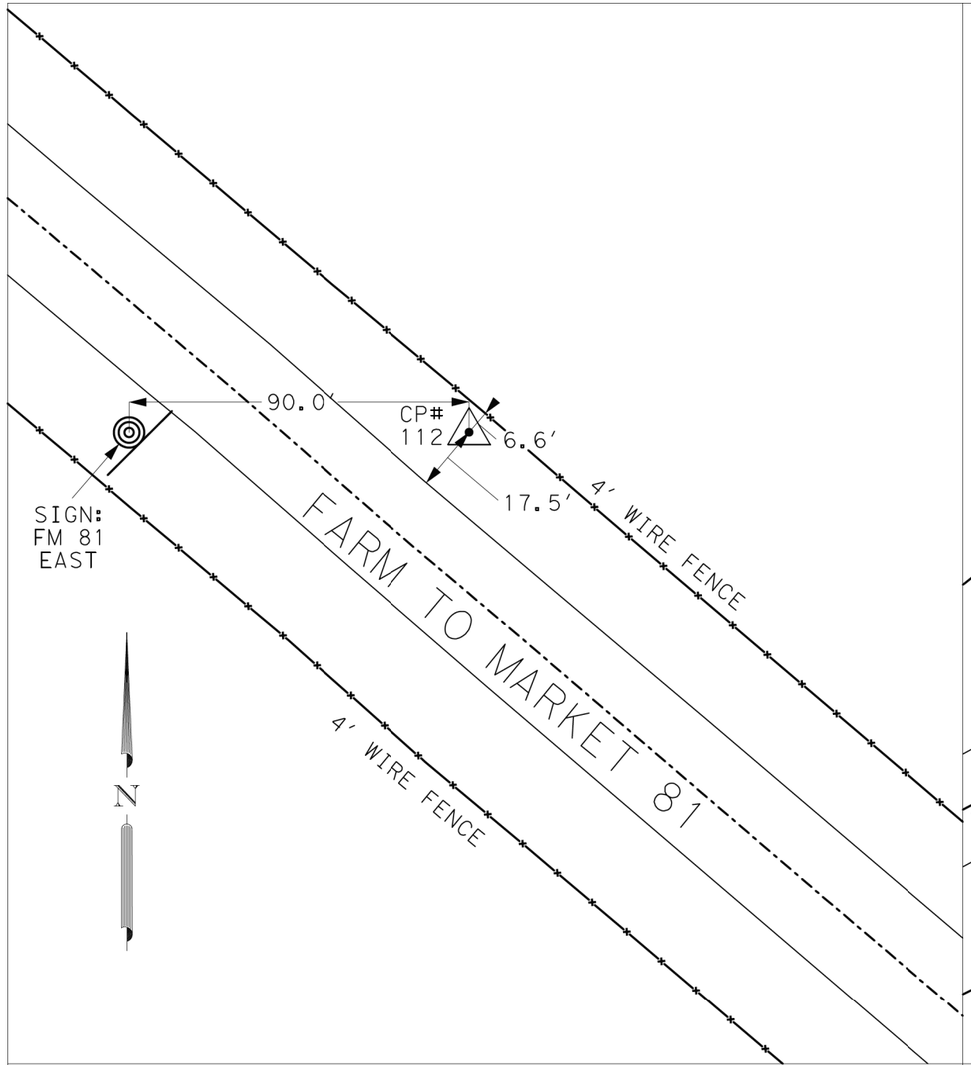
APPROXIMATE LOCATION:
ON THE SOUTHWEST SIDE OF FM 81 APPROXIMATELY 9,292 FEET NORTHWEST OF THE INTERSECTION OF FM 81 AND CR 334.

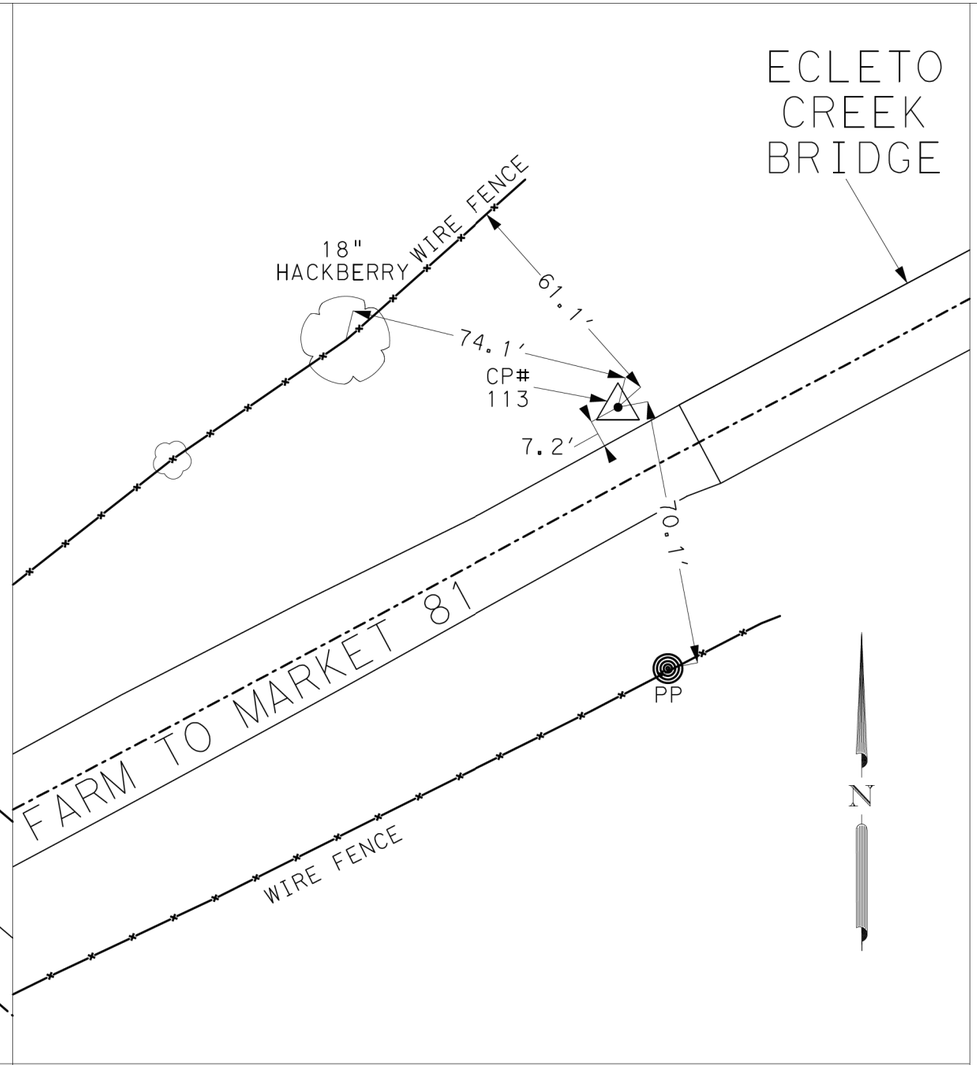
US SURVEY FEET
NAVD 88 ELEVATION: 276.59'
DATE SET: 01/27/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "111" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,527,935.92'
EASTING: 2,353,042.09'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

SURVEY CONTROL

SCALE: 1" = 40' SHEET 2 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	63
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





CONTROL POINT # 112

APPROXIMATE LOCATION:
ON THE NORTHEAST SIDE OF FM 81 APPROXIMATELY 3,833 FEET NORTHWEST OF THE INTERSECTION OF FM 81 AND CR 334.

US SURVEY FEET
NAVD 88 ELEVATION: 278.99'
DATE SET: 01/27/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "112" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,524,433.71'
EASTING: 2,357,235.84'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 113

APPROXIMATE LOCATION:
ON THE NORTHEAST SIDE OF FM 81 AT THE SOUTHERN END OF THE ECLETO CREEK BRIDGE AND APPROXIMATELY 1,136 FEET NORTHEAST OF THE INTERSECTION OF FM 81 AND CR 334.

US SURVEY FEET
NAVD 88 ELEVATION: 244.70'
DATE SET: 01/27/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "113" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,522,255.24'
EASTING: 2,361,248.05'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

NOTES:

HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE (4204) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983, NAD 83 (NA 2011) EPOCH DATE 2010 WITH A KARNES COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00013. (GRID x 1.00013 = SURFACE) VALUES WERE DERIVED FROM UTILIZING THE STATE VIRTUAL REFERENCE NETWORK IN JANUARY 2020.

VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

05/27/2020

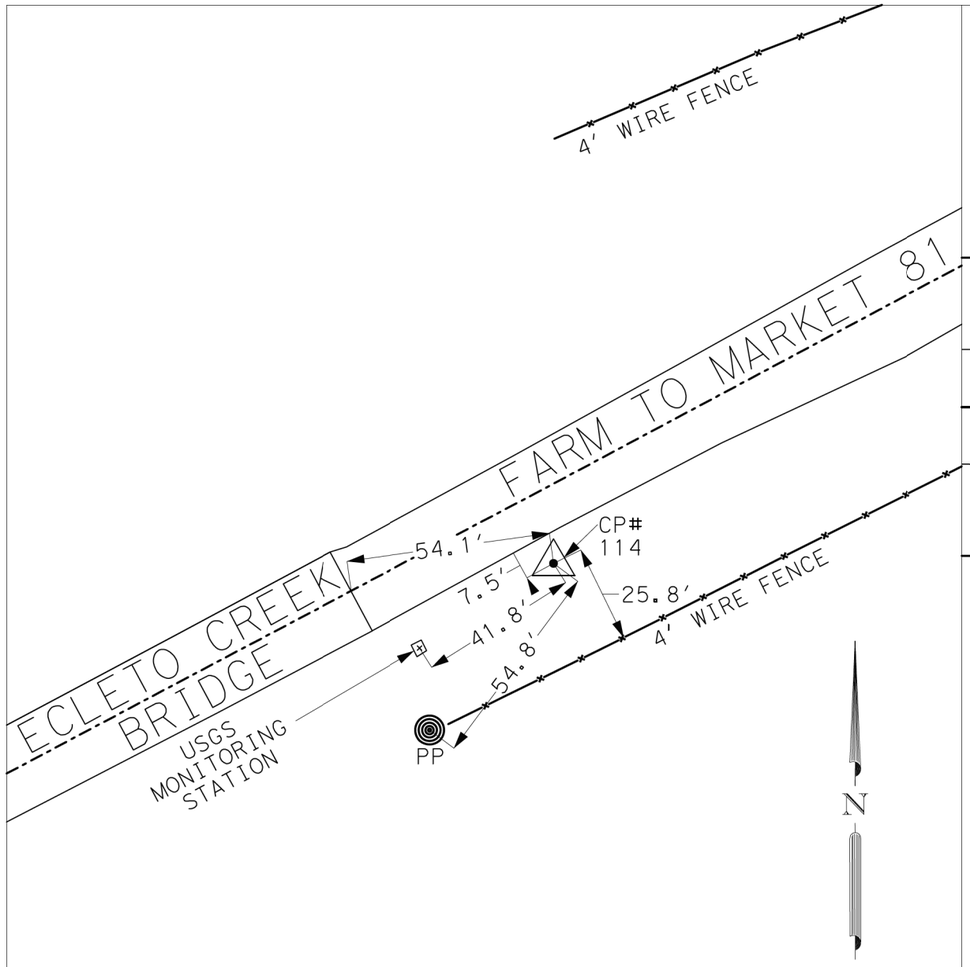
S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

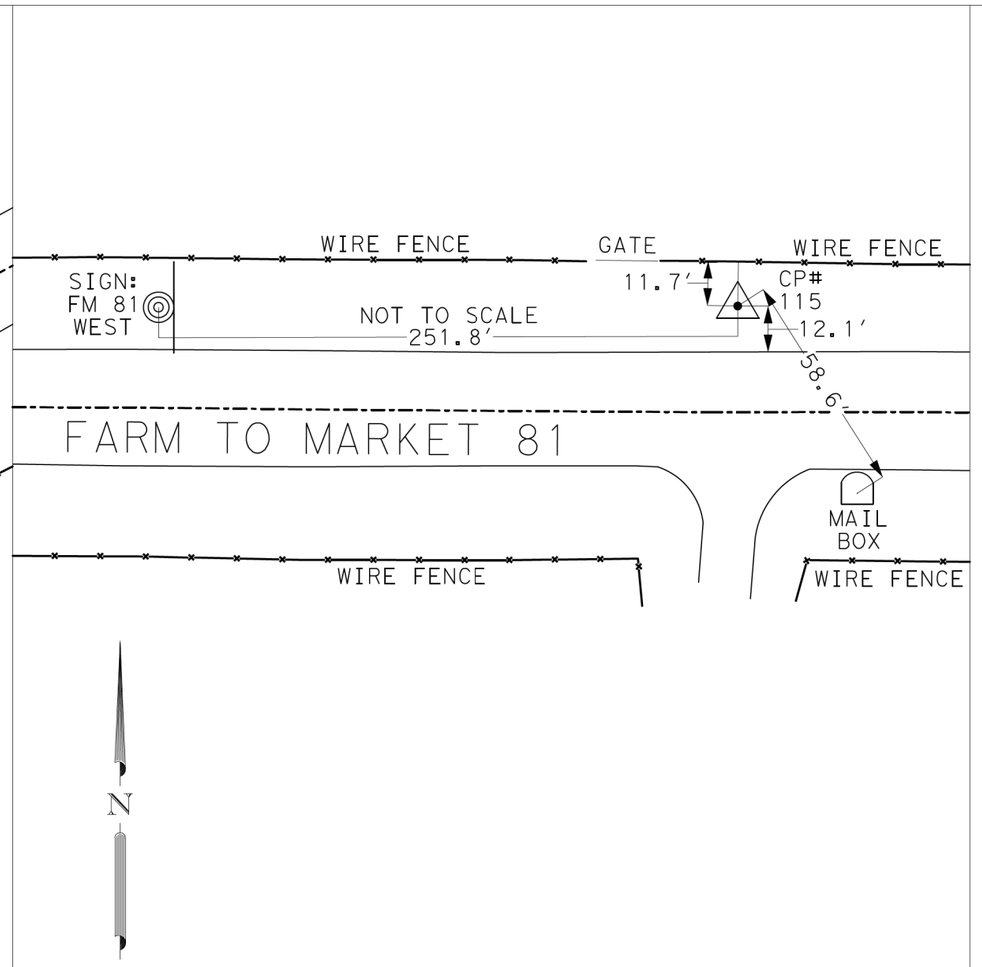
Texas Department of Transportation

SURVEY CONTROL

SCALE: 1" = 40'

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	64
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





CONTROL POINT # 114

APPROXIMATE LOCATION:
ON THE SOUTHWEST SIDE OF FM 81 AT THE NORTHERN END OF THE ECLETO CREEK BRIDGE AND APPROXIMATELY 1499 FEET NORTHWEST OF THE INTERSECTION OF FM 81 AND CR 334.

US SURVEY FEET
NAVD 88 ELEVATION: 245.29'
DATE SET: 01/27/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "114" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,522,393.99'
EASTING: 2,361,587.64'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 115

APPROXIMATE LOCATION:
ON THE NORTH SIDE OF FM 81 APPROXIMATELY 1,700 FEET WEST OF THE INTERSECTION OF FM 81 AND CR 335.

US SURVEY FEET
NAVD 88 ELEVATION: 261.55'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "115" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,522,755.60'
EASTING: 2,366,924.61'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

NOTES:

HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE (4204) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983, NAD 83 (NA 2011) EPOCH DATE 2010 WITH A KARNES COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00013. (GRID x 1.00013 = SURFACE) VALUES WERE DERIVED FROM UTILIZING THE STATE VIRTUAL REFERENCE NETWORK IN JANUARY 2020.

VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

05/26/2020

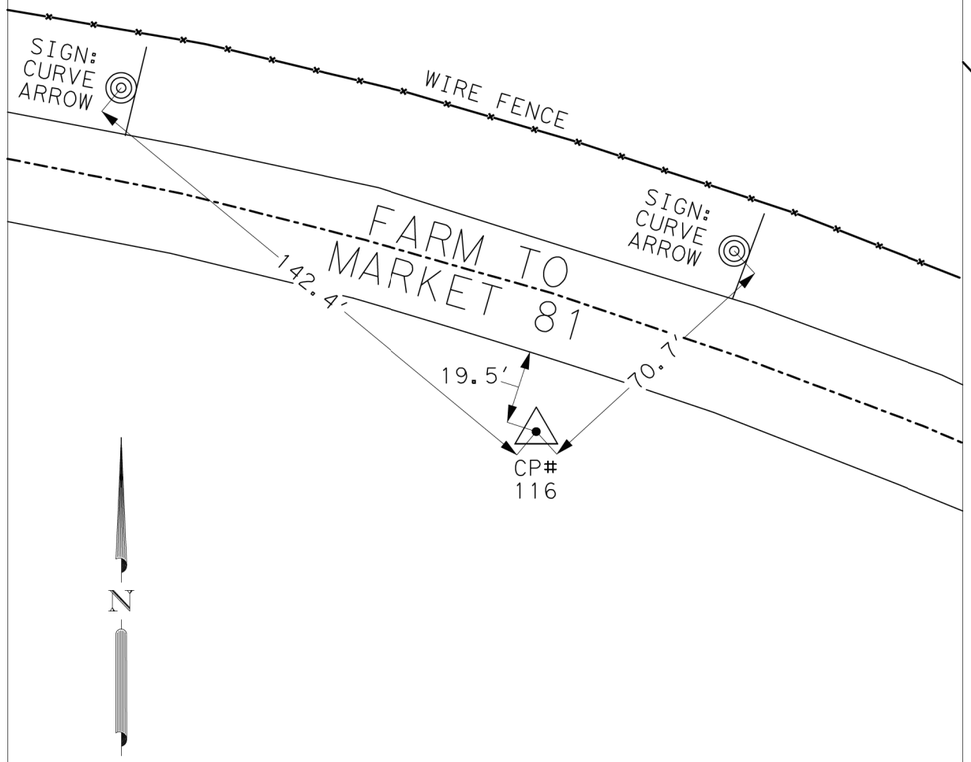
S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

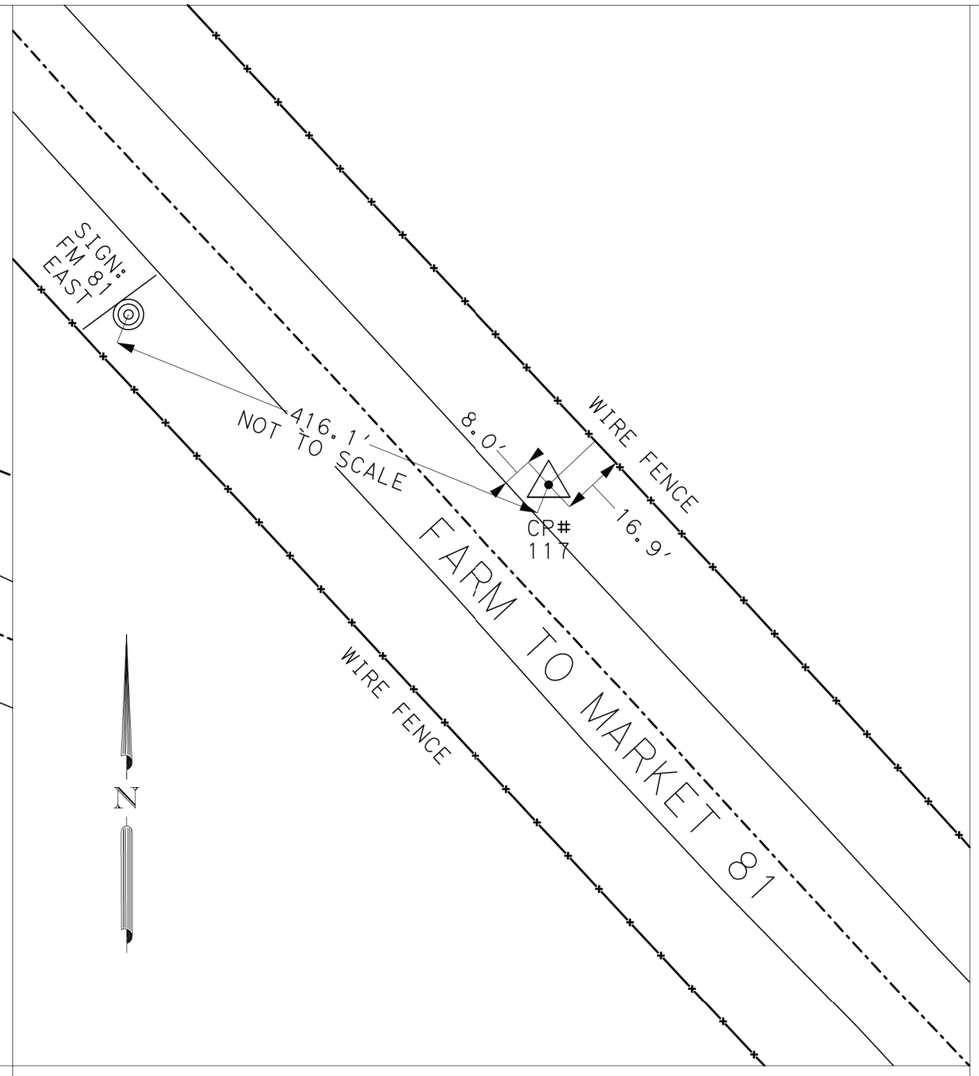
Texas Department of Transportation

SURVEY CONTROL

SCALE: 1" = 40'

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	65
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





NOTES:

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VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

S. Kevin Wendell
05/26/2020

S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

Texas Department of Transportation

CONTROL POINT # 116

APPROXIMATE LOCATION:
ON THE SOUTH SIDE OF FM 81 APPROXIMATELY 961 FEET EAST OF THE INTERSECTION OF FM 81 AND CR 315.

US SURVEY FEET
NAVD 88 ELEVATION: 304.78'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "116" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,522,851.74'
EASTING: 2,372,271.03'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 117

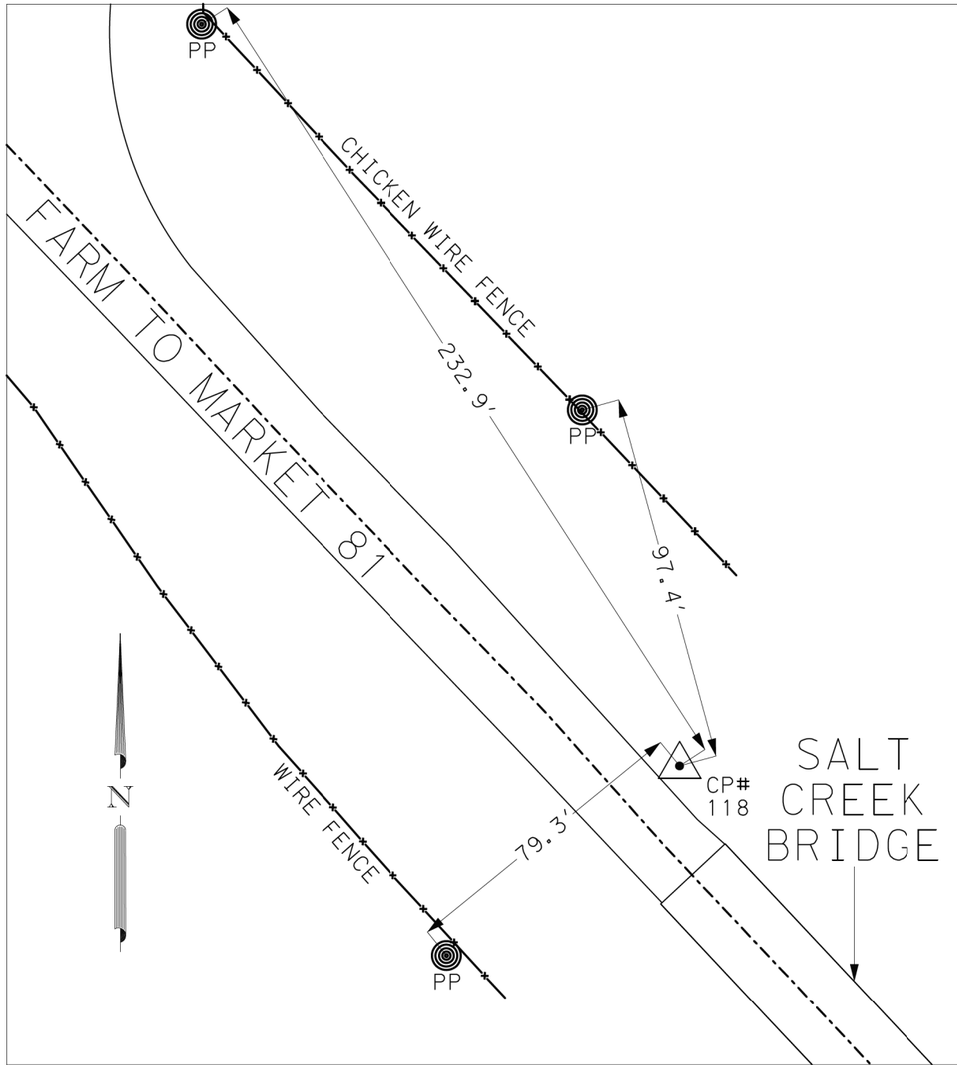
APPROXIMATE LOCATION:
ON THE NORTH SIDE OF FM 81 APPROXIMATELY 1,886 FEET WEST OF THE INTERSECTION OF FM 81 AND CR 335.

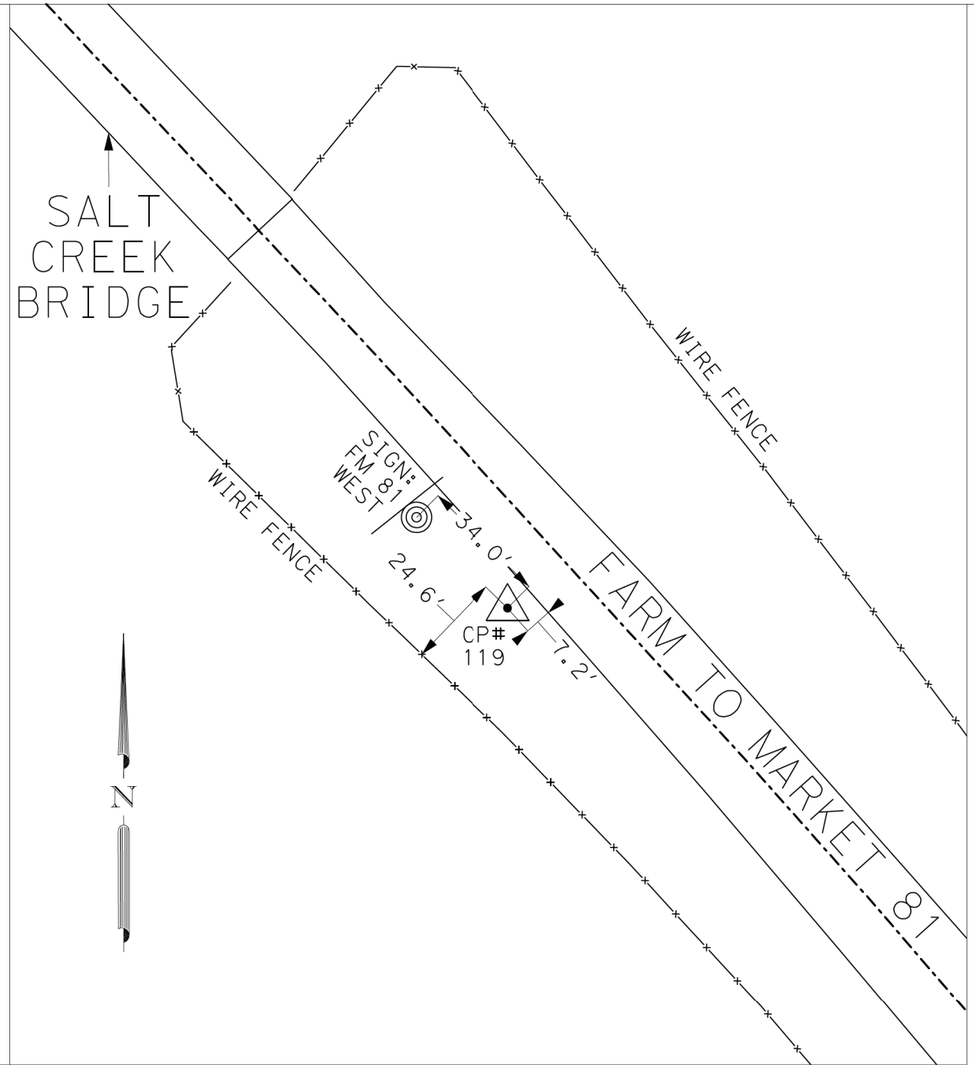
US SURVEY FEET
NAVD 88 ELEVATION: 295.77'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "117" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,519,036.72'
EASTING: 2,375,920.58'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

SURVEY CONTROL

SCALE: 1" = 40' SHEET 5 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	66
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





NOTES:

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VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

CONTROL POINT # 118

APPROXIMATE LOCATION:
ON THE NORTHEAST SIDE OF FM 81 AT THE NORTH END OF THE SALT CREEK BRIDGE APPROXIMATELY 257 FEET SOUTHWEST OF THE INTERSECTION OF FM 81 AND CR 627.

US SURVEY FEET
NAVD 88 ELEVATION: 260.30'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "118" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,521,440.35'
EASTING: 2,373,867.18'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 119

APPROXIMATE LOCATION:
ON THE SOUTHWEST SIDE OF FM 81 NEAR THE SOUTH END OF THE SALT CREEK BRIDGE APPROXIMATELY 547 FEET SOUTHWEST OF THE INTERSECTION OF FM 81 AND CR 627.

US SURVEY FEET
NAVD 88 ELEVATION: 261.08'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "119" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,521,202.73'
EASTING: 2,374,038.71'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

05/26/2020

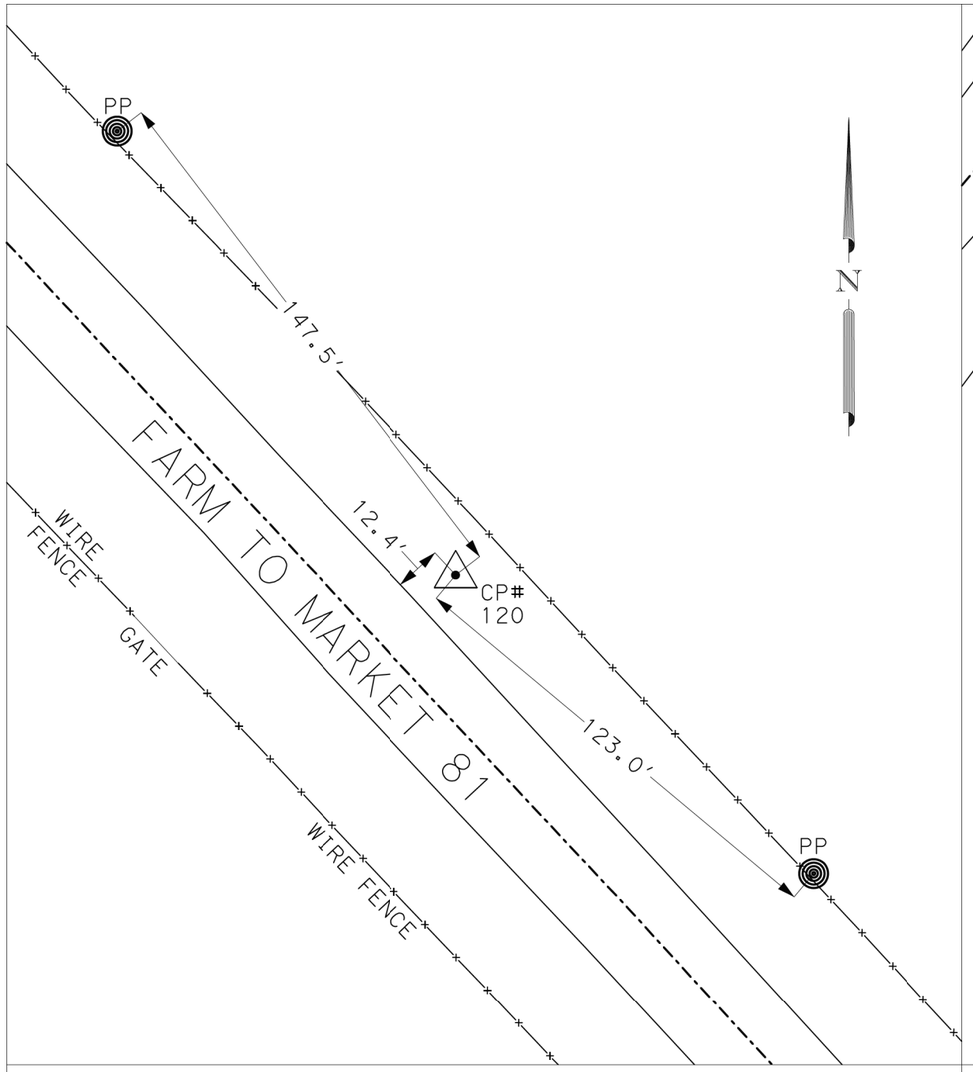
S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

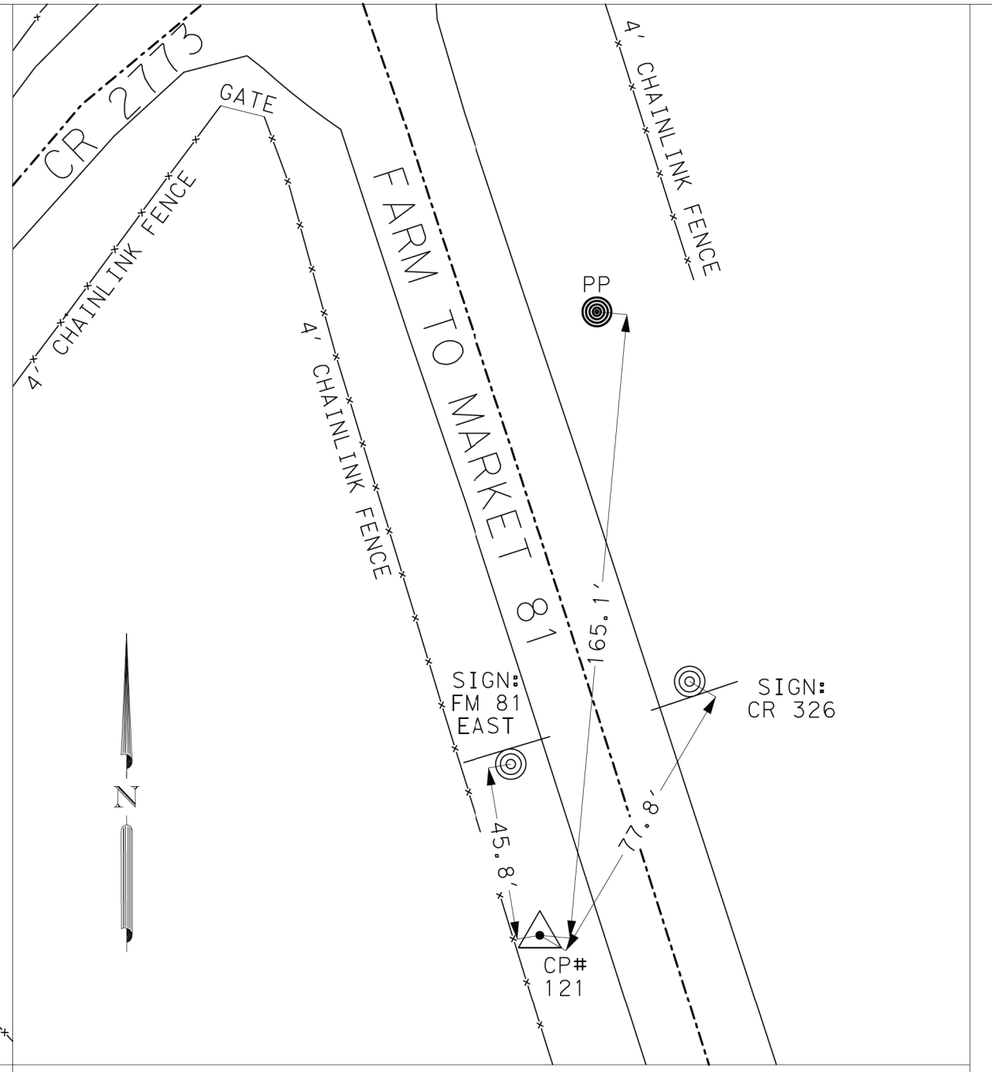
Texas Department of Transportation

SURVEY CONTROL

SCALE: 1" = 40'

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		FM 81
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	67
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	





CONTROL POINT # 120

APPROXIMATE LOCATION:
ON THE NORTHEAST SIDE OF FM 81 APPROXIMATELY 488 FEET SOUTHWEST OF THE INTERSECTION OF FM 81 AND CR 335.

US SURVEY FEET
NAVD 88 ELEVATION: 319.02'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "120" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 1,3517,298.45'
EASTING: 2,377,547.85'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI DISTRICT VRS NETWORK.

CONTROL POINT # 121

APPROXIMATE LOCATION:
ON THE WEST SIDE OF FM 81 APPROXIMATELY 317 FEET SOUTHWEST OF THE INTERSECTION OF FM 81 AND CR 2773.

US SURVEY FEET
NAVD 88 ELEVATION: 248.98'
DATE SET: 01/28/2020
MONUMENT: 3" ALUMINIUM CAP STAMPED "121" ON 5/8" STEEL ROD
SURFACE ENGLISH CO-ORDS
KARNES COUNTY SCALE FACTOR: 1.00013
NORTHING: 13,513,032.27'
EASTING: 2,379,525.22'
ELEVATIONS ARE NAVD 88 BASED UPON TxDOT CORPUS CHRISTI VRS NETWORK.

NOTES:

HORIZONTAL COORDINATES SHOWN ARE IN U.S. SURVEY FEET, AND ARE BASED UPON THE TEXAS STATE PLANE COORDINATE SYSTEM, TEXAS SOUTH CENTRAL ZONE (4204) AND ADJUSTED TO THE NORTH AMERICAN DATUM OF 1983, NAD 83 (NA 2011) EPOCH DATE 2010 WITH A KARNES COUNTY SURFACE ADJUSTMENT FACTOR OF 1.00013. (GRID x 1.00013 = SURFACE) VALUES WERE DERIVED FROM UTILIZING THE STATE VIRTUAL REFERENCE NETWORK IN JANUARY 2020.

VERTICAL IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). GEOID 12B.

I HEREBY CERTIFY THAT THE HORIZONTAL AND VERTICAL DATA SHOWN HEREON WAS DETERMINED BY A FIELD SURVEY IN JANUARY, 2020.

STATE OF TEXAS
REGISTERED
S. KEVIN WENDELL
5500
PROFESSIONAL
LAND SURVEYOR

S. Kevin Wendell

05/26/2020

S. KEVIN WENDELL - RPLS NO. 5500
T.B.P.E.&L.S. FIRM REGISTRATION # 10163300

Texas Department of Transportation

SURVEY CONTROL

SCALE: 1" = 40'

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS	6	SEE TITLE SHEET		FM 81
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	CRP	KARNES	68
CHECK	CONTROL	SECTION	JOB	
	0691	01	040	

FM 81

```
Chain FM81 contains:
 FM810001 CUR FM819 CUR FM8110 CUR FM8111 CUR FM8112 FM810002

Beginning chain FM81 description
===============================================================================

Point FM10001        N  13,522,574.5043 E   2,372,780.0584 Sta     328+42.84

Course from FM10001 to PC FM819 S 43° 10' 02.41" E Dist 1,817.2776

                                  Curve Data
                                 *----------*
Curve FM819
P.I.  Station            347+80.17  N     13,521,161.4993  E      2,374,105.4432
Delta        =       3° 36' 00.47"  (RT)
Degree       =       1° 29' 59.84"
Tangent      =            120.0474
Length       =            240.0157
Radius       =          3,819.8300
External     =              1.8859
Long Chord   =            239.9763
Mid. Ord.    =              1.8850
P.C.  Station            346+60.12  N     13,521,249.0569  E      2,374,023.3150
P.T.  Station            349+00.14  N     13,521,068.9574  E      2,374,181.9113
C.C.                                N     13,518,635.7913  E      2,371,237.2885
Back         = S  43° 10' 02.41" E
Ahead        = S  39° 34' 01.93" E
Chord Bear   = S  41° 22' 02.17" E

Course from PT FM819 to PC FM8110 S 39° 34' 01.93" E Dist 2,106.2302

                                  Curve Data
                                 *----------*
Curve FM8110
P.I.  Station            371+76.19  N     13,519,314.3964  E      2,375,631.7196
Delta        =       3° 23' 43.68"  (LT)
Degree       =       0° 59' 59.95"
Tangent      =            169.8252
Length       =            339.5510
Radius       =          5,729.6500
External     =              2.5162
Long Chord   =            339.5013
Mid. Ord.    =              2.5151
P.C.  Station            370+06.37  N     13,519,445.3109  E      2,375,523.5439
P.T.  Station            373+45.92  N     13,519,190.1187  E      2,375,747.4592
C.C.                                N     13,523,094.9997  E      2,379,940.4049
Back         = S  39° 34' 01.93" E
Ahead        = S  42° 57' 45.62" E
Chord Bear   = S  41° 15' 53.77" E

Course from PT FM8110 to PC FM8111 S 42° 57' 45.62" E Dist 2,822.4555

                                  Curve Data
                                 *----------*
Curve FM8111
P.I.  Station            403+62.38  N     13,516,982.6749  E      2,377,803.2467
Delta        =      15° 25' 25.90"  (RT)
Degree       =       3° 59' 57.03"
Tangent      =            194.0111
Length       =            385.6761
Radius       =          1,432.6900
External     =             13.0766
Long Chord   =            384.5126
Mid. Ord.    =             12.9583
P.C.  Station            401+68.37  N     13,517,124.6518  E      2,377,671.0239
P.T.  Station            405+54.05  N     13,516,810.6456  E      2,377,892.9476
C.C.                                N     13,516,148.2424  E      2,376,622.5844
Back         = S  42° 57' 45.62" E
Ahead        = S  27° 32' 19.71" E
Chord Bear   = S  35° 15' 02.66" E

Course from PT FM8111 to PC FM8112 S 27° 32' 19.71" E Dist 2,094.8033

                                  Curve Data
                                 *----------*
Curve FM8112
P.I.  Station            428+57.93  N     13,514,767.8004  E      2,378,958.1448
Delta        =       8° 20' 52.25"  (RT)
Degree       =       1° 59' 59.65"
Tangent      =            209.0764
Length       =            417.4129
Radius       =          2,864.9300
External     =              7.6188
Long Chord   =            417.0438
Mid. Ord.    =              7.5986
P.C.  Station            426+48.85  N     13,514,953.1880  E      2,378,861.4784
P.T.  Station            430+66.26  N     13,514,570.3427  E      2,379,026.8719
C.C.                                N     13,513,628.5896  E      2,376,321.1511
Back         = S  27° 32' 19.71" E
Ahead        = S  19° 11' 27.46" E
Chord Bear   = S  23° 21' 53.59" E

Course from PT FM8112 to FM810002 S 19° 11' 27.46" E Dist 1,302.5602

Point FM810002       N  13,513,340.1681 E   2,379,455.0464 Sta     443+68.82

===============================================================================
Ending chain FM81 description
```

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

Stantec
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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	69
CONTROL	SECTION	JOB	
0691	01	044	

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FM 627

```
Chain FM627 contains:
 CUR FM6271 CUR FM6272 FM6272

Beginning chain FM627 description
==============================================================================

                                    Curve Data
                                   *----------*
Curve FM6271
P.I.  Station            8+68.35  N     13,521,748.0623  E       2,373,700.9960
Delta        =      1° 14' 28.43" (RT)
Degree       =      0° 54' 28.86"
Tangent      =            68.3512
Length       =           136.6970
Radius       =         6,310.0000
External     =             0.3702
Long Chord   =           136.6943
Mid. Ord.    =             0.3702
P.C.  Station            8+00.00  N     13,521,816.4086  E       2,373,700.1817
P.T.  Station            9+36.70  N     13,521,679.7144  E       2,373,700.3295
C.C.                              N     13,521,741.2394  E       2,367,390.6295
Back         = S  0° 40' 57.23" E
Ahead        = S  0° 33' 31.20" W
Chord Bear   = S  0° 03' 43.02" E

                                    Curve Data
                                   *----------*
Curve FM6272
P.I.  Station            9+58.06  N     13,521,658.3504  E       2,373,700.1212
Delta        =     46° 16' 26.40" (RT)
Degree       =    114° 35' 29.63"
Tangent      =            21.3650
Length       =            40.3817
Radius       =            50.0000
External     =             4.3734
Long Chord   =            39.2931
Mid. Ord.    =             4.0216
P.C.  Station            9+36.70  N     13,521,679.7144  E       2,373,700.3295
P.T.  Station            9+77.08  N     13,521,643.7340  E       2,373,684.5385
C.C.                              N     13,521,680.2019  E       2,373,650.3319
Back         = S  0° 33' 31.20" W
Ahead        = S 46° 49' 57.59" W
Chord Bear   = S 23° 41' 44.39" W

Course from PT FM6272 to FM6272 S 46° 49' 57.59" W Dist 22.9213

Point FM6272         N  13,521,628.0528 E   2,373,667.8206 Sta      10+00.00

==============================================================================
Ending chain FM627 description
```

CR 335

```
Chain CR335B contains:
 CR3353 CUR CR335B1 CUR CR335B2

Beginning chain CR335B description
==============================================================================

Point CR3353         N  13,517,657.4430 E   2,377,174.8366 Sta      10+00.00

Course from CR3353 to PC CR335B1 S 47° 02' 14.38" W Dist 20.3552

                                    Curve Data
                                   *----------*
Curve CR335B1
P.I.  Station           10+54.97  N     13,517,619.9822  E       2,377,134.6122
Delta        =     52° 37' 11.58" (RT)
Degree       =     81° 51' 04.01"
Tangent      =            34.6113
Length       =            64.2873
Radius       =            70.0000
External     =             8.0893
Long Chord   =            62.0517
Mid. Ord.    =             7.2513
P.C.  Station           10+20.36  N     13,517,643.5705  E       2,377,159.9407
P.T.  Station           10+84.64  N     13,517,625.7883  E       2,377,100.4914
C.C.                              N     13,517,694.7964  E       2,377,112.2342
Back         = S 47° 02' 14.38" W
Ahead        = N 80° 20' 34.04" W
Chord Bear   = S 73° 20' 50.17" W

                                    Curve Data
                                   *----------*
Curve CR335B2
P.I.  Station           11+42.33  N     13,517,635.4654  E       2,377,043.6229
Delta        =      2° 13' 45.02" (RT)
Degree       =      1° 55' 56.65"
Tangent      =            57.6860
Length       =           115.3575
Radius       =         2,965.0000
External     =             0.5611
Long Chord   =           115.3502
Mid. Ord.    =             0.5610
P.C.  Station           10+84.64  N     13,517,625.7883  E       2,377,100.4914
P.T.  Station           12+00.00  N     13,517,647.3470  E       2,376,987.1737
C.C.                              N     13,520,548.7714  E       2,377,597.8797
Back         = N 80° 20' 34.04" W
Ahead        = N 78° 06' 49.02" W
Chord Bear   = N 79° 13' 41.53" W

==============================================================================
Ending chain CR335B description
```

DATE	BY	REV	REVISION

STATE OF TEXAS
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FM 81

HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	70
CONTROL	SECTION	JOB	
0691	01	044	

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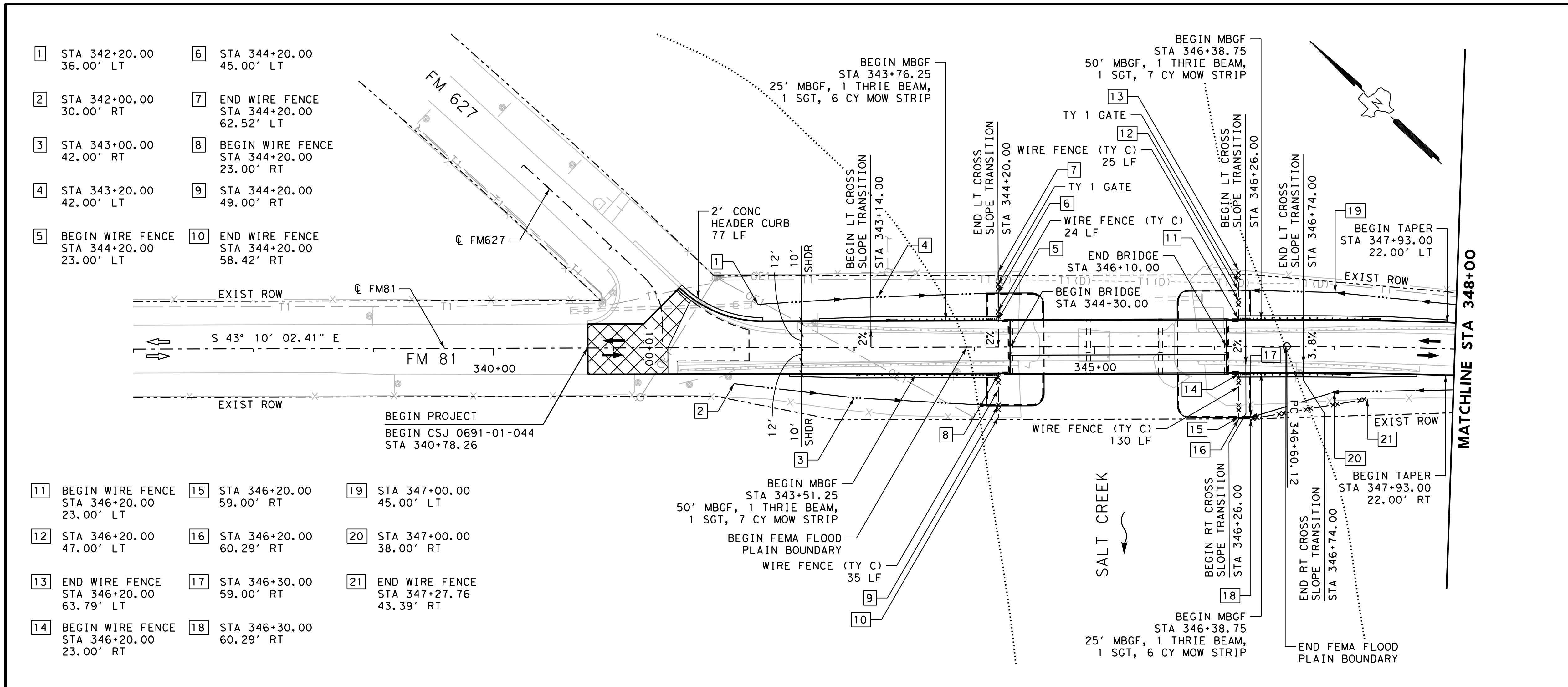

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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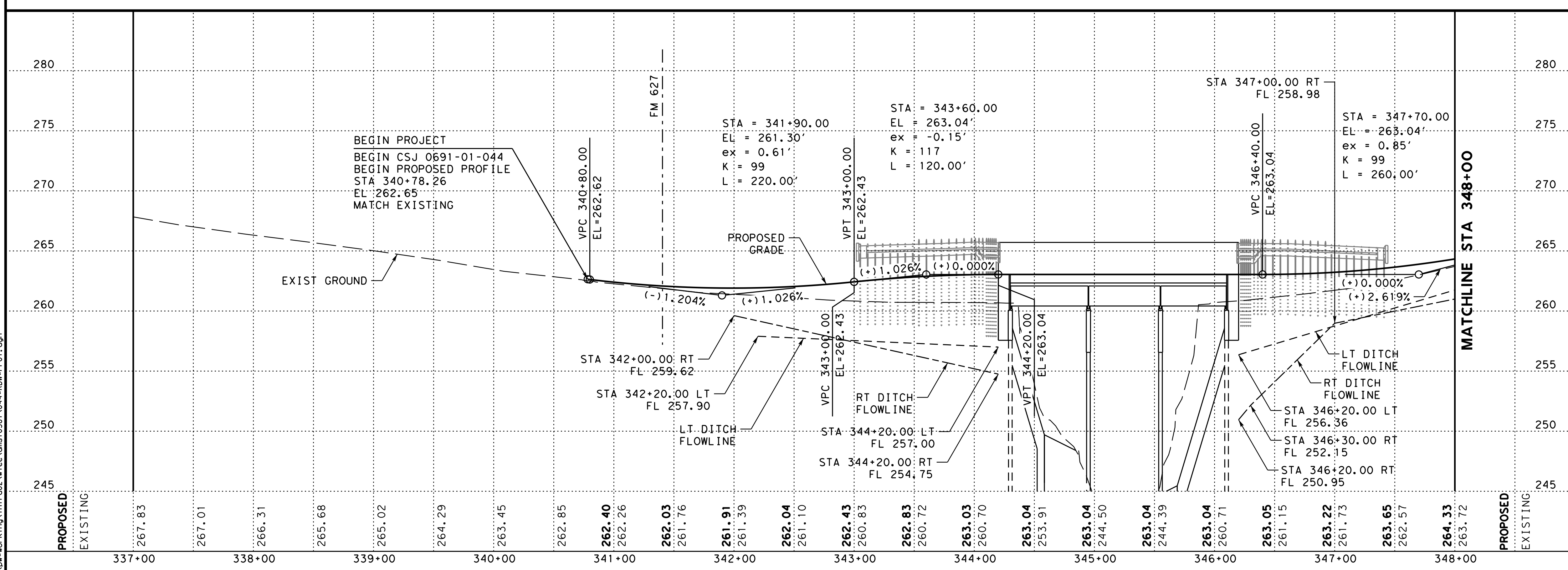
SCALE: 1"=100' H 1"=10' V

DATE	BY	REV	REVISION



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FM 81
PLAN AND PROFILE
BEGIN PROJECT TO STA 348+00

SCALE: 1"=100'H/10' V
SHEET 1 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	71
CONTROL	SECTION	JOB	
0691	01	044	

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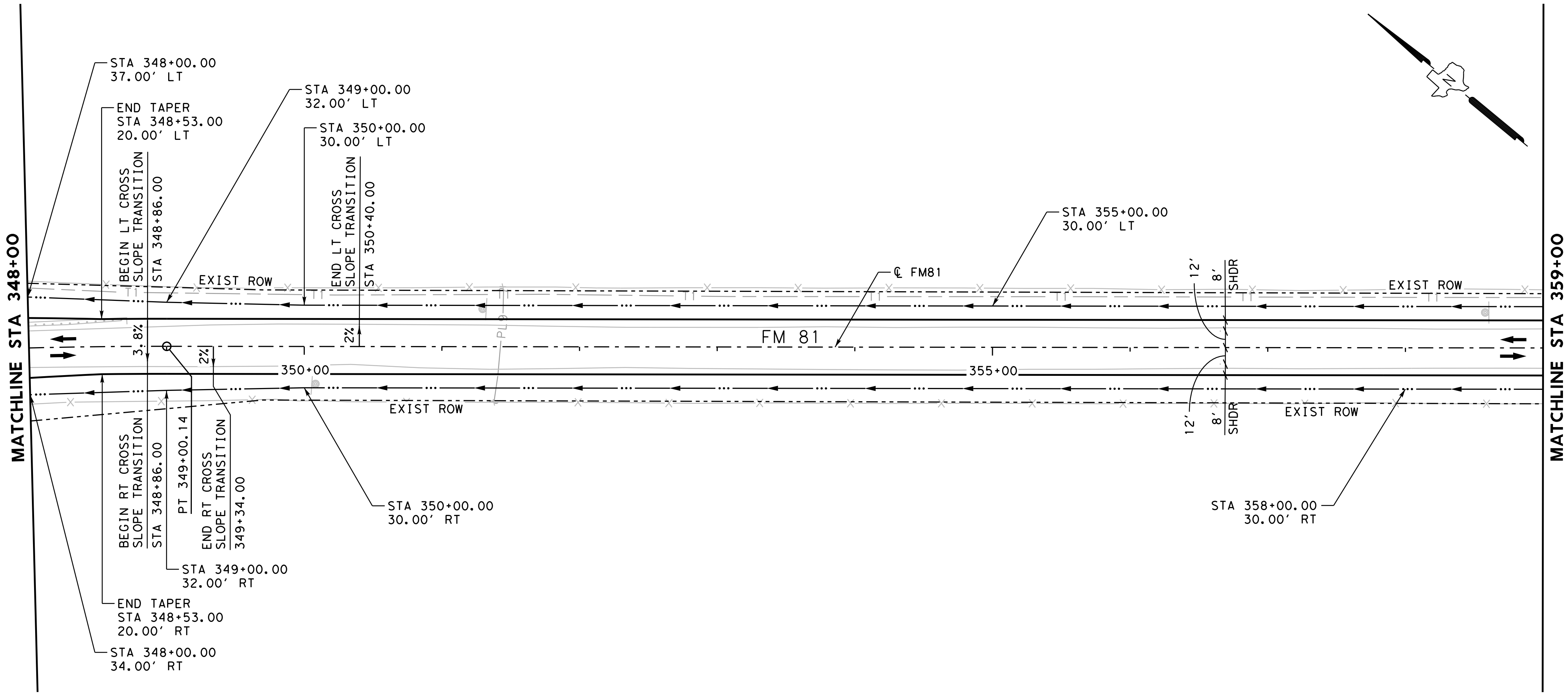

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1——OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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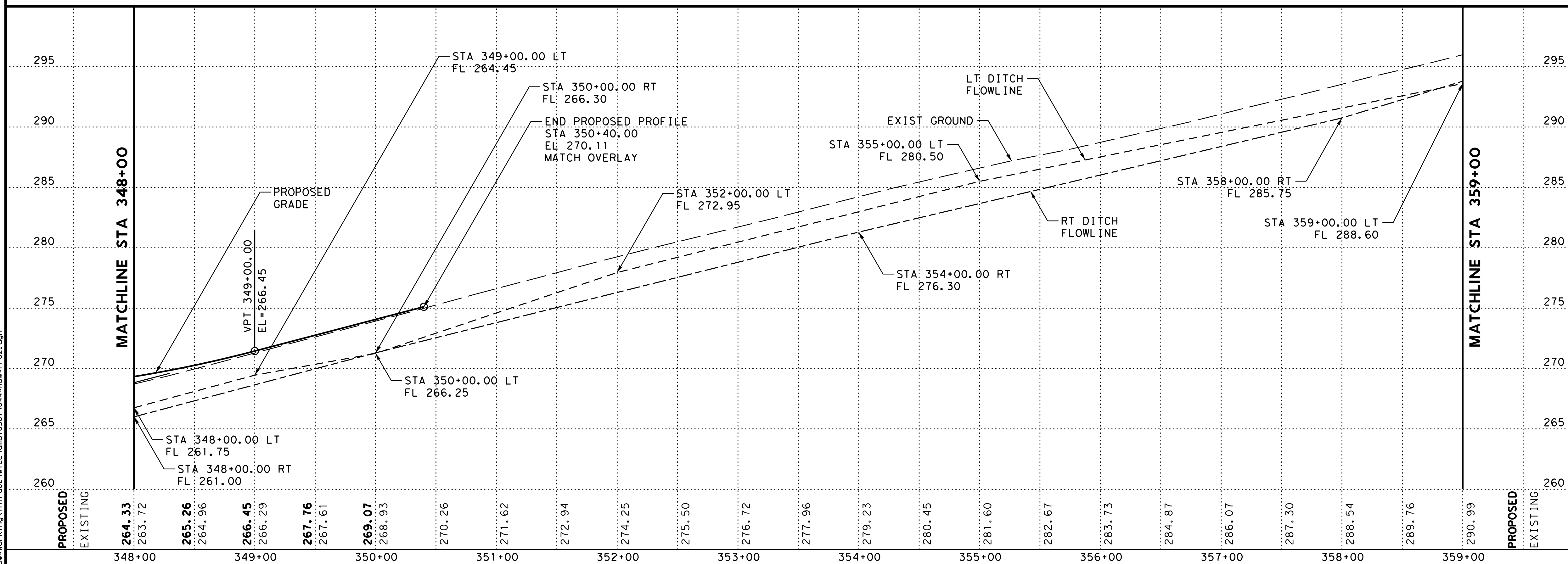
SCALE: 1"=100' H
1"=10' V

DATE	BY	REV	REVISION



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FM 81
PLAN AND PROFILE
STA 348+00 TO STA 359+00

SCALE: 1"=100'H/10' V SHEET 2 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	72
CONTROL	SECTION	JOB	
0691	01	044	

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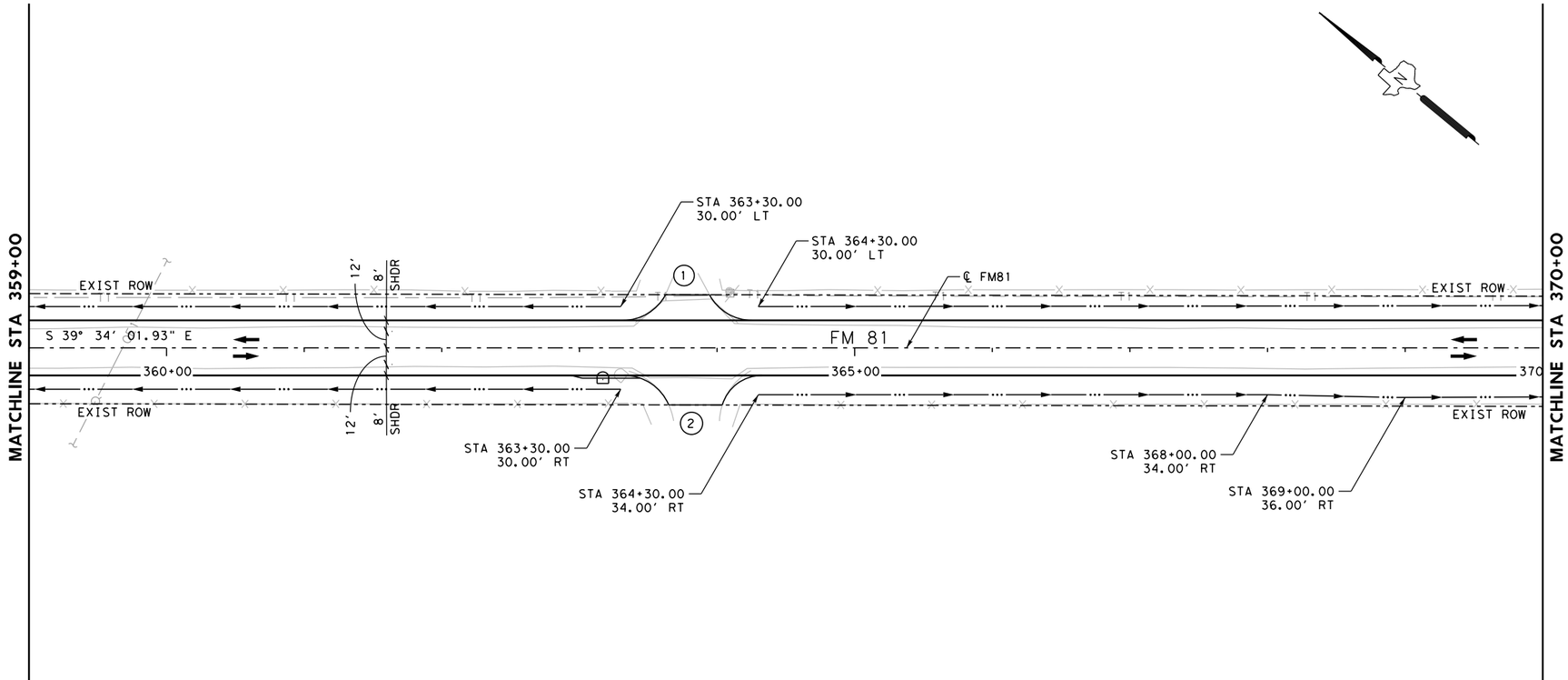

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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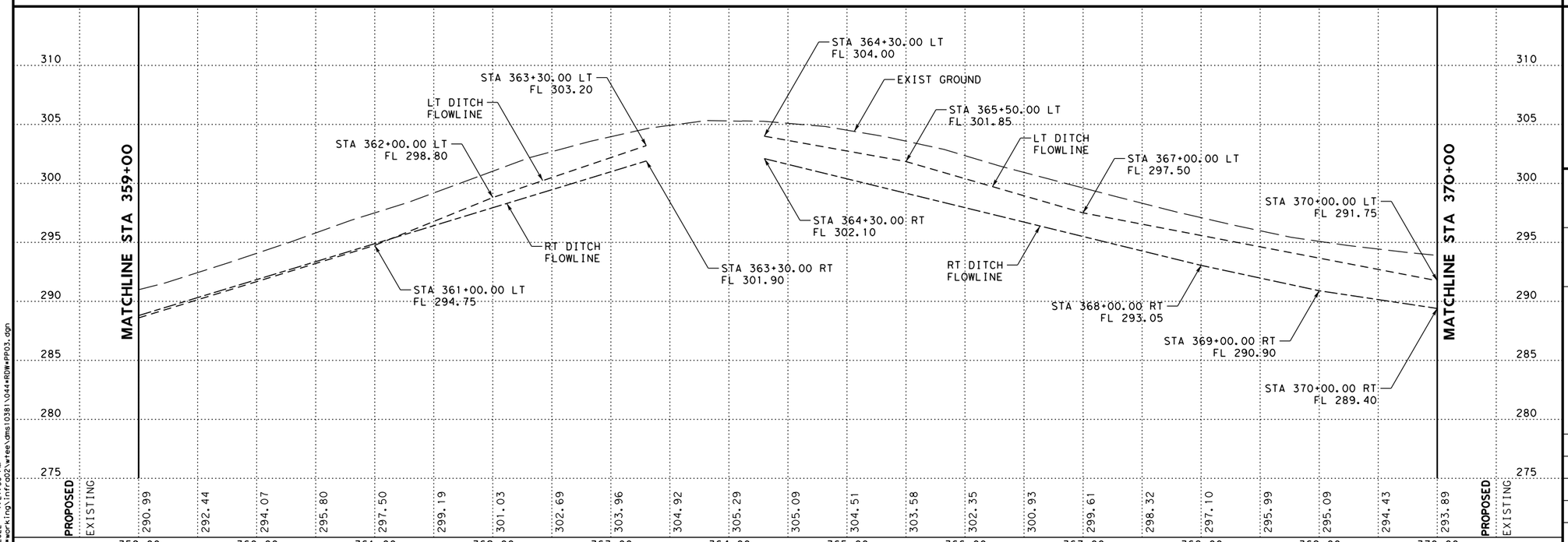
SCALE: 1"=100' H
1"=10' V



DATE	BY	REV	REVISION

STATE OF TEXAS
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FM 81

PLAN AND PROFILE

STA 359+00 TO STA 370+00

SCALE: 1"=100'H/10' V
SHEET 3 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	73
CONTROL	SECTION	JOB	
0691	01	044	

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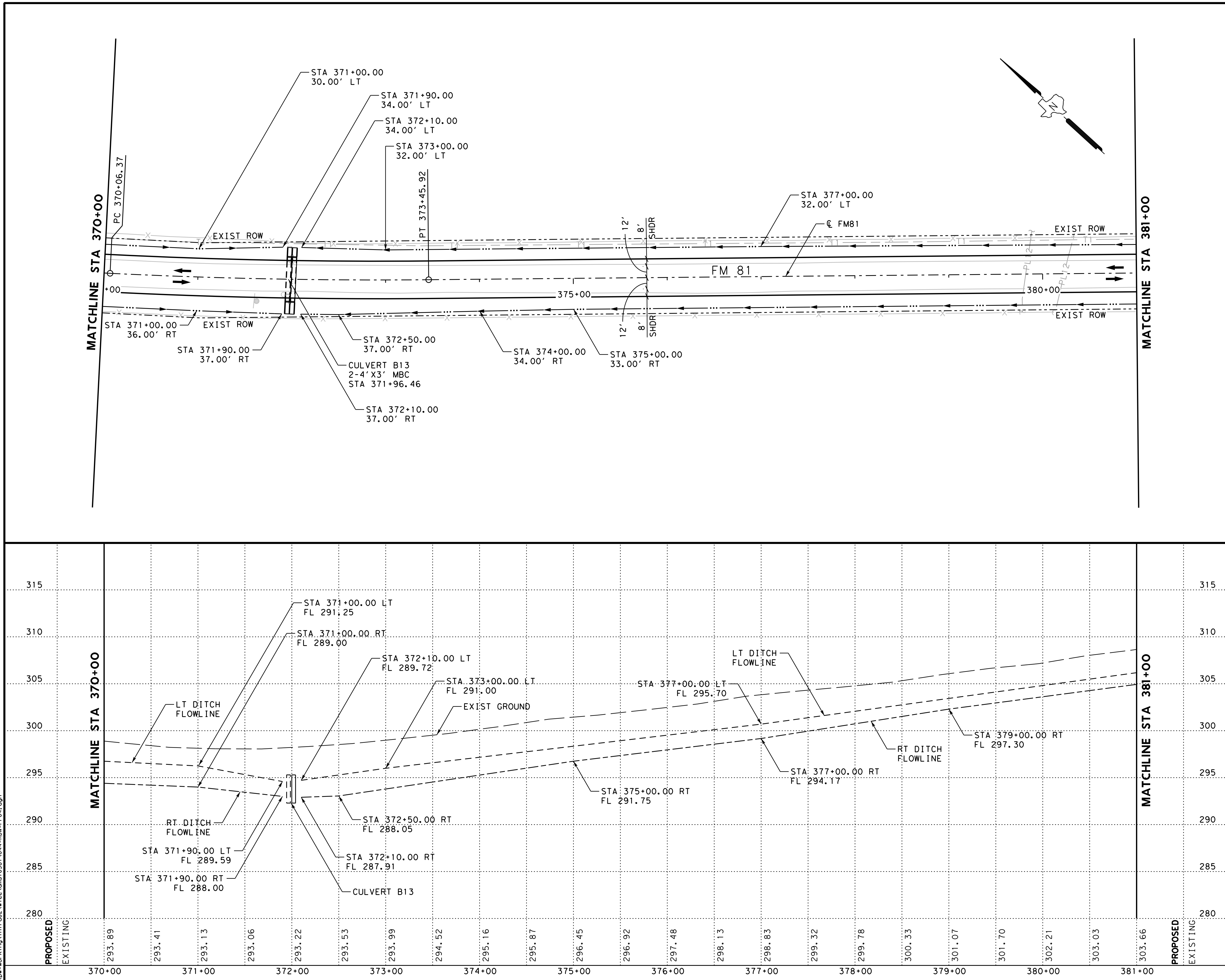

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- DRIVEWAY NUMBER
- OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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

DATE	BY	REV	REVISION

STATE OF TEXAS — WEIYIH TEE — 98478 — LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81
PLAN AND PROFILE

STA 370+00 TO STA 381+00

SCALE: 1"=100'H/10' V — SHEET 4 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	74
CONTROL	SECTION	JOB	
0691	01	044	

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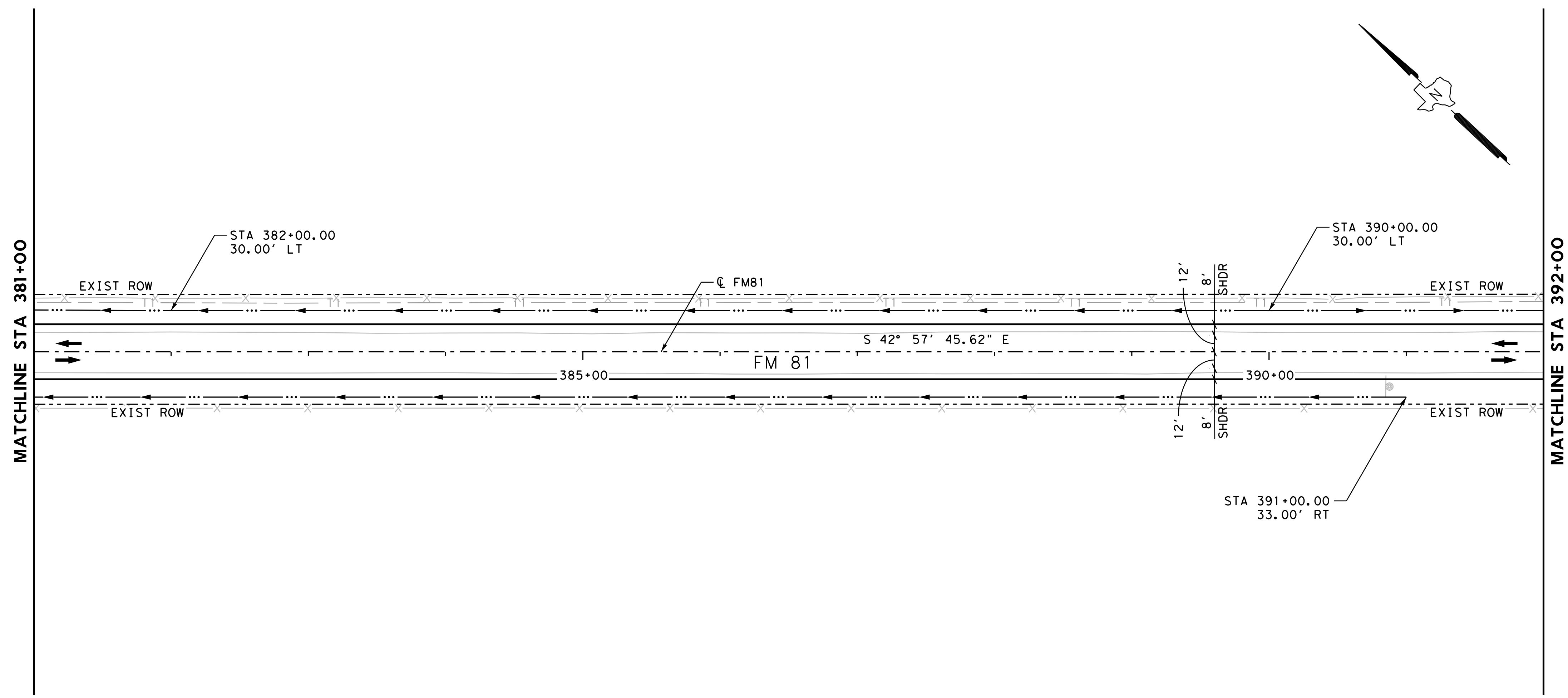

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 — OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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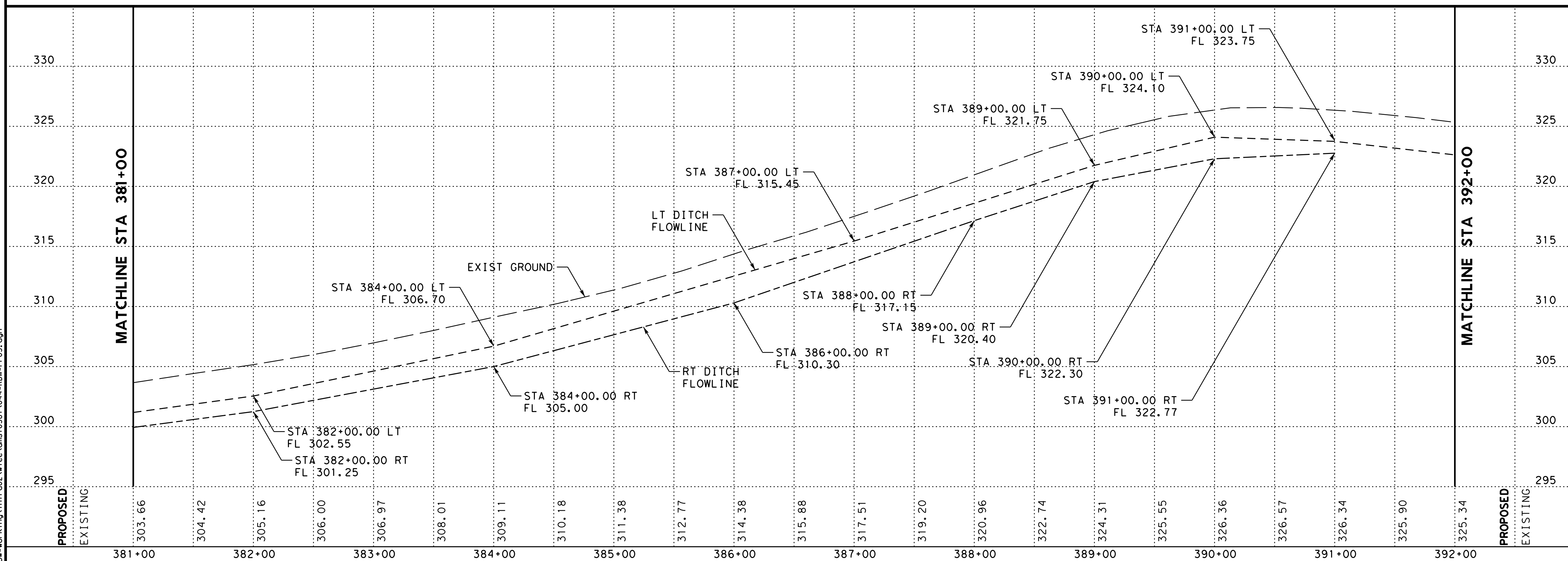
SCALE: 1"=100' H
1"=10' V

DATE	BY	REV	REVISION



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98478
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6/17/2022

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FM 81
PLAN AND PROFILE

STA 381+00 TO STA 392+00

SCALE: 1"=100'H/10' V — SHEET 5 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	75
CONTROL	SECTION	JOB	
0691	01	044	

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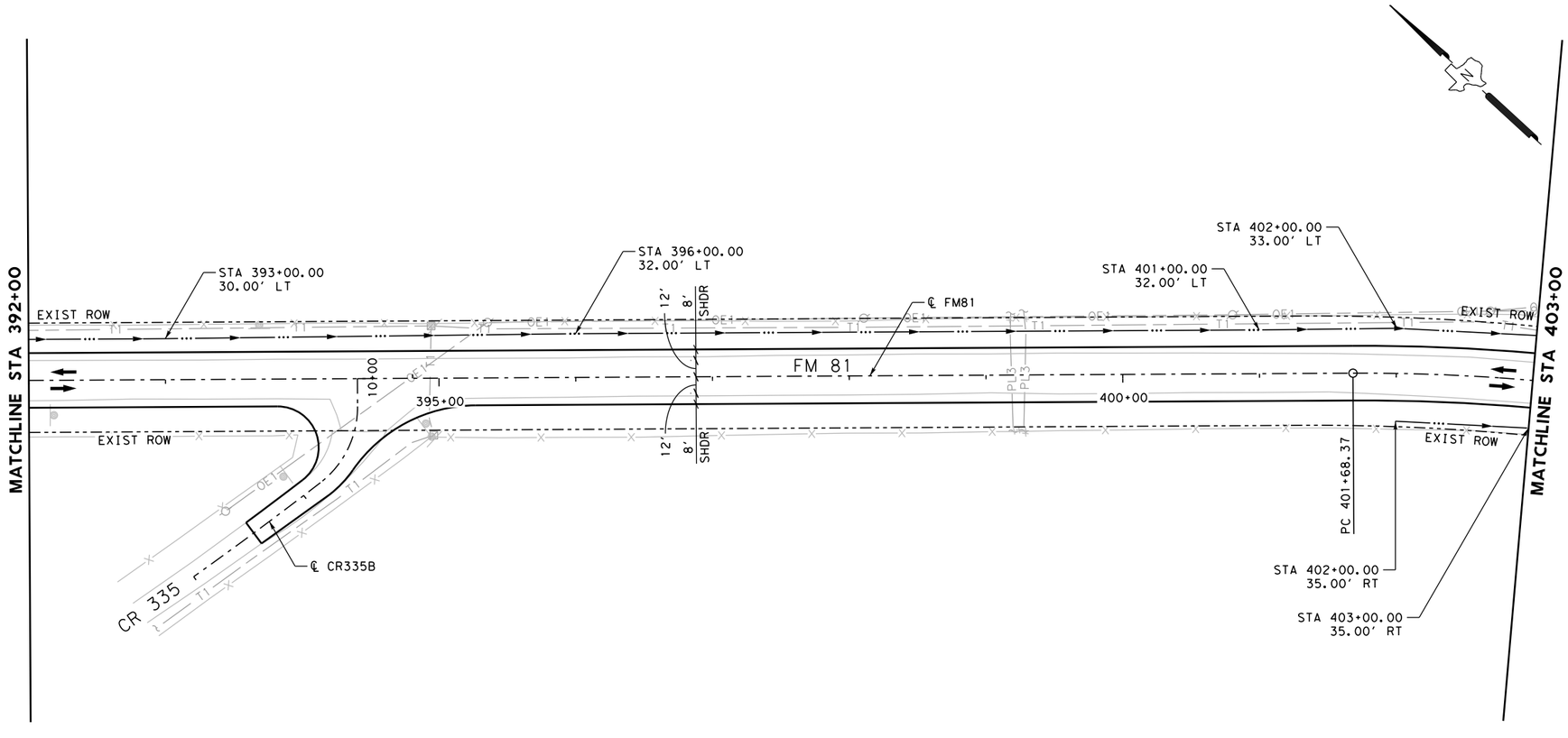


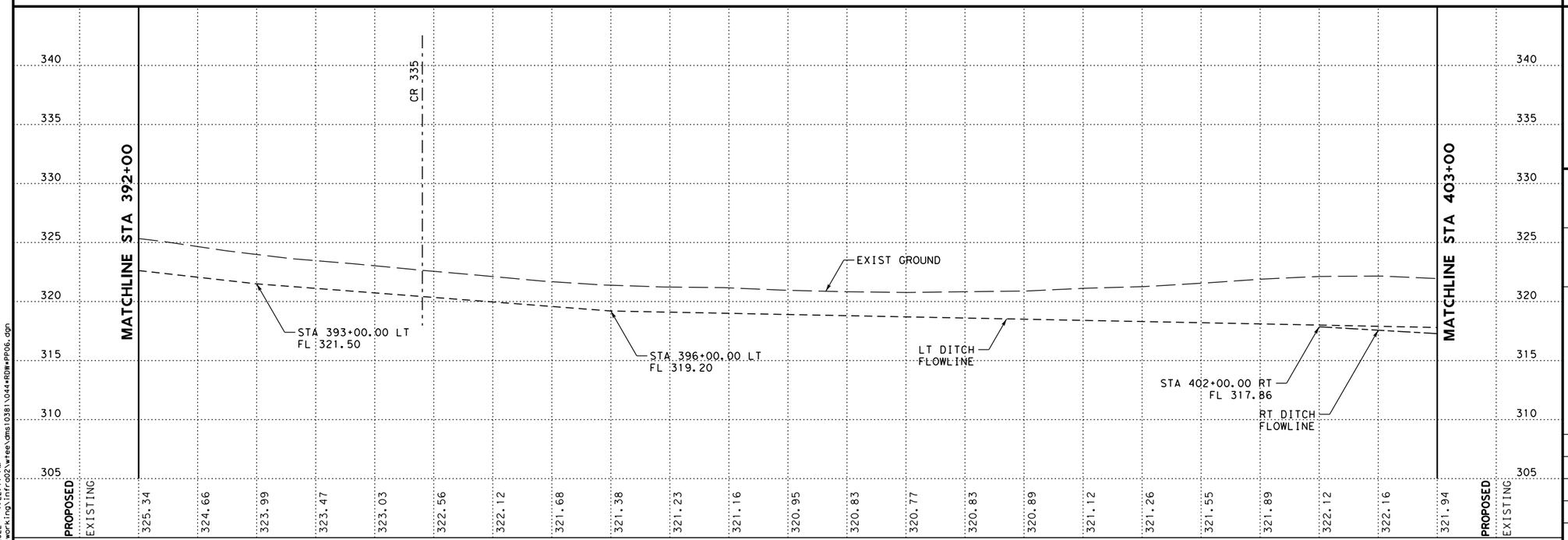
LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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



DATE	BY	REV	REVISION

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FM 81

PLAN AND PROFILE

STA 392+00 TO STA 403+00

SCALE: 1"=100'H/10' V SHEET 6 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	76
CONTROL	SECTION	JOB	
0691	01	044	

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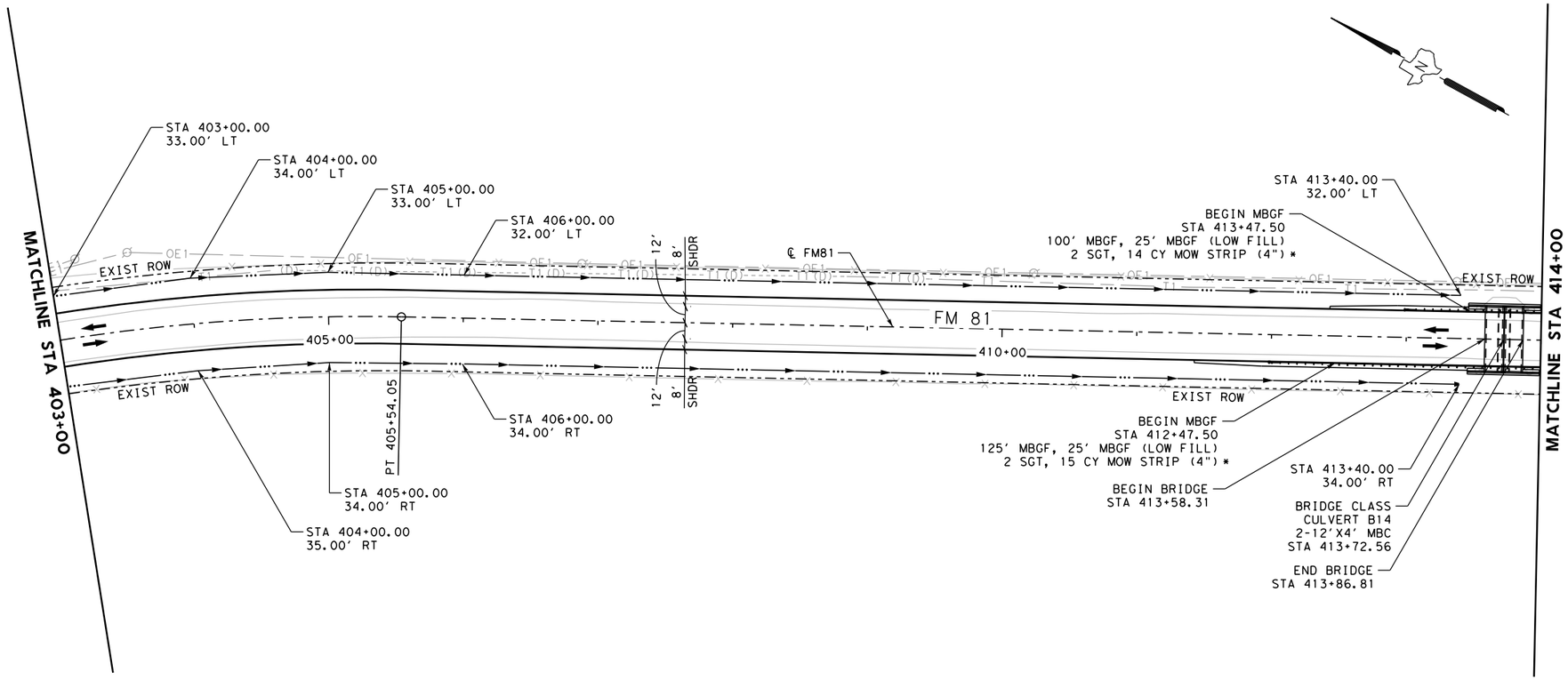


LEGEND

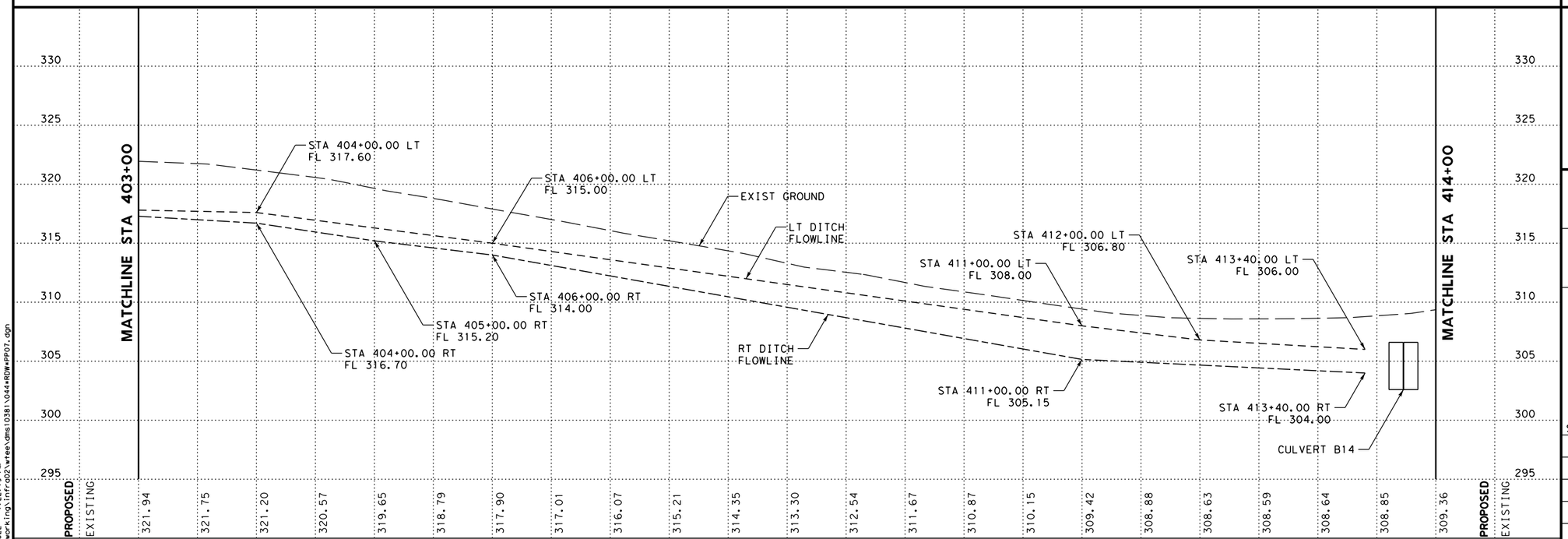
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

* EXTEND MOW STRIP TO CULVERT WINGWALL

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



DATE	BY	REV	REVISION

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FM 81

PLAN AND PROFILE

STA 403+00 TO STA 414+00

SCALE: 1"=100'H/10' V SHEET 7 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	77
CONTROL	SECTION	JOB	
0691	01	044	

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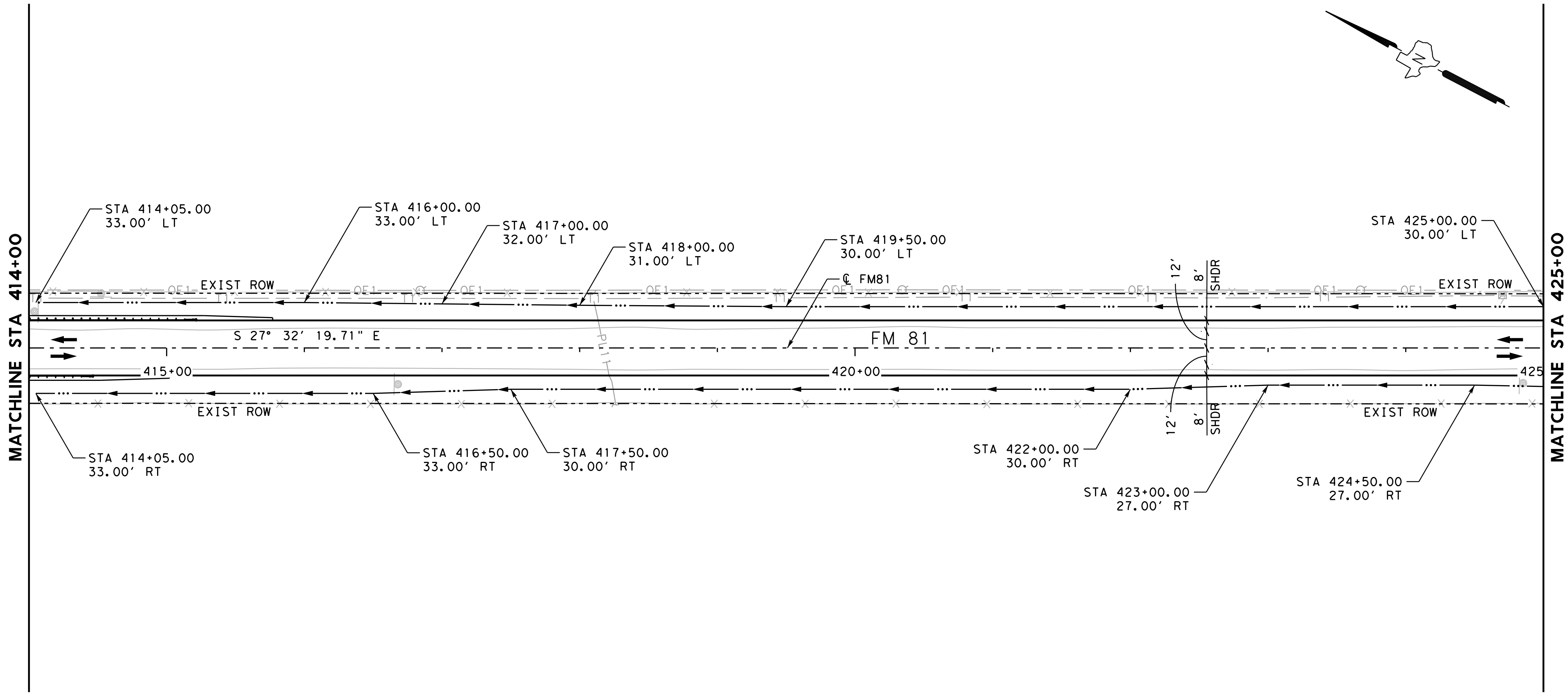


LEGEND

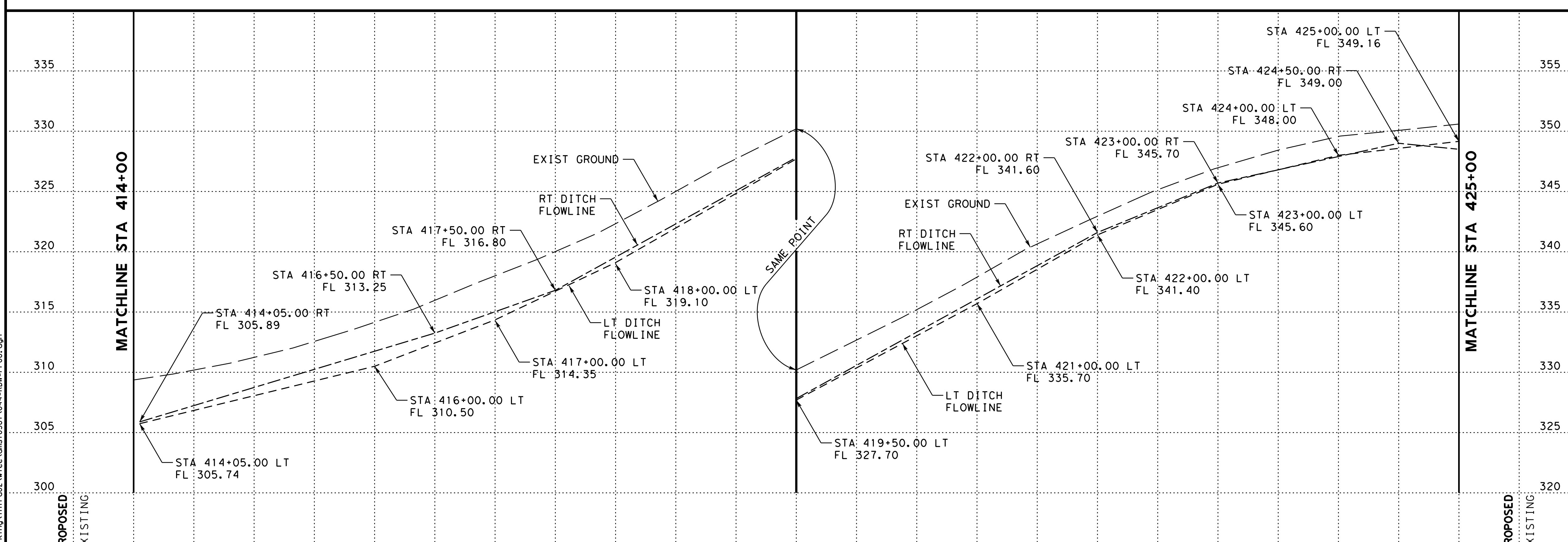
- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

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

DATE	BY	REV	REVISION



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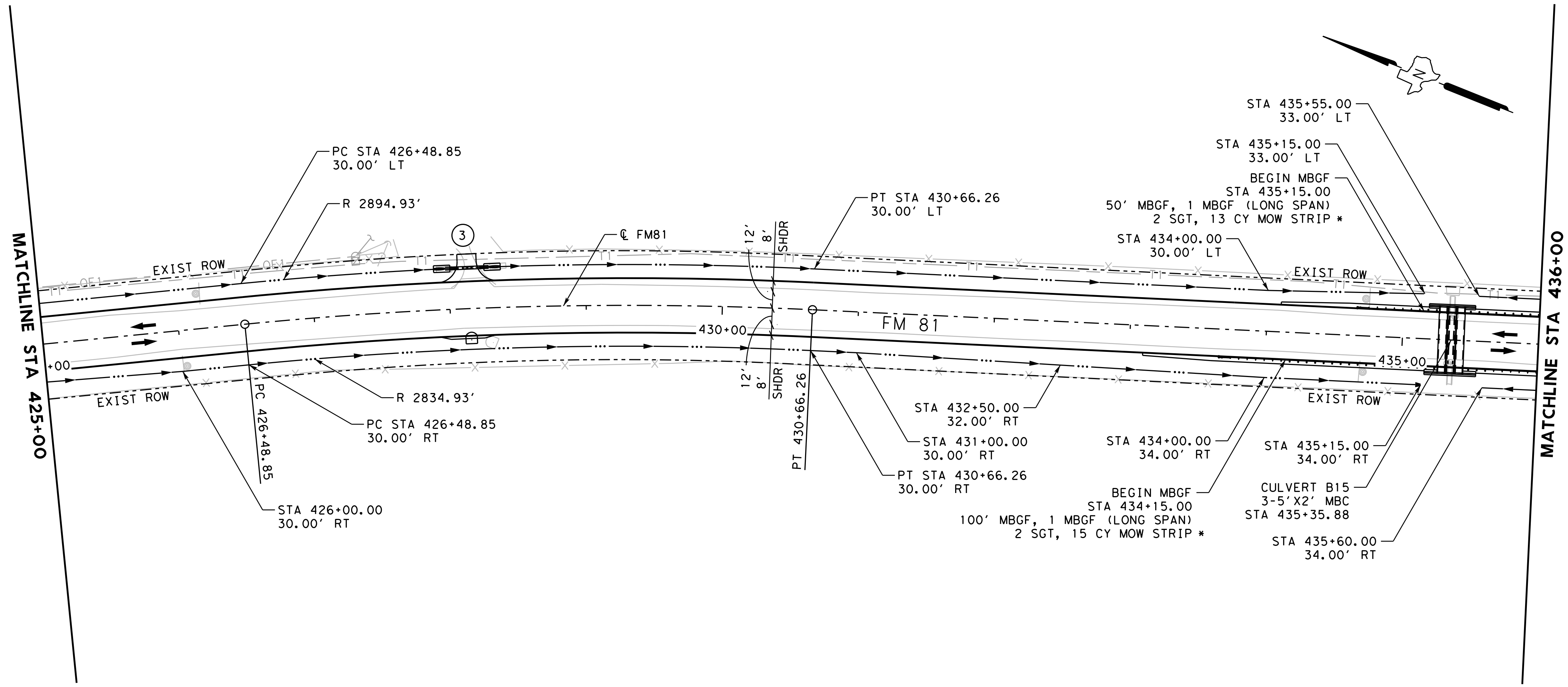
FM 81

PLAN AND PROFILE

STA 414+00 TO STA 425+00

SCALE: 1"=100'H/10' V SHEET 8 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	78
CONTROL	SECTION	JOB	
0691	01	044	



LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

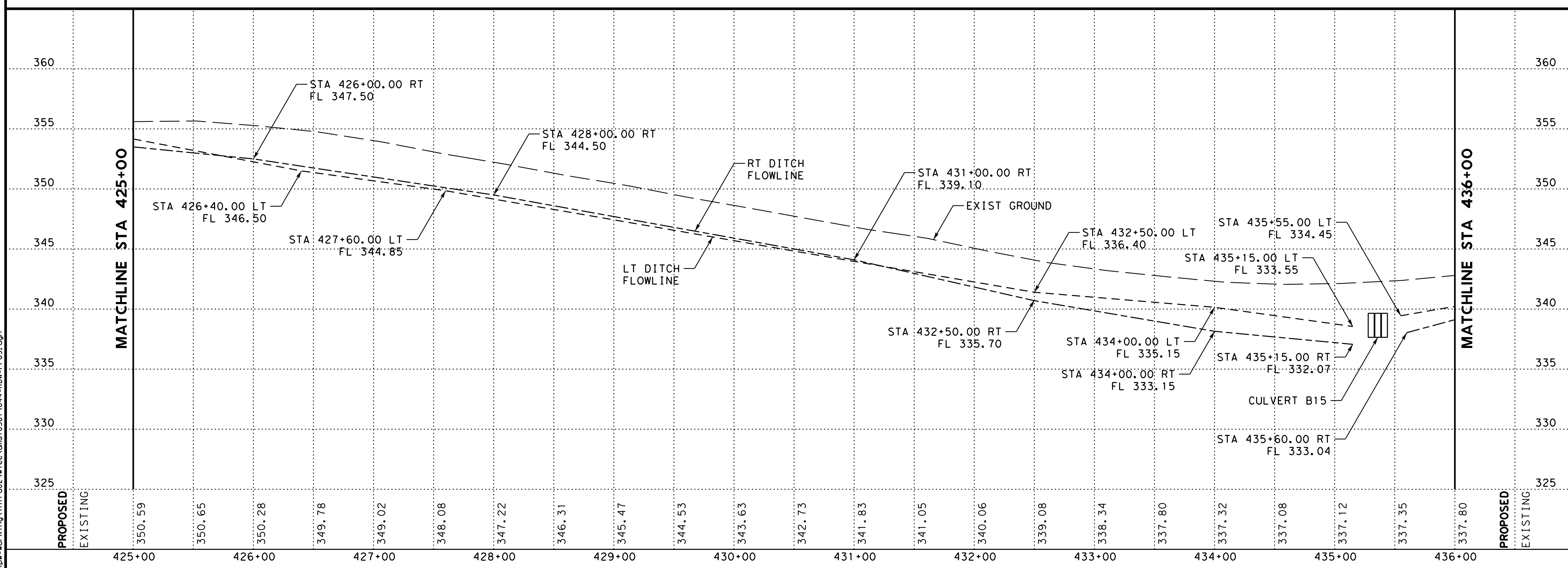
NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

* EXTEND MOW STRIP TO CULVERT WINGWALL

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

DATE	BY	REV	REVISION



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FM 81
PLAN AND PROFILE
STA 425+00 TO STA 436+00

SCALE: 1"=100'H/10' V — SHEET 9 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	79
CONTROL	SECTION	JOB	
0691	01	044	

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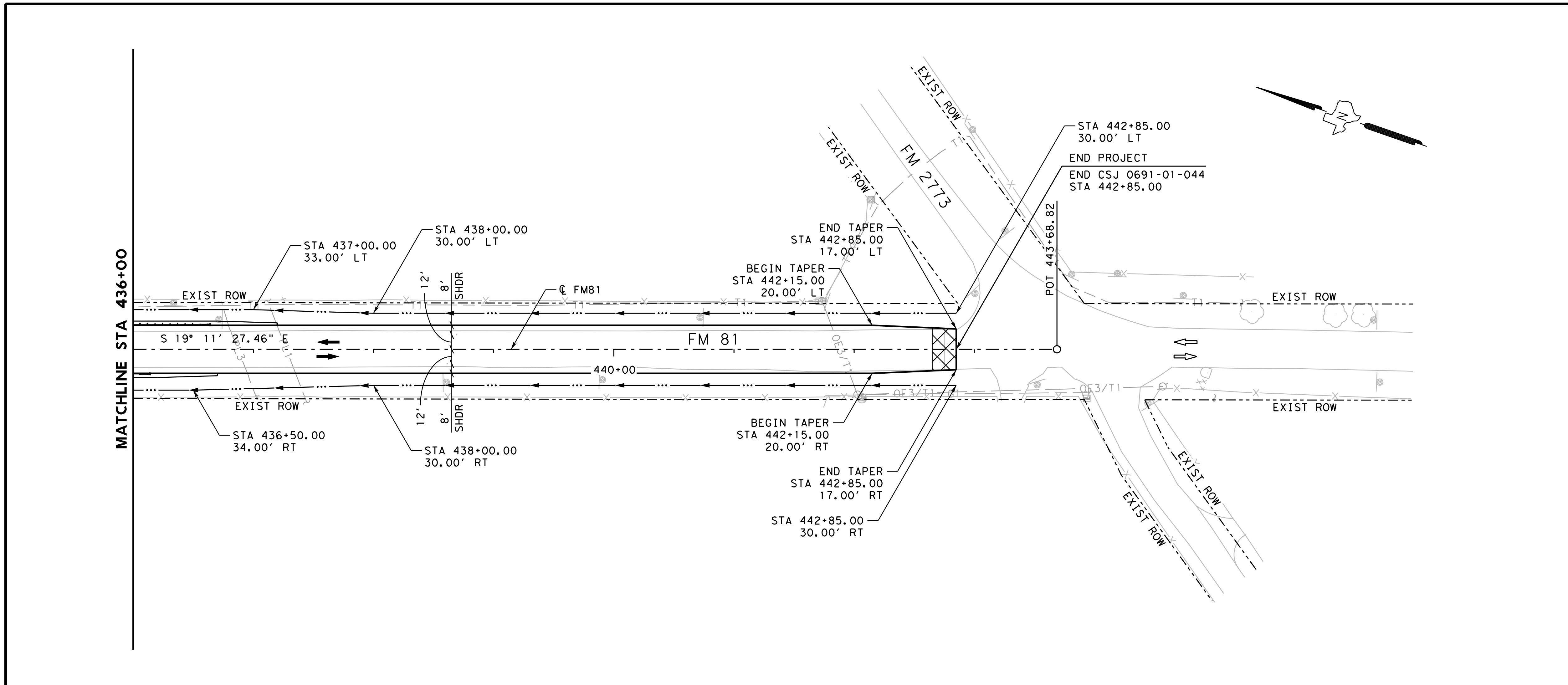


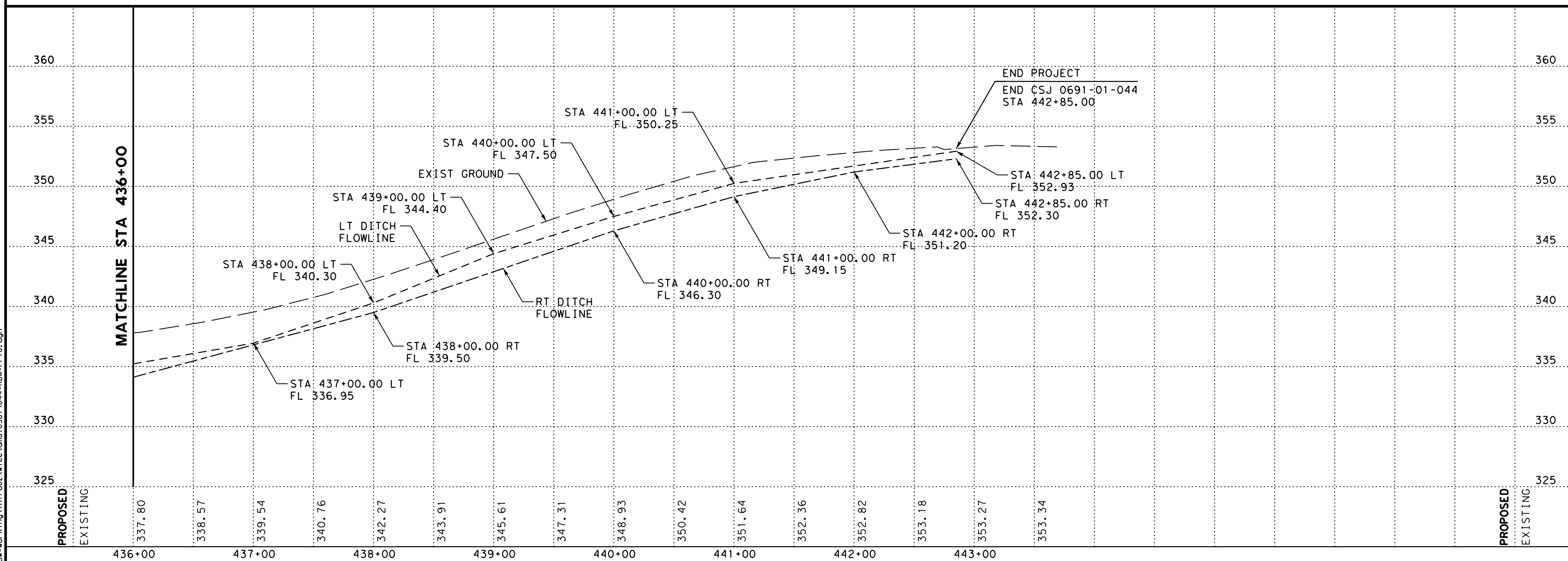
LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING FENCE
- EXISTING ROW
- FEMA FLOOD PLAIN
- (XX) DRIVEWAY NUMBER
- OE1 OVERHEAD POWERLINE
- PROPOSED MAILBOX
- PROPOSED DITCH FLOWLINE
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

1. REFER TO SURVEY CONTROL SHEETS FOR PROJECT CONTROL DATA, CONTROL POINT, AND BENCH MARK DATA.
2. REFER TO TYPICAL SECTIONS, DRIVEWAY DATA AND DETAILS, INTERSECTION LAYOUT, RIPRAP LAYOUT, AND MISCELLANEOUS ROADWAY DETAILS FOR ADDITIONAL INFORMATION.

DATE	BY	REV	REVISION



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FM 81
PLAN AND PROFILE

STA 436+00 TO END PROJECT

SCALE: 1"=100'H/10' V — SHEET 10 OF 10

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	80
CONTROL	SECTION	JOB	
0691	01	044	

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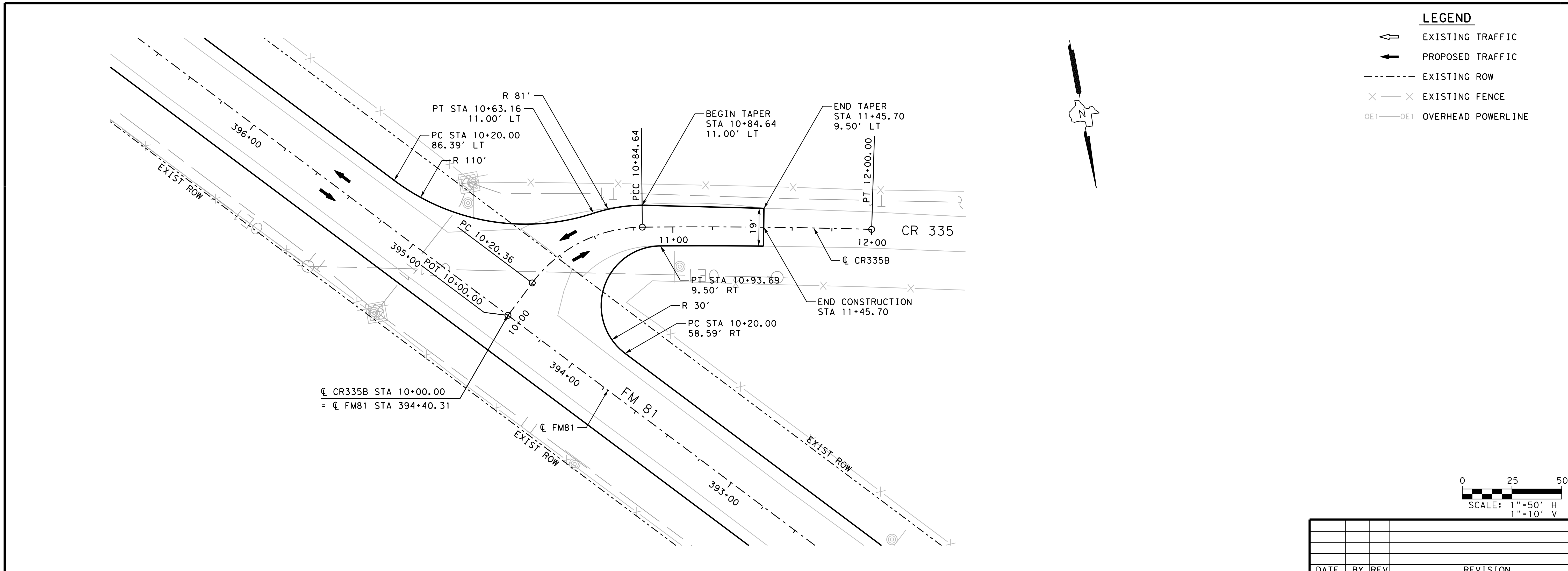

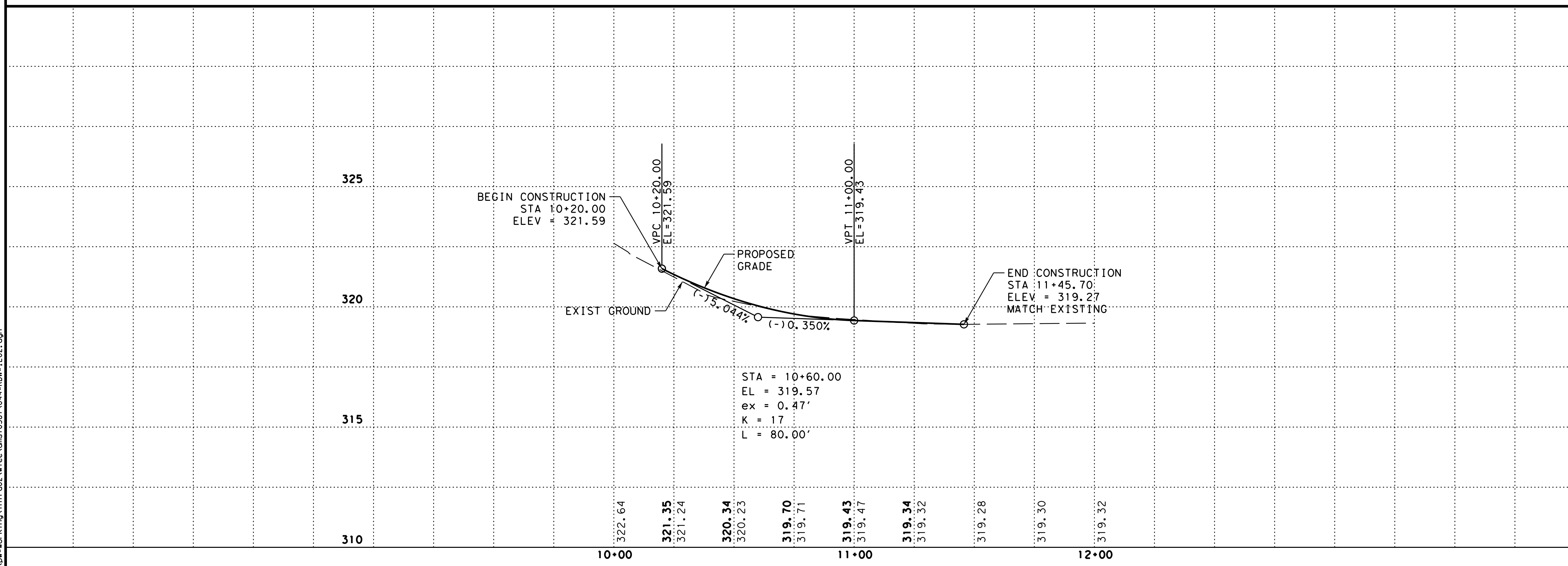

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FM 81

CROSS STREET PLAN AND PROFILE

CR 335

SCALE: 1"=50' H/10' V SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	81
CONTROL	SECTION	JOB	
0691	01	044	

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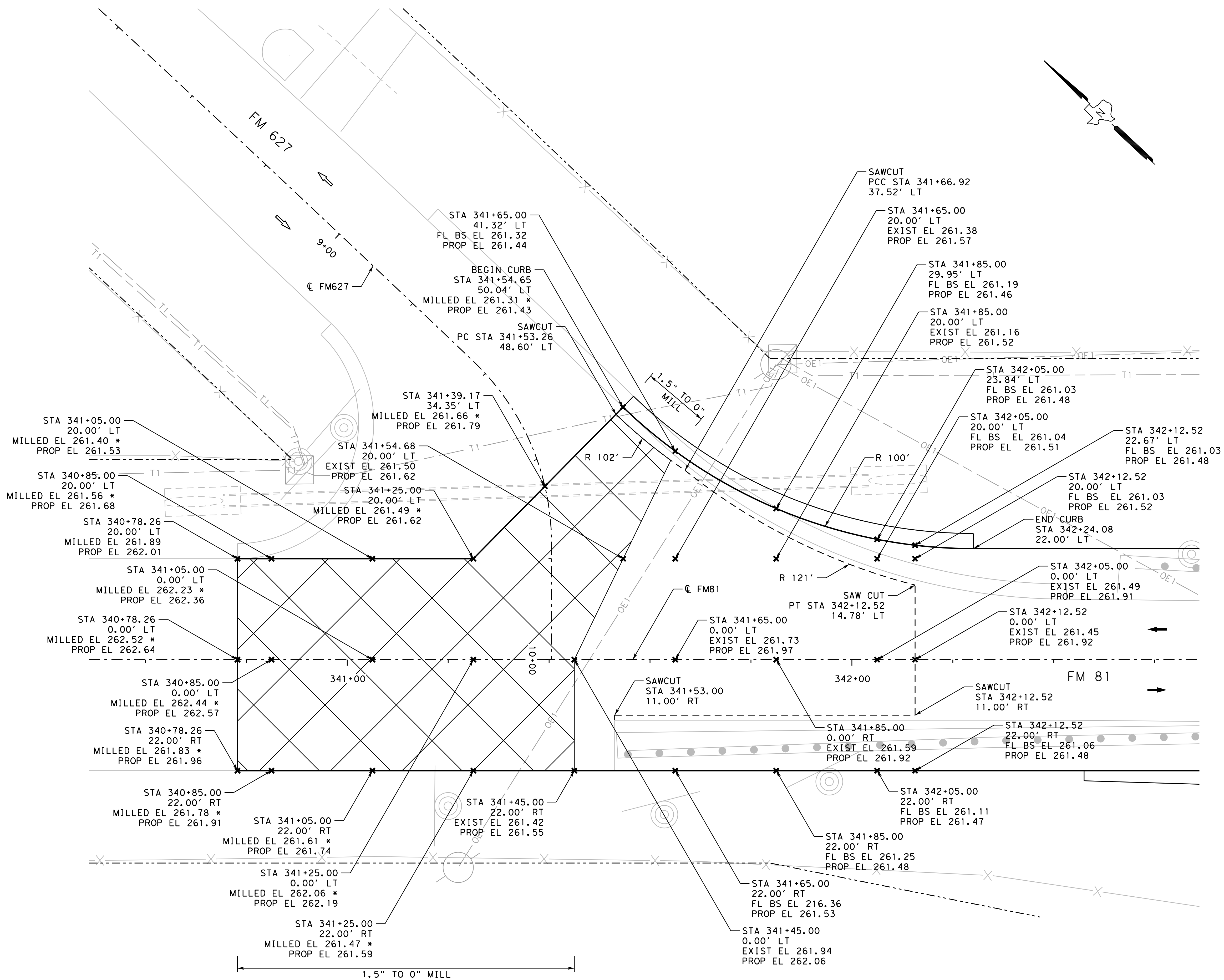

LEGEND

- EXISTING TRAFFIC
- PROPOSED TRAFFIC
- EXISTING ROW
- EXISTING FENCE
- OE1 OVERHEAD POWERLINE
- SPOT ELEVATION
- TRANSITION MILLING FROM 0" TO 1.5"

NOTES:

* ELEVATION AFTER VARIABLE DEPTH MILL

PROP EL = TOP OF D-GR HMA, TY-D (LEVEL-UP)

FL BS EL = TOP OF CEM TRT FL BASE WIDENING

DATE	BY	REV	REVISION

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INTERSECTION LAYOUT

FM 627

SCALE: 1"=20'   SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	82
CONTROL	SECTION	JOB	
0691	01	044	

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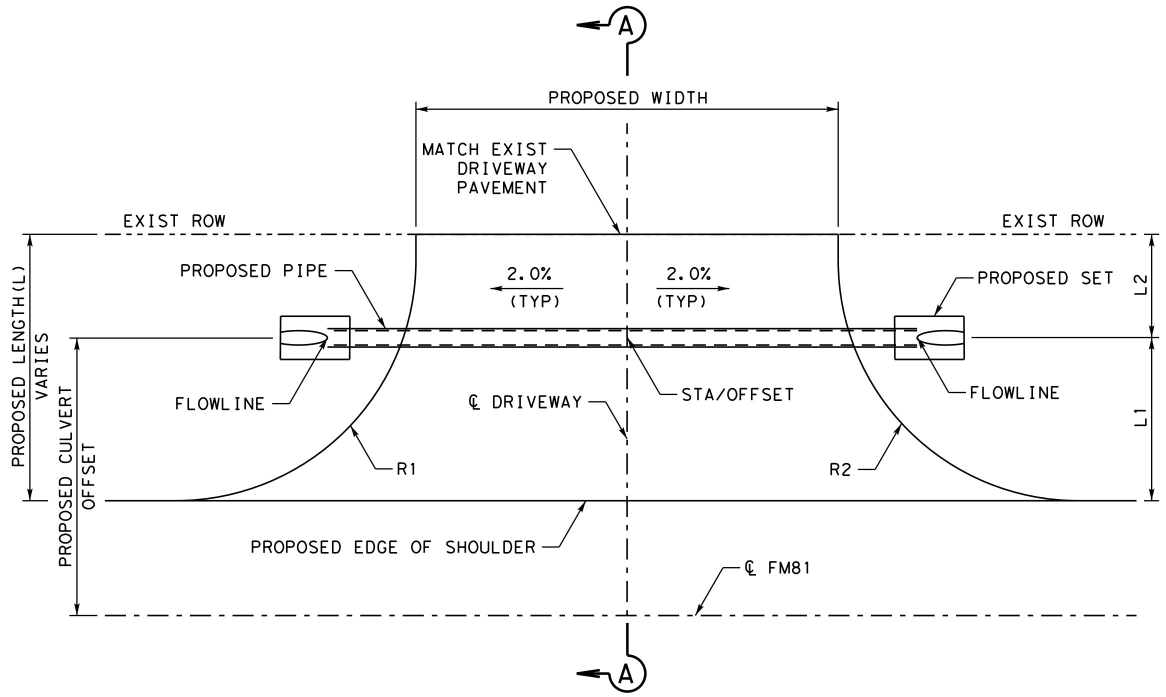
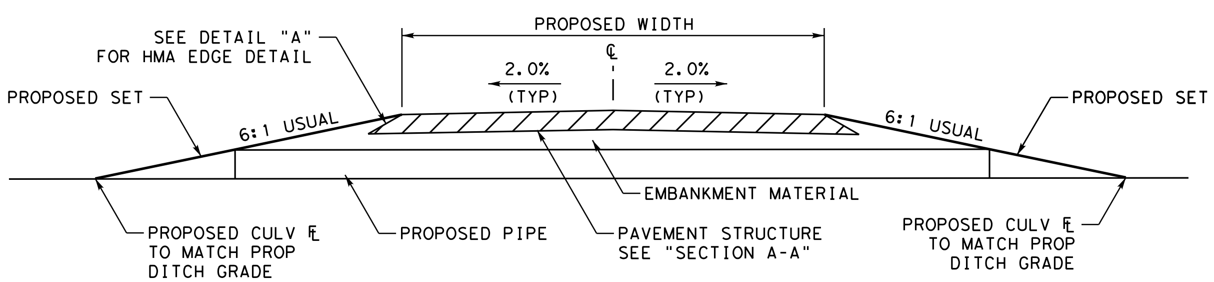
DRIVEWAY DATA

PLAN AND PROFILE SHEET #	DRWY #	APPRX STA	LT/RT	DRIVEWAY										PIPE BENEATH DRIVEWAY					FOR INFORMATION ONLY							
						VERTICAL				RADIUS		SURFACE TYPE		RCP		SET	FLOW LINE			PRIME COAT		OCST		2nd COURSE		
				WIDTH "W" (FT)	LENGTH "L" (FT)	L1	L2	G1	G2	R1	R2	SURF TREAT (SY)	ACP (SY)	BARREL	18" (LF)	18" (6:1)	US INVERT (FT)	DS INVERT (FT)	FL BS (CMP IN PLC) (TYA GR1-2) (CY)	ASPH (RC-250) 0.2 GAL/SY (GAL)	AGGR (TY-B GR-5 SAC-B) 1 CY/135 SY (CY)	ASPH (AC-15P, HFRS-2P OR CRS-2P) 0.40 GAL/SY (GAL)	AGGR (TY-PB GR-3 OR TY-PB GR-3S) (SAC-B) 1 CY/85 SY (CY)	ASPH (AC-15P, HFRS-2P OR CRS-2P) 0.35 GAL/SY (GAL)	AGGR (TY-PB GR-4S OR TY-PB GR-4) (SAC-B) 1 CY/110 SY (CY)	D-GR HMA TY-D SAC-B PG70-22 (TON)
3/10	1	363+79	LT	32	18.6	18.6		0.45%		35	35		103						17	20.5	0.8	41.1	1.2			11
	2	363+84	RT	39	21.4	21.4		-2.61%		30	35		132						22	26.4	1.0	52.7	1.6			15
9/10	3	428+14	LT	14	20.2	10	10.2	-2.07%	-3.50%	15	15	42		1	32	2	344.47	343.38	7	8.4	0.3	16.8	0.5	14.7	0.4	

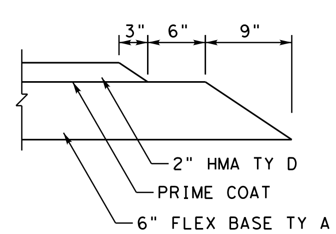


DRIVEWAY



DRIVEWAYS TYPICAL SECTION

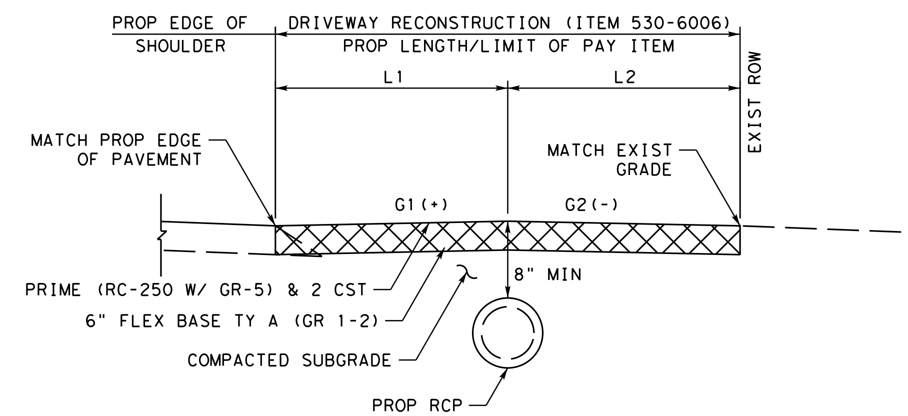
(SURFACE TREAT, ACP)



DETAIL "A"

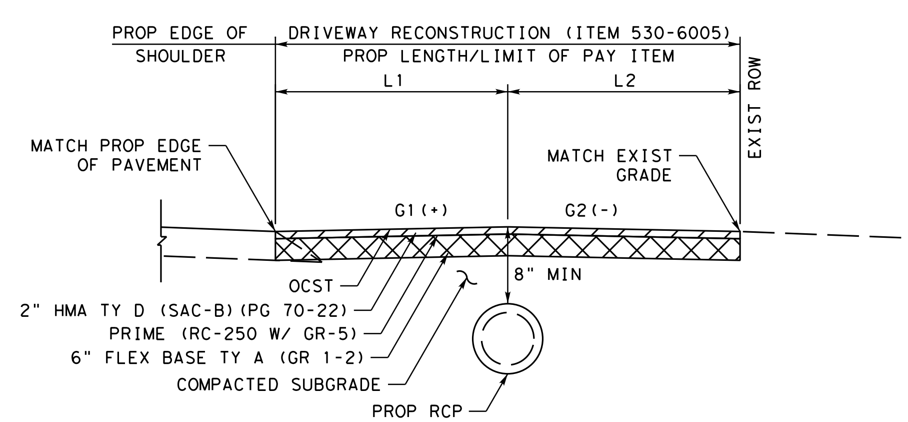
TWO COURSE SURFACE TREATMENT:
TOP COURSE:
ASPH: AC-15P, HFRS-2P OR CRS-2P
AGGR: TY-PB GR 4S OR 4 (SAC B)

BOTTOM COURSE:
ASPH: AC-15P, HFRS-2P OR CRS-2P
AGGR: TY-PB GR 3S OR 3 (SAC B)



SECTION A-A

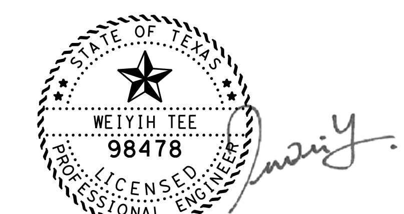
DRIVEWAY (SURFACE TREAT)



SECTION A-A

DRIVEWAY (ACP)

DATE	BY	REV	REVISION



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FM 81

DRIVEWAY DATA AND DETAILS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	83
CONTROL	SECTION	JOB	
0691	01	044	

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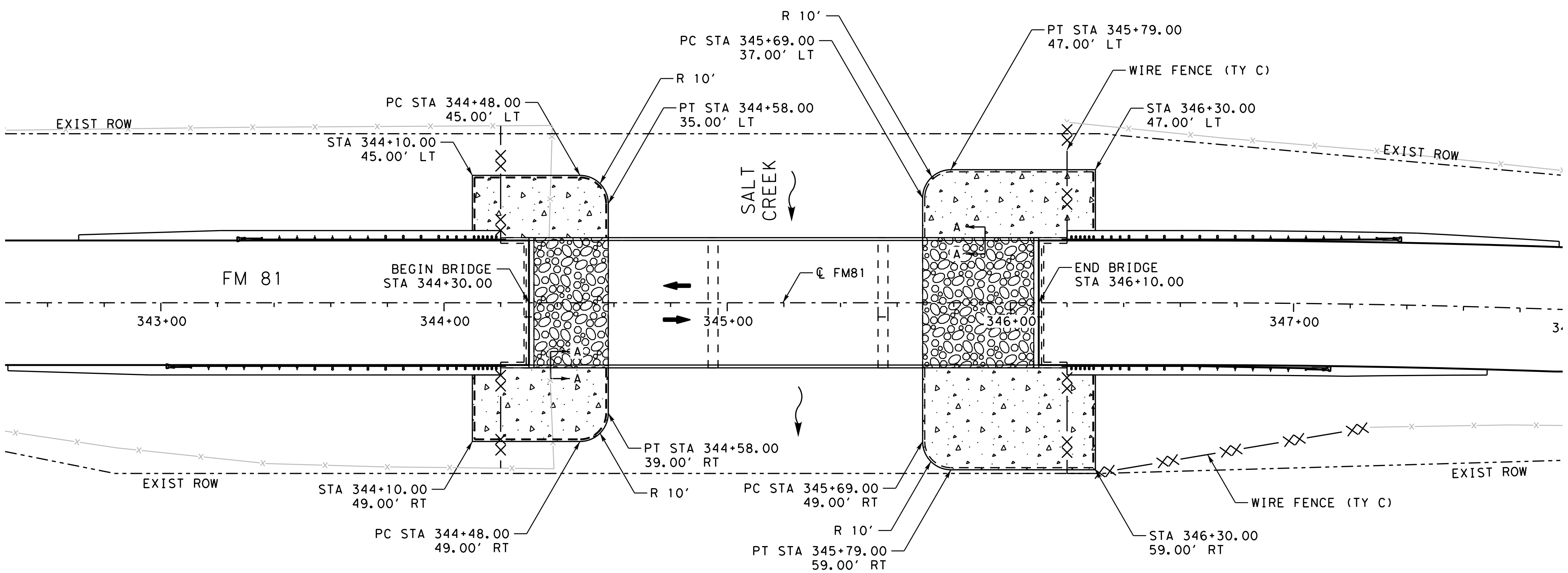
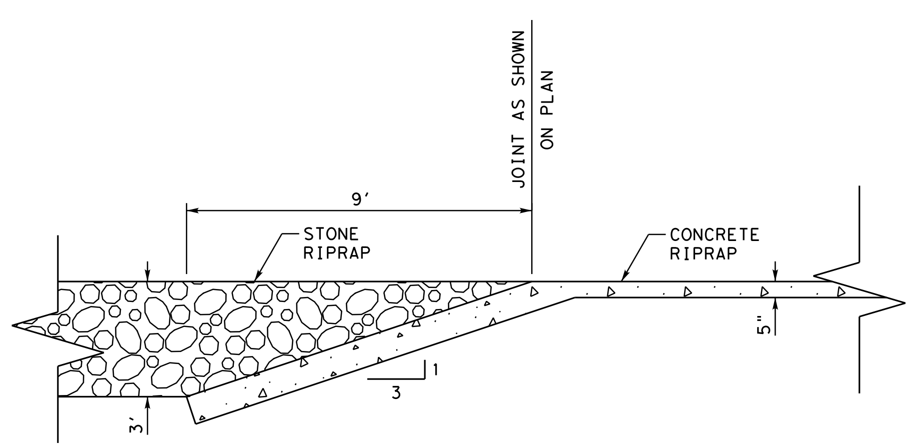
LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- EXISTING ROW
- EXISTING WIRE FENCE
- PROPOSED WIRE FENCE
- RIPRAP (CONC)(CL B)(RR8&RR9)
- RIPRAP (STONE PROTECTION)(18IN), THICKNESS = 36IN

NOTE:

SEE STANDARDS CRR AND SRR FOR ADDITIONAL DETAILS.





SECTION A-A

0 25 50
SCALE: 1"=50'

DATE	BY	REV	REVISION

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6/17/2022

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RIPRAP LAYOUT

SCALE: 1"=50' SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	84
CONTROL	SECTION	JOB	
0691	01	044	

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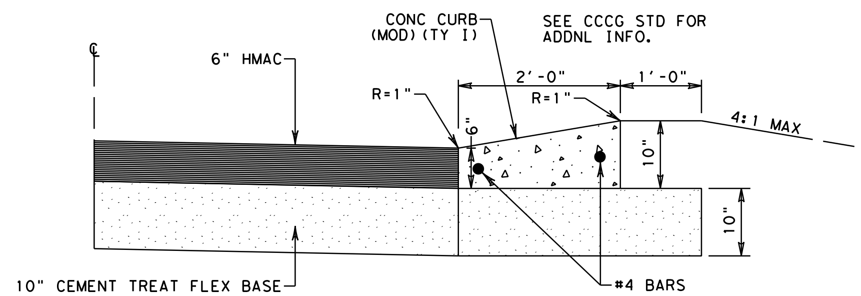
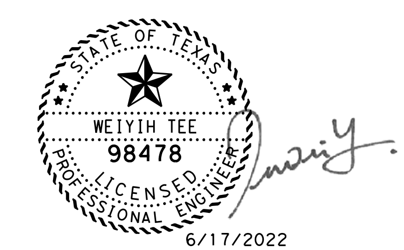


NOTE: FLEX BASE SHALL BE SUBSIDIARY TO THE "CONCRETE CURB (SPECIAL)" BID ITEM

CONC. HEADER CURB (SPECIAL)

DATE	BY	REV	REVISION



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FM 81

MISCELLANEOUS ROADWAY DETAILS

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

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	85
CONTROL	SECTION	JOB	
0691	01	044	

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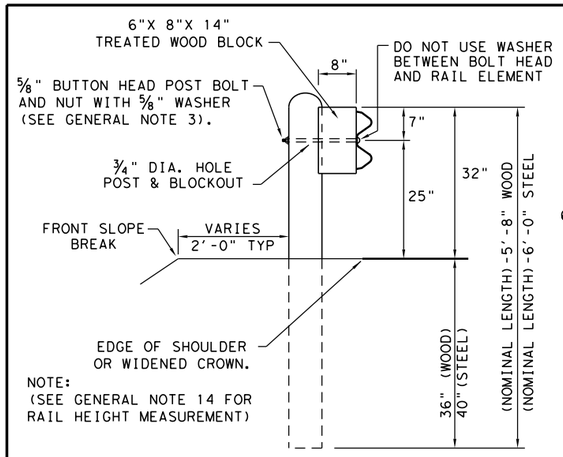
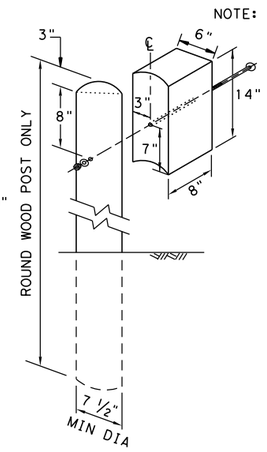
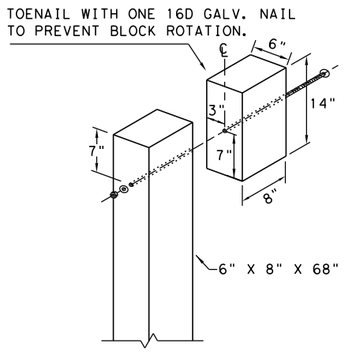


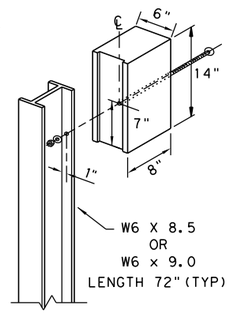
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

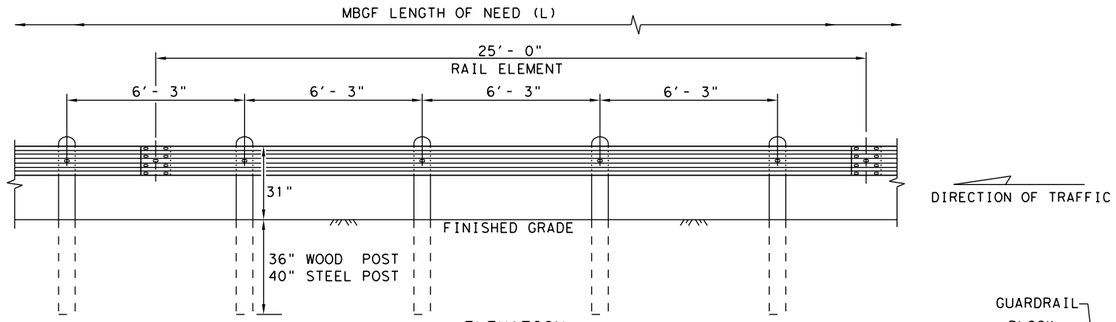


WOOD BLOCK TO
RECTANGULAR WOOD POST



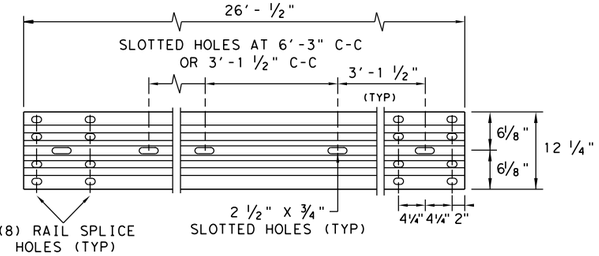
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



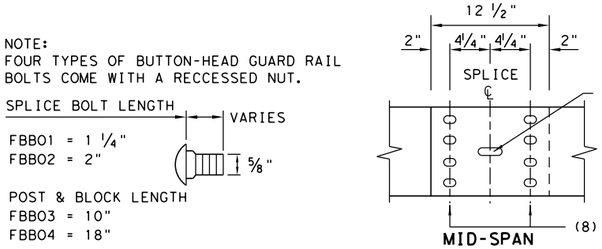
ELEVATION
MID-SPAN RAIL SPLICE

SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



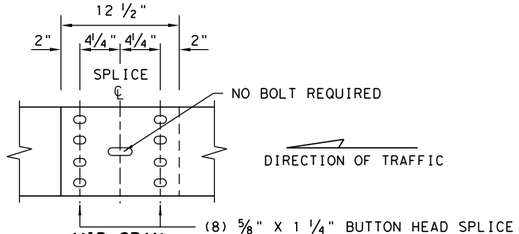
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



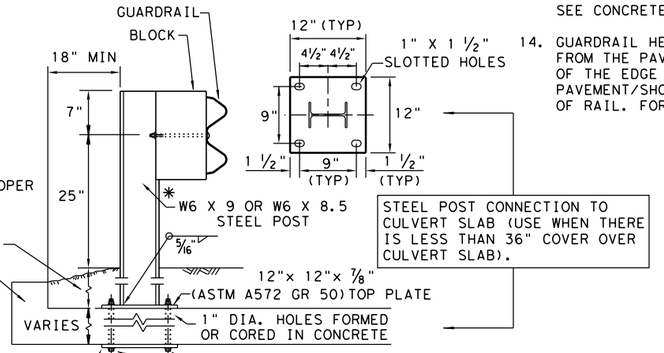
BUTTON HEAD BOLT

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.



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

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

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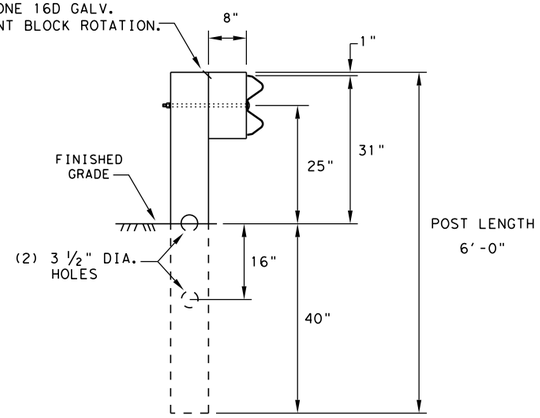
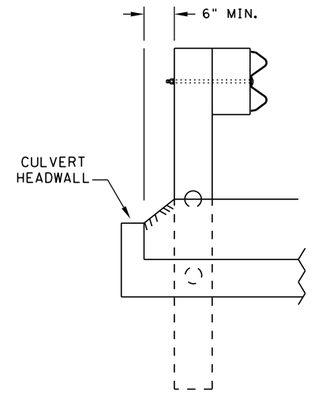


RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



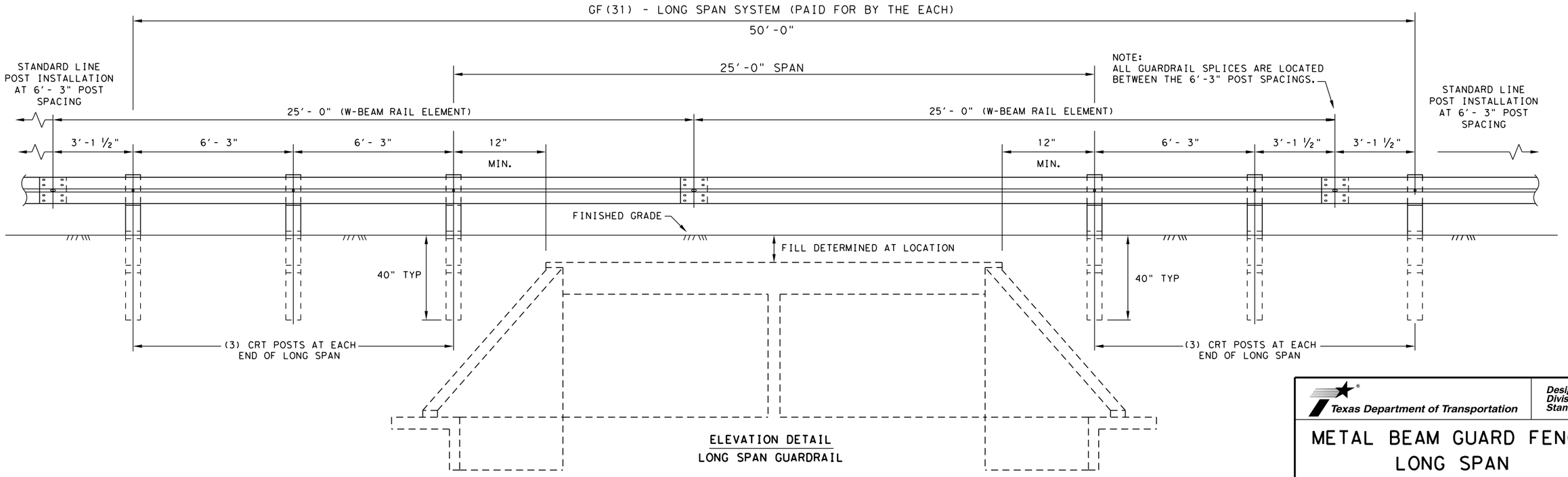
LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

GENERAL NOTES

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

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

DIRECTION OF TRAFFIC



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

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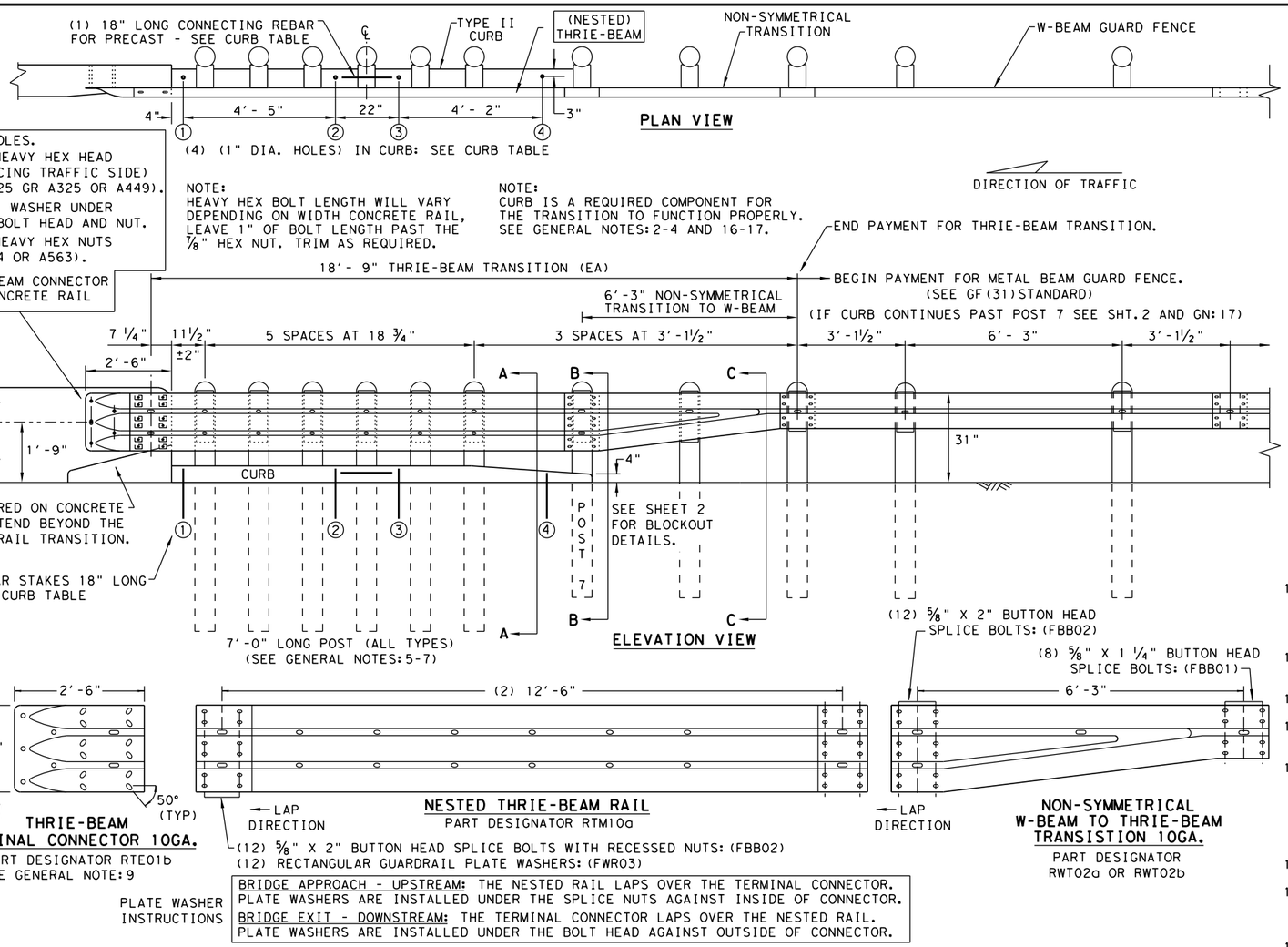
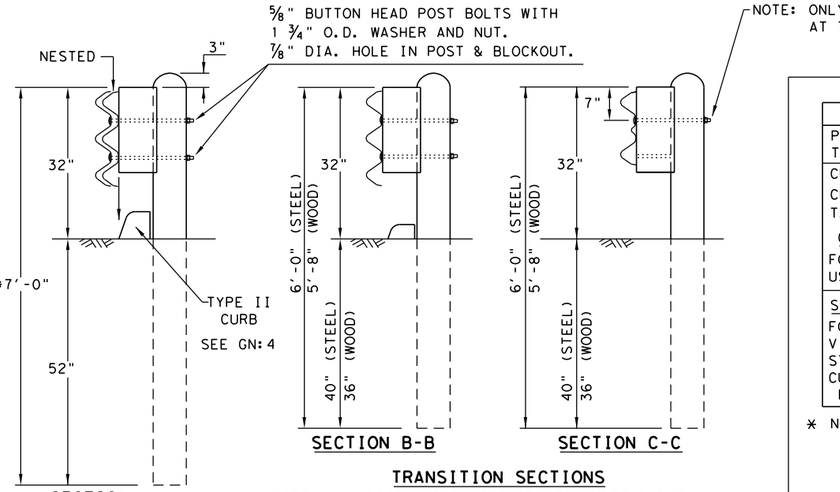
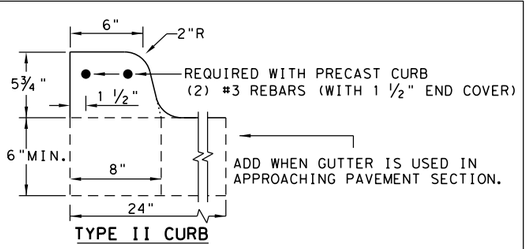




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB 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 ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



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

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- ¾" 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 ½" 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 ⅝" 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 ⅝" 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.

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

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	DIST	COUNTY		SHEET NO.
	CRP	KARNES		88

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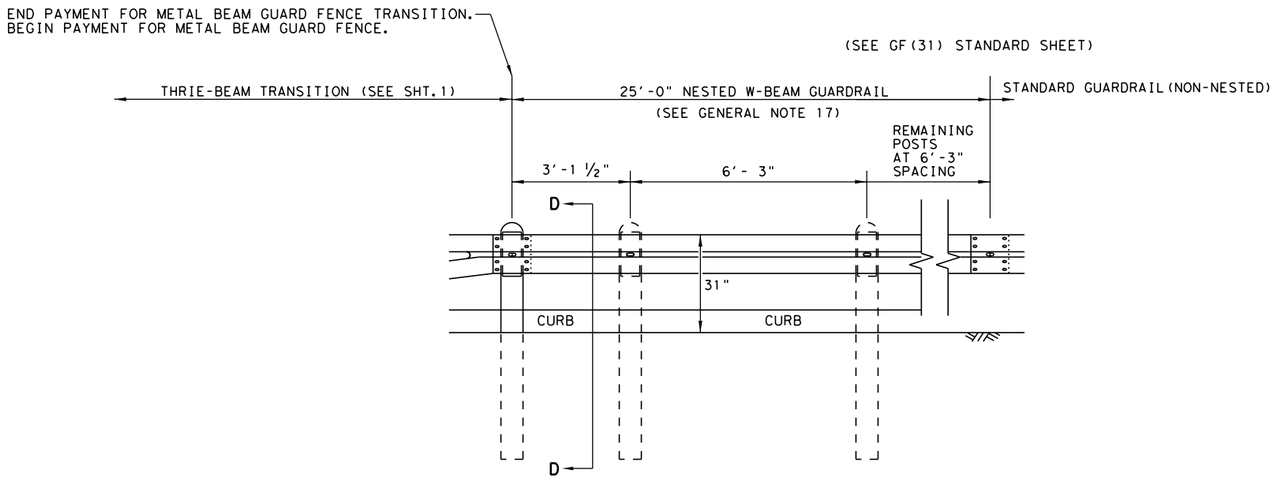
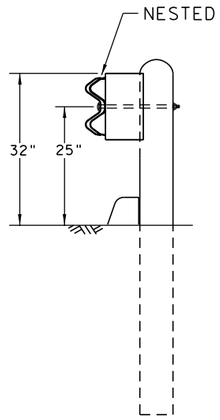
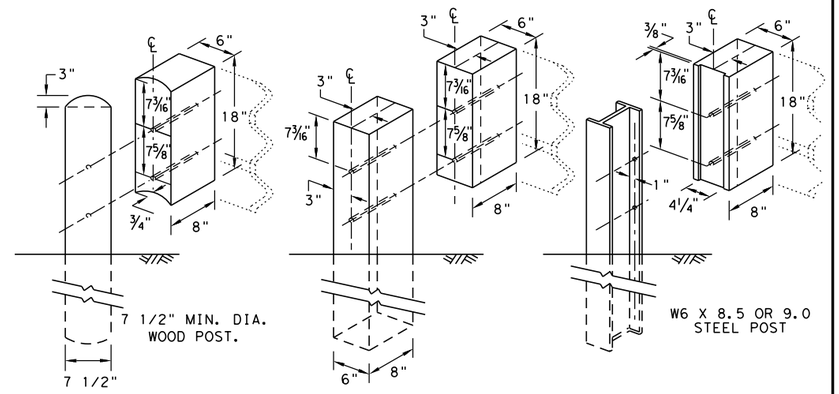
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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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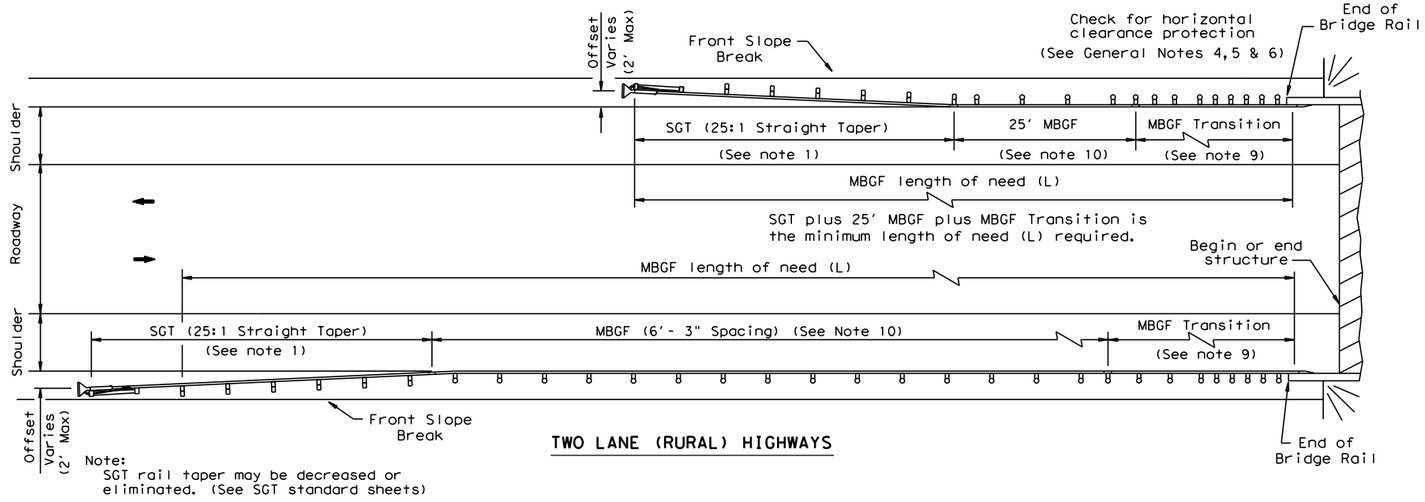
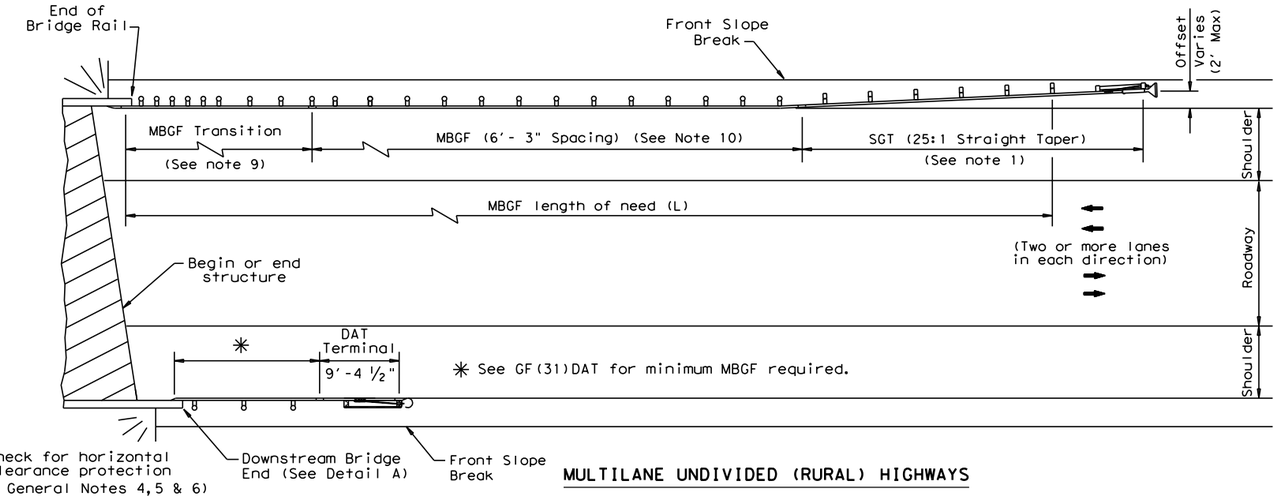
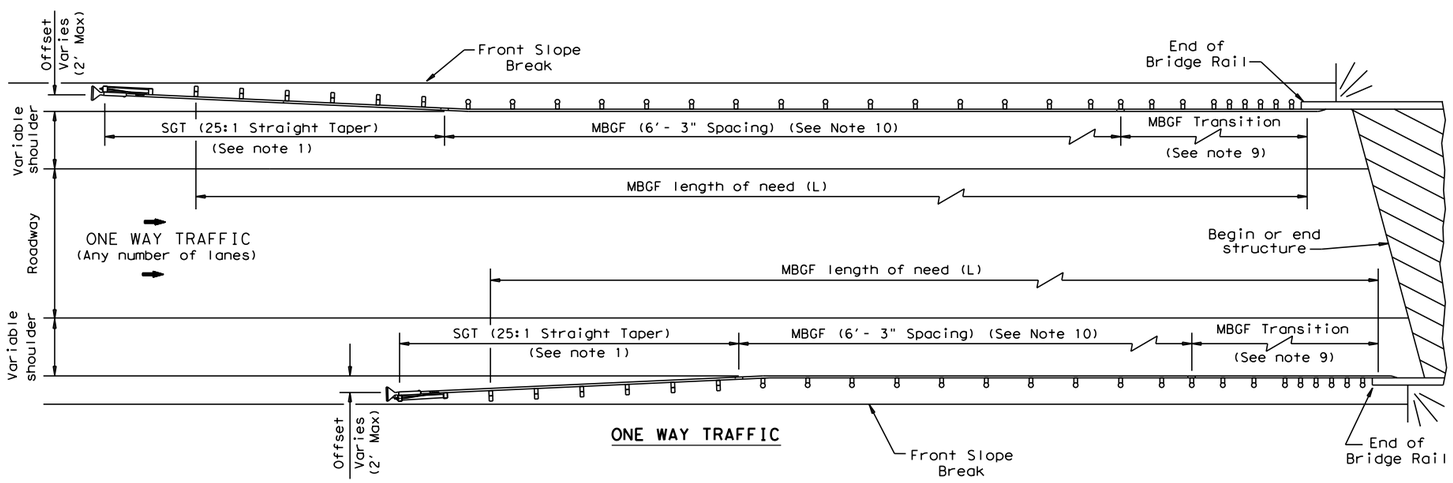


TWO LANE (RURAL) HIGHWAYS

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



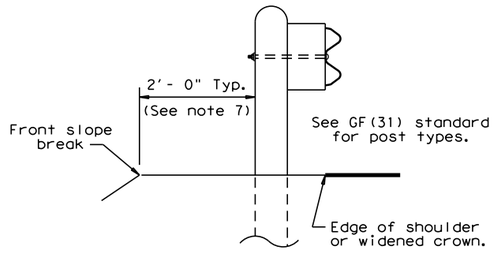
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



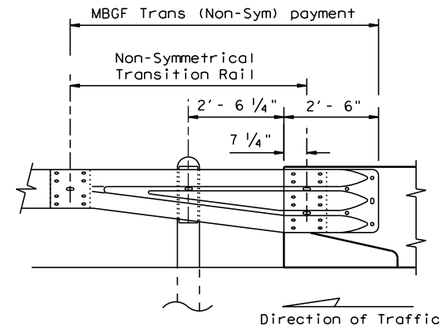
ONE WAY TRAFFIC

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)	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		90

DATE: 6/17/2022
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NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

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

PLAN VIEW

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE:B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE:C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE NOTE:A

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

POST 40" DEPTH (TYP 1-8)

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

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" X 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE:A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

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

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

FINISHED GRADE

POST(2)

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		91

DATE: 6/17/2022
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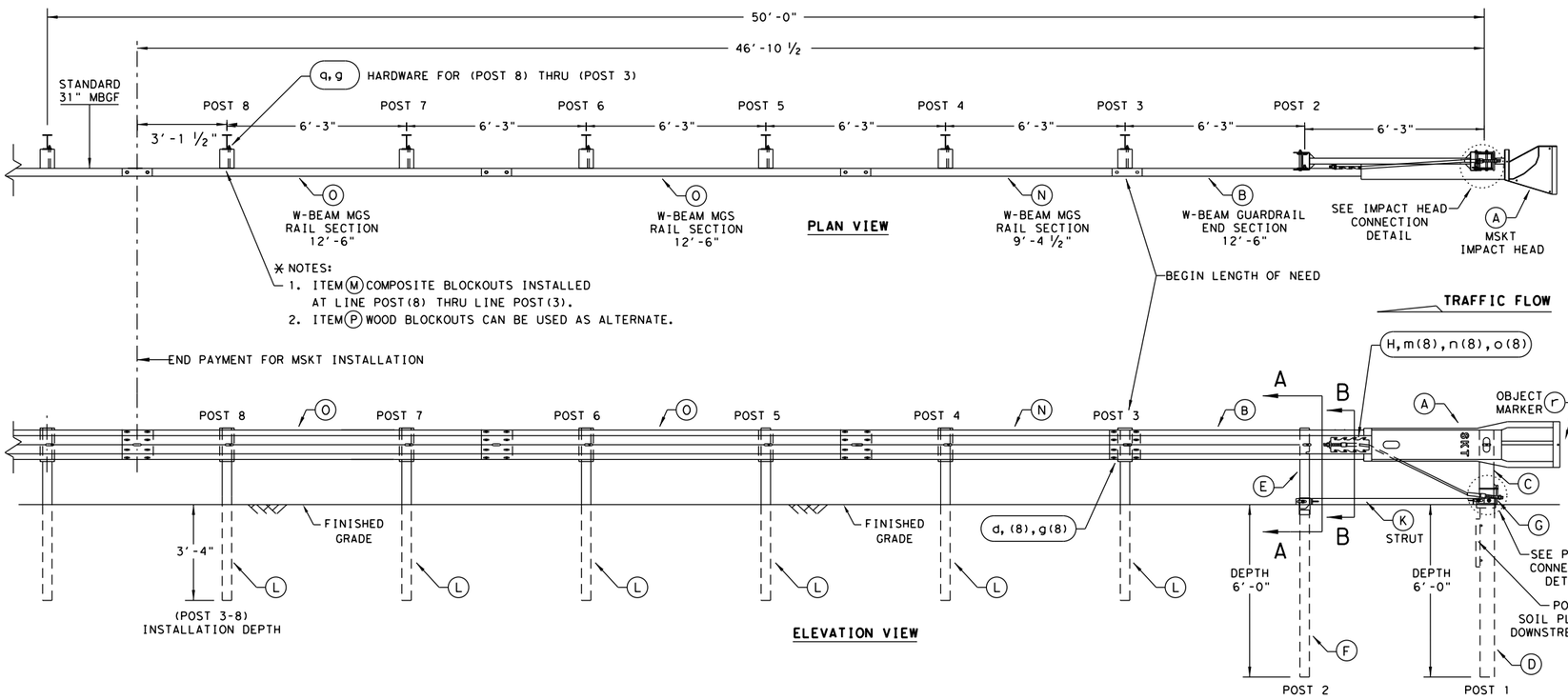


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

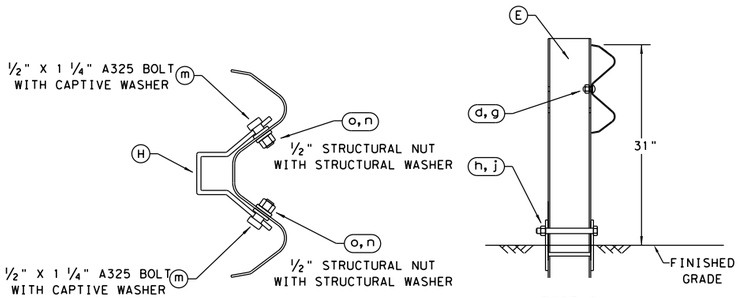
GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 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 ⅛" 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

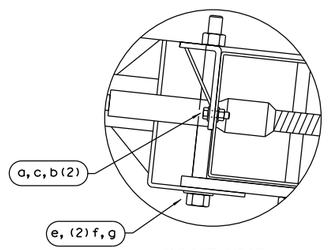
SEE NOTES: ✳

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

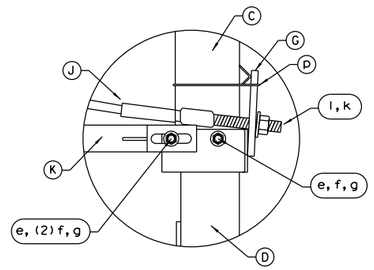


SECTION B-B
ANCHOR BRACKET

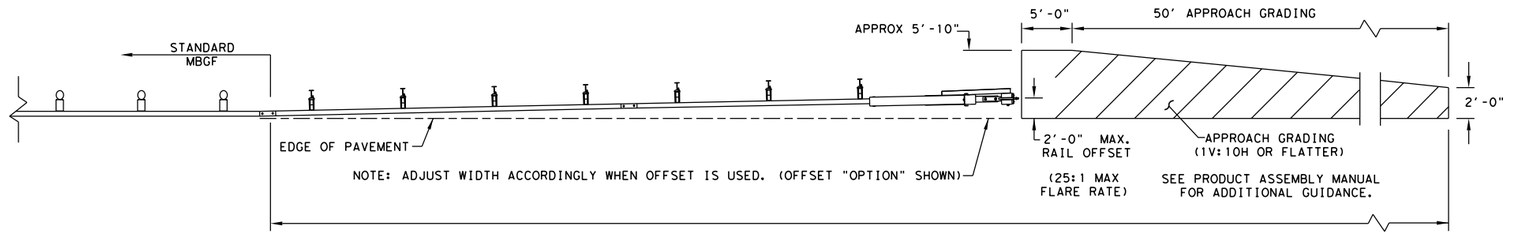
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0691	01	044	FM 81	
	DIST	COUNTY		SHEET NO.	
	CRP	KARNES		92	

DATE: 6/17/2022
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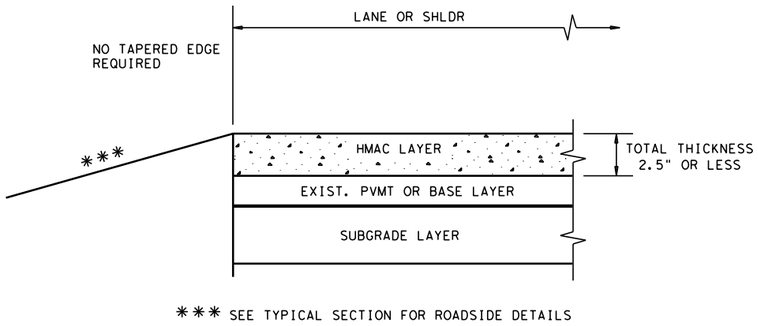
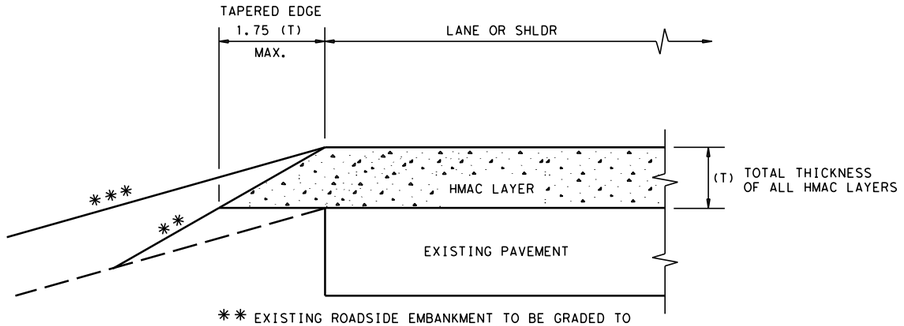


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

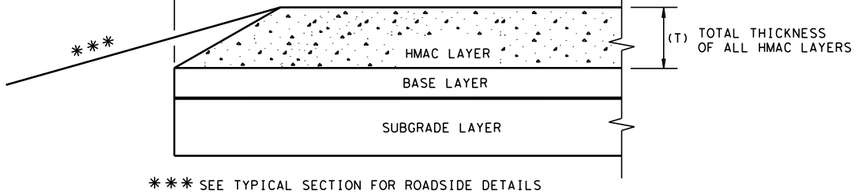
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



** 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.

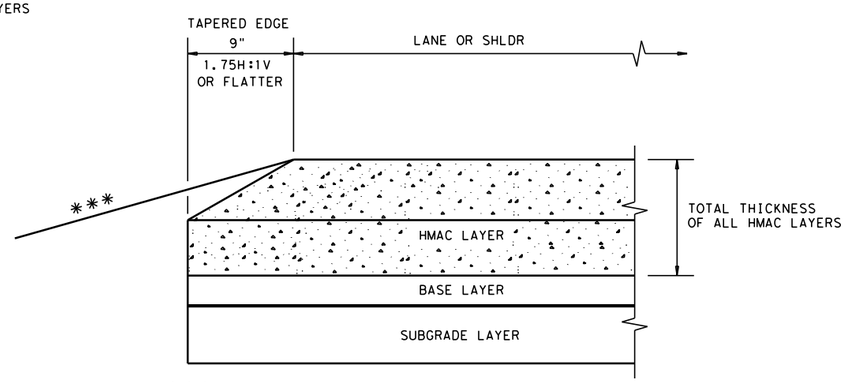
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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:
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REVISIONS	0691	01	044	FM 81
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	CRP	KARNES		93

DATE: 6/17/2022
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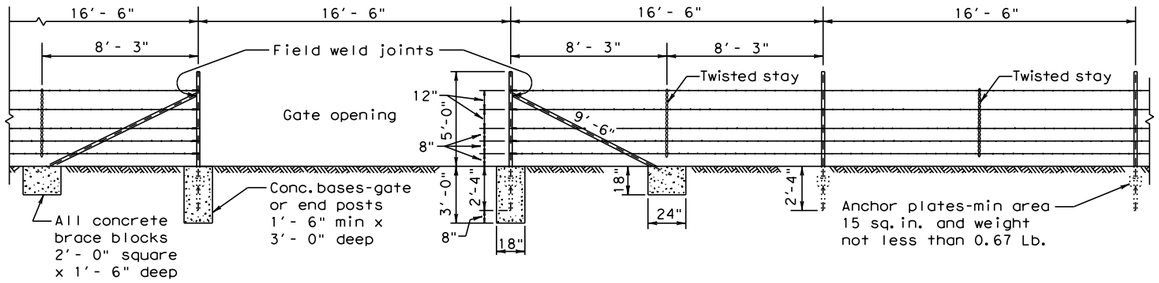
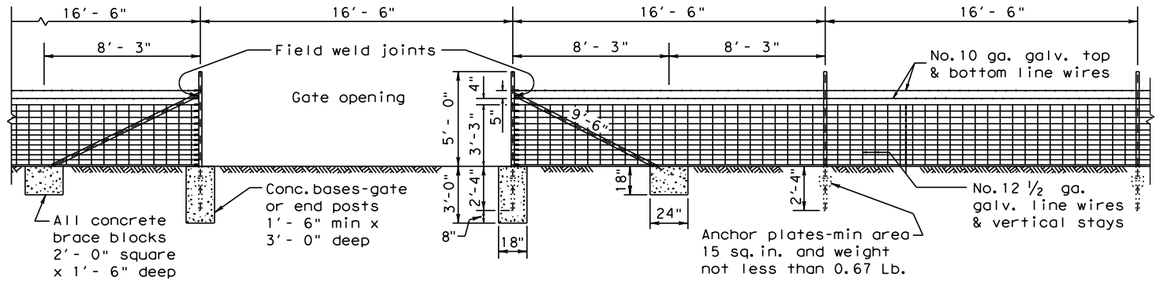
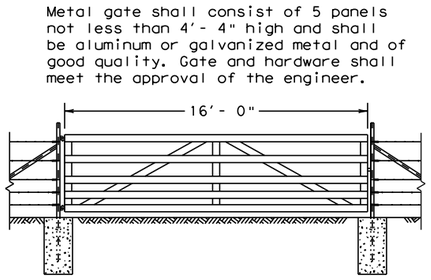


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
(See General Note 8)

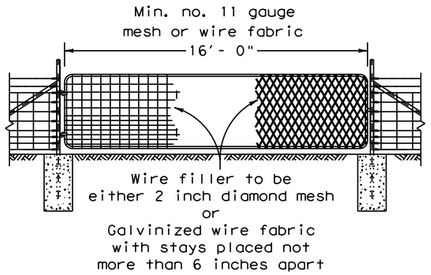
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



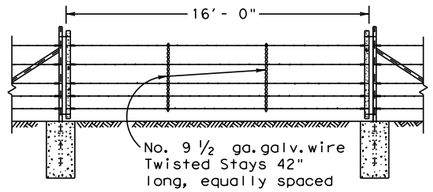
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
(See General Note 8)



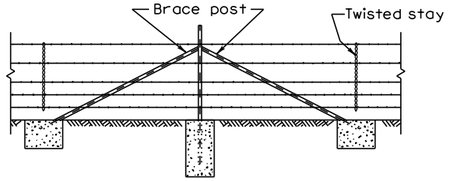
DETAIL TYPE 1 GATE



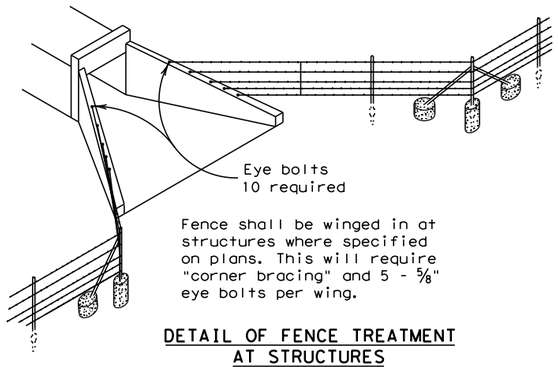
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

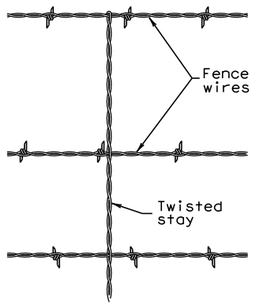


CORNER OR PULL POST ASSEMBLY

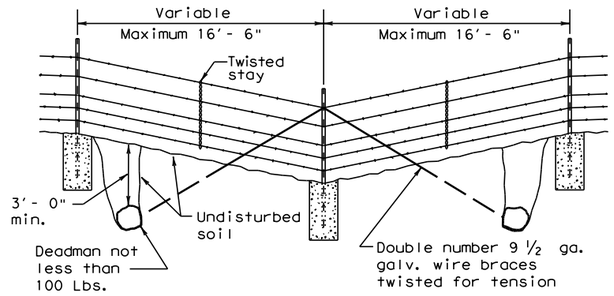


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

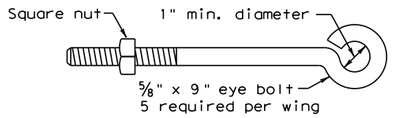
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

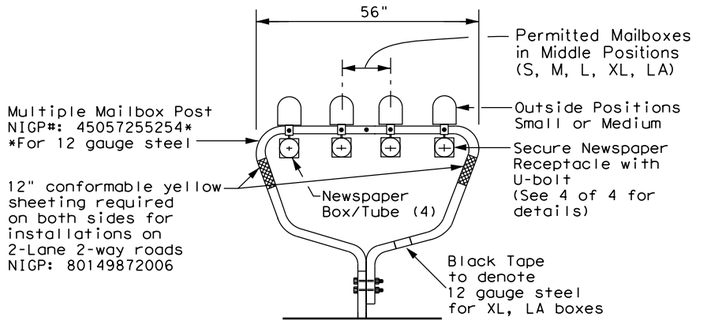
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE
(STEEL POSTS)

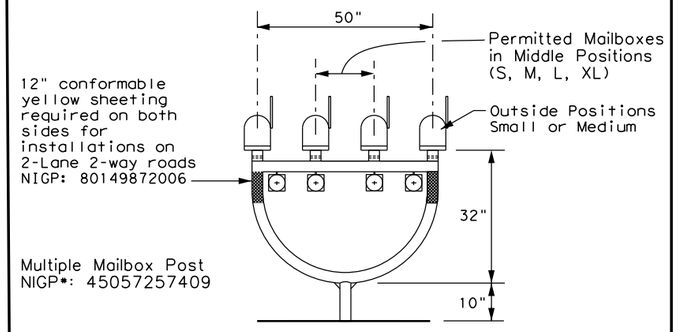
WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		94

TYPE 1 - MULTIPLE



TYPE 4 - MULTIPLE



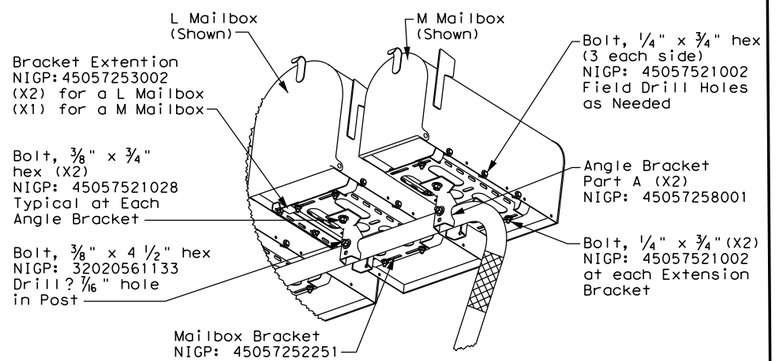
MAILBOX SIZES

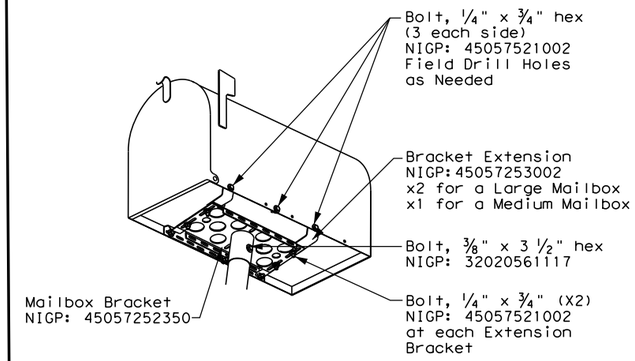
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 ½"	6"	7"	6 LBS
MEDIUM	22 ½" *	8" *	11 ½" *	8 LBS
LARGE	23 ½"	11 ½"	13 ½"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 ½"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

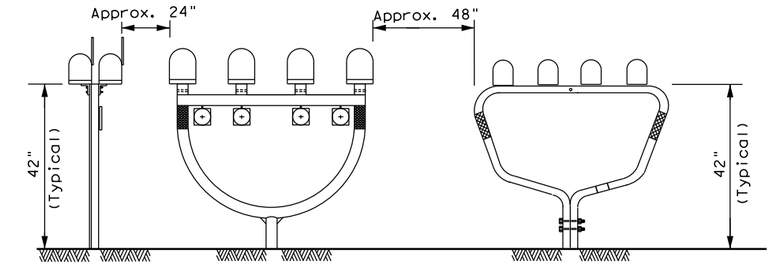
GENERAL NOTES:

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.





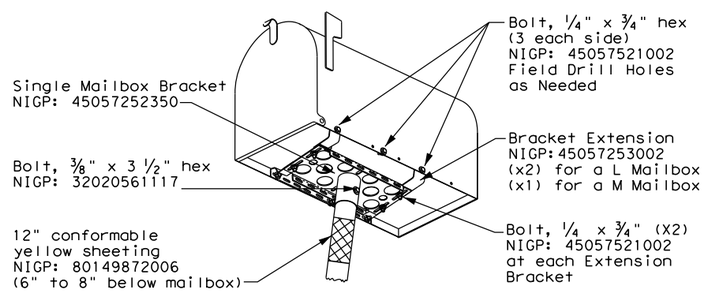
TYPICAL INSTALLATION MEASUREMENTS

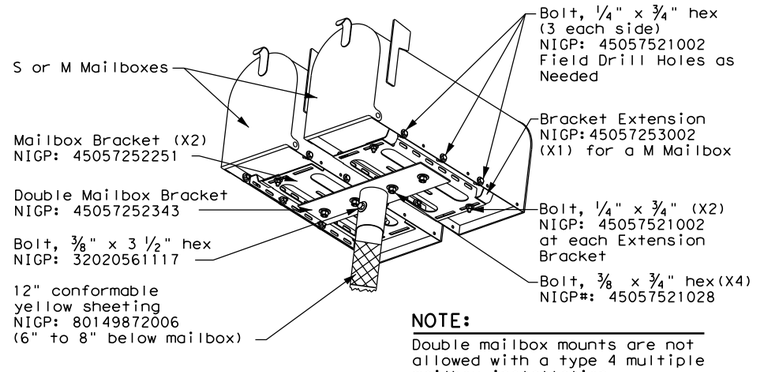


NOTE:

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

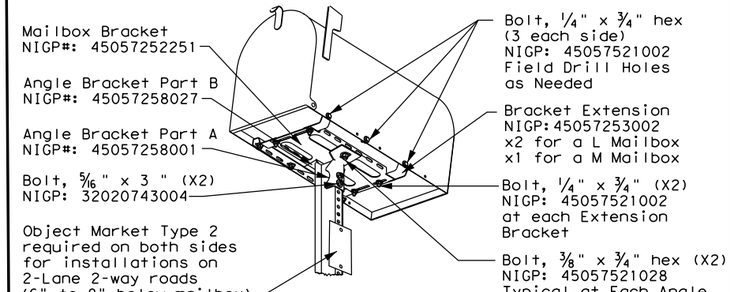


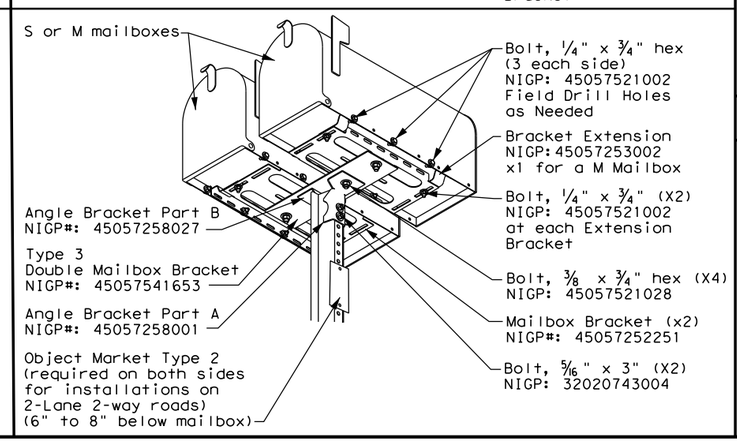


NOTE:

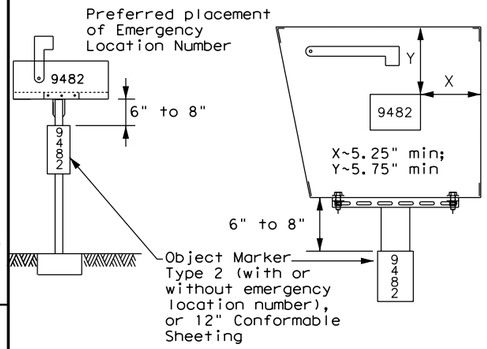
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

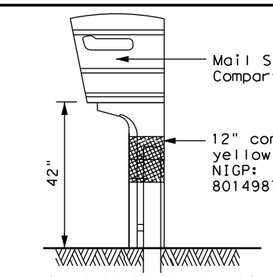


NOTES:

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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	CRP	KARNES		95

DATE: 6/17/2022 1:26:47 PM
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DATE: 6/17/2022 1:26:48 PM
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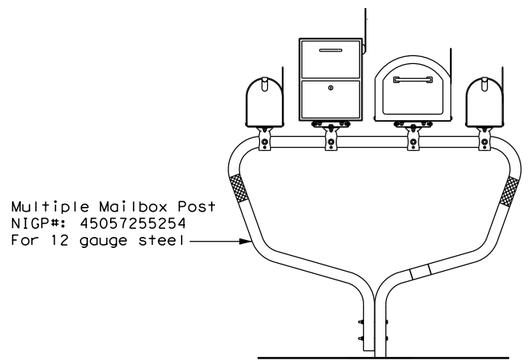
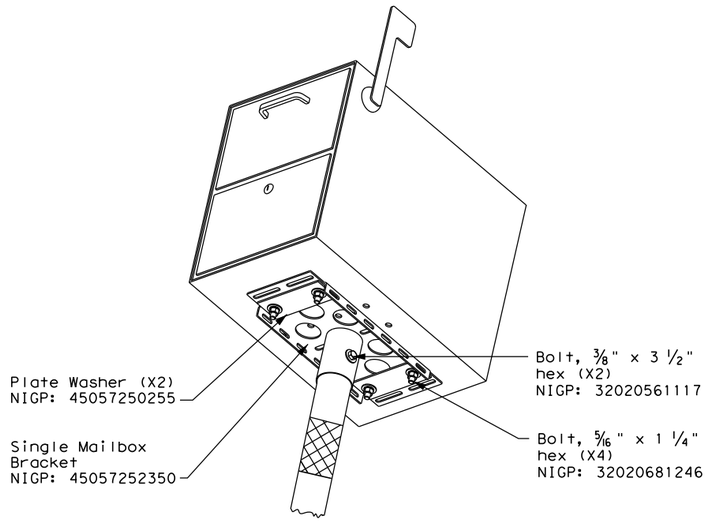
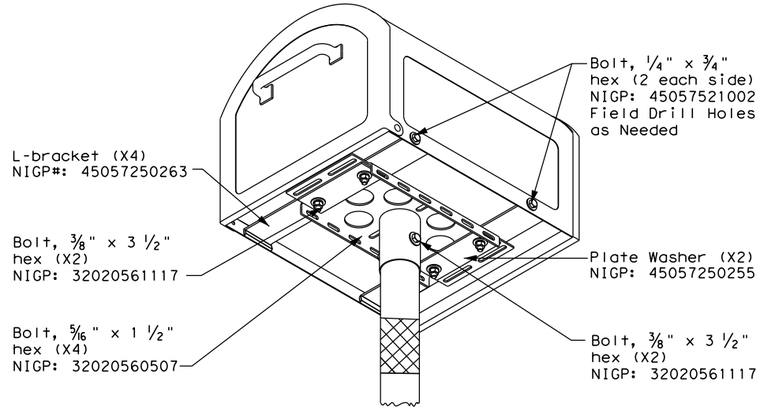
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

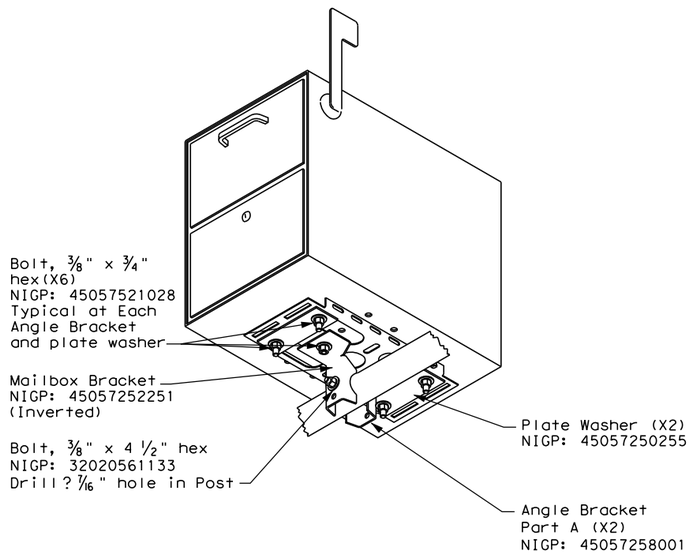


TYPE 2/4 - SINGLE XL MAILBOX

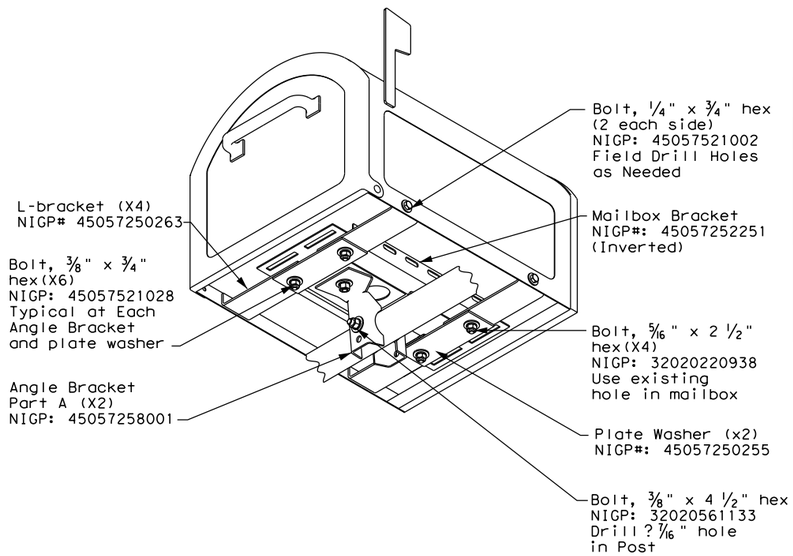


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

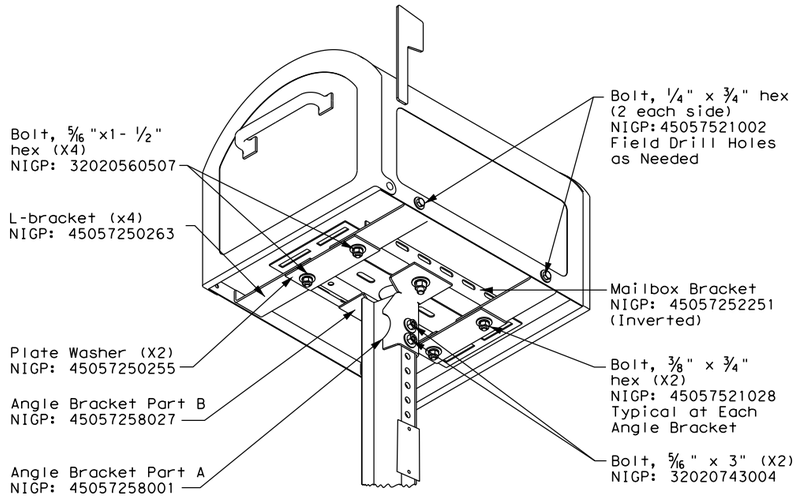
TYPE 1 MULTI - LOCKABLE ARCHITECTURAL (LA)



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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	CRP	KARNES		96

DATE: 6/17/2022 1:26:48 PM
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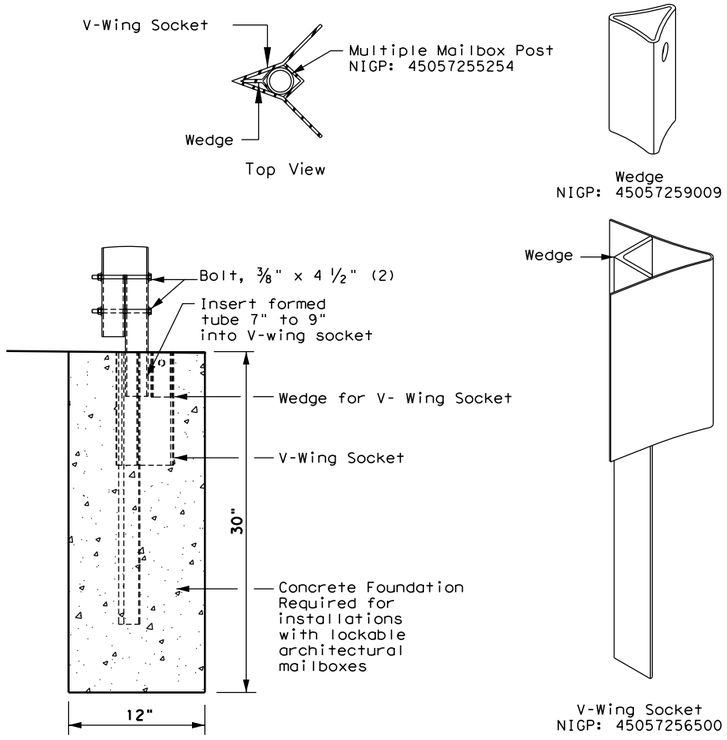
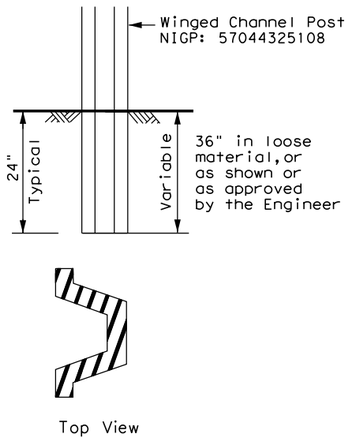
TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

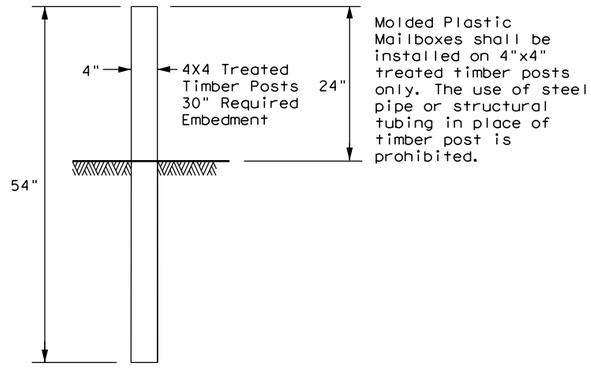


TYPE 3 - SUPPORT/FOUNDATION

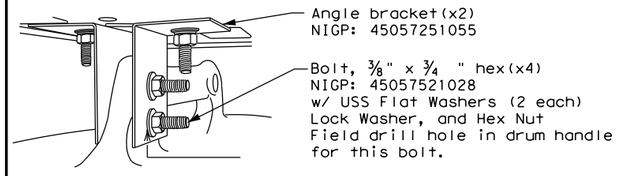


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

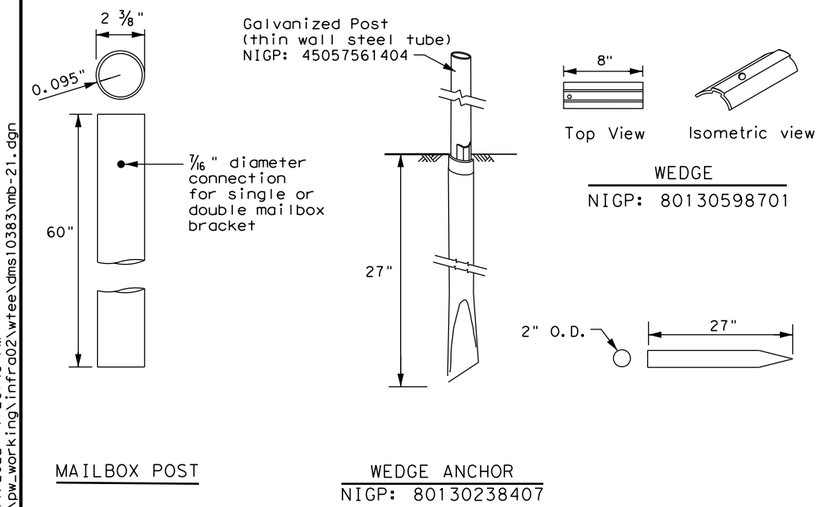


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

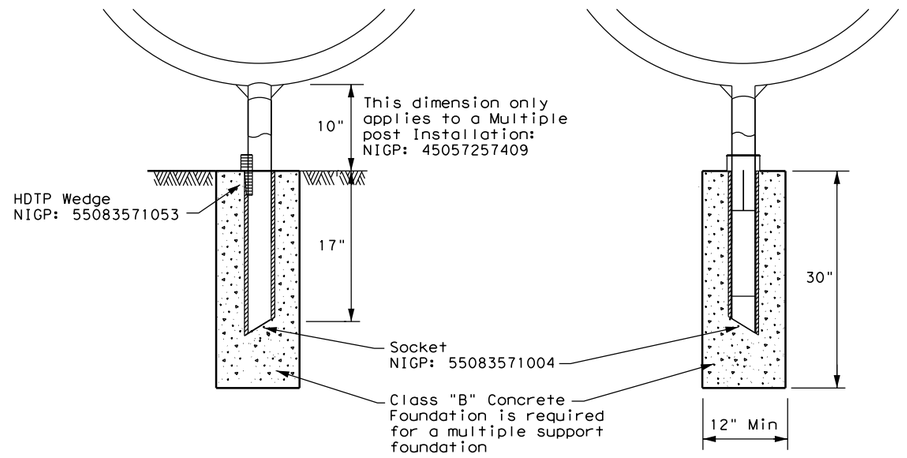
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



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

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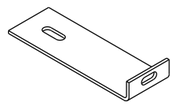
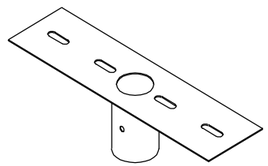
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		97

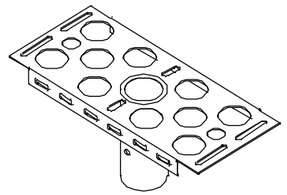
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP •	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



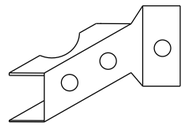
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



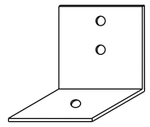
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



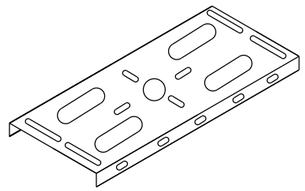
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



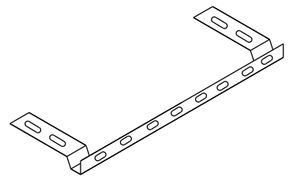
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



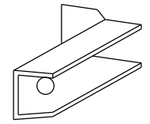
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



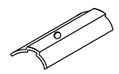
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



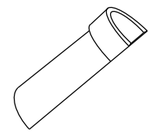
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



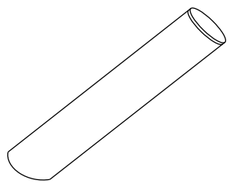
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

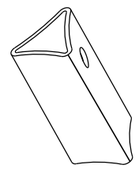


NIGP: 55083571053
Type 4 Mailbox Wedge

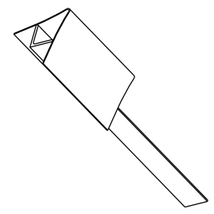


NIGP: 55083571004
Type 4 Mailbox Socket

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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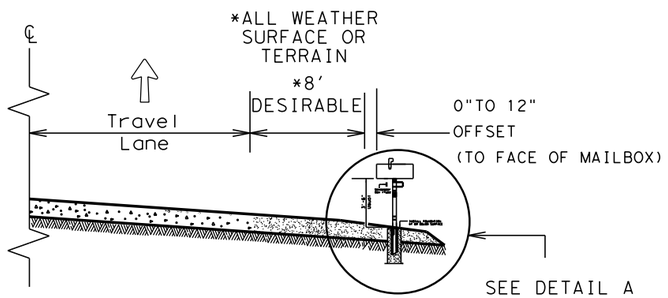
Texas Department of Transportation — Maintenance Division Standard

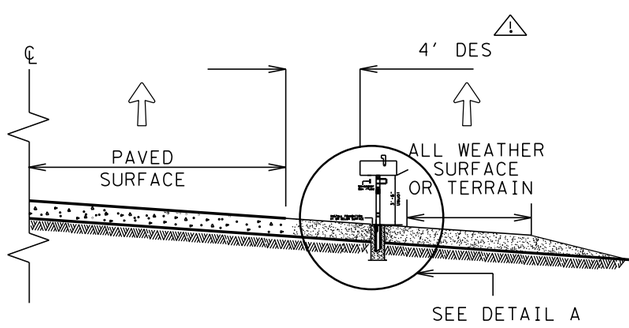
NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

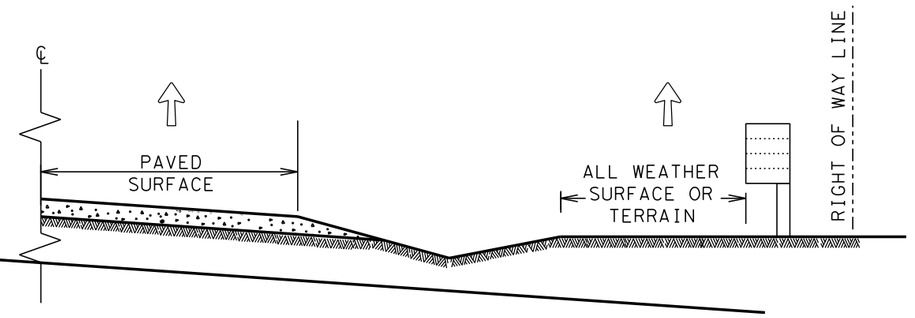
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	DIST	COUNTY		SHEET NO.
	CRP	KARNES		98



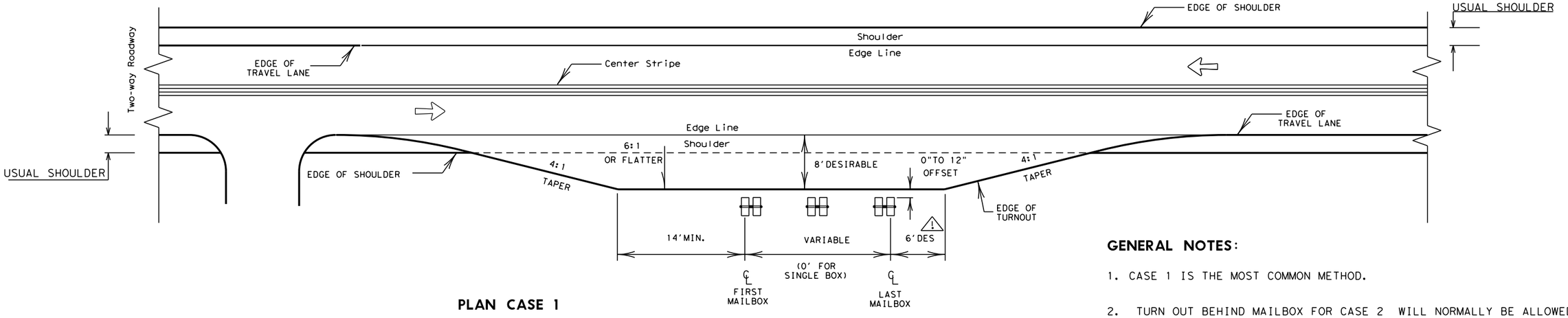
CASE 1. OFF TRAVEL WAY DELIVERY



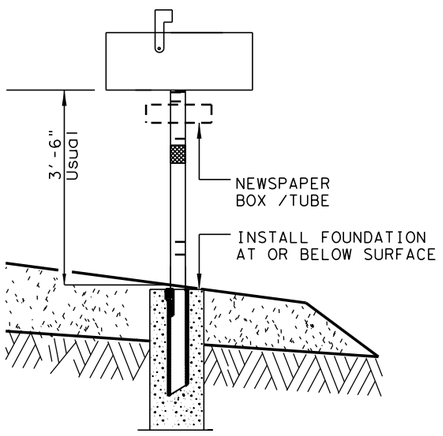
CASE 2. BACK SIDE DELIVERY



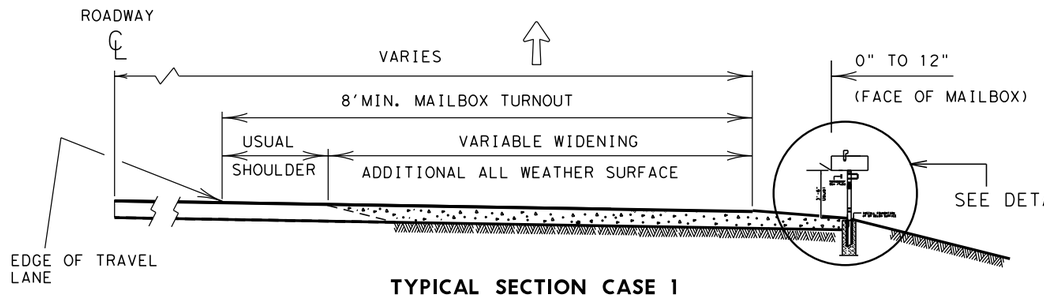
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



PLAN CASE 1



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

GENERAL NOTES:

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

Texas Department of Transportation | Maintenance Division Standard

Guideline

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

FILE: MB14(2).DGN		DN: JEO		CK:	DW: JEO		CK:
©TxDOT MAY 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0691	01	044		FM 81	
DECEMBER 2012-NEW TXDOT TITLE BLOCK		DIST	COUNTY			SHEET NO.	
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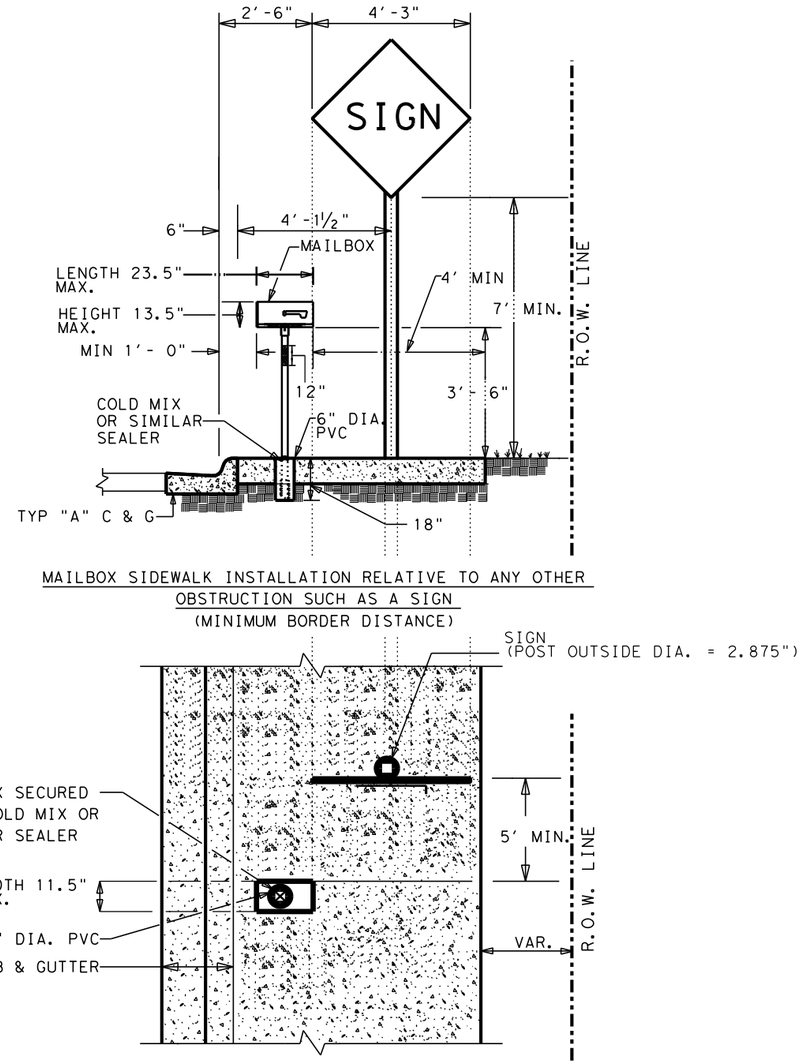
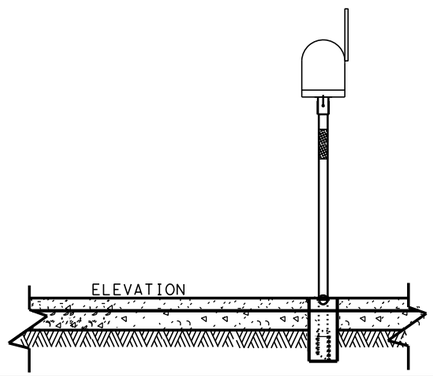
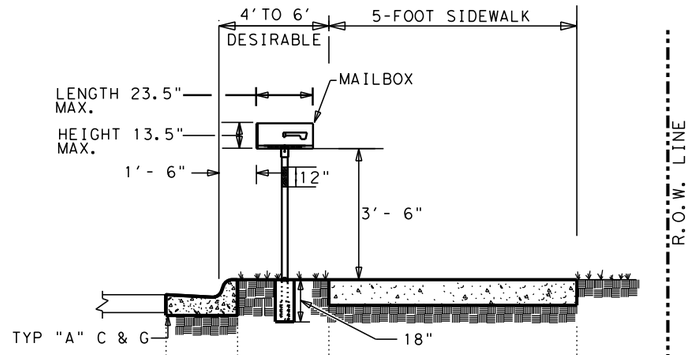


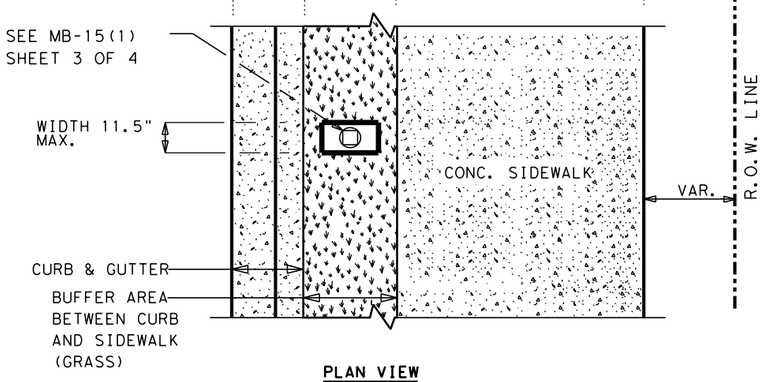
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

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Texas Department of Transportation

Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2A)

REVISIONS

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
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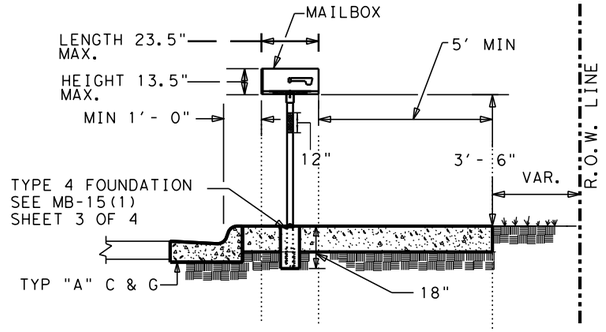
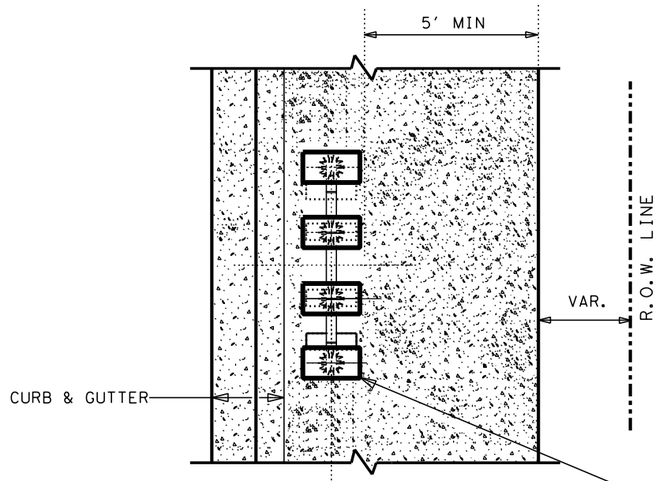
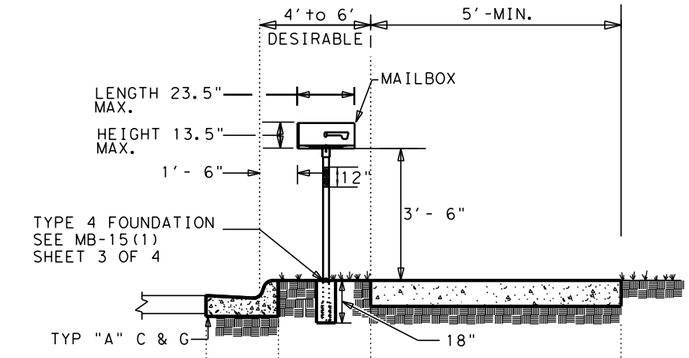


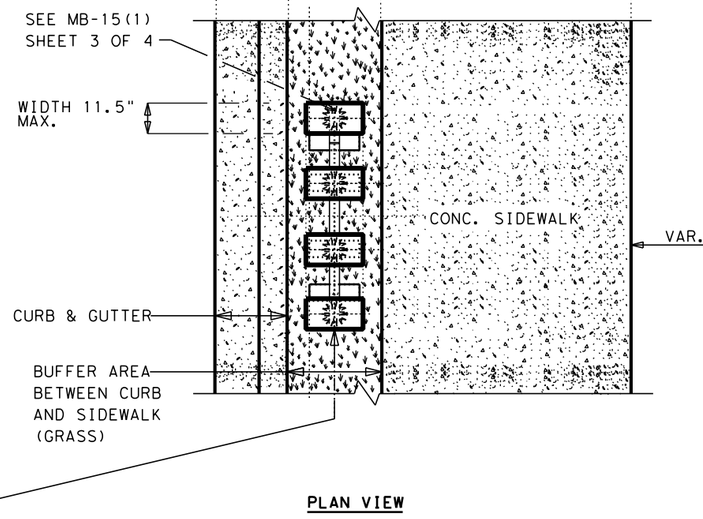
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



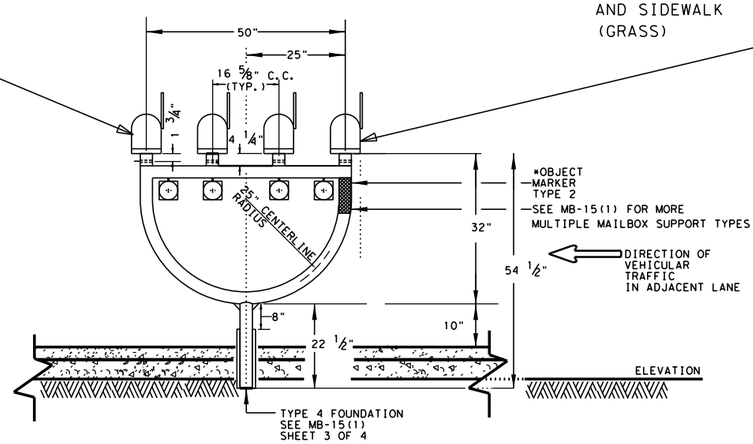
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



SHEET 3 OF 3

Texas Department of Transportation

Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

MB-14(2B)

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© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
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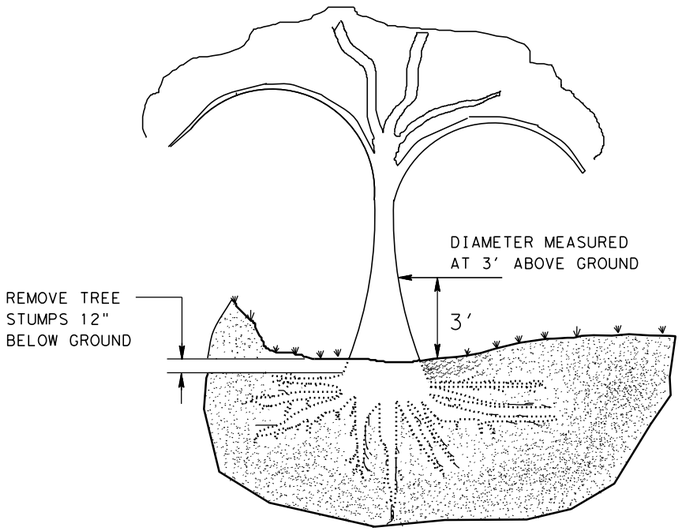
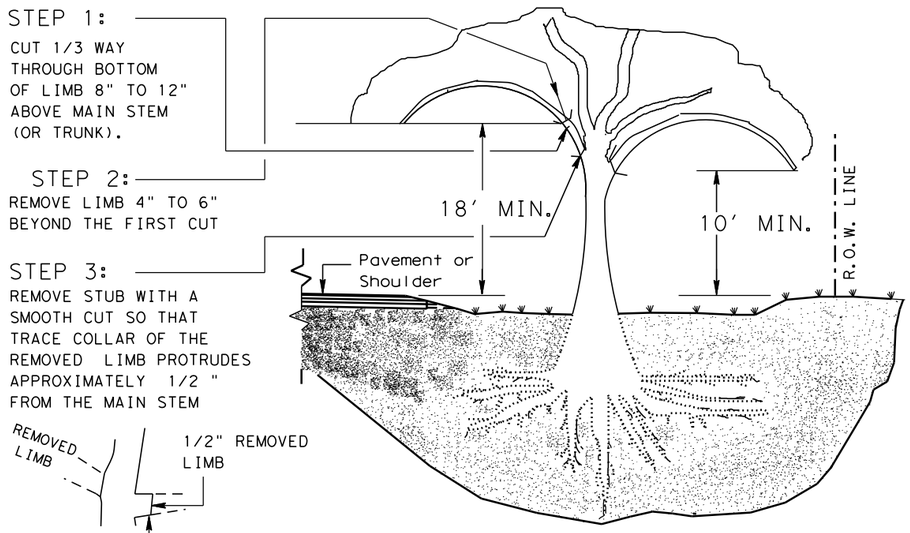
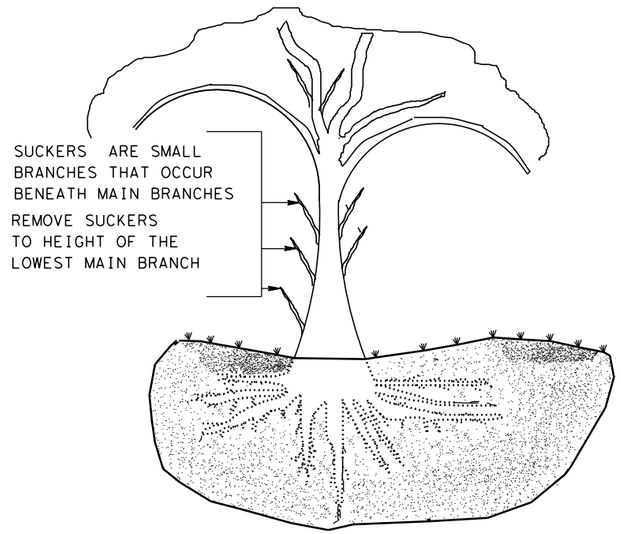


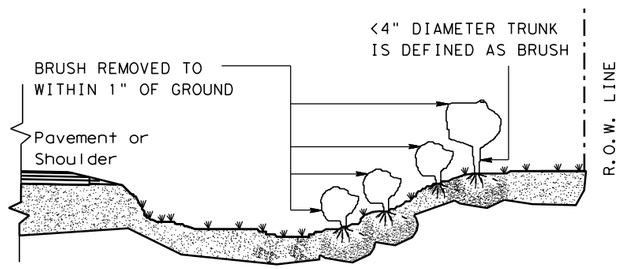
TREE REMOVAL



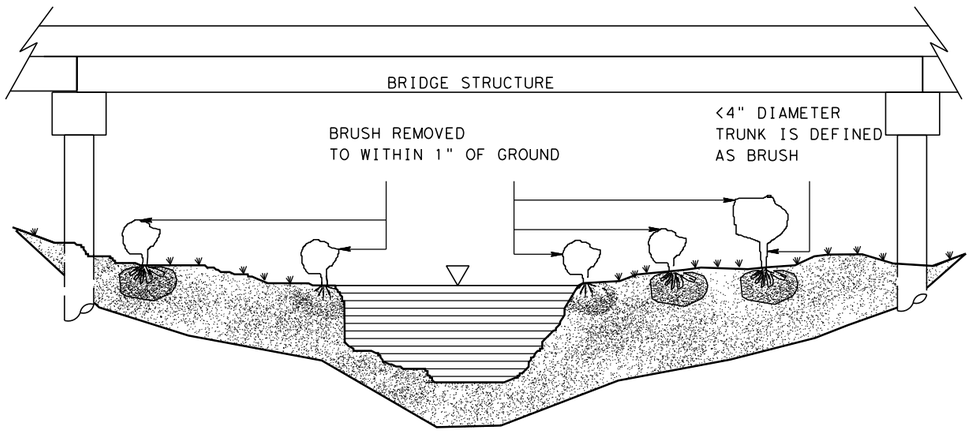
TREE TRIMMING



STEPS 1, 2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

STATE OF TEXAS
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98478
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6/17/2022

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TREE AND BRUSH REMOVAL

TRB-15 (MOD)

SHEET 1 OF 2

FILE:	DN: JEO	CK: LJB	DW: JEO	CK:
© TxDOT MARCH 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
Revised table 1 to 2014 Specification	DIST	COUNTY		SHEET NO.
	CRP	KARNES		102

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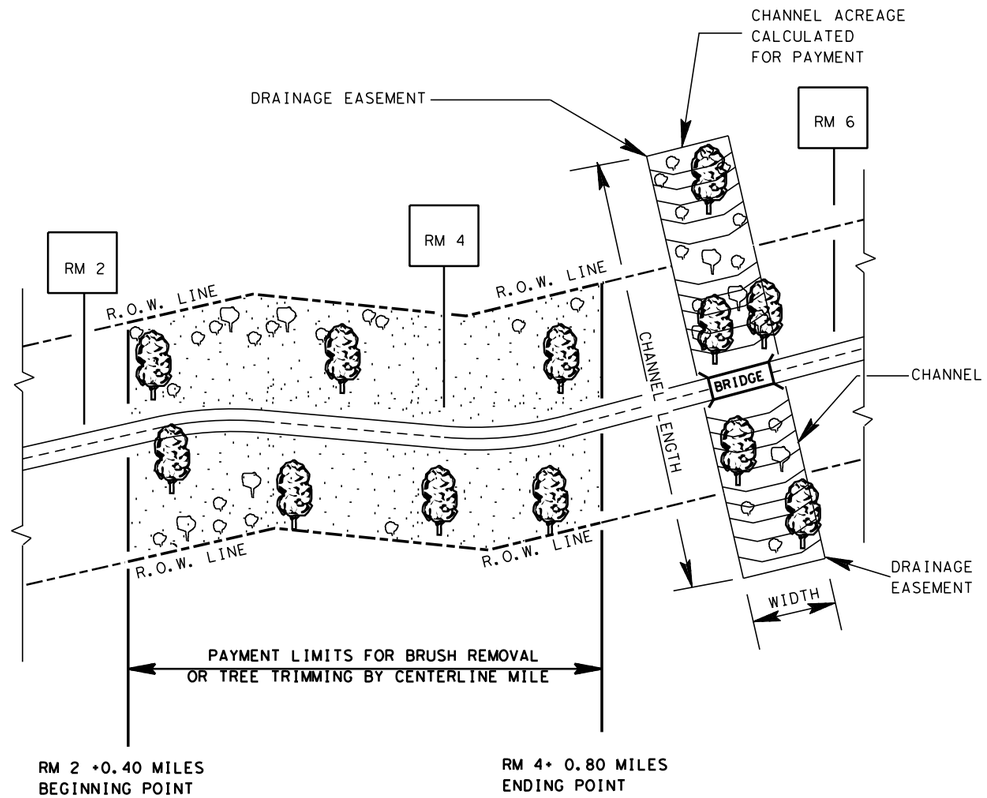
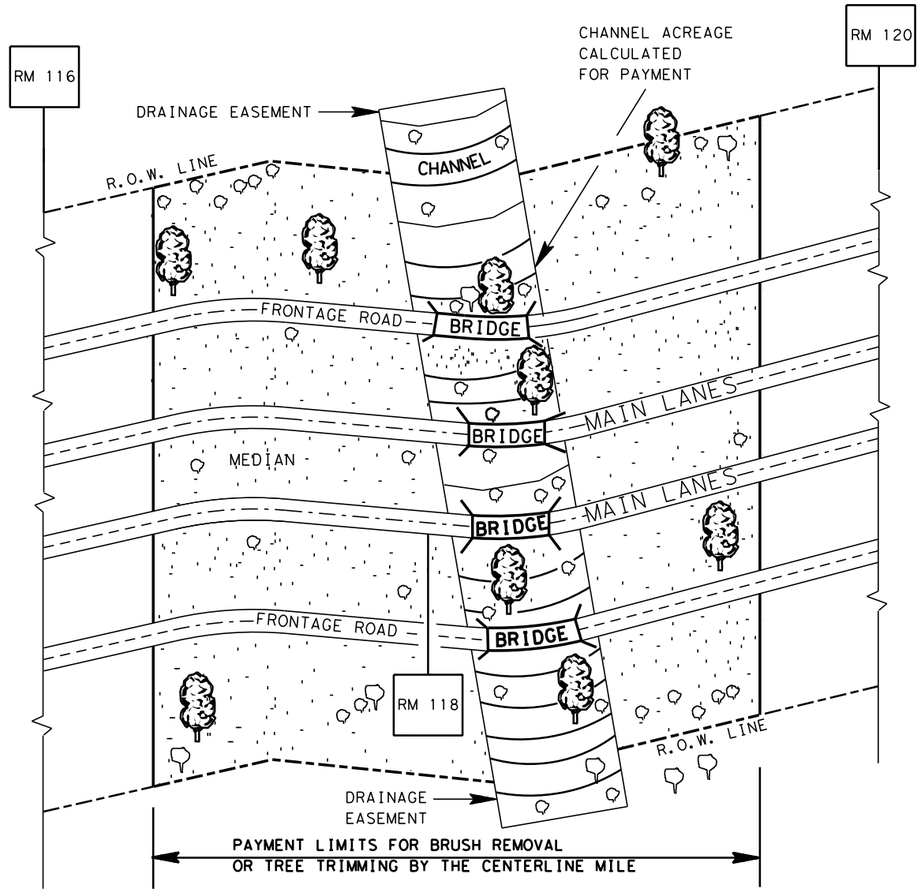


BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: UNDIVIDED HIGHWAY



RM 116 + 0.40 MILES
BEGINNING POINT

BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

RM 118 + 1.50 MILES
ENDING POINT

EXAMPLE: DIVIDED HIGHWAY WITH FRONTAGE ROADS

GENERAL NOTES:

TREE TRIMMING AND BRUSH REMOVAL

1. LIMITS OF TREE TRIMMING AND BRUSH REMOVAL SHALL BE THE ENTIRE PROJECT LIMITS AS SHOWN ON THE PLANS.
2. TREE TRIMMING OR BRUSH REMOVAL IN THE RIGHT OF WAY ON BOTH SIDES OF THE ROADWAY WILL NOT BE MEASURED OR PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO ITEMS 100.
3. TREE AND BRUSH REMOVAL UNDER BRIDGES, IN AND ALONG CHANNELS AND EASEMENTS ARE PAID FOR BY THE ACRE FOR AREAS DESIGNATED ON THE PLANS.

STATE OF TEXAS
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Maintenance Division
Standard Plans

TREE AND BRUSH REMOVAL

TRB-15(MOD)

SHEET 2 OF 2

FILE: TRB-15(2).DGN	DRAWN: JEO		CHECKED: DW: LJB	DW: -	CK: -	NEG NO.:		
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REVISED: 5/13/2004	LJB	CRP	6	SEE TITLE SHEET				103
REVISED: 9/24/2004	LJB	COUNTY		CONTROL	SECTION	JOB	HIGHWAY	
REVISED: APRIL 2015	JEO	KARNES		0691	01	044	FM 81	

DATE: 6/17/2022
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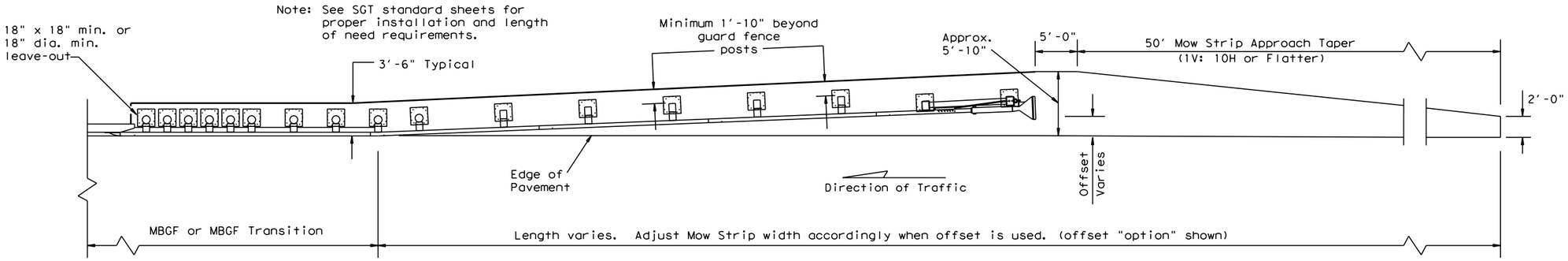
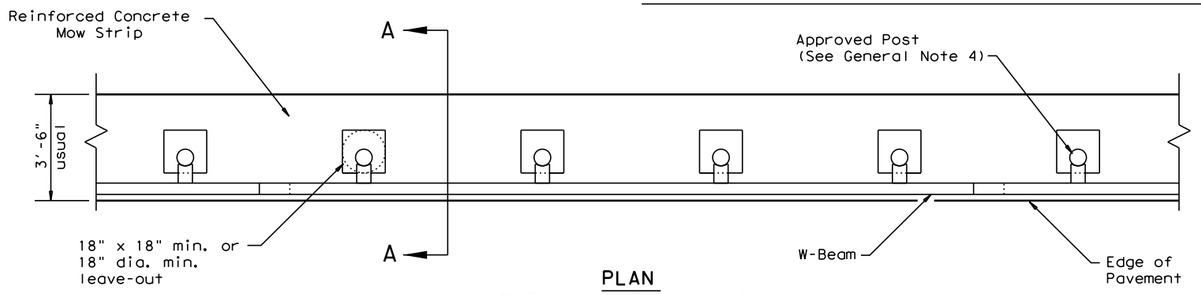
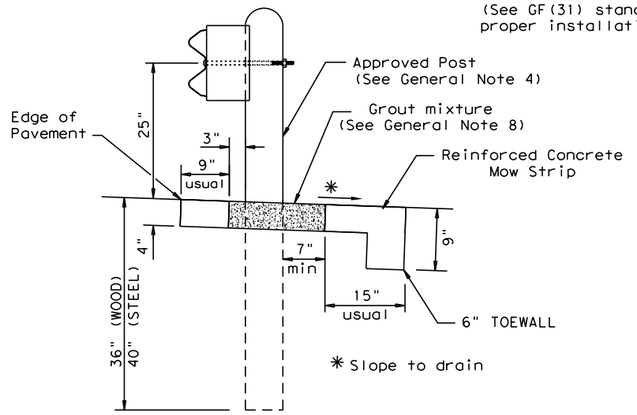


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



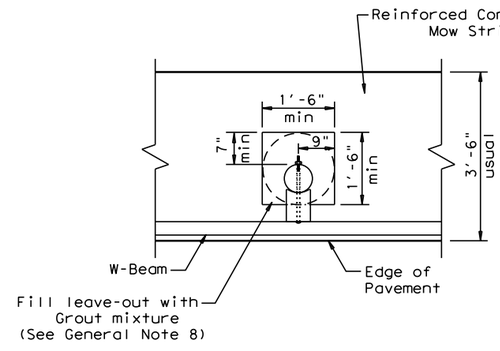
PLAN

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



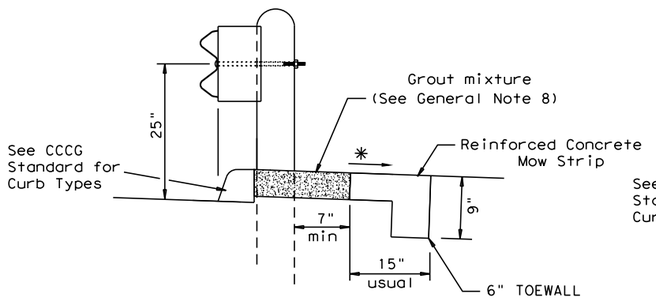
SECTION A-A

Typical



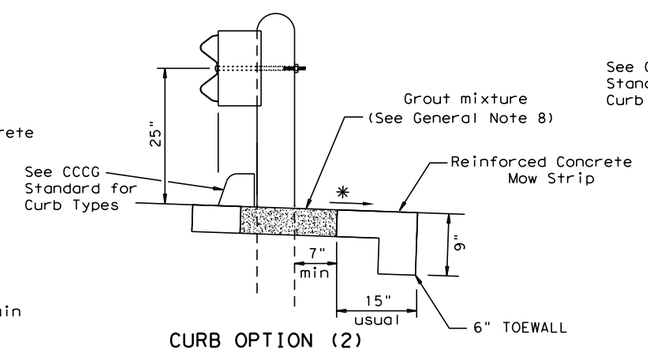
MOW STRIP DETAIL

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



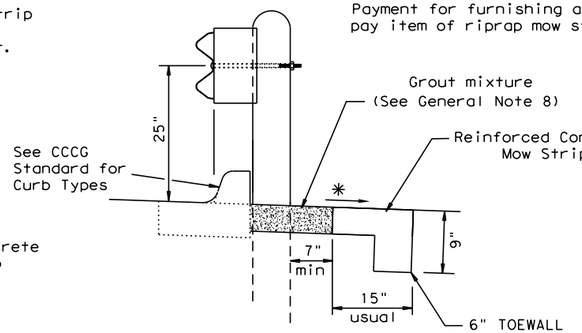
CURB OPTION (1)

This option will increase the post
embedment through out the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

* Slope to drain

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 asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The 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 asphaltic pavement or 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

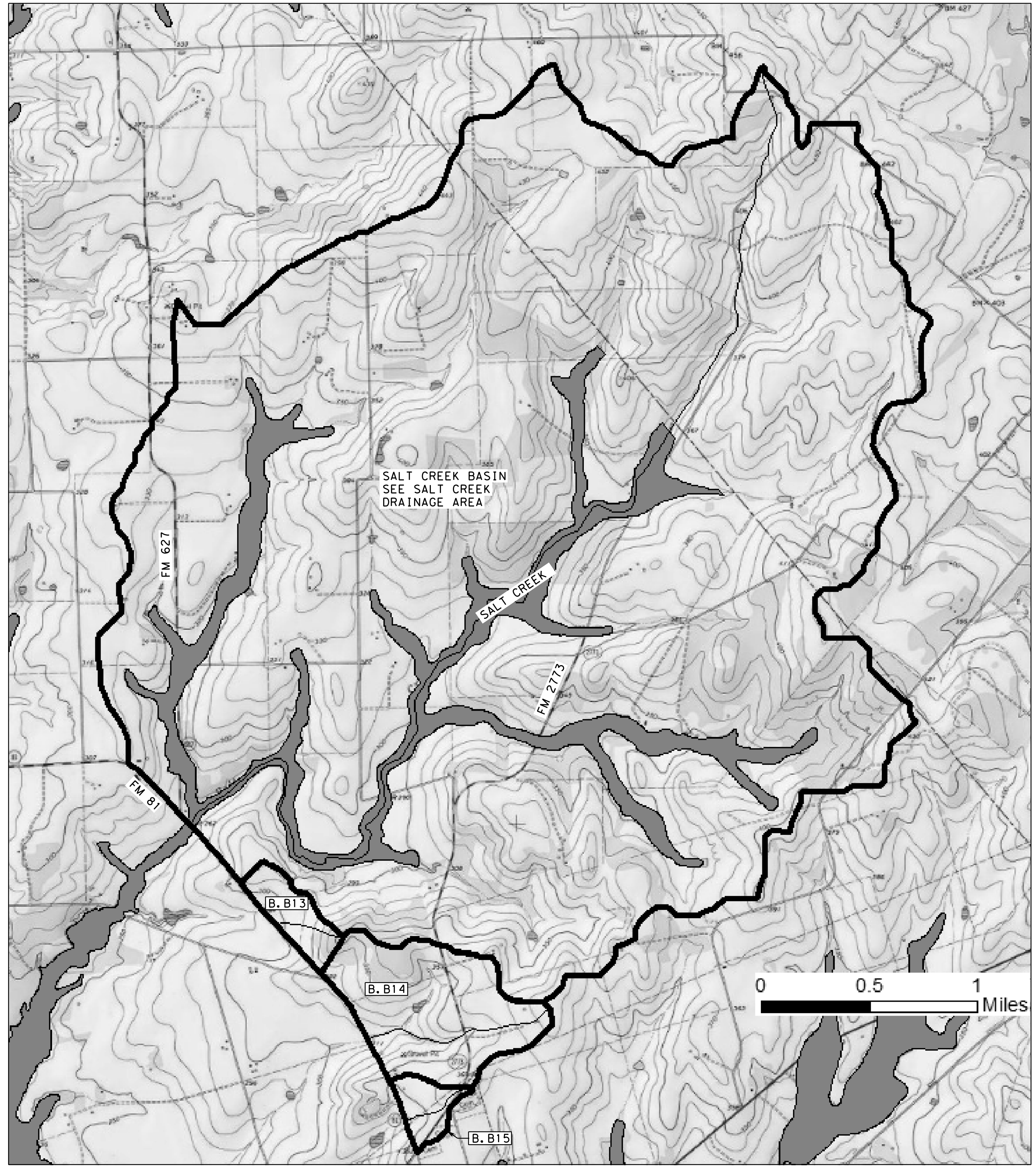
Corpus Christi District Standard

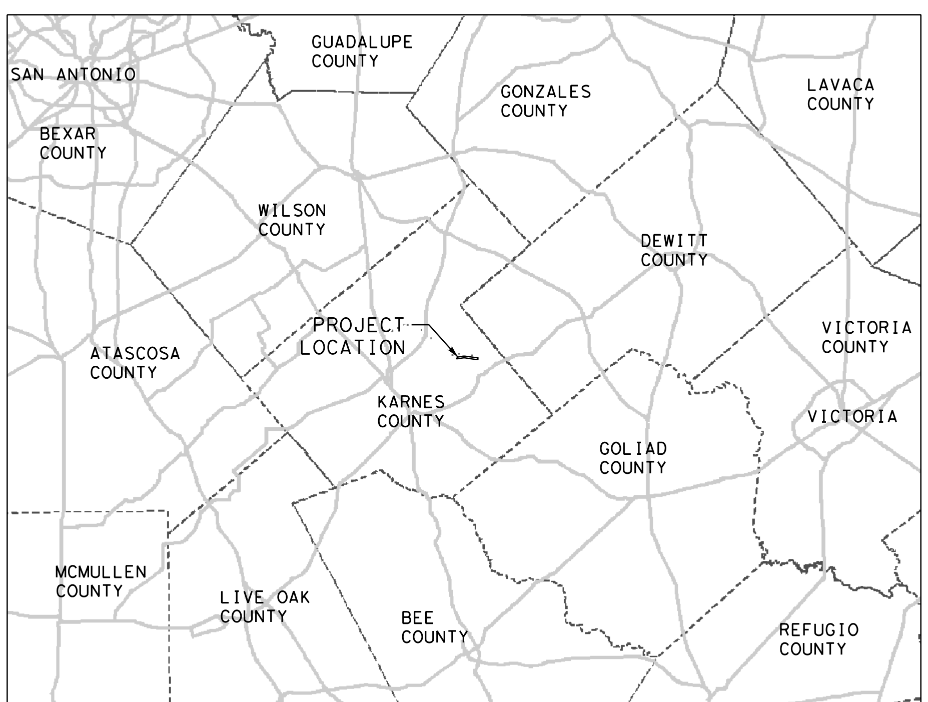
METAL BEAM GUARD FENCE

(MOW STRIP)

CRP-GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: TXDOT	CK: CL
© TxDOT December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
Revised 11, 2019 KM	DIST	COUNTY		SHEET NO.
	CRP	KARNES		104





LEGEND

B.BX	DRAINAGE AREA ID
	Tc PATH
	DRAINAGE AREA BOUNDARY
	FEMA ZONE A FLOODPLAIN

NOTES:

1. PRECIPITATION DEPTHS FOR 5-MIN TO 24HR DURATIONS WERE ESTIMATED FROM NOAA ATLAS 14, VOLUME 11, VERSION 2 AMS-BASED POINT PRECIPITATION FREQUENCY ESTIMATES. LINEAR INTERPOLATION OR CURVE GENERATION WAS NEEDED TO OBTAIN INTENSITY VALUES BETWEEN TABULAR DURATIONS AS OUTLINED BY THE TXDOT HYDRAULIC DESIGN MANUAL, CH. 4, SECTION 12, SEPTEMBER 2019.
2. Tc VALUES WERE ESTIMATED USING THE KERBY-KIRPICH METHOD.
3. FOR DRAINAGE AREAS SMALLER THAN 200 AC., THE PEAK FLOWS WERE ESTIMATED USING THE RATIONAL METHOD. FOR DRAINAGE AREAS LARGER THAN 200 AC., THE PEAK FLOWS WERE ESTIMATED USING A HYDROLOGIC MODEL DEVELOPED USING HEC-HMS 4.3
LOSS METHOD: NRCS CURVE NUMBER
TRANSFORM METHOD: NRCS UNIT HYDROGRAPH
STORM DURATION: 24 HOURS
4. SOURCE OF CONTOUR DATA IS USGS NATIONAL ELEVATION DATASET.

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED
PROFESSIONAL ENGINEER
6/16/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
OVERALL DRAINAGE AREA MAP

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	105
CONTROL	SECTION	JOB	
0691	01	044	

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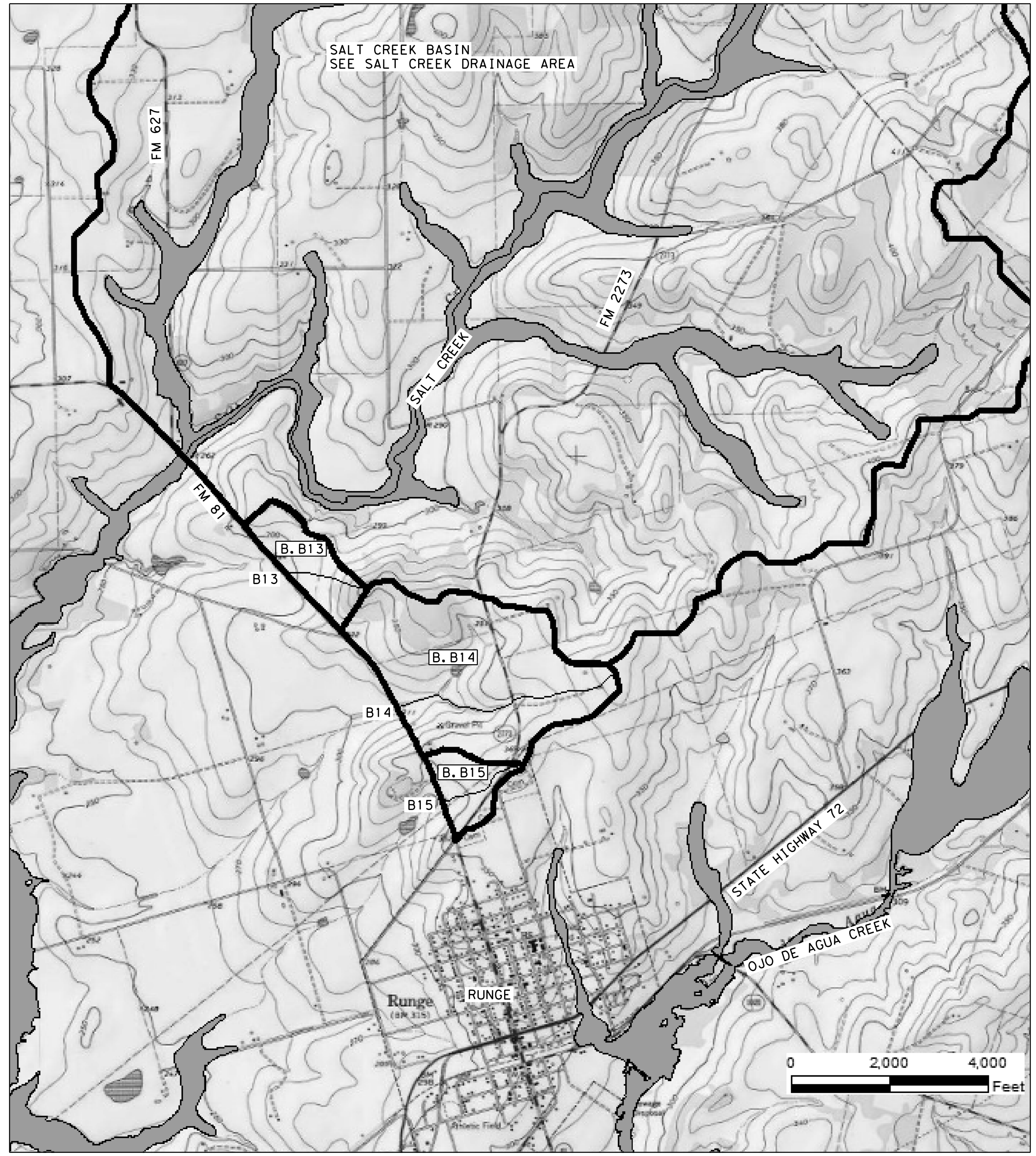


LEGEND

B.BX	DRAINAGE AREA ID
(heavy line)	DRAINAGE AREA BOUNDARY
(thin line)	Tc PATH
BX	CULVERT ID
(shaded)	FEMA ZONE A FLOODPLAIN

NOTES:

1. PRECIPITATION DEPTHS FOR 5-MIN TO 24HR DURATIONS WERE ESTIMATED FROM NOAA ATLAS 14, VOLUME 11, VERSION 2 AMS-BASED POINT PRECIPITATION FREQUENCY ESTIMATES. LINEAR INTERPOLATION OR CURVE GENERATION WAS NEEDED TO OBTAIN INTENSITY VALUES BETWEEN TABULAR DURATIONS AS OUTLINED BY THE TXDOT HYDRAULIC DESIGN MANUAL, CH. 4, SECTION 12, SEPTEMBER 2019.
2. Tc VALUES WERE ESTIMATED USING THE KERBY-KIRPICH METHOD.
3. FOR DRAINAGE AREAS SMALLER THAN 200 AC., THE PEAK FLOWS WERE ESTIMATED USING THE RATIONAL METHOD. FOR DRAINAGE AREAS LARGER THAN 200 AC., THE PEAK FLOWS WERE ESTIMATED USING A HYDROLOGIC MODEL DEVELOPED USING HEC-HMS 4.3
LOSS METHOD: NRCS CURVE NUMBER
TRANSFORM METHOD: NRCS UNIT HYDROGRAPH
STORM DURATION: 24 HOURS
4. SOURCE OF CONTOUR DATA IS USGS NATIONAL ELEVATION DATASET.

	POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hour)							
NOAA Atlas 14 Volume 11 Version 2	Precipitation Frequency Estimates by duration for AEP (1/years)							
Data type: Precipitation intensity	Duration	1/2	1/5	1/10	1/25	1/50	1/100	1/500
Time series type: Annual maximum	5 MIN	5.92	7.57	8.86	10.6	12.1	13.5	16.2
Project area: Texas	10 MIN	4.71	6.05	7.09	8.51	9.69	10.8	12.9
Location name (ESRI Maps): Karnes City	15 MIN	3.95	5.05	5.9	7.06	8	8.91	10.7
Station Name: -	30 MIN	2.78	3.53	4.11	4.9	5.53	6.16	7.44
Latitude: 28.9729°	60 MIN	1.81	2.31	2.71	3.25	3.68	4.11	5.06
Longitude: -97.8601°	2 HR	1.09	1.45	1.73	2.12	2.43	2.75	3.53
Elevation (USGS): 266 ft	3 HR	0.8	1.09	1.31	1.63	1.88	2.15	2.84
Date/time (GMT): Fri Nov 1 20:30:07 2019	6 HR	0.46	0.64	0.79	1	1.17	1.36	1.86
	12 HR	0.25	0.36	0.45	0.58	0.69	0.81	1.16
	24 HR	0.14	0.21	0.26	0.34	0.4	0.48	0.7

BASIN ID	DRAINAGE AREA	WEIGHTED CN	Tc	SCS INITIAL ABSTRACTION	SCS LAG TIME	HEC-HMS RUNOFF COMPUTATIONS						
	[AC]		[MIN]	[IN]	[MIN]	Q_{2YR} [CFS]	Q_{5YR} [CFS]	Q_{10YR} [CFS]	Q_{25YR} [CFS]	Q_{50YR} [CFS]	Q_{100YR} [CFS]	Q_{500YR} [CFS]
B.B14	298.7	**68**	50	0.9	30	163	332	481	697	873	1057	1473

BASIN ID	DRAINAGE AREA	RUNOFF COEFFICIENTS					Tc	RATIONAL METHOD RUNOFF COMPUTATIONS													
	[AC]	RELIEF C_r	INFILTRATION C_i	VEGETAL COVER C_v	SURFACE STORAGE C_s	C	[MIN]	i_{2YR} [IN/HR]	Q_{2YR} [CFS]	i_{5YR} [IN/HR]	Q_{5YR} [CFS]	i_{10YR} [IN/HR]	Q_{10YR} [CFS]	i_{25YR} [IN/HR]	Q_{25YR} [CFS]	i_{50YR} [IN/HR]	Q_{50YR} [CFS]	i_{100YR} [IN/HR]	Q_{100YR} [CFS]	i_{500YR} [IN/HR]	Q_{500YR} [CFS]
B.B13	62.8	0.11	0.09	0.07	0.07	0.34	28	2.90	62	3.68	79	4.29	92	5.12	110	5.78	124	6.44	138	7.77	167
B.B15	43.7	0.10	0.09	0.07	0.07	0.33	26	3.06	44	3.89	56	4.54	66	5.42	78	6.12	89	6.82	99	8.22	119

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED
PROFESSIONAL ENGINEER
6/16/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

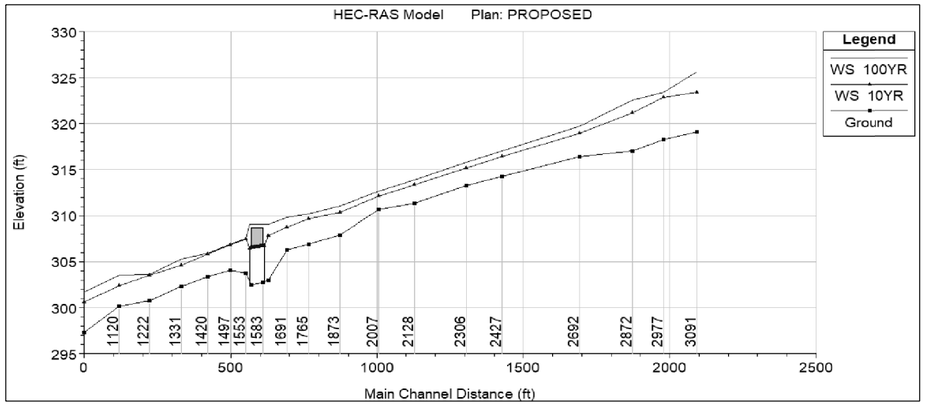
Texas Department of Transportation

FM 81

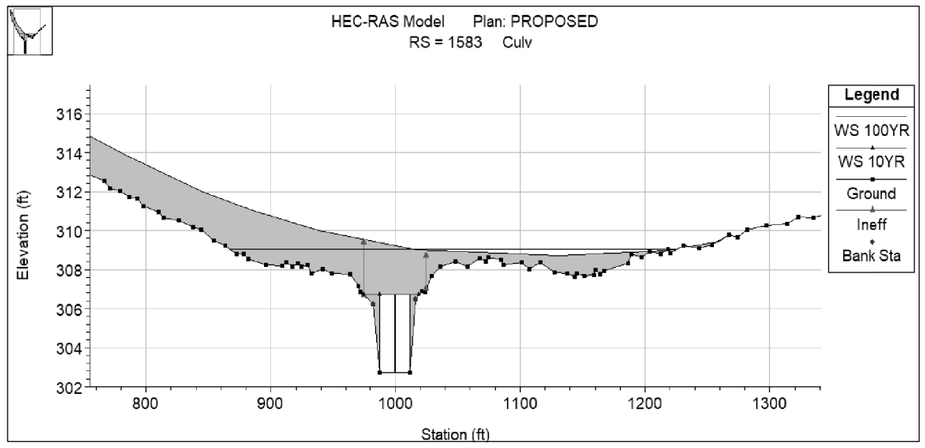
DRAINAGE AREA MAP B.B13 TO B.B15

SHEET 1 OF 1

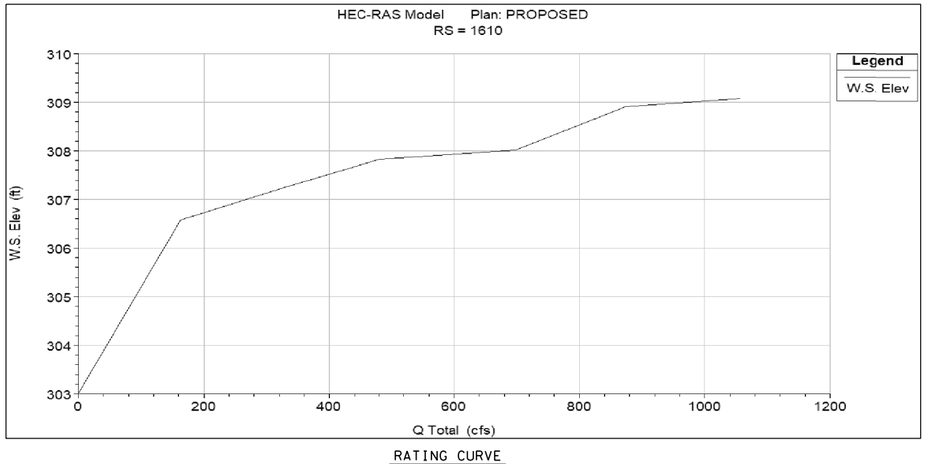
FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	106
CONTROL	SECTION	JOB	
0691	01	044	



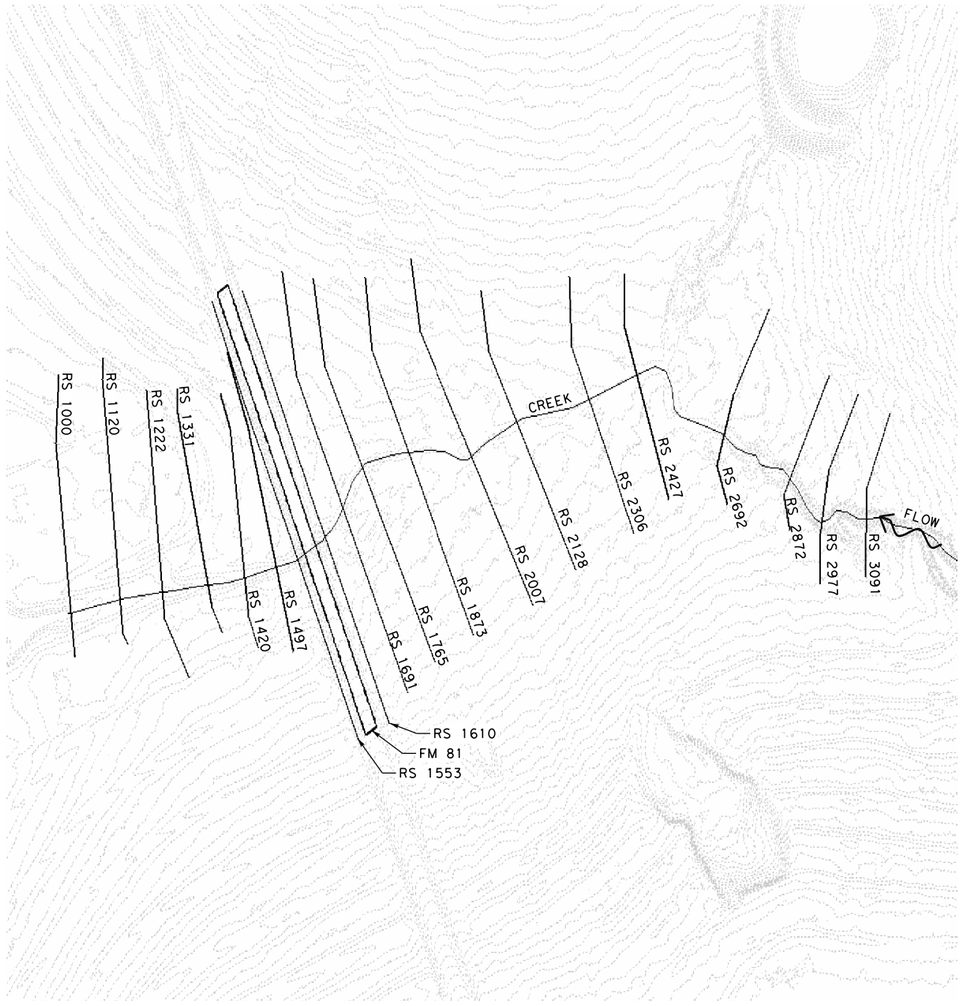
PROFILE PLOT



CROSS-SECTION



RATING CURVE



HEC-RAS CROSS-SECTION MAP

Storm Frequency	Q Total	W.S. Elev
[years]	[cfs]	[ft]
-	0	303.00
10	481	307.82
100	1057	309.08

RATING CURVE TABLE

LEGEND

- 1 FT CONTOURS
- FLOW DIRECTION
- STREAM
- HEC-RAS CROSS-SECTION

NOTES:

1. HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS 5.0.7.
2. CROSS-SECTION POINTS, ROADWAY HIGH CHORD, AND STREAM FLOW LINE WERE OBTAINED FROM SURVEY DATA AND/OR TEXAS NATURAL RESOURCES LIDAR DATA.
3. NORMAL DEPTH WITH A SLOPE OF 0.01441 FT/FT WAS USED FOR DOWNSTREAM BOUNDARY CONDITIONS.
4. PEAK FLOWS ESTIMATED USING HEC-HMS 4.3.
5. THIS DRAINAGEWAY HAS BEEN DELINEATED AS UNSHADED ZONE X FLOOD HAZARD AREA AS SHOWN ON FIRM MAP #48255C0300C, EFFECTIVE OCTOBER 19, 2010 . THE KARNES COUNTY FLOODPLAIN ADMINISTRATOR WAS NOTIFIED ABOUT THIS PROJECT ON JULY 27, 2020.

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED PROFESSIONAL ENGINEER
6/16/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

HYDRAULIC DATA
BRIDGE CLASS CULVERT B14

SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	107
CONTROL	SECTION	JOB	
0691	01	044	

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HEC-RAS HYDRAULIC SUMMARY

River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3091	100YR	EX	1057	319.07	325.62	325.62	326.29	0.00715	7.35	244.54	195.94	0.59
3091	100YR	PR	1057	319.07	325.62	325.62	326.29	0.007161	7.36	244.34	195.92	0.59
3091	10YR	EX	481	319.07	323.43	322.94	324.35	0.014789	7.71	62.39	20.97	0.79
3091	10YR	PR	481	319.07	323.43	322.94	324.35	0.014788	7.71	62.39	20.97	0.79
2977	100YR	EX	1057	318.28	323.41	323.07	324.69	0.015492	9.06	117.32	119.36	0.86
2977	100YR	PR	1057	318.28	323.41	323.07	324.69	0.015492	9.06	117.32	119.36	0.86
2977	10YR	EX	481	318.28	322.83	321.48	323.21	0.00559	4.94	97.31	50.09	0.5
2977	10YR	PR	481	318.28	322.83	321.48	323.21	0.005589	4.94	97.32	50.13	0.5
2872	100YR	EX	1057	317.06	322.57	322.57	323.18	0.0104	7.42	231.58	176.55	0.7
2872	100YR	PR	1057	317.06	322.57	322.57	323.18	0.0104	7.42	231.58	176.55	0.7
2872	10YR	EX	481	317.06	321.18	320.95	322.16	0.018941	7.97	60.33	52.73	0.89
2872	10YR	PR	481	317.06	321.18	320.95	322.16	0.018955	7.98	60.31	52.63	0.89
2692	100YR	EX	1057	316.42	319.73	319.25	319.92	0.006869	4.88	372.79	281.08	0.55
2692	100YR	PR	1057	316.42	319.73	319.25	319.92	0.006853	4.88	373.08	281.12	0.55
2692	10YR	EX	481	316.42	318.94	318.94	319.19	0.012738	5.12	155.17	222.17	0.7
2692	10YR	PR	481	316.42	318.94	318.94	319.19	0.012738	5.12	155.17	222.17	0.7
2427	100YR	EX	1057	314.26	317.03		317.39	0.014524	7.41	283.7	252.13	0.82
2427	100YR	PR	1057	314.26	317.03		317.39	0.014523	7.41	283.71	252.14	0.82
2427	10YR	EX	481	314.26	316.43		316.72	0.013394	5.97	149.72	187.6	0.75
2427	10YR	PR	481	314.26	316.45		316.73	0.012883	5.88	152.17	191.89	0.74
2306	100YR	EX	1057	313.3	315.79	315.38	316	0.008657	5.09	312.01	256.89	0.61
2306	100YR	PR	1057	313.3	315.78	315.38	316	0.008833	5.13	309.79	254.99	0.62
2306	10YR	EX	481	313.3	315.22	314.89	315.36	0.008869	4.18	177.68	214.56	0.59
2306	10YR	PR	481	313.3	315.2	314.89	315.35	0.009405	4.27	174.19	214.08	0.61
2128	100YR	EX	1057	311.37	313.9	313.63	314.18	0.012436	5.47	277.06	255.99	0.72
2128	100YR	PR	1057	311.37	313.91	313.63	314.19	0.012006	5.4	280.43	257.56	0.7
2128	10YR	EX	481	311.37	313.36	313.17	313.54	0.011933	4.24	156.37	200.73	0.66
2128	10YR	PR	481	311.37	313.38	313.17	313.55	0.011148	4.13	160.23	203.5	0.64
2007	100YR	EX	1057	310.68	312.72		312.9	0.008555	4.46	322.3	261.96	0.59
2007	100YR	PR	1057	310.68	312.68		312.87	0.009374	4.59	310.23	259.36	0.62
2007	10YR	EX	481	310.68	312.16	311.83	312.27	0.008845	3.51	183.82	219.72	0.56
2007	10YR	PR	481	310.68	312.13		312.25	0.00993	3.66	176.85	212.57	0.59
1873	100YR	EX	1057	307.93	310.86		311.26	0.013639	6.53	237.97	192.46	0.77
1873	100YR	PR	1057	307.93	311.06	310.78	311.38	0.010008	5.93	269.4	209.94	0.67
1873	10YR	EX	481	307.93	310.24	310.21	310.56	0.015017	5.52	129.36	164.02	0.77
1873	10YR	PR	481	307.93	310.37	310.29	310.64	0.011485	5.08	141.09	167.2	0.68
1765	100YR	EX	1057	306.93	310.09	309.02	310.25	0.005715	4.16	353.78	260.13	0.5
1765	100YR	PR	1057	306.93	310.16	309.77	310.38	0.007697	4.94	322.22	267.39	0.58
1765	10YR	EX	481	306.93	309.34	308.99	309.45	0.006496	3.34	187.04	196.89	0.5
1765	10YR	PR	481	306.93	309.68	309.32	309.79	0.004971	3.38	207.35	216.69	0.45
1691	100YR	EX	1057	306.28	309.95	308.74	310.01	0.001599	2.56	611.28	387.39	0.27
1691	100YR	PR	1057	306.28	309.79	308.69	309.92	0.004045	3.91	442.96	375.09	0.43
1691	10YR	EX	481	306.28	309.2	308.51	309.23	0.00136	1.9	347.43	294.32	0.24
1691	10YR	PR	481	306.28	308.77	308.77	309.11	0.015556	5.44	124.39	253.52	0.78
1610	100YR	EX	1057	303	309.65	307.76	309.85	0.002033	4.28	458.3	412.94	0.34
1610	100YR	PR	1057	303	309.08	307.78	309.55	0.004512	5.89	259.12	360.17	0.49
1610	10YR	EX	481	303	308.99	306.51	309.12	0.00124	3.04	213.59	353.67	0.26
1610	10YR	PR	481	303	307.82	306.53	308.07	0.003484	4.14	126	107.45	0.41
1583		Culvert										

River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1553	100YR	EX	1057	303.77	307.79	307.79	309.44	0.019706	10.3	102.61	424.48	1
1553	100YR	PR	1057	303.76	307.54	307.54	309.01	0.020256	9.81	109.49	421.76	0.99
1553	10YR	EX	481	303.77	307.47	306.43	307.89	0.005751	5.2	92.57	397.45	0.53
1553	10YR	PR	481	303.76	307.43	306.33	307.76	0.004742	4.63	105.5	413	0.48
1497	100YR	EX	1057	304.03	306.9	306.9	307.01	0.005324	3.52	416.33	354.83	0.46
1497	100YR	PR	1057	304.03	306.89	306.89	307	0.005466	3.55	412.79	354.52	0.47
1497	10YR	EX	481	304.03	306.84	306.84	307.36	0.017875	6.3	92.68	352.96	0.85
1497	10YR	PR	481	304.03	306.85	306.82	307.3	0.015857	5.97	102.97	353.37	0.8
1420	100YR	EX	1057	303.4	305.81	305.81	306.2	0.02144	6.67	239.04	316.91	0.92
1420	100YR	PR	1057	303.4	305.88	305.88	306.2	0.017691	6.11	257.77	324.1	0.84
1420	10YR	EX	481	303.4	305.81	305.81	305.89	0.00444	3.04	239.04	316.91	0.42
1420	10YR	PR	481	303.4	305.82	305.71	306.14	0.012903	5.19	119.49	318.31	0.71
1331	100YR	EX	1057	302.33	305.19	304.81	305.27	0.003113	2.67	470.92	332.19	0.36
1331	100YR	PR	1057	302.33	305.28	304.81	305.35	0.002632	2.54	491.02	346.88	0.33
1331	10YR	EX	481	302.33	304.56	304.56	304.82	0.015796	4.69	121.88	268.99	0.75
1331	10YR	PR	481	302.33	304.56	304.56	304.82	0.015796	4.69	121.88	268.99	0.75
1222	100YR	EX	1057	300.79	303.59	303.59	304.49	0.020908	8.8	148.97	294.65	0.98
1222	100YR	PR	1057	300.79	303.59	303.59	304.49	0.020908	8.8	148.97	294.65	0.98
1222	10YR	EX	481	300.79	303.5	302.7	303.71	0.004986	4.2	141.9	292.48	0.48
1222	10YR	PR	481	300.79	303.5	302.7	303.71	0.004986	4.2	141.9	292.48	0.48
1120	100YR	EX	1057	300.17	303.53	303.19	303.61	0.002094	3.17	562.81	419.06	0.32
1120	100YR	PR	1057	300.17	303.53	303.19	303.61	0.002094	3.17	562.81	419.06	0.32
1120	10YR	EX	481	300.17	302.39	302.16	302.89	0.013565	5.91	89.98	254.74	0.75
1120	10YR	PR	481	300.17	302.39	302.16	302.89	0.013565	5.91	89.98	254.74	0.75

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED
PROFESSIONAL ENGINEER
6/16/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

HYDRAULIC DATA BRIDGE CLASS CULVERT B14

SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	108
CONTROL	SECTION	JOB	
0691	01	044	

HY8 EXISTING HYDRAULIC SUMMARY

CULVERT ID	STATION	CULVERT TYPE	ROAD OVERTOPPING ELEVATION	AVERAGE RECURRENCE INTERVAL: 10-YEAR					AVERAGE RECURRENCE INTERVAL: 100-YEAR					NOTES
				DESIGN FLOW	CULVERT FLOW	OVERTOPPING FLOW	HEADWATER ELEVATION	TAILWATER ELEVATION	DESIGN FLOW	CULVERT FLOW	OVERTOPPING FLOW	HEADWATER ELEVATION	TAILWATER ELEVATION	
			[FT]	[CFS]	[CFS]	[%]	[FT]	[FT]	[CFS]	[CFS]	[%]	[FT]	[FT]	
B13	371+96.46	4' X 3' RCB	293.07	92	86	6%	293.17	290.02	138	91	34%	293.48	290.45	ROAD OVERTOPPED DURING 10-YEAR EVENT
B15	435+35.88	3' X 3' RCB	337.08	66	64	3%	337.13	335.61	99	62	38%	337.43	336.02	ROAD OVERTOPPED DURING 10-YEAR EVENT
NOTE: DESIGN FLOW EVENT IS THE 10-YEAR EVENT														

HY8 PROPOSED HYDRAULIC SUMMARY

CULVERT ID	STATION	CULVERT TYPE	ROAD OVERTOPPING ELEVATION	AVERAGE RECURRENCE INTERVAL: 10-YEAR					AVERAGE RECURRENCE INTERVAL: 100-YEAR					NOTES
				DESIGN FLOW	CULVERT FLOW	OVERTOPPING FLOW	HEADWATER ELEVATION	TAILWATER ELEVATION	DESIGN FLOW	CULVERT FLOW	OVERTOPPING FLOW	HEADWATER ELEVATION	TAILWATER ELEVATION	
			[FT]	[CFS]	[CFS]	[%]	[FT]	[FT]	[CFS]	[CFS]	[%]	[FT]	[FT]	
B13	371+96.46	2-4' X 3' RCB	293.07	92	92	0%	291.43	289.92	138	138	0%	292.45	290.35	
B15	435+35.88	3-5' X 2' RCB	337.21	66	66	0%	334.91	334.74	99	99	0%	335.41	335.08	
NOTE: DESIGN FLOW EVENT IS THE 10-YEAR EVENT														

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED
PROFESSIONAL ENGINEER
6/16/2022

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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

CULVERT HYDRAULIC DATA

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	109
CONTROL	SECTION	JOB	
0691	01	044	

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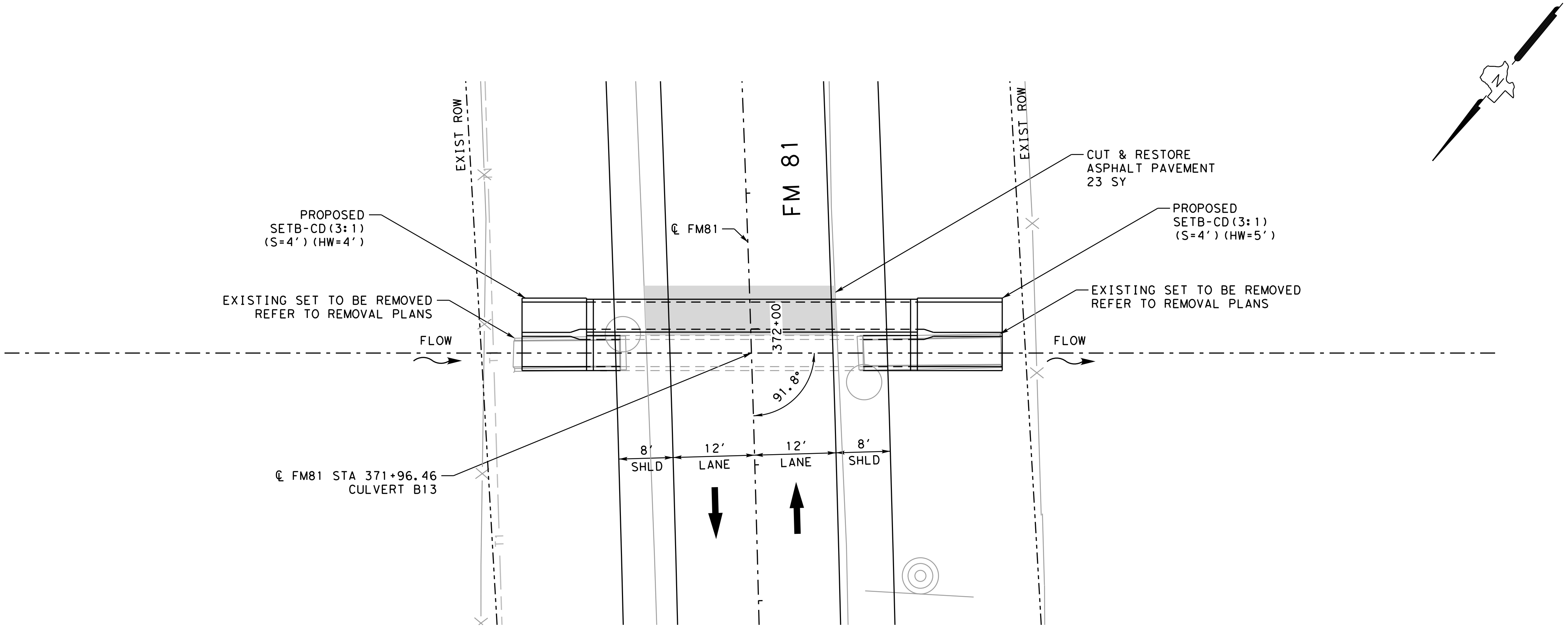

LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- OE OVERHEAD ELECTRIC
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION.
2. SEE HORIZONTAL DATA SHEET FOR ROADWAY GEOMETRY DATA.

CULVERT B13 HYDRAULIC DATA

EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)	STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)
10 YR	293.17	290.02	10 YR	291.43	289.92
100 YR	293.48	290.45	100 YR	292.45	290.35

PLAN

CULVERT B13 FLOW DATA

EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)	STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)
10 YR	92	13.7	10 YR	92	12.6
100 YR	138	13.8	100 YR	138	13.7

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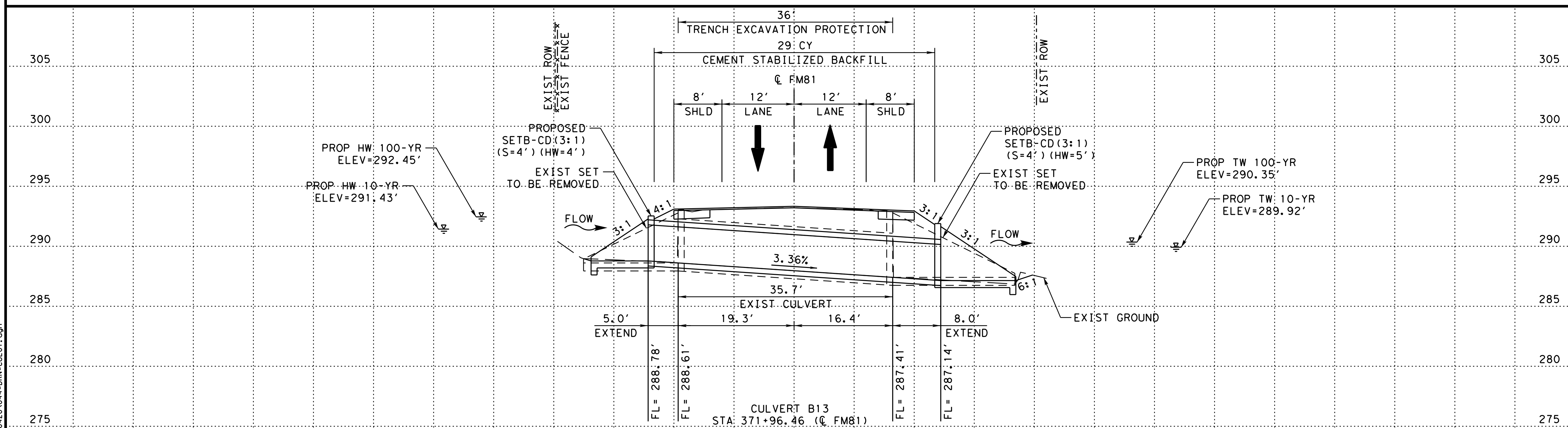
SCALE: 1"=20' H
1"=10' V

DATE	BY	REV	REVISION



CULVERT B13
STA 371+96.46 (℄ FM81)
EXISTING 36 LF 4'X3' SBC
EXTEND 5 LF 4'X3' SBC (LT) W/ SETB-CD(3:1)(S=4 FT)(HW=4 FT) USING SCC-3&4, SCC-MD, SETB-CD, ECD & BCS
EXTEND 8 LF 4'X3' SBC (RT) W/ SETB-CD(3:1)(S=4 FT)(HW=5 FT) USING SCC-3&4, SCC-MD, SETB-CD, ECD & BCS
PROPOSED 49 LF 4'X3' SBC W/ (LT) SETB-CD(3:1)(S=4 FT)(HW=4 FT) & (RT) SETB-CD(3:1)(S=4 FT)(HW=5 FT)
USING SCP-4, SCP-MD, SETB-CD, ECD & BCS

PROFILE

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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Texas Department of Transportation

FM 81

CULVERT LAYOUT CULVERT B13

SCALE: 1"=20' H/10' V
SHEET 1 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	110
CONTROL	SECTION	JOB	
0691	01	044	

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LEGEND

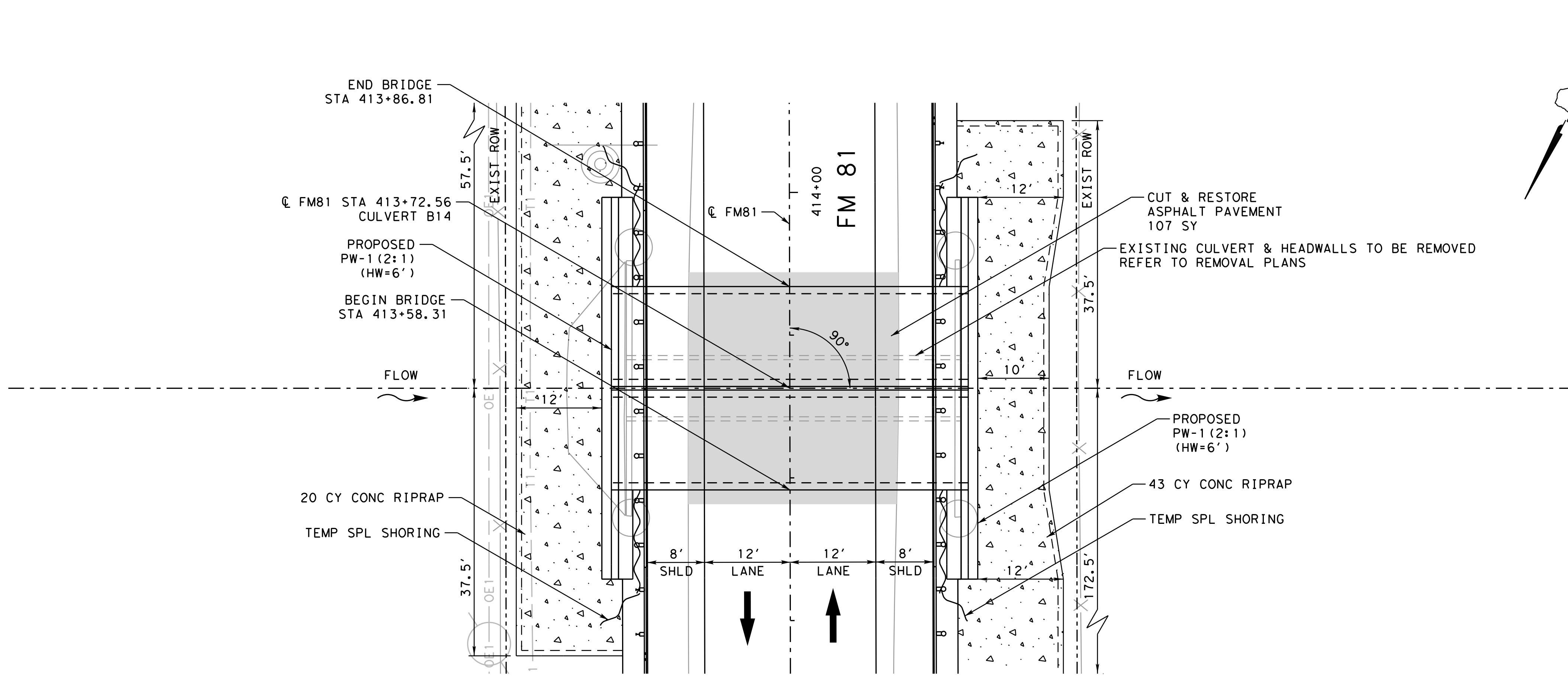
- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- OE — OVERHEAD ELECTRIC
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION.
2. SEE HORIZONTAL DATA SHEET FOR ROADWAY GEOMETRY DATA.

DESIGN DATA:

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
ADT(2020): 3,100
ADT(2040): 4,340
DESIGN SPEED: 40 MPH
NBI#: 16-129-0-0691-01-017



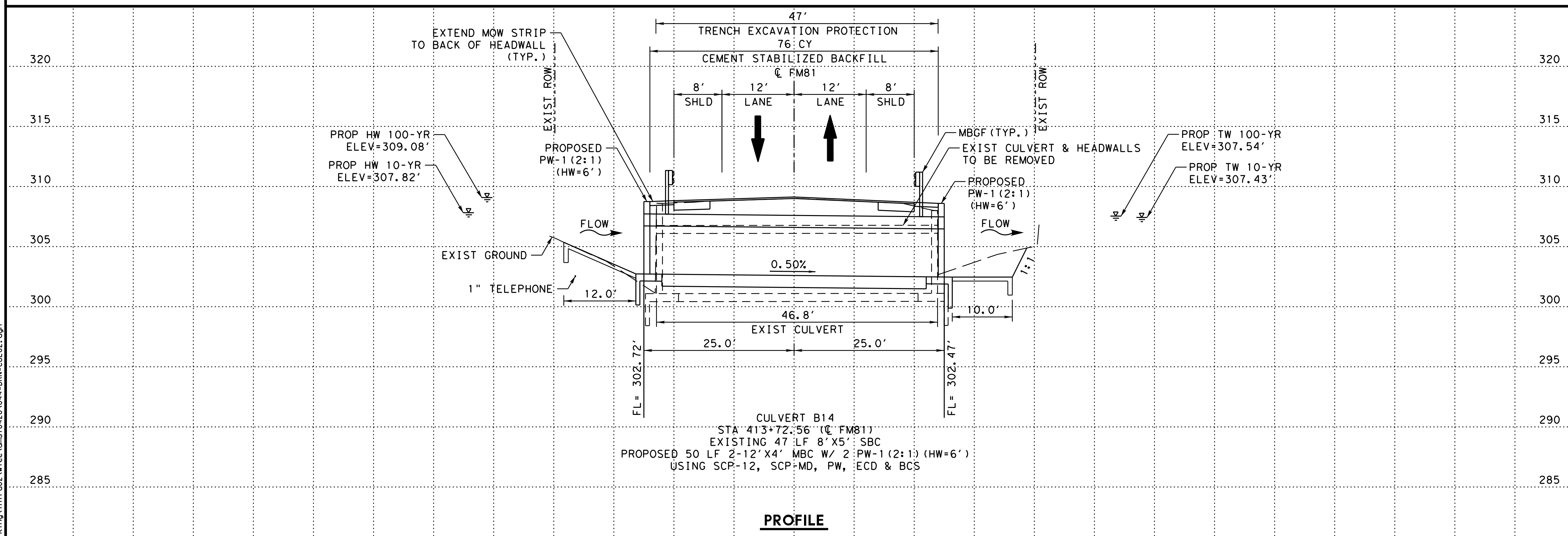
PLAN

CULVERT B14 HYDRAULIC DATA					
EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)	STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)
10 YR	308.99	307.47	10 YR	307.82	307.43
100 YR	309.65	307.79	100 YR	309.08	307.54

CULVERT B14 FLOW DATA					
EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)	STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)
10 YR	481	8.1	10 YR	481	5.0
100 YR	1057	6.5	100 YR	1057	7.4

0 10 20
SCALE: 1"=20' H
1"=10' V

DATE	BY	REV	REVISION



CULVERT B14
STA 413+72.56 (℄ FM81)
EXISTING 47 LF 8'X5' SBC
PROPOSED 50 LF 2-12'X4' MBC W/ 2 PW-1(2:1)(HW=6')
USING SCP-12, SCP-MD, PW, ECD & BCS

PROFILE

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

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Texas Registered Engineering Firm F-6324

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FM 81

CULVERT LAYOUT BRIDGE CLASS CULVERT B14

SCALE: 1"=20' H/10' V

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	111
CONTROL	SECTION	JOB	
0691	01	044	

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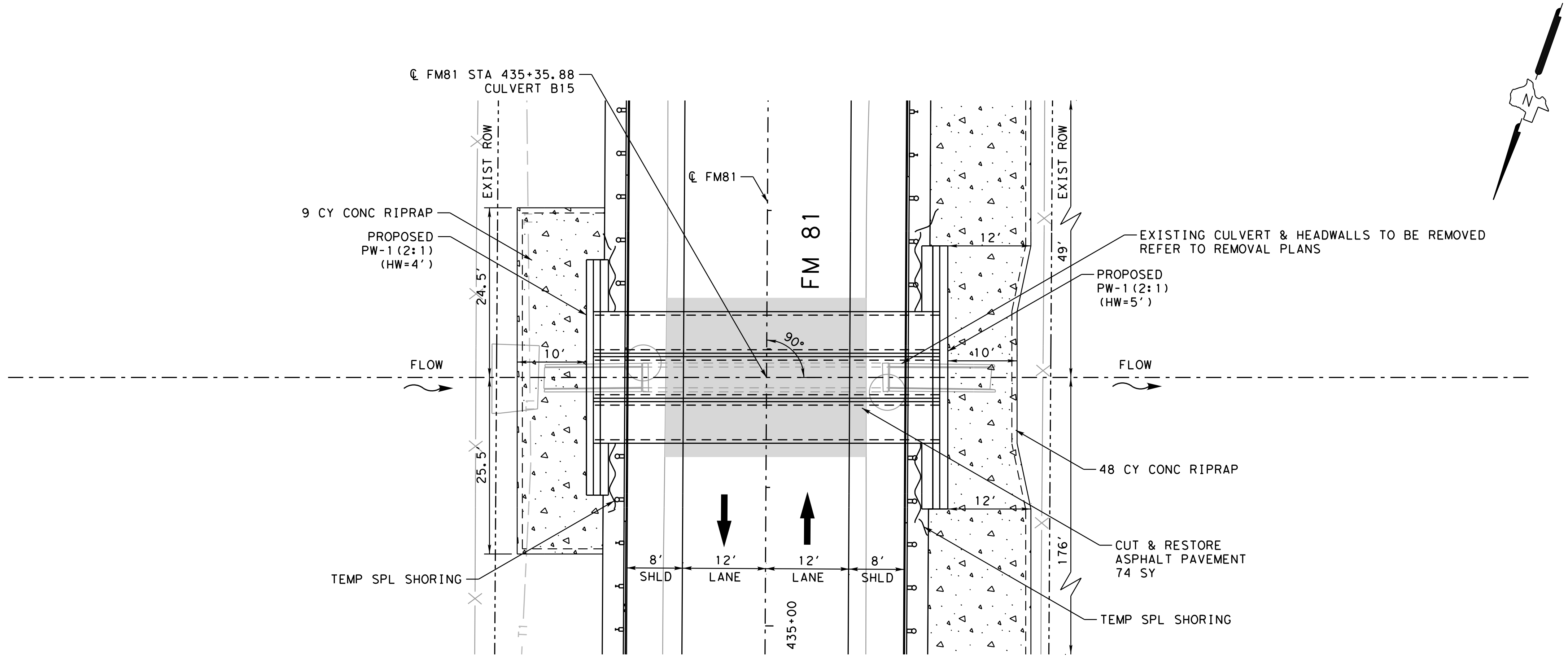
LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- OE — OVERHEAD ELECTRIC
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)



PLAN

CULVERT B15 HYDRAULIC DATA					
EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)	STORM FREQUENCY	CLV US WSEL (FT)	CLV DS WSEL (FT)
10 YR	337.13	335.61	10 YR	334.91	334.74
100 YR	337.43	336.02	100 YR	335.41	335.08

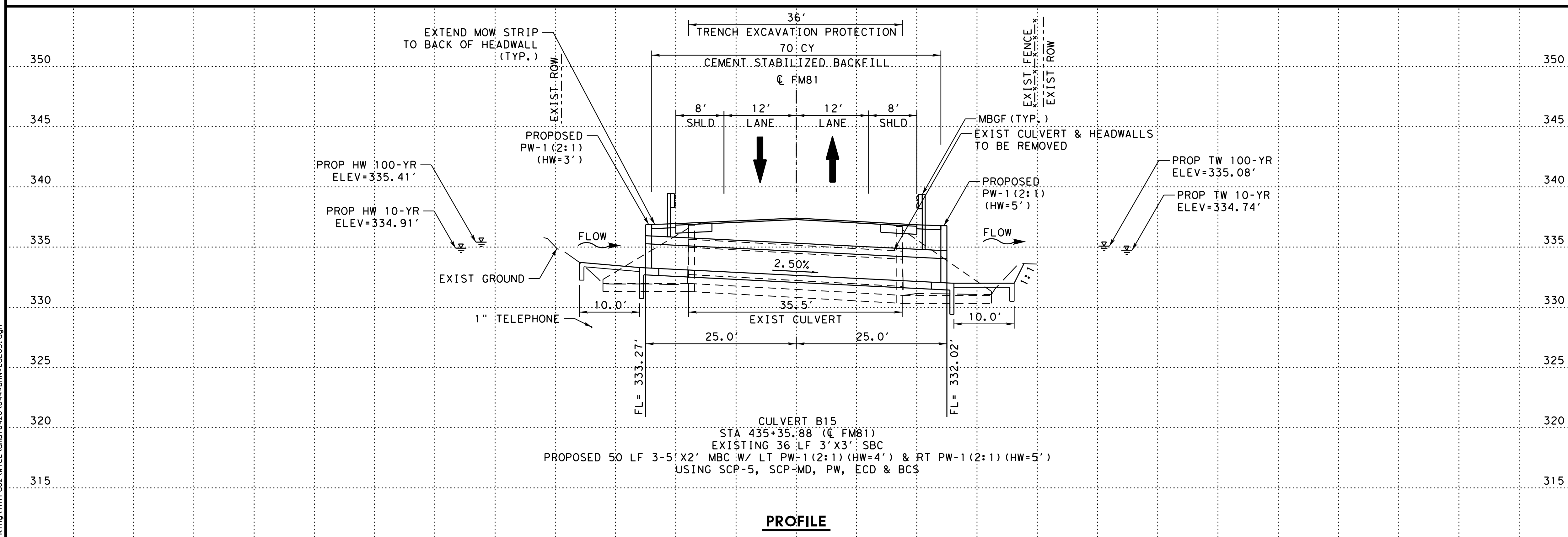
CULVERT B15 FLOW DATA					
EXISTING CONDITIONS			PROPOSED CONDITIONS		
STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)	STORM FREQUENCY	FLOW (CFS)	OUTLET VELOCITY (FPS)
10 YR	66	7.1	10 YR	66	2.2
100 YR	99	6.9	100 YR	99	3.3

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION.
2. SEE HORIZONTAL DATA SHEET FOR ROADWAY GEOMETRY DATA.

0 10 20
SCALE: 1"=20' H
1"=10' V

DATE	BY	REV	REVISION



CULVERT B15
STA 435+35.88 (℄ FM81)
EXISTING 36 LF 3'X3' SBC
PROPOSED 50 LF 3-5'X2' MBC W/ LT PW-1(2:1)(HW=4') & RT PW-1(2:1)(HW=5')
USING SCP-5, SCP-MD, PW, ECD & BCS

PROFILE

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/21/2022

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FM 81

CULVERT LAYOUT CULVERT B15

SCALE: 1"=20' H/10' V SHEET 3 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	112
CONTROL	SECTION	JOB	
0691	01	044	

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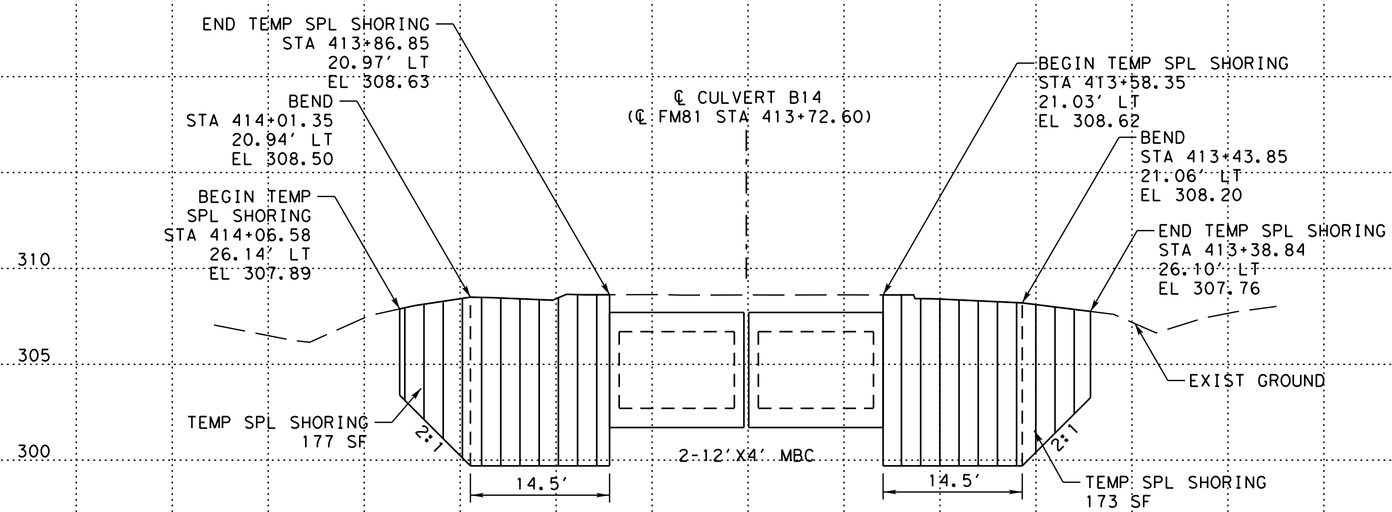
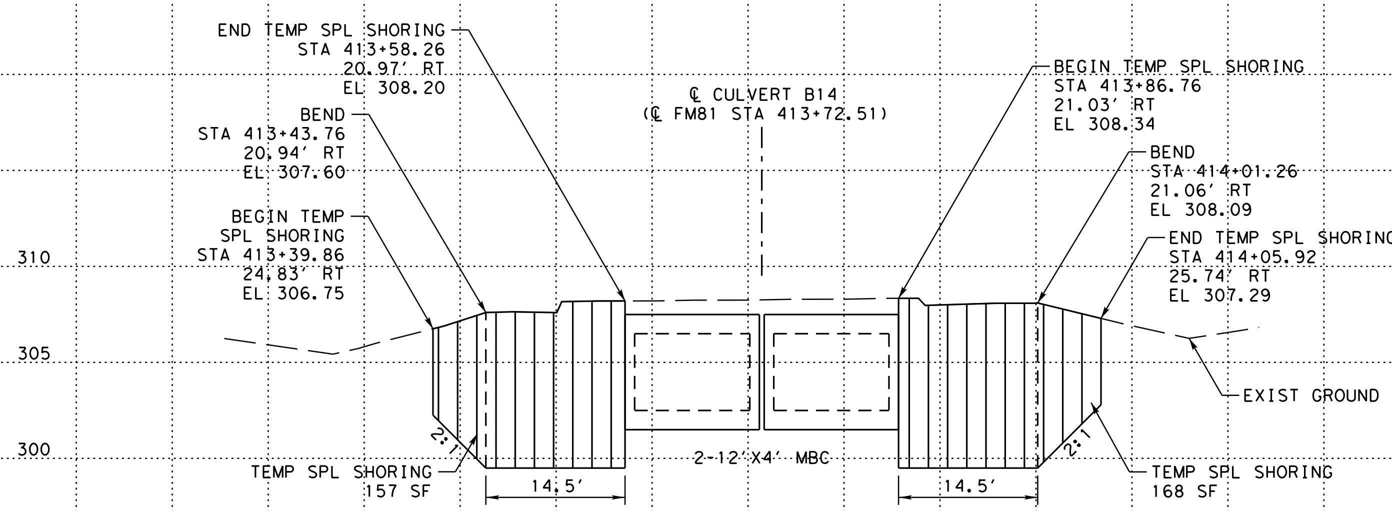


CULVERT B14 - TEMP SPL SHORING LEFT
EXISTING 47 LF 8'X5' SBC
PROPOSED 50 LF 2-12'X4' MBC W/ 2 PW-1(2:1)(HW=6')



CULVERT B14 - TEMP SPL SHORING RIGHT
EXISTING 47 LF 8'X5' SBC
PROPOSED 50 LF 2-12'X4' MBC W/ 2 PW-1(2:1)(HW=6')

0 10 20
SCALE: 1"=20' H
1"=10' V

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
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LICENSED
PROFESSIONAL ENGINEER
6/17/2022

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FM 81
TEMPORARY SPECIAL SHORING PROFILE
CULVERT B14

SCALE: 1"=20' H/10' V
SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	113
CONTROL	SECTION	JOB	
0691	01	044	

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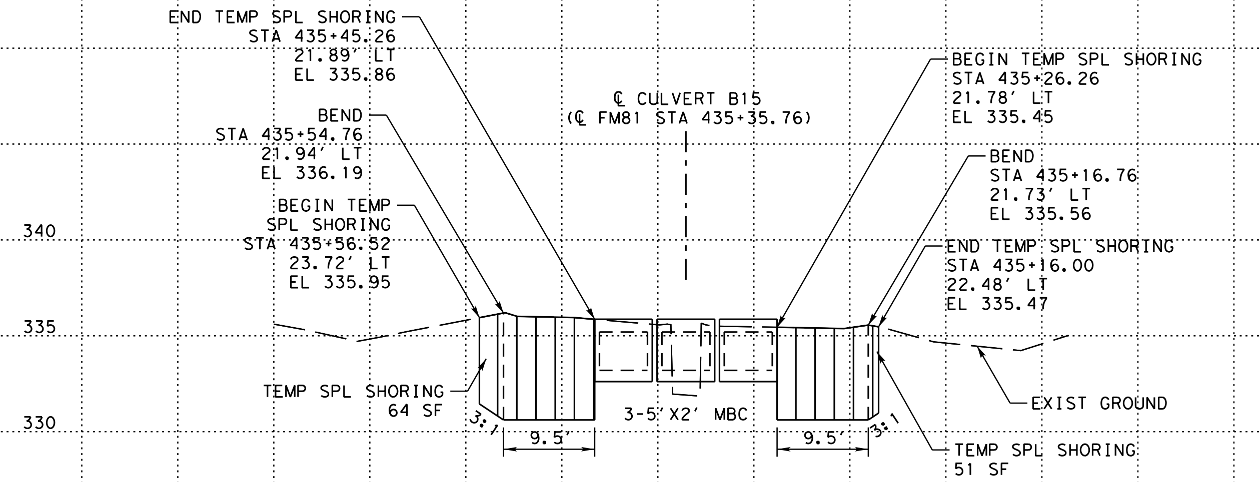
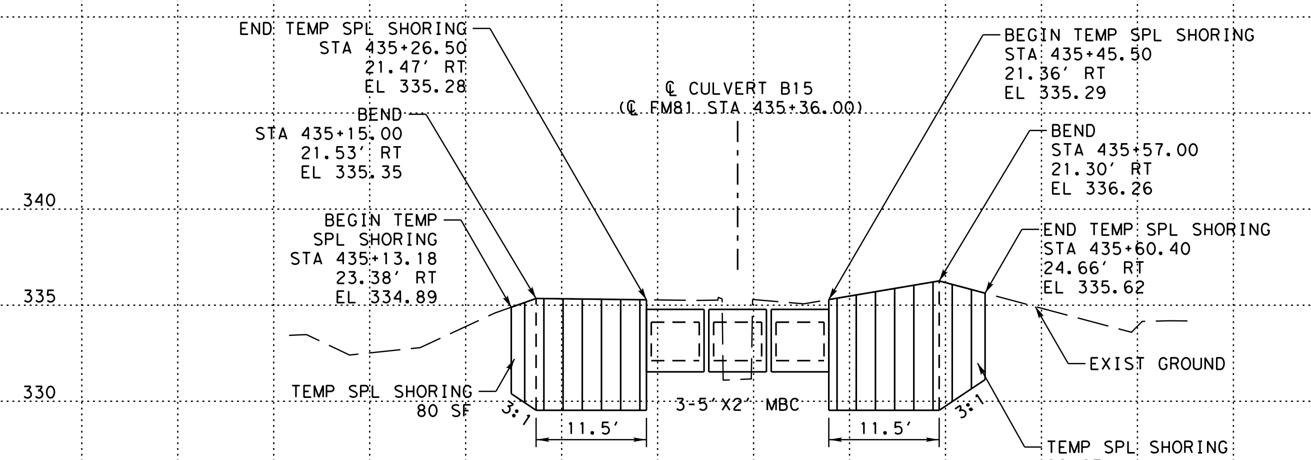


CULVERT B15 - TEMP SPL SHORING LEFT
EXISTING 36 LF 3'X3' SBC
PROPOSED 50 LF 3-5'X2' MBC W/ LT PW-1(2:1)(HW=4') & RT PW-1(2:1)(HW=5')



CULVERT B15 - TEMP SPL SHORING RIGHT
EXISTING 36 LF 3'X3' SBC
PROPOSED 50 LF 3-5'X2' MBC W/ LT PW-1(2:1)(HW=4') & RT PW-1(2:1)(HW=5')

0 10 20
SCALE: 1"=20' H
1"=10' V

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
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6/17/2022

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FM 81
TEMPORARY SPECIAL SHORING PROFILE
CULVERT B15

SCALE: 1"=20' H/10' V — SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	114
CONTROL	SECTION	JOB	
0691	01	044	

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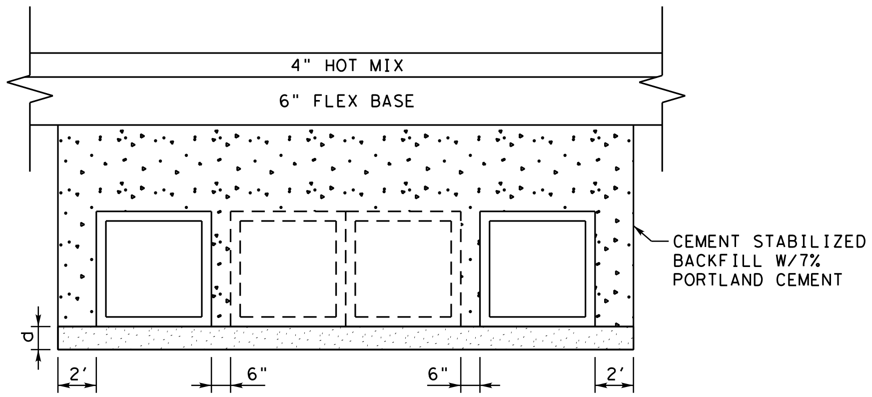


MULTIPLE BOX CULVERT
TYPICAL CEMENT
STABILIZED BACKFILL DETAIL

D or S	d
≤ 27"	3"
30" to 60"	4"
≥ 66"	6"

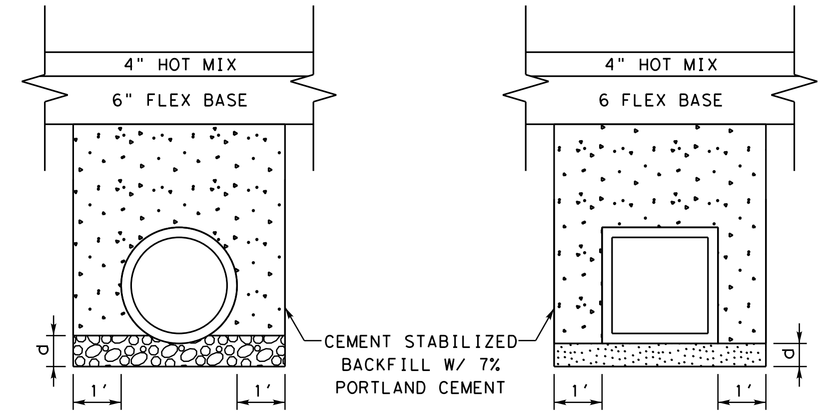
D - INSIDE DIAMETER OF PIPE

S - BOX CULVERT SPAN LENGTH

d - MIN. BEDDING MATERIAL BELOW PIPE/BOX

COMPACTED GRANULAR MATERIAL

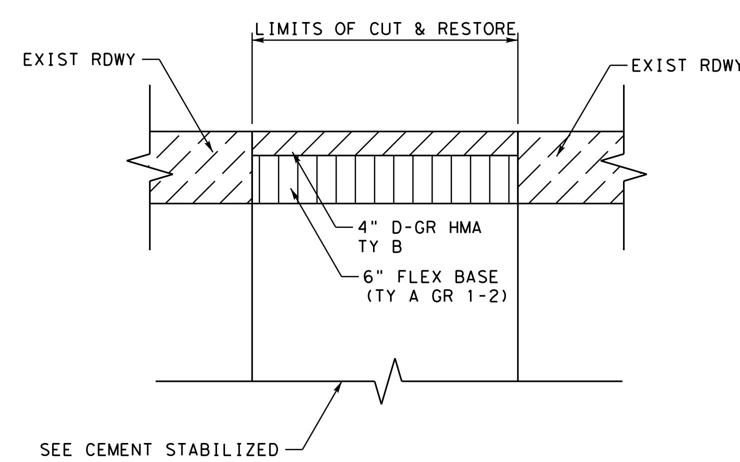
FINE GRANULAR MATERIAL (2 IN. MIN)



TYPICAL CEMENT
STABILIZED BACKFILL
DETAIL

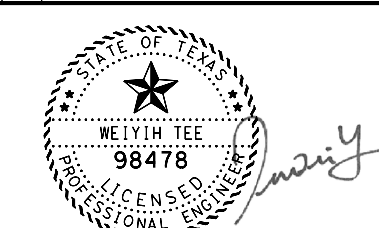
NOTES

1. FOR PAYMENT OF CEMENT STABILIZED BACKFILL REFER TO SUMMARY OF DRAINAGE ITEMS - ITEM 400 CEM STABIL BKFL.
2. REFER TO SCP-MD FOR ADDITIONAL DETAIL ON CEMENT STABILIZED BACKFILL FOR MULTIPLE BOX CULVERT.
3. THE LENGTH LIMITS FOR CEMENT STABILIZED BACKFILL SHALL EXTEND 1' BEYOND THE PAVEMENT EDGE.
4. ANY EXCAVATION WIDTH EXCEEDING THE LIMITS SHOWN SHALL BE BACKFILLED IN ACCORDANCE WITH THIS SHEET.
5. FOR CUT AND RESTORE, PAVEMENT STRUCTURE QUANTITIES SHALL BE SUBSIDIARY TO ITEM 400-6008 CUT AND RESTORE ASPH PAVING.
6. BEDDING SHALL BE SUBSIDIARY TO ITEMS 462 & 464.
7. ANY LABOR, EQUIPMENT AND MATERIALS REQUIRED FOR CONSTRUCTION EXCEEDING THE WIDTHS SHOWN ARE SUBSIDIARY TO PERTINENT ITEMS.



CUT & RESTORE PAVEMENT DETAIL

DATE	BY	REV	REVISION



6/17/2022

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FM 81

MISCELLANEOUS DRAINAGE DETAILS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	115
CONTROL	SECTION	JOB	
0691	01	044	

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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)
CULVERT B13 STA 371+96.46 (Lt)	2 ~ 4' X 3'	2.5'	SCP-4	SETB-CD	0	3:1	5"	5"	0.333	3.500	N/A	N/A	9.500	N/A	10.500	0.0	0.1	3.6	N/A
CULVERT B13 STA 371+96.46 (Rt)	2 ~ 4' X 3'	2.5'	SCP-4	SETB-CD	0	3:1	5"	5"	1.333	4.500	N/A	N/A	12.500	N/A	10.500	0.0	0.5	5.1	N/A
CULVERT B14 STA 413+72.56 (Lt)	2 ~ 12' X 4'	1.5'	SCP-12	PW-1	0	2:1	12"	12"	1.021	6.021	N/A	N/A	12.042	28.500	N/A	0.0	1.1	11.5	145
CULVERT B14 STA 413+72.56 (Rt)	2 ~ 12' X 4'	1.5'	SCP-12	PW-1	0	2:1	12"	12"	1.125	6.125	N/A	N/A	12.250	28.500	N/A	0.0	1.2	11.6	150
CULVERT B15 STA 435+35.88 (Lt)	3 ~ 5' X 2'	2.5'	SCP-5	PW-1	0	2:1	6"	6"	0.938	3.438	N/A	N/A	6.875	19.000	N/A	0.0	0.7	4.6	47
CULVERT B15 STA 435+35.88 (Rt)	3 ~ 5' X 2'	2.5'	SCP-5	PW-1	0	2:1	6"	6"	2.083	4.583	N/A	N/A	9.167	19.000	N/A	0.0	1.5	7.2	84

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.

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STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		116

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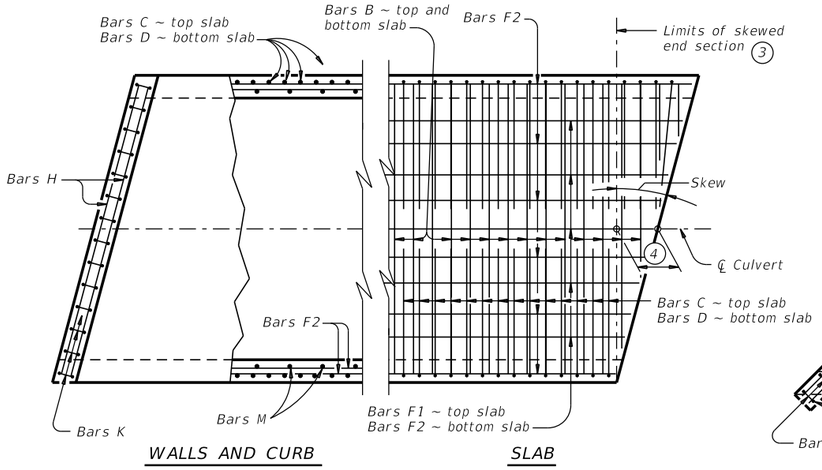
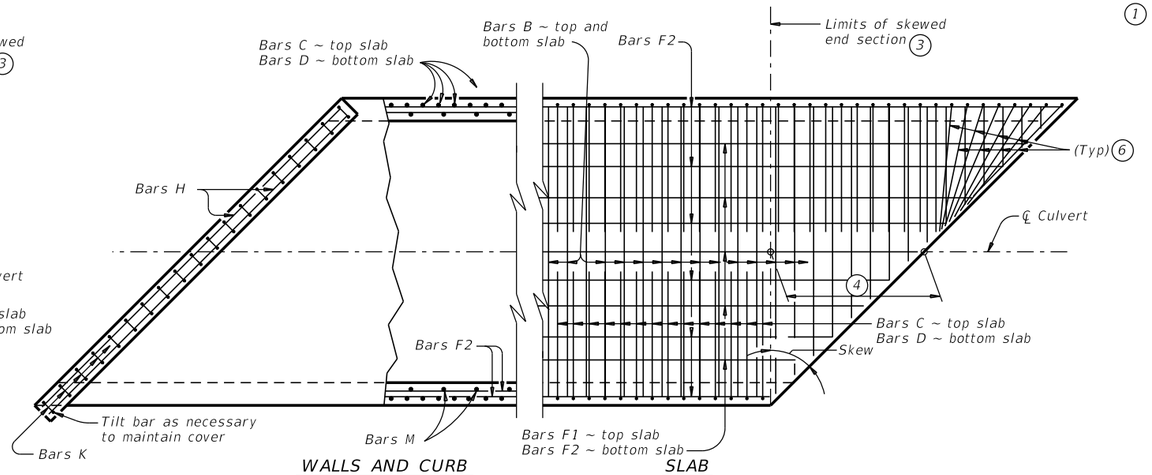
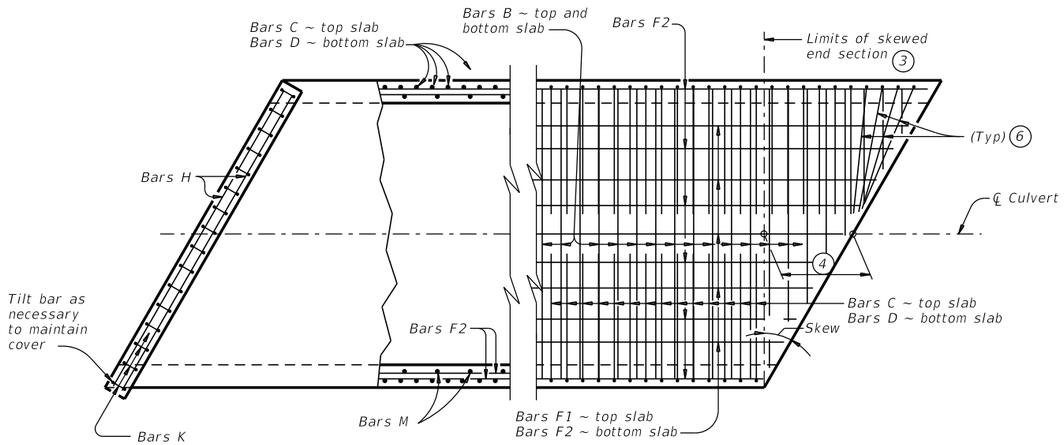


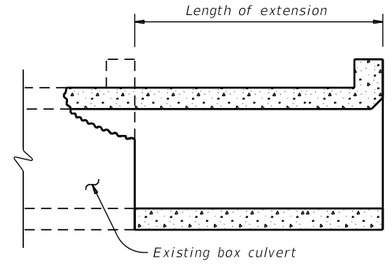
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



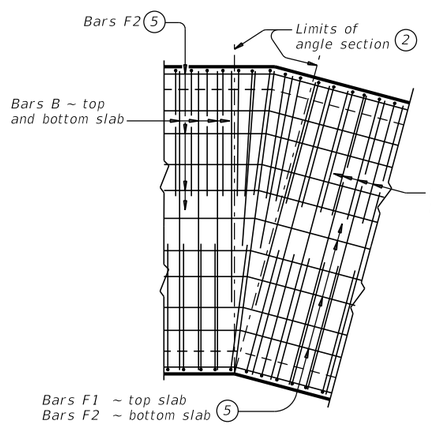
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



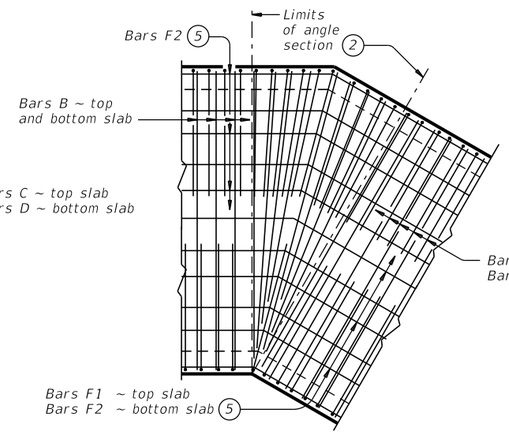
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



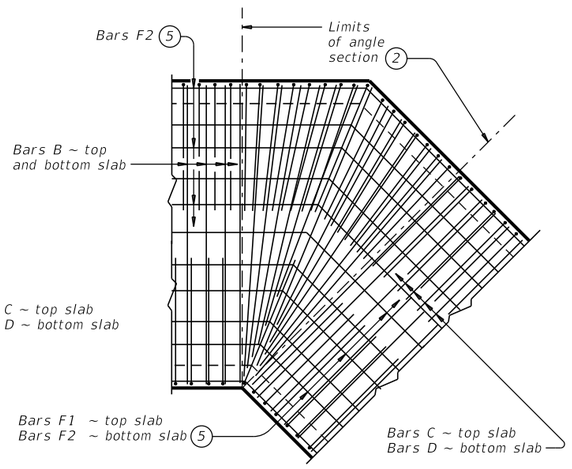
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

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

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

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

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

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

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

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

(6) When necessary to avoid 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, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast–In–Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		117

DATE: 6/17/2022 1:29:02 PM
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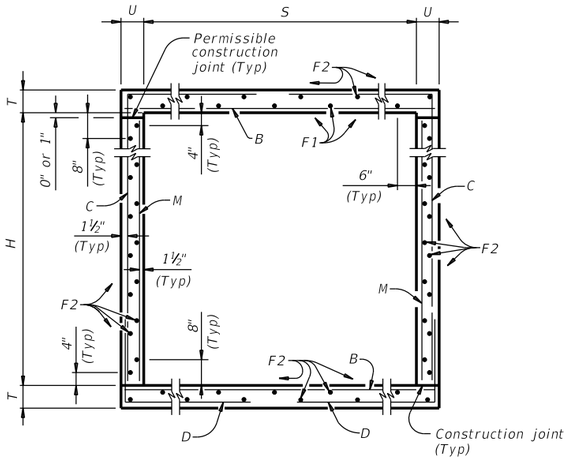
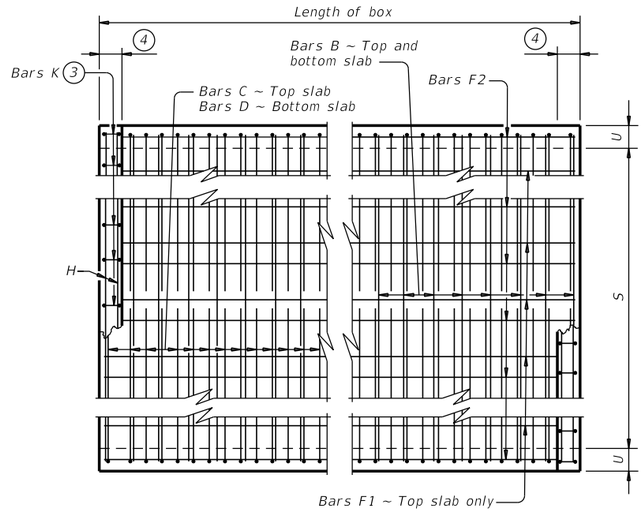
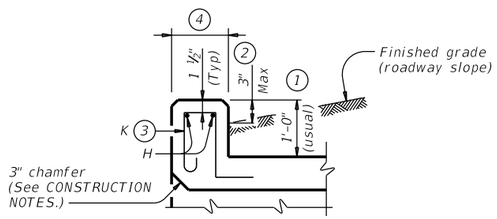


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

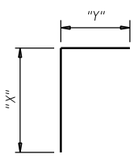
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts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

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

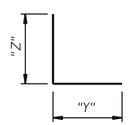
GENERAL NOTES:

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

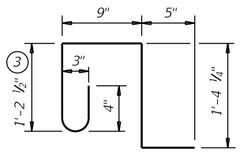
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	CRP	KARNES		118

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																											QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	CRP	KARNES		119

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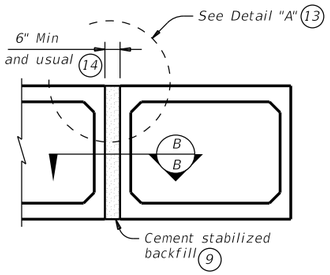
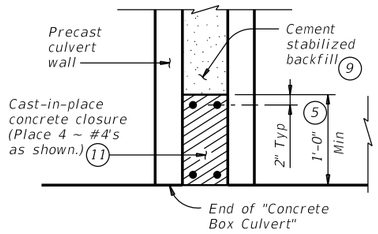
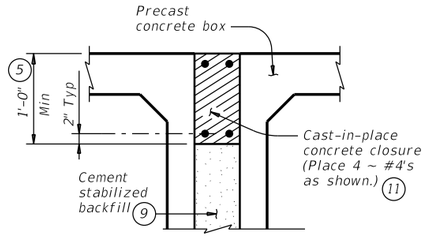


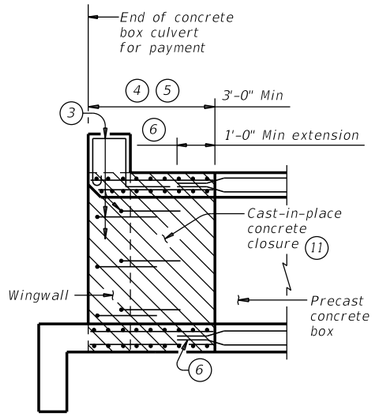
MULTIPLE UNIT PLACEMENT



SECTION B-B

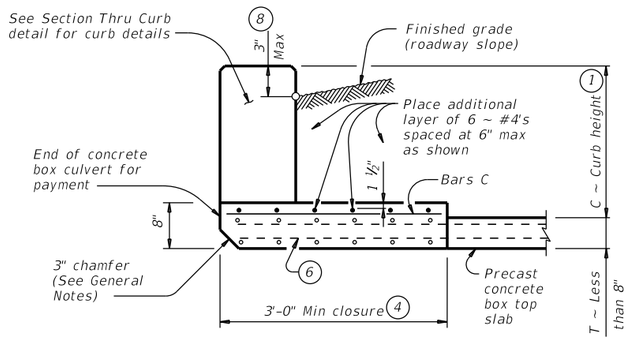


DETAIL "A" (13)

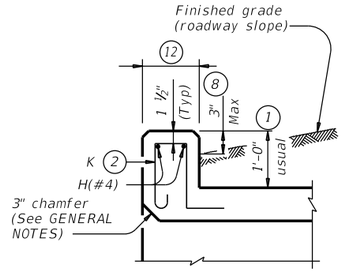


WINGWALL CONNECTION

(Also applies to safety end treatment.)

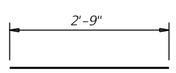


SECTION THRU TOP SLABS LESS THAN 8"

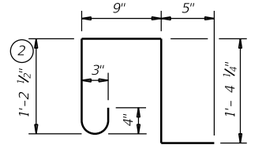


SECTION THRU CURB

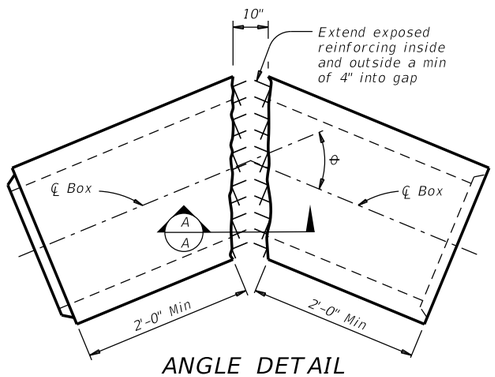
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



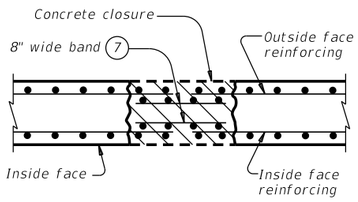
BARS C (#4)
(Spa = 1'–0" Max)



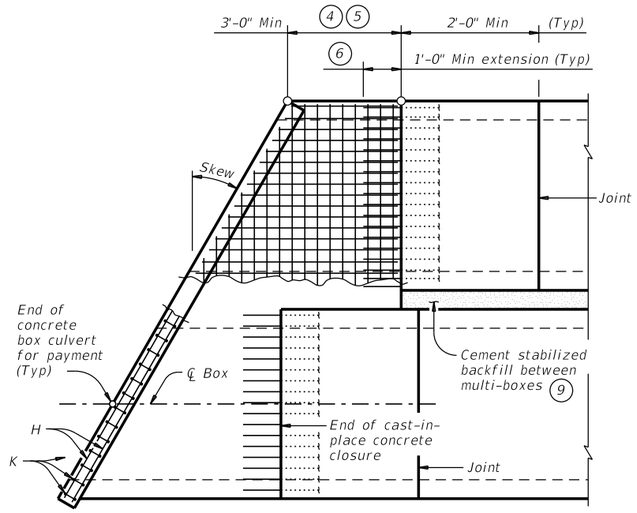
BARS K (#4)
(Spa = 1'–0" Max)
(Length = 4'–2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		120

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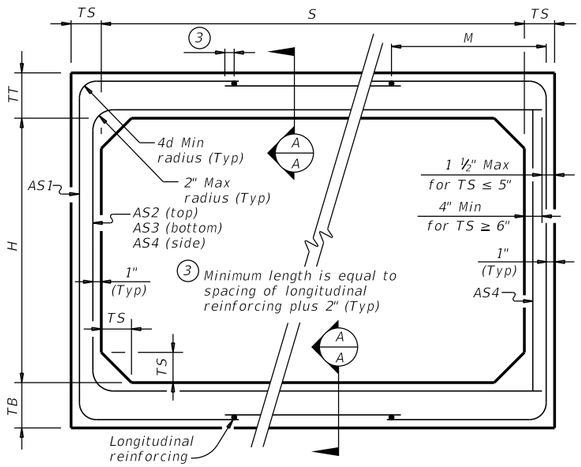
BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	–	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	–	–	–	3.6
4	2	5	5	5	3 – 5	38	0.13	0.13	0.13	0.12	–	–	–	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	–	–	–	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	–	–	–	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	–	–	–	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	–	–	–	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	–	–	–	3.6
4	3	7.5	6	5	< 2	–	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	–	–	–	4.1
4	3	5	5	5	3 – 5	38	0.12	0.16	0.16	0.12	–	–	–	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	–	–	–	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	–	–	–	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	–	–	–	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	–	–	–	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	–	–	–	4.1
4	4	7.5	6	5	< 2	–	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	–	–	–	4.6
4	4	5	5	5	3 – 5	38	0.12	0.18	0.18	0.12	–	–	–	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	–	–	–	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	–	–	–	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	–	–	–	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	–	–	–	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	–	–	–	4.6

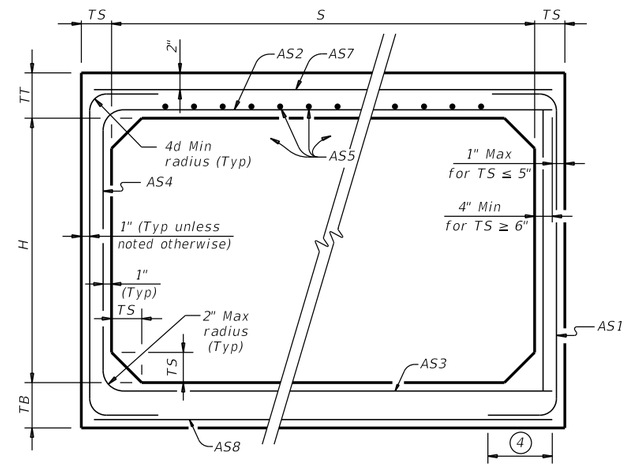
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

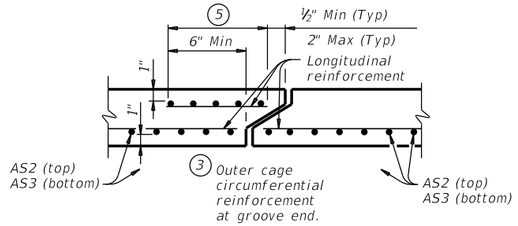
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

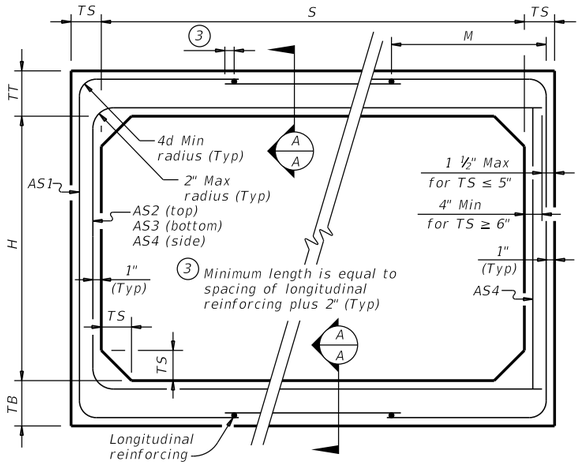
FILE: scp04sts-20.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		121

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9

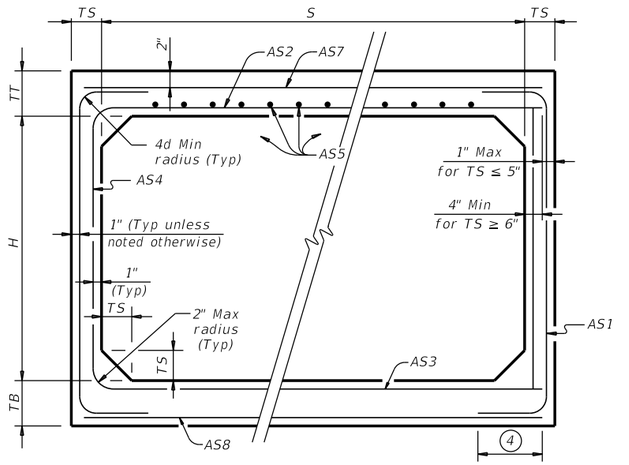
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

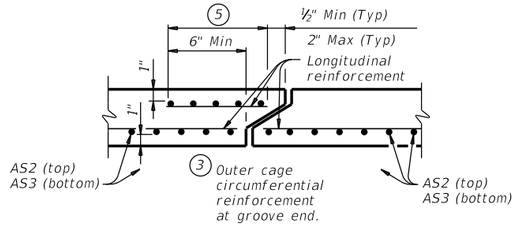
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		122

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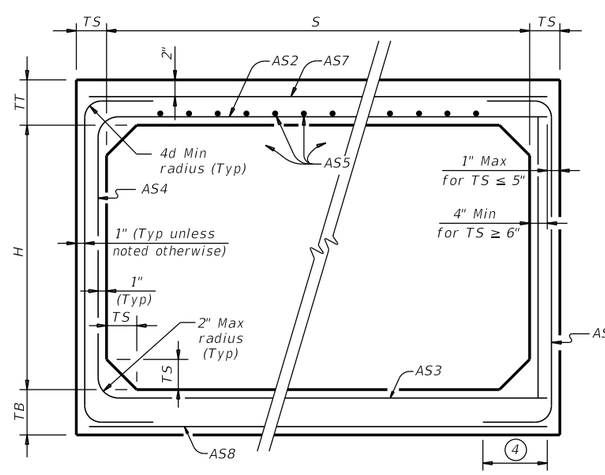
DATE: 6/17/2022 1:29:37 PM
FILE: c:\pw_working\infra02\wtee\dms10422\scp12sts-20.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
12	4	12	12	12	< 2	–	0.38	0.31	0.29	0.29	0.29	0.29	0.29	22.8
12	4	12	12	12	2 < 3	73	0.44	0.37	0.30	0.29	–	–	–	22.8
12	4	12	12	12	3 – 5	66	0.37	0.30	0.29	0.29	–	–	–	22.8
12	4	12	12	12	10	66	0.44	0.34	0.35	0.29	–	–	–	22.8
12	4	12	12	12	15	59	0.60	0.46	0.48	0.29	–	–	–	22.8
12	4	12	12	12	20	59	0.78	0.60	0.61	0.29	–	–	–	22.8
12	4	12	12	12	25	59	0.97	0.74	0.75	0.29	–	–	–	22.8
12	5	12	12	12	< 2	–	0.34	0.33	0.29	0.29	0.29	0.29	0.29	24.0
12	5	12	12	12	2 < 3	66	0.41	0.40	0.33	0.29	–	–	–	24.0
12	5	12	12	12	3 – 5	61	0.34	0.33	0.30	0.29	–	–	–	24.0
12	5	12	12	12	10	59	0.41	0.38	0.39	0.29	–	–	–	24.0
12	5	12	12	12	15	59	0.55	0.51	0.52	0.29	–	–	–	24.0
12	5	12	12	12	20	59	0.71	0.66	0.67	0.29	–	–	–	24.0
12	5	12	12	12	25	59	0.88	0.81	0.82	0.29	–	–	–	24.0
12	6	12	12	12	< 2	–	0.32	0.36	0.32	0.29	0.29	0.29	0.29	25.2
12	6	12	12	12	2 < 3	66	0.38	0.43	0.36	0.29	–	–	–	25.2
12	6	12	12	12	3 – 5	59	0.32	0.36	0.33	0.29	–	–	–	25.2
12	6	12	12	12	10	59	0.38	0.41	0.42	0.29	–	–	–	25.2
12	6	12	12	12	15	53	0.51	0.55	0.57	0.29	–	–	–	25.2
12	6	12	12	12	20	53	0.65	0.71	0.72	0.29	–	–	–	25.2
12	6	12	12	12	25	53	0.81	0.87	0.89	0.29	–	–	–	25.2
12	7	12	12	12	< 2	–	0.30	0.39	0.35	0.29	0.29	0.29	0.29	26.4
12	7	12	12	12	2 < 3	66	0.35	0.46	0.39	0.29	–	–	–	26.4
12	7	12	12	12	3 – 5	59	0.29	0.38	0.36	0.29	–	–	–	26.4
12	7	12	12	12	10	59	0.36	0.43	0.45	0.29	–	–	–	26.4
12	7	12	12	12	15	53	0.47	0.58	0.61	0.29	–	–	–	26.4
12	7	12	12	12	20	53	0.61	0.75	0.77	0.29	–	–	–	26.4
12	8	12	12	12	< 2	–	0.29	0.41	0.38	0.29	0.29	0.29	0.29	27.6
12	8	12	12	12	2 < 3	66	0.33	0.49	0.42	0.29	–	–	–	27.6
12	8	12	12	12	3 – 5	59	0.29	0.41	0.38	0.29	–	–	–	27.6
12	8	12	12	12	10	59	0.34	0.46	0.48	0.29	–	–	–	27.6
12	8	12	12	12	15	53	0.44	0.61	0.64	0.29	–	–	–	27.6
12	8	12	12	12	20	53	0.57	0.78	0.81	0.29	–	–	–	27.6
12	8	12	12	12	25	53	0.69	0.96	0.99	0.29	–	–	–	27.6

BOX DATA

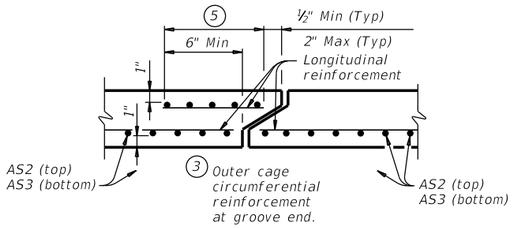
SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
12	9	12	12	12	< 2	–	0.29	0.43	0.40	0.29	0.29	0.29	0.29	28.8
12	9	12	12	12	2 < 3	66	0.30	0.51	0.45	0.29	–	–	–	28.8
12	9	12	12	12	3 – 5	66	0.29	0.43	0.41	0.29	–	–	–	28.8
12	9	12	12	12	10	59	0.32	0.47	0.51	0.29	–	–	–	28.8
12	9	12	12	12	15	53	0.42	0.63	0.67	0.29	–	–	–	28.8
12	9	12	12	12	20	53	0.53	0.81	0.85	0.29	–	–	–	28.8
12	9	12	12	12	25	53	0.69	0.96	0.99	0.29	–	–	–	28.8
12	10	12	12	12	< 2	–	0.29	0.45	0.43	0.29	0.29	0.29	0.29	30.0
12	10	12	12	12	2 < 3	73	0.29	0.54	0.48	0.29	–	–	–	30.0
12	10	12	12	12	3 – 5	66	0.29	0.45	0.43	0.29	–	–	–	30.0
12	10	12	12	12	10	59	0.31	0.49	0.53	0.29	–	–	–	30.0
12	10	12	12	12	15	53	0.40	0.65	0.70	0.29	–	–	–	30.0
12	10	12	12	12	20	53	0.51	0.84	0.88	0.29	–	–	–	30.0
12	10	12	12	12	25	53	0.62	1.03	1.07	0.29	–	–	–	30.0
12	11	12	12	12	< 2	–	0.29	0.47	0.45	0.29	0.29	0.29	0.29	31.2
12	11	12	12	12	2 < 3	80	0.29	0.56	0.51	0.29	–	–	–	31.2
12	11	12	12	12	3 – 5	73	0.29	0.47	0.46	0.29	–	–	–	31.2
12	11	12	12	12	10	66	0.29	0.51	0.55	0.29	–	–	–	31.2
12	11	12	12	12	15	59	0.38	0.67	0.72	0.29	–	–	–	31.2
12	11	12	12	12	20	53	0.48	0.85	0.91	0.29	–	–	–	31.2
12	11	12	12	12	25	53	0.59	1.05	1.10	0.29	–	–	–	31.2
12	12	12	12	12	< 2	–	0.29	0.49	0.48	0.33	0.29	0.29	0.29	32.4
12	12	12	12	12	2 < 3	93	0.29	0.59	0.53	0.29	–	–	–	32.4
12	12	12	12	12	3 – 5	80	0.29	0.49	0.48	0.29	–	–	–	32.4
12	12	12	12	12	10	73	0.29	0.52	0.58	0.29	–	–	–	32.4
12	12	12	12	12	15	59	0.37	0.69	0.74	0.29	–	–	–	32.4
12	12	12	12	12	20	59	0.46	0.87	0.93	0.29	–	–	–	32.4



CORNER OPTION "A" CORNER OPTION "B"

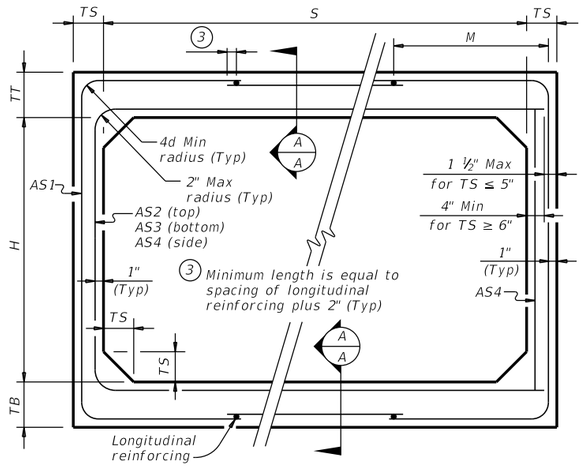
FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER

(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

MATERIAL NOTES:

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HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

12'-0" SPAN

SCP-12

FILE: scp12sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		123

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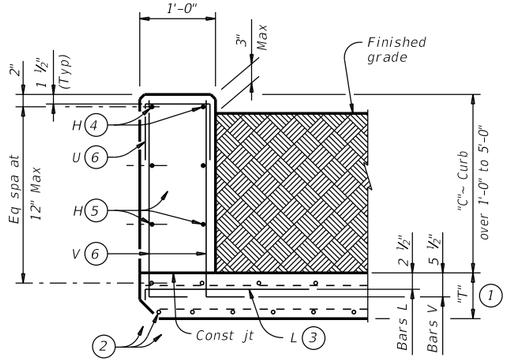
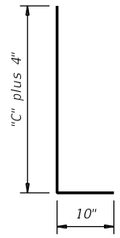
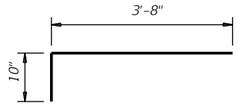


TYPICAL SECTION

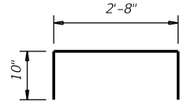
Used for curbs over 1'-0" to 5'-0"



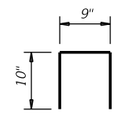
BARS V (#5) (6)
Spaced at 12" Max



BARS L (#5) (3)
Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)
Spaced at 12" Max



BARS U (#4) (6)
Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	15.6
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.3
4'-0"	0.148	22.4
4'-6"	0.167	24.8
5'-0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

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) minimum for curbs.

Provide bar laps, where required, as follows:

- Uncoated or galvanized ~ #4 = 1'-8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

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

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

FILE: ecdstde1-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		124

DATE: 6/17/2022 1:29:54 PM
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

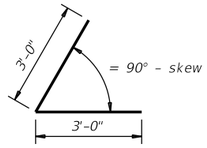
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

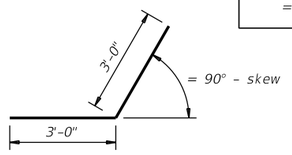
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

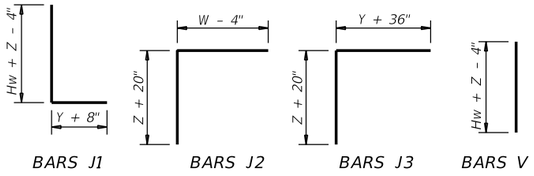
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

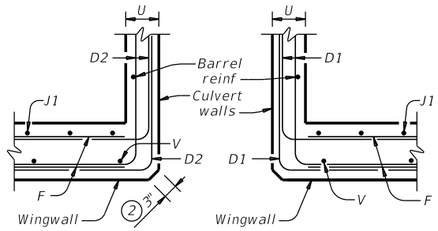
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

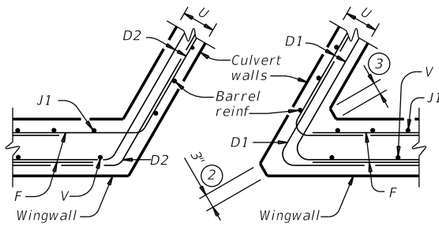
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

See applicable box culvert standard sheet for S, H, T, and U values.



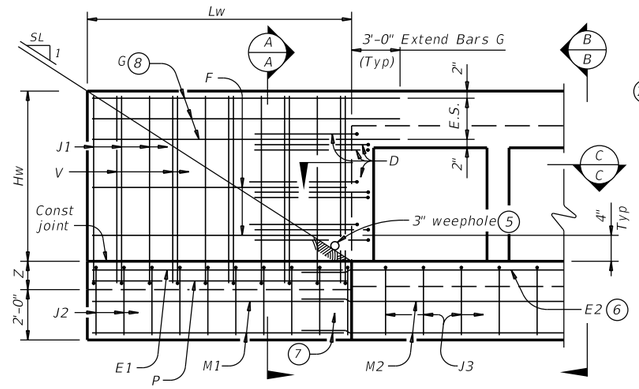
SECTION C-C - PW-1



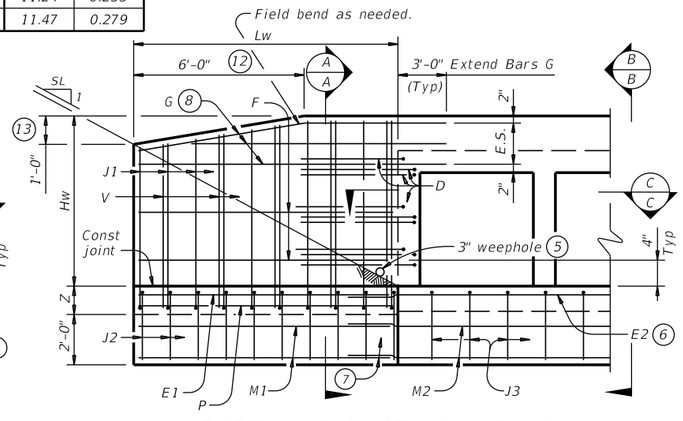
SECTION C-C - PW-2

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

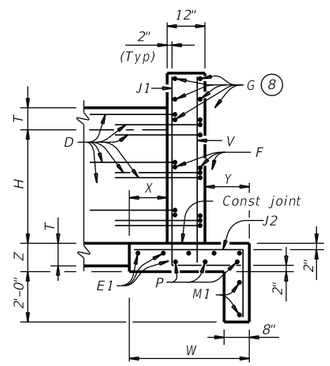
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.



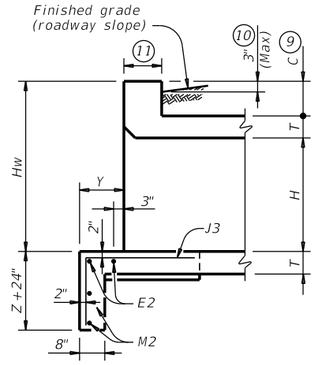
PARTIAL ELEVATION - PW-1



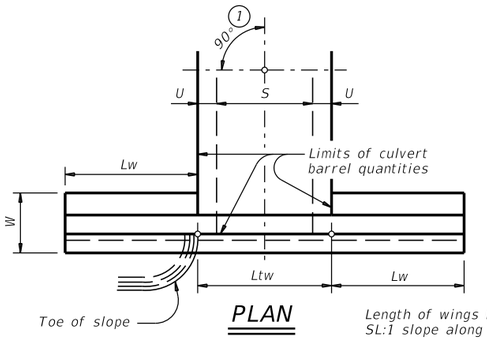
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

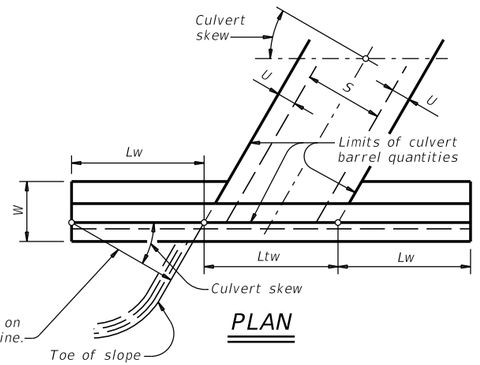


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

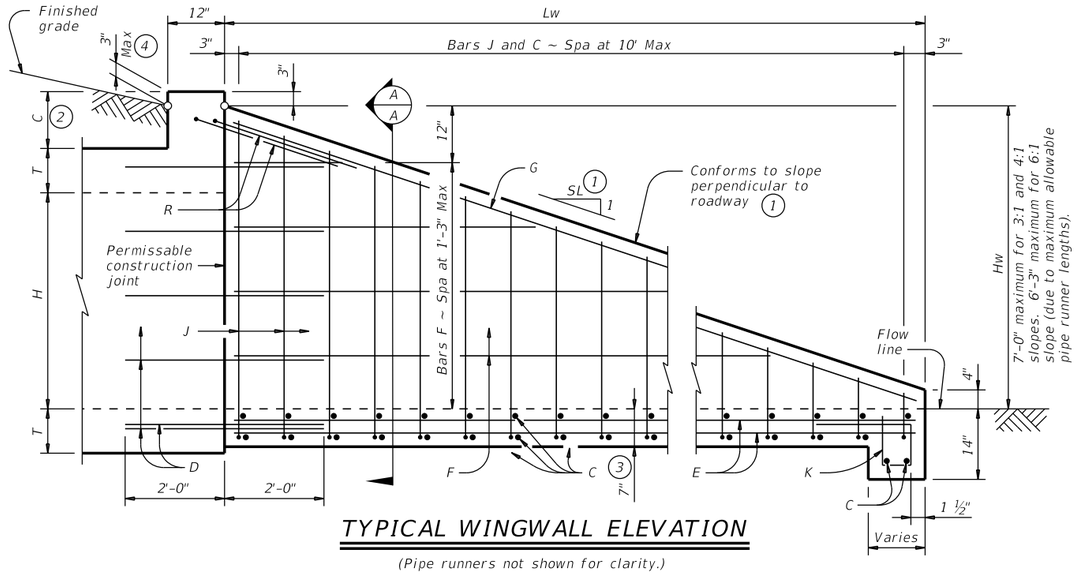
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

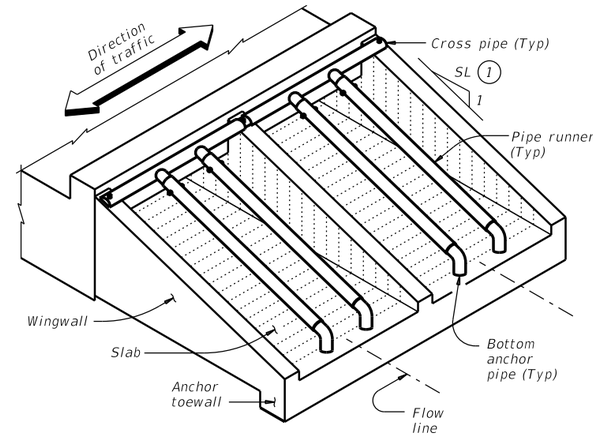
PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		125



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)
$= [(\text{Wingwall Area}) (0.583') +$
$(Lw) (Atw) (0.583') +$
$(Atw) (1.167') (1.167' - 0.583')] \div (27)$

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
$= (Lw) (K1) - (1.917')$

Total Reinforcing (Lb)
$= (1.55) (Lw) (Atw) +$
$(4.43) (Atw) +$
$(K2) (Hw) (N + 1) (\sqrt{Lw})$

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.

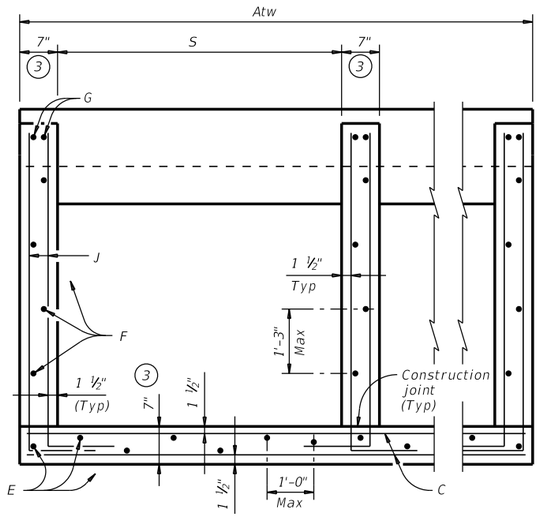
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

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.

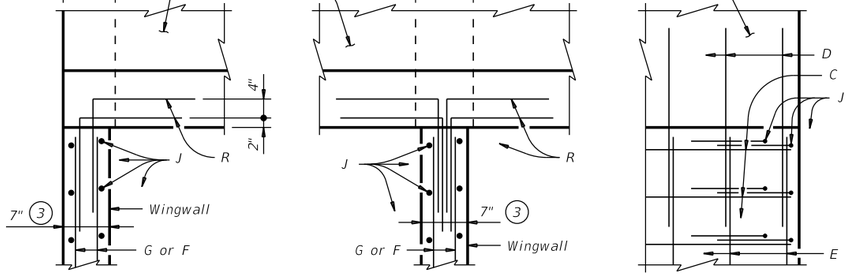
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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.)



AT TOP OF EXTERIOR WINGWALL

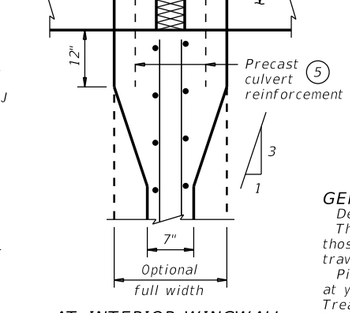
(Cast-in-place culvert)

AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)

AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

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

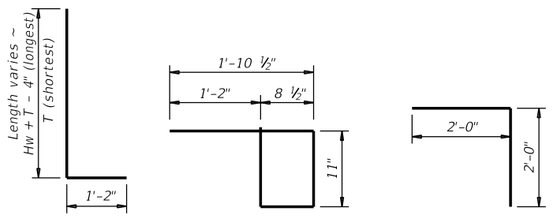
(1) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(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.



SHEET 1 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: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		126

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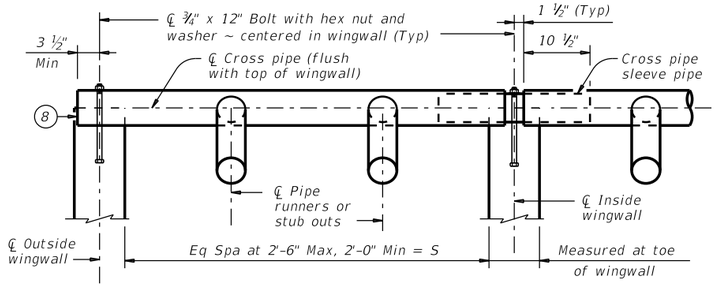
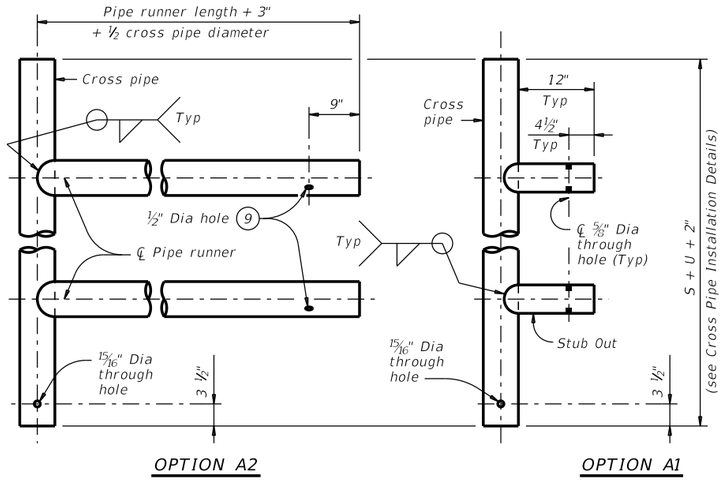
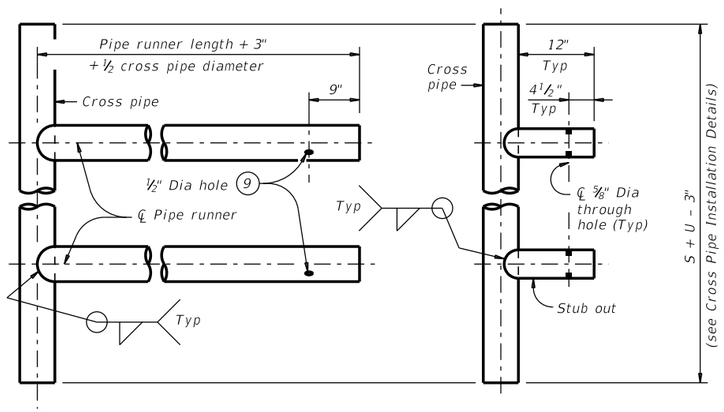


NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a $^{15}/_{16}$" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS

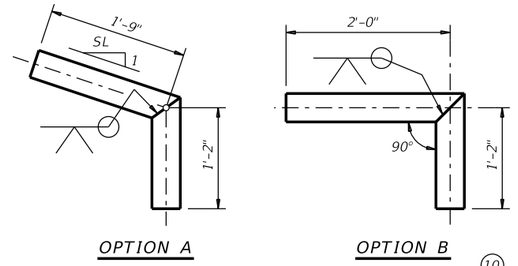


FOR USE IN OUTSIDE CULVERT BAY

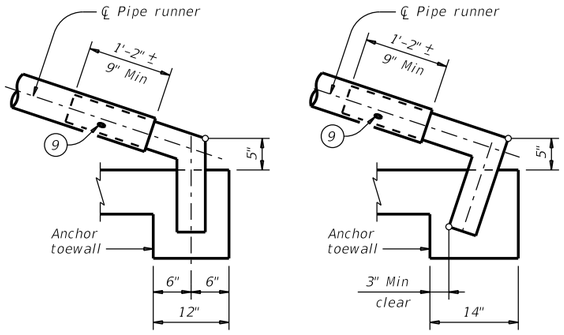


FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS

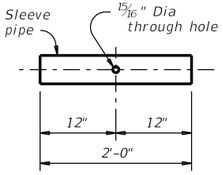


BOTTOM ANCHOR PIPE DETAILS (10)

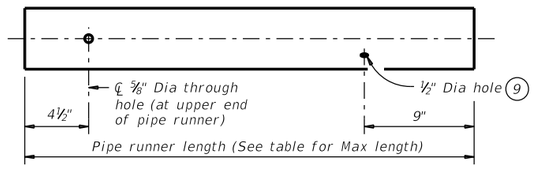


BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

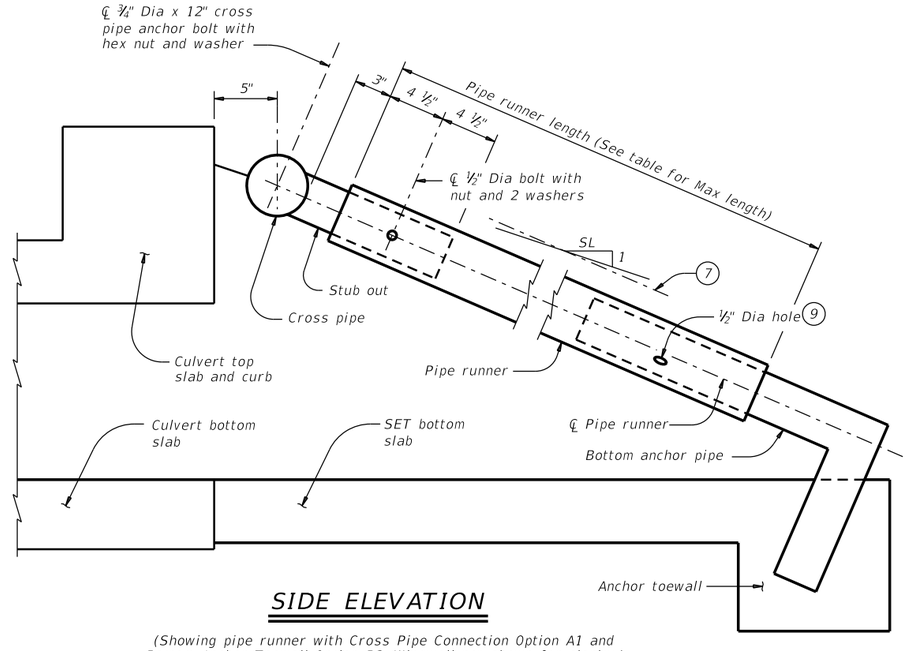


CROSS PIPE SLEEVE PIPE DETAILS



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

PIPE RUNNER DETAILS



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

(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"

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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: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
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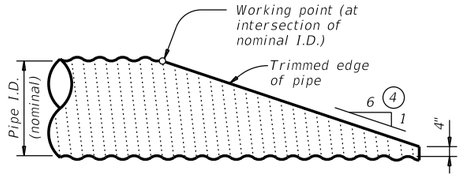
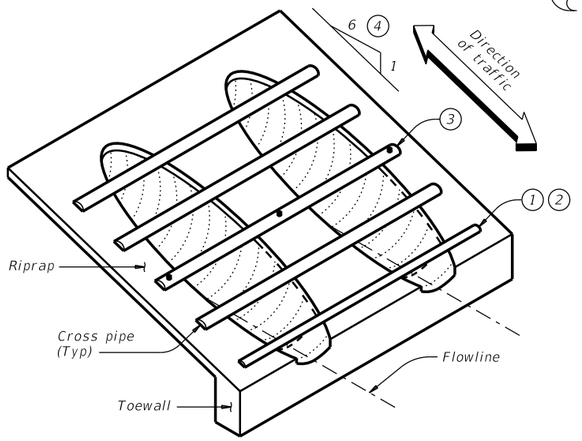


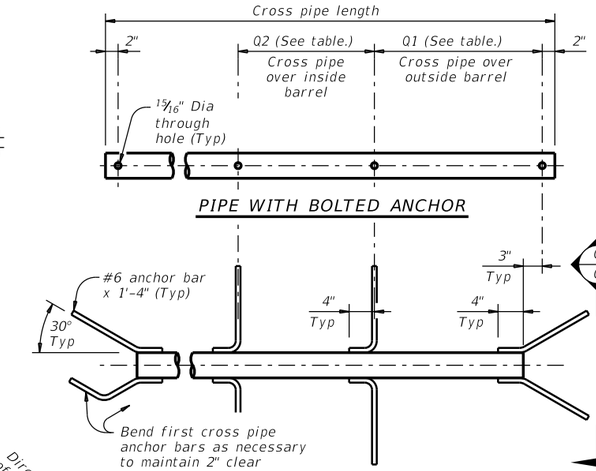
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

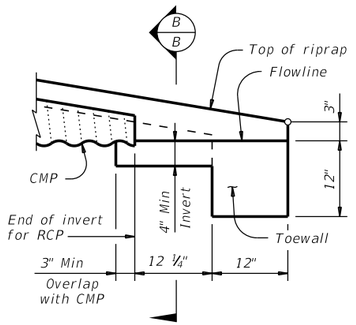
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

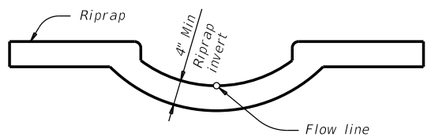


CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

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

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

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

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

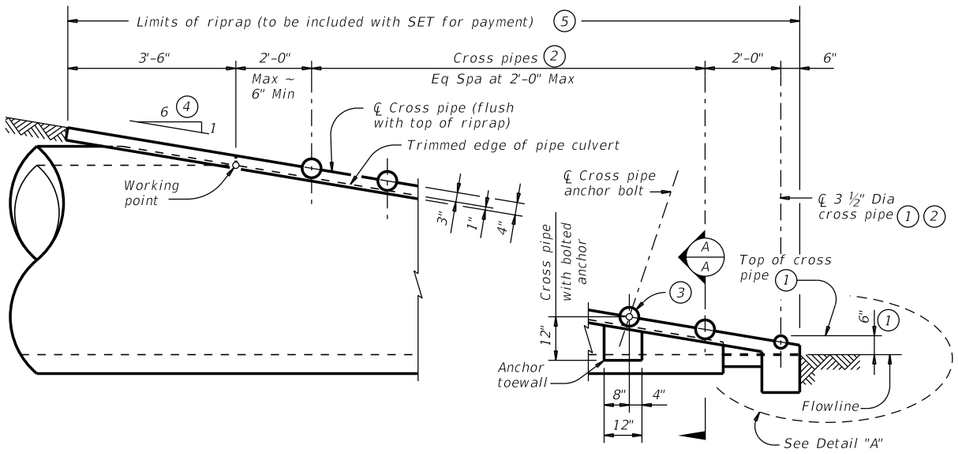
GENERAL NOTES:

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

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

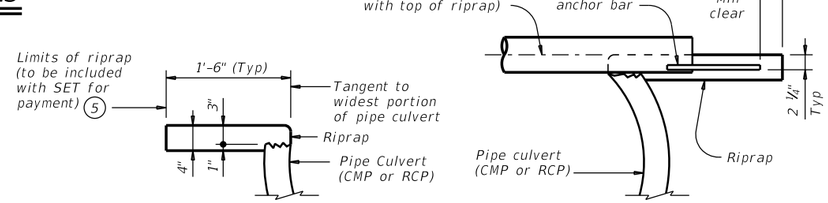
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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



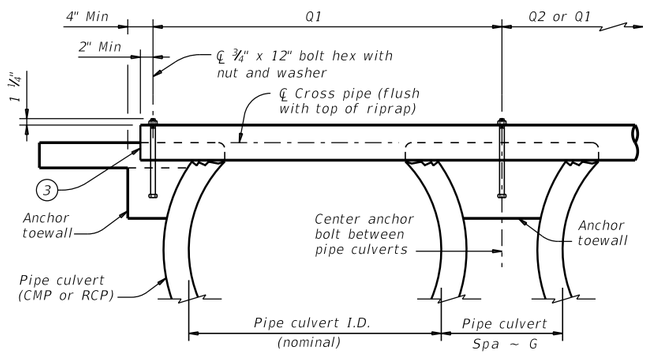
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-PD

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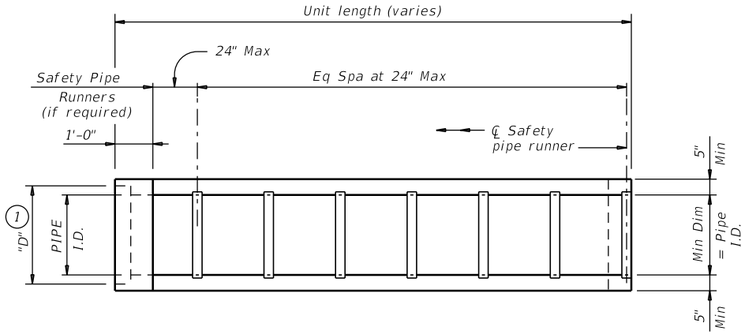
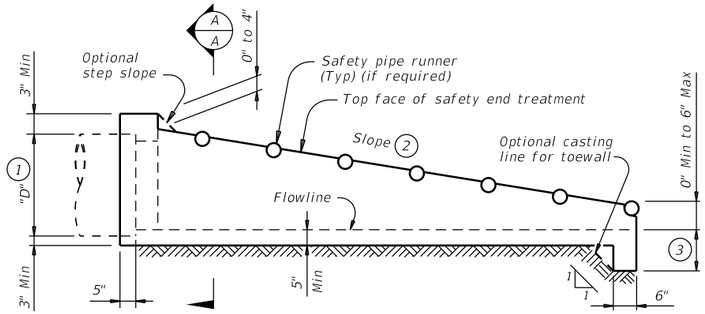


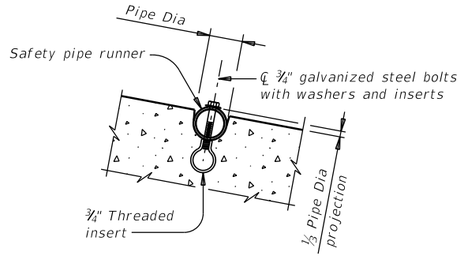
PLAN

(Showing bell end connection.)



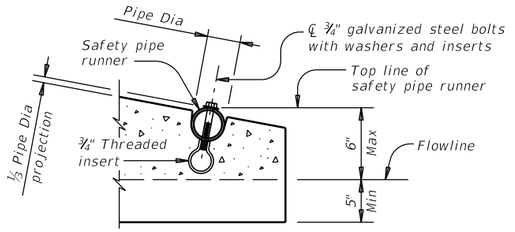
LONGITUDINAL ELEVATION

(Showing bell end connection.)

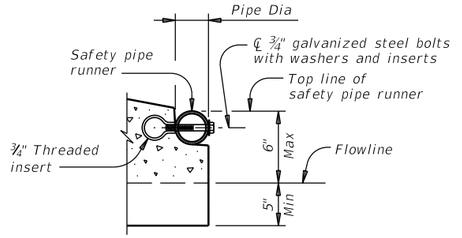


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



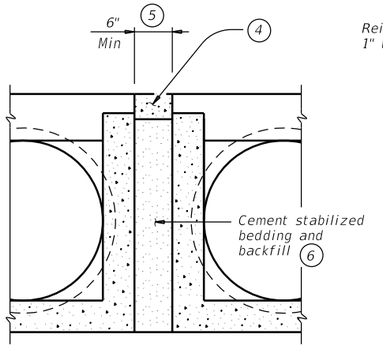
OPTION A



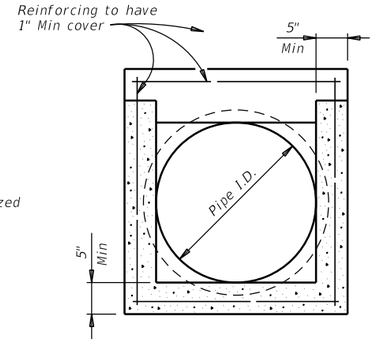
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

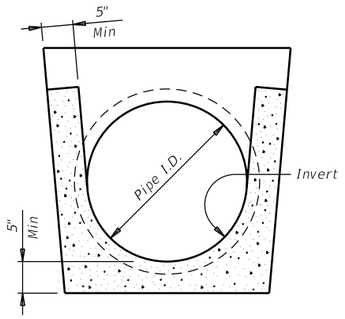
(If required)



MULTIPLE PIPE INSTALLATION

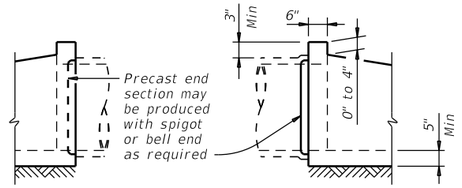


OPTION WITH SQUARE BOTTOM



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

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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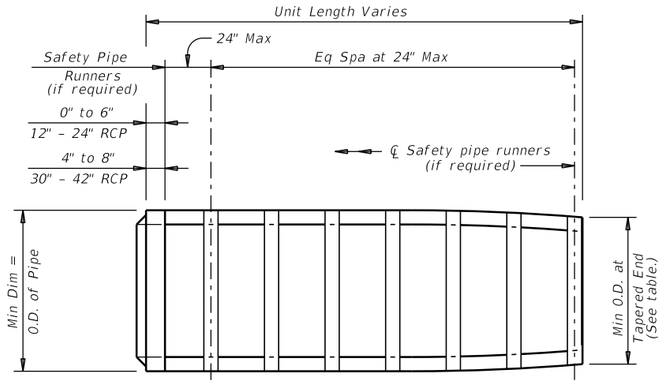
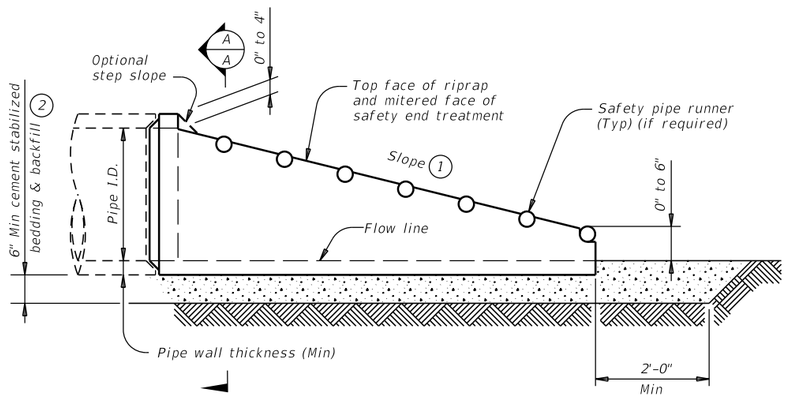


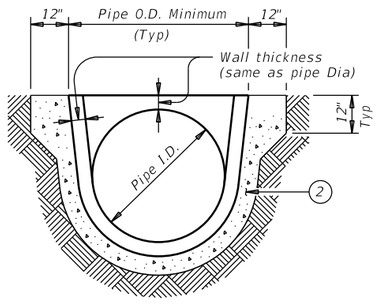
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

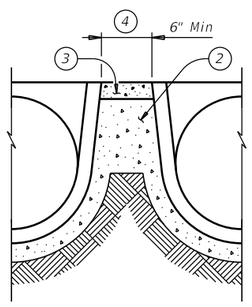


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

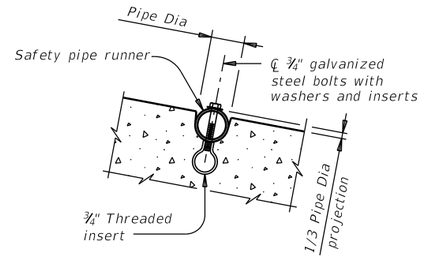
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(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".

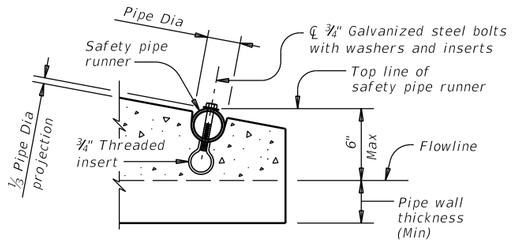
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

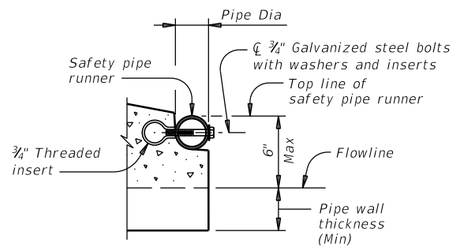


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	CRP	KARNES		130

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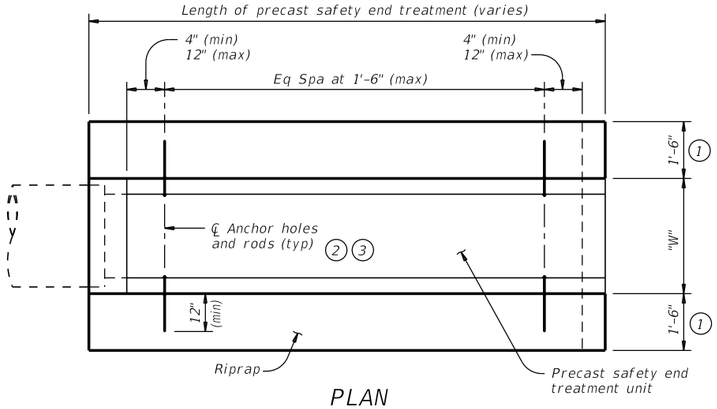

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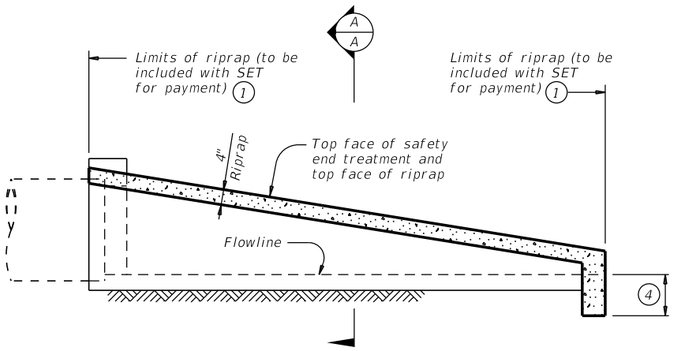

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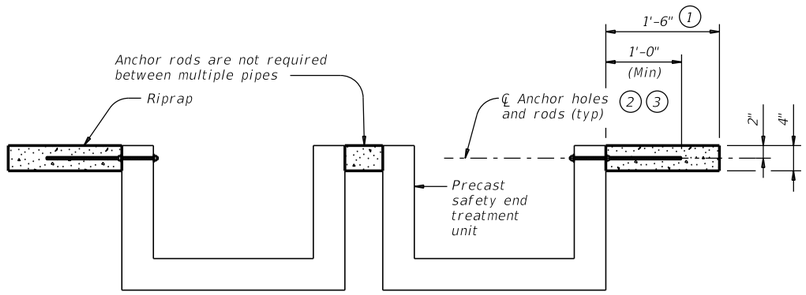
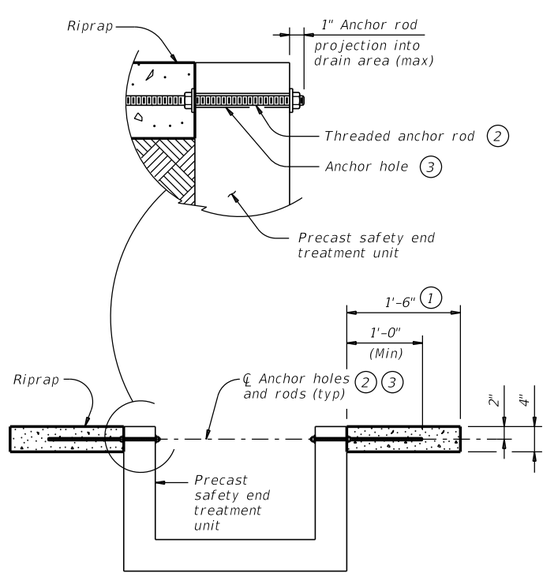


MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".
Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.
For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.
Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		131

DATE: 6/17/2022 1:30:35 PM
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LEGEND

OVERHEAD ELECTRIC	OE1	KARNES ELECTRIC
OVERHEAD ELECTRIC/FIBER OPTIC	OE1/FOC1	KARNES ELECTRIC/ATT
OVERHEAD TELEPHONE	OHT1	ATT
ELECTRIC	E1	KARNES ELECTRIC
ELECTRIC	E1(D)	KARNES ELECTRIC
ELECTRIC	E2	TXDOT
ELECTRIC	E2(D)	TXDOT
TELEPHONE	T1	ATT
TELEPHONE	T1(D)	ATT
FIBER OPTIC	T2	FRONTIER
FIBER OPTIC	T2(D)	FRONTIER
FIBER OPTIC	FOC1	ATT
FIBER OPTIC	FOC1(D)	ATT
GAS	G1	CENTERPOINT ENERGY
GAS	G1(D)	CENTERPOINT ENERGY
PIPELINE	PL1	DCP MIDSTREAM(also DUKE ENERGY)
PIPELINE	PL1(D)	DCP MIDSTREAM(also DUKE ENERGY)
PIPELINE	PL2	MURPHY EXPLORATION
PIPELINE	PL2(D)	MURPHY EXPLORATION
PIPELINE	PL3	ENTERPRISE
PIPELINE	PL3(D)	ENTERPRISE
PIPELINE	PL4	FLINT HILLS
PIPELINE	PL4(D)	FLINT HILLS
PIPELINE	PL5	BPX (FORMERLY BHP)
PIPELINE	PL5(D)	BPX (FORMERLY BHP)
PIPELINE	PL6	IRONWOOD
PIPELINE	PL6(D)	IRONWOOD
PIPELINE	PL7	MARATHON
PIPELINE	PL7(D)	MARATHON
WATER	W1	EL OSO WSC
WATER	W1(D)	EL OSO WSC

- TRANSMISSION TOWER
- ELECTRIC HANDHOLE
- TRAFFIC SIGNAL LIGHT
- POWER POLE
- LIGHT POLE
- TELEPHONE PEDESTAL
- TELEPHONE HAND HOLE
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- WASTE WATER MANHOLE
- OUT OF SCOPE
- END OF LINE

GENERAL NOTES:

1. UTILITIES ARE DEPICTED ON THESE PLANS IN ACCORDANCE WITH THEIR ACHIEVED QUALITY LEVELS AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEER'S DOCUMENT ASCE 38-02, "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA".

2. THE HORIZONTAL ALIGNMENT OF QUALITY LEVEL B LINES SHOWN WERE ARRIVED AT USING GEOPHYSICAL EQUIPMENT. THE ACCURACY OF THE HORIZONTAL LOCATION CAN BE INFLUENCED BY MOISTURE CONTENT, PROXIMITY OF OTHER UNDERGROUND UTILITIES OR STRUCTURES, DEPTH OF THE UTILITY AND LOCATION OF TRACE WIRE/TAPE IN RELATIONSHIP TO THE TOP OF THE PIPE.

3. GEOPHYSICAL SEARCH AND RECORDS RESEARCH DO NOT GUARANTY ALL UTILITIES WILL BE FOUND.

4. UTILITY INFORMATION LABELED AS LEVELS "C" OR "D" ARE DERIVED FROM FURNISHED RECORDS. SUCH INFORMATION MAY NOT BE ACCURATE OR RELIABLE. LTRA DISCLAIMS RESPONSIBILITY FOR THE ACCURACY OR RELIABILITY OF UTILITY INFORMATION DEPICTED ACCORDING TO RECORDS.

5. THE ROADWAY AND ROW FILES WERE PROVIDED BY OTHERS AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

6. RELIANCE UPON THESE DATA FOR RISK MANAGEMENT PURPOSES DURING BIDDING DOES NOT RELIEVE THE EXCAVATOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION LAWS AND REGULATIONS. THIS INCLUDES BUT IS NOT LIMITED TO GIVING NOTIFICATION TO UTILITY OWNER'S "ONE-CALL" CENTERS BEFORE EXCAVATION.

7. FIELD WORK BEGAN ON 9-24-19 AND WAS COMPLETED 1-03-2020, LTRA EXPRESSLY DISCLAIMS RESPONSIBILITY FOR NEW UTILITY INSTALLATIONS, MODIFICATIONS OR ADJUSTMENTS TO EXISTING UTILITIES AFTER 1-03-2020 ALONG THE MAIN CORRIDOR.

Quality Level "D": Information derived from existing records and/or oral recollections,

Quality Level "C": Information obtained by surveying and plotting visible above-ground utility features and by using professional judgment in correlating this information to quality level D information.

Quality Level "B": Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities (aka Designating).

Quality Level "A": Precise horizontal and vertical location of utilities obtained by the actual exposure and subsequent measurement of subsurface utilities, usually at a specific point (aka Locating).

QUALITY LEVEL LEGEND

- WW1 — QUALITY LEVEL "B"
- WW1(D) — QUALITY LEVEL "D"
- WW1(C) — QUALITY LEVEL "C"

TYPICAL FOR ALL UTILITIES

DATE	BY	REV	REVISION

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JOSEPH A. MURPHY
89796
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Road
Farmers Branch, Texas 75234 - 214-979-1144
FIRM REGISTRATION NO. F-782
TBPLS REGISTRATION NO. 10140700

Texas Department of Transportation

FM 81

EXISTING UTILITY LEGEND

SHEET 1 OF 1

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STATE	DISTRICT	COUNTY	SHEET NO
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CONTROL	SECTION	JOB	
0691	01	044	

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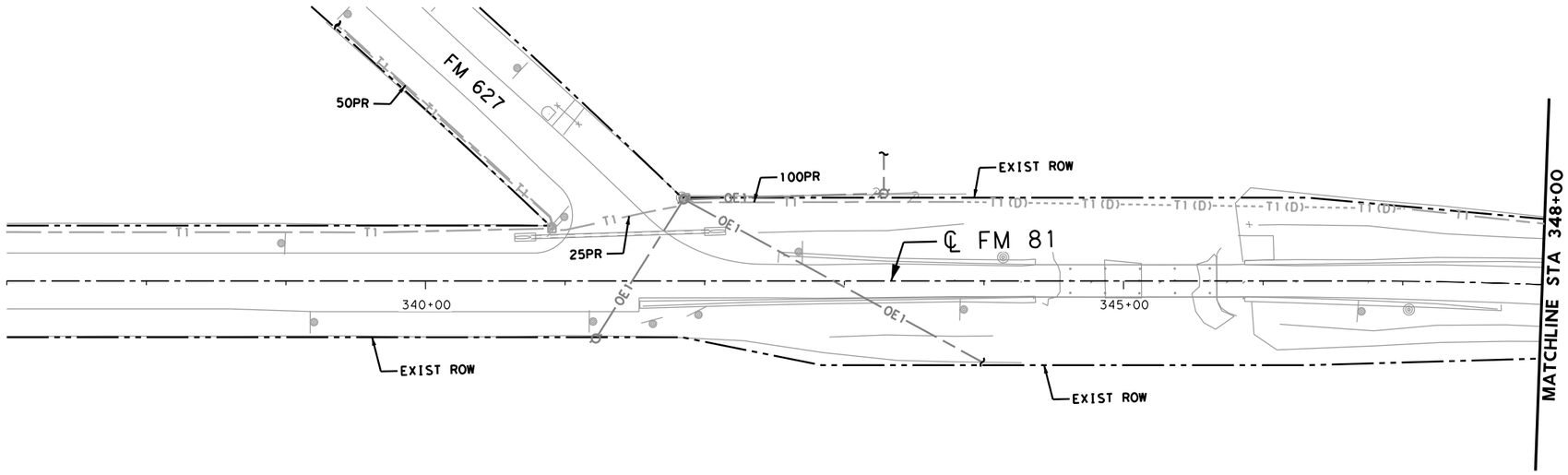

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DATE	BY	REV	REVISION

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FM 81

EXISTING UTILITY PLAN

BEGIN TO STA 348+00

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CONTROL	SECTION	JOB	
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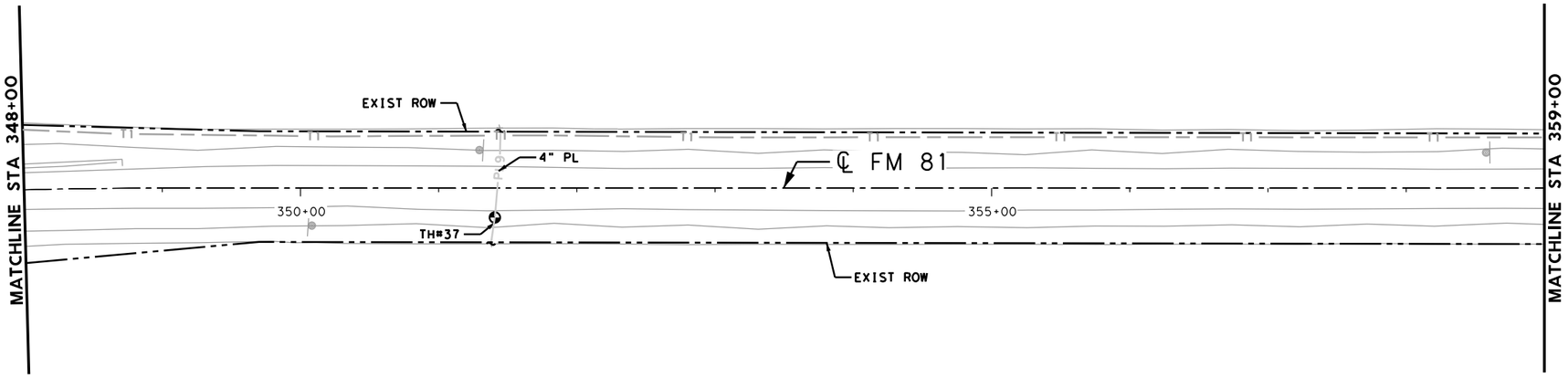

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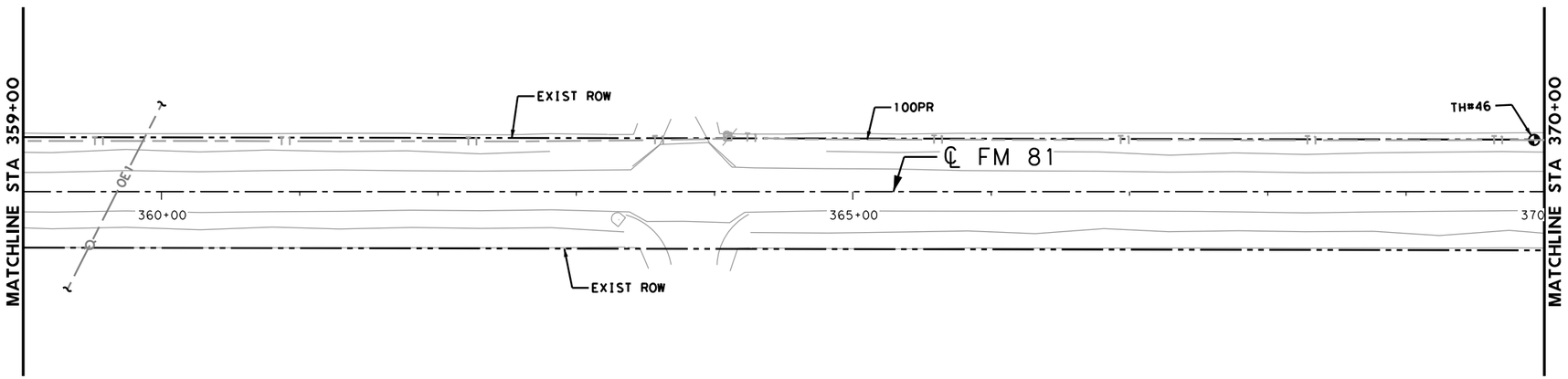

DATE	BY	REV	REVISION

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Farmers Branch, Texas 75234 - 214-979-1144
FIRM REGISTRATION NO. F-782
TBPLS REGISTRATION NO. 10140700

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FM 81

EXISTING UTILITY PLAN

348+00 TO STA 370+00

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CONTROL	SECTION	JOB	
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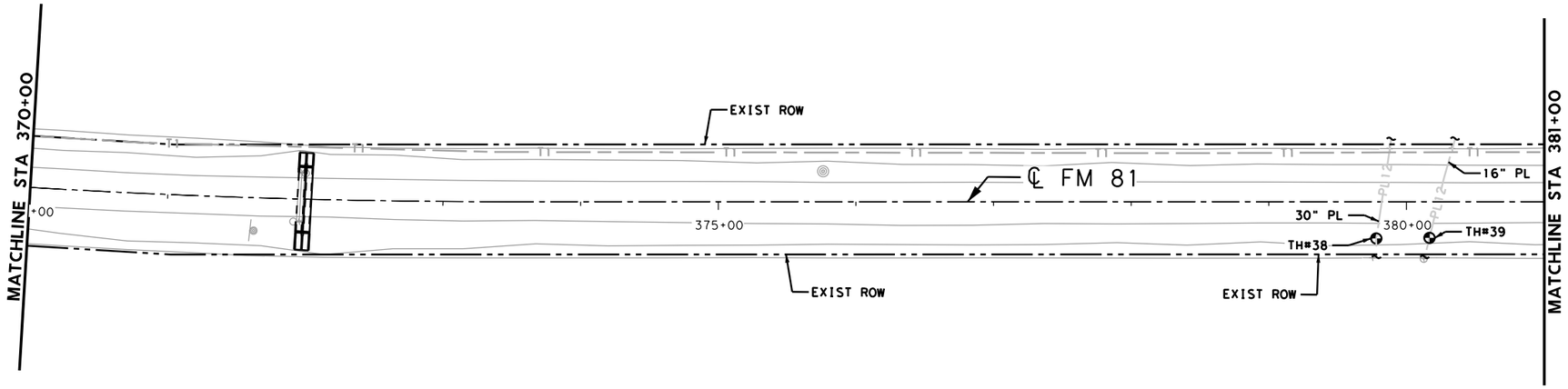

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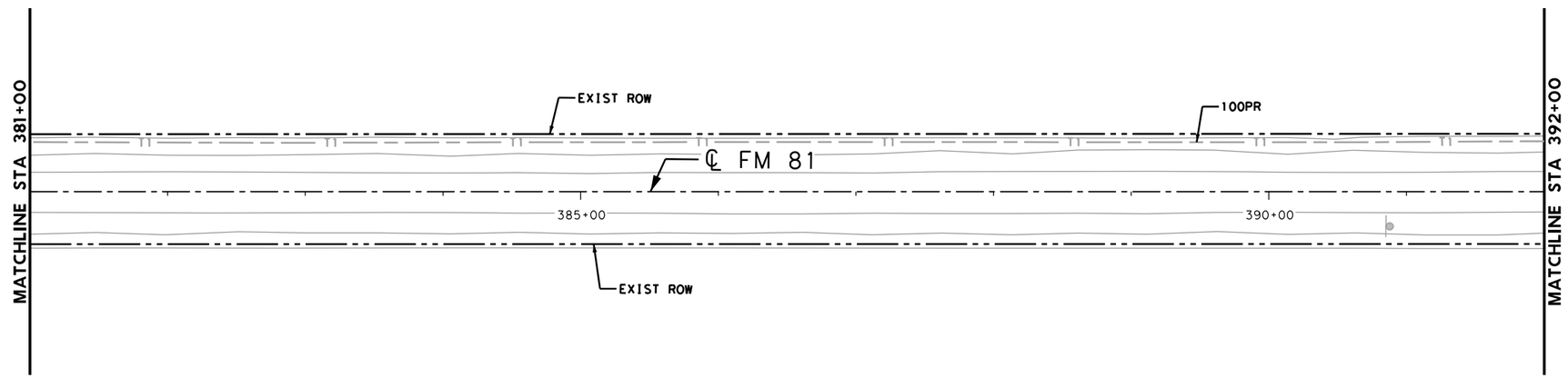

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FM 81

EXISTING UTILITY PLAN

370+00 TO STA 392+00

SCALE: 1"=100' SHEET 3 OF 6

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STATE	DISTRICT	COUNTY	SHEET NO
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CONTROL	SECTION	JOB	
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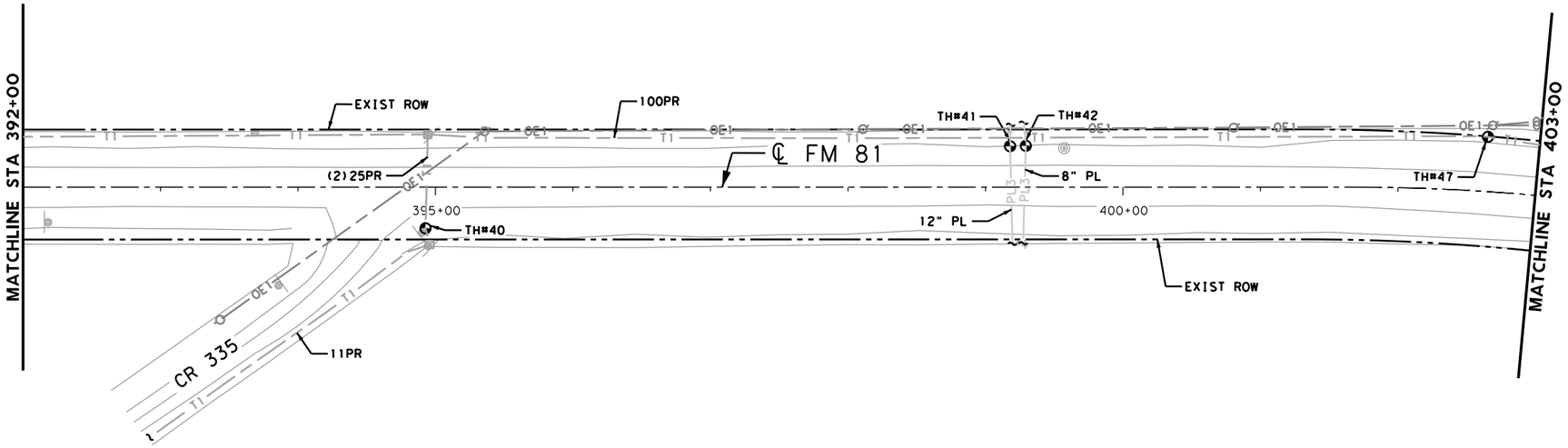

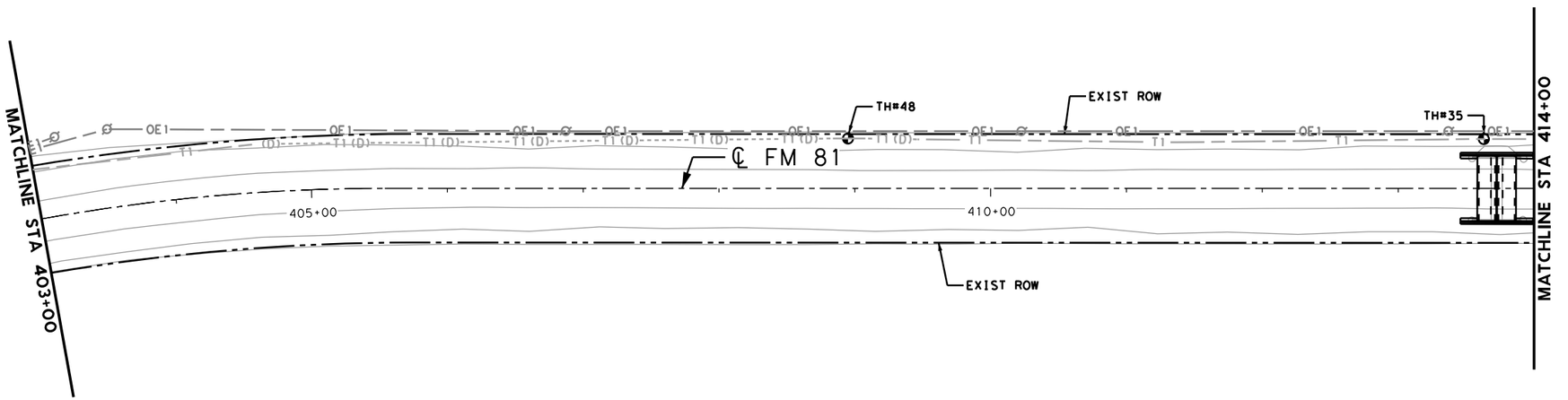

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FM 81

EXISTING UTILITY PLAN

392+00 TO STA 414+00

SCALE: 1"=100' SHEET 4 OF 6

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CONTROL	SECTION	JOB	
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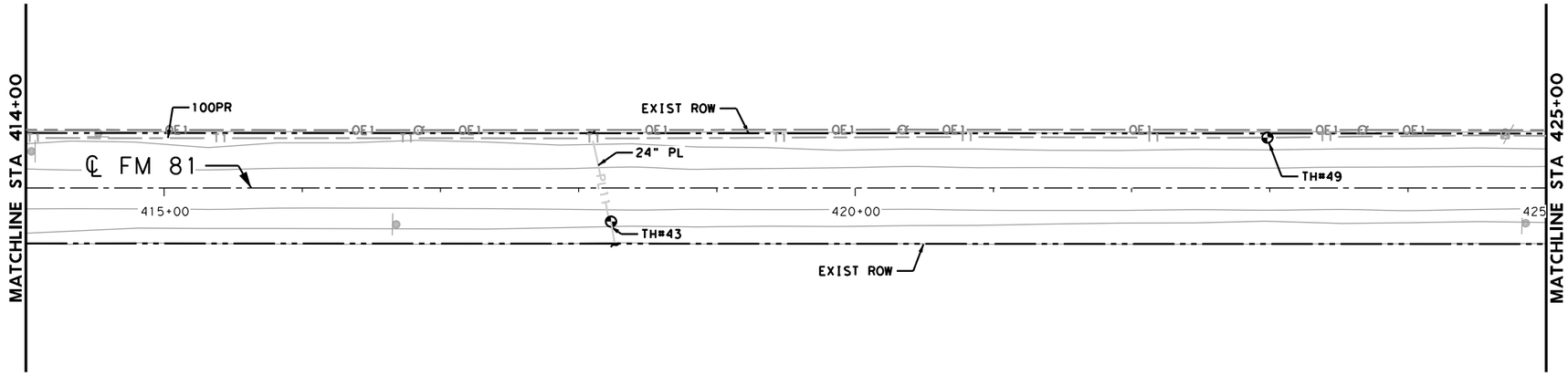

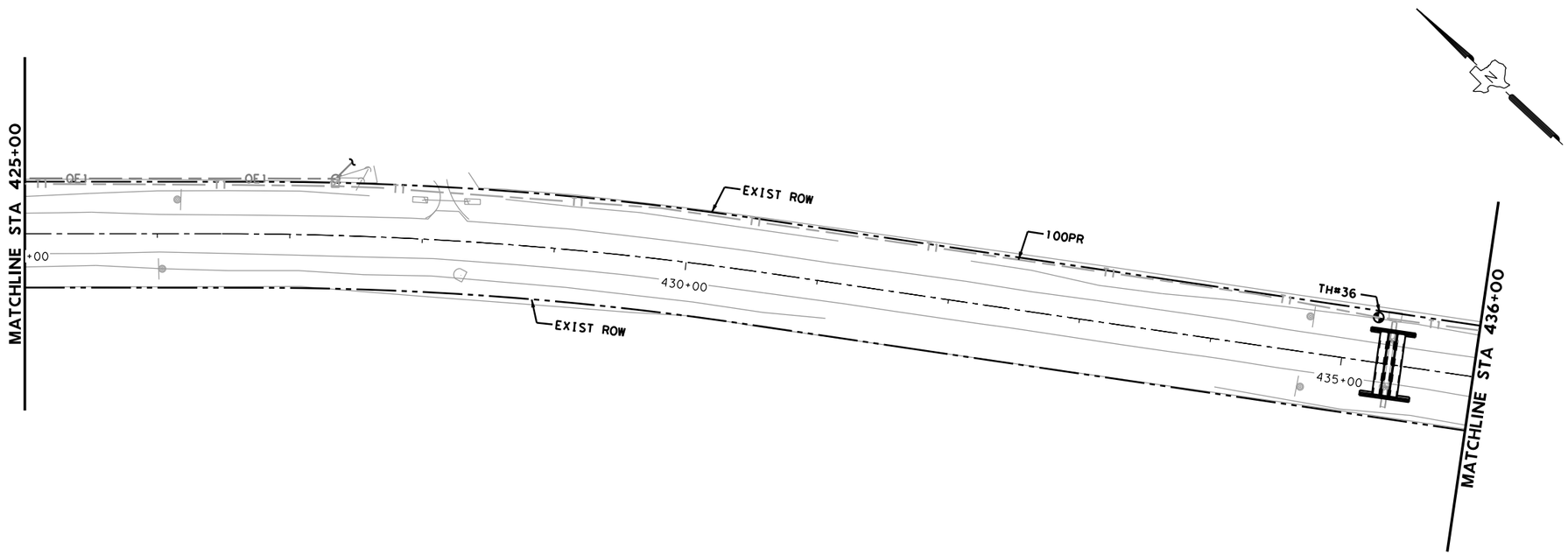

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SCALE: 1"=100'

DATE	BY	REV	REVISION

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FM 81

EXISTING UTILITY PLAN

414+00 TO STA 436+00

SCALE: 1"=100' SHEET 5 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	137
CONTROL	SECTION	JOB	
0691	01	044	

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jmartinez
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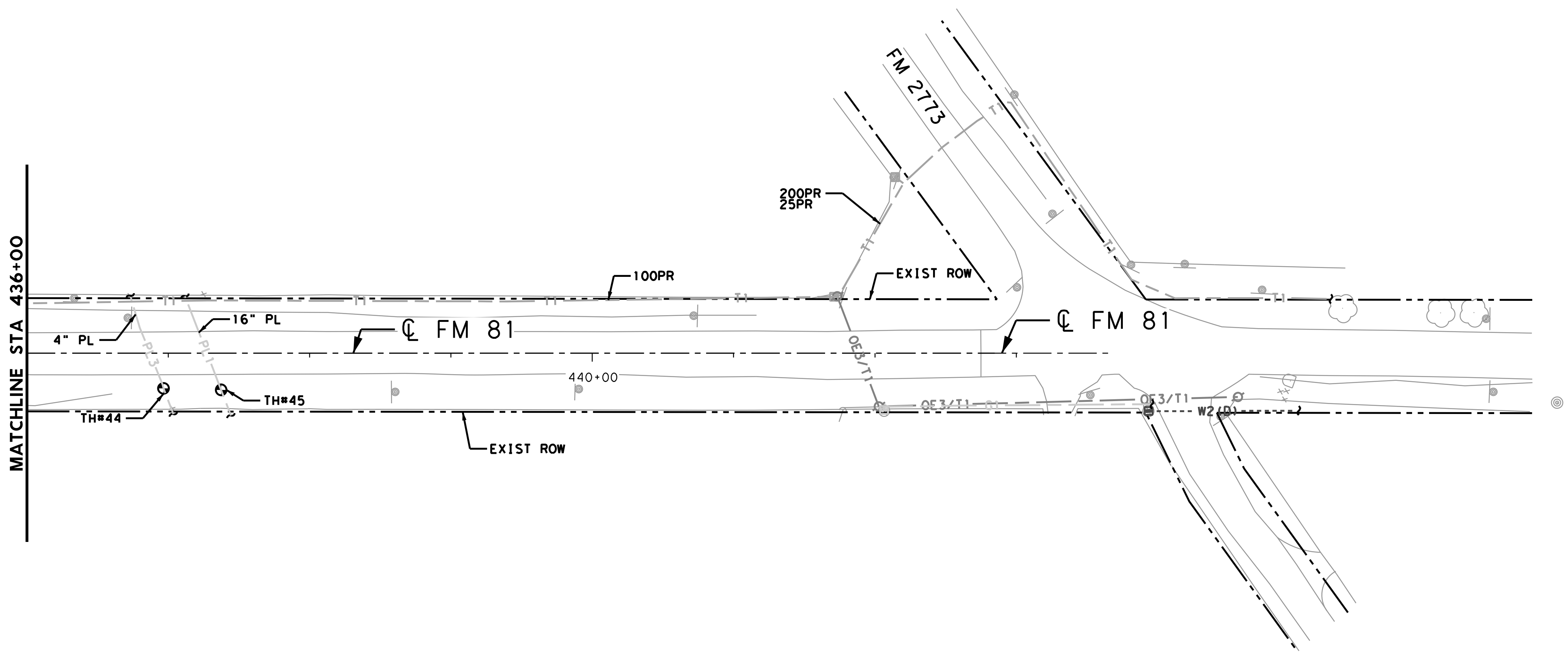

NOTES:

1. SEE SHEET " " FOR EXISTING UTILITY LEGEND

DATE	BY	REV	REVISION

STATE OF TEXAS
JOSEPH A. MURPHY
89796
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Road
Farmers Branch, Texas 75234 - 214-979-1144
FIRM REGISTRATION NO. F-782
TBPLS REGISTRATION NO. 10140700

Texas Department of Transportation

FM 81
EXISTING UTILITY PLAN
436+00 TO STA END

SCALE: 1"=100'
SHEET 6 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	138
CONTROL	SECTION	JOB	
0691	01	044	

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jmartinez
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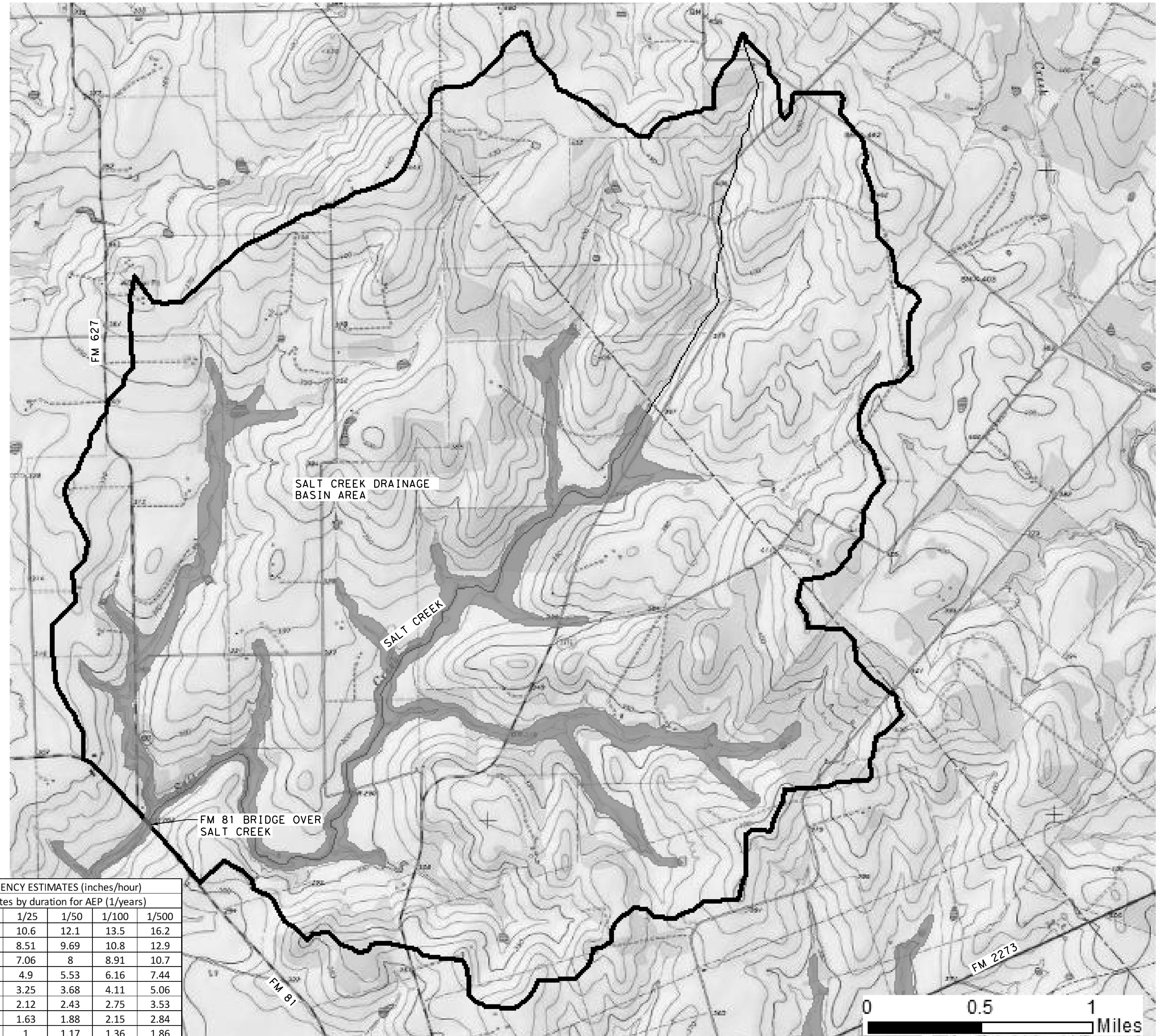

LEGEND

DRAINAGE AREA BOUNDARY

Tc PATH

FEMA ZONE A FLOODPLAIN

NOTES:

1. PRECIPITATION DEPTHS FOR 5-MIN TO 24HR DURATIONS WERE ESTIMATED FROM NOAA ATLAS 14, VOLUME 11, VERSION 2 AMS-BASED POINT PRECIPITATION FREQUENCY ESTIMATES. LINEAR INTERPOLATION OR CURVE GENERATION WAS NEEDED TO OBTAIN INTENSITY VALUES BETWEEN TABULAR DURATIONS AS OUTLINED BY THE TXDOT HYDRAULIC DESIGN MANUAL, CH. 4, SECTION 12, SEPTEMBER 2019.
2. Tc VALUES WERE ESTIMATED USING THE KERBY-KIRPICH METHOD.
3. FOR DRAINAGE AREAS LARGER THAN 200 AC., THE PEAK FLOWS WERE ESTIMATED USING A HYDROLOGIC MODEL DEVELOPED USING HEC-HMS 4.3
LOSS METHOD: NRCS CURVE NUMBER
TRANSFORM METHOD: NRCS UNIT HYDROGRAPH
STORM DURATION: 24 HOURS
4. SOURCE OF CONTOUR DATA IS USGS NATIONAL ELEVATION DATASET.

	POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hour)							
NOAA Atlas 14 Volume 11 Version 2	Precipitation Frequency Estimates by duration for AEP (1/years)							
Data type: Precipitation intensity	Duration	1/2	1/5	1/10	1/25	1/50	1/100	1/500
Time series type: Annual maximum	5 MIN	5.92	7.57	8.86	10.6	12.1	13.5	16.2
Project area: Texas	10 MIN	4.71	6.05	7.09	8.51	9.69	10.8	12.9
Location name (ESRI Maps): Karnes City	15 MIN	3.95	5.05	5.9	7.06	8	8.91	10.7
Station Name: -	30 MIN	2.78	3.53	4.11	4.9	5.53	6.16	7.44
Latitude: 28.9729°	60 MIN	1.81	2.31	2.71	3.25	3.68	4.11	5.06
Longitude: -97.8601°	2 HR	1.09	1.45	1.73	2.12	2.43	2.75	3.53
Elevation (USGS): 266 ft	3 HR	0.8	1.09	1.31	1.63	1.88	2.15	2.84
Date/time (GMT): Fri Nov 1 20:30:07 20	6 HR	0.46	0.64	0.79	1	1.17	1.36	1.86
	12 HR	0.25	0.36	0.45	0.58	0.69	0.81	1.16
	24 HR	0.14	0.21	0.26	0.34	0.4	0.48	0.7

BASIN ID	DRAINAGE AREA	WEIGHTED CN	Tc	SCS INITIAL ABSTRACTION	SCS LAG TIME	HEC-HMS RUNOFF COMPUTATIONS						
	[AC]		[MIN]	[IN]	[MIN]	Q_{2YR} [CFS]	Q_{5YR} [CFS]	Q_{10YR} [CFS]	Q_{25YR} [CFS]	Q_{50YR} [CFS]	Q_{100YR} [CFS]	Q_{500YR} [CFS]
SALT CREEK	7394.1	**67**	179	1.0	108	907	2225	3523	5547	7286	9228	14292

DATE	BY	REV	REVISION

STATE OF TEXAS
KYLE C. DONOVAN
138584
LICENSED
PROFESSIONAL ENGINEER
6/16/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK DRAINAGE AREA

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	139
CONTROL	SECTION	JOB	
0691	01	044	

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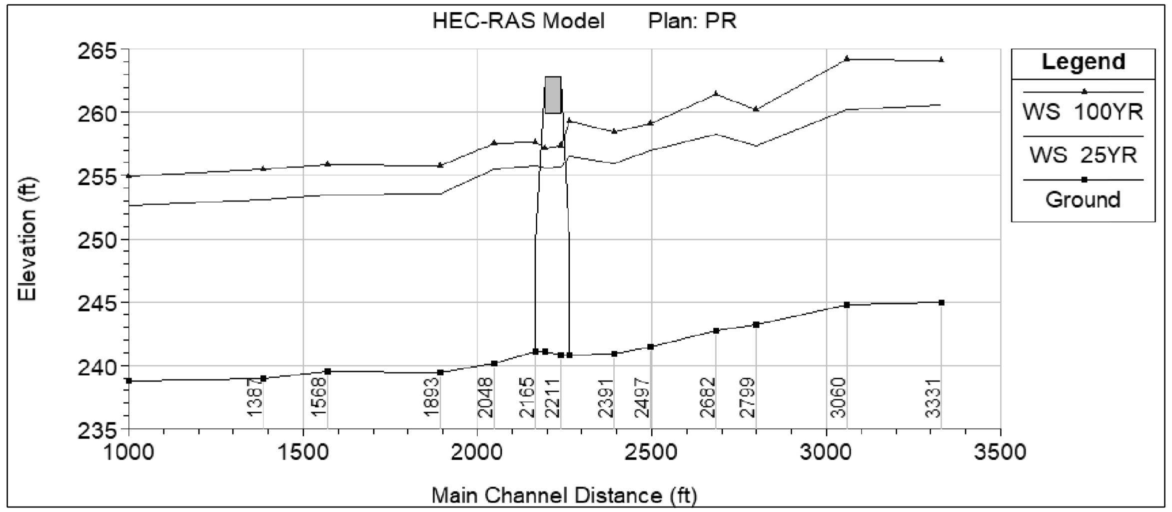
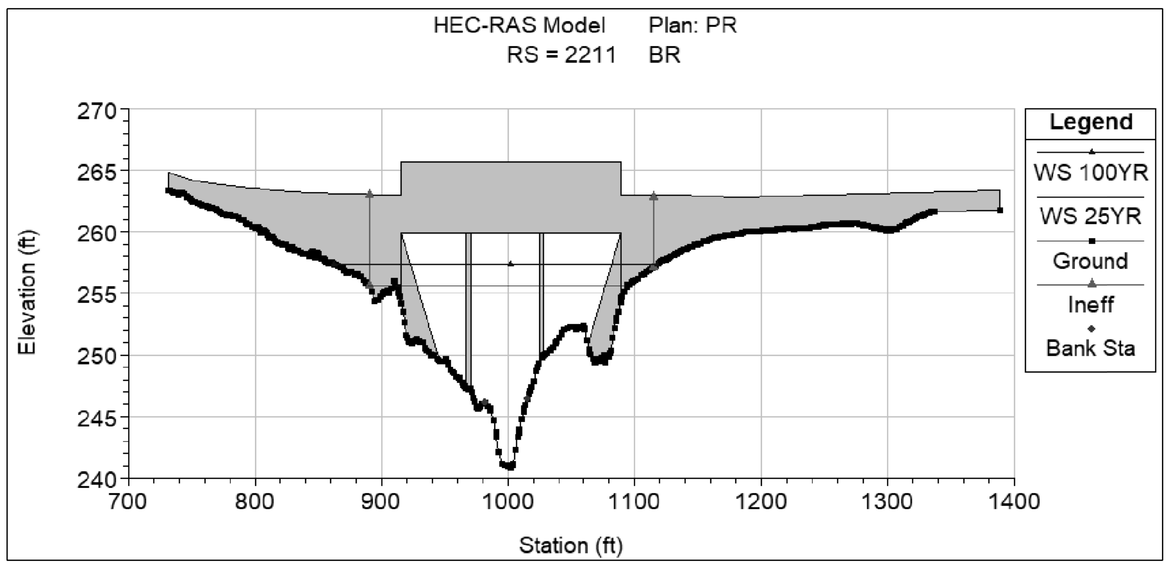
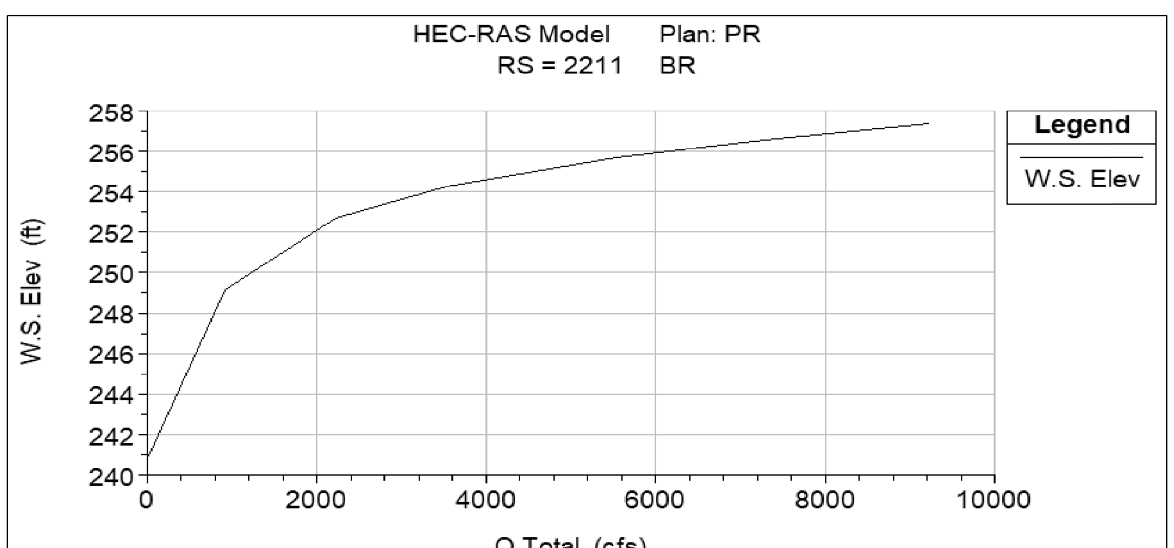


PROFILE PLOT



CROSS-SECTION



RATING CURVE

HEC-RAS CROSS-SECTION MAP

Storm Frequency	Q Total	W.S. Elev
[years]	[cfs]	[ft]
-	0	240.82
25	5547	255.67
100	9228	257.35

RATING CURVE TABLE

LEGEND

- 1 FT CONTOURS
- FLOW DIRECTION
- STREAM
- HEC-RAS CROSS-SECTION
- FEMA ZONE A FLOODPLAIN

NOTES:

1. HYDRAULIC ANALYSIS PERFORMED WITH HEC-RAS 5.0.7.
2. CROSS-SECTION POINTS, ROADWAY HIGH CHORD, AND STREAM FLOW LINE WERE OBTAINED FROM SURVEY DATA AND/OR TEXAS NATURAL RESOURCES LIDAR DATA.
3. NORMAL DEPTH WITH A SLOPE OF 0.00133 FT/FT WAS USED FOR DOWNSTREAM BOUNDARY CONDITIONS.
4. PEAK FLOWS ESTIMATED USING HEC-HMS 4.3.
5. THIS DRAINAGEWAY HAS A DELINEATED ZONE A FLOOD HAZARD AREA AS SHOWN ON FIRM MAP #48255C0300C, EFFECTIVE OCTOBER 19, 2010 . THE KARNES COUNTY FLOODPLAIN ADMINISTRATOR WAS NOTIFIED ABOUT THIS PROJECT ON JULY 27, 2020.

DATE	BY	REV	REVISION

6/16/2022

Stantec

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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK HYDRAULIC DATA

SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	140
CONTROL	SECTION	JOB	
0691	01	044	

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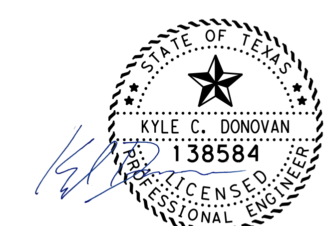
HEC-RAS HYDRAULIC SUMMARY

River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
3331	25YR	EX	5547	244.98	260.58	256.19	261.55	0.002025	8.6	1067.29	168.52	0.43
3331	25YR	PR	5547	244.98	260.55	256.19	261.52	0.002044	8.63	1062.38	167.83	0.43
3331	100YR	EX	9228	244.98	264.1	259.11	265.16	0.001817	9.62	1849.5	277.65	0.42
3331	100YR	PR	9228	244.98	264.1	259.11	265.16	0.001818	9.62	1849.21	277.62	0.42
3060	25YR	EX	5547	244.81	260.2	255.85	260.98	0.001767	7.84	1014.21	194.5	0.4
3060	25YR	PR	5547	244.81	260.16	255.85	260.95	0.001798	7.89	1006.46	193.47	0.4
3060	100YR	EX	9228	244.81	264.14	259.76	264.64	0.000979	7.04	2083.05	365.09	0.31
3060	100YR	PR	9228	244.81	264.14	259.76	264.64	0.00098	7.04	2082.64	365	0.31
2799	25YR	EX	5547	243.23	257.57	255.99	260.06	0.00546	13.65	828.65	159.38	0.7
2799	25YR	PR	5547	243.23	257.38	255.99	260	0.00583	13.96	798.37	155.88	0.72
2799	100YR	EX	9228	243.23	260.53	259.66	263.84	0.005944	16.51	1369.67	206.44	0.75
2799	100YR	PR	9228	243.23	260.18	259.66	263.79	0.006597	17.13	1299.77	200.31	0.79
2682	25YR	EX	5547	242.74	258.44	252.64	259.27	0.001446	7.88	1306.66	184.78	0.38
2682	25YR	PR	5547	242.74	258.3	252.64	259.16	0.001503	7.98	1282.01	182.63	0.38
2682	100YR	EX	9228	242.74	261.6	255.97	262.88	0.001777	10.03	2023.57	298.48	0.43
2682	100YR	PR	9228	242.74	261.44	255.97	262.73	0.001826	10.11	1976.21	282.48	0.44
2497	25YR	EX	5547	241.42	257.22		258.79	0.003587	11.43	1114.27	169.2	0.55
2497	25YR	PR	5547	241.42	256.99		258.65	0.003859	11.72	1075.59	166.14	0.57
2497	100YR	EX	9228	241.42	259.66		262.23	0.004973	15.07	1591.31	221.98	0.67
2497	100YR	PR	9228	241.42	259.1	257.2	262.02	0.005814	15.91	1470.65	210.17	0.72
2391	25YR	EX	5547	240.88	256.55	253.86	258.36	0.00416	12.47	1068.22	179.6	0.6
2391	25YR	PR	5547	240.88	255.99	253.86	258.14	0.005082	13.39	970.23	169.5	0.66
2391	100YR	EX	9228	240.88	259.3	257.72	261.65	0.004764	15.11	1621.09	223.89	0.66
2391	100YR	PR	9228	240.88	258.48	257.72	261.39	0.006107	16.52	1443.3	208.99	0.75
2264	25YR	EX	5547	240.82	256.98	252.66	257.43	0.00116	6.95	1492.5	242.25	0.33
2264	25YR	PR	5547	240.82	256.5	252.66	257.02	0.001368	7.38	1405.91	224.34	0.36
2264	100YR	EX	9228	240.82	259.95	254.5	260.48	0.00116	7.92	2144.37	375.93	0.34
2264	100YR	PR	9228	240.82	259.3	254.51	259.91	0.001404	8.48	2032.27	341.69	0.37
2211 BR U	25YR	EX	5547	240.82	256.78	251.79	257.33	0.006185	6.28	1006.08	126.98	0.26
2211 BR U	25YR	PR	5547	240.82	255.67	252.23	256.79	0.002955	9.79	982.89	143	0.49
2211 BR U	100YR	EX	9228	240.82	259.1	254.02	260.48	0.015671	8.29	1310.87		0.32
2211 BR U	100YR	PR	9228	240.82	257.35	255.06	259.42	0.004812	13.6	1231.71	152.77	0.64
2211 BR D	25YR	EX	5547	241.09	255.83	251	256.37	0.004528	6.29	1035.69	125.54	0.34
2211 BR D	25YR	PR	5547	241.09	255.58	251.88	256.62	0.00263	9.67	1037.04	142.49	0.49
2211 BR D	100YR	EX	9228	241.09	257.63	253.02	258.55	0.007842	8.66	1269.6	133.66	0.44
2211 BR D	100YR	PR	9228	241.09	257.17	254.41	259.17	0.004436	13.63	1271.35	151.72	0.65

River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2165	25YR	EX	5547	241.09	255.77	251.81	256.32	0.001545	7.49	1261.37	191.3	0.38
2165	25YR	PR	5547	241.09	255.78	251.81	256.32	0.00153	7.45	1272.89	191.36	0.37
2165	100YR	EX	9228	241.09	257.63	253.84	258.55	0.002201	9.81	1587.78	266.45	0.46
2165	100YR	PR	9228	241.09	257.63	253.88	258.55	0.002198	9.81	1622.94	266.56	0.46
2048	25YR	EX	5547	240.15	255.49	253.27	256.1	0.001992	8.34	1347.34	267.65	0.42
2048	25YR	PR	5547	240.15	255.49	253.27	256.1	0.001992	8.34	1347.34	267.65	0.42
2048	100YR	EX	9228	240.15	257.53	255.17	258.17	0.001947	9.12	1962.28	328.05	0.42
2048	100YR	PR	9228	240.15	257.53	255.17	258.17	0.001947	9.12	1962.28	328.05	0.42
1893	25YR	EX	5547	239.4	253.59	253.59	255.47	0.006177	13.03	916.81	211.87	0.7
1893	25YR	PR	5547	239.4	253.59	253.59	255.47	0.006177	13.03	916.81	211.87	0.7
1893	100YR	EX	9228	239.4	255.78	255.31	257.58	0.005542	13.96	1431.44	258.39	0.68
1893	100YR	PR	9228	239.4	255.78	255.31	257.58	0.005542	13.96	1431.44	258.39	0.68
1568	25YR	EX	5547	239.51	253.5		254.02	0.001375	6.8	1094.56	206.37	0.35
1568	25YR	PR	5547	239.51	253.5		254.02	0.001375	6.8	1094.56	206.37	0.35
1568	100YR	EX	9228	239.51	255.83		256.45	0.001313	7.5	1614	239.34	0.36
1568	100YR	PR	9228	239.51	255.83		256.45	0.001313	7.5	1614	239.34	0.36
1387	25YR	EX	5547	239.01	253.12	250.77	253.71	0.002025	8	1235.76	224.51	0.41
1387	25YR	PR	5547	239.01	253.12	250.77	253.71	0.002025	8	1235.76	224.51	0.41
1387	100YR	EX	9228	239.01	255.47	252.47	256.16	0.001984	8.95	1810.3	267	0.42
1387	100YR	PR	9228	239.01	255.47	252.48	256.16	0.001984	8.95	1810.31	267	0.42
1000	25YR	EX	5547	238.75	252.59	248.86	253.04	0.001335	6.35	1811.19	417.49	0.34
1000	25YR	PR	5547	238.75	252.59	248.86	253.04	0.001335	6.35	1811.19	417.49	0.34
1000	100YR	EX	9228	238.75	254.97	251.05	255.48	0.001335	7.27	2877.92	484.31	0.36
1000	100YR	PR	9228	238.75	254.97	251.05	255.48	0.001335	7.27	2877.92	484.31	0.36

DATE	BY	REV	REVISION



6/16/2022

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK HYDRAULIC DATA

SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	141
CONTROL	SECTION	JOB	
0691	01	044	

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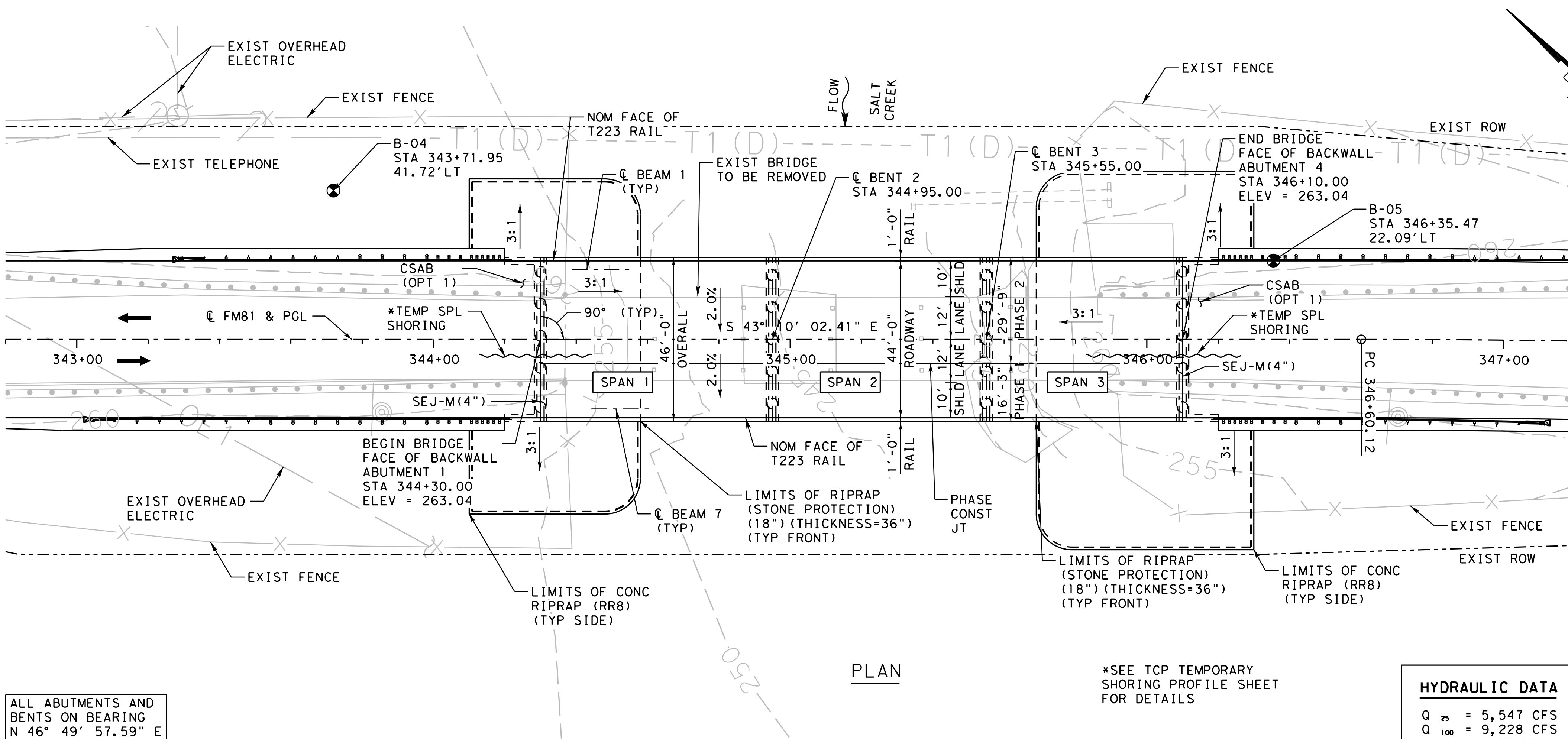


PLAN

*SEE TCP TEMPORARY SHORING PROFILE SHEET FOR DETAILS

ALL ABUTMENTS AND BENTS ON BEARING N 46° 49' 57.59" E

GENERAL NOTES

1. DESIGNED FOR HL-93 LOADING ACCORDING TO AASHTO LRFD SPECIFICATIONS, 8TH EDITION.
2. "D" INDICATES DOWEL BAR IN CAP AT EXTERIOR GIRDERS.
3. THE "H" VALUE SHOWN ARE ESTIMATED COLUMN HEIGHTS AT THE CENTERLINE.
4. SEE TYPICAL SECTIONS SHEET FOR BRIDGE TYPICAL SECTIONS AND PHASED CONSTRUCTION.
5. SAW CUT GROOVING OF THE BRIDGE DECK IS REQUIRED.
6. EXISTING 6 SPAN FLAT SLAB BRIDGE WITH CONCRETE DECK ON CONCRETE AND STEEL SUBSTRUCTURE TO BE REMOVED.

DESIGN DATA

FUNC CLASS: MAJOR COLLECTOR
ADT (2020): 3,100
ADT (2040): 4,340
DESIGN SPEED: 50 MPH

LEGEND

←	PROPOSED TRAFFIC
⇦	EXISTING TRAFFIC
~→	FLOW DIRECTION
—·—·—	EXISTING ROW
×—×	EXISTING FENCE
OE—OE	OVERHEAD POWERLINE

HYDRAULIC DATA

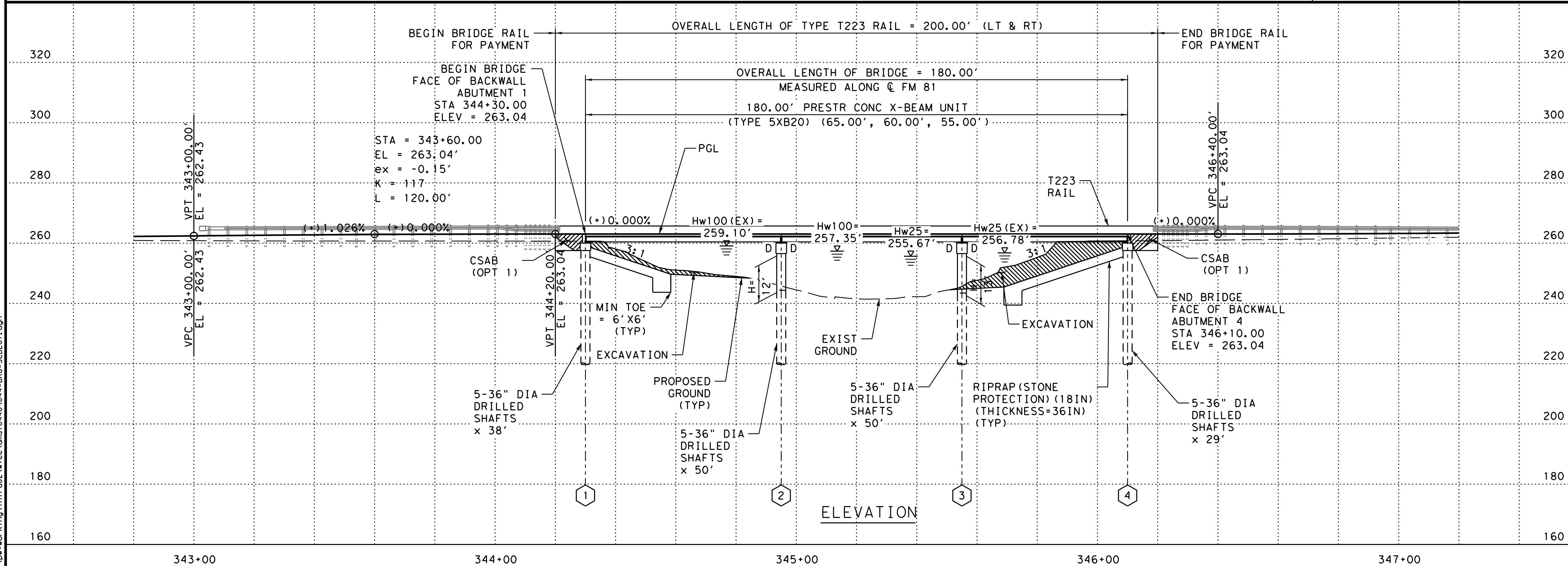
Q_{25} = 5,547 CFS
Q_{100} = 9,228 CFS
V_{25} = 9.79 FPS
V_{100} = 13.6 FPS
EL_{25} = 255.67'
EL_{100} = 257.35'

Exist. NBI: 16-129-0-0691-01-008
New NBI: 16-129-0-0691-01-018

0 20 40
SCALE: 1"=40'

HL-93 LOADING

DATE	BY	REV	REVISION



ELEVATION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
SALT CREEK BRIDGE LAYOUT

SCALE: 1"=40'
SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	142
CONTROL	SECTION	JOB	
0691	01	044	

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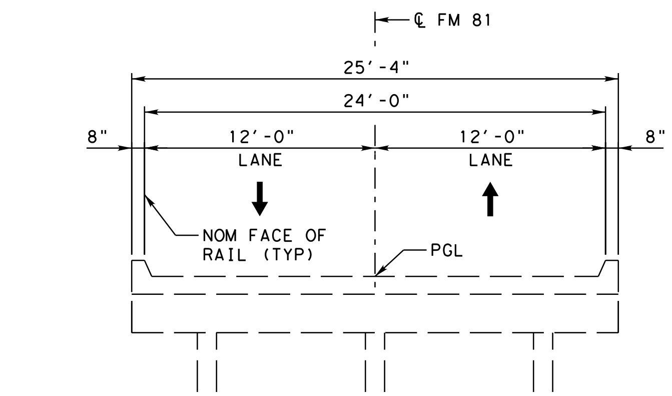
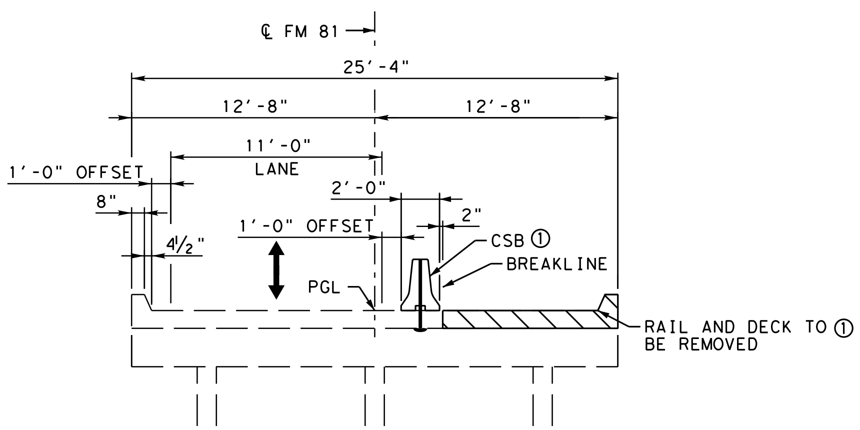
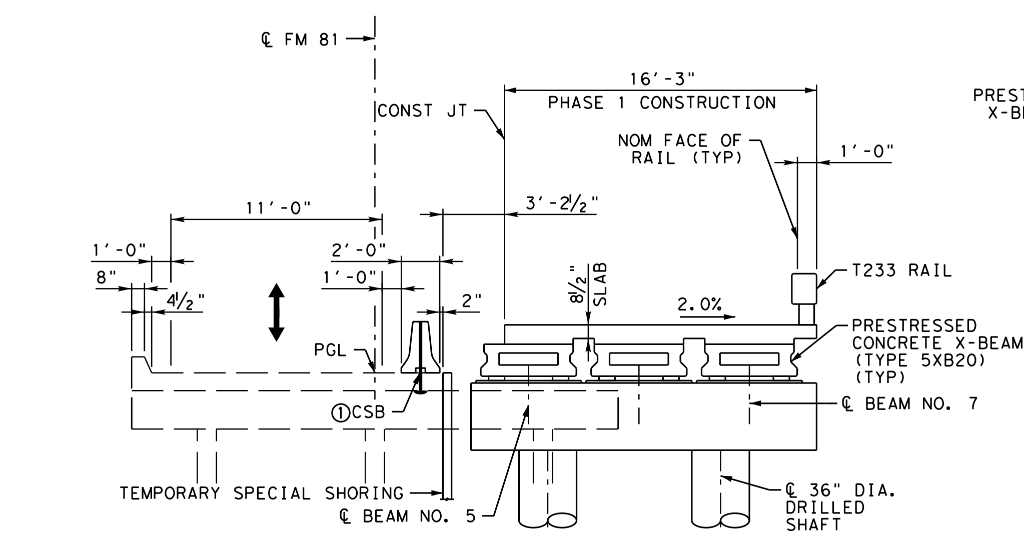


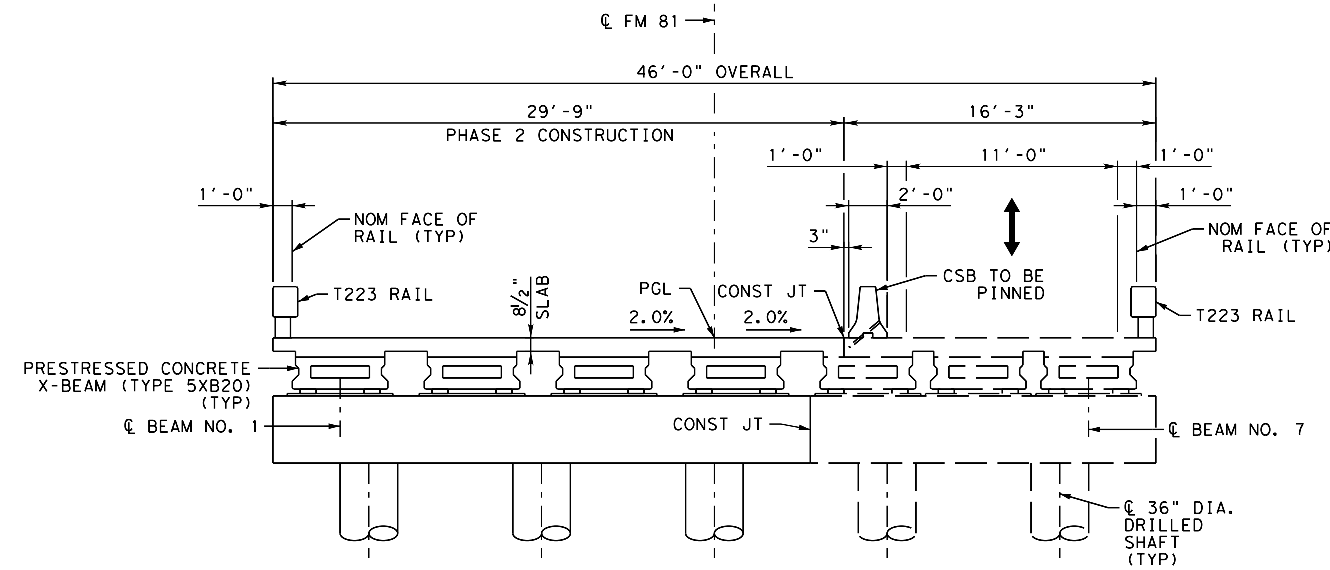
EXISTING BRIDGE TYPICAL SECTION



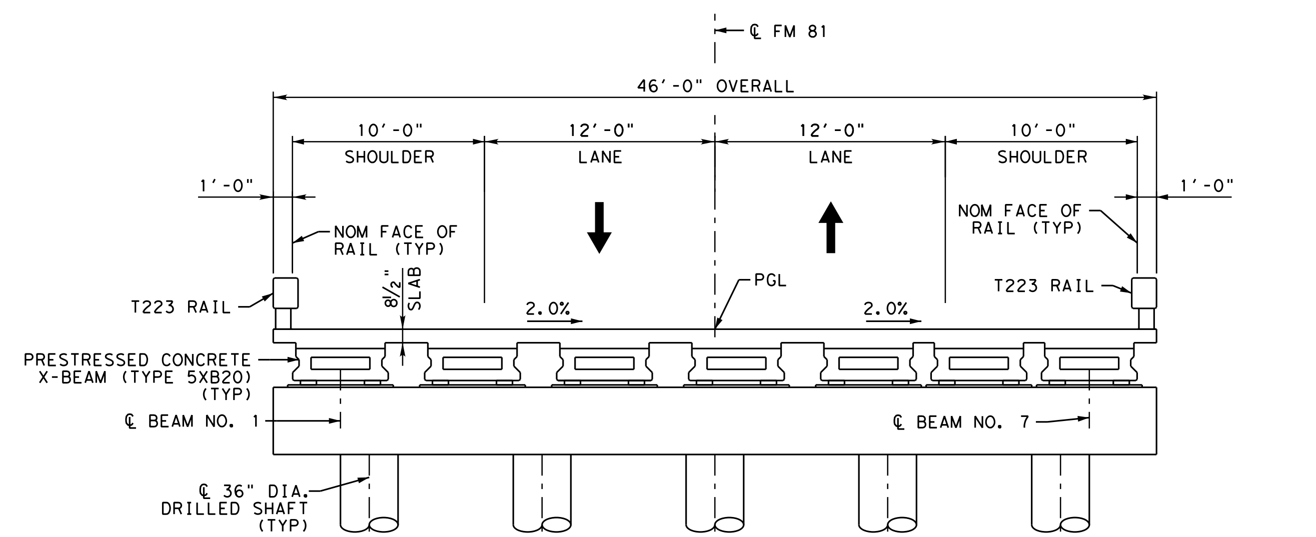
BREAKOUT FOR PHASE 1 CONSTRUCTION



PHASE 1 CONSTRUCTION



PHASE 2 CONSTRUCTION



PROPOSED FINAL TYPICAL SECTION

① SLAB EDGE MUST BE SUPPORTED PRIOR TO REMOVING EDGE BEAM. SEE "FLAT SLAB TEMPORARY TRAFFIC BARRIER SLAB SUPPORT DETAIL" FOR DETAILS.

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

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FM 81

SALT CREEK BRIDGE TYPICAL SECTION

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	143
CONTROL	SECTION	JOB	
0691	01	044	

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BRIDGE ESTIMATED QUANITITIES

ITEM NO.	400 6005	416 6004	420 6013	420 6029	420 6037	422 6001	425 6020	432 6008	432 6033	450 6006	454 6018
ITEN DESCRIPTION NBI NO.	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT) ①	CL C CONC (CAP) ①	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC BOX BEAM (5XB20)	RIPRAP (CONC) (CL B) (RR8&RR9)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ-M)
UNIT	CY	LF	CY	CY	CY	SF	LF	CY	CY	LF	LF
ABUTMENTS	100	335	50.8					146	476	40.0	
INTERIOR BENTS		500		42.6	32.7						
1~180.00' PRESTR CONC X-BEAM UNIT						8,280	1249.50			360.0	92
TOTAL	100	835	50.8	42.6	32.7	8,280	1249.50	146	476	400.0	92

① INCLUDES SHEAR KEY QTY

BEARING SEAT ELEVATIONS

		BEAM 1		BEAM 2		BEAM 3		BEAM 4		BEAM 5		BEAM 6		BEAM 7	
		LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT
ABUT 1	(FWD)	260.589	260.479	260.452	260.342	260.314	260.204	260.177	260.067	260.039	259.929	259.924	259.814	259.809	259.699
BENT 2	(BK)	260.589	260.479	260.452	260.342	260.314	260.204	260.177	260.067	260.039	259.929	259.924	259.814	259.809	259.699
	(FWD)	260.631	260.521	260.493	260.383	260.356	260.246	260.218	260.108	260.081	260.971	259.966	259.856	259.851	259.741
BENT 3	(BK)	260.631	260.521	260.493	260.383	260.356	260.246	260.218	260.108	260.081	260.971	259.966	259.856	259.851	259.741
	(FWD)	260.693	260.583	260.556	260.446	260.418	260.308	260.281	260.171	260.143	260.033	260.028	259.918	259.913	259.803
ABUT 4	(BK)	260.693	260.583	260.556	260.446	260.418	260.308	260.281	260.171	260.143	260.033	260.028	259.918	259.913	259.803

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
SALT CREEK BRIDGE
ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	144
CONTROL	SECTION	JOB	
0691	01	044	

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-04	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	11/03/2019
CSJ	0691-01-040	Station		Grnd. Elev.	256.20 ft
		Offset		GW Elev.	235.80 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Properties: Wet Den. (pcf)	Additional Remarks
			SAND, Clayey, compact to very dense, moist, dark brown to 2', brown thereafter, fine grained, trace calcareous nodules, trace organics top 2" (SC)			14				SSS@0', N=6
						9	37	24		PTS@2', PP=4.5+, -#200=48.9% Sulfate Content=<100 ppm
										PTS@4', PP=4.5+
5		33 (6) 28 (6)								
						7				SSS@6.5', N=23
						9				SSS@8.5', N=23
10		50 (1) 50 (3.75)				10	28	11		SSS@10.7', N=23,38,50/4.5 -#200=54.8% Sulfate Content=107 ppm
245.5			CLAY, Sandy Lean, hard, moist, yellowish brown and light gray, trace calcareous nodules (CL)							
15		50 (4.75) 50 (5)								
240.1			SAND, Silty, slightly compact to dense, moist to wet, gray, fine grained, trace calcareous nodules, trace ferrous staining and clay seams below 33.5' (SM)			9				SSS@16.1', N=36
20		44 (6) 40 (6)				24				SSS@21.3', N=12
25		16 (6) 18 (6)				18				SSS@26.5', N=25, -#200=12.6%
30		50 (4.5) 50 (4)				12				SSS@31', N=19,47,50/6
35		50 (3.5) 50 (3.5)				36	45	28		SSS@35.8', N=40,50/4 -#200=93.3% Sulfate Content=<100 ppm
220.4			CLAY, Lean, hard, moist, gray, trace ferrous staining (CL)							
40		50 (4.5) 50 (0.5)								

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 20', then Mud Rotary; Northing: 13521487.77, Easting: 2373856.60 Groundwater seepage was encountered at approximately 20.5 ft. (elevation of 235.8')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger: Omar Jimenez** **Organization: Kleinfelder**

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-04	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	11/03/2019
CSJ	0691-01-040	Station		Grnd. Elev.	256.20 ft
		Offset		GW Elev.	235.80 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Properties: Wet Den. (pcf)	Additional Remarks
			CLAY, Lean, hard, moist, gray, trace ferrous staining (CL)			16				SSS@40.5', N=34,50/3.5
214.2			SAND, Silty, dense, wet, gray, fine grained (SM)							
45		47 (6) 50 (5)								
210.			SAND, Clayey, dense, wet, gray, fine grained, trace calcareous noduels and ferrous staining (SC)			14				SSS@46.2', N=80
50		50 (4) 50 (3.25)								
						19				SSS@50.8', N=46
55		50 (3.5) 50 (3)								
						22				SSS@55.7', N=36
60		50 (3.75) 50 (3)				19				SSS@60.7', N=73, -#200=9.4%
65		50 (1.75) 50 (2)								SSS@65.4', N=47,50/5.75
70		50 (2.5) 50 (1.5)				18				SSS@70.4', N=31,50/5
183.2			SAND, Poorly Graded with Silt, very dense, wet, gray, fine grained (SP-SM)							
75		50 (2) 50 (1)				17				SSS@75.4', N=16,50/5
180.2			CLAY, Sandy Fat, very hard, moist, yellowish brown and light gray, trace calcareous deposits and ferrous staining (CH)							
80		50 (1.5) 50 (0.75)								

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 20', then Mud Rotary; Northing: 13521487.77, Easting: 2373856.60 Groundwater seepage was encountered at approximately 20.5 ft. (elevation of 235.8')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger: Omar Jimenez** **Organization: Kleinfelder**

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DATE	BY	REV	REVISION

STATE OF TEXAS
NOEL W. JANACEK
103586
LICENSED PROFESSIONAL ENGINEER
4/14/2021

KLEINFELDER Bright People. Right Solutions.
Firm F-16438
7805 Mesquite Bend Dr., Suite 100
Irving, TX 75063

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE BORING LOGS

SHEET 1 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	145
CONTROL	SECTION	JOB	
0691	01	044	

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-04	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	11/03/2019
CSJ	0691-01-040	Station		Grnd. Elev.	256.20 ft
		Offset		GW Elev.	235.80 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			CLAY, Sandy Fat, very hard, moist, yellowish brown and light gray, trace calcareous deposits and ferrous staining (CH)							SSS@80.3', N=50/3.75
85		50 (1.5) 50 (1.5)				18				SSS@85.3', N=24,30,50/4 -#200=53.1%
169.4										Boring Terminated at 86.8'
90										
95										
100										
105										
110										
115										
120										

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 20', then Mud Rotary; Northing: 13521487.77, Easting: 2373856.60
Groundwater seepage was encountered at approximately 20.5 ft. (elevation of 235.8')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger:** Omar Jimenez **Organization:** Kleinfelder

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-05	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	10/28/2019
CSJ	0691-01-040	Station		Grnd. Elev.	259.86 ft
		Offset		GW Elev.	236.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			CLAY, Fat with Sand, moist, dark brown, trace calcareous nodules, trace organics top 2" (CH)			13	54	35		SSS@0', N=16, -#200=34.0%
						11				SSS@2', N=13
						9				SSS@3.5', N=14
255.9										
5		12 (6) 16 (6)	SAND, Clayey, slightly compact to dense, dry, brown, fine grained, trace calcareous nodules (SC)							
						6				SSS@6.5', N=16
						5	28	15		SSS@8.5', N=25, -#200=25.8% Sulfate Content=100 ppm
10		36 (6) 50 (5)								
						6				SSS@11.1', N=32
15		50 (5) 45 (6)								
243.8			SAND, Silty, very dense, dry, light brown, fine grained (SM)			4				SSS@16.1', N=23
20		50 (3) 50 (1.5)								
239.2			CLAY, Sandy Lean, hard, moist, gray, few calcareous nodules (CL)			10				SSS@20.7', N=67
25		50 (6) 48 (6)								
						15	43	28		SSS@26.3', N=56, -#200=68.9% Sulfate Content=127 ppm
30		50 (3) 50 (3.75)								
229.3			SAND, Silty, very dense, wet, light gray, fine grained, trace ferrous staining (SM)			17				SSS@30.6', N=44
35		50 (2.25) 50 (1.5)				17				SSS@35.4', N=27,50/4.5
40		50 (1.75) 50 (1)								

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 25', then Mud Rotary; Northing: 13521282.15, Easting: 2374022.56
Groundwater seepage was encountered at approximately 23.5 ft. (elevation of 236.4')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger:** Omar Jimenez **Organization:** Kleinfelder

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DATE	BY	REV	REVISION

STATE OF TEXAS
NOEL W. JANACEK
103586
LICENSED PROFESSIONAL ENGINEER
4/14/2021

KLEINFELDER
Bright People. Right Solutions.
Firm F-16438
7805 Mesquite Bend Dr., Suite 100
Irving, TX 75063

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE BORING LOGS

SHEET 2 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	146
CONTROL	SECTION	JOB	
0691	01	044	

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-05	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	10/28/2019
CSJ	0691-01-040	Station		Grnd. Elev.	259.86 ft
		Offset		GW Elev.	236.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, very dense, wet, light gray, fine grained, trace ferrous staining (SM)			20				SSS@40.3', N=45,50/5.25
45		50 (1) 50 (1)				30				SSS@45.3', N=31
213.9			CLAY, Fat, very stiff to hard, moist, gray to 56', brown thereafter, trace ferrous staining, slikensided to 56', trace calcareous nodules below 56' (CH)							
50		33 (6) 36 (6)				25	59	41		SSS@51.3', N=28, -#200=87.8% Sulfate Content=160 ppm
55		50 (5.5) 50 (5)				18				SSS@56', N=55
60		50 (3) 50 (1)				13				SSS@60.5', N=25,38,50/6
198.4			SAND, Silty, dense to very dense, wet, gray, fine grained, trace calcareous nodules and clay seams below 80.5' (SM)							
65		50 (4) 50 (1.5)				16				SSS@65.6', N=27,40,50/6 -#200=20.3%
70		50 (2) 50 (1.25)				19				SSS@70.4', N=68, -#200=14.0%
75		50 (4) 50 (2.75)				17				SSS@75.8', N=80
80		50 (2.5) 50 (2.5)								

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 25', then Mud Rotary; Northing: 13521282.15, Easting: 2374022.56
Groundwater seepage was encountered at approximately 23.5 ft. (elevation of 236.4')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger:** Omar Jimenez **Organization:** Kleinfelder

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DRILLING LOG

WinCore Version 3.3

County	Karnes	Hole	B-05	District	Corpus Christi
Highway	FM 81	Structure	Bridge	Date	10/28/2019
CSJ	0691-01-040	Station		Grnd. Elev.	259.86 ft
		Offset		GW Elev.	236.36 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, dense to very dense, wet, gray, fine grained, trace calcareous nodules and clay seams below 80.5' (SM)			16				SSS@80.5', N=27,49,50/3
85		50 (2.5) 50 (1.75)								Boring Terminated at 85.5'
174.4										
90										
95										
100										
105										
110										
115										
120										

Remarks: Drill Rig: CME75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 25', then Mud Rotary; Northing: 13521282.15, Easting: 2374022.56
Groundwater seepage was encountered at approximately 23.5 ft. (elevation of 236.4')

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole **Logger:** Omar Jimenez **Organization:** Kleinfelder

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DATE	BY	REV	REVISION

STATE OF TEXAS
NOEL W. JANACEK
103586
LICENSED
PROFESSIONAL ENGINEER
4/14/2021

KLEINFELDER
Bright People. Right Solutions.
Firm F-16438
7805 Mesquite Bend Dr., Suite 100
Irving, TX 75063

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE BORING LOGS

SHEET 3 OF 3

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	147
CONTROL	SECTION	JOB	
0691	01	044	

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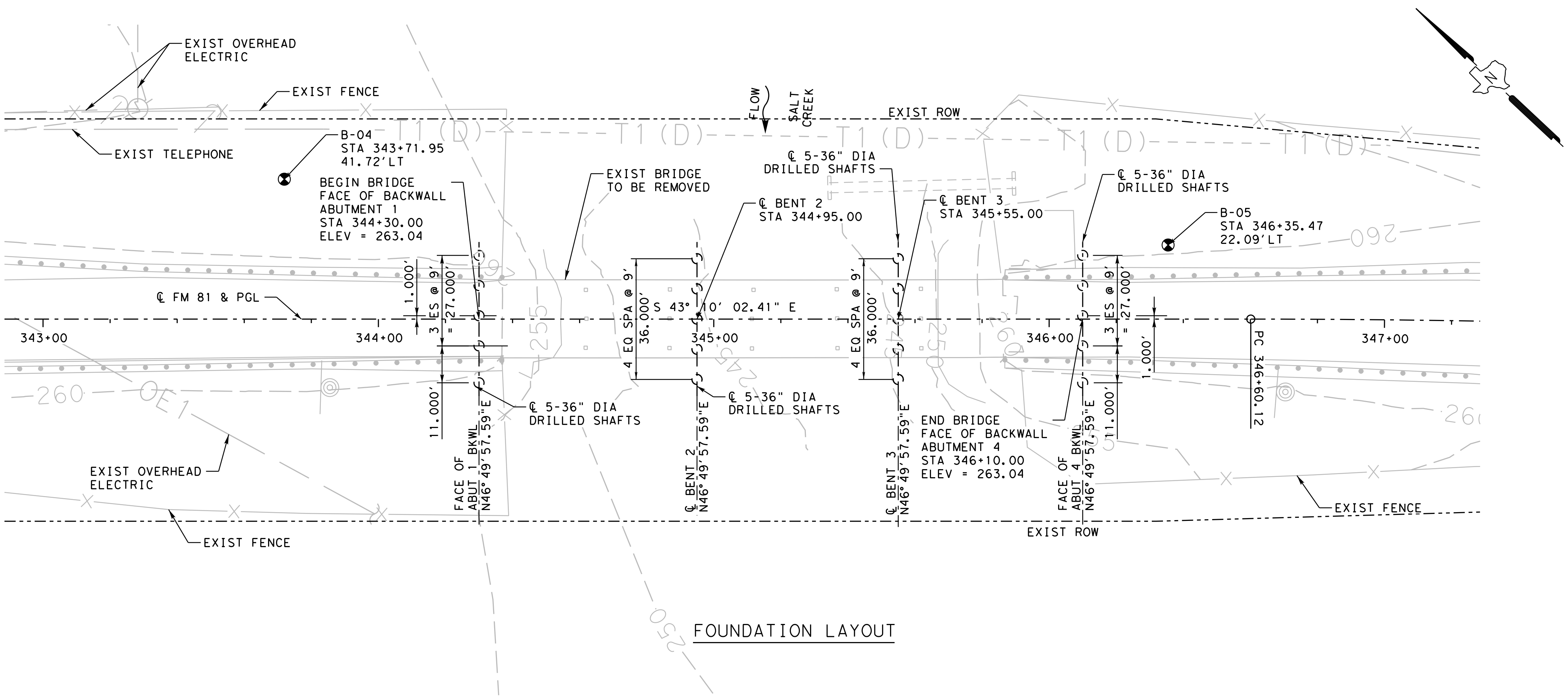

FOUNDATION LAYOUT

GENERAL NOTES

1. DESIGNED FOR HL-93 LOADING ACCORDING TO AASHTO LRFD SPECIFICATIONS, 8TH EDITION.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL ABUTMENT AND BENT FOUNDATION DETAILS NOT SHOWN.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS.
4. SEE BORING LOG SHEETS FOR BORE HOLE DATA.
5. EXISTING 6 SPAN FLAT SLAB BRIDGE WITH CONCRETE DECK ON CONCRETE AND STEEL SUBSTRUCTURE TO BE REMOVED.

LEGEND

FLOW DIRECTION
EXISTING ROW
EXISTING FENCE
OE — OE OVERHEAD POWERLINE

0 20 40
SCALE: 1"=40'

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE
FOUNDATION LAYOUT

SCALE: 1"=40' SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	148
CONTROL	SECTION	JOB	
0691	01	044	

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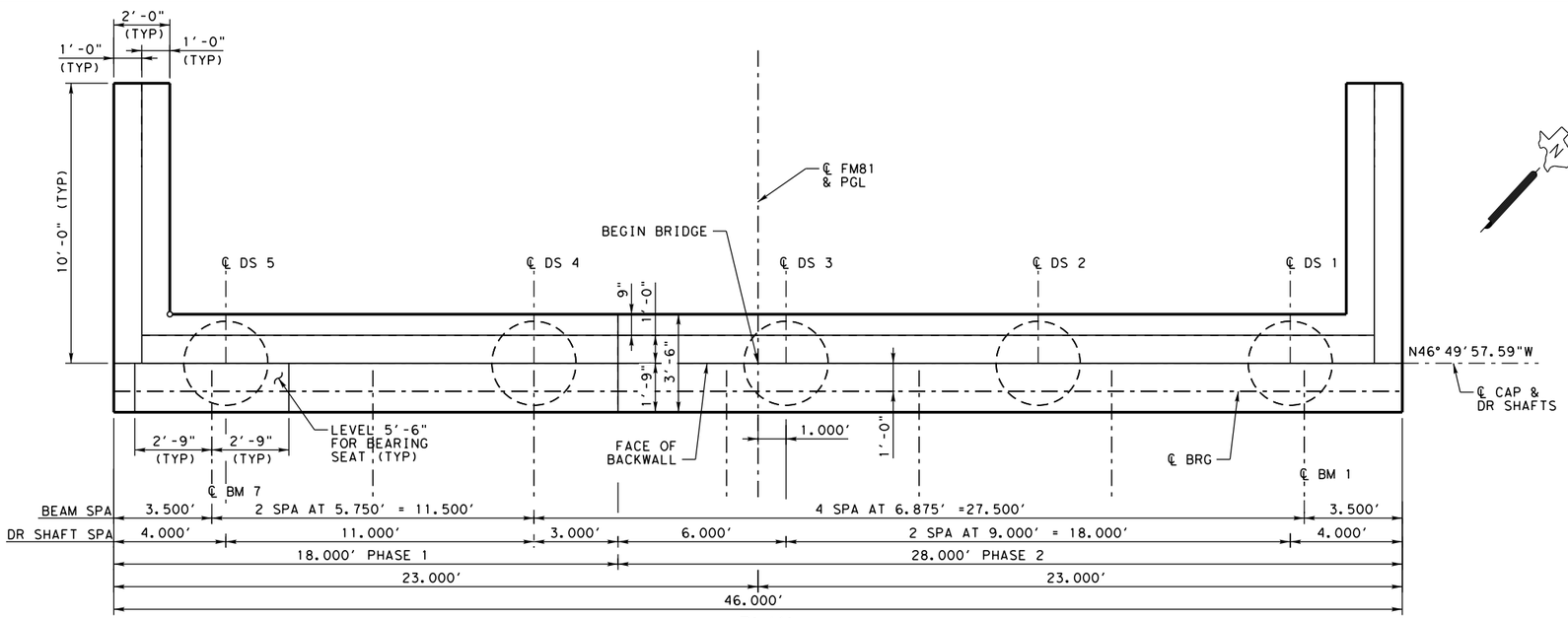
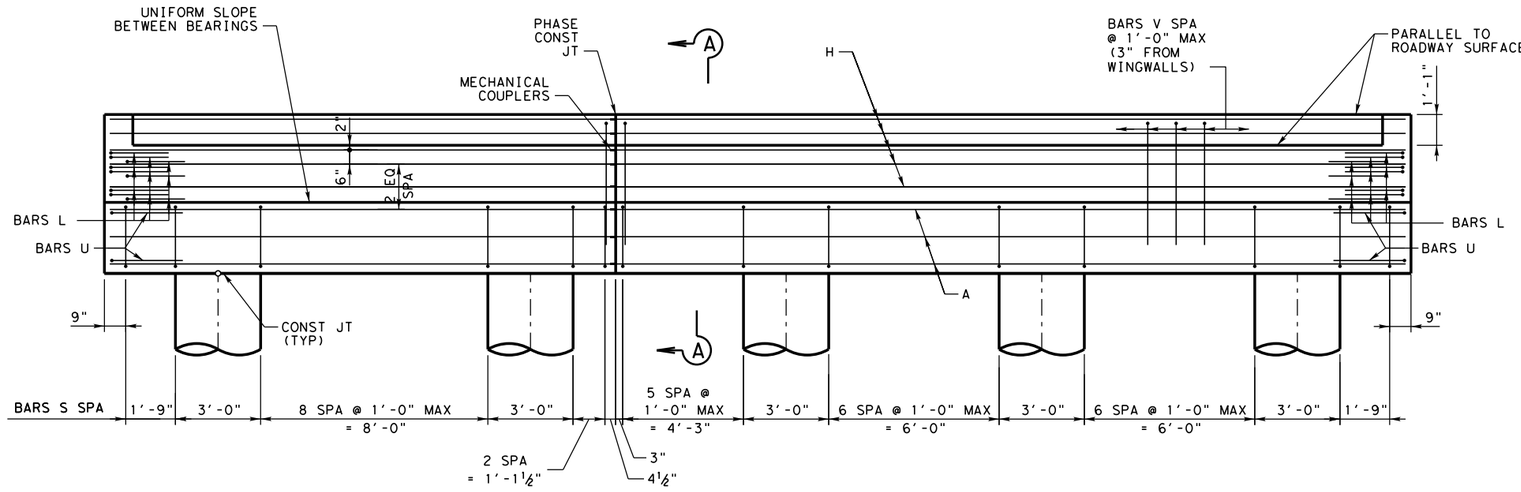


PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. DESIGNED FOR HL-93 LOADING ACCORDING TO AASHTO SPECIFICATIONS, 8TH EDITION.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. FOR BEARING SEAT ELEVATIONS, SEE BEARING SEAT ELEVATIONS SHEET. SEE SHEET X OF X FOR BEARING SEAT DETAIL.
4. CALCULATED FOUNDATION LOADS = 120 TONS/DRILLED SHAFT.

COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

PROVIDE CLASS "C" CONCRETE f'c = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER

Lauren Brod 6/17/2022

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE ABUTMENT 1 DETAILS

SCALE: AS NOTED SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	149
CONTROL	SECTION	JOB	
0691	01	044	

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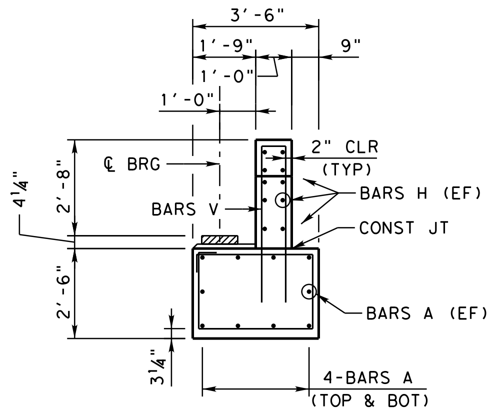
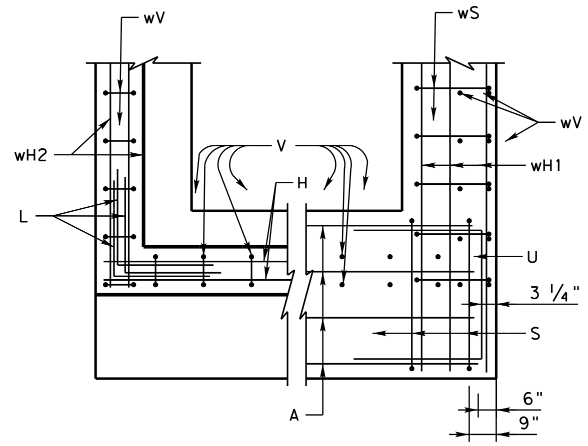


SECTION A-A

SCALE: 3/16" = 1'-0"



BACK WALL CAP

CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES (12)

BAR	No.	SIZE	LENGTH	WEIGHT
A1	10	#11	18'-6"	983
A2	10	#11	27'-6"	1,461
H1	6	#6	18'-10"	170
H2	6	#6	27'-10"	251
L	18	#6	4'-0"	108
S	38	#5	11'-4"	449
U	4	#6	8'-0"	48
V	46	#5	8'-5"	404
wH 1	14	#6	11'-5"	240
wH 2	16	#6	9'-8"	232
wS	22	#4	7'-8"	113
wV	22	#5	8'-10"	203
(2) REINFORCING STEEL			LB	4,662
(3) CLASS "C" CONCRETE			CY	25.5

(2) FOR CONTRACTOR'S INFORMATION ONLY.

(3) INCLUDES SHEAR KEY QUANTITY

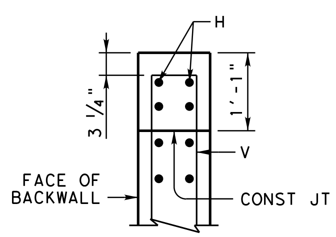
GENERAL NOTES

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

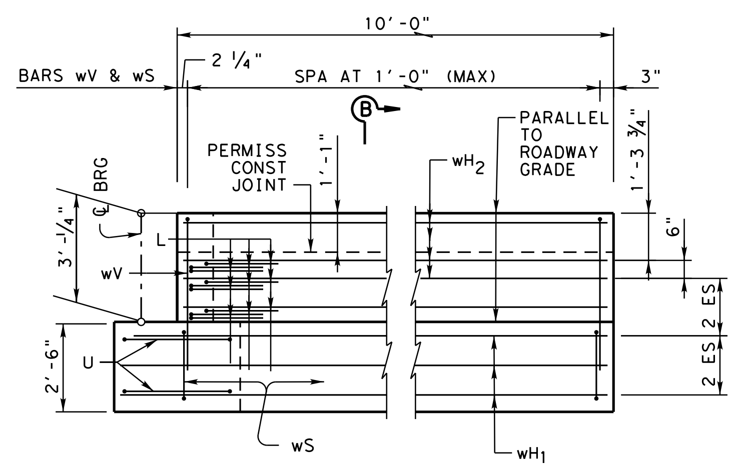
COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

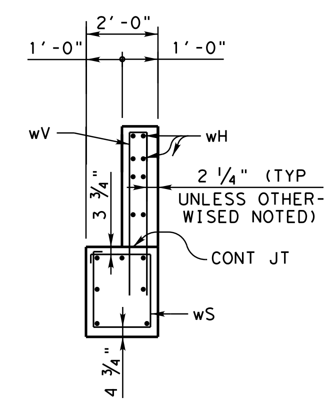
PROVIDE CLASS "C" CONCRETE F'C = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.



BACK WALL DETAIL

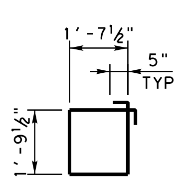


WINGWALL ELEVATION

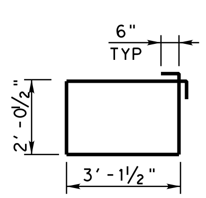


SECTION B-B

HL-93 LOADING



BARS wS



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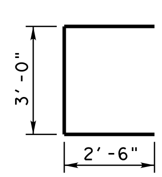
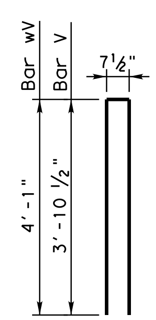
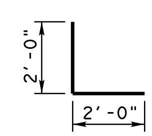


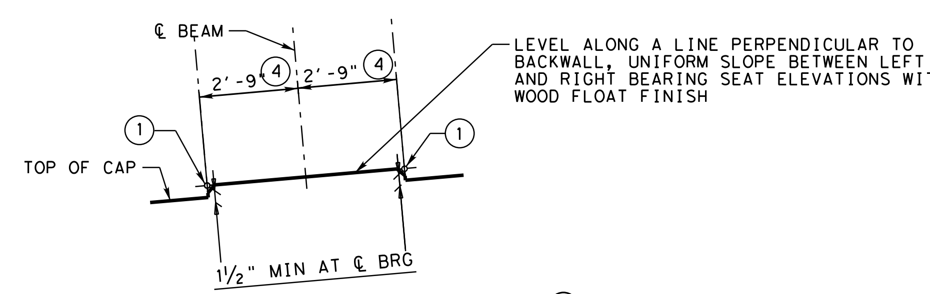
BARS U



BARS V & wV



BARS L



BEARING SEAT DETAIL

(BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

(1) LEFT AND RIGHT BEARING SEAT ELEVATIONS PROVIDED ELSEWHERE.

(4) MEASURED ALONG ℄ OF BEARING.

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc. Texas Registered Engineering Firm F-6324

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Texas Department of Transportation

FM 81

SALT CREEK BRIDGE ABUTMENT 1 DETAILS

SCALE: AS NOTED SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	150
CONTROL	SECTION	JOB	
0691	01	044	

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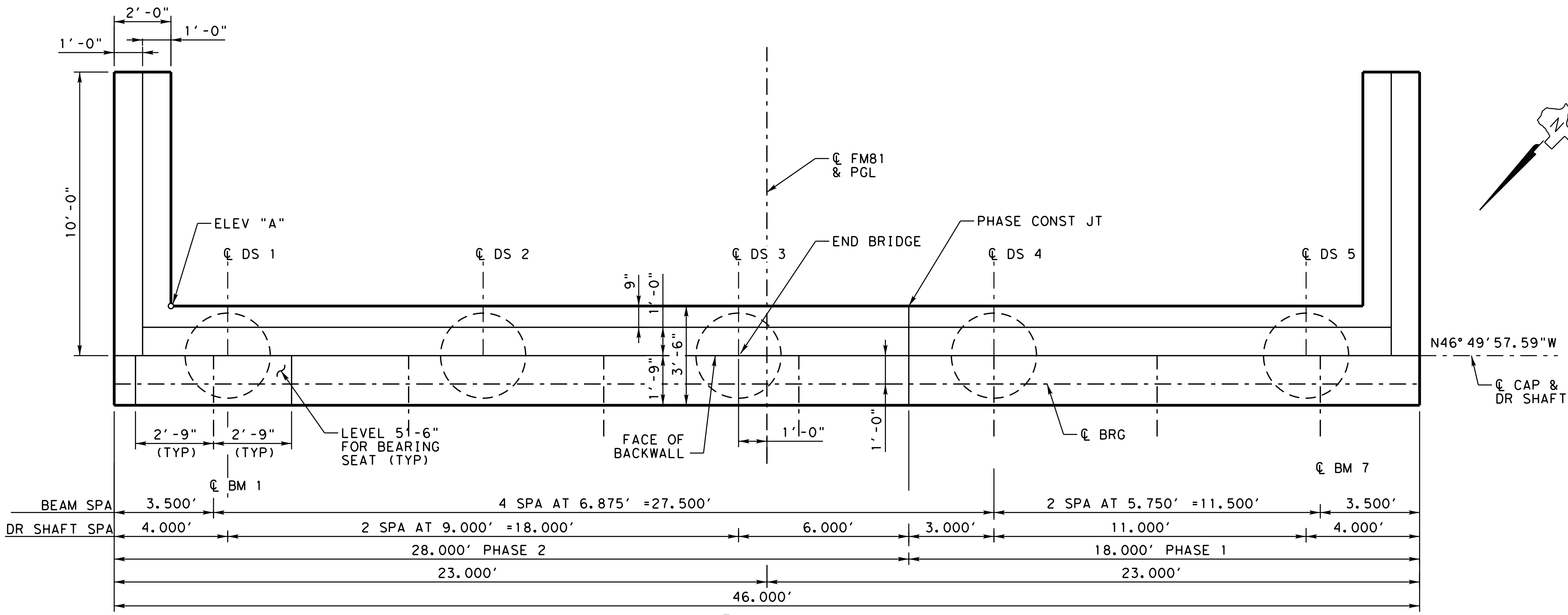
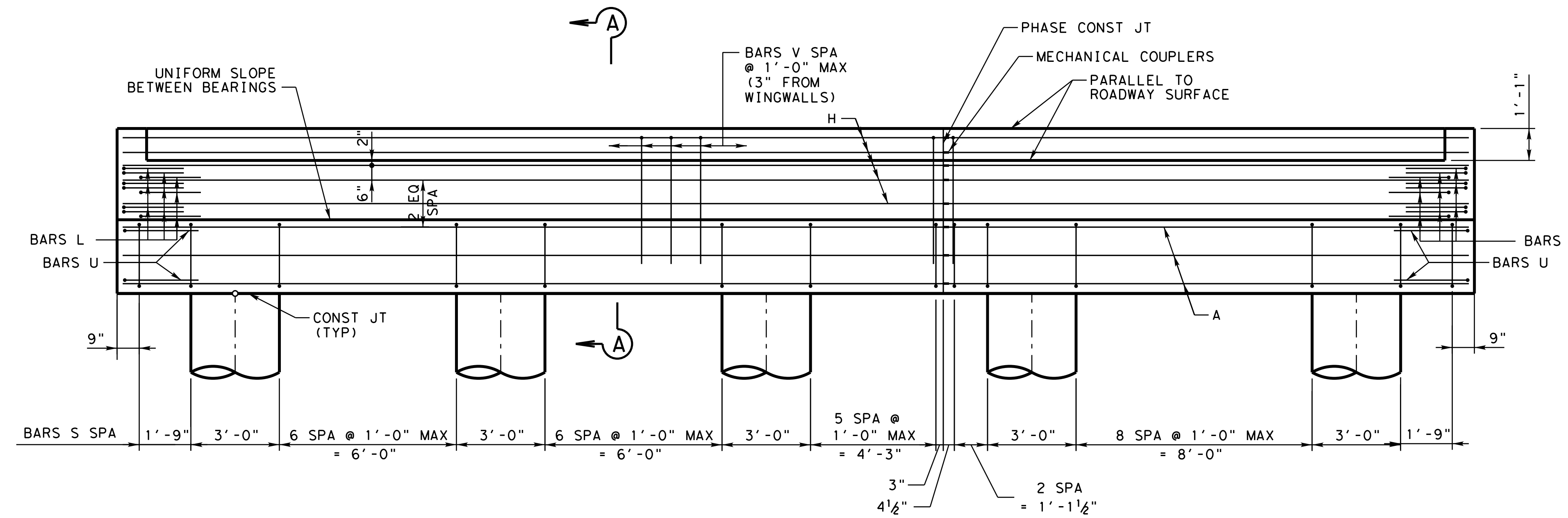


PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"

GENERAL NOTES

1. DESIGNED FOR HL-93 LOADING ACCORDING TO AASHTO SPECIFICATIONS, 8TH EDITION.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. FOR BEARING SEAT ELEVATIONS, SEE BEARING SEAT ELEVATIONS SHEET. SEE SHEET X OF X FOR BEARING SEAT DETAIL.
4. CALCULATED FOUNDATION LOADS = 120 TONS/DRILLED SHAFT.

COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

PROVIDE CLASS "C" CONCRETE f'c = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE
ABUTMENT 4 DETAILS

SCALE: AS NOTED | SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	151
CONTROL	SECTION	JOB	
0691	01	044	

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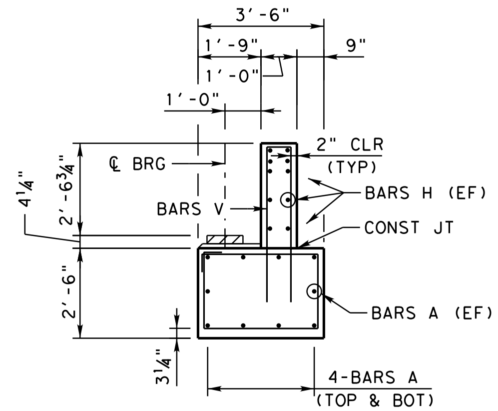
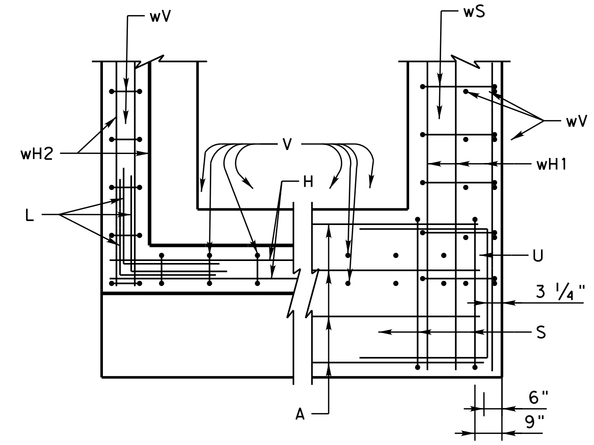


SECTION A-A

SCALE: 3⁄16"= 1'-0"



BACK WALL CAP

CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A1	10	#11	18'-6"	983
A2	10	#11	27'-6"	1,461
H1	6	#6	18'-10"	170
H2	6	#6	27'-10"	251
L	18	#6	4'-0"	108
S	38	#5	11'-4"	449
U	4	#6	8'-0"	48
V	46	#5	8'-4"	400
wH 1	14	#6	11'-5"	240
wH 2	16	#6	9'-8"	232
wS	22	#4	7'-8"	113
wV	22	#5	8'-7"	197
(2) REINFORCING STEEL			LB	4,652
(3) CLASS "C" CONCRETE			CY	25.3

(2) FOR CONTRACTOR'S INFORMATION ONLY.

(3) INCLUDES SHEAR KEY QUANTITY

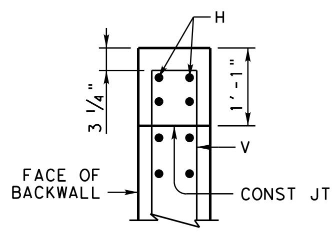
GENERAL NOTES

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

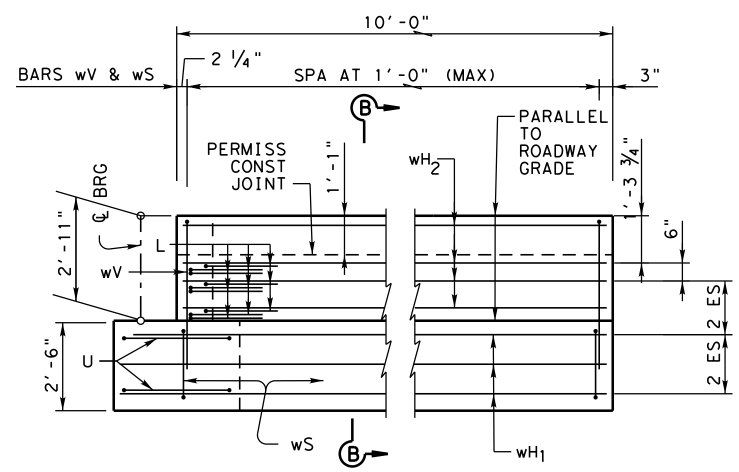
COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES

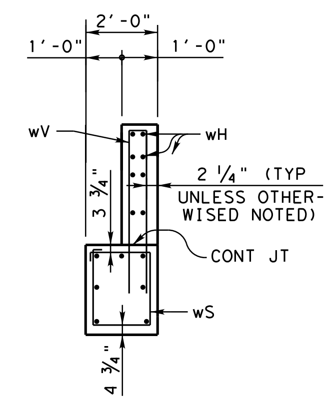
PROVIDE CLASS "C" CONCRETE F'C = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.



BACK WALL DETAIL



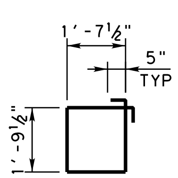
WINGWALL ELEVATION

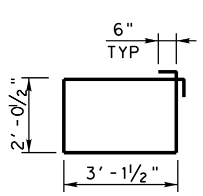


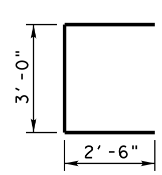
SECTION B-B

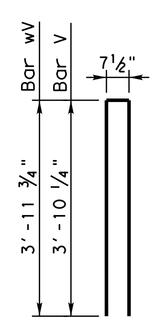
HL-93 LOADING

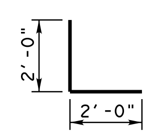
DATE	BY	REV	REVISION



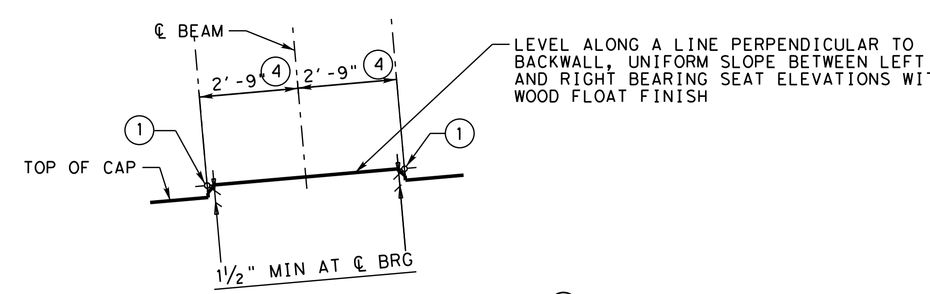








BARS wS BARS S BARS U BARS V & wV BARS L



BEARING SEAT DETAIL

(BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

(1) LEFT AND RIGHT BEARING SEAT ELEVATIONS PROVIDED ELSEWHERE.

(4) MEASURED ALONG ℄ OF BEARING.

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER

Lauren Brod 6/17/2022

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE ABUTMENT 4 DETAILS

SCALE: AS NOTED

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	152
CONTROL	SECTION	JOB	
0691	01	044	

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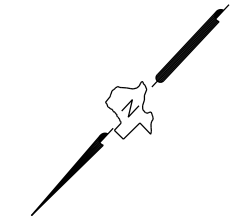
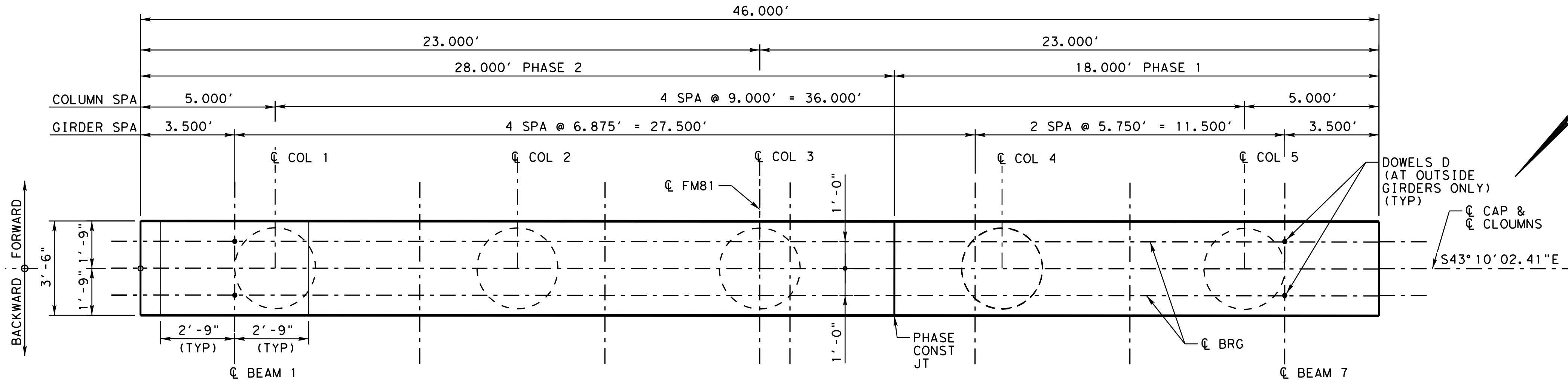
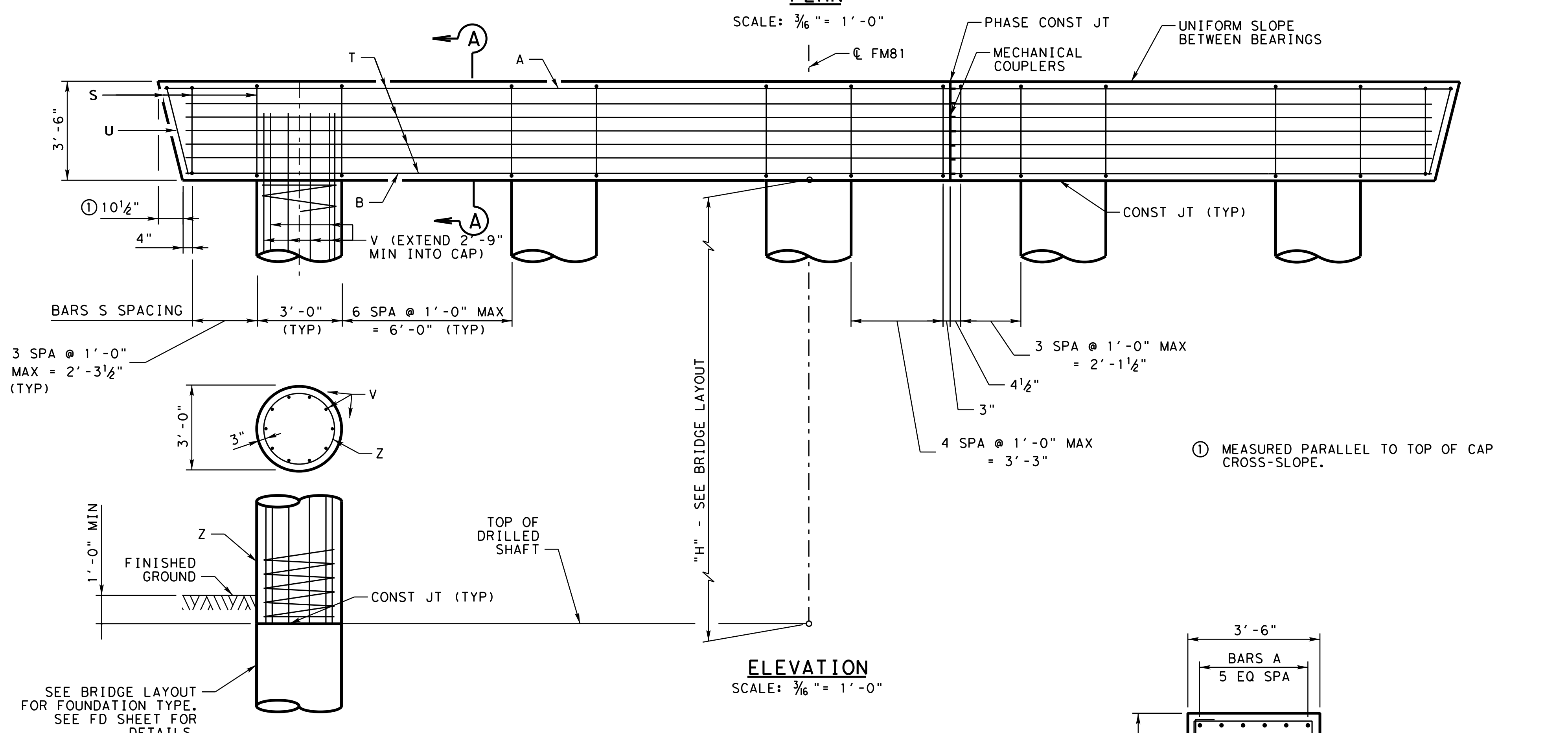




PLAN

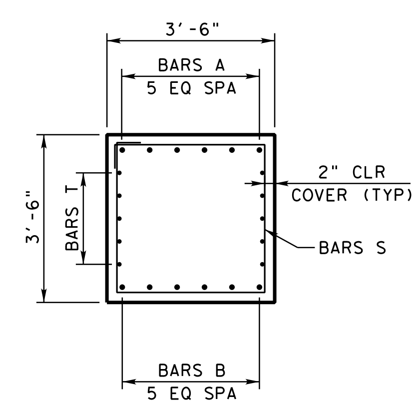
SCALE: 3/16" = 1'-0"



① MEASURED PARALLEL TO TOP OF CAP CROSS-SLOPE.

ELEVATION

SCALE: 3/16" = 1'-0"



SECTION A-A

SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. DESIGNED FOR HL-93 LOADING ACCORDING TO AASHTO LRFD SPECIFICATIONS, 8TH EDITION.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS SHOWN OTHERWISE. REINFORCING DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. FOR BEARING SEAT ELEVATIONS, SEE ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS SHEET.
4. CALCULATED FOUNDATION LOAD = 170 TONS/DRILLED SHAFT.

MATERIAL NOTES

1. CL C CONCRETE STRENGTH f'c = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER

Lauren Brod 6/17/2022

Stantec

Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE BENTS DETAILS

SCALE: AS NOTED

SHEET 1 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	153
CONTROL	SECTION	JOB	
0691	01	044	

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TABLE OF COLUMN QUANTITIES ② ③

BENT	"H"	BARS V 50 - #9		BARS Z 5 - #4		REINF STEEL	CLASS "C" CONC (COL)
-	HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	12'	14'-9"	2508	400'- 7"	1338	3846	15.7
3	13'	15'-9"	2678	432'- 0"	1443	4121	17.0

TABLE OF ESTIMATED QUANTITIES ②

BAR	NO.	SIZE	LENGTH	WEIGHT
A1	6	#11	18'-9"	598
A2	6	#11	27'-9"	885
B1	6	#11	18'-0"	574
B2	6	#11	27'-0"	861
D	4	#9	1'-8"	23
S	38	#5	13'-6"	535
T1	10	#5	18'-0"	188
T2	10	#5	27'-0"	282
U	2	#5	9'-8"	20
REINF STEEL			LB	3,966
④ CL C CONC (CAP)			CY	21.3

② QUANTITIES SHOWN ARE FOR ONE BENT ONLY.

③ QUANTITIES SHOWN ARE BASED ON AN "H" VALUES SHOWN, FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 31'-5"
REINFORCING STEEL, 275 LB
CLASS "C" CONCRETE (COL), 1.31 CY

④ INCLUDES SHEAR KEY QTY

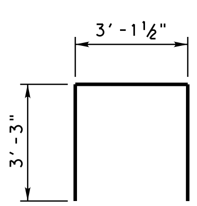
* FOR CONTRACTOR'S INFORMATION ONLY

GENERAL NOTES

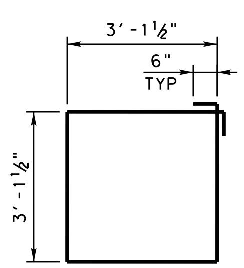
SEE SHEET 1 OF 2 FOR GENERAL NOTES.

MATERIAL NOTES

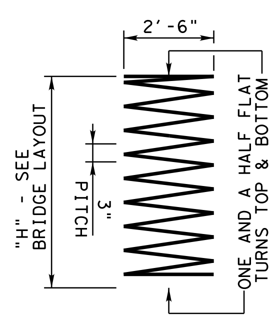
1. CL C CONCRETE STRENGTH f'c = 3,600 PSI. ALL REINFORCING SHALL BE GRADE 60.
2. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.



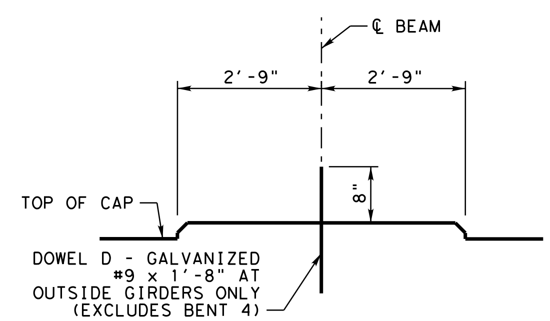
BARS U



BARS S



BARS Z



BEARING SEAT DETAIL
(BEARING SURFACE SHALL BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

HL-93 LOADING

DATE	BY	REV	REVISION

6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SALT CREEK BRIDGE BENTS DETAILS

SCALE: AS NOTED

SHEET 2 OF 2

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	154
CONTROL	SECTION	JOB	
0691	01	044	

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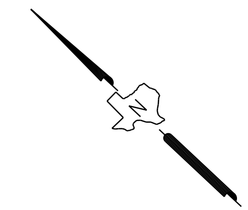
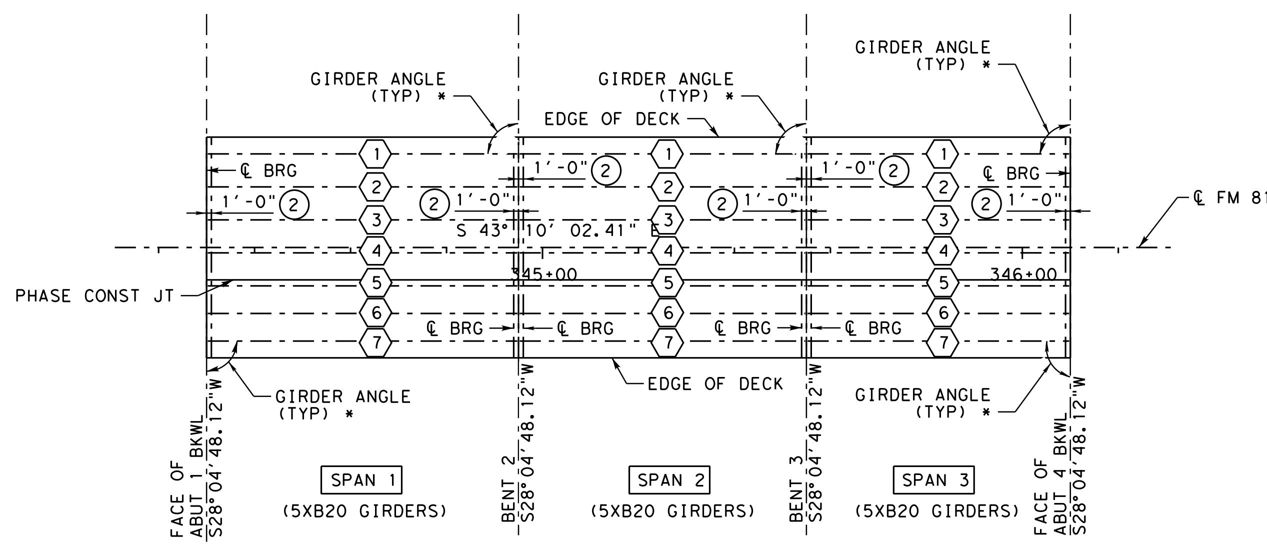


* BEAM ANGLE LISTED IN TABLE BENT REPORT.

(1) BEAM LENGTHS SHOWN ARE BOTTOM BEAM FLANGE LENGTHS WITH ADJUSTMENT MADE FOR BEAM SLOPE.

(2) SEE XBEB STANDARD FOR ORIENTATION OF DIMENSION.

⟨1⟩ BEAM NUMBER



PLAN

BENT REPORT

BENT NO. 1 (N 46 49 57.59 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			

BENT NO. 2 (N 46 49 57.59 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D	M	S
SPAN 1	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			
SPAN 2	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			

BENT NO. 3 (N 46 49 57.59 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D	M	S
SPAN 2	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			
SPAN 3	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			

BENT NO. 4 (N 46 49 57.59 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 19.500 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D	M	S
SPAN 3	BEAM 1	0.000	90	0	0
	BEAM 2	6.875	90	0	0
	BEAM 3	6.875	90	0	0
	BEAM 4	6.875	90	0	0
	BEAM 5	6.875	90	0	0
	BEAM 6	5.750	90	0	0
	BEAM 7	5.750	90	0	0
	TOTAL	39.000			

BEAM REPORT (1)

BEAM REPORT AT CENTER OF BEAM, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	BEAM BEARING
BEAM 1	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 2	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 3	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 4	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 5	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 6	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E
BEAM 7	65.0000	63.0000	64.5000	0.00000	S 43 10 2.41 E

BEAM REPORT AT CENTER OF BEAM, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	BEAM BEARING
BEAM 1	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 2	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 3	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 4	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 5	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 6	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E
BEAM 7	60.0000	58.0000	59.5000	0.00000	S 43 10 2.41 E

BEAM REPORT AT CENTER OF BEAM, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE	BEAM BEARING
BEAM 1	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 2	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 3	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 4	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 5	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 6	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E
BEAM 7	55.0000	53.0000	54.5000	0.00000	S 43 10 2.41 E

0 20 40
SCALE: 1"=40'

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER

Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
SALT CREEK BRIDGE BEAM LAYOUT

SCALE: 1"=40' SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	155
CONTROL	SECTION	JOB	
0691	01	044	

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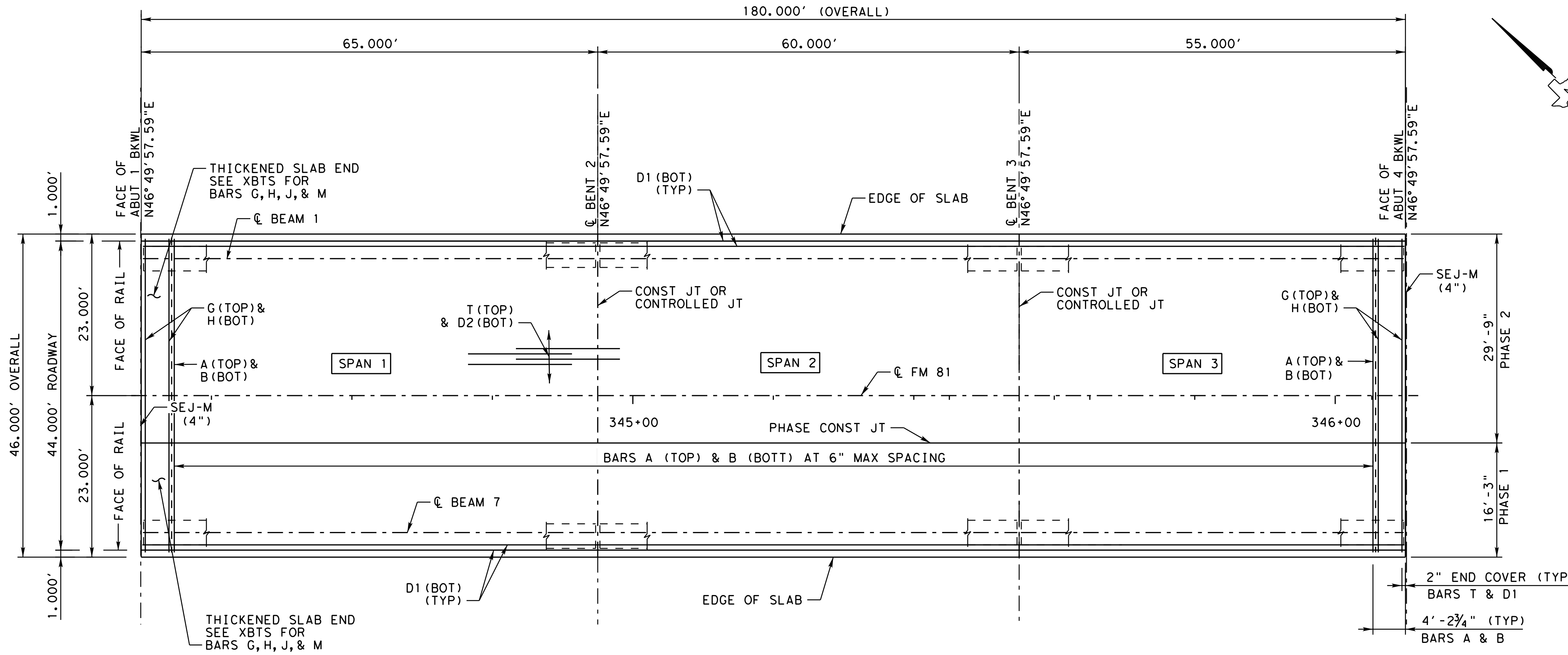
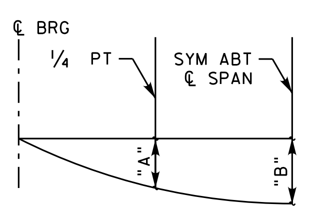


NOTES

1. FOR GENERAL NOTES, SEE "GENERAL NOTES" SHEETS.
2. SEE XBTS FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.
3. SEE PCP STANDARDS FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.
4. SEE XBBR-MS STANDARD FOR MISCELLANEOUS DETAILS.
5. BAR LAPS, WHERE REQUIRED, SHALL BE AS FOLLOWS:
   UNCOATED - #4 = 1'-5"
   - #5 = 1'-9"
6. SEE "SLAB DETAILS (SPANS 1-3)" SHEET FOR SLAB TYPICAL SECTIONS AND DETAILS.
7. SEE T223 STANDARD SHEET FOR RAIL ANCHORAGE IN SLAB.

0 10 20
SCALE: 1"=20'

HL-93 LOADING



DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS & CAST-IN-PLACE SLAB ONLY. (E_c = 5000 KSI) ADJUST DEFLECTIONS BASED ON FIELD OBSERVATIONS AS NEEDED.

DEAD LOAD DEFLECTION DIAGRAM

SPAN NO	GIRDER NO	"A" FT	"B" FT
1	1	0.084	0.119
	2	0.083	0.118
	3	0.083	0.118
	4	0.083	0.118
	5	0.050	0.071
	6	0.069	0.099
	7	0.076	0.109
2	1	0.060	0.086
	2	0.060	0.085
	3	0.060	0.085
	4	0.060	0.085
	5	0.036	0.051
	6	0.050	0.071
	7	0.055	0.078
3	1	0.042	0.060
	2	0.042	0.059
	3	0.042	0.059
	4	0.042	0.059
	5	0.025	0.036
	6	0.035	0.049
	7	0.038	0.054

BAR TABLE

SIZE	BAR
A	#5
B	#5
D	#5
G	#5
H	#5
J	#5
M	#5
T	#4

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
SALT CREEK BRIDGE
180.00' PRESTRESSED CONCRETE X-BEAM UNIT 1
SPANS 1-3

SCALE: 1"=20' SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	156
CONTROL	SECTION	JOB	
0691	01	044	

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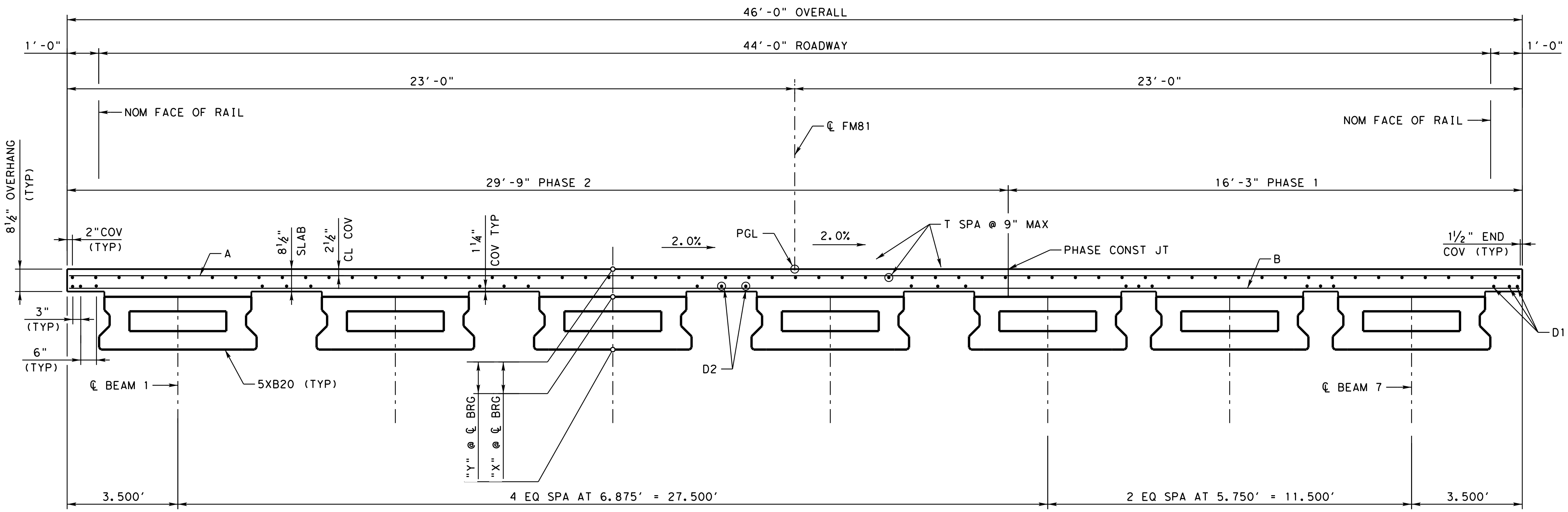

TYPICAL TRANSVERSE SECTION - (SPANS 1 - 3)

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONC SLAB	PRESTRESSED CONC BEAMS (5XB20) (3)	REINFORCING STEEL
-	SF	LF	LB
1	2,990	451.50	19,435
2	2,760	416.50	17,940
3	2,530	381.50	16,445
TOTAL	8,280	1,249.50	53,820 (2)

(2) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 6.5 LBs/SF

(3) QUANTITIES SHOWN ARE BOTTOM BEAM FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE. SEE FRAMING PLAN SHEET FOR BEAM LENGTHS.

TABLE OF SECTION DEPTHS

SPAN NO	GIRDER NO	"X" AT ℄ BRG	"Y" AT ℄ BRG
1	1-4	1'-0"	2'-8"
1	5	1'-0"	2'-8"
1	6	1'-0"	2'-8"
1	7	1'-0"	2'-8"
2	1-4	0'-11½"	2'-7½"
2	5	0'-11½"	2'-7½"
2	6	0'-11½"	2'-7½"
2	7	0'-11½"	2'-7½"
3	1-4	0'-10¾"	2'-6¾"
3	5	0'-10¾"	2'-6¾"
3	6	0'-10¾"	2'-6¾"
3	7	0'-10¾"	2'-6¾"

NOTES

1. FOR GENERAL NOTES, SEE "GENERAL NOTES" SHEETS.
2. SEE PCP AND PCP-FAB STANDARDS FOR PANEL DETAILS IF THIS OPTION IS USED.
3. SEE XBTS STANDARDS FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENT.
4. SEE XBBR-MS STANDARD FOR MISCELLANEOUS DETAILS.
5. SEE T223 STANDARD FOR RAIL ANCHORAGE IN SLAB.

0 10 20
SCALE: 1"=20'

HL-93 LOADING

DATE	BY	REV	REVISION

STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED
PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
SALT CREEK BRIDGE
SLAB DETAILS
SPANS 1 - 3

SCALE: 1"=20' SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	157
CONTROL	SECTION	JOB	
0691	01	044	

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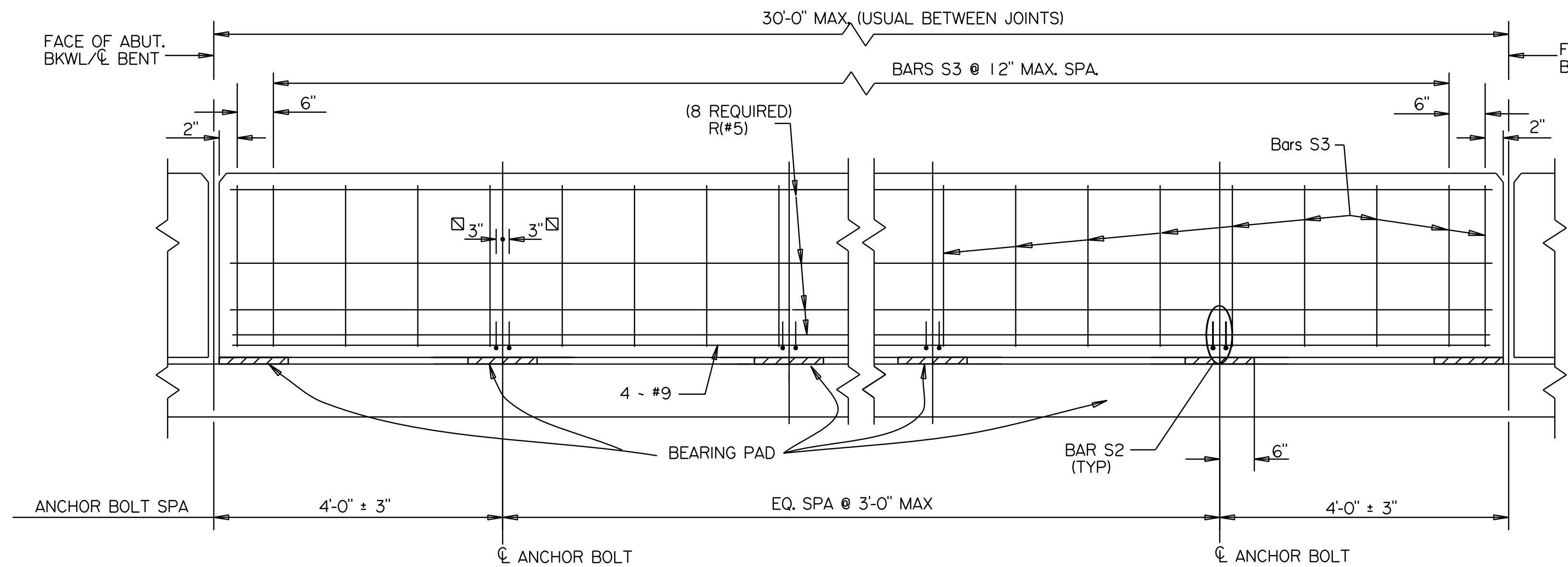
GENERAL NOTES:
ALL ANCHOR BOLTS, NUTS, BEARING PADS, REBARS AND WORK REQUIRED TO COMPLETE THE BARRIER INSTALLATION, INCLUDING VERIFICATION OF OVERLAY, IF ANY, AND SLAB THICKNESS SHALL BE SUBSIDIARY TO THE PRICE PAID FOR TEMPORARY RAIL.
ANCHOR BOLTS AND ASSOCIATED NUTS, WASHERS, AND PLATES FOR THE BARRIER TO SLAB ATTACHMENT SHALL BE GALVANIZED IN ACCORDANCE WITH THE GOVERNING SPECIFICATION. ANCHOR BOLT ASSEMBLIES SHALL CONFORM TO ITEM 449, HIGH STRENGTH STEEL ANCHOR BOLTS WITH TACK WELDED NUTS. DRILLED ANCHORAGE HOLES SHALL BE INSTALLED WITH ROTARY TYPE EQUIPMENT; PERCUSSION DRILLING IS DISALLOWED. SPALLS IN THE BOTTOM OF THE SLAB EXCEEDING ONE HALF INCH FROM THE EDGE OF THE HOLE SHALL BE PATCHED.
BOLTS AND NUTS SHALL HAVE CLASS 2A AND 2B FIT TOLERANCES.
ANCHOR SYSTEM EQUAL OR STRONGER THAN THOSE SHOWN MAY BE USED PROVIDED THE DETAILS OF SUCH SYSTEMS ARE SUBMITTED TO AND APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.
FOR ADDITIONAL NOTES AND DETAILS NOT SHOWN SEE "CONCRETE SAFETY BARRIER (F-SHAPE) - CSB (1)" (LATEST VERSION) STANDARD DRAWING.
PAYMENT FOR THIS MODIFIED CSB WILL BE SUBSIDIARY TO CSB PROVIDED FOR TRAFFIC CONTROL.

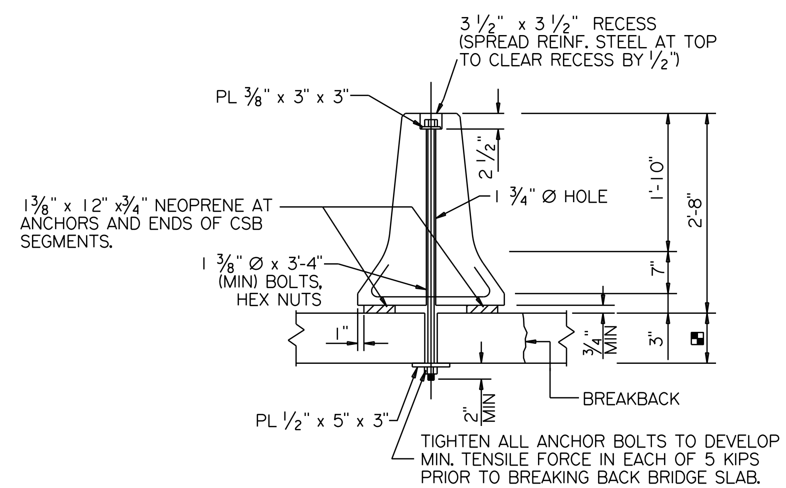
TRAFFIC BARRIER SHALL BE PRECAST ONLY AND SHALL NOT BE CAST UNTIL LENGTH OF SPAN HAS BEEN DETERMINED. CONTRACTOR SHALL SUBMIT A RAIL LAYOUT FOR APPROVAL PRIOR TO CASTING TRAFFIC BARRIER.



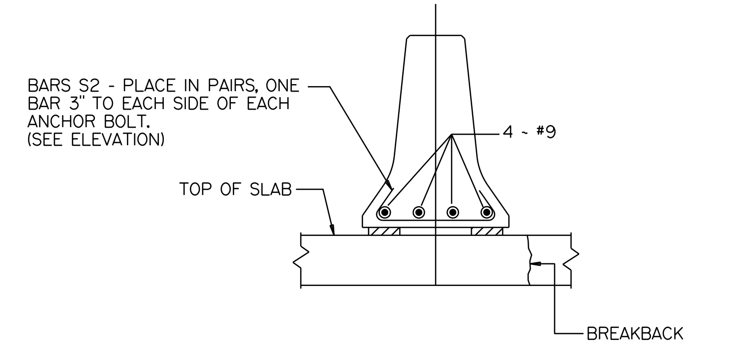
ELEVATION OF TRAFFIC BARRIER

■ ~ THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING: 1) WHETHER THE BRIDGE DECK HAS AN OVERLAY; AND 2) THE EXIST. SLAB THICKNESS. BASED ON THIS INFORMATION THE HEIGHT OF THE BARRIER AND BOLTS MUST THEN BE ADJUSTED ACCORDINGLY.

* ~ LENGTH OF BOLT DEPENDENT ON HEIGHT OF BEAM AND SLAB THICKNESS.

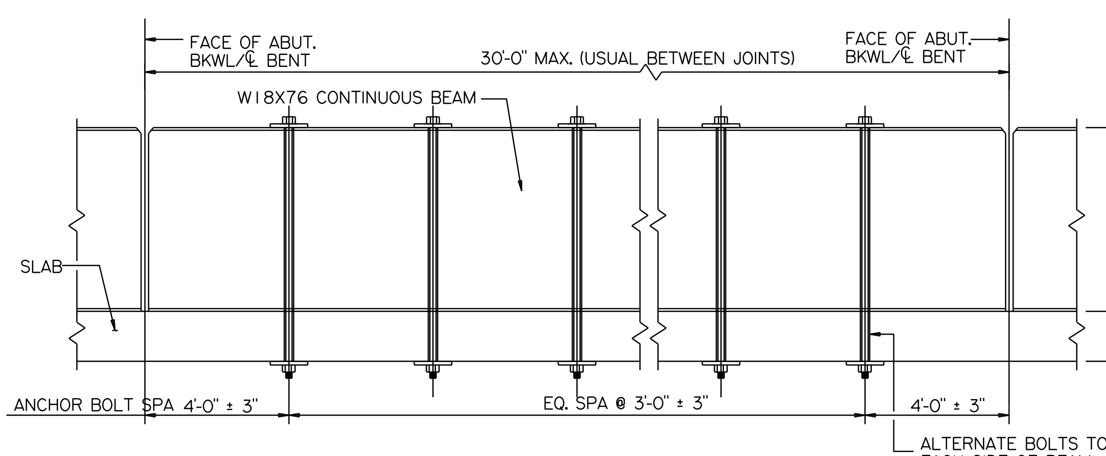


ANCHORAGE DETAIL

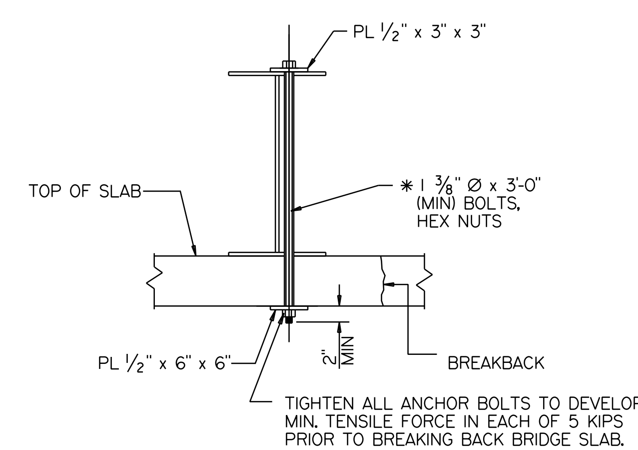


TYPICAL SECTION SHOWING ADDITIONAL REBARS

SEE "CONCRETE SAFETY BARRIER (F-SHAPE) - CSB (1)" (LATEST VERSION) STANDARD DRAWING FOR REINF. STEEL DETAILS AND NOTES NOT SHOWN.



ELEVATION OF I-BEAM HOLDOWN



TYPICAL SECTION SHOWING ANCHORAGE DETAIL

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STATE OF TEXAS
LAUREN N.C. BROD
107201
LICENSED PROFESSIONAL ENGINEER
Lauren Brod 6/17/2022

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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
FLAT SLAB TEMPORARY TRAFFIC BARRIER SLAB SUPPORT DETAIL

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

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	158
CONTROL	SECTION	JOB	
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DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: TOTAL	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: DE-BONDED	DEBONDED STRAND PATTERN PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
SALT CREEK	1	1-5	5XB20		34	0.6	270	6.68	6.60	6	2.50	28	6	0	2	2	2	0	4.600	5.000
	1	6-7	5XB20		36	0.6	270	6.59	6.50	6	2.50	28	6	2	0	2	2	0	5.000	5.200
	2	1-5	5XB20		28	0.6	270	7.03	7.03	6	2.50	28	6	2	2	2	0	0	4.100	5.000
	2	6-7	5XB20		30	0.6	270	6.90	6.87	6	2.50	28	6	2	2	2	0	0	4.400	5.000
	3	1-5	5XB20		24	0.6	270	7.03	7.03	10	2.50	24	10	0	0	10	0	0	4.000	5.000
	3	6-7	5XB20		24	0.6	270	7.03	7.03	4	2.50	24	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	LIVE LOAD DISTRIBUTION FACTOR ② Shear
SALT CREEK	1	1-5	5XB20	3.211	-3.776	2558	0.600	0.656
	1	6-7	5XB20	3.222	-3.947	2838	0.652	0.652
	2	1-5	5XB20	2.604	-3.104	2222	0.600	0.661
	2	6-7	5XB20	2.714	-3.311	2464	0.652	0.652
	3	1-5	5XB20	2.269	-2.736	1906	0.600	0.667
	3	6-7	5XB20	2.275	-2.843	2104	0.652	0.652

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel 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 stand 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.

Stand 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 △.

① Based on the following allowable stresses (ksi):

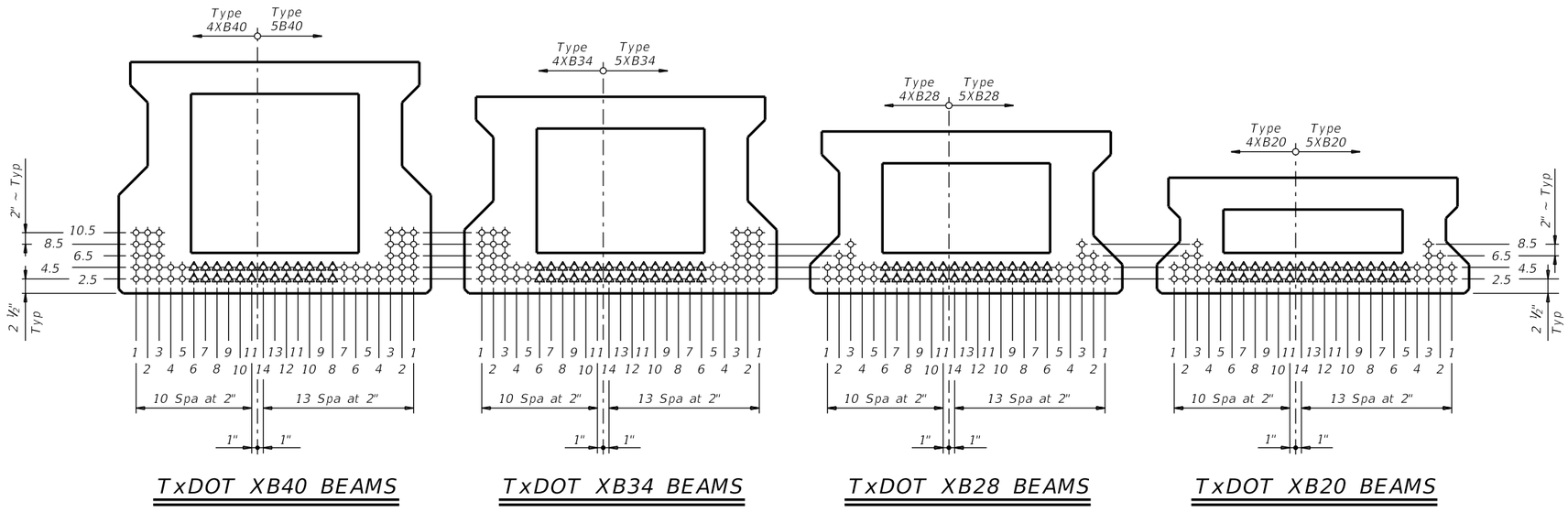
Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

Lauren Brod 6/17/2022



TxDOT XB40 BEAMS

TxDOT XB34 BEAMS

TxDOT XB28 BEAMS

TxDOT XB20 BEAMS

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DESIGNS (NON-STANDARD SPANS)

SALT CREEK BRIDGE

XBND

FILE: xbstds08.dgn	DN: TxDOT	CK: TxDOT	DW: SFS	CK: SDB
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
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	CRP	KARNES		159

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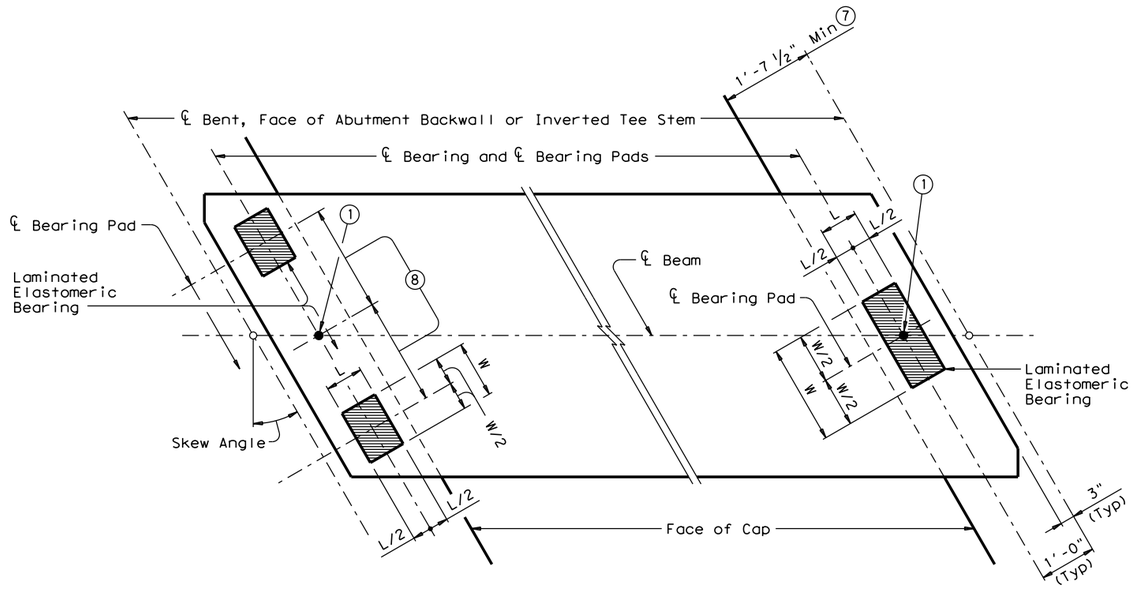
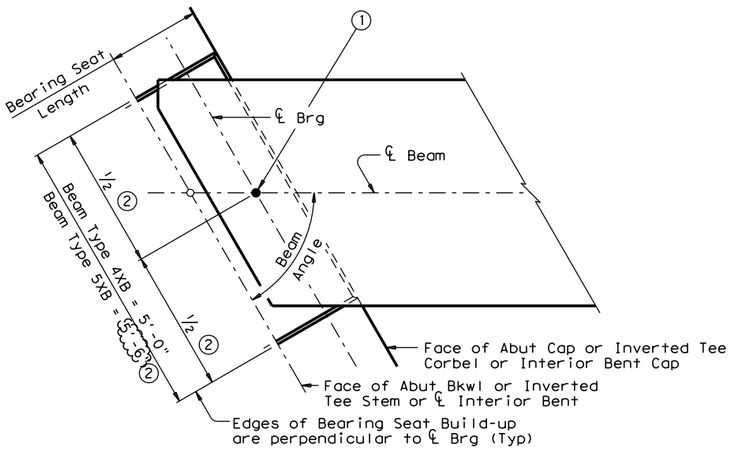


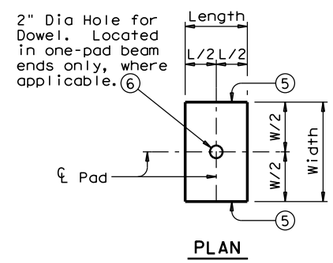
ELASTOMERIC BEARING PLACEMENT DIAGRAMS

Place one bearing at forward station beam end.
Place two bearings at back station beam end.

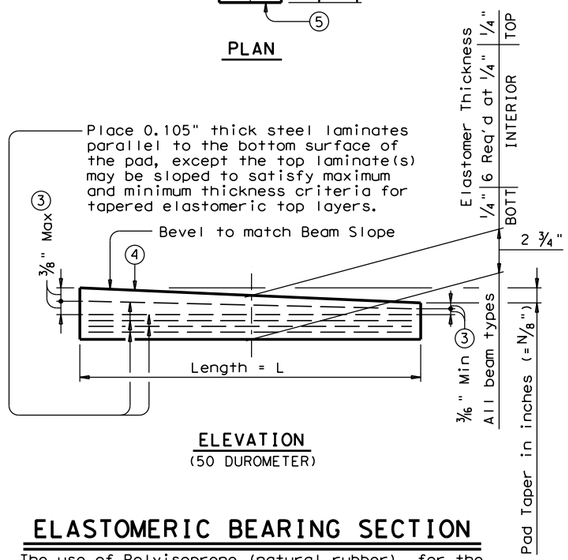


BEARING SEAT DIMENSIONS

Used when shown on Abutment and/or Bent details.



PLAN



ELEVATION
(50 DUROMETER)

ELASTOMERIC BEARING SECTION

The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

ELASTOMETRIC BEARING DIMENSIONS TABLE

BEARING TYPE (4)	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
XB20-"N"	4XB20	8"	21"	8"	10"
	5XB20	8"	21"	8"	10"
XB28-"N"	4XB28	8"	21"	8"	10"
	5XB28	8"	21"	8"	10"
XB34-"N"	4XB34	8"	21"	8"	12"
	5XB34	8"	21"	8"	12"
XB40-"N"	4XB40	8"	21"	8"	12"
	5XB40	8"	21"	8"	12"

(1) Dowel at doweled beam end [labeled (D) on Bridge Layout]. Required for outside girder 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" Dia 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 beam slopes up to 0.008 ft/ft.

For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.

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.

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

STATE OF TEXAS
LAUREN N.C. BROD
107201
PROFESSIONAL ENGINEER
LICENSED

6/17/2022

Modified 02/11/2022:

Changed bearing seat length to 5'-6" for Beam Type 5XB.

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING DETAILS
PRESTR CONC X-BEAMS

XBEB(MOD)

FILE: xbstde07.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		160

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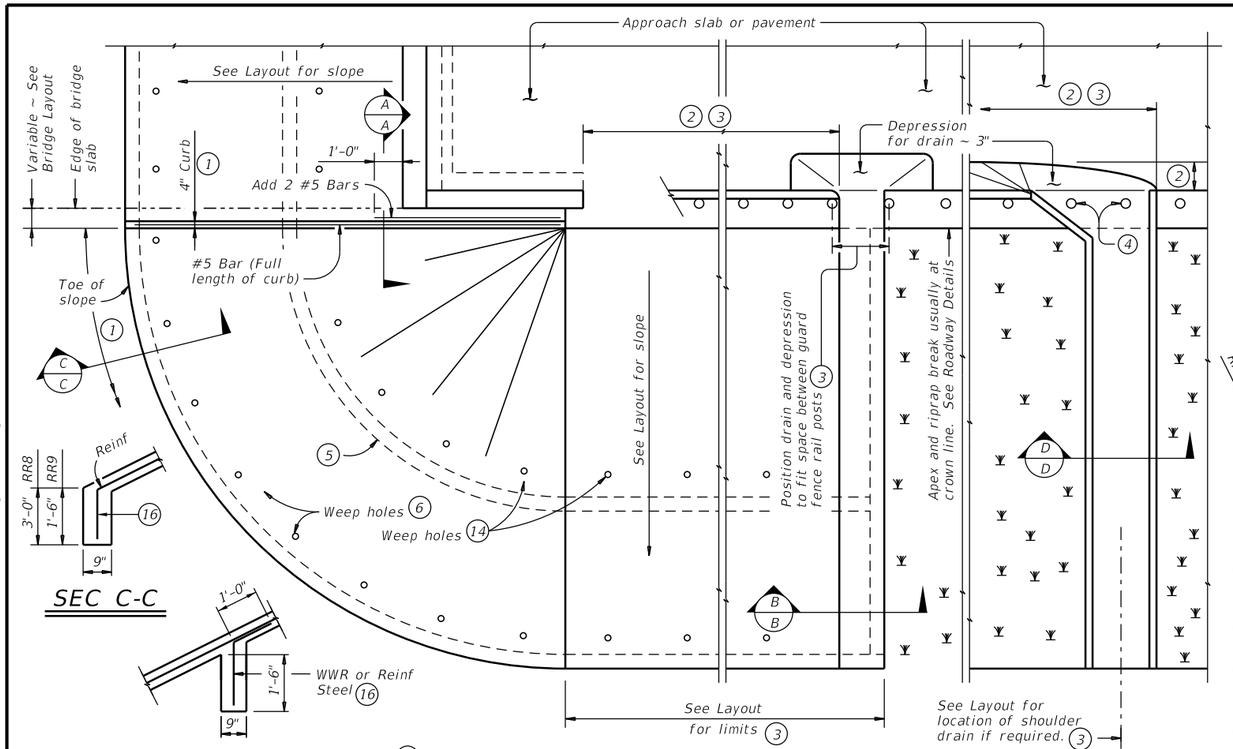
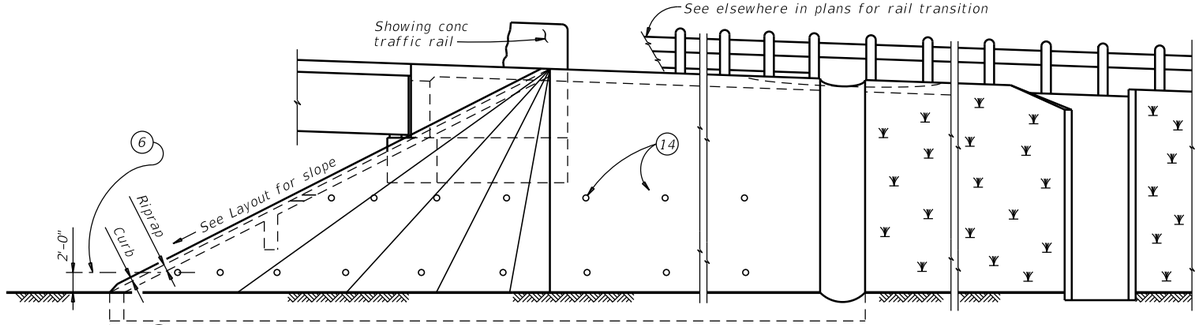


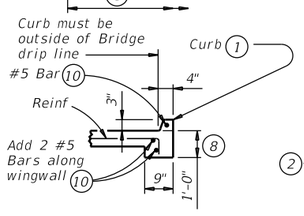
PLAN

SEC C-C

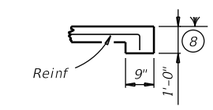
INTERMEDIATE TOEWALL



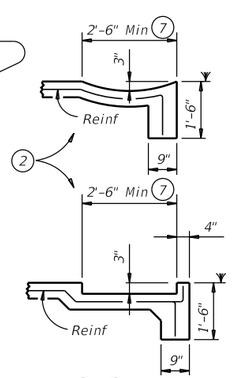
ELEVATION



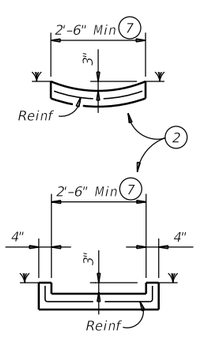
SEC A-A



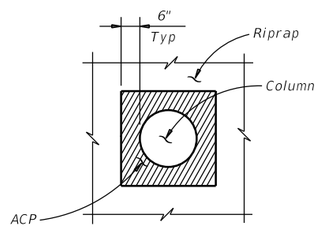
SEC B-B
(No drain)



SEC B-B
(Shoulder drain integral with riprap)

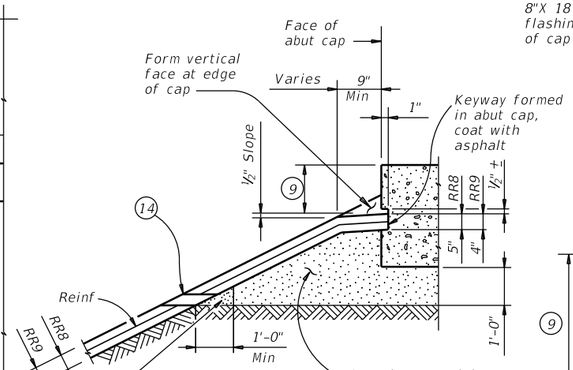


SEC D-D
(Shoulder drain)

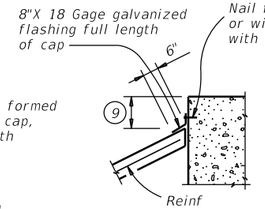


Riprap blockout to be filled with ACP. (Subsidiary to riprap)

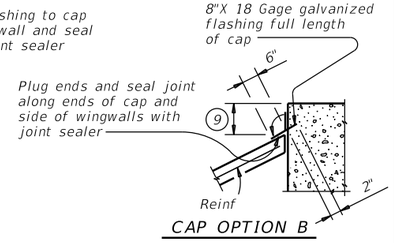
RIPRAP DETAIL AT COLUMNS
(As directed by the Engineer)



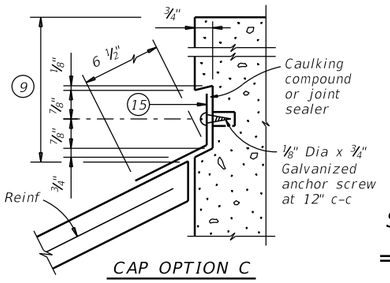
SHOWING KEYWAY OPTION



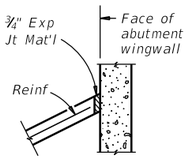
CAP OPTION A



CAP OPTION B

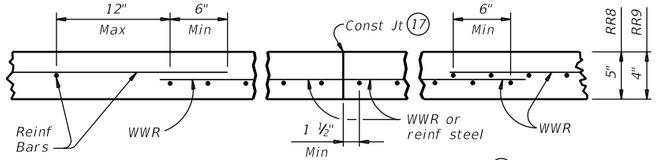


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		161

DATE: 6/17/2022 11:37:45 PM
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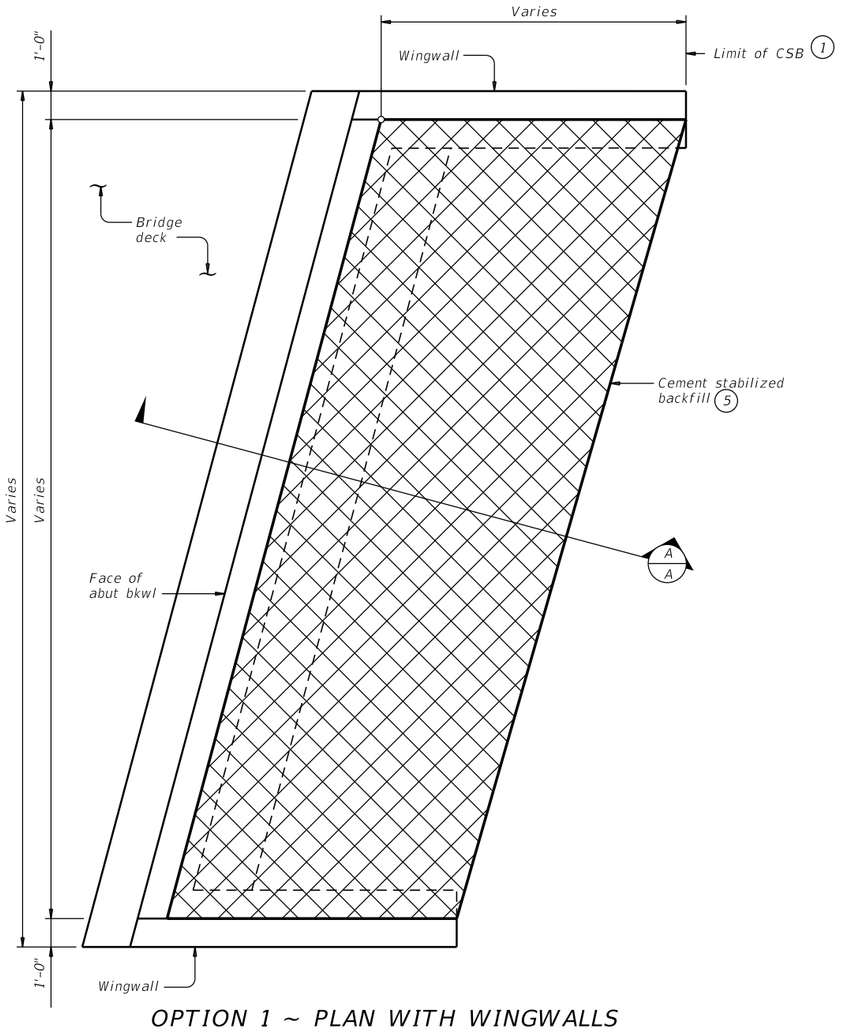
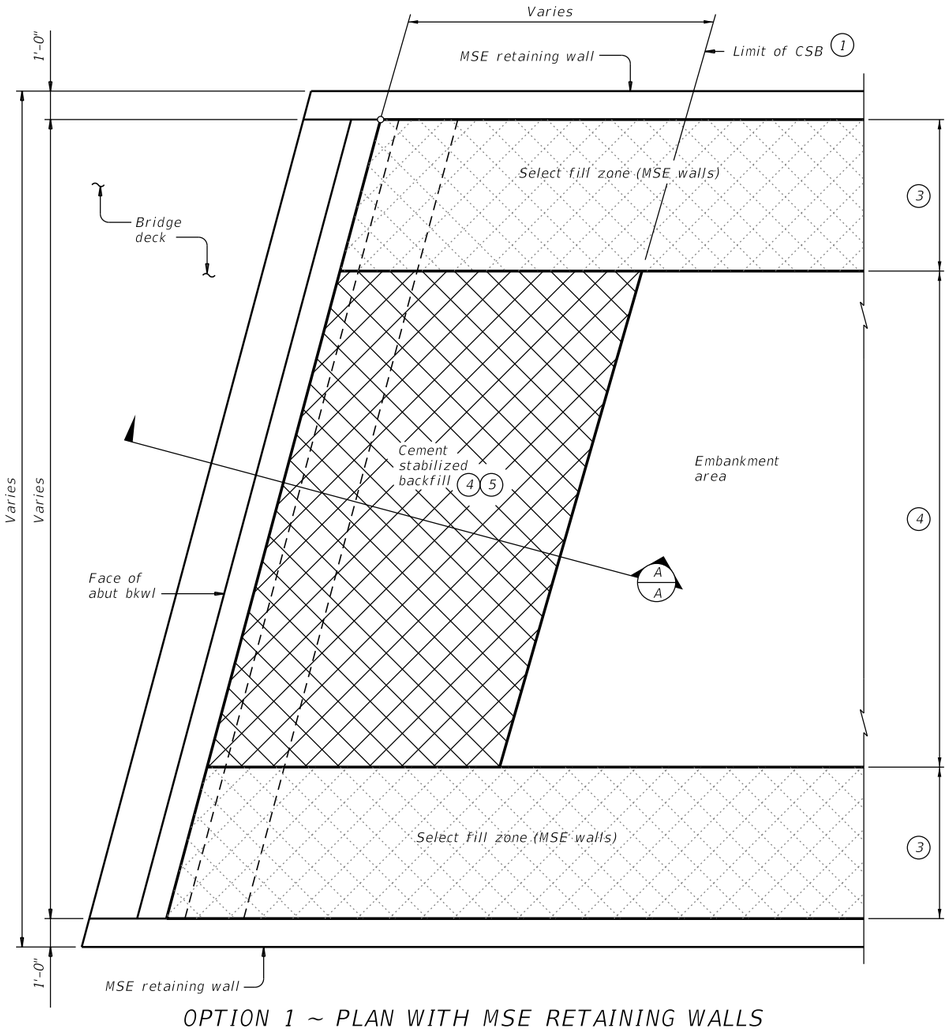
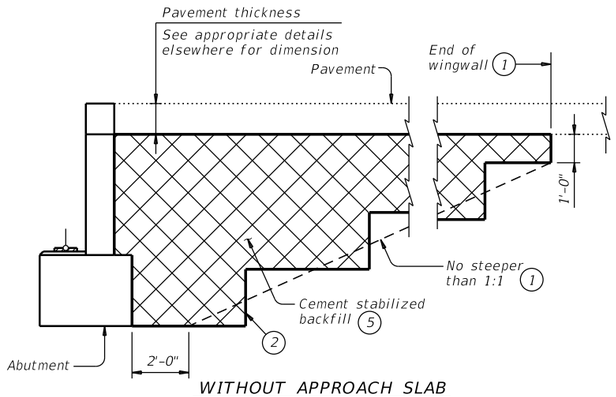


OPTION 1 ~ PLAN WITH WINGWALLS

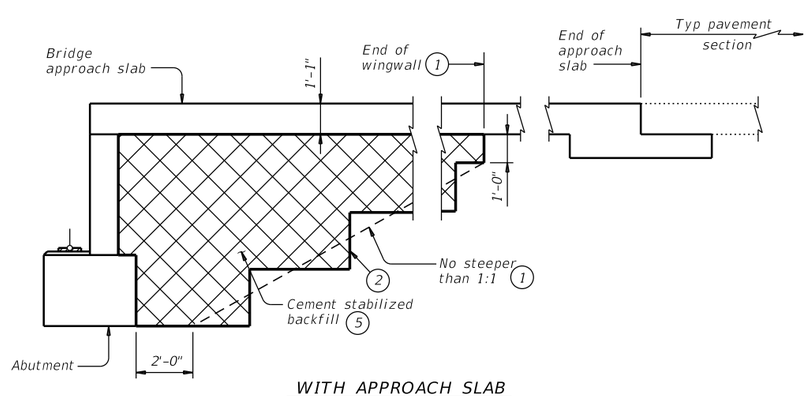
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	CRP	KARNES		162

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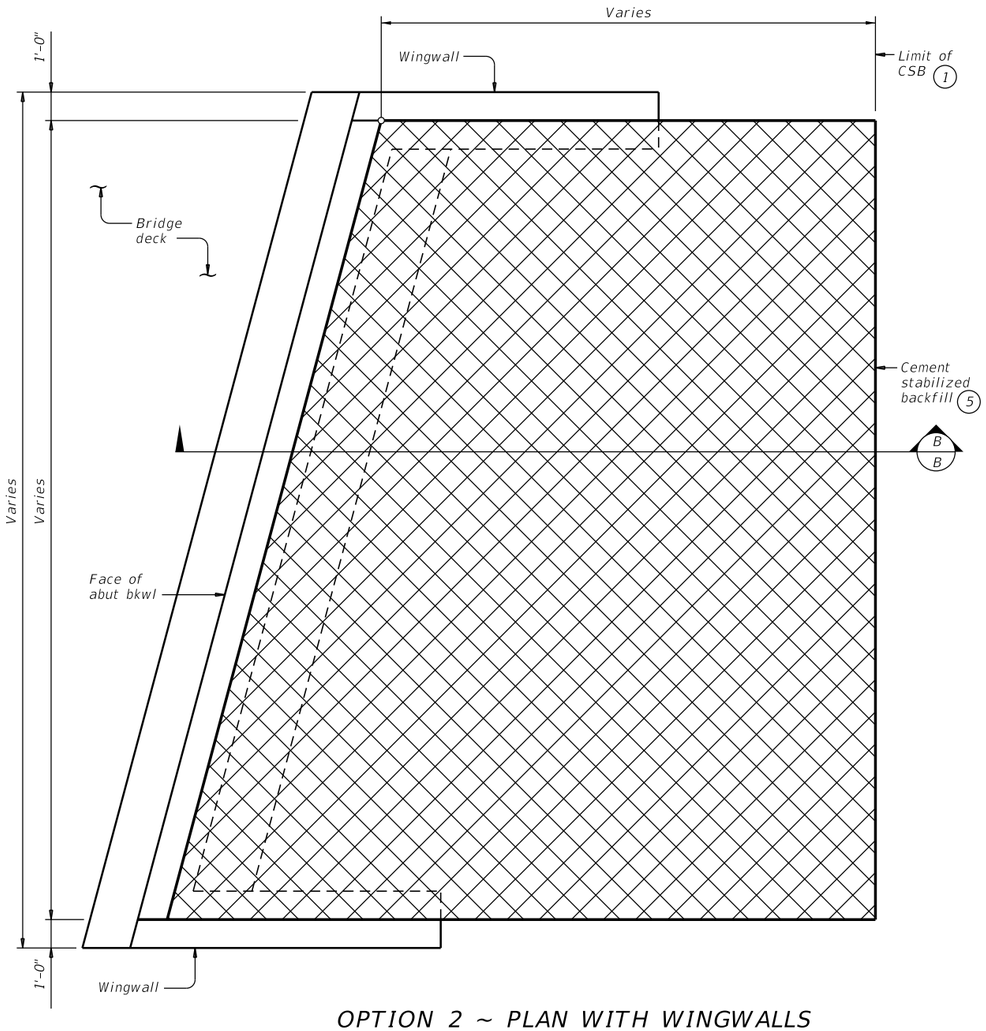
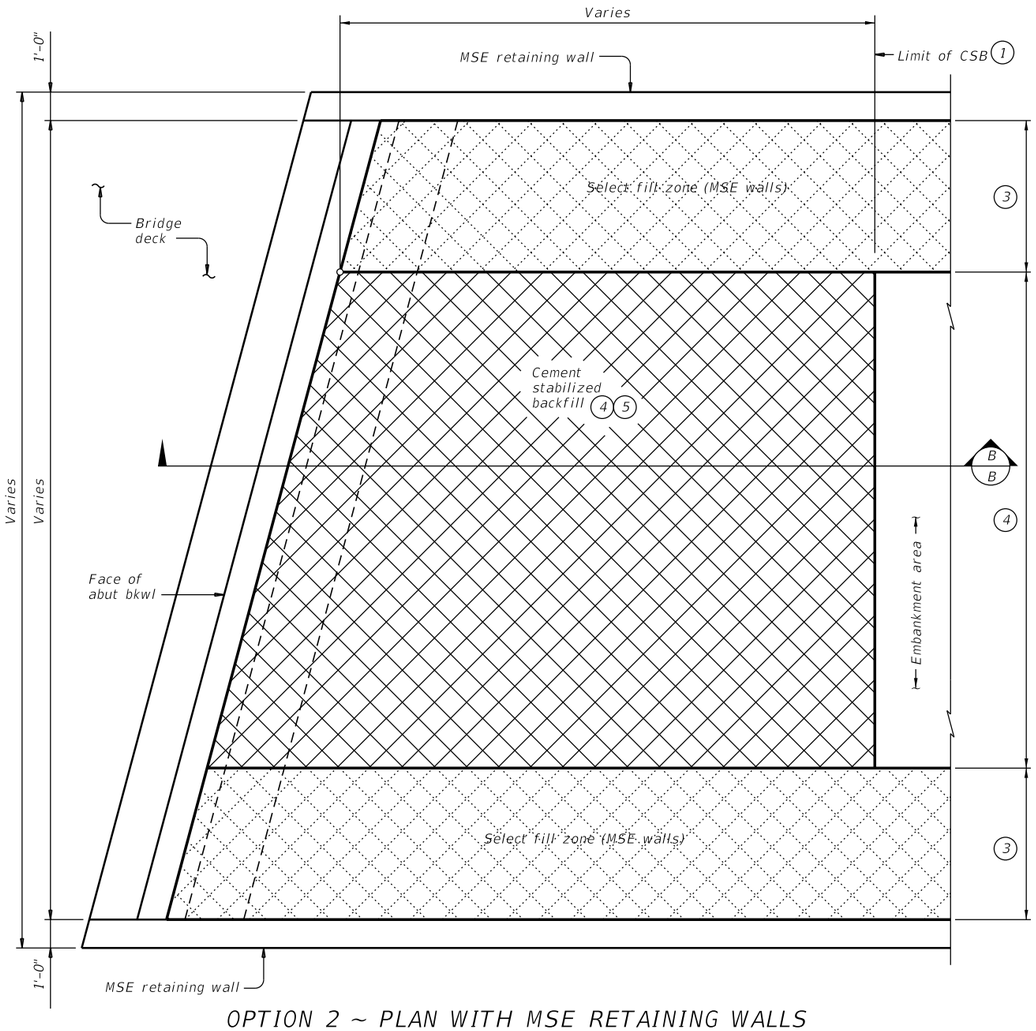


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

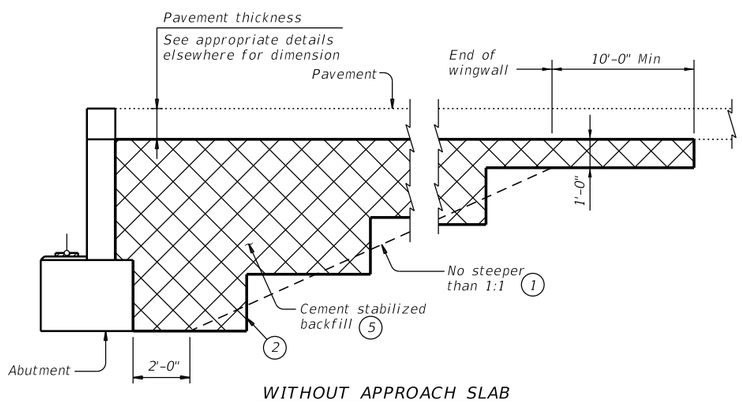
(1) *Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.*

(2) *Bench backfill as shown with 12" (approximate) bench depths.*

(3) *Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.*

(4) *When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.*

(5) *If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:*
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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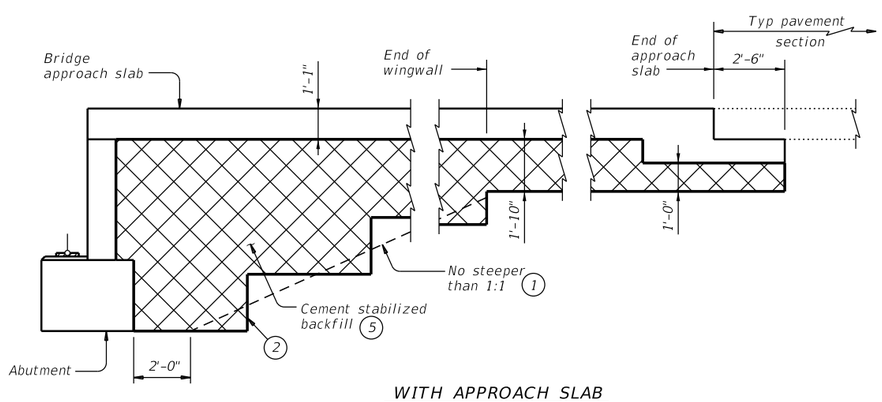

WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
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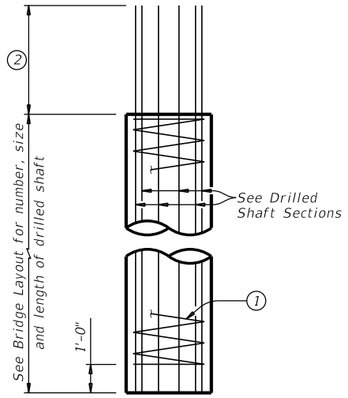
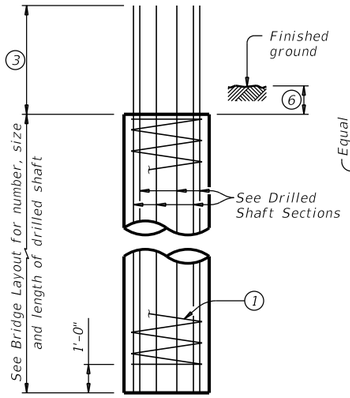
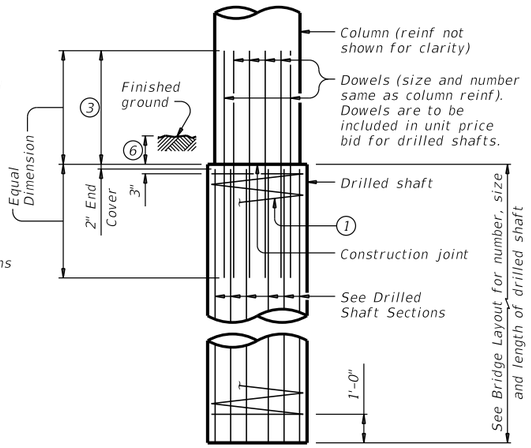


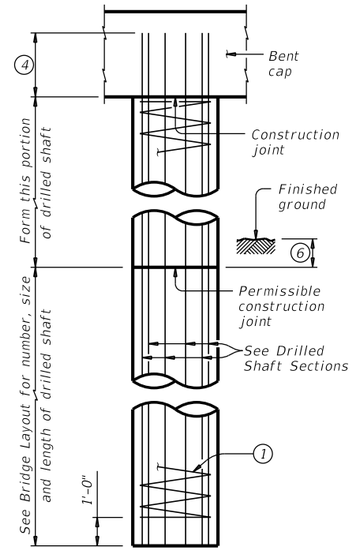
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



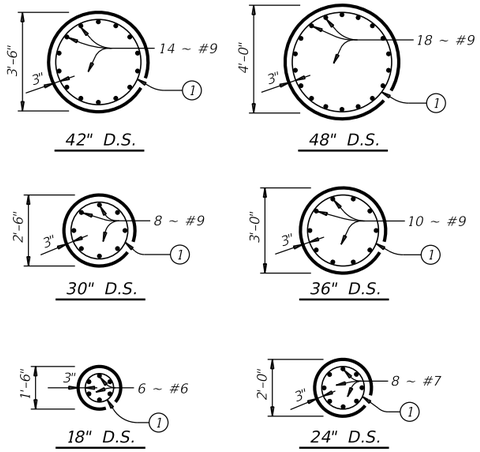
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

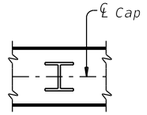


DRILLED SHAFT SECTIONS

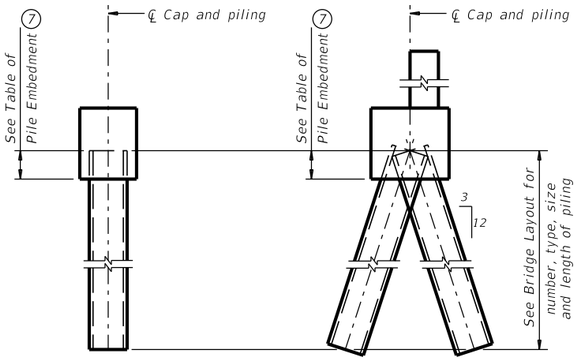
DRILLED SHAFT DETAILS

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"

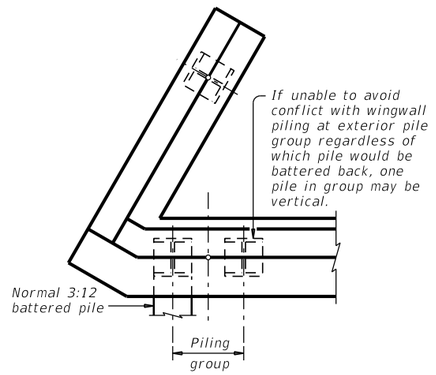
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



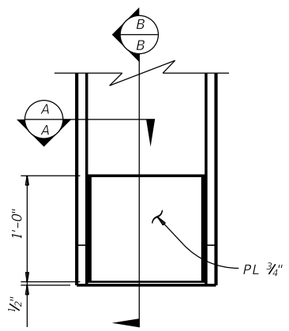
ORIENTATION OF STEEL H-PILING



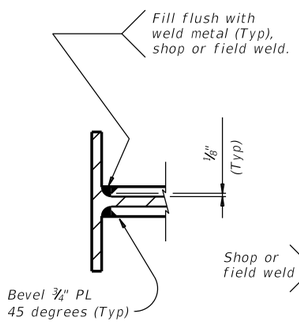
PILING DETAILS
(Concrete or steel H)



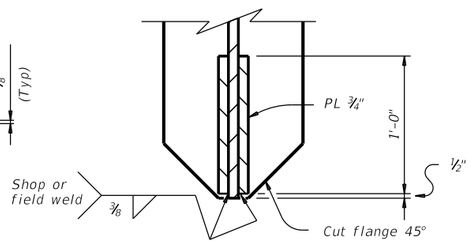
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



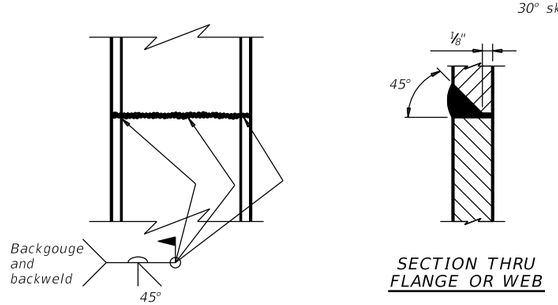
SECTION A-A



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.



STEEL H-PILE SPLICE DETAIL

Use when required.

SECTION THRU FLANGE OR WEB

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

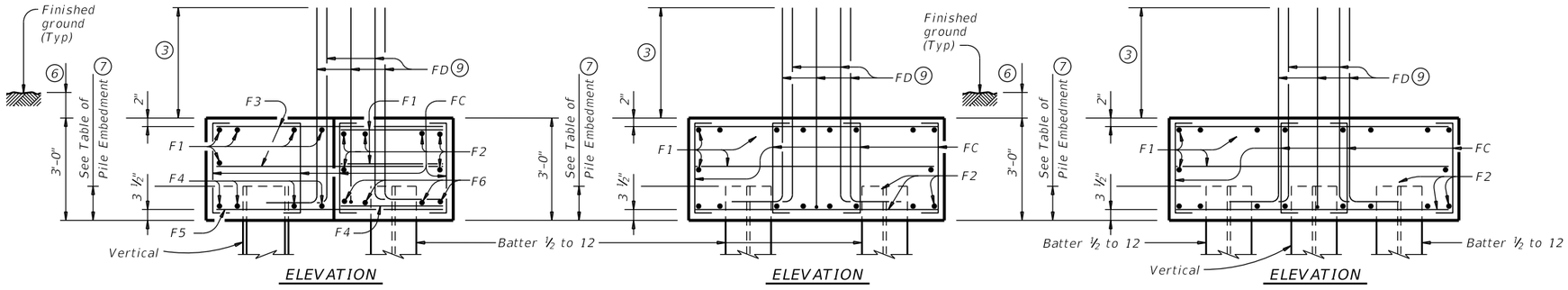
Texas Department of Transportation

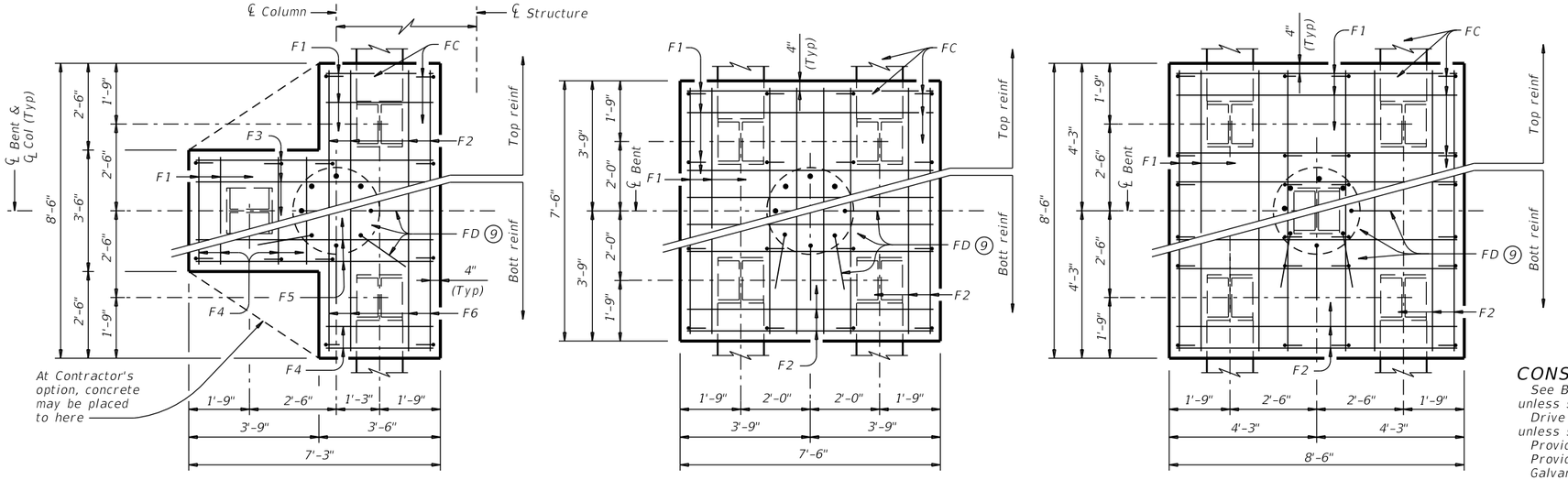
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	CRP	KARNES		164





THREE PILE FOOTING (8)

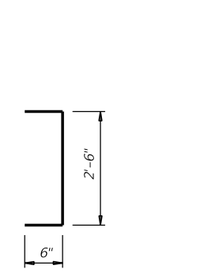
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	CRP	KARNES		165

DATE: 6/17/2022 1:37:56 PM
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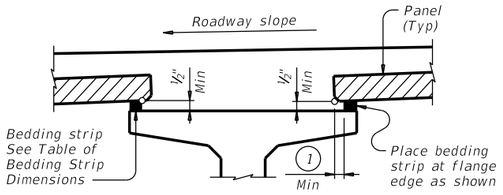
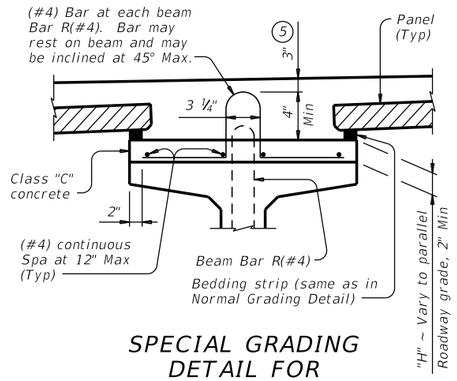


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders. (Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders. (Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" Min for all other beam types.

(2) Allowed for I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

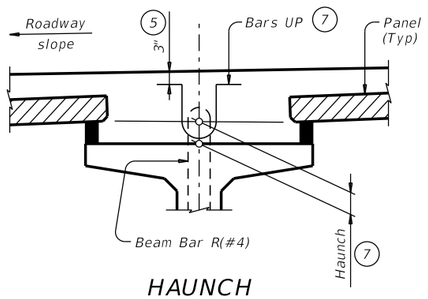
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

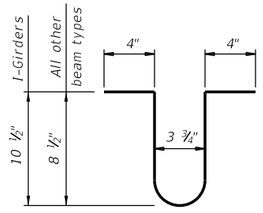
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

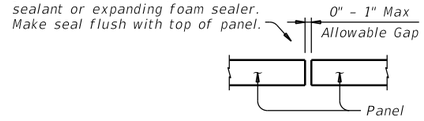


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders. (Other beam types similar)

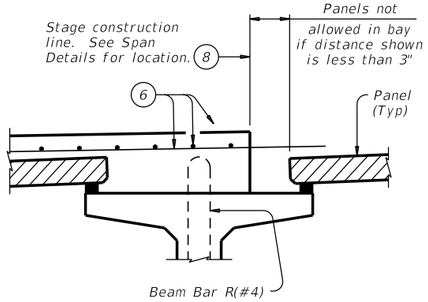


BARS UP (#4) (7)

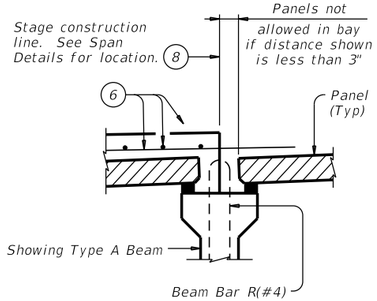


PANEL JOINTS

(Panel reinforcing not shown for clarity. The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



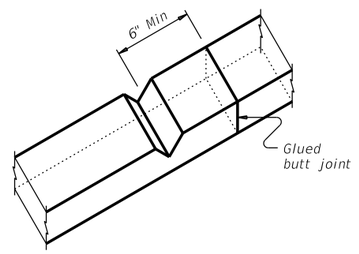
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars 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.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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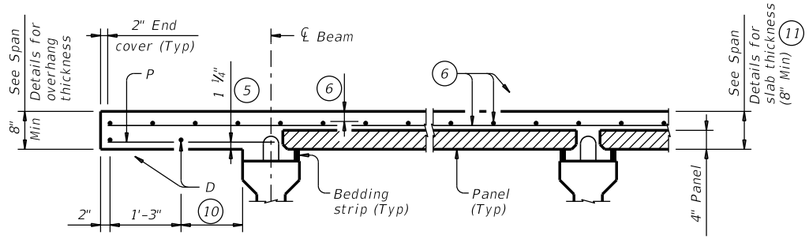
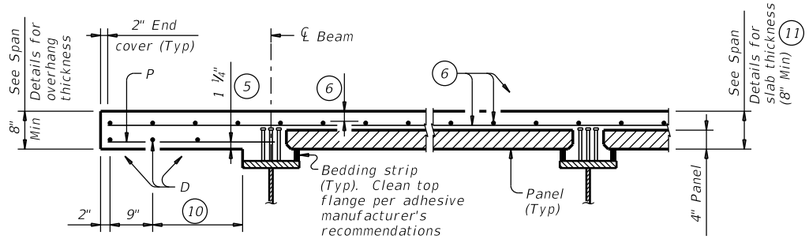
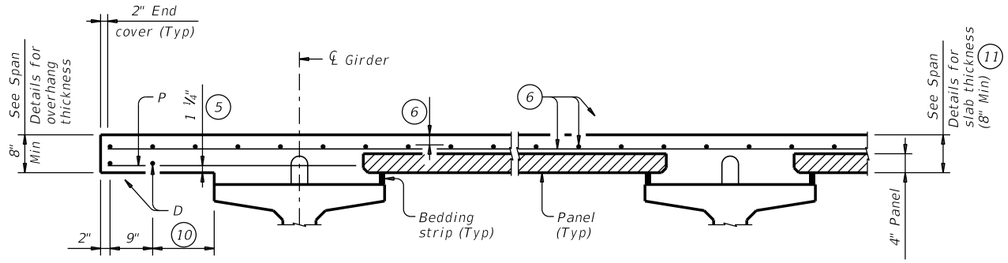


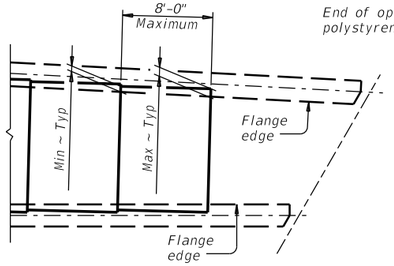
PRESTRESSED CONCRETE I-BEAMS



STEEL BEAMS

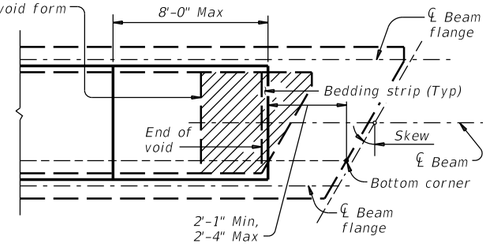


PRESTRESSED CONCRETE I-GIRDERS

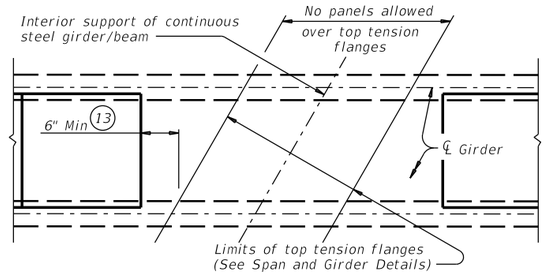


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on bemm/girder type.



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

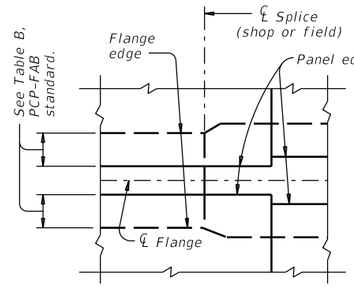
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

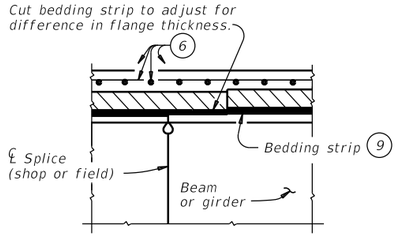
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



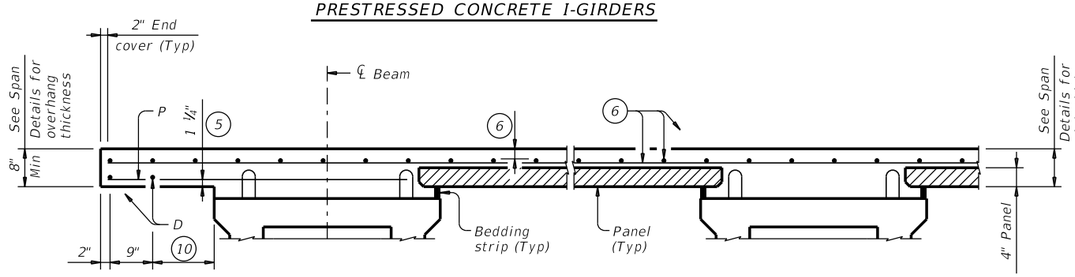
PLAN AT SPLICE

(Showing steel beams with flange width transition)

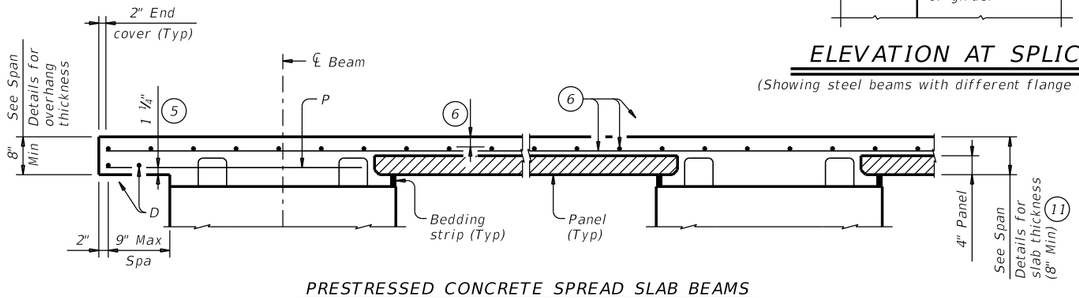


ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)

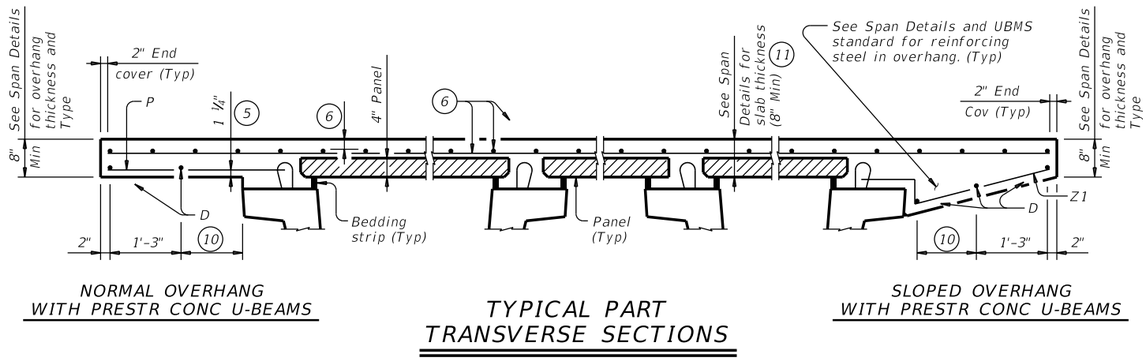


PRESTRESSED CONCRETE X-BEAMS



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

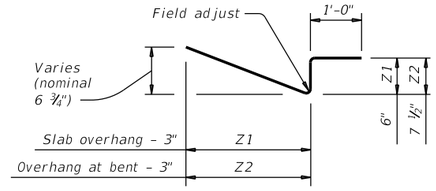
Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



BARS Z (#4) (12)

HL93 LOADING SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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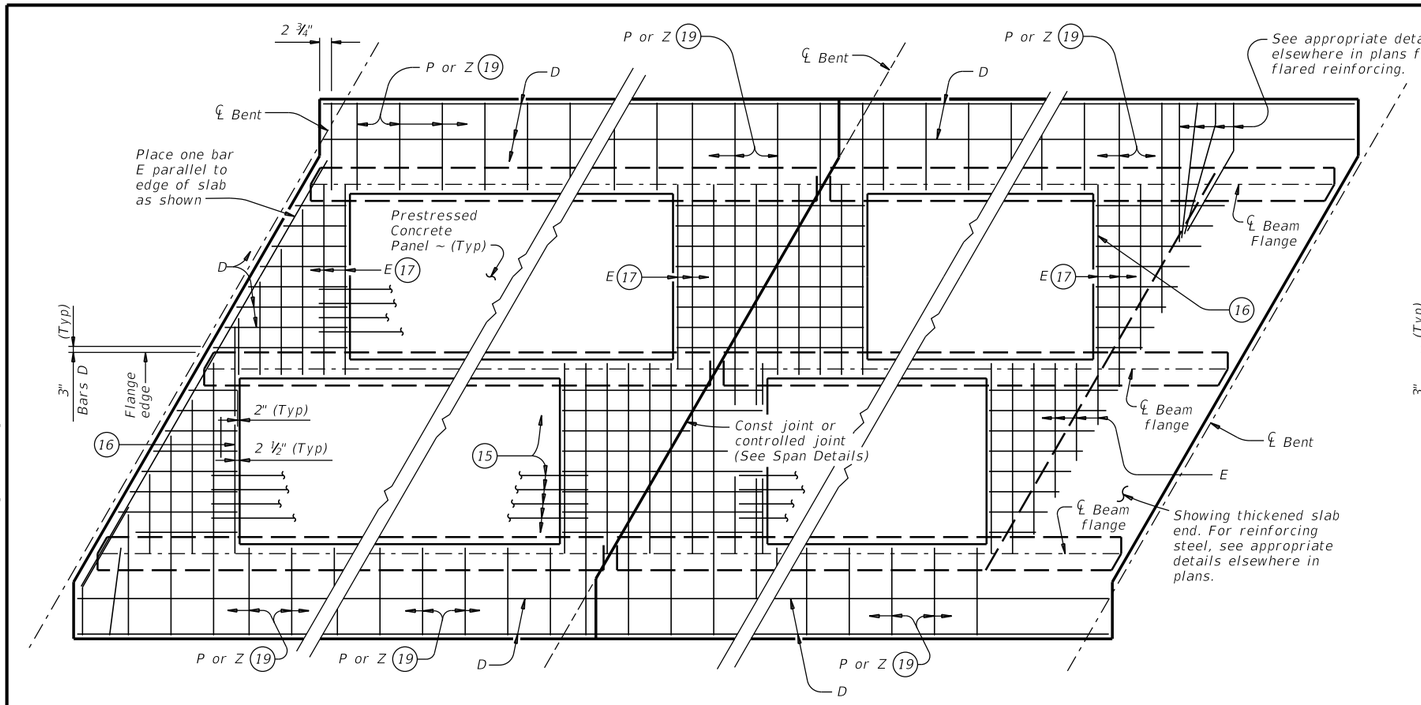
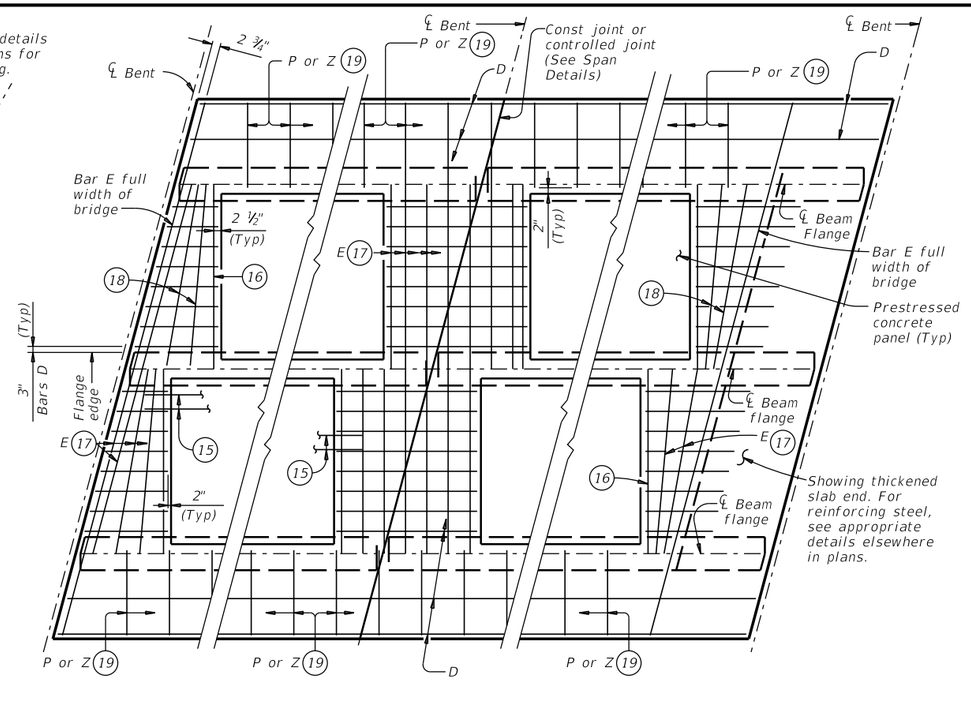


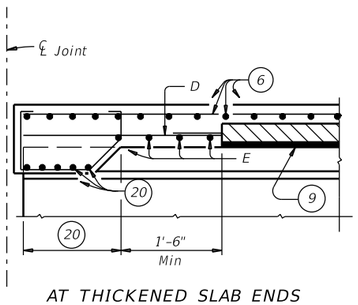
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

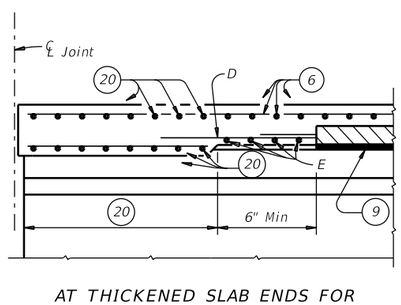


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

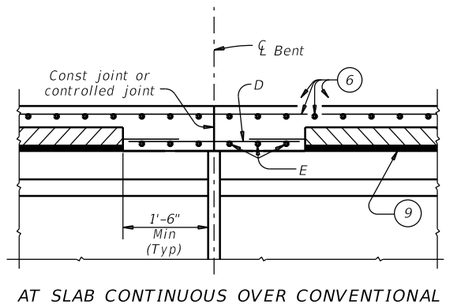
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



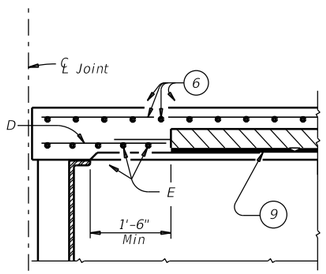
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



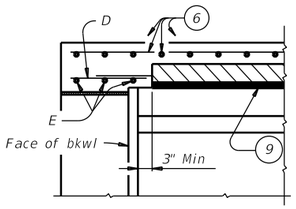
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



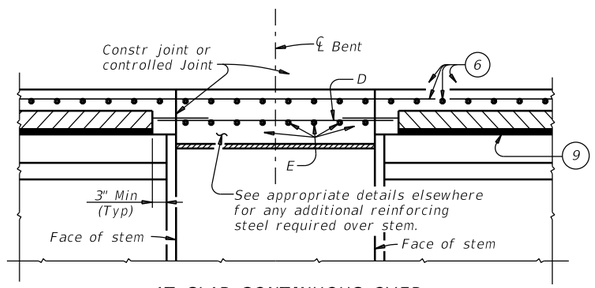
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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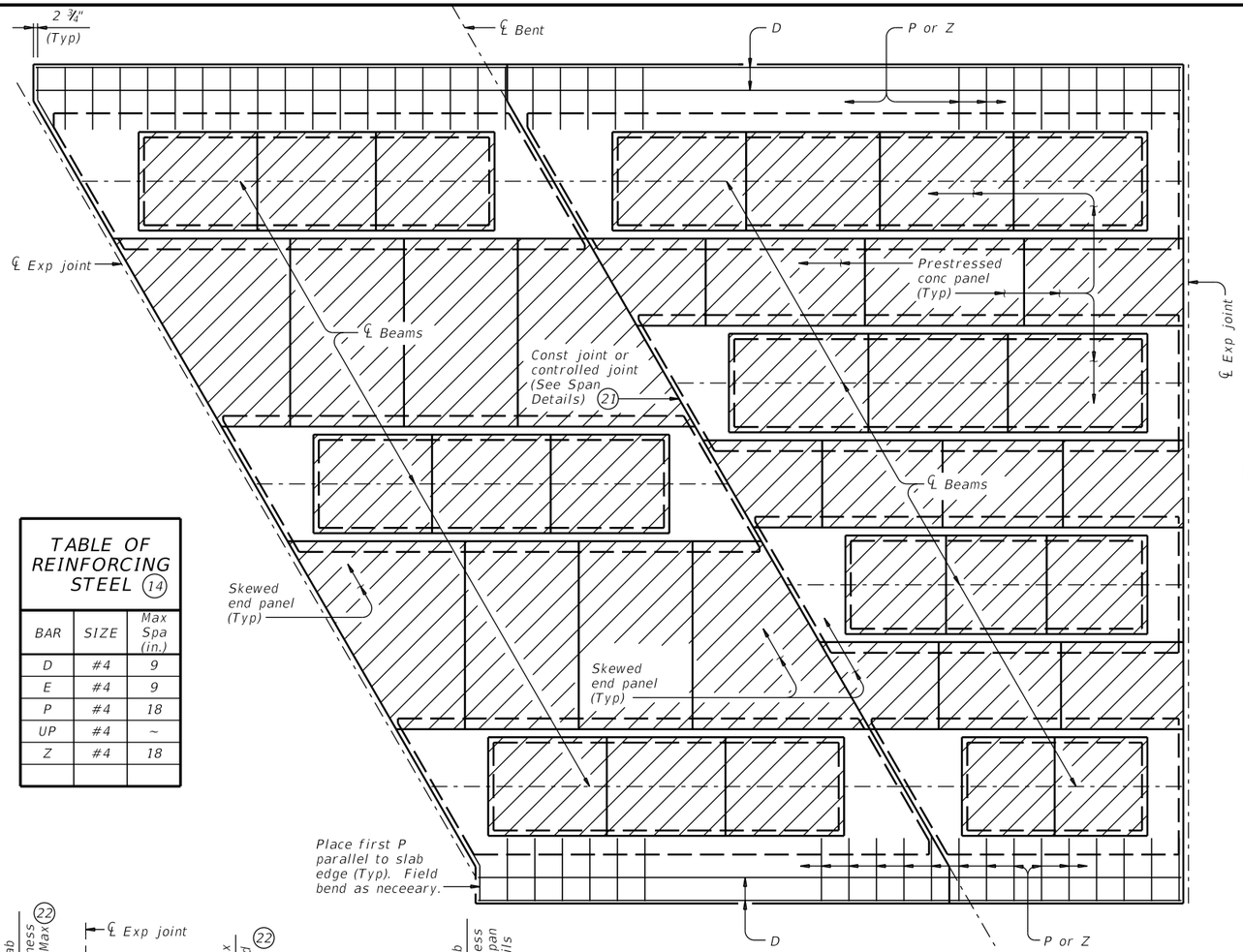
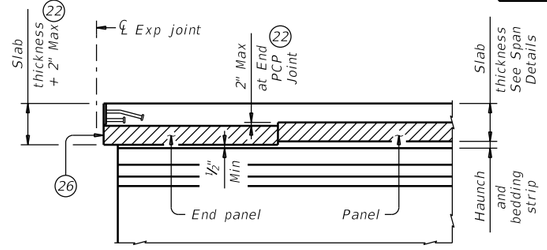
	CRP	KARNES		168



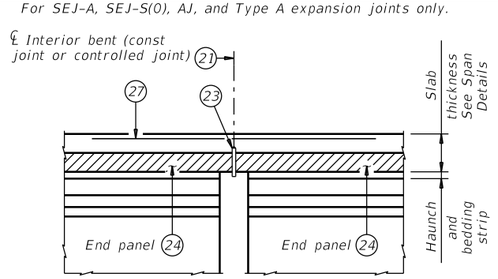
OPTION 2 ~ PLAN OF SLAB

(Showing U-Beams; other beams similar)



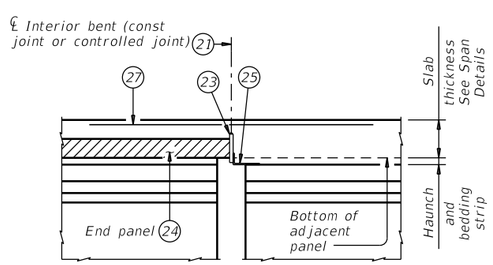
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



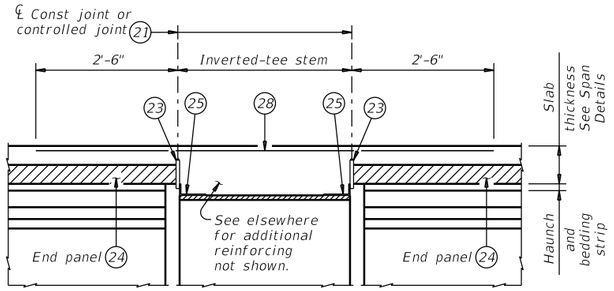
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adacent span.

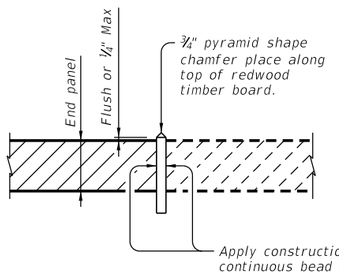


INVERTED-T BENT

Panels against inverted-tee stem

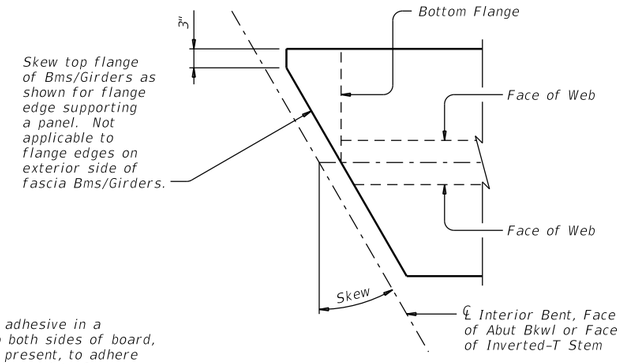
OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and OA from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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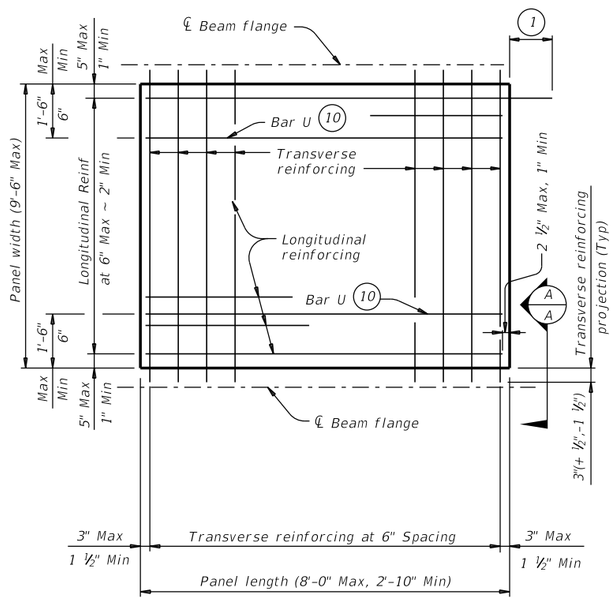
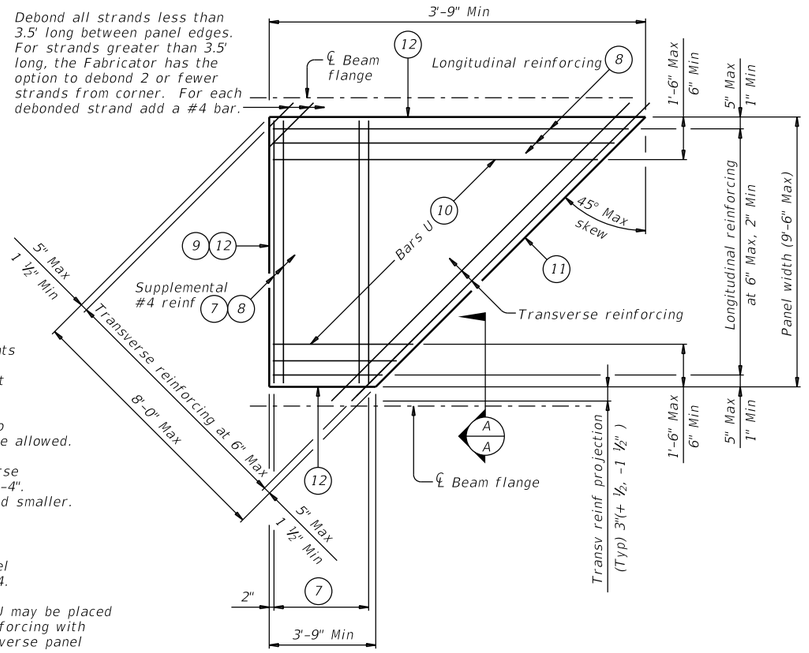


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

TABLE A (4) (5)

Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)

Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

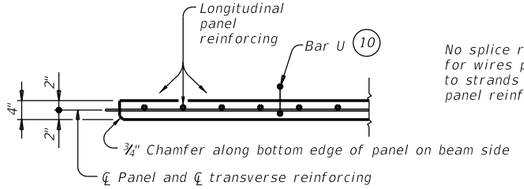
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

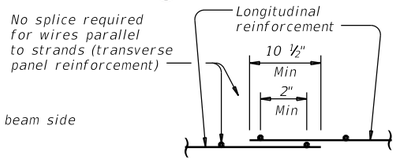
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

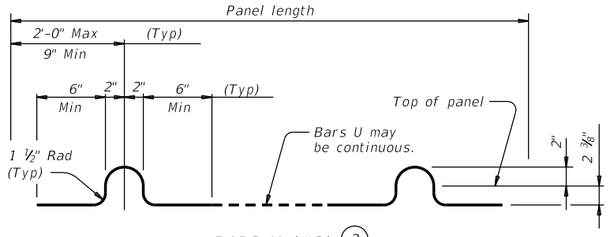


SECTION A-A

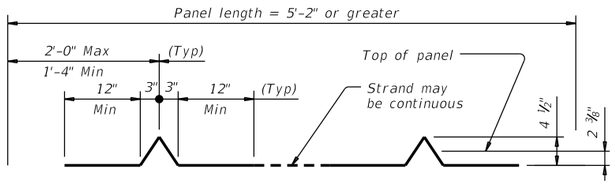
(Not showing supplemental #4 bars for skewed end panels.)



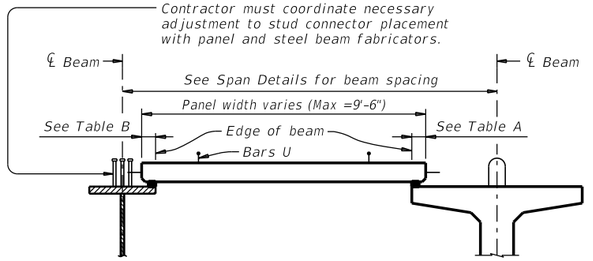
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



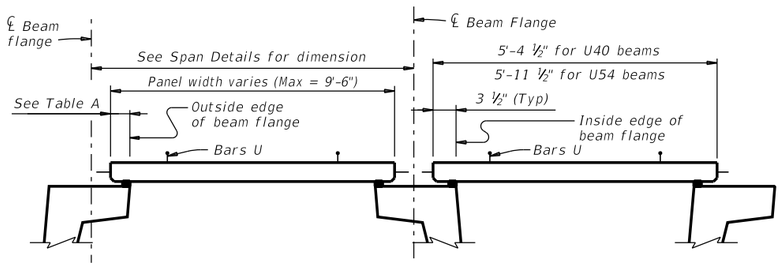
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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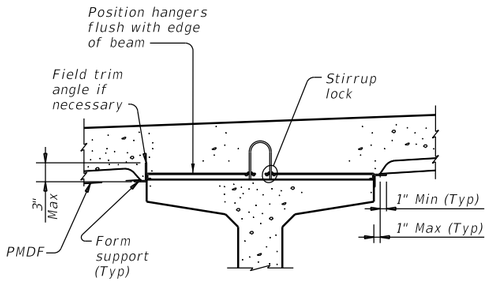
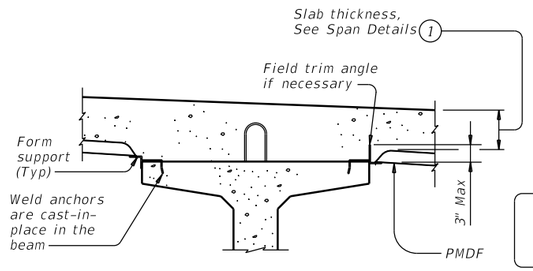
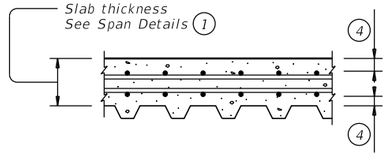


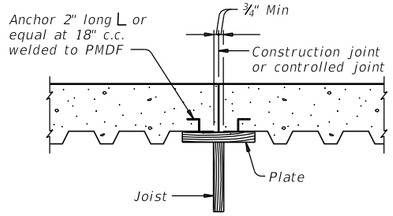
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

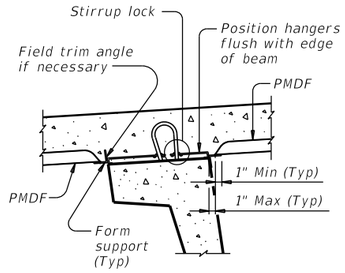


TYP LONGITUDINAL SLAB SECTION

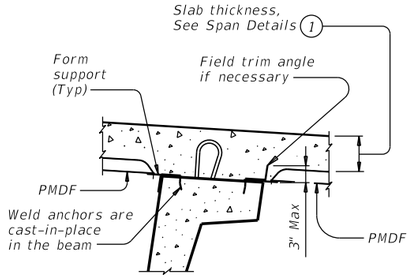


Note: In spans where PMD forms are used, timber forms must be used at construction joints.
Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

SECTION THRU CONSTRUCTION JOINT



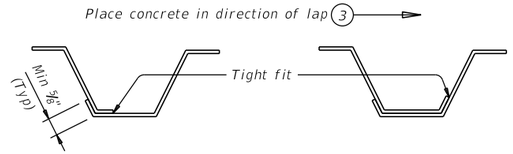
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.



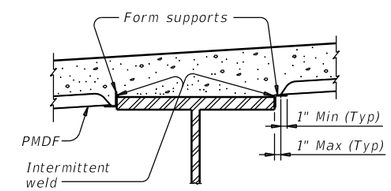
SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

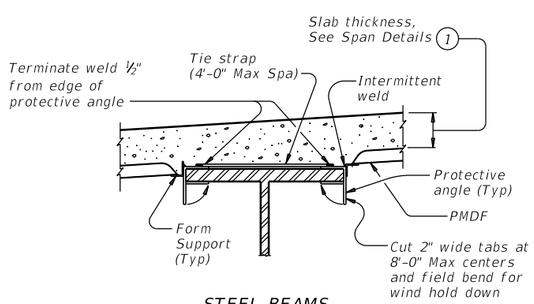
(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

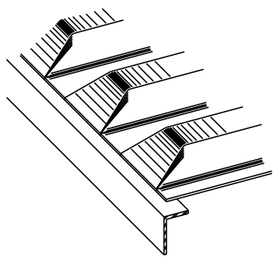


STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES 2

TYPICAL TRANSVERSE SECTIONS



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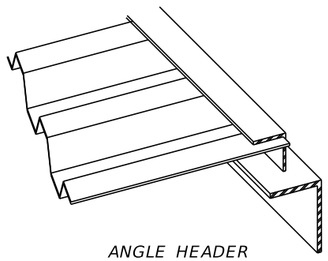

ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES

GENERAL NOTES:
Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.
Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.
The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.
All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:
As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.
Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:
Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.
All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.
Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.
All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.
Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.
Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.
A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	CRP	KARNES		171

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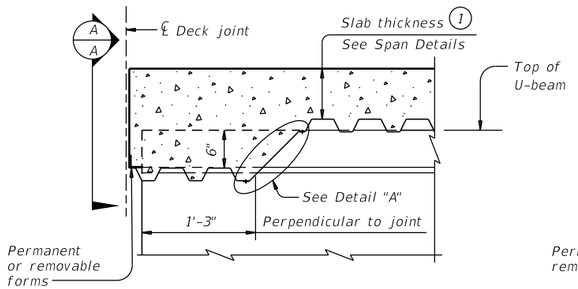
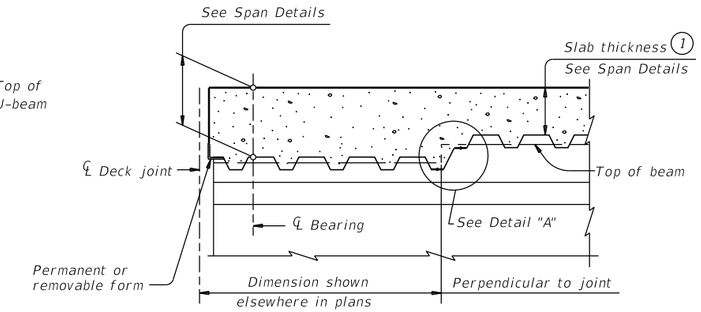
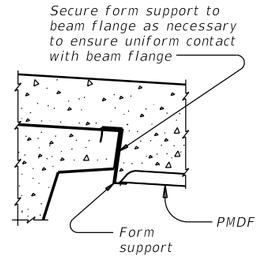


AT THICKENED SLAB END FOR U-BEAMS

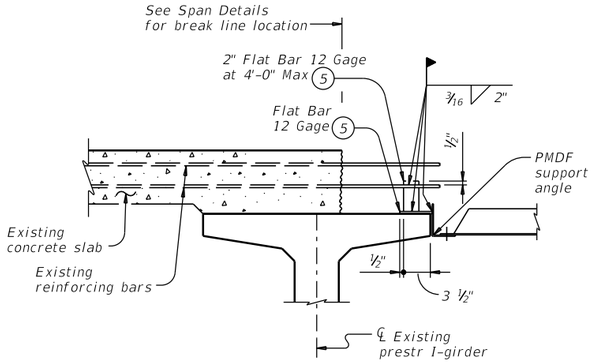


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

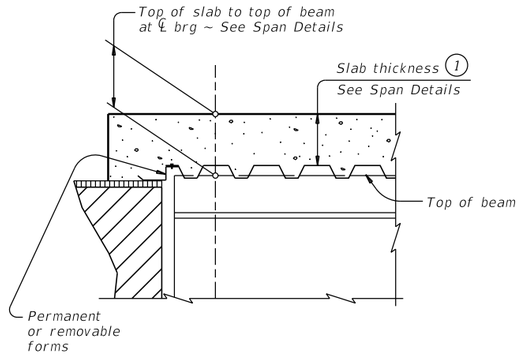
Showing I-beam block-out. No block-out for I-girders or steel beams.



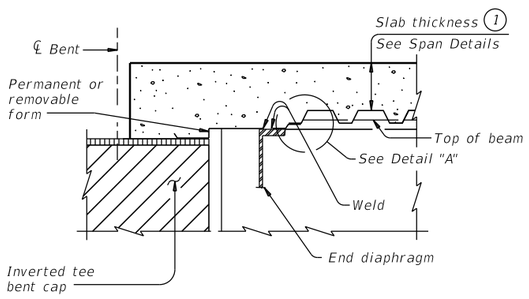
SECTION A-A



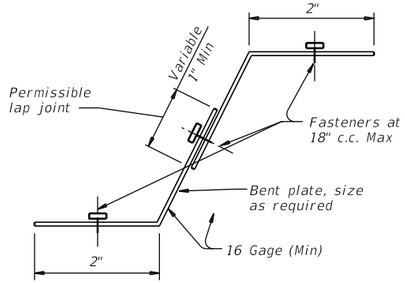
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



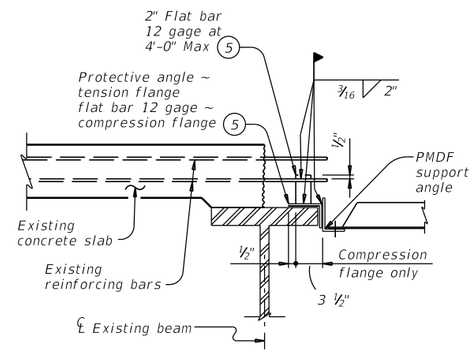
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

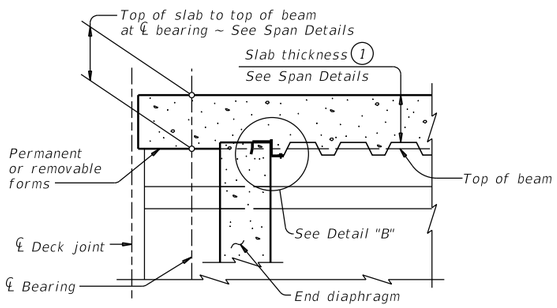


DETAIL "A"

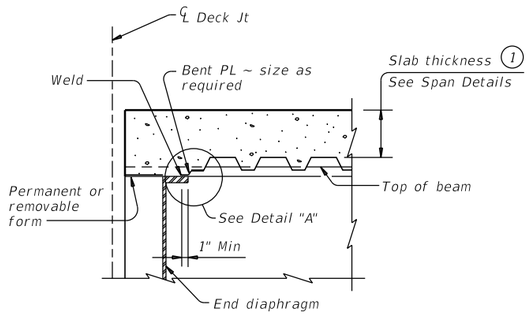


SHOWING STEEL BEAMS

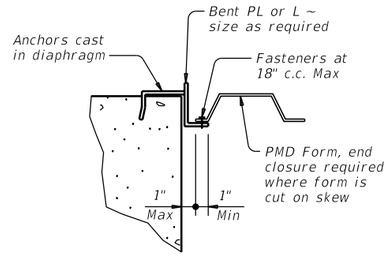
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfstel-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	CRP	KARNES		172

DATE: 6/17/2022 1:38:31 PM
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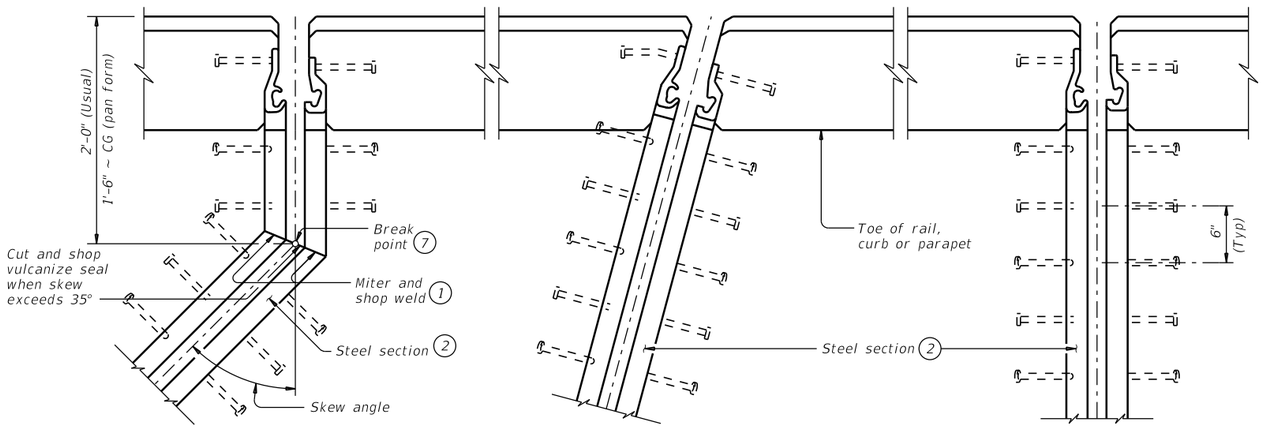
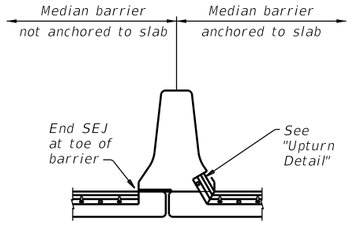


SHOWING SKEWS WITH SLAB BREAKBACKS

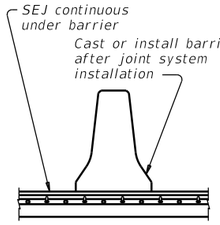
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

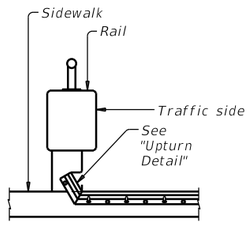
PLANS OF END CONDITIONS



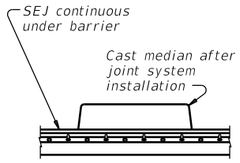
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



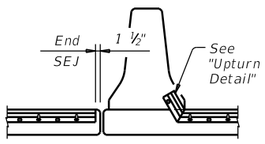
AT MEDIAN BARRIER



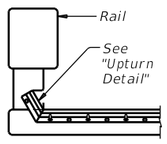
AT SIDEWALK BEHIND BRIDGE RAIL



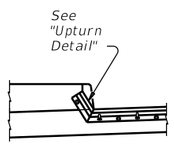
AT RAISED MEDIAN



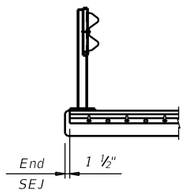
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

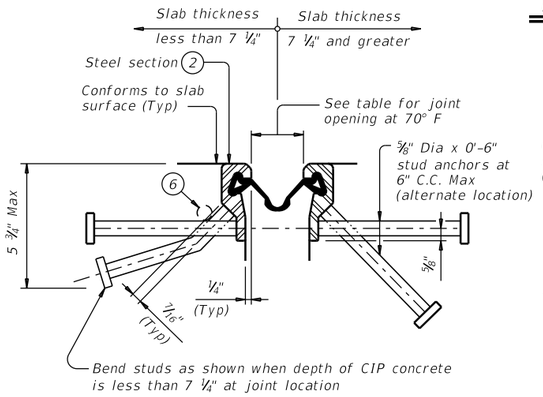


AT SIDEWALK

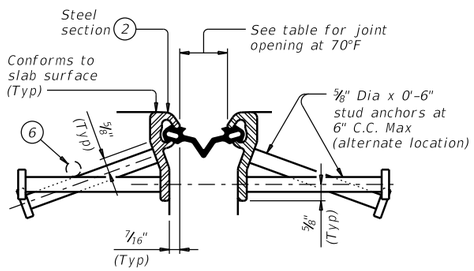


AT STEEL POST BRIDGE RAIL

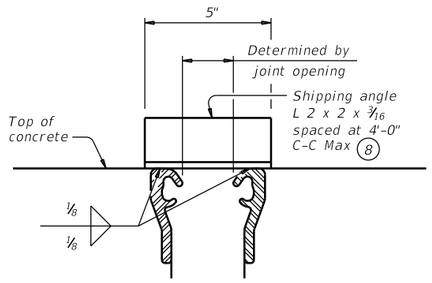
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

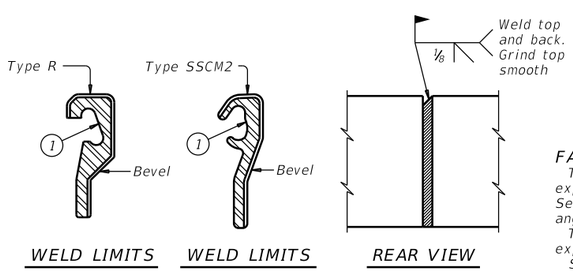
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

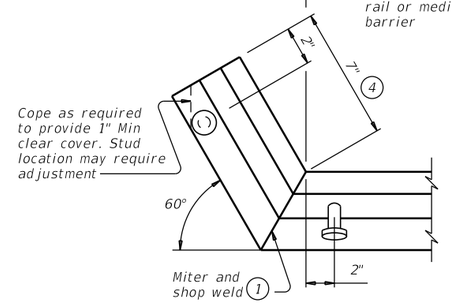
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the 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 sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M
WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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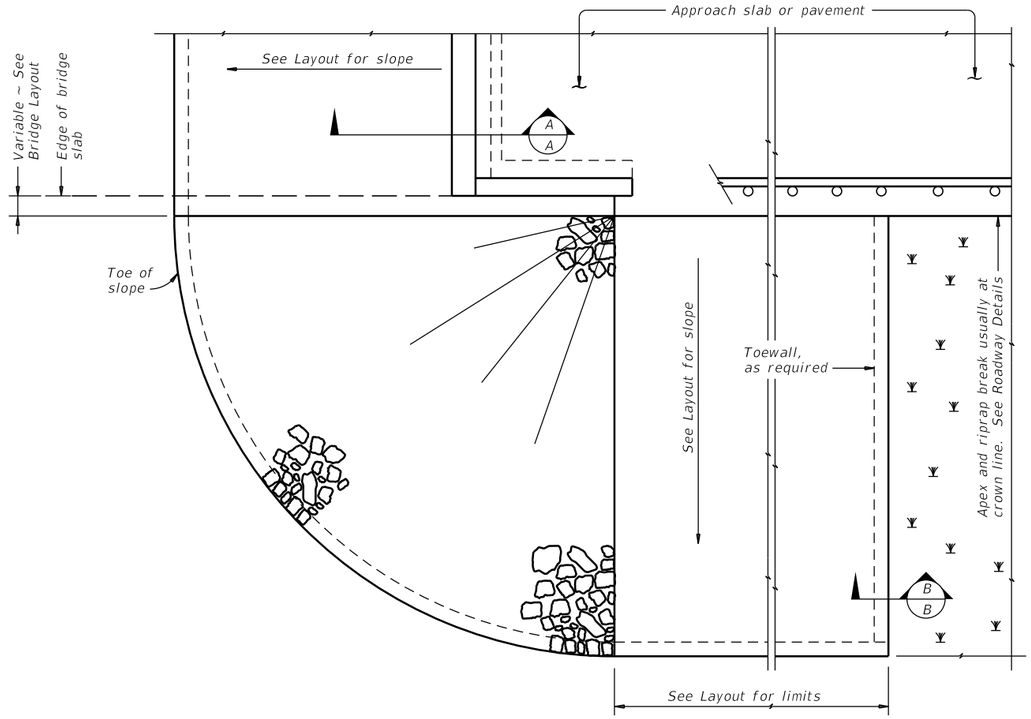
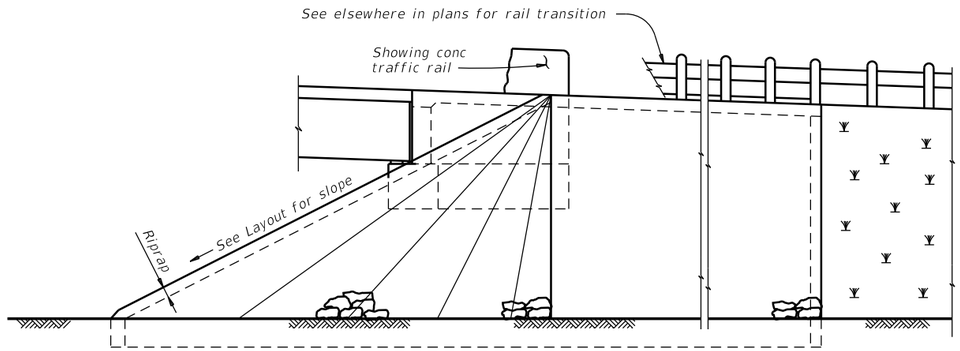
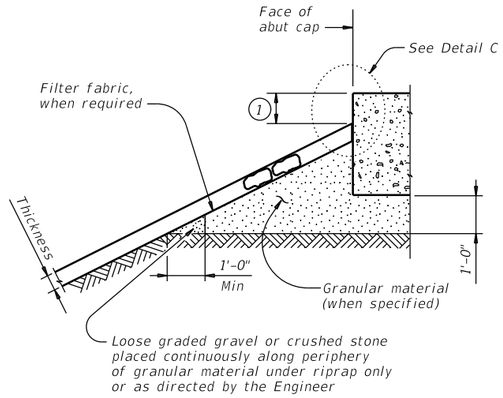
	CRP	KARNES		173



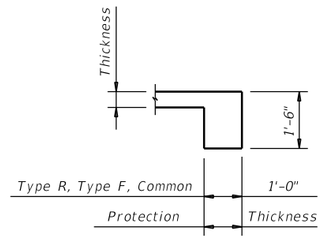
PLAN



ELEVATION

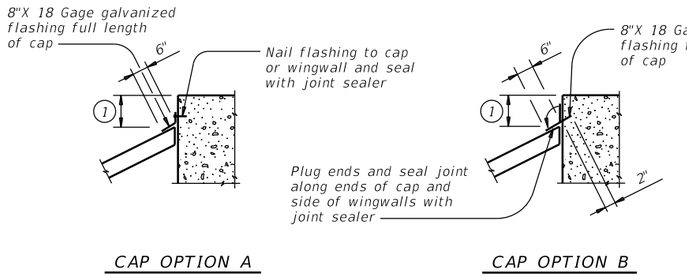


SECTION A-A AT CAP



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

(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.

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.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES		
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0691	01	044	FM 81		
	DIST	COUNTY		SHEET NO.		
	CRP	KARNES		174		

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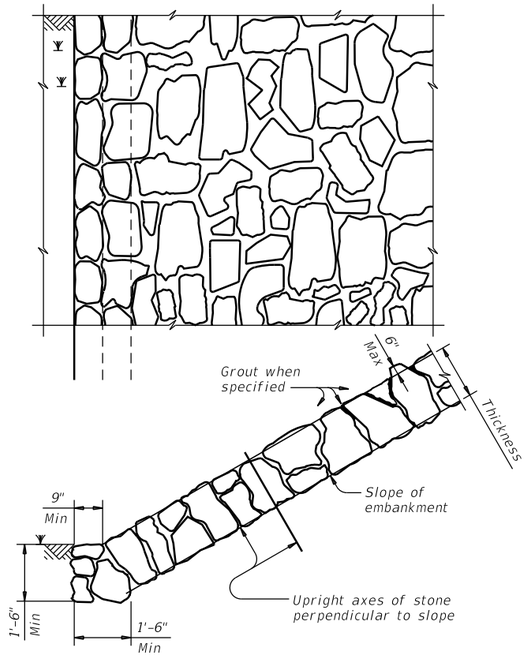


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

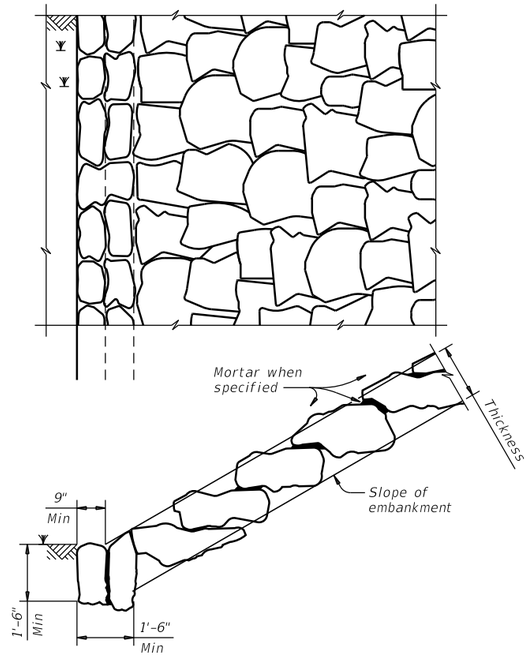


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

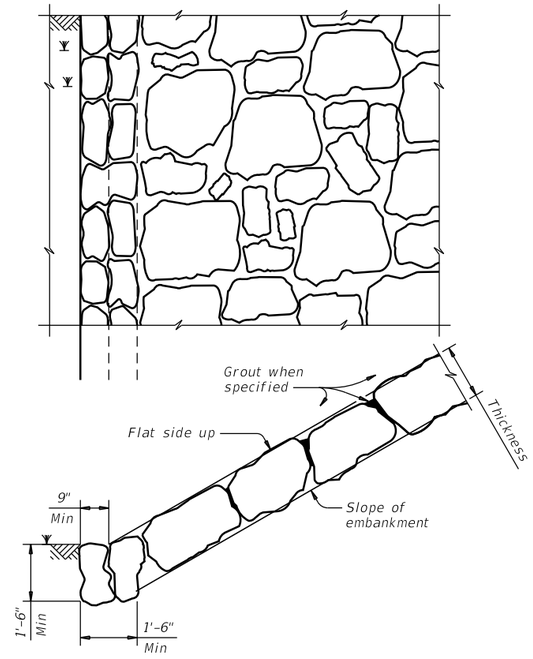


FIGURE 3 ~ TYPE F STONE RIPRAP

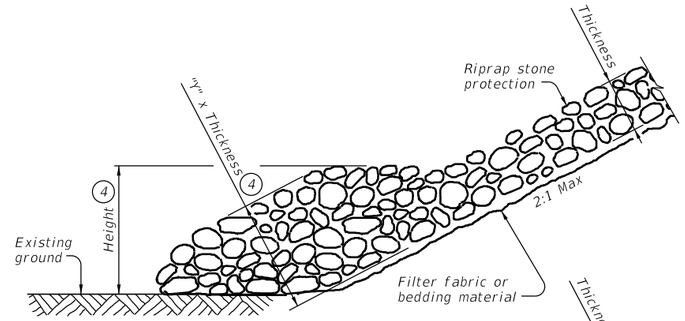
grouted

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

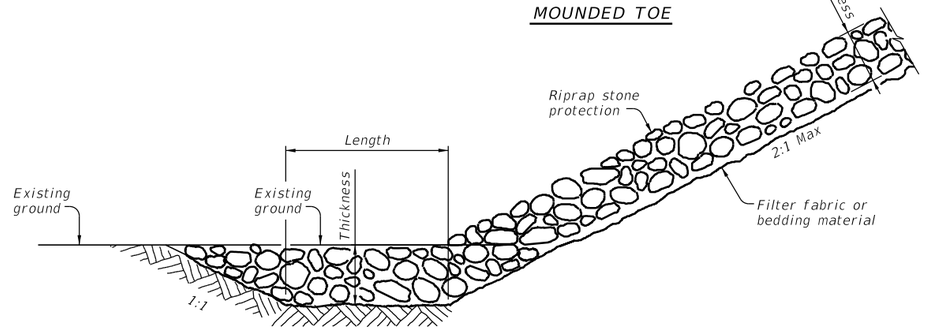
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

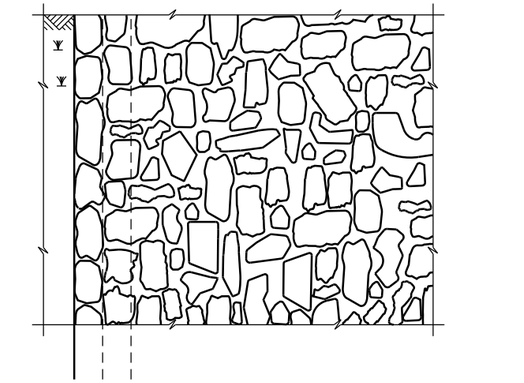


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

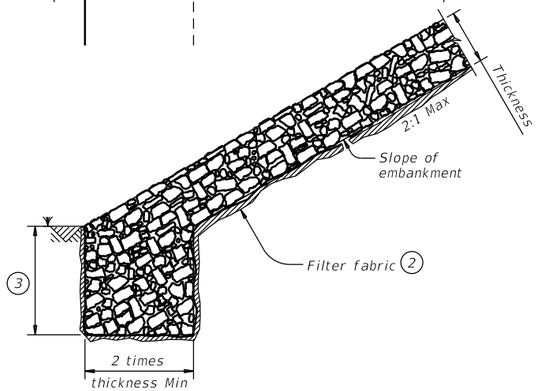


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
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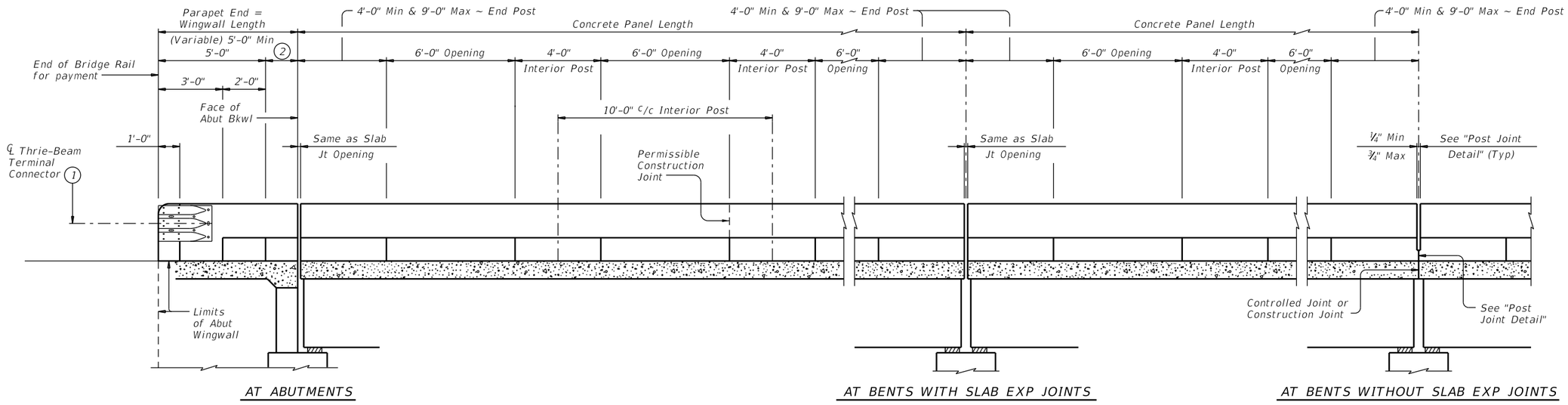
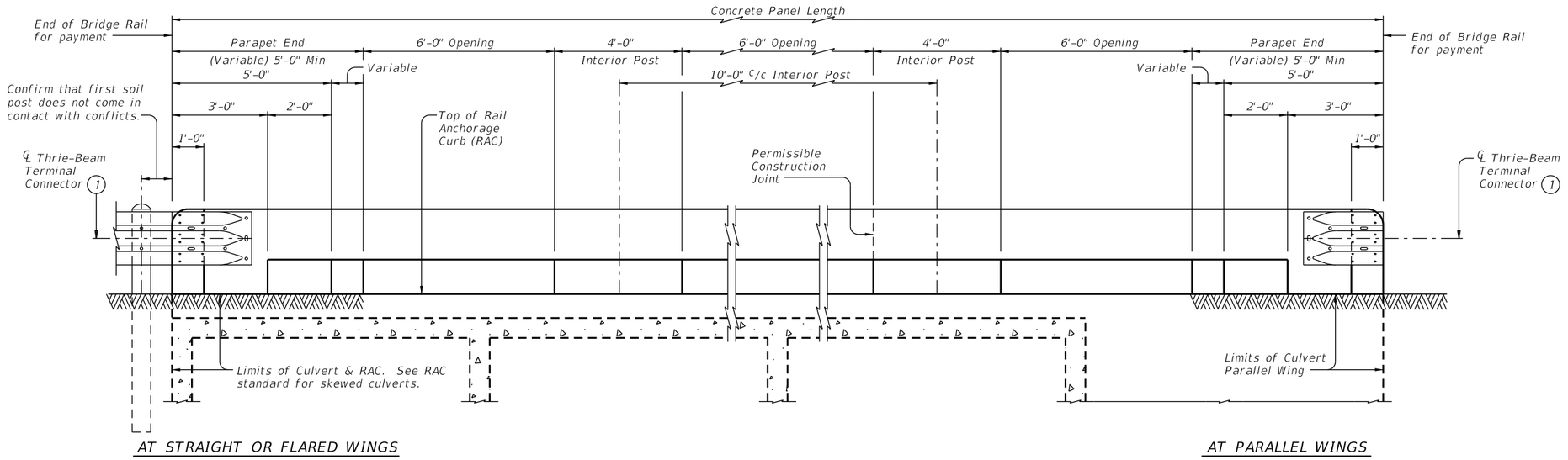


ROADWAY ELEVATION OF RAIL ON BRIDGE



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

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
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REVISIONS	0691	01	044	FM 81
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	CRP	KARNES		176

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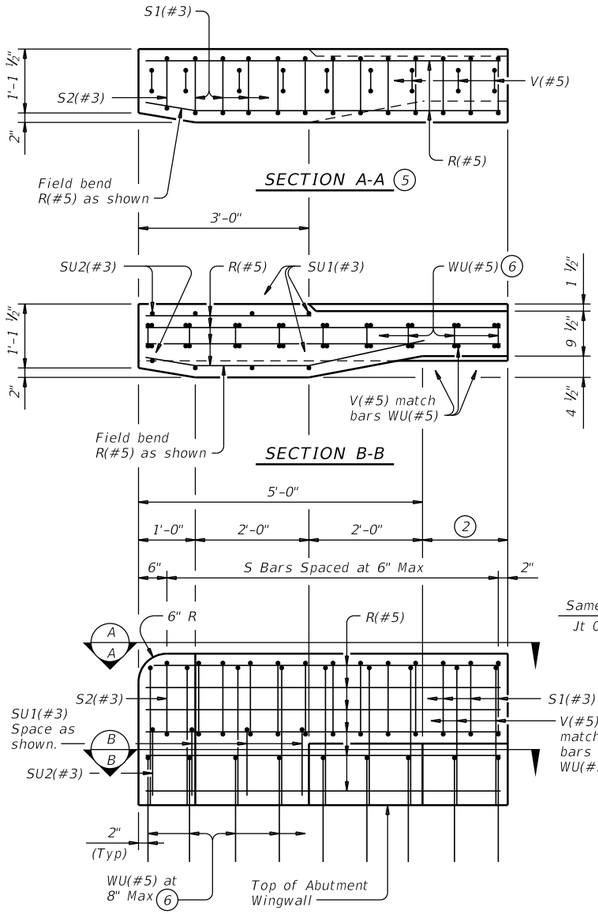
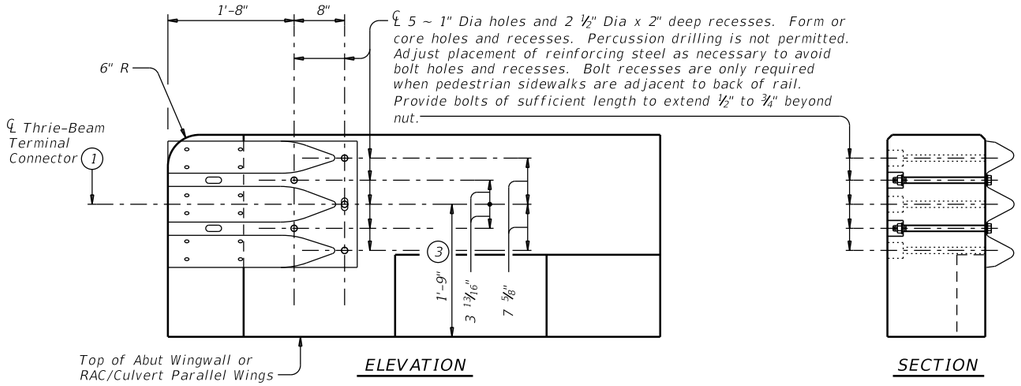
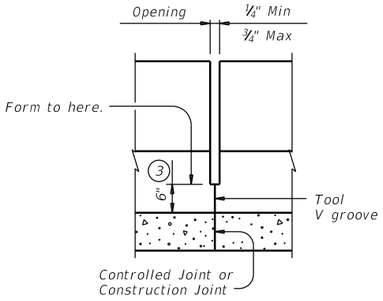


PARAPET END AT ABUT WINGWALL (6)

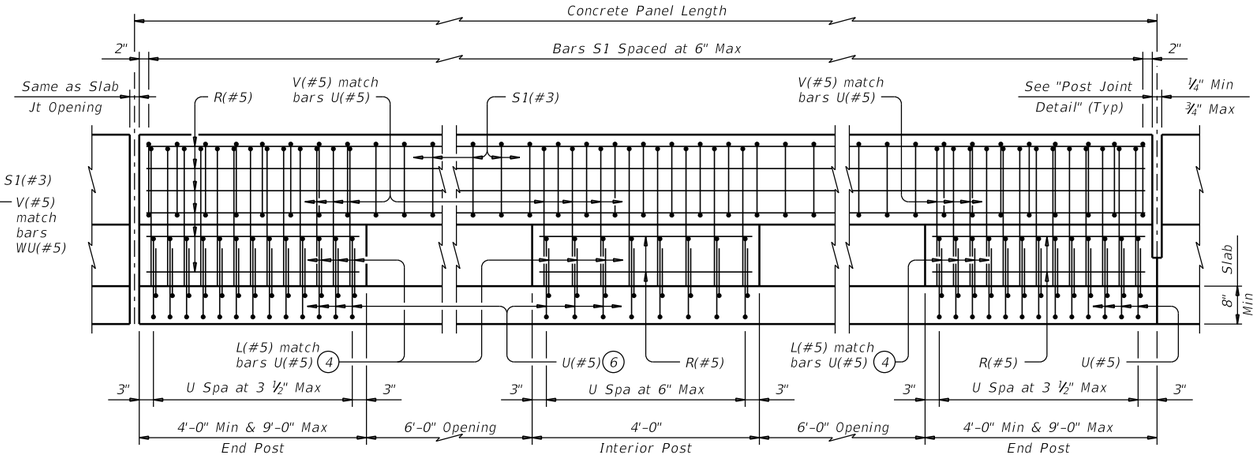


TERMINAL CONNECTION DETAILS



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 achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
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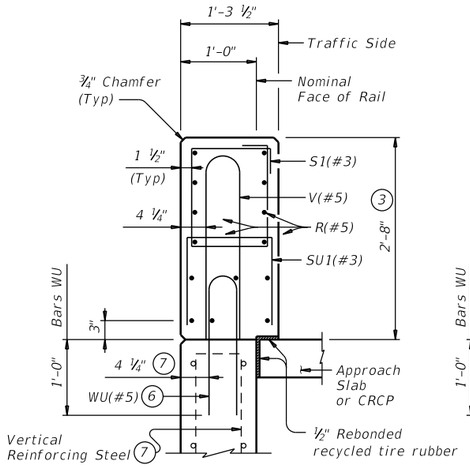
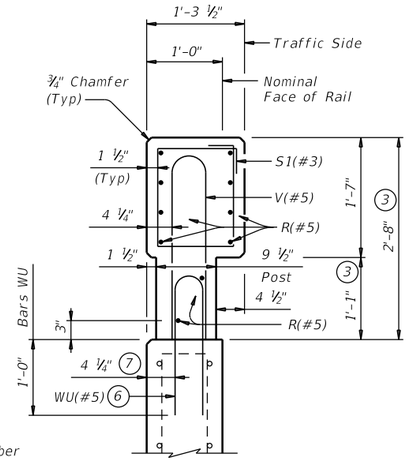
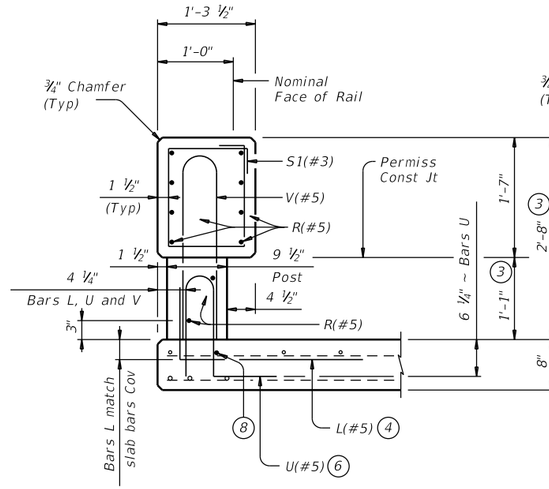


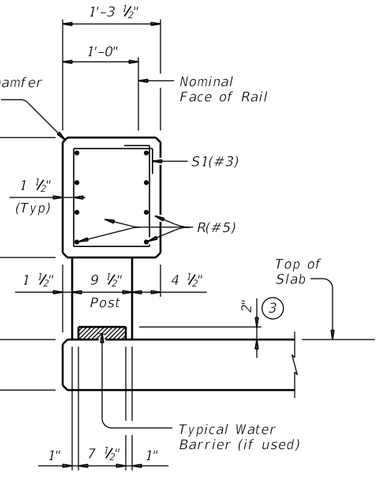
SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



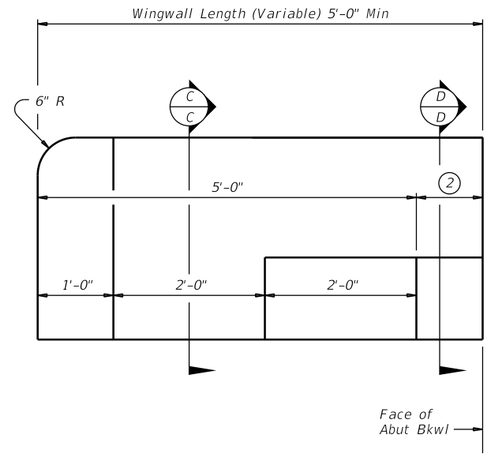
AT POST
ON BRIDGE SLAB



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.

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.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

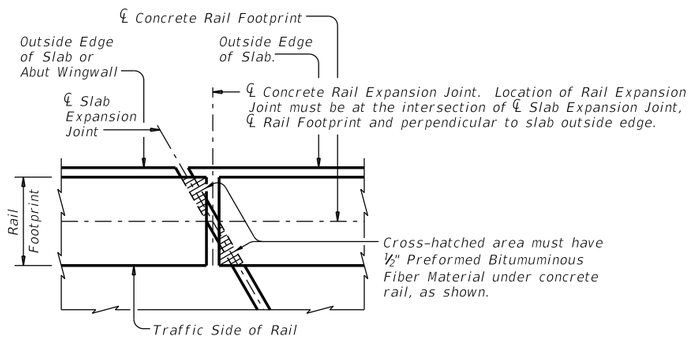
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(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.

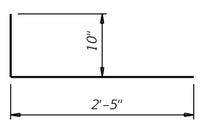
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(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.

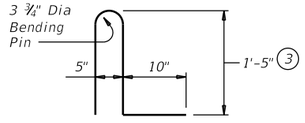


PLAN OF RAIL AT EXPANSION JOINTS

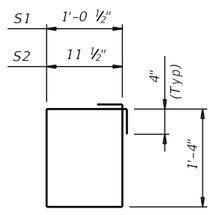
Example showing Slab Expansion Joints without breakbacks.



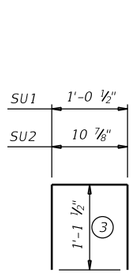
BARS L (#5)



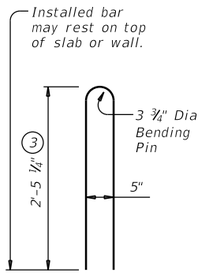
BARS U (#5) (9)



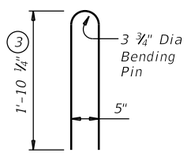
BARS S (#3)



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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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
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	CRP	KARNES		178

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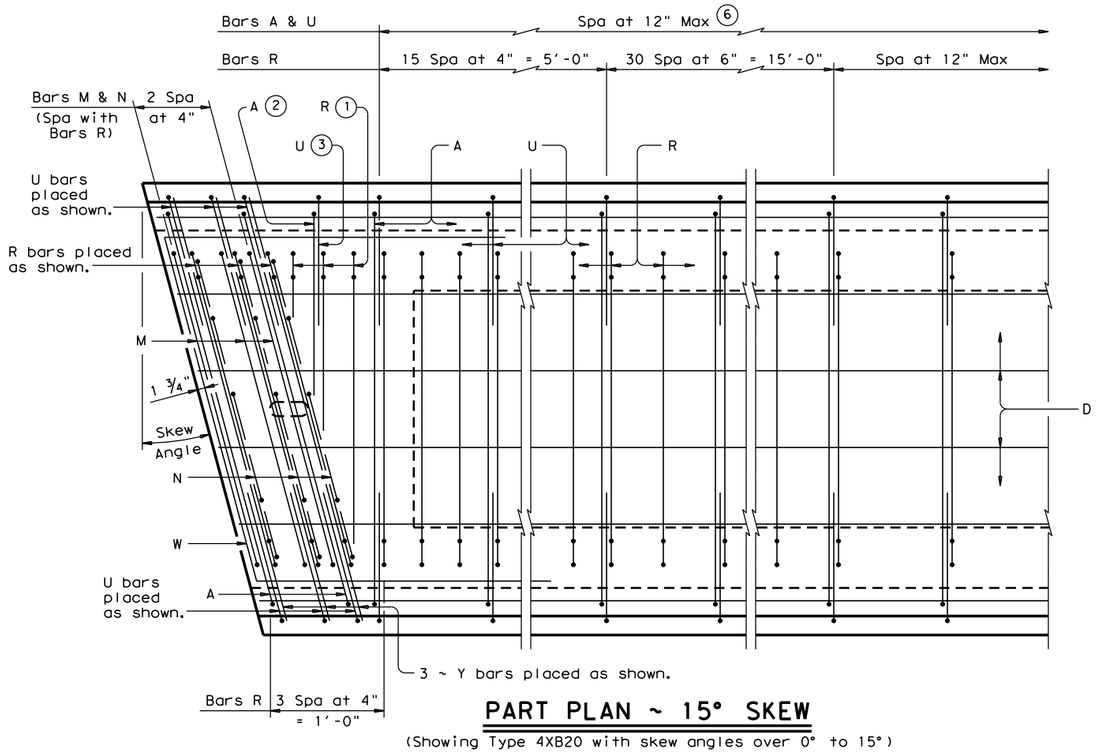
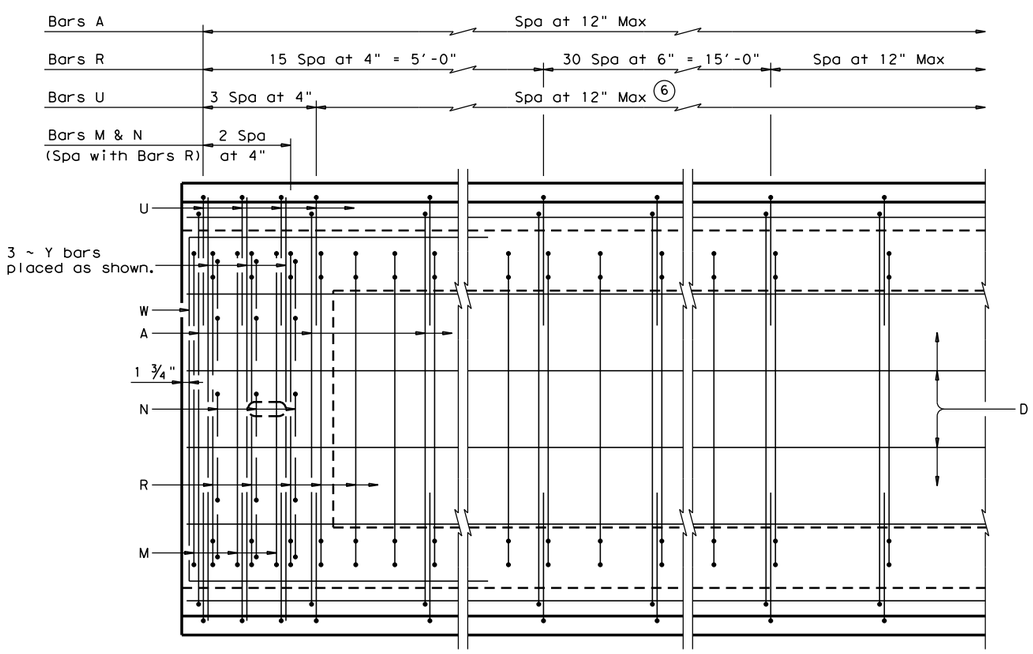


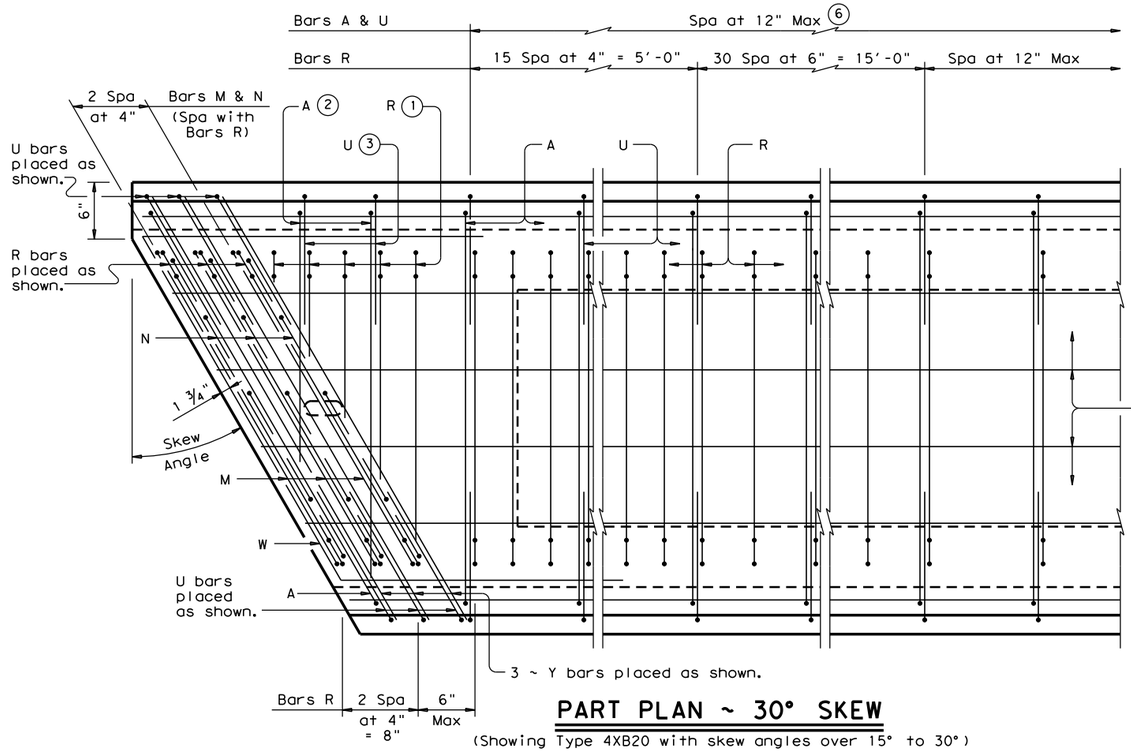
PART PLAN ~ 15° SKEW

(Showing Type 4XB20 with skew angles over 0° to 15°)



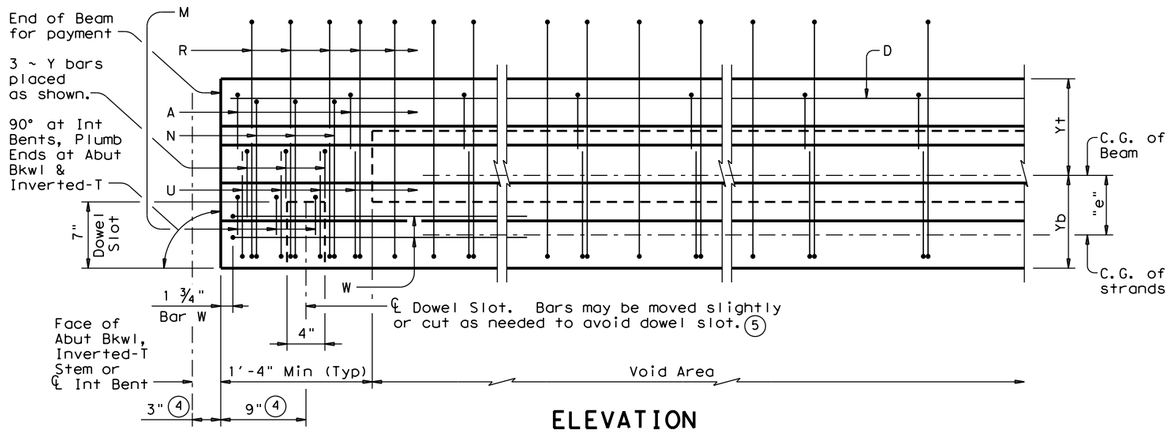
PART PLAN

(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 Bkwl 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) End Bars U the greater of 5' from beam ends or 3' beyond the last debonded strands.

HL93 LOADING

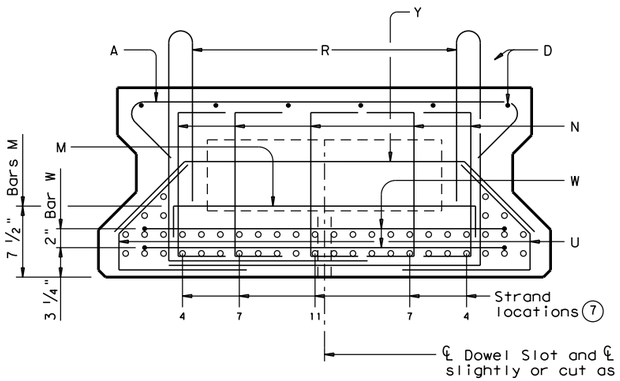
Texas Department of Transportation

Bridge Division Standard

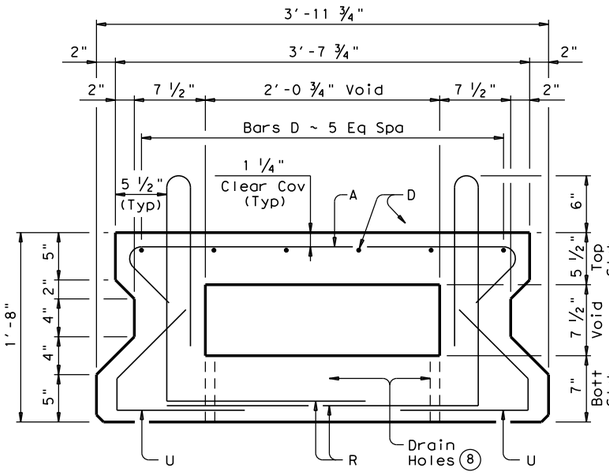
PRESTRESSED CONCRETE X-BEAM DETAILS (TYPE XB20)

XB20

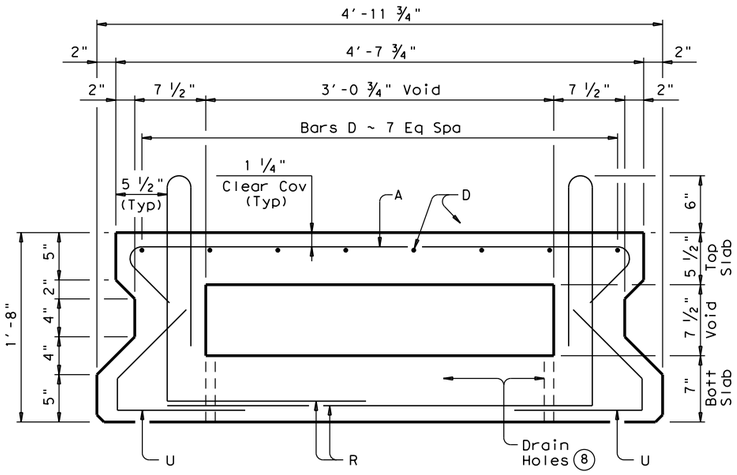
FILE: xbstds01.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		179



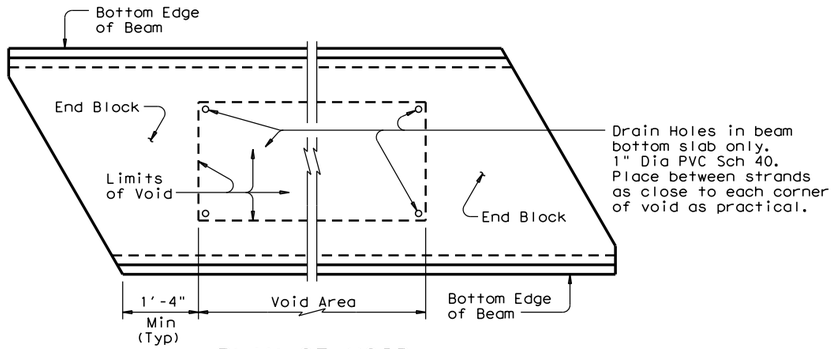
END BLOCK SECTION ~ TYPE 4XB20



TYPICAL SECTION ~ TYPE 4XB20



TYPICAL 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 holes 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 standard XBND or appropriate Prestressed Concrete X-Beam Standard Designs sheet for locations of pretensioning strands.

(8) Drain Holes 1" Dia PVC Sch 40 Pipe as shown between strands in all beam void corners. See "Plan of Void".

(9) Based on 150 pcf weight density of concrete. Weight of end blocks is not included.

(10) Dimension will vary slightly with skew. Adjust as necessary.

(11) At the Fabricator's option, alternate designs utilizing deformed welded wire reinforcement (WWR) conforming to ASTM A1064 of equivalent cross sectional area to replace all or some of Bars A, D, R and U will be permitted. Smooth Welded Wire Reinforcement is not permitted.

BEAM PROPERTIES			
		Type 4XB20	Type 5XB20
Area	in^2	689	839
Y top	in	10.47	10.47
Y bott	in	9.53	9.53
I	in^4	29,124	36,621
Weight (9)	lb/ft	718	874

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.

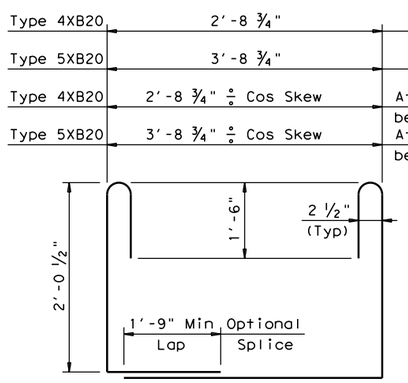
Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.

1 ¼" clear cover to reinforcement is required unless noted otherwise.

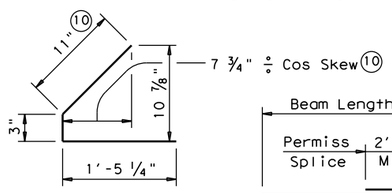
These details are applicable for skews up to 30 degrees only.

Chamfer bottom beam corners ¾" or round to a ¾" radius.

Punch through all drain holes, removing any blockage, before beams are shipped.

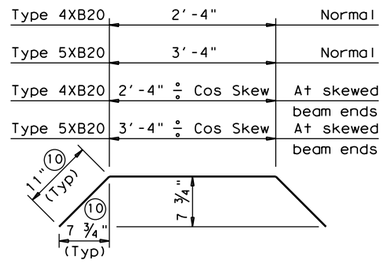


BARS R (#4) (11)

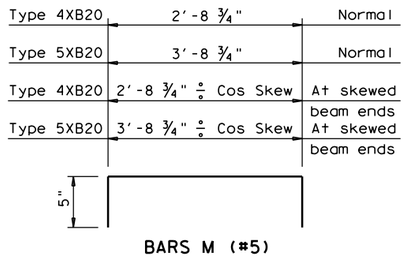


BARS U (#4) (11)

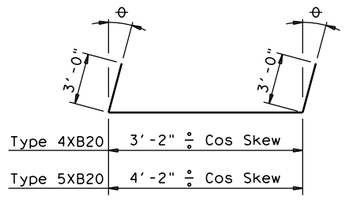
BARS D (#5) (11)
(Place splices in middle third of span)



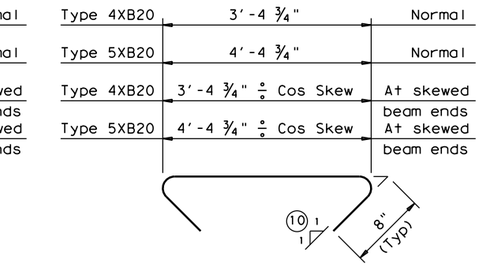
BARS Y (#5)



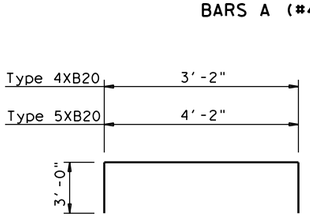
BARS M (#5)



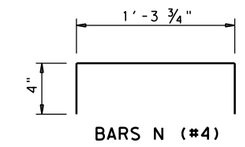
BARS W (#5)
(For skewed beam ends)



BARS A (#4) (11)



BARS W (#5)
(For square beam ends)



BARS N (#4)

HL93 LOADING *SHEET 2 OF 2*

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS (TYPE XB20)

XB20

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©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		180

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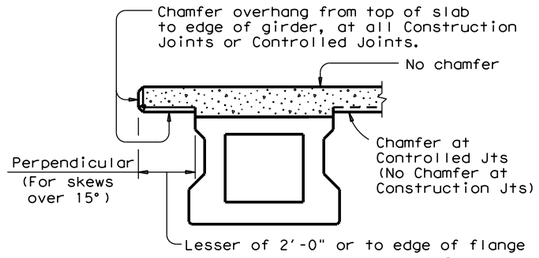
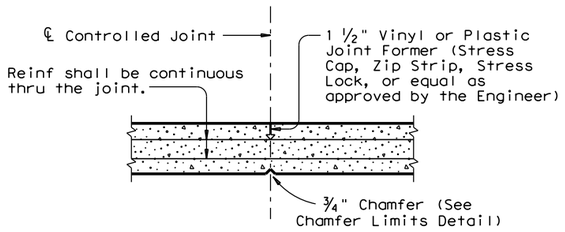
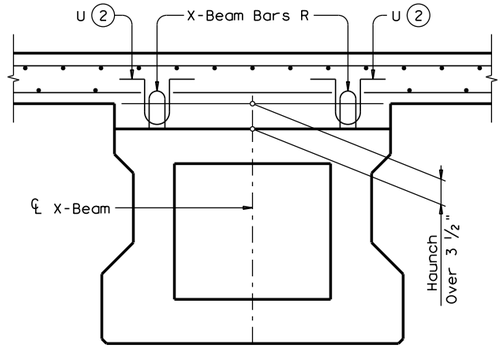


CHAMFER LIMITS DETAIL (1)

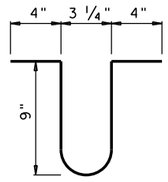


CONTROLLED JOINT DETAIL

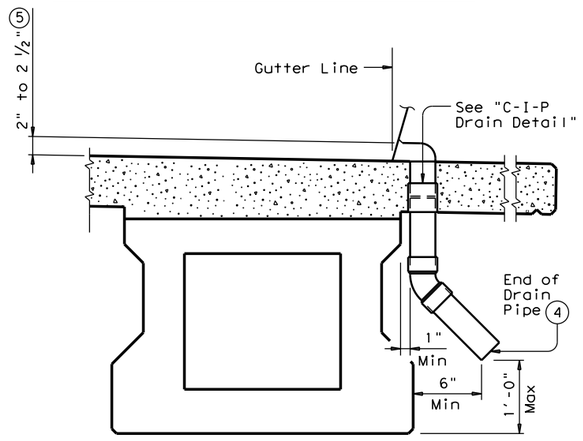
(Saw-cutting will not be allowed)



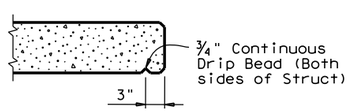
HAUNCH REINFORCING DETAIL



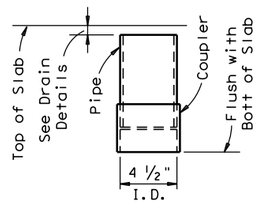
BARS U (#4)



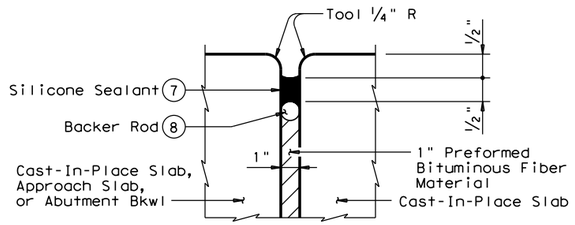
DRAIN DETAIL (6)



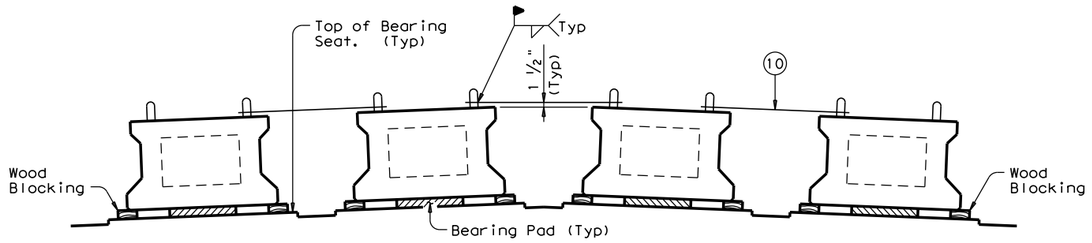
DRIP BEAD DETAIL



C-I-P DRAIN DETAIL (3)



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.

(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) No water shall 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 shall be as directed by the Engineer. No drains shall be 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, shall 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. Type A joints will not be paid for directly, but shall be considered subsidiary to Item 422, "Concrete Superstructures".

(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.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Specifications.

All items (reinforcing steel, drains, joint formers, etc.) shown on this sheet shall be considered 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.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS WITH MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE X-BEAMS

XBBR-MS

FILE: xbstds05.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
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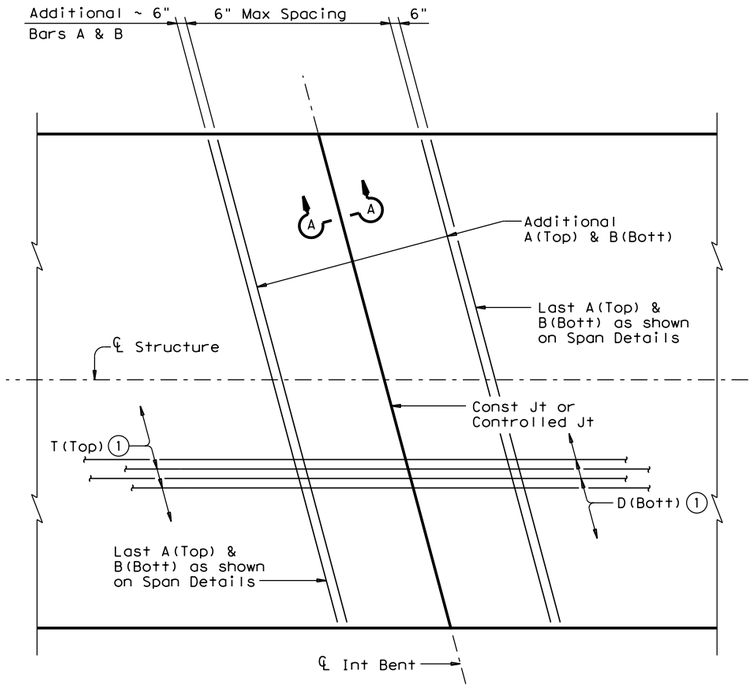
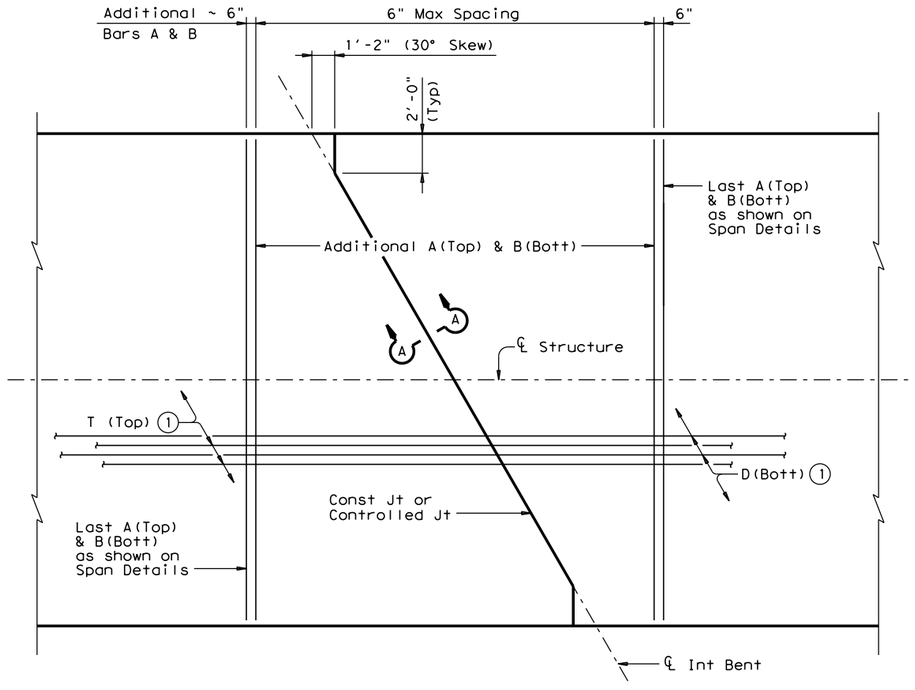
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		181



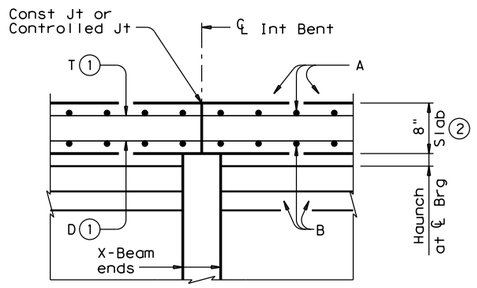
PLAN FOR SKEW ANGLES 0° TO 15°

(Showing 15° skew)



PLAN FOR SKEW ANGLES OVER 15° TO 30°

(Showing 30° skew)



SECTION A-A

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant 8" thick slab over the bent.

TABLE OF ALLOWABLE UNIT LENGTH	
Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.6
1.00	4.4
2.00	4.2
3.00	4.0
4.00	3.7
5.00	3.5

Unit length must not exceed the length of the shortest end span times the Unit Length Factor shown in table or 400', whichever is less.

BAR TABLE	
BAR	SIZE
A	#5
B	#5
D	#5
T	#4

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".

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

Where multi-span units are indicated on the Bridge Layout, the Thickened Slab End details and reinforcement shown on Standard XBTS (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 Standard PCP (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.

All reinforcing must be Grade 60.

Concrete strength f'c = 4,000 psi.

Bar laps, where required, will be as follows:

Uncoated ~ #4 = 1'-5"
~ #5 = 1'-9"
Epoxy Coated ~ #4 = 2'-1"
~ #5 = 2'-7"

The details shown on this sheet are applicable for use only with the Prestressed Concrete X-Beam Standard Designs shown on standards XBSD-32, XBSD-38, XBSD-40 and XBSD-44.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

CONTINUOUS SLAB DETAILS

PRESTR CONC X-BEAM SPANS

XBCS

FILE: xbstde06.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		182

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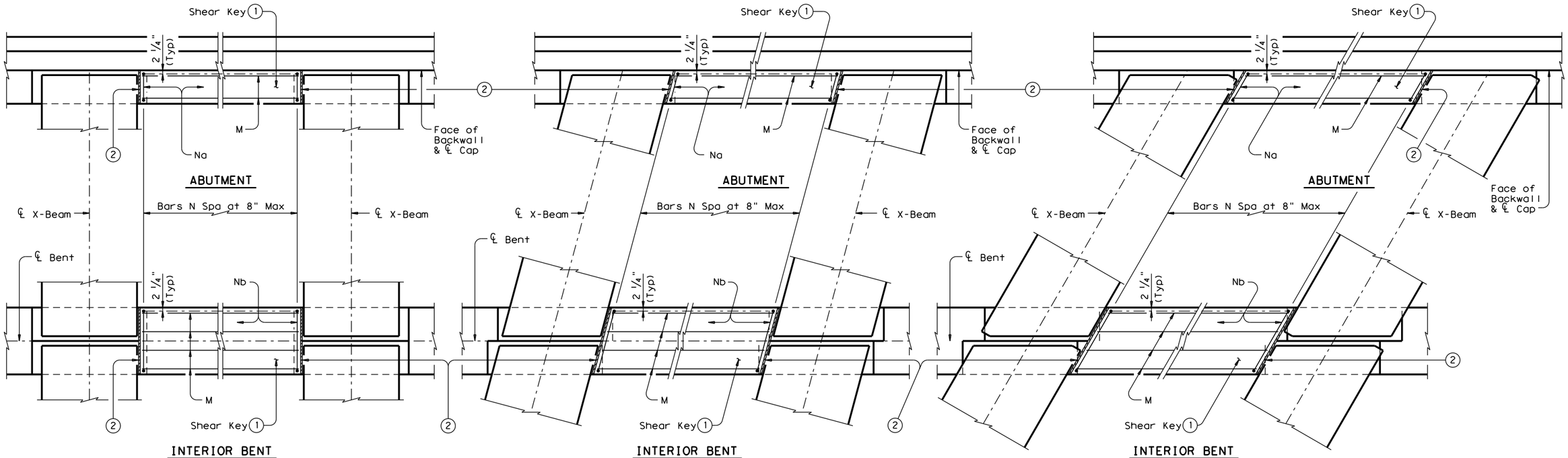


PARTIAL PLANS WITH NO SKEW

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 1/4" 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.

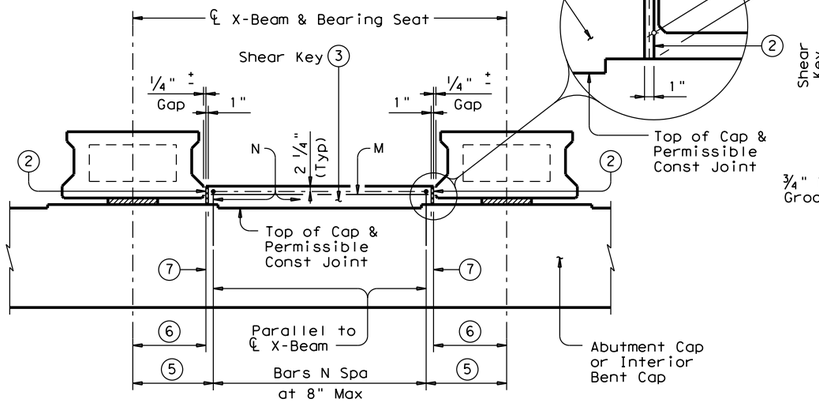
(5) With No Skew = 2'-10", measured along ℄ Cap.
With Skew = 2'-10" ÷ Cos Skew, measured along ℄ Cap.

(6) With No Skew = 2'-6 1/4", measured anlong ℄ Cap.
With Skew = 2'-6 1/4" ÷ Cos Skew, measured anlong ℄ Cap.

(7) Face of UHMW Polyethylene Wear Pad. Smooth side of polyethylene wear pad facing beam.

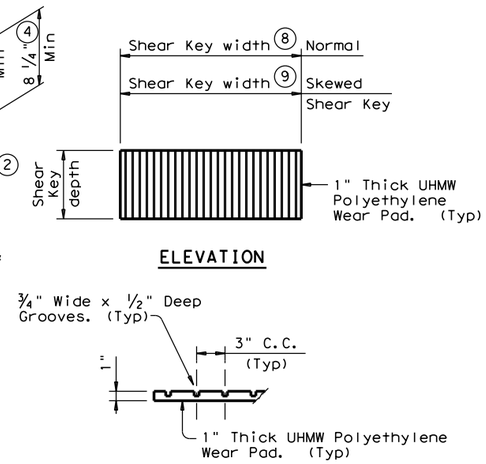
(8) Abutments = 1/2 Cap width.
Interior Bents = Cap width.

(9) Abutments = 1/2 Cap width ÷ Cos Skew.
Interior Bents = Cap width ÷ Cos Skew.

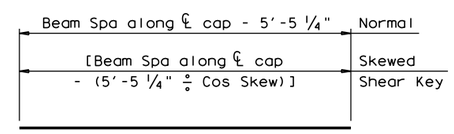


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

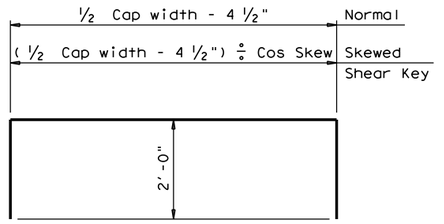
Showing shear key with beam Type 5XB28.
Other XB beam types similar.



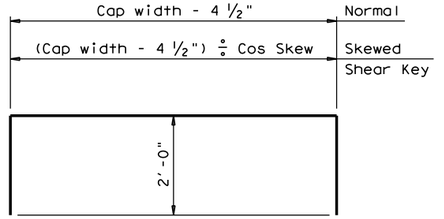
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For Abutments)



BARS Nb (#5)
(For Interior Bents)

CONSTRUCTION NOTES:

Use Class "C" concrete. Use Class "C" (HPC) if shown elsewhere on the plans.

Provide concrete with strength f'c = 3,600 psi.

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 Polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD 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.

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE X-BEAMS

XBSK

FILE: xbstds92.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT April 2013 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	CRP	KARNES		183

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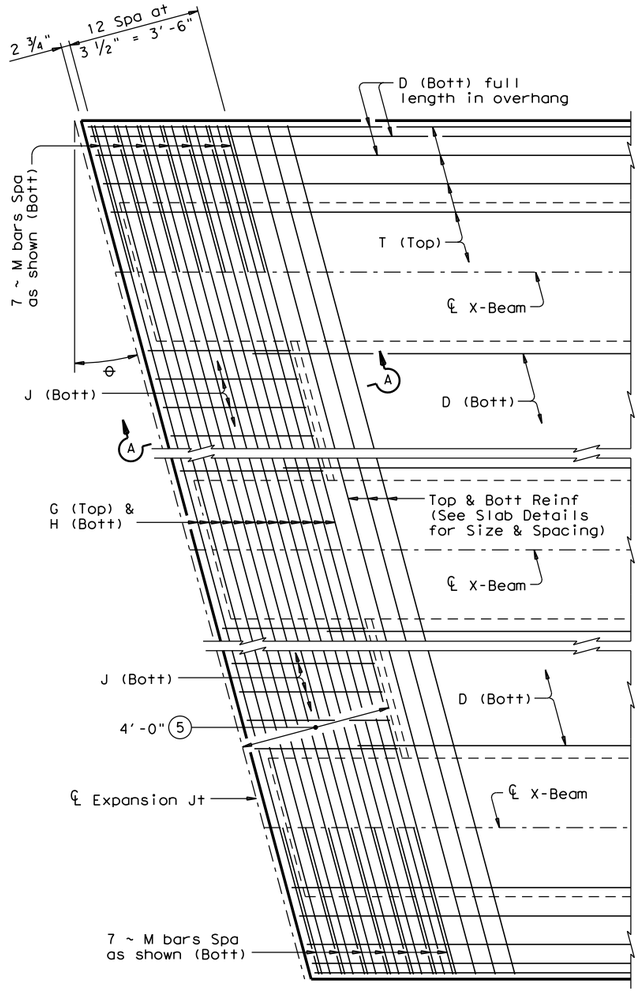
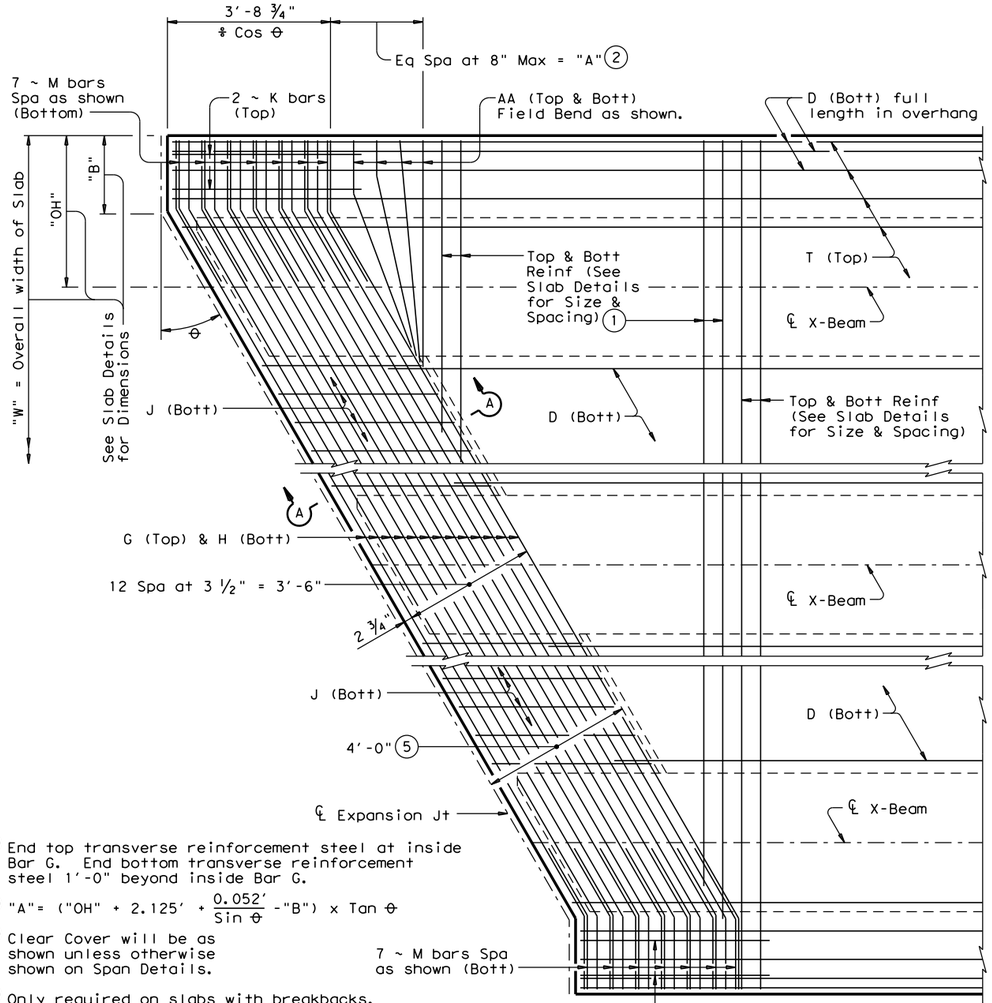




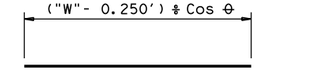
(1) End top transverse reinforcement steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A" = ("OH" + 2.125' + $\frac{0.052'}{\sin\theta}$ - "B") x Tan θ

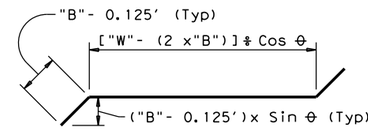
(3) Clear Cover will be as shown unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

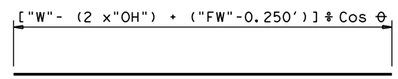
(5) Thickened Slab End dimensioned perpendicular to Face of Bkwl, Centerline Interior Bent or Face of Inverted-T Stem.



BARS G (#5)
(For Slabs Without Breakbacks)



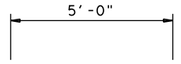
BARS G (#5)
(For Slabs With Breakbacks)



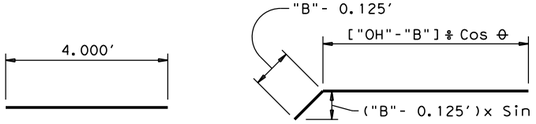
"FW" = Beam top Flange width (ft)

BARS H (#5)

BARS AA (#5) (4) **BARS J (#5)**



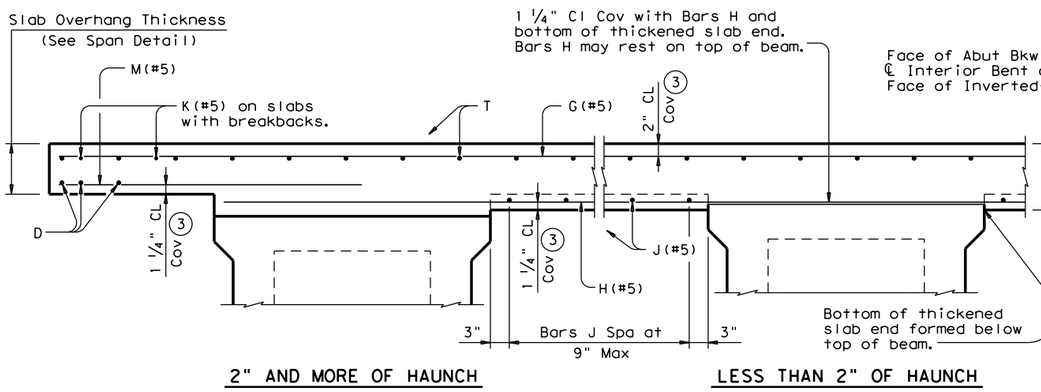
BARS K (#5) (4)



BARS M (#5)
(For Slabs Without Breakbacks)

BARS M (#5)
(For Slabs With Breakbacks)

PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



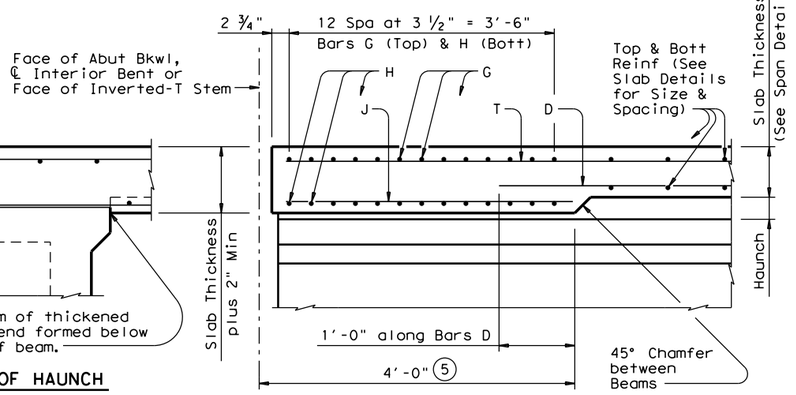
2" AND MORE OF HAUNCH

LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc X-Beams at ℄ Brg)

PARTIAL PLAN FOR SLABS WITH BREAKBACK



SECTION A-A

(Showing with 2" and more of Haunch)

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details are restricted to Prestressed Concrete X-Beam Spans.

These details are to be used in conjunction with the Span Details and Standard PCP (if prestressed concrete panels are used).

All reinforcing bars must be Grade 60 steel.

If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J and M must be epoxy coated.

Bar laps, where required, will be as follows:

Uncoated ~ #4	1'-5"
~ #5	1'-9"
Epoxy Coated ~ #4	2'-1"
~ #5	2'-7"

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

THICKENED SLAB END DETAILS
PRESTRESSED CONCRETE X-BEAM SPANS

XBTS

FILE: xbstde09.dgn	DN: JMH	CK: AM	DW: JTR	CK: JMH
©TxDOT June 2011	CONT	SECT	JOB	HIGHWAY
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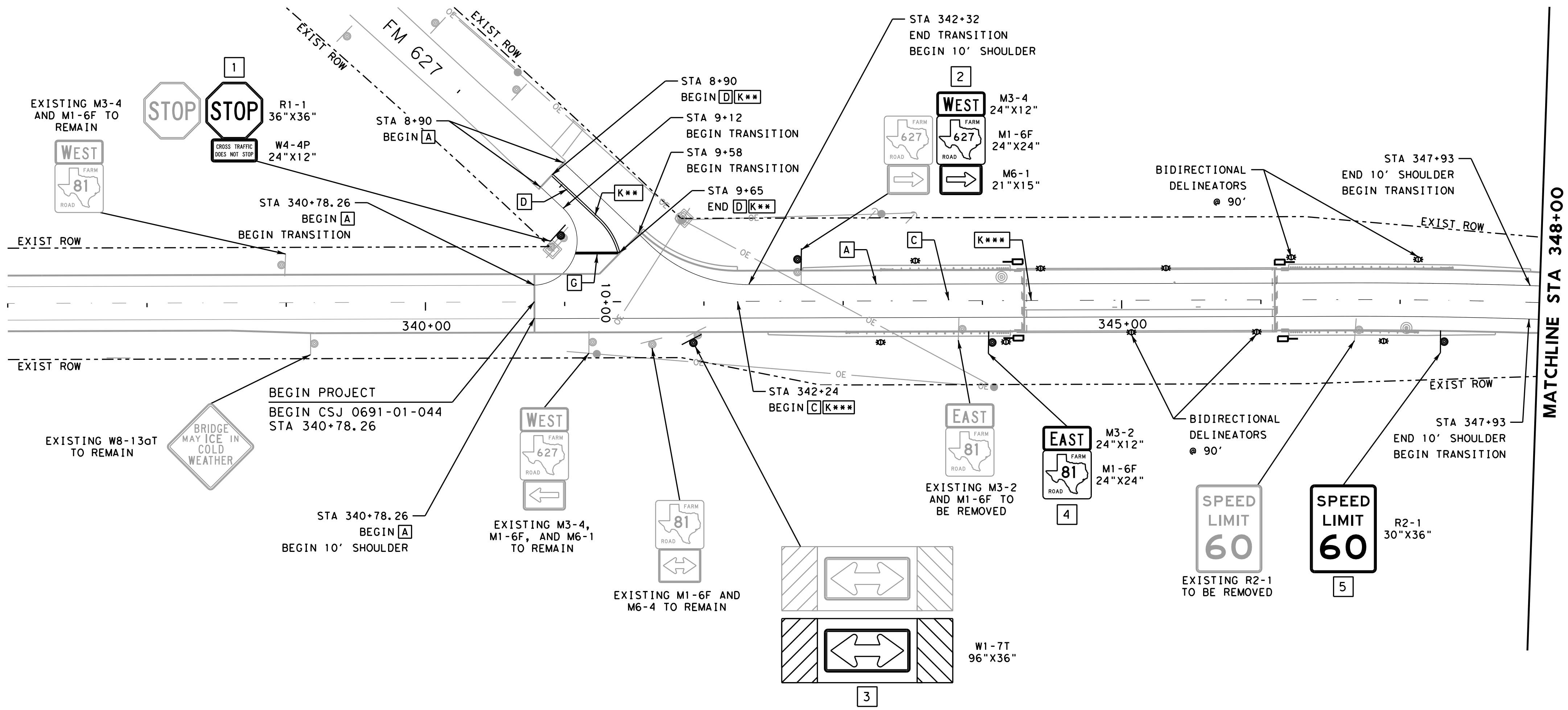
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		184



LEGEND

- A RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
- B RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
- C RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
- D RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
- E REFL PAV MRK TY I (W)8"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)12"(SLD)
- G PREFAB PAV MRK TY C (W)24"(SLD)
- H PREFAB PAV MRK TY C (Y)24"(SLD)
- I PREFAB PAV MRK TY C (W)(ARROW)
- J PREFAB PAV MRK TY C (W)(WORD)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR

NOTES:
1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
5. IF EXISTING, CONTRACTOR WILL REMOVE, STORE, AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY. REMOVAL, STORAGE, AND INSTALLATIONS SHALL BE SUBSIDIARY TO SIGN-ITEM 644.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81

SIGNING AND PAVEMENT MARKING PLAN

BEGIN PROJECT TO STA 348+00

SCALE: 1"=100' SHEET 1 OF 6

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TEXAS	CRP	KARNES	185
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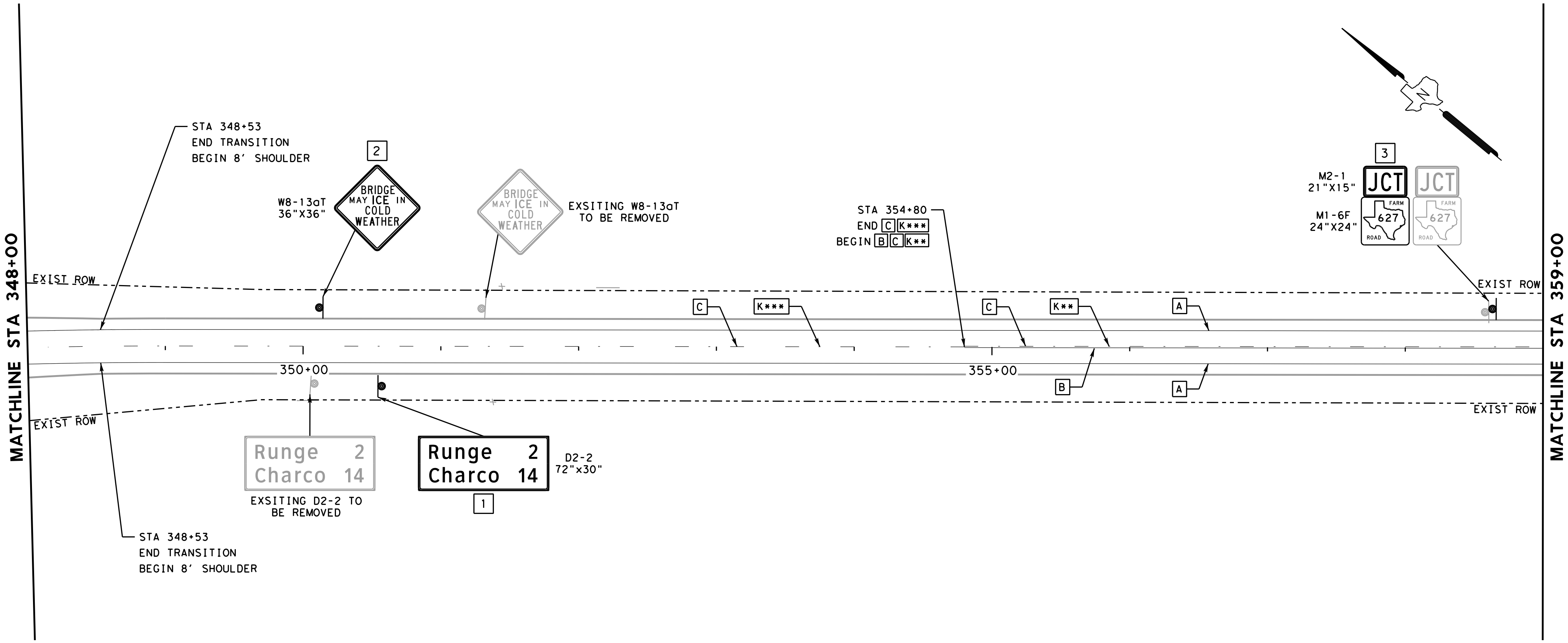

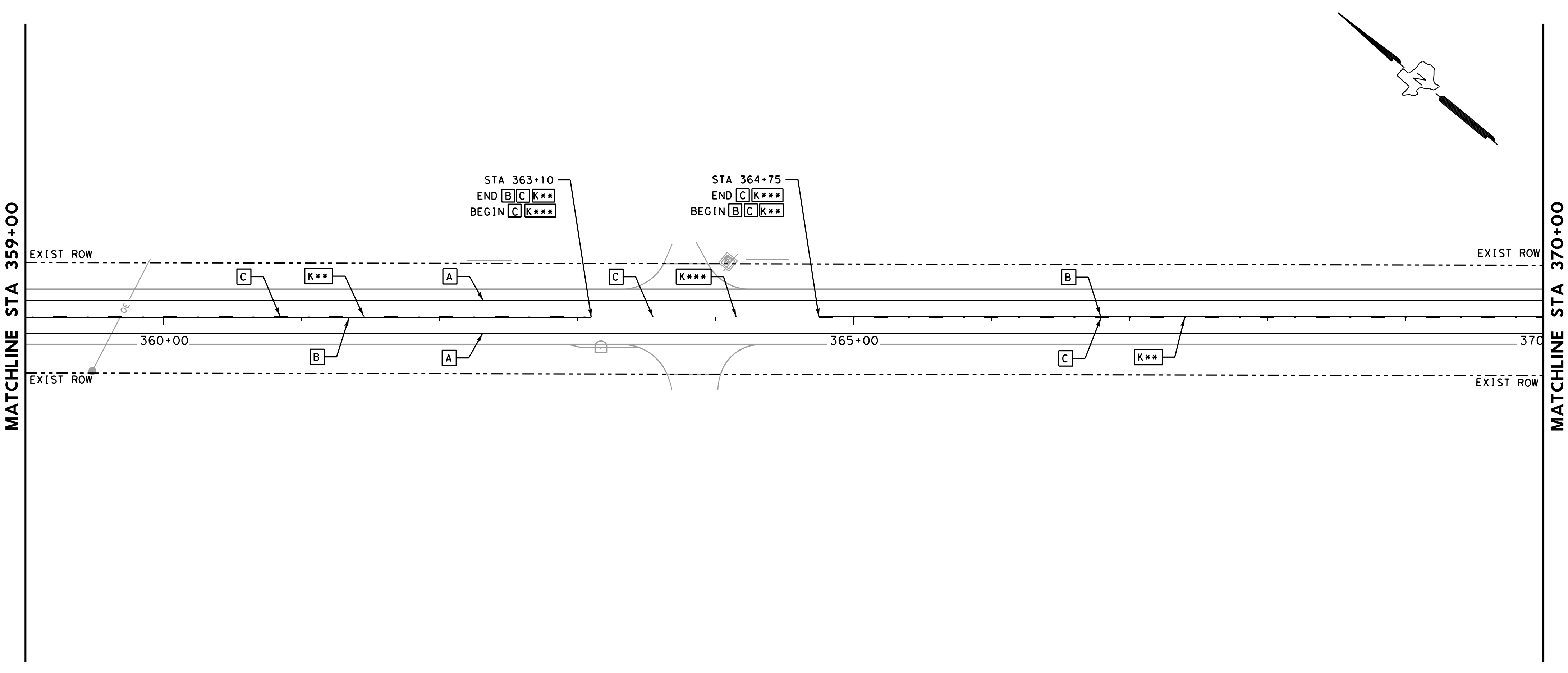

LEGEND

- A RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
- B RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
- C RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
- D RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
- E REFL PAV MRK TY I (W)8"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)12"(SLD)
- G PREFAB PAV MRK TY C (W)24"(SLD)
- H PREFAB PAV MRK TY C (Y)24"(SLD)
- I PREFAB PAV MRK TY C (W)(ARROW)
- J PREFAB PAV MRK TY C (W)(WORD)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR

NOTES:
1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
5. IF EXISTING, CONTRACTOR WILL REMOVE, STORE, AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY. REMOVAL, STORAGE, AND INSTALLATIONS SHALL BE SUBSIDIARY TO SIGN-ITEM 644.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

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FM 81

SIGNING AND PAVEMENT MARKING PLAN

STA 348+00 TO STA 370+00

SCALE: 1"=100' SHEET 2 OF 6

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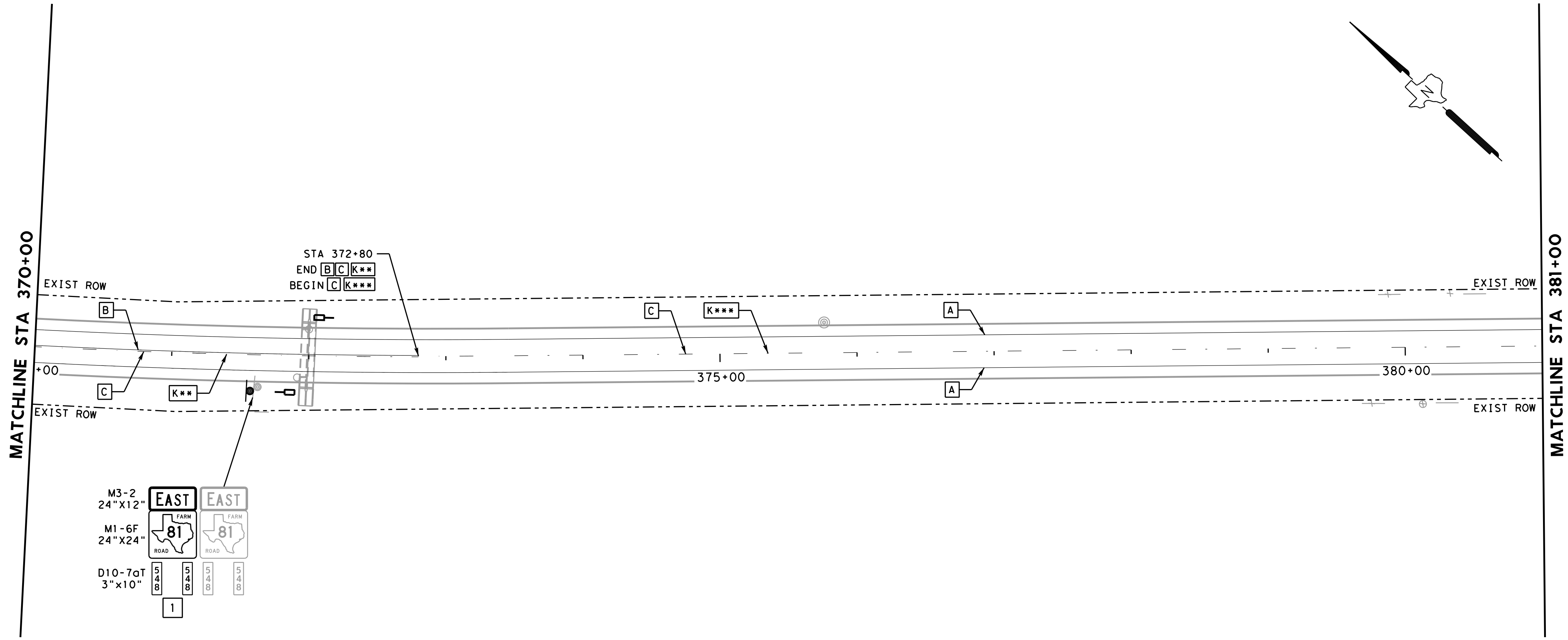

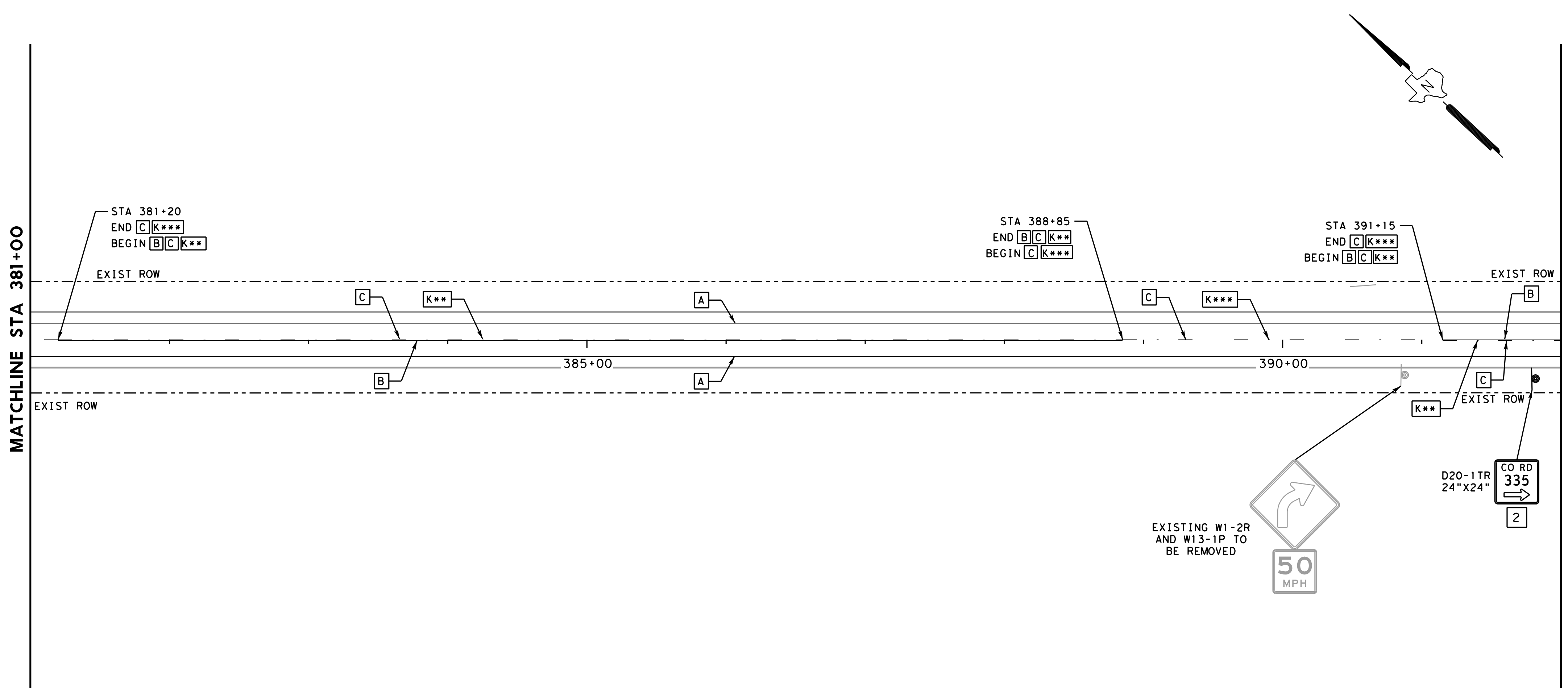

LEGEND

- [A] RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
- [B] RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
- [C] RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
- [D] RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
- [E] REFL PAV MRK TY I (W)8"(SLD)(090MIL)
- [F] PREFAB PAV MRK TY C (W)12"(SLD)
- [G] PREFAB PAV MRK TY C (W)24"(SLD)
- [H] PREFAB PAV MRK TY C (Y)24"(SLD)
- [I] PREFAB PAV MRK TY C (W)(ARROW)
- [J] PREFAB PAV MRK TY C (W)(WORD)
- [K] REFL PAV MRKR TY II-A-A
- [L] REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR

NOTES:
1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
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0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED
PROFESSIONAL ENGINEER
6/17/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

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FM 81

SIGNING AND PAVEMENT MARKING PLAN

STA 370+00 TO STA 392+00

SCALE: 1"=100' SHEET 3 OF 6

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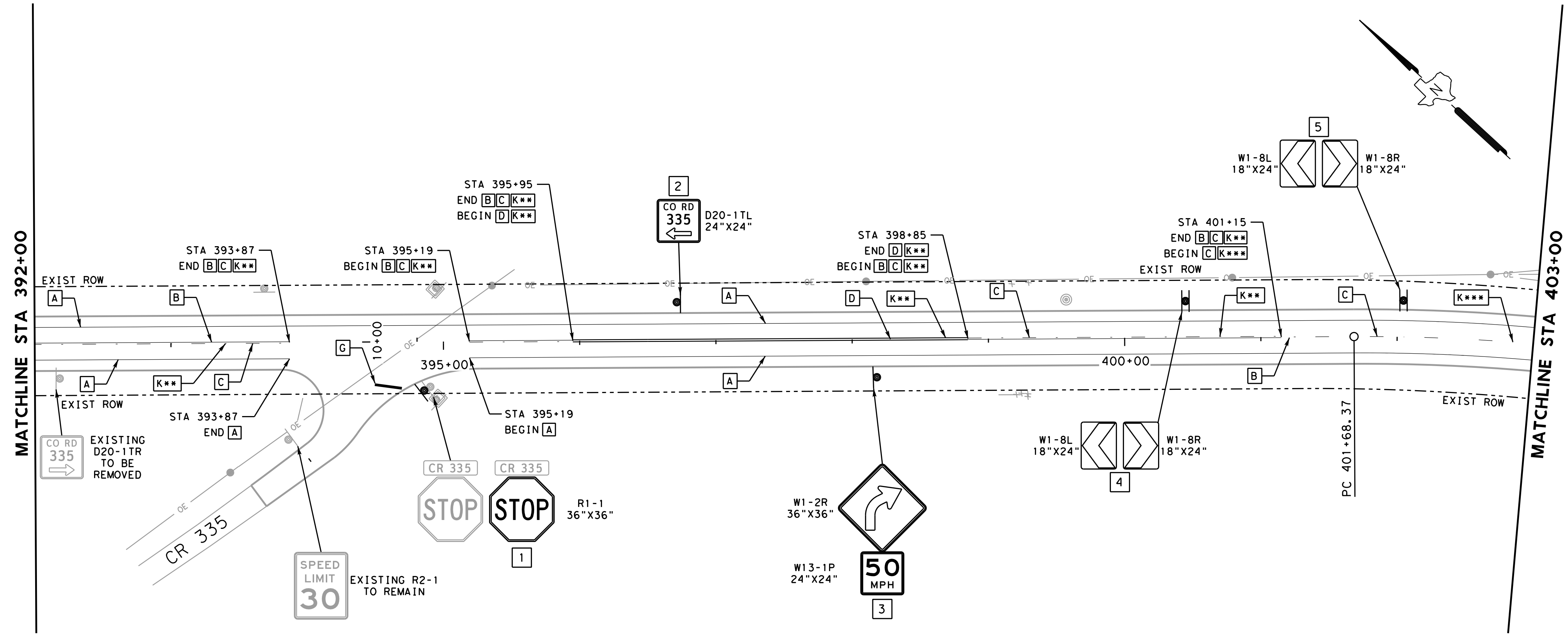


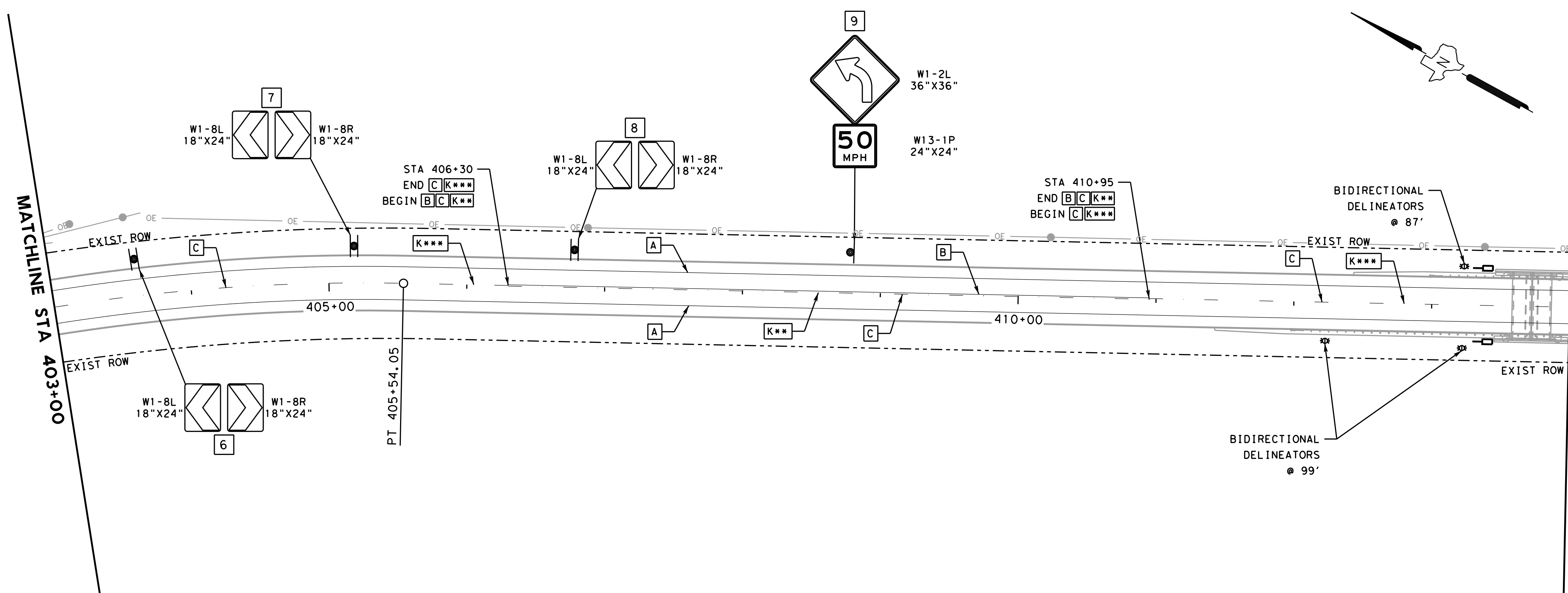
LEGEND

A	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
B	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
C	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
D	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
E	REFL PAV MRK TY I (W)8"(SLD)(090MIL)
F	PREFAB PAV MRK TY C (W)12"(SLD)
G	PREFAB PAV MRK TY C (W)24"(SLD)
H	PREFAB PAV MRK TY C (Y)24"(SLD)
I	PREFAB PAV MRK TY C (W)(ARROW)
J	PREFAB PAV MRK TY C (W)(WORD)
K	REFL PAV MRKR TY II-A-A
L	REFL PAV MRKR TY I-C
*	20' MARKER SPACING
**	40' MARKER SPACING
***	80' MARKER SPACING
←	DIRECTION OF TRAFFIC FLOW
	PROPOSED SIGN
	PROPOSED OBJECT MARKER
	PROPOSED DELINEATOR

NOTES:

1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
5. IF EXISTING, CONTRACTOR WILL REMOVE, STORE, AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY. REMOVAL, STORAGE, AND INSTALLATIONS SHALL BE SUBSIDIARY TO SIGN-ITEM 644.

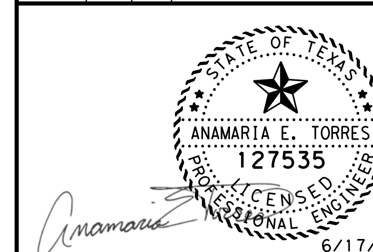
0 50 100
SCALE: 1"=100'



NOTES CONT'D:

6. CONTRACTOR SHALL OBTAIN APPROVAL OF THE NEED FOR CURVE WARNING SIGNS, ADVISORY SPEED LEGEND AND PLACEMENT/QUANTITY OF CHEVRONS BY THE ENGINEER/CORPUS CHRISTI DISTRICT TRAFFIC PRIOR TO ORDERING SIGNS.

DATE	BY	REV	REVISION



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Texas Department of Transportation

FM 81

SIGNING AND PAVEMENT MARKING PLAN

STA 392+00 TO STA 414+00

SCALE: 1"=100' SHEET 4 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	188
CONTROL	SECTION	JOB	
0691	01	044	

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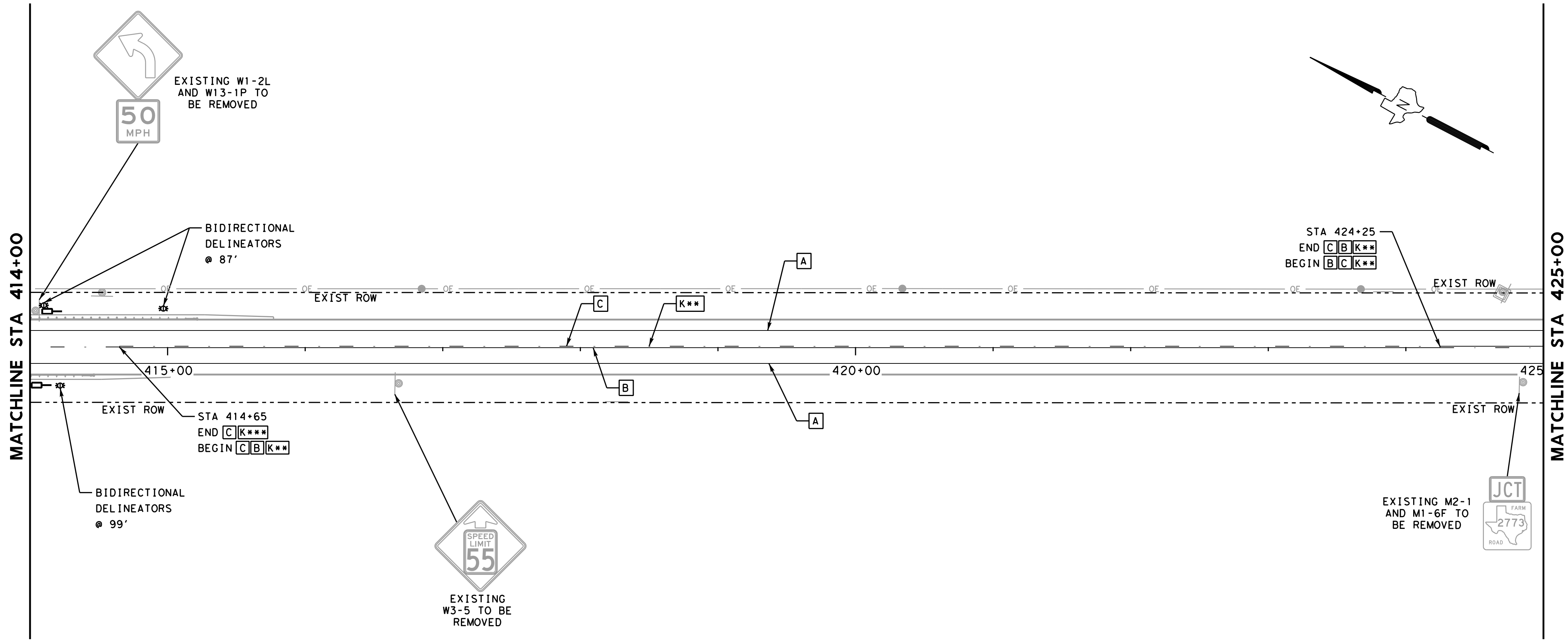

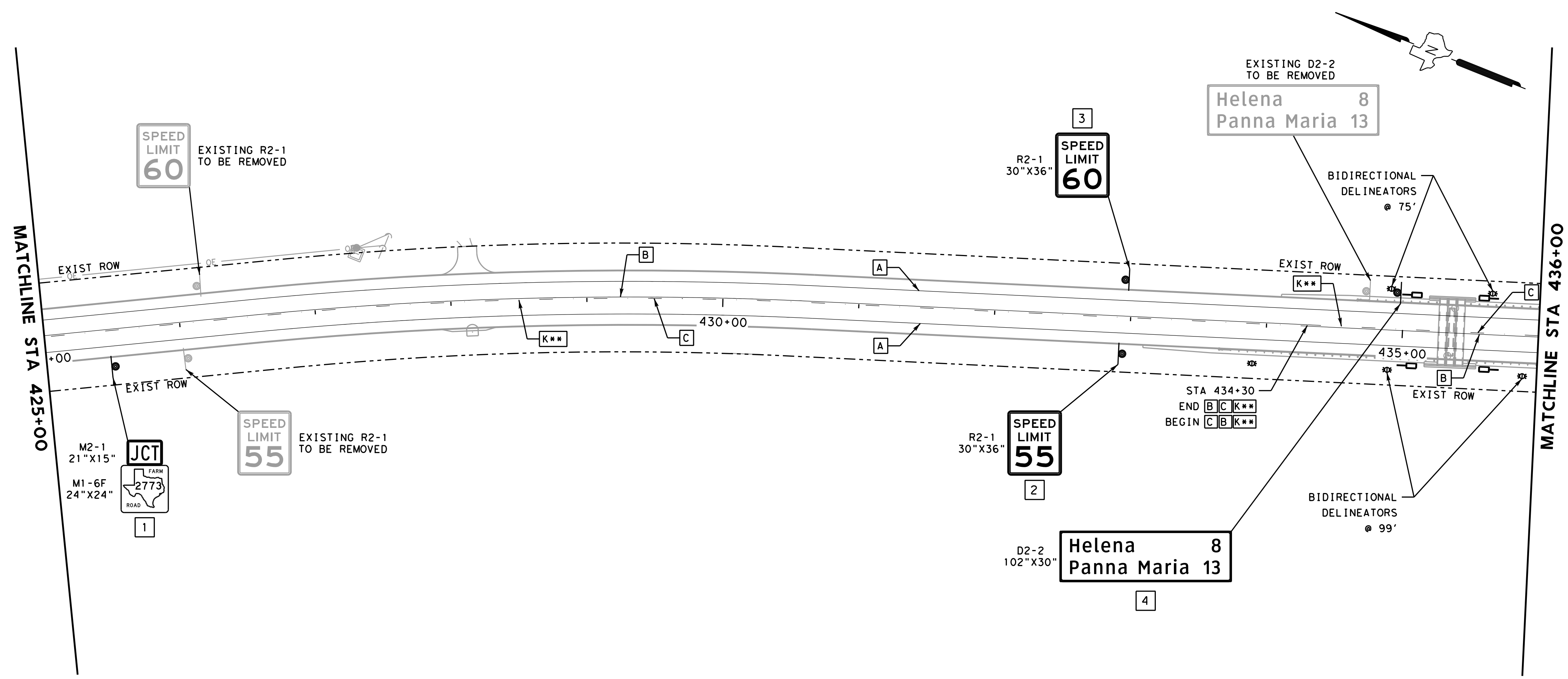

LEGEND

- A RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
- B RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
- C RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
- D RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
- E REFL PAV MRK TY I (W)8"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)12"(SLD)
- G PREFAB PAV MRK TY C (W)24"(SLD)
- H PREFAB PAV MRK TY C (Y)24"(SLD)
- I PREFAB PAV MRK TY C (W)(ARROW)
- J PREFAB PAV MRK TY C (W)(WORD)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR

NOTES:

1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
5. IF EXISTING, CONTRACTOR WILL REMOVE, STORE, AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY. REMOVAL, STORAGE, AND INSTALLATIONS SHALL BE SUBSIDIARY TO SIGN-ITEM 644.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81

SIGNING AND PAVEMENT MARKING PLAN

STA 414+00 TO STA 436+00

SCALE: 1"=100' SHEET 5 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	189
CONTROL	SECTION	JOB	
0691	01	044	

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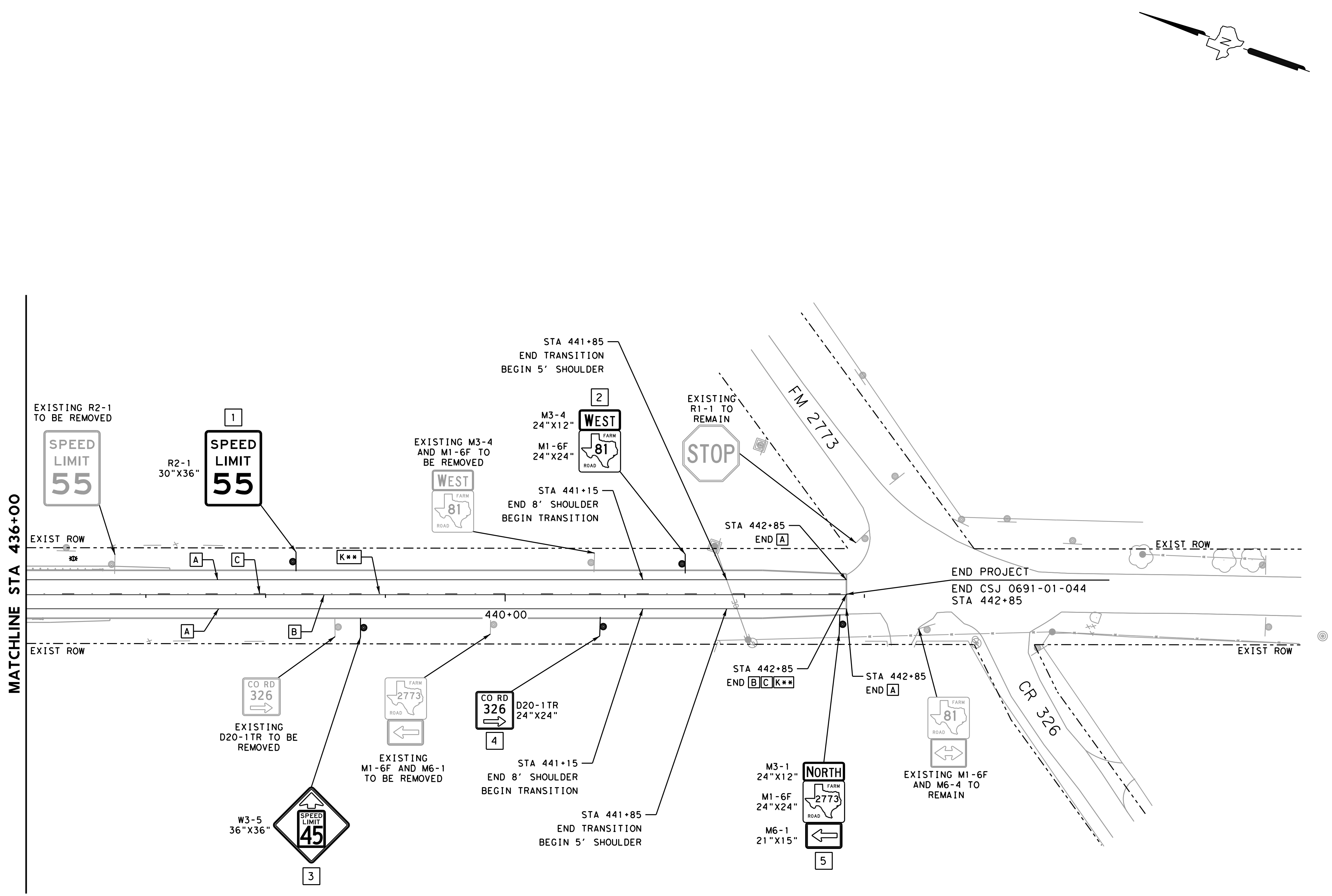

LEGEND

- A RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)
- B RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)
- C RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)
- D RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)DBL
- E REFL PAV MRK TY I (W)8"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)12"(SLD)
- G PREFAB PAV MRK TY C (W)24"(SLD)
- H PREFAB PAV MRK TY C (Y)24"(SLD)
- I PREFAB PAV MRK TY C (W)(ARROW)
- J PREFAB PAV MRK TY C (W)(WORD)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- DIRECTION OF TRAFFIC FLOW
- PROPOSED SIGN
- PROPOSED OBJECT MARKER
- PROPOSED DELINEATOR

NOTES:

1. ALL PROPOSED PAVEMENT MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS.
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 3' SHOULDER WIDTHS TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. FM 81 CENTERLINE NOT SHOWN FOR CLARITY.
4. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
5. IF EXISTING, CONTRACTOR WILL REMOVE, STORE, AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY. REMOVAL, STORAGE, AND INSTALLATIONS SHALL BE SUBSIDIARY TO SIGN-ITEM 644.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
ANAMARIA E. TORRES
127535
LICENSED PROFESSIONAL ENGINEER
6/17/2022

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FM 81
SIGNING AND PAVEMENT MARKING PLAN
STA 436+00 TO END PROJECT

SCALE: 1"=100' SHEET 6 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	190
CONTROL	SECTION	JOB	
0691	01	044	

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	FLAT ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION
							FRP = Fiberglass TWT = Thin Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA = Universal Conc UB = Universal Bolt SA = Slipbase-Conc SB = Slipbase-Bolt WS = Wedge Steel WP = Wedge Plastic	P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL = Extruded Alum Sign Panels
SHEET 1 OF 6											
	1	R1-1	STOP	36" X 36"	X		S80	1	SA	P	
		W4-4P	CROSS TRAFFIC DOES NOT STOP	24" X 12"	X						
	2	M3-4	WEST	24" X 12"	X		S80	1	SA	P	
		M1-6F	FM 627	24" X 24"	X						
		M6-1	ARROW RIGHT	21" X 15"	X						
	3	W1-7T	CHEVRON/TWO DIRECTION LARGE ARROW	96" X 36"	X		S80	1	SA	U	BM
	4	M3-2	EAST	24" X 12"	X		S80	1	SA	P	
		M1-6F	FM 81	24" X 24"	X						
	5	R2-1	SPEED LIMIT 60	30" X 36"	X		S80	1	SA	P	
SHEET 2 OF 6											
	1	D2-2	RUNGE 2/CHARCO 14	72" X 30"	X		S80	1	SA	U	BM
	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" X 36"	X		S80	1	SA	T	
	3	M2-1	JCT	21" X 15"	X		S80	1	SA	P	
		M1-6F	FM 627	24" X 24"	X						
SHEET 3 OF 6											
	1	M3-2	EAST	24" X 12"	X		S80	1	SA	P	
		M1-6F	FM 81	24" X 24"	X						
		D10-7aT	548	3" X 10"	X						
		D10-7aT	548	3" X 10"	X						
	2	D20-1TR	CO RD 335 RIGHT	24" X 24"	X		S80	1	SA	P	
SHEET 4 OF 6											
	1	R1-1	STOP	36" X 36"	X		S80	1	SA	P	BM
	2	D20-1TL	CO RD 335 LEFT	24" X 24"	X		S80	1	SA	P	
	3	W1-2R	CURVE RIGHT	36" X 36"	X		S80	1	SA	T	
		W13-1P	ADVISORY SPEED 50 MPH	24" X 24"	X						
	4	W1-8L	CHEVRON LEFT	18" X 24"	X		S80	1	SA	P	
		W1-8R	CHEVRON RIGHT	18" X 24"	X						
	5	W1-8L	CHEVRON LEFT	18" X 24"	X		S80	1	SA	P	
		W1-8R	CHEVRON RIGHT	18" X 24"	X						
	6	W1-8L	CHEVRON LEFT	18" X 24"	X		S80	1	SA	P	
		W1-8R	CHEVRON RIGHT	18" X 24"	X						
	7	W1-8L	CHEVRON LEFT	18" X 24"	X		S80	1	SA	P	
		W1-8R	CHEVRON RIGHT	18" X 24"	X						
	8	W1-8L	CHEVRON LEFT	18" X 24"	X		S80	1	SA	P	
		W1-8R	CHEVRON RIGHT	18" X 24"	X						
	9	W1-2L	CURVE LEFT	36" X 36"	X		S80	1	SA	T	
		W13-1P	ADVISORY SPEED 50 MPH	24" X 24"	X						

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Contractor shall obtain approval of the need for curve warning signs, advisory speed legend and placement/quantity of chevrons by the Engineer/Corpus Christi District Traffic prior to ordering signs.

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
4-16	DIST	COUNTY		SHEET NO.
8-16	CRP	KARNES		191

18

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	FLAT ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
										PREFABRICATED	
							FRP = Fiberglass TWT = Thin Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA = Universal Conc UB = Universal Bolt SA = Slipbase-Conc SB = Slipbase-Bolt WS = Wedge Steel WP = Wedge Plastic	P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL = Extruded Alum Sign Panels
SHEET 5 OF 6											
	1	M2-1	JCT	21" X 15"	X		S80	1	SA	P	
		M1-6F	FM 2773	24" X 24"	X						
	2	R2-1	SPEED LIMIT 55	30" X 36"	X		S80	1	SA	P	
	3	R2-1	SPEED LIMIT 60	30" X 36"	X		S80	1	SA	P	
	4	D2-2	HELENA 8/PANNA MARIA 13	102" X 30"	X		S80	1	SA	U	BM
SHEET 6 OF 6											
	1	R2-1	SPEED LIMIT 55	30" X 36"	X		S80	1	SA	P	
	2	M3-4	WEST	24" X 12"	X		S80	1	SA	P	
		M1-6F	FM 81	24" X 24"	X						
	3	W3-5	REDUCED SPEED LIMIT AHEAD (45)	36" X 36"	X		S80	1	SA	T	
	4	D20-1TR	CO RD 326 RIGHT	24" X 24"	X		S80	1	SA	P	
	5	M3-1	NORTH	24" X 12"	X		S80	1	SA	P	
		M1-6F	FM 2773	24" X 24"	X						
		M6-1	ARROW LEFT	21" X 15"	X						

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

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

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).
4. Contractor shall obtain approval of the need for curve warning signs, advisory speed legend and placement/quantity of chevrons by the Engineer/Corpus Christi District Traffic prior to ordering signs.

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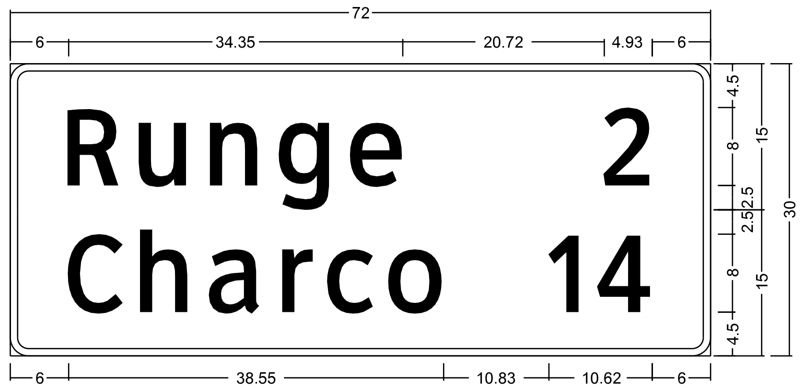
Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
4-16	DIST	COUNTY		SHEET NO.
8-16	CRP	KARNES		192

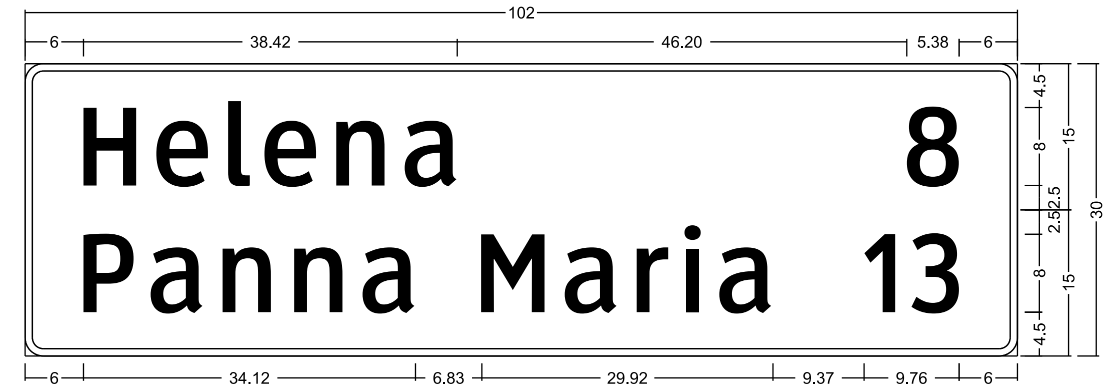


D2-2 ;

1.875" Radius, 0.75" Border, White on, Green;
"Runge", ClearviewHwy-3-W; "2", ClearviewHwy-3-W;

1.875" Radius, 0.75" Border, White on, Green;
"Charco", ClearviewHwy-3-W; "14", ClearviewHwy-3-W;

SHEET 2 OF 6
SIGN 1
(72"x30")



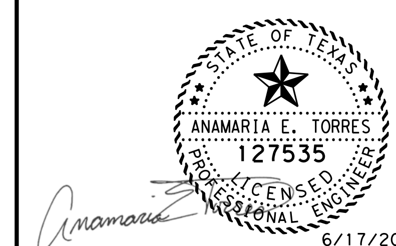
D2-2 ;

1.875" Radius, 0.75" Border, White on, Green;
"Helena", ClearviewHwy-3-W; "8", ClearviewHwy-3-W;

1.875" Radius, 0.75" Border, White on, Green;
"Panna Maria", ClearviewHwy-3-W; "13", ClearviewHwy-3-W;

SHEET 5 OF 6
SIGN 4
(102"x30")

DATE	BY	REV	REVISION



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Texas Department of Transportation

FM 81

SIGN DETAILS

SHEET 1 OF 1

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	193
CONTROL	SECTION	JOB	
0691	01	044	

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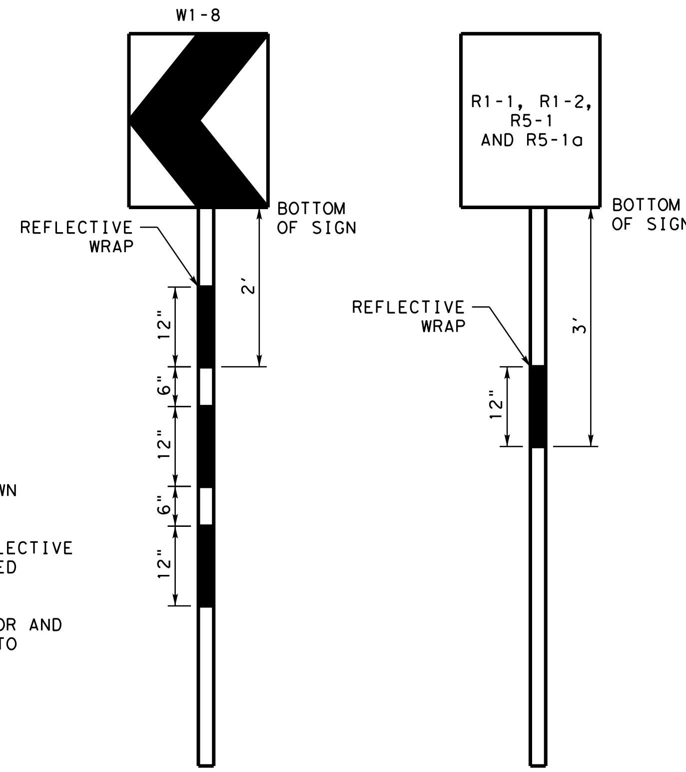


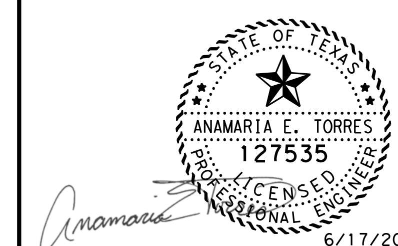
NOTES:

1. REFLECTIVE WRAP COLOR SHALL MATCH THE BACKGROUND OF THE SIGN, EXCEPT FOR STOP AND YIELD SIGNS, WHICH WILL BE RED.
2. APPLY WRAP TO ALL CHEVRONS, STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS AS SHOWN HERE.
3. WRAP WILL CONSIST OF A 12" STRIP OF REFLECTIVE MATERIAL OF THE APPROPRIATE COLOR WRAPPED AROUND THE SIGN POST AS SHOWN HERE.
4. WRAPS WILL BE FURNISHED BY THE CONTRACTOR AND SHALL BE SUBSIDIARY TO ITEM 644. REFER TO GENERAL NOTES FOR MORE DETAILS.

REFLECTIVE WRAP DETAIL

NOT TO SCALE

DATE	BY	REV	REVISION



6/17/2022

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Texas Department of Transportation

FM 81

REFLECTIVE WRAP DETAIL

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

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	194
CONTROL	SECTION	JOB	
0691	01	044	

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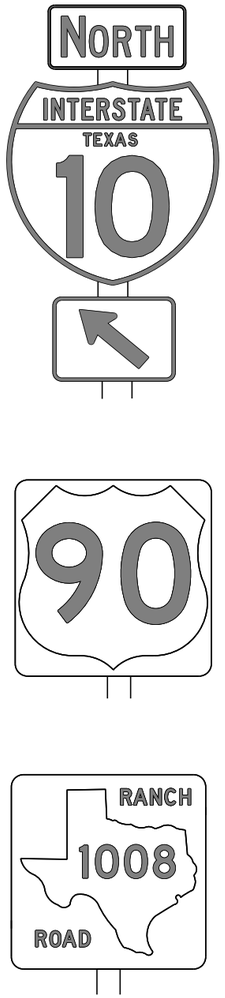
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

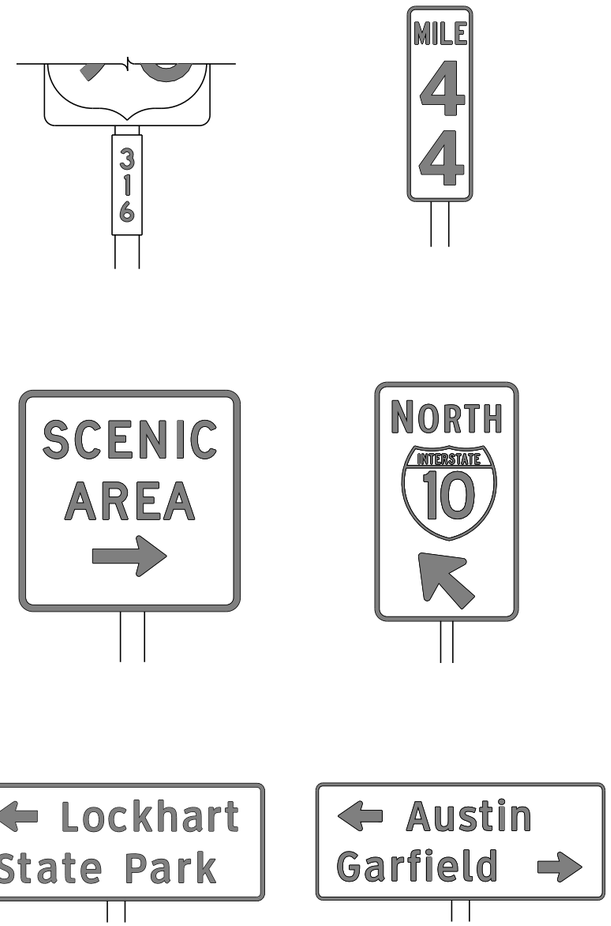
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

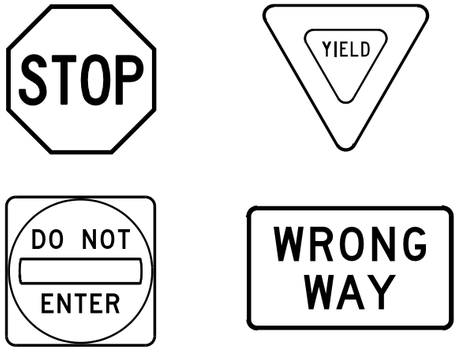
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	CRP	KARNES		195

DATE: 6/17/2022 1:51:41 PM
FILE: c:\pw_working\infra02\wtee\dms10460\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

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.

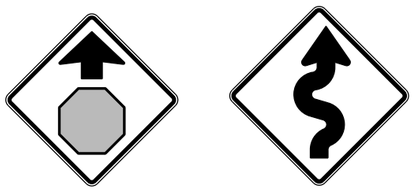
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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/

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

Texas Department of Transportation

Traffic Operations Division Standard

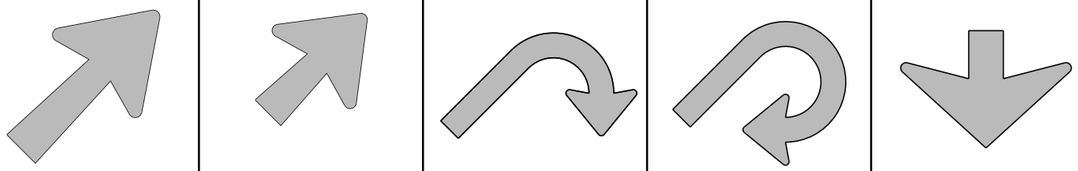
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	CRP	KARNES		196

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

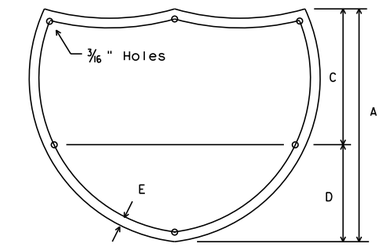
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

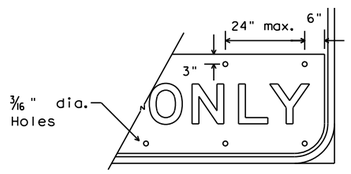
http://www.txdot.gov/

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

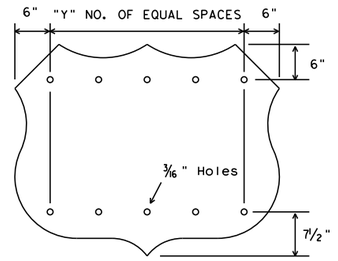


INTERSTATE ROUTE MARKERS

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

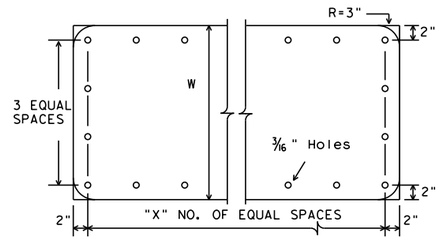


EXIT ONLY PANEL



U.S. ROUTE MARKERS

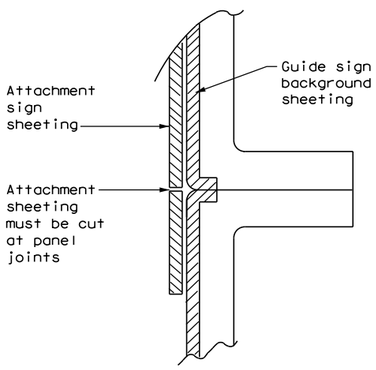
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

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

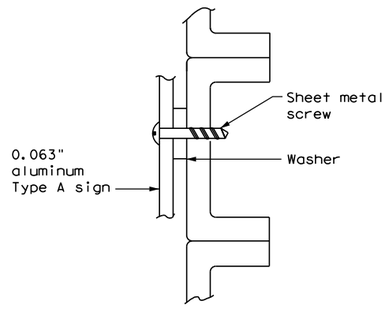
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



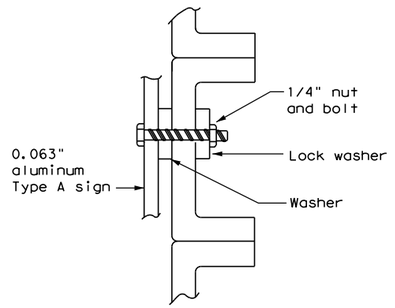
DIRECT APPLIED ATTACHMENT

NOTE:

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



SCREW ATTACHMENT



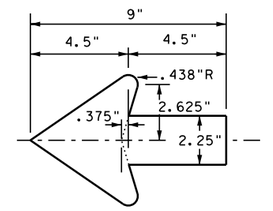
NUT/BOLT ATTACHMENT

NOTE:

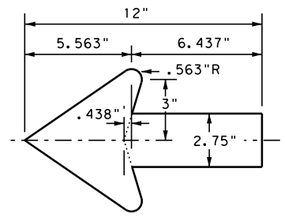
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

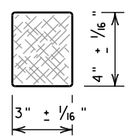
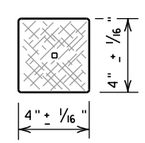
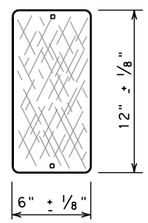
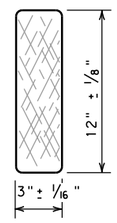
TYPICAL SIGN REQUIREMENTS

TSR(5)-13

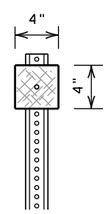
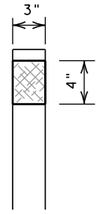
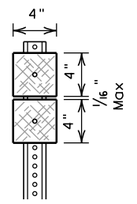
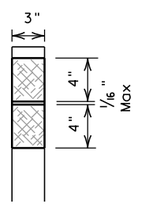
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	CRP	KARNES		197

5

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

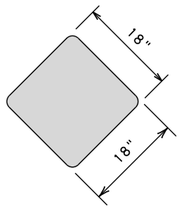
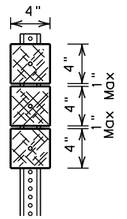
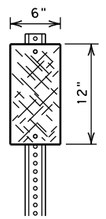
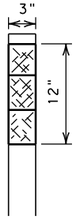
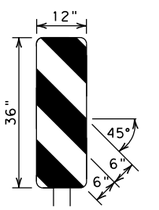
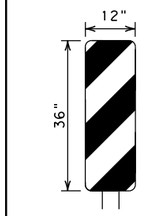
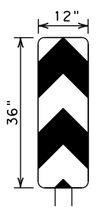
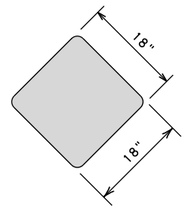
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

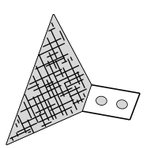
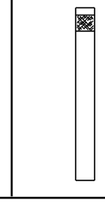
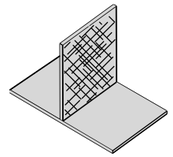
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		 3-Size 2 reflector units	 1-Size 3 reflector unit	 3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

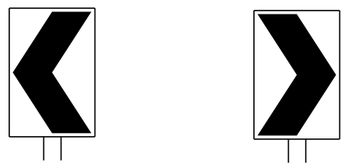
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



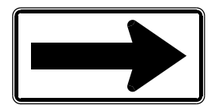
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

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
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REVISIONS	0691	01	044	FM 81
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20A

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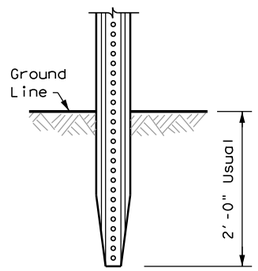
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

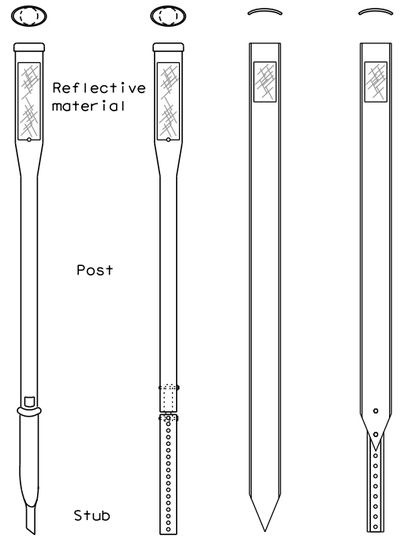


NOTES

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.

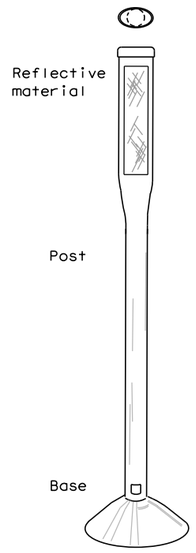
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



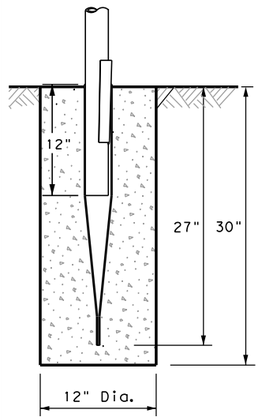
SURFACE MOUNT

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.

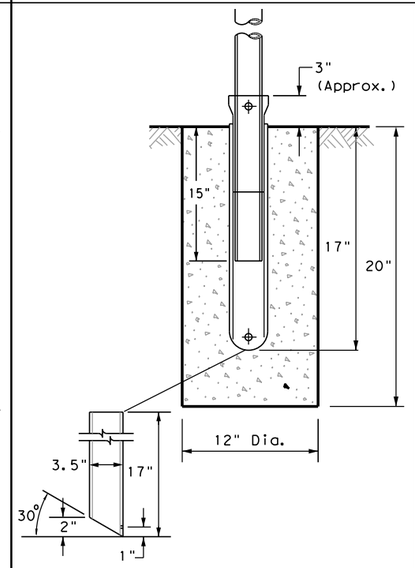
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

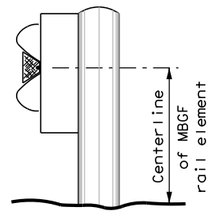
NOTE

1. Install per manufacturer's recommendations.

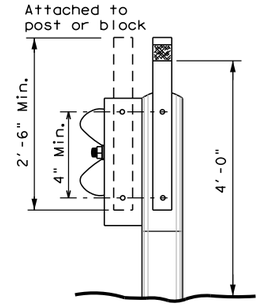
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

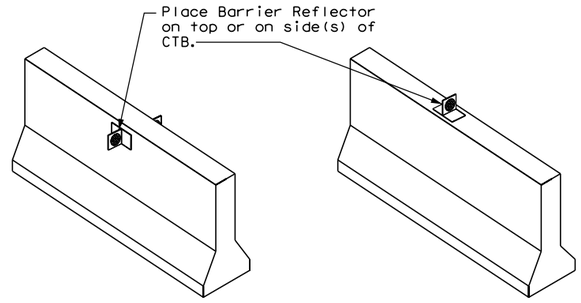
GF1



GF2



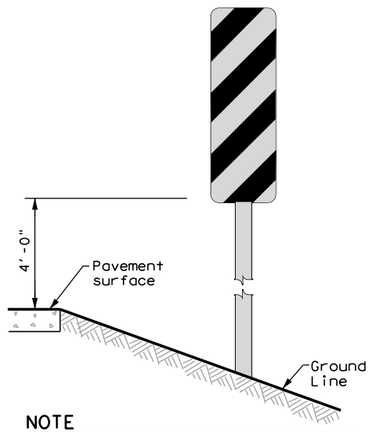
CONCRETE TRAFFIC BARRIER (CTB)



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.

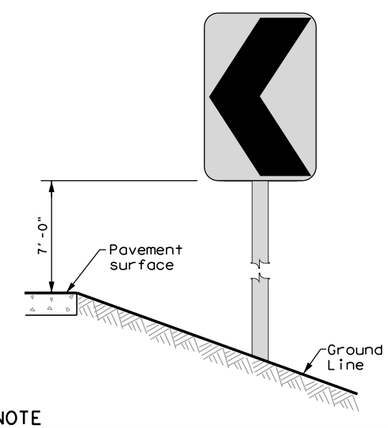
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

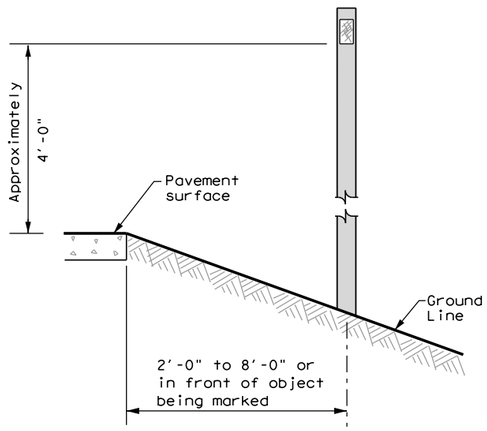
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
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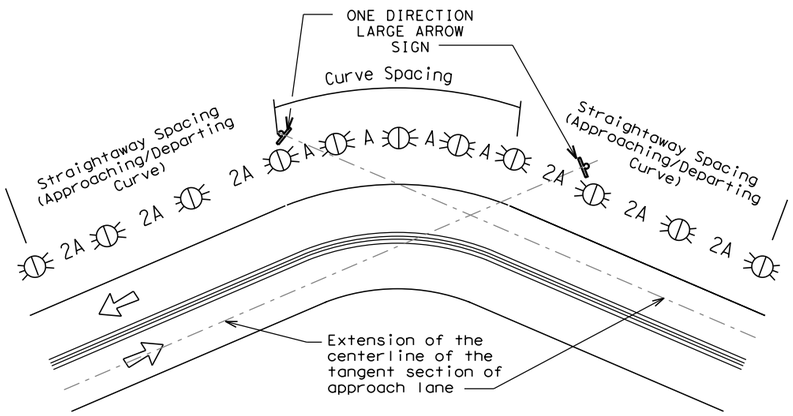
20B

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

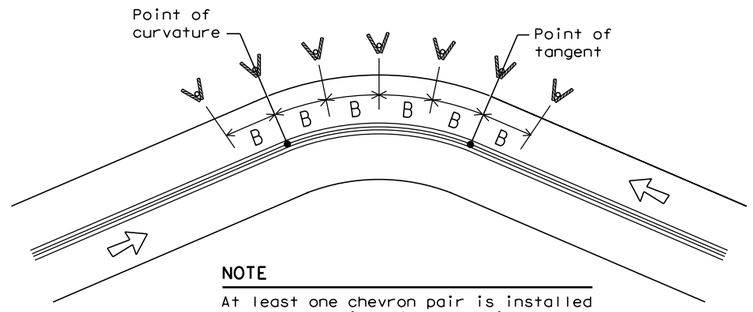
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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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8-15 7-20	CRP	KARNES		200

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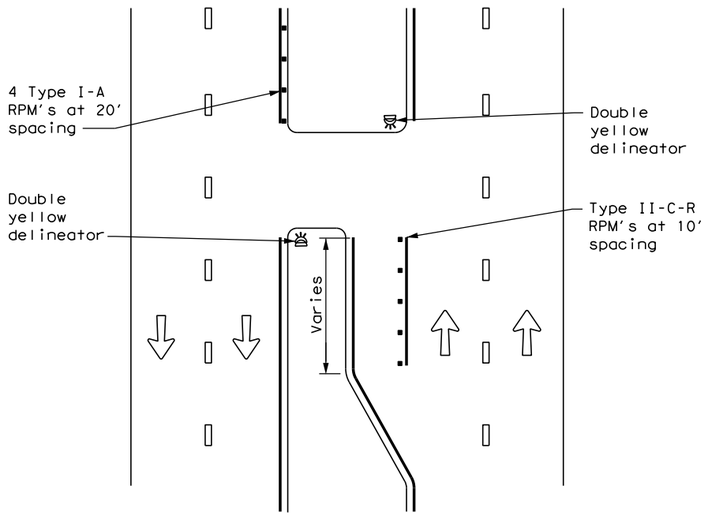
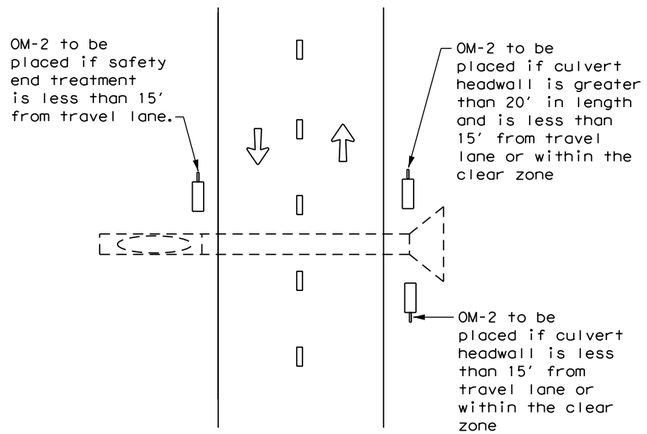
CROSSOVERS



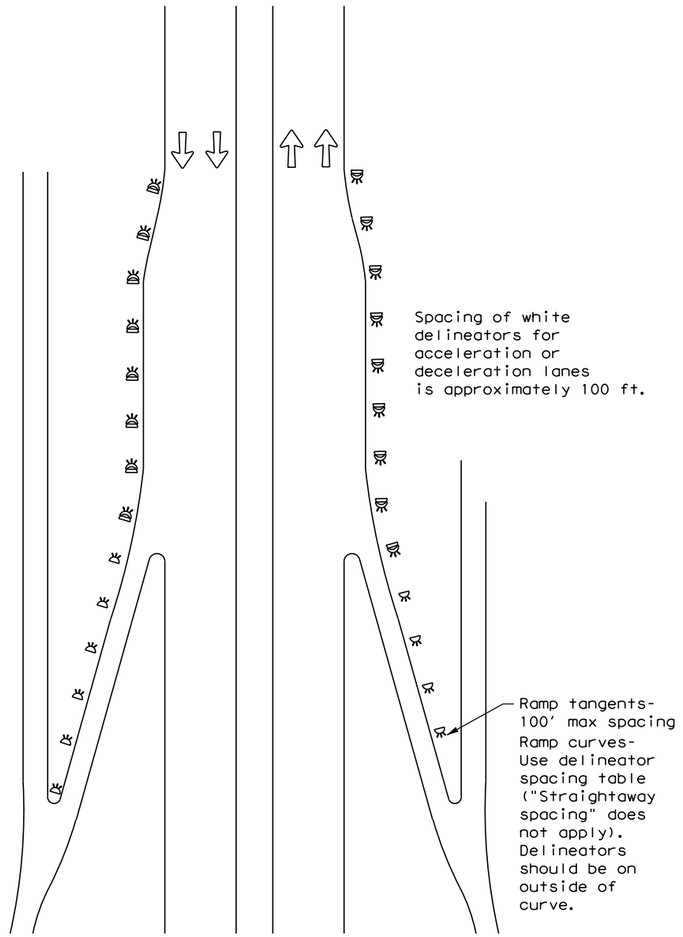
DETAIL 1

FOR CULVERTS WITHOUT MBGF



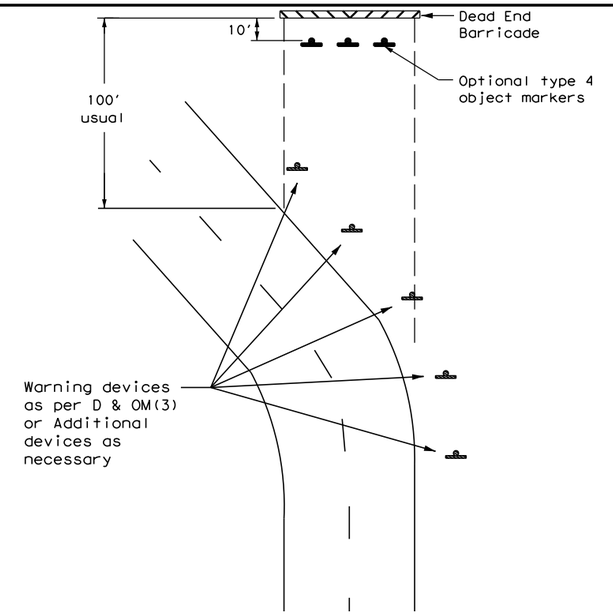
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



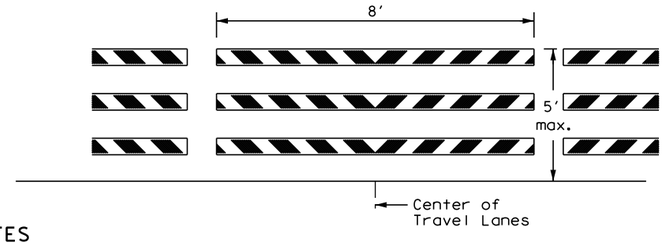
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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	CRP	KARNES		201

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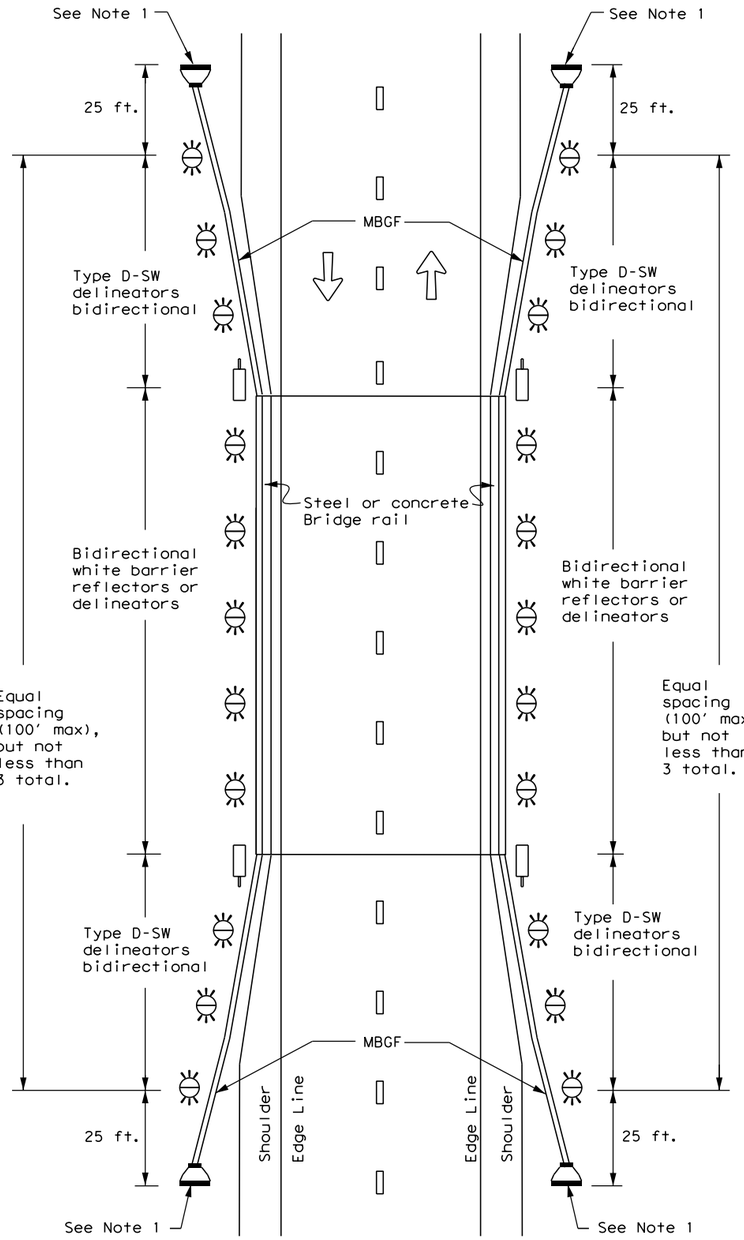
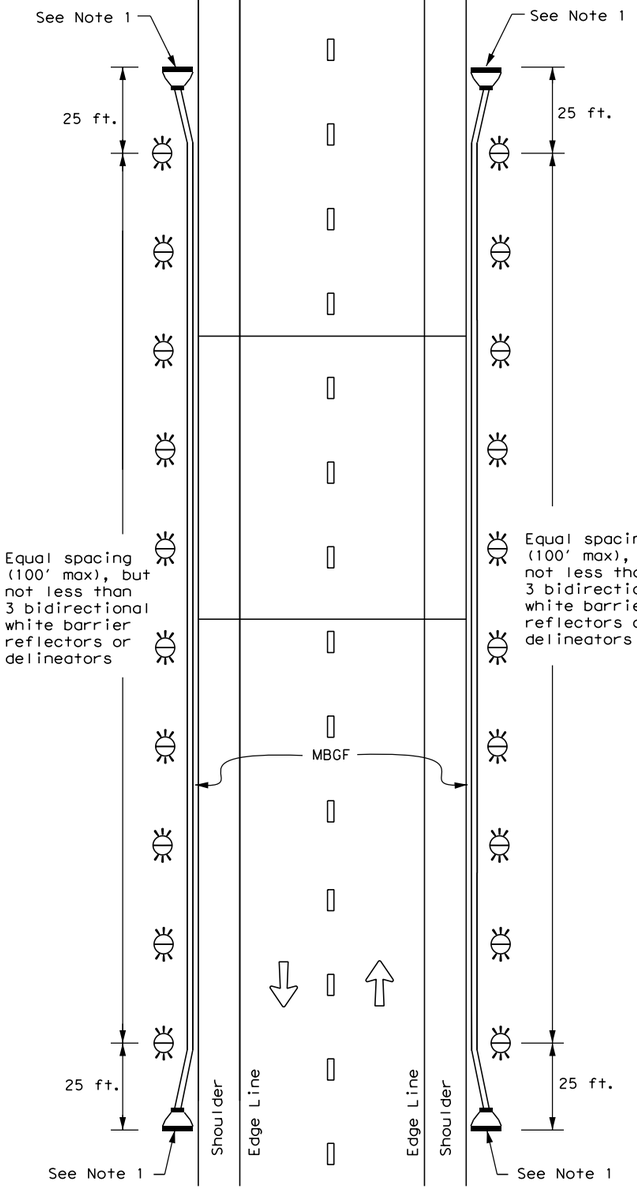
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

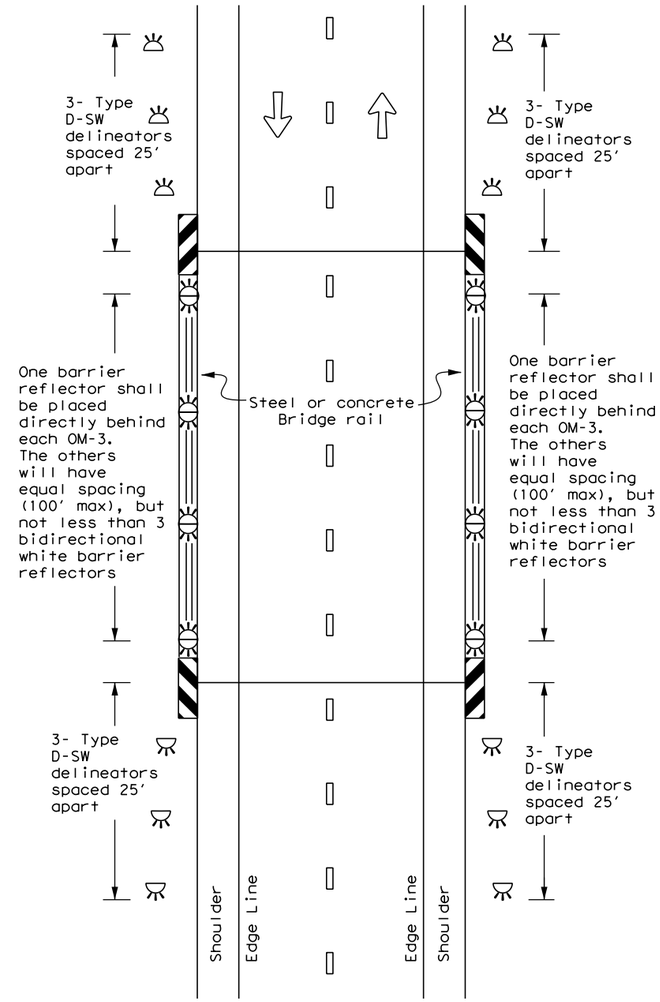
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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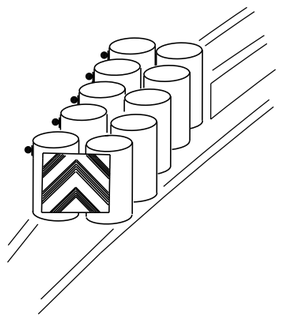
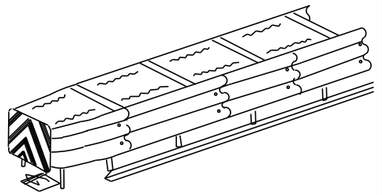
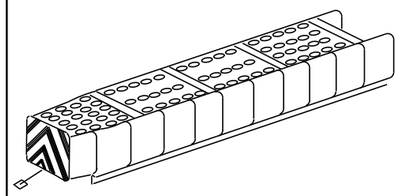
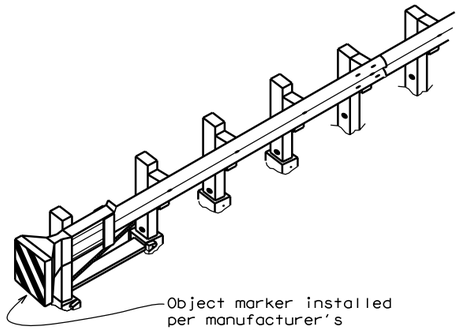
	CRP	KARNES		202

20E

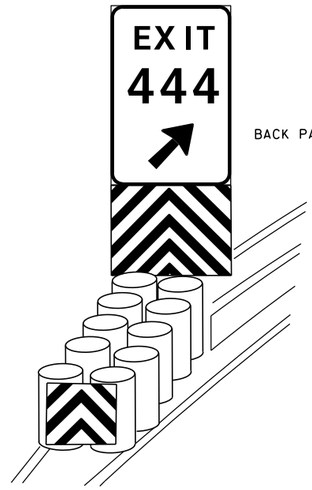




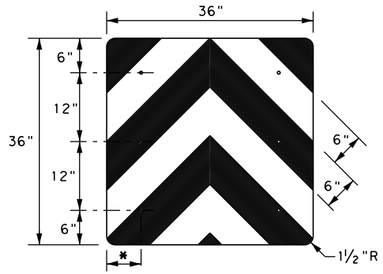


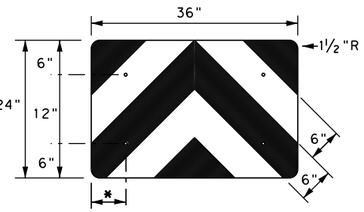


Object marker installed per manufacturer's recommendations.

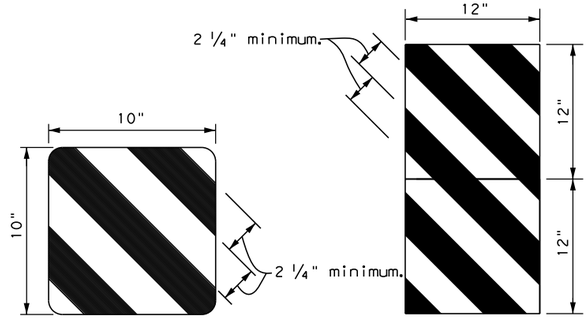


BACK PANEL (OPTIONAL)

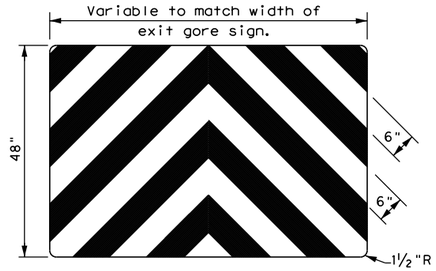


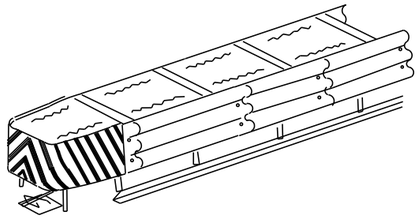


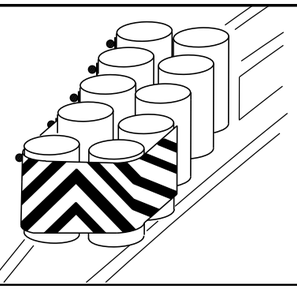
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

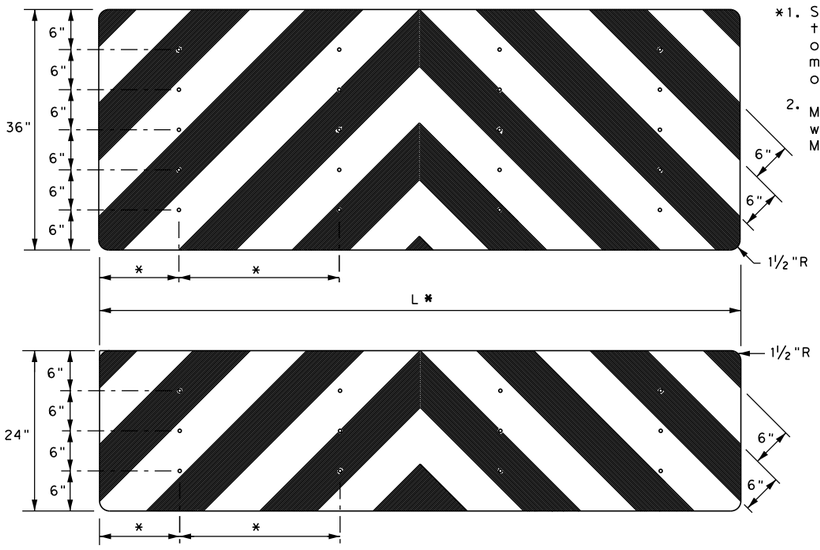


OBJECT MARKERS SMALLER THAN 3 FT^2









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

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	CRP	KARNES		203
4-98 7-20				
20G				

DATE: 6/17/2022 1:52:42 PM
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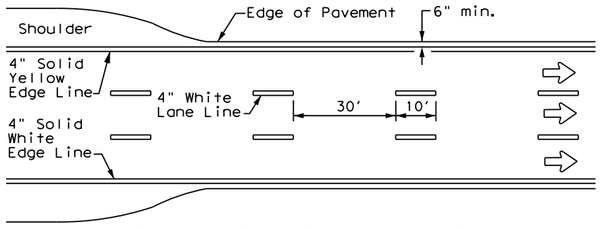
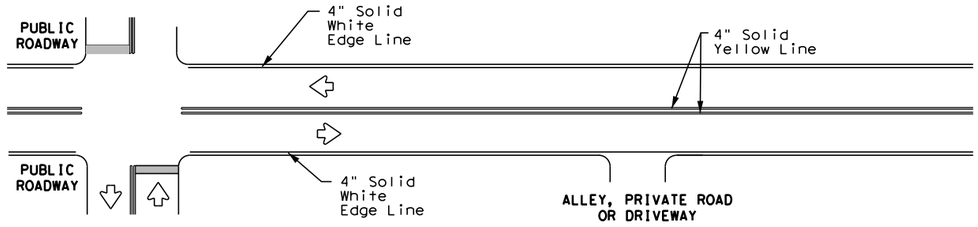
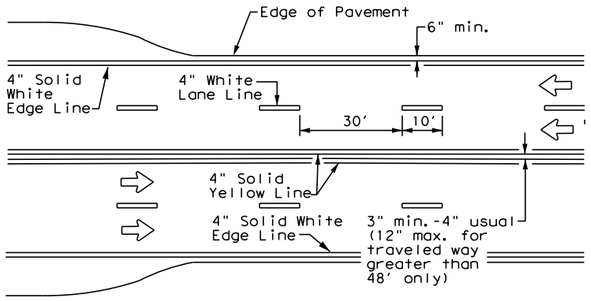


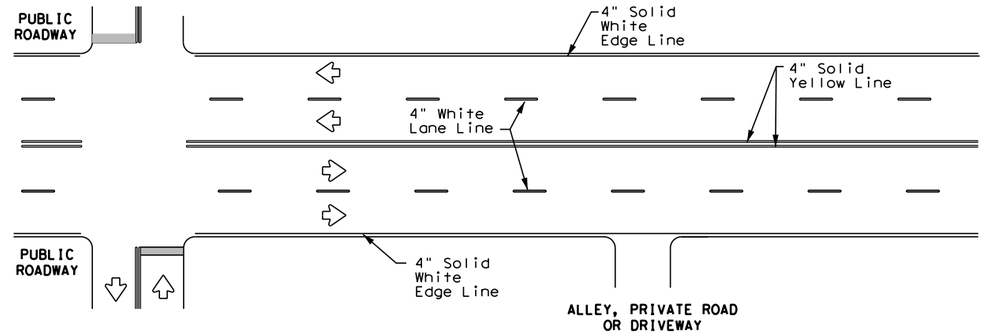
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



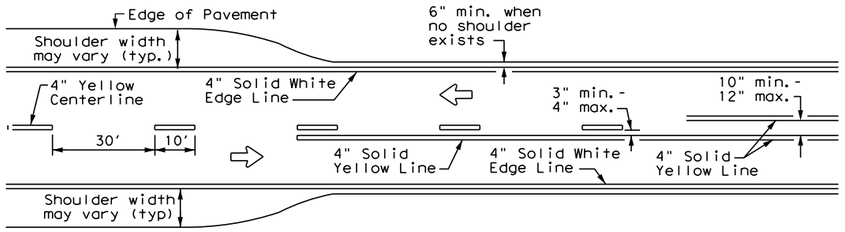
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



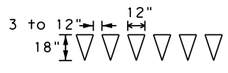
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



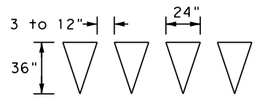
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

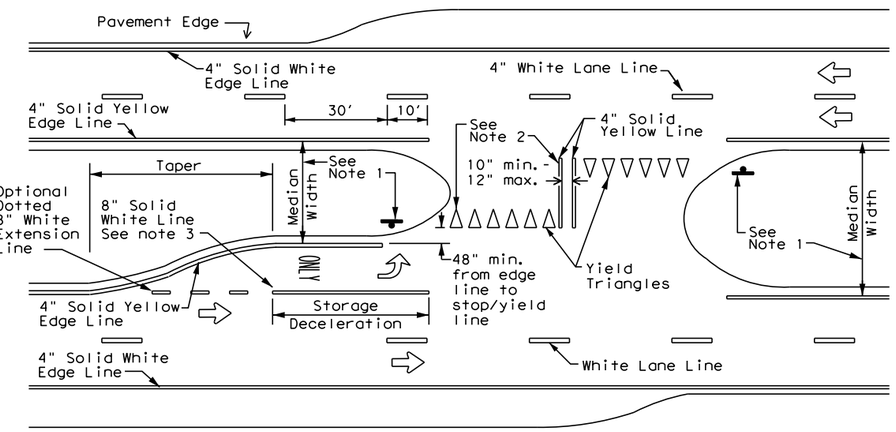


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

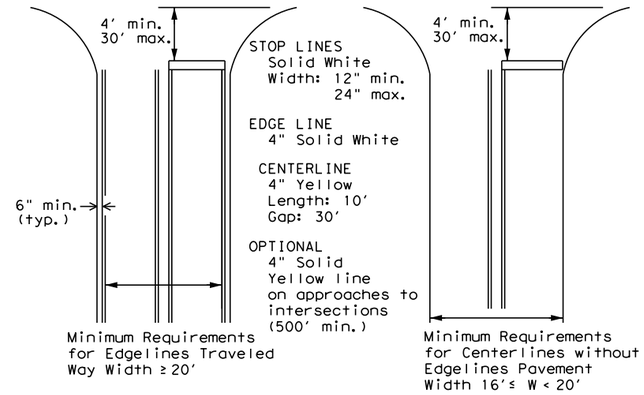
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0691	01	044	FM 81
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	CRP	KARNES		204

22A

DATE: 6/17/2022 1:52:51 PM
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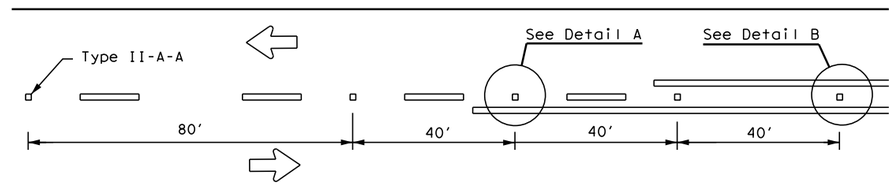
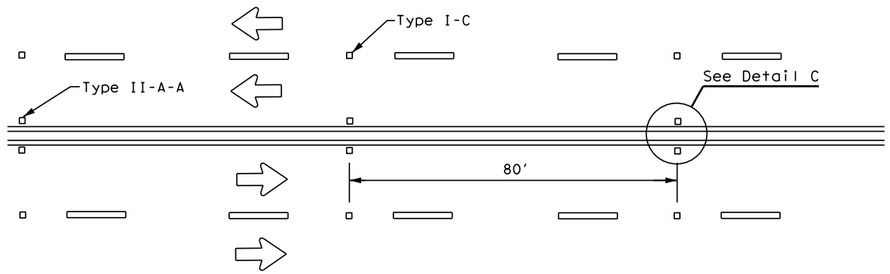
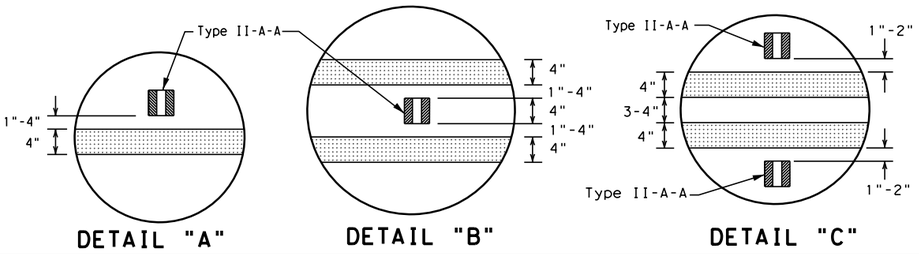
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



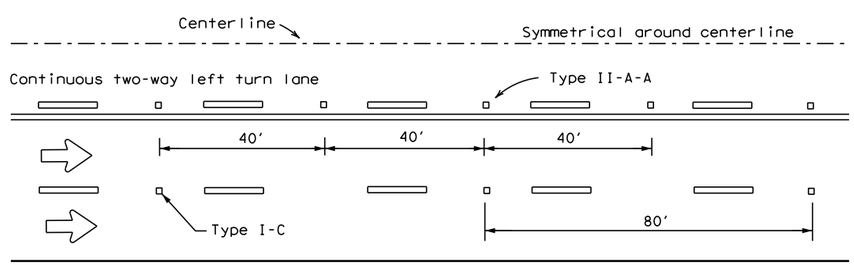
CENTERLINE FOR ALL TWO LANE ROADWAYS



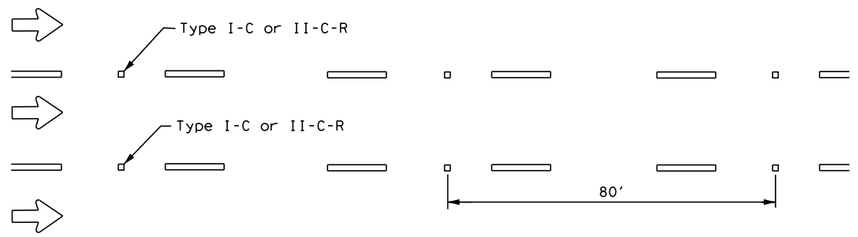
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

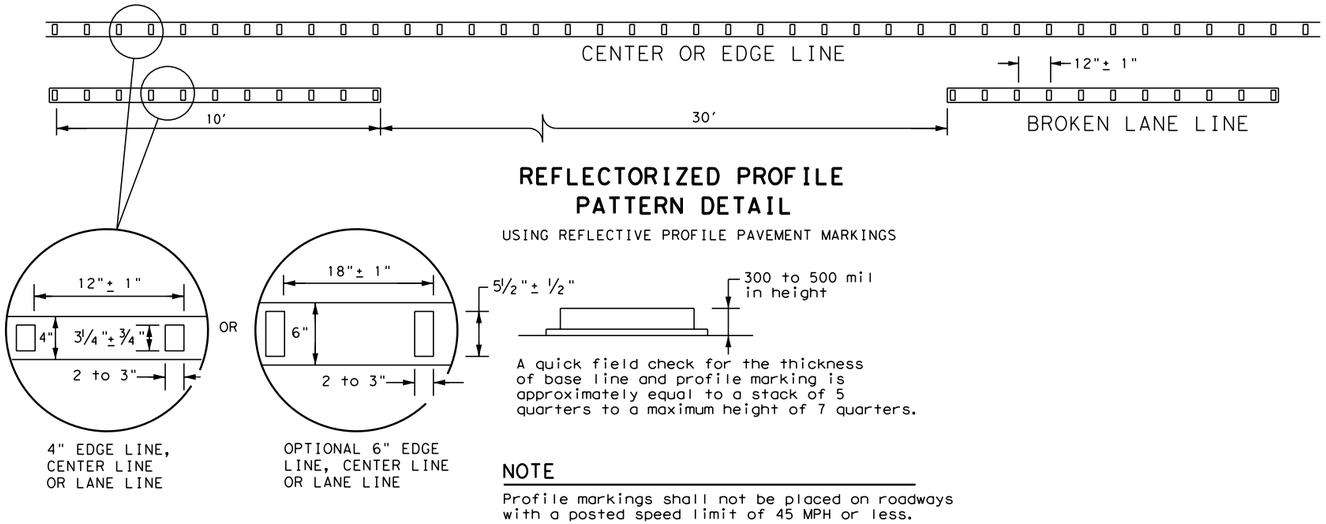


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

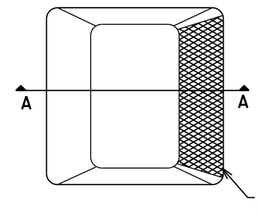
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

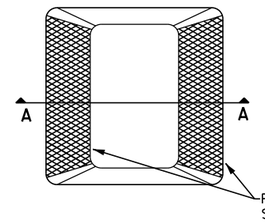
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

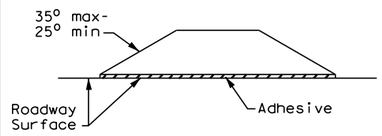
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		205

22B

DATE: 6/17/2022 1:53:00 PM
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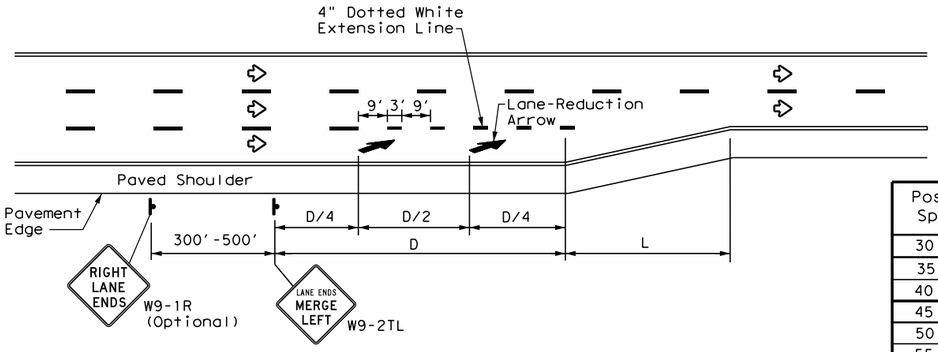
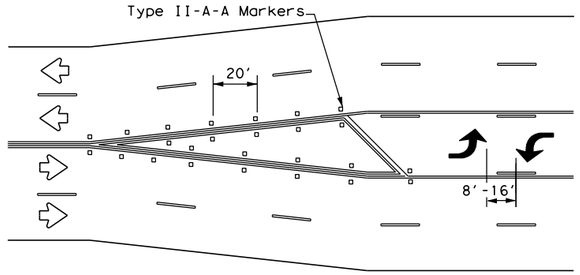


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

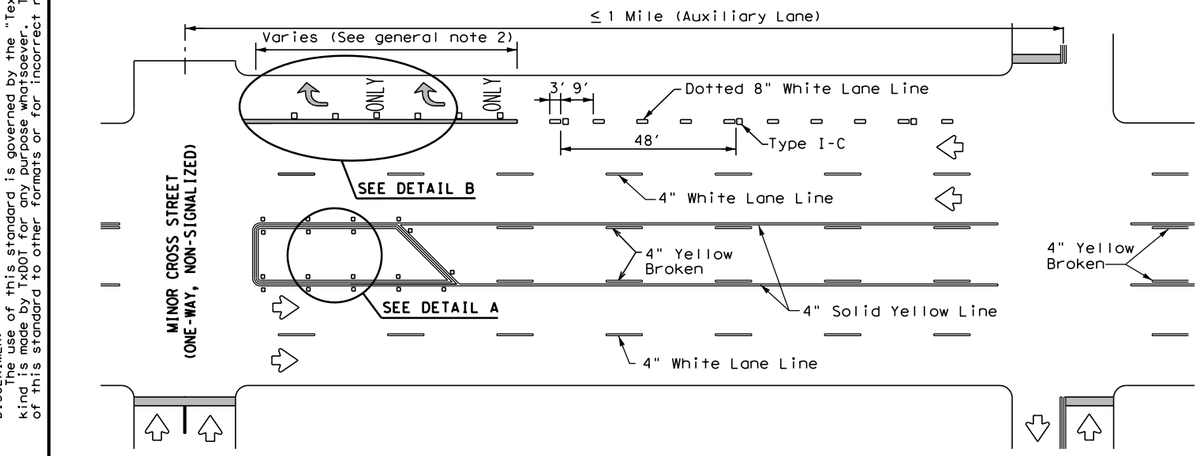
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

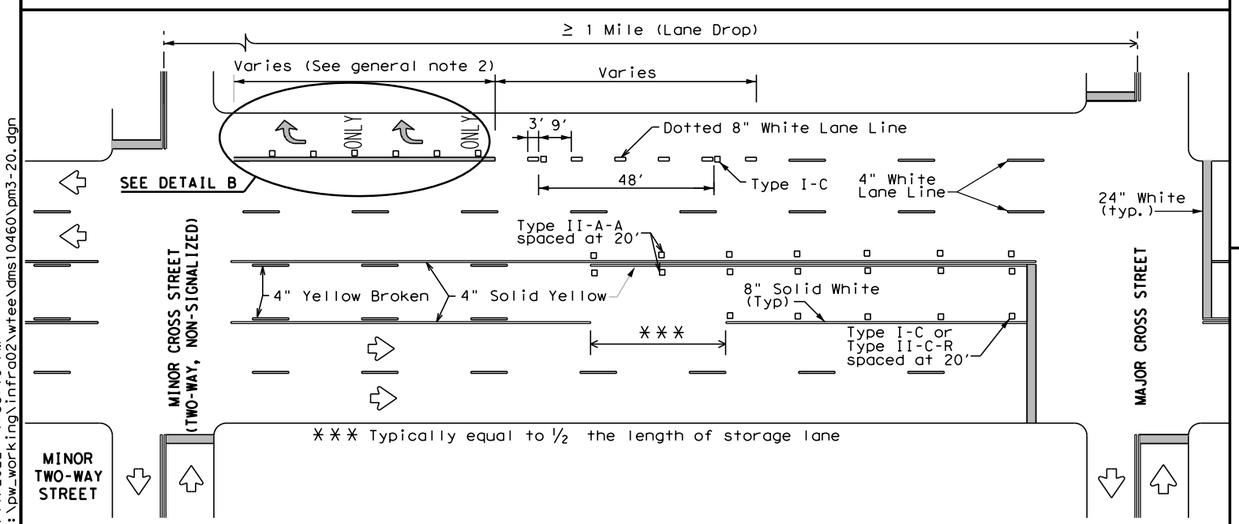
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

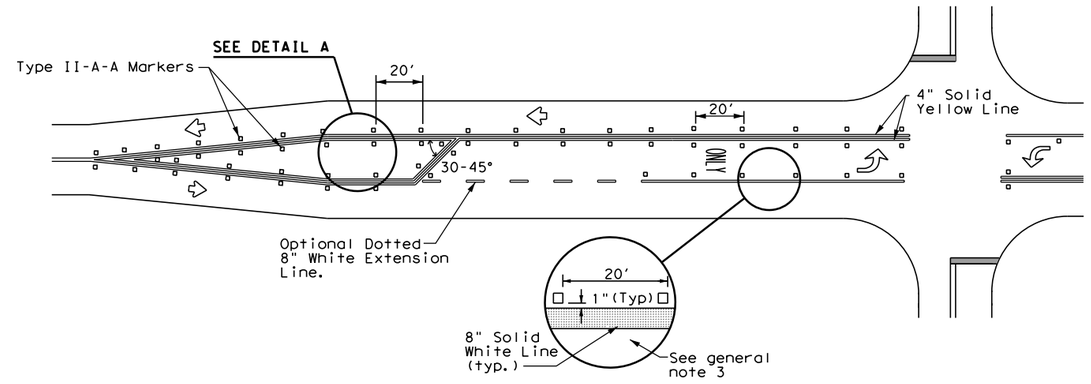
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



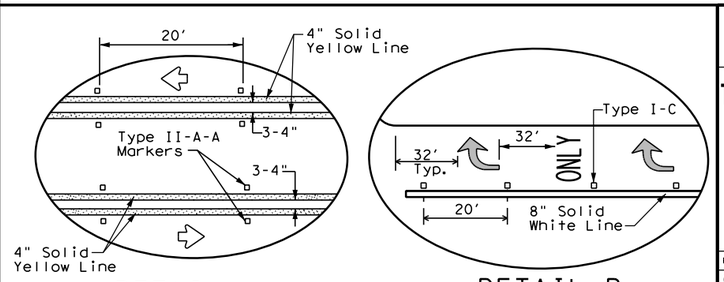
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A DETAIL B

Texas Department of Transportation — Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	CRP	KARNES		206
3-03 6-20				

22C

DATE: 6/17/2022 1:53:10 PM
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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

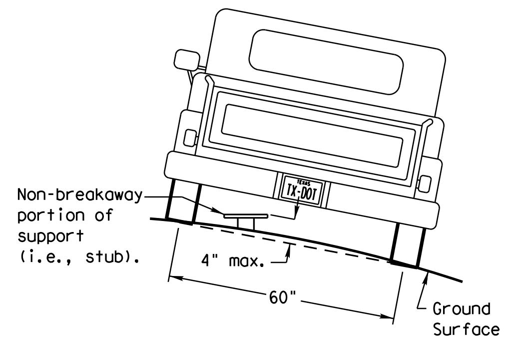
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

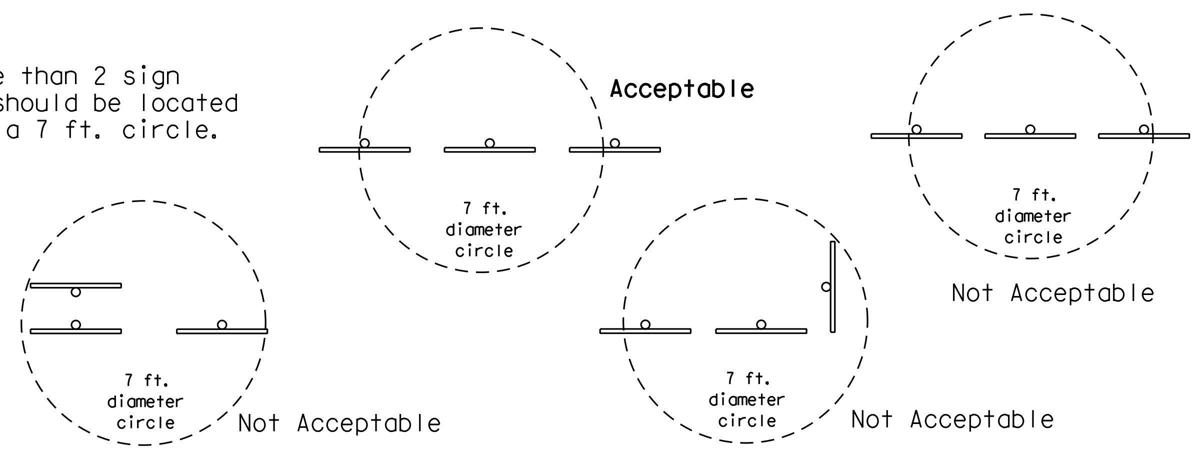
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



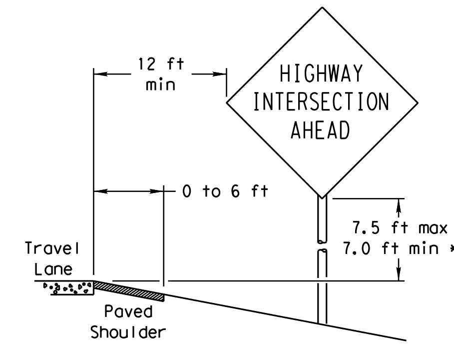
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



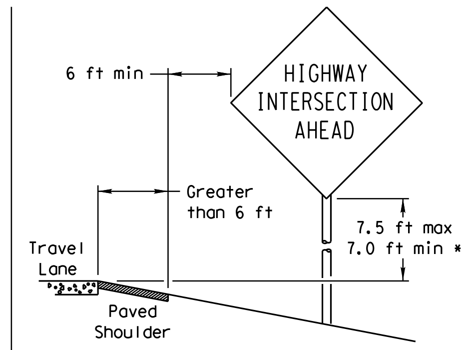
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

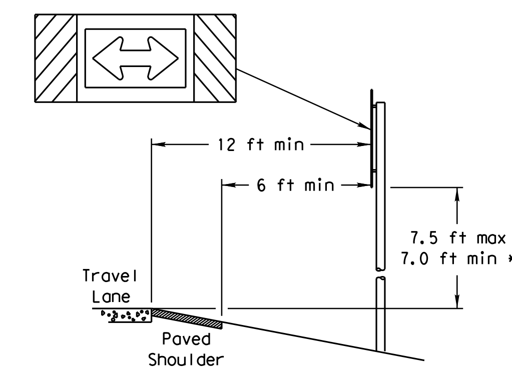
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



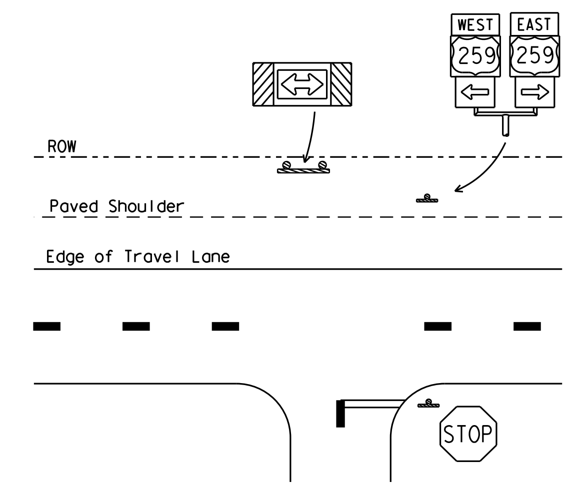
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

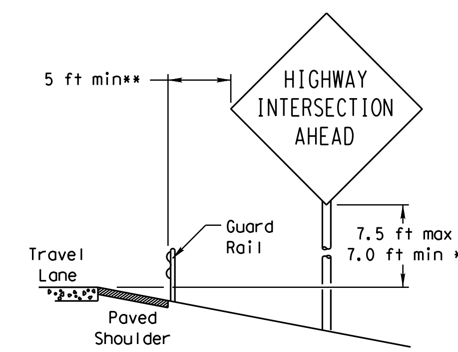
T-INTERSECTION



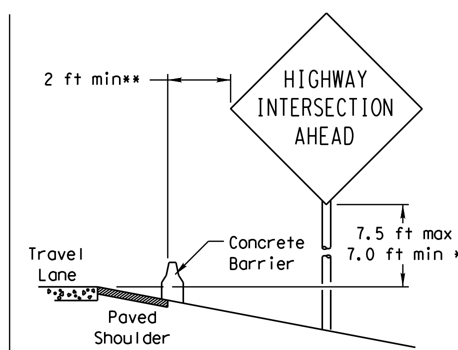
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



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.

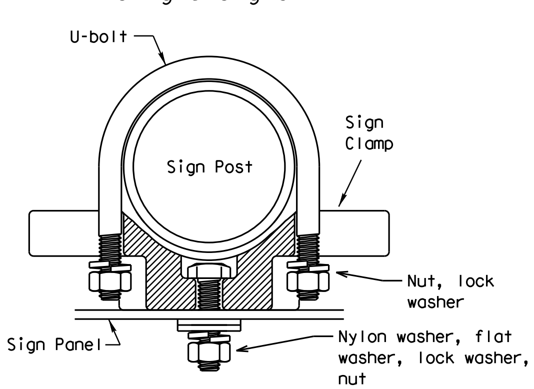
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

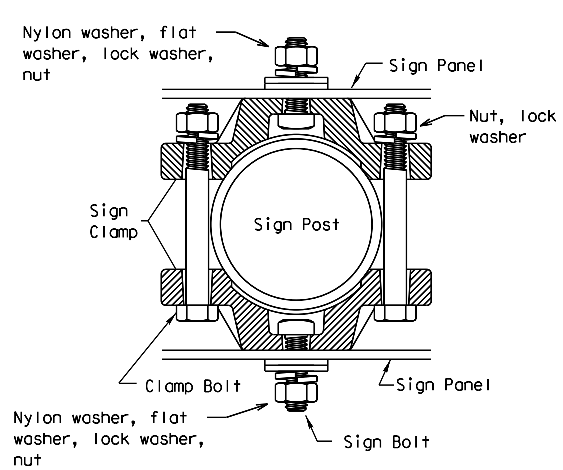
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



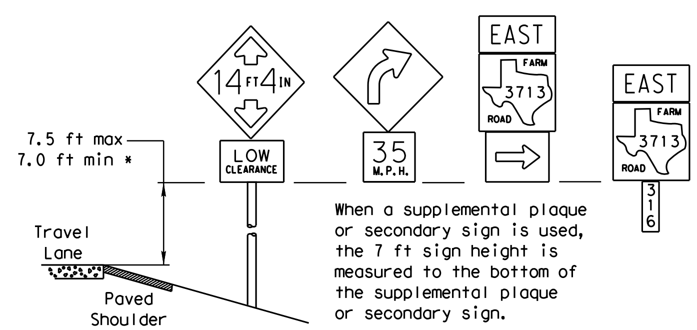
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

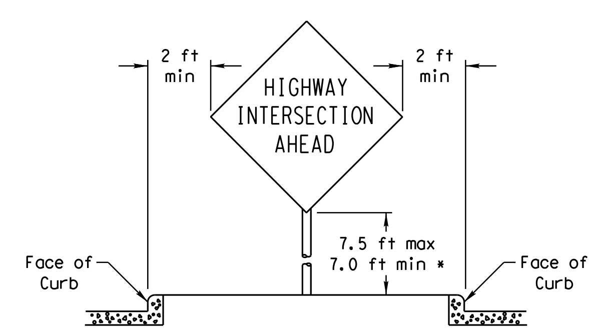
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



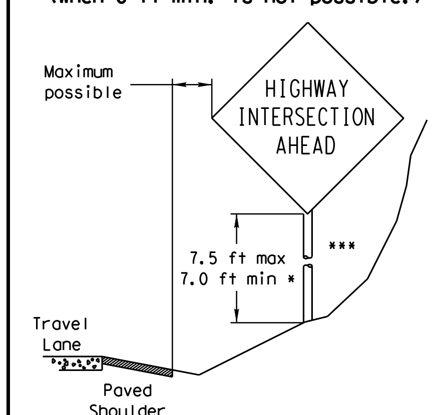
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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	0691	01	044	FM 81
	DIST		COUNTY	SHEET NO.
	CRP		KARNES	207

26A

DATE: 6/17/2022 1:53:19 PM
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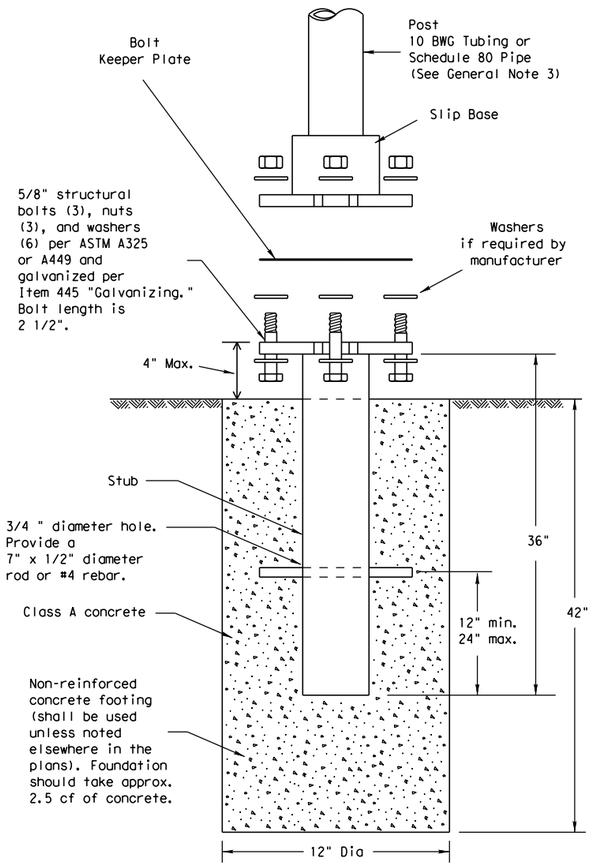
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

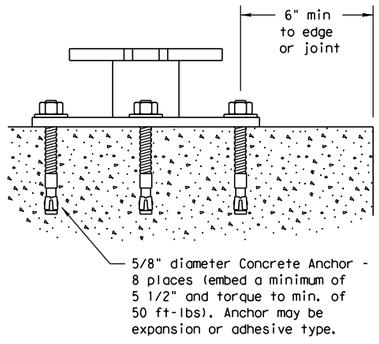
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0691	01	044	FM 81

DIST	COUNTY	SHEET NO.
CRP	KARNES	208

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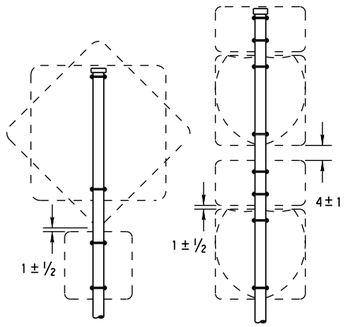
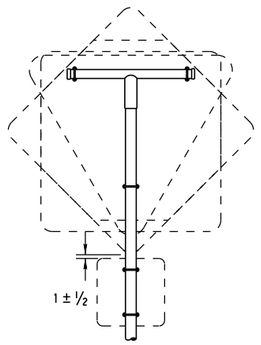


SM RD SGN ASSM TY XXXXX(1)XX(P)



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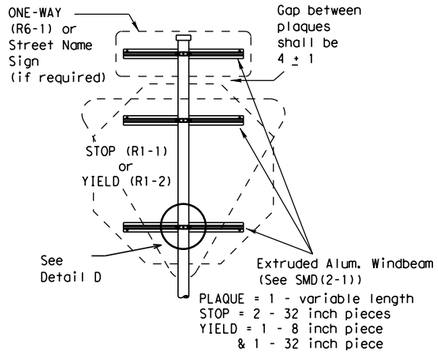

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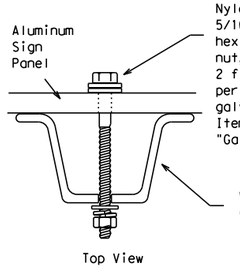

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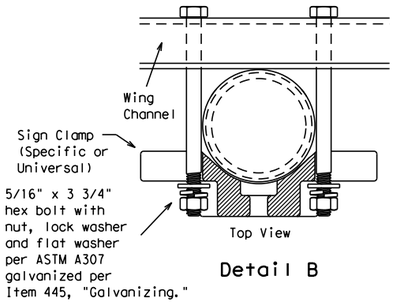
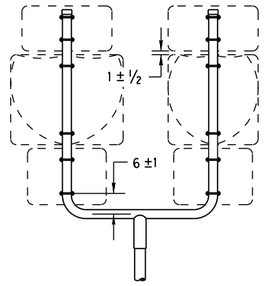


Detail B



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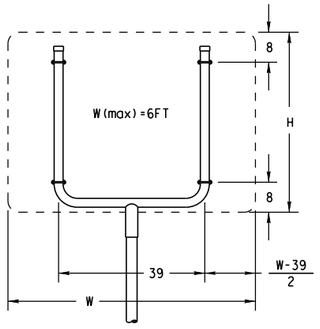

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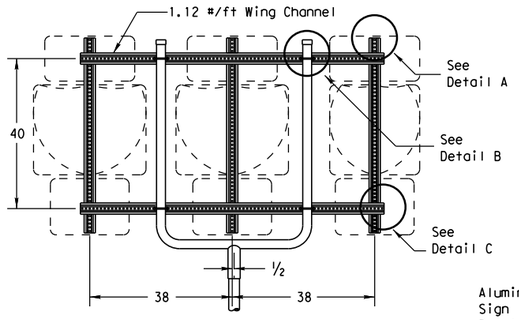
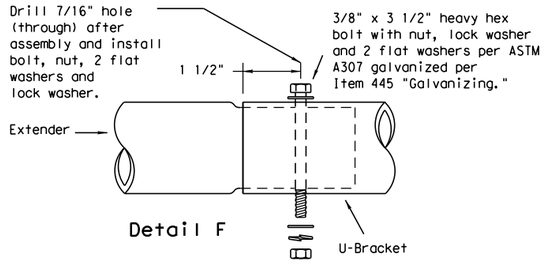
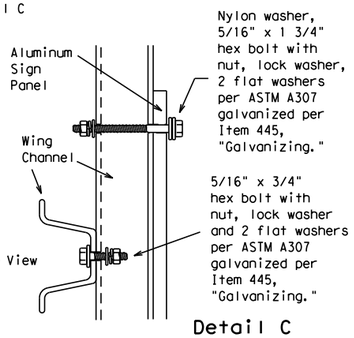


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

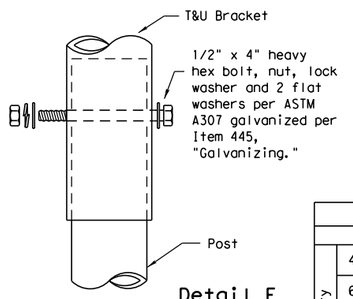


Detail F

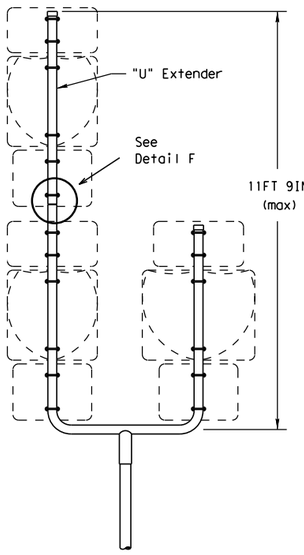
Splices shall only be allowed behind the sign substrate.



Detail C



Detail E



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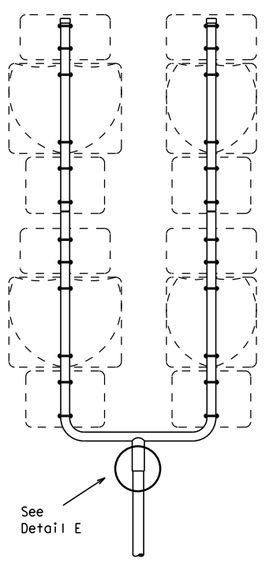

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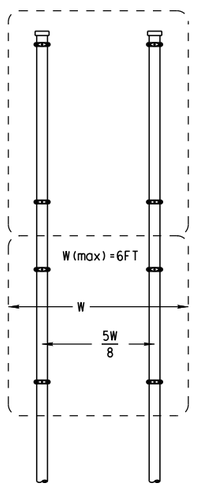
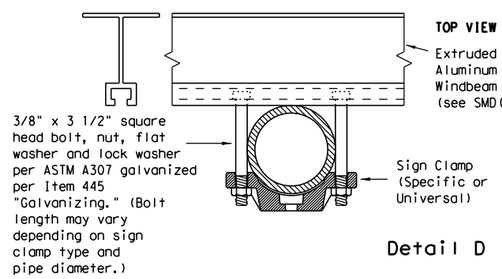
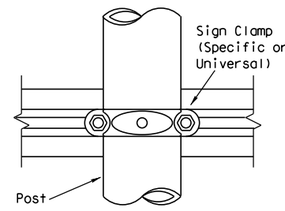


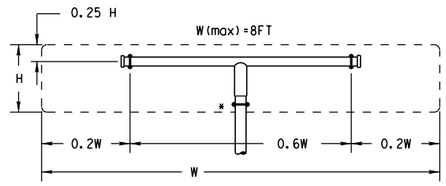
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

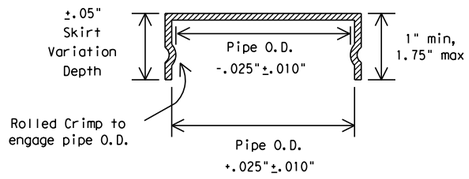




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

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
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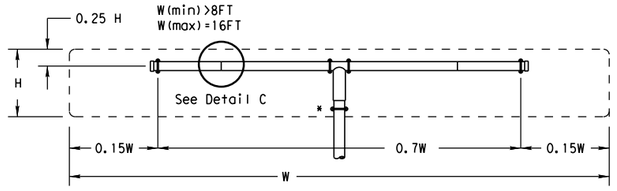
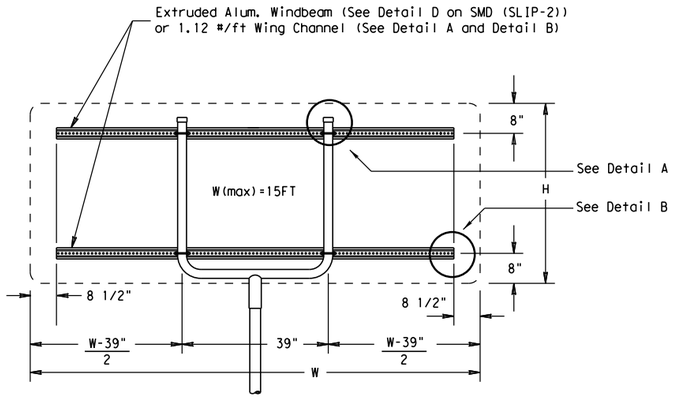
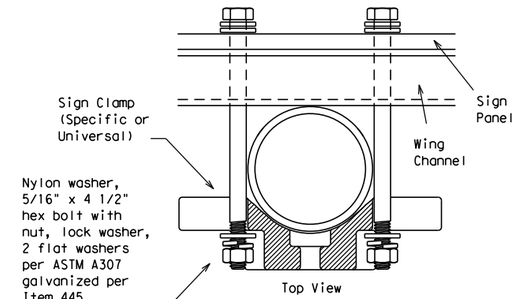


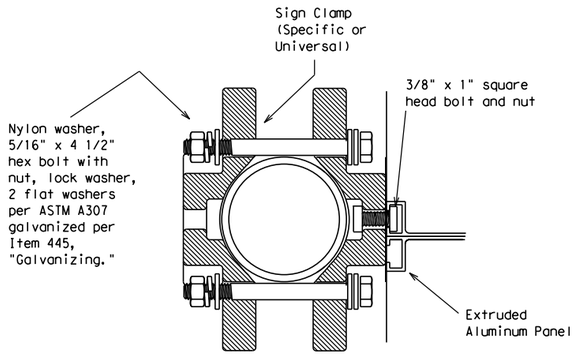
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



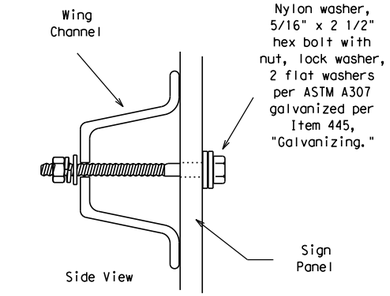
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



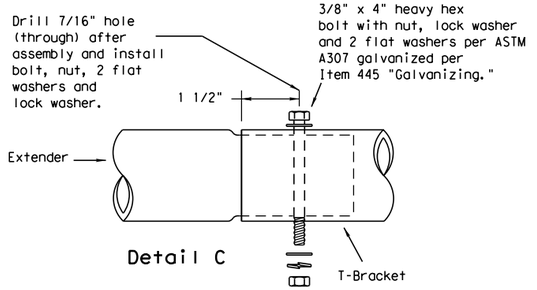
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

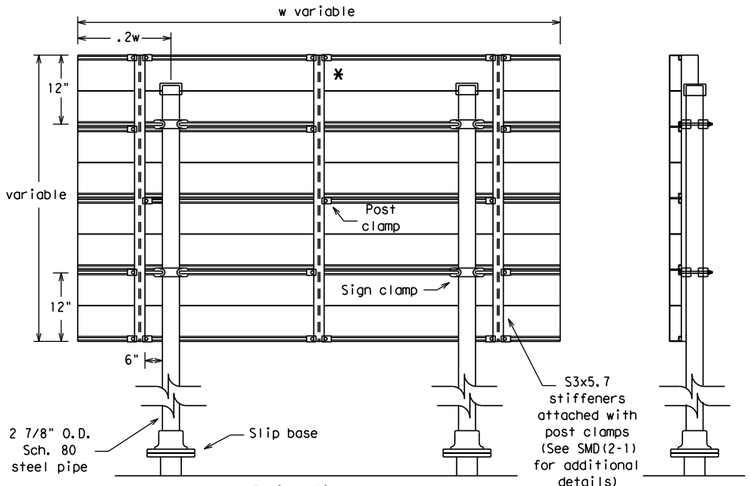


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

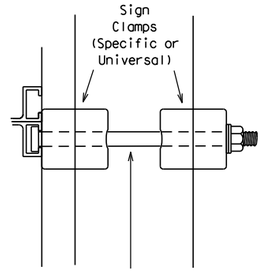


Typical Sign Mount

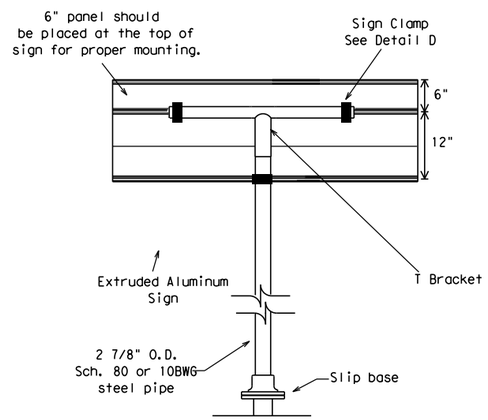
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

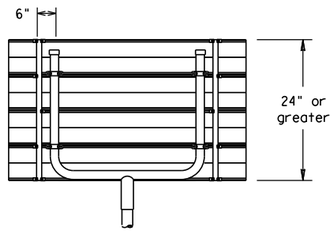
See Detail E
for clamp installation



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	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
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26D

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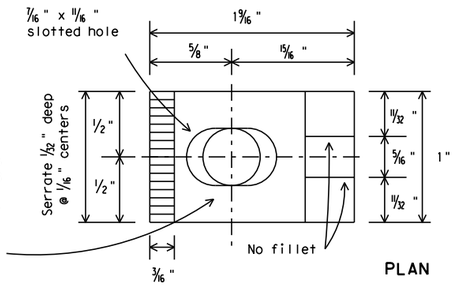
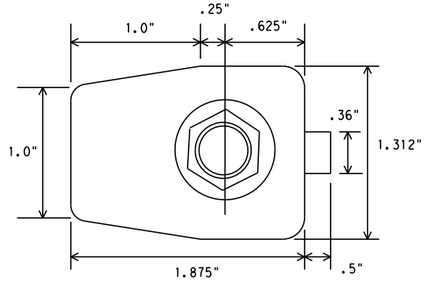
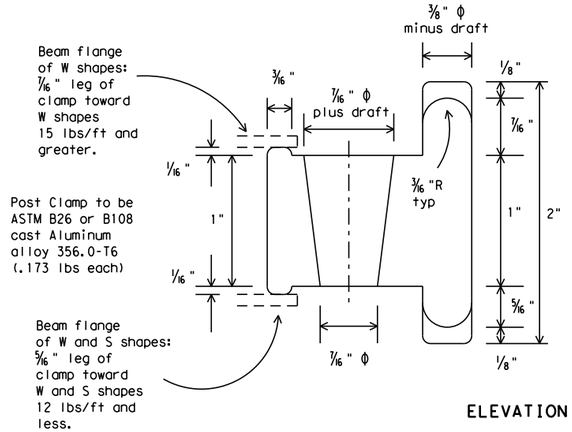


NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

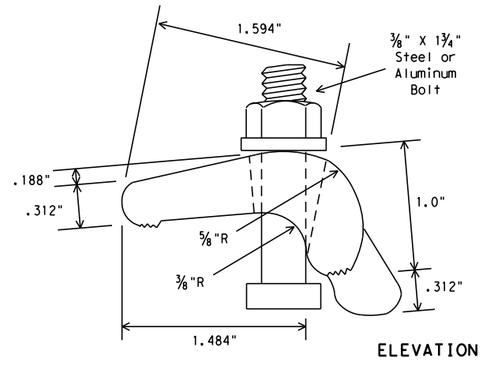


PLAN



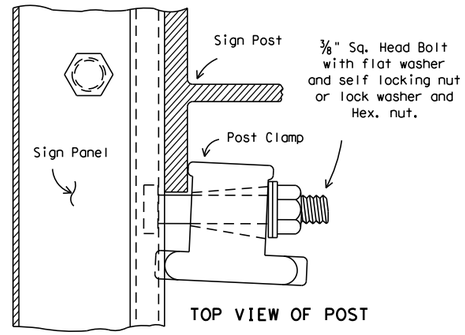
ELEVATION

POST CLAMP DETAIL

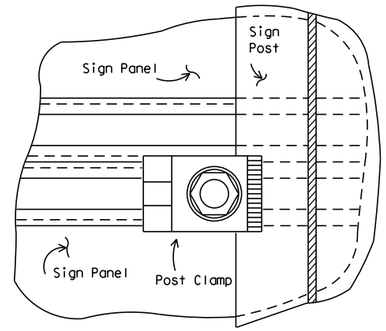


ELEVATION

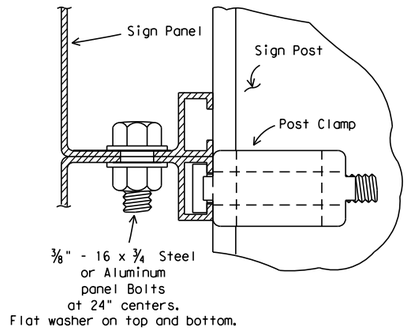
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



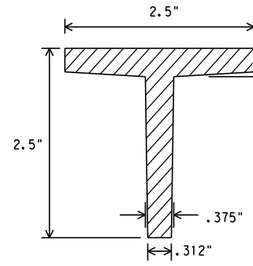
SIDE VIEW OF PANELS

CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

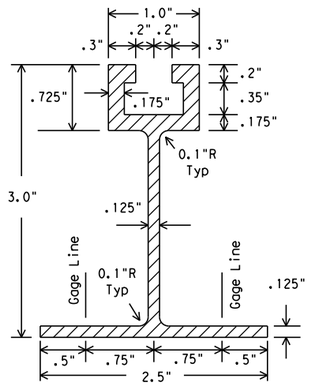


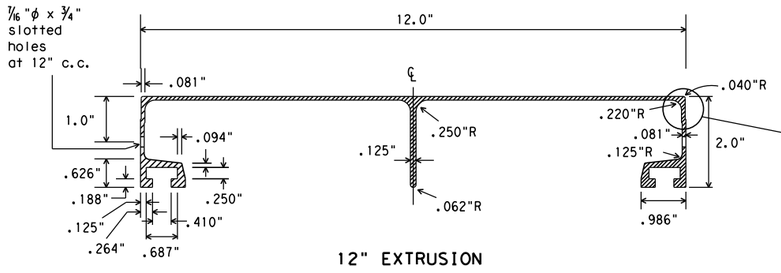
1.912 lbs/ft

ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE

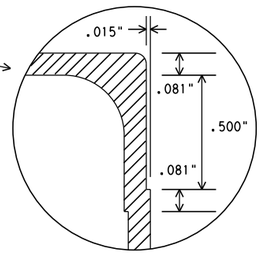
WINDBEAM
CROSS
SECTION

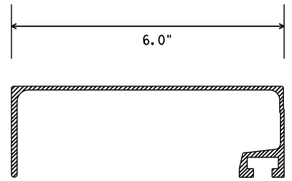
Windbeam to be
extruded aluminum
(1.175 lbs/ft)
or approved
alternative





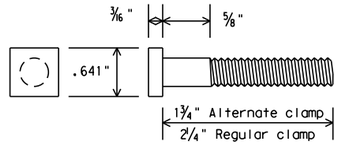
12" EXTRUSION





6" EXTRUSION

ALUMINUM SIGN PANEL EXTRUSION DETAILS



POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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27A

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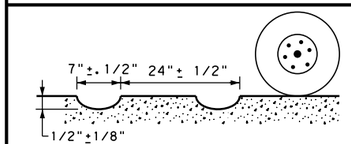
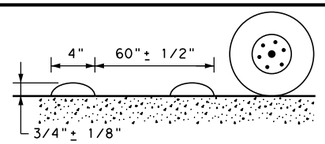
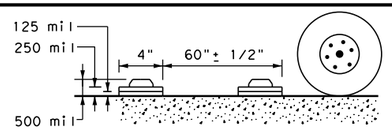
CENTERLINE RUMBLE STRIPS



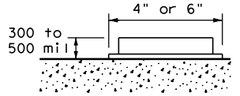
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

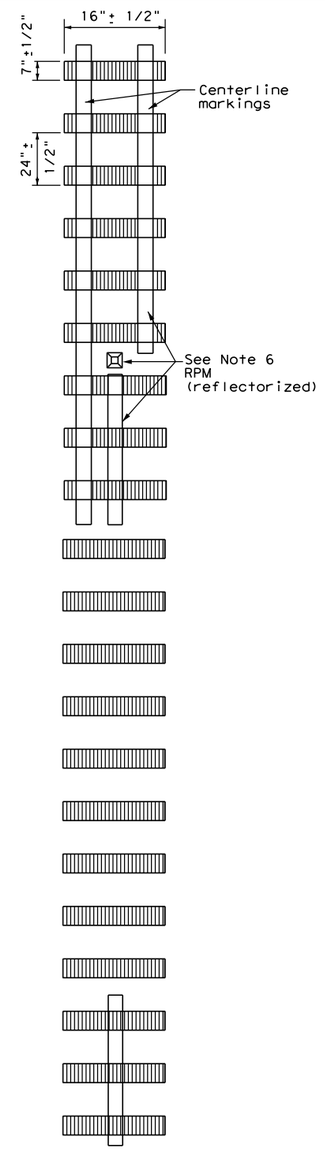


PREFORMED THERMOPLASTIC STRIPS



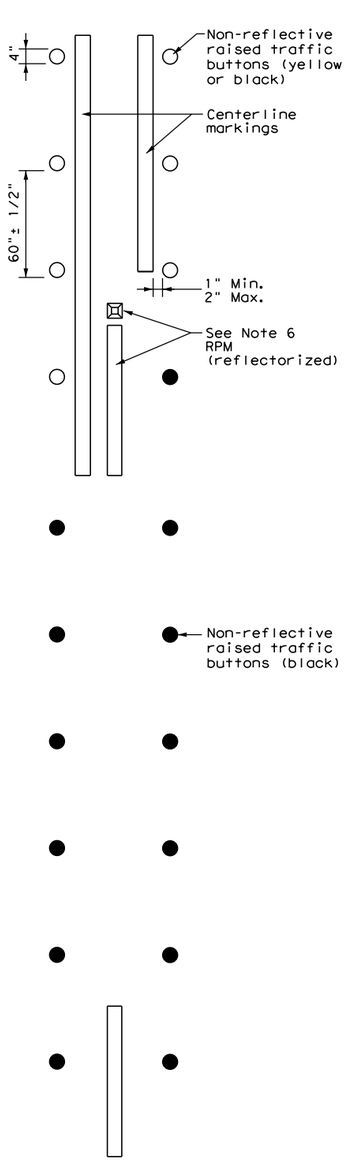
PROFILE MARKINGS

PROFILE VIEW



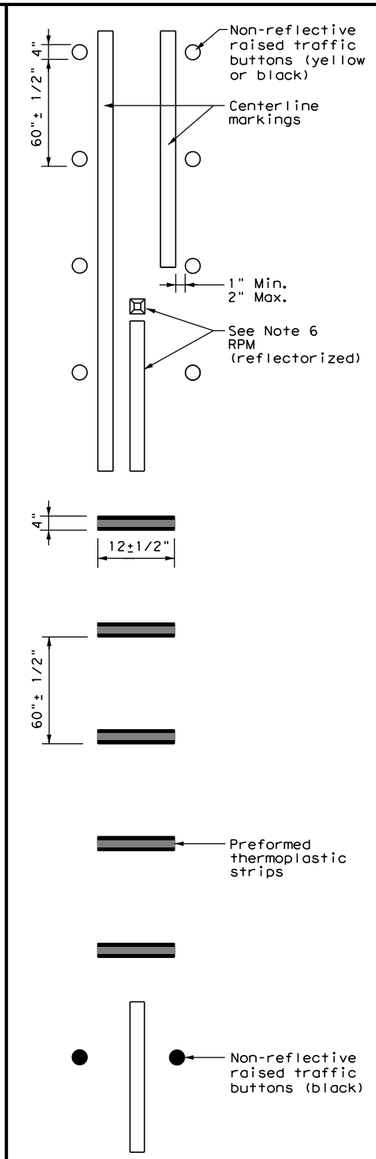
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



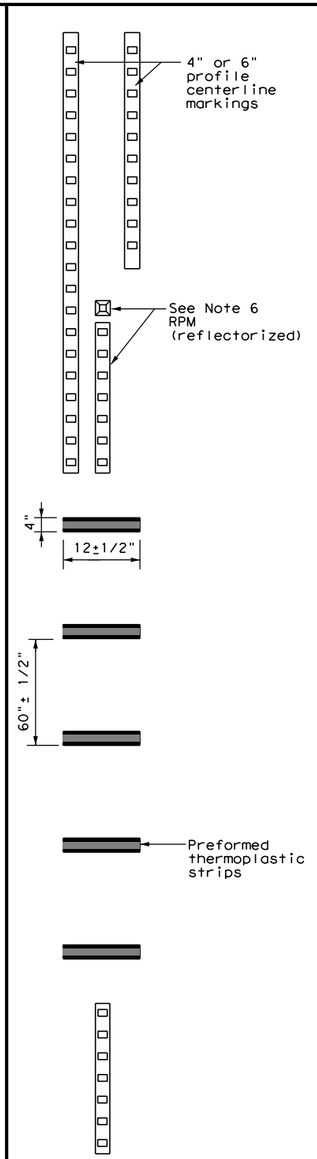
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



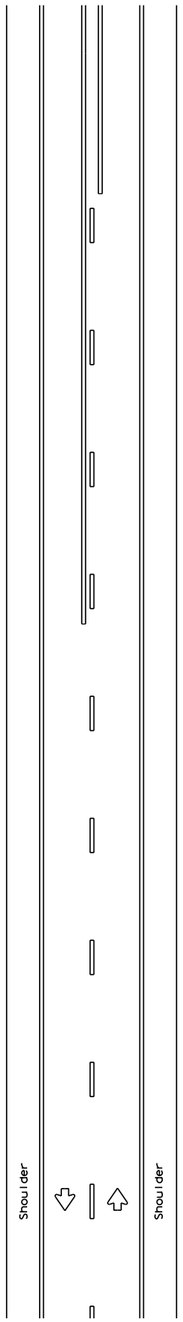
PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS



TWO LANE TWO-WAY ROADWAYS

GENERAL NOTES

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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

12. See standard sheet RS(4).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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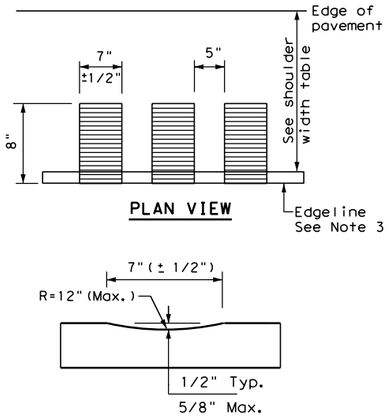
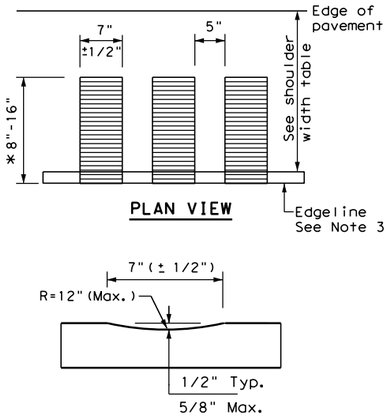
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		212



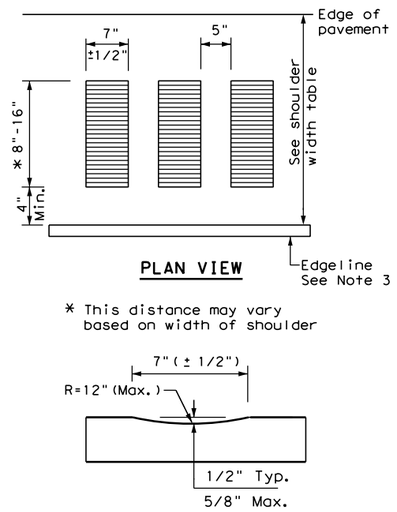
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



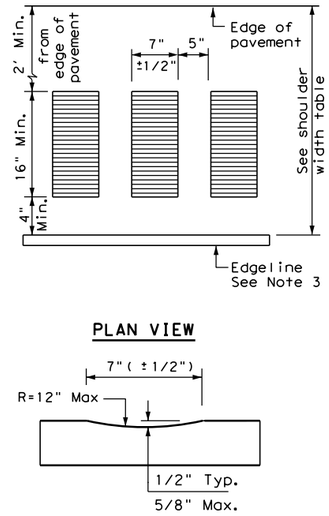
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



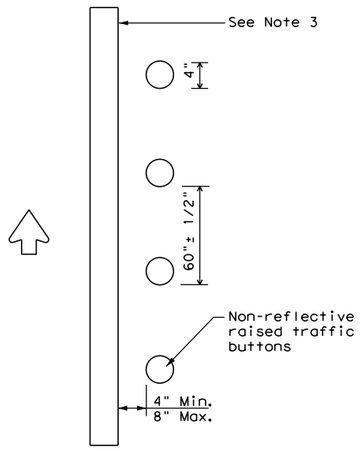
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



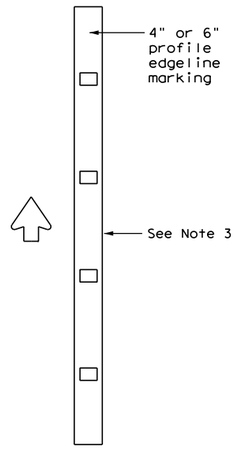
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



OPTION 5

RAISED EDGELINE RUMBLE STRIPS



OPTION 6

PROFILE EDGELINE MARKINGS

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

GENERAL NOTES

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

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

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

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Work at SALT Creek is expected to be authorized under Nationwide Permit 14 because permanent impacts of the design (placement of columns, footings, riprap, etc.) would be less than 0.10 acre and no potential wetlands are present within the project area.
2. To comply with the Nationwide Permit the contractor must abide by the following conditions, (1) filling or grading of the Creek is temporary and the Creek will be returned to original elevation and grade, (2) normal downstream flow of the Creek must be maintained, and (3) soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills within the Creek must be permanently stabilized by the end of the job.

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	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. See sheet 2 OF 2 for additional information.

2.

3.

4.

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. See sheet 2 OF 2 for additional information.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Action No.

1. Green lead-based paint was found on bridge column. See sample location diagram in the Inspection Report.
2. Contractors who may be tasked with disturbing the lead-based paint materials should be made aware of the lead content in the material so proper OSHA PPE and procedures can be implemented.
3. Verify the Texas Department of State Health Services (TDSHS) has been notified 15 days before demolition. The notification must have an accurate start date. If demolition or abatement schedule changes, notify TDSHS as soon as possible.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0691	01	044	FM 81	
	DIST	COUNTY		SHEET NO.	
	CRP	KARNES		214	

DATE: 6/20/2022
FILE: c:\pw_working\infro02\wtee\dms10610\044_ECS_EPIC02.dgn

Amphibians

a. Be advised of the potential occurrence of **Sheep frog** in the project area. This species prefers subterranean burrows, such as those of pack rats. They will also burrow under fallen tree limbs. Although this species will remain in its burrow for most of the year, they may emerge with heavy rains in the late summer season. Breeding takes place in August and September. Ensure that SW3P and 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.

b. Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats. Maintain hydrologic regime and connections between wetlands and other aquatic features. Use silt fencing (barrier) to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.

c. Consider applying hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

d. Project Specific Locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features. When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crawfish burrows), where feasible. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.

Birds

The Federal Migratory Bird Treaty Act (MBTA) states that it is unlawful to pursue, hunt, take, kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit. This project does not have a federal permit; therefore, in accordance with this regulation, the Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, etc. Typical breeding season occurs from March through August; therefore, tree trimming and other vegetation clearing activities that may disturb breeding birds should be done in the non-breeding season (September-February), when possible. If work must be performed during the breeding season, the Contractor shall have a qualified biologist conduct a survey of the right of way to determine if bird nests are present. In the event that active nests are encountered on-site during construction, the Contractor shall notify the Engineer and measures shall be taken to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the MBTA. Phasing of work during construction may be necessary to stay in compliance with the MBTA. The Contractor can discuss other preventative measures with the Project Engineer and/or District Environmental Staff.

Insects

At the time of environmental clearance, the **Monarch butterfly** was a federal candidate species under the Endangered Species Act. In the event the monarch butterfly become federally listed prior to or during construction, additional restrictions or activities may be required (ex: additional seeding, fenced or restricted areas, etc.).

Mammals

e. Be advised of the potential occurrence of **White-nosed Coati** in the project area. Avoid harming the species if encountered.

Reptiles

f. Be advised of the potential occurrence of the **Texas Horned Lizard** in the project area.

- Avoid harvester ant mounds in the selection of Project Specific Locations (PSLs) where feasible.
- Inform contractors that if reptiles are found on the project site allow species to safely leave the project area. Avoid harming this species if encountered.

g. Be advised of the potential occurrence of **Texas Tortoise** in the project area. Utility trenches should be covered overnight or visually inspected before filling to avoid burial of the species.

If Texas Tortoises are present in a project area they should be removed from the area. After removal of the tortoises, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude tortoises and other reptiles. The exclusion fence should be constructed and maintained as follows:

- The exclusion fence should be constructed with metal flashing or drift fence material.
- Rolled erosion control mesh material should not be used.
- The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
- The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been revegetated.

h. If the construction of the project requires the use of open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

i. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

Water Quality

j. Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.

k. When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

l. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.

Other

m. Do not attempt to handle or catch any of these species. Report all sightings and/or impacts to the TxDOT Corpus Christ District Environmental Section.

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	CRP	KARNES		215

A. GENERAL SITE DATA

1. PROJECT LIMITS: *FROM FM 627 TO FM 2773*

Begin Project Coordinates : Latitude (N): 28.9538441 *Longitude (W):* -97.8239427

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: Drainage Area Maps Sheet 105*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections Sheets 8 - 10*
- *Location of Erosion and Sediment Controls: SW3P Layout Sheets 217 - 222*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layouts Sheets 110 - 112*
- *Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shown on SW3P Site Map (If PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).*

3. PROJECT DESCRIPTION:

For the construction of widen and rehab roadway, consisting of grading, base, surface and structures.

4. MAJOR SOIL DISTURBING ACTIVITIES:

Phase 1 - Prepare ROW, Extending culverts and replace Salt Creek bridge
Phase 2 - Widen shoulder, reconstruct roadway and driveways, and regrade ditch

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

95% Vegetative Cover

6. TOTAL PROJECT AREA: *19.56* Acres

7. TOTAL AREA TO BE DISTURBED: *16.87* Acres (*86* %)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.33*
AFTER CONSTRUCTION: *0.34*

9. NAME OF RECEIVING WATERS:

Salt Creek

10. PROJECT SW3P Binder:

A. For projects disturbing one to five acres, TxDOT will maintain a SW3P Binder at the project field office (If there is not a project field office, should be kept at the Area Office) which contains the following: Index Sheet, TCEQ Signature Authority, TxDOT's and Contractor's Small Construction Site Notice, SW3P Inspector Qualification Statements, EPIC Sheet, SW3P Sheet, Site Location Maps, Inspection and Maintenance Reports (Form 2118), Construction Stage Gate Checklist(s) (CSGC), Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, TxDOT and Contractor MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, TxDOT will follow the actions listed in (10.A.) above with the addition of the following: TxDOT and Contractor Notice Of Intent (N.O.I.) and Fee Payment Form, TxDOT and Contractor Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A.) and (10.B.) above are not required. Acreage is calculated by adding Total Area To Be Disturbed Acres on project (See #7 above) and the PSL(s) acreage located within one mile of project.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

T	TEMPORARY SEEDING		PRESERVATION OF NATURAL RESOURCES
	MULCHING (Hay or Straw)		FLEXIBLE CHANNEL LINER
	BUFFER ZONES		RIGID CHANNEL LINER
	PLANTING	P	SOIL RETENTION BLANKET
P	SEEDING		COMPOST MANUFACTURED TOPSOIL
	SODDING		VERTICAL TRACKING
			OTHER:

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

T	SILT FENCES
	EROSION CONTROL LOGS
	EROSION CONTROL COMPOST BERMS (Low Velocity)
T	ROCK FILTER DAMS
	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
	DIVERSION DIKE AND SWALE COMBINATIONS
	PIPE SLOPE DRAINS
	PAVED FLUMES
	ROCK BEDDING AT CONSTRUCTION EXIT
	TIMBER MATTING AT CONSTRUCTION EXIT
	CHANNEL LINERS
	SEDIMENT TRAPS
	SEDIMENT BASINS
	STORM INLET SEDIMENT TRAP
	STONE OUTLET STRUCTURES
	CURBS AND GUTTERS
	STORM SEWERS
	VELOCITY CONTROL DEVICES
	OTHER:

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

3. STORM WATER MANAGEMENT:

A. Storm water drainage will be provided by ditches which carry drainage within the R.O.W. to the lows within the roadway and project site which drains to natural facilities.

B. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4 :1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

In Phase 1, all stormwater management facilities will be put in place for the duration of the project. Retention ponds will not be installed because the limits of the ROW prohibit the construction of retention ponds.

5. NON-STORM WATER DISCHARGES:

Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to timeframes described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

2. INSPECTION:

A TxDOT Inspector will perform a regularly scheduled SW3P inspection every 7 calendar days. An Inspection and Maintenance Report, signed by the TxDOT Inspector and the Contractor, will be filed for each inspection. Revise/clean/repair/replace each BMP control device in accordance with the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above.

3. WASTE MATERIALS:

On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

4. HAZARDOUS WASTE & SPILL REPORTING:

As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

5. SANITARY WASTE:

Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

6. CONSTRUCTION VEHICLE TRACKING:

On a regular basis, or as may be directed, dampen haul roads for dust control and construct construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways on project, abutting and traversing the project site.

7. MANAGEMENT PRACTICES:

A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
E. Procedures and/or practices should be taken to control dust.
F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER

, P.E. 6/20/2022
Signature of Registrant & Date

Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

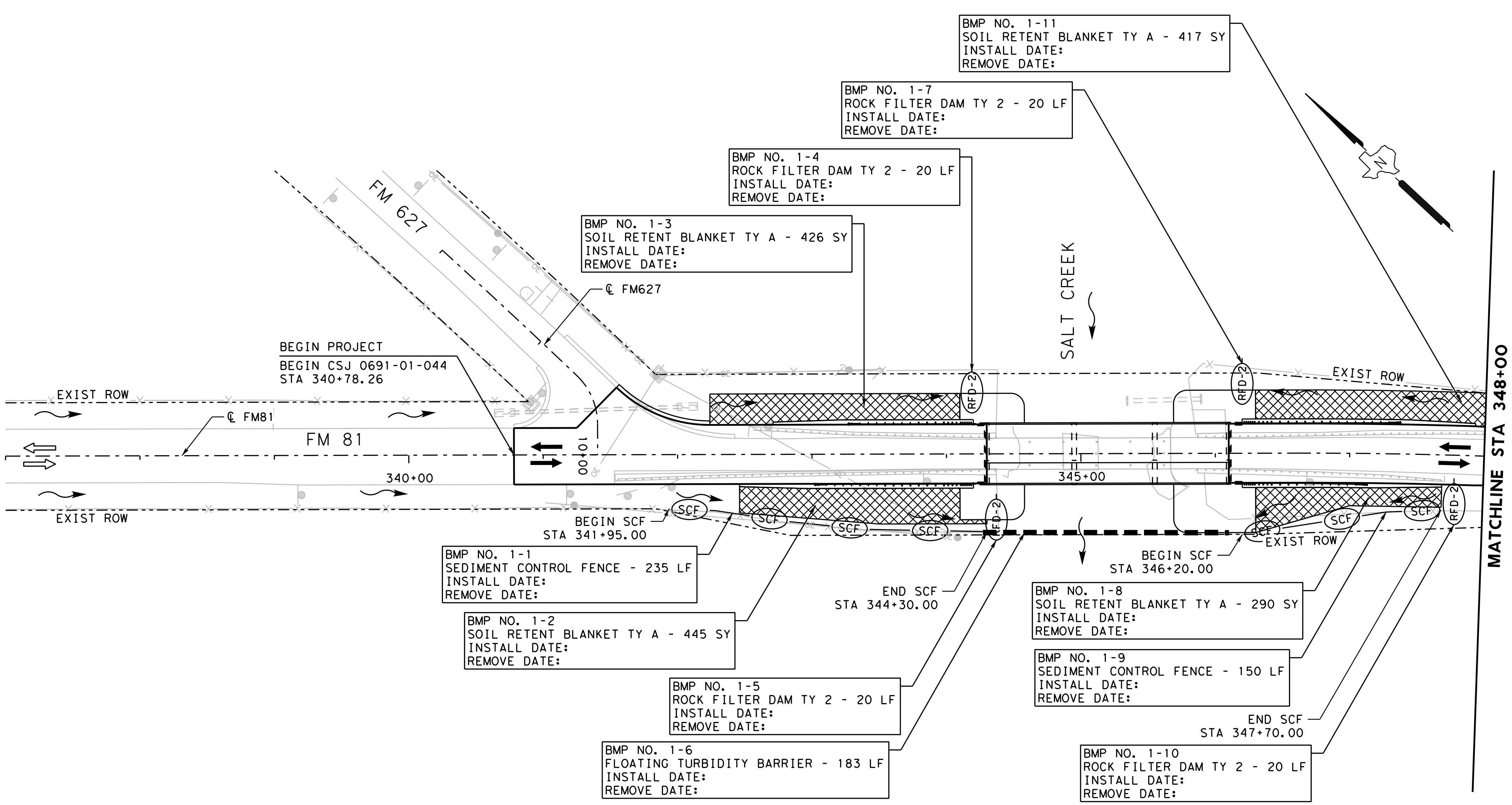
TEMPLATE REVISION DATE: 02/07/18

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
STN	6	SEE TITLE SHEET		FM 81
GRAPHICS STN	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK STN	TEXAS	CRP	KARNES	216
CHECK STN	CONTROL	SECTION	JOB	
	0691	01	044	

FILE NAME
DATE
DESIGNER

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- EXISTING ROW
- EXISTING FENCE
- OVERHEAD POWERLINE
- CONCRETE RIPRAP
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- RFD3 — ROCK FILTER DAM (TY 3)
- FLOATING TURBIDITY BARRIER
- SOIL RETENTION BLANKET (TY A)



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DATE	BY	REV	REVISION

STATE OF TEXAS
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6/20/2022

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FM 81
SW3P LAYOUT
BEGIN OF PROJECT TO STA 348+00

SCALE: 1"=100' SHEET 1 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	217
CONTROL	SECTION	JOB	
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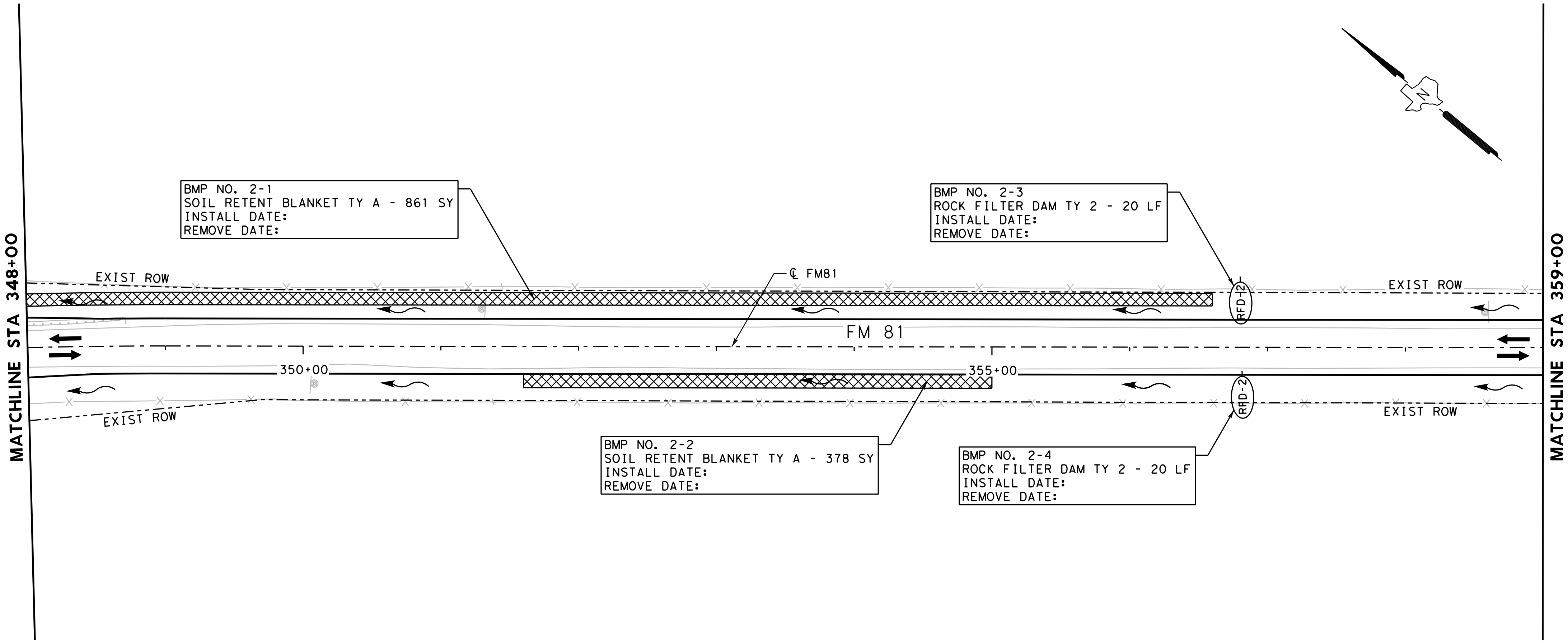

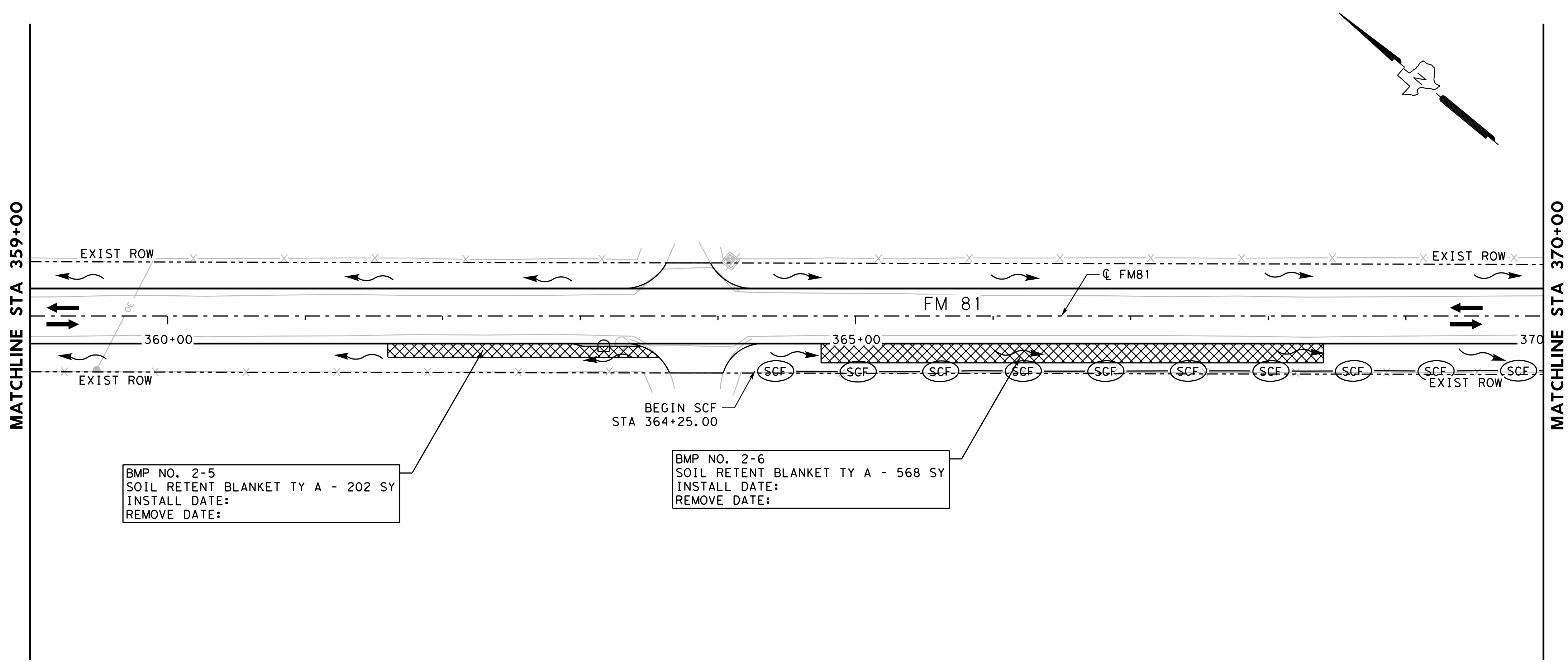

LEGEND

Symbol	Description
←	DIRECTION OF TRAFFIC
~→	DIRECTION OF FLOW
- - -	EXISTING ROW
X — X	EXISTING FENCE
OE — OE	OVERHEAD POWERLINE
(box)	CONCRETE RIPRAP
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
▬ ▬ ▬	FLOATING TURBIDITY BARRIER
(hatch)	SOIL RETENTION BLANKET (TY A)

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SCALE: 1"=100'

DATE	BY	REV	REVISION

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FM 81
SW3P LAYOUT

STA 348+00 TO STA 370+00

SCALE: 1"=100' SHEET 2 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	218
CONTROL	SECTION	JOB	
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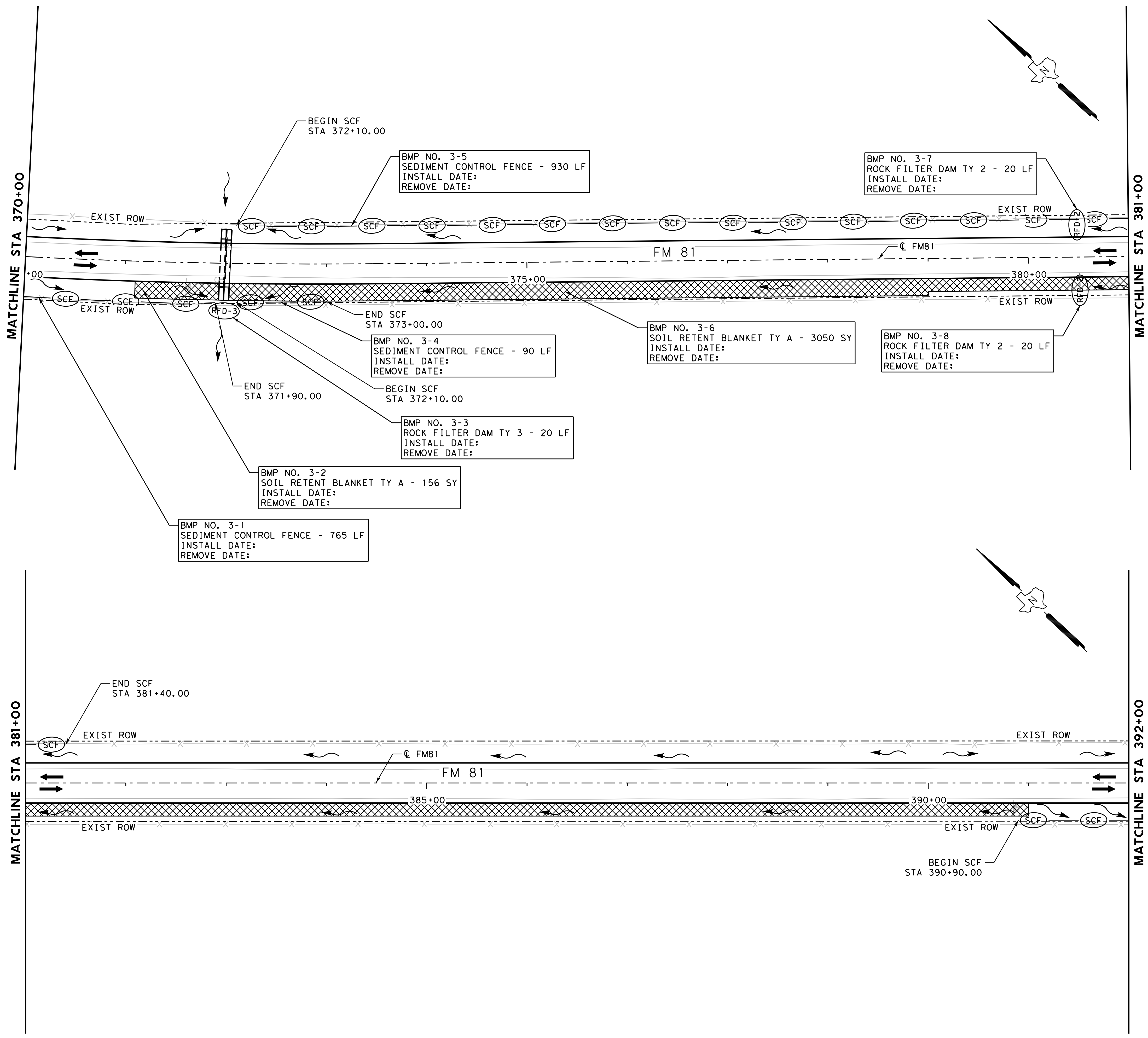

LEGEND

- DIRECTION OF TRAFFIC
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- EXISTING ROW
- EXISTING FENCE
- OVERHEAD POWERLINE
- CONCRETE RIPRAP
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
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SCALE: 1"=100'

DATE	BY	REV	REVISION

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FM 81
SW3P LAYOUT

STA 370+00 TO STA 392+00

SCALE: 1"=100' SHEET 3 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	219
CONTROL	SECTION	JOB	
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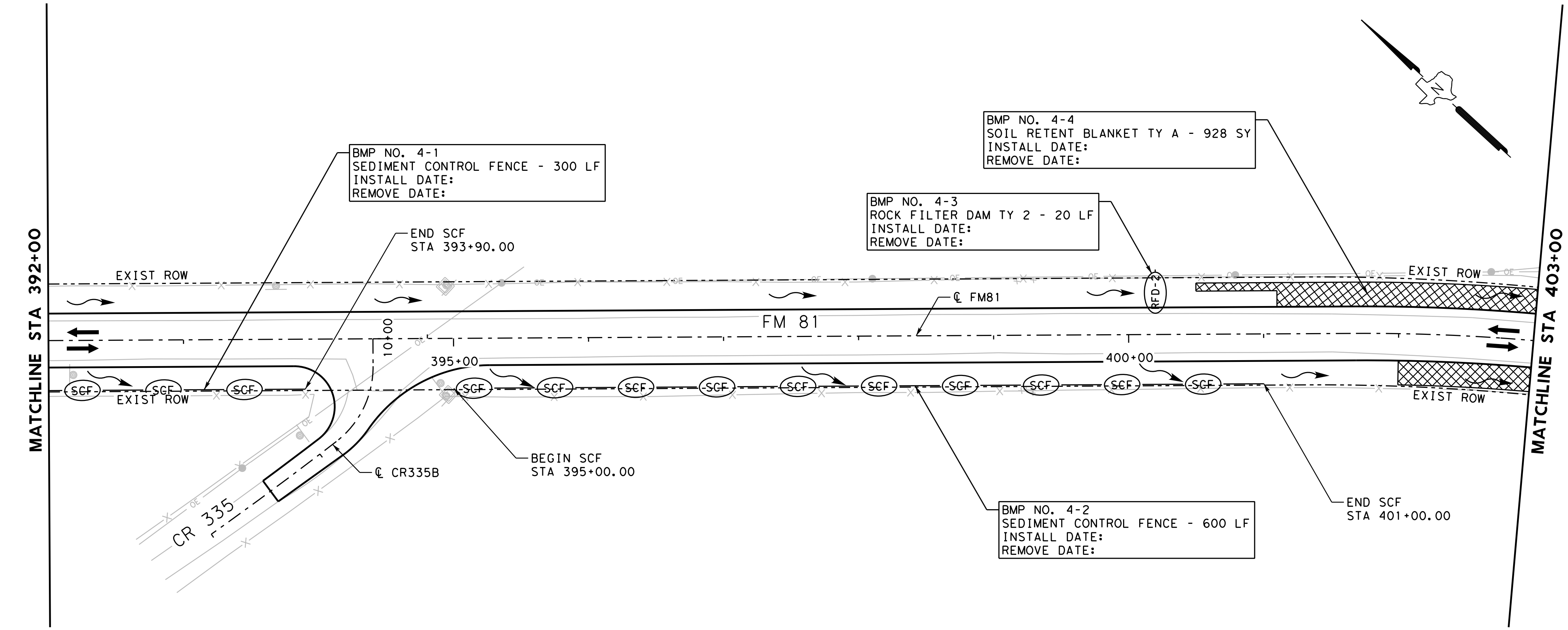

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- EXISTING ROW
- EXISTING FENCE
- OVERHEAD POWERLINE
- CONCRETE RIPRAP
- SEDIMENT CONTROL FENCE (SCF)
- ROCK FILTER DAM (TY 2) (RFD2)
- ROCK FILTER DAM (TY 3) (RFD3)
- FLOATING TURBIDITY BARRIER
- SOIL RETENTION BLANKET (TY A)

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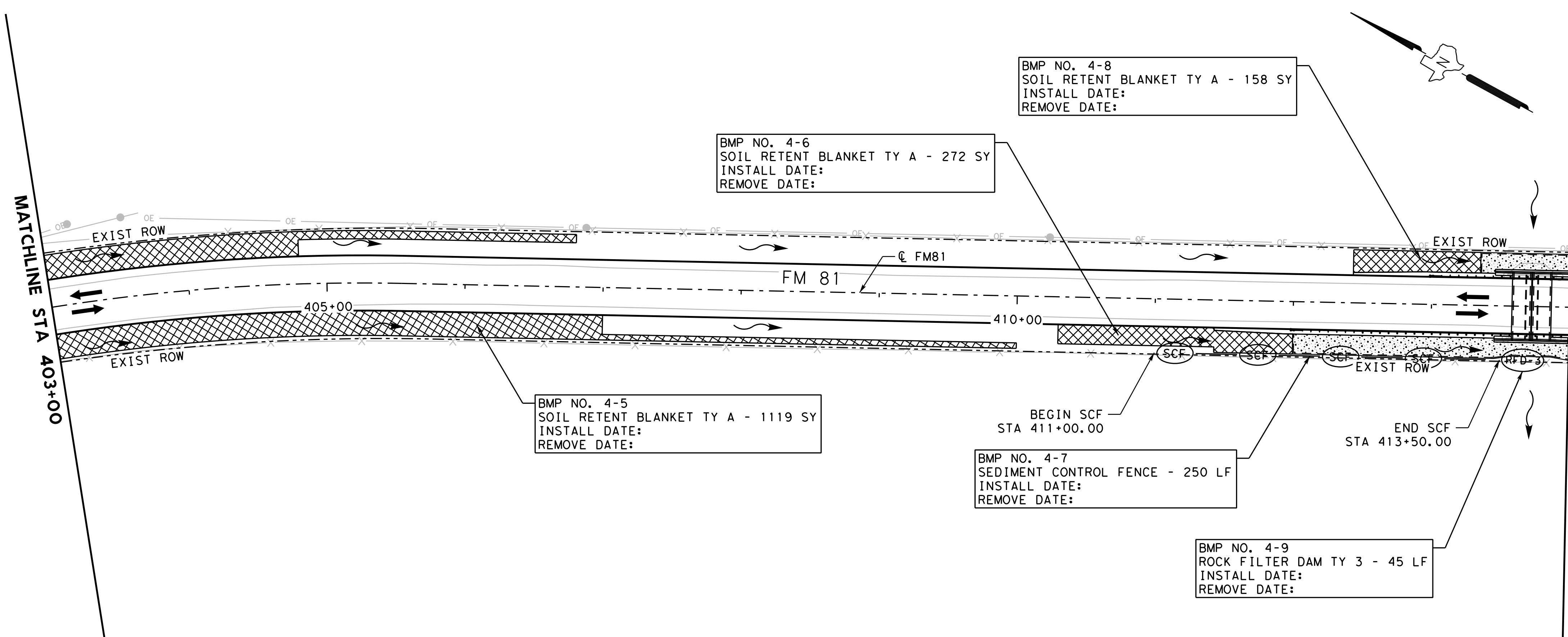

DATE	BY	REV	REVISION

STATE OF TEXAS
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FM 81
SW3P LAYOUT

STA 392+00 TO STA 414+00

SCALE: 1"=100' SHEET 4 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	220
CONTROL	SECTION	JOB	
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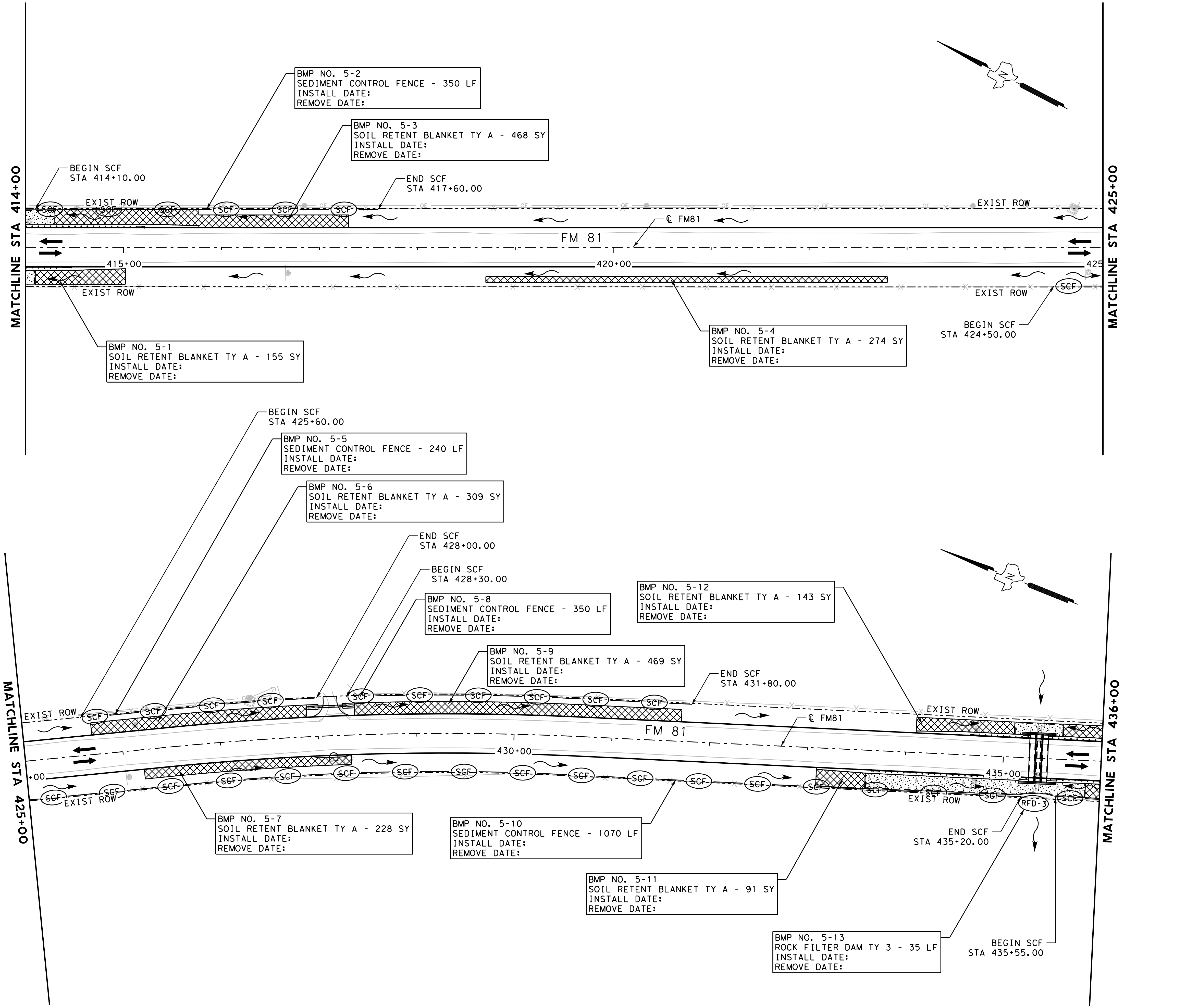

LEGEND

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0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

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LICENSED PROFESSIONAL ENGINEER
6/20/2022

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Texas Registered Engineering Firm F-6324

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Texas Department of Transportation

FM 81
SW3P LAYOUT

STA 414+00 TO STA 436+00

SCALE: 1"=100' SHEET 5 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	221
CONTROL	SECTION	JOB	
0691	01	044	

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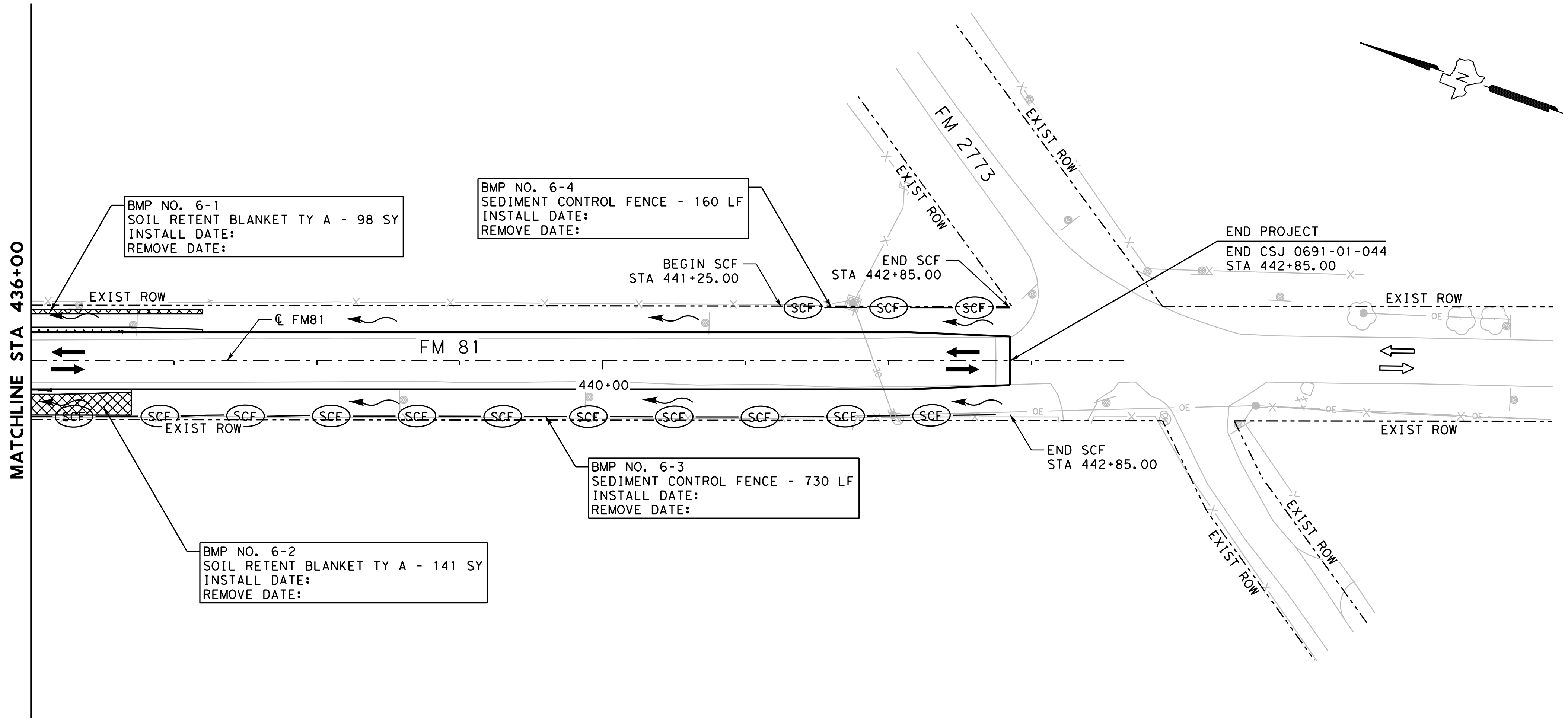

LEGEND

- DIRECTION OF TRAFFIC
- DIRECTION OF FLOW
- EXISTING ROW
- EXISTING FENCE
- OE — OE OVERHEAD POWERLINE
- CONCRETE RIPRAP
- SCF SEDIMENT CONTROL FENCE
- RFD2 ROCK FILTER DAM (TY 2)
- RFD3 ROCK FILTER DAM (TY 3)
- FLOATING TURBIDITY BARRIER
- SOIL RETENTION BLANKET (TY A)

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/20/2022

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Texas Department of Transportation

FM 81
SW3P LAYOUT
STA 436+00 TO END PROJECT

SCALE: 1"=100' SHEET 6 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	222
CONTROL	SECTION	JOB	
0691	01	044	

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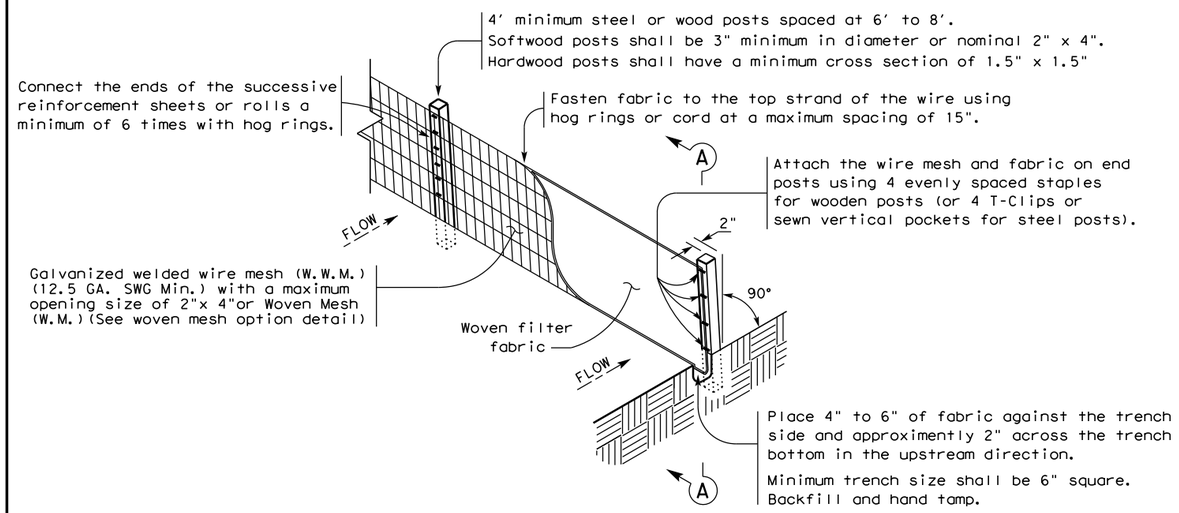
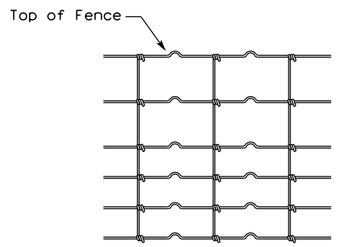
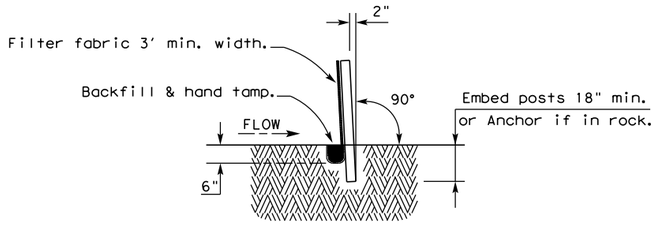


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

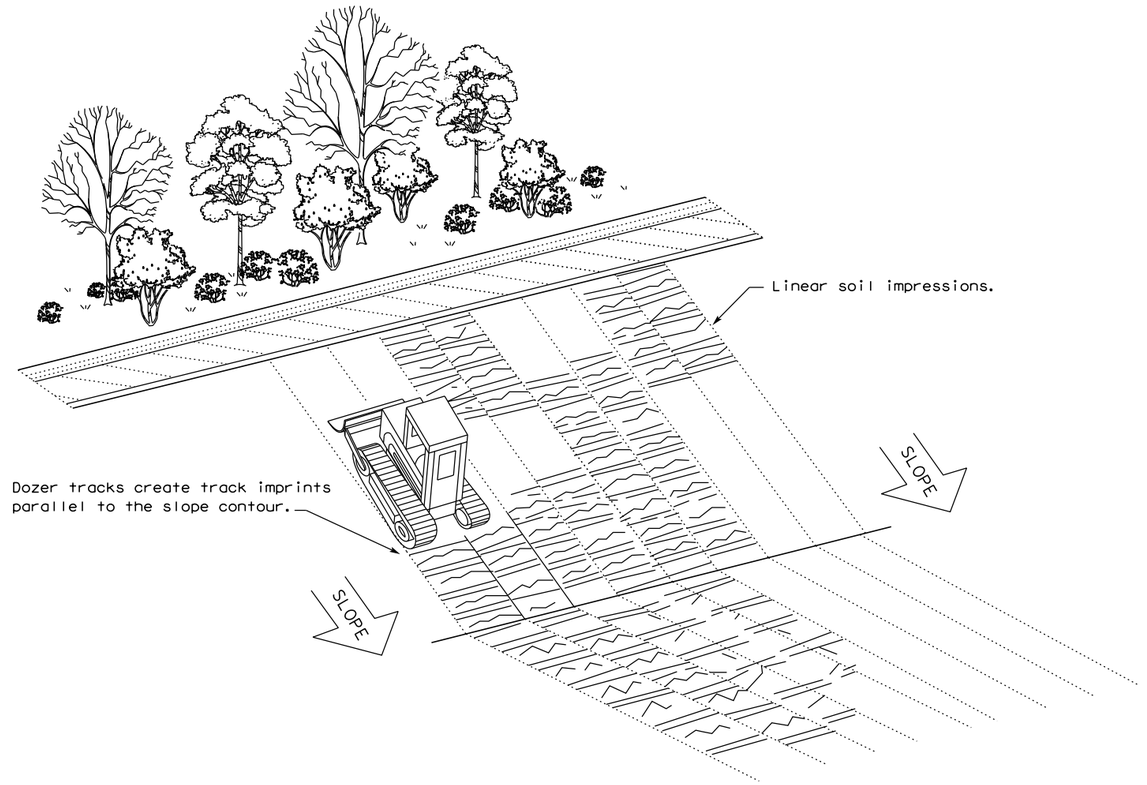
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		223

6/30/2022
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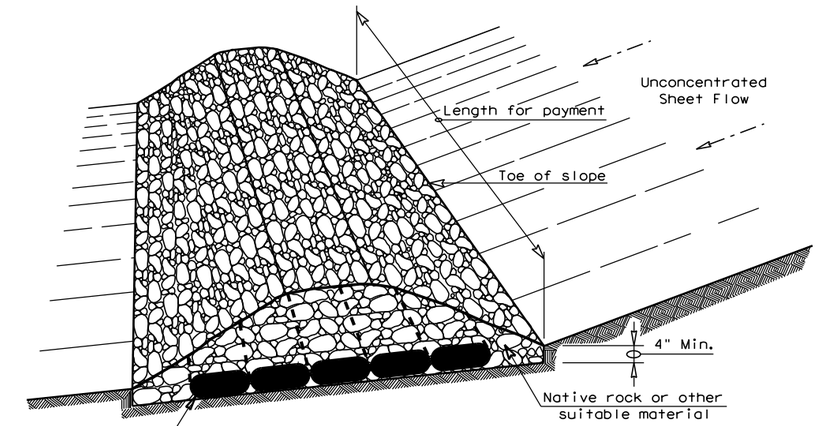
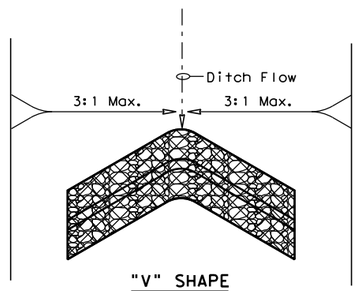
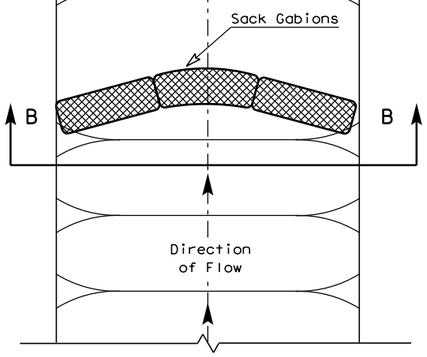


FILTER DAM AT TOE OF SLOPE

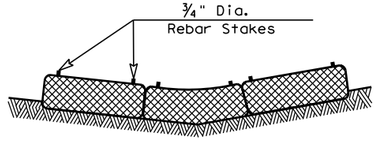
RFD1



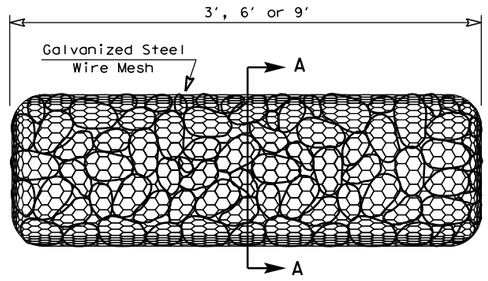
"V" SHAPE
PLAN VIEW



PLAN VIEW

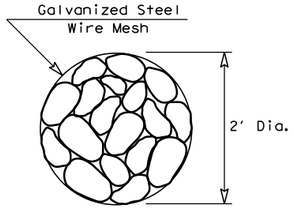


SECTION B-B

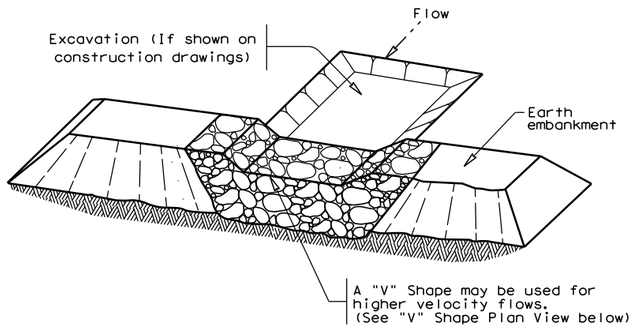


TYPE 4 (SACK GABIONS)

RFD4

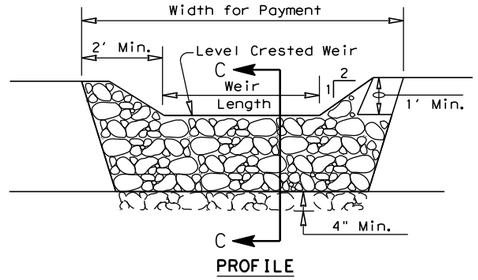


SECTION A-A



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



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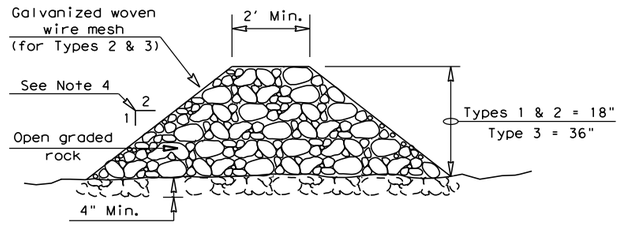
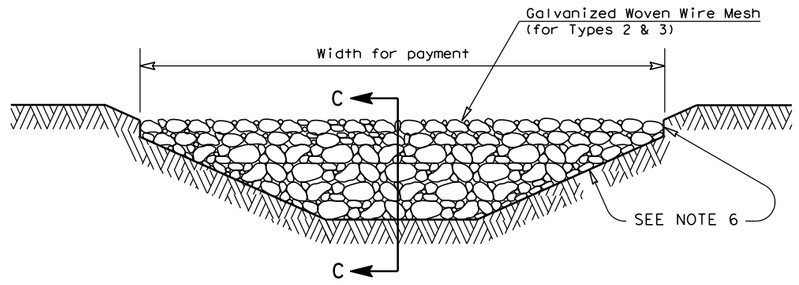


SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0691	01	044		FM 81	
	DIST	COUNTY			SHEET NO.	
	CRP	KARNES			224	

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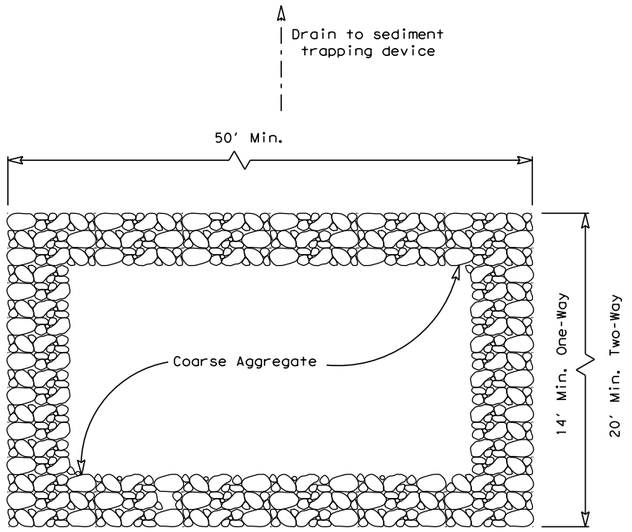
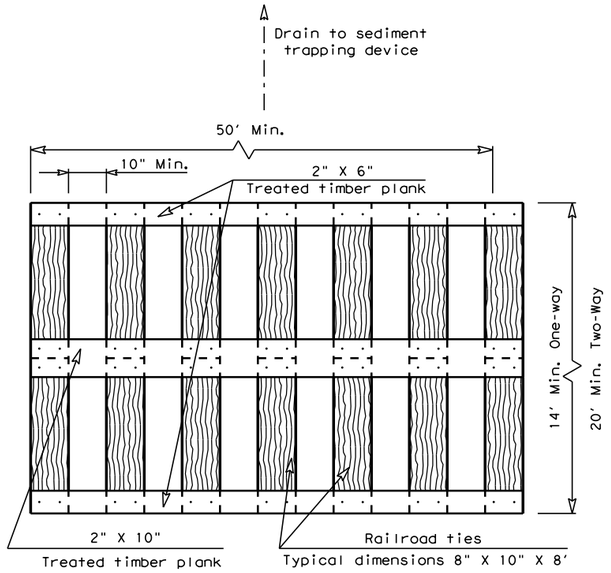


PLAN VIEW



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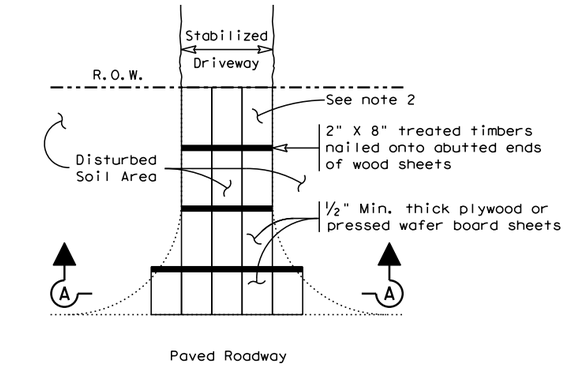

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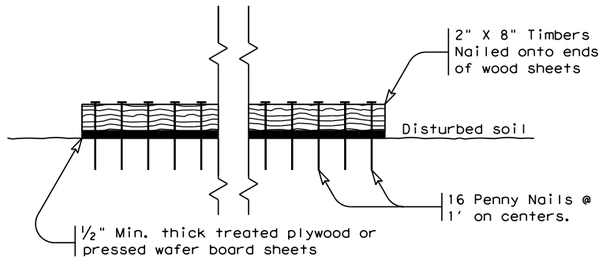
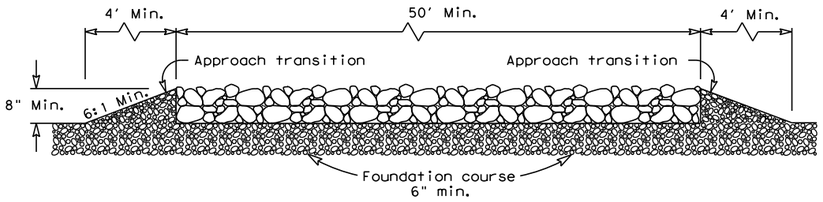


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

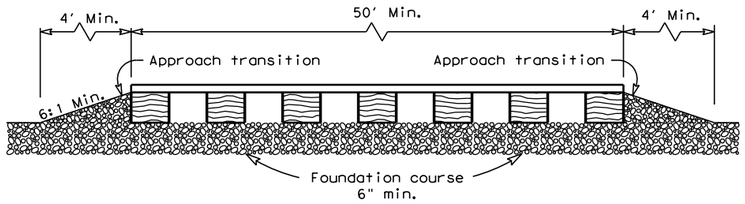
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0691	01	044	FM 81
	DIST	COUNTY		SHEET NO.
	CRP	KARNES		225

LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
- REMOVE STONE RIPRAP
- REMOVE CONCRETE RIPRAP
- TRIM TREE / REMOVE BRUSH (CHANNELS)
- REMOVE FENCE

NOTES:

* REMOVAL OF PIPE, HEADWALLS, WINGWALLS & SETS ARE INCIDENTAL TO ITEMS 462, 464, 466 AND 467.

** STONE RIPRAP SHALL BE REMOVED AND SALVAGED. THE WORK SHALL BE CONSIDERED SUBSIDIARY TO ITEM 110. THE STONE RIPRAP SHALL BE STOCKPILED AT THE NORTHEAST CORNER OF THE INTERSECTION OF FM 81 AND FM 2773, WITHIN TXDOT ROW AND AT A MINIMUM DISTANCE OF 30 FT FROM EDGE OF PAVEMENT.

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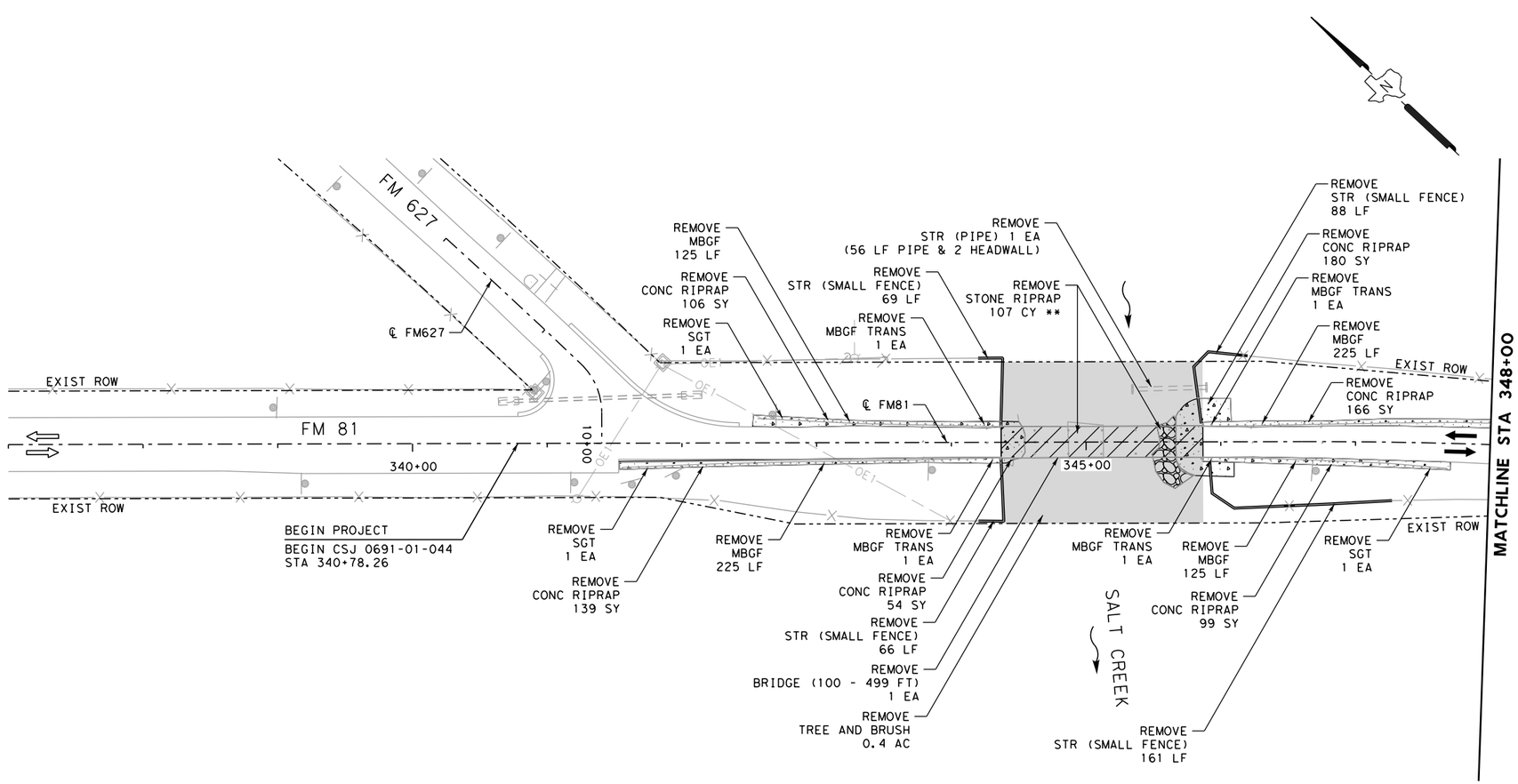

DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED
PROFESSIONAL ENGINEER
6/20/2022

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Texas Department of Transportation

FM 81
REMOVAL PLAN

BEGIN PROJECT TO STA 348+00

SCALE: 1"=100' SHEET 1 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	226
CONTROL	SECTION	JOB	
0691	01	044	

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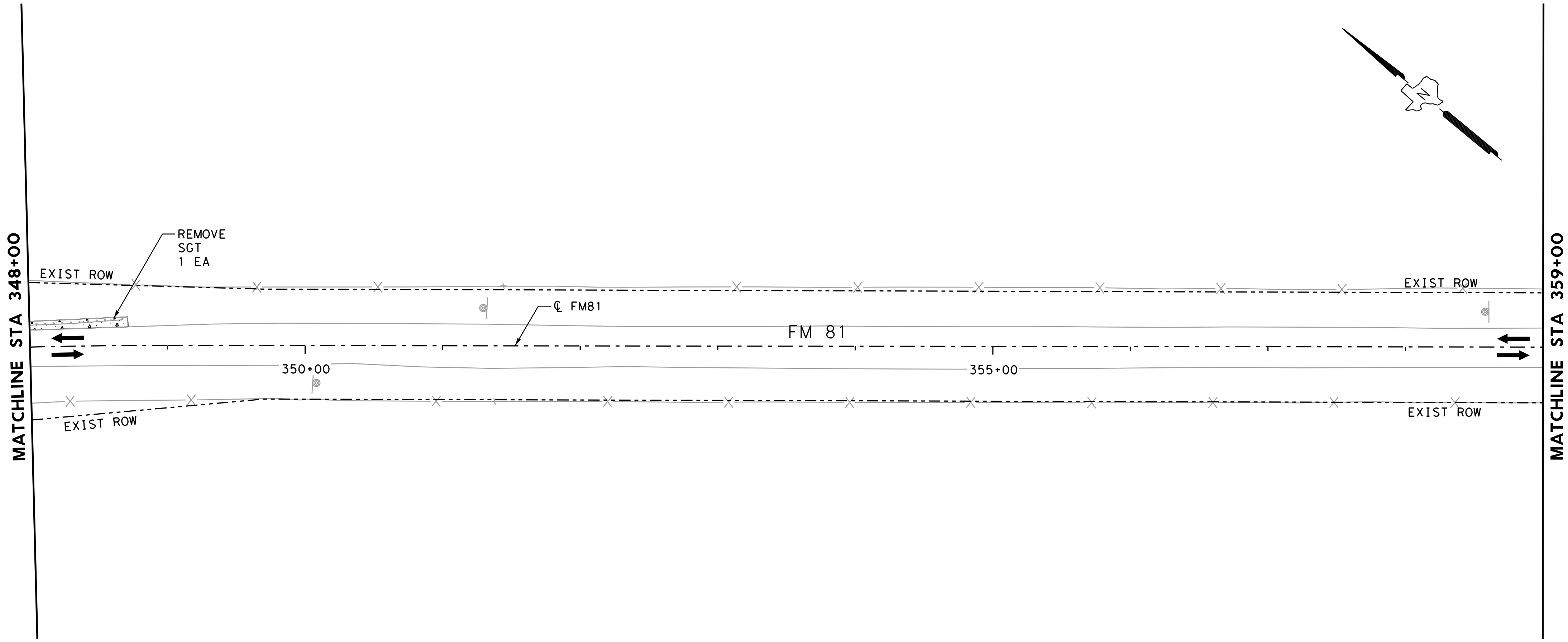

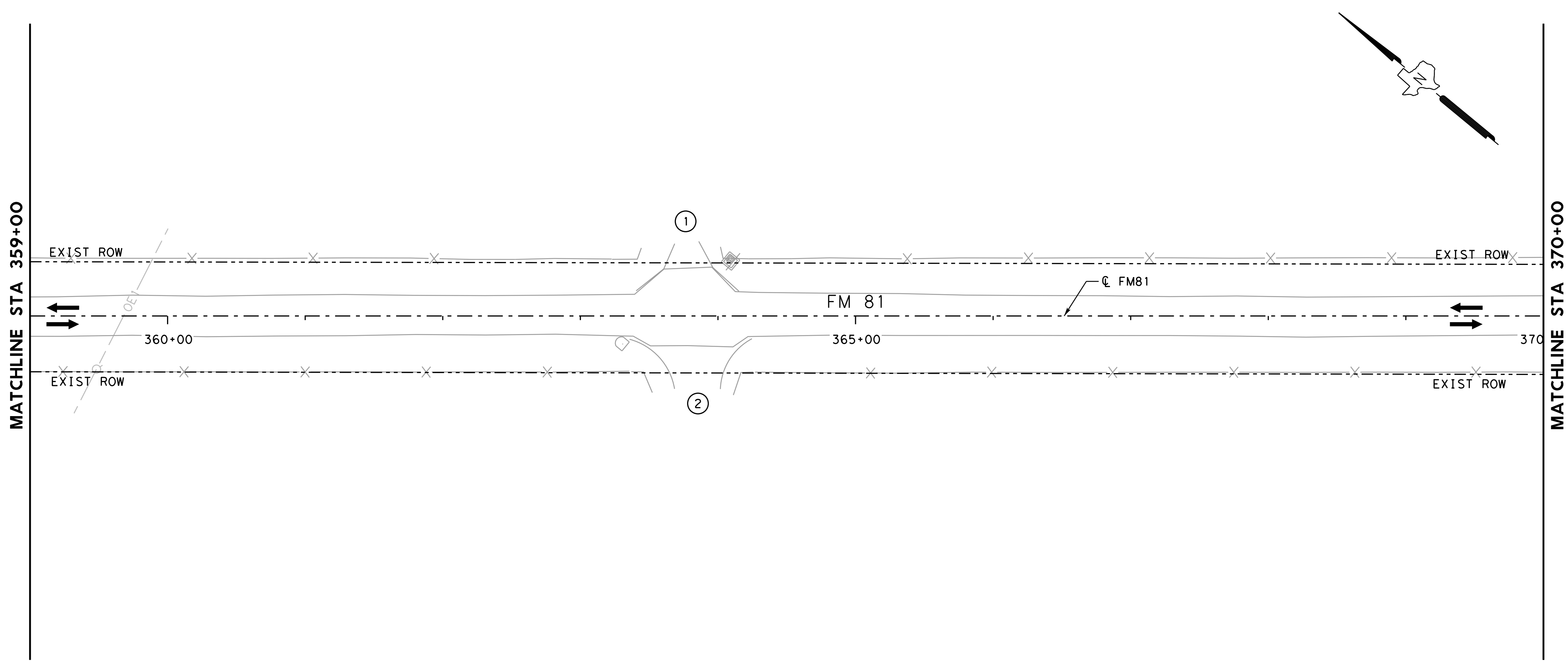

LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
- REMOVE STONE RIPRAP
- REMOVE CONCRETE RIPRAP
- TRIM TREE / REMOVE BRUSH (CHANNELS)
- REMOVE FENCE

NOTES:

* REMOVAL OF PIPE, HEADWALLS, WINGWALLS & SETS ARE INCIDENTAL TO ITEMS 462, 464, 466 AND 467.

0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
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6/20/2022

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FM 81
REMOVAL PLAN

STA 348+00 TO STA 370+00

SCALE: 1"=100'   SHEET 2 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	227
CONTROL	SECTION	JOB	
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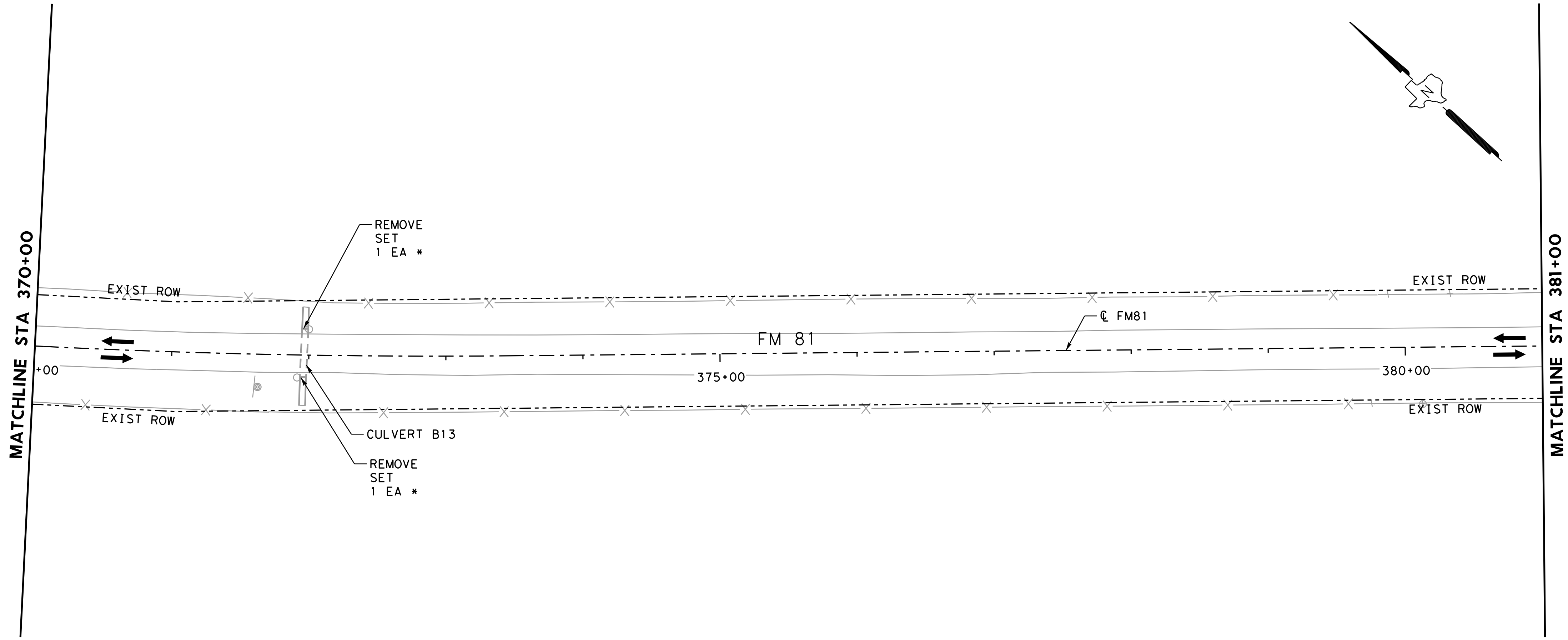

LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
- REMOVE STONE RIPRAP
- REMOVE CONCRETE RIPRAP
- TRIM TREE / REMOVE BRUSH (CHANNELS)
- REMOVE FENCE

NOTES:

* REMOVAL OF PIPE, HEADWALLS, WINGWALLS & SETS ARE INCIDENTAL TO ITEMS 462, 464, 466 AND 467.

0 50 100
SCALE: 1"=100'

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6/20/2022

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FM 81

REMOVAL PLAN

STA 370+00 TO STA 392+00

SCALE: 1"=100' SHEET 3 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	228
CONTROL	SECTION	JOB	
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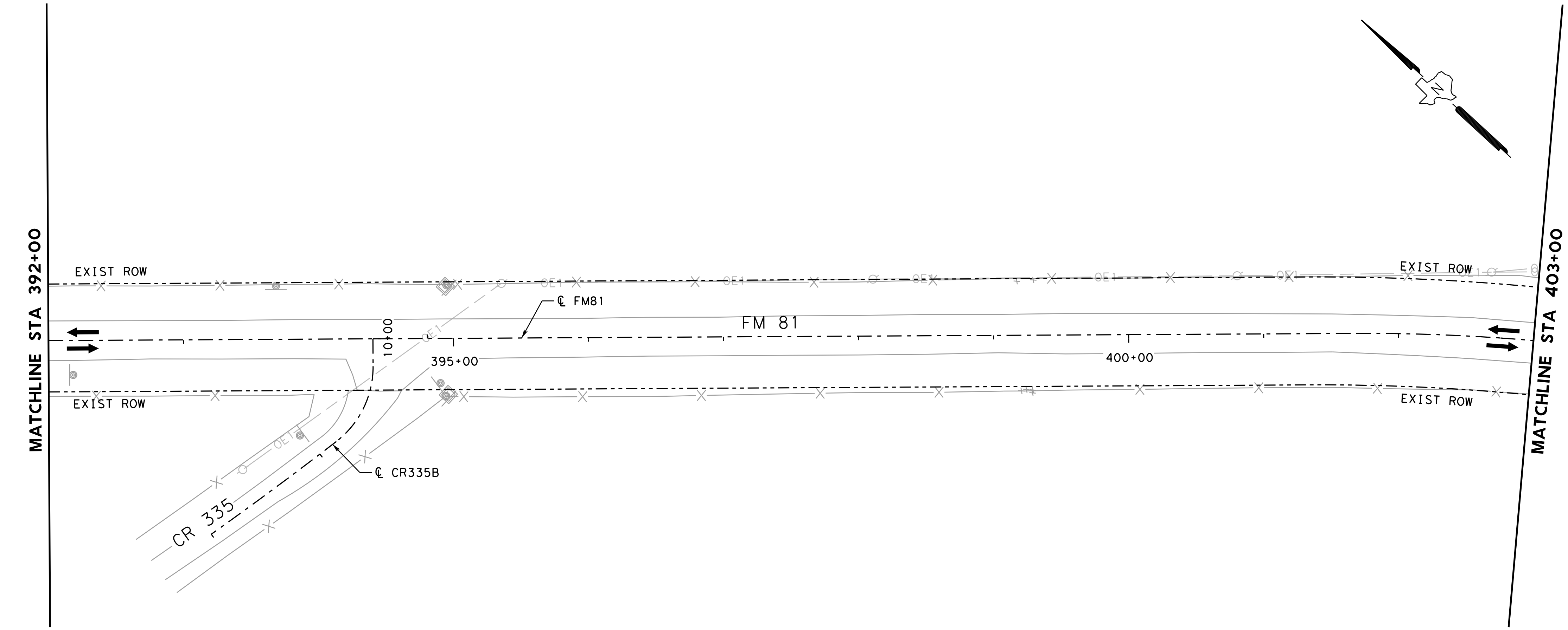

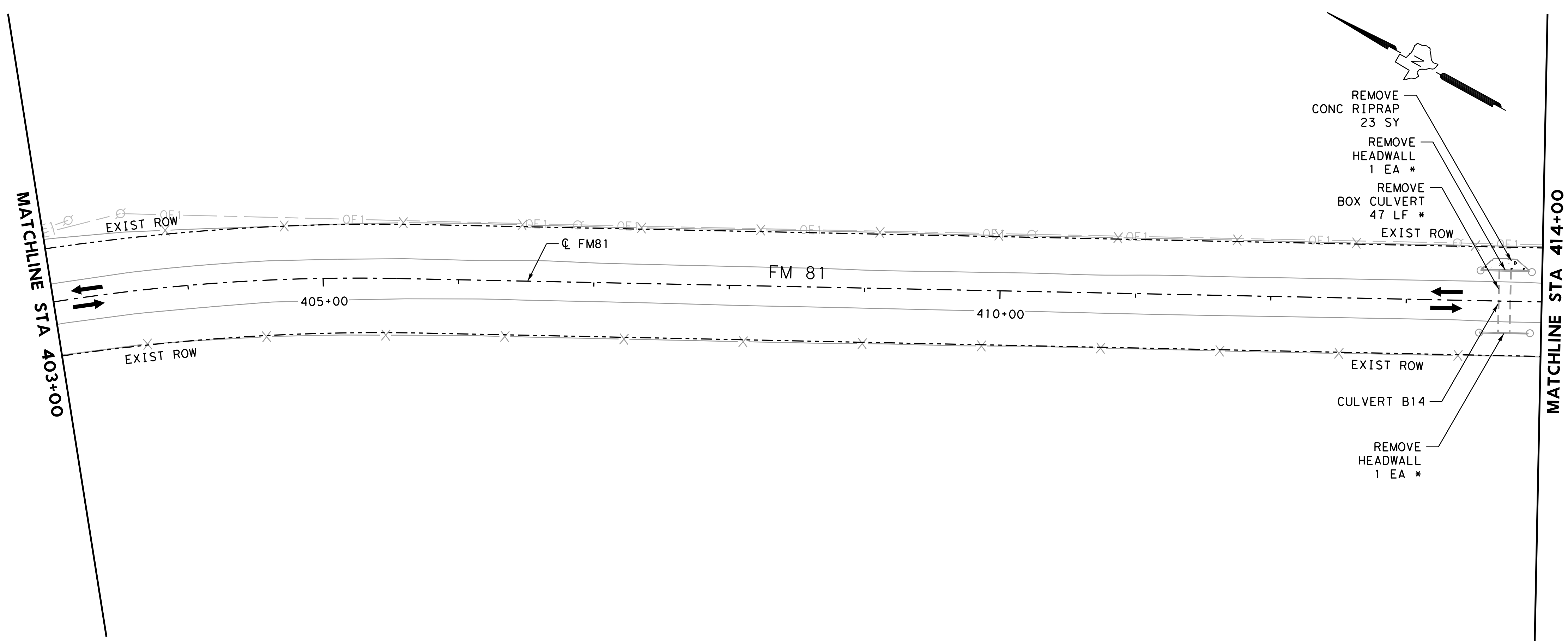

LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
- REMOVE STONE RIPRAP
- REMOVE CONCRETE RIPRAP
- TRIM TREE / REMOVE BRUSH (CHANNELS)
- REMOVE FENCE

NOTES:

* REMOVAL OF PIPE, HEADWALLS, WINGWALLS & SETS ARE INCIDENTAL TO ITEMS 462, 464, 466 AND 467.

0 50 100
SCALE: 1"=100'

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FM 81
REMOVAL PLAN

STA 392+00 TO STA 414+00

SCALE: 1"=100' SHEET 4 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	229
CONTROL	SECTION	JOB	
0691	01	044	

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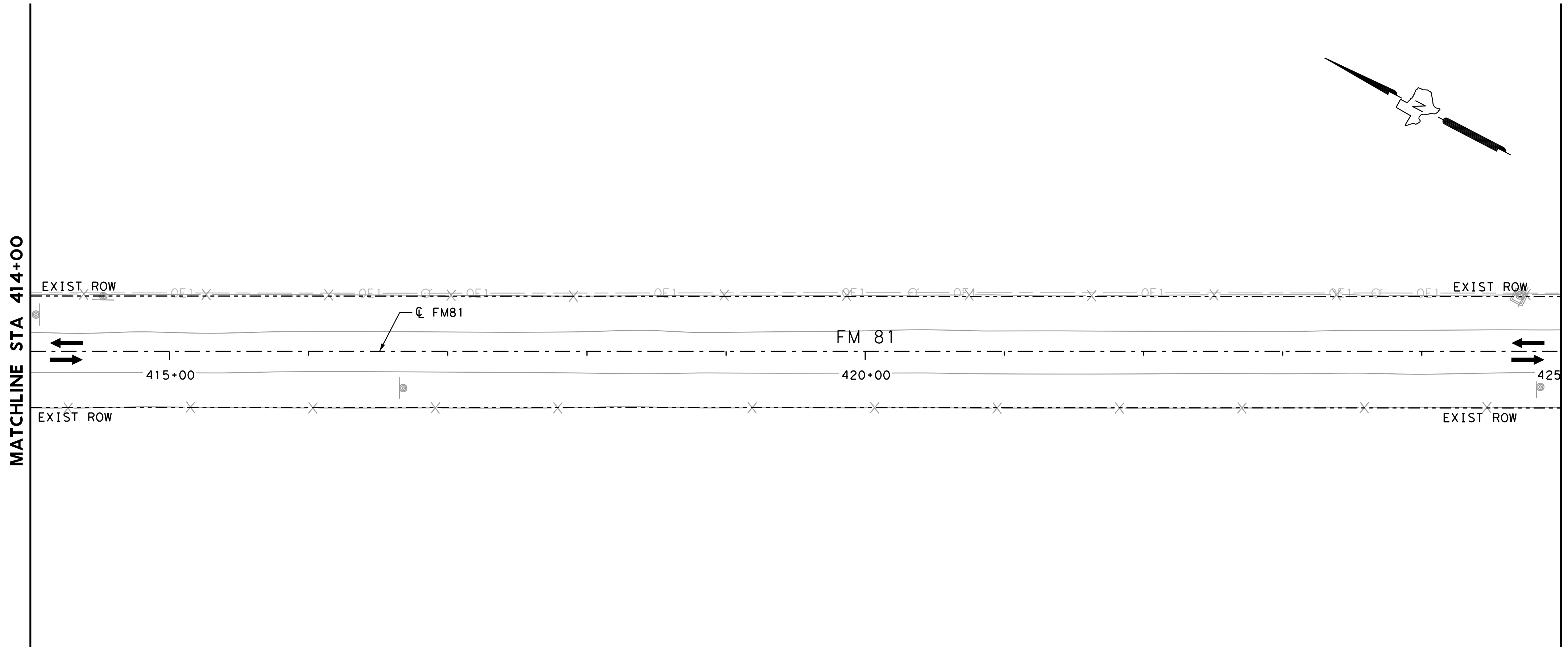


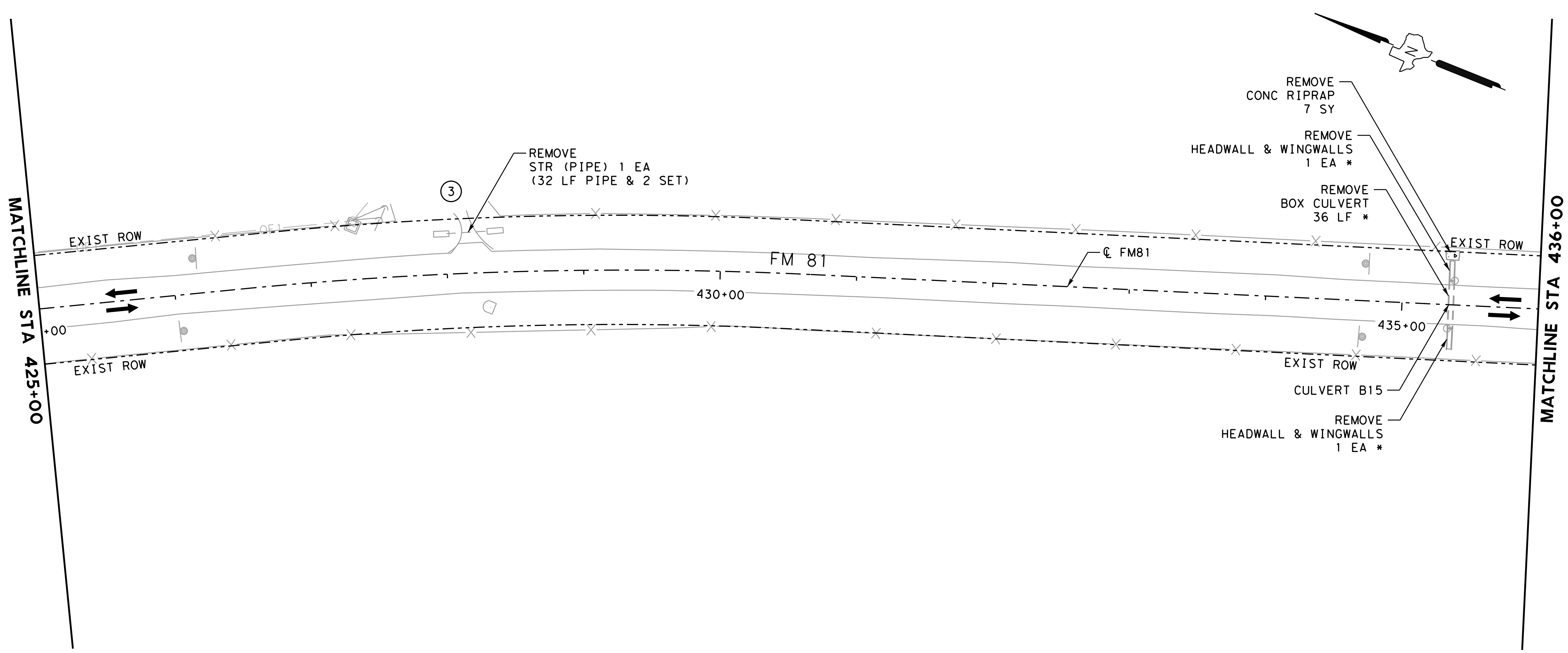
LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
- REMOVE STONE RIPRAP
- REMOVE CONCRETE RIPRAP
- TRIM TREE / REMOVE BRUSH (CHANNELS)
- REMOVE FENCE

NOTES:

* REMOVAL OF PIPE, HEADWALLS, WINGWALLS & SETS ARE INCIDENTAL TO ITEMS 462, 464, 466 AND 467.

0 50 100
SCALE: 1"=100'



DATE	BY	REV	REVISION

STATE OF TEXAS
WEIYIH TEE
98478
LICENSED PROFESSIONAL ENGINEER
6/20/2022

Stantec
Engineered by Stantec Consulting Services Inc.
Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
REMOVAL PLAN
STA 414+00 TO STA 436+00

SCALE: 1"=100' SHEET 5 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	230
CONTROL	SECTION	JOB	
0691	01	044	

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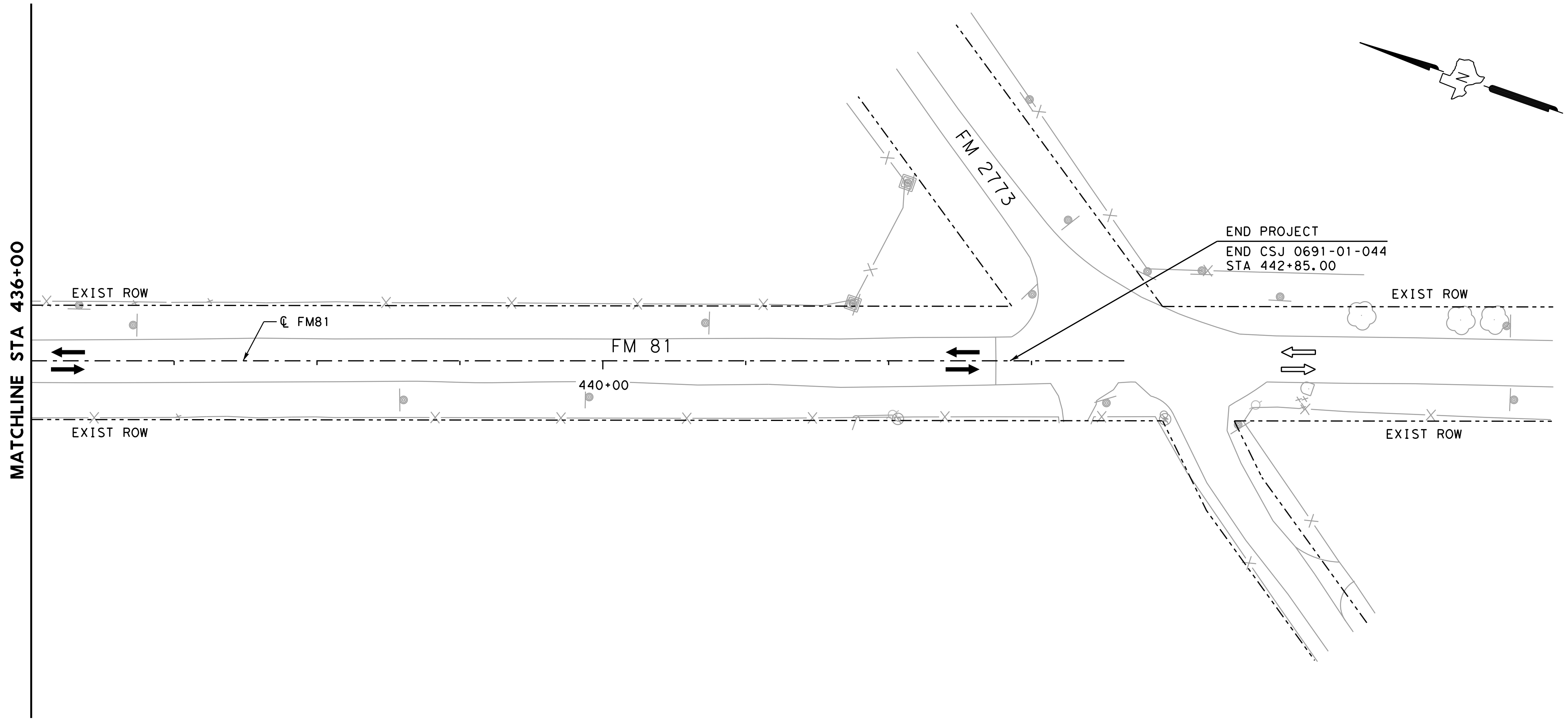

LEGEND

- TRAFFIC FLOW DIRECTION
- EXISTING TRAFFIC FLOW DIRECTION
- (XX) DRIVEWAY NUMBER
- REMOVE BRIDGE
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- REMOVE CONCRETE RIPRAP
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0 50 100
SCALE: 1"=100'

DATE	BY	REV	REVISION

STATE OF TEXAS
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6/20/2022

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Texas Registered Engineering Firm F-6324

Texas Department of Transportation

FM 81
REMOVAL PLAN
STA 436+00 TO END PROJECT

SCALE: 1"=100' SHEET 6 OF 6

FED RD DIV NO	FEDERAL AID PROJECT NO.		HIGHWAY
6	SEE TITLE SHEET		FM 81
STATE	DISTRICT	COUNTY	SHEET NO
TEXAS	CRP	KARNES	231
CONTROL	SECTION	JOB	
0691	01	044	

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