FM 2556 (2529-02-010)

COUNTY CAMERON PROJ. NO.
HWY.NO. FM 2556 LETTING DATE
DATE ACCEPTED

INDEX OF SHEETS
SEE SHEET NO. 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
CAMERON COUNTY BRIDGE REPLACEMENT

Project No.: STP 2B24(212)HES

CSJ: 2529-02-010

FM 2556

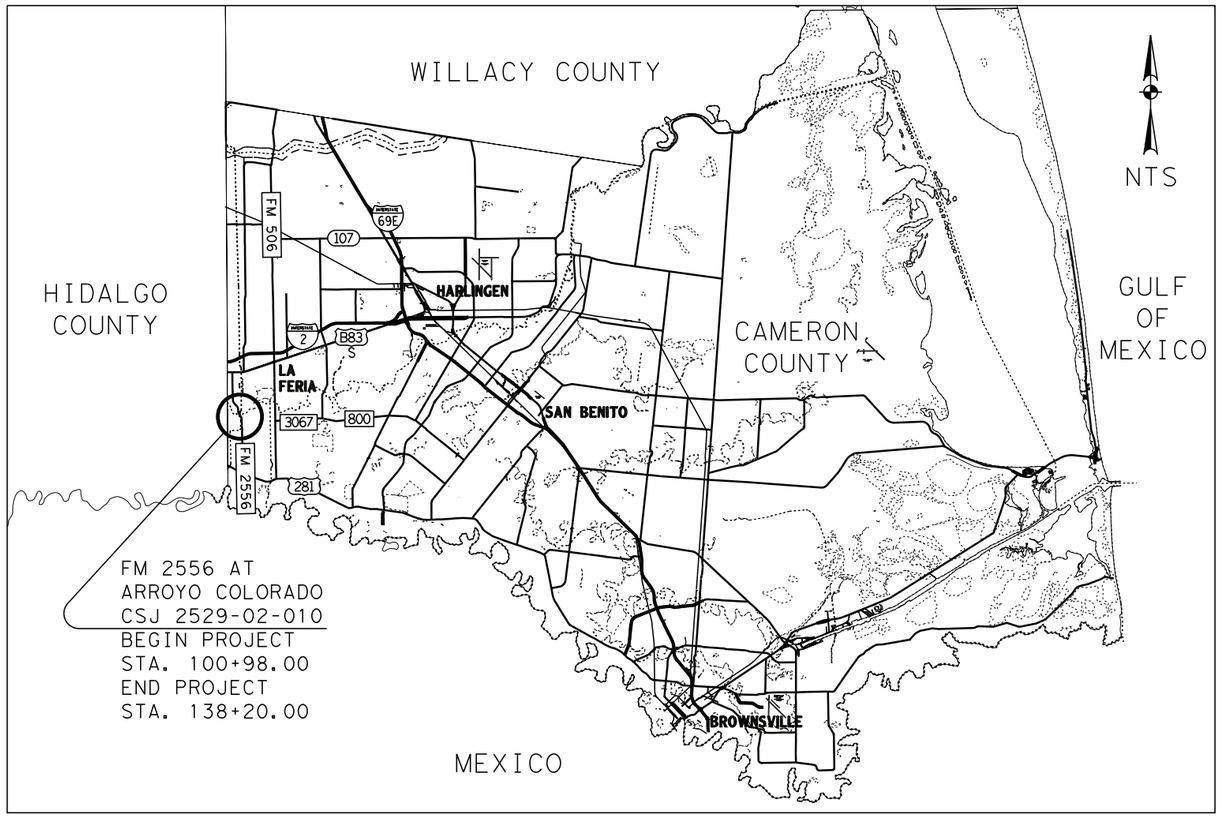
LIMITS: AT ARROYO COLORADO

NET LENGTH OF PROJECT		
ROADWAY	=	0.525 MILES
BRIDGE	=	0.180 MILES
TOTAL	=	0.705 MILES

TYPE OF WORK CONSISTS OF THE FOLLOWING:
REPLACE EXISTING BRIDGE WITH NEW AND WIDER
BRIDGE STRUCTURE AND ROADWAY APPROACHES.

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
AM				
GRAPHICS AM	6	STP 2B24(212)HES		FM 2256
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK JK	TEXAS	PHARR	CAMERON	
	CONTROL	SECTION	JOB	1
CHECK AT	2529	02	010	

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright 6/5/24



LOCAL ENTITIES

US INTERNATIONAL BOUNDARY AND WATER COMMISSION (USIBWC)
CONCURRENCE DATE:
NAME TITLE

DELTA LAKE IRRIGATION DISTRICT
CONCURRENCE DATE:
NAME TITLE

CAMERON COUNTY
CONCURRENCE DATE:
NAME TITLE

FINAL PLAN DATA:

FINAL CONTRACT PRICE: _____
CONTRACTORS NAME: _____
CONTRACTORS ADDRESS: _____
LETTING DATE: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE OF ACCEPTANCE: _____

CHANGE ORDERS & SUPP. AGREEMENTS:

ALL CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS SPECIFICATIONS AND CONTRACT. ALL PROPOSED CONSTRUCTION WAS COMPLETED UNLESS OTHERWISE NOTED.

ANDRES ESPINOZA , P.E. DATE
AREA ENGINEER

T.D.L.R. INSPECTION NOT REQUIRED

PROJECT DATA

LOCATION	ROADWAY	DESIGN SPEED	EXCEPTION	RAILROAD CROSSING	EQUATION
1	FM 2556	60 MPH	NONE	NONE	NONE

FM 2556

FUNCTIONAL CLASSIFICATION: MAJOR COLLECTOR
ADT (2016): 1,952
ADT (2036): 2,730
DESIGN LOAD: HL93
EXISTING STRUCTURE: 21-031-0-2529-02-001
PROPOSED STRUCTURE: 21-031-0-2529-02-187

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FROM FHWA 1273, OCTOBER 23, 2023)

Texas Department of Transportation ©2024

RECOMMENDED FOR LETTING: DATE: 6/11/2024
DocuSigned by: Pedro R. Alvarez
DISTRICT ENGINEER
EABA335C2DAA48C...

SUBMITTED FOR LETTING: DATE: 6/11/2024
DocuSigned by: Andres Espinoza P.E.
AREA ENGINEER
936FACCE27D42E...

SHEET NO.			DESCRIPTION
I. GENERAL			
1			TITLE SHEET
2			INDEX OF SHEETS
3 - 6			FM 2556 ROADWAY TYPICAL SECTIONS
7,7A - 7I			GENERAL NOTES
8 - 8A			ESTIMATE & QUANTITY SHEET
9 - 12			QUANTITY SUMMARY
II. TRAFFIC CONTROL PLAN			
13			TRAFFIC CONTROL PLAN NOTES
14			FM 2556 ROAD CLOSURE AND DETOUR PLAN
15			FM 2556 TCP NARRATIVE AND BARRICADE PLAN
STANDARDS			
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28	(S)	*	TCP(1-1)-18
29	(S)	*	TCP(1-2)-18
30	(S)	*	TCP(2-1)-18
31	(S)	*	TCP(2-2)-18
III. ROADWAY DETAILS			
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33 - 34			FM 2556 HORIZONTAL AND VERTICAL CONTROL SHEETS
35			FM 2556 HORIZONTAL ALIGNMENT DATA
36 - 40			FM 2556 REMOVAL LAYOUT
41 - 45			FM 2556 PLAN AND PROFILE
46			FM 2556 CROSS STREET SW LEVEE RD PLAN AND PROFILE
47			FM 2556 CROSS STREET SE LEVEE RD PLAN AND PROFILE
48			FM 2556 DRIVEWAY PROFILES
49			OMITTED
STANDARDS			
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51	(S)	*	M-10
52	(S)	*	MBTRNOUT
53			OMITTED
54	(S)	*	GF(31)-19
55 - 56	(S)	*	GF(31)TRTL3-20
57	(S)	*	GF(31)MS-19
58	(S)	*	SGT(10S)31-16
59	(S)	*	SGT(11S)31-18
60	(S)	*	SGT(12S)31-18
61	(S)	*	SMTC(N)-16
62	(S)	*	TE(HMAC)-11
63	(S)	*	WF(1)-10
64	(S)	*	WF(2)-10
65 - 66	(S)	*	SETP-CD
67	(S)	*	SETP-PD
68	(S)	*	PSET-SC
69	(S)	*	PSET-SP
70	(S)	*	PSET-RC
71	(S)	*	PSET-RP
72	(D)	*	DRIVEWAY PROFILE DETAILS
73	(D)	*	DRIVEWAY DETAILS PRIVATE (RESIDENTIAL-COMMERCIAL)
74	(D)	*	MISCELLANEOUS PIPE DETAILS
75	(D)	*	SAFETY END TREATMENT DETAILS

SHEET NO.			DESCRIPTION
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77			FM 2556 HYDRAULIC DATA DRAINAGE MAP
78 - 80			FM 2556 HYDRAULIC DATA SHEETS
V. BRIDGES			
81 - 83			FM 2556 BRIDGE LAYOUT
84			FM 2556 BRIDGE TYPICAL SECTION
85			FM 2556 BRIDGE QUANTITY & BEARING SEAT ELEVATIONS
86			FM 2556 BRIDGE ABUTMENT CONTROL ELEVATIONS
87 - 88			FM 2556 BRIDGE BENT DETAILS INTERIOR BENTS 2-5 & 9-10
89 - 90			FM 2556 BRIDGE BENT DETAILS INTERIOR BENTS 6 & 8
91 - 93			FM 2556 BRIDGE BENT DETAILS INTERIOR BENT 7
94 - 97			FM 2556 BRIDGE GIRDER LAYOUT
98			FM 2556 270' PRESTRESSED CONC GIRDER UNIT (SPANS 1-3)
99			FM 2556 180' PRESTRESSED CONC GIRDER UNIT (SPANS 4-5)
100			FM 2556 230' PRESTRESSED CONC GIRDER UNIT (SPANS 6-7)
101			FM 2556 270' PRESTRESSED CONC GIRDER UNIT (SPANS 8-10)
102			FM 2556 PRESTRESSED CONC GIRDER UNIT SECTION
103			FM 2556 BORING LOGS
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108 - 109	(S)	**	CSAB
110 - 111			FD (MOD)
112	(S)	**	IGCS
113 - 114	(S)	**	IGD
115 - 117	(S)	**	IGEB
118 - 119	(S)	**	IGMS
120 - 121	(S)	**	IGSD-44
122	(S)	**	IGSK
123	(S)	**	IGTS
124 - 125	(S)	**	MEBR(C)
126 - 129	(S)	**	PCP
130 - 133	(S)	**	OMITTED
134	(S)	**	PCP-FAB
135 - 136	(S)	**	PMDF
137	(S)	**	SEJ-M
138 - 139	(S)	**	SRR
140 - 142	(S)	**	TYPE T223

SHEET NO.			DESCRIPTION
VI. SIGNING AND PAVEMENT MARKINGS			
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148			FM 2556 SUMMARY OF SMALL SIGNS
STANDARDS			
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150	(S)	*	D&OM(2)-20
151	(S)	*	D&OM(3)-20
152	(S)	*	D&OM(4)-20
153	(S)	*	D&OM(5)-20
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155	(S)	*	PM(1)-22
156	(S)	*	PM(2)-22
157	(S)	*	TSR(3)-13
157A	(S)	*	TSR(4)-13
158	(S)	*	SMD(GEN)-08
159	(S)	*	SMD(SLIP-1)-08
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VII. ENVIRONMENTAL ISSUES			
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165B - 165D			FM 2556 EPIC SHEET SUPPLEMENTALS, TPWD BMPS
166 - 166A			FM 2556 STORM WATER POLLUTION PREVENTION PLAN (SWP3)
167 - 171			FM 2556 SW3P SITE PLAN
STANDARDS			
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173	(S)	*	EC(2)-16

* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS INDEX OF SHEETS WITH THE SYMBOL TO THE LEFT HAVE BEEN ISSUED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
6/5/24

** THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS INDEX OF SHEETS WITH THE SYMBOL TO THE LEFT HAVE BEEN ISSUED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
ZACHARY J. BEIL
139718
LICENSED
PROFESSIONAL ENGINEER
Zachary J Beil
06-05-2024

NOTES:
(S) STATE STANDARD
(D) DISTRICT STANDARD

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 284

Texas Department of Transportation

FM 2556

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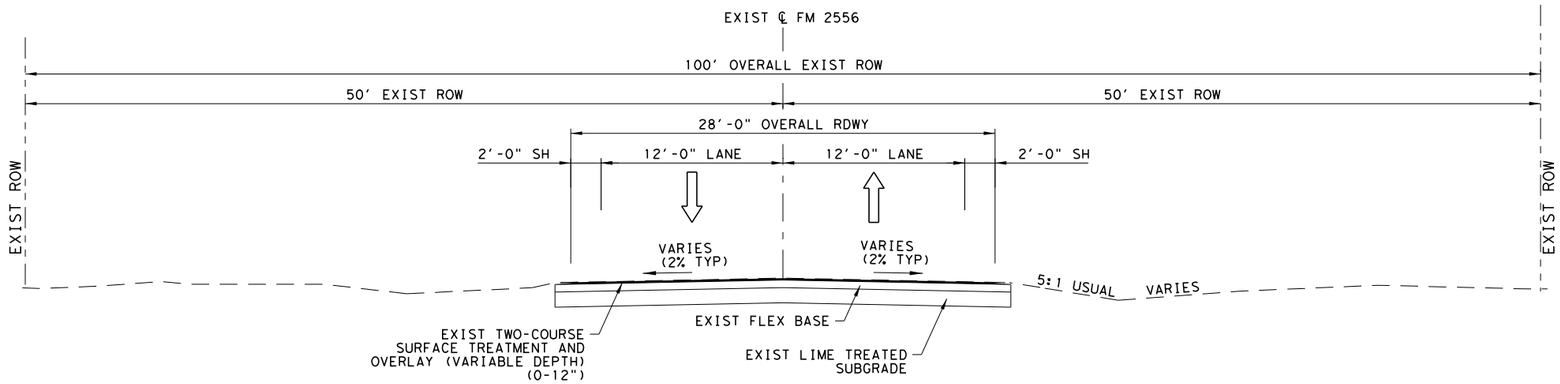
DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		2



EXISTING ROADWAY TYPICAL SECTION
FM 2556

FROM STA 100+98.00 TO 118+56.00
AND
FROM STA 119+66.00 TO 138+20.00

STATE OF TEXAS
ALEXANDER R. MASSARA
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

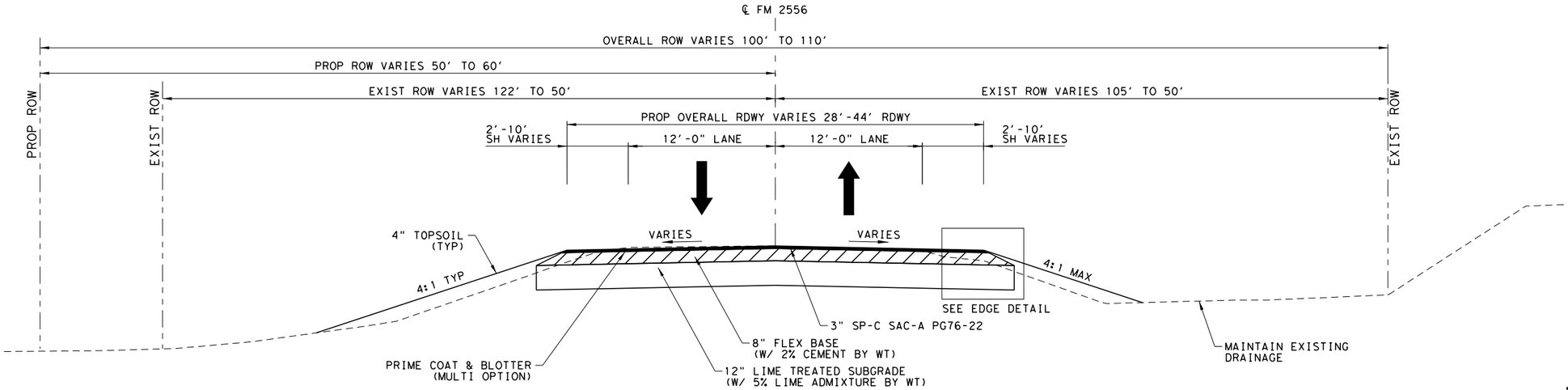
Texas Department of Transportation

FM 2556

TYPICAL SECTIONS

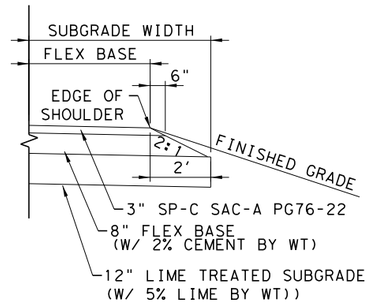
SHEET 1 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		3



PROPOSED ROADWAY TYPICAL SECTION
FM 2556

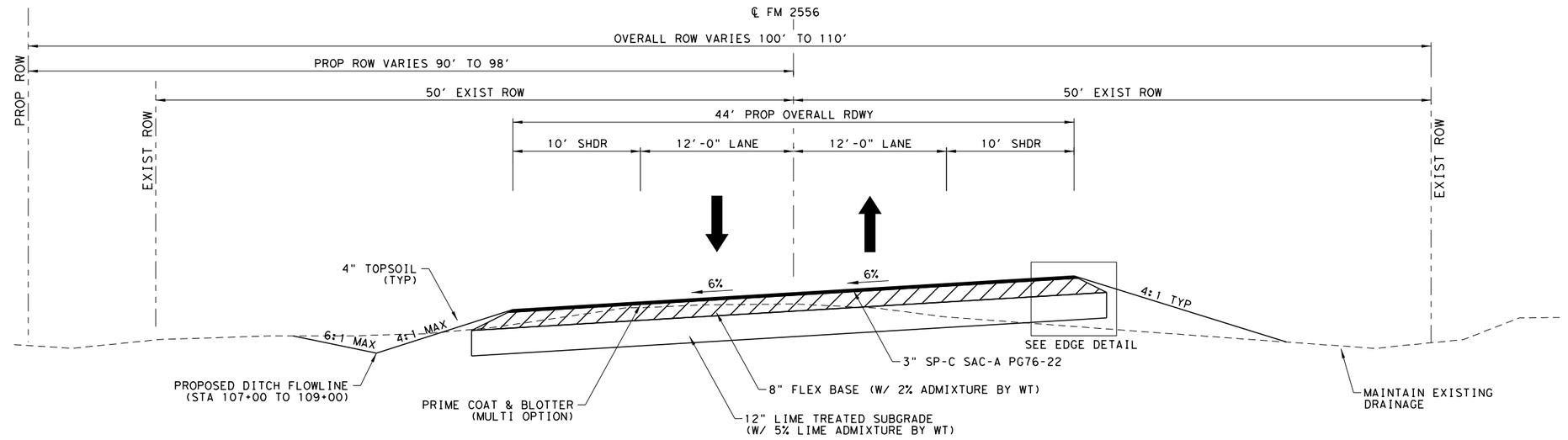
FROM (BEGIN PROJECT) STA 100+98.00 TO STA 104+80.00
FROM STA 127+00.00 TO STA 129+40.00



EDGE DETAIL

NOTES:

1. PAYMENT FOR THE FLEXIBLE BASE AND CEMENT IN THE TAPER WILL BE SUBSIDIARY TO ITEMS 247 AND 275.
2. REFER TO PLAN AND PROFILE SHEETS FOR MBGF LIMITS.
3. REFER TO THE HORIZONTAL ALIGNMENT DATA SHEET SUPERELEVATION TABLE FOR CROSS-SLOPE AND SUPERELEVATION TRANSITION LIMITS.



PROPOSED ROADWAY TYPICAL SECTION
FM 2556

FROM STA 104+80.00 TO STA 110+00.00

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

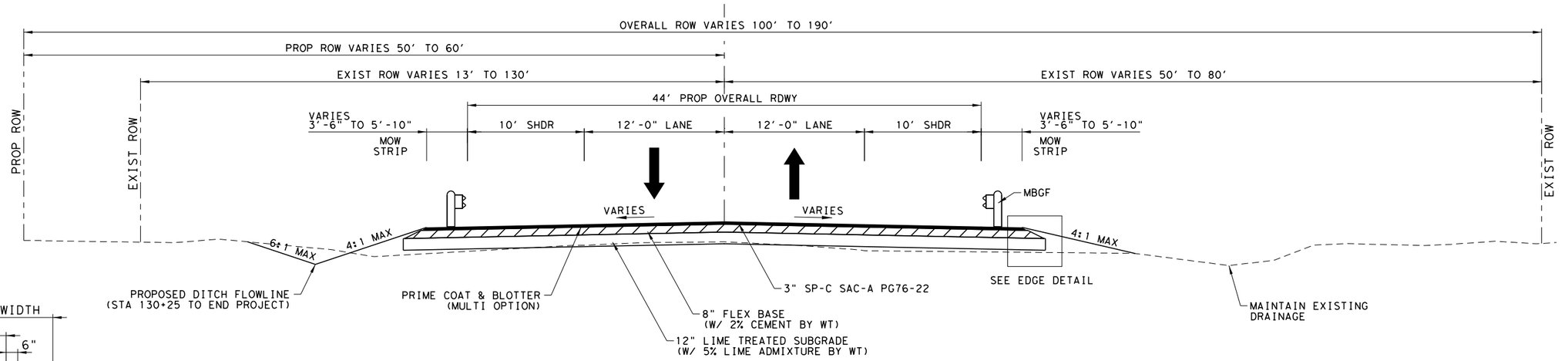
Texas Department of Transportation

FM 2556

TYPICAL SECTIONS

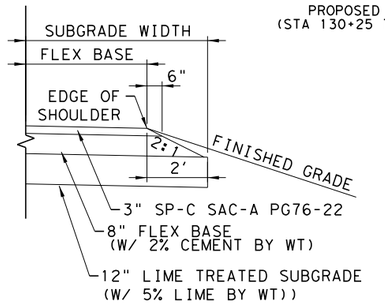
SHEET 2 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		4



PROPOSED ROADWAY TYPICAL SECTION
FM 2556

FROM STA 110+00.00 TO STA 113+10.00
FROM STA 122+60.00 TO STA 123+65.00



EDGE DETAIL

NOTES:

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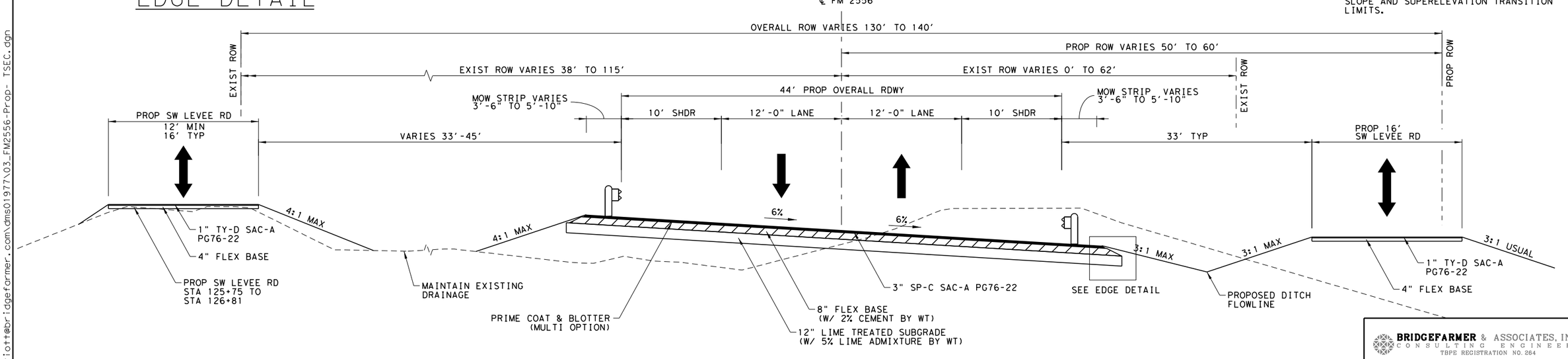


PROPOSED ROADWAY TYPICAL SECTION
FM 2556

FROM STA 123+65.00 TO STA 127+00.00

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER

Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

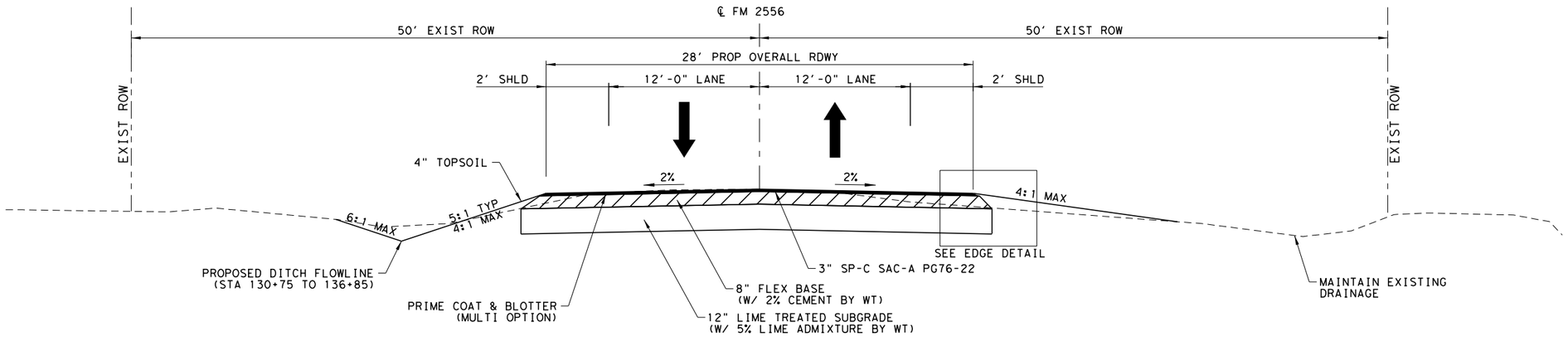
Texas Department of Transportation

FM 2556

TYPICAL SECTIONS

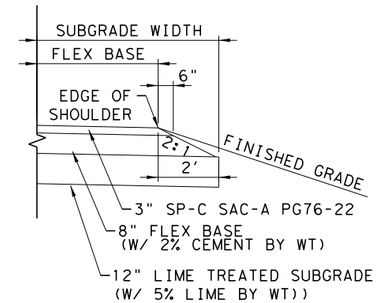
SHEET 3 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		5



PROPOSED ROADWAY TYPICAL SECTION
FM 2556

FROM STA 129+40.00 TO STA 138+20.00 (END PROJECT)



EDGE DETAIL

NOTES:

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Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

TYPICAL SECTIONS

SHEET 4 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		6

Project Number:

County: Cameron **Control:** 2529-02-010

Highway: FM 2556

2014 SPECS GENERAL NOTES:

****

General Requirements and Covenants to ITEMS 1 thru 9

For all pits or quarries, comply with the "Texas Aggregate Quarry and Pit Safety Act."

Provide on a weekly basis a list of equipment, including idle equipment, utilized on the project that week.

The 1-800 call services for utility locations do not include TxDOT facilities. Contact the Pharr District Signal Section (956-702-6225) for coordination regarding TxDOT underground lines.

ITEM 2: Instructions to Bidders

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

Andres Espinoza, P.E., San Benito Area Engineer; Andres.Espinoza@txdot.gov
Gabriel Villareal, P.E., Assist. Area Engineer; Gabriel.Villarreal@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

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

Information found on TxDOT's FTP server will be considered for informational purposes only.
Index of /pub/txdot-info/Pre-Letting Responses/Pharr District/21-Pharr District (Construction) (state.tx.us)

Project Number:

County: Cameron **Control:** 2529-02-010

Highway: FM 2556

ITEM 5: Control of the Work

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

Prior to contract letting, bidders may obtain a free computerized transfer of files (from the Engineer's office) that contains the earthwork information. If copies of the actual cross-sections in additional to, or instead of the electronic files are requested, they will be available at the Engineer's office for borrowing by copying companies for the purpose of making copies for the bidder at the bidder's expense.

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/business/resources/highway/bridge/bridge-publications.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

ITEM 6: Control of Materials

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

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

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

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

ITEM 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

Roadway or Lane closures during the following key dates and/or special events are prohibited:

- National Holidays
- The day before a National Holiday
- During emergency events such as natural disasters or as directed by the Engineer

Project Number:

County: Cameron **Control:** 2529-02-010

Highway: FM 2556

404 Permit Requirements:
The Contractor shall note that discharge of permanent or temporary fill material into the waters of the United States (U.S.), including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

TxDOT will obtain the appropriate nationwide or individual permit(s) when necessary, as dictated by project specific conditions and the potential to affect USACE jurisdictional areas to address the work detailed in the plans. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits or scope of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE on the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by TxDOT. However, the Contractor may request TxDOT to assist in this process by providing complete and specific revised details for TxDOT review and submittal to the USACE. For off project right of way coordination, the Contractor or his agent shall handle all activities directly with the USACE.

It is essential that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Pharr District Environmental Coordinator.

Project Specific Locations (PSL's) Coordination
The Contractor shall not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The Contractor shall be responsible for any and all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE.

The Contractor shall provide the department with a copy of all consultation(s), or approval(s), from the USACE prior to initiating activities.
The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The Contractor is solely responsible for documenting any determination(s) that their activities do not affect a USACE permit area. The Contractor shall maintain copies of their determination(s) for review by the department or any regulatory agency.

Project Number:

County: Cameron **Control:** 2529-02-010

Highway: FM 2556

The disturbed area for all project locations in the Contract, and the 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 required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed 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 right of way to the Engineer and to the local government that operates a separate storm sewer system.

In order to expedite the approval process for PSL's or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the USACE **within 30 days from the date of "authorization to begin work".** If this is not done, the Contractor waives the right to request any contract time considerations if project progress is impacted and PSL'S approval is still pending.

Requests submitted to the Area Engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request shall include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district's environmental section.

ITEM 8: Prosecution and Progress

Working days will be computed and charged in accordance with Article 8.3.1.4. Standard Workweek.

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

TxDOT is required to provide 10 working days advanced written notice of all proposed bridge widening, rehabilitation, or demolition work to the Texas Department of State Health Services (TDSHS) to allow them the opportunity to both verify information provided regarding asbestos containing materials and abatement and observe the demolition/renovation work. Considering that this notice will be provided TDSHS at the beginning of the project for all affected bridge work based on start and finish dates included in the Contractor's original submitted work schedule, any schedule changes proposed by the Contractor shall be submitted to TxDOT at least 15 days prior to the revised or original start date to accommodate the required coordination with TDSHS.

Working days will be computed and charged in accordance with Article 8.3.1.6. defined as follows:

Work and time charges will continue until the start of the bird nesting season. Upon the start of the bird nesting season, work and time charges will stop for a maximum period of 120-Working days for the bird nesting season delay to be completed. Time charges in accordance with Article 8.3.1.4. will resume at the end of the 120-day bird nesting season delay or earlier if mutually agreed in writing by the Engineer and Contractor.

Prepare progress schedules using the Critical Path Method (CPM). Also provide a Project Schedule Summary Report (PSSR) in accordance with Article 8.5.5.2.3.1.

ITEM 100: Preparing Right of Way

Preparation of right of way will be done in accordance with the construction phasing shown on the Traffic Control Plans. Performance of this item will not be allowed outside of the project's current construction phase without prior approval by the Engineer.

Removal of all existing vegetation and trees within the ROW will be subsidiary to prep ROW.

ITEM 132: Embankment

Embankment (DENS CONT) shall be Type C with a max. PI of 40. Material used as embankment material in the top two feet below the bottom of Flexible Base shall meet the following requirements based on preliminary tests and such other tests found necessary by the Engineer.

1. The material shall be such as to produce a well-bonded embankment and shall have a minimum PI of 8 and a maximum PI of 30.

It is the Contractor's responsibility to advise the Engineer of the location of the source sufficiently in advance to avoid delay.

ITEM 160: Topsoil

Use topsoil as needed and directed by the Project Engineer for select problem areas. Unless otherwise approved by the Project Engineer, use topsoil from approved sources outside the right of way as per standard specifications. Existing topsoil is to be salvaged and retained for re-use on the project as topsoil.

For certain locations as shown in the plans, use Biotic Soil Amendments to the topsoil as per the following specification.

Use a natural medium of organic soil amending materials, meeting the following requirements:

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1. Free from roots, clods, hard clay, noxious weeds, tall grass, brush, sticks, stubble, or other litter and free draining and non-toxic.
2. Containing 40% by volume of thermally and mechanically processed straw, flexible flax fibers; 58% by volume of sphagnum peat moss or compost, 2% by volume of additional materials that provide plant derived valuable trace minerals, sugars, starches, proteins fiber and 16 amino acids including folic acid, vitamin A, and tricontanol growth stimulant/regulator; and mycorrhiza inoculants.
3. Total organic matter content of 93% or greater.
4. Application rate must meet manufacturer's recommendation.

Notify the Engineer of the source of topsoil Biotic Soil Amendments at least 30 days prior to delivery of topsoil to the project. The Engineer will confirm the topsoil Biotic Soil Amendments meet or exceed topsoil requirements before approval will be granted for its use. The cost of the Biotic Soil Amendments will be subsidiary to this bid Item.

ITEM 164: Seeding for Erosion Control

During drill seeding operations, application methods shall be in accordance with the method shown in the Standard Specification Book.

SS-1 Tacking Agent shall be a ratio of 2:1, two (Emulsion) to one (water) and applied at a rate of 0.05 gallons per square yard. The SS-1 Tacking Agent required for Drill Seed operations, will not be paid for directly, but will be subsidiary to Item 164 "Drill Seeding." Watering shall not be used with the Drill Seed Method. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer's recommendations when approved by the Engineer.

Cool Season or Warm Season Grasses shall be included as part of Item 164 (See Table 3 and/or Table 4 in the Standard Specification Book or dates and seed type).

Seed mixture shall be as specified under Item 164.

ITEM 166: Fertilizer

Fertilizer rate is based on a rate of 100 Lbs. of Nitrogen per acre. The Nitrogen-Phosphorous Potassium (NPK) ratio shall include a minimum of 5% Phosphorous and 5% Potassium.

Fertilizer shall be homogenized.

ITEM 247: Flexible Base

Flexible Base Type E will be composed of caliche (argillaceous Limestone, calcareous or calcareous clay particles) and may contain stone, conglomerate, gravel, sand, or granular materials when these materials are in situ with the caliche.

Flexible Base (TY E GR 4) caliche shall conform to the following requirements:

Table 1: Gradation Requirements for Flexible Base

Retained on Sq. Sieve:	Percent Retained
2”	0
½”	20-60
No. 4	40-75
No. 40	70-90
Max. PI	15
Max. Wet Ball PI	15
Wet Ball Mill Max. Amount	50
Min. Comp. Strength PSI	150 at 15 PSI lateral pressure
Triaxial Test	Tex-117-E

The Wet Ball Test (Tex-116-E) shall be run and the Plasticity Index of the material passing the No.40 sieve shall be determined (Wet Ball PI).

Flexible Base (TY E GR 4) caliche shall meet minimum compressive strength specified on Table 1 Gradation Requirements for Flexible Base above.

The percent of density as determined by Compaction Ratio (Tex-113-E) for the new Flexible Base shall be a minimum of 98%.

The Contractor's attention is called to the fact that certain existing and/or proposed structures may be within the limits of the Flexible Base. It shall be the Contractor's responsibility to perform construction operations without damage to these structures.

For water added under Item 247, the sulfate content will not exceed 3000-ppm and the chloride content will not exceed 3000-ppm.

ITEM 260: Lime Treatment (Road-Mixed)

The Contractor's attention is called to the fact that certain existing and/or proposed structures are within the limits of the lime-treated Subgrade. Unless otherwise directed by the Engineer, these structures shall be installed before the final rolling of this Subgrade. It shall be the Contractor's responsibility to perform the proper lime treating operation without damage to these structures.

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The slurry method of applying lime will be required, except when the lime is to be added to naturally wet materials as directed by the Engineer.

For this project, the Engineer will direct a random number of lime trucks to be check weighed.

The percent of density as determined by Tex-121-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

Proof roll all constructed lime treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

Allow the mixture to mellow for a minimum period of 48 hours for all types of lime utilized. Additional time might be required due to sulfate and organic testing requirements, as directed by Engineer.

ITEM 275: Cement Treatment (Road-Mixed)

The percent of density as determined by Tex-120-E for the new and salvage Flexible Base shall be a minimum of 98% for all courses.

Proof roll all constructed cement treated subgrade and bases courses in accordance with Item 216, “Proof Rolling.” Correct soft spots as directed. Correction of soft spots in the subgrade or base courses will be at the Contractor’s expense.

Contractor is to place an underseal and/or pavement course as indicated on plans within 14 calendar days of initial prime coat application. Otherwise, reapply prime coat as directed by the Engineer. Reapplication of the prime coat will be at the Contractor’s expense.

ITEM 3096: Asphalts, Oils, and Emulsions

Temporary ramps/detours and driveways may use Performance Grade Binder 64-22.

ITEM 301: Asphalt Antistripping Agents

Hydrated Lime shall be added as an Antistripping additive between the rates of 1% minimum and 2.0% maximum by weight for Items 292, 3076, 3077, and 3080. If the Hamburg Wheel Test cannot be met within these limits, Liquid Antistripping agents as approved by the Engineer may be used in conjunction with lime for Items 3076, 3077, and 3080.

ITEM 310: Prime Coat

The Contractor shall exercise diligence in the application of asphalt by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

Do not apply subsequent courses over the initial prime coat no earlier than 12 hours after the prime coat was applied, unless otherwise authorized or directed by the Engineer.

ITEM 314: Emulsified Asphalt Treatment

The Contractor shall exercise diligence in the application of emulsified asphalt by the use of flagging to keep from spraying or splattering the traveling public with asphaltic material.

ITEM 3076: Dense-Graded Hot-Mix Asphalt

The Contractor shall exercise diligence in the application of "Bonding Course" by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

Blading (not to exceed more than 3-ft from the pavement edge) may also be necessary to clean dirt and grass from pavement edges and turnout areas as work under this bid Item. The cost of this blading will not be paid for directly but shall be considered subsidiary to this bid Item.

Level-up will be placed before the surface course. An asphaltic concrete spreading and finishing machine and/or motor graders; when approved by the Engineer may be used to place the ACP level-up.

All unconfined longitudinal joints shall be constructed with a joint maker providing a maximum ½-inch vertical edge and a minimum 6:1 edge taper or as approved by the Engineer. The Engineer may waive this requirement when no impacts to the traveling public are foreseen.

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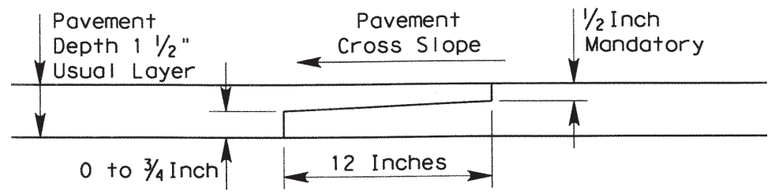

NOTCHED WEDGE JOINT

The engineer may allow for variances to the dimensions shown.

The Hamburg Wheel Test requirement for PG 64 binder will be 5,000 passes @ 0.5-inch rut depth.

Design mixture using a Superpave Gyratory Compactor.

Design layers as shown on typical section to 97.5% density.

Public and private driveways need to have a smooth vertical transition between the edge of pavement and the existing driveways. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 3076.

The use of RAP and RAS (recycled asphalt shingles) will not be allowed as part of the mix design for the final riding surface.

Use a release agent from the Department's MPL to clean and to coat the inside of truck beds for hauling equipment. Hauling equipment shall be cleaned prior to hauling material to job site. Submit a copy of the bill of lading to the Engineer as part of the QCP. Ensure the pavement is free from any spillage of hydraulic oil or diesel from construction equipment. The Department may reject trucks that contain any foreign material and suspend production if the pavement is contaminated by any pollutants mentioned above.

The percentage of RAS used in the total mix shall not exceed 3% when allowed.

When SAC B aggregate is used, material properties are required to be 10 or less on the magnesium sulfate soundness test and 20 or less on the Micro-Deval test.

ITEM 3077: Superpave Mixtures

The Contractor shall exercise diligence in the application of "Bonding Course" by the use of flagging and rolling procedures to keep from spraying or splattering the traveling public with asphaltic material.

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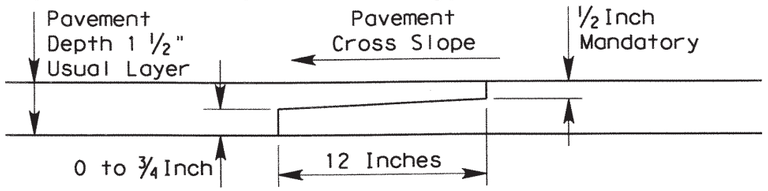
Blading (not to exceed more than 3-ft from the pavement edge) may also be necessary to clean dirt and grass from pavement edges and turnout areas as work under this bid Item. The cost of this blading will not be paid for directly but shall be considered subsidiary to this bid Item.

Level-up will be placed before the surface course. An asphaltic concrete spreading and finishing machine and/or motor graders; when approved by the Engineer may be used to place the ACP level-up.

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

All unconfined longitudinal joints shall be constructed with a joint maker providing a maximum ½-inch vertical edge and a minimum 6:1 edge taper or as approved by the Engineer. The Engineer may waive this requirement when no impacts to the traveling public are foreseen.



NOTCHED WEDGE JOINT

The engineer may allow for variances to the dimensions shown.

Public and private driveways need to have a smooth vertical transition between the edge of pavement and the existing driveways. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 3077.

The use of RAP and RAS (recycled asphalt shingles) will not be allowed as part of the mix design for the final riding surface.

Use a release agent from the Department's MPL to clean and to coat the inside of truck beds for hauling equipment. Hauling equipment shall be cleaned prior to hauling material to job site. Submit a copy of the bill of lading to the Engineer as part of the QCP. Ensure the pavement is free from any spillage of hydraulic oil or diesel from construction equipment. The Department may reject trucks that contain any foreign material and suspend production if the pavement is contaminated by any pollutants mentioned above.

The percentage of RAS used in the total mix shall not exceed 3% when allowed.

SAC B aggregate must have material properties that require 10 or less on the magnesium sulfate soundness test and 20 or less on the Micro-Deval test.

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ITEM 400: Excavation and Backfill for Structures

If the Contractor elects to cut pavement (existing/detour) for structural work beyond that required by the construction phasing shown in the plans and approved by the Engineer, it shall be restored at his expense and backfilled to its original condition or better in accordance with Item 400.

Unless shown otherwise in the plans, use a 1-ft depth for Item 400 Structural Excavation (Special) for gravel bedding needed below drainage structures with unstable material.

Structural Excavation Special (Gravel):

Use durable natural stone when tested in accordance with Tex-411-A, has weight loss of no more than 18% after 5 cycles of magnesium sulfate solution. Provide gravel conforming to an aggregate Grade No. 1 as shown on Table 4 of Article 421.2.

ITEM 416: Drilled Shaft Foundations

Payment for furnishing and installing anchor bolts mounted in drill shafts will be included in the unit price bid for the various diameter drill shafts.

The Contractor shall coordinate with the utility companies to verify utility locations before drilling foundations.

The Contractor shall form, or provide a smooth finish, the portions of drilled shaft that project above the ground line. Place a ¾ inch chamfer on the top edge of each pole foundation. This work will not be paid for directly but will be considered subsidiary to this bid Item.

All drilled shaft foundations will be based on the lengths shown on the plans or those established in writing. Adequate calculations for measurements of foundations have been made in accordance with Article 9.1. of the Standard Specifications. Increases or decreases in the quantities required by change in design will be measured as specified and the revised quantities will be the basis for payment.

In the presence of excess ground water and/or unstable conditions in sub-grade soils prevents excavation to the line and depths indicated on the plans for "Drilled Shaft Foundation", other proposed methods of foundation installation such as casing, etc. shall be submitted for review and approved by the Engineer.

ITEM 420: Concrete Substructures

Pay bent concrete as plan quantity.

ITEM 421: Hydraulic Cement Concrete

Provide Sulfate Resistant Concrete for all concrete piling and drilled shafts.

Provide equipment at the batch plant for determining the free moisture and/or absorption of aggregates in accordance with applicable TXDOT Test.

Provide the following items for concrete batch inspection in accordance with specifications outlined in DMS-10101, "Computer Equipment":

(1) One Desktop Microcomputer or One Laptop Microcomputer
(2) One Integrated Printer/Scanner/Copier/Fax Unit
(3) Contractor-Furnished Software
(4) Hardware

Submit to the Engineer for approval the project locations for all Portland Cement concrete washout areas prior to starting any concrete work.

Fiber Reinforced Concrete is not permitted.

ITEM 427: Surface Finishes for Concrete

Provide surface finishes for concrete as follows:

(1) Bridge overpass and underpass structures – surface area I, opaque sealer coating (color to be determined by the Engineer).
(2) Bridge waterway crossings and bridge class box culvert structures – surface area II, opaque sealer coating (color to be determined by the Engineer).

Concrete traffic barrier/railing (roadway and bridge) and retaining wall coping - opaque sealer coating (color to be determined by the Engineer) to all exposed surfaces.

ITEM 432: Riprap

Provide Class "A" concrete minimum for riprap aprons placed around all box culvert and pipe safety end treatments. Provide ¼-inch thick dummy joints at least every 15-ft for riprap aprons placed around box and pipe culverts.

Do not use fiber reinforced concrete RIPRAP on side slopes equal to or steeper than 6:1 unless approved by the Engineer.

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ITEM 464: Reinforced Concrete Pipe

Use tongue and groove pipe where the RCP extends into the lime treated subgrade. The 4-foot depth restriction for heavy equipment passage over pipe structures is voided. The Contractor will be responsible for any construction damage to these facilities.

Do not use mortar joints.

All reinforced concrete pipe shall include rubber gaskets unless shown otherwise on the plans or directed by the Engineer.

ITEM 467: Safety End Treatment

All Type II SET's shall have riprap, Class "A" minimum, aprons as shown on the plans. The Contractor may submit an alternate precast SET design for approval by the Engineer.

ITEM 496: Removing Structures

Submit a demolition plan in accordance with Item 496 and the plans for bridge structures identified for removal.

ITEM 502: Barricades, Signs, and Traffic Handling

Shadow vehicles equipped with Truck-Mounted Attenuators are required for traffic handling. See notes for Item 6185: Truck Mounted Attenuator/Trailer Attenuator, for additional references pertaining to the TMAs.

Replace/relocate all regulatory signs removed due to construction operations with the same sign on fixed support(s) immediately upon its removal. First obtain Project Engineer approval before removing any regulatory roadway sign. Required flaggers are to be available to direct traffic during sign intermediate down time.

Relocate any Directional Sign Assemblies removed during construction operations immediately upon their removal.

These signs shall be relocated to a location in accordance with the Latest Version of the "Texas Manual on Uniform Traffic Control Devices". In no case will a sign be removed without a replacement sign and support(s) being readily available and a location established. Removal and relocation of these signs required for traffic control will not be paid for directly but shall be considered subsidiary to Item 502.

From the beginning to the end of the project, all traffic control devices need to be in acceptable condition as per the Texas Quality Guidelines for Work Zone Traffic Control Devices.

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 "Safety Contingency" is not intended to be used in lieu of bid Items established by the contract.

Remove and dispose of all litter, debris, objectionable material, excess materials that accumulate at the base of all traffic control devices as directed by the Engineer.

ITEM 504: Field Office and Laboratory

Furnish (1) Field Office (Type C).

The Contractor will furnish a Type D Structure (Asphalt Mix Laboratory) modified by the following.

Laboratory room:

The other room of this building will be used as a laboratory and will include access to a bathroom facility from the interior. The laboratory and bathroom facility will have the walls, ceiling and floor insulated such that the air temperature can always be maintained at 76 degrees Fahrenheit.

Furnish for the Department's use in the asphalt laboratory one (1) desktop computer.

ITEM 506: Temporary Erosion, Sedimentation, and Environmental Controls

Before starting each phase of construction, review with the Engineer the SW3P used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SW3P. Location of Construction Exits are to be approved by the Engineer. After completing earthwork operations, restore and reseed the disturbed areas in accordance with the Department's specifications for permanent or temporary erosion control. Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

The Contractor Force Account "Erosion Control Maintenance" that has been established for this project is intended to be utilized for work zone Best Management Practice (BMP) maintenance, to improve the effectiveness of the Environmental Controls that may need maintenance attention

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and/or require replacement while the project is still under the construction stage. These procedures will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent BMP management reviews on the project. The "Erosion Control Maintenance" is not intended to be used in lieu of bid Items established by the contract.

ITEM 529: Concrete Curb, Gutter, and Combined Curb and Gutter

Before final acceptance of the project, remove discoloration caused by tire marks, mud, asphalt, paint, or other similar material by any method satisfactory to the Engineer to achieve a uniform color and texture of the finished surface exposed to view.

Curb attached to the MBGF thrie-beam transition section will be subsidiary to the MBGF transition.

ITEM 530: Intersections, Driveways, and Turnouts

Prime coat shall meet the requirements of Item 310.

Public and private driveways need to have a smooth vertical transition tie-in between the proposed driveway and the existing driveway. The Contractor is to add a vertical taper if needed which will be subsidiary to Item 530.

ITEM 538: Right of Way Markers

Right of way markers will be set under the supervision of a registered public land surveyor.

Existing right of way monuments to be reset with proposed right of way markers will be referenced to a minimum of three reference points set under the supervision of a registered public land surveyor.

The Contractor will inform the Engineer when all reference points have been installed and allow the TXDOT survey crew to survey the reference points before installing the proposed right of way markers.

ITEM 540: Metal Beam Guard Fence

The optional terminal anchor post with the terminal connector will be required as shown on the Metal Beam Guard Fence Standard.

Galvanize the rail elements supplied for this project using a Type II Zinc Coating.

ITEM 542: Removing Metal Beam Guard Fence

Dispose all metal beam guard fence materials unless shown otherwise in the plans.

ITEM 544: Guardrail End Treatments

Label “end treatment type” on backside of unit at time of installation.

ITEM 552: Wire Fence

Contractor is to repair any wire fence that is damaged by the Contractor’s construction operations to insure the retention of livestock, if any, in their respective pastures along the project.

ITEM 560: Mailbox Assemblies

Coordinate and verify final mailbox locations with TxDOT and the US Postmaster.

ITEMS 636: Signs

Complete sign blanks and panels shall be handled and stored at the job site in such a manner that corners, edges and faces are not damaged. Finished sign blanks shall be stored in either a weatherproof warehouse or outside and off the ground in a vertical position. All paper, cardboard and chemically treated separators and packaging shall be removed prior to outside storage.

ITEM 644: Small Roadside Sign Assemblies

All signs shall be installed as shown in the plans and in accordance with the current edition of the "Texas Manual on Uniform Traffic Control Devices" and the “Sign Crew Field Book” (SCFB).

All signs shall be erected according to the locations shown on the signing layout sheets except that a sign may be shifted in order to secure a more desirable location. All sign locations will be staked as shown in the plans and as approved. It is the intent of the plans to erect all roadside traffic signs with the sign edge a minimum of 6 feet from the edge of the shoulder, or if none, 12 feet from the edge of the travel lane. In curb and gutter sections, the sign edge shall be a minimum of 2 feet from the face of the curb.

For this project, aluminum type sign blanks as provided for under Item 636 will be required for all proposed signing installed under Item 644. Aluminum sign blanks less than 7.5 square feet shall be

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0.08-inch-thick, sign blanks 7.5 to 15 square feet shall be 0.100-inch-thick and sign blanks greater than 15 square feet shall be 0.125 inch thick.

All excess excavation shall be spread uniformly inside the right of way as directed and shall be included in the price of these Items.

Sign types which design details are not shown on the plans shall conform with the latest edition of the Department's "Standard Highway Sign Design for Texas" Manual.

Signs shown to be removed shall include the complete sign installation and separate the sign post at the concrete foundation. The concrete foundation shall be disposed in accordance with this bid Item. Except for concrete foundations, all removed sign panels, sign posts, and hardware shall remain then property of the Department. All removed sign installations shall be completely disassembled. All salvageable sections of sign panels shall be recycled by TxDOT. The removed sign material will be required to be hauled to the maintenance yard closest to the project. No signs shall be removed without prior approval.

ITEM 658: Delineator and Object Marker Assemblies

Delineator assemblies shall be installed 8 feet from the edge of the shoulder unless restricted by some obstruction, in which case, the delineator assembly shall be placed between 2 and 8 feet from the edge of the shoulder.

Bi-directional object markers shall be in accordance with the D&OM standard sheets. The Contractor is directed to the standards when instructed where and how to install the object markers.

ITEMS 662 and 666: Work Zone Pavement Markings and Retroreflectorized Pavement Markings

All permanent pavement markings and work zone pavement markings for this project under these Items shall be 0.100 inches (100 mil) thick thermoplastic.

Any permanent pavement markings or non-removal work zone pavement markings lacking reflectivity in accordance with the requirements of Tex 828-B, or that fail to meet minimum retro reflectivity requirements for longitudinal pavement markings when required, will be addressed per the requirements of the specification. The roadway will be re-striped at no additional compensation.

Pavement surface preparation for markings and markers will not be paid for directly but shall be considered subsidiary to Item 666.

Prior to any striping operations, an on-site coordination meeting between all the parties involved will be required to review striping details and requirements to ensure quality work.

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The beads used on this project shall meet the requirements of Departmental Materials Specification DMS-8290, Glass Traffic Beads Texas Type II & III. Use a 50% Type II/ 50% Type III mix utilizing a double drop system with Type III beads dropped first.

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2529-02-010 **DISTRICT** Pharr **COUNTY** Cameron
HIGHWAY FM 2556

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**2529-02-010**			
		PROJECT ID		**A00122544**			
		COUNTY		**Cameron**			
		HIGHWAY		**FM 2556**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	39.000		39.000	
	104-6027	REMOVING CONC (APPR SLAB)	SY	164.000		164.000	
	105-6014	REMOVING STAB BASE & ASPH PAV (7"-12")	SY	11,330.000		11,330.000	
	106-6001	OBLITERATING ABANDONED ROAD	STA	22.000		22.000	
	110-6001	EXCAVATION (ROADWAY)	CY	2,327.000		2,327.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	18,438.000		18,438.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	38,491.000		38,491.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	36,570.000		36,570.000	
	166-6002	FERTILIZER	TON	1.800		1.800	
	168-6001	VEGETATIVE WATERING	MG	615.000		615.000	
	247-6060	FL BS (CMP IN PLC)(TY E GR 4)(FNAL POS)	CY	2,799.000		2,799.000	
	260-6011	LIME TRT (EXST MATL) (12")	SY	12,200.000		12,200.000	
	260-6016	LIME (HYD, COM, OR QK(SLURRY))	TON	302.000		302.000	
	275-6001	CEMENT	TON	91.000		91.000	
	275-6009	CEMENT TREAT (NEW BASE) (8")	SY	12,110.000		12,110.000	
	310-6009	PRIME COAT (MC-30)	GAL	2,474.000		2,474.000	
	400-6005	CEM STABIL BKFL	CY	224.000		224.000	
	403-6001	TEMPORARY SPL SHORING	SF	690.000		690.000	
	416-6001	DRILL SHAFT (18 IN)	LF	122.000		122.000	
	416-6003	DRILL SHAFT (30 IN)	LF	1,134.000		1,134.000	
	416-6004	DRILL SHAFT (36 IN)	LF	495.000		495.000	
	416-6005	DRILL SHAFT (42 IN)	LF	2,445.000		2,445.000	
	420-6013	CL C CONC (ABUT)	CY	62.600		62.600	
	420-6029	CL C CONC (CAP)	CY	332.200		332.200	
	420-6037	CL C CONC (COLUMN)	CY	207.400		207.400	
	420-6043	CL C CONC (FOOTING)	CY	147.000		147.000	
	422-6001	REINF CONC SLAB	SF	43,700.000		43,700.000	
	422-6015	APPROACH SLAB	CY	70.600		70.600	
	425-6037	PRESTR CONC GIRDER (TX40)	LF	4,296.000		4,296.000	
	425-6039	PRESTR CONC GIRDER (TX54)	LF	1,374.000		1,374.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	15.000		15.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	366.000		366.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	78.000		78.000	
	450-6006	RAIL (TY T223)	LF	1,960.000		1,960.000	
	454-6001	SEALED EXPANSION JOINT (4 IN) (SEJ - A)	LF	226.000		226.000	
	464-6014	RC PIPE (CL III)(72 IN)	LF	56.000		56.000	
	464-6025	RC PIPE (CL V)(18 IN)	LF	92.000		92.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2529-02-010 **DISTRICT** Pharr **COUNTY** Cameron
HIGHWAY FM 2556

			CONTROL SECTION JOB		**2529-02-010**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00122544**		
			COUNTY		**Cameron**		
			HIGHWAY		**FM 2556**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	3.000		3.000	
	467-6506	SET (TY II) (72 IN) (RCP) (4: 1) (P)	EA	1.000		1.000	
	496-6006	REMOV STR (HEADWALL)	EA	1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF	25.000		25.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	496-6043	REMOV STR (SMALL FENCE)	LF	1,500.000		1,500.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	15.000		15.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	120.000		120.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	6,975.000		6,975.000	
	530-6005	DRIVEWAYS (ACP)	SY	80.000		80.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,275.000		1,275.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	825.000		825.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	8.000		8.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	16.000		16.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	7.000		7.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	14.000		14.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	14.000		14.000	
	658-6071	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA	20.000		20.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	7,770.000		7,770.000	
	666-6208	REFL PAV MRK TY II (Y) 6" (BRK)	LF	50.000		50.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	7,880.000		7,880.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	95.000		95.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	15,630.000		15,630.000	
	3076-6049	D-GR HMA TY-D SAC-A PG76-22	TON	46.000		46.000	
	3077-6033	SP MIXES SP-C SAC-A PG76-22	TON	1,970.000		1,970.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

ROADWAY QUANTITIES

SUMMARY OF ROADWAY ITEMS																			
LOCATION	100 6002	106 6001	110 6001	132 6006	160 6003	247 6060	260 6011	260 6016	275 6001	275 6009	310 6009	3076 6049	3077 6033	432 6031	432 6045	464 6025	464 6014	467 6363	467 6506
	PREPARING ROW	OBLITERATING ABANDONED ROAD	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	FURNISHING AND PLACING TOPSOIL (4")	FL BS (CMP IN PLC) (TY E GR 4) (FNAL POS)	LIME TRT (EXST MATL) (12")	LIME (HYD, COM, OR QK (SLURRY))	CEMENT	CEMENT TREAT (NEW BASE) (8")	PRIME COAT (MC-30)	D-GR HMA TY-D SAC-A PG76-22	SP MIXES SP-C SAC-A PG76-22	RIPRAP (STONE PROTECTION) (12 IN)	RIPRAP (MOW STRIP) (4 IN)	RC PIPE (CL V) (18 IN)	RC PIPE (CL III) (72 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (72 IN) (RCP) (4: 1) (P)
	STA	STA	CY	CY	SY	CY	SY	TON	TON	SY	GAL	TON	TON	CY	CY	LF	LF	EA	EA
FM 2556	39	22	2327	18438	38491	2799	12200	302	91	12110	2474	46	1970	15	78	92	56	3	1
CSJ: 2529-02-010																			
PROJECT TOTALS	**39**	**22**	**2327**	**18438**	**38491**	**2799**	**12200**	**302**	**91**	**12110**	**2474**	**46**	**1970**	**15**	**78**	**92**	**56**	**3**	**1**

ROADWAY QUANTITIES

SUMMARY OF ROADWAY ITEMS				
LOCATION	530 6005	540 6001	540 6006	544 6001
	DRIVEWAYS (ACP)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)
	SY	LF	EA	EA
FM 2556	80	1275	4	4
CSJ: 2529-02-010				
PROJECT TOTALS	**80**	**1275**	**4**	**4**

REMOVAL QUANTITIES

SUMMARY OF REMOVAL ITEMS								
LOCATION	104 6027	105 6014	496 6006	496 6007	496 6010	496 6043	542 6001	542 6002
	REMOVING CONC (APPR SLAB)	REMOVING STAB BASE & ASPH PAV (7"-12")	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOV STR (SMALL FENCE)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION
	SY	SY	EA	LF	EA	LF	LF	EA
FM 2556	164	11330	1	25	1	1500	825	8
CSJ: 2529-02-010								
PROJECT TOTALS	**164**	**11330**	**1**	**25**	**1**	**1500**	**825**	**8**

NOTE:

1. BASIS OF ESTIMATE IS FOR CONTRACTOR USE ONLY.

SWPPP QUANTITIES

SUMMARY OF EROSION CONTROL ITEMS					
LOCATION	164 6035	166 6002	168 6001	506 6002	506 6038
	DRILL SEEDING (PERM) (RURAL) (CLAY)	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	TEMP SEDMT CONT FENCE (INSTALL)
	SY	TON	MG	LF	LF
FM 2556	36570	1.8	615	120	6975
CSJ: 2529-02-010					
PROJECT TOTALS	**36570**	**1.8**	**615**	**120**	**6975**

BASIS OF ESTIMATE

BASIS OF ESTIMATE						
				FM 2556 CSJ: 2529-02-010		
ITEM		DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT
166	6002	FERTILIZER	0.1 LB/SY	36570	1.8	TON
168	6001	VEGETATIVE WATERING	81.4 MG/AC	36570	615.0	MG
247	6060	FLEX BASE*	3374 LBS/CY (4" TH)	900	99	CY
247	6060	FLEX BASE**	3374 LBS/CY (8" TH)	12110	2700	CY
260	6016	LIME	5% OF 2970 LB/CY	12200	302	TON
275	6001	CEMENT	2% OF 3374 LB/CY	12110	91	TON
310	2001	PRIME COAT (MC-30)	0.2 GAL/SY	12366	2474	GAL
3076	6049	D-GR HMA TY-D SAC-A PG76-22*	114 LBS/SY (1" TH)	799	46	TON
3077	6033	SP MIXES SP-C-SAC-A PG76-22**	342 LBS/SY (3" TH)	11490	1970	TON

*RATES APPLICABLE TO LEVEE ACCESS ROADWAYS
**RATES APPLICABLE TO FM 2556 ROADWAYS

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

QUANTITY SUMMARY

SHEET 1 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		9

PAVEMENT MARKING QUANTITIES

SUMMARY OF PAVEMENT MARKING ITEMS					
LOCATION	666 6174	666 6208	666 6210	672 6009	678 6002
	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (Y) 6" (BRK)	REFL PAV MRK TY II (Y) 6" (SLD)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")
	LF	LF	LF	EA	LF
FM 2556	7700	50	7880	95	15630
CSJ: 2529-02-010					
PROJECT TOTALS	**7700**	**50**	**7880**	**95**	**15630**

SIGNING QUANTITIES

SUMMARY OF SIGNING ITEMS					
LOCATION	644 6027	644 6030	644 6076	658 6062	658 6071
	IN SM RD SN SUP&AM TYS80(1)SA(P)	IN SM RD SN SUP&AM TYS80(1)SA(T)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2 (BI)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)
	EA	EA	EA	EA	EA
FM 2556	16	7	14	14	20
CSJ: 2529-02-010					
PROJECT TOTALS	**16**	**7**	**14**	**14**	**20**

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

QUANTITY SUMMARY

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		10

BRIDGE QUANTITIES

SUMMARY OF BRIDGE ITEMS																	
LOCATION	400 6005	403 6001	416 6001	416 6003	416 6004	416 6005	420 6013	420 6029	420 6037	420 6043	422 6001	422 6015	425 6037	425 6039	432 6033	450 6006	454 6001
	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)	DRILL SHAFT (30 IN)	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	CL C CONC (FOOTING)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX40)	PRESTR CONC GIRDER (TX54)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - A)
	CY	SF	LF	LF	LF	LF	CY	CY	CY	CY	SF	CY	LF	LF	CY	LF	LF
FM 2556	224	690	122	1134	495	2445	62.6	332.2	207.4	147.0	43700	70.6	4296.00	1374.00	366	1960.0	226
CSJ: 2529-02-010																	

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

QUANTITY SUMMARY

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		11

EARTHWORK QUANTITIES

EARTHWORK - FM 2556

		Area		Volume			
STA	Dist	Cut	Fill	Incr. Cut	Cumul. Cut	Incr. Fill	Cumul. Fill
	(FT)	(SF)	(SF)	(CY)	(CY)	(CY)	(CY)
101+00		0	0				
101+50	50	0	2	0	0	2	2
102+00	50	0	5	0	0	6	8
102+50	50	0	10	0	0	14	22
103+00	50	0	12	0	0	20	42
103+50	50	0	12	0	0	22	64
104+00	50	0	20	0	0	30	94
104+50	50	0	22	0	0	39	133
105+00	50	0	30	0	0	48	181
105+50	50	0	26	0	0	52	233
106+00	50	0	25	0	0	47	280
106+50	50	0	23	0	0	44	324
107+00	50	0	39	0	0	57	381
107+50	50	1	72	1	1	103	484
108+00	50	1	115	2	3	173	657
108+50	50	8	160	8	11	255	912
109+00	50	4	216	11	22	348	1,260
109+50	50	0	814	4	26	954	2,214
110+00	50	0	381	0	26	1,106	3,320
110+50	50	0	465	0	26	783	4,103
111+00	50	0	592	0	26	979	5,082
111+50	50	0	668	0	26	1,167	6,249
112+00	50	0	745	0	26	1,308	7,557
112+50	50	0	812	0	26	1,442	8,999
113+00	50	0	842	0	26	1,531	10,530
113+50	50	0	0	0	26	780	11,310
122+50	900	0	0	0	26	0	11,310
123+00	50	0	931	0	26	862	12,172
123+50	50	0	597	0	26	1,415	13,587
124+00	50	144	255	133	159	789	14,376
124+50	50	103	471	229	388	672	15,048
125+00	50	92	404	181	569	810	15,858
125+50	50	84	358	163	732	706	16,564
126+00	50	75	335	147	879	642	17,206
126+50	50	118	125	179	1,058	426	17,632
127+00	50	138	0	237	1,295	116	17,748
127+50	50	93	1	214	1,509	1	17,749
128+00	50	81	46	161	1,670	44	17,793
128+50	50	68	54	138	1,808	93	17,886
129+00	50	58	39	117	1,925	86	17,972
129+50	50	25	58	77	2,002	90	18,062
130+00	50	21	16	43	2,045	69	18,131
130+50	50	14	39	32	2,077	51	18,182
131+00	50	8	11	20	2,097	46	18,228
131+50	50	23	6	29	2,126	16	18,244
132+00	50	20	3	40	2,166	8	18,252
132+50	50	12	4	30	2,196	6	18,258
133+00	50	12	6	22	2,218	9	18,267
133+50	50	9	9	19	2,237	14	18,281
134+00	50	16	8	23	2,260	16	18,297
134+50	50	8	7	22	2,282	14	18,311
135+00	50	8	18	15	2,297	23	18,334
135+50	50	9	9	16	2,313	25	18,359
136+00	50	1	12	9	2,322	19	18,378
136+50	50	1	6	2	2,324	17	18,395
137+00	50	1	7	2	2,326	12	18,407
137+50	50	0	8	1	2,327	14	18,421
138+00	50	0	10	0	2,327	17	18,438
TOTAL				**2,327**		**18,438**	

NOTE:
SHRINKAGE OR SWELLING FACTORS WERE NOT CONSIDERED IN DETERMINING QUANTITIES. VOLUMES WERE MEASURED AS ORIGINAL AND FINAL POSITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE VALUES WHEN NEEDED.

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

QUANTITY SUMMARY

SHEET 4 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		12

GENERAL NOTES AND SPECIFICATIONS DATA:

USE A POWER-BROOM WHEN CLEANING THE ROADWAY AS NEEDED.

REMOVE & DISPOSE ALL MATERIAL NOT DEEMED SALVAGEABLE BY THE ENGINEER, UNLESS OTHERWISE SHOWN ON THE PLANS.

ON EXISTING PAVEMENT THAT WILL REMAIN IN PLACE, SAND BLAST OR SURFACE TREAT IN ORDER TO REMOVE EXISTING STRIPING.

DO NOT BLOCK DRAINAGE WHEN HANDLING & STOCKPILING EXCAVATED MATERIAL.

MAINTAIN ACCESS TO DRIVEWAYS AND INTERSECTIONS THROUGH ALL PHASES OF CONSTRUCTION.

MAINTAIN POSITIVE DRAINAGE DURING ALL PHASES OF CONSTRUCTION.

ALWAYS COMPLETE THE PROPOSED DRIVEWAYS DURING THEIR TCP PHASE BEFORE SWITCHING TRAFFIC TO A NEW PHASE UNLESS DIRECTED BY THE ENGINEER.

TRAFFIC CONTROL DEVICES:

AT THE COMMENCEMENT OF THE PROJECT, ALL TRAFFIC CONTROL DEVICES SHALL BE IN ACCEPTABLE CONDITION, AND MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT, AS PER GUIDELINES FOR TEMPORARY TRAFFIC CONTROL DEVICES AND FEATURES.

NOTIFY THE AREA ENGINEER(AE) IN WRITING(E-MAIL IS ACCEPTABLE) ONCE THE TRAFFIC CONTROL PLAN(TCP) AND ALL TRAFFIC CONTROL DEVICES HAVE BEEN INSTALLED AS PER PLANS ON THE PROJECT SO THAT THE DEPARTMENT'S RESPONSIBLE PERSON ACCOMPANIED BY THE CONTRACTOR'S RESPONSIBLE PERSON CAN CONDUCT A NIGHT INSPECTION ON THE SAID TCP AND TRAFFIC CONTROL DEVICES. COMMENCEMENT OF WORK WILL NOT BE AUTHORIZED NOR ALLOWED UNTIL THE AE NOTIFIES THE CONTRACTOR IN WRITING(E-MAIL IS ACCEPTABLE) TO PROCEED WITH THE WORK.

CONTRACTOR SHALL HAVE A SUFFICIENT AMOUNT OF TRAFFIC CONTROL DEVICES IN ACCEPTABLE CONDITION TO REPLACE ANY DAMAGED TRAFFIC CONTROL DEVICE WITHIN 24 HOURS OF NOTIFICATION.

PROVIDE ADDITIONAL SIGNS AND BARRICADES AS NECESSARY TO ADDRESS FIELD CONSTRUCTIBILITY & VISIBILITY. THESE ADDITIONAL SIGNS WILL BE CONSIDERED SUBSIDIARY TO ITEM 502.

REMOVE OR COMPLETELY COVER ALL EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN.

ADJUST STOP SIGNS AS NEEDED ON INTERSECTING STREETS DURING THE VARIOUS CONSTRUCTION PHASES. DO NOT REMOVE ANY EXISTING STOP SIGNS UNTIL TEMPORARY SIGNS ARE IN PLACE.

COORDINATE THE TRAFFIC CONTROL PLAN AND THE VARIOUS SEQUENCES OF CONSTRUCTION WITH ADJACENT CONSTRUCTION PROJECTS IF APPLICABLE, TO ENSURE THE UNINTERRUPTED AND SAFE FLOW OF TRAFFIC.

NOTIFY THE ENGINEER IN WRITING WHEN MAJOR TRAFFIC CHANGES ARE TO BE MADE. NOTIFICATIONS MUST BE GIVEN A MINIMUM OF THREE WORKING DAYS PRIOR TO THE CHANGE.

ALL WORK ZONE PAVEMENT MARKINGS FOR THIS PROJECT SHALL BE 0.100 INCHES (100 MIL) THICK THERMOPLASTIC.

SAFETY:

PROTECT EXPOSED PITS THAT MUST REMAIN OPEN DURING NON-WORKING HOURS AS PER OSHA REQUIREMENTS.

PROJECT SPECIFIC NOTES:

1. FM 2556: CONTACT DAVID LOZANO (CELL: (956) 373-4196) WITH THE DELTA LAKE IRRIGATION DISTRICT AT LEAST A WEEK PRIOR TO DRILLING AT THE ARROYO COLORADO SITE.

2. CONTRACTOR SHALL MAINTAIN ACCESS TO PROPERTIES AT ALL TIMES DURING CONSTRUCTION.

TRAFFIC CONTROL PLAN NOTES

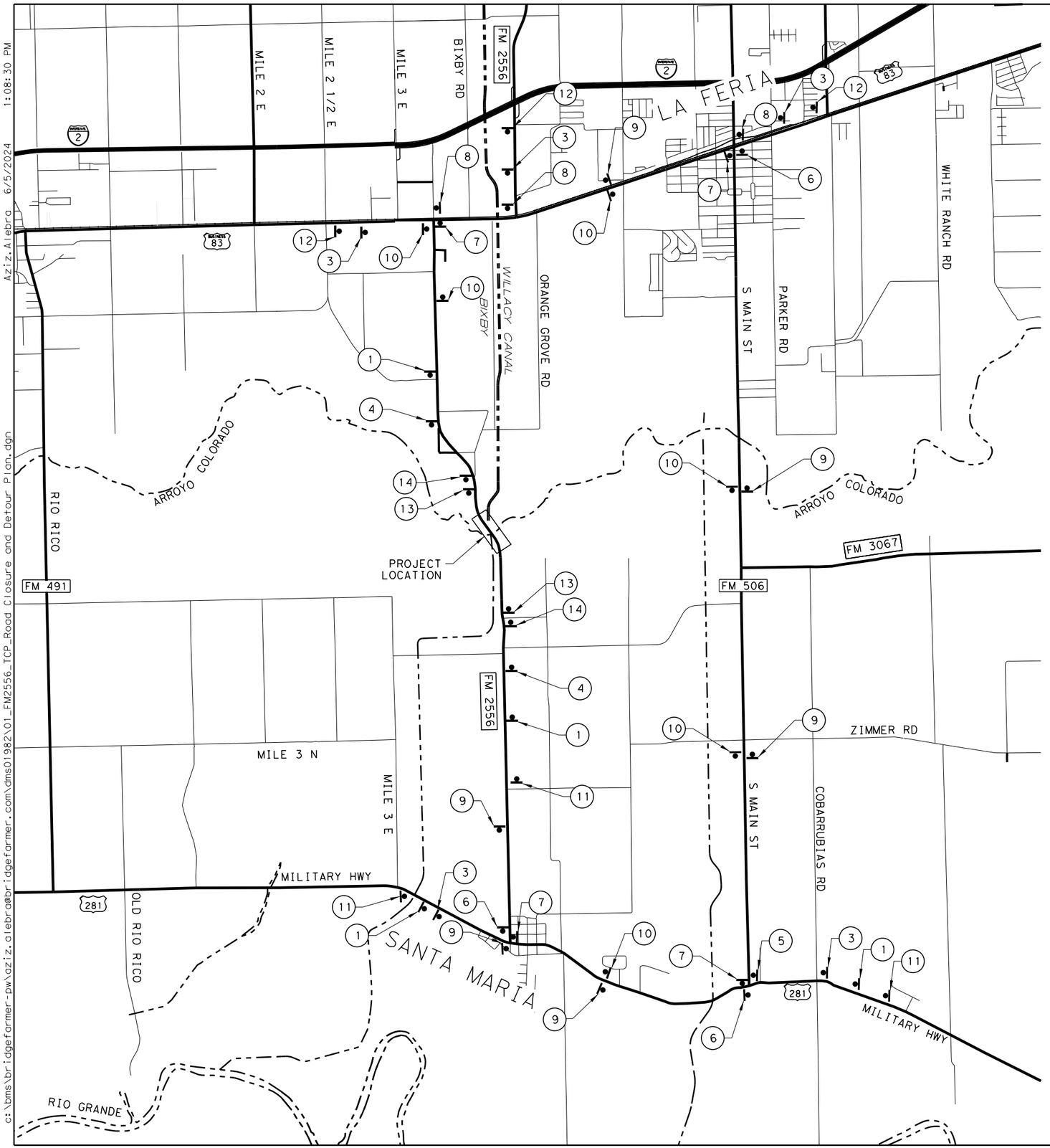
SHEET 1 OF 1 SHEETS

PHARR DISTRICT STANDARD

Texas Department of Transportation

Rev 03/22/2017

STATE	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
TEXAS	6				13
DIST.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
PHR	CAMERON	2529	02	010	FM2556



ROAD WORK AHEAD
CW21-4D
1

END ROAD WORK
G20-2A
2

DETOUR AHEAD
CW20-2D
3

END DETOUR
M4-8a
4

DETOUR NORTH FARM 2556 ROAD
M4-8
M3-1
M1-6F
M5-1R
5

DETOUR NORTH FARM 2556 ROAD
M4-8
M3-1
M1-6F
M5-1L
6

DETOUR SOUTH FARM 2556 ROAD
M4-8
M3-3
M1-6F
M5-1R
7

DETOUR SOUTH FARM 2556 ROAD
M4-8
M3-3
M1-6F
M5-1L
8

DETOUR NORTH FARM 2556 ROAD
M4-8
M3-1
M1-6F
M6-3
10

DETOUR NORTH FARM 2556 ROAD
M4-8
M3-1
M1-6F
M6-3
9

FM 2556 NORTH CLOSED TO THRU TRAFFIC
SPL
11

FM 2556 SOUTH CLOSED TO THRU TRAFFIC
SPL
12

ROAD CLOSED 500 FT
CW21-4D
13

ROAD CLOSED 1000 FT
CW21-4D
14

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
ROAD CLOSURE AND DETOUR PLAN

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		14

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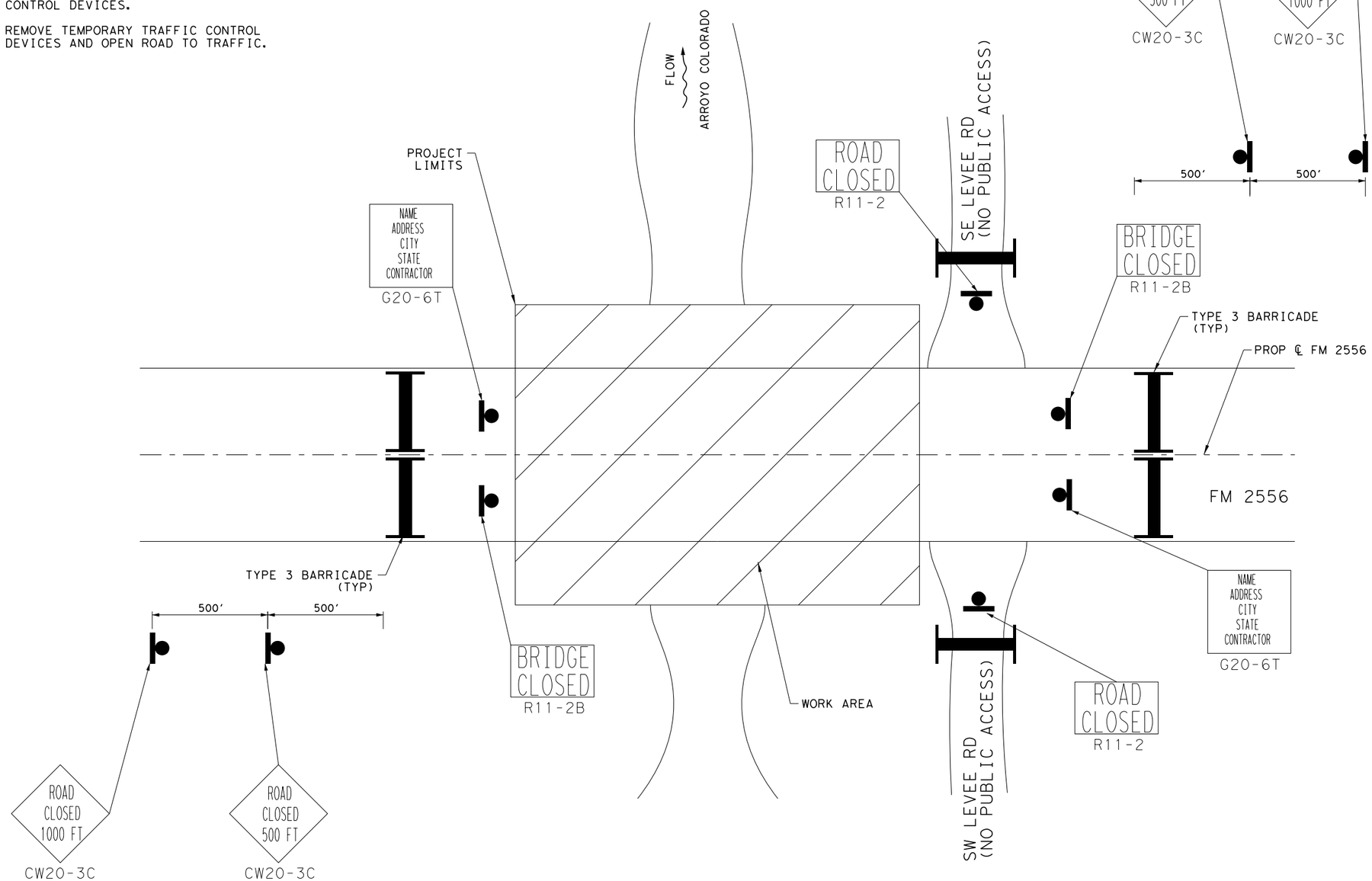
SEQUENCE OF CONSTRUCTION:

1. PLACE ADVANCE WARNING SIGNS, TRAFFIC CONTROL DEVICES, TEMPORARY EROSION CONTROL DEVICES, AND CLOSE ROAD TO TRAFFIC.
2. REMOVE EXISTING STRUCTURE.
3. CONSTRUCT NEW BRIDGE AND APPROACHES.
4. PLACE PAVEMENT MARKINGS, OBJECT MARKERS, TOPSOIL SEEDING, AND PERMANENT EROSION CONTROL DEVICES.
5. REMOVE TEMPORARY TRAFFIC CONTROL DEVICES AND OPEN ROAD TO TRAFFIC.



LEGEND

CHANNEL FLOW DIRECTION

TYPE 3 BARRICADE

SIGN

NOTES:

1. LIMIT WORK TO ONE BRIDGE AT A TIME UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. TRAFFIC CONTROL SHOWN HEREON IS THE MINIMUM REQUIREMENT FOR THIS PROJECT. ALL TRAFFIC CONTROL DEVICES FOR THIS PROJECT WILL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE TEXAS MUTCD AND STANDARD (BC) SHEETS.
3. IF THE CONSTRAINTS DO NOT ALLOW COMPLETION OF ALL CONSTRUCTION PRIOR TO OPENING THE ROADWAY TO TRAFFIC, ADVANCE SIGNS AS DIRECTED BY ENGINEER WILL BE INSTALLED AND MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETED.
4. REFER TO GENERAL NOTES FOR ADDITIONAL INFORMATION.
5. CONTRACTOR SHALL MAINTAIN ACCESS TO PROPERTIES AT ALL TIMES DURING CONSTRUCTION.

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
TCP NARRATIVE AND BARRICADE PLAN

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		15

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		16

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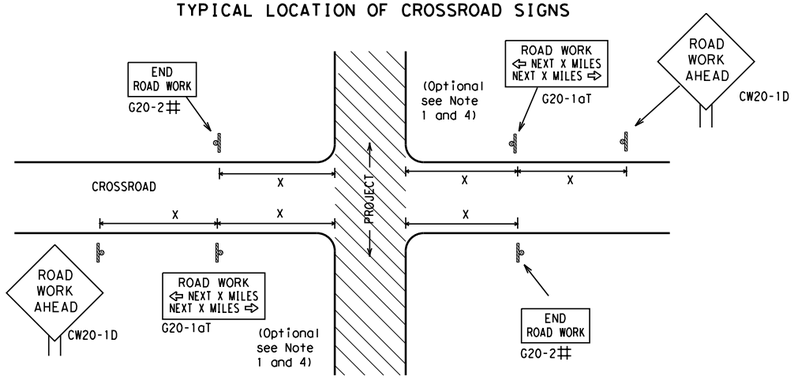
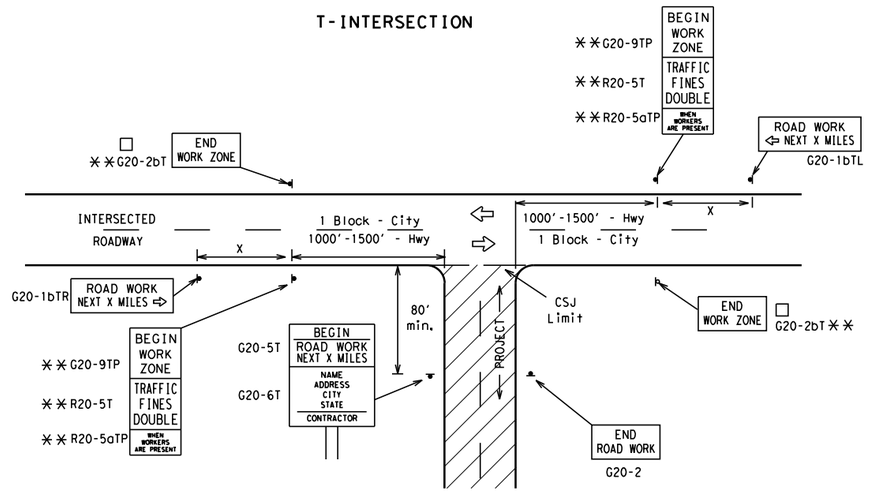
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

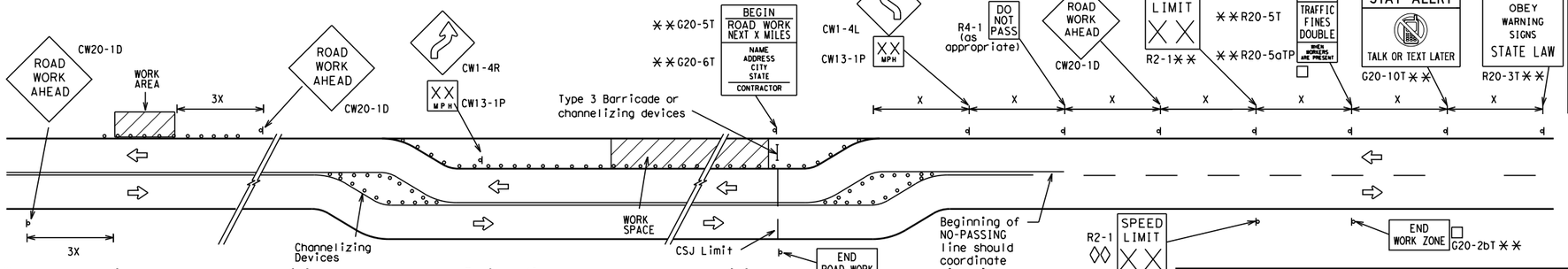
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

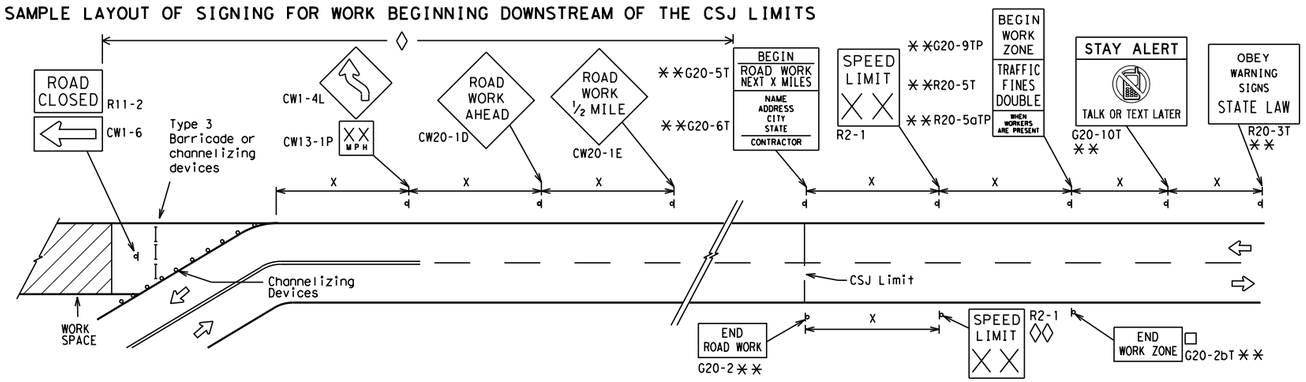
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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

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REVISIONS	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		17

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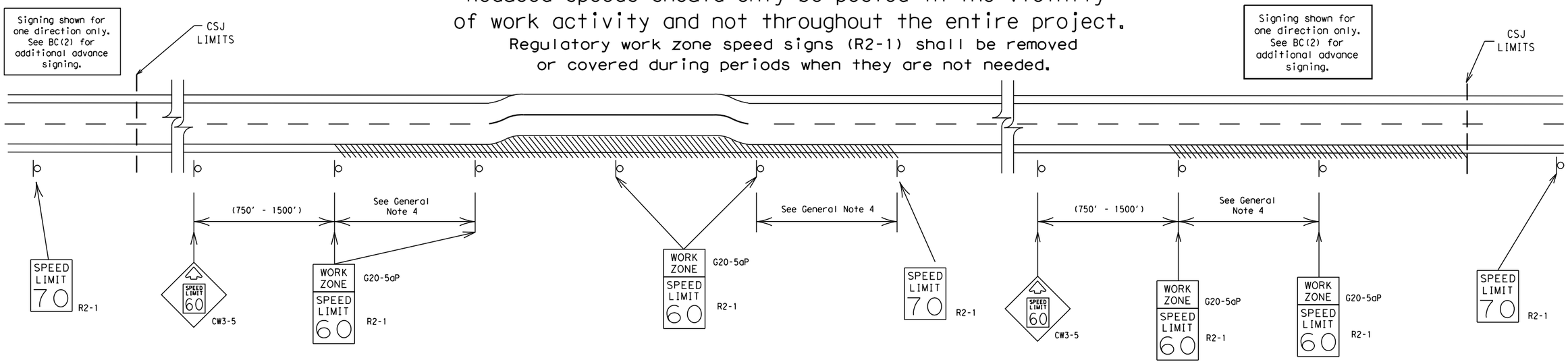
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	PHARR	CAMERON		18

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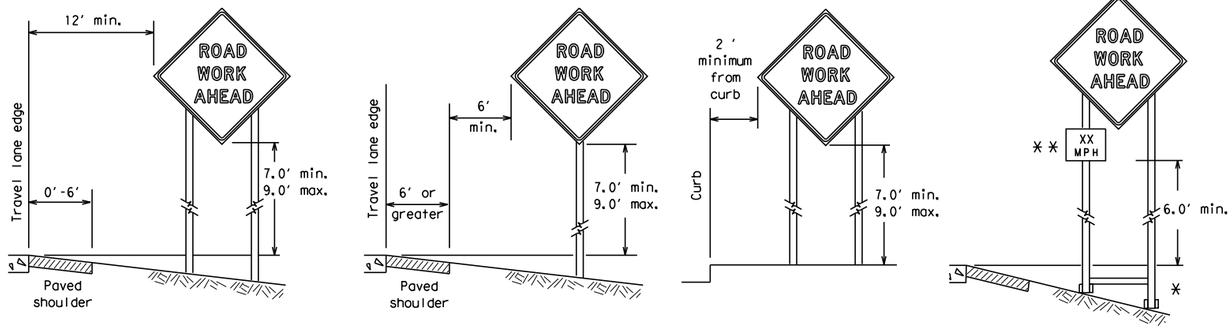
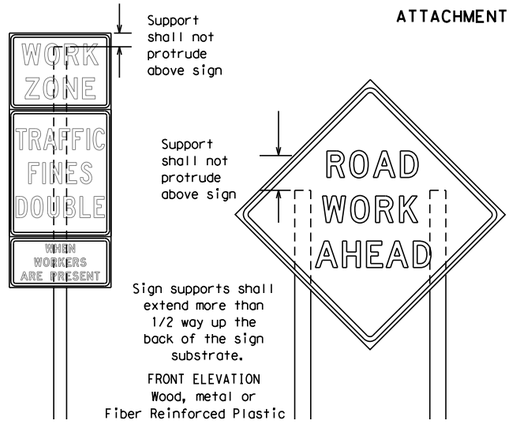
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

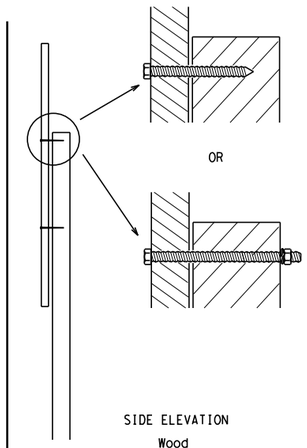


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





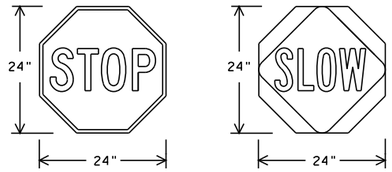
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		19

DATE: 5/7/2024 6:20:20 PM AKH
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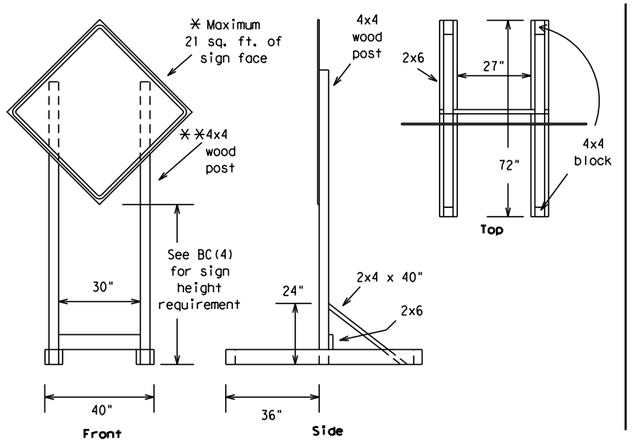
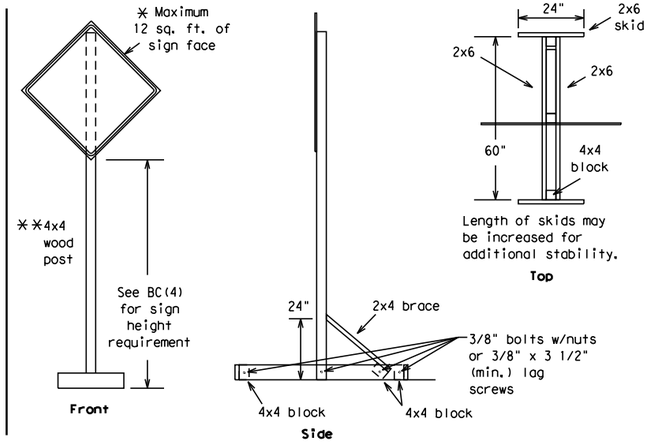
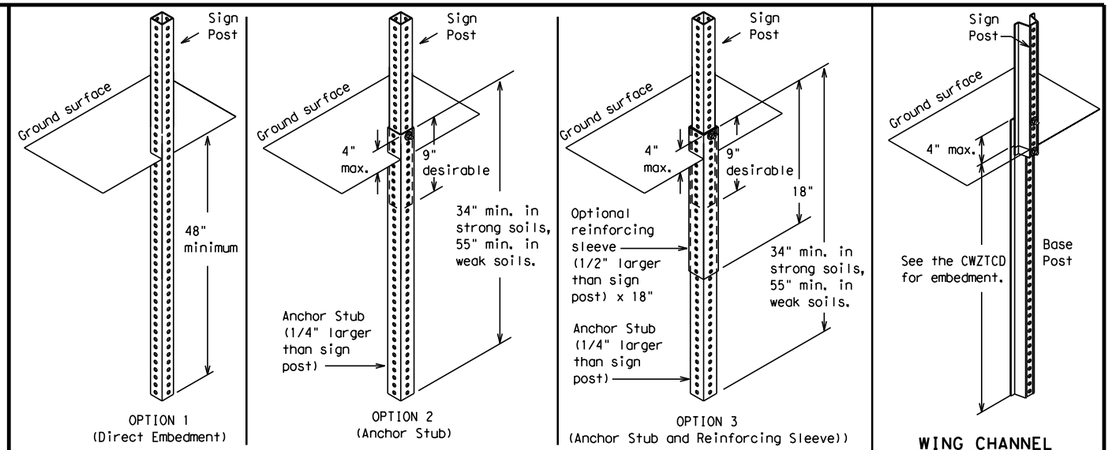




SKID MOUNTED WOOD SIGN SUPPORTS

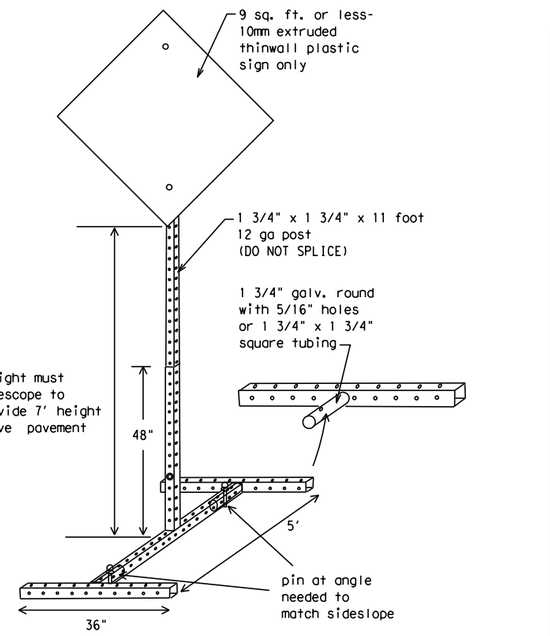
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

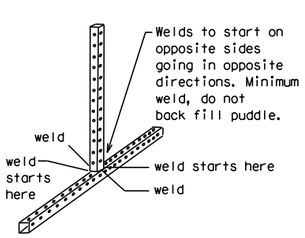


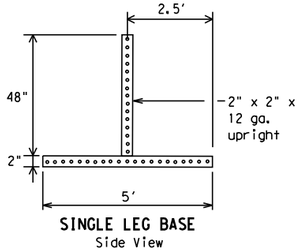
PERFORATED SQUARE METAL TUBING

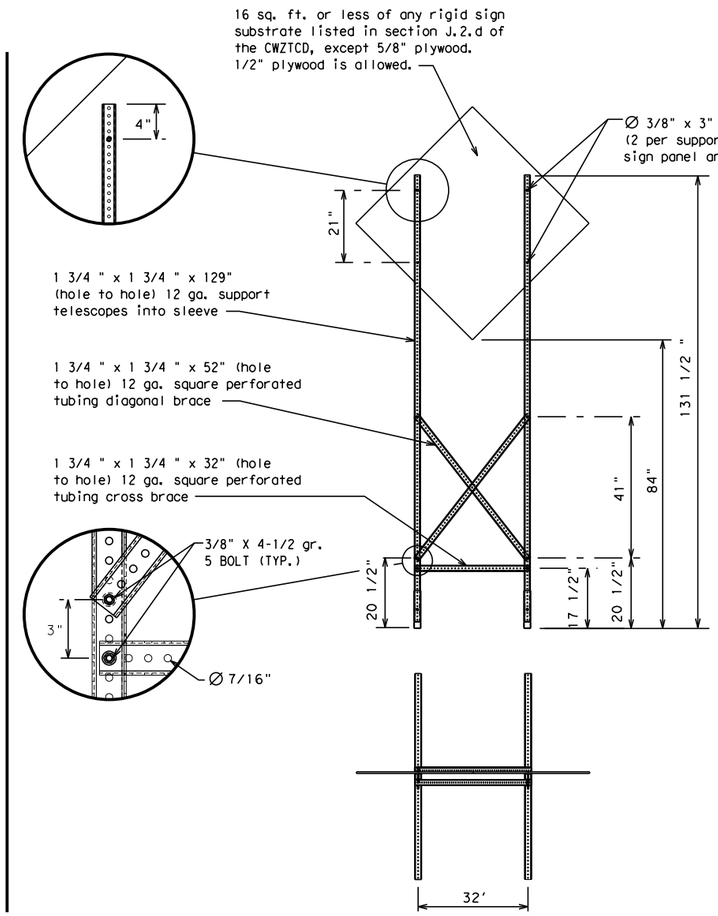
GROUND MOUNTED SIGN SUPPORTS

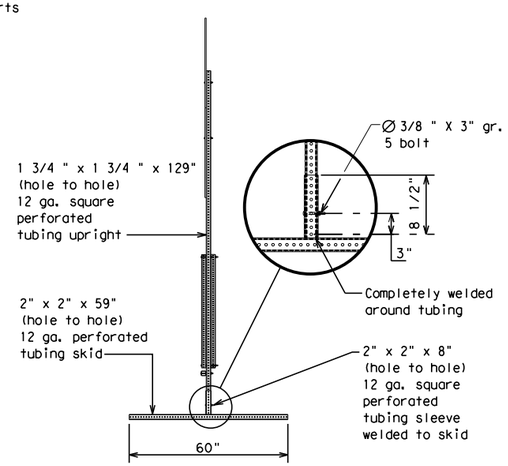
Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.











SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		20

DATE: 5/7/2024 6:20:23 PM
FILE: c:\bms\bridgefarmer-pw\alicia.hudgens\dms01988\fm2556-bc-06-21.dgn
AKH

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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DATE: 5/7/2024 6:20:27 PM
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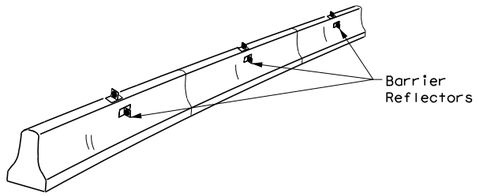
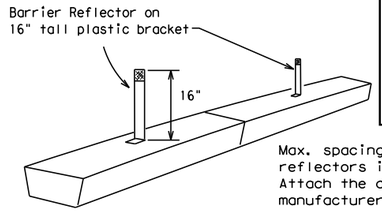
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

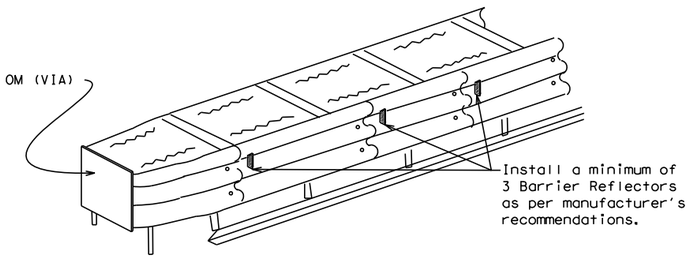


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

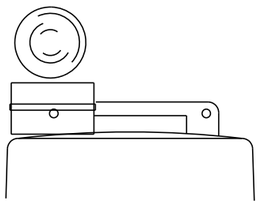


DELINEATION OF END TREATMENTS

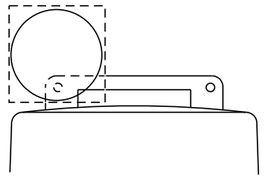
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

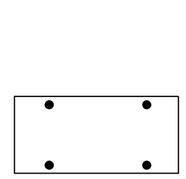
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

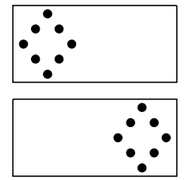
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

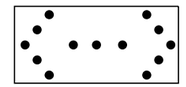


4 CORNER CAUTION

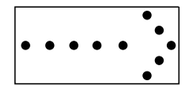
OR



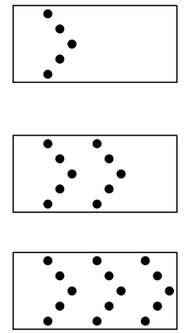
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



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



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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

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	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		22

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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:

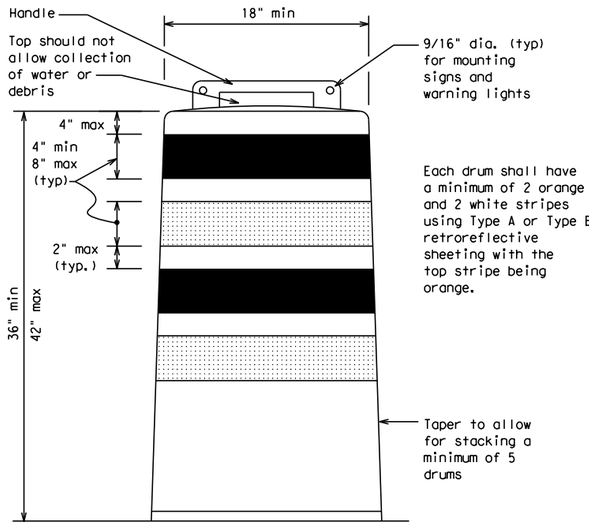
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

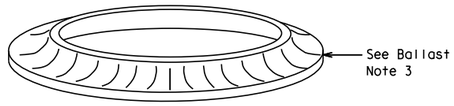
RETROREFLECTIVE SHEETING

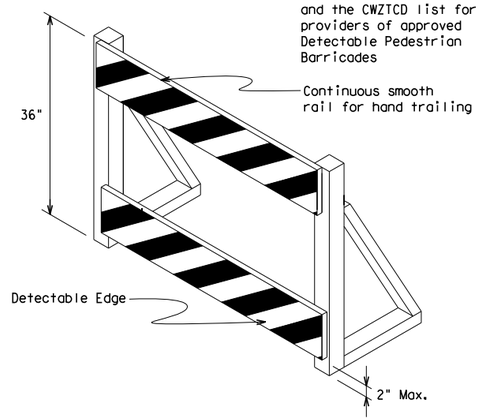
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

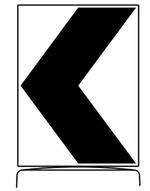




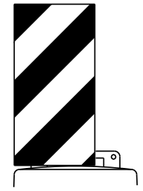


DETECTABLE PEDESTRIAN BARRICADES

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
REVISIONS	2529	02	010	FM 2556
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	PHARR	CAMERON		23
7-13				

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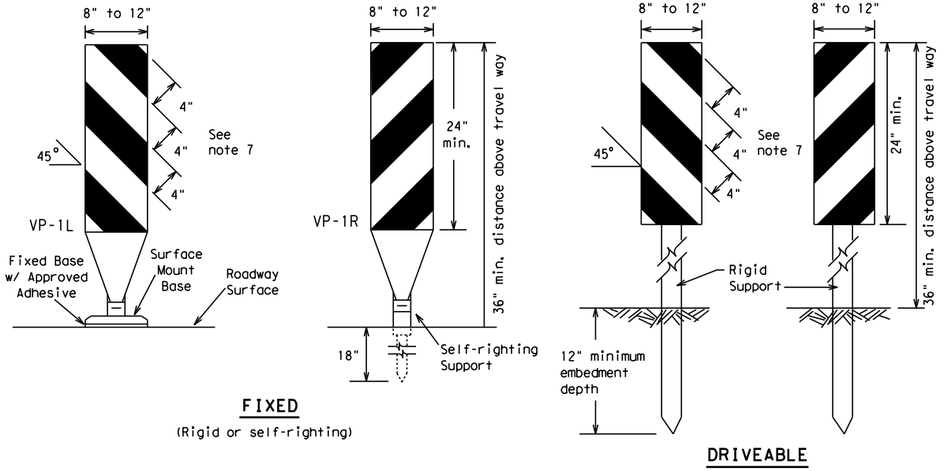
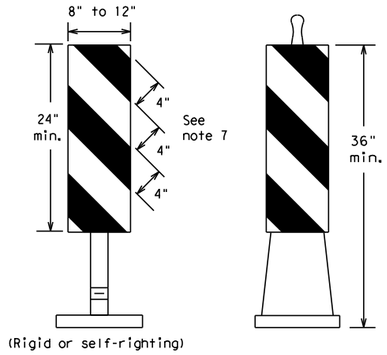


FIXED
(Rigid or self-righting)

DRIVEABLE

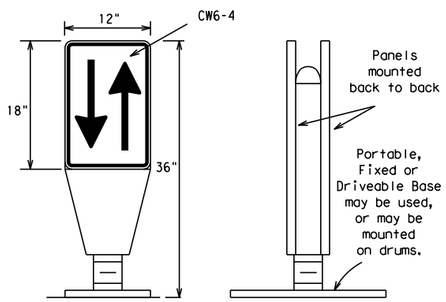


(Rigid or self-righting)

PORTABLE

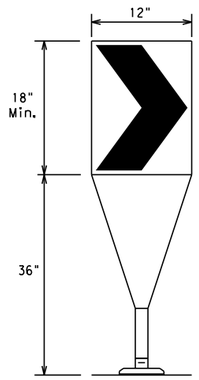
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



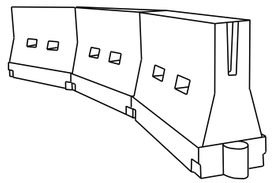
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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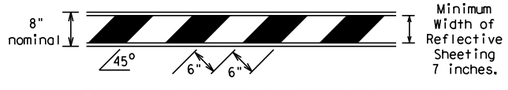
REVISIONS	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		24

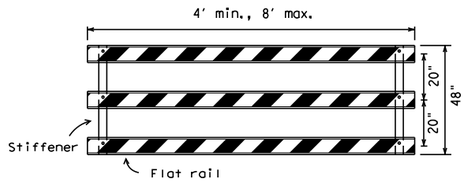
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



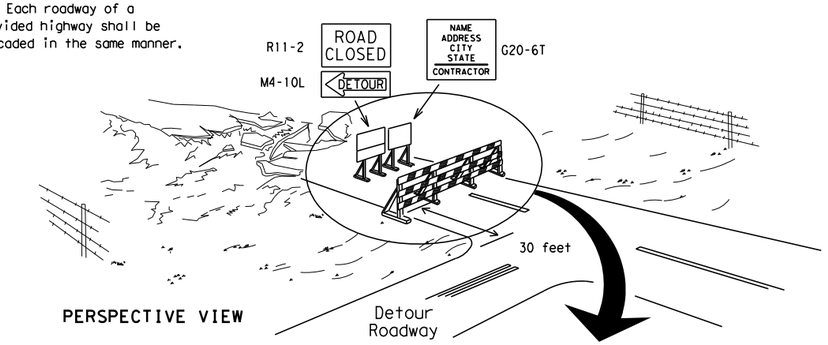
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

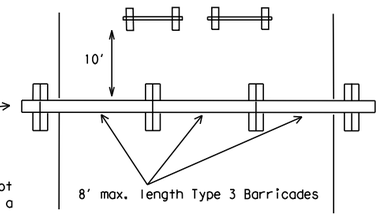
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

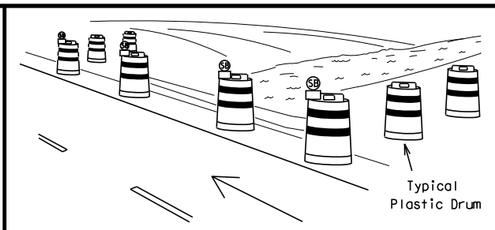
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

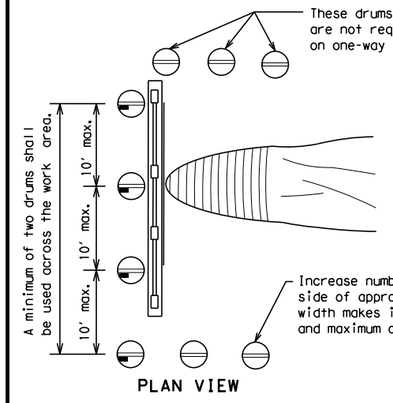
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

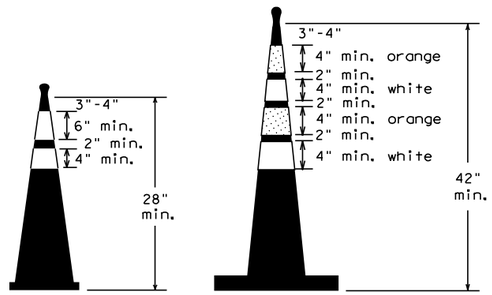
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



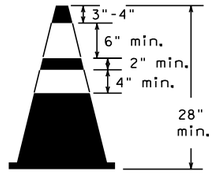
PLAN VIEW

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

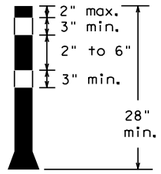
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

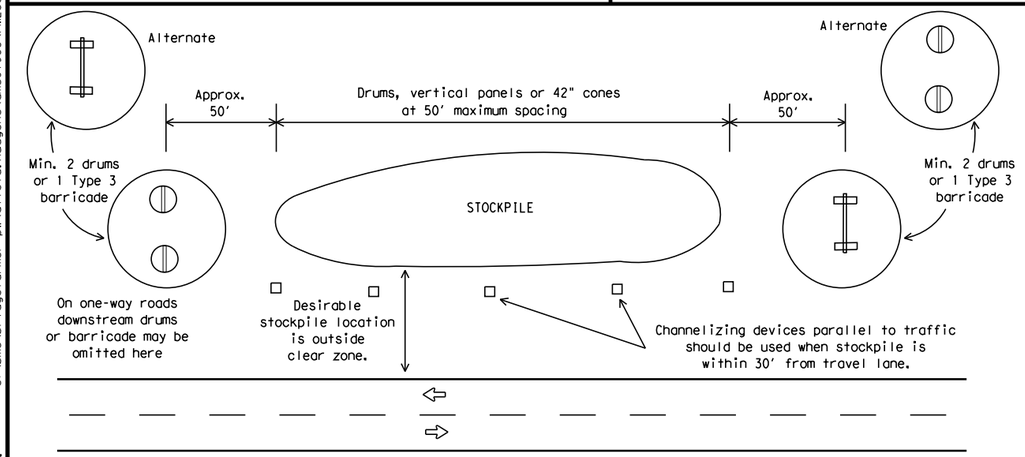


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PHARR	CAMERON		25

104

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AKH

DATE: 5/7/2024 6:20:42 PM
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AKH

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.

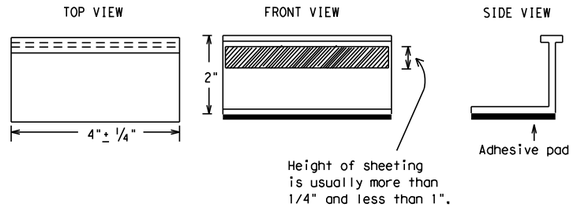
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	PHARR	CAMERON		26
11-02 8-14				

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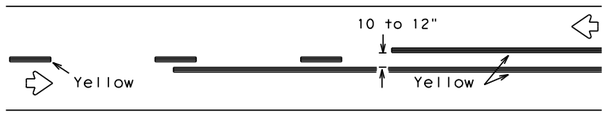
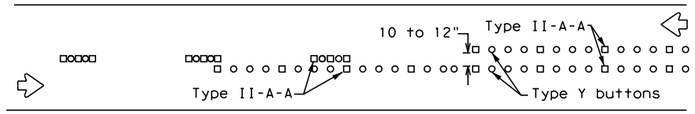
AKH

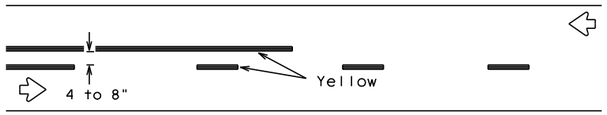
PAVEMENT MARKING PATTERNS



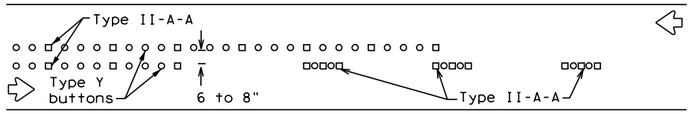
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



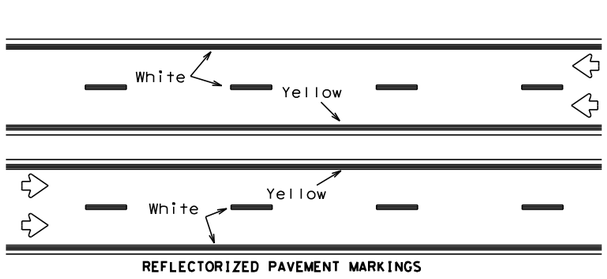
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



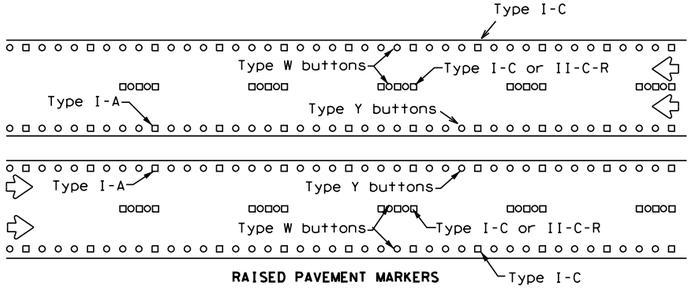
RAISED PAVEMENT MARKERS - PATTERN B

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



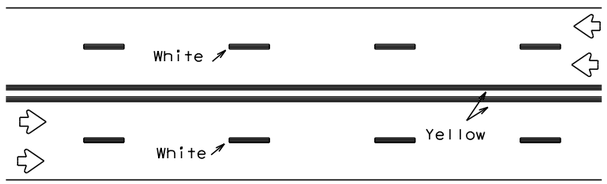
REFLECTORIZED PAVEMENT MARKINGS



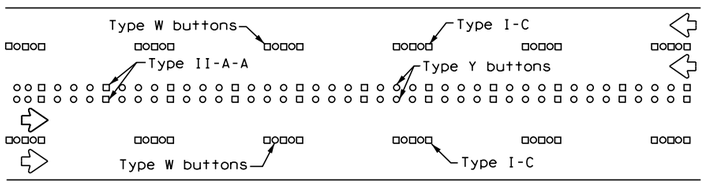
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



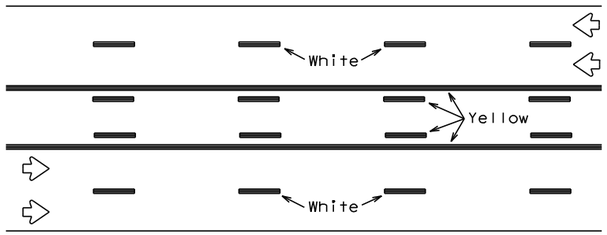
REFLECTORIZED PAVEMENT MARKINGS



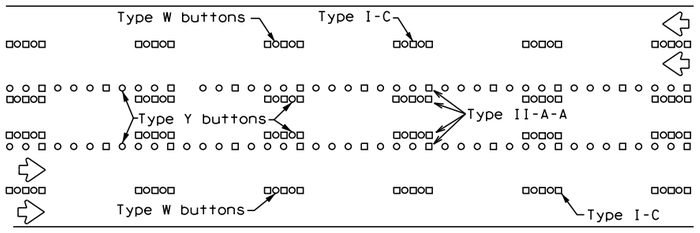
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

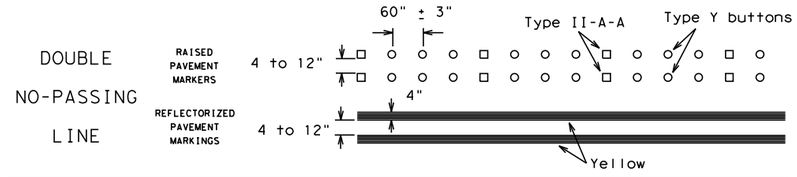
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

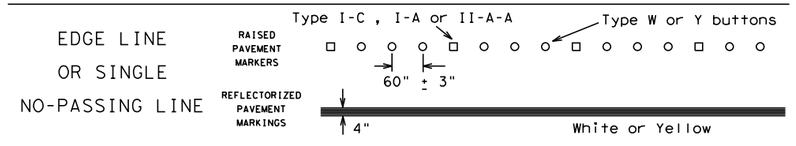
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

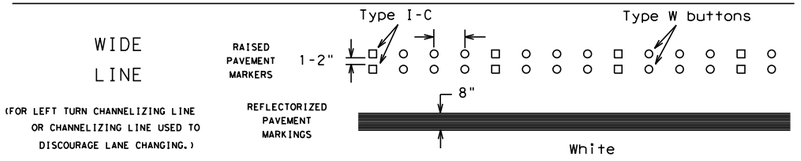


EDGE LINE OR SINGLE NO-PASSING LINE



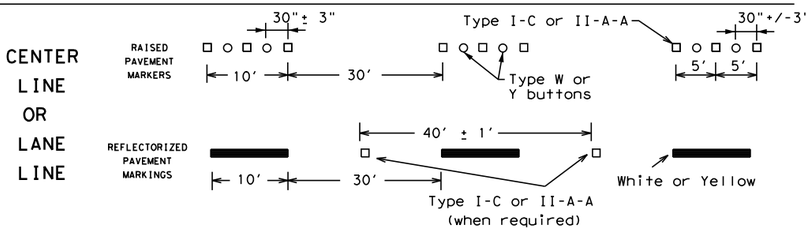
WIDE LINE

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

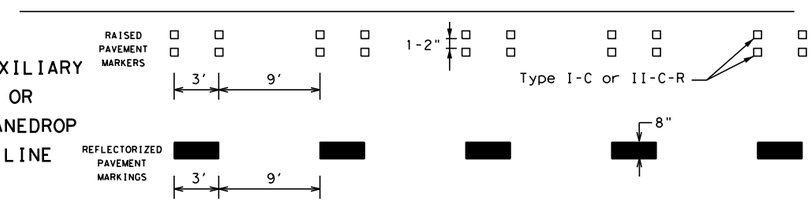


BROKEN LINES

CENTER LINE OR LANE LINE

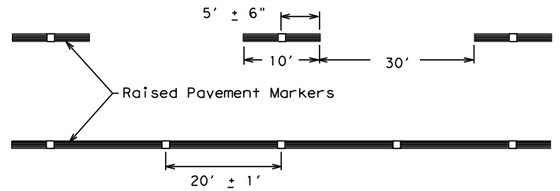


AUXILIARY OR LANEDROP LINE



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
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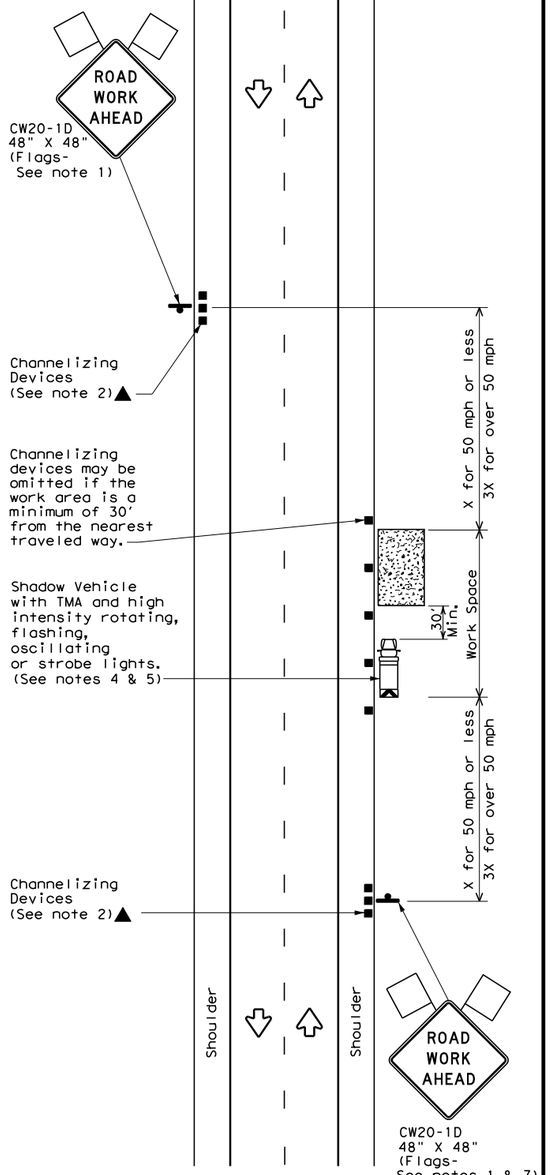
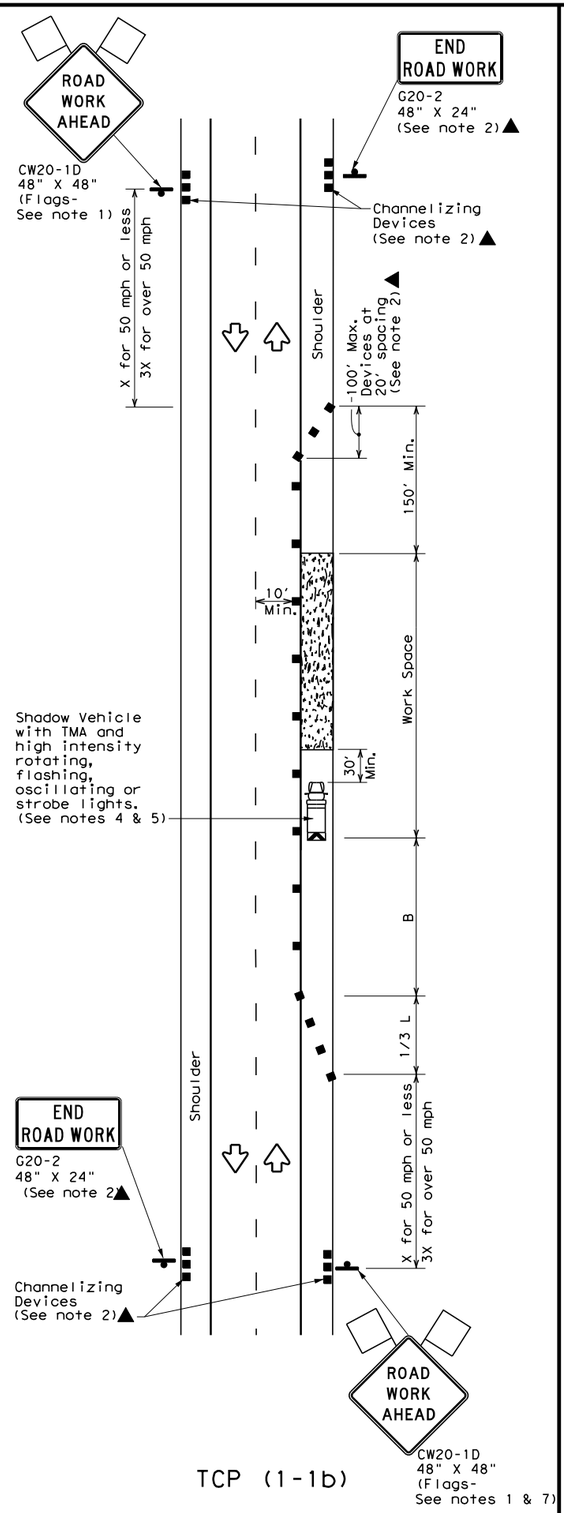


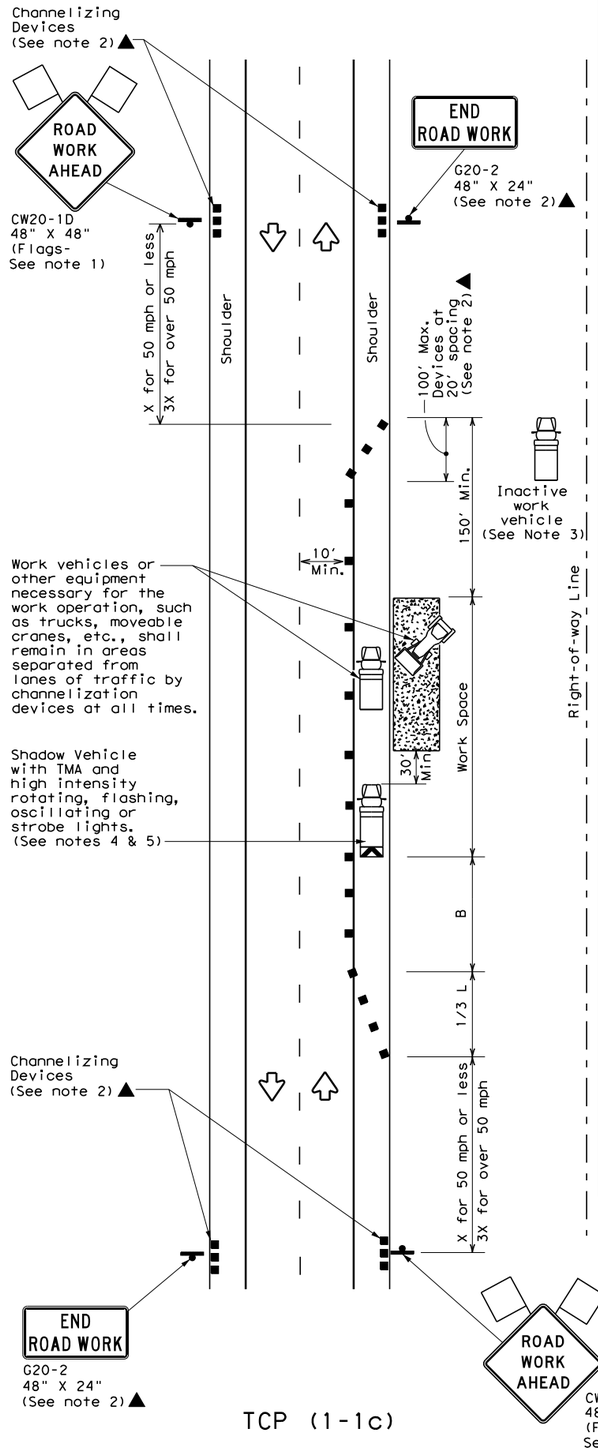
TCP (1-1a)

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

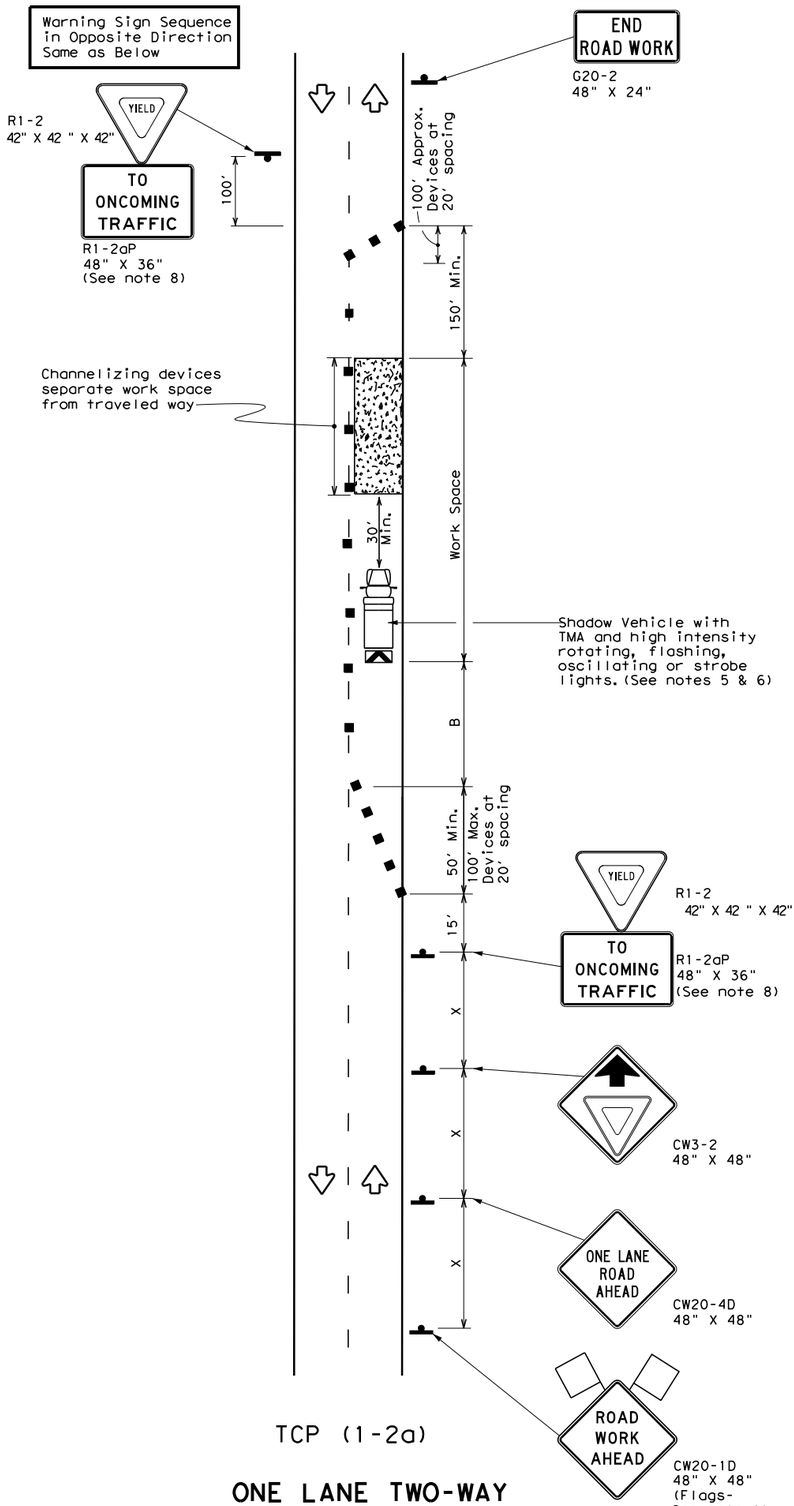
Traffic Operations Division Standard

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	2529	02	010	FM 2556
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	PHARR	CAMERON		28
1-97 2-18				

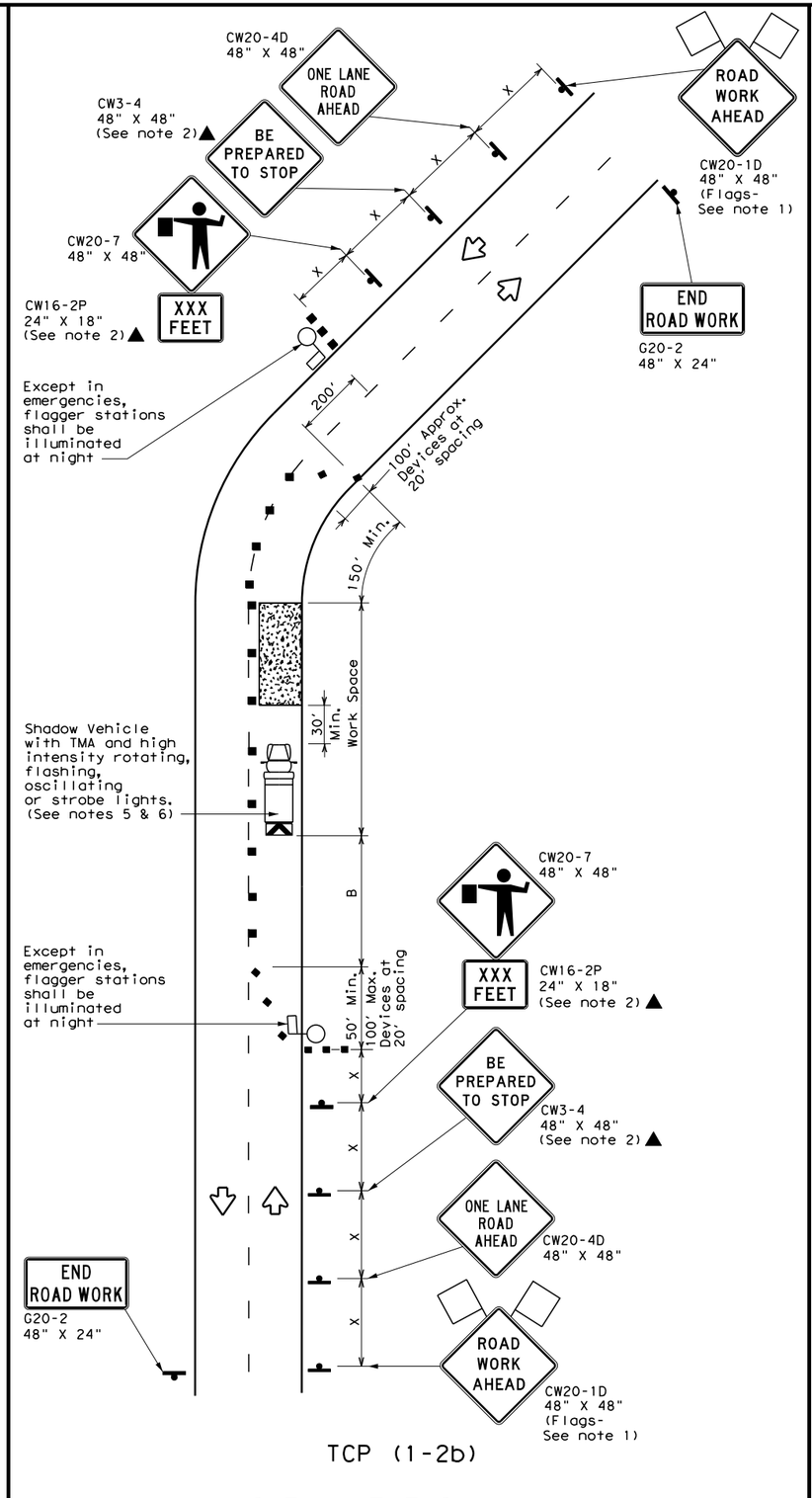
DATE: 6/5/2024 1:09:56 PM
FILE: c:\users\azizalebra-pw\bridgefarmer-pw\aziz.alebra@bridgefarmer.com\dms01988\fm2556-tcp1-2-18.dgn



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	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		29

DATE: 6/5/2024
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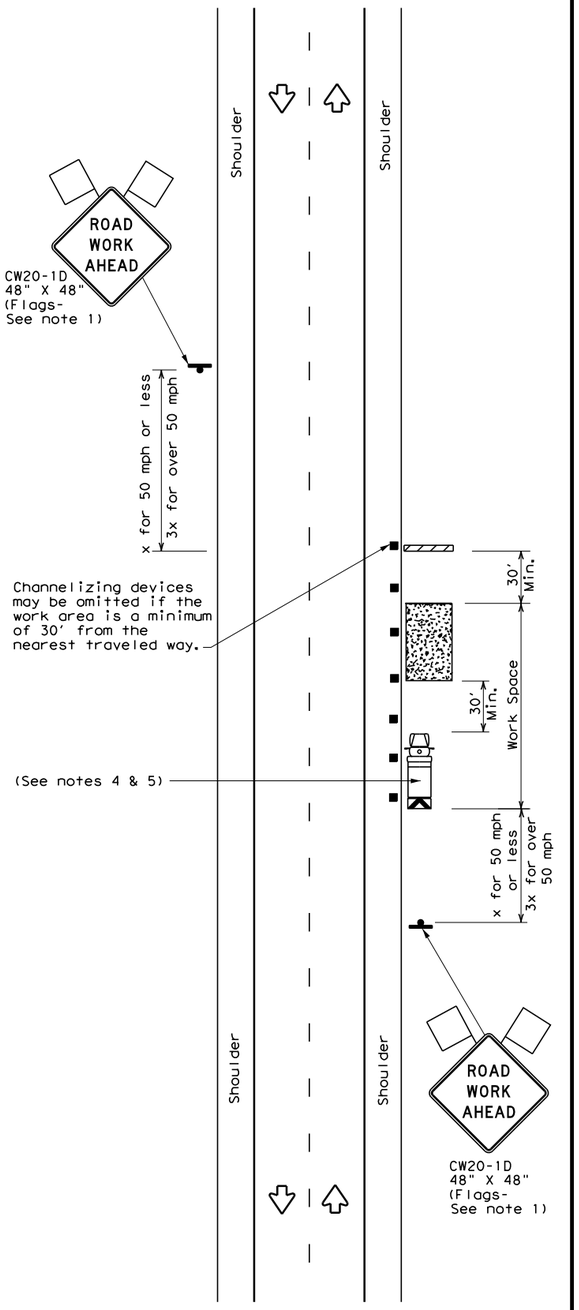
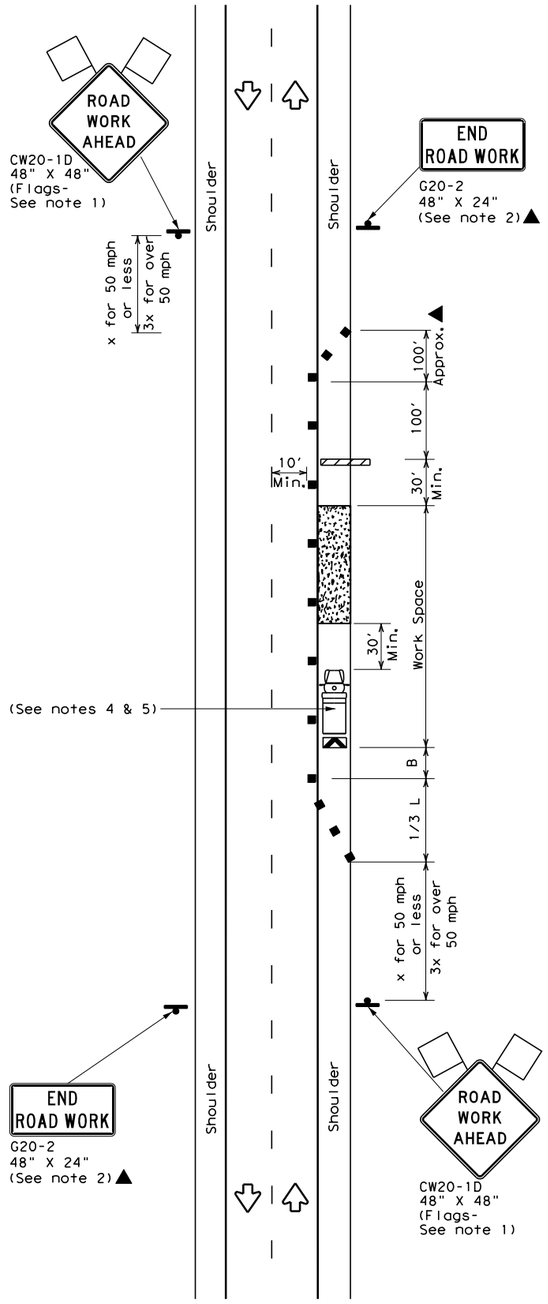


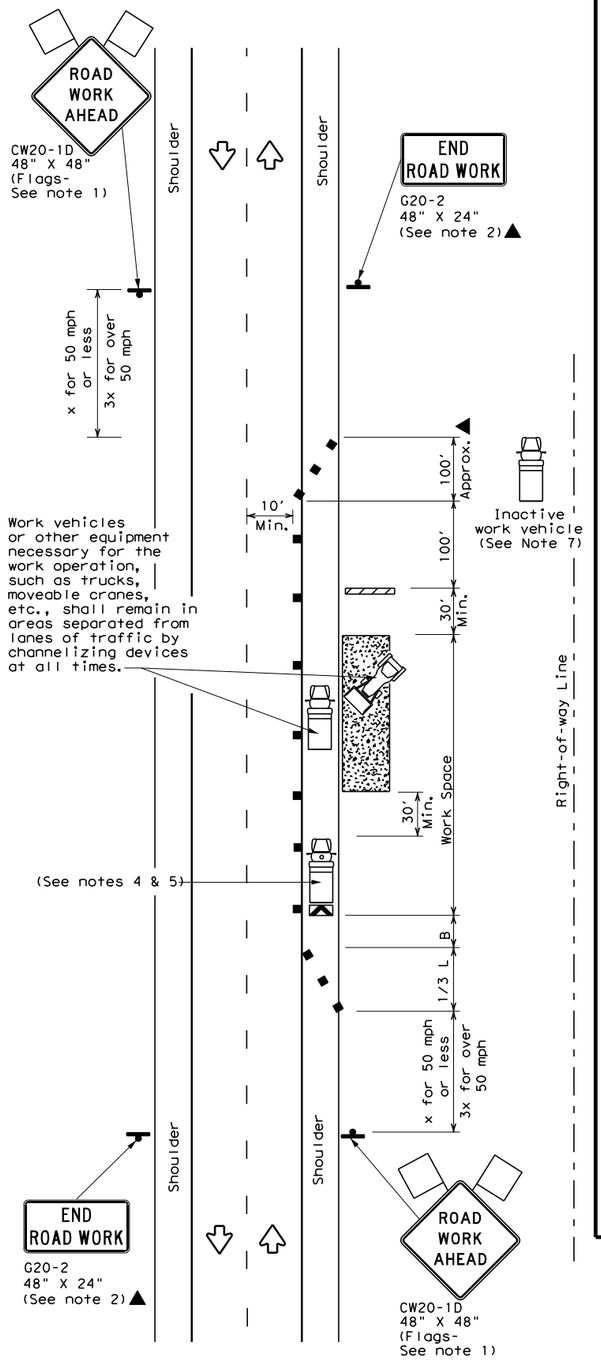
TCP (2-1a)

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	2529	02	010	FM 2556
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	PHARR	CAMERON		30
1-97 2-18				

DATE: 6/5/2024 1:10:08 PM
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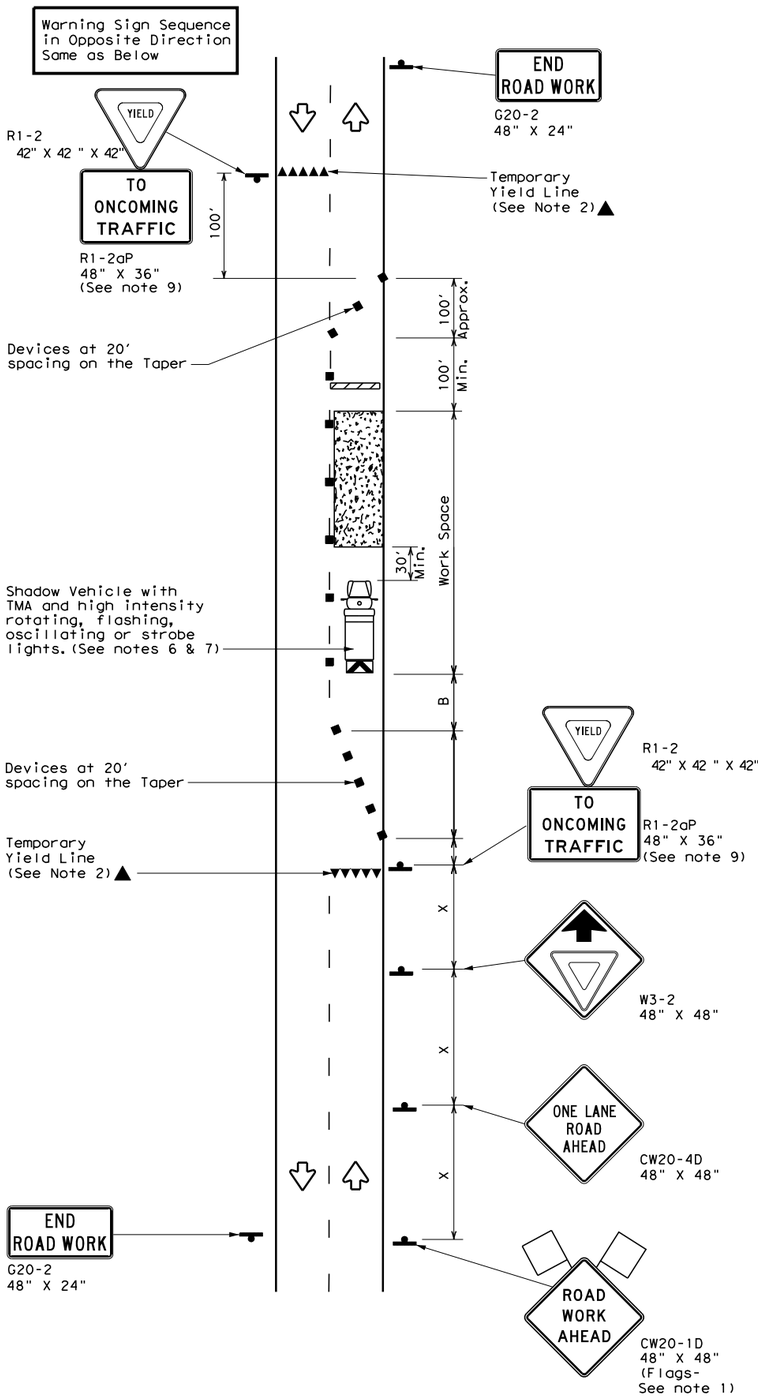
Aziz.Alebra

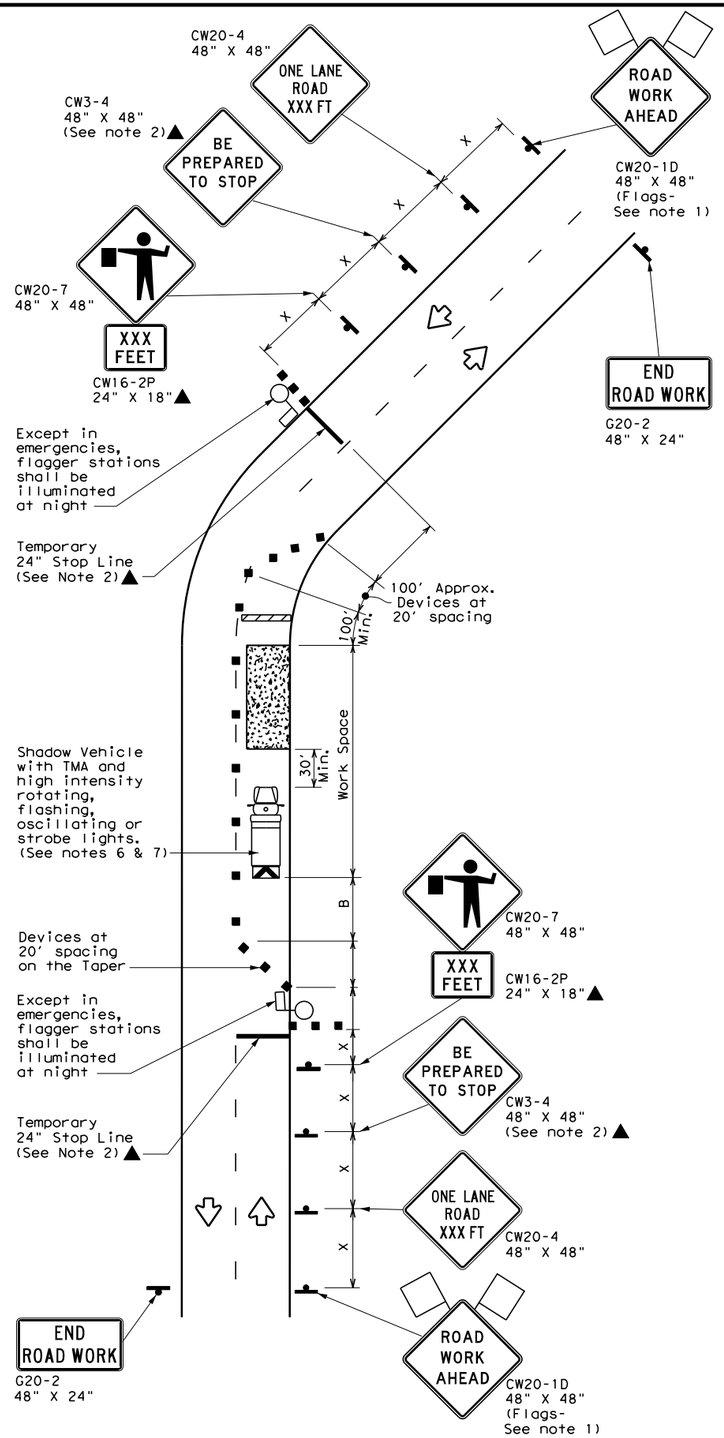


2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See Note 9)



2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY

CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		31

12/29/2022 6:55:11 PM

AT

c:\bms\bridgefarmer-pw\aaron.tainter\dms01975\01_FM2556_SurveyControl.dgn

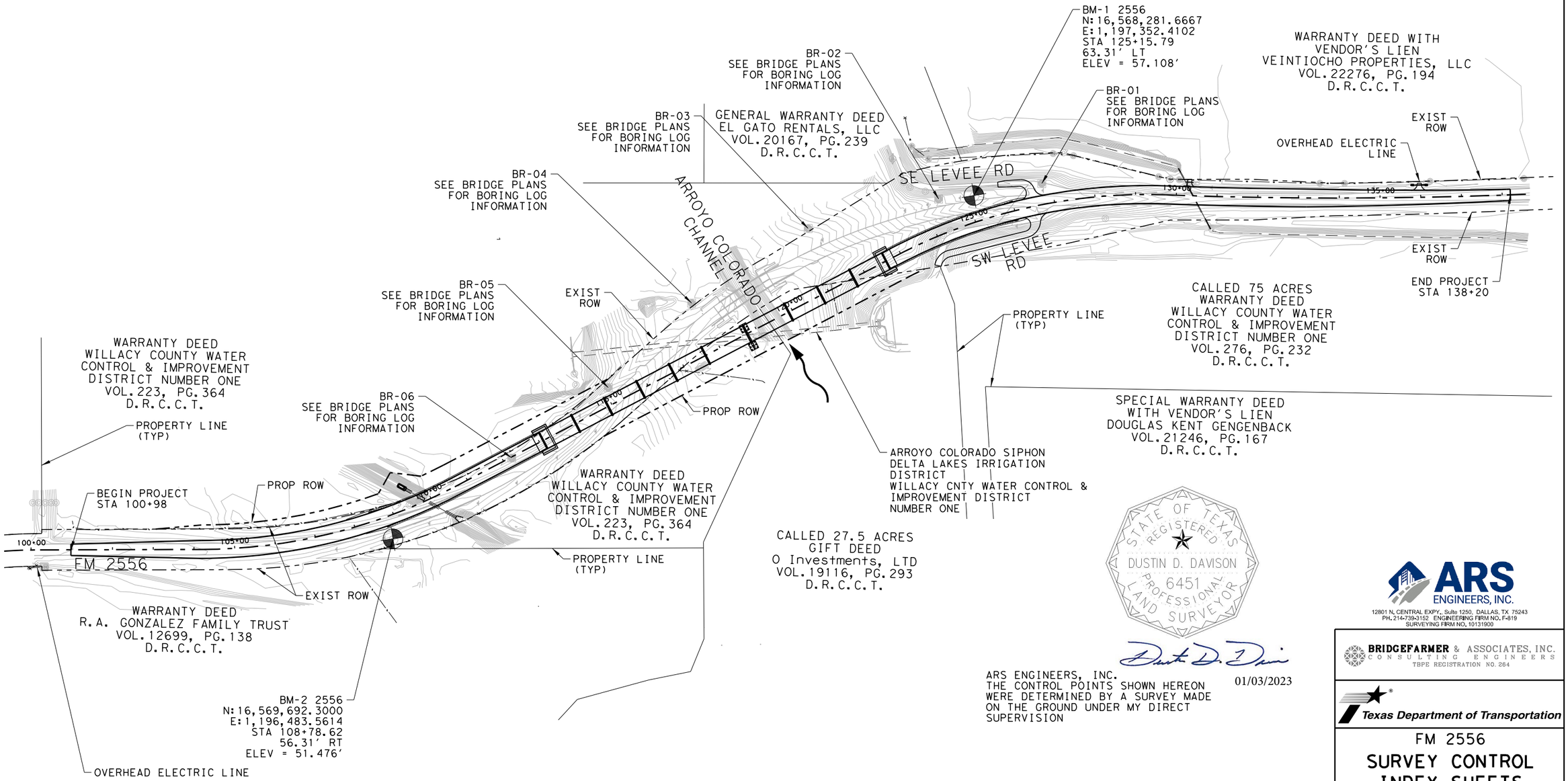
NOTES:

1. COORDINATES AND DISTANCES ARE US SURVEY FEET DISPLAYED IN SURFACE VALUES USING THE SURFACE ADJUSTMENT FACTOR 0.999960
2. THE VERTICAL CONTROL IS BASED ON NAVD 88 AND WAS ESTABLISHED UTILIZING THE TxDOT VRS NETWORK AND ELEVATIONS ESTABLISHED WITH REDUNDANT OBSERVATION.
3. HORIZONTAL CONTROL IS BASED ON THE TEXAS COORDINATE SYSTEM NAD 83 (2011) POSITION (EPOCH 2010) TEXAS SOUTH ZONE.

125 0 125 250
SCALE: 1" = 250'

LEGEND

CONTROL POINT
REFER TO HORIZONTAL AND VERTICAL CONTROL DATA SHEET FOR DESCRIPTION



STATE OF TEXAS
REGISTERED
DUSTIN D. DAVISON
6451
PROFESSIONAL
LAND SURVEYOR

ARS ENGINEERS, INC.
THE CONTROL POINTS SHOWN HEREON WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY DIRECT SUPERVISION

01/03/2023

BRIDGEFARMER & ASSOCIATES, INC.
THE SURVEY AND CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E

ARS ENGINEERS, INC.
12801 N. CENTRAL EXPY., Suite 1250, DALLAS, TX 75243
PH. 214-739-3152 ENGINEERING FIRM NO. F-819
SURVEYING FIRM NO. 10131900

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
SURVEY CONTROL INDEX SHEETS

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		32

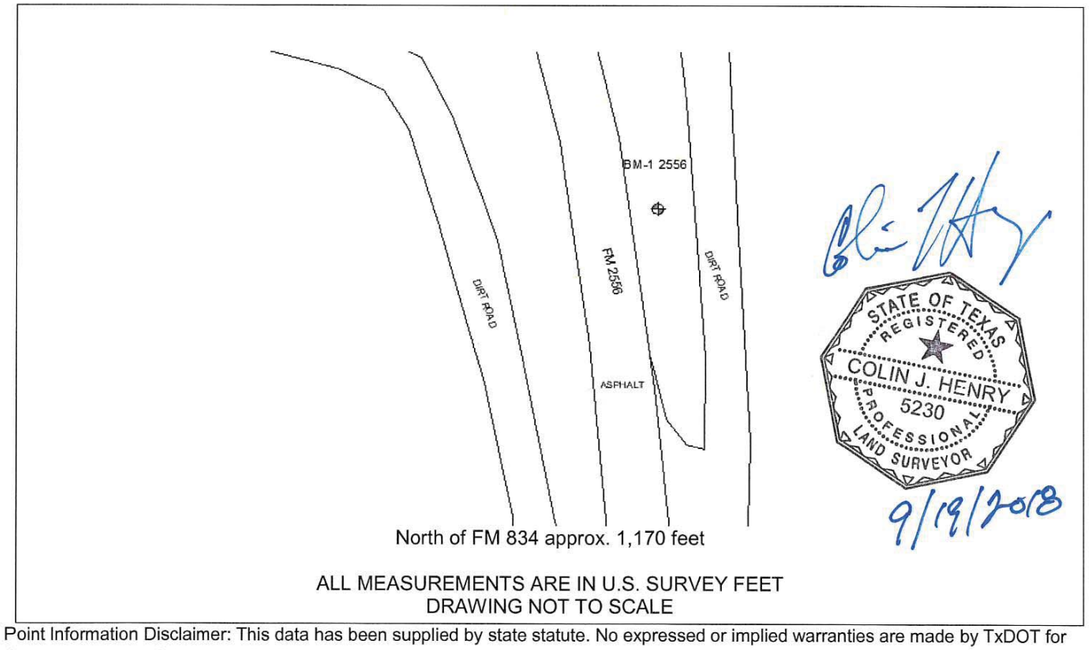
Texas Department of Transportation

Highway / Location	FM 2556 North of FM 834			Station Name	BM-1 2556
TxDOT CSJ No.	2529-02-010			Condition	Set, Good Condition
County	Cameron	State	Texas	Established By	ARS Engineers, Inc.
TxDOT Survey Level	Level 2		Date Established	May, 2018	
Intervisible Stations	BM-2 2556		Survey Method Hz.	GPS OBS (Static)	
Unit of Measure	US Survey Feet		Survey Method Vt.	GPS OBS (Static)	
Hz. Datum	NAD 83		Vt. Datum	NAVD 88	
Hz. Adjustment	2011 EPOCH 2010.00		Vt. Adjustment	1991	
Projection Zone	4205 South		Geoid Model	Geoid12B	
Monument(s) Held Hz	TxDOT CORS Station TXLN, TXPR, PHR-031-0012, PHR-245-099				
Monument(s) Held Vt	TxDOT CORS Station TXLN, TXPR, PHR-031-0012, PHR-245-099				

Geodetic Position		Grid Coordinates		Surface Coordinates	
Lat	N26°07'06.47149"	North	16,568,944.4245	North	16,568,281.6667
Long	W97°51'01.55807"	East	1,197,400.3062	East	1,197,352.4102
Elevation in US Survey Feet		57.108			
TxDOT Surface Adjustment Factor		0.999960			

Mapping Angle	0°17'42"	Scale Factor	1.0000124908	Combined Factor	1.0000133716
Mark Logo	TXDOT R.O.W. MONUMENT		Stamping	BM-1	
Type of Marker	3-1/4 inch TXDOT Aluminum Cap on 5/8 inch Iron Rod				

Station Sketch



ALL MEASUREMENTS ARE IN U.S. SURVEY FEET
DRAWING NOT TO SCALE

Texas Department of Transportation

Highway/Location	FM 2556 North of FM 834	Station Name	BM-1 2556
TxDOT CSJ No.	2529-02-010		

To Reach Description

LOCATED ON EAST SIDE OF FM 2556; NORTH OF FM 834 APPROXIMATELY 1,170 FEET; WEST OF A DIRT LEVEE ACCESS ROAD

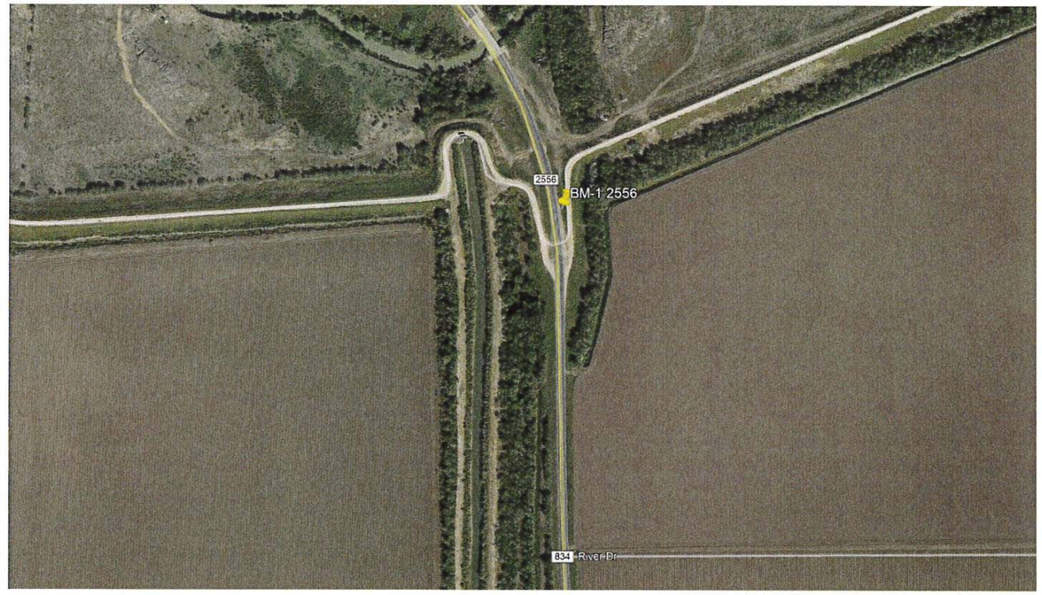


Photo 1-Station Detail	Photo 2 – Station Area Picture
	

Point Information Disclaimer: This data has been supplied by state statute. No expressed or implied warranties are made by TxDOT for the accuracy, completeness, reliability, usability, or suitability of the point data. The department assumes no responsibility for incorrect results or damages resulting from the use of data.

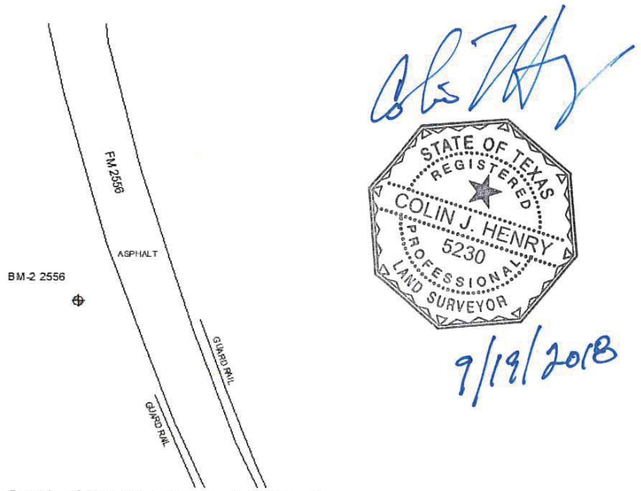
Texas Department of Transportation

Highway / Location	FM 2556 South of FM 407			Station Name	BM-2 2556
TxDOT CSJ No.	2529-02-010			Condition	Set, Good Condition
County	Cameron	State	Texas	Established By	ARS Engineers, Inc.
TxDOT Survey Level	Level 2		Date Established	May, 2018	
Intervisible Stations	BM-1 2556		Survey Method Hz.	GPS OBS (Static)	
Unit of Measure	US Survey Feet		Survey Method Vt.	GPS OBS (Static)	
Hz. Datum	NAD 83		Vt. Datum	NAVD 88	
Hz. Adjustment	2011 EPOCH 2010.00		Vt. Adjustment	1991	
Projection Zone	4205 South		Geoid Model	Geoid12B	
Monument(s) Held Hz	TxDOT CORS Station TXLN, TXPR, PHR-031-0012, PHR-245-099				
Monument(s) Held Vt	TxDOT CORS Station TXLN, TXPR, PHR-031-0012, PHR-245-099				

Geodetic Position		Grid Coordinates		Surface Coordinates	
Lat	N26°07'20.48706"	North	16,570,355.1142	North	16,569,692.3000
Long	W97°51'11.01097"	East	1,196,531.4227	East	1,196,483.5614
Elevation in US Survey Feet		51.476			
TxDOT Surface Adjustment Factor		0.999960			

Mapping Angle	0°17'37"	Scale Factor	1.0000114560	Combined Factor	1.0000126084
Mark Logo	TXDOT R.O.W. MONUMENT	Stamping	BM-2		
Type of Marker	3-1/4 inch TXDOT Aluminum Cap on 5/8 inch Iron Rod				

Station Sketch



South of FM 407 approx. 1,200 feet

ALL MEASUREMENTS ARE IN U.S. SURVEY FEET
DRAWING NOT TO SCALE

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Texas Department of Transportation

Highway/Location	FM 2556 South of FM 407	Station Name	BM-2 2556
TxDOT CSJ No.	2529-02-010		

To Reach Description

LOCATED ON WEST SIDE OF FM 2556; SOUTH OF FM 407 APRROXIMATLY 1,200 FEET; 64 FEET NORTHWEST OF THE NORTH END OF THE WEST GUARD RAIL

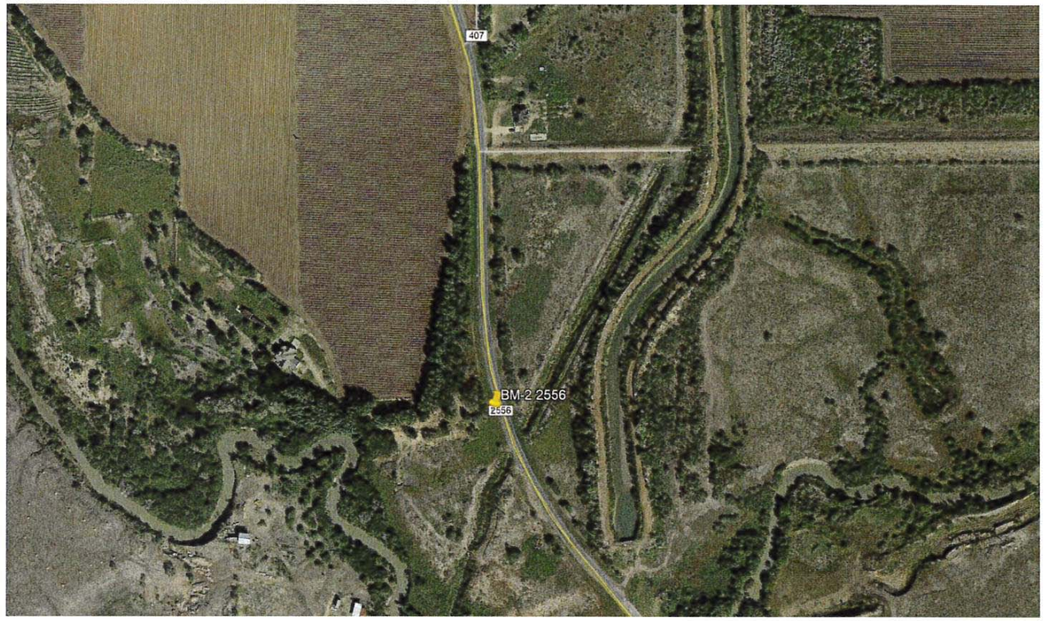

Photo 1-Station Detail	Photo 2 – Station Area Picture
	

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FM 2556:

Beginning chain FM2556 description

		Curve Data				
Curve FM25561						
P.I. Station		99+11.30	X	1,196,440.4261	Y	16,570,670.7241
Delta	= 8° 54′ 02.05"	(RT)				
Degree	= 4° 00′ 24.11"					
Tangent	= 111.2950					
Length	= 222.1423					
Radius	= 1,430.0000					
External	= 4.3244					
Long Chord	= 221.9190					
Mid. Ord.	= 4.3114					
P.C. Station		98+00.00	X	1,196,420.9164	Y	16,570,780.2958
P.T. Station		100+22.14	X	1,196,442.7479	Y	16,570,559.4533
C.C.			X	1,195,013.0591	Y	16,570,529.6209
Back	= S 10° 05′ 45.42" E					
Ahead	= S 1° 11′ 43.37" E					
Chord Bear	= S 5° 38′ 44.40" E					

Course from PT FM25561 to PC FM25562 S 1° 11′ 43.37" E Dist 395.8578

		Curve Data				
Curve FM25562						
P.I. Station		107+47.84	X	1,196,457.8872	Y	16,569,833.9158
Delta	= 27° 27′ 34.32"	(LT)				
Degree	= 4° 14′ 38.87"					
Tangent	= 329.8376					
Length	= 647.0000					
Radius	= 1,350.0000					
External	= 39.7096					
Long Chord	= 640.8257					
Mid. Ord.	= 38.5750					
P.C. Station		104+18.00	X	1,196,451.0062	Y	16,570,163.6817
P.T. Station		110+65.00	X	1,196,616.0553	Y	16,569,544.4755
C.C.			X	1,197,800.7124	Y	16,570,191.8452
Back	= S 1° 11′ 43.37" E					
Ahead	= S 28° 39′ 17.69" E					
Chord Bear	= S 14° 55′ 30.53" E					

Course from PT FM25562 to PC FM25563 S 28° 39′ 17.69" E Dist 1,220.0000

		Curve Data				
Curve FM25563						
P.I. Station		126+37.95	X	1,197,370.3380	Y	16,568,164.1725
Delta	= 29° 43′ 29.56"	(RT)				
Degree	= 4° 18′ 28.63"					
Tangent	= 352.9522					
Length	= 690.0000					
Radius	= 1,330.0000					
External	= 46.0361					
Long Chord	= 682.2879					
Mid. Ord.	= 44.4959					
P.C. Station		122+85.00	X	1,197,201.0857	Y	16,568,473.8964
P.T. Station		129+75.00	X	1,197,363.7472	Y	16,567,811.2819
C.C.			X	1,196,033.9791	Y	16,567,836.1174
Back	= S 28° 39′ 17.69" E					
Ahead	= S 1° 04′ 11.87" W					
Chord Bear	= S 13° 47′ 32.91" E					

		Curve Data				
Curve FM25564						
P.I. Station		133+93.39	X	1,197,355.9346	Y	16,567,392.9698
Delta	= 4° 10′ 01.75"	(LT)				
Degree	= 0° 29′ 53.61"					
Tangent	= 418.3851					
Length	= 836.4012					
Radius	= 11,500.0000					
External	= 7.6082					
Long Chord	= 836.2169					
Mid. Ord.	= 7.6032					
P.C. Station		129+75.00	X	1,197,363.7472	Y	16,567,811.2819
P.T. Station		138+11.40	X	1,197,378.5398	Y	16,566,975.1958
C.C.			X	1,208,861.7420	Y	16,567,596.5388
Back	= S 1° 04′ 11.87" W					
Ahead	= S 3° 05′ 49.88" E					
Chord Bear	= S 1° 00′ 49.00" E					

Course from PT FM25564 to FM2556101 S 3° 05′ 49.88" E Dist 48.5987

Point FM2556101 X 1,197,381.1656 Y 16,566,926.6681 Sta 138+60.00

Ending chain FM2556 description

SE LEVEE RD

Beginning chain SELEVEE description

Point SELEV100 X 1,197,378.8143 Y 16,568,274.7451 Sta 40+00.00

Course from SELEV100 to PC SELEVEE1 S 4° 10′ 10.74" E Dist 106.6153

		Curve Data				
Curve SELEVEE1						
P.I. Station		41+28.06	X	1,197,388.1253	Y	16,568,147.0266
Delta	= 81° 14′ 19.56"	(RT)				
Degree	= 229° 10′ 59.22"					
Tangent	= 21.4423					
Length	= 35.4471					
Radius	= 25.0000					
External	= 7.9359					
Long Chord	= 32.5516					
Mid. Ord.	= 6.0237					
P.C. Station		41+06.62	X	1,197,386.5663	Y	16,568,168.4121
P.T. Station		41+42.06	X	1,197,367.2268	Y	16,568,142.2283
C.C.			X	1,197,361.6324	Y	16,568,166.5943
Back	= S 4° 10′ 10.74" E					
Ahead	= S 77° 04′ 08.82" W					
Chord Bear	= S 36° 26′ 59.04" W					

Course from PT SELEVEE1 to SELEV101 S 77° 04′ 08.82" W Dist 37.9376

Point SELEV101 X 1,197,330.2512 Y 16,568,133.7388 Sta 41+80.00

Ending chain SELEVEE description

SW LEVEE RD

Beginning chain SWLEVEE description

Point SWLEVEE01 X 1,197,175.1527 Y 16,568,368.8827 Sta 20+00.00

Course from SWLEVEE01 to PC SWLEVEE1 S 80° 31′ 54.35" E Dist 5.0000

		Curve Data				
Curve SWLEVEE1						
P.I. Station		20+29.55	X	1,197,204.3040	Y	16,568,364.0210
Delta	= 65° 44′ 14.78"	(RT)				
Degree	= 150° 46′ 42.12"					
Tangent	= 24.5539					
Length	= 43.5987					
Radius	= 38.0000					
External	= 7.2426					
Long Chord	= 41.2464					
Mid. Ord.	= 6.0832					
P.C. Station		20+05.00	X	1,197,180.0846	Y	16,568,368.0602
P.T. Station		20+48.60	X	1,197,210.5738	Y	16,568,340.2811
C.C.			X	1,197,173.8336	Y	16,568,330.5778
Back	= S 80° 31′ 54.34" E					
Ahead	= S 14° 47′ 39.56" E					
Chord Bear	= S 47° 39′ 46.95" E					

Course from PT SWLEVEE1 to PC SWLEVEE2 S 14° 59′ 12.90" E Dist 194.1513

		Curve Data				
Curve SWLEVEE2						
P.I. Station		22+76.82	X	1,197,269.2953	Y	16,568,119.7435
Delta	= 88° 27′ 34.58"	(LT)				
Degree	= 163° 42′ 08.02"					
Tangent	= 34.0715					
Length	= 54.0369					
Radius	= 35.0000					
External	= 13.8453					
Long Chord	= 48.8277					
Mid. Ord.	= 9.9208					
P.C. Station		22+42.75	X	1,197,260.7810	Y	16,568,152.7339
P.T. Station		22+96.79	X	1,197,302.5027	Y	16,568,127.3678
C.C.			X	1,197,294.6706	Y	16,568,161.4802
Back	= S 14° 28′ 16.60" E					
Ahead	= N 77° 04′ 08.82" E					
Chord Bear	= S 58° 42′ 03.89" E					

Course from PT SWLEVEE2 to SWLEVEE02 N 77° 04′ 08.82" E Dist 28.4705

Point SWLEVEE02 X 1,197,330.2512 Y 16,568,133.7388 Sta 23+25.26

Ending chain SWLEVEE description

SUPERELEVATION TABLE

SOUTHBOUND		
LIMITS		RATE
BEGIN	END	
100+98.00	102+60.00	-2.00%
102+60.00	104+80.00	TRANSITION -2.00% TO 6.00%
104+80.00	110+00.00	6.00%
110+00.00	112+20.00	TRANSITION 6.00% TO -2.00%
112+20.00	121+30.00	-2.00%
121+30.00	123+50.00	TRANSITION -2.00% TO -6.00%
123+50.00	129+10.00	-6.00%
129+10.00	131+30.00	TRANSITION -6.00% TO -2.00%
131+30.00	138+20.00	-2.00%

NORTHBOUND		
LIMITS		RATE
BEGIN	END	
100+98.00	102+60.00	-2.00%
102+60.00	104+80.00	TRANSITION -2.00% TO -6.00%
104+80.00	110+00.00	-6.00%
110+00.00	112+20.00	TRANSITION -6.00% TO -2.00%
112+20.00	121+30.00	-2.00%
121+30.00	123+50.00	TRANSITION -2.00% TO 6.00%
123+50.00	129+10.00	6.00%
129+10.00	131+30.00	TRANSITION 6.00% TO -2.00%
131+30.00	138+20.00	-2.00%

STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

HORIZONTAL ALIGNMENT DATA

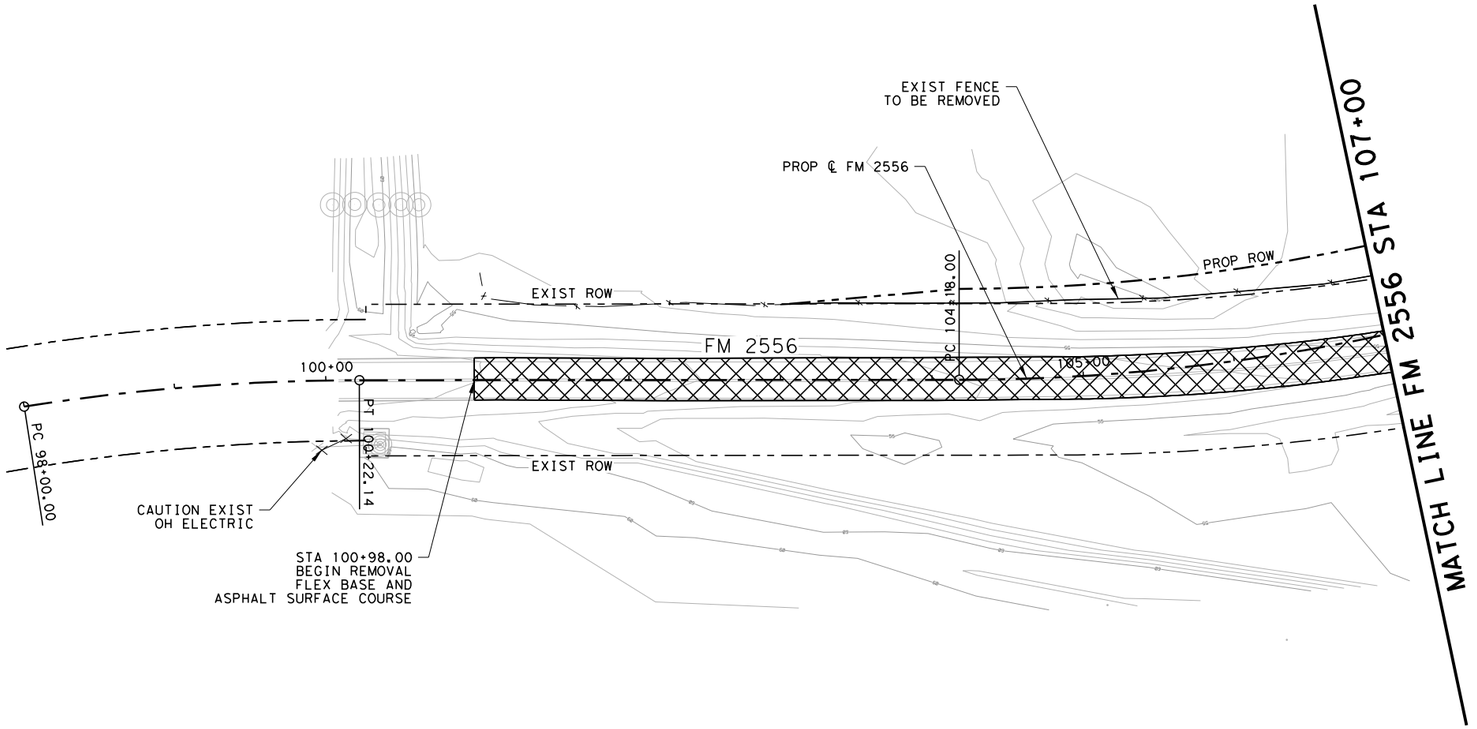
SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		35

50 0 50 100
SCALE: 1" = 100'

LEGEND

- REMOVE EXISTING ASPHALT PAVEMENT AND BASE MATERIAL
- REMOVE EXISTING GRAVEL DRIVEWAY



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

REMOVAL LAYOUT

SCALE: 1" = 100' SHEET 1 OF 5

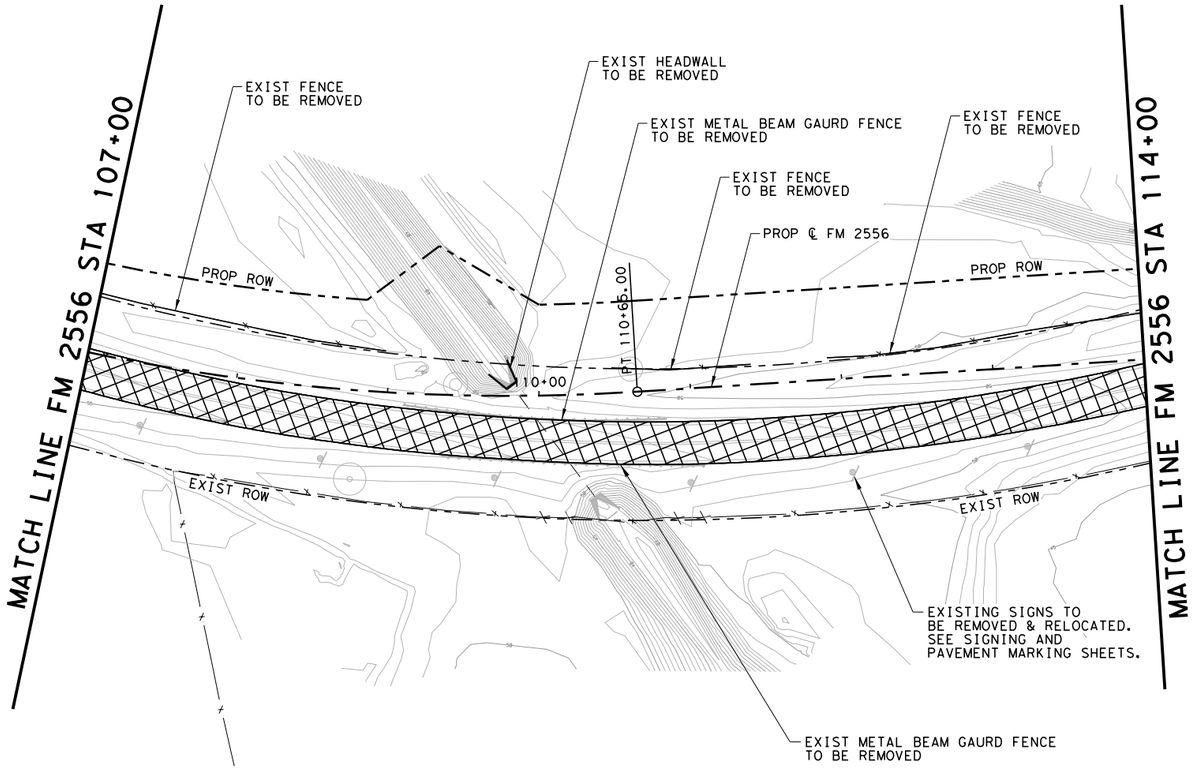
DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		36

50 0 50 100
SCALE: 1" = 100'

LEGEND

REMOVE EXISTING ASPHALT PAVEMENT AND BASE MATERIAL

REMOVE EXISTING GRAVEL DRIVEWAY



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

REMOVAL LAYOUT

SCALE: 1" = 100' SHEET 2 OF 5

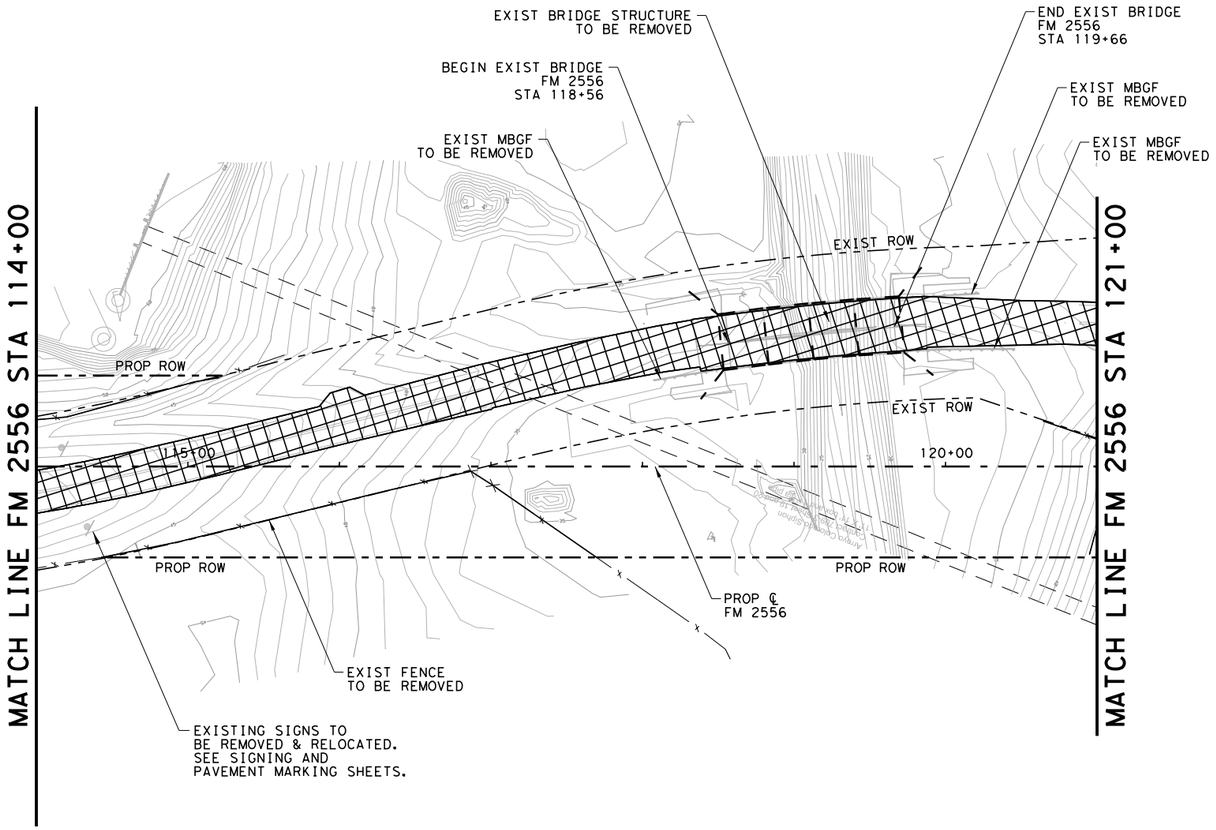
		CONT	SECT	JOB	HIGHWAY
DS: AM	CK: DH	2529	02	010	FM 2556
		DIST	COUNTY		SHEET NO.
DW: AM	CK: AT	PHARR	CAMERON		37

50 0 50 100
SCALE: 1" = 100'

LEGEND

REMOVE EXISTING ASPHALT PAVEMENT AND BASE MATERIAL

REMOVE EXISTING GRAVEL DRIVEWAY



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

REMOVAL LAYOUT

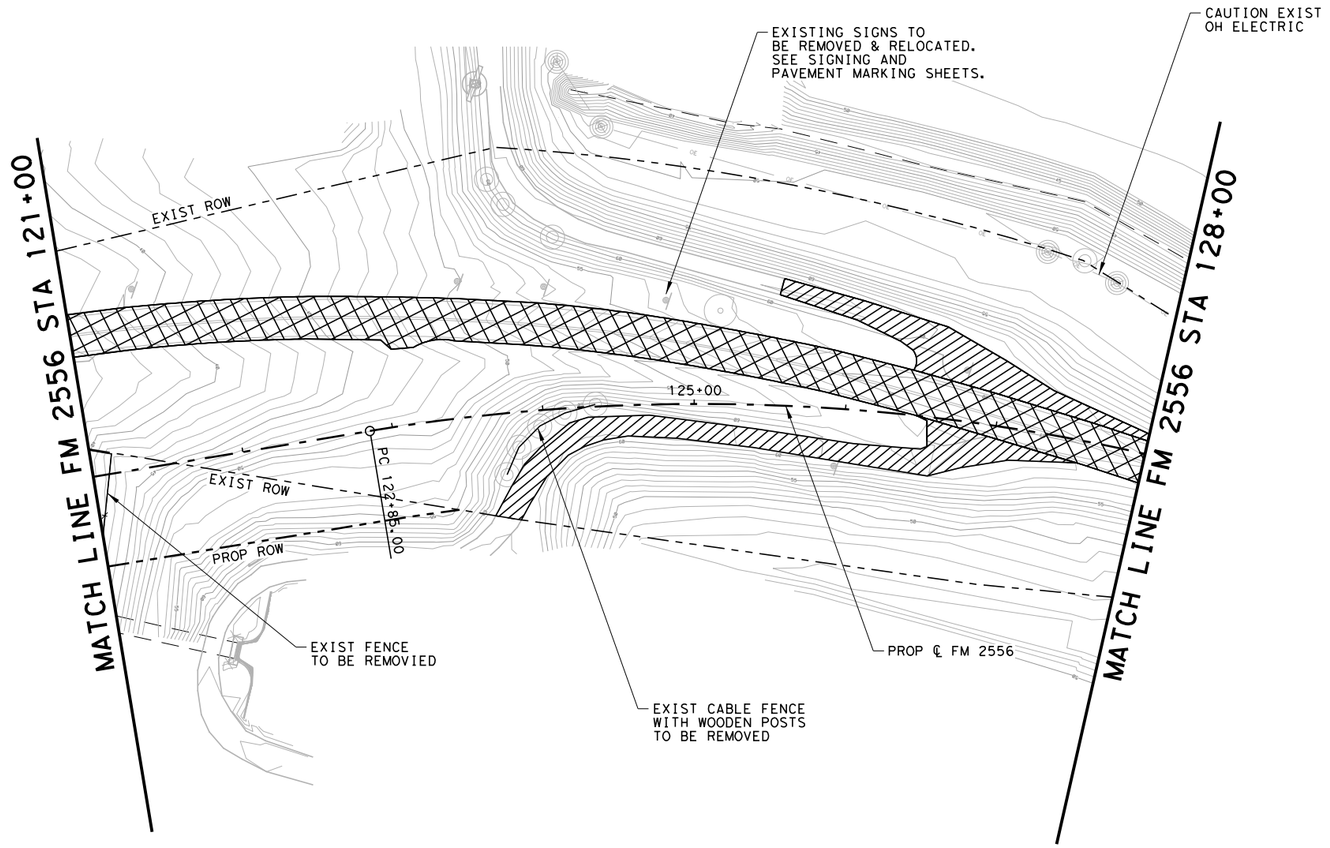
SCALE: 1" = 100' SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		38

50 0 50 100
SCALE: 1" = 100'

LEGEND

- REMOVE EXISTING ASPHALT PAVEMENT AND BASE MATERIAL
- REMOVE EXISTING GRAVEL DRIVEWAY



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

REMOVAL LAYOUT

SCALE: 1" = 100' SHEET 4 OF 5

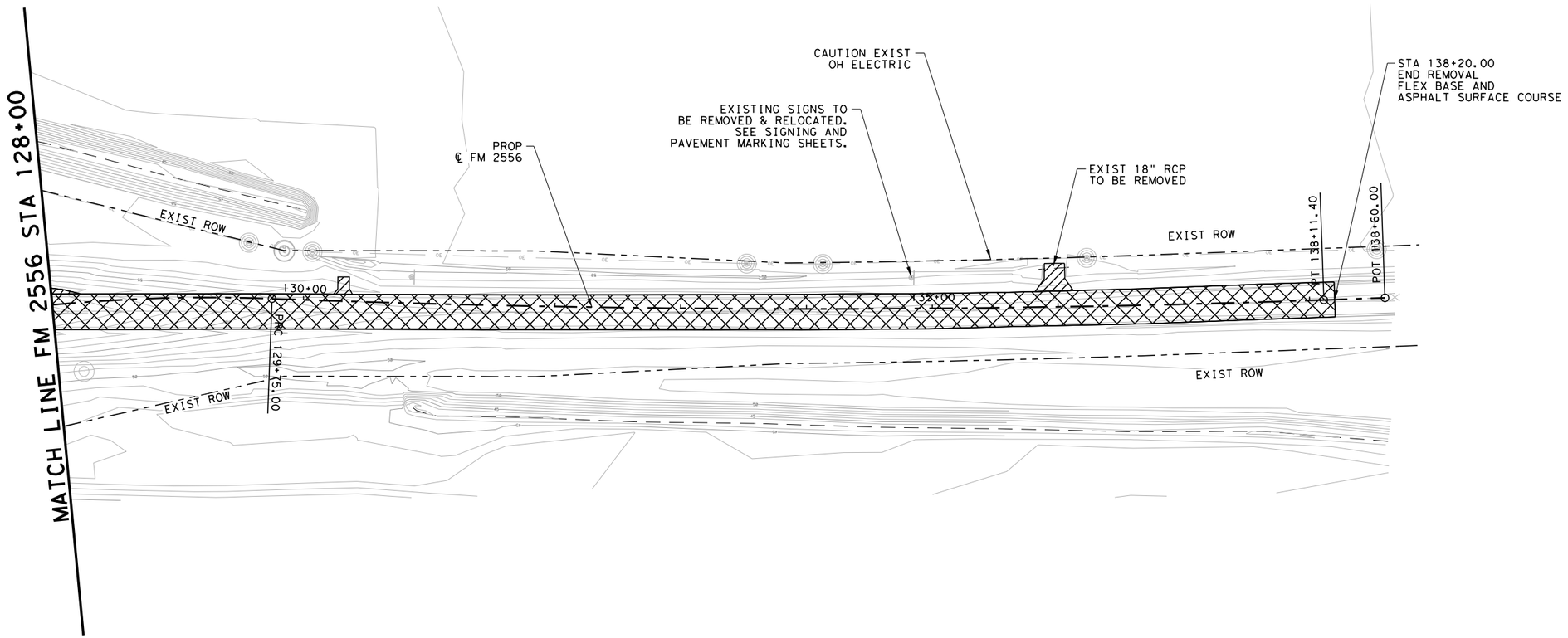
		CONT	SECT	JOB	HIGHWAY
DS: DS	CK: DH	2529	02	010	FM 2556
DW: DW	CK: DW	DIST	COUNTY		SHEET NO.
		PHARR	CAMERON		39

50 0 50 100
SCALE: 1" = 100'

LEGEND

REMOVE EXISTING ASPHALT PAVEMENT AND BASE MATERIAL

REMOVE EXISTING GRAVEL DRIVEWAY



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

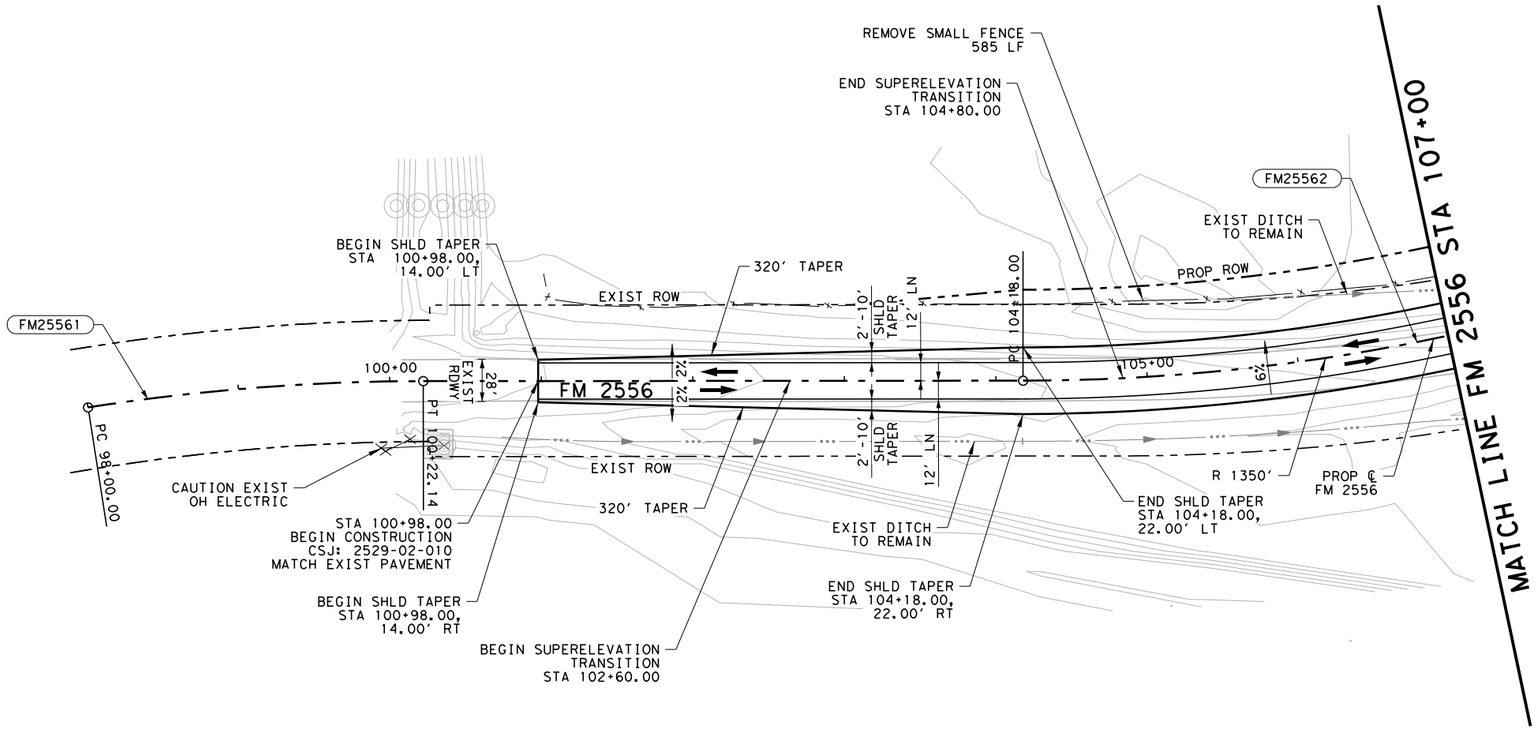
Texas Department of Transportation

FM 2556

REMOVAL LAYOUT

SCALE: 1" = 100' SHEET 5 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		40



SCALE: 1" = 100' HORIZONTAL

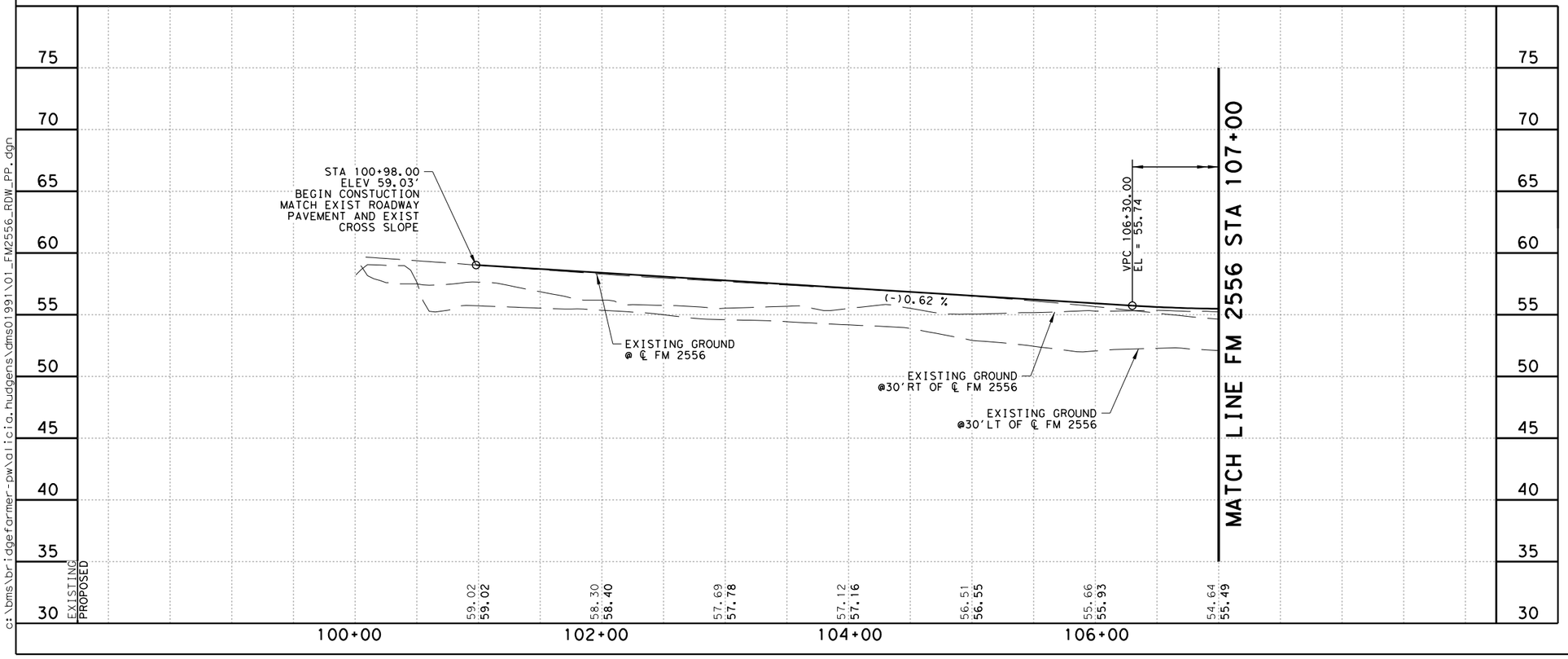
SCALE: 1" = 10' VERTICAL

LEGEND

- PROPOSED DIRECTION ARROWS
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- EXISTING DITCH
- PROPOSED DITCH

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. SEE "FM 2556 CROSS STREET LEVEE RD PLAN AND PROFILE" SHEETS FOR MORE INFORMATION ON LEVEE RD REPLACEMENT.
3. UTILITIES SHOWN ARE FOR REFERENCE ONLY.
4. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 WILL ACT AS PART OF THE USIBWC LEVEE.
5. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 MEETS 44 CFR 65.10(b).



ALEXANDER R. MASSARA
143293
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
1-10-2024

1 01/10/2024 - ADDED SHEET NOTES 4 AND 5

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

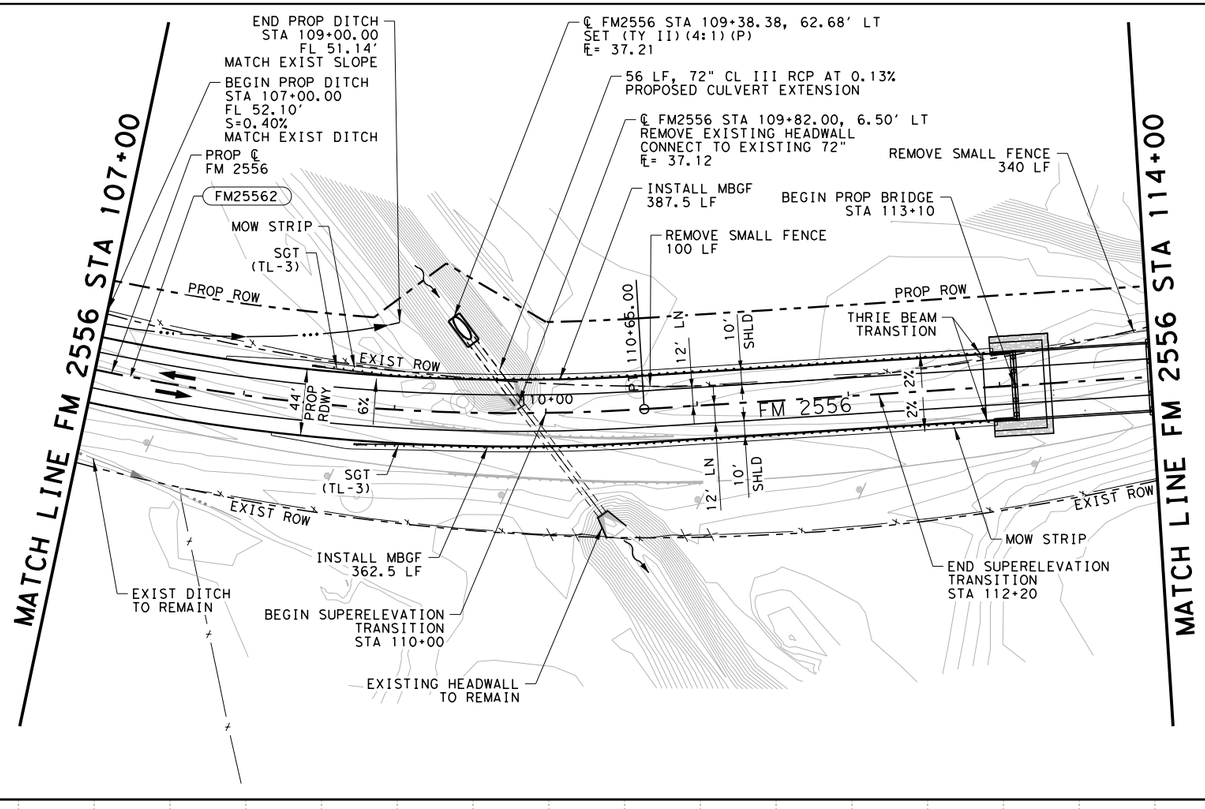
Texas Department of Transportation

FM 2556

PLAN AND PROFILE

SHEET 1 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		41



50 0 50 100
SCALE: 1" = 100' HORIZONTAL

5 0 5 10
SCALE: 1" = 10' VERTICAL

LEGEND

- PROPOSED DIRECTION ARROWS
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- EXISTING DITCH
- PROPOSED DITCH

NOTES:

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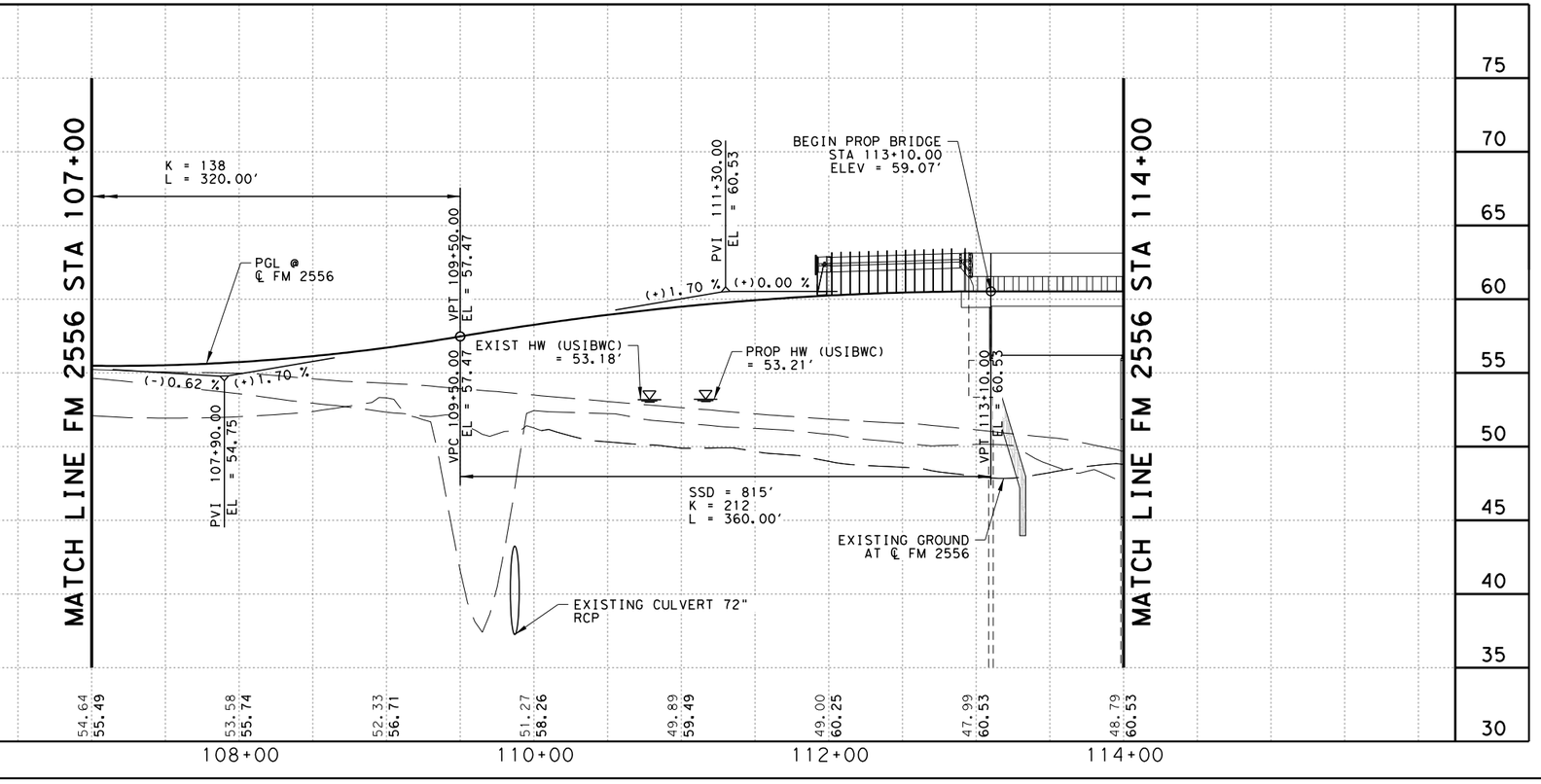
5. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 MEETS 44 CFR 65.10(b).

1



STATE OF TEXAS
ALEXANDER R. MASSARA
143293
LICENSED
PROFESSIONAL ENGINEER
1-10-2024

1 01/10/2024 - ADDED SHEET NOTES 4 AND 5

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

PLAN AND PROFILE

SHEET 2 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		42

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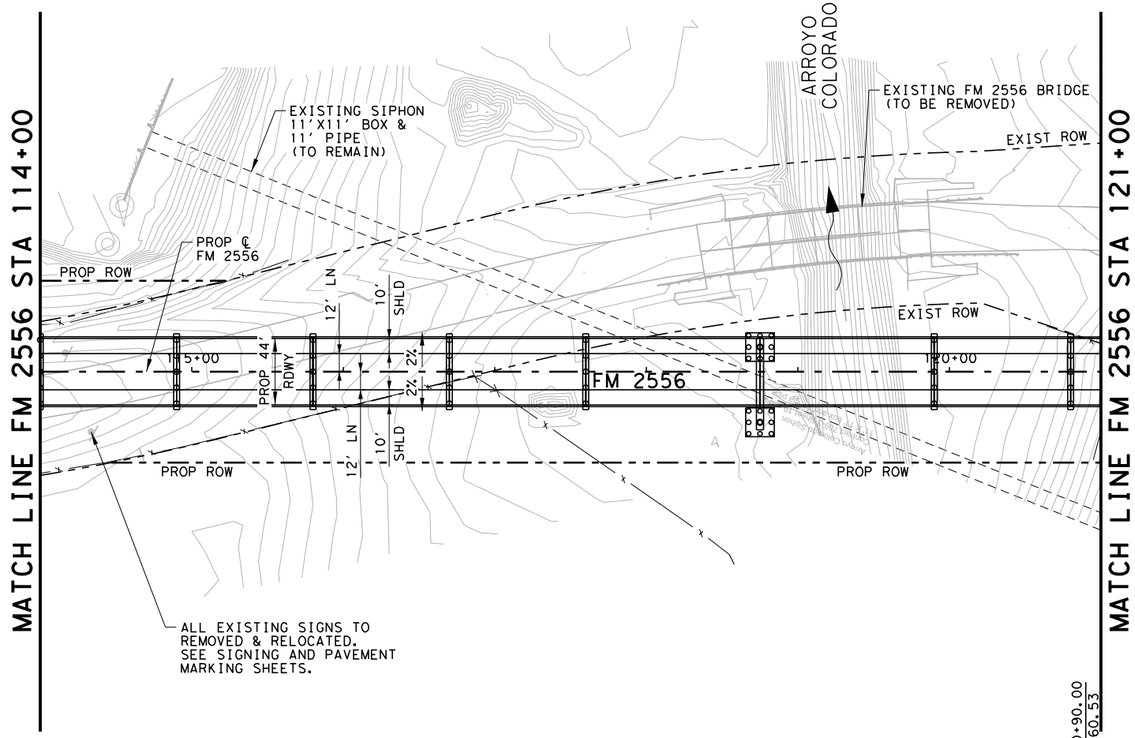

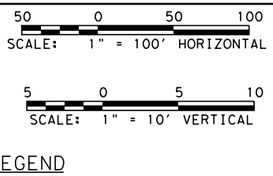

LEGEND

- PROPOSED DIRECTION ARROWS
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- EXISTING DITCH
- PROPOSED DITCH

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
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3. UTILITIES SHOWN ARE FOR REFERENCE ONLY.
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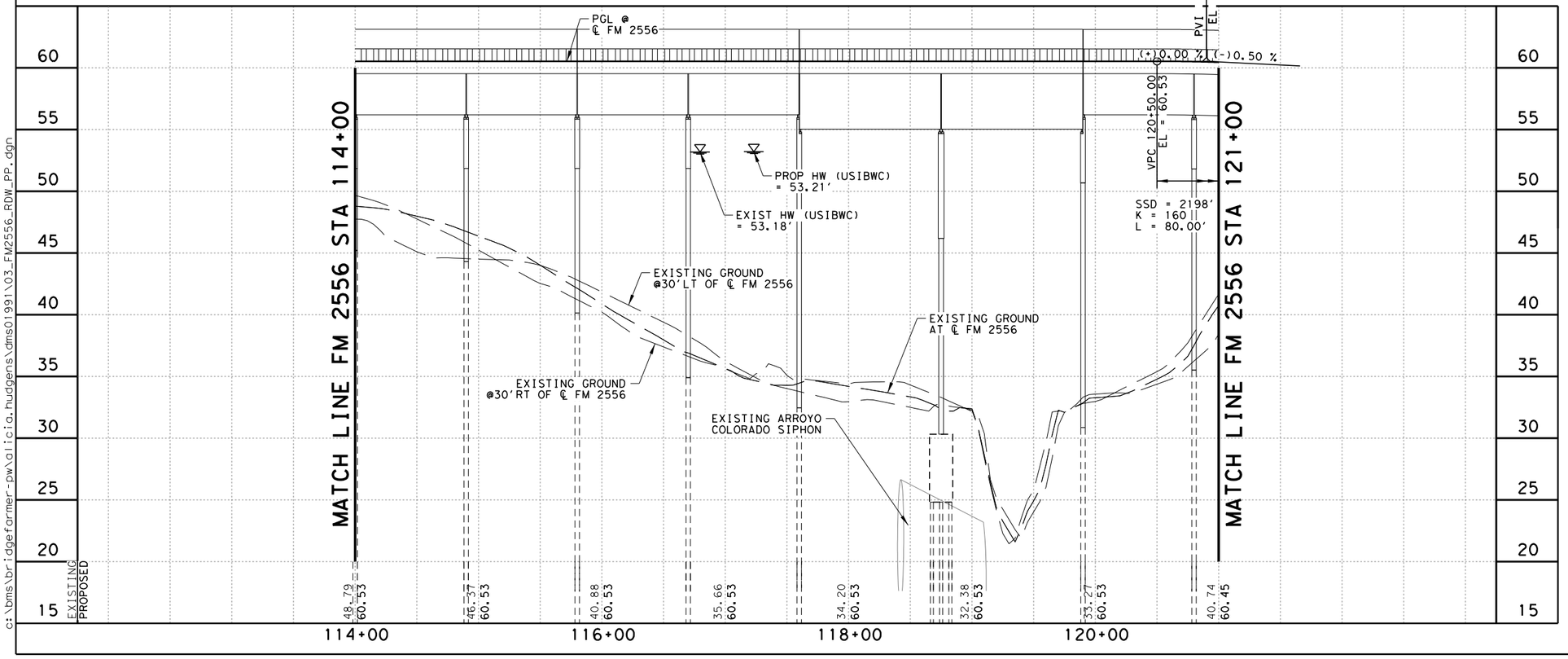
5. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 MEETS 44 CFR 65.10(b).

1



STATE OF TEXAS
ALEXANDER R. MASSARA
143293
LICENSED
PROFESSIONAL ENGINEER
1-10-2024

1 01/10/2024 - ADDED SHEET NOTES 4 AND 5

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

PLAN AND PROFILE

SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		43

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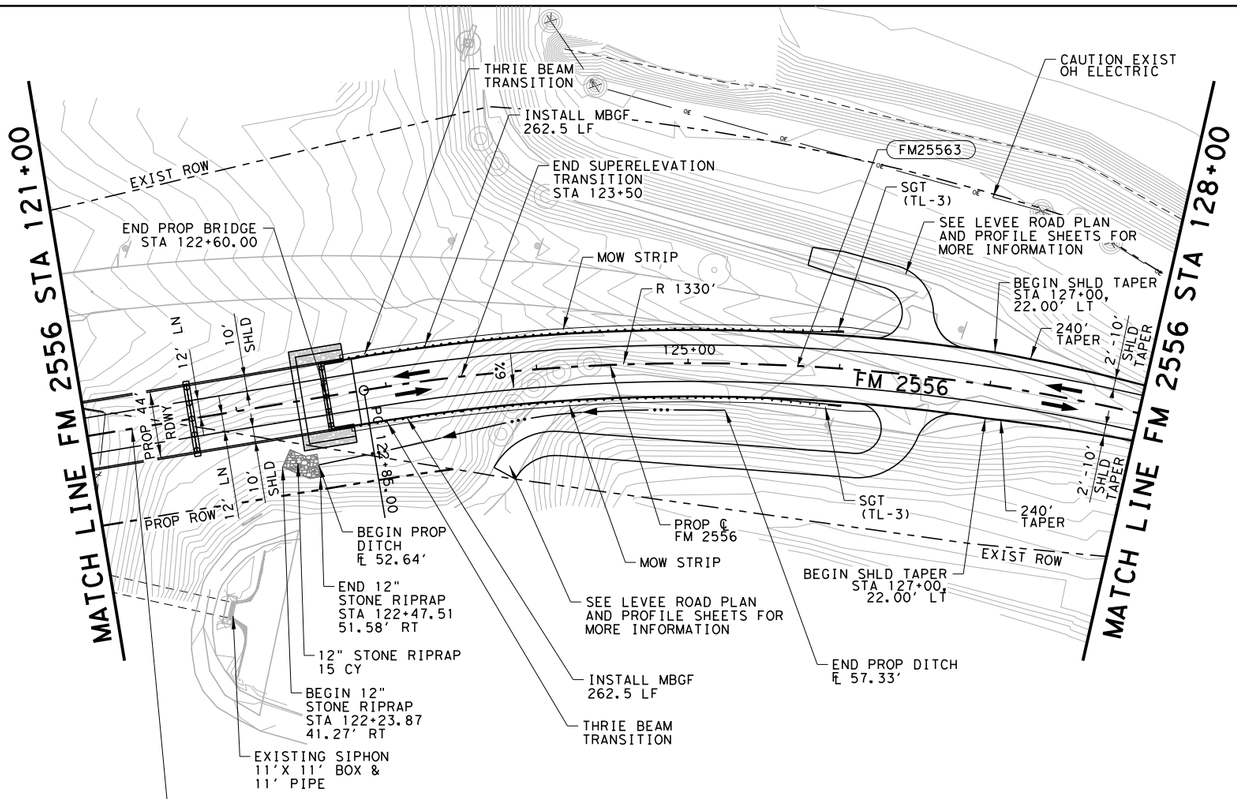
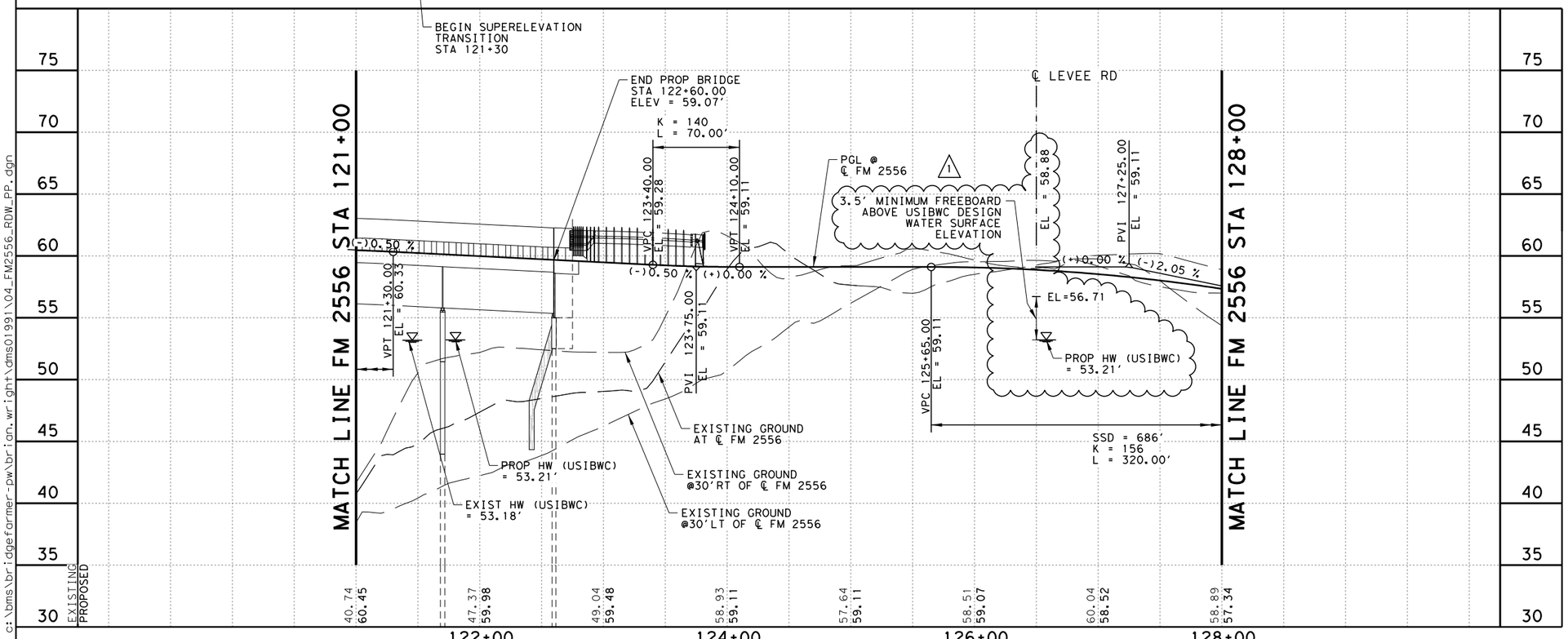




SCALE: 1" = 100' HORIZONTAL

SCALE: 1" = 10' VERTICAL

LEGEND

- PROPOSED DIRECTION ARROWS
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- EXISTING DITCH
- PROPOSED DITCH

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. SEE "FM 2556 CROSS STREET LEVEE RD PLAN AND PROFILE" SHEETS FOR MORE INFORMATION ON LEVEE RD REPLACEMENT.
3. UTILITIES SHOWN ARE FOR REFERENCE ONLY.
4. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 WILL ACT AS PART OF THE USIBWC LEVEE.
5. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 MEETS 44 CFR 65.10(b).

1

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D. Wright
4/9/24

THIS SEAL APPLIES TO REVISION 1.
THE ORIGINAL SHEET WAS SIGNED BY ALEXANDER R. MASSARA, TEXAS PE 143293.

1 04/09/2024 - ADDED SHEET NOTES AND ADDED 3.5' MIN FREEBOARD NOTE

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

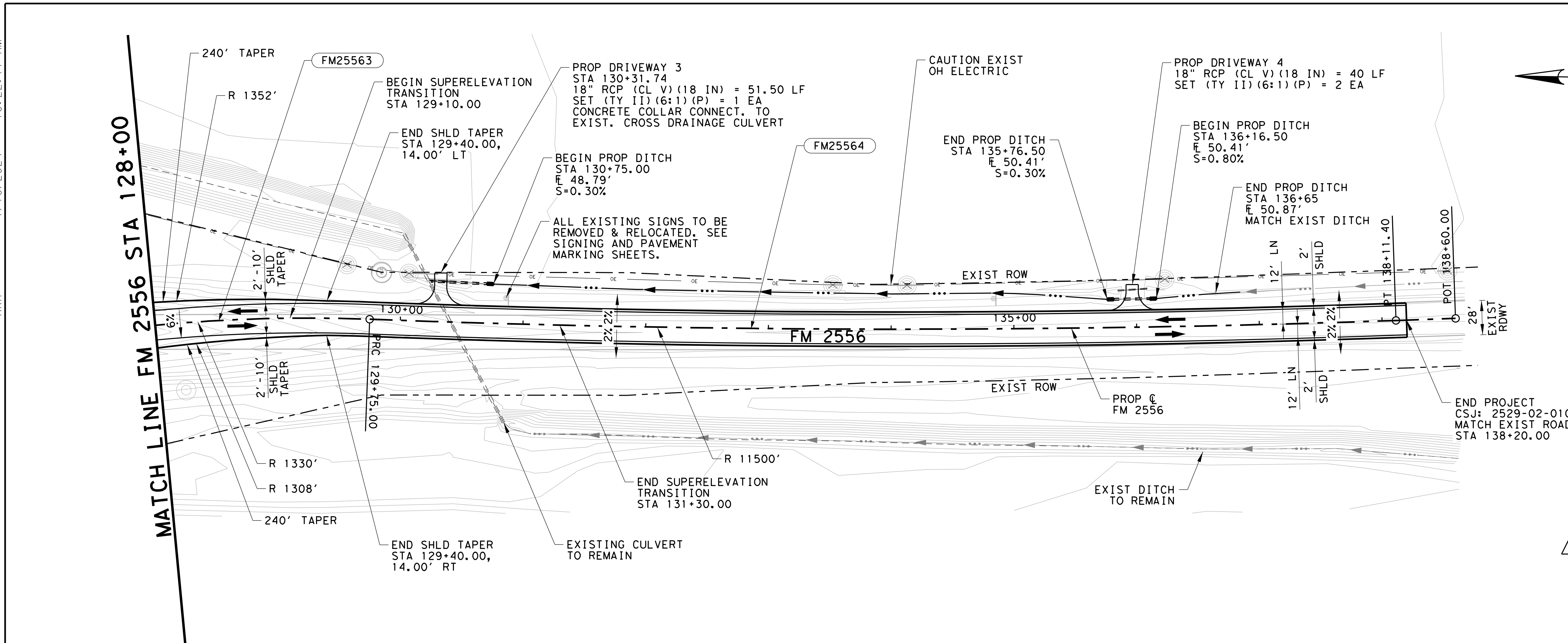
Texas Department of Transportation

FM 2556

PLAN AND PROFILE

SHEET 4 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		44

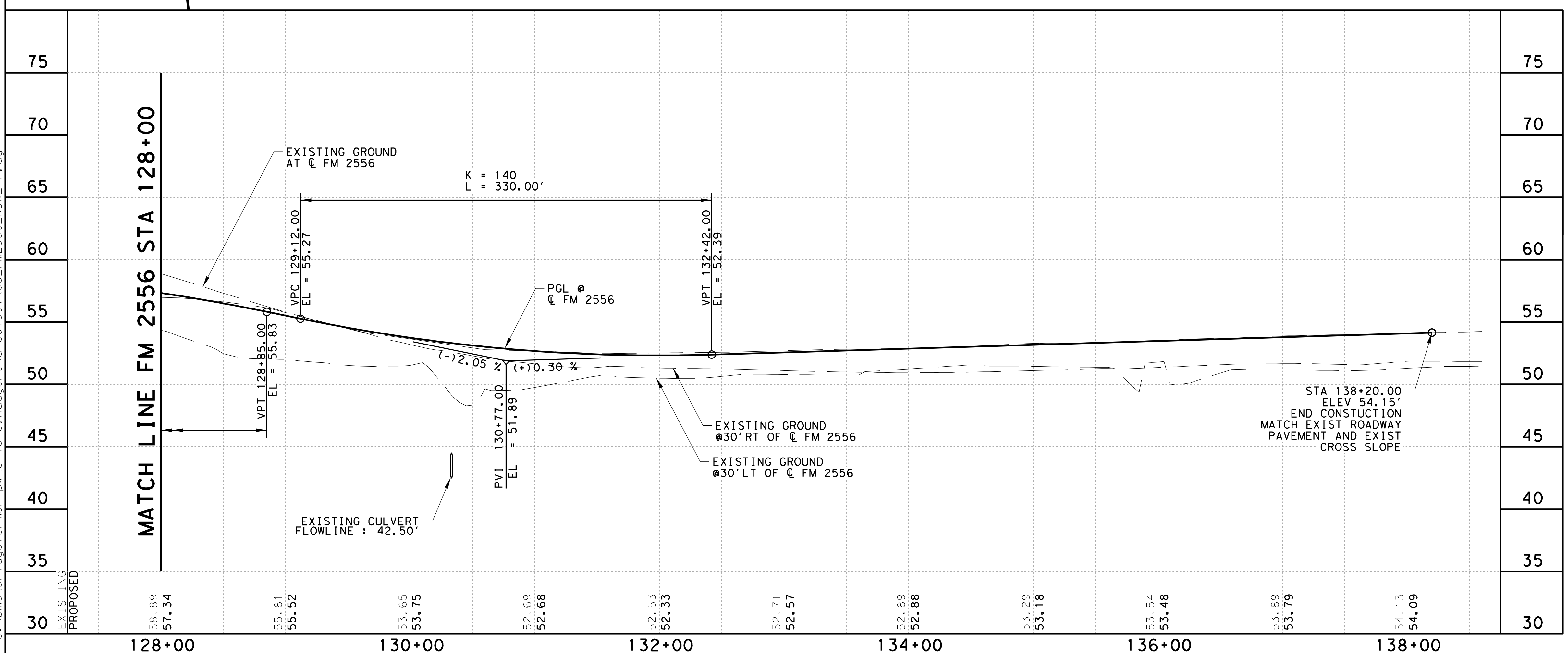


LEGEND

- PROPOSED DIRECTION ARROWS
- EXISTING RIGHT-OF-WAY
- PROPOSED RIGHT-OF-WAY
- EXISTING DITCH
- PROPOSED DITCH

NOTES:

1. REFER TO "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. SEE "FM 2556 CROSS STREET LEVEE RD PLAN AND PROFILE" SHEETS FOR MORE INFORMATION ON LEVEE RD REPLACEMENT.
3. UTILITIES SHOWN ARE FOR REFERENCE ONLY.
4. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 WILL ACT AS PART OF THE USIBWC LEVEE.
5. FM 2556 ROADWAY EMBANKMENT FROM CL FM2556 STATION 122+60 TO 128+00 MEETS 44 CFR 65.10(b).



STATE OF TEXAS — ALEXANDER R. MASSARA — 143293 — LICENSED PROFESSIONAL ENGINEER
1-10-2024

△1 01/10/2024 - ADDED SHEET NOTES 4 AND 5

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

PLAN AND PROFILE

SHEET 5 OF 5

DS: AM	CK: DH	CONT 2529	SECT 02	JOB 010	HIGHWAY FM 2556
DW: AM	CK: MM	DIST PHARR		COUNTY CAMERON	SHEET NO. 45

SCALE: 1" = 40' HORIZONTAL
1" = 4' VERTICAL

EXIST SE LEVEE RD

EXIST ROW

SW LEVEE RD
PCC
STA 23+02.79
35.11' LT

FM 2556

123+00 124+00 125+00 126+00 127+00

PC 122+85.00

PROP DITCH

POT 23+25.26

PT 22+96.79

PC 22+42.75

SW LEVEE RD
PCC
STA 23+02.89
30.92' RT

R 25'

R 16.50'

R 43'

R 35'

SW LEVEE RD
PRC
STA 22+86.94
8.00' RT

SW LEVEE RD
PC
STA 22+43.06
8.00' RT

SW LEVEE RD
PC
STA 22+43.00
8.00' LT

PROP ROW

EXIST
SW LEVEE RD

PT 20+05.00

20+48.80

R 30'

21+00 22+00

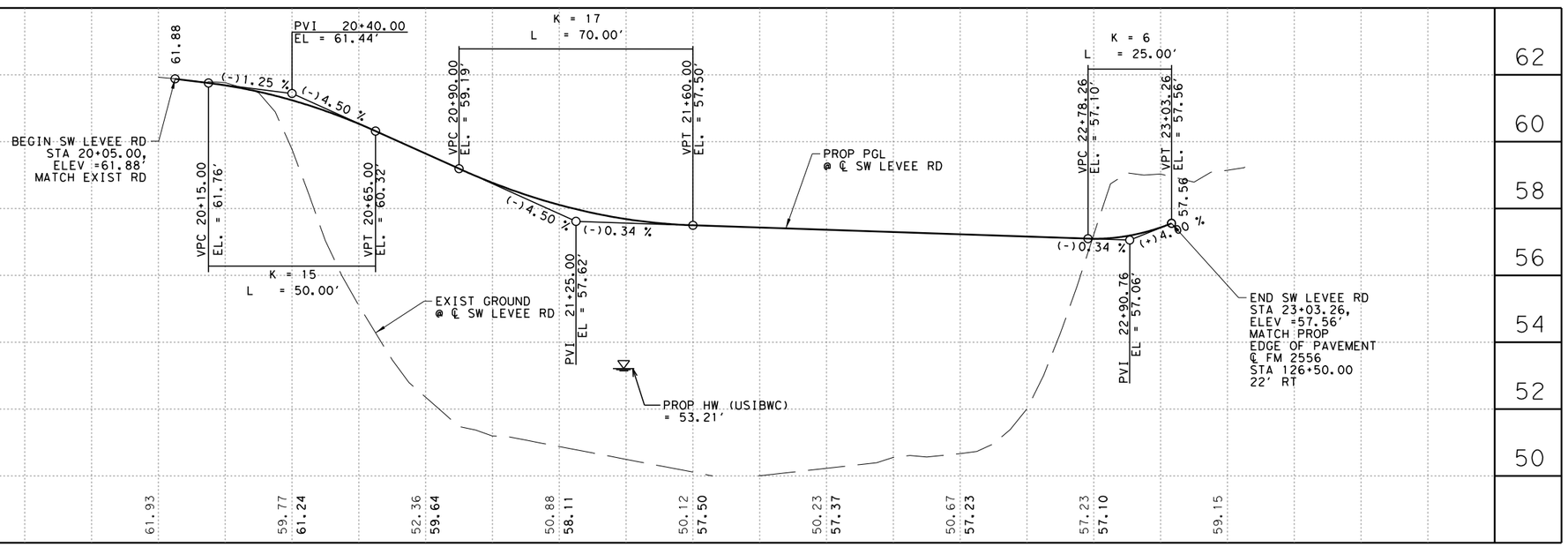
16'

8' 8'

PROP ℄ SW LEVEE
ROAD

BEGIN SW LEVEE RD
STA 20+05.00
MATCH EXIST LEVEE RD

EXIST ROW



STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

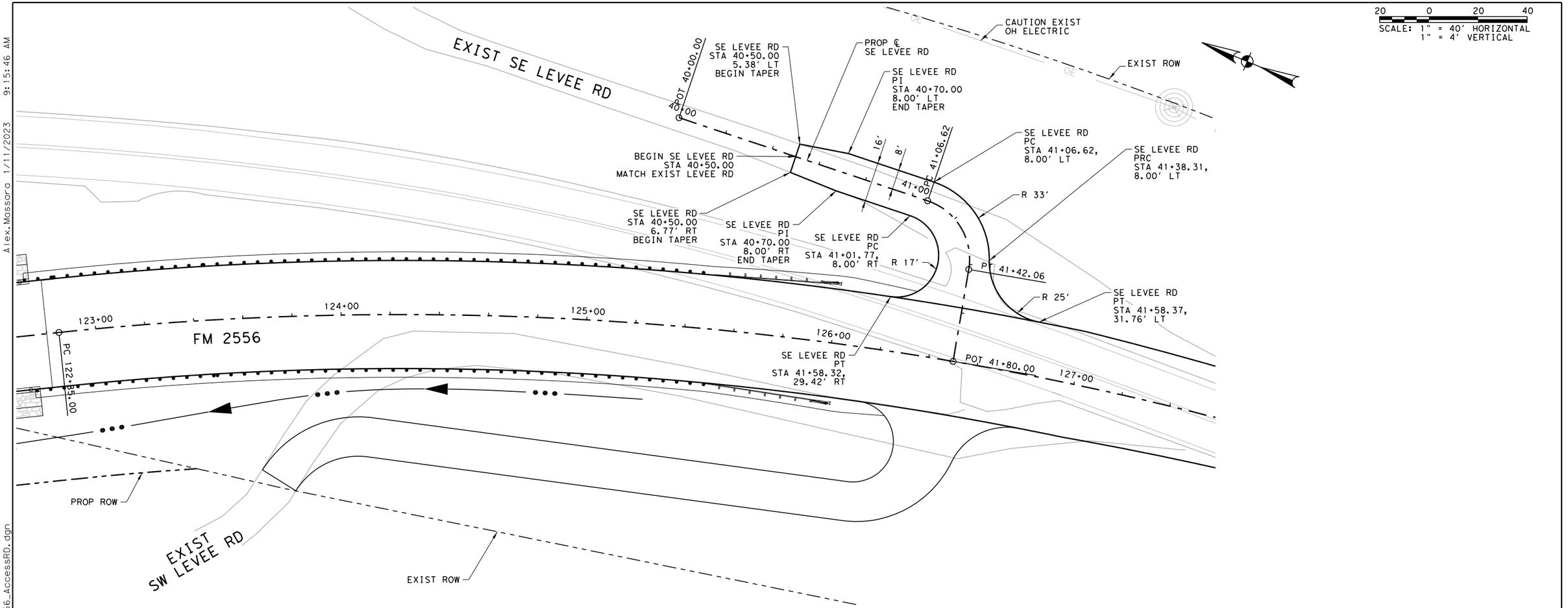
BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

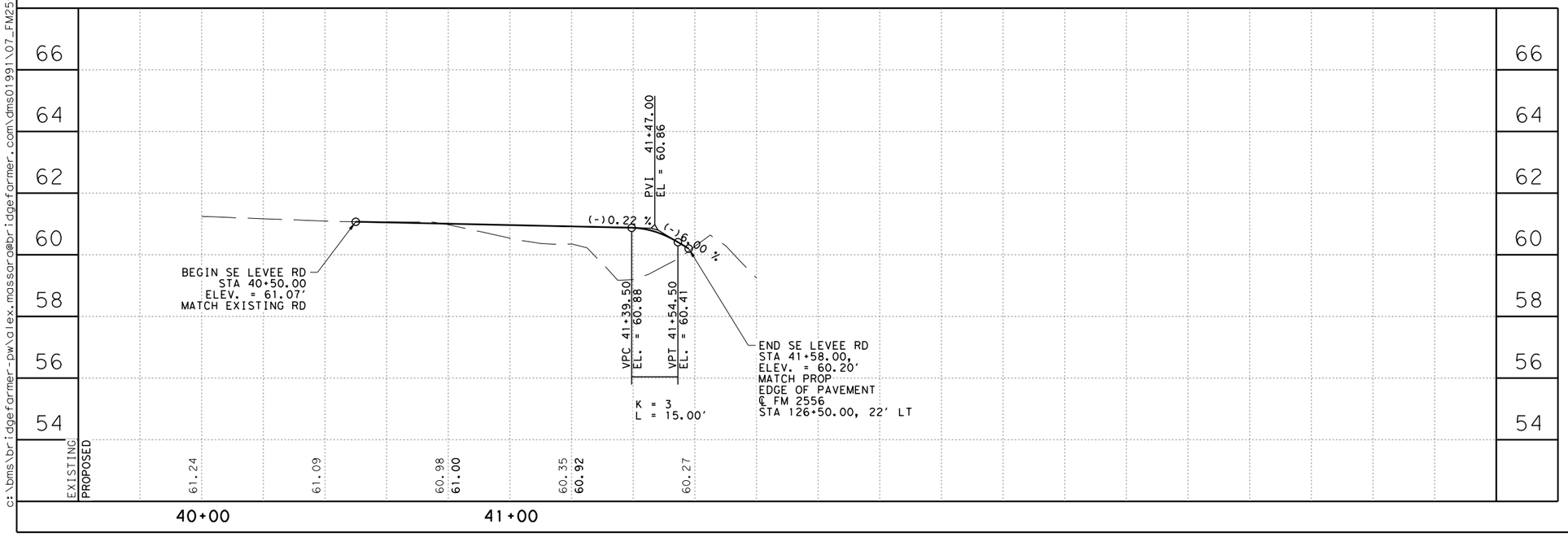
Texas Department of Transportation

FM 2556
CROSS STREET SW LEVEE ROAD PLAN AND PROFILE

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		46





STATE OF TEXAS
ALEXANDER R. MASSARO
143293
LICENSED
PROFESSIONAL ENGINEER
1-11-2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

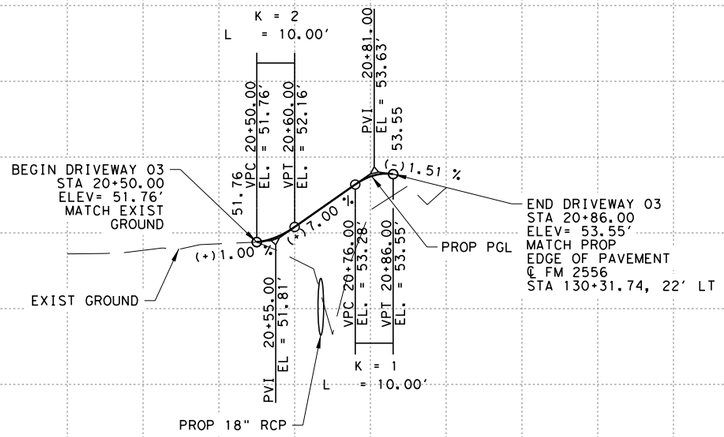
FM 2556

CROSS STREET SE LEVEE ROAD PLAN AND PROFILE

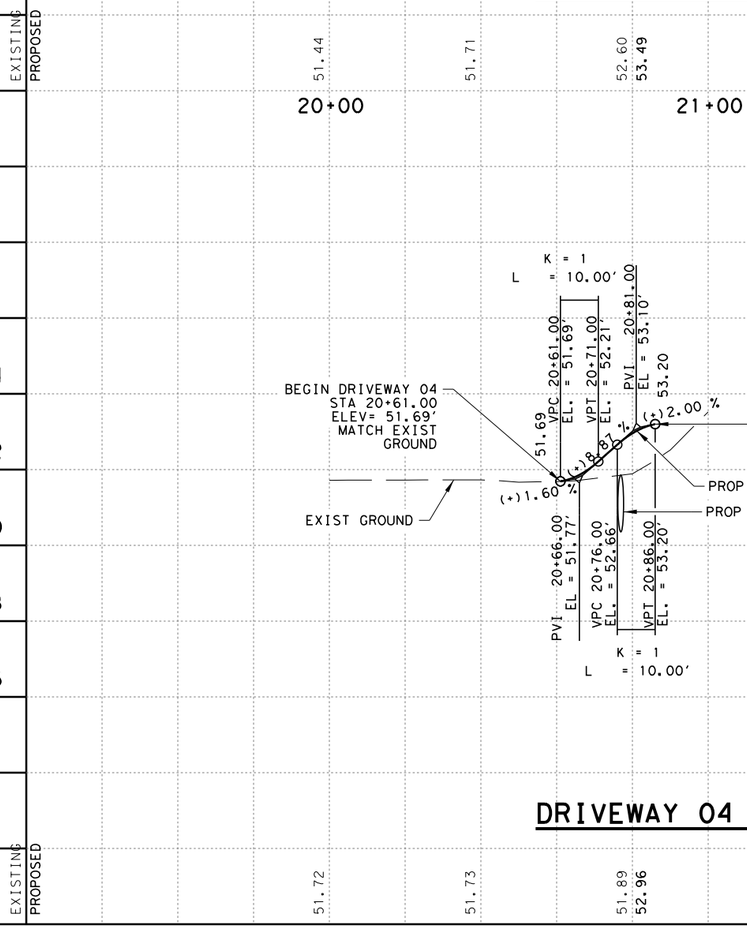
SHEET 1 OF 1

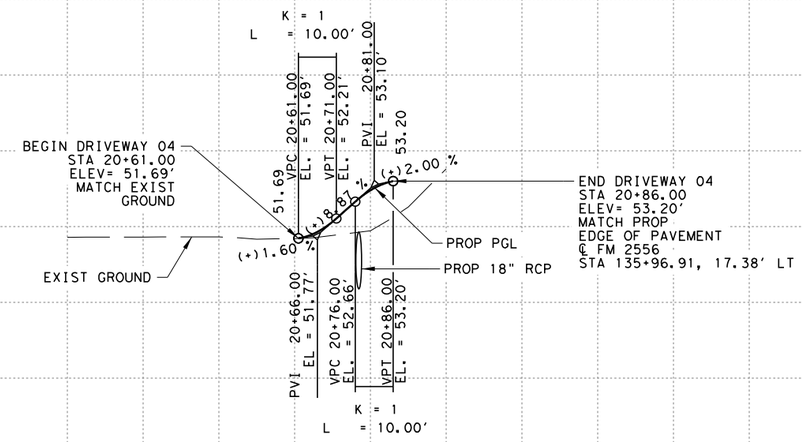
DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MM	PHARR	CAMERON		47

SCALE: 1" = 40' HORIZONTAL
1" = 4' VERTICAL



FM 2556
DRIVEWAY 03 - STA 130+31.74 (LT)





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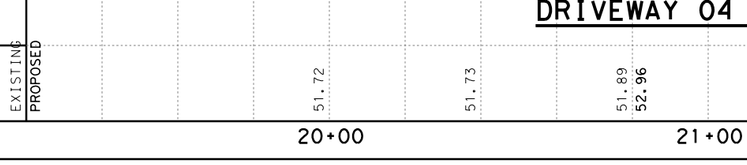

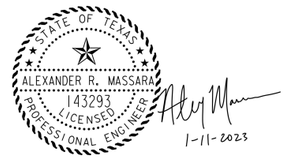

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
DRIVEWAY PROFILES

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MM	AT	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
MM	DH	PHARR	CAMERON		48

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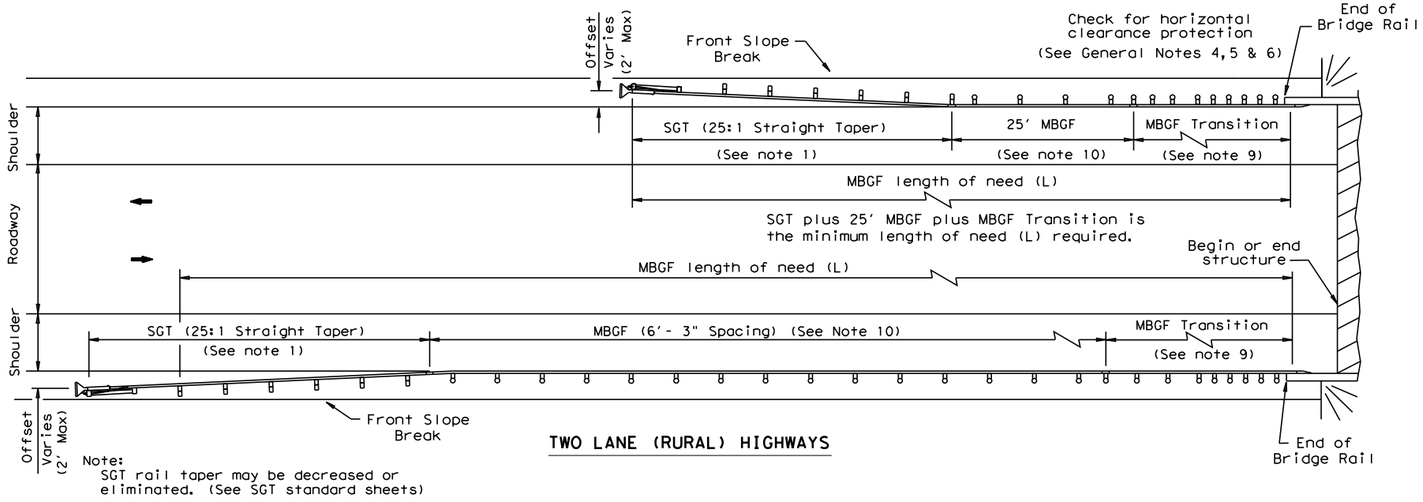
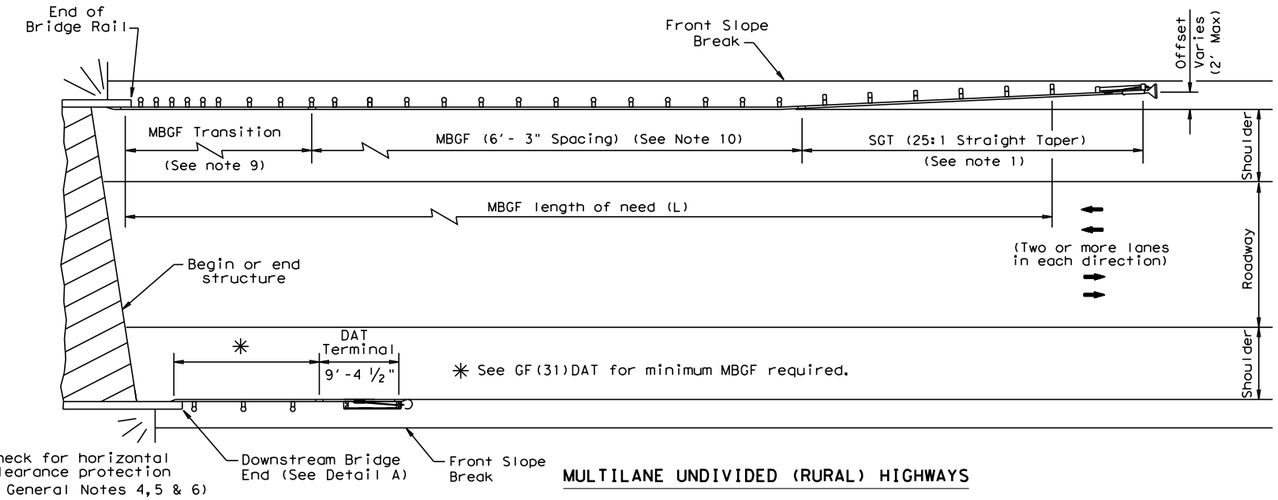
Alex.Massara

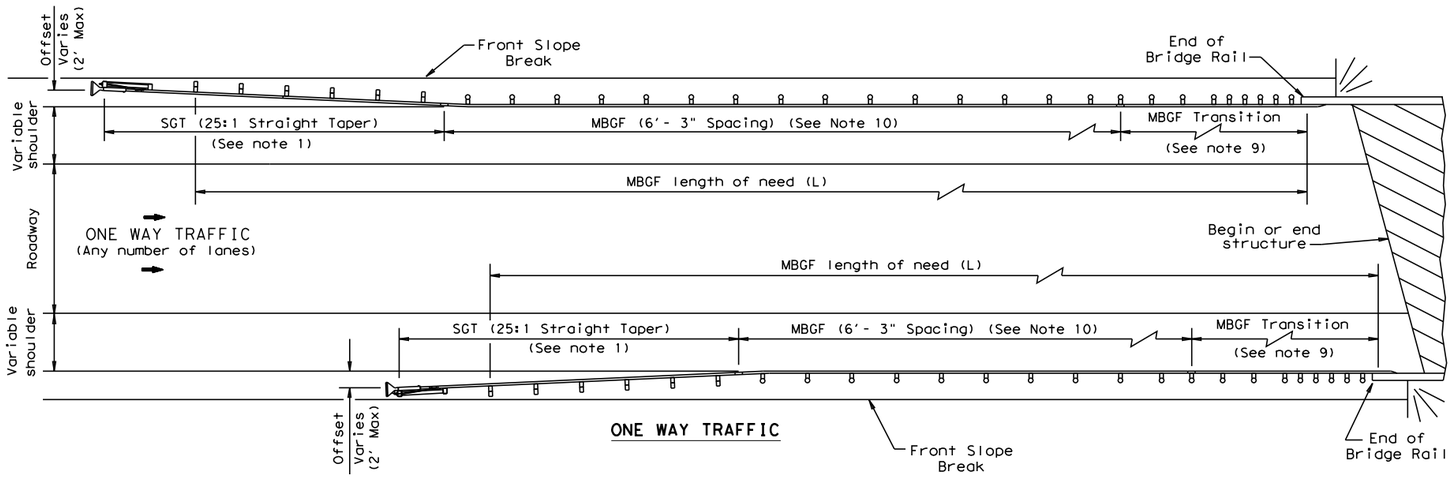


TWO LANE (RURAL) HIGHWAYS

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



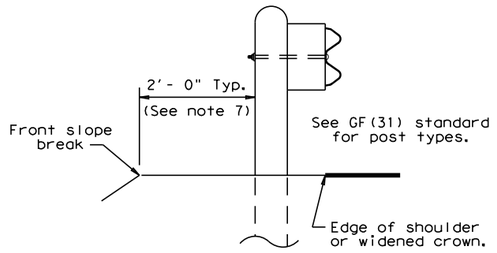
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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)	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		50

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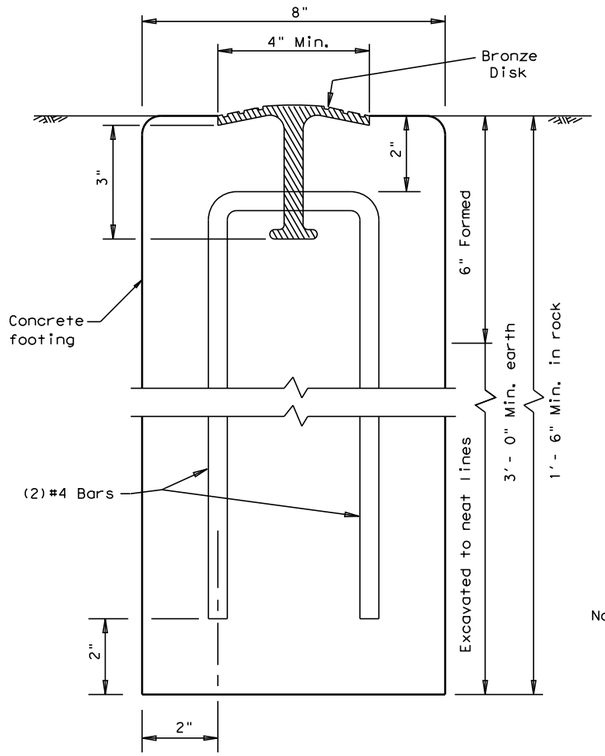
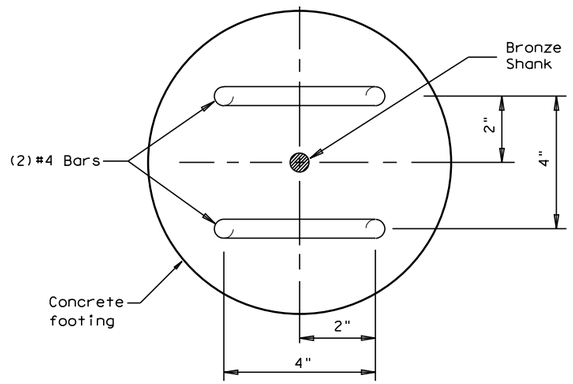
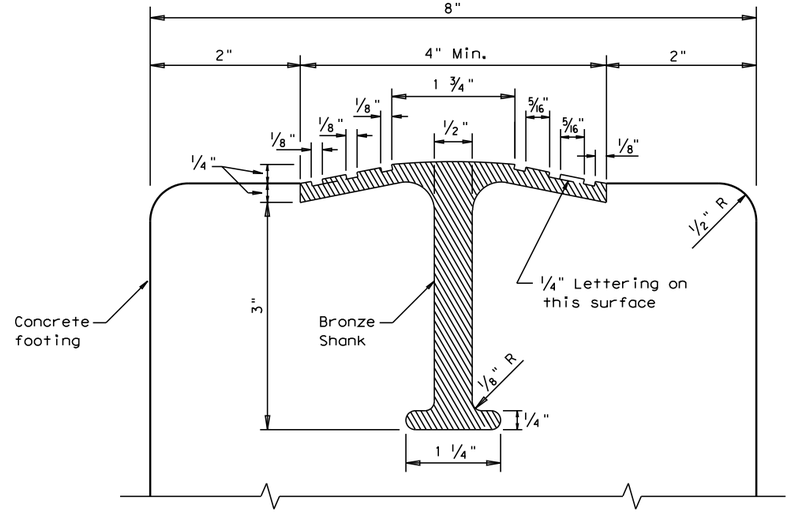


SECTION A-A

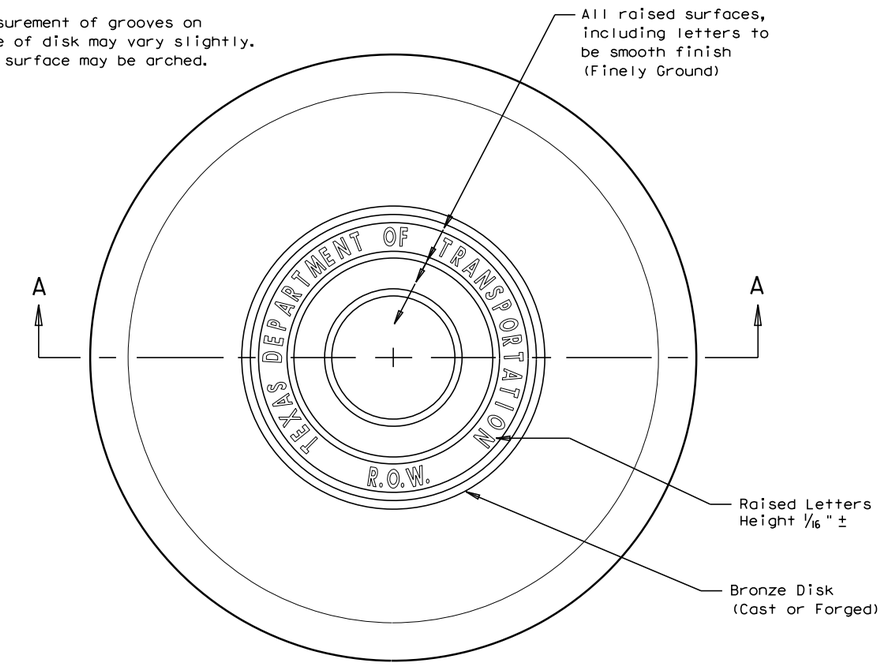


CROSS SECTION THRU MARKER



SECTION THRU TOP OF ROW MARKER

Note:
Measurement of grooves on face of disk may vary slightly. Top surface may be arched.



TOP VIEW OF ROW MARKER

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 538, "Right of way markers."
2. Right-of-Way marker concrete shall be poured in place. The bronze disks shall be set to the correct line and grade, as directed by the Engineer.
3. The bronze disk shall be of architectural bronze with the following composition: Copper 85%, Tin 5%, Lead 5%, Zinc 5%. Excavation of the marker locations shall be made of uniform lines except for the top of 6 inches which shall be formed with removable forms. The top part of the marker around the bronze disk shall receive a trowel finish.
4. Once the concrete has set, the Engineer will stencil the required survey data and, with a chisel or center punch, cut across marker the exact location of the Right-of-Way line in the bronze disk.

Texas Department of Transportation

Design Division Standard

RIGHT-OF-WAY MARKER

M-10

FILE: m10.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: VP
© TxDOT February 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		51

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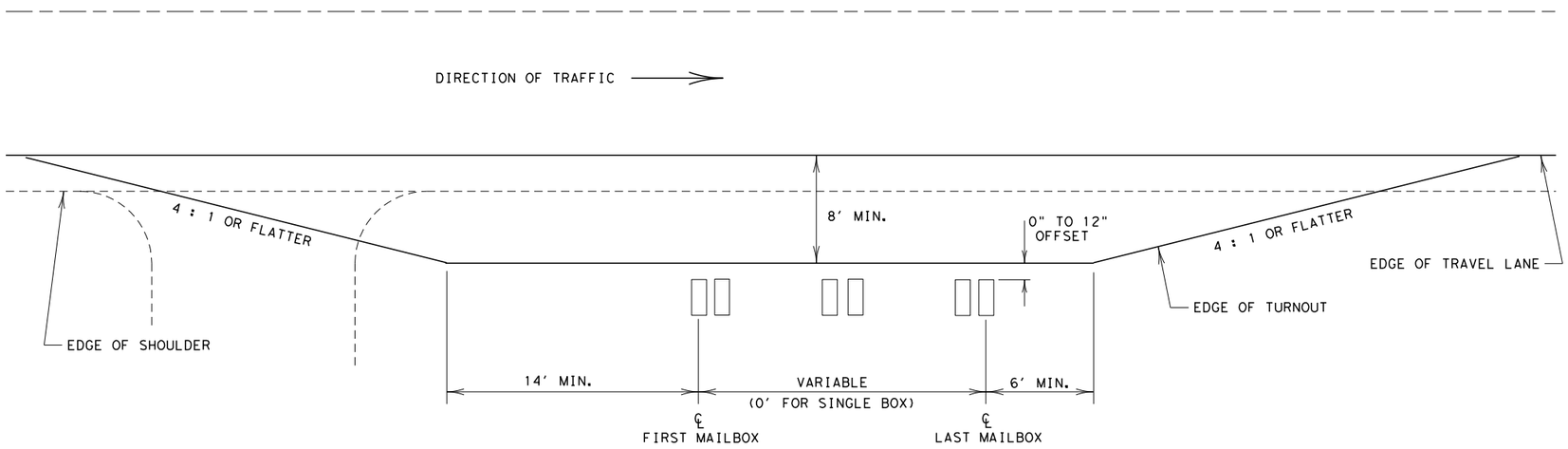
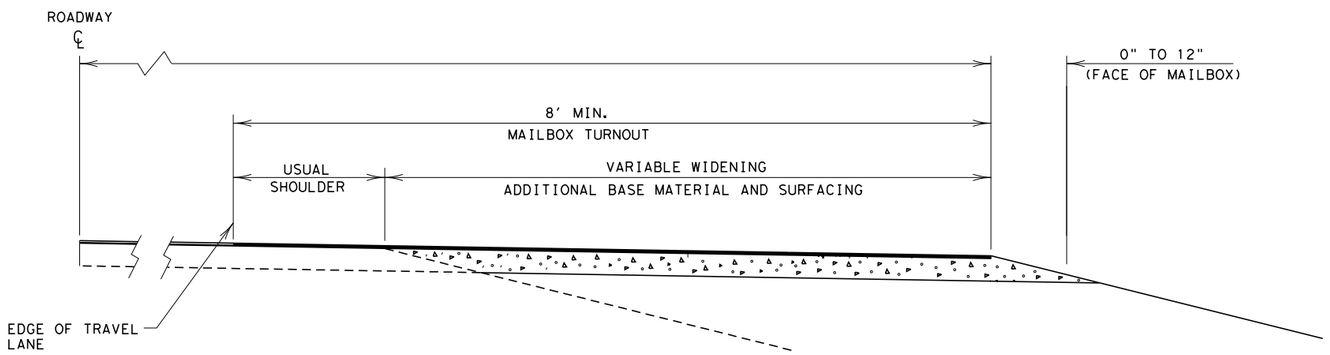


PLAN



TYPICAL SECTION

SUMMARY OF MAILBOX TURNOUTS

LOACTION (STATION)	FLEX BASE	PRIME COAT	SURFACE TREATMENT	ASPHALTIC CONCRETE PAVEMENT	
TOTALS					

DESIGN DETAILS FOR TYPICAL MAILBOX TURNOUTS

MBTRNOUT

FILE: mbtrnout.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
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	PHARR	CAMERON		52

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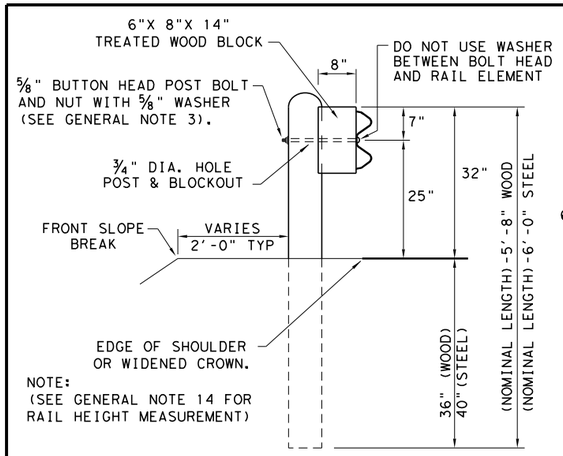
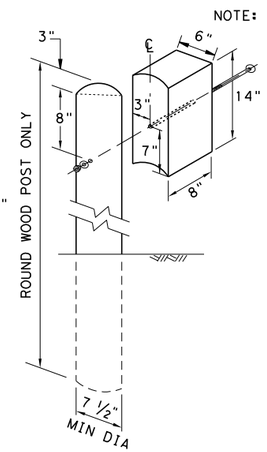
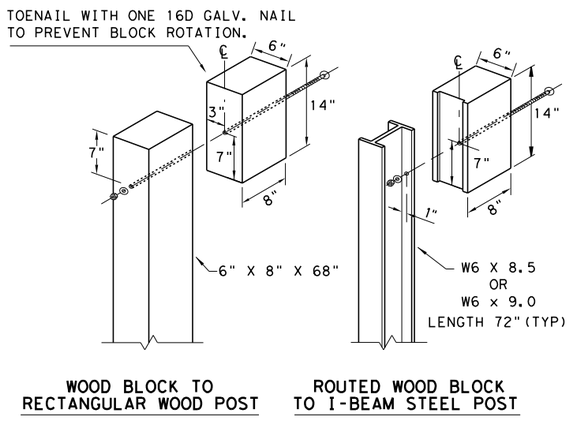


TYPICAL POST PLACEMENT



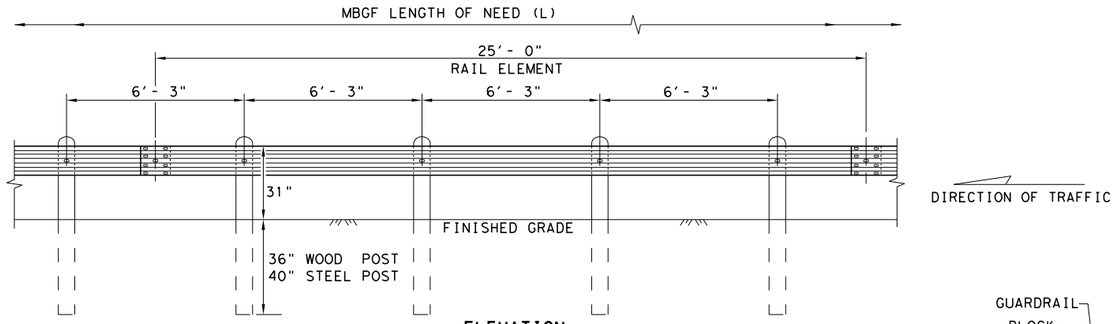
WOOD BLOCK TO
ROUND WOOD POST



WOOD BLOCK TO
RECTANGULAR WOOD POST

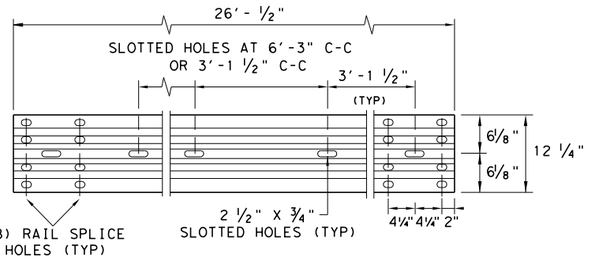
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

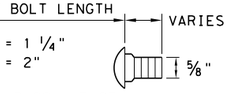
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

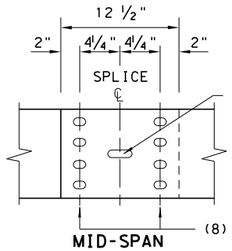
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



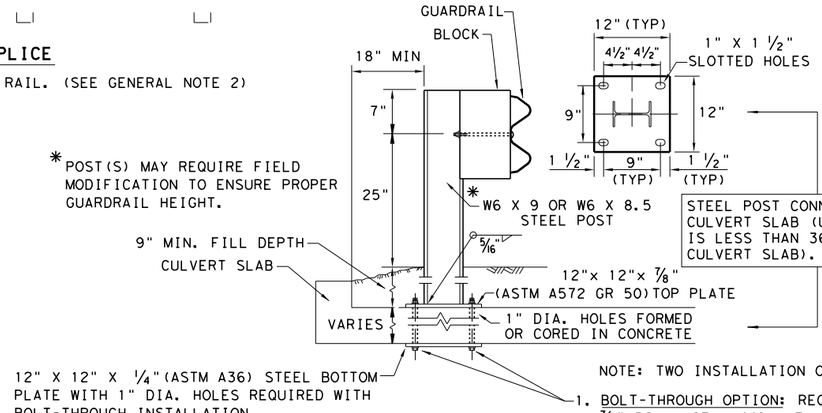
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



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

12" X 12" X ¼"(ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation — Design Division Standard

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

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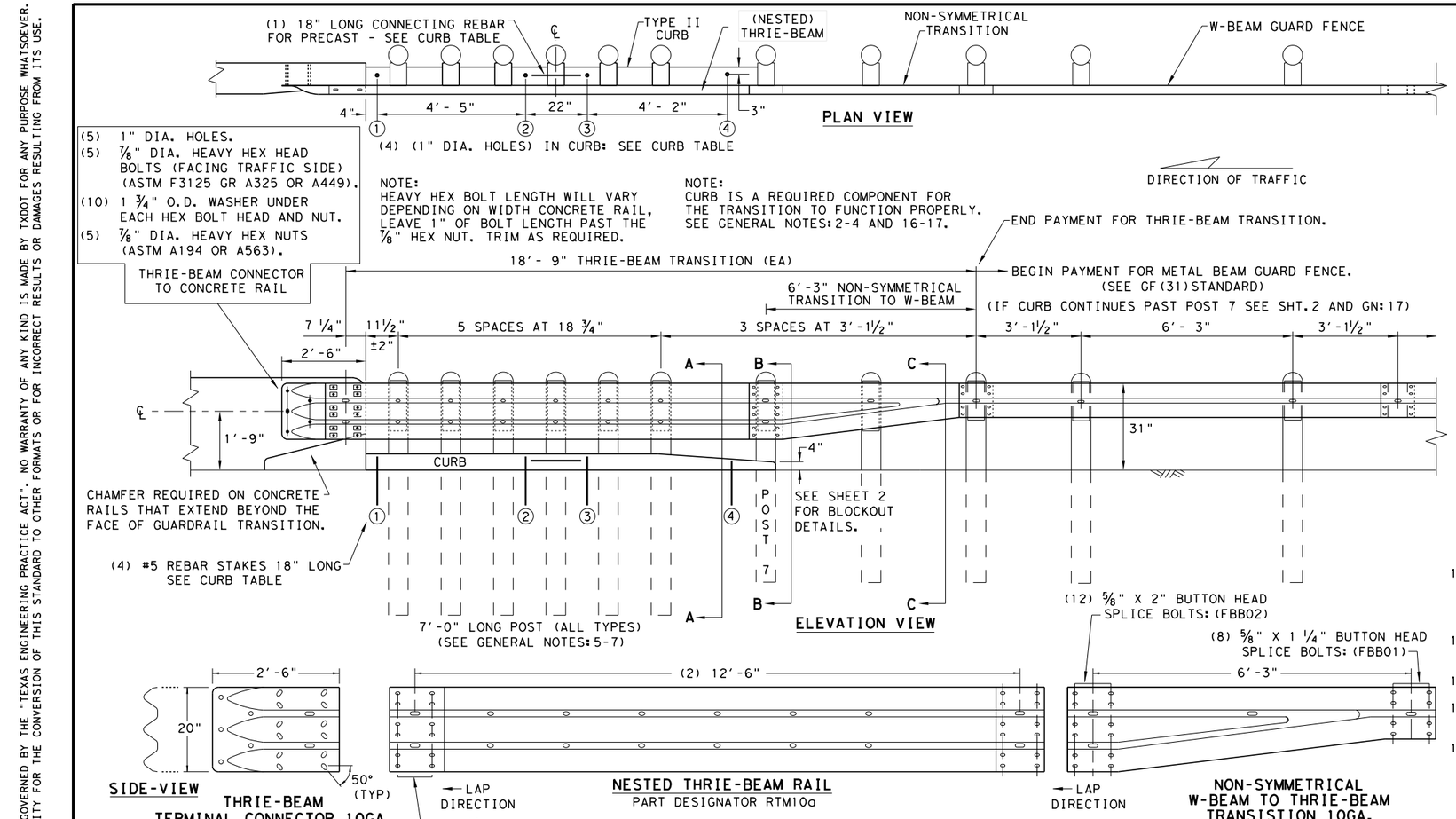
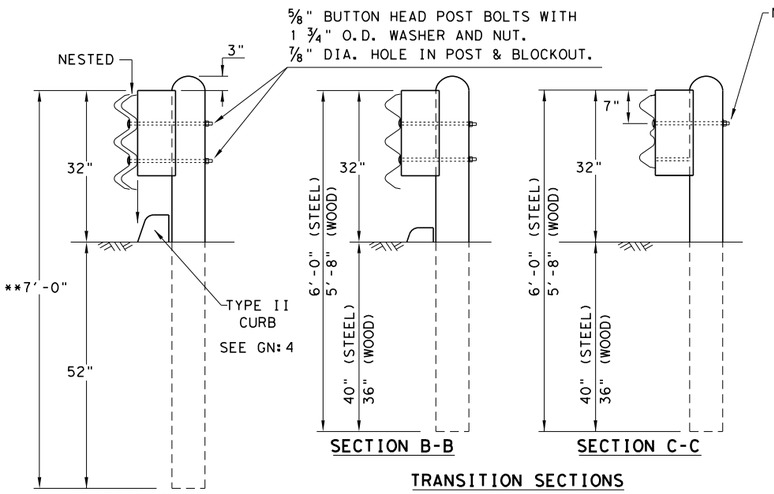
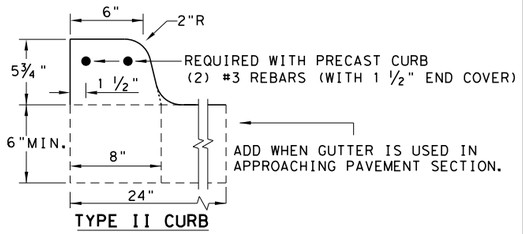




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.

* 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.



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

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- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16g) 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

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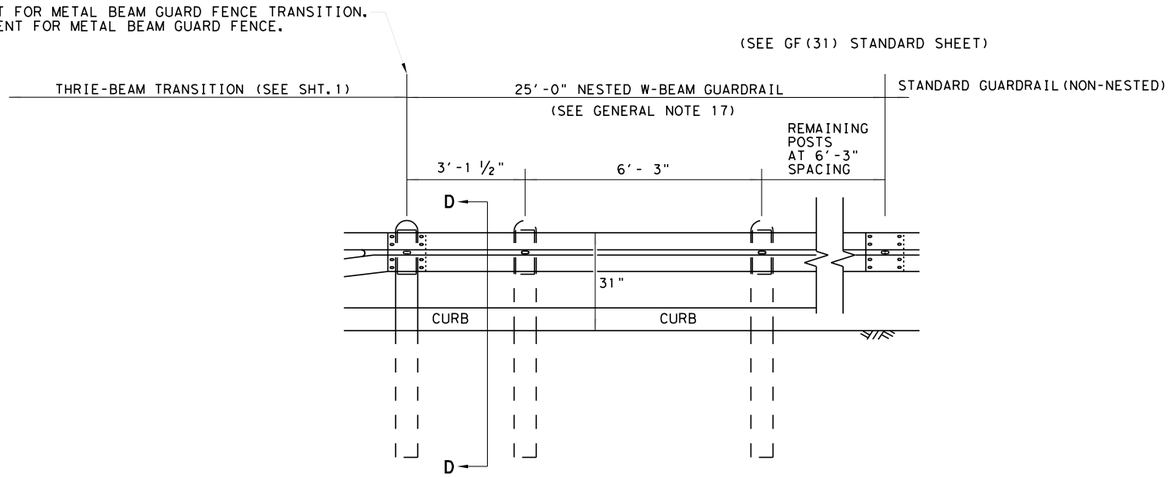
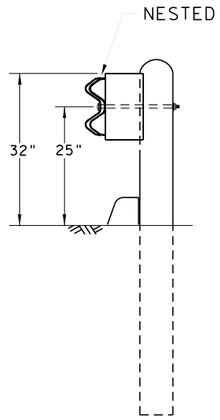
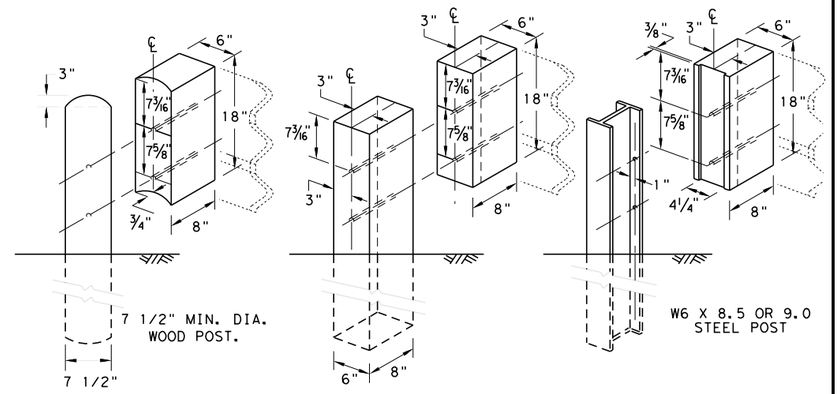
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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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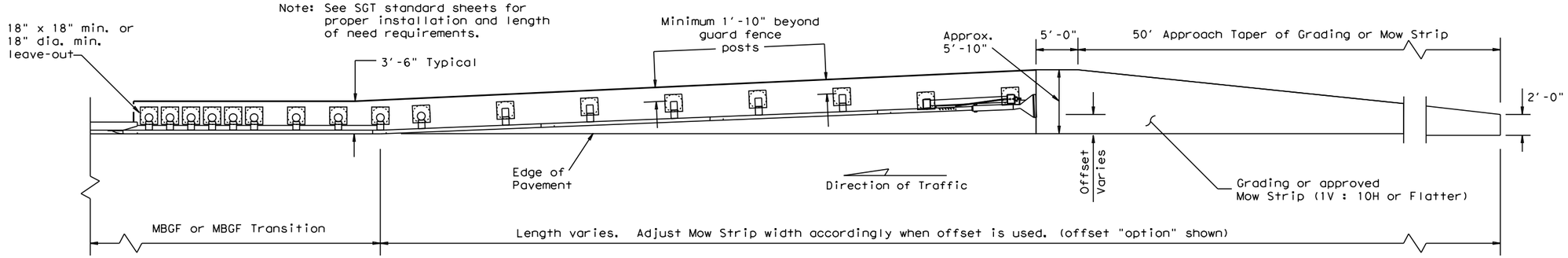
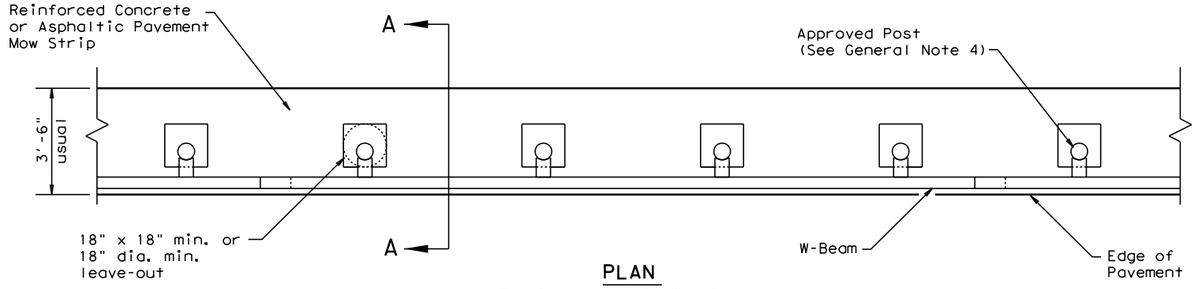
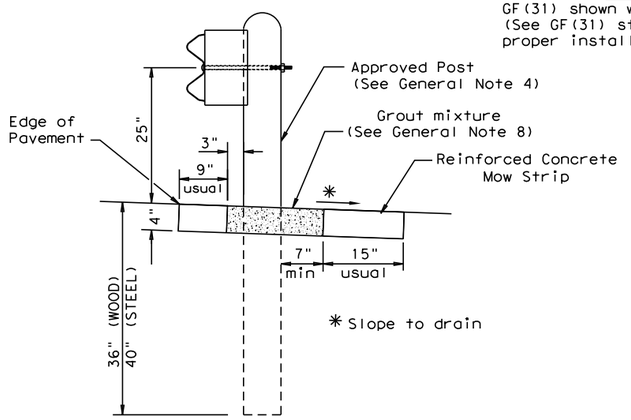


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



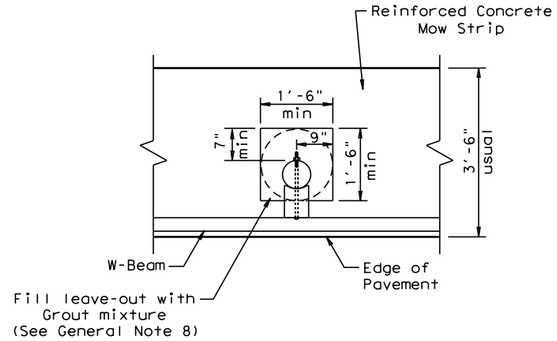
PLAN

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



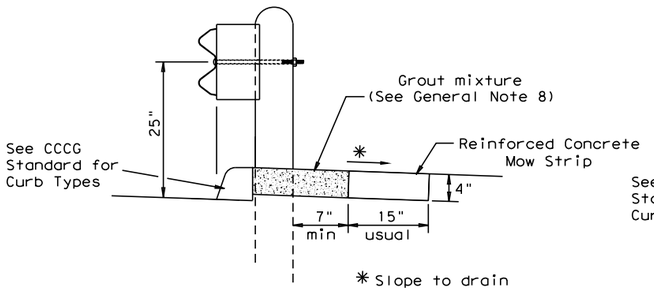
SECTION A-A

Typical



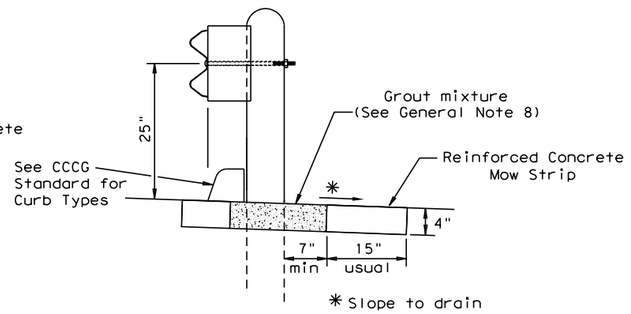
MOW STRIP DETAIL

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



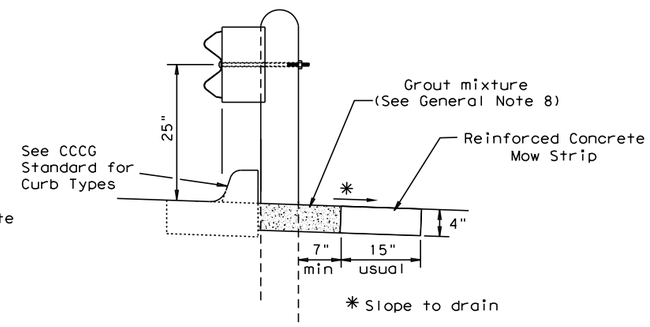
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

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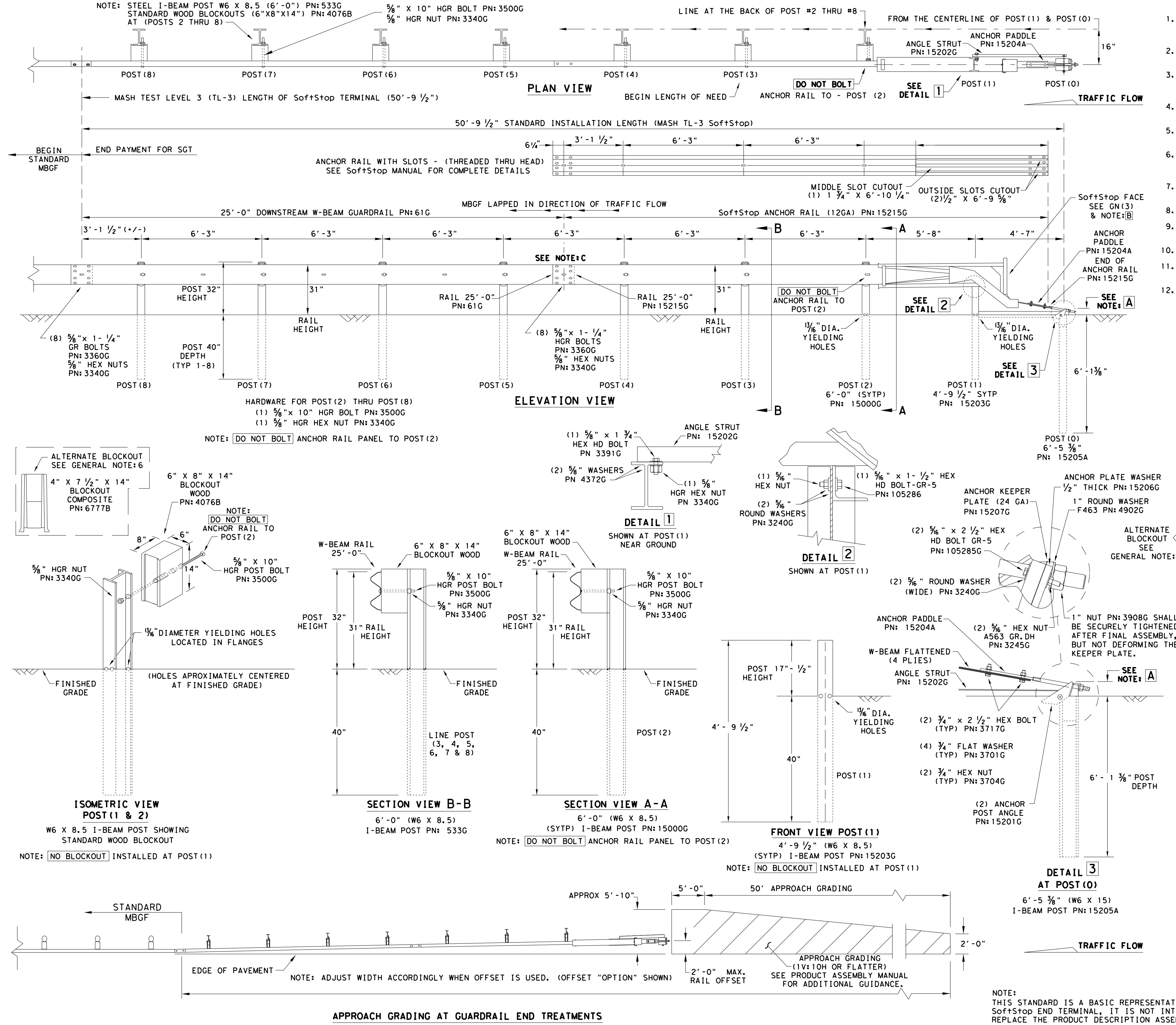

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

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

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" 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 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
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 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/16" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/16" ROUND WASHER (WIDE)
3245G	3	5/16" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3

SGT(10S)31-16

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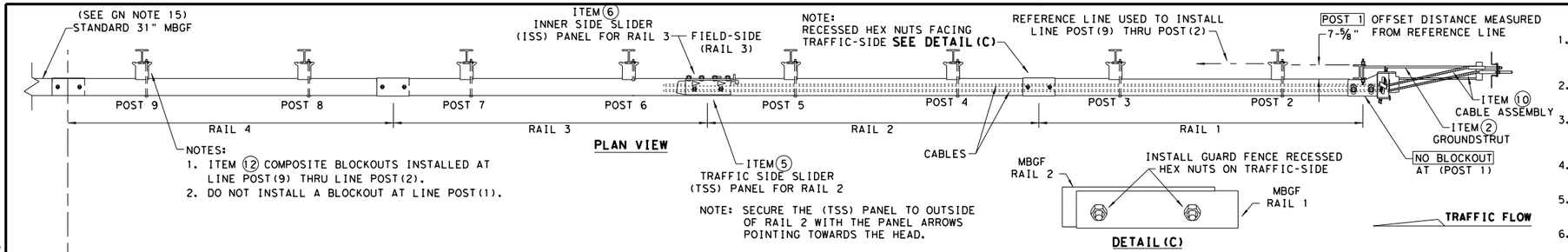

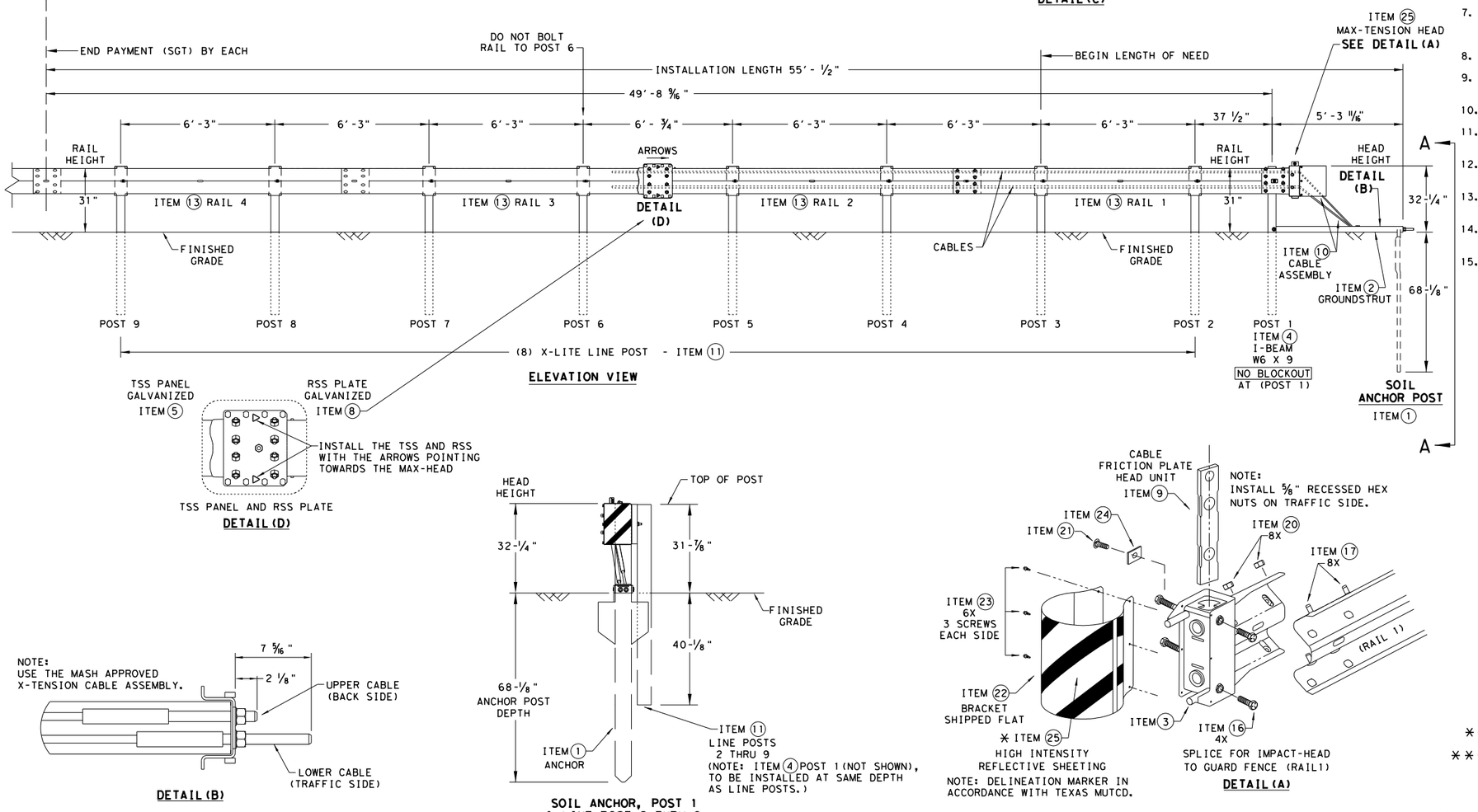

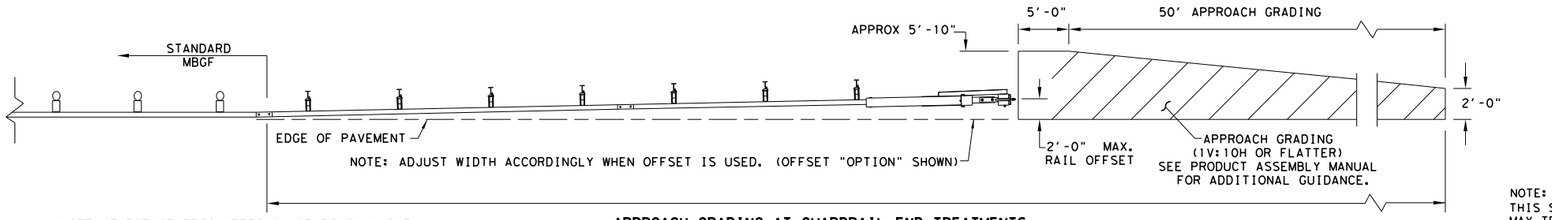

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

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© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		59

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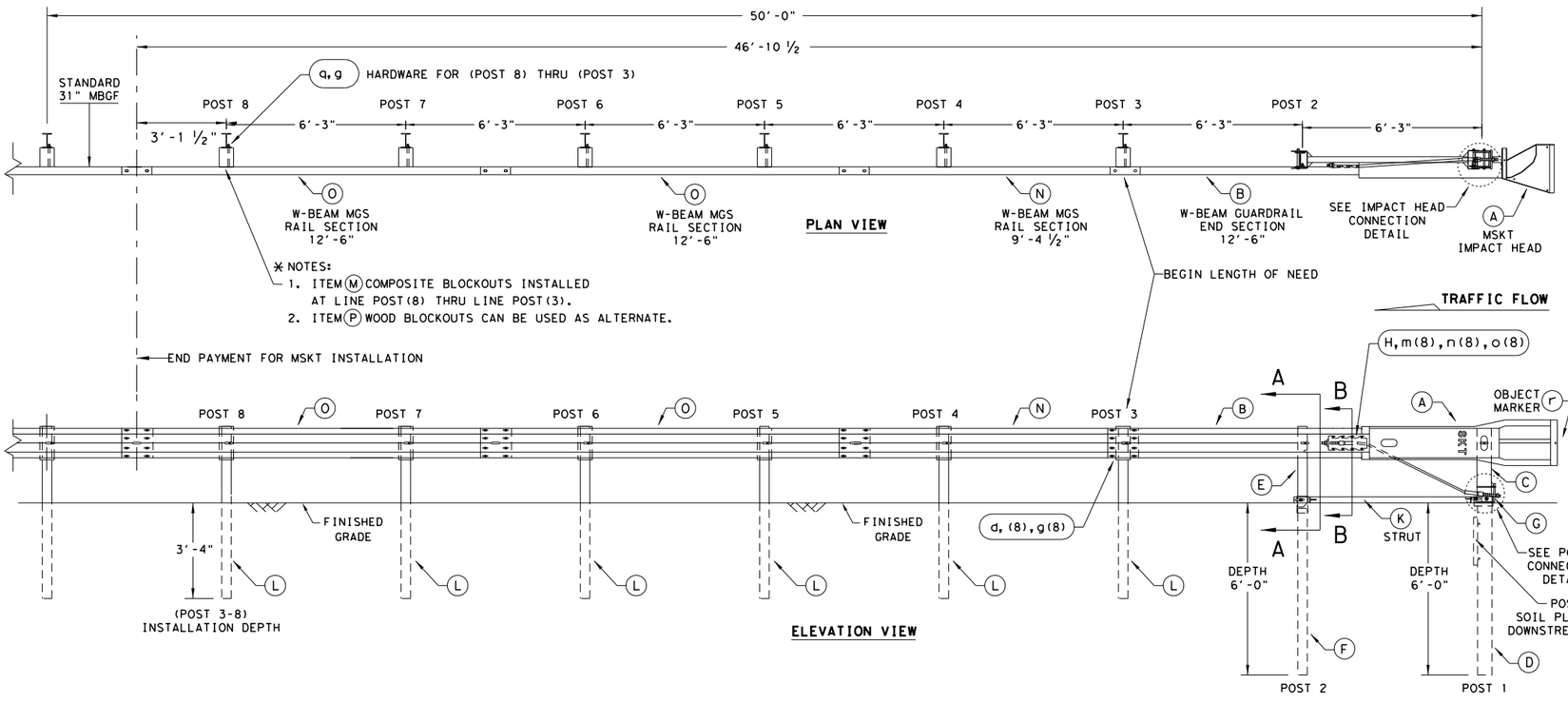
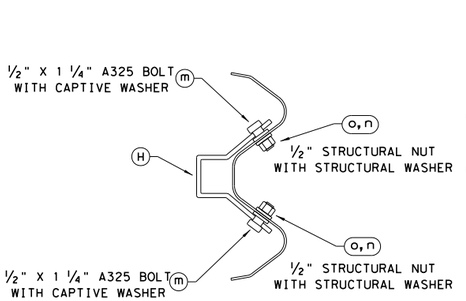
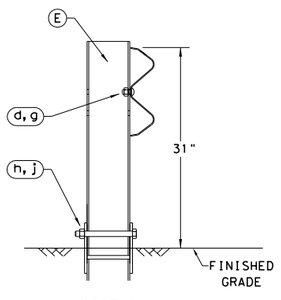
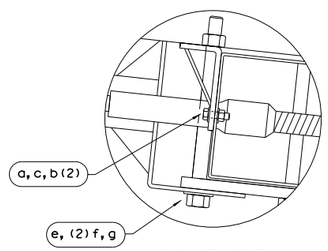
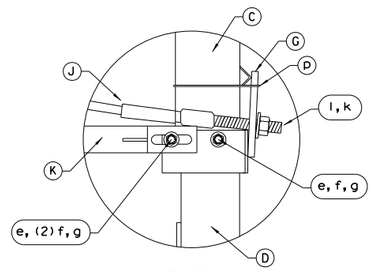


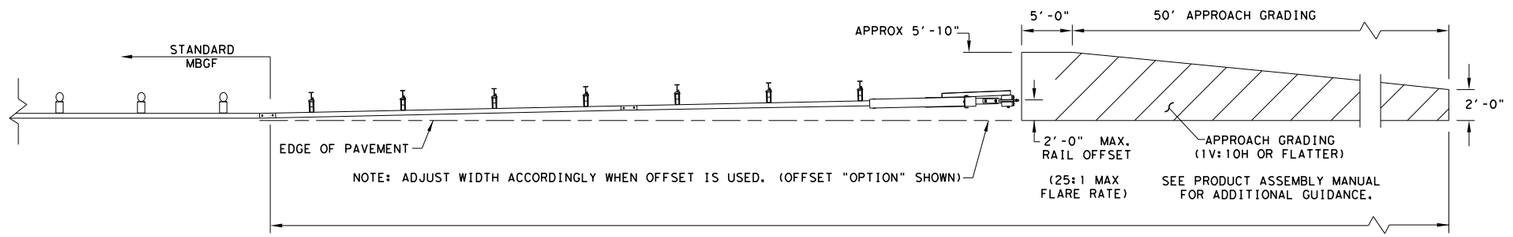
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.











APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

SEE NOTES: ✱

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

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

Texas Department of Transportation

Design Division Standard

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

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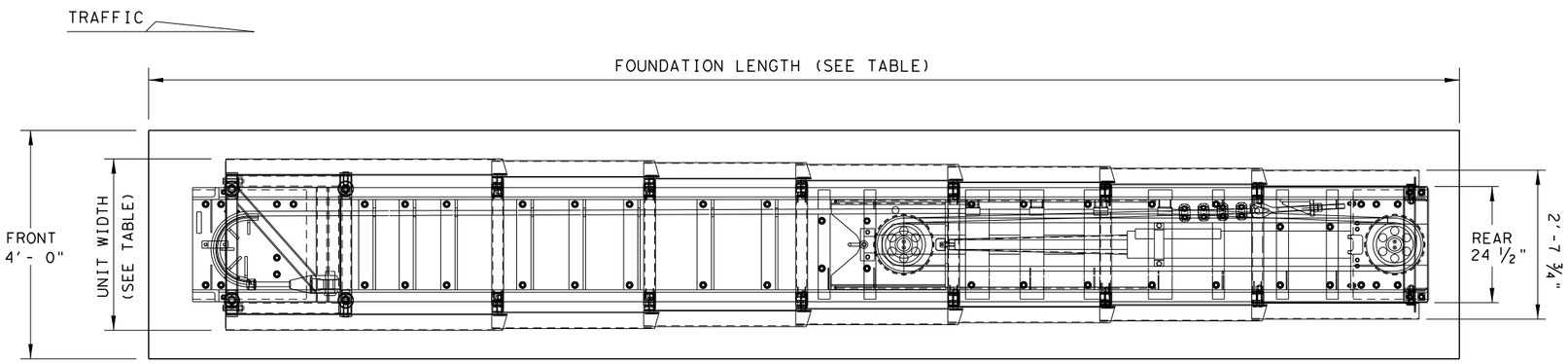
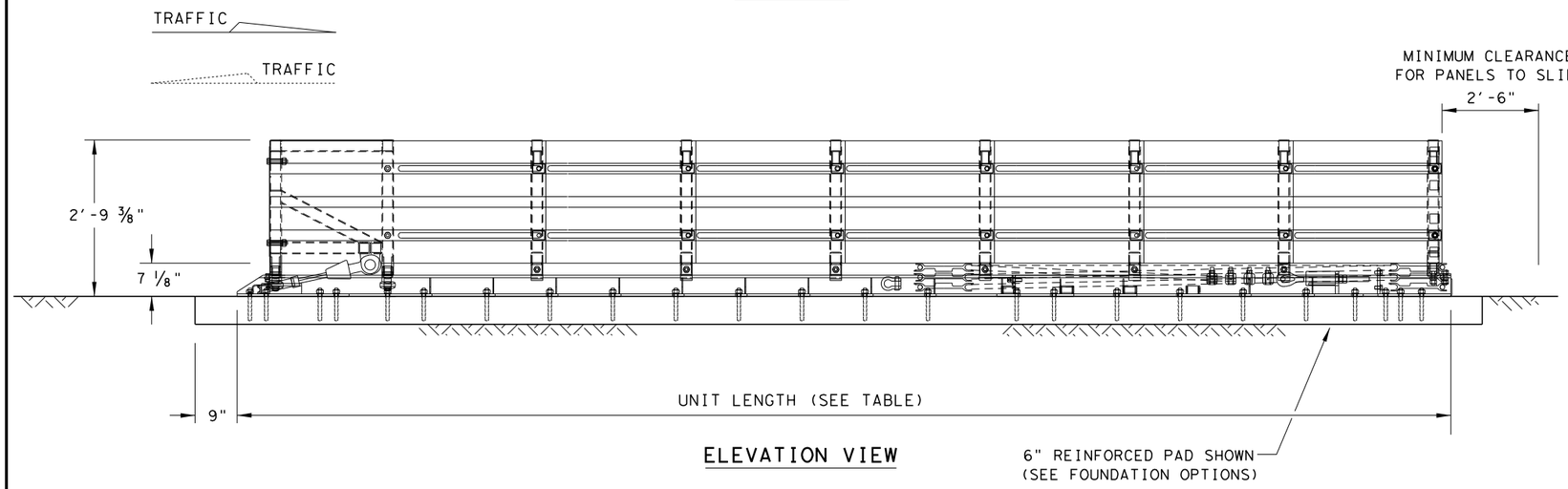


PLAN VIEW



ELEVATION VIEW

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13′-6"	2′-10 ⅝"	15′- 6 ¼"	24"to 36"
SCI100GM	TL-3	21′-6"	3′-1 ½"	23′- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

LOW MAINTENANCE

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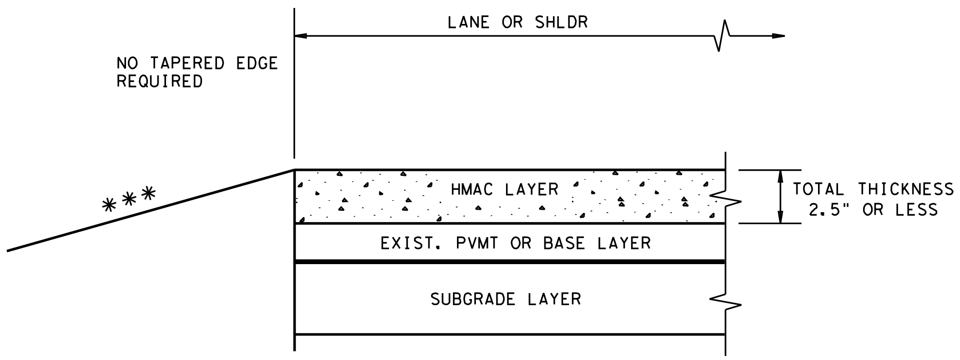
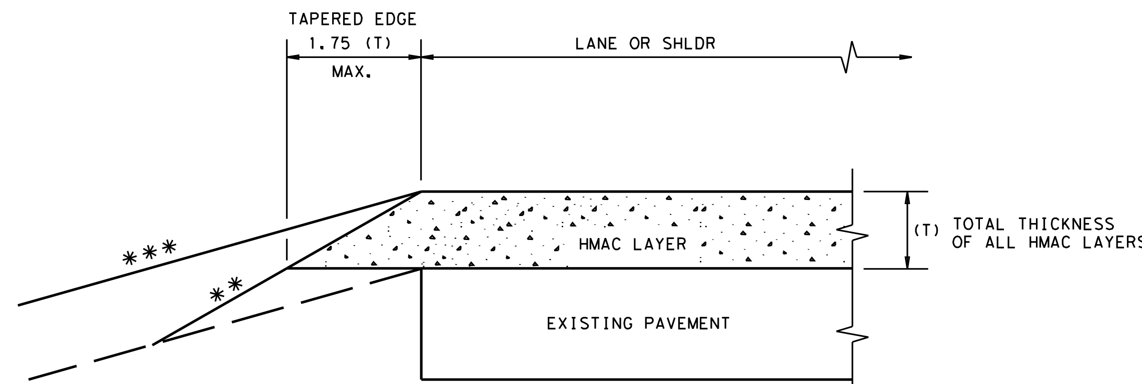


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS

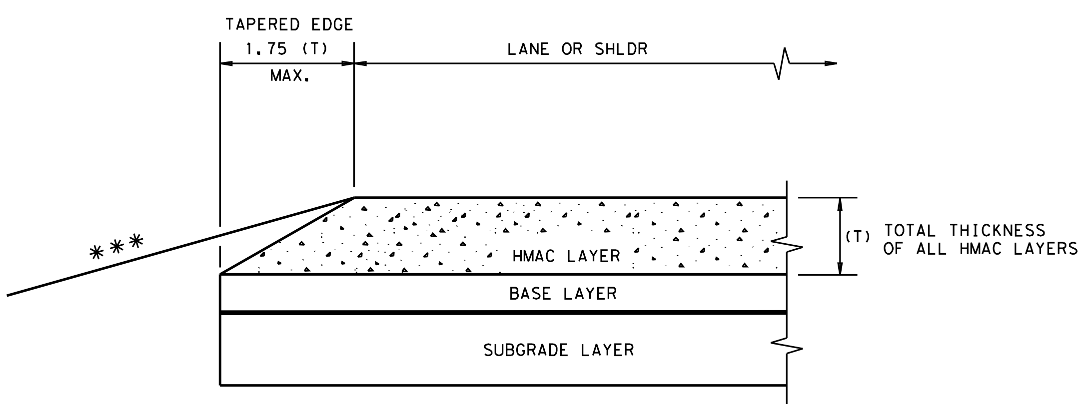


** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2

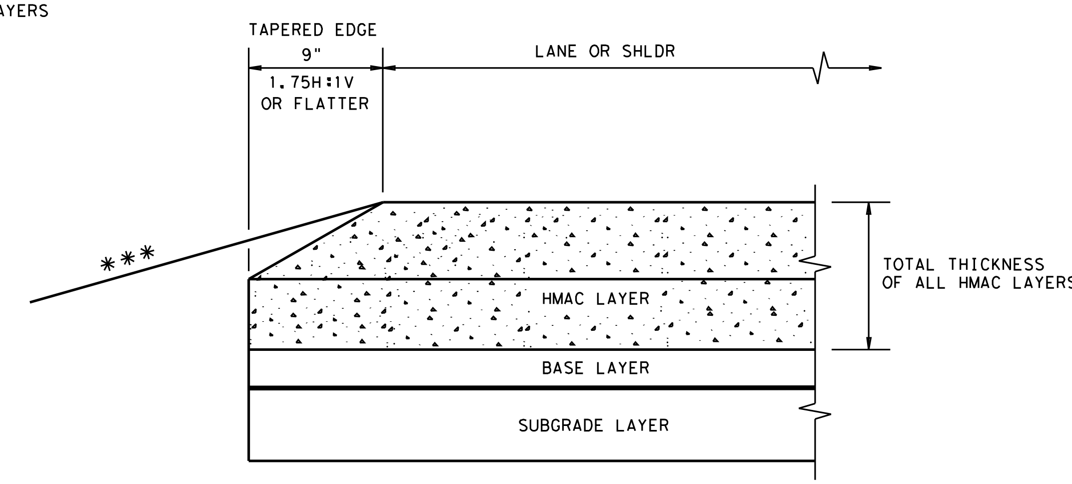
OVERLAY OF EXISTING PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 2.5" TO 5"



***** SEE TYPICAL SECTION FOR ROADSIDE DETAILS**

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 5" OR GREATER

GENERAL NOTES

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

(NOT TO SCALE)

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

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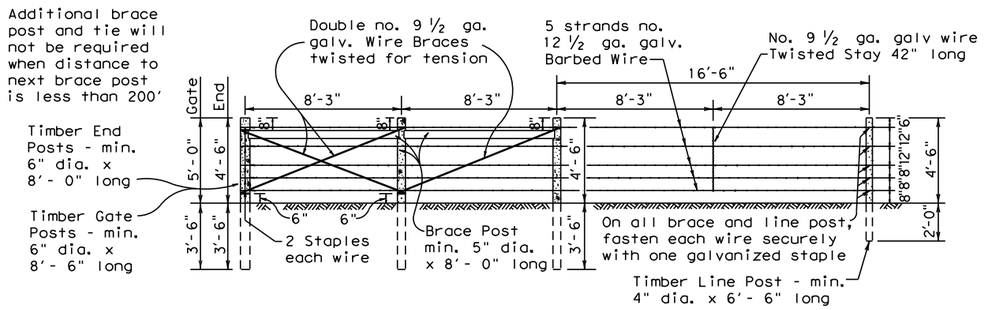
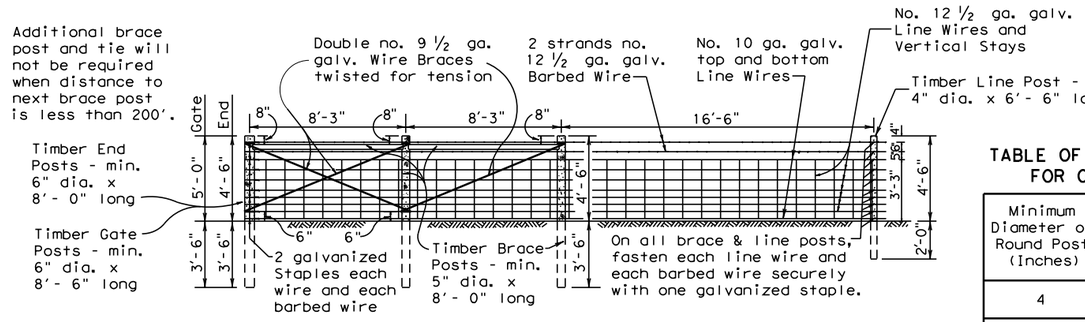


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

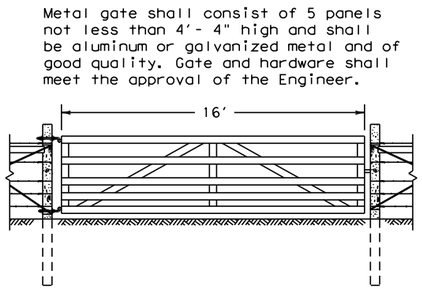
Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

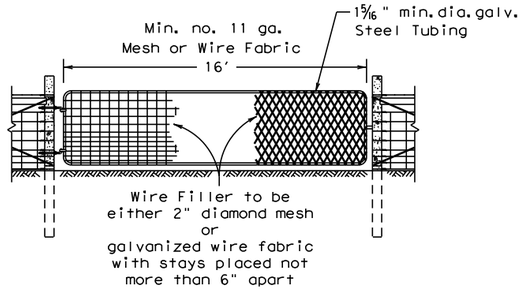
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

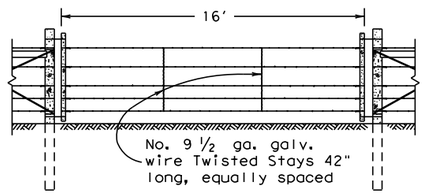
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

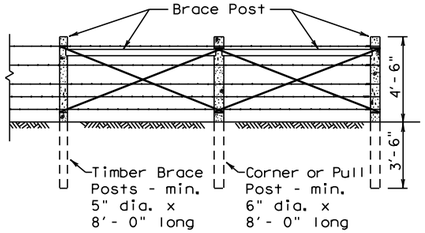


DETAIL TYPE 3 GATE

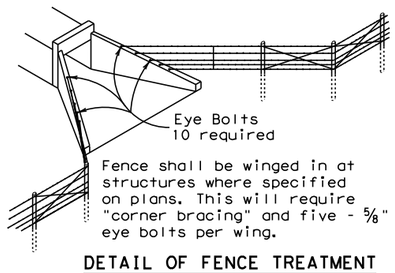
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'- 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'- 6" below the ground surface, the holes shall be drilled a minimum of 2'- 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

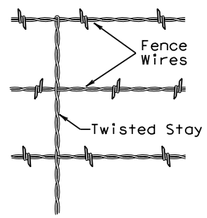
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



CORNER OR PULL POST ASSEMBLY

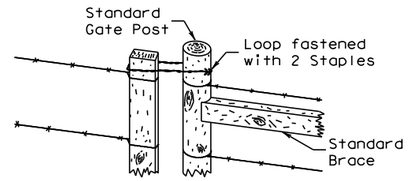


DETAIL OF FENCE TREATMENT AT STRUCTURES



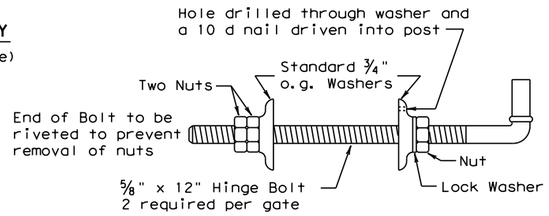
DETAIL OF STAY

(Barbed wire fence)

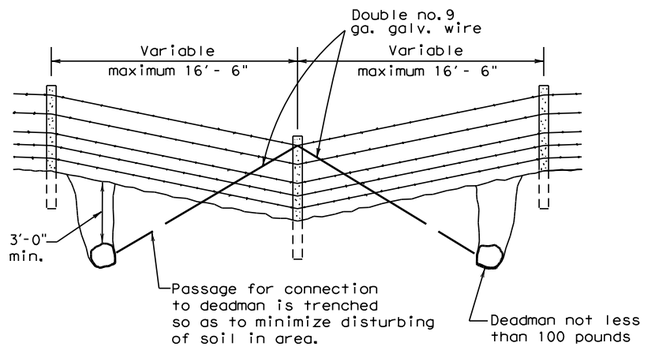


Loop to be made from two strands twisted no. 9 ½ ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

DETAIL FASTENER TYPE 3 GATE

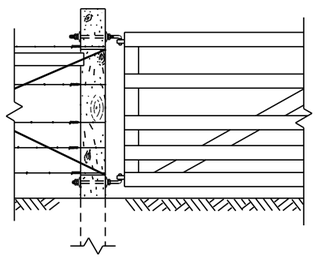


DETAIL OF GATE HINGE BOLT ASSEMBLY

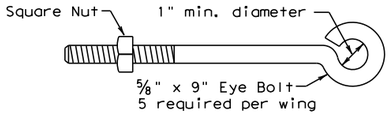


DETAIL OF FENCE SAG

(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

Texas Department of Transportation

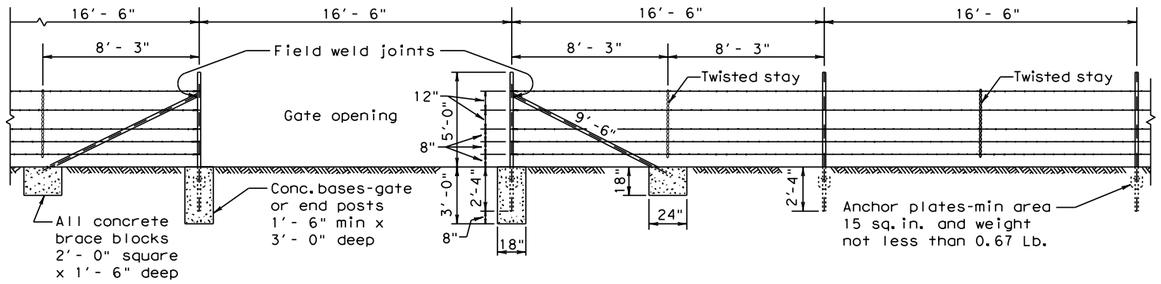
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE

(WOOD POSTS)

WF(1)-10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		63

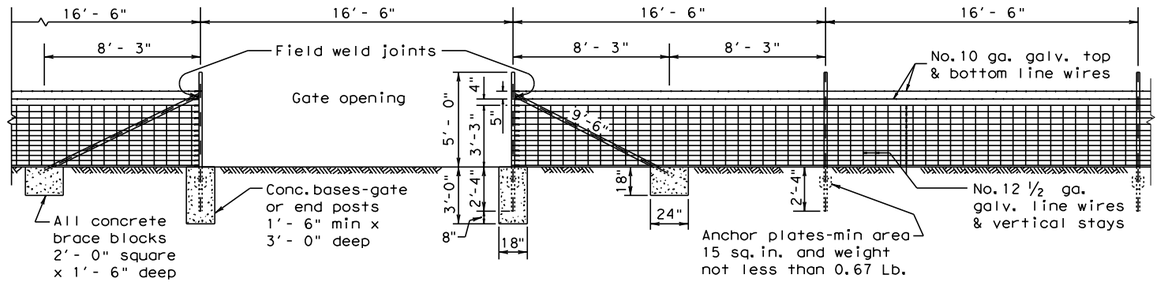


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



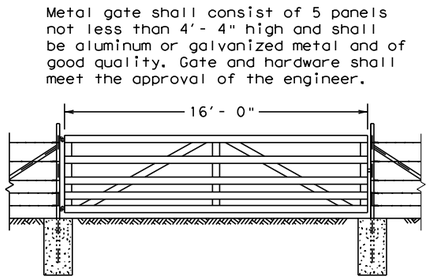
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

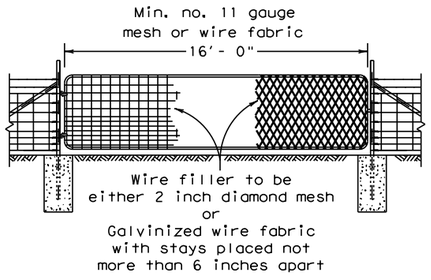
TYPE "D" FENCE

(See General Note 8)

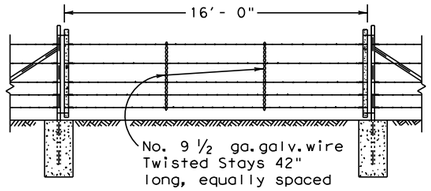
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



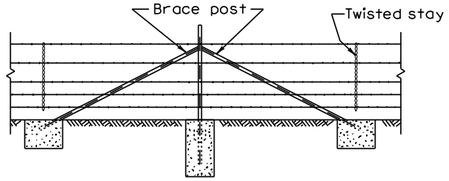
DETAIL TYPE 1 GATE



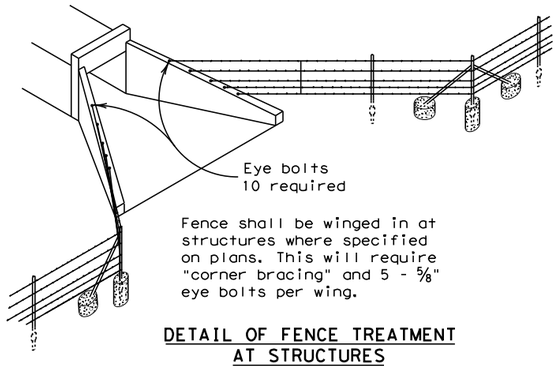
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

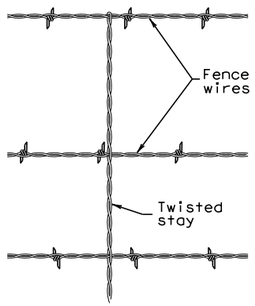


CORNER OR PULL POST ASSEMBLY



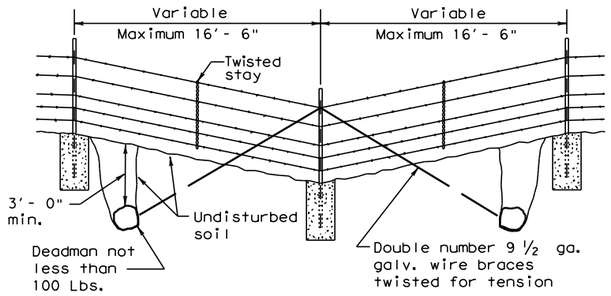
Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

DETAIL OF FENCE TREATMENT AT STRUCTURES

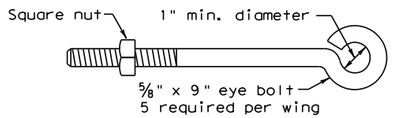


DETAIL OF STAY

(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	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		64

DATE: 6/5/2024
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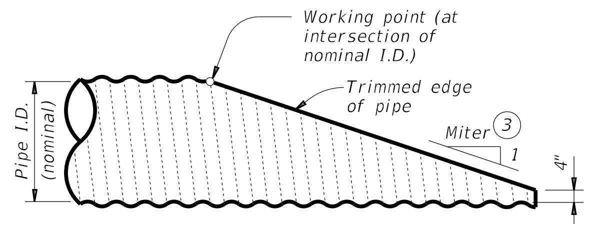
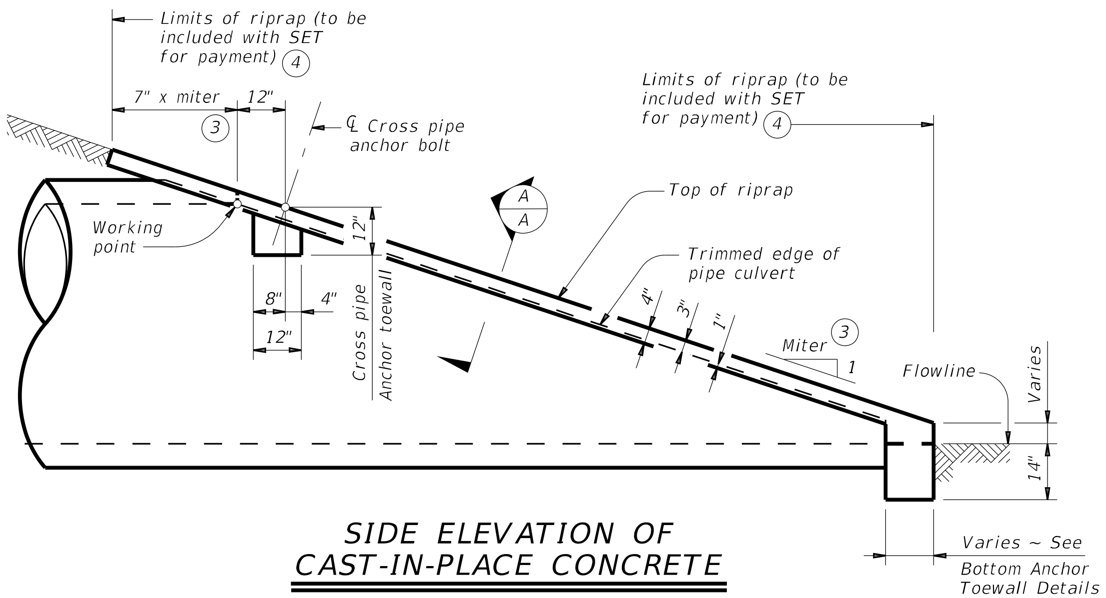


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

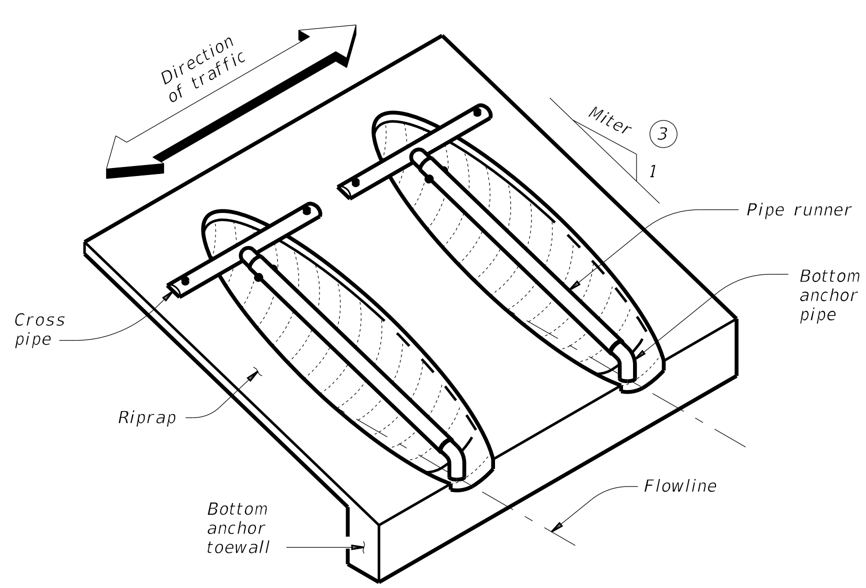
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS ① ②

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length: 3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	N/A	8' - 1"	N/A	N/A	N/A	12' - 9"
27"	1' - 8"	3' - 8"	N/A	N/A	5' - 5"	6' - 11"	N/A	N/A	7' - 7"	9' - 7"	N/A	N/A	11' - 11"	14' - 11"
30"	1' - 10"	3' - 11"	N/A	N/A	6' - 4"	8' - 0"	N/A	N/A	8' - 9"	11' - 0"	N/A	N/A	13' - 8"	17' - 0"
33"	1' - 11"	4' - 2"	6' - 2"	6' - 5"	7' - 3"	9' - 1"	8' - 6"	8' - 10"	10' - 0"	12' - 5"	13' - 3"	13' - 9"	15' - 5"	19' - 2"
36"	2' - 1"	4' - 5"	6' - 11"	7' - 3"	8' - 2"	10' - 2"	9' - 6"	9' - 11"	11' - 2"	13' - 10"	14' - 9"	15' - 3"	17' - 2"	21' - 3"
42"	2' - 4"	4' - 11"	8' - 6"	8' - 10"	9' - 11"	12' - 4"	11' - 7"	12' - 0"	13' - 6"	16' - 8"	17' - 9"	18' - 5"	20' - 8"	25' - 7"
48"	2' - 7"	5' - 5"	10' - 1"	10' - 5"	11' - 9"	N/A	13' - 7"	14' - 2"	15' - 10"	N/A	20' - 9"	21' - 6"	24' - 2"	N/A
54"	3' - 0"	5' - 11"	11' - 8"	12' - 1"	N/A	N/A	15' - 8"	16' - 3"	N/A	N/A	23' - 10"	24' - 8"	N/A	N/A
60"	3' - 3"	6' - 5"	13' - 3"	N/A	N/A	N/A	17' - 9"	N/A	N/A	N/A	26' - 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS ③

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED ②

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS ①

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' - 0"
4" STD	4.500"	4.026"	19' - 8"
5" STD	5.563"	5.047"	34' - 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) ⑤

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

① Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

② This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

③ Miter = slope of mitered end of pipe culvert.

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

⑤ Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

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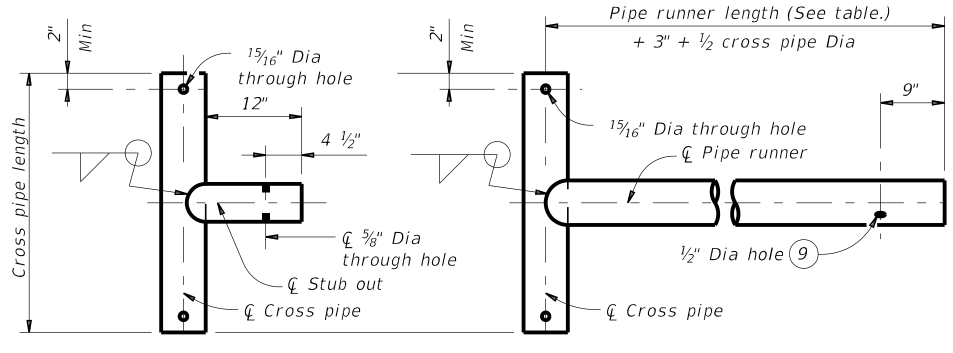
SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

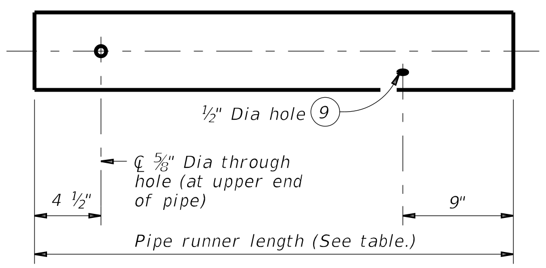
SAFETY END TREATMENT
FOR 12" DIA TO 60" DIA PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT 2529	SECT 02	JOB 010	HIGHWAY FM 2556
REVISIONS	DIST PHARR	COUNTY CAMERON		SHEET NO. 65

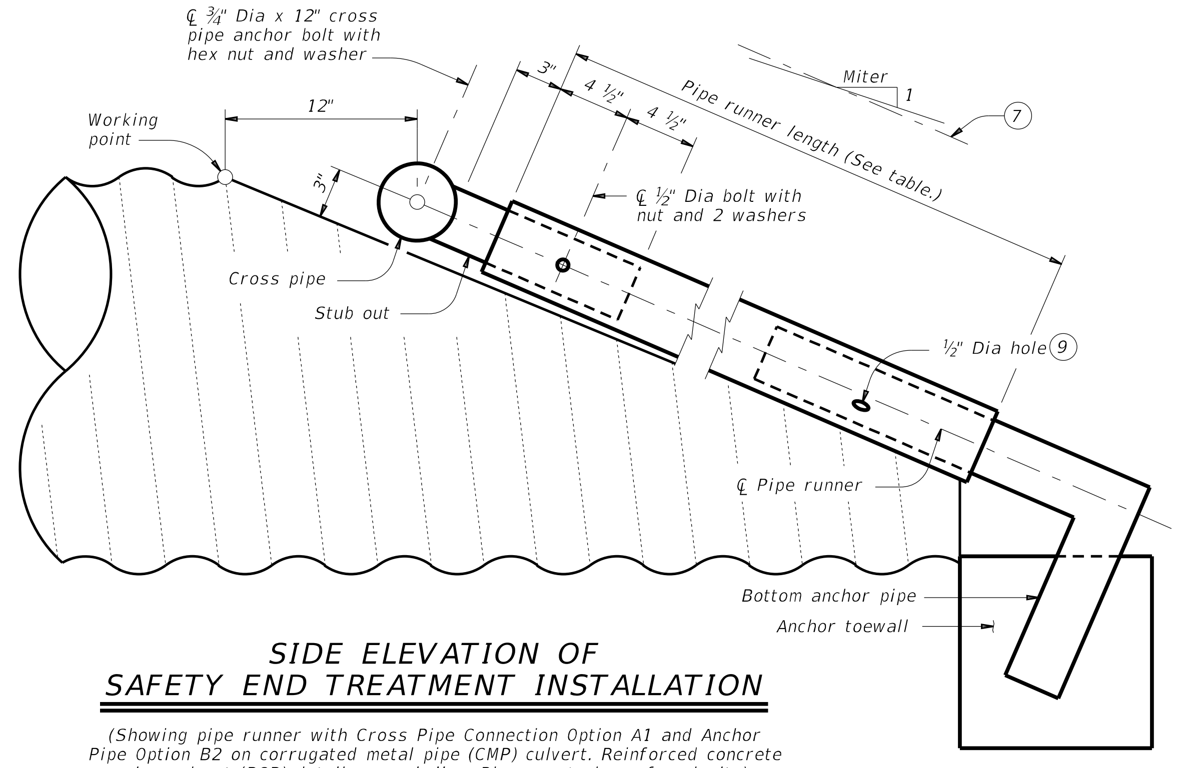


CROSS PIPE AND CONNECTIONS DETAILS



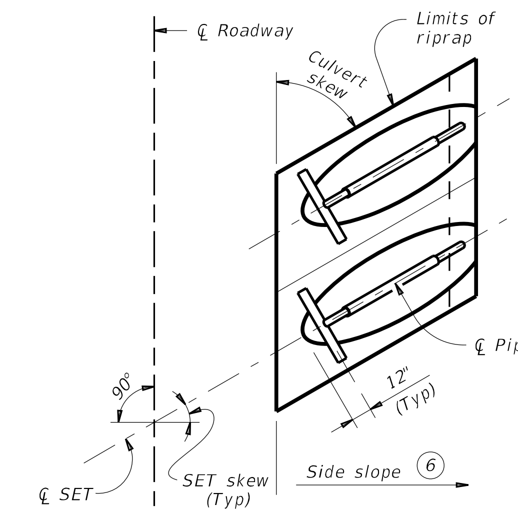
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

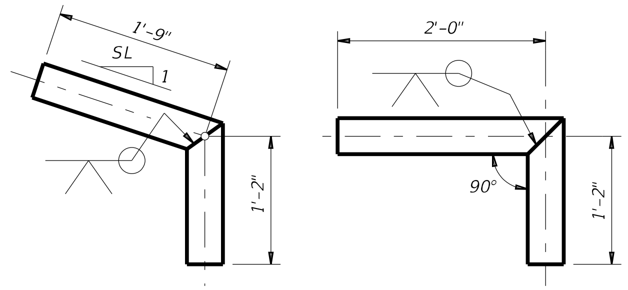


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

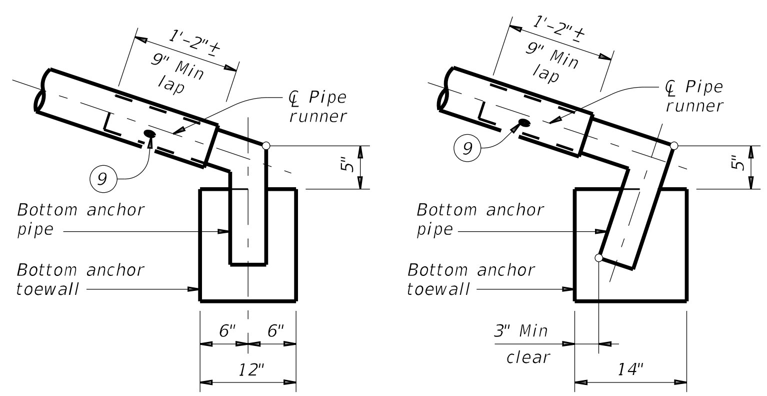
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)



PLAN OF SKEWED INSTALLATION

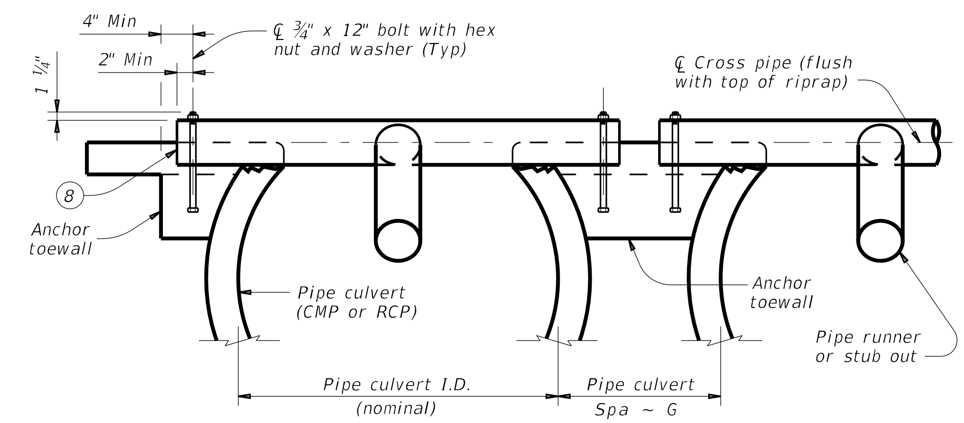


BOTTOM ANCHOR PIPE DETAILS ⑩

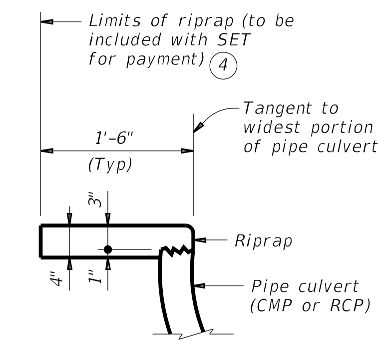


BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

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

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

MATERIAL NOTES:

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

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

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

Payment for riprap and toewall is included in the price bid for each safety end treatment.

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

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

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		DIST		COUNTY	SHEET NO.
		PHARR		CAMERON	66

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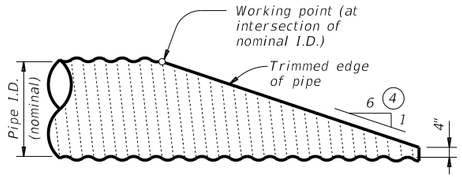
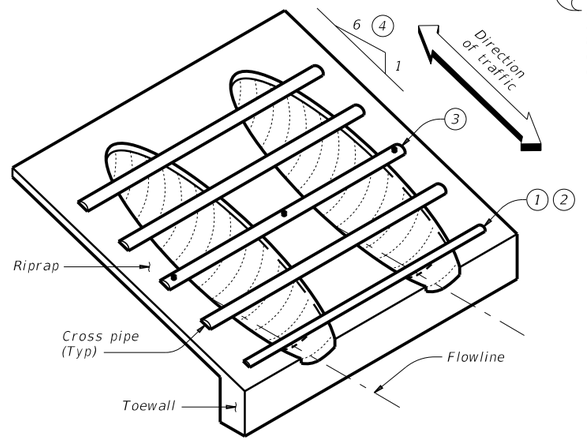


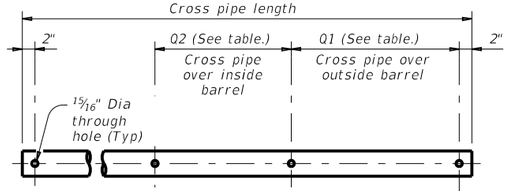
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

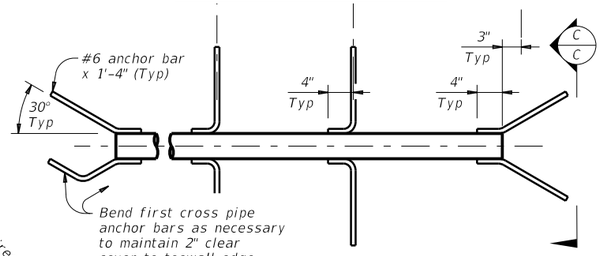
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



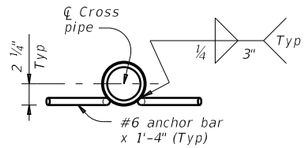
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

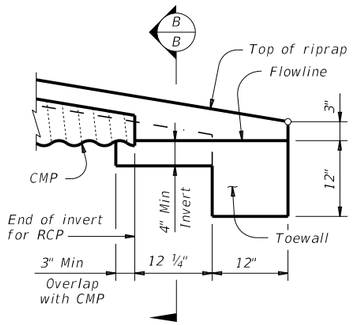


PIPE WITH ANCHOR BARS



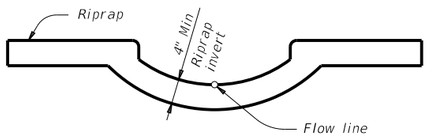
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

(1) The proper installation of the 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.

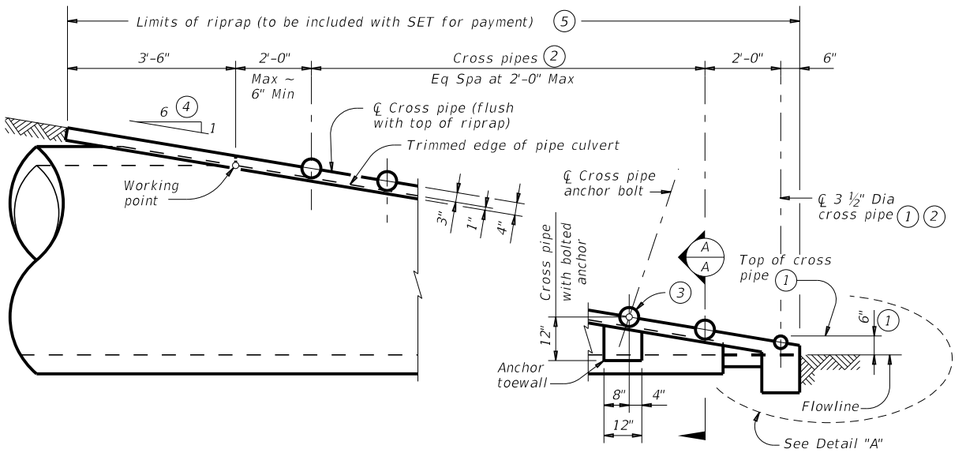
GENERAL NOTES:

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.

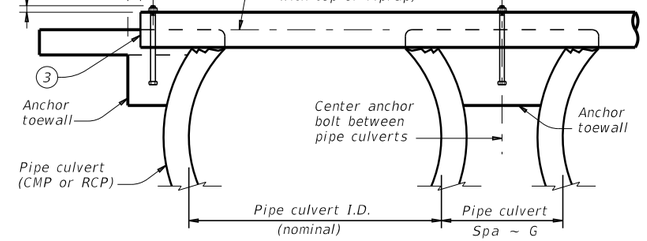
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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



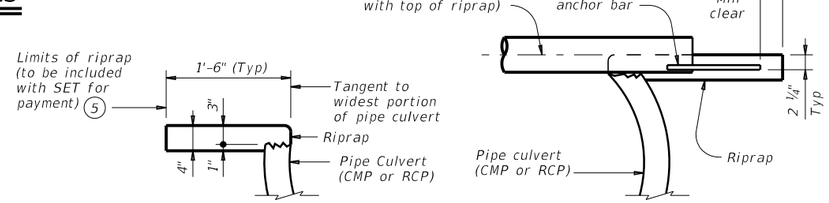
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

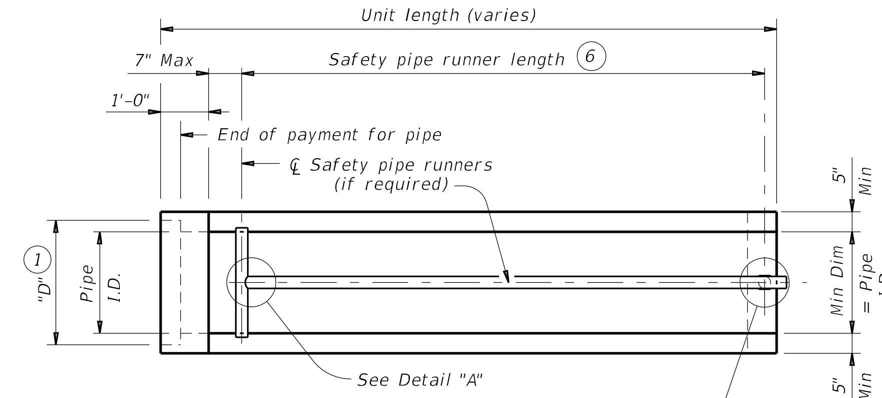
FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		67

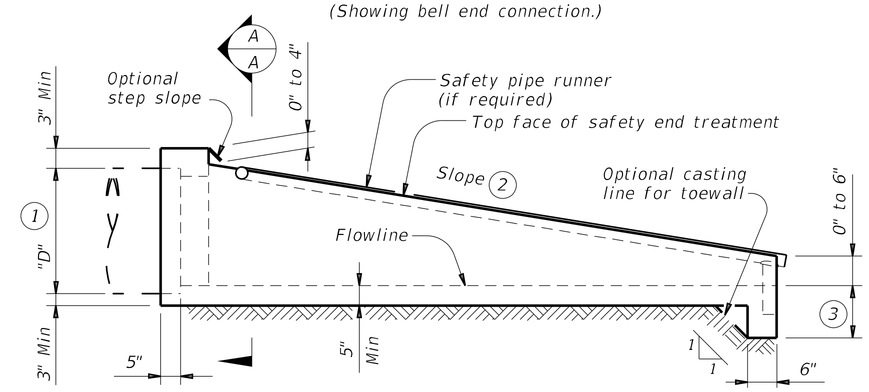
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

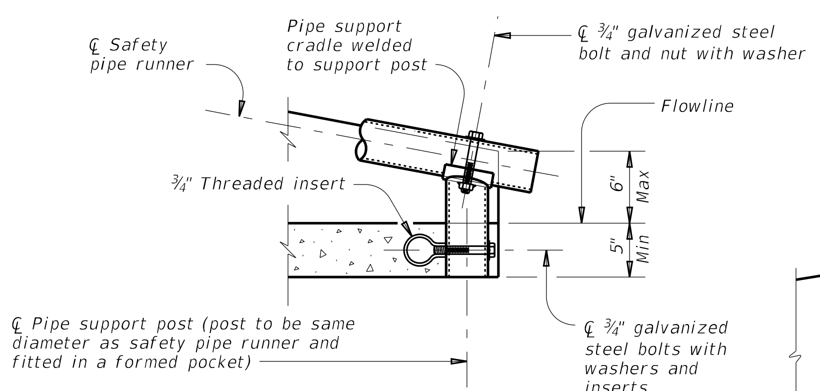
(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment."

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

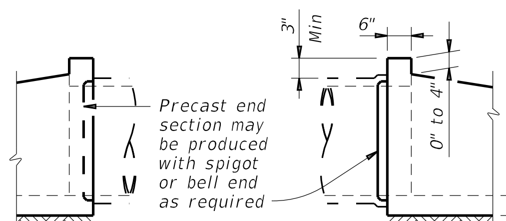
(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures." Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment." When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.



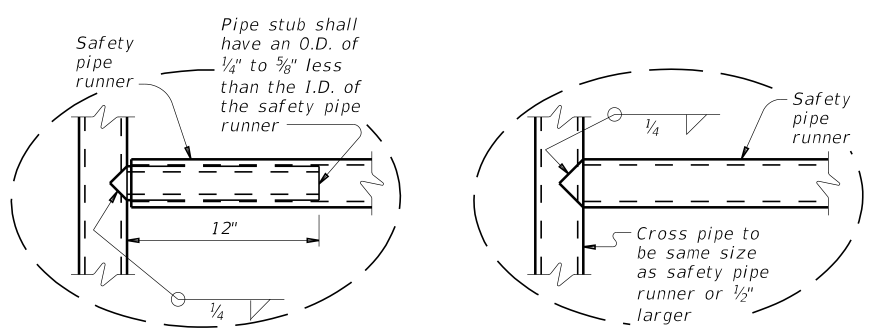
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



OPTION A

DETAIL A

(If required)

OPTION B

GENERAL NOTES:

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

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

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

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

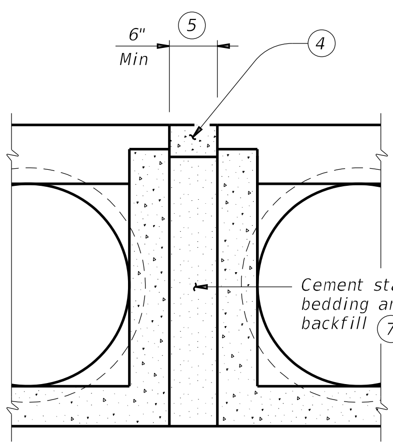
At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

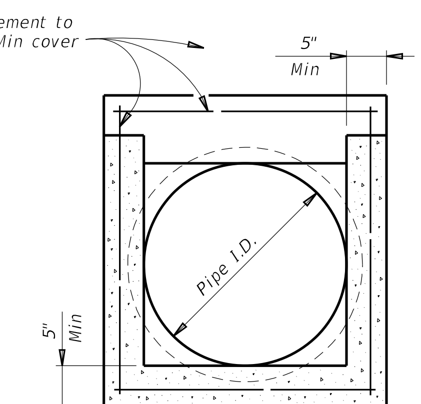
Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

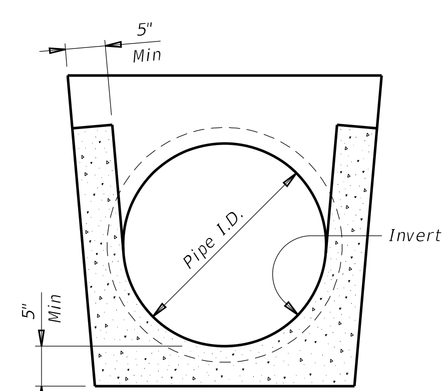
Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.



MULTIPLE PIPE INSTALLATION

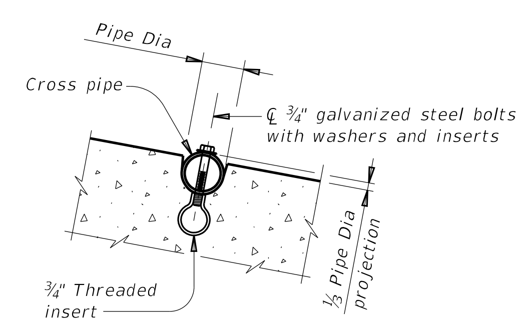


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

Texas Department of Transportation | Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

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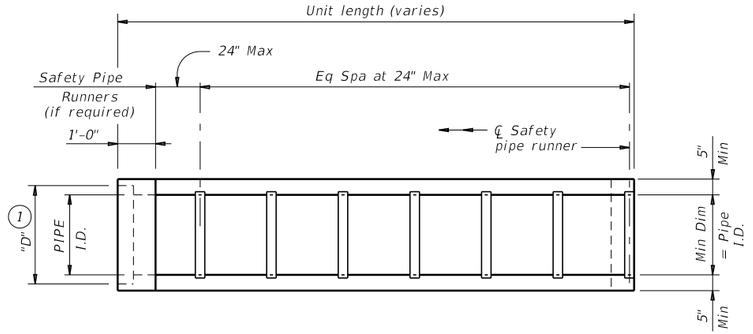
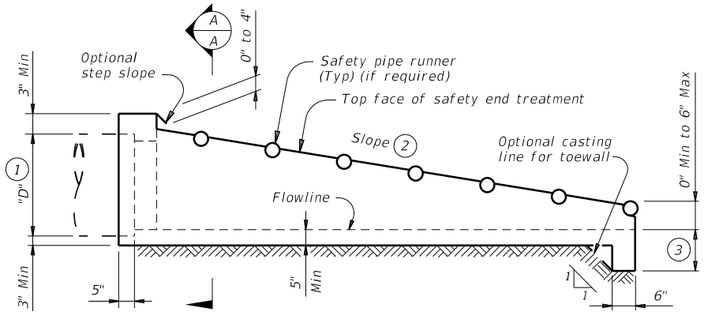


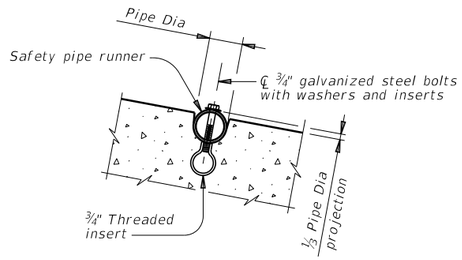
PLAN

(Showing bell end connection.)



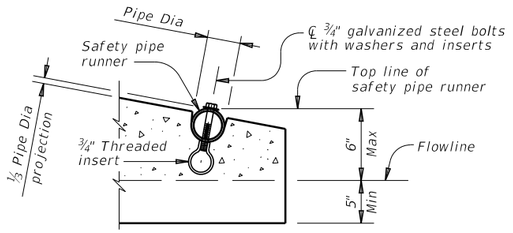
LONGITUDINAL ELEVATION

(Showing bell end connection.)

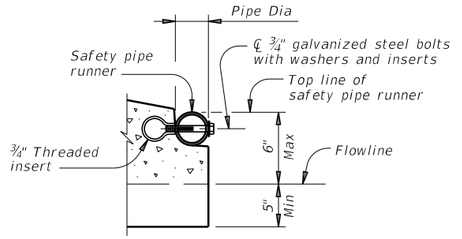


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

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).

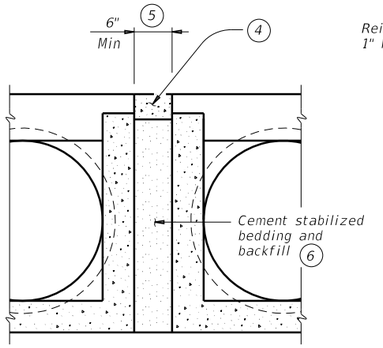
At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

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.

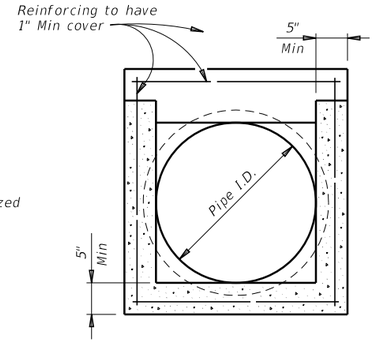
Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

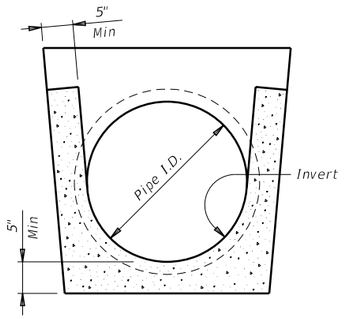
Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe." Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.



MULTIPLE PIPE INSTALLATION

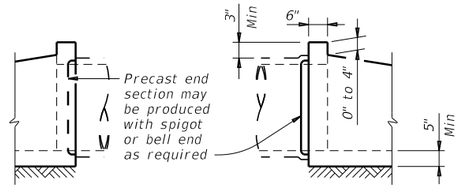


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		69

DATE: 6/5/2024 1:14:49 PM
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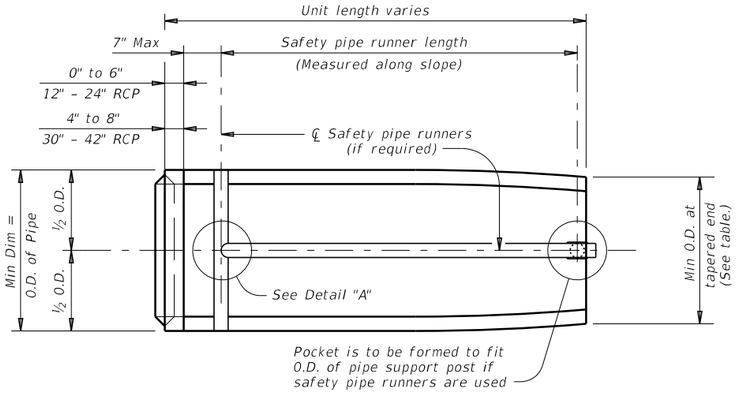
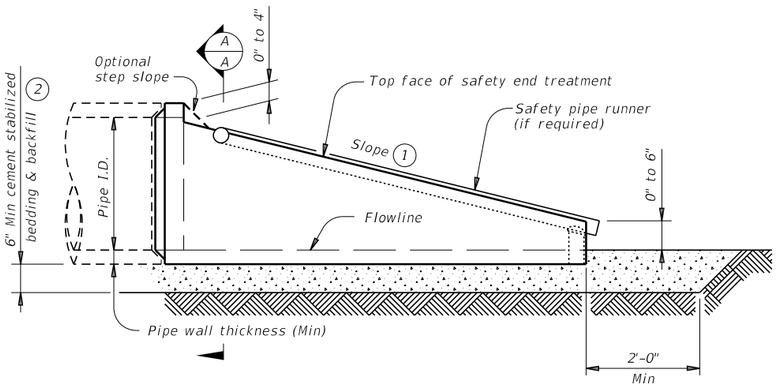
Aziz.Alebra



PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

(Showing spigot end connection.)

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.

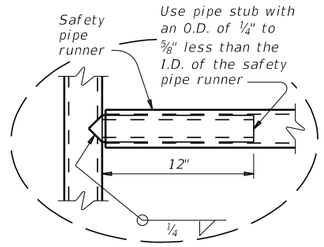
(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

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

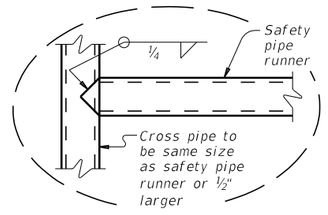
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' – 0"	≤ 45°	No	≤ 45°	No
					4:1	2' – 8"				
					6:1	4' – 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' – 10"	≤ 45°	No	≤ 45°	No
					4:1	3' – 9"				
					6:1	5' – 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
					4:1	4' – 10"				
					6:1	7' – 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' – 3"	≤ 45°	No	≤ 30°	No
					4:1	7' – 0"			> 30°	Yes
					6:1	10' – 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' – 3"	≤ 15°	No	≤ 15°	No
					4:1	8' – 2"				
					6:1	12' – 1"	> 15°	Yes	> 15°	Yes
36"	4"	44"	36"	0.19 Ellip.	3:1	7' – 10"	= 0°	No	≥ 0°	Yes
					4:1	10' – 4"				
					6:1	15' – 4"	> 0°	Yes		
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' – 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' – 6"				
					6:1	18' – 7"				

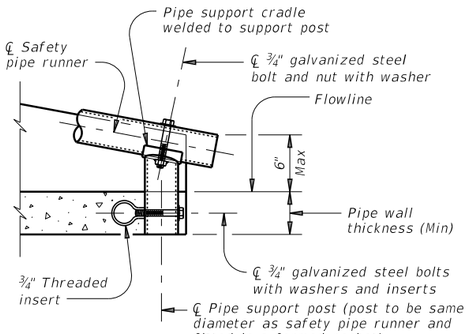


OPTION A



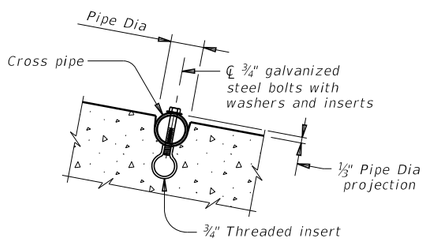
OPTION B

DETAIL A



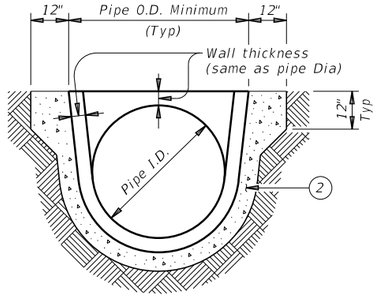
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

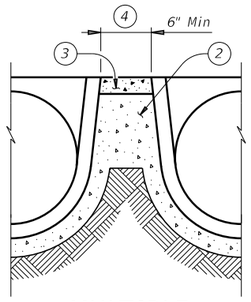


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

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

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

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

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

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

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		70

DATE: 6/5/2024 1:14:55 PM
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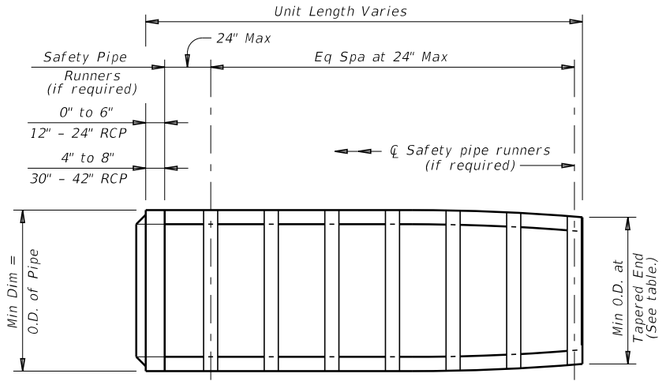
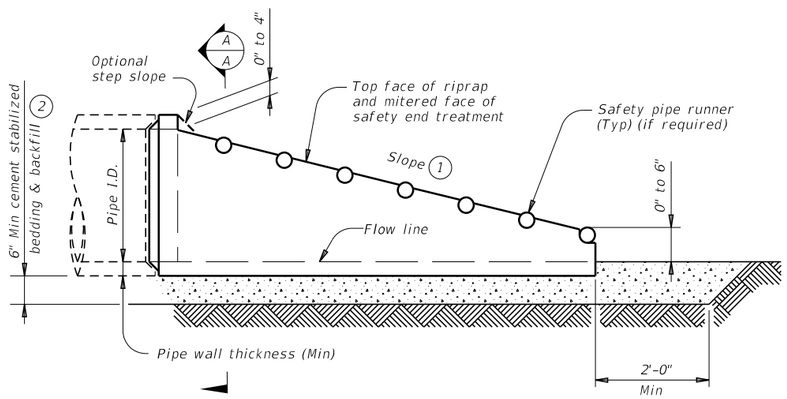


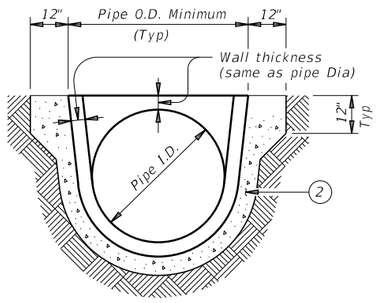
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

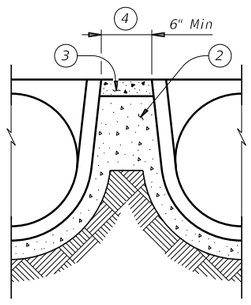


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

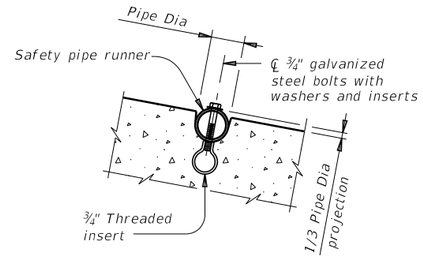
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

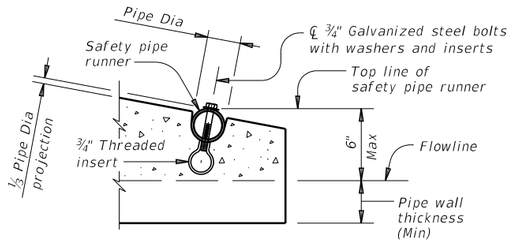
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

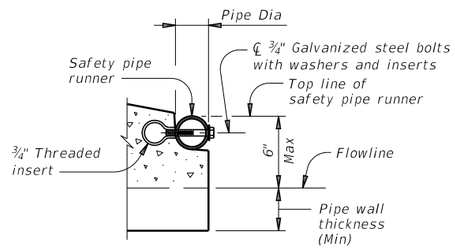


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		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

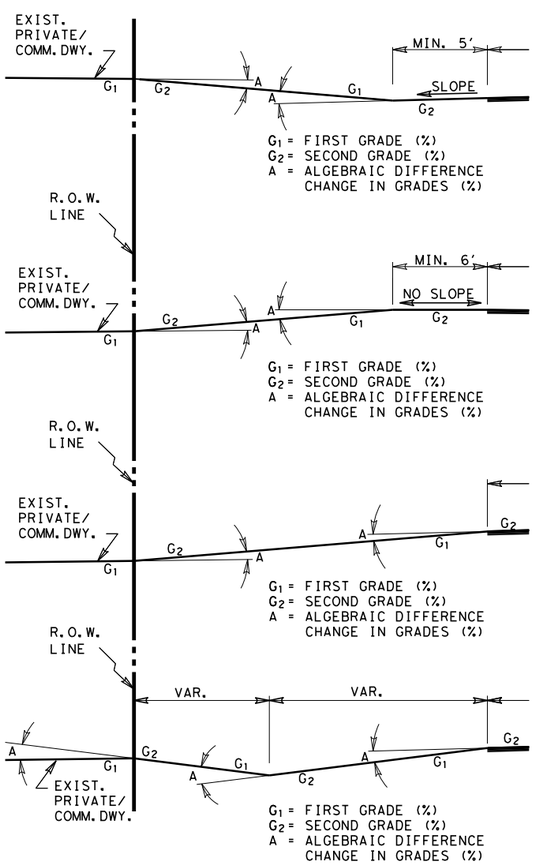
Bridge Division Standard

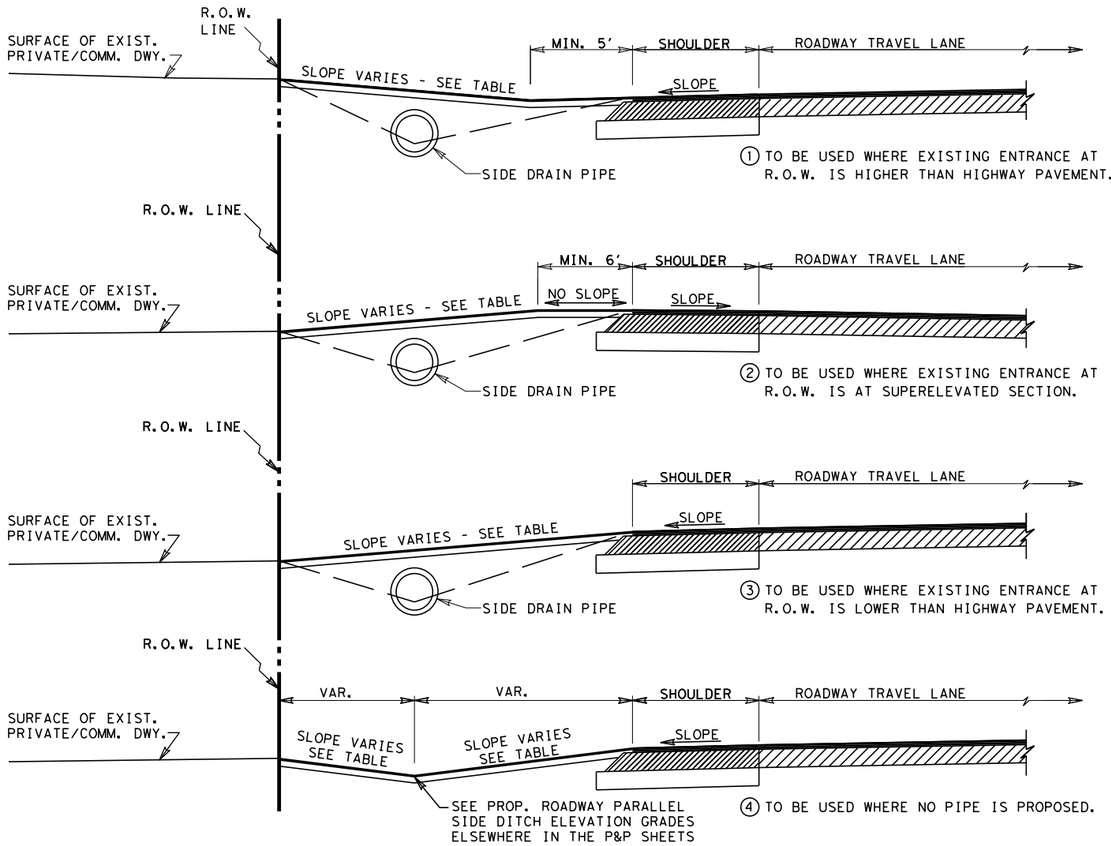
PRECAST SAFETY END TREATMENT

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
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		71

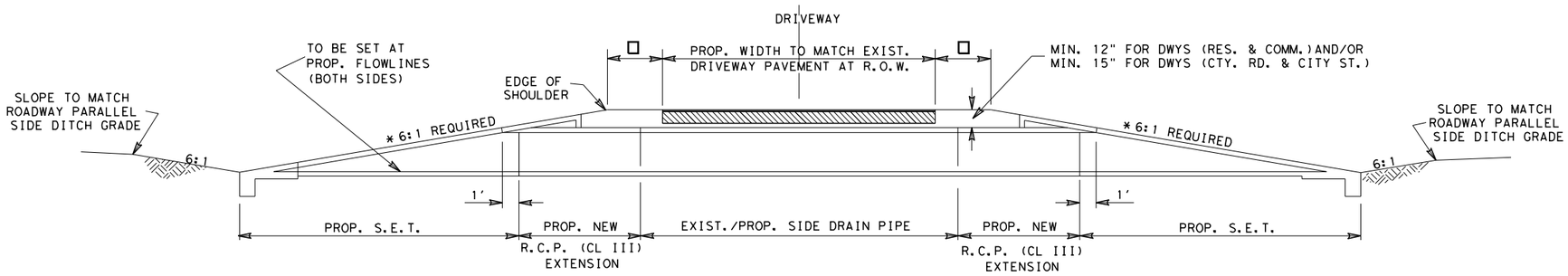




TYPICAL ENTRANCE PROFILE FOR DRIVEWAYS W/OUT C&G

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX.
RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% DESIRABLE
RESIDENTIAL DRIVEWAYS @ A = 8% DESIRABLE
FORMULA, A=G2-G1



□ - 1' MIN. ON DRIVEWAYS (RES. & COMM.)
2' MIN. ON DRIVEWAYS (COUNTY RD. & CITY ST.)

* - 6:1 SLOPE REQUIRED

NOTES:

ALL ENTRANCES CONSTRUCTED ON THIS PROJECT ARE SUBJECT TO CONCURRENCE WITH EXISTING GOVERNING REGULATIONS AS SET OUT BY THE STATE - TEXAS TRANSPORTATION COMMISSION.

ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING DRIVEWAY GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

ALL FLEXIBLE BASE USED FOR PRIVATE DRIVES & COMMERCIAL DRIVES WILL NOT REQUIRE LIME TREATMENT.

EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER.

PROP. WIDTH OF DRIVEWAYS TO MATCH EXISTING WIDTH AT R.O.W. LINE.

114 #/SY ACP (COMPACTED) IS EQUAL TO 1 IN. DEPTH,
171 #/SY ACP (COMPACTED) IS EQUAL TO 1½ IN. DEPTH.

SIDE DRAIN PIPES TO BE INSTALLED WHERE ROADWAY DITCH DRAINAGE IS NECESSARY, AS INDICATED ON PLANS AND/OR AS DIRECTED BY THE ENGINEER.

SIDE DRAIN PIPES TO BE INSTALLED WITH A MINIMUM OF 12" COVER WITH PROPOSED RESIDENTIAL & COMMERCIAL DRIVEWAY MATERIAL OR 15" COVER WITH PROPOSED COUNTY ROAD & CITY STREET ROADWAY MATERIAL.

AVERAGE DRIVEWAY DIMENSIONS SHOWN ON TABLE OF DRIVEWAYS (ELSEWHERE IN PLANS) ARE FOR ESTIMATING PURPOSES ONLY. ACTUAL DRIVEWAY DIMENSIONS MAY BE CHANGED BY THE ENGINEER BASED ON EXISTING FIELD CONDITIONS.

THE RATE OF PRIME COAT SHALL BE 0.10 GAL/SY FOR PRIVATE AND/OR COMMERCIAL DRIVEWAYS AND 0.20 GAL/SY FOR PUBLIC DRIVEWAYS (COUNTY ROADS AND/OR CITY STREETS).

TYPICALLY A CHANGE IN GRADE OF THREE PERCENT (3%) OR LESS AND A DISTANCE BETWEEN CHANGES IN GRADE OF AT LEAST ELEVEN FEET (11') ACCOMMODATES MOST VEHICLES. HOWEVER, LITERATURE SUGGESTS THAT A SIX PERCENT (6%) TO EIGHT PERCENT (8%) CHANGE IN GRADE MAY OPERATE EFFECTIVELY. INDIVIDUAL SITE CONDITIONS SHOULD BE EVALUATED TO ACCOMMODATE THE VEHICLE FLEET USING THE DRIVEWAY.

PHARR DISTRICT STANDARD

TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY PROFILE DETAILS

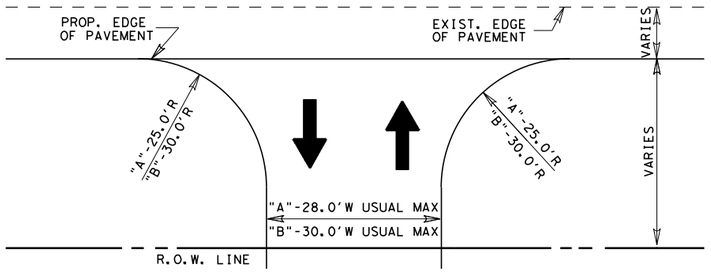
REV. 3/2020

DRIVEWAY1.DGN

FED.RD. DIV.NO.	STATE AID PROJECT NO.	FILE NO.	SHEET NO.
6			72

STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	2529	02	010	FM 2556

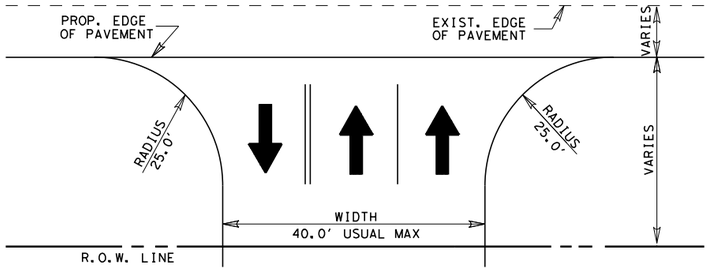
DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



"A"- ONE ENTRY LANE AND ONE EXIT LANE, FEWER THAN 4 LARGE VEHICLES PER HOUR

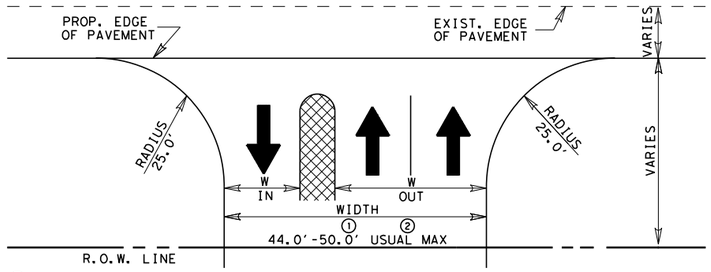
"B"- ONE ENTRY LANE AND ONE EXIT LANE, 4 OR MORE SINGLE UNIT VEHICLES① PER HOUR

① - *DRIVEWAY DESIGNS FOR LARGER VEHICLES WILL BE CONSIDERED ON A CASE BY CASE BASIS*



ONE ENTRY LANE AND TWO EXIT LANES (WITHOUT DIVIDERS)

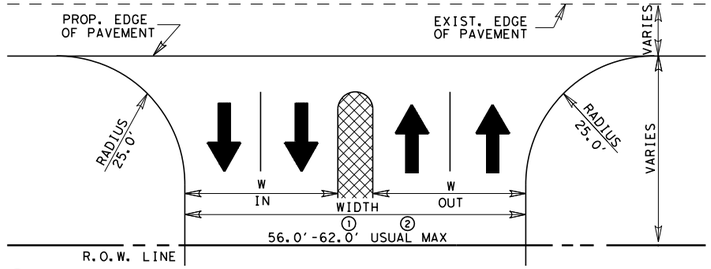
DESIGNS FOR TWO-WAY COMMERCIAL DRIVEWAYS



① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*

② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

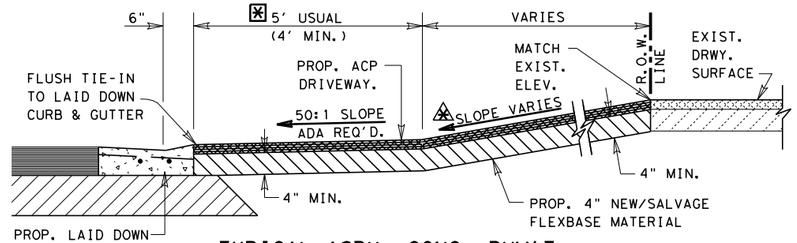
ONE ENTRY LANE AND TWO EXIT LANES (WITH A DIVIDER)



① - *4.0' WIDE DIVIDER, FACE-TO-FACE CURBS*

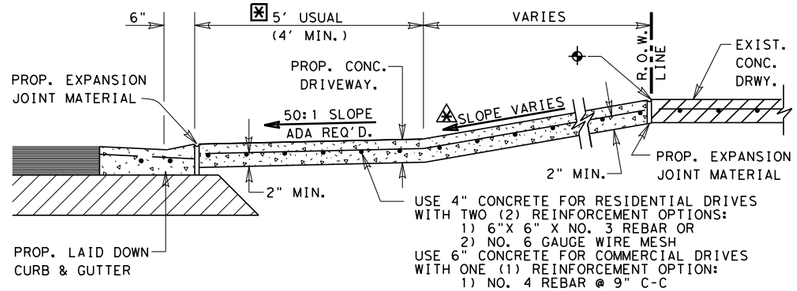
② - *10.0' WIDE DIVIDER, FACE-TO-FACE-CURBS*

TWO ENTRY LANES AND TWO EXIT LANES (WITH A DIVIDER)



TYPICAL ASPH. CONC. PVM'T. DRIVEWAY SECTION

N.T.S.



TYPICAL CONCRETE DRIVEWAY SECTION

N.T.S.

⊕ CONCRETE SHALL BE SAW CUT TO THE LIMITS OF REMOVAL WHERE APPLICABLE.

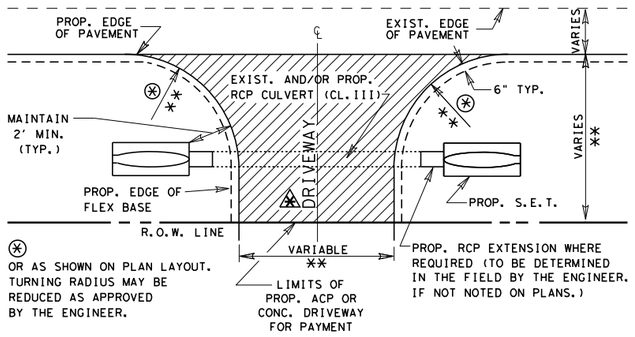
⊠ PROP./FUTURE SIDEWALK CROSSING LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. SEE P&P SHEETS FOR PROP. SIDEWALK LOCATION IF SIDEWALKS ARE INCLUDED AS PART OF PROJECT. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⚠ ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 12:1 FOR COMMERCIAL DRIVEWAY AND 8:1 FOR RESIDENTIAL DRIVEWAY SLOPE WILL BE CONSTRUCTED.

PROP. DWY ALGEBRAIC DIFFERENCE TABLE
COMMERCIAL DRIVEWAYS @ A = 6% MAX.
RESIDENTIAL DRIVEWAYS @ A = 8% MAX.

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 12:1 MAX.
RESIDENTIAL DRIVEWAYS @ 8:1 MAX.

PRIVATE AND COMMERCIAL DRIVES WITHOUT CURB & GUTTER



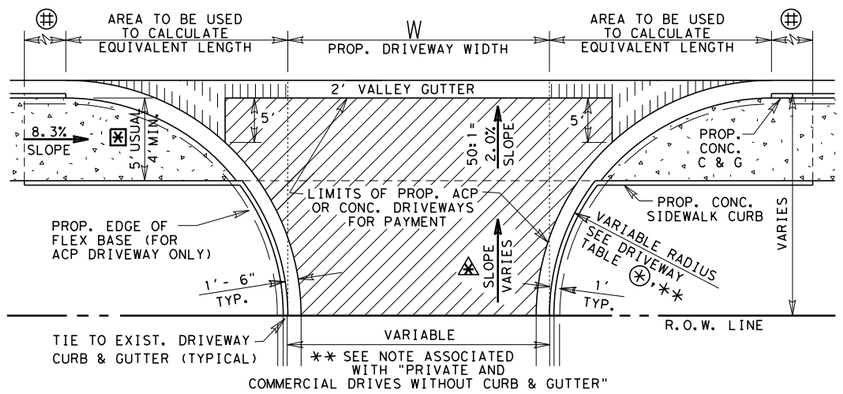
⊛ OR AS SHOWN ON PLAN LAYOUT. TURNING RADIUS MAY BE REDUCED AS APPROVED BY THE ENGINEER.

PLAN OF PRIVATE AND COMMERCIAL DRIVES

** FOR PRIVATE RESIDENTIAL DRIVES, TRY TO MATCH EXISTING WITH A MINIMUM WIDTH OF 12 FT. AND A MAXIMUM WIDTH OF 24 FT. WITH 15 FT. USUAL RADIUS. FOR COMMERCIAL DRIVES, USE ABOVE COMMERCIAL DRIVEWAY DETAILS.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

PRIVATE AND COMMERCIAL DRIVES WITH CURB & GUTTER



PLAN OF PRIVATE AND COMMERCIAL DRIVES

SEE P&P SHEETS FOR LOCATIONS OF DRIVES
N.T.S.

⊠ PROP./FUTURE CONC. SIDEWALK LOCATION UNLESS SHOWN ELSEWHERE ON P&P SHEETS. REFER TO STATE STANDARDS - PEDESTRIAN FACILITIES - FOR ADDITIONAL REQUIREMENTS.

⊕ LIMITS OF SLOPE FOR PROP. CONC. CURB BASED ON 8.3% SLOPE FOR SIDEWALK.

⚠ SEE TYPICAL DRIVEWAY SECTIONS NOTES FOR DRIVEWAY SLOPE CRITERIA.

LF EQUIVALENT TABLE FOR PAYMENT LIMITS OF 2' VALLEY GUTTER

LF OF VALLEY GUTTER= W + X1 + X2

WHERE X1 AND X2 MAY VARY DEPENDING ON RADIUS

Prop. Driveway Radius	X1 or X2 (Sq Ft Area / 2') Equivalent LF Length
5'	1
8'	2
10'	4
12'	6
15'	9
18'	12
20'	15
22'	18
25'	24
28'	30
30'	34

SEE DRIVEWAY TABLE FOR LIMITS OF LAID DOWN CURB TO BE PAID FOR AS CURB AND GUTTER

DRIVEWAY TYPES

TY PB-1

EXIST. PRIVATE OR COMMERCIAL DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" NEW AND/OR SALVAGE FLEX. BASE, PRIMED AND SURFACED WITH 171#/SY ACP. (HMA-D PG 64-22 SAC B MEETING ITEM 340)

CONCRETE (RESIDENTIAL)

EXIST. PRIVATE DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 4" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

CONCRETE (COMMERCIAL)

EXIST. BUSINESS DRIVEWAYS TO BE CONSTRUCTED AS SHOWN WITH 6" CONCRETE. TO BE PAID FOR BY THE SQ.YD.

PHARR DISTRICT STANDARD

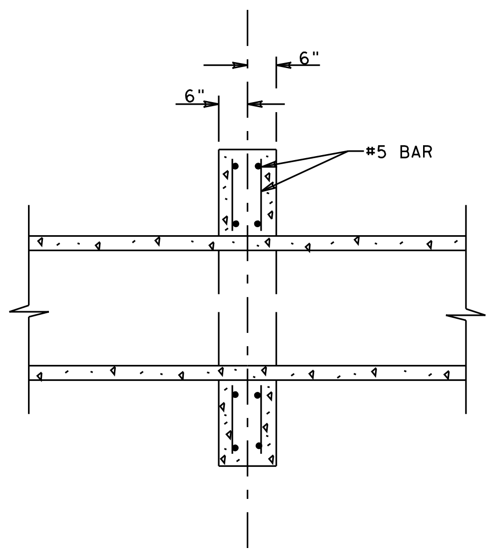
TEXAS DEPARTMENT OF TRANSPORTATION

DRIVEWAY DETAILS PRIVATE (RESIDENTIAL-COMMERCIAL)

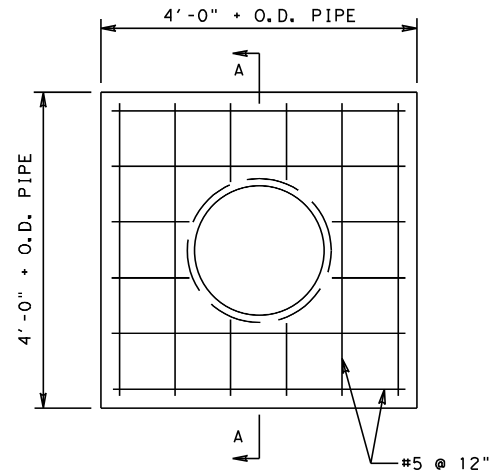
REV. 08/22

DRIVEWAY2.DGN

FED. RD. DIV. NO.	PROJECT NO.		FILE NO.			SHEET NO.
6						73
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	2529	02	010	FM 2556

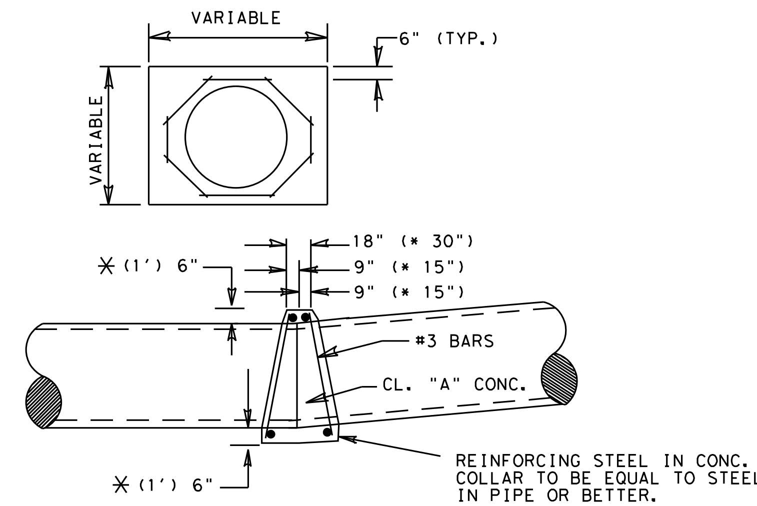


SECTION A-A



FRONT ELEVATION

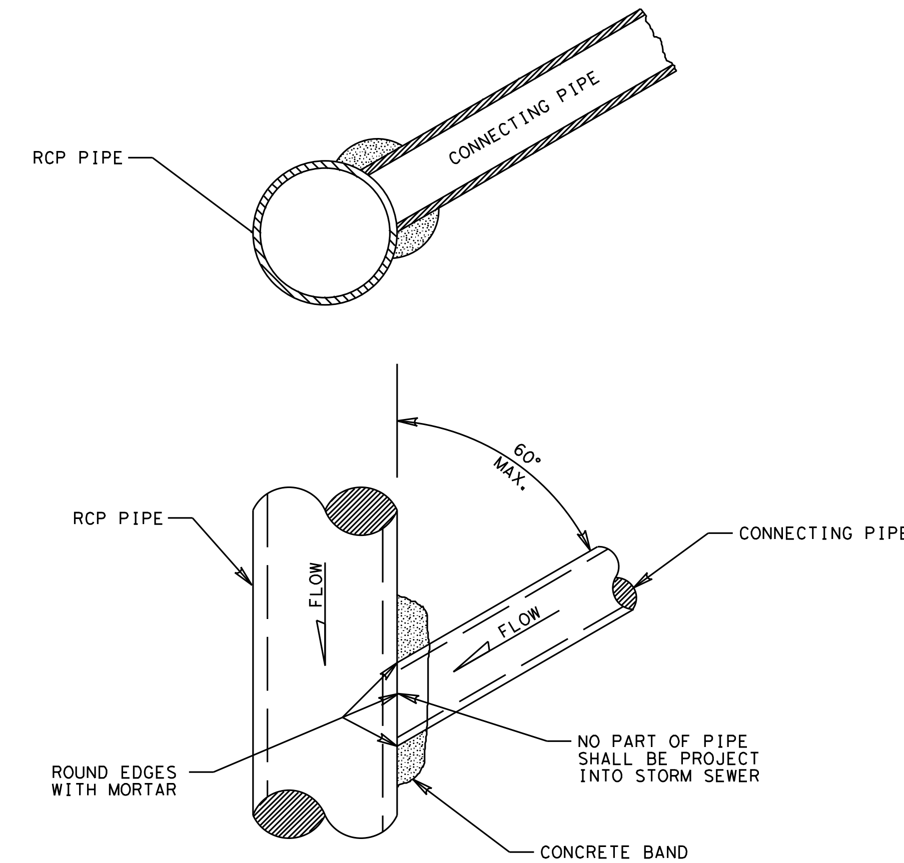
CONCRETE PIPE COLLAR



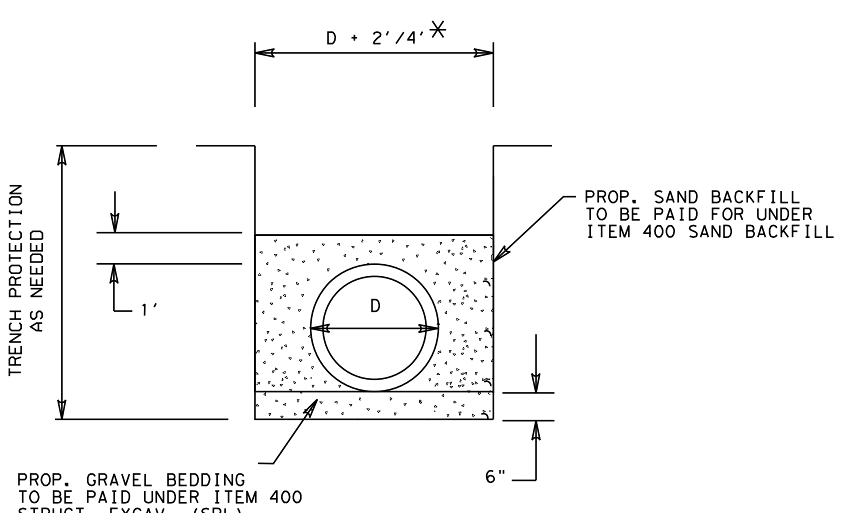
DETAIL FOR CONC. COLLARS DRAINAGE STRUCTURES AND PIPE SIPHONS (HORIZ. & VERT. BENDS)

NOTE: PROP. CONC. COLLAR WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE BIDS ITEMS INVOLVED.

* FOR 42" DIAMETER AND LARGER PIPE



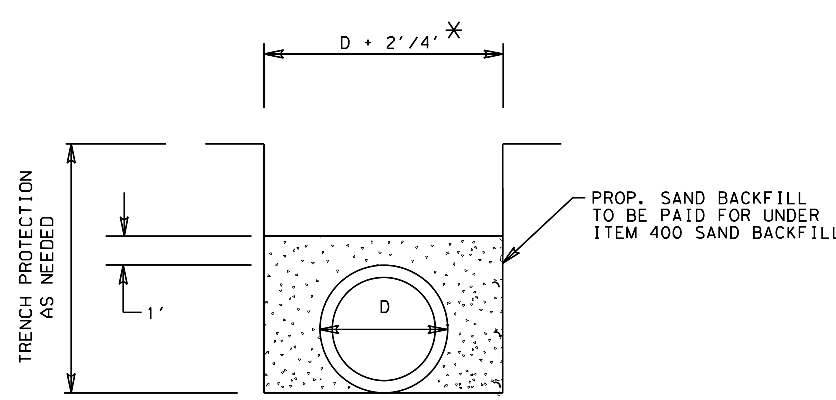
TYPICAL REINFORCED CONC. PIPE CONNECTION WITHOUT MANHOLE



* FOR PIPE 42" DIAMETER OR LESS PLACE 1'OF FILL ON EACH SIDE OF THE PIPE.
FOR PIPE LARGER THAN 42" DIAMETER PLACE 2' OF FILL ON EACH SIDE OF THE PIPE.

SPIRAL RIB CMP

TYPICAL BACKFILL DETAIL GRAVEL & SAND



* FOR PIPE 42" DIAMETER OR LESS PLACE 1'OF FILL ON EACH SIDE OF THE PIPE.
FOR PIPE LARGER THAN 42" DIAMETER PLACE 2' OF FILL ON EACH SIDE OF THE PIPE.

REINFORCED CONCRETE PIPE

TYPICAL BACKFILL DETAIL-SAND

PHARR DISTRICT STANDARD

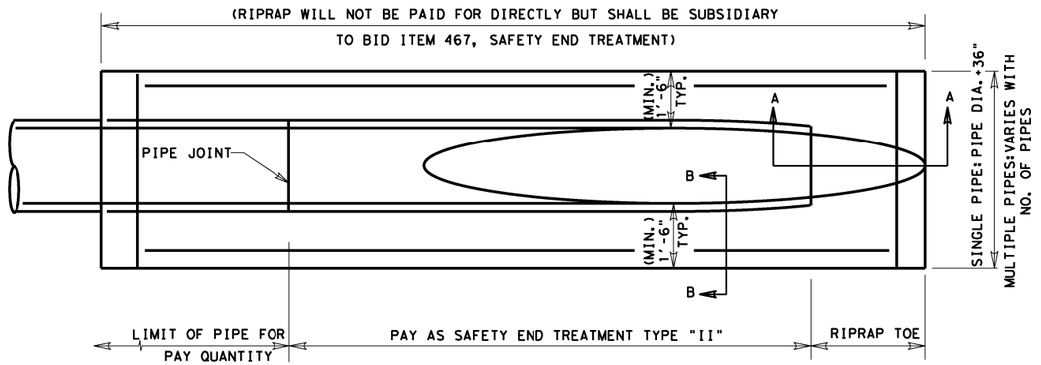
TEXAS DEPARTMENT OF TRANSPORTATION

MISCELLANEOUS PIPE DETAILS

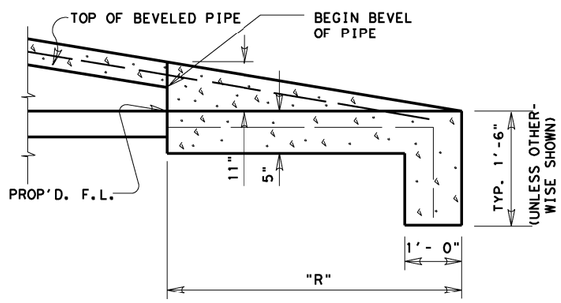
REV. 8/14 COLLAR.DGN

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		FILE NO.			SHEET NO.
6						74
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	2529	02	010	FM 2556

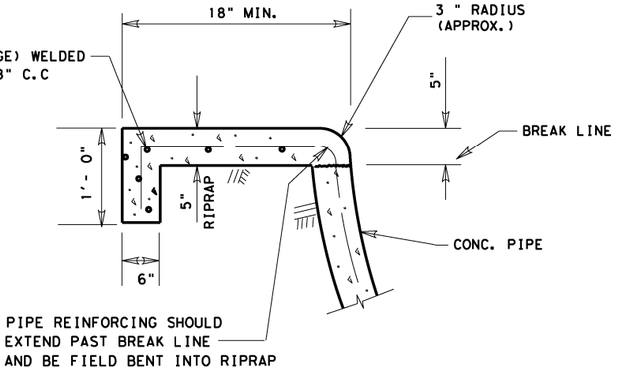
FILE: c:\bms\bridgeformer-pw\aaron.tainter\dms01999\25-FM2556-MISCPIPEDET.dgn
DATE: 6/12/2022 12:34:49 PM



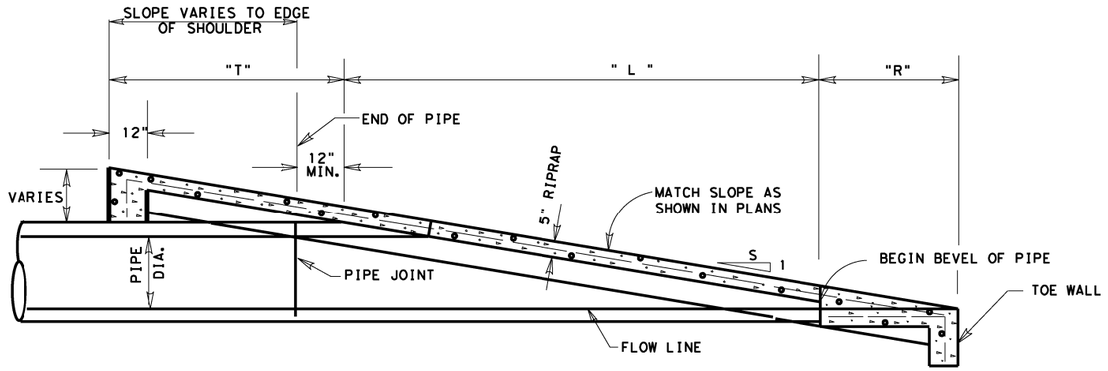
PLAN VIEW



SEC. A-A



SEC. B-B



ELEVATION
SAFETY END TREATMENT

SAFETY END TREATMENT PIPE LENGTHS

PIPE DIA. (IN.)	"L"			
	3:1	4:1	5:1	6:1
12	2'-0"	2'-8"	3'-4"	4'-0"
15	2'-9"	3'-8"	4'-7"	5'-6"
18	3'-6"	4'-8"	5'-10"	7'-0"
24	5'-1½"	6'-10"	8'-6½"	10'-3"
30	6'-9"	9-0"	11'-3"	13'-6"
36	8'-6"	11'-4"	14'-2"	17'-0"
42	10'-1½"	13'-6"	16'-10½"	20'-3"
48	11'-9"	15'-8"	19'-7"	23'-6"

⊛ DRIVEWAYS & TURNOUTS ARE 6:1 ONLY

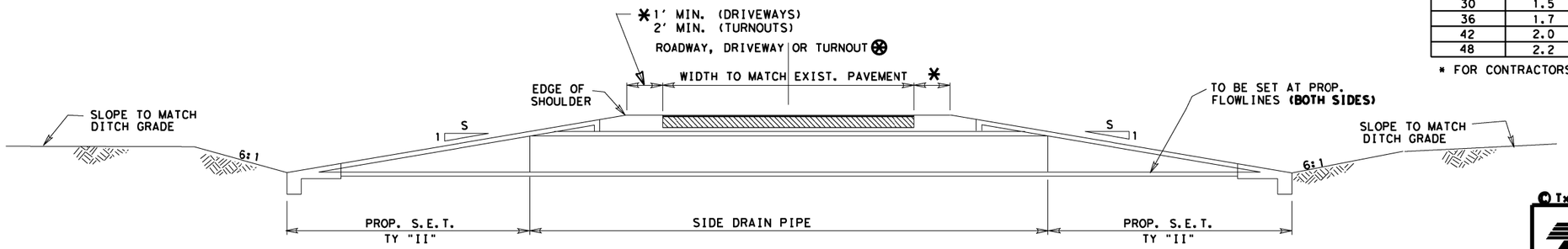
RIPRAP TOE LENGTHS

SLOPE	" R "	"T"
3:1	2'-9"	1'-9"
4:1	3'-8"	2'-4"
5:1	4'-7"	2'-11"
6:1	5'-6"	3'-6"

ESTIMATED RIPRAP VOLUME (CY)

PIPE DIA. (IN.)				
	3:1	4:1	5:1	6:1
12	.9	1.1	1.3	1.6
15	1.0	1.2	1.5	1.8
18	1.1	1.4	1.6	1.9
24	1.3	1.6	2.0	2.3
30	1.5	1.9	2.3	2.7
36	1.7	2.2	2.7	3.2
42	2.0	2.5	3.1	3.6
48	2.2	2.8	3.4	4.1

* FOR CONTRACTORS INFORMATION ONLY (SINGLE PIPE)



TYPICAL SIDEDRAIN SECTION

NOTE:

ALL EXCAVATION AND BACKFILL REQUIRED AT ALL PIPE SIDE DRAIN CONNECTIONS, ADJUSTMENTS AND/OR EXTENSIONS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE SUBSIDIARY TO THE BID ITEMS INVOLVED AND IN ACCORDANCE WITH ITEM 400 "STRUCTURAL EXCAVATION".

PHARR DISTRICT STANDARDS

TEXAS DEPARTMENT OF TRANSPORTATION

SAFETY END TREATMENT DETAILS

REV. 9/16

SET. DGN

FED. RD. DIV. NO.	STATE AID PROJECT NO.		FILE NO.			SHEET NO.
6						75
STATE	STATE DIST. NO.	COUNTY	CONT.	SECT.	JOB	HIGHWAY NO.
TEXAS	21	CAMERON	2529	02	010	FM 2556

MINUTE 238 FLOWS FROM THE USIBWC AND USACE REPORTS

(SEE NOTES THIS SHEET)

LOCATION	CFS
RIO GRANDE AT RIO GRANDE CITY	250,000
STORAGE REDUCTION BETWEEN RIO GRANDE CITY AND PENITAS	15,000
RIO GRANDE AT PENITAS	235,000
DIVERSION TO UNITED STATES MAIN FLOODWAY	105,000
NORTH FLOODWAY DOWNSTREAM OF LLANO GRANDE LAKE	84,000
ARROYO COLORADO DOWNSTREAM OF LLANO GRANDE LAKE	21,000

20,000 0 20,000 40,000
SCALE: 1" = 40,000' HORIZONTAL

NOTES:

MINUTE 238 FLOWS ARE DETERMINED BY THE US INTERNATIONAL BOUNDARY AND WATER COMMISSION (USIBWC) MINUTE 238, WHICH IS AN AGREEMENT BETWEEN THE UNITED STATES AND MEXICO FROM 1970 IN RESPONSE TO DAMAGES FROM THE 1967 BEULAH HURRICANE.

MINUTE 238 IS AN AGREEMENT TO CONSTRUCT IMPROVEMENTS TO THE LOWER RIO GRANDE FLOOD CONTROL PROJECT (LRGFCP) BASED ON A FLOOD FLOW OF 250,000 CFS AT RIO GRANDE CITY.

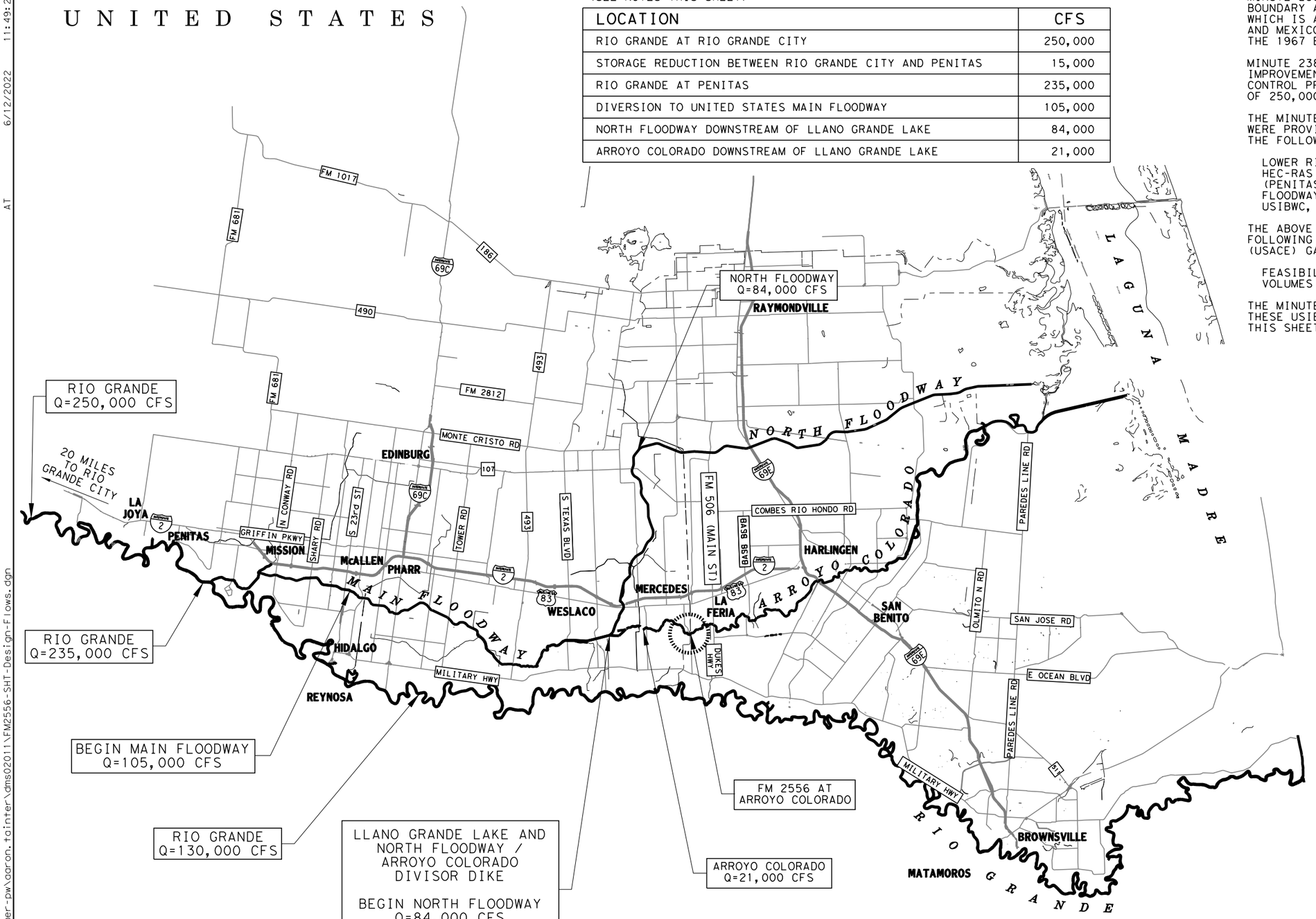
THE MINUTE 238 FLOWS ANALYZED FOR THIS PROJECT WERE PROVIDED BY THE USIBWC, AS DOCUMENTED IN THE FOLLOWING REPORT:

LOWER RIO GRANDE FLOOD CONTROL PROJECT
HEC-RAS HYDRAULIC MODEL UPDATE AND VALIDATION
(PENITAS TO RIVER MILE 28 AND OFF-RIVER FLOODWAYS IN TEXAS AND MEXICO)
USIBWC, JULY 2008

THE ABOVE USIBWC REPORT ALSO REFERS TO THE FOLLOWING UNITED STATES ARMY CORPS OF ENGINEERS (USACE) GALVESTON DISTRICT REPORT:

FEASIBILITY REPORT, CAMERON COUNTY, TEXAS
VOLUMES 1 AND 2, 1990

THE MINUTE 238 FLOWS USED ON THIS PROJECT FROM THESE USIBWC AND USACE REPORTS ARE DOCUMENTED ON THIS SHEET.



100% SUBMITTAL

JUNE 12, 2022

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
HYDRAULIC DATA
FM 2556
DESIGN FLOWS

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		76

15,000 0 7,500 15,000
SCALE: 1" = 15,000'

LEGEND

- A-X / XX.XX — AREA DESIGNATION / SQ. MILES
- FLOW DIRECTION
- DRAINAGE AREA

REGRESSION FLOWS	
EVENT	Peak Flow Discharge (cfs)
2 YR	1203
5 YR	2185
10 YR	3048
25 YR	4312
50 YR	5374
100 YR	6595
500 YR	10069

NOTES:
1. REGRESSION FLOWS ARE FOR COMPARISON PURPOSES ONLY.
2. REFER TO "DESIGN FLOWS MAP" PLAN SHEET FOR USIBWC DESIGN FLOWS.

100% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

JANUARY 11, 2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

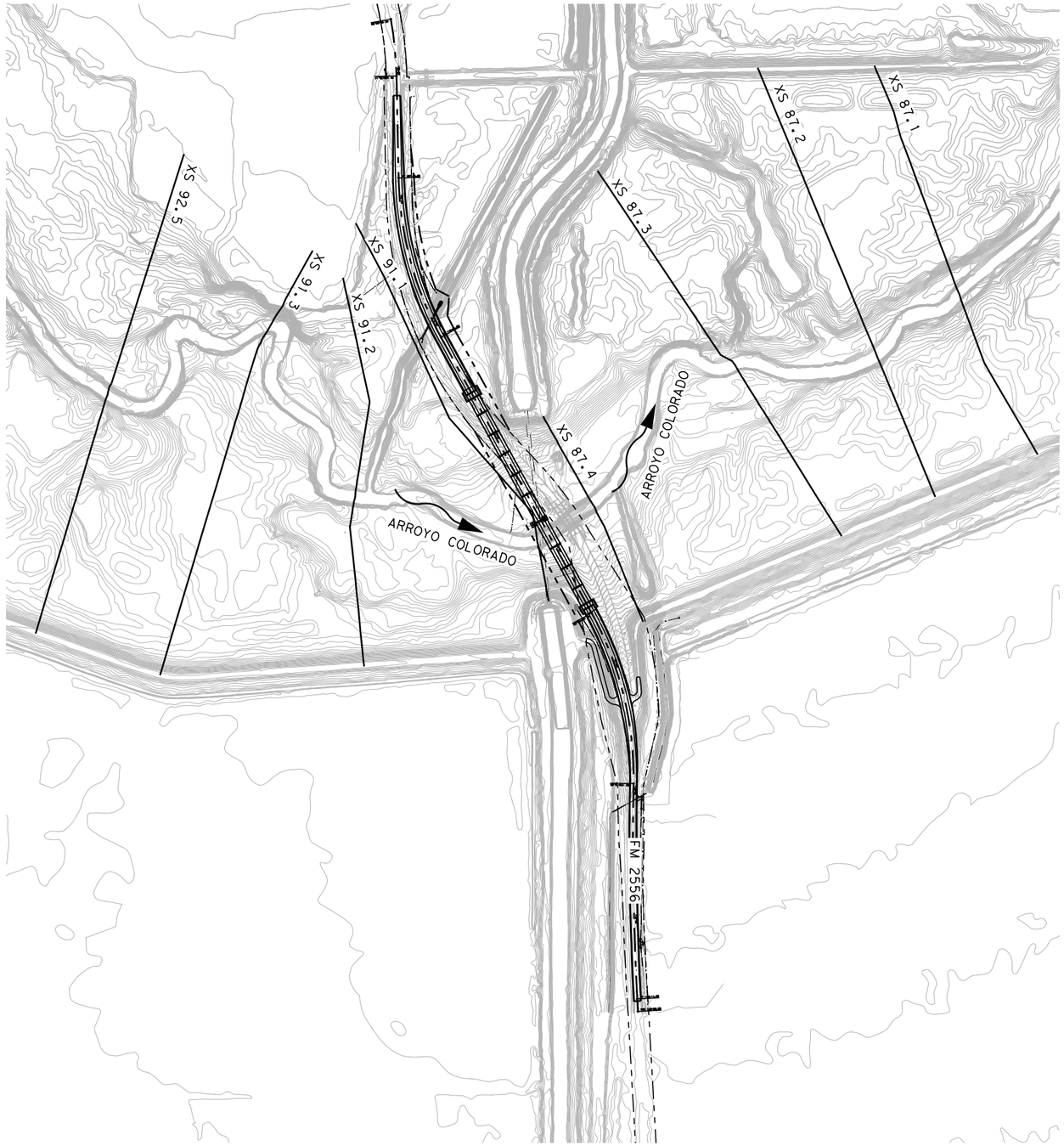
Texas Department of Transportation

FM 2556
DRAINAGE AREA MAP

SHEET 1 OF 1

		CONT	SECT	JOB	HIGHWAY
DS: AM	CK: JK	2529	02	010	FM 2556
		DIST	COUNTY		SHEET NO.
DW: AM	CK: AT	PHARR	CAMERON		77

HEC-RAS CROSS SECTION PLAN VIEW



NOTES:

THIS HYDRAULIC MODEL IS BASED ON THE "2008 HEC-RAS ARROYO COLORADO" MODEL RECEIVED FROM THE US INTERNATIONAL BOUNDARY AND WATER COMMISSION (USIBWC).

THE USIBWC 2008 MODEL WAS DEVELOPED IN HEC-RAS VERSION 4.0. AS DISCUSSED WITH THE USIBWC, THIS MODEL WAS CONVERTED TO THE CURRENT VERSION OF HEC-RAS, AND THEREFORE HEC-RAS VERSION 5.0.6 WAS USED FOR THIS ANALYSIS.

GEOMETRY AT THE FM 2556 CROSSING WAS UPDATED BASED ON PROJECT SURVEY DATA COLLECTED IN 2018, SUPPLEMENTED WITH IBWC 2011 LIDAR DATA FROM TNRIS.

HORIZONTAL CONTROL
HZ DATUM: NAD 83
HZ ADJUSTMENT: 2011 EPOCH 2010.00
PROJECTION ZONE: 4205 SOUTH

VERTICAL CONTROL
VT DATUM: NAVD 88
VT ADJUSTMENT: 1991
GEOID MODEL: GEOID12B

100% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

JANUARY 11, 2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
HYDRAULIC DATA SHEETS

SHEET 1 OF 3

		CONT	SECT	JOB	HIGHWAY
DS: AM	CK: JK	2529	02	010	FM 2556
DW: AM	CK: AT	DIST	COUNTY		SHEET NO.
		PHARR	CAMERON		78

HEC-RAS CROSS SECTION OUTPUT

Reach	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
Reach-1	101	Design Flow	EXIST	21000	27.84	58.71	46.03	59.86	0.000658	9.31	3288.03	1486.22	0.32
Reach-1	101	Design Flow	PROP	21000	27.84	58.72	46.03	59.86	0.000658	9.3	3288.36	1486.42	0.32
Reach-1	100	Design Flow	EXIST	21000	27.84	58.71	46.03	59.86	0.000658	9.31	3287.71	1486.03	0.32
Reach-1	100	Design Flow	PROP	21000	27.84	58.71	46.03	59.86	0.000658	9.31	3288.04	1486.23	0.32
Reach-1	99	Design Flow	EXIST	21000	27.34	58.55	44.14	59.21	0.000387	7.38	6802.92	1750.18	0.25
Reach-1	99	Design Flow	PROP	21000	27.34	58.55	44.14	59.21	0.000387	7.38	6806.05	1750.19	0.25
Reach-1	98	Design Flow	EXIST	21000	28.44	58.01	44.26	58.54	0.000375	6.64	9087.24	2968.81	0.23
Reach-1	98	Design Flow	PROP	21000	28.44	58.01	44.26	58.54	0.000374	6.64	9094.66	2968.83	0.23
Reach-1	97	Design Flow	EXIST	21000	27.64	57.85	45.38	58.15	0.000274	5.86	11820.19	2267.56	0.2
Reach-1	97	Design Flow	PROP	21000	27.64	57.85	45.38	58.15	0.000274	5.86	11826.12	2267.59	0.2
Reach-1	96	Design Flow	EXIST	21000	25.94	56.33	45.96	57.14	0.000631	8.63	8031.08	2539.67	0.3
Reach-1	96	Design Flow	PROP	21000	25.94	56.34	45.96	57.14	0.000629	8.62	8050.14	2541.09	0.3
Reach-1	95.5	Design Flow	EXIST	21000	29.98	56.07	43.7	56.2	0.000142	3.33	15121.77	5032.62	0.14
Reach-1	95.5	Design Flow	PROP	21000	29.98	56.08	43.7	56.21	0.000141	3.33	15152.05	5033.55	0.14
Reach-1	95	Design Flow	EXIST	21000	25.44	55.42	42.66	55.68	0.00023	4.89	12858.33	5406.41	0.18
Reach-1	95	Design Flow	PROP	21000	25.44	55.43	42.66	55.69	0.000229	4.89	12895.53	5418.35	0.18
Reach-1	94	Design Flow	EXIST	21000	24.54	54.33	39.47	54.75	0.000268	6.05	9297.33	2652.25	0.21
Reach-1	94	Design Flow	PROP	21000	24.54	54.34	39.47	54.76	0.000267	6.05	9334.57	2680.48	0.21
Reach-1	93	Design Flow	EXIST	21000	24.04	53.68	40.82	54.09	0.000334	6.54	10169.45	2608.59	0.22
Reach-1	93	Design Flow	PROP	21000	24.04	53.69	40.82	54.11	0.000332	6.52	10214.54	2623.37	0.22
Reach-1	92.5	Design Flow	EXIST	21000	22.62	53.49	42.31	53.55	0.000093	3.25	17267.92	1637.65	0.12
Reach-1	92.5	Design Flow	PROP	21000	22.62	53.5	42.31	53.56	0.000092	3.25	17297.14	1638.12	0.12
Reach-1	92	Design Flow	EXIST	21000	23.74	53.36	37.14	53.5	0.000115	3.92	13433.52	1482.17	0.13
Reach-1	92	Design Flow	PROP	21000	23.74	53.38	37.14	53.52	0.000115	3.91	13460.94	1482.26	0.13
Reach-1	91.3	Design Flow	EXIST	21000	22.76	53.34	36.32	53.47	0.000103	3.73	13534.68	1460.02	0.13
Reach-1	91.3	Design Flow	PROP	21000	22.76	53.36	36.32	53.49	0.000102	3.72	13561.79	1460.1	0.13
Reach-1	91.2	Design Flow	EXIST	21000	20.27	53.31	40.22	53.39	0.000104	3.72	14990.11	1307.96	0.12
Reach-1	91.2	Design Flow	PROP	21000	20.27	53.33	40.22	53.41	0.000103	3.72	15014.54	1308.47	0.12
Reach-1	91.1	Design Flow	EXIST	21000	22.1	53.22	38.92	53.33	0.000115	4.03	13013.98	1380.19	0.13
Reach-1	91.1	Design Flow	PROP	21000	22.1	53.24	38.92	53.34	0.000115	4.02	13032.34	1380.99	0.13

Reach	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
Reach-1	90	Design Flow	EXIST	21000	21.63	53.19	38.99	53.31	0.000131	4.25	12359.56	1495.14	0.14
Reach-1	90	Design Flow	PROP	21000	21.63	53.21	38.99	53.33	0.00013	4.24	12378	1497.08	0.14
Reach-1	89			Bridge									
Reach-1	88	Design Flow	EXIST	21000	22.18	53.19	41.04	53.26	0.000445	0.69	11589.81	1395.62	0.03
Reach-1	88	Design Flow	PROP	21000	22.18	53.19	41.04	53.26	0.000445	0.69	11589.73	1395.56	0.03
Reach-1	87.4	Design Flow	EXIST	21000	21.37	53.11	39.41	53.23	0.000125	4.03	11797.97	828.93	0.14
Reach-1	87.4	Design Flow	PROP	21000	21.37	53.11	39.41	53.23	0.000125	4.03	11797.97	828.93	0.14
Reach-1	87.3	Design Flow	EXIST	21000	22.37	53	36.06	53.14	0.000107	3.87	13570.14	1616.02	0.13
Reach-1	87.3	Design Flow	PROP	21000	22.37	53	36.06	53.14	0.000107	3.87	13570.14	1616.02	0.13
Reach-1	87.2	Design Flow	EXIST	21000	19.97	52.86	35.99	53.06	0.000139	4.42	12147.36	1707	0.15
Reach-1	87.2	Design Flow	PROP	21000	19.97	52.86	35.99	53.06	0.000139	4.42	12147.36	1707	0.15
Reach-1	87.1	Design Flow	EXIST	21000	19.96	52.7	38.21	52.98	0.000252	5.88	10979.11	1543.86	0.2
Reach-1	87.1	Design Flow	PROP	21000	19.96	52.7	38.21	52.98	0.000252	5.88	10979.11	1543.86	0.2
Reach-1	87	Design Flow	EXIST	21000	21.14	52.53	38.38	52.89	0.000288	6.19	9906.28	1574.23	0.21
Reach-1	87	Design Flow	PROP	21000	21.14	52.53	38.38	52.89	0.000288	6.19	9906.28	1574.23	0.21

100% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

JANUARY 11, 2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

HYDRAULIC DATA SHEETS

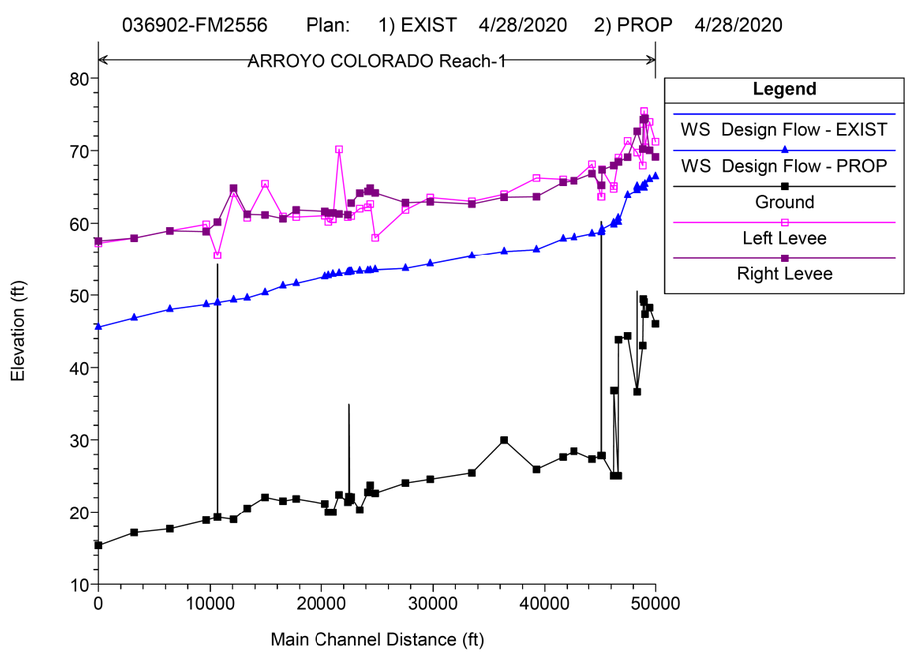
DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		79

Plan: EXIST	ARROYO COLORADO	Reach-1 RS: 89	Profile: Design Flow	
E.G. US. (ft)	53.31	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	53.19	E.G. Elev (ft)	53.28	53.27
Q Total (cfs)	21000	W.S. Elev (ft)	53.22	53.19
Q Bridge (cfs)	769.05	Crit W.S. (ft)	39.84	42.46
Q Weir (cfs)		Max Chl Dpth (ft)	31.59	31.02
Weir Sta Lft (ft)		Vel Total (ft/s)	1.88	1.88
Weir Sta Rgt (ft)		Flow Area (sq ft)	11153.55	11152.42
Weir Submerg		Froude # Chl	0.06	0.07
Weir Max Depth (ft)		Specif Force (cu ft)	91583.08	79132.64
Min El Weir Flow (ft)	34.94	Hydr Depth (ft)	11.58	10.81
Min El Prs (ft)	33.77	W.P. Total (ft)	1233.19	1179.92
Delta EG (ft)	0.05	Conv. Total (cfs)	1170930	929487.6
Delta WS (ft)	0	Top Width (ft)	1309.44	1311.27
BR Open Area (sq ft)	374.46	Frctn Loss (ft)	0.01	0.01
BR Open Vel (ft/s)	2.05	C & E Loss (ft)	0	0
BR Sluice Coef		Shear Total (lb/sq ft)	0.18	0.3
BR Sel Method	Energy only	Power Total (lb/ft s)	0.34	0.57

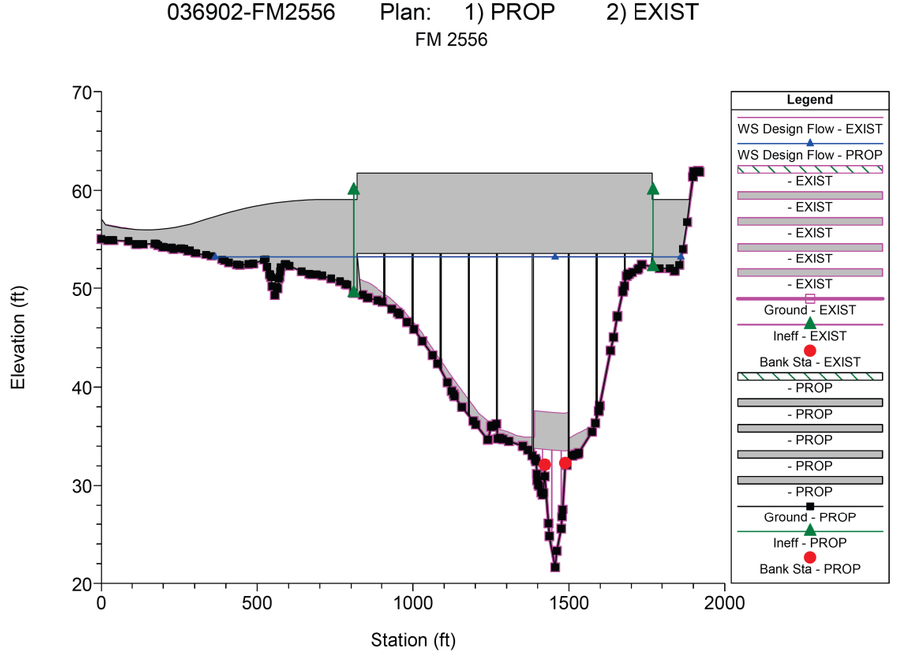
HEC-RAS EXISTING BRIDGE OUTPUT

Plan: PROP	ARROYO COLORADO	Reach-1 RS: 89	Profile: Design Flow	
E.G. US. (ft)	53.33	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	53.21	E.G. Elev (ft)	53.33	53.3
Q Total (cfs)	21000	W.S. Elev (ft)	53.19	53.22
Q Bridge (cfs)	21000	Crit W.S. (ft)	38.9	41.32
Q Weir (cfs)		Max Chl Dpth (ft)	31.56	31.05
Weir Sta Lft (ft)		Vel Total (ft/s)	1.77	1.93
Weir Sta Rgt (ft)		Flow Area (sq ft)	11867.16	10890.41
Weir Submerg		Froude # Chl	0.09	0.02
Weir Max Depth (ft)		Specif Force (cu ft)	106177	82099.65
Min El Weir Flow (ft)	59.08	Hydr Depth (ft)	12.96	12.26
Min El Prs (ft)	53.62	W.P. Total (ft)	1165.45	1112.7
Delta EG (ft)	0.07	Conv. Total (cfs)	1732078	898570.9
Delta WS (ft)	0.02	Top Width (ft)	915.42	915.62
BR Open Area (sq ft)	11240.39	Frctn Loss (ft)	0.01	0.04
BR Open Vel (ft/s)	1.93	C & E Loss (ft)	0.02	0
BR Sluice Coef		Shear Total (lb/sq ft)	0.09	0.33
BR Sel Method	Energy only	Power Total (lb/ft s)	0.17	0.64

HEC-RAS PROPOSED BRIDGE OUTPUT



HEC-RAS PROFILE OUTPUT



HEC-RAS CROSS-SECTION OUTPUT

100% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

JANUARY 11, 2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
HYDRAULIC DATA SHEETS

SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		80

SCALE: 1" = 40'

ALL ABUTMENTS AND BENTS ARE ALONG A BEARING OF N 61°20'42"E

MBGF (TYP) (SEE RDWY PLANS FOR DETAILS)
BEGIN BRIDGE
FACE OF ABUT 1 BKWL
STA 113+10.00
EL= 60.53'
PROP FM2556 ℄ & PGL
APPRCH SLAB & CSAB (OPT 2)
TEST HOLE B-06
℄ FM2556
STA 112+21.74
2.41' RT
LIMITS OF RIPRAP (PROTECTION STONE) (18") (TYP) THICKNESS = 24"
3:1 MAX
20'-0" BAS-A
℄ GIRDER # 1 (TYP)
℄ GIRDER # 6 (TYP)
SEJ (M)-4"
℄ BENT 2
STA 114+00.00
℄ BENT 3
STA 114+90.00
℄ BENT 4
STA 115+80.00
113+00
114+00
115+00
116+00
SPAN 01
SPAN 02
SPAN 03
SPAN 04
120'-0" ~ 144'-0" ROW VARIES
60'-0" ~ 83'-0" ROW VARIES
60'-0" ~ 81'-0" ROW VARIES
46'-0" OVERALL BRIDGE WIDTH
44'-0" ROADWAY WIDTH
23'-0"
12'-0" LANE
1'-0" RAIL
10'-0" SHLD
EXIST ROW
PROP ROW
TEST HOLE B-05
℄ FM2556
STA 115+11.72
40.89' LT
NOM FACE OF T223 RAIL
CONST JT OR CONTROL JT
90°0'0" (TYP)
S28°39'18"E
2.00%
MATCH LINE STA 116+20

℄ DENOTES CORE BORING LOCATIONS. STATIONS SHOWN TO ℄ FM2556.

PLAN

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 60 MPH
ADT(2016): 1,952
ADT(2036): 2,730
EXIST NBI NO: 21-031-0-2529-02-001
PROPOSED NBI NO: 21-031-0-2529-02-187

THERMAL INTEGRITY PROFILER (TIP) TESTING OF DRILLED SHAFTS IS REQUIRED. EQUIPMENT FOR PROBE OR WIRE IS REQUIRED WITHIN ALL SHAFTS TO BE USED FOR A MIN OF 1 RANDOMLY SELECTED SHAFT TIP TESTING AT EACH ABUT/BENT THROUGHOUT THE BRIDGE. TIP TESTING SHALL BE IN ACCORDANCE WITH TXDOT SPECIAL SPECIFICATION SS4021. ONLY AFTER ACCEPTANCE OF SHAFTS, PROBE ACCESS TUBES, WHERE USED, SHALL BE FULLY GROUTED BOTTOM TO TOP USING TREMIE.

HYDRAULIC DATA TABLE

EXIST HW_{USIBWC} = 53.19'
EXIST Q_{USIBWC} = 21,000 cfs
EXIST V_{USIBWC} = 2.05 fps

PROP HW_{USIBWC} = 53.21'
PROP Q_{USIBWC} = 21,000 cfs
PROP V_{USIBWC} = 1.93 fps

HYDRAULIC NOTE:

"USIBWC" FLOWS FROM 1970 AGREEMENT BETWEEN THE US AND MEXICO KNOWN AS "MINUTE NUMBER 238".

CONTRACTOR IS CAUTIONED THAT THE GROUNDWATER ENCOUNTERED DURING SOIL EXPLORATIONS WILL VARY DEPENDING ON CLIMATIC CONDITIONS. VARYING GROUNDWATER LEVELS DURING CONSTRUCTION WILL NOT BE A BASIS FOR A CLAIM OF CHANGED SITE CONDITIONS.

THE CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING GRANULAR SOILS SHOWN IN BORING LOGS. THE USE OF TEMPORARY CASING AND/OR DRILLING SLURRY METHODS WILL BE NECESSARY TO INSTALL THE DRILLED SHAFT TO THE REQUIRED PENETRATION. IF USED, TEMPORARY CASING SHALL BE REMOVED. CASING SHALL BE SUBSIDIARY TO ITEM 416 DRILLED SHAFT FOUNDATION.

DRILLED SHAFT CONCRETE SHALL BE SULFATE RESISTANT. SEE FD(MOD) SHEET FOR DRILLED SHAFT MATERIAL NOTE.

GENERAL NOTES:

1. SEE ROADWAY PLANS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL AND RIGHT OF WAY.
2. SEE ROADWAY PLANS FOR IDENTIFICATION OF EXISTING UTILITIES.
3. CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDERING MATERIALS AND NOTIFY ENGINEERS IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
4. SEE FM2556 BORE LOG SHEETS FOR BORE LOG INFORMATION.
5. SEE BRIDGE TYPICAL SECTION SHEET FOR ADDITIONAL INFORMATION.
6. SAW CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.
7. ALL DIMENSIONS AND ELEVATIONS SHALL BE FIELD VERIFIED PRIOR TO ORDERING MATERIALS OR PERFORMING ANY CONSTRUCTION WORK.
8. SEE DRAINAGE PLANS FOR DRAINAGE DESIGN INFORMATION AND DETAILS.
9. SEE CSAB AND BAS-A STANDARD FOR CEMENT STABILIZED ABUTMENT BACKFILL AND BRIDGE APPROACH SLAB DETAILS.
10. BRIDGE CLOSED DURING CONSTRUCTION. SEE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAILS.
11. CONCRETE FOR DRILLED SHAFTS SHALL BE PLACED IMMEDIATELY AFTER COMPLETED FOUNDATION EXCAVATION. UNDER NO CIRCUMSTANCES, COMPLETED FOUNDATION EXCAVATION REMAINS OPEN OVERNIGHT.

DESIGN NOTES:

1. BRIDGE DESIGNED FOR HL-93 LOADING PER AASHTO BRIDGE DESIGN SPECIFICATIONS (2017), 8TH EDITION.
2. D DENOTES BENTS WITH DOWEL BARS FOR EXTERIOR BEAMS WITH SLOTTED HOLES.
3. "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATION OF ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.

END OF BRIDGE RAIL FOR PAYMENT
15.00' WINGWALL
OVERALL LENGTH OF T223 RAIL = 980.00' (LT & RT)
OVERALL LENGTH OF BRIDGE = 950.00' (ALONG ℄ FM2556)
270.00' PRESTR CONC GIRDER UNIT 1 (90.00'-90.00'-90.00') (TYPE TX40 PCG)
180.00' PRESTR CONC GIRDER UNIT 2 (90.00'-90.00') (TYPE TX40 PCG)
BEGIN BRIDGE
FACE OF ABUT 1 BKWL
STA 113+10.00
EL = 60.53'
MBGF (TYP) (SEE RDWY PLANS FOR DETAILS)
VPT STA 113+10.00
EL = 60.53'
APPRCH SLAB (TYP)
CSAB (OPT 2)
3:1 MAX
1.00 %
TYPE T223 RAIL
PGL
0.00%
PROP HW (USIBWC) = 53.21'
HW (USIBWC) = 53.19'
PROP GROUND AT ℄ FM 2556
EXIST GROUND AT ℄ FM 2556
RIPRAP (PROTECTION STONE) (18") THICKNESS = 24" (TYP)
2-18" DIA DS X 30'
5-36" DIA DS X 43'
5-42" DIA DS X 58'
5-42" DIA DS X 57'
5-42" DIA DS X 55'
"H" = 7'
"H" = 8'
"H" = 12'
172.50'
PROP GROUND (1% SLOPE)
MATCH LINE STA 116+20

VERT CURVE DATA

CURVE FM2556-3
(+) 1.70% 0.00%
VPI STA 111+30.00
EL = 60.53'
EX = -0.77
K = 211.80'
L = 360.00'

ELEVATION

EXISTING STREAM BANK TO BE REMOVED

HL 93 LOADING

ZACHARY J. BEIL 139718 LICENSED PROFESSIONAL ENGINEER
Zachary J Beil 06-05-2024

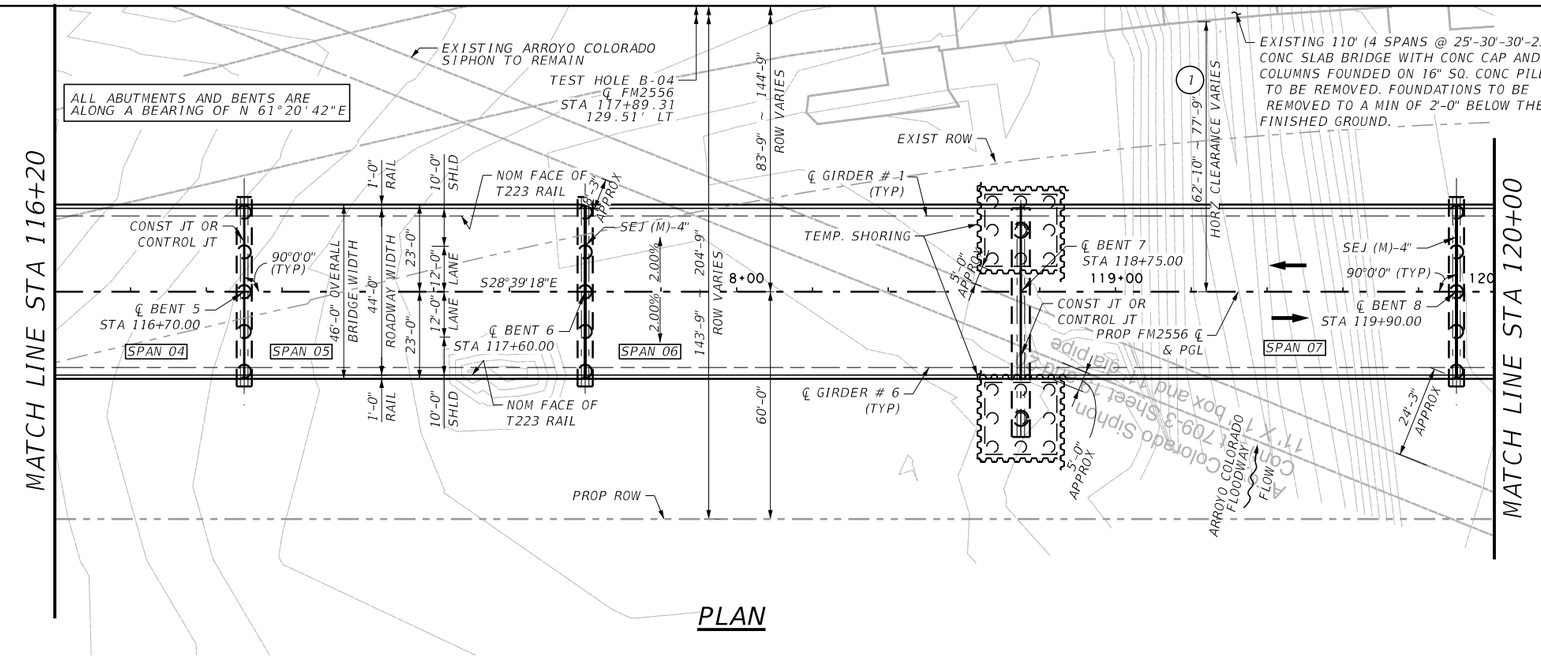
BRIDGEFARMER & ASSOCIATES, INC. CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
BRIDGE LAYOUT
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 1 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		81



PLAN

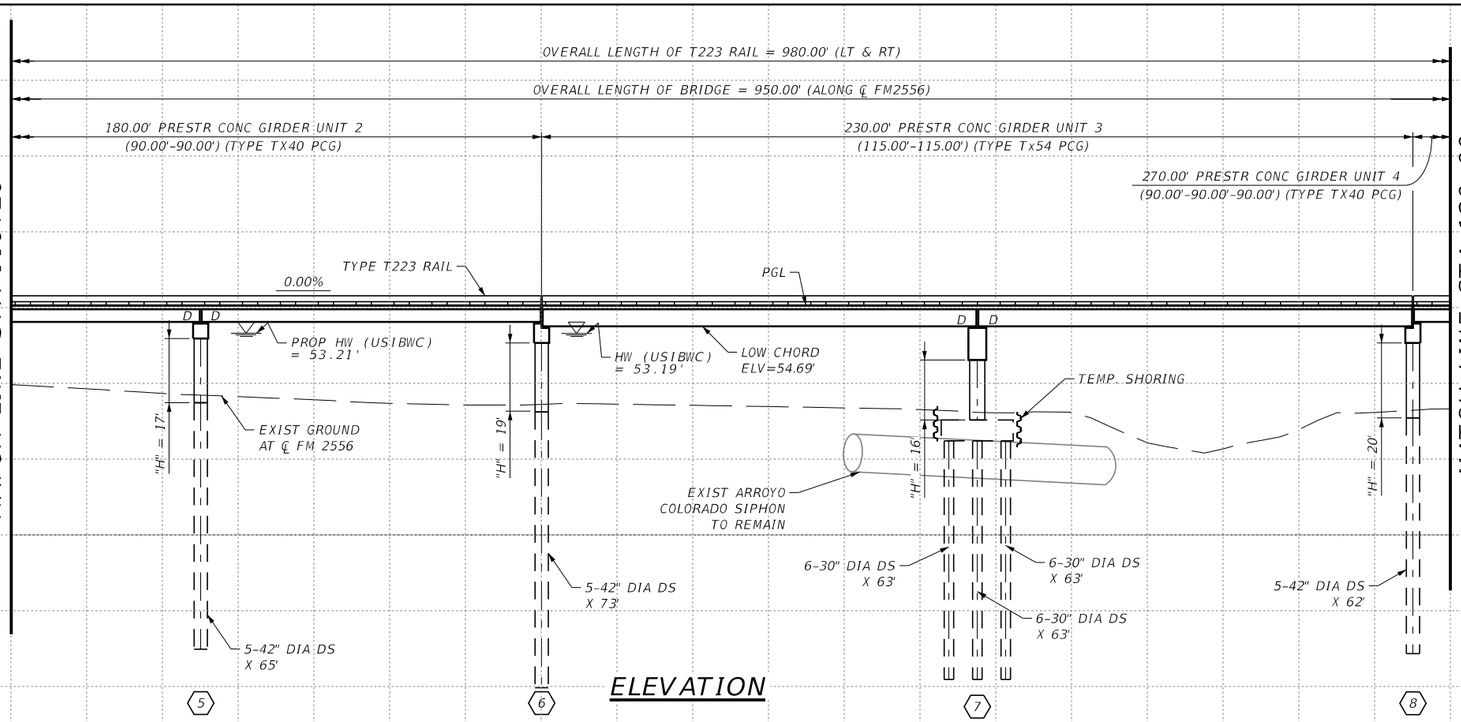
DENOTES CORE BORING LOCATIONS. STATIONS SHOWN TO ℄ FM2556.

20 0 20 40
SCALE: 1" = 40'

GENERAL NOTES:

1. FOR NOTES NOT SHOWN, SEE SHEET 1 OF 3

(1) HORIZONTAL DISTANCE TO THE EXISTING BRIDGE.



ELEVATION

HL 93 LOADING

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12,23,22

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

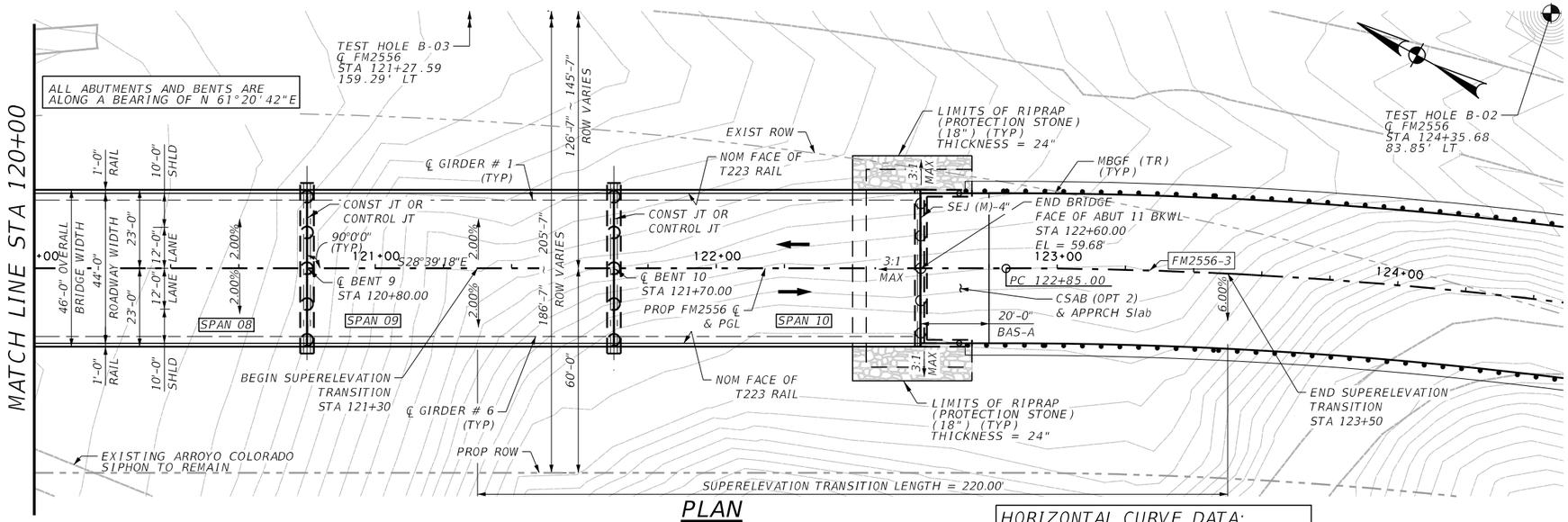
Texas Department of Transportation

FM 2556
BRIDGE LAYOUT
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 2 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		82

SCALE: 1" = 40'



PLAN

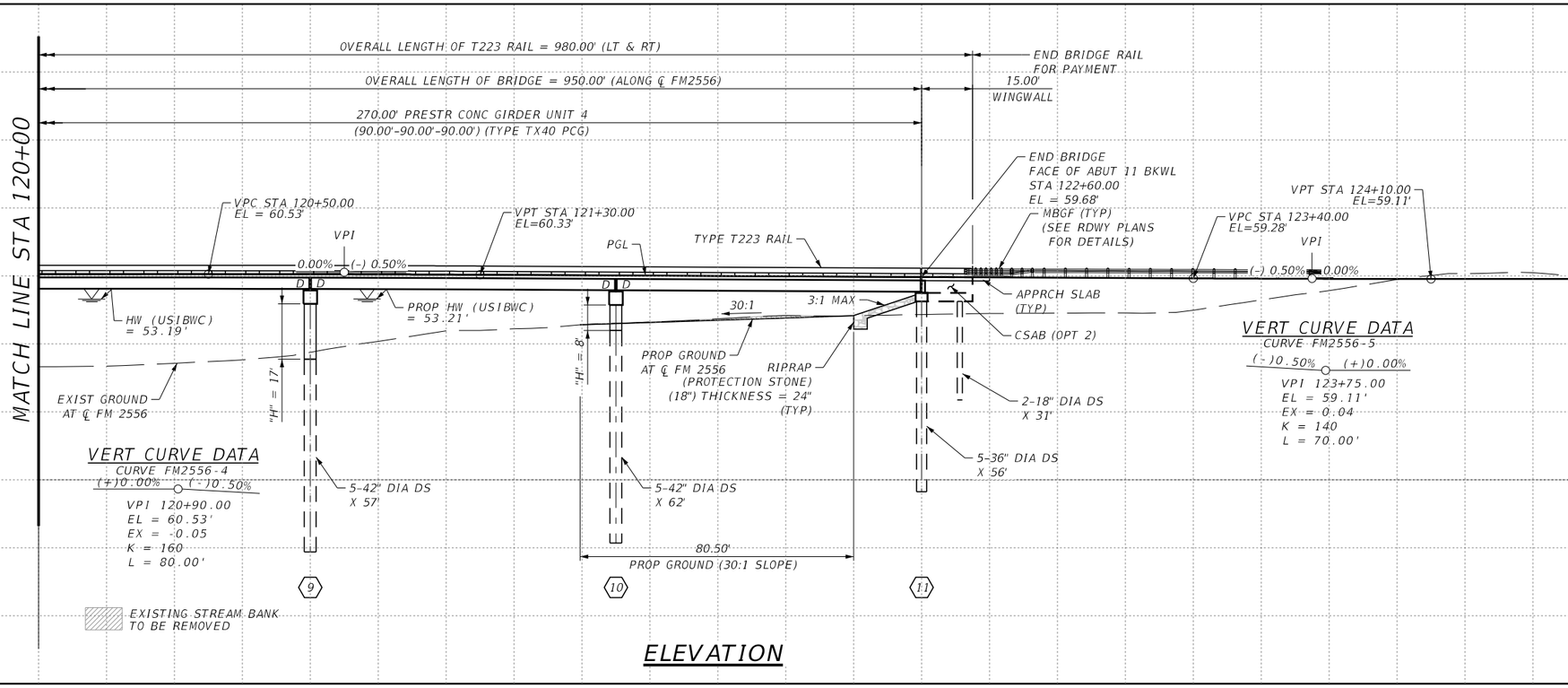
DENOTES CORE BORING LOCATIONS. STATIONS SHOWN TO ℄ FM2556.

GENERAL NOTES:

1. FOR NOTES NOT SHOWN, SEE SHEET 1 OF 3

HORIZONTAL CURVE DATA:

Curve FM2556-3			
P.I. Station			126+37.95
Delta	=		29° 43' 29.56" (RT)
Degree	=		4° 18' 28.63"
Tangent	=		352.9522
Length	=		690.0000
Radius	=		1,330.0000
P.C. Station			122+85.00
P.T. Station			129+75.00
P.C. BRG	=	S	28° 39' 17.69" E
P.T. BRG	=	S	1° 04' 11.87" W
Chord Bear	=	S	13° 47' 32.91" E



ELEVATION

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

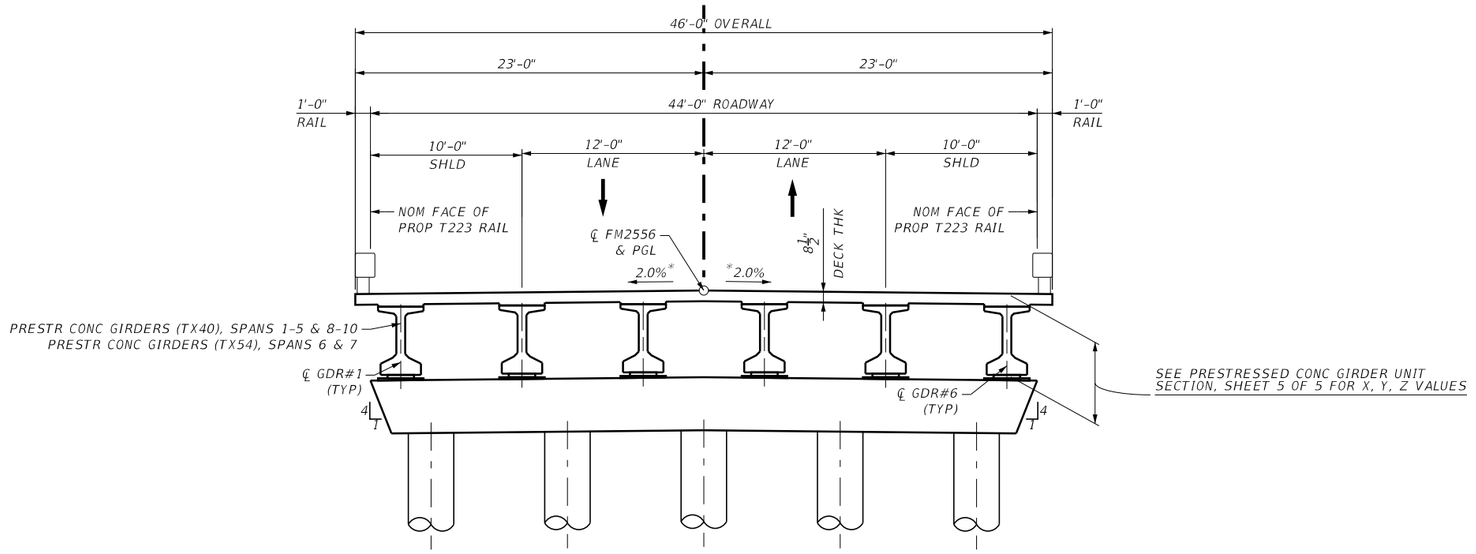
FM 2556
BRIDGE LAYOUT
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		83

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12/23/22

SCALE: 1" = 10'



TYPICAL SECTION

(SPANS 1-10)

*VARIES NEAR END OF BRIDGE, SEE BRIDGE LAYOUT PLAN FOR SUPERELEVATION LIMITS. THE METHOD OF TRANSITION IS TXDOT'S PREFERRED REVERS PARABOLIC (AASHTO METHOD 5).

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12,23,22

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

BRIDGE TYPICAL SECTION
FM 2556 OVER ARROYO
COLORADO FLOODWAY

SCALE: 1" = 10' SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		84

FM2556 BRIDGE QUANTITIES

BID CODES	0400-6005	0403-6001	0416-6001	0416-6003	0416-6004	0416-6005	0420-6013	0420-6029	0420-6037	0420-6194
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (18 IN)**	DRILL SHAFT (30 IN)**	DRILL SHAFT (36 IN)**	DRILL SHAFT (42 IN)**	CL C CONC (ABUT)*	CL C CONC (CAP)*	CL C CONC (COLUMN)	CL C CONC (CAP)(STRDL)*
	CY	SF	LF	LF	LF	LF	CY	CY	CY	CY
2 ~ ABUTMENTS	179		122		495		62.3			
9 ~ INTERIOR BENTS		1380		1134		2445		244.0	207.4	89.7
2 ~ 270.00' PRESTR CONC GIRDER UNIT										
1 ~ 180.00' PRESTR CONC GIRDER UNIT										
1 ~ 230.00' PRESTR CONC GIRDER UNIT										
TOTAL	179	1380	122	1134	495	2445	62.3	244.0	207.4	89.7

BID CODES	0420-6045	0422-6001	0422-6015	0425-6037	0425-6039	0432-6033	0450-6006	0454-6018	4021-6001
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CL C CONC (FOOTING)(MASS)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX40)	PRESTR CONC GIRDER (TX54)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	TIP TESTING (DRILL SHAFT)
	CY	SF	CY	LF	LF	CY	LF	LF	EA
2 ~ ABUTMENTS			70.6			301	60.0	90	
9 ~ INTERIOR BENTS	147.1							136	
2 ~ 270.00' PRESTR CONC GIRDER UNIT		24840		3222.00			1080.0		
1 ~ 180.00' PRESTR CONC GIRDER UNIT		8280		1074.00			360.0		
1 ~ 230.00' PRESTR CONC GIRDER UNIT		10580			1374.00		460.0		
TOTAL	147.1	43700	70.6	4296.00	1374.00	301	1960.0	226	11

*SHEAR KEY QUANTITY IS INCLUDED

**DRILLED SHAFT CONCRETE SHALL BE SULFATE RESISTANT. SEE COMMON FOUNDATION DETAILING FD(MOD) SHEET FOR MATERIAL NOTES.

BEARING SEAT ELEVATIONS

			GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
ABUT	1	(FWD)	55.601	55.761	55.921	55.921	55.761	55.601
BENT	2	(BK)	55.601	55.761	55.921	55.921	55.761	55.601
		(FWD)	55.601	55.761	55.921	55.921	55.761	55.601
BENT	3	(BK)	55.601	55.761	55.921	55.921	55.761	55.601
		(FWD)	55.601	55.761	55.921	55.921	55.761	55.601
BENT	4	(BK)	55.601	55.761	55.921	55.921	55.761	55.601
		(FWD)	55.601	55.761	55.921	55.921	55.761	55.601
BENT	5	(BK)	55.601	55.761	55.921	55.921	55.761	55.601
		(FWD)	55.601	55.761	55.921	55.921	55.761	55.601
BENT	6	(BK)	55.601	55.761	55.921	55.921	55.761	55.601
		(FWD)	54.455	54.615	54.775	54.775	54.615	54.455
BENT	7	(BK)	54.455	54.615	54.775	54.775	54.615	54.455
		(FWD)	54.455	54.615	54.775	54.775	54.615	54.455
BENT	8	(BK)	54.455	54.615	54.775	54.775	54.615	54.455
		(FWD)	55.612	55.772	55.932	55.932	55.772	55.612
BENT	9	(BK)	55.585	55.745	55.905	55.905	55.745	55.585
		(FWD)	55.550	55.710	55.870	55.870	55.710	55.550
BENT	10	(BK)	55.286	55.406	55.526	55.495	55.315	55.135
		(FWD)	55.224	55.340	55.455	55.422	55.240	55.057
ABUT	11	(BK)	55.725	55.464	55.203	54.888	54.517	54.147

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12.23.22

BRIDGEFARMER & ASSOCIATES, INC.
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TBPE REGISTRATION NO. 264

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FM 2556

BRIDGE QUANTITY & BEARING SEAT ELEVATIONS

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		85

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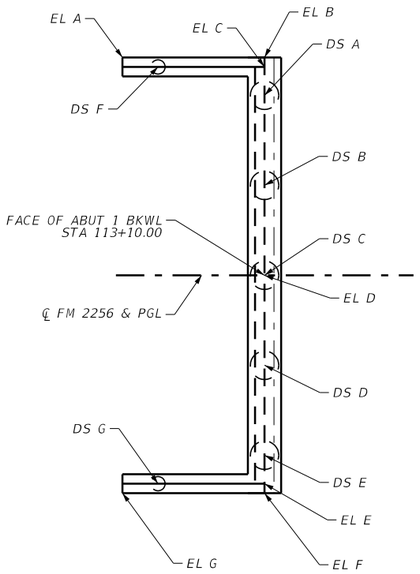
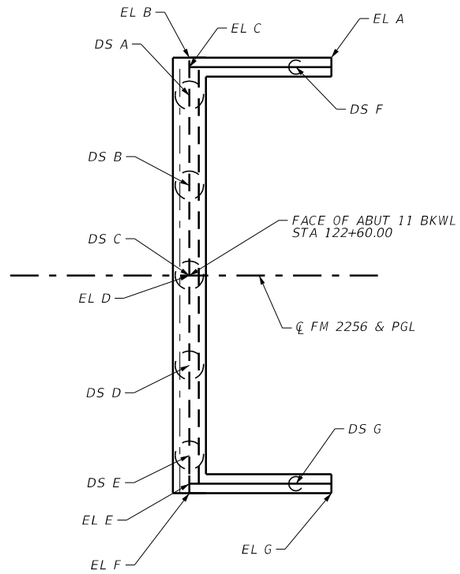


ABUT 1



ABUT 11

ABUTMENT CONTROL ELEVATIONS - KEY PLAN

NOT TO SCALE

NOTES:

SEE AIG-44(MOD) STANDARD SHEETS FOR DETAILS NOT SHOWN.

ABUT NO.	CONTROL ELEVATIONS															
	TOP OF WINGWALL						TOP OF BACKWALL			TOP OF DRILLED SHAFT						
	EL A	EL B	(1) EL C	(1) EL E	EL F	EL G	(2) EL C	EL D	(2) EL E	DS A	DS B	DS C	DS D	DS E	DS F	DS G
1	60.067	60.073	60.093	60.093	60.073	60.067	59.009	59.449	59.009	52.996	53.186	53.376	53.186	52.996	52.933	52.933
11	60.559	60.446	60.413	58.657	58.610	58.441	59.330	58.599	57.574	53.074	52.759	52.443	52.000	51.557	53.255	51.292

(1) ELEVATION AT TOP OF WINGWALL WHICH FLUSHES WITH THE ROADWAY SURFACE

(2) ELEVATION AT TOP OF BACKWALL WHICH IS 13" BELOW TOP OF THE APPROACH SLAB

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12/23/22

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

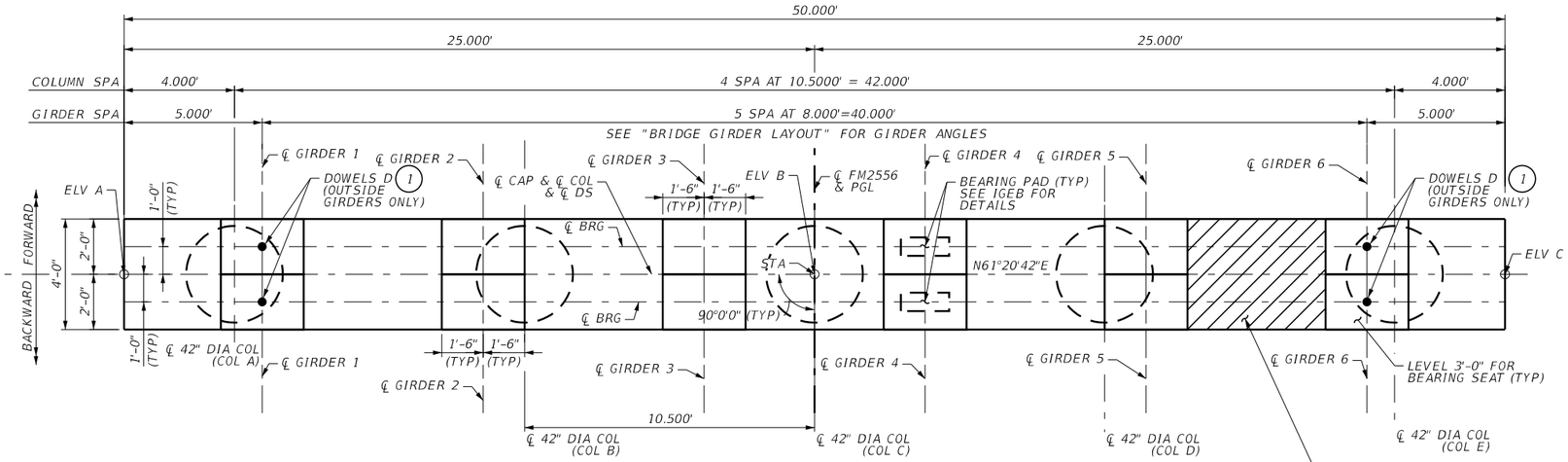
Texas Department of Transportation

FM 2556

BRIDGE ABUTMENT CONTROL ELEVATIONS

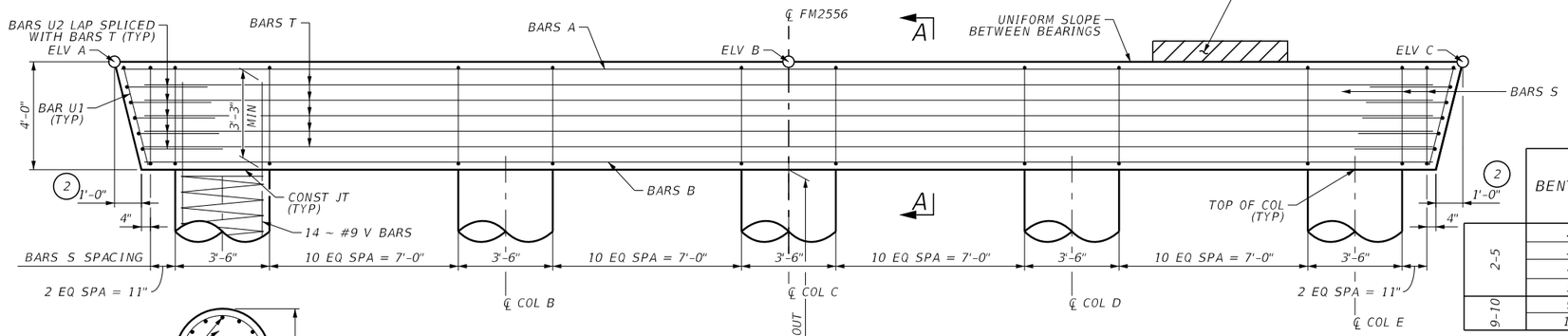
SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		86



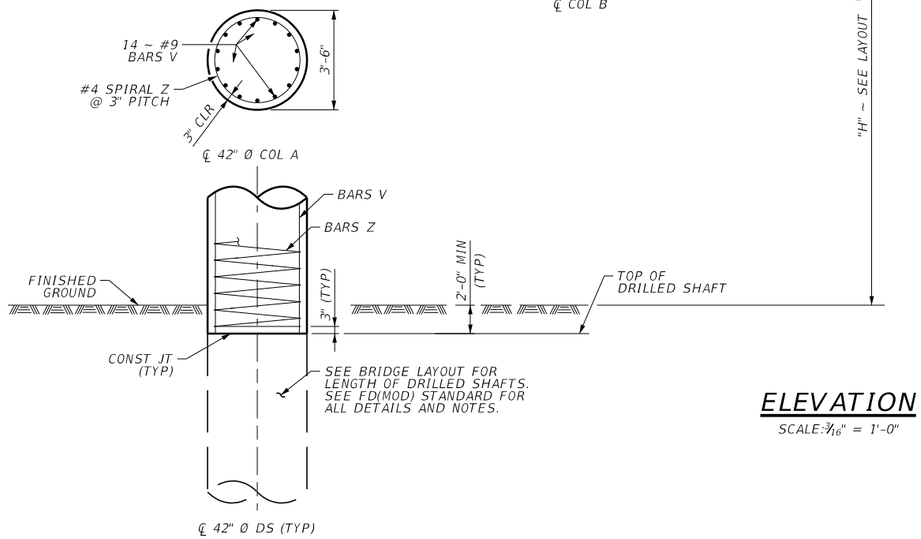
PLAN

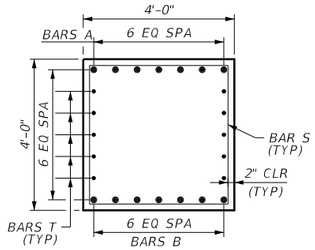
SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"





SECTION A-A

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION 8TH EDIT..
2. SEE SHEAR KEY (IGSK) STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFTS' LENGTH.
4. SEE COMMON FOUNDATION DETAILS FD(MOD) SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
5. SEE "BRIDGE QUANTITY & BEARING SEAT ELEVATIONS" SHEET FOR BEARING SEAT ELEVATIONS.
6. CALCULATED DRILLED SHAFT FOUNDATION LOADS:

   BENT 2 ~ 160 TON/DS
   BENT 3 ~ 160 TON/DS
   BENT 4 ~ 165 TON/DS
   BENT 5 ~ 170 TON/DS

   BENT 9 ~ 170 TON/DS
   BENT 10 ~ 160 TON/DS

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c=3,600 PSI).
2. ALL REINFORCING PROVIDED SHALL BE GRADE 60.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BARS.
5. GALVANIZE DOWEL BARS D.

(1) OMIT DOWELS D AT BENT 4. ADJUST REINFORCING STEEL TOTAL ACCORDINGLY.

(2) MEASURED PARALLEL TO TOP OF CAP CROSS-SLOPE.

BENT NO.	STATION	CONTROL ELEVATIONS							
		TOP OF CAP			TOP OF COLUMN				
		EL A	EL B	EL C	COL A	COL B	COL C	COL D	COL E
2-5	2	114+00.00	55.376	55.876	55.376	51.456	51.666	51.876	51.666	51.456
	3	114+90.00	55.376	55.876	55.376	51.456	51.666	51.876	51.666	51.456
	4	115+80.00	55.376	55.876	55.376	51.456	51.666	51.876	51.666	51.456
	5	116+70.00	55.376	55.876	55.376	51.456	51.666	51.876	51.666	51.456
9-10	9	120+80.00	55.325	55.825	55.325	51.405	51.615	51.825	51.615	51.405
	10	121+70.00	55.022	55.389	54.823	51.080	51.235	51.389	51.152	50.914

BENT NO.	DOWELS "D"
2	YES
3	YES
4	NO
5	YES
9	YES
10	YES

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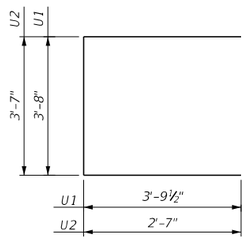
Texas Department of Transportation

FM 2556

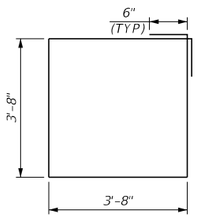
BRIDGE BENT DETAILS INTERIOR BENTS 2-5 & 9-10

SHEET 1 OF 2

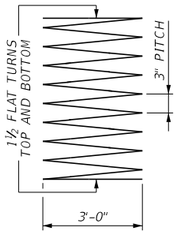
DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		87



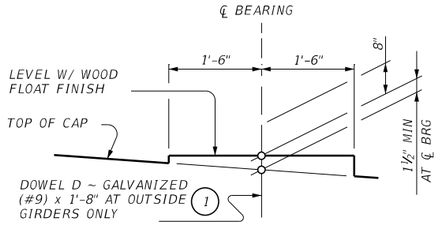
BAR U1 & U2



BAR S



BAR Z



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE SETTING BEARING PAD.)

TABLE OF COLUMN QUANTITIES PER BENT (4)

BENT	"H"	BARS V 70 ~ #9		BARS Z 5 ~ #4		✱REINF STEEL	CLASS "C" CONC
No.	HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	7'	10'-3"	2440	292'-6"	977	3417	12.5
3	8'	11'-3"	2678	330'-3"	1103	3781	14.3
4	12'	15'-3"	3630	481'-3"	1607	5237	21.4
5	17'	20'-3"	4820	670'-0"	2238	7058	30.3
9	17'	20'-3"	4820	670'-0"	2238	7058	30.3
10	8'	11'-3"	2678	330'-3"	1103	3781	14.3

NOTES:

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

(1) OMIT DOWELS D AT BENT 4. ADJUST REINFORCING STEEL TOTAL ACCORDINGLY.

(3) CAP CONCRETE VOLUME ADJUSTED FOR REQUIRED THICKER BEARING SEATS THAN MIN. OF 1½".

(4) FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS PER COLUMN:
ADJUST BAR V LENGTH BY 1'-0".
ADJUST BAR Z BY 37'-9".
ADJUST REINFORCING STEEL BY 73 Lb.
ADJUST COLUMN QUANTITIES BY 0.356 CY.

BAR SCHEDULE - ONE CAP

BAR	TYPE	NO.	SIZE	LENGTH	WEIGHT
A	ST	7	# 11	49'-6"	1,842
B	ST	7	# 11	47'-10"	1,778
(1) D	ST	4	# 9	1'-8"	23
S	BT	50	# 5	15'-8"	817
T	ST	10	# 5	47'-10"	499
U1	BT	2	# 5	11'-3"	23
U2	BT	10	# 5	8'-9"	91
✱ REINF STEEL				LB	5,073
CL C CONC(CAP)				CY	30.0

✱ FOR CONTRACTOR'S INFORMATION ONLY

TABLE OF ESTIMATED QUANTITIES

BENT No.	ITEM	UNIT	TOTAL	
2	DRILLED SHAFT (42")	LF	290	
	CL C CONC(CAP)	CY	30.0	
	CL C CONC(COL)	CY	12.5	
*	REINF STEEL	LB	8,490	
3	DRILLED SHAFT (42")	LF	285	
	CL C CONC(CAP)	CY	30.0	
	CL C CONC(COL)	CY	14.3	
*	REINF STEEL	LB	8,854	
4	DRILLED SHAFT (42")	LF	275	
	CL C CONC(CAP)	CY	30.0	
	CL C CONC(COL)	CY	21.4	
*	REINF STEEL	LB	10,310	
5	DRILLED SHAFT (42")	LF	325	
	CL C CONC(CAP)	CY	30.0	
	CL C CONC(COL)	CY	30.3	
*	REINF STEEL	LB	12,131	
9	DRILLED SHAFT (42")	LF	285	
	CL C CONC(CAP)	CY	30.0	(3)
	CL C CONC(COL)	CY	30.3	
*	REINF STEEL	LB	12,131	
10	DRILLED SHAFT (42")	LF	310	
	CL C CONC(CAP)	CY	30.1	(3)
	CL C CONC(COL)	CY	14.3	
*	REINF STEEL	LB	8,854	

* FOR CONTRACTOR'S INFORMATION ONLY

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12,23,22

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

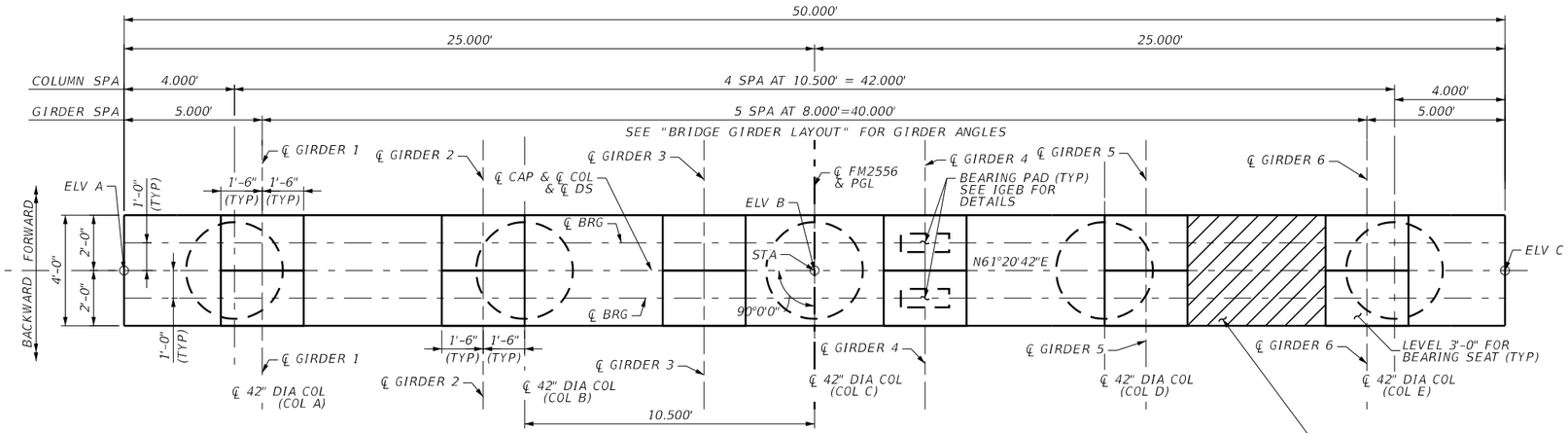
Texas Department of Transportation

FM 2556

BRIDGE BENT DETAILS INTERIOR BENTS 2-5 & 9-10

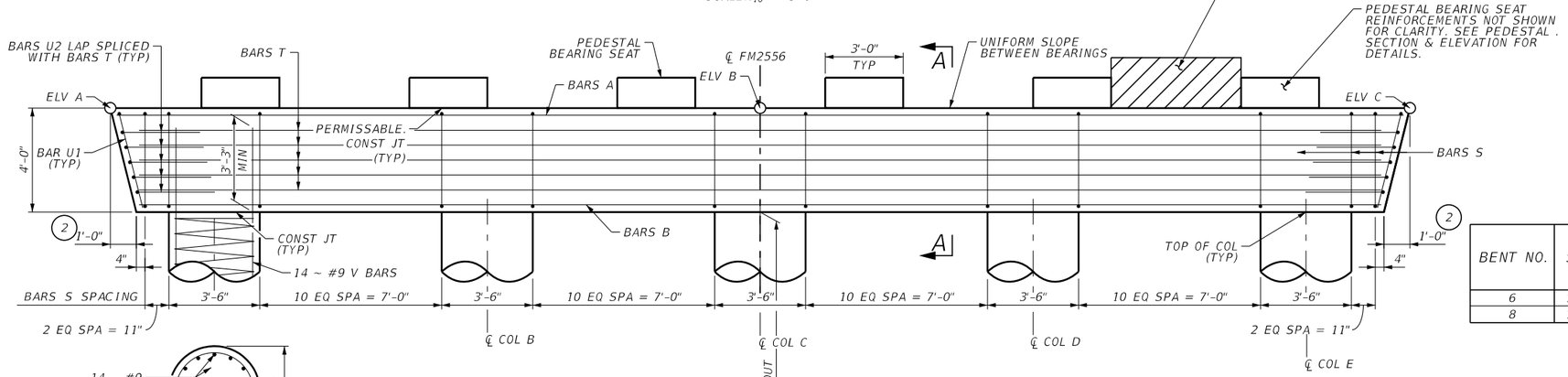
SHEET 2 OF 2

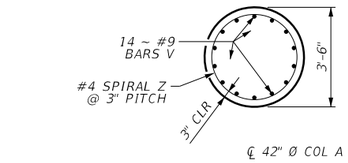
DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		88

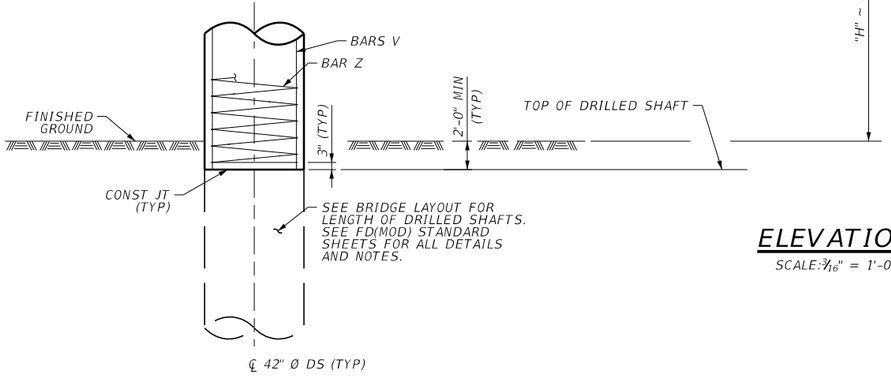


PLAN

SCALE: 3/16" = 1'-0"

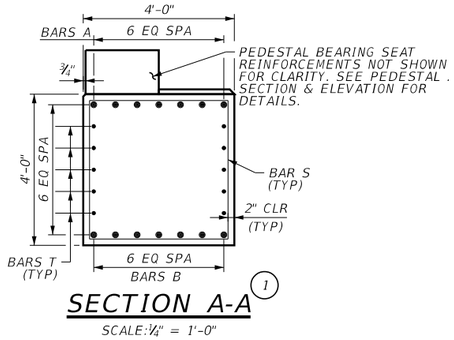






ELEVATION

SCALE: 3/16" = 1'-0"



SECTION A-A (1)

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION 2017, 8TH EDIT..
2. SEE SHEAR KEY (IGSK) STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFTS' LENGTH.
4. SEE COMMON FOUNDATION DETAILS FD(MOD) SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
5. SEE "BRIDGE QUANTITY & BEARING SEAT ELEVATIONS" SHEET FOR BEARING SEAT ELEVATIONS.
6. CALCULATED DRILLED SHAFT FOUNDATION LOADS:

   BENT 6 ~ 195 TON/DS
   BENT 8 ~ 195 TON/DS

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c=3,600 PSI).
2. ALL REINFORCING PROVIDED SHALL BE GRADE 60.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BARS.

(1) SECTION A-A SHOWS BENT 6 CROSS SECTION.FOR BENT 8, PEDESTAL IS ON OPPOSITE SIDE.

(2) MEASURED PARALLEL TO TOP OF CAP CROSS-SLOPE.

BENT NO.	STATION	CONTROL ELEVATIONS							
		TOP OF CAP			TOP OF COLUMN				
		EL A	EL B	EL C	COL A	COL B	COL C	COL D	COL E
6	117+60.00	54.230	54.730	54.230	50.310	50.520	50.730	50.520	50.310
8	119+90.00	54.230	54.730	54.230	50.310	50.520	50.730	50.520	50.310

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Texas Department of Transportation

FM 2556

BRIDGE BENT DETAILS INTERIOR BENTS 6 & 8

SHEET 1 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		89

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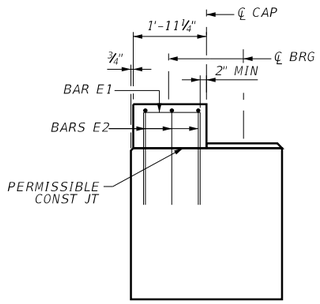
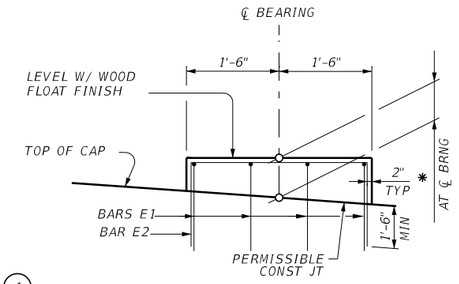


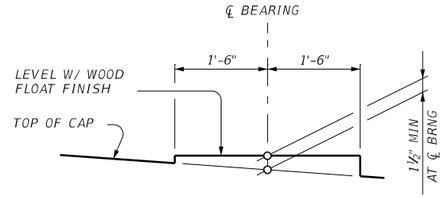
PEDESTAL SECTION (1)

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE SETTING BEARING PAD.)



PEDESTAL ELEVATION

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE SETTING BEARING PAD.)



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE SETTING BEARING PAD.)

TABLE OF COLUMN QUANTITIES PER BENT (3)

BENT	"H"	BARS V 70 ~ #9		BARS Z 5 ~ #4		REINF STEEL	CLASS "C" CONC
No.	HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
6	19'	22'-3"	5296	745'-6"	2490	7786	33.9
8	20'	23'-3"	5534	783'-3"	2616	8150	35.6

BAR SCHEDULE - ONE CAP

	BAR	TYPE	NO.	SIZE	LENGTH	WEIGHT
	A	ST	7	# 11	49'-6"	1,842
	B	ST	7	# 11	47'-10"	1,778
	E1	BT	24	# 5	7'-2"	179
	E2	BT	18	# 5	8'-4"	156
	S	BT	50	# 5	15'-8"	817
	T	ST	10	# 5	47'-10"	499
	U1	BT	2	# 5	11'-3"	23
	U2	BT	10	# 5	8'-9"	91
*	REINF STEEL				LB	5,385
	CL C CONC(CAP)				CY	32.0

* FOR CONTRACTOR'S INFORMATION ONLY

NOTES:

SEE SHEET 1 OF 2 FOR GENERAL NOTES.

(1) SECTION A-A SHOWS BENT 6 CROSS SECTION FOR BENT 8, PEDESTAL IS ON OPPOSITE SIDE.

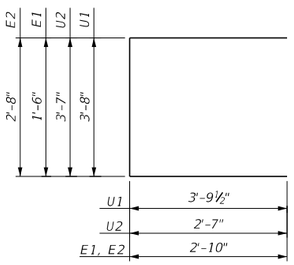
(3) FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS PER COLUMN:
ADJUST BAR V LENGTH BY 1'-0".
ADJUST BAR Z BY 37'-9".
ADJUST REINFORCING STEEL BY 73 Lb.
ADJUST COLUMN QUANTITIES BY 0.356 CY.

✱ PEDESTAL REINF. REQUIRED PER SECTION 420.4.9 WHEN HEIGHT EXCEEDS 3".

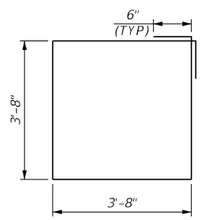
TABLE OF ESTIMATED QUANTITIES

BENT No.	ITEM	UNIT	TOTAL
6	DRILLED SHAFT (42")	LF	365
	CL C CONC(CAP)	CY	32.0
	CL C CONC(COL)	CY	33.9
*	REINF STEEL	LB	13,171
8	DRILLED SHAFT (42")	LF	310
	CL C CONC(CAP)	CY	32.0
	CL C CONC(COL)	CY	35.6
*	REINF STEEL	LB	13,535

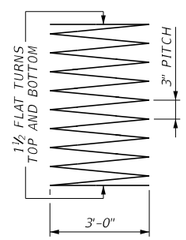
* FOR CONTRACTOR'S INFORMATION ONLY



BAR U1, U2, E1 & E2



BAR S



BAR Z

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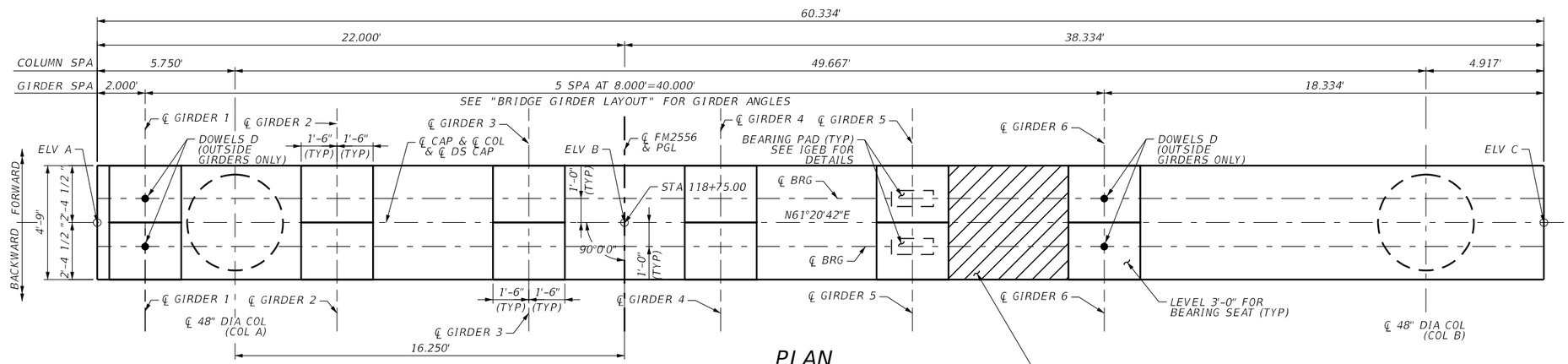
FM 2556

BRIDGE BENT DETAILS INTERIOR BENTS 6 & 8

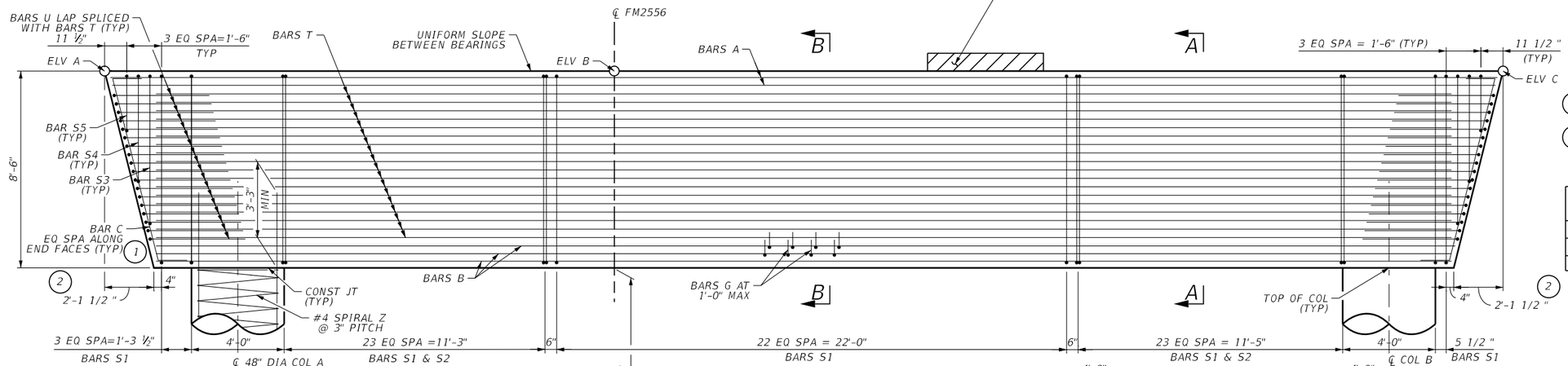
SHEET 2 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		90



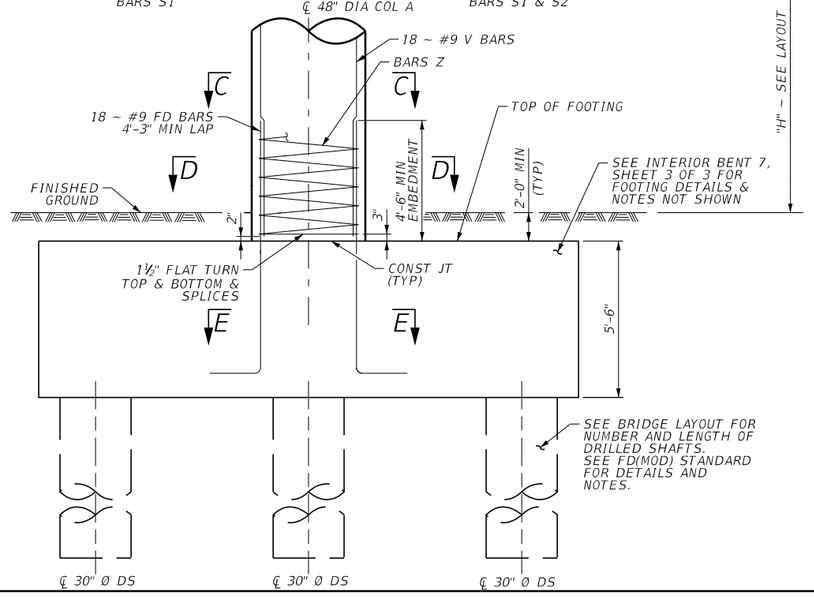
PLAN

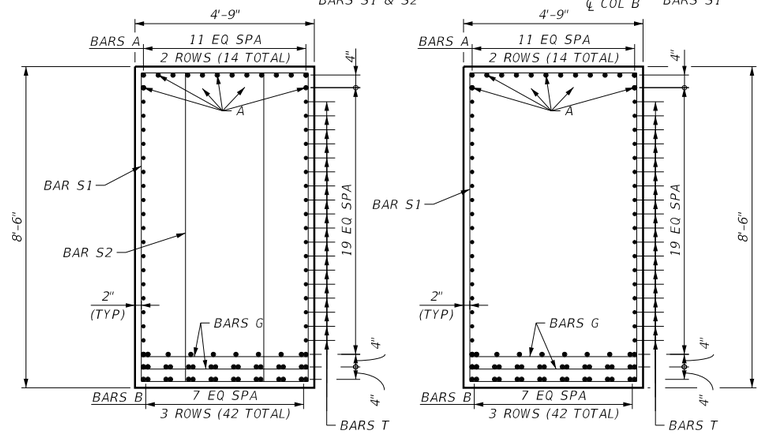
SCALE: 3/16" = 1'-0"



ELEVATION

SCALE: 3/16" = 1'-0"





SECTION A-A

SCALE: 1/4" = 1'-0"

SECTION B-B

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION 8" ED. (2017) WITH INTERIMS.
2. SEE SHEAR KEY (IGSK) STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.
3. SEE BRIDGE LAYOUT FOR DRILLED SHAFTLENGTHS
4. SEE "BRIDGE BENT DETAILS, INTERIOR BENT 7", SHEET 3 OF 3 FOR FOOTING DETAILS AND NOTES NOT SHOWN HEREIN.
5. INCLUDE COLUMN ANCHOR BARS INTO FOOTING UNIT PRICE BID ITEM.
6. SEE "BRIDGE QUANTITY & BEARING SEAT ELEVATIONS" SHEET FOR BEARING SEAT ELEVATIONS.
7. SEE FD(MOD) SHEET FOR FOUNDATION DETAILS AND NOTES.
8. CALCULATED DRILLED SHAFT FOUNDATION LOAD = 123 TONS/DS

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c=3,600 PSI).
2. ALL REINFORCING PROVIDED SHALL BE GRADE 60.
3. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
4. REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BARS.
5. GALVANIZE DOWEL BARS D.

(1) SEE BAR SCHEDULE FOR NUMBER OF BARS.

(2) MEASURED PARALLEL TO THE CAP CROSS-SLOPE.

CONTROL ELEVATIONS

TOP OF CAP			TOP OF COLUMN	
EL A	EL B	EL C	COL A	COL B
54.290	54.730	53.964	45.905	45.562

HL 93 LOADING

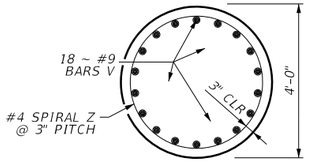
BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
BRIDGE BENT DETAILS INTERIOR BENT 7

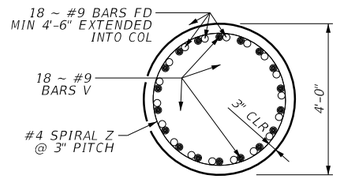
SHEET 1 OF 3

		CONT	SECT	JOB	HIGHWAY
DS: MRZ	CK: KM	2529	02	010	FM 2556
		DIST	COUNTY		SHEET NO.
DW: AM	CK: MRZ	PHARR	CAMERON		91



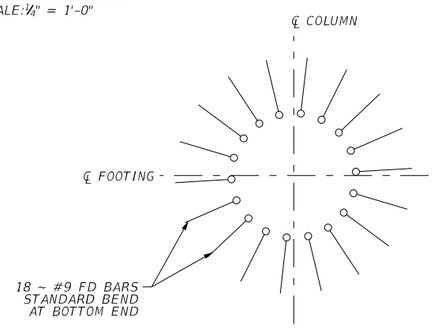
SECTION C-C

SCALE: ¼" = 1'-0"



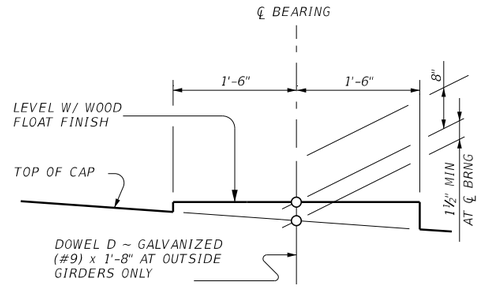
SECTION D-D

SCALE: ¼" = 1'-0"



SECTION E-E

SCALE: ¼" = 1'-0"



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE SETTING BEARING PAD.)

TABLE OF COLUMN QUANTITIES PER BENT (3)

BENT	"H"	BARS V 36 ~ #9		BARS Z 2 ~ #4		REINF STEEL	CLASS "C" CONC
No.	HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
7	16'	19'-3"	2356	737'-0"	985	3341	14.9

TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	BENT 7
DRILLED SHAFT (30")	LF	1,134
CL C CONC(CAP)	CY	88.1
CL C CONC(COL)	CY	14.9
REINF STEEL	LB	28,555

FOR CONTRACTOR'S INFORMATION ONLY

BAR SCHEDULE - ONE CAP

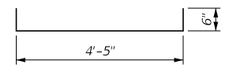
BAR	TYPE	NO.	SIZE	LENGTH	WEIGHT
A	ST	14	# 11	59'-10"	4,451
B	ST	42	# 11	55'-11"	12,470
C	BT	16	# 5	12'-0"	200
D	ST	4	# 9	1'-8"	23
G	BT	98	# 5	5'-5"	554
S1	BT	77	# 6	27'-2"	3,141
S2	BT	48	# 6	22'-6"	1,625
S3	BT	2	# 6	23'-8"	71
S4	BT	2	# 6	20'-1"	60
S5	BT	2	# 6	15'-8"	47
T	ST	36	# 5	55'-11"	2,098
U	BT	36	# 5	12'-8"	474
* REINF STEEL				LB	25,214
CL C CONC(CAP)				CY	89.7

* FOR CONTRACTOR'S INFORMATION ONLY

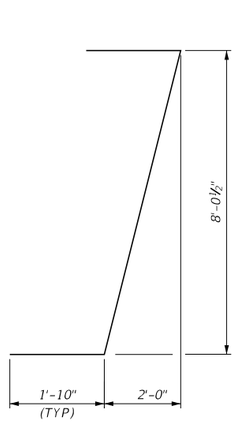
(3) FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS PER COLUMN:
ADJUST BAR V LENGTH BY 1'-0".
ADJUST BAR Z BY 44'-0".
ADJUST REINFORCING STEEL BY 91 Lb.
ADJUST COLUMN QUANTITIES BY 0.465 CY.

NOTES:

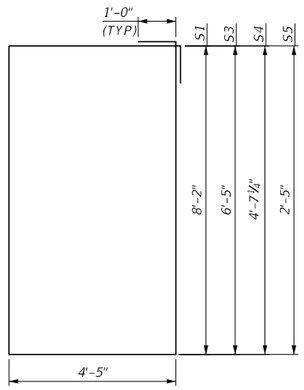
SEE SHEET 1 OF 2 FOR GENERAL NOTES.



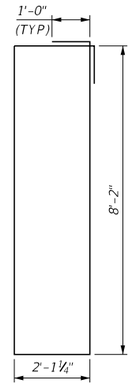
BARS G



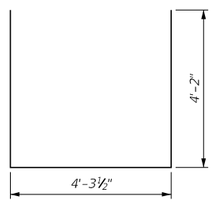
BAR C



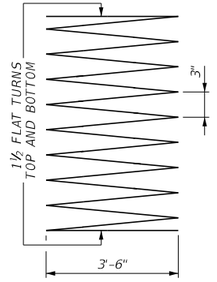
BARS S



BAR S2



BAR U



BAR Z

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TBPE REGISTRATION NO. 264

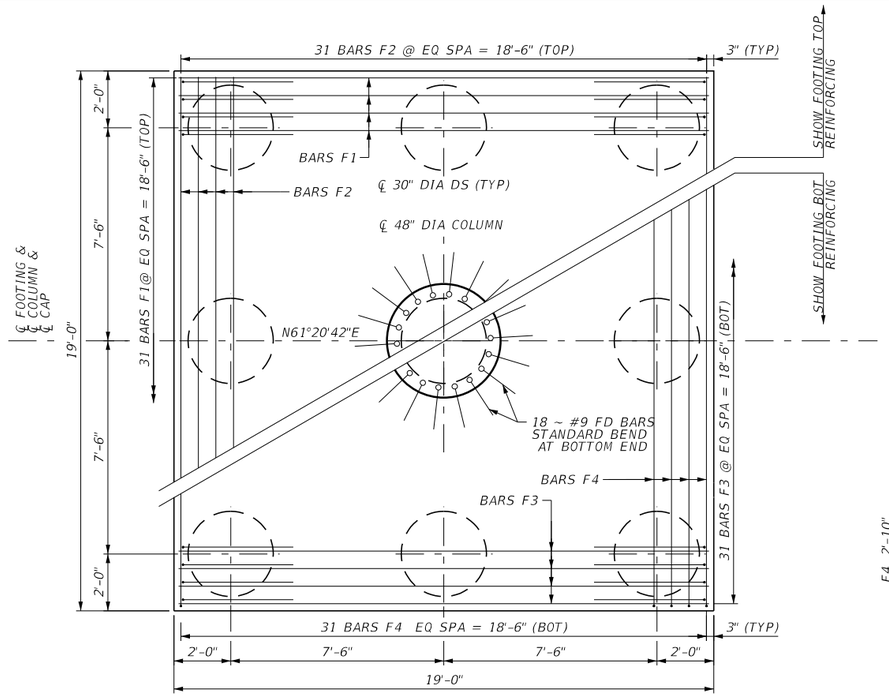
Texas Department of Transportation

FM 2556

BRIDGE BENT DETAILS
INTERIOR BENT 7

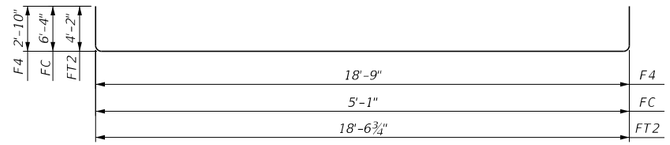
SHEET 2 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		92

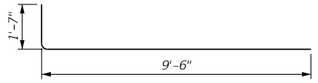


FOOTING PLAN

SCALE: 3/16" = 1'-0"



BARS F4, FC & FT2



BARS FD

BAR SCHEDULE - ONE FOOTING

BAR	TYPE	NO.	SIZE	LENGTH	WEIGHT
F1	ST	31	# 6	18'-8"	869
F2	ST	31	# 6	18'-8"	869
F3	ST	31	# 9	18'-8"	1,968
F4	BT	31	# 9	24'-5"	2,574
FC	BT	62	# 6	17'-9"	1,653
FD	BT	18	# 9	11'-1"	677
FT1	ST	10	# 6	18'-8"	280
FT2	BT	10	# 6	26'-11"	404
* REINF STEEL				LB	9,294
CL "C" CONC (FOOTING)(MASS)				CY	73.5

* FOR CONTRACTOR'S INFORMATION ONLY

GENERAL NOTES:

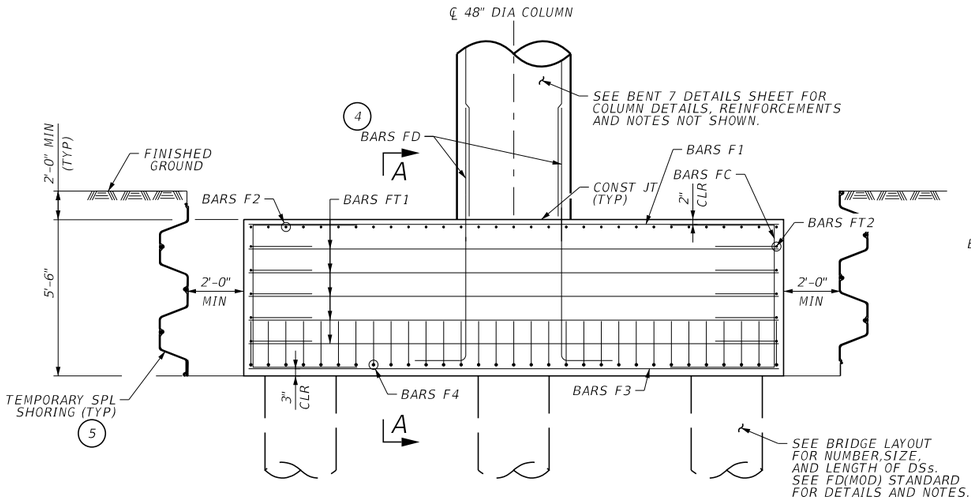
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION 8TH ED.
2. SEE BRIDGE LAYOUT FOR DRILLED SHAFTS' NUMBER, LENGTH, AND SIZE.
3. SEE FD(MOD) SHEET FOR FOUNDATION DETAILS AND NOTES.
4. INCLUDE DRILLED SHAFT- FOOTING CONNECTING BARS IN UNIT PRICE BID FOR DRILLED SHAFTS.
5. FOR DETAILS AND QUANTITIES NOT SHOWN HERE SEE BENT 7 DETAILS SHEETS.

MATERIAL NOTES:

1. PROVIDE SULFATE RESISTANT CLASS C CONCRETE (f'c=3,600 PSI).
2. ALL REINFORCING PROVIDED SHALL BE GRADE 60.
3. REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BARS.

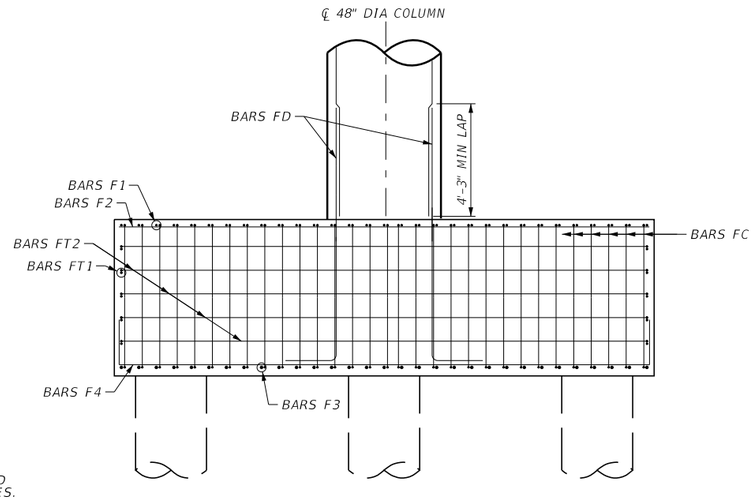
(4) BARS FD SHALL BE TIED TO THE TOP OF THE FOOTING BOTTOM REINFORCING MAT.

(5) FOR TEMPORARY SPL SHORING QUANTITY SEE QUANTITY SUMMARY SHEET.



ELEVATION

SCALE: 3/16" = 1'-0"



SECTION A-A

SCALE: 3/16" = 1'-0"

HL 93 LOADING

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12,23,22

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

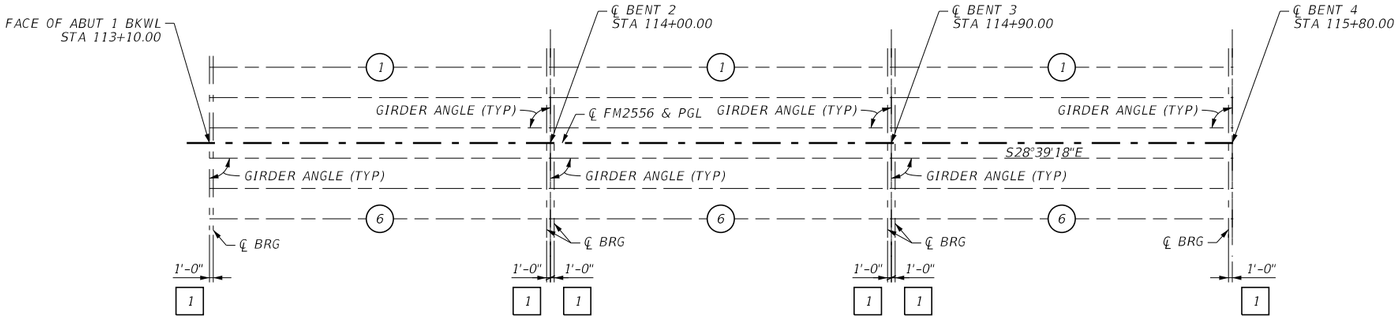
FM 2556

BRIDGE BENT DETAILS INTERIOR BENT 7

SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		93

20 0 20 40
SCALE: 1" = 40'

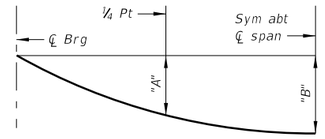


(#) DENOTES GIRDER NUMBER

[1] SEE IGEB STANDARD FOR OREINTATION OF DIMENSION.

[2] GIRDER LENGTH SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

* ALL BEAM LENGHTS ARE HORIZONTAL DISTANCES WITHOUT ANY ADJUSTMENT MADE FOR LONGITUDINAL SLOPE. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.



DEAD LOAD DEFLECTION DIAGRAM

DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE CONCRETE SLAB ONLY (Ec=5000 KSI). ADJUST VALUES AS REQUIRED IF OPTIONAL SLAB FORMING IS USED OR BASED ON FIELD OBSERVATIONS.

BENT REPORT

ABUT NO.1 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (ABUT BKWL)	GIRDER ANGLE D M S
SPAN 1	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.2 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 2	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.3 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 3	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.2 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 1	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.3 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 2	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.4 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 3	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

GIRDER REPORT

GIRDER REPORT, SPAN 1

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
TOTAL					537.00			

GIRDER REPORT, SPAN 2

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
TOTAL					537.00			

GIRDER REPORT, SPAN 3

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
TOTAL					537.00			

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12/23/22

HL 93 LOADING

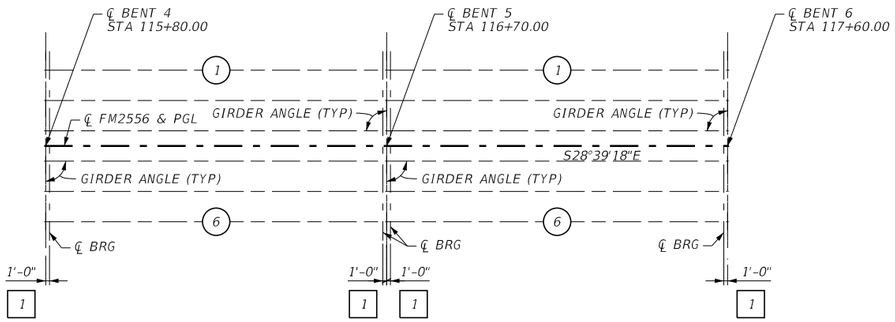
BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
BRIDGE GIRDER LAYOUT
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 1 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		94



SPAN 4
(TX40 GIRDERS)

SPAN 5
(TX40 GIRDERS)

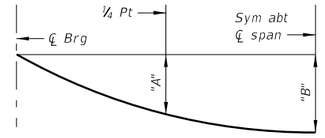
20 0 20 40
SCALE: 1" = 40'

(#) DENOTES GIRDER NUMBER

[1] SEE IGEB STANDARD FOR OREINTATION OF DIMENSION.

[2] GIRDER LENGTH SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

* ALL BEAM LENGHTS ARE HORIZONTAL DISTANCES WITHOUT ANY ADJUSTMENT MADE FOR LONGITUDINAL SLOPE. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.



DEAD LOAD DEFLECTION DIAGRAM

DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE CONCRETE SLAB ONLY (Ec=5000 KSI). ADJUST VALUES AS REQUIRED IF OPTIONAL SLAB FORMING IS USED OR BASED ON FIELD OBSERVATIONS.

BENT REPORT

BENT NO.4 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 4	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.5 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 5	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.5 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 4	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.6 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 5	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

GIRDER REPORT

GIRDER REPORT, SPAN 4

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
TOTAL					537.00			

GIRDER REPORT, SPAN 5

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	0.0000	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	0.0000	0.088	0.124
TOTAL					537.00			

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

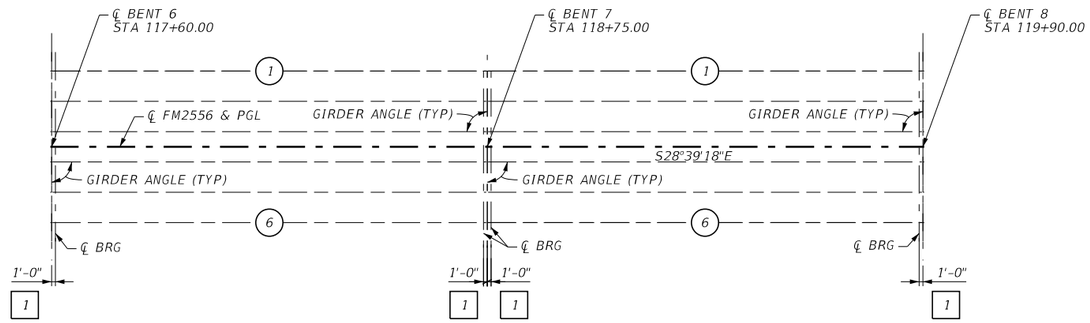
Texas Department of Transportation

FM 2556
BRIDGE GIRDER LAYOUT FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 2 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		95

20 0 20 40
SCALE: 1" = 40'



SPAN 6
(TX54 GIRDERS)

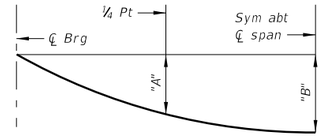
SPAN 7
(TX54 GIRDERS)

(#) DENOTES GIRDER NUMBER

[1] SEE IGEB STANDARD FOR OREINTATION OF DIMENSION.

[2] GIRDER LENGTH SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

* ALL BEAM LENGHTS ARE HORIZONTAL DISTANCES WITHOUT ANY ADJUSTMENT MADE FOR LONGITUDINAL SLOPE. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.



DEAD LOAD DEFLECTION DIAGRAM

DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE CONCRETE SLAB ONLY (Ec=5000 KSI). ADJUST VALUES AS REQUIRED IF OPTIONAL SLAB FORMING IS USED OR BASED ON FIELD OBSERVATIONS.

BENT REPORT

BENT NO.6 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 6	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.7 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 7	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.7 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 6	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.8 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 7	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

GIRDER REPORT

GIRDER REPORT, SPAN 6

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	115.000	114.50	113.000	114.50	0.0000	0.108	0.152
GIRDER	2	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	3	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	4	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	5	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	6	115.000	114.50	113.000	114.50	0.0000	0.108	0.152
TOTAL					687.00			

GIRDER REPORT, SPAN 7

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] TRUE LENGTH BOT.BM.FLG.	GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	115.000	114.50	113.000	114.50	0.0000	0.108	0.152
GIRDER	2	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	3	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	4	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	5	115.000	114.50	113.000	114.50	0.0000	0.123	0.173
GIRDER	6	115.000	114.50	113.000	114.50	0.0000	0.108	0.152
TOTAL					687.00			

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

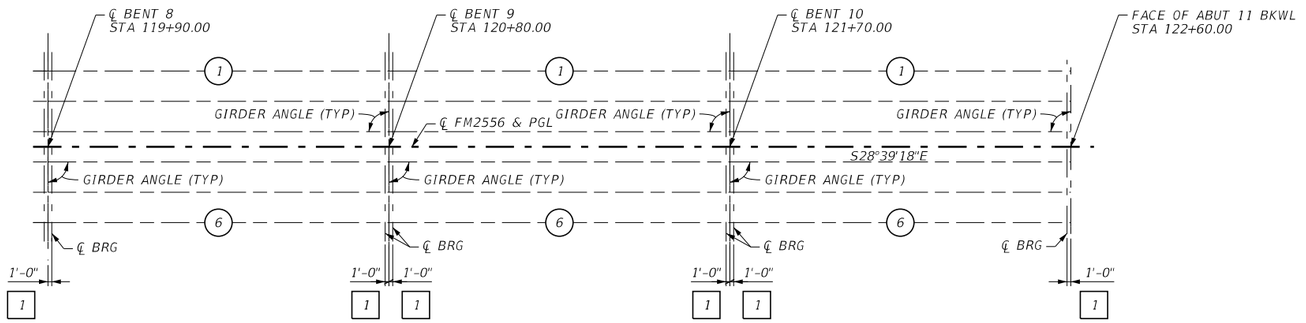
Texas Department of Transportation

FM 2556
BRIDGE GIRDER LAYOUT FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 3 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		96

20 0 20 40
SCALE: 1" = 40'

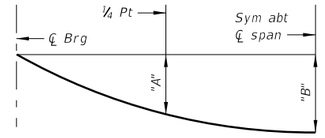


(#) DENOTES GIRDER NUMBER

[1] SEE IGEB STANDARD FOR OREINTATION OF DIMENSION.

[2] GIRDER LENGTH SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

* ALL BEAM LENGHTS ARE HORIZONTAL DISTANCES WITHOUT ANY ADJUSTMENT MADE FOR LONGITUDINAL SLOPE. ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE NOTED.



DEAD LOAD DEFLECTION DIAGRAM

DEFLECTIONS SHOWN ARE DUE TO PRESTRESSED CONCRETE PANELS AND CAST-IN-PLACE CONCRETE SLAB ONLY (Ec=5000 KSI). ADJUST VALUES AS REQUIRED IF OPTIONAL SLAB FORMING IS USED OR BASED ON FIELD OBSERVATIONS.

BENT REPORT

BENT NO.8 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 8	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.9 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 9	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.10 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 10	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.9 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 8	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

BENT NO.10 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (C.L. BENT)	GIRDER ANGLE D M S
SPAN 9	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

ABUT NO.11 (N 61 20 42 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1 20.000 L

			GIRDER SPAC. (ABUT BKWL)	GIRDER ANGLE D M S
SPAN 10	GIRDER	1	0.000	90 00 00
	GIRDER	2	8.000	90 00 00
	GIRDER	3	8.000	90 00 00
	GIRDER	4	8.000	90 00 00
	GIRDER	5	8.000	90 00 00
	GIRDER	6	8.000	90 00 00
	TOTAL		40.000	

GIRDER REPORT

GIRDER REPORT, SPAN 8

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] BOT.BM.FLG.	TRUE LENGTH GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	-0.0003	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	-0.0003	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	-0.0003	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	-0.0003	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	-0.0003	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	-0.0003	0.088	0.124
TOTAL					537.00			

GIRDER REPORT, SPAN 9

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] BOT.BM.FLG.	TRUE LENGTH GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	-0.0030	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	-0.0035	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	-0.0039	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	-0.0043	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	-0.0045	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	-0.0047	0.088	0.124
TOTAL					537.00			

GIRDER REPORT, SPAN 10

		HORIZONTAL DISTANCE * C-C BENT	E-E BM.	C-C BRG.	[2] BOT.BM.FLG.	TRUE LENGTH GIRDER SLOPE	DEFLECTIONS A	B
GIRDER	1	90.000	89.50	88.000	89.50	0.0057	0.088	0.124
GIRDER	2	90.000	89.50	88.000	89.50	0.0014	0.101	0.142
GIRDER	3	90.000	89.50	88.000	89.50	-0.0029	0.101	0.142
GIRDER	4	90.000	89.50	88.000	89.50	-0.0061	0.101	0.142
GIRDER	5	90.000	89.50	88.000	89.50	-0.0082	0.101	0.142
GIRDER	6	90.000	89.50	88.000	89.50	-0.0103	0.088	0.124
TOTAL					537.01			

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

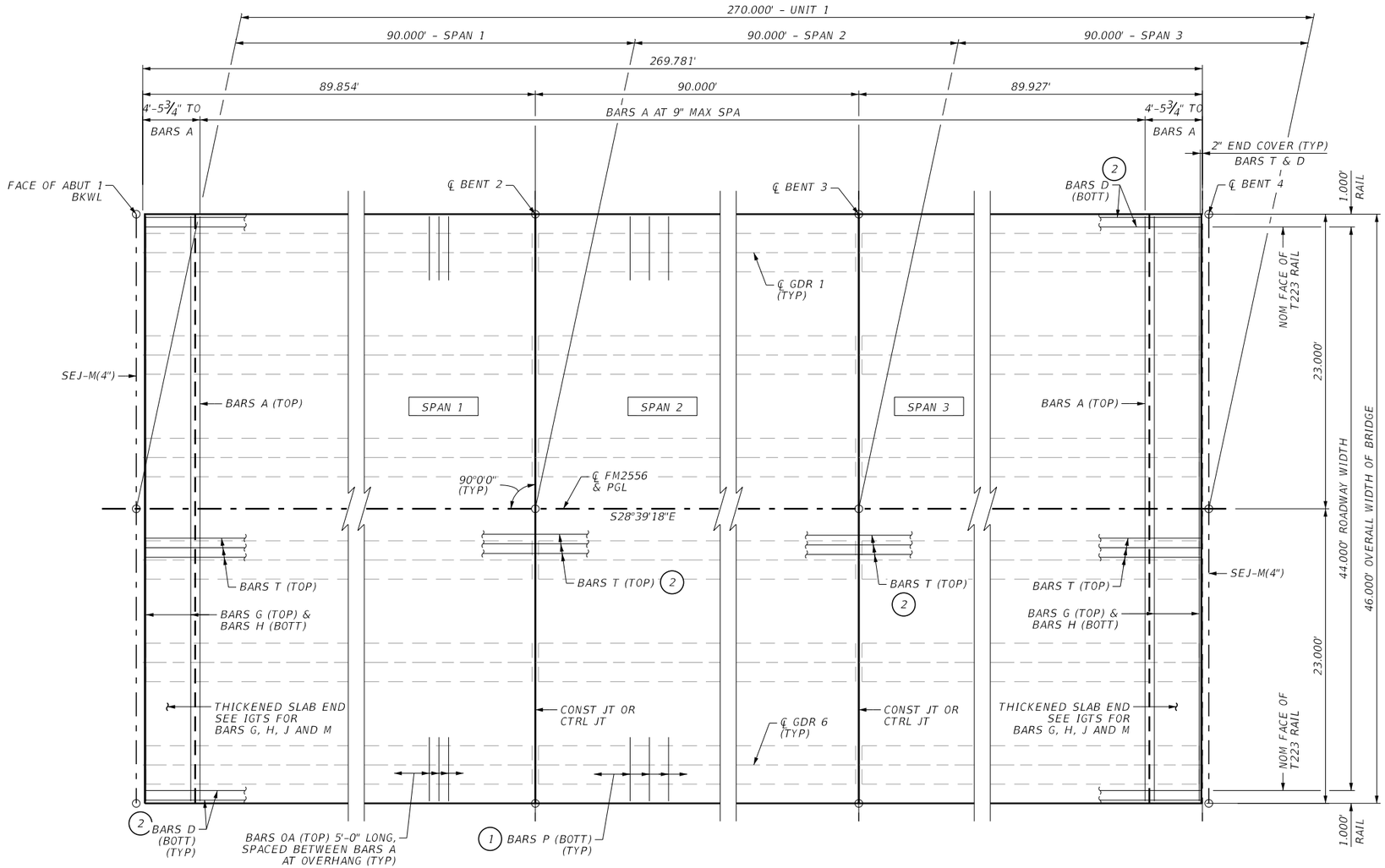
Texas Department of Transportation

FM 2556
BRIDGE GIRDER LAYOUT
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 4 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		97

SCALE: 1" = 10'



PLAN

1. SEE PCP STANDARD SHEETS FOR DETAILS NOT SHOWN.
2. BARS T & D MUST BE CONTINUOUS THROUGH THE CONST. OR CTRL JOINTS.

HL 93 LOADING

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATION (2017), 8TH EDITION.

PROVIDE CLASS S CONCRETE, f'c = 4 KSI.

FOR GIRDER, BEARING PAD, MISC. SLAB, CONTINUOUS SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD & IGSD-44, IGEB, IGMS, IGCS, AND IGTS, RESPECTIVELY.

FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M.

FOR SEALED EXPANSION JOINT QUANTITIES NOT SHOWN, SEE BRIDGE QUANTITY & BEARING SEAT ELEVATIONS SHEET.

PLACE AND FINISH NOT LESS THAN 30 FEET OF BRIDGE DECK CONCRETE PER HOUR.

FOR RAIL AND THE ANCHORAGE IN SLAB DETAILS NOT SHOWN, SEE TRAFFIC RAIL TYPE T223.

FOR FRAMING DETAILS NOT SHOWN, SEE BRIDGE GIRDER LAYOUT SHEETS.

FOR SLAB DETAILS AND QUANTITIES NOT SHOWN SEE PRESTRESSED CONC GIRDER UNIT SECTION SHEET.

PROVIDE UNCOATED, GRADE 60 REINFORCING.

WHERE REQUIRED, PROVIDE BAR LAPS AS FOLLOWS:
UNCOATED #4 = 1'-7"

SEE PCP(O) AND PCP(O)FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

SEE PCP AND PCP-FAB OR PMDF STANDARDS FOR DETAILS AND QUANTITY ADJUSTMENTS IF EITHER OF THESE OPTIONS ARE USED.

SEE BRIDGE LAYOUT FOR SURFACE TEXTURE REQUIREMENTS.

LAPS IN BARS SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P OR T UNLESS OTHERWISE NOTED

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

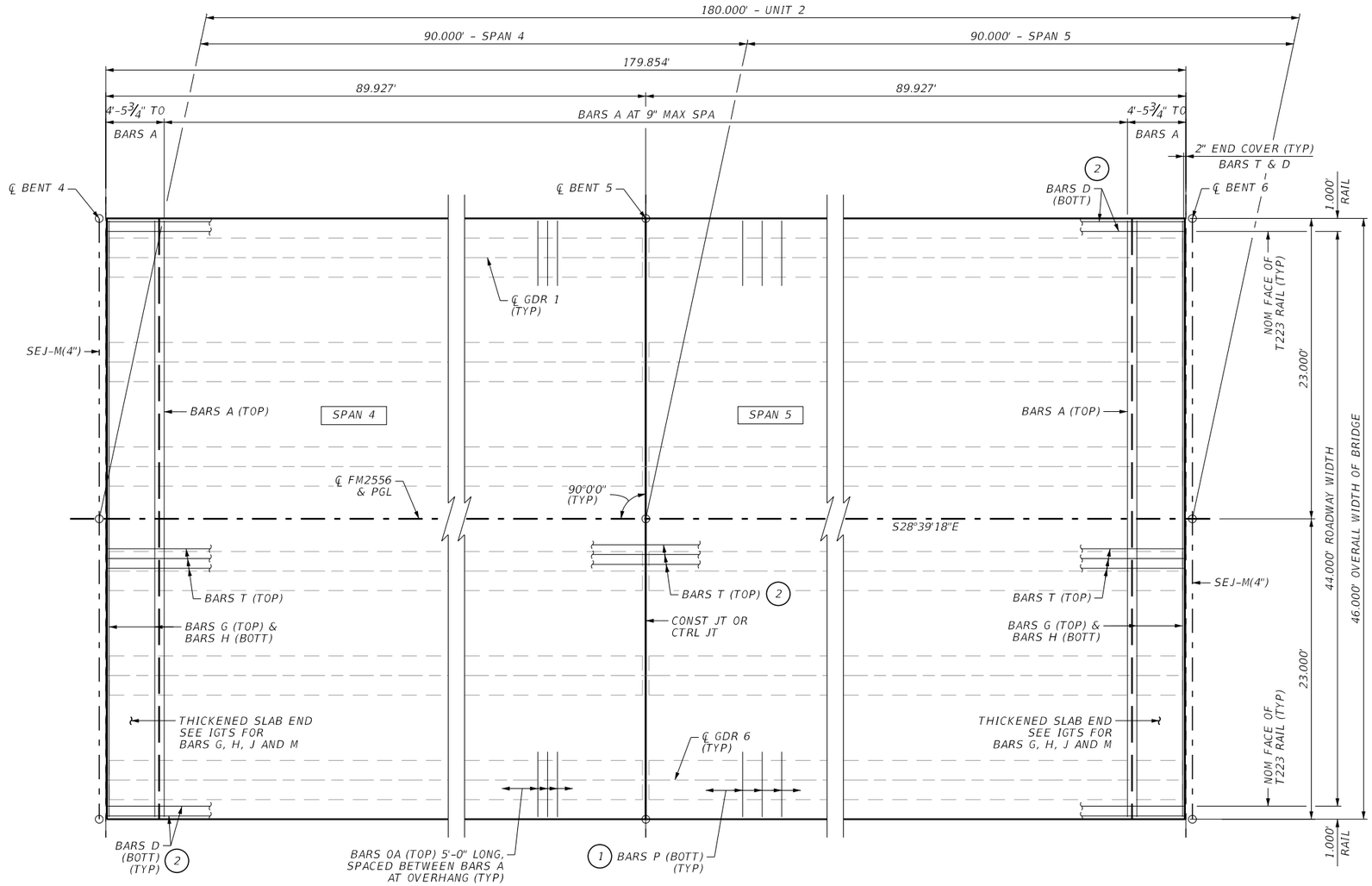
Texas Department of Transportation

FM 2556
270' PRESTRESSED CONC GIRDER UNIT (SPANS 1-3)
FM 2556 BRIDGE

SCALE: 1" = 10' SHEET 1 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		98

SCALE: 1" = 10'



PLAN

1. SEE PCP STANDARD SHEETS FOR DETAILS NOT SHOWN.
2. BARS D & T MUST BE CONTINUOUS THROUGH THE CTRL/CONST. JOINTS. SEE IGCS SHEET FOR MORE DETAILS & NOTES.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATION (2017), 8TH EDITION.
PROVIDE CLASS S CONCRETE, f'c = 4 KSI.
FOR GIRDER, BEARING PAD, MISC. SLAB, CONTINUOUS SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD & IGSD-44, IGEB, IGMS, IGCS, AND IGTS, RESPECTIVELY.
FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M.
FOR SEALED EXPANSION JOINT QUANTITIES NOT SHOWN, SEE BRIDGE QUANTITY & BEARING SEAT ELEVATIONS SHEET.
PLACE AND FINISH NOT LESS THAN 30 FEET OF BRIDGE DECK CONCRETE PER HOUR.
FOR RAIL AND THE ANCHORAGE IN SLAB DETAILS NOT SHOWN, SEE TRAFFIC RAIL TYPE T223.
FOR FRAMING DETAILS NOT SHOWN, SEE BRIDGE GIRDER LAYOUT SHEETS.
FOR SLAB DETAILS AND QUANTITIES NOT SHOWN SEE PRESTRESSED CONC GIRDER UNIT SECTION SHEET.
PROVIDE UNCOATED, GRADE 60 REINFORCING.
WHERE REQUIRED, PROVIDE BAR LAPS AS FOLLOWS:
UNCOATED #4 = 1'-7"
SEE PCP(O) AND PCP(O)FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.
SEE PCP AND PCP-FAB OR PMDF STANDARDS FOR DETAILS AND QUANTITY ADJUSTMENTS IF EITHER OF THESE OPTIONS ARE USED.
SEE BRIDGE LAYOUT FOR SURFACE TEXTURE REQUIREMENTS.
LAPS IN BARS SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.
DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P OR T UNLESS OTHERWISE NOTED

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12,23,22

HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

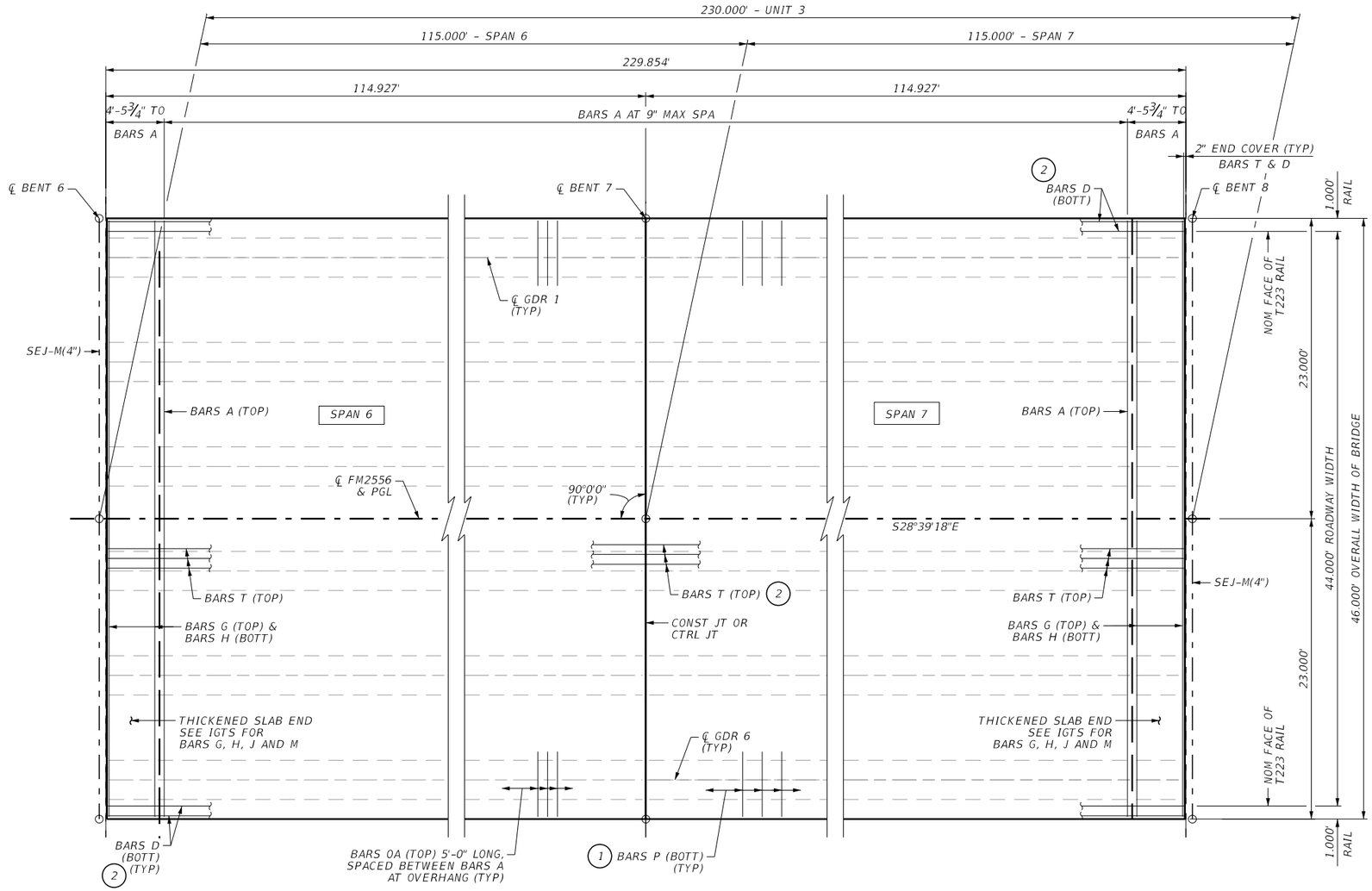
Texas Department of Transportation

FM 2556
180' PRESTRESSED CONC GIRDER UNIT (SPANS 4-5)
FM 2556 BRIDGE

SCALE: 1" = 10' SHEET 2 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		99

SCALE: 1" = 10'



PLAN

1. SEE PCP STANDARD SHEETS FOR DETAILS NOT SHOWN.
2. BARS D & T MUST BE CONTINUOUS THROUGH THE CTRL/CONST. JOINTS. SEE IGCS SHEET FOR MORE DETAILS & NOTES.

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12.23.22

HL 93 LOADING

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATION (2017), 8TH EDITION.
PROVIDE CLASS S CONCRETE, f'c = 4 KSI.
FOR GIRDER, BEARING PAD, MISC. SLAB, CONTINUOUS SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD & IGSD-44, IGEB, IGMS, IGCS, AND IGTS, RESPECTIVELY.
FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M.
FOR SEALED EXPANSION JOINT QUANTITIES NOT SHOWN, SEE BRIDGE QUANTITY & BEARING SEAT ELEVATIONS SHEET.
PLACE AND FINISH NOT LESS THAN 30 FEET OF BRIDGE DECK CONCRETE PER HOUR.
FOR RAIL AND THE ANCHORAGE IN SLAB DETAILS NOT SHOWN, SEE TRAFFIC RAIL TYPE T223.
FOR FRAMING DETAILS NOT SHOWN, SEE BRIDGE GIRDER LAYOUT SHEETS.
FOR SLAB DETAILS AND QUANTITIES NOT SHOWN SEE PRESTRESSED CONC GIRDER UNIT SECTION SHEET.
PROVIDE UNCOATED, GRADE 60 REINFORCING.
WHERE REQUIRED, PROVIDE BAR LAPS AS FOLLOWS:
UNCOATED #4 = 1'-7"
SEE PCP(O) AND PCP(O)FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.
SEE PCP AND PCP-FAB OR PMDF STANDARDS FOR DETAILS AND QUANTITY ADJUSTMENTS IF EITHER OF THESE OPTIONS ARE USED.
SEE BRIDGE LAYOUT FOR SURFACE TEXTURE REQUIREMENTS.
LAPS IN BARS SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.
DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P OR T UNLESS OTHERWISE NOTED

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

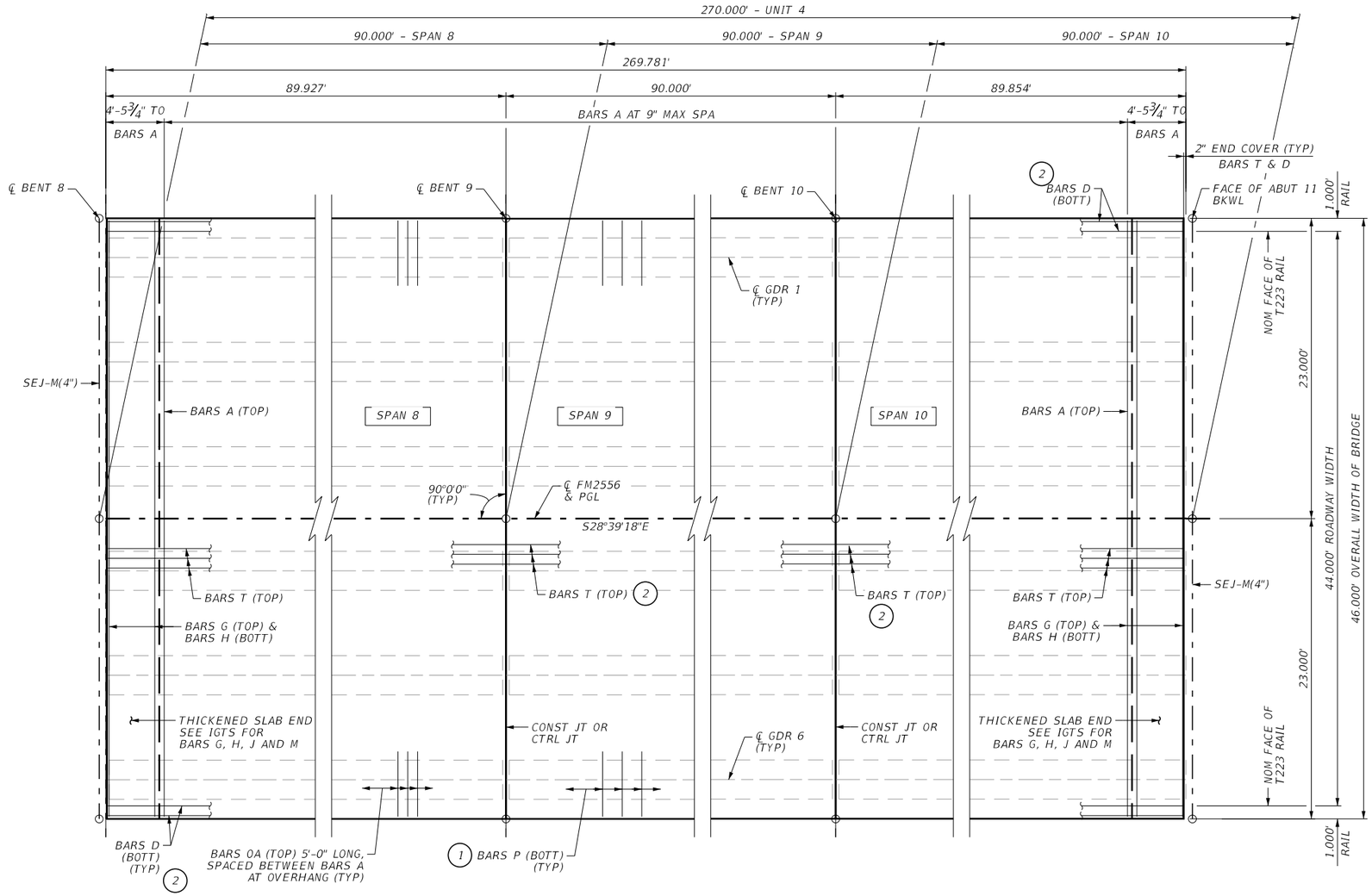
FM 2556

230' PRESTRESSED CONC GIRDER UNIT (SPANS 6-7) FM 2556 BRIDGE

SCALE: 1" = 10' SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		100

SCALE: 1" = 10'



PLAN

1. SEE PCP STANDARD SHEETS FOR DETAILS NOT SHOWN.
2. BARS D & T MUST BE CONTINUOUS THROUGH THE CTRL/CONST. JOINTS. SEE IGCS SHEET FOR MORE DETAILS & NOTES.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATION (2017), 8TH EDITION.
PROVIDE CLASS S CONCRETE, f'c = 4 KSI.
FOR GIRDER, BEARING PAD, MISC. SLAB, CONTINUOUS SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD & IGSD-44, IGEB, IGMS, IGCS, AND IGTS, RESPECTIVELY.
FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M.
FOR SEALED EXPANSION JOINT QUANTITIES NOT SHOWN, SEE BRIDGE QUANTITY & BEARING SEAT ELEVATIONS SHEET.
PLACE AND FINISH NOT LESS THAN 30 FEET OF BRIDGE DECK CONCRETE PER HOUR.
FOR RAIL AND THE ANCHORAGE IN SLAB DETAILS NOT SHOWN, SEE TRAFFIC RAIL TYPE T223.
FOR FRAMING DETAILS NOT SHOWN, SEE BRIDGE GIRDER LAYOUT SHEETS.
FOR SLAB DETAILS AND QUANTITIES NOT SHOWN SEE PRESTRESSED CONC GIRDER UNIT SECTION SHEET.
PROVIDE UNCOATED, GRADE 60 REINFORCING.
WHERE REQUIRED, PROVIDE BAR LAPS AS FOLLOWS:
UNCOATED #4 = 1'-7"
SEE PCP(O) AND PCP(O)FAB STANDARDS FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.
SEE PCP AND PCP-FAB OR PMDF STANDARDS FOR DETAILS AND QUANTITY ADJUSTMENTS IF EITHER OF THESE OPTIONS ARE USED.
SEE BRIDGE LAYOUT FOR SURFACE TEXTURE REQUIREMENTS.
LAPS IN BARS SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.
DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P OR T UNLESS OTHERWISE NOTED

STATE OF TEXAS
M. REZA ZARRINPOUR
136594
LICENSED
PROFESSIONAL ENGINEER
12/23/22

HL 93 LOADING

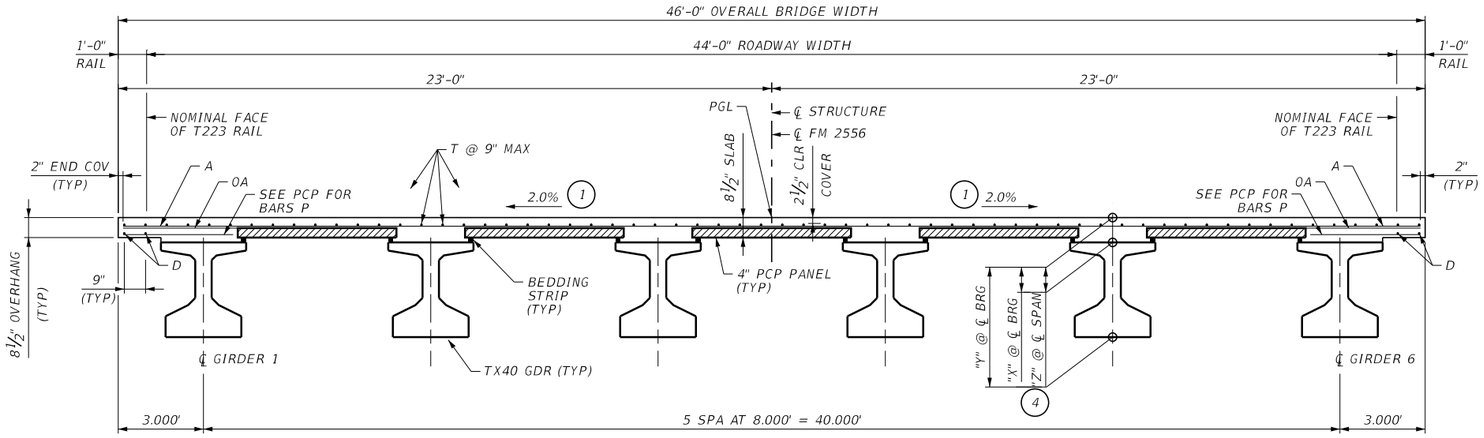
BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
270' PRESTRESSED CONC GIRDER UNIT (SPANS 8-10)
FM 2556 BRIDGE

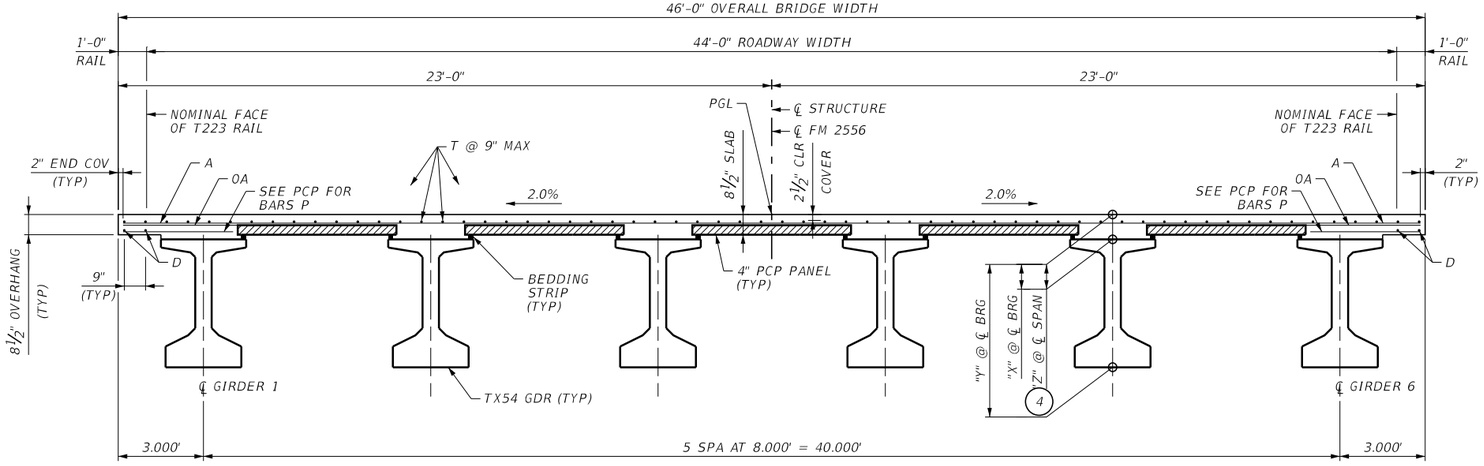
SCALE: 1" = 10' SHEET 4 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		101



TYPICAL TRANSVERSE SECTION

(SPANS 1-5 & 8-10, TX40)
SCALE: 3/16" = 1'-0"



TYPICAL TRANSVERSE SECTION

(SPANS 6 & 7, TX54)
SCALE: 3/16" = 1'-0"

NOTES:

FOR DECK FORMS, SEE PCP & PCP-FAB FOR DETAILS.

SEE PCP(O) & PCP(O)FAB FOR PRECAST OVERHANG PANEL DETAILS IF THIS OPTION IS USED.

SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENT IF THIS OPTION IS USED.

THE DECK DESIGN IS BASED ON 8.5" SLAB THICKNESS. WHEN USING PRESTRESSED CONCRETE PANEL OPTION, THE 8.5" SLAB THICKNESS SHALL BE MAINTAINED BY VARYING HEIGHT OF BEDDING STRIP ALONG THE GIRDER.

SEE HAUNCH REINFORCING DETAILS ON IGMS AND PCP STANDARDS FOR REQUIRED U BARS WHEN HAUNCH IS GREATER THAN 3½".

SEE TRAFFIC RAIL T223 STANDARD SHEET FOR RAIL ANCHORAGE IN SLAB DETAILS AND NOTES NOT SHOWN

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONC SLAB	PRESTRESSED CONC GIRDERS (Tx40)	PRESTRESSED CONC GIRDERS (Tx54)	CLASS "S" CONC (2)	TOTAL REINFORCING *STEEL (3)
	SF	LF	LF	CY	LB
1	4,140	537.00	0.00	117.5	9,522
2	4,140	537.00	0.00	116.9	9,522
3	4,140	537.00	0.00	117.5	9,522
4	4,140	537.00	0.00	117.5	9,522
5	4,140	537.00	0.00	117.5	9,522
6	5,290	0.00	687.00	149.6	12,167
7	5,290	0.00	687.00	149.6	12,167
8	4,140	537.00	0.00	117.4	9,522
9	4,140	537.00	0.00	119.3	9,522
10	4,140	537.00	0.00	121.9	9,522
TOTAL	43,700	4,296.00	1,374.00	1,244.7	100,510

*FOR CONTRACTOR'S INFORMATION ONLY

(1) *VARIES NEAR END OF BRIDGE, SEE BRIDGE LAYOUT PLAN FOR SUPERELEVATION LIMITS. THE METHOD OF TRANSITION IS TXDOT'S PREFERRED REVERS PARABOLIC (AASHTO METHOD 5).

(2) QUANTITIES INCLUDE THICKENED SLAB END AND HAUNCH.

(3) REINFORCING STEEL WEIGHT IS CALCULATED USING AND APPROXIMATE FACTOR OF 2.3 LBS/SF.

(4) THEORETICAL DIMENSION

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4
U	#4
UP	#4

TABLE OF SECTION DEPTHS			
SPAN NO.	"X" @ C/L BRG	"Y" @ C/L BRG	(4) "Z" @ MIDSPAN
1	11 5/8"	4'-3 5/8"	9 3/8"
2	11 5/8"	4'-3 5/8"	9 3/8"
3	11 5/8"	4'-3 5/8"	9 3/8"
4	11 5/8"	4'-3 5/8"	9 3/8"
5	11 5/8"	4'-3 5/8"	9 3/8"
6	11 3/8"	5'-5 3/8"	9 3/8"
7	11 3/8"	5'-5 3/8"	9 3/8"
8	11 1/2"	4'-3 1/2"	9 3/8"
9	11 7/8"	4'-3 7/8"	9 3/8"
10	1'-0 5/8"	4'-4 5/8"	9 1/8"

STATE OF TEXAS
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136594
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HL 93 LOADING

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
PRESTRESSED CONC GIRDER UNIT SECTION
FM 2556 BRIDGE

SHEET 5 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
MRZ	KM	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	MRZ	PHARR	CAMERON		102

20 0 20 40
SCALE: 1" = 40'

60 40 20 0 -20 -40

Test Hole No. BR-01
El 59.75

7(6) 11(6)	CLAY, Fat, soft, moist, brown, trace Gravel to 1.5', trace ferrous deposits to 9', trace fossils from 11.5' to 13'
9(6) 10(6)	
4(6) 7(6)	
12(6) 14(6)	SILT, with Sand, loose, moist, light brown, 5" CL seam at 18.5' (ML)
8(6) 4(6)	SILT, slightly compact, moist to wet, light brown (ML)
4(6) 4(6)	SILT, loose, wet, light brown (ML)
4(6) 6(6)	CLAY, Fat, soft, moist, brown, trace fossils
6(6) 7(6)	CLAY, Lean, soft, moist, brown
13(6) 13(6)	CLAY, Fat, soft, moist, brown, trace Gypsum crystals
8(6) 8(6)	CLAY, Fat, stiff, moist, brown, trace Gypsum crystals
20(6) 19(6)	CLAY, Fat, soft, moist, brown, trace Gypsum crystals
16(6) 17(6)	SILT, with Sand, compact, wet, brown to gray, few SC lenses (ML)
14(6) 17(6)	CLAY, Fat, stiff, moist, brown, trace Gypsum crystals, trace ML seams to 58', trace calcareous nodules below 66.5'
9(6) 9(6)	
15(6) 15(6)	CLAY, Fat, soft, moist, brown, trace Gypsum crystals
14(6) 14(6)	CLAY, Fat, stiff, moist, brown, trace Gypsum crystals

B/H = -21.75

Test Hole No. BR-02
El 54.25

13(6) 11(6)	CLAY, Fat, stiff, moist, brown, trace roots to 4', trace Gypsum crystals from 2.5' to 4', CL Layer from 0.0' to 0.8'
7(6) 7(6)	
11(6) 13(6)	CLAY, Fat, soft, moist, brown, trace fossils, 3'' CL seam at 12.6'
6(6) 8(6)	SILT, slightly compact, moist, brown to 16', gray thereafter (ML)
6(6) 10(6)	CLAY, Fat, soft, moist, brown, trace fossils
3(6) 8(6)	CLAY, Lean, soft, moist, gray
6(6) 9(6)	SAND, Silty, loose, wet, brown, fine grained (SM)
6(6) 9(6)	
30(6) 32(6)	SAND, Silty, compact, wet, gray, fine grained (SM)
22(6) 15(6)	
16(6) 14(6)	CLAY, Fat, stiff, moist, brown, traces fossils and Gypsum crystals below 56.4'
15(6) 17(6)	
7(6) 10(6)	CLAY, Fat, soft, moist, brown, trace Gypsum crystals
15(6) 16(6)	CLAY, Fat, stiff, moist, brown, trace Gypsum crystals

B/H = -17.25

Test Hole No. BR-03
El 39.23

22(6) 14(6)	CLAY, Fat, moist, brown
7(6) 8(6)	CLAY, Lean, stiff, dry to moist, light brown to brown, trace roots to 4'
7(6) 11(6)	CLAY, Lean, soft, moist, brown, trace calcareous nodules, CH from 8.1' to 9'
20(6) 23(6)	SAND, Silty, loose, wet, brown, fine grained (SM)
25(6) 26(6)	SAND, Silty, compact, wet, brown, fine grained, trace CH lenses from 31.2' to 32.7' (SM)
33(6) 26(6)	
20(6) 10(6)	SAND, Silty, slightly compact, wet, brown, fine to medium grained, trace fossils, Silt Layer from 37' to 38' (SM)
12(6) 11(6)	CLAY, Fat, stiff, moist, brown
15(6) 18(6)	
13(6) 14(6)	
12(6) 14(6)	CLAY, Fat, stiff, moist, brown, trace Gypsum crystals to 48', trace fossils from 61.5' to 63'
12(6) 12(6)	
14(6) 15(6)	
13(6) 15(6)	

B/H = -32.27

Test Hole No. BR-04
El 35.8

10(6) 10(6)	CLAY, Fat, moist, brown, traces SM and SC seams and roots
4(6) 8(6)	CLAY, Fat with Sand, soft, moist, brown, trace Gypsum crystals
13(6) 15(6)	SAND, Clayey, loose, moist to wet, brown, fine grained, trace fossils to 9', trace Gravel and fine to medium grained below 12.1'
14(6) 12(6)	SAND, Silty, slightly compact, wet, brown, fine grained, trace CH seams, trace Gravel below 21.5', trace fossils to 18' (SM)
25(6) 22(6)	
7(6) 5(6)	SAND, Silty, compact, wet, brown, fine grained, trace fossils (SM)
11(6) 14(6)	CLAY, Fat, soft, moist, brown, traces CL and SM seams
12(6) 14(6)	
11(6) 12(6)	
18(6) 18(6)	CLAY, Fat, stiff, moist, brown, trace fossils from 46.5' to 48'
11(6) 13(6)	
19(6) 18(6)	
9(6) 8(6)	SILT, with Sand, slightly compact, wet, brown, trace CL seams (ML)
9(6) 9(6)	CLAY, Lean, soft, moist, brown, trace SM seams

B/H = -35.7

Test Hole No. BR-05
El 43.25

	CLAY, Lean, dry to moist, light brown, traces roots and calcareous deposits, CH Layer from 0.0' to 0.5'
15(6) 12(6)	SILT, slightly compact, dry to moist, light brown, trace roots to 4' (ML)
5(6) 5(6)	
4(6) 5(6)	SILT, loose, moist to wet, brown, trace Clay seams, with Sand below 17' (ML)
27(6) 20(6)	
50(5.25) 50(5.25)	SAND, Silty, compact, wet, brown, fine grained, trace CH seams (SM)
18(6) 16(6)	SAND, Silty, dense, wet, brown, fine grained (SM)
31(6) 43(6)	SAND, Silty, slightly compact, wet, brown, fine grained, trace CH seams (SM)
14(6) 17(6)	SAND, Silty, compact, wet, brown, fine grained, trace CH seams (SM)
13(6) 16(6)	
13(6) 16(6)	CLAY, Fat, stiff, moist, brown
8(6) 6(6)	
16(6) 21(6)	SAND, Clayey, loose, moist, brown, fine grained, trace SM seams below 56.5'
14(6) 21(6)	SAND, Clayey, slightly compact, moist, brown, fine grained, trace CH seams from 61.5' to 63'
11(6) 10(6)	

B/H = -28.25

Test Hole No. BR-06
El 48.61

7(6) 8(6)	CLAY, Fat, moist, brown, trace roots, trace Gypsum crystals below 2.5'
12(6) 11(6)	SILT, Sandy, loose, dry to moist, light brown (ML)
14(6) 11(6)	SILT, slightly compact, moist, light brown (ML)
7(6) 5(6)	CLAY, Fat, stiff, moist, brown, trace fossils, CL seam from 12.6' to 13'
17(5) 23(6)	SAND, Silty, loose, wet, brown, fine grained, trace SC seams (SM)
33(6) 40(6)	SAND, Silty, compact, wet, brown, fine grained, trace CH seams below 31.3' (SM)
45(6) 47(6)	
46(6) 24(6)	SAND, Silty, dense, wet, brown, fine grained, trace CH seams (SM)
19(6) 13(6)	CLAY, Fat, very stiff, moist, light brown, trace Gypsum crystals
5(6) 6(6)	SAND, Clayey, slightly compact, moist, light brown, fine grained
11(6) 16(6)	SAND, Clayey, loose, moist, brown, fine grained
48(6) 37(6)	SAND, Clayey, slightly compact, moist, brown, fine to coarse grained, trace calcareous nodules
50(3) 50(2)	CLAY, Lean, hard, moist, brown, little calcareous nodules to 58', traces Gypsum crystals and calcareous deposits below 61.2'
20(3) 22(2)	SAND, Silty, dense, wet, brown, fine grained, trace CH seams (SM)
	SAND, Silty, compact, wet, brown, fine grained, trace CH seams (SM)

B/H = -22.69

BORING LOG DATA FROM:
CORSAIR CONSULTING LLC
TBPE REGISTRATION NO 14217
FINAL GEOTECHNICAL ENGINEERING REPORT
FM 2556 BRIDGE OVER ARROYO COLORADO
CSJ NO. 2529-02-010
CORSAIR PROJECT NO. 1700531
TxDOT CONTRACT NO. 36-6IDP5397 WA#2
CAMERON COUNTY, TEXAS
SIGNED BY HUN SOO HA, PE #109091
SEPTEMBER 12, 2018

100% SUBMITTAL

PRELIMINARY
FOR REVIEW ONLY

JANUARY 11, 2023

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556
BORING LOGS
FM 2556 OVER ARROYO COLORADO FLOODWAY

SCALE: 1" = 40' SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	JK	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		103

DATE: 5/8/2024 1:55:21 PM zBeil
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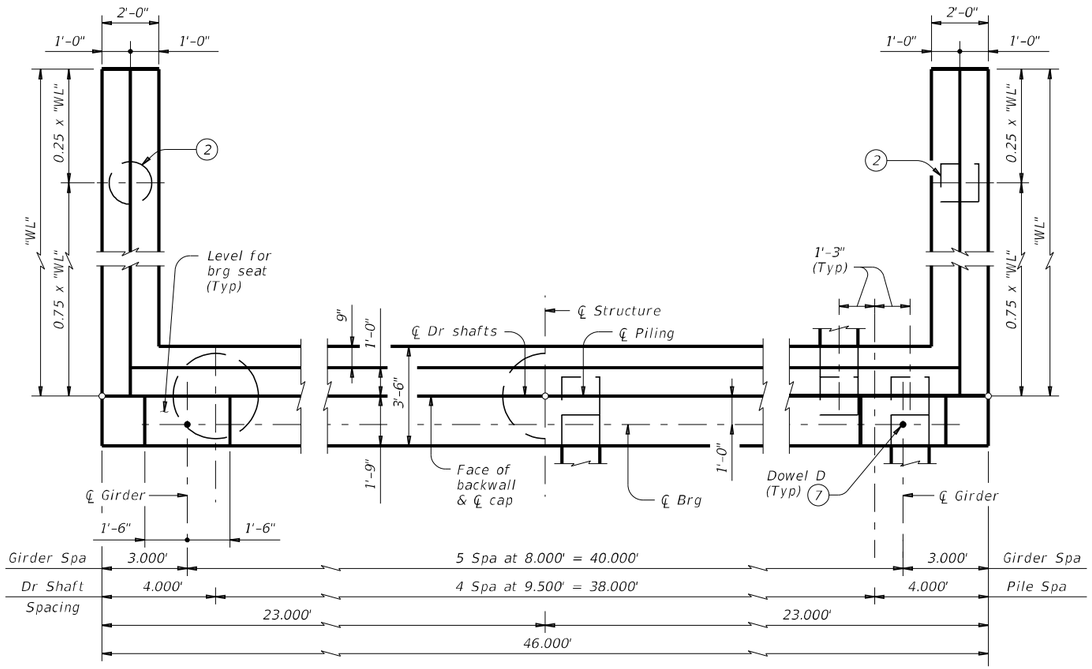
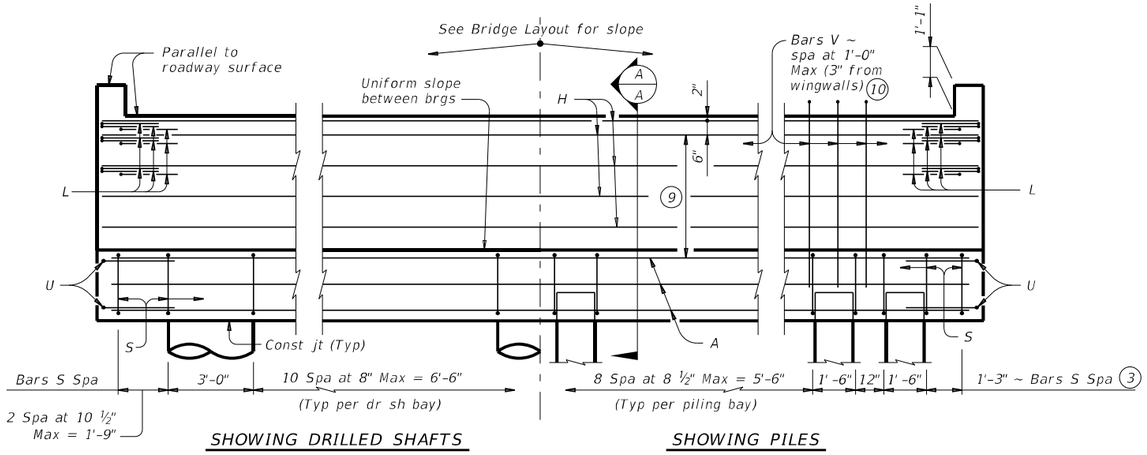


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN (1)

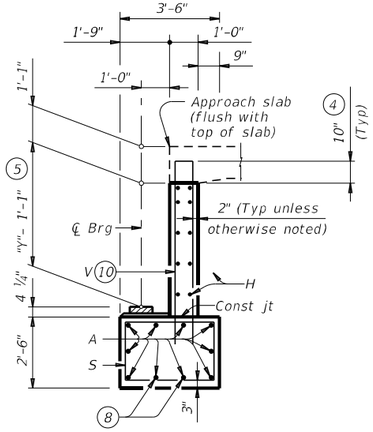


SHOWING DRILLED SHAFTS — SHOWING PILES

ELEVATION

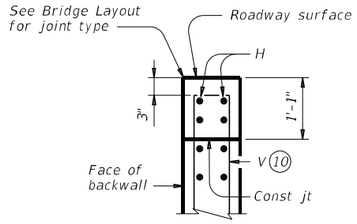
TABLE A

Header Slope	Girder Type	Wingwall Type	Wingwall Lgth "WL"
2:1	Tx28	Cantilevered	8.000'
	Tx34	Cantilevered	9.000'
	Tx40	Cantilevered	10.000'
	Tx46	Cantilevered	11.000'
	Tx54	Cantilevered	12.000'
3:1	Tx28	Cantilevered	12.000'
	Tx34	Founded	13.000'
	Tx40	Founded	15.000'
	Tx46	Founded	16.000'
	Tx54	Founded	18.000'



SECTION A-A

(With approach slab) (6)



BACKWALL DETAIL

(Without approach slab) (6)

TABLE OF FOUNDATION LOADS

Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	55	51
45	59	53
50	63	55
55	66	56
60	70	58
65	73	60
70	77	62
75	80	64
80	84	66
85	87	67
90	95	69
95	94	71
100	98	73
105	101	74
110	104	76
115	108	78
120	111	80
125	114	81

(1) See Table A for variable dimensions based on header slope and girder type.

(2) See Table A to determine if wingwall foundations are required.

(3) For piling larger than 16" adjust Bars S spacing as required to avoid piling.

(4) Increase as required to maintain 3" from finished grade.

(5) See Span details for "Y" value.

(6) See Bridge Layout to determine if approach slab is present.

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(8) With pile foundations, move Bars A shown to clear piles.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

See Bridge Layout for header slope and foundation type, size and length.

See Common Foundation Details FD(MOD) standard sheet for all foundation details and notes. (1)

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

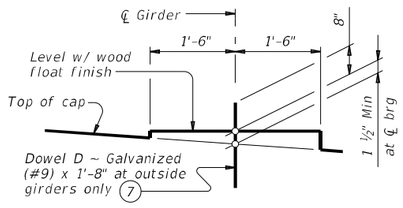
See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SIG-44 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Galvanize dowel bars D.



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

(1) SIGNING ENGINEER RESPONSIBLE FOR MODIFICATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

HL93 LOADING — SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE:	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
10-2023 ~ Stirrup Spa 12-22 (MOD) sheet 1 for future DLs & x-ref to FD(MOD)1 for required SRC	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		104

DATE: 5/8/2024 1:55:25 PM
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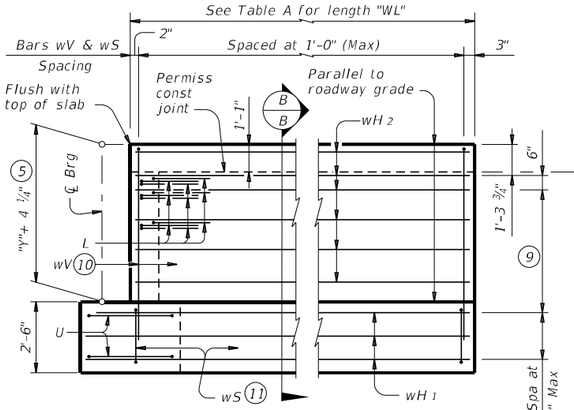
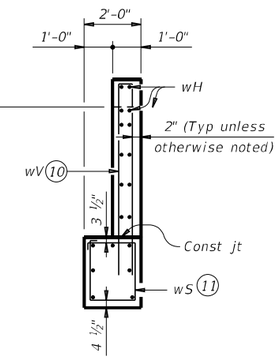
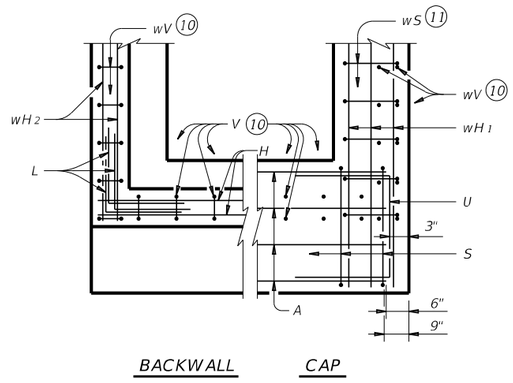
zBeil



WINGWALL ELEVATION

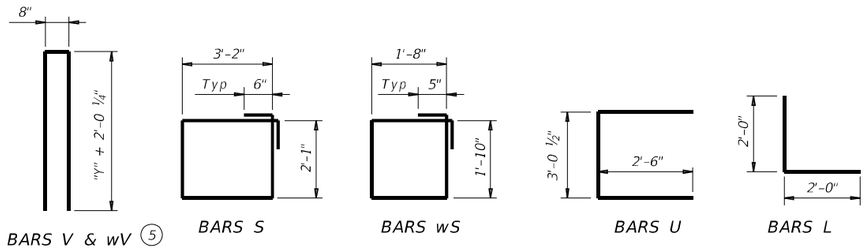


SECTION B-B



BACKWALL CAP

CORNER DETAILS



BARS V & wV (5) BARS S BARS wS BARS U BARS L

(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

(11) Adjust as required to avoid piling.

(1) SIGNING ENGINEER RESPONSIBLE FOR MODIFICATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

STATE OF TEXAS
ZACHARY J. BEIL
139718
LICENSED
PROFESSIONAL ENGINEER
Zachary J Beil
05-08-2024

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE:	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
10-2023 ~ Silrrup Spa 12-22: (MOD) sheet 1 for future DLs & x-ref to FB(MOD) for required SRC	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		105

DATE: 5/8/2024 1:55:29 PM zBeil
FILE: c:\bms\bridgefarmer-pw\zoch.beil\dms02040\FM2556-IG-AIG4400-23-03.dgn

TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	11'-4"	532
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213

Reinforcing Steel	Lb	4,975
Class "C" Concrete	CY	23.6

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	12'-4"	579
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-4"	257

Reinforcing Steel	Lb	5,128
Class "C" Concrete	CY	25.4

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	13'-4"	626
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	348
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306

Reinforcing Steel	Lb	5,480
Class "C" Concrete	CY	27.3

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	14'-4"	673
wH1	14	#6	12'-5"	261
wH2	24	#6	10'-8"	385
wS	24	#4	7'-10"	126
wV	24	#5	14'-4"	359

Reinforcing Steel	Lb	5,649
Class "C" Concrete	CY	29.2

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	12	#6	45'-8"	823
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	15'-8"	735
wH1	14	#6	13'-5"	282
wH2	28	#6	11'-8"	491
wS	26	#4	7'-10"	136
wV	26	#5	15'-8"	425

Reinforcing Steel	Lb	6,051
Class "C" Concrete	CY	31.7

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	11'-4"	532
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307

Reinforcing Steel	Lb	5,315
Class "C" Concrete	CY	26.2

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	12'-4"	579
wH1	14	#6	14'-5"	303
wH2	20	#6	12'-8"	381
wS	28	#4	7'-10"	147
wV	28	#5	12'-4"	360

Reinforcing Steel	Lb	5,478
Class "C" Concrete	CY	28.1

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	13'-4"	626
wH1	14	#6	16'-5"	345
wH2	24	#6	14'-8"	529
wS	32	#4	7'-10"	167
wV	32	#5	13'-4"	445

Reinforcing Steel	Lb	5,957
Class "C" Concrete	CY	30.9

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	14'-4"	673
wH1	14	#6	17'-5"	366
wH2	24	#6	15'-8"	565
wS	34	#4	7'-10"	178
wV	34	#5	14'-4"	508

Reinforcing Steel	Lb	6,135
Class "C" Concrete	CY	33.0

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	12	#6	45'-8"	823
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	15'-8"	735
wH1	14	#6	19'-5"	408
wH2	28	#6	17'-8"	743
wS	38	#4	7'-10"	199
wV	38	#5	15'-8"	621

Reinforcing Steel	Lb	6,688
Class "C" Concrete	CY	36.5

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(12) Quantities shown are for one abutment only (with approach slab). With no approach slab, add 1.8 CY Class "C" concrete and 274 lbs reinforcing steel for 4 additional Bars H.

(1) SIGNING ENGINEER RESPONSIBLE FOR MODIFICATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

STATE OF TEXAS
ZACHARY J. BEIL
139718
LICENSED
PROFESSIONAL ENGINEER
Zachary J. Beil
05-08-2024

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE:	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
10-2023 – Silvrap Spa 12-22: (MOD) sheet 1 for future DLs & x-ref to FD(MOD) for required SRC	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		106

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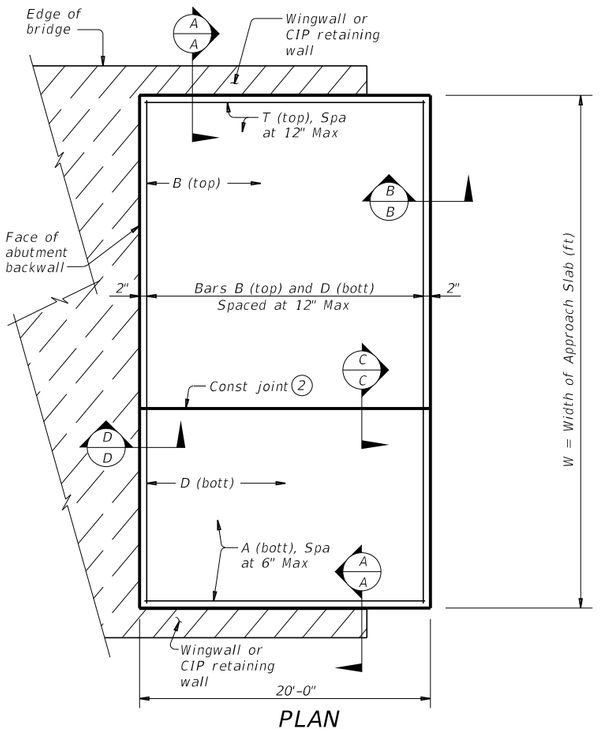
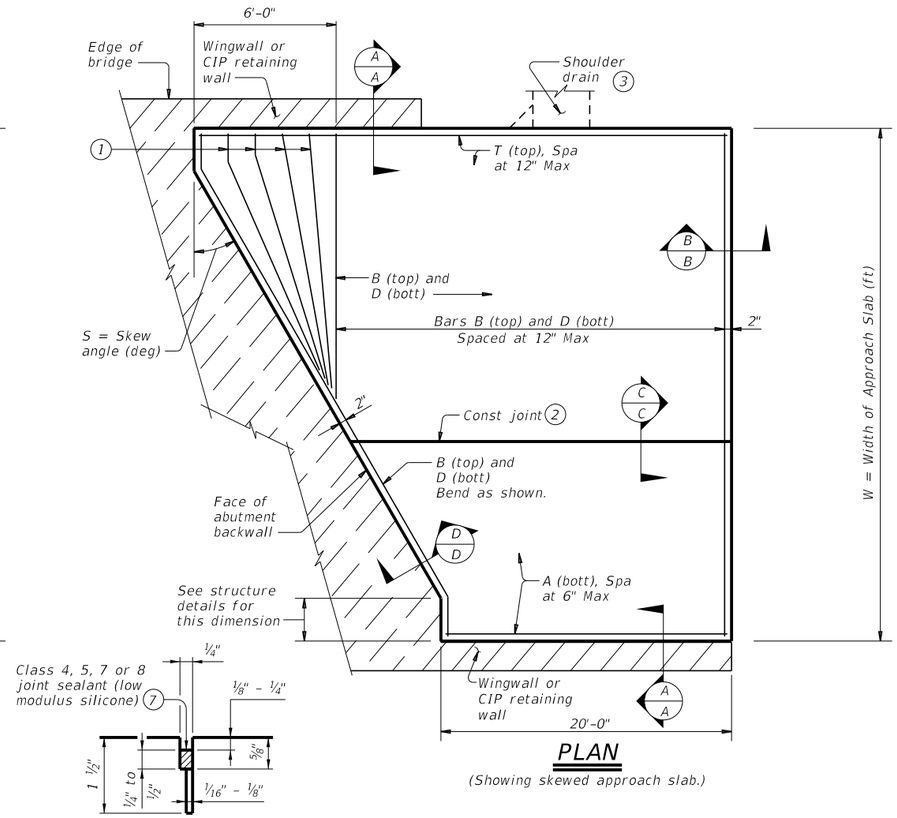


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

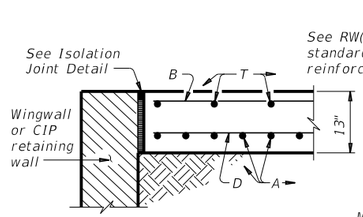
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

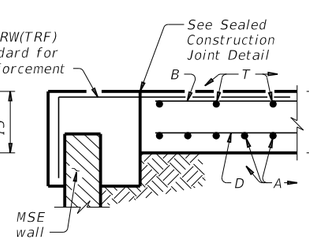
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

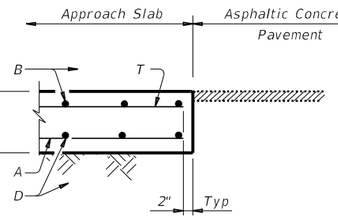
Cover dimensions are clear dimensions, unless noted otherwise.

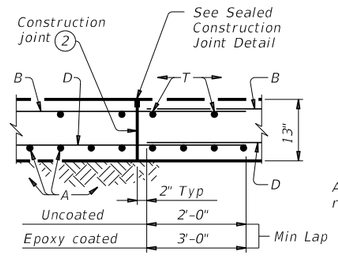


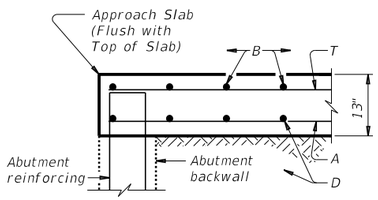
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





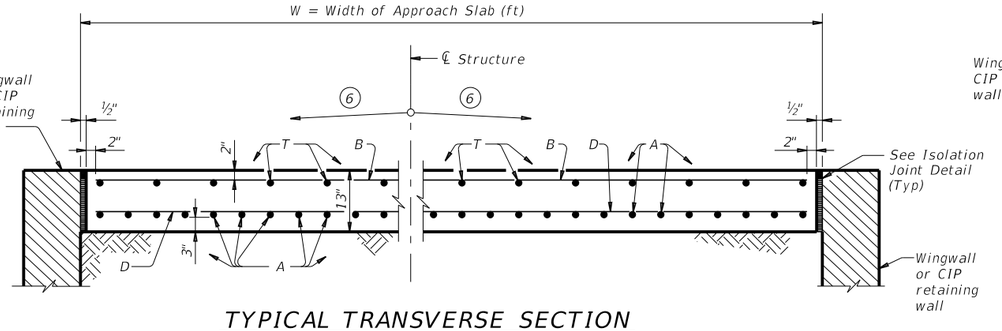


SECTION A-A

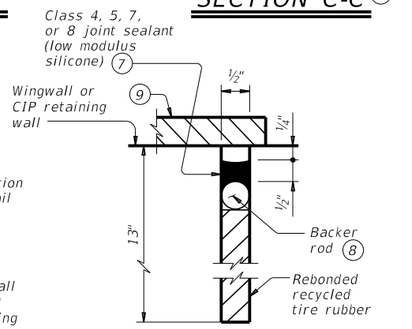
SECTION B-B

SECTION C-C (5)

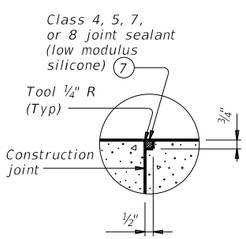
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		107

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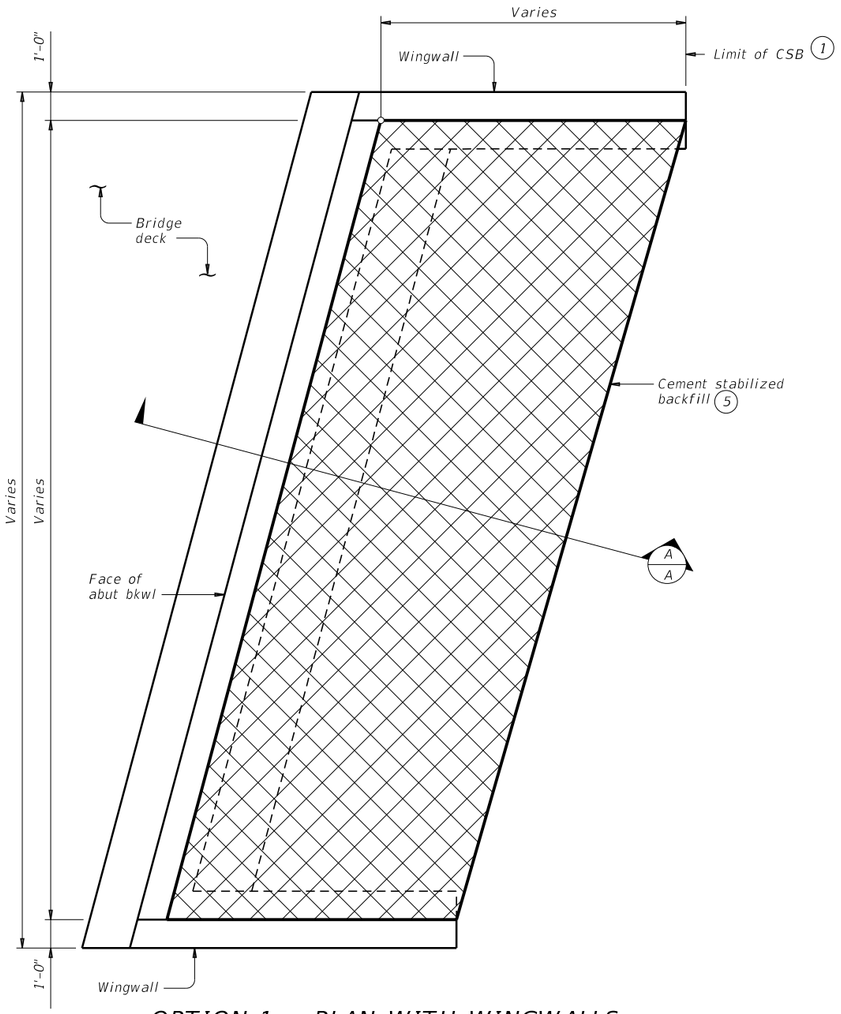
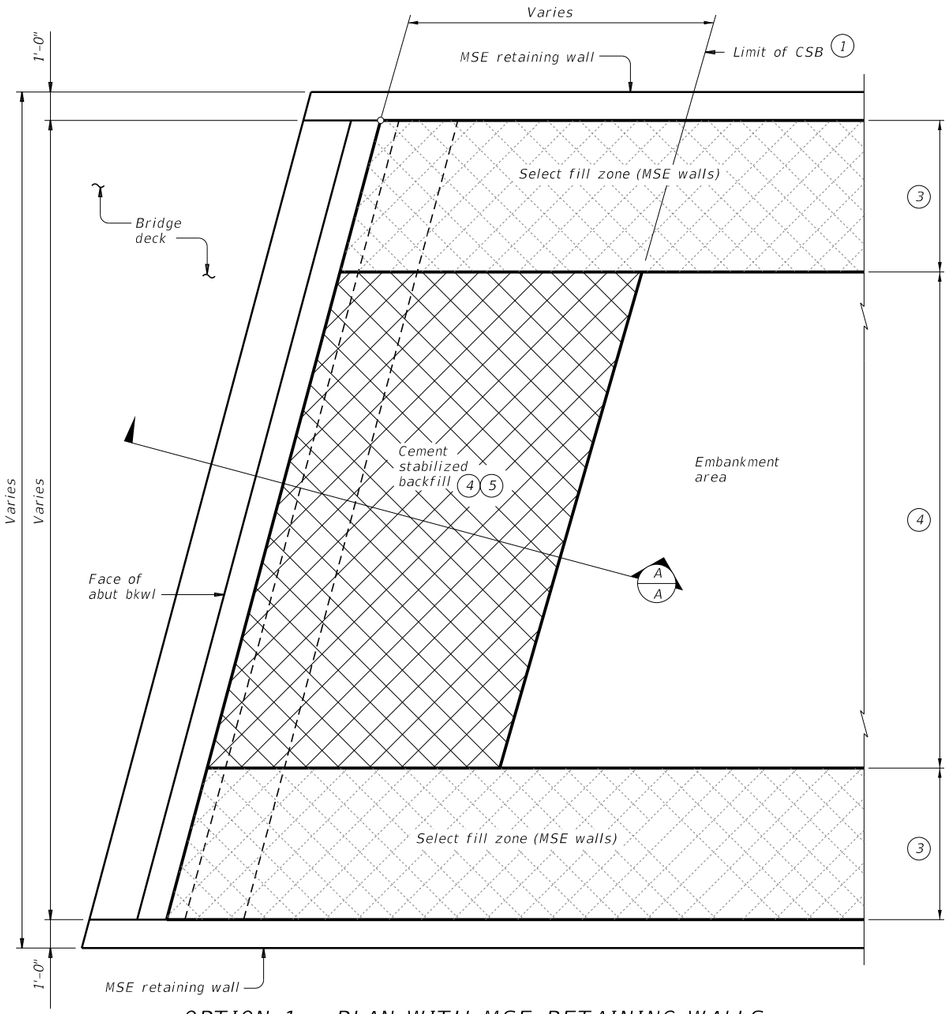
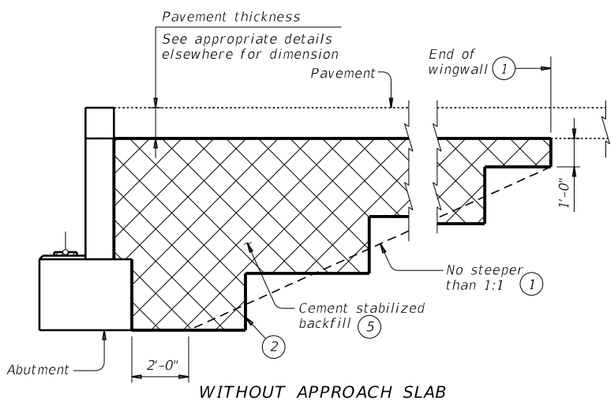


OPTION 1 ~ PLAN WITH WINGWALLS

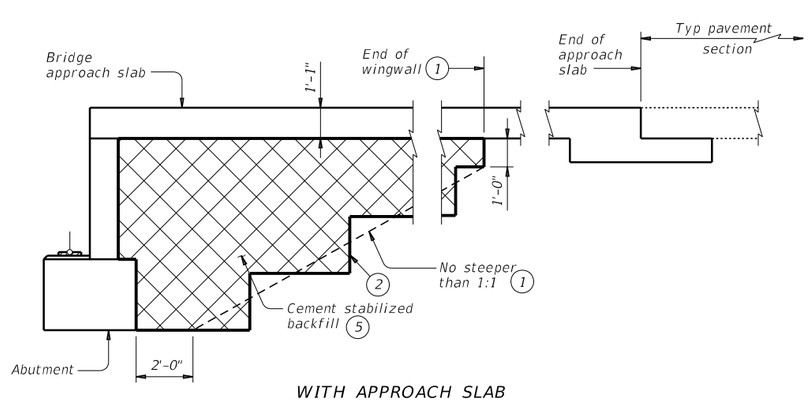
Cast-in-place retaining walls similar.



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 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		108

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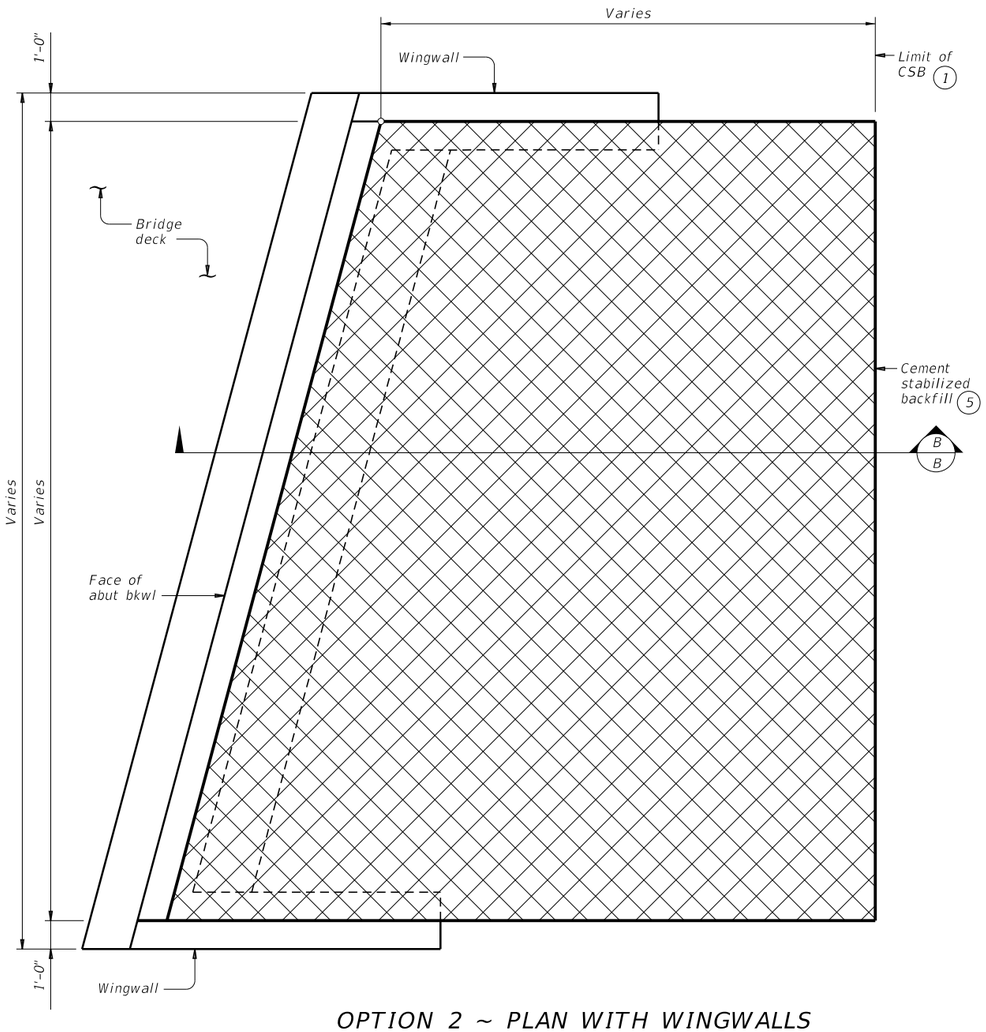
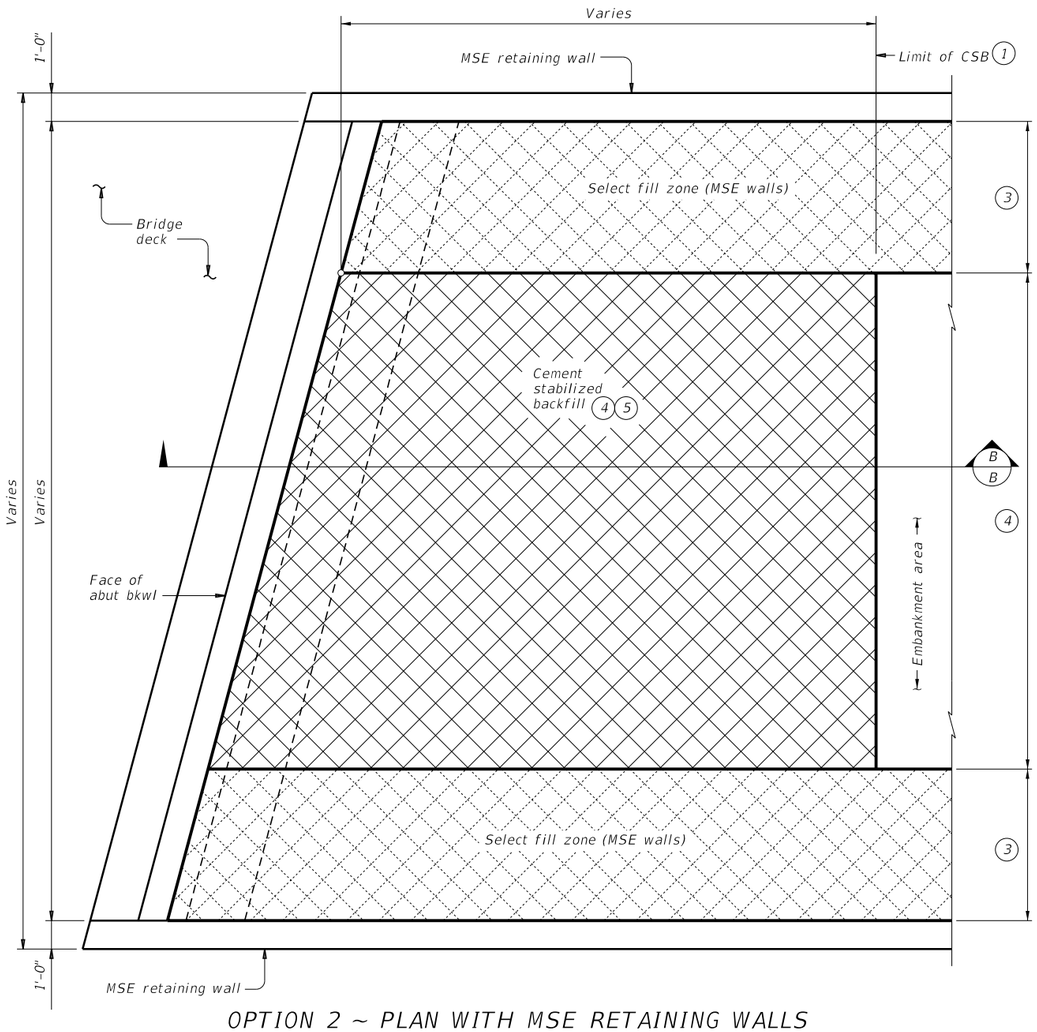
Aziz.Alebra



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) *Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.*

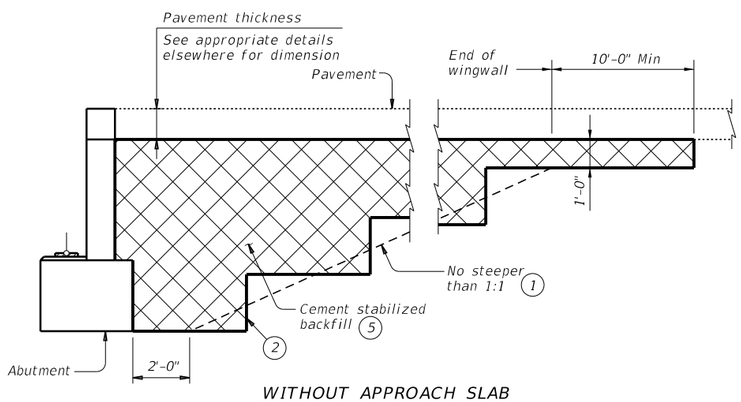
(2) *Bench backfill as shown with 12" (approximate) bench depths.*

(3) *Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.*

(4) *When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.*

(5) *If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:*
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

(6) *1'-0" for BAS-A*
1'-10" for BAS-C



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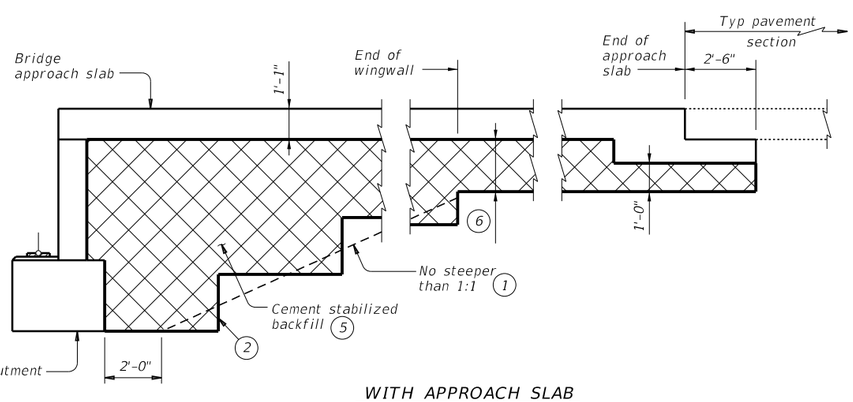

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		109

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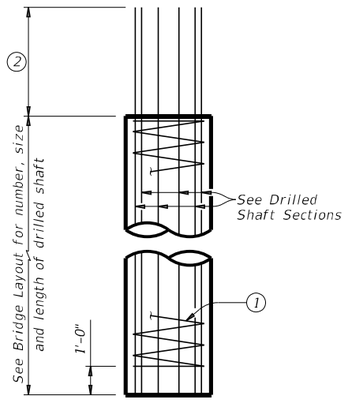
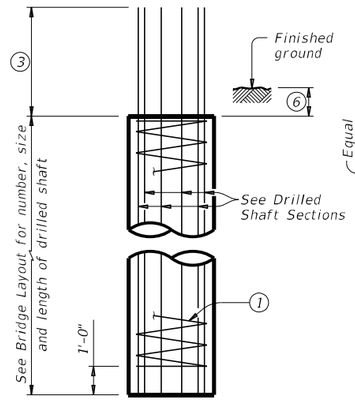


ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



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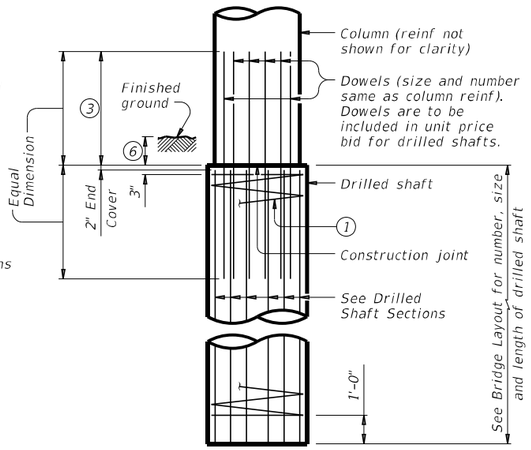
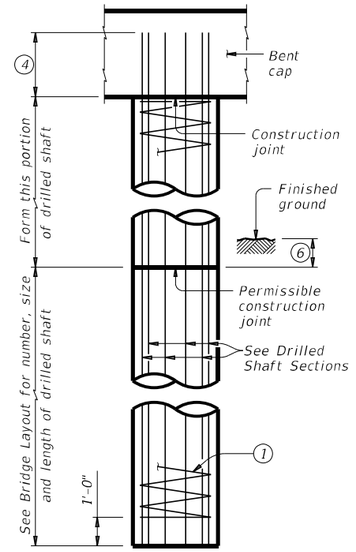
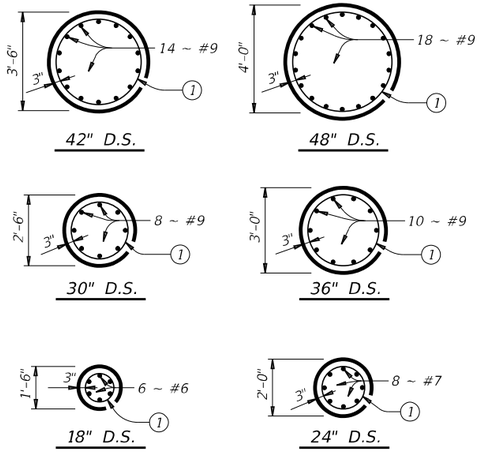


INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

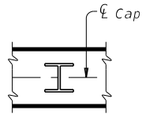


DRILLED SHAFT SECTIONS

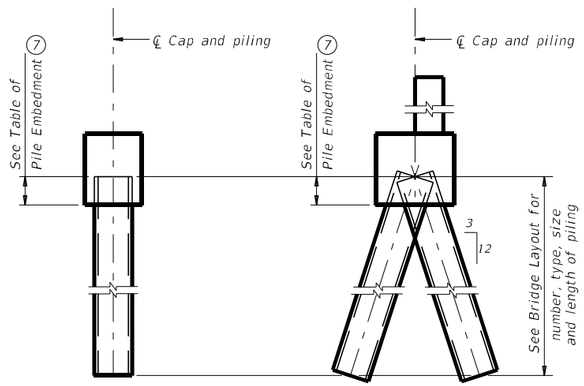
DRILLED SHAFT DETAILS

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"

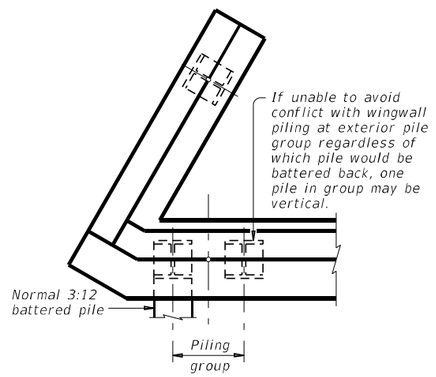
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



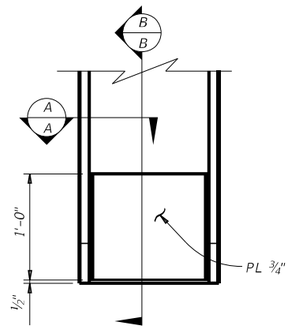
ORIENTATION OF STEEL H-PILING



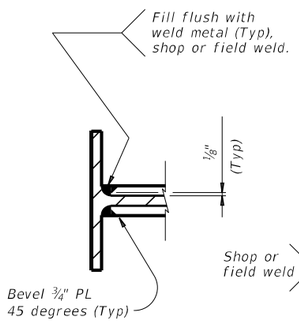
PILING DETAILS
(Concrete or steel H)



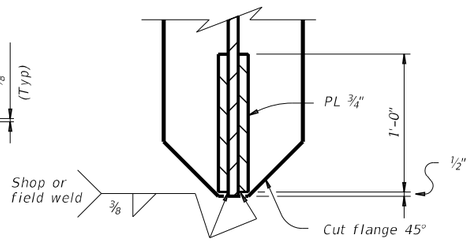
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION

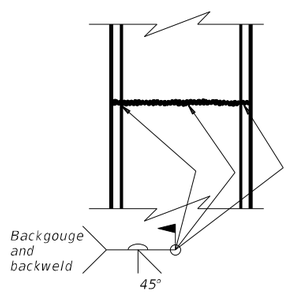


SECTION A-A

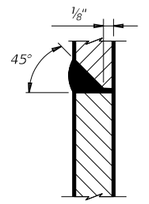


SECTION B-B

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. SIGNING ENGINEER RESPONSIBLE FOR MODIFCATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

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ZACHARY J. BEIL
139718
LICENSED
PROFESSIONAL ENGINEER
05-08-2024

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(MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
12-22: (MOD) sht 2 for project required SRC.	PHARR	CAMERON		110

DATE: 5/7/2024 6:27:10 PM AKH
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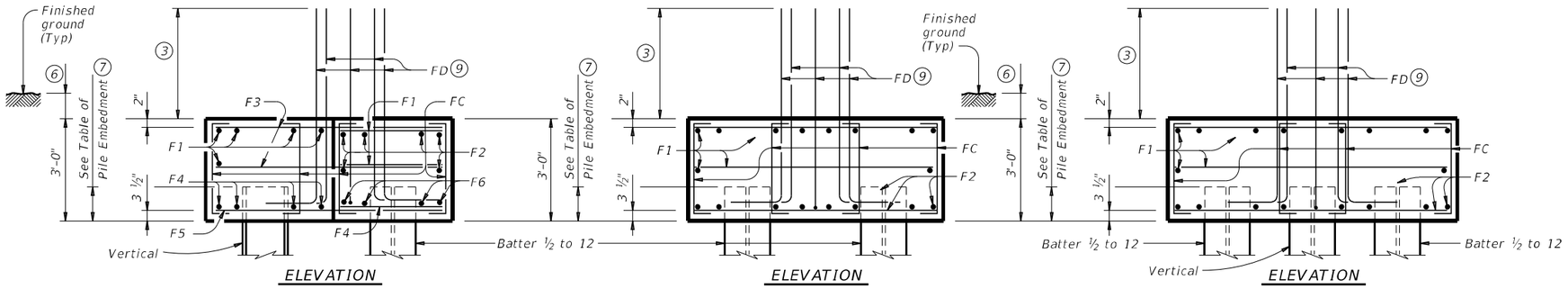
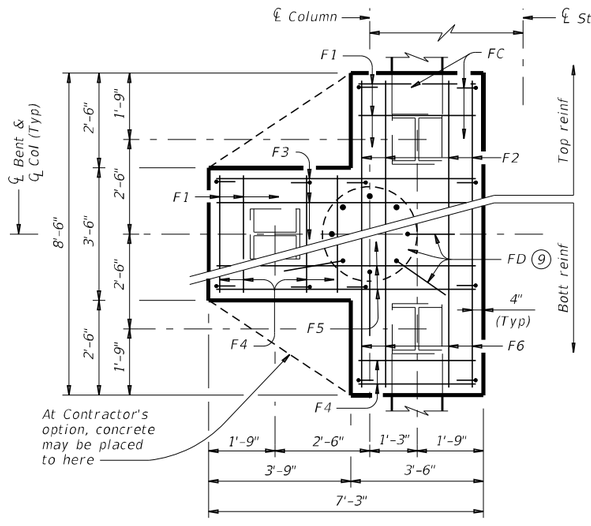


ELEVATION

ELEVATION

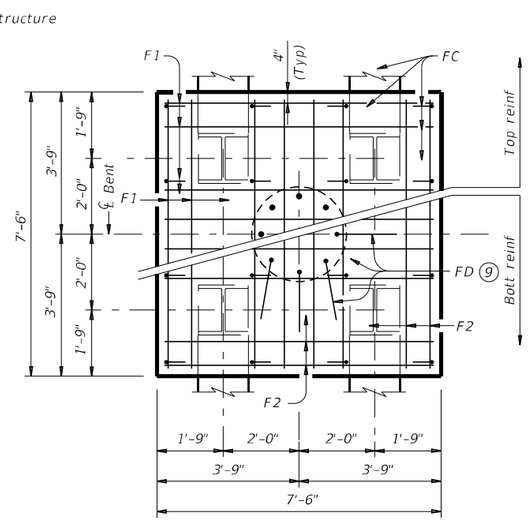
ELEVATION



PLAN

THREE PILE FOOTING (8)

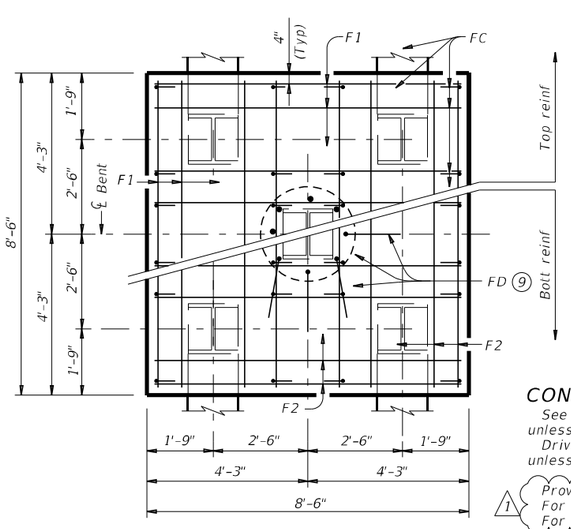
For 36" Dia and smaller columns.



PLAN

FOUR PILE FOOTING (8)

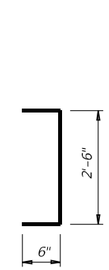
For 42" Dia and smaller columns.



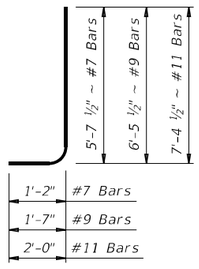
PLAN

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

(1) Provide Sulfate Resistant Concrete of the following classes:
For Dry placement, Class C (f'c = 3,600 psi).
For Wet/Slurry placement, Class SS (f'c = 3,600 psi).

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

(1) SIGNING ENGINEER RESPONSIBLE FOR MODIFCATIONS AS NOTED. ALL OTHER DETAILS IN THE UNMODIFIED CONDITION ARE SHOWN IDENTICAL TO THE UNMODIFIED STANDARD.

STATE OF TEXAS
ZACHARY J. BEIL
139718
LICENSED
PROFESSIONAL ENGINEER
05-08-2024

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD(MOD)

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
12-22: (MOD) snt 2 for project required SRC.	PHARR	CAMERON		111

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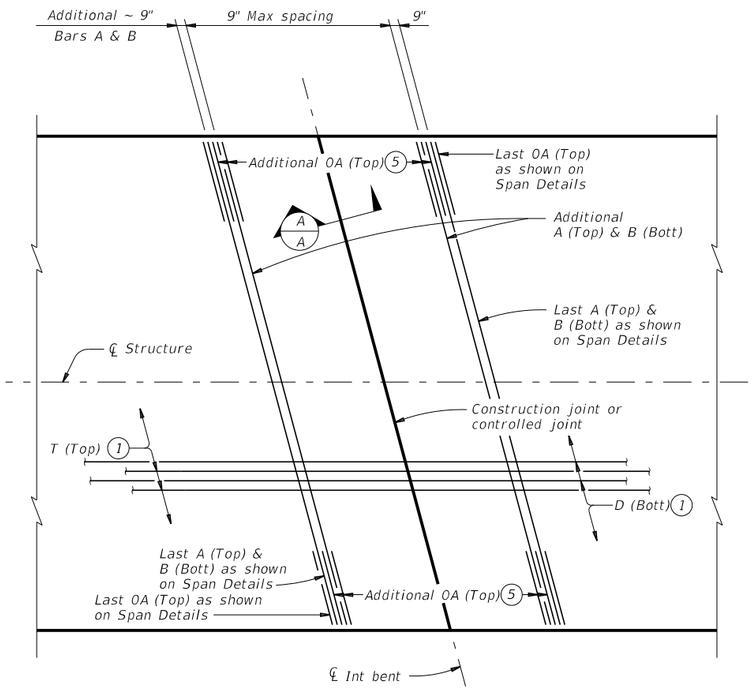
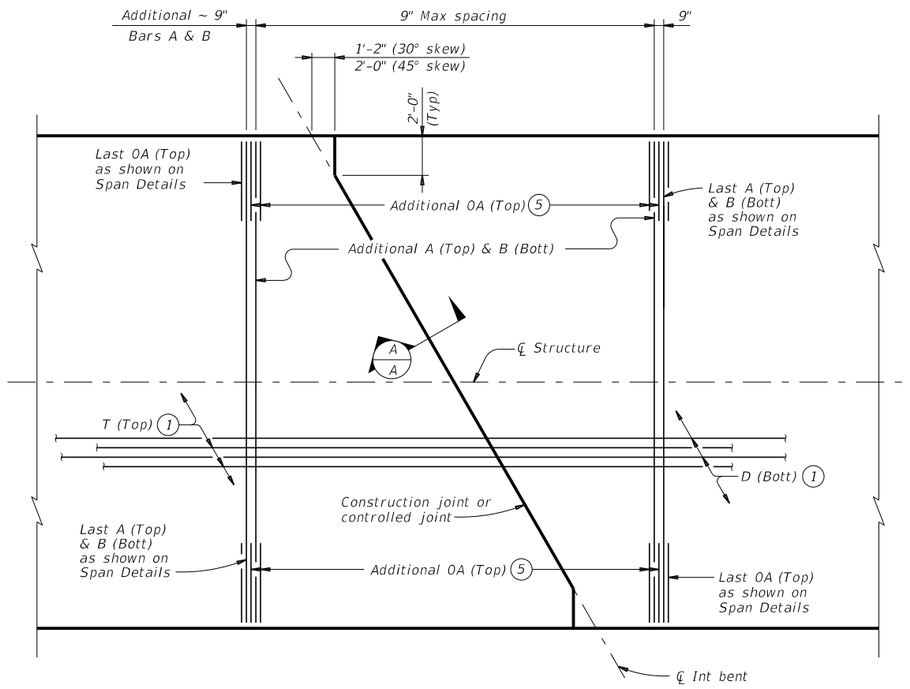
Aziz.Alebra



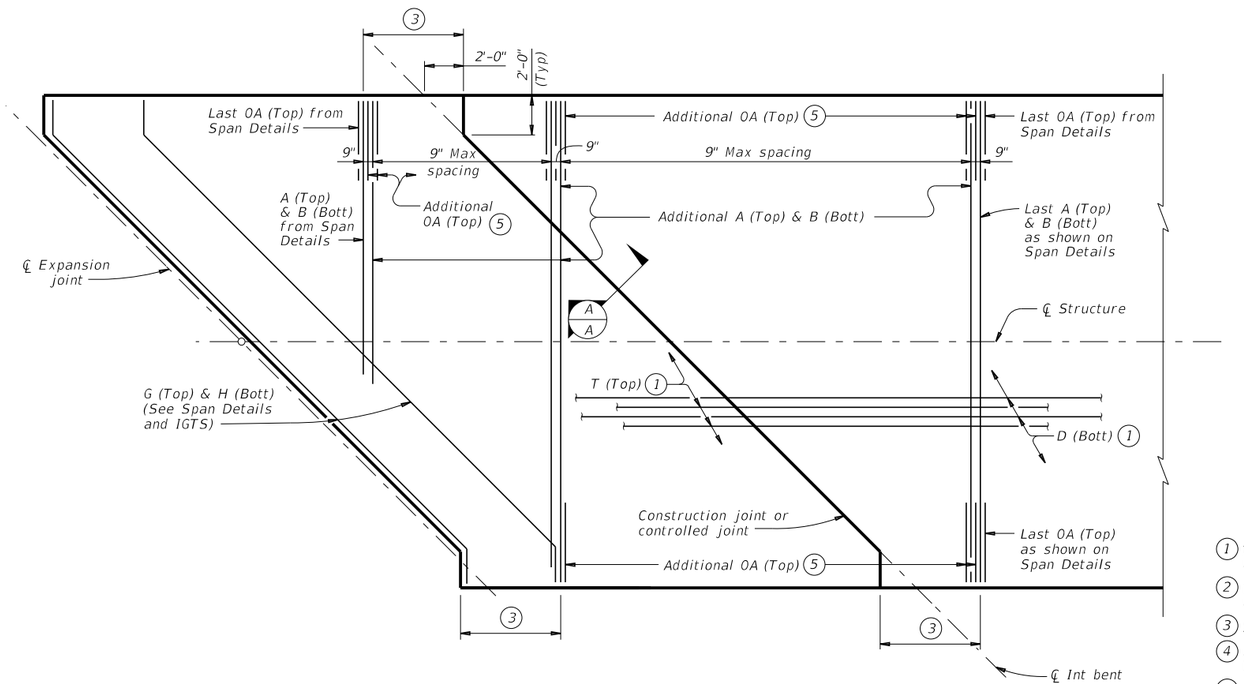
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



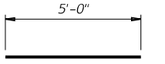
PLAN FOR 30° OR 45° SKEW

(Showing 30° skew)

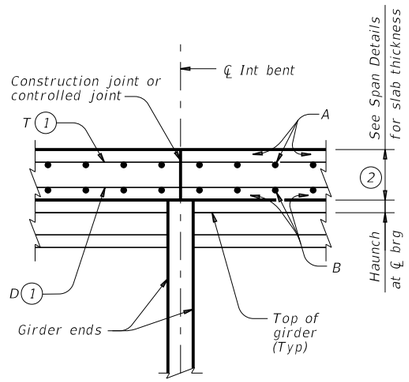


PLAN FOR 45° SKEW 4

(Showing short span condition.)



BARS OA (#5)



SECTION A-A

Bars 0A (Top) not shown for clarity.

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant slab thickness over the bent.
3. 5'-4" as shown on Span Details.
4. Use these details when no full slab width bars A and B are shown on Span Details.
5. Bars 0A (Top) at 9" Max spacing between Bars A (Top).
6. Values in table assume a temperature change of 70° F after erection when calculating thermal movement in one direction (not total).

TABLE OF ⑥ ALLOWABLE UNIT LENGTH

Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.1
1.00	3.9
2.00	3.7
3.00	3.5
4.00	3.3
5.00	3.1

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	#4
B	#4
D	#4
T	#4
0A	#5

The details shown on this sheet are applicable for two and three span units comprised of the same girder type.
Units may be comprised of different span lengths. See "Table of Allowable Unit Length".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

CONSTRUCTION NOTES:

Where multi-span units are indicated on the Bridge Layout, the thickened slab end details and reinforcement shown on IGTS standard (Bars AA, G, H, J, K, and M) and on the Span Details will be omitted where slabs are continuous over interior bents. At these locations, the slab details and reinforcement will be as shown on this sheet or on PCP standard (if using this option).

Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).

See Span Details for remainder of slab reinforcement and details.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if shown elsewhere on the plans.

Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

The details shown on this sheet are applicable for use only with the Prestressed Concrete I-Girder Standard Designs shown on standards IGSD-24, IGSD-28, IGSD-30, IGSD-32, IGSD-34, IGSD-38, IGSD-40 and IGSD-44.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

CONTINUOUS SLAB DETAILS

PRESTR CONC I-GIRDER SPANS

IGCS

FILE:	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
10-19: Added bubble note 6.	DIST	COUNTY		SHEET NO.
01-23: Added 34' Rdwy.	PHARR	CAMERON		112

DATE: 6/3/2024 8:42:47 AM
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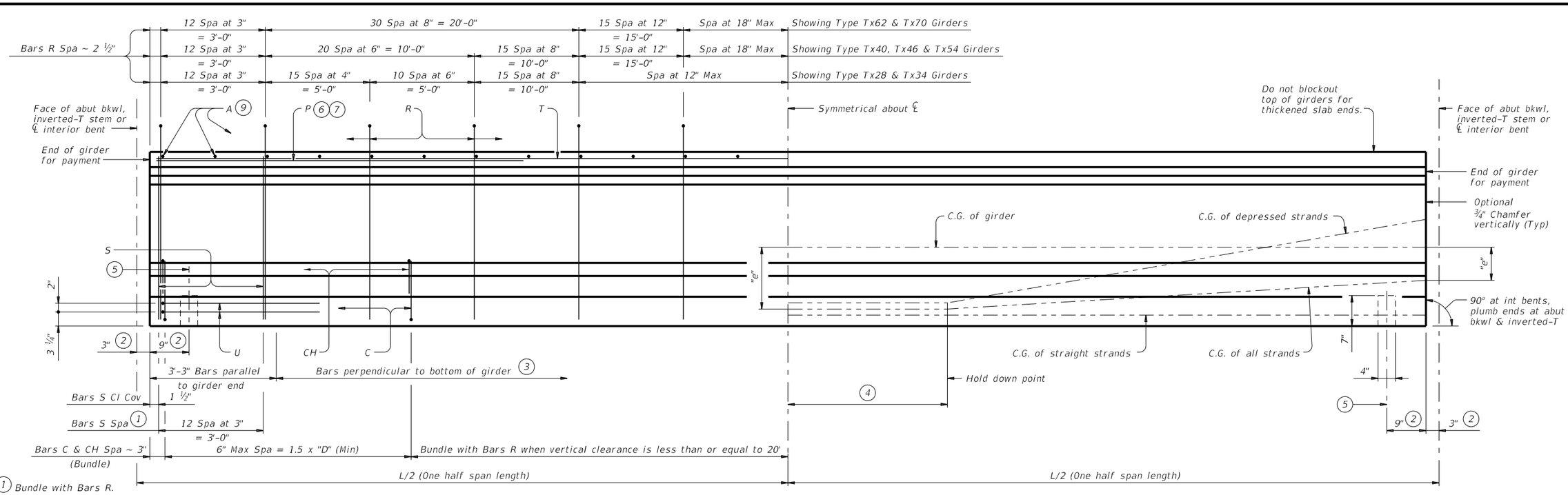
Aziz.Alebra



(1) Bundle with Bars R.

(2) Measured along ℄ Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.

(3) The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

(4) L/20, but not less than 5'-0" (-0,+2').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder 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.

GIRDER ELEVATION

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

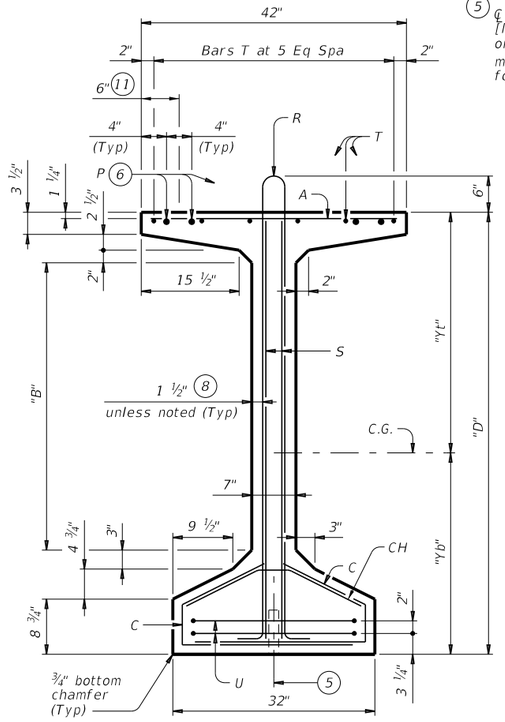
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

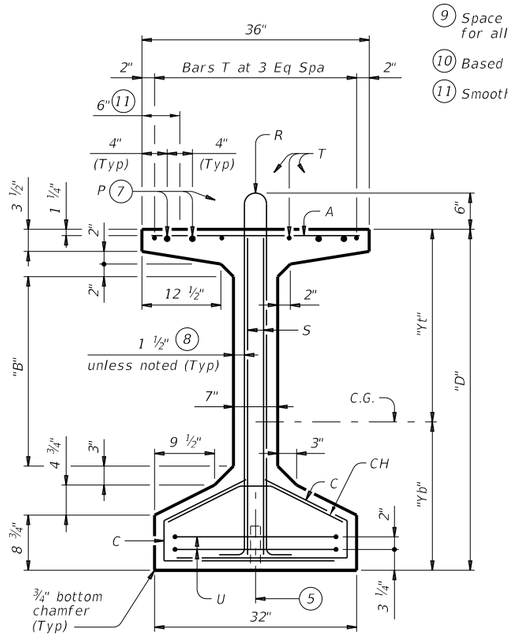
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

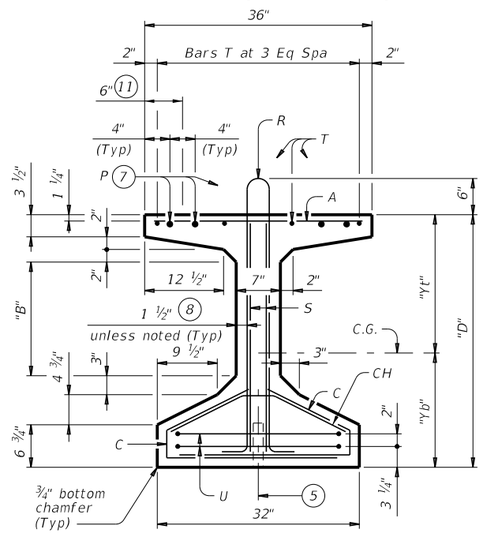
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	38.09	31.91	966	628,747	57,579	1,040

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.
When vertical clearance of the span is less than or equal to 20', provide additional Bars C and CH in every girder of that span.

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

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE:	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		113

DATE: 6/3/2024 8:42:51 AM
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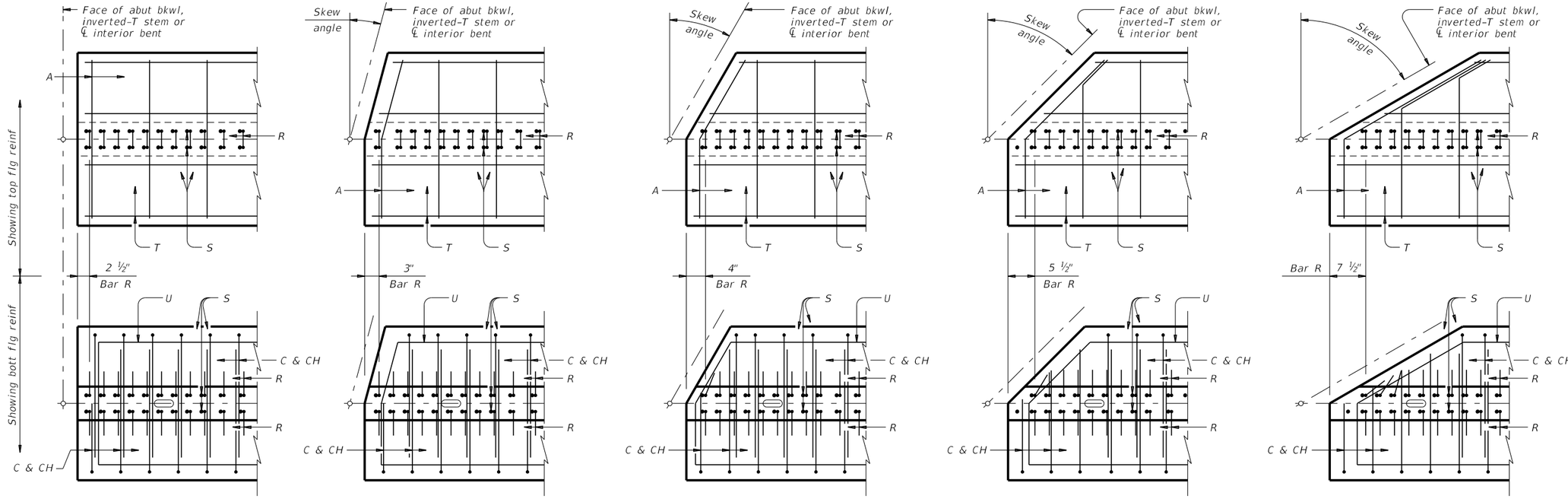
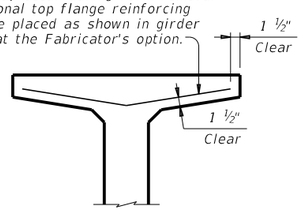
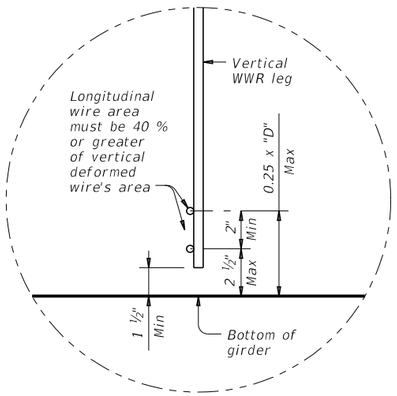


PLAN OF GIRDER ENDS (12)

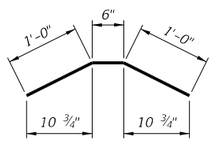
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



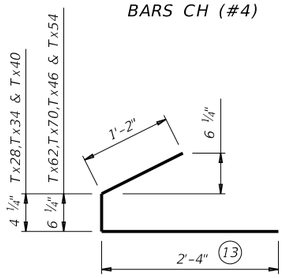
OPTIONAL TOP FLANGE REINFORCING DETAIL



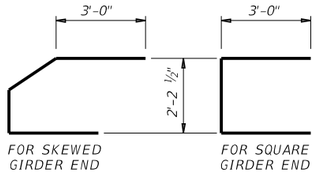
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



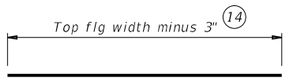
BARS CH (#4)



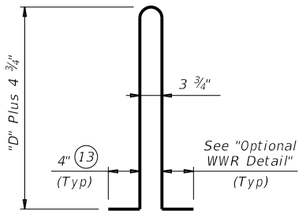
BARS C (#4)



BARS U (#5)

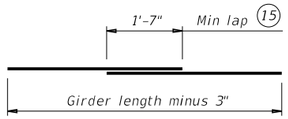


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE:	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
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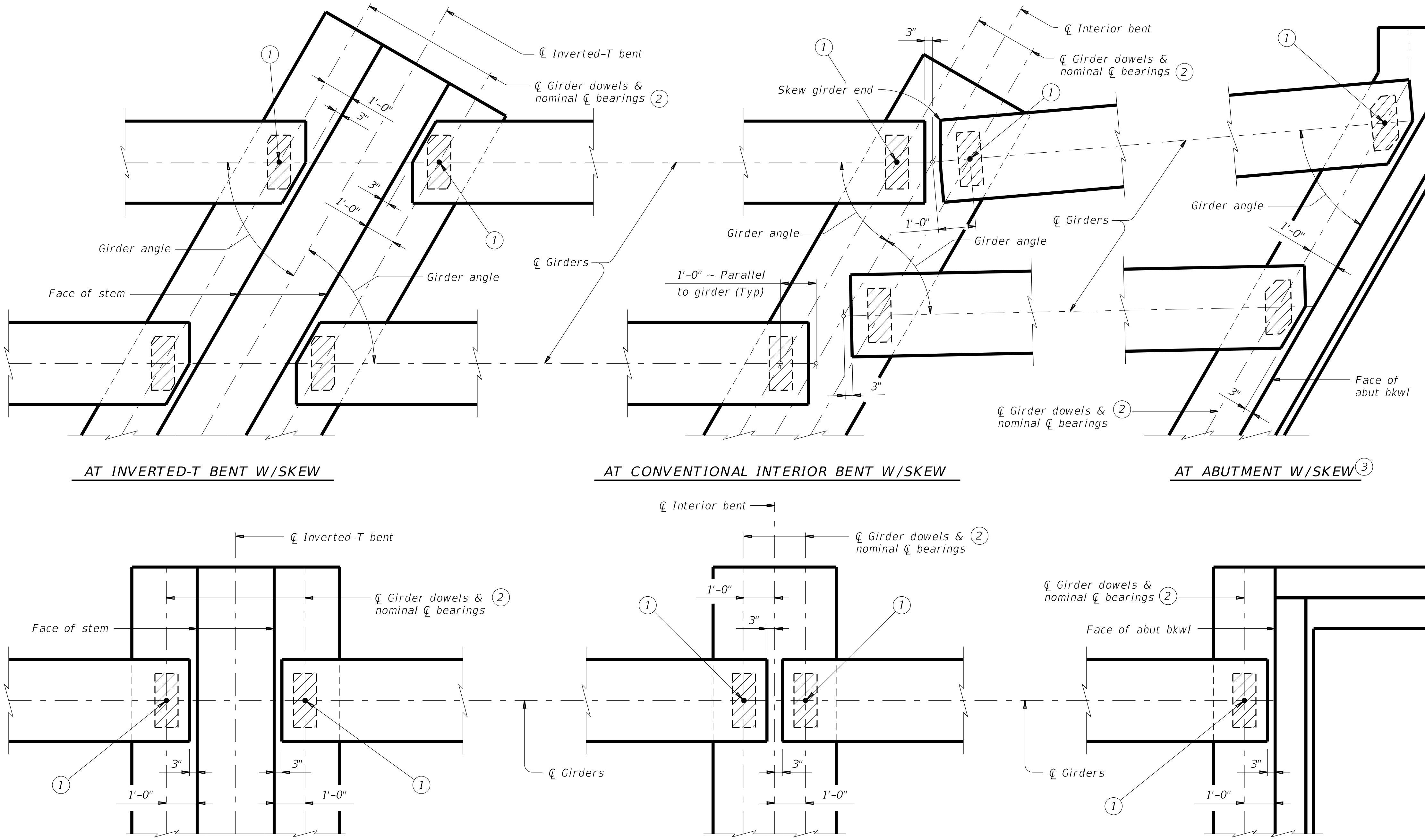
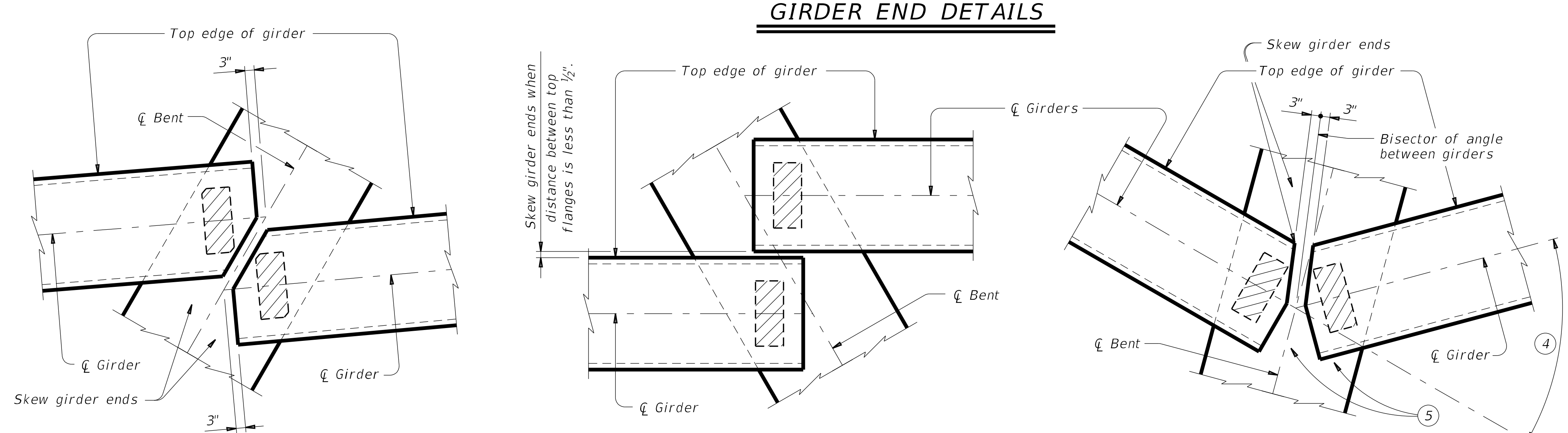
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clarified C and CH requirement	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		114



GIRDER END DETAILS



GIRDER CONFLICT DETAILS

1. Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.
2. For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
3. For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.
4. When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.
5. See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table reflects girder conflicts of this type on radial bents only.

GENERAL NOTES:

These details accommodate skew angles up to 60°.
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. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

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HL93 LOADING — SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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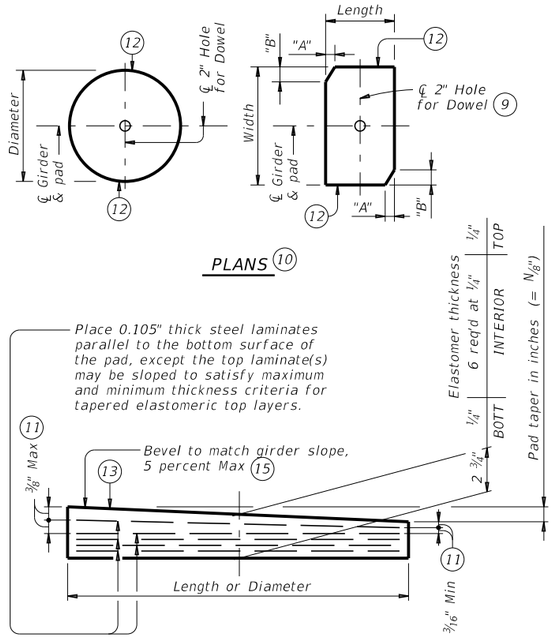
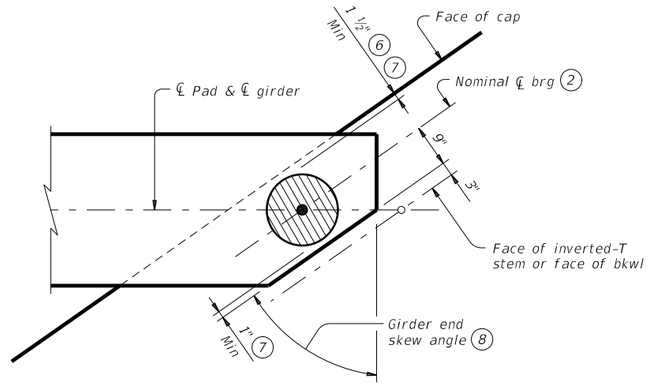


PLANS (10)

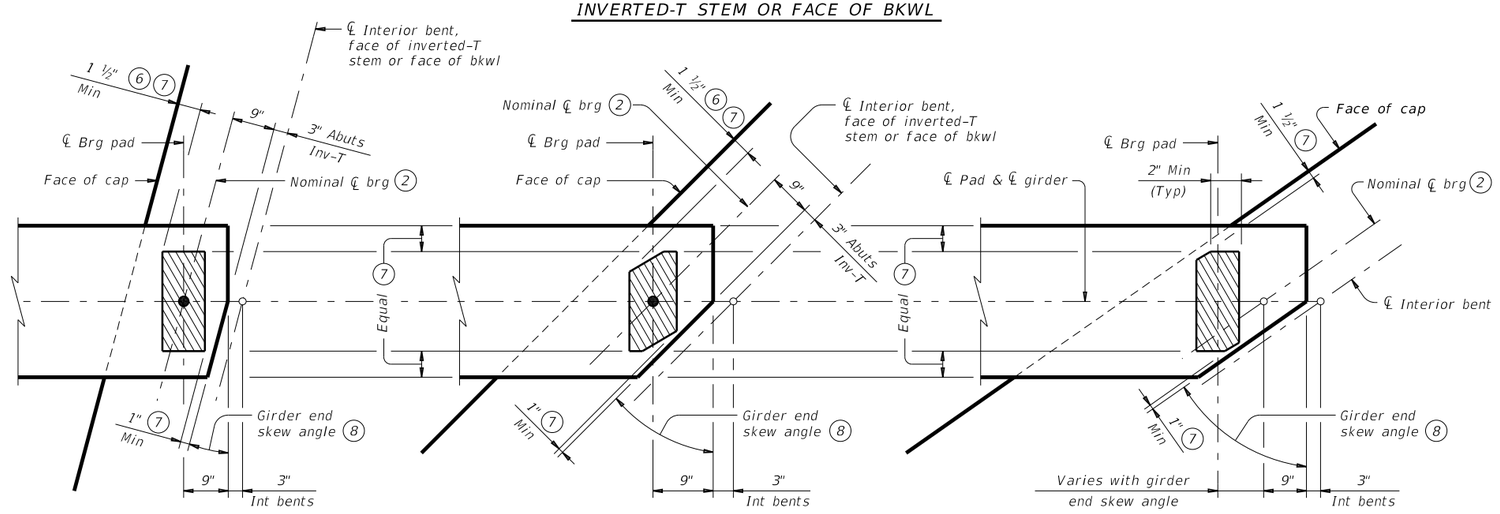
ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL



SKEWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

Girder Type	Abutments	Int Bents	Inv-T Bents
	Face of Bkwl to Face of Cap	Overall Cap Width	Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS

Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

(11) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(12) Locate Permanent Mark here.

(13) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must 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 girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

(14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.

(15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.

(16) If girder end is skewed for a girder conflict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS

PRESTR CONCRETE I-GIRDERS

IGEB

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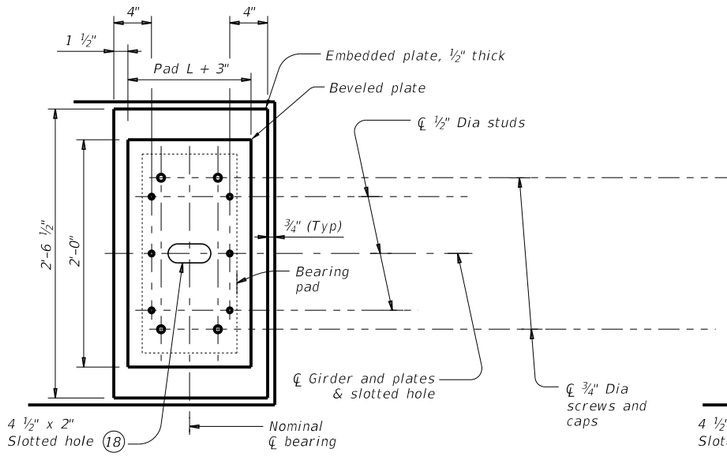
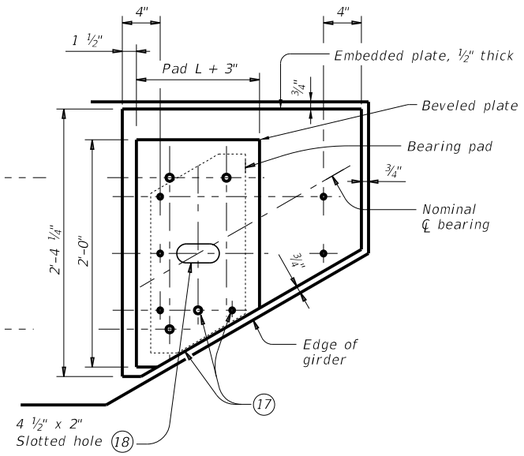
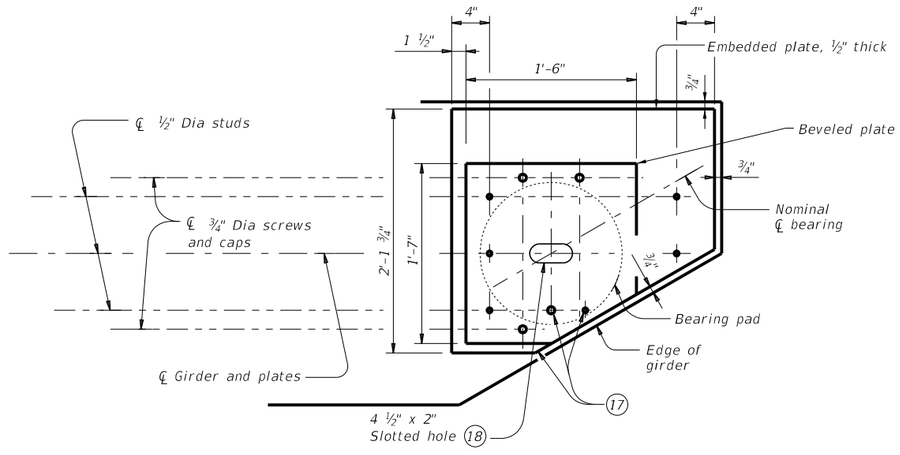


NORMAL GIRDER END
RECTANGULAR BEARING PAD

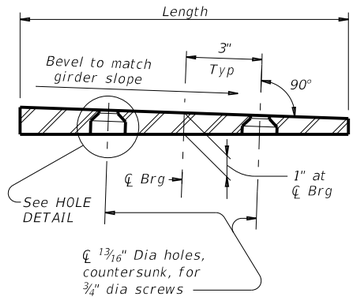


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD



SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



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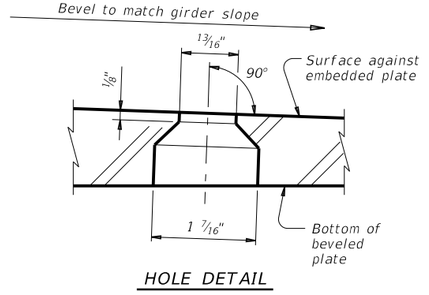
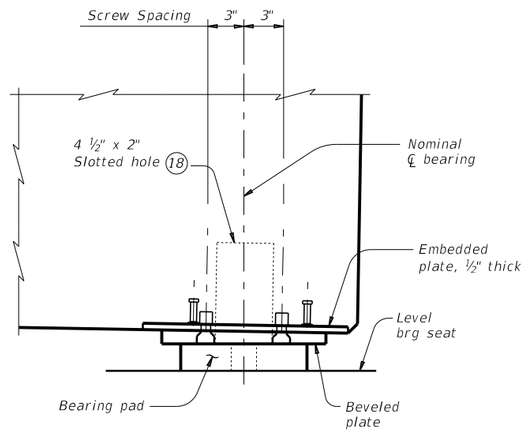
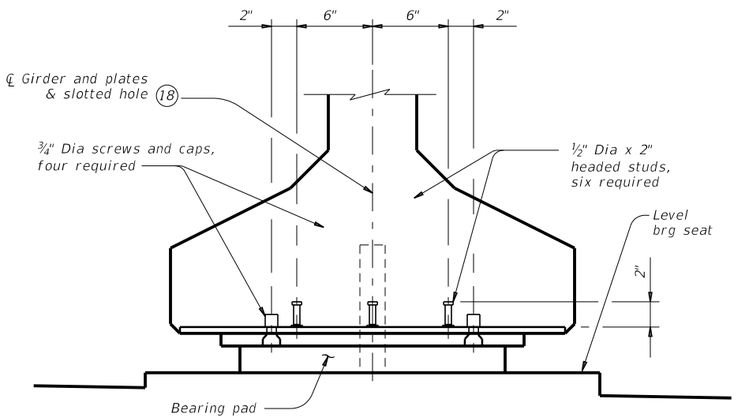


HOLE DETAIL

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

(17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.

(18) Slotted hole is required at doweled girder end locations.

SOLE PLATE NOTES:

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1/16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1/16"+/-, except variation from a plane parallel to the theoretical top surface can not exceed 1/16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

¾" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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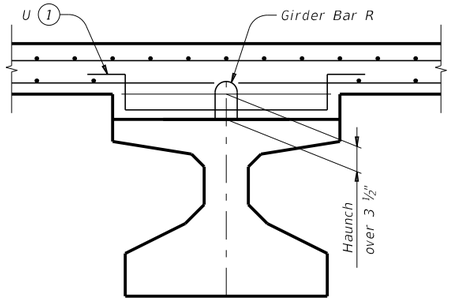
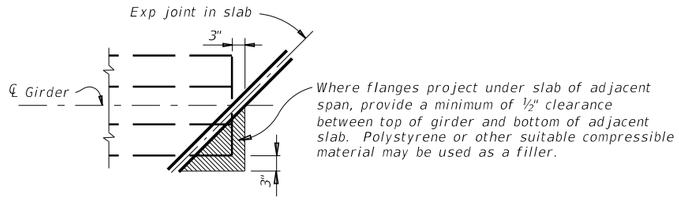
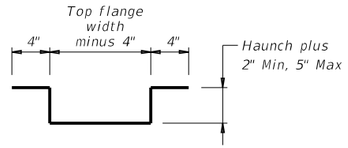


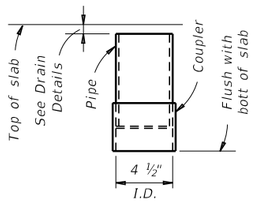
HAUNCH REINFORCING DETAIL



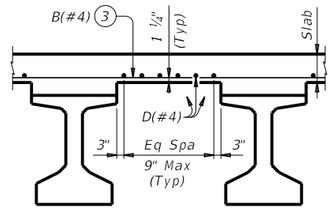
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

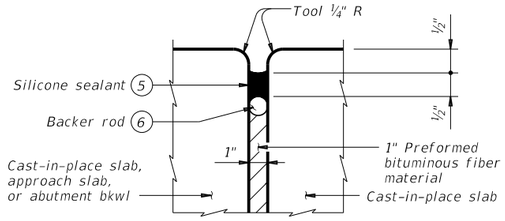


C-I-P DRAIN DETAIL (2)

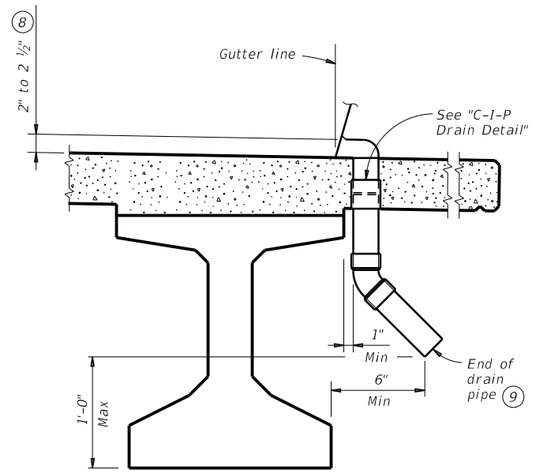


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

(1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

(2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

(4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(5) 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.

(6) 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.

(7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

(10) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

DECK FORMWORK NOTES:

Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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REVISIONS	2529	02	010		FM 2556		
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY			SHEET NO.		
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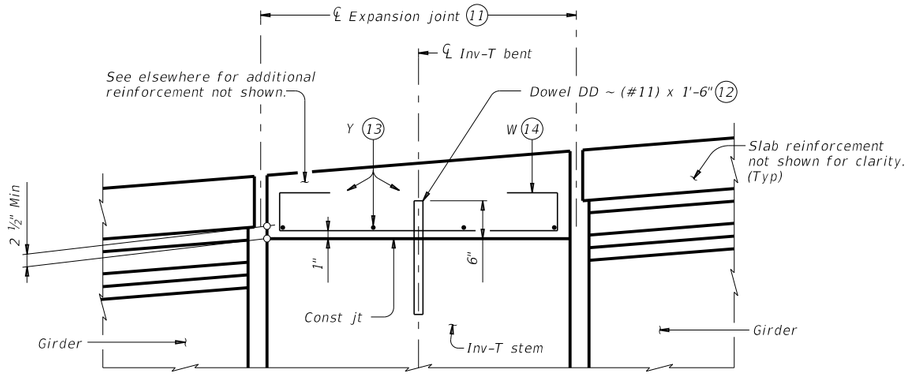
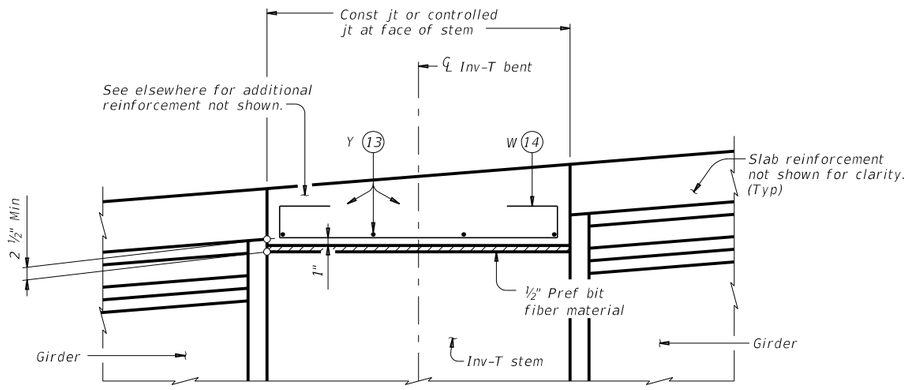
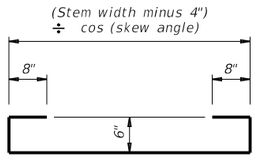


SHOWING EXPANSION JOINTS

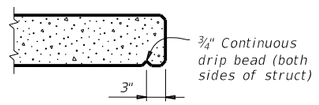


SHOWING CONST JTS OR CONTROLLED JTS

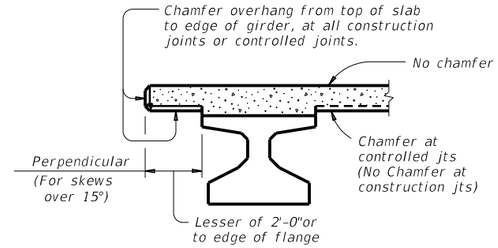
REINFORCEMENT OVER INV-T BENTS



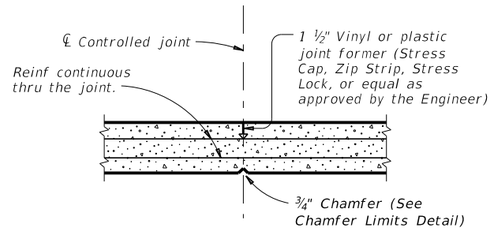
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmsstsl-19.dgn		DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT		
©TxDOT August 2017		CONT	SECT	JOB		HIGHWAY	
REVISIONS		2529	02	010		FM 2556	
10-19: Modified Note 7. Type A now a pay item.		DIST	COUNTY			SHEET NO.	
		PHARR	CAMERON			119	

STRUCTURE	DESIGNED GIRDERS: SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	DEPRESSED STRAND PATTERN: NO.	TO END (in)	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: 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) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	Shear	LOAD RATING FACTORS: STRENGTH I: Inv	Opr	SERVICE III: Inv
Type Tx28 Girders 44' Roadway 8.5" Slab	40	ALL	Tx28		12	0.6	270	10.48	10.48			4.700	5.000	1.118	-1.542	1586	0.760	0.960	1.71	2.22	2.09
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.500	5.500	1.403	-1.879	1555	0.740	0.970	1.39	1.80	1.53
	50	ALL	Tx28		14	0.6	270	10.48	9.62	2	8.5	4.000	5.200	1.733	-2.266	1813	0.710	0.970	1.37	1.78	1.34
	55	ALL	Tx28		16	0.6	270	10.23	9.23	4	8.5	4.000	5.600	2.083	-2.688	2121	0.700	0.980	1.31	1.69	1.13
	60	ALL	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.000	6.300	2.478	-3.135	2424	0.680	0.980	1.60	2.07	1.30
	65	ALL	Tx28		24	0.6	270	9.65	6.31	4	24.5	4.700	6.500	2.879	-3.586	2725	0.660	0.980	1.45	1.94	1.12
	70	ALL	Tx28		28	0.6	270	9.48	6.62	4	24.5	5.600	7.000	3.340	-4.101	3068	0.650	0.990	1.28	1.82	1.11
Type Tx34 Girders 44' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.881	-1.184	1785	0.790	0.940	2.01	2.60	2.70
	45	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.110	-1.440	1920	0.760	0.950	1.66	2.15	2.10
	50	ALL	Tx34		14	0.6	270	13.01	13.01			5.100	6.100	1.359	-1.735	2194	0.740	0.950	1.63	2.12	1.87
	55	ALL	Tx34		14	0.6	270	13.01	13.01			4.900	5.900	1.642	-2.056	2186	0.720	0.960	1.34	1.74	1.40
	60	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.934	-2.383	2493	0.700	0.960	1.33	1.73	1.24
	65	ALL	Tx34		18	0.6	270	12.57	11.23	4	10.5	4.000	5.200	2.267	-2.754	2839	0.690	0.960	1.21	1.68	1.07
	70	ALL	Tx34		22	0.6	270	12.28	7.92	4	28.5	4.000	5.700	2.604	-3.128	3186	0.680	0.970	1.44	1.86	1.09
	75	ALL	Tx34		26	0.6	270	12.09	8.40	4	28.5	4.800	6.000	2.980	-3.521	3523	0.660	0.970	1.55	2.01	1.14
	80	ALL	Tx34		30	0.6	270	11.81	7.41	6	28.5	5.200	6.200	3.356	-3.927	3886	0.650	0.970	1.37	2.01	1.10
	85	ALL	Tx34		34	0.6	270	11.48	7.60	6	28.5	5.900	6.600	3.782	-4.375	4273	0.640	0.980	1.37	1.75	1.06
Type Tx40 Girders 44' Roadway 8.5" Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.727	-0.959	1847	0.820	0.930	1.84	2.39	2.77
	45	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.913	-1.165	2181	0.790	0.930	1.90	2.47	2.61
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.500	1.125	-1.410	2588	0.770	0.940	1.87	2.42	2.34
	55	ALL	Tx40		14	0.6	270	15.60	15.60			4.300	5.300	1.347	-1.662	2519	0.750	0.940	1.55	2.01	1.84
	60	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.598	-1.935	2633	0.730	0.950	1.54	2.00	1.66
	65	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.868	-2.224	2927	0.710	0.950	1.31	1.70	1.29
	70	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.144	-2.525	3287	0.700	0.950	1.30	1.69	1.16
	75	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.000	2.451	-2.841	3637	0.680	0.950	1.31	1.76	1.03
	80	ALL	Tx40		24	0.6	270	14.77	9.43	4	36.5	4.000	5.400	2.758	-3.168	4013	0.670	0.960	1.31	1.89	1.09
	85	ALL	Tx40		28	0.6	270	14.60	10.03	4	36.5	4.800	5.600	3.106	-3.529	4415	0.660	0.960	1.42	2.03	1.12
	90	ALL	Tx40		32	0.6	270	14.23	8.60	6	36.5	5.100	5.700	3.445	-3.881	4809	0.650	0.960	1.51	2.11	1.11
	95	ALL	Tx40		34	0.6	270	14.07	10.19	6	28.5	5.800	6.800	3.829	-4.272	5232	0.640	0.970	1.40	1.85	1.02
Type Tx46 Girders 44' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.638	-0.765	1924	0.850	0.920	2.04	2.65	3.31
	45	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.800	-0.930	2275	0.820	0.920	2.11	2.74	3.13
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.983	-1.120	2688	0.790	0.920	1.73	2.25	2.47
	55	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.184	-1.328	3015	0.770	0.930	1.75	2.27	2.28
	60	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.406	-1.555	2964	0.760	0.930	1.45	1.88	1.78
	65	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.629	-1.779	3161	0.740	0.930	1.47	1.91	1.66
	70	ALL	Tx46		16	0.6	270	17.35	16.85	4	6.5	4.000	5.000	1.880	-2.022	3426	0.720	0.940	1.26	1.63	1.30
	75	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.151	-2.287	3827	0.710	0.940	1.27	1.64	1.18
	80	ALL	Tx46		20	0.6	270	17.00	15.40	4	12.5	4.000	5.000	2.422	-2.552	4226	0.700	0.940	1.26	1.65	1.07
	85	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.000	2.725	-2.843	4652	0.690	0.940	1.43	1.86	1.11
	90	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.100	3.022	-3.129	5071	0.680	0.950	1.55	2.03	1.15
	95	ALL	Tx46		32	0.6	270	16.23	9.48	6	42.5	4.400	5.300	3.358	-3.445	5521	0.670	0.950	1.62	2.15	1.13
	100	ALL	Tx46		34	0.6	270	16.07	10.43	6	38.5	4.900	5.600	3.710	-3.774	5983	0.660	0.950	1.43	2.07	1.03
	105	ALL	Tx46		38	0.6	270	15.81	10.76	6	38.5	5.500	6.300	4.063	-4.103	6444	0.650	0.950	1.52	2.14	1.05
	110	ALL	Tx46		42	0.6	270	15.60	10.75	6	40.5	6.000	6.900	4.429	-4.443	6915	0.640	0.950	1.58	1.83	1.06

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(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.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders 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.

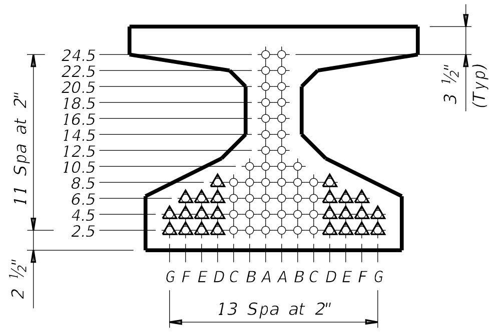
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

When shown on this sheet, the Fabricator has the option of furnishing either the designed girder or an approved optional design. All optional design submittals must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

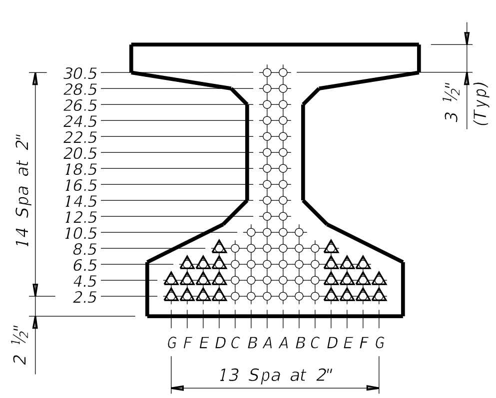
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

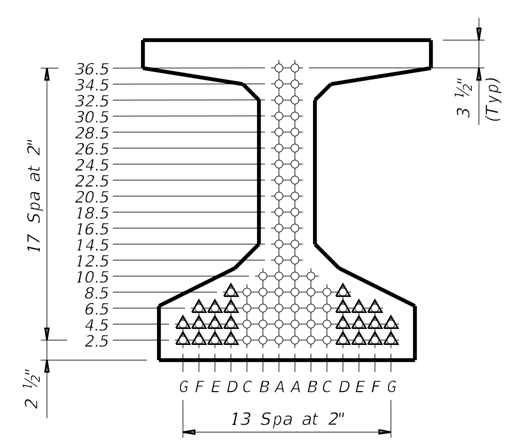
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



TYPE Tx28



TYPE Tx34



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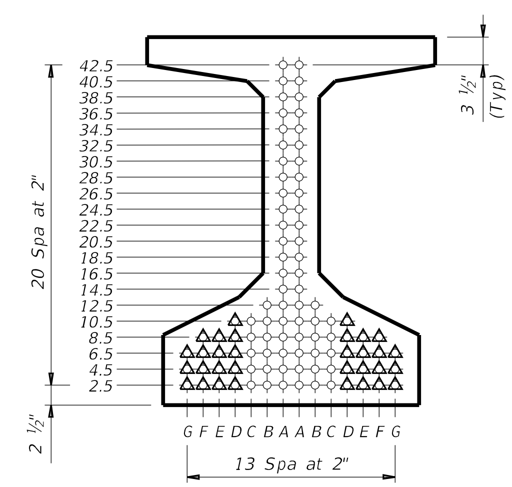


TYPE Tx46

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

44' ROADWAY

IGSD-44

FILE:	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	2529	02	010	FM 2556
	DIST		COUNTY	SHEET NO.
	PHARR		CAMERON	120

DATE: 6/3/2024 8:43:25 AM
FILE: c:\dms\bridgeformer-pw\aziz.alebra@bridgeformer.com\dms02040\FM2556-IG-IGSD44-21-02.dgn
Aziz.Alebra

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS			
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	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) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
Type Tx54 Girders 44' Roadway 8.5" Slab	40	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.530	-0.623	1989	0.880	0.910	2.33	3.03	3.97
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.662	-0.758	2354	0.850	0.910	2.42	3.13	3.78
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.812	-0.912	2784	0.820	0.910	2.00	2.59	3.04
	55	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	0.978	-1.081	3245	0.800	0.920	2.02	2.61	2.83
	60	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.157	-1.259	3617	0.780	0.920	1.71	2.21	2.31
	65	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.350	-1.447	3859	0.760	0.920	1.73	2.25	2.17
	70	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.548	-1.644	3811	0.750	0.920	1.48	1.92	1.76
	75	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	1.766	-1.851	4040	0.730	0.930	1.51	1.96	1.66
	80	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.002	-2.076	4367	0.720	0.930	1.30	1.69	1.31
	85	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.251	-2.312	4809	0.710	0.930	1.12	1.45	1.01
	90	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.496	-2.545	5246	0.700	0.930	1.33	1.73	1.13
	95	ALL	Tx54		24	0.6	270	20.17	17.84	4	18.5	4.000	5.000	2.771	-2.802	5712	0.690	0.930	1.33	1.73	1.02
	100	ALL	Tx54		28	0.6	270	20.01	14.29	4	44.5	4.000	5.000	3.060	-3.069	6192	0.680	0.940	1.48	1.93	1.05
	105	ALL	Tx54		32	0.6	270	19.63	11.38	6	50.5	4.100	5.000	3.338	-3.327	6660	0.670	0.940	1.61	2.09	1.07
	110	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.400	3.652	-3.613	7163	0.660	0.940	1.53	2.04	1.02
	115	ALL	Tx54		38	0.6	270	19.22	12.27	6	50.5	5.000	5.900	3.980	-3.910	7680	0.650	0.940	1.49	2.00	1.04
	120	ALL	Tx54		42	0.6	270	19.01	12.72	6	50.5	5.600	6.500	4.311	-4.222	8253	0.650	0.940	1.50	2.01	1.07
	125	ALL	Tx54		46	0.6	270	18.66	11.36	8	50.5	5.800	7.100	4.665	-4.539	8796	0.640	0.940	1.45	1.87	1.04
Type Tx62 Girders 44' Roadway 8.5" Slab	60	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	0.911	-1.054	3863	0.800	0.910	1.93	2.51	2.79
	65	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.063	-1.217	4246	0.790	0.910	1.63	2.12	2.28
	70	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.224	-1.383	4540	0.770	0.910	1.68	2.18	2.18
	75	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.398	-1.564	4494	0.760	0.920	1.44	1.87	1.78
	80	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.567	-1.736	4780	0.740	0.920	1.50	1.94	1.73
	85	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.760	-1.933	5010	0.730	0.920	1.30	1.68	1.40
	90	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.965	-2.140	5488	0.720	0.920	1.12	1.45	1.10
	95	ALL	Tx62		20	0.6	270	25.18	24.78	4	6.5	4.000	5.000	2.179	-2.355	5980	0.710	0.920	1.15	1.49	1.04
	100	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.405	-2.579	6487	0.700	0.920	1.36	1.76	1.14
	105	ALL	Tx62		26	0.6	270	24.85	22.70	4	18.5	4.000	5.000	2.620	-2.795	6978	0.690	0.930	1.37	1.78	1.07
	110	ALL	Tx62		30	0.6	270	24.58	17.78	6	40.5	4.000	5.000	2.864	-3.035	7510	0.680	0.930	1.52	1.97	1.10
	115	ALL	Tx62		34	0.6	270	24.25	15.42	6	56.5	4.200	5.000	3.119	-3.284	8055	0.670	0.930	1.50	1.95	1.00
	120	ALL	Tx62		36	0.6	270	24.11	15.78	6	56.5	4.500	5.300	3.357	-3.518	8575	0.660	0.930	1.63	2.11	1.07
	125	ALL	Tx62		40	0.6	270	23.88	16.08	6	58.5	5.000	5.900	3.637	-3.798	9210	0.660	0.930	1.58	2.04	1.02
	130	ALL	Tx62		42	0.6	270	23.78	16.35	6	58.5	5.300	6.200	3.888	-4.044	9750	0.650	0.930	1.40	2.16	1.05
	135	ALL	Tx62		46	0.6	270	23.43	14.73	8	58.5	5.500	6.400	4.180	-4.324	10345	0.640	0.940	1.46	1.90	1.05

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

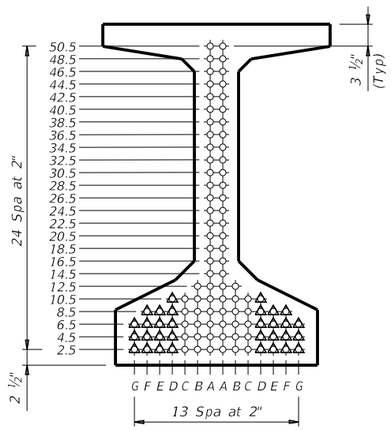
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

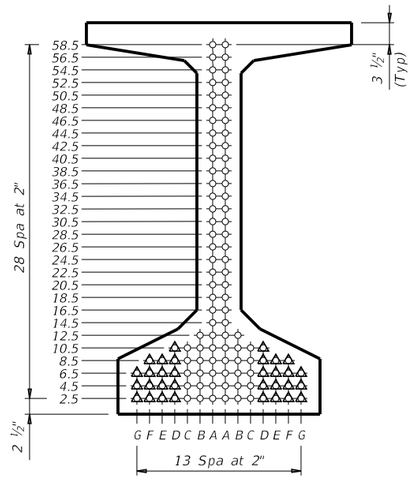
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING SHEET 2 OF 2

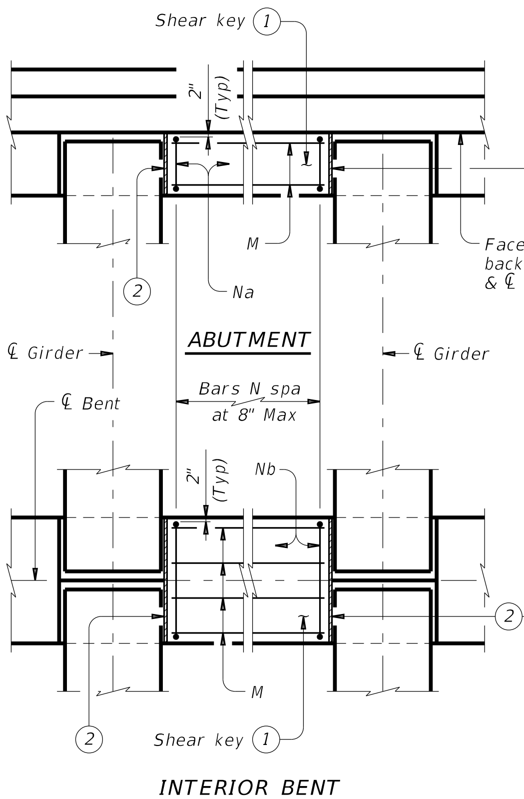
Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

44' ROADWAY

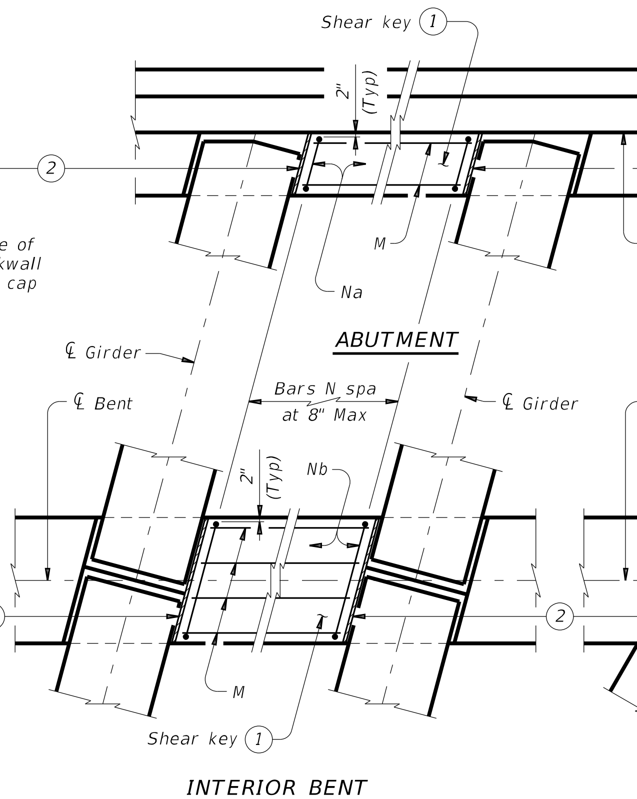
IGSD-44

FILE:	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		121



PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.



PARTIAL PLANS WITH 15° SKEW

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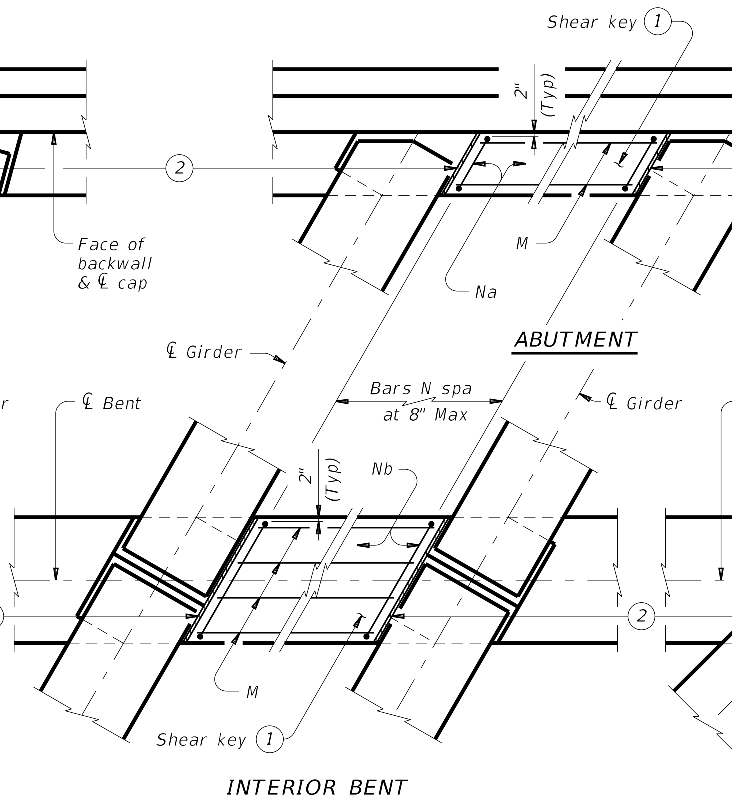
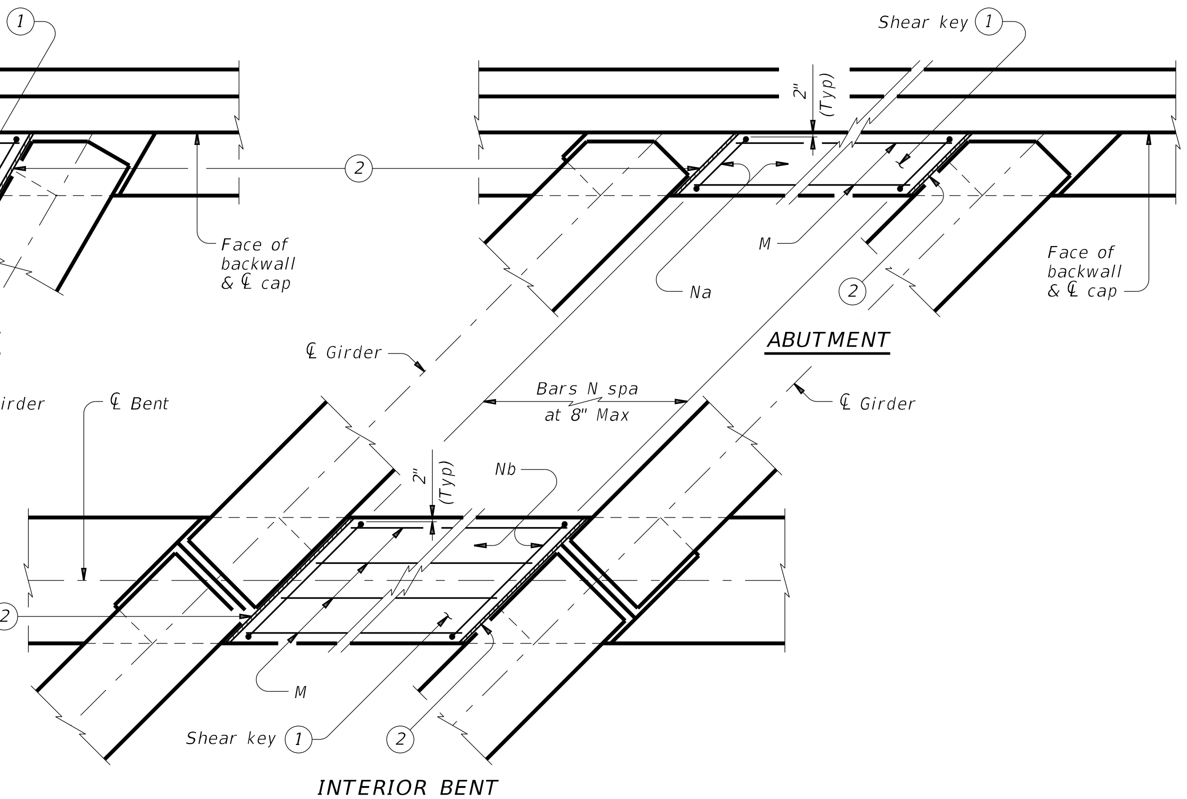


PARTIAL PLANS WITH 30° SKEW

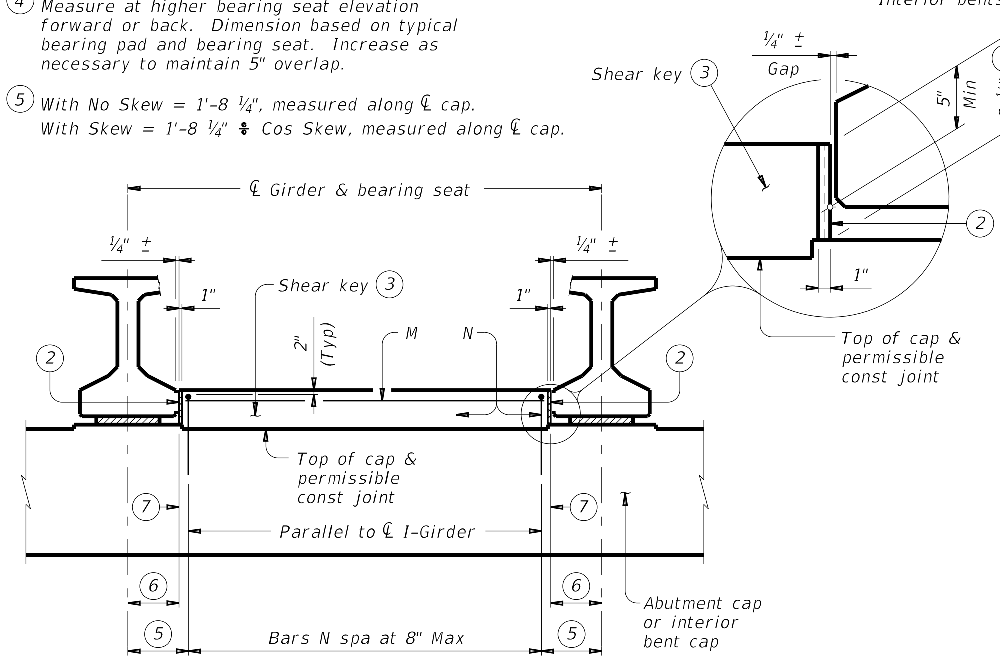
Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.



PARTIAL PLANS WITH 45° SKEW

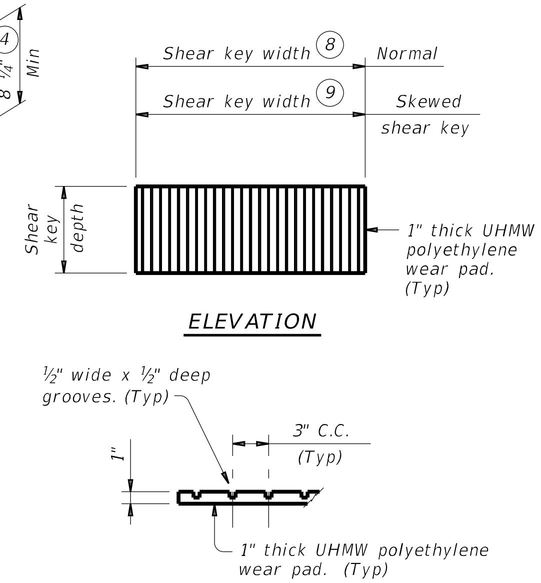
Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

1. Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.
2. UHMW polyethylene wear pad. (Typ)
3. Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from flowing under girder. 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 = 1'-8 ¼", measured along ℄ cap. With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.
6. With No Skew = 1'-4 ¼", measured along ℄ cap. With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.
7. Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.
8. Abutments = ½ Cap width. Interior bents = Cap width.
9. Abutments = ½ Cap width ÷ Cos Skew. Interior bents = Cap width ÷ Cos Skew.

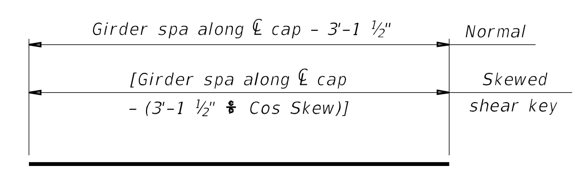


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

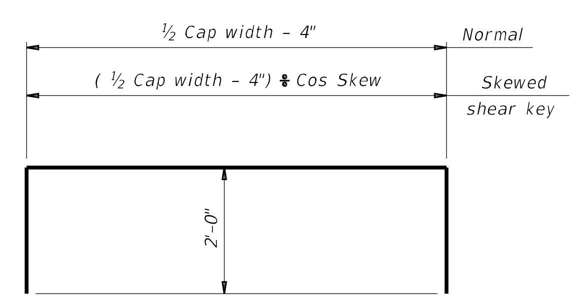
Showing shear key with girder Type Tx46. Other I-Girder types similar.



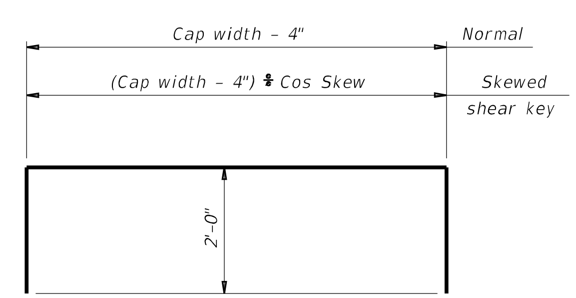
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

DATE: 6/3/2024 8:43:30 AM Aziz.Alebra
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Texas Department of Transportation
Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	PHARR		CAMERON	122

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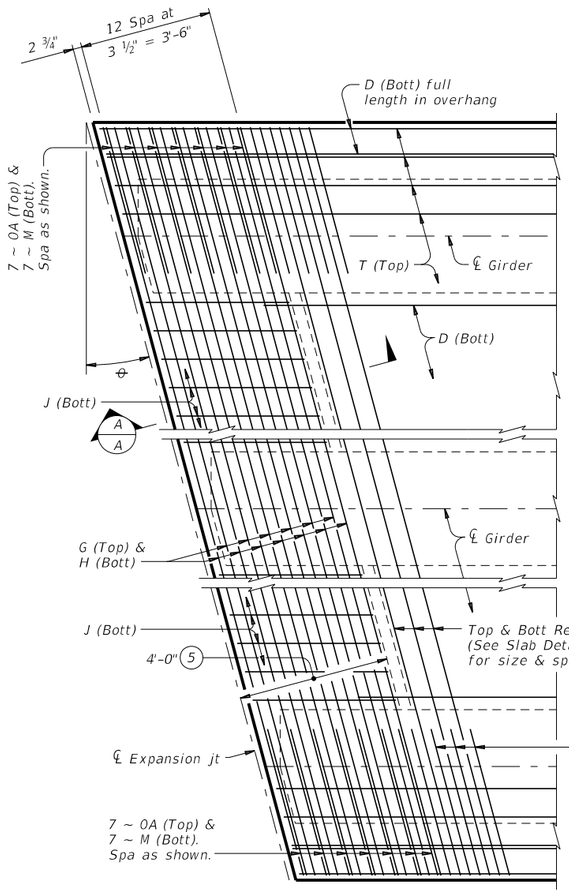
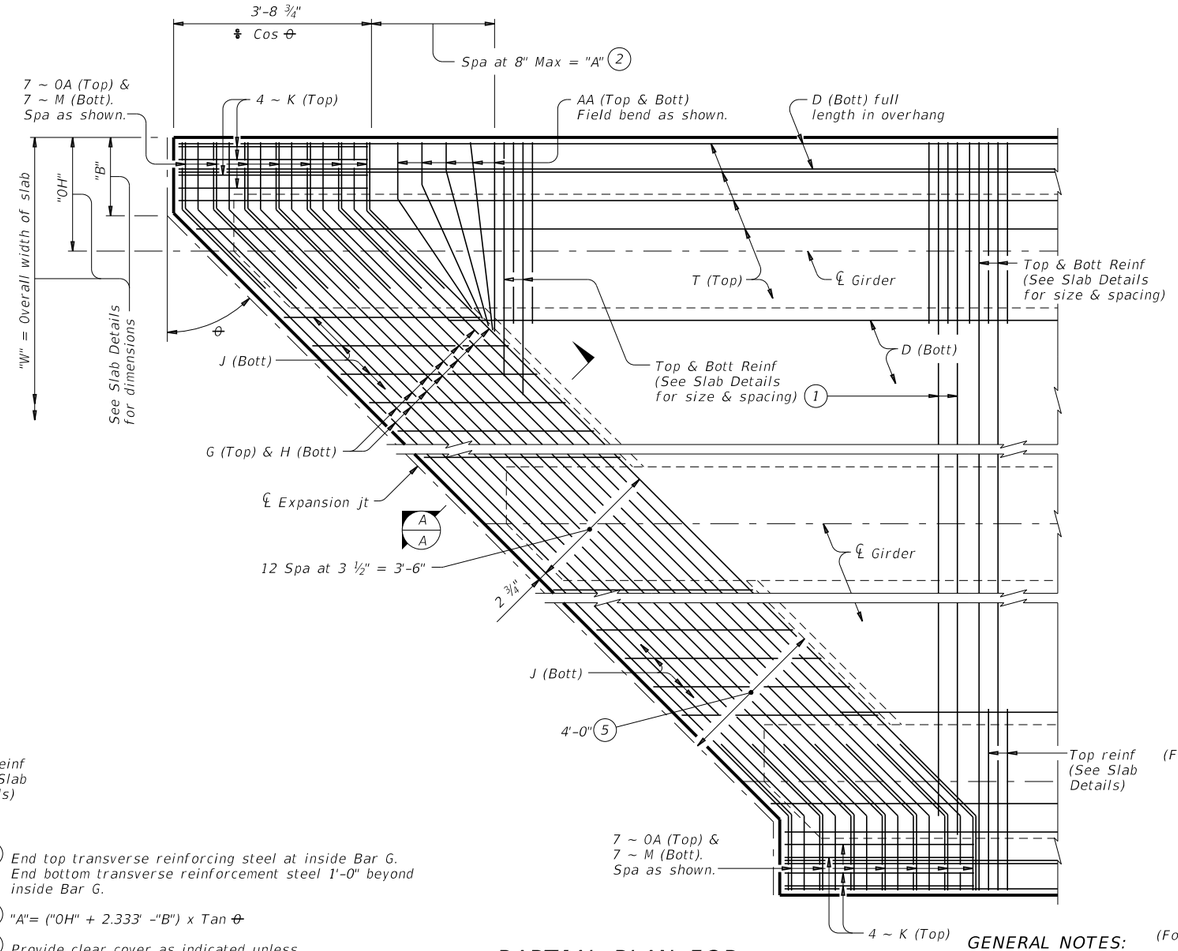
Aziz Alebra



PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

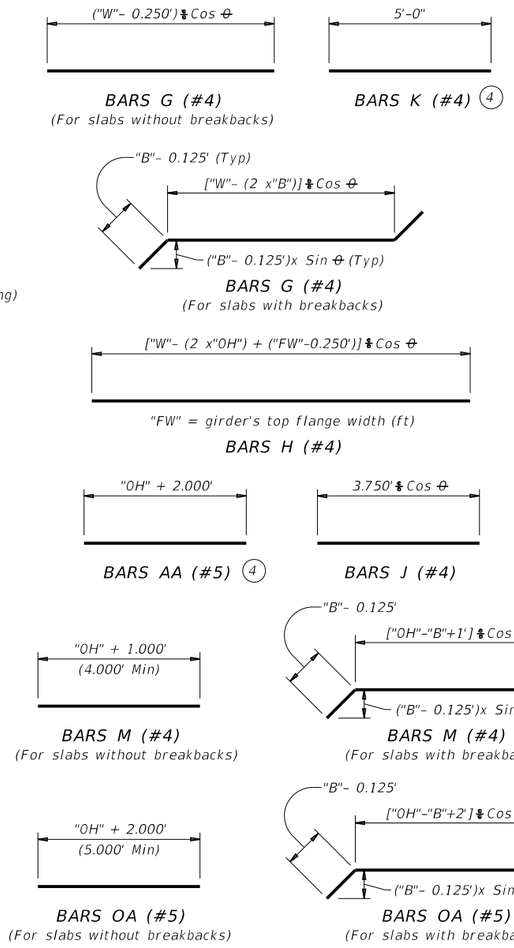
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("OH" + 2.333' -"B") x Tan θ

(3) Provide clear cover as indicated 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.



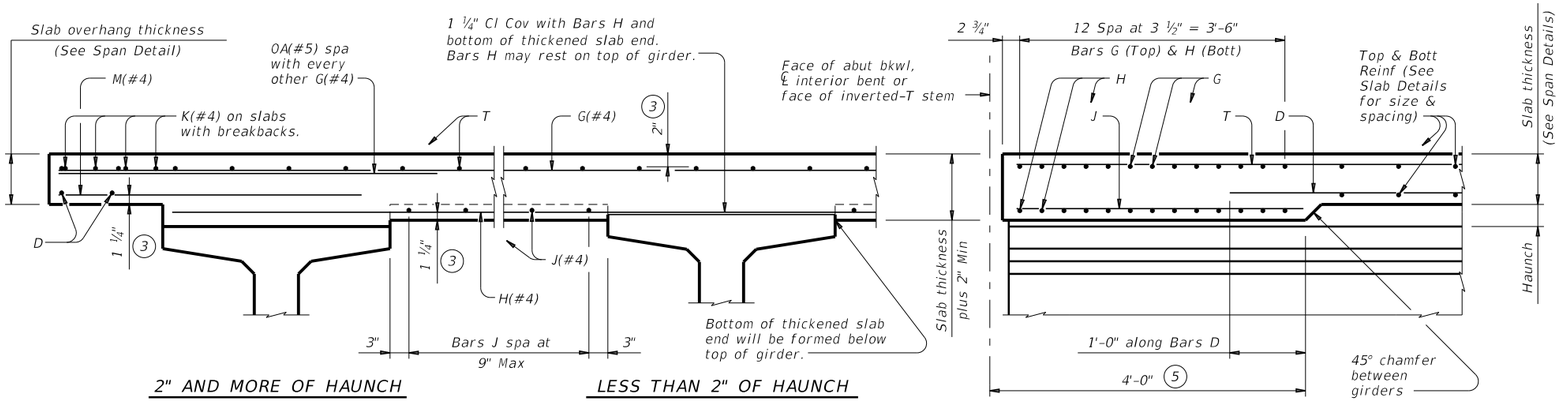
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

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



TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)

SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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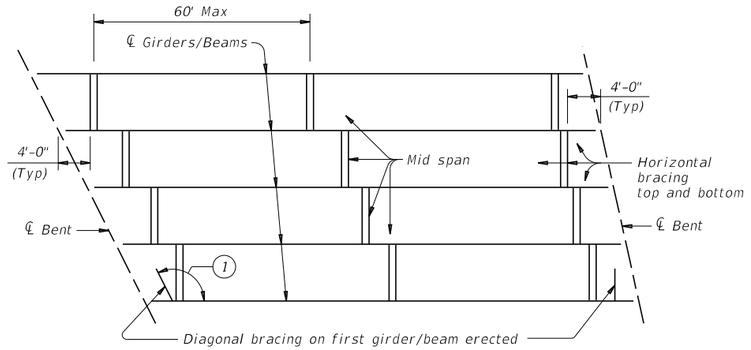
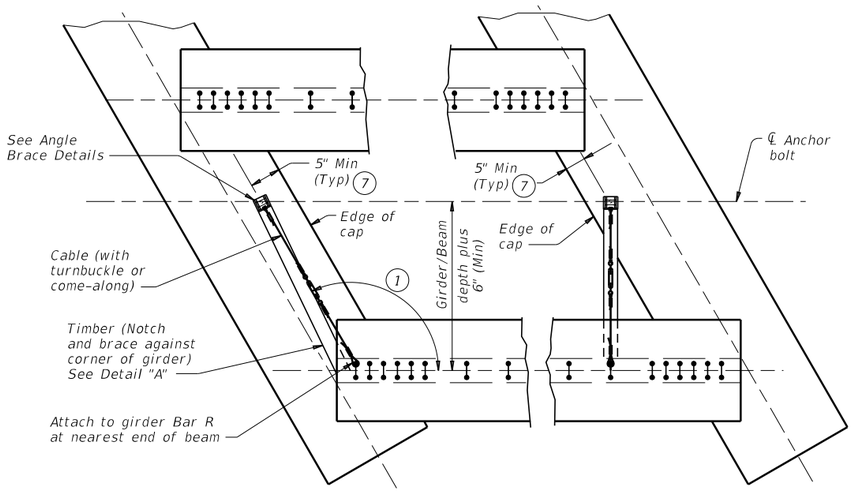
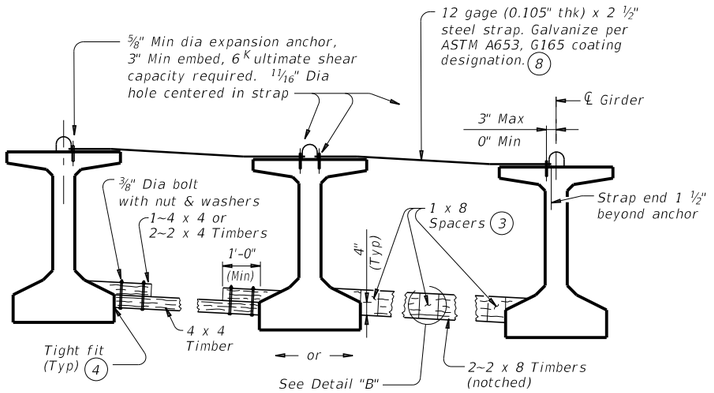


ERECTION BRACING

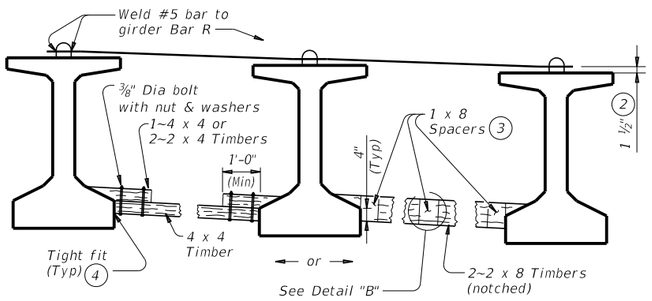


PLAN



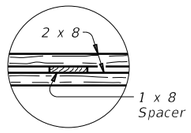
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



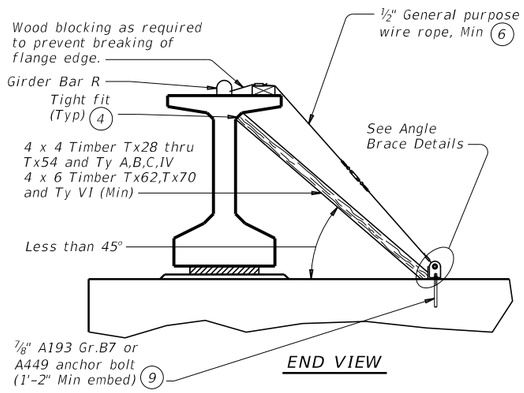
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5



PLAN

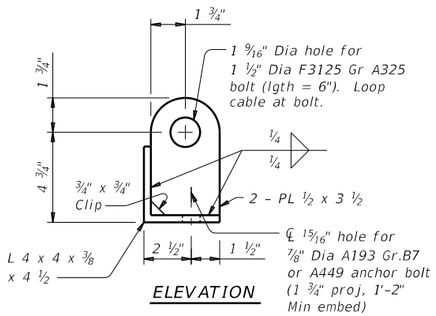
DETAIL "B"



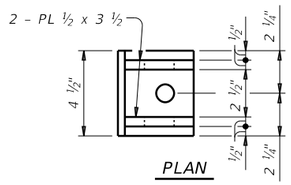
END VIEW

DIAGONAL BRACING DETAILS 5

(To be used on both ends of the first girder/beam erected in the span in each phase.)



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

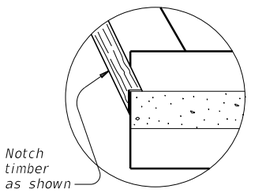
ERECTION BRACING:

Erection bracing details shown are considered the minimum for fulfilling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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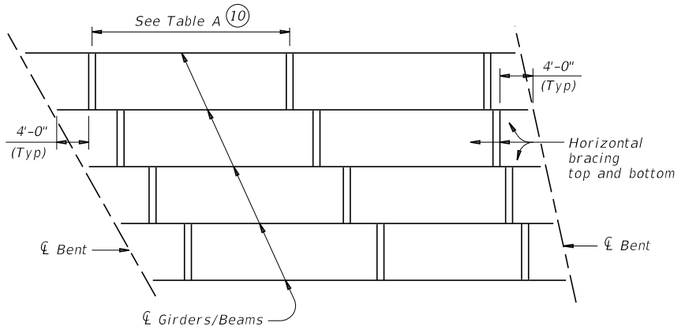
	PHARR	CAMERON		124



SLAB PLACEMENT BRACING

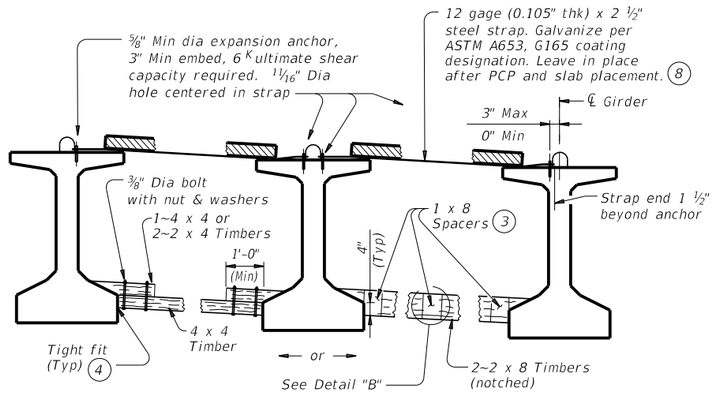
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

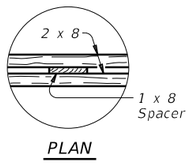
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" (11)	Slab Overhang 4'-0" and greater (11)
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft



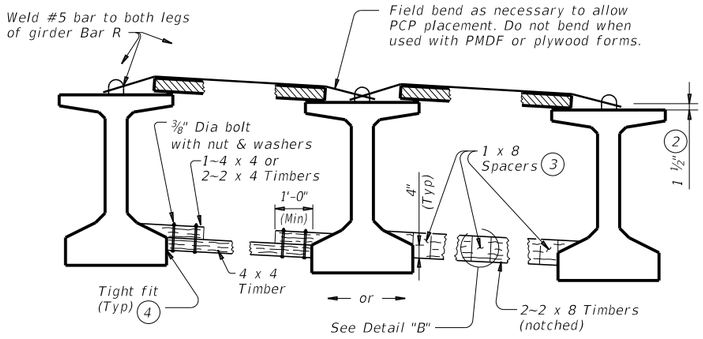
FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



PLAN

DETAIL "B"



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(8) Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

(10) Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

(11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

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 or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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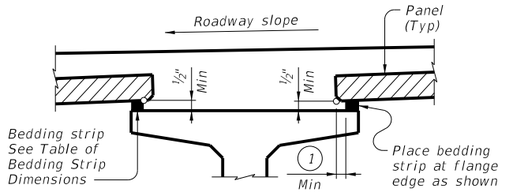
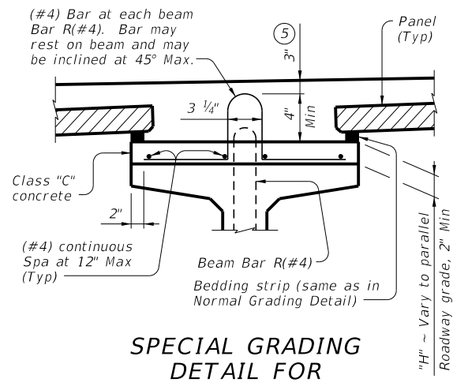
	PHARR	CAMERON		125



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-girders, 1 ½" Min for all other beam types.

(2) Allowed for prestressed concrete 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..

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.

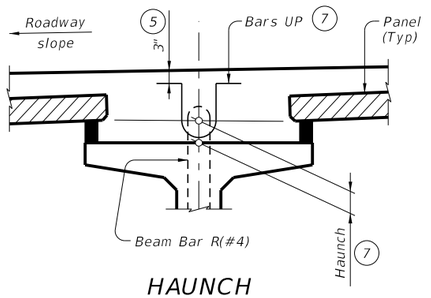
These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

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".

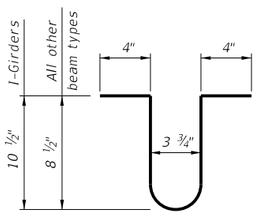
Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

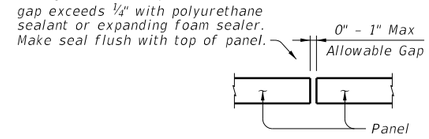


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders. (Other beam types similar)

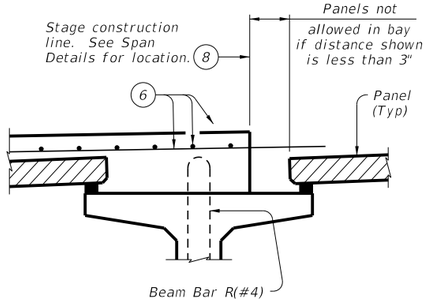


BARS UP (#4) (7)

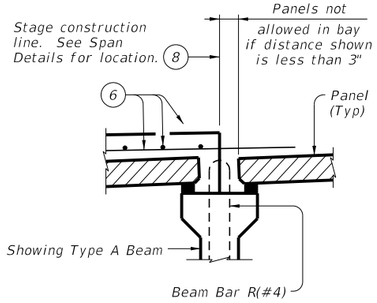


PANEL JOINTS

(Panel reinforcing not shown for clarity. The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



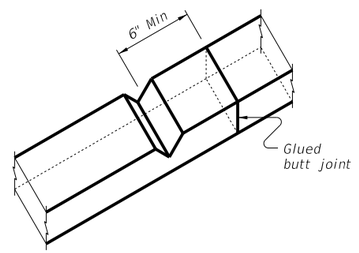
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

HL93 LOADING SHEET 1 OF 4

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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	PHARR	CAMERON		126

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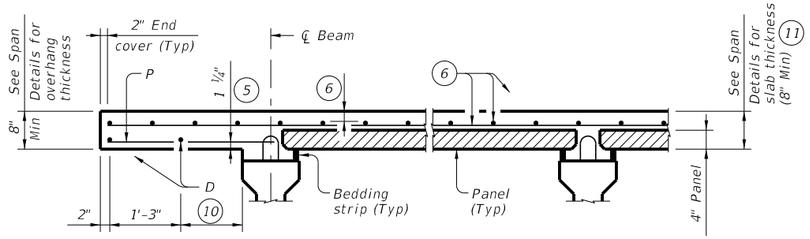
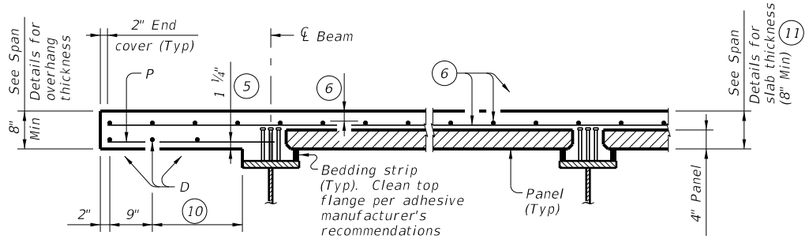
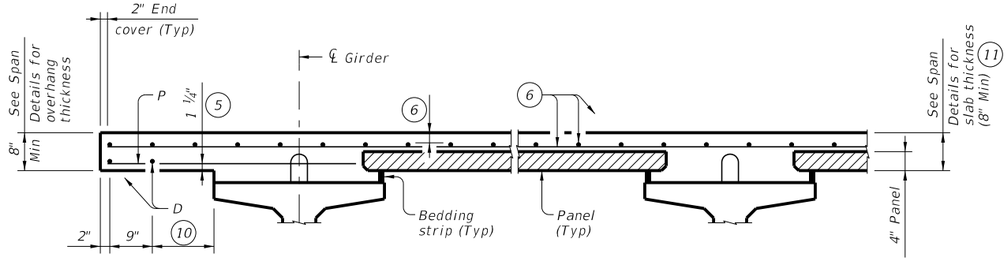


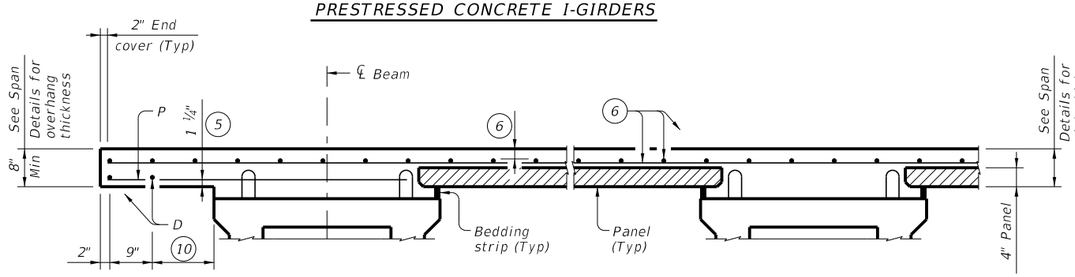
PRESTRESSED CONCRETE I-BEAMS



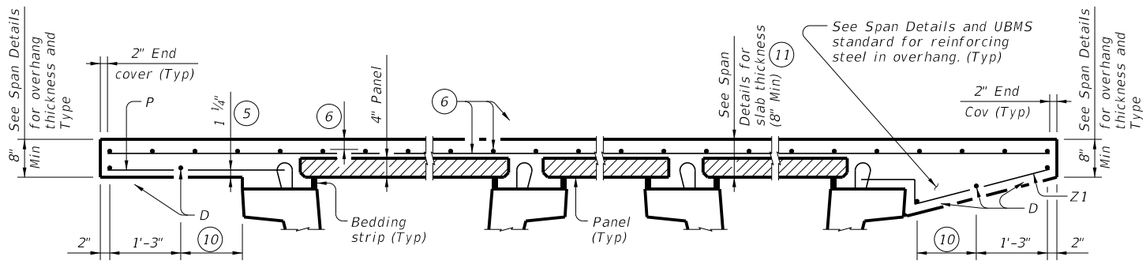
STEEL BEAMS (13)



PRESTRESSED CONCRETE I-GIRDERS



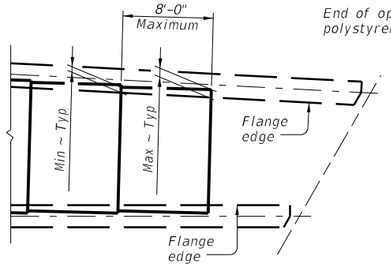
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

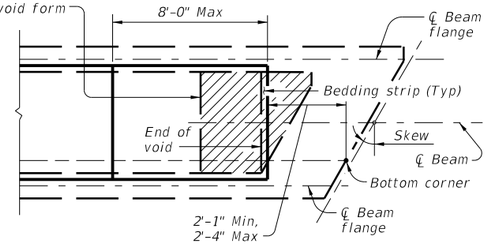
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



OVER CONC U-BEAMS

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.

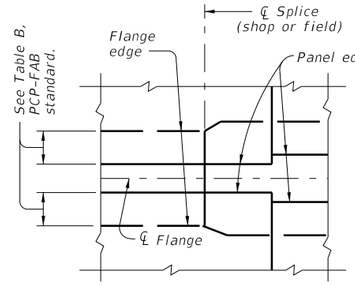
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(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.

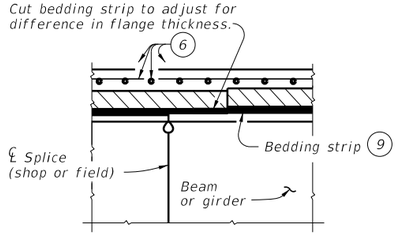
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Panels are allowed over top tension flanges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



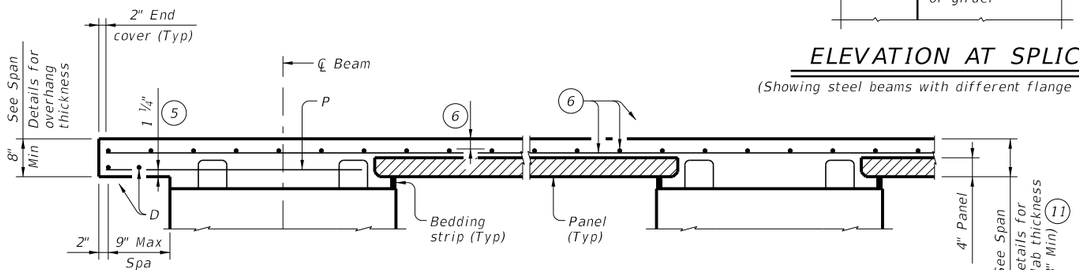
PLAN AT SPLICE

(Showing steel beams with flange width transition)



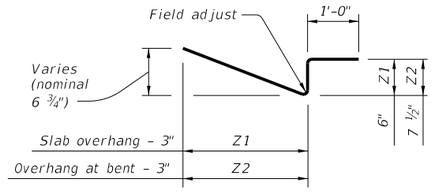
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE 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.



BARS Z (#4) (12)

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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	PHARR	CAMERON		127

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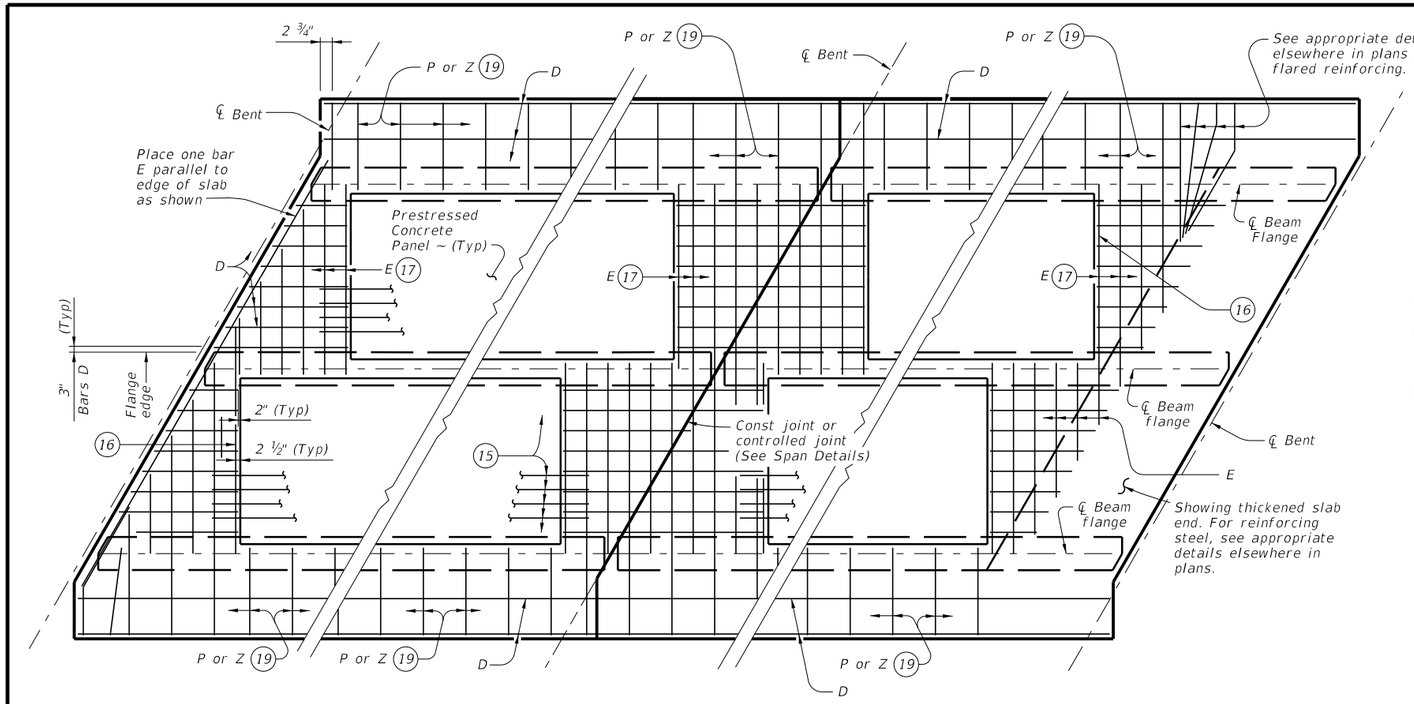
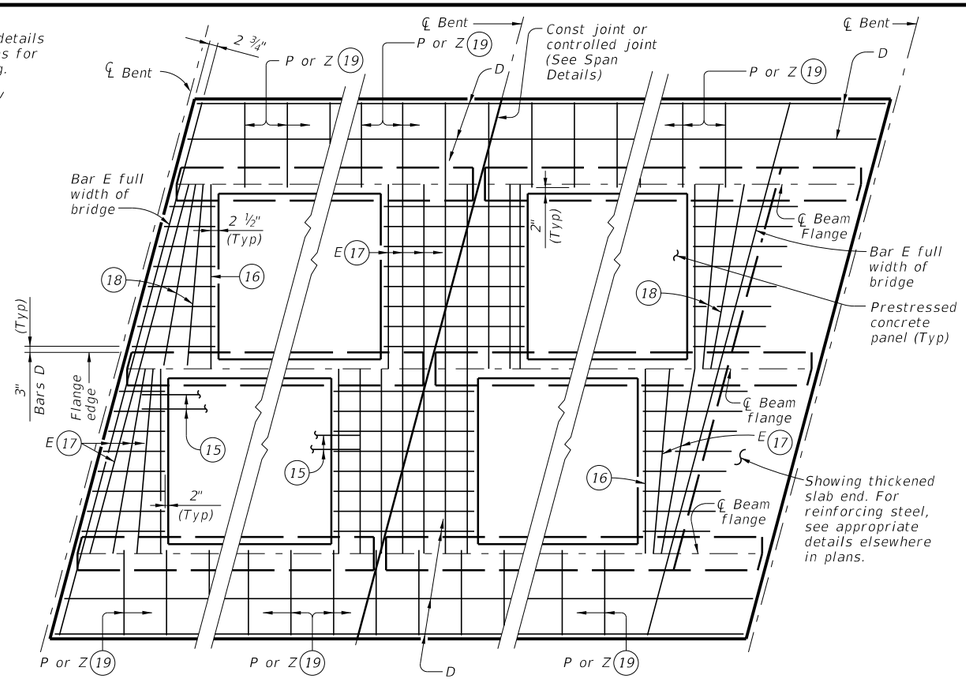


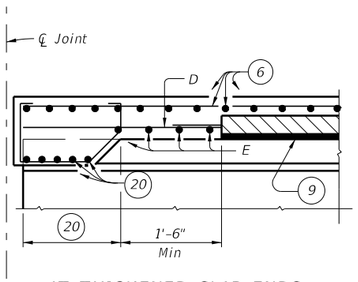
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

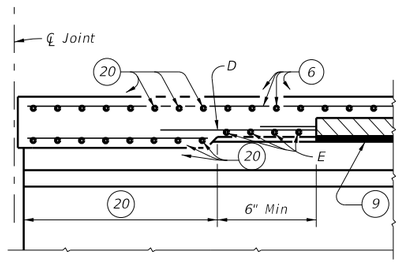


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

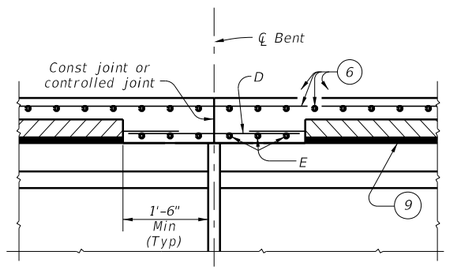
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



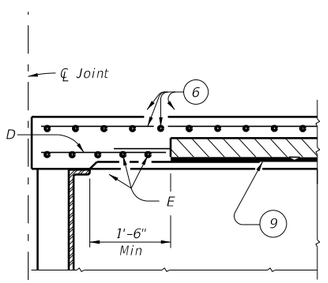
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE U-BEAMS



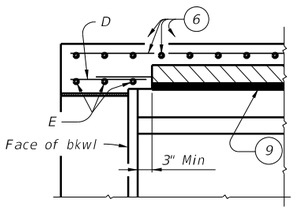
AT THICKENED SLAB ENDS FOR PRESTR CONCRETE I-BEAMS AND STEEL BEAMS



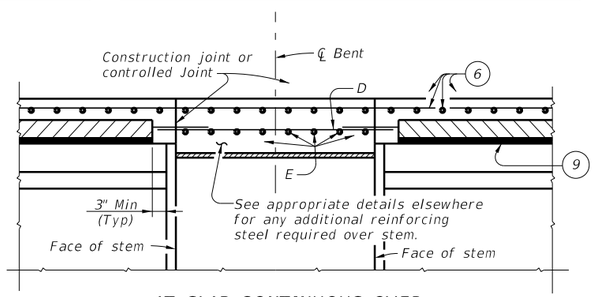
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BEAMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BEAMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BEAMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BEAMS

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

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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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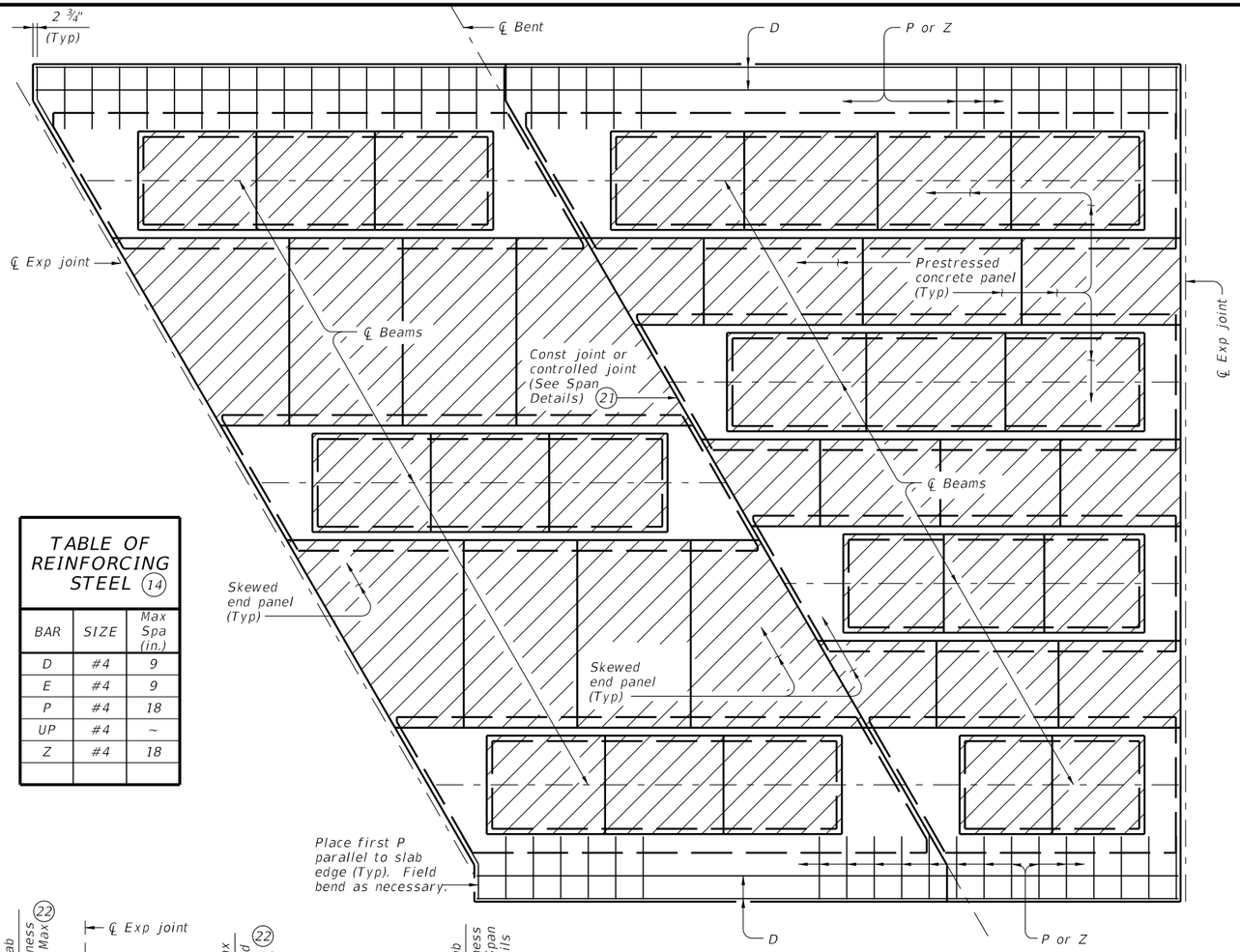
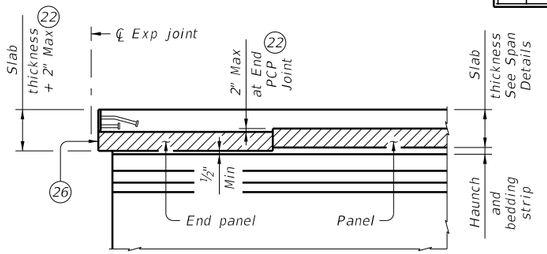


OPTION 2 ~ PLAN OF SLAB

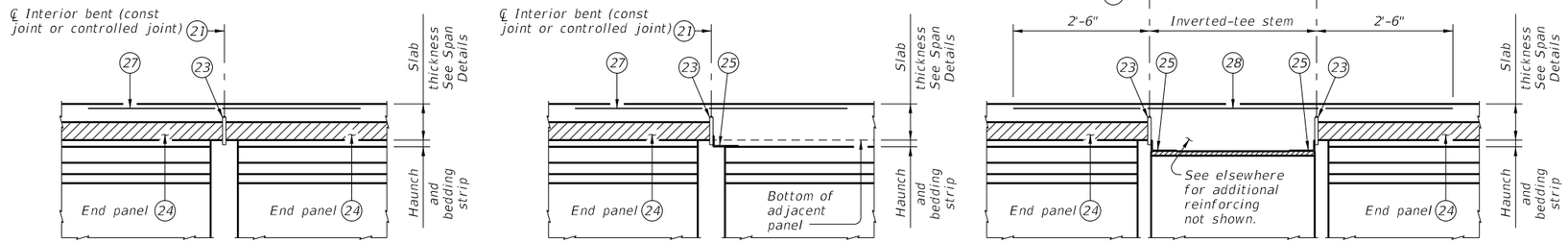
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.

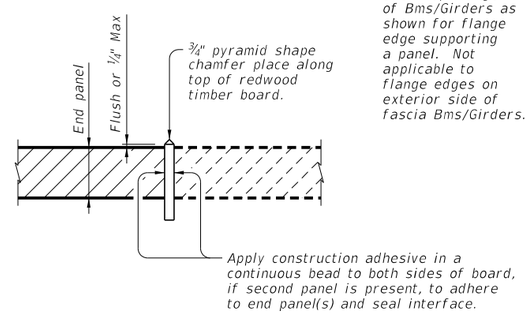


CONVENTIONAL INTERIOR BENT
Panel against panel between beams/girders.

CONVENTIONAL INTERIOR BENT
Panel against beam/girder end in adjacent span.

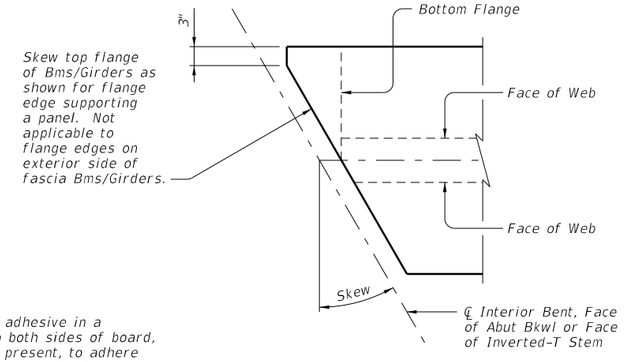
INVERTED-T BENT
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



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-Beam/I-Girder, U-Beams and Steel Beams 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-B, SEJ-M, 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:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
3/2023: Removed top flange tension limit.	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		129

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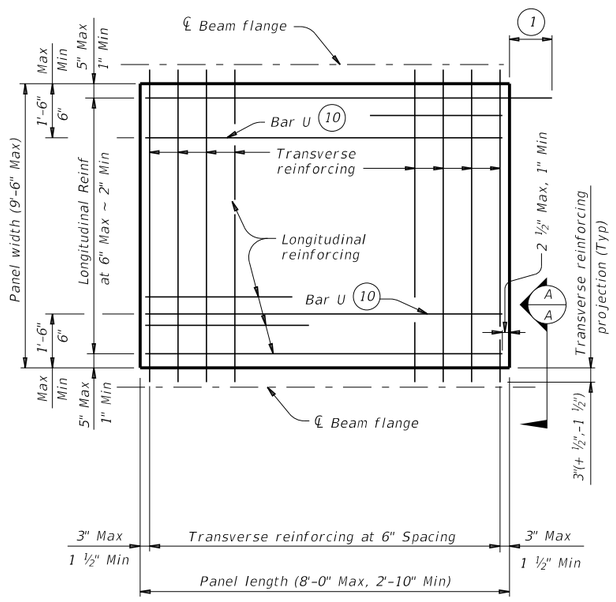
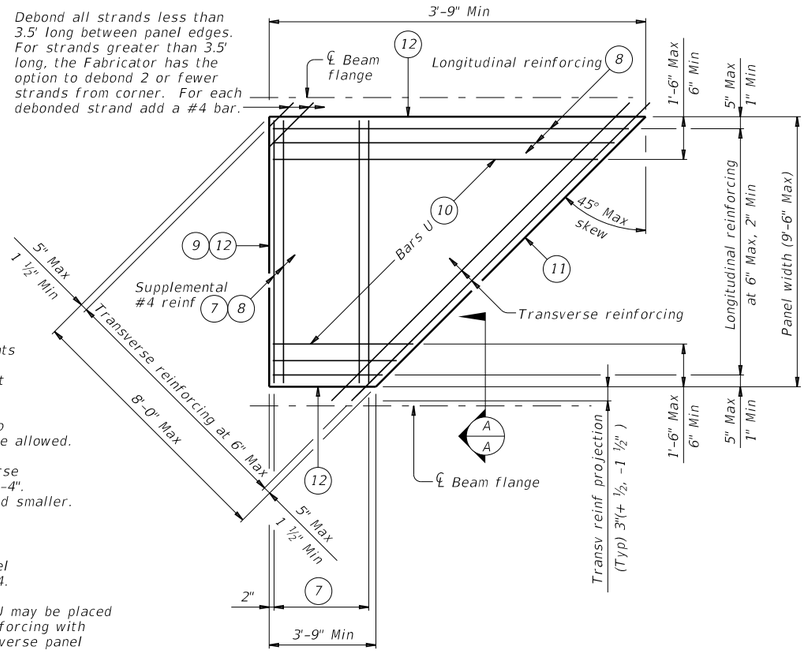
Aziz Alebra



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.

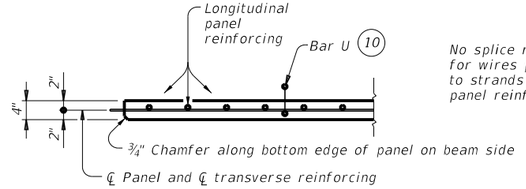
LONGITUDINAL PANEL REINFORCEMENT:

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.

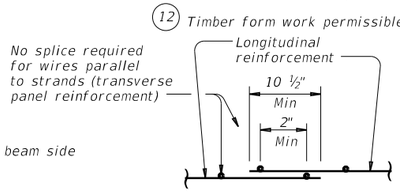
No combination of longitudinal reinforcement options in a panel is allowed.

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.

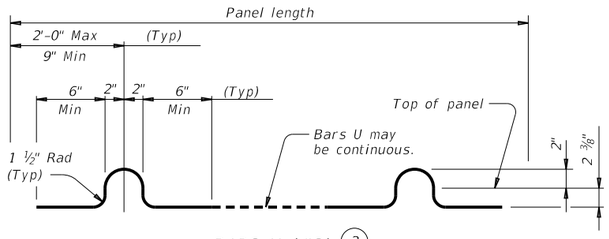


SECTION A-A

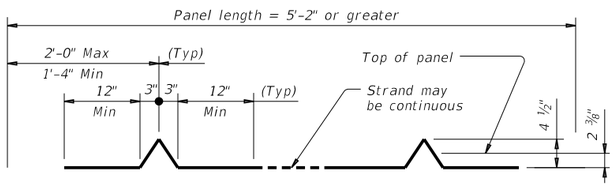
(Not showing supplemental #4 bars for skewed end panels.)



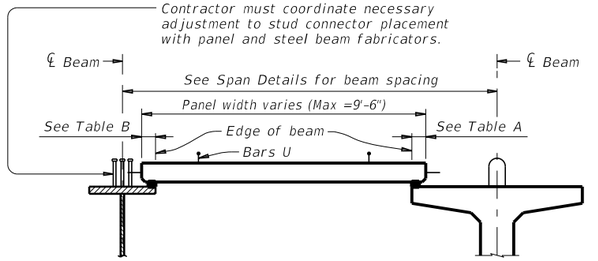
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



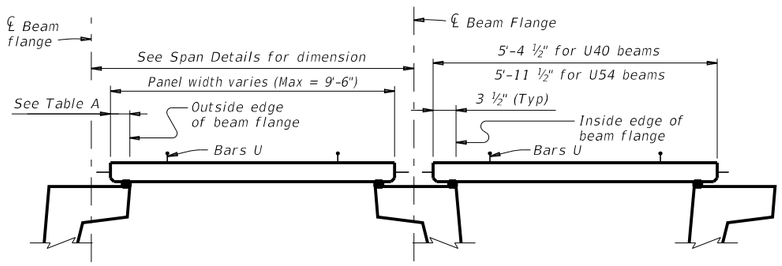
OPTIONAL STRAND FOR BARS U (3)



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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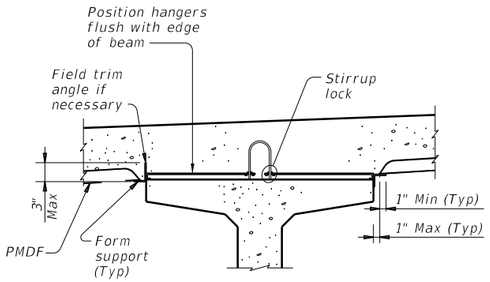
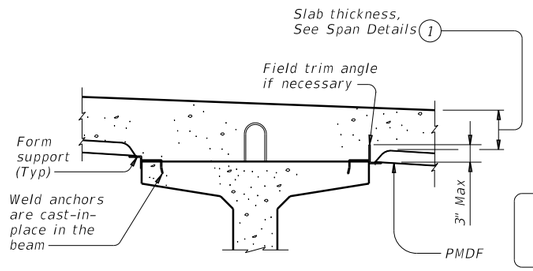
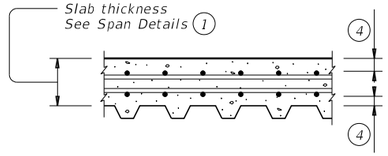


PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS



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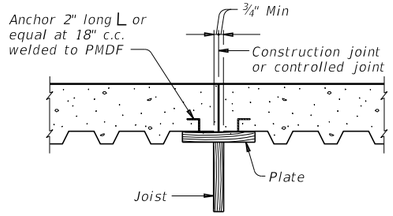
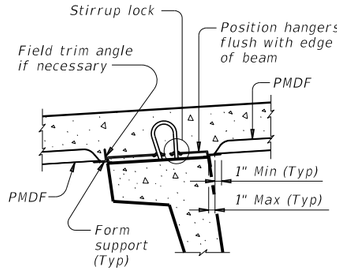
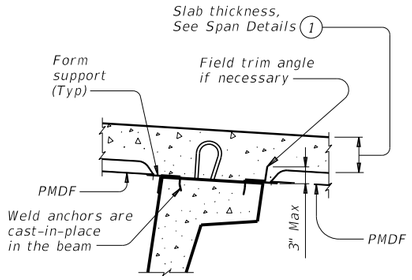


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

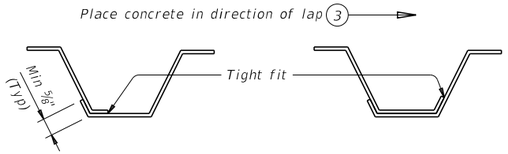
SECTION THRU CONSTRUCTION JOINT



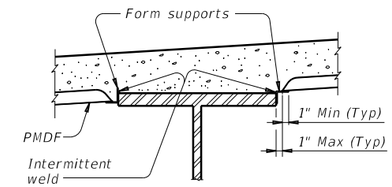
U-BEAMS WITH STIRRUP LOCKS



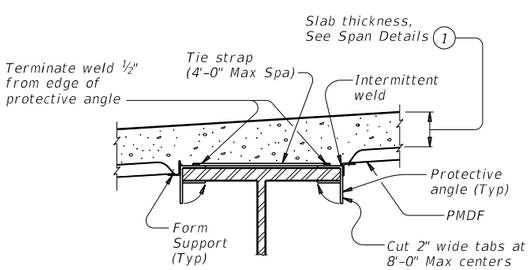
U-BEAMS WITH WELD ANCHORS



SIDE LAP DETAILS



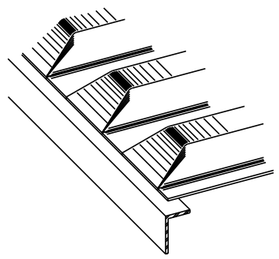
STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS

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.



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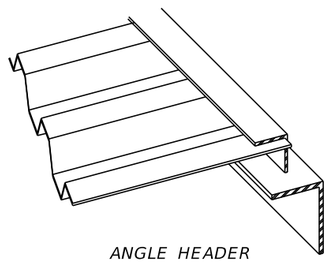

ANGLE HEADER

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".

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.

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 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. 12-21: Updated max deflection for RR.	DIST	COUNTY		SHEET NO.
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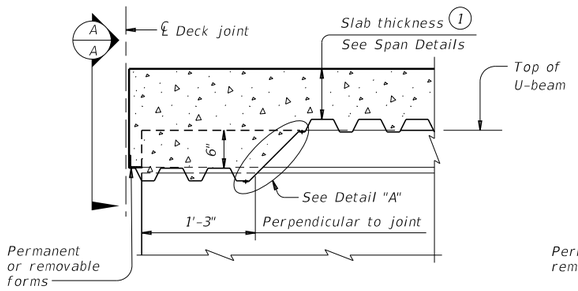
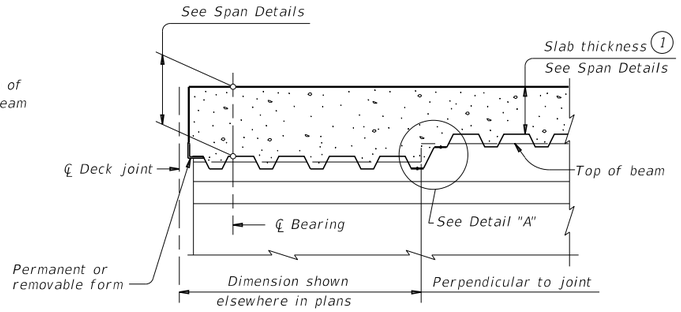
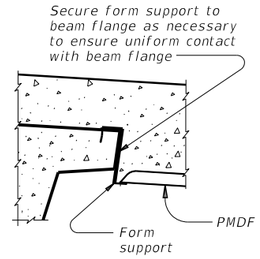


AT THICKENED SLAB END FOR U-BEAMS

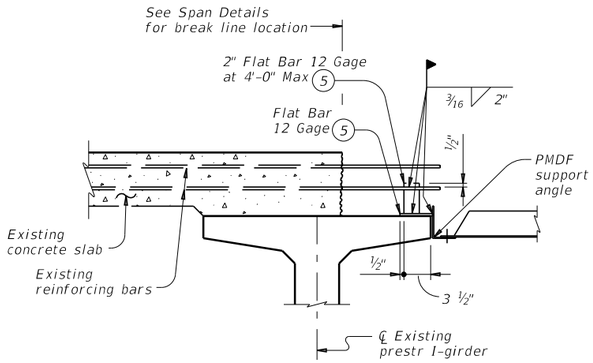


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

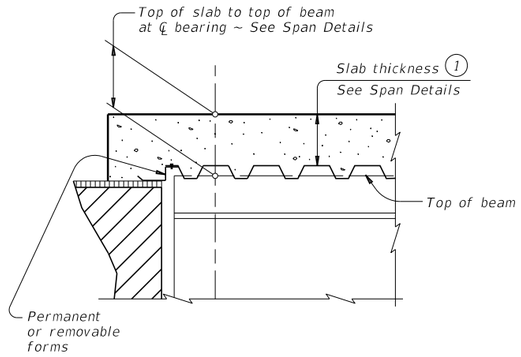
Showing I-beam block-out. No block-out for I-girders or steel beams.



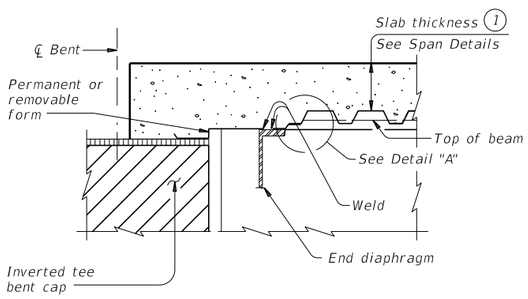
SECTION A-A



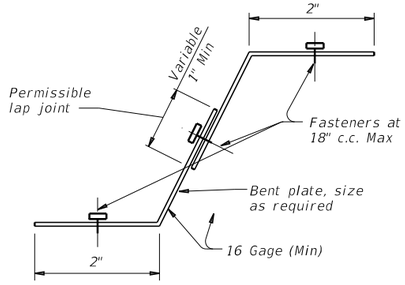
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



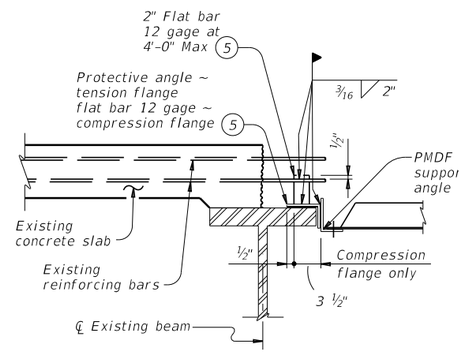
AT SLAB OVER ABUTMENT BACKWALL OR INVERTED-T STEM FOR CONCRETE BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INVERTED-T STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

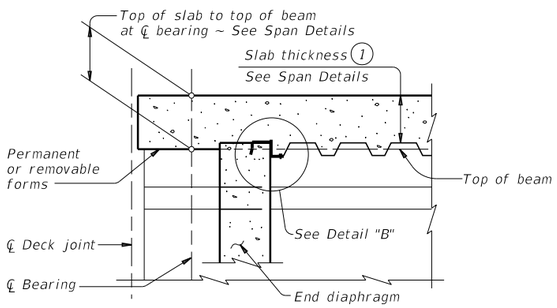


DETAIL "A"



SHOWING STEEL BEAMS

WIDENING DETAILS



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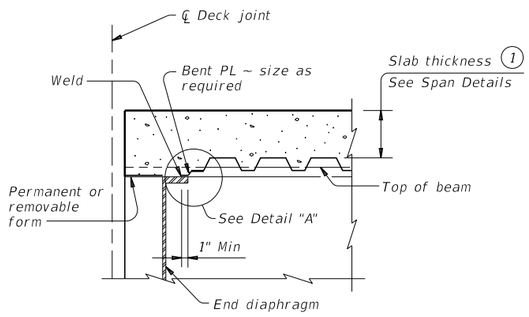
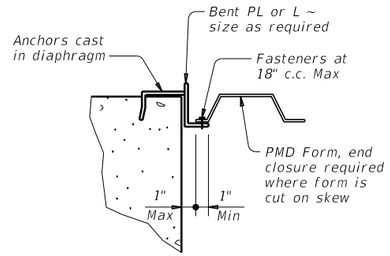


AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



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

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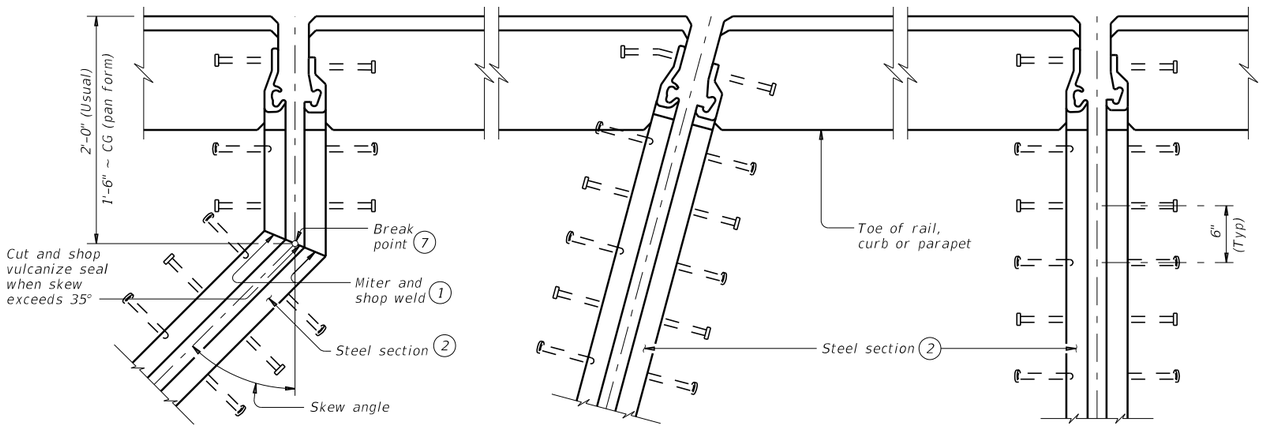
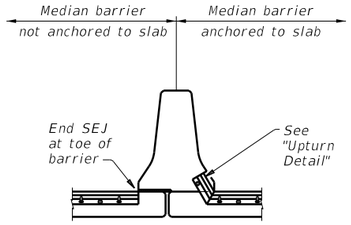
Aziz.Alebra

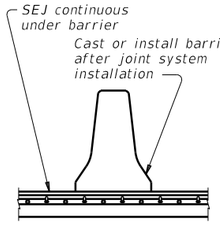


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

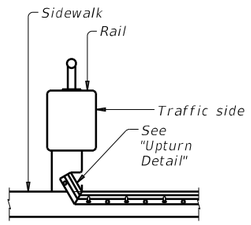
PLANS OF END CONDITIONS



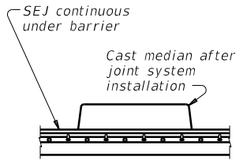
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



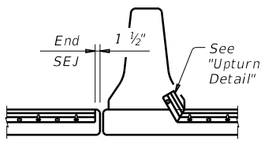
AT MEDIAN BARRIER



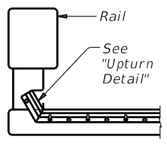
AT SIDEWALK BEHIND BRIDGE RAIL



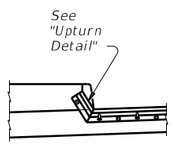
AT RAISED MEDIAN



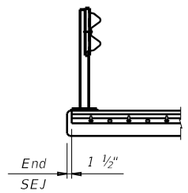
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

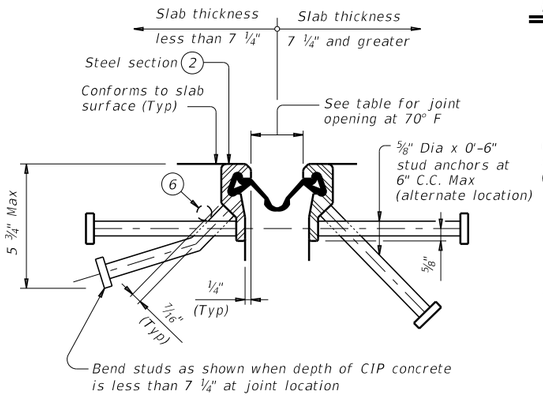


AT SIDEWALK

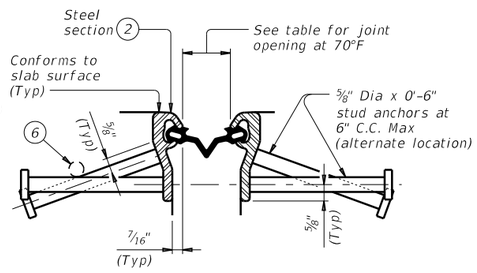


AT STEEL POST BRIDGE RAIL

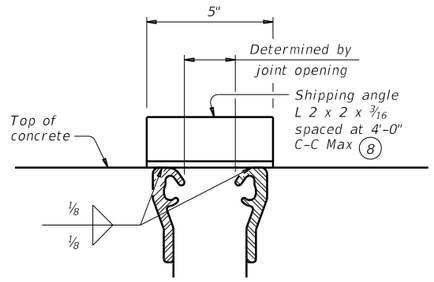
TYPICAL SECTIONS (5)



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.

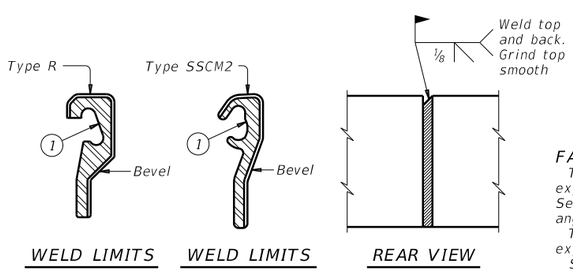
(4) Reduce for sidewalk or parapet heights less than 6".

(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.

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.

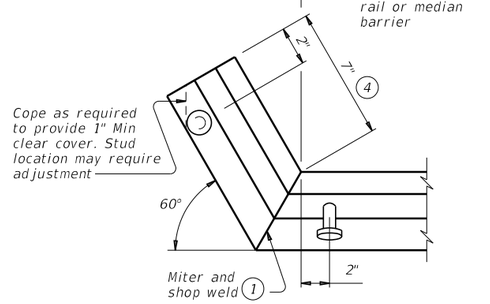
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

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".



UPTURN DETAIL

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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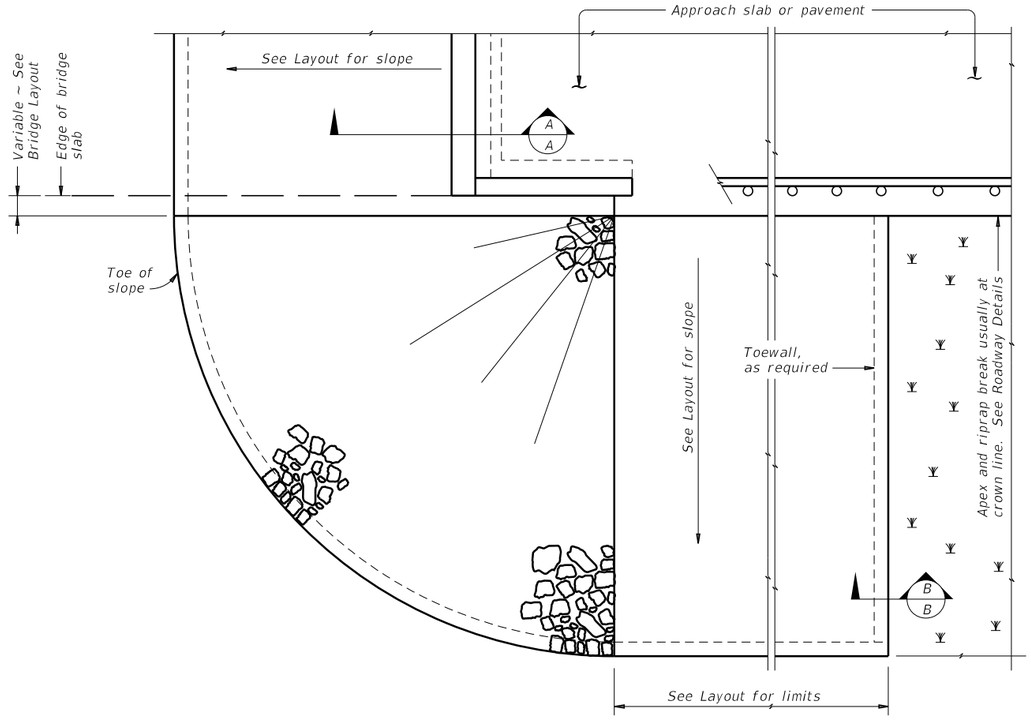
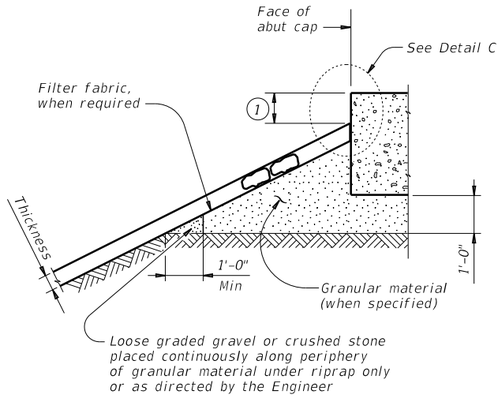
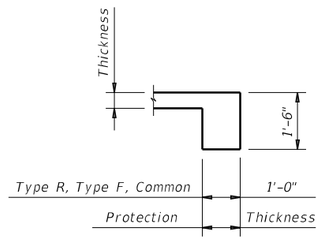


PLAN

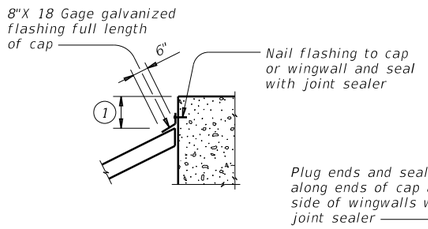


SECTION A-A AT CAP

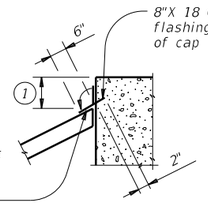


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

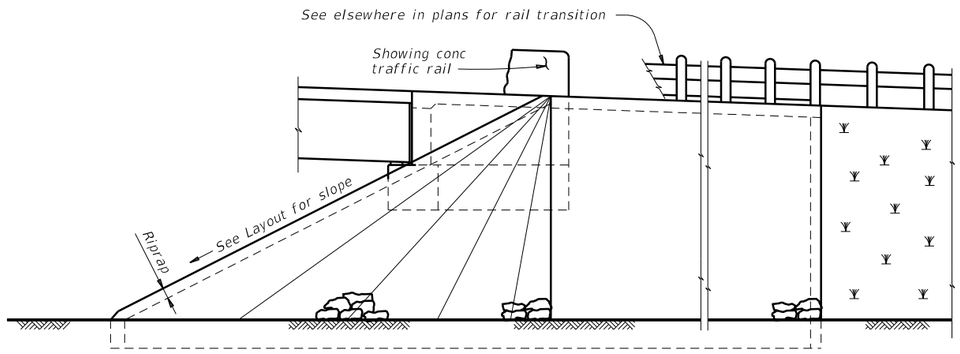


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(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

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©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY		
REVISIONS	2529	02	010		FM 2556		
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	PHARR	CAMERON				138	

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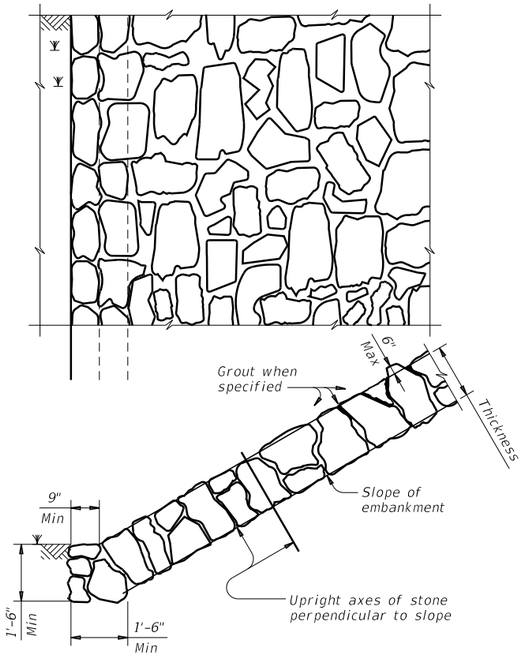


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

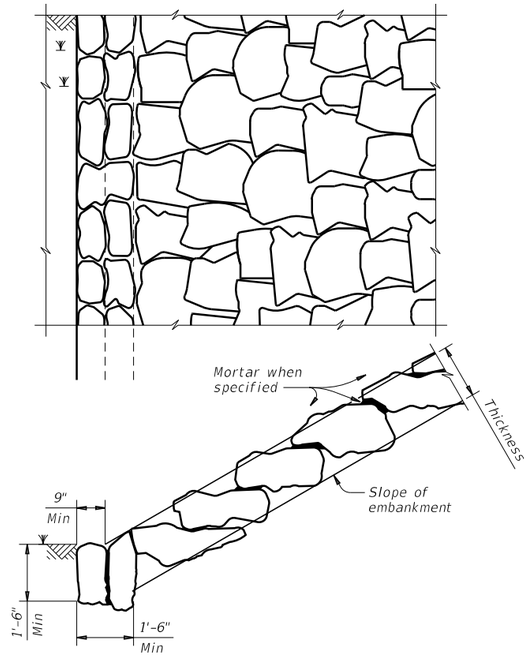


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

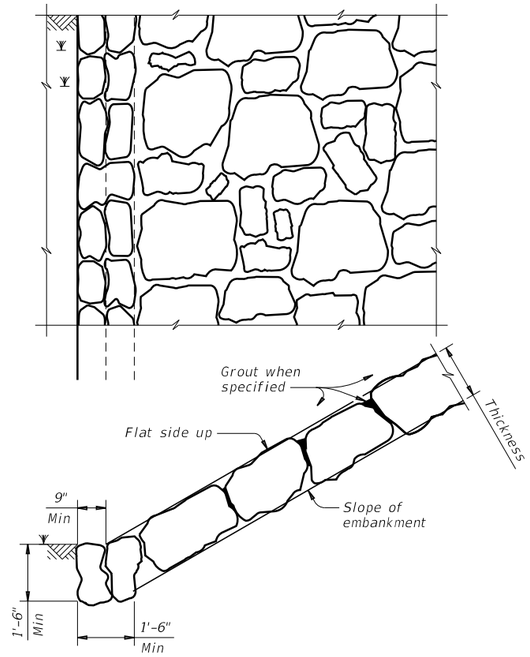
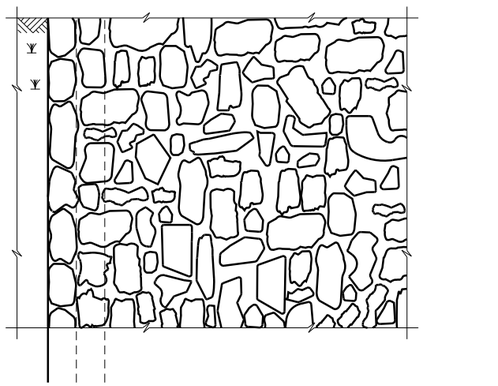


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted



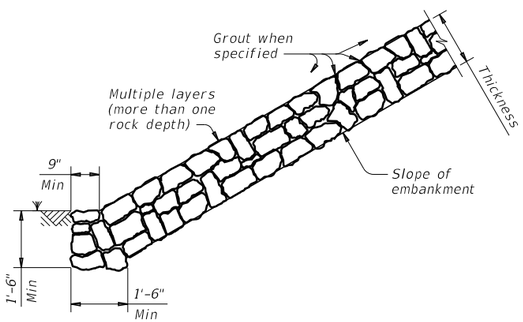
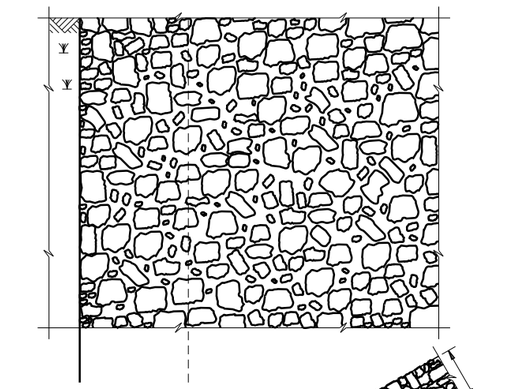


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted



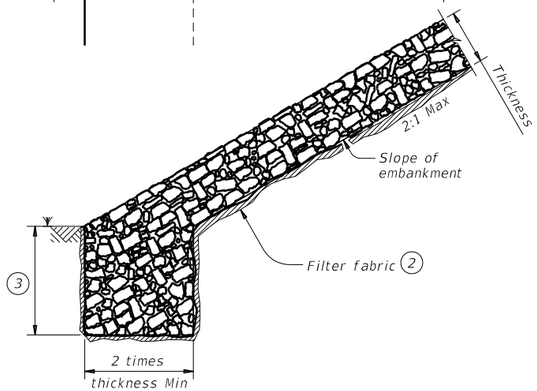


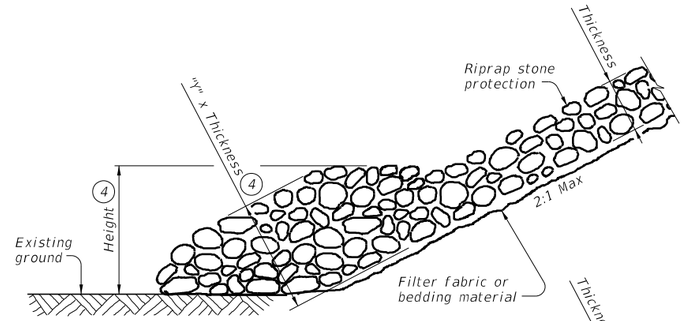
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

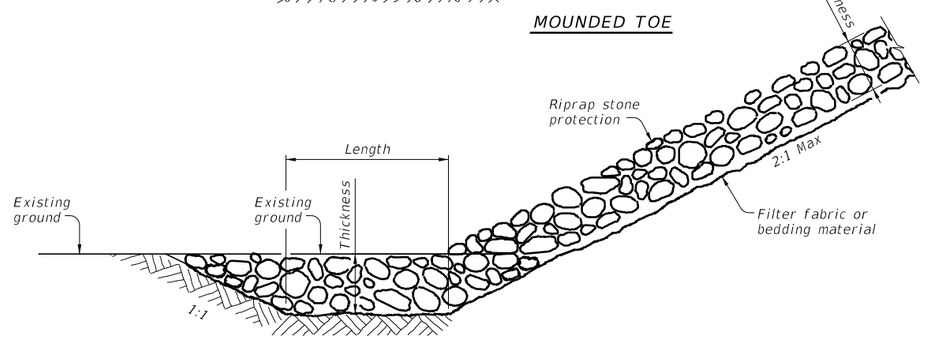
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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REVISIONS	2529	02	010	FM 2556
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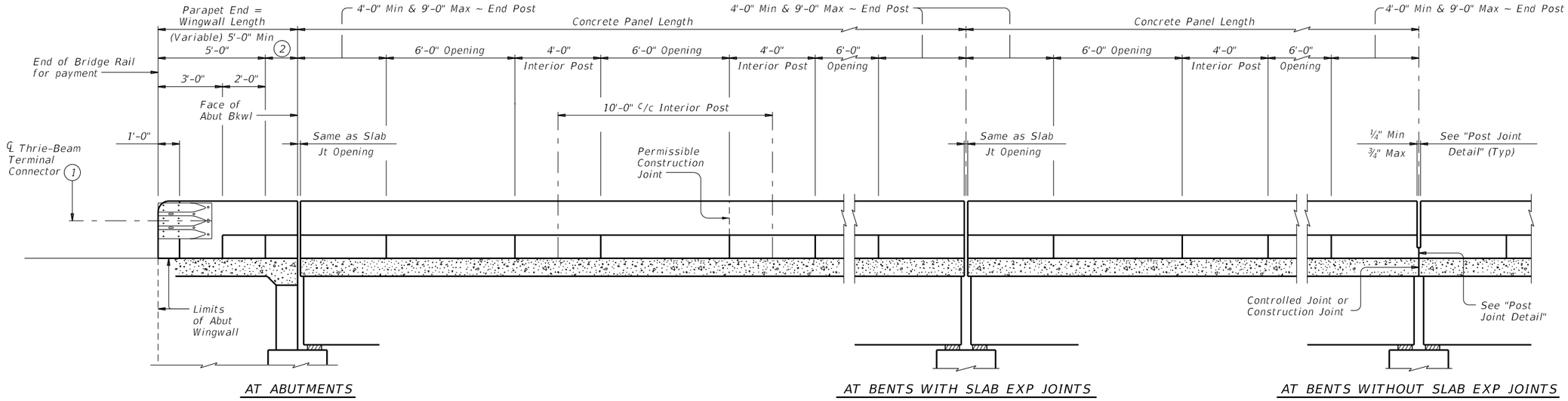
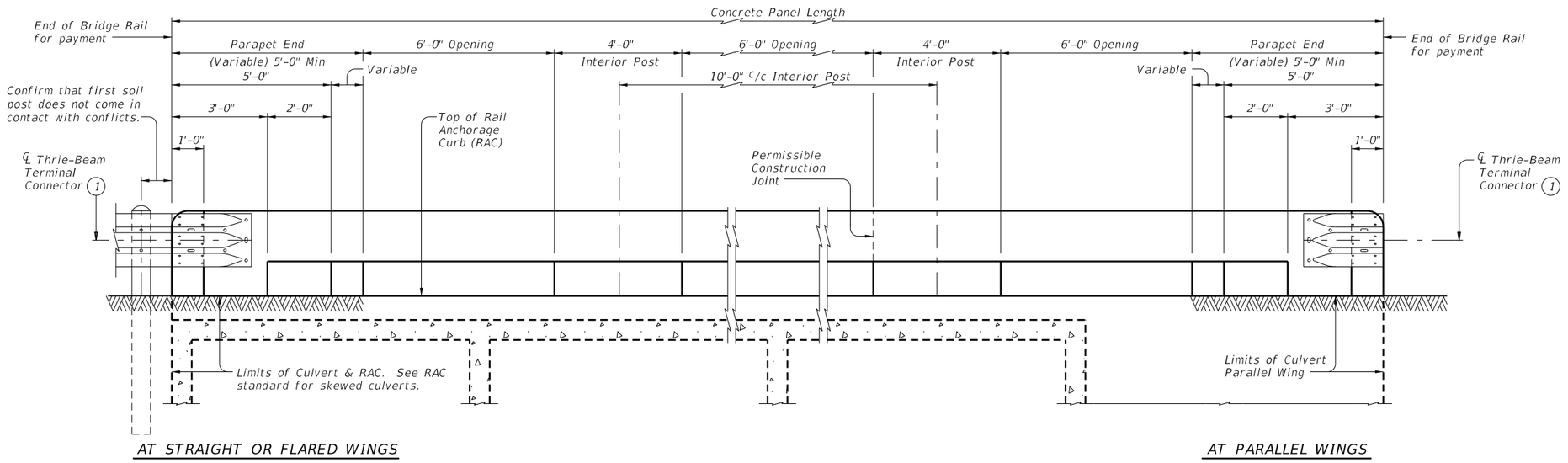
Aziz.Alebra



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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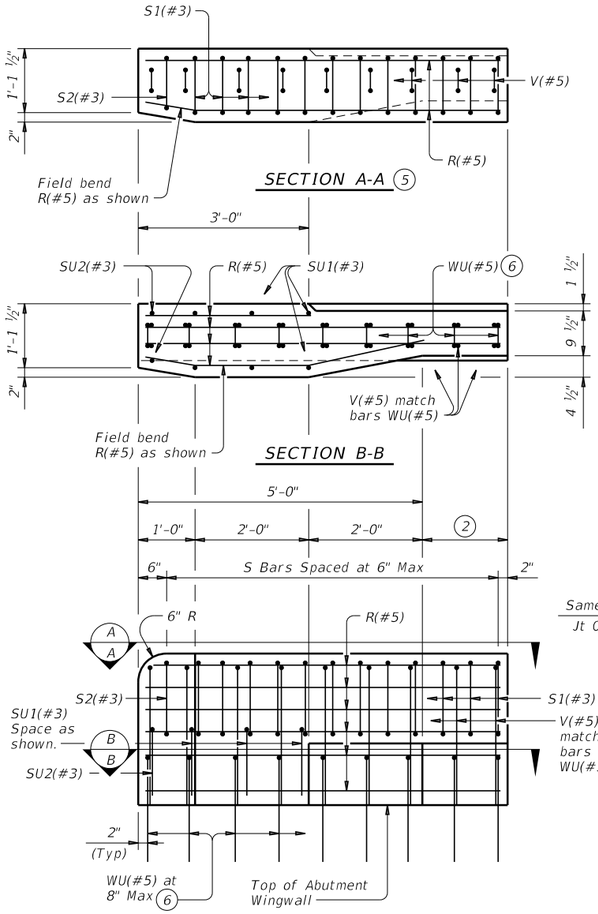
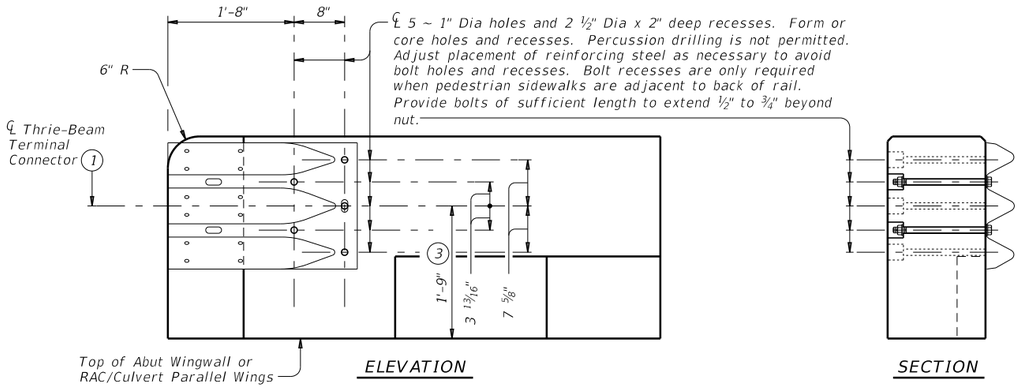


SECTION A-A (5)

SECTION B-B

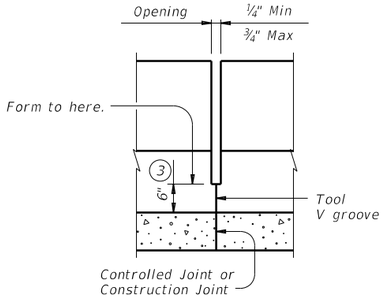
PARAPET END AT ABUT WINGWALL (6)



ELEVATION

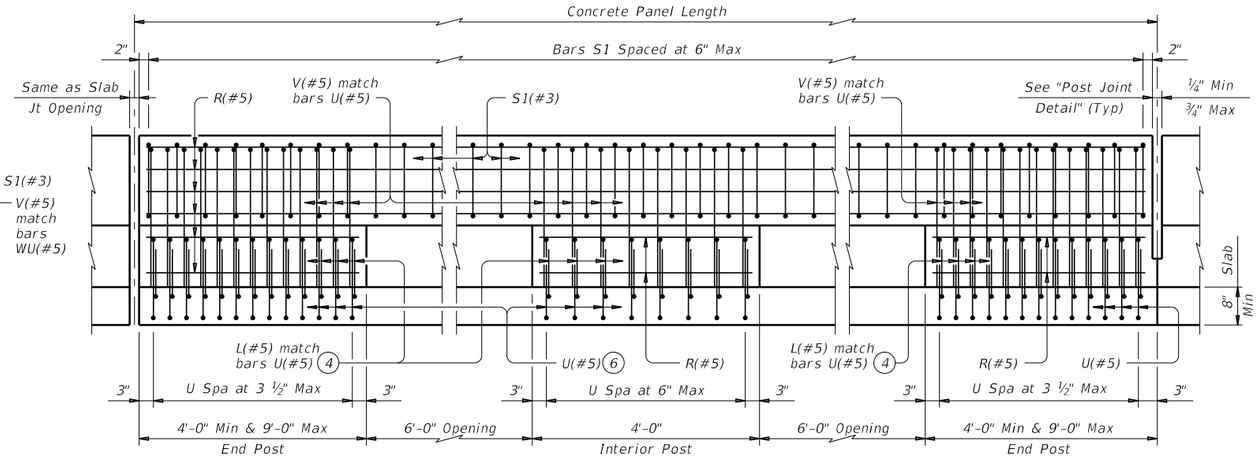
SECTION

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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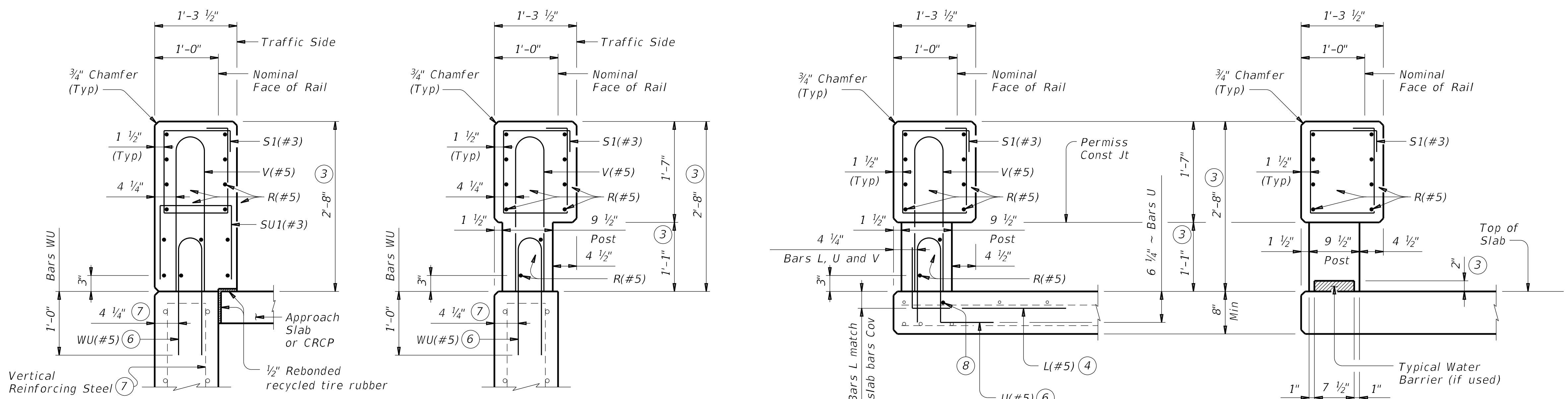
	PHARR	CAMERON		141



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

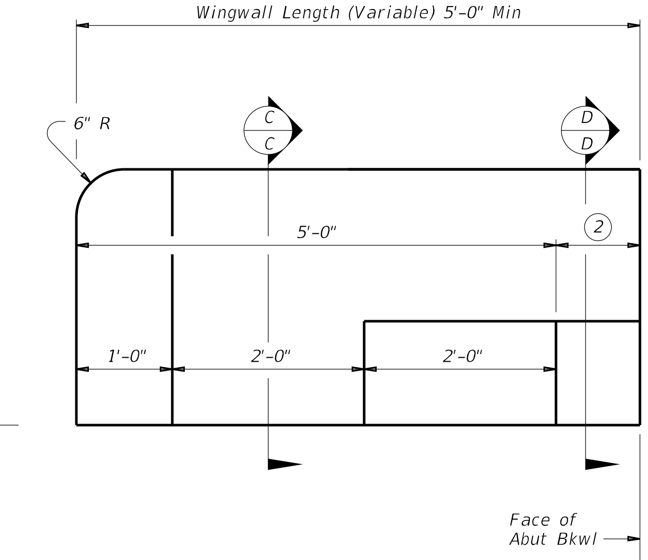
SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

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.

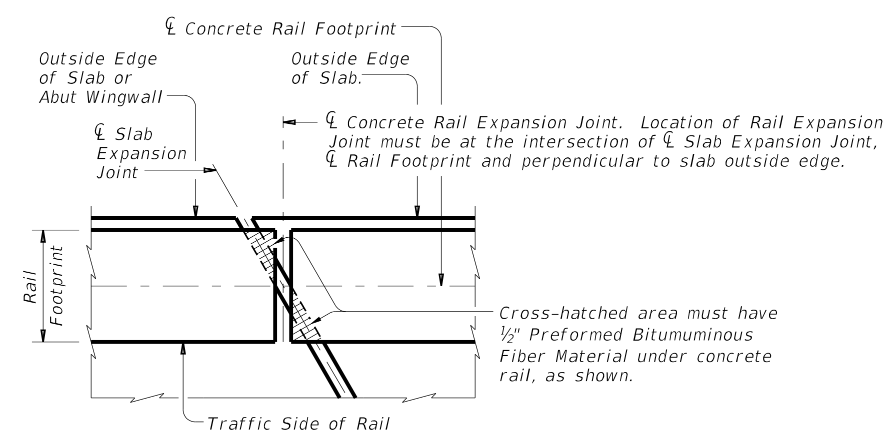
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(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.

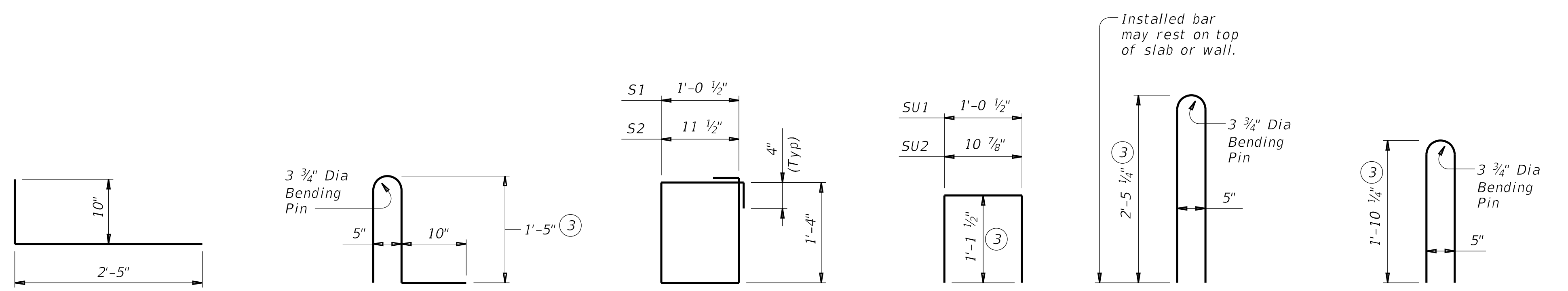
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(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)

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

TYPE T223

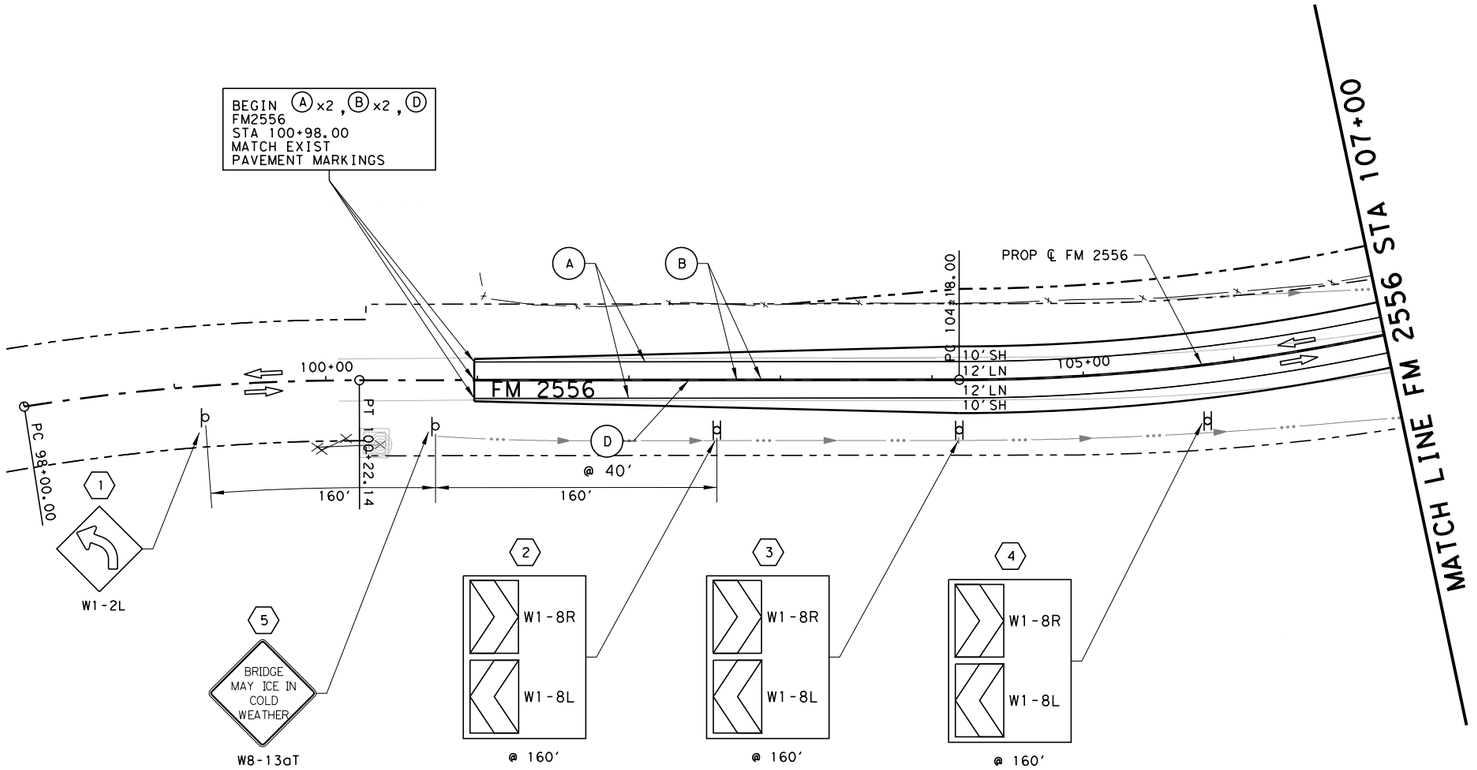
FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT 2529	SECT 02	JOB 010	HIGHWAY FM 2556
REVISIONS	DIST PHARR	COUNTY CAMERON		SHEET NO. 142

DATE: 6/3/2024 8:44:42 AM Aziz.Alebra
FILE: c:\bms\bridgeformer-pw\aziz.alebra@bridgeformer.com\dms02040\FM2556-rlstd005-19-03.dgn

50 0 50 100
SCALE: 1" = 100'

LEGEND

- (A) REFL. P.M. W/RET. REQ. TY I (W)(6")(SLD)
- (B) REFL. P.M. W/RET. REQ. TY I (Y)(6")(SLD)
- (C) REFL. P.M. W/RET. REQ. TY I (Y)(6")(BRK)
- (D) RAIS. PAV. MRKR. (REFL) TY II-A-A
- (XX) PROPOSED SMALL SIGN
- POST MOUNTED SIGN
- DIRECTION OF TRAVEL
- (D-SW)SZ 1(BRF)GF2(BI)
- (D-SW)SZ 1(BRF)CTB(BI)



STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 264

Texas Department of Transportation

FM 2556

SIGNING AND PAVEMENT MARKING LAYOUTS

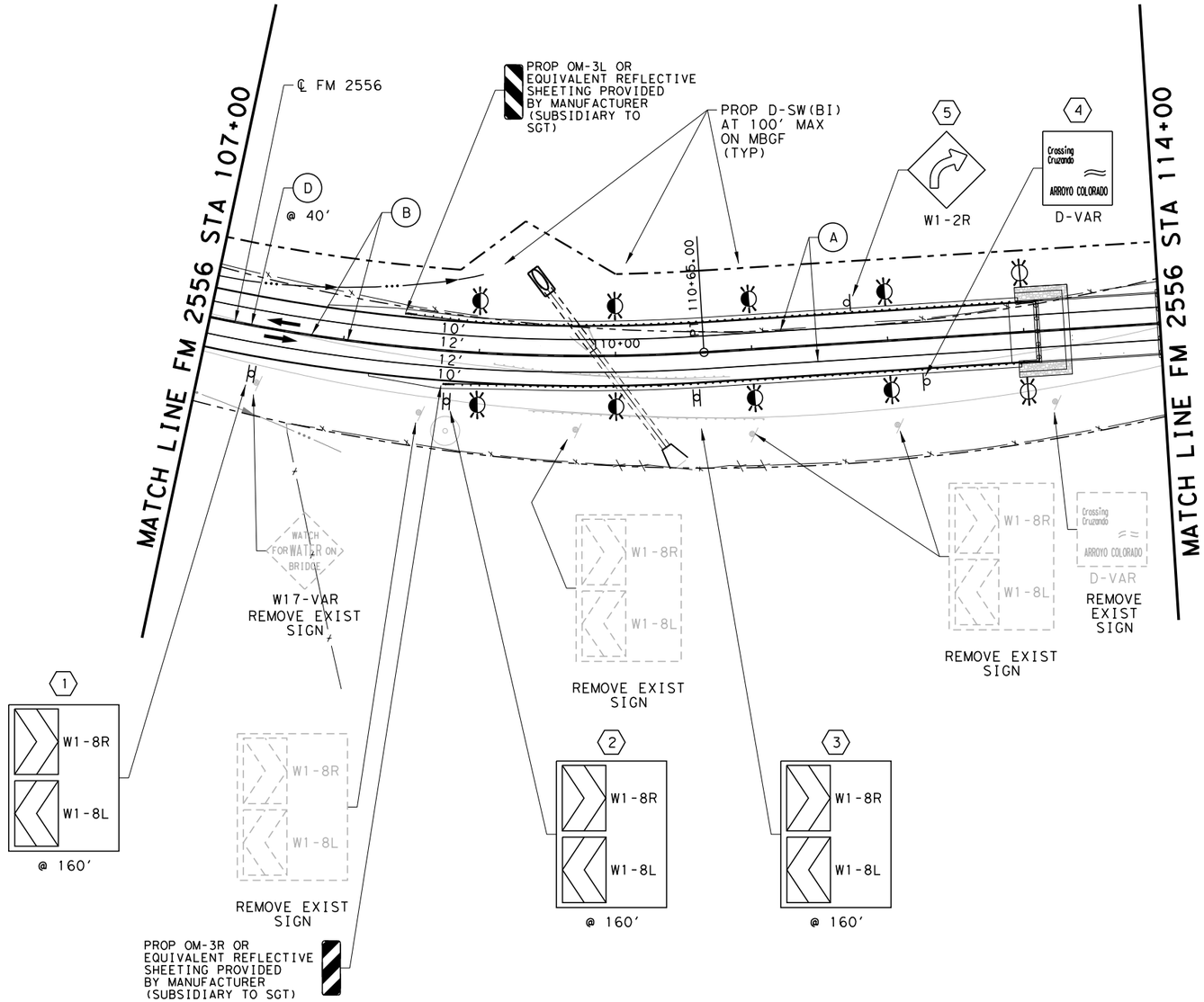
SCALE: 1" = 100' SHEET 1 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		143

50 0 50 100
SCALE: 1" = 100'

LEGEND

- (A) REFL. P.M. W/RET. REQ. TY I (W)(6")(SLD)
- (B) REFL. P.M. W/RET. REQ. TY I (Y)(6")(SLD)
- (C) REFL. P.M. W/RET. REQ. TY I (Y)(6")(BRK)
- (D) RAIS. PAV. MRKR. (REFL) TY II-A-A
- (XX) PROPOSED SMALL SIGN
- POST MOUNTED SIGN
- DIRECTION OF TRAVEL
- (D-SW)SZ 1(BRF)GF2(BI)
- (D-SW)SZ 1(BRF)CTB(BI)



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FM 2556

SIGNING AND PAVEMENT MARKING LAYOUTS

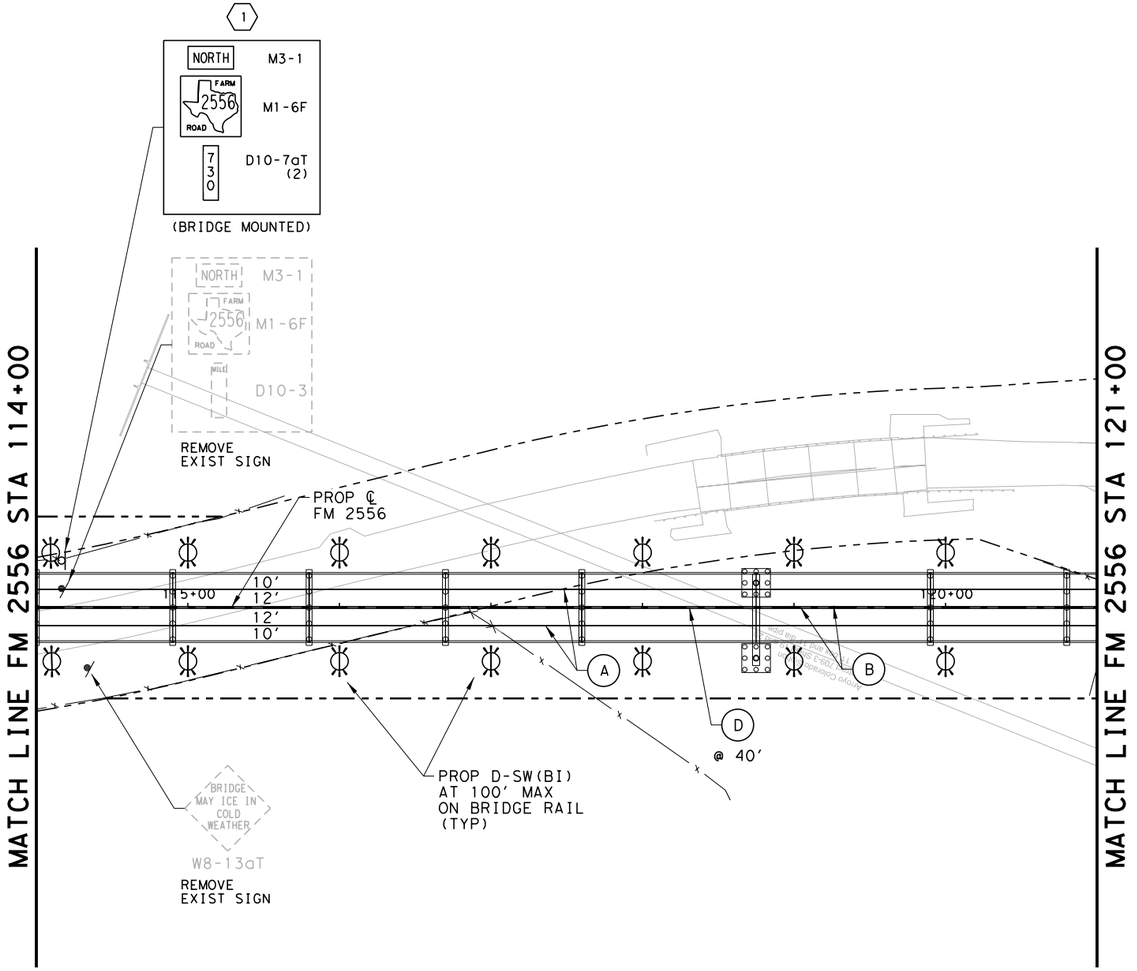
SCALE: 1" = 100' SHEET 2 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		144

50 0 50 100
SCALE: 1" = 100'

LEGEND

- (A) REFL. P.M. W/RET. REQ. TY I (W)(6")(SLD)
- (B) REFL. P.M. W/RET. REQ. TY I (Y)(6")(SLD)
- (C) REFL. P.M. W/RET. REQ. TY I (Y)(6")(BRK)
- (D) RAIS. PAV. MRKR. (REFL) TY II-A-A
- (XX) PROPOSED SMALL SIGN
- POST MOUNTED SIGN
- DIRECTION OF TRAVEL
- (D-SW)SZ 1(BRF)GF2(BI)
- (D-SW)SZ 1(BRF)CTB(BI)



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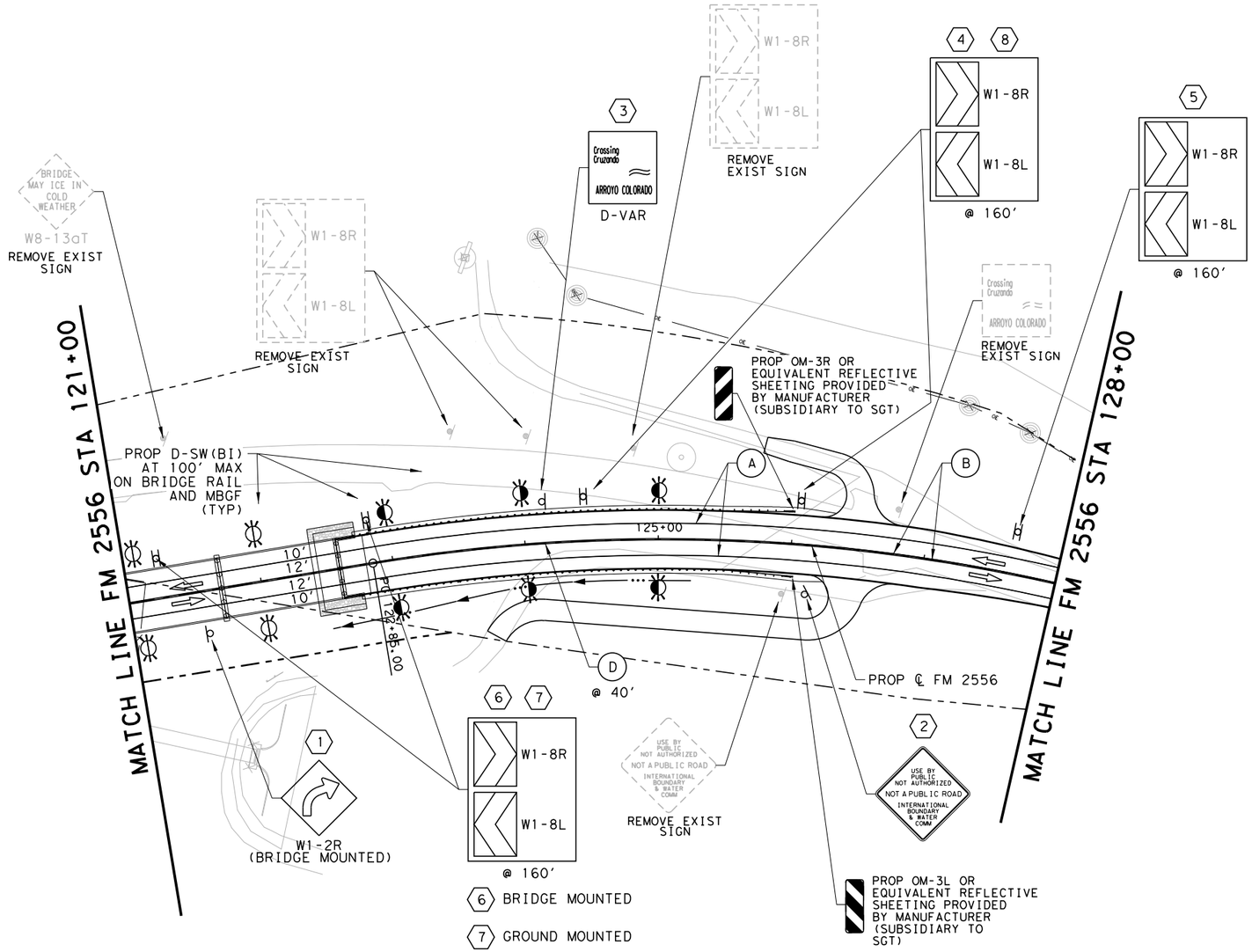
SIGNING AND PAVEMENT MARKING LAYOUTS

SCALE: 1" = 100' SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		145

50 0 50 100
SCALE: 1" = 100'



LEGEND

- (A) REFL. P.M. W/RET. REQ. TY I (W)(6")(SLD)
- (B) REFL. P.M. W/RET. REQ. TY I (Y)(6")(SLD)
- (C) REFL. P.M. W/RET. REQ. TY I (Y)(6")(BRK)
- (D) RAIS. PAV. MRKR. (REFL) TY II-A-A
- (XX) PROPOSED SMALL SIGN
- POST MOUNTED SIGN
- DIRECTION OF TRAVEL
- (D-SW)SZ 1(BRF)GF2(BI)
- (D-SW)SZ 1(BRF)CTB(BI)

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SIGNING AND PAVEMENT MARKING LAYOUTS

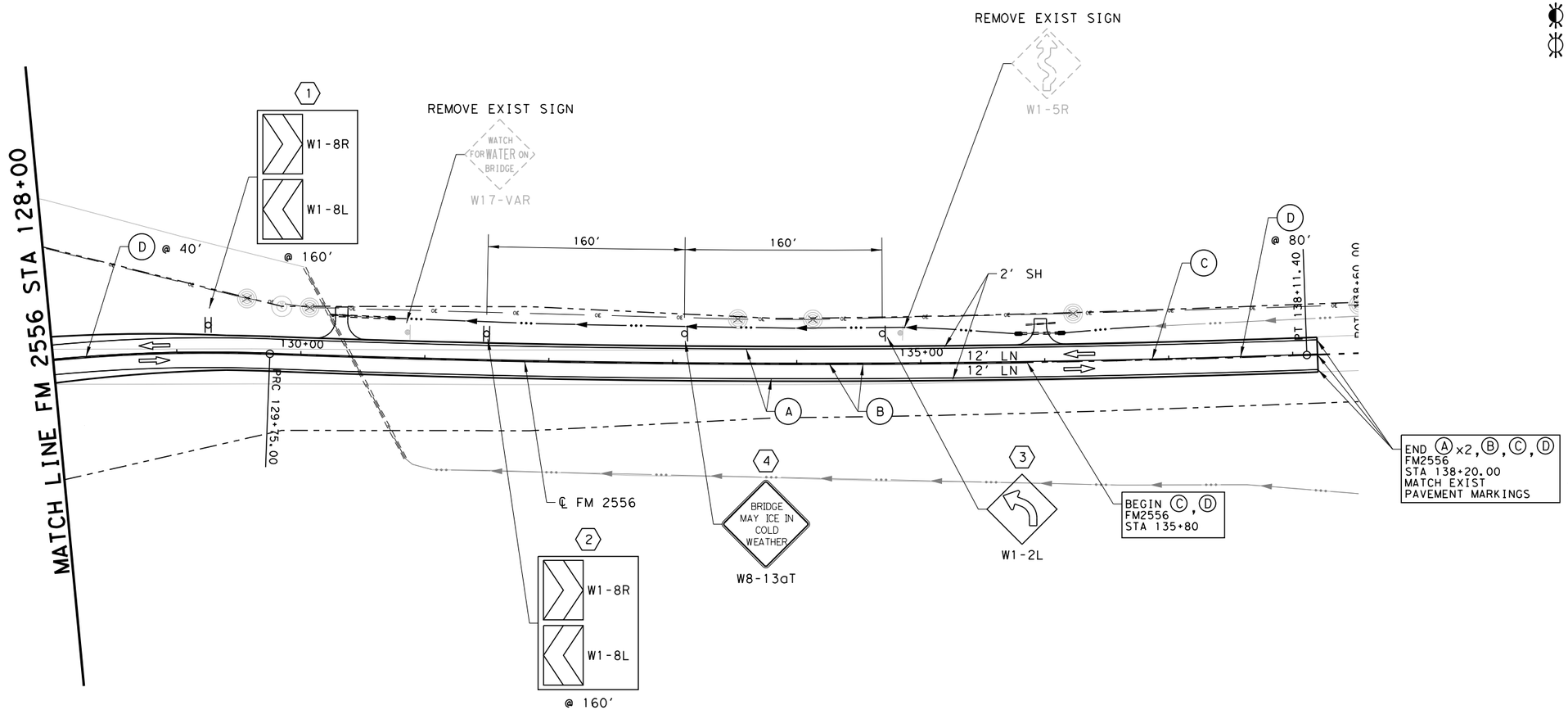
SCALE: 1" = 100' SHEET 4 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		146

50 0 50 100
SCALE: 1" = 100'

LEGEND

- (A) REFL. P.M. W/RET. REQ. TY I (W)(6")(SLD)
- (B) REFL. P.M. W/RET. REQ. TY I (Y)(6")(SLD)
- (C) REFL. P.M. W/RET. REQ. TY I (Y)(6")(BRK)
- (D) RAIS. PAV. MRKR. (REFL) TY II-A-A
- (XX) PROPOSED SMALL SIGN
- POST MOUNTED SIGN
- DIRECTION OF TRAVEL
- (D-SW)SZ 1(BRF)GF2(BI)
- (D-SW)SZ 1(BRF)CTB(BI)



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SIGNING AND PAVEMENT MARKING LAYOUTS

SCALE: 1" = 100' SHEET 5 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		147

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	SMA RD SGN ASSM TY XXXXX (X) XX (X-XXXX) Post Type: FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched	Posts (1 or 2)	Anchor Type: UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SB = Slip-Bolt WS = Wedge	Mounting Designation: P = Prefb. "Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	BRIDGE MOUNT CLEARANCE SIGNS: TY N = Type N TY S = Type S
1 OF 5	1	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		S80	1	SA	T		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	2	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	4	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
	5	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		S80	1	SA	T		
2 OF 5		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	1	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	2	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	3	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
	4	D-VAR*	ARROYO COLORADO XING	24 x 24	X		S80	1	SA	P		
	5	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	X		S80	1	SA	T		
3 OF 5		M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X							
	1	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X							
		D10-7aT	<3 DIGIT VERTICAL NUMBER>	3 x 10	X		S80	1	SA	P		
4 OF 5	1	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	X		S80	1	SA	T		
	2	W-VAR*	NOT A PUBLIC ROAD	36 x 36	X		S80	1	SA	T		
	3	D-VAR*	ARROYO COLORADO XING	24 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	4	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	5	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	6	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	7	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	8	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
5 OF 5		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	1	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
		W1-8L	<CHEVRON LEFT>	18 x 24	X							
	2	W1-8R	<CHEVRON RIGHT>	18 x 24	X		S80	1	SA	P		
	3	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	X		S80	1	SA	T		
	4	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		S80	1	SA	T		

*COORDINATE WITH USIBWC
TO GET APPROPRIATE SIGNS

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).

STATE OF TEXAS
BRIAN D. WRIGHT
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6/5/24

BRIDGEFARMER & ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE REGISTRATION NO. 284

Texas Department of Transportation

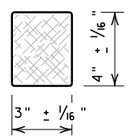
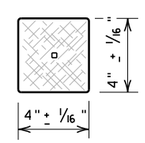
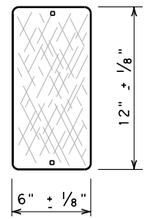
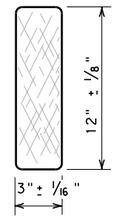
FM 2556
SUMMARY OF SMALL SIGNS

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		148

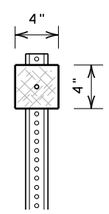
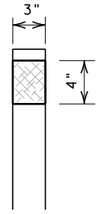
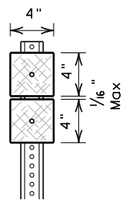
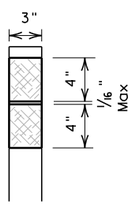
DATE: Aziz.Alebra 6/5/2024 1:23:26 PM
FILE: c:\dms\bridgefarmer-pw\aziz.alebra@bridgefarmer.com\dms02050\FM2556-dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

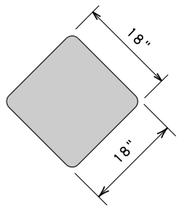
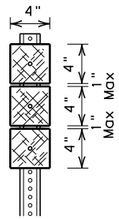
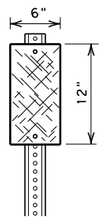
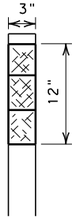
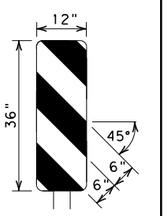
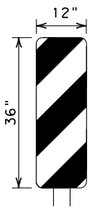
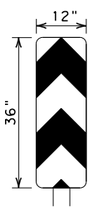
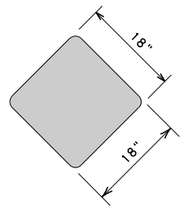
	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

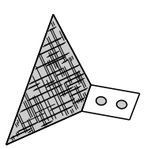
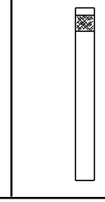
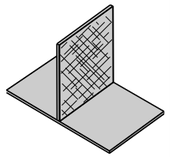
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

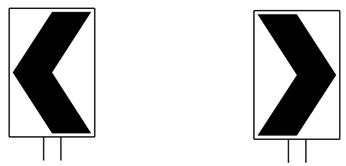
	GF1	GF2	CTB
DEVICE			

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.

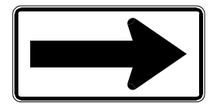
CHEVRONS

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"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:
Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PHARR	CAMERON		149

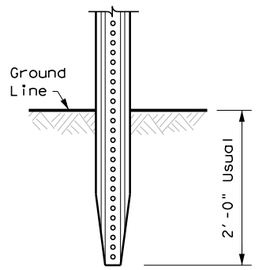
20A

DATE: 6/5/2024 1:23:36 PM
FILE: ms:\bridgefarmer-pw\aziz.alebra@bridgefarmer.com\dms02050\FM2556-dom2-20.dgn
Aziz.Alebra

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

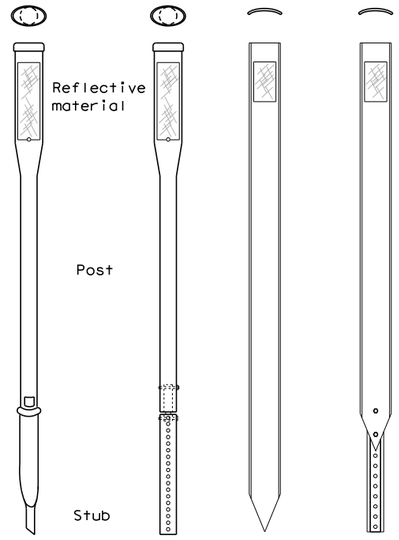


NOTES

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.

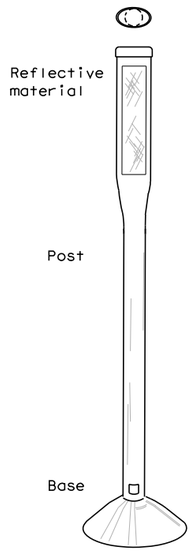
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



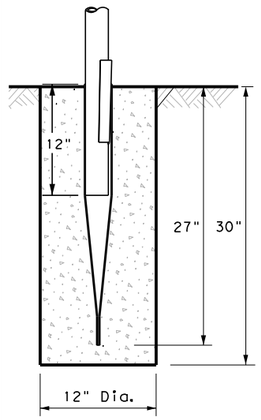
SURFACE MOUNT

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.

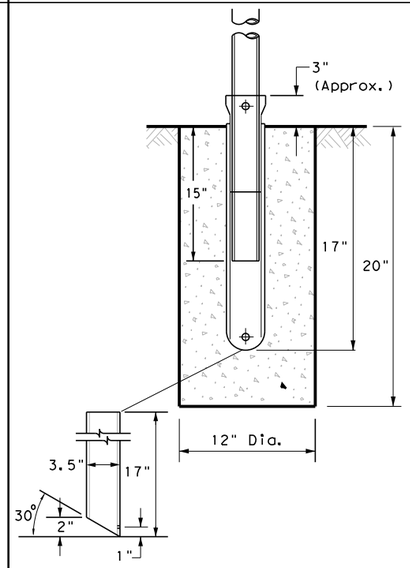
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

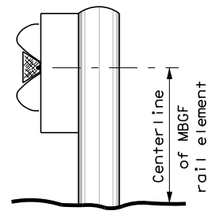
NOTE

1. Install per manufacturer's recommendations.

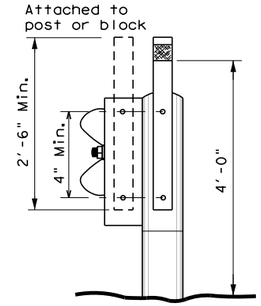
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

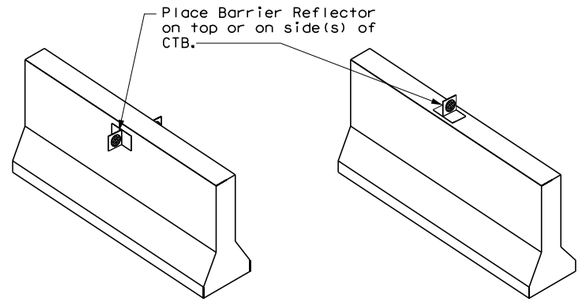
GF1



GF2



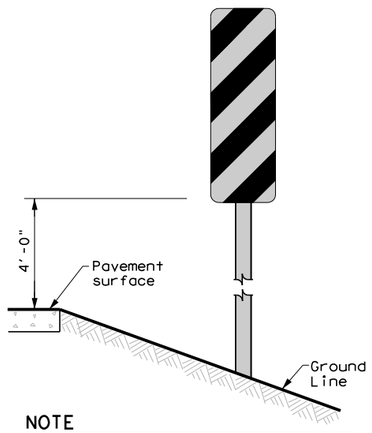
CONCRETE TRAFFIC BARRIER (CTB)



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.

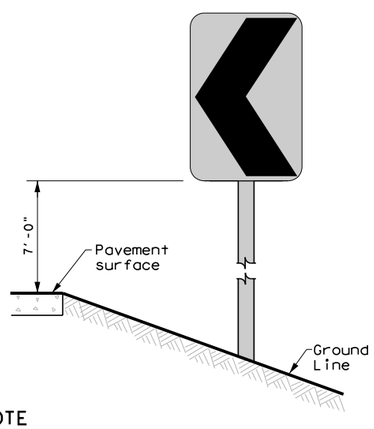
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

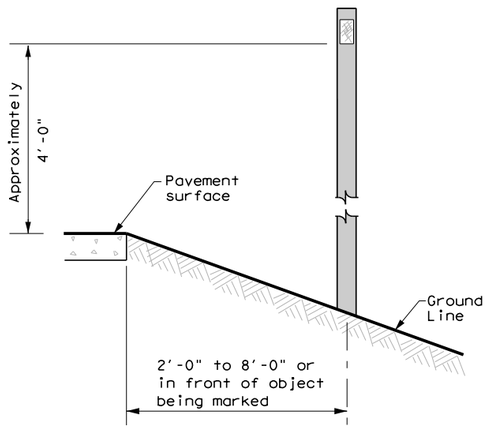
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	PHARR	CAMERON		150

20B

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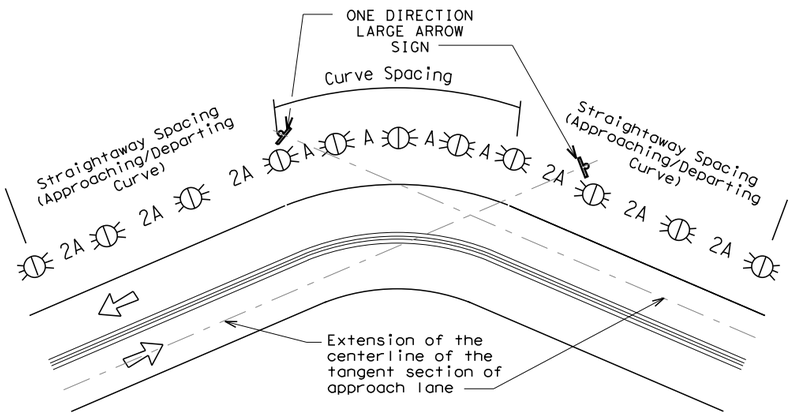
Aziz.Alebra

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

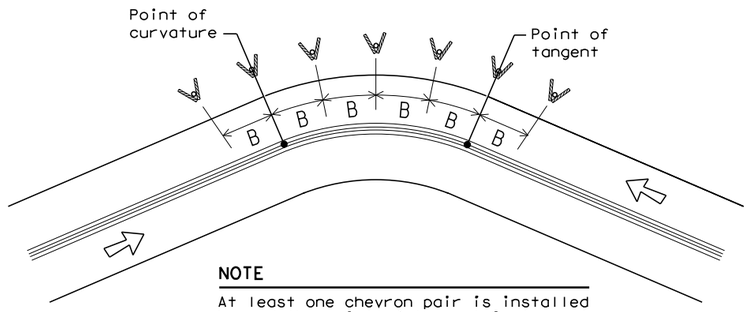
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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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3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	PHARR	CAMERON		151

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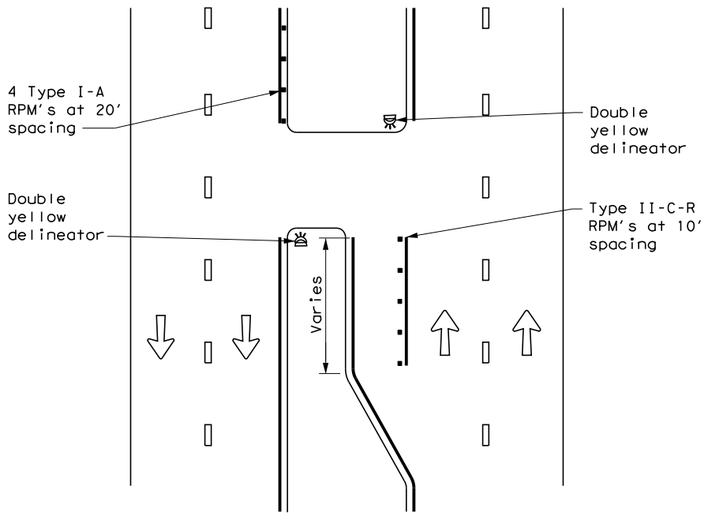
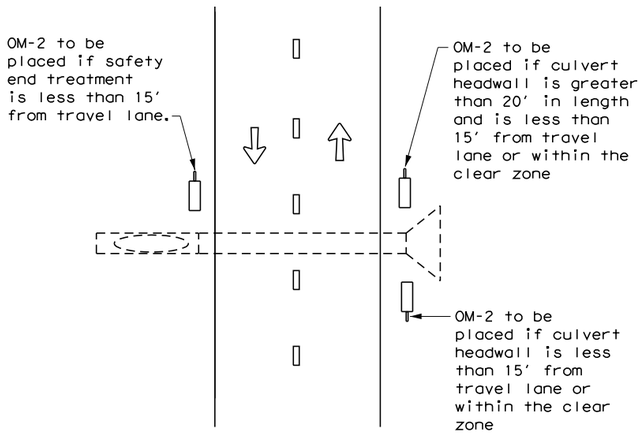
CROSSOVERS



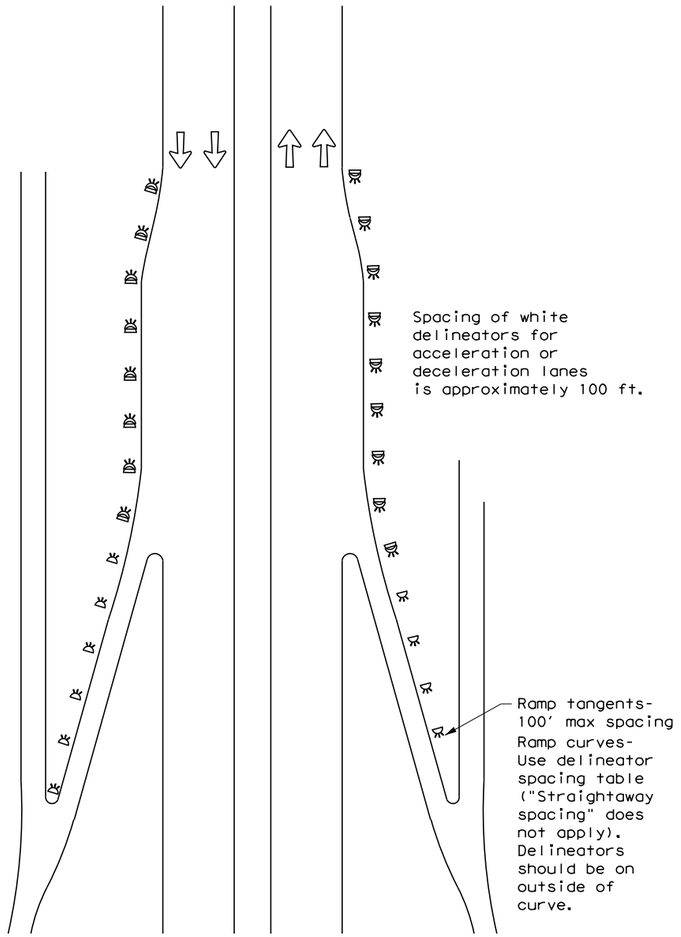
DETAIL 1

FOR CULVERTS WITHOUT MBGF



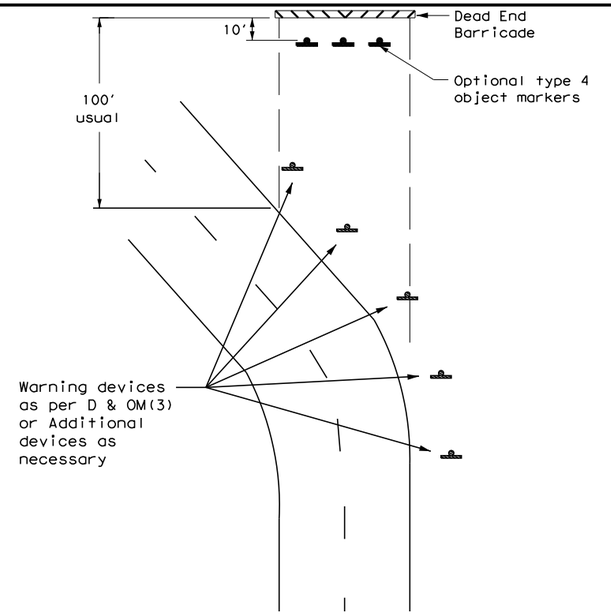
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



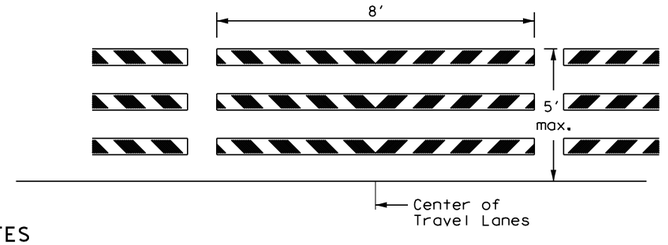
DETAIL 3

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
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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7-20	PHARR	CAMERON		152

20D

DATE: 6/5/2024 1:23:51 PM
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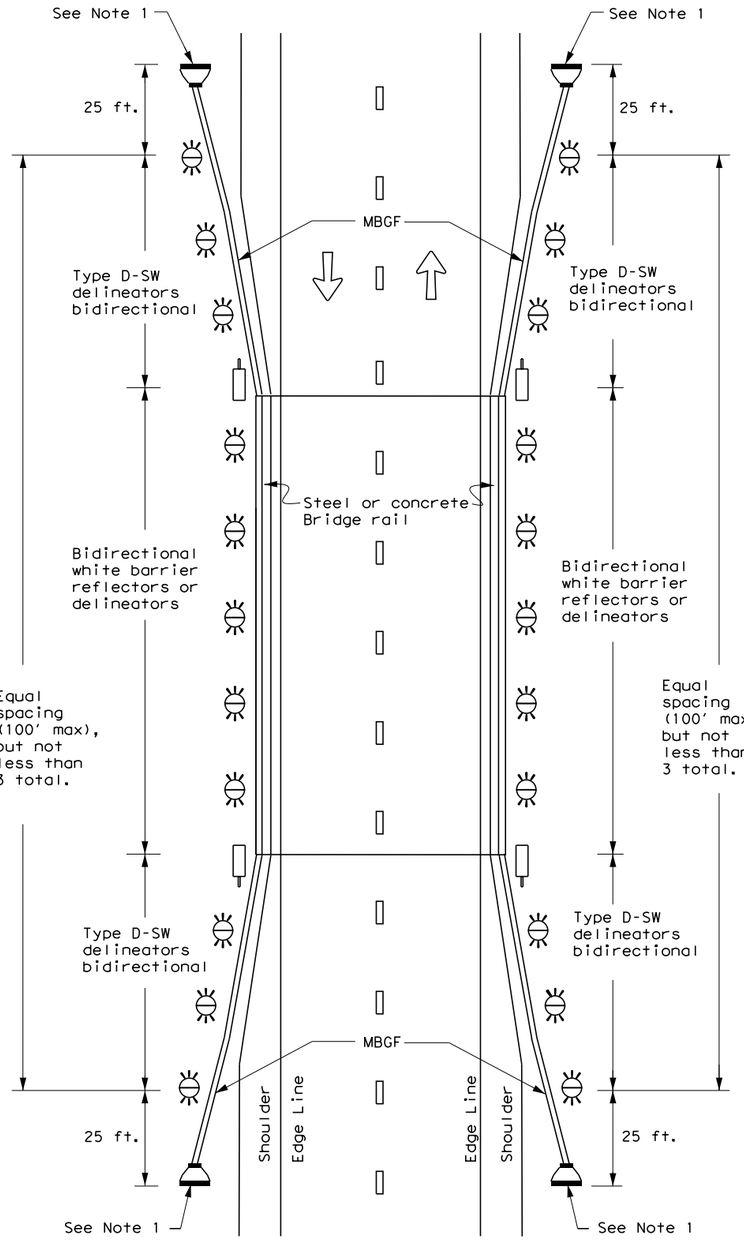
Aziz.Alebra

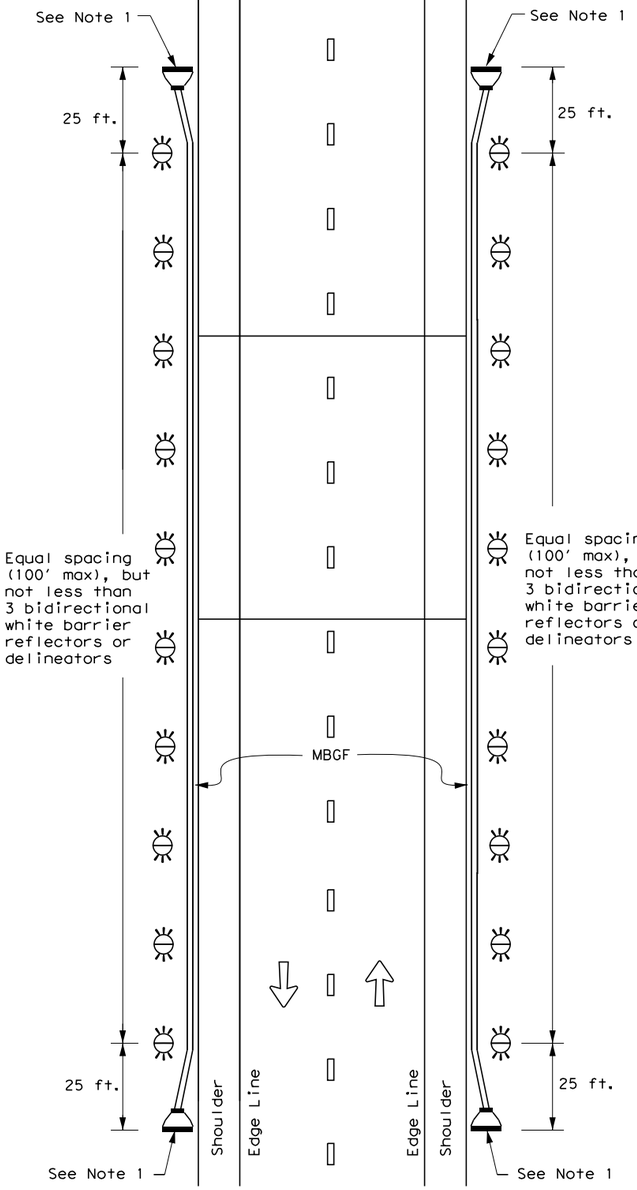
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

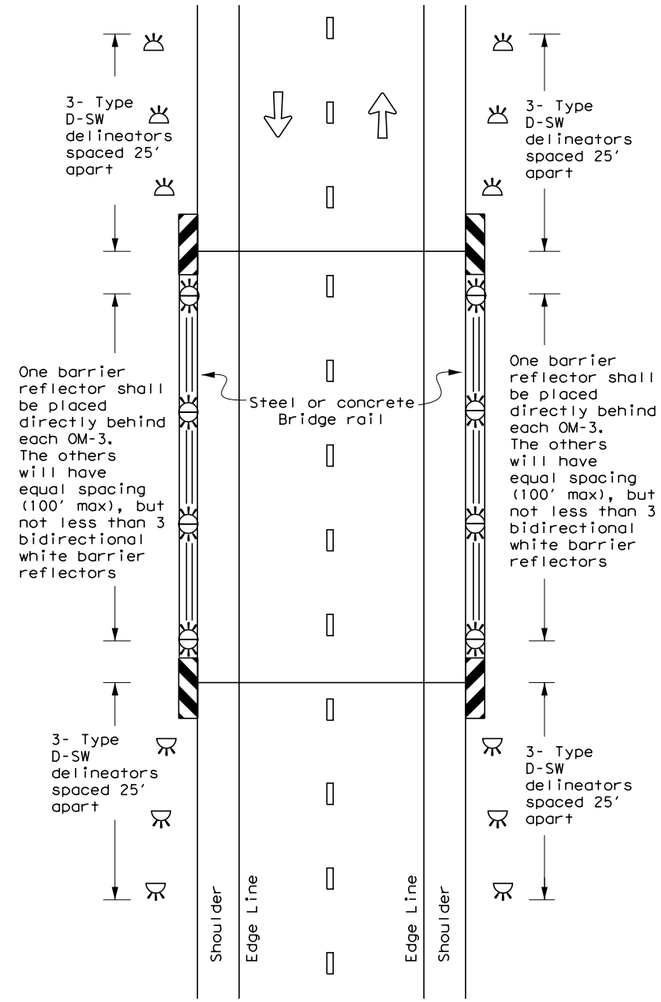
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

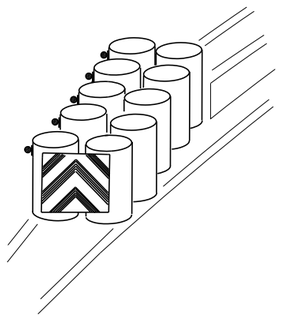
Traffic Safety Division Standard

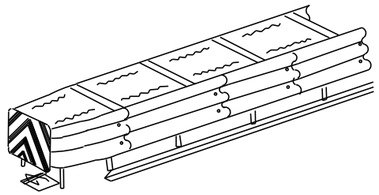
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

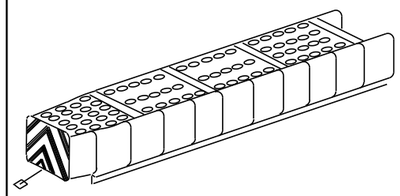
D & OM(5)-20

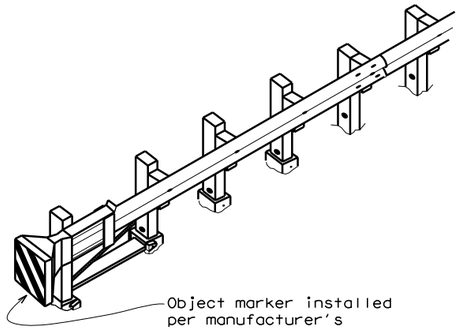
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
7-20	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		153

20E

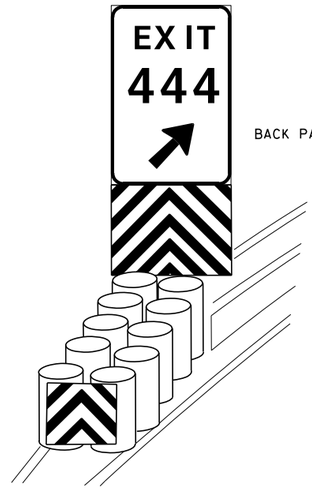




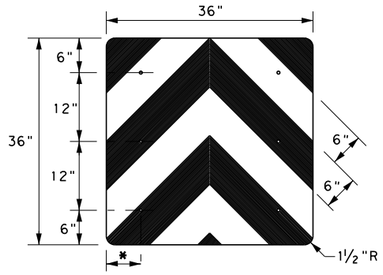


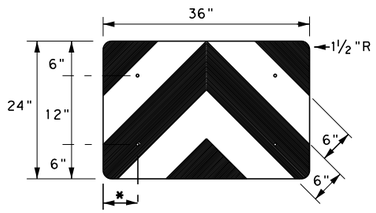


Object marker installed per manufacturer's recommendations.

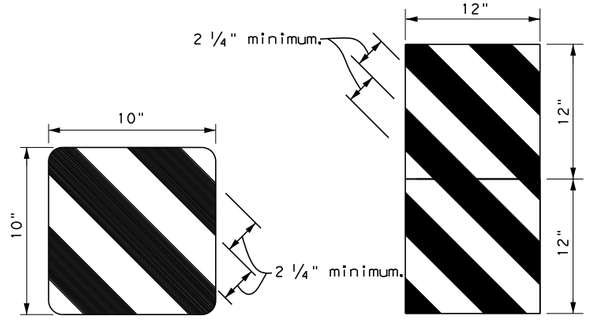


BACK PANEL (OPTIONAL)

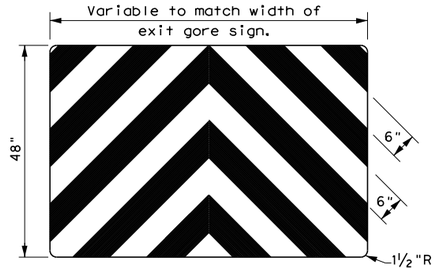


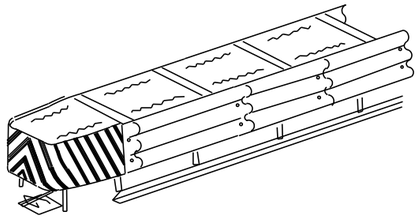


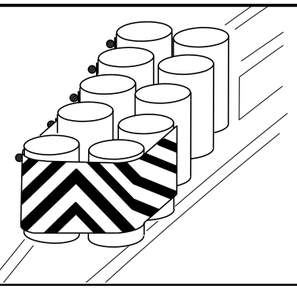
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

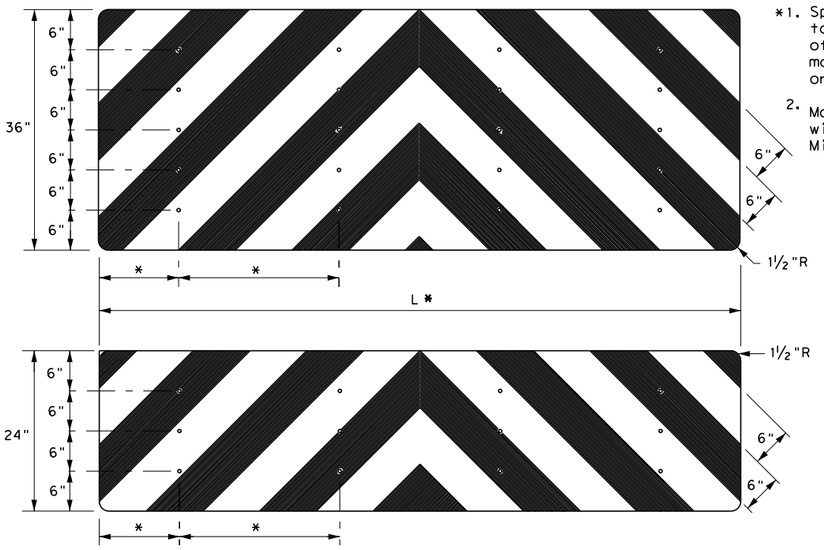


OBJECT MARKERS SMALLER THAN 3 FT^2









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	2529	02	010	FM 2556
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	PHARR	CAMERON		154
4-98 7-20				

20G

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Aziz.Alebra 6/5/2024 1:23:57 PM

DATE: 5/7/2024 6:30:19 PM
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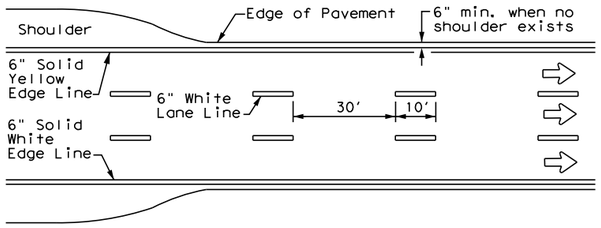
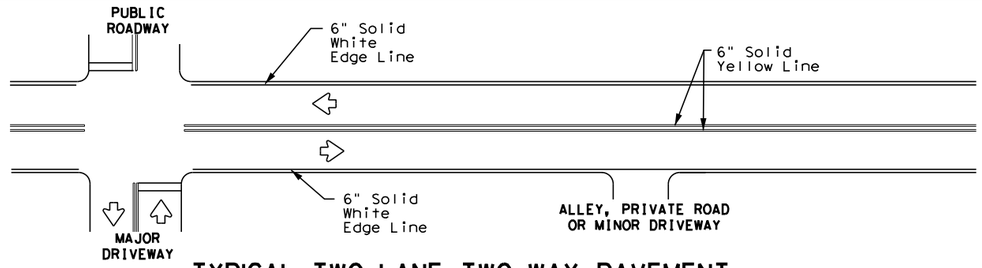
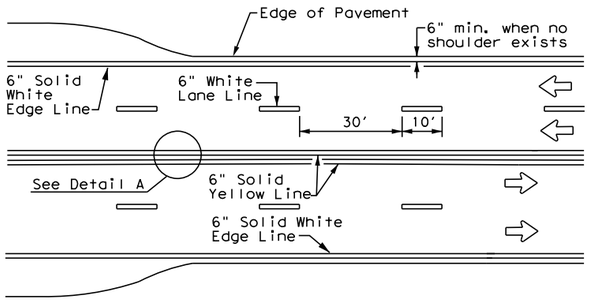
AKH

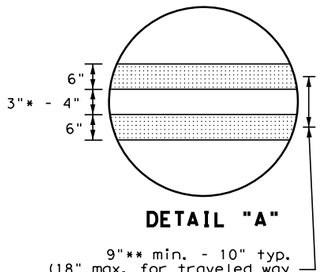


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

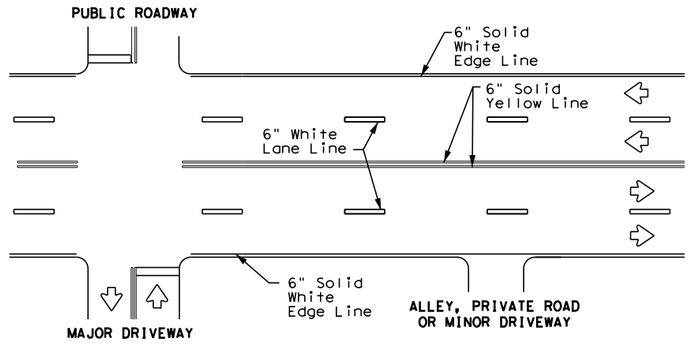




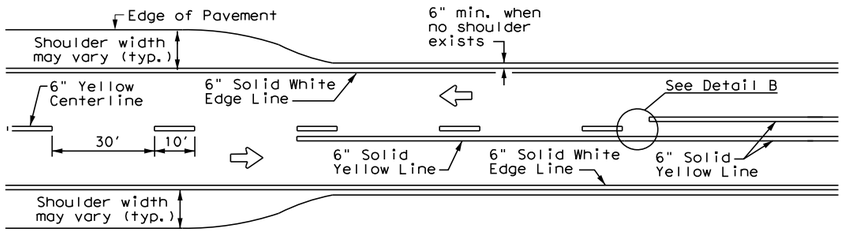
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

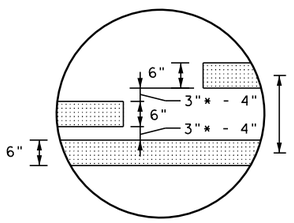
** 8" minimum for restripe projects when approved by the Engineer.



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

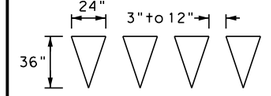


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



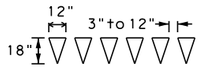
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

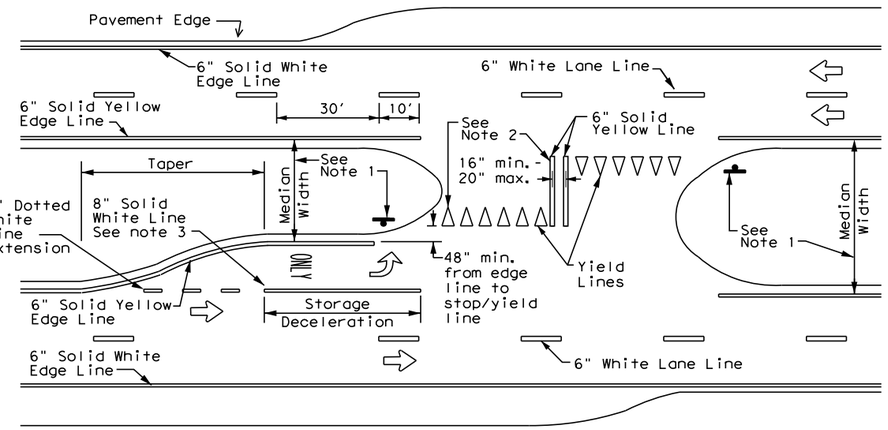


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

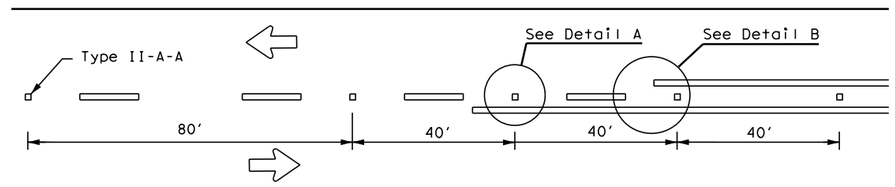
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

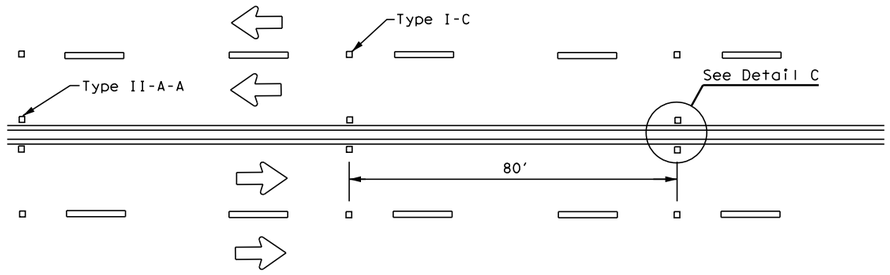
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	2529	02	010	FM 2556
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	PHARR	CAMERON		155

22A

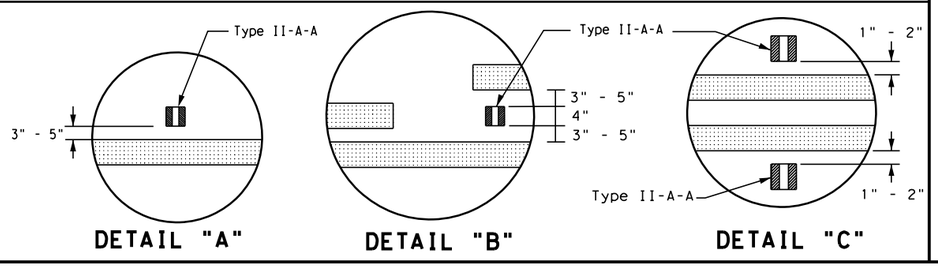
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



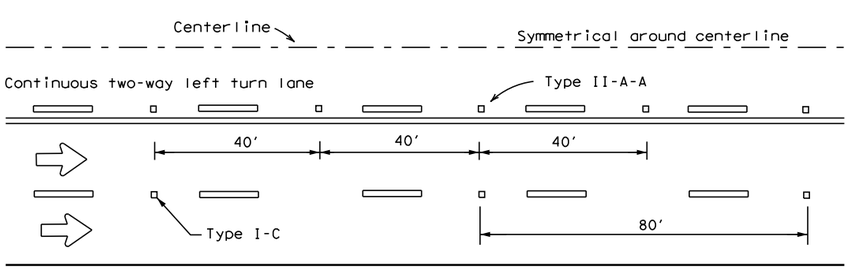
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



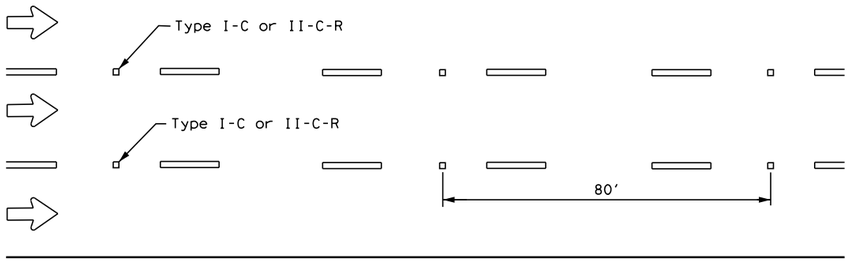
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



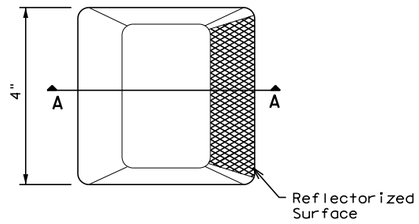
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

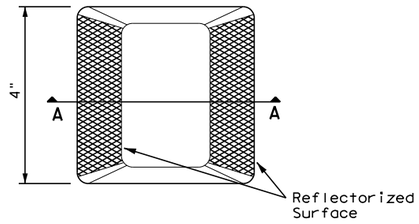
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

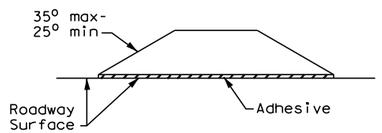
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

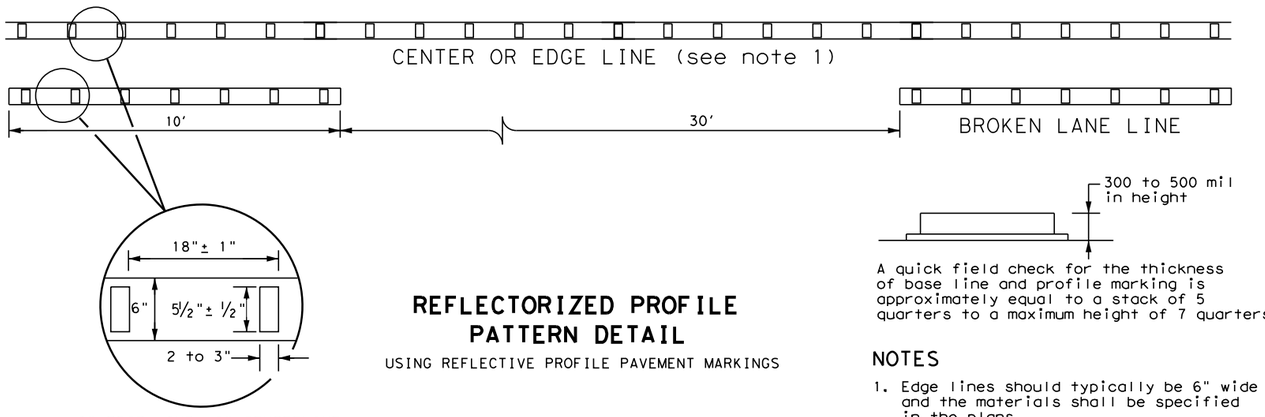


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		156

22B

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AKH

DATE: 5/7/2024 6:50:34 PM
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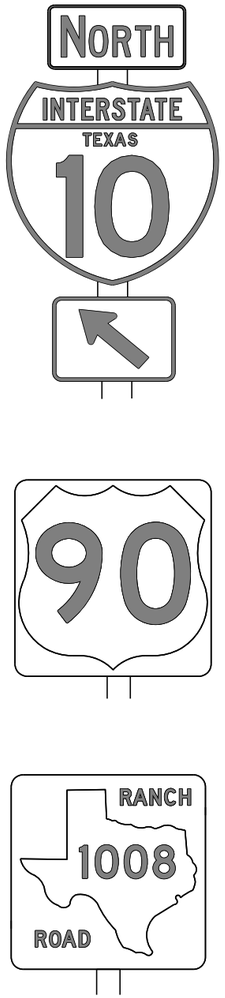
AKH

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

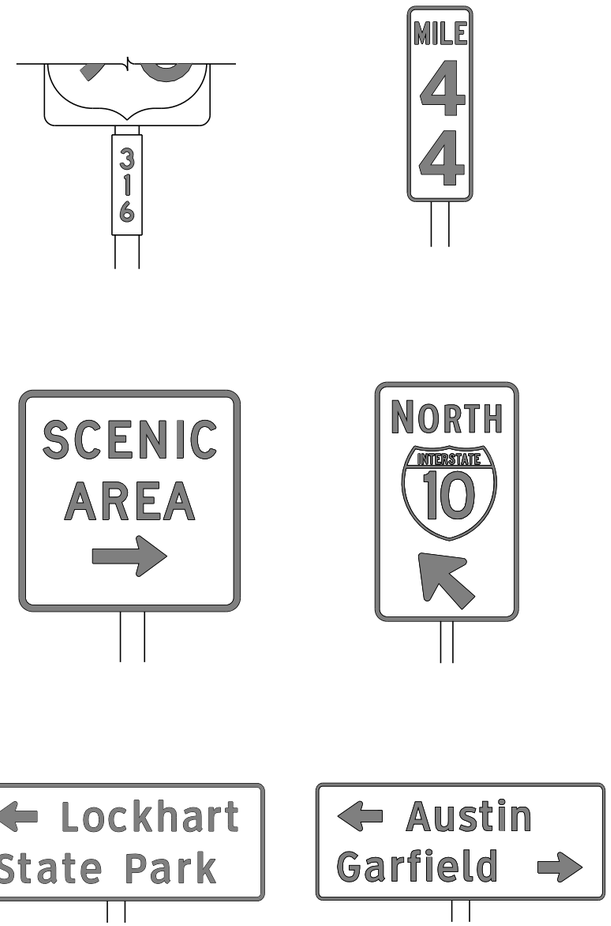
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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	2529	02	010	FM 2556
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	PHARR	CAMERON		157

3

DATE: 5/1/2024 6:50:37 PM
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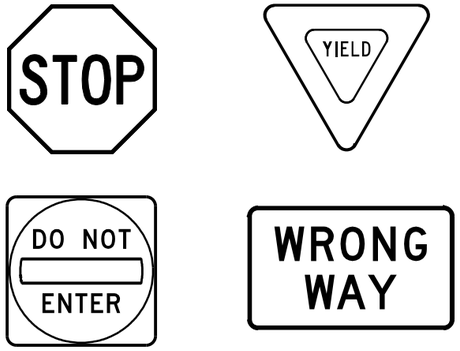
AKH

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

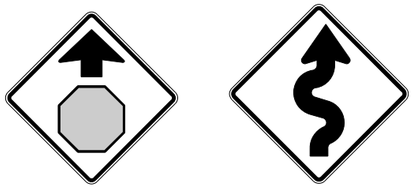
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		157A

4

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

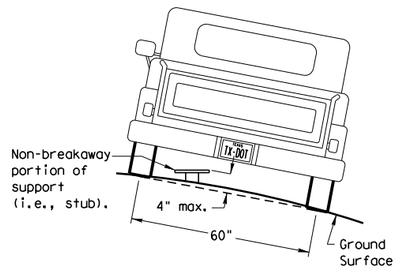
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

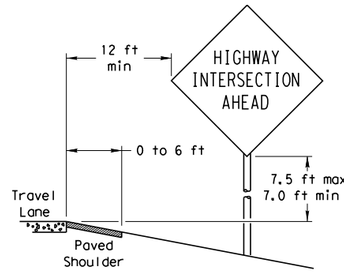
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

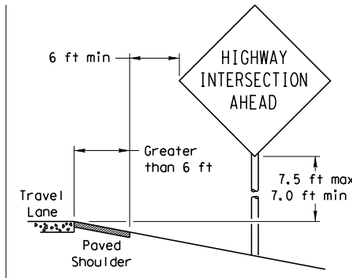
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

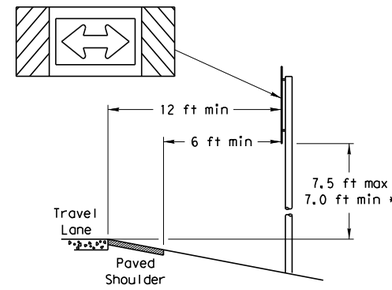
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



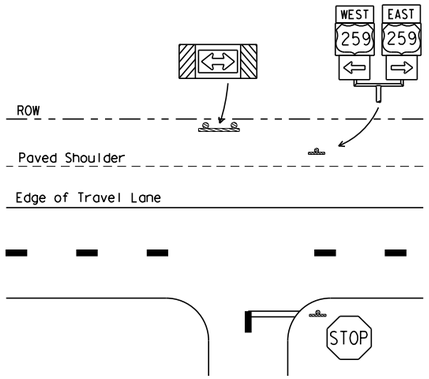
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

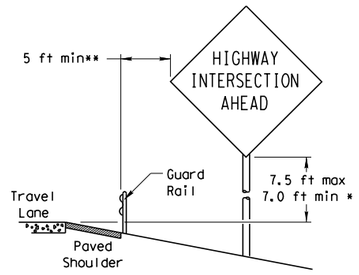
T-INTERSECTION



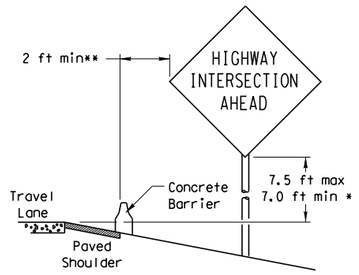
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



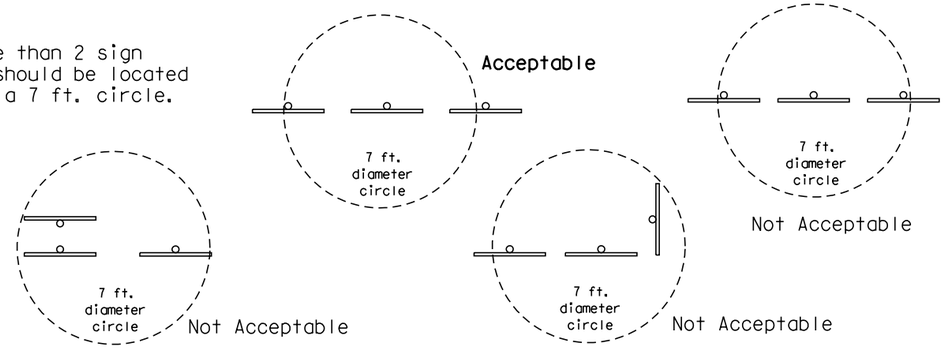
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

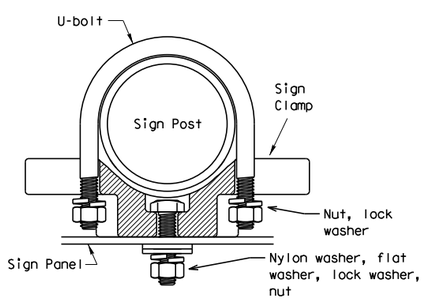
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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

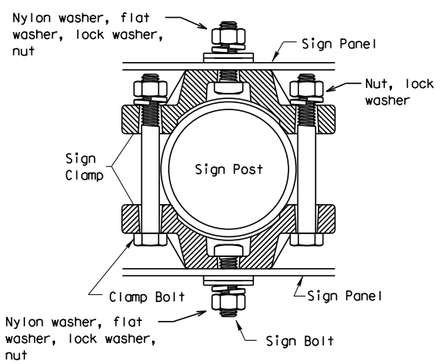


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



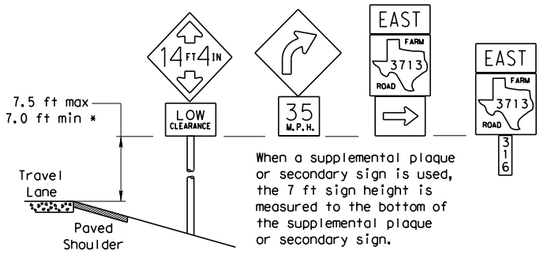
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

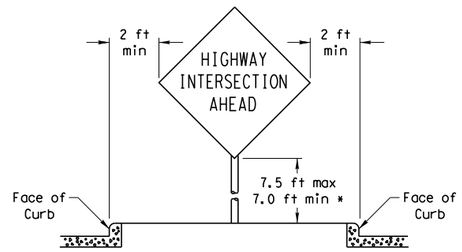
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



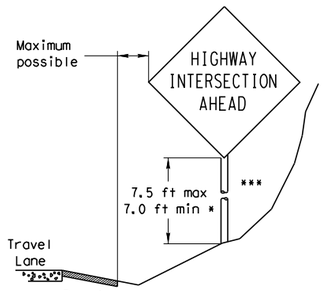
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		158

26A

DATE: 6/5/2024 1:24:27 PM
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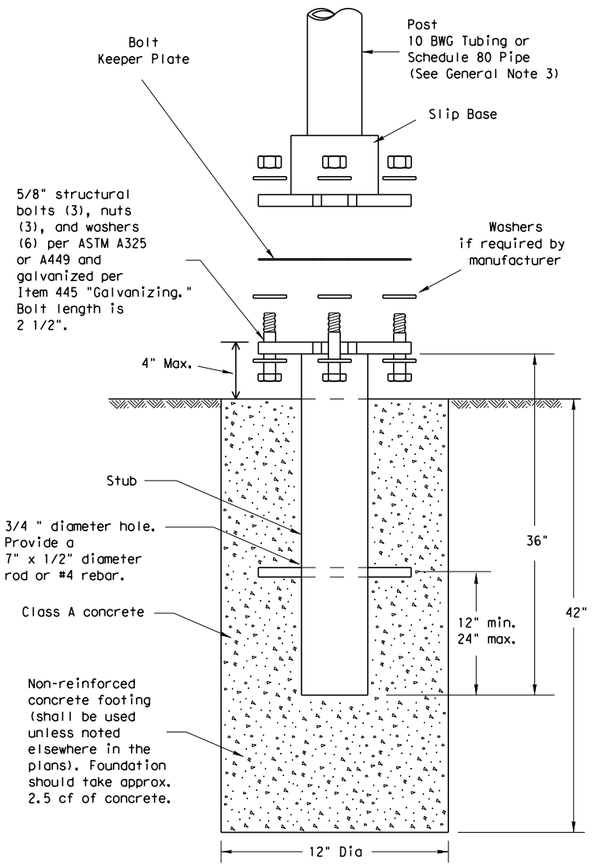
Aziz.Alebra

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.

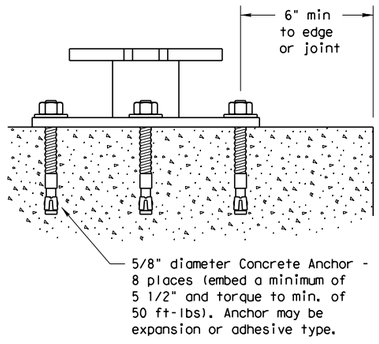
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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
2529	02	010	FM 2556

DIST	COUNTY	SHEET NO.
PHARR	CAMERON	159

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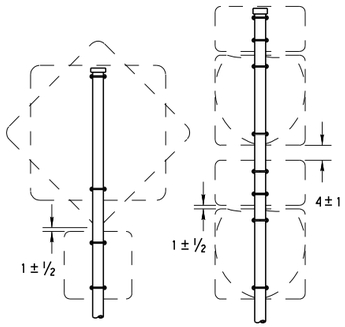
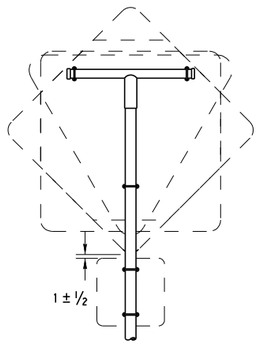
Aziz.Alebra



SM RD SGN ASSM TY XXXXX(1)XX(P)



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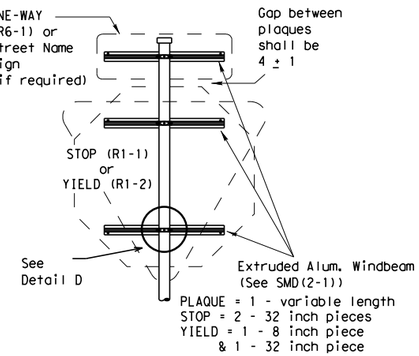

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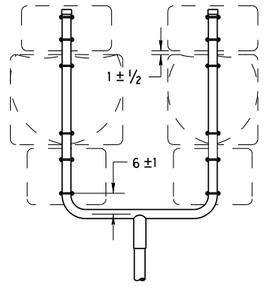
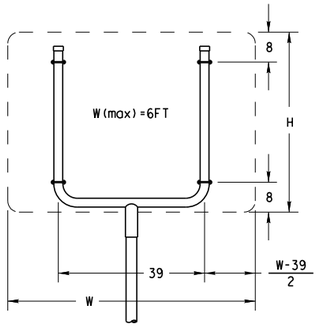
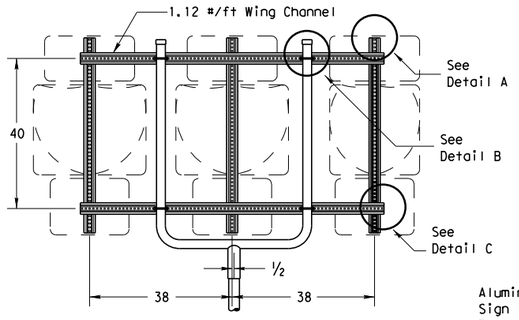


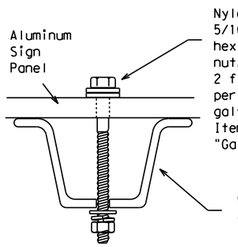
SM RD SGN ASSM TY XXXXX(1)XX(U)



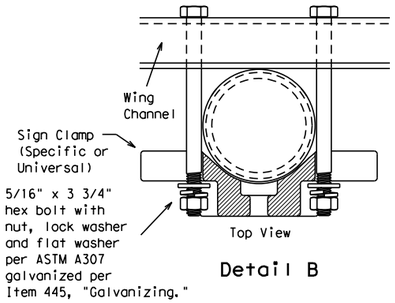
SM RD SGN ASSM TY XXXXX(1)XX(U)



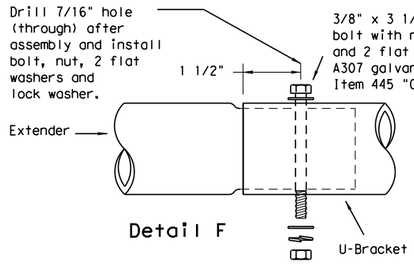
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

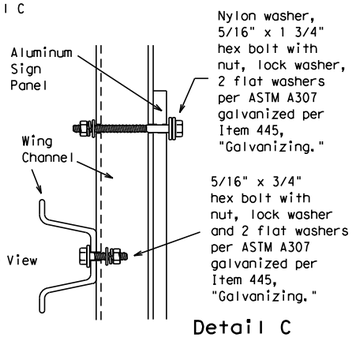


Detail B

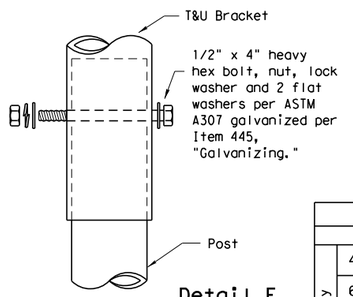


Detail F

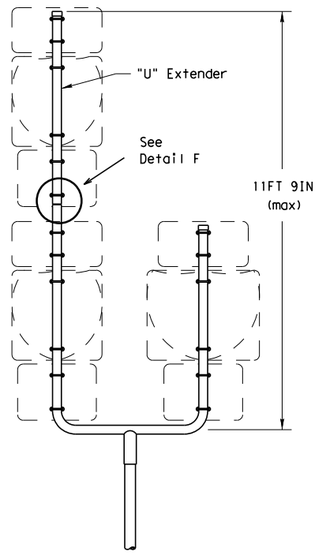
Splices shall only be allowed behind the sign substrate.



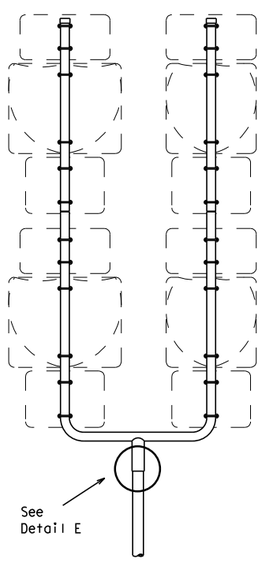
Detail C



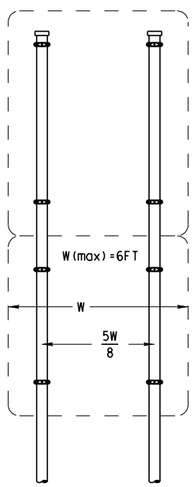
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

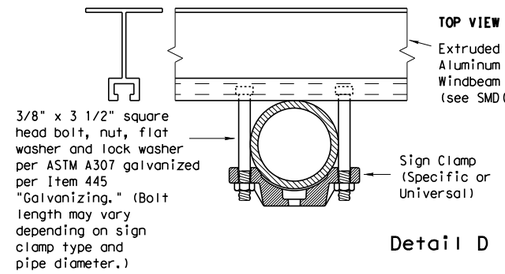


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

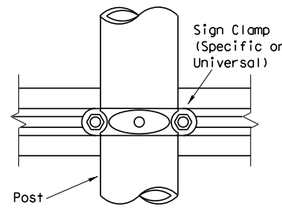


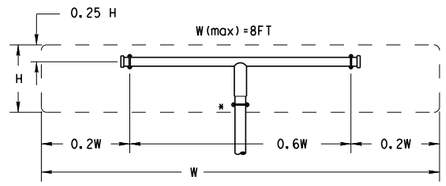
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

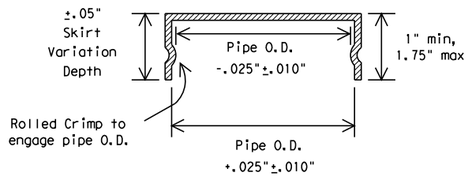




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

CONT	SECT	JOB	HIGHWAY
2529	02	010	FM 2556

DIST	COUNTY	SHEET NO.
PHARR	CAMERON	160

9-08 REVISIONS

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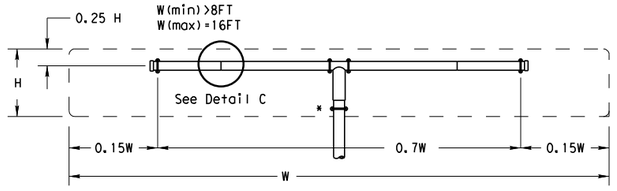
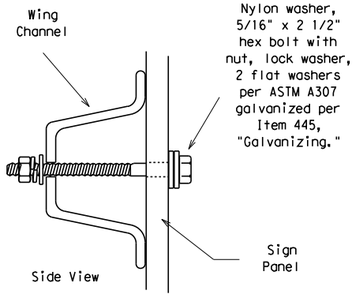
Aziz.Alebra

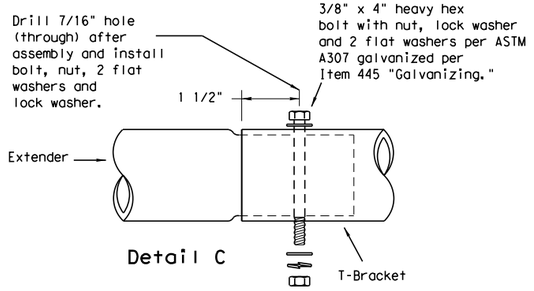


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)



Detail B



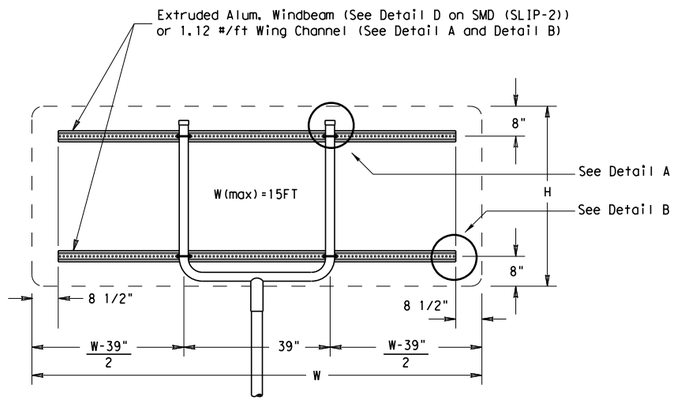
Detail C

Splices shall only be allowed behind the sign substrate.

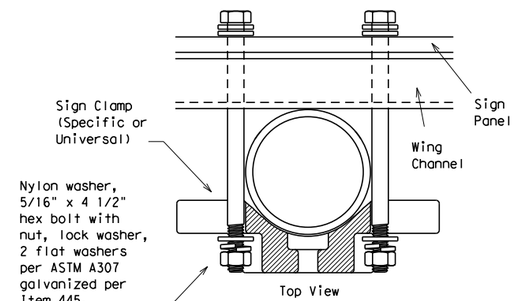
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

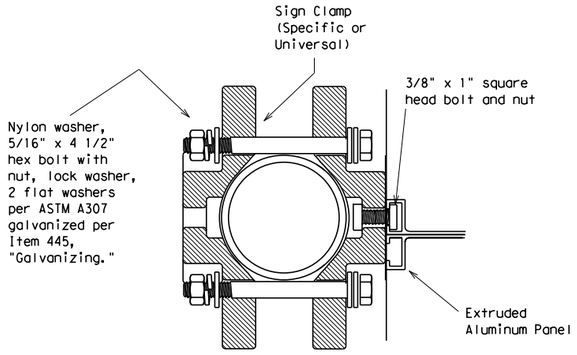
1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.



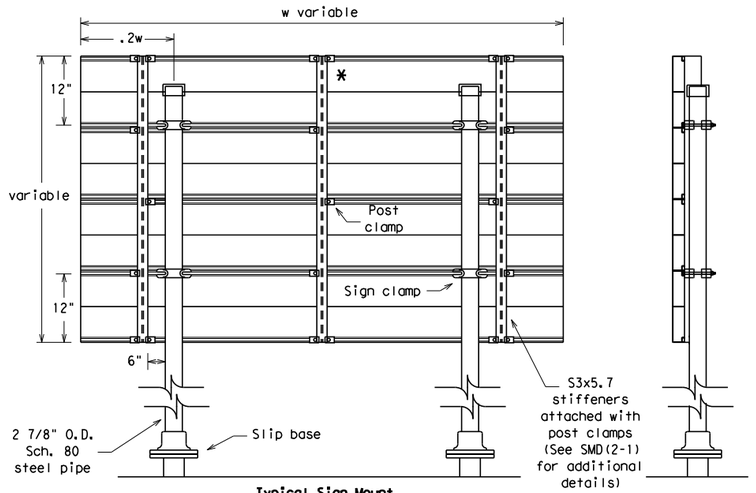
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail A



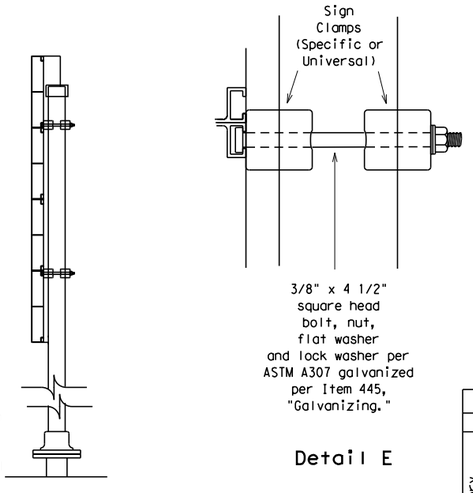
Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Typical Sign Mount

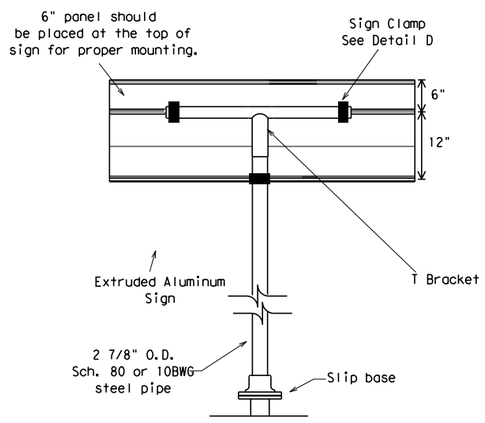
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

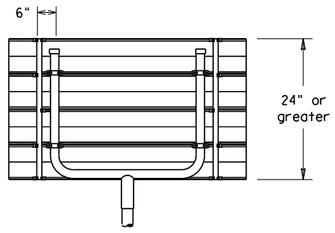


Detail E

See Detail E for clamp installation



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
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PHARR	CAMERON		161

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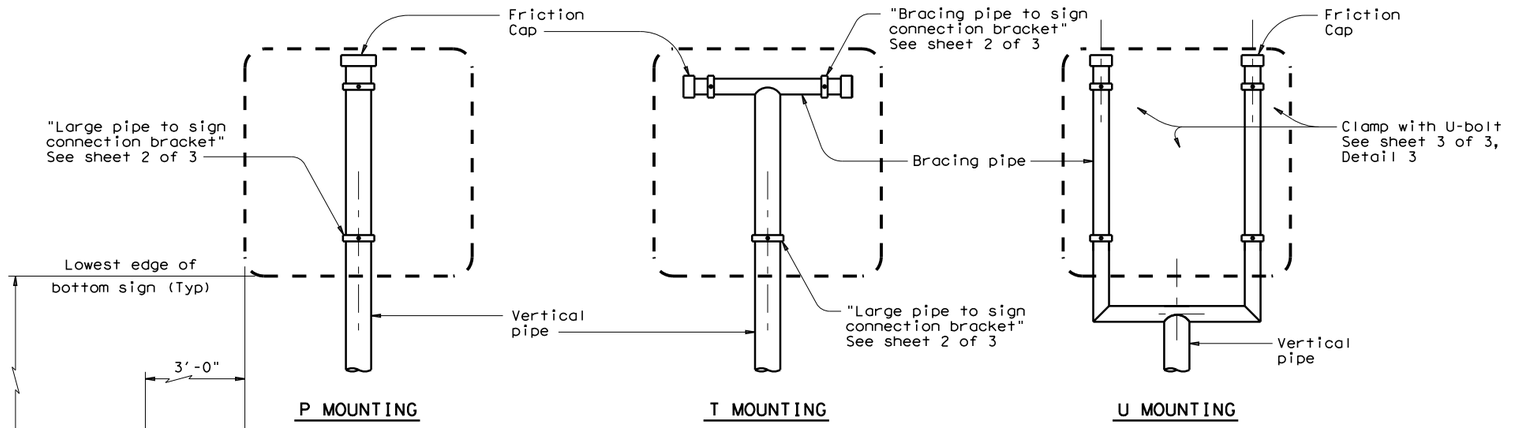
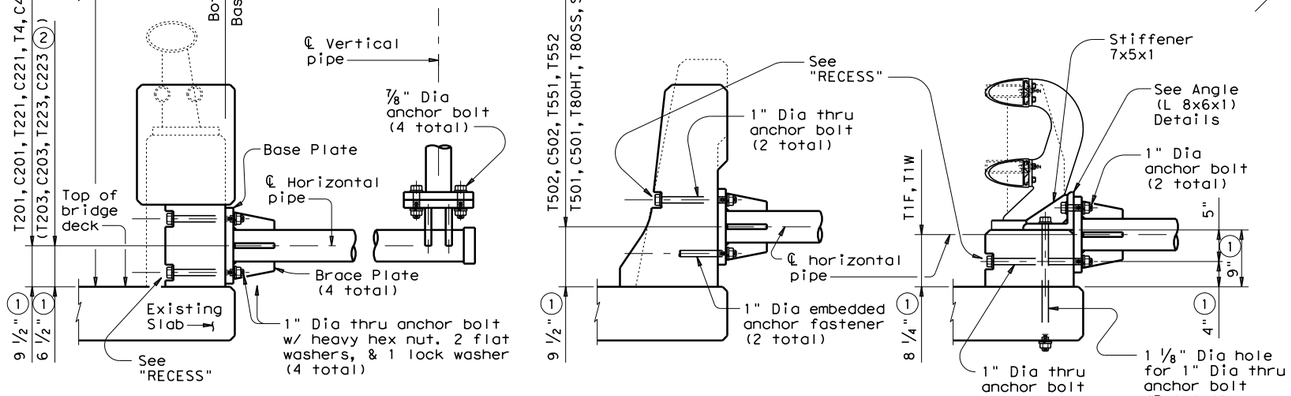


VARIOUS SIGN ATTACHMENTS

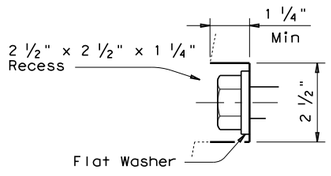
(Mounting NOT deviated from SHSD)



LONGITUDINAL SECTION THROUGH RAILING & SIGN MOUNT

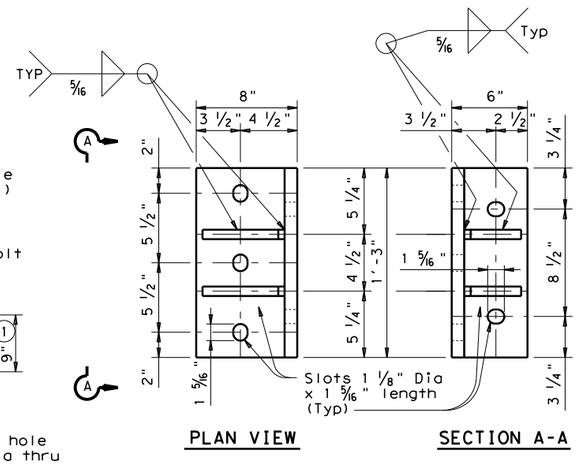
(1) Increase 2" for structure with overlay.

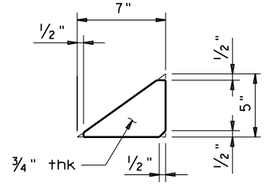
(2) Attached at ℄ post.



RECESS

PIPE SIZE AND THICKNESS			
Pipe Placement / Design Wind Speed	Horizontal	Vertical	Bracing
90 mph	5" X-Strong (.375")	4" X-Strong (.337")	2 ½" Standard (.203")
130 mph	6" X-Strong (.432")	5" X-Strong (.375")	3" X-Strong (.300")





STIFFENER

ANGLE (L 8x6x1) DETAILS

GENERAL NOTES:

Design conforms to 2013 AASHTO Standard Specifications for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design 3-second gust wind speeds of 90 mph and 130 mph with a 1.14 gust factor, and a wind importance factor of 1.0 (50-year mean recurrence interval) for the supporting structures. For mounting connection between sign panel and pipe, wind importance factors of 0.71 and 0.54, for 90 mph and 130 mph winds, respectively, are applied to adjust the wind speeds to a 10-year mean recurrence interval.

See standard sheet WV & IZ(LTS2013) for the boundaries of each design wind zone. All mounting shall be based on 130 mph wind speed design except when located in 90 mph wind zone. Maximum panel area is 30 sq. ft. Maximum design height is 50 ft, with design height defined as the distance between natural ground (average elevation of surrounding terrain) and the center of sign(s) at the mounting location.

Material for pipe shall be ASTM A53 Grade B, or A501. Structural steel plates shall be ASTM A36, A572 Grade 50, or A588. Bolts used to connect pipe and mounting bracket, and wind beam to sign panel shall be ASTM A307. Anchor bolts shall be ASTM A325 or A193 B7. Each anchor bolt shall be provided with 2 flat washers, 1 lock washer, and 1 heavy hex nut. All parts shall be galvanized in accordance with Standard Specifications Item 445, "Galvanizing".

Attach horizontal pipe at least 2'-0" from the edge of any nearby drain slot.

Contractor shall verify applicable field dimensions before fabrication. Holes drilled through the railing parapet wall shall be drilled with rotary (coring or masonry drill) type equipment. Percussion (star) drilling shall not be allowed. Anchorage for pipe attached to rail shall be placed using an anchoring system approved by the engineer. Installation of anchor fasteners including hole depth, diameter and material shall be in accordance with the manufacturers' recommendation.

Each embedded anchor fastener shall resist an allowable design loading (after applying the reduction factors of bolt spacing and bolt edge distance) of:

	130 mph	90 mph
Tension	12.5 kips	7.5 kips
Shear	9.0 kips	5.0 kips

Each anchoring system shall provide a capacity to resist the required tension and shear acting simultaneously.

For sign connection to mounting, shop drill holes on sign blank in accordance with the current Standard Highway Sign Designs for Texas (SHSD). Additional hole(s) needed to meet a stipulated-type mounting may be field drilled. For multi-sign or back-to-back signs mounting, the engineer shall determine the proper type which ensures each individual mounting meets requirements.

Refer to Standard sheets SMD(GEN), SMD(SLIP-2 and SMD(2-1) for details not covered here.

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-1)-14

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©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		162

DATE: 6/5/2024 1:24:49 PM
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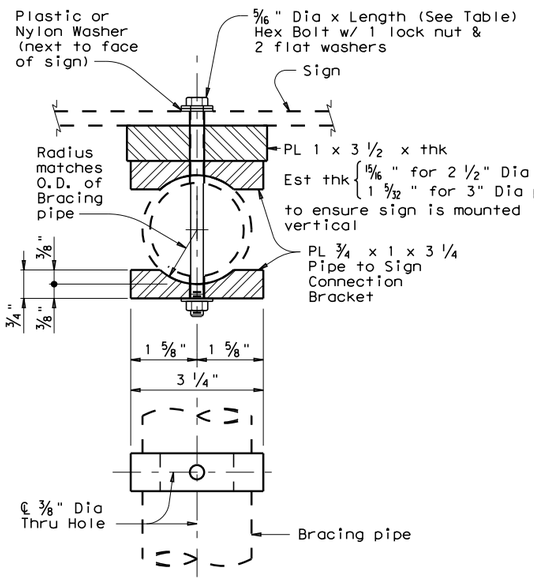
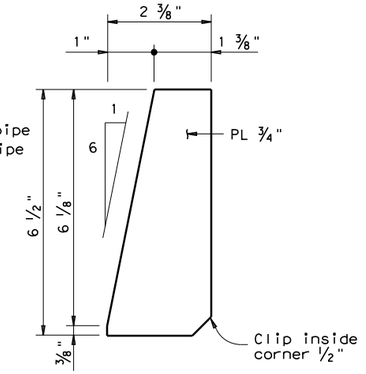
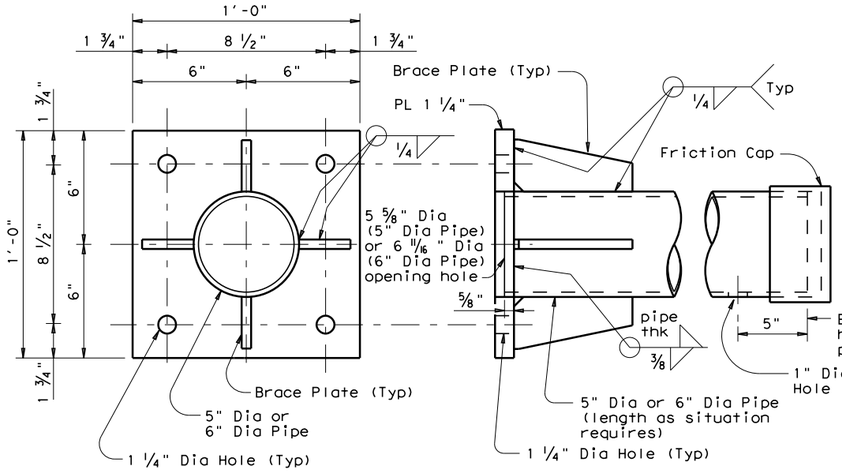


BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

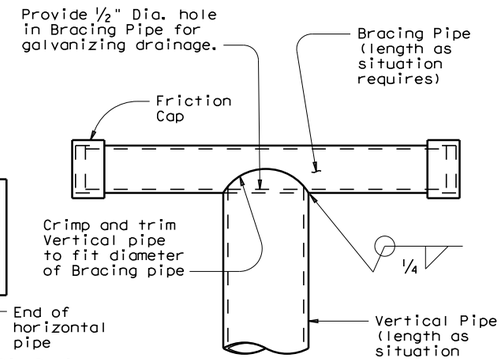
(Showing T Mounting)

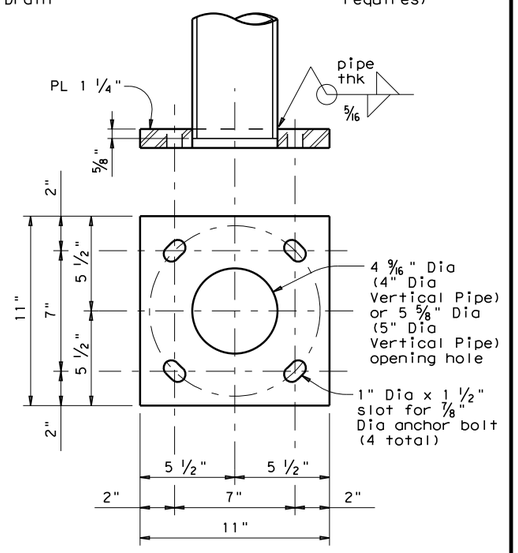


BRACE PLATE DETAILS



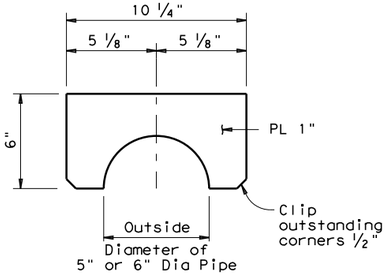
BASE PLATE DETAILS





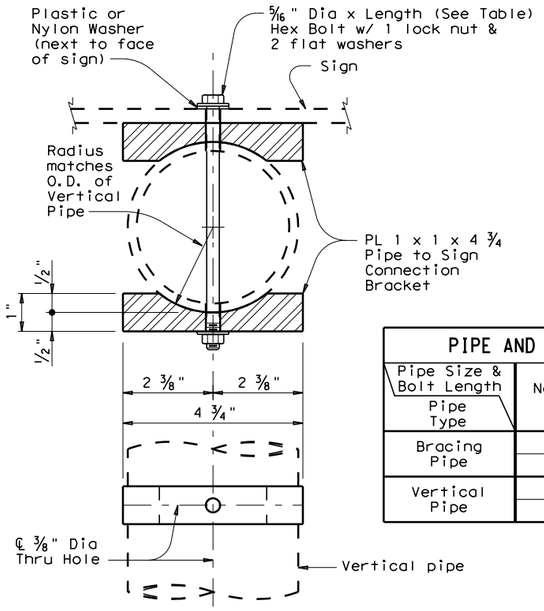
SIGN POLE & POLE BASE PLATE DETAILS

(Showing only T Mounting)



SIGN POLE SUPPORT PLATE BRACKET DETAILS

SIGN POLE SUPPORT PLATE DETAILS



LARGE PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing P or T Mounting)

PIPE AND BOLT SPECIFICATIONS		
Pipe Size & Bolt Length / Pipe Type	Nominal Pipe Dia (in.)	Bolt Length (in.)
Bracing Pipe	2 1/2	6
	3	7
Vertical Pipe	4	7
	5	8

SHEET 2 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-2)-14

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©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
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	PHARR	CAMERON		163

26H

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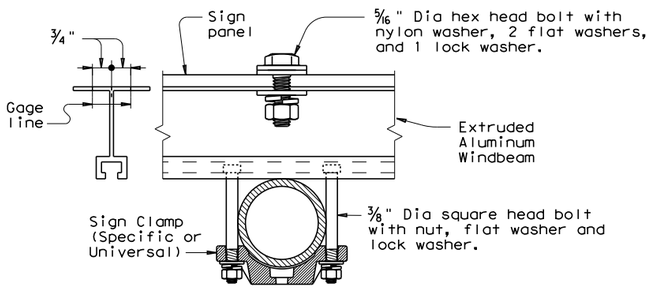
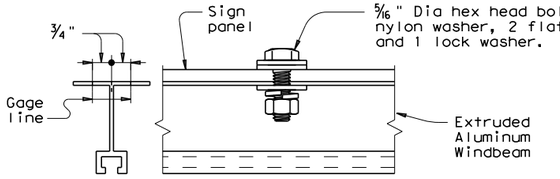


DETAIL 1



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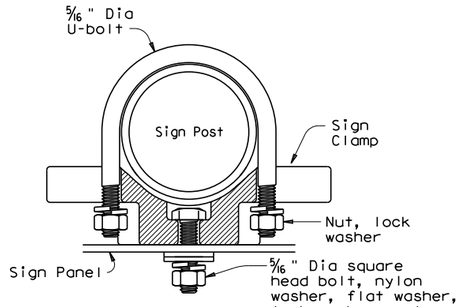
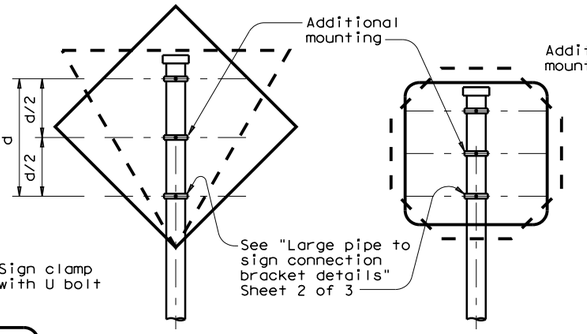


DETAIL 3

SIGN SHAPE	SQUARE			HORIZONTAL RECTANGLE			VERTICAL RECTANGLE			DIAMOND			OCTAGON			EQUILATERAL TRIANGLE			INTERSTATE SHIELD	PENTAGON (SCHOOL)	
Type of Sign Mounting on SHSD / Design Wind Speed	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	P	T
90 mph					(Type 23) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"		(Type 2) 36"x48" (Type 32) 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" 48"x72" (Type 3) 48"x84"			(Type 3) 60"x60"									(Type Special) 45"x36"		
130 mph	(Type 1) 30"x30" 36"x36"	(Type 3) 48"x48"		(Type 1) 36"x24" 36"x30"	(Type 23) 48"x42" 54"x42" 60"x30" 66"x36" 84"x24" (Type 3) 60"x48"	(Type 3) 72"x36" 78"x36" (Type 23) 72"x30" 84"x24"	(Type 1) 30"x36" 30"x42"	(Type 3) 36"x48" 36"x60" 36"x72" 42"x60" 48"x54" 48"x60" (Type 4) 48"x72" 48"x84"	(Type 3) 48"x60"	(Type 1) 36"x36"	(Type 3) 48"x48" 60"x60"					(Type 1) 48"x48"			(Type Special) 36"x36" 45"x36"		

Notes:
1. Drill holes in addition to the hole pattern of the Standard Highway Sign Designs for Texas (SHSD) at specified locations to meet a stipulated-type mounting indicated in the parenthesis ( ).
2. "Blank" in the above table indicates all other signs excluded from stipulated mounting shall be mounted in accordance with SHSD.

(1) In lieu of welding, the Fabricator may bend bracing pipe elbows if the following conditions are met:
a. Spacing between vertical bracing pipes is equal to or greater than 2'-6".
b. Bending radius is 12".
c. The distance between the lowest clamp and centerline of horizontal bent pipe is 13" max.



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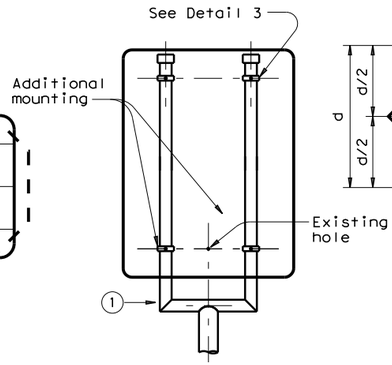

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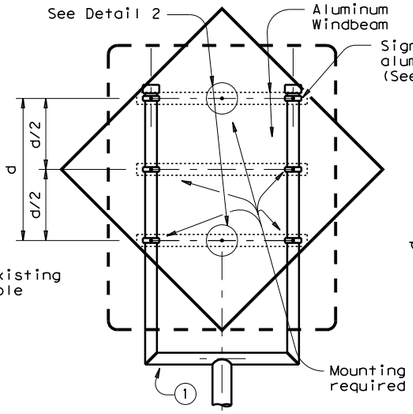
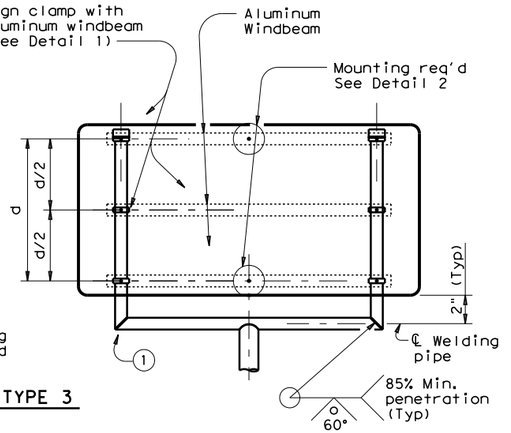
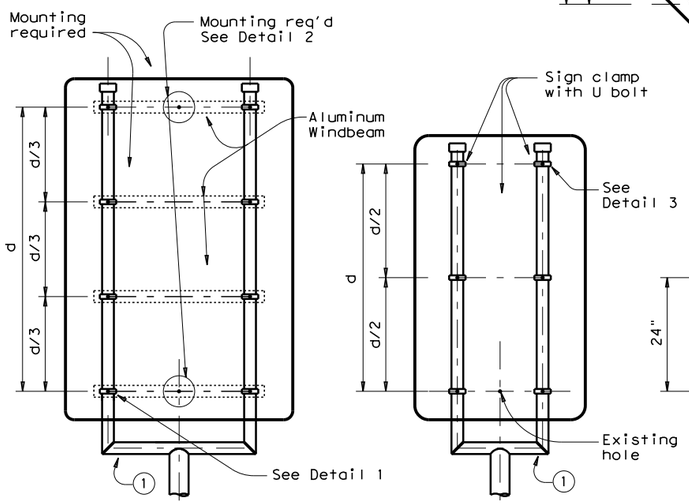


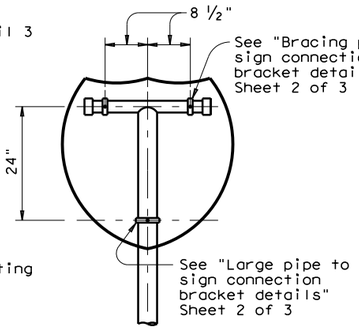


TYPE 3

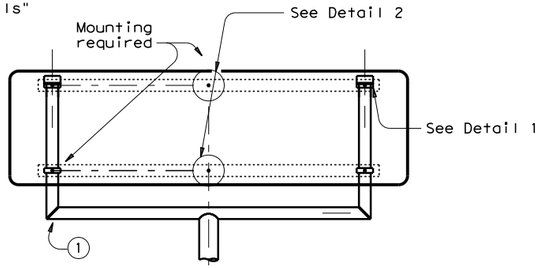


TYPE 4

TYPE 32



TYPE SPECIAL



TYPE 23

SHEET 3 OF 3

Texas Department of Transportation | Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-3)-14

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		164

26J

During the planning phase of project development, the following Environmental Permits, Issues and Commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities as additional environmental clearances may be required.

I. Clean Water Act, Section 402; Stormwater Pollution Prevention

Action Items Required : ☐ No Action Required

1. ☒ The contractor must implement the SW3P by installing Best Management Practices (BMPs) as indicated in the construction plans and maintained appropriately throughout construction. BMPs must be in place prior to the start of construction. The SW3P may need to be revised as necessary as construction progresses.

2. ☒ For all construction PSL's off the ROW, the contractor must certify compliance with all applicable laws, rules and regulations pertaining to the preservation of cultural resources, natural resources and the environment.

3. ☒ Based on the acreage of impact, select the appropriate box below:

   ☐ This project will disturb less than 1 acre of soil and is not part of a larger common plan of development; therefore, a NOI and TPDES Site Notice are not required for this project.

   or

   ☐ This project will disturb equal to or more than 1 acre of soil but less than 5 acres; therefore a NOI is not required but a TPDES Site Notice is required. The Construction Site Notice (CSN) is required to be posted at the construction site in a publicly accessible location for review by the public, TCEQ, EPA and other Inspectors.

   or

   ☒ This project will disturb equal to or more than 5 acres of soil and will require a NOI and TPDES Site Notice. The NOI and Site Notice are required to be posted at the construction site in a publicly accessible location.

4. ☒ Need to address MS4 requirements (Cameron & Hidalgo Counties only) ☐ MS4 requirements not needed

II. Clean Water Act, Sections 401 and 404 Compliance

Action Items Rquired : ☐ No Action Required

1. ☒ Filling, dredging or excavating in any water bodies, rivers, creeks, streams, wetlands or wet areas is prohibited unless specified in the USACE permit and approved by the Engineer. The contractor shall adhere to all agreements, mitigation plans, and BMPs required by the NWP as regulated by the USACE.

   The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

   ☐ No Permit Required

   ☒ Nationwide Permit 3 (a) - PCN not Required (less than 1/10th acre waters or wetlands affected)

   ☐ Nationwide Permit 14 - PCN Required (1/10th to <1/2 acre, 1/3 in tidal waters)

   ☐ Individual 404 Permit Required

   ☒ Other Nationwide Permit Required: NWP# 3 (a), NWP #15-PCN Not Required-FM 2556 Arroyo Colorado

2. ☒ The contractor is responsible for obtaining new or revised Section 404 permit(s) for Contractor initiated changes in construction methods that change Impacts To Waters Of The U.S., including wetlands. The Contractor will ensure that the water quality of the State will be maintained and not degraded.

3. ☒ Best Management Practices for applicable Section 401 General Conditions:

General Condition 12 - Categories I and II BMPs required

Category I (Erosion Control)

☒ Temporary Vegetation	☒ Interceptor Swale	☒ Mulch Filter Berms and/or Socks
☒ Blankets, Matting	☒ Diversion Dike	☒ Compost Filter Berms and/or Socks
☒ Mulch	☐ Erosion Control Compost	☐ Compost Blankets
☒ Sodding		

Category II (Sedimentation Control)

☒ Silt Fence	☐ Hay (Straw) Bale Dike	☒ Mulch Filter Berms and/or Socks
☒ Rock Berm	☐ Brush Berms	☒ Compost Filter Berms and/or Socks
☐ Triangular Filter Dike	☐ Sediment Basins	☐ Stone Outlet Sediment Traps
☐ Sand Bag Berm	☐ Erosion Control Compost	

General Condition 21 - Category III BMPs required

Category III (Post-Construction TSS Control)

☒ Vegetative Filter Strips	☐ Wet Basins	☐ Mulch Filter Berms and/or Socks
☐ Retention/Irrigation	☐ Grassy Swales	☐ Compost Filter Berms and/or Socks
☐ Extended Detention Basin	☒ Vegetation-Lined Ditches	☐ Sand Filter Systems
☐ Constructed Wetlands	☐ Erosion Control Compost	☐ Sedimentation Chambers

II. Clean Water Act, Sections 401 and 404 Compliance - Continued:

4. ☒ The Contractor's designated and qualified Contractor Responsible Person Environmental (CRPe) will monitor the project site daily to ensue compliance with SW3P and TPDES General Permit TXR 150000. Daily Monitoring Reports shall be provided to TxDOT within 48 hours, in accordance with Item 506.3.1.

5. ☒ Other Project Specific Actions:

   1. Contractor shall sweep roadway and remove any debris along the roadway upon completion of daily operations.
   2. Contractor shall not place any removed materials along adjacent grass areas.
   3. Project location and limits are located within and over the USIBWC Arroyo Colorado Floodway. No PSL's are to be located within the floodway. Follow USIBWC License Requirements.
   4. Removed aggregate, debris, and construction material must be removed and disposed of properly.
   5. Project shall have Erosion Control measures in place to prevent runoff and spills from reaching the Floodway.
   6. Daily sweeping and removal of debris on bridge.

III. Cultural Resources

Action Items Required : ☐ No Action Required

1. ☒ Refer to the 2014 TxDOT Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges, Item 7.7.1., 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.

2. ☐ Other Project Specific Actions:

   1. N/A
   2. N/A

IV. Vegetation Resources

Action Items Required : ☐ No Action Required

1. ☒ In accordance with the 2014 TxDOT Standard Specifications; Item 164 - Seeding For Erosion Control; provide and install temporary or permanent seeding for erosion control as shown on the plans or as directed by the Engineer for all seeding and replanting of right of way where possible. (Required for Urban Settings)

2. ☒ In accordance with Executive Order 13112 on invasive species and the Executive Memorandum on Beneficial Landscaping, native species of plants shall be used for all seeding and replanting of right of way where possible for rural roadways. (Required for Rural Settings)

3. ☒ Preserve vegetation where possible throughout the project and minimize clearing, grubbing and excavation within stream banks, bed and approach sections.

4. ☐ Other Project Specific Actions:

   1. N/A
   2. N/A

Pharr District Contact No. 956-702-6100 Revised 01/30/2017

List of Abbreviations

BMP: Best Management Practice	NWP: Nationwide Permit
CGP: Construction General Permit	PCN: Pre-Construction Notification
CRPe: Contractor Responsible Person Environmental	PSL: Project Specific Location
DSHS: Texas Department of State Health Services	SPCC: Spill Prevention Control and Countermeasure
FEMA: Federal Emergency Management Agency	SW3P: Storm Water Pollution Prevention Plan
FHWA: Federal Highway Administration	TCEQ: Texas Commission on Environmental Quality
MOA: Memorandum of Agreement	THC: Texas Historical Commission
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MSAT: Mobile Source Air Toxic	TxDOT: Texas Department of Transportation
MBTA: Migratory Bird Treaty Act	T&E: Threatened and Endangered Species
NOI: Notice of Intent	USACE: U.S. Army Corp of Engineers
NOT: Notice of Termination	USFWS: U.S. Fish and Wildlife Service

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PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6			FM 2556
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	SHEET NO.
CONTROL	SECTION	JOB	
2529	02	010	165

V. Federal Listed, and Proposed Threatened and Endangered Species, Critical Habitat, State Listed Species, Candidate Species and Migratory Birds

Action Items Required : ☐ No Action Required

1. ☒ Under the Migratory Bird Treaty Act (MBTA) of 1918, codified at 16 U.S.C. § 703-712 and as enforced by the USFWS, the proposed construction work will not remove active nests from bridges, trees, ground and other structures during migratory bird nesting season, (February 1st. through October 1st.). If the Contractor needs to perform work within the right of way during nesting season, a qualified Biologist shall conduct a survey to determine if active nests are present. If present, the Contractor shall maintain a buffer zone around the nest(s) as directed by the Biologist. The buffer zone will be protected from clearing and disturbance until such time as the Biologist has determined that the nest(s) is no longer active. Prior to the nesting season, existing bridges and culverts should be treated against migratory bird nesting by utilizing Bird Exclusion Methods. Bird Exclusion Methods should be monitored and maintained throughout the nesting season. Refer to Standard Bird Exclusion Details.

2. ☒ There is the potential for the presence of state-listed species & species of concern in the project area and state law prohibits the taking (incidental or otherwise) of state-listed species. Taking is defined as the collection, hooking, hunting, netting, shooting, or share by any means or devices. If any listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately.

3. ☒ Other Project Specific Actions:

   1. Federal & State Listed Species: Ocelot (Leopardus paradalis) Jaguarundi(Herpailurus yagouarundi),Texas Tortoise (Gopherus berlandieri), Texas Horned Lizard (Phrynosoma cornutum), Monarch Butterfly (Danaus plexippus), Black-spotted Newt (Notophthalmus meridionalis), White-lipped Frog (Leptodactylus fragilis) Sheep Frog (Hypopachus variolosus), South Texas Siren (Large Form) (Siren sp.), Botteri's Sparrow (Peucacea botteri), Tricolored Bat (Perimyotis subflavus), White-tailed Hawk (Buteo albicaudatus), Mexican Goby (Ctenogonlus claytonil), Rio Grande Shiner (Notropis jemezanus), Coue's Rice Rat (Orzyomys couesl), White-nosed coati (Nasua narica), Mexican Fawnsfoot (Truncillacognata), Salina Mucket (Potamilus metnecktayi), Northern Cat-eyed Snake (Leptodeiri septentrionalis), Speckled Racer (Drymobius magaritferus)

   2. NO WORK SHALL OCCUR FROM DUSK TO DAWN. CONSTRUCTION AND MAINTENANCE ACTIVITIES SHALL OCCUR ONLY DURING DAYLIGHT HOURS.

   3. SEE EPIC SHEET SUPPLEMENTAL FOR TPWD BMPs.

   4. Complete freshwater mussel survey protocol for group 5 steams prior to construction.

VI. Hazardous Materials on Contamination Issues

Action Items Required : ☐ No Action Required

General (applies to all projects):

Comply with the Hazard Communication Act (HCA) 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 HCA.

Maintain an adequate supply of on-site spill response materials as indicated in the MSDS. In the event of a spill, take immediate action to mitigate the spill as indicated in the MSDS and in accordance with safe work practices. Contact the TxDOT Pharr 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 (identified as not normal)
- Trash piles, drums, canisters, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of contaminant substances

Any other evidence indicating possible hazardous materials or contamination discovered on site.

1. ☒ If potentially hazardous material and/or contaminated media (i.e.: soil, groundwater, surface water, sediment, building materials) are unexpectedly encountered during construction, assure that such materials and contamination are handled according to applicable federal and state regulations, cease work in the immediate area and contact the Engineer immediately.

VI. Hazardous Materials on Contamination Issues - Continued:

2. 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 required.
   If "Yes", then TxDOT is responsible for completing an asbestos assessment/inspection.

3. Are the results of the asbestos inspection positive (is asbestos present)?

   ☐ Yes ☒ No

   If "Yes", then TxDOT must retain a Texas Department of State Health Services (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 abatement activities and/or demolition.

   If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

4. ☐ The Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and an Asbestos Consultant in order to minimize construction delays and subsequent claims.

VII. Other Environmental Issues

Action Items Required : ☐ No Action Required

1. ☒ Noise

   Contractor shall make every reasonable effort to minimize construction noise through abatement measures such as work hour controls and proper maintenance of equipment mufflers.

2. ☒ Air

   Contractor shall practice common dust control techniques such as surface chemical treatment or watering of unpaved road surfaces and vehicle speed reduction shall be implemented to minimize and prevent airborne dust during construction.

   Contractor should minimize MSAT by utilizing measures to encourage use of EPA required cleaner diesel fuels, limits on idling, increase use of cleaner burning diesel engines, and other emission limitation techniques, as appropriate.

3. ☒ USIBWC

Pharr District Contact No. 956-702-6100 Revised 01/30/2017

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Texas Department of Transportation

PHARR DISTRICT

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

(EPIC)

SHEET 2 OF 2

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6			FM 2556
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	SHEET NO.
CONTROL	SECTION	JOB	
2529	02	010	165A

TPWD BMPs

Under Section 12.0011 of the Texas Parks and Wildlife Code, Texas Parks and Wildlife Department (TPWD) is charged with "providing recommendations that will protect fish and wildlife resources to local, state, and federal agencies that approve, permit, license, or construct developmental projects" and "providing information on fish and wildlife resources to any local, state, and federal agencies or private organizations that make decisions affecting those resources."

The purpose of this section is to provide beneficial management practices (BMP) that should be implemented during construction, and maintenance activities statewide for transportation projects with the goal of avoidance and minimization of impacts to natural resources. Statewide Standard BMP pertain to all fish and wildlife species, including state-listed species and other Species of Greatest Conservation Need (SGCN). Implementing the recommendations as outlined below will improve conservation of species and their habitat.

☒ General Design/Construction BMPs

- ☒ Prior to start of construction, information will be provided to personnel of the potential for all state-listed threatened species or other SGCN to occur within the project area and should be advised of relevant rules and regulations to protect plants, fish, and wildlife.
- ☒ Contractor should avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
- ☒ Contractors should install wildlife exclusion fencing and should examine the inside of the exclusion area daily to determine if any wildlife species have been trapped inside the area of impact and provide safe egress opportunities prior to initiation of construction activities.
- ☒ Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas around wetlands and in riparian areas.
- ☒ Contractor should use woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.
- ☒ Project staging areas, stockpiles, temporary construction easements, and other project related sites should be situated in previously disturbed areas to avoid or minimize impacts to sensitive or unique habitats including intact native vegetation, floodplains, riparian corridors, wetlands, playa lakes, and habitat for wildlife species.
- ☒ When lighting is added, consider wildlife impacts from light pollution and incorporating dark-sky practices into design strategies. Minimize sky glow by focusing light downward, with full cutoff luminaries to avoid light emitting above the horizontal. The minimum amount of night-time lighting needed for safety and security should be used.

☒ Vegetation BMPs

- ☒ Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided. Impacted vegetation should be replaced with in-kind on- site replacement /restoration of native vegetation.
- ☐ It is strongly recommended that trees greater than 12 inches in diameter at breast height (DBH) that are removed be replaced. TPWDs experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3:1) lost should be provided to either on-site or off-site. Trees less than 12 inches DBH should be replaced at a 1:1 ratio.
- ☒ The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- ☒ The use of seed mix that contains seeds from only regional ecotype native species is recommended

☒ Invasive Species BMPs

- ☐ For all work in water bodies designated as infested or positive for invasive zebra (Dreissena polymorpha) OR quagga mussels (Dreissena bugensis) as well as waters downstream of these lakes, all machinery, equipment, vessels, or vehicles coming in contact with such waters should be cleaned prior to leaving the site to remove any mud, plants, organisms, or debris, water drained (if applicable), and dried completely before use in another water body to prevent the potential spread of invasive mussels.
- ☒ Care should be taken to prevent the spread of aquatic and terrestrial invasive plants during construction activities.
- ☒ Care should be taken to avoid the spread of aquatic invasive plants such as giant Salvinia (Salvinia molesta), common salvinia (Salvinia minima), hydrilla (Hydrilla verticillata), water hyacinth (Eichhornia spp.), Eurasian watermilfoil (Myriophyllum spicatum), water lettuce (Pistia stratiotes), and alligatorweed (Alternanthera philoxeroides) from infested water bodies into areas not currently infested. All machinery, equipment, vessels, boat trailers, or vehicles coming in contact with waters containing aquatic invasive plant species should be cleaned prior to leaving the site to remove all aquatic plant material and dried completely before use on another water body to prevent the potential spread of invasive plants. Removed plants should be transported for disposal in a secure manner to prevent dispersal.
- ☒ Only native or non-invasive plants should be planted. Care should be taken to avoid mowing invasive giant reed (Arundo donax), which spreads by fragmentation, and to clean equipment if inadvertently mowed to prevent spread. If using hay bales for sediment control, use locally grown weed-free hay to prevent the spread of invasive species. Leave the hay bales in place and allow them to break down, as this acts as mulch assisting in revegetation.

☒ Stream Crossings BMPs

- ☒ Riparian buffer zones should remain undisturbed.

☒ Dewatering BMPs

- ☒ Impact avoidance measures for aquatic organisms, including all native fish and freshwater mussel species, regardless of state-listing status, should be considered during project planning and construction activities.

☒ Wildlife Crossing BMPs

- ☒ Incorporate wildlife crossings with fencing, particularly in areas that bisect wildlife travel corridors or seasonal movement routes to avoid further habitat fragmentation and minimize wildlife-vehicle interactions.

☒ Rare Plant BMPs

- ☐ Avoid impacts and minimize unavoidable impacts. Plant locations should be protected with temporary barrier fencing and contractors should be instructed to avoid protected areas. Conducting construction outside of the growing season or after a plant has produced mature fruit is the preferred way to avoid/minimize impacts to SGCN plant populations. Staging areas, stockpiles, and other project related sites on TxDOT ROW should not impact SGCN plant populations. After construction begins, minimize herbicide use near SGCN plant populations (if possible, use hand-held spot sprayers, several meters from rare plants, on still or days with little wind).

Pharr District Contact No. 956-702-6100

☒ Rare Plants BMPs (Continued)

- ☒ If there are unintended impacts to SGCN populations, these impacts should be reported to TPWD Transportation Staff.
- ☐ During project period, conduct work during times of the year when plants are dormant and/or conditions minimize disturbance of the habitat.

☒ Bird BMPs

- ☒ Avoid vegetation clearing activities during the general bird nesting season, February 15th to October 1st to minimize adverse impacts to birds.
- ☒ Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
- ☒ Minimize extended human presence near nesting birds during construction and maintenance activities. Protect sensitive habitat areas with temporary barriers or fencing to limit human foot- traffic and off-road vehicle use to alert and discourage contractors from causing any unintentional impacts.
- ☒ Minimize construction noise above ambient levels during general bird nesting season to minimize adverse impacts on birds.
- ☒ Minimize construction lighting during the general bird nesting season by scheduling work activities between dawn and dusk.

☐ Rookeries BMPs

- ☐ In general, nesting dates for herons and egrets range from early February to late August in Texas, depending on the species. Great blue herons (GBHE) (Ardea herodis) are usually the first to nest. When GBHE get disrupted from the nest and abandon nesting, then the other species of herons and egrets may not attempt to nest at the colony that year.
- ☐ If rookeries are encountered, avoid and minimize disturbance during nesting to protect rookery species and their habitat.
- ☐ Vegetation clearing in a primary buffer area of 300 meters (984 feet) from a rookery or heronry periphery should be avoided. Utilizing areas that have already been cleared within this buffer area may be acceptable depending on site-specific characteristics. Additionally, human foot-traffic or machinery use should not occur within this buffer area during the nesting season.
- ☐ Clearing activities or construction using heavy machinery in a secondary buffer area of 1000 meters (3281 feet) from the heronry periphery should be avoided during the breeding season (courting and nesting).

Revised 02/24/2022

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THC: Texas Historical Commission
TPDES: Texas Pollutant Discharge Elimination System
TPWD: Texas Parks and Wildlife Department
TxDOT: Texas Department of Transportation
T&E: Threatened and Endangered Species
USACE: U.S. Army Corp of Engineers
USFWS: U.S. Fish and Wildlife Service

Texas Department of Transportation
PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 1 OF 3

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6			FM 2556
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	SHEET NO.
CONTROL	SECTION	JOB	
2529	02	010	165B

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☒ Fish BMPs

- ☒ The following Fish BMP apply to projects for all fish species in waters of the state to minimize impacts to water quality and aquatic passage from transportation projects.
- ☒ For projects in waters of the state and work is adjacent to water: follow Water Quality and Stream Crossing BMPs.
- ☒ For projects in waters of the state and work is in the water: follow Water Quality, Stream Crossing, and Dewatering BMP.

☒ Aquatic Invertebrate BMPs

- ☒ For projects within the range of a SGCN or state-listed species and work is adjacent to water: Water Quality and Stream Crossing BMP
- ☒ For projects within the range of a SGCN or state-listed species and work is in the water: Water Quality, Stream Crossing, and Dewatering BMP.
- ☐ For spring-seep associated caddisflies (Cheumatopsyche morsei, Chimarra holzenthali, and Hydroptila ouachita): Avoid or minimize impacts to the natural riparian buffer along stream channel including native shrubs and trees.

☒ Crayfish BMP

- ☒ For projects within the range of a SGCN or state-listed species and work is adjacent to water: Water Quality and Stream Crossing BMP.
- ☒ For projects within the range of a SGCN or state-listed species and work is in the water: Water Quality, Stream Crossing, and Dewatering BMP.
- ☒ Avoid or minimize impacts to the natural riparian buffer that provides terrestrial and aquatic plant matter for the diet of most crayfish species.

☒ Freshwater Mussel BMP

- ☒ In addition to Water Quality and Stream Crossing BMP, follow the most recent, TPWD TxDOT Annual Work Plan for Pre-Construction Surveys, Aquatic Resources Relocations, and Other Best Management Practices to Avoid, Minimize, and Mitigate Impacts to Freshwater Resources.9/32
- ☒ When work is adjacent to the water: Water Quality BMP implemented as part of the Texas Commission on Environmental Quality (TCEQ) Stormwater Pollution Prevention Plan (SWPPP) for a construction general permit or any conditions of the 401 Water Quality Certification for the project will be implemented.

☒ Insect Pollinator BMP

- ☒ Deep soil disturbances, such as, tilling or deep disking in areas that host aggregations of ground- nesting bees should be avoided. Tilling and disking also may promote the invasion or germination of non-native plants. Different species of native ground-nesting bees prefer different soil conditions, although research suggests that many ground nesting bees prefer sandy, loamy sand or sandy loam soils. In areas with these soil types consider leaving open patches of soil.
- ☒ Allow dead trees to stand (so long as they do not pose a risk to property or people) and protect shrubs and herbaceous plants with pithy or hollow stems (e.g., cane fruits, sumac, elderberry), as these provide nesting habitat for tunnel-nesting native bees.
  Retain dead or dying branches whenever it is safe and practical at the edges of the ROW. Wood- boring beetle larvae often fill dead trees and branches with narrow tunnels into which tunnel- nesting bees will establish nests. Additionally, bumble bees may choose to nest in wood piles.
- ☒ Retain rotting logs at edges of the ROW where some bee species may burrow tunnels in which to nest.

☒ Insect Pollinator BMP (Continued)

- ☒ Protect sloped or well-drained ground sites where plants are sparse and direct access to soil is available. These are the areas where ground-nesting bees may dig nests. Turning the soil destroys all ground nests that are present at that depth and hinders the emergence of bees that are nesting deeper in the ground.
- ☒ Protect grassy thickets, or other areas of dense, low cover from mowing or other disturbance. These are the sites where bumble bees might find the nest cavities they need, as well as annual and perennial wildflowers that can provide important food resources.
- ☒ Where available and economical, native plants and seed should be procured from local eco-type providers. Seed mixes should be diverse and include as many ecoregion natives as possible ensuring full season floral resources. Species by Texas ecoregion can be found in the Texas Management Recommendations for Native Insect Pollinators in Texas document: https://tpwd.texas.gov/publications/pwdpubs/media/pwd*bk*w7000*1813.pdf
- ☒ Planting at least three different native flowering plants within each of three blooming periods are recommended (spring, summer, early fall) in high rainfall regions of Texas. In drier regions of the state, a target of three native flowering plants within each of two blooming periods can be used.

☐ Small Mammal BMP

For Coues' rice rat (Oryzomys couesi aquaticus):

- ☐ Minimize impacts to wetland, resaca, oxbow Conversion of property containing cave or cliff features to transportation purposes should be avoided.lake, and marsh habitats
- ☐ Water Quality BMP

☐ Fossorial Mammal BMP

- ☐ When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area.
- ☐ When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW.

☒ Bat BMP

- ☒ For activities that have the potential to impact structures, cliffs or caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.
- ☐ For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
- ☒ If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.
- ☐ Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area.

Pharr District Contact No. 956-702-6100

☒ Bat BMP (Continued)

- ☐ If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat-friendly design or artificial roosts should be constructed to replace these features.
- ☐ Avoid unnecessary removal of dead fronds on native and ornamental palm trees in south Texas (Cameron, Hidalgo, Willacy, Kenedy, Brooks, Kleberg, Nueces, and San Patricio counties) from April 1 through October 31. If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warms periods (nighttime temperatures = 55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts.
- ☐ Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
- ☐ Retain mature, large diameter hardwood forest species and native/ornamental palm trees.
- ☒ In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

☒ Aquatic Amphibian and Reptile BMP

For projects within existing right-of-way (ROW) when work is in water or will permanently impact a water feature and potential habitat exists for the target species complete the following:

- ☒ Minimize impacts to wetlands, temporary and permanent open water features, including depressions, and riverine habitats.
- ☐ Maintain the existing hydrologic regime and any connections between wetlands and other aquatic features.
- ☐ Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
- ☐ Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas around wetlands and in riparian areas. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.
- ☐ 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 refugia/overwinter sites (e.g., brush and debris piles, crayfish burrows, aquatic logjams, and leaf packs).

Revised 02/24/2022

List of Abbreviations

BMP: Best Management Practice	MSAT: Mobile Source Air Toxic	TCEQ: Texas Commission on Environmental Quality
CGP: Construction General Permit	MBTA: Migratory Bird Treaty Act	THC: Texas Historical Commission
CRPe: Contractor Responsible Person Environmental	NOI: Notice of Intent	TPDES: Texas Pollutant Discharge Elimination System
DSHS: Texas Department of State Health Services	NOT: Notice of Termination	TPWD: Texas Parks and Wildlife Department
FEMA: Federal Emergency Management Agency	NWP: Nationwide Permit	TxDOT: Texas Department of Transportation
FHWA: Federal Highway Administration	PCN: Pre-Construction Notification	T&E: Threatened and Endangered Species
MOA: Memorandum of Agreement	PSL: Project Specific Location	USACE: U.S. Army Corp of Engineers
MOU: Memorandum of Understanding	SPCC: Spill Prevention Control and Countermeasure	USFWS: U.S. Fish and Wildlife Service
MS4: Municipal Separate Stormwater Sewer System	SW3P: Storm Water Pollution Prevention Plan	

Texas Department of Transportation

PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 2 OF 3

FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6			FM 2556
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	SHEET NO.
CONTROL	SECTION	JOB	
2529	02	010	165C

☒ Aquatic Amphibian and Reptile BMP (Continued)

☒ If gutters and curbs are part of the roadway design, install gutters that do not include the side box inlet and include sloped (i.e., mountable) curbs to allow small animals to leave roadway. If this modification to the entire curb system is not possible, install sections of sloped curb on either side of the storm water drain for several feet to allow small animals to leave the roadway. Priority areas for these design recommendations are those with nearby wetlands or other aquatic features.

For projects that require acquisition of additional ROW and work within that new ROW is in water or will permanently impact a water feature, implement BMP for projects within existing ROW above plus those below:

☒ For sections of roadway adjacent to wetlands or other aquatic features, install wildlife barriers that prevent climbing. Barriers should terminate at culvert openings in order to funnel animals under the road. The barriers should be of the same length as the adjacent feature or 80 feet long in each direction, or whichever is the lesser of the two.

☒ For culvert extensions and culvert replacement/installation, incorporate measures to funnel animals toward culverts such as concrete wingwalls and barrier walls with overhangs.

☒ When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of terrestrial or aquatic wildlife through the water feature. Biotechnical streambank stabilization methods using live native vegetation, or a combination of vegetative and structural materials should be used.

☒ Terrestrial Amphibian and Reptile BMP

☒ For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling

☒ Avoid or minimize disturbing or removing cover objects, such as downed trees, rotting stumps, brush piles, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion.

☒ Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.

☒ Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season.
Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.

☒ If Texas tortoises (Gopherus berlandieri) or box turtles (Terrepene spp.) are present in a project area, they should be removed from the area and relocated between 100 and 200 meters from the project area. After removal of the individuals, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude reentry by turtles, 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.

☒ Terrestrial Amphibian and Reptile BMP (Continued)

☒ After project is complete, revegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product should not contain nylon netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.

☒ Black-spotted newt/Mexican Burrowing toad/ Mexican treefrog/ Strecker's chorus frog/White-lipped frog/Woodhouse's toad

☒ Aquatic Amphibian and Reptile BMP
☒ Terrestrial Amphibian and Reptile BMP
☒ Water Quality BMP
☒ Vegetation BMP

☒ Sheep Frog

☒ Minimize disturbance to burrows or downed woody debris
☒ Aquatic Amphibian and Reptile BMP
☒ Terrestrial Amphibian and Reptile BMP
☒ Water Quality BMP
☒ Vegetation BMP

☒ South Texas Siren (Large Form)

☒ Minimize impacts to warm, shallow waters with vegetative cover such as ponds and ditches
☒ Aquatic Amphibian and Reptile BMP
☒ Water Quality BMP

☒ Black-striped snake/ Eastern box turtle/Northern cat-eyed snake/Plateau spot-tailed earless lizard/ Reticulate collared lizard/ Slender glass lizard/ Speckler racer/Tamaulipan spot-tailed earless lizard/ Texas Indigo snake/ Western box turtle/Western hognose snake/Western massasauga

☒ Terrestrial Amphibian and Reptile BMP
☒ Vegetation BMP

☐ Rio Grande River Cooter

☐ Aquatic Amphibian and Reptile BMP
☐ Water Quality BMP

☒ Texas Horned Lizard

☒ Avoid harvester ant mounds in the selection of Project Specific Locations (PSLs).
☒ Terrestrial Amphibian and Reptile BMP
☒ Vegetation BMP

☒ Texas Tortoise

☒ Utility trenches should be covered overnight or visually inspected before filling to avoid burial of the species
☒ Terrestrial Amphibian and Reptile BMP
☒ Vegetation BMP

Pharr District Contact No. 956-702-6100

OTHER PERTINENT INFORMATION

☒ Trifold Available

☒ Ocelot information
☐ Pelican information
☐ Ashy dogweed

☒ Stockcards Available

☒ Mitigatory Bird Treaty Act
☒ Texas Tortoise
☒ Harvester Ants and Horn Lizards

Revised 02/24/2022

List of Abbreviations

BMP: Best Management Practice	MSAT: Mobile Source Air Toxic	TCEQ: Texas Commission on Environmental Quality
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MOU: Memorandum of Understanding	SPCC: Spill Prevention Control and Countermeasure	USFWS: U.S. Fish and Wildlife Service
MS4: Municipal Separate Stormwater Sewer System	SW3P: Storm Water Pollution Prevention Plan	

Texas Department of Transportation

PHARR DISTRICT

EPIC SHEET SUPPLEMENTALS

TPWD BMPs

SHEET 3 OF 3

FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
6			FM 2556
STATE	DISTRICT	COUNTY	
TEXAS	PHR	CAMERON	SHEET NO.
CONTROL	SECTION	JOB	
2529	02	010	165D

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
2529-02-010

1.2 PROJECT LIMITS:
From: 0.36 miles North of Arroyo Colorado

To: 0.35 miles South of Arroyo Colorado

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 26.123529 ,(Long) -97.853389

END: (Lat) 26.112914 ,(Long) -97.850523

1.4 TOTAL PROJECT AREA (Acres): 9.47

1.5 TOTAL AREA TO BE DISTURBED (Acres): 7.49

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Replace existing bridge with new and wider bridge structure and roadway approaches.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
CLAY	Clay with varying amounts of silt, sand and gravel.
SILT	Silt with varying amounts of clay, sand and gravel.
SAND	Sand with varying amounts of clay, silt and gravel.

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction
- ☒ Placement of PSLs such as staging areas,equipment storage areas, temporary access road, etc., will be based on restrictions and commitments identified in the Environmental Permits, Issues, and Commitments (EPIC) sheets

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☒ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☒ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☒ Remove existing culverts, safety end treatments (SETs)
- ☒ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☒ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☒ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☒ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☒ Solvents, paints, adhesives, etc. from various construction activities
- ☒ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☒ Contaminated water from excavation or dewatering pump-out water
- ☒ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☒ Long-term stockpiles of material and waste
- ☐

- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Arroyo Colorado Above Tidal	Stream Segment 2202
Drainage ditches flowing into Arroyo Colorado Above Tidal	Stream Segment 2202F

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
Cameron County

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER
Brian D Wright
3/7/24

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			166
STATE	STATE DIST.	COUNTY	
TEXAS	PHARR	CAMERON	
CONT.	SECT.	JOB	HIGHWAY NO.
2529	02	010	FM 2556

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- X X Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- X ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- X ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- X ☐ Interceptor Swale
- ☐ X Riprap
- X ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- X ☐ Other: Mulch Filter Berms and/or Socks
- X ☐ Other: Comopost Filter Berms and/or Socks
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ X Vegetated Filter Strips
- ☐ X Other: Vegatation-lined Ditches
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- X ☐ Sedimentation Basin
  - X Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- X Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- X Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
BRIAN D. WRIGHT
113392
LICENSED
PROFESSIONAL ENGINEER

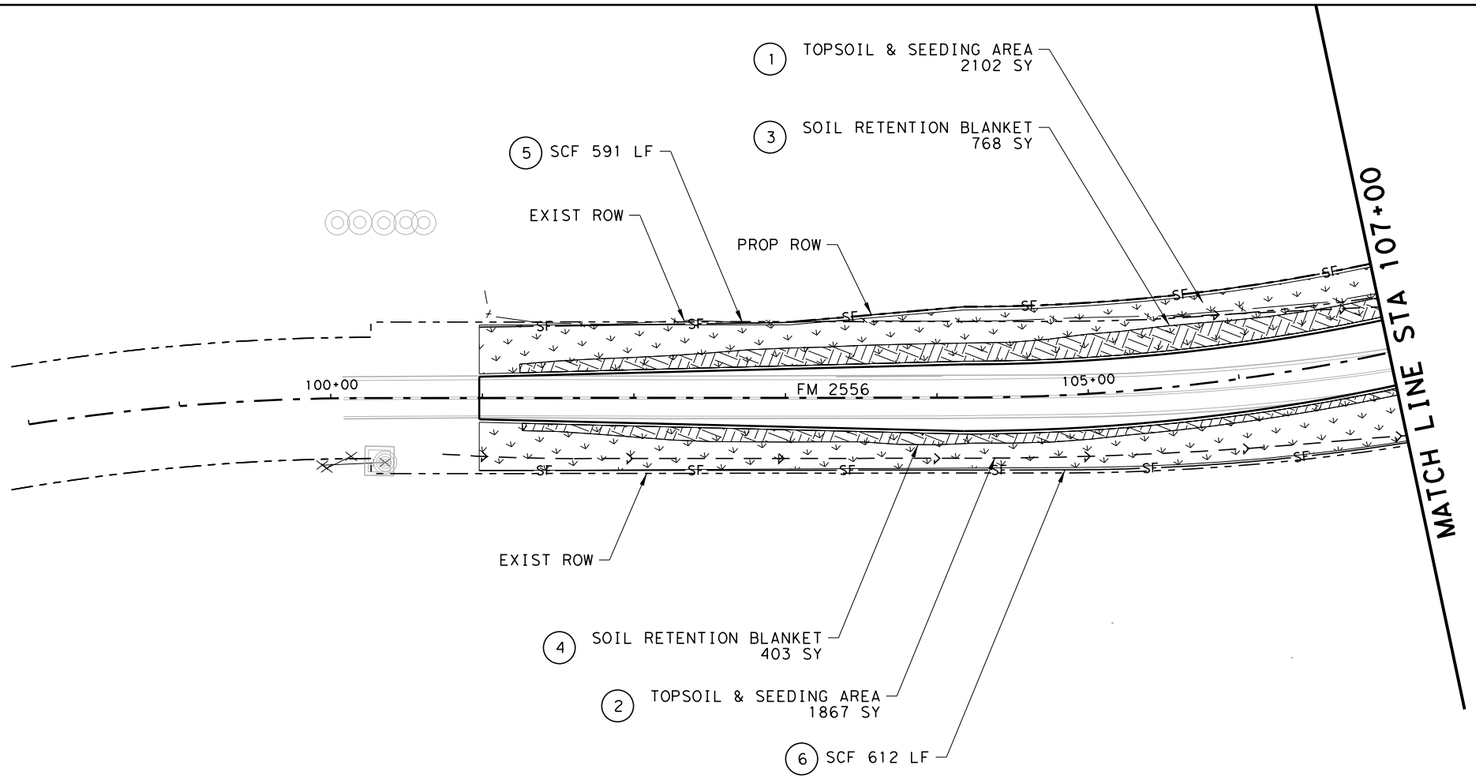
Brian D Wright
3/1/24

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			166A
STATE	STATE DIST.	COUNTY	
TEXAS	PHARR	CAMERON	
CONT.	SECT.	JOB	HIGHWAY NO.
2529	02	010	FM 2556



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SCALE: 1" = 100'

SW3P PLAN LEGEND

- SF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM, TYPE 2
- RIGHT-OF-WAY
- EXISTING DITCH
- PROP DITCH
- EXISTING ROW FENCE
- SEEDING FOR EROSION CONTROL
- SOIL RETENTION BLANKET

NOTES: THIS SHEET IS NOT TO BE USED FOR BIDDING PURPOSES. IT IS PROVIDED AS PART OF THE SW3P PERMIT AND WILL BE USED BY DEPARTMENT PERSONNEL DURING CONSTRUCTION ACTIVITIES TO DOCUMENT THE INSTALLATION AND MAINTENANCE OF ANY BMP'S USED ON THIS PROJECT.

	BMP			DATE	
NO.	TYPE	UNIT	QNTY	PLACED	REMOVED
1	SEED	SY	2102		
2	SEED	SY	1867		
3	SRB	SY	768		
4	SRB	SY	403		
5	SCF	LF	591		
6	SCF	LF	612		

STATE OF TEXAS
ALEXANDER R. MASSARO
143293
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PROFESSIONAL ENGINEER
1-11-2023

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TBPE REGISTRATION NO. 264

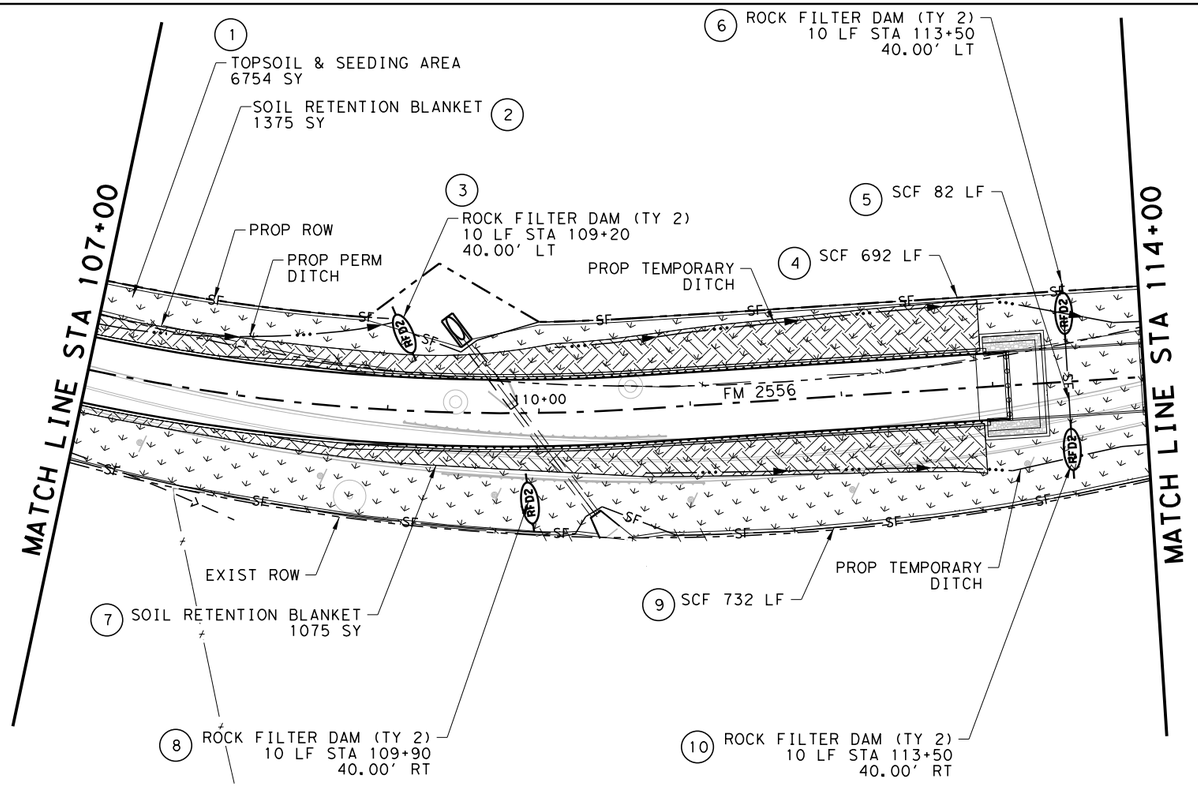
Texas Department of Transportation

FM 2556

SW3P SITE PLAN

SCALE: 1" = 100' SHEET 1 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		167



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SCALE: 1" = 100'

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	BMP			DATE	
NO.	TYPE	UNIT	QNTY	PLACED	REMOVED
1	SEED	SY	6754		
2	SRB	SY	1375		
3	RFD2	LF	10		
4	SCF	LF	692		
5	SCF	LF	82		
6	RFD2	LF	10		
7	SRB	SY	1075		
8	RFD2	LF	10		
9	SCF	LF	732		
10	RFD2	LF	10		

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Texas Department of Transportation

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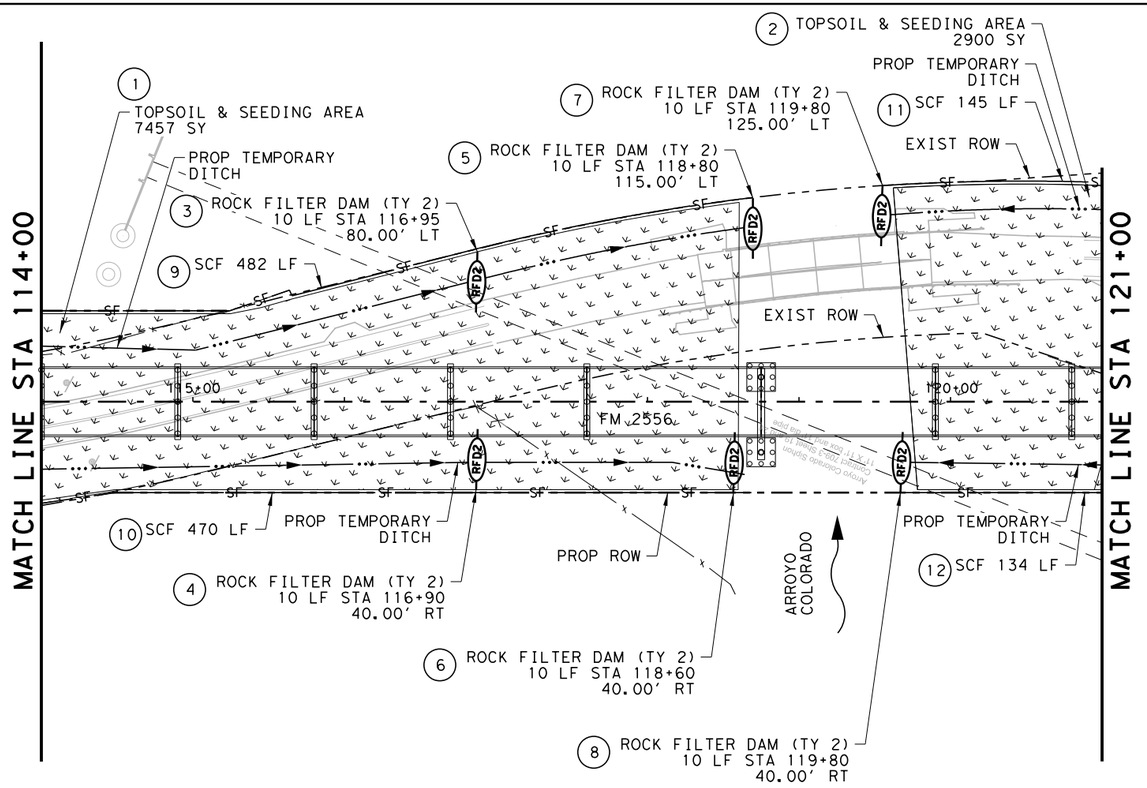
SW3P SITE PLAN

SCALE: 1" = 100' SHEET 2 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		168



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SCALE: 1" = 100'

SW3P PLAN LEGEND

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	BMP			DATE	
NO.	TYPE	UNIT	QNTY	PLACED	REMOVED
1	SEED	SY	7457		
2	SEED	SY	2900		
3	RFD2	LF	10		
4	RFD2	LF	10		
5	RFD2	LF	10		
6	RFD2	LF	10		
7	RFD2	LF	10		
8	RFD2	LF	10		
9	SCF	LF	482		
10	SCF	LF	470		
11	SCF	LF	145		
12	SCF	LF	134		

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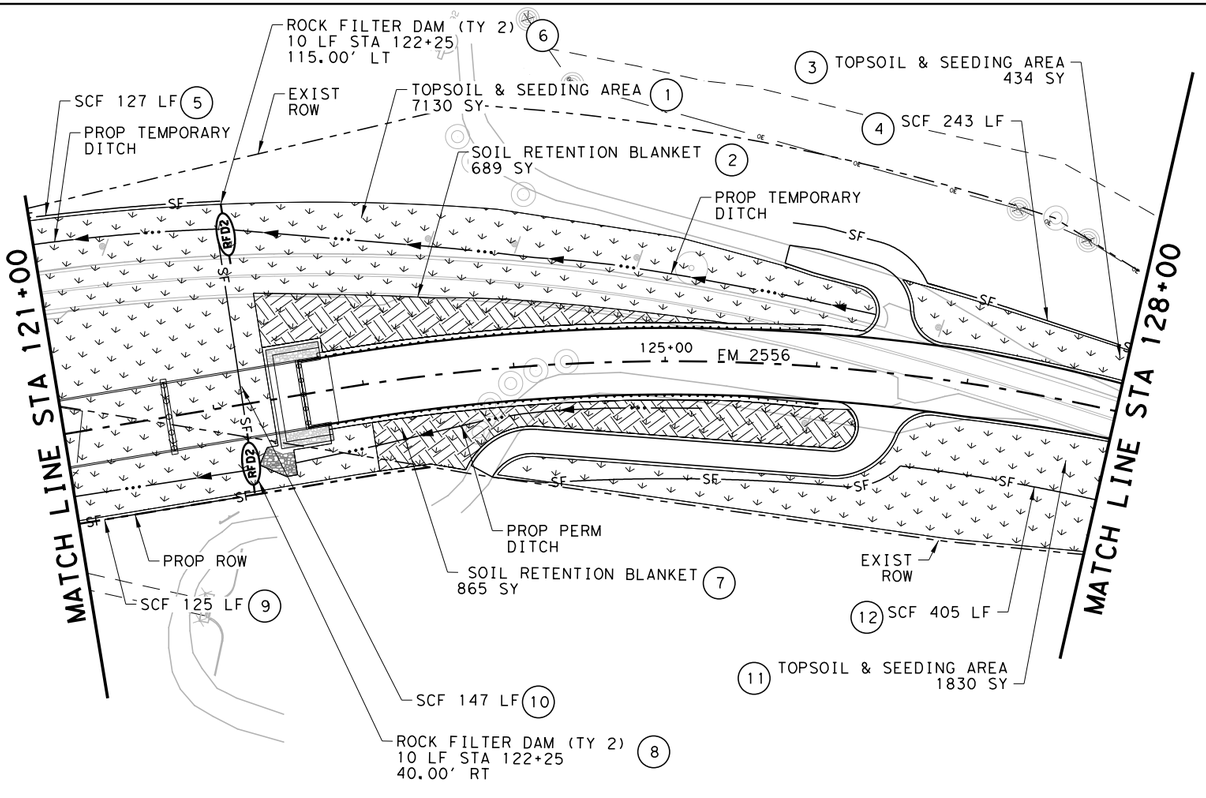
SW3P SITE PLAN

SCALE: 1" = 100' SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		169



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SCALE: 1" = 100'

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	BMP			DATE	
NO.	TYPE	UNIT	QNTY	PLACED	REMOVED
1	SEED	SY	7130		
2	SRB	SY	689		
3	SEED	SY	434		
4	SCF	LF	243		
5	SCF	LF	127		
6	RFD2	LF	10		
7	SRB	SY	865		
8	RFD2	LF	10		
9	SCF	LF	125		
10	SCF	LF	147		
11	SEED	SY	1830		
12	SCF	LF	405		

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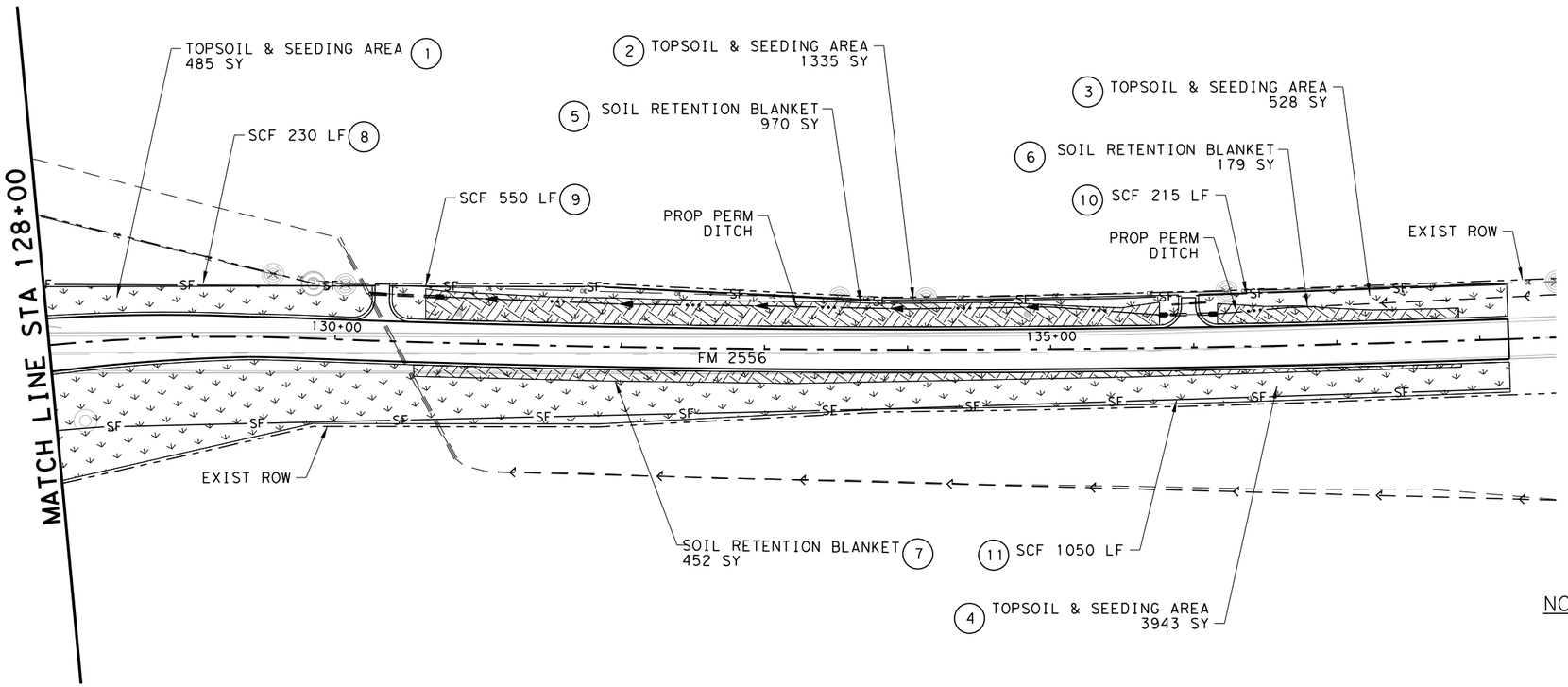
SW3P SITE PLAN

SCALE: 1" = 100' SHEET 4 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
DW:	CK:	DIST	COUNTY		SHEET NO.
AM	AT	PHARR	CAMERON		170



50 0 50 100
SCALE: 1" = 100'

SW3P PLAN LEGEND

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	BMP			DATE	
NO.	TYPE	UNIT	QNTY	PLACED	REMOVED
1	SEED	SY	485		
2	SEED	SY	1335		
3	SEED	SY	528		
4	SEED	SY	3943		
5	SRB	SY	970		
6	SRB	SY	179		
7	SRB	SY	452		
8	SCF	LF	230		
9	SCF	LF	550		
10	SCF	LF	215		
11	SCF	LF	1050		

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SW3P SITE PLAN

SCALE: 1" = 100' SHEET 5 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
AM	DH	2529	02	010	FM 2556
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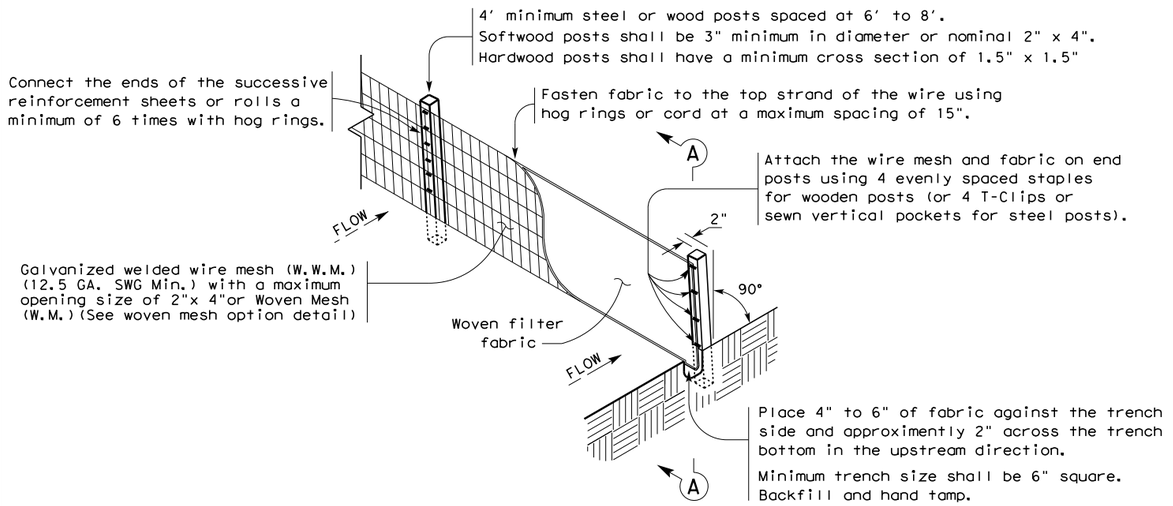
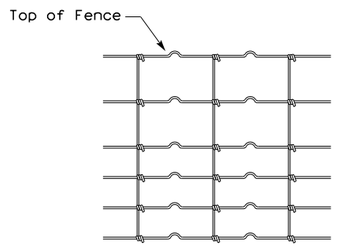
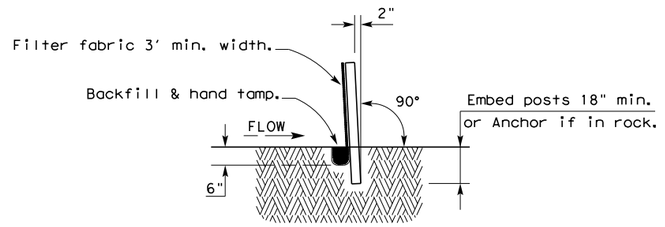


TEMPORARY SEDIMENT CONTROL FENCE

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.

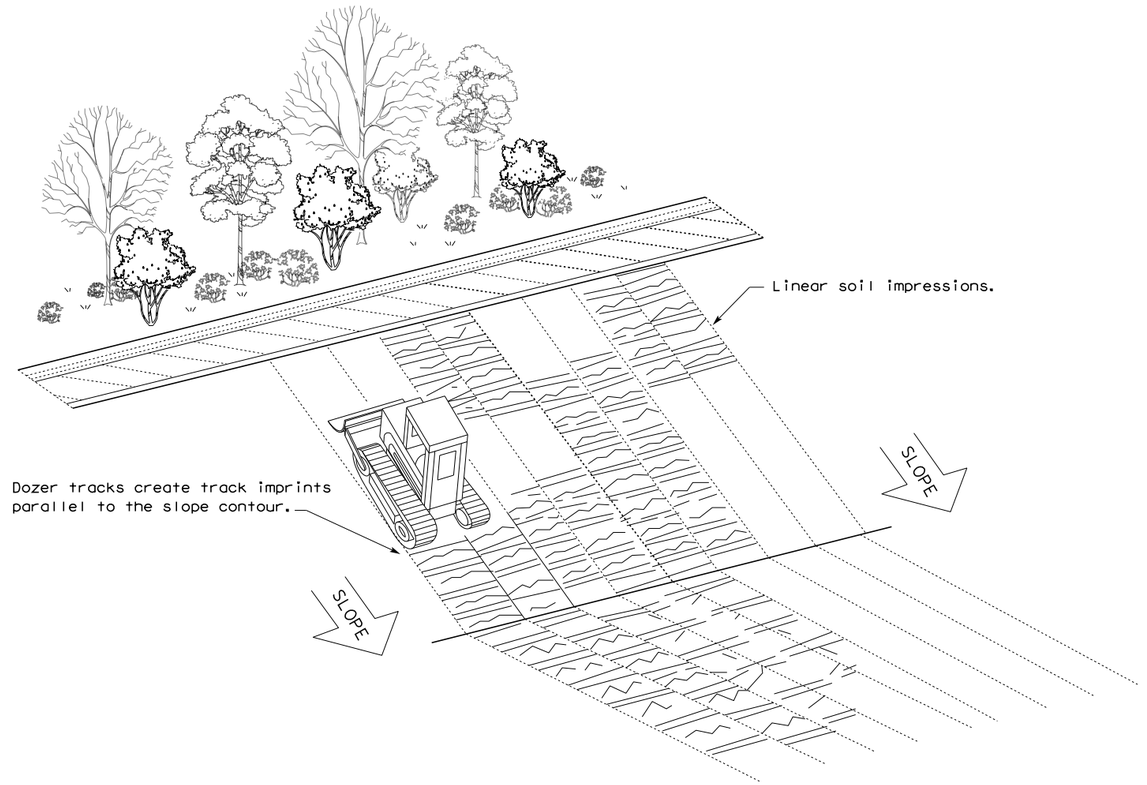
LEGEND

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	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		172

DATE: 6/5/2024 1:26:27 PM
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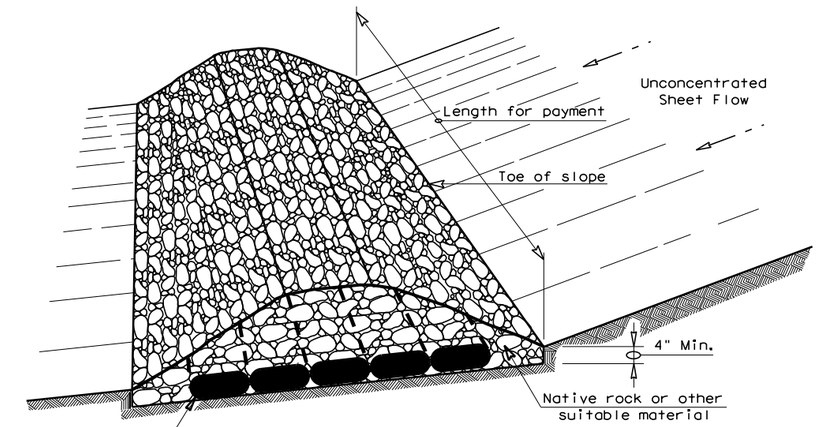
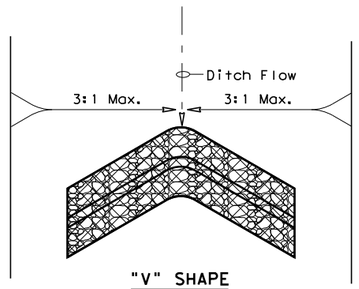
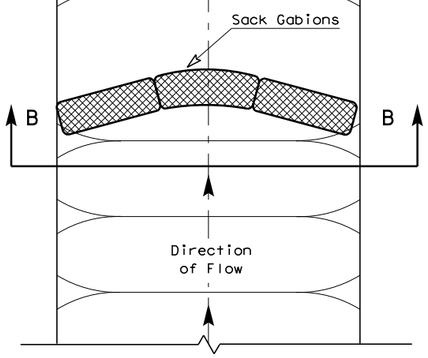


FILTER DAM AT TOE OF SLOPE

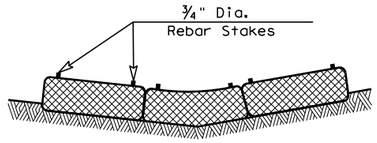
RFD1



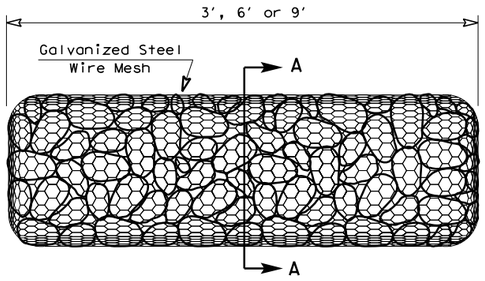
"V" SHAPE
PLAN VIEW



PLAN VIEW

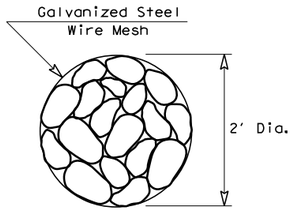


SECTION B-B

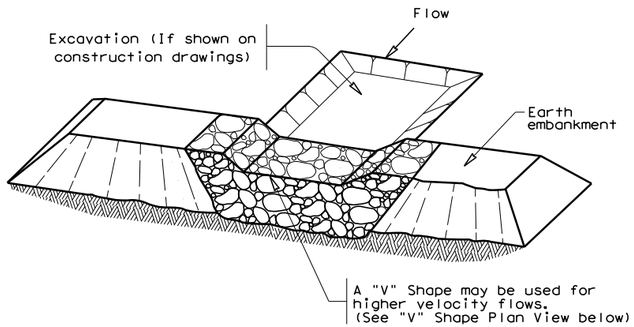


TYPE 4 (SACK GABIONS)

RFD4

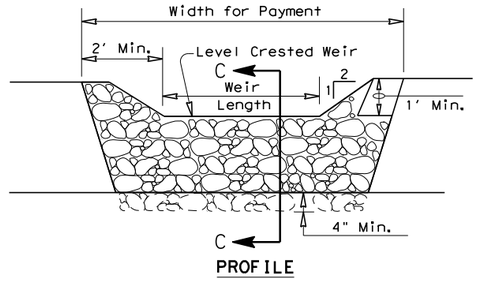


SECTION A-A

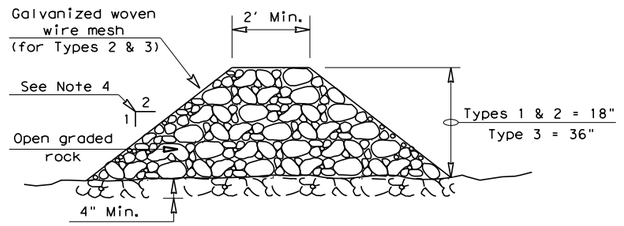


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

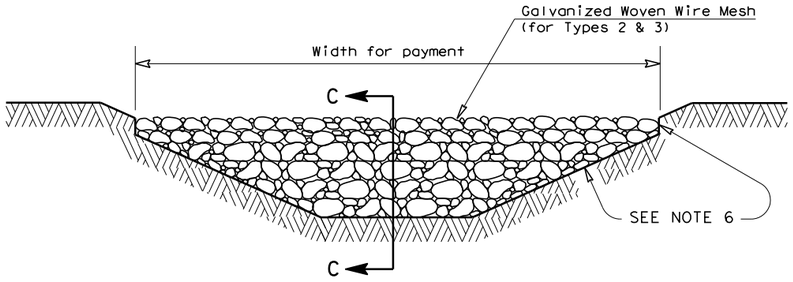
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2529	02	010	FM 2556
	DIST	COUNTY		SHEET NO.
	PHARR	CAMERON		173