FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	BR 2021(617)		1
STATE	DIST.	COUNTY	
TEXAS	WACO	CORYELL	
CONT.	SECT.	JOB	HIGHWAY NO.
0513	01	017	SH 236

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
FEDERAL AID PROJECT NO. BR 2021(617)
CORYELL COUNTY
STATE HIGHWAY 236

INDEX OF SHEETS

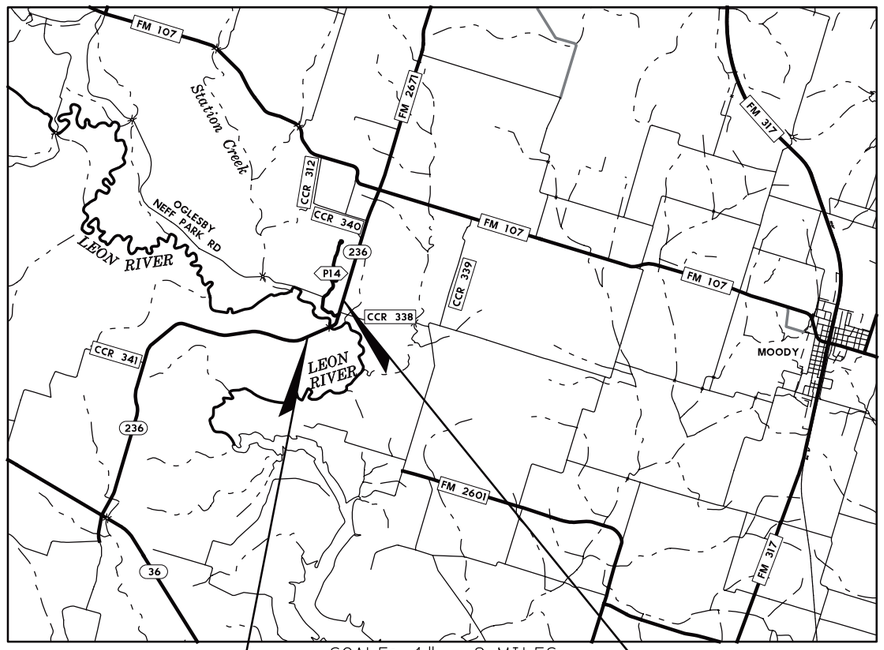
DESIGN SPEED = 40 MPH
ADT (2019) = 498
ADT (2039) = 598

NET LENGTH OF PROJECT = ROADWAY = 2,833.00 FT = 0.537 MI
BRIDGE = 1,050.00 FT = 0.199 MI
TOTAL = 3,883.00 FT = 0.736 MI

LIMITS: FROM @ LEON RIVER TO (STR #001)

FOR THE CONSTRUCTION OF: BRIDGE REPLACEMENT

CONSISTING OF REPLACE BRIDGE AND APPROACHES



SCALE: 1" = 2 MILES

BEGIN PROJECT
BEGIN CSJ: 0513-01-017
STA 246+17.00
REF. MRKR. 0368+0.267

EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

END PROJECT
END CSJ: 0513-01-017
STA 285+00.00
REF. MRKR. 0366+1.497

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORATION, NOVEMBER 1, 2014, AND SPECIFICATION ITEMS LISTED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCITON CONTRACTS (FORM FHWA 1273, MAY, 2012)

03/12/2021
Phaisarn Cwatanaphol, P.E.
PHAISARN CWATANAPHOL
PROJECT MANAGER
HDR ENGINEERING, INC
FIRM REGISTRATION NO. 754

Texas Department of Transportation

RECOMMENDED FOR LE — 3/30/2021
DocuSigned by:
Jarod E. Johnson P.E.
AR — 95CEAC277D81429...

RECOMMENDED FOR LETTING — 03/30/2021
Victor Vasbel, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

RECOMMENDED FOR LETTING — 3/31/2021
DocuSigned by:
Stanley Swiatek
DISTRICT ENGINEER — 869D7496DD564C9...

COUNTY CORYELL PROJ. NO.
HWY. NO. SH 236 LETTING DATE
DATE ACCEPTED

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 3/9/2021 TIME: 4:22:25 PM SCALE: 1:1
FILE: SH236TSHOI.dgn

SHEET NUMBERS	DESCRIPTION
	I. GENERAL SHEETS
1	TITLE SHEET
2	INDEX OF SHEETS
3	PROJECT LAYOUT
4	EXISTING TYPICAL SECTIONS
5 - 7	PROPOSED TYPICAL SECTIONS
8, 8A-8H	GENERAL NOTES
9, 9A, 9B	ESTIMATE AND QUANTITY
10 - 12	QUANTITY SUMMARY
13 - 14	SUMMARY OF SMALL SIGNS
	II. TRAFFIC CONTROL PLAN SHEETS
15	TRAFFIC CONTROL AND SEQUENCE OF CONSTRUCTION
16	DETOUR SIGNING LAYOUT
	TRAFFIC CONTROL STANDARDS
17 - 28	BC(1)-14 TO BC(12)-14 *
29	WZ(RCD)-13 *
	III. ROADWAY SHEETS
30 - 32	SURVEY CONTROL
33 - 34	HORIZONTAL ALIGNMENT DATA
35	ROADWAY TABLE OF CROSS SLOPES
36 - 37	REMOVAL PLAN
38 - 41	PLAN AND PROFILE
42	PARK ROAD 14 PLAN AND PROFILE
43	COUNTY ROAD 338 PLAN AND PROFILE
44	ACCESS ROAD PLAN AND PROFILE
45	DRIVEWAY DETAILS
46	CRASH CUSHION SUMMARY SHEET
47 - 48	BORROW PIT DETAIL
	ROADWAY STANDARDS
49 - 50	GF(31)TR TL3-20 *
51	GF(31)-19 *
52	SGT(11S)31-18 *
53	SGT(12S)31-18 *
54	GF(31)MS-19 *
55	BED-14 *
56	REACT(N)-16 *
57	SMTC(N)-16 *
58	CCCG-21 *
59	WF(2)-10 *
	IV. RETAINING WALL SHEETS
60	RETAINING WALL TYPICAL SECTION
61	RETAINING WALL HORIZ. CONTROL DATA
62	RETAINING WALL A LAYOUT
63	RETAINING WALL B LAYOUT
64	RETAINING WALL C LAYOUT
65 - 66	RETAINING WALL D LAYOUT
67	RETAINING WALL E LAYOUT
68	RETAINING WALL F LAYOUT
69	RETAINING WALL BORING LOGS
70	RETAINING WALL COLLAR DETAIL 30" RCP
71	GROUND IMPROVEMENT DETAILS
72	MSE RETAINING WALL SURFACE DETAIL
	RETAINING WALL STANDARDS
73	RW(MSE)DD(MOD)
74	RW(EM) **
75 - 76	RW(MSE) **
77	RW(TRF) **

SHEET NUMBERS	DESCRIPTION
	V. DRAINAGE SHEETS
78	OVERALL DRAINAGE AREA MAP
79 - 80	DRAINAGE AREA MAP
81	HYDRAULIC DATA SHEET CULVERT A
82	HYDRAULIC DATA SHEET CULVERT B
83	CULVERT A LAYOUT STA 273+11
84	CULVERT B LAYOUT STA 10+45
	DRAINAGE STANDARDS
85	SETP-PD ***
86	PSET-SP ***
87	PSET-RP ***
88	PSET-RR ***
	VI. BRIDGE SHEETS
89 - 90	BRIDGE HYDRAULIC DATA SHEET
91 - 93	BRIDGE LAYOUT
94 - 96	BRIDGE BORING LOGS
97	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS
98 - 99	ABUTMENT NO.1
100	ABUTMENT NO. 11
101	INTERIOR BENT NOS. 2-3
102	INTERIOR BENT NOS. 4-5
103	INTERIOR BENT NO. 6
104	INTERIOR BENT NOS. 7-10
105	FRAMING PLAN (SPANS 1-3)
106	300.00' PRESTRESSED CONCRETE GIRDER UNIT
107	FRAMING PLAN (SPAN 4)
108	150.00' PRESTRESSED CONCRETE GIRDER UNIT
109	FRAMING PLAN (SPANS 5-7)
110 - 111	300.00' PRESTRESSED CONCRETE GIRDER UNIT
112	FRAMING PLAN (SPANS 8-10)
113 - 114	300.00' PRESTRESSED CONCRETE GIRDER UNIT
115	CEMENT STABILIZED ABUTMENT BACKFILL DETAILS
	BRIDGE STANDARDS
116	IGND #
117	BAS-A #
118 - 119	CSAB #
120	CRR #
121 - 122	FD #
123	IGCS #
124 - 125	IGD #
126 - 128	IGEB #
129 - 130	IGMS #
131	IGSK #
132	IGTS #
133 - 134	MEBR(C) #
135 - 138	PCP #
139	PCP-FAB #
140 - 141	PCP(O) #
142 - 143	PCP(O)-FAB #
144 - 145	PMDF #
146 - 149	TYPE T1W #
150	SEJ-M #
151 - 152	SRR #

SHEET NUMBERS	DESCRIPTION
	VII. SIGNING AND PAVEMENT MARKING SHEETS
153 - 154	SIGNING AND PAVEMENT MARKING LAYOUT
155	SIGN DETAILS
	SIGNING AND PAVEMENT MARKING STANDARDS
156	TSR(3)-13 *
157	TSR(4)-13 *
158	TSR(5)-13 *
159	D & OM(1)-20 *
160	D & OM(2)-20 *
161	D & OM(3)-20 *
162	D & OM(5)-20 *
163	D & OM(VIA)-20 *
164	PM(1)-20 *
165	PM(2)-20 *
166	SMD(GEN)-08 *
167	SMD(SLIP-1)-08 *
168	SMD(SLIP-2)-08 *
169	SMD(SLIP-3)-08 *
170	SMD(BR-1)-14 *
171	SMD(BR-2)-14 *
172	SMD(BR-3)-14 *
173	RS(3)-13 *
174	RS(4)-13 *
	VIII. ENVIRONMENTAL SHEETS
175	STORM WATER POLLUTION PREVENTION PLAN (SW3P) WACO DISTRICT
176	EPIC
177 - 180	SW3P LAYOUT
	ENVIRONMENTAL STANDARDS
181 - 190	TA-BMP (WACO DISTRICT) ***
191	EC(1)-16 ***
192	EC(2)-16 ***
193	EC(3)-16 ***

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/26/2021
Phaisarn Cwatanaphol, P.E.

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

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED
PROFESSIONAL ENGINEER
03/26/2021
Marco E. Garcia P.E.

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

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED
PROFESSIONAL ENGINEER
03/26/2021
Erik A. Nelsen, P.E.

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

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED
PROFESSIONAL ENGINEER
03/26/2021
Erin E O'Malley
Digitally signed by Erin E O'Malley
DN: CN=Erin E O'Malley, OU=PA1442, 0.9.2342.19200300.100.1.1=A00000168ASDF2B130001513B, O=Texas DOT, C=US
Date: 2021.03.26 10:00:00-05'00'

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

NO.	DATE	REVISION	APPROVED

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

INDEX OF SHEETS

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	2
CONTROL	SECTION	JOB	
0513	01	017	

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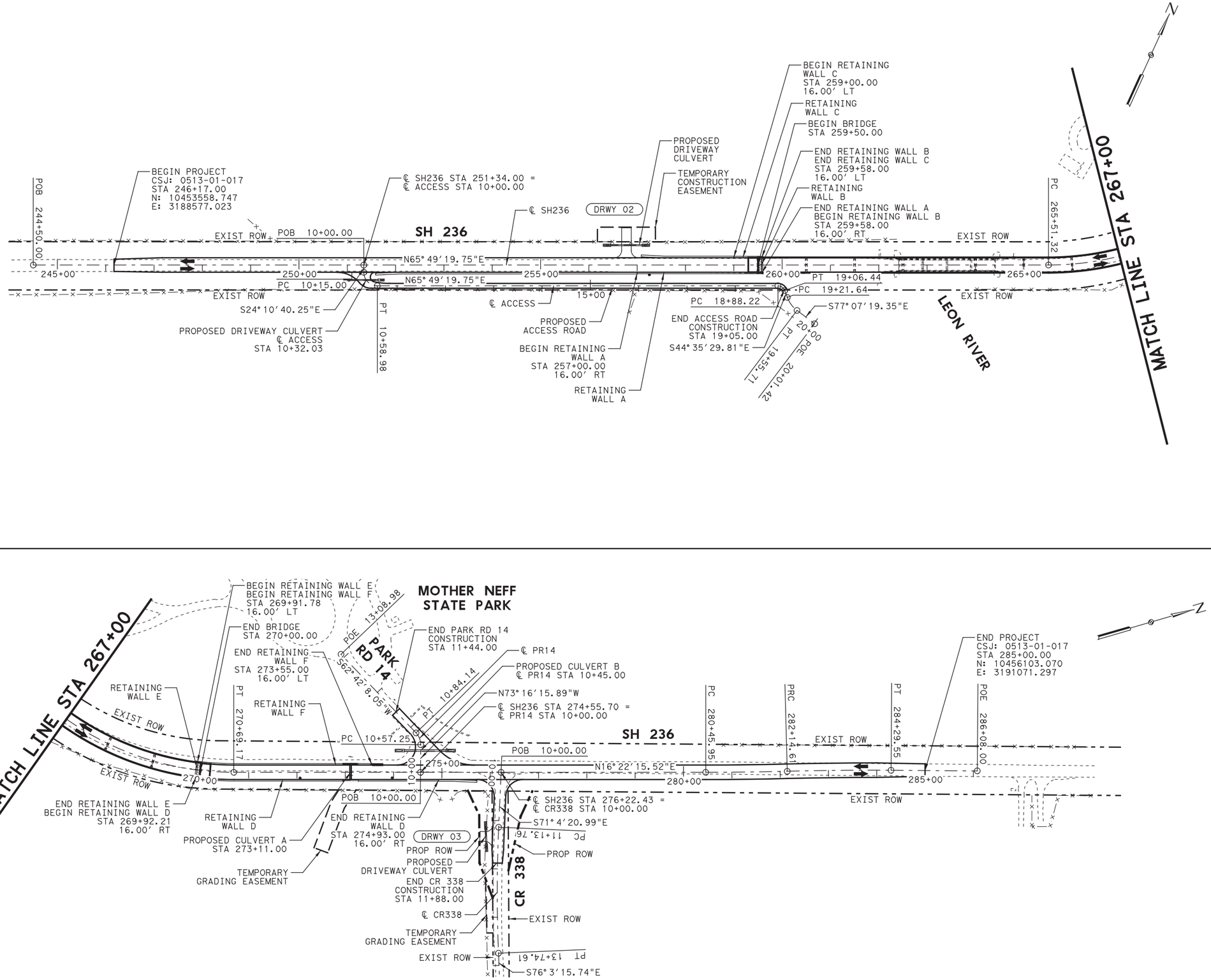
FILE: SH236INDOI.dgn



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/30/2021
Phaisarn Cwatanapho, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

PROJECT LAYOUT

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	3
CONTROL	SECTION	JOB	
0513	01	017	

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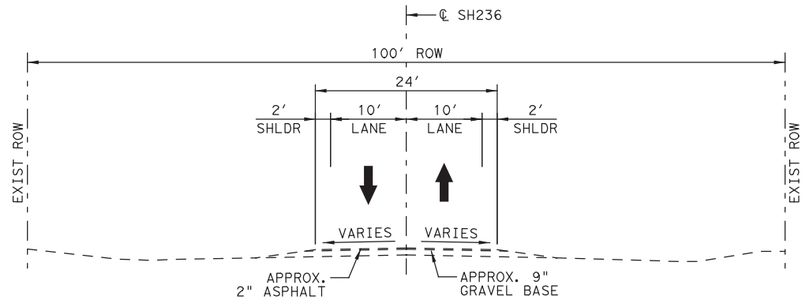
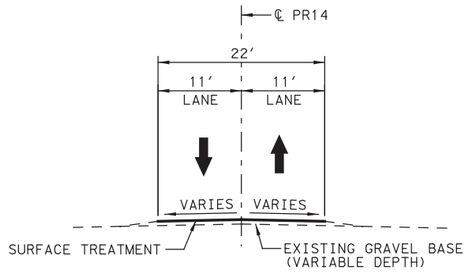
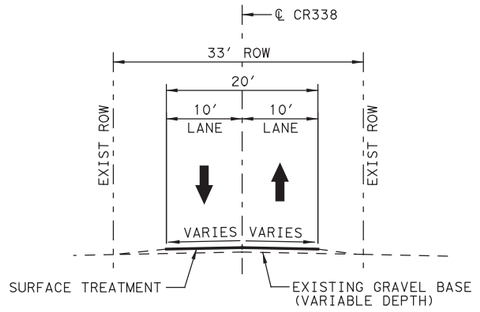


EXISTING
SH 236 TYPICAL SECTION
BEGIN TO END

NOTES:
1. ANY ADDITIONAL EXISTING BASE THAT IS NOT REMOVED WITH ITEM 105 WILL BE REMOVED WITH ITEM 110.



EXISTING
PARK ROAD 14 TYPICAL SECTION
BEGIN TO END



EXISTING
COUNTY ROAD 338 TYPICAL SECTION
BEGIN TO END

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
03/05/2021
Phaisarn Cwatanapho, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

EXISTING
TYPICAL SECTIONS
SH 236 AT LEON RIVER

NOT TO SCALE — SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	4
CONTROL	SECTION	JOB	
0513	01	017	

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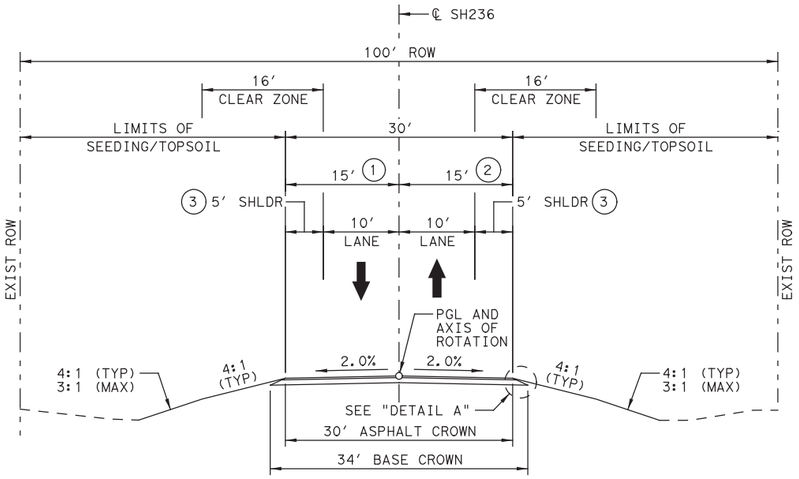


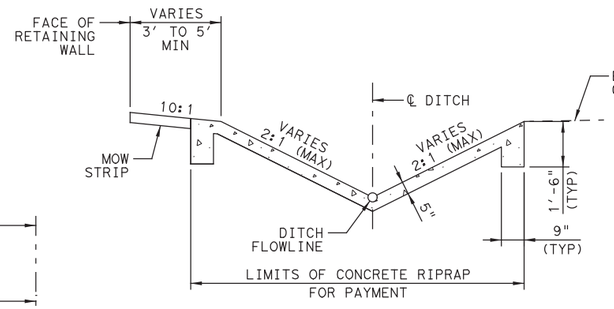
PROPOSED TYPICAL SECTION

BEGIN TO STA 251+58
STA 282+00 TO END

(1) VARIES 12′ TO 15′
BEGIN TO STA 247+17
VARIES 15′ TO 13.74′
STA 284+00 TO END

(2) VARIES 13.24′ TO 15′
BEGIN TO STA 247+17
VARIES 15′ TO 12′
STA 284+00 TO END

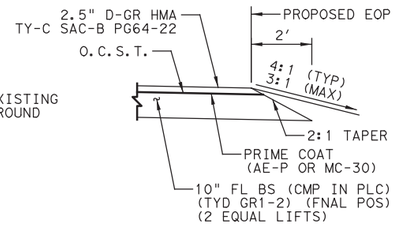
(3) SHLDR VARIES 2′ TO 5′
BEGIN TO STA 247+17
SHLDR VARIES 5′ TO 2′
STA 284+00 TO END



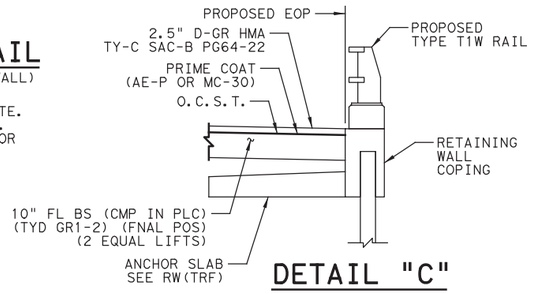
CONCRETE RIPRAP DETAIL

(SHOWING RIPRAP ADJACENT TO RETAINING WALL)
(RIPRAP ADJACENT TO MBGF SIMILAR)

CONCRETE RIPRAP SHALL BE CLASS B CONCRETE. PLACE RIPRAP REINFORCEMENT PER ITEM 432. SEE "ROADWAY PLAN AND PROFILE" SHEETS FOR LIMITS OF CONCRETE RIPRAP.

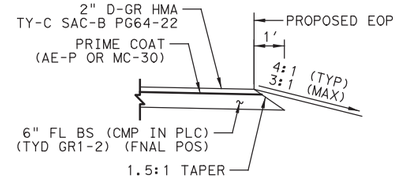


DETAIL "A"



DETAIL "C"

SEE "RETAINING WALL LAYOUT"
SHEETS FOR ADDITIONAL INFORMATION



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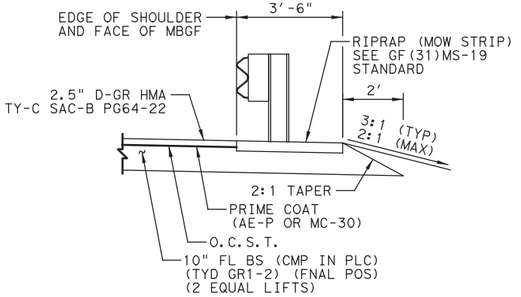
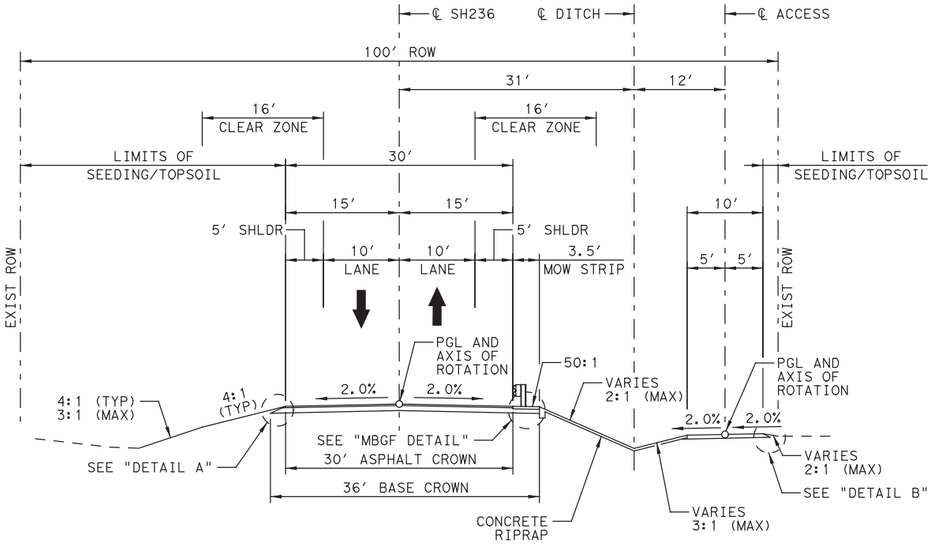


MBGF DETAIL

SEE ROADWAY PLAN SHEETS
FOR MBGF LOCATIONS

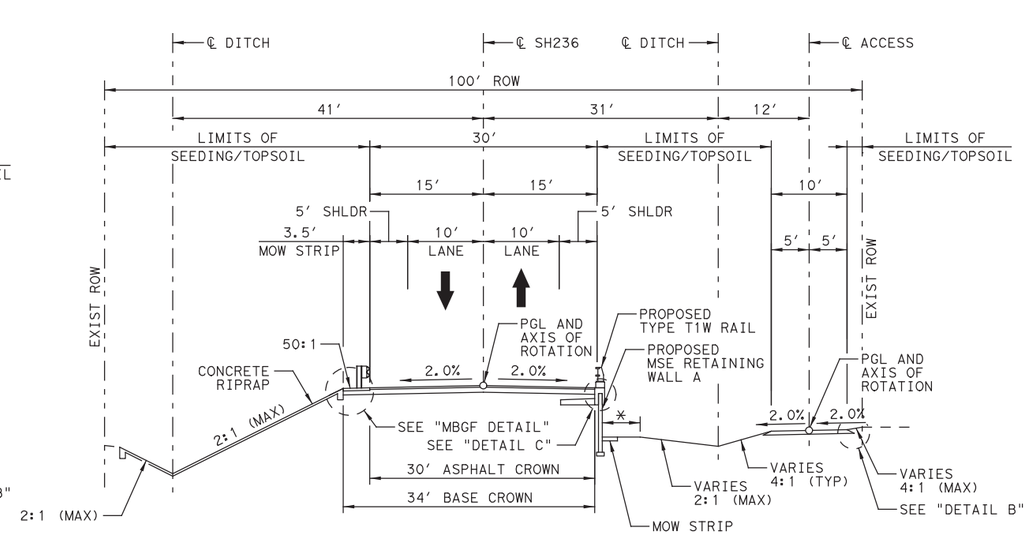
NOTES:

1. O.C.S.T. = ONE COURSE SURFACE TREATMENT
2. SEE "SW3P LAYOUT" SHEETS FOR ACTUAL LIMITS AND PAYMENT FOR SEEDING AND TOPSOIL.
3. SEE "ROADWAY TABLE OF CROSS SLOPES" SHEET FOR ACTUAL SUPERELEVATION TRANSITION RATES AND LOCATIONS.
4. SEE "RETAINING WALL LAYOUT" SHEETS FOR ADDITIONAL RETAINING WALL DETAILS AND NOTES.
5. SEE "RW(MSE)DD(MOD)" SHEET FOR RETAINING WALL BENCH WIDTH AT BASE OF WALL CRITERIA, DETAILS, AND NOTES.



PROPOSED TYPICAL SECTION

STA 251+58 TO STA 257+00



PROPOSED TYPICAL SECTION

STA 257+00 TO STA 259+00

* RETAINING WALL BENCH WIDTH
WALL A - BEGIN WALL A TO STA 257+30 = 5′ MIN
WALL A - STA 257+30 TO STA 257+40 = 5′ TO 3′ MIN
WALL A - STA 257+40 TO STA 259+00 = 3′ MIN

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHATSARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER

03/26/2021

Phatsarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

PROPOSED TYPICAL SECTIONS
SH 236 AT LEON RIVER

NOT TO SCALE SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	5
CONTROL	SECTION	JOB	
0513	01	017	

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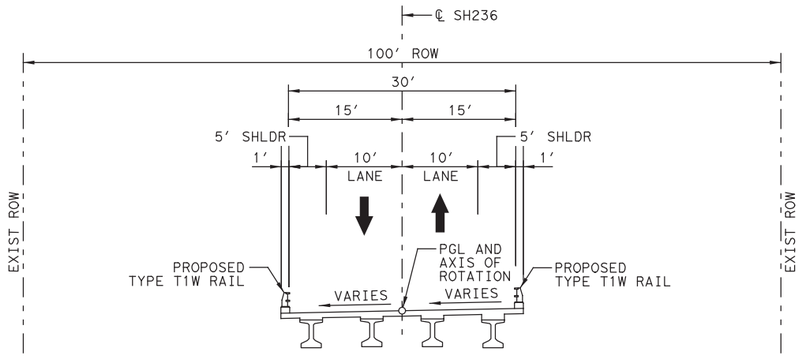
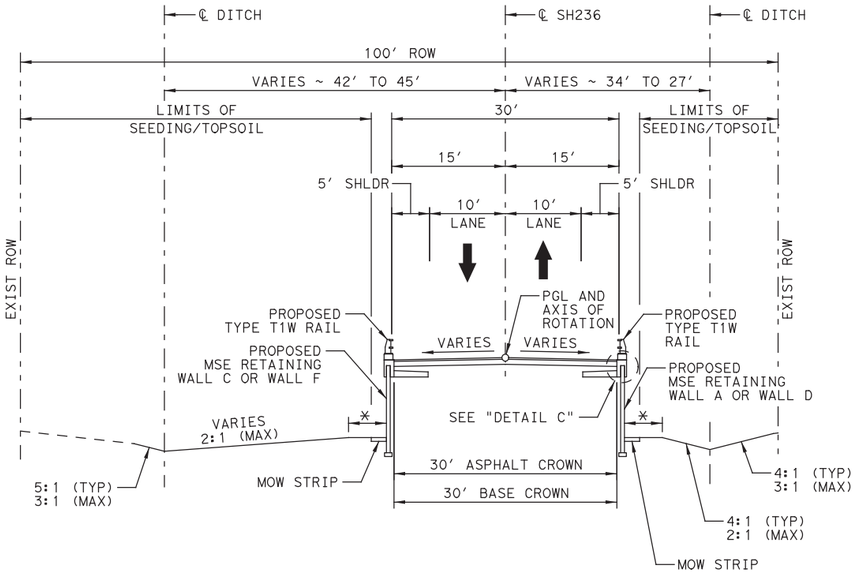


PROPOSED TYPICAL SECTION

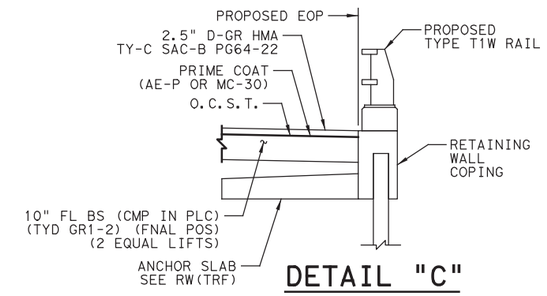
STA 259+50 TO STA 270+00



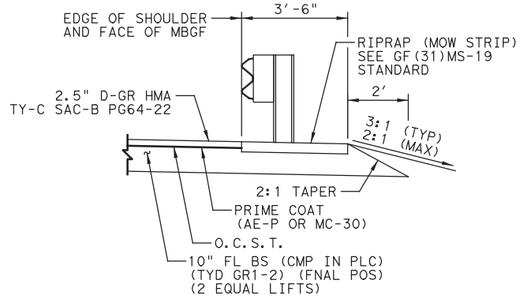
PROPOSED TYPICAL SECTION

STA 259+00 TO STA 259+50
STA 270+00 TO STA 273+55

* RETAINING WALL BENCH WIDTH
WALL A - STA 259+00 TO END WALL A = 3′ MIN
WALL C - BEGIN WALL C TO STA 259+45 = 5′ MIN
WALL C - STA 259+45 TO STA 259+55 = 5′ TO 3′ MIN
WALL C - STA 259+55 TO END WALL C = 3′ MIN
WALL D - BEGIN WALL D TO STA 272+00 = 3′ MIN
WALL D - STA 272+00 TO STA 272+10 = 3′ TO 5′ MIN
WALL D - STA 272+10 TO STA 273+55 = 5′ MIN
WALL F - BEGIN WALL F TO STA 273+30 = 3′ MIN
WALL F - STA 273+30 TO STA 273+40 = 3′ TO 5′ MIN
WALL F - STA 273+40 TO END WALL F = 5′ MIN



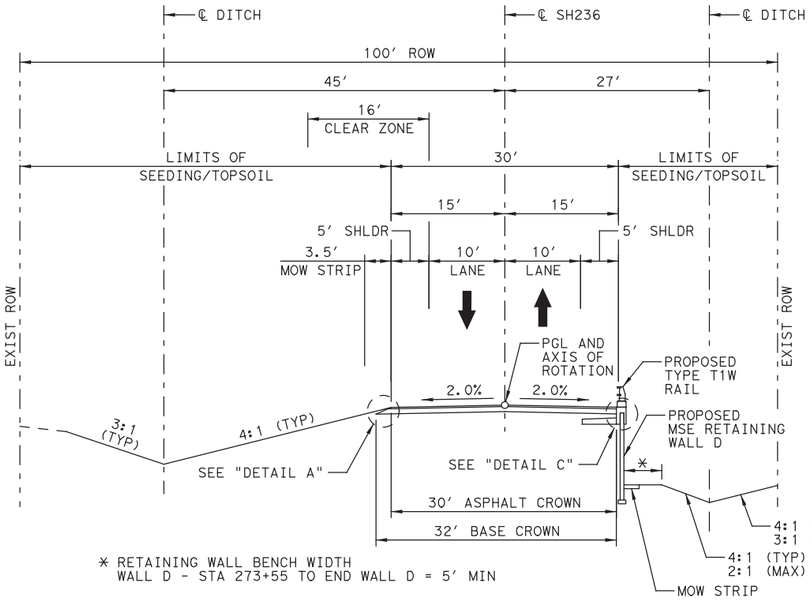
DETAIL "C"



MBGF DETAIL

SEE ROADWAY PLAN SHEETS
FOR MBGF LOCATIONS

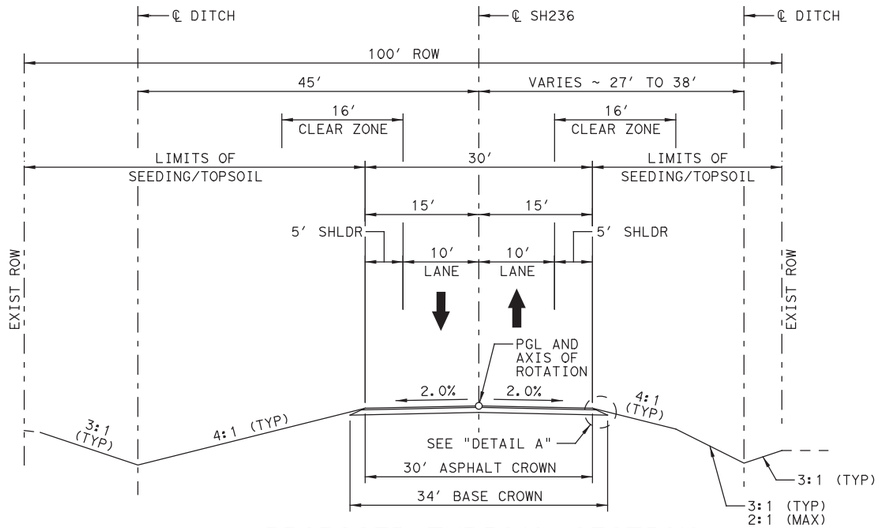
SEE "RETAINING WALL LAYOUT"
SHEETS FOR ADDITIONAL INFORMATION



* RETAINING WALL BENCH WIDTH
WALL D - STA 273+55 TO END WALL D = 5′ MIN

PROPOSED TYPICAL SECTION

STA 273+55 TO STA 274+93



PROPOSED TYPICAL SECTION

STA 274+93 TO STA 282+00

NOTES:

1. O.C.S.T. = ONE COURSE SURFACE TREATMENT
2. SEE "SW3P LAYOUT" SHEETS FOR ACTUAL LIMITS AND PAYMENT FOR SEEDING AND TOPSOIL.
3. SEE "ROADWAY TABLE OF CROSS SLOPES" SHEET FOR ACTUAL SUPERELEVATION TRANSITION RATES AND LOCATIONS.
4. SEE "RETAINING WALL LAYOUT" SHEETS FOR ADDITIONAL RETAINING WALL DETAILS AND NOTES.
5. SEE "RW(MSE)DD(MOD)" SHEET FOR RETAINING WALL BENCH WIDTH AT BASE OF WALL CRITERIA, DETAILS, AND NOTES.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/26/2021
Phaisarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

PROPOSED TYPICAL SECTIONS
SH 236 AT LEON RIVER

NOT TO SCALE SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	6
CONTROL	SECTION	JOB	
0513	01	017	

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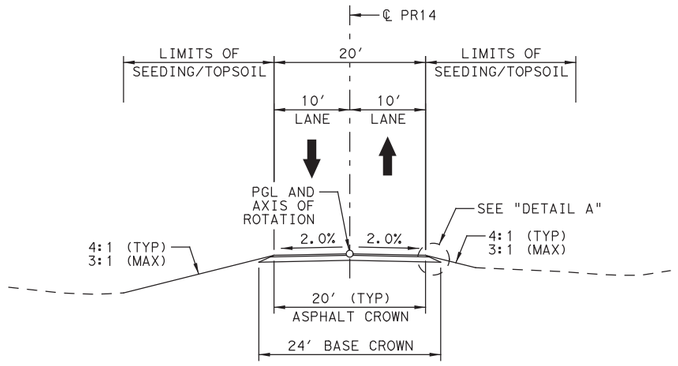
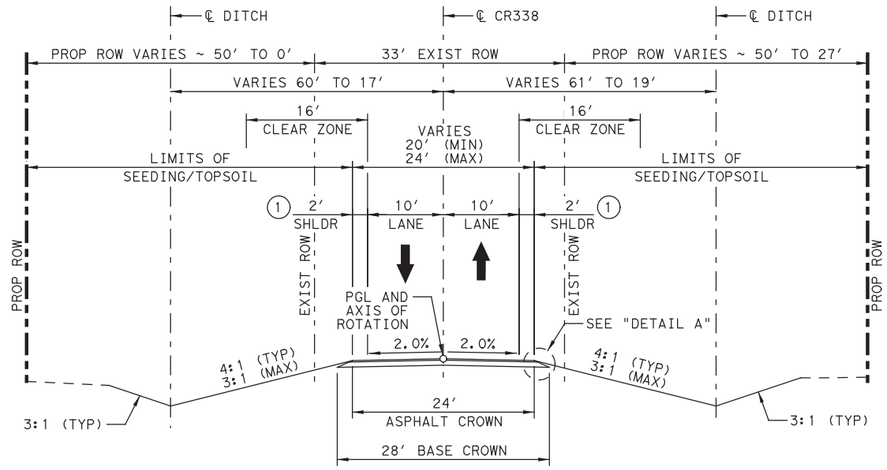


PROPOSED
PARK ROAD 14 TYPICAL SECTION

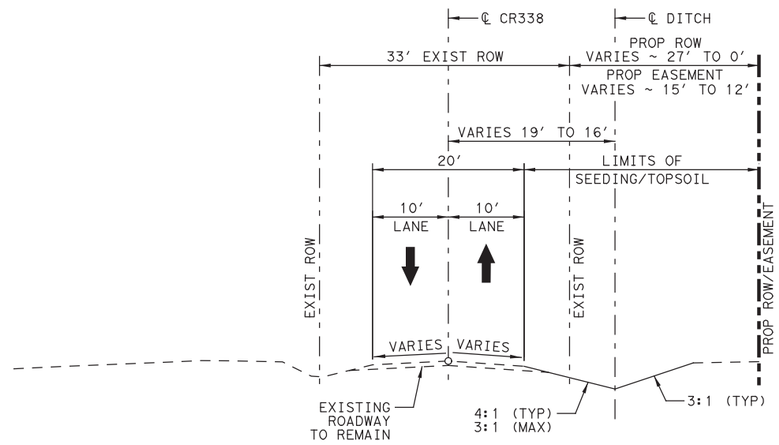
BEGIN TO END



PROPOSED
CR 338 TYPICAL SECTION

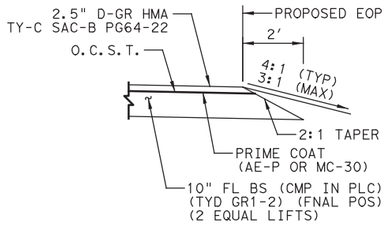
BEGIN TO STA 11+88

(1) SHLDR VARIES 2′ TO 0′ STA 11+60 TO STA 11+88



PROPOSED
CR 338 TYPICAL SECTION

STA 11+88 TO END



DETAIL "A"

NOTES:

1. O.C.S.T. = ONE COURSE SURFACE TREATMENT
2. SEE "SW3P LAYOUT" SHEETS FOR ACTUAL LIMITS AND PAYMENT FOR SEEDING AND TOPSOIL.
3. SEE "ROADWAY TABLE OF CROSS SLOPES" SHEET FOR ACTUAL SUPERELEVATION TRANSITION RATES AND LOCATIONS.
4. SEE "RETAINING WALL LAYOUT" SHEETS FOR ADDITIONAL RETAINING WALL DETAILS AND NOTES.
5. SEE "RW(MSE)DD(MOD)" SHEET FOR RETAINING WALL BENCH WIDTH AT BASE OF WALL CRITERIA, DETAILS, AND NOTES.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER

03/26/2021

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HDR ENGINEERING, INC.
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Texas Department of Transportation

PROPOSED
TYPICAL SECTIONS
SH 236 AT LEON RIVER

NOT TO SCALE — SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
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BASIS OF ESTIMATE TABLES

Table 1: Basis of Estimate for Erosion Control Items

Item	Description	Rate	Basis	Quantities
*166	FERTILIZER			
	FERTILIZER (20-10-10) (PERMANENT)	300 LBS / AC	5.5 AC	0.83 TON
	FERTILIZER (20-10-10) (TEMPORARY)	300 LBS / AC	5.5 AC	0.83 TON
168	VEGETATIVE WATERING			
	(3 APPLICATIONS - PERM)	13,100 GAL/AC/APP	5.5 AC	216.5 MG
	(3 APPLICATIONS - TEMP)	13,100 GAL/AC/APP	5.5 AC	216.5 MG

Table 2: Basis of Estimate for Base Work

Item	Description	Rate	Basis	Quantities
*216	PROOF ROLLING			
	PROOF ROLLING	8HR /ROADBED-MILE	0.537 ROADBED-MILE	4 HR
247	FLEXIBLE BASE			
	(TY D GR 1-2 FNAL POS)	138 LB/CF	84,834 CF	3,142 CY *5,854 TON
310	PRIME COAT			
	PRIME COAT (MC-30 OR AE-P)	0.20 GAL / SY	10,510 SY	2,102 GAL

* FOR CONTRACTOR'S INFORMATION ONLY

Table 3: Basis of Estimate for Seal Coats

Item	Description	Rate	Basis	Quantities
316	**SEAL COAT**			
	ASPH (CRS-2)	0.45 GAL / SY	10,510 SY	4,729 GAL
	AGGR (TY-D GR-4 OR TY-L GR-4)	1 CY / 135 SY	10,510 SY	78 CY

Table 4: Basis of Estimate for Asphalt Pavements

Item	Description	Rate	Basis	Quantities
3076	**DENSE-GRADED HOT MIX ASPHALT (2 ½")**			
	TY-C PG 64-22 SAC-B (EXEMPT)	275 LB / SY	10,419 SY	1,433 TON

GENERAL

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 5.5 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

Contractor questions on this project are to be emailed to the Waco District at the following address:

Bill Compton - Wacoprebid@txdot.gov, 254-867-2707, 100 S. Loop Dr., Waco, TX
Carmen Chau - Wacoprebid@txdot.gov, 254-867-2794, 100 S. Loop Dr., Waco, TX

Or Via phone or in person to the following individual(s):
Area Engineer's: Jarod Johnson, (254) 865-7115
Assistant Area Engineer's: Mallory Donavan, (254) 865-7115

All contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20 Responses/

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

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

GENERAL NOTES

The following standard detail sheets have been modified:

RW(MSE)DD(MOD)

ITEM 5: CONTROL OF THE WORK

Submit all fabrication and shop drawings per TxDOT's online shop drawing submittal system and copy the Area Engineer on the email submittal, unless otherwise directed.

Where a precast or cast-in-place concrete element is shown in the plans, Contractor may submit a precast concrete alternate in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at:
https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design.
Acceptance or denial of an alternate is at the sole discretion of the Department. Contractor is responsible for impacts to the project schedule and cost resulting from the use of alternates.

ITEM 6: CONTROL OF MATERIALS

References to manufacturer's trade name or catalog numbers are for the purpose of identification only and the contractor will be permitted to furnish like materials of other manufacturers provided they are of equal quality and comply with specifications for this project.

This project has structure with surface coatings which contain hazardous constituent which is lead paint. Contractor is responsible for the health and safety of his employees and compliance with all OSHA standards and regulations.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

No significant traffic generator events identified.

If utilizing private property for waste disposal sites, field office sites, equipment storage sites or for any other purpose involved with this project, provide to the Engineer written proof of the property owner's approval of the use of this property. This proof may be in the form of a letter or agreement signed by the property owner or other documents acceptable to the Engineer.

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

The contractor is alerted to the possible presence of swallows under the existing bridges or culverts. Because the migratory bird treaty act prohibits harm to swallows, their eggs or their nestlings, the contractor will not begin potentially disturbing activities on or near the bridge until the birds have abandoned any occupied nests (approximately September 1). Active nests may not be removed regardless of the date.

Prior to the swallows returning to the nests (approximately March 1), abandoned nests will be removed from the bridge. The contractor will prevent the establishment of new nests on any portion of the structure. Methods for preventing the establishment of new nests must be approved by the project Engineer. Examples of acceptable nest prevention methods are bird-deterrent netting and bird-repelling sprays and/or gels to be applied to the structure. This work will not be paid for directly, but will be subsidiary to the various bid items.

The Contractor will submit detailed site-specific plans for work in each "water of the United States" designated on the EPIC sheet. These plans must be approved by the TxDOT Engineer prior to starting any work in these areas. The plans must also describe facilities and work activities adjacent the Ordinary High-Water Marks. The plan must show actual dimensions and materials for:

- Proposed construction roads and work areas leading to or in close proximity to the Ordinary High-Water Marks
- Temporary material or equipment storage areas in close proximity to the Ordinary High-Water Marks
- Locations of proposed sediment and erosion control devices
- Identification of construction equipment and construction techniques to accomplish the work

Once this drawing and supporting information is reviewed and approved by TxDOT, all construction workers should be made aware of the limits designated on the drawings by the Contractor's supervision. Work in all waters of the US will be limited to the minimum necessary required to construct the bridge, culvert or roadway fills. Work will also include all activities needed for bridge and culvert demolitions. Working or disturbing soil in the stream channel outside the limits of the work plan will not be allowed. Orange fencing will be provided and maintained to establish the TxDOT approved boundaries in which work may be conducted between the Ordinary High-Water Marks. Orange fencing will not be paid for but will be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling".

ITEM 8: PROSECUTION AND PROGRESS

This Project will be a Standard Workweek in accordance with Article 8.3.1.4.

Nighttime work is allowed in accordance with Article 8.3.3.

Meet bi-weekly or at intervals as agreed upon with the engineer to notify him or her of planned work for the upcoming 3-week period.

Critical Path Method (CPM) schedule in P6 format will be required for this project. Submit baseline schedule and obtain approval prior to beginning construction. The baseline schedule working days will be the same as the number of working days established by the Contract. The Estimate will be held if monthly schedule update is not submitted.

Submit the schedule in both PDF and in a base software electronic file format acceptable to TxDOT to allow for import and analysis into TxDOT's current scheduling software.

ITEM 100: PREPARING RIGHT OF WAY

The limits of preparing right of way will be measured at the following locations:

From Sta. 246+17 to Sta. 285+00 along the centerline of construction.

The limits of preparing right of way for the borrow pit site on Winkler Park Road will be measured as shown on the project layout sheets.

Remove the existing roadway delineators and object markers as shown on the plans, or as directed, during construction within the right of way. Delineator and object marker removals are subsidiary to this Item.

Prune trees as required for construction operations or as directed. Treat all pruning cuts or damage to trees with a commercial wound dressing within 20 minutes of cut or damage. All pruning or tree trimming for trees not be removed shall be subsidiary to this bid item.

ITEMS 105: REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT

Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly, but is subsidiary to this item.

Take possession of recycled asphalt pavement from the project and recycle the material.

Properly dispose of unsalvageable material at Contractor's expense.

Remove the loose material from the roadway before opening to traffic.

ITEM 110: EXCAVATION

In a cut section, when soils are encountered at subgrade depths that are unstable and are deemed unsuitable by the Engineer, undercut this material for a minimum depth of one (1.0) foot below the maximum depth as determined and replace with a material having a plasticity index less than 25 and a liquid limit of less than 50.

ITEMS 110 & 132: EXCAVATION & EMBANKMENT

Excavation and embankment for driveways, sleeper slabs, alleys and intersections will not be paid for directly, but will be considered subsidiary to these items.

In those cases where fixed features require, the governing slopes indicated herein and on the cross sections may be varied between the limits and to the extent determined.

ITEM 132: EMBANKMENT

The Ty C embankment material for this project must meet the following requirements:

Properties	Test Method	Specification Limits
LIQUID LIMITS	TEX-104-E	≤ 50
PLASTICITY INDEX (PI)	TEX-106-E	10 ≤ PI ≤ 25

Perform Tex-106-E (Plasticity Index) by an approved laboratory on excavated soils from sources outside right of way when used in roadway embankment. Provide the test results at no expense to the department. The engineer will sample and test soils produced by the construction project for specification requirements or material sources specified in the plans.

Type C Embankment will consist of suitable earthen material such as rock, loam, clay or other materials that will form a stable embankment. In addition, the top two (2) feet of embankment, including material used to complete front slopes after final surfacing will meet the physical requirements listed herein. Shale will not be allowed

ITEM 160: TOPSOIL

Salvage the existing topsoil from the cut/fill areas. Topsoil not stored in small windrows will be stockpiled in locations with heights no greater than four (4) feet and dumped loose from Contractor equipment. The Contractor will minimize topsoil compaction and limit equipment being driven over stockpiled topsoil.

Additional Topsoil will come from approved sources outside of the ROW. Topsoil must come from a location within six (6) inches of the natural ground surface to ensure it contains nutrients and is not sterile soil. Off ROW top soil will contain a minimum organic content of three & one-half (3.5%) percent, based on soil test results.

ITEM 164: SEEDING FOR EROSION CONTROL

Temporary seeding mixtures (cool and warm) will also include three (3) lbs of Bermuda grass seed per acre, with all seeds being planted concurrently.

Contractor will mow or disc wheat and or oats in spring prior to vegetation going to seed.

Permanent seed mixes for both urban and rural projects including sand or clay soils in the Waco District will be bid and installed to include a minimum of one & one-half (1.5) pounds per acre Green Sprangletop seed and four (4) pounds per acre Bermudagrass seed, with other seed types also being included and quantities remaining unchanged.

ITEM 169: SOIL RETENTION BLANKETS

Hydraulically apply Flexterra FGM, CocoFlex ET-FGM, Earth Guard or other spray applied soil retention as approved by the Engineer for erosion control on the specified slopes or areas in the construction plan. Apply as required per manufacturer's recommendations.

Use Tables under Item 164 to determine type of seeds to be used. Water for application, seeding, labor, equipment, tools, supplies, materials, fertilizer and incidentals will not be paid for directly but will be subsidiary to this Item.

ITEM 247: FLEXIBLE BASE

Construct uniform layer thickness of 6 inches, or less with the required density and moisture content.

Minimum PI is equal to three (3) for all grades, or a minimum Bar Linear Shrinkage of 2%.

RAP may not be incorporated into Flexbase Material

ITEM 310: PRIME COAT

When cutback asphalt is used, a minimum curing time of seven (7) days will be required before application of Item 316, "Seal Coat", unless otherwise approved in writing.

ITEM 316: SEAL COAT

No AC or Emulsion for surface treatment items will be placed between September 15 and May 1 unless approved in writing.

All trucks hauling materials to be paid for by truck measurement will be "struck off" prior to delivery to the project.

Unless otherwise approved, seal coat will not be exposed to traffic for more than seven(7) calendar day before application of HMAC..

ITEM 320: EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT

Use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It shall have a minimum storage capacity of approximately 25 tons. It shall be equipped with a pivoting discharge conveyor and shall completely and thoroughly remix the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver shall have a surge storage insert with a minimum capacity of 20 tons.

The use of windrow pick-up equipment is allowed except on the first course of roadway material placed over the subgrade.

ITEM 400: EXCAVATION AND BACKFILL OF STRUCTURES

Aggregate for cement stabilized backfill will be coarse aggregates, GRADE 3, 4 or 5 and fine aggregate, as shown in Item 421, "Hydraulic Cement Concrete". The ratio of course aggregate to sand should not contain more than sixty percent (60%) sand unless otherwise approved.

CLASS B bedding is required if rock is encountered.

ITEM 416: DRILLED SHAFT FOUNDATIONS

Provide a minimum of one core per bent, regardless of placement method.

ITEM 420 CONCRETE SUBSTRUCTURES

Form columns to a point a minimum of one foot below the proposed future or existing bottom of channel elevation indicated on the bridge layouts by an acceptable method. This form work is not paid for directly, but is considered subsidiary to this item.

Apply an ordinary surface finish to all concrete surfaces within 30 days after form removal.

BENT NUMBERING:
For bridges with four or more spans, number every third bent (counting the abutments) on the up-station and down-station faces of the outside column(s) at approximately the mid height of the column. For structures with three columns or less per bent, place numbers on column A. Where there are four or more columns per bent, place numbers on both outside columns. Bent numbers shall be as shown on the bridge layout.

Provide block numbers with a height of 6". Place numbers using appropriate die cut stencils and black paint. All materials, labor and incidentals associated with placing bent numbers are subsidiary to the various bid items.

For bridges with aesthetic treatments, the numbering will be incorporated into the aesthetics package.

NATIONAL BRIDGE INVENTORY NUMBERS:
Provide National Bridge Inventory (NBI) numbers on all bridge structures and bridge class culverts.

Where beam types allow access to the face of abutment backwall, place NBI numbers on the face of each abutment backwall using 3" block numbers. Locate NBI numbers between the outside beams at opposite corners of the bridge.

Where beam types do not allow access to the face of abutment backwall, place NBI numbers on the face of each abutment cap using 3" block numbers. Locate NBI numbers below the outside beams at opposite corners of the bridge.

Where a bridge begins, ends or contains a bent common to multiple structures, place NBI numbers on both faces near both ends of the common bent cap. The number placed at each of the four locations will correspond to the NBI number assigned to the bridge immediately above the number. Locate NBI numbers below the outside beam. Place using 3" Block Numbers.

For all conditions, use appropriate die cut stencils and black paint for placement. All materials, labor and incidentals associated with placing NBI numbers are subsidiary to the various bid items.

Reduce headwall heights, if necessary, to provide a maximum of three (3) inches projection above the roadway slope. No increase or decrease will be made in plan quantities of concrete or reinforcing steel for this work.

ITEM 421: HYDRAULIC CEMENT CONCRETE

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Provide High Performance Concrete (HPC) of the class specified for the following bridge components: abutments, bent caps, and columns.

Provide sulfate resistant concrete for all drilled shafts.

Supply the Engineer with a list of certified personnel and copies of their current ACI certificates before beginning production and when personnel changes are made. Supply hard copies of calibration reports for testing equipment when required by the Engineer.

ITEM 423: RETAINING WALLS

For Mechanically Stabilized Earth (MSE) walls, provide a system from one of the following approved suppliers:
The Reinforced Earth Company
Contech Engineered Solutions LLC
ROSCH Earth Technologies
Structural Embankment, LLC
Tricon Precast, Ltd.
Valley Prestress Products, Inc.

All retaining walls will have a uniform texture and appearance.

Unless otherwise noted in the plans, the top of the leveling pad is located 2 feet below the proposed ground.

Unless otherwise shown on the plans, provide Type AS backfill as defined under this item for permanent MSE or concrete block (CB) walls not subject to inundation. Unless otherwise shown on the plans, provide type DS backfill as defined under this item for permanent MSE or CB walls subject to inundation.

Supply drainage aggregate meeting the requirements of this item for use as filter material with the retaining wall.

Cement-Stabilized Backfill (CSB) is not permitted.

Unless otherwise noted on the plans, provide flowable backfill meeting the requirements of Item 401 between the back of panels and inlets or drainage pipes where the required compaction can not be achieved. Flowable backfill used for this purpose is subsidiary to this item.

Provide earth reinforcements with a minimum length of 8' or longer as required by RW(MSE)-DD. Earth reinforcement length is measured perpendicular to the wall. Adjust skewed earth reinforcements as necessary of obtain required length.

Submit design calculations supporting the details necessary to incorporate coping, railing, inlets, drainage, electrical conduits and any additional necessary features.

Unless otherwise shown on the plans, form the map of Texas emblem into a wall panel next to each bridge abutment. Engineer approval of the exact location of each emblem is required. The cost of forming emblems is considered subsidiary to this item. Inset the map of Texas a minimum of ¾ inch into the face of the panel, and provide a smooth finish with an engineer approved contrasting color.

Six inch (6") perforated pipe underdrain, as per MSE wall standard sheet, will be required. Pipe outfall should be terminated into wall of drainage structures or as shown in the plans. Pipe underdrain for retaining walls will be subsidiary to Item 423, "Retaining Walls".

ITEM 427: SURFACE FINISHES FOR CONCRETE

Table of Special Surface Finishes and Coatings

ITEM	SPECIAL SURFACE FINISH	COATING	REMARKS
RETAINING WALL PANELS	FORMLINER FINISH	N/A	N/A

Apply an Ordinary Surface Finish to elements not listed in "Surface Area I".

Special Surface Finishes listed above will not be paid for directly but are considered subsidiary to various bid items.

FORM LINER FINISHES: Place architectural concrete treatments as shown on MSE Retaining Wall Surface Detail sheet in the plans. Placement is subsidiary to this item.

Provide form liners that release without leaving pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. Provide form release agents as recommended by the manufacturer. Replace form liners as directed that have become damaged or worn. Replacement of form liners is considered incidental to the work and no additional compensation is provided.

Provide sample panels a minimum of ten days in advance of starting construction of the textured concrete surfaces. Construct sample panel(s) in accordance with Item 427.4.3.5 “Form Liner Finish” using each type of approved form liner. Sample panels must meet the requirements of the plans and specifications and be approved before any construction form liners may be ordered, obtained or used. Provide panels having a textured portion at least 5'-0" by 5'-0" with a representative un-textured surrounding surface. If directed, construct and finish additional test panels until a satisfactory concrete surface texture is obtained.

The approved sample panel is the standard of comparison for the production concrete surface texture. If directed, build a new test panel to demonstrate acceptability of any proposed change in construction method.

Tool or replace areas requiring surface treatment that do no match their associated sample panels. Upon completion, tooled or replaced panels must match the associated sample panel. Tooling or replacement is at the contractor's expense.

Joint reveal details and location may vary slightly from what is shown to match the adjacent MSE walls as directed. No additional compensation will be allowed.

ITEM 432: RIPRAP

Weep holes and granular material, are required and locations will be determined prior to placement of concrete riprap at bridge abutments.

ITEM 440: REINFORCEMENT FOR CONCRETE

Fiber Reinforced Concrete (FRC) can be used as a substitute for Non-Structural Class Reinforced Concrete in Mow-Strip and Rip Rap Items. FRC may also be used for other Non-Structural Class Reinforced Concrete Items as approved.

ITEMS 450: RAILING

Apply additional paint coating to all T1W metal posts and tubular sections and as directed. Paint color shall be DoT Highway Brown (FS 10055). A different color even if equivalent must be approved before application. Refer to material notes on standard TYPE T1W.

Blast clean all railing and barrier wall installed as part of the project in accordance with Item 427, “Surface Finishes for Concrete”, prior to final acceptance of the project. This work will be considered subsidiary to Items 450, “Railing”.

Ensure slip formed barrier and cast-in-place barrier will be uniform in color and texture.

ITEM 464: REINFORCED CONCRETE PIPE

The concrete collars and the connections of pipes to existing or proposed concrete boxes or pipe will not be paid for directly but will be considered subsidiary to the various bid items.

ITEM 496: REMOVING STRUCTURES

Submit to the Engineer for approval a detailed plan for bridge removal including methods, equipment and sequencing.

ITEM 500: MOBILIZATION

Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.

When excavation is required next to a pavement lane carrying traffic and the widening is not completed by the end of the work day, backfill against the edge of the pavement with at least a 3:1 slope using an acceptable material to support vehicular traffic. Carefully remove and dispose of this material when work resumes. Backfilling pavement edges, and the materials required for the work will be subsidiary to this item.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

The Contractor Responsible Person(s) (CRP) for Work Zone Traffic Controls will inspect and ensure any deficiencies are corrected each and every day throughout the duration of this contract. Any misaligned or damaged traffic control devices will be repaired as soon as practical after deficiency is discovered.

In addition to providing a Contractor’s Responsible Person and a phone number for emergency contact, have an employee(s) available to respond on the project for emergencies and for taking corrective measures within One (1) Hour.

ITEM 504: FIELD OFFICE

Furnish one Asphalt Mix Control Laboratory (Type D) for this project.

Chain link fencing, area dimensioned as directed by the Engineer, will be provided around TxDOT field office/laboratory and parking areas separate from contractor areas. Keep Contractor and TxDOT parking separate. No Contractor vehicles, equipment, dumpsters, storage, etc. is allowed in TxDOT parking area.

Provide an all in one printer/scanner/fax/copier with software that is compatible with TxDOT equipment, cost not in excess of $300. This is subsidiary to the various bid items.

ITEM 506: TEMPROARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS

Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas, before the next rain event or within 24 hours of the discharge.

If temporary construction stream crossings are allowed under a Nationwide Permit, submit in writing for approval the type and location of each temporary stream crossing. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for temporary stream crossings. A temporary culvert crossing will consist of storm sewer pipes and 4- to 8-inch nominal size rock. Temporary stream crossings must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or cause more than minimal degradation of water quality. Remove the temporary stream crossings in their entirety and return the affected areas to their pre-existing elevation. All work and materials use for temporary construction stream crossings will not be paid for directly but are subsidiary to pertinent Items.

Provide SW3P Signs. Obtain from the Engineer a copy of the project's completed TPDES Storm Water Program Construction Site Notice and Contractor Site Notice. Laminate the sheets and bond with adhesive to 36" X 36" sign blanks. Ensure the sheets remain dry. Apply Type C Blue reflective sheeting as the background and add the text "SW3P" in 5" white lettering, centered at the top. Attach the signs to approved temporary mounts and locate at each of the project limits just inside the right of way line at a readable height or as directed by the Engineer. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. SW3P signs, maintenance, and reposting (for replacement or as needed to ensure readability) will be subsidiary to Item 502.

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

No soil disturbing activities will begin on any section of TxDOT ROW without adequate sedimentation controls first being installed and functioning at adjacent drainage outfalls. Begin and continuously prosecute the repairs, additions and maintenance of erosion and sedimentation control devices within seven days after the Contractor receives each Form 2118, Field Inspection and Maintenance Report, from the Engineer. Failure of the Contractor to fulfill either of the above requirements places TxDOT in potential non-compliance with permit requirements and may result in withholding estimates or stopping work or both until all environmental permit requirements are fulfilled.

Concrete Washouts are required per the CGP. The Concrete Washout Area(s) structural controls must consist of temporary berms, temporary shallow pits, and/or temporary storage tanks to prevent contaminated runoff and must be lined as to prevent contamination of underlying soil. Ensure pits properly maintained including removal of concrete as not to allow over flow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls."

Cleaning and sweeping of open roadways due to material spillage or loss from Contractor equipment or tires will be the responsibility of the Contractor at no cost to TxDOT. This work will not be charged as Item 738, "Cleaning and Sweeping Highways". Cleaning and sweeping of roadways will be completed as directed, including multiple times per day if necessary, to maintain acceptable roadways for the traveling public and to meet environmental regulations. Construction activities will cease when material deposited on the roadway is not properly removed or when equipment is not available as needed. Adequate construction exits will be planned, constructed and maintained by the Contractor per Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls".

Place construction perimeter fencing between work area and masonry wall at PR 14 Mother Neff State Park entrance. See removal plan. Limits and length to be as directed and approved and paid for under item 506 "Temporary Erosion, Sedimentation and Environmental Controls. Construction perimeter or safety fencing at all other areas of project outside of these limits adjacent to the masonry wall shall be subsidiary to items in the plans.

ITEM 533: MILLED RUMBLE STRIPS

Provide an off-set milling head for milling shoulder rumble strips in vicinity of metal beam guard fence, if directed.

ITEM 540: METAL BEAM GUARD FENCE

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

Wooden block out will not be allowed.

ITEMS 542 & 544: REMOVING METAL BEAM GUARD FENCE & GUARDRAIL END TREATMENTS

W-Beam elements, steel posts and composite material blockouts will become the property of the contractor.

ITEM 544: GUARDRAIL END TREATMENTS

The use of wooden block-outs will not be allowed.

ITEM 585: RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type A on all intersections and driveways.

Use Surface Test Type B pay adjustment schedule 1 on the travel lanes.

The contractor will ensure satisfactory profile results in the intermediate paving layers (mixture) to eliminate corrective action for excessive deviations in the final surface layers.

Milling will not be allowed as a corrective action for excessive deviations in the surface layer.

ITEM 644: SMALL ROADSIDE SIGN ASSEMBLIES

Bolt Clamp type will be used on Texas Triangular Slip Base System.

As practical with new construction, leave the existing sign assemblies in place until the proposed foundation, post and sign are in installed, and then remove the old sign assemblies.

Do not leave any sign foundation holes open overnight. Ensure all holes drilled are at least the minimum required depth with no loose material remaining in the hole.

Stake proposed sign locations and receive approval before installation of sign foundations.

Expanded foam foundations are not permitted.

Cut the bottom of all posts square.

For sign types which design details are not shown on these plans, fabricate according to the "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS".

Removed material that is deemed salvageable (signs and posts) will be the property of TxDOT. Deliver salvageable material to the TxDOT Maintenance Office. Remove unsalvageable material.

The Contractor will relocate the existing double sided street name signs and furnish the post mounted brackets for the street name signs to be paid for as part of the proposed Stop Signs (R1-1). Existing street name signs will be mounted above Stop signs. If damaged while being relocated, the Contractor will furnish new double sided street name sign at their own expense.

ITEM 658: DELINEATOR AND OBJECT MARKER ASSEMBLIES

All flexible and GF2 delineators will have a tubular body.

The delineator assembly BRF Class A (D-SW) and (D-SY) are to be single delineators (Class I) attached to a flat, plastic bracket to facilitate the mounting of the delineator on top of the bridge rail at the locations shown on the plans. Submit a sample for approval before ordering materials.

ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS

The Contractor will layout the proposed striping in accordance with TxDOT Traffic Control Plan Standards and latest version Texas Manual on Uniform Traffic Control Devices (TMUTCD) and project striping layout sheets. The Engineer will verify proposed striping layout prior to the beginning of striping operations.

The Contractor will locate the beginning and ending points of No Pass Zones.

ITEM 677: ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

The following are considered acceptable Pavement Marking Removal methods on this project for non-final pavement surfaces:
Provide 2' wide strip seals
Water blasting
Mechanical Method

ITEM 3076: DENSE-GRADED HOT-MIX ASPHALT

Design for a target Laboratory-molded density of 97.0% when using the Texas Gyratory Compactor (TGC) (Tex-204-F, Part I).

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

Maximum stripping of 0% is required.

RAP from Contractor owned sources may be used if the RAP is fractionated.

ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN

This project will require "full matrix" type portable changeable message signs.

Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Furnish two (2) portable changeable message signs. The portable changeable message sign(s) will be used for all lane closures and freeway closures as shown on the traffic control plan standard sheets.

Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

ITEM 6185: TRUCK MOUNTED ATTENUATORS

The total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario		Required TMA	
(1-1)-18 / (1-2)-18			1	
(1-3)-18	A	B	1	2
(1-4)-18 / (1-5)-18 / (1-6)-18			1	

Shadow vehicles equipped for truck mounted attenuators (TMA) for stationary operations will be paid for by the day and must be available for use at any time as determined by the Engineer.

Mobile operations will be paid for by the hour, per specifications. For mobile operations, payment will be made only while the TMA is in use.

For mobile operations requiring multiple TMA's, judgement may be applied in lower speed, urban / in town traffic environments to reduce the numbers of TMA in use where the added TMA may pose a hazard for traffic entering and exiting driveways, side streets, etc.

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the contractor expects compensation will require prior approval from the Engineer.

ITEM 7000: REMOVAL AND PROPER DISPOSAL OF DRIFTWOOD AND DEBRIS

Equipment may include but is not limited to dragline, front-end loader, backhoe, hydraulic excavator, dozer, track loader, dump trucks, etc.

Limits for the removal of driftwood and debris shall typically include the width of the right of way (upstream and downstream) for the length of the structure.

Debris shall consist of all foreign material within the work area including trash, tires, etc.

Contractor shall cut and remove abandoned timber bridge piles. This shall not be paid for directly, but considered subsidiary to various bid items.

Cut driftwood as required, load, haul and dispose of driftwood and debris off the right of way in accordance with federal, state and local regulations. Unless otherwise approved by the Engineer, small items (less than 24 inches in diameter) may be chipped on site and spread on the ROW above the ordinary high-water mark as approved by the Engineer. No debris, whole or chipped will be deposited in a floodplain area.

Disposal sites must be permitted by State and Local Government.

QUANTITY SHEET

CONTROLLING PROJECT ID 0513-01-017 **DISTRICT** Waco **COUNTY** Coryell
HIGHWAY SH 236

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0513-01-017**			
		PROJECT ID		**A00001906**			
		COUNTY		**Coryell**			
		HIGHWAY		**SH 236**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6001	PREPARING ROW	AC	7.100		7.100	
	100-6002	PREPARING ROW	STA	39.000		39.000	
	100-6004	PREPARING ROW(TREE)(12" TO 24" DIA)	EA	7.000		7.000	
	100-6011	PREPARING ROW(TREE)(24" TO 36" DIA.)	EA	11.000		11.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	78.000		78.000	
	104-6044	REMOVING CONC (FLUME)	SY	57.000		57.000	
	105-6011	REMOVING STAB BASE AND ASPH PAV (2"-6")	SY	11,497.000		11,497.000	
	110-6001	EXCAVATION (ROADWAY)	CY	1,329.000		1,329.000	
	110-6002	EXCAVATION (CHANNEL)	CY	5,555.000		5,555.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	23,360.000		23,360.000	
	158-6006	SPEC EXCAV WORK (VEHICLE)	CY	19,712.000		19,712.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	26,466.000		26,466.000	
	160-6006	FURNISHING AND PLACING TOPSOIL (3")	SY	14,970.000		14,970.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	26,466.000		26,466.000	
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)	SY	26,466.000		26,466.000	
	168-6001	VEGETATIVE WATERING	MG	433.000		433.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	950.000		950.000	
	247-6053	FL BS (CMP IN PLC)(TYD GR1-2)(FNAL POS)	CY	3,142.000		3,142.000	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	2,102.000		2,102.000	
	316-6022	ASPH (CRS-2)	GAL	4,729.000		4,729.000	
	316-6397	AGGR(TY-D GR-4 OR TY-L GR-4)	CY	78.000		78.000	
	400-6005	CEM STABIL BKFL	CY	110.000		110.000	
	416-6004	DRILL SHAFT (36 IN)	LF	1,016.000		1,016.000	
	416-6005	DRILL SHAFT (42 IN)	LF	294.000		294.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	29.000		29.000	
	420-6030	CL C CONC (CAP)(HPC)	CY	143.000		143.000	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	39.000		39.000	
	420-6074	CL C CONC (MISC)	CY	11.200		11.200	
	422-6001	REINF CONC SLAB	SF	33,600.000		33,600.000	
	422-6015	APPROACH SLAB	CY	48.000		48.000	
	423-6001	RETAINING WALL (MSE)	SF	13,603.000		13,603.000	
	425-6038	PRESTR CONC GIRDER (TX46)	LF	3,582.630		3,582.630	
	425-6041	PRESTR CONC GIRDER (TX70)	LF	598.000		598.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	4.000		4.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	462.000		462.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	76.000		76.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	70.000		70.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0513-01-017 **DISTRICT** Waco **COUNTY** Coryell
HIGHWAY SH 236

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0513-01-017**			
		PROJECT ID		**A00001906**			
		COUNTY		**Coryell**			
		HIGHWAY		**SH 236**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	450-6003	RAIL (TY T1W)	LF	3,249.000		3,249.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	156.000		156.000	
	460-6001	CMP (GAL STL 12 IN)	LF	50.000		50.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	66.000		66.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	110.000		110.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	123.000		123.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	4.000		4.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	496-6005	REMOV STR (WINGWALL)	EA	2.000		2.000	
	496-6007	REMOV STR (PIPE)	LF	376.000		376.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000		11.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	192.000		192.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	192.000		192.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	224.000		224.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	224.000		224.000	
	506-6034	CONSTRUCTION PERIMETER FENCE	LF	313.000		313.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	8,393.000		8,393.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	8,393.000		8,393.000	
	530-6005	DRIVEWAYS (ACP)	SY	1,298.000		1,298.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	4,751.000		4,751.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	2,152.000		2,152.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	612.500		612.500	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	3.000		3.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	450.000		450.000	
	542-6005	RM MTL BM GD FEN TRANS (T101)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	3.000		3.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1.000		1.000	
	552-6003	WIRE FENCE (TY C)	LF	862.000		862.000	
	552-6005	GATE (TY 1)	EA	3.000		3.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	10.000		10.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	3.000		3.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	1.000		1.000	
	644-6066	IN SM RD SN SUP&AM (RAIL MOUNT)	EA	15.000		15.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0513-01-017 **DISTRICT** Waco **COUNTY** Coryell
HIGHWAY SH 236

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0513-01-017**			
		PROJECT ID		**A00001906**			
		COUNTY		**Coryell**			
		HIGHWAY		**SH 236**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	644-6076	REMOVE SM RD SN SUP&AM	EA	40.000		40.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	32.000		32.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	11.000		11.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	75.000		75.000	
	666-6224	PAVEMENT SEALER 4"	LF	4,360.000		4,360.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	7,516.000		7,516.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	7,398.000		7,398.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	92.000		92.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	4,360.000		4,360.000	
	3076-6069	D-GR HMA TY-C SAC-B PG64-22 (EXEMPT)	TON	1,433.000		1,433.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	10.000		10.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	120.000		120.000	
	7000-6002	REML & DISPL DRIFTWOOD & DEBRIS	LS	1.000		1.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF REMOVAL QUANTITIES

LOCATION	100 6002	100 6004	100 6011	104 6009	104 6044	105 6011	496 6005	496 6007	496 6010	506 6034	542 6001	542 6005	544 6003	644 6076	7000 6002
	PREPARING ROW	PREPARING ROW(TREE) (12" TO 24" DIA)	PREPARING ROW(TREE) (24" TO 36" DIA.)	REMOVING CONC (RIPRAP)	REMOVING CONC (FLUME)	REMOVING STAB BASE AND ASPH PAV (2"-6")	REMOV STR (WINGWALL)	REMOV STR (PIPE)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	CONSTRUCTION PERIMETER FENCE	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FEN TRANS (T101)	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM	REML & DISPL DRIFTWOOD & DEBRIS
	STA	EA	EA	SY	SY	SY	EA	LF	EA	LF	LF	EA	EA	EA	LS
REMOVAL PLAN															
BEGIN TO STA 267+00	21	-	2	78	57	5,448	-	205	1	-	450	4	4	13	1
STA 267+00 TO END	18	7	9	-	-	6,049	2	171	-	313	-	-	-	27	-
PROJECT TOTALS	**39**	**7**	**11**	**78**	**57**	**11,497**	**2**	**376**	**1**	**313**	**450**	**4**	**4**	**40**	**1**

SUMMARY OF ROADWAY QUANTITIES

LOCATION	247 6053	310 6027	316 6022	316 6397	3076 6069	432 6002	432 6045	464 6003	464 6005	467 6363	467 6395	530 6005	540 6002	540 6006	544 6001	545 6019	552 6003	552 6005
	FL BS (CMP IN PLC)(TYD GR1-2)(FNAL POS)	PRIME COAT(MC-30 OR AE-P)	ASPH (CRS-2)	AGGR(TY-D GR-4 OR TY-L GR-4)	D-GR HMA TY-C SAC-B PG64-22 (EXEMPT)	RIPRAP (CONC) (5 IN)	RIPRAP (MOW STRIP) (4 IN)	RC PIPE (CL III) (18 IN)	RC PIPE (CL III) (24 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	DRIVEWAYS (ACP)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	WIRE FENCE (TY C)	GATE (TY 1)
	CY	GAL	GAL	CY	TON	CY	CY	LF	LF	EA	EA	SY	LF	EA	EA	EA	LF	EA
ROADWAY PLAN AND PROFILE																		
BEGIN TO STA 256+00	1,019	664	1,493	25	452	73	20	-	-	-	-	-	393.0	-	1	-	96	1
STA 256+00 TO STA 267+00	349	221	497	8	152	156	13	-	-	-	-	-	207.0	2	1	-	138	1
STA 267+00 TO STA 278+00	761	526	1,183	19	360	155	4	-	-	-	-	-	12.5	1	1	1	302	-
STA 278+00 TO END	694	474	1,067	18	322	57	-	-	-	-	-	-	-	-	-	-	-	-
PARK ROAD 14	164	112	252	4	76	-	-	-	-	-	-	-	-	-	-	-	-	-
COUNTY ROAD 338	155	105	237	4	71	-	-	-	-	-	-	-	-	-	-	-	326	1
ACCESS ROAD	-	-	-	-	-	-	-	66	-	2	-	1,081	-	-	-	-	-	-
DRIVEWAY NO. 2	-	-	-	-	-	-	-	-	72	-	2	149	-	-	-	-	-	-
DRIVEWAY NO. 3	-	-	-	-	-	-	-	-	38	-	2	68	-	-	-	-	-	-
PROJECT TOTALS	**3,142**	**2,102**	**4,729**	**78**	**1,433**	**441**	**37**	**66**	**110**	**2**	**4**	**1,298**	**612.5**	**3**	**3**	**1**	**862**	**3**

SUMMARY OF EARTHWORK QUANTITIES

STATION	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6006 EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY	CY
246+17.00	0	0	0
247+00.00	7	0	5
248+00.00	19	0	185
249+00.00	0	0	405
250+00.00	0	0	497
251+00.00	0	0	473
252+00.00	15	0	409
253+00.00	27	0	349
254+00.00	27	0	334
255+00.00	33	0	442
256+00.00	36	0	666
257+00.00	27	0	1,004
258+00.00	55	0	1,119
259+00.00	101	0	1,146
259+50.00	74	0	575
260+00.00	0	156	273
261+00.00	0	796	56
262+00.00	0	1,200	57
263+00.00	0	711	39
264+00.00	0	209	0
265+00.00	0	790	26

SUMMARY OF EARTHWORK QUANTITIES CONTINUED

STATION	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6006 EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY	CY
266+00.00	0	949	49
267+00.00	0	514	49
268+00.00	0	193	54
269+00.00	0	37	81
270+00.00	0	0	688
271+00.00	51	0	1,297
272+00.00	54	0	1,311
273+00.00	100	0	1,194
274+00.00	159	0	960
275+00.00	98	0	743
276+00.00	17	0	1,057
277+00.00	26	0	1,271
278+00.00	29	0	1,064
279+00.00	35	0	999
280+00.00	43	0	912
281+00.00	34	0	731
282+00.00	15	0	422
283+00.00	0	0	108
284+00.00	42	0	4
285+00.00	52	0	3
SH 236 TOTALS	**1,174**	**5,555**	**21,055**

SUMMARY OF EARTHWORK QUANTITIES CONTINUED

STATION	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6006 EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY	CY
PARK ROAD 14	4	0	869
COUNTY ROAD 338	124	0	954
DRWY01	2	0	0
DRWY02	9	0	265
DRWY03	16	0	27
CULVERT A	0	0	190
SIDE STREET AND DRIVEWAY TOTALS	**155**	**0**	**2,305**
PROJECT TOTALS	**1,329**	**5,555**	**23,360**

SUMMARY OF LAKE BELTON MITIGATION QUANTITIES

LOCATION	100 6001 PREPARING ROW	158 6006 SPEC EXCAV WORK (VEHICLE)	160 6006 FURNISHING AND PLACING TOPSOIL (3")	460 6001 CMP (GAL STL 12 IN)
	AC	CY	SY	LF
LAKE BELTON MITIGATION	7.1	19,712	14,970	50
PROJECT TOTALS	**7.1**	**19,712**	**14,970**	**50**

SUMMARY OF TRAFFIC CONTROL QUANTITIES

LOCATION	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)	6185 6003 TMA (MOBILE OPERATION)
	EA	DAY	HR
DETOUR SIGNING LAYOUT	2	10	120
PROJECT TOTALS	**2**	**10**	**120**

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

QUANTITY SUMMARY

SH 236 AT LEON RIVER

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	10
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 1004074.tbl
USER: KBERGER DATE: 3/30/2021 TIME: 1:56:01 PM SCALE: 1:1
FILE: SH236SUM01.dgn

SUMMARY OF RETAINING WALL QUANTITIES

LOCATION	420 6074	423 6001	432 6045	450 6003	(1) 556
	CL C CONC (MISC)	RETAINING WALL (MSE)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY T1W)	PIPE UNDERDRAINS (TY 6) (6")
	CY	SF	CY	LF	LF
RETAINING WALL LAYOUT					
RETAINING WALL A	-	2,389	7	250	570
RETAINING WALL B	-	167	1	-	-
RETAINING WALL C	-	579	2	50	90
RETAINING WALL D	5.6	5,710	13	495	463
RETAINING WALL E	-	162	1	-	-
RETAINING WALL F	5.6	4,596	9	354	380
PROJECT TOTALS	**11.2**	**13,603**	**33**	**1,149**	**1,503**

(1) FOR CONTRACTOR'S INFORMATION ONLY. PAYMENT SUBSIDIARY TO ITEM 423, RETAINING WALLS. INCLUDES PERFORATED PORTION WITHIN WALL LIMITS, NON-PERFORATED PORTION BETWEEN WALL AND OUTFALL, WYE CONNECTION, AND CL B RIPRAP FOR UNDERDRAIN OUTLET TO SIDE DITCH.

SUMMARY OF DRAINAGE QUANTITIES

LOCATION	432 6002	432 6033	464 6007	467 6423
	RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION) (18 IN)	RC PIPE (CL III) (30 IN)	SET (TY II) (30 IN) (RCP) (6: 1) (P)
	CY	CY	LF	EA
CULVERT LAYOUT				
CULVERT A	21	76	34	-
CULVERT B	-	-	89	2
PROJECT TOTALS	**21**	**76**	**123**	**2**

SUMMARY OF SW3P QUANTITIES

LOCATION	160 6003	164 6035	164 6071	168 6001	169 6001	506 6002	506 6011	506 6020	506 6024	506 6038	506 6039
	FURNISHING AND PLACING TOPSOIL (4")	DRILL SEEDING (PERM) (RURAL) (CLAY)	BROADCAST SEED (TEMP) (WARM OR COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	MG	SY	LF	LF	SY	SY	LF	LF
SW3P LAYOUT											
BEGIN TO STA 256+00	6,407	6,407	6,407	105	361			112	112	2,059	2,059
STA 256+00 TO STA 267+00	6,434	6,434	6,434	105	70					2,760	2,760
STA 267+00 TO STA 278+00	8,507	8,507	8,507	139	334	192	192			2,134	2,134
STA 278+00 TO END	5,118	5,118	5,118	84	185			112	112	1,440	1,440
PROJECT TOTALS	**26,466**	**26,466**	**26,466**	**433**	**950**	**192**	**192**	**224**	**224**	**8,393**	**8,393**

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QUANTITY SUMMARY

SH 236 AT LEON RIVER

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	11
CONTROL	SECTION	JOB	
0513	01	017	

SUMMARY OF SIGNING QUANTITIES

LOCATION	644 6001	644 6004	644 6033	644 6066	658 6014	658 6062
	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	IN SM RD SN SUP&AM TY10BWG(1) SA(T)	IN SM RD SN SUP&AM TYS80(1) SA(U)	IN SM RD SN SUP&AM (RAIL MOUNT)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI)
	EA	EA	EA	EA	EA	EA
SIGNING AND PAVEMENT MARKING LAYOUT						
BEGIN TO STA 267+00	4	-	-	6	18	9
STA 267+00 TO END	6	3	1	9	14	2
PROJECT TOTALS	**10**	**3**	**1**	**15**	**32**	**11**

SUMMARY OF PAVEMENT MARKING QUANTITIES

LOCATION	533 6001	533 6002	666 6048	666 6224	666 6303	666 6315	672 6009	678 6001
	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	PAVEMENT SEALER 4"	RE PM W/RET REQ TY I (W)4"(SLD) (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")
	LF	LF	LF	LF	LF	LF	EA	LF
SIGNING AND PAVEMENT MARKING LAYOUT								
BEGIN TO STA 267+00	2,346	1,083	-	3,080	4,166	4,166	52	3,080
STA 267+00 TO END	2,405	1,069	75	1,280	3,350	3,232	40	1,280
PROJECT TOTALS	**4,751**	**2,152**	**75**	**4,360**	**7,516**	**7,398**	**92**	**4,360**

SUMMARY OF BRIDGE QUANTITIES

LOCATION	400 6005	416 6004	416 6005	420 6014	420 6030	420 6038	422 6001	422 6015	425 6038	425 6041	432 6001	450 6003	454 6018
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (TX46)	PRESTR CONC GIRDER (TX70)	RIPRAP (CONC) (4 IN)	RAIL (TY T1W)	SEALED EXPANSION JOINT (4IN) (SEJ-M)
	CY	LF	LF	CY	CY	CY	SF	CY	LF	LF	CY	LF	LF
LEON RIVER BRIDGE	110	1,016	294	29.0	143.0	39.0	33,600	48.0	3,582.63	598.00	4	2,100.0	156
PROJECT TOTALS	**110**	**1,016**	**294**	**29.0**	**143.0**	**39.0**	**33,600**	**48.0**	**3,582.63**	**598.00**	**4**	**2,100.0**	**156**

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Texas Department of Transportation

QUANTITY SUMMARY

SH 236 AT LEON RIVER

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	12
CONTROL	SECTION	JOB	
0513	01	017	

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
153	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36	X		10 BWG	1	SA	P		
	2	W1-2aR	COMBINATION HORIZONTAL CURVE RIGHT AND 60 M.P.H	36x36	X		10 BWG	1	SA	P		
	3	M2-1	JUNCTION	21x15	X		10 BWG	1	SA	P		
		M1-6T	PARK ROAD 14	24x24								
	4	R2-1	SPEED LIMIT 65	30x36	X		10 BWG	1	SA	P		
	5	M3-1	NORTH	24x12	X		SCH 80	1		P	RAIL MOUNT	
		M1-6T	236 TEXAS	24x24	X							
		D10-7aT	368	3x10	X							
		D10-7aT	368	3x10	X							
	6	I-3	LEON RIVER	24x18	X		SCH 80	1		P	RAIL MOUNT	
	7	W1-2aL	COMBINATION HORIZONTAL CURVE LEFT AND 40 M.P.H.	36x36	X		SCH 80	1		P	RAIL MOUNT	
	8	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	9	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	10	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
154	1	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	2	D7-2TL	MOTHER NEFF STATE PARK	78x24	X		SCH 80	1		T	RAIL MOUNT	
	3	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	4	I-3	LEON RIVER	24x18	X		SCH 80	1		P	RAIL MOUNT	
	5	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	6	D20-1TR	CO RD 338	24x24	X		SCH 80	1		U	RAIL MOUNT	
	7	W1-8L	CHEVRON ALIGNMENT (LEFT)	18x24	X		SCH 80	1		P	RAIL MOUNT	
		W1-8R	CHEVRON ALIGNMENT (RIGHT)	18x24	X							
	8	W1-2aR	COMBINATION HORIZONTAL CURVE RIGHT AND 40 M.P.H.	36x36	X		SCH 80	1		P	RAIL MOUNT	
	9	M1-6T	PARK ROAD 14	24x24	X		SCH 80	1		U	RAIL MOUNT	
		M6-1	DIRECTIONAL ARROW LEFT	21x15	X							
	10	R1-1	STOP	36x36	X		10 BWG	1	SA	T		
	11	M1-6T	PARK ROAD 14	24x24	X		10 BWG	1	SA	P		
		D10-7aT	548	3x10	X							
		D10-7aT	548	3x10	X							
	12	M3-1	NORTH	24x12	X		SCH 80	1	SA	U		
		M1-6T	236 TEXAS	24x24	X							
		M6-1	DIRECTIONAL ARROW LEFT	21x15	X							
		M3-1	SOUTH	24x12	X							
		M1-6T	236 TEXAS	24x24	X							
		M6-1	DIRECTIONAL ARROW RIGHT	21x15	X							

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

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

http://www.txdot.gov/

NOTE:

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

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Cwatanaphol, P.E.

SHEET 1 OF 2

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
4-16	DIST	COUNTY		SHEET NO.
8-16	WACO	CORYELL		13

18

DATE: 8/3/2020 10:58:40 AM
FILE: c:\pwworking\central01\dms70062\sums16-01.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = 1.12 #/ft Wing WC = Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	Extruded Wind Beam; Extruded Alum Sign Panels	TY N TY S
154	13	M1-6T	PARK ROAD 14	24x24	X		10 BWG	1	SA	P		
		M6-1	DIRECTIONAL ARROW RIGHT	21x15	X							
	14	R1-1	STOP	36x36	X		10 BWG	1	SA	T		
	15	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36	X		10 BWG	1	SA	P		
	16	M3-1	NORTH	24x12	X		10 BWG	1	SA	P		
		M1-6T	236 TEXAS	24x24	X							
	17	D20-1TL	CO RD 338	24x24	X		10 BWG	1	SA	P		
	18	D7-2TR	MOTHER NEFF STATE PARK	72x24	X		10 BWG	1	SA	T		
	19	R2-1	SPEED LIMIT 65	30x36	X		10 BWG	1	SA	P		

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

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

STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Chatanaphol, P.E.

SHEET 2 OF 2

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
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512.685.2900

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
4-16	DIST	COUNTY		SHEET NO.
8-16	WACO	CORYELL		14

18

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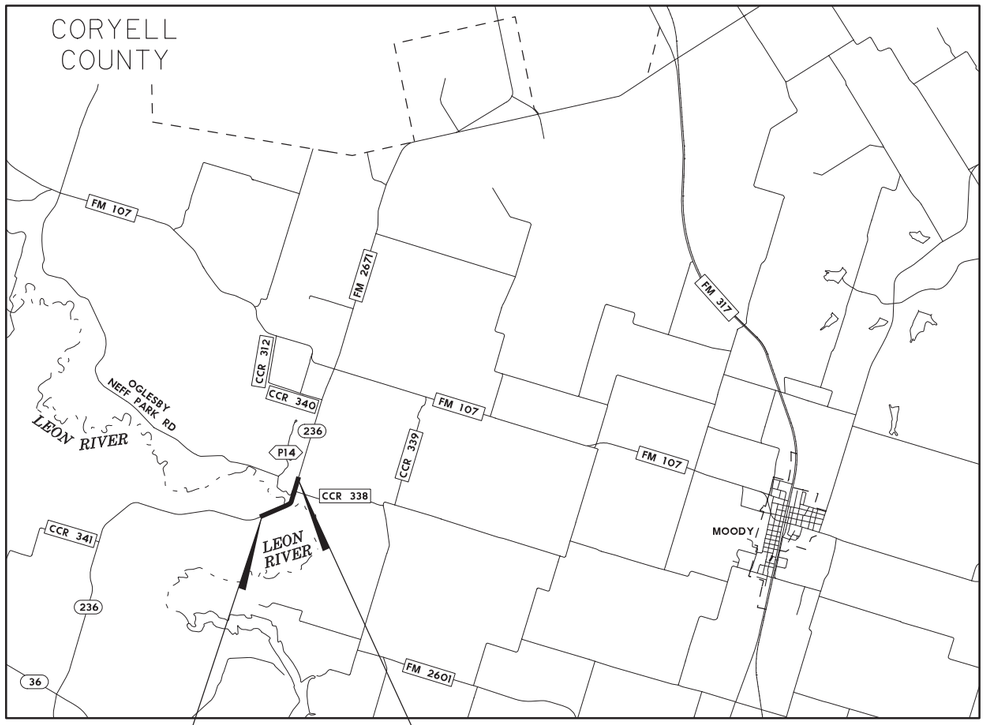

VICINITY MAP
NOT TO SCALE

SIGNS G20-6T, G20-2, G20-2bT, CW20-3C, CW20-3B, R11-2, R20-3T, G20-10T, R20-5T, G20-9TP AND R20-5aTP WILL BE REQUIRED AT PROJECT LIMITS.

SIGNS CW20-3C, CW20-3B, AND R11-2 WILL BE REQUIRED AT ALL CROSSROADS WITHIN PROJECT LIMITS.

SEE "DETOUR LAYOUT" SHEET AND WZ(RCD) STANDARD SHEET FOR SIGNS R11-3A MOUNTED ON A TYPE III BARRICADE REQUIRED AT THE SH 236 AND SH 36 INTERSECTION AND THE SH 236 AND FM 107 INTERSECTION.

SEE "DETOUR LAYOUT" SHEET FOR TYPE III BARRICADE LOCATIONS AND ADDITIONAL DETOUR SIGNAGE REQUIRED.

SIGNAGE LEGEND		
G20-6T	(48X30)	- NAME, ADDRESS, CITY, STATE, CONTRACTOR
G20-2	(48X24)	- END ROAD WORK
G20-2bT	(36X30)	- END WORK ZONE
G20-9TP	(36X30)	- BEGIN WORK ZONE
G20-10T	(60X48)	- STAY ALERT TALK OR TEXT LATER
CW20-3C	(48X48)	- ROAD CLOSED 500 FT
CW20-3B	(48X48)	- ROAD CLOSED 1000 FT
R11-2	(48X30)	- ROAD CLOSED
R11-3a	(60X30)	- ROAD CLOSED - LOCAL TRAFFIC ONLY
R20-3T	(48X42)	- OBEY WARNING SIGNS STATE LAW
R20-5T	(36X36)	- TRAFFIC FINES DOUBLE
R20-5aTP	(36X18)	- WHEN WORKERS ARE PRESENT

TRAFFIC CONTROL PLAN GENERAL NOTES:

1. INSTALL ALL SIGNS, BARRICADES, AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH THE STANDARD BC SHEETS AND AS DIRECTED. SIGNS MAY BE ADJUSTED DUE TO FIELD CONDITIONS AND SAFETY TO THE TRAVELING PUBLIC.
2. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM WITH THE LATEST EDITION OF THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND SHALL BE MAINTAINED AS DIRECTED BY THE ENGINEER. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.
3. ADDITIONAL SIGNS, BARRICADES, OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES, OR TRAFFIC CONTROL DEVICES WILL BE CONSIDERED SUBSIDIARY TO THE ITEM 502, "BARRICADES, SIGNS AND TRAFFIC HANDLING".
4. WORK SITES WILL BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN, AND IN GOOD REPAIR.
5. ACCESS TO ALL PRIVATE PROPERTY SHOULD TO THE GREATEST EXTENT POSSIBLE BE MAINTAINED AT ALL TIMES AND ALL WEATHER CONDITIONS AT THE SOLE EXPENSE OF THE CONTRACTOR. CONTACT THE PROPERTY OWNER AT LEAST 5 DAYS IN ADVANCE OF DRIVEWAY CONSTRUCTION. IF THE PROPERTY OWNER HAS MORE THAN ONE DRIVEWAY, CONSTRUCTION WILL ONLY BE PERMITTED ON ONE DRIVEWAY AT A TIME. DRIVEWAY GRADES DURING CONSTRUCTION SHOULD NOT EXCEED 15%. ADJUST CONSTRUCTION ACTIVITIES ACCORDINGLY TO NOT EXCEED MAXIMUM GRADE LIMITS. PROVIDE ADEQUATE TEMPORARY SURFACING FOR TRANSITIONS BETWEEN PAVEMENT ELEVATIONS FOR ALL DRIVEWAYS.
6. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF OPERATION.
7. COMPLETE ALL WORK ON THE PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.
8. ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OR TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR HIS WRITTEN APPROVAL.
9. NO EQUIPMENT OR MATERIALS SHALL BE STORED WITHIN THE CLEAR ZONE UNLESS OTHERWISE APPROVED.

SEQUENCE OF OPERATION

1. SET PROJECT BARRICADES AND DETOUR SIGNAGE.
2. INSTALL REQUIRED TEMPORARY EROSION CONTROL DEVICES, AS DIRECTED.
3. REMOVE EXISTING BRIDGE.
4. CONSTRUCT NEW BRIDGE AND ROADWAY APPROACHES.
5. PLACE PERMANENT SIGNAGE AND PAVEMENT MARKINGS.
6. COMPLETE ALL OTHER WORK AS SHOWN ON THE PLANS.
7. CLEAN UP PROJECT AND REMOVE TEMPORARY EROSION CONTROL DEVICES, PROJECT BARRICADES, AND DETOUR SIGNAGE.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

TRAFFIC CONTROL AND SEQUENCE OF CONSTRUCTION
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	15
0513	01	017	

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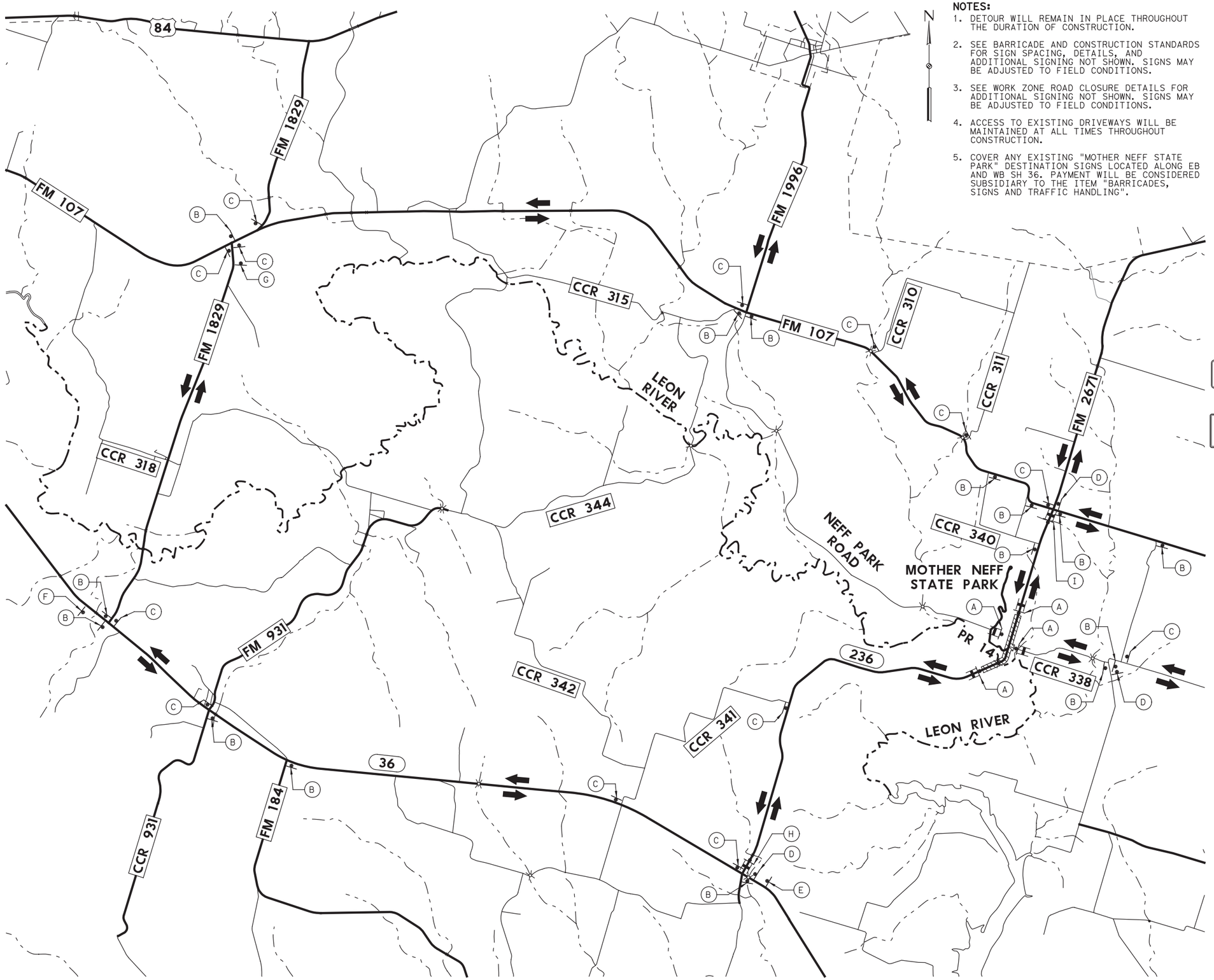


NOTES:

1. DETOUR WILL REMAIN IN PLACE THROUGHOUT THE DURATION OF CONSTRUCTION.
2. SEE BARRICADE AND CONSTRUCTION STANDARDS FOR SIGN SPACING, DETAILS, AND ADDITIONAL SIGNING NOT SHOWN. SIGNS MAY BE ADJUSTED TO FIELD CONDITIONS.
3. SEE WORK ZONE ROAD CLOSURE DETAILS FOR ADDITIONAL SIGNING NOT SHOWN. SIGNS MAY BE ADJUSTED TO FIELD CONDITIONS.
4. ACCESS TO EXISTING DRIVEWAYS WILL BE MAINTAINED AT ALL TIMES THROUGHOUT CONSTRUCTION.
5. COVER ANY EXISTING "MOTHER NEFF STATE PARK" DESTINATION SIGNS LOCATED ALONG EB AND WB SH 36. PAYMENT WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "BARRICADES, SIGNS AND TRAFFIC HANDLING".

LEGEND

- CONSTRUCTION AREA
- TYPE III BARRICADE
- PROPOSED TEMPORARY SIGN
- PROPOSED TRAFFIC FLOW

A: 500′ | 500′

- ROAD CLOSED — R11-2 — NAME ADDRESS CITY STATE CONTRACTOR — G20-6T
- ROAD CLOSED 500 FT — CW20-3C
- ROAD CLOSED 1000 FT — CW20-3B
- B: 236 TEXAS — M1-6T; DETOUR ⇦ — M4-9L
- C: 236 TEXAS — M1-6T; DETOUR ⇨ — M4-9R
- D: 236 TEXAS — M1-6T
- E: DETOUR ⇧ — M4-9S; Mother Neff State Park
- F: DETOUR ⇦ — M4-9L; Mother Neff State Park
- G: DETOUR ⇨ — M4-9R; Mother Neff State Park
- H: ROAD CLOSED 5 MILES AHEAD LOCAL TRAFFIC ONLY — R11-3a
- I: ROAD CLOSED 2 MILES AHEAD LOCAL TRAFFIC ONLY — R11-3a

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS — PHAISARN CWATANAPHOL — 89252 — LICENSED PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

DETOUR SIGNING LAYOUT

SH 236 AT LEON RIVER

NOT TO SCALE — SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	16
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 10:58:50 AM SCALE: 1:6000
FILE: SH236DETOI.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

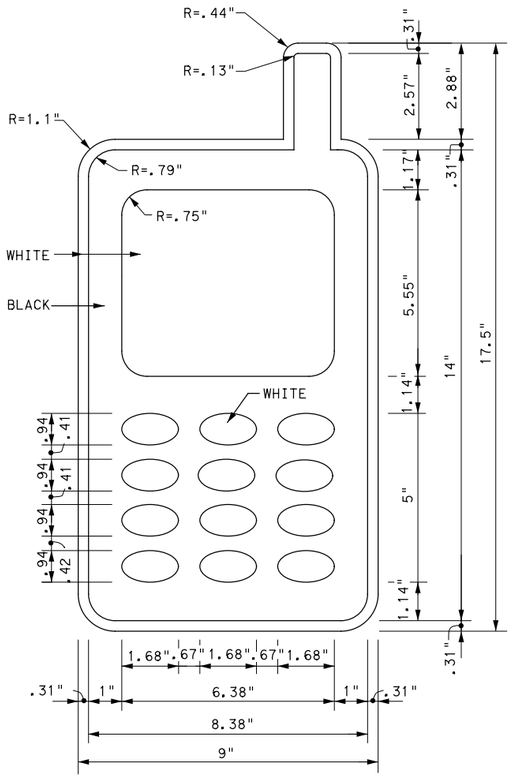
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

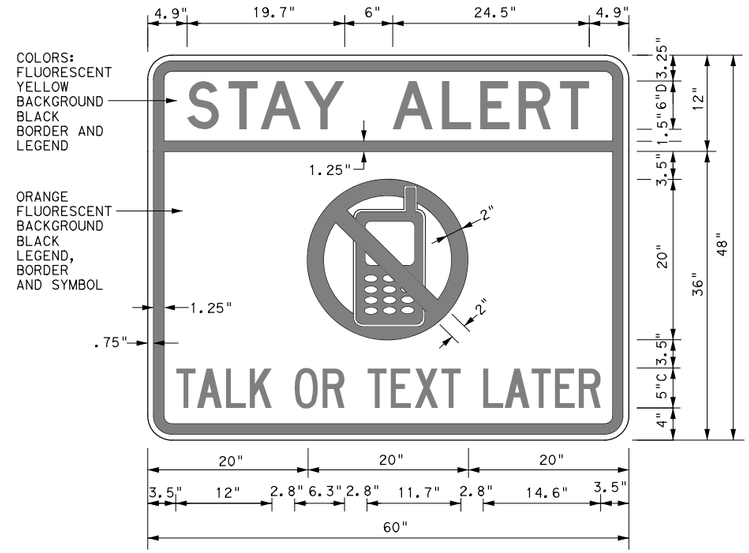
12. The Engineer has the final decision on the location of all traffic control devices.

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

WORKER SAFETY APPAREL NOTES:

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





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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 5-10 8-14 9-07 7-13	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		17

DATE: 8/3/2020 10:58:53 AM
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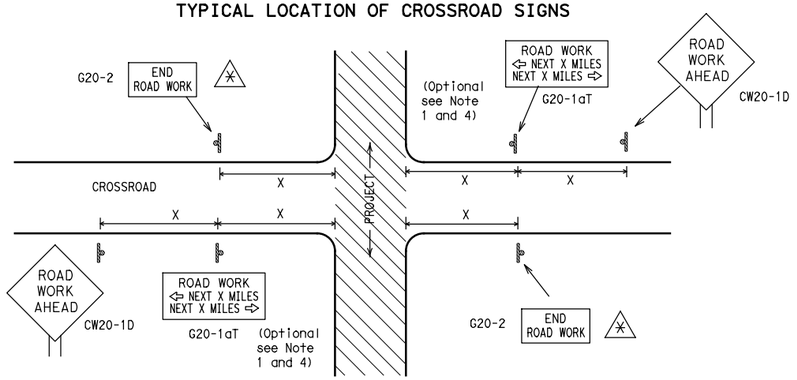
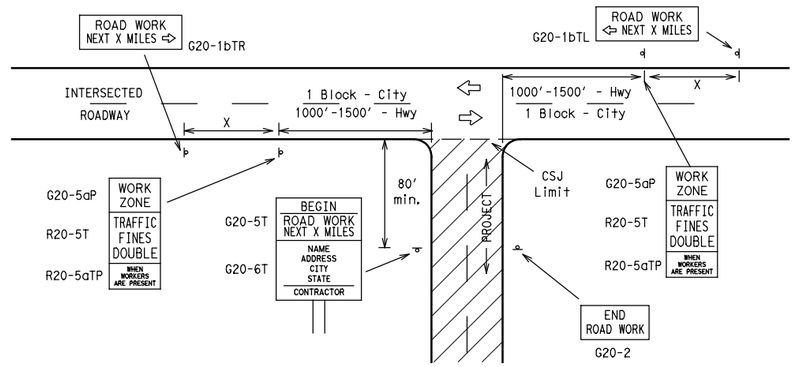
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

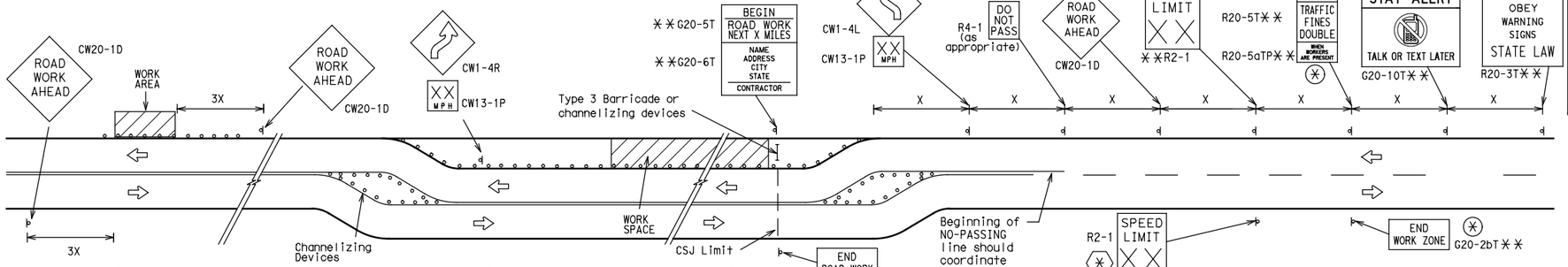
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

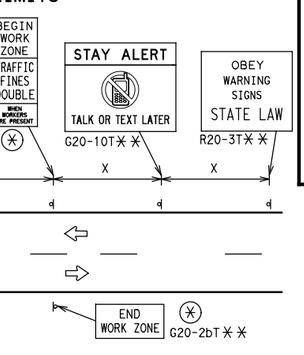
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

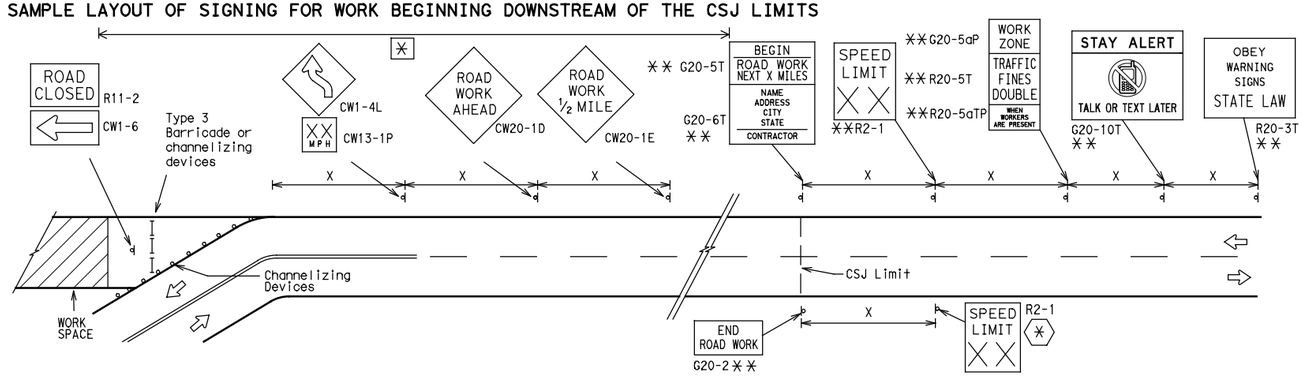


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

✳✳ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

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

(✳) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	WACO	CORYELL		18

DATE: 8/3/2020 10:58:54 AM
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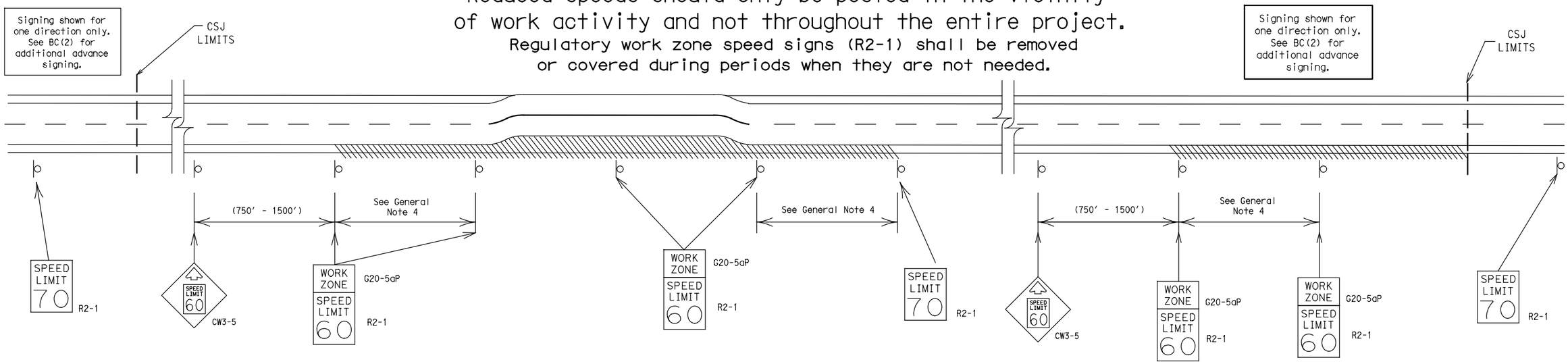
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled way.

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		19

DATE: 8/3/2020 10:58:56 AM
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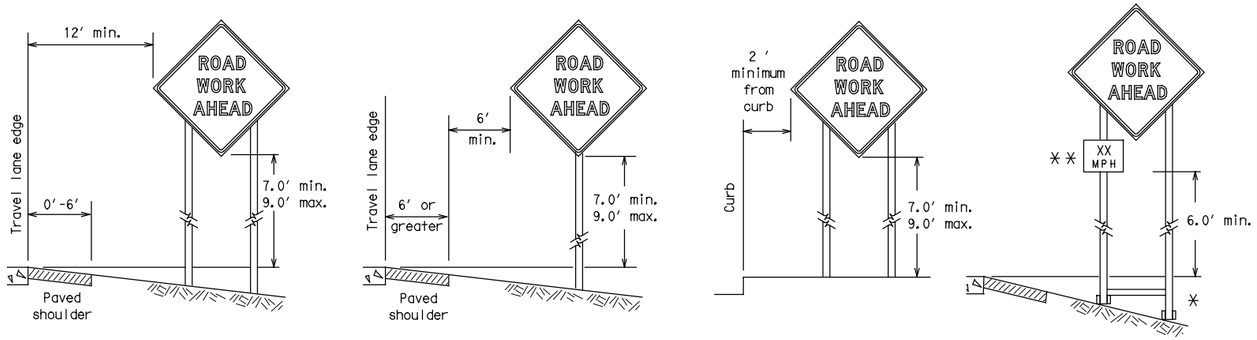
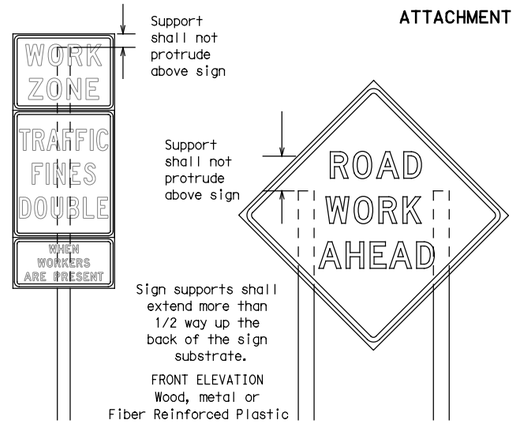
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



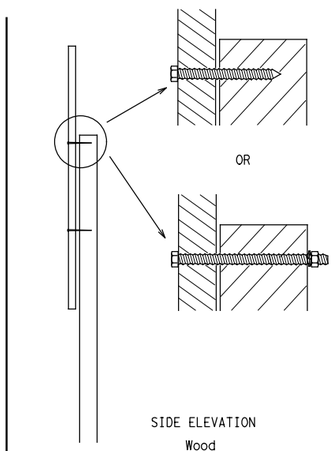
⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

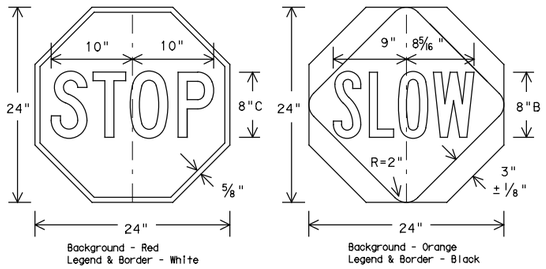


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		20

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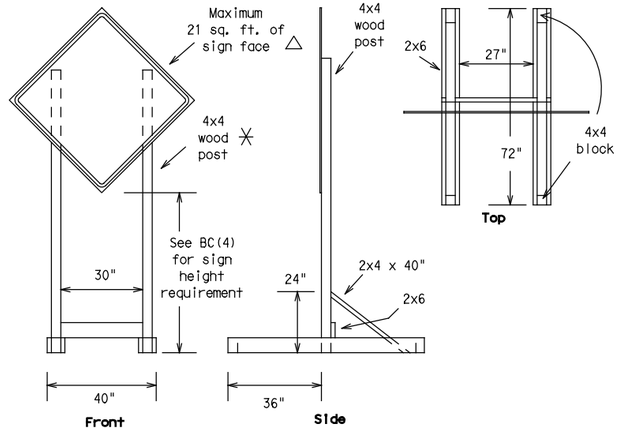
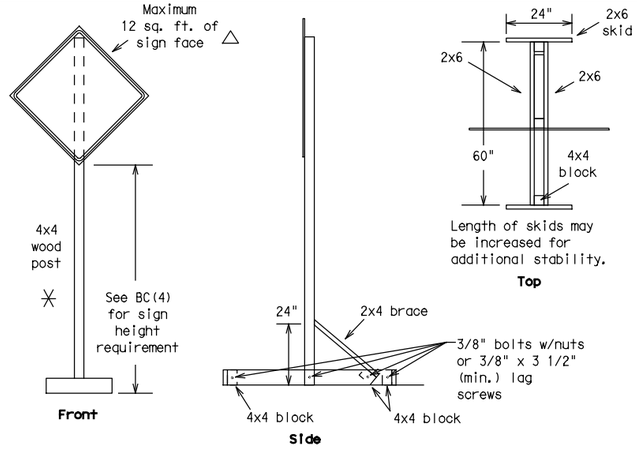
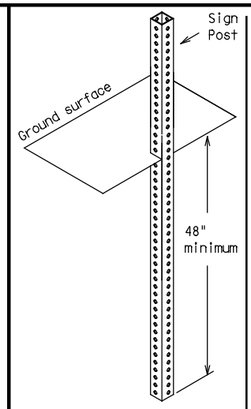
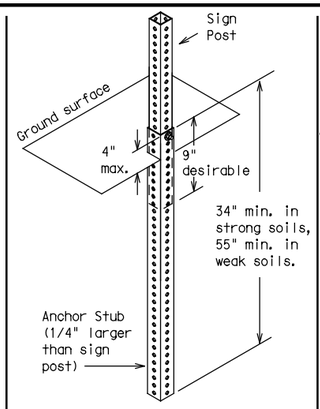


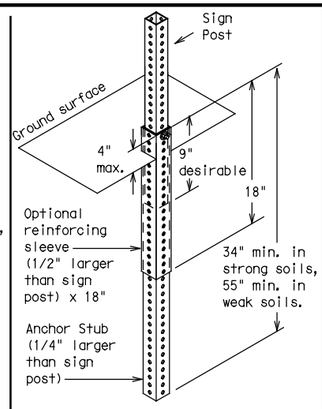


SKID MOUNTED WOOD SIGN SUPPORTS

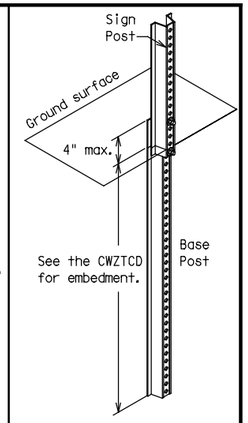
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □







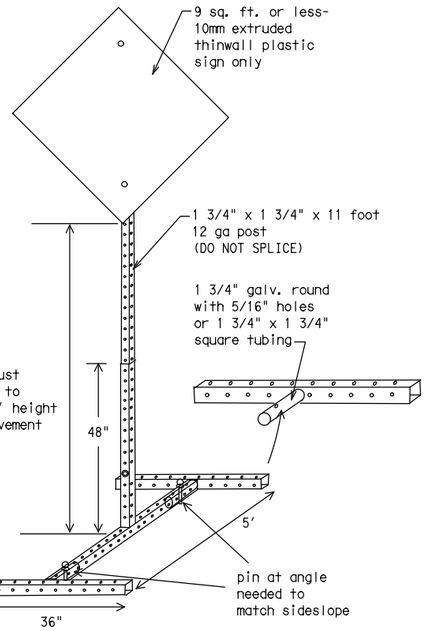
PERFORATED SQUARE METAL TUBING

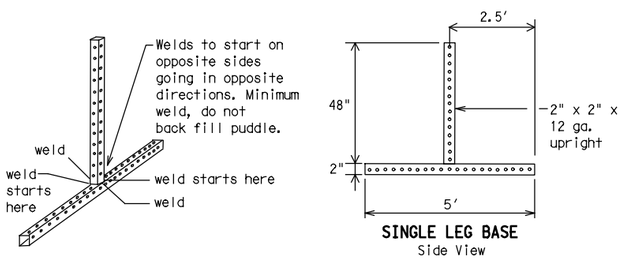


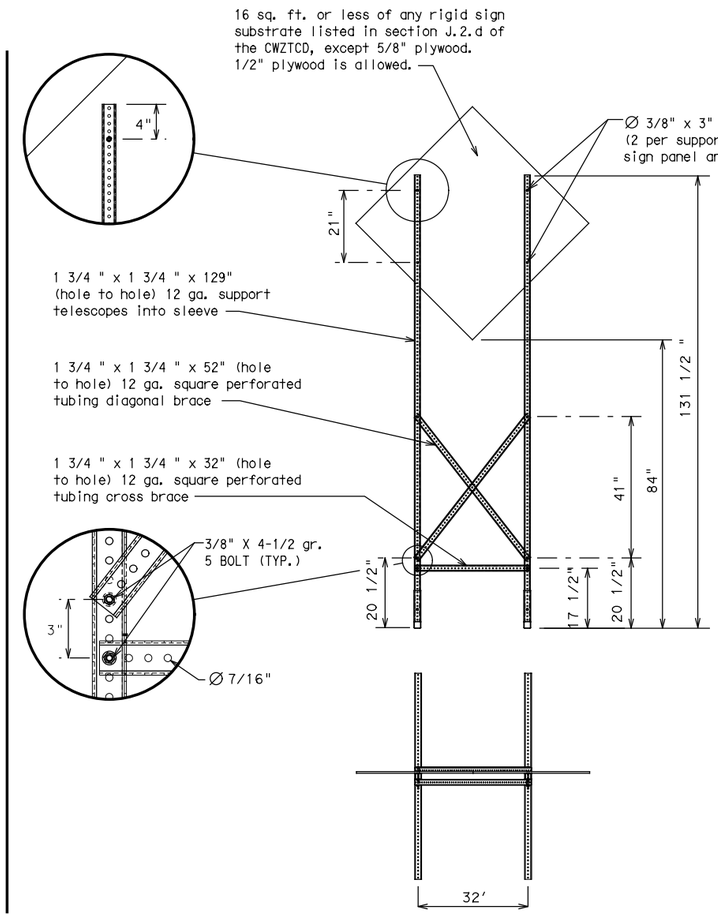
WING CHANNEL
Lap-splice/base bolted anchor

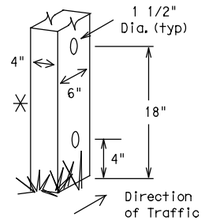
GROUND MOUNTED SIGN SUPPORTS

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



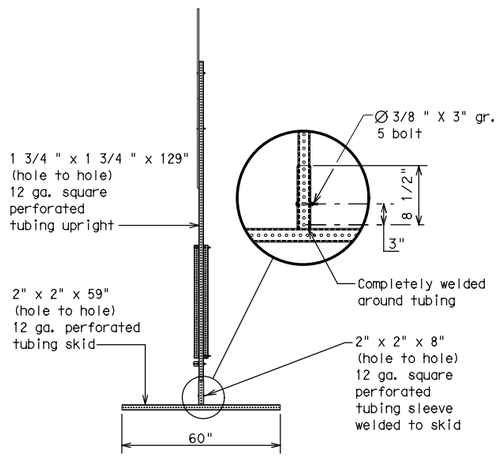






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0513	01	017	SH236
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	WACO	CORYELL		21

DATE: 8/3/2020 10:59:01 AM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	WACO	CORYELL		22

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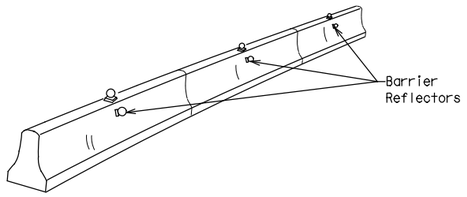
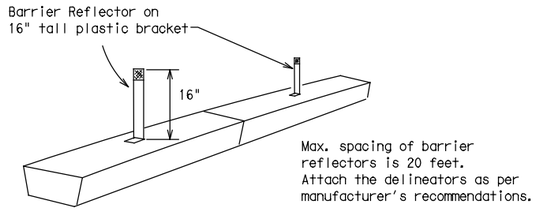
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

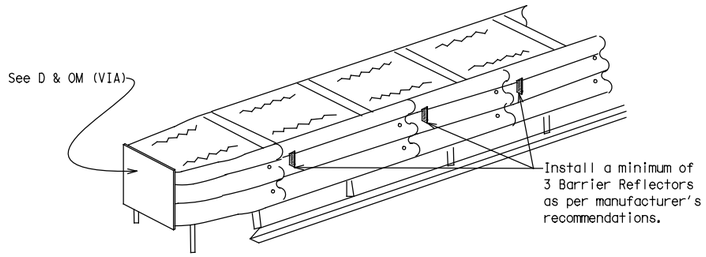


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

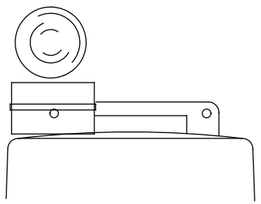


DELINEATION OF END TREATMENTS

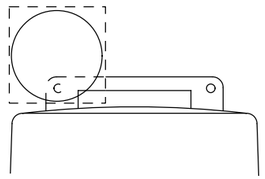
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

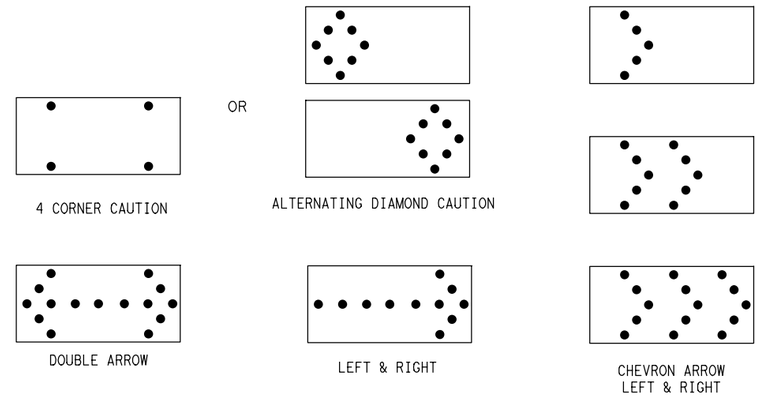
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0513	01	017	SH236
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	WACO	CORYELL		23

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

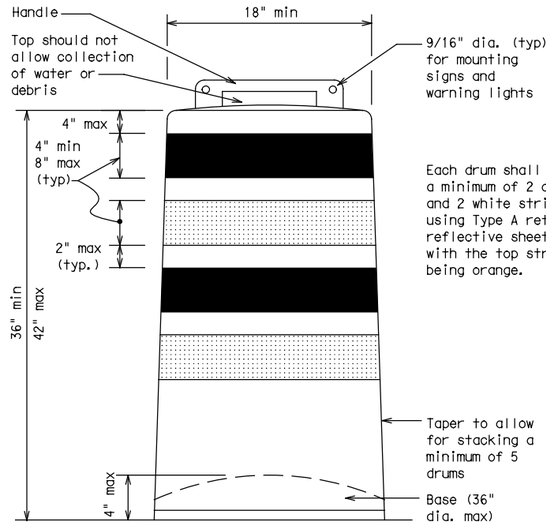
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

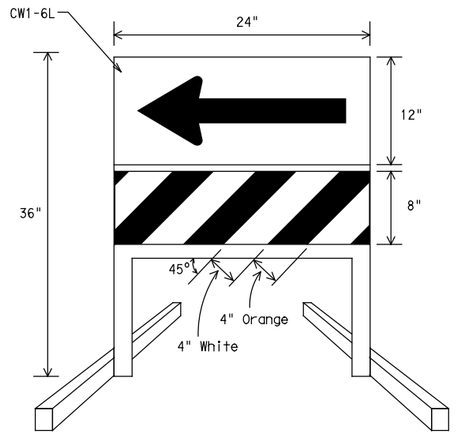
RETROREFLECTIVE SHEETING

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

BALLAST

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

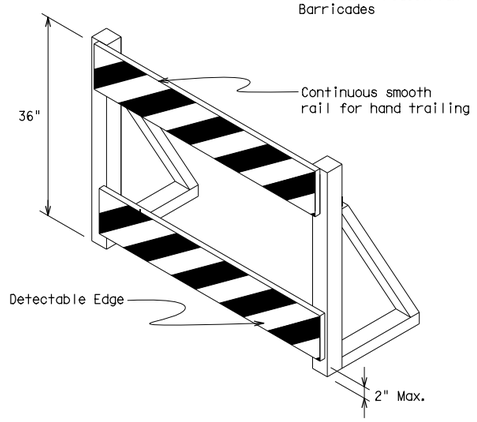




DIRECTION INDICATOR BARRICADE

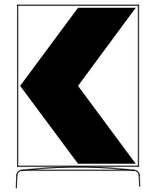
1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3.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

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

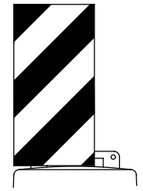


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0513	01	017	SH236
4-03 7-13	DIST	COUNTY		SHEET NO.
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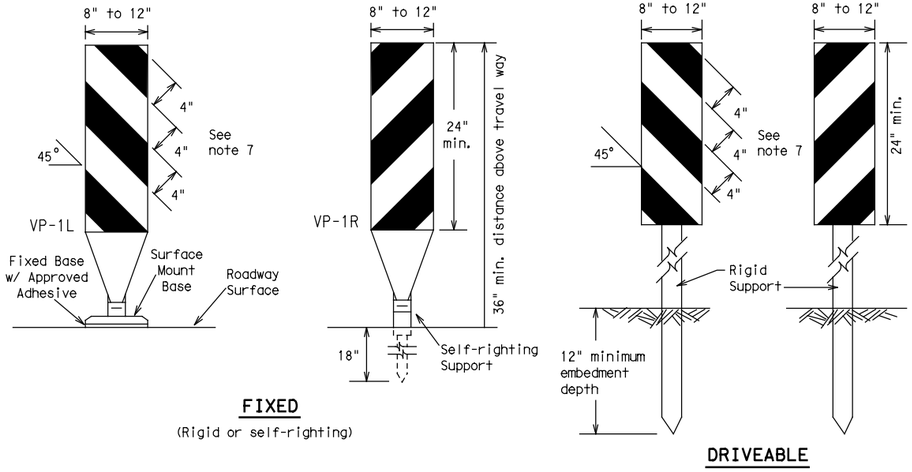
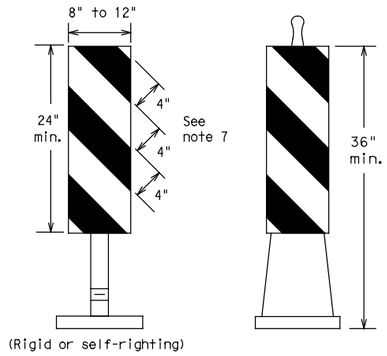


FIXED
(Rigid or self-righting)

DRIVEABLE

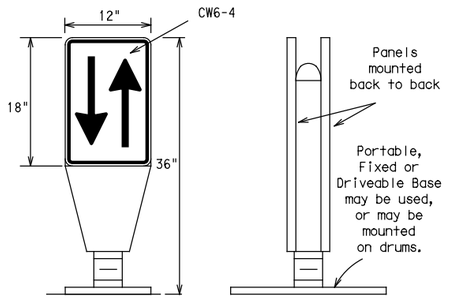


(Rigid or self-righting)

PORTABLE

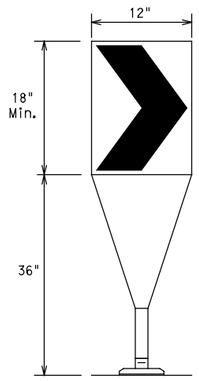
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



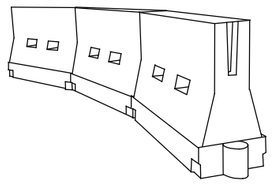
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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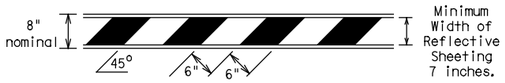
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		25

103

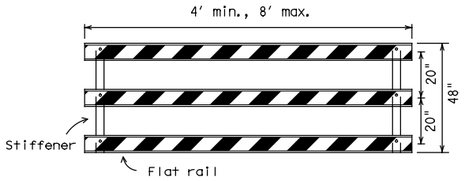
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



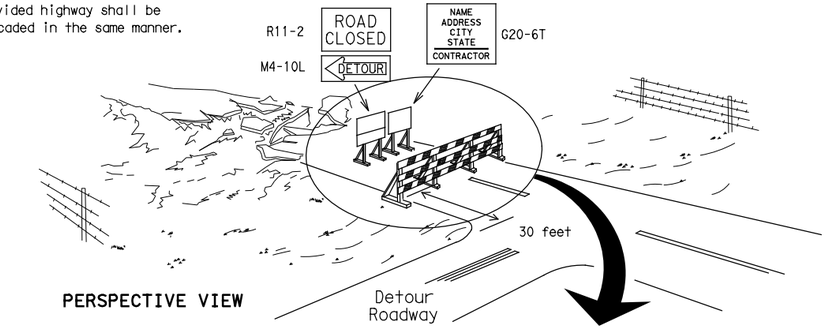
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

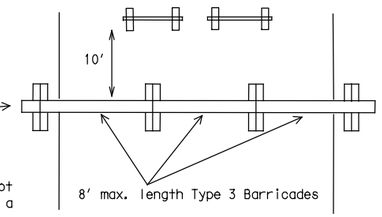
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

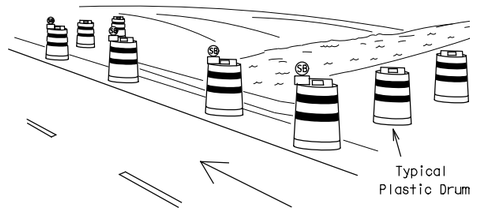
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

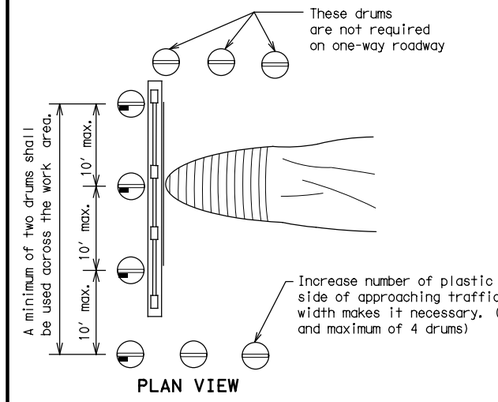
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

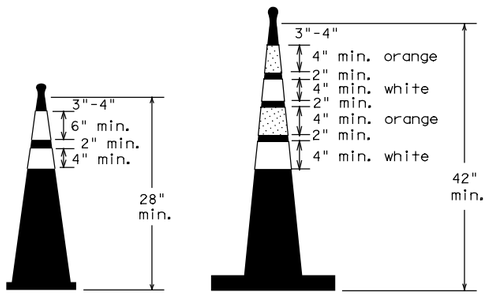
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

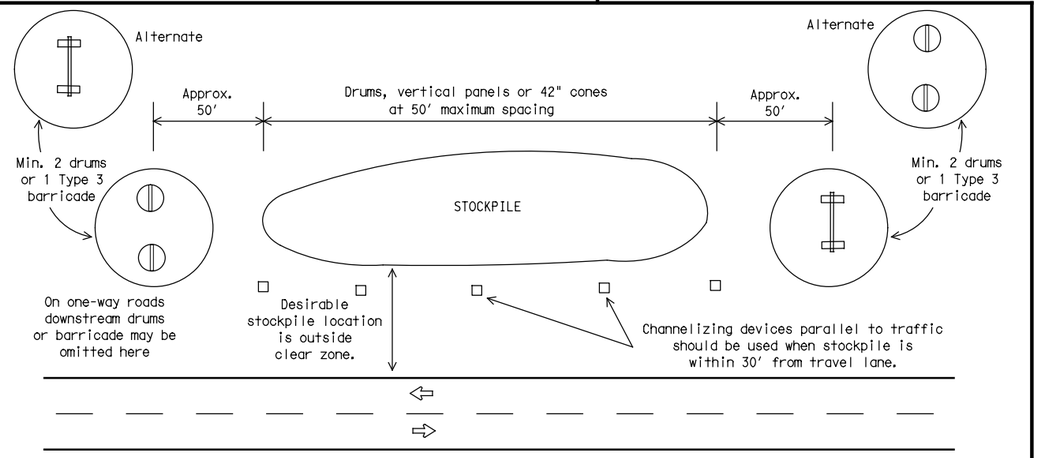
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

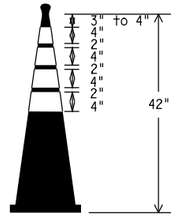
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	WACO	CORYELL		26

DATE: 8/3/2020 10:59:10 AM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

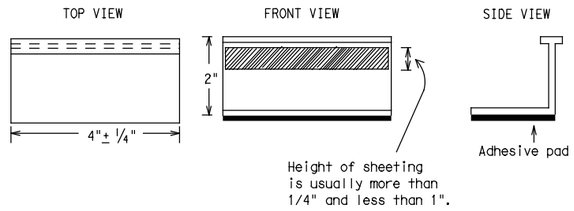
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	WACO	CORYELL		27
11-02 8-14				

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DATE: 8/3/2020 10:59:12 AM
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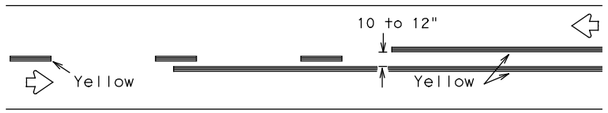
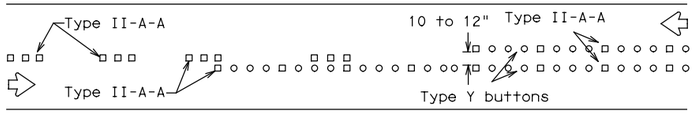
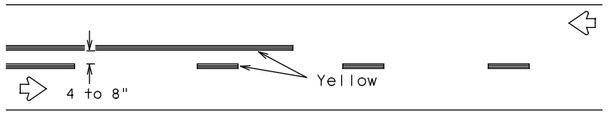
PAVEMENT MARKING PATTERNS



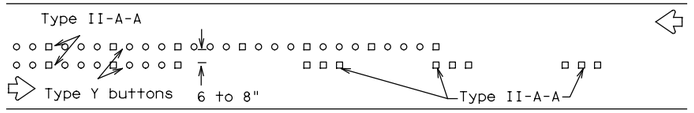
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



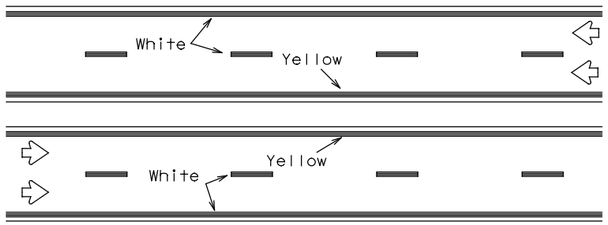
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



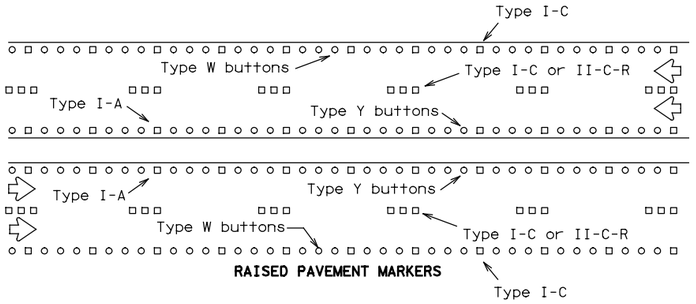
RAISED PAVEMENT MARKERS - PATTERN B

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

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



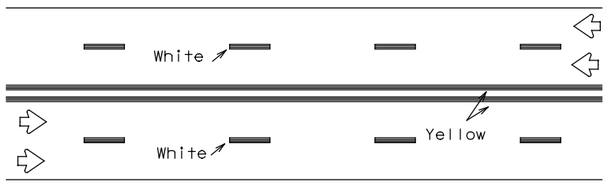
REFLECTORIZED PAVEMENT MARKINGS



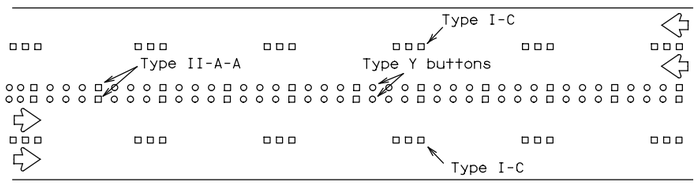
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



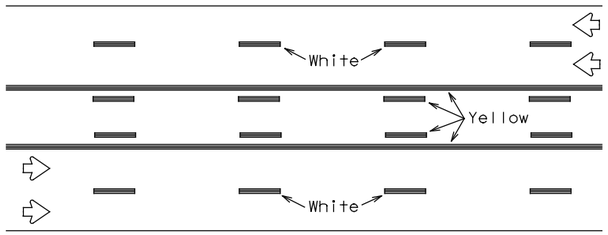
REFLECTORIZED PAVEMENT MARKINGS



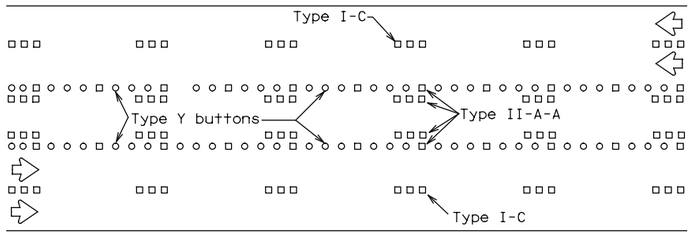
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

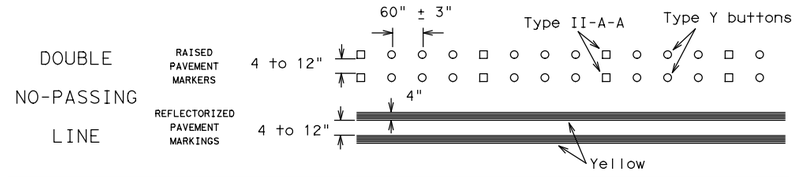
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

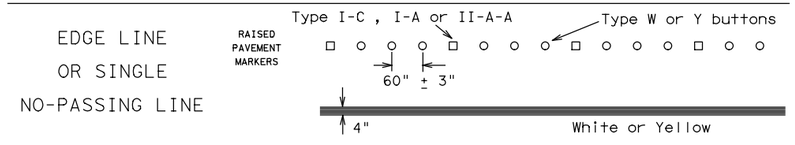
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

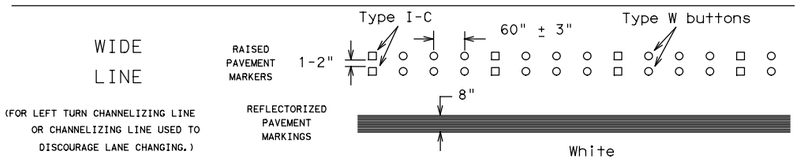


EDGE LINE OR SINGLE NO-PASSING LINE



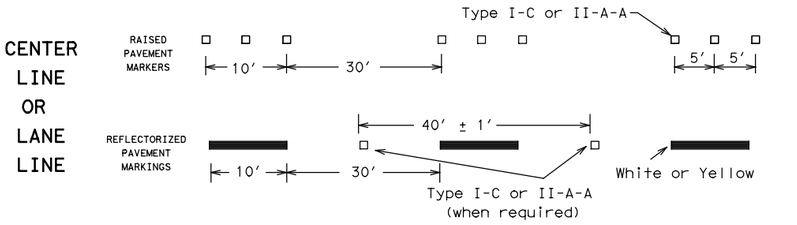
WIDE LINE

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

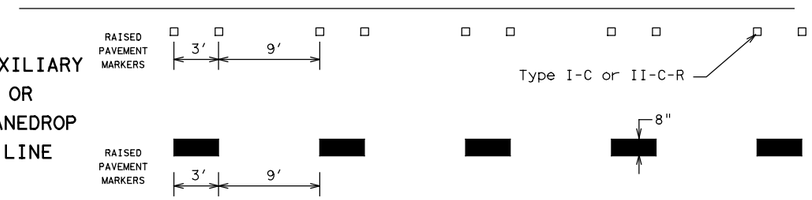


BROKEN LINES

CENTER LINE OR LANE LINE

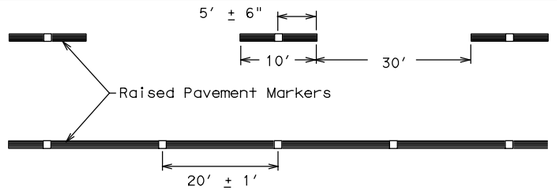


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

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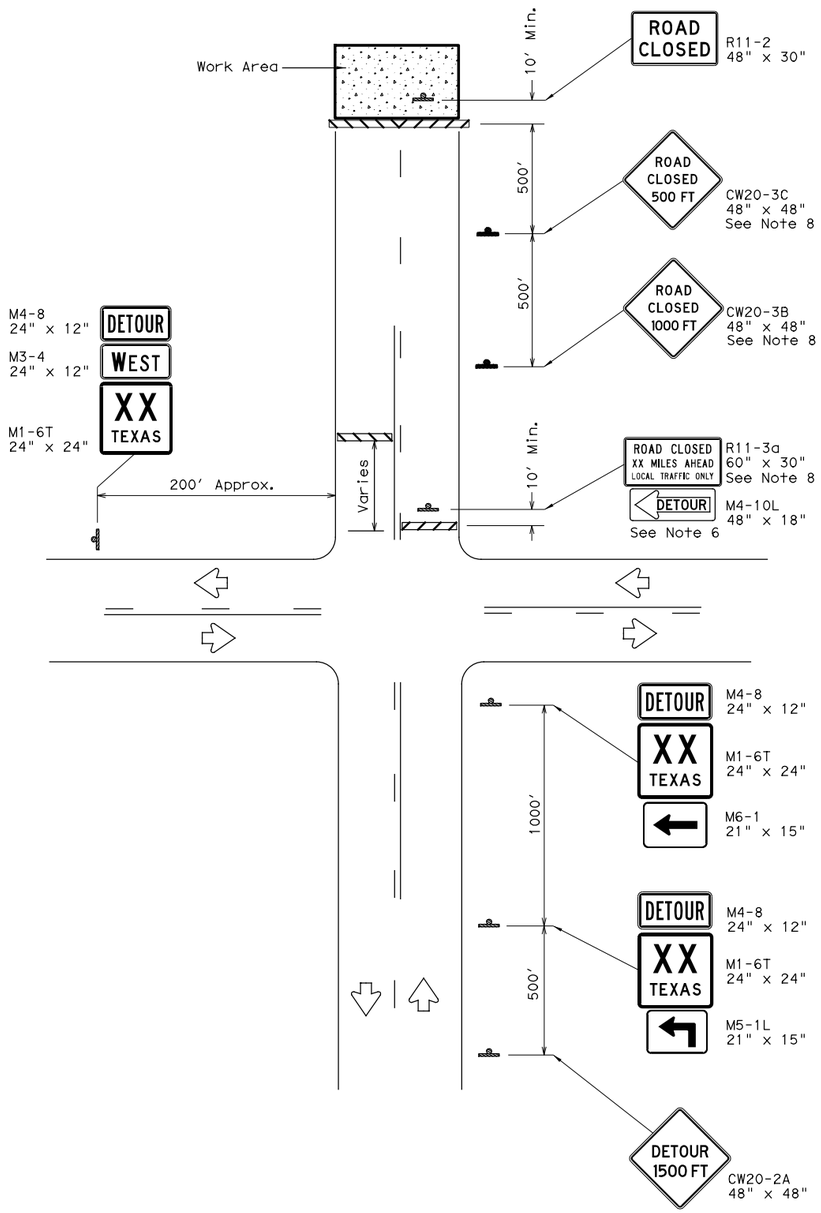
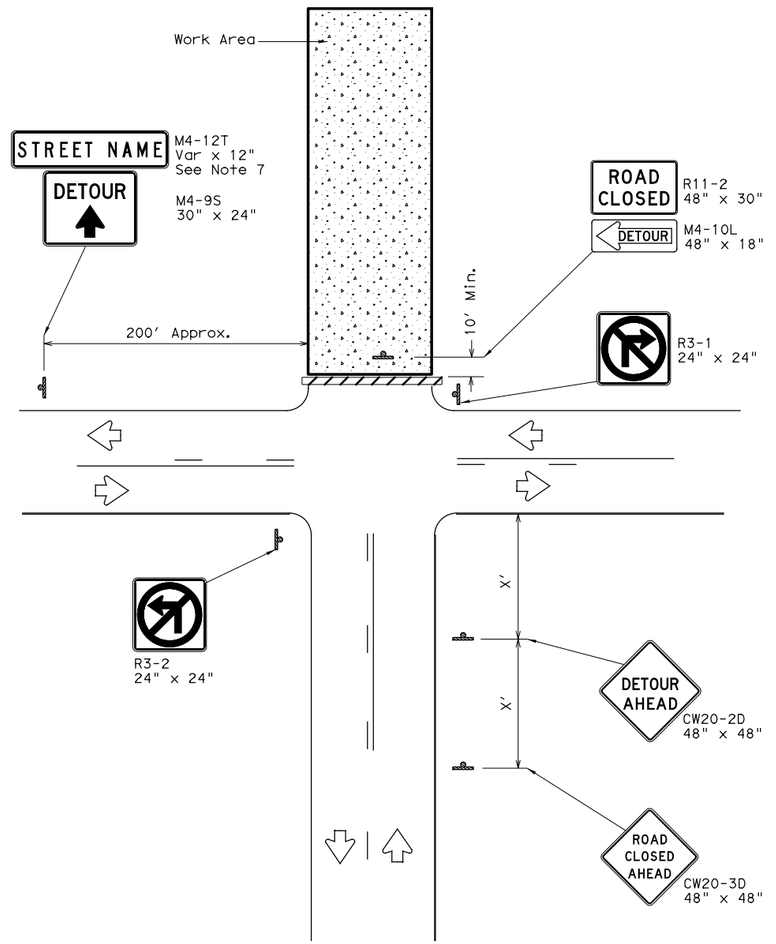


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

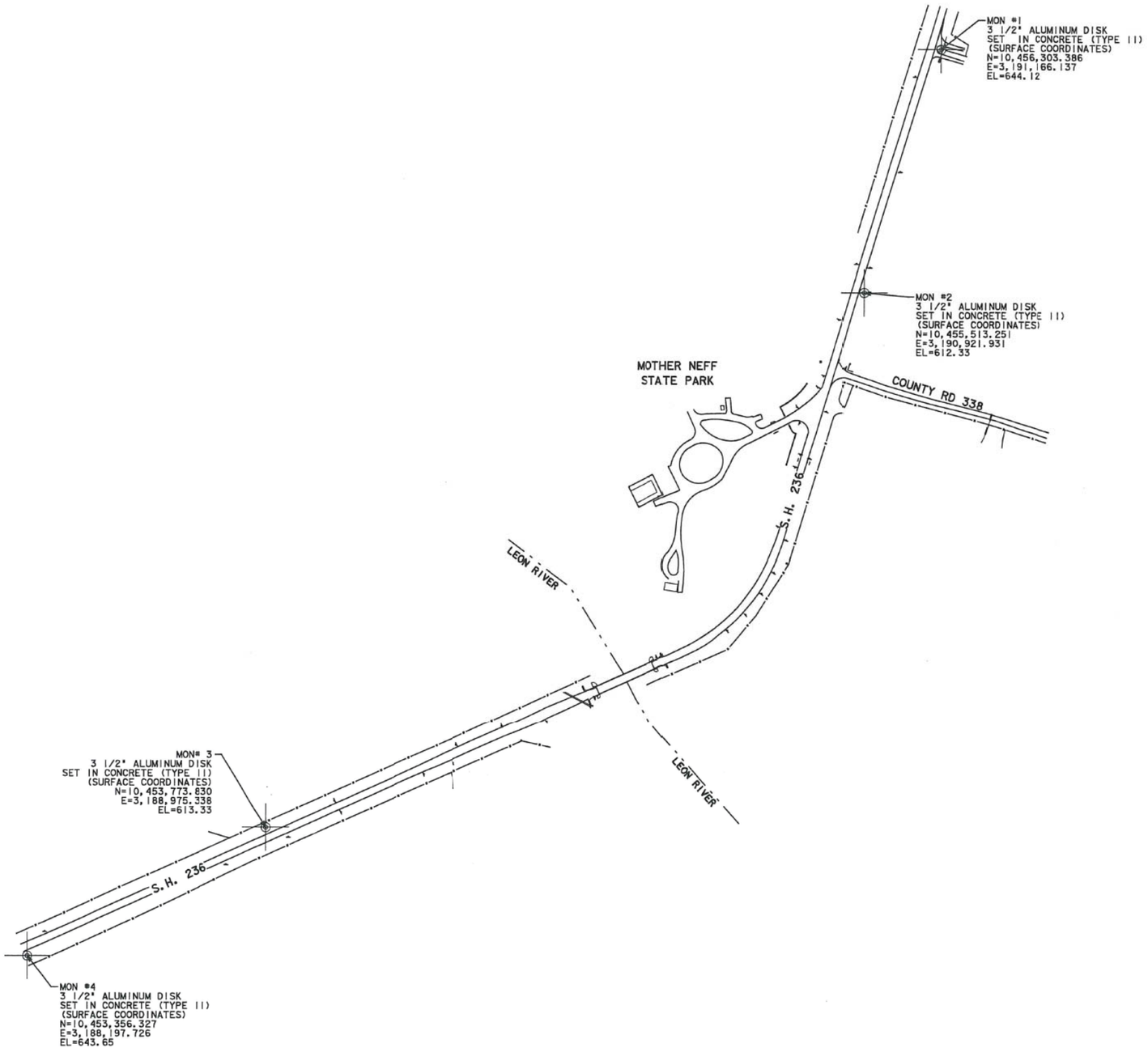
Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	WACO	CORYELL		29

DATE: 8/3/2020 10:59:17 AM
FILE: c:\pwworking\central01\d0974298\wzrcd-13.dgn



NOTES:

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS COORDINATE SYSTEM OF 1983 (NAD83 STATE PLANE), TEXAS CENTRAL ZONE 4203, NORTH AMERICAN DATUM OF 1983 (NAD83), GEOID 12A MODEL, WITH A GRID TO SURFACE ADJUSTMENT FACTOR OF 1.00012 (CORYELL COUNTY). ALL VALUES ARE DERIVED FROM GPS OBSERVATIONS USING TXDOT VRS RTK NETWORK. ELEVATIONS ARE IN U.S. SURVEY FEET BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BY GPS VRS RTK OBSERVATIONS.

0 200 400 600 800

HORIZ. SCALE IN FEET

I, THE UNDERSIGNED, A REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF TEXAS, DO HEREBY CERTIFY THAT THE COORDINATE AND ELEVATION INFORMATION SHOWN WERE DERIVED FROM A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JOSEPH S. BENITEZ
5934
PROFESSIONAL
LAND SURVEYOR

06-26-2020

JOSEPH S. BENITEZ DATE
RPLS NO. 5934

NO.	REVISIONS	BY	DATE
2	GENERAL REVISIONS/UPDATE	RME	06-26-20
1	GENERAL REVISIONS	MDC	02-26-19

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098
TBPLS REGISTRATION No. 10088700

Texas Department of Transportation

SURVEY CONTROL

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE TITLE BLOCK		30
STATE	DISTRICT	COUNTY	
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	HIGHWAY NO.
0513	01	017	S.H. 236

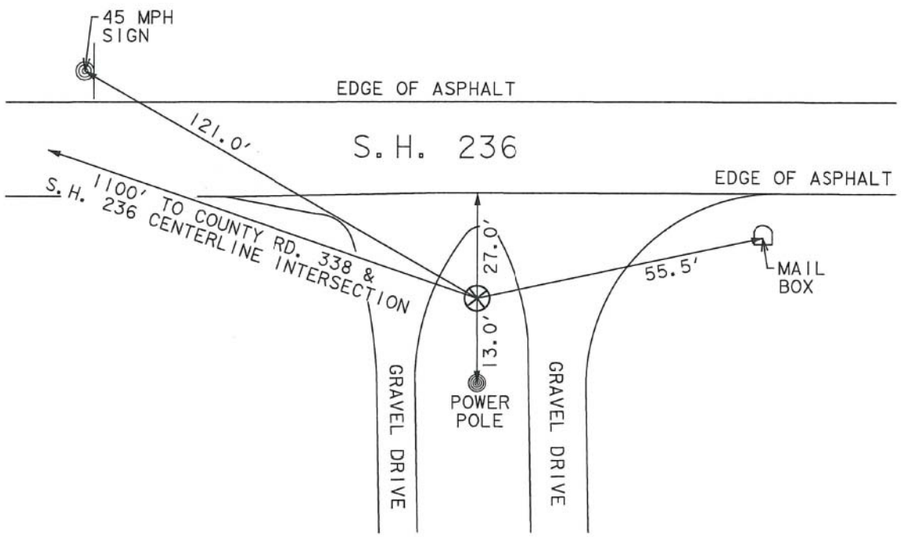
6/26/2020

c:\pwworking\azb\pwazbpod\ndelacruz\dms366171\SH236_Control_1x17_SHEET1_R2.dgn

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE "MON 1".

SKETCH
(NOT TO SCALE)



CONTROL POINT MON 1

APPROXIMATE LOCATION:

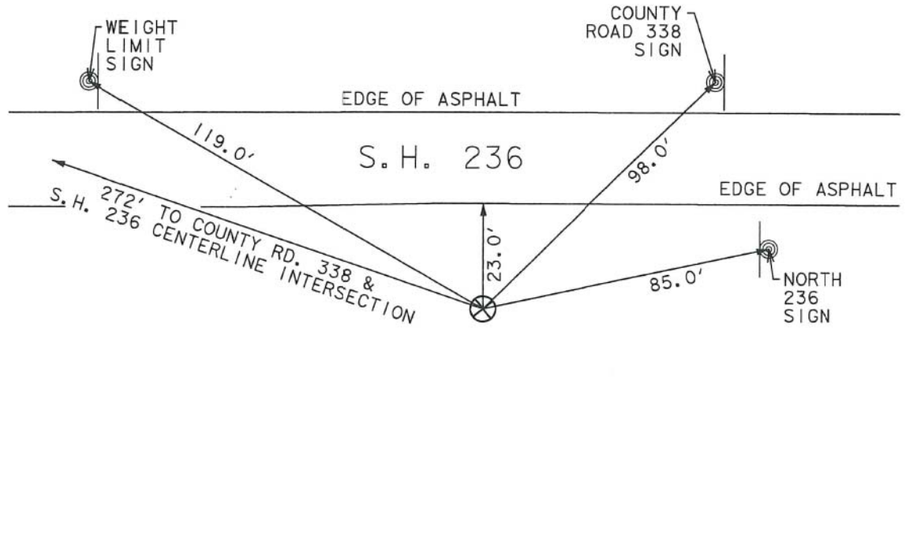
A 3 1/2" ALUMINUM DISK SET IN CONCRETE (TYPE II) LOCATED NEAR THE EAST RIGHT OF WAY LINE OF STATE HIGHWAY 236, 27.0' EAST OF THE EDGE OF ASPHALT, 13.0' WEST OF A POWER POLE, 55.5' SOUTH OF A MAIL BOX, 121.0' NORTHEAST OF A "45 MPH" SIGN AND APPROXIMATELY 1100' NORTH OF COUNTY RD. 338 AND S.H. 236 CENTERLINE INTERSECTION.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF 1983 (NAD83)
GEOID 12A MODEL
DATE SET: AUGUST 3, 2016
CORYELL COUNTY SCALE FACTOR: 1.00012
GRID NORTHING: 10,455,048.780
GRID EASTING: 3,190,783.243
SURFACE NORTHING: 10,456,303.386
SURFACE EASTING: 3,191,166.137
NAVD88 ELEVATION: 644.12

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE "MON 2".

SKETCH
(NOT TO SCALE)



CONTROL POINT MON 2

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE (TYPE II) LOCATED NEAR THE EAST RIGHT OF WAY LINE OF STATE HIGHWAY 236, 23.0' EAST OF THE EDGE OF ASPHALT, 119.0' NORTHEAST OF A WEIGHT LIMIT SIGN, 98.0' SOUTHEAST OF A COUNTY RD 338 SIGN, 85.0' SOUTH OF A "NORTH 236" SIGN AND APPROXIMATELY 272' NORTH OF COUNTY ROAD 338 AND S.H. 236 CENTERLINE INTERSECTION.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF 1983 (NAD83)
GEOID 12A MODEL
DATE SET: AUGUST 3, 2016
CORYELL COUNTY SCALE FACTOR: 1.00012
GRID NORTHING: 10,454,258.740
GRID EASTING: 3,190,539.066
SURFACE NORTHING: 10,455,513.251
SURFACE EASTING: 3,190,921.931
NAVD88 ELEVATION: 612.33

NOTES:

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE 4203, NORTH AMERICAN DATUM OF 1983 (NAD83), GEOID 12A MODEL, WITH A GRID TO SURFACE ADJUSTMENT FACTOR OF 1.00012 (CORYELL COUNTY). ALL VALUES ARE DERIVED FROM GPS OBSERVATIONS USING TXDOT VRS RTK NETWORK. ELEVATIONS ARE IN U.S. SURVEY FEET BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BY GPS VRS OBSERVATIONS.

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STATE OF TEXAS
REGISTERED
JOSEPH S. BENITEZ
5934
PROFESSIONAL
LAND SURVEYOR

06-26-2020

JOSEPH S. BENITEZ DATE
RPLS NO. 5934

NO.	REVISIONS	BY	DATE

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098
TBPLS REGISTRATION No. 10088700

Texas Department of Transportation

SURVEY CONTROL

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		31
STATE	DISTRICT	COUNTY	
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	HIGHWAY NO.
0513	01	017	S.H. 236

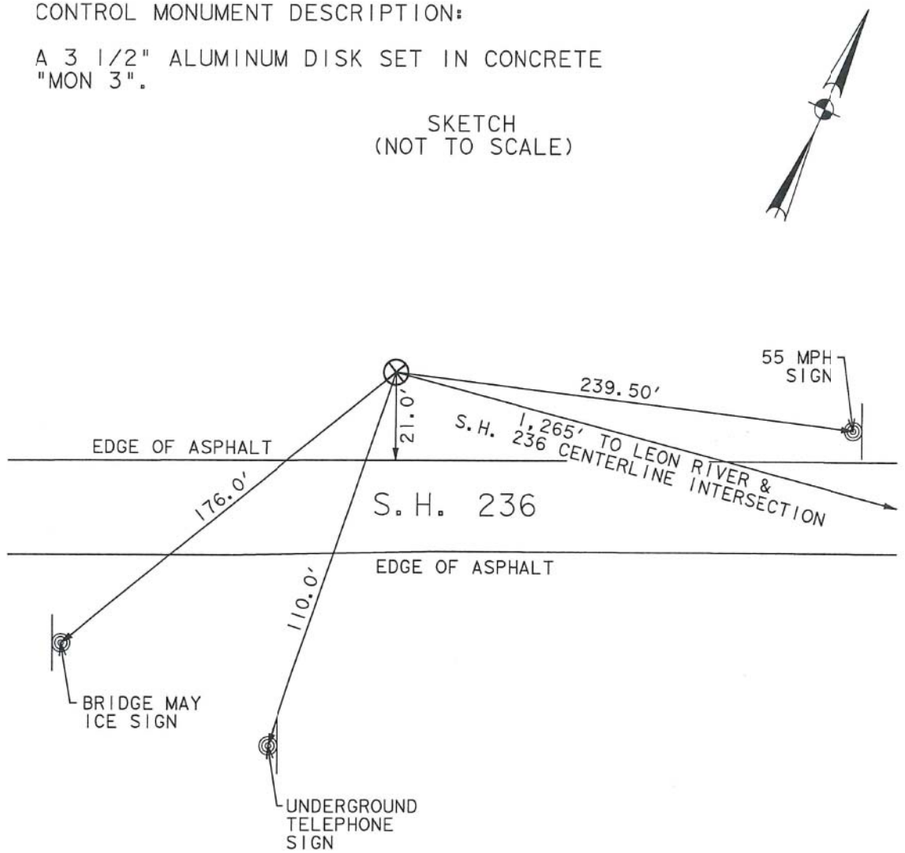
6/26/2020

c:\pwworking\azb\pwazbpod1\mdelacruz\dms366171\SH236_Control_Jlx17_SHEETS R2.dgn

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE "MON 3".

SKETCH
(NOT TO SCALE)



CONTROL POINT MON 3

APPROXIMATE LOCATION:

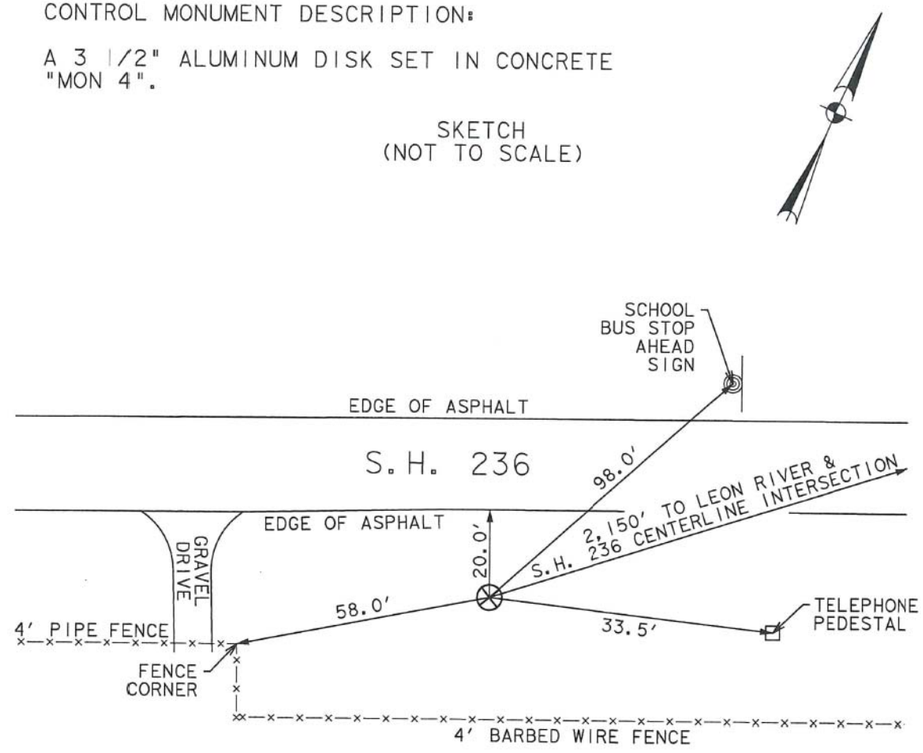
A 3 1/2" ALUMINUM DISK SET IN CONCRETE (TYPE II) LOCATED NEAR THE NORTHWEST RIGHT OF WAY LINE OF STATE HIGHWAY 236, 21.0' WEST OF THE EDGE OF ASPHALT, 239.5' SOUTHWEST OF A "55 MPH" SIGN, 110.0' NORTH OF AN UNDERGROUND TELEPHONE SIGN, 176.0' NORTH OF A "BRIDGE MAY ICE" SIGN AND APPROXIMATELY 1,265' SOUTHWEST OF THE LEON RIVER AND S.H. 236 CENTERLINE INTERSECTION.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF 1983 (NAD83)
GEOID 12A MODEL
DATE SET: AUGUST 3, 2016
CORYELL COUNTY SCALE FACTOR: 1.00012
GRID NORTHING: 10,452,519.528
GRID EASTING: 3,188,592.707
SURFACE NORTHING: 10,453,773.830
SURFACE EASTING: 3,188,975.338
NAVD88 ELEVATION: 613.33

CONTROL MONUMENT DESCRIPTION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE "MON 4".

SKETCH
(NOT TO SCALE)



CONTROL POINT MON 4

APPROXIMATE LOCATION:

A 3 1/2" ALUMINUM DISK SET IN CONCRETE (TYPE II) LOCATED NEAR THE SOUTHEAST RIGHT OF WAY LINE OF STATE HIGHWAY 236, 20.0' SOUTHEAST OF THE EDGE OF ASPHALT, 58.0' NORTH OF A FENCE CORNER, 98.0' SOUTH OF A "SCHOOL BUS STOP AHEAD" SIGN, 33.5' WEST OF A TELEPHONE PEDESTAL AND APPROXIMATELY 2,150' SOUTHWEST OF THE LEON RIVER AND S.H. 236 CENTERLINE INTERSECTION.

US SURVEY FEET
TEXAS NORTH CENTRAL ZONE 4202
NORTH AMERICAN DATUM OF 1983 (NAD83)
GEOID 12A MODEL
DATE SET: AUGUST 3, 2016
CORYELL COUNTY SCALE FACTOR: 1.00012
GRID NORTHING: 10,452,102.074
GRID EASTING: 3,187,815.188
SURFACE NORTHING: 10,453,356.327
SURFACE EASTING: 3,188,197.726
NAVD88 ELEVATION: 643.65

NOTES:

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE 4203, NORTH AMERICAN DATUM OF 1983 (NAD83), GEOID 12A MODEL, WITH A GRID TO SURFACE ADJUSTMENT FACTOR OF 1.00012 (CORYELL COUNTY). ALL VALUES ARE DERIVED FROM GPS OBSERVATIONS USING TXDOT VRS RTK NETWORK. ELEVATIONS ARE IN U.S. SURVEY FEET BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) BY GPS VRS OBSERVATIONS.

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STATE OF TEXAS
REGISTERED
JOSEPH S. BENITEZ
5934
PROFESSIONAL
LAND SURVEYOR

06-26-2020

JOSEPH S. BENITEZ DATE
RPLS NO. 5934

NO.	REVISIONS	BY	DATE

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098
TBPLS REGISTRATION No. 10088700

Texas Department of Transportation

SURVEY CONTROL

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		32
STATE	DISTRICT	COUNTY	
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	HIGHWAY NO.
0513	01	017	S.H. 236

6/26/2020

c:\pwworking\azb\pwazbpod\mdelacruz\dms366l7\SH236_Control_1x17_SHEETS R2.dgn

PROPOSED SH 236 ALIGNMENT DATA (℄ SH236)

		STATION	NORTHING	EASTING
Element: Linear				
	POB ( )	244+50.00	10453490.349	3188424.672
	PC ( )	265+51.32	10454350.986	3190341.660
Tangent Direction:	N 65°49'19.75" E			
Tangent Length:	2101.3183			
SH236-01 Element: Circular				
	PC ( )	265+51.32	10454350.986	3190341.660
	PI ( )	268+27.61	10454464.148	3190593.717
	CC ( )		10454898.353	3190095.918
	PT ( )	270+69.17	10454729.240	3190671.592
Radius:	600.0000			
Delta:	49°27'04.23" Left			
Degree of Curvature(Arc):	9°32'57.47"			
Length:	517.8515			
Tangent:	276.2939			
Chord:	501.9273			
Middle Ordinate:	55.0071			
External:	60.5591			
Tangent Direction:	N 65°49'19.75" E			
Radial Direction:	S 24°10'40.25" E			
Chord Direction:	N 41°05'47.64" E			
Radial Direction:	S 73°37'44.48" E			
Tangent Direction:	N 16°22'15.52" E			
Element: Linear				
	PT ( )	270+69.17	10454729.240	3190671.592
	PC ( )	280+45.95	10455666.416	3190946.902
Tangent Direction:	N 16°22'15.52" E			
Tangent Length:	976.7775			
SH236-02 Element: Circular				
	PC ( )	280+45.95	10455666.416	3190946.902
	PI ( )	281+74.64	10455789.890	3190983.174
	CC ( )		10457492.840	3184729.621
	PRC ( )	283+03.30	10455914.706	3191014.515
Radius:	6480.0000			
Delta:	2°16'31.66" Left			
Degree of Curvature(Arc):	0°53'03.10"			
Length:	257.3487			
Tangent:	128.6913			
Chord:	257.3318			
Middle Ordinate:	1.2775			
External:	1.2778			
Tangent Direction:	N 16°22'15.52" E			
Radial Direction:	S 73°37'44.48" E			
Chord Direction:	N 15°13'59.69" E			
Radial Direction:	S 75°54'16.14" E			
Tangent Direction:	N 14°05'43.86" E			
SH236-03 Element: Circular				
	PRC ( )	283+03.30	10455914.706	3191014.515
	PI ( )	284+52.24	10456059.163	3191050.789
	CC ( )		10454336.573	3197299.410
	PT ( )	286+01.13	10456201.802	3191093.661
Radius:	6480.0000			
Delta:	2°38'00.25" Right			
Degree of Curvature(Arc):	0°53'03.10"			
Length:	297.8310			
Tangent:	148.9417			
Chord:	297.8047			
Middle Ordinate:	1.7110			
External:	1.7115			
Tangent Direction:	N 14°05'43.86" E			
Radial Direction:	S 75°54'16.14" E			
Chord Direction:	N 15°24'43.98" E			
Radial Direction:	S 73°16'15.89" E			
Tangent Direction:	N 16°43'44.11" E			
Element: Linear				
	PT ( )	286+01.13	10456201.802	3191093.661
	POE ( )	286+08.26	10456208.634	3191095.714
Tangent Direction:	N 16°43'44.11" E			
Tangent Length:	7.1348			

PROPOSED PARK ROAD 14 ALIGNMENT DATA (℄ PR14)

		STATION	NORTHING	EASTING
Element: Linear				
	POB ( )	10+00.00	10455100.099	3190780.537
	PC ( )	10+57.25	10455116.577	3190725.713
Tangent Direction:	N 73°16'15.89" W			
Tangent Length:	57.2473			
PR14-01 Element: Circular				
	PC ( )	10+57.25	10455116.577	3190725.713
	PI ( )	10+71.40	10455120.650	3190712.161
	CC ( )		10455083.059	3190715.638
	PT ( )	10+84.14	10455114.161	3190699.587
Radius:	35.0000			
Delta:	44°01'36.06" Left			
Degree of Curvature(Arc):	163°42'08.02"			
Length:	26.8944			
Tangent:	14.1504			
Chord:	26.2376			
Middle Ordinate:	2.5516			
External:	2.7523			
Tangent Direction:	N 73°16'15.89" W			
Radial Direction:	N 16°43'44.11" E			
Chord Direction:	S 84°42'56.08" W			
Radial Direction:	N 27°17'51.95" W			
Tangent Direction:	S 62°42'08.05" W			
Element: Linear				
	PT ( )	10+84.14	10455114.161	3190699.587
	POE ( )	13+08.98	10455011.045	3190499.784
Tangent Direction:	S 62°42'08.05" W			
Tangent Length:	224.8423			

PROPOSED COUNTY ROAD 338 ALIGNMENT DATA (℄ CR338)

		STATION	NORTHING	EASTING
Element: Linear				
	POB ( )	10+00.00	10455254.718	3190825.959
	PC ( )	11+38.32	10455213.200	3190957.906
Tangent Direction:	S 72°32'00.47" E			
Tangent Length:	138.3250			
CR338-01 Element: Circular				
	PC ( )	11+38.32	10455213.200	3190957.906
	PI ( )	12+12.60	10455190.907	3191028.758
	CC ( )		10458074.878	3191858.352
	PT ( )	12+86.85	10455172.146	3191100.626
Radius:	3000.0000			
Delta:	2°50'11.61" Left			
Degree of Curvature(Arc):	1°54'35.49"			
Length:	148.5218			
Tangent:	74.2761			
Chord:	148.5067			
Middle Ordinate:	0.9191			
External:	0.9193			
Tangent Direction:	S 72°32'00.47" E			
Radial Direction:	S 17°27'59.53" W			
Chord Direction:	S 73°57'06.28" E			
Radial Direction:	S 14°37'47.92" W			
Tangent Direction:	S 75°22'12.08" E			
Element: Linear				
	PT ( )	12+86.85	10455172.146	3191100.626
	POE ( )	14+11.32	10455140.708	3191221.061
Tangent Direction:	S 75°22'12.08" E			
Tangent Length:	124.4709			

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

HORIZONTAL ALIGNMENT DATA
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	33
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 8/3/2020
FILE: SH236HADOI.dgn
PENTABLE: I0040174.tbl
TIME: 10:59:34 AM SCALE:1:1

PROPOSED ACCESS ROAD ALIGNMENT DATA (℄ ACCESS)

		STATION	NORTHING	EASTING
	Element: Linear			
	POB ( )	10+00.00	10453772.543	3189053.232
	PC ( )	10+28.00	10453746.999	3189064.700
	Tangent Direction:	S 24°10′40.25" E		
	Tangent Length:	28.0000		
ACCESS-01	Element: Circular			
	PC ( )	10+28.00	10453746.999	3189064.700
	PI ( )	10+43.00	10453733.315	3189070.844
	CC ( )		10453753.142	3189078.384
	PT ( )	10+51.56	10453739.458	3189084.528
	Radius:	15.0000		
	Delta:	90°00′00.00"	Left	
	Degree of Curvature(Arc):	381°58′18.71"		
	Length:	23.5619		
	Tangent:	15.0000		
	Chord:	21.2132		
	Middle Ordinate:	4.3934		
	External:	6.2132		
	Tangent Direction:	S 24°10′40.25" E		
	Radial Direction:	S 65°49′19.75" W		
	Chord Direction:	S 69°10′40.25" E		
	Radial Direction:	S 24°10′40.25" E		
	Tangent Direction:	N 65°49′19.75" E		
	Element: Linear			
	PT ( )	10+51.56	10453739.458	3189084.528
	PC ( )	18+88.80	10454082.366	3189848.322
	Tangent Direction:	N 65°49′19.75" E		
	Tangent Length:	837.2384		
ACCESS-02	Element: Circular			
	PC ( )	18+88.80	10454082.366	3189848.322
	PI ( )	18+99.22	10454086.635	3189857.831
	CC ( )		10454068.682	3189854.466
	PT ( )	19+07.02	10454079.213	3189865.148
	Radius:	15.0000		
	Delta:	69°35′10.43"	Right	
	Degree of Curvature(Arc):	381°58′18.71"		
	Length:	18.2176		
	Tangent:	10.4226		
	Chord:	17.1184		
	Middle Ordinate:	2.6817		
	External:	3.2656		
	Tangent Direction:	N 65°49′19.75" E		
	Radial Direction:	S 24°10′40.25" E		
	Chord Direction:	S 79°23′05.03" E		
	Radial Direction:	S 45°24′30.19" W		
	Tangent Direction:	S 44°35′29.81" E		
	Element: Linear			
	PT ( )	19+07.02	10454079.213	3189865.148
	PC ( )	19+22.22	10454068.388	3189875.820
	Tangent Direction:	S 44°35′29.81" E		
	Tangent Length:	15.2010		
ACCESS-03	Element: Circular			
	PC ( )	19+22.22	10454068.388	3189875.820
	PI ( )	19+39.72	10454055.921	3189888.110
	CC ( )		10454110.511	3189918.547
	PT ( )	19+56.28	10454052.020	3189905.175
	Radius:	60.0000		
	Delta:	32°31′49.54"	Left	
	Degree of Curvature(Arc):	95°29′34.68"		
	Length:	34.0658		
	Tangent:	17.5057		
	Chord:	33.6101		
	Middle Ordinate:	2.4015		
	External:	2.5016		
	Tangent Direction:	S 44°35′29.81" E		
	Radial Direction:	S 45°24′30.19" W		
	Chord Direction:	S 60°51′24.58" E		
	Radial Direction:	S 12°52′40.65" W		
	Tangent Direction:	S 77°07′19.35" E		
	Element: Linear			
	PT ( )	19+56.28	10454052.020	3189905.175
	POE ( )	20+02.00	10454041.831	3189949.740
	Tangent Direction:	S 77°07′19.35" E		
	Tangent Length:	45.7153		

PROPOSED DRIVEWAY NO. 2 ALIGNMENT DATA (℄ DRWY02)

	STATION	NORTHING	EASTING
Element: Linear			
POB ( )	10+00.00	10453993.161	3189544.639
POE ( )	11+00.00	10454084.389	3189503.682
Tangent Direction:	N 24°10′40.25" W		
Tangent Length:	100.0000		

PROPOSED DRIVEWAY NO. 3 ALIGNMENT DATA (℄ DRWY03)

	STATION	NORTHING	EASTING
Element: Linear			
POB ( )	10+00.00	10455214.573	3190953.545
POE ( )	11+00.00	10455119.183	3190923.530
Tangent Direction:	S 17°27′59.53" W		
Tangent Length:	100.0000		

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER

03/30/2021

Phaisarn Cwatanapho, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

HORIZONTAL ALIGNMENT DATA
SH 236 AT LEON RIVER

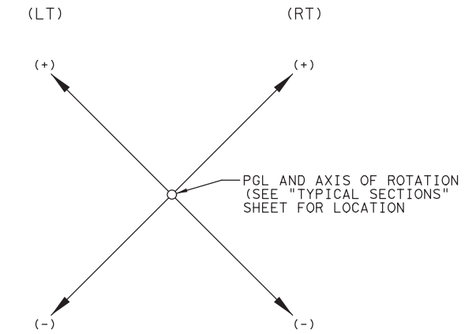
SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	34
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 3/30/2021
FILE: SH236HAD02.dgn
TIME: 1:42:26 PM
PENTABLE: 100401174.tbl
SCALE: 1:1

TABLE OF CROSS SLOPES

SH 236	ALIGNMENT: SH236		
	STATION	SLOPE (LT)	SLOPE (RT)
BEGIN PROJECT BEGIN TRANSITION	246+17.00	-3.2% (MATCH EXISTING)	-1.4% (MATCH EXISTING)
END TRANSITION	246+67.00	-2.0%	-2.0%
BEGIN TRANSITION	257+80.00	-2.0%	-2.0%
END TRANSITION	258+80.00	-2.0%	+2.0%
BEGIN TRANSITION	264+00.00	-2.0%	+2.0%
END TRANSITION	265+00.00	-6.0%	+6.0%
BEGIN TRANSITION	270+50.00	-6.0%	+6.0%
END TRANSITION	271+20.00	-2.0%	+2.0%
BEGIN TRANSITION	271+20.00	-2.0%	+2.0%
END TRANSITION	271+90.00	-2.0%	-2.0%
BEGIN TRANSITION	284+50.00	-2.0%	-2.0%
END PROJECT END TRANSITION	285+00.00	-0.2% (MATCH EXISTING)	-4.1% (MATCH EXISTING)



CROSS SLOPE SIGN CONVENTION

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER

08/20/2020

Phaisarn Cwatanaphol, P.E.

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Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

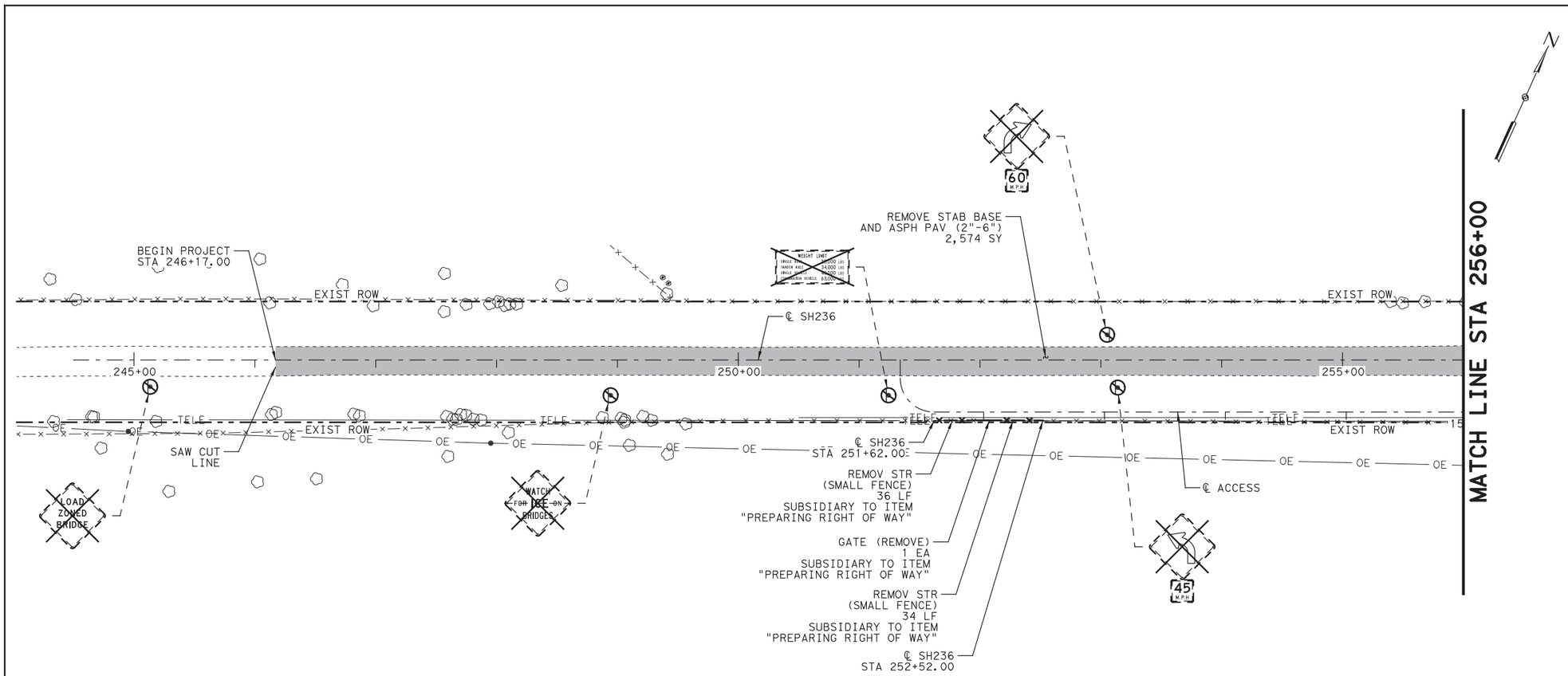
Texas Department of Transportation

ROADWAY
TABLE OF CROSS SLOPES
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	35
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 1004074.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 10:59:40 AM SCALE: 1:1
FILE: SH236TBL01.dgn



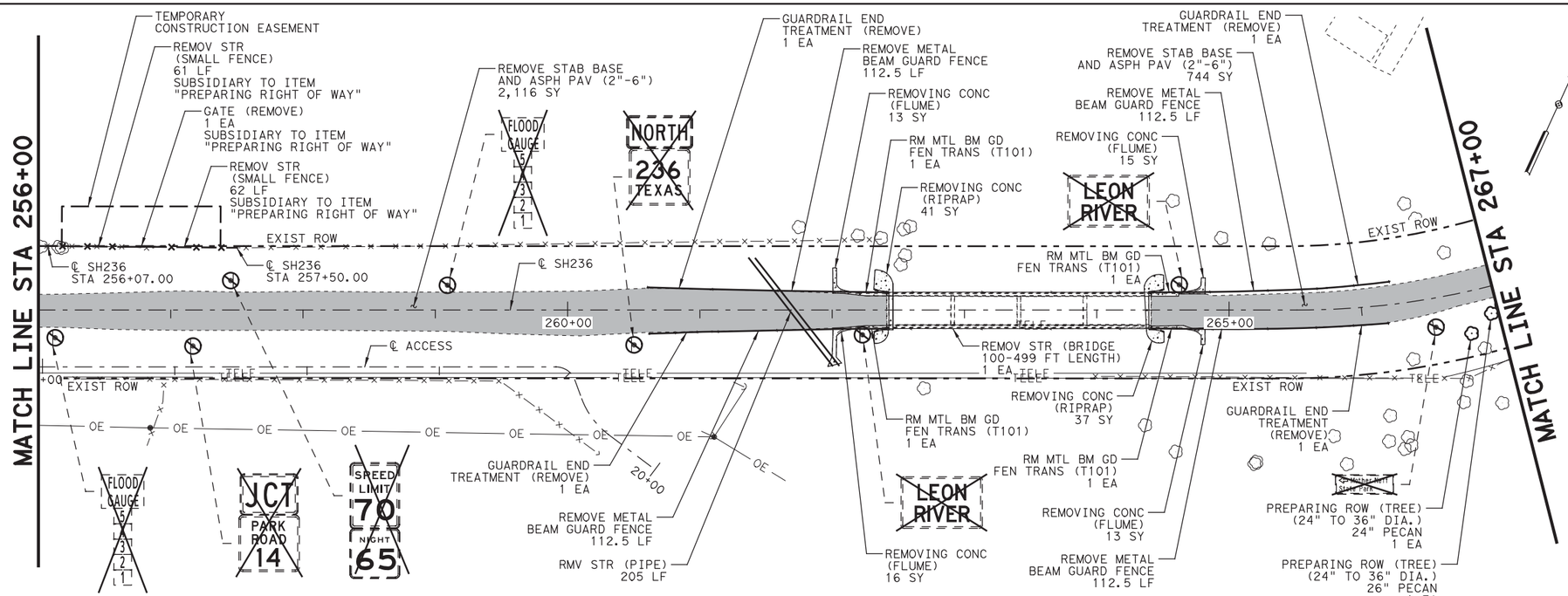
LEGEND

- REMOVE STAB BASE AND ASPH PAV
- REMOVE CONCRETE RIPRAP
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- EXISTING SIGN POST
- EXISTING SIGN POST TO BE REMOVED
- EXISTING SIGN TO BE REMOVED

NOTES:

1. ANY ITEMS REQUIRING REMOVAL THAT ARE NOT DIRECTLY CALLED OUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM "PREPARING RIGHT OF WAY".
2. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
3. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
4. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
5. COORDINATE FENCE REMOVALS WITH LOCAL LANDOWNER.
6. TRIM TREES IF REQUIRED FOR CONSTRUCTION OPERATION.

0 50 100 150 200
SCALE IN FEET



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
08/20/2020
Phaisarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Heslers Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

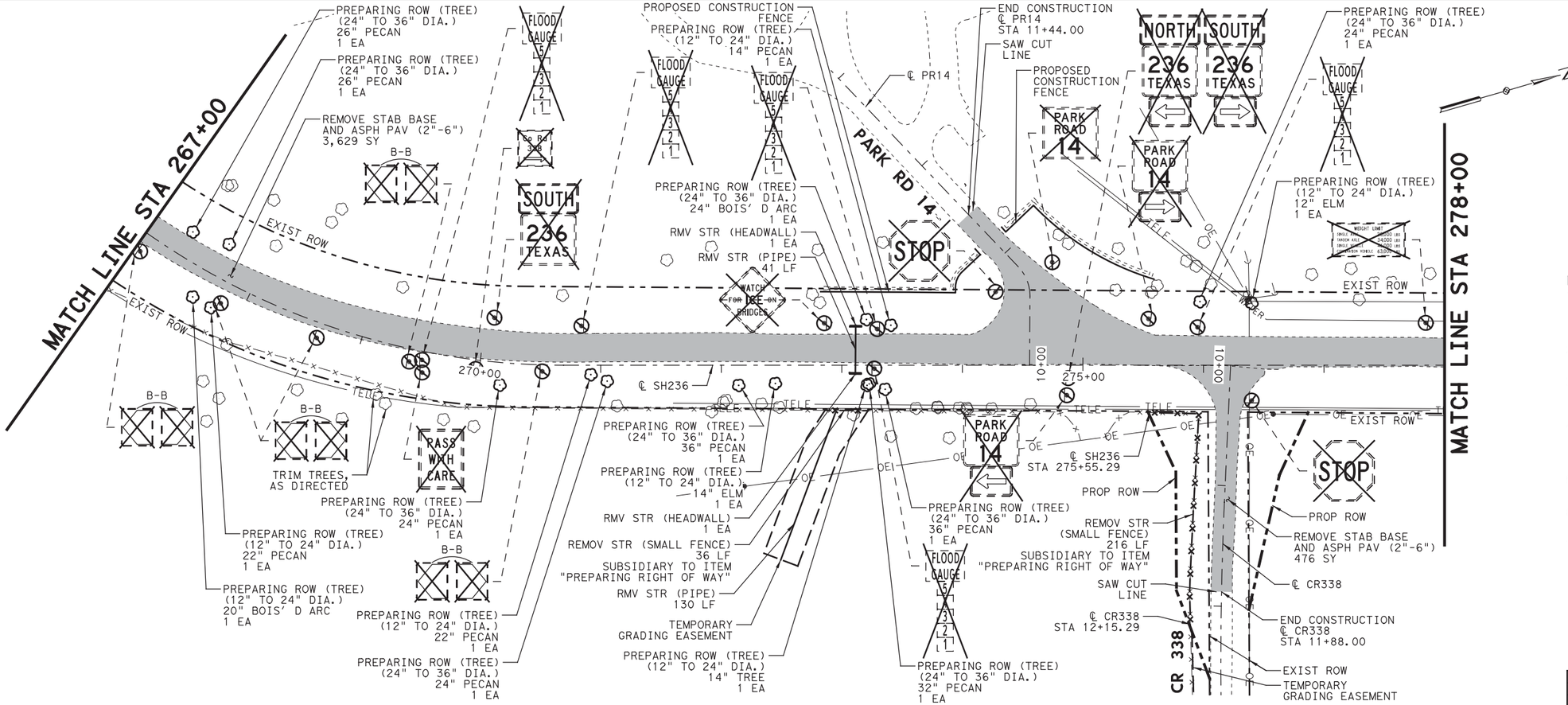
REMOVAL PLAN

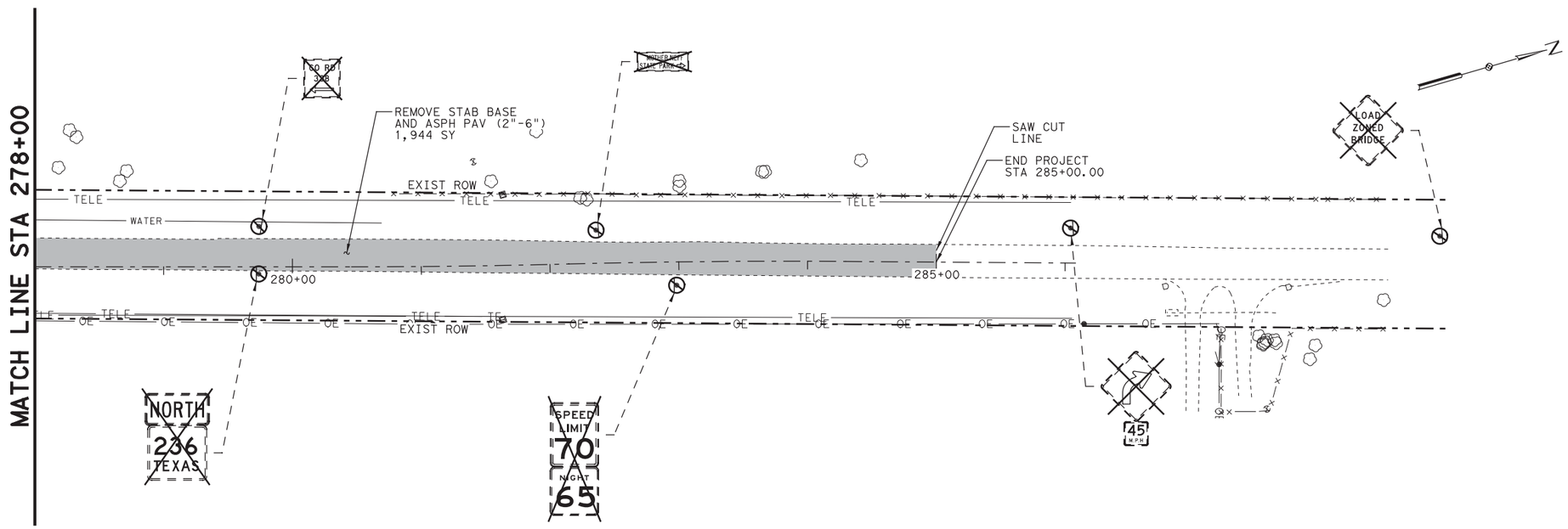
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	36
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 10:59:43 AM SCALE: 1:100
FILE: SH236RMV01.dgn





LEGEND

- REMOVE STAB BASE AND ASPH PAV
- REMOVE CONCRETE RIPRAP
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- EXISTING SIGN POST
- EXISTING SIGN POST TO BE REMOVED
- EXISTING SIGN TO BE REMOVED

NOTES:

1. ANY ITEMS REQUIRING REMOVAL THAT ARE NOT DIRECTLY CALLED OUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM "PREPARING RIGHT OF WAY".
2. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
3. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
4. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
5. COORDINATE FENCE REMOVALS WITH LOCAL LANDOWNER.
6. TRIM TREES IF REQUIRED FOR CONSTRUCTION OPERATION.
7. PLACE CONSTRUCTION PERIMETER FENCING BETWEEN WORK AREA AND MASONRY WALL AT PR 14. LIMITS AND LENGTH TO BE AS DIRECTED OR APPROVED.

0 50 100 150 200
SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
03/12/2021
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

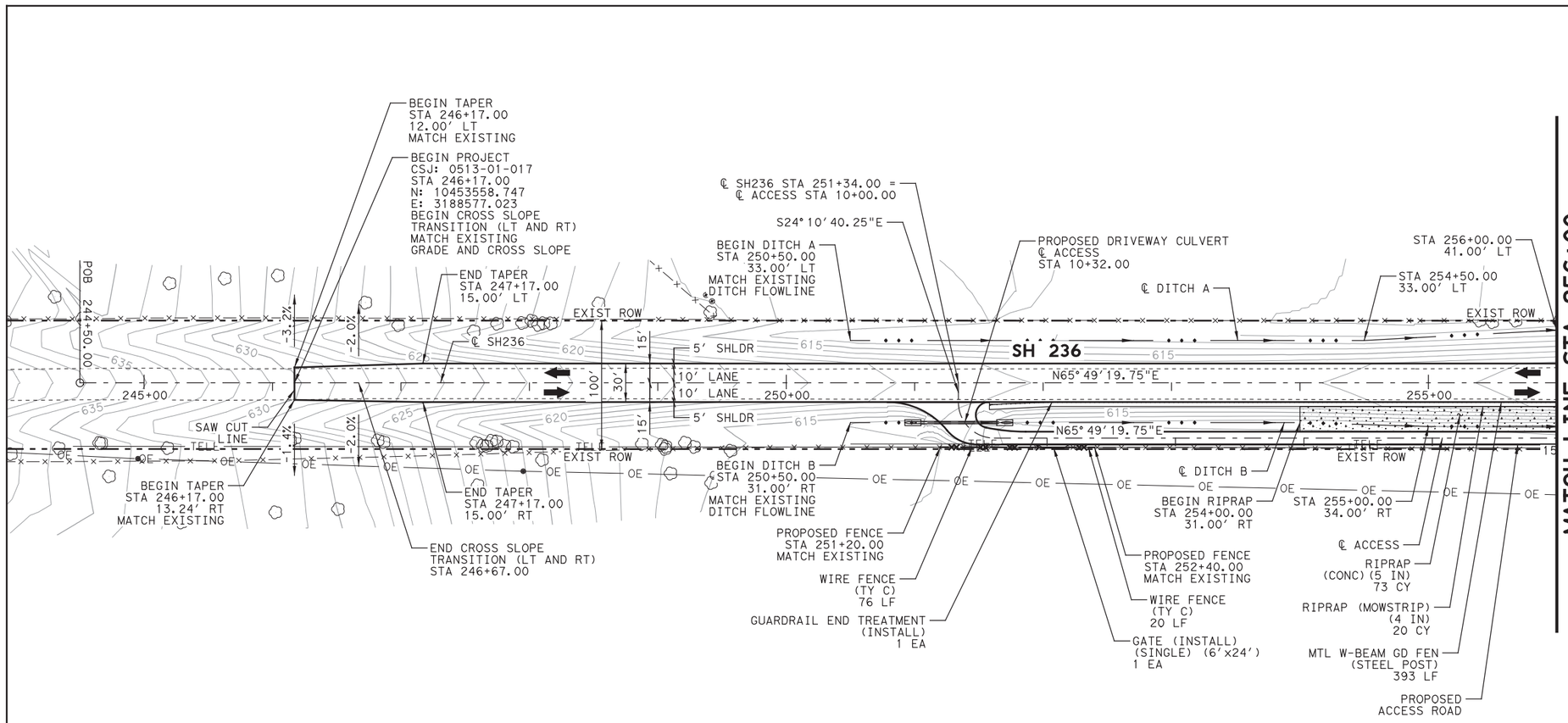
REMOVAL PLAN

SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	37
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 3/12/2021
FILE: SH236RMV02.dgn
PENTABLE: 0040174.tbl
TIME: 8:57:20 AM SCALE:1:00



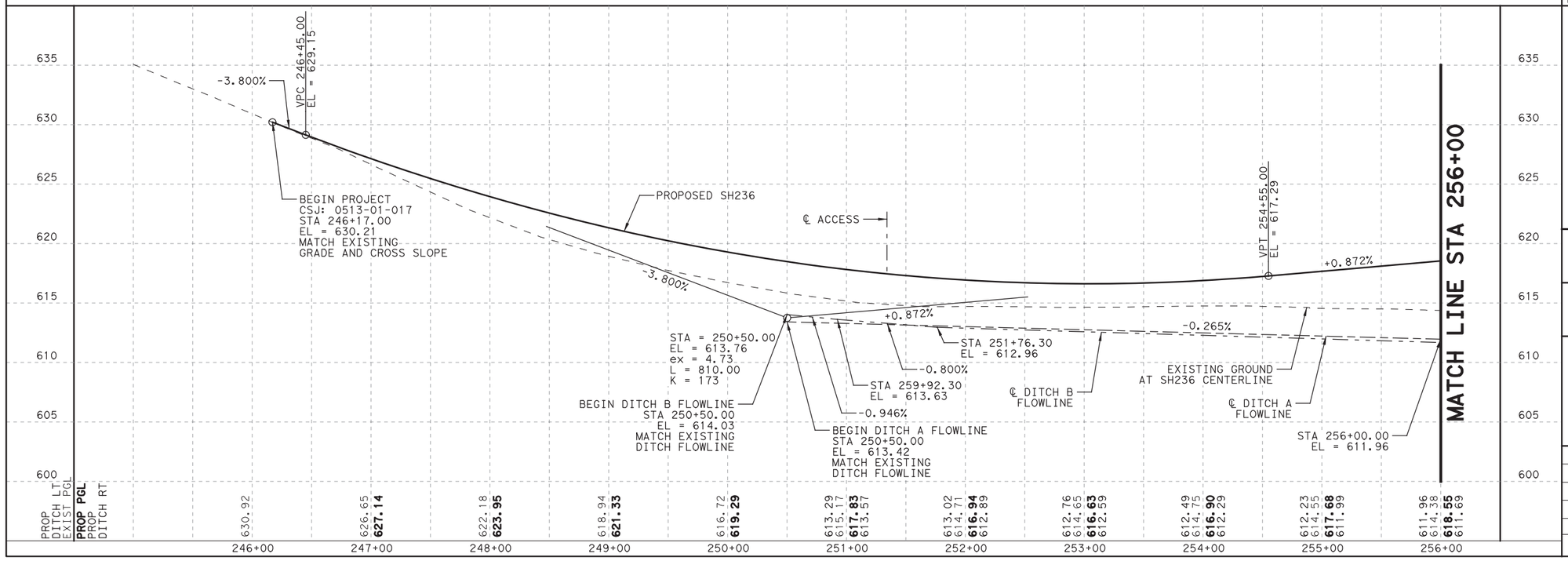
LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF SH 236 CENTERLINE (℄ SH236) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
7. SEE "COUNTY ROAD 338 PLAN AND PROFILE" SHEET FOR DITCH CONTINUATIONS.
8. THE ENGINEER WILL COORDINATE WITH ADJOINING LANDOWNERS PRIOR TO REMOVAL AND CONSTRUCTION OF FENCING.

H: 0 50 100 150 200
V: 0 5 10 15 20
SCALE IN FEET



NO.	DATE	REVISION	APPROVED

PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
03/30/2021
Phaisarn Cwatanapho, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Heslers Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

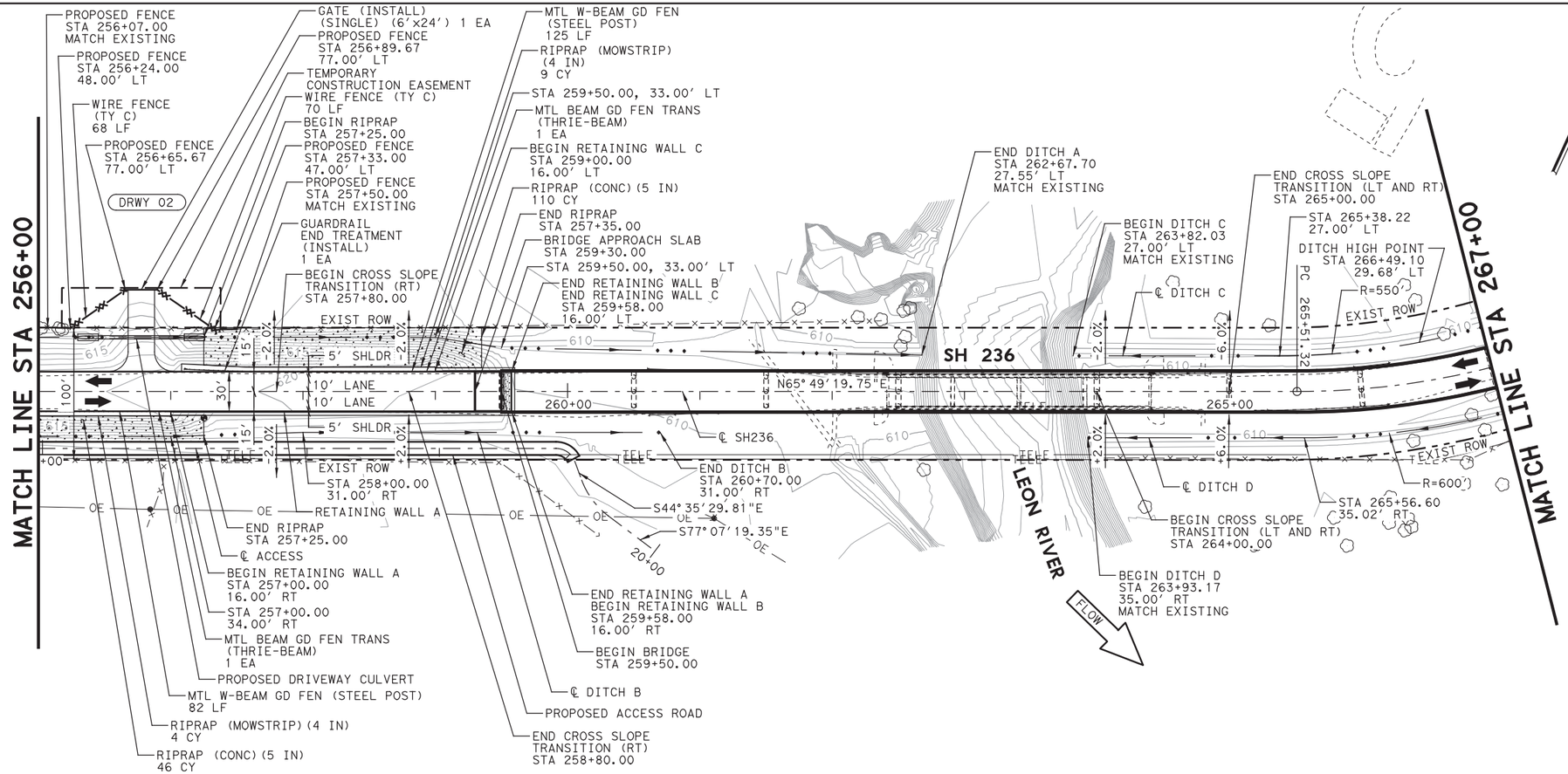
PLAN AND PROFILE

SH 236 AT LEON RIVER
BEGIN TO STA 256+00

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	38
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 3/30/2021 TIME: 1:42:32 PM SCALE: 1:100
FILE: SH236RDPP01.dgn PENTABLE: 10040174.tbl



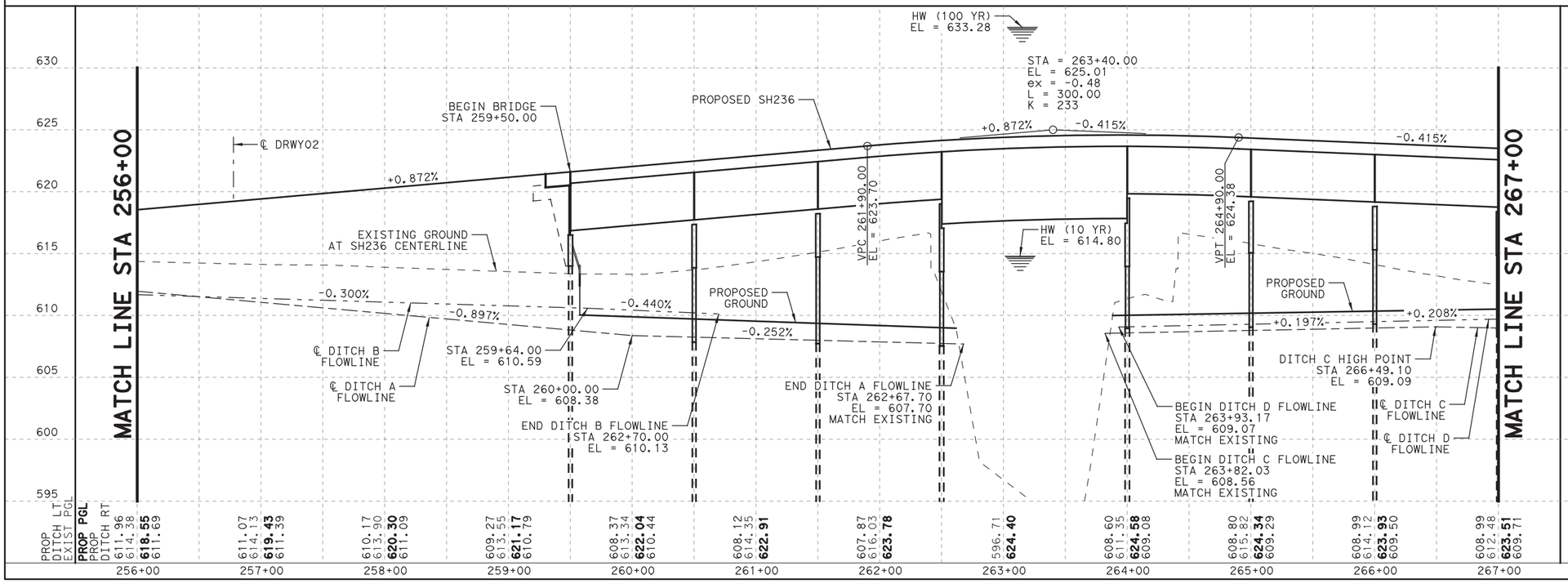
LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF SH 236 CENTERLINE (℄ SH236) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
7. SEE "COUNTY ROAD 338 PLAN AND PROFILE" SHEET FOR DITCH CONTINUATIONS.
8. THE ENGINEER WILL COORDINATE WITH ADJOINING LANDOWNERS PRIOR TO REMOVAL AND CONSTRUCTION OF FENCING.

H: 0 50 100 150 200
V: 0 5 10 15 20
SCALE IN FEET



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
08/20/2020
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

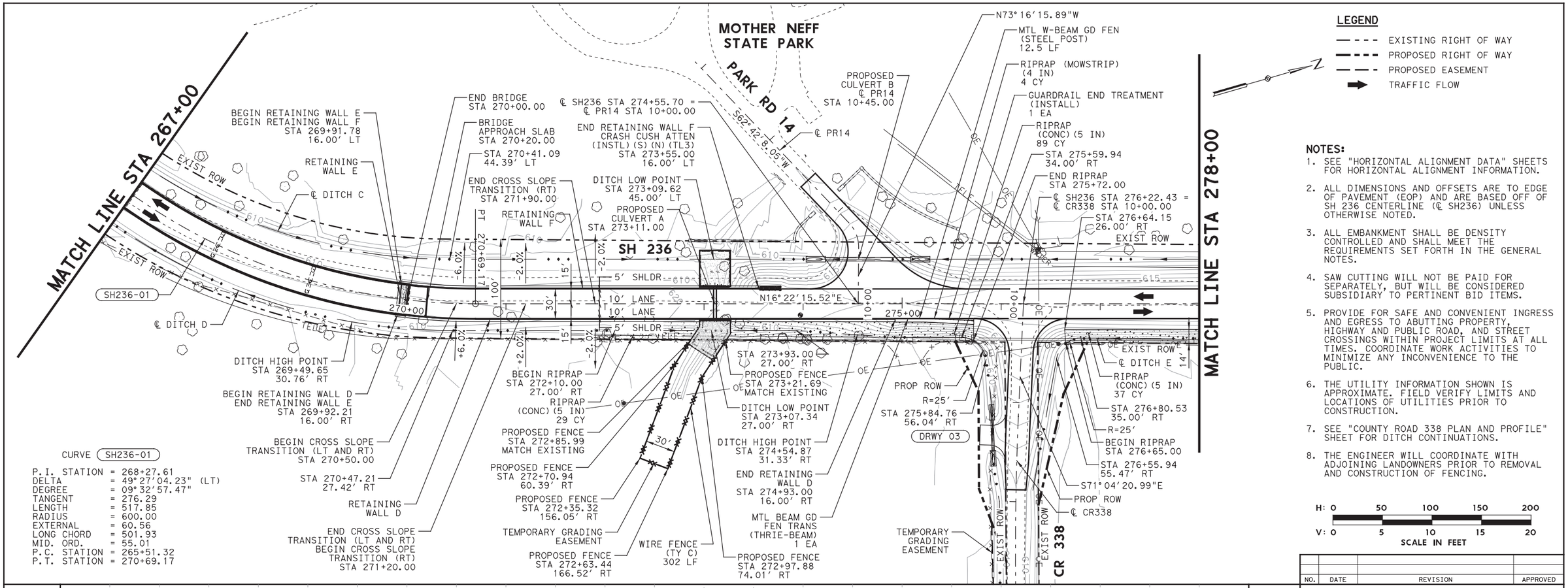
PLAN AND PROFILE

SH 236 AT LEON RIVER STA 256+00 TO STA 267+00

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	39
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 10040174.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 11:58:32 AM SCALE: 1:100
FILE: SH236RDPP02.dgn

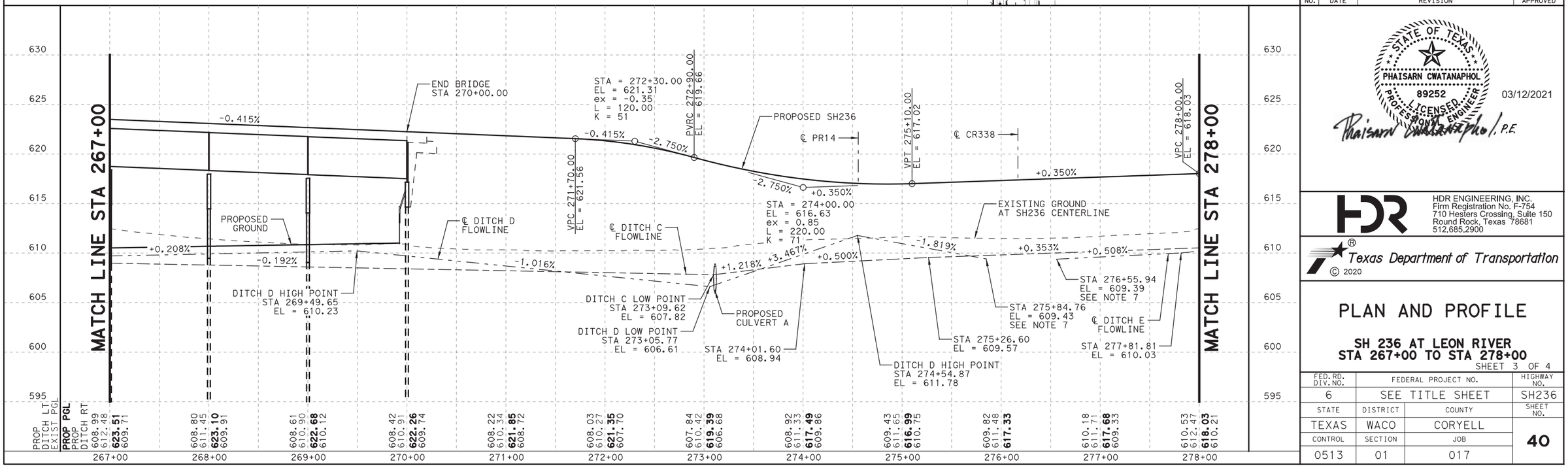


CURVE SH236-01

P.I. STATION	= 268+27.61
DELTA	= 49°27'04.23" (LT)
DEGREE	= 09°32'57.47"
TANGENT	= 276.29
LENGTH	= 517.85
RADIUS	= 600.00
EXTERNAL	= 60.56
LONG CHORD	= 501.93
MID. ORD.	= 55.01
P.C. STATION	= 265+51.32
P.T. STATION	= 270+69.17

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF SH 236 CENTERLINE (℄ SH236) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
7. SEE "COUNTY ROAD 338 PLAN AND PROFILE" SHEET FOR DITCH CONTINUATIONS.
8. THE ENGINEER WILL COORDINATE WITH ADJOINING LANDOWNERS PRIOR TO REMOVAL AND CONSTRUCTION OF FENCING.



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
03/12/2021
Phaisarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation
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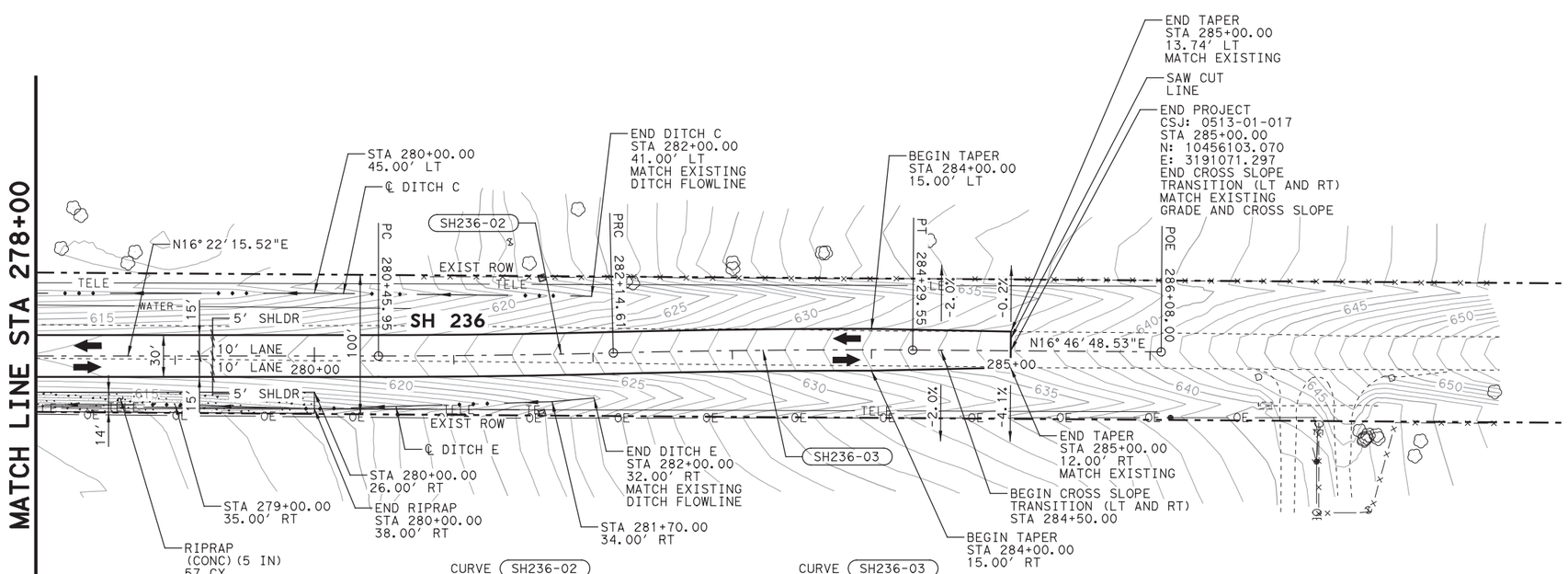
PLAN AND PROFILE

SH 236 AT LEON RIVER
STA 267+00 TO STA 278+00

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	40
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 3/11/2021 TIME: 10:30:45 AM SCALE: 1:100
FILE: SH236RDPP03.dgn



CURVE (SH236-02)

P.I. STATION	= 281+30.28
DELTA	= 01°29'28.67" (LT)
DEGREE	= 00°53'03.10"
TANGENT	= 84.34
LENGTH	= 168.66
RADIUS	= 6,480.00
EXTERNAL	= 0.55
LONG CHORD	= 168.66
MID. ORD.	= 0.55
P.C. STATION	= 280+45.95
P.R.C. STATION	= 282+14.61

CURVE (SH236-03)

P.I. STATION	= 283+22.09
DELTA	= 01°54'01.68" (RT)
DEGREE	= 00°53'03.10"
TANGENT	= 107.48
LENGTH	= 214.94
RADIUS	= 6,480.00
EXTERNAL	= 0.89
LONG CHORD	= 214.93
MID. ORD.	= 0.89
P.R.C. STATION	= 282+14.61
P.T. STATION	= 284+29.55

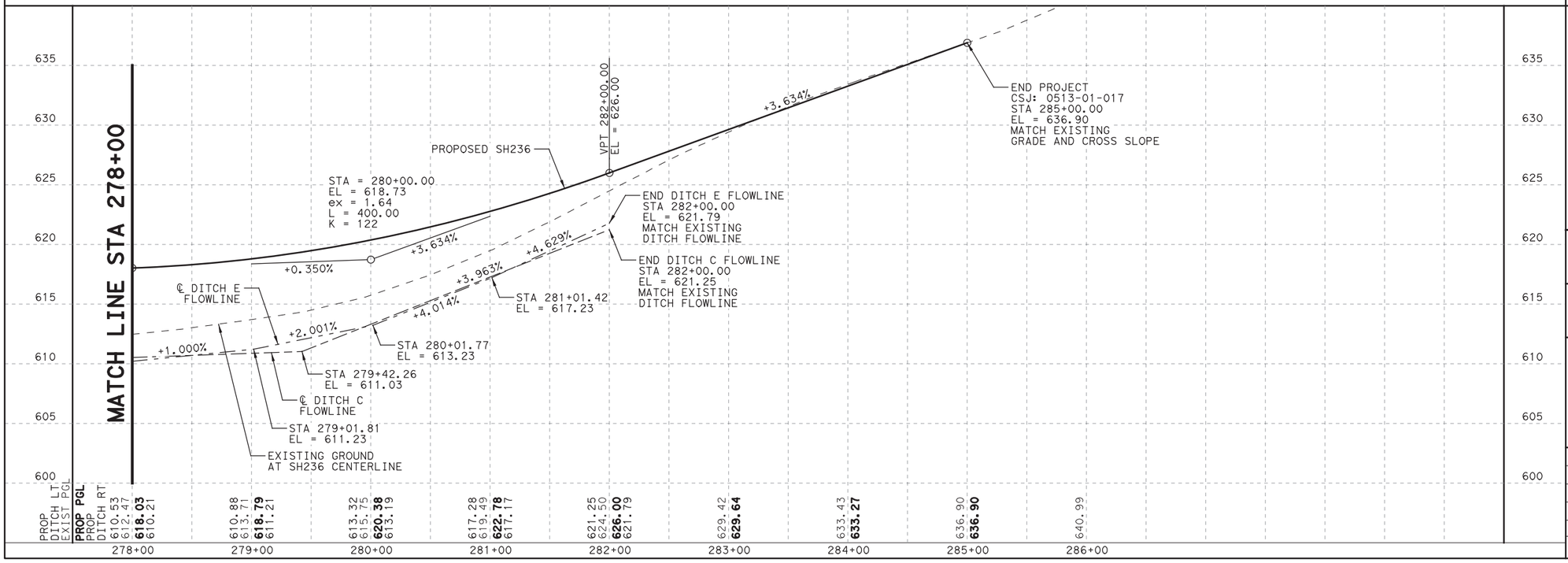
LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF SH 236 CENTERLINE (℄ SH236) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
7. SEE "COUNTY ROAD 338 PLAN AND PROFILE" SHEET FOR DITCH CONTINUATIONS.
8. THE ENGINEER WILL COORDINATE WITH ADJOINING LANDOWNERS PRIOR TO REMOVAL AND CONSTRUCTION OF FENCING.

H: 0 50 100 150 200
V: 0 5 10 15 20
SCALE IN FEET



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/12/2021
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

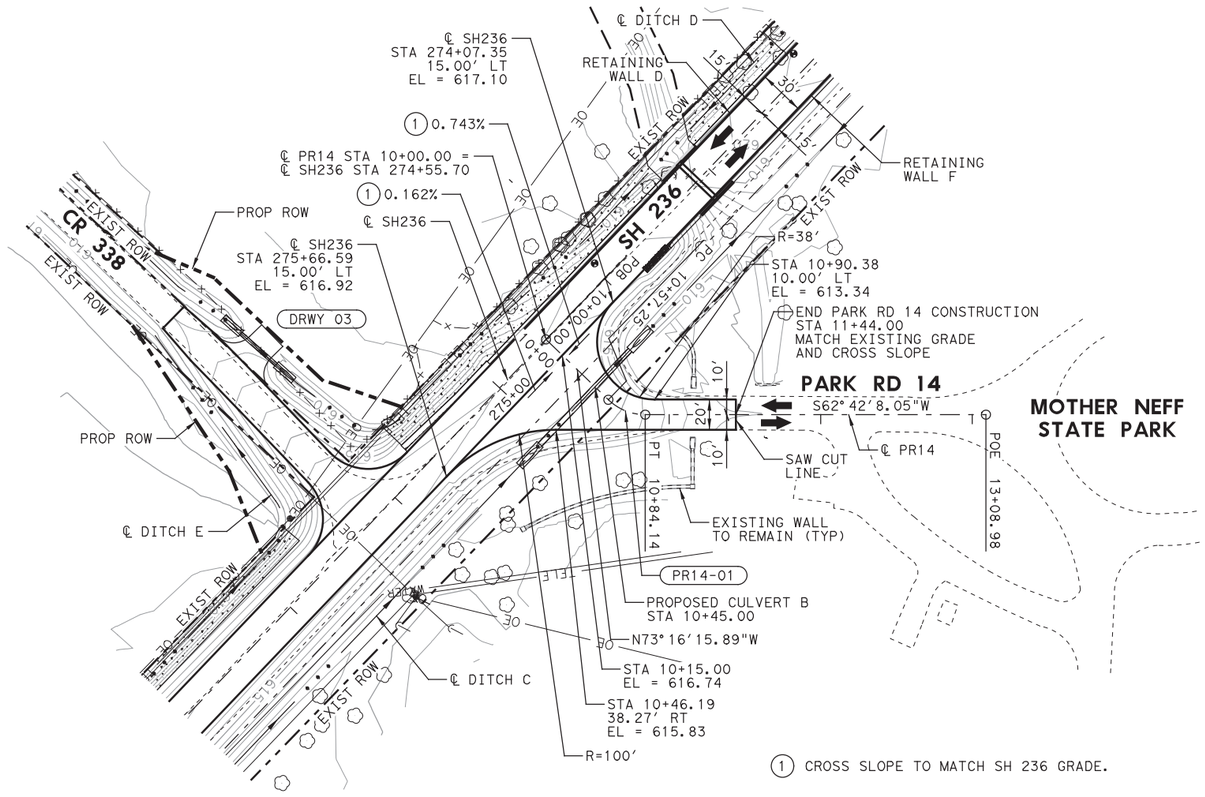
PLAN AND PROFILE

SH 236 AT LEON RIVER
STA 278+00 TO END

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	41
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 3/11/2021 TIME: 10:30:51 AM SCALE: 1:100
FILE: SH236RDPP04.dgn



LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

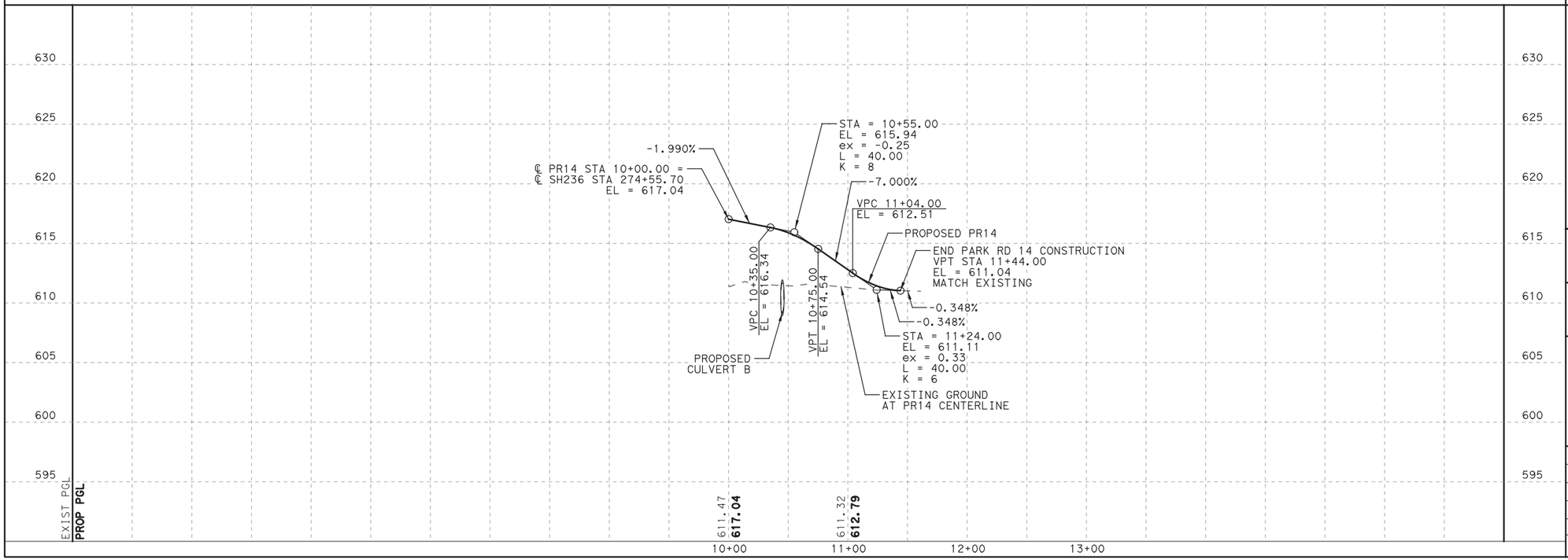
NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF PARK ROAD 14 CENTERLINE (℄ PR14) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.

CURVE (PR14-01)

P.I. STATION	= 10+71.40
DELTA	= 44°01'36.06" (LT)
DEGREE	= 163°42'08.02"
TANGENT	= 14.15
LENGTH	= 26.89
RADIUS	= 35.00
EXTERNAL	= 2.75
LONG CHORD	= 26.24
MID. ORD.	= 2.55
P.C. STATION	= 10+57.25
P.T. STATION	= 10+84.14

H: 0 50 100 150 200
V: 0 5 10 15 20
SCALE IN FEET



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHATSARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
08/20/2020
Phatsarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

PARK ROAD 14
PLAN AND PROFILE
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	42
CONTROL	SECTION	JOB	
0513	01	017	

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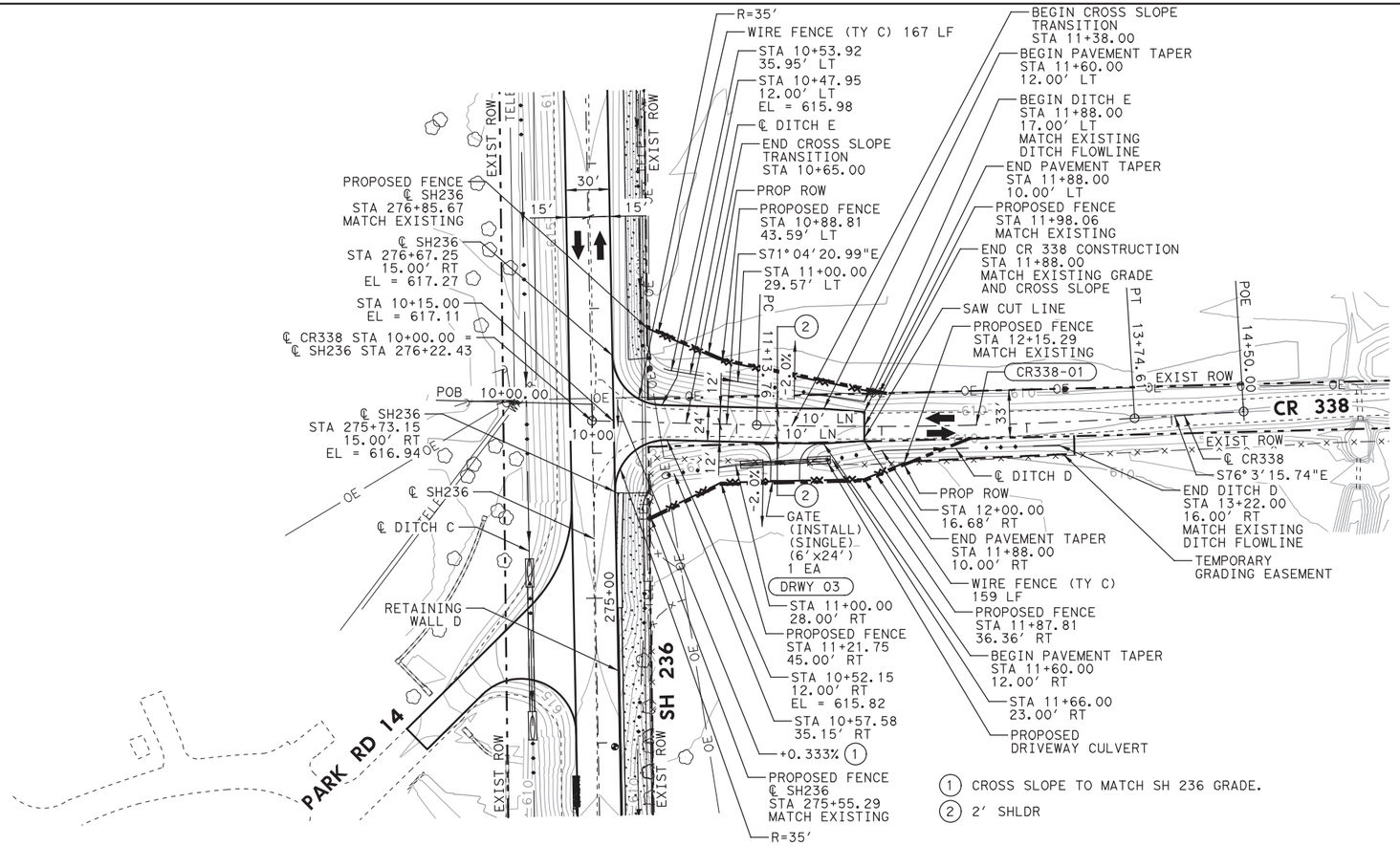

LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

CURVE (CR338-01)

P.I. STATION	= 12+44.27
DELTA	= 04°58'54.75" (LT)
DEGREE	= 01°54'35.49"
TANGENT	= 130.51
LENGTH	= 260.85
RADIUS	= 3,000.00
EXTERNAL	= 2.84
LONG CHORD	= 260.77
MID. ORD.	= 2.83
P.C. STATION	= 11+13.76
P.T. STATION	= 13+74.61

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF COUNTY ROAD 338 CENTERLINE (℄ CR338) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.
7. SEE "SH 236 PLAN AND PROFILE" SHEETS FOR DITCH CONTINUATIONS.

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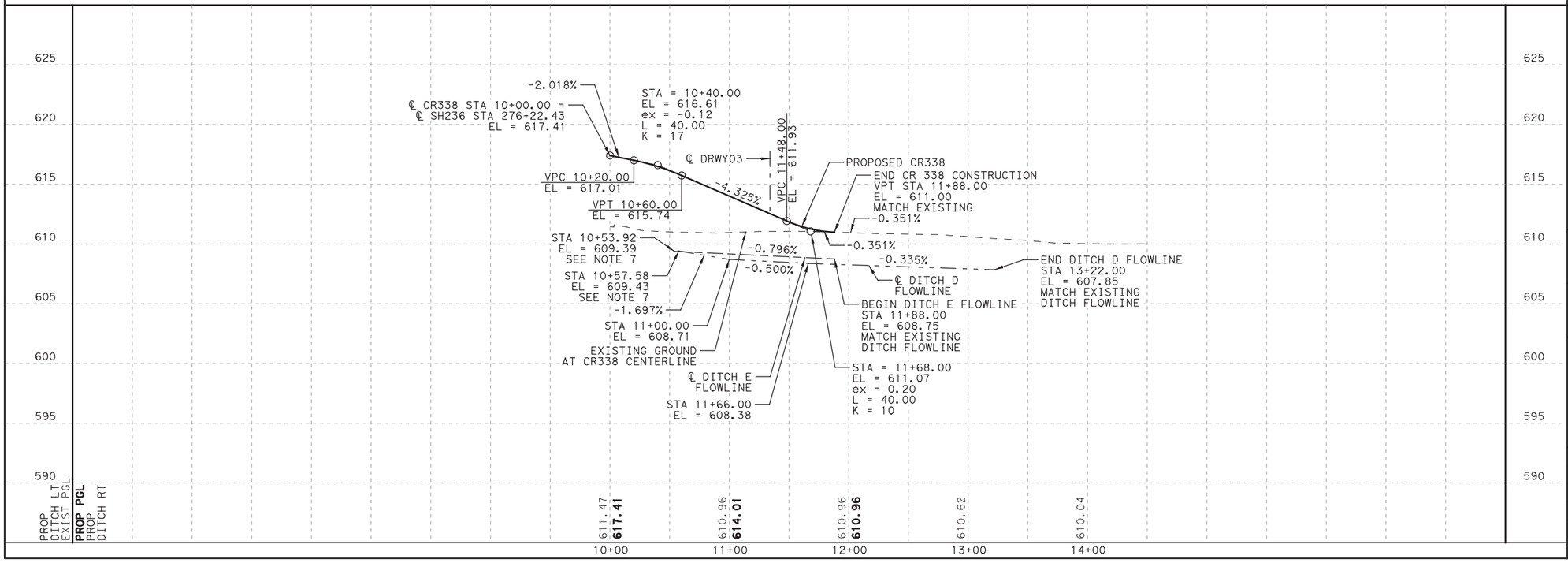
V: 0 5 10 15 20
SCALE IN FEET

NO.	DATE	REVISION	APPROVED



STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/12/2021
Phaisarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
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Round Rock, Texas 78681
512.685.2900

COUNTY ROAD 338 PLAN AND PROFILE
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	43
CONTROL	SECTION	JOB	
0513	01	017	

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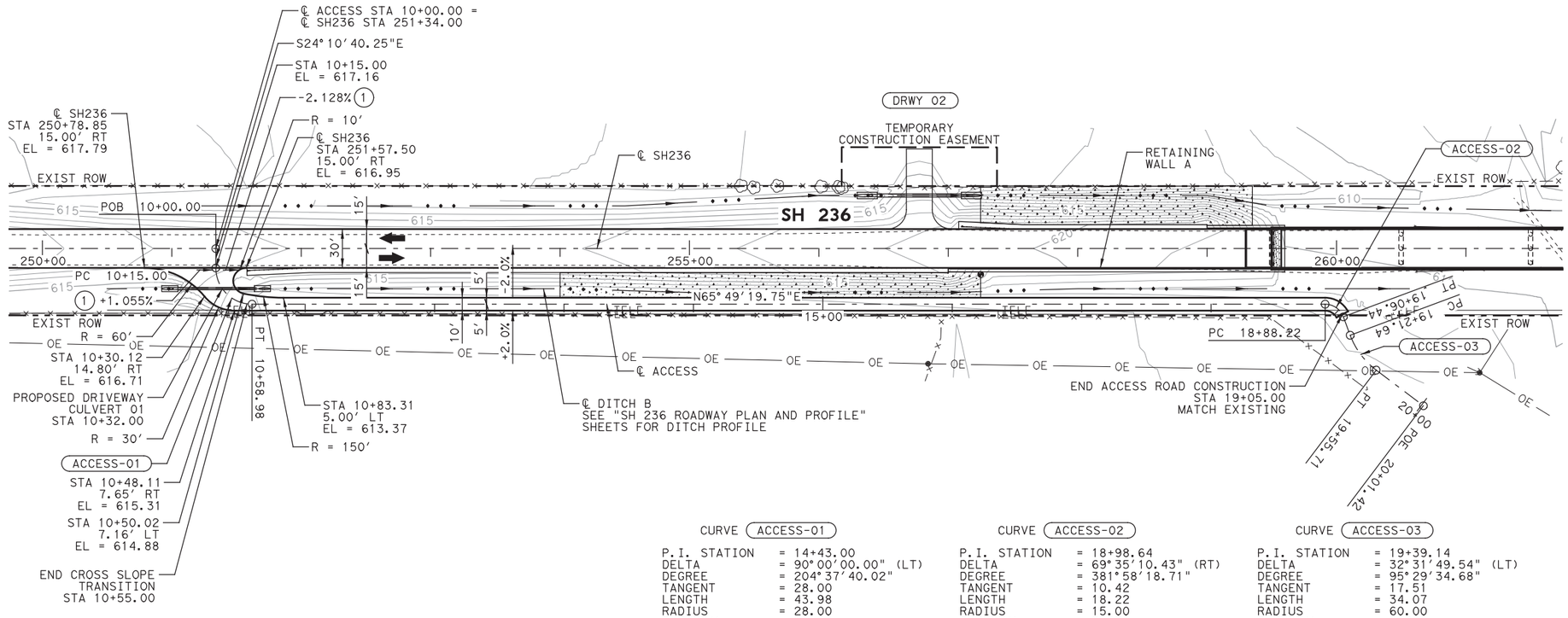


(1) CROSS SLOPE TO MATCH SH 236 GRADE.

CURVE ACCESS-01

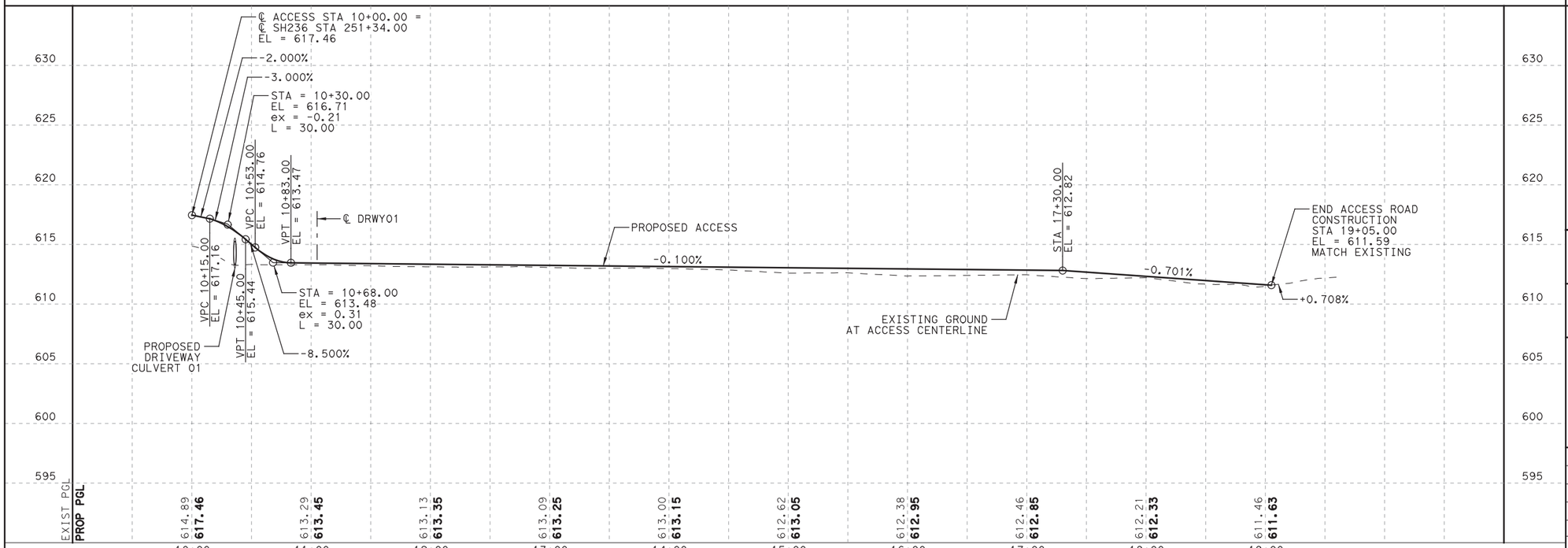
P.I. STATION	= 14+43.00
DELTA	= 90°00'00.00" (LT)
DEGREE	= 204°37'40.02"
TANGENT	= 28.00
LENGTH	= 43.98
RADIUS	= 28.00
EXTERNAL	= 11.60
LONG CHORD	= 39.60
MID. ORD.	= 8.20
P.C. STATION	= 10+15.00
P.T. STATION	= 10+58.98

CURVE ACCESS-02

P.I. STATION	= 18+98.64
DELTA	= 69°35'10.43" (RT)
DEGREE	= 381°58'18.71"
TANGENT	= 10.42
LENGTH	= 18.22
RADIUS	= 15.00
EXTERNAL	= 3.27
LONG CHORD	= 17.12
MID. ORD.	= 2.68
P.C. STATION	= 18+88.22
P.T. STATION	= 19+06.44

CURVE ACCESS-03

P.I. STATION	= 19+39.14
DELTA	= 32°31'49.54" (LT)
DEGREE	= 95°29'34.68"
TANGENT	= 17.51
LENGTH	= 34.07
RADIUS	= 60.00
EXTERNAL	= 2.50
LONG CHORD	= 33.61
MID. ORD.	= 2.40
P.C. STATION	= 19+21.64
P.T. STATION	= 19+55.71



LEGEND

- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- TRAFFIC FLOW

NOTES:

1. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL DIMENSIONS AND OFFSETS ARE TO EDGE OF PAVEMENT (EOP) AND ARE BASED OFF OF ACCESS ROAD CENTERLINE (℄ ACCESS) UNLESS OTHERWISE NOTED.
3. ALL EMBANKMENT SHALL BE DENSITY CONTROLLED AND SHALL MEET THE REQUIREMENTS SET FORTH IN THE GENERAL NOTES.
4. SAW CUTTING WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.
5. PROVIDE FOR SAFE AND CONVENIENT INGRESS AND EGRESS TO ABUTTING PROPERTY, HIGHWAY AND PUBLIC ROAD, AND STREET CROSSINGS WITHIN PROJECT LIMITS AT ALL TIMES. COORDINATE WORK ACTIVITIES TO MINIMIZE ANY INCONVENIENCE TO THE PUBLIC.
6. THE UTILITY INFORMATION SHOWN IS APPROXIMATE. FIELD VERIFY LIMITS AND LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION.

H: 0 50 100 150 200
V: 0 5 10 15 20
SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/30/2021
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

ACCESS ROAD PLAN AND PROFILE
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	44
CONTROL	SECTION	JOB	
0513	01	017	

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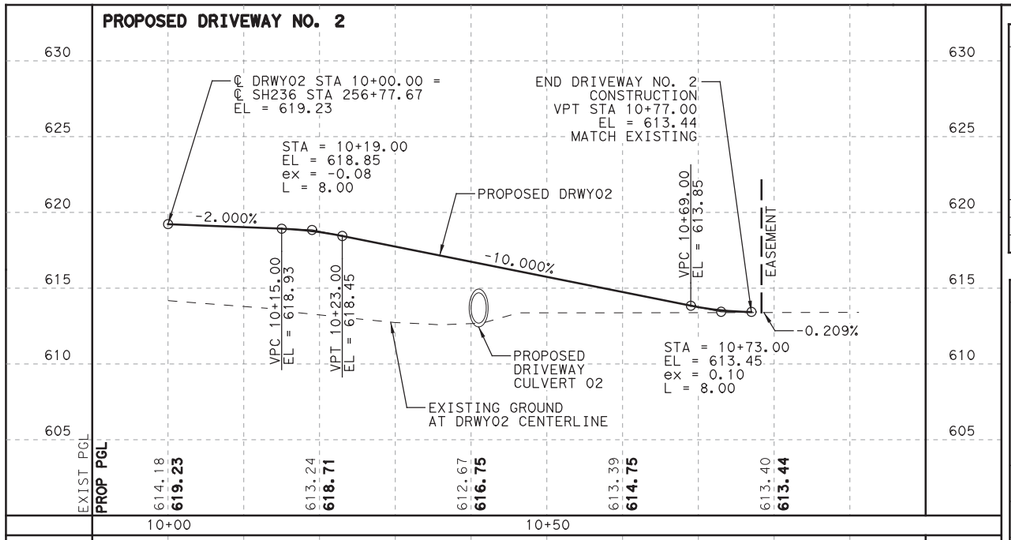
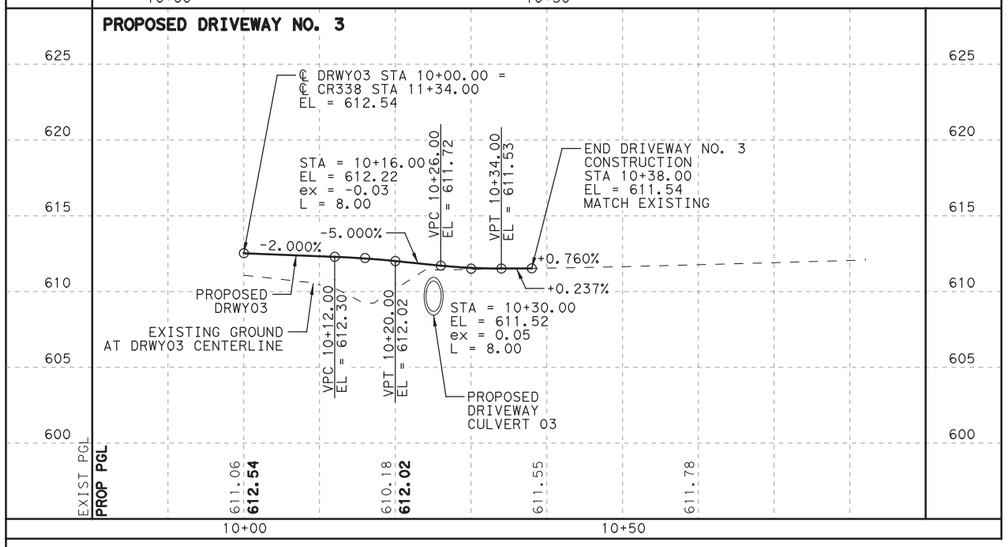




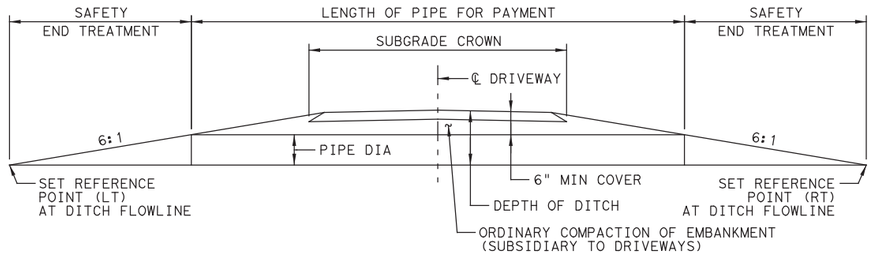
DRIVEWAY SUMMARY

DRIVEWAY NUMBER	LOCATION	STATION	LT OR RT	FOR CONTRACTOR'S INFORMATION ONLY "WIDTH" (FT)	"LENGTH" (FT)	RADIUS "R1" (FT)	RADIUS "R2" (FT)	EXISTING RIGHT OF WAY PENETRATION (FT)	247 6053 FL BS (CMP IN PLC) (TY D GR 1-2) (FNAL POS) Ø (CY)	310 6027 PRIME COAT (MC-30 OR AE-P) Ø (GAL)	3076 6069 D-GR HMA TY-C SAC-B PG64-22 (EXEMPT) Ø (TON)	530 6005 DRIVEWAYS (ACP) (SY)
ACCESS ROAD	SH 236	251+34.00	RT	SEE "ACCESS ROAD PLAN AND PROFILE" SHEET				-	201	225	123	1,081
DRWY02	SH 236	256+77.67	LT	20	62	15	15	29	25	30	17	149
DRWY03	CR 338	11+34.00	RT	20	26	15	15	26	12	14	9	68

DRIVEWAY CULVERT SUMMARY

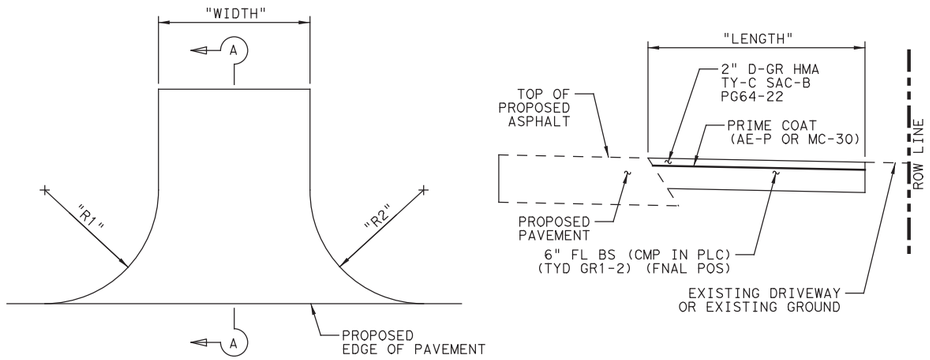
DRIVEWAY NUMBER	SET REFERENCE POINT: DRIVEWAY STATION (STA)	OFFSET (FT)	UPSTREAM ELEVATION (FT)	DOWNSTREAM ELEVATION (FT)	PIPE SLOPE (%)	464 6003 RC PIPE (CL III) (18 IN) (LF)	464 6005 RC PIPE (CL III) (24 IN) (LF)	467 6363 SET (TY II) (18 IN) (RCP) (6:1) (P) (EA)	467 6395 SET (TY II) (24 IN) (RCP) (6:1) (P) (EA)
ACCESS ROAD	10+21.32	43.51' RT	613.63	612.96	0.80	66	-	2	-
	10+73.29	12.00' LT							
DRWY02	10+41.00	48.00' LT	611.69	610.84	0.90	-	72	-	2
	10+41.00	48.00' RT							
DRWY03	10+27.58	30.91' RT	608.70	608.39	0.50	-	38	-	2
	10+22.92	30.91' LT							

Ø FOR CONTRACTOR'S INFORMATION ONLY. SUBSIDIARY TO ITEM 530.



DRIVEWAY CULVERT TYPICAL SECTION

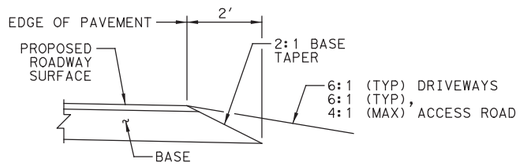
NOT TO SCALE



PLAN **SECTION A-A**

PROPOSED DRIVEWAY DETAIL

NOT TO SCALE



DRIVEWAY PAVEMENT EDGE DETAIL

NOT TO SCALE

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CHATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER
03/30/2021
Phaisarn Chatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

DRIVEWAY DETAILS

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	45
CONTROL	SECTION	JOB	
0513	01	017	

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USER: KBERGER DATE: 3/30/2021 TIME: 1:42:41 PM SCALE: 1:20
FILE: SH236DRWOI.dgn

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	N/A	40	SH 236	273+55	TL3	BI	CONCRETE	6"	CONCRETE RAIL	14"	34"	50'-0"	1								X	
												TOTALS	1									

LEGEND:

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

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

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
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08/20/2020

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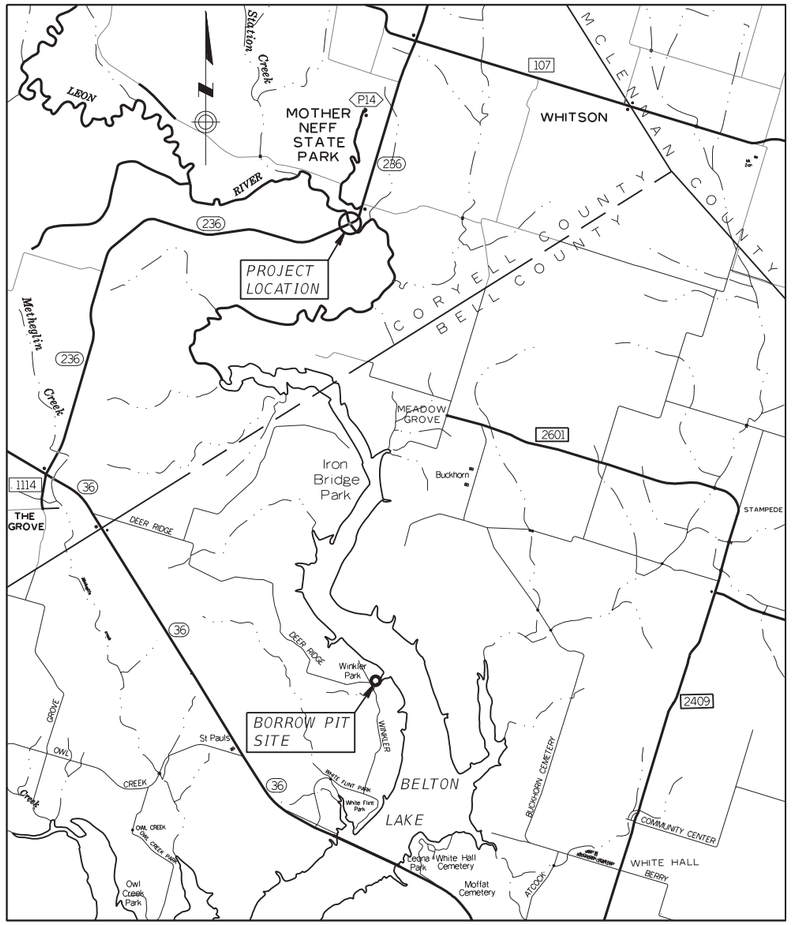
512.685.2900

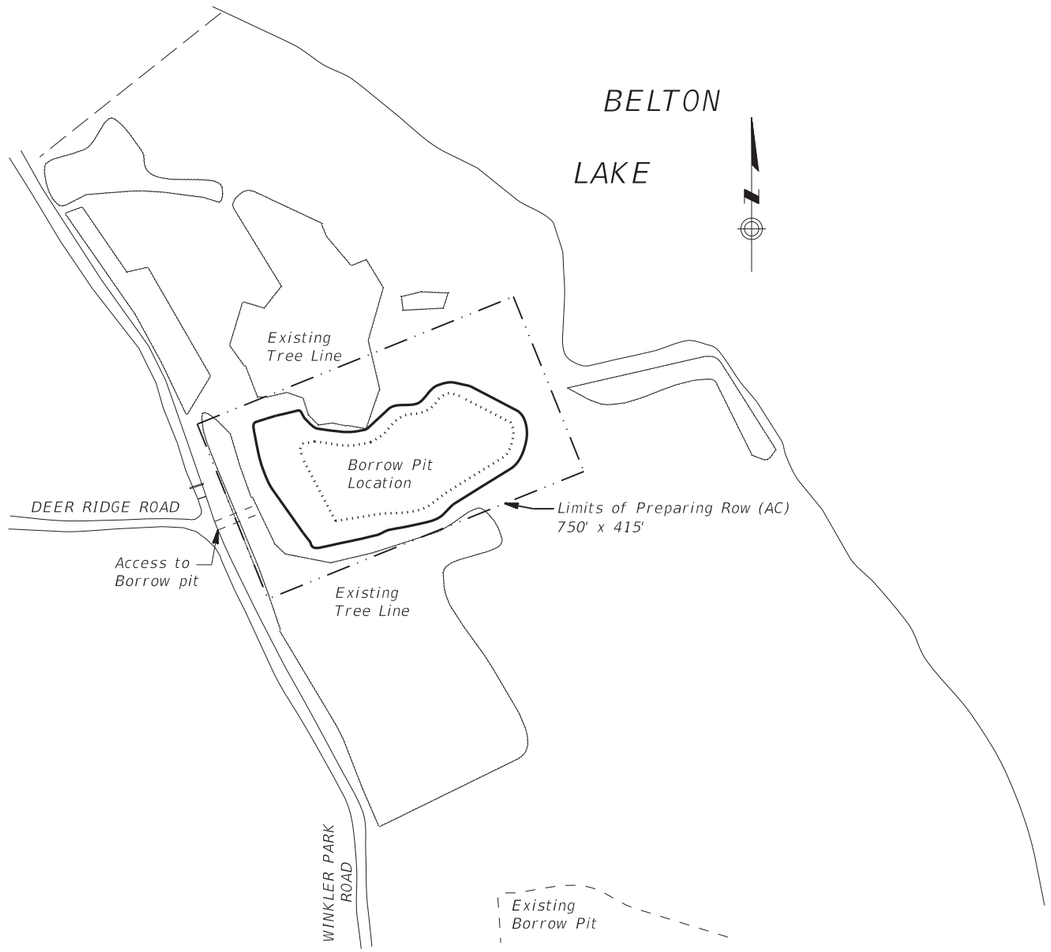
CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		
	WACO	CORYELL		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			46



LOCATION MAP

NOT TO SCALE



BORROW PIT AREA

NOT TO SCALE

NOTES:

1. Borrow pit location is approximately 9.5 miles from the project site.
2. The limits of the borrow pit shown are approximate. The area to be excavated shall be verified in the field by the engineer, prior to beginning construction. Excavation of the borrow site shall be paid for under Item 158 SPEC EXCAV WORK (VEHICLE).
3. In the areas of proposed excavation, the top 3" of topsoil shall be removed and stockpiled in windrows adjacent to the borrow pit. Upon completion of excavation, this material shall be put back in place upon all areas of excavation. This shall be paid for under Item 160 "FURNISHING AND PLACING TOPSOIL" (3").
4. All areas of excavation shall be compacted prior to placement of topsoil. Bentonite, or an equivalent, shall be placed upon the surface of the bottom of the borrow site after compaction (Estimated @ 135,000 SF). The rate of application of bentonite shall be one-half pound per square foot. Bentonite, and its placement, shall be subsidiary to Item 160 "FURNISHING AND PLACING TOPSOIL" (3").
5. Install 50 LF corrugated metal pipe (12" diameter) to match bottom flow elevation of the borrow site. Location of pipe culvert will be as approved and should be placed at location to outfall to drain to Belton Lake. The control structure required shall be an Agri Drain Inline Water Level Control Structure, or equivalent, of 12" diameter pipe size. Grade outfall downstream of pipe culvert to drain. The pipe, control structure and grading of outfall is subsidiary to item 460, "Corrugated Metal Pipe".
6. Clearing, vegetation and brush removal and small tree removal for designated area for borrow site shall be paid under Item 100, "Preparing Right of Way" (AC). Removal of trees and brush for access road is included in limits for measurement. Limit tree removal to trees with diameters less than 12 inches unless approved. Avoid tree removals in areas shown as existing tree lines unless approved.
7. Access road location to be approved. Limit brush clearing and tree removal to allow vehicular access for construction traffic.
8. For SW3P plan, follow all TxDOT and federal requirements as described in the plans.

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

03/14/2021

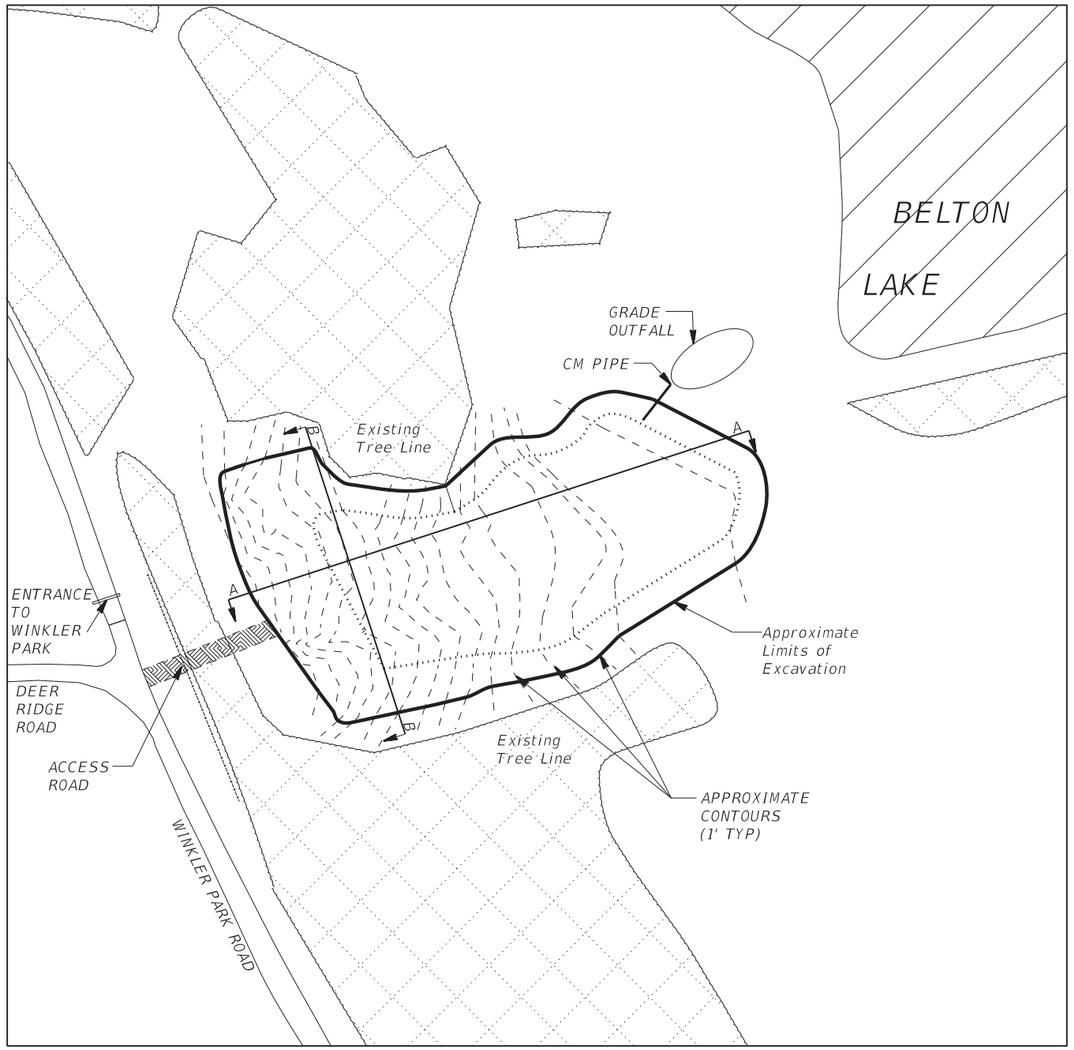
Texas Department of Transportation

BORROW PIT DETAIL

SH 236 OVER LEON RIVER

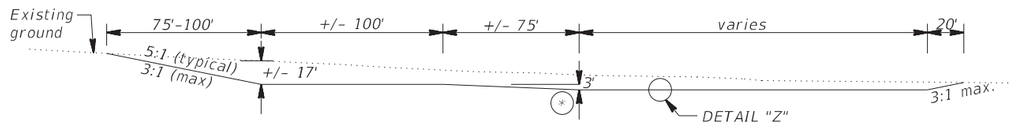
FILE: BORROWPIT.DGN	DN: TxDOT	CK: TxDOT	DW: GNH	CK: TxDOT
© TxDOT 2021	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS	WACO			47

COUNTY	CONTROL	SECT	JOB	HIGHWAY
CORYELL	0513	01	017	SH 236



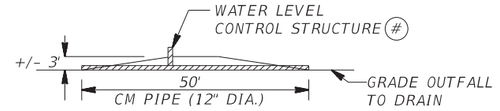
PLAN LAYOUT

NOT TO SCALE

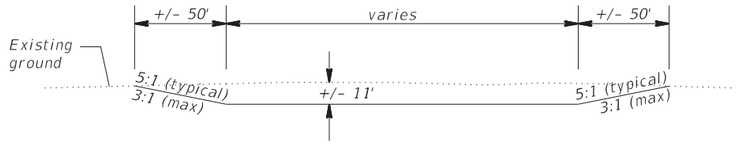


(*) HEIGHT MAY VARY DEPENDING ON FLOW LINE ELEVATION AT OUTFALL, SHOULD BE AT LEAST 3' MINIMUM

SECTION A-A



(#) HEIGHT CAN BE VARIED DEPENDING ON HEIGHT OF FILL ABOVE FLOW LINE (MINIMUM 3', TYPICAL 5')

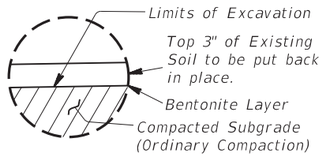


SECTION B-B

NOTE: ALL DIMENSIONS MAY VARY FOR EXCAVATION VOLUME NEEDED TO MATCH EXCAVATION QUANTITY IN THE PLANS.

ITEM	DESCRIPTION	UNIT	QUANTITY
100-6001	PREPARING ROW	AC	7.1
158-6006	SPEC EXCAV WORK (VEHICLE)	CY	19,712
160-6006	FURNISHING AND PLACING TOPSOIL (3")	SY	14,970
460-6001	CMP (GAL STL 12 IN)	LF	50
(1) 460	WATER LEVEL CONTROL STRUCTURE		

(1) FOR CONTRACTOR'S INFO ONLY, SUBSIDIARY TO ITEM 460



DETAIL "Z"

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

03/14/2021

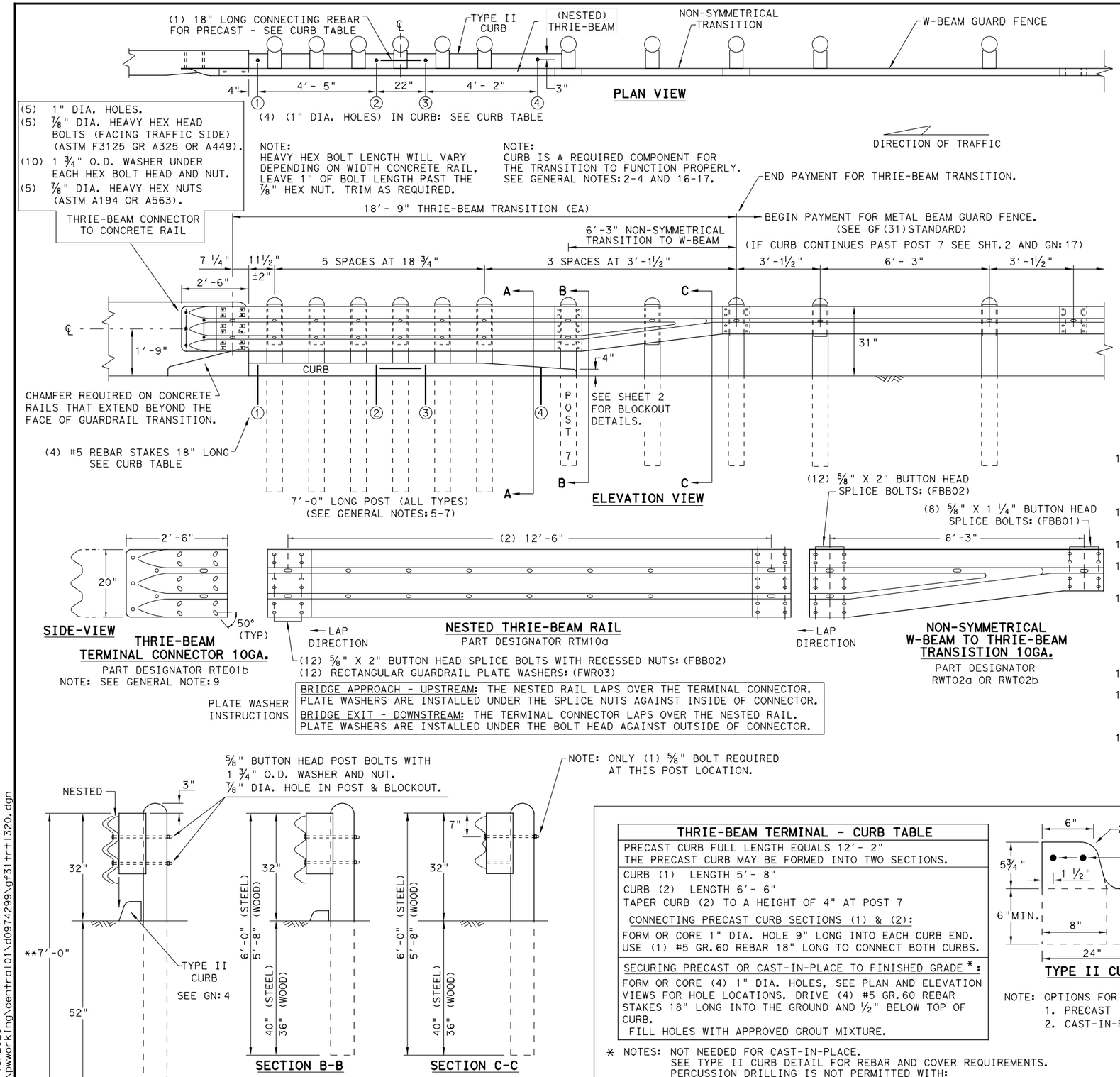
Texas Department of Transportation

BORROW PIT DETAIL

SH 236 OVER LEON RIVER

FILE: BORROWPIT.DGN	DN: TxDOT	CK: TxDOT	DW: GNH	CK: TxDOT
© TxDOT 2021	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS	WACO			48
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	CORYELL	0513	01	017	SH 236

DATE: 11/19/2020
FILE: c:\pwworking\central01\d0974299\gf31trt1320.dgn



GENERAL NOTES

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

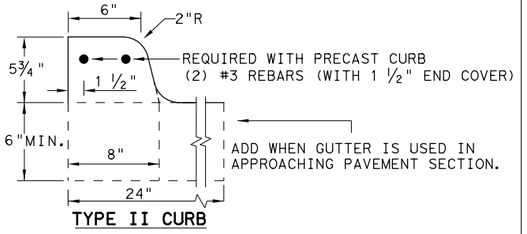
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

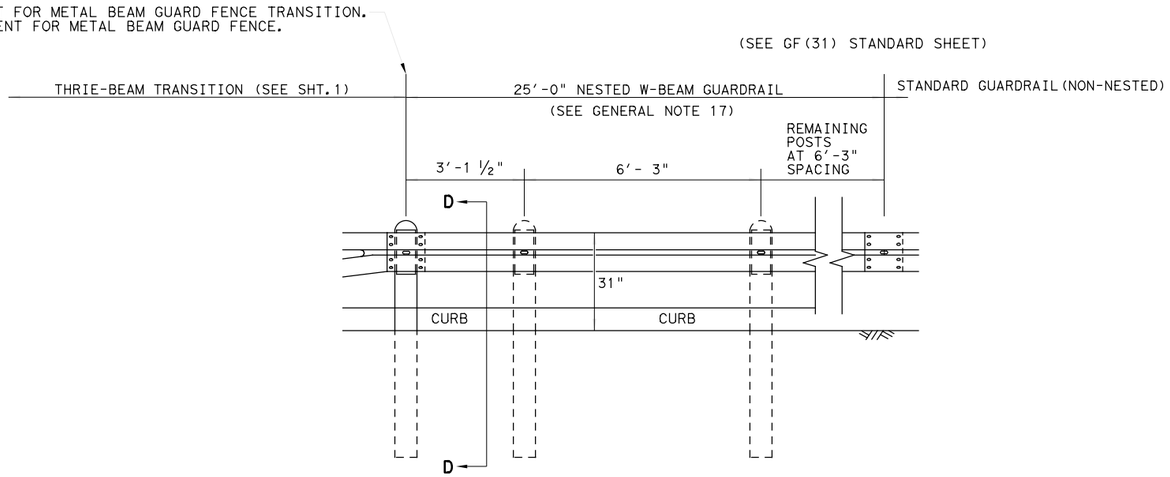
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

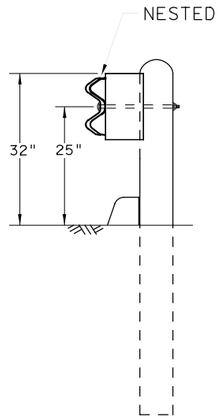
FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		49

DATE: 11/19/2020
FILE: c:\pwworking\central01\d0974299\gf31trt1320.dgn

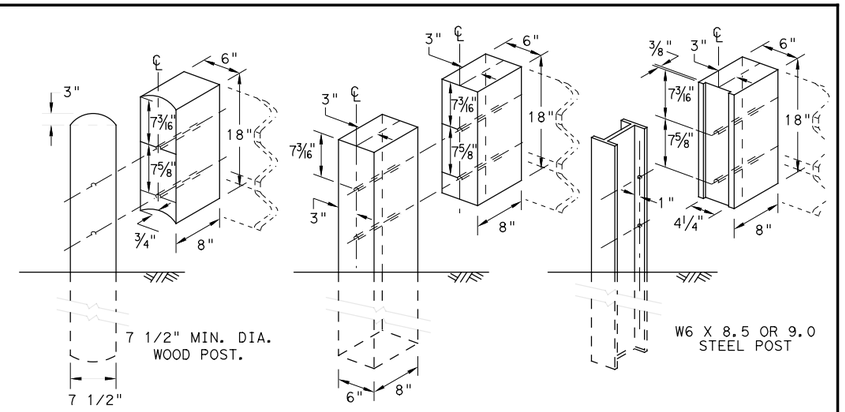
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0513	01	017		SH236	
	DIST	COUNTY			SHEET NO.	
	WACO	CORYELL			50	

DATE: 8/3/2020
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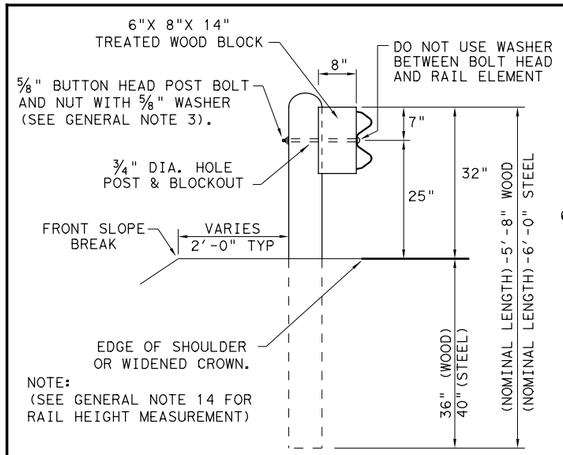
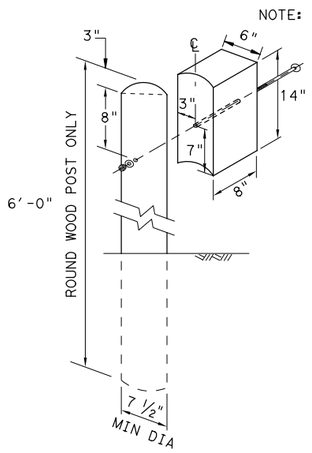
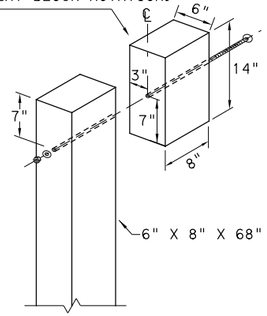


TYPICAL POST PLACEMENT

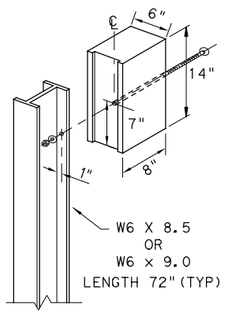


WOOD BLOCK TO ROUND WOOD POST

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

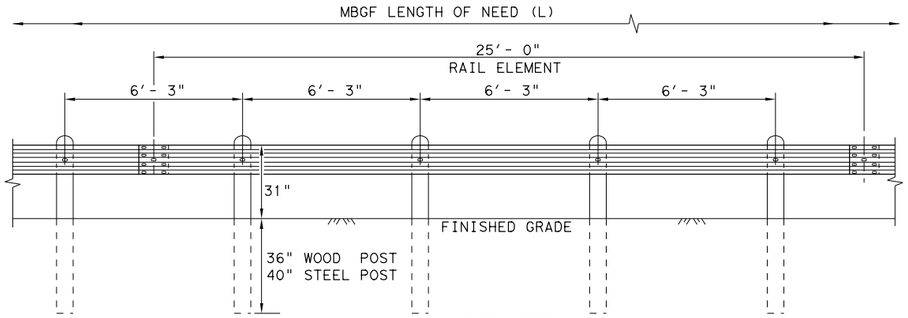


WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

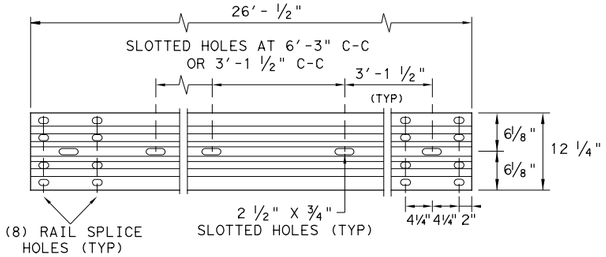
NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

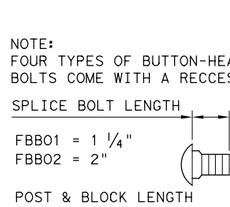
ELEVATION
MID-SPAN RAIL SPLICE

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



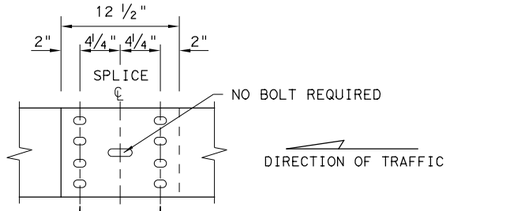
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



BUTTON HEAD BOLT

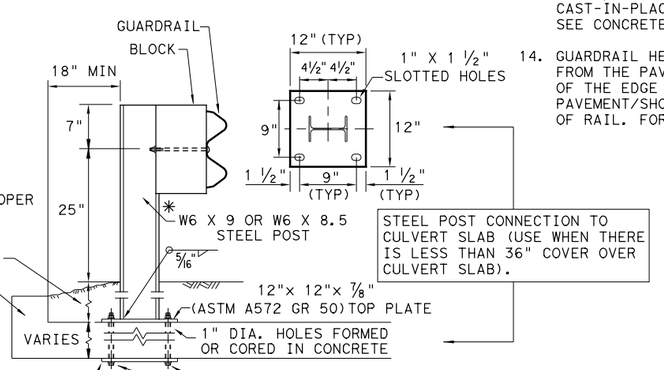
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



DIRECTION OF TRAFFIC

MID-SPAN RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
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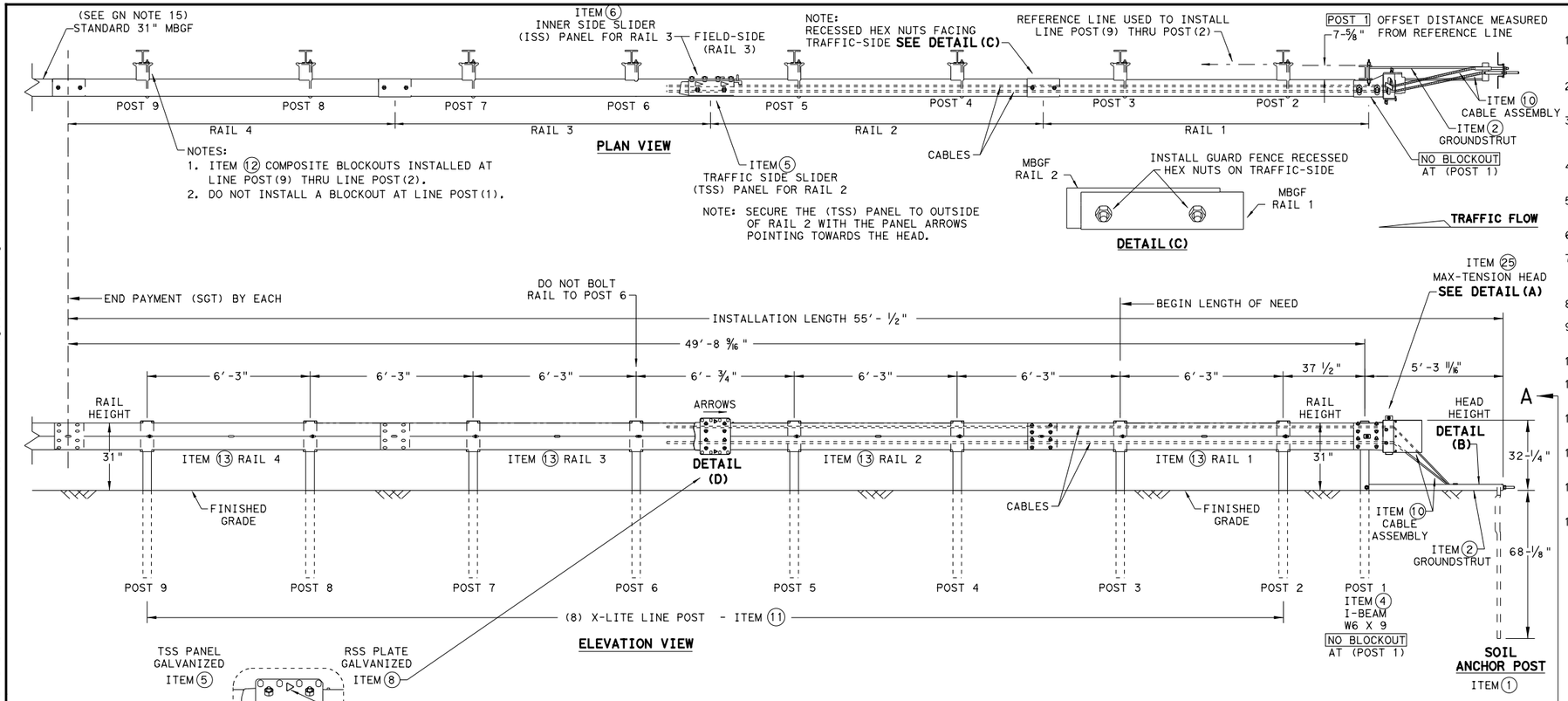
	WACO	CORYELL		51



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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		52

DATE: 8/3/2020
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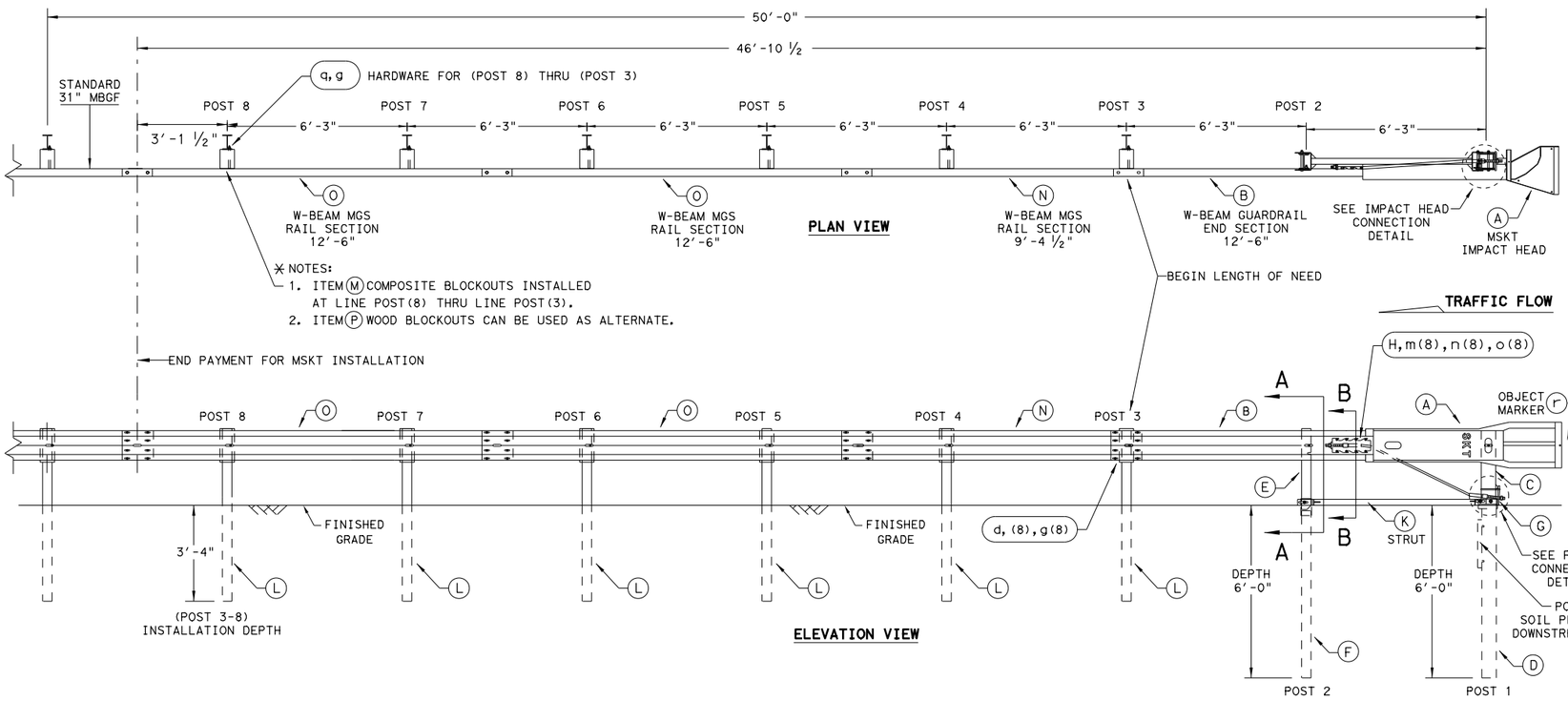


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

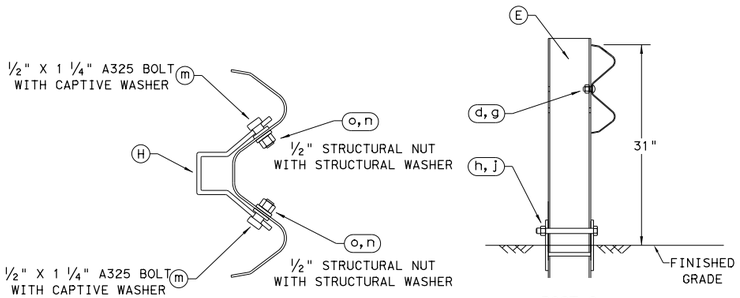
GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 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	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" 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

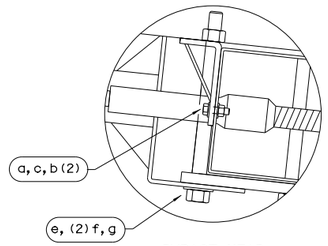
SEE NOTES: ✳

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

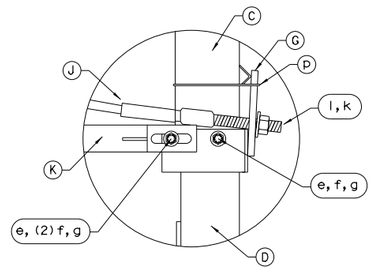


SECTION B-B
ANCHOR BRACKET

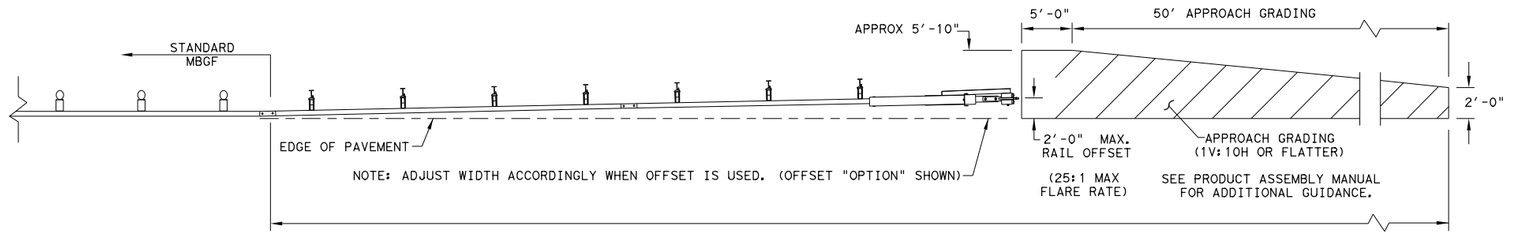
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

TRAFFIC FLOW

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0513	01	017	SH236	
	DIST	COUNTY		SHEET NO.	
	WACO	CORYELL		53	

DATE: 8/3/2020
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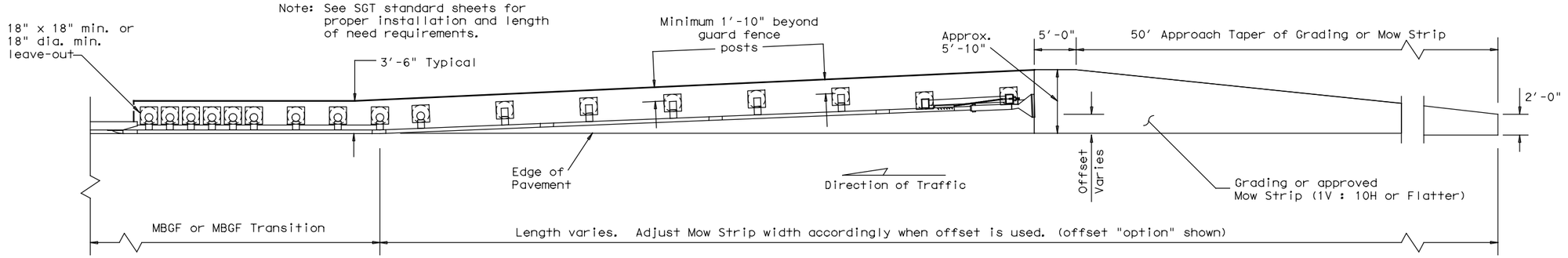
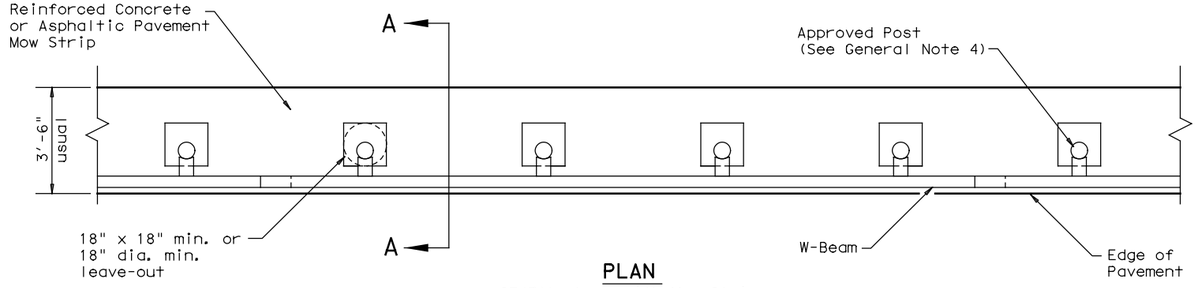
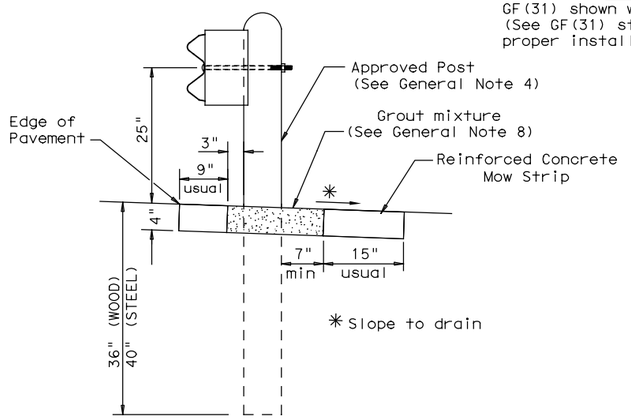


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



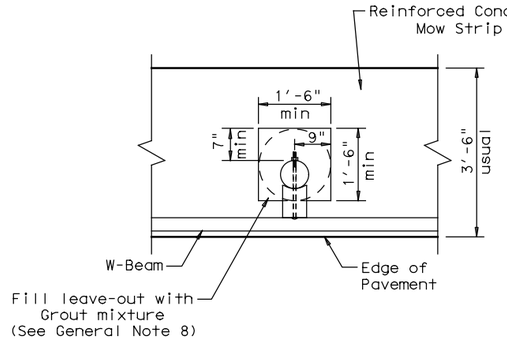
PLAN

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



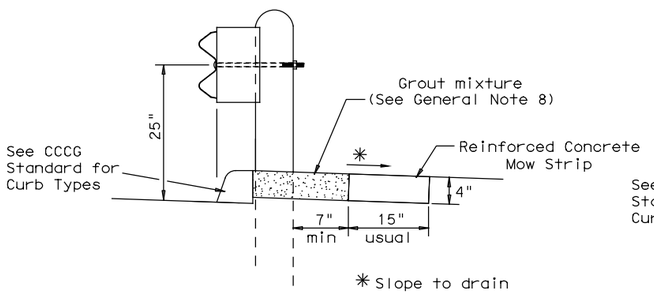
SECTION A-A

Typical



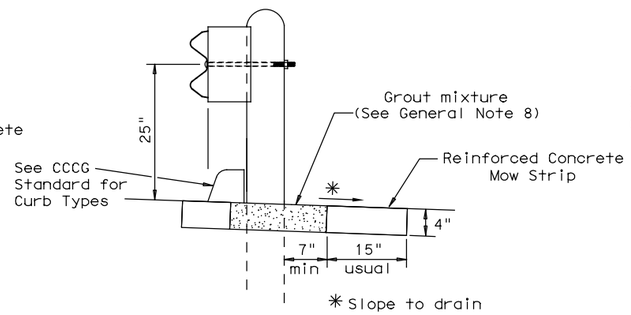
MOW STRIP DETAIL

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



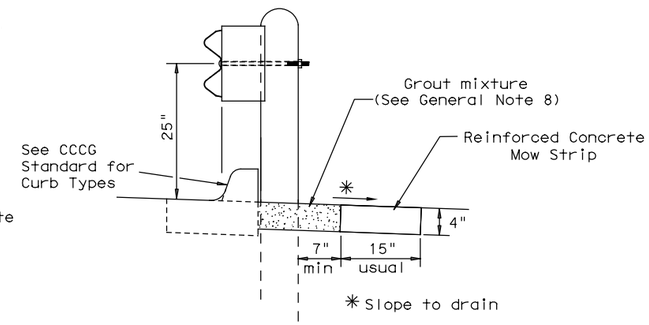
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		54

DATE: 8/3/2020 11:00:55 AM
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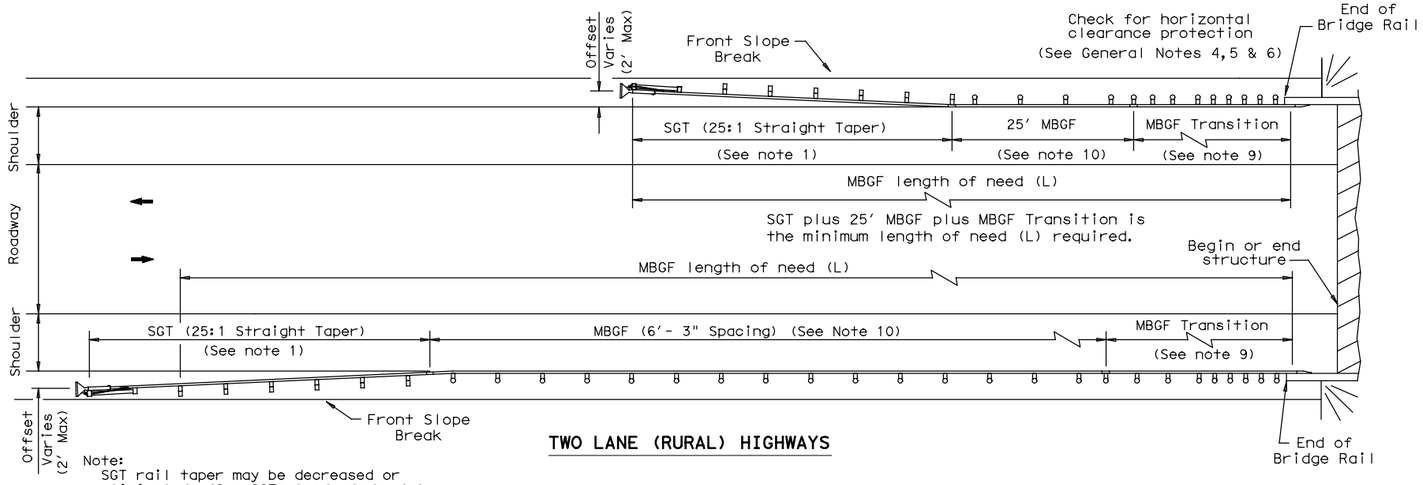
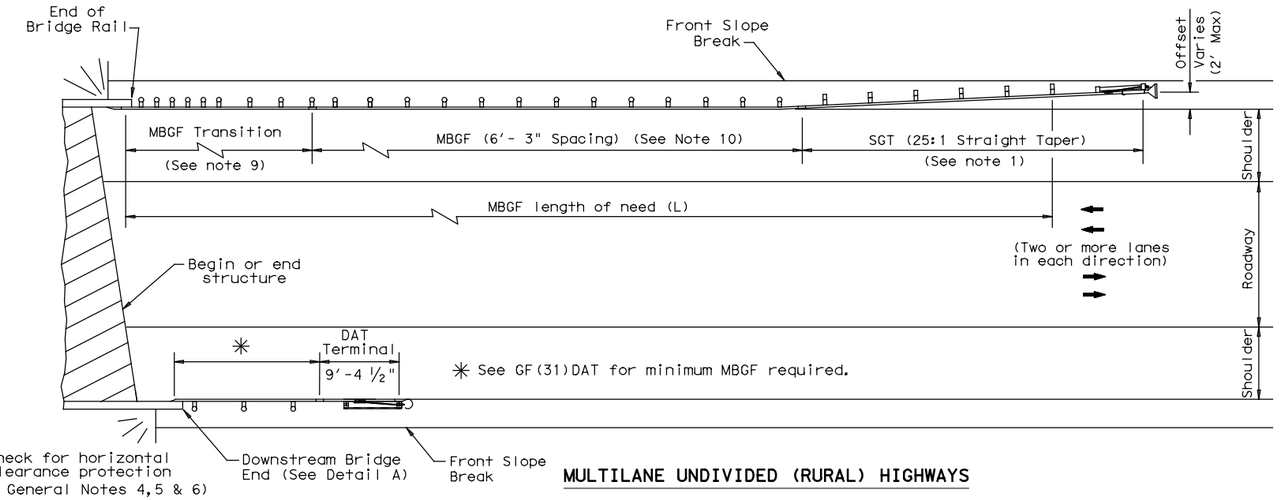
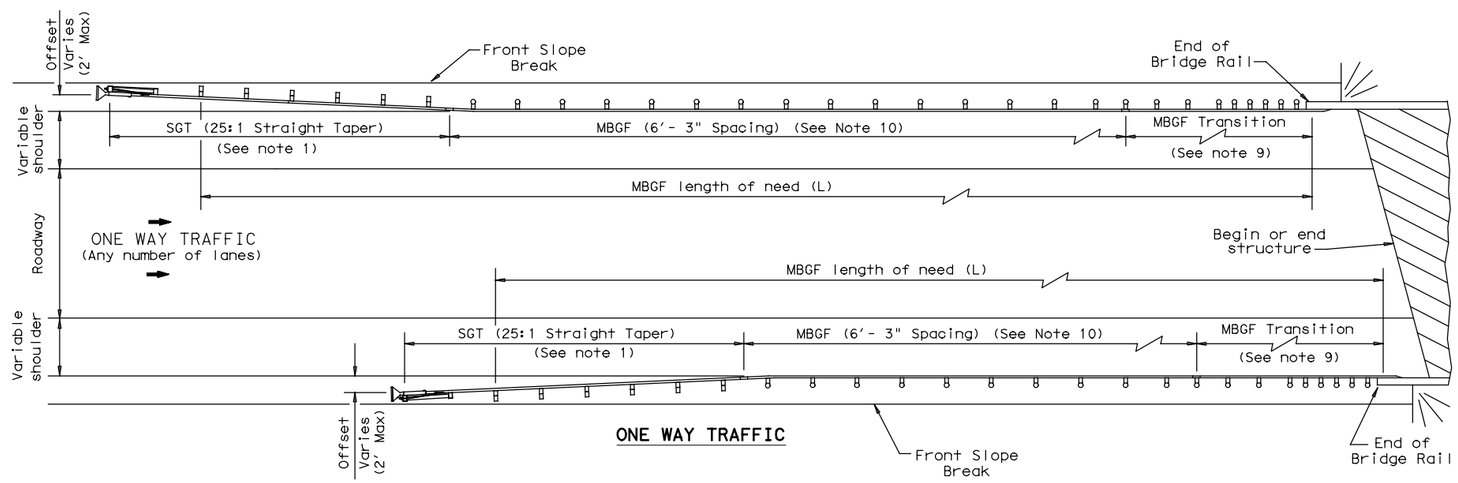


TWO LANE (RURAL) HIGHWAYS

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



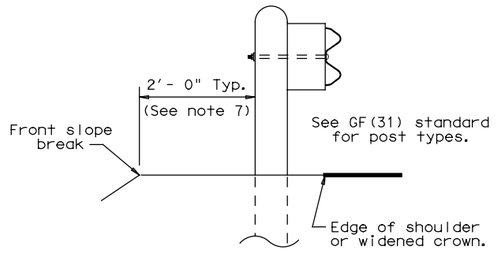
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



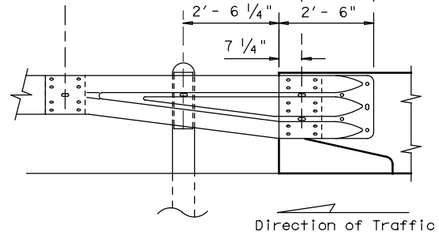
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

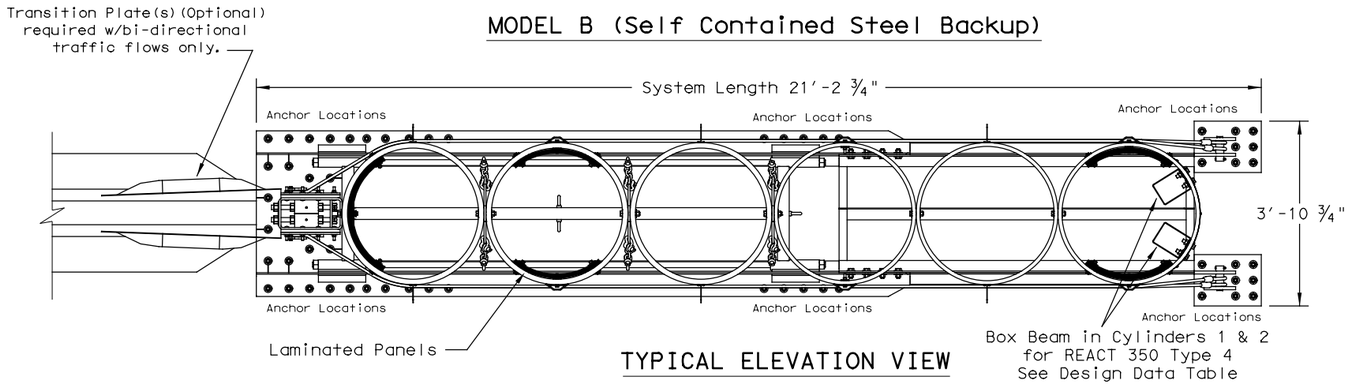
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		55

DATE: 8/3/2020
FILE: c:\pwworking\central01\d0974299\reactn16.dgn

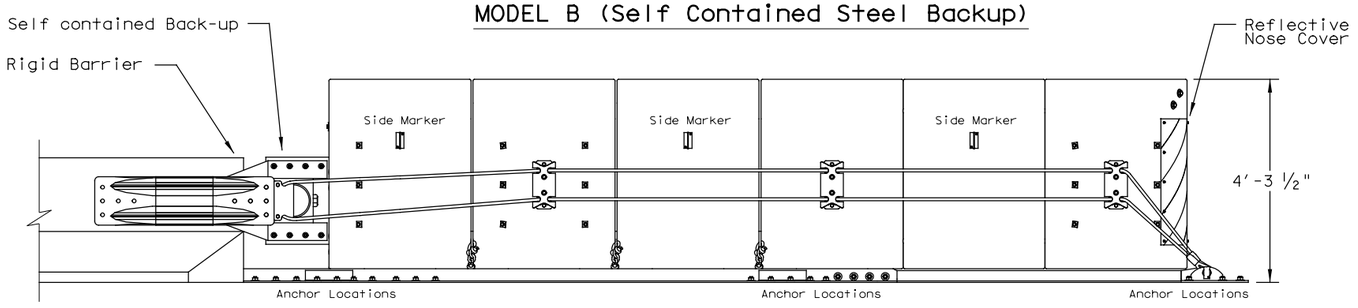
TYPICAL PLAN VIEW

MODEL B (Self Contained Steel Backup)



TYPICAL ELEVATION VIEW

MODEL B (Self Contained Steel Backup)



GENERAL NOTES

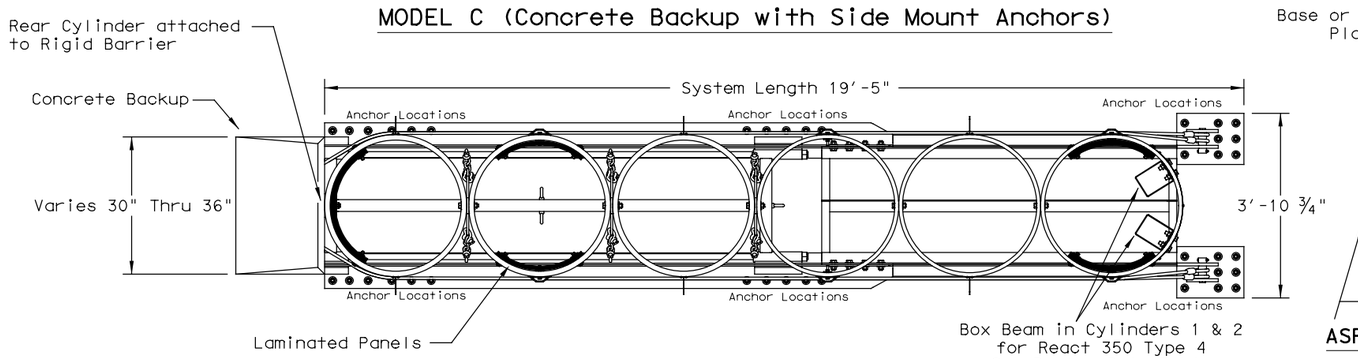
1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. The nose of the REACT 350 shall be clad with a plastic wrap with standard delineation adhered to the wrap and shall have a series of side marker reflectors on both sides of the unit. See site plan views for marker and plastic wrap color orientation.
3. All steel components to be hot dipped galvanized except stakes, drive spikes, threaded bolts in backup unit, and wedge fittings on cables.
4. The installation area should be free from curbs, elevated objects, or depressions. If the REACT system is to span expansion joints contact the manufacturer.
5. The REACT system should be approximately parallel with the barrier or ℄ of merging barriers. The maximum permissible cross-slope is 8%.
6. REACT 350 II has laminated panels in cyliners 1, 5, & 6.

DESIGN DATA TABLE FOR REACT 350 AND REACT 350 II				
TYPE	REACT 350 4-B	REACT 350 4-C	REACT 350 II 6-B	REACT 350 II 6-C
Test Level	TL-2	TL-2	TL-3	TL-3
OVERALL LENGTH	15'-3"	13'-9"	21'-3"	19'-5"

FOUNDATION AND ANCHORAGE TABLE FOR REACT 350 AND REACT 350 II			
FOUNDATION TYPE		MINIMUM THICKNESS	ANCHORAGE
A	CONCRETE PAD OR ROADWAY	6"	MP-3 WITH 7" STUDS [5.5" EMBEDMENT]
B	ASPHALT OVER CONCRETE PAVEMENT	6" CONCRETE PAVEMENT	ANCHOR LENGTH REQUIRED IS 7" STUD PLUS ASPHALT THICKNESS
C	ASPHALT OVER BASE	6" ACP + 6" BASE	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]
D	ASPHALT ONLY	8"	MP-3 WITH 18" STUDS [16.5" EMBEDMENT]

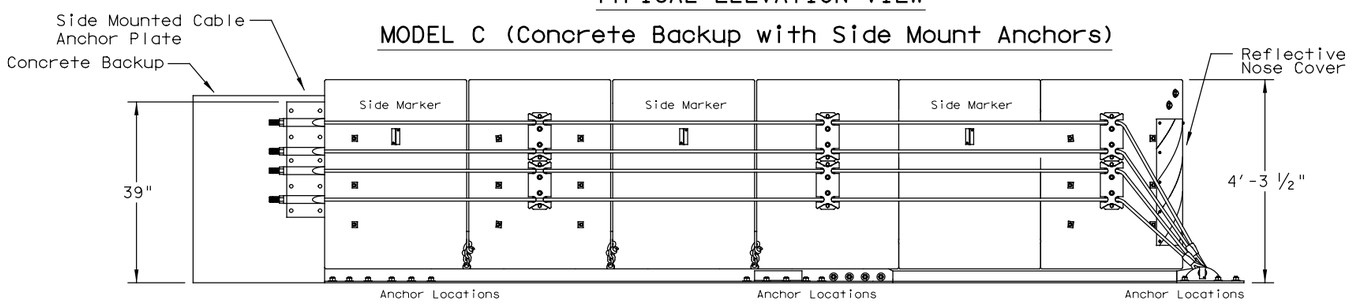
TYPICAL PLAN VIEW

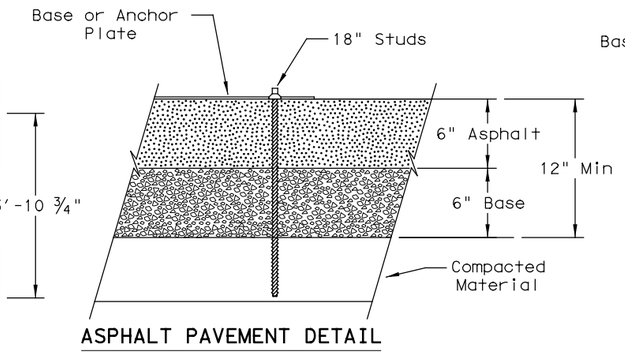
MODEL C (Concrete Backup with Side Mount Anchors)



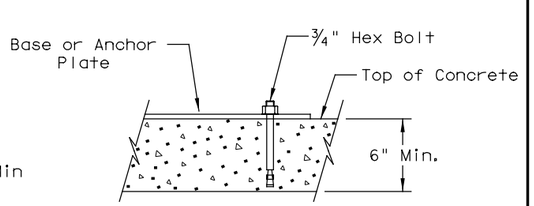
TYPICAL ELEVATION VIEW

MODEL C (Concrete Backup with Side Mount Anchors)

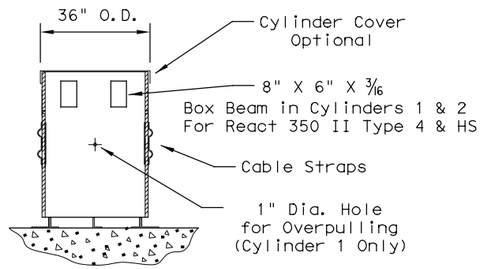




ASPHALT PAVEMENT DETAIL



CONCRETE PAVEMENT DETAIL



TYPICAL CYLINDER

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION (REACT 350 NARROW) (REACT 350 II NARROW)

REACT(N)-16

FILE: reactn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
REVISED 06,2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03,2016 (VP)	WACO	CORYELL		56

LOW MAINTENANCE

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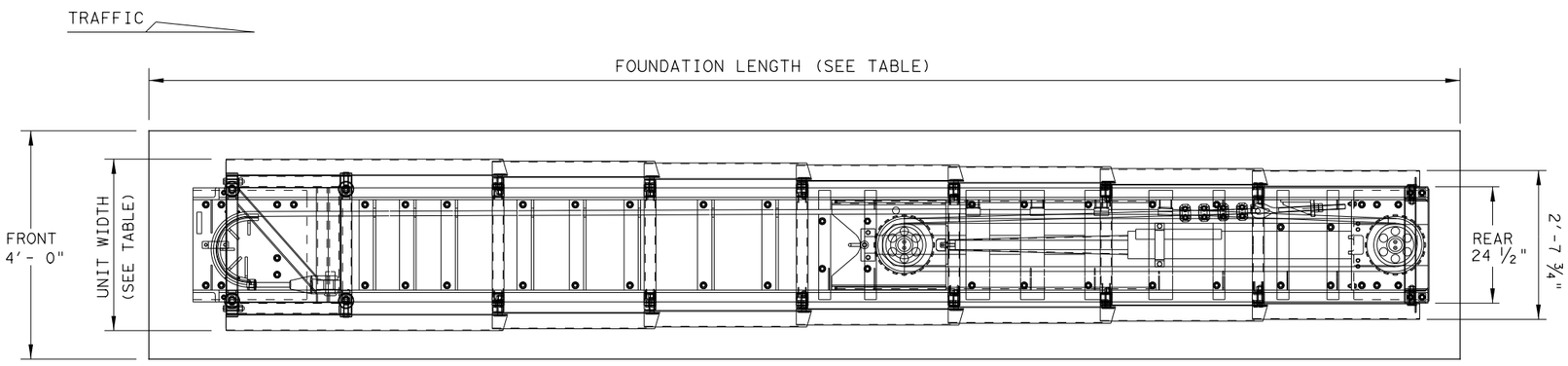
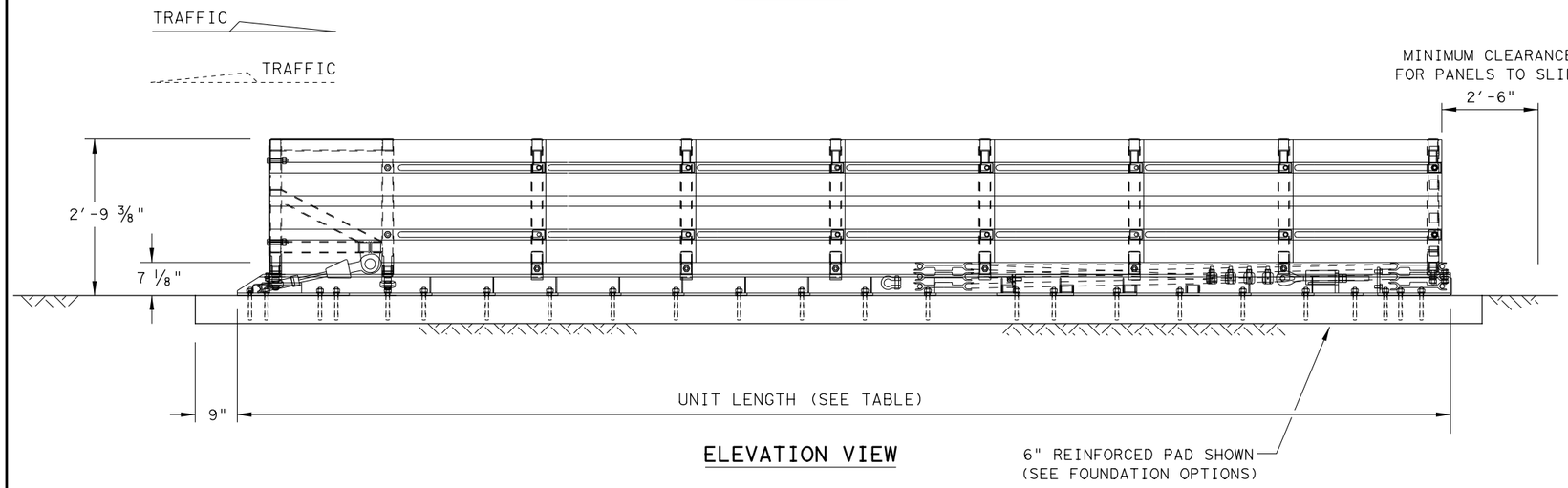


PLAN VIEW



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

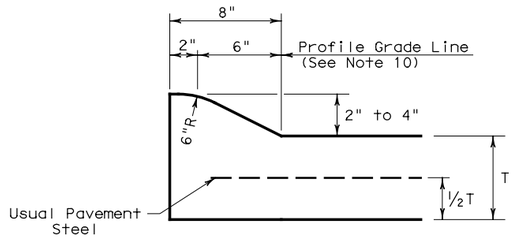
WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

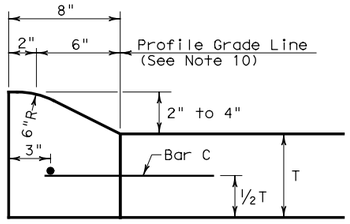
LOW MAINTENANCE

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		57

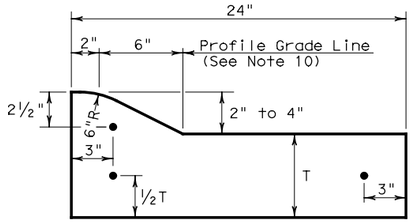
DATE: 3/26/2021
FILE: c:\pwworking\central01\d0974299\cccg21.dgn



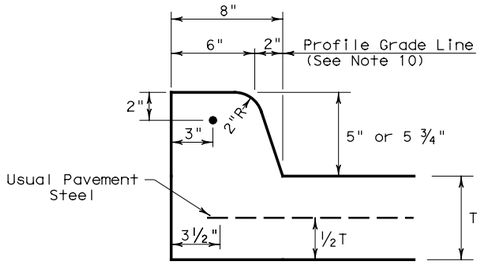
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



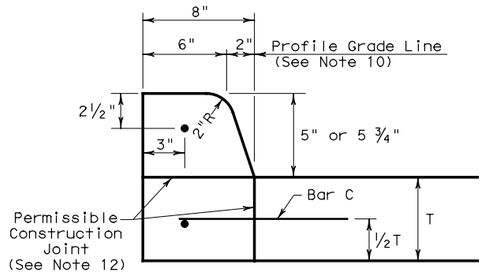
TYPE I CURB
2" - 4" HEIGHT



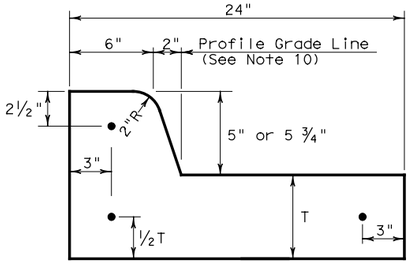
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



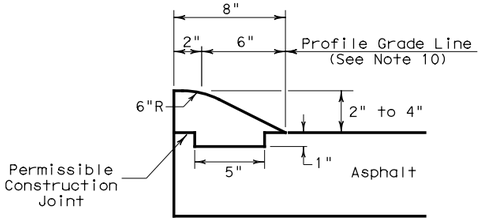
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



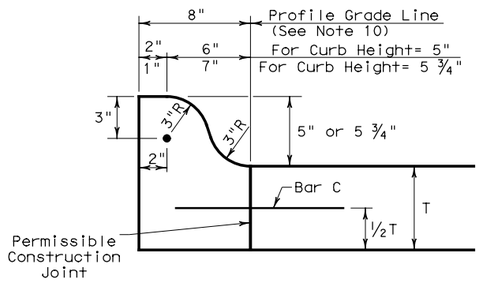
TYPE II CURB
5" - 5 ¾" HEIGHT



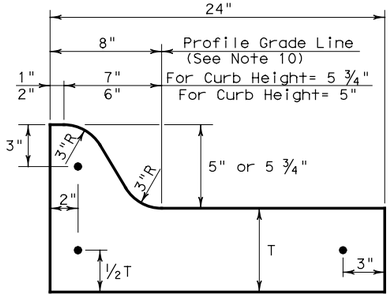
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



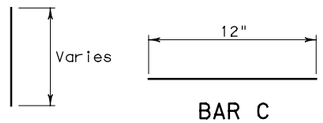
TYPE III CURB (KEYED)
2" - 4" HEIGHT



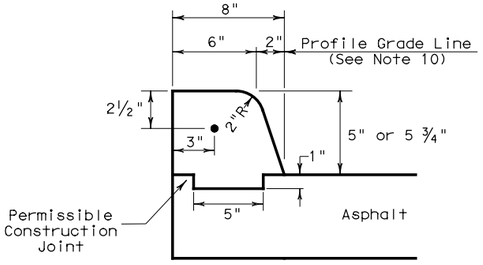
TYPE IIa CURB
5" - 5 ¾" HEIGHT



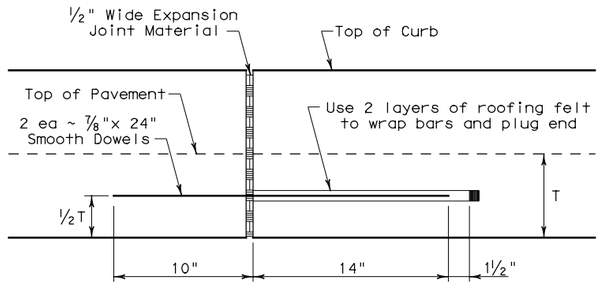
TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



BAR B BAR C

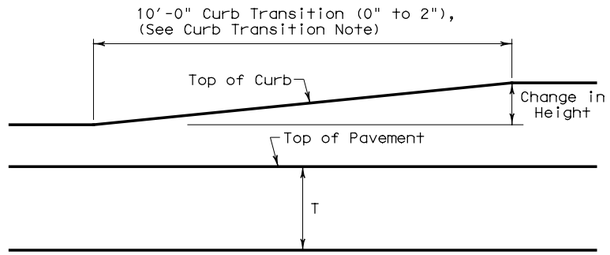


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and the grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B used as needed to support curb reinforcing steel during concrete placement.

Texas Department of Transportation

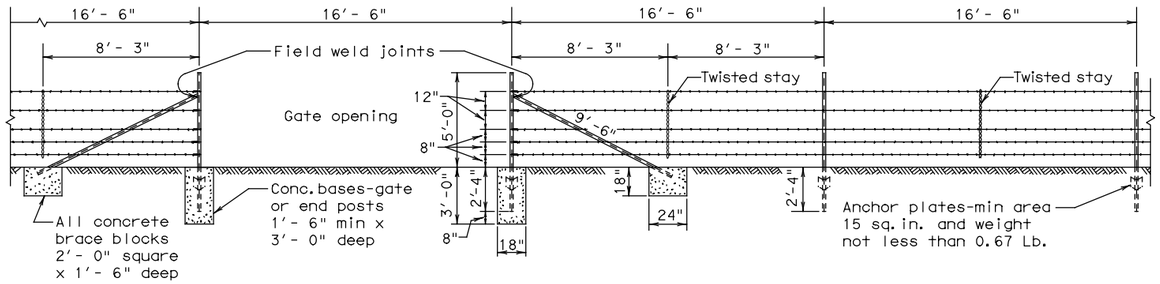
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		58

DATE: 8/3/2020
FILE: c:\pwworking\central01\d0974299\wf210.dgn

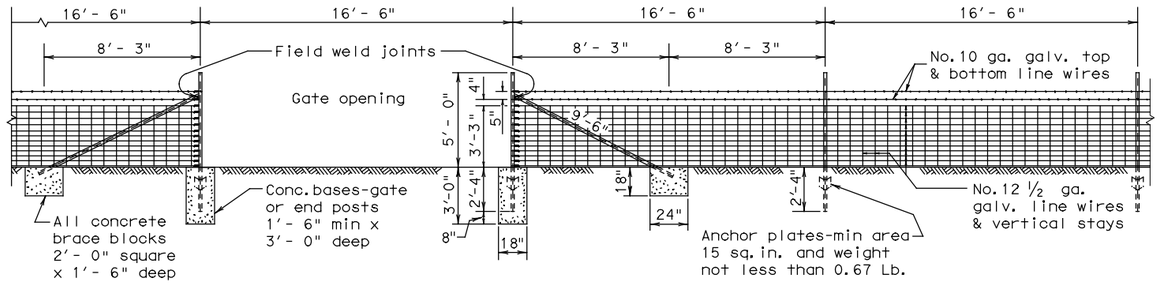


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



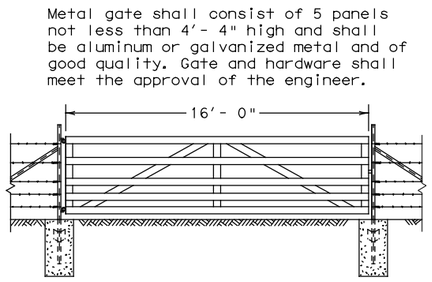
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)

SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

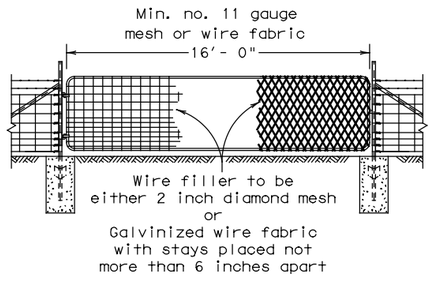
BRACING DETAIL USED AT ENDS AND GATES

TYPE "D" FENCE

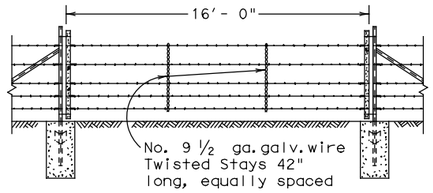
(See General Note 8)



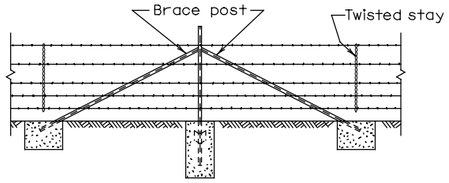
DETAIL TYPE 1 GATE



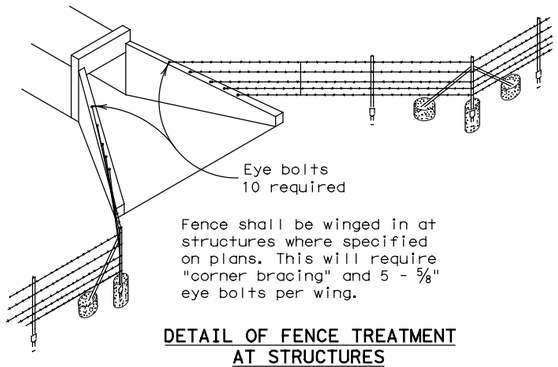
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

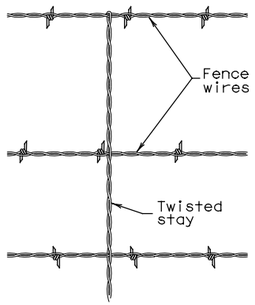


CORNER OR PULL POST ASSEMBLY

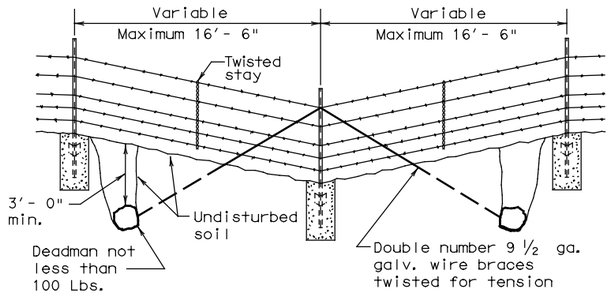


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

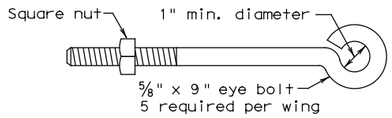
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

Design Division Standard

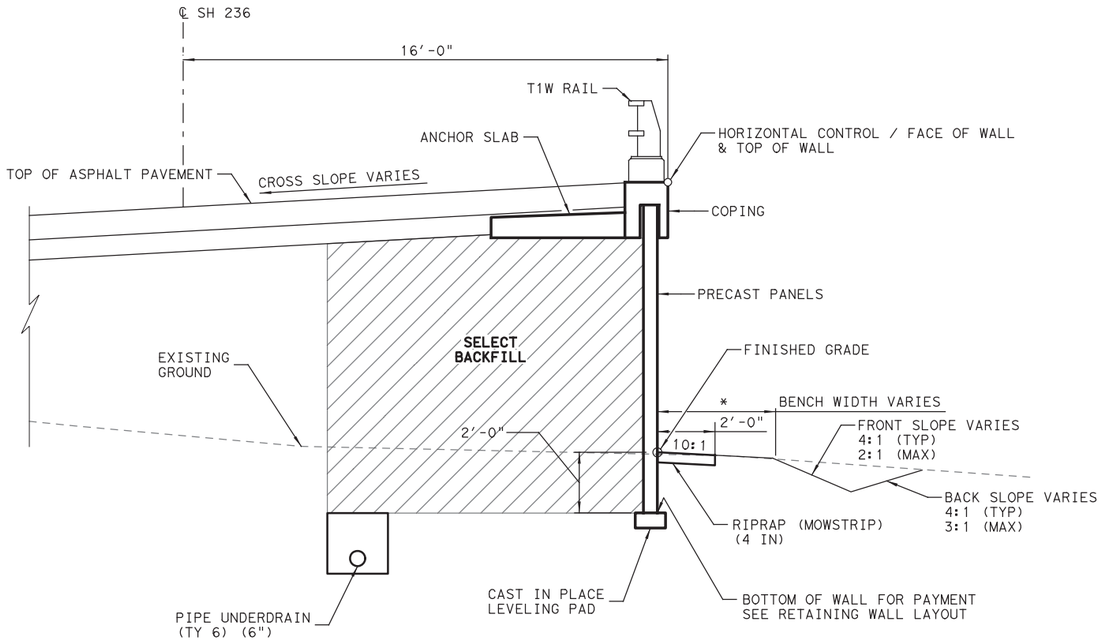
BARBED WIRE AND WOVEN WIRE FENCE

(STEEL POSTS)

WF(2)-10

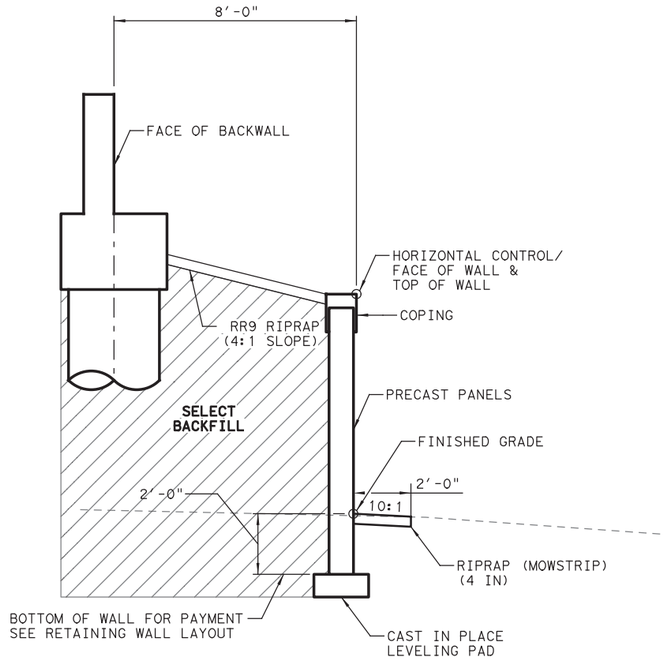
FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		59

NOT TO SCALE



MSE RETAINING WALL
WALLS A, C, D & F

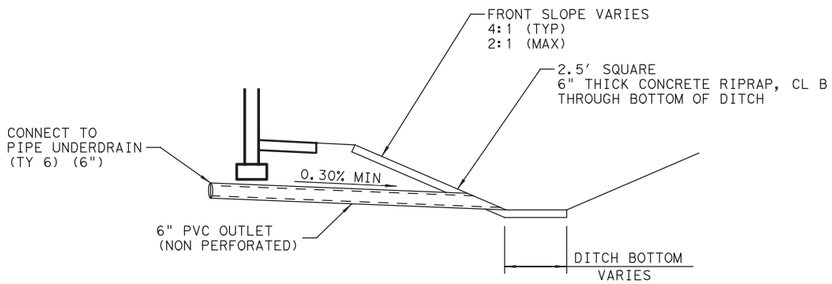
(WALLS A & D SHOWN, WALL C & F MIRRORED)
* SEE ROADWAY PROPOSED TYPICAL SECTIONS FOR RETAINING WALL BENCH WIDTH



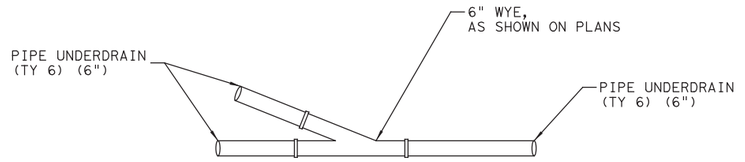
MSE RETAINING WALL
WALL B & E

NOTE:

SEE TxDOT STANDARDS RW(MSE), RW(TRF), RW(MSE)DD(MOD) & RW(EM) FOR RETAINING WALL DETAILS.



TYPICAL UNDERDRAIN OUTLET DETAILS
TO SIDE DITCH



TYPICAL UNDERDRAIN WYE CONNECTION

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
3/26/2021
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL TYPICAL SECTION
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	60
0513	01	017	

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FILE: SH236-Wall Typical Sections

RETAINING WALL A "RWA"

Beginning chain RWA description

Point RWA01 N 10,453,946.7580 E 3,189,480.3456 Sta 10+00.00

Course from RWA01 to RWA02 N 65° 49′ 19.75" E Dist 400.0000

Point RWA02 N 10,454,110.5861 E 3,189,845.2570 Sta 14+00.00

Ending chain RWA description

RETAINING WALL B "RWB"

Beginning chain RWB description

Point RWB01 N 10,454,093.3842 E 3,189,806.9413 Sta 10+00.00

Course from RWB01 to RWB02 N 24° 10′ 40.25" W Dist 32.0000

Point RWB02 N 10,454,122.5771 E 3,189,793.8350 Sta 10+32.00

Ending chain RWB description

RETAINING WALL C "RWC"

Beginning chain RWC description

Point RWC01 N 10,453,975.9509 E 3,189,467.2393 Sta 10+00.00

Course from RWC01 to RWC02 N 65° 49′ 19.75" E Dist 400.0000

Point RWC02 N 10,454,139.7790 E 3,189,832.1507 Sta 14+00.00

Ending chain RWC description

RETAINING WALL D "RWD"

Beginning chain RWD description

Curve Data

Curve RWD1						
P.I. Station		10+87.42	N	10,454,640.8543	E	3,190,662.3031
Delta	=	16° 09′ 16.30"	(LT)			
Degree	=	9° 18′ 04.55"				
Tangent	=	87.4204				
Length	=	173.6810				
Radius	=	616.0000				
External	=	6.1723				
Long Chord	=	173.1063				
Mid. Ord.	=	6.1110				
P.C. Station		10+00.00	N	10,454,567.1455	E	3,190,615.2993
P.T. Station		11+73.68	N	10,454,724.7304	E	3,190,686.9430
C.C.			N	10,454,898.3534	E	3,190,095.9175
Back	= N	32° 31′ 31.82" E				
Ahead	= N	16° 22′ 15.52" E				
Chord Bear	= N	24° 26′ 53.67" E				

Course from PT RWD1 to RWD02 N 16° 22′ 15.52" E Dist 530.8302

Point RWD02 N 10,455,234.0390 E 3,190,836.5604 Sta 17+04.51

Ending chain RWD description

RETAINING WALL E "RWE"

Beginning chain RWE description

Point RWE01 N 10,454,663.0457 E 3,190,630.4138 Sta 10+00.00

Course from RWE01 to RWE02 S 67° 01′ 25.64" E Dist 32.0028

Point RWE02 N 10,454,650.5534 E 3,190,659.8778 Sta 10+32.00

Ending chain RWE description

RETAINING WALL F "RWF"

Beginning chain RWF description

Curve Data

Curve RWF1						
P.I. Station		10+82.88	N	10,454,654.2308	E	3,190,632.8804
Delta	=	16° 09′ 16.30"	(LT)			
Degree	=	9° 48′ 39.32"				
Tangent	=	82.8791				
Length	=	164.6586				
Radius	=	584.0000				
External	=	5.8516				
Long Chord	=	164.1138				
Mid. Ord.	=	5.7936				
P.C. Station		10+00.00	N	10,454,584.3511	E	3,190,588.3184
P.T. Station		11+64.66	N	10,454,733.7497	E	3,190,656.2404
C.C.			N	10,454,898.3534	E	3,190,095.9175
Back	= N	32° 31′ 31.82" E				
Ahead	= N	16° 22′ 15.52" E				
Chord Bear	= N	24° 26′ 53.67" E				

Course from PT RWF1 to RWF02 N 16° 22′ 15.52" E Dist 330.8302

Point RWF02 N 10,455,051.1670 E 3,190,749.4867 Sta 14+95.49

Ending chain RWF description

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED
PROFESSIONAL ENGINEER

7/28/2020

Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL HORIZ. CONTROL DATA
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	61
CONTROL	SECTION	JOB	
0513	01	017	

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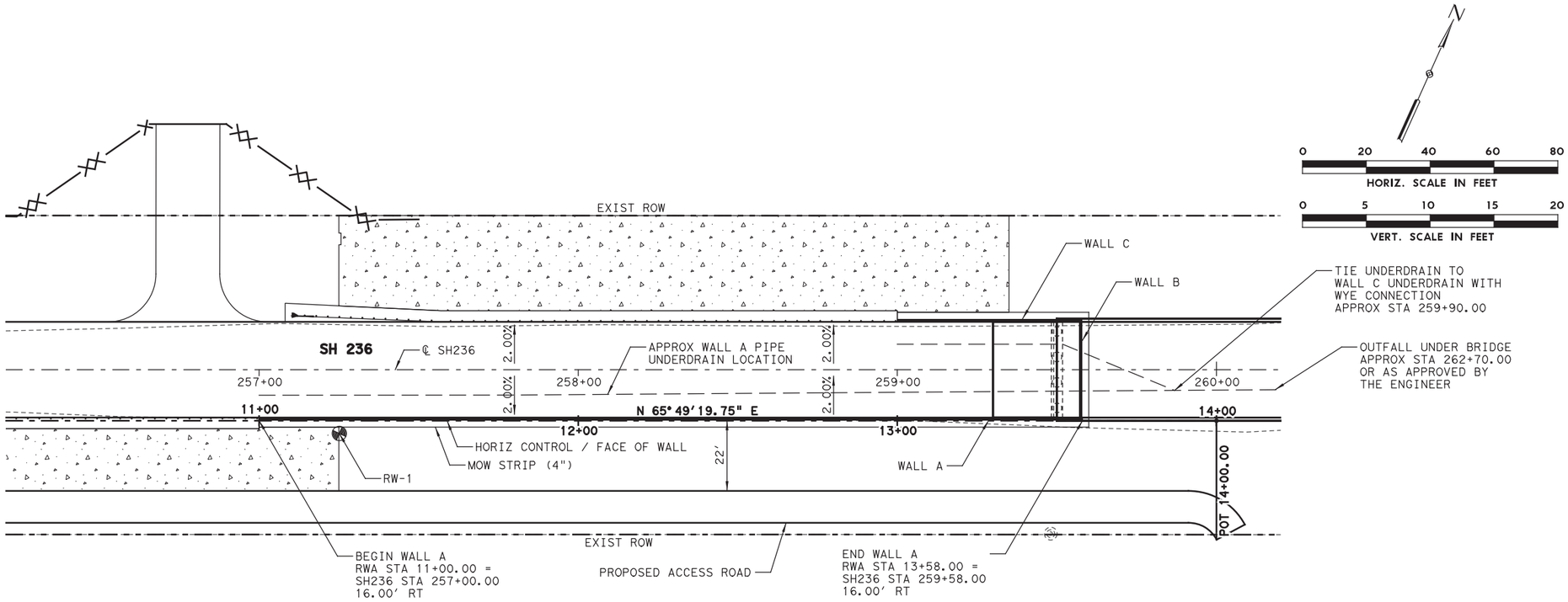
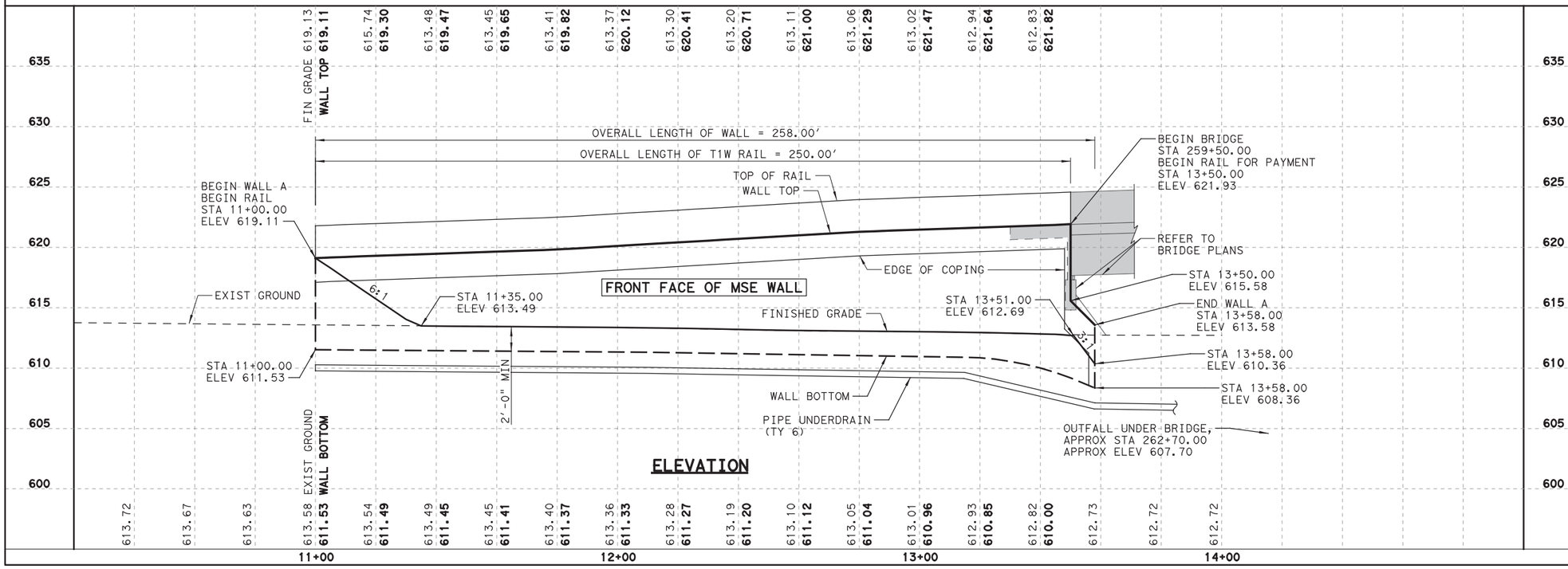


PLAN



ELEVATION

NOTES:

1. BOTTOM OF WALL ELEVATION IS 2' BELOW EXISTING GROUND OR FINISHED GRADE, WHICHEVER IS LOWER.
2. TOP OF WALL SHALL MATCH EDGE OF PAVEMENT AS CONSTRUCTED, ELEVATIONS SHOWN MAY NEED ADJUSTMENT.

NO.	DATE	REVISION	APPROVED

MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
7/28/2020
Marco Garcia P.E.

RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL A LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	62
CONTROL	SECTION	JOB	
0513	01	017	

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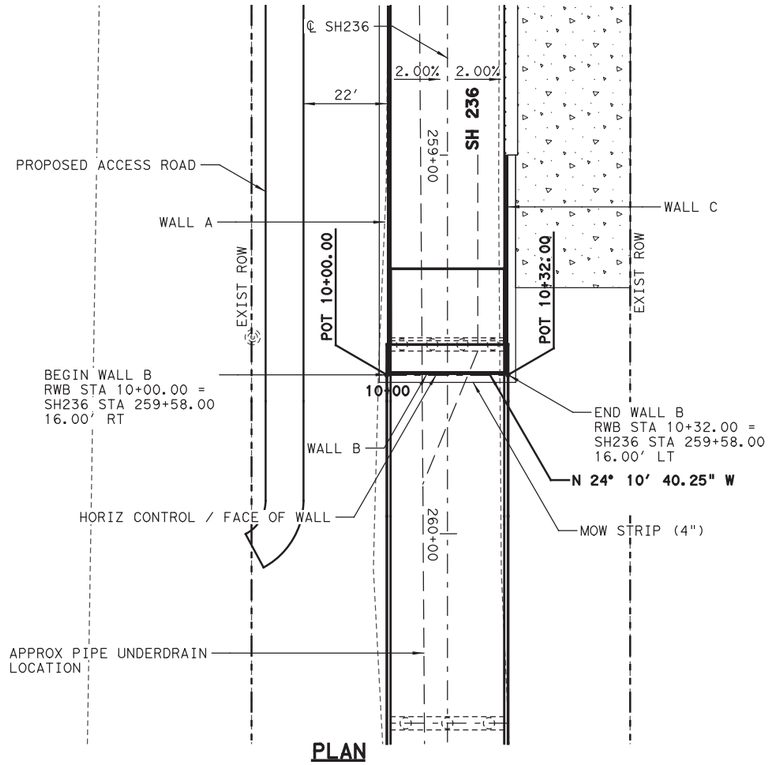
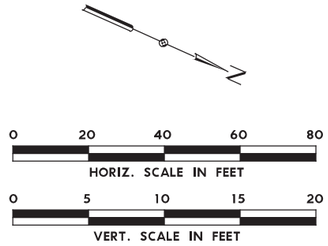
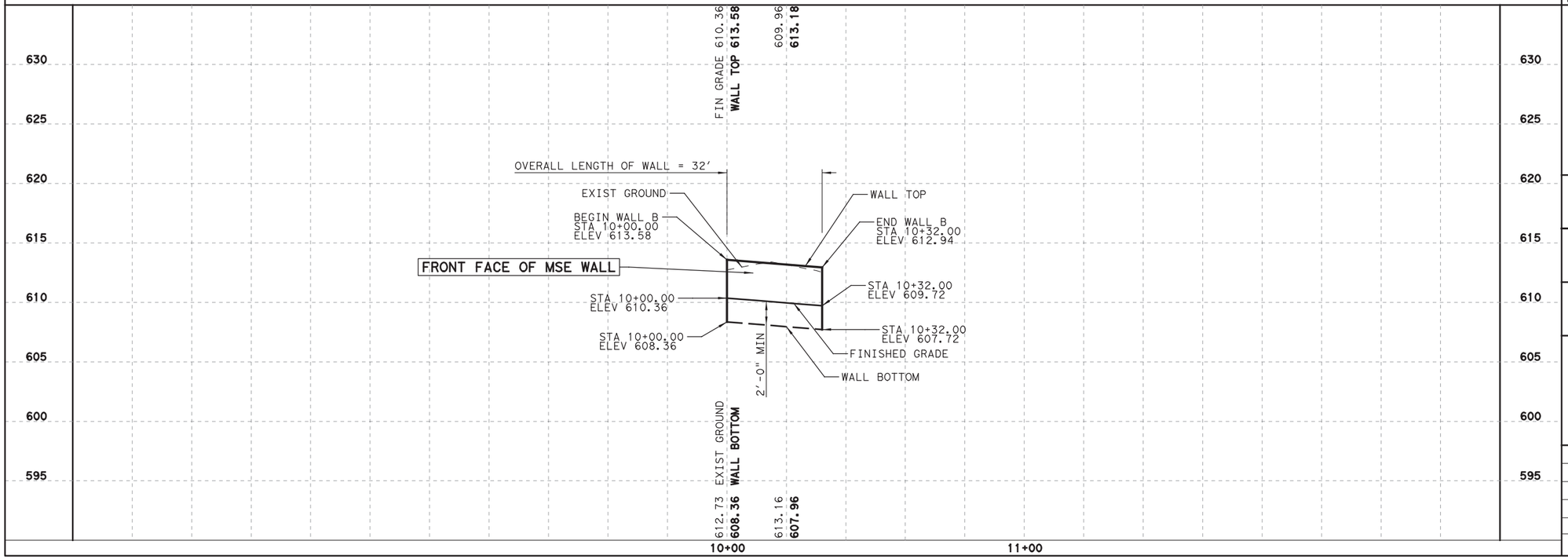


PLAN



NOTES:

1. BOTTOM OF WALL ELEVATION IS 2' BELOW EXISTING GROUND OR FINISHED GRADE, WHICHEVER IS LOWER.
2. TOP OF WALL SHALL MATCH EDGE OF PAVEMENT AS CONSTRUCTED, ELEVATIONS SHOWN MAY NEED ADJUSTMENT.



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER

7/28/2020

Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL B LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	63
CONTROL	SECTION	JOB	
0513	01	017	

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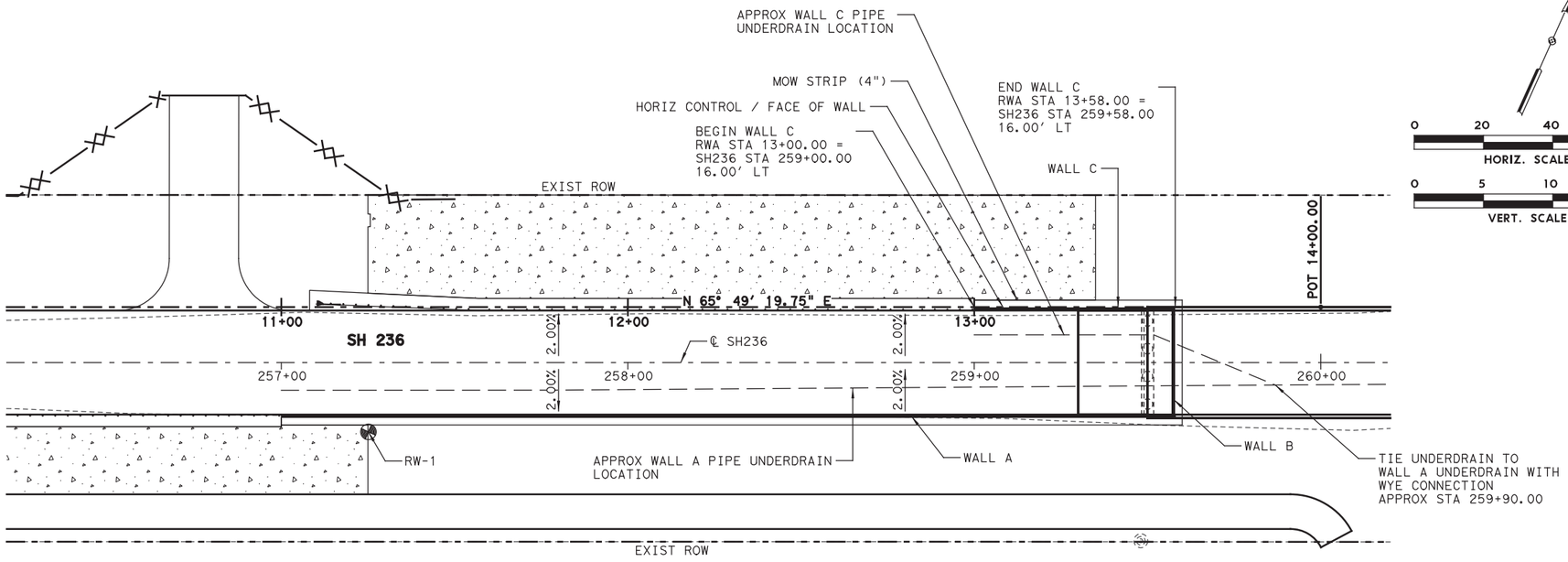

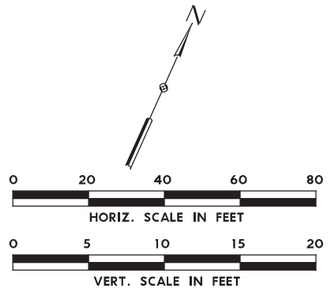

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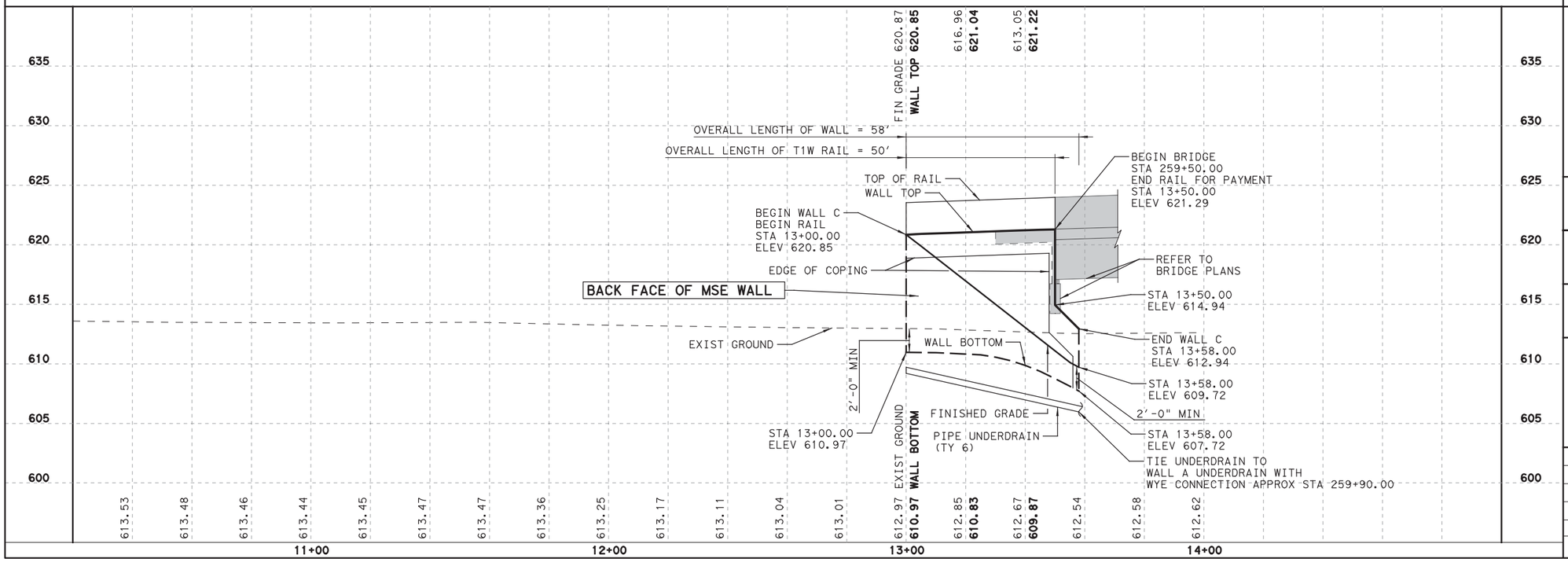
PLAN



NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
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512.685.2900

Texas Department of Transportation

RETAINING WALL C LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	64
CONTROL	SECTION	JOB	
0513	01	017	

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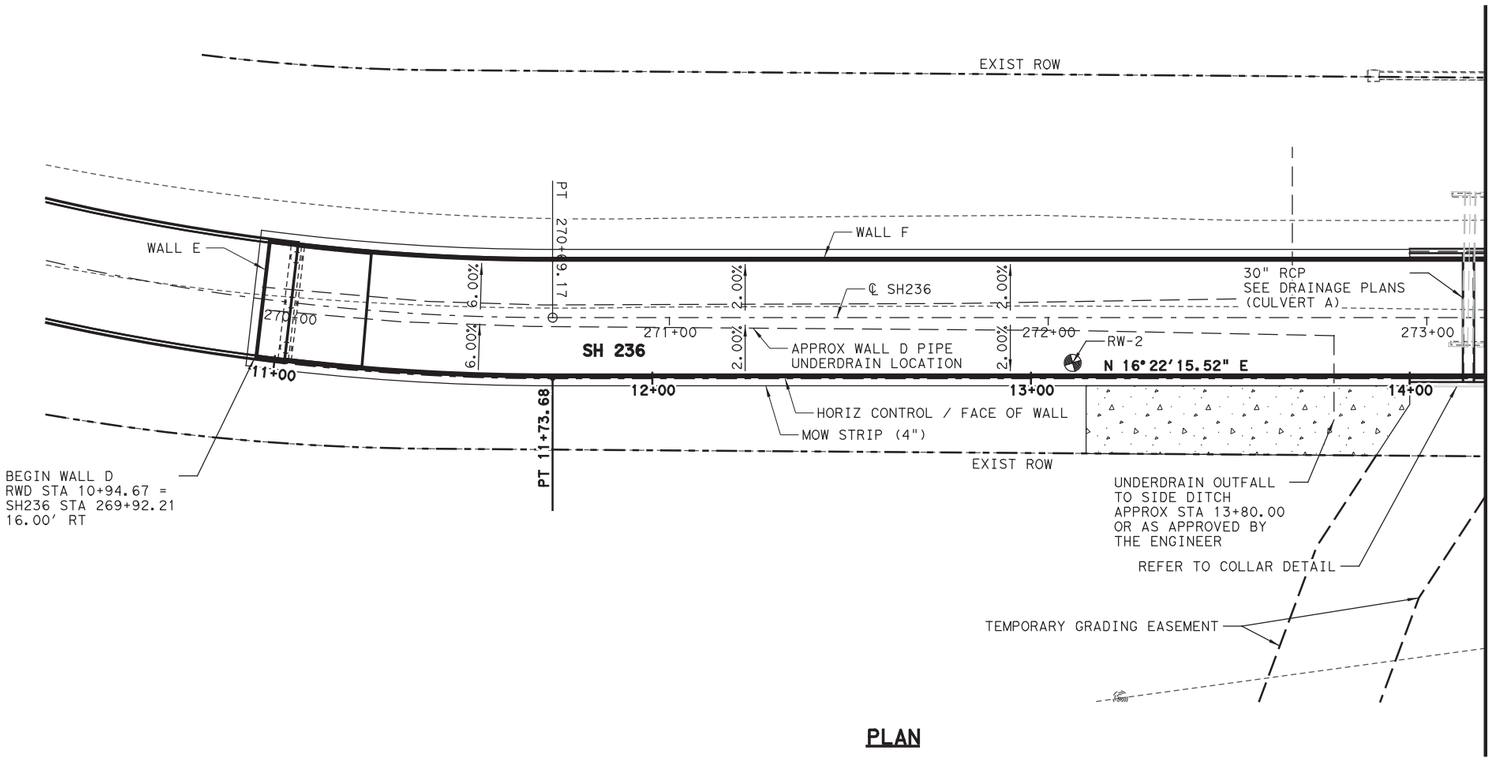

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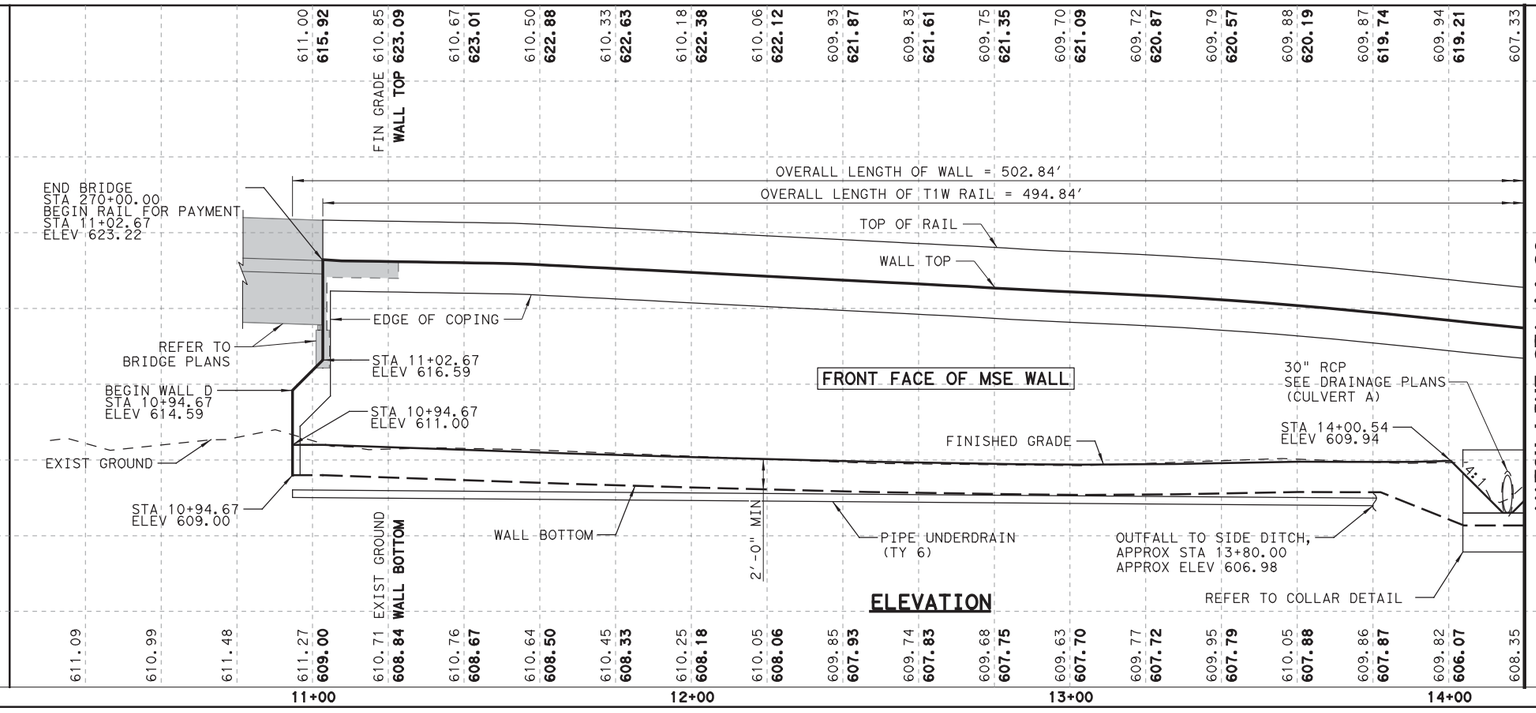

ELEVATION

NOTES:

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0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL D LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	65
CONTROL	SECTION	JOB	
0513	01	017	

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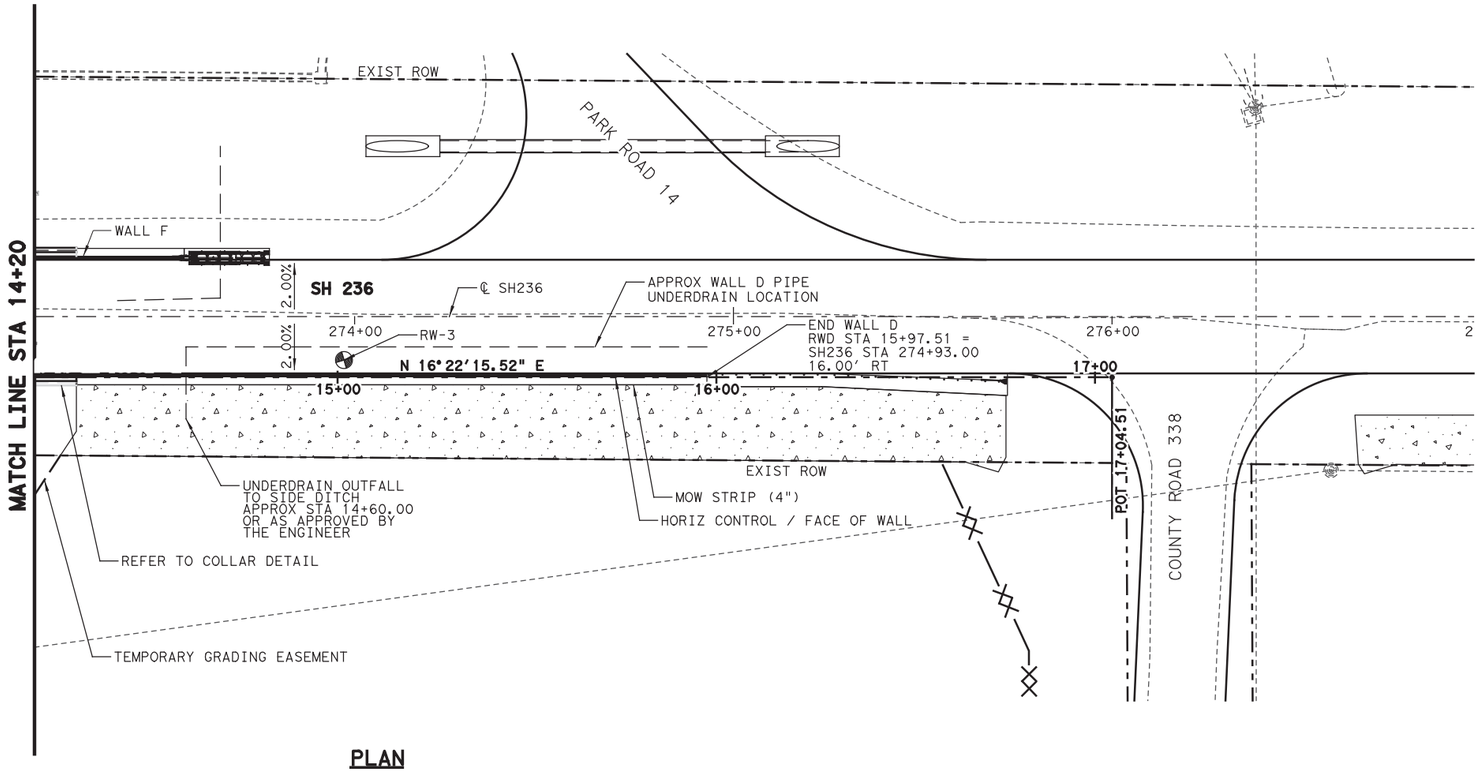
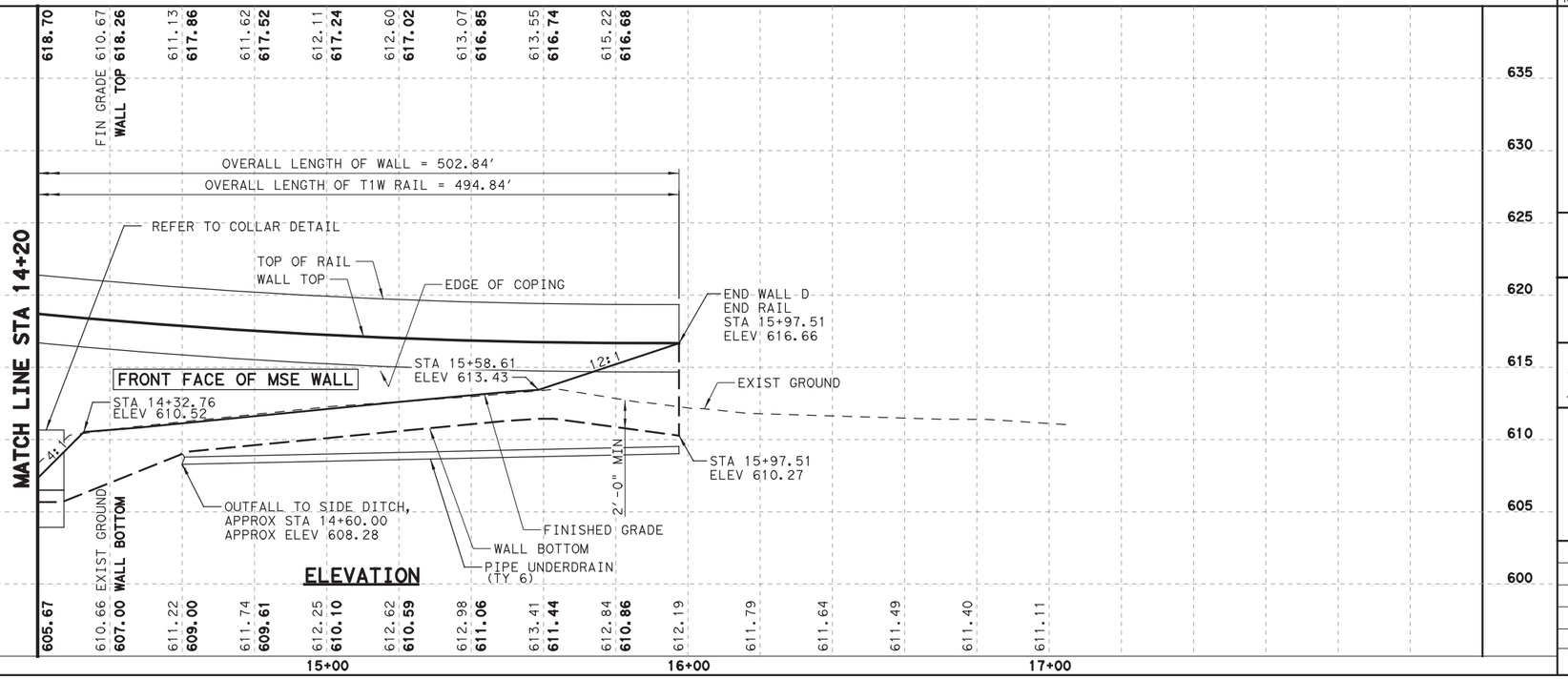


PLAN



ELEVATION

0 20 40 60 80
HORIZ. SCALE IN FEET

0 5 10 15 20
VERT. SCALE IN FEET

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NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

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RETAINING WALL D LAYOUT
SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	66
CONTROL	SECTION	JOB	
0513	01	017	

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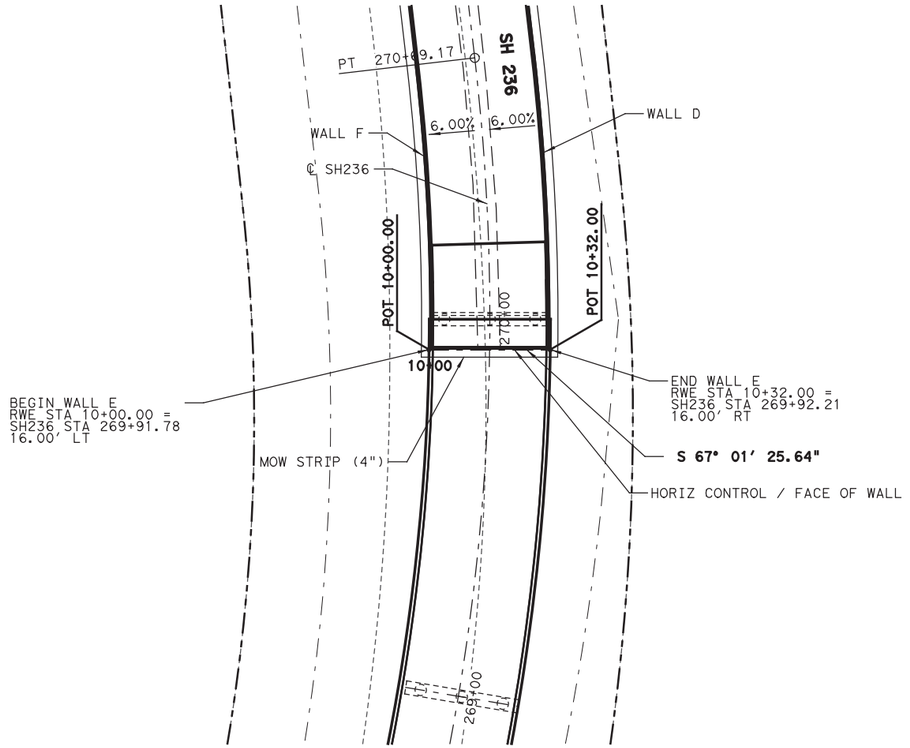
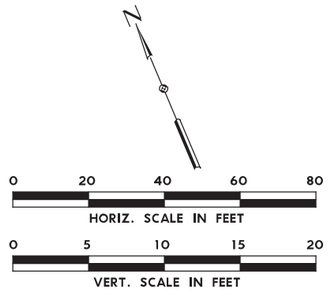


PLAN



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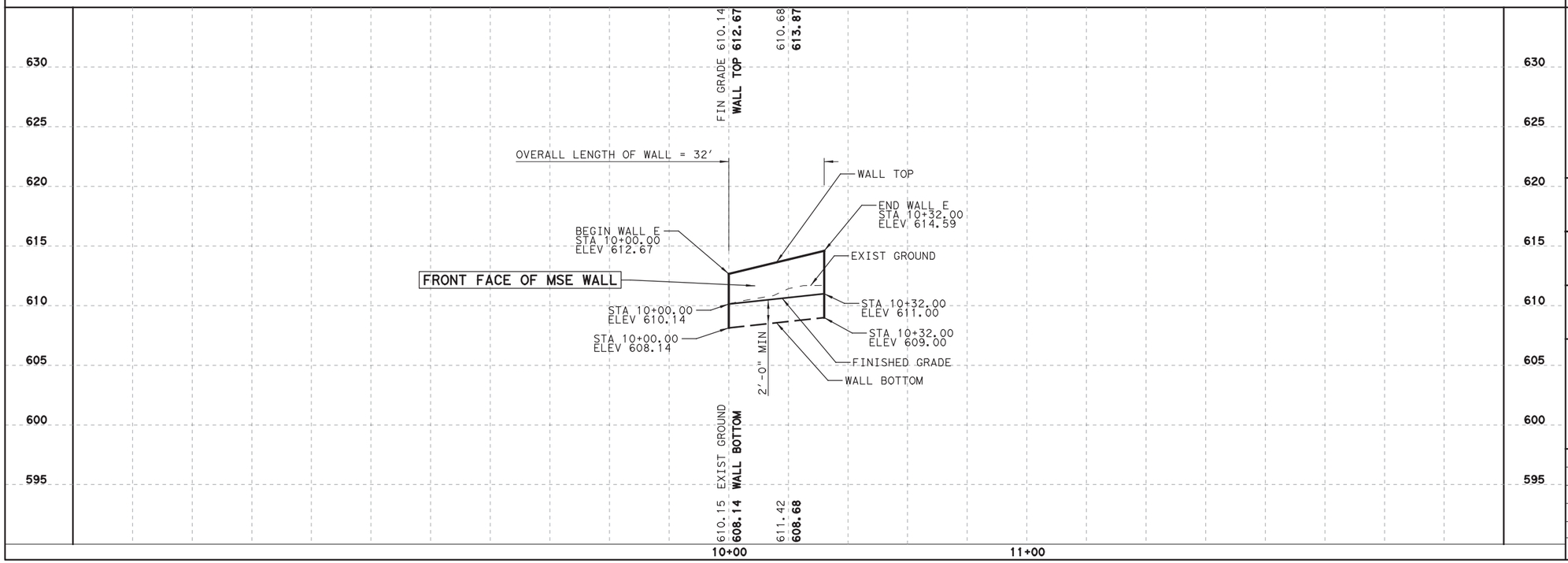

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
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RETAINING WALL E LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	67
0513	01	017	

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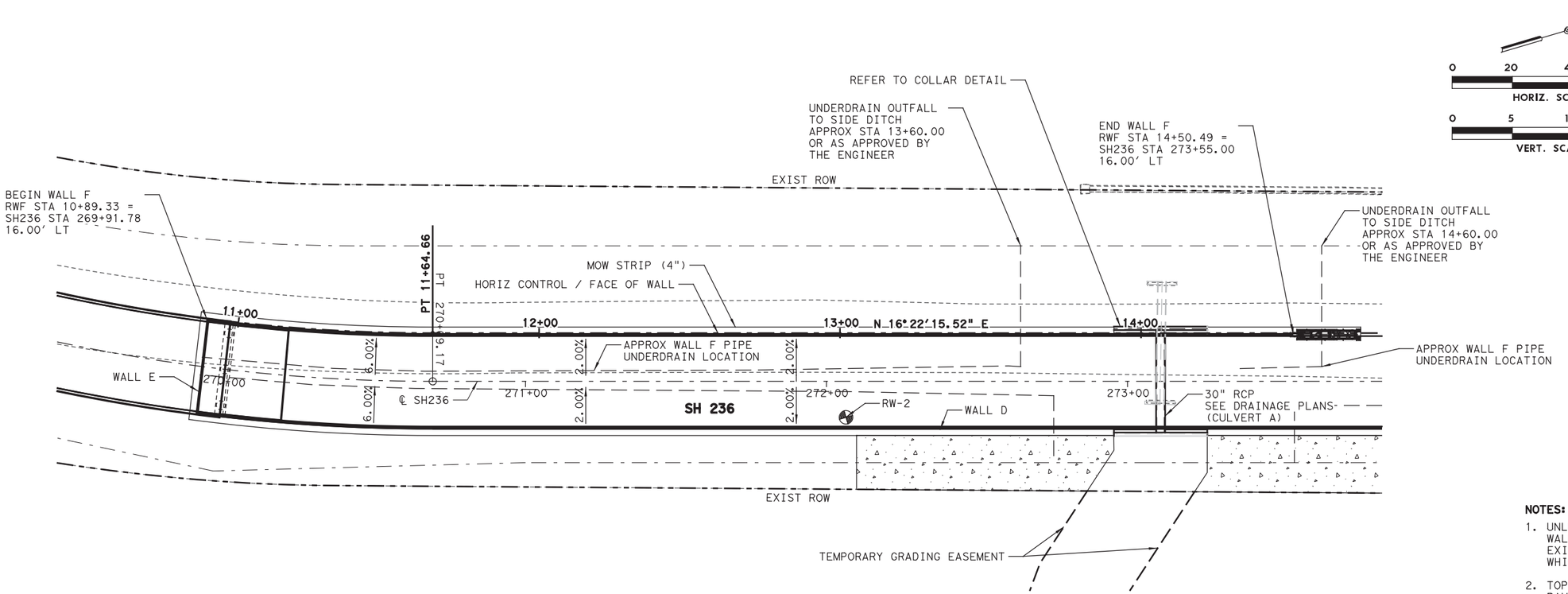

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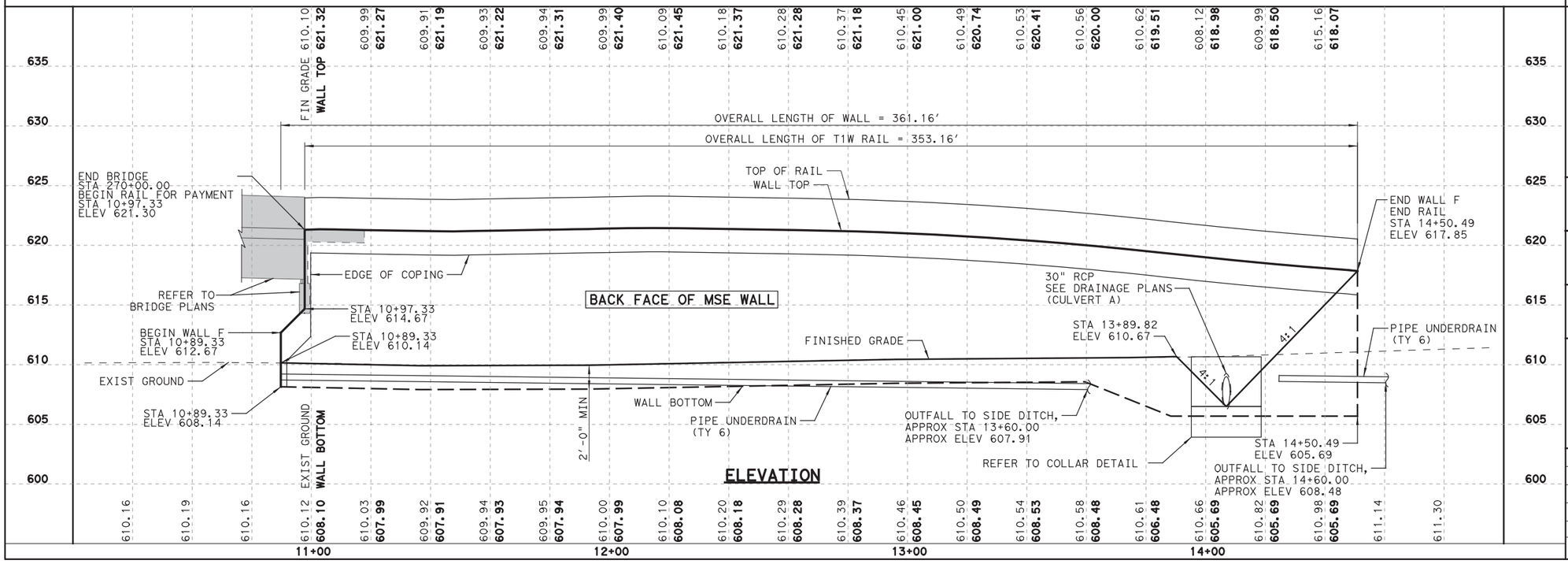

ELEVATION

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STATE OF TEXAS
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125518
LICENSED PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC. Firm Registration No. F-754 710 Hesters Crossing, Suite 150 Round Rock, Texas 78681 512.685.2900

Texas Department of Transportation

RETAINING WALL F LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	68
CONTROL	SECTION	JOB	
0513	01	017	

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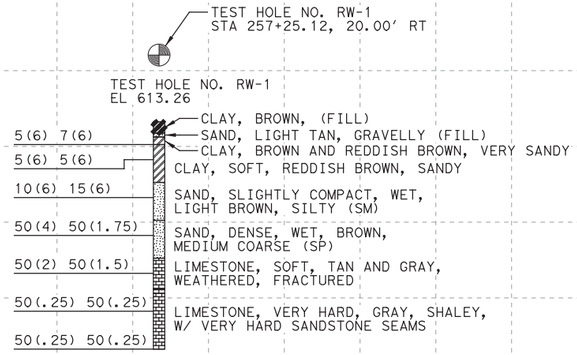

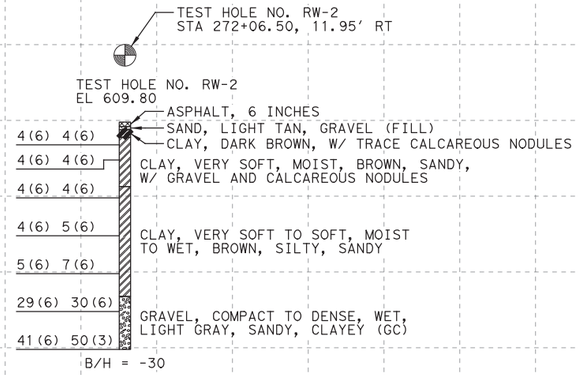

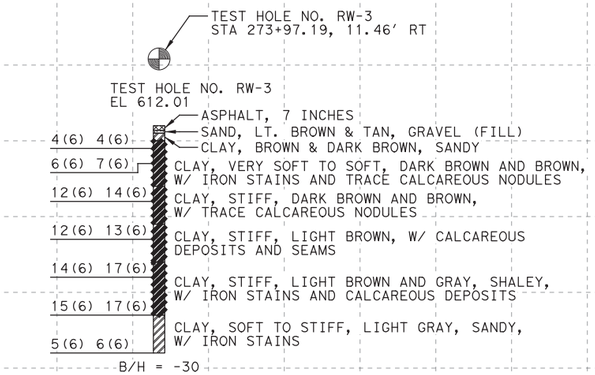

NOTE:
BORING LOGS CONDUCTED BY ALLIANCE GEOTECHNICAL GROUP ARE SHOWN HERE FOR INFORMATIONAL PURPOSES ONLY. SEE GEOTECHNICAL INVESTIGATION SH 236 AT LEON RIVER PROPOSED BRIDGE REPLACEMENT, CORYELL COUNTY, TEXAS, CERTIFICATION LETTER, DATED FEBRUARY 4, 2019.

NO.	DATE	REVISION	APPROVED

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL BORING LOGS
SH 236 AT LEON RIVER

NOT TO SCALE SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	69
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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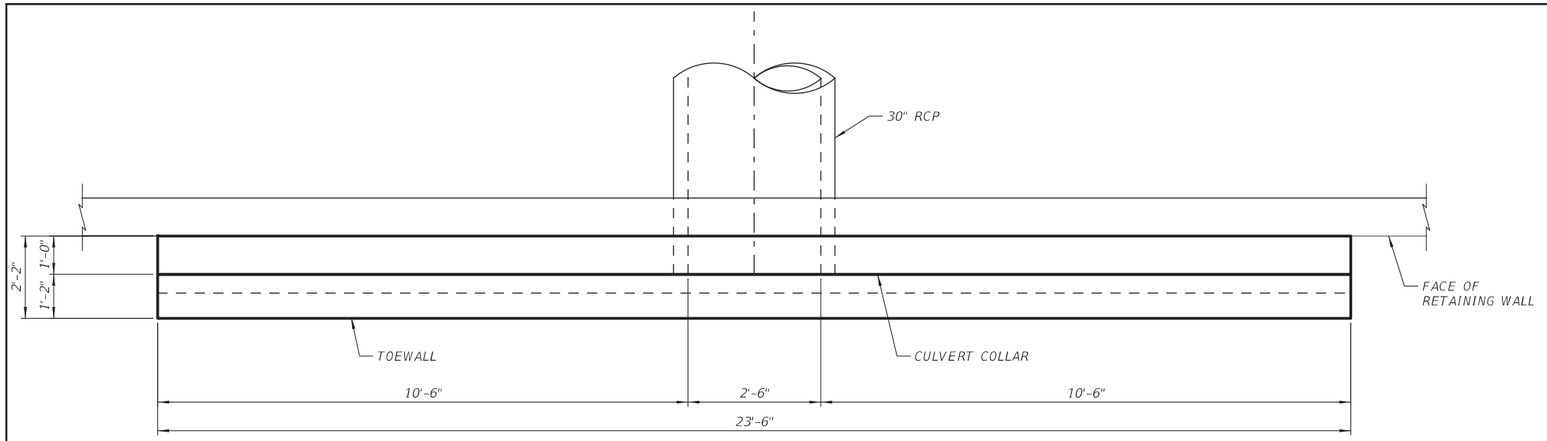
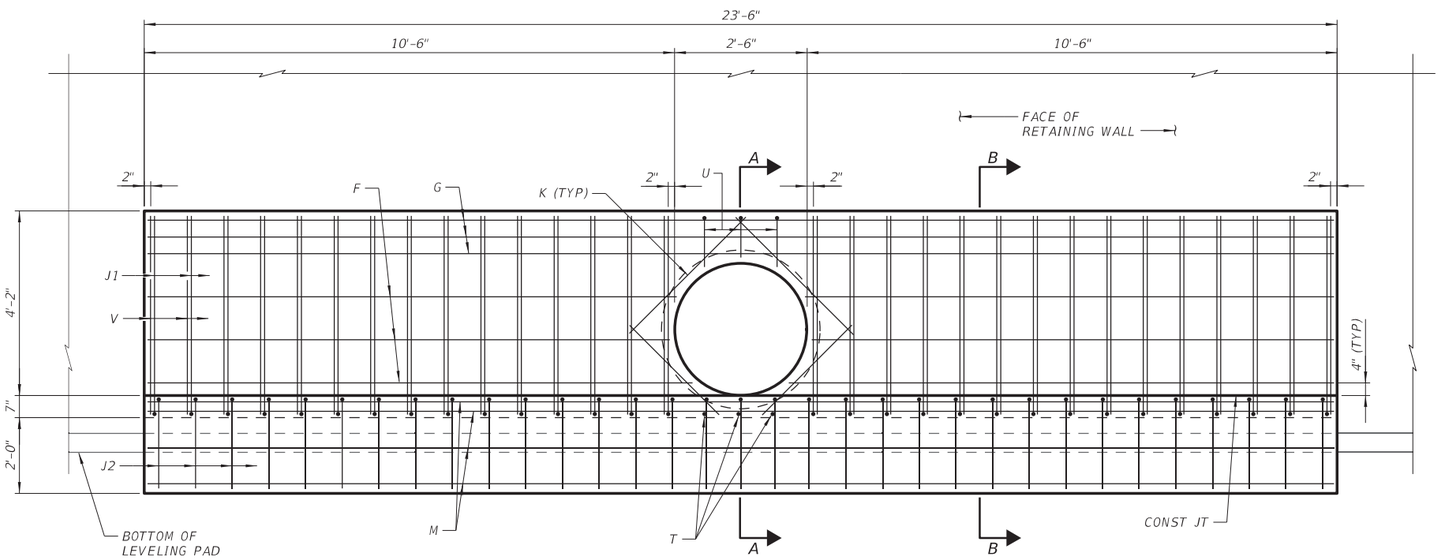


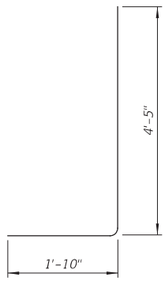
PLAN



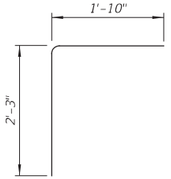
ELEVATION

BAR TABLE		
BAR	SIZE	SPA
F	#4	-
G	#6	8"
K	#4	-
J1	#4	1'-0"
J2	#4	1'-0"
M	#4	-
T	#4	1'-0"
U	#4	1'-0"
V	#4	1'-0"
CLASS "C" CONC	CY	5.6

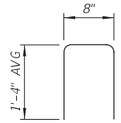
* QUANTITIES SHOWN ARE FOR ONE RETAINING WALL COLLAR DETAIL.



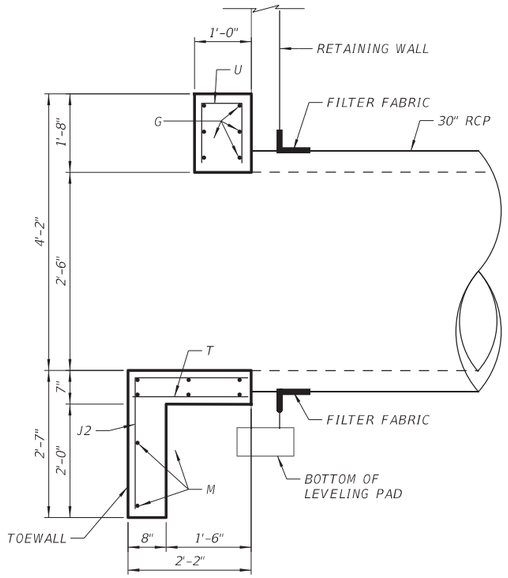
BARS J1



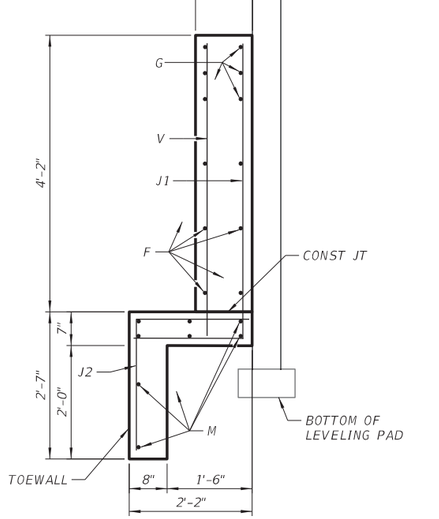
BARS J2



BARS U



SECTION A-A



SECTION B-B

NOT TO SCALE

NOTES:

1. PROVIDE 2" CLEAR COVER TO ALL REINFORCING UNLESS NOTED OTHERWISE.
2. PROVIDE CLASS "C" CONCRETE, f'c = 3600 PSI.
3. PROVIDE GRADE 60 REINFORCING.
4. RETAINING WALL COLLAR DETAIL IS PAID BY ITEM 420 6074. PAYMENT QUANTITIES ARE SHOWN ON SUMMARY OF RETAINING WALL QUANTITIES.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
MARCO E. GARCIA
125518
LICENSED
PROFESSIONAL ENGINEER
7/28/2020
Marco Garcia P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

RETAINING WALL COLLAR DETAIL 30" RCP
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	70
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
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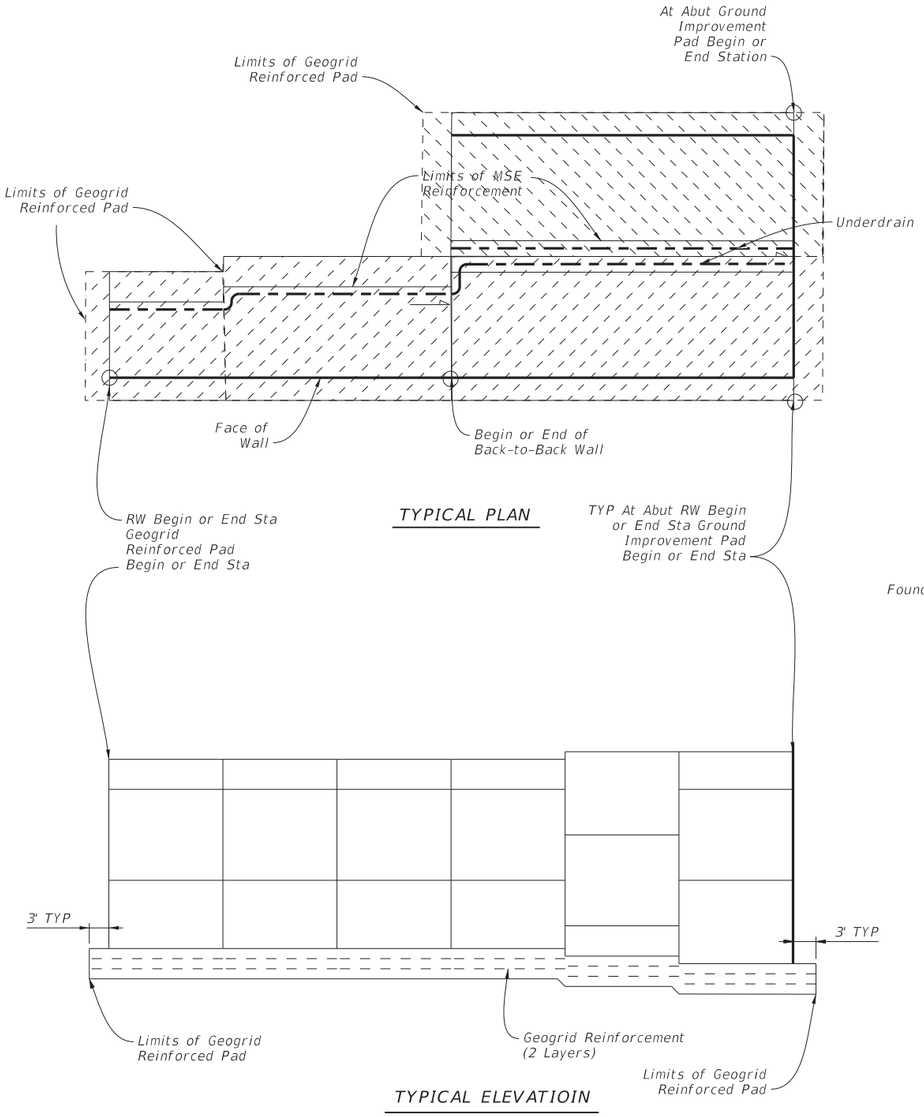
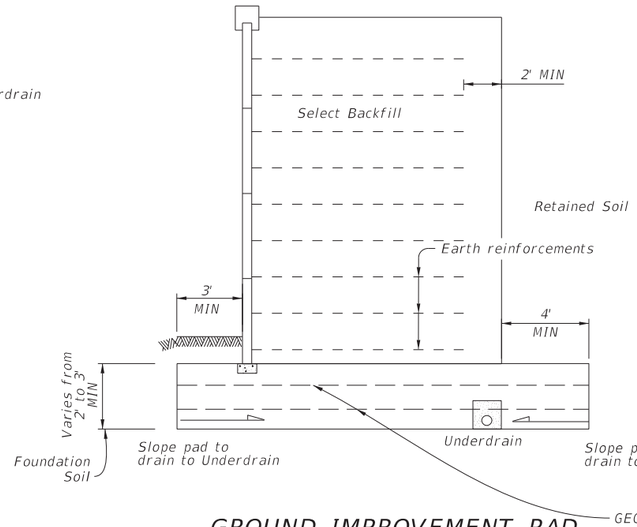


TYPICAL PLAN

TYPICAL ELEVATIOIN

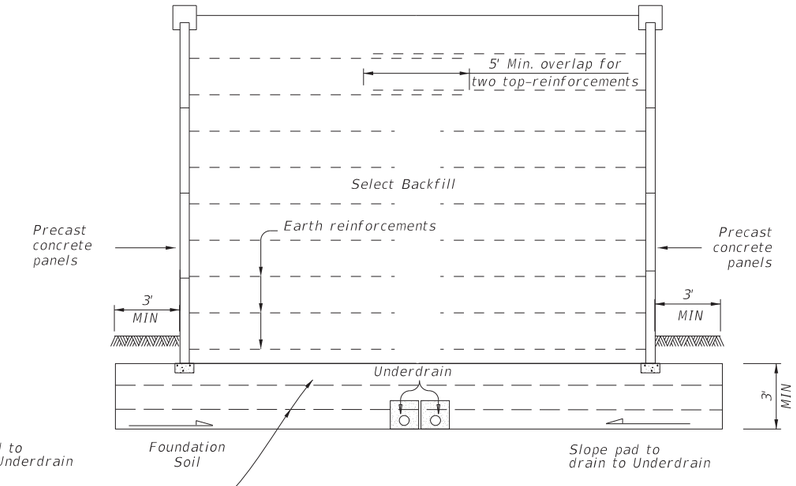
GENERAL NOTES

(1) Ground Improvement Pad to be constructed under Retaining Wall designated in RW(MSE)DD sheet. Ground improvement Pad to be composed of select fill (Item 423, Type DS) with TWO levels of geogrid reinforcement. Ground Improvement Pad is subsidary to Item 423.
(2) Geogrid to be Mirafi – Miragrid 3XT or equivalent and have a minimum LTDS of 1300 lbs/ft.
(3) Geogrid to be placed 8" off the top and bottom of ground improvement pad.
(4) Underdrain pipe to be placed to drain section of MSE wall treated with ground improvement pad.



GROUND IMPROVEMENT PAD TYPICAL SECTION

(RW A Sta. 11+00 to 13+00, and RW D Sta. 14+50.49 to 15+97.51).



GROUND IMPROVEMENT PAD TYPICAL SECTION

(Back-to-Back Wall)
(RW A and RW C Sta. 13+00 to 13+58 RW D Sta. 10+94.67 to 14+50.49, and RW F Sta. 10+89.33 to 14+50.49).

ESTIMATED QUANTITIES

Retaining Wall	Pad Begin Station	Pad End Station	Ground Improvement Pad fill (Item 423, Type AS or DS) (CY)	Geogrid (SY)
RW A	11+00	12+00	176	527
RW A	12+00	13+00	278	556
**RW A, B, & C	13+00	13+58	270	541
**RW D, E, & F	10+89	14+50.5	1,551	3,101
RW D	14+50.5	15+20	119	355
RW D	15+20	15+97.5	125	375

* For Contractor's Information Only
** For Back-to-Back Walls

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

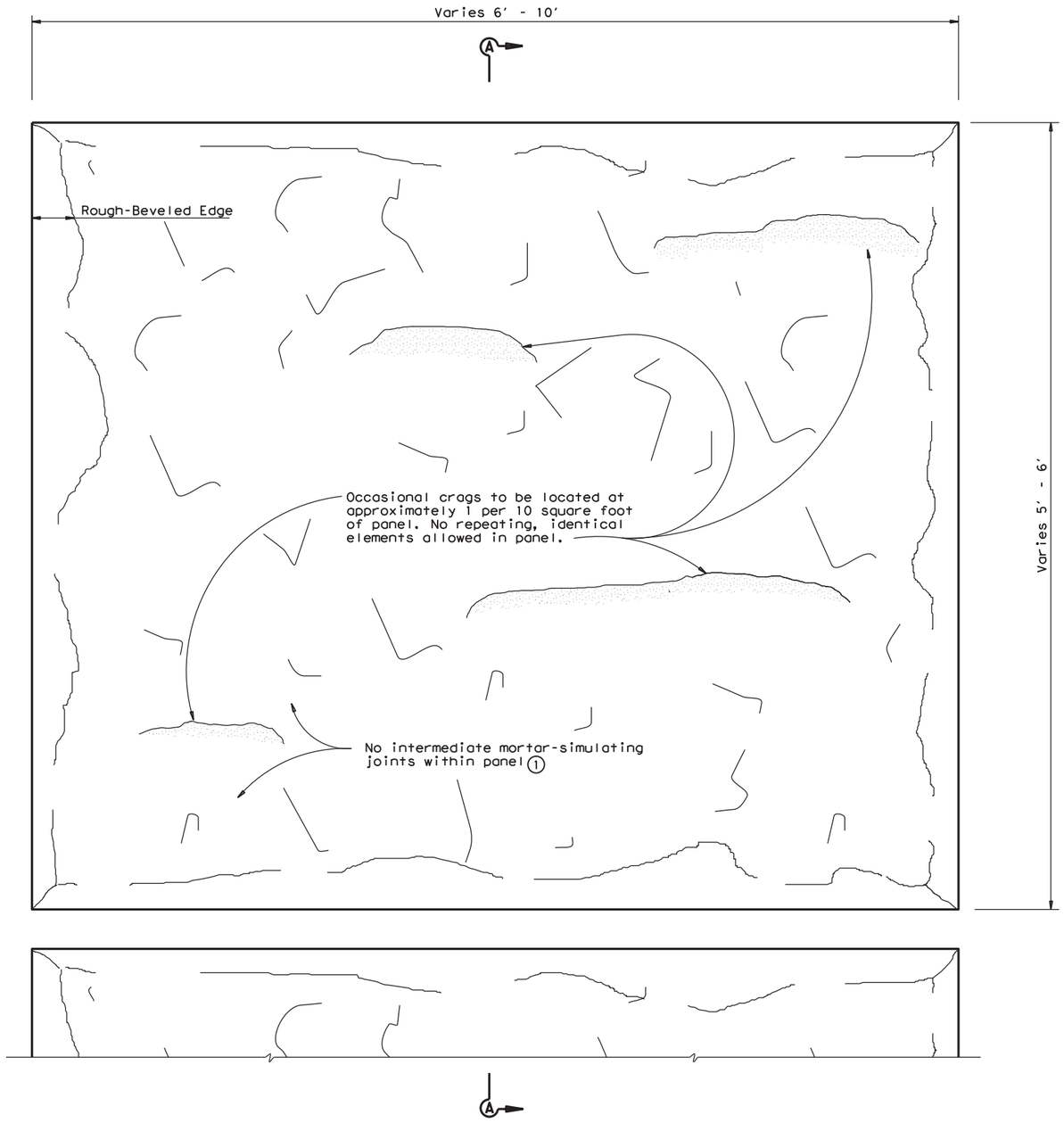
10/14/2020

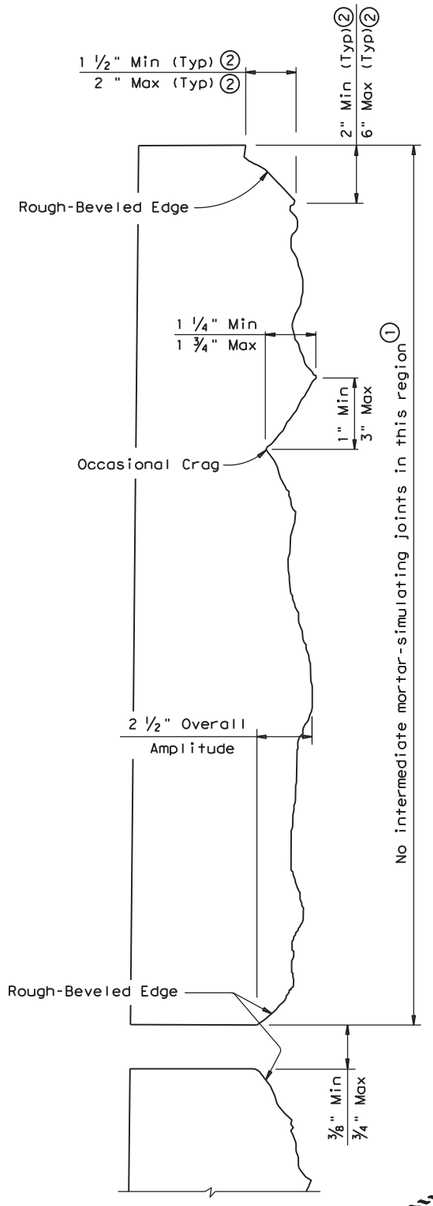
Texas Department of Transportation | Bridge Division

GROUND IMPROVEMENT DETAILS

FILE: SH 236 Ground Improvement	DN: CHL	CK: SMY	DW: LC	CK: CHL
©TxDOT October 14, 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WAC	CORYELL		71

DATE: 10/14/2020
FILE: Ground Improvement Pad under MSEW v3 4-8-20 (BRG Standard).dgn





SAMPLE PERSPECTIVE

NOTE:
A minimum of 3 unique formliners shall be used and distributed randomly to create the effect of individually cut blocks. Approximately one-half of each type of block shall be placed upside down. Orientation and location of individual panels shall be such so that there appears to be a random mix of 6 types of blocks.

Approximately 1/3 of the panels will be made with each formliner panel type.

Blocks shall be rectangular.

Panel dimensions indicated are nominal and subject to final approval of Engineer sealing this drawing.

Shop drawings of formliner shall be submitted for approval prior to casting.

The Contractor shall pour and finish a full-scale concrete sample of each standard formliner panel. The panels shall meet with the requirements of the plans and specifications and be approved by the signer of this sheet before beginning any work. The approved sample panels shall be considered typical for the finish. Any deviation of color, grade, or depth of the approved sample panels will be grounds for rejection of the formliner treatment and shall be removed and replaced as specified in the contract. The sample panel shall not be paid for directly but shall be considered subsidiary to the various bid items.

(1) Formliner intended to create effect of stacked, large, rough-cut, natural limestone blocks.

(2) Dimension shall vary to the extremes of these limits.

ELEVATION

SECTION A-A

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

08/25/2020

Texas Department of Transportation

MSE RETAINING WALL SURFACE DETAIL

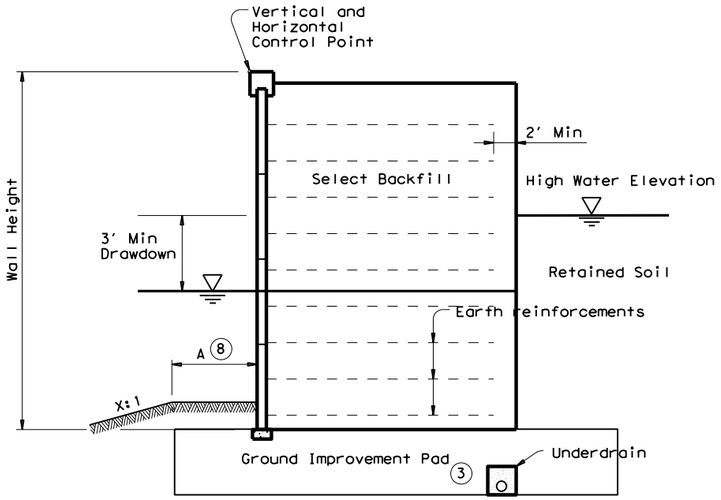
SH 236 OVER LEON RIVER

FILE: 7140ob01.dgn	DN:DVL/NRN	CK: DOT	DW: DOT	CK: DOT		
©TxDOT JUNE 2020	DISTRICT	FEDERAL AID PROJECT			SHEET	
REVISIONS	WACO				72	
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	CORYELL		0513	01	017	SH 236

DATE: 10/14/2020

WALL SUMMARY

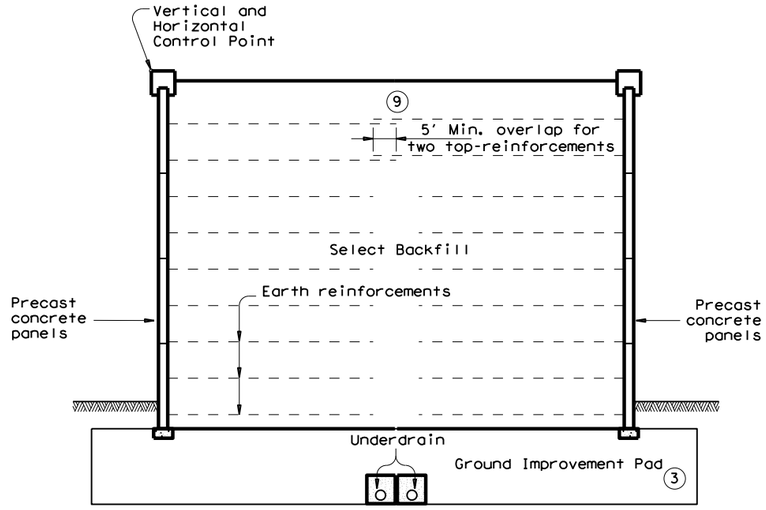
MSE Retaining Wall	Begin Station (1)	End Station (1)	Retained Soil Friction Angle (2)	Foundation Soil Friction Angle (2)	Ground Improvement, Min Depth (3)	Min Earth Reinforcement Length (4)	Min Wall Embedment (7)	Underdrain Required (5)	Drawdown Analysis (6)	Bench Width (8)
RETAINING WALL A	11+00	12+00	30 deg.	30 deg.	YES, 2'	14'-0" or 1.6H	2'-0"	YES	YES	SEE NOTE 8
RETAINING WALL A	12+00	13+00	30 deg.	30 deg.	YES, 3'	16'-0" or 1.45H	2'-0"	YES	YES	SEE NOTE 8
RETAINING WALL A	13+00	13+58	34 deg.	30 deg.	YES, 3	(9) 16'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL B	10+00	10+32	34 deg.	30 deg.	YES, 3'	(9) 16'-0" or 1.15H	2'-0"	NO	NO	SEE NOTE 8
RETAINING WALL C	13+00	13+58	34 deg.	30 deg.	YES, 3'	(9) 16'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL D	10+94.67	13+20	34 deg.	30 deg.	YES, 3'	(9) 17'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL D	13+20	14+40	34 deg.	30 deg.	YES, 3'	(9) 16'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL D	14+40	14+50.49	34 deg.	30 deg.	YES, 3'	(9) 14'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL D	14+50.49	15+20	30 deg.	30 deg.	YES, 2'	14'-0" or 1.6H	2'-0"	YES	YES	SEE NOTE 8
RETAINING WALL D	15+20	15+97.51	30 deg.	30 deg.	YES, 2'	12'-0" or 1.7H	2'-0"	YES	YES	SEE NOTE 8
RETAINING WALL E	10+00	10+32	34 deg.	30 deg.	YES, 3'	(9) 17'-0" or 1.15H	2'-0"	NO	NO	SEE NOTE 8
RETAINING WALL F	10+89.33	12+40	34 deg.	30 deg.	YES, 3'	(9) 16'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8
RETAINING WALL F	12+40	14+50.49	34 deg.	30 deg.	YES, 3'	(9) 15'-0" or 1.15H	2'-0"	YES	NO	SEE NOTE 8



TYPICAL SECTION

(RAPID DRAWDOWN CONDITION)

(RW A Sta. 11+00 to 13+00, and
RW D Sta. 14+50.49 to 15+97.51).



TYPICAL SECTION (9)

(Back-to-Back Wall)

(RW A and RW C Sta. 13+00 to 13+58
RW D Sta. 10+94.67 to 14+50.49, and
RW F Sta. 10+89.33 to 14+50.49).

(1) Indicate limits for which the stated soil design requirements/assumptions are applicable.

(2) Retained friction angle of non back-to-back wall or Foundation friction angle without ground improvement listed should be based on local experience or measured/correlated long term strength values.

(3) Refer to Ground Improvement Details for additional information. Ground Improvement is subsidary to Item 423

(4) Indicate on table minimum length and length ratio required. The minimum default length of earth reinforcements shall be either 8'-0" or 70% of the wall height, whichever is greater. Wall height and design wall height may differ depending on project geometry and loading conditions. Note: Wall height at bridge abutments is equal to the distance between the top of leveling pad and finished grade at the bridge abutment backwall. The min. length do not include the 5' overlap of top two layers for back-to-back wall portion (see note 9 and Typ Section Back to Back Wall).

(5) Indicate if underdrain is required.

(6) Indicate if rapid drawdown analysis is required.

(7) Guidance to wall designer of record for determination of minimum wall embedment: Unless noted elsewhere in the plans, the minimum embedment provided from the top of leveling pad to finish grade shall be 1' for level ground where there is no potential for erosion or future excavation or 2' for sloping ground (4.0H:1.0V or steeper) or where there is potential for removal of soil in front of the wall.

(8) Horizontal Bench width at base of wall varies. Use the following criteria to establish base width.
A = 3.0' Min for X $\geq$ 4. or
A = 5.0' Min for X $\leq$ 4.
Applicable to both drawdown and dry condition.

(9) Use Select backfill (Item 423, Type DS) in entire back-to-back wall section and place two top-reinforcements with a minimum overlap of 5ft for RW station indicated in "Wall Summary" table (RW A and RW C Sta. 13+00 to 13+58, RW D Sta. 10+94.67 to 14+50.49, and RW F Sta. 10+89.33 to 14+50.49). Min. Strap Length in Summary Table do not include the 5-ft overlap.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

03/29/2021

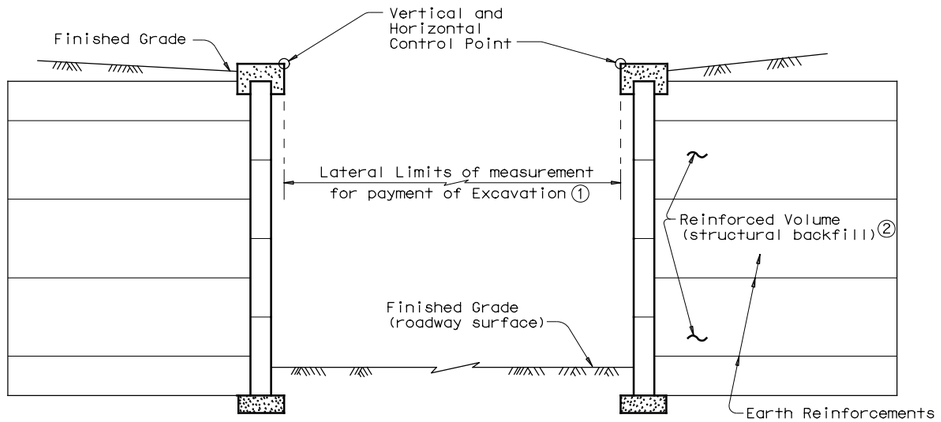
Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL DESIGN DATA

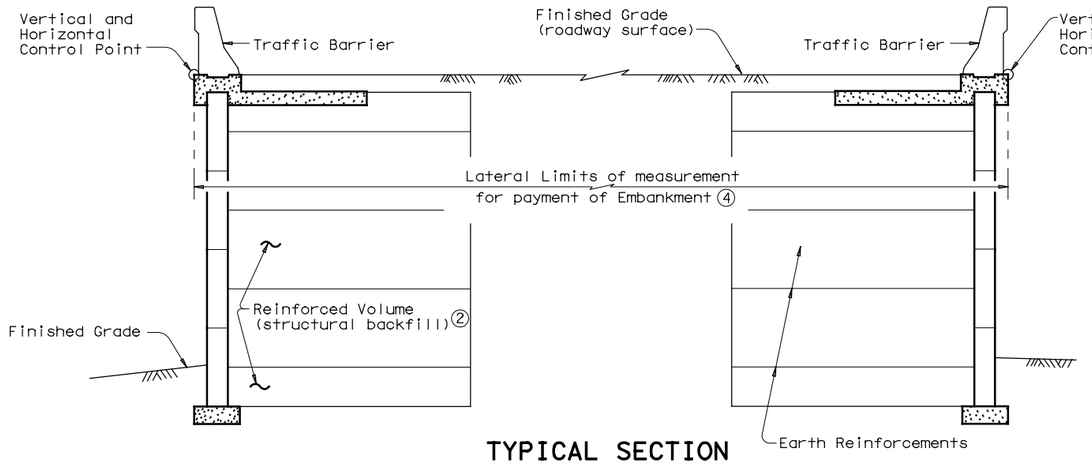
RW(MSE)DD(MOD)

FILE: rwstde16.dgn	DN: CHL	CK: NM	DW: CHL	CK: SMY
©TxDOT Oct 14, 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		73



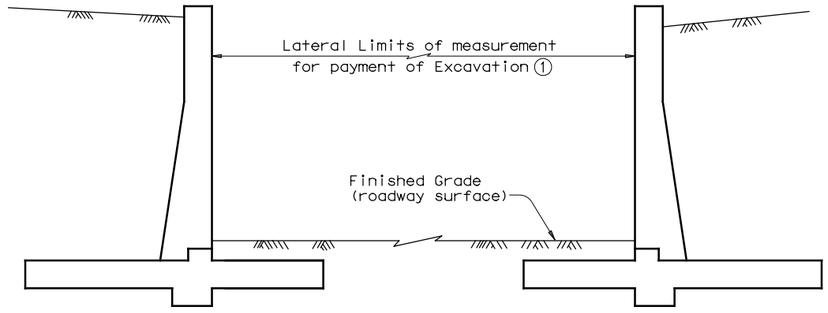
TYPICAL SECTION

Excavation Between MSE Retaining Walls ③



TYPICAL SECTION

Embankment Between MSE Retaining Walls ③



TYPICAL SECTION

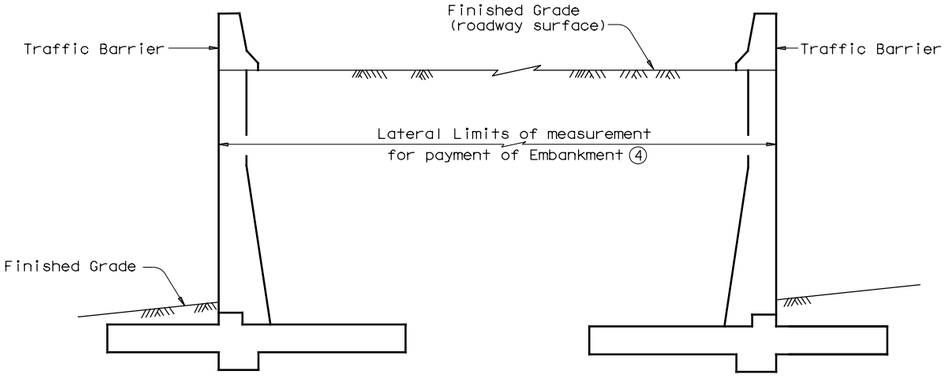
Excavation Between Conventional Retaining Walls

① Only the Excavation above the proposed subgrade elevation will be measured for payment.

② Meeting requirements of Retaining-Wall Item.

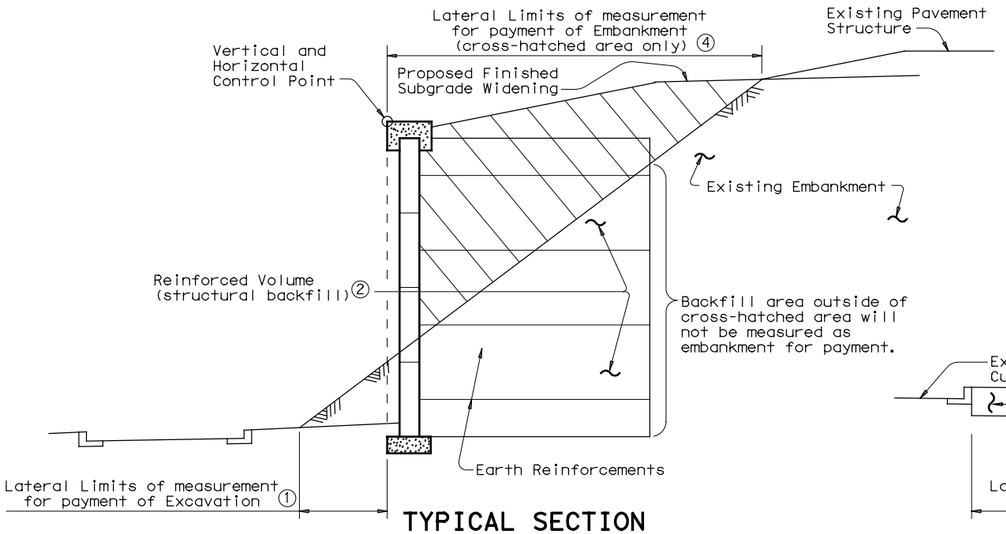
③ Earthwork measurement with other designs of retaining walls will be made to the outside finished face in the same manner.

④ Only the Embankment above the existing ground line will be measured for payment.



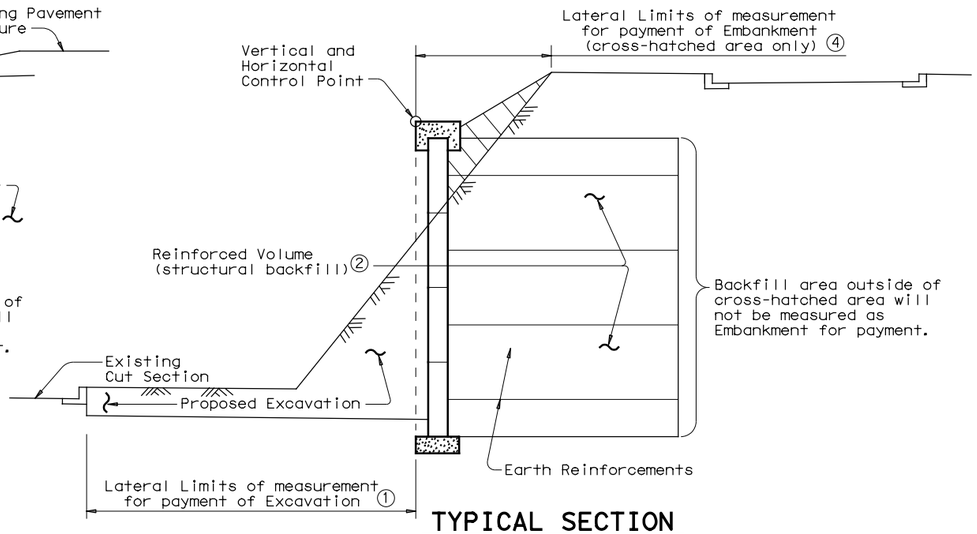
TYPICAL SECTION

Embankment Between Conventional Retaining Walls



TYPICAL SECTION

Widening Embankment with MSE Retaining Walls ③



TYPICAL SECTION

Widening Cut Section with MSE Retaining Walls ③

Texas Department of Transportation

Bridge Division Standard

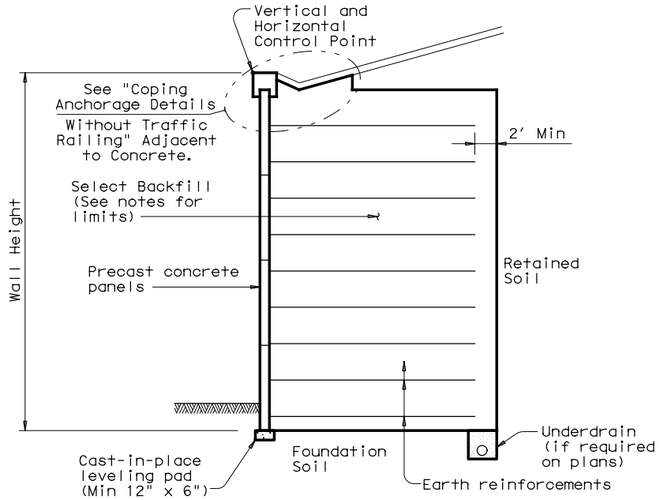
EARTHWORK MEASUREMENT AT RETAINING WALLS

RW(EM)

FILE:	rwstde12.dgn	DN: TxDOT	CK: TxDOT	DW: BWH	CK: JMH
©TxDOT	March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS		0513	01	017	SH236
		DIST	COUNTY		SHEET NO.
		WACO	CORYELL		74

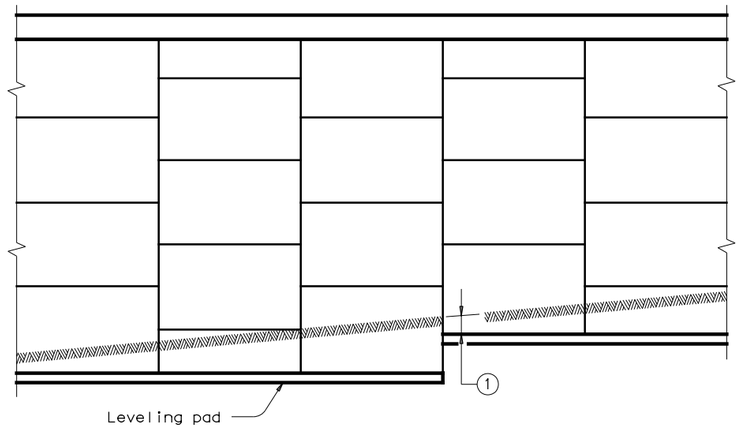
DATE: 7/28/2020 1:04:04 PM
FILE: c:\pwworking\central01\d0974300\RW(EM).dgn

DATE: 7/28/2020 1:04:06 PM
FILE: c:\pwworking\central01\d0974300\RW(MSE).dgn

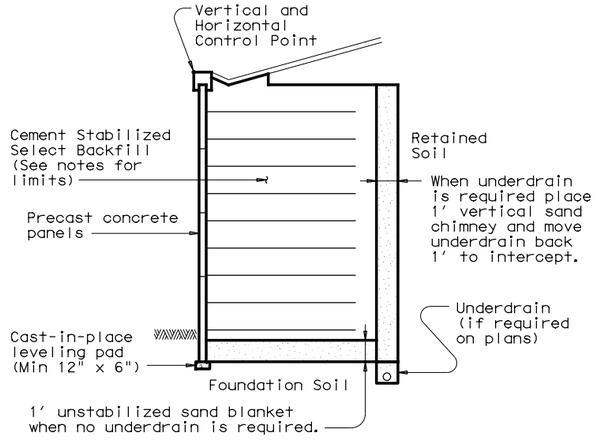


TYPICAL SECTION

(Wall at bottom of slope)

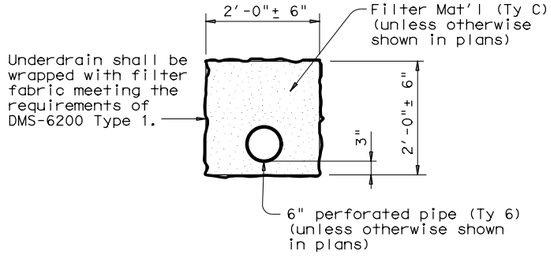


ELEVATION

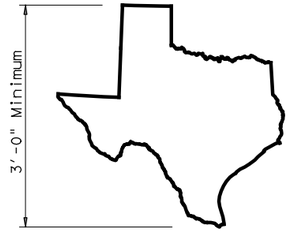


SPECIAL DRAINAGE PROVISIONS

(When cement stabilized backfill is used)



UNDERDRAIN DETAIL



MAP OF TEXAS EMBLEM ②

① Minimum embedment conforming to values given on the RW(MSE)DD standard.

② Map of Texas emblem shall be formed into a wall panel next to each bridge abutment. The exact location of each emblem shall be approved by the Engineer. The cost of forming the emblems will not be paid for directly, but shall be incidental to the Item "Retaining Wall". The map of Texas shall be inset a minimum of ¾" into the face of the panel, and shall receive a smooth finish. The inset area shall be finished in a contrasting color as approved by the Engineer.

Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)

FILE: rwstde01.dgn	DN: TxDOT	CK: TxDOT	DW: JGD	CK: MJG
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-11: Added Table & Corrosion Criteria. 01-13: Wall embed, (WS) table, retained fill, soil strength.	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		75

DATE: 7/28/2020 1:04:07 PM
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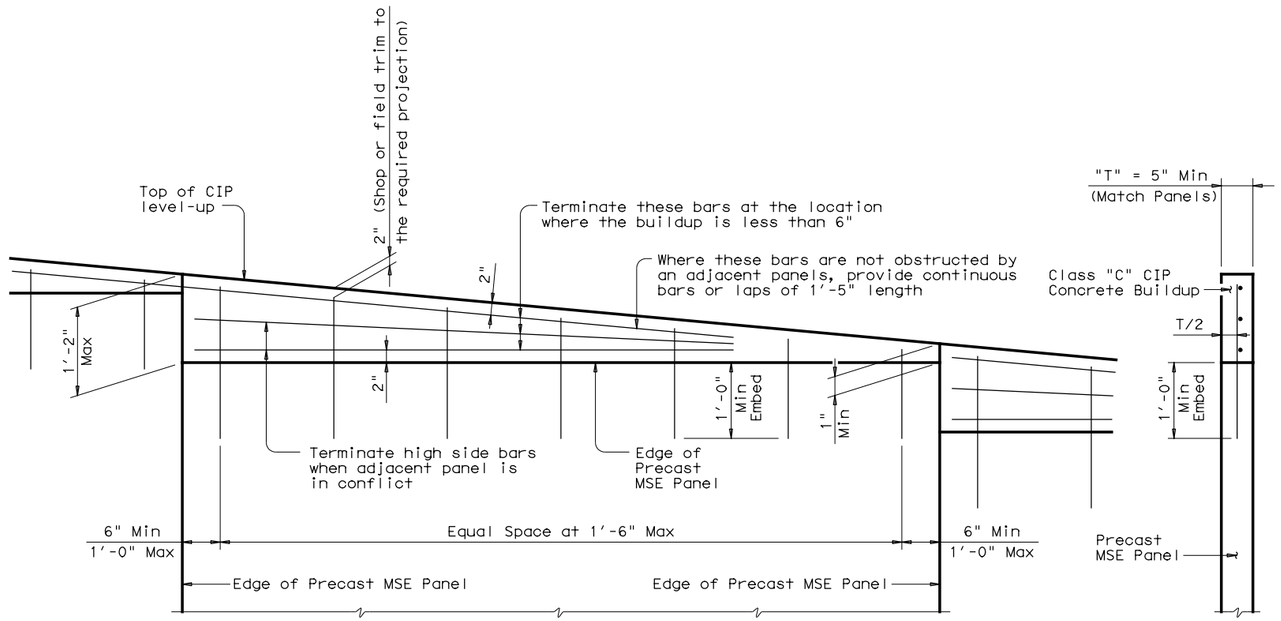


LEVEL UP DETAIL (5)

Provide Grade 60 (#4) Reinforcement

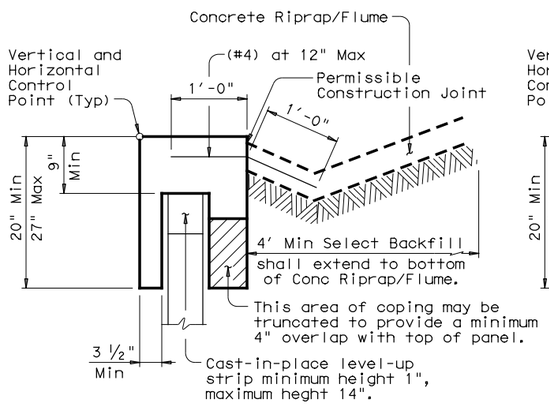
(3) Precast coping shall be anchored to prevent rotation or displacement. Use these details to develop custom anchorage for precast copings. Details shall include coping reinforcement. Concrete flume (if required) shall be paid for separately from Item 423.

(4) Soil design parameter must be based on long term soil strength. Design parameters must be listed on the RW(MSE)DD standard.

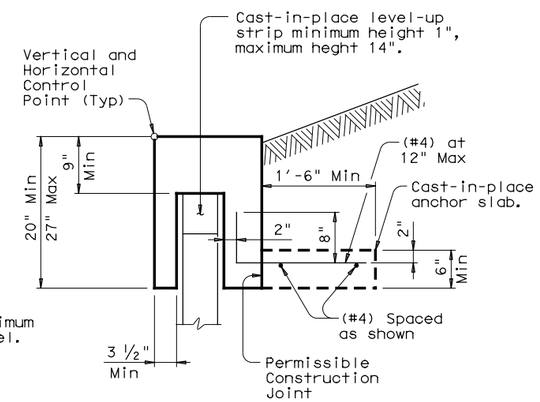
(5) Cast vertical bars into the top of panels. At contractor's option vertical bars may be embedded 4" with a Type III Clac C epoxy anchorage system. Follow manufacturer's directions for installing the epoxied vertical bars.

(6)

SELECT BACKFILL UNIT WEIGHT			
Type AS, BS & DS	Unit Weight	Inernal Stability	External Stability
	105 PCF	Pullout	Sliding, Overturning, Eccentricity
	125 PCF	Rupture	Bearing



ADJACENT TO CONCRETE
(Excluding Concrete Pavement)



ADJACENT TO SOIL

COPING ANCHORAGE DETAILS WITHOUT TRAFFIC RAILING (3)

DESIGN PARAMETERS:

Design of retaining walls shall be based on the following design parameters unless stated elsewhere in the plans:

Retained Soil	Unit Weight = 125 pcf Ø = (4) C = 0 psf
Foundation Soil	Ø = (4) C = 0 psf
Select Backfill	Unit Weight = See Table (6) Ø = 34 C = 0 psf
Cement Stabilized Select Backfill	Unit Weight = 125 pcf Ø = 45 C = 0 psf

Stress in steel and concrete shall be in accordance with current AASHTO Standard and Interim Specifications. The minimum length of earth reinforcements are as shown on the RW(MSE)DD standard.

STABILITY CRITERIA:

Stability criteria applies to both dry and drawdown analysis.
Factor of safety in sliding along the base of the structure shall be greater than or equal to 1.5.
Factor of safety in overturning shall be greater than or equal to 2.0.
The base pressure resultant shall fall within the middle third of the retaining wall.
The factor of safety against pullout of the earth reinforcements shall be greater than or equal to 1.5 at each level. Pullout resistance shall be determined from test data evaluated at ¾ inch strain.

CORROSION CRITERIA:

The earth reinforcement elements shall be designed to have a minimum design life of 75 years, using current AASHTO corrosion rates.
Stress calculations (rupture) shall be done on the calculated earth reinforcement section remaining after 75 years. Pullout calculations may be based on non-corroded section.

PRECAST COPINGS:

Wall supplier is to maximize lengths of precast coping. Precast coping is to be provided in 10′ minimum lengths (typical). To optimize coping lengths at radiuses, end of runs or other wall geometric conditions favorable to shorter coping sections, shorter lengths may be used pending approval by the Engineer. This applies only to coping without railing.

JOINT SEALER:

The joints between coping segments must be sealed in accordance with the DMS-6310 "Joint Sealant's and Fillers", joint sealing material, Class 4. The joint must be sealed 3" below and 6" above the adjoining pavement surface, or as directed by the Engineer. The purpose of the joint sealing is to contain surface drainage and prevent infiltration into the retaining wall backfill.

GENERAL NOTES:

Section and elevation shown is for informational purposes only. Specific geometry is to be determined based on wall layouts and other plan information.
The select backfill specified for use within the mechanically stabilized earth volume shall extend horizontally from the back of the panels to a minimum 2′ beyond the end of the earth reinforcements. The select backfill shall extend vertically from the top of the leveling pad or 4" below the lowest earth reinforcement, whichever is lower, to the top of panels.
The uppermost earth reinforcements shall be no more than 3.0′ below the top of wall.
The lowest level of earth reinforcements shall be no more than 2.0′ above the top of the leveling pad.
Minimum wire size for earth reinforcements shall be W7.0. If different longitudinal and cross wires are used in an earth reinforcement mesh, the smaller wire shall have at least 50% of the cross sectional area of the larger wire.
A maximum of four wire mesh configurations (wire sizes) will be allowed on a project. Each mesh configuration shall have a unique transverse bar spacing, differing from other configurations by a minimum of 3". Earth reinforcement lengths shall be stepped in increments no finer than 12".
Standard precast concrete panels shall have a maximum height of 6′, and a maximum surface area of 50 sq ft. Top and bottom panels may exceed these limitations as necessary to achieve required wall grades. Maximum height of any panel shall be 7′-6". Minimum panel thickness shall be 5". Panels shall be arranged to provide offset horizontal joints.
An open joint shall be provided around the perimeter of the concrete panels. The joint configuration shall be such that 1) the filter fabric and/or pad materials are not exposed at the wall face and 2) the design opening is between ⅜" and ¾".
A one-piece corner panel shall be provided for wall angle changes of greater than 30 degrees. Butting of chamfered panels will be allowed for angle changes of 30 degrees or less.
Concrete coping shall be provided along the top of wall, at the vertical steps at bridge backwalls, and at other vertical steps along the top of wall. The joints between all coping segments shall be sealed to prevent infiltration of water into the retaining wall backfill. Sealing shall be in accordance with the DMS-6310 "Joint Sealants and Fillers", using Class 4 joint sealant.
When obstructions (inlets, drilled shafts, piling, etc.) prevent placement of soil reinforcements in their normal locations, provide details and calculations that establish support for the affected panels. Furnish the same earth reinforcement coverage as that required in the absence of the obstruction. For skewed (rotated) earth reinforcements no adjustment in length is needed for skew angles between 1 and 10 degrees. For skew angles greater than 10 degrees adjust the length of earth reinforcement to provide a cosine length of the reinforcement equivalent to the stated design length for the section of wall. Provide calculations that justify any alterations made to the soil reinforcements or modifications to their normal placement. Do not use panels without any soil reinforcements connected to them unless they are connected with galvanized hardware to adjacent panels which do have supporting Soil reinforcements attached to them and as approved by the Engineer.
Reinforced concrete must be Class "C", Precast concrete Class "H", Unreinforced concrete Class "A".
All reinforcing steel must be Grade 60.
Coping and anchor slabs are considered subsidiary to the Item "Retaining Wall".
These details are to be used in conjunction with the retaining wall layout, standard RW(MSE)DD and other applicable standards.

Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)

FILE: rwstde01.dgn	DN: TxDOT	CK: TxDOT	DW: JGD	CK: MJG
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-11: Added Table & Corrosion Criteria. 01-13: Wall embed, (WS) table, retained fill, soil strength.	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		76

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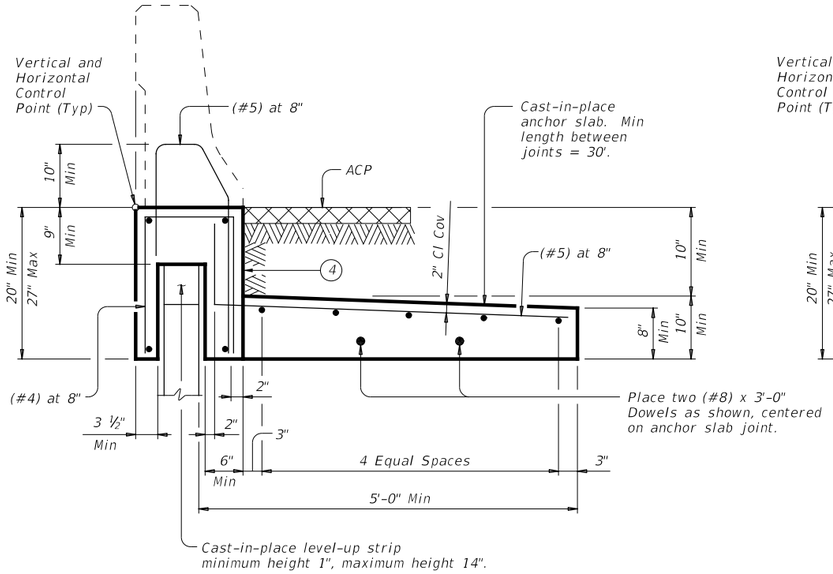
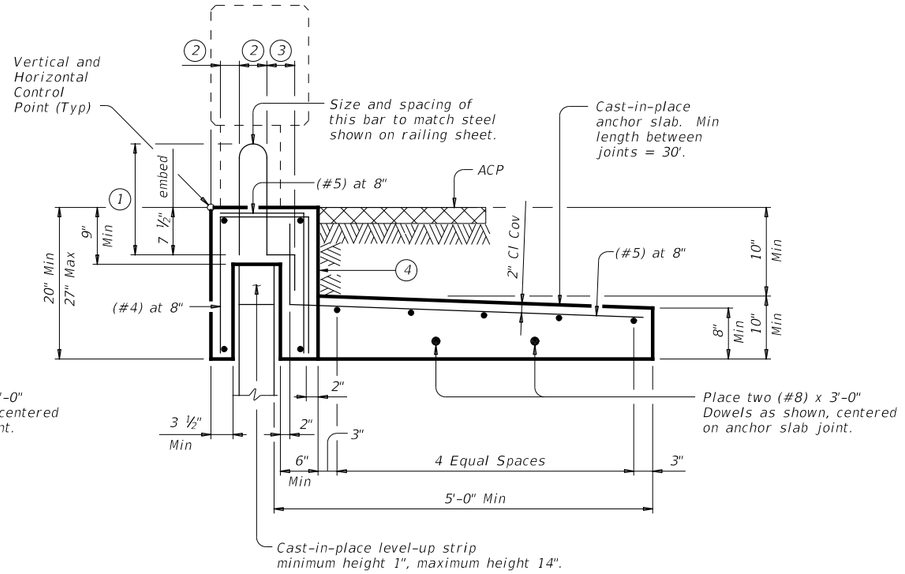


"WIDE BASED" ADJACENT TO ACP

(Showing T551 Rail, other rails listed similar)



"NARROW BASED" ADJACENT TO ACP

(Showing T223 Rail, other rails listed similar)

Rail Type (5)	Detail	Precasting Rail with Coping Allowed
T1F/T1W/C1W/T2P/C2P	NARROW	NO
T221/C221/T222	NARROW	YES
T223/C223	NARROW	NO
T401/T402/C402	NARROW	NO
T411/C411	NARROW	NO
T551/T552	WIDE	YES
T66	NARROW	NO
SSTR	WIDE	YES

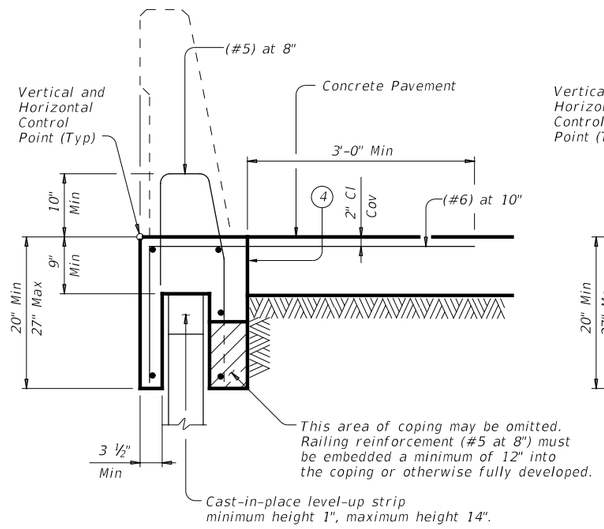
(1) Reinforcement length equal to length shown on the appropriate Rail standard plus 1".

(2) Match dimension on the appropriate Rail standard.

(3) Match dimension on the appropriate Rail standard. Bend end of rail anchorage reinforcing as shown as required to maintain clear cover.

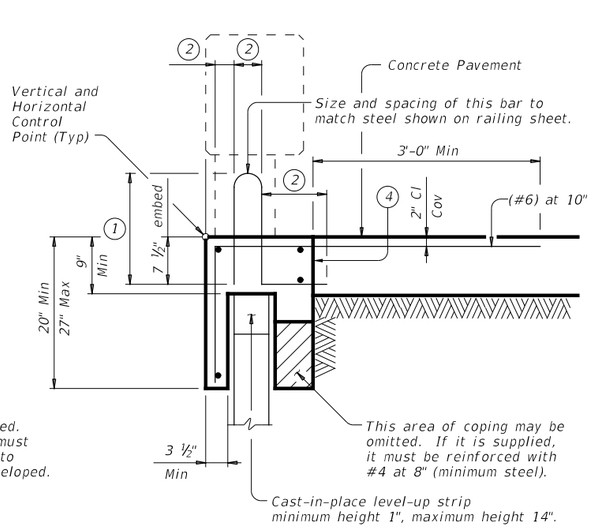
(4) See "Coping Joint Sealer Details".

(5) Use of these rails will result in a railing acceptable for MASH Test Level 3 (TL-3) regardless of the higher ratings that may be indicated on the rail standard.



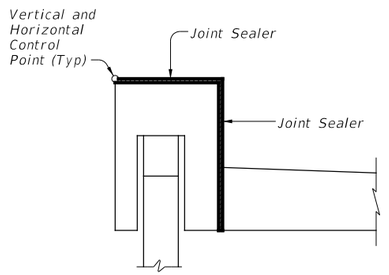
"WIDE BASED" ADJACENT TO CONCRETE PAVEMENT

(Showing SSTR Rail, other rails listed similar)

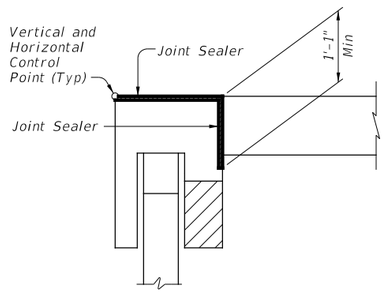


"NARROW BASED" ADJACENT TO CONCRETE PAVEMENT

(Showing T223 Rail, other rails listed similar)



ADJACENT TO ACP



ADJACENT TO CONCRETE PAVEMENT

COPING JOINT SEALER DETAILS

(Reinforcing steel not shown for clarity)

CAST-IN-PLACE COPINGS:

Provide compressible material to isolate precast panel from cast-in-place coping to prevent cracking. Attach compressible material to both sides of precast panel prior to casting concrete for coping.

When cast-in-place coping is anchored to reinforced concrete pavement, a smooth level-up strip must be provided on the top of the precast panels. The purpose of the level-up is to allow the pavement and coping to move longitudinally relative to the wall without causing damage.

Align coping and railing joints with precast panel joints. Optional rail joints are allowed as approved by Engineer. Provide railing construction joints or expansion joints at no greater than 100' spacing.

PRECAST COPINGS:

Provide a smooth level-up strip on top of the precast panels prior to installation of the coping. Shims may be used on top of the level-up strip to facilitate alignment. Total shim thickness not to exceed 1".

Provide precast coping in 10' minimum lengths.

JOINTED CONCRETE PAVEMENT:

When coping is adjacent to and anchored into jointed concrete pavement, the coping joints must coincide with the pavement joints.

JOINT SEALER:

Seal joints between coping segments in accordance with Item 438, "Cleaning and Sealing Joints". Provide Class 4 joint seal. Place sealant flush with coping surface. The purpose of the joint sealing is to reduce surface drainage infiltration into the retaining wall backfill. Sealing coping joint is considered subsidiary to other items.

GENERAL NOTES:

Details on this sheet are to be used in development of specific details for mounting traffic railing on mechanically stabilized earth (MSE) walls.

The specific details proposed must have strengths equivalent to those shown on this sheet. Areas of particular importance are the connection of the coping to the railing, the strength of the vertical coping leg connecting the railing to the anchor slab, and the connection of the coping to the anchor slab or concrete pavement.

Submit shop drawings for the traffic railing foundations to the Engineer in accordance with Item 423 "Retaining Wall". The shop drawings must include bar bending details.

Precasting of railing with the coping will be allowed as noted in the table on this sheet.

The Contractor's attention is directed to the fact that various configurations of precast coping/railing combinations are covered by patent. The contractor must provide for use of these systems in accordance with Article 7.3.

Provide Class C concrete (f'c=3,600 psi).

Provide Grade 60 reinforcing steel.

Provide (#4) longitudinal bars, unless otherwise shown.

Coping and anchor slabs are considered subsidiary to Item 423 "Retaining Wall". Payment for traffic railing is per the linear foot for the appropriate railing type.

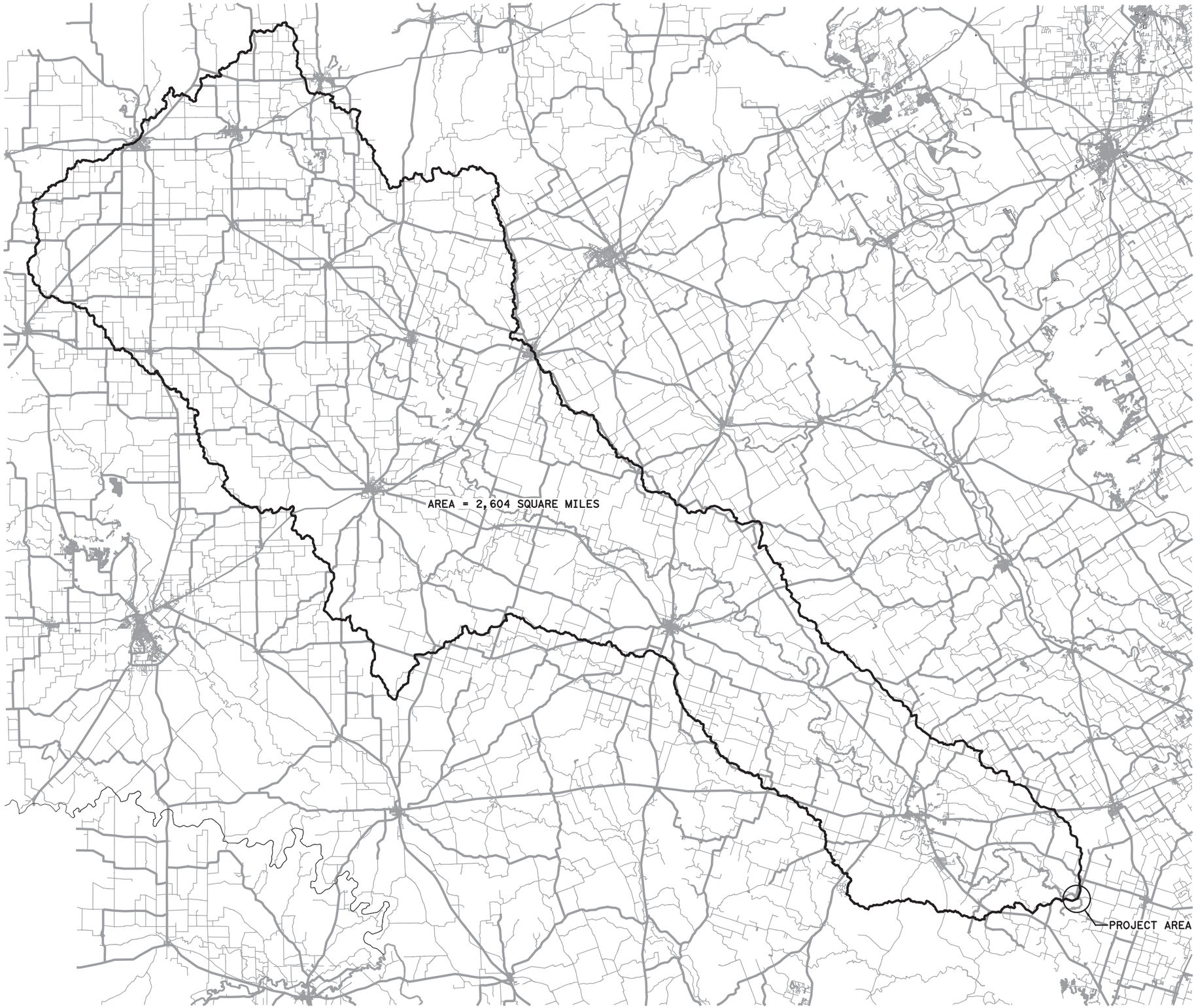
Texas Department of Transportation

Bridge Division Standard

RETAINING WALL TRAFFIC RAILING FOUNDATIONS

RW(TRF)

FILE: rwstde03-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: MPM
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-13: Precast option with Rails. 03-18: Cast-in-Place Copings, railing construction and expansion joints. 02-20: Note 5 added for precast rail option.	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		77



N

PEAK FLOW SUMMARY

DESIGN STORM FLOOD FREQUENCY EVENT	PEAK FLOW (CFS)
10-YR	25,800
25-YR	44,700
50-YR	65,400
100-YR	93,500

NOTES:

USGS STREAM GAGE STATION 08100500 (LEON RIVER AT GATESVILLE, TX) IS LOCATED ABOUT 20 MILES UPSTREAM OF THE BRIDGE WITH A LISTED TOTAL DRAINAGE AREA OF 2,342 SQUARE MILES. THE DRAINAGE AREA BETWEEN THE GATESVILLE GAGE AND THE BRIDGE WAS ESTIMATED TO BE 262 SQUARE MILES USING USGS CATCHMENTS BASED ON HYDROLOGIC UNIT CODES (HUCs) AND 5-FT CONTOURS FROM USGS TOPOGRAPHY. THIS INTERVENING DRAINAGE AREA WAS ADDED TO THE GATESVILLE GAGE AREA TO ESTIMATE THE TOTAL DRAINAGE AREA AT THE BRIDGE, WHICH IS 2,604 SQUARE MILES.

THE GATESVILLE GAGE HAS 107 YEARS OF ANNUAL MAXIMUM FLOW DATA AVAILABLE AND WAS USED TO CALCULATE DESIGN FLOWS AT THE SH 236 BRIDGE. U.S. ARMY CORPS OF ENGINEER'S "HYDROLOGIC ENGINEERING CENTER-STATISTICAL SOFTWARE PACKAGE" (HEC-SSP v2.1) WAS USED FOR THE ANALYSIS WHICH INCLUDES LOG-PEARSON TYPE III PROCEDURES REFERENCED IN BULLETIN 17B.

DESIGN STORM PEAK DISCHARGES WERE ESTIMATED AT THE GATESVILLE GAGE AND TRANSPOSED TO THE PROJECT SITE.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
SUNIT R. DEO
104943
LICENSED PROFESSIONAL ENGINEER

08/21/2020

Deo, Sunit

Digitally signed by Deo, Sunit
Date: 2020.08.21 10:52:42 -05'00'

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

OVERALL DRAINAGE AREA MAP
SH 236 AT LEON RIVER

SCALE: 1"=50000' SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	78
CONTROL	SECTION	JOB	
0513	01	017	

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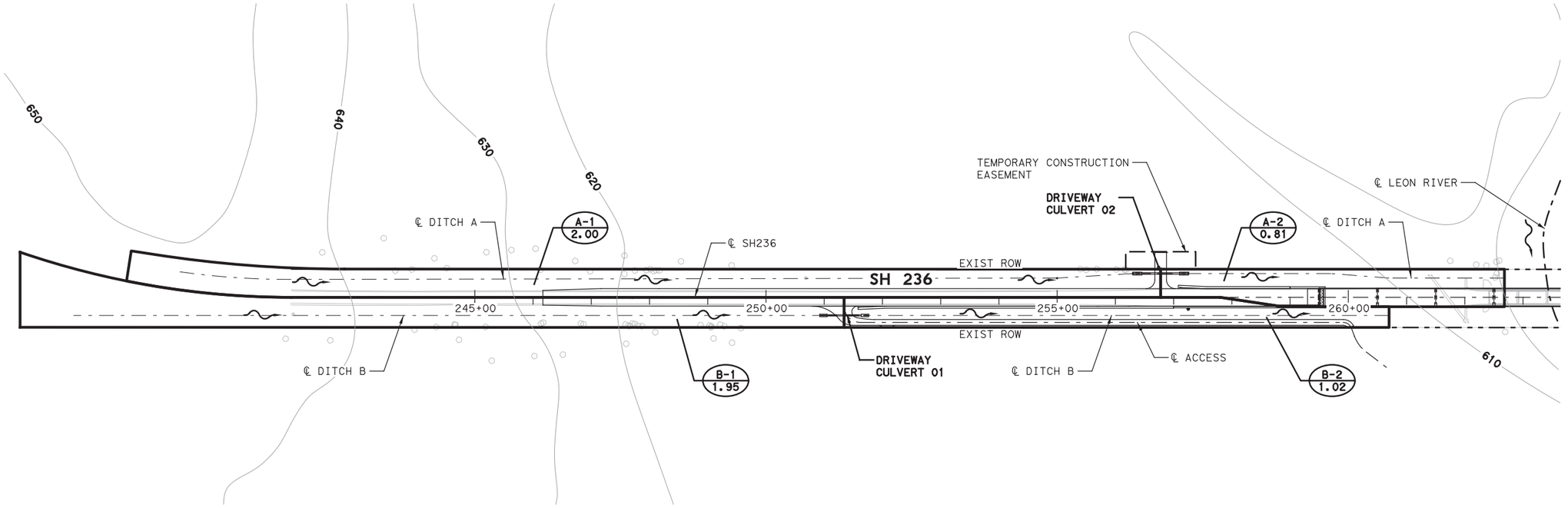

LEGEND

- X / X.XX — AREA I.D. / AREA IN ACRES
- DIRECTION OF FLOW
- DRAINAGE AREA BOUNDARY

NOTE:

CONTOURS ARE SHOWN AT 10' INTERVALS.

0 100 200 300 400

SCALE IN FEET

RUNOFF SUMMARY FOR DRAINAGE AREAS SMALLER THAN 200 ACRES USING THE RATIONAL METHOD

DRAINAGE AREA NO.	DRAINAGE AREA ACRES	SUBAREAS (AC) SUBAREA 1 AREA (AC)	SUBAREA 1 C	SUBAREA 1 LAND USE	SUBAREA 2 AREA (AC)	SUBAREA 2 C	SUBAREA 2 LAND USE	COMPOSITE C VALUE	TOTAL CA	TOTAL Tc (MIN)	INTENSITY I(5) (IN/HR)	DISCHARGE Q(5) (CFS)	INTENSITY I(10) (IN/HR)	DISCHARGE Q(10) (CFS)	INTENSITY I(100) (IN/HR)	DISCHARGE Q(100) (CFS)	COMMENTS (COMBINED DRAINAGE AREAS, ETC.)
A-1	2.00	0.61	0.90	IMP	1.40	0.20	PARK	0.41	0.83	10.00	6.90	5.7	7.87	6.51	11.66	9.65	DITCH A TO LEON RIVER
A-2	0.81	0.35	0.90	IMP	0.46	0.20	PARK	0.51	0.41	10.00	6.90	2.83	7.87	3.23	11.66	4.79	DITCH A TO LEON RIVER
B-1	1.95	0.53	0.90	IMP	1.41	0.20	PARK	0.39	0.76	10.00	6.90	5.25	7.87	6	11.66	8.88	DITCH B TO LEON RIVER
B-2	1.02	0.49	0.90	IMP	0.53	0.20	PARK	0.54	0.55	10.00	6.90	3.8	7.87	4.33	11.66	6.42	DITCH B TO LEON RIVER

Conveyance

Link I.D.	Node I.D. US	Node I.D. DS	Invert Elev US (ft)	Invert Elev DS (ft)	Soffit Elev US (ft)	Soffit Elev DS (ft)	Link Type	No. of Barrels	Span (ft)	Rise/ Dia (ft)	Link Mtrl	Shape	Hyd Length (ft)	Slope (%)	Manning's "n"	H.G.L. US Elev (ft)	H.G.L. DS Elev (ft)	E.G.L. US Elev (ft)	E.G.L. DS Elev (ft)	Unif Depth (ft)	Unif Vel (ft/s)	Crit Depth (ft)	Crit Vel (ft/s)	Crit Slope (%)	Frictn Slope (%)	Actual Depth (ft)	Actual Vel (ft/s)	Total Q (cfs)	Link Capacity (cfs)	Junctn Loss (ft)
DITCH A-1	A-1	A-1A	612.86	611.69	614.86	613.69	Ditch	n/a	16	2	n/a	n/a	130.25	0.90	0.012	613.19	611.86	613.30	612.05	0.17	3.51	0.22	2.62	0.35	0.90	0.17	3.49	9.95	730.62	0.11
DITCH A-2	A-2	A-2A	610.00	607.88	612.00	609.88	Ditch	n/a	16	2	n/a	n/a	245.00	0.87	0.013	610.36	608.09	610.49	608.31	0.21	3.73	0.27	2.92	0.39	0.87	0.21	3.73	13.2	582.70	0.09
DITCH B-1	B-1	B-1A	615.47	613.52	617.47	615.52	Ditch	n/a	16	2	n/a	n/a	487.00	0.40	0.013	615.79	614.87	615.89	615.27	0.22	2.56	0.22	2.58	0.42	0.41	1.35	0.33	9.46	450.11	0.10
DITCH B-2	B-2	B-2-OUT	613.36	610.00	615.36	612.00	Ditch	n/a	16	2	n/a	n/a	896.00	0.38	0.013	613.69	610.30	613.82	610.43	0.30	2.97	0.30	2.98	0.38	0.38	0.30	2.98	15.2	435.82	0.03

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSON
91924
LICENSED PROFESSIONAL ENGINEER
7/28/2020
P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

DRAINAGE AREA MAP

SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	79

CONTROL	SECTION	JOB
0513	01	017

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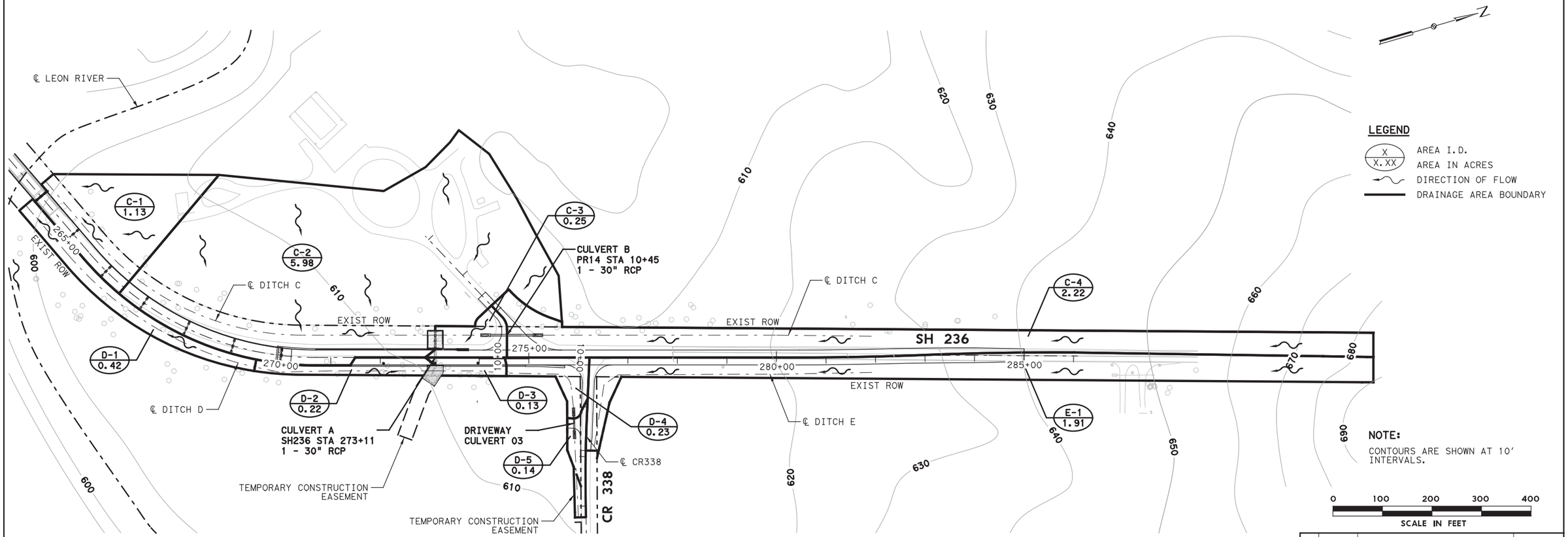

RUNOFF SUMMARY FOR DRAINAGE AREAS SMALLER THAN 200 ACRES USING THE RATIONAL METHOD

DRAINAGE AREA		SUBAREAS (AC)						COMPOSITE	TOTAL	TOTAL	INTENSITY	DISCHARGE	INTENSITY	DISCHARGE	INTENSITY	DISCHARGE	COMMENTS
NO.	ACRES	SUBAREA 1			SUBAREA 2			C VALUE	CA	Tc	I(5)	Q(5)	I(10)	Q(10)	I(100)	Q(100)	(COMBINED DRAINAGE AREAS, ETC.)
		AREA (AC)	C	LAND USE	AREA (AC)	C	LAND USE			(MIN)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	(IN/HR)	(CFS)	
C-1	1.13	0.19	0.90	IMP	0.94	0.20	PARK	0.32	0.36	10.00	6.90	2.47	7.87	2.82	11.66	4.17	DITCH C TO LEON RIVER
C-2	5.98	1.07	0.90	IMP	4.91	0.20	PARK	0.33	1.95	10.00	6.90	13.4	7.87	15.3	11.66	22.7	DITCH C TO CULV A
C-3	0.25	0.08	0.90	IMP	0.17	0.20	PARK	0.44	0.11	10.00	6.90	0.75	7.87	0.86	11.66	1.27	DITCH C TO CULV A
C-4	2.22	0.58	0.90	IMP	1.64	0.20	PARK	0.38	0.85	10.00	6.90	5.89	7.87	6.72	11.66	9.96	DITCH C TO CULV A
D-1	0.42	0.42	0.20	PARK				0.20	0.08	10.00	6.90	0.59	7.87	0.67	11.66	0.99	DITCH D TO LEON RIVER
D-2	0.22	0.05	0.90	IMP	0.17	0.20	PARK	0.37	0.08	10.00	6.90	0.57	7.87	0.65	11.66	0.96	DITCH D TO CULV A
D-3	0.13	0.05	0.90	IMP	0.07	0.20	PARK	0.49	0.06	10.00	6.90	0.43	7.87	0.49	11.66	0.73	DITCH D TO CULV A
D-4	0.23	0.09	0.90	IMP	0.14	0.20	PARK	0.46	0.11	10.00	6.90	0.74	7.87	0.85	11.66	1.25	DITCH D
D-5	0.14	0.07	0.90	IMP	0.07	0.20	PARK	0.54	0.08	10.00	6.90	0.53	7.87	0.6	11.66	0.89	DITCH D
E-1	1.91	0.69	0.90	IMP	1.22	0.20	PARK	0.45	0.87	10.00	6.90	5.98	7.87	6.82	11.66	10.1	DITCH E

Conveyance

Link I.D.	Node I.D.		Invert Elev		Soffit Elev		Link Type	No. of Barrels	Span	Rise/ Dia	Link Mtrl	Shape	Hyd Length	Slope	Manning's "n"	H.G.L.		E.G.L.		Unif Depth	Unif Vel	Crit Depth	Crit Vel	Crit Slope	Frictn Slope	Actual Depth	Actual Vel	Total Q	Link Capacity	Junctn Loss
	US	DS	US (ft)	DS (ft)	US (ft)	DS (ft)			(ft)	(ft)			(ft)	(%)		US Elev (ft)	DS Elev (ft)	US Elev (ft)	DS Elev (ft)	(ft)	(ft/s)	(ft)	(ft/s)	(%)	(%)	(ft)	(ft/s)	(cfs)	(cfs)	(ft)
DITCH C-1	C-1	C-1-OUT	609.09	608.56	611.09	610.56	Ditch	n/a	8	2	n/a	n/a	261.47	0.20	0.035	609.59	608.78	610.10	608.88	0.48	1.05	0.22	2.56	3.06	0.21	0.22	2.56	5.07	73.10	0.02
DITCH C-2	C-2	C-2-OUT	609.09	607.82	611.09	609.82	Ditch	n/a	8	2	n/a	n/a	634.43	0.20	0.035	610.36	608.46	611.63	608.71	1.22	1.73	0.64	4.06	2.27	0.20	0.64	4.06	27.2	72.65	0.05
DITCH C-3	C-3	C-3-OUT	608.94	607.82	610.94	609.82	Ditch	n/a	8	2	n/a	n/a	109.50	1.24	0.035	609.72	608.21	609.82	608.37	0.48	2.54	0.39	3.27	2.61	1.24	0.39	3.27	12	181.13	0.06
DITCH C-4	C-4	C-4A	621.25	611.03	623.25	613.03	Ditch	n/a	8	2	n/a	n/a	257.02	3.98	0.035	621.77	611.35	621.92	611.55	0.32	3.62	0.36	3.17	2.66	3.98	0.32	3.62	10.7	323.78	0.16
DITCH D-1	D-1	D-1-OUT	610.23	609.07	612.23	611.07	Ditch	n/a	8	2	n/a	n/a	577.39	0.20	0.035	610.50	609.18	610.76	609.23	0.26	0.72	0.11	1.82	3.80	0.20	0.11	1.82	1.67	72.79	0.01
DITCH D-2	D-2	D-2-OUT	610.23	606.61	612.23	608.61	Ditch	n/a	8	2	n/a	n/a	359.43	1.01	0.035	610.37	606.69	610.51	606.73	0.12	1.02	0.08	1.58	4.21	1.01	0.08	1.58	1.06	162.95	0.02
DITCH D-3	D-3	D-3-OUT	611.78	606.61	613.78	608.61	Ditch	n/a	8	2	n/a	n/a	145.15	3.56	0.035	611.87	606.67	611.96	606.70	0.06	1.27	0.06	1.37	4.58	3.56	0.06	1.37	0.68	306.44	0.02
DITCH D-4	D-4	D-4A	611.78	609.39	613.78	611.39	Ditch	n/a	8	2	n/a	n/a	104.60	2.28	0.035	611.91	609.64	611.94	609.80	0.10	1.38	0.09	1.66	4.16	2.28	0.25	0.53	1.21	245.44	0.03
DITCH D-5	D-5	D-5-OUT	608.45	607.85	610.45	609.85	Ditch	n/a	8	2	n/a	n/a	171.47	0.38	0.035	608.76	607.97	608.77	608.03	0.24	0.94	0.12	1.93	3.67	0.38	0.12	1.93	2	100.07	0.02
DITCH E-1	E-1	E-1A	621.79	613.23	623.79	615.23	Ditch	n/a	8	2	n/a	n/a	199.78	4.28	0.035	622.18	613.47	622.30	613.63	0.24	3.16	0.27	2.78	2.89	4.28	0.24	3.16	6.82	336.10	0.12
DITCH A-2A	A-2A	A-2B	607.88	607.63	609.88	609.63	Ditch	n/a	16	2	n/a	n/a	100.32	0.25	0.013	608.20	607.95	608.30	608.05	0.31	2.54	0.27	2.92	0.39	0.25	0.32	2.50	13.2	313.21	0.01
DITCH A-2B	A-2B	A-2-OUT	607.63	607.20	609.63	609.20	Ditch	n/a	16	2	n/a	n/a	198.00	0.22	0.012	607.95	607.47	608.05	607.61	0.31	2.54	0.27	2.92	0.33	0.21	0.27	2.92	13.2	315.88	0.01
DITCH C-4A	C-4A	C-4B	611.03	609.57	613.03	611.57	Ditch	n/a	8	2	n/a	n/a	433.50	0.35	0.035	611.74	610.72	611.78	611.10	0.64	1.59	0.36	3.17	2.66	0.34	1.15	0.74	10.7	96.42	0.00
DITCH D-4A	D-4A	D-4B	609.39	608.74	611.39	610.74	Ditch	n/a	8	2	n/a	n/a	94.97	0.80	0.035	609.64	609.17	609.80	609.30	0.14	0.99	0.09	1.66	4.16	0.80	0.43	0.29	1.21	144.87	0.00
DITCH E-1A	E-1A	E-1B	613.23	611.23	615.23	613.23	Ditch	n/a	8	2	n/a	n/a	100.00	2.00	0.035	613.53	611.62	613.63	611.67	0.30	2.47	0.27	2.78	2.89	2.01	0.39	1.83	6.82	229.63	0.01
DITCH E-1B	E-1B	E-1C	611.23	609.39	613.23	611.39	Ditch	n/a	8	2	n/a	n/a	220.47	0.83	0.035	611.62	609.89	611.67	610.40	0.39	1.85	0.27	2.78	2.89	0.83	0.50	1.38	6.82	148.34	0.00
DITCH E-1C	E-1C	E-1-OUT	609.39	608.75	611.39	610.75	Ditch	n/a	8	2	n/a	n/a	169.88	0.38	0.035	609.89	609.02	610.40	609.14	0.48	1.42	0.27	2.78	2.89	0.38	0.27	2.78	6.82	99.66	0.01

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED PROFESSIONAL ENGINEER
7/28/202
P.E.

RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation
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DRAINAGE AREA MAP

SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	80

CONTROL	SECTION	JOB
0513	01	017

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Table 1 - Summary of Culvert Flows at Crossing: EXIST CULVERT A

Headwater Elevation (ft)	Total Discharge (cfs)	CULVERT A Discharge (cfs)	Roadway Discharge (cfs)	Iterations
608.41	20.04	20.04	0.00	1
608.51	21.43	21.43	0.00	1
** 608.61	22.88	22.88	0.00	1
608.70	24.21	24.21	0.00	1
608.80	25.60	25.60	0.00	1
608.90	26.98	26.98	0.00	1
609.00	28.37	28.37	0.00	1
609.10	29.76	29.76	0.00	1
609.20	31.15	31.15	0.00	1
609.30	32.54	32.54	0.00	1
*** 609.41	33.93	33.93	0.00	1
610.76	48.65	48.65	0.00	Overtopping

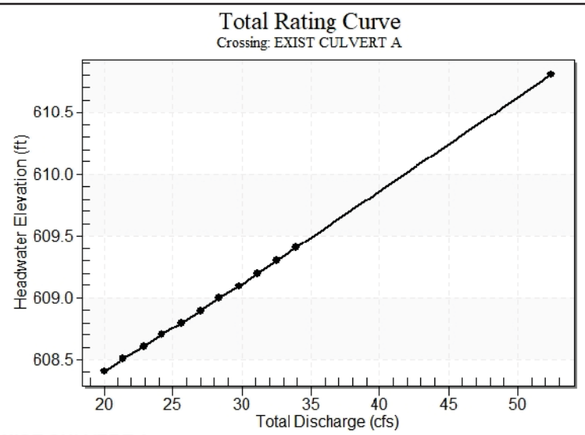


Table 2 - Culvert Summary Table: CULVERT A

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
20.04	20.04	608.41	2.215	2.311	2-M2c	2.500	1.519	1.519	1.027	6.418	2.415
21.43	21.43	608.51	2.306	2.409	2-M2c	2.500	1.573	1.573	1.063	6.587	2.462
** 22.88	22.88	608.61	2.400	2.511	7-M2c	2.500	1.628	1.628	1.100	6.762	2.507
24.21	24.21	608.70	2.487	2.604	7-M2c	2.500	1.676	1.676	1.132	6.922	2.547
25.60	25.60	608.80	2.580	2.701	7-M2c	2.500	1.724	1.724	1.165	7.089	2.587
26.98	26.98	608.90	2.674	2.798	7-M2c	2.500	1.771	1.771	1.197	7.258	2.625
28.37	28.37	609.00	2.770	2.896	7-M2c	2.500	1.816	1.816	1.228	7.428	2.662
29.76	29.76	609.10	2.869	2.996	7-M2c	2.500	1.860	1.860	1.258	7.601	2.698
31.15	31.15	609.20	2.970	3.097	7-M2c	2.500	1.902	1.902	1.287	7.776	2.732
32.54	32.54	609.30	3.075	3.200	7-M2c	2.500	1.942	1.942	1.316	7.954	2.765
***33.93	33.93	609.41	3.182	3.306	7-M2c	2.500	1.980	1.980	1.344	8.136	2.796

Site Data - CULVERT A

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 606.10 ft
Outlet Station: 41.00 ft
Outlet Elevation: 606.03 ft
Number of Barrels: 1

Culvert Data Summary - CULVERT A

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material:
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: None

Tailwater Channel Data - EXIST CULVERT A

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 5.00 ft
Side Slope (H:V): 3.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 606.03 ft

Roadway Data for Crossing: EXIST CULVERT A

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 610.76 ft
Roadway Surface: Paved
Roadway Top Width: 24.00 ft

EXIST CULVERT

****

Straight Culvert

Inlet Elevation (invert): 606.10 ft, Outlet Elevation (invert): 606.03 ft

Culvert Length: 41.00 ft, Culvert Slope: 0.0017

****

PROP CULVERT

****

Straight Culvert

Inlet Elevation (invert): 607.50 ft, Outlet Elevation (invert): 607.16 ft

Culvert Length: 34.00 ft, Culvert Slope: 0.0100

****

Table 1 - Summary of Culvert Flows at Crossing: PROP CULVERT A

Headwater Elevation (ft)	Total Discharge (cfs)	CULVERT A Discharge (cfs)	Roadway Discharge (cfs)	Iterations
609.70	20.04	20.04	0.00	1
609.80	21.43	21.43	0.00	1
** 609.89	22.88	22.88	0.00	1
609.98	24.21	24.21	0.00	1
610.07	25.60	25.60	0.00	1
610.16	26.98	26.98	0.00	1
610.26	28.37	28.37	0.00	1
610.36	29.76	29.76	0.00	1
610.46	31.15	31.15	0.00	1
610.56	32.54	32.54	0.00	1
*** 610.67	33.93	33.93	0.00	1
618.64	90.19	90.19	0.00	Overtopping

Table 2 - Culvert Summary Table: CULVERT A

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
20.04	20.04	609.70	2.204	1.559	1-S2n	1.176	1.519	1.264	1.027	8.050	2.415
21.43	21.43	609.80	2.295	1.667	1-S2n	1.222	1.573	1.315	1.063	8.190	2.462
** 22.88	22.88	609.89	2.390	1.782	1-S2n	1.270	1.628	1.367	1.100	8.332	2.507
24.21	24.21	609.98	2.477	1.889	1-S2n	1.314	1.676	1.414	1.132	8.458	2.547
25.60	25.60	610.07	2.569	2.003	5-S2n	1.359	1.724	1.462	1.165	8.586	2.587
26.98	26.98	610.16	2.663	2.119	5-S2n	1.404	1.771	1.509	1.197	8.712	2.625
28.37	28.37	610.26	2.760	2.237	5-S2n	1.450	1.816	1.556	1.228	8.835	2.662
29.76	29.76	610.36	2.858	2.356	5-S2n	1.495	1.860	1.602	1.258	8.955	2.698
31.15	31.15	610.46	2.960	2.777	5-S2n	1.541	1.902	1.648	1.287	9.075	2.732
32.54	32.54	610.56	3.064	2.881	5-S2n	1.587	1.942	1.694	1.316	9.193	2.765
***33.93	33.93	610.67	3.172	2.988	5-S2n	1.634	1.980	1.739	1.344	9.309	2.796

Site Data - CULVERT A

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 607.50 ft
Outlet Station: 34.00 ft
Outlet Elevation: 607.16 ft
Number of Barrels: 1

Culvert Data Summary - CULVERT A

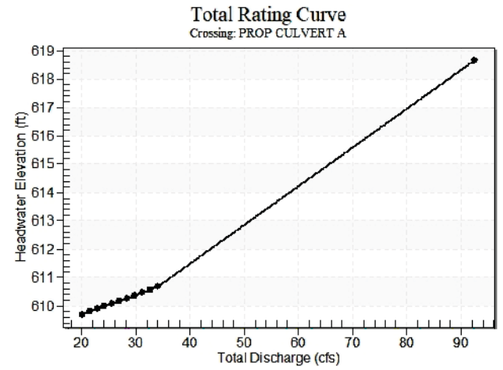
Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material:
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Beveled Edge (1.5:1)
Inlet Depression: None

Tailwater Channel Data - PROP CULVERT A

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 5.00 ft
Side Slope (H:V): 3.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 606.00 ft

Roadway Data for Crossing: PROP CULVERT A

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 618.64 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft



** 10% AEP DESIGN STORM FREQ
***1% AEP STORM FREQ

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED PROFESSIONAL ENGINEER
7/28/2020

RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

HYDRAULIC DATA SHEET
CULVERT A
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	81
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg USER: KBERGER FILE: SH236COMP01.dgn
PENTABLE: I0040174.tbl TIME: 1:23:01 PM DATE: 7/28/2020 SCALE: 1:100

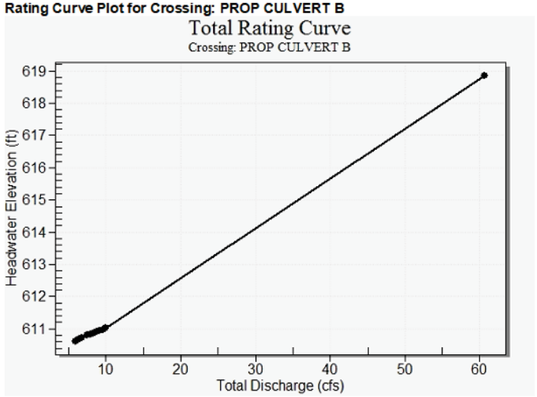
Table 1 - Summary of Culvert Flows at Crossing: PROP CULVERT B

Headwater Elevation (ft)	Total Discharge (cfs)	STA 10+45 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
610.62	5.89	5.89	0.00	1
610.66	6.30	6.30	0.00	1
610.70	6.70	6.70	0.00	1
** 610.71	6.72	6.72	0.00	1
610.79	7.52	7.52	0.00	1
610.83	7.93	7.93	0.00	1
610.87	8.33	8.33	0.00	1
610.90	8.74	8.74	0.00	1
610.94	9.15	9.15	0.00	1
610.98	9.55	9.55	0.00	1
*** 611.01	9.96	9.96	0.00	1
618.64	60.70	60.70	0.00	Overtopping

Table 2 - Culvert Summary Table: STA 10+45

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
5.89	5.89	610.62	1.151	0.001	1-S2n	0.716	0.800	0.736	0.531	4.715	1.681
6.30	6.30	610.66	1.193	0.449	1-S2n	0.740	0.828	0.762	0.551	4.797	1.717
6.70	6.70	610.70	1.235	0.482	1-S2n	0.765	0.852	0.788	0.571	4.877	1.750
** 6.72	6.72	610.71	1.236	0.483	1-S2n	0.766	0.853	0.789	0.571	4.881	1.751
7.52	7.52	610.79	1.318	0.554	1-S2n	0.812	0.907	0.837	0.608	5.038	1.812
7.93	7.93	610.83	1.358	0.590	1-S2n	0.836	0.933	0.860	0.626	5.121	1.842
8.33	8.33	610.87	1.397	0.625	1-S2n	0.858	0.958	0.883	0.643	5.193	1.870
8.74	8.74	610.90	1.435	0.657	1-S2n	0.880	0.979	0.880	0.660	5.475	1.897
9.15	9.15	610.94	1.472	0.693	1-S2n	0.902	1.004	0.927	0.677	5.335	1.923
9.55	9.55	610.98	1.509	0.729	1-S2n	0.923	1.028	0.950	0.693	5.392	1.948
*** 9.96	9.96	611.01	1.544	0.765	1-S2n	0.944	1.052	0.944	0.709	5.672	1.973

Rating Curve Plot for Crossing: PROP CULVERT B



****

Proposed Straight Culvert

Inlet Elevation (invert): 609.47 ft, Outlet Elevation (invert): 609.03 ft

Culvert Length: 89.00 ft, Culvert Slope: 0.0049

****

Site Data - STA 10+45

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 609.47 ft
Outlet Station: 89.00 ft
Outlet Elevation: 609.03 ft
Number of Barrels: 1

Culvert Data Summary - STA 10+45

Barrel Shape: Circular
Barrel Diameter: 2.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Tailwater Channel Data - PROP CULVERT B

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 5.00 ft
Side Slope (H:V): 3.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 608.94 ft

Roadway Data for Crossing: PROP CULVERT B

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 618.64 ft
Roadway Surface: Paved
Roadway Top Width: 32.00 ft

** 10% AEP DESIGN STORM FREQ
***1% AEP STORM FREQ

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED PROFESSIONAL ENGINEER
7/28/2020
P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

HYDRAULIC DATA SHEET
CULVERT B
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	82
CONTROL	SECTION	JOB	
0513	01	017	

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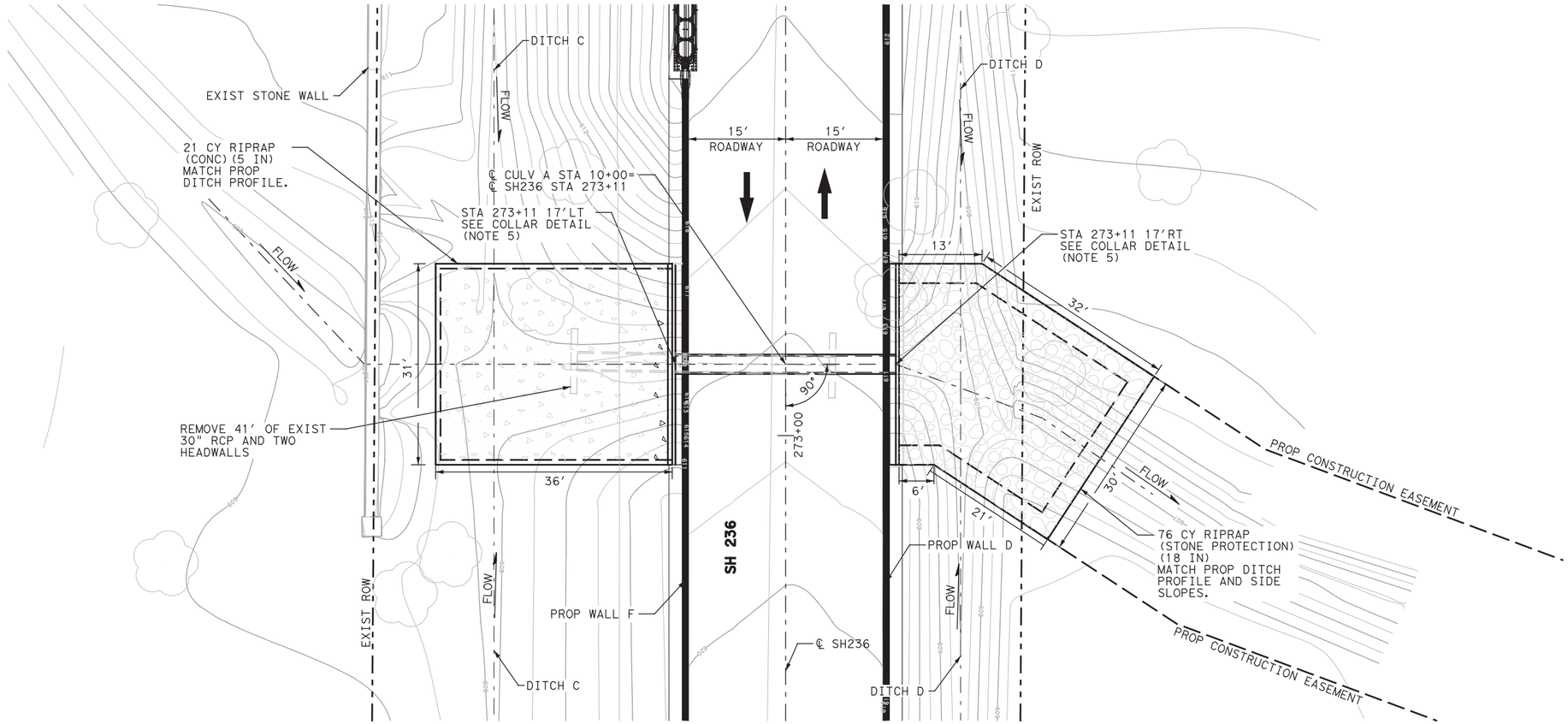
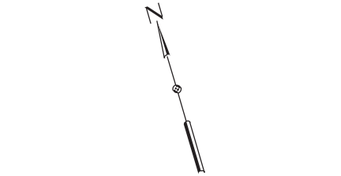
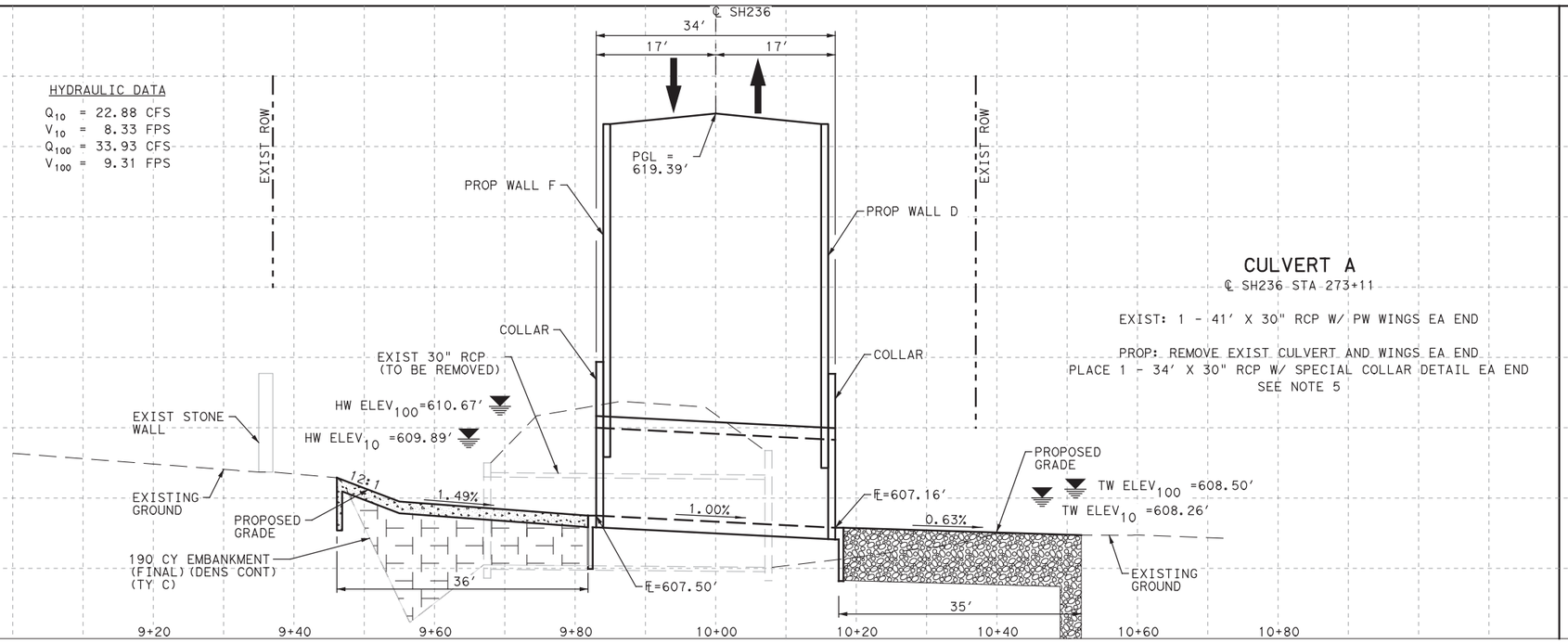




432 6002	432 6033	464 6007
RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION) (18 IN)	RC PIPE (CL III) (30 IN)
CY	CY	LF
21	76	34

NOTES:

1. ALL STATION AND OFFSETS ARE FROM "CL SH236" UNLESS OTHERWISE NOTED. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR HORIZONTAL ALIGNMENT INFORMATION.
2. SEE ROADWAY P&P SHEETS FOR ROADWAY GEOMETRY INFORMATION.
3. SEE CULVERT COMPUTATION SHEETS FOR CULVERT HYDRAULIC DATA AND OUTLET PROTECTION COMPUTATIONS.
4. SEE ROADWAY PLAN AND PROFILE SHEETS FOR DITCH INFORMATION.
5. SEE COLLAR DETAIL SHEET FOR END TREATMENT INFO.



CULVERT A

℄ SH236 STA 273+11

EXIST: 1 - 41' X 30" RCP W/ PW WINGS EA END

PROP: REMOVE EXIST CULVERT AND WINGS EA END
PLACE 1 - 34' X 30" RCP W/ SPECIAL COLLAR DETAIL EA END
SEE NOTE 5

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSON
91924
LICENSED PROFESSIONAL ENGINEER
7/28/2020
P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

CULVERT A LAYOUT STA 273+11
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236
STATE	DISTRICT / COUNTY	SHEET NO.
TEXAS	WACO / CORYELL	83
CONTROL	SECTION / JOB	
0513	01 / 017	

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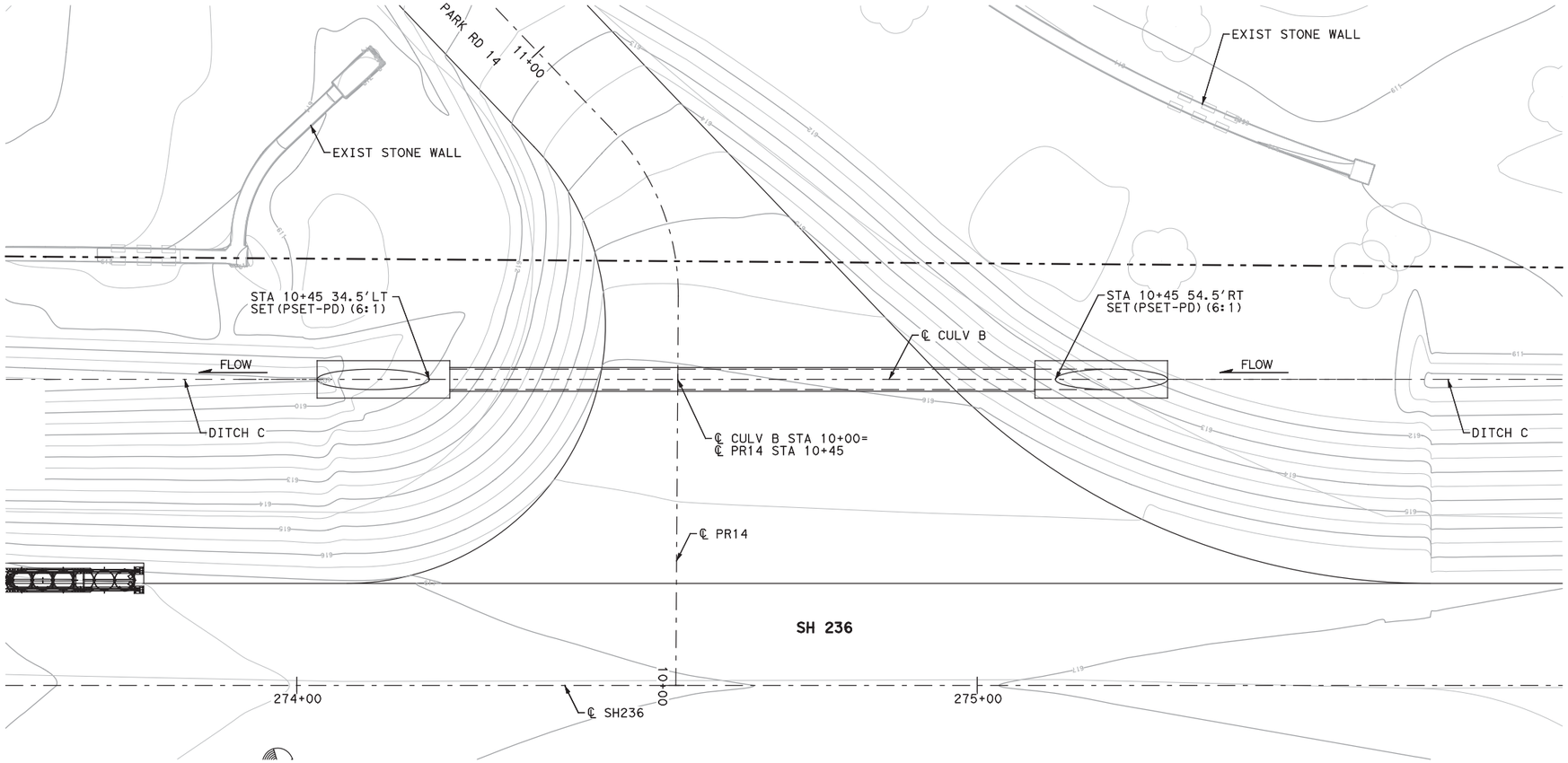
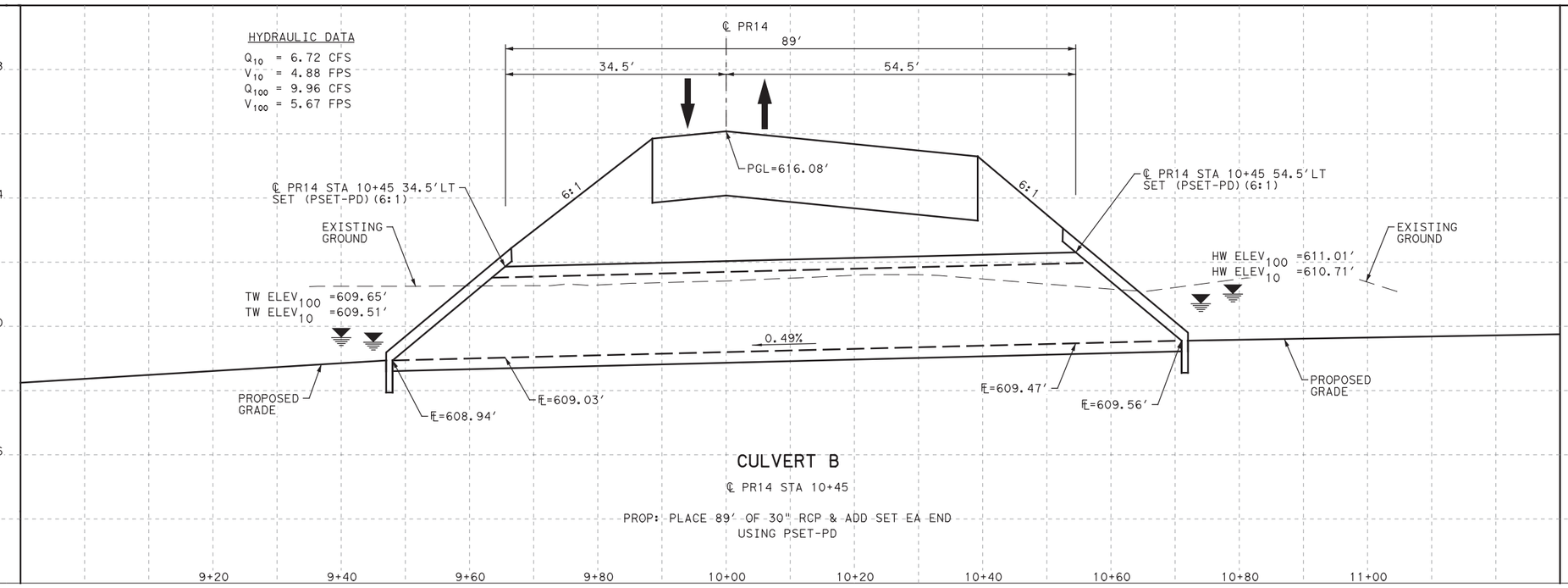
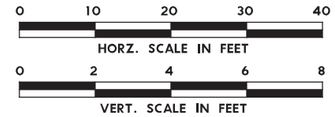




CULVERT B

℄ PR14 STA 10+45

PROP: PLACE 89' OF 30" RCP & ADD SET EA END USING PSET-PD



464 6007	467 6423
RC PIPE (CL III) (30 IN)	SET (TY II) (30 IN)(6:1) (P)
LF	EA
89	2

NOTES:

1. ALL STATION AND OFFSETS ARE FROM "CL SH236" UNLESS OTHERWISE NOTED. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR HORIZONTAL ALIGNMENT INFORMATION.
2. SEE ROADWAY P&P SHEETS FOR ROADWAY GEOMETRY INFORMATION.
3. SEE CULVERT COMPUTATION SHEETS FOR CULVERT HYDRAULIC DATA AND OUTLET PROTECTION COMPUTATIONS.
4. SEE ROADWAY PLAN AND PROFILE SHEETS FOR DITCH INFORMATION.

NO.	DATE	REVISION	APPROVED

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Heslers Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

CULVERT B LAYOUT STA 10+45

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	84
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 7/28/2020
FILE: SH236DRPP02.dgn
PENTABLE: I0040174.tbl
TIME: 1:12:10 PM
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DATE: 7/28/2020 1:12:13 PM
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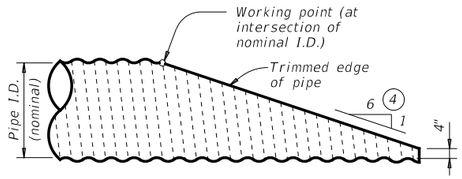
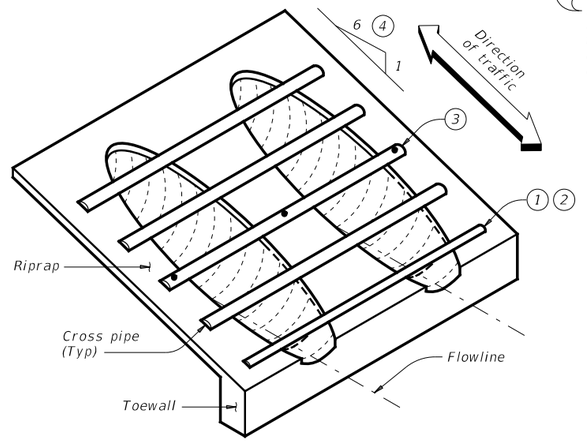


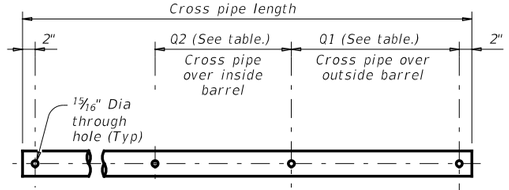
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

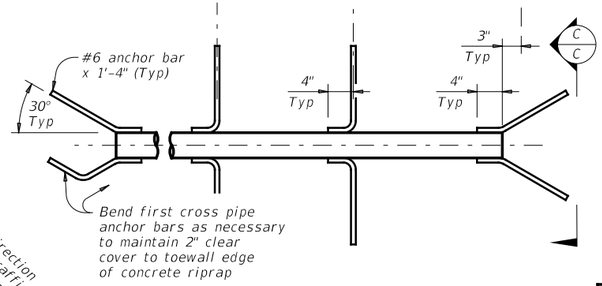
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



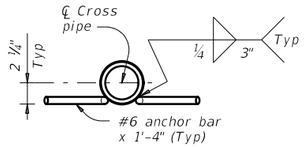
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

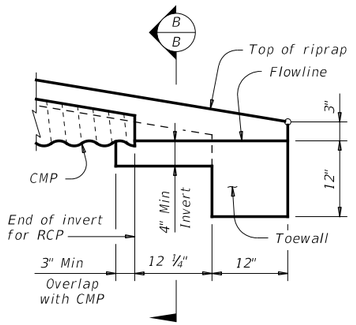


PIPE WITH ANCHOR BARS



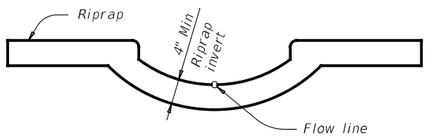
SECTION C-C

CROSS PIPE DETAILS



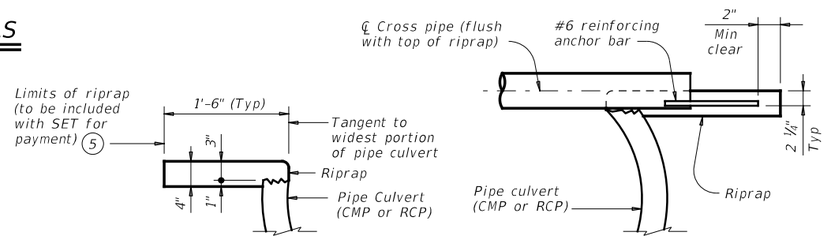
DETAIL "A"

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



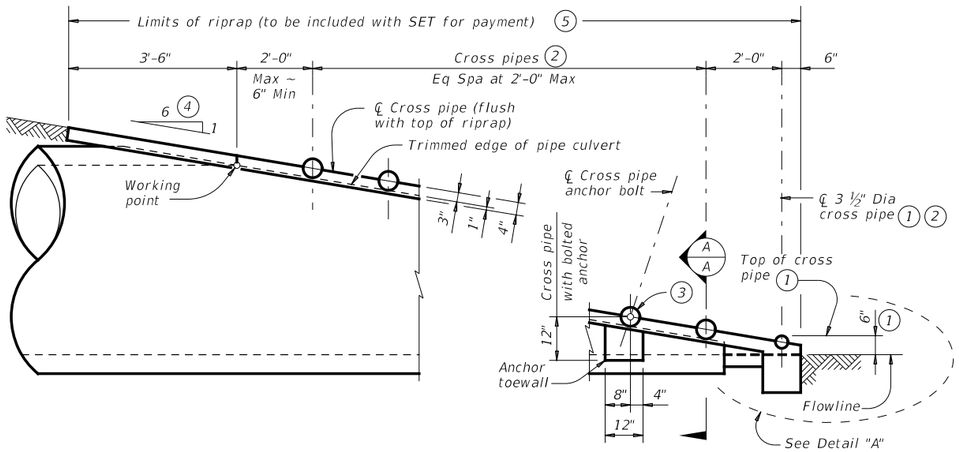
SECTION B-B

(Cross pipes not shown for clarity.)



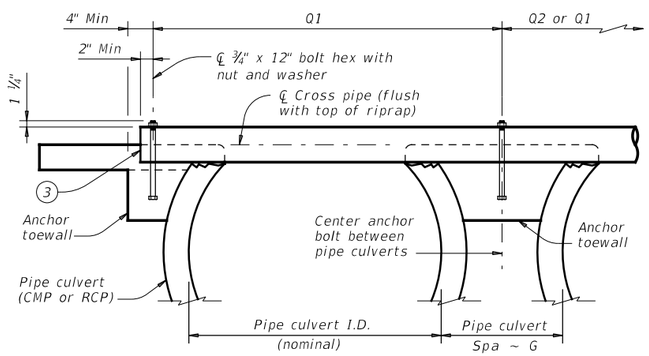
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

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.

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	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		85

DATE: 7/28/2020 1:12:16 PM
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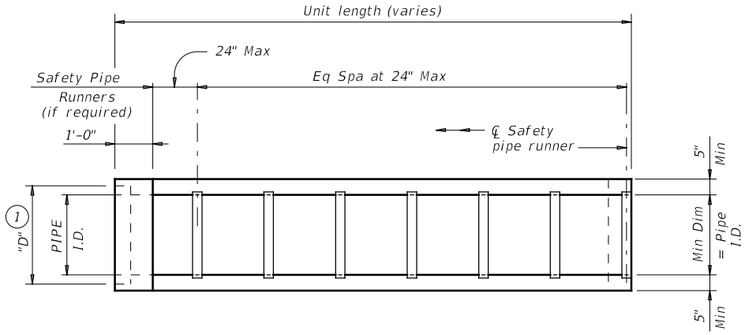
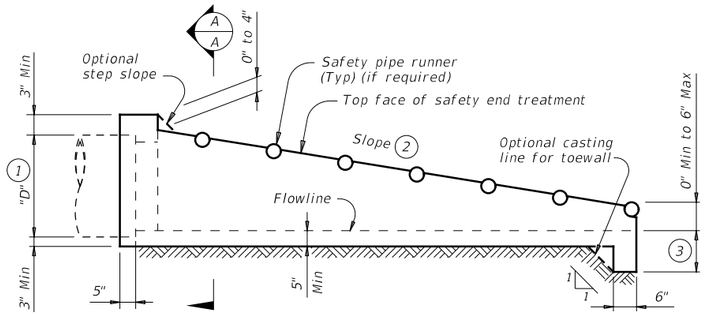


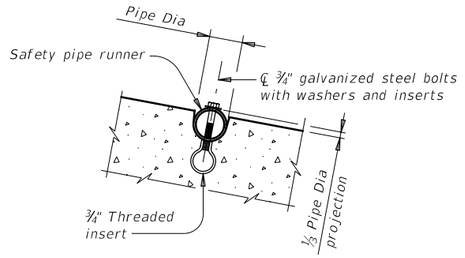
PLAN

(Showing bell end connection.)



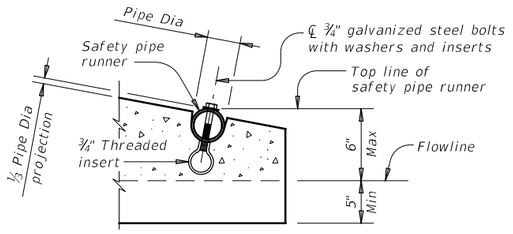
LONGITUDINAL ELEVATION

(Showing bell end connection.)

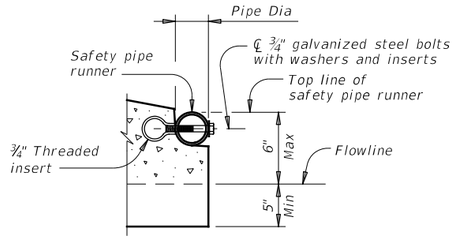


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



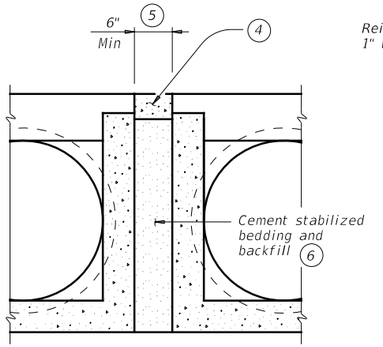
OPTION A



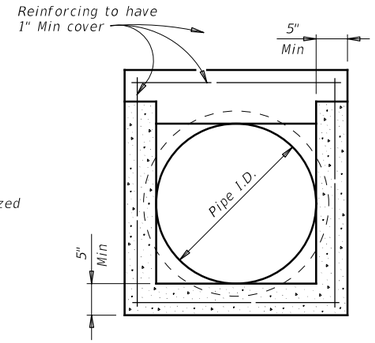
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

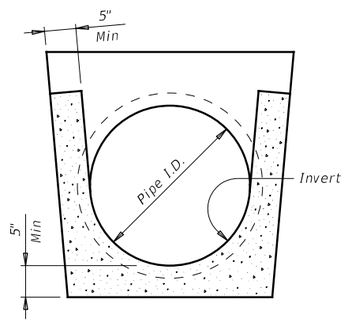
(If required)



MULTIPLE PIPE INSTALLATION

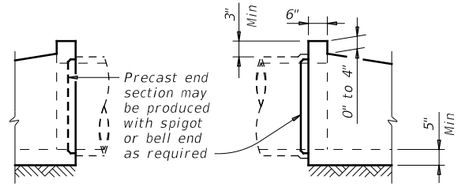


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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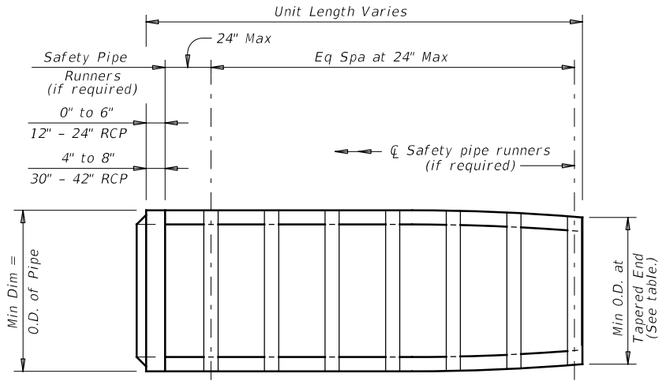
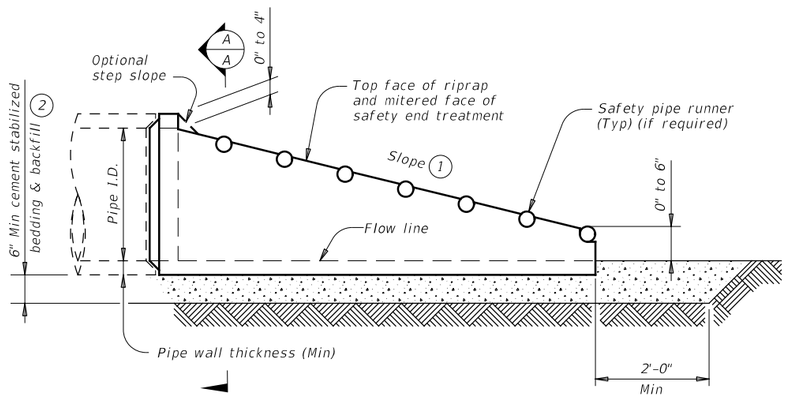
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		86



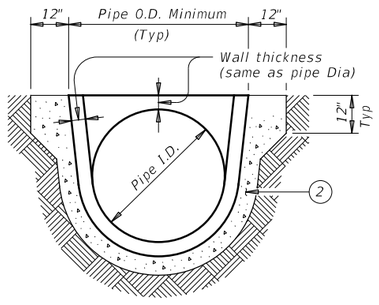
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

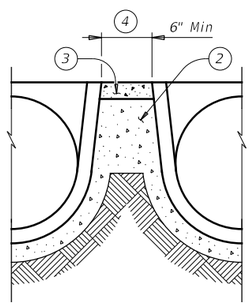


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

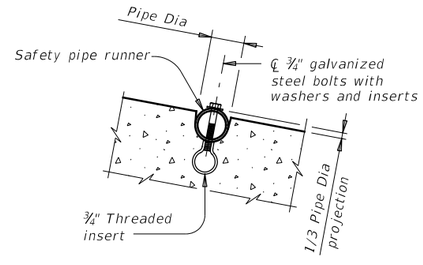
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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".

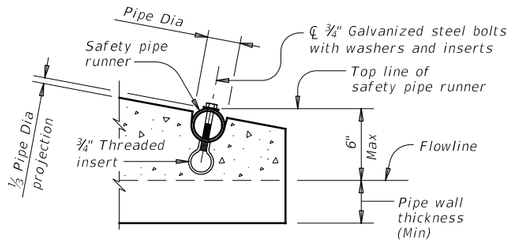
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

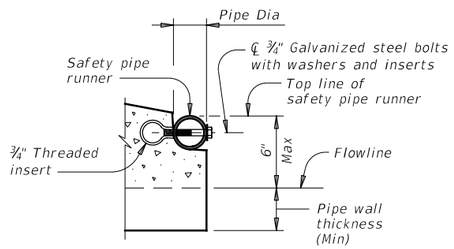


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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
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	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		87

DATE: 7/28/2020 1:12:18 PM
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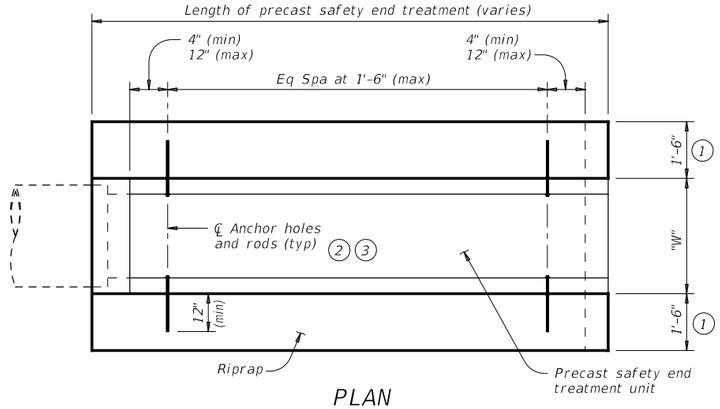
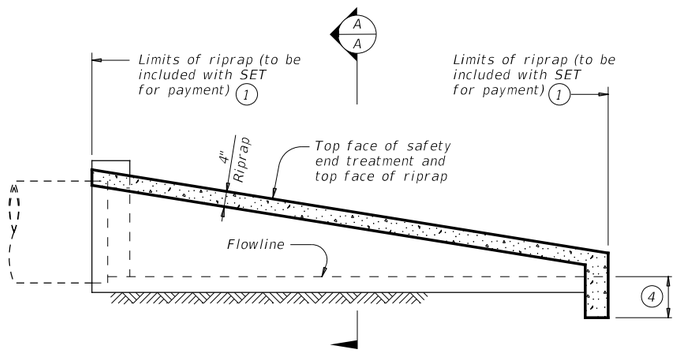
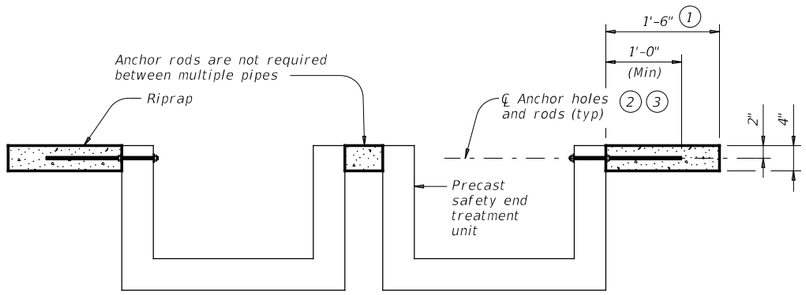


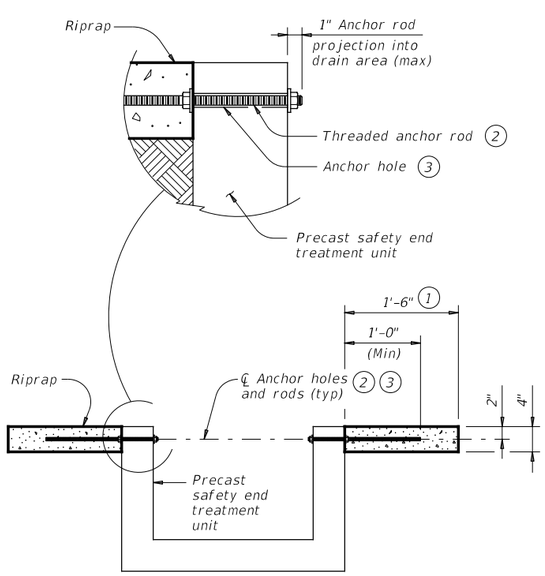
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

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

GENERAL NOTES:

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

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

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

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

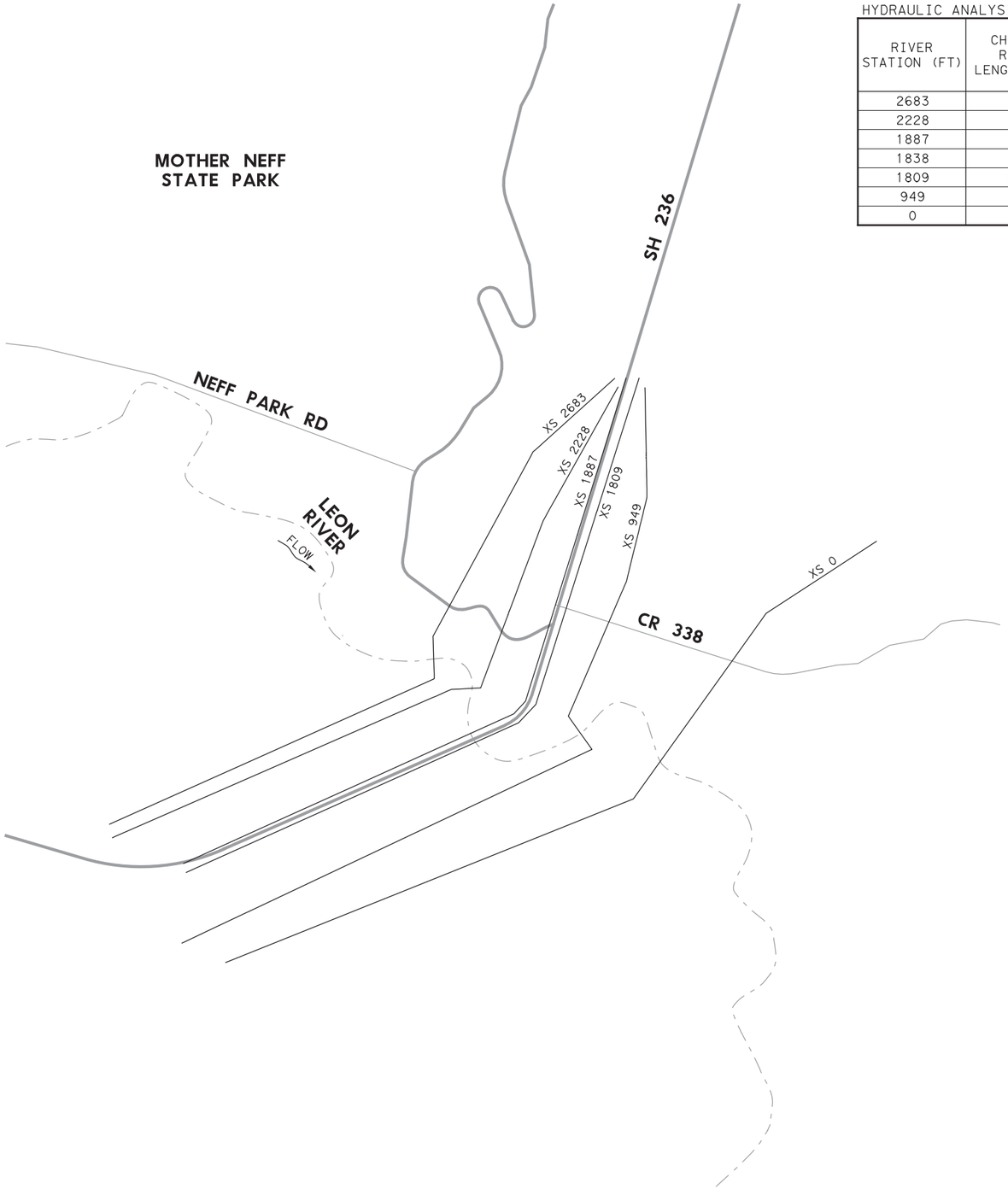
Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		88



HYDRAULIC CROSS SECTION SCHEMATIC

HYDRAULIC ANALYSIS RESULTS SUMMARY

RIVER STATION (FT)	CHANNEL REACH LENGTH (FT)	PROPOSED STRUCTURE						EXISTING STRUCTURE					
		10-YEAR			100-YEAR			10-YEAR			100-YEAR		
		Q (CFS)	V-CHNL (FT/S)	WSEL (FT)	Q (CFS)	V-CHNL (FT/S)	WSEL (FT)	Q (CFS)	V-CHNL (FT/S)	WSEL (FT)	Q (CFS)	V-CHNL (FT/S)	WSEL (FT)
2683	455	25,800	4.2	616.40	93,500	2.4	633.32	25,800	4.3	616.30	93,500	2.4	633.30
2228	341	25,800	4.8	616.07	93,500	2.4	633.30	25,800	3.7	615.93	93,500	2.1	633.28
1887	78	25,800	8.6	614.80	93,500	2.8	633.28	25,800	5.1	615.39	93,500	2.4	633.26
1838		BRIDGE											
1809	860	25,800	9.3	614.23	93,500	2.2	633.26	25,800	7.1	614.23	93,500	2.2	633.26
949	949	25,800	7.5	613.27	93,500	1.9	633.23	25,800	7.5	613.27	93,500	1.9	633.23
0	0	25,800	6.6	612.20	93,500	2.3	633.20	25,800	6.6	612.20	93,500	2.3	633.20

NOTES:

HEC-RAS VERSION 5.03 WAS USED FOR THE HYDRAULIC ANALYSIS AND DESIGN OF THE BRIDGE. KNOWN WATER SURFACE ELEVATIONS WERE USED AS DOWNSTREAM BOUNDARY CONDITIONS BASED ON LAKE BELTON LEVELS FOR CORRESPONDING STORM EVENTS FOR EXISTING AND PROPOSED CONDITIONS.

PROJECT AREA IS MAPPED WITH FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) ZONE A SPECIAL FLOOD HAZARD AREA (SFHA) FOR LEON RIVER AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP (FIRM) 48099C0 500F, EFFECTIVE FEBRUARY 17, 2010.

THE PROPOSED BRIDGE LOW CHORD WILL BE ABOVE WATER SURFACE ELEVATION FOR 10-YEAR STORM EVENT. THE 100-YEAR WSEL INCREASE UPSTREAM OF SH 236 CAUSES NO ADVERSE IMPACT TO EXISTING HABITABLE STRUCTURES AND MEET CRITERIA FOR FEMA ZONE A SFHA.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
SUNIT R. DEO
104943
LICENSED
PROFESSIONAL ENGINEER

08/21/2020

Deo, Sunit

Digitally signed by Deo, Sunit
Date: 2020.08.21 10:51:27 -05'00'

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

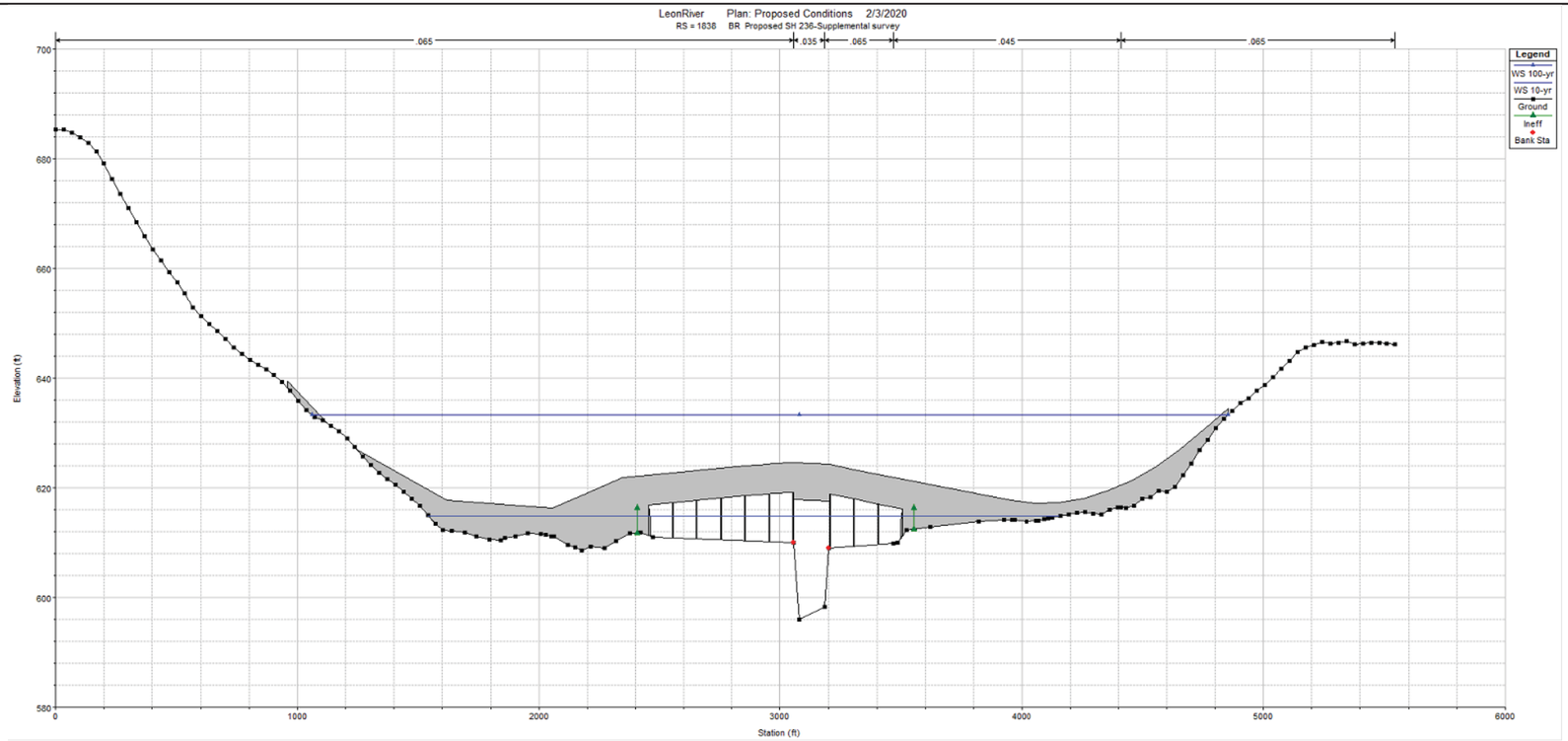
Texas Department of Transportation

BRIDGE HYDRAULIC DATA SHEET
SH 236 AT LEON RIVER

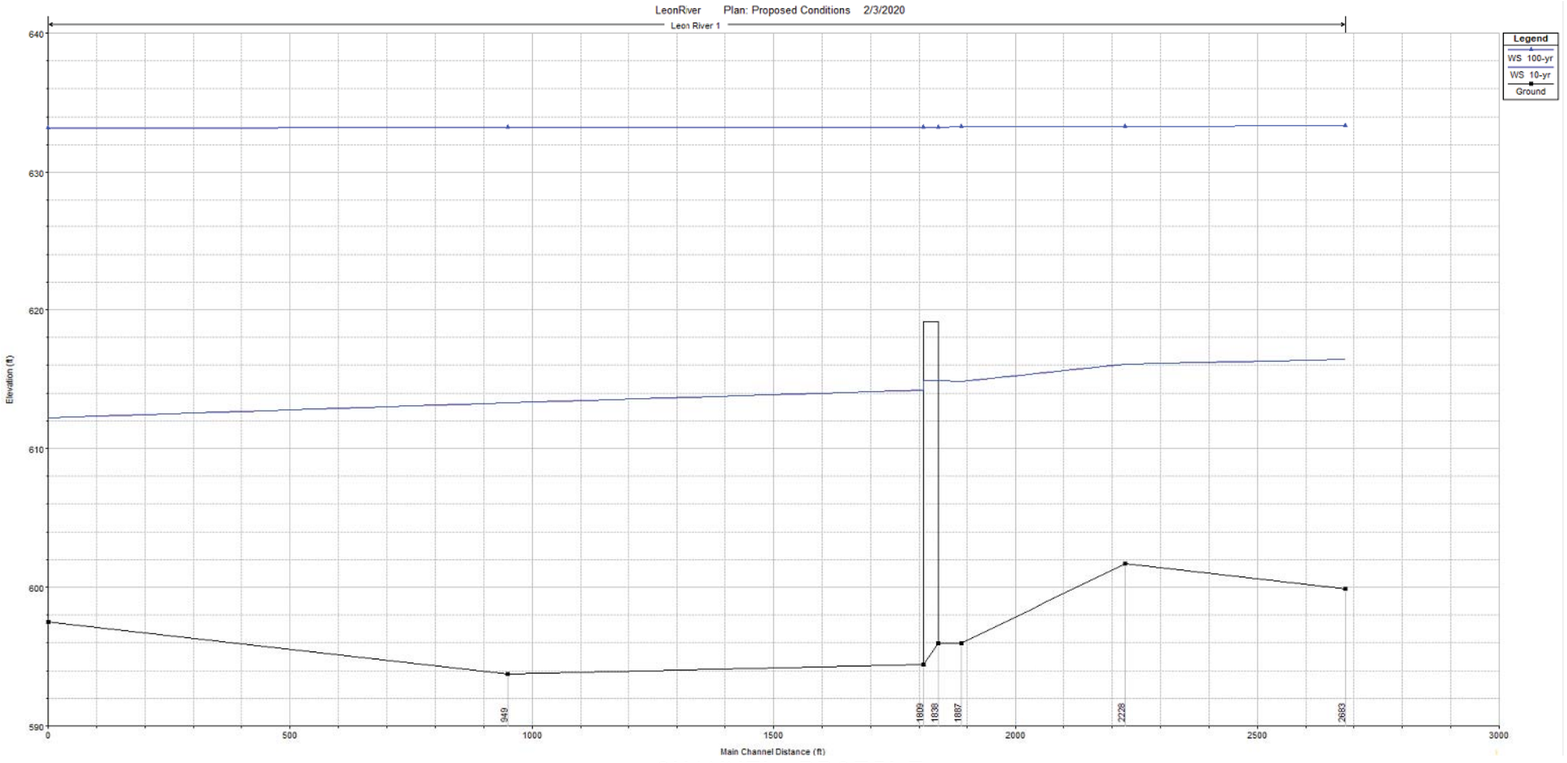
SCALE: 1"=1000' SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	89
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 10:0:00 AM SCALE: 1:1000
FILE: SH236BRHYD01.dgn



BRIDGE CROSS SECTION



CHANNEL PROFILE

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
SUNIT R. DEO
104943
LICENSED PROFESSIONAL ENGINEER

08/21/2020

Deo, Sunit

Digitally signed by Deo, Sunit
Date: 2020.08.21 10:49:28 -05'00'

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

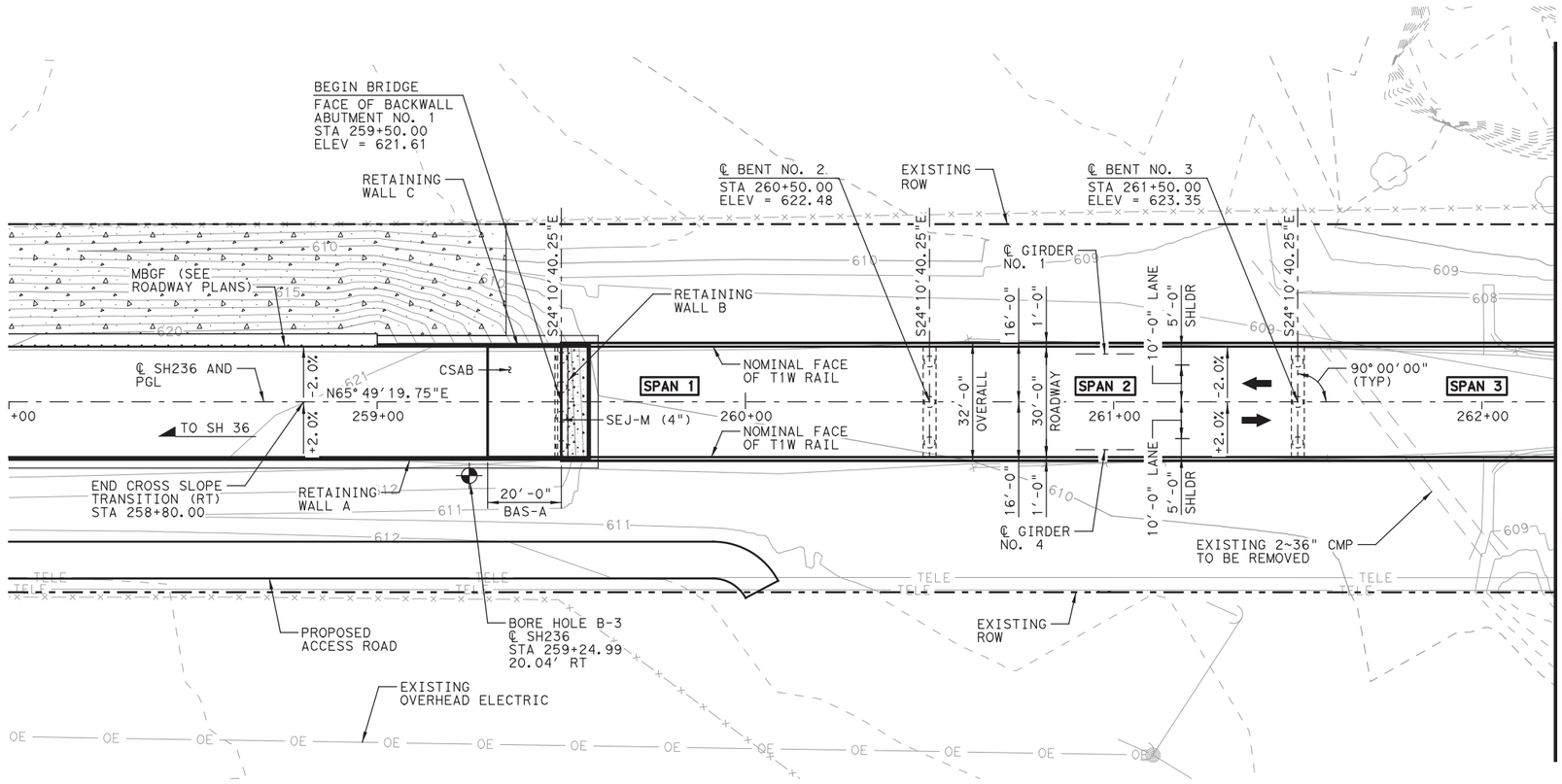
BRIDGE HYDRAULIC DATA SHEET
SH 236 AT LEON RIVER

SHEET 2 OF 2

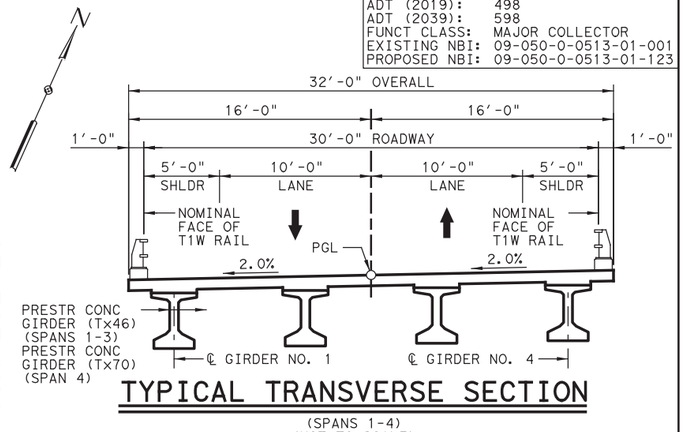
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	90
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER DATE: 8/3/2020 TIME: 10:10:03 AM SCALE: 1:1
FILE: SH236BRHYD02.dgn

DESIGN SPEED:	40 MPH
ADT (2019):	498
ADT (2039):	598
FUNCT CLASS:	MAJOR COLLECTOR
EXISTING NBI:	09-050-0-0513-01-001
PROPOSED NBI:	09-050-0-0513-01-123



PLAN



TYPICAL TRANSVERSE SECTION

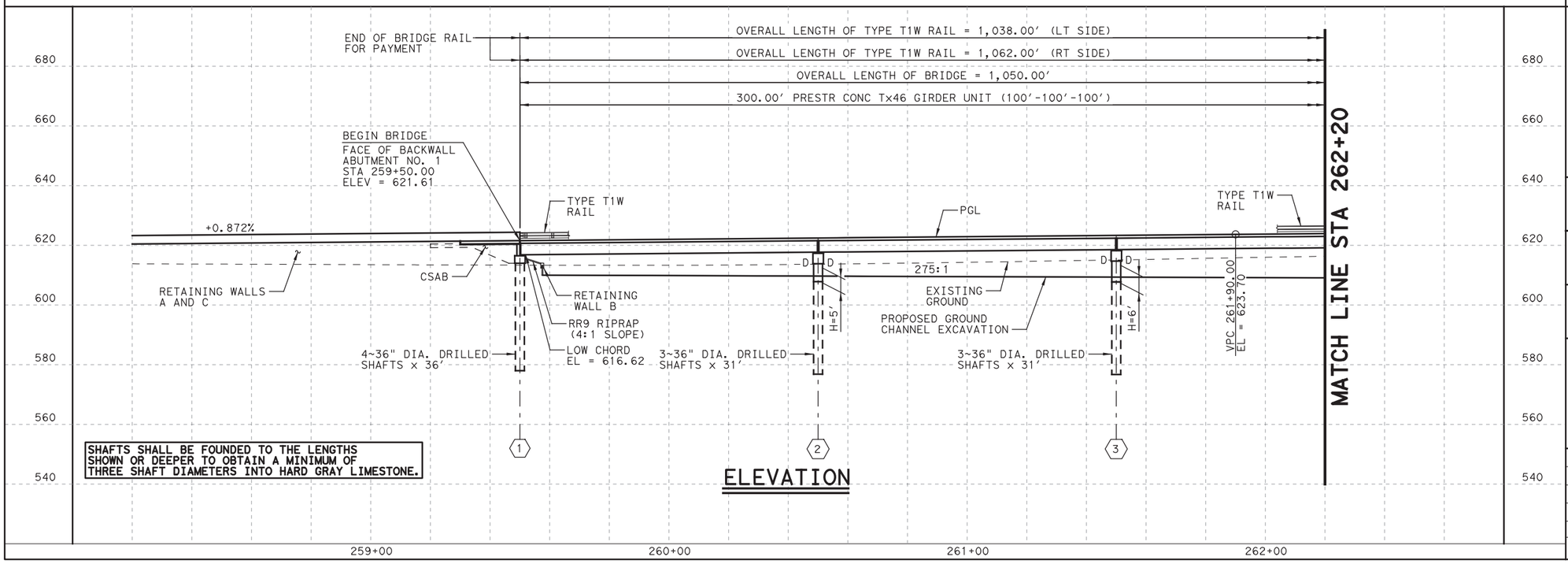
(SPANS 1-4)
(NOT TO SCALE)

GENERAL NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION, 8TH EDITION (2017).
2. FOR VERTICAL AND HORIZONTAL PROFILES SEE ROADWAY SHEETS.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
4. THE CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING THE LOCATION OF ALL UTILITIES PRIOR TO ORDERING MATERIALS AND EXCAVATION.
5. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
6. THE EXISTING FOUR SPAN BRIDGE CONSISTS OF A CONCRETE DECK SUPPORTED ON STEEL BEAMS AND A CONCRETE SUBSTRUCTURE. THIS BRIDGE IS TO BE REMOVED AND DISPOSED OF IN ACCORDANCE WITH STANDARD SPECIFICATION ITEM 496.
7. SEE ROADWAY PLAN AND PROFILE SHEETS FOR SUPERELEVATION RATES NOT SHOWN.
8. FOR PLAN OF EXISTING BRIDGE: CSJ: 0513-01-001
9. SEE RETAINING WALL SHEETS FOR RETAINING WALL DETAILS.
10. SEE CEMENT STABILIZED ABUTMENT BACKFILL DETAILS SHEET.
11. THE CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. THE STABILITY OF THE DRILLED SHAFT HOLE IS THE RESPONSIBILITY OF THE DRILLED SHAFT CONTRACTOR.

0 20 40 60 80
SCALE IN FEET

HL93 LOADING



SHAFTS SHALL BE FOUNDED TO THE LENGTHS SHOWN OR DEEPER TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS INTO HARD GRAY LIMESTONE.

ELEVATION

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
03/12/2021

Erin E O'Malley

Digitally signed by Erin E O'Malley
DN: CN=Erin E O'Malley, OU=A01410220000168A9DF2B1300015138, O=Not Issued, C=US
Date: 2021.03.12 09:32:13-06'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation
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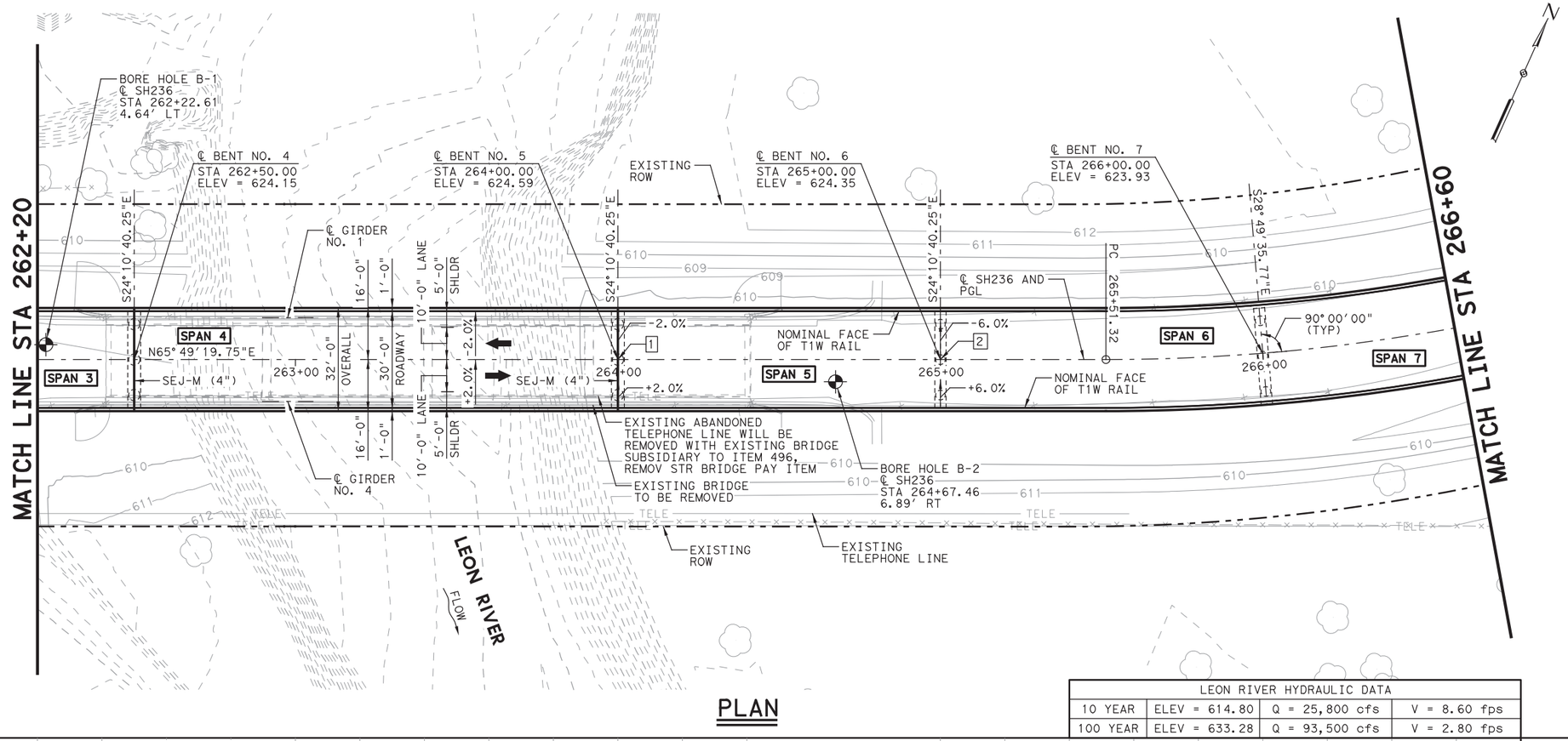
BRIDGE LAYOUT

SH 236 AT LEON RIVER

SHEET 1 OF 3

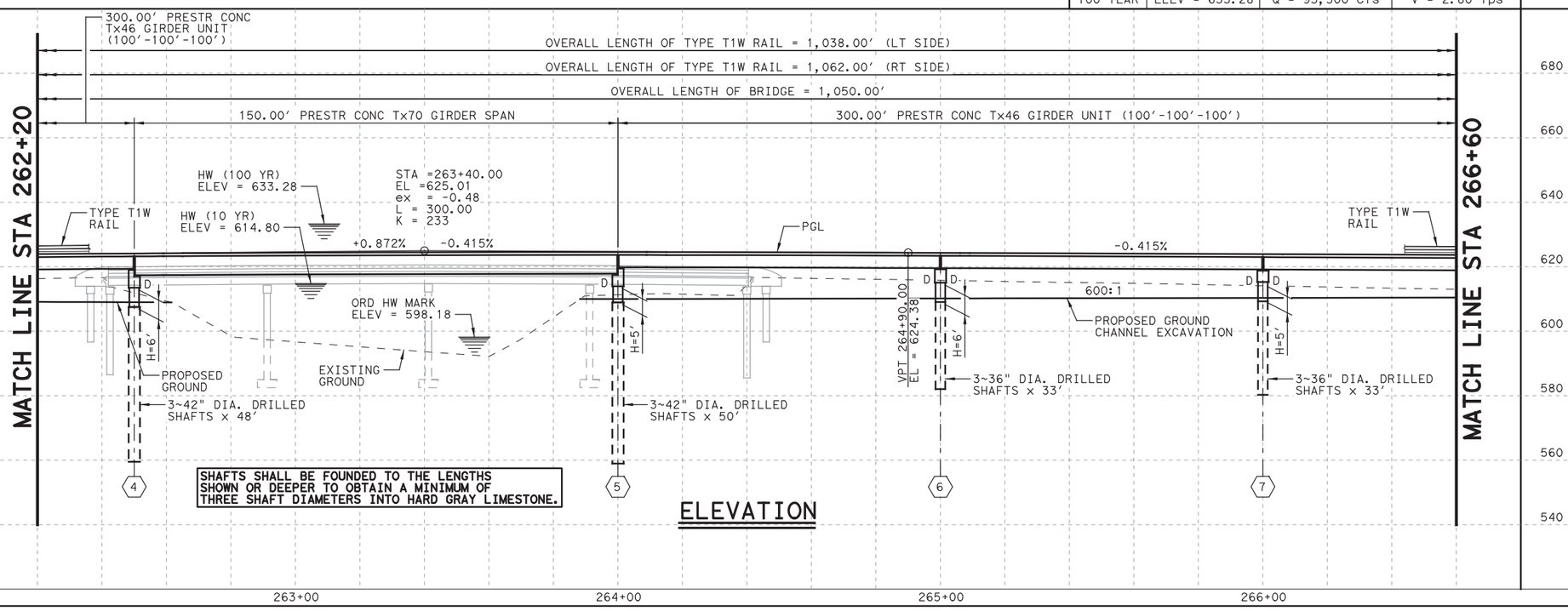
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	91
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 3/11/2021
FILE: SH236BL01.dgn
PENTABLE: 10040174.tbl
TIME: 10:31:20 AM SCALE: 1:40



PLAN

LEON RIVER HYDRAULIC DATA			
10 YEAR	ELEV = 614.80	Q = 25,800 cfs	V = 8.60 fps
100 YEAR	ELEV = 633.28	Q = 93,500 cfs	V = 2.80 fps



SHAFTS SHALL BE FOUNDED TO THE LENGTHS SHOWN OR DEEPER TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS INTO HARD GRAY LIMESTONE.

ELEVATION

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED
PROFESSIONAL ENGINEER
Erin E O'Malley
Digitally signed by Erin E O'Malley
Date: 2020.08.03 18:03:52-05'00'

FOR SPANS 1-4 ONLY

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER
7/30/2020

FOR SPANS 5-10 ONLY

Thomas G. Ashcraft

1 BEGIN SUPERELEVATION TRANSITION STA 264+00.00

2 END SUPERELEVATION TRANSITION STA 265+00.00

0 20 40 60 80
SCALE IN FEET

HL93 LOADING

NO.	DATE	REVISION	APPROVED

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

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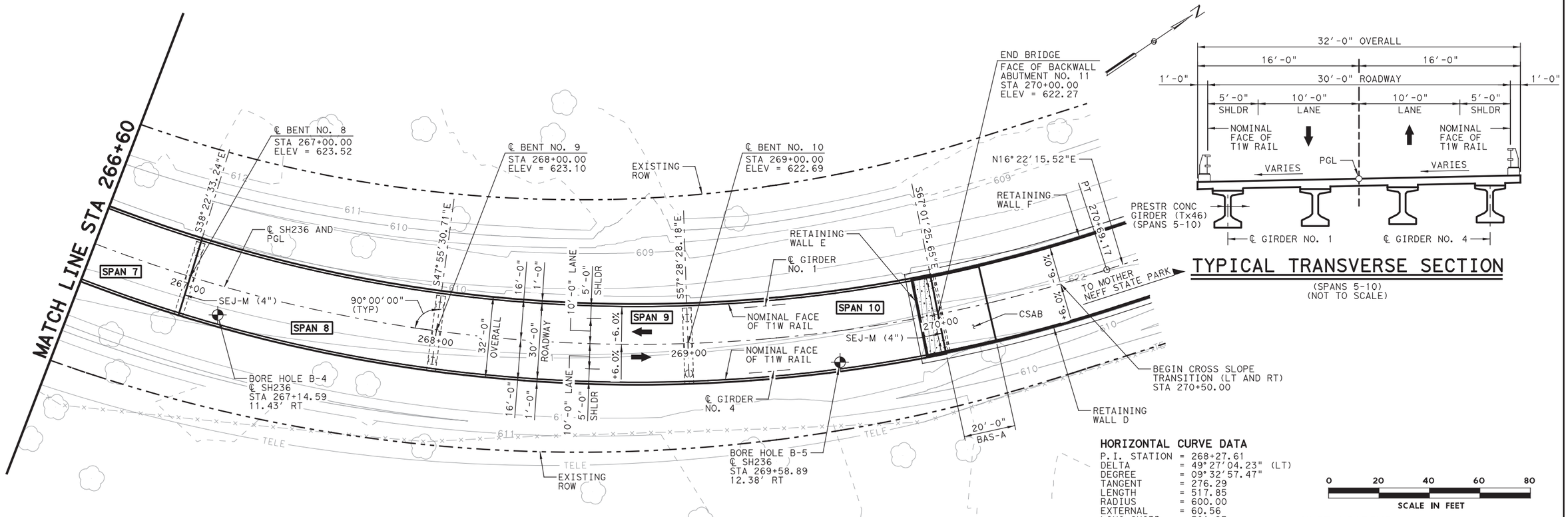
BRIDGE LAYOUT

SH 236 AT LEON RIVER

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	92
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040I74.tbl
USER: mflores DATE: 7/30/2020 TIME: 2:55:32 PM SCALE: 1:40
FILE: SH236 Bridge Layout



PLAN

TYPICAL TRANSVERSE SECTION

(SPANS 5-10)
(NOT TO SCALE)

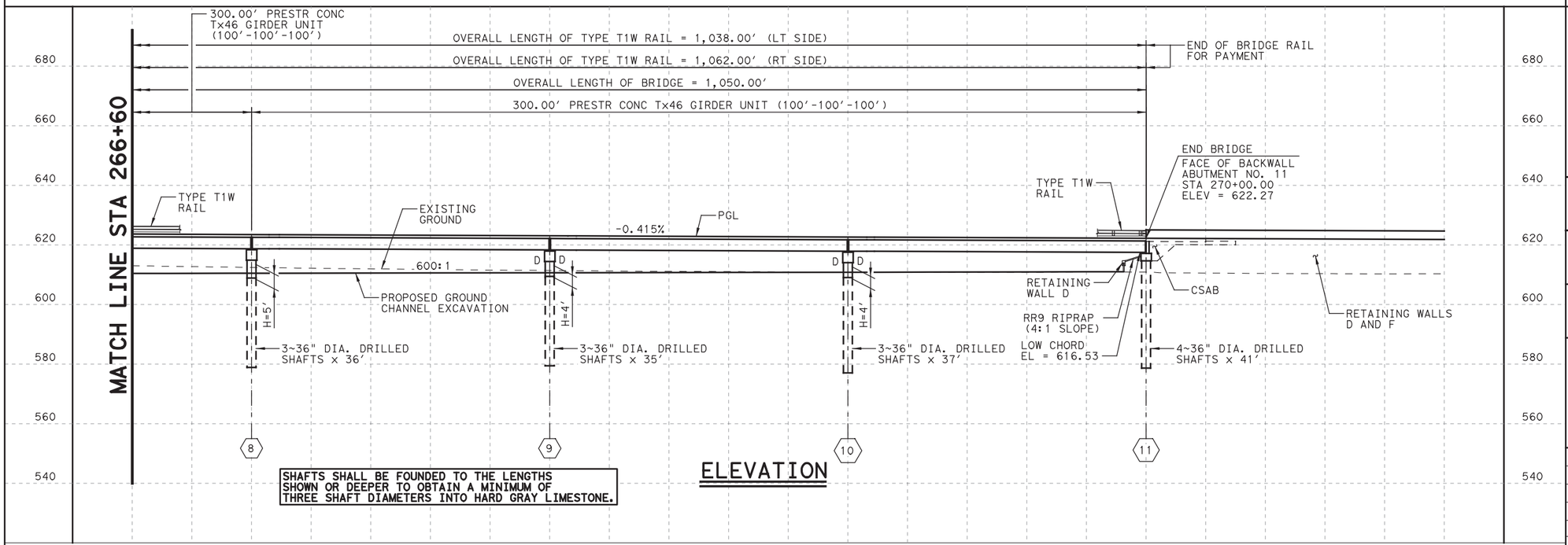
HORIZONTAL CURVE DATA

P.I. STATION	=	268+27.61
DELTA	=	49°27'04.23" (LT)
DEGREE	=	09°32'57.47"
TANGENT	=	276.29
LENGTH	=	517.85
RADIUS	=	600.00
EXTERNAL	=	60.56
LONG CHORD	=	501.93
MID. ORD.	=	55.01
P.C. STATION	=	265+51.32
P.T. STATION	=	270+69.17

0 20 40 60 80
SCALE IN FEET

HL93 LOADING

NO.	DATE	REVISION	APPROVED



SHAFTS SHALL BE FOUNDED TO THE LENGTHS SHOWN OR DEEPER TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS INTO HARD GRAY LIMESTONE.

ELEVATION

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

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BRIDGE LAYOUT

SH 236 AT LEON RIVER

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	93
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 00401174.tbl
USER: mflores DATE: 7/30/2020 TIME: 2:55:39 PM SCALE: 1:40
FILE: SH236 Bridge Layout

DRILLING LOG

WinCore Version 3.1

County	Coryell	Hole	B-1	District	Waco
Highway	SH 236 at Leon River	Structure	Bridge	Date	9/17/2016
CSJ	0513-01-017	Station	262+22.61	Grnd. Elev.	616.27
		Offset	4.64' Lt	GW Elev.	-20.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
-.4			ASPHALT, 3 inches							
-1.			CONCRETE, 8 inches							
			SAND, moist, brown and tan, clayey, w/ gravel (FILL) (SC)			11				
-3.			SAND, loose to slightly compact, moist, brown, reddish brown and tan, clayey, w/ calcareous deposits, trace gravel, and clay seams (FILL) (SC)			13	26	13	135	PP=3.25 tsf -Sulfate 120 ppm; PP=3.5 tsf
5		8 (6) 25 (6)				21				SPT at 6.5' 2/3/4
-7.			CLAY, soft, moist, dark brown, silty (CL)			19	38	23	127	PP=2.25 tsf
										PP=2.25 tsf
10		5 (6) 6 (6)								PP=3.0 tsf
-14.			CLAY, soft, moist, tan, sandy, w/ calcareous nodules and gravel seams (CL)			17	45	30		-200=56.3%; Sulfate 120 ppm PP=3.1 tsf
15		7 (6) 9 (6)								
						18				PP=3.25 tsf
20		6 (6) 9 (6)								PP=2.0 tsf
-21.			SAND, wet, tan, gravelly (SP)							
-24.			LIMESTONE, very hard, gray, w/ embedded fossils							SPT at 24' 50/2 inches
25		50 (0.25) 50 (0)								
30		50 (0.5) 50 (0.25)								

Remarks: Latitude: 31.31357 Longitude: -97.47313

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: D. Garcia Logger: F. Mbogning, E.I.T. Organization: AGG

DRILLING LOG

WinCore Version 3.1

County	Coryell	Hole	B-1	District	Waco
Highway	SH 236 at Leon River	Structure	Bridge	Date	9/17/2016
CSJ	0513-01-017	Station	262+22.61	Grnd. Elev.	616.27
		Offset	4.64' Lt	GW Elev.	-20.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			LIMESTONE, very hard, gray, w/ embedded fossils			5			145	Qu=351.8 ksf at 1.9%
35		50 (0.25) 50 (0)								
						4			143	Qu=249.4 ksf at 1.6%
40		50 (0.25) 50 (0)								
						3			148	Qu=469.5 ksf at 1.8%
-45. 45		50 (0.5) 50 (0)								
50										
55										
60										

Remarks: Latitude: 31.31357 Longitude: -97.47313

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: D. Garcia Logger: F. Mbogning, E.I.T. Organization: AGG

NOTE:
BORING LOGS CONDUCTED BY ALLIANCE GEOTECHNICAL GROUP ARE SHOWN HERE FOR INFORMATIONAL PURPOSES ONLY. SEE GEOTECHNICAL INVESTIGATION SH 236 AT LEON RIVER PROPOSED BRIDGE REPLACEMENT, CORYELL COUNTY, TEXAS, AGG REPORT NO. E16-0706, DATED NOVEMBER 28, 2016.

NO.	DATE	REVISION	APPROVED

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

BRIDGE BORING LOGS
SH 236 AT LEON RIVER

NOT TO SCALE SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	94
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 8/3/2020
FILE: SH236BOROI.dgn
PENTABLE: I0040I74.tbl
TIME: 10:0:23 AM SCALE: 1:1

DRILLING LOG

WinCore Version 3.1

County	Coryell	Hole	B-2	District	Waco
Highway	SH 236 at Leon River	Structure	Bridge	Date	09/15/2016
CSJ	0513-01-017	Station	264+67.46	Grnd. Elev.	616.24
		Offset	6.89' Rt	GW Elev.	-17.00 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	Properties: LL	Properties: PI	Properties: Wet Den. (pcf)	Additional Remarks
-.3		ASPHALT, 2 inches CONCRETE, 9 inches							
-1.		CLAY, moist, dark brown, brown and tan, w/ sand, calcareous nodules and gravel (FILL) (CH)			23				PP=2.0 tsf PP=1.5 tsf
					25				-Sulfate 100 ppm; PP=1.9 tsf
-4.		CLAY, soft, moist, tan, calcareous, w/ crushed limestone and cobbles (FILL) (CL)							
5	6 (6) 8 (6)								
					26	58	37		-Sulfate 160 ppm; PP=2.5 tsf
-7.5		CLAY, soft, moist, brown, sandy, silty, w/ trace gravel (CL)			23	51	33		-200=80.1%; PP=2.5 tsf
									PP=2.5 tsf
10	6 (6) 9 (6)								
					21			123	-Sulfate 120 ppm; PP=1.8 tsf Qu=2.2 ksf at 6%; PP=1.75 tsf
15	5 (6) 5 (6)								
-18.		CLAY, very soft to soft, wet, brown, sandy, slightly silty (CL)							PP=1.8 tsf
					24			124	-200=66.9%; Sulfate <100 ppm Qu=0.6 ksf at 15%; PP=0.5 tsf
20	3 (6) 5 (6)								
-24.					9				PP=1.5 tsf
25	32 (6) 36 (6)	SAND, compact, wet, tan and brown, gravelly (SP)							-#200=17%
									SPT at 28.5' 50/5.5 inches
30	13 (6) 50 (5)								

Remarks: Latitude: 31.31383 Longitude: -97.47236

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: D. Garcia Logger: F. Mbogning, E.I.T. Organization: AGG

DRILLING LOG

WinCore Version 3.1

County	Coryell	Hole	B-2	District	Waco
Highway	SH 236 at Leon River	Structure	Bridge	Date	09/15/2016
CSJ	0513-01-017	Station	264+67.46	Grnd. Elev.	616.24
		Offset	6.89' Rt	GW Elev.	-17.00 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	Properties: LL	Properties: PI	Properties: Wet Den. (pcf)	Additional Remarks
-31.		SAND, compact, wet, tan and brown, gravelly (SP)							
		LIMESTONE, wet, tan, weathered, fractured, w/ clay seams							
-33.		LIMESTONE, very hard, gray, w/ embedded fossils							SPT at 34' 50/2 inches
35	50 (0.5) 50 (0)								
					3			145	Qu=325.8 ksf at 1.6%
-40. 40	50 (0.5) 50 (0)								-fracture at 39.8'
		LIMESTONE, very hard, gray, w/ embedded fossils and shaley limestone seams							
					1			146	Qu=332.6 ksf at 2.0%
45	50 (1) 50 (0)								
					1			144	Qu=278.7 ksf at 1.8%
-50. 50	50 (0.5) 50 (0)								
55									
60									

Remarks: Latitude: 31.31383 Longitude: -97.47236

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: D. Garcia Logger: F. Mbogning, E.I.T. Organization: AGG

NOTE:
BORING LOGS CONDUCTED BY ALLIANCE GEOTECHNICAL GROUP ARE SHOWN HERE FOR INFORMATIONAL PURPOSES ONLY. SEE GEOTECHNICAL INVESTIGATION SH 236 AT LEON RIVER PROPOSED BRIDGE REPLACEMENT, CORYELL COUNTY, TEXAS, AGG REPORT NO. E16-0706, DATED NOVEMBER 28, 2016.

NO.	DATE	REVISION	APPROVED

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

BRIDGE BORING LOGS
SH 236 AT LEON RIVER

NOT TO SCALE SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	95
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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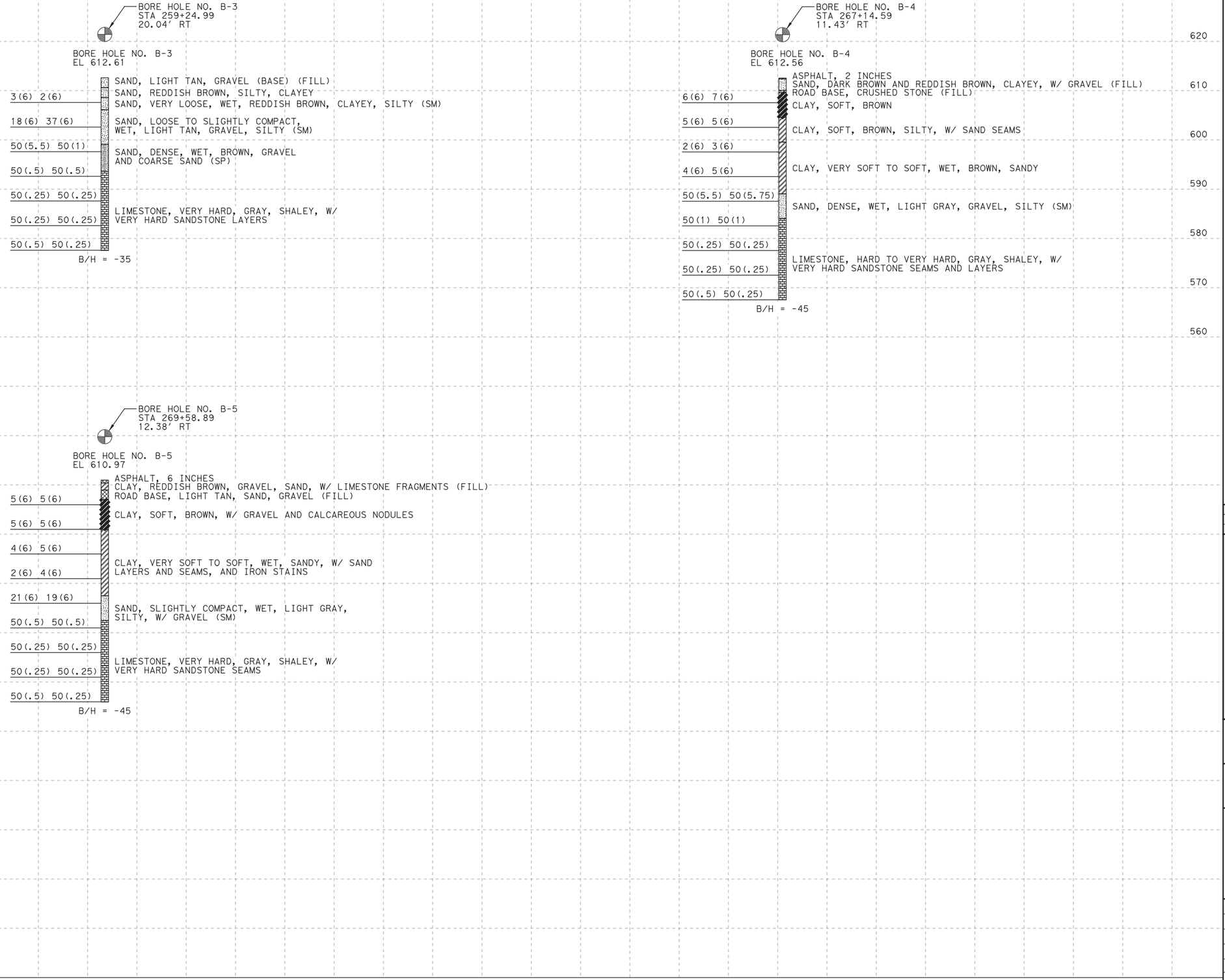

NOTE:
BORING LOGS CONDUCTED BY ALLIANCE GEOTECHNICAL GROUP ARE SHOWN HERE FOR INFORMATIONAL PURPOSES ONLY. SEE GEOTECHNICAL INVESTIGATION SH 236 AT LEON RIVER PROPOSED BRIDGE REPLACEMENT, CORYELL COUNTY, TEXAS, CERTIFICATION LETTER, DATED FEBRUARY 4, 2019.

NO.	DATE	REVISION	APPROVED

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

BRIDGE BORING LOGS
SH 236 AT LEON RIVER

NOT TO SCALE — SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	96
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 8/3/2020
FILE: SH236BOR03.dgn
PENTABLE: 10040174.tbl TIME: 10:10:31 AM SCALE: 1:20

SUMMARY OF ESTIMATED QUANTITIES

BID CODES	0400 6005	0416 6004	0416 6005	0420 6014	0420 6030	0420 6038	0422 6001	0422 6015	0425 6038	0425 6041	0432 6001	0450 6003	0454 6018	0496 6010
BRIDGE ELEMENT / BID ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (36 IN)	DRILL SHAFT (42 IN)	CL C CONC (ABUT) (HPC) (1)	CL C CONC (CAP) (HPC) (1)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC GIRDER (Tx46)	PRESTR CONC GIRDER (Tx70)	RIPRAP (CONC) (4 IN)	RAIL (TY T1W)	SEALED EXPANSION JOINT (4 IN)(SEJ-M)	REMOVE STR (BRIDGE 100 - 499 FT LENGTH)
	CY	LF	LF	CY	CY	CY	SF	CY	LF	LF	CY	LF	LF	EA
2 ~ ABUTMENTS	110	308		29.0				48.0			4			
9 ~ INTERIOR BENTS		708	294		143.0	39.0								
1~300.00'PRESTR CONC GIRDER UNIT(SPAN 1-3)							9600		1194.04			600.0	31	
1~150.00'PRESTR CONC GIRDER UNIT(SPAN 4)							4800			598.00		300.0	31	
1~300.00'PRESTR CONC GIRDER UNIT(SPAN 5-7)							9600		1194.25			600.0	31	
1~300.00'PRESTR CONC GIRDER UNIT(SPAN 8-10)							9600		1194.34			600.0	63	
TOTAL	110	1016	294	29.0	143.0	39.0	33600	48.0	3582.63	598.00	4	2100.0	156	1

(1) Quanitity includes shear key

BEARING SEAT ELEVATIONS

		BEAM 1	BEAM 2	BEAM 3	BEAM 4
BENT 1	(FWD)	616.388	616.555	616.721	616.888
BENT 2	(BK)	617.243	617.409	617.576	617.743
	(FWD)	617.260	617.427	617.594	617.760
BENT 3	(BK)	618.115	618.282	618.448	618.615
	(FWD)	618.174	618.340	618.507	618.674
BENT 4	(BK)	618.954	619.120	619.287	619.454
	(FWD)	616.966	617.133	617.299	617.466
BENT 5	(BK)	617.399	617.566	617.732	617.899
	(FWD)	619.311	619.481	619.651	619.821
BENT 6	(BK)	618.583	619.080	619.577	620.073
	(FWD)	618.402	618.902	619.403	619.903
BENT 7	(BK)	618.024	618.539	619.054	619.569
	(FWD)	617.952	618.468	618.983	619.498
BENT 8	(BK)	617.545	618.060	618.575	619.090
	(FWD)	617.537	618.052	618.567	619.082
BENT 9	(BK)	617.129	617.644	618.160	618.675
	(FWD)	617.121	617.636	618.151	618.667
BENT 10	(BK)	616.714	617.229	617.744	618.259
	(FWD)	616.705	617.220	617.735	618.251
BENT 11	(BK)	616.298	616.802	617.306	617.811

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED
PROFESSIONAL ENGINEER

Erin E O'Malley
Digitally signed by Erin E O'Malley
Date: 2020.08.03 18:02:43-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

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STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER

7/30/2020

For Bent Nos. 6-10 and Abutment No. 11 Bearing Seat Elevations.

Thomas G. Ashcraft

ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	97
CONTROL	SECTION	JOB	
0513	01	017	

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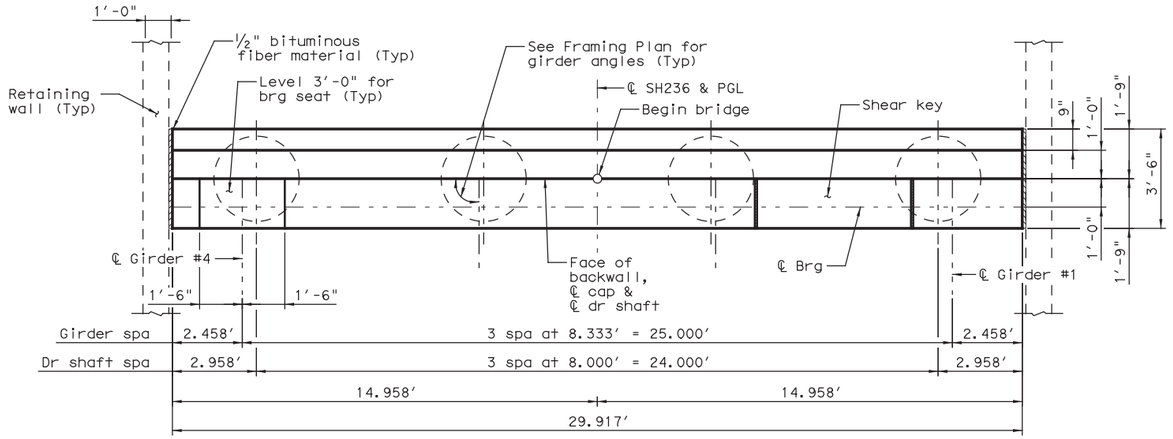
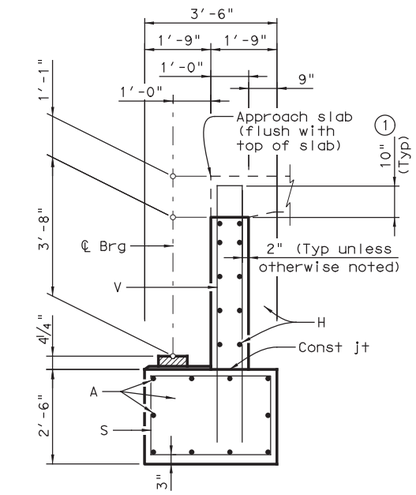
USER: mflores DATE: 7/30/2020 TIME: 2:55:43 PM SCALE: 1:1
FILE: Estimated Quantities and Bearings (1 of 1)

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Bridge Layout for foundation length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated foundation loads:
90 tons/Abutment DS

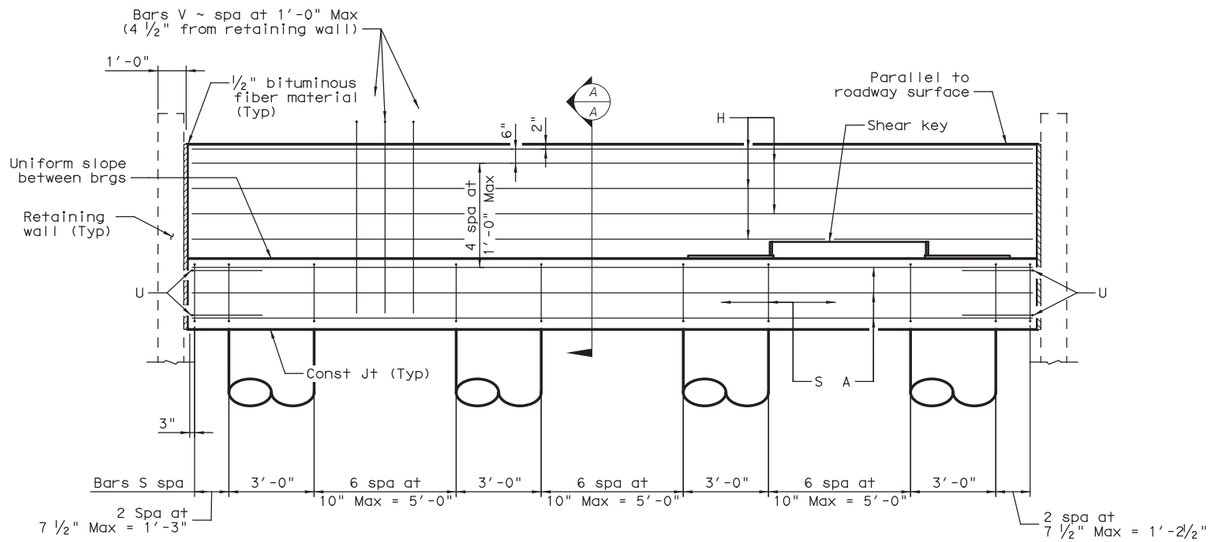


PLAN

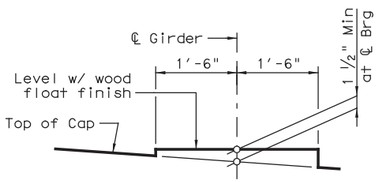


SECTION A-A

(1) Increase as required to maintain 3" from finished grade.



ELEVATION



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Digitally signed by Erin E O'Malley
Date: 2020.08.03 15:18:35-05'00'

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HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

ABUTMENT NO. 1

SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	98
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: KBERGER DATE: 8/3/2020
FILE: SH236ABO1.dgn
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TIME: 10:10:39 AM SCALE: 1:1

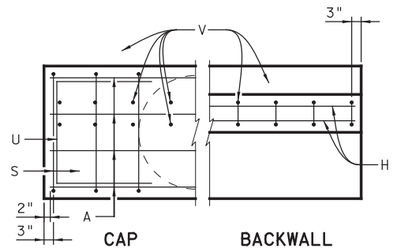
GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Bridge Layout for foundation length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated foundation loads:
90 tons/Abutment DS

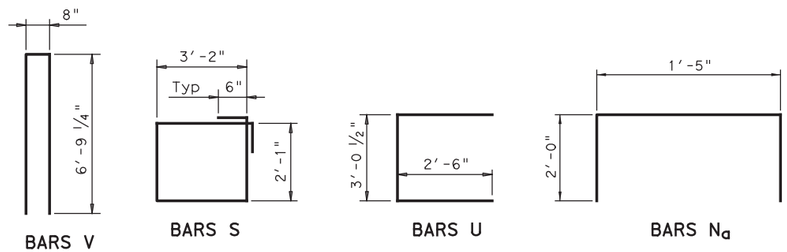
TABLE OF ESTIMATED QUANTITIES

Bar	No.	Size	Length	Weight
A	10	#11	29'-7"	1572
H	10	#6	29'-7"	444
M (2)	2	#5	5'-2"	11
N_a (2)	9	#5	5'-5"	51
S	27	#5	11'-6"	324
U	4	#6	8'-1"	49
V	31	#5	14'-3"	461
Reinforcing Steel			Lb	2912
Class C Concrete (Abut)(HPC)			CY	14.5

(2) See shear key details for bar locations.



CORNER DETAILS



HL93 LOADING

NO.	DATE	REVISION	APPROVED

ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
08/03/2020

Erin E O'Malley
Digitally signed by Erin E O'Malley
Date: 2020.08.03 15:16:40-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

ABUTMENT NO. 1

SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	99
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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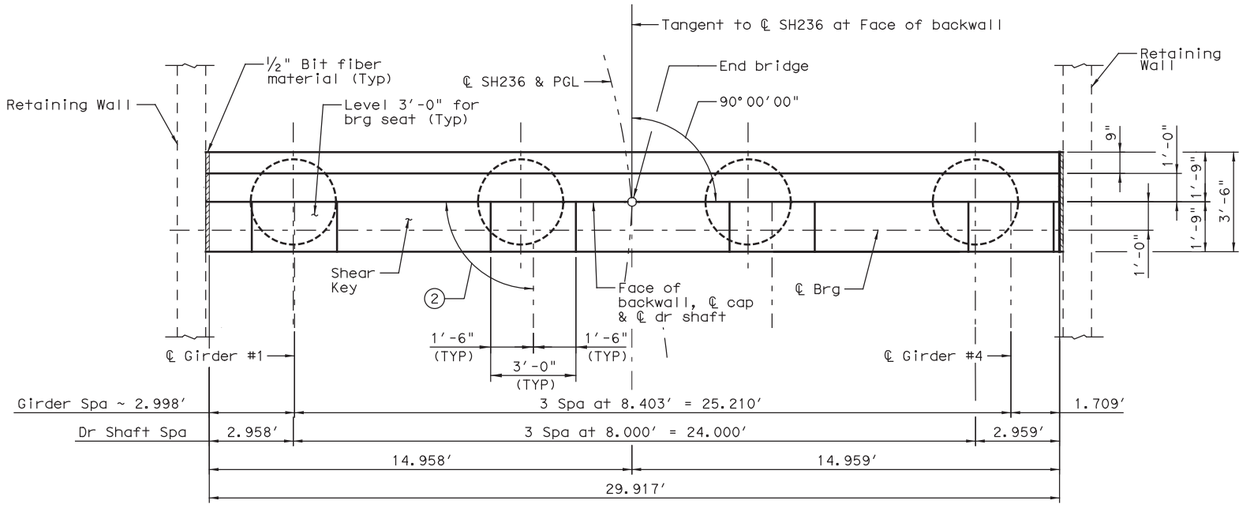
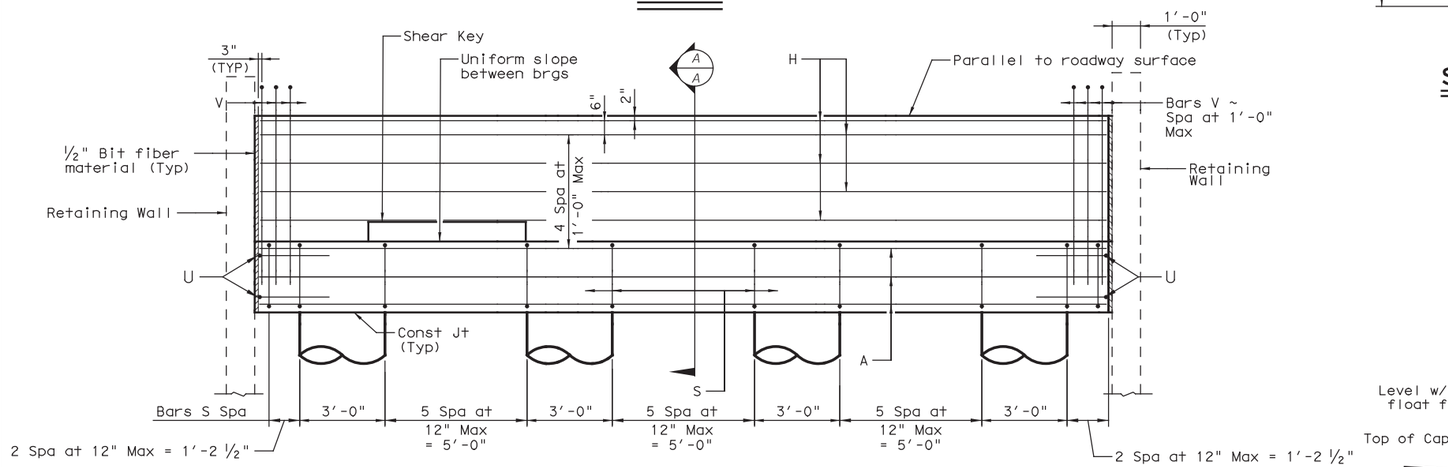


PLAN



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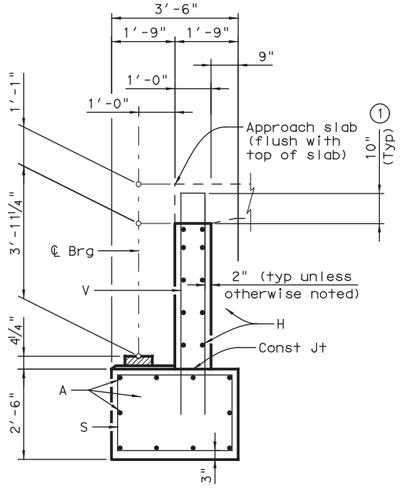
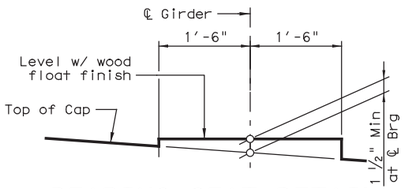
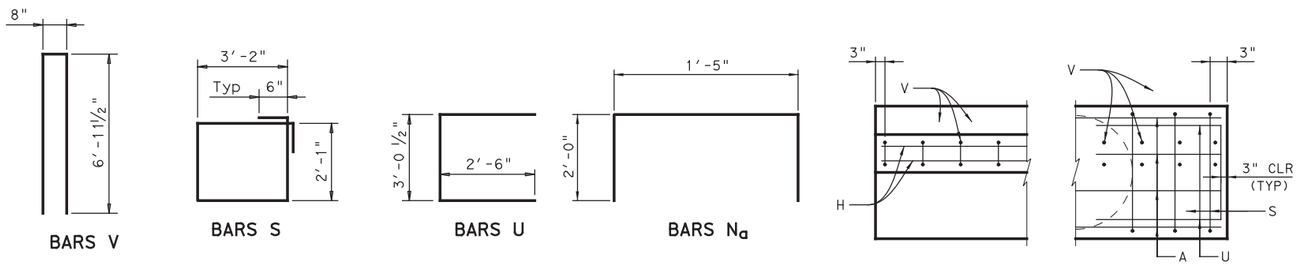


SECTION A-A



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)



CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	29'-7"	1,572
H	10	#6	29'-7"	444
M (3)	2	#5	5'-4"	11
Na (3)	9	#5	5'-5"	51
V	31	#5	14'-7"	434
S	24	#5	11'- 6"	288
U	4	#6	8'- 1"	49
Reinforcing Steel			LB	2,849
Class "C" Conc(Abut)(HPC)			CY	14.5

(1) Increase as required to maintain 3" clear from finished grade.

(2) See Framing Plan for girder angle (Typ).

(3) See Shear Key detail for bar location.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2018).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Bridge Layout for foundation length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated foundation loads = 84 tons/Dr Sh.

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

ABUTMENT NO. 11

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	100
CONTROL	SECTION	JOB	
0513	01	017	

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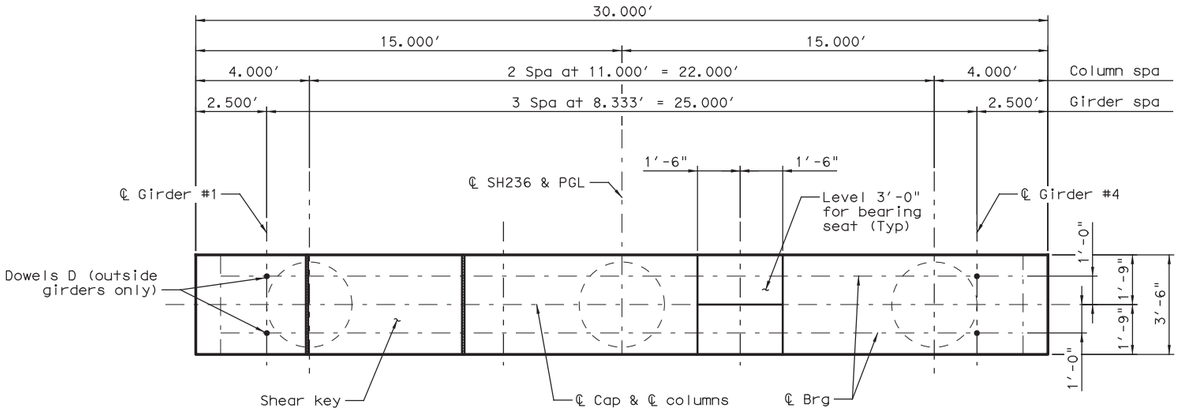
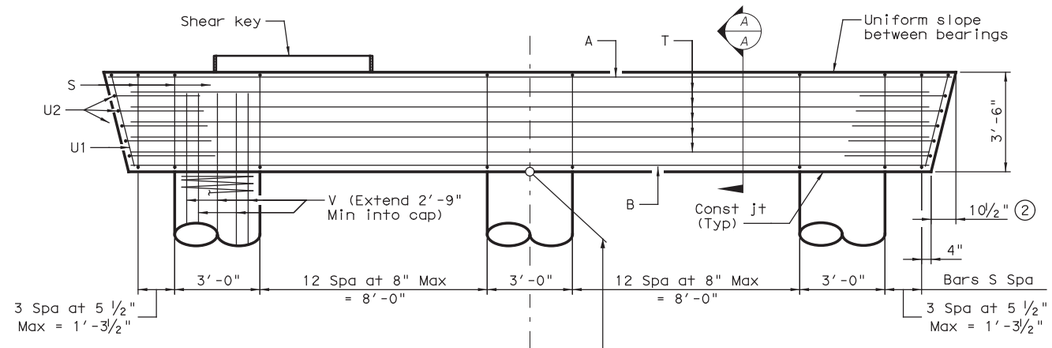
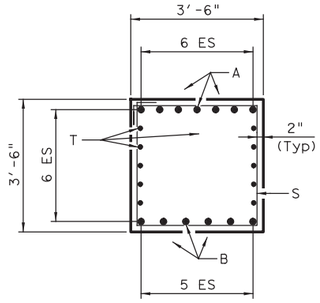


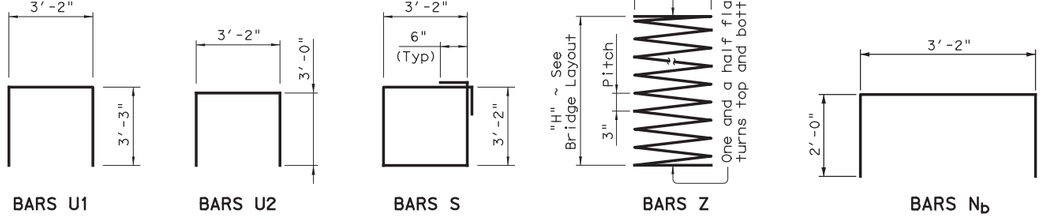
PLAN

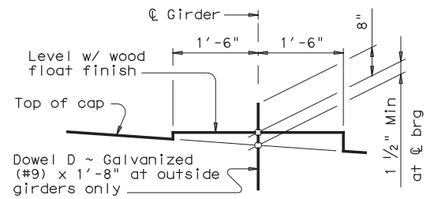


ELEVATION



SECTION A-A





BEARING SEAT ELEVATION

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

1. Quantities shown are based on "H" value in table. For each linear foot variation in "H" value, make the following adjustments:
   Bars V length, 1'-0"
   Bars Z length, 31'-5"
   Reinforcing steel, 165 Lb
   Class C Concrete (Col), 0.78 CY
2. Measured parallel to top of cap cross-slope
3. Quantities shown are for one bent only.
4. See shear key details for bar location.

TABLE OF CAP QUANTITIES (3)

Bar	No.	Size	Length	Weight
A	7	#11	29'-6"	1097
B	6	#11	28'-0"	893
D	4	#9	1'-8"	23
M (4)	4	#5	5'-2"	22
N_b (4)	9	#5	7'-2"	67
S	34	#5	13'-8"	485
T	10	#5	27'-11"	291
U1	2	#5	9'-8"	20
U2	10	#5	9'-2"	96
Reinforcing Steel			Lb	2993
Class C Concrete (Cap) (HPC)			CY	14.0

TABLE OF COLUMN QUANTITIES (1) (3)

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4 Spiral		Reinf Steel	Class C Conc (Col) (HPC)
No.	Ft	Length	Weight	Length	Weight	Lb	CY
2	5	7'-9"	791	180'-8"	362	1153	3.9
3	6	8'-9"	893	212'-0"	425	1318	4.7

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Framing Plan for girder angles.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated Foundation Loads = 176 tons/Dr Sh.

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Digitally signed by Erin E O'Malley
Date: 2020.08.03 15:21:36-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

INTERIOR BENT NOS. 2-3
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236
STATE	DISTRICT	COUNTY
TEXAS	WACO	CORYELL
CONTROL	SECTION	JOB
0513	01	017

SHEET NO. 101

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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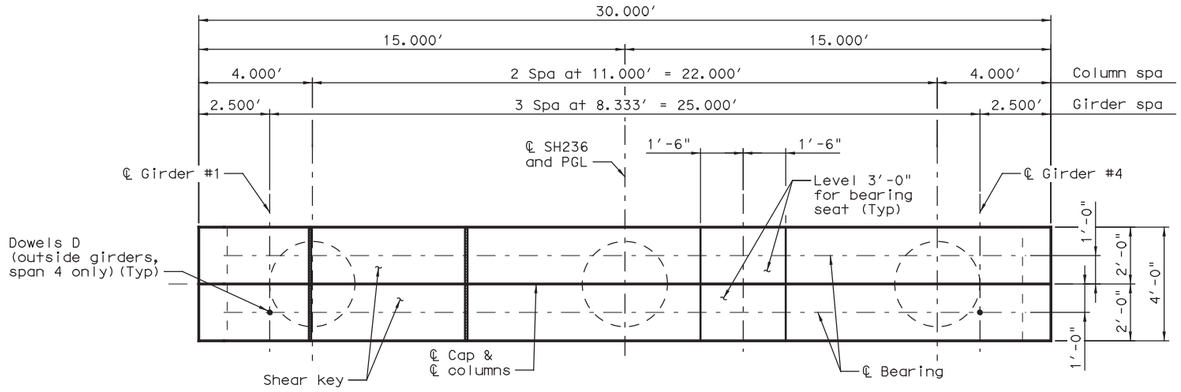
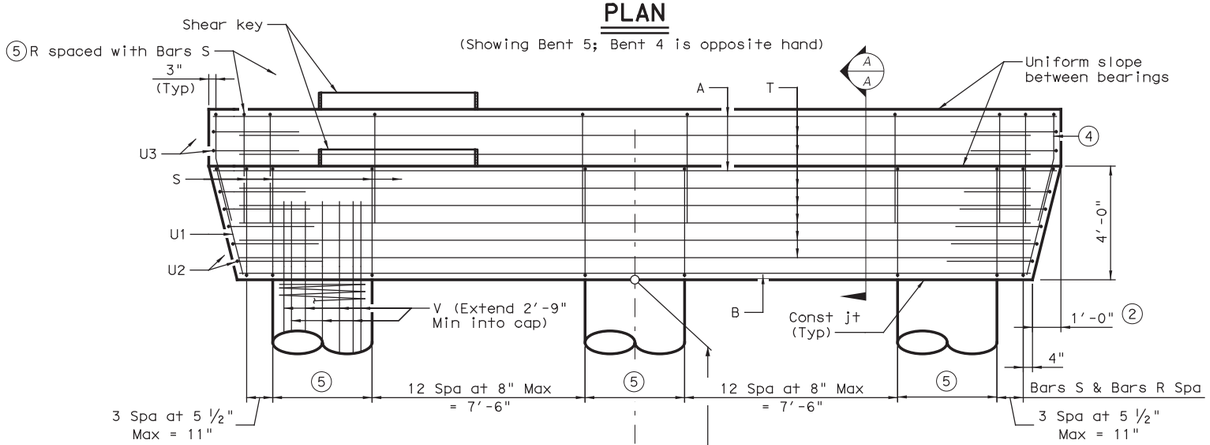
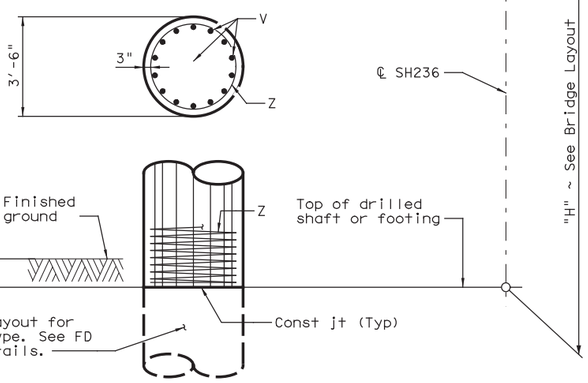


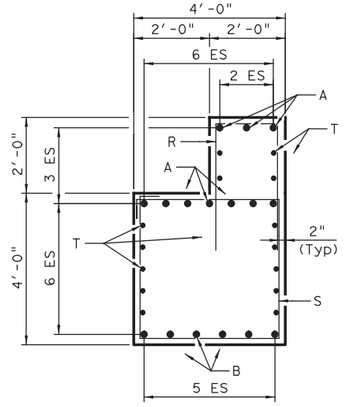
PLAN

(Showing Bent 5; Bent 4 is opposite hand)

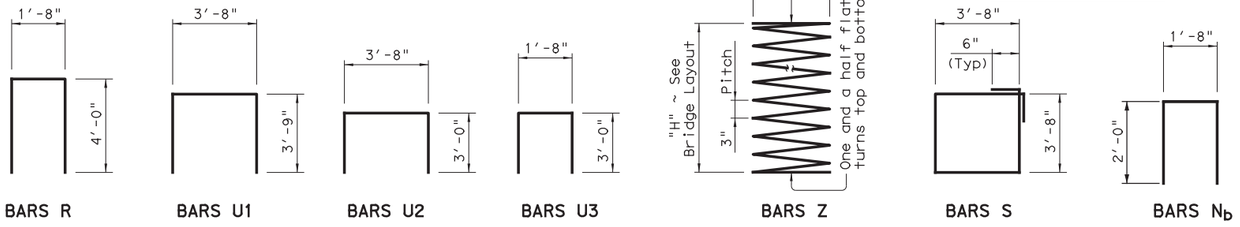


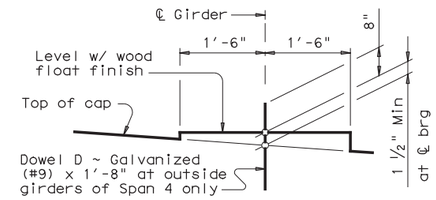


ELEVATION



SECTION A-A





BEARING SEAT ELEVATION

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

① Quantities shown are based on "H" value in table. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 37'-9"
Reinforcing steel, 219 Lb
Class C Concrete (Col), 1.07 CY

② Measured parallel to top of cap cross-slope.

③ Quantities shown are for one bent only.

④ Field bend R Bar at end of cap to match slope of end face (Typ).

⑤ 3'-6" column diameter, 5 Spa at 9" Max, additional R Bars over column (Typ).

⑥ See shear key details for bar locations.

TABLE OF CAP QUANTITIES ③

Bar	No.	Size	Length	Weight
A	10	#11	29'-6"	1567
B	6	#11	27'-9"	885
D	2	#9	1'-8"	11
M ⑥	4	#5	5'-2"	22
N_b ⑥	18	#5	5'-8"	106
R	51	#5	9'-8"	514
S	34	#5	15'-8"	556
T	14	#5	27'-8"	404
U1	2	#5	11'-2"	23
U2	10	#5	9'-8"	101
U3	4	#5	7'-8"	32
Reinforcing Steel			Lb	4221
Class C Concrete (Cap) (HPC)			CY	22.5

TABLE OF COLUMN QUANTITIES ①

Bent	"H"	Bars V 42 ~ #9		Bars Z 3 ~ #4 Spiral		Reinf Steel	Class C Conc (Col) (HPC)
No.	Ft	Length	Weight	Length	Weight	Lb	CY
4	6	8'-9"	1250	254'-9"	511	1761	6.4
5	5	7'-9"	1107	217'-0"	435	1542	5.3

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Framing Plan for girder angles.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated Foundation Loads = 230 tons/Dr Sh.

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Erin E O'Malley Digitally signed by Erin E O'Malley Date: 2020.08.03 15:23:51 -05'00'

TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

INTERIOR BENT NOS. 4-5
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	102
CONTROL	SECTION	JOB	
0513	01	017	

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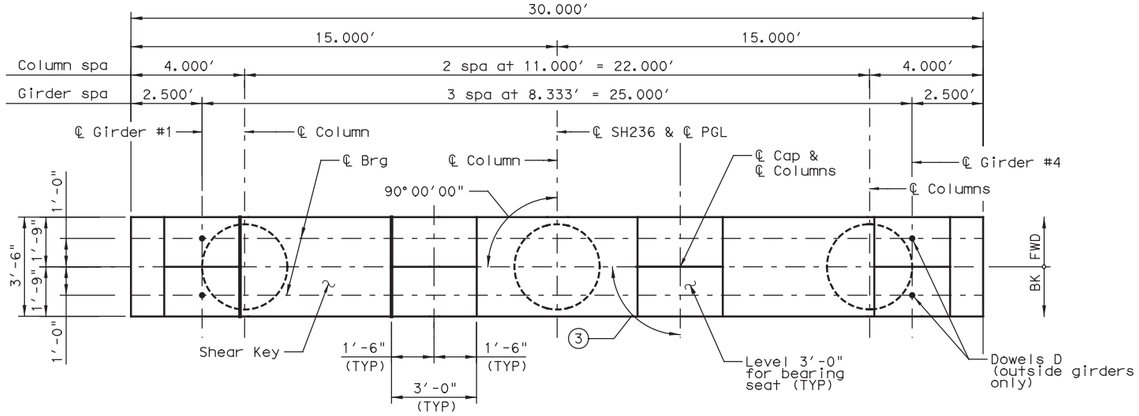

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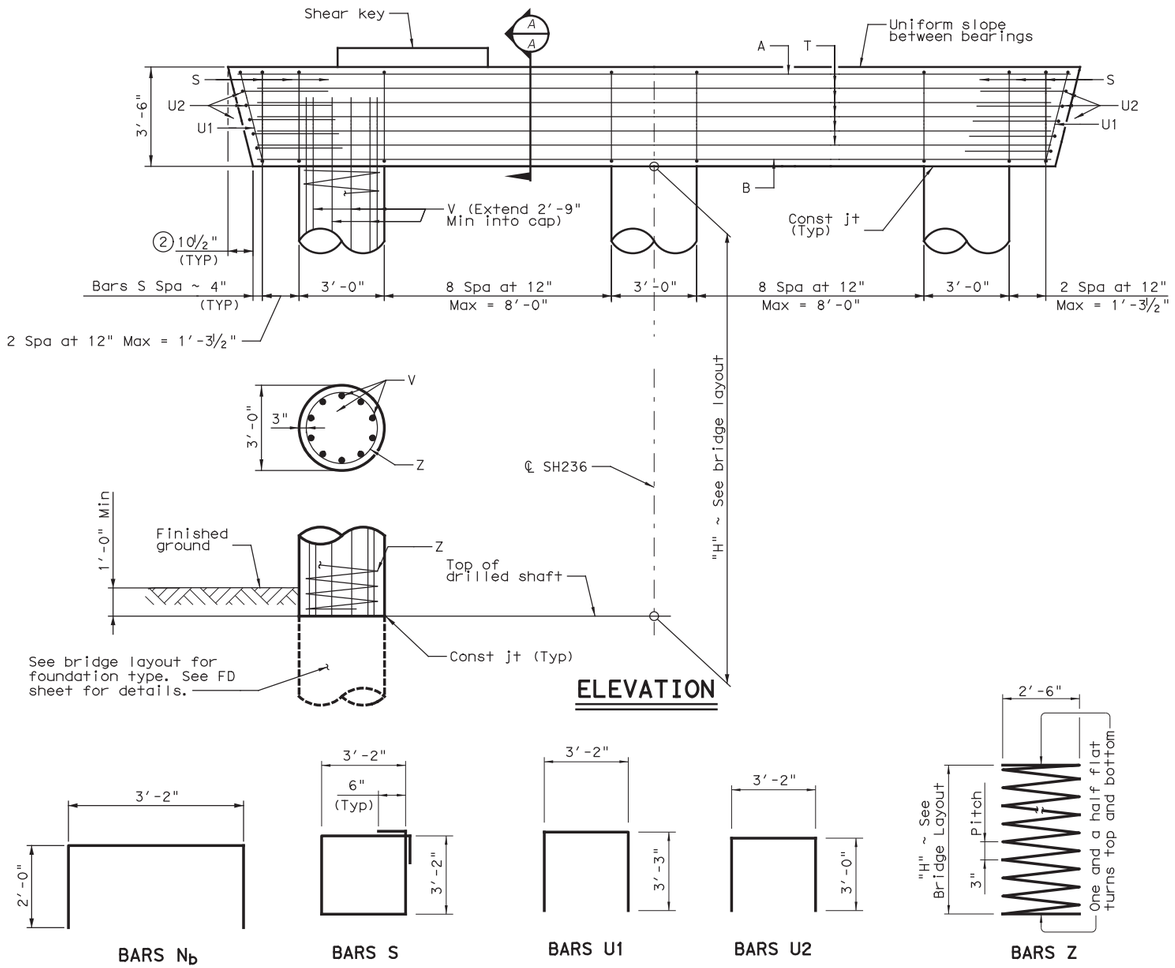

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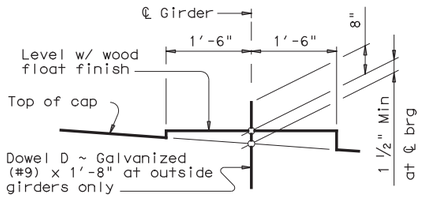


BEARING SEAT ELEVATION

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

TABLE OF CAP QUANTITIES

Bar	No.	Size	Length	Weight
A	7	#11	29'-6"	1,097
B	6	#11	27'-11"	890
D	4	#9	1'-8"	23
M (4)	4	#5	5'-3"	22
N_b (4)	9	#5	7'-2"	67
S	24	#5	13'-8"	342
T	10	#5	27'-11"	291
U1	2	#5	9'-8"	20
U2	10	#5	9'-2"	96
Reinforcing Steel			Lb	2,848
Class C Concrete (Cap) (HPC)			CY	13.9

TABLE OF COLUMN QUANTITIES (1) (3)

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4 Spiral		Reinf Steel	Class C Conc (Col) (HPC)
No.	Ft	Length	Weight	Length	Weight	Lb	CY
6	6	8'-9"	893	212'-1"	425	1,318	4.7

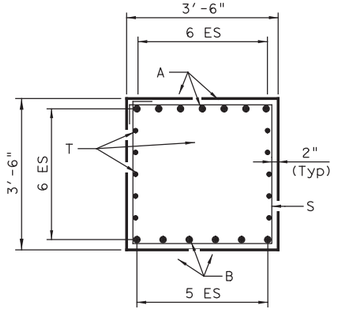
(1) Quantities shown are based on "H"=6' value in table. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing steel, 165 Lb
Class C Concrete (Col), 0.78 CY

(2) Measured parallel to top of cap cross-slope

(3) See framing plan for girder angles (Typ).

(4) See shear key details for bar location.

HL93 LOADING



SECTION A-A

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Framing Plan for girder angles.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated Foundation Loads = 187 tons/Dr Sh.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

INTERIOR BENT NO. 6

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	103
CONTROL	SECTION	JOB	
0513	01	017	

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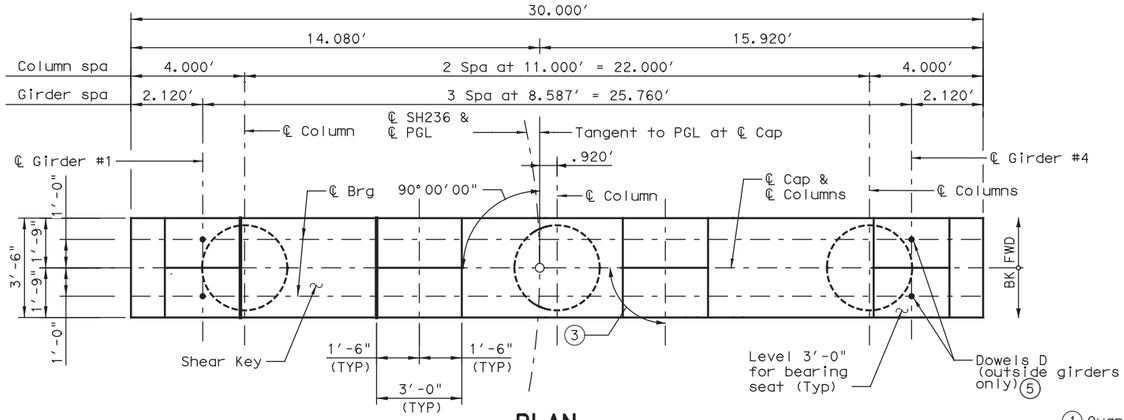

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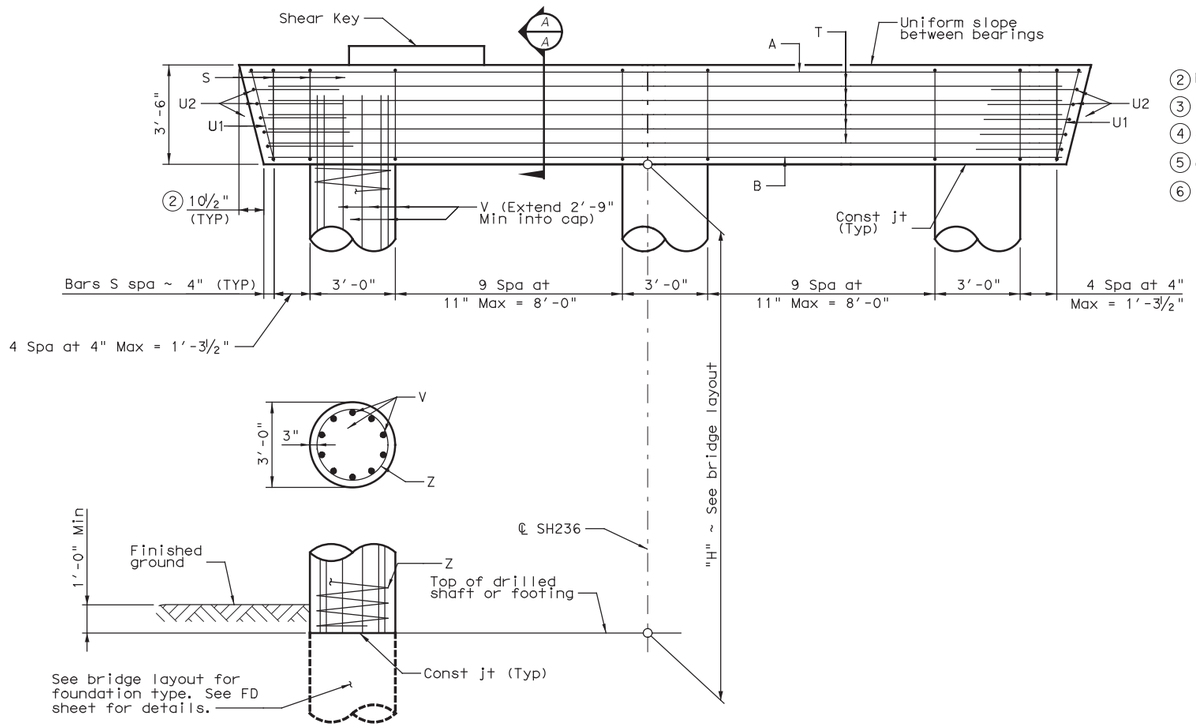
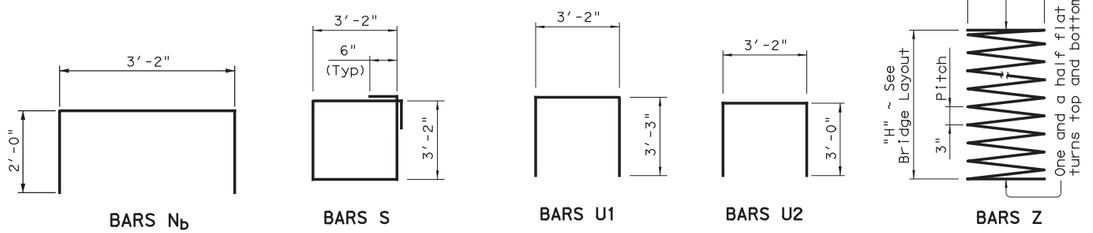
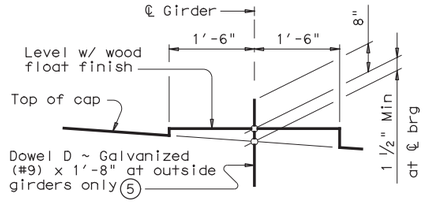


ELEVATION





BEARING SEAT ELEVATION

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

TABLE OF CAP QUANTITIES

Bar	No.	Size	Length	Weight
A	7	#11	29'-6"	1,097
B	6	#11	27'-11"	890
D (5)	4	#9	1'-8"	23
M (6)	4	#5	5'-6"	23
N_b (6)	9	#5	7'-2"	67
S	30	#5	13'-8"	428
T	10	#5	27'-11"	291
U1	2	#5	9'-8"	20
U2	10	#5	9'-2"	96
Reinforcing Steel			Lb	2,935
Class C Concrete (Cap) (HPC)			CY	14.0

TABLE OF COLUMN QUANTITIES (1)

Bent	"H"	Bars V 30 ~ #9		Bars Z 3 ~ #4 Spiral		Reinf Steel	Class C Conc (Col) (HPC)
No.	Height	Length	Weight	Length	Weight	Lb	CY
7	5	7'-9"	791	180'-8"	362	1,153	3.9
8	5	7'-9"	791	180'-8"	362	1,153	3.9
9	4	6'-9"	689	149'-3"	299	988	3.1
10	4	6'-9"	689	149'-3"	299	988	3.1

(1) Quantities shown are based on "H" value in table. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing steel, 165 Lb
Class C Concrete (Col), 0.78 CY

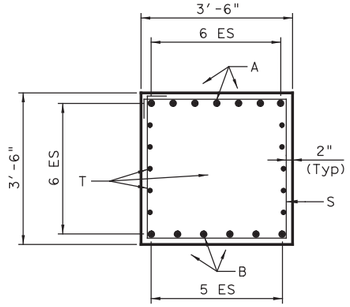
(2) Measured parallel to top of cap cross-slope

(3) See framing plan for girder angles (typ).

(4) Quantities shown are for one bent only.

(5) Omit Dowels D at Bent 8. Deduct 23 lbs of reinforcing steel.

(6) See shear key details for bar location.



SECTION A-A

HL93 LOADING

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specification, 8th Edition (2017).
All concrete shall be Class C, f'c = 3600 psi.
All reinforcing steel shall be Grade 60.
See Framing Plan for girder angles.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details FD Standard sheet for all foundation details and notes.
See Shear Key Details (IGSK) standard sheet for all shear key details and notes.
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar unless noted otherwise.
Calculated Foundation Loads:
Bent Nos. 7-8 = 187 tons/Dr Sh.
Bent Nos. 9-10 = 186 tons/Dr Sh.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

INTERIOR BENT NOS. 7 - 10

SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	104
CONTROL	SECTION	JOB	
0513	01	017	

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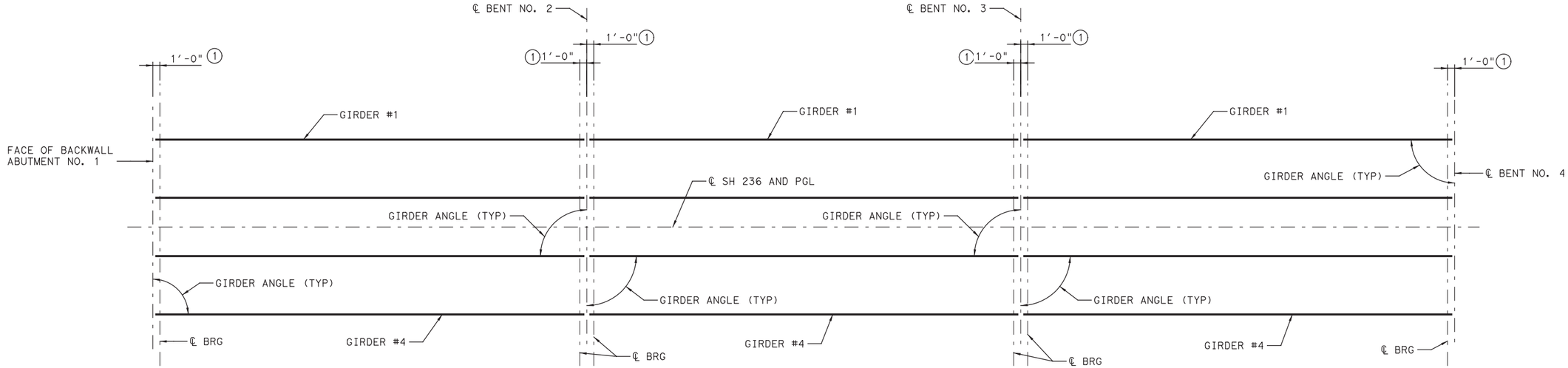

(1) SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.

(2) GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 1 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 2 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 1	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 2 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 2	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 3 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 2	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 3 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 3	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 4 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 3	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

GIRDER REPORT

GIRDER REPORT, SPAN 1

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	100.000	98.000	99.50	0.0087
GIRDER 2	100.000	98.000	99.50	0.0087
GIRDER 3	100.000	98.000	99.50	0.0087
GIRDER 4	100.000	98.000	99.50	0.0087

GIRDER REPORT, SPAN 2

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	100.000	98.000	99.50	0.0087
GIRDER 2	100.000	98.000	99.50	0.0087
GIRDER 3	100.000	98.000	99.50	0.0087
GIRDER 4	100.000	98.000	99.50	0.0087

GIRDER REPORT, SPAN 3

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GDR FLG. (2)	GIRDER SLOPE
GIRDER 1	100.000	98.000	99.50	0.0080
GIRDER 2	100.000	98.000	99.50	0.0080
GIRDER 3	100.000	98.000	99.50	0.0080
GIRDER 4	100.000	98.000	99.50	0.0080

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Erin E O'Malley Digitally signed by Erin E O'Malley Date: 2020.08.03 15:23:24-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

FRAMING PLAN
(SPANS 1-3)
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	105
CONTROL	SECTION	JOB	
0513	01	017	

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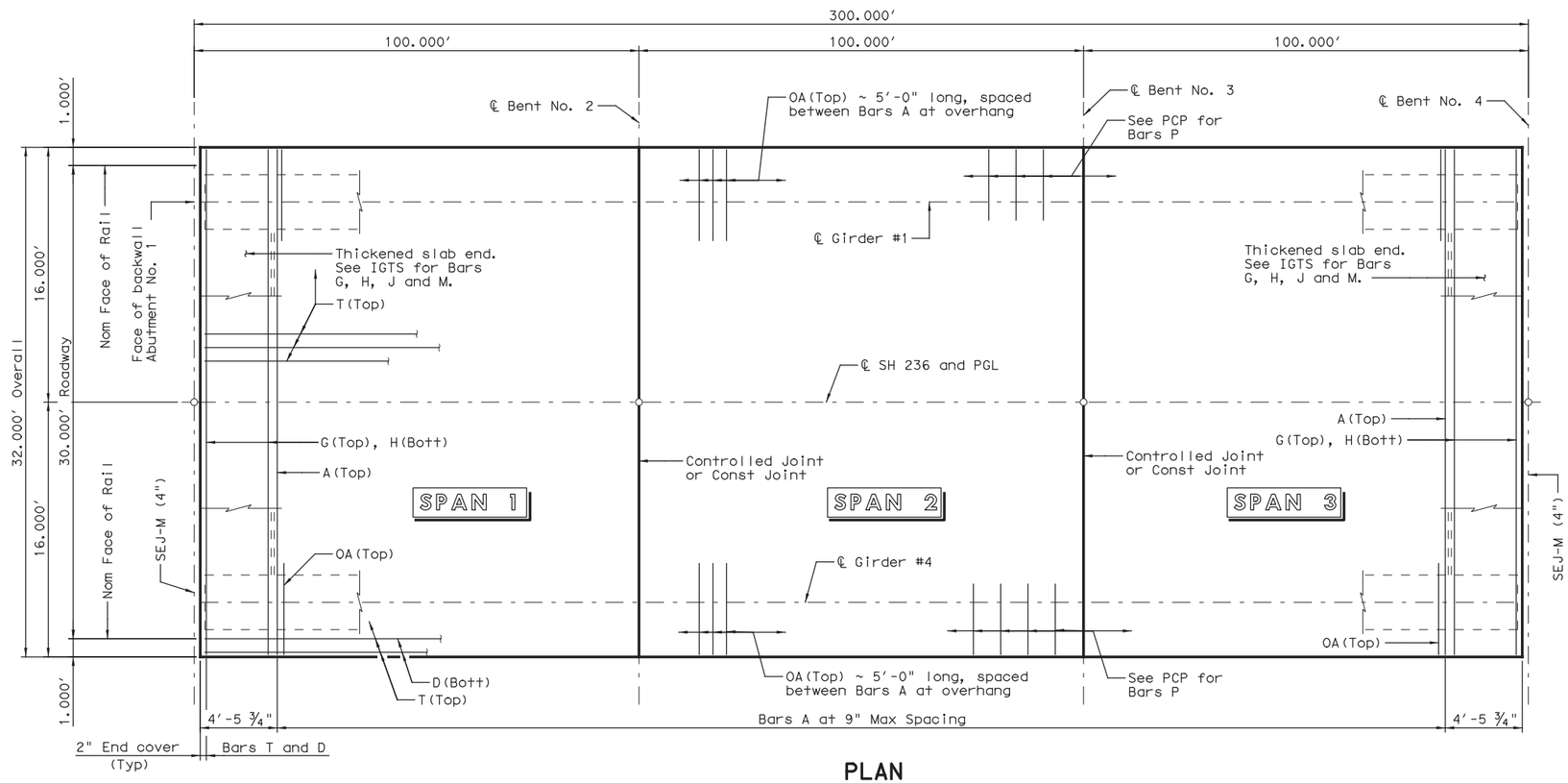

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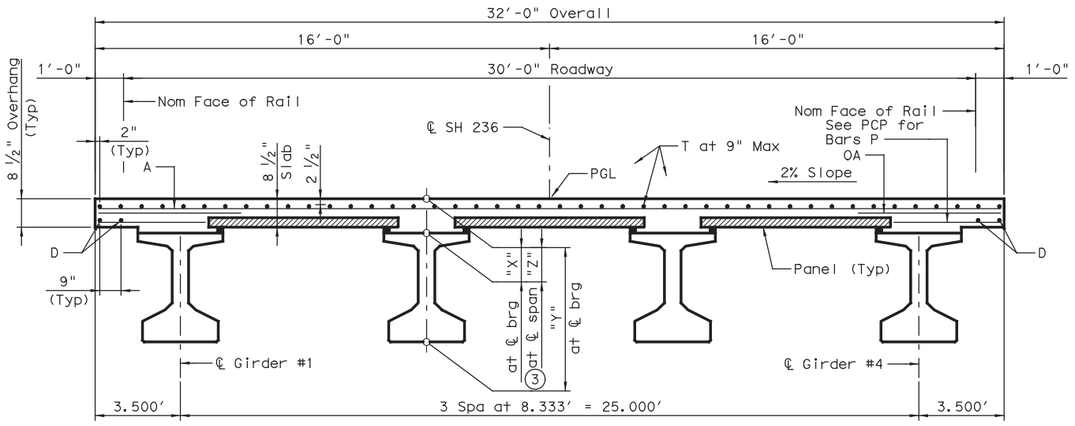


TYPICAL TRANSVERSE SECTION

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4

TABLE OF ESTIMATED QUANTITIES

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 46) ②	Reinf Steel ①
No.	SF	LF	Lb
1	3200	398.02	7360
2	3200	398.02	7360
3	3200	398.01	7360
Total	9600	1194.04	22080

① Reinforcing steel weight is calculated using an approximate factor of 2.3 Lbs/SF.

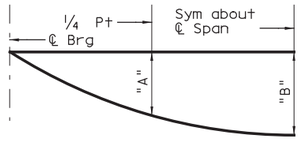
② Lengths shown are bottom girder flange lengths with adjustments made for girder slope.

③ Theoretical dimension

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications, 8th Edition (2017).
All concrete shall be Class S, f′c = 4000 psi.
All reinforcing steel shall be Grade 60.
See rail standard for anchorage in slab.
Bar laps, where required shall be as follows:
Uncoated ~ #4 = 1′-7"
See PCP and PCP-FAB standards for panel details not shown.
See IGMS standard for miscellaneous details.
See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec= 5000 ksi). Calculated deflections shown are theoretical and actual deflection may be less. Deflection shall be adjusted based on field observation.

Span No.	Girder No.	"A"	"B"
		F†	F†
1-3	1,4	0.100	0.142
	2,3	0.109	0.155

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span ③
1-2	1,4	11"	4′-9"	9 5/8"
	2,3	11"	4′-9"	9 ¾"
3	1,4	10 ½"	4′-8 ½"	9 ½"
	2,3	10 ½"	4′-8 ½"	9 5/8"

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Erin E O'Malley Digitally signed by Erin E O'Malley Date: 2020.08.03 15:23:01-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

300.00′ PRESTRESSED CONCRETE GIRDER UNIT
(SPANS 1-3)
SH 236 AT LEON RIVER

SHEET OF

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	106
CONTROL	SECTION	JOB	
0513	01	017	

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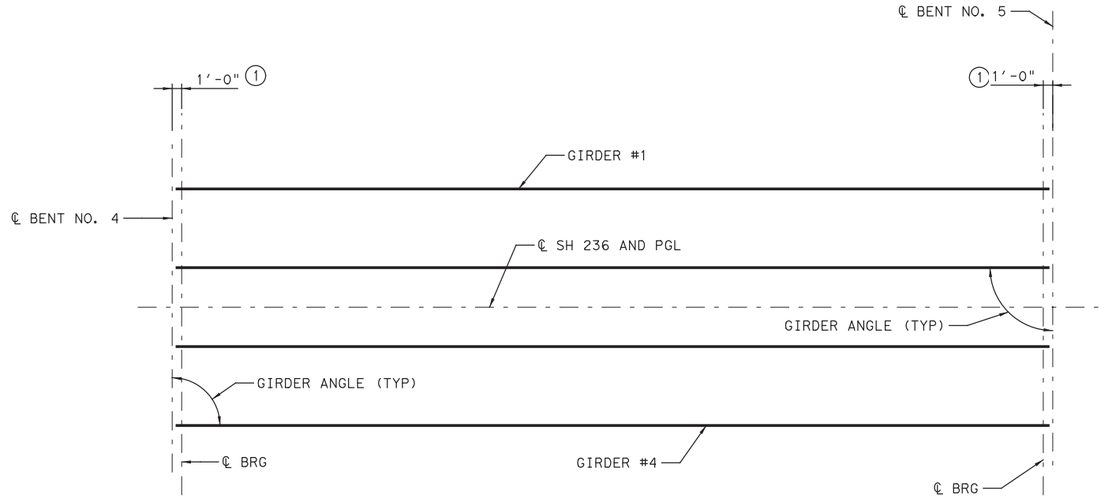

SPAN 4
(TYPE Tx70 GIRDERS)

(1) SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.

(2) GIRDER LENGTHS SHOWN ARE BOTTOM GIRDER FLANGE LENGTHS WITH ADJUSTMENTS FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 4 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 5 (N 24 10 40.24 W)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 4	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

GIRDER REPORT

GIRDER REPORT, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. GDR FLG.	GIRDER SLOPE (2)
GIRDER 1	150.000	148.000	149.50	0.0029
GIRDER 2	150.000	148.000	149.50	0.0029
GIRDER 3	150.000	148.000	149.50	0.0029
GIRDER 4	150.000	148.000	149.50	0.0029

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED PROFESSIONAL ENGINEER
08/03/2020

Erin E O'Malley
Digitally signed by Erin E O'Malley
Date: 2020.08.03 15:19:55-05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

FRAMING PLAN
(SPAN 4)
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	107
CONTROL	SECTION	JOB	
0513	01	017	

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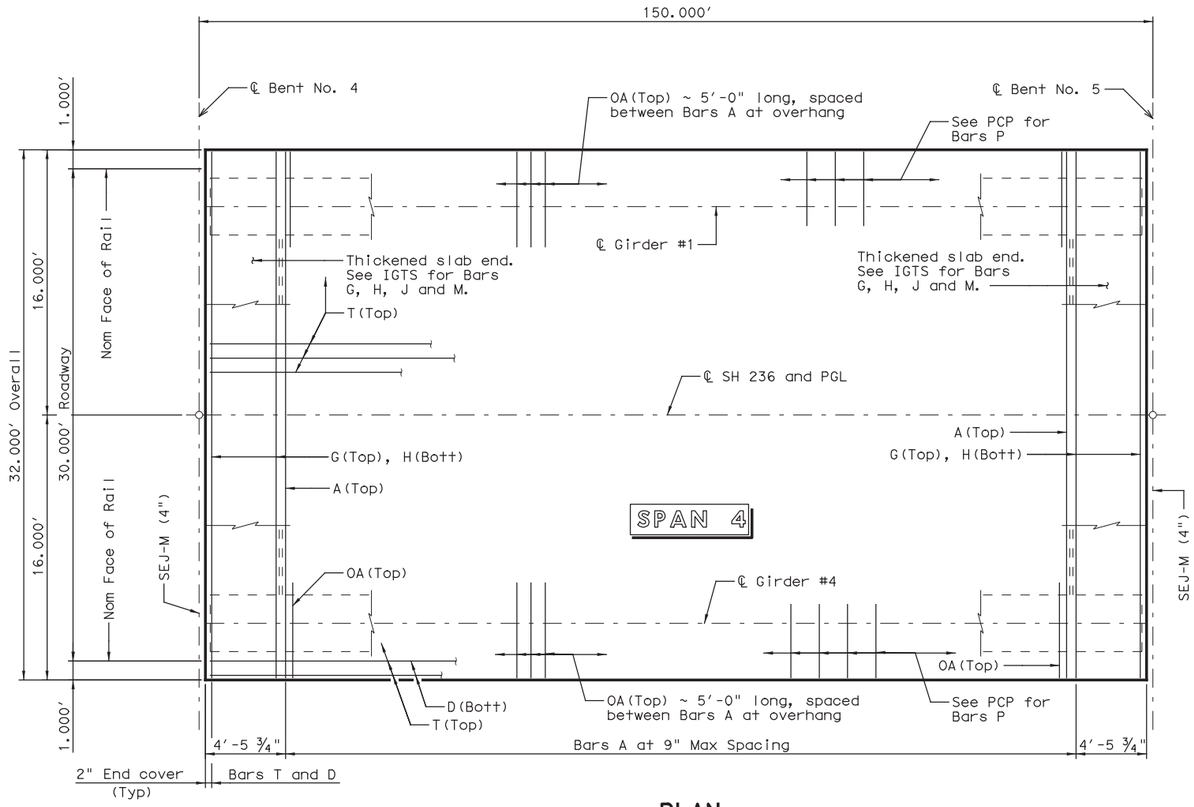
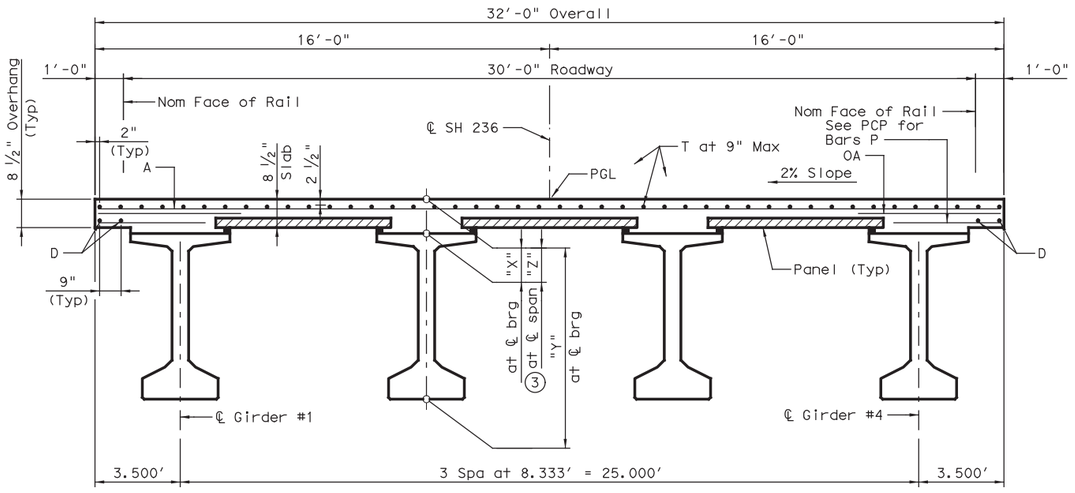


PLAN



TYPICAL TRANSVERSE SECTION

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4

TABLE OF ESTIMATED QUANTITIES

Span	Reinf Concrete Slab	Prestr Concrete Girder (2) (Tx 70)	Reinf Steel (1)
No.	SF	LF	Lb
4	4800	598.00	11040
Total	4800	598.00	11040

(1) Reinforcing steel weight is calculated using an approximate factor of 2.3 Lbs/SF.

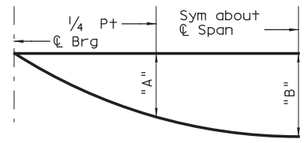
(2) Lengths shown are bottom girder flange lengths with adjustments made for girder slope.

(3) Theoretical dimension

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications, 8th Edition (2017).
All concrete shall be Class S, f'c = 4000 psi.
All reinforcing steel shall be Grade 60.
See rail standard for anchorage in slab.
Bar laps, where required shall be as follows:
Uncoated ~ #4 = 1'-7"
See PCP and PCP-FAB standards for panel details not shown.
See IGMS standard for miscellaneous details.
See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec= 5000 ksi). Calculated deflections shown are theoretical and actual deflection may be less. Deflection shall be adjusted based on field observation.

Span No.	Girder No.	"A" Ft	"B" Ft
4	1,4	0.164	0.233
	2,3	0.178	0.253

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span (3)
4	1,4	10 1/2"	6'-8 1/2"	9 5/8"
	2,3	10 1/2"	6'-8 1/2"	9 7/8"

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS — ERIN E. O'MALLEY — 117101 — LICENSED PROFESSIONAL ENGINEER — 08/03/2020

Digitally signed by Erin E O'Malley
Date: 2020.08.03 15:23:42 -05'00'

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

150.00' PRESTRESSED CONCRETE GIRDER UNIT
(SPAN 4)
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	108
CONTROL	SECTION	JOB	
0513	01	017	

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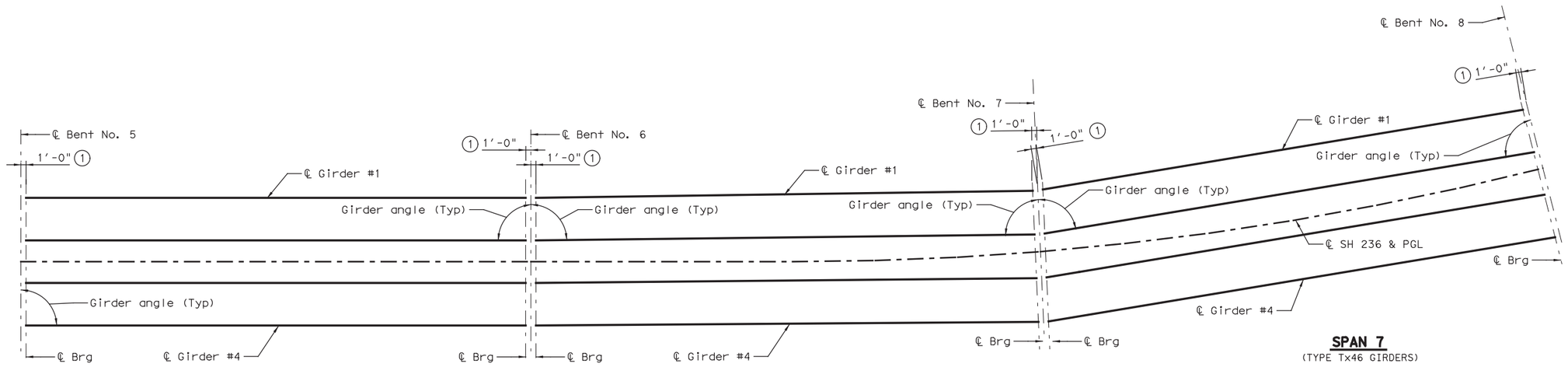

SPAN 5
(TYPE Tx46 GIRDERS)

SPAN 6
(TYPE Tx46 GIRDERS)

SPAN 7
(TYPE Tx46 GIRDERS)

(1) See IGEB standard for orientation of dimension.

(2) Girder lengths shown are bottom girder flange lengths with adjustments for girder slope.

BENT REPORT

BENT NO. 5 (S 24 10 40.25 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 5	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			

BENT NO. 6 (S 24 10 40.25 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 12.500 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 5	GIRDER 1	0.000	90	0	0
	GIRDER 2	8.333	90	0	0
	GIRDER 3	8.333	90	0	0
	GIRDER 4	8.333	90	0	0
	TOTAL	25.000			
SPAN 6	GIRDER 1	0.000	89	11	34
	GIRDER 2	8.333	89	19	40
	GIRDER 3	8.333	89	27	39
	GIRDER 4	8.333	89	35	32
	TOTAL	25.000			

BENT NO. 7 (S 28 49 35.78 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 6	GIRDER 1	0.000	86	09	30
	GIRDER 2	8.587	86	01	24
	GIRDER 3	8.587	85	53	25
	GIRDER 4	8.587	85	45	32
	TOTAL	25.760			
SPAN 7	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			

BENT NO. 8 (S 38 22 33.24 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 7	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			

GIRDER REPORT

GIRDER REPORT, SPAN 5

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE (2) BOT. GIR. FLG.	GIRDER SLOPE
GIRDER 1	100.000	98.000	99.50	-0.0074
GIRDER 2	100.000	98.000	99.50	-0.0041
GIRDER 3	100.000	98.000	99.50	-0.0008
GIRDER 4	100.000	98.000	99.50	0.0026

GIRDER REPORT, SPAN 6

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE (2) BOT. GIR. FLG.	GIRDER SLOPE
GIRDER 1	98.987	96.987	98.49	-0.0039
GIRDER 2	99.680	97.680	99.18	-0.0037
GIRDER 3	100.374	98.374	99.87	-0.0035
GIRDER 4	101.068	99.068	100.57	-0.0034

GIRDER REPORT, SPAN 7

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE (2) BOT. GIR. FLG.	GIRDER SLOPE
GIRDER 1	97.893	95.893	97.39	-0.0042
GIRDER 2	99.323	97.323	98.82	-0.0042
GIRDER 3	100.752	98.752	100.25	-0.0041
GIRDER 4	102.182	100.182	101.68	-0.0041

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

FRAMING PLAN
(SPANS 5-7)
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	109
CONTROL	SECTION	JOB	
0513	01	017	

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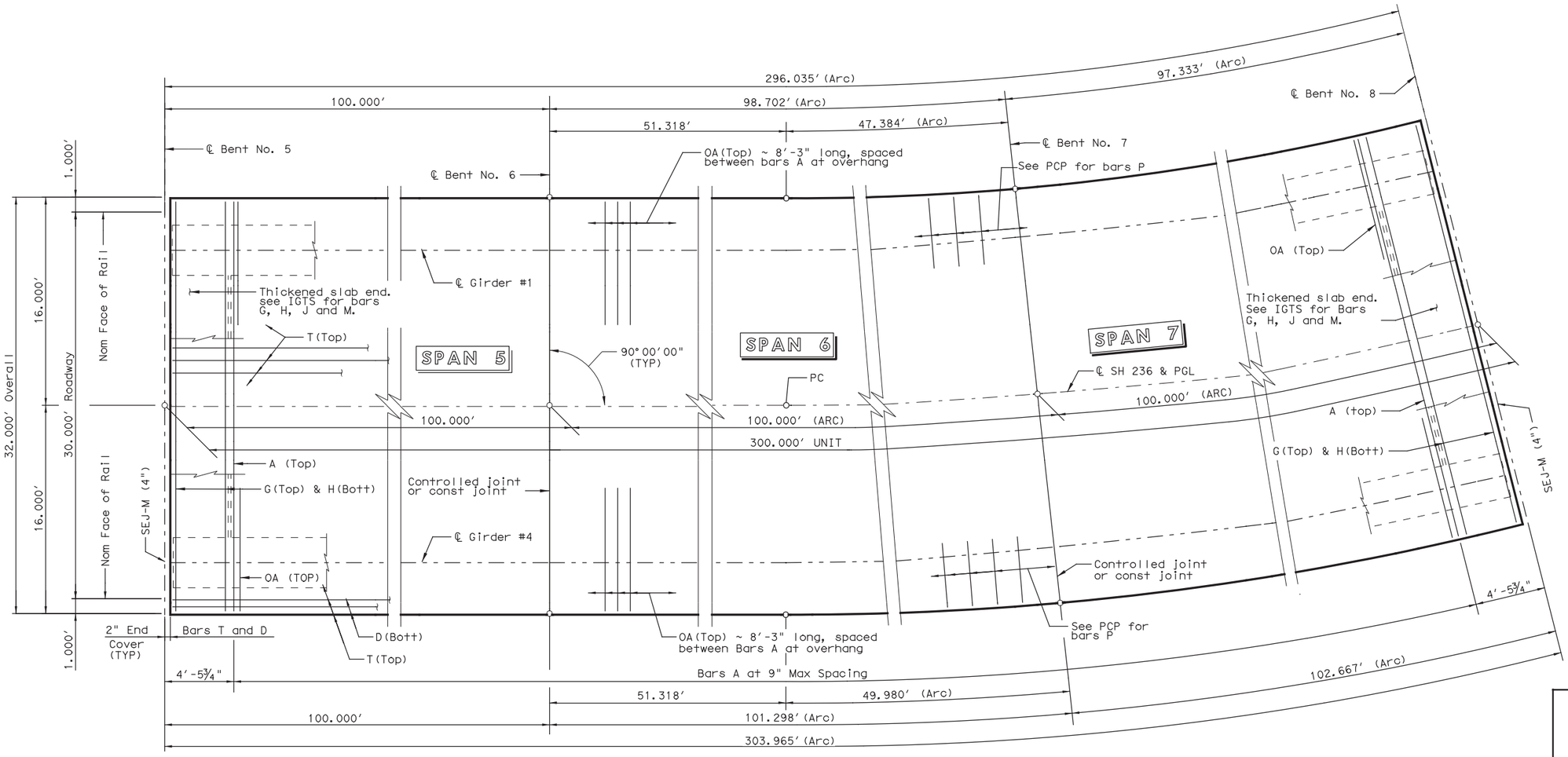

PLAN

TABLE OF ESTIMATED QUANTITIES

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 46) (2)	Reinf Steel (1)
No.	SF	LF	Lb
5	3,200	398.00	7,360
6	3,200	398.11	7,360
7	3,200	398.14	7,360
Total	9,600	1,194.25	22,080

(1) Reinforcing steel weight is calculated using an approximate factor of 2.3 Lbs/SF.

(2) Lengths shown are bottom girder flange lengths with adjustments made for girder slope.

BAR TABLE

BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#6
P	#4
T	#4

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications, 8th Edition (2017).
All concrete shall be Class S, f′c = 4000 psi.
All reinforcing steel shall be Grade 60.
See rail standard for anchorage in slab.
Bar laps, where required shall be as follows:
Uncoated ~ #4 = 1′-7"
See PCP and PCP-FAB standards for panel details not shown.
See IGMS standard for miscellaneous details.
See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

300.00′ PRESTRESSED CONCRETE GIRDER UNIT
(SPANS 5-7)
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	110
CONTROL	SECTION	JOB	
0513	01	017	

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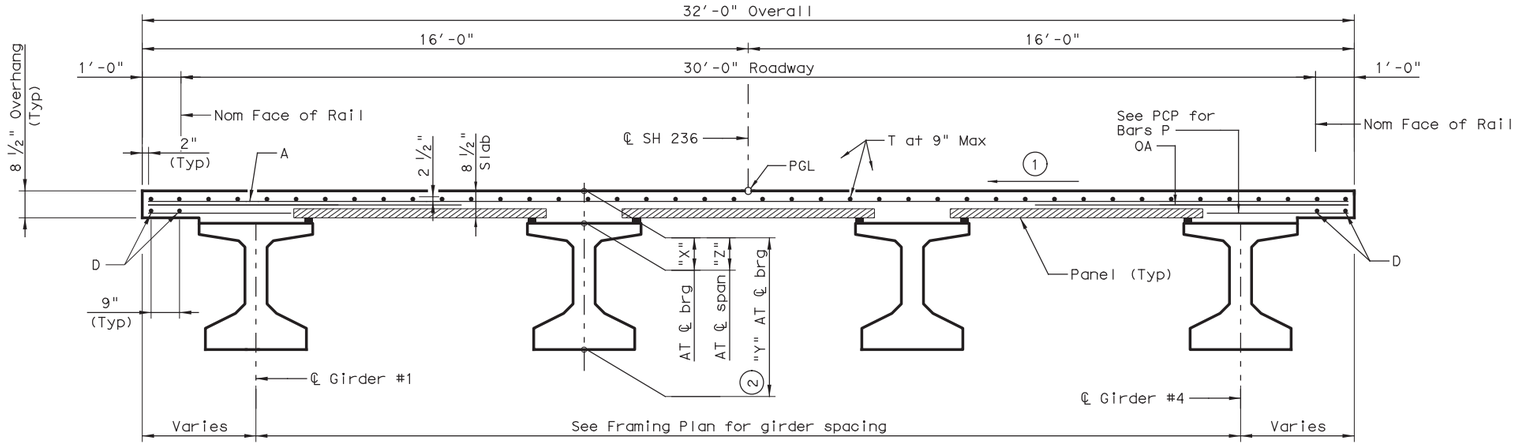
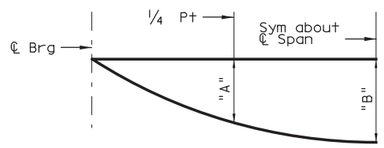


TYPICAL TRANSVERSE SECTION

1. See bridge layout for cross-slope.
2. Theoretical dimension.



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec= 5000 ksi). Calculated deflections shown are theoretical and actual deflection may be less. Deflection shall be adjusted based on field observation.

TABLE OF DEAD LOAD DEFLECTIONS

Span No.	Girder No.	"A" Ft	"B" Ft
5	1, 4	0.1011	0.142
	2-3	0.1104	0.115
6	1	0.0912	0.128
	2	0.1104	0.155
	3	0.1133	0.159
	4	0.109	0.153
7	1	0.0805	0.113
	2	0.1097	0.154
	3	0.1168	0.164
	4	0.1182	0.166

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span (2)
5	1, 4	11 ½"	4′-9 ½"	9 ¾"
	2-3	11 ½"	4′-9 ½"	9 ⅞"
6	1	1′-1 ½"	4′- 11 ½"	10 ⅜"
	2	1′-1 ½"	4′- 11 ½"	10 ⅝"
	3-4	1′-1 ½"	4′- 11 ½"	10 ½"
7	1	1′-2 ¼"	5′- 0 ¼"	10 ¼"
	2	1′-2 ¼"	5′- 0 ¼"	10 ⅝"
	3-4	1′-2 ¼"	5′- 0 ¼"	10 ¾"

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

300.00′ PRESTRESSED CONCRETE GIRDER UNIT
(SPANS 5-7)

SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	111
CONTROL	SECTION	JOB	
0513	01	017	

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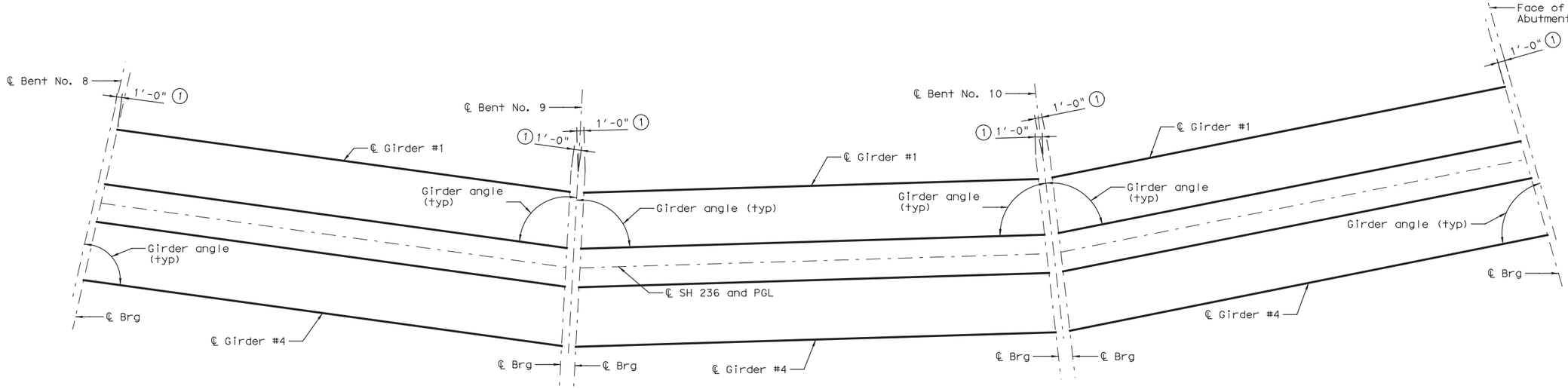

SPAN 8
(TYPE Tx46 GIRDERS)

SPAN 9
(TYPE Tx46 GIRDERS)

SPAN 10
(TYPE Tx46 GIRDERS)

(1) See IGEB standard for orientation of dimension.

(2) Girder lengths shown are bottom girder flange lengths with adjustments for girder slope.

BENT REPORT

BENT NO. 8 (S 38 22 33.24 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 8	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			

BENT NO. 9 (S 47 55 30.71 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 8	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			
SPAN 9	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			

BENT NO. 10 (S 57 28 28.18 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 9	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	13	31
	GIRDER 3	8.587	85	13	31
	GIRDER 4	8.587	85	13	31
	TOTAL	25.760			
SPAN 10	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.587	85	07	11
	GIRDER 3	8.587	85	01	02
	GIRDER 4	8.587	85	55	04
	TOTAL	25.760			

ABUT NO. 11 (S 67 01 25.65 E)
DISTANCE BETWEEN STATION LINE AND GIRDER 1, 11.960 L

		GIRDER SPAC (C.L. BENT)	GIRDER ANGLE D	M	S
SPAN 10	GIRDER 1	0.000	85	13	31
	GIRDER 2	8.403	85	19	50
	GIRDER 3	8.403	85	35	00
	GIRDER 4	8.403	85	31	58
	TOTAL	25.210			

GIRDER REPORT

GIRDER REPORT, SPAN 8

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GIR. FLG.		GIRDER SLOPE
GIRDER 1	97.893	95.893	97.39	(2)	-0.0042
GIRDER 2	99.323	97.323	98.82		-0.0042
GIRDER 3	100.752	98.752	100.25		-0.0041
GIRDER 4	102.182	100.182	101.68		-0.0041

GIRDER REPORT, SPAN 9

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GIR. FLG.		GIRDER SLOPE
GIRDER 1	97.893	95.893	97.39	(2)	-0.0042
GIRDER 2	99.323	97.323	98.82		-0.0042
GIRDER 3	100.752	98.752	100.25		-0.0041
GIRDER 4	102.182	100.182	101.68		-0.0041

GIRDER REPORT, SPAN 10

	HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. GIR. FLG.		GIRDER SLOPE
GIRDER 1	97.893	95.890	97.39	(2)	-0.0042
GIRDER 2	99.308	97.304	98.81		-0.0043
GIRDER 3	100.722	98.719	100.22		-0.0043
GIRDER 4	102.137	100.134	101.64		-0.0044

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

FRAMING PLAN
(SPANS 8-10)
SH 236 AT LEON RIVER

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	112
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 100401f4.tbl
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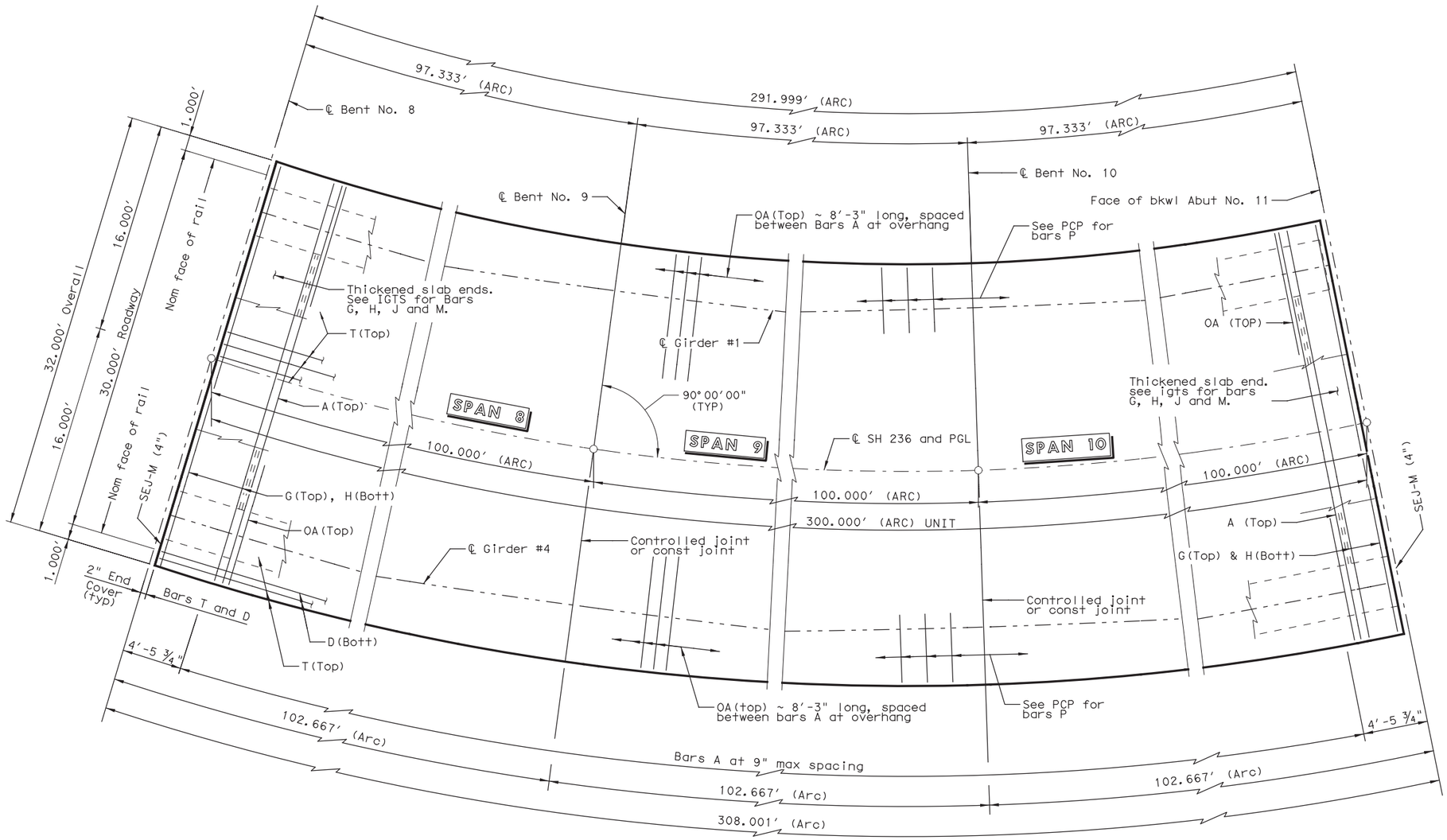

PLAN

TABLE OF ESTIMATED QUANTITIES

Span	Reinf Concrete Slab	Prestr Concrete Girder (Tx 46) (2)	Reinf Steel (1)
No.	SF	LF	Lb
8	3,200	398.14	7,360
9	3,200	398.14	7,360
10	3,200	398.06	7,360
Total	9,600	1,194.34	22,080

(1) Reinforcing steel weight is calculated using an approximate factor of 2.3 Lbs/SF.

(2) Lengths shown are bottom girder flange lengths with adjustments made for girder slope.

BAR TABLE

BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#6
P	#4
T	#4

HL93 LOADING

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications, 8th Edition (2017).
All concrete shall be Class S, f′c = 4000 psi.
All reinforcing steel shall be Grade 60.
See rail standard for anchorage in slab.
Bar laps, where required shall be as follows:
Uncoated ~ #4 = 1′-7"
See PCP and PCP-FAB standards for panel details not shown.
See IGMS standard for miscellaneous details.
See PMDF standard for details and quantity adjustments if this option is used.

Cover dimensions are clear dimensions, unless noted otherwise.

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED
PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

300.00′ PRESTRESSED CONCRETE GIRDER UNIT
(SPANS 8-10)
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	113
CONTROL	SECTION	JOB	
0513	01	017	

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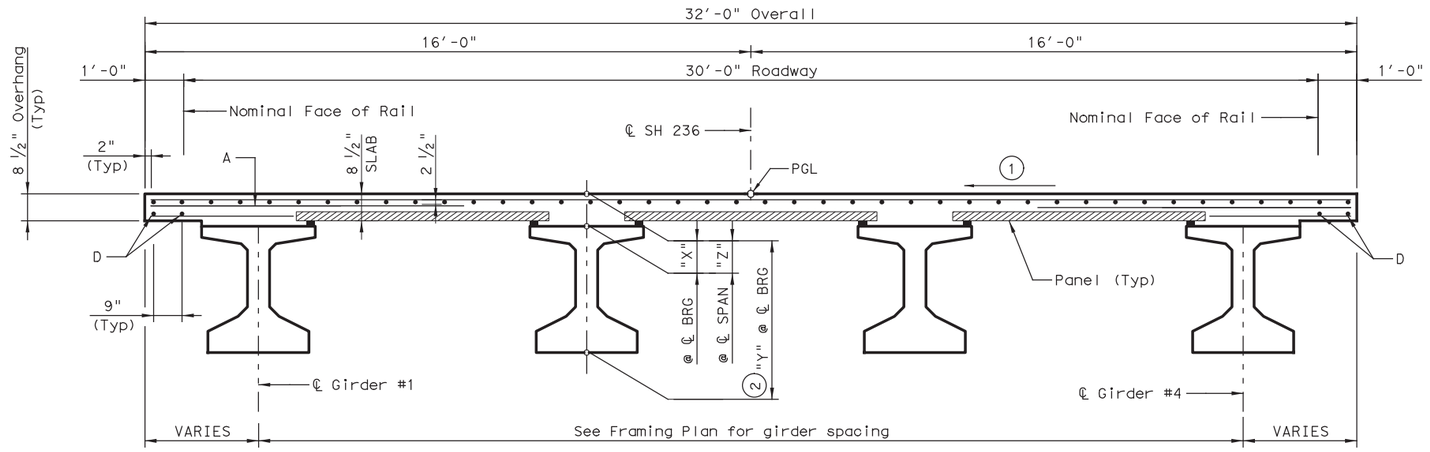
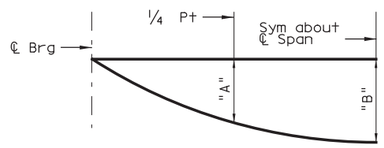


TYPICAL TRANSVERSE SECTION

(1) See bridge layout for cross-slope.
(2) Theoretical dimension.



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only. (Ec= 5000 ksi). Calculated deflections shown are theoretical and actual deflection may be less. Deflection shall be adjusted based on field observation.

TABLE OF DEAD LOAD DEFLECTIONS

Span No.	Girder No.	"A" F†	"B" F†
8-9	1	0.0805	0.1130
	2	0.1097	0.1540
	3	0.1168	0.1640
	4	0.1182	0.1660
10	1	0.0805	0.1130
	2	0.1090	0.1530
	3	0.1161	0.1630
	4	0.1204	0.1690

TABLE OF SECTION DEPTHS

Span No.	Girder No.	"X" at ℄ Brg	"Y" at ℄ Brg	"Z" at ℄ Span (2)
8-10	1	1′-2 ¼"	5′-0 ¼"	10 ¼"
	2	1′-2 ¼"	5′-0 ¼"	10 ⅝"
	3-4	1′-2 ¼"	5′-0 ¼"	10 ¾"

HL93 LOADING

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER
7/30/2020

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

300.00′ PRESTRESSED CONCRETE GIRDER UNIT
(SPANS 8-10)
SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	114
CONTROL	SECTION	JOB	
0513	01	017	

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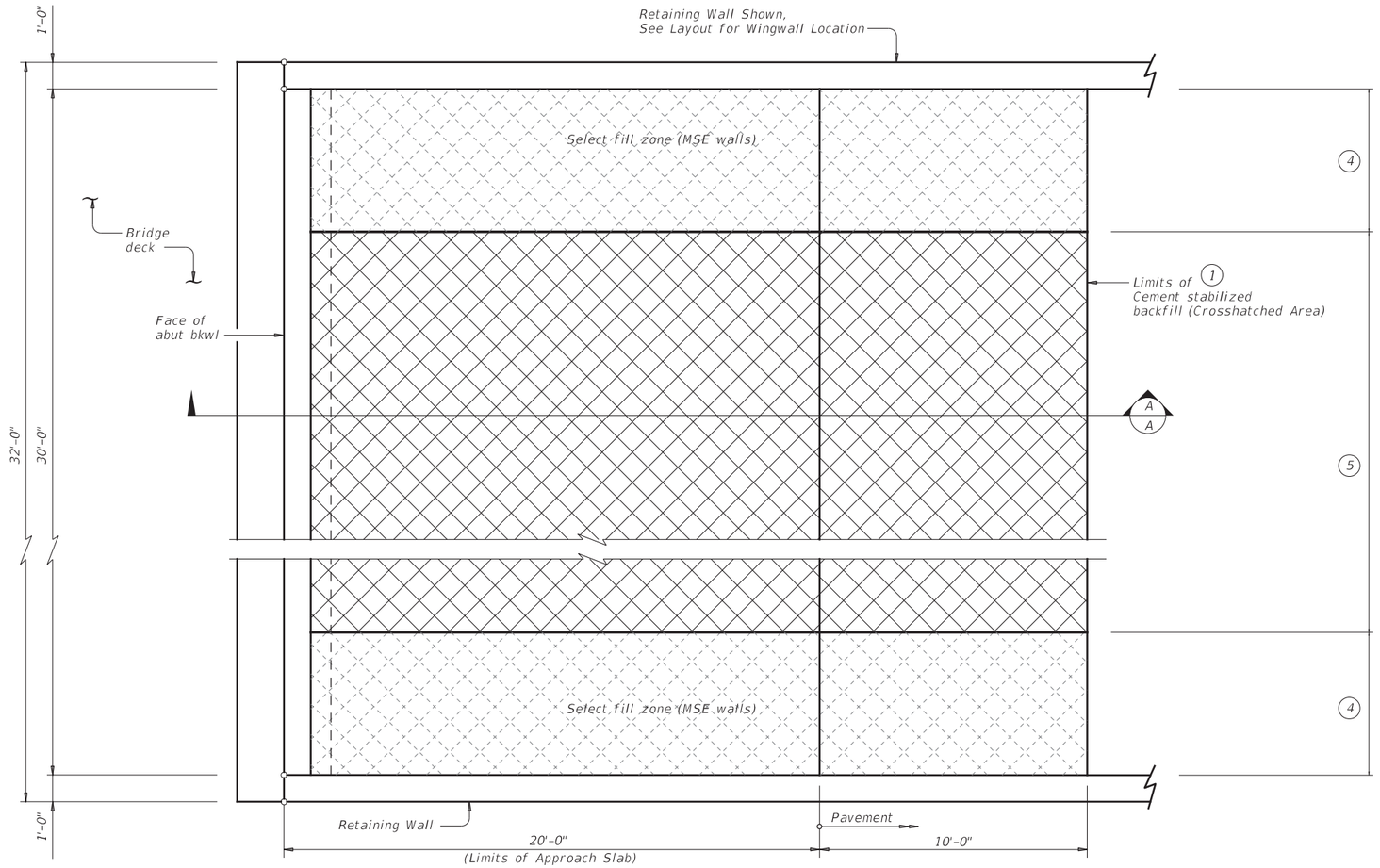
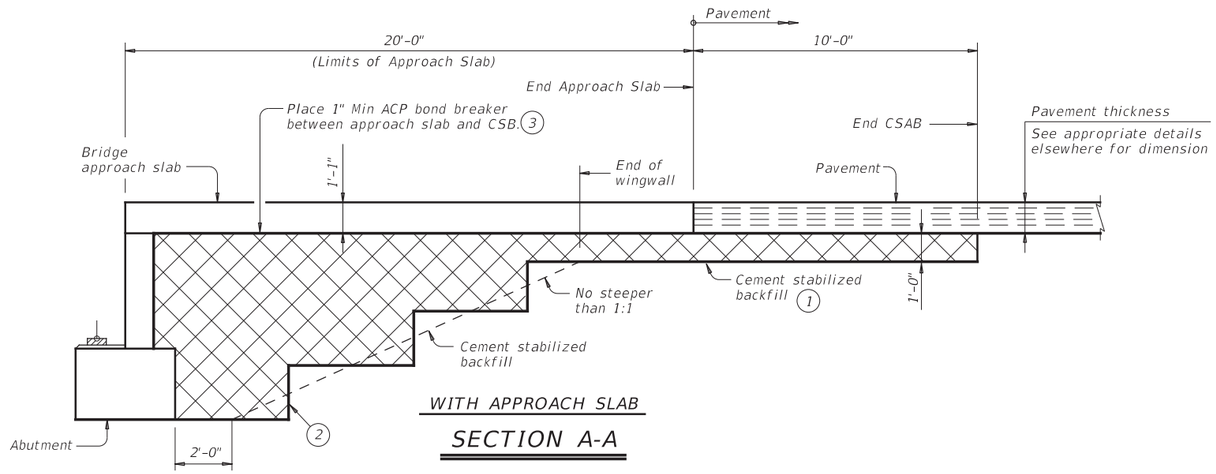


PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



WITH APPROACH SLAB

SECTION A-A

(1) Extend CSB limits as shown.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Other materials can be used as a bond breaker if permitted by the Engineer. 2 layers of 30 Lb roofing felt or 2 layers of heavy mil polyethylene sheeting are examples.

(4) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(5) 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.

GENERAL NOTES:

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED
PROFESSIONAL ENGINEER

08/03/2020

Erin E O'Malley Digitally signed by Erin E O'Malley Date: 2020.08.03 15:21:56-05'00'

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

CEMENT STABILIZED ABUTMENT BACKFILL DETAILS

BRIDGE ABUTMENT

FILE: csabdet.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		115

DATE:
FILE:

DATE: 8/3/2020 10:11:59 AM
FILE: c:\pwworking\central01\d0974302\ignds1s1-19.dgn

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	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)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
SH 236 AT LEON RIVER	1-3	1,4	Tx46		34	0.6	270	13.96	13.96	2	42.5	5.800	7.100	3.630	-3.709	6000	0.700	0.838
	1-3	2,3	Tx46		34	0.6	270	13.96	13.96	2	42.5	5.800	7.100	3.697	-3.720	5874	0.652	0.838
	4	1,4	Tx70		52	0.6	270	26.65	17.72	8	66.5	6.000	7.100	4.432	-4.501	12901	0.700	0.838
	4	2,3	Tx70		52	0.6	270	26.65	17.72	8	66.5	6.000	7.100	4.475	-4.501	12597	0.637	0.838
	5-10	ALL	Tx46		38	0.6	270	15.81	11.39	6	34.5	5.600	7.100	3.946	-4.160	6934	0.821	0.853

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.

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.

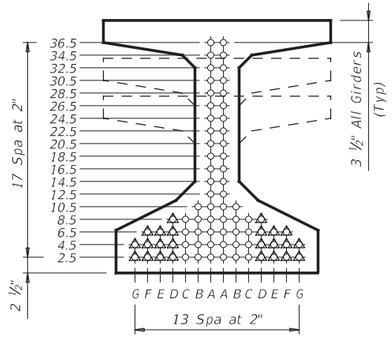
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands in outer most position of each row.

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.

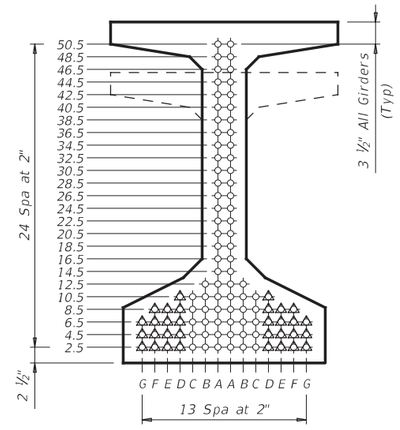
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

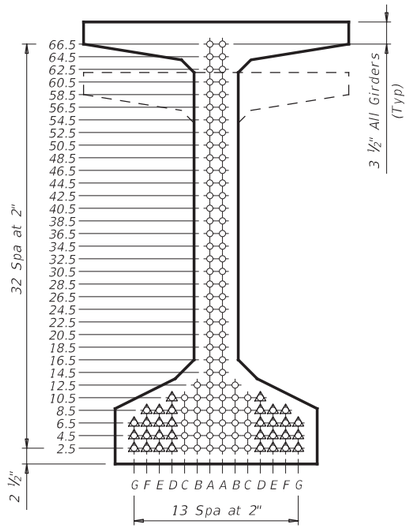
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands 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, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

HL93 LOADING

STATE OF TEXAS
ERIN E. O'MALLEY
117101
LICENSED
PROFESSIONAL ENGINEER

Erin E O'Malley Digitally signed by Erin E O'Malley Date: 2020.08.03 15:21:44-05'00'

08/03/2020

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: ignds1s1-19.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only.	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		116

DATE: 8/3/2020 10:12:03 AM
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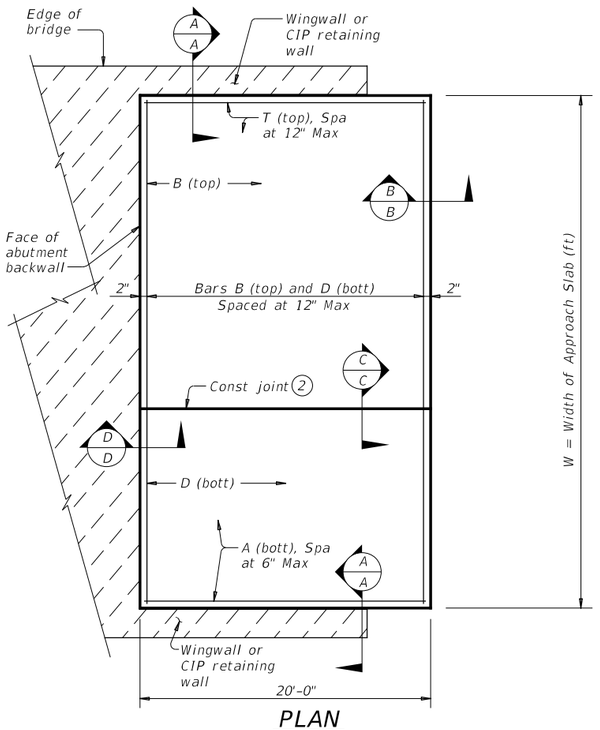
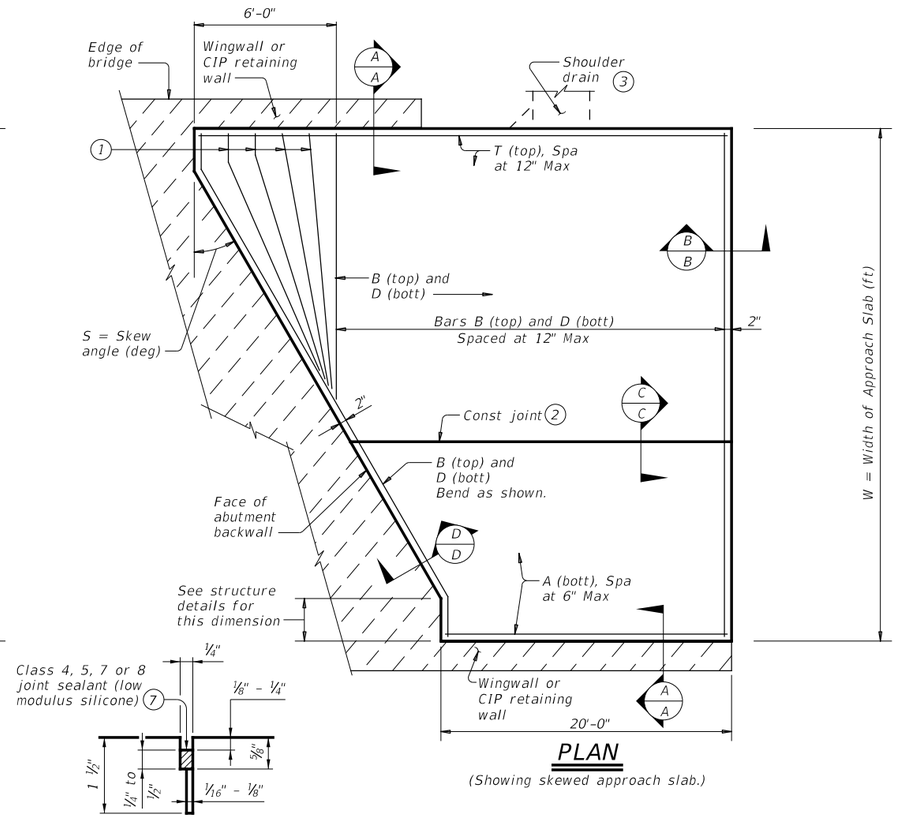


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

BAR TABLE

BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

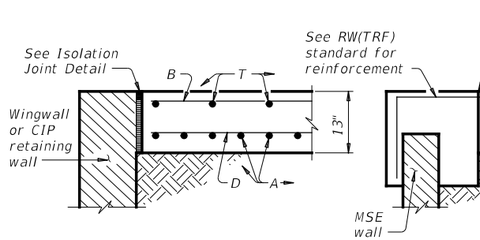
(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

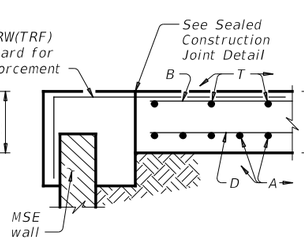
(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

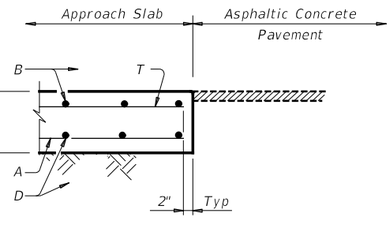
LONGITUDINAL SAW CUT JOINT DETAIL

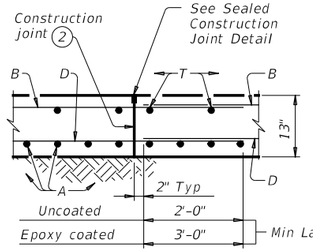


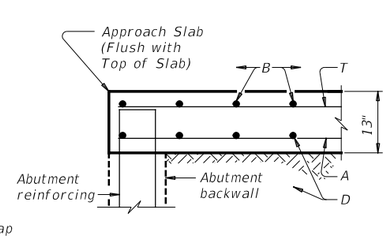
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





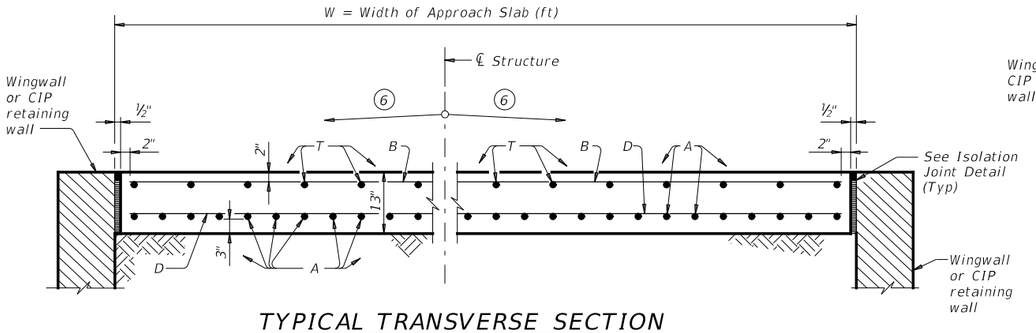


SECTION A-A

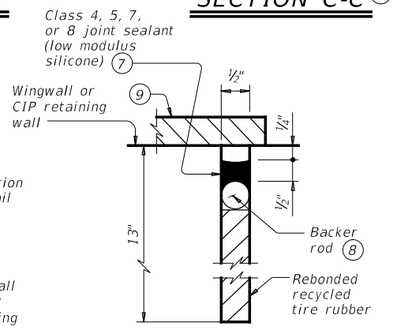
SECTION B-B

SECTION C-C (5)

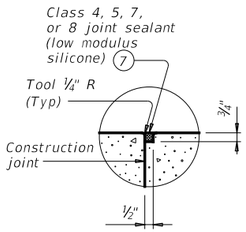
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

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.

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	0513	01	017	SH236
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		117

DATE: 8/3/2020 10:12:06 AM
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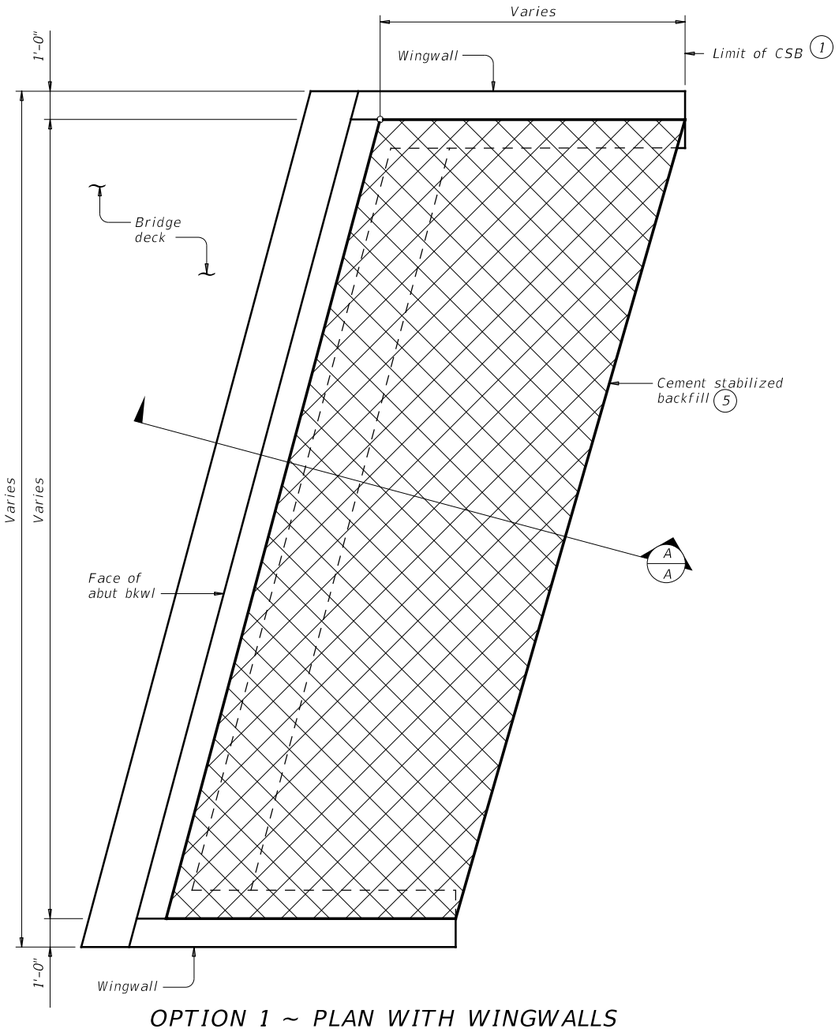
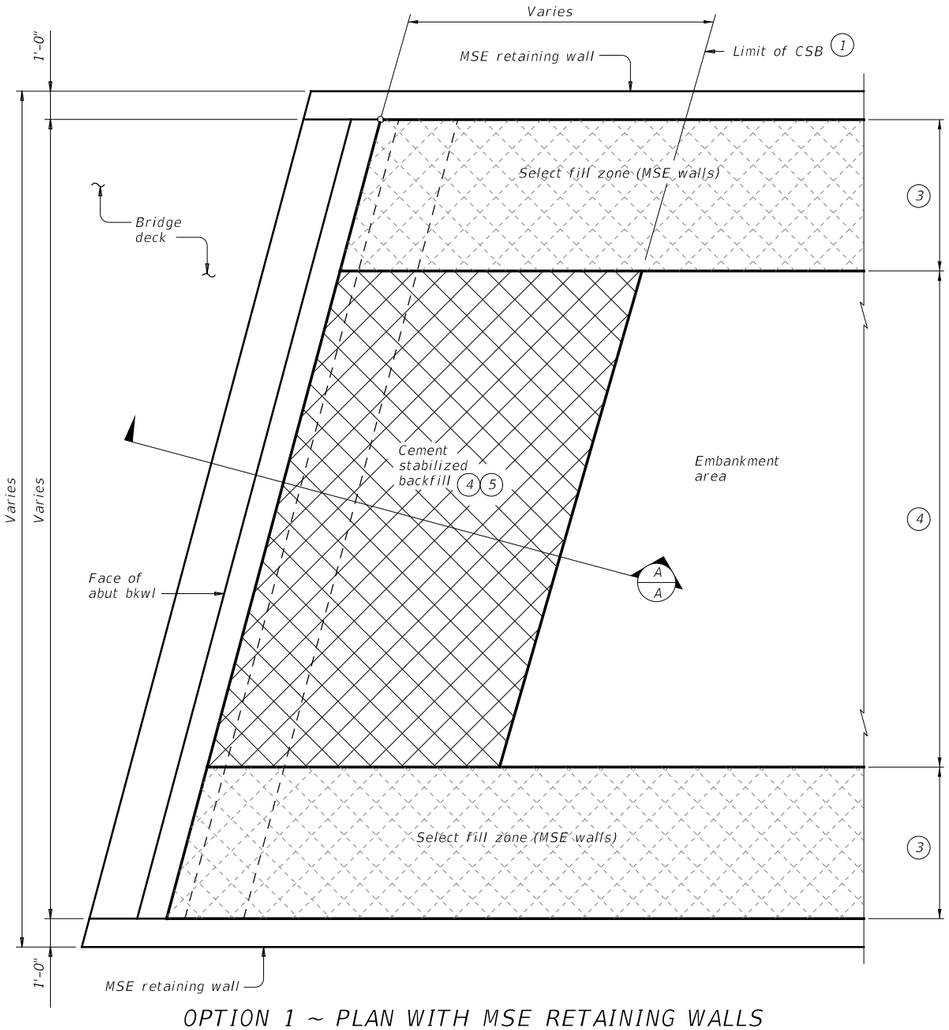
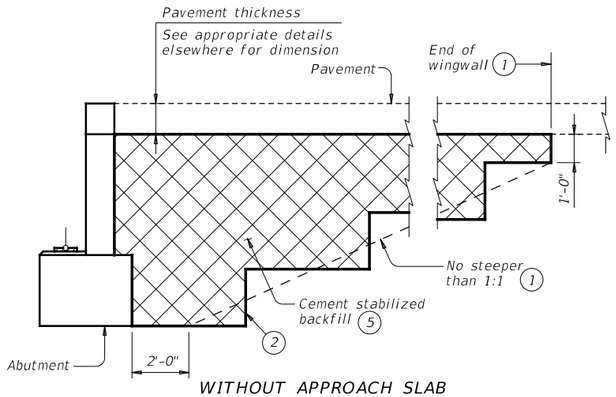


OPTION 1 ~ PLAN WITH WINGWALLS

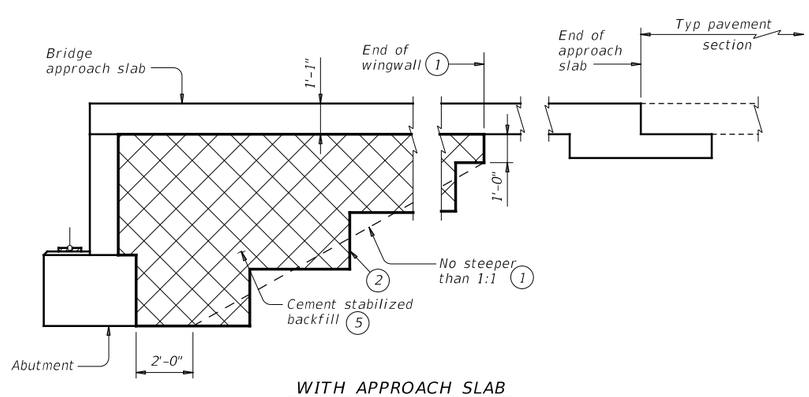
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		118

DATE: 8/3/2020 10:12:08 AM
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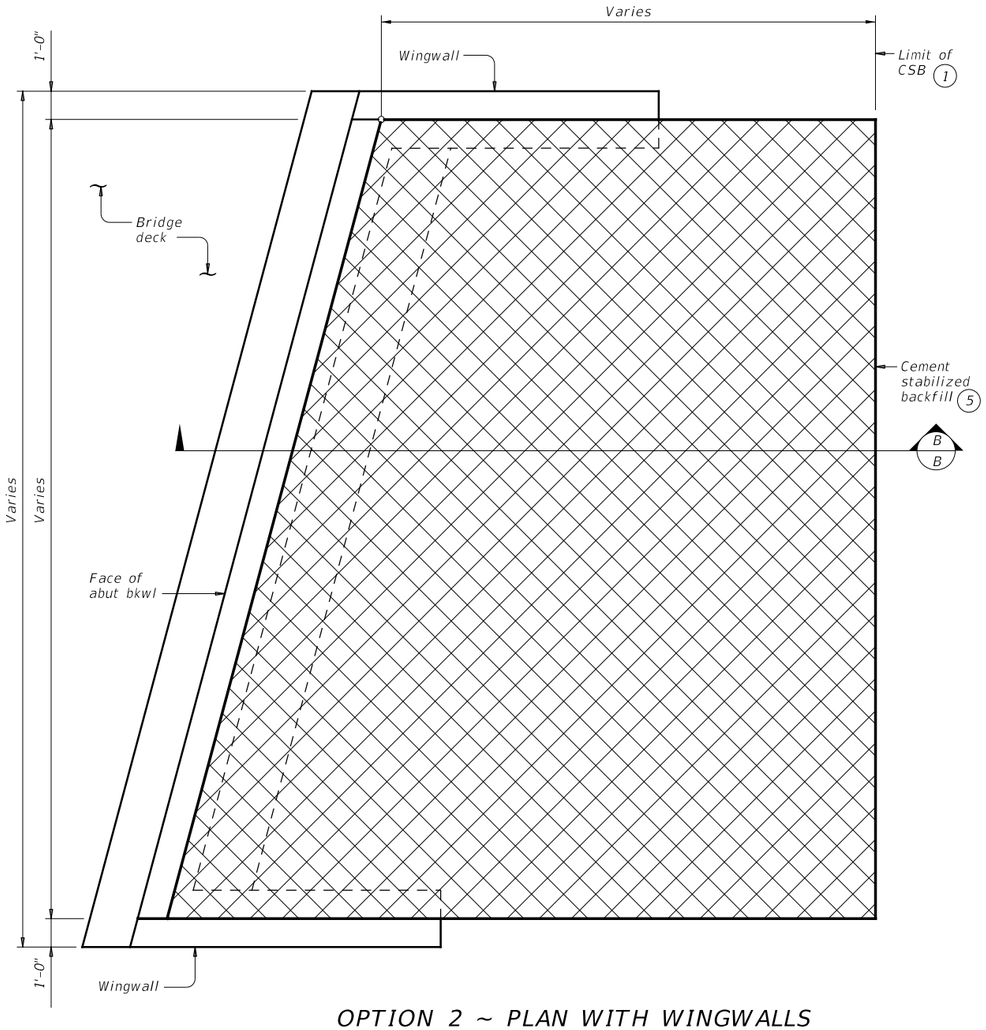
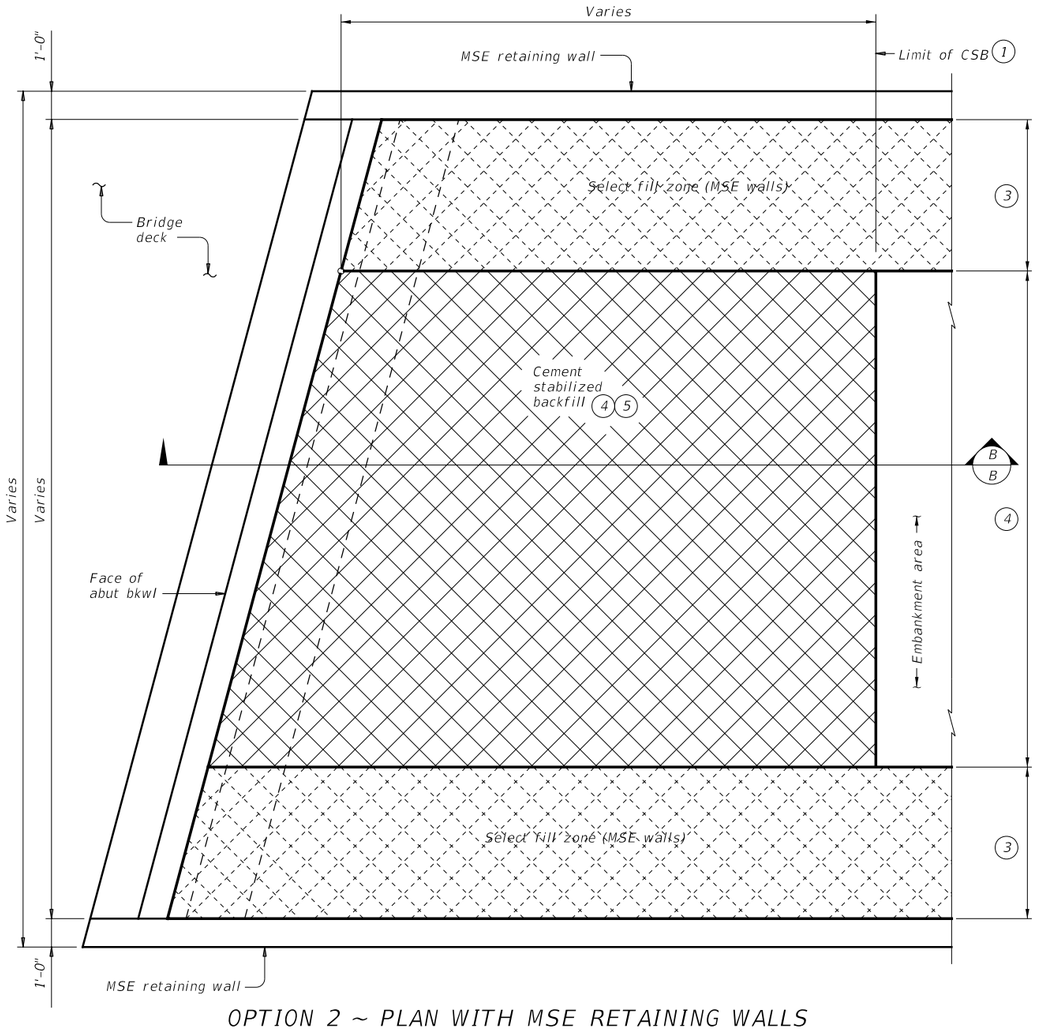


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

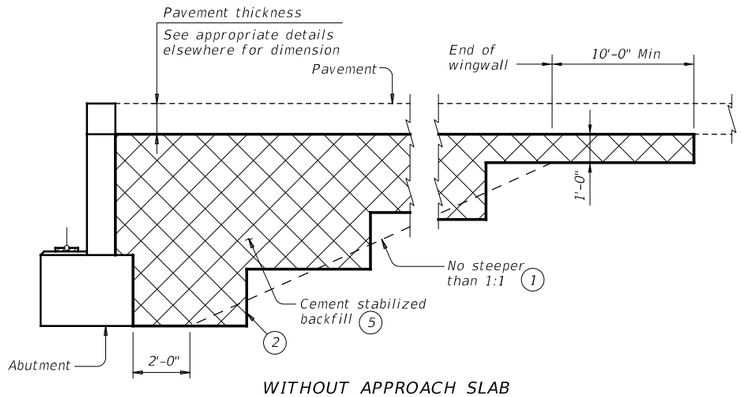
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

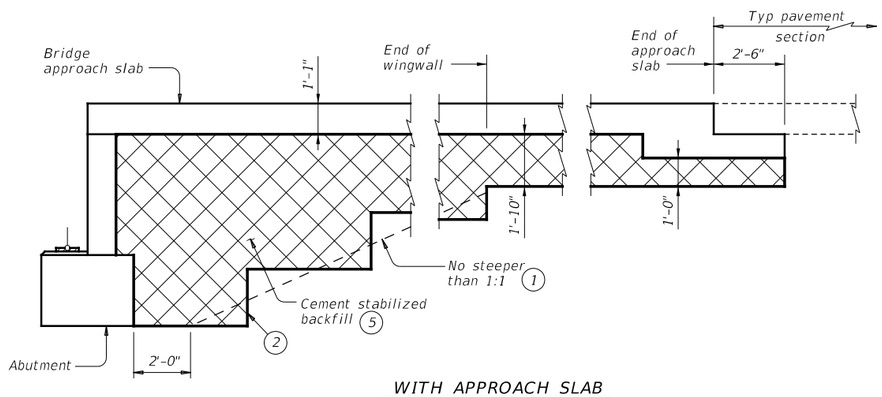
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		119

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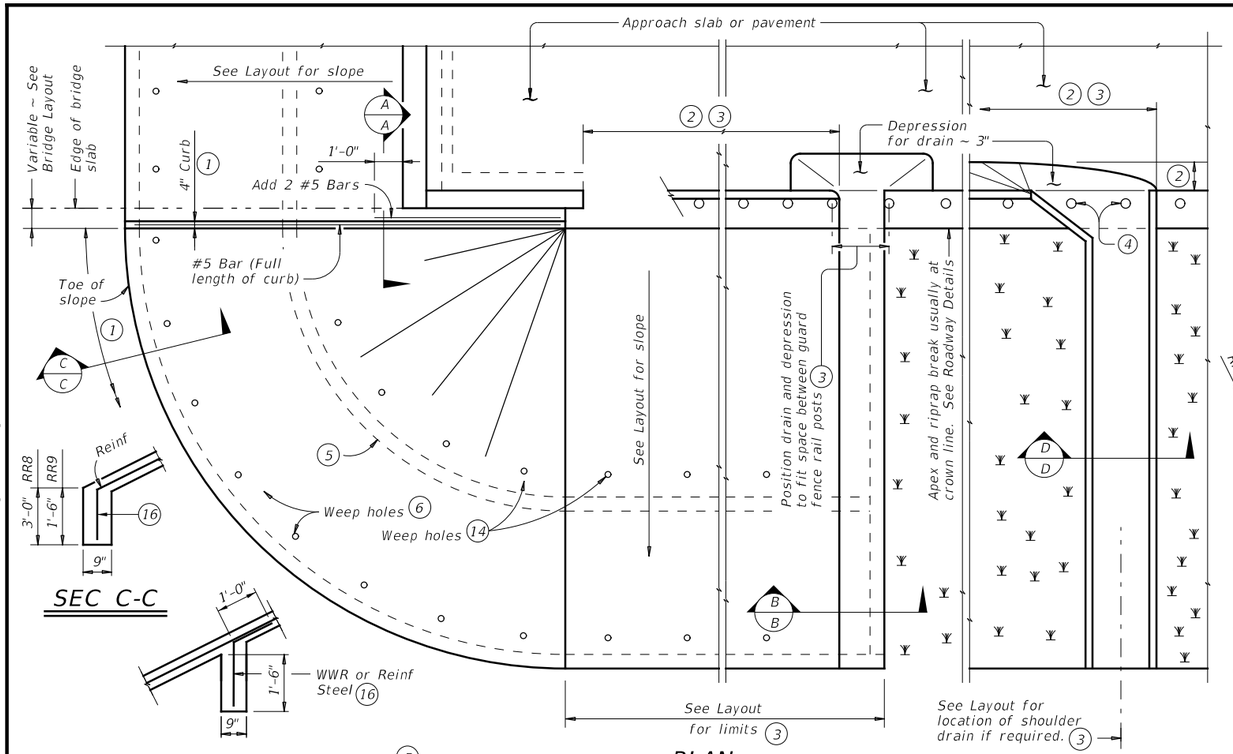
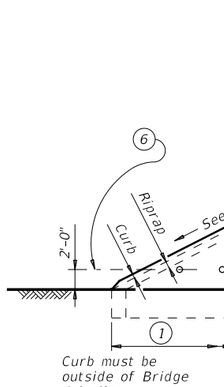
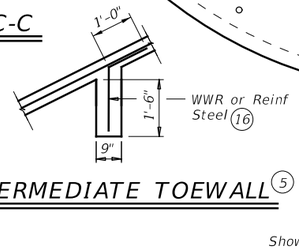


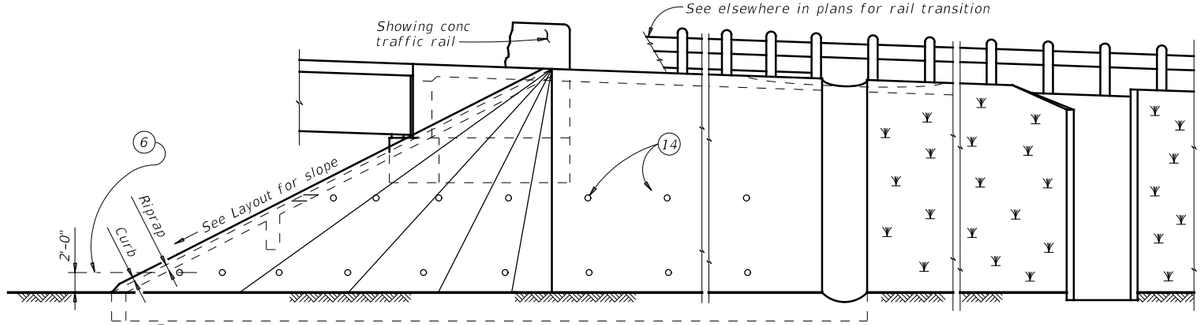
PLAN



SEC C-C



INTERMEDIATE TOEWALL



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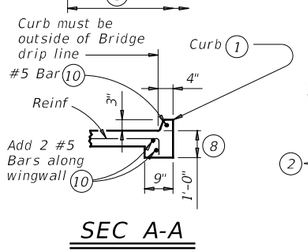
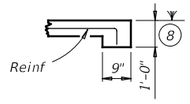
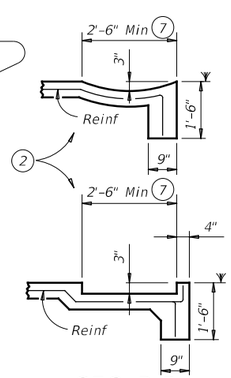


SEC A-A



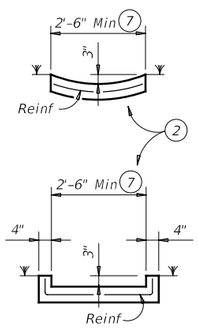
SEC B-B

(No drain)



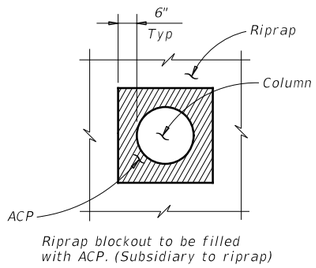
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

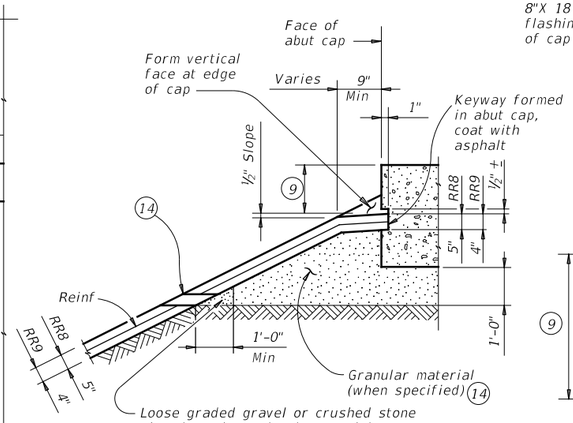
(Shoulder drain)



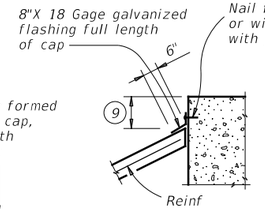
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

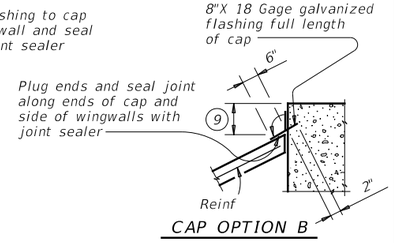
(As directed by the Engineer)



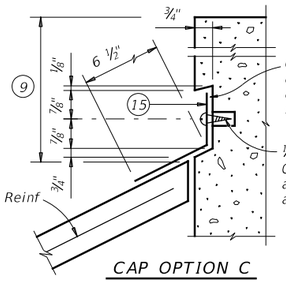
SHOWING KEYWAY OPTION



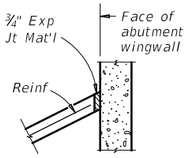
CAP OPTION A



CAP OPTION B

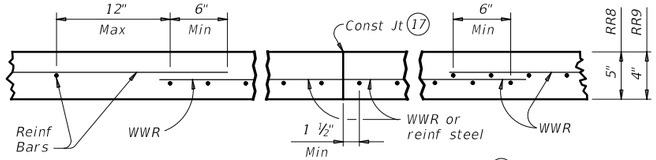


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		120

DATE: 8/3/2020 10:12:14 AM
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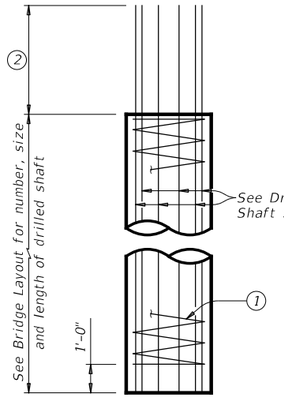
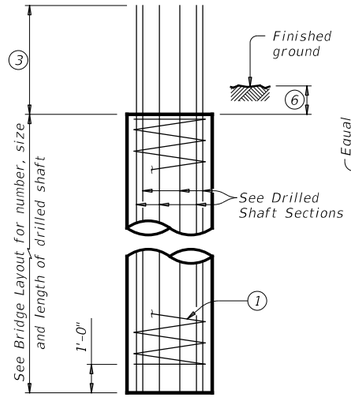
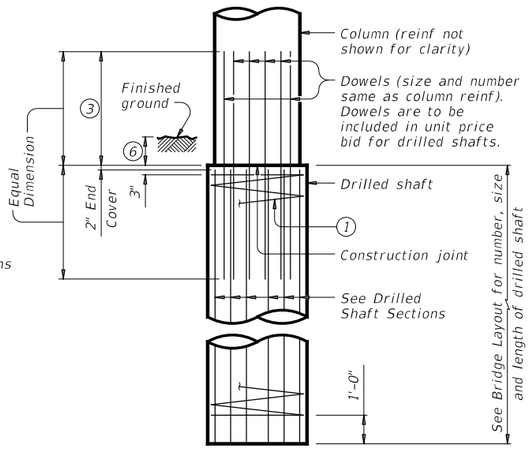


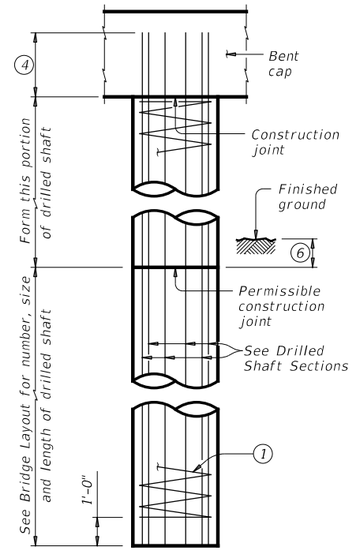
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



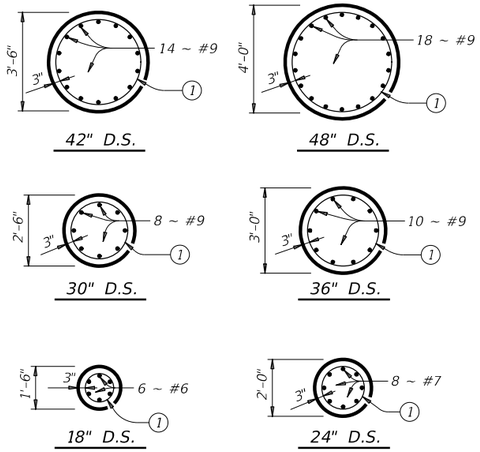
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

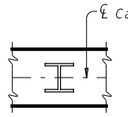


DRILLED SHAFT SECTIONS

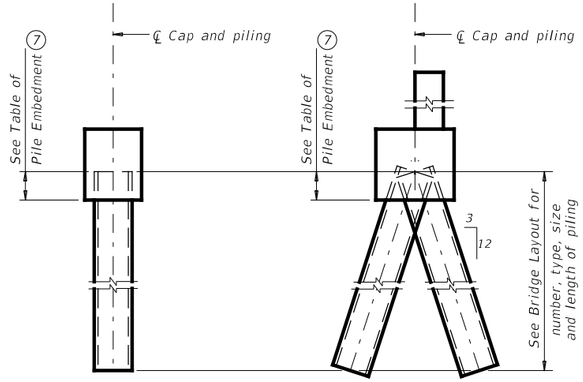
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

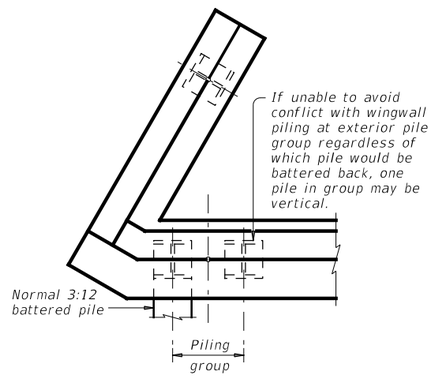


ORIENTATION OF STEEL H-PILING

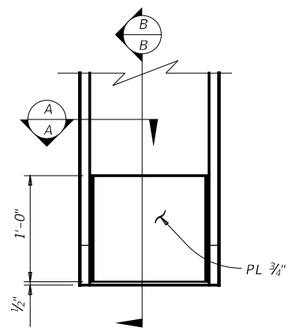


VERTICAL PILE BATTERED PILE

PILING DETAILS
(Concrete or steel H)



DETAIL "A"
(Showing plan view of a 30° skewed abutment)



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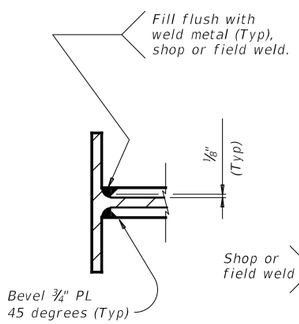
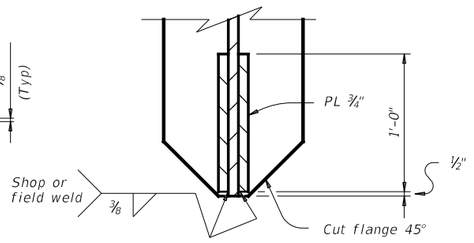


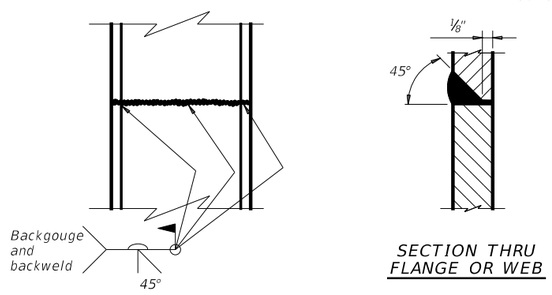
SECTION A-A



SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		121

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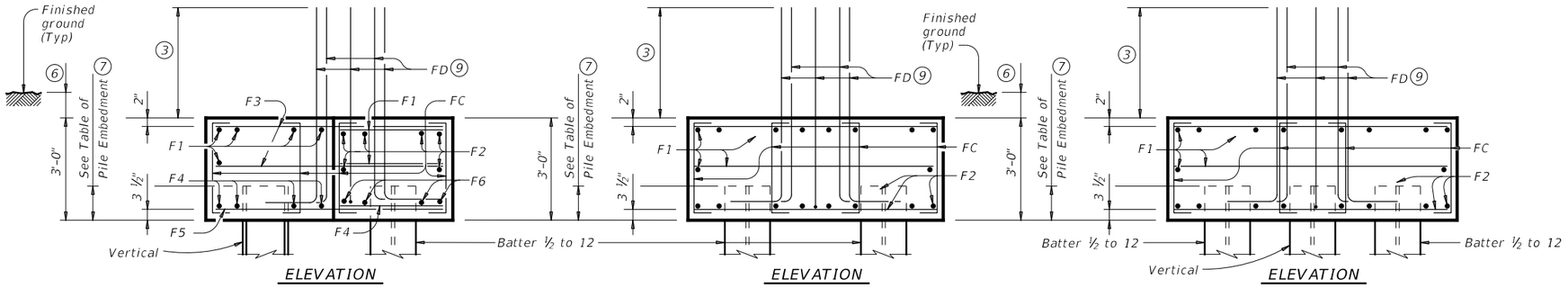
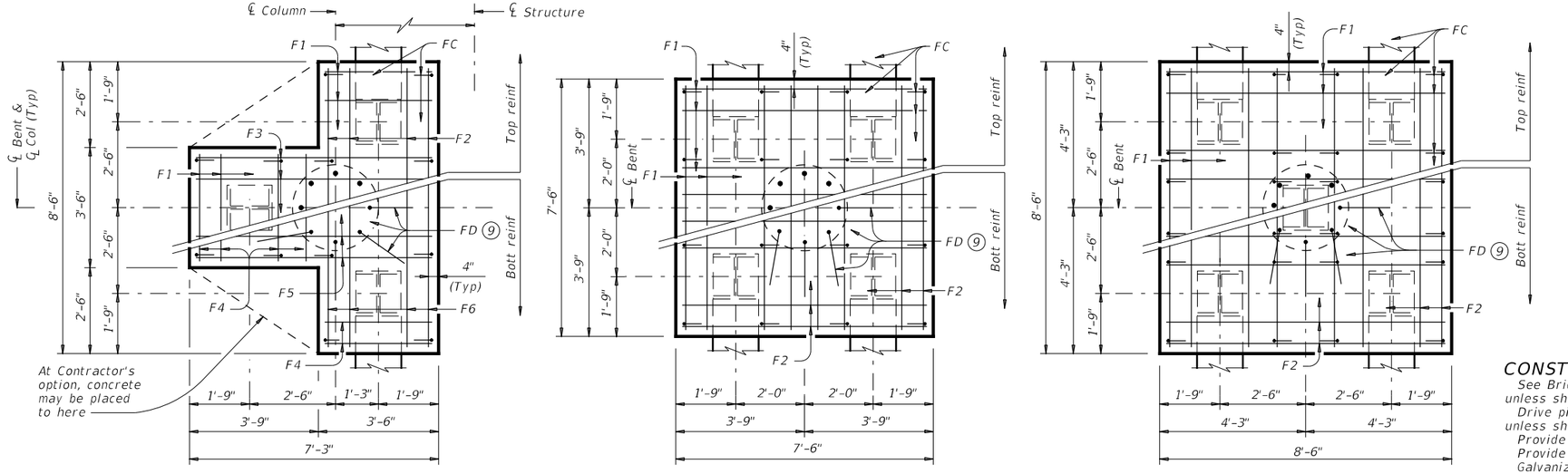




THREE PILE FOOTING (8)

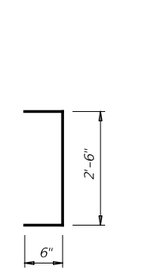
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

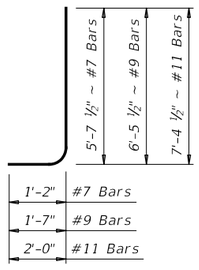
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		122

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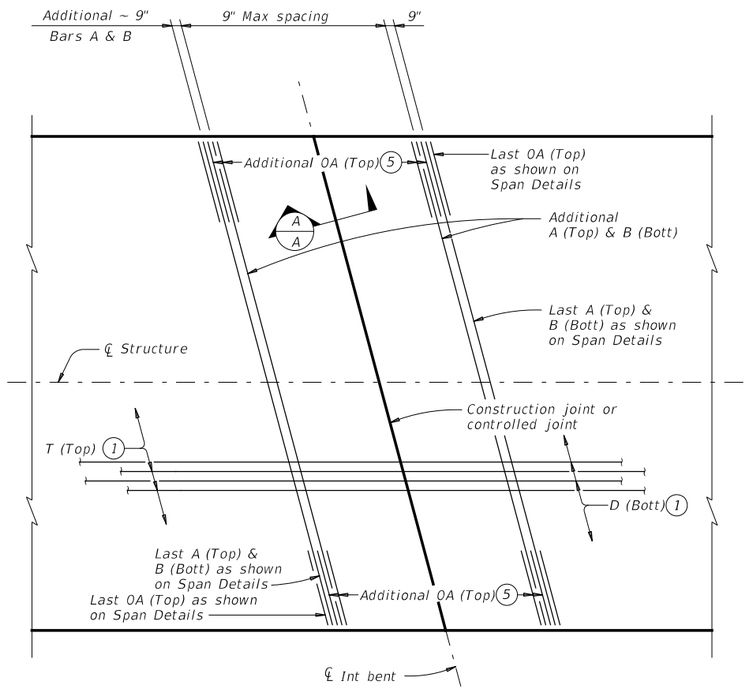
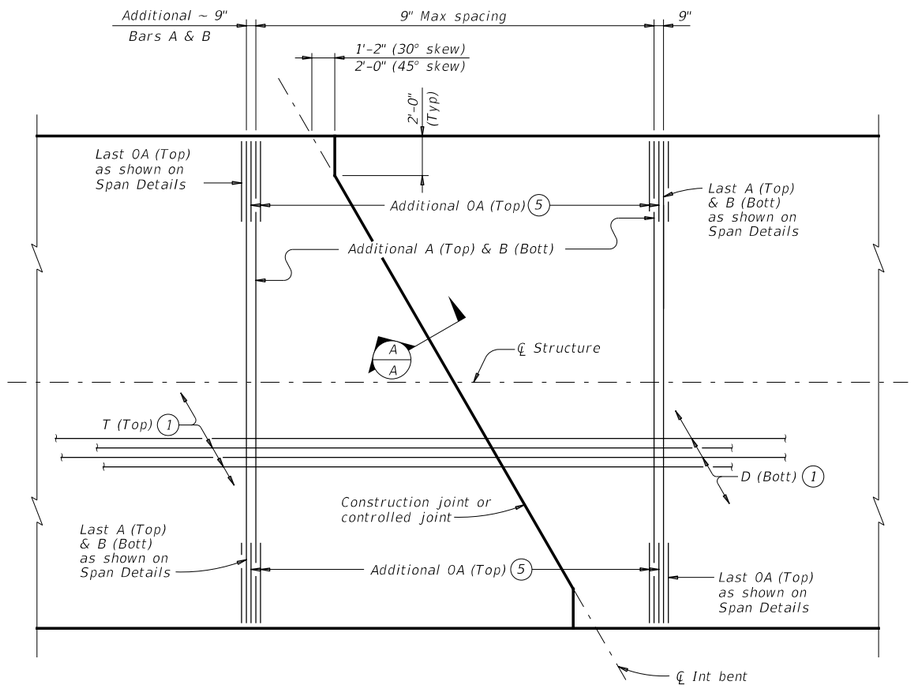


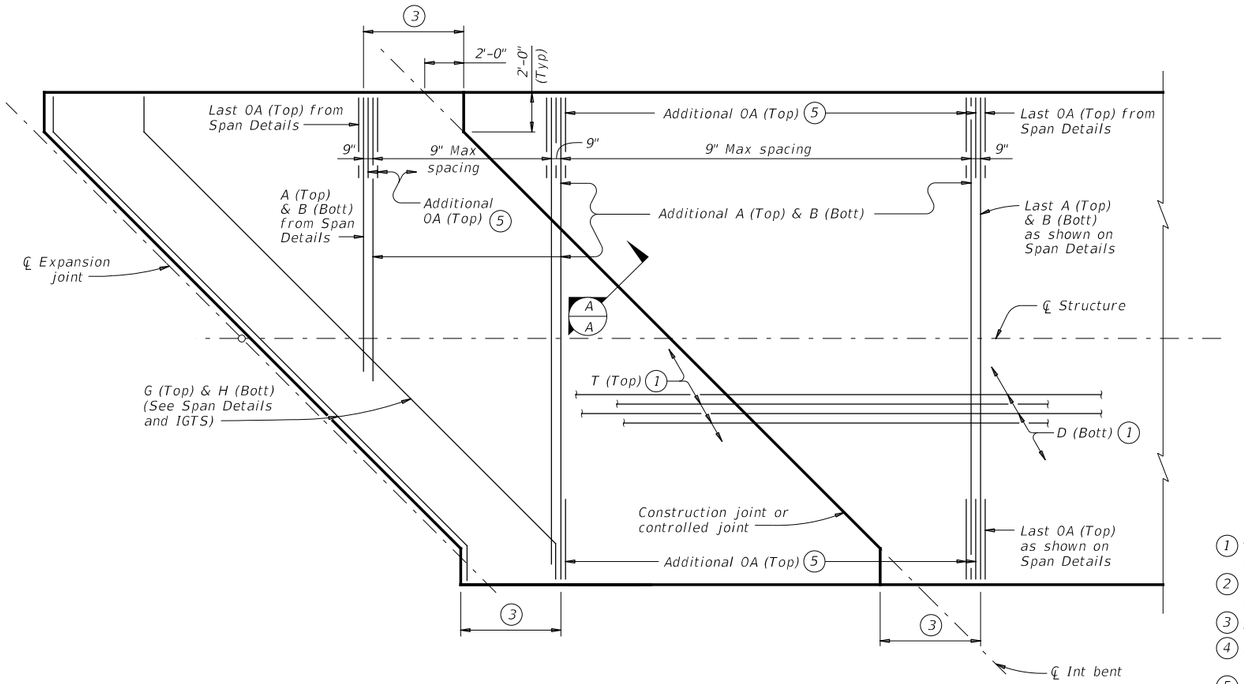
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



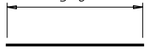
PLAN FOR 30° OR 45° SKEW

(Showing 30° skew)

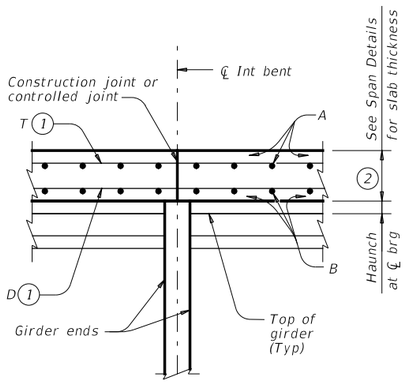


PLAN FOR 45° SKEW 4

(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-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: igcs1sts-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
10-19: Added bubble note 6.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		123

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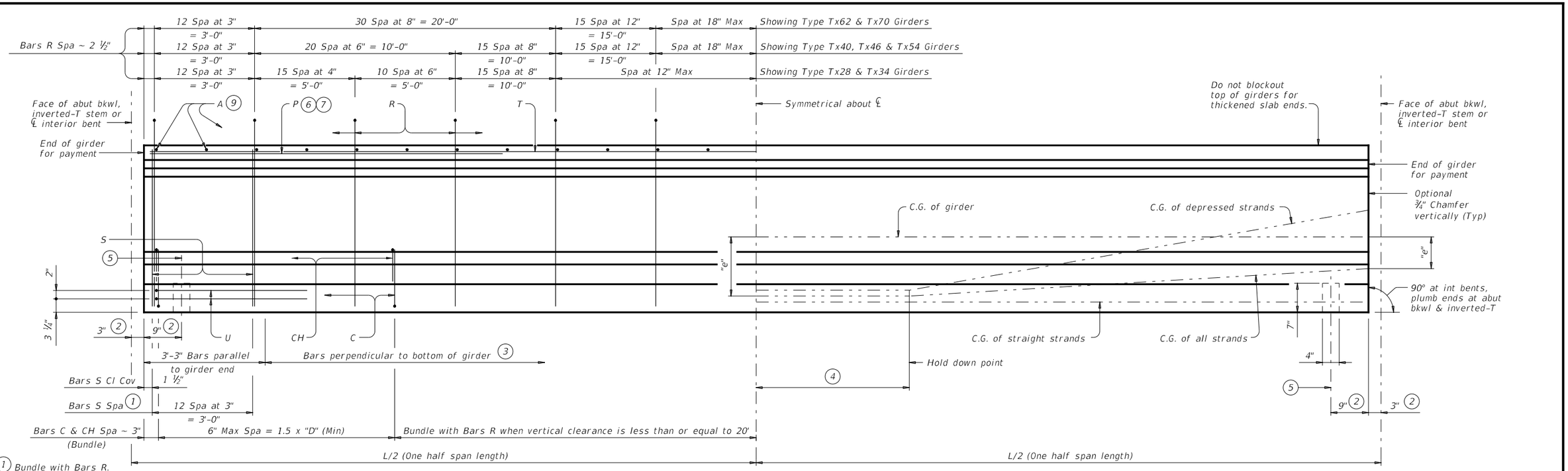


(1) Bundle with Bars R.

(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.

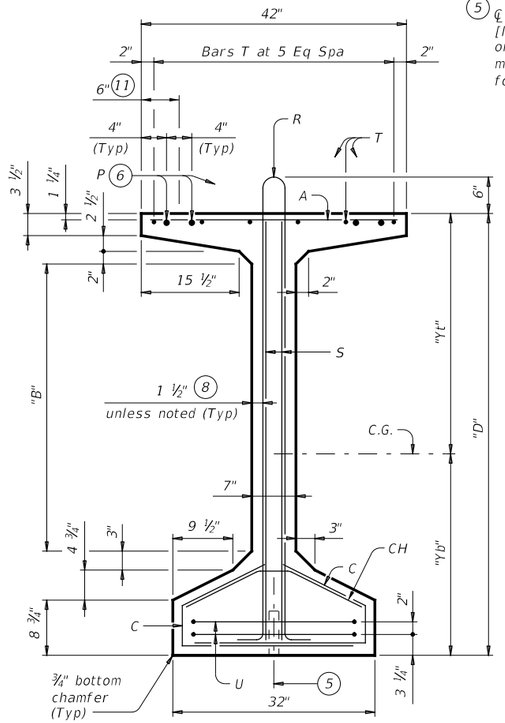
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

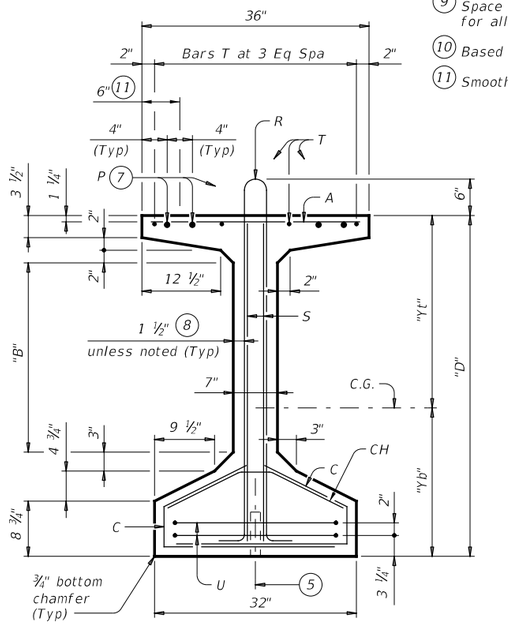
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

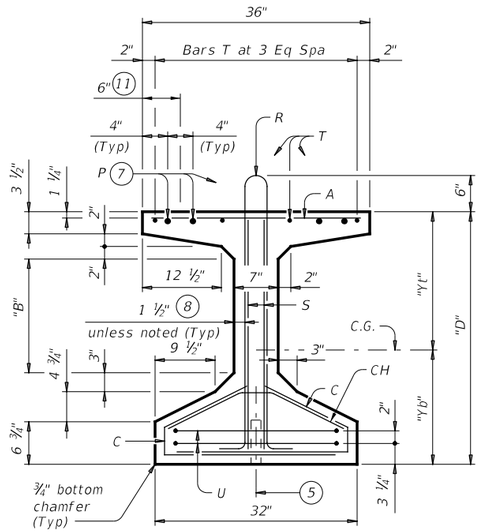
(11) Smooth trowel finish on the slab overhang side of exterior girder.



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.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		124

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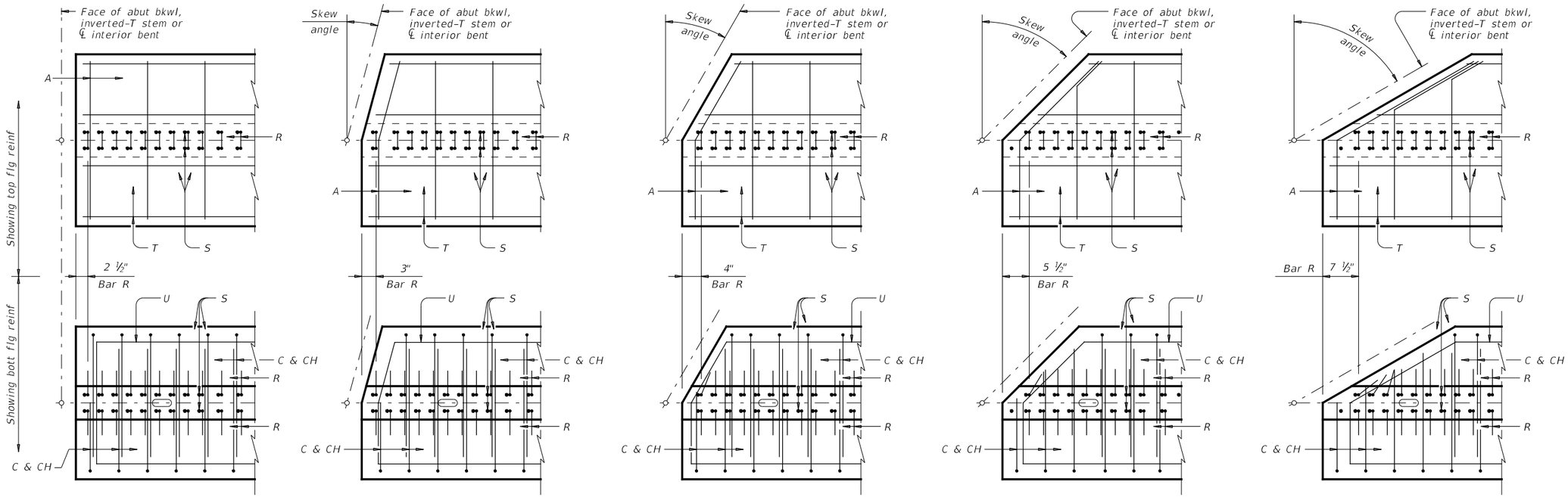
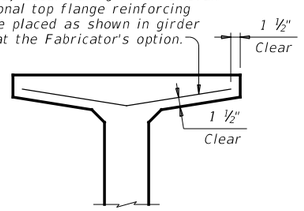
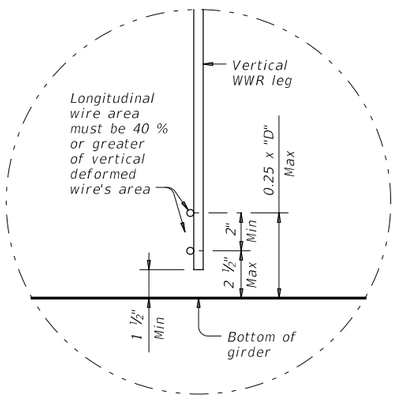


PLAN OF GIRDER ENDS (12)

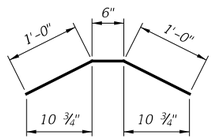
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



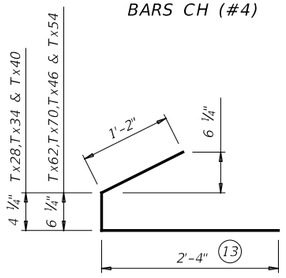
OPTIONAL TOP FLANGE REINFORCING DETAIL



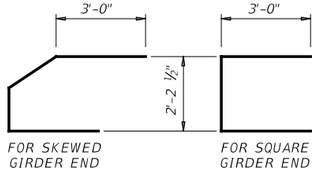
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



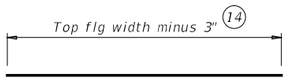
BARS CH (#4)



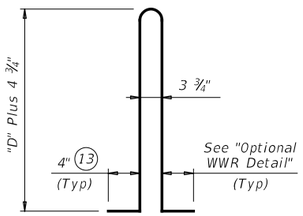
BARS C (#4)



BARS U (#5)

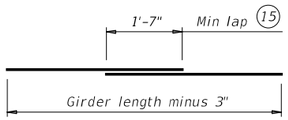


BARS A (#3)



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

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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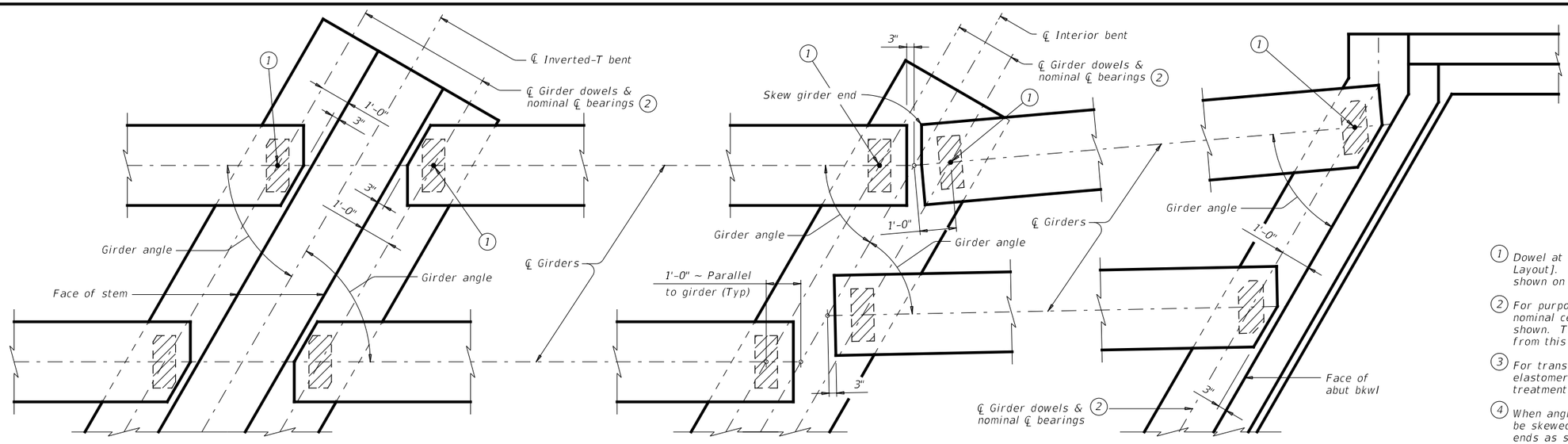


AT INVERTED-T BENT W/SKEW

AT CONVENTIONAL INTERIOR BENT W/SKEW

AT ABUTMENT W/SKEW (3)

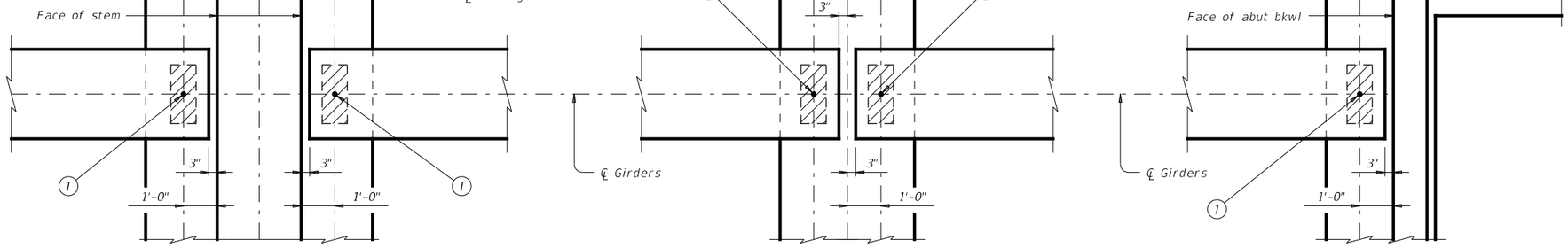
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(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.

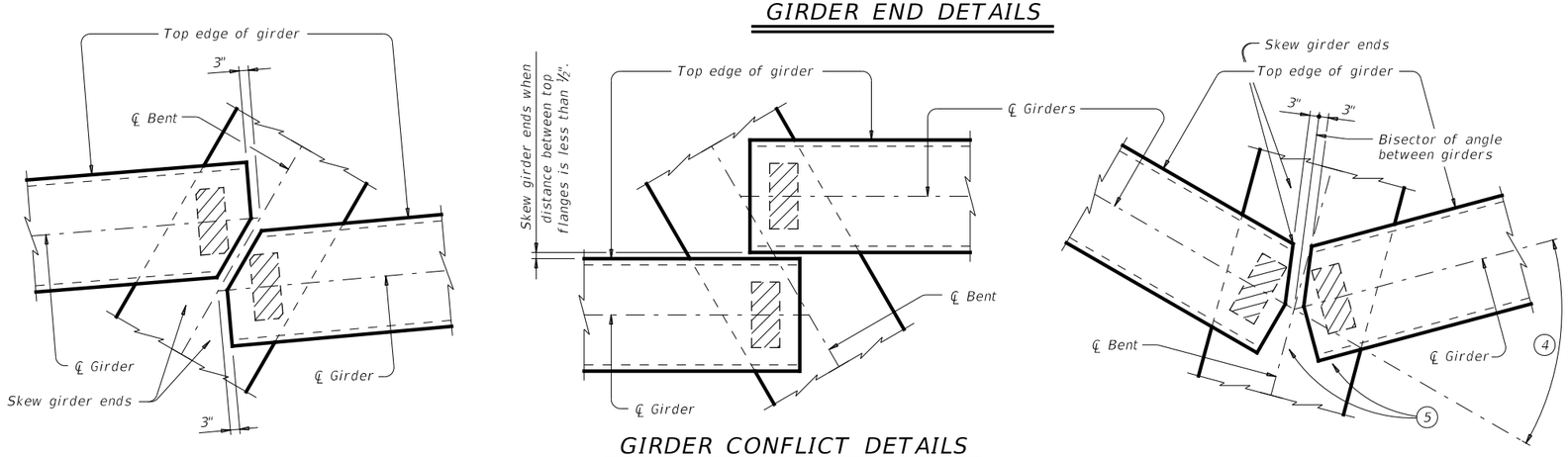


AT INVERTED-T BENT

AT CONVENTIONAL INTERIOR BENT

AT ABUTMENT (3)

GIRDER END DETAILS



GIRDER CONFLICT DETAILS

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".

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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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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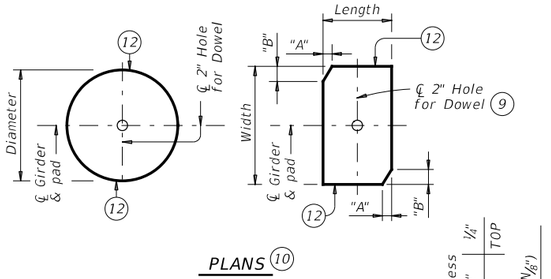
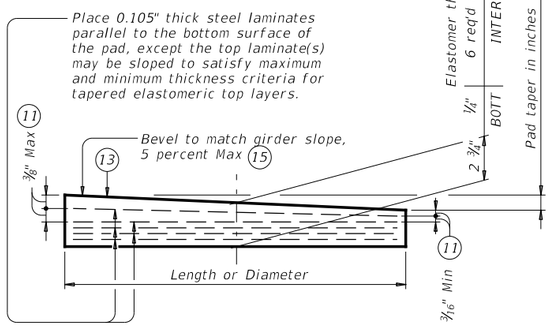


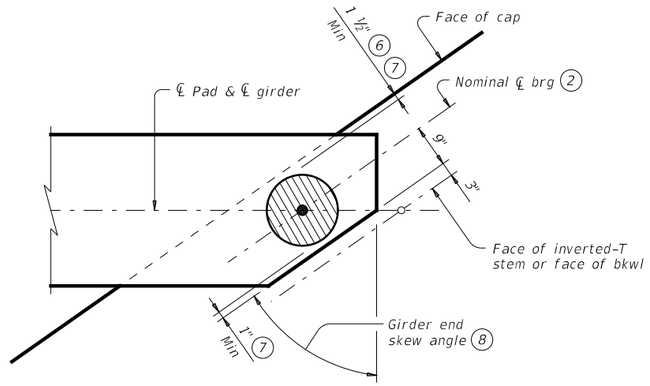
PLANS (10)



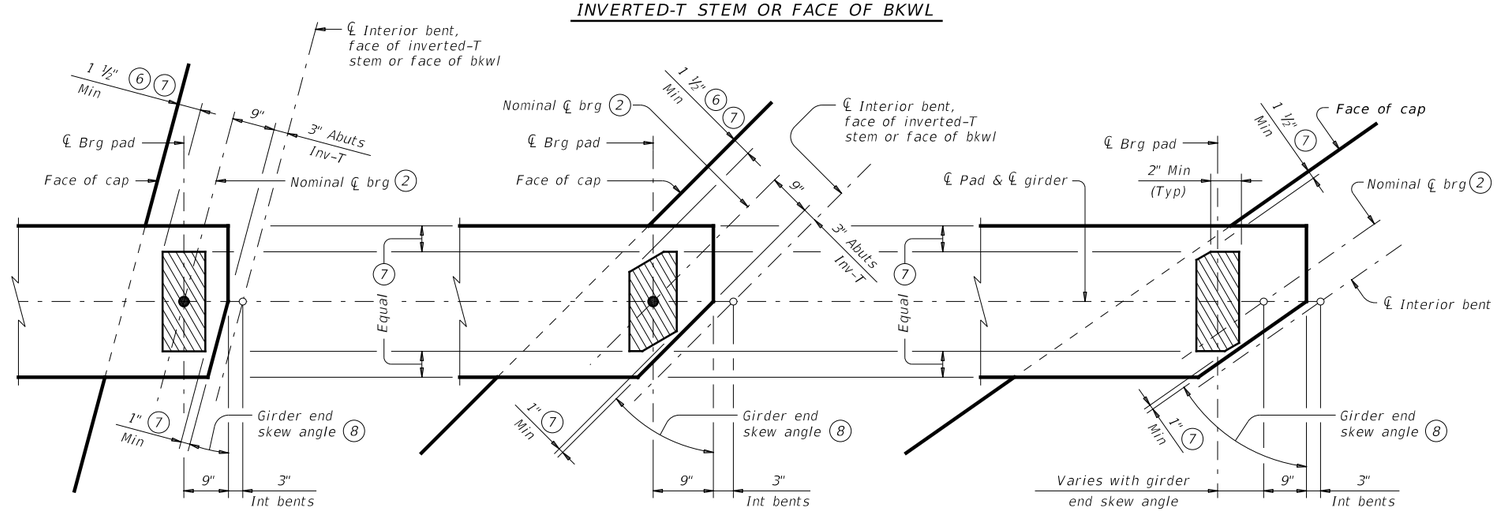
ELEVATION

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: Face of Bkwl to Face of Cap	Int Bents: Overall Cap Width	Inv-T Bents: 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

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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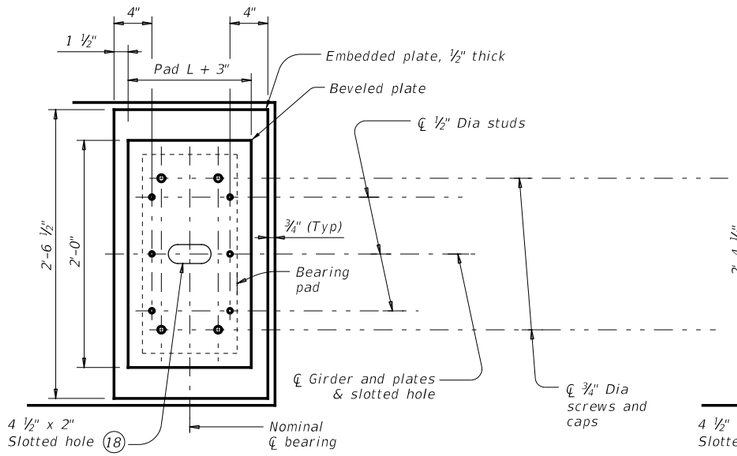
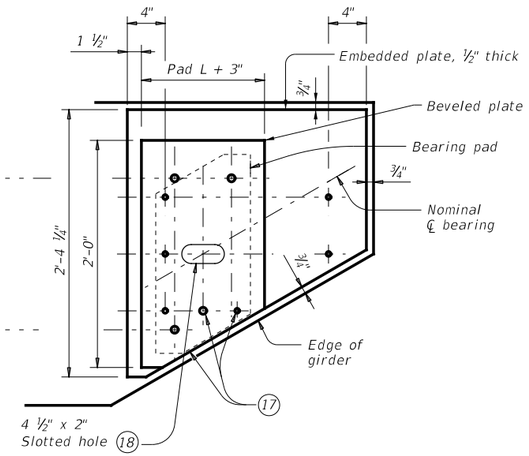
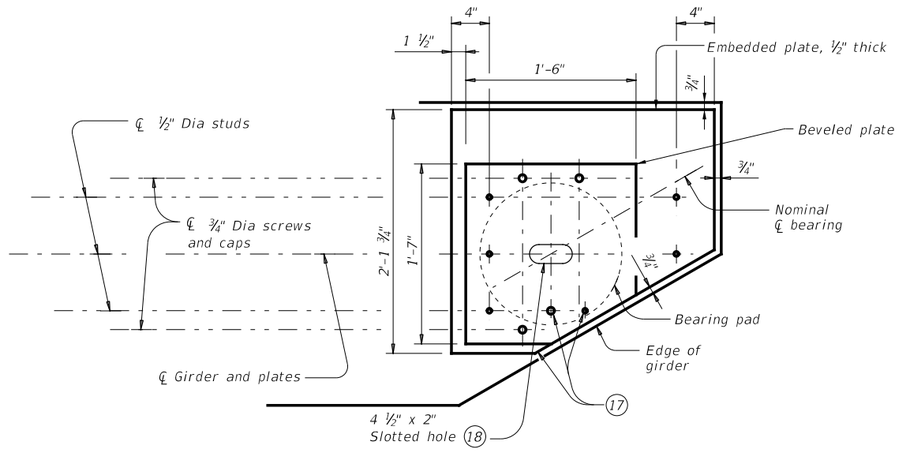


NORMAL GIRDER END
RECTANGULAR BEARING PAD

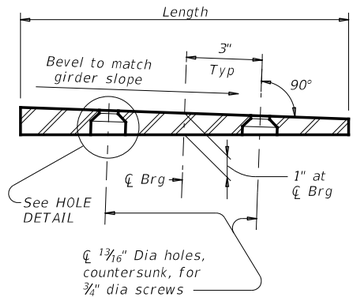


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD



SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



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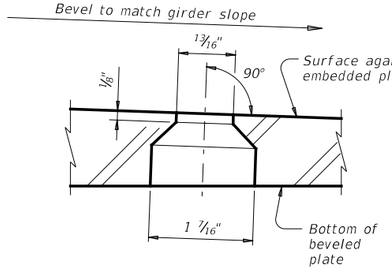
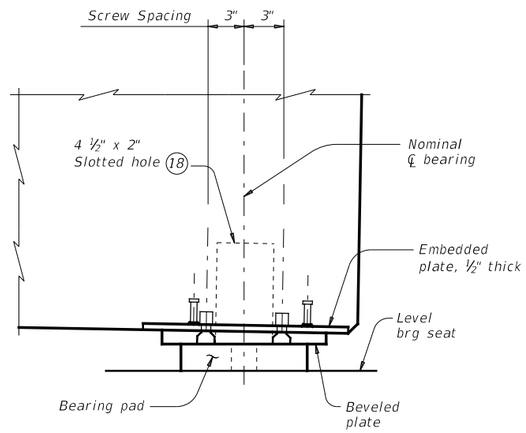
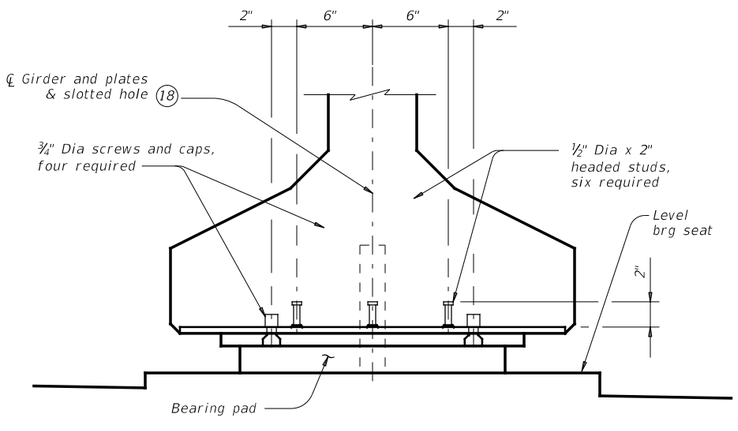


HOLE DETAIL

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

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		128

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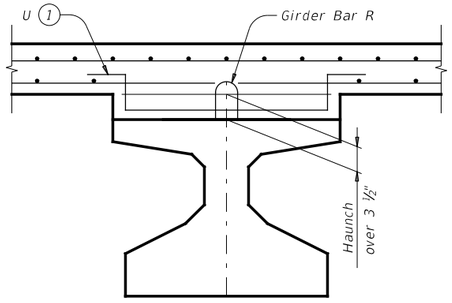
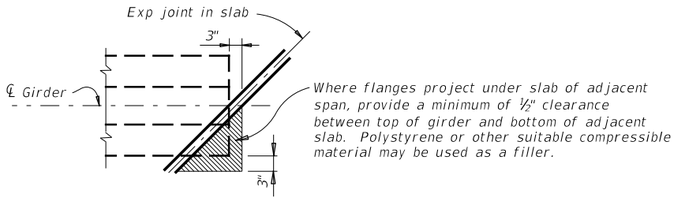
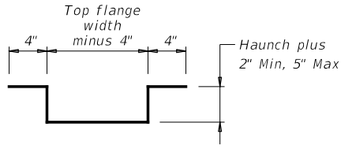


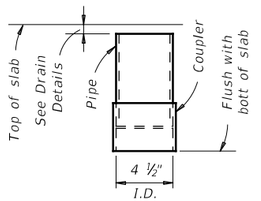
HAUNCH REINFORCING DETAIL



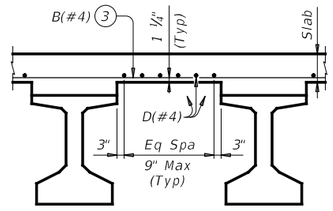
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

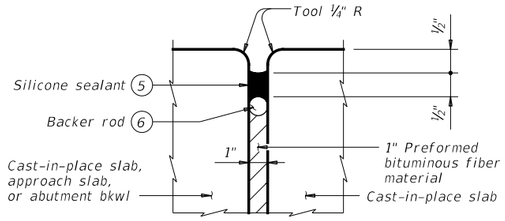


C-I-P DRAIN DETAIL (2)

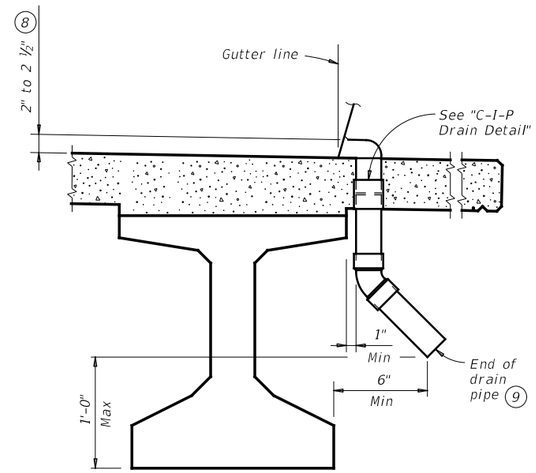


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

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

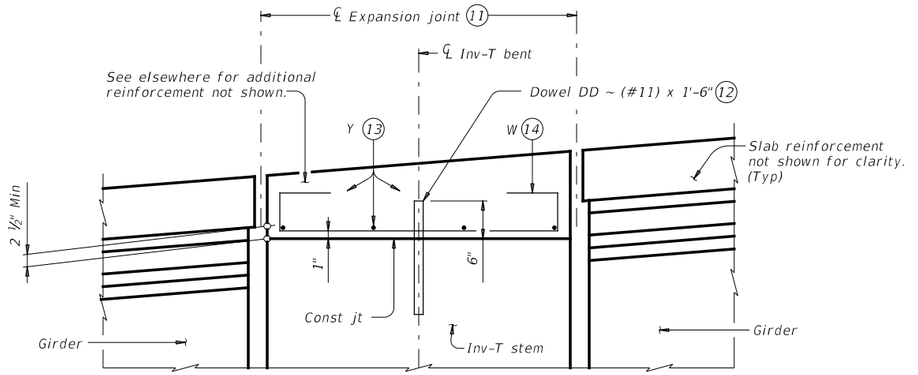
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

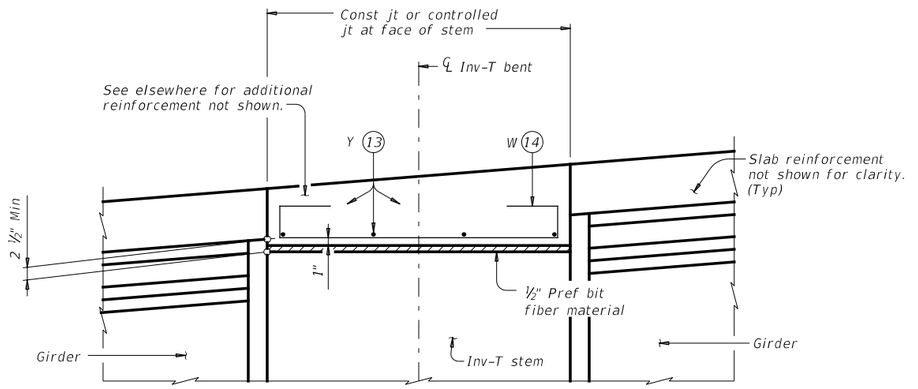
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		129

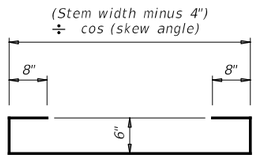


SHOWING EXPANSION JOINTS

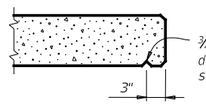


SHOWING CONST JTS OR CONTROLLED JTS

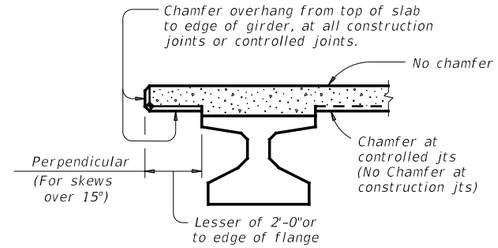
REINFORCEMENT OVER INV-T BENTS



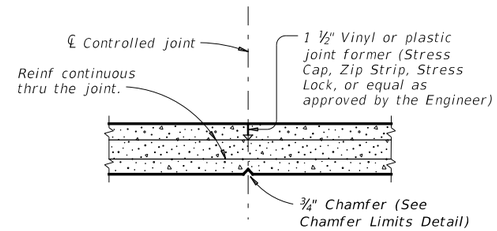
BARS W (#4)



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.

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SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
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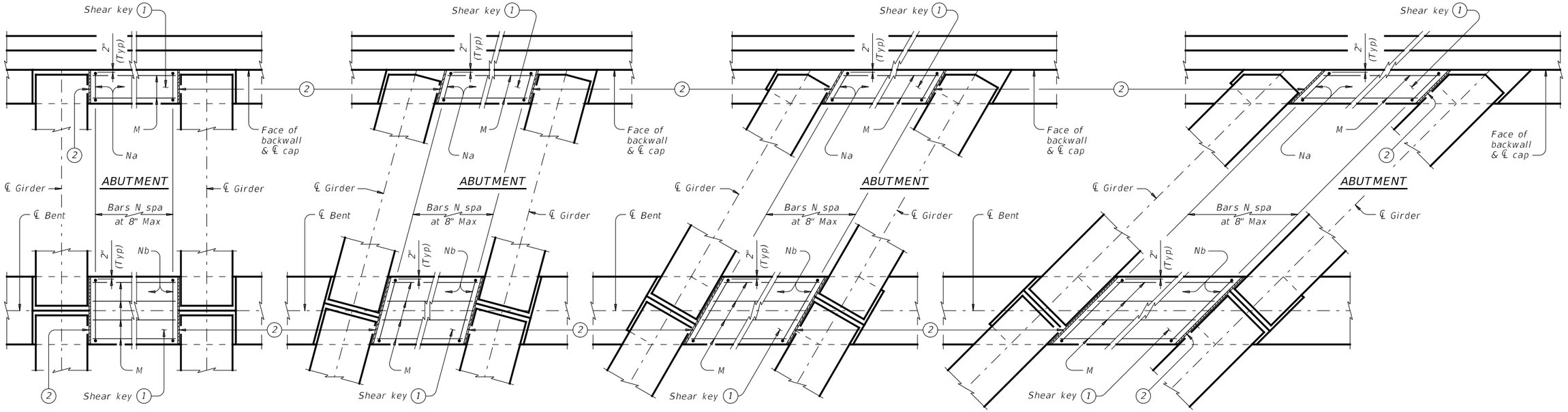


INTERIOR BENT

PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

INTERIOR BENT

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

INTERIOR BENT

PARTIAL PLANS WITH 30° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

INTERIOR BENT

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.

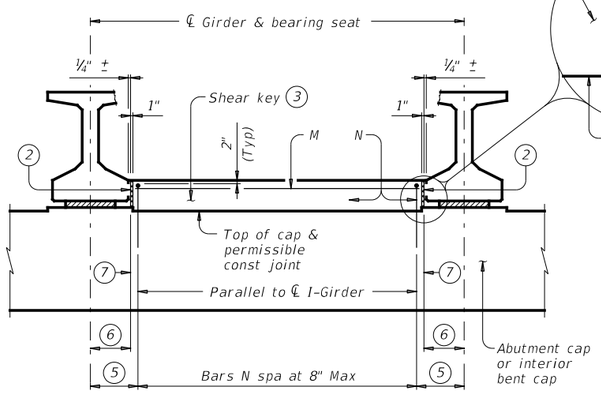
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(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.

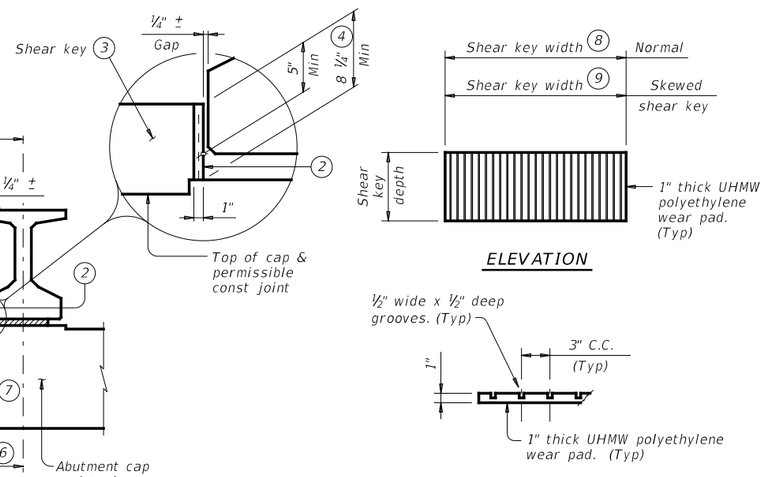
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.



PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

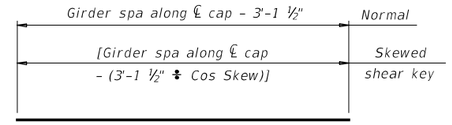
Showing shear key with girder Type Tx46.
Other I-Girder types similar.



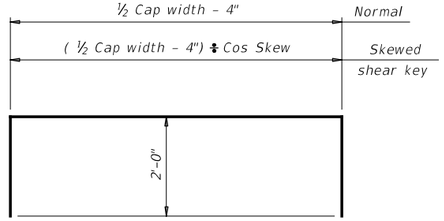
ELEVATION

PART SECTION

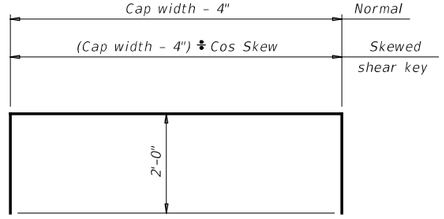
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



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.

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

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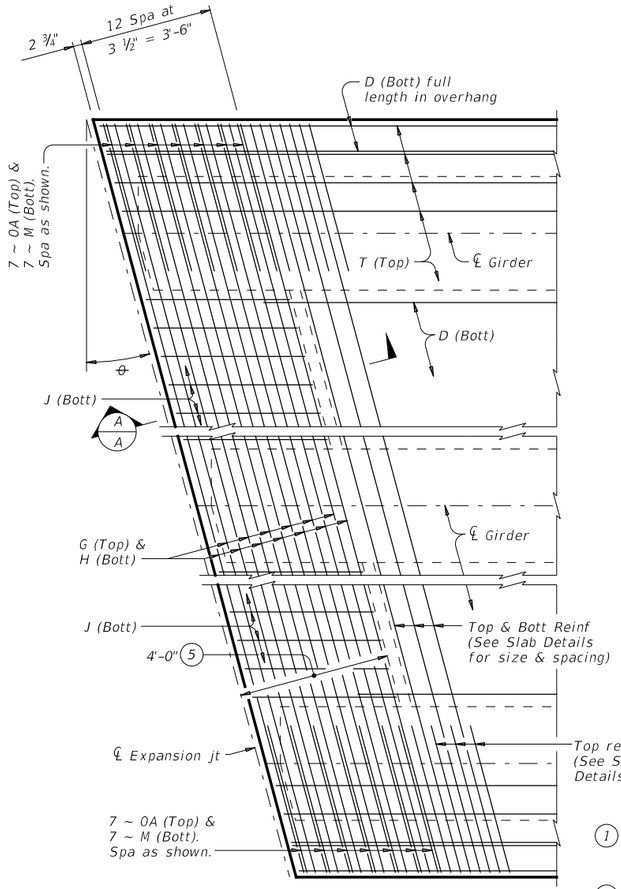
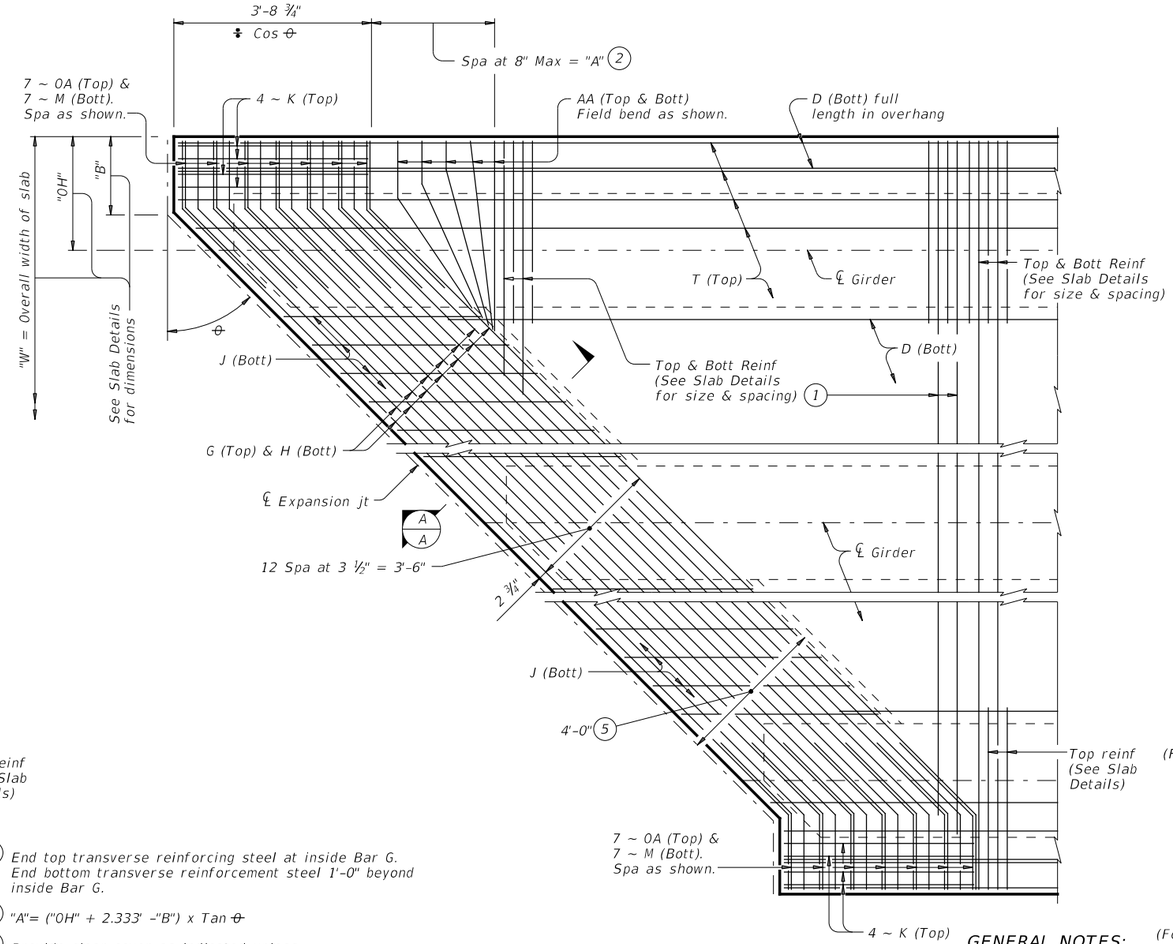


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

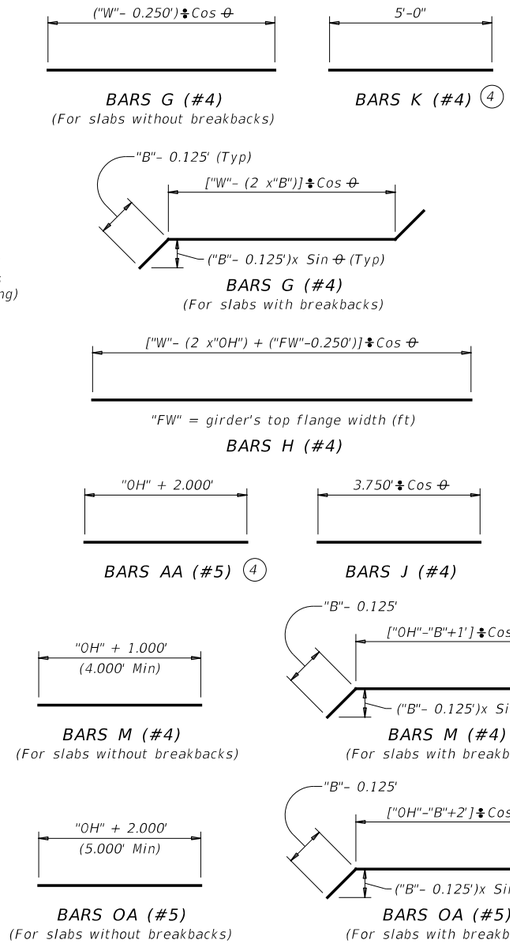
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 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.



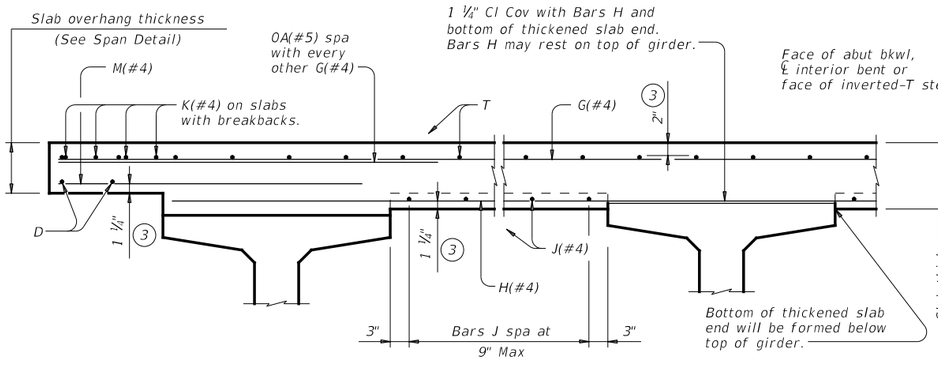
GENERAL NOTES:

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 0A 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 0A must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

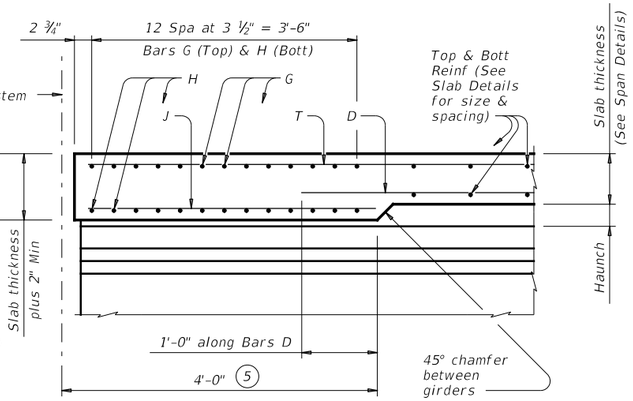
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

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: igtsst1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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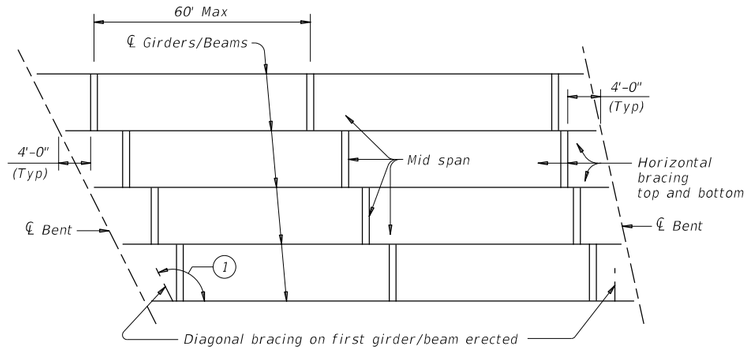
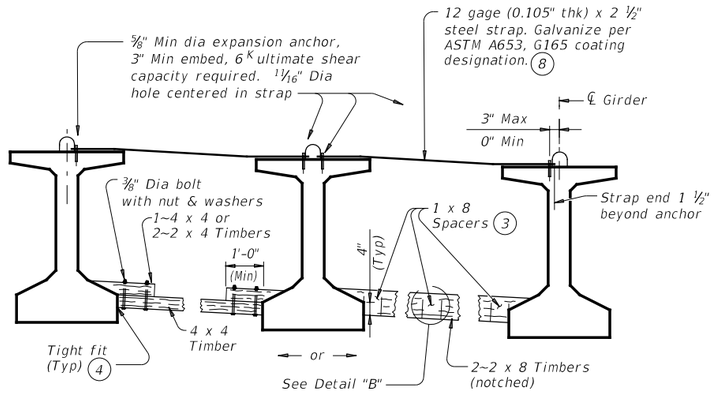
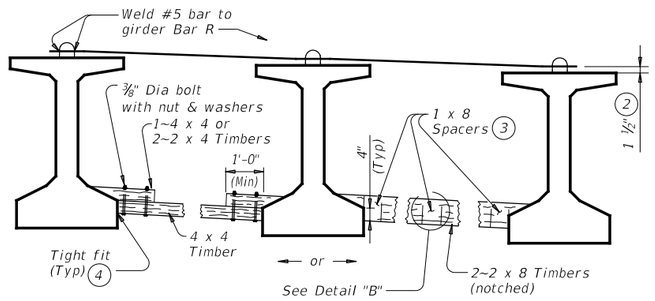


ERECTION BRACING



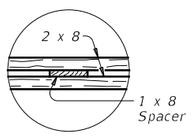
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



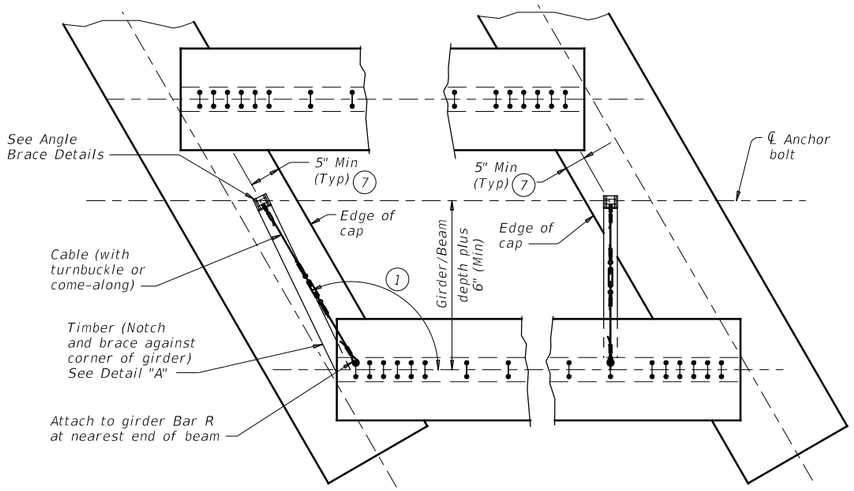
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

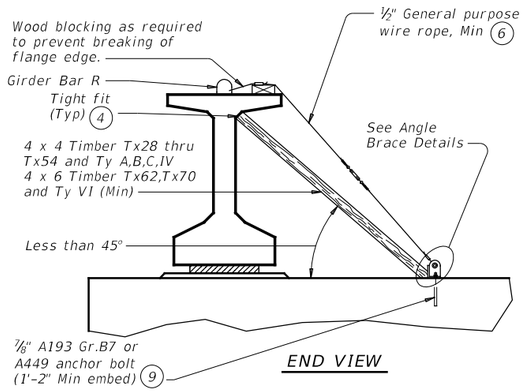


PLAN

DETAIL "B"



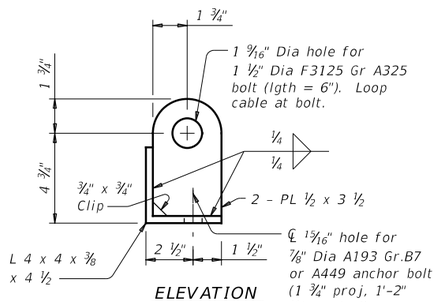
PLAN



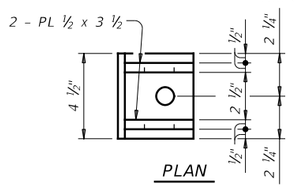
END VIEW

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.

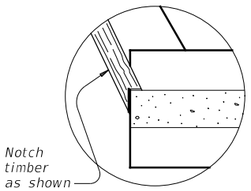
ERECTION BRACING:

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
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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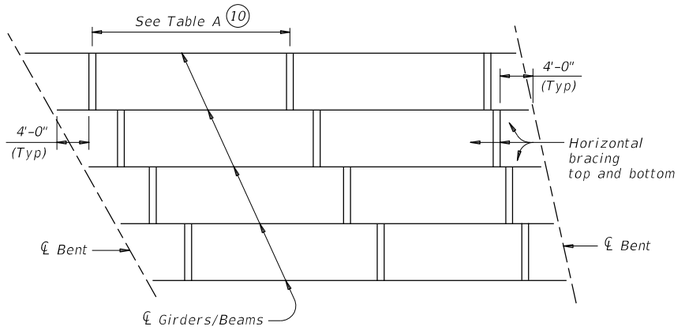
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		133



SLAB PLACEMENT BRACING

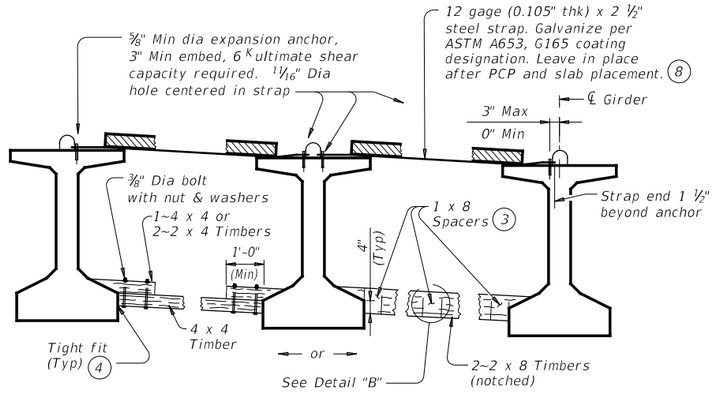
TABLE A

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

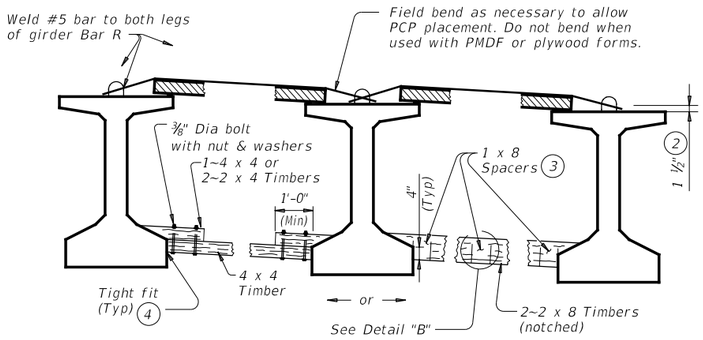
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

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

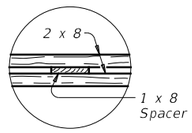
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS (5)



PLAN

DETAIL "B"

(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)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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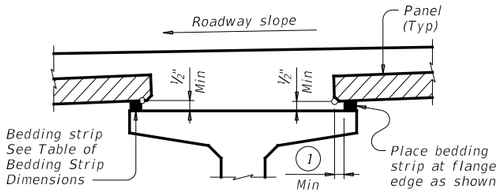
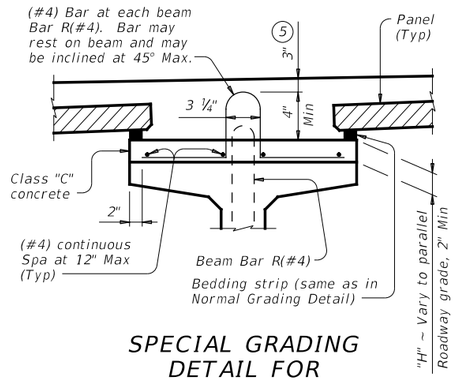


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders.
(Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders.
(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" Min for all other beam types.

(2) Allowed for I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

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.

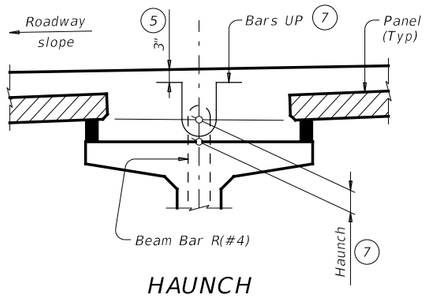
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

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.

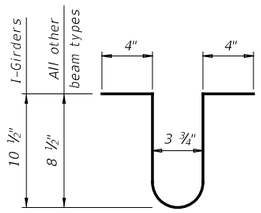
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

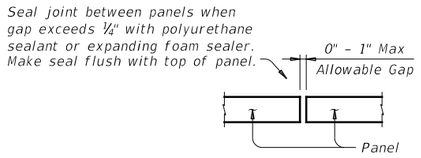


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders.
(Other beam types similar)

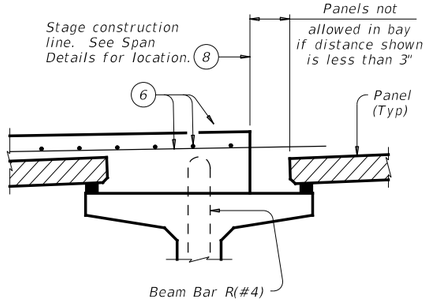


BARS UP (#4) (7)

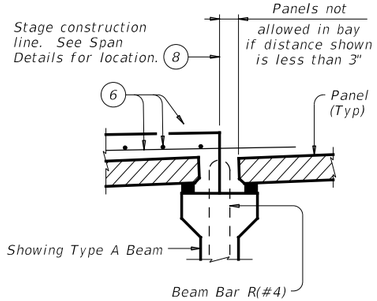


PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



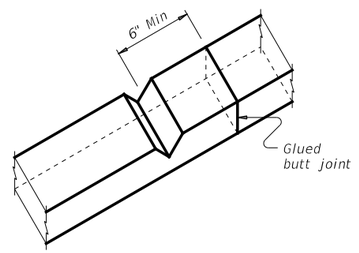
PRESTR CONC I-GIRDERS



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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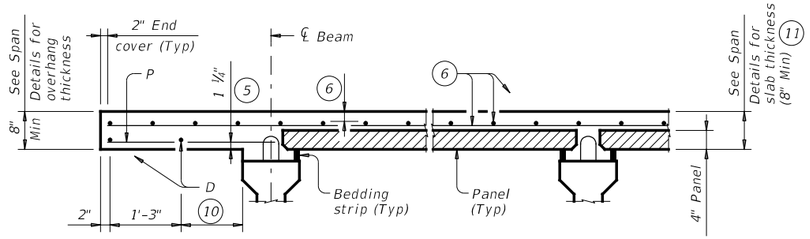
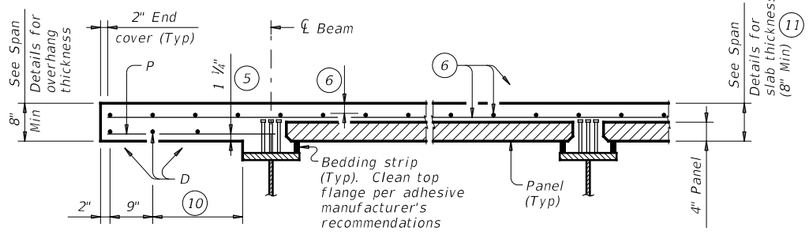
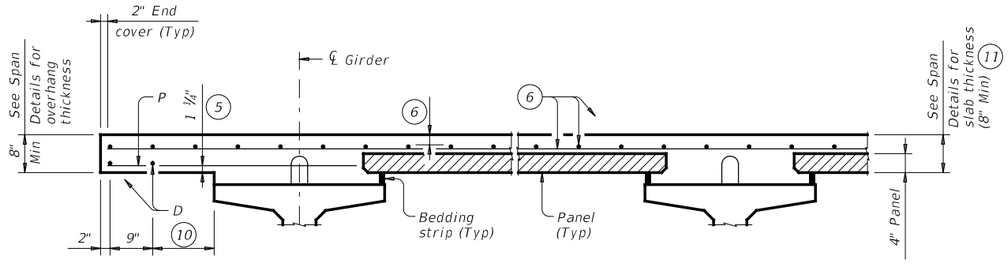


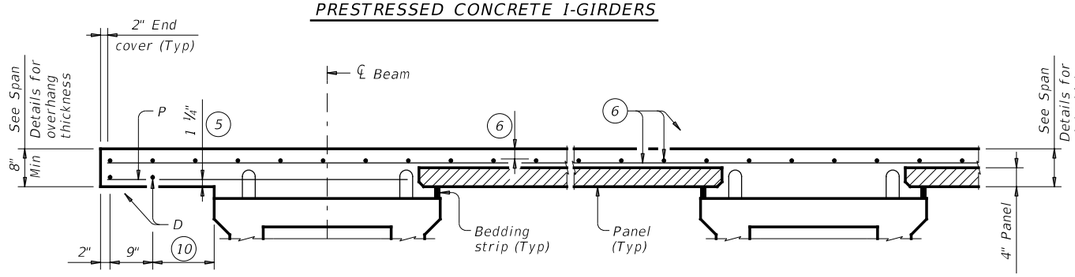
PRESTRESSED CONCRETE I-BEAMS



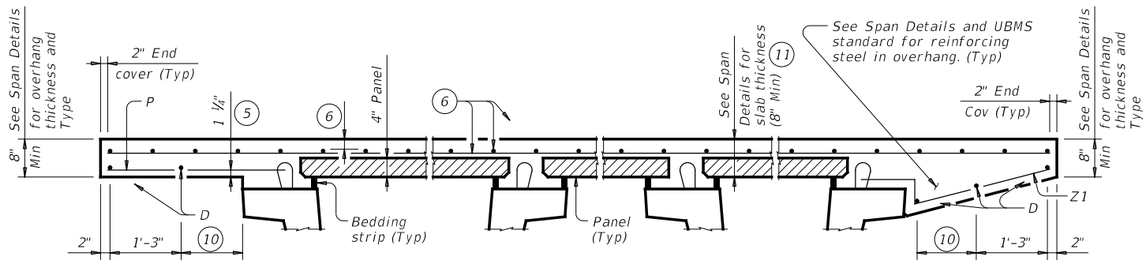
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



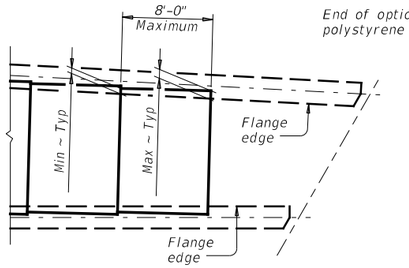
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

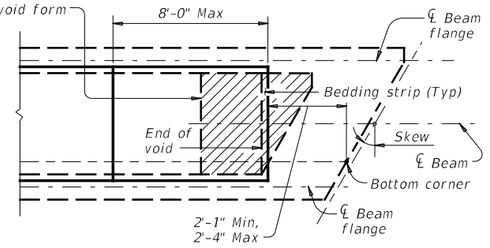
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

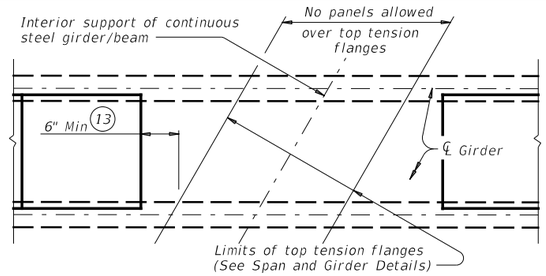


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on bemm/girder type.



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

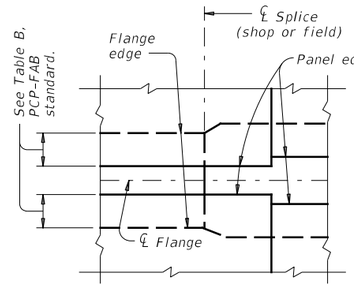
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

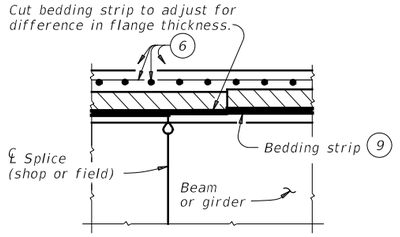
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



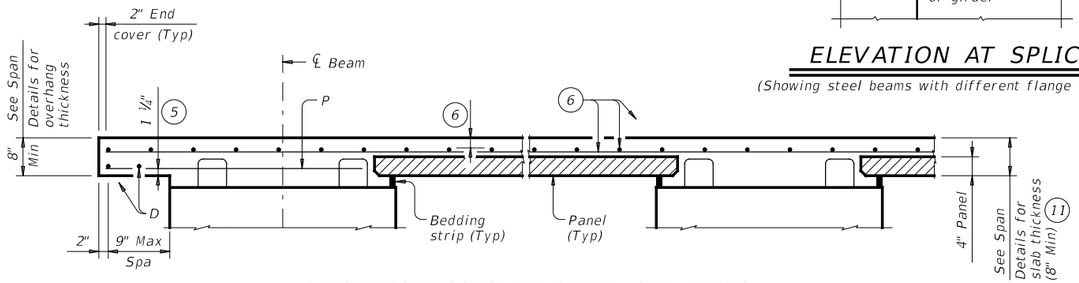
PLAN AT SPLICE

(Showing steel beams with flange width transition)



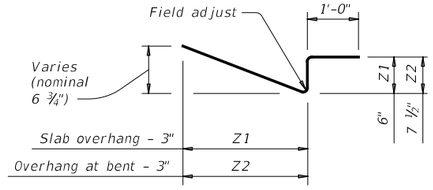
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE 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)

HL93 LOADING SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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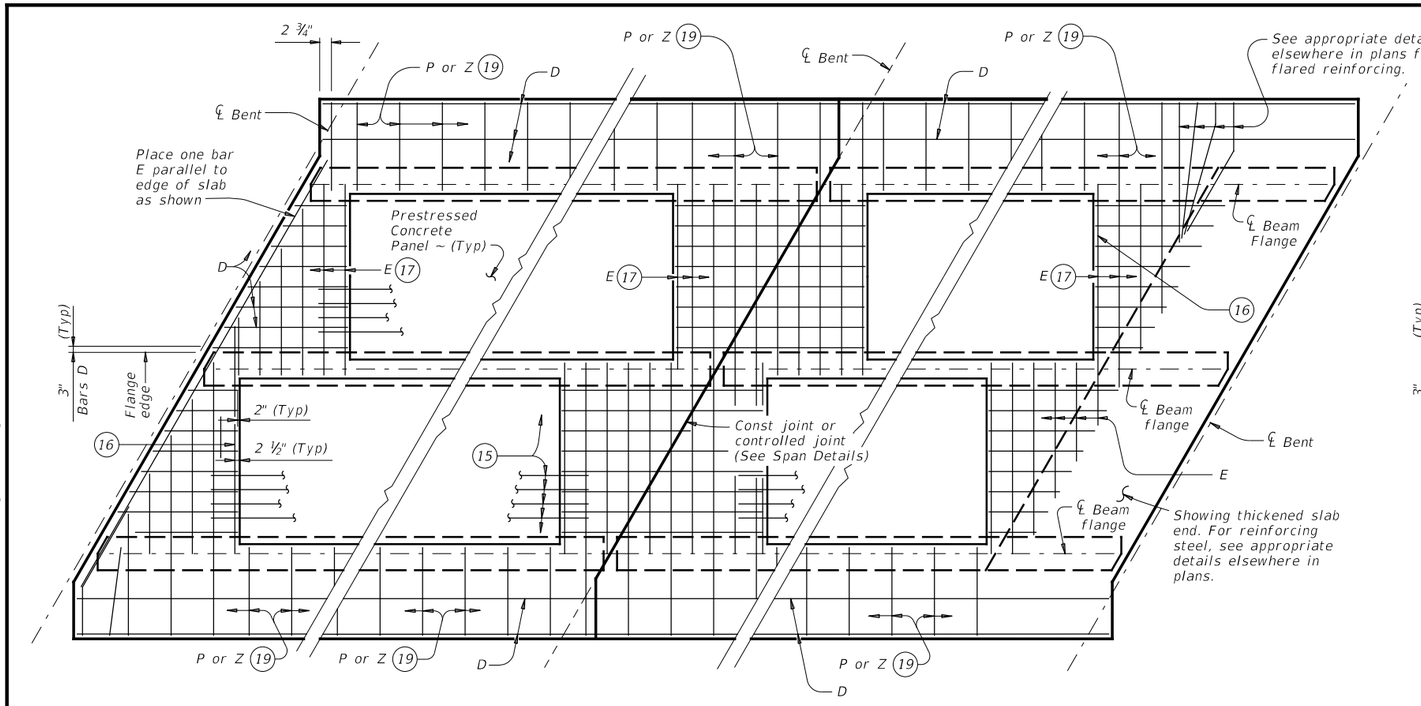
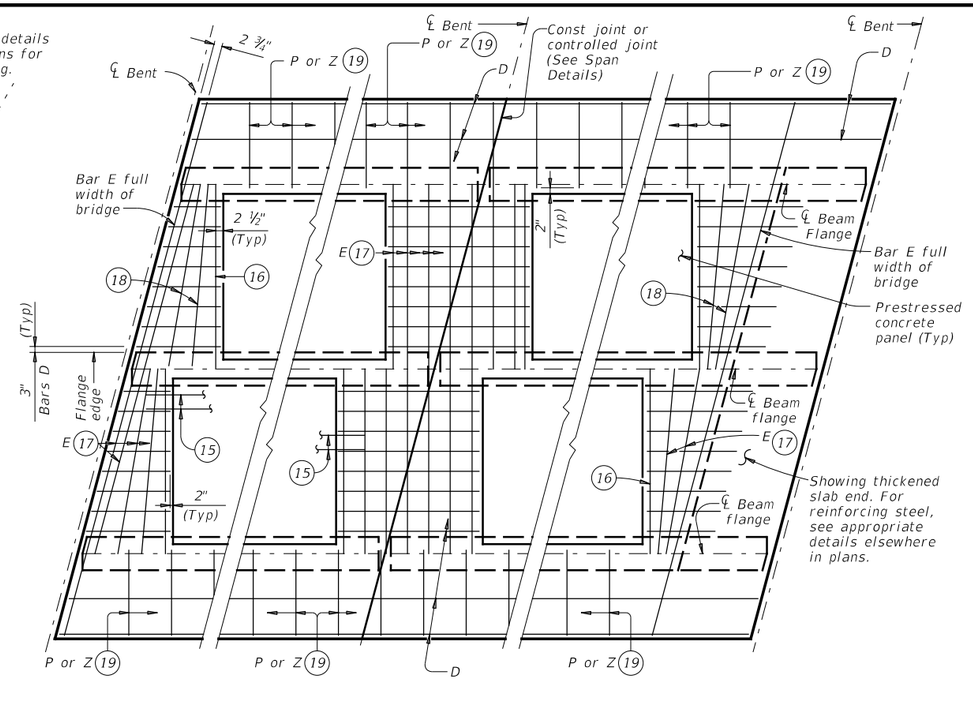


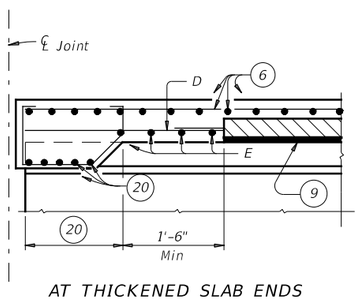
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

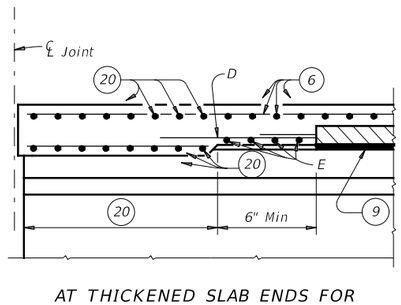


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

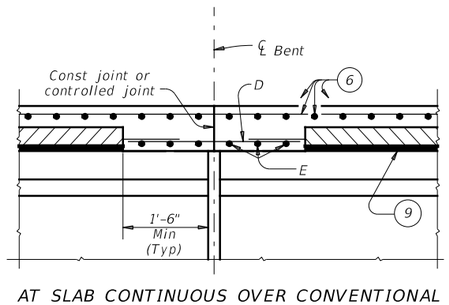
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



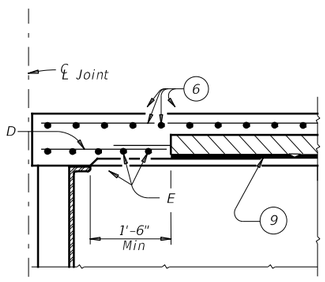
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



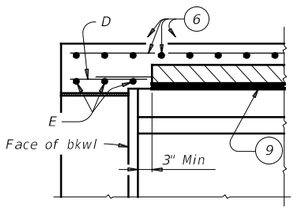
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



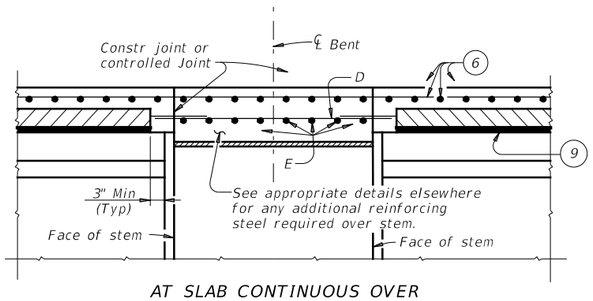
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING SHEET 3 OF 4

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		137

DATE: 8/3/2020 10:12:51 AM
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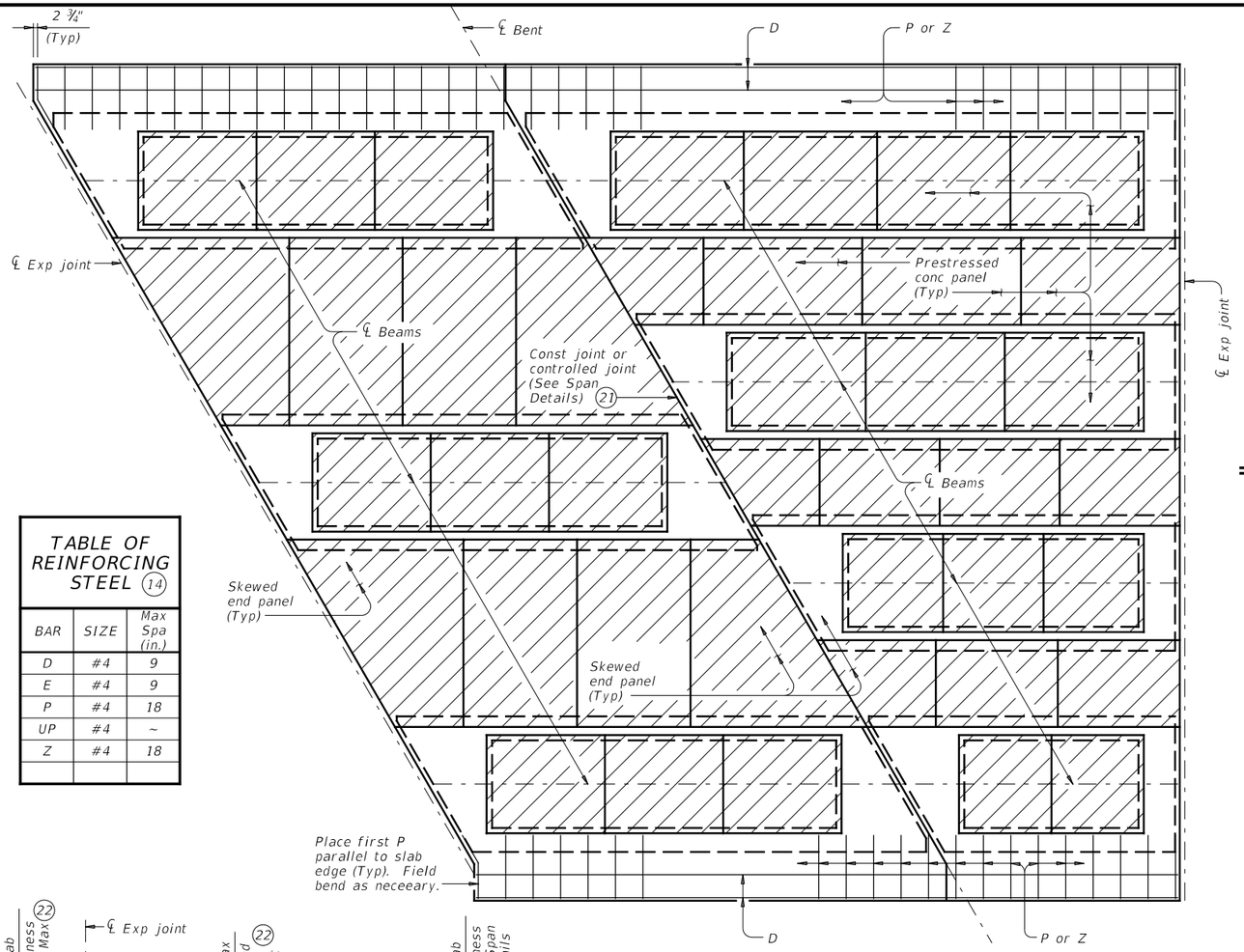
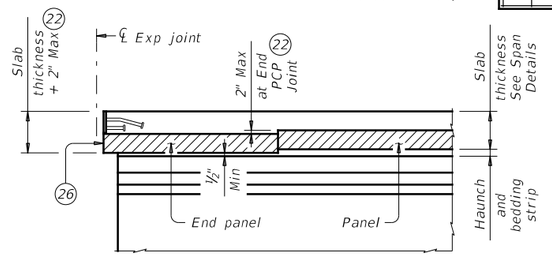


OPTION 2 ~ PLAN OF SLAB

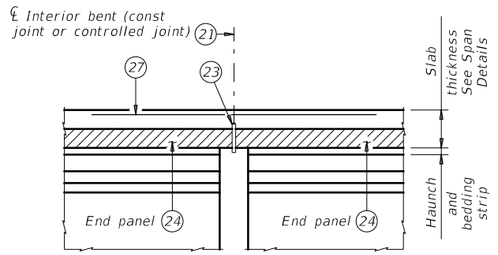
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



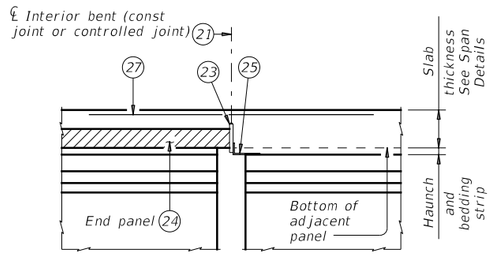
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



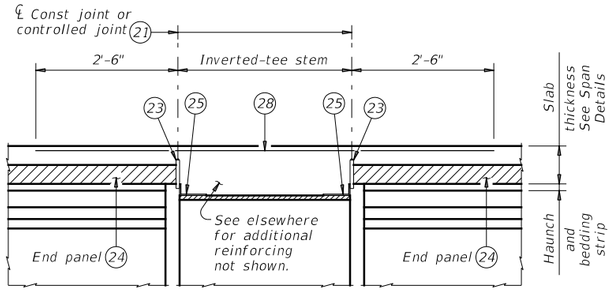
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

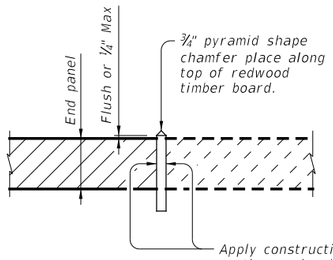
Panel against beam/girder end in adacent span.



INVERTED-T BENT

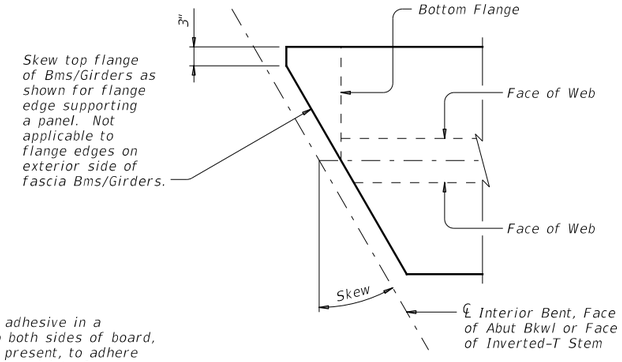
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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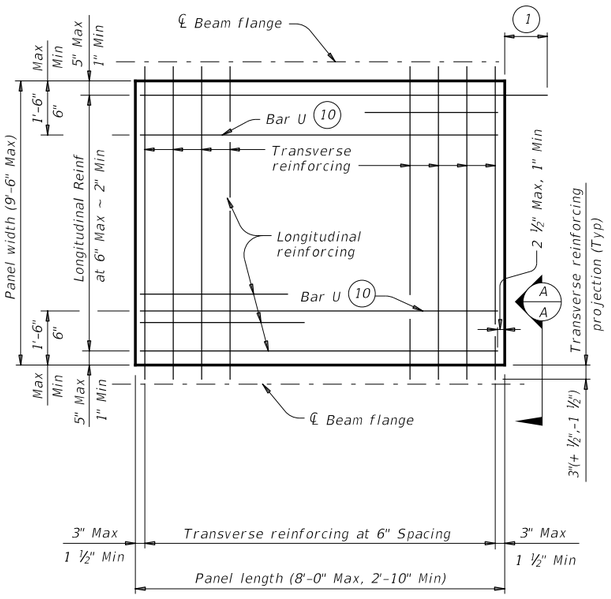
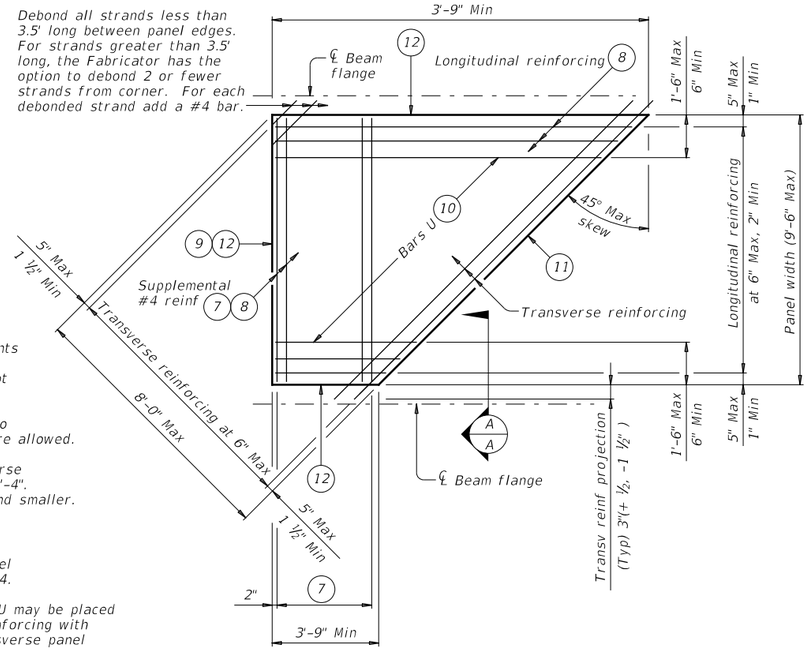
	WACO	CORYELL		138



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.

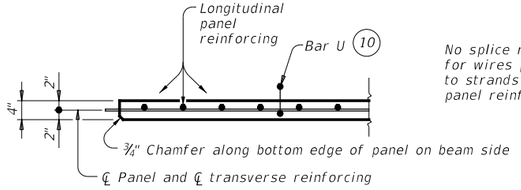
LONGITUDINAL PANEL REINFORCEMENT:

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.

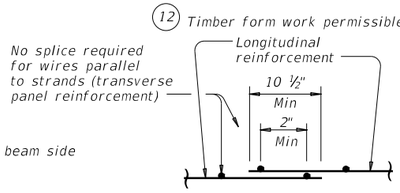
No combination of longitudinal reinforcement options in a panel is allowed.

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.

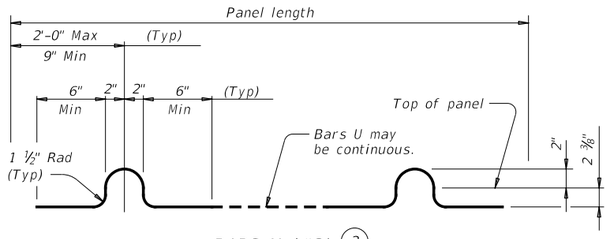


SECTION A-A

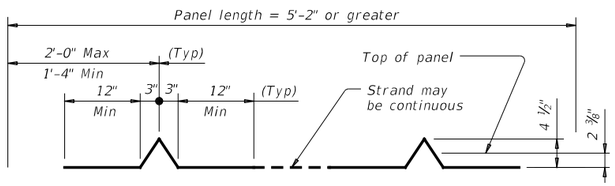
(Not showing supplemental #4 bars for skewed end panels.)



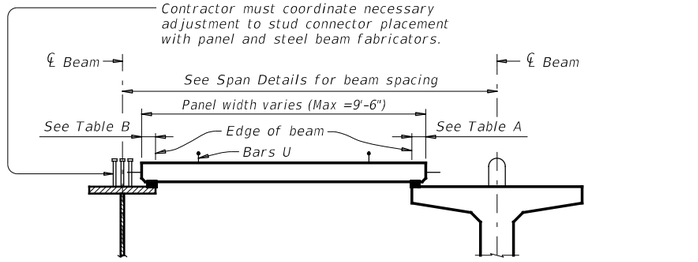
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



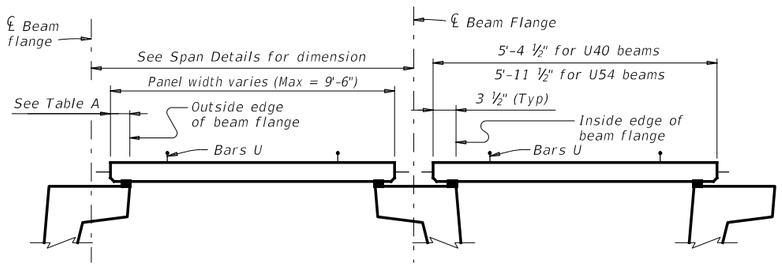
OPTIONAL STRAND FOR BARS U (3)



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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	WACO	CORYELL		139

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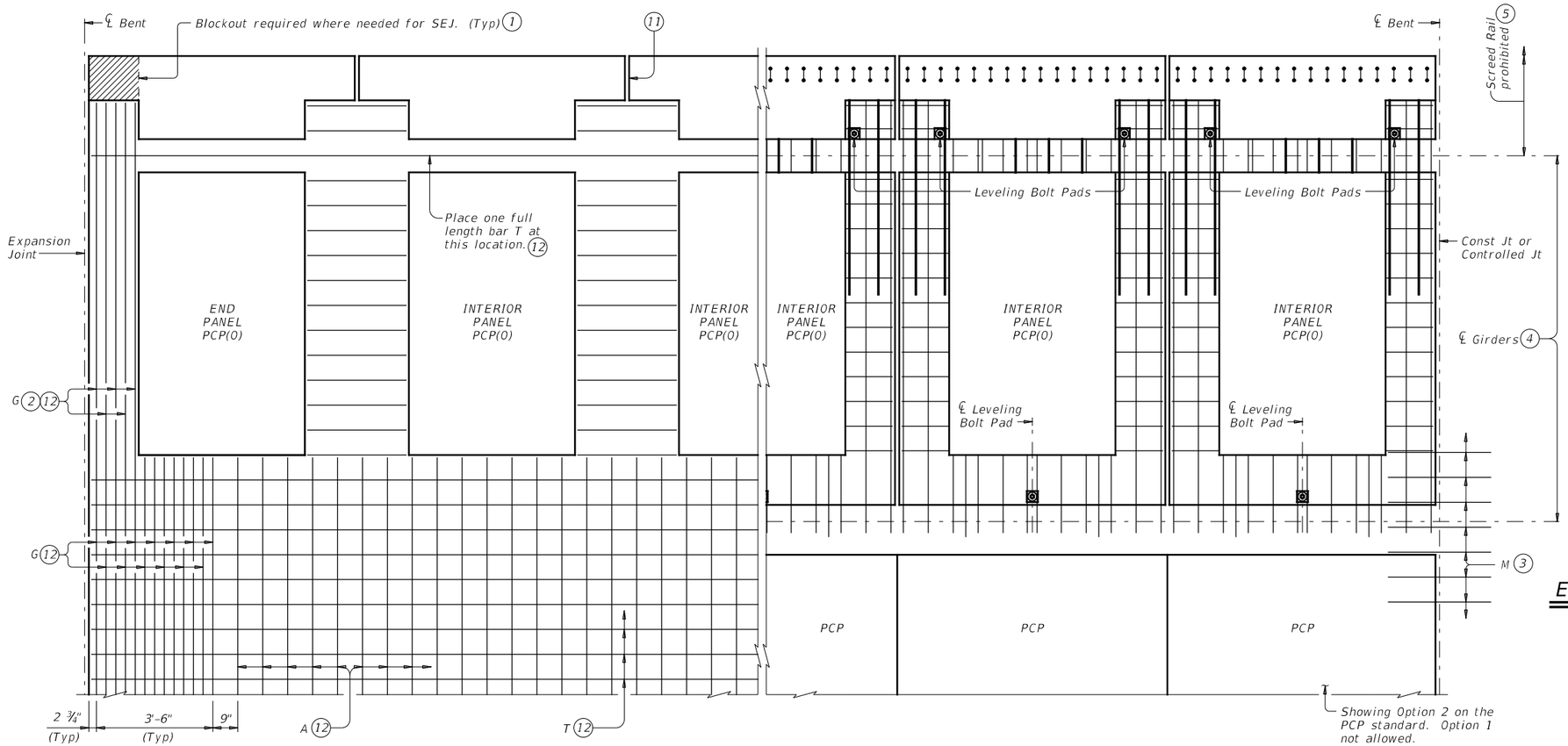


SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

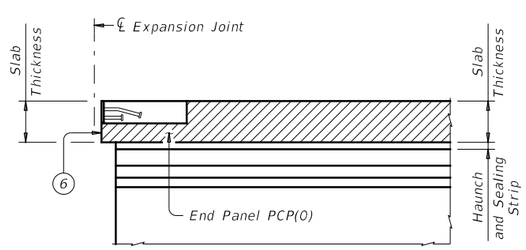
SHOWING PCP(0) EXPOSED REINFORCING STEEL

Field placed bars M shown for clarity.

PANEL LAYOUT

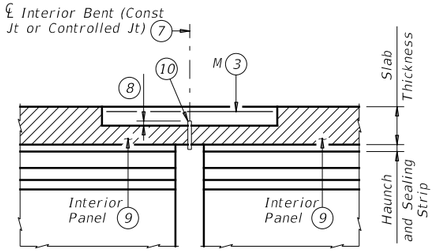
PCP(0) shown with gaps between panels for clarity.
The gap cannot be considered as a panel fabrication tolerance.

1. 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
2. When blockout is required, extend bars G into blockout.
3. Place additional bars M 2'-11" in length on top of bars A and between every bar T. Center bars M at center of bent. Located at bents with construction joints or controlled joints only. Bars M may replace additional (#4) bars 5'-0" in length as shown on PCP standard in Option 2 ~ Elevations At Beam Ends. Option 1 not allowed.
4. It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.
5. Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
6. Place end panel PCP(0) within ½" of expansion joint opening. Do not encroach on required expansion joint opening.
7. Top Plastic Joint Former at Controlled Joints (Stress Cap, Zip Strip, Stress Lock, etc.) is not required with these Details.
8. 0" Min, ¾" Max, support as necessary.
9. Place panel within ½" of ¾" thick board.
10. ¾" thick wood/timber board, leave in place. Place straight, within ¼" of Centerline of Bent, across bridge width and end board at exterior flange edge of fascia girders. Do not extend into overhang.
11. Seal top of panel only, with a Class 4 sealant prior to rail construction. Typical between panels. Do not seal at Expansion Joints.
12. 1 ½" End Cover. (Typ)



EXPANSION JOINT

For SEJ-A, SEJ-S(0), AJ and Type A Expansion Joints only.

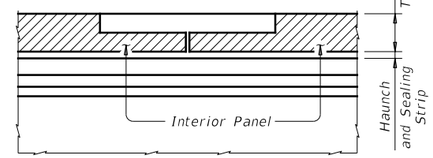


CONST JT OR CONTROLLED JT

Panel against Panel between Bms/Girders.

ELEVATIONS AT GIRDER ENDS WITH PCP(O)

Reinforcing steel not shown for clarity.



ELEVATION BETWEEN PCP(O)

The gap cannot be considered as a panel fabrication tolerance.
Reinforcing steel not shown for clarity.

HL93 LOADING

Texas Department of Transportation — Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

FILE: pcpostd1-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
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	WACO	CORYELL		140

DATE: 8/3/2020 10:12:56 AM
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BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12)(17)	#4	9"
G (12)(17)	#4	3½"
M	#4	9"
T (12)(17)	#4	9"

(4) It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

(5) Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.

(12) 1 ½" End Cover on bars. (Typ)

(13) Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 ½" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.

(14) 6" plus or minus.

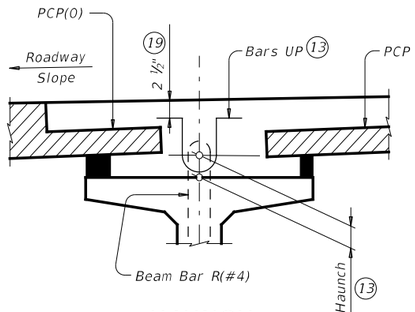
(15) Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and compress to grade.

(16) (#3) Panel bars F must be field bent and welded to the R bars in girder. Two bars F per panel.

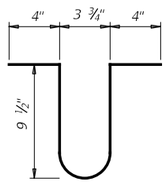
(17) Field placed bars that are allowed to be lapped. Reinforcing steel that protrudes from panels are not considered bars to be lapped. See "Material Notes" for applicable bar laps.

(18) ℄ Leveling Bolt Pad. 1" Dia Coil Rod or 1" Dia Coil Bolt shown, are furnished by the contractor. After grading each PCP(0) panel with the 1" Dia coil rods or coil bolts, secure each panel in its final resting position (plastic shims, welding, etc) and remove all 1" Dia coil rods or coil bolts for the cast-in-place concrete. Coil rods/bolts may be left in place at contractor's option. If coil rods/bolts are left in place, coil rods/bolts must have at least 2 ½" of cover to top of finish grade. Grading bolts are inadequate to carry all conceivable screed/construction loads. Panel support method must be calculated, location identified, and placed on shop drawings. Method chosen to support panels must be adequate for all construction loads. Panel support method must be placed/constructed after final grading and before screed rail placement.

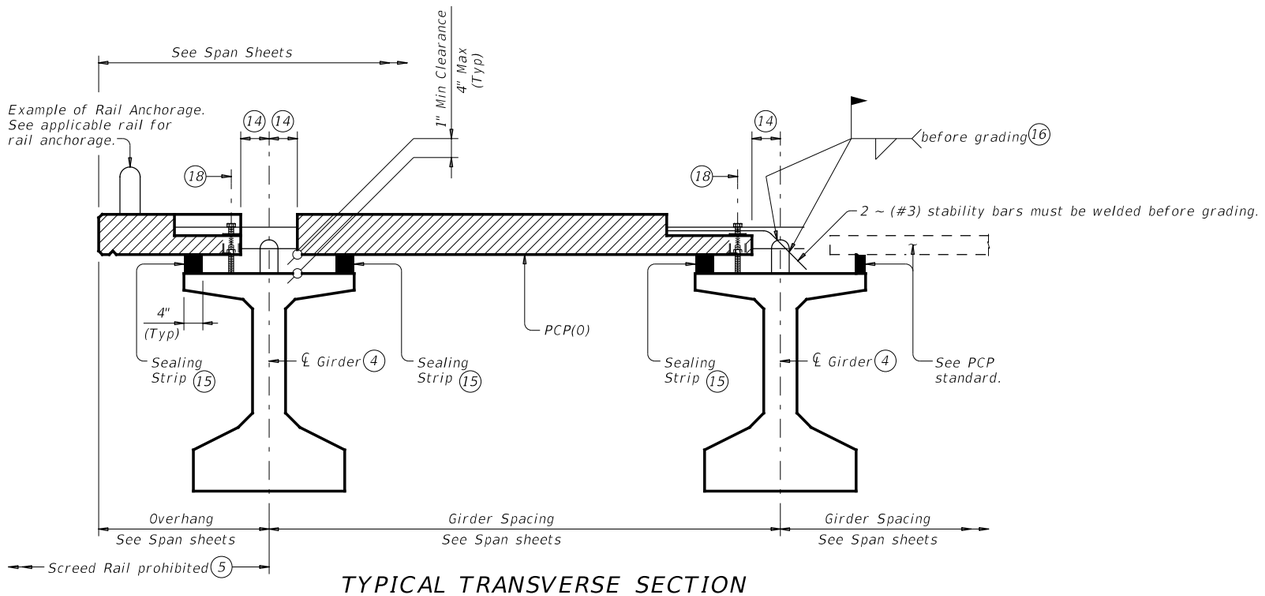
(19) Unless shown otherwise on Span Details.



HAUNCH REINFORCING DETAIL (4)



BARS UP (#4) (13)



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION NOTES:

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended.

Ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Place sealing strips at girder flange edges so that adequate space is provided for the mortar to flow a minimum of 8" transversely under the panels as the slab concrete is placed.

Panel placement with Option 1 on the PCP standard is not allowed.

It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

To allow the proper amount of mortar to flow between girder and panel, maintain a minimum vertical opening of 1". Roadway cross-slope reduces the opening available for entry of the mortar. Sealing strips vary in thickness along girder are therefore required.

Seal the top panel with a Class 4 sealant as shown in the Panel Layout.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the reinforcing steel is shown on the Span Details to be epoxy coated, then epoxy coat bars A, G, M, & T.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

Provide sealing strips comprised of one layer low density polyurethane (1.0 Lbs density) foam sealing strips or equivalent. Oversize the height of sealing strips by 2". Bond sealing strips to the girder with 3M Scotch ® 4693 or equivalent adhesive compatible with sealing strips.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details can be used as an option to construct the deck overhang when noted on the Span details and in conjunction with the PCP(0)-FAB, PCP and applicable Standard sheets.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement or concrete required on these details is subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING

Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

FILE: pcpostd1-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		141

DATE: 8/3/2020 10:12:58 AM
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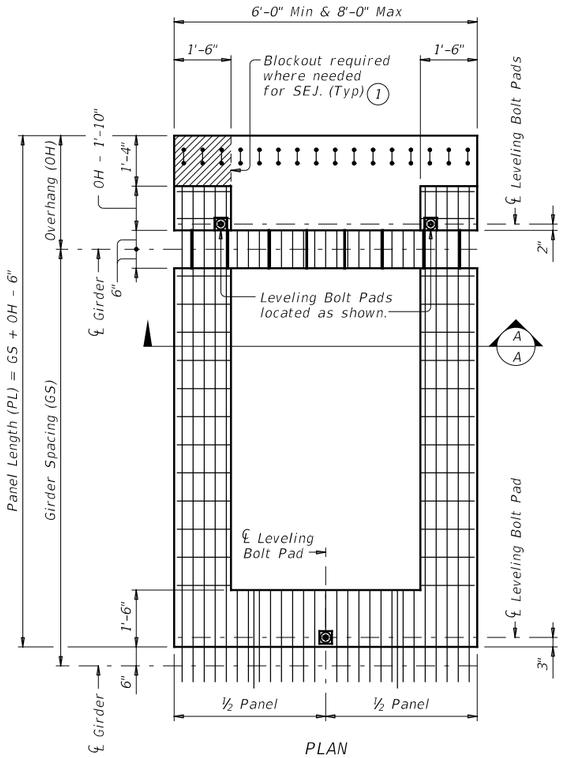
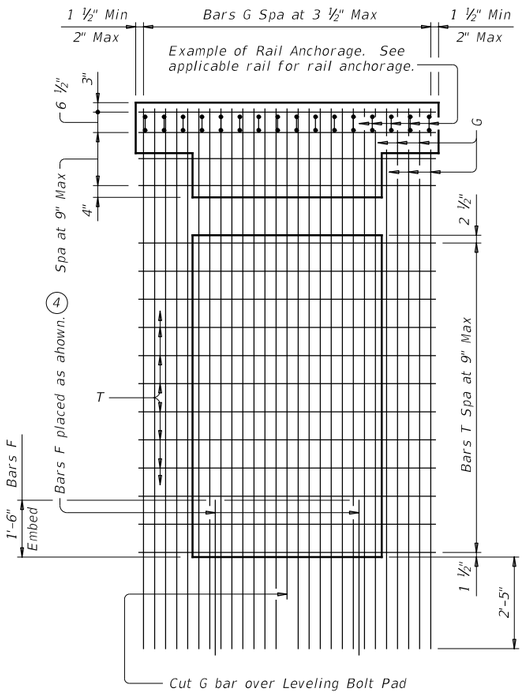
BAR TABLE	
BAR	SIZE
A (2)	#4
B (2)	#4
D (2) (3)	#4
F (3)	#3
G (2)	#4
H (2)	#4
K (2) (3)	#8
T (2) (3)	#4

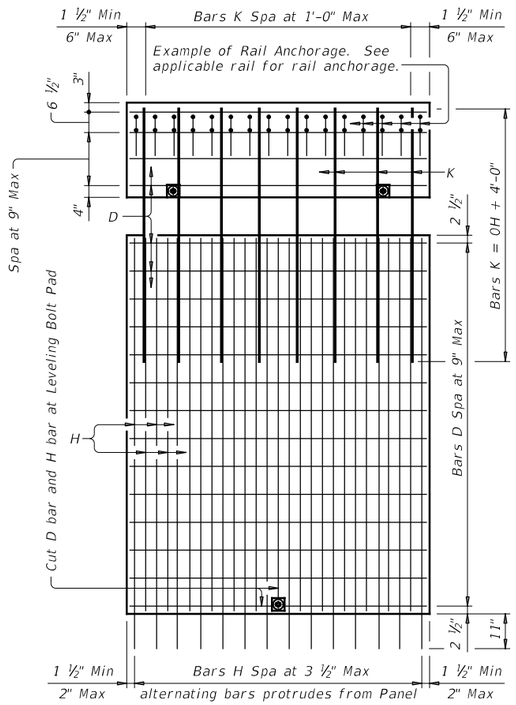


PLAN



TOP REINFORCING STEEL

END PANEL



BOTTOM REINFORCING STEEL

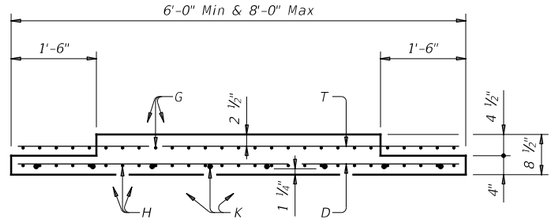
(1) 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.

(2) 1 ½" End Cover on bars. (Typ)

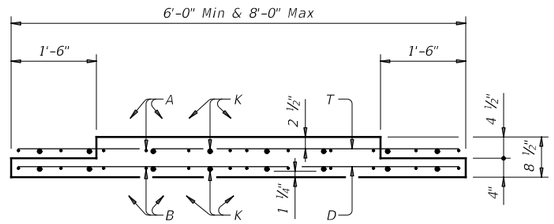
(3) Bars that are not allowed to have lap splices.

(4) Place F bars under bars T and against bars G.

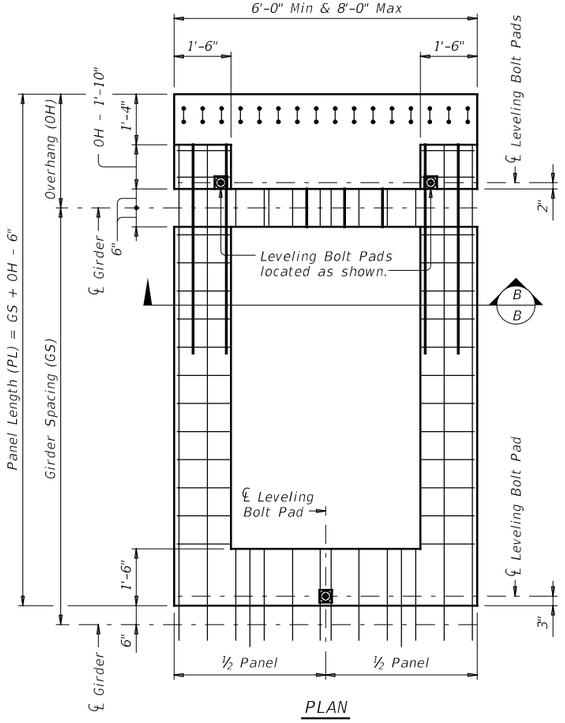
(5) Place F bars under bars T and between bars A.



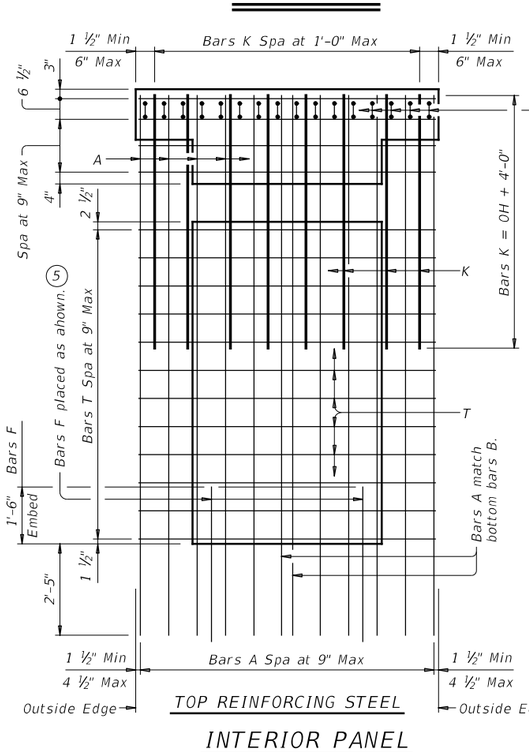
SECTION A-A



SECTION B-B

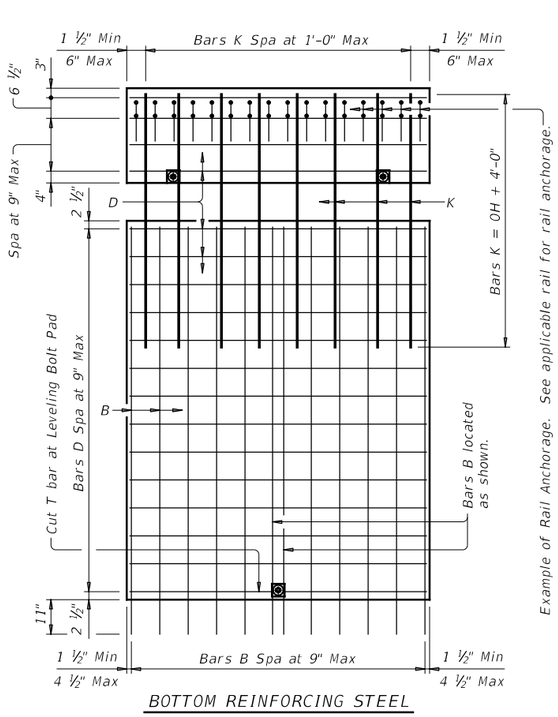


PLAN



TOP REINFORCING STEEL

INTERIOR PANEL



BOTTOM REINFORCING STEEL

HL93 LOADING

Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
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	WACO	CORYELL		142

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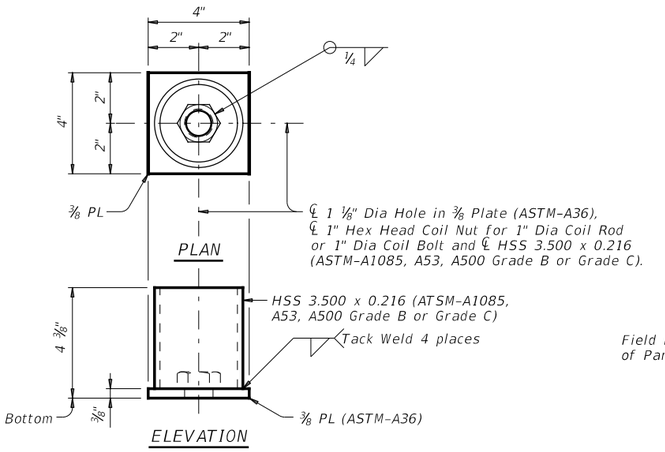
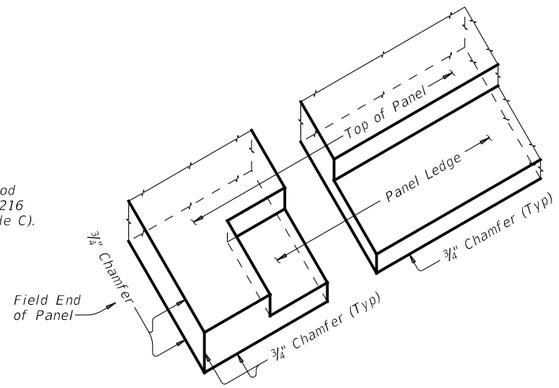


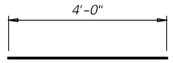
LEVELING BOLT PAD DETAILS

Galvanize if epoxy coated reinforcing steel is used in slab. Do not oil this assembly.

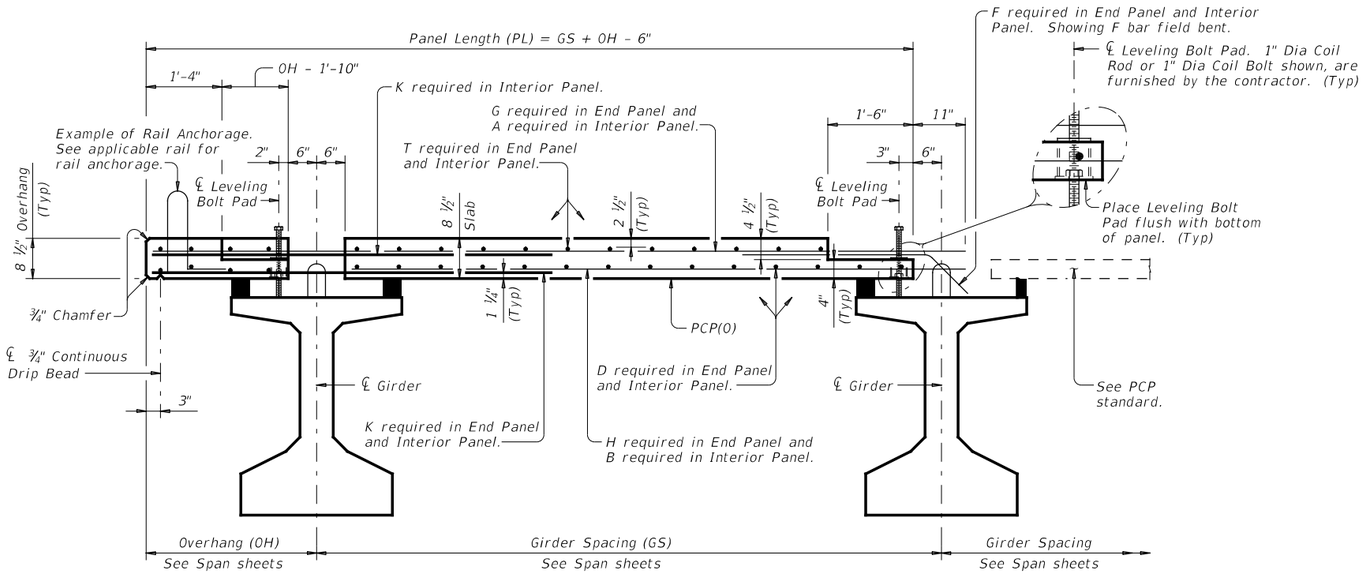


ISOMETRIC VIEW AT CORNER OF PANEL

Showing Typical Chamfers on Panel. Drip Bead and reinforcing steel not shown for clarity.



BARS F



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION/FABRICATION NOTES:

Remove laitance from top panel surface.

Finish top surface area of panel with a broom finish. Finish top ledge 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).

Provide ¾" concrete chamfers as shown on these details.

Do not lap splice bars D, F, K & T. Bars A, B, G & H, may be spliced with only one lap splice allowed on each bar.

Panels must be fabricated by a fabricator meeting the requirements of DMS 7300 for Multi-Project Nonstressed Member Fabrication Plant.

MATERIAL NOTES:

Provide Class H concrete (f'c=4000 psi) in panels. Provide Class H (HPC) concrete for panels if required elsewhere in plans. Maximum large aggregate size is 1".

Provide material as shown on this standard for the Leveling Bolt Pad.

Provide Grade 60 conventional reinforcing steel.

Provide epoxy coated reinforcement for bars A, B, D, G, H, K & T if slab reinforcement is epoxy coated.

An equal area and spacing of deformed Welded Wire Reinforcement (WWR) ASTM-A1064 may be substituted for bars A, B, D, G, H & T, unless otherwise noted. Bars F and K can not be replaced with WWR.

Galvanize leveling bolt pad assembly if epoxy-coated reinforcing steel is used in slab.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement, lifting devices or epoxy coated reinforcement required on these details are subsidiary to the bid Item "Reinforced Concrete Slab".

See railing details for rail anchorage in panel overhang.

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.

Submit stable lifting methods and devices to the Engineer for approval.

Shop drawings for the fabrication of panels will require the Engineer's approval.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

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Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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REVISIONS	0513	01	017	SH236
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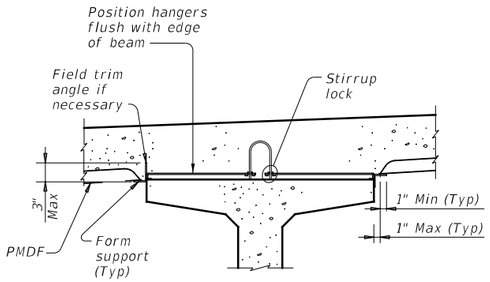
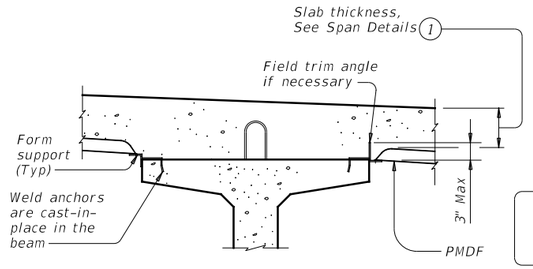
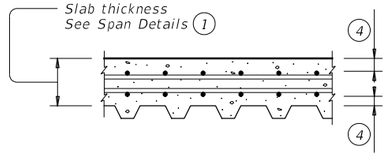


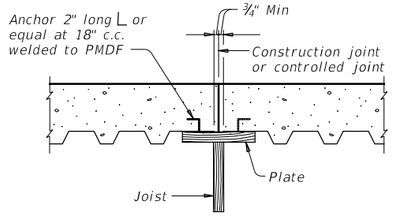
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

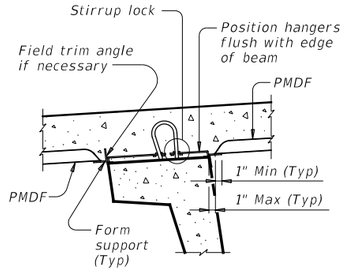


TYP LONGITUDINAL SLAB SECTION

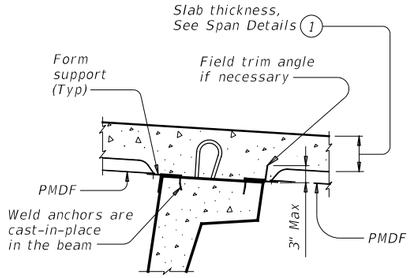


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

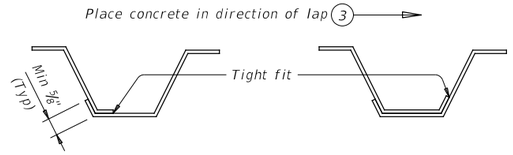
SECTION THRU CONSTRUCTION JOINT



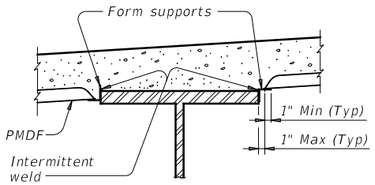
U-BEAMS WITH STIRRUP LOCKS



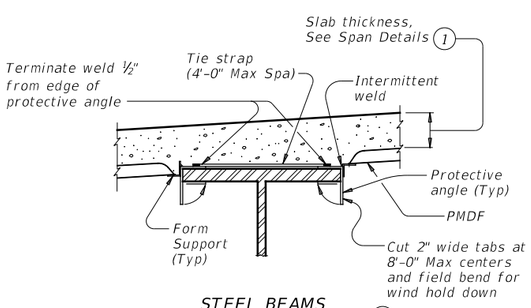
U-BEAMS WITH WELD ANCHORS



SIDE LAP DETAILS

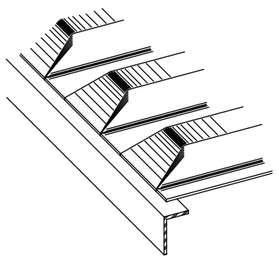


STEEL BEAMS AT COMPRESSION FLANGES

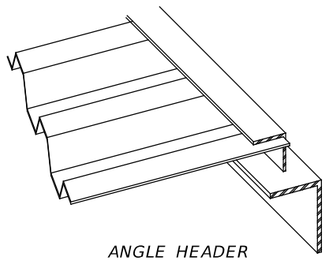


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES

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.

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.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
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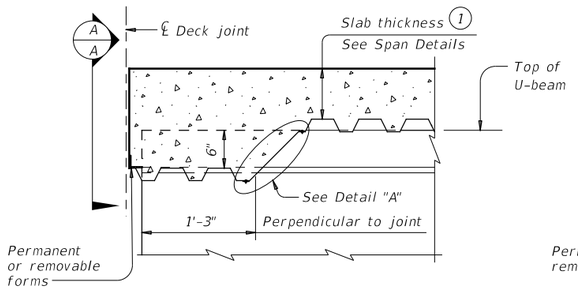
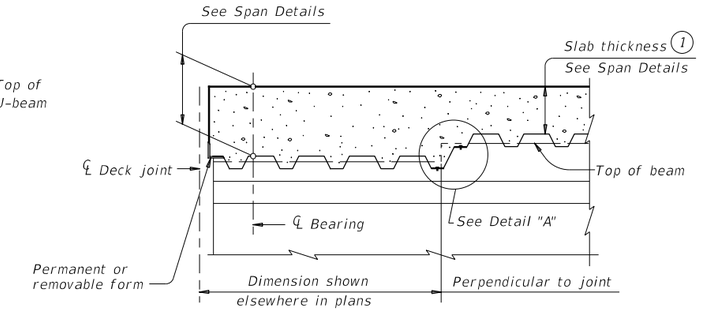
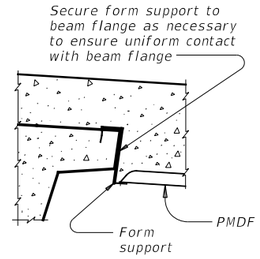


AT THICKENED SLAB END FOR U-BEAMS

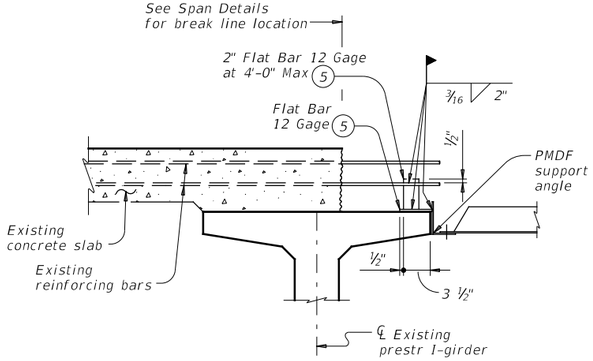


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

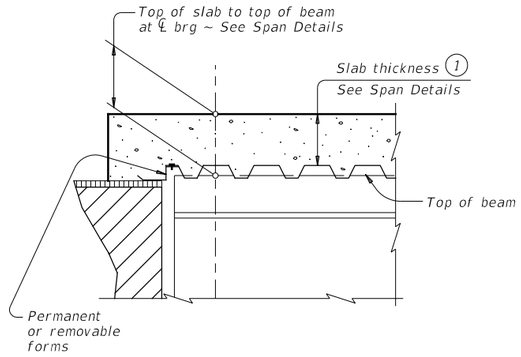
Showing I-beam block-out. No block-out for I-girders or steel beams.



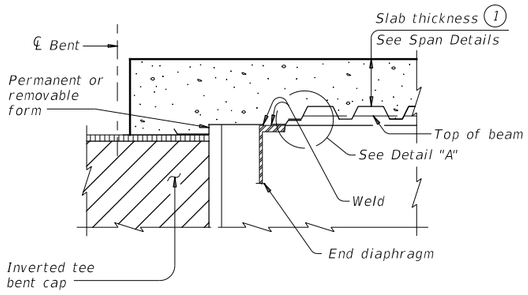
SECTION A-A



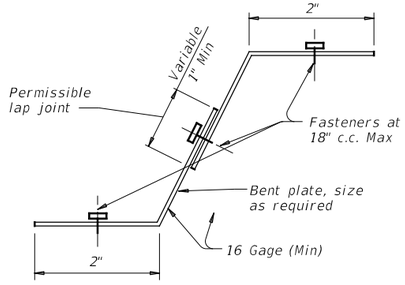
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



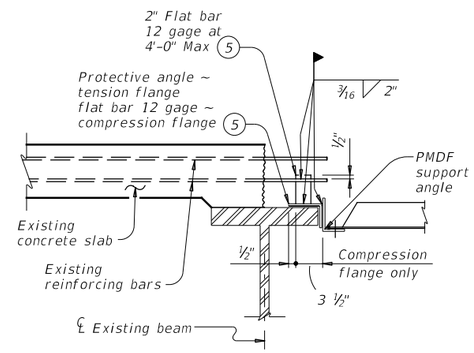
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

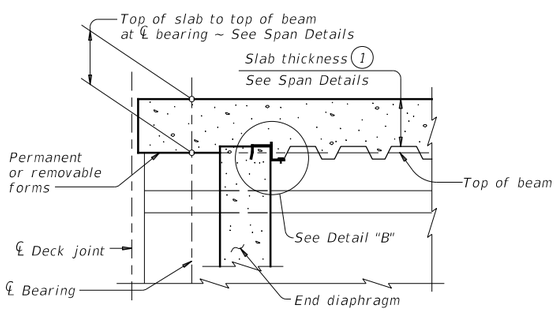


DETAIL "A"

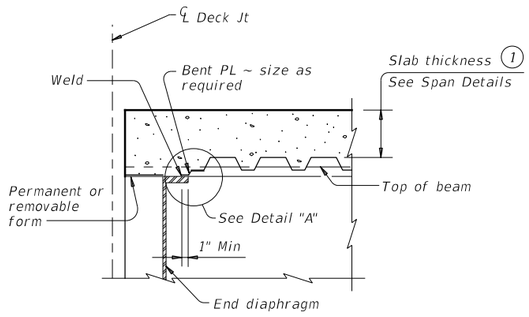


SHOWING STEEL BEAMS

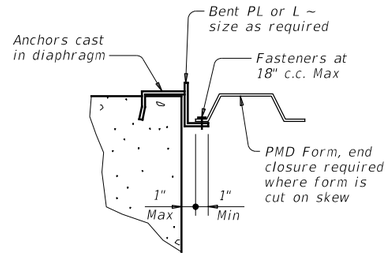
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 3/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

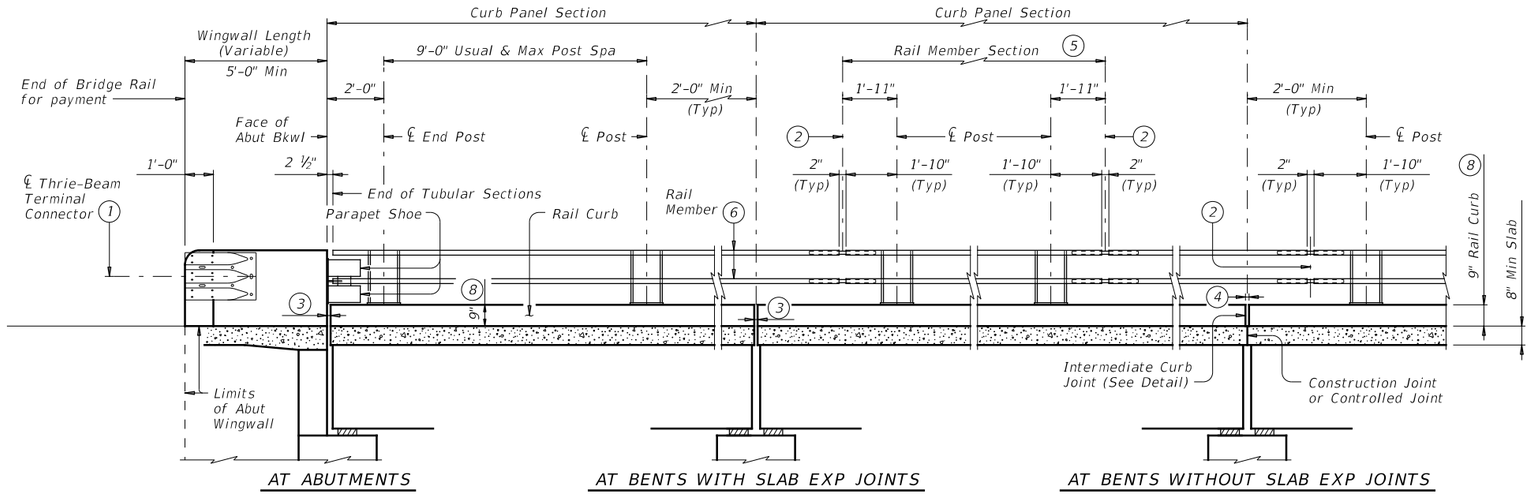
Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

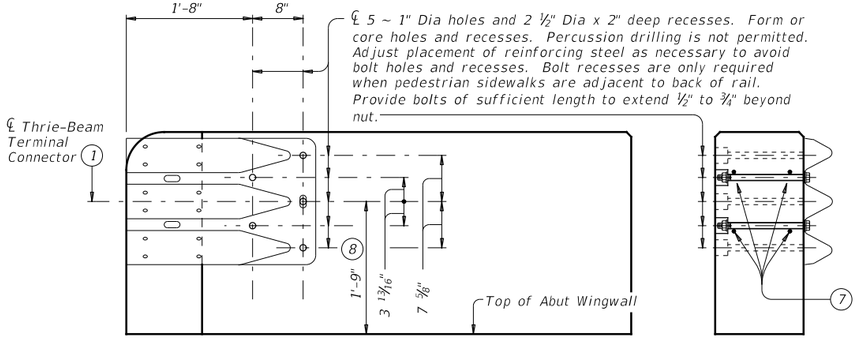
PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		145

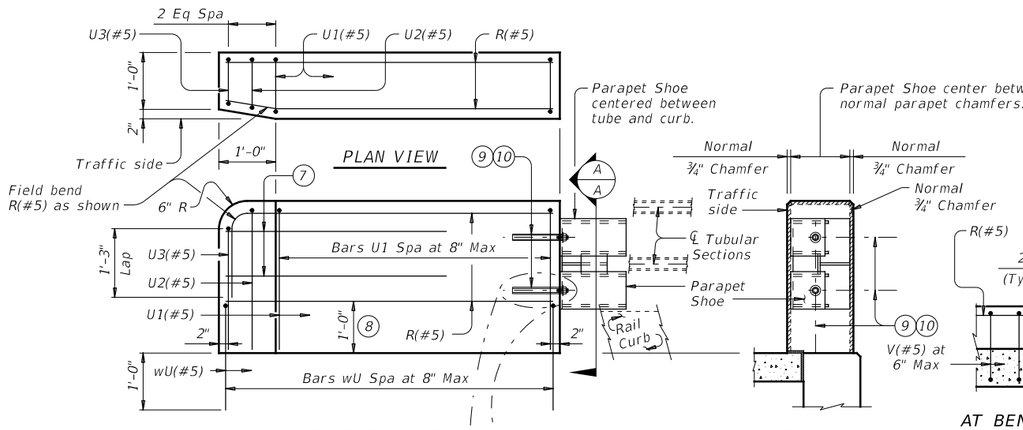


ROADWAY ELEVATION OF RAIL

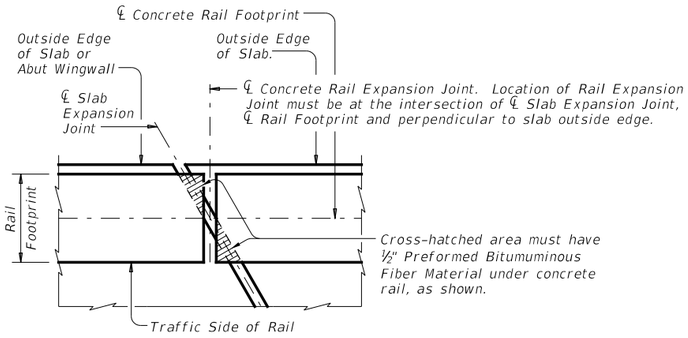
1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. ℄ Expansion Joint or Splice Joint as required.
3. Same as slab joint opening. (5" Max Expansion Joint).
4. ¼" Min, ¾" Max.
5. Rail member sections must have at least two posts but not more than four.
6. HSS 6 x 2 x ¼ (ASTM A1085 or A500 Gr B).
7. Place 4 additional Bars R(#5) 3'-8" in length inside Bars U(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
8. Increase 2" for structures with overlay.
9. Anchor bolts must be ⅞" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with heavy hex nuts and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".
10. Install Parapet Shoe after rail has been placed. To ease installation, temporarily brace parapet shoe until the anchorage system achieves manufacturer's recommended curing time. Anchorage system must be assembled with one hardened steel washer (ASTM F436) and one heavy hex nut (ASTM A563) each. Remove temporary bracing after anchorage systems has been firmly tightened.



TERMINAL CONNECTION DETAILS

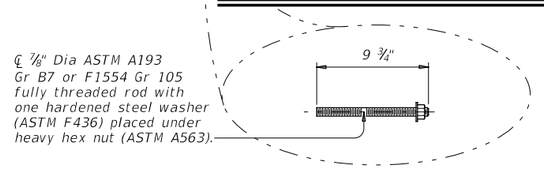


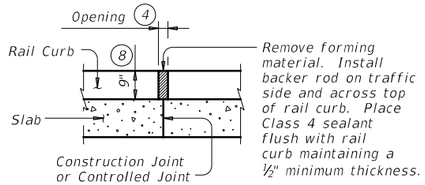
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.





INTERMEDIATE CURB JOINT DETAIL

Provide at all interior bents without slab expansion joints.

SHEET 1 OF 4

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T1W

FILE: rlstd002-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH			
©TxDOT September 2019	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0513	01	017		SH236		
	DIST	COUNTY			SHEET NO.		
	WACO	CORYELL			146		

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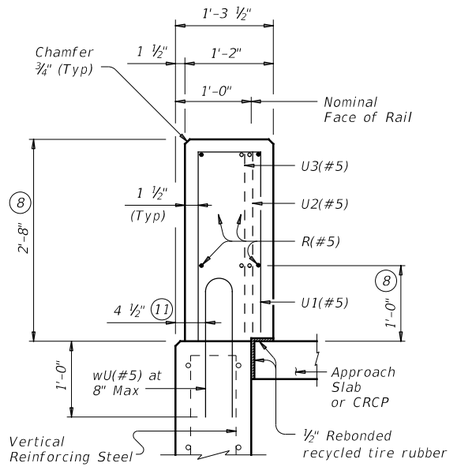
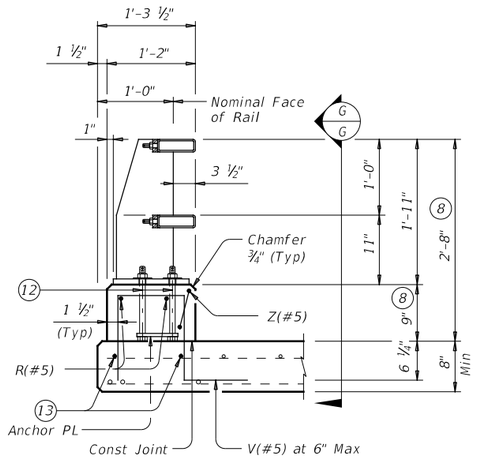
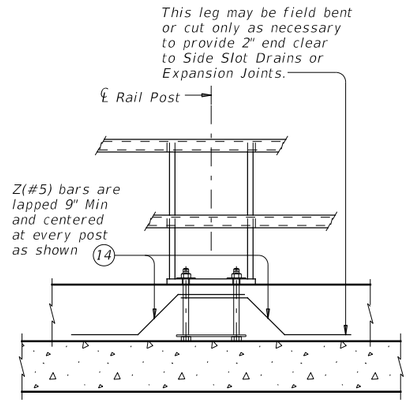


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

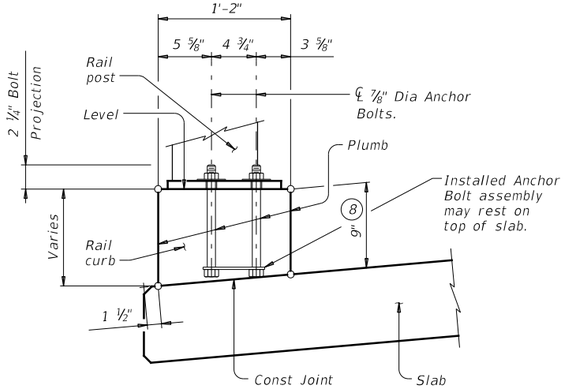


ON BRIDGE SLAB



VIEW G-G

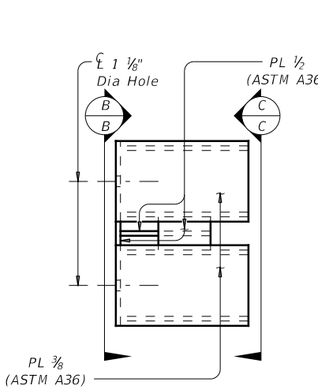
Bars V and R omitted for clarity.



RAIL CURB FORMING DETAIL

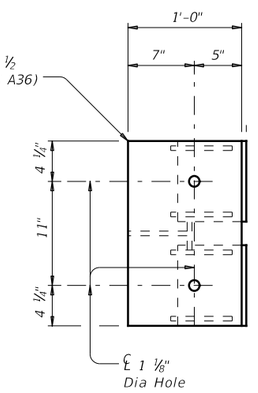
Reinforcing steel and rail curb chamfers not shown for clarity.

SECTIONS THRU RAIL

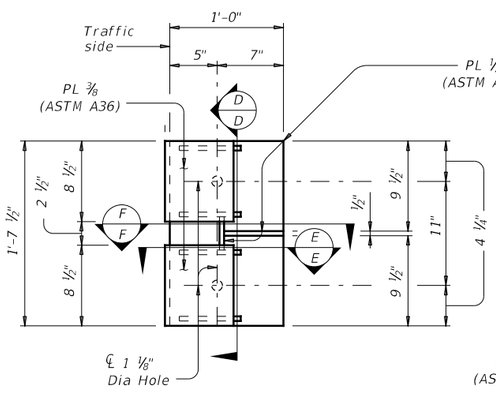


PARAPET SHOE

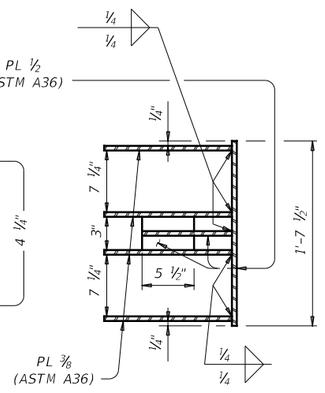
(Parapet Shoe weight = 92 lb each, for contractor's information only).



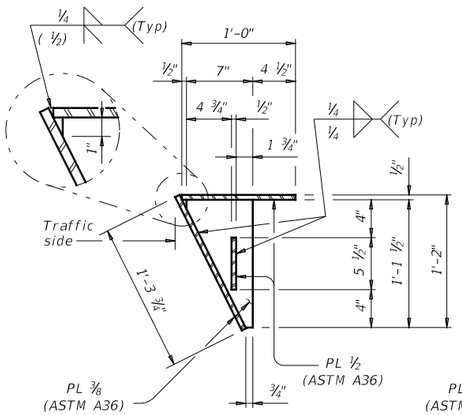
VIEW B-B



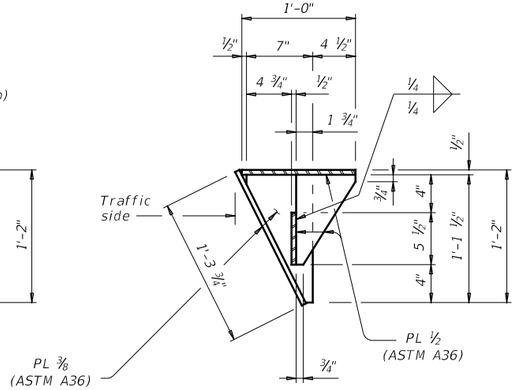
VIEW C-C



SECTION D-D



SECTION E-E



SECTION F-F

(8) Increase 2" for structures with overlay.

(11) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

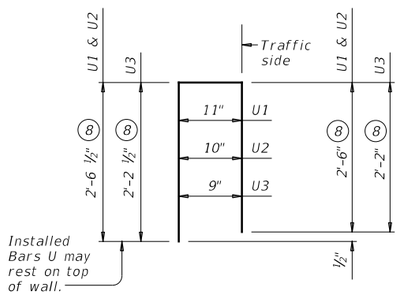
(12) ℄ ⅞" Dia Anchor Bolts. See "Anchor Bolt Assembly Details".

(13) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

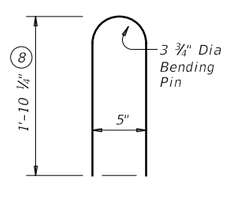
(14) Adjust Bars Z(#5) as necessary to avoid Bars V(#5).

(15) Length shown for 6 ¼" Min bar embedment with no overlay. Adjust as required.

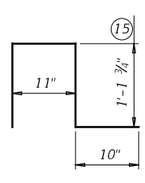
(16) Increase 2 ¾" for structures with overlay.



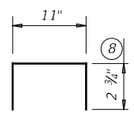
BARS U(#5)



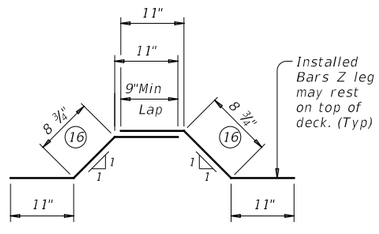
BARS wU(#5)



BARS V(#5)



BARS VS(#5)



BARS Z(#5)

SHEET 2 OF 4

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T1W

FILE: rlstd002-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
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REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		147

DATE: 8/3/2020 10:13:13 AM
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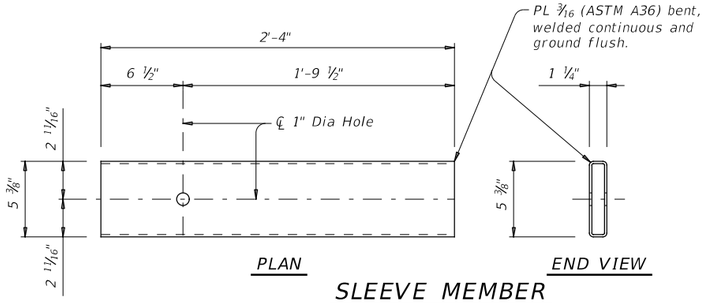
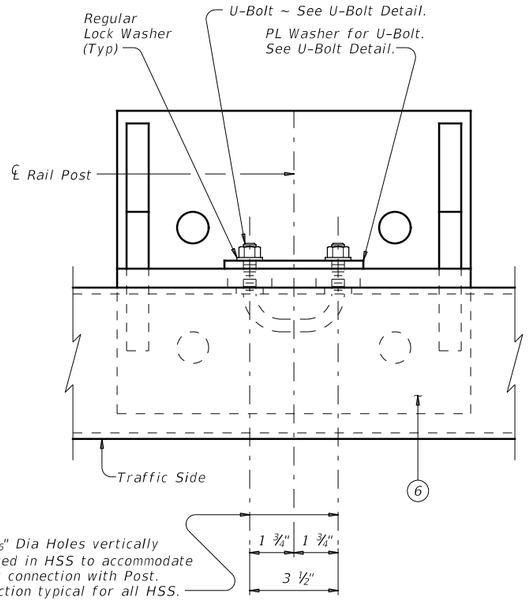
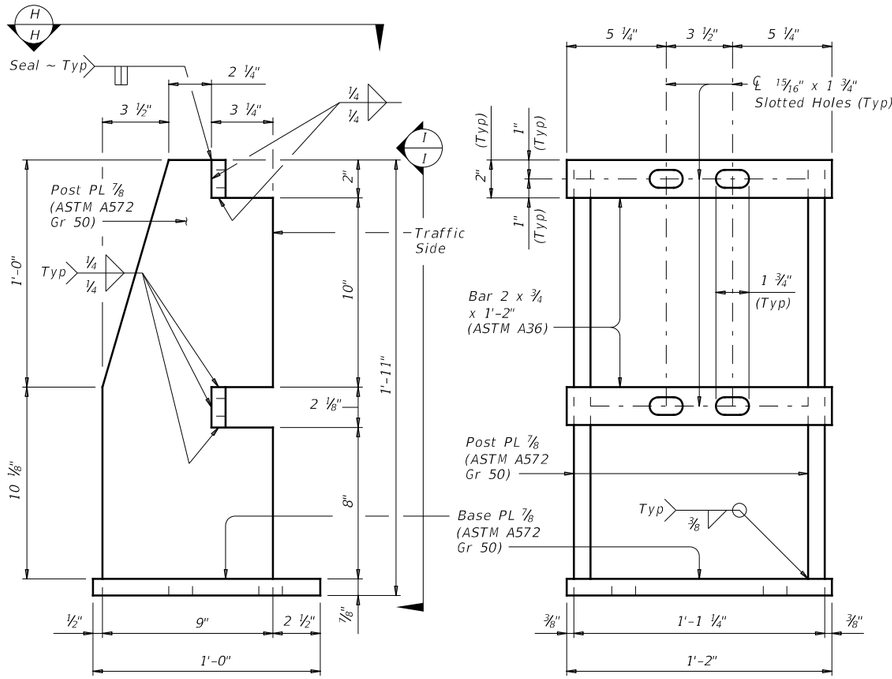


SLEEVE MEMBER



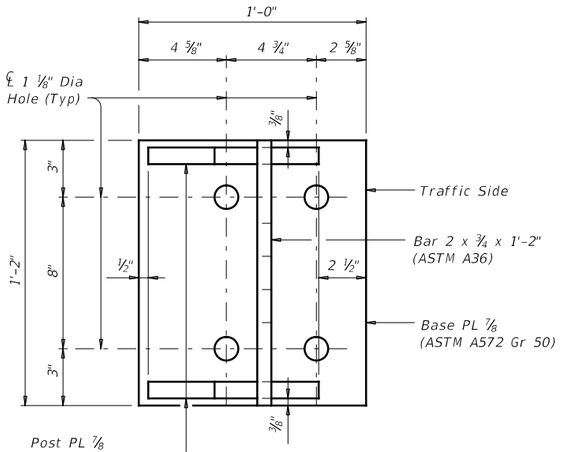
TOP VIEW OF RAIL POST

(Showing connection for rail post and HSS.)



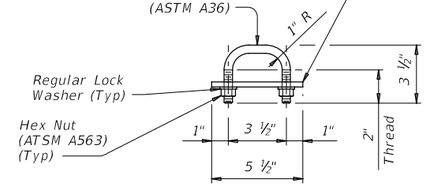
POST DETAIL

VIEW I-I



VIEW H-H

(Showing Hole location in Base PL)

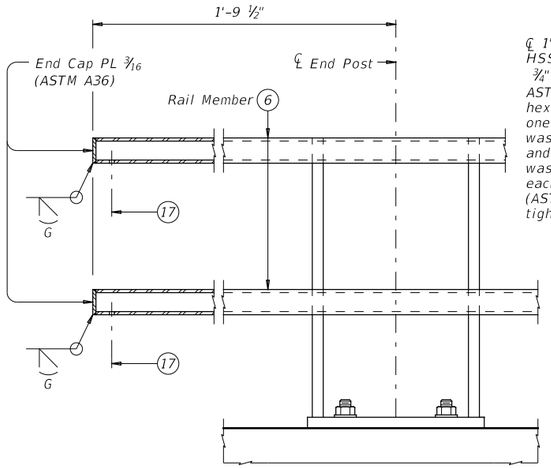


U-BOLT DETAIL

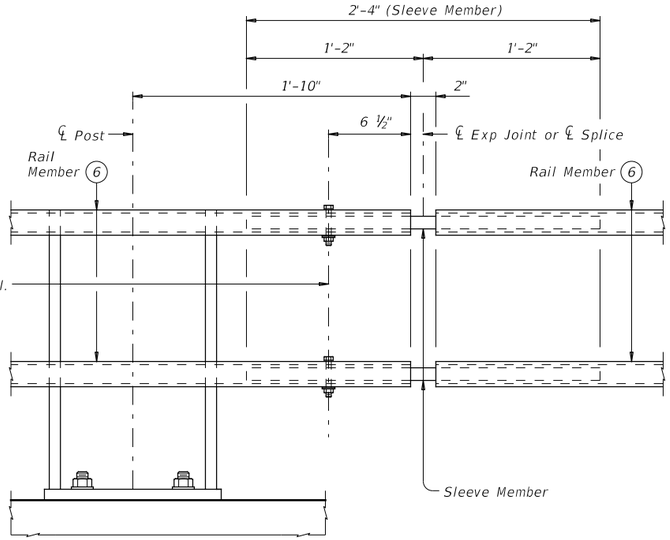
(Showing U-Bolt for rail post and HSS.)

⑥ HSS 6 x 2 x ¼ (ASTM A1085 or A500 Gr B).

⑰ ℄ ⅜" Dia Drain Hole in bottom of HSS.



END CAPS ON HSS AT END POST



EXPANSION JOINT OR SPLICE

SHEET 3 OF 4

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T1W

FILE: rlstd002-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
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	WACO	CORYELL		148

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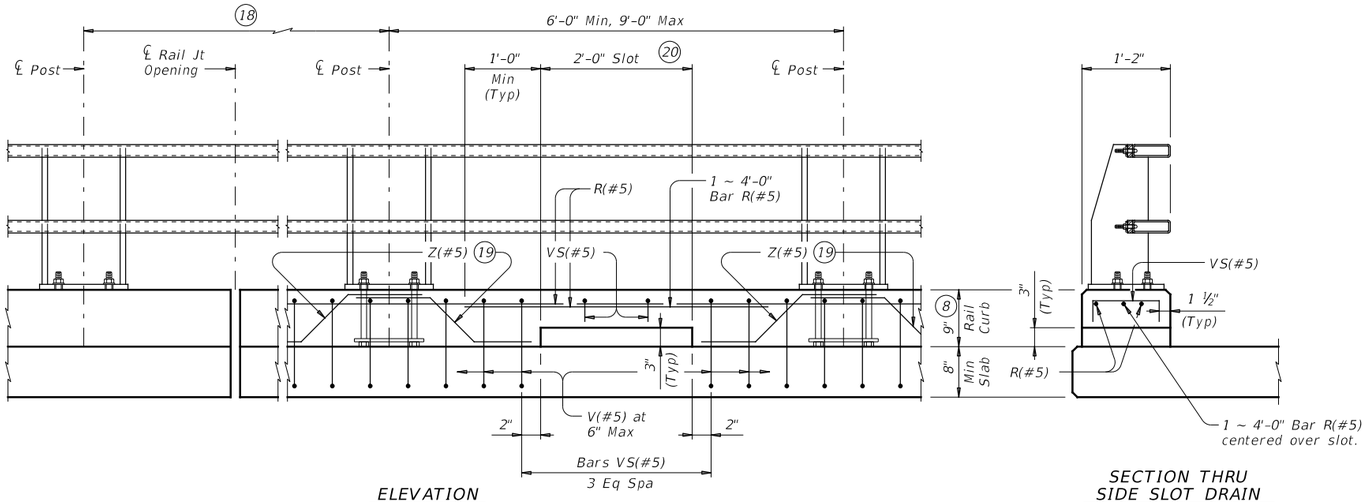
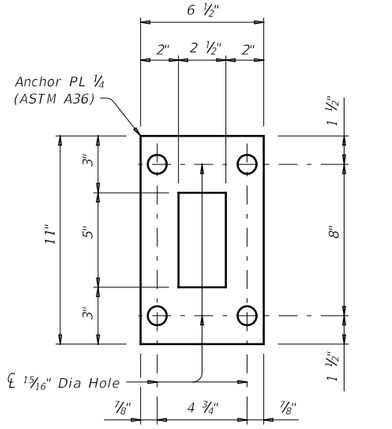


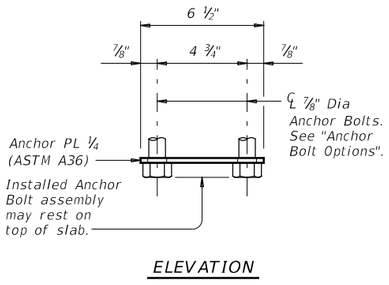
ELEVATION

SECTION THRU SIDE SLOT DRAIN

OPTIONAL SIDE SLOT DRAIN DETAILS 21

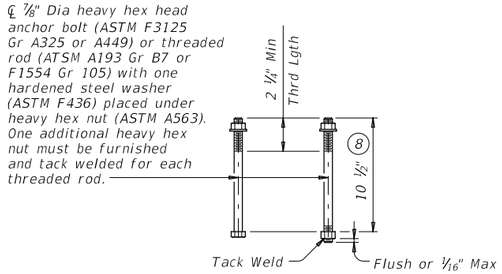


PLAN OF ANCHOR PLATE



ELEVATION

ANCHOR BOLT ASSEMBLY DETAILS



ANCHOR BOLT OPTIONS

(Showing Anchor Bolts for Base Plate)

(8) Increase 2" for structures with Overlay.

(18) Side slot drains are not allowed in areas where there is a joint in the concrete curb between rail posts.

(19) Bars Z(#5). See "Section Thru Rail" and "View G-G" for Bar Z placement and spacing.

(20) Center side slot drain between posts within the limits shown.

(21) Side slot drains may be used where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway and a sidewalk, side slot drains are not permitted.

CONSTRUCTION NOTES:

The face of tubular sections and rail curb must be plumb unless otherwise approved. Steel posts must be square to the top of curb. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

Bend tubes to required radius for curved rails. Shop drawings for approval are required for curved rails.

One shop splice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

Round or chamfer exposed edges of rail members and rail posts to approximately 1/16" by grinding.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide ASTM A1085 or A500 Gr B for all HSS.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over gavanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Anchor bolts for base plate must be ⅞" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Provide ¾" Dia x 3 ½" hex head bolts (ASTM F3125 Gr A325) for expansion or splice joints in HSS with one regular washer and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Provide ½" Dia round bar U-bolts (ASTM A36) with plate washer (ASTM A36) and regular lock washers placed under hex nuts that conform to ASTM A563 requirements. See "U-Bolt Detail".

Provide Class "S" concrete. When Class "S" concrete for slab is HPC, include a minimum of 3 gallons of calcium nitrite inorganic corrosion inhibitor per cubic yard of Class "S" concrete.

Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been successfully 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.

This railing cannot be used on bridges with expansion joints providing more than 5" movement or on cast-in-place retaining walls, unless otherwise noted.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Submit erection drawings showing panel lengths, rail post spacing, and anchor bolt setting, to the Engineer for approval.

Average weight of railing with no overlay: 173 plf total
131 plf (Conc)
42 plf (Steel).

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T1W

FILE: rlstd002-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		149

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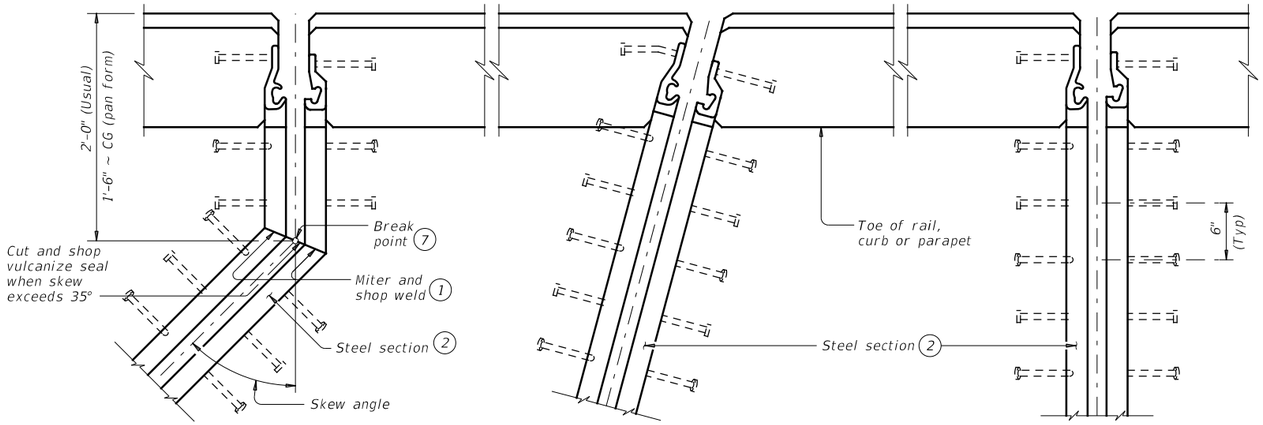
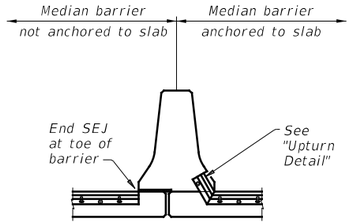


SHOWING SKEWS WITH SLAB BREAKBACKS

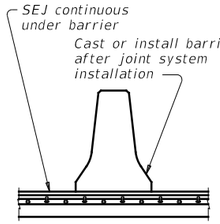
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

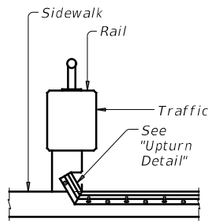
PLANS OF END CONDITIONS



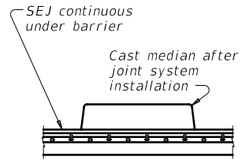
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



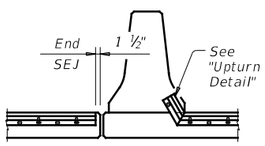
AT MEDIAN BARRIER



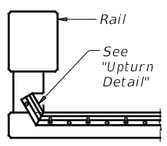
AT SIDEWALK BEHIND BRIDGE RAIL



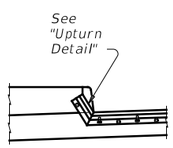
AT RAISED MEDIAN



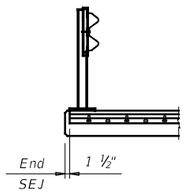
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

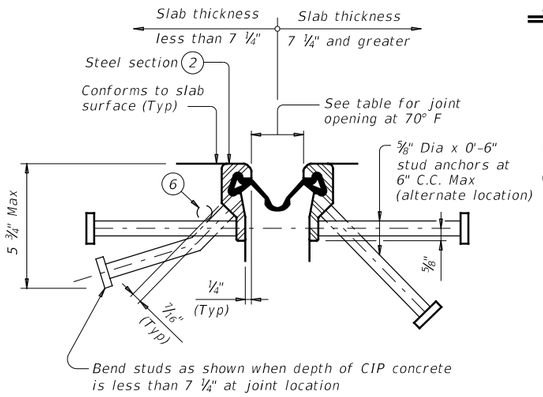


AT SIDEWALK

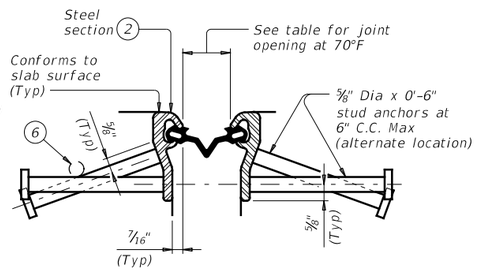


AT STEEL POST BRIDGE RAIL

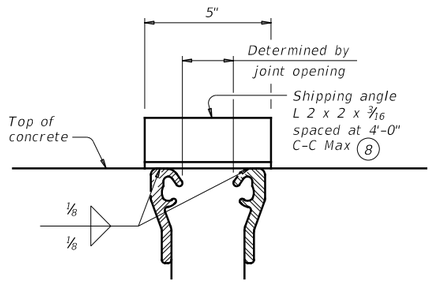
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

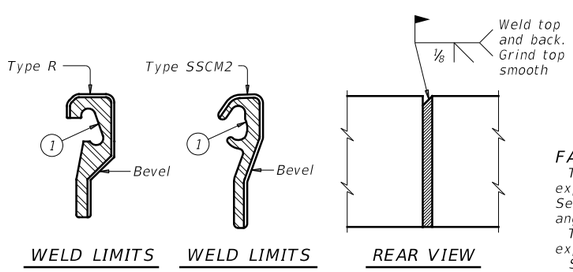
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

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.

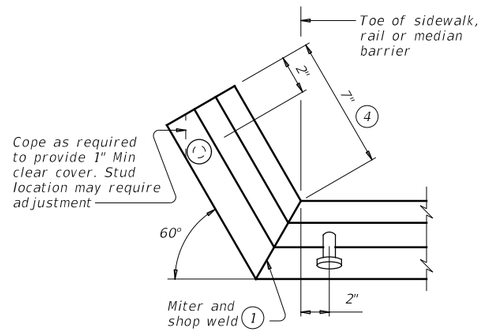
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

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

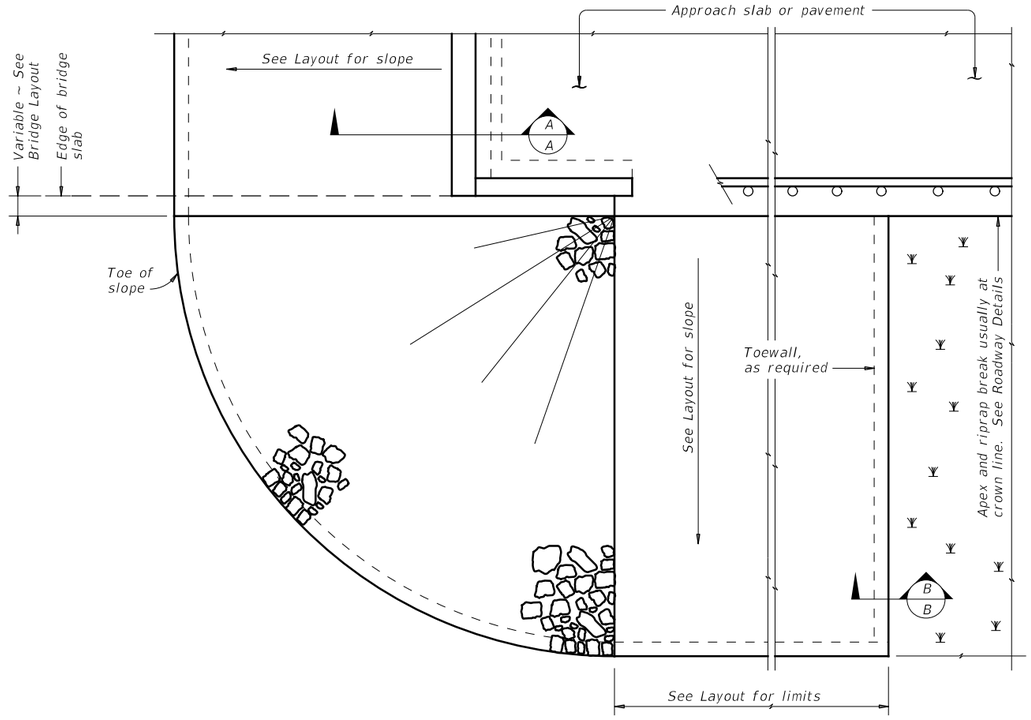
Texas Department of Transportation

Bridge Division Standard

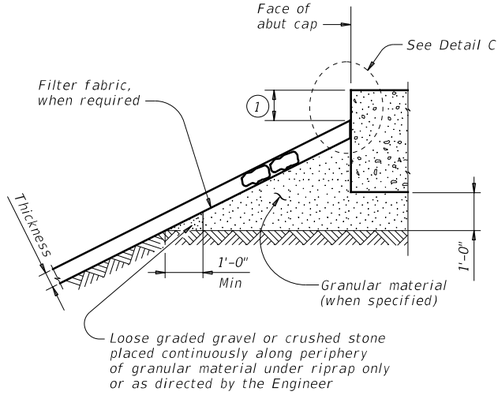
SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

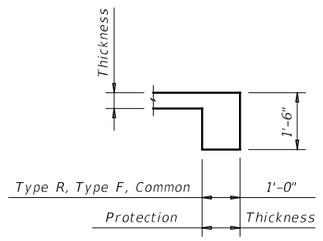
FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		150



PLAN

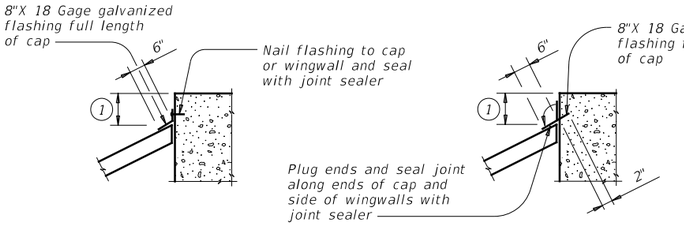


SECTION A-A AT CAP



SECTION B-B

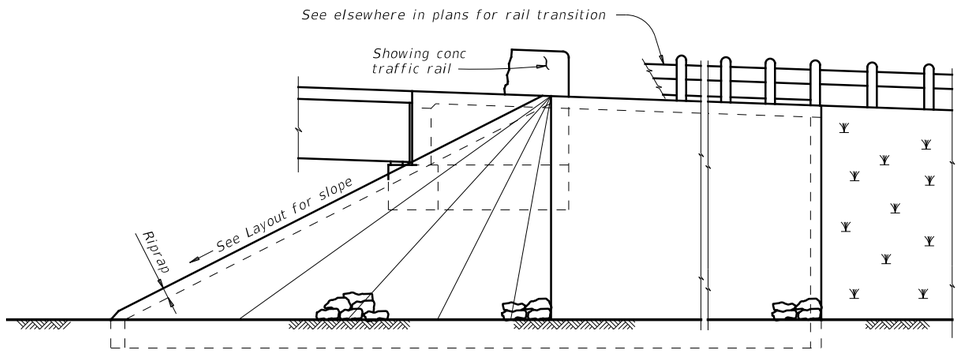
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



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

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		151

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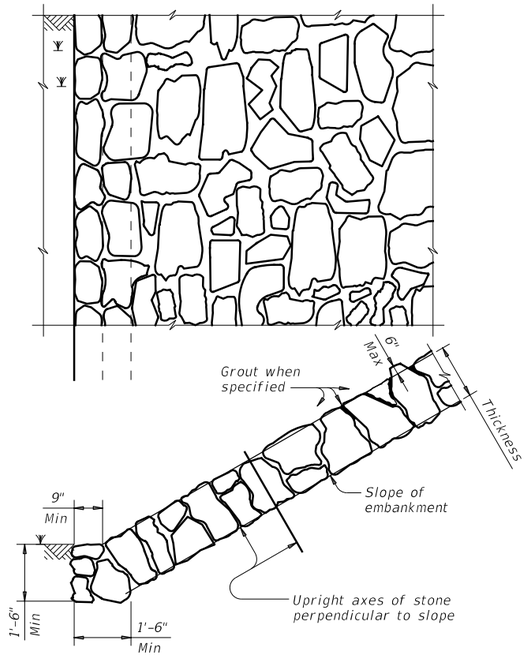


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

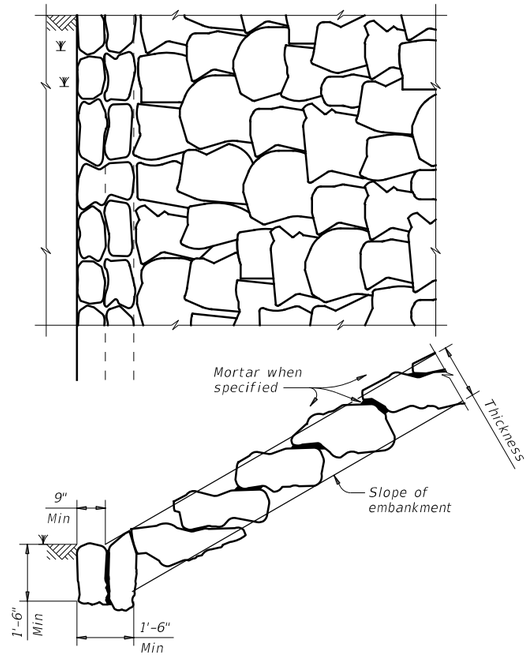


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

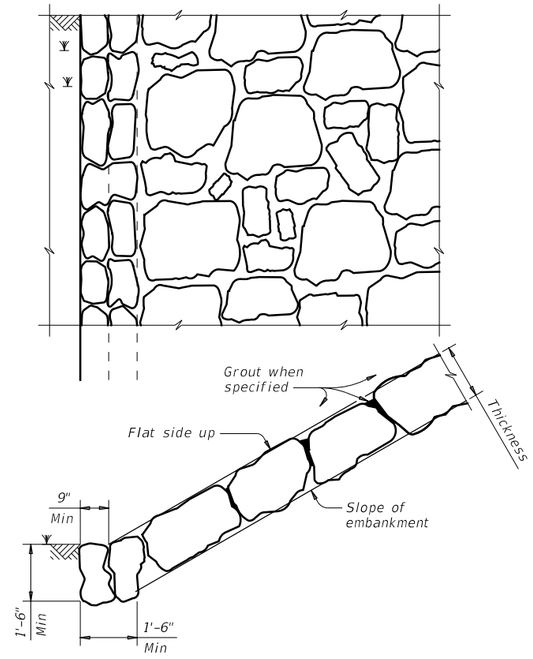


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

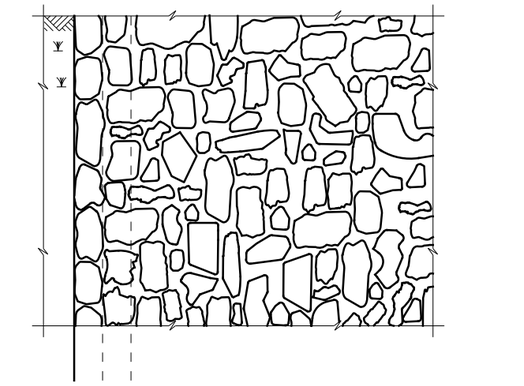


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

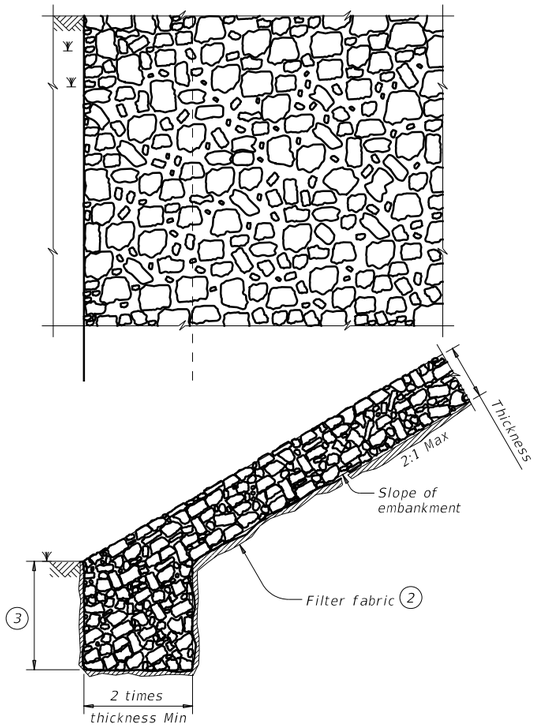


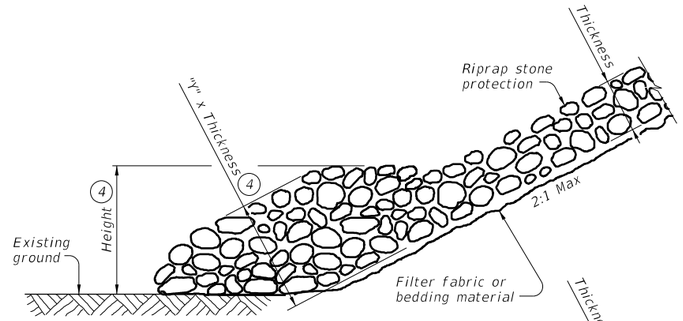
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

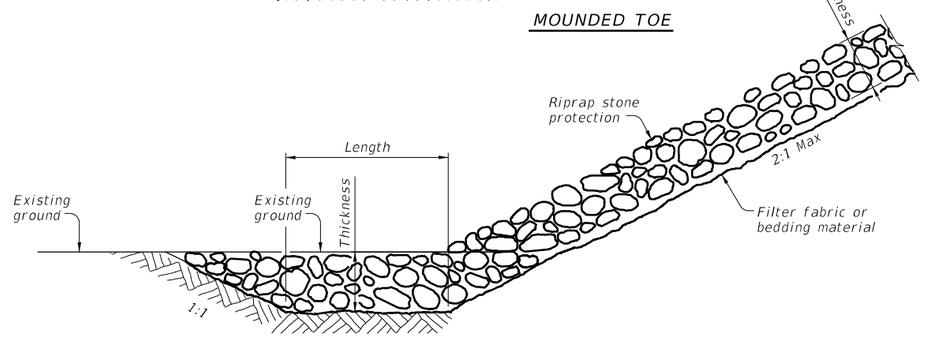
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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)

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SHEET 2 OF 2

Texas Department of Transportation

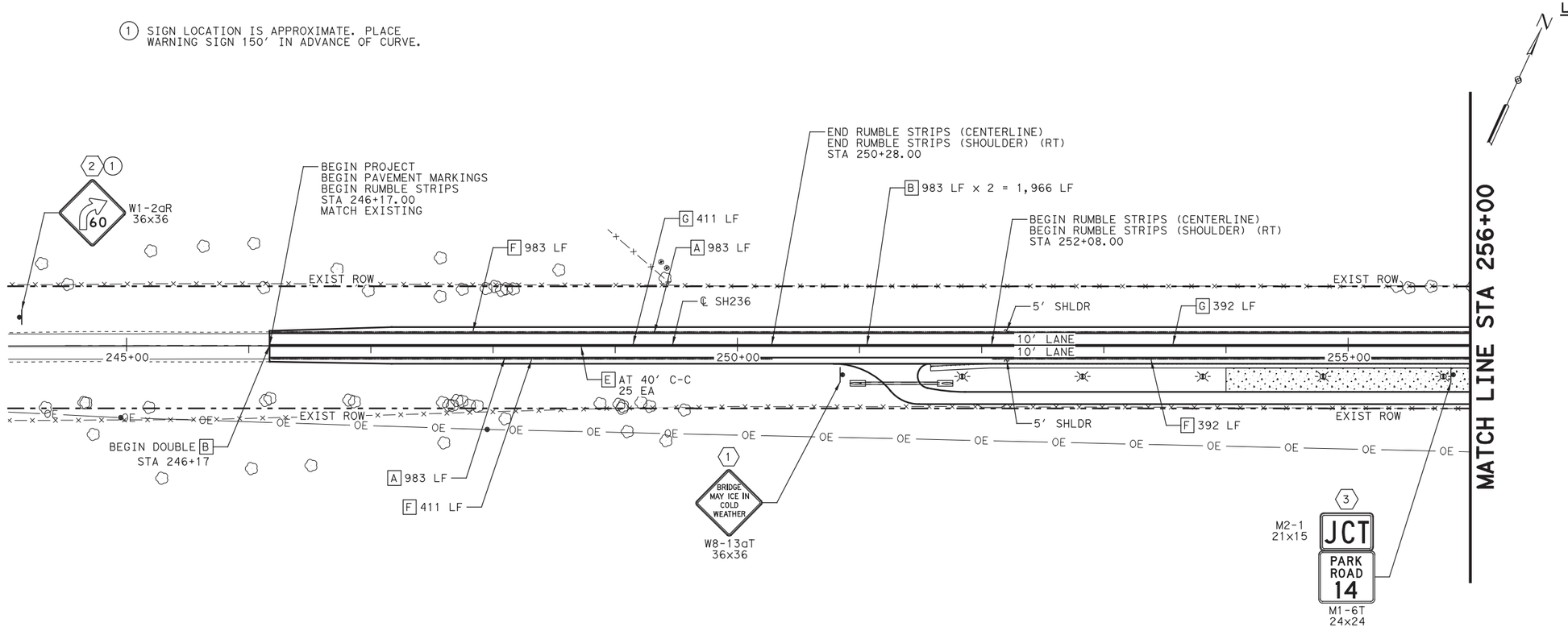
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		152

(1) SIGN LOCATION IS APPROXIMATE. PLACE WARNING SIGN 150' IN ADVANCE OF CURVE.



LEGEND

- A RE PM W/RET REQ TY I (W) 4"(SLD)(100MIL)
- B RE PM W/RET REQ TY I (Y) 4"(SLD)(100MIL)
- C REFL PAV MRK TY I (W) 24" (SLD)
- D PAVEMENT SEALER (4")
- E REFL PAV MRKR TY II-A-A
- F RUMBLE STRIPS (SHOULDER)
- G RUMBLE STRIPS (CENTERLINE)
- INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
- INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)
- PROPOSED SIGN POST

NOTES:

1. ALL STATION AND OFFSETS ARE FROM "CL SH236" UNLESS OTHERWISE NOTED. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL PAVEMENT MARKINGS AND SIGNAGE SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

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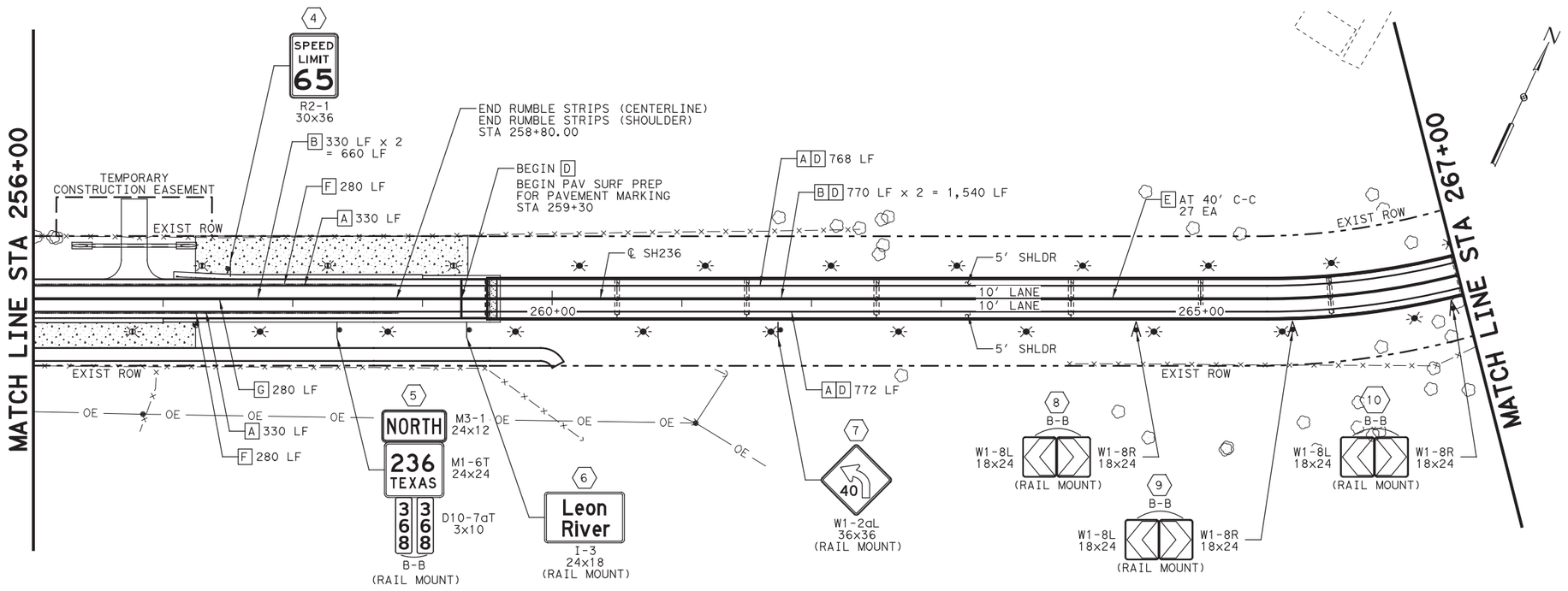

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
08/20/2020
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

SIGNING AND PAVEMENT MARKING LAYOUT
SH 236 AT LEON RIVER

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	153
CONTROL	SECTION	JOB	
0513	01	017	

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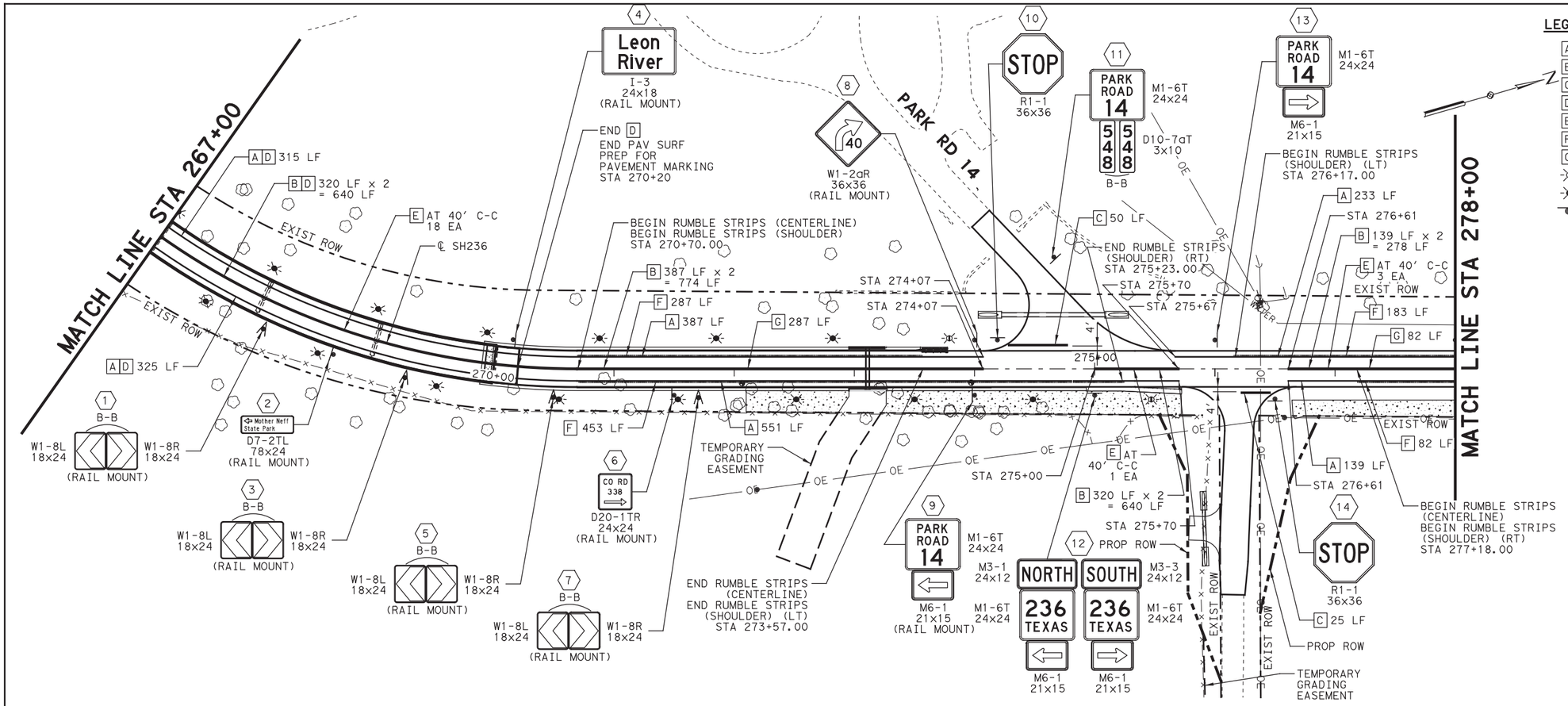

LEGEND

- A RE PM W/RET REQ TY I (W) 4"(SLD)(100MIL)
- B RE PM W/RET REQ TY I (Y) 4"(SLD)(100MIL)
- C REFL PAV MRK TY I (W) 24" (SLD)
- D PAVEMENT SEALER (4")
- E REFL PAV MRKR TY II-A-A
- F RUMBLE STRIPS (SHOULDER)
- G RUMBLE STRIPS (CENTERLINE)
- INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
- INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)
- PROPOSED SIGN POST

NOTES:

1. ALL STATION AND OFFSETS ARE FROM "CL SH236" UNLESS OTHERWISE NOTED. SEE "HORIZONTAL ALIGNMENT DATA" SHEETS FOR HORIZONTAL ALIGNMENT INFORMATION.
2. ALL PAVEMENT MARKINGS AND SIGNAGE SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

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SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED PROFESSIONAL ENGINEER
08/20/2020
Phaisarn Cwatanaphol, P.E.

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

SIGNING AND PAVEMENT MARKING LAYOUT
SH 236 AT LEON RIVER

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	154
CONTROL	SECTION	JOB	
0513	01	017	

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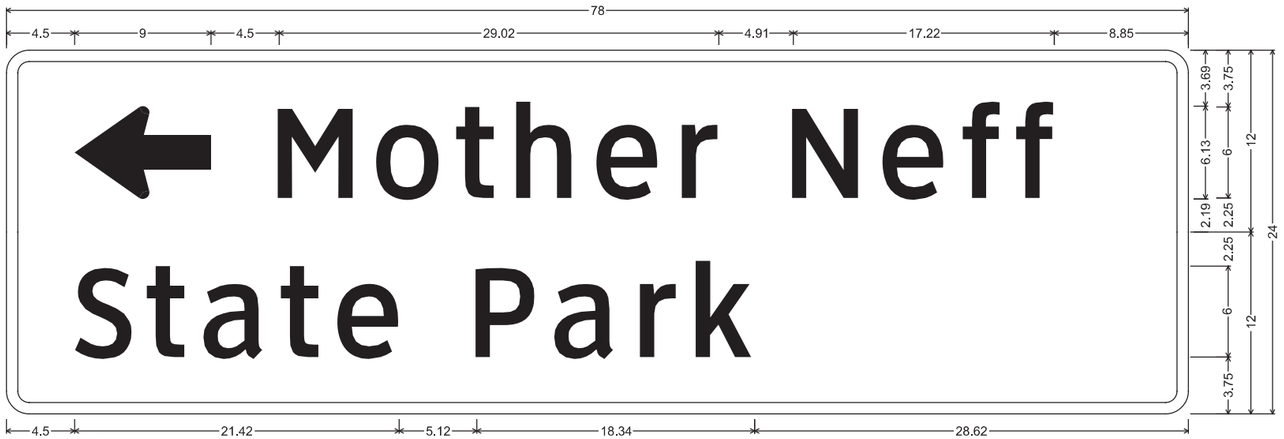

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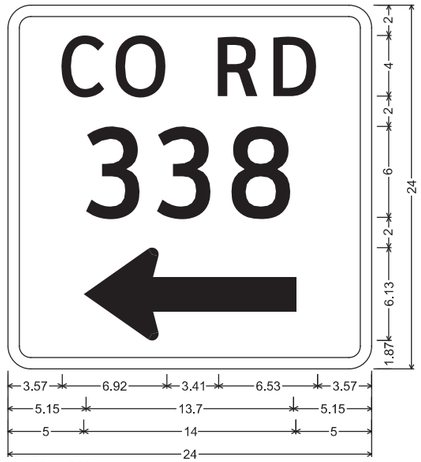
Standard Arrow Custom 9.00" X 6.13" 180°; [Mother Neff] ClearviewHwy-3-W;
1.50" Radius, 0.75" Border, White on Brown;
[State Park] ClearviewHwy-3-W;



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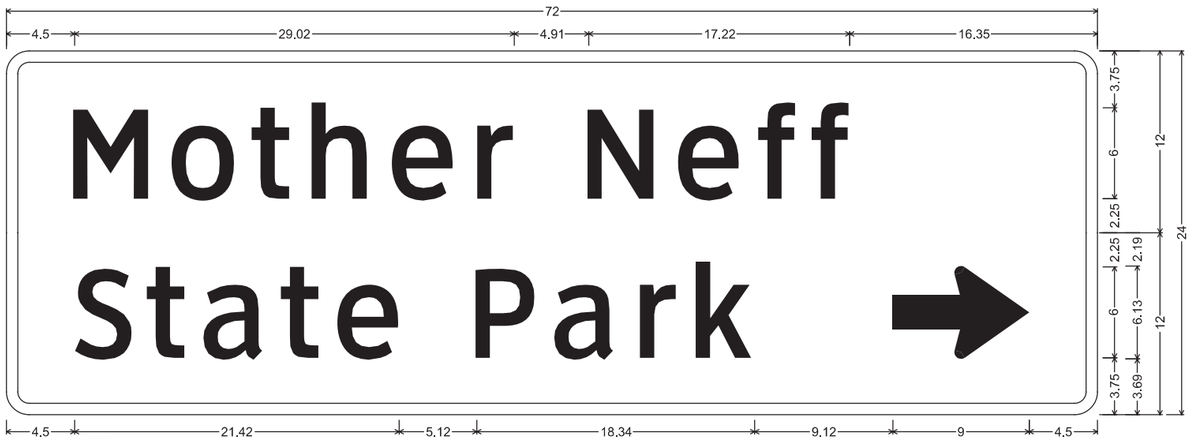

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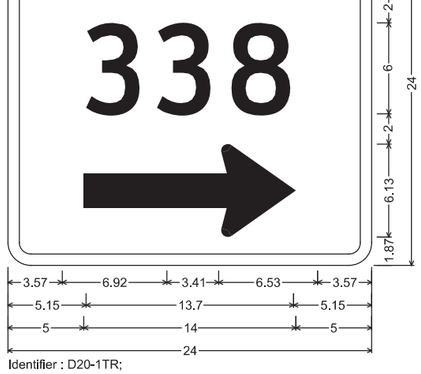
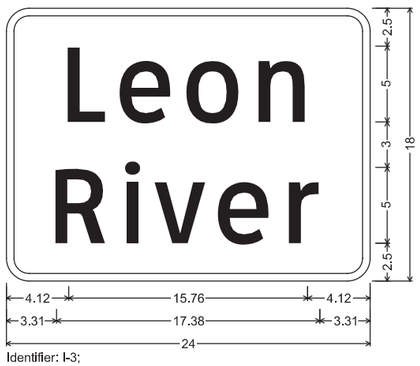
[State Park] ClearviewHwy-3-W; Standard Arrow Custom 9.00" X 6.13" 0°;



Identifier : D20-1TR;
1.50" Radius, 0.75" Border, White on Green;
[CO RD] ClearviewHwy-3-W; [338] ClearviewHwy-3-W;
Standard Arrow Custom 14.00" X 6.13" 0°;



Identifier: I-3;
1.50" Radius, 0.50" Border, White on Green;
[Leon] ClearviewHwy-3-W; [River] ClearviewHwy-3-W;

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
LICENSED
PROFESSIONAL ENGINEER

Phaisarn Cwatanapho, P.E. 08/20/2020

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

SIGN DETAILS

SH 236 AT LEON RIVER

NOT TO SCALE SHEET 1 OF 1

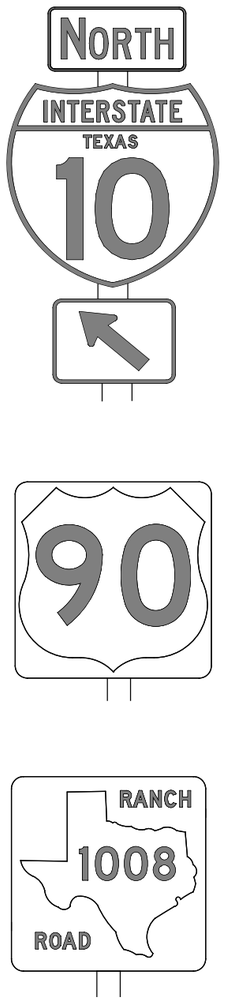
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	155
CONTROL	SECTION	JOB	
0513	01	017	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0040174.tbl
USER: KBERGER TIME: 11:01:18 AM SCALE: 1:10
DATE: 8/3/2020
FILE: SH236SGNDTL01.dgn

DATE: 8/3/2020 11:01:20 AM
FILE: c:\pwworking\central01\d0974303\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

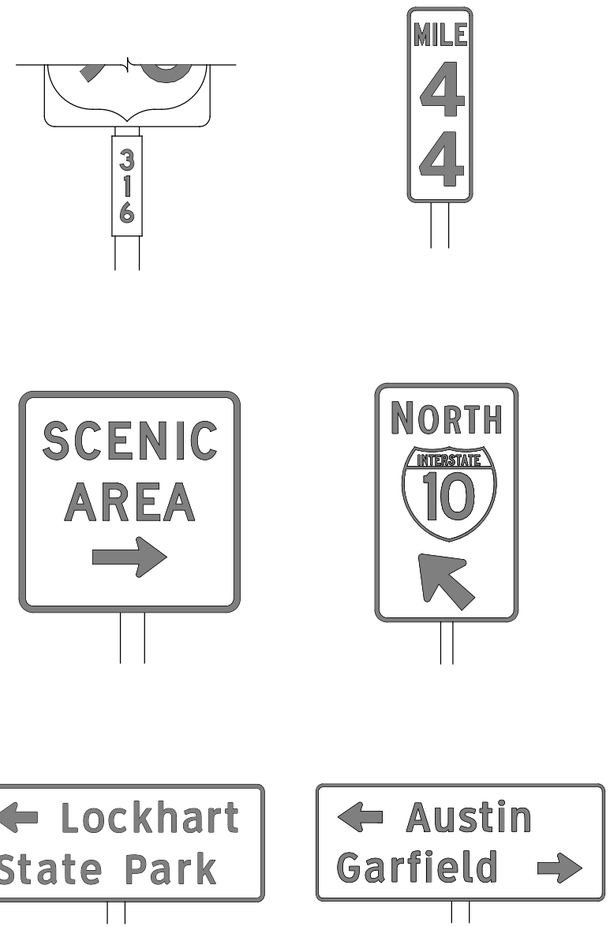
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

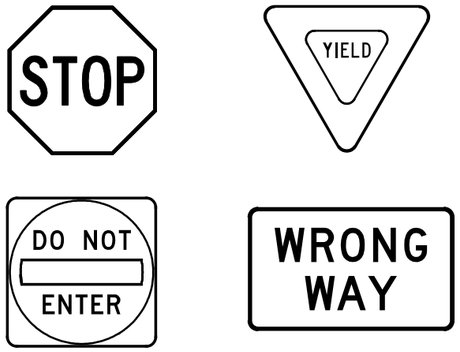
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	CORYELL		156

3

DATE: 8/3/2020 11:01:22 AM
FILE: c:\pwworking\central01\d0974303\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

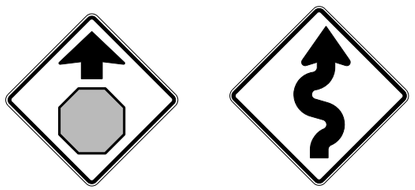
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

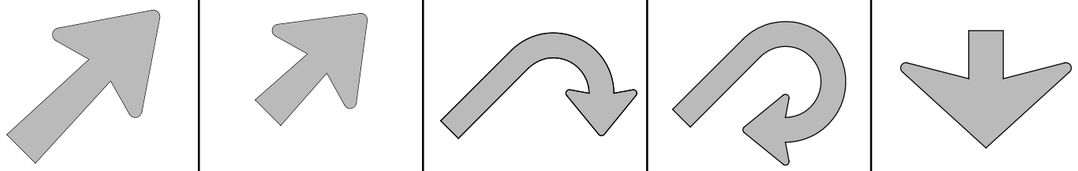
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		157

4

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

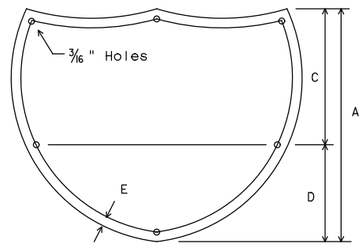
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

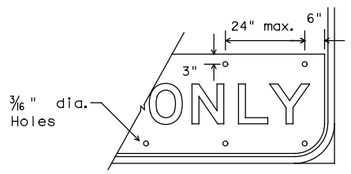
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

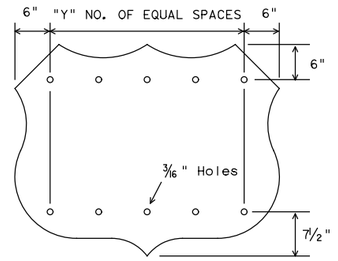


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	11/2
48	28	20	13/4

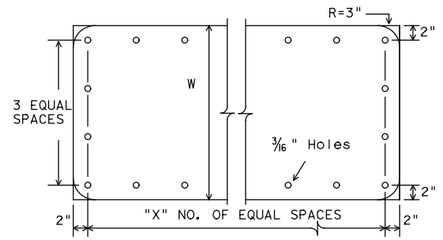


EXIT ONLY PANEL



U.S. ROUTE MARKERS

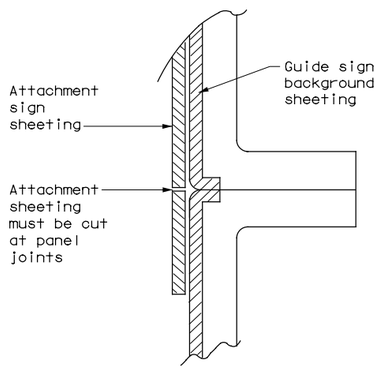
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

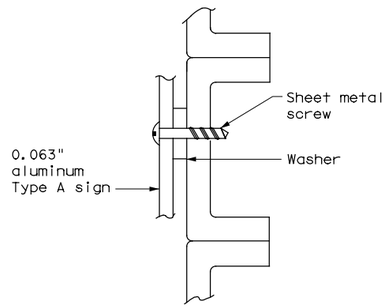
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



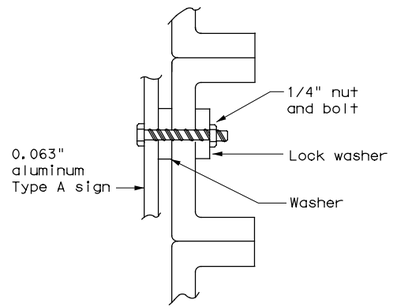
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



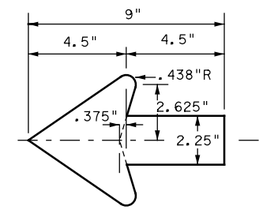
NUT/BOLT ATTACHMENT

NOTE:

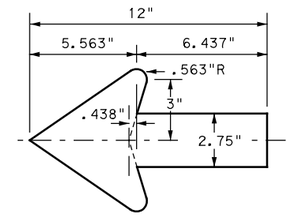
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

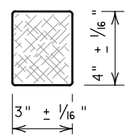
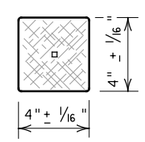
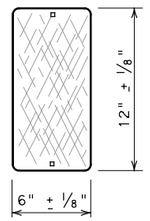
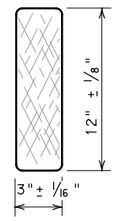
TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	WACO	CORYELL		158

5

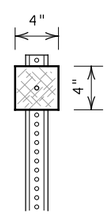
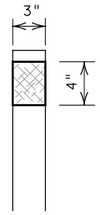
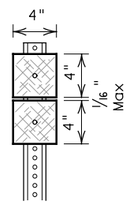
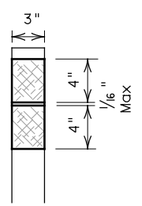
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

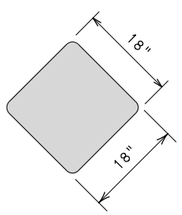
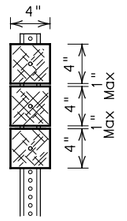
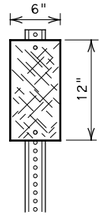
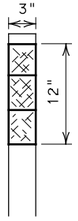
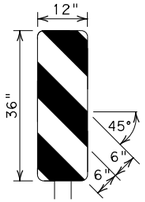
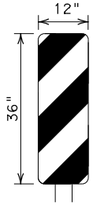
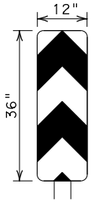
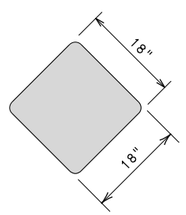
NOTE

1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

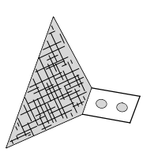
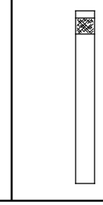
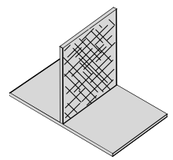
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

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.

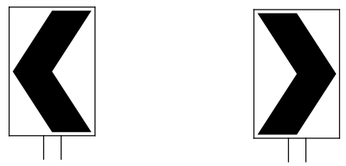
SHEETING: Yellow, White, Red

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
REVISIONS	0513	01	017	SH236
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	CORYELL		159

20A

DATE: 3/5/2021 1:08:01 PM
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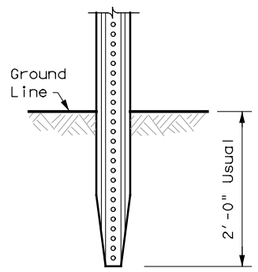
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

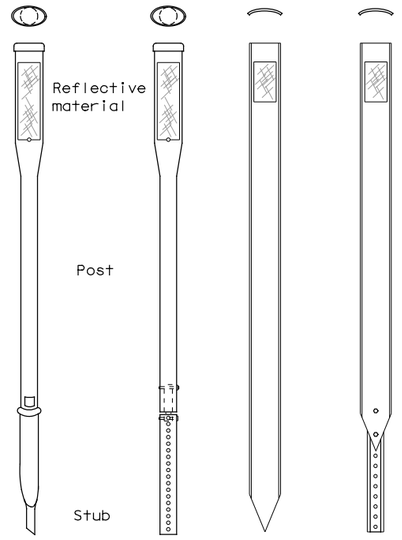


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

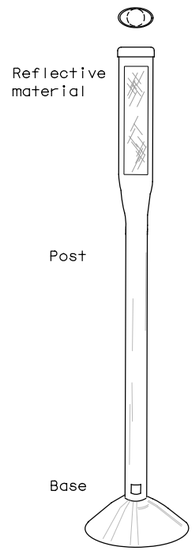
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



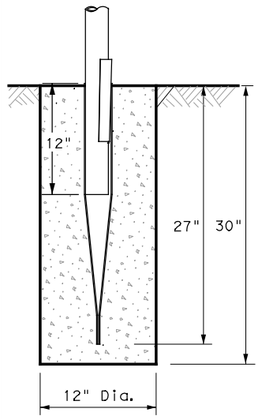
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

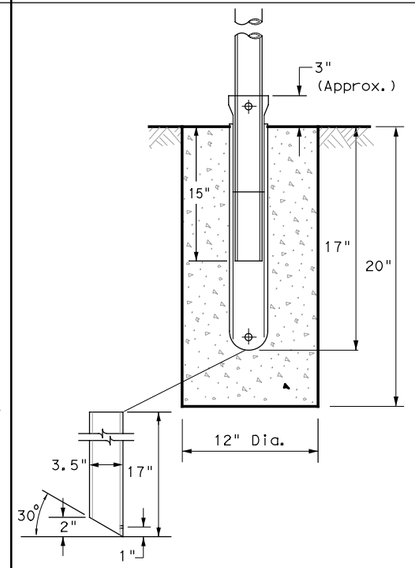
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

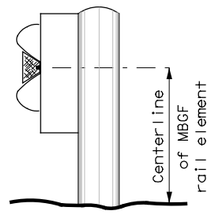
NOTE

1. Install per manufacturer's recommendations.

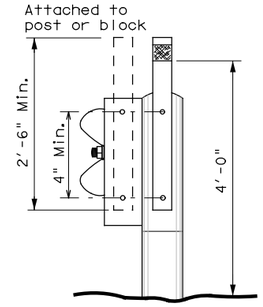
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

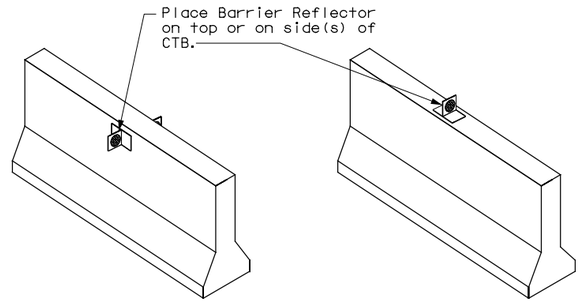
GF1



GF2



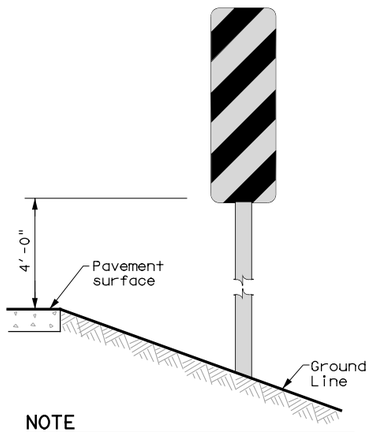
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

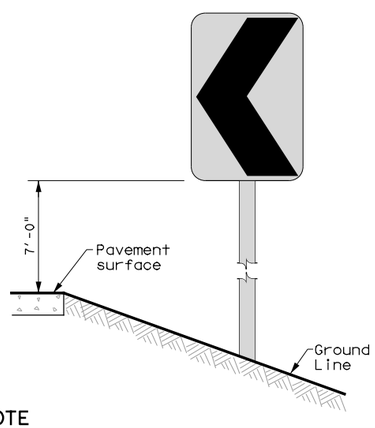
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

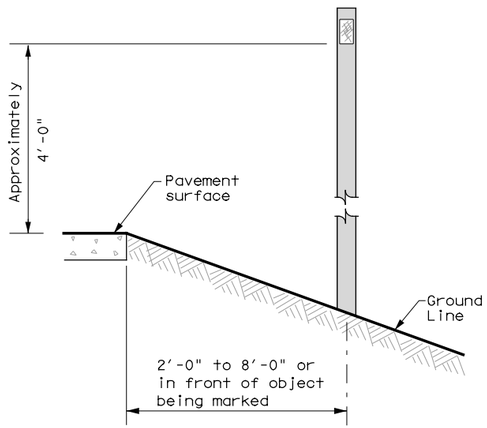
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	CORYELL		160

20B

DATE: 3/5/2021 1:08:03 PM
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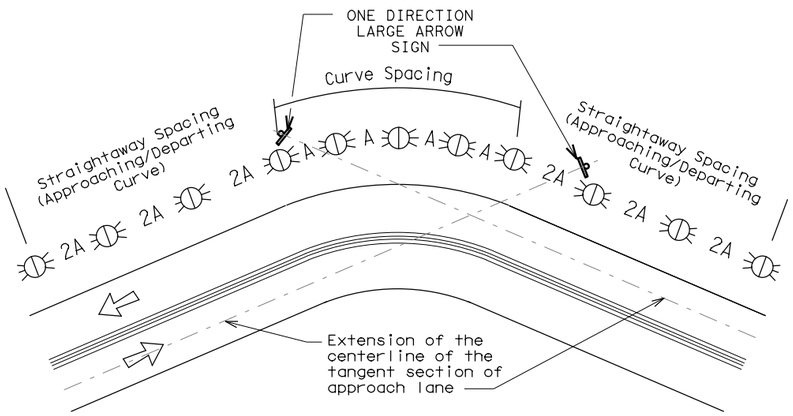
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

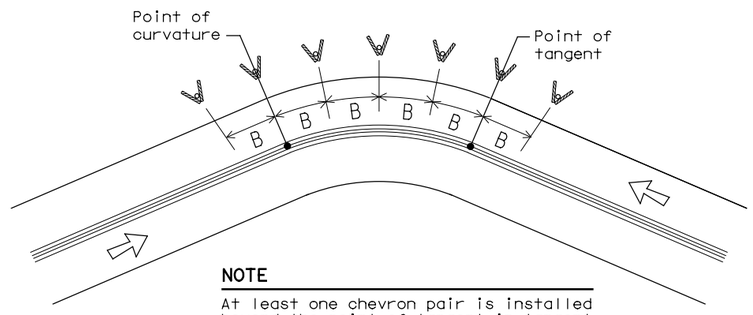
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS	0513	01	017	SH236
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	WACO	CORYELL		161

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DATE: 3/5/2021 1:08:05 PM
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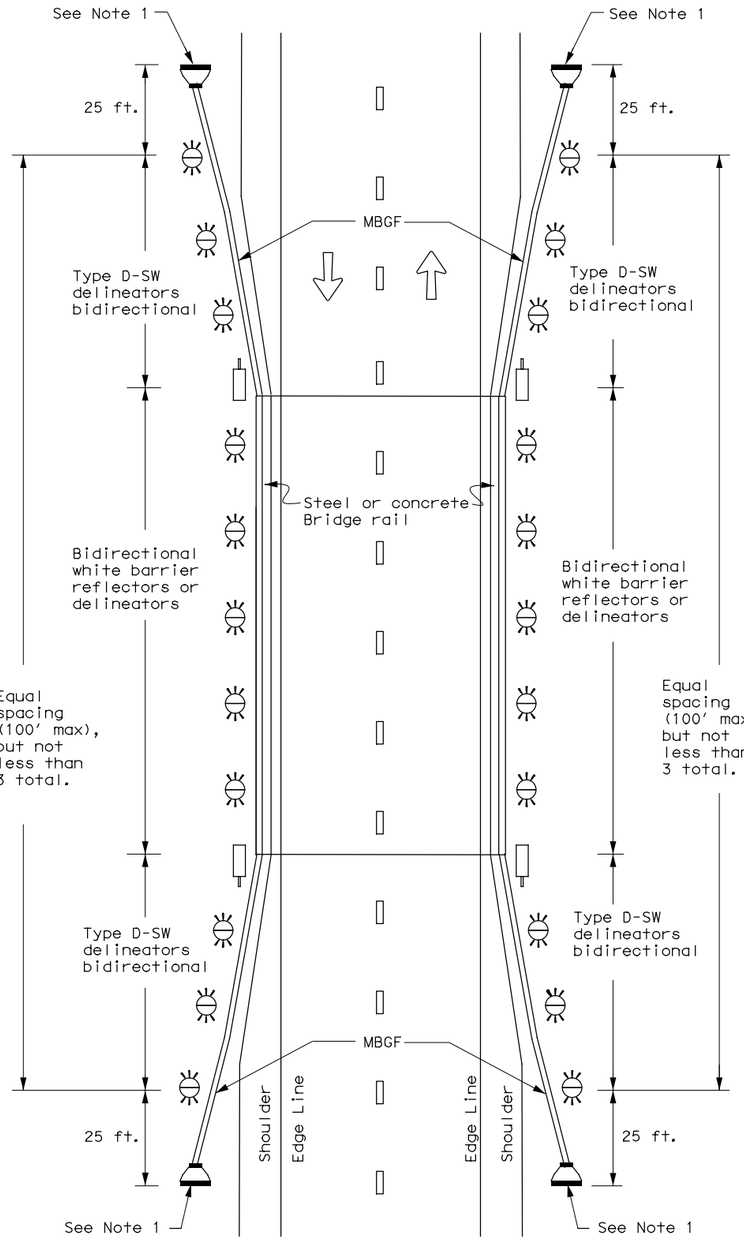
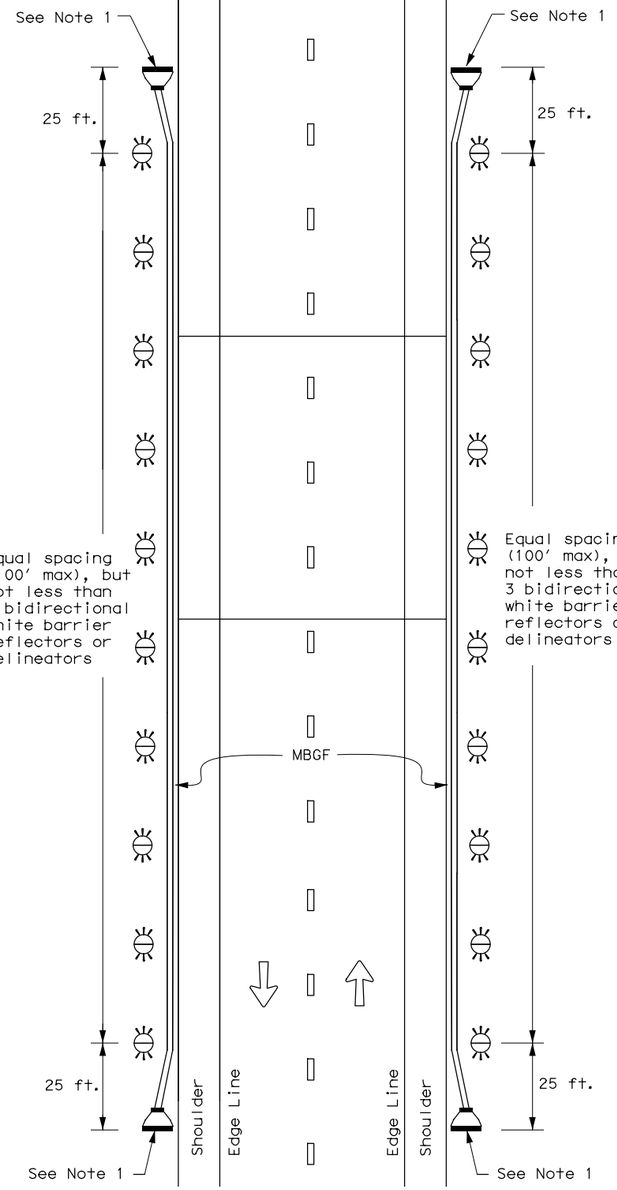
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

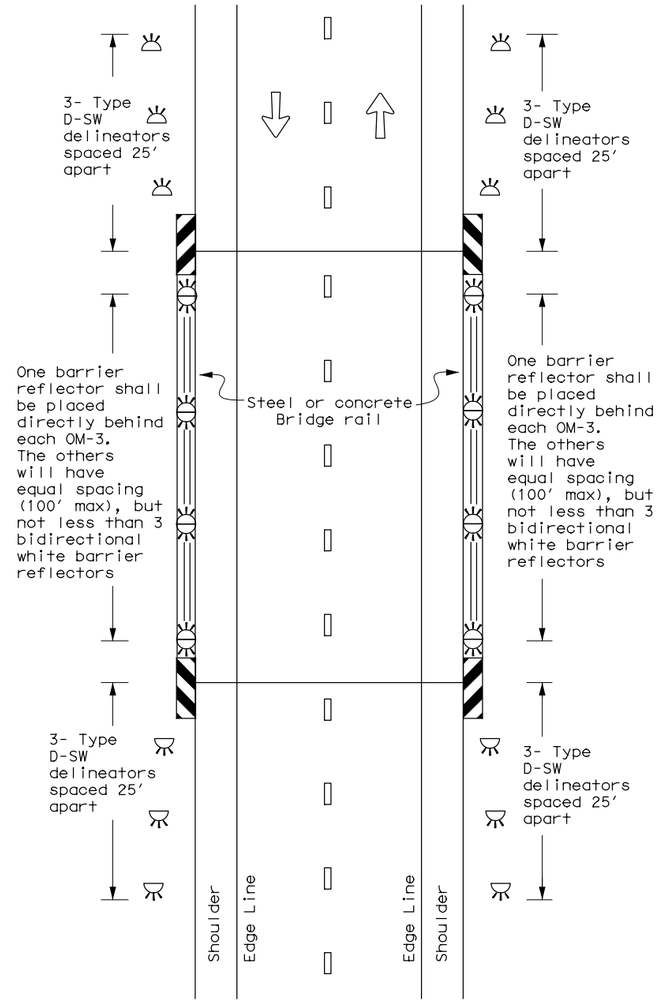
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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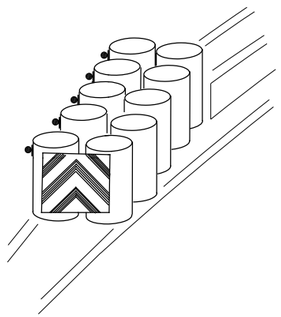
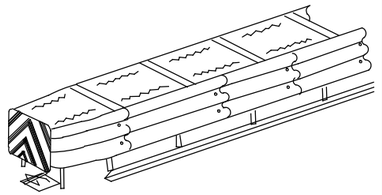
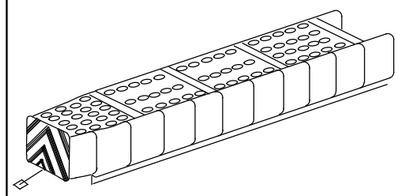
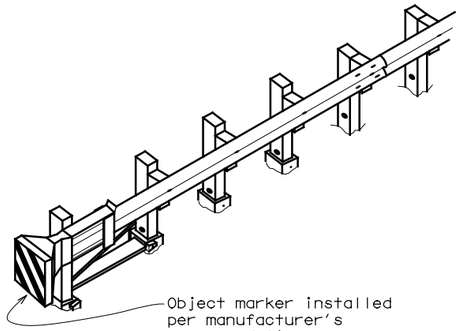
7-20	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		162

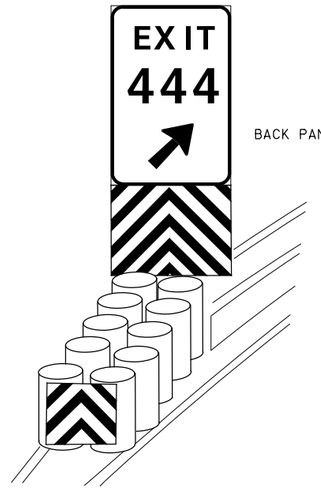
20E

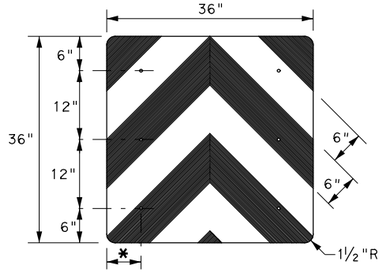


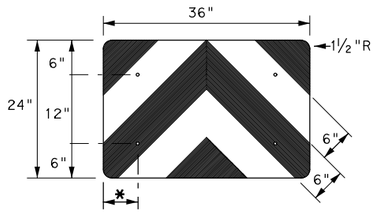




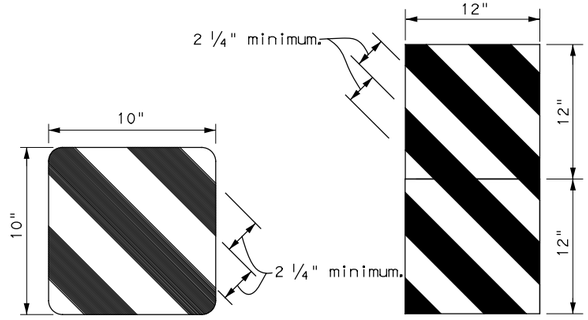




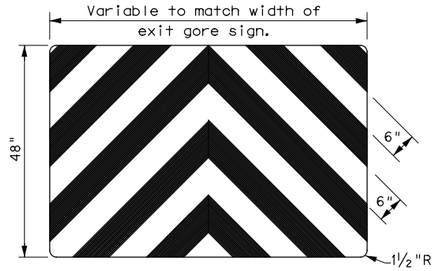


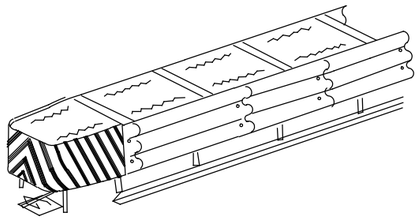


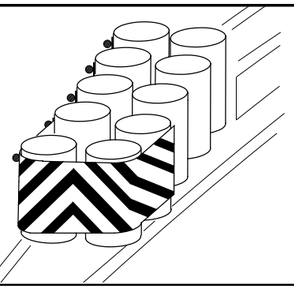
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

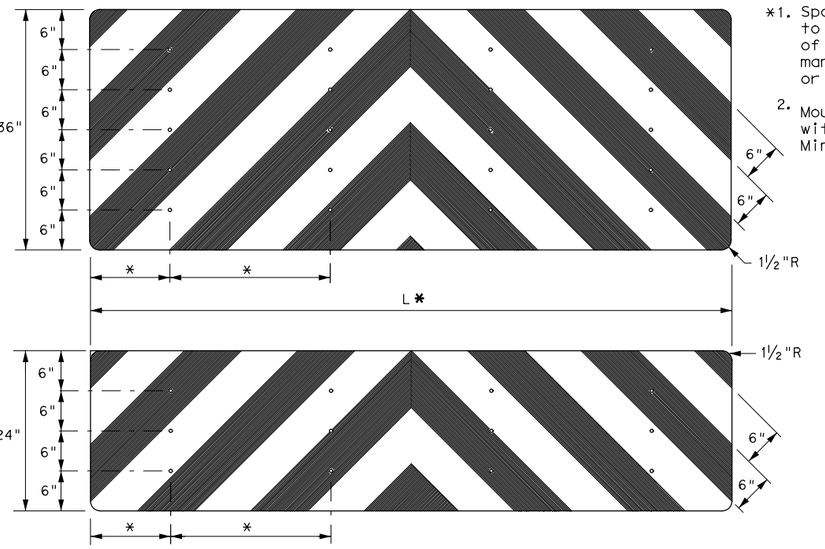


OBJECT MARKERS SMALLER THAN 3 FT^2









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	0513	01	017	SH236
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	WACO	CORYELL		163
4-98 7-20				
20G				

DATE: 3/5/2021 1:08:07 PM
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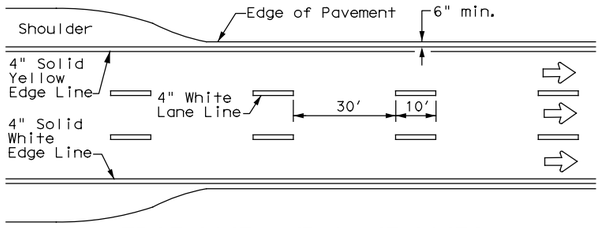
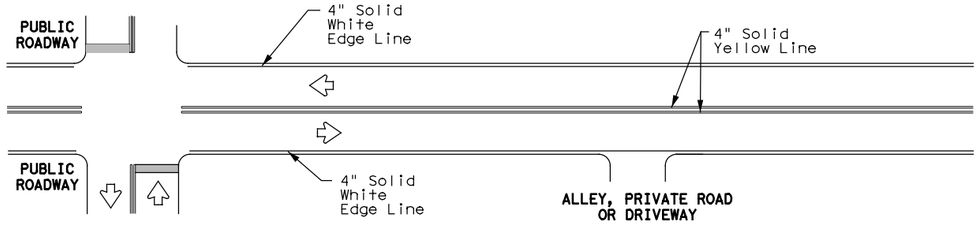
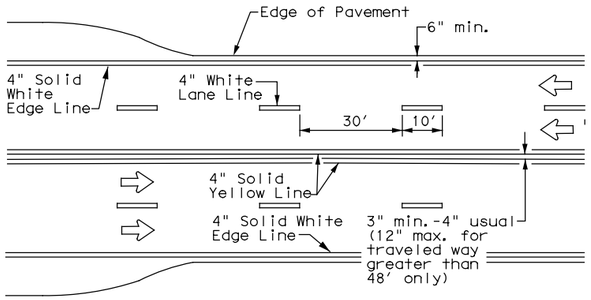


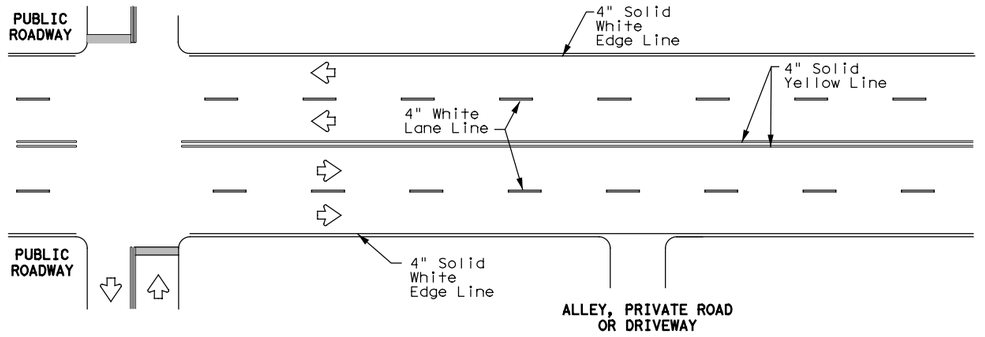
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



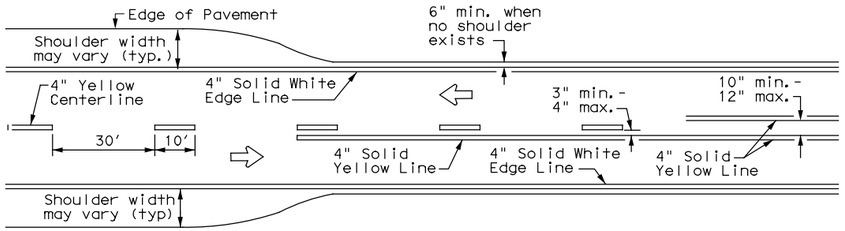
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



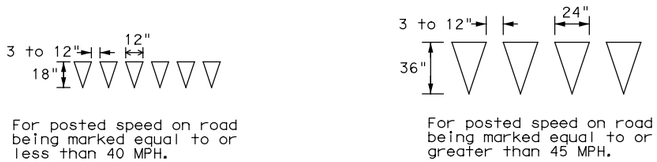
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



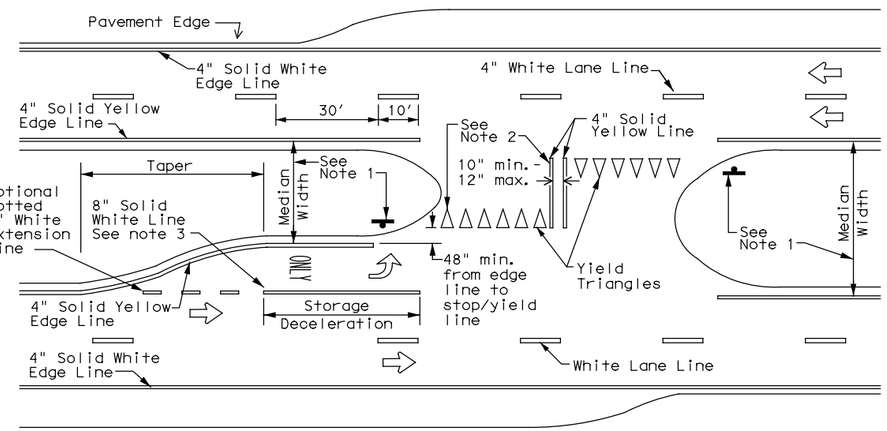
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

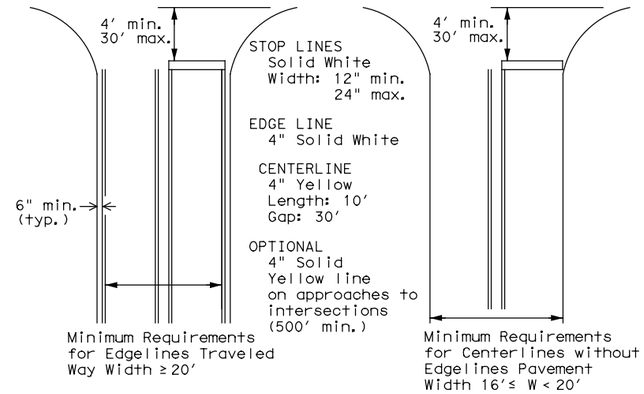
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

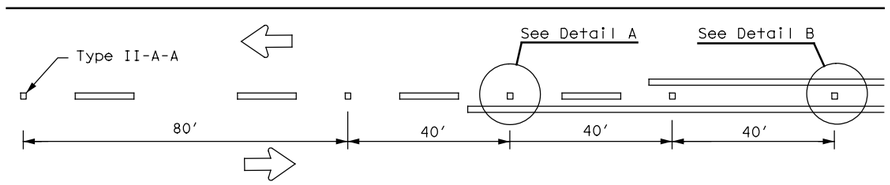
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0513	01	017	SH236
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	WACO	CORYELL		164

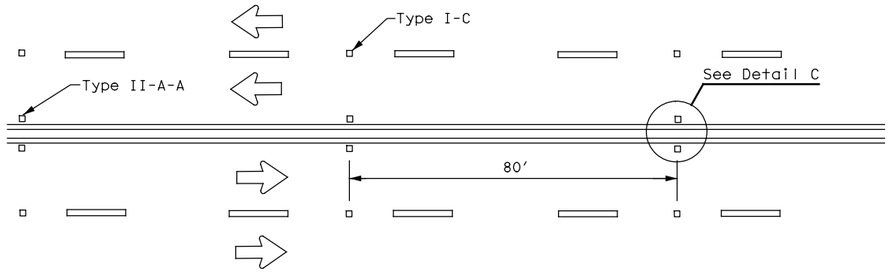
22B

DATE: 8/3/2020 11:01:37 AM
FILE: c:\pwworking\central01\d0974303\pm1-20.dgn

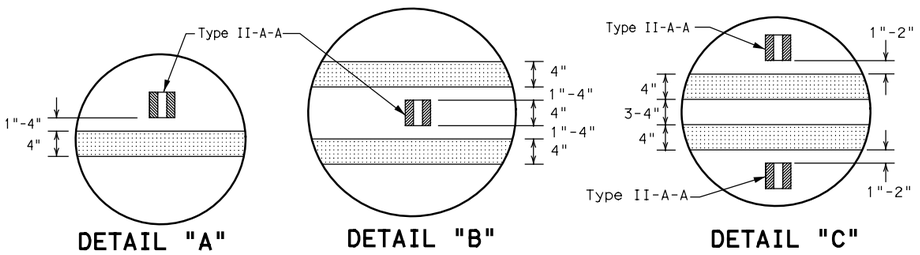
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



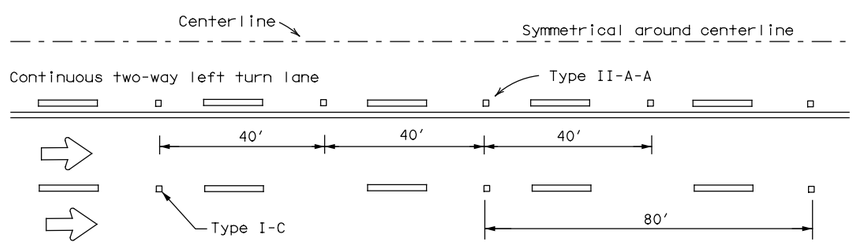
CENTERLINE FOR ALL TWO LANE ROADWAYS



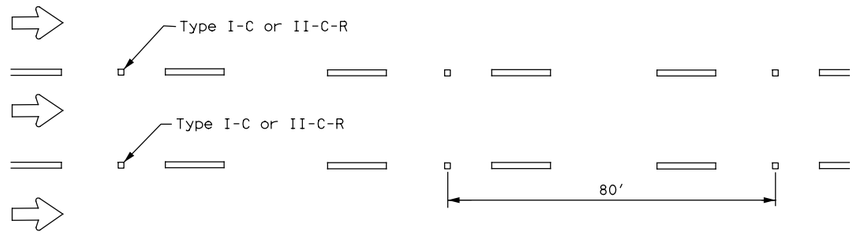
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

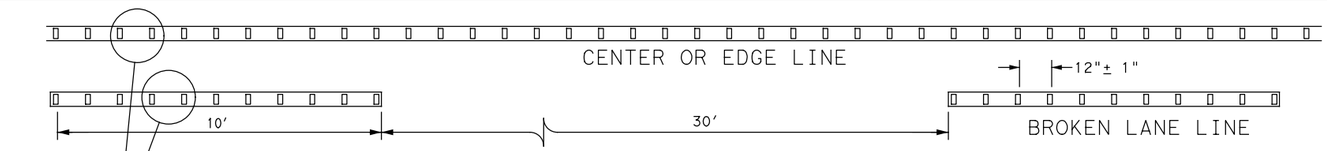


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



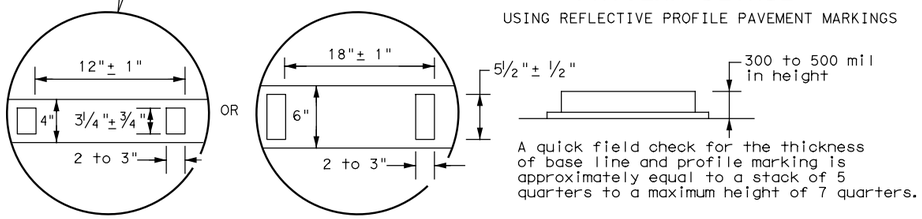
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

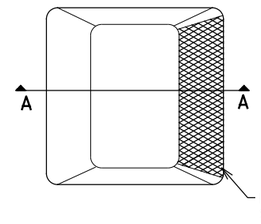
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

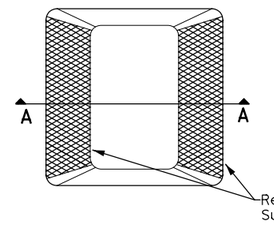
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

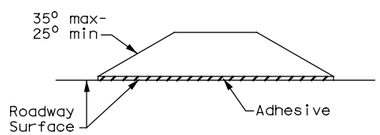
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		165

22B

DATE: 8/3/2020 11:01:39 AM
FILE: c:\pwworking\central01\d0974303\pm2-20.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

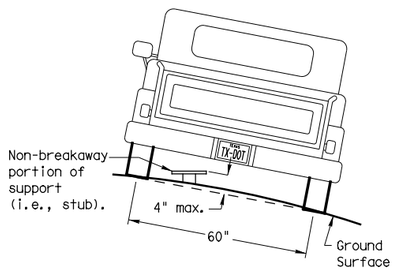
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

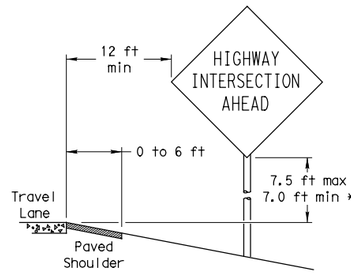
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

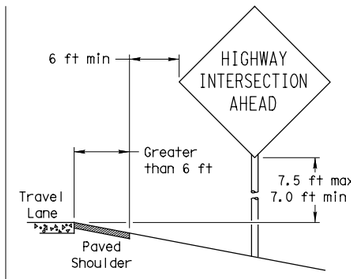
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

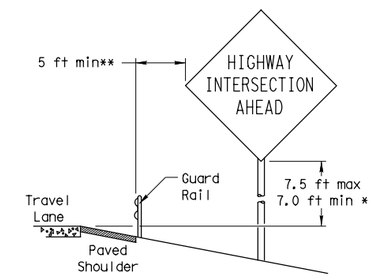
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



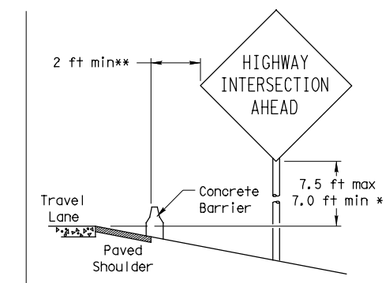
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



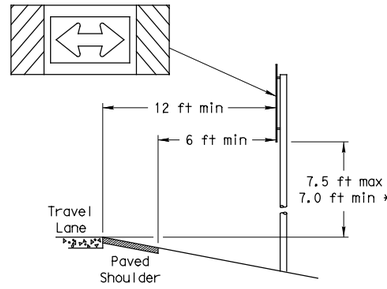
BEHIND GUARDRAIL



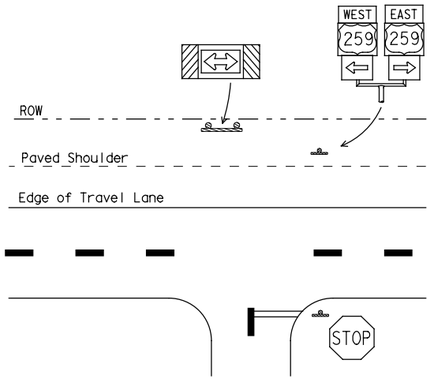
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

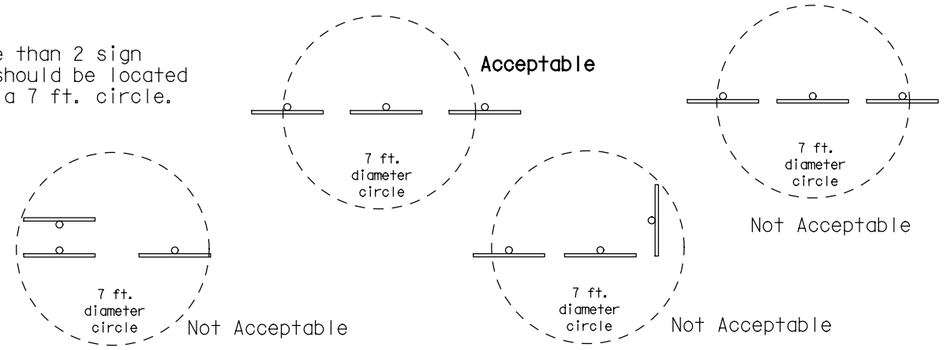
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

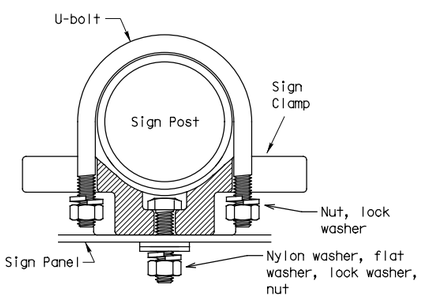
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

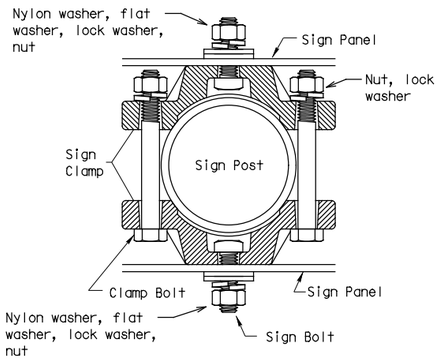


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

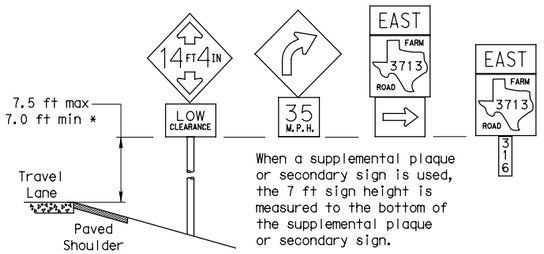
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



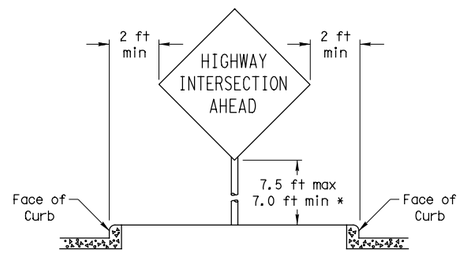
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



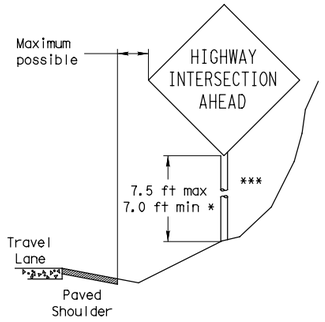
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		166

DATE: 8/3/2020 11:01:41 AM
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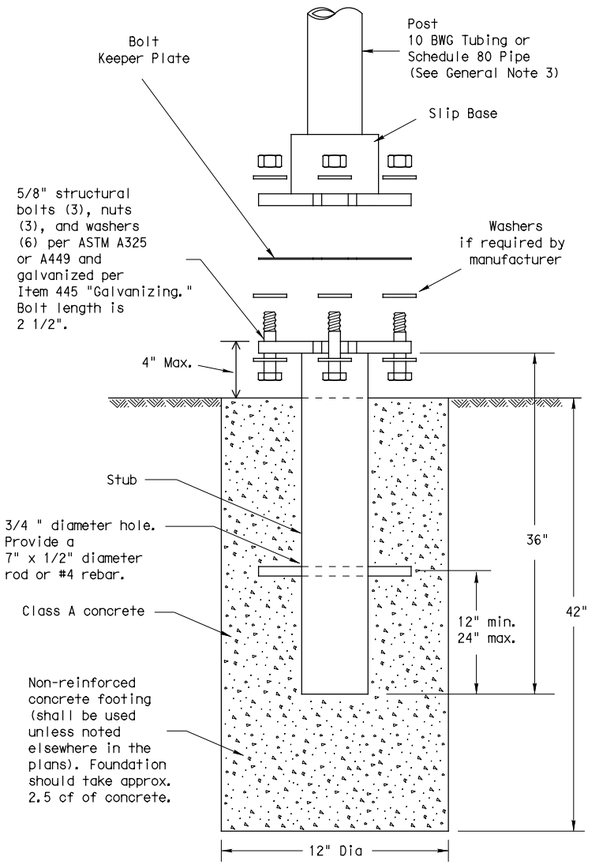
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

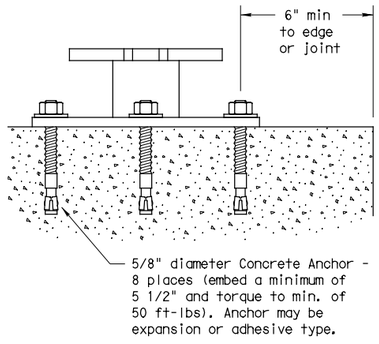
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0513	01	017	SH236

DIST	COUNTY	SHEET NO.
WACO	CORYELL	167

26B

DATE: 8/3/2020 11:01:43 AM
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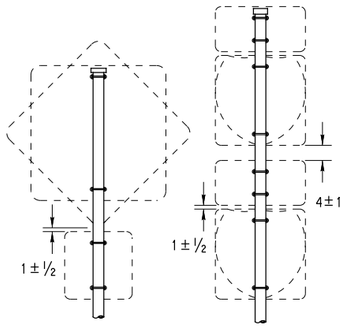
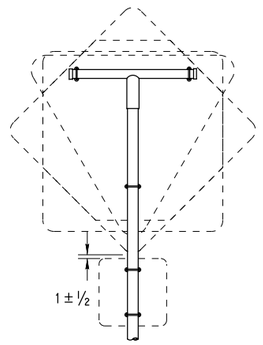


SM RD SGN ASSM TY XXXXX(1)XX(P)



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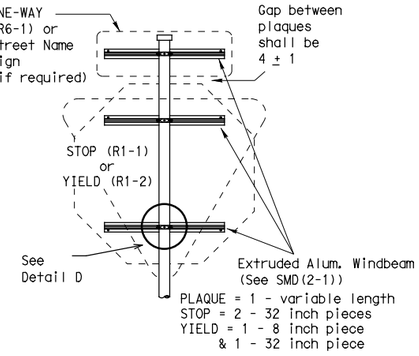

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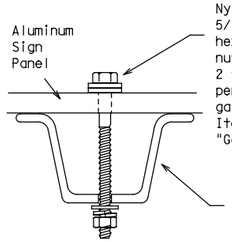
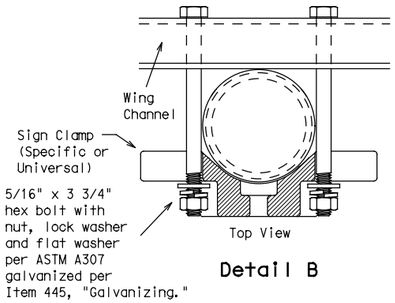
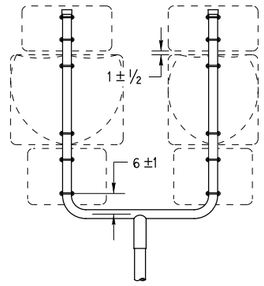


Detail A



Detail B



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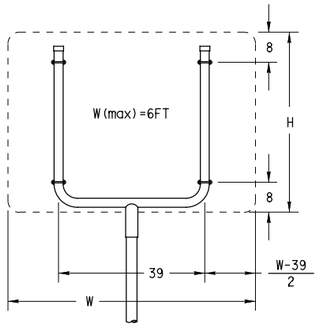

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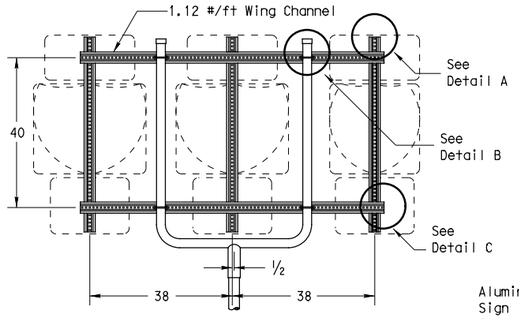
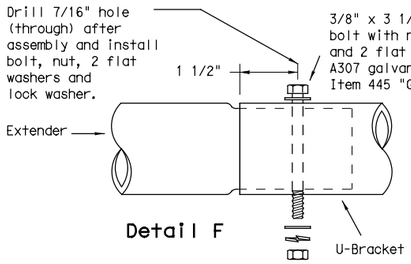
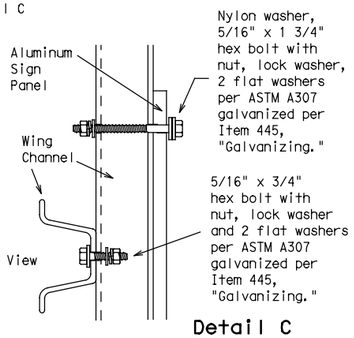


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

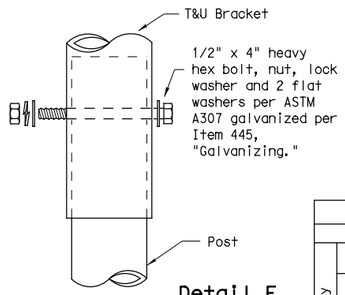


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



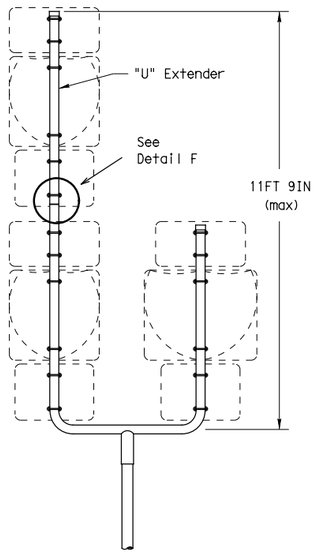
Detail E

GENERAL NOTES:

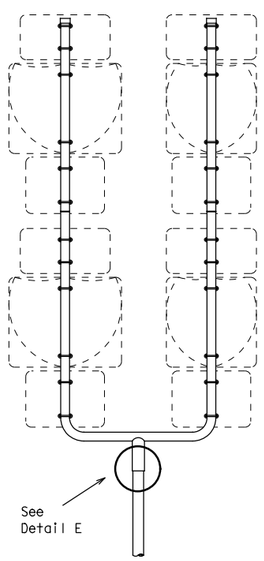
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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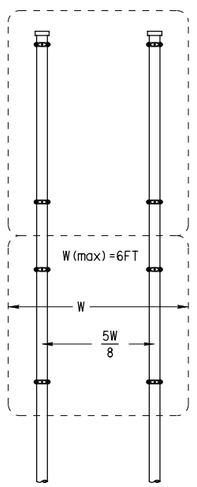
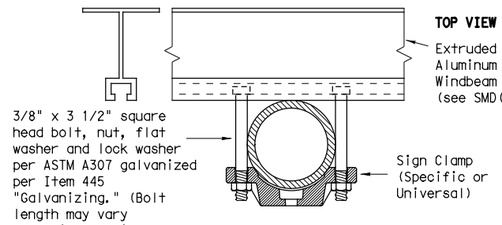
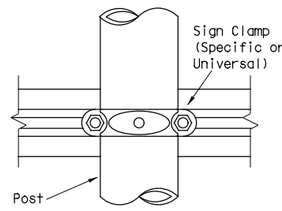


SM RD SGN ASSYM TY XXXXX(2)XX(P)

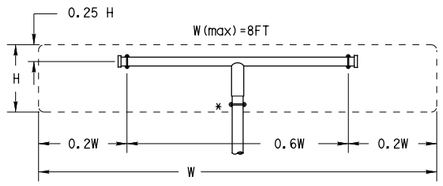
SIDE VIEW



Detail D



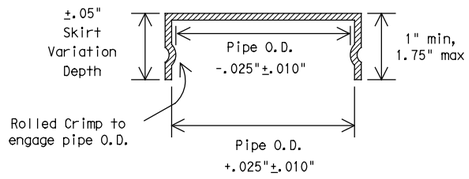
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

CONT	SECT	JOB	HIGHWAY
0513	01	017	SH236

DIST	COUNTY	SHEET NO.
WACO	CORYELL	168

9-08 REVISIONS

26C

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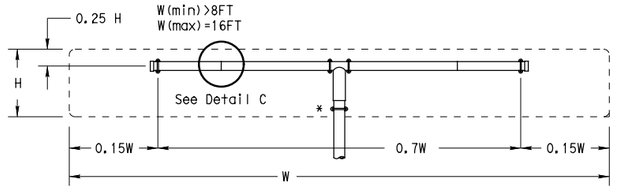
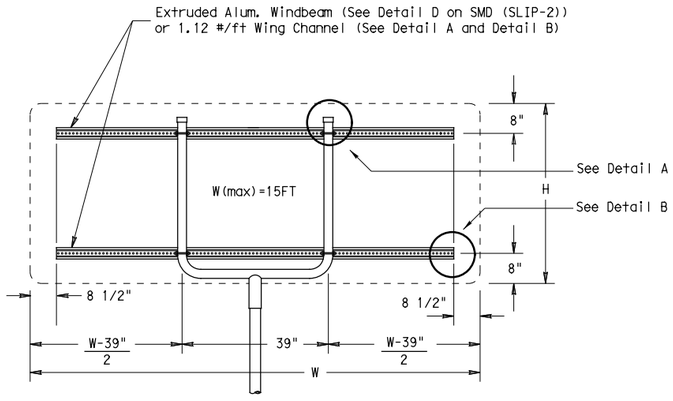
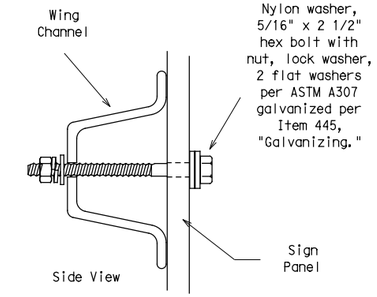


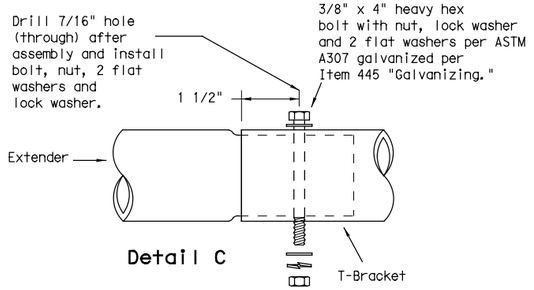
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

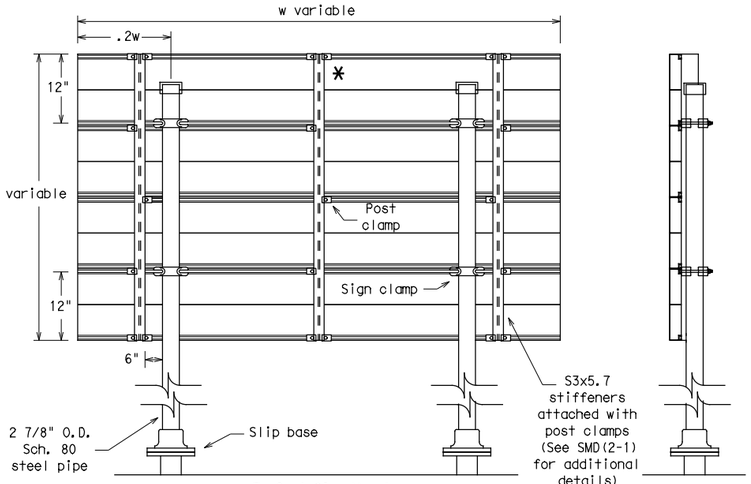


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

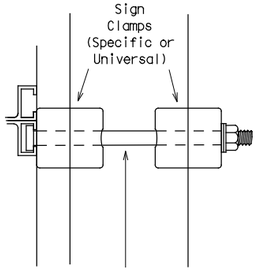


Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E
for clamp installation



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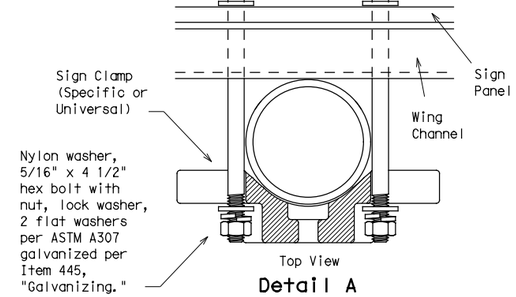
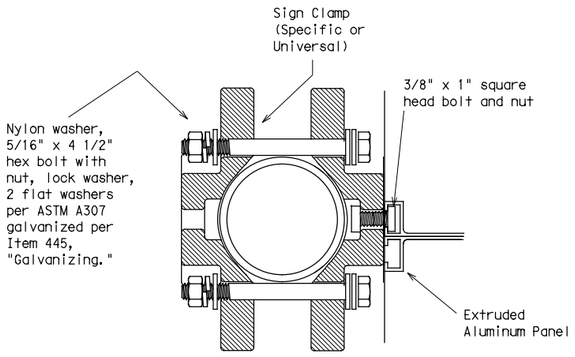
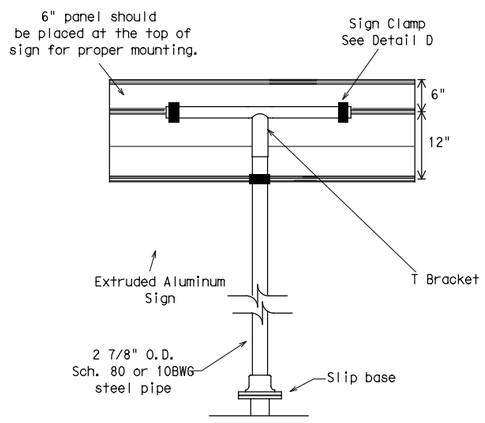


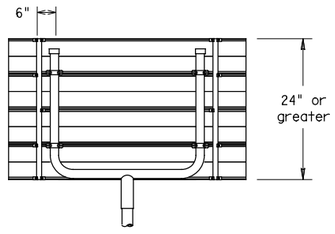
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

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. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		169

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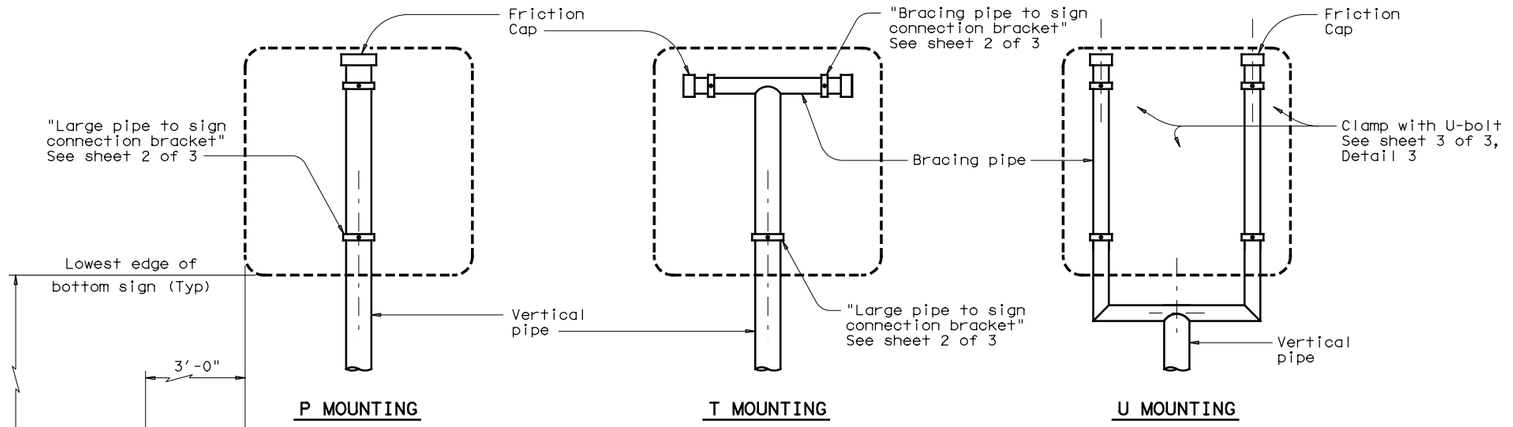
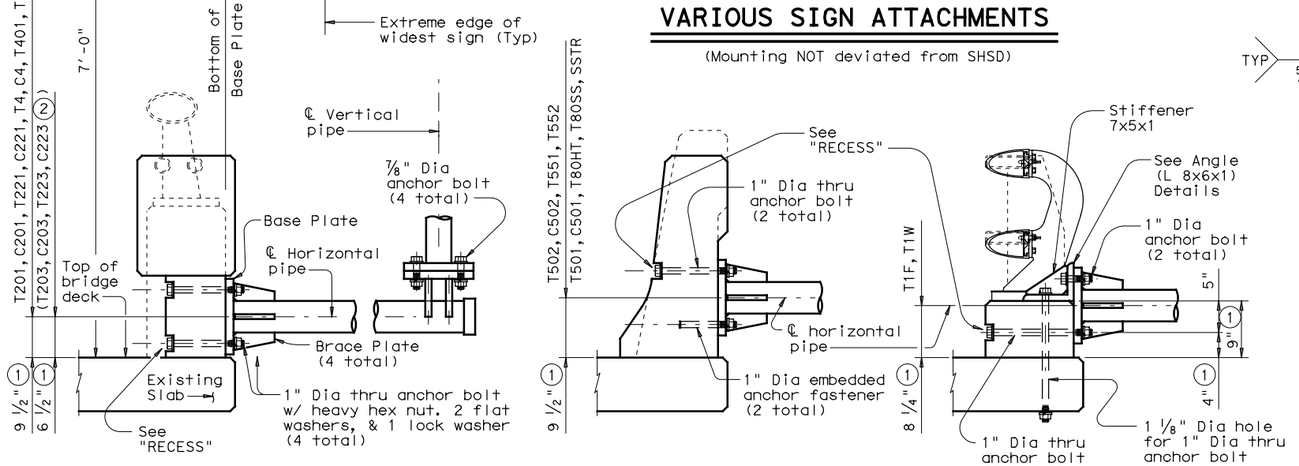
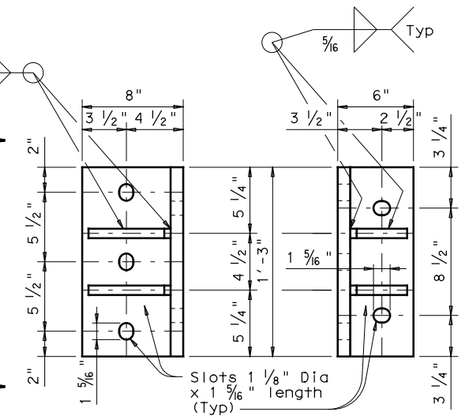


VARIOUS SIGN ATTACHMENTS

(Mounting NOT deviated from SHSD)

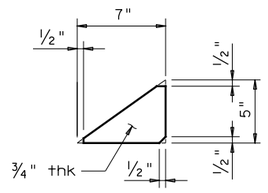


LONGITUDINAL SECTION THROUGH RAILING & SIGN MOUNT



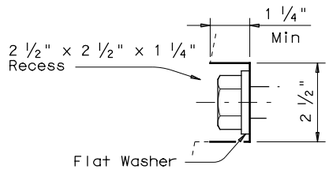
PLAN VIEW

SECTION A-A



STIFFENER

ANGLE (L 8x6x1) DETAILS



RECESS

① Increase 2" for structure with overlay.

② Attached at ℄ post.

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")

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

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		170

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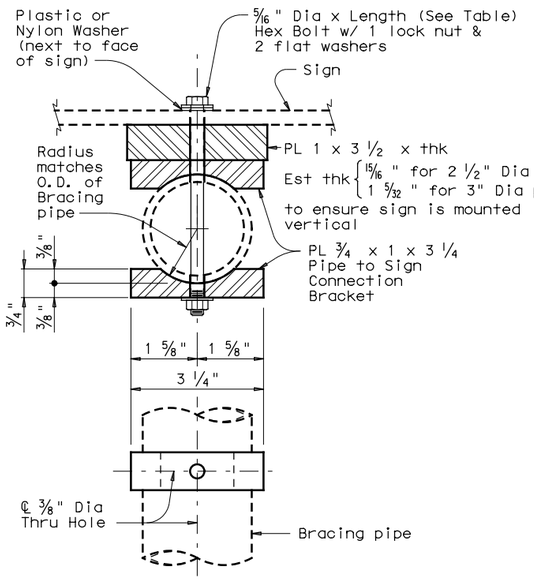
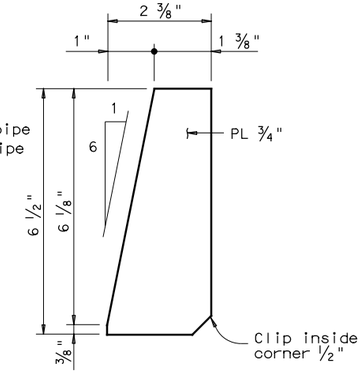
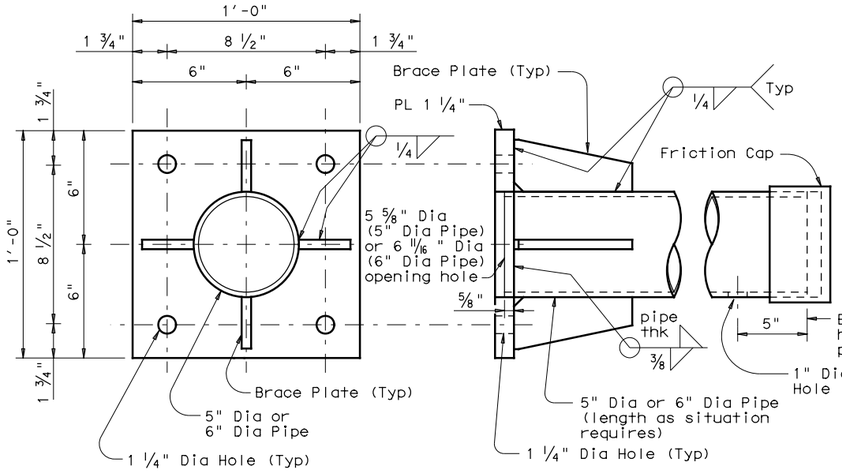


BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

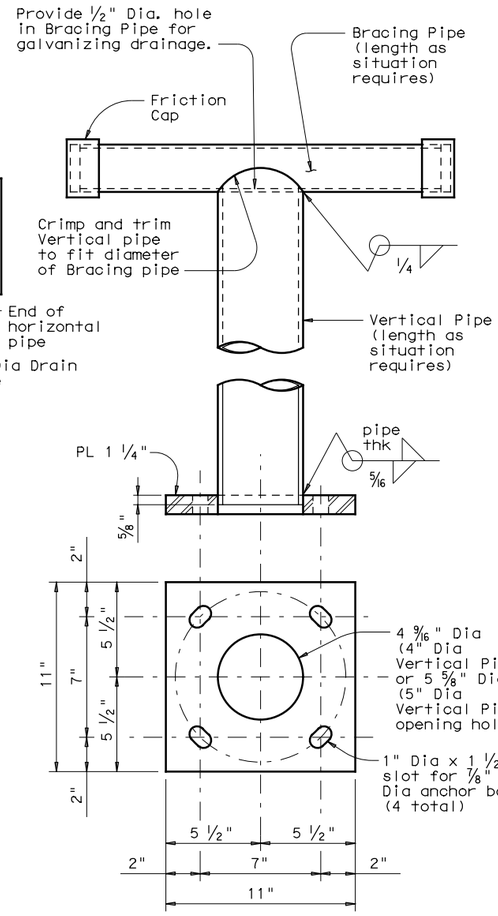
(Showing T Mounting)



BRACE PLATE DETAILS

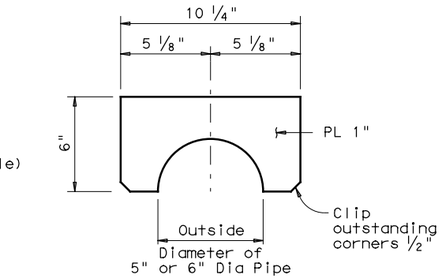


BASE PLATE DETAILS



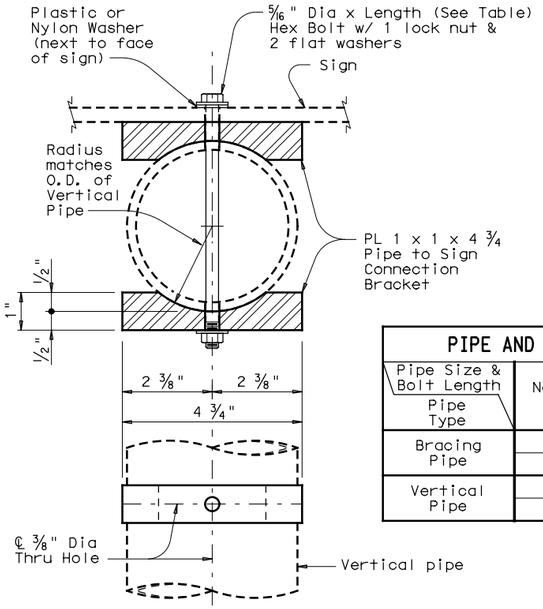
SIGN POLE & POLE BASE PLATE DETAILS

(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

FILE: smdbr-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
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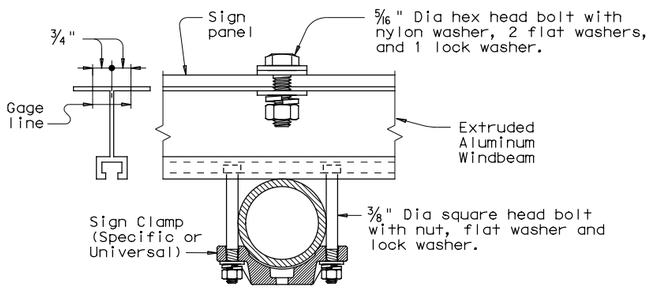
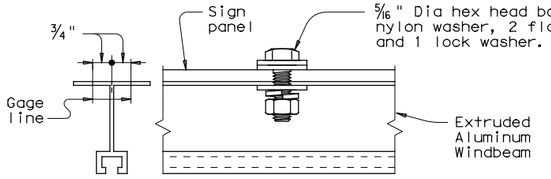
	WACO	CORYELL		171

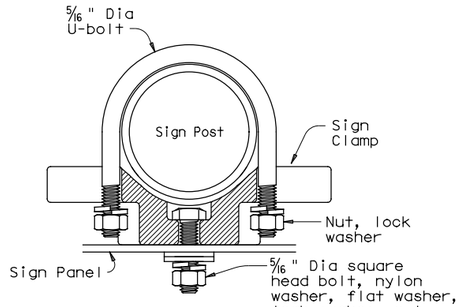
26H



DETAIL 1



DETAIL 2

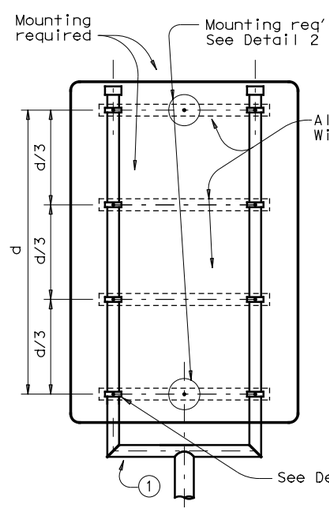


DETAIL 3

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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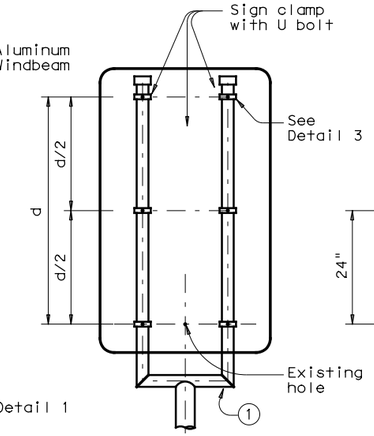
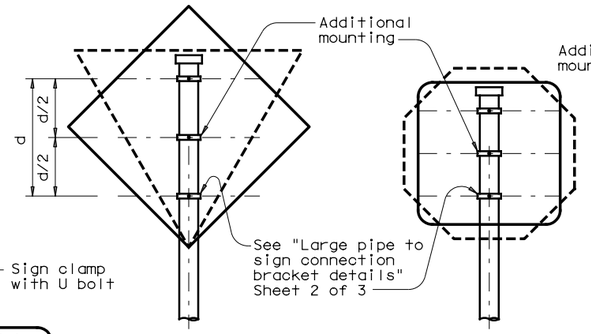


TYPE 32



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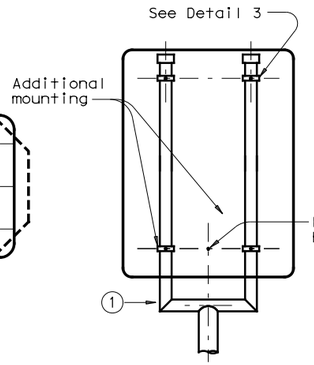

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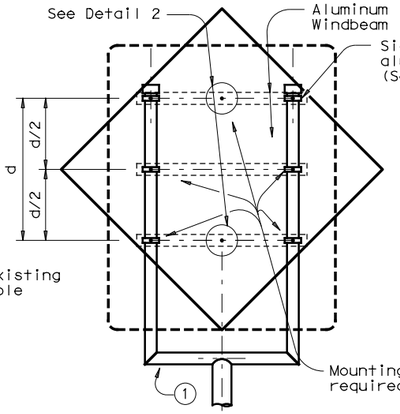

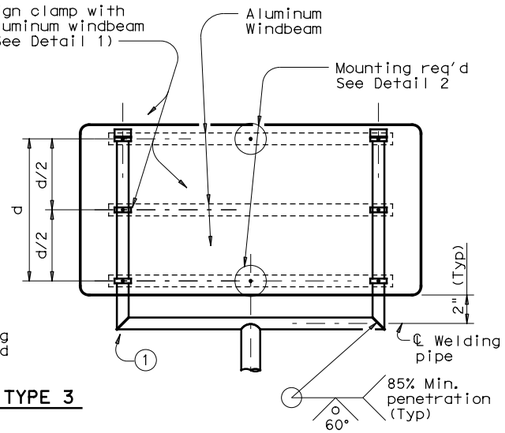

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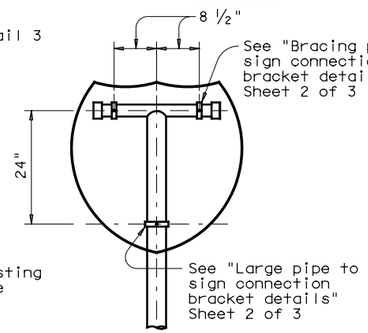

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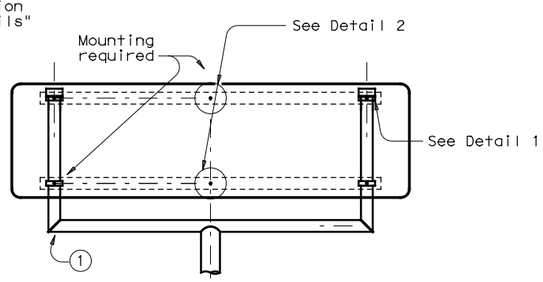

TYPE 23

SHEET 3 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-3)-14

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©TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		172

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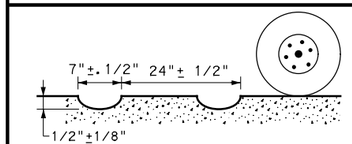
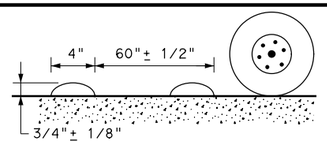
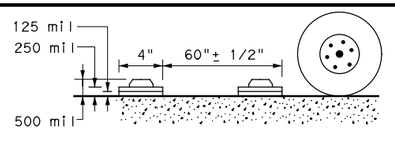
CENTERLINE RUMBLE STRIPS



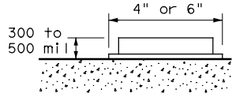
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

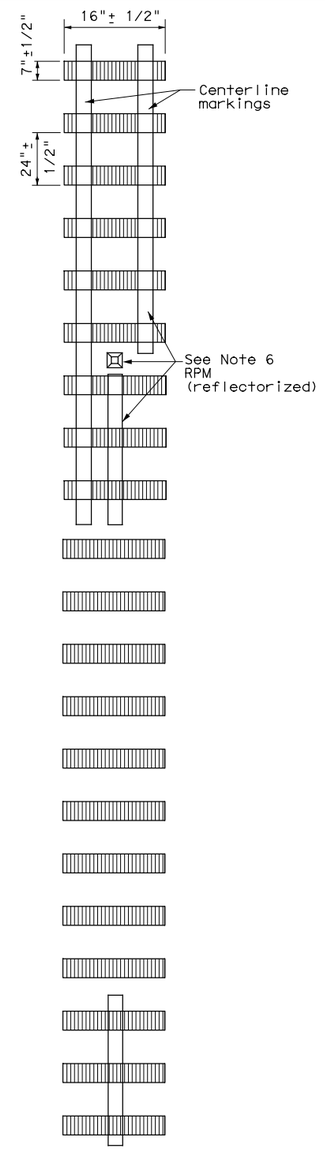


PREFORMED THERMOPLASTIC STRIPS



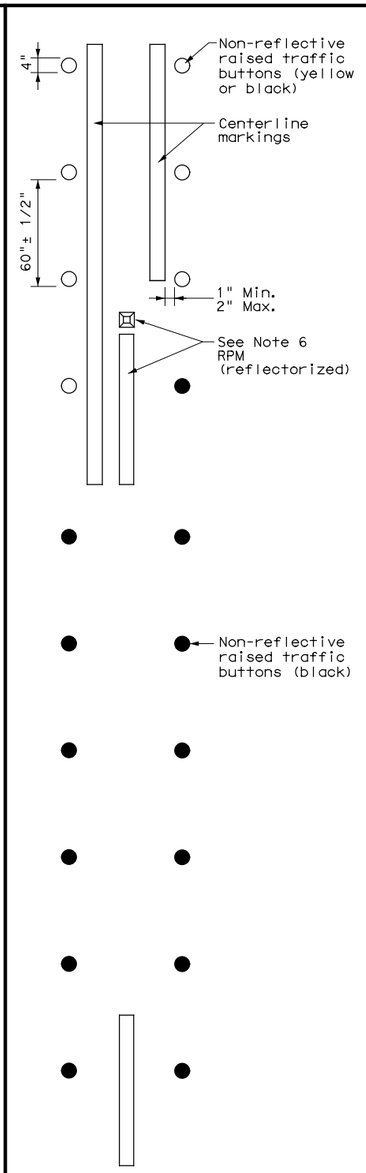
PROFILE MARKINGS

PROFILE VIEW



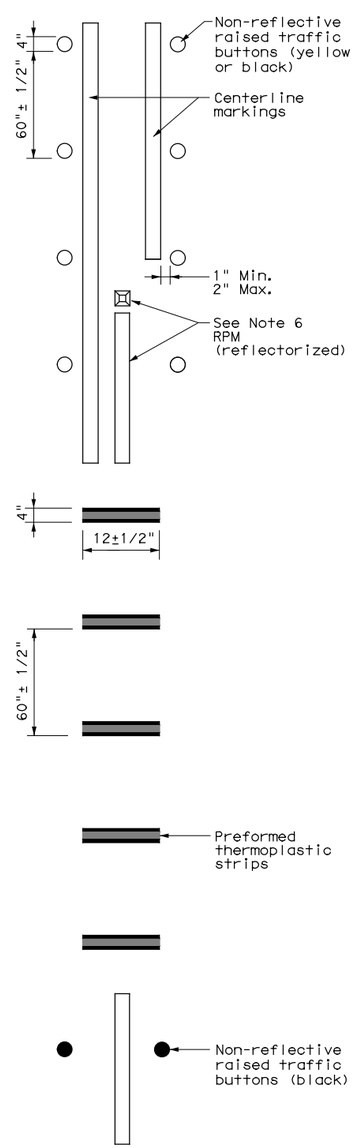
PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS



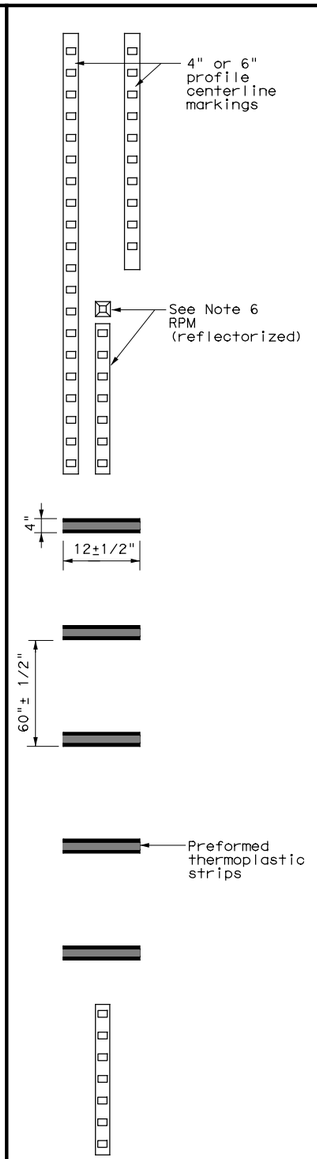
PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



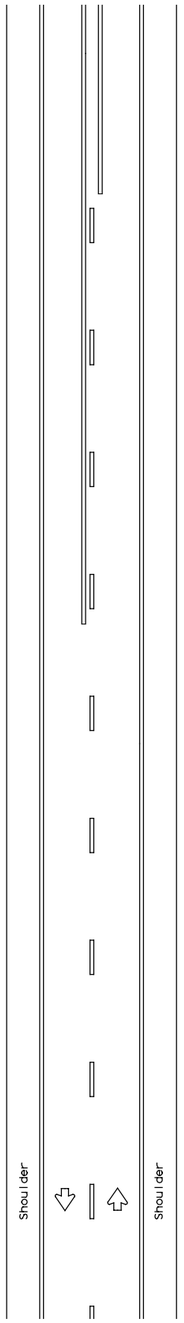
PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS



TWO LANE TWO-WAY ROADWAYS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(4).

Texas Department of Transportation®
Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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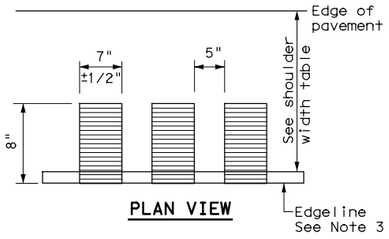
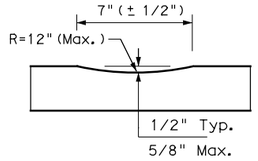
	WACO	CORYELL		173



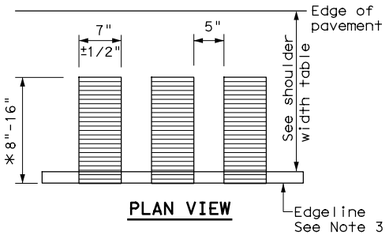
PLAN VIEW



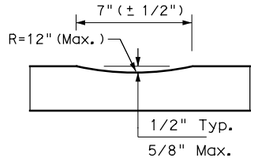
PROFILE VIEW

OPTION 1

CONTINUOUS MILLED DEPRESSIONS (Rumble Stripes)



PLAN VIEW

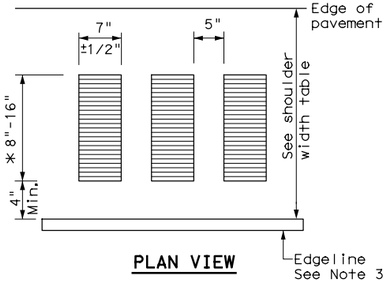


* This distance may vary based on width of shoulder

PROFILE VIEW

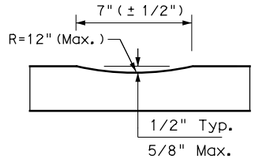
OPTION 2

CONTINUOUS MILLED DEPRESSIONS (Rumble Stripes)



PLAN VIEW

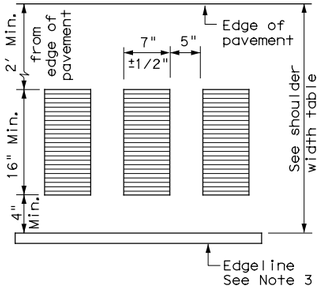
* This distance may vary based on width of shoulder



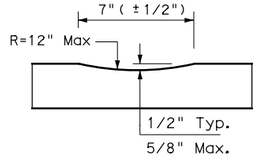
PROFILE VIEW

OPTION 3

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



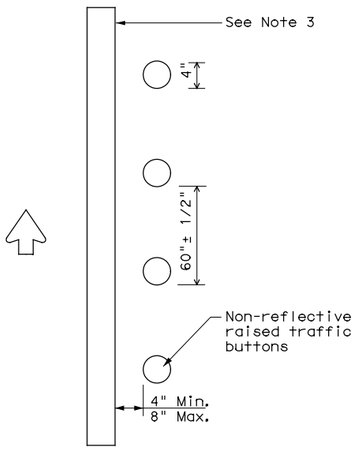
PLAN VIEW



PROFILE VIEW

OPTION 4

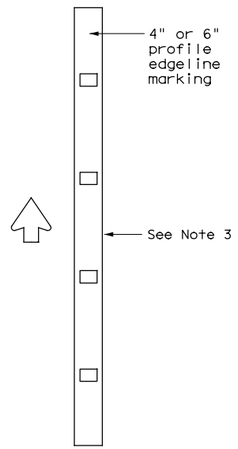
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



PLAN VIEW

OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW

OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		174

DATE: 8/3/2020 11:01:58 AM
FILE: c:\pwworking\central01\d0974303\rs(4)-13.dgn

SITE DESCRIPTION

PROJECT LIMITS:

CSJ 0513-01-017: On SH 236 @ Leon River, Coryell Co.

LOCATION MAPS:

Refer to title sheet for project location map.

PROJECT DESCRIPTION:

CSJ 0513-01-017:

Construction of Bridge Replacement
Consisting of Repl Br & Apprs

MAJOR SOIL DISTURBING ACTIVITIES:

The major soil disturbing activities for this project will consist of excavation, embankment, grading and construction of proposed bridge, culverts and roadway.

TOTAL PROJECT AREA:	9.00 AC
TOTAL AREA TO BE DISTURBED:	5.47 AC

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

CSJ 0513-01-017:
The predominate soil type North of Leon River is Frio Silty Clay. While the predominate soil type South of Leon River is Bastsil Fine Sandy Loam. Vegetative cover is in good condition with 90% coverage.

NAME OF RECEIVING WATERS:

CSJ 0513-01-017:
Leon River (Segment ID 1259) above Belton Lake receives all drainage from this project, and drains into Belton Lake.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [X] SOIL RETENTION BLANKET
- [X] NATURAL BARRIERS OR BUFFER ZONES
- [X] PRESERVATION OF NATURAL RESOURCES

OTHER: TXR 150000, Part III, Section G, 2 Stabilization of disturbed areas must, at a minimum, be initiated immediately whenever any clearing, grading, excavating, or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Temporary stabilization must be completed no more than 14 calendar days after initiation of soil stabilization measures, and final stabilization must be achieved prior to termination of permit coverage.

STRUCTURAL PRACTICES:

- [T] SILT FENCES
- [ ] HAY BALES
- [T] SANDBAG OR ROCK BERMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

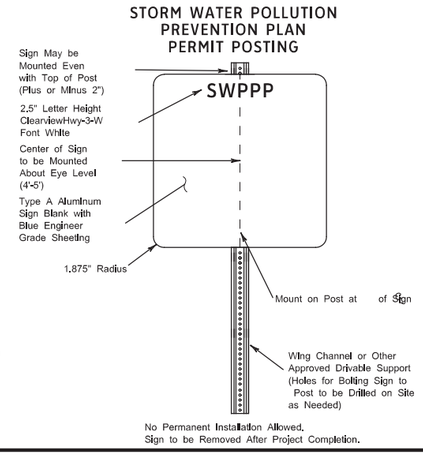
The order of activities will be as follows:

1. Preserve existing vegetative cover as much as possible.
2. Install temporary sediment control fencing, and rock berms as shown on plans prior to any soil disturbing activities.
3. Remove existing bridge, construct proposed bridge and roadway and perform any necessary excavation, embankment and grading.
4. Place temporary/permanent seeding as shown in the plans and as directed by the engineer.

STORM WATER MANAGEMENT:

An integral part of the SWPPP for this project includes the EPIC Sheet, Item 506, Waco District Typical Applications for Best Management Practices, Form 2118 TxDOT inspection forms, Contractor daily inspection forms, miscellaneous general notes on environmental requirements, TxDOT EC Standards, 2014 Standard Specifications, TxDOT roadway design drawings, SWPPP design and working BMP drawings, Site Manager Data Base, EMS Stage Gate Inspections and the Waco District environmental folders. The requirements of the TxDOT EMS will be fully implemented including training requirements for Contractors and TxDOT staff.

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED PROFESSIONAL ENGINEER
7/28/202
P.E.



Texas Department of Transportation
Waco District Office
Advanced Project Development
100 South Loop Drive
Waco Texas, 76704-2858

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment best management practices (BMPs) will be maintained in good working order per the environmental notes, details and standards included as part of the project plans and contract documents. BMP repairs will be made at the earliest possible date, but no later than seven calendar days after the inspection report has been completed and immediately after the ground has dried sufficiently to allow equipment access. BMPs damaged by the Contractor will be repaired or replaced immediately. The installation and repair of BMPs at creeks and outfalls will be given priority.

INSPECTION: TxDOT Form 2118 inspections to support TXR150000 and 404 permits will be conducted on a seven day interval on the same day of the week, until permits are terminated. The Contractor will provide daily BMP inspection reports on work days. Stage Gate Inspections and other BMP inspections will be conducted by the District and Area Office Staff based on requirements of the TxDOT Environmental Management System (EMS).

WASTE MATERIALS: Any waste materials generated during construction will be disposed of in accordance with existing federal, state, and local laws.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a minimum, any products in the following categories are considered to be hazardous: Fuels, Lubricating products, Asphalt products, or Concrete curing compounds and any additives. In the event of a spill which may be hazardous, clean-up will be done in accordance with federal, state, and local regulations. The Contractor will maintain a list of all chemicals and wastes required for the project; including chemicals used by sub-contractors, and will implement written spill prevention and clean-up plans.

SANITARY WASTE: Sanitary waste from portable units will be collected by a licensed sanitary waste management contractor.

OFF SITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [X] STABILIZED CONSTRUCTION ENTRANCE

REMARKS:

Disposal areas, stockpiles, and haul roads will be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas will not be located in any wetland, waterbody or streambed. Construction staging area and vehicle maintenance area will be constructed by the contractor in a manner to minimize the runoff pollutants.

Furnish one SW3P permit posting sign and sign support as detailed on the SW3P Sheet. Install this sign in a location selected by the Engineer. The sign and support should be removed upon completion of the project and is the property of the Contractor. The purchase of the sign and support, installation, relocation(s) if determined necessary by the Engineer and removal at project end will be subsidiary to Item 506.

Sedimentation Basins - Since the area disturbed is less than 10 acres, per outfall location, a sedimentation basin is not required.

Texas Department of Transportation

WACO DISTRICT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		175
STATE	DIST.	COUNTY	
TEXAS	WACO	CORYELL	
CONT.	SECT.	JOB	HIGHWAY NO.
0513	01	017	SH236

c:\pwworking\central01\dms70050\SH236-SW3P.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. Project will disturb more than 5 acres, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Leon River
2.
3.
4.
5.
6.
7.
8.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☐ No Action Required ☒ Required Action

Action No.

1. SEE STATEMENT ABOVE
2. Orange construction fencing shall be placed around the masonry walls adjacent to station 275+00 to create at a minimum one foot buffer or as directed by the engineer.
2. Bridge and guard railing to be painted FS 10055 (brown) or as directed by the engineer

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. SEE STATEMENT ABOVE
2. Vegetation clearing must be completed during the non-nesting season September 15 - March 1.
3.
4.

☐ No Action Required ☒ Required Action

Action No.

1. Plains Spotted Skunk: Contractors will be advised of potential occurence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens
2. Comply with Migratory Bird Treaty Act (MBTA)
3. Texas Horned Lizard: Contractors will be advised of potential occurance in the project area, and to avoid harming the species of encountered. This should include avoiding harvester ant mounds in the selection of Pojrect Specific Locations (PSL's)
4. SEE STATEMENT BELOW
5.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Action No.

1. Lead paint on metal elements of existing bridge.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

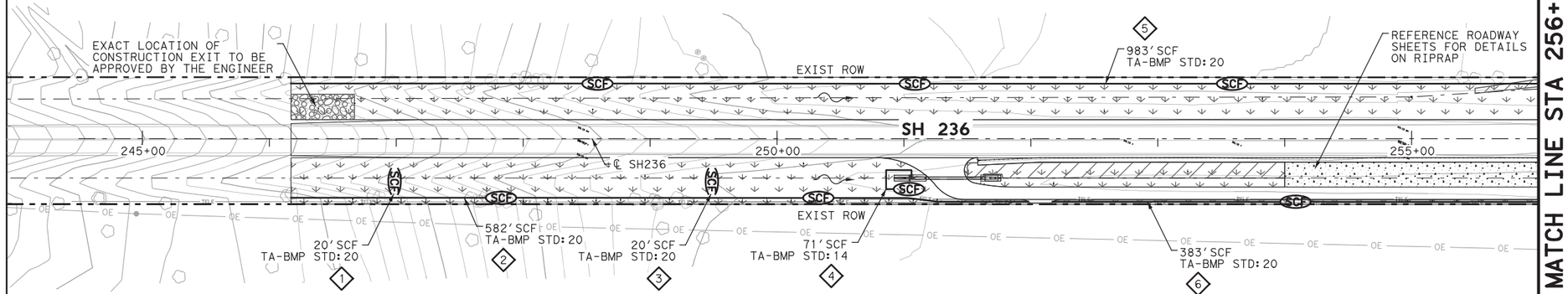
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH 236
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	09	CORYELL		176
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- DRAINAGE FLOW ARROW
- LIMITS OF TOPSOIL AND SEEDING
- CONSTRUCTION EXIT
- SOIL RETENTION BLANKET (CL 1) (TY A)

1	2	3	4
DATE INSTALLED:	DATE INSTALLED:	DATE INSTALLED:	DATE INSTALLED:
DATE REMOVED:	DATE REMOVED:	DATE REMOVED:	DATE REMOVED:
LENGTH:	LENGTH:	LENGTH:	LENGTH:



5	6
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DATE REMOVED:	DATE REMOVED:
LENGTH:	LENGTH:

NOTES:

1. LOCATIONS OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS ARE TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. INSTALL, MAINTAIN, AND REMOVE EROSION CONTROL DEVICES IN ACCORDANCE WITH TxDOT AND WACO DISTRICT STANDARDS FOR EROSION CONTROL.

0 50 100 150 200
SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED
PROFESSIONAL ENGINEER
7/28/2020
P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Heslers Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

SW3P LAYOUT
BEGIN TO STA 256+00
SH 236 AT LEON RIVER

SCALE: 1"=100' SHEET 1 OF 4

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	177
CONTROL	SECTION	JOB	
0513	01	017	

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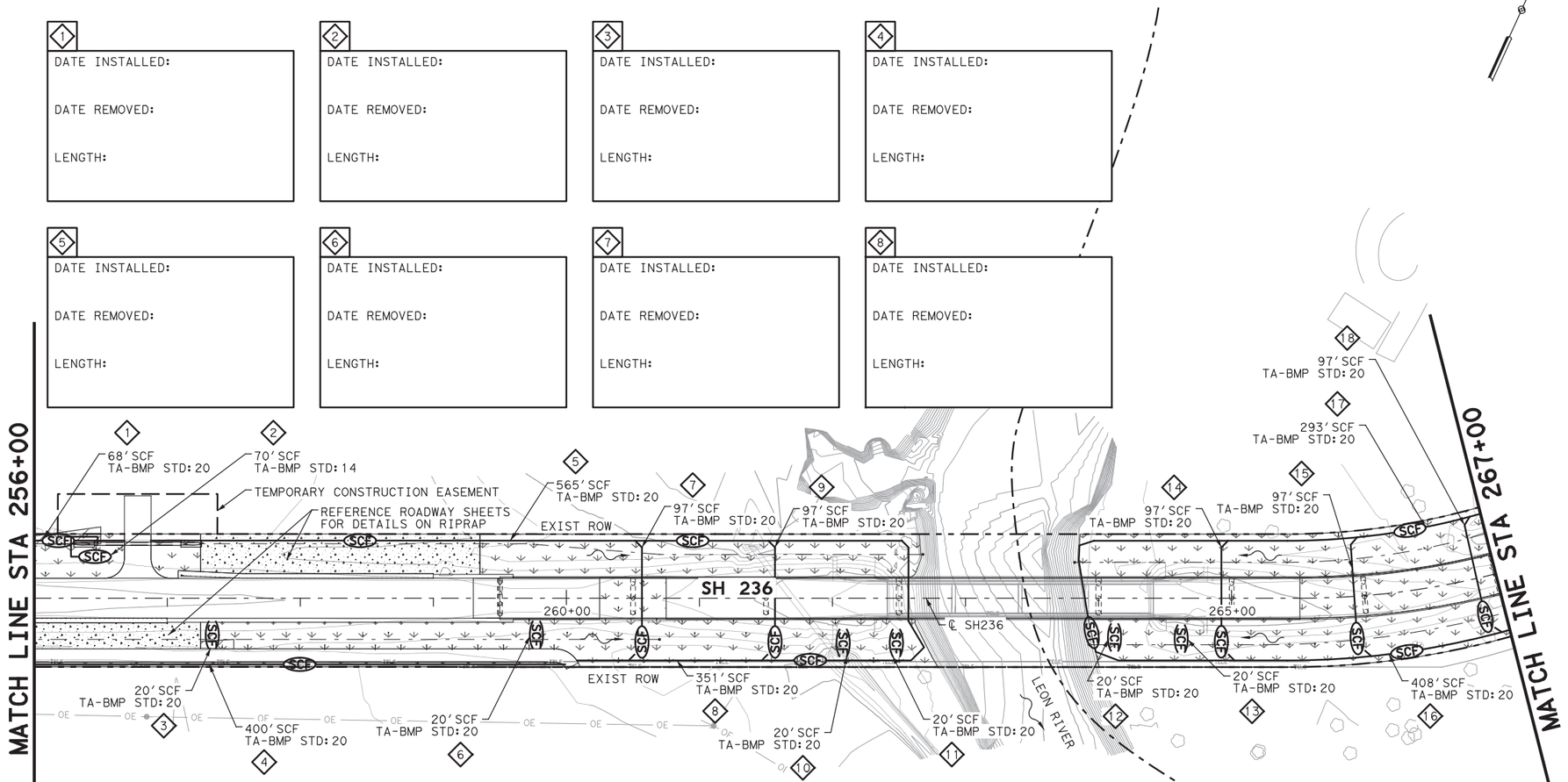
USER: KBERGER DATE: 7/28/2020 TIME: 1:18:4 PM SCALE: 1:100
FILE: SH236ESC01.dgn PENTABLE: 10040174.tbl



1 DATE INSTALLED: / DATE REMOVED: / LENGTH:

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7 DATE INSTALLED: / DATE REMOVED: / LENGTH:

8 DATE INSTALLED: / DATE REMOVED: / LENGTH:

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10 DATE INSTALLED: / DATE REMOVED: / LENGTH:

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18 DATE INSTALLED: / DATE REMOVED: / LENGTH:

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- DRAINAGE FLOW ARROW
- LIMITS OF TOPSOIL AND SEEDING
- CONSTRUCTION EXIT
- SOIL RETENTION BLANKET (CL 1) (TY A)

NOTES:

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0 50 100 150 200
SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS — ERIK A. NELSEN — 91924 — LICENSED PROFESSIONAL ENGINEER — 7/28/2020

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

SW3P LAYOUT
STA 256+00 TO STA 267+00
SH 236 AT LEON RIVER

SCALE: 1"=100' SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	SH236
STATE	DISTRICT / COUNTY	SHEET NO.
TEXAS	WACO / CORYELL	178
CONTROL	SECTION / JOB	
0513	01 / 017	

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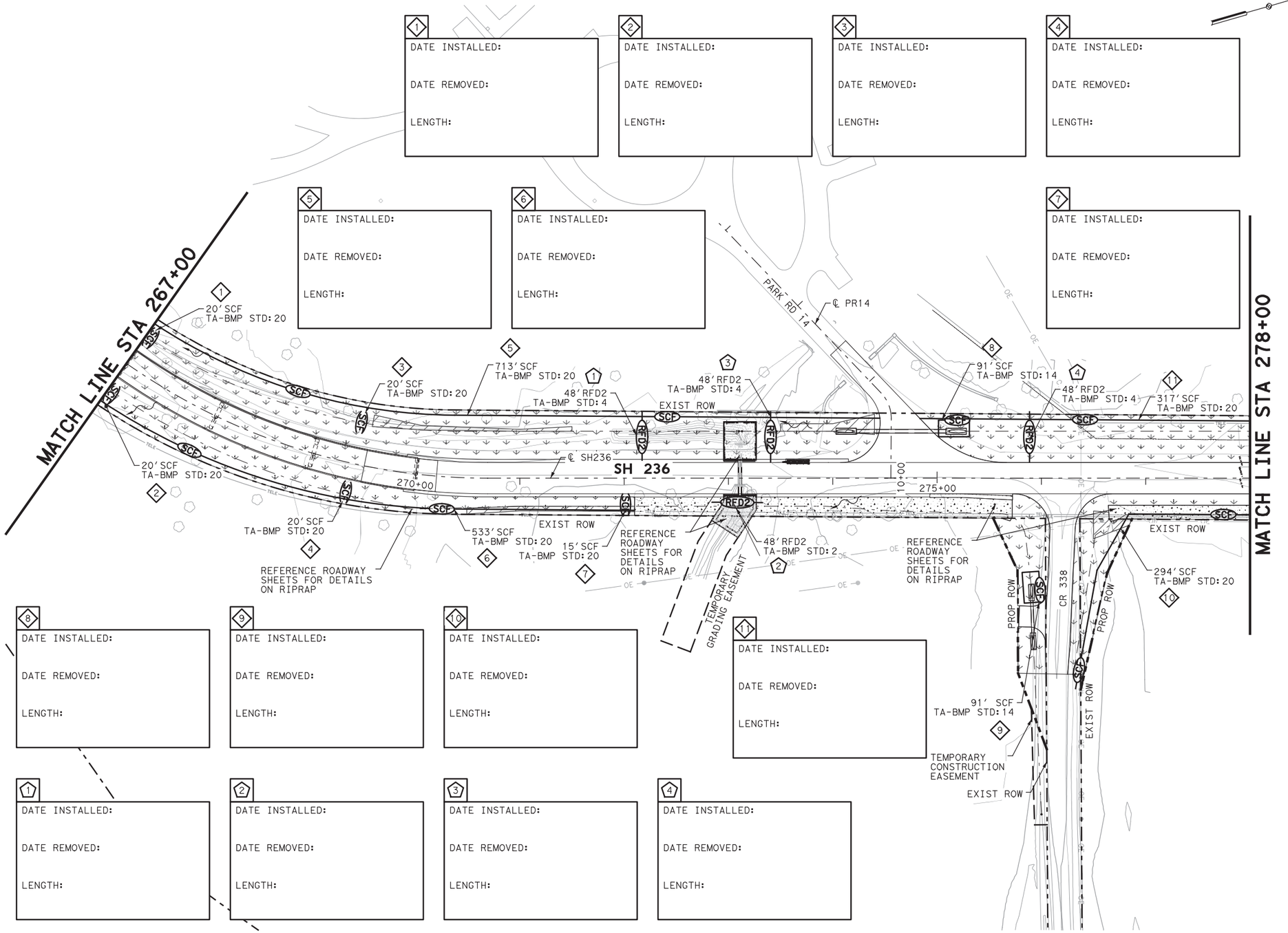
USER: KBERGER DATE: 7/28/2020 TIME: 4:8:17 PM SCALE: 1:100
FILE: SH236ESC02.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- DRAINAGE FLOW ARROW
- LIMITS OF TOPSOIL AND SEEDING
- CONSTRUCTION EXIT
- SOIL RETENTION BLANKET (CL 1) (TY A)



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NOTES:

1. LOCATIONS OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS ARE TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. INSTALL, MAINTAIN, AND REMOVE EROSION CONTROL DEVICES IN ACCORDANCE WITH TxDOT AND WACO DISTRICT STANDARDS FOR EROSION CONTROL.

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SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED PROFESSIONAL ENGINEER
7/28/2020
P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP
FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Hesters Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

SW3P LAYOUT
STA 267+00 TO STA 278+00
SH 236 AT LEON RIVER

SCALE: 1"=100' SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	179
CONTROL	SECTION	JOB	
0513	01	017	

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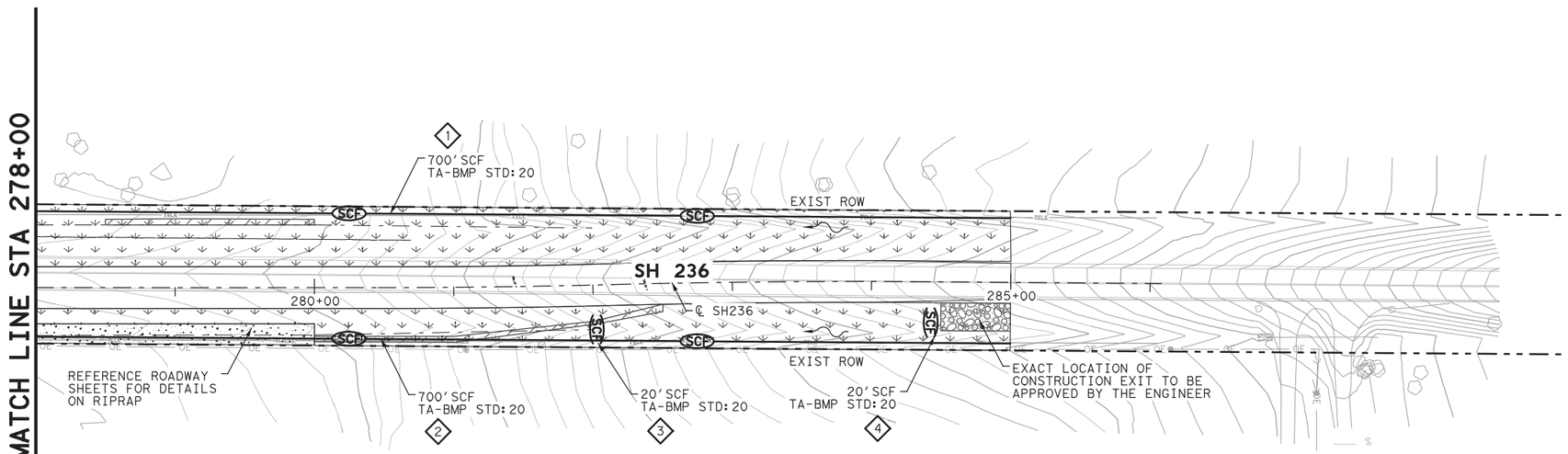
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TY 2)
- DRAINAGE FLOW ARROW
- LIMITS OF TOPSOIL AND SEEDING
- CONSTRUCTION EXIT
- SOIL RETENTION BLANKET (CL 1) (TY A)



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NOTES:

1. LOCATIONS OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS ARE TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
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0 50 100 150 200
SCALE IN FEET

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
ERIK A. NELSEN
91924
LICENSED
PROFESSIONAL ENGINEER
7/28/2020
, P.E.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

HDR ENGINEERING, INC.
Firm Registration No. F-754
710 Heslers Crossing, Suite 150
Round Rock, Texas 78681
512.685.2900

Texas Department of Transportation

SW3P LAYOUT
STA 278+00 TO END
SH 236 AT LEON RIVER

SCALE: 1"=100' SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		SH236
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	WACO	CORYELL	
CONTROL	SECTION	JOB	180
0513	01	017	

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FILE: SH236ESC04.dgn

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

1. Prior to TxDOT allowing the Contractor to start construction, the Contractor will provide the required storm water and 404 permit documentation and support activities, including but not limited to the following:

   - Provide a list of all chemicals, construction and waste products that will be generated, stored or brought upon TxDOT ROW. The list includes expected construction debris, sanitary wastes, construction chemicals and petroleum products used or generated by the Contractor and sub-contractors. Along with the list, the Contractor will supply a spill prevention plan and clean up procedures that will include each of these chemical products or generated waste.

   - Provide in the construction schedule the necessary line items that will comply with the schedule and planning requirements of the storm water permit.

   - Post the TxDOT storm water permit and any Contractor permits, per permit requirements.

   - Provide copies of storm water permits for Contractor PSL(s). As new PSL(s) may be obtained for the project, provide copies of new or amended permits to TxDOT. The Contractor will not disturb soil without the proper permits.

   - Provide scale drawings of off ROW PSL's within one mile of the project, for field offices, borrow sources, plant sites or other uses.

   - Provide permit information on any Contractor batch plants or concrete crushing plants to be located at a Contractor PSL(s) within one mile of the project limits or boundaries. Copies of the air and water permits are to be provided to TxDOT before materials will be used on the project. No asphalt or concrete batch plants or concrete crushing plants will be located on TxDOT ROW.

   - Provide a letter indicating a Contractor Responsible Person for environmental compliance (CRP) for the project, and maintain a CRP throughout the project duration.

   - Provide all environmental documentation including certification of compliance and EMS training documents/certificates prior to starting work. The Contractor is to provide daily BMP inspection reports that document all field BMPs needing repair or replacement. The Contractor is to clearly document specific BMPs needing repair and location each work day. The Contractor is encouraged to be proactive in fixing BMPs without TxDOT direction.

   - Provide documentation required for Waters of the US, Note #3 and submittals for Item 496 bridge removal. Bridge removal methods submitted will follow all Waters of the US note requirements. The Contractor is not to start construction within the Ordinary High Water Marks of any stream until receiving approval for stream channel construction methods from TxDOT.

   - Provide a written procedure for managing all chemicals and construction items placed in vertical containment structures. Also, provide methods to be used for the treatment, disposal, collection or release of storm water.

   - Provide an estimated date by letter, for the submittal of marked up bridge drawings, indicating cut locations for any structural steel requiring cutting or torching of steel, coated with lead containing paints.

2. Place and maintain trash cans and portable sanitary facilities at locations where there is active construction. Worker generated trash and construction debris will be kept from being transported by storm water and will be collected daily from the ground and routinely hauled from the work area.

3. Contractor will provide TxDOT copies of all correspondence with MS4s, TCEQ, EPA, DSHS and Corps of Engineers regarding activities on this project.

4. Contractor to conduct storm water inspections and develop SWPPP documents to support Contractor permits obtained for the project including PSL(s).

5. Contractor will maintain written documentation of locations of all portable sanitary facilities. The Contractor is required to document the location and disposition of all spills and cleanups from portable sanitary facilities.

6. Contractor will not store chemicals on TxDOT ROW, unless chemicals are stored following all environmental and safety regulations. Fuels for construction equipment will not be stored on TxDOT ROW.

7. The Contractor will store fuels and bulk chemicals on Contractor PSL(s) using a secondary containment method, such as double lined tanks and/or free standing containment reservoirs made of plastic or steel designed to hold bulk chemicals or drums.

8. The Contractor will not remove sediment controls without the prior approval of TxDOT, except for a sediment control that may back up water and cause safety or traffic problems.

SCALE = NTS SHEET 1 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn		DN:	CK:	DW:		CK:
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DEC 2013	DIST	COUNTY				SHEET NO.
FEB 2015	WACO	CORYELL				181

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

9. Any sediment controls removed by the Contractor must be re-installed before the next rainfall event or by the end of day, as approved in advance.

10. Vegetative buffer strips may be used in place of temporary sediment controls such as silt fences and rock filter dams. The amount of disturbed soil area will be limited to 1/3 of an acre or less for a minimum of 50 feet of grassed ditch and 2/3 of an acre of disturbed soil for a minimum of 100 feet of grassed ditch.

11. Construction equipment found to be leaking oil, fuel or coolant will be immediately stopped, the leaking fluid collected and the equipment fixed. Equipment continuing to leak will be removed from the project at no cost to TxDOT. Leaking fluids from equipment will be collected and removed from the project or PSL.

12. Earth berms or mounds typically used to stockpile topsoil and used in place of boundary silt fence will be seeded upon being constructed. Long term use of earth berms or mounds will not be continued without establishing grass on the control.

13. The Contractor will inform TxDOT of new areas where soil will be disturbed to facilitate planning for new sediment controls. Areas of vegetated soil will not be disturbed by the Contractor, unless adequate sediment controls can be installed before the next rainfall event. The Contractor will assist TxDOT in keeping an accurate set of working SWPPP drawings that show the locations of all temporary sediment and erosion controls.

14. The Contractor will maintain an adequate amount of temporary sediment controls on hand at the field office or project staging area for critical SWPPP maintenance, including silt fence (minimum of 200 feet) and rock / fabric for rock filter dams (minimum for 100 feet of Type III dams).

    The requirement for BMP rock quantities on hand is waived for small projects for on and off system bridge installations. The Contractor having a BMP Subcontractor does not eliminate the requirement for the Contractor to have the required silt fence and rock on hand, typically stored at the Contractor PSL.

15. Failure of a sub-contractor to complete storm water work on time will require the Contractor to start storm water sediment control work immediately and complete the work with high priority, or be subject to stop work on the entire project.

16. Earth materials on roads as a result of soil tracking will not be allowed to be transported off ROW in storm water. Soil or rock material found on roadways deposited from Contractor equipment will be removed daily.

17. Unless approved, completed concrete curb inlets will not be blocked by sediment controls. The contractor will frequently sweep the completed or partially completed roadway to keep sediment out of drainage pipes.

18. The Contractor will be responsible for proper dust control and will route construction traffic in a manner that minimizes dust generation.

19. Water for dust control will contain no pollutants, but may be non-potable from upland stock ponds. No quantity of water to be used for construction purposes may be taken from a 404 stream, prior to the proper authorizations or permits being obtained by the Contractor.

20. Contractor is to direct workers and sub-contractors to use portable sanitary facilities provided by the Contractor and not to trespass off ROW.

21. Contractor will provide written verification to TxDOT that earth borrow pits and disposal sources meet environmental and regulatory requirements, prior to use. Excavations will meet all OSHA requirements and the current safety guidelines established for TxDOT Quarries and Pits.

22. Boundary silt fences that are terminated down slope, with one end being at the lowest elevation, will be installed with an L - hook to contain sediment. Boundary silt fences that are installed on flat ground will have L-hooks on both ends.

23. Rock filter dams across ditches will be constructed where the rock filter dam ends are embedded within the ditch side slopes and ditch bottom. The top center elevation of the rock filter dam will be at least 6 inches lower than the elevations on the rock filter dam ends.

24. Silt fence will be constructed in a U or V pattern across ditch lines and up the ditch side slope to keep storm water from flowing around the ends of the silt fence. Small silt fences that do not adequately span the ditch and allows storm water around the end(s) will not be used. Where there is adequate space, large U pattern silt fences are preferred to facilitate sediment collection and sediment removal with equipment.

25. Sediment controls (RFDs or silt fences) will be located along road ditches as marked on the SWPPP drawings. Modifications to the sediment control spacing will be adjusted during the project based on sediment control effectiveness. The installation and maintenance of sediment controls at or near outfalls, where storm water leaves TxDOT ROW, takes persistent over ditch line sediment controls.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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REVISIONS	0513	01	017	SH236
DEC 2013	DIST	COUNTY		SHEET NO.
FEB 2015	WACO	CORYELL		182

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

26. Storm water draining sheet flow over disturbed soil sloped towards the ROW property line, will be intercepted by a boundary silt fence typically installed with L-shaped ends.

27. For ditch grading and shoulder up work, the Contractor is limited during good weather to remove up to one mile (limited to five acres of disturbed soil) of ditch line sediment controls; on one side of the roadway. Outfall controls cannot be removed during this activity. Ditch line controls must be replaced upon completion of work and before the next rain event.

28. Sediment controls damaged by the Contractor, as defined by permit, must be fixed or replaced immediately upon discovery.

29. Notches in silt fences are not typically allowed. Specific silt fences that back up water onto lanes of traffic may be notched if approved.

30. For silt fence maintenance, the Contractor will leave approximately 4 inches of deposited sediment up stream of silt fences and not over excavate around silt fences or rock filter dams.

31. The Contractor will inform TxDOT of new construction areas and where soil is planned to be disturbed. Sediment controls will be installed at outfalls prior to the Contractor beginning soil disturbing activities up slope from the outfall.

32. Water from concrete saw cutting, concrete grinding and concrete coring activities; or fine materials from concrete chipping and salvage will not be allowed to enter storm drains or enter streams.

33. Storm water containing suspended sediment and turbidity needing to be removed from excavations or low areas will be pumped or gravity drained through vegetated buffer strips (50 foot minimum) or placed in ditches with temporary sediment controls, prior to the water being discharged into a stream.

34. Uncontaminated water from natural groundwater seepage, springs, foundations and drains that does not contain suspended sediment or any pollutants may be discharged without storm water controls.

35. Lime or cement if spilled in ditches or outside the defined limits of application is considered a pollutant and will be excavated and removed the same day, to avoid contaminating streams.

36. If located along the project ROW, RAP stockpiles will be located where there is a minimum 100 feet of vegetative buffer strip before storm water will reach a stream. RAP will not be used as a construction material within the Ordinary High Water Marks of a stream channel of a 404 designated stream.

37. If allowed on the project, concrete truck wash out areas will have adequate volume to allow 12 inch freeboard for rain and will be lined with 6 mils of plastic. No concrete will be stored higher than the 12 inch freeboard. Cleaning of truck chutes and equipment does not constitute concrete truck wash out and this activity may be completed at the concrete placement location. Wash out areas will not be located closer than 50 ft from down slope inlets or stream channels.

38. For outfalls near stock ponds closer than 50 foot from disturbed soil at the ROW line, redundant sediment controls will be provided, typically a combination of rock filter dam and a silt fence constructed in line of the flow.

39. Earth stockpiles will utilize silt fence sediment controls, positioned on the low end of the stockpile drainage area with L-hooks or silt fence installed around the entire stockpile.

40. Sediment controls including rock filter dams and silt fences will not be installed across any 404 streams. Sediment controls at 404 streams will be positioned to limit sediment entering the stream from the banks and around structures/culverts, and will allow free flow of storm water to pass through the ROW without being dammed by any sediment controls. Remove loose materials from stream channels prior to each rain event.

41. Sediment controls for non-404 streams may be constructed across the drainage channel in unlimited locations. It is appropriate to use sediment control details typically used for 404 streams for non-404 streams when flow velocities are high. Remove loose material from stream channels prior to each rain event.

42. Incomplete drainage pipe installation across the roadway does not remove the requirement for having sediment controls around the ends of the pipe. To stay within permit requirements, sediment controls should be installed over and around the terminated end and along each side of the banks as soon as construction on the pipe has been completed. Remove loose material from stream channels prior to each rain event.

43. Safety end / headwall construction temporarily will require the removal of part of the sediment control placed over and around the pipe end. Retain in place as much functioning sediment control as possible. Replace the silt fence over and around the top of the pipe, immediately upon concrete placement and form removal. Do not remove culvert sediment controls that cannot be replaced before the next rain event. Sediment control at the ends of culverts must be in place and available for any rain event until the disturbed soil areas are re-vegetated.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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REVISIONS	0513	01	017		SH236		
DEC 2013 FEB 2015	DIST	COUNTY			SHEET NO.		
	WACO	CORYELL			183		

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

44. Between the Ordinary High Water Marks of a 404 stream channel, the Contractor will disturb only the minimum amount of stream channel that is necessary to complete the work.

45. Rock riprap for erosion control does not replace the requirements to maintain sediment control until vegetation is re-established. Replace sediment controls immediately after installing erosion rock.

46. At the direction of TxDOT, sediment deposited into existing and new culverts will be removed subsidiary to Item 506. Sediment to be removed is either pre-existing material before construction starts or sediment generated as a part of this project.

47. Provide treated 2X4 cross bracing for rectangular inlet silt fence, subsidiary to Item 506.

48. Loose or granular earth materials will not be used to repair silt fence undercuts. Silt fence undercut repairs will be conducted with well compacted soils or the silt fence will be reset in a nearby location.

49. Silt fence steel T posts of approximately 1.25 pounds per foot are allowed at a spacing of 8 feet or less. Silt fence steel T posts between approximately 1.25 pounds per foot and 0.85 pounds per foot are allowed for T post spacing of 5 feet or less.

50. Silt fence to be used to slow the flow of storm water down slopes will be positioned approximately horizontal (on the contour) with L hooks on the ends and limited to approximately 200 feet in length. Multiple sections and levels of silt fence may be required in addition to temporary / permanent erosion control flumes.

51. Soil retention blankets will be installed rolled down the slope with the small dimension side embedded at the top of slope, unless recommended otherwise by the manufacturer. Excess grass, rocks, trash, debris or clods will be removed before seeding and installing soil retention blankets. All installations will be by the manufacturer recommendations. Contractor equipment, including tractor mowers will be kept off areas with soil retention blankets until the grass is established.

SCALE = NTS SHEET 4 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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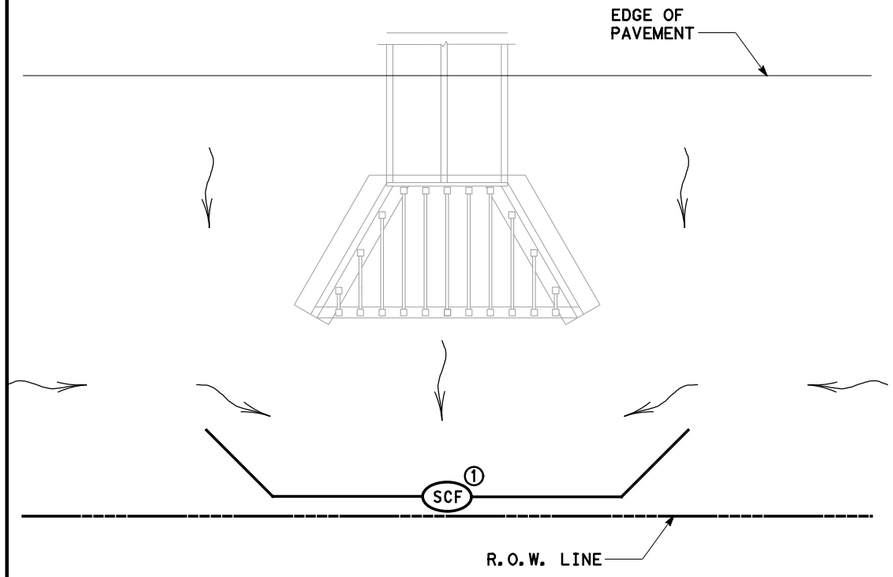
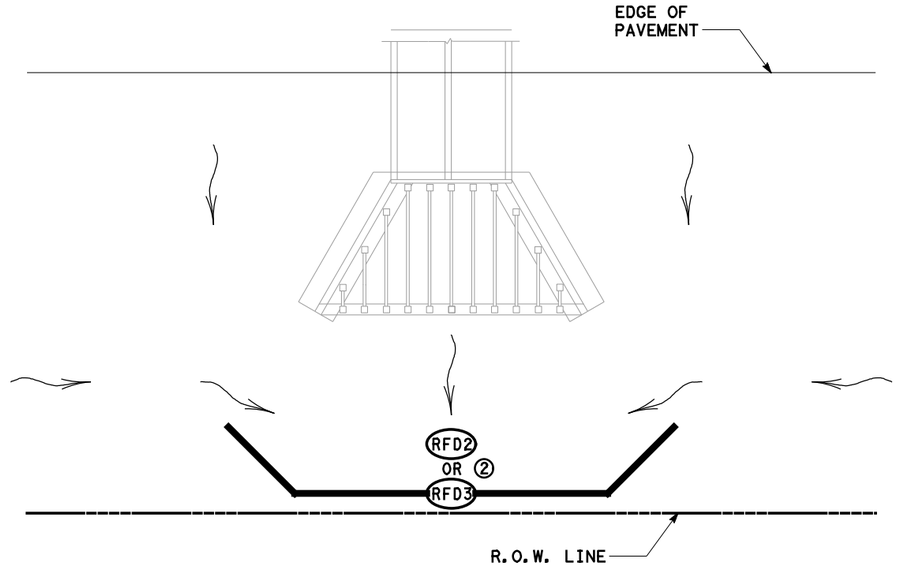


BEST MANAGEMENT PRACTICE (BMP) #1

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



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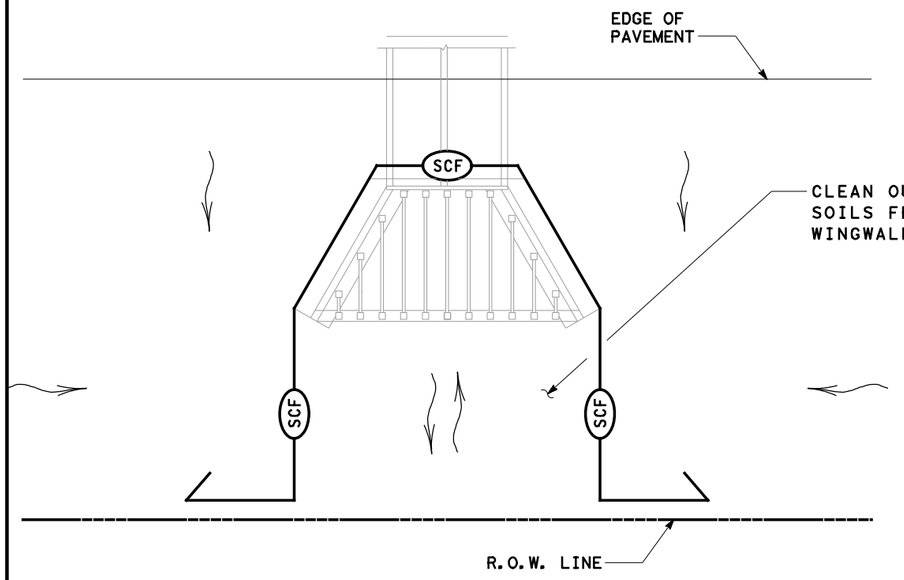
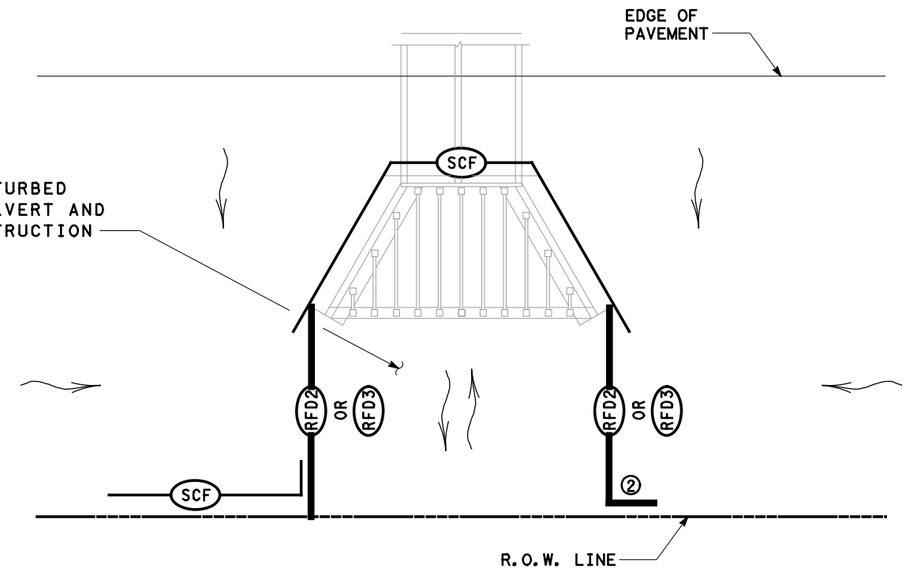
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #3

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #4

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

① EXTEND SILT FENCE SO STORM WATER DOES NOT GO AROUND THE ENDS. USE L-HOOKS ON ENDS AS REQUIRED.

② EXTEND ROCK FILTER DAM SO STORM WATER DOES NOT GO AROUND THE ENDS.

SCALE = NTS SHEET 5 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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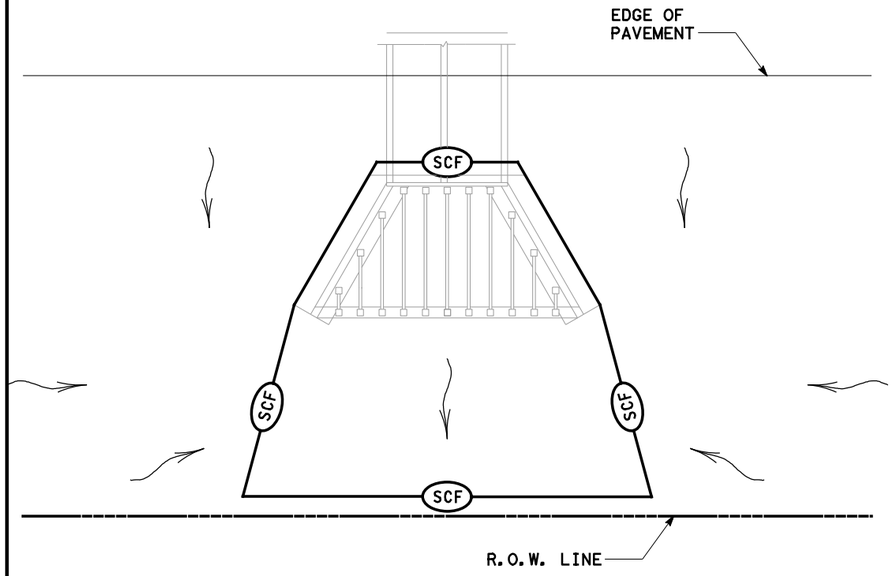
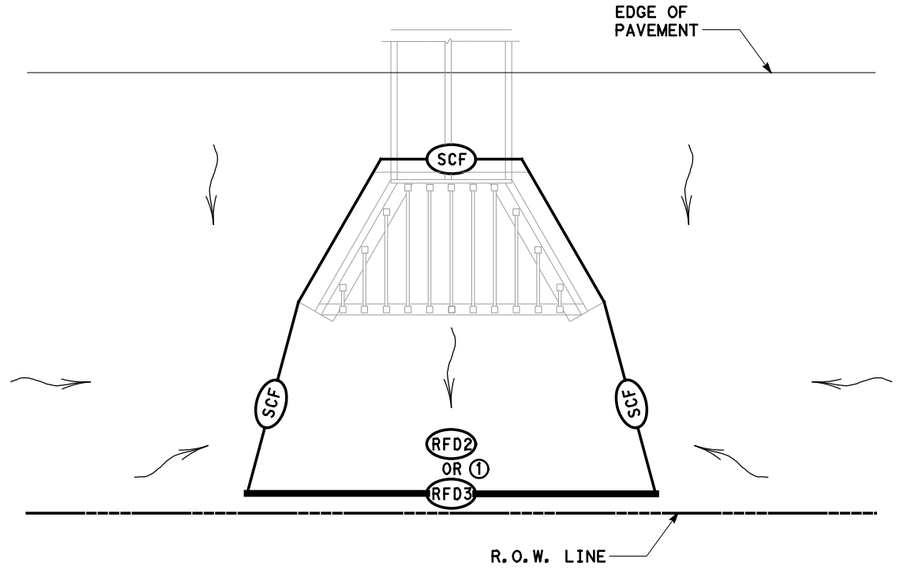
FEB 2015		WACO		CORYELL			185



BEST MANAGEMENT PRACTICE (BMP) #5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #6

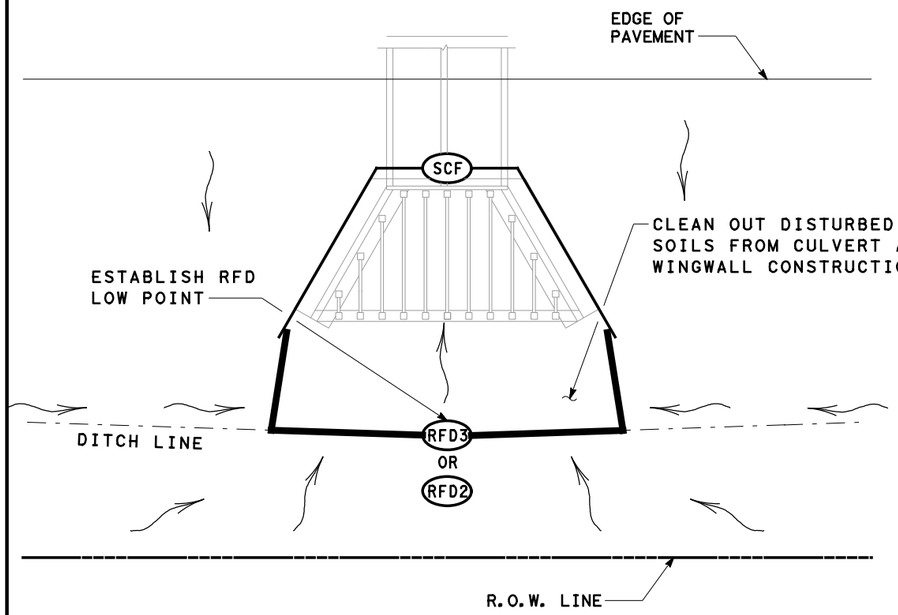
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

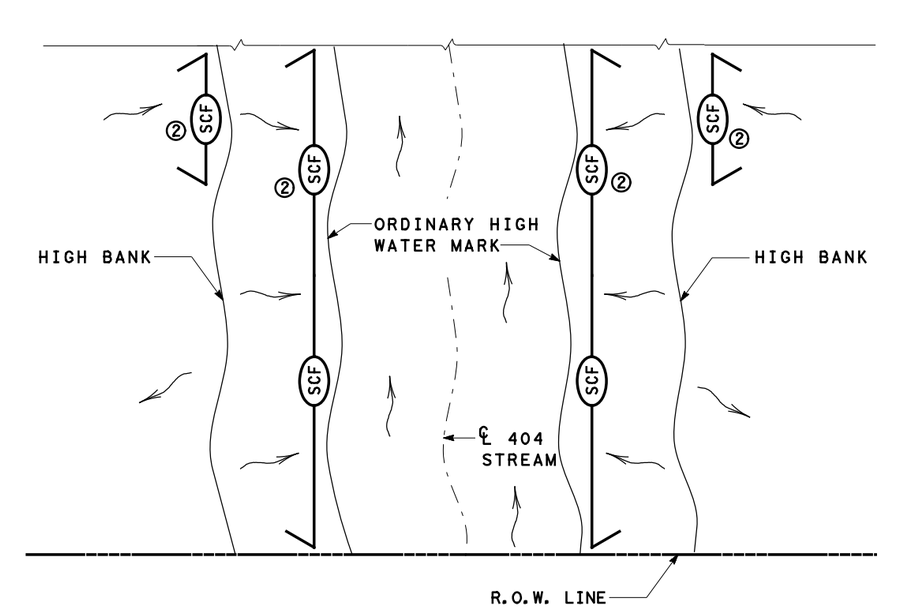
① PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.

② USE SILT FENCE L-HOOKS ON ENDS TO BLOCK STORM WATER SEDIMENT



BEST MANAGEMENT PRACTICE (BMP) #7

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #8

FOR 404 STREAMS ~ SEDIMENT CONTROL DURING PROJECT CLEARING AND GRUBBING

SCALE = NTS SHEET 6 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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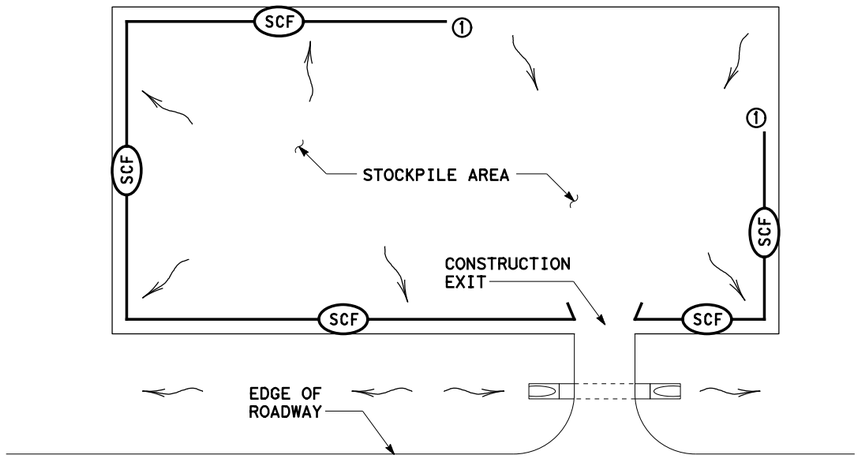
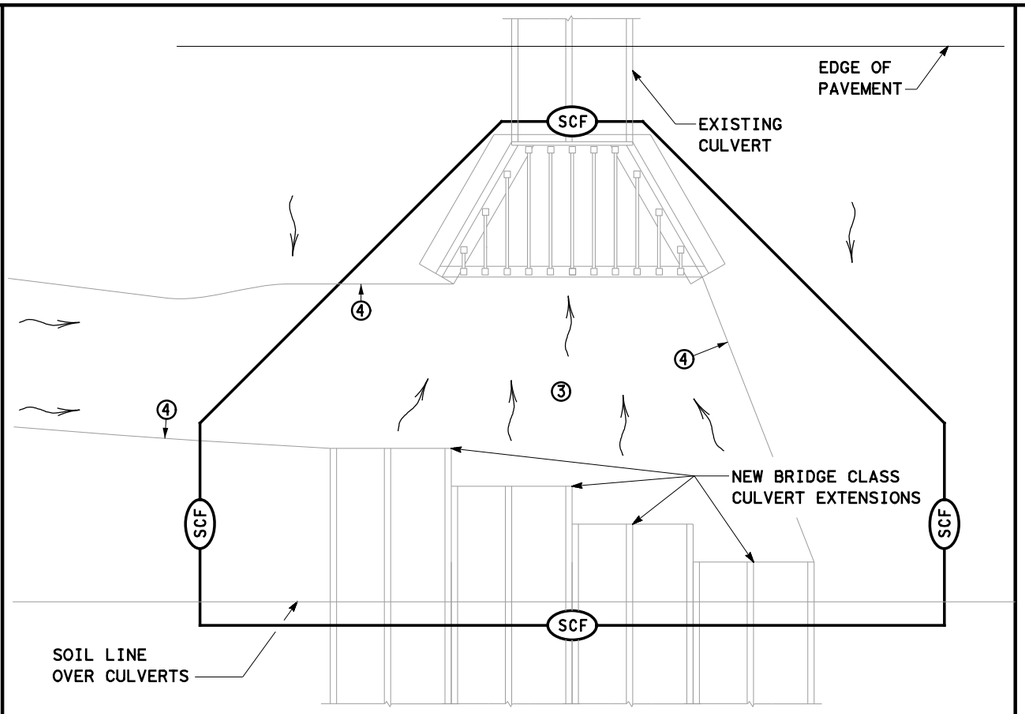
FEB 2015		WACO		CORYELL			186



BEST MANAGEMENT PRACTICE (BMP) #9

STOCKPILE SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #10

FOR 404 OR NON-404 STREAMS ONLY ~
SEDIMENT CONTROL AT PHASED CONSTRUCTION OF BRIDGE CLASS CULVERTS

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

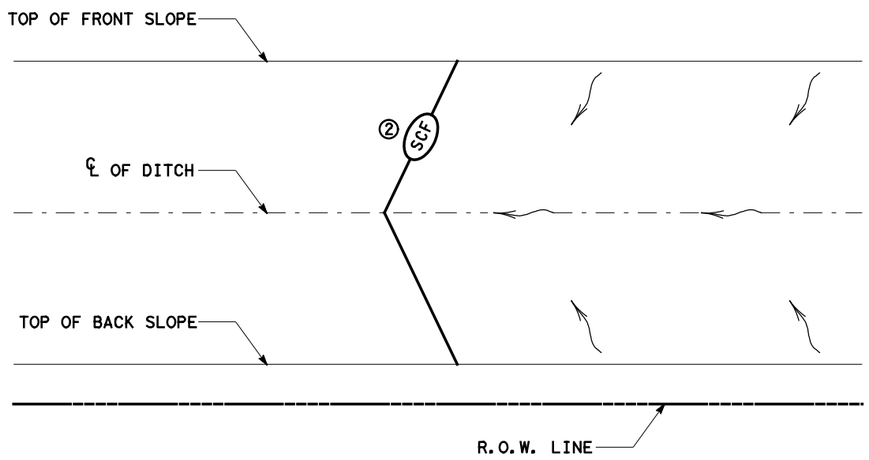
NOTES:

① START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED

② ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.

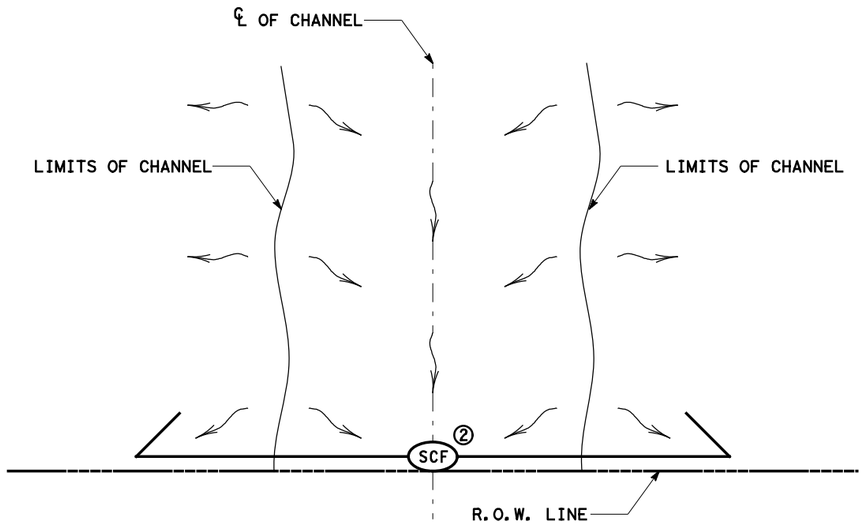
③ PROVIDE A SMOOTH TRANSITION FROM THE INVERT ELEVATIONS BETWEEN CULVERTS. REMOVE LOOSE SOIL FROM EXCAVATED AREA BETWEEN CULVERTS.

④ PROVIDE AND INSTALL PNEUMATICALLY PLACED CONCRETE ON THE DITCH BOTTOM AND SIDE SLOPES BETWEEN TEMPORARY TERMINATIONS BETWEEN OLD AND NEW CULVERTS. PNEUMATICALLY PLACED CONCRETE WILL BE PLACED TO THE HEIGHT OF THE LARGEST CULVERT ON THE DITCH SIDE SLOPES; AND TO A LIMIT 10 FEET OUTSIDE THE LOCATION OF BMPS ALONG THE DITCH BOTTOM. CEMENT STABILIZED SAND MAY BE SUBSTITUTED FOR PNEUMATICALLY PLACED CONCRETE, IN AREAS WHERE INSTALLATION WORKS AND AT THE OPTION OF TXDOT.



BEST MANAGEMENT PRACTICE (BMP) #11

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE



BEST MANAGEMENT PRACTICE (BMP) #12

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED DOWN SLOPE

SCALE = NTS SHEET 7 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn		DN: TXDOT		CK: TXDOT	DW: TXDOT		CK: TXDOT
© TxDOT 2009		CONT	SECT	JOB		HIGHWAY	
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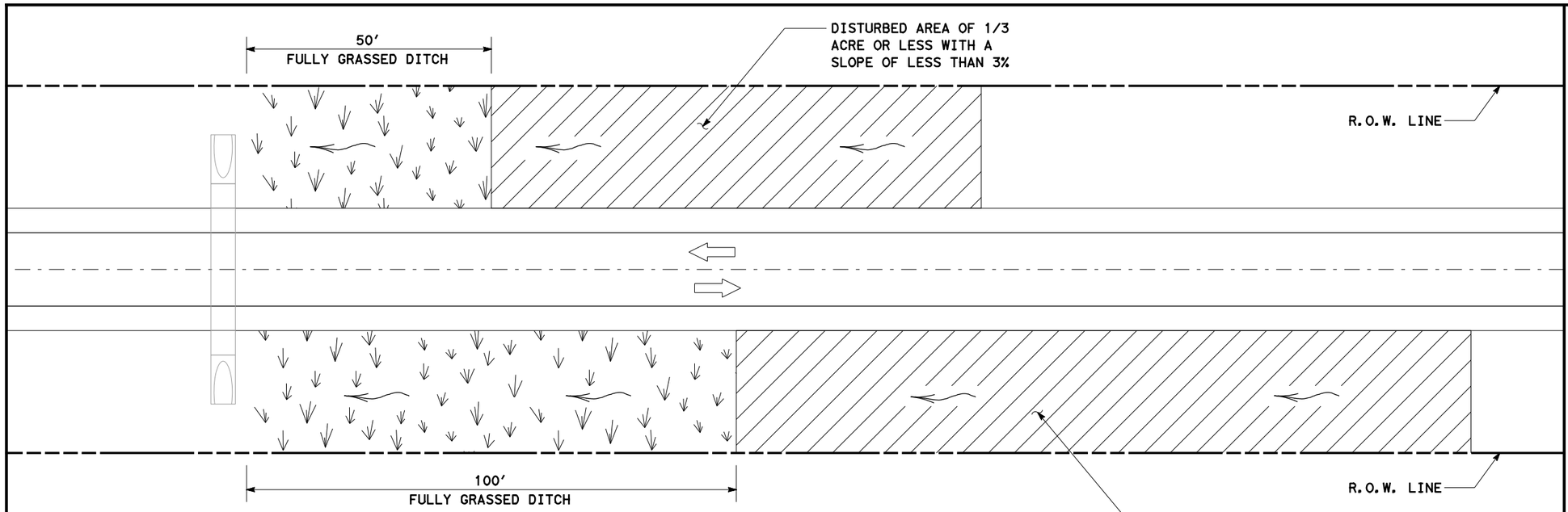
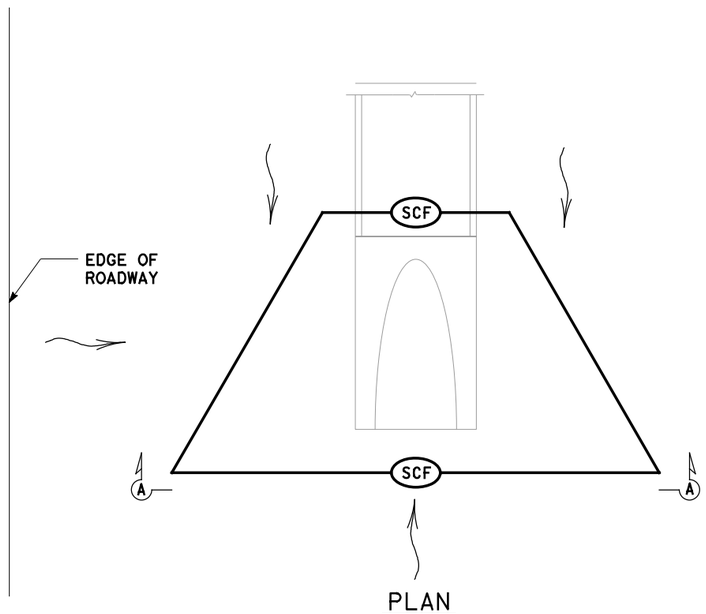
DEC 2013		DIST	COUNTY			SHEET NO.	
FEB 2015		WACO	CORYELL			187	

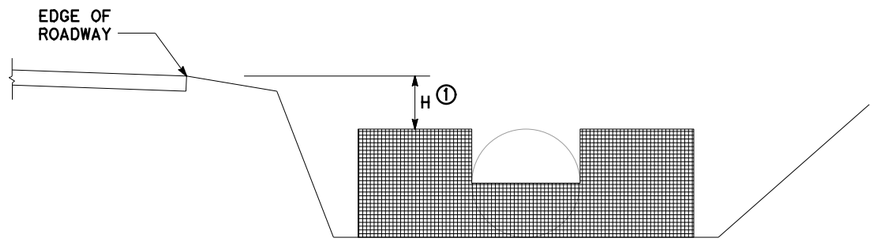


BEST MANAGEMENT PRACTICE (BMP) #13

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS



PLAN



VIEW A-A

BEST MANAGEMENT PRACTICE (BMP) #14

NON-404 STREAMS AND DITCHES ONLY ~ SEDIMENT CONTROL AT PARALLEL DRAINAGE STRUCTURE ENTRANCE ②

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE

① FOR H DIMENSIONS LESS THAN 1.5' SILT FENCE MAY NEED TO BE NOTCHED AS SHOWN IN VIEW A-A. ADD EXTRA POSTS AT NOTCH.

② BMP #14 MAY BE USED AT CROSS DRAINAGE STRUCTURES AS DIRECTED.

SCALE = NTS SHEET 8 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn		DN: TXDOT		CK: TXDOT	DW: TXDOT		CK: TXDOT
		CONT	SECT	JOB		HIGHWAY	
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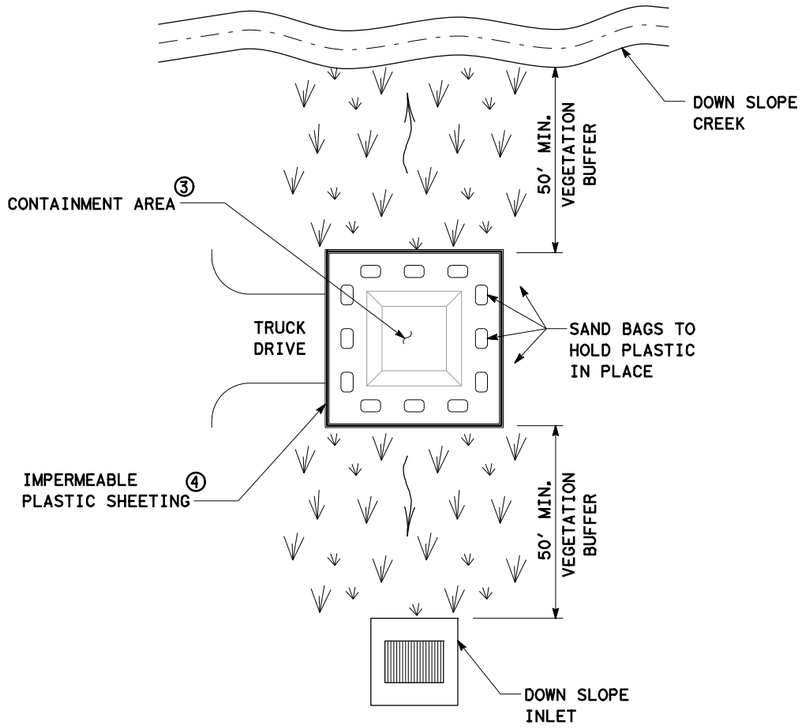
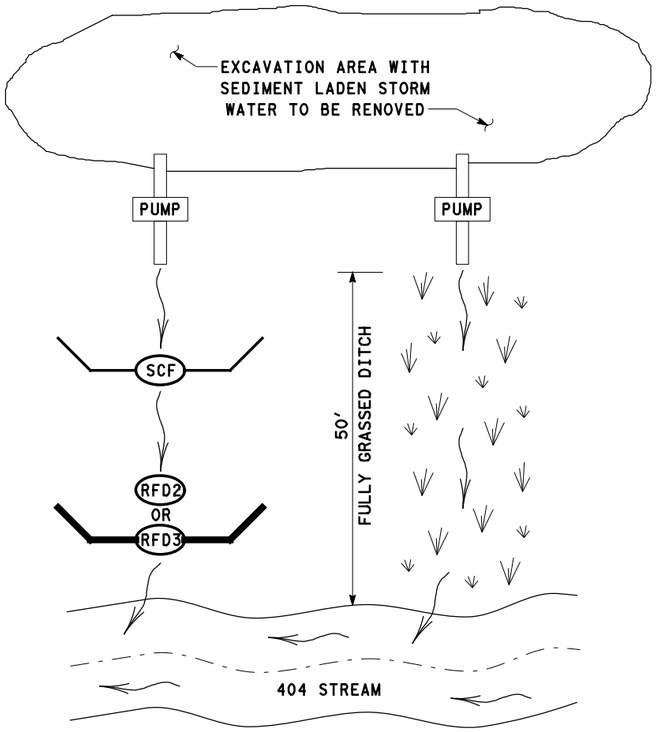


BEST MANAGEMENT PRACTICE (BMP) #15

CONCRETE TRUCK WASHOUT AREA



BEST MANAGEMENT PRACTICE (BMP) #16

PUMPED STORM WATER SEDIMENT CONTROLS ①

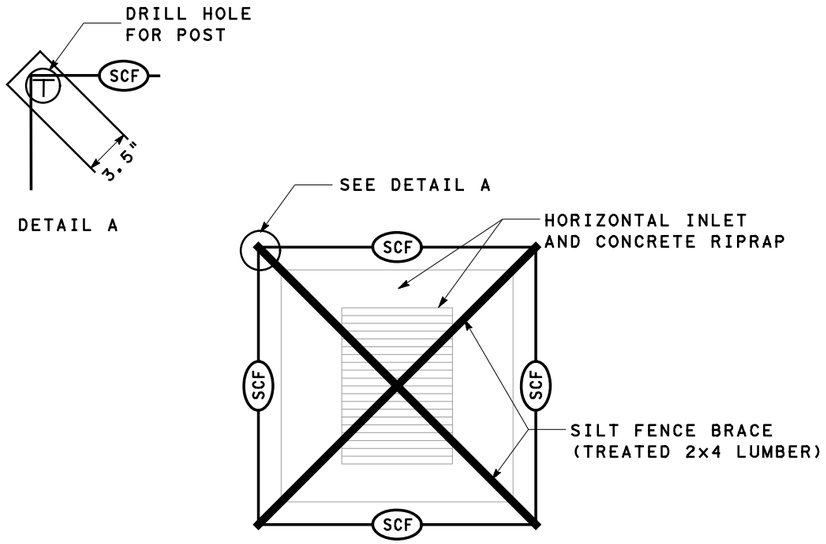
	FULLY GRASSED DITCH
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)

① PUMPED STROM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS BEFORE ENTERING A 404 STREAM.

② FOR LANDOWNER STOCKPONDS WITHIN 50' OF THE RIGHT OF WAY LINE, PROVIDE REDUNDANT SEDIMENT CONTROLS AT THE CONVEYANCE OF THE POND. MINIMUM OF TWO SEDIMENT CONTROLS.

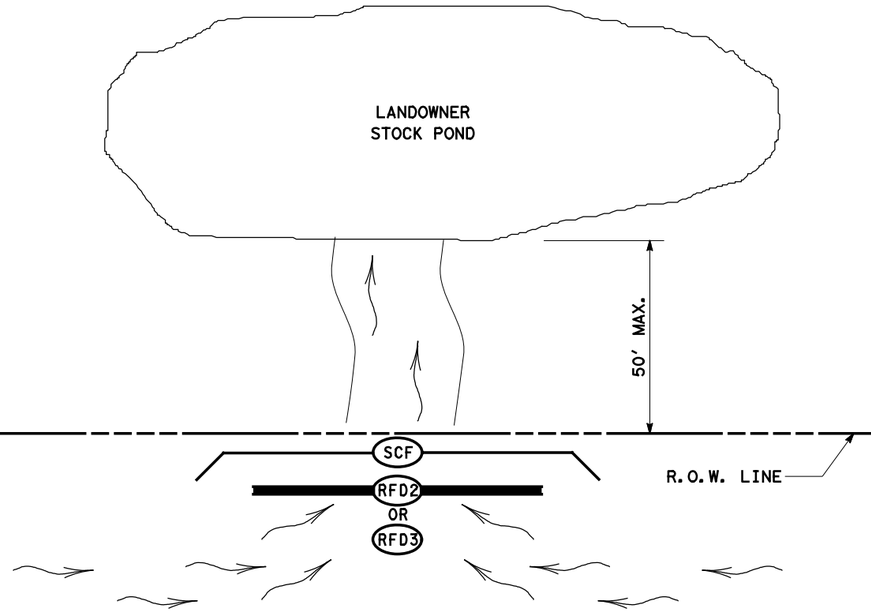
③ WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.

④ EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING.



BEST MANAGEMENT PRACTICE (BMP) #17

HORIZONTAL INLET SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #18

LANDOWNER STOCKPOND SEDIMENT CONTROL ②

SCALE = NTS SHEET 9 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn		DN: TXDOT		CK: TXDOT	DW: TXDOT		CK: TXDOT
© TxDOT 2009		CONT	SECT	JOB		HIGHWAY	
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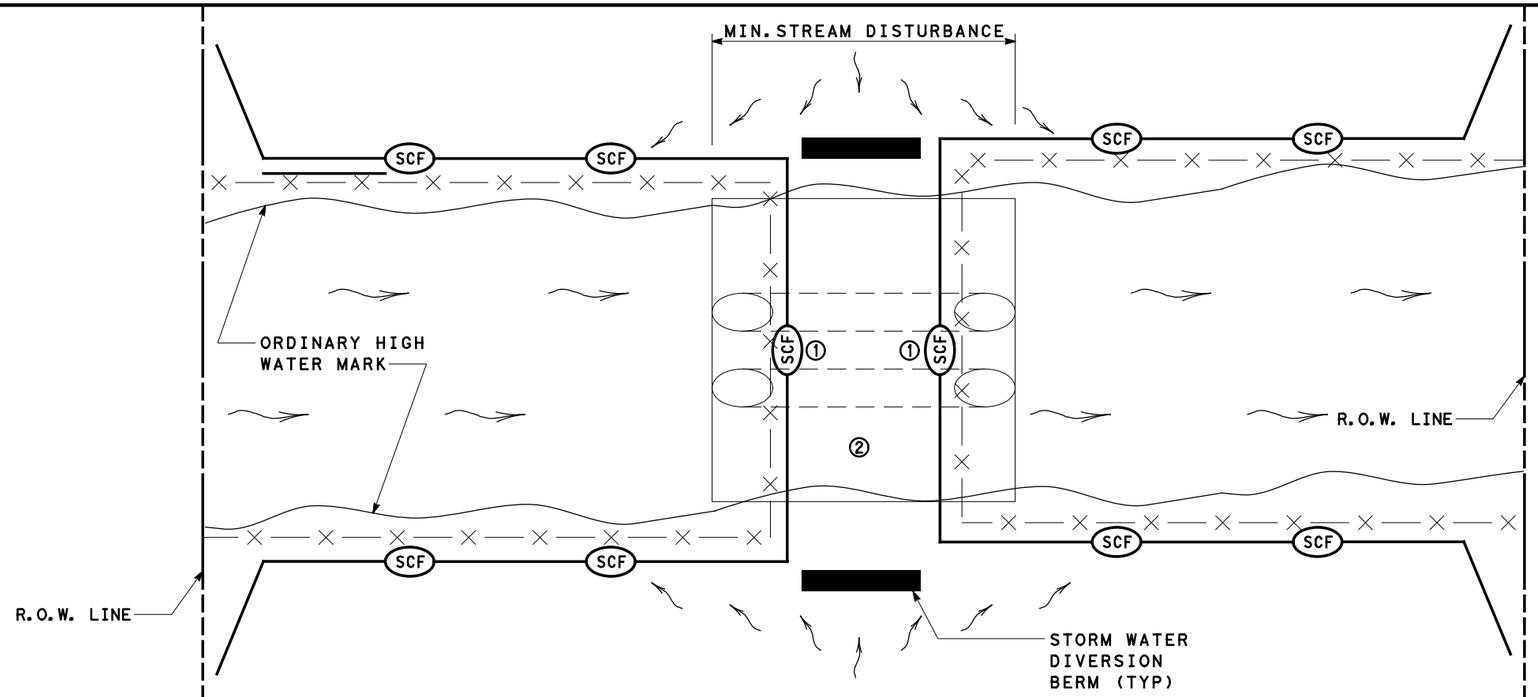
FEB 2015		WACO		CORYELL			189



BEST MANAGEMENT PRACTICE (BMP) #19

TYPICAL 404 STREAM CROSSING (SEDIMENT CONTROL AT CROSSING)

	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD	ROCK FILTER DAM
× — ×	SECURITY FENCING

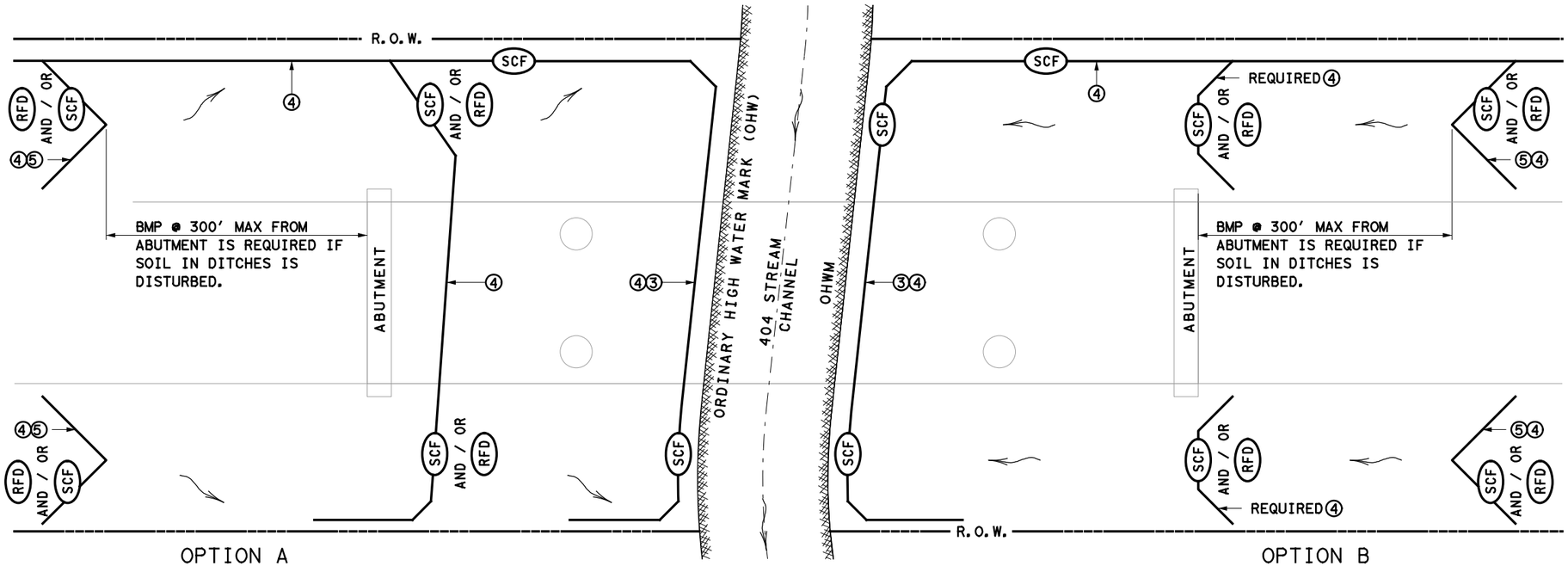
① HAY BALES MAY BE SUBSTITUTED FOR SILT FENCE OVER THE STREAM CROSSING.

② CROSSING WILL BE AS PER REQUIREMENTS OF THE WATERS OF THE US GENERAL NOTES.

③ INSTALL SILT FENCE SLIGHTLY UP FROM OHW MARK FROM R.O.W. TO R.O.W.

④ USE SILT FENCE L-HOOKS ON LEVEL OR DOWN SLOPING ENDS TO BLOCK STORM WATER SEDIMENT

⑤ INSTALL LARGE V OR U SHAPED BMP'S FROM ABUTMENT AS SHOWN. IF THERE IS STEEP DITCH CONDITIONS DECREASE SPACING AND CONSIDER RFD'S. ADD ADDITIONAL BMP'S IF GRADE IS STEEP OR IF FLOW IS HIGH.



BEST MANAGEMENT PRACTICE (BMP) #20

FOR 404 STREAMS ~ BMP'S AT BRIDGES

SCALE = NTS SHEET 10 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS DEC 2013 FEB 2015	0513	01	017	SH236
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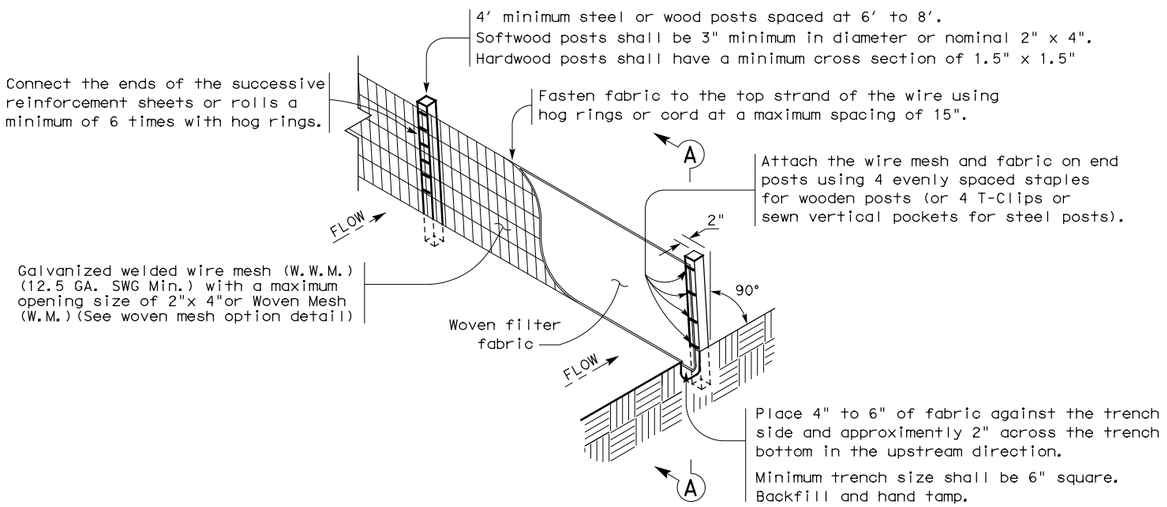
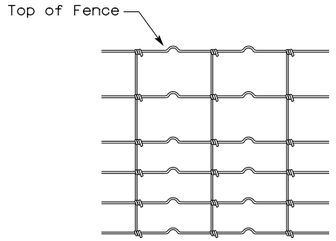
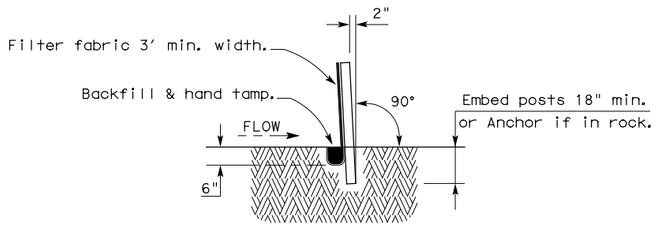
	WACO	CORYELL		190



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.

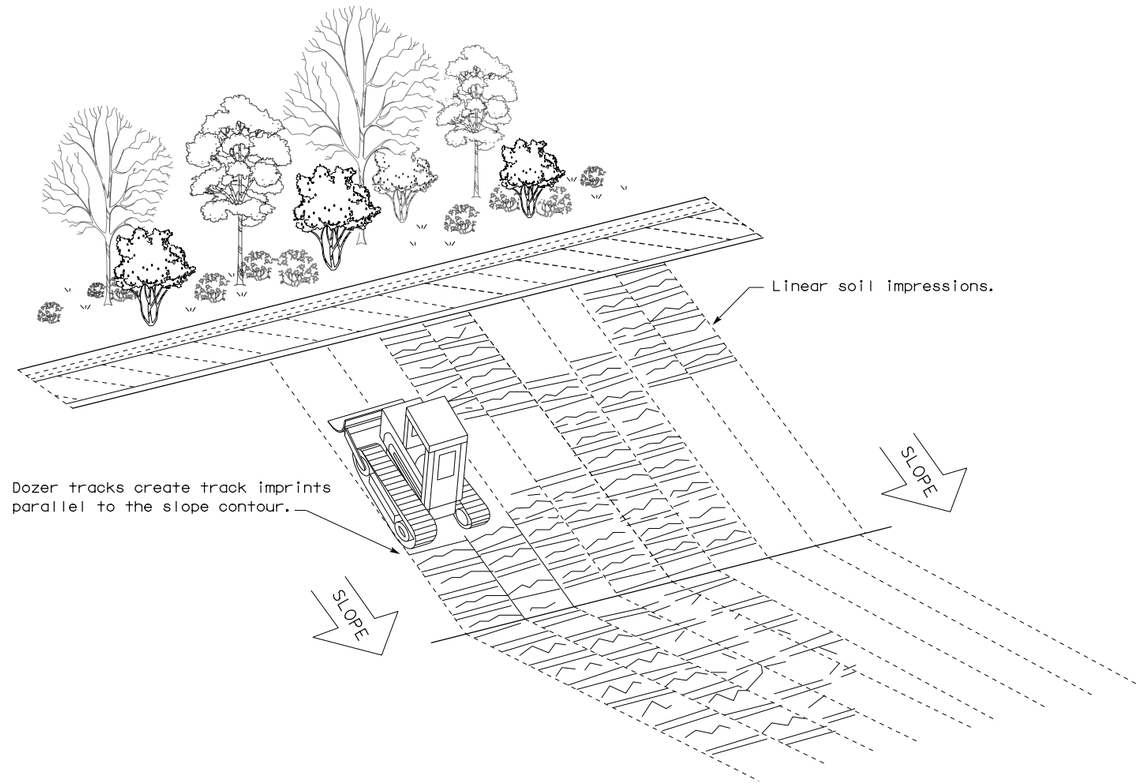
LEGEND

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	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		191

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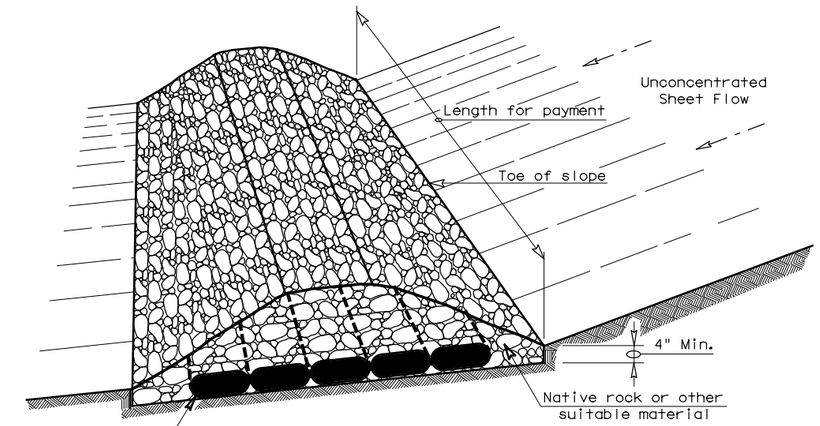
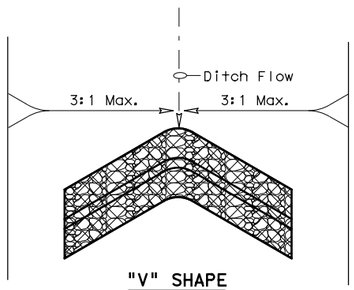
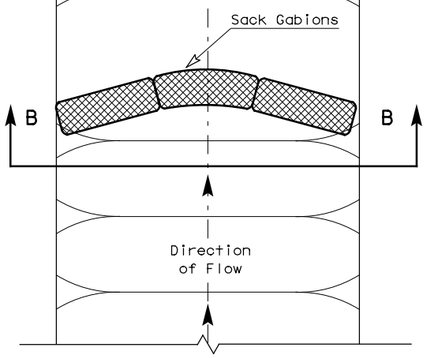


FILTER DAM AT TOE OF SLOPE

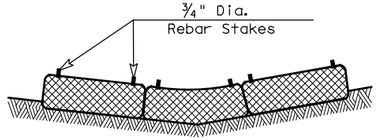
RFD1



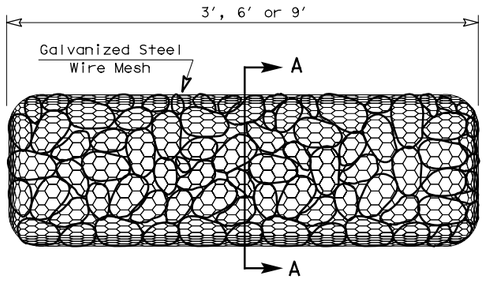
"V" SHAPE PLAN VIEW



PLAN VIEW

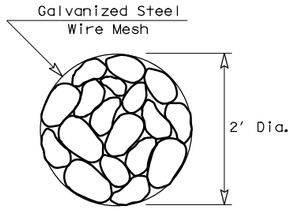


SECTION B-B

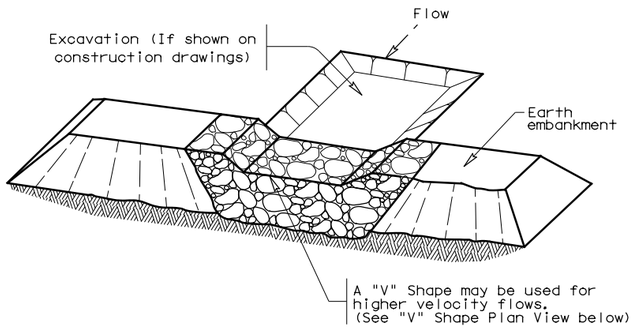


TYPE 4 (SACK GABIONS)

RFD4

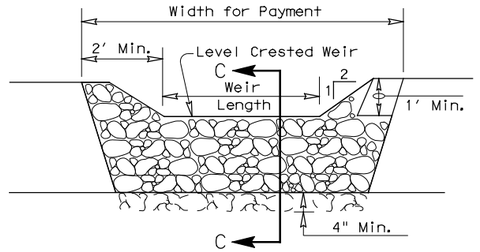


SECTION A-A



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



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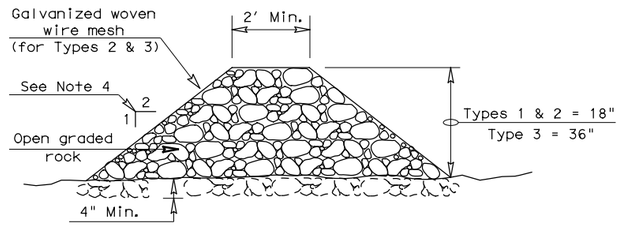
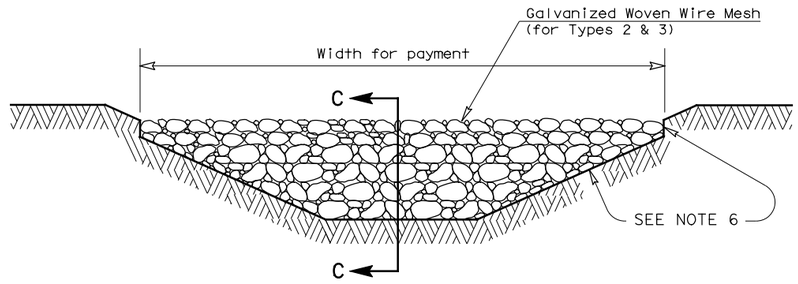


SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0513	01	017	SH236		
	DIST	COUNTY		SHEET NO.		
	WACO	CORYELL		192		

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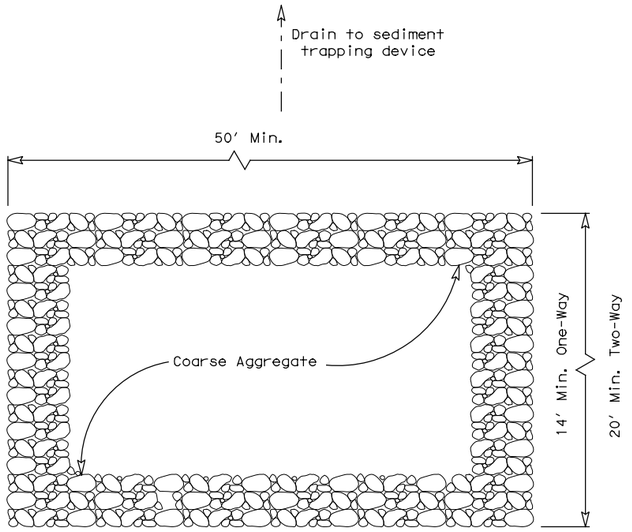
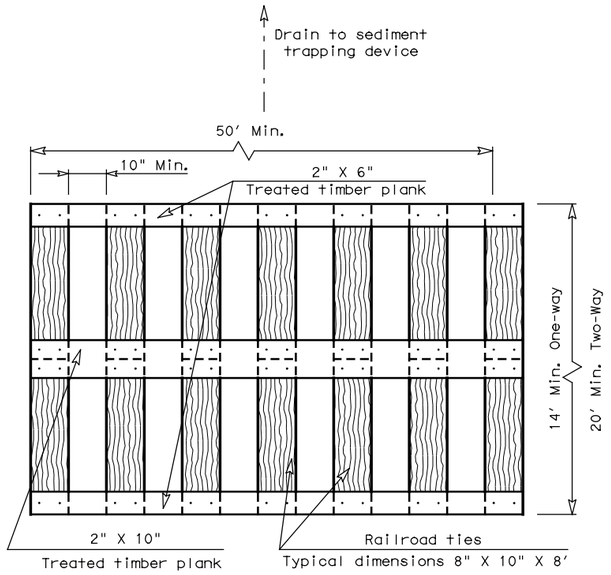


PLAN VIEW



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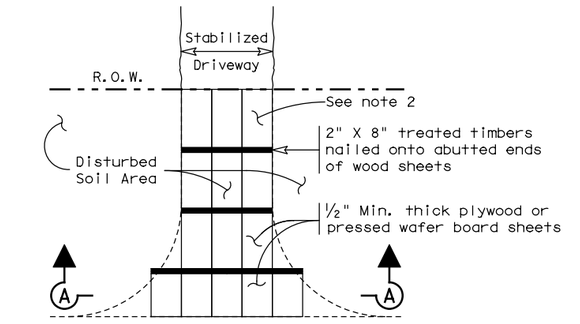
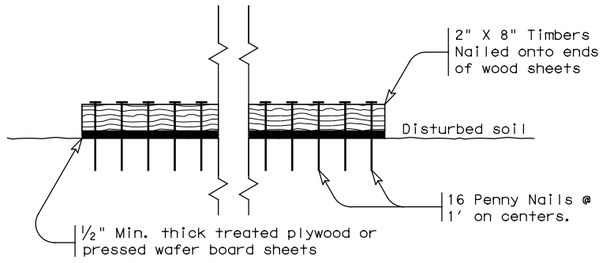


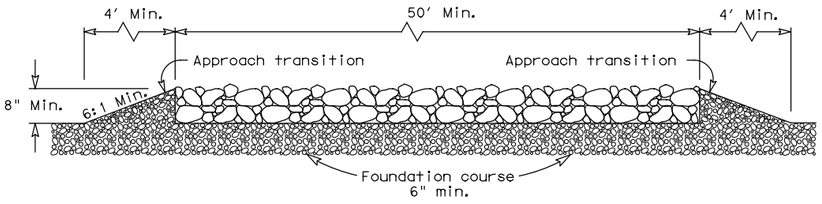
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

SHORT TERM



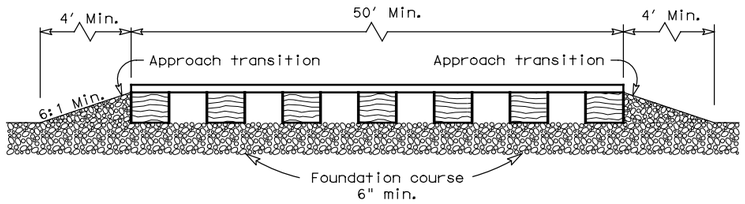
ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0513	01	017	SH236
	DIST	COUNTY		SHEET NO.
	WACO	CORYELL		193