DocuSign Envelope ID: 37F8E11D-BEBF-4C1A-9C3E-D5A12EBF1CB0

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	BR 2022 (518), ETC		CR 110, ETC
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	DALLAS	KAUFMAN	1
CONTROL	SECTION	JOB	
0918	11	100, ETC.	

FINAL PLANS

NAME OF CONTRACTOR: ______________________

DATE OF LETTING: ______________________

DATE WORK BEGAN: ______________________

DATE WORK COMPLETED: ______________________

DATE WORK ACCEPTED: ______________________

SUMMARY OF CHANGE ORDERS:

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT

BR 2022 (518), ETC

CCSJ: 0918-11-100, ETC.

CR 110, ETC.

KAUFMAN COUNTY

LIMITS: CSJ 0918-11-100: CR 110 AT JONES CREEK
CSJ 0918-11-101: CR 279 AT BACHELOR CREEK RELIEF
CSJ 0918-11-102: CR 312 AT MUDDY CEDAR CREEK TRIBUTARY

TOTAL LENGTH OF PROJECT =

CSJ: 0918-11-100	ROADWAY =	322.00 FT. =	0.061 MI.
	BRIDGE =	45.00 FT. =	0.009 MI.
	CSJ TOTAL =	367.00 FT. =	0.070 MI.
CSJ: 0918-11-101	ROADWAY =	408.00 FT. =	0.077 MI.
	BRIDGE =	50.00 FT. =	0.010 MI.
	CSJ TOTAL =	458.00 FT. =	0.087 MI.
CSJ: 0918-11-102	ROADWAY =	200.00 FT. =	0.038 MI.
	BRIDGE =	45.00 FT. =	0.009 MI.
	CSJ TOTAL =	245.00 FT. =	0.047 MI.
	PROJECT TOTAL =	1070.00 FT. =	0.204 MI.

TYPE OF WORK: FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF: REPLACE BRIDGE AND APPROACHES

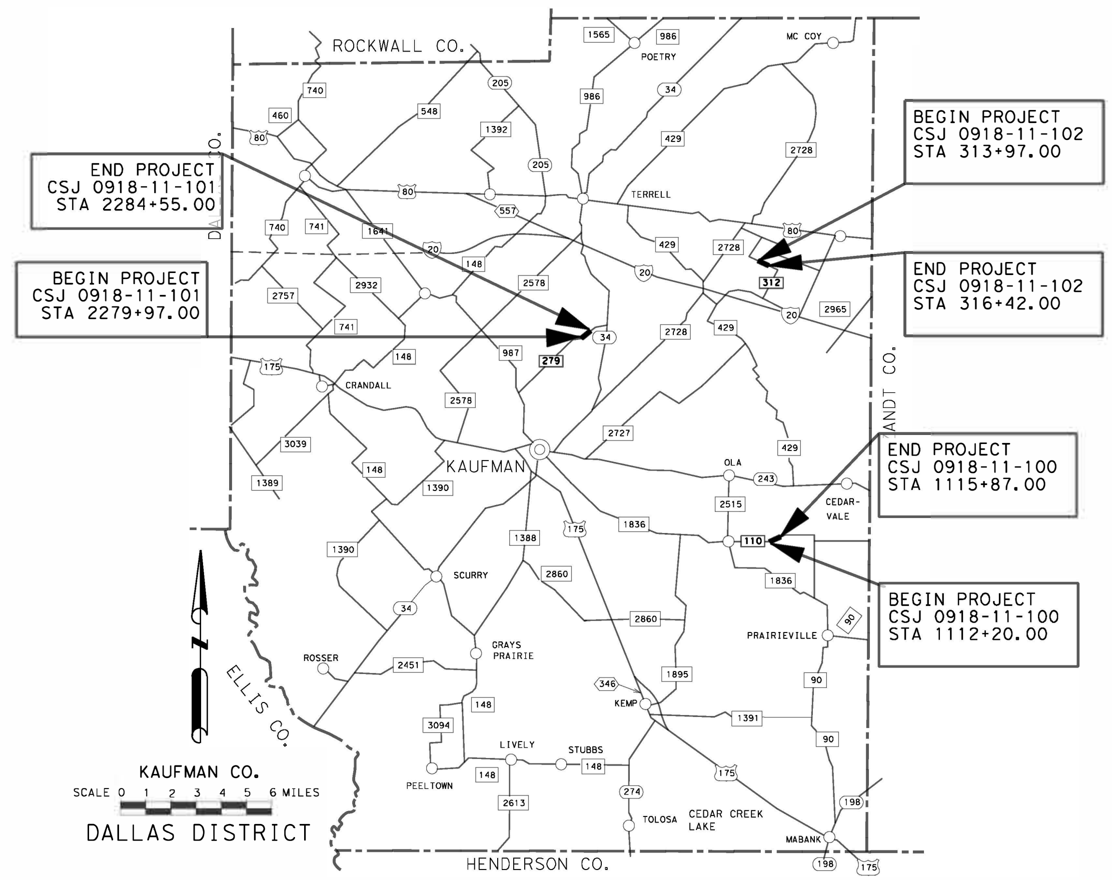
FUNCTIONAL CLASS = RURAL LOCAL ROAD
DESIGN SPEEDS = MEETS OR EXCEEDS EXISTING

EXISTING ADT: 30 (2023) - CR 110
25 (2023) - CR 279
30 (2023) - CR 312

FUTURE ADT: 40 (2043) - CR 110
35 (2043) - CR 279
40 (2043) - CR 312

NOTE:

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



EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

SUBMITTED FOR LETTING: 2/16/2023

Rodolfo Chapa, P.E.
Rodolfo Chapa, P.E.
CONSULTANT PROJECT MANAGER

© 2023 Texas Department of Transportation

RECOMMENDED FOR LETTING: 2/24/2023
DocuSigned by: James P. Campbell, P.E.
9867...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

RECOMMENDED FOR LETTING: 2/23/2023
DocuSigned by: Lane Selman, P.E.
29F92BAFC...
AREA ENGINEER

APPROVED FOR LETTING: 2/24/2023
DocuSigned by: Ceason Clemens, P.E.
A879E0D...
DISTRICT ENGINEER

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

______________________, P.E.
Signature of Registrant & Date

RMorfin
2/16/2023 4:56:12 PM
N:\P5072-18-19-4\CADD*BR*11-100\DGN\01*GENERAL\KAUF*GNTS*TITLE.dgn
...\TXDOT-BW-HALF*PDF.pltcfg

SHEET NO.	DESCRIPTION
	I. GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3 - 5	PROJECT LAYOUT
6 - 8	TYPICAL SECTIONS
9 , 9A-9D	GENERAL NOTES
10 , 10A	ESTIMATE AND QUANTITIES
11 - 12	SUMMARY OF QUANTITIES
13	EARTHWORK QUANTITY SUMMARY
14	SUMMARY OF SMALL SIGNS
	II. TRAFFIC CONTROL PLAN
15	TRAFFIC CONTROL NARRATIVE
16	TRAFFIC CONTROL PLAN DETOUR PLAN- CR 110
17	TRAFFIC CONTROL PLAN DETOUR PLAN- CR 279
18	TRAFFIC CONTROL PLAN DETOUR PLAN- CR 312
19 - 30	*BC(1)-21 THRU BC(12)-21
31	*WZ(RCD)-13
	III. ROADWAY DETAILS
32 - 34	SURVEY CONTROL INDEX
35 - 37	HORIZONTAL AND VERTICAL CONTROL
38 - 40	ALIGNMENT DATA
41 - 44	ROADWAY PLAN & PROFILE
45 - 47	RIPRAP DETAILS
48	*BED-14
49	*GF (31)-19
50	*GF (31)MS-19
51 - 52	*GF (31)TR TL3-20
53	*SGT(10S)31-16
54	*SGT(11S)31-18
55	*SGT(12S)31-18
56	*SGT(15)-31-20
57	*TE (HMAC)-11
58	*WF(1)-10
59	*WF(2)-10
	IV. RETAINING WALL DETAILS
	NONE
	V. DRAINAGE DETAILS
60	CR 110 DRAINAGE AREA MAP
61 - 64	CR 110 HYDRAULIC DATA
65	CR 110 SCOUR ANALYSIS
66	CR 279 DRAINAGE AREA MAP
67 - 70	CR 279 HYDRAULIC DATA
71	CR 279 SCOUR ANALYSIS
72	CR 312 DRAINAGE AREA MAP
73 - 76	CR 312 HYDRAULIC DATA
77	CR 312 SCOUR ANALYSIS
	VI. UTILITIES
	NONE
	VII. BRIDGE DETAILS
78	CR 110 JONES CREEK ESTIMATED QUANTITIES
79	CR 110 JONES CREEK BRIDGE LAYOUT
80	CR 110 JONES CREEK BRIDGE TYPICAL SECTIONS
81	CR 110 JONES CREEK CAP ELEVATIONS
82 - 83	CR 110 JONES CREEK BORING LOGS
84	CR 279 BACHELOR CREEK RELIEF ESTIMATED QUANTITIES
85	CR 279 BACHELOR CREEK RELIEF BRIDGE LAYOUT
86	CR 279 BACHELOR CREEK RELIEF BRIDGE TYPICAL SECTIONS
87	CR 279 BACHELOR CREEK RELIEF CAP ELEVATIONS
88 - 89	CR 279 BACHELOR CREEK RELIEF BORING LOGS
90	CR 312 MUDDY CEDAR CREEK TRIBUTARY ESTIMATED QUANTITIES
91	CR 312 MUDDY CEDAR CREEK TRIBUTARY BRIDGE LAYOUT
92	CR 312 MUDDY CEDAR CREEK TRIBUTARY BRIDGE TYPICAL SECTIONS
93	CR 312 MUDDY CEDAR CREEK TRIBUTARY CAP ELEVATIONS
94 - 95	CR 312 MUDDY CEDAR CREEK TRIBUTARY BORING LOGS
96	**AJ
97	**BAS-A
98	**APSB-24
99	**APSB-24-15
100	**SPSB-24
101	**SPSB-24-15
102	**PSB-5SB15
103	**PSBEB
104	**PSBRA
105	**PSBSD
106 - 107	**FD
108 - 109	**TYPE T221
110 - 111	*SRR
	VIII. TRAFFIC ITEMS
112 - 114	SIGNING & PAVEMENT MARKINGS
115 - 117	*D&OM(1)-20 THRU D&OM(3)-20
118	*D&OM(5)-20
119	*SMD (GEN)-08
120	*SMD(SLIP-1)(DAL)
121 - 122	*SMD(SLIP-2)-08 THRU SMD(SLIP-3)-08
123 - 124	*TSR (3)-13 THRU TSR(4)-13
	IX. ENVIRONMENTAL ISSUES
125 - 127	ENVIORMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)(DAL)
128 - 133	STORM WATER POLLUTION PREVENTION PLAN (SWP3)
134 - 136	SW3P LAYOUT
137	*EC(1)-16
138	*EC(2)-16
139 - 141	*EC(9)-16
142	*VEGETATION ESTABLISHMENT SHEET (DAL)
	X. MISCELLANEOUS ITEMS
	NONE

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

RODOLFO CHAPA (No. 105922) Rodolfo Chapa DATE: 3/1/2023

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER

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

LLOYD WOLF (No. 73649) Lloyd M. Wolf, P.E. DATE: 3/1/2023

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

NO.	DATE	REVISION	APPROV.
-	- -	.....	...
-	- -	.....	...
-	- -	.....	...
-	- -	.....	...

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

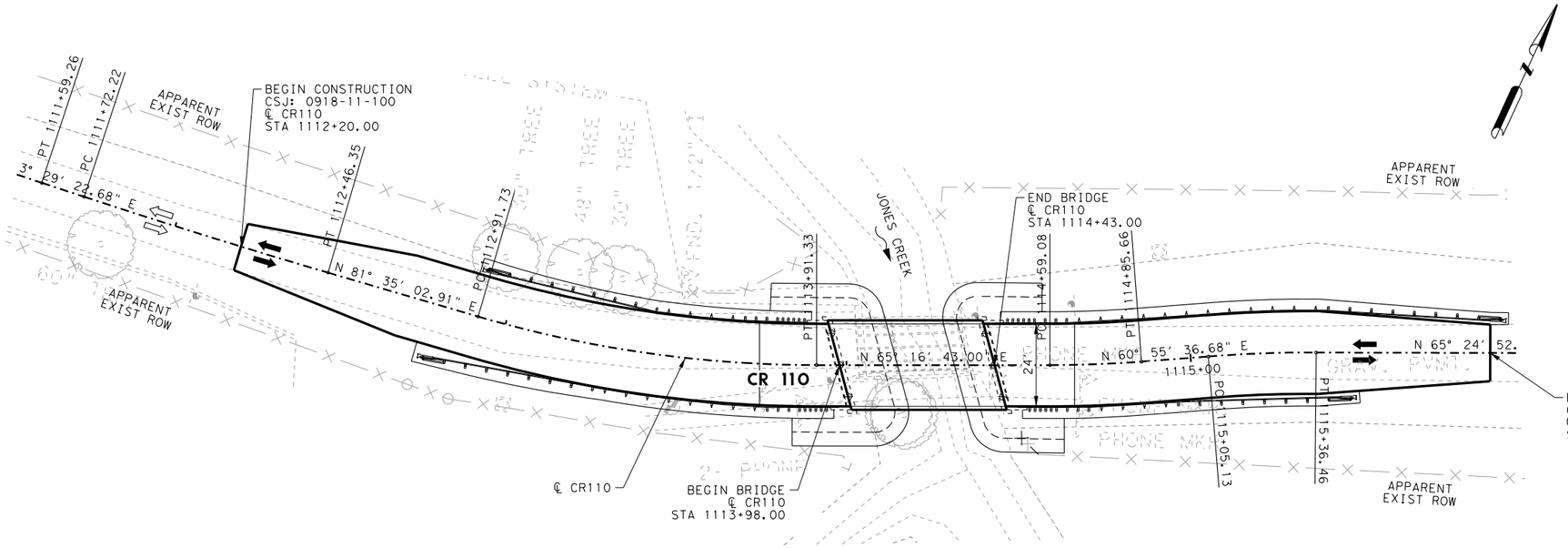
INDEX OF SHEETS

SHEET 1 OF 1

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	2

KAUF_GNIS_01.dgn

RMorfin
3/1/2023 1:59:34 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\KAUF_GNIS_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER

2/16/2023

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

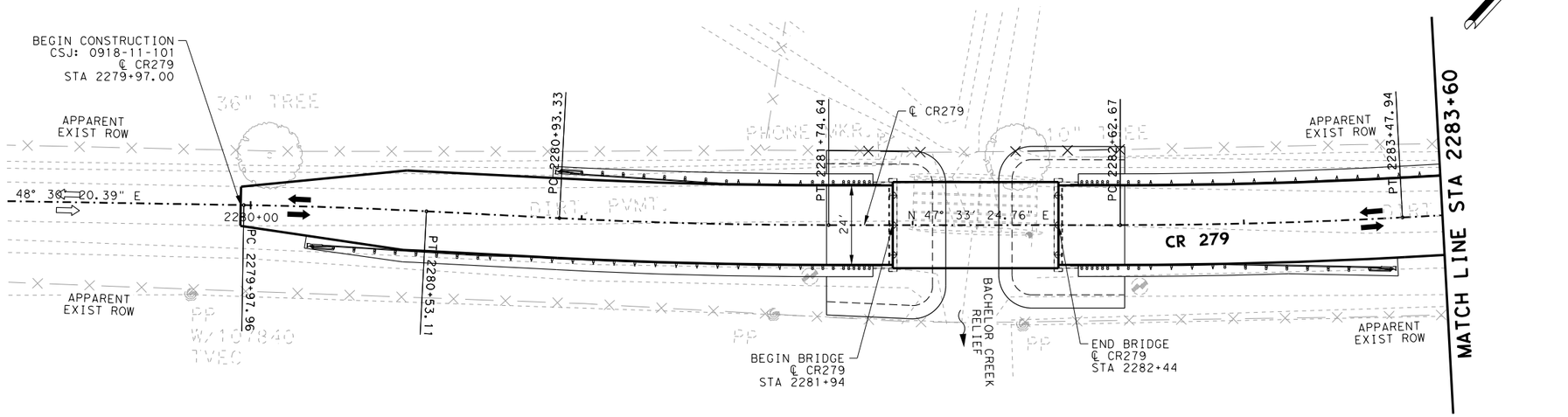
PROJECT LAYOUT
CR 110
JONES CREEK

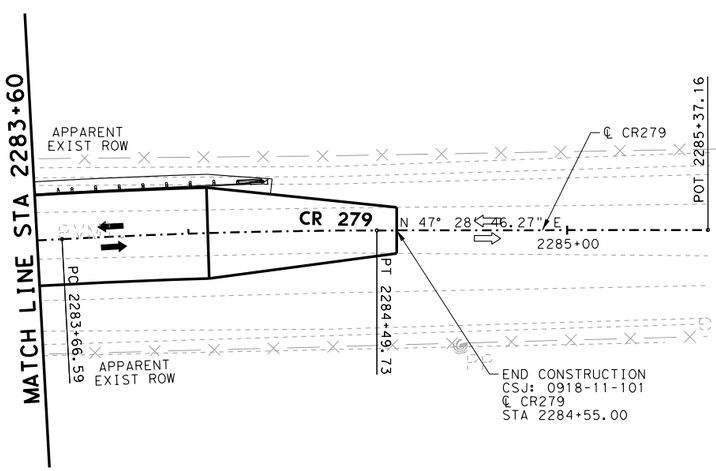
SHEET 1 OF 3

		FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RM	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
DW:	RM	DAL	KAUFMAN	0918	11	100,ETC	3
CK DW:	RC						

CR110_GNPL_01.dgn

RMorfin
2/16/2023 4:56:14 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR110_GNPL_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg





STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

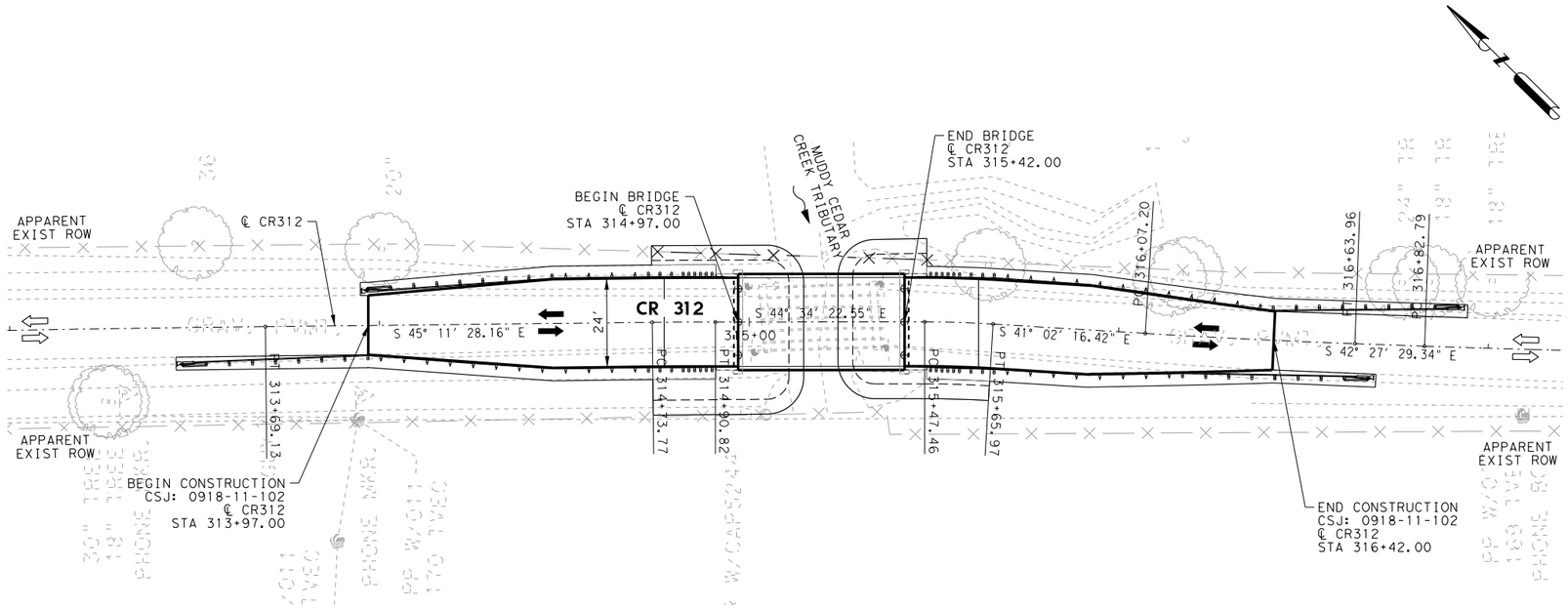
ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

PROJECT LAYOUT
CR 279
BACHELOR CREEK RELIEF

SHEET 2 OF 3

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC		4

RMorfin
2/16/2023 4:56:16 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR279_GNPL_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
2/16/2023

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

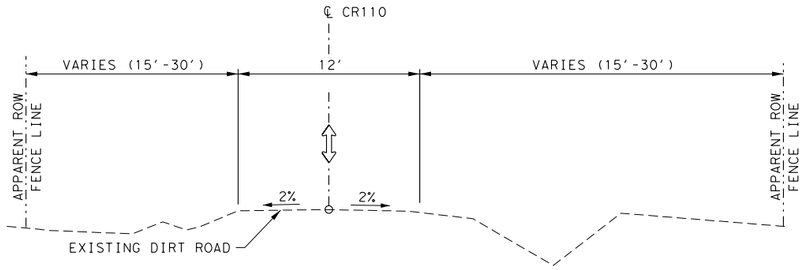
ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

PROJECT LAYOUT
CR 312
MUDDY CEDAR CREEK TRIBUTARY

SHEET 3 OF 3

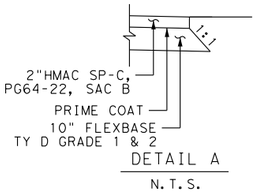
DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	5

RMorfin
2/16/2023 4:56:16 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR312_GNPL_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



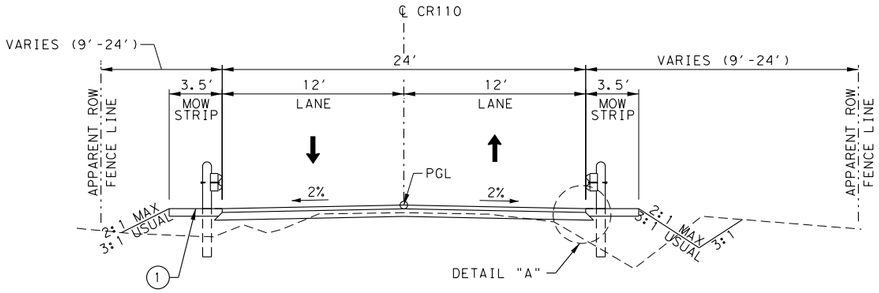
EXISTING TYPICAL SECTION

STA 1112+20 TO STA 1113+98
STA 1114+43 TO STA 1115+87



DETAIL A

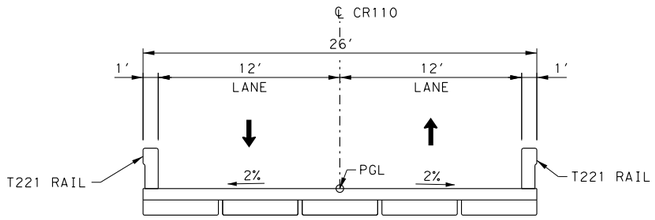
N.T.S.



PROPOSED TYPICAL SECTION

STA 1112+20 TO STA 1113+98
STA 1114+43 TO STA 1115+87

(1) SEE ROADWAY PLAN & PROFILE SHEETS FOR GUARD FENCE AND MOW STRIP LIMITS.



PROPOSED BRIDGE SECTION

STA 1113+98 TO STA 1114+43

RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

2/16/2023

0 5 10

SCALE: 1"=10'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

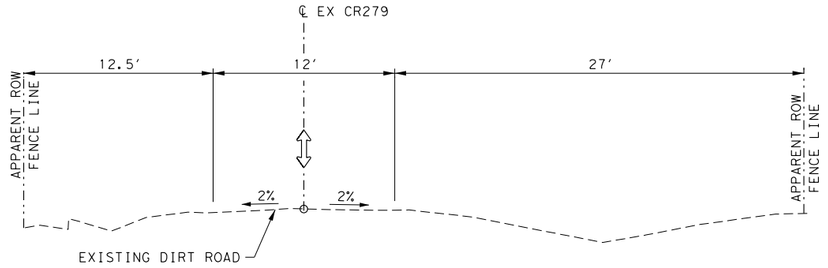
TYPICAL SECTIONS
CR 110

SHEET 1 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	6

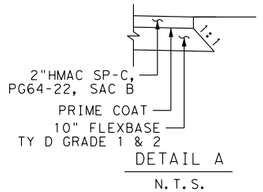
CR110_GNTY.dgn

RMorfin
2/16/2023 4:56:17 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR110_GNTY.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



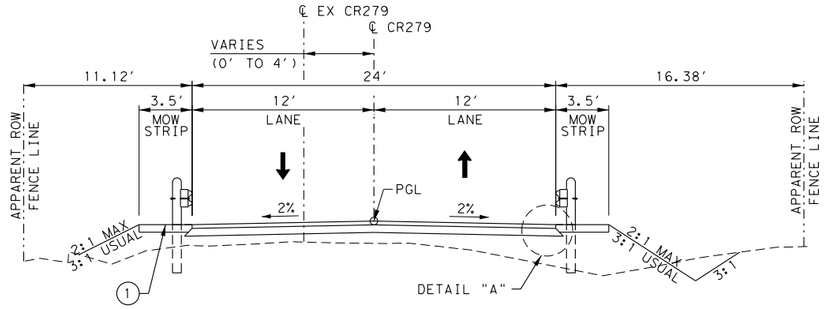
EXISTING TYPICAL SECTION

STA 2279+97 TO STA 2281+94
STA 2282+44 TO STA 2284+55



DETAIL A

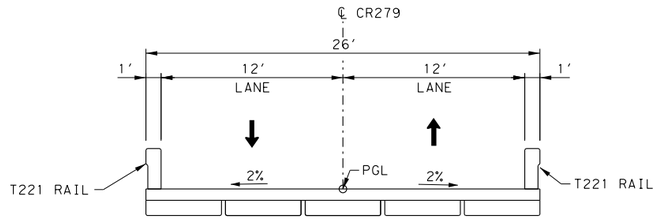
N.T.S.



PROPOSED TYPICAL SECTION

STA 2279+97 TO STA 2281+94
STA 2282+44 TO STA 2284+55

(1) SEE ROADWAY PLAN & PROFILE SHEETS FOR GUARD FENCE AND MOW STRIP LIMITS.



PROPOSED BRIDGE SECTION

STA 2281+94 TO STA 2282+44

2/16/2023

0 5 10

SCALE: 1"=10′

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

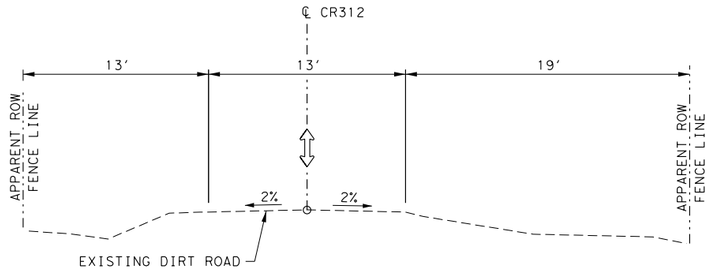
TYPICAL SECTIONS
CR 279

SHEET 2 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	7

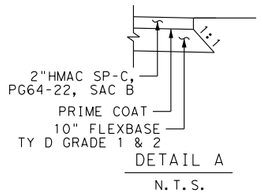
CR279_GNTY.dgn

RMorfin
2/16/2023 4:56:18 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR279_GNTY.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



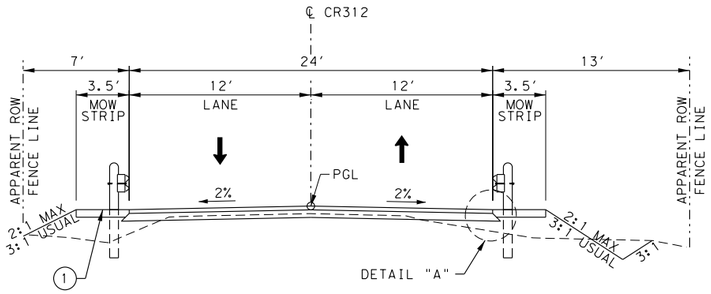
EXISTING TYPICAL SECTION

STA 313+97 TO STA 314+97
STA 315+42 TO STA 316+42



DETAIL A

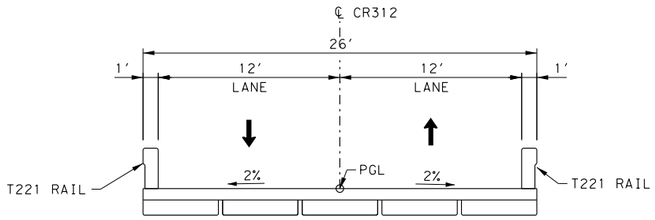
N.T.S.



PROPOSED TYPICAL SECTION

STA 313+97 TO STA 314+97
STA 315+42 TO STA 316+42

(1) SEE ROADWAY PLAN & PROFILE SHEETS FOR GUARD FENCE AND MOW STRIP LIMITS.



PROPOSED BRIDGE SECTION

STA 314+97 TO STA 315+42

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

0 5 10

SCALE: 1"=10′

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

TYPICAL SECTIONS
CR 312

SHEET 3 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	8

CR312_GNTY.dgn

RMorfin
2/16/2023 4:56:19 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\CR312_GNTY.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

SPECIFICATION DATA

Table 1: Soil Constants Requirements				
Item	Description	Plasticity Index		Note
		Max	Min	
132	Embankment (Final) (DC) (Ty C1)	40	8	1
132	Embankment (Final) (DC) (Ty C2)	25	8	2

Note 1: Material excavated from the project must meet the PI requirements when used in the top 10 feet of embankment that supports the pavement structure or other locations shown in the plans. Do not use shale and obtain approval to incorporate shaley clay produced by the construction project.

Note 2: Use as a non-select embankment backfill as defined under Item 423.2.4.1. Use as an embankment to backfill behind abutments to the extent of the approach slab or to backfill areas enclosed by an abutment and / or retaining walls or other locations as shown in the plans.

Table 2: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
162	Block Sod	N/A	See Specifications		2849 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	0.15 Ton
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	424 MG
310	Prime Coat	N/A	0.20	Gal/SY	413 Gal
3077	SP MIXES	See Plans	110	Lbs./SY/In	228 Ton
*For Contractor's information only. **Use summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Plan Sheet for estimated daily rates.					
Note: (1) Base material weight based on 1.50 Ton/CY (dry-compacted) (2) Asphalt weight based on 110 Lbs./SY/In (3) Subgrade weight based on 1.48 Ton/CY (dry-compacted)					

Table 3: Basis of Estimate for Temporary Erosion Control Items				
Item	Description	Rate		Quantity
164	Drill Seeding (Temp) (Warm or Cool)	See Specifications		2849 SY
166 *	Fertilizer (12-6-6)	500	Lb/Ac	0.16 Ton
168	Vegetative Watering (Warm)**	12	MG/Ac/Day	425 MG
*For Contractor's information only. **Use summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Sheet for estimated daily rates.				

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 0.51 acres for CR 110, 0.49 acres for CR 279 and 0.30 acres for CR 312. 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 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).

This project required consultation and permitting with environmental resource agencies as outlined in the plan set Environmental Permits Issues and Commitments (EPIC) Sheet. There is a high probability that an environmentally sensitive area could be encountered on the Contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 "Project-Specific Locations" provides a listing of regulatory agencies that may need to be contacted regarding this project.

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

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address: https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors or Contractor questions on this project are to be addressed to the following individual(s):

Lane Selman, P.E. Lane.Selman@txdot.gov
Nicholas Wadlington, P.E. Nicholas.Wadlington@txdot.gov

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

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

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

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).

Item 5:
Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (214-320-6682) for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (214-320-6205) for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.

Place construction stakes/station markings at intervals of no more than 100 feet or as directed by the Engineer. Place stakes and markings so as not to interfere with normal construction operations.

Submit all shop drawings, working drawings, or other documents which require review sufficiently in advance of scheduled construction to allow no less than thirty (30) calendar days for review and response.

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

Item 6:
This project has a structure along CR 110 over Jones Creek with surface coatings which contains a hazardous constituent which is silver/black lead-based paint (LBP) on the steel beams at 700 ppm. The Contractor is responsible for the health and safety of his employees and compliance with all OSHA standards and regulations.

Paint containing hazardous materials will be removed by a third party, 10.1.1

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

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

The Buy America Material Classification Sheet is found online at https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7:
Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility locates performed.

Holiday restrictions – The Engineer may decide that no lane closures or construction operations shall be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

- New Year's Eve and Day (5 am on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (5 am on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (5 am on Friday thru 10:00pm Monday)
- Independence Day (5 am on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (5 am on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (5 am on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (5 am on December 23 thru 10:00 pm December 26)

No significant traffic generator events identified.

Item 8:
This Project will be a Standard Workweek.

Nighttime work is allowed in accordance with Article 8.3.3.

Meet weekly with the Engineer to notify him or her of planned work for the upcoming week.

Provide the Engineer with a daily work schedule of planned work.

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 Estimate will be held if monthly schedule update is not submitted.

Item 100:
Remove the existing roadway small signs, delineators and object markers as shown on the

plans, or as directed, during construction within the right of way. Small sign, delineator and object marker removals are subsidiary to this Item.

The limits of preparing right of way will be measured at CR 110 at Jones Creek from Sta. 1112+20.00 to Sta. 1115+87.00 along the centerline of construction, at CR 279 at Bachelor Creek Relief from Sta. 2279+97.00 to Sta. 2284+55.00 along the centerline of construction, and at CR 312 at Muddy Cedar Creek Tributary from Sta. 313+97.00 to Sta. 316+42.00 along the centerline of construction.

Item 110:
Excavated shale is not an acceptable material for embankment.

Items 110 and 132:
Scarify and loosen the excavated areas, unpaved surface areas, except rock, to a depth of at least 8 inches and compact in accordance with the specifications.

Item 132:
Excavated material from the project site has not been determined to be suitable for embankment. The bidder assumes all risk for the use of excavated materials for embankment and is expected to meet all material requirements for embankment regardless of the source.

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.

Earth embankment Type C1 and C2, are mainly composed of material other than shale. Furnish material that is free from vegetation or other objectionable material and that conforms to the requirements of Table 1 (Sheet A). If necessary, treat material with lime slurry in accordance with Item 260, “Lime Treatment (Road-Mixed)” in order to meet these requirements. Use Tex-121-E, figure 1, page 4 to calculate the amount of lime required. When lime treated subgrade is specified, 3000 PPM is the maximum allowed sulfate content in the top 3 feet when material comes from borrow source. Follow recommendations of 260.4.4 for mixing and mellowing. The Engineer will test material placed or excavated to a depth of one foot below and laterally to one foot outside the proposed treatment limit. Lime treatment of this material will not be paid for directly but will be considered subsidiary to this item.

Do not use shaley clays in embankment unless approved in writing.

Use embankment material Type C2 described in Table 1 “Soil Constants Requirements” for embankments behind bridge abutments to the extent of the bridge approach slabs, and other embankments enclosed by an abutment and / or retaining walls.

Item 160:
Sequence construction operations to salvage topsoil from one location and spread on areas ready to receive topsoil. Keep stockpiling of topsoil to a minimum.

Use fertile clay or loam from the project site not more than six inches below natural grade as topsoil.

Item 161:
Provide tickets representing quantity of compost delivered to site.

Item 247:
Construct uniform layer thickness of 12 inches, or less with the required density and moisture content. Minimum PI is equal to three (3) for all grades.

Item 301:
Provide liquid antistripping agents unless otherwise directed. Add the minimum dosage determined by the manufacturer or higher dosage determined by design requirement and try subsequent trials at 0.25% increments.

Item 320:
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:
Structural Excavation is not paid for directly but is considered subsidiary to pertinent Items.

Item 416:
Provide a minimum of one core per bent, regardless of placement method.

Item 420:
Apply an ordinary surface finish to all concrete surfaces within 30 days after form removal.

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.

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.

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 Bent Numbering and NBI Numbering, furnish materials that conform to the pertinent requirements of the following items:

- Stencil ink, black 11 oz., spray can (lead, CFC, and CFHC free). Black spray will be waterproof, weather resistance and dry instantly on all surfaces, without smearing, smudging, or rippling and
- Die cut stencils or
- Brass stencil, 3 in., numbers and letters, adjustable interlocking stencil, set content 92-piece numbers and letters, legend height 3 in., symbol height 3 in. Stencils must be industrial grade and interlocking.

All materials, labor and incidentals associated with placing NBI numbers are subsidiary to the various bid items.

Item 421:
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: approach slabs, abutments, bents, columns, slabs, sidewalks, and medians.

Provide High Performance Concrete (HPC) of the class specified for all railing and permanent concrete traffic barrier placed on bridges or approach slabs. HPC concrete is not required for portions of rail or concrete traffic barrier not located on a bridge.

Provide sulfate resistant concrete for box culverts and all drilled shafts.

Strength evaluation using maturity testing, Tex-426-A, may be used for all concrete elements except drilled shafts and mass concrete pours.

Provide a digital hydraulic compression testing Machine and accessories. The machine shall have a minimum testing range of 2500 pounds force to 250,000 pounds force with a hydraulic switching valve to allow for rapid advancing, hold, controlled advancing and rapid retracting. The machine shall have a load cell to measure compressive forces within the testing range and shall be calibrated and verified in accordance with ASTM latest version. The Machine can meet or exceed the following when approved by the Engineer:

ELE International ACCU-TEK250 Digital Compression Tester including accessories or Forney F-250EX Standard Compression Machine including accessories or TxDOT approved equal.

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 425:
Repair "Safety Harness Pole Holes" in beams in accordance with Item 429 prior to placement of the Bridge Slab. This work is considered subsidiary to the various bid items.

Item 440:
Provide reinforcing steel with epoxy coating meeting the requirements of item 440 for the following bridge components: approach slab, slab, sidewalk, median, concrete traffic barrier, and rail.

Epoxy coated reinforcing is not required for portions of rail or concrete traffic barrier not located on a bridge.

Reinforcing for abutments, bents and columns are not required to be epoxy coated.

R-bars (I-beams, U-beams, X-Beams and TX Girders), Z-bars (boxes), and H-bars (Slab beams) are not required to be epoxy coated**.**

All ties, chairs and other appurtenances used with epoxy coated reinforcing shall be epoxy coated or non-metallic.

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

Item 442:
Use temperature Zone 1 for CVN testing.

Item 500:
Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

Item 502:
The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, which 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.

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

Do not operate or park any equipment/machinery closer than 30 feet from the traveled roadway after sunset unless authorized by the Engineer.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

Provide written proposed lane closure information by 1:00 PM on the business day prior to the proposed lane closures. Do not close lanes when this requirement is not met.

Item 506:
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.

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 overflow. 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."

Item 540:
Furnish one type of post throughout the project except as specifically noted in the plans.

Item 585:
Use Surface Test Type A.

Items 644:
Provide two (2) sets of shop drawings for signs. The shop drawings shall conform to the details shown on the plans. The shop drawings shall show the details of the panels, wind beams, stiffeners, joint backing plates, splices, fasteners, brackets, and sign support connections. The shop drawings shall show letter types and sizes, interline spacing and message arrangements. Affix a sign identification decal to the back of all signs and mark out the installation date in accordance with Item 643.

Prior to taking elevations to determine lengths for fabrication of signposts and/or sign support towers, obtain verification of all proposed locations.

All sign mounts shall have a clamp base system for all small roadside sign assemblies.

Item 672:
Black adhesive will be used on asphalt pavements and white adhesive will be used on concrete pavements.

Item 730:
At the discretion of the Engineer, mow non-paved areas within the project prior to placement of permanent vegetation. Mow up to three (3) cycles per growing season.

Item 3077:
Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.

Provide PG binder 64-22 in Type SP-C mixture.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-11-100 **DISTRICT** Dallas **COUNTY** Kaufman
HIGHWAY CR 110, CR 279, CR 312

			CONTROL SECTION JOB	**0918-11-100**		**0918-11-101**		**0918-11-102**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00064834**		**A00064835**		**A00064836**			
			COUNTY	**Kaufman**		**Kaufman**		**Kaufman**			
			HIGHWAY	**CR 110**		**CR 279**		**CR 312**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	3.670		4.580		2.450		10.700	
	110-6001	EXCAVATION (ROADWAY)	CY	147.000		168.000		107.000		422.000	
	132-6025	EMBANKMENT (FINAL) (DENS CONT) (TY C1)	CY	248.000		506.000		253.000		1,007.000	
	132-6026	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	CY	66.000		62.000		48.000		176.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	1,308.000		984.000		557.000		2,849.000	
	162-6002	BLOCK SODDING	SY	1,308.000		984.000		557.000		2,849.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	1,308.000		984.000		557.000		2,849.000	
	168-6001	VEGETATIVE WATERING	MG	390.000		293.000		166.000		849.000	
	247-6304	FL BS (CMP IN PLACE) (TY D GR 1-2)(10")	SY	711.000		947.000		398.000		2,056.000	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	143.000		190.000		80.000		413.000	
	416-6002	DRILL SHAFT (24 IN)	LF	114.000		174.000		132.000		420.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	19.000		18.400		18.400		55.800	
	422-6002	REINF CONC SLAB (HPC)	SF	1,170.000		1,300.000		1,170.000		3,640.000	
	422-6016	APPROACH SLAB (HPC)	CY	45.000		39.000		39.000		123.000	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	221.410		247.500		222.500		691.410	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	191.000		237.000		209.000		637.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	22.000		25.000		21.000		68.000	
	450-6005	RAIL (TY T221)(HPC)	LF	114.000		124.000		114.000		352.000	
	454-6003	ARMOR JOINT	LF	46.000		44.000		44.000		134.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000		1.000		3.000	
	500-6001	MOBILIZATION	LS	0.330		0.370		0.300		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	18.000						18.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	16.000		16.000		10.000		42.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	16.000		16.000		10.000		42.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	474.000		842.000		564.000		1,880.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	474.000		842.000		564.000		1,880.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	192.000		158.000		90.000		440.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	192.000		158.000		90.000		440.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	175.000		250.000		225.000		650.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000		4.000		12.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		4.000		12.000	
	552-6003	WIRE FENCE (TY C)	LF			114.000		105.000		219.000	
	552-6004	WIRE FENCE (TY D)	LF	12.000						12.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2.000		2.000		2.000		6.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	2.000		4.000		2.000		8.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	9.000		10.000		12.000		31.000	
	730-6107	FULL - WIDTH MOWING	CYC	1.000						1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-11-100 **DISTRICT** Dallas **COUNTY** Kaufman
HIGHWAY CR 110, CR 279, CR 312

			CONTROL SECTION JOB	**0918-11-100**		**0918-11-101**		**0918-11-102**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00064834**		**A00064835**		**A00064836**			
			COUNTY	**Kaufman**		**Kaufman**		**Kaufman**			
			HIGHWAY	**CR 110**		**CR 279**		**CR 312**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	734-6002	LITTER REMOVAL	CYC	1.000						1.000	
	3077-6013	SP MIXESSP-CSAC-B PG64-22	TON	79.000		105.000		44.000		228.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	

SUMMARY OF TCP QUANTITIES	
ITEM	502
DESC. CODE	6001
LOCATION	BARRICADES, SIGNS AND TRAFFIC HANDLING
	MO
CCSJ: 0918-11-100	18
PROJECT TOTALS	**18**

SUMMARY OF REMOVAL QUANTITIES			
ITEM	496	*644	*658
DESC. CODE	6009	6076	6060
LOCATION	REMOV STR (BRIDGE O - 99 FT LENGTH)	REMOVE SM RD SN SUP&AM	REMOVE DELIN & OBJECT MARKER ASSMS
	EA	EA	EA
CSJ: 0918-11-100	1	2	4
CSJ: 0918-11-101	1	2	4
CSJ: 0918-11-102	1	2	4
PROJECT TOTALS	**3**	**6**	**12**

* FOR CONTRACTOR'S INFORMATION ONLY
(ITEM SUBSIDIARY TO ITEM 100)

SUMMARY OF ROADWAY												
ITEM	100	247	310	422	432	432	540	540	544	552	552	3077
DESC. CODE	6002	6304	6027	6016	6031	6045	6001	6006	6001	6003	6004	6013
LOCATION	PREP ROW	FL BS (CMP IN PLACE) (TY D GR 1-2) (10")	PRIME COAT (MC -30 OR AE-P)	APPROACH SLAB (HPC)	RIPRAP (STONE PROTECTION) (12 IN)	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY C)	WIRE FENCE (TY D)	SP MIXES SP-C SAC-B PG64-22
	STA	SY	GAL	CY	CY	CY	LF	EA	EA	LF	LF	TON
CSJ: 0918-11-100	3.67	711	143	45	191	22	175	4	4		12	79
CSJ: 0918-11-101	4.58	947	190	39	237	25	250	4	4	114		105
CSJ: 0918-11-102	2.45	398	80	39	209	21	225	4	4	105		44
PROJECT TOTALS	**10.70**	**2056**	**413**	**123**	**637**	**68**	**650**	**12**	**12**	**219**	**12**	**228**

SUMMARY OF SIGNING QUANTITITES	
ITEM	644
DESC. CODE	6001
LOCATION	IN SM RD SN SUP&AM TY10BWG (1)SA(P)
	EA
CSJ: 0918-11-100	2
CSJ: 0918-11-101	2
CSJ: 0918-11-102	2
PROJECT TOTALS	**6**

SUMMARY OF PAVEMENT MARKING QUANTITIES		
ITEM	658	658
DESC. CODE	6014	6016
LOCATION	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	EA	EA
CSJ: 0918-11-100	2	9
CSJ: 0918-11-101	4	10
CSJ: 0918-11-102	2	12
PROJECT TOTALS	**8**	**31**

SUMMARY OF SW3P QUANTITIES													
ITEM	161	162	164	**166	168	506	506	506	506	506	506	730	734
DESC. CODE	6017	6002	6051	6002	6001	6003	6011	6038	6039	6041	6043	6107	6002
LOCATION	COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	DRILL SEED (TEMP) (WARM OR COOL)	FERTILIZER	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)	FULL - WIDTH MOWING	LITTER REMOVAL
	SY	SY	SY	TON	MG	LF	LF	LF	LF	LF	LF	CYC	CYC
CSJ: 0918-11-100	1308	1308	1308	0.14	390	16	16	451	451	183	183	1	1
CSJ: 0918-11-101	984	984	984	0.11	293	16	16	802	802	150	150		
CSJ: 0918-11-102	557	557	557	0.06	166	10	10	537	537	85	85		
SUBTOTAL	2849	2849	2849	0.31	849	42	42	1790	1790	418	418	1	1
5% ADDITIONAL CSJ: 0918-11-100								23	23	9	9		
5% ADDITIONAL CSJ: 0918-11-101								40	40	8	8		
5% ADDITIONAL CSJ: 0918-11-102								27	27	5	5		
PROJECT TOTALS	**2849**	**2849**	**2849**	**0.31**	**849**	**42**	**42**	**1880**	**1880**	**440**	**440**	**1**	**1**

NOTE: SW3P QUANTITIES ARE BEING INCREASED BY 5% TO ACCOUNT FOR DIFFERING SITE CONDITIONS AND REPLACEMENTS DUE TO NORMAL WEAR DURING CONSTRUCTION.

** FOR CONTRACTOR'S INFORMATION ONLY (ITEM SUBSIDIARY TO ITEMS 162 & 164)

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

SUMMARY OF QUANTITIES

SHEET 1 OF 2

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	11

KAUF_GNSM_01.dgn

SUMMARY OF BRIDGE QUANTITIES						
ITEM	416	420	422	425	450	454
DESC. CODE	6002	6014	6002	6012	6005	6003
LOCATION	DRILL SHAFT (24 IN)	CL C CONC (ABUT)(HPC)	REINF CONC SLAB (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T221)(HPC)	ARMOR JOINT
	LF	CY	SF	LF	LF	LF
CSJ: 0918-11-100	114	19	1170	221.41	114	46
CSJ: 0918-11-101	174	18.4	1300	247.50	124	44
CSJ: 0918-11-102	132	18.4	1170	222.50	114	44
PROJECT TOTALS	**420**	**55.8**	**3640**	**691.41**	**352**	**134**

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

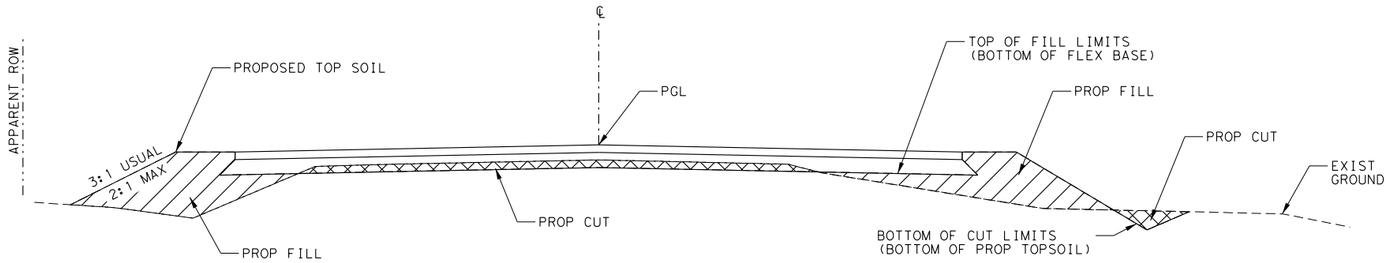
SUMMARY OF QUANTITIES

SHEET 2 OF 2

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	12

KAUF_GNSM_02.dgn

RMorfin
2/16/2023 4:56:20 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\KAUF_GNSM_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



N.T.S

SUMMARY OF EARTHWORK			
ITEM	110	132	132
DESC. CODE	6001	6025	6026
STATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C1)	EMBANKMENT (FINAL) (DENS CONT) (TY C2)
	CY	CY	CY
CR 110			
1112+20	0	0	
1113+00	50	21	
1113+98	36	141	35
JONES CREEK BRIDGE			
1115+00	14	46	31
1115+87	47	40	
CSJ 0918-11-100 TOTAL	147	248	66
CR 279			
2279+97			
2280+00	2	0	
2281+00	67	30	
2281+94	31	181	31
BACHELOR CREEK RELIEF BRIDGE			
2283+00	0	155	31
2284+00	35	124	
2284+55	33	16	
CSJ 0918-11-101 TOTAL	168	506	62
CR 312			
312+97			
313+00	1	0	
314+00	37	22	
314+97	22	134	22
MUDDY CEDAR CREEK TRIBUTARY BRIDGE			
316+00	19	81	26
316+42	28	16	
CSJ 0918-11-102 TOTAL	107	253	48
TOTAL	422	1007	176

NO.	DATE	REVISION	APPROV.
-	- -	- -	-
-	- -	- -	-
-	- -	- -	-
-	- -	- -	-

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

EARTHWORK QUANTITY SUMMARY

SHEET 1 OF 1

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	13

RChapa
2/28/2023 10:34:22 AM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\01_GENERAL\KAUF_GNSM_03.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

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"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
			FOR CSJ:0918-11-100									
1	1,2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"X36"	X		10BWG	1	SA	P		
			FOR CSJ:0918-11-101									
2	1,2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"X36"	X		10BWG	1	SA	P		
			FOR CSJ:0918-11-102									
3	1,2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"X36"	X		10BWG	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0918	11	100,ETC.	CR 110,ETC.
4-16		DIST	COUNTY		SHEET NO.
8-16		DAL	KAUFMAN		14

18

DATE: 2/16/2023 4:56:21 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\sums16.dgn

CSJ: 0918-11-100: CR 110 @ JONES CREEK

SEQUENCE OF CONSTRUCTION

PHASE 1

1. IMPLEMENT SW3P.

2. PLACE DETOUR SIGNS AND BARRICADES. REFER TO BARRICADE AND CONSTRUCTION STANDARD DETAILS BC(1)-21 THRU BC (12)-21. PLACE TYPE III BARRICADES IN ADVANCE OF ROADWAY CLOSURE WHILE ALLOWING LOCAL TRAFFIC TO MAINTAIN ACCESS ALONG CR 110 DURING CONSTRUCTION. REFER TO WORK ZONE ROAD CLOSURE STANDARD DETAILS. CLOSE EXISTING BRIDGE AND ROADWAY APPROACHES.

3. REMOVE EXISTING BRIDGE AND ROADWAY APPROACHES.

4. CONSTRUCT PROPOSED BRIDGE AND ROADWAY APPROACHES. GRADE ROADSIDE DITCHES. INSTALL STONE RIPRAP. INSTALL PERMANENT EROSION CONTROL. INSTALL PERMANENT PAVEMENT MARKINGS.

5. REMOVE TEMPORARY SW3P DEVICES ONCE DISTURBED SOILS HAVE REACHED FINAL STABILIZATION IN THEIR CONTROL AREAS, AS DIRECTED OR AUTHORIZED BY ENGINEER.

6. REMOVE DETOUR SIGNS AND BARRICADES. OPEN PROPOSED BRIDGE AND ROADWAY APPROACHES.

CSJ: 0918-11-101: CR 279 @ BACHELOR CREEK RELIEF

PHASE 2

1. IMPLEMENT SW3P.

2. PLACE DETOUR SIGNS AND BARRICADES. REFER TO BARRICADE AND CONSTRUCTION STANDARD DETAILS BC(1)-21 THRU BC (12)-21. PLACE TYPE III BARRICADES IN ADVANCE OF ROADWAY CLOSURE WHILE ALLOWING LOCAL TRAFFIC TO MAINTAIN ACCESS ALONG CR 279 DURING CONSTRUCTION. REFER TO WORK ZONE ROAD CLOSURE STANDARD DETAILS. CLOSE EXISTING BRIDGE AND ROADWAY APPROACHES.

3. REMOVE EXISTING BRIDGE AND ROADWAY APPROACHES.

4. CONSTRUCT PROPOSED BRIDGE AND ROADWAY APPROACHES. GRADE ROADSIDE DITCHES. INSTALL STONE RIPRAP. INSTALL PERMANENT EROSION CONTROL. INSTALL PERMANENT PAVEMENT MARKINGS.

5. REMOVE TEMPORARY SW3P DEVICES ONCE DISTURBED SOILS HAVE REACHED FINAL STABILIZATION IN THEIR CONTROL AREAS, AS DIRECTED OR AUTHORIZED BY ENGINEER.

6. REMOVE DETOUR SIGNS AND BARRICADES. OPEN PROPOSED BRIDGE AND ROADWAY APPROACHES.

CSJ: 0918-11-102: CR 312 @ MUDDY CEDAR CREEK TRIBUTARY

PHASE 3

1. IMPLEMENT SW3P.

2. PLACE DETOUR SIGNS AND BARRICADES. REFER TO BARRICADE AND CONSTRUCTION STANDARD DETAILS BC(1)-21 THRU BC (12)-21. PLACE TYPE III BARRICADES IN ADVANCE OF ROADWAY CLOSURE WHILE ALLOWING LOCAL TRAFFIC TO MAINTAIN ACCESS ALONG CR 312 DURING CONSTRUCTION. REFER TO WORK ZONE ROAD CLOSURE STANDARD DETAILS. CLOSE EXISTING BRIDGE AND ROADWAY APPROACHES.

3. REMOVE EXISTING BRIDGE AND ROADWAY APPROACHES.

4. CONSTRUCT PROPOSED BRIDGE AND ROADWAY APPROACHES. GRADE ROADSIDE DITCHES. INSTALL STONE RIPRAP. INSTALL PERMANENT EROSION CONTROL. INSTALL PERMANENT PAVEMENT MARKINGS.

5. REMOVE TEMPORARY SW3P DEVICES ONCE DISTURBED SOILS HAVE REACHED FINAL STABILIZATION IN THEIR CONTROL AREAS, AS DIRECTED OR AUTHORIZED BY ENGINEER.

6. REMOVE DETOUR SIGNS AND BARRICADES. OPEN PROPOSED BRIDGE AND ROADWAY APPROACHES.

GENERAL NOTES

1. CONSTRUCT ONE BRIDGE AT A TIME.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

TRAFFIC CONTROL NARRRATIVE

SHEET 1 OF 1

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC		15

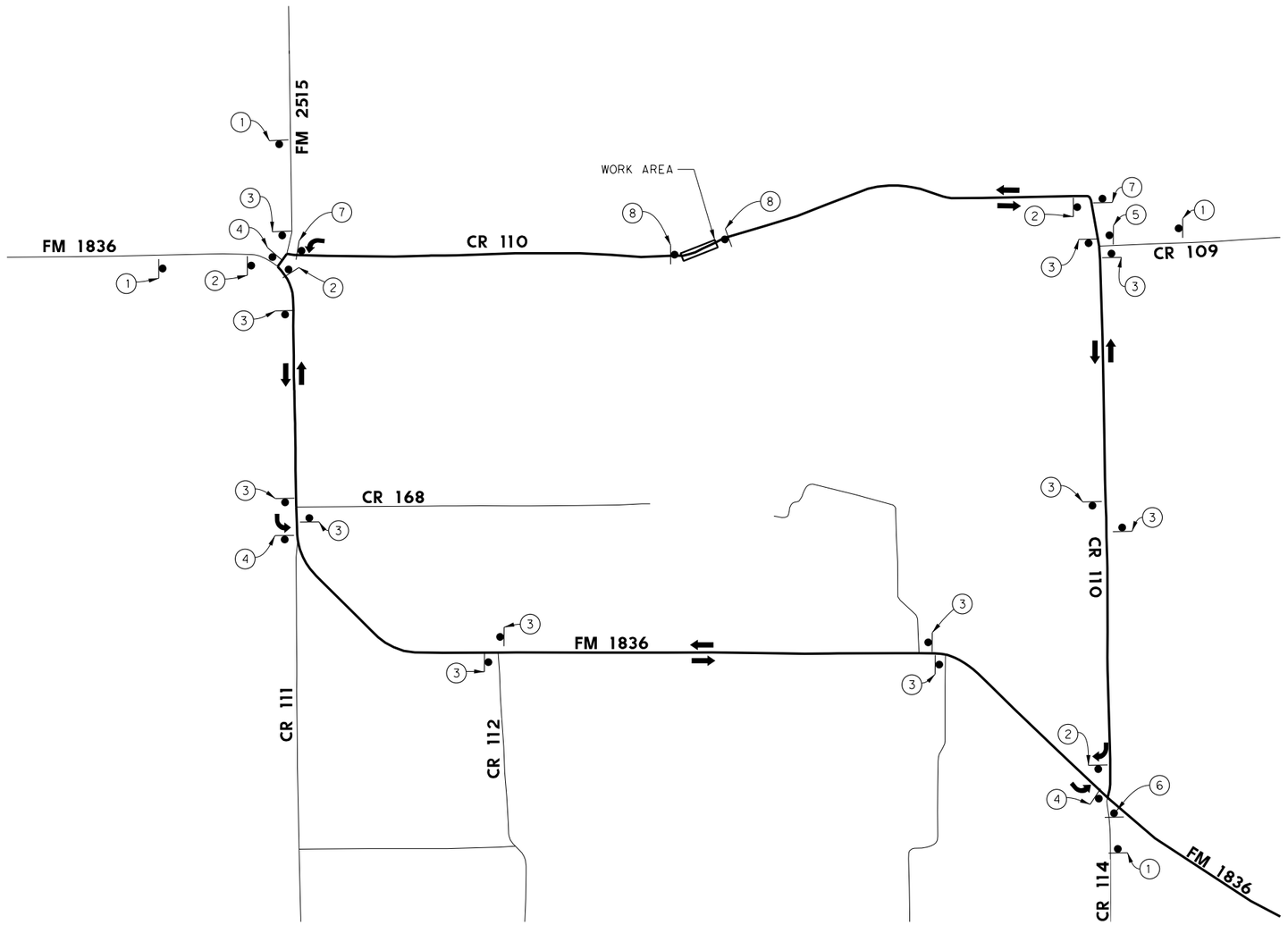
CR110_TCPNAR_01.dgn

RMorfin
2/16/2023 4:56:22 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\CR110_TCPNAR_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

LEGEND:

DETOUR ROUTE

DETOUR SIGN



CW20-2D
48"X48"
DETOUR AHEAD
(1)

M4-12T
30"X12"
CR 110
DETOUR
M4-9R
30"X24"
(2)

M4-12T
30"X12"
CR 110
DETOUR
M4-9S
30"X24"
(3)

M4-12T
30"X12"
CR 110
DETOUR
M4-9L
30"X24"
(4)

R11-3b (MOD)
60"X30"
CR 110 BRIDGE OUT
1 MILE AHEAD
LOCAL TRAFFIC ONLY
DETOUR
M4-10L
48"X18"
(5)

R11-3b (MOD)
60"X30"
CR 110 BRIDGE OUT
2.5 MILES AHEAD
LOCAL TRAFFIC ONLY
DETOUR
M4-10L
48"X18"
(6)

R11-4
60"X30"
ROAD CLOSED
TO
THRU TRAFFIC
TYPE 3 BARRICADE
(7)

R11-2
48"X30"
ROAD
CLOSED
TYPE 3 BARRICADE
(8)

NOTES:

1. SEE TXDOT STANDARD BC(2)-21 FOR SIGN SPACING.
2. SEE TXDOT STANDARD WZ(RCD)-13 FOR ROAD CLOSURE DETAILS.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

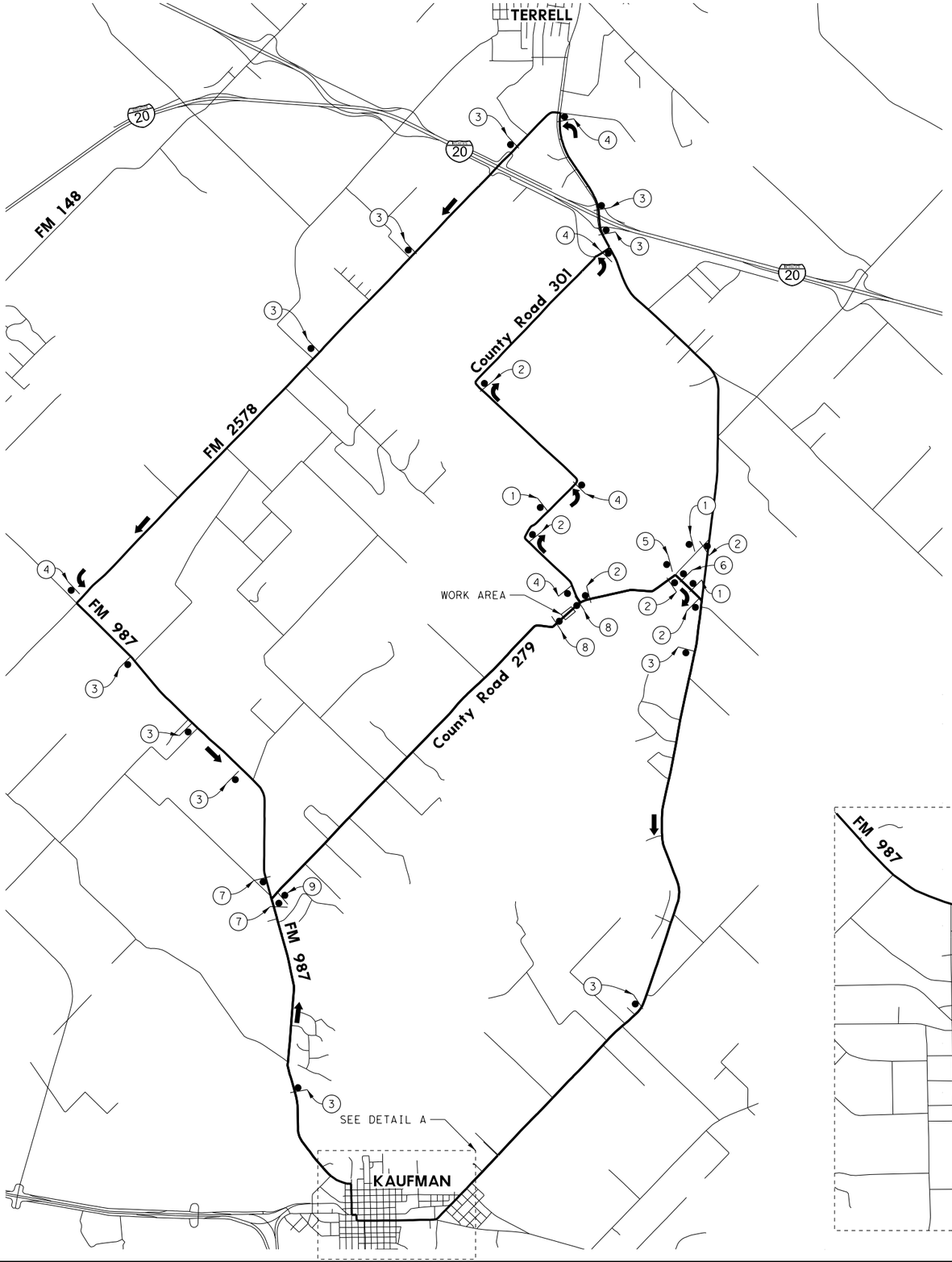
TRAFFIC CONTROL PLAN
DETOUR PLAN
CR 110

SHEET 1 OF 1

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	16

CR110_TCPDET_01.dgn

RMorfin
2/16/2023 5:32:10 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\CR110_TCPDET_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



LEGEND:

DETOUR ROUTE

DETOUR SIGN

CW20-2D
48"X48"
DETOUR AHEAD
1

M4-12T
30"X12"
CR 279
DETOUR
M4-9R
30"X24"
2

M4-12T
30"X12"
CR 279
DETOUR
M4-9S
30"X24"
3

M4-12T
30"X12"
CR 279
DETOUR
M4-9L
30"X24"
4

R11-3a
60"X30"
ROAD CLOSED
1 MILE AHEAD
LOCAL TRAFFIC ONLY
M4-12T
30"X12"
CR 279
DETOUR
M4-10L
48"X18"
5

R11-3a
60"X30"
ROAD CLOSED
1 MILE AHEAD
LOCAL TRAFFIC ONLY
M4-12T
30"X12"
CR 279
DETOUR
M4-10R
48"X18"
6

M4-12T
30"X12"
CR 279
DETOUR
M4-9S
30"X24"
CR 279 BRIDGE OUT
3.2 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3b (MOD)
60"X30"
7

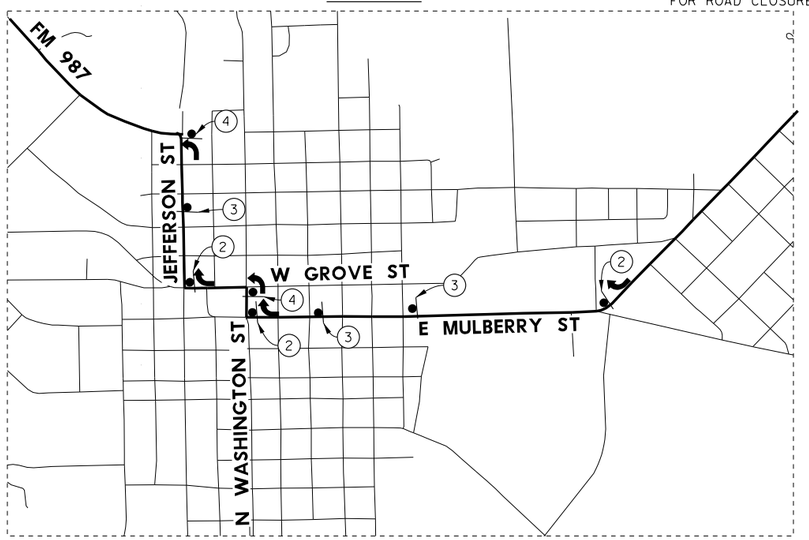
R11-2
48"X30"
ROAD CLOSED
TYPE 3 BARRICADE
8

R11-4
60"X30"
ROAD CLOSED
TO
THRU TRAFFIC
TYPE 3 BARRICADE
9

NOTES:

1. SEE TXDOT STANDARD BC(2)-21 FOR SIGN SPACING
2. SEE TXDOT STANDARD WZ(RCD)-13 FOR ROAD CLOSURE DETAILS.

DETAIL A



STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

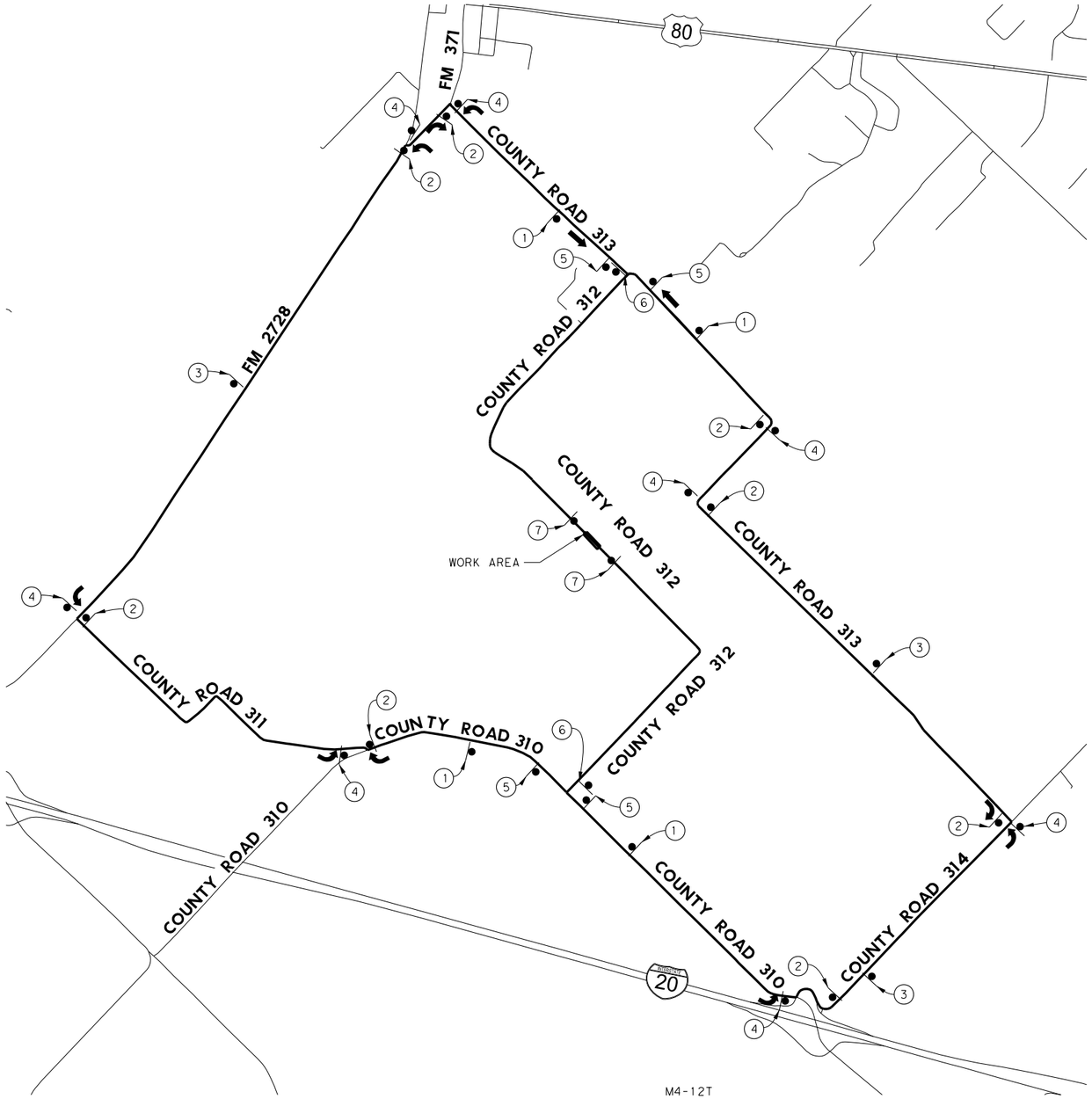
TRAFFIC CONTROL PLAN
DETOUR PLAN
CR 279

SHEET 1 OF 1

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	17

RMorfin
2/16/2023 5:32:33 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\CR279_TCPDET_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

CR279_TCPDET_02.dgn



LEGEND:

DETOUR ROUTE

DETOUR SIGN

CW20-2D
48"X48"
DETOUR AHEAD
(1)

M4-12T
30"X12"
CR 312
DETOUR
M4-9R
30"X24"
(2)

M4-12T
30"X12"
CR 312
DETOUR
M4-9S
30"X24"
(3)

M4-12T
30"X12"
CR 312
DETOUR
M4-9L
30"X24"
(4)

M4-12T
30"X12"
CR 312
DETOUR
M4-9S
30"X24"
CR 312 BRIDGE OUT
1.2 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3b (MOD)
60"X30"
(5)

R11-4
60"X30"
ROAD CLOSED
TO
THRU TRAFFIC
TYPE 3 BARRICADE
(6)

R11-2
48"X30"
ROAD
CLOSED
TYPE 3 BARRICADE
(7)

NOTES:

1. SEE TXDOT STANDARD BC(2)-21 FOR SIGN SPACING
2. SEE TXDOT STANDARD WZ(RCD)-13 FOR ROAD CLOSURE DETAILS.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

TRAFFIC CONTROL PLAN
DETOUR PLAN
CR 312

SHEET 1 OF 1

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RM	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
DW:	RM	DAL	KAUFMAN	0918	11	100,ETC	18
CK DW:	RC						

CR312_TCPDET_03.dgn

RMorfin
2/16/2023 5:32:59 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\CR312_TCPDET_03.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DATE: 2/16/2023 4:56:46 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-10\DGN\02_TRAF_CONT\StdDetails\bc-21.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. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

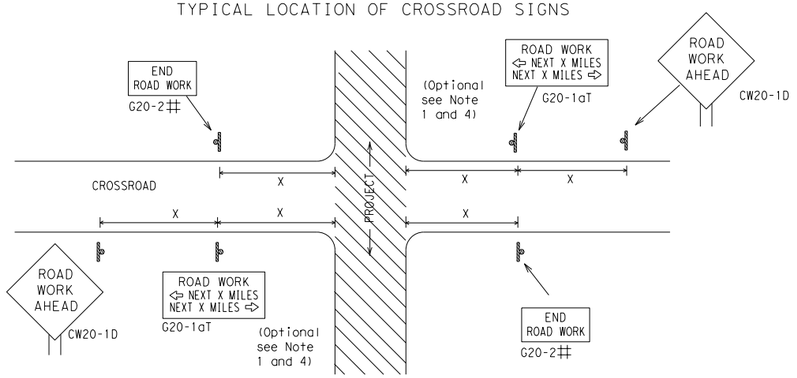
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

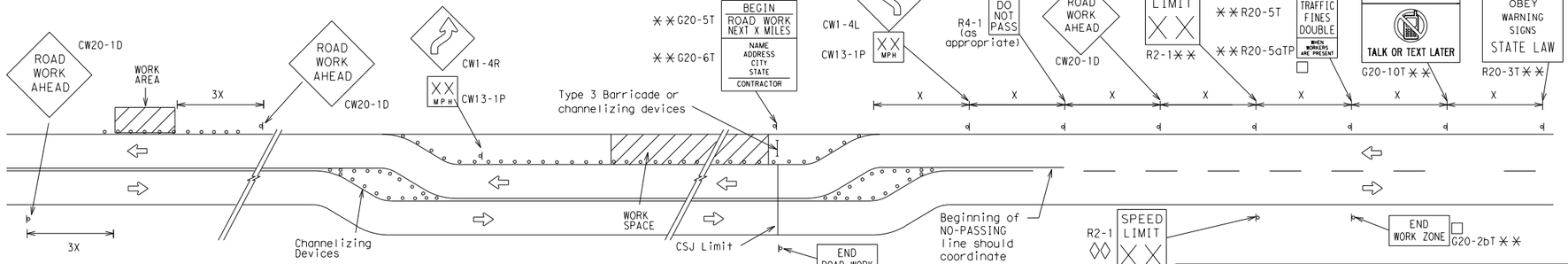
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		19

DATE: 2/16/2023 4:56:46 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

TYPICAL LOCATION OF CROSSROAD SIGNS

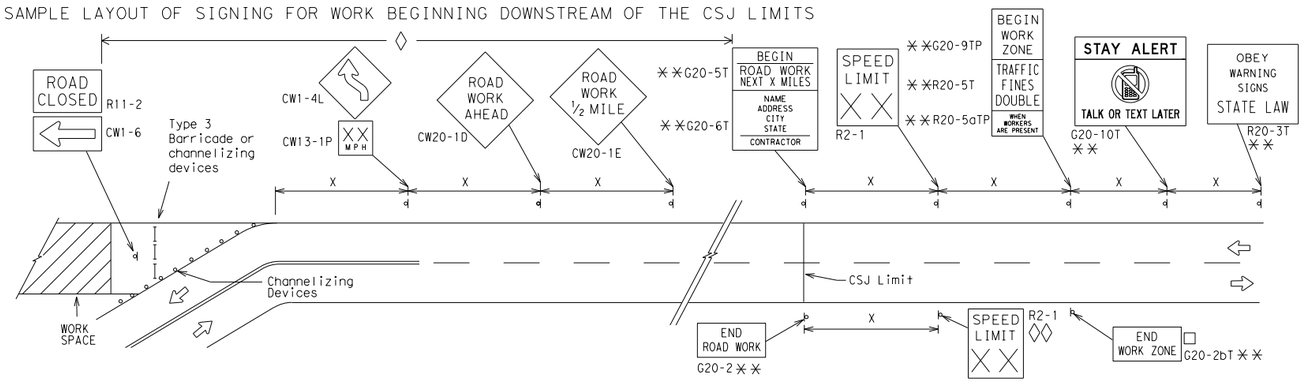


WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

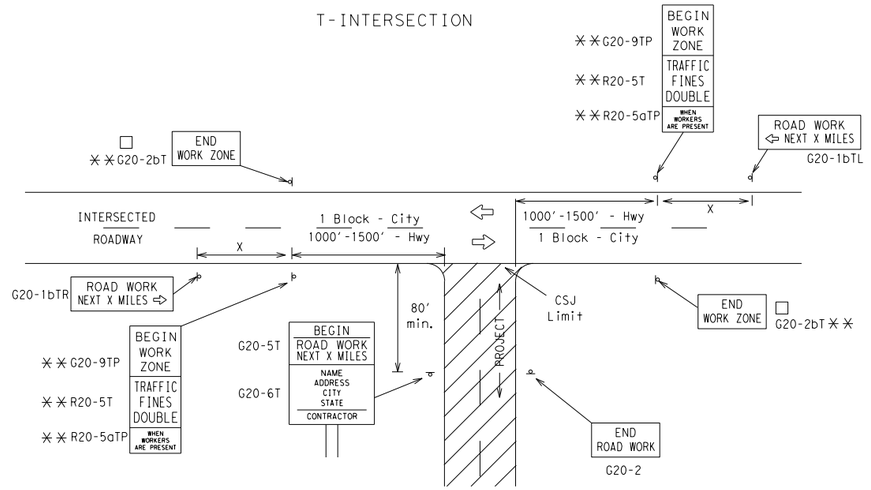


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



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]

Sign Number or Series	SIZE Conventional Road	SIZE Expressway/ Freeway	SPACING Posted Speed	SPACING Sign △ Spacing "X"
			MPH	Feet (Apprx.)
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"	30	120
			35	160
			40	240
			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
			55	500[2]
			60	600[2]
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	65	700[2]
			70	800[2]
			75	900[2]
			80	1000[2]
			*	*[3]

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

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

GENERAL NOTES

1. Special or larger size signs may be used as necessary.

2. Distance between signs should be increased as required to have 1500 feet advance warning.

3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.

4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".

5. Only diamond shaped warning sign sizes are indicated.

6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		20

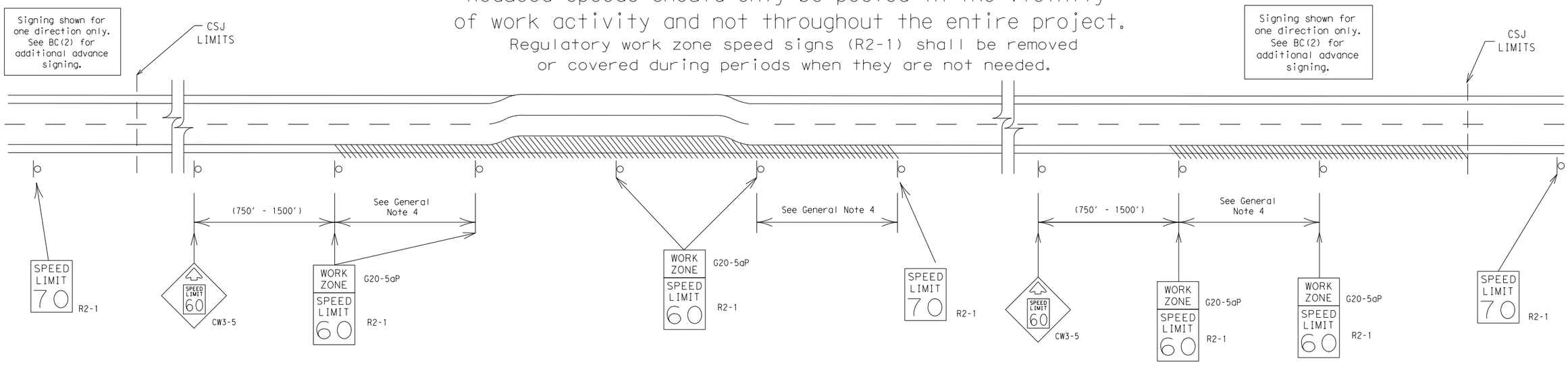
DATE: 2/16/2023 4:56:47 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

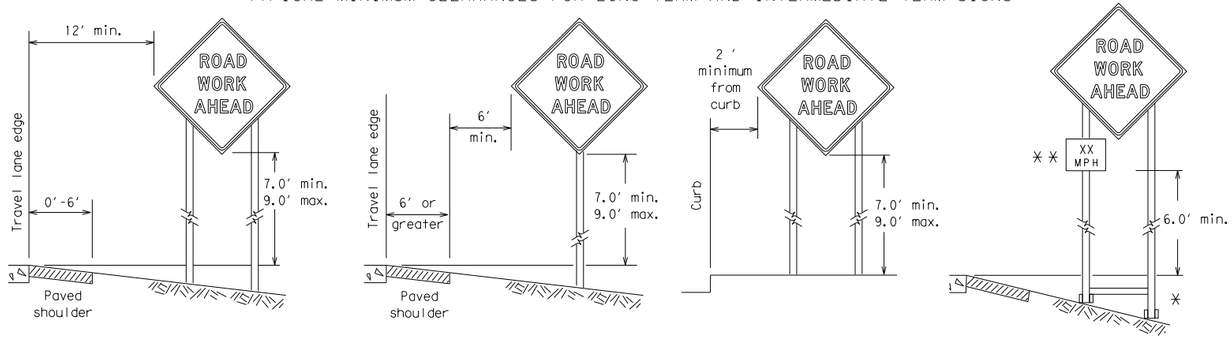
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		21

DATE: 2/16/2023 4:56:47 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

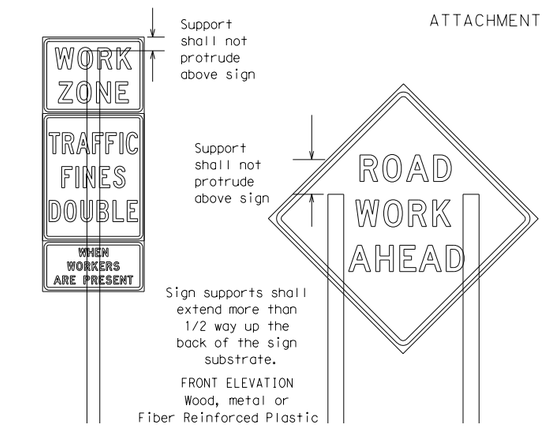
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

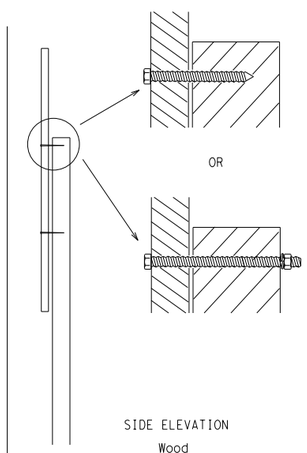


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





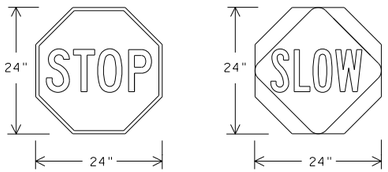
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

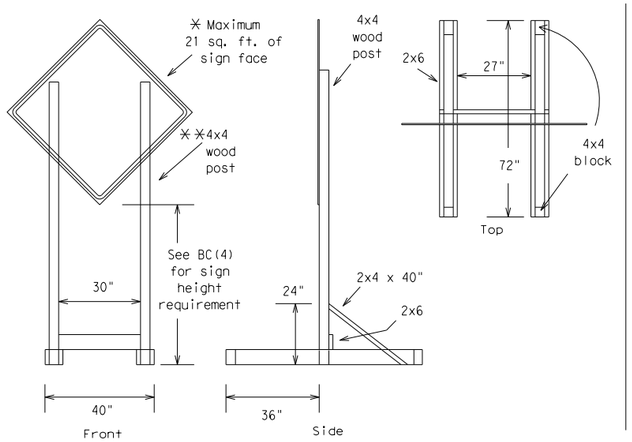
Traffic Safety Division Standard

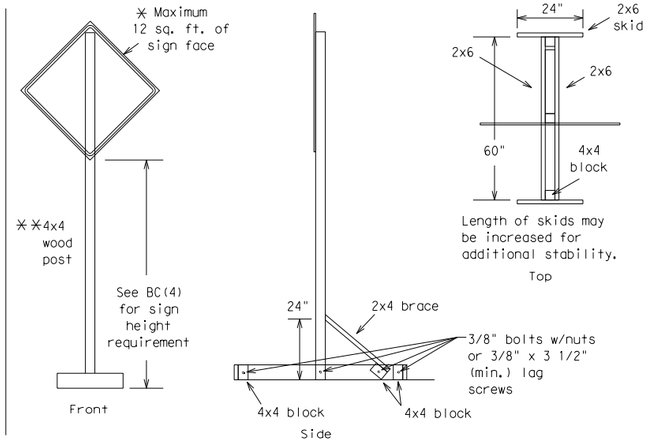
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		22

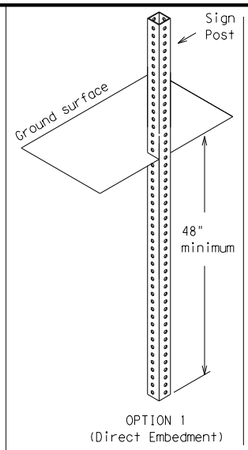
DATE: 2/16/2023 4:56:48 PM
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

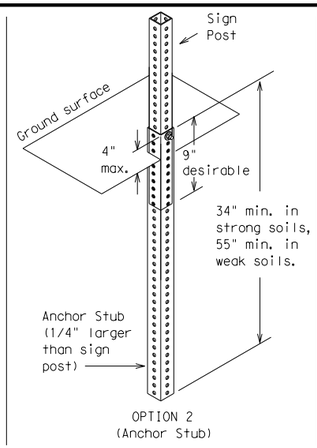


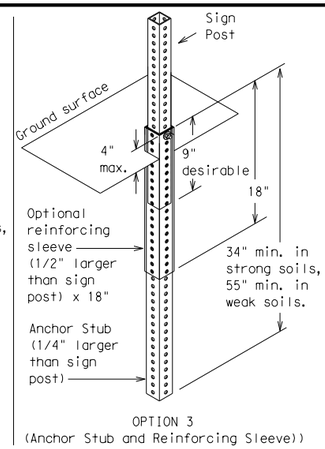


SKID MOUNTED WOOD SIGN SUPPORTS

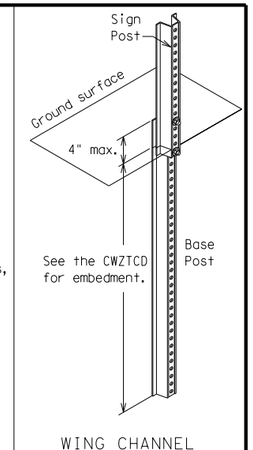
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







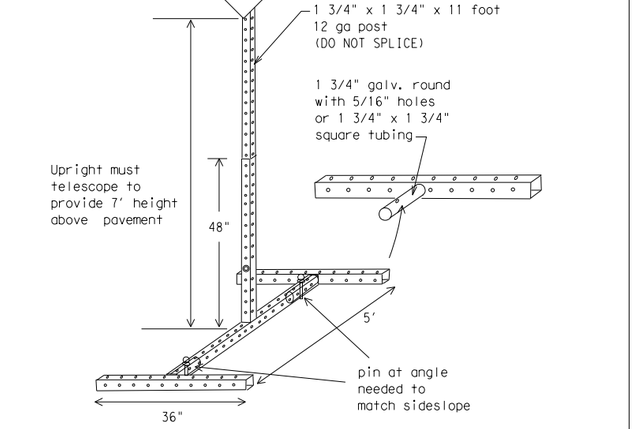
PERFORATED SQUARE METAL TUBING

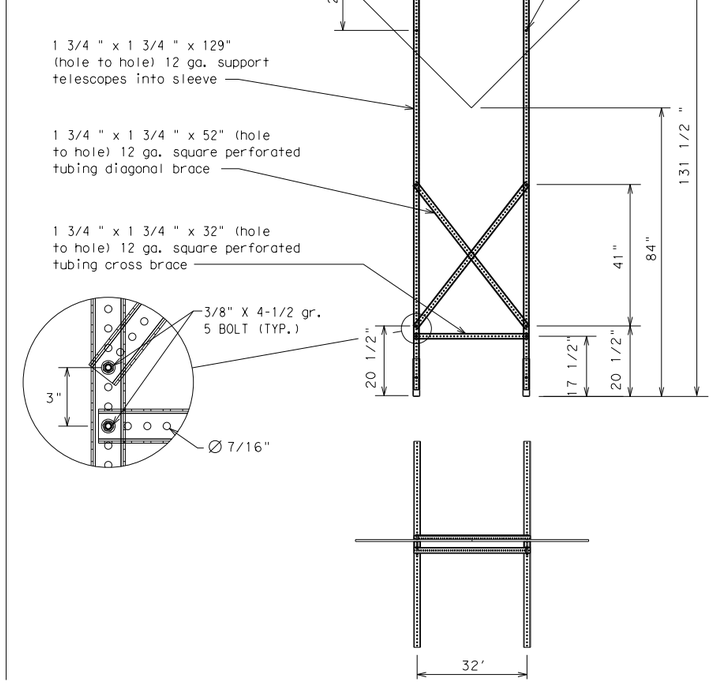


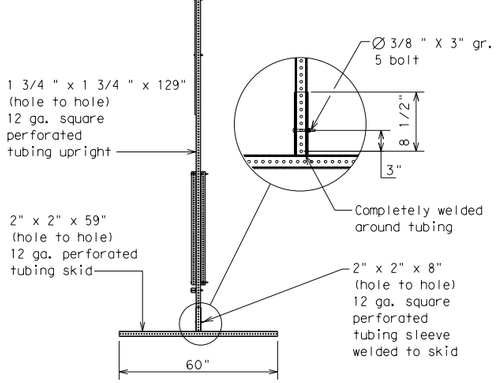
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		23

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 *

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

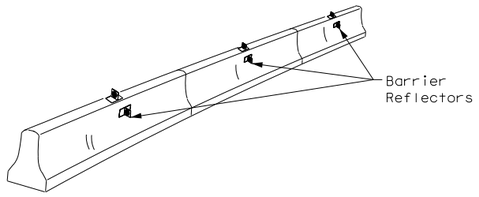
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		24

100

DATE: 2/16/2023 4:56:48 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-10\DGN\02_TRAF_CONTS\StdDetails\bc-21.dgn

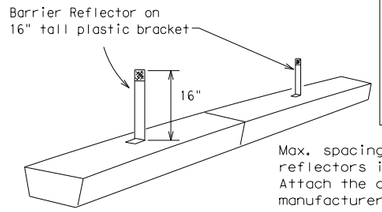
DATE: 2/16/2023 4:56:49 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONTSStdDetails\bc-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

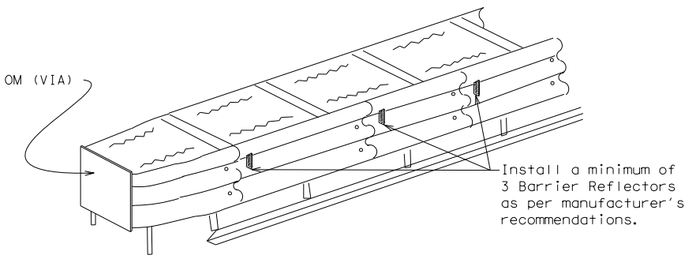


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

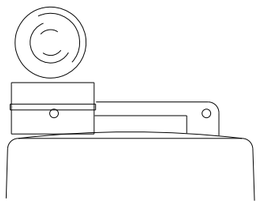


DELINEATION OF END TREATMENTS

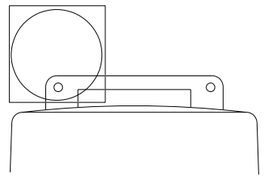
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

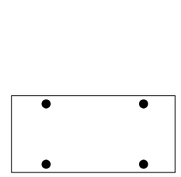
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

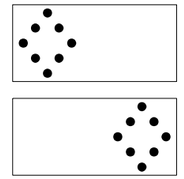
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

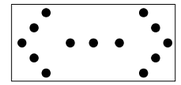


4 CORNER CAUTION

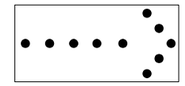
OR



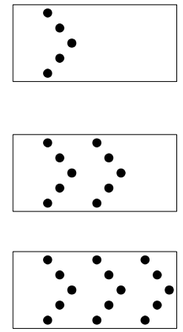
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



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



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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		25

101

DATE: 2/16/2023 4:56:49 PM
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

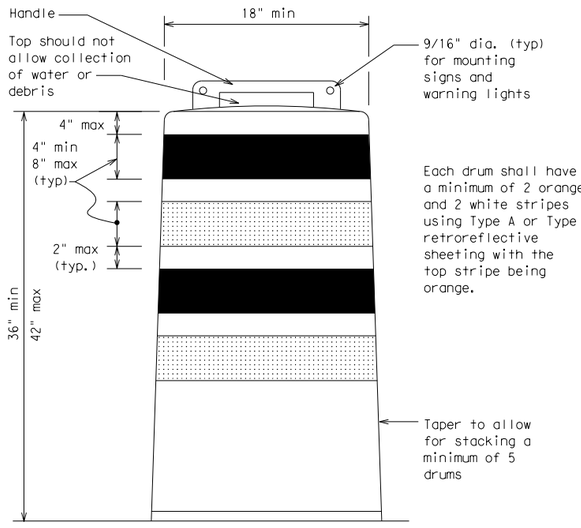
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

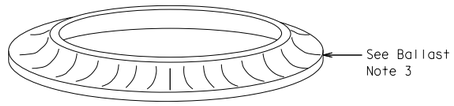
RETROREFLECTIVE SHEETING

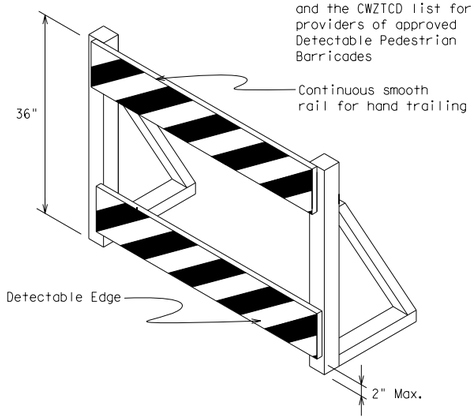
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

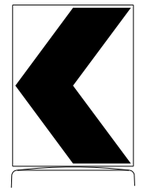




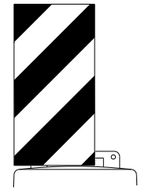


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

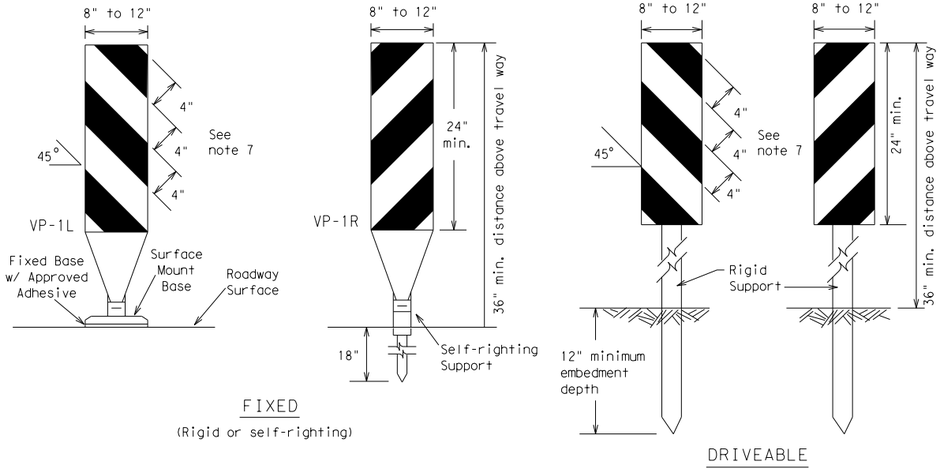
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 8-14 9-07 5-21 7-13	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		26

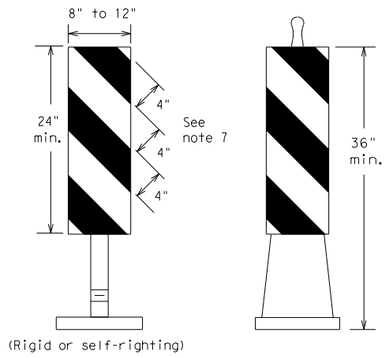
DATE: 2/16/2023 4:56:50 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn



FIXED

(Rigid or self-righting)

DRIVEABLE

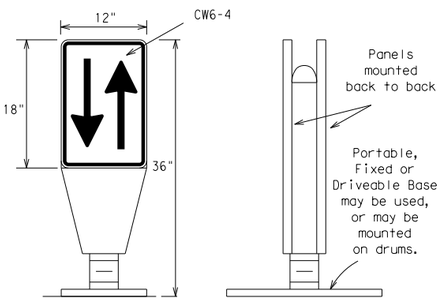


(Rigid or self-righting)

PORTABLE

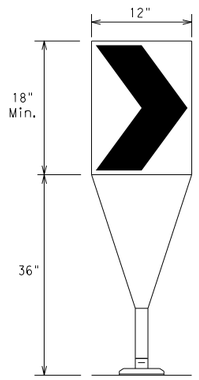
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



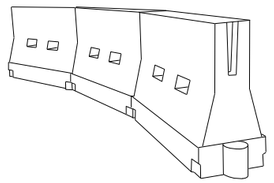
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

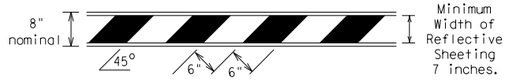
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		27

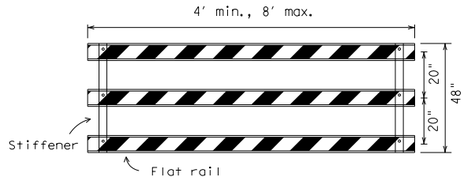
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



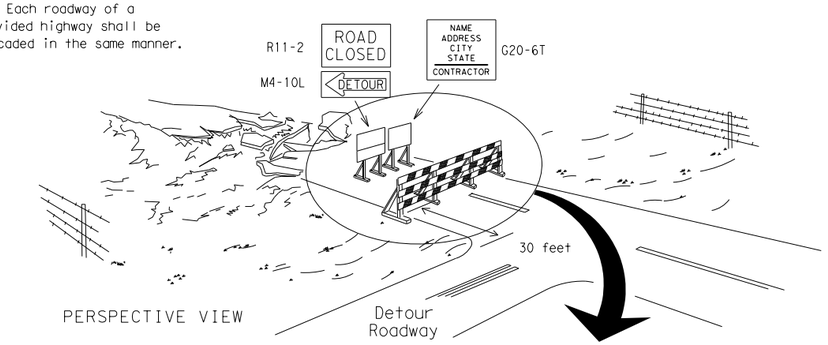
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

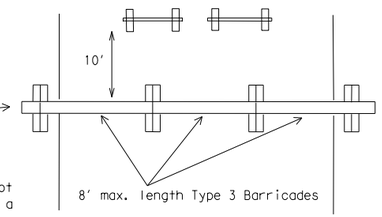
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

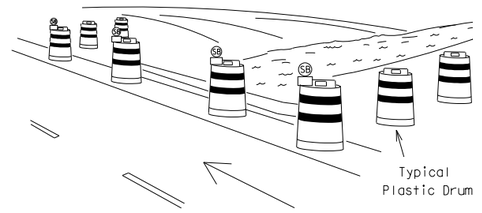
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

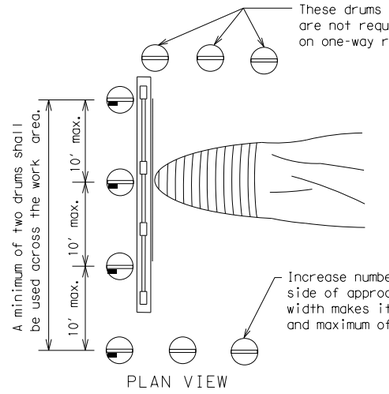
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

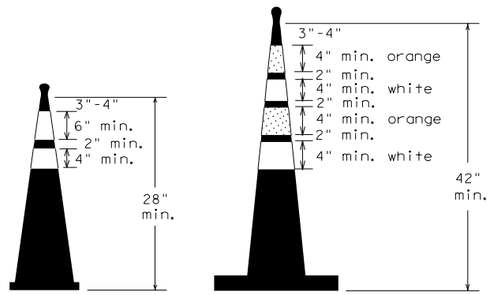
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



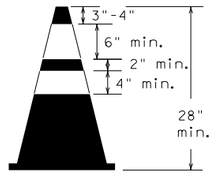
PLAN VIEW

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

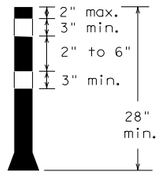
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

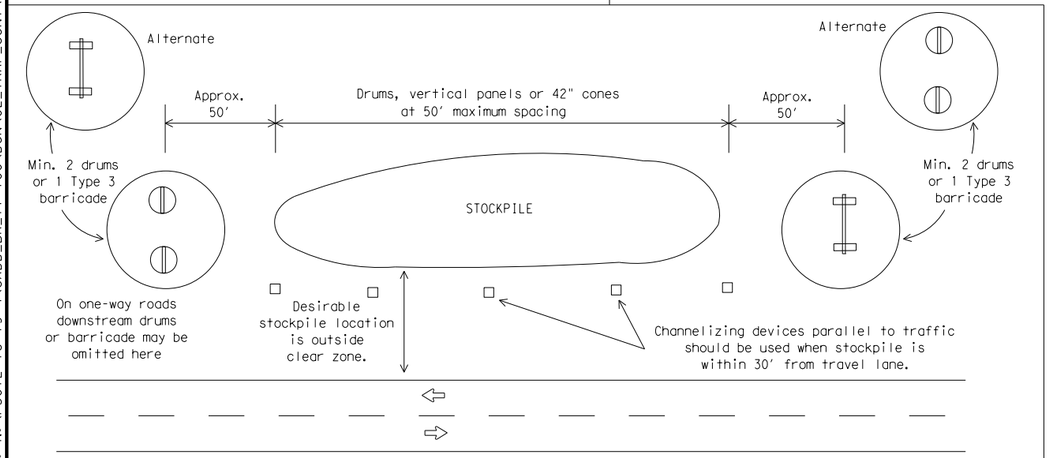


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	KAUFMAN		28

104

DATE: 2/16/2023 4:56:50 PM
FILE: N:\PSO72-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONTS\StdDetails\bc-21.dgn

DATE: 2/16/2023 4:56:50 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONTSStdDetails\bc-21.dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

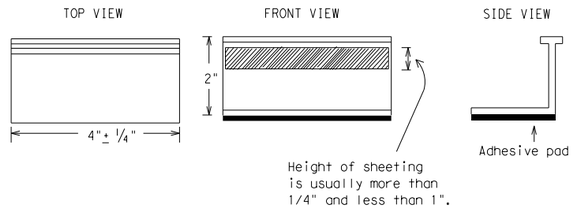
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

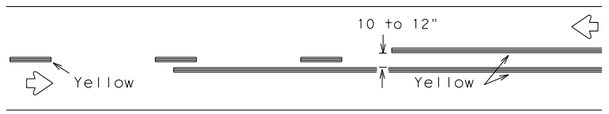
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21	0918	11	100,ETC.	CR 110,ETC.
1-02 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	DAL	KAUFMAN		29

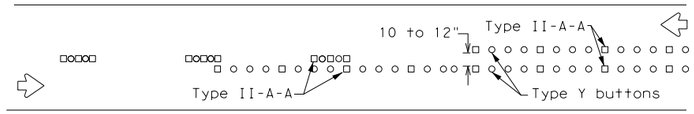
105

DATE: 2/16/2023 4:56:51 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-10\DGN\02_TRAF_CONT\StdDetails\bc-21.dgn

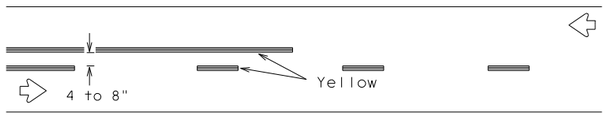
PAVEMENT MARKING PATTERNS



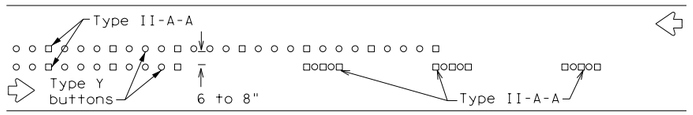
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



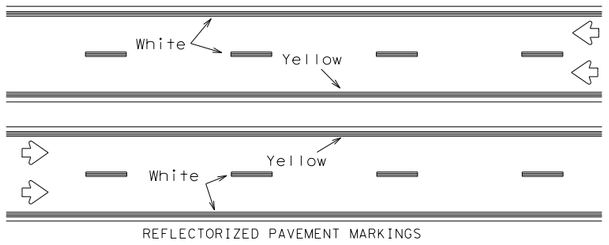
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



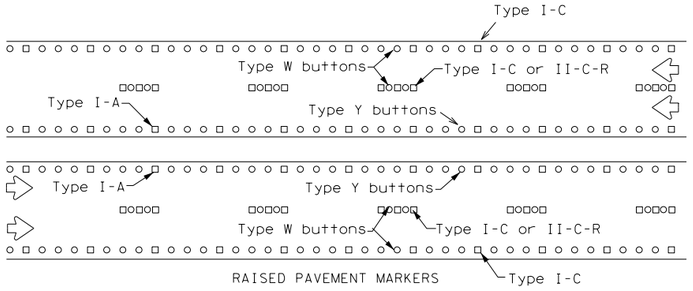
RAISED PAVEMENT MARKERS - PATTERN B

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

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



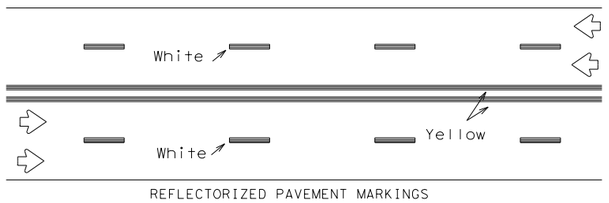
REFLECTORIZED PAVEMENT MARKINGS



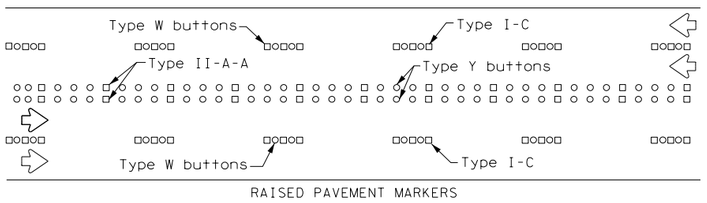
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



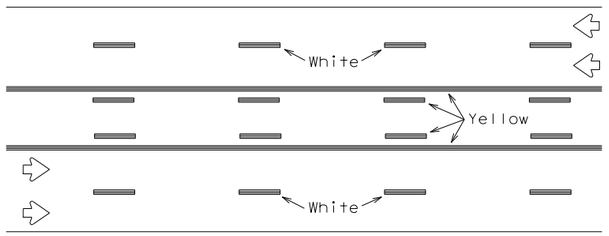
REFLECTORIZED PAVEMENT MARKINGS



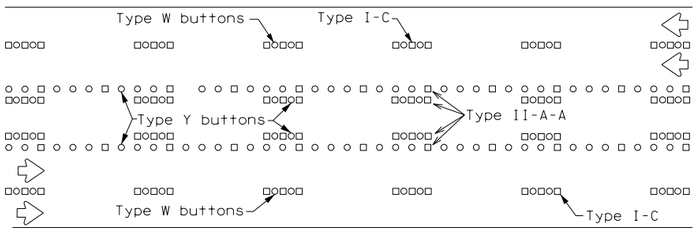
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

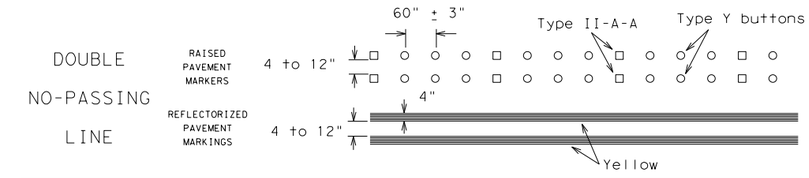
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

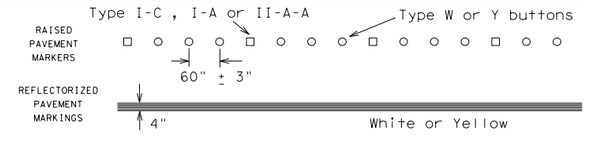
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

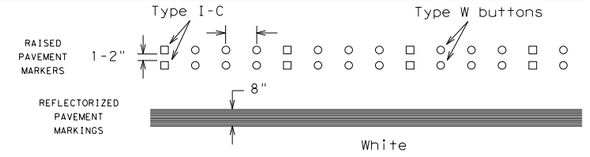


EDGE LINE OR SINGLE NO-PASSING LINE



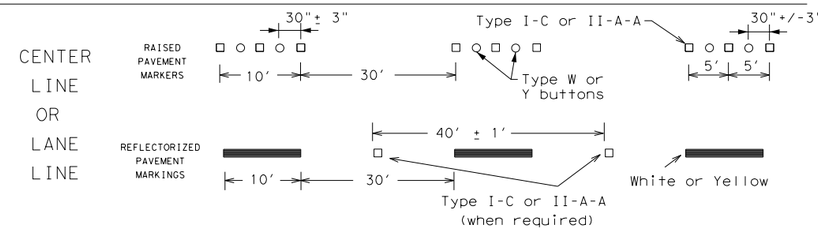
WIDE LINE

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

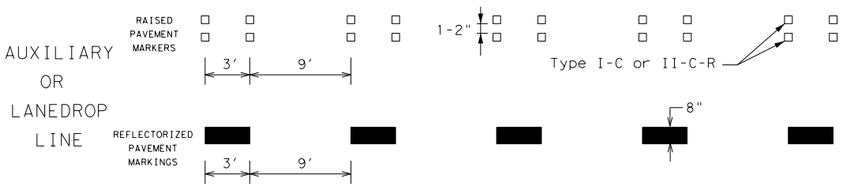


BROKEN LINES

CENTER LINE OR LANE LINE

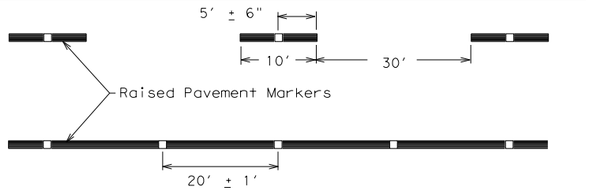


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

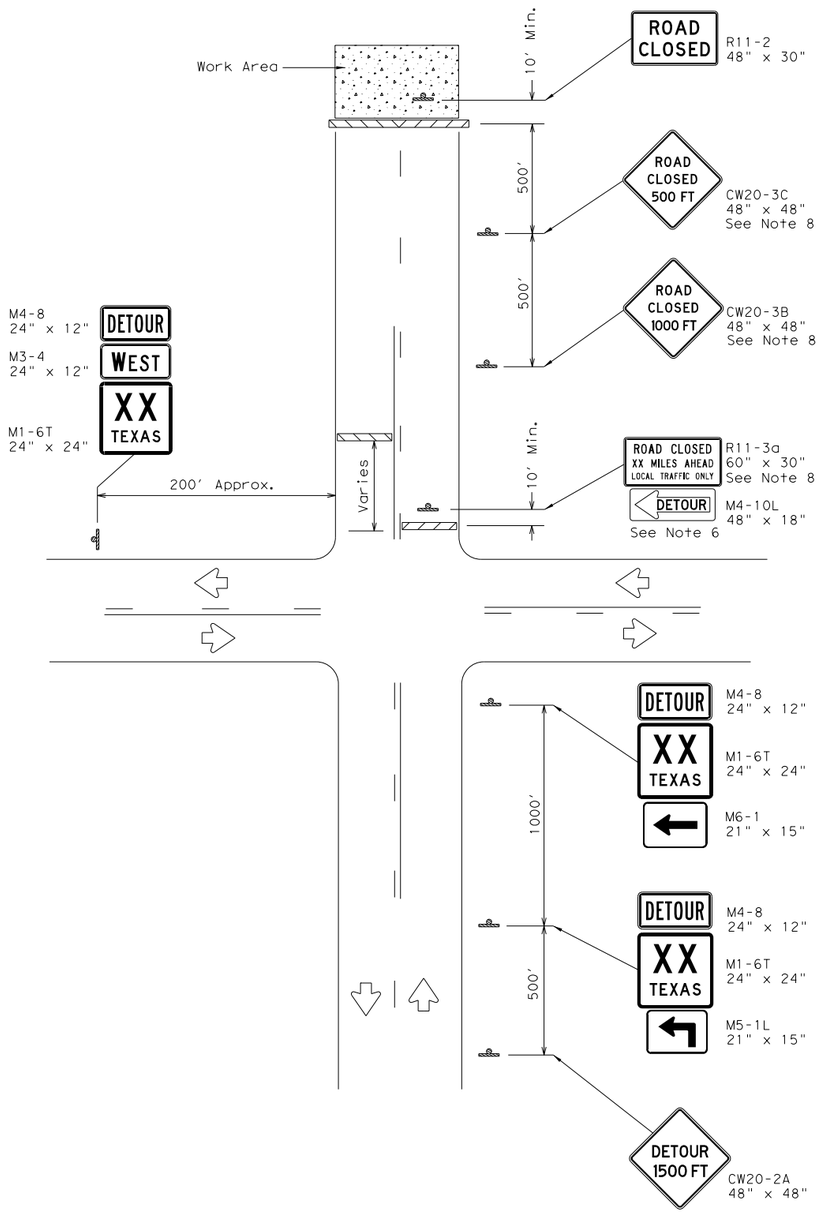
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

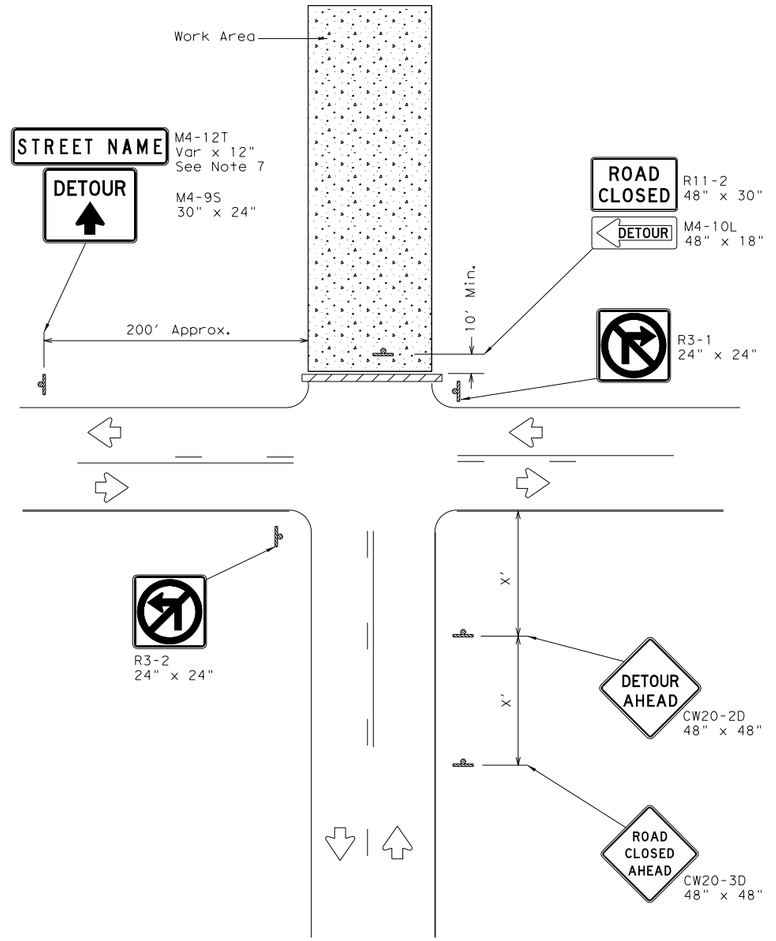
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		30

DATE: 2/16/2023 4:56:51 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\02_TRAF_CONT\StdDetails\wzrcd-13.dgn



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	0918	11	100,ETC.	CR 110,ETC.
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	DAL	KAUFMAN		31

CONTROL MONUMENTATION TABLE				
POINT	NORTHING (N)	EASTING (E)	ELEV.	DESCRIPTION
F1300272	6,887,784.78	2,690,031.73	393.02	SET TxDOT MONUMENT
F1300282	6,887,820.94	2,690,205.31	394.33	SET TxDOT MONUMENT
F1300292	6,887,908.92	2,690,297.04	393.36	SET TxDOT MONUMENT
F1300302	6,887,958.58	2,690,507.57	395.27	SET TxDOT MONUMENT

LINE DATA		
LINE	BEARING	LENGTH
L1	N 83° 29′ 23" E	12.96′
L2	N 81° 35′ 03" E	45.38′
L3	N 65° 16′ 43" E	67.75′
L4	N 60° 55′ 37" E	19.46′
L5	N 64° 53′ 39" E	76.50′
L6	N 68° 06′ 05" E	66.39′

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
F1300272	F1300282	N 78°14′00"E	177.31′
F1300282	F1300292	N 46°11′36"E	127.10′
F1300292	F1300302	N 76°43′40"E	216.32′

NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

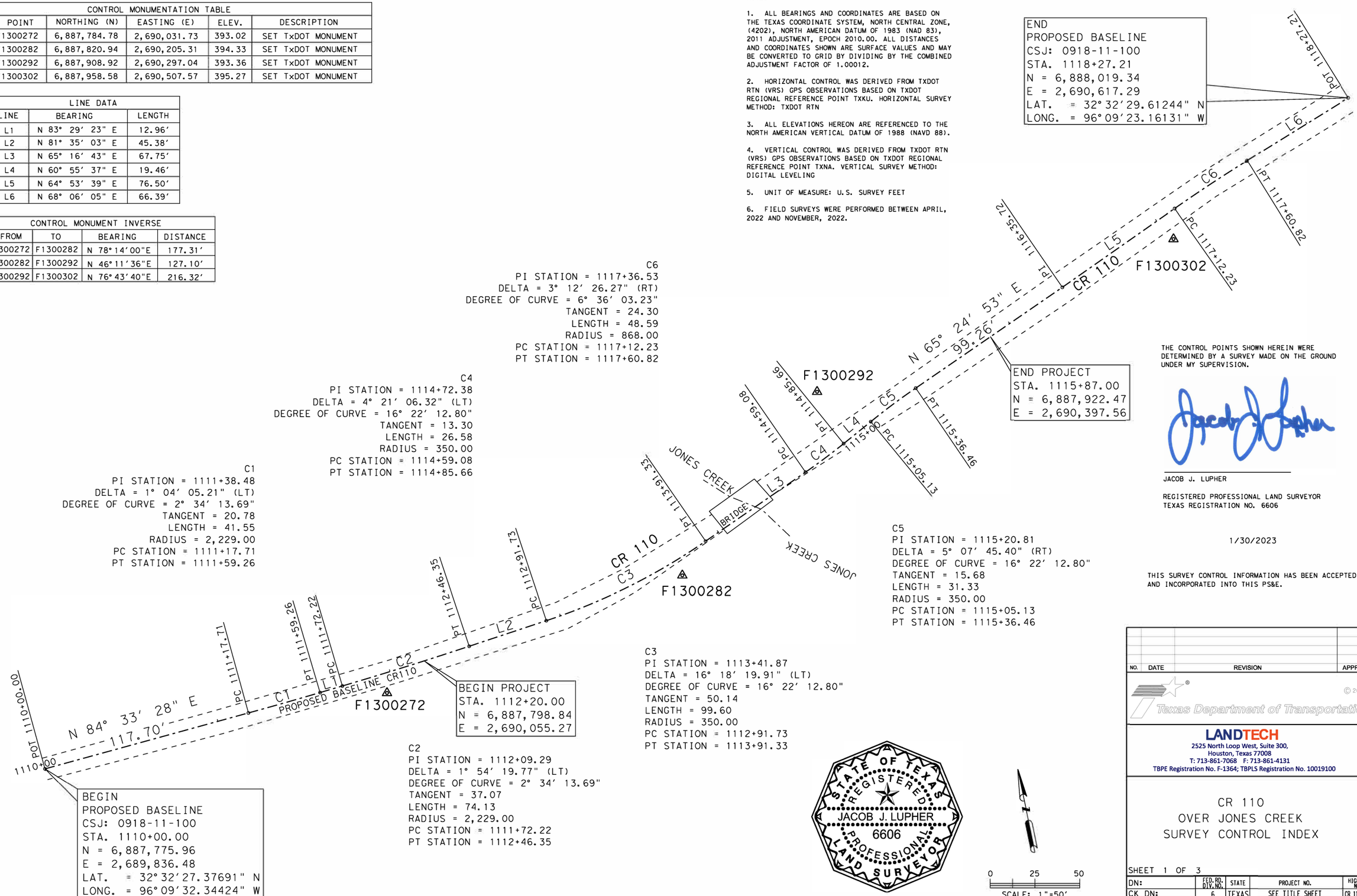
5. UNIT OF MEASURE: U.S. SURVEY FEET

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.

C6
PI STATION = 1117+36.53
DELTA = 3° 12′ 26.27" (RT)
DEGREE OF CURVE = 6° 36′ 03.23"
TANGENT = 24.30
LENGTH = 48.59
RADIUS = 868.00
PC STATION = 1117+12.23
PT STATION = 1117+60.82

C4
PI STATION = 1114+72.38
DELTA = 4° 21′ 06.32" (LT)
DEGREE OF CURVE = 16° 22′ 12.80"
TANGENT = 13.30
LENGTH = 26.58
RADIUS = 350.00
PC STATION = 1114+59.08
PT STATION = 1114+85.66

C1
PI STATION = 1111+38.48
DELTA = 1° 04′ 05.21" (LT)
DEGREE OF CURVE = 2° 34′ 13.69"
TANGENT = 20.78
LENGTH = 41.55
RADIUS = 2,229.00
PC STATION = 1111+17.71
PT STATION = 1111+59.26



C2
PI STATION = 1112+09.29
DELTA = 1° 54′ 19.77" (LT)
DEGREE OF CURVE = 2° 34′ 13.69"
TANGENT = 37.07
LENGTH = 74.13
RADIUS = 2,229.00
PC STATION = 1111+72.22
PT STATION = 1112+46.35

C3
PI STATION = 1113+41.87
DELTA = 16° 18′ 19.91" (LT)
DEGREE OF CURVE = 16° 22′ 12.80"
TANGENT = 50.14
LENGTH = 99.60
RADIUS = 350.00
PC STATION = 1112+91.73
PT STATION = 1113+91.33

C5
PI STATION = 1115+20.81
DELTA = 5° 07′ 45.40" (RT)
DEGREE OF CURVE = 16° 22′ 12.80"
TANGENT = 15.68
LENGTH = 31.33
RADIUS = 350.00
PC STATION = 1115+05.13
PT STATION = 1115+36.46

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

0 25 50
SCALE: 1"=50′

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

CR 110
OVER JONES CREEK
SURVEY CONTROL INDEX

SHEET 1 OF 3

DN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC	32

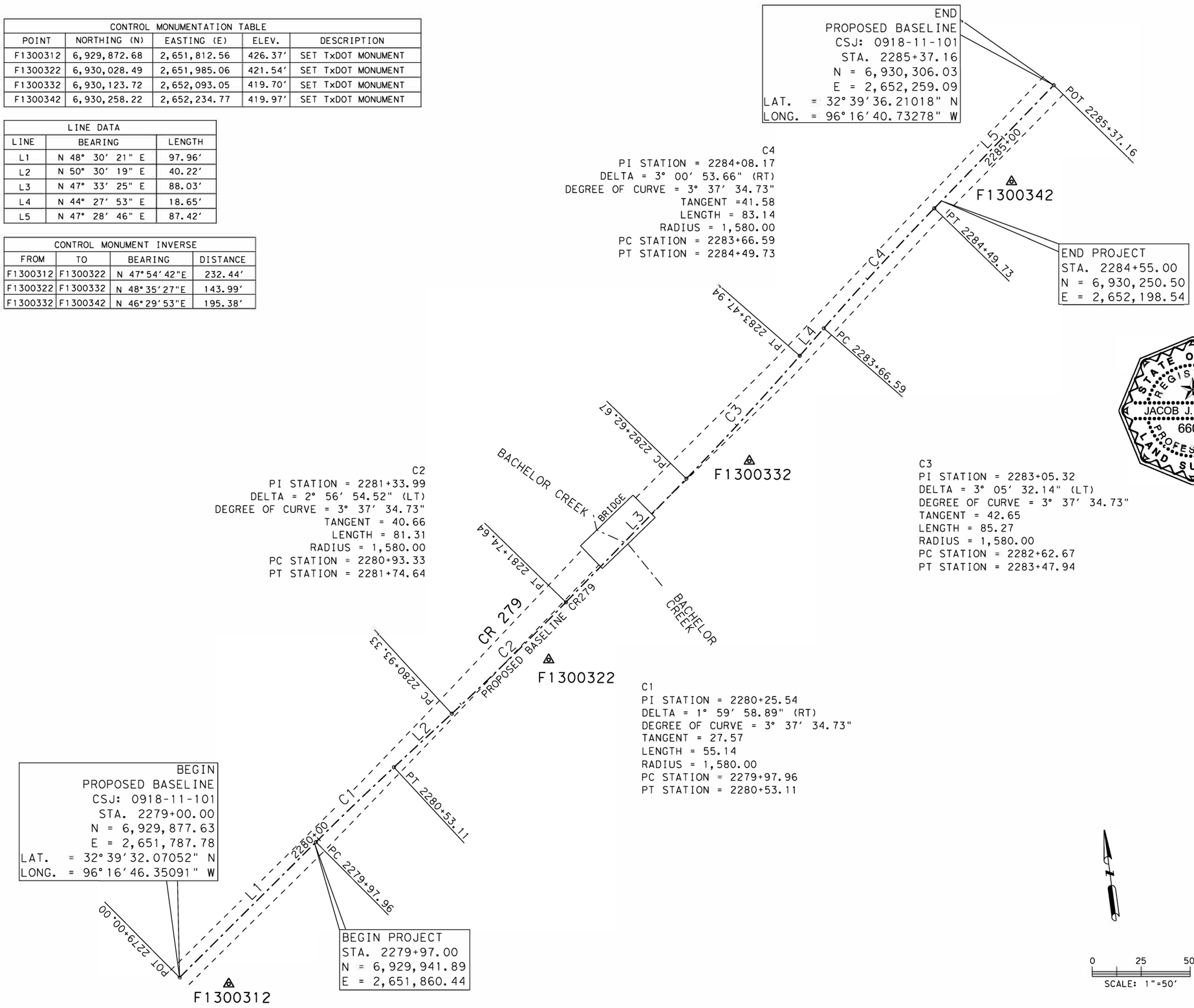
1/30/2023 2:58:24 PM
S:\2022\2220056-KAUFMAN CO BRIDGES\CADD\01_CR-110_Jones\MRF01_CR-110_TxDOT_SCM.dgr
$PLOTET$

$FILES$

CONTROL MONUMENTATION TABLE				
POINT	NORTHING (N)	EASTING (E)	ELEV.	DESCRIPTION
F1300312	6,929,872.68	2,651,812.56	426.37′	SET TxDOT MONUMENT
F1300322	6,930,028.49	2,651,985.06	421.54′	SET TxDOT MONUMENT
F1300332	6,930,123.72	2,652,093.05	419.70′	SET TxDOT MONUMENT
F1300342	6,930,258.22	2,652,234.77	419.97′	SET TxDOT MONUMENT

LINE DATA		
LINE	BEARING	LENGTH
L1	N 48° 30′ 21" E	97.96′
L2	N 50° 30′ 19" E	40.22′
L3	N 47° 33′ 25" E	88.03′
L4	N 44° 27′ 53" E	18.65′
L5	N 47° 28′ 46" E	87.42′

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
F1300312	F1300322	N 47°54′42"E	232.44′
F1300322	F1300332	N 48°35′27"E	143.99′
F1300332	F1300342	N 46°29′53"E	195.38′



NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.

STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

CR 279
OVER BACHELOR CREEK RELIEF
SURVEY CONTROL INDEX

SHEET 2 OF 3

DN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC	33

CONTROL MONUMENTATION TABLE				
POINT	NORTHING (N)	EASTING (E)	ELEV.	DESCRIPTION
F1300352	6,944,491.24	2,688,554.71	477.73′	SET TxDOT MONUMENT
F1300362	6,944,250.30	2,688,802.72	471.64′	SET TxDOT MONUMENT
F1300372	6,944,143.59	2,688,905.27	471.20′	SET TxDOT MONUMENT
F1300382	6,943,894.88	2,689,148.60	472.97′	SET TxDOT MONUMENT

LINE DATA		
LINE	BEARING	LENGTH
L1	S 45° 59′ 59.40" E	27.99′
L2	S 45° 11′ 28.16" E	104.64′
L3	S 44° 34′ 22.55" E	56.64′
L4	S 41° 02′ 16.42" E	41.23′
L5	S 42° 27′ 29.34" E	18.83′
L6	S 45° 08′ 56.23" E	47.50′

CONTROL MONUMENT INVERSE			
FROM	TO	BEARING	DISTANCE
F1300362	F1300352	N 45°49′41"W	345.77′
F1300372	F1300362	N 43°51′39"W	148.01′
F1300382	F1300372	N 44°22′22"W	347.94′

NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

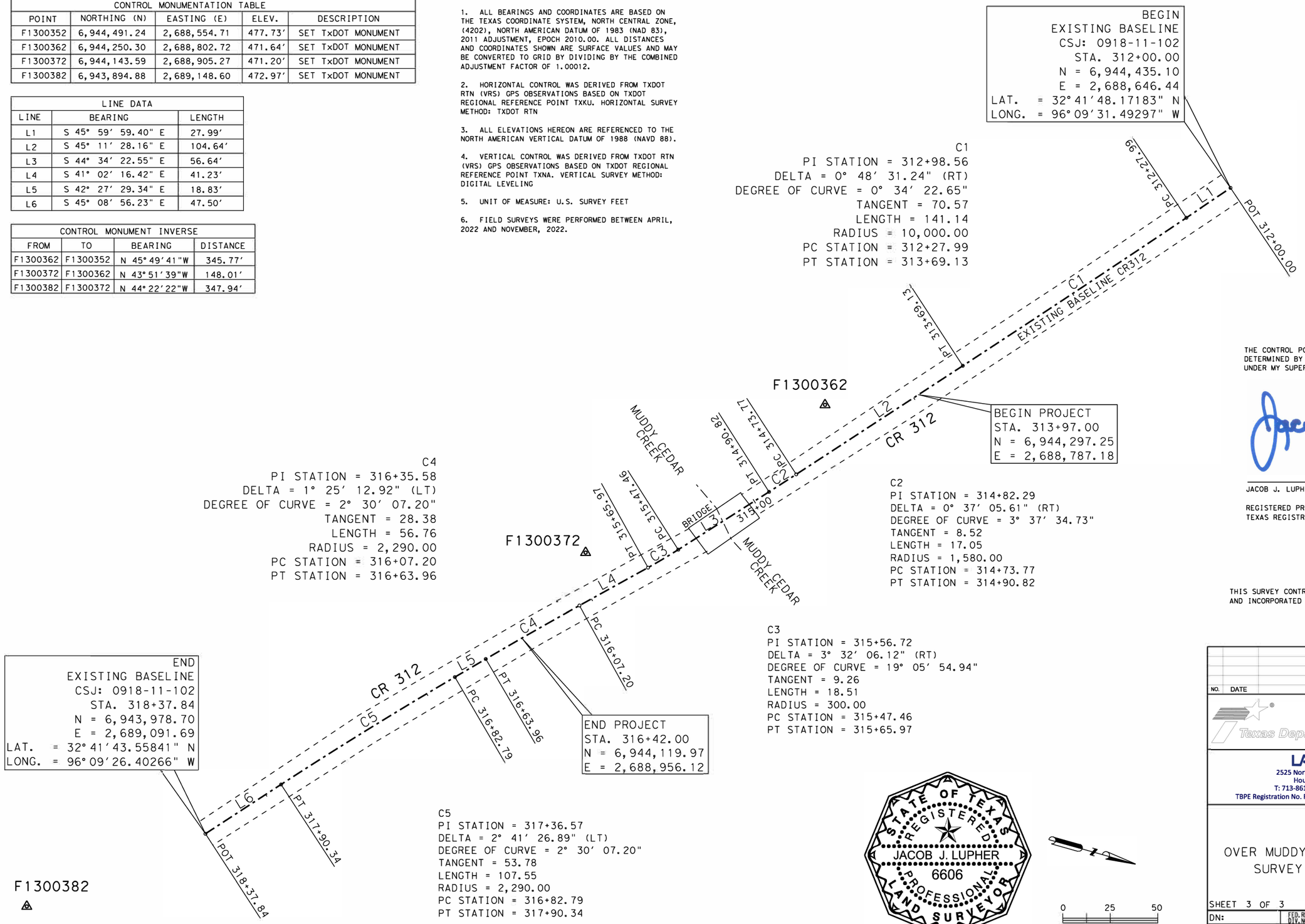
2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.



THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

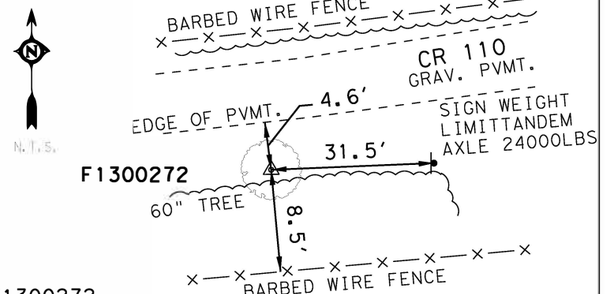
STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

SCALE: 1"=50′

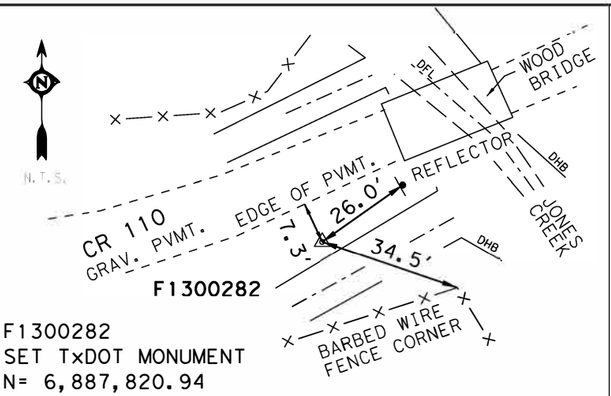
CR 312
OVER MUDDY CEDAR CREEK TRIB
SURVEY CONTROL INDEX

SHEET 3 OF 3

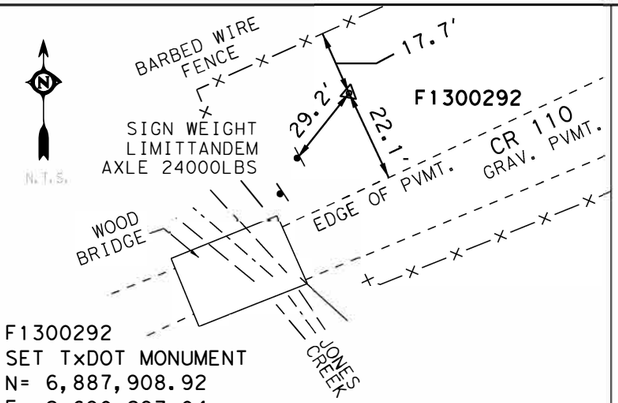
DN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC	34



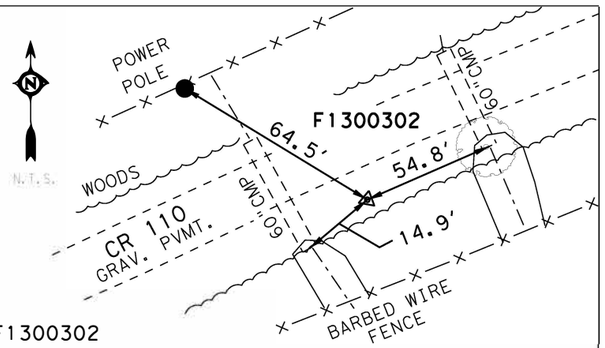
F1300272
SET TxDOT MONUMENT
N= 6,887,784.78
E= 2,690,031.73
ELEV. = 393.02



F1300282
SET TxDOT MONUMENT
N= 6,887,820.94
E= 2,690,205.31
ELEV. = 394.33



F1300292
SET TxDOT MONUMENT
N= 6,887,908.92
E= 2,690,297.04
ELEV. = 393.36



F1300302
SET TxDOT MONUMENT
N= 6,887,958.58
E= 2,690,507.57
ELEV. = 395.27

NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.

STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

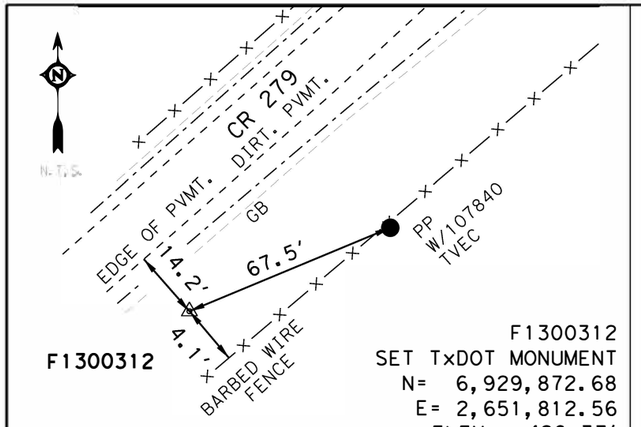
NO.	DATE	REVISION	APPROV.

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

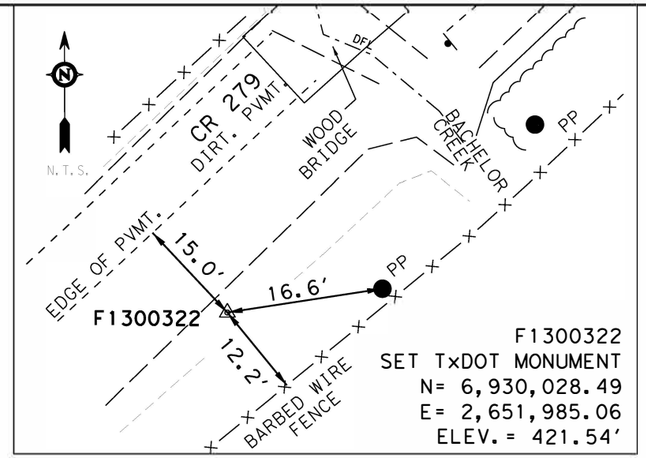
CR 110
OVER JONES CREEK
HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 3

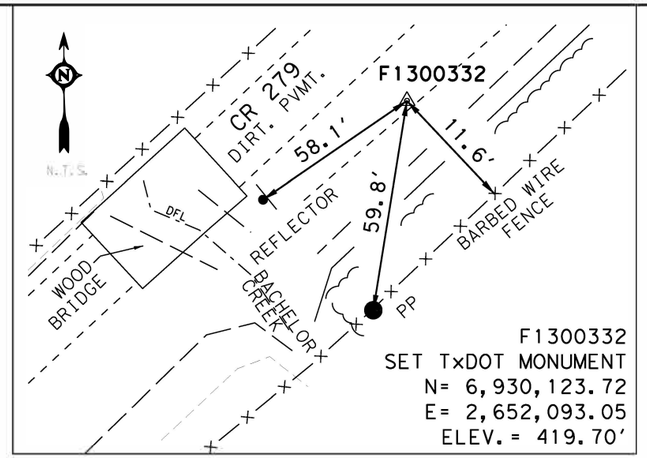
DN:	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC		35



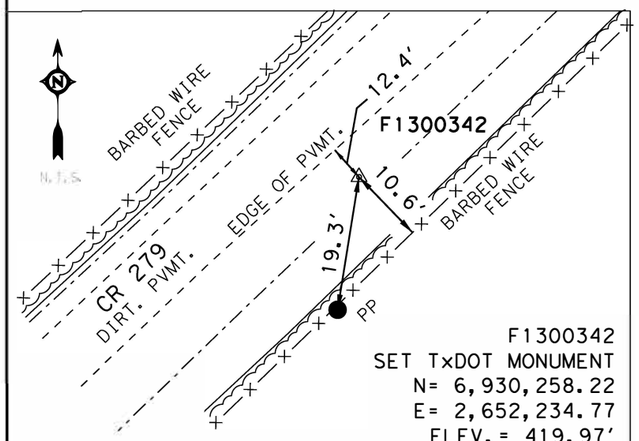
F1300312
SET TxDOT MONUMENT
N= 6,929,872.68
E= 2,651,812.56
ELEV. = 426.37'



F1300322
SET TxDOT MONUMENT
N= 6,930,028.49
E= 2,651,985.06
ELEV. = 421.54'



F1300332
SET TxDOT MONUMENT
N= 6,930,123.72
E= 2,652,093.05
ELEV. = 419.70'



F1300342
SET TxDOT MONUMENT
N= 6,930,258.22
E= 2,652,234.77
ELEV. = 419.97'

NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.

STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

NO.	DATE	REVISION	APPROV.

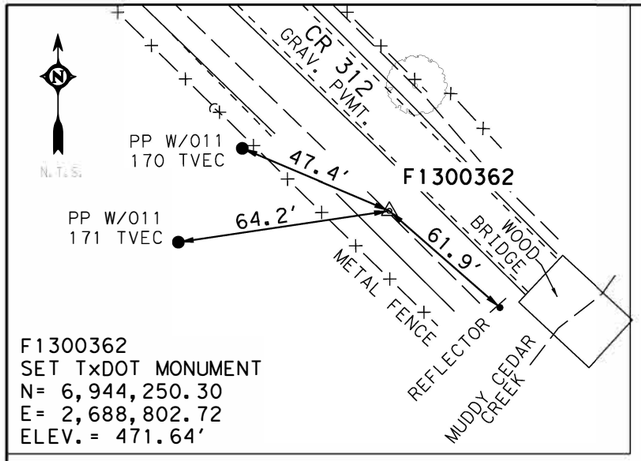
Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

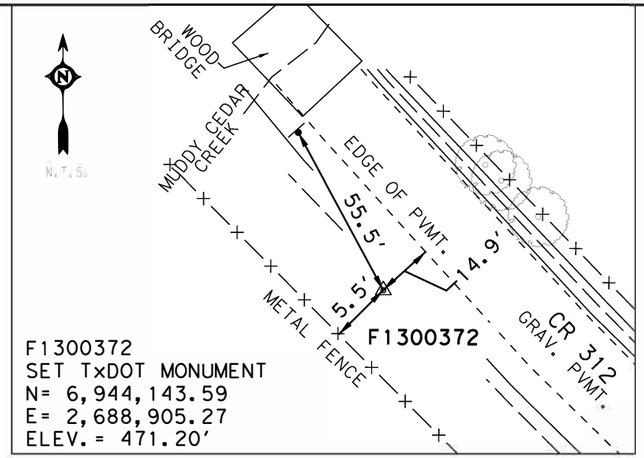
CR 279
OVER BACHELOR CREEK RELLEF
HORIZONTAL AND VERTICAL CONTROL

SHEET 2 OF 3

DN:	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC	36



F1300362
SET TxDOT MONUMENT
N= 6,944,250.30
E= 2,688,802.72
ELEV. = 471.64'



F1300372
SET TxDOT MONUMENT
N= 6,944,143.59
E= 2,688,905.27
ELEV. = 471.20'

NOTES

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE, (4202), NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 1.00012.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXKU. HORIZONTAL SURVEY METHOD: TXDOT RTN

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

4. VERTICAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN APRIL, 2022 AND NOVEMBER, 2022.

STATE OF TEXAS
REGISTERED
JACOB J. LUPHER
6606
PROFESSIONAL
LAND SURVEYOR

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

JACOB J. LUPHER

REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

1/30/2023

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

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

CR 312
OVER MUDDY CEDAR CREEK TRIB
HORIZONTAL AND VERTICAL CONTROL

SHEET 3 OF 3

DN:	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	DAL	KAUFMAN	0918	11	100,ETC	37

CR 110 @ JONES CREEK(℄ CR110)

Beginning chain P*CR110 description

Point 11001 N 6,887,775.9595 E 2,689,836.4797 Sta 1110+00.00

Course from 11001 to PC EX*CR110*1 N 84° 33′ 27.90" E Dist 117.7062

Curve Data					
Curve EX*CR110*1					
P.I. Station	1111+38.48	N	6,887,789.0936	E	2,689,974.3388
Delta =	1° 04′ 05.21"	(LT)			
Degree =	2° 34′ 13.69"				
Tangent =	20.7772				
Length =	41.5533				
Radius =	2,229.0000				
External =	0.0968				
Long Chord =	41.5527				
Mid. Ord. =	0.0968				
P.C. Station	1111+17.71	N	6,887,787.1230	E	2,689,953.6553
P.T. Station	1111+59.26	N	6,887,791.4493	E	2,689,994.9821
C.C.		N	6,890,006.0753	E	2,689,742.2515
Back = N	84° 33′ 27.90" E				
Ahead = N	83° 29′ 22.68" E				
Chord Bear = N	84° 01′ 25.29" E				

Course from PT EX*CR110*1 to PC EX*CR110*2 N 83° 29′ 22.68" E Dist 12.9622

Curve Data					
Curve EX*CR110*2					
P.I. Station	1112+09.29	N	6,887,797.1220	E	2,690,044.6901
Delta =	1° 54′ 19.77"	(LT)			
Degree =	2° 34′ 13.69"				
Tangent =	37.0684				
Length =	74.1301				
Radius =	2,229.0000				
External =	0.3082				
Long Chord =	74.1266				
Mid. Ord. =	0.3082				
P.C. Station	1111+72.22	N	6,887,792.9190	E	2,690,007.8607
P.T. Station	1112+46.35	N	6,887,802.5472	E	2,690,081.3594
C.C.		N	6,890,007.5450	E	2,689,755.1301
Back = N	83° 29′ 22.68" E				
Ahead = N	81° 35′ 02.91" E				
Chord Bear = N	82° 32′ 12.80" E				

Course from PT EX*CR110*2 to PC P*CR110*1 N 81° 35′ 02.91" E Dist 45.3778

Curve Data					
Curve P*CR110*1					
P.I. Station	1113+41.87	N	6,887,816.5270	E	2,690,175.8499
Delta =	16° 18′ 19.91"	(LT)			
Degree =	16° 22′ 12.80"				
Tangent =	50.1413				
Length =	99.6048				
Radius =	350.0000				
External =	3.5734				
Long Chord =	99.2690				
Mid. Ord. =	3.5373				
P.C. Station	1112+91.73	N	6,887,809.1885	E	2,690,126.2485
P.T. Station	1113+91.33	N	6,887,837.4964	E	2,690,221.3958
C.C.		N	6,888,155.4197	E	2,690,075.0237
Back = N	81° 35′ 02.92" E				
Ahead = N	65° 16′ 43.00" E				
Chord Bear = N	73° 25′ 52.96" E				

Course from PT P*CR110*1 to PC P*CR110*2 N 65° 16′ 43.00" E Dist 67.7468

Curve Data					
Curve P*CR110*2					
P.I. Station	1114+72.38	N	6,887,871.3899	E	2,690,295.0131
Delta =	4° 21′ 06.32"	(LT)			
Degree =	16° 22′ 12.80"				
Tangent =	13.2981				
Length =	26.5834				
Radius =	350.0000				
External =	0.2525				
Long Chord =	26.5770				
Mid. Ord. =	0.2524				
P.C. Station	1114+59.08	N	6,887,865.8286	E	2,690,282.9338
P.T. Station	1114+85.66	N	6,887,877.8518	E	2,690,306.6356
C.C.		N	6,888,183.7518	E	2,690,136.5616
Back = N	65° 16′ 43.00" E				
Ahead = N	60° 55′ 36.68" E				
Chord Bear = N	63° 06′ 09.84" E				

Course from PT P*CR110*2 to PC P*CR110*3 N 60° 55′ 36.68" E Dist 19.4643

CR 110 @ JONES CREEK(℄ CR110) CONT'D

Curve Data					
Curve P*CR110*3					
P.I. Station	1115+20.81	N	6,887,895.0044	E	2,690,337.3062
Delta =	5° 07′ 45.40"	(RT)			
Degree =	16° 22′ 12.80"				
Tangent =	15.6770				
Length =	31.3330				
Radius =	350.0000				
External =	0.3509				
Long Chord =	31.3225				
Mid. Ord. =	0.3506				
P.C. Station	1115+05.13	N	6,887,887.3100	E	2,690,323.6474
P.T. Station	1115+36.46	N	6,887,901.4469	E	2,690,351.5982
C.C.		N	6,887,582.3668	E	2,690,495.4312
Back = N	60° 36′ 21.96" E				
Ahead = N	65° 44′ 07.35" E				
Chord Bear = N	63° 10′ 14.66" E				

Course from PT P*CR110*3 to 11008 N 65° 24′ 52.63" E Dist 99.2630

Point 11008 N 6,887,942.7451 E 2,690,441.8622 Sta 1116+35.72

Course from 11008 to PC EX*CR110*5 N 64° 53′ 38.74" E Dist 76.5015

Curve Data					
Curve EX*CR110*5					
P.I. Station	1117+36.53	N	6,887,985.5148	E	2,690,533.1412
Delta =	3° 12′ 26.27"	(RT)			
Degree =	6° 36′ 03.23"				
Tangent =	24.3008				
Length =	48.5888				
Radius =	868.0000				
External =	0.3401				
Long Chord =	48.5825				
Mid. Ord. =	0.3400				
P.C. Station	1117+12.23	N	6,887,975.2041	E	2,690,511.1363
P.T. Station	1117+60.82	N	6,887,994.5781	E	2,690,555.6886
C.C.		N	6,887,189.2084	E	2,690,879.4224
Back = N	64° 53′ 38.74" E				
Ahead = N	68° 06′ 05.02" E				
Chord Bear = N	66° 29′ 51.88" E				

Course from PT EX*CR110*5 to 11010 N 68° 06′ 05.02" E Dist 66.3939

Point 11010 N 6,888,019.3407 E 2,690,617.2918 Sta 1118+27.21

Ending chain P*CR110 description

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ALIGNMENT DATA
CR 110

SHEET 1 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	38

RMorfin
2/16/2023 4:56:52 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR110_RDAD_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

CR 279 @ BACHELOR CREEK RELIEF(℄ CR279)

Beginning chain P*CR279 description

Point 27901 N 6,929,877.6278 E 2,651,787.7816 Sta 2279+00.00

Course from 27901 to PC P*CR279*10 N 48° 30′ 20.39" E Dist 97.9632

Curve Data

Curve P*CR279*10					
P.I. Station	2280+25.54	N	6,929,960.8025	E	2,651,881.8122
Delta =	1° 59′ 58.89" (RT)				
Degree =	3° 37′ 34.73"				
Tangent =	27.5748				
Length =	55.1439				
Radius =	1,580.0000				
External =	0.2406				
Long Chord =	55.1411				
Mid. Ord. =	0.2406				
P.C. Station	2279+97.96	N	6,929,942.5330	E	2,651,861.1582
P.T. Station	2280+53.11	N	6,929,978.3402	E	2,651,903.0912
C.C.		N	6,928,759.0795	E	2,652,907.9809
Back = N	48° 30′ 20.39" E				
Ahead = N	50° 30′ 19.28" E				
Chord Bear = N	49° 30′ 19.84" E				

Course from PT P*CR279*10 to PC P*CR279*11 N 50° 30′ 19.28" E Dist 40.2229

Curve Data

Curve P*CR279*11					
P.I. Station	2281+33.99	N	6,930,029.7841	E	2,651,965.5095
Delta =	2° 56′ 54.52" (LT)				
Degree =	3° 37′ 34.73"				
Tangent =	40.6629				
Length =	81.3079				
Radius =	1,580.0000				
External =	0.5232				
Long Chord =	81.2989				
Mid. Ord. =	0.5230				
P.C. Station	2280+93.33	N	6,930,003.9223	E	2,651,934.1306
P.T. Station	2281+74.64	N	6,930,057.2258	E	2,651,995.5166
C.C.		N	6,931,223.1830	E	2,650,929.2410
Back = N	50° 30′ 19.28" E				
Ahead = N	47° 33′ 24.76" E				
Chord Bear = N	49° 01′ 52.02" E				

Course from PT P*CR279*11 to PC P*CR279*12 N 47° 33′ 24.76" E Dist 88.0329

Curve Data

Curve P*CR279*12					
P.I. Station	2283+05.32	N	6,930,145.4160	E	2,652,091.9514
Delta =	3° 05′ 32.14" (LT)				
Degree =	3° 37′ 34.73"				
Tangent =	42.6468				
Length =	85.2728				
Radius =	1,580.0000				
External =	0.5754				
Long Chord =	85.2625				
Mid. Ord. =	0.5752				
P.C. Station	2282+62.67	N	6,930,116.6355	E	2,652,060.4803
P.T. Station	2283+47.94	N	6,930,175.8523	E	2,652,121.8241
C.C.		N	6,931,282.5927	E	2,650,994.2047
Back = N	47° 33′ 24.76" E				
Ahead = N	44° 27′ 52.62" E				
Chord Bear = N	46° 00′ 38.69" E				

Course from PT P*CR279*12 to PC P*CR279*13 N 44° 27′ 52.62" E Dist 18.6508

Curve Data

Curve P*CR279*13					
P.I. Station	2284+08.17	N	6,930,218.8375	E	2,652,164.0134
Delta =	3° 00′ 53.66" (RT)				
Degree =	3° 37′ 34.73"				
Tangent =	41.5794				
Length =	83.1396				
Radius =	1,580.0000				
External =	0.5470				
Long Chord =	83.1300				
Mid. Ord. =	0.5468				
P.C. Station	2283+66.59	N	6,930,189.1630	E	2,652,134.8884
P.T. Station	2284+49.73	N	6,930,246.9391	E	2,652,194.6589
C.C.		N	6,929,082.4225	E	2,653,262.5078
Back = N	44° 27′ 52.62" E				
Ahead = N	47° 28′ 46.27" E				
Chord Bear = N	45° 58′ 19.45" E				

Course from PT P*CR279*13 to 27908 N 47° 28′ 46.27" E Dist 87.4240

Point 27908 N 6,930,306.0250 E 2,652,259.0935 Sta 2285+37.16

Ending chain P*CR279 description

RMorfin
2/16/2023 4:56:53 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR279_RDAD_01.dgn
...\xDOT-BW-HALF_PDF.pltcfg

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ALIGNMENT DATA
CR 279

SHEET 2 OF 3

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC		39

CR279_RDAD_01.dgn

CR 312 @ MUDDY CEDAR CREEK TRIBUTARY(℄ CR312)

Beginning chain EX*CR312 description

Point 31201 N 6,944,435.0984 E 2,688,646.4390 Sta 312+00.00

Course from 31201 to PC EX*CR312*01 S 45° 59′ 59.40" E Dist 27.9916

	Curve Data				
Curve EX*CR312*01					
P.I. Station	312+98.56	N	6,944,366.6304	E	2,688,717.3393
Delta =	0° 48′ 31.24"	(RT)			
Degree =	0° 34′ 22.65"				
Tangent =	70.5717				
Length =	141.1410				
Radius =	10,000.0000				
External =	0.2490				
Long Chord =	141.1399				
Mid. Ord. =	0.2490				
P.C. Station	312+27.99	N	6,944,415.6538	E	2,688,666.5744
P.T. Station	313+69.13	N	6,944,316.8955	E	2,688,767.4072
C.C.		N	6,937,222.2760	E	2,681,719.9698
Back = S	45° 59′ 59.40" E				
Ahead = S	45° 11′ 28.16" E				
Chord Bear = S	45° 35′ 43.78" E				

Course from PT EX*CR312*01 to PC EX*CR312*02 S 45° 11′ 28.16" E Dist 104.6375

	Curve Data				
Curve EX*CR312*02					
P.I. Station	314+82.29	N	6,944,237.1454	E	2,688,847.6912
Delta =	0° 37′ 05.61"	(RT)			
Degree =	3° 37′ 34.73"				
Tangent =	8.5242				
Length =	17.0483				
Radius =	1,580.0000				
External =	0.0230				
Long Chord =	17.0482				
Mid. Ord. =	0.0230				
P.C. Station	314+73.77	N	6,944,243.1528	E	2,688,841.6436
P.T. Station	314+90.82	N	6,944,231.0731	E	2,688,853.6736
C.C.		N	6,943,122.2029	E	2,687,728.1485
Back = S	45° 11′ 28.16" E				
Ahead = S	44° 34′ 22.55" E				
Chord Bear = S	44° 52′ 55.35" E				

Course from PT EX*CR312*02 to PC EX*CR312*03 S 44° 34′ 22.55" E Dist 56.6444

	Curve Data				
Curve EX*CR312*03					
P.I. Station	315+56.72	N	6,944,184.1273	E	2,688,899.9248
Delta =	3° 32′ 06.12"	(RT)			
Degree =	19° 05′ 54.94"				
Tangent =	9.2576				
Length =	18.5094				
Radius =	300.0000				
External =	0.1428				
Long Chord =	18.5065				
Mid. Ord. =	0.1427				
P.C. Station	315+47.46	N	6,944,190.7221	E	2,688,893.4276
P.T. Station	315+65.97	N	6,944,177.1445	E	2,688,906.0029
C.C.		N	6,943,980.1771	E	2,688,679.7203
Back = S	44° 34′ 22.55" E				
Ahead = S	41° 02′ 16.42" E				
Chord Bear = S	42° 48′ 19.48" E				

Course from PT EX*CR312*03 to PC EX*CR312*04 S 41° 02′ 16.42" E Dist 41.2260

	Curve Data				
Curve EX*CR312*04					
P.I. Station	316+35.58	N	6,944,124.6395	E	2,688,951.7058
Delta =	1° 25′ 12.92"	(LT)			
Degree =	2° 30′ 07.20"				
Tangent =	28.3839				
Length =	56.7648				
Radius =	2,290.0000				
External =	0.1759				
Long Chord =	56.7633				
Mid. Ord. =	0.1759				
P.C. Station	316+07.20	N	6,944,146.0487	E	2,688,933.0702
P.T. Station	316+63.96	N	6,944,103.6987	E	2,688,970.8664
C.C.		N	6,945,649.5667	E	2,690,660.3611
Back = S	41° 02′ 16.42" E				
Ahead = S	42° 27′ 29.34" E				
Chord Bear = S	41° 44′ 52.88" E				

Course from PT EX*CR312*04 to PC EX*CR312*05 S 42° 27′ 29.34" E Dist 18.8290

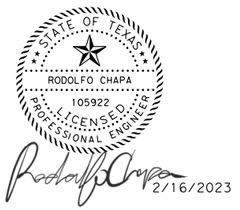
CR 312 @ MUDDY CEDAR CREEK TRIBUTARY(℄ CR312) CONT'D

	Curve Data				
Curve EX*CR312*05					
P.I. Station	317+36.57	N	6,944,050.1278	E	2,689,019.8832
Delta =	2° 41′ 26.89"	(LT)			
Degree =	2° 30′ 07.20"				
Tangent =	53.7829				
Length =	107.5461				
Radius =	2,290.0000				
External =	0.6315				
Long Chord =	107.5362				
Mid. Ord. =	0.6313				
P.C. Station	316+82.79	N	6,944,089.8072	E	2,688,983.5770
P.T. Station	317+90.34	N	6,944,012.1965	E	2,689,058.0122
C.C.		N	6,945,635.6752	E	2,690,673.0716
Back = S	42° 27′ 29.34" E				
Ahead = S	45° 08′ 56.23" E				
Chord Bear = S	43° 48′ 12.78" E				

Course from PT EX*CR312*05 to 31207 S 45° 08′ 56.23" E Dist 47.5007

Point 31207 N 6,943,978.6959 E 2,689,091.6875 Sta 318+37.84

Ending chain EX*CR312 description



SCALE: N.T.S.

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ALIGNMENT DATA
CR 312

SHEET 3 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	40

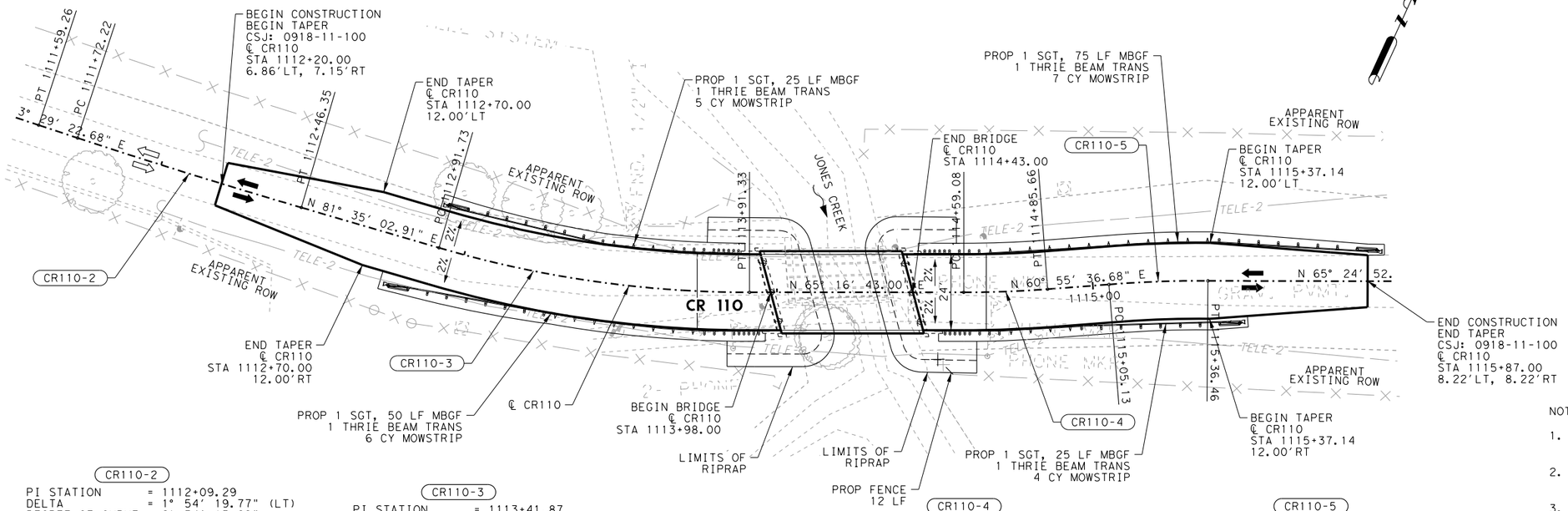
CR312_RDAD_01.dgn

RMorfin
2/16/2023 4:56:54 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR312_RDAD_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

LEGEND

PROP DIRECTION OF TRAFFIC

EXIST DIRECTION OF TRAFFIC



CR110-2

PI STATION	= 1112+09.29
DELTA	= 1° 54' 19.77" (LT)
DEGREE OF CURVE	= 2° 34' 13.69"
TANGENT	= 37.07
LENGTH	= 74.13
RADIUS	= 2,229.00
PC STATION	= 1111+72.22
PT STATION	= 1112+46.35

CR110-3

PI STATION	= 1113+41.87
DELTA	= 16° 18' 19.91" (LT)
DEGREE OF CURVE	= 16° 22' 12.80"
TANGENT	= 50.14
LENGTH	= 99.60
RADIUS	= 350.00
PC STATION	= 1112+91.73
PT STATION	= 1113+91.33

CR110-4

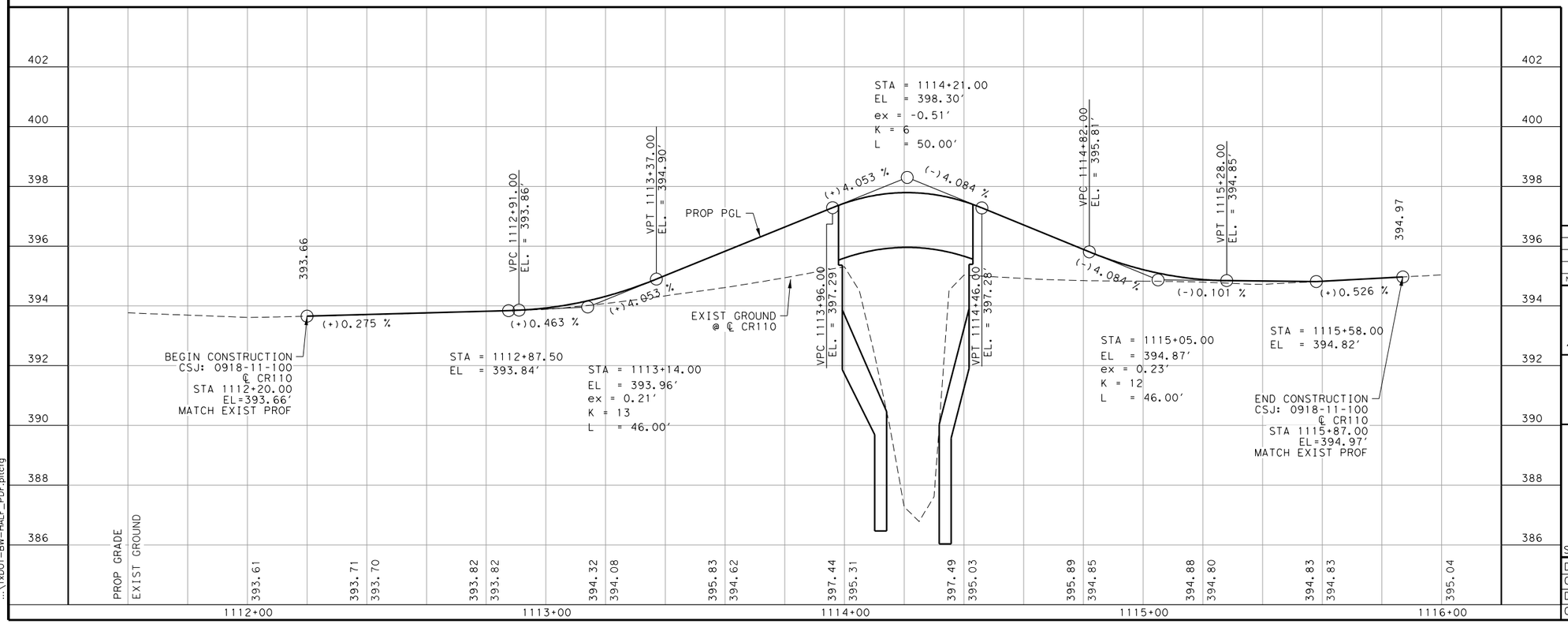
PI STATION	= 1114+72.38
DELTA	= 4° 21' 06.32" (LT)
DEGREE OF CURVE	= 16° 22' 12.80"
TANGENT	= 13.30
LENGTH	= 26.58
RADIUS	= 350.00
PC STATION	= 1114+59.08
PT STATION	= 1114+85.66

CR110-5

PI STATION	= 1115+20.81
DELTA	= 5° 07' 45.40" (LT)
DEGREE OF CURVE	= 16° 22' 12.80"
TANGENT	= 15.67
LENGTH	= 31.33
RADIUS	= 350.00
PC STATION	= 1115+05.13
PT STATION	= 1115+36.46

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR HORIZONTAL ALIGNMENT DATA.
2. REFER TO HORIZONTAL & VERTICAL CONTROL SHEETS FOR BENCHMARK INFO.
3. REFER TO BRIDGE LAYOUT FOR BRIDGE DETAILS.



HORIZ. 0 20 40

VERT. 0 2 4

NO.	DATE	REVISION	APPROV.
..			
..			
..			
..			

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC

F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ROADWAY PLAN & PROFILE
CR 110
JONES CREEK

SHEET 1 OF 4

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	41

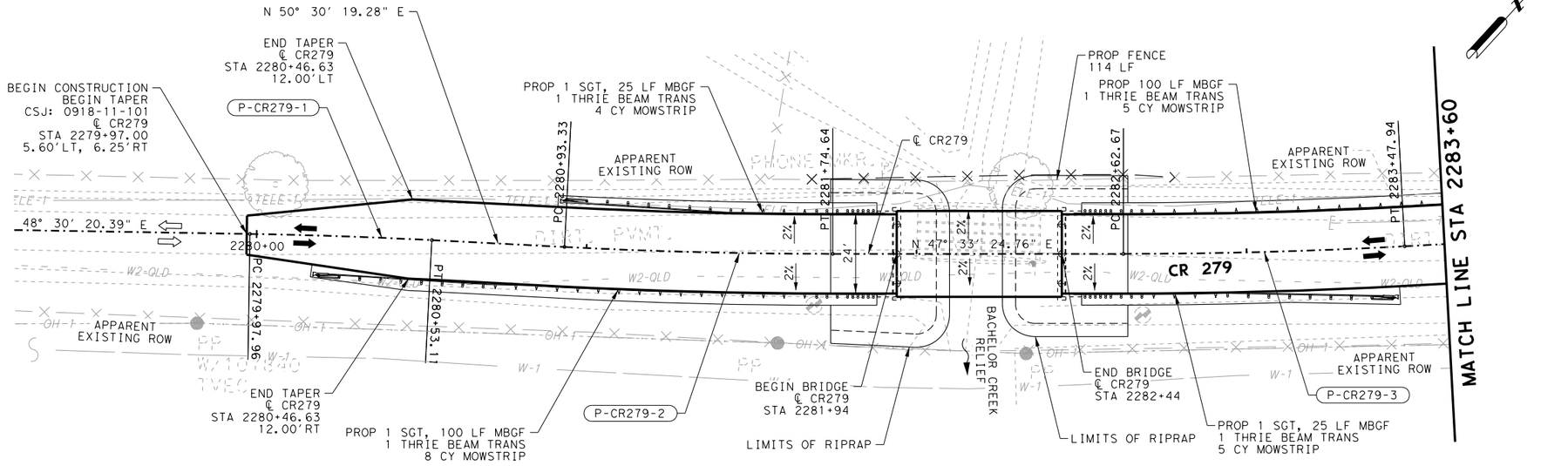
RMorfin
2/16/2023 4:56:56 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR110_RDPP_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

CR110_RDPP_01.dgn

LEGEND

PROP DIRECTION OF TRAFFIC

EXIST DIRECTION OF TRAFFIC



P-CR279-1

PI STATION	= 2280+25.54
DELTA	= 1° 59' 58.89" (RT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 27.57
LENGTH	= 55.14
RADIUS	= 1,580.00
PC STATION	= 2279+97.96
PT STATION	= 2280+53.11

P-CR279-2

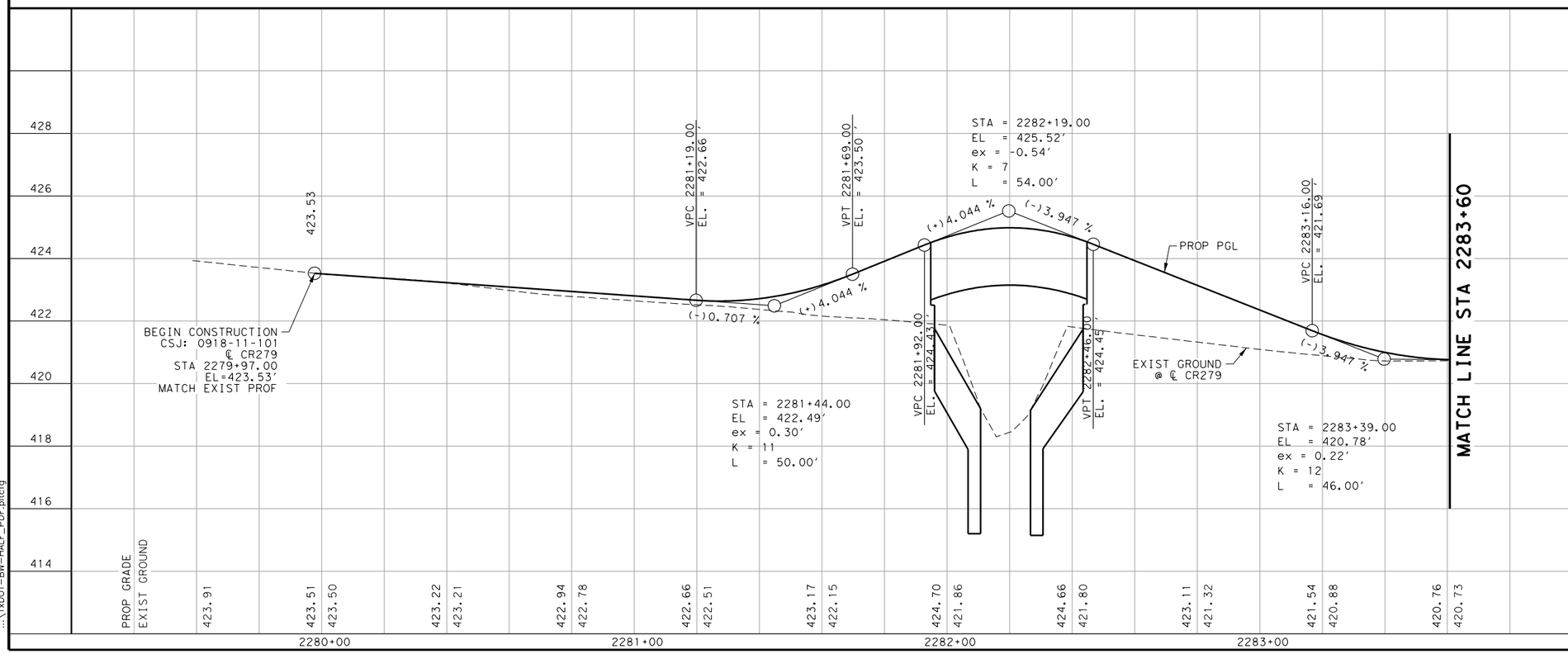
PI STATION	= 2281+33.99
DELTA	= 2° 56' 54.52" (LT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 40.66
LENGTH	= 81.31
RADIUS	= 1,580.00
PC STATION	= 2280+93.33
PT STATION	= 2281+74.64

P-CR279-3

PI STATION	= 2283+05.32
DELTA	= 3° 05' 32.14" (LT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 42.65
LENGTH	= 85.27
RADIUS	= 1,580.00
PC STATION	= 2282+62.67
PT STATION	= 2283+47.94

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR HORIZONTAL ALIGNMENT DATA.
2. REFER TO HORIZONTAL & VERTICAL CONTROL SHEETS FOR BENCHMARK INFO.
3. REFER TO BRIDGE LAYOUT FOR BRIDGE DETAILS.



RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
2/24/2023

HORIZ. 0 20 40
VERT. 0 2 4

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ROADWAY PLAN & PROFILE
CR279
BACHELOR CREEK RELIEF

SHEET 2 OF 4

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET		CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	42

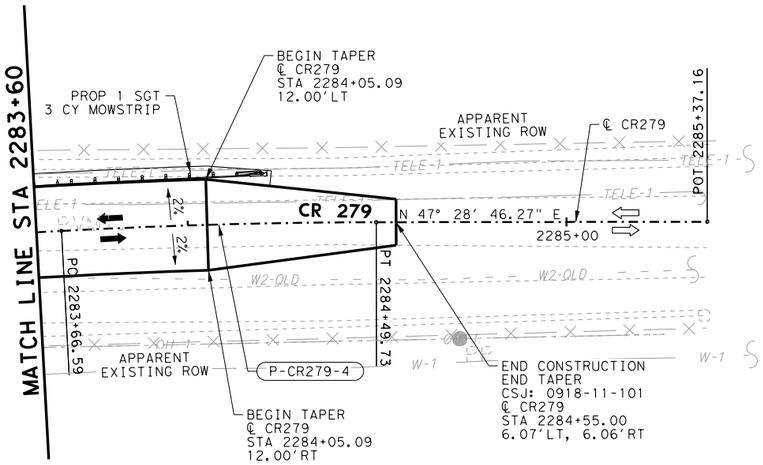
CR279_RDPP_01.dgn

RChapa
2/24/2023
9:18:41 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR279_RDPP_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

LEGEND

PROP DIRECTION OF TRAFFIC

EXIST DIRECTION OF TRAFFIC

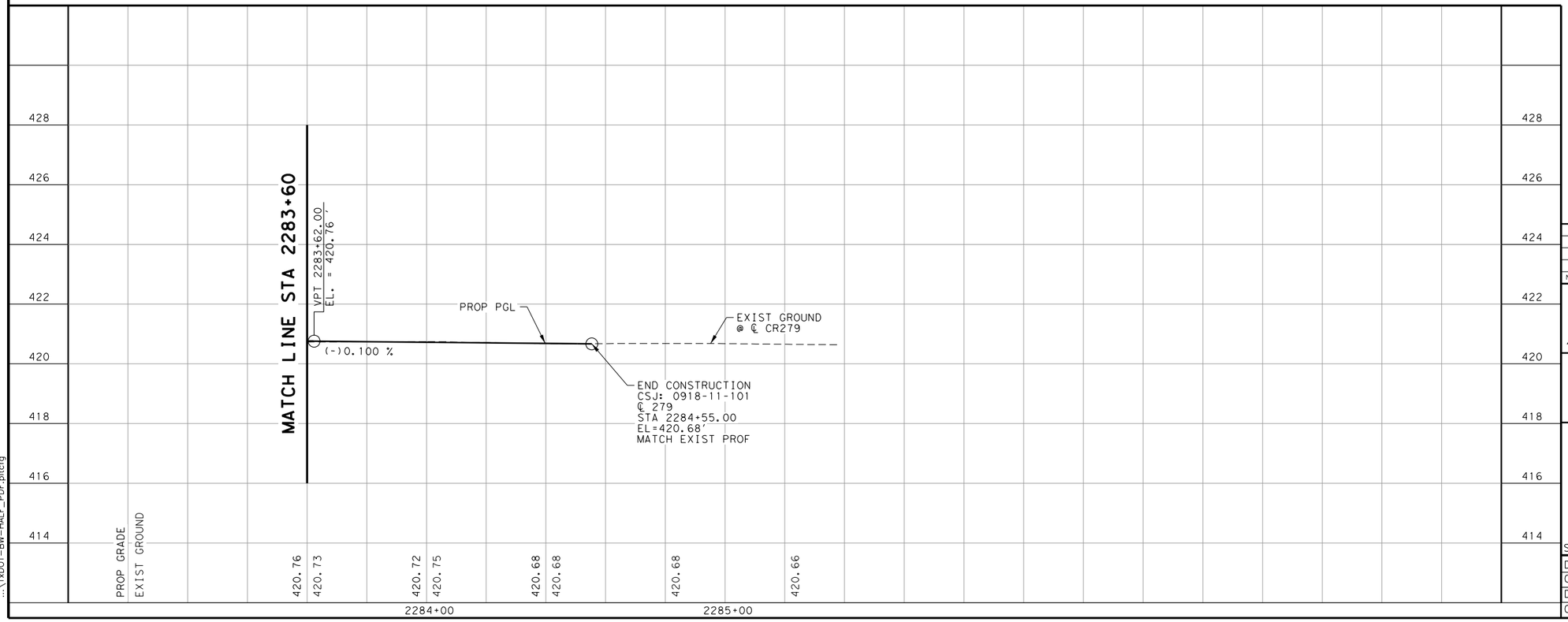


P-CR279-4

PI STATION	= 2284+08.17
DELTA	= 3° 00' 53.66" (RT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 41.58
LENGTH	= 83.14
RADIUS	= 1,580.00
PC STATION	= 2283+66.59
PT STATION	= 2284+49.73

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR HORIZONTAL ALIGNMENT DATA.
2. REFER TO HORIZONTAL & VERTICAL CONTROL SHEETS FOR BENCHMARK INFO.
3. REFER TO BRIDGE LAYOUT FOR BRIDGE DETAILS.



RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
2/16/2023

HORIZ. 0 20 40

VERT. 0 2 4

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

ROADWAY PLAN & PROFILE
CR 279
BACHELOR CREEK RELIEF

SHEET 3 OF 4

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC		43

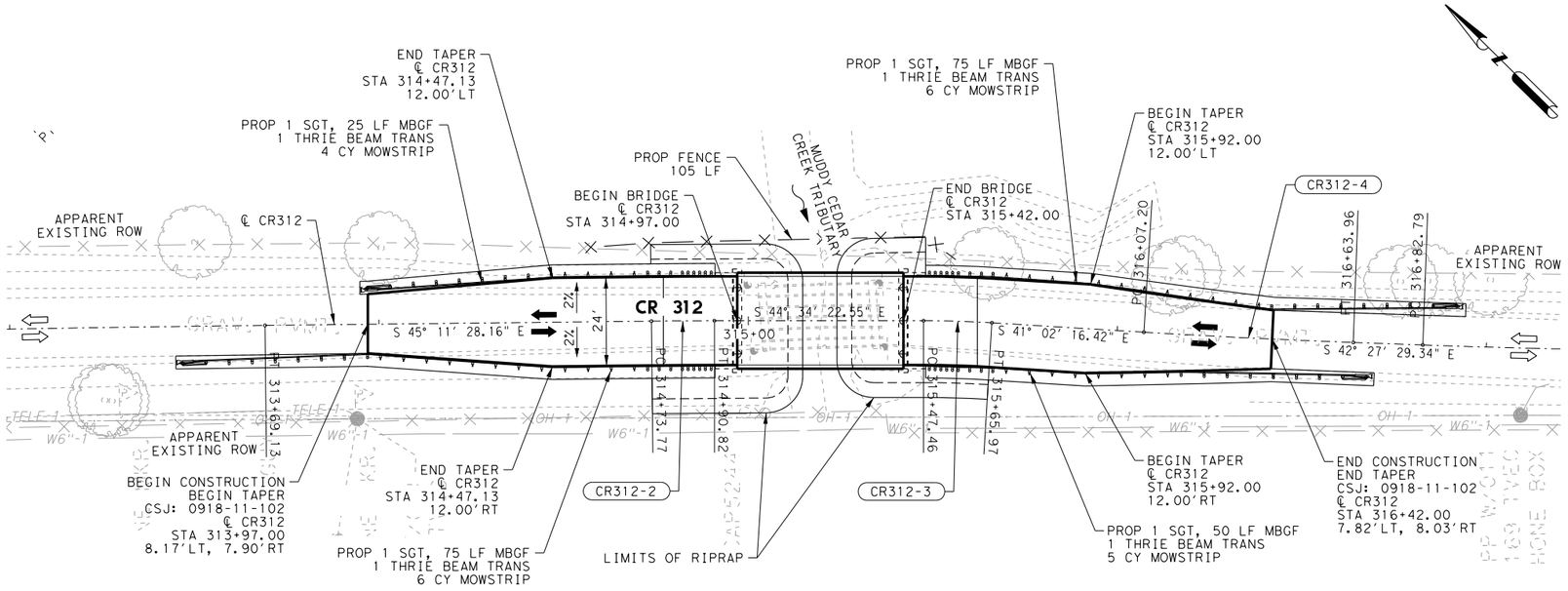
CR279_RDPP_02.dgn

RMorfin
2/16/2023 4:56:58 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR279_RDPP_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

LEGEND

PROP DIRECTION OF TRAFFIC

EXIST DIRECTION OF TRAFFIC



CR312-2

PI STATION	= 314+82.29
DELTA	= 0° 37' 05.61" (RT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 8.52
LENGTH	= 17.05
RADIUS	= 1,580.00
PC STATION	= 314+73.77
PT STATION	= 314+90.82

CR312-3

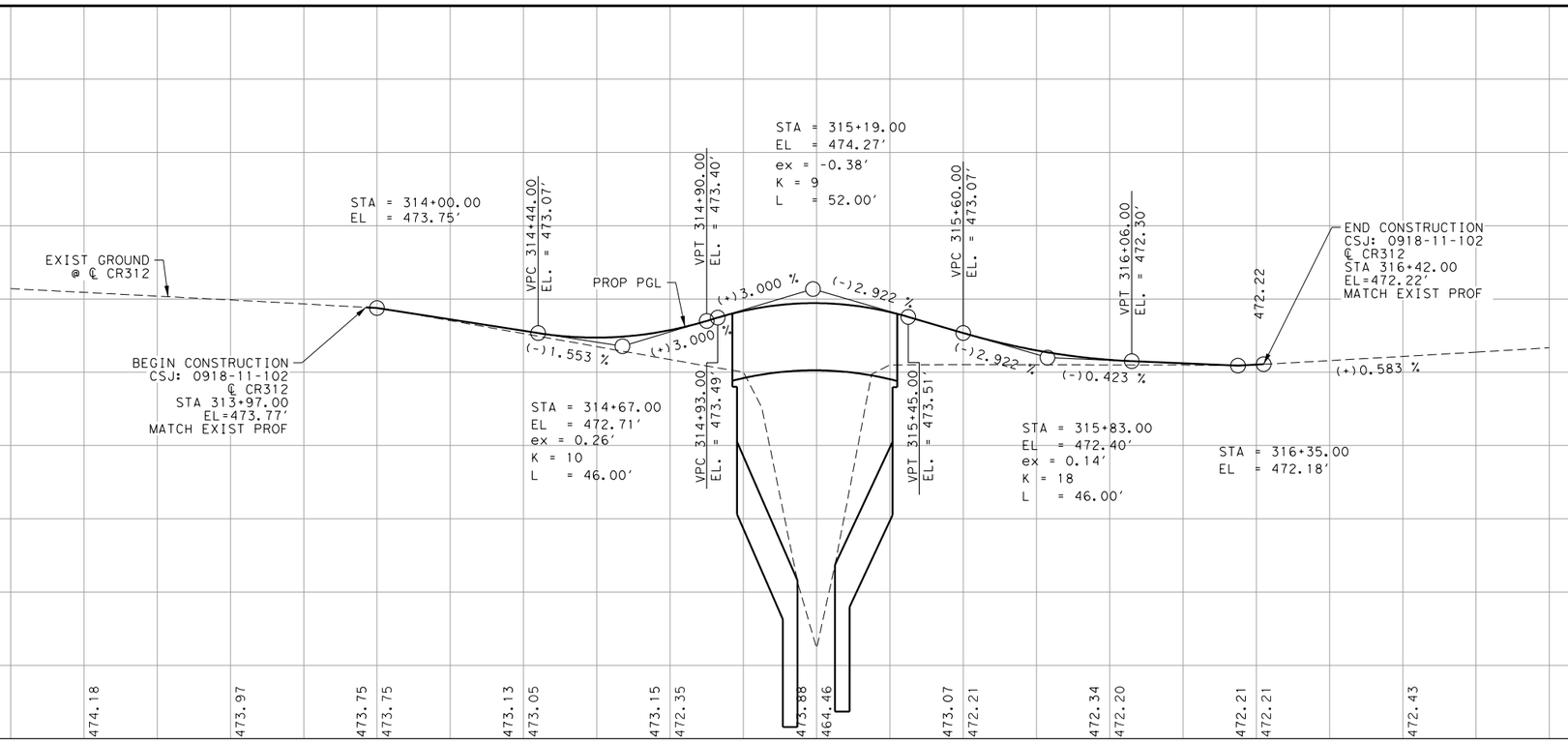
PI STATION	= 315+56.72
DELTA	= 3° 32' 06.12" (RT)
DEGREE OF CURVE	= 19° 05' 54.94"
TANGENT	= 9.26
LENGTH	= 18.51
RADIUS	= 300.00
PC STATION	= 315+47.46
PT STATION	= 315+65.97

CR312-4

PI STATION	= 316+35.58
DELTA	= 1° 25' 12.92" (LT)
DEGREE OF CURVE	= 2° 30' 07.20"
TANGENT	= 28.38
LENGTH	= 56.76
RADIUS	= 2,290.00
PC STATION	= 316+07.20
PT STATION	= 316+63.96

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR HORIZONTAL ALIGNMENT DATA.
2. REFER TO HORIZONTAL & VERTICAL CONTROL SHEETS FOR BENCHMARK INFO.
3. REFER TO BRIDGE LAYOUT FOR BRIDGE DETAILS.



RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/24/2023

HORIZ. 0 20 40

VERT. 0 2 4

NO.	DATE	REVISION	APPROV.
	..		
	..		
	..		
	..		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

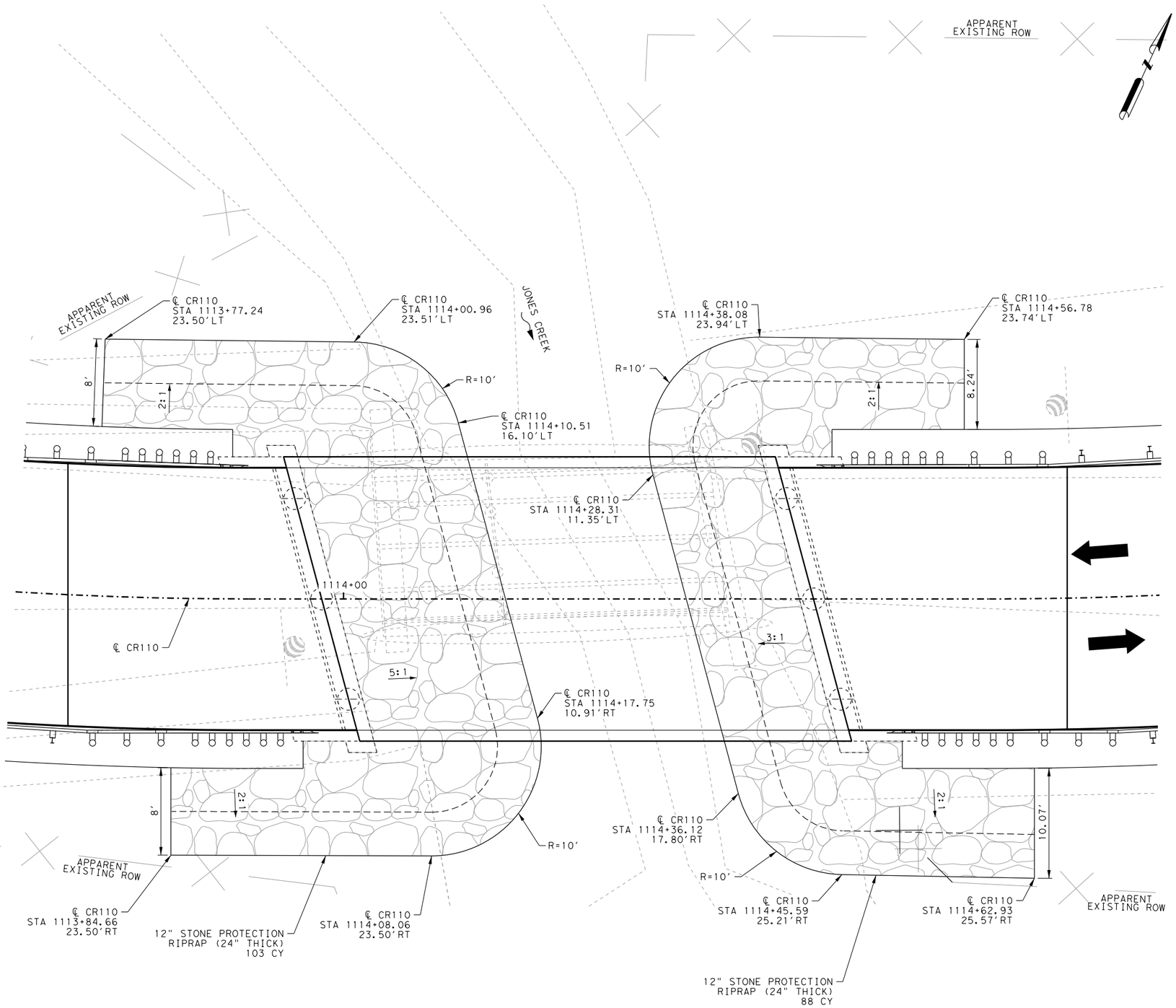
ROADWAY PLAN & PROFILE
CR 312
MUDDY CEDAR CREEK TRIBUTARY

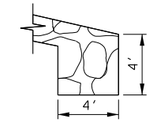
SHEET 4 OF 4

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	44

RChapa
2/24/2023
9:18:45 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR312_RDPP_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

CR312_RDPP_01.dgn





TOE DETAIL
N.T.S.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

0 5 10
SCALE: 1"=10'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

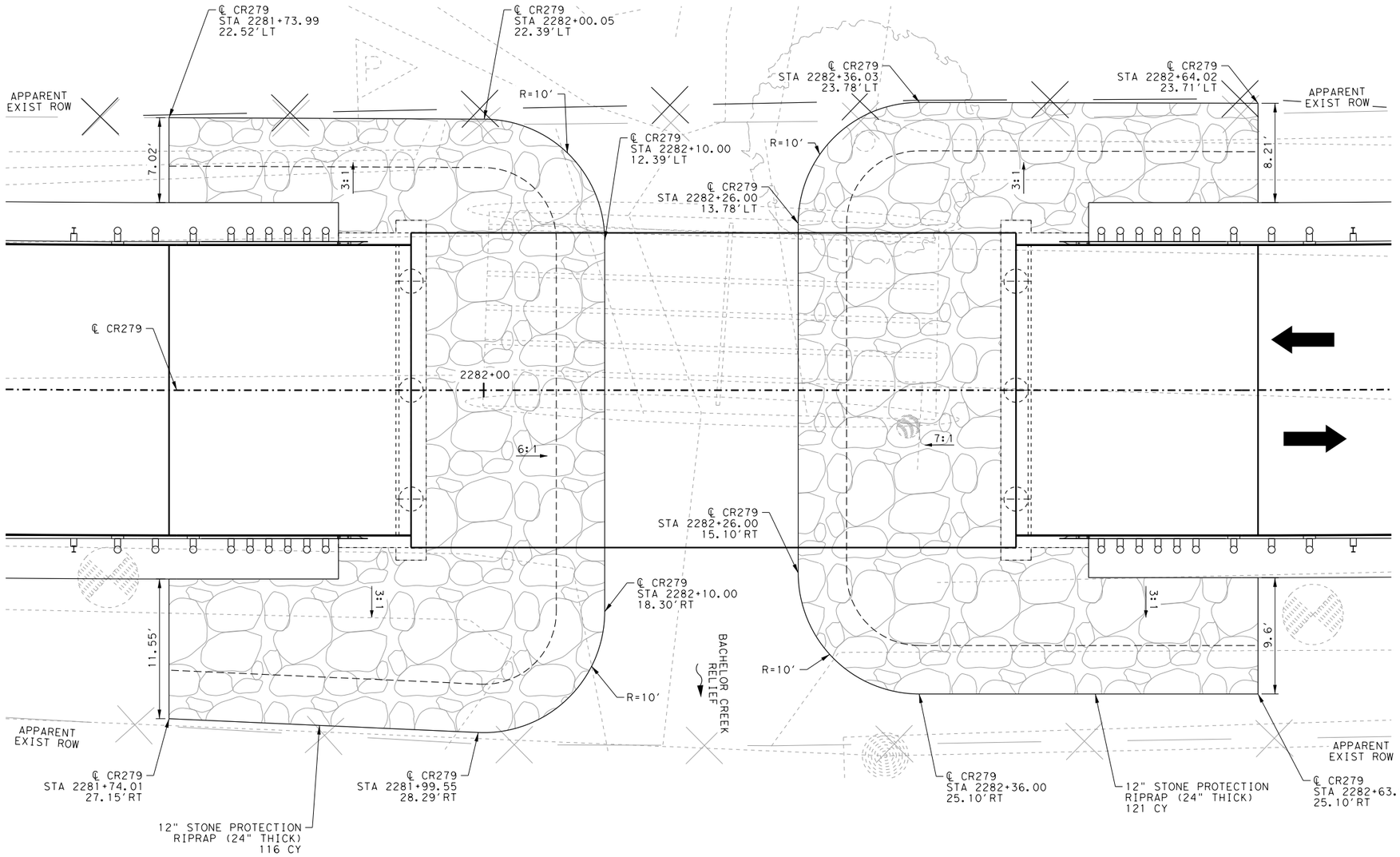
ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

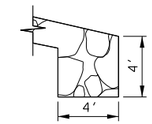
RIPRAP DETAILS
CR 110
JONES CREEK

SHEET 1 OF 3

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	45

RMorfin
2/16/2023 4:56:59 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR110_RDRR_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg





TOE DETAIL
N.T.S.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/24/2023

0 5 10
SCALE: 1"=10'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

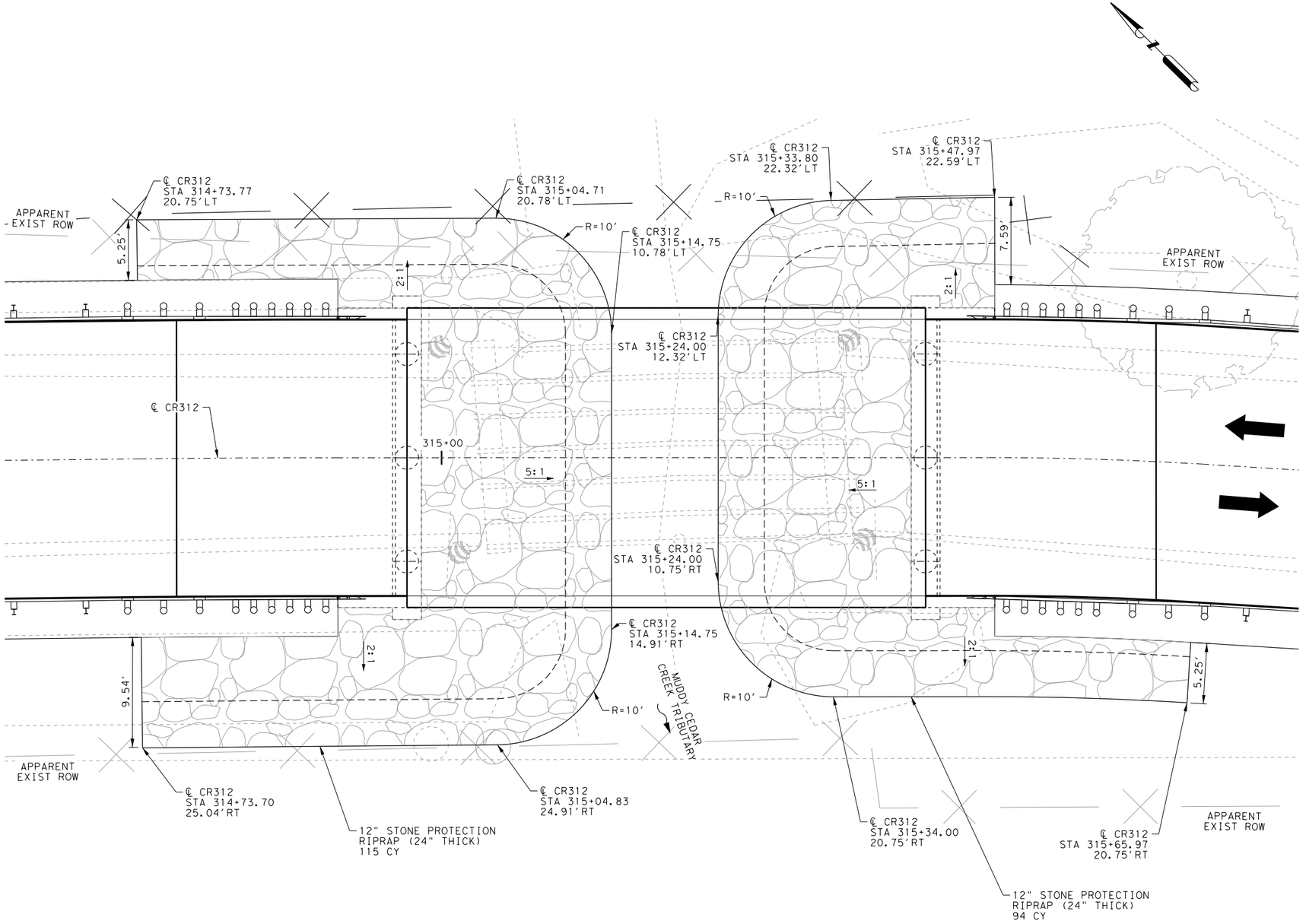
ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

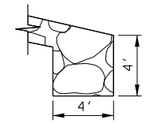
RIPRAP DETAILS
CR 279
BACHELOR CREEK RELIEF

SHEET 2 OF 3

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RM	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
DW:	RM	DAL	KAUFMAN	0918	11	100,ETC	46
CK DW:	RC						

RChapa
2/24/2023 9:18:49 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR279_RDRR_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg





TOE DETAIL
N.T.S.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/24/2023

0 5 10
SCALE: 1"=10'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

RIPRAP DETAILS
CR 312
MUDDY CEDAR CREEK TRIBUTARY

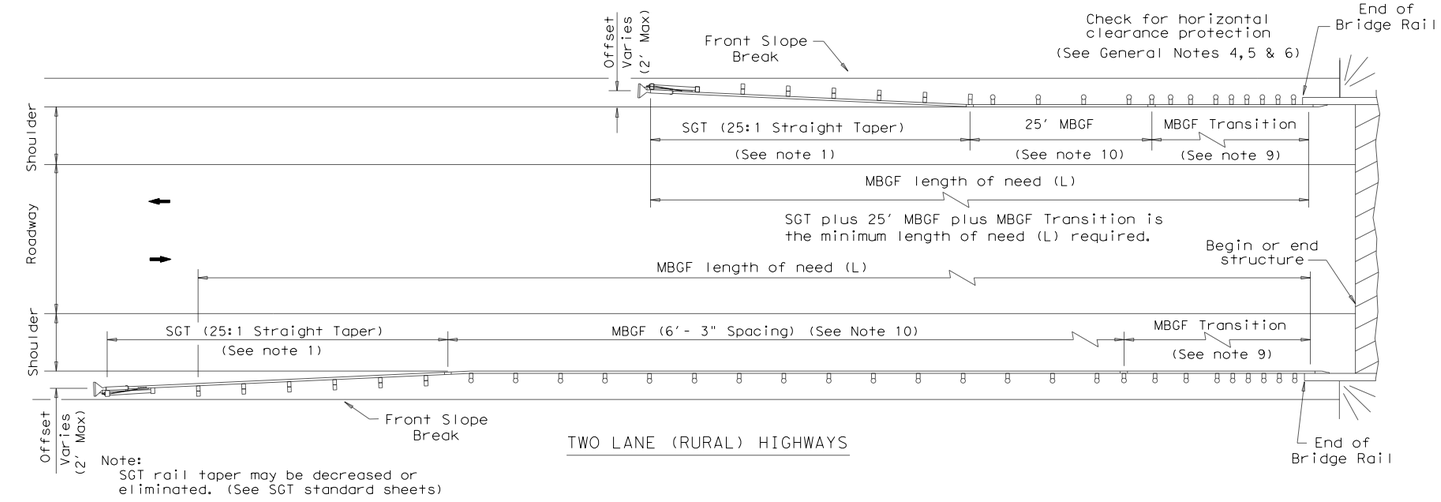
SHEET 3 OF 3

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RM	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	RC						
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	47

CR312_RDRR_01.dgn

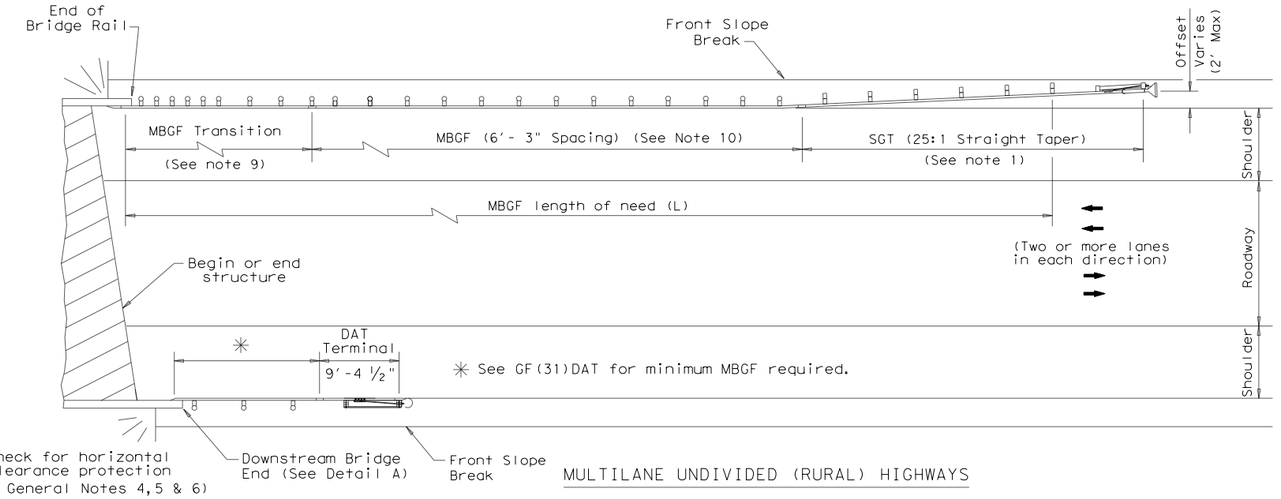
RChapa
2/24/2023 9:18:53 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\CR312_RDRR_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DATE: 2/16/2023 4:57:02 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\bed14.dgn

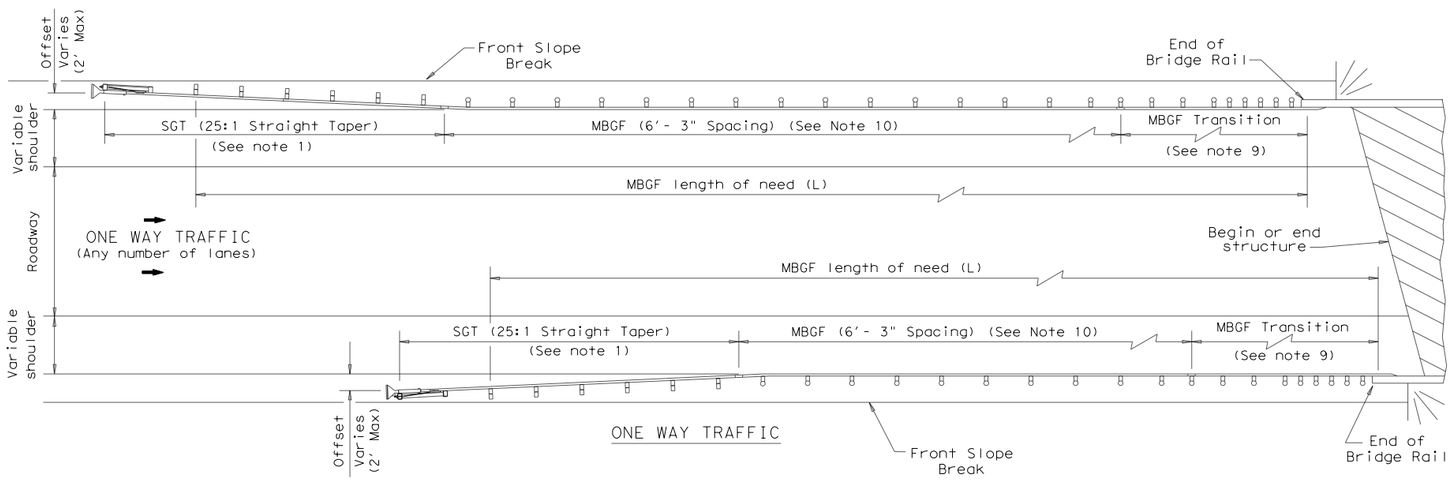


TWO LANE (RURAL) HIGHWAYS

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



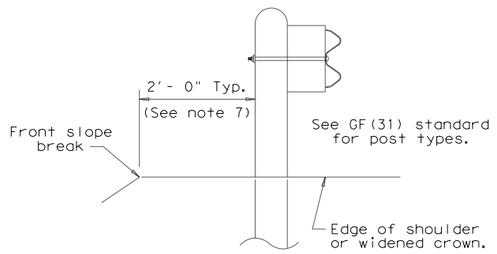
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



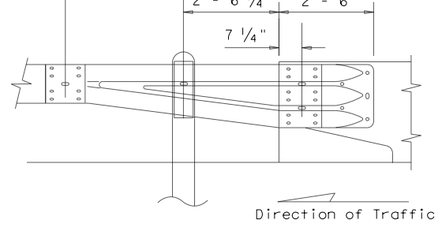
ONE WAY TRAFFIC

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

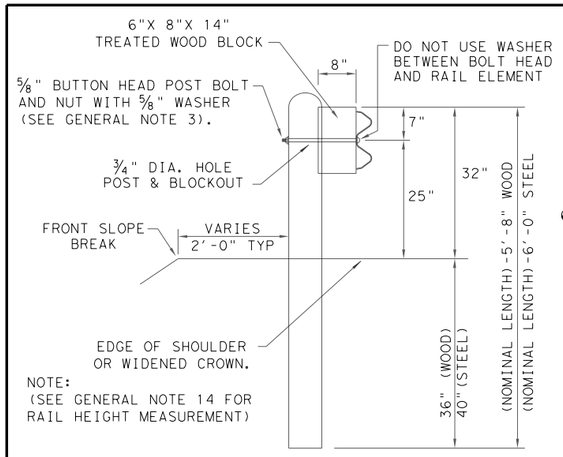
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

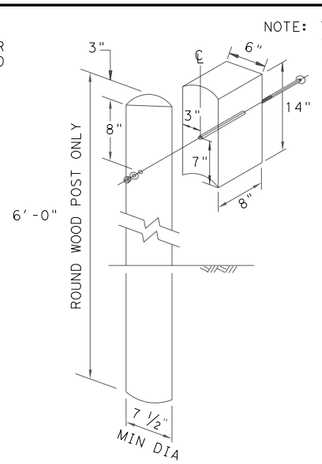
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		48

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\gf3119.dgn

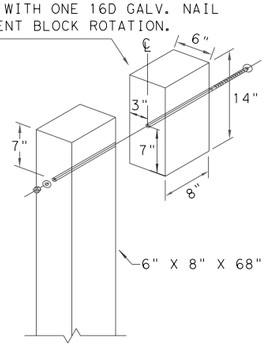


TYPICAL POST PLACEMENT

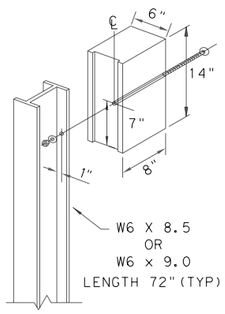


WOOD BLOCK TO
ROUND WOOD POST

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

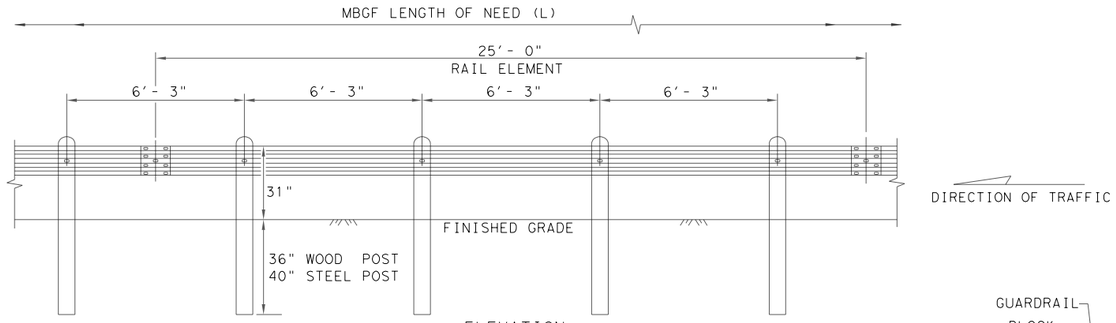


WOOD BLOCK TO
RECTANGULAR WOOD POST



ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

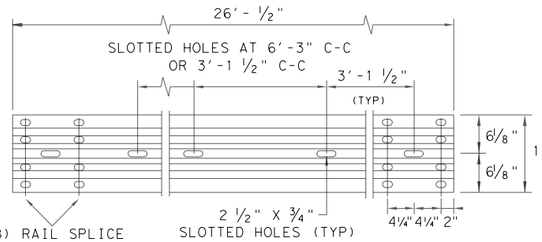
NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



ELEVATION
MID-SPAN RAIL SPLICE

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

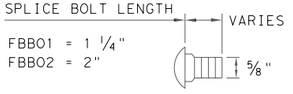
DIRECTION OF TRAFFIC



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

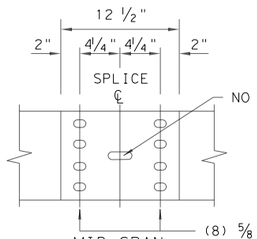
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



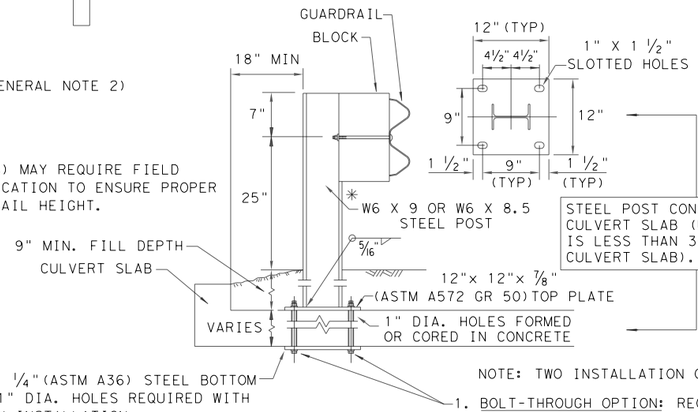
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



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

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.

GENERAL NOTES

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

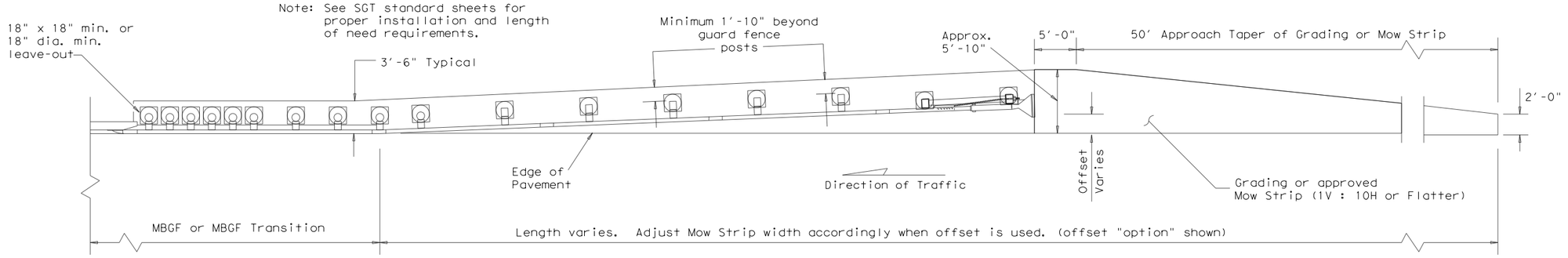
NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

Texas Department of Transportation | Design Division Standard

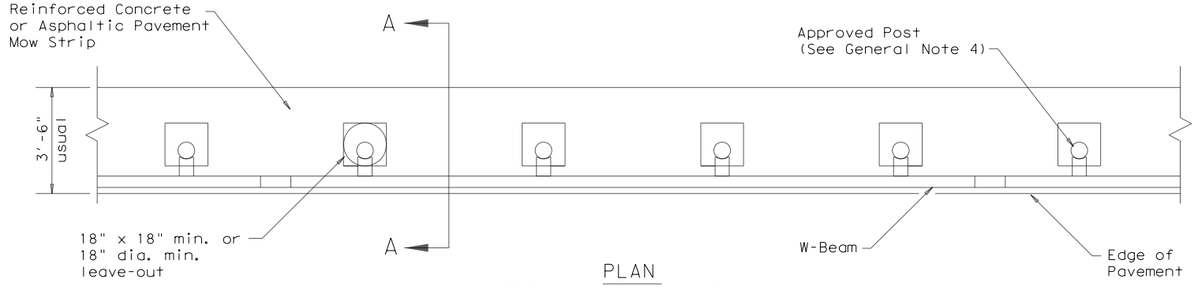
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	11	100,ETC.	CR 110,ETC.	
	DIST	COUNTY		SHEET NO.	
	DAL	KAUFMAN		49	

DATE: 2/16/2023
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\gf31ms19.dgn

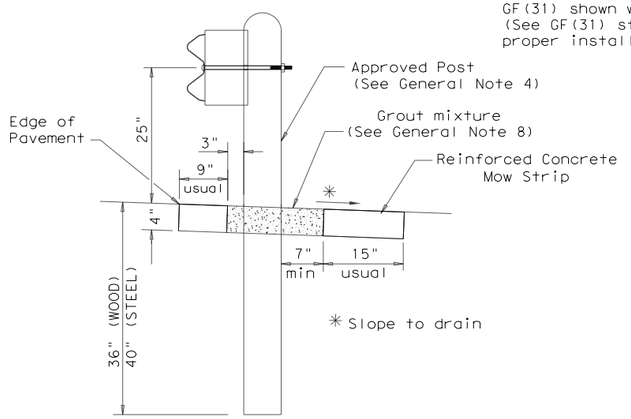


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



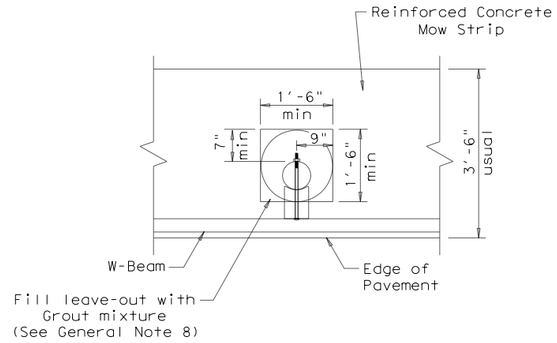
PLAN

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



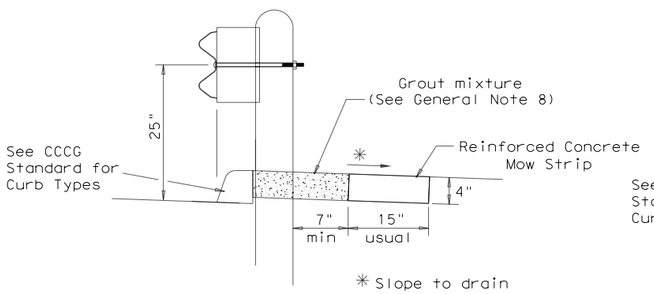
SECTION A-A

Typical



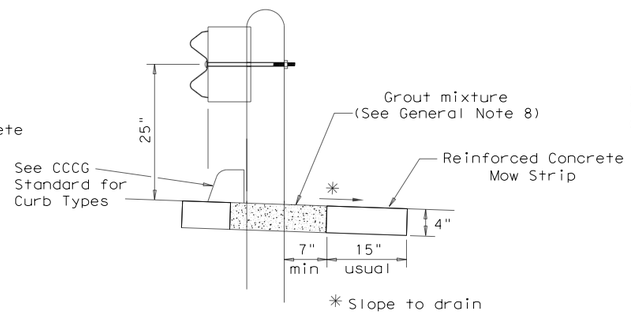
MOW STRIP DETAIL

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



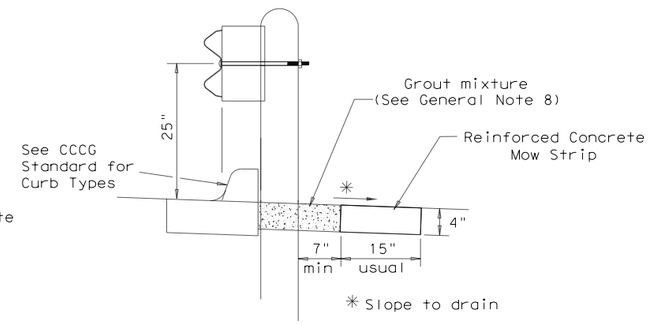
CURB OPTION (1)

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.

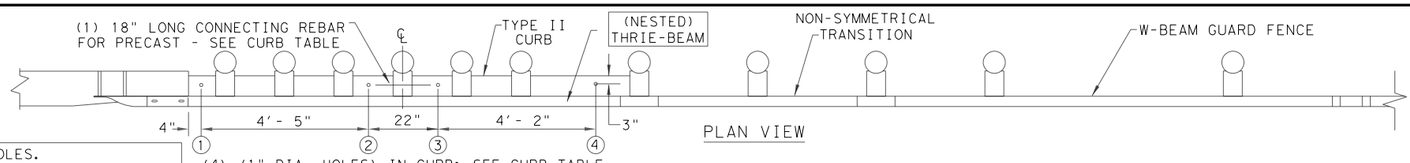
Texas Department of Transportation

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	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		50



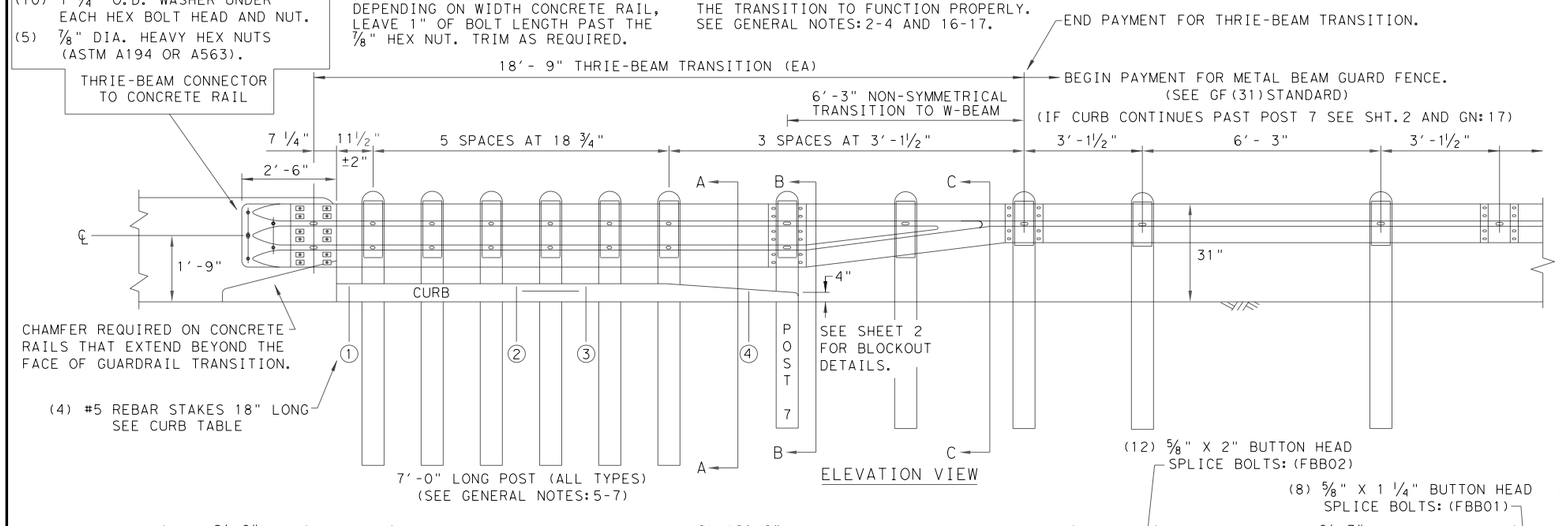
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

DIRECTION OF TRAFFIC

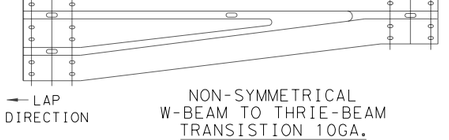


SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

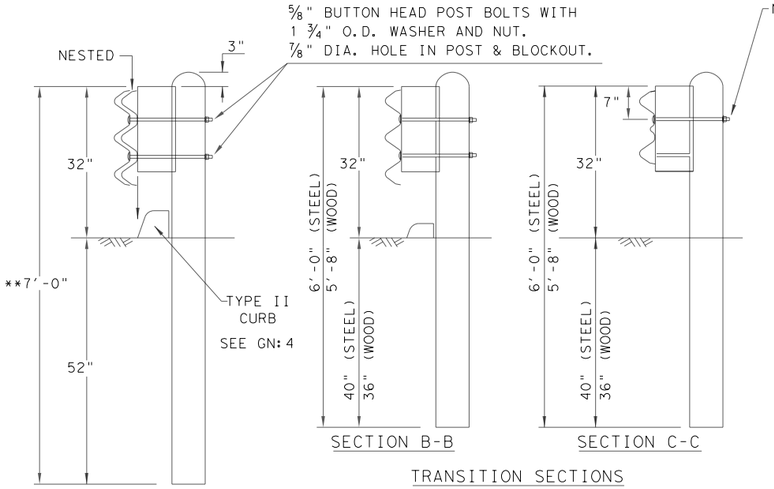
(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)



NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION 10GA.
PART DESIGNATOR RWT02a OR RWT02b

PLATE WASHER INSTRUCTIONS

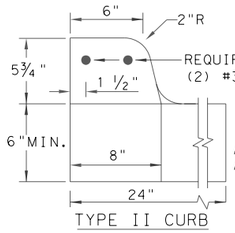
BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



TRANSITION SECTIONS
NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



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

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

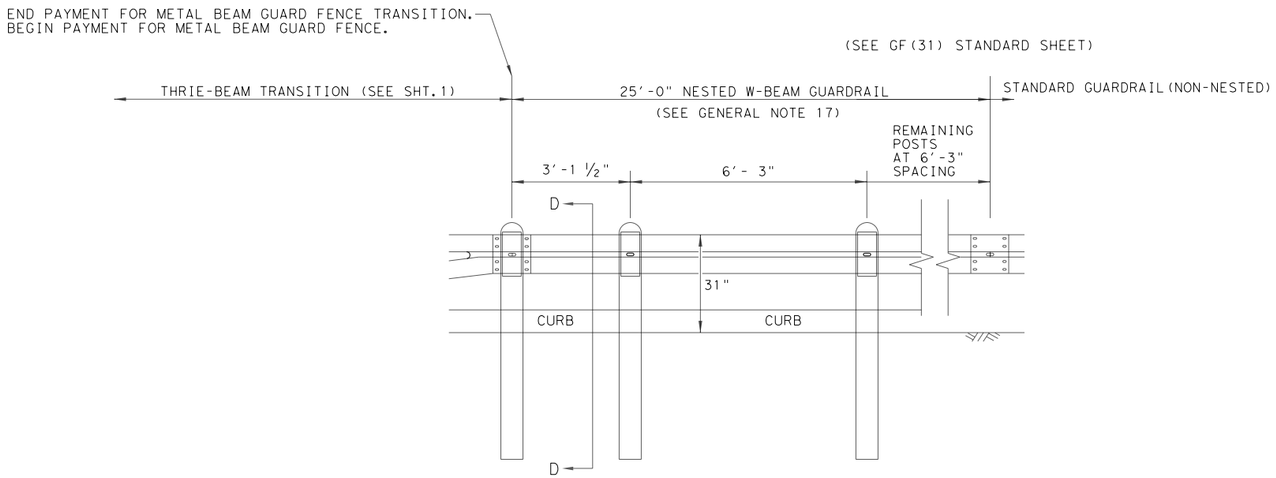
GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	11	100, ETC.	CR 110, ETC.	
	DIST	COUNTY		SHEET NO.	
	DAL	KAUFMAN		51	

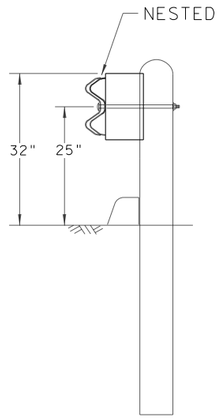
DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAYS\StdDetails\gf31trt1320.dgn

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\gf31trt1320.dgn

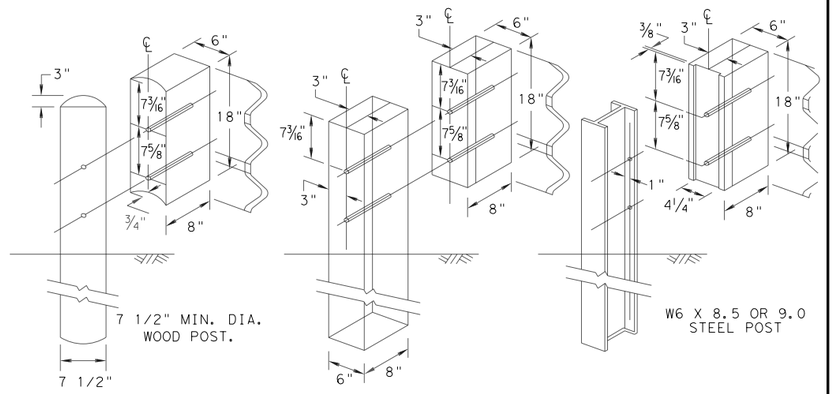
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

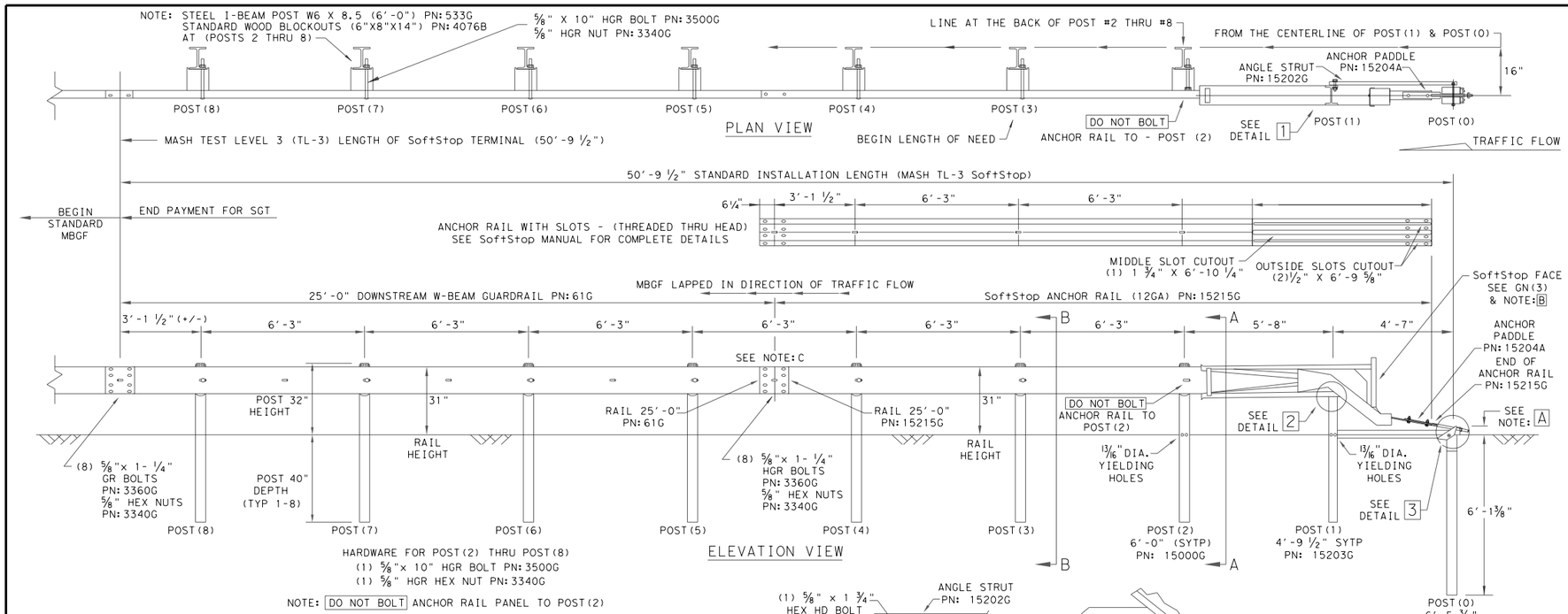
Texas Department of Transportation | Design Division Standard

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	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		52

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\sgt10s3116.dgn



GENERAL NOTES

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

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

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

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

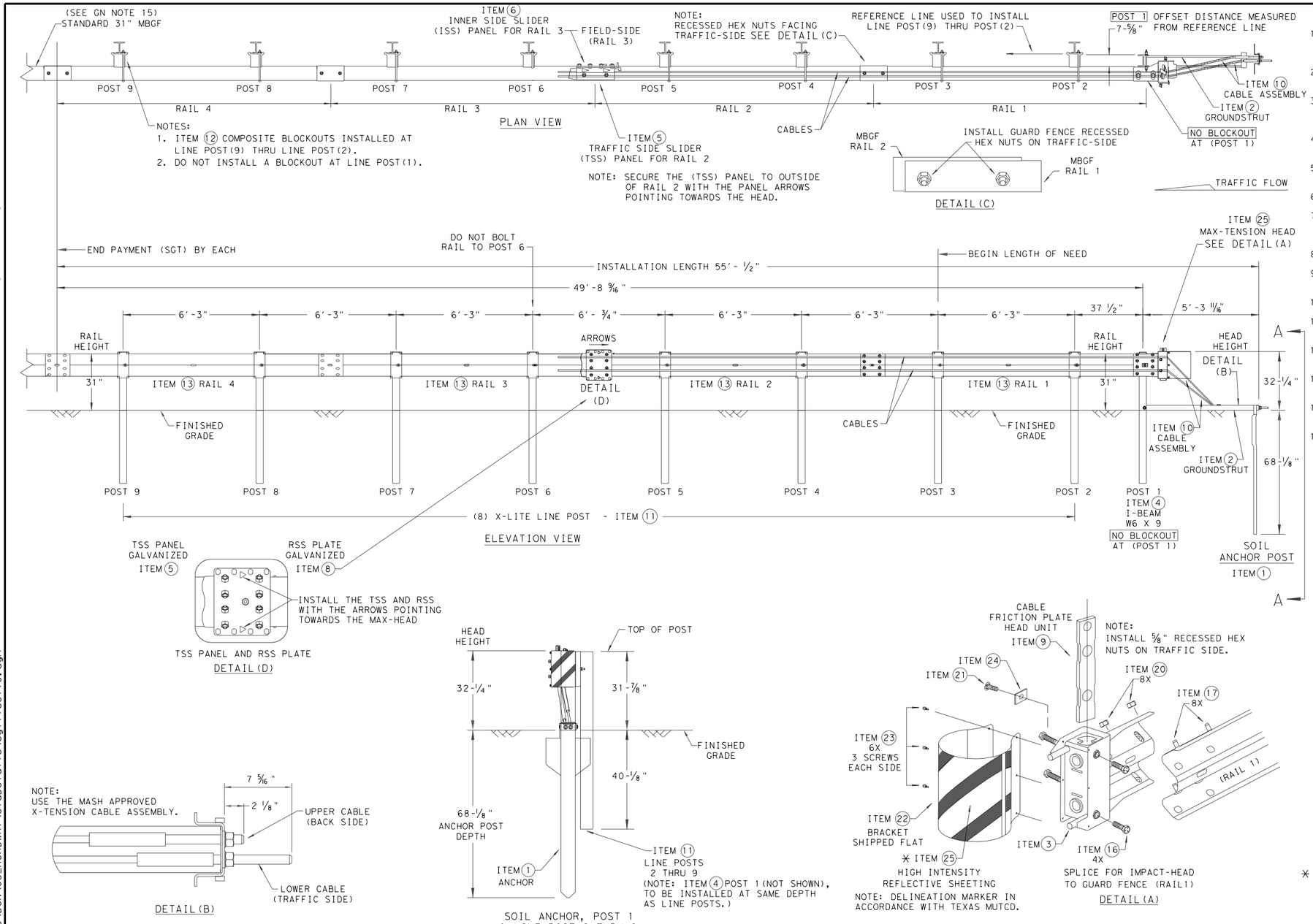
Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0918	11	100, ETC.	CR 110, ETC.		
	DIST	COUNTY		SHEET NO.		
	DAL	KAUFMAN		53		

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\sgt11s3118.dgn



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.

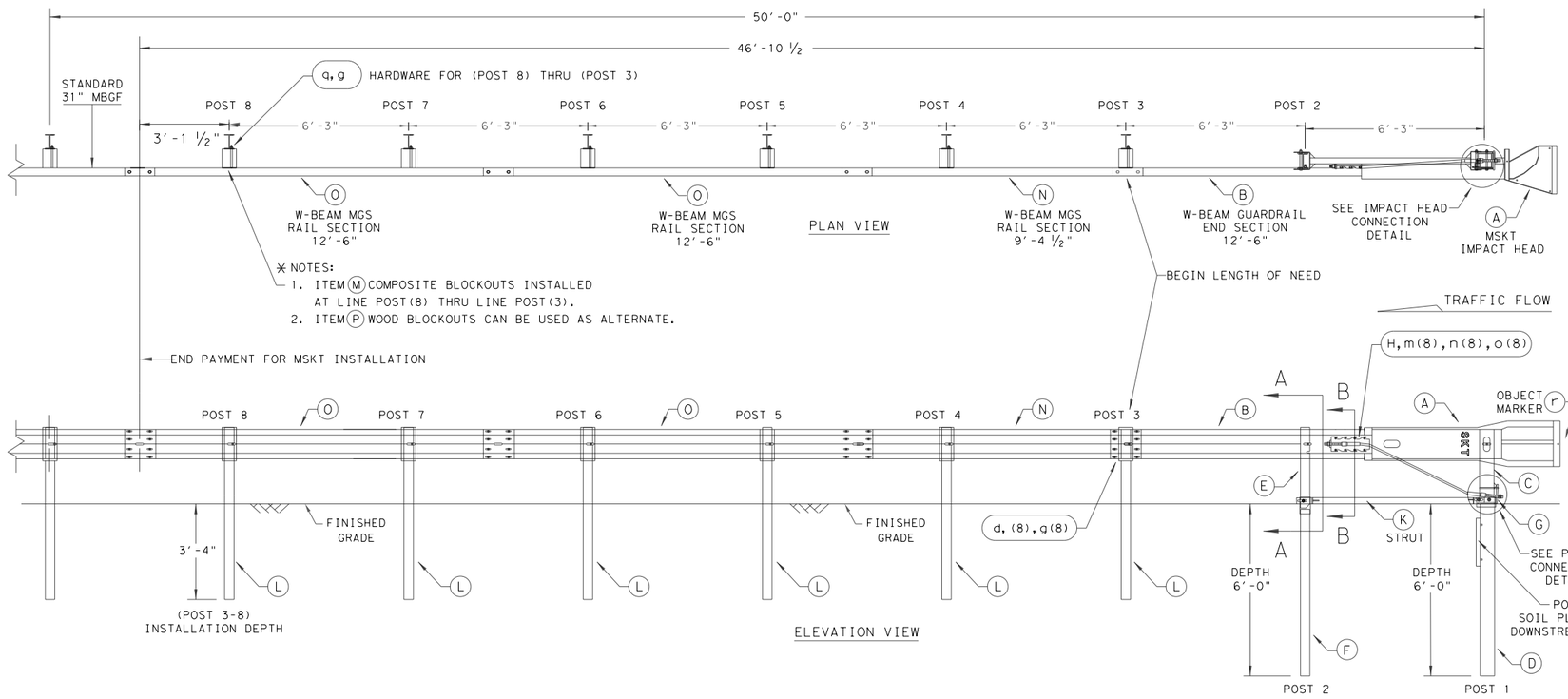
Texas Department of Transportation

Design Division Standard

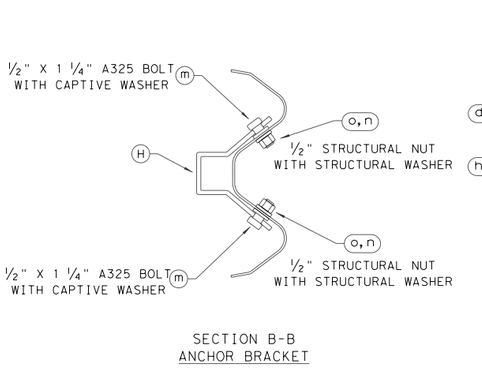
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		54

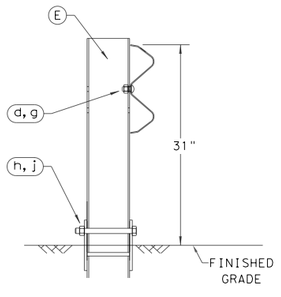
DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\sgt12s3118.dgn



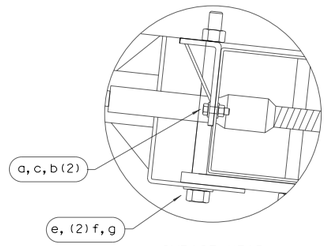
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



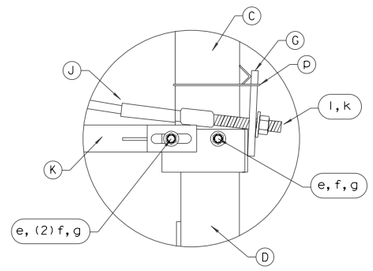
SECTION B-B
ANCHOR BRACKET



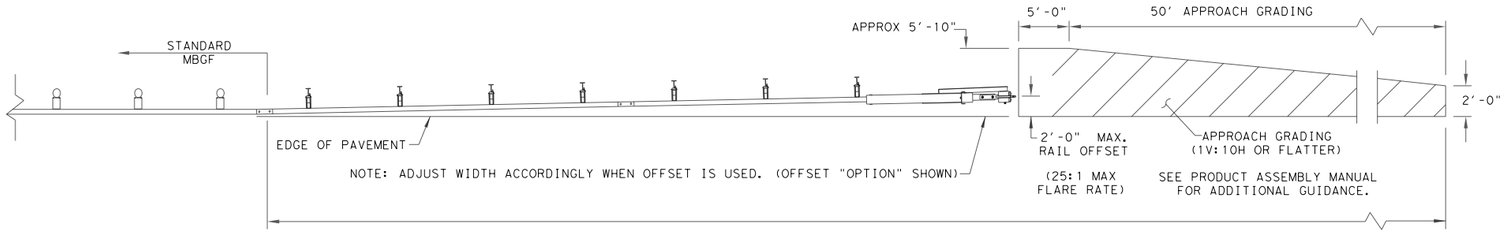
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

Texas Department of Transportation

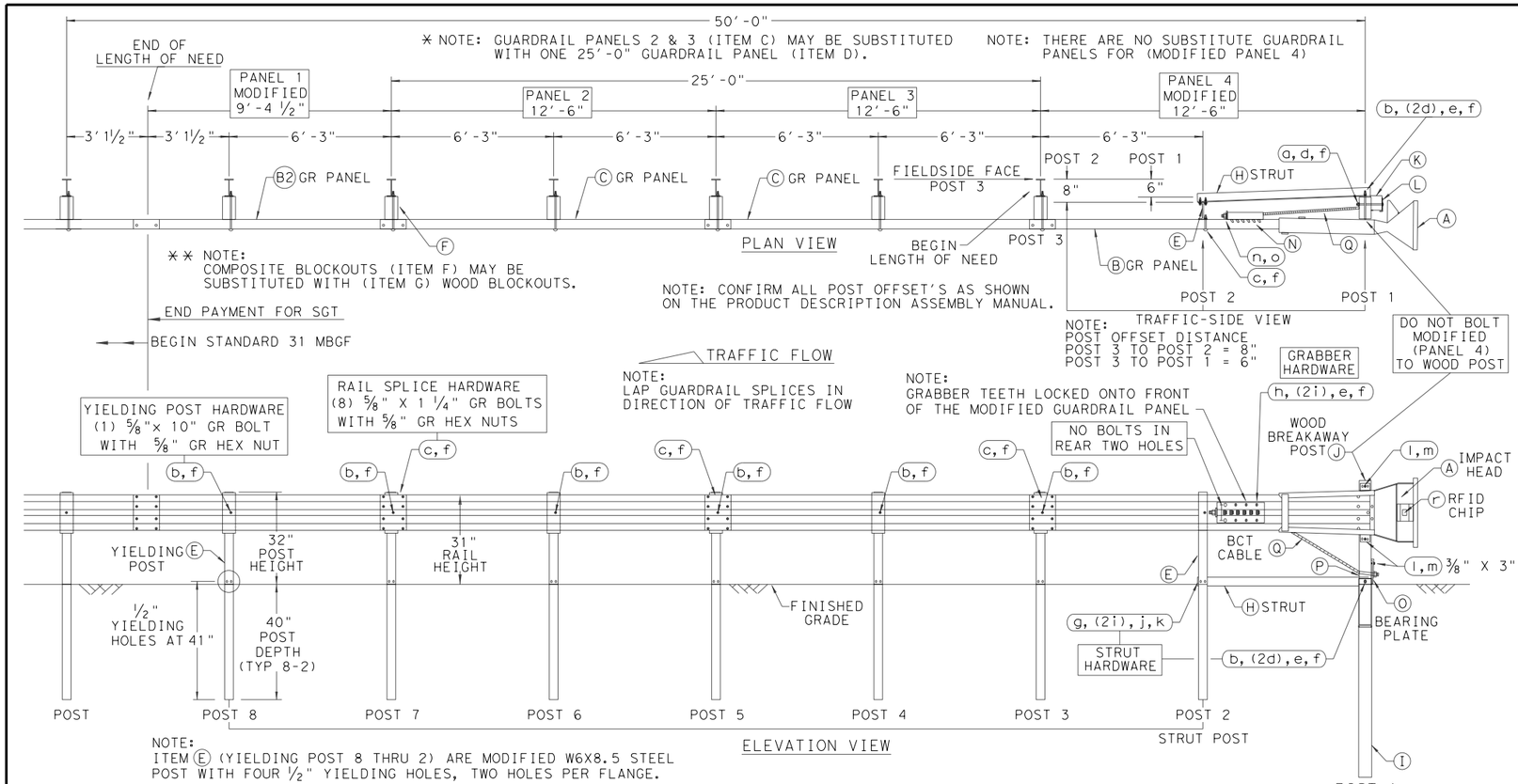
Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	11	100,ETC.	CR 110,ETC.	
	DIST	COUNTY		SHEET NO.	
	DAL	KAUFMAN		55	

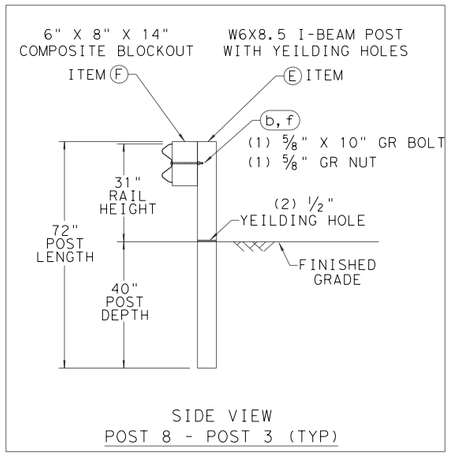


GENERAL NOTES

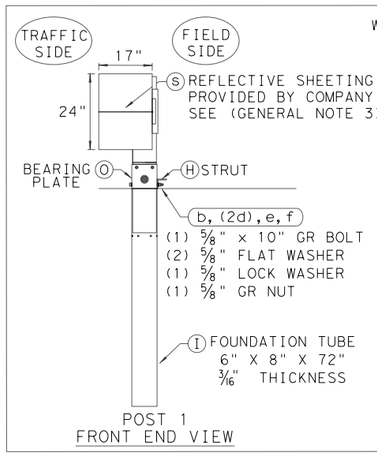
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

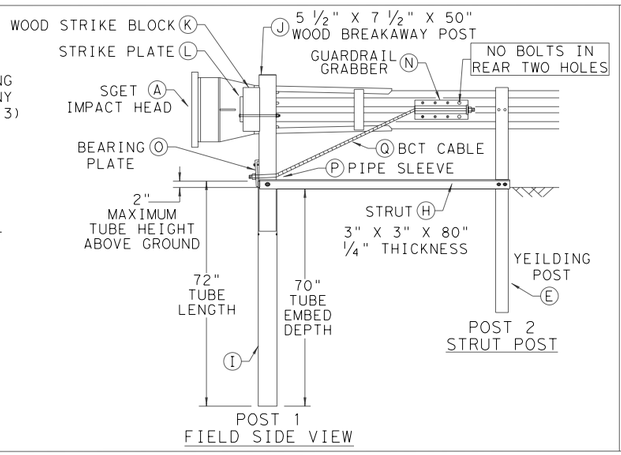
ALTERNATIVE ITEMS NOTE: SEE PLAN VIEW
* D
** G



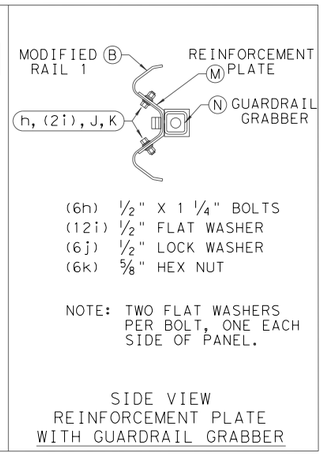
SIDE VIEW
POST 8 - POST 3 (TYP)



POST 1
FRONT END VIEW



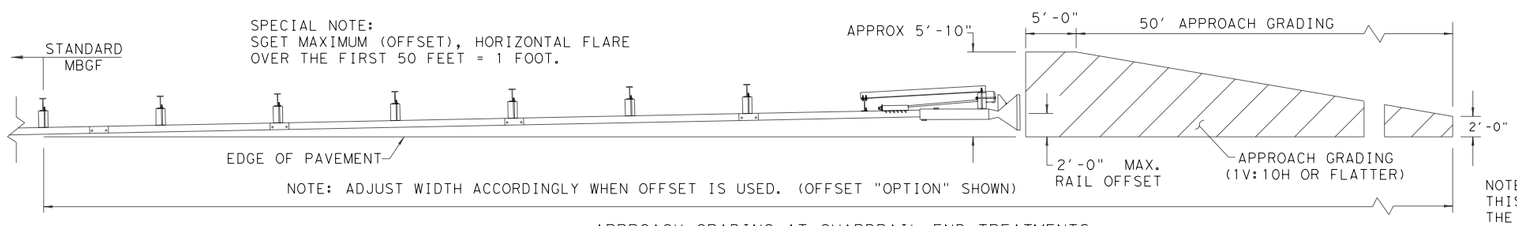
POST 1
FIELD SIDE VIEW



(6h) 1/2" X 1 1/4" BOLTS
(12i) 1/2" FLAT WASHER
(6j) 1/2" LOCK WASHER
(6k) 5/8" HEX NUT

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

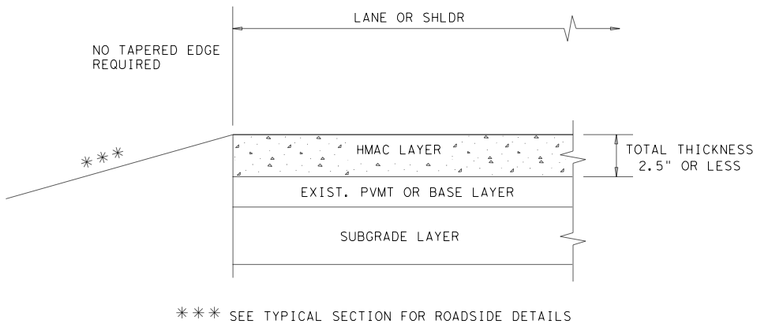
Texas Department of Transportation — Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		56

DATE: 2/16/2023
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\sgt153120.dgn

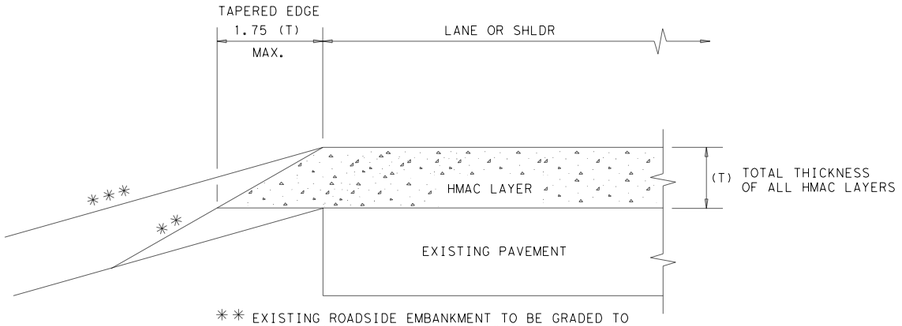
DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\tehmac11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

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

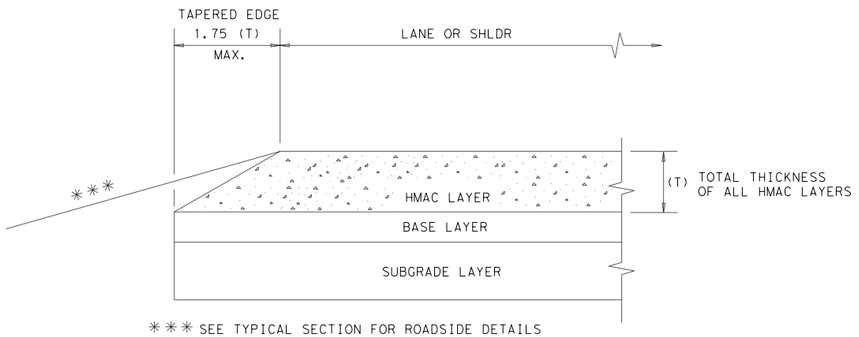


** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2

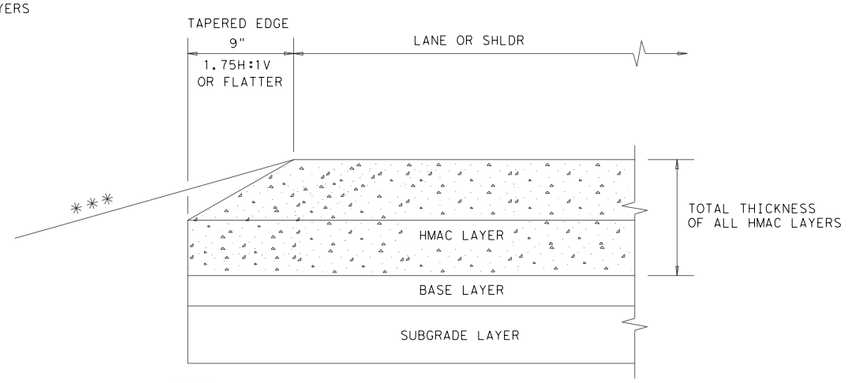
OVERLAY OF EXISTING PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

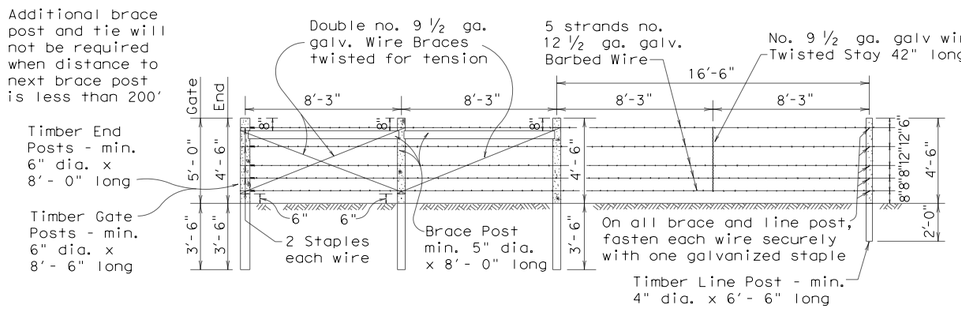
Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

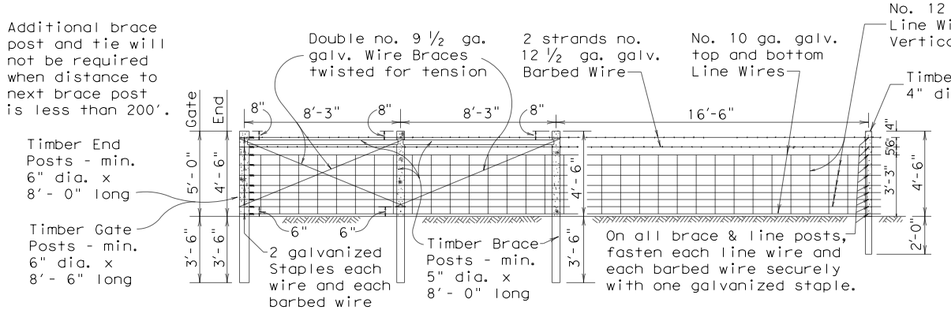
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		57

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\wf110.dgn



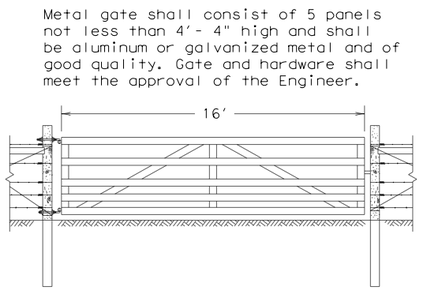
SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "A" FENCE
(See General Note 6)



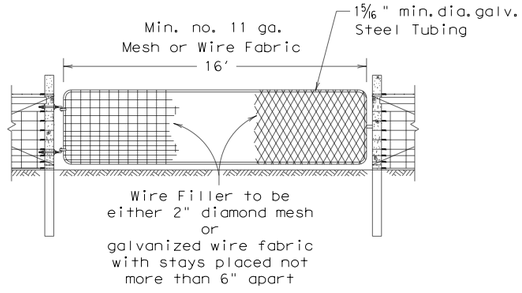
SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "B" FENCE
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

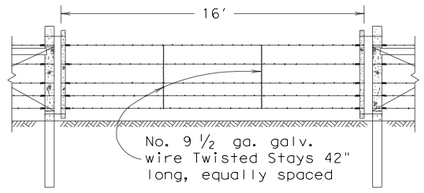
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

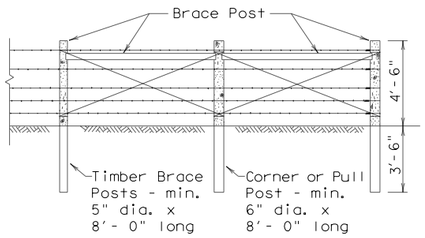


DETAIL TYPE 3 GATE

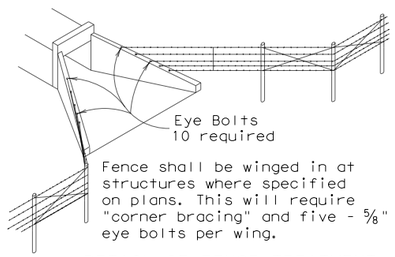
GENERAL NOTES

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

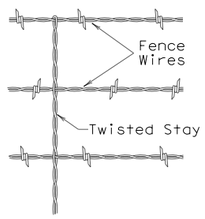
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood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



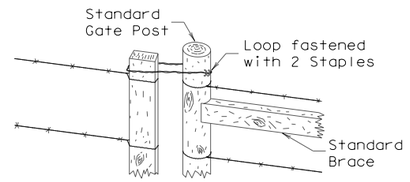
CORNER OR PULL POST ASSEMBLY



DETAIL OF FENCE TREATMENT AT STRUCTURES

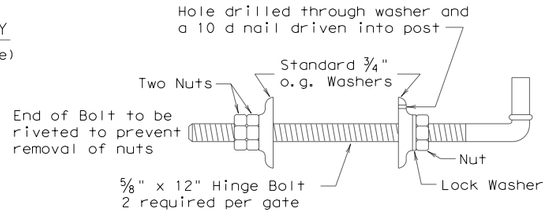


DETAIL OF STAY
(Barbed wire fence)

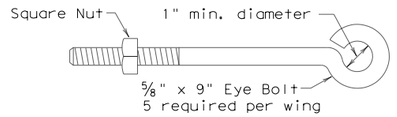


Loop to be made from two strands twisted no. 9 ½ ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

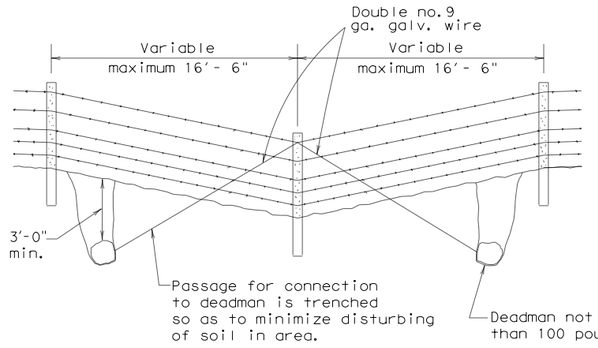
DETAIL FASTENER TYPE 3 GATE



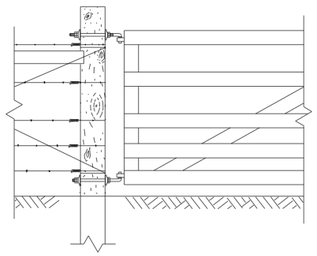
DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF EYE BOLT



DETAIL OF FENCE SAG
(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE

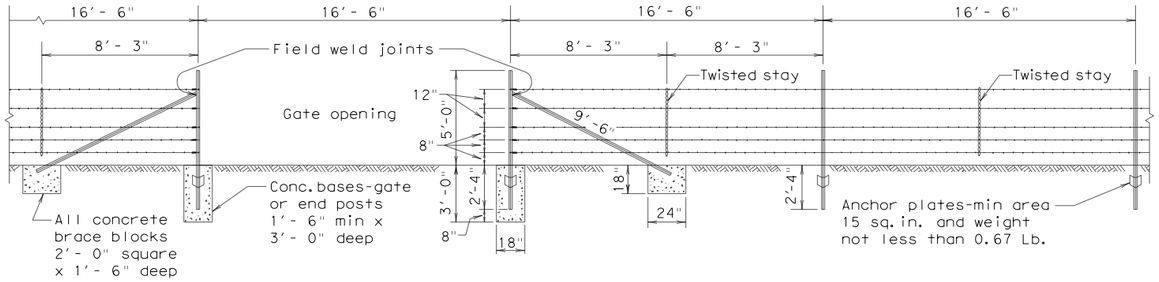
Texas Department of Transportation
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS)

WF(1)-10

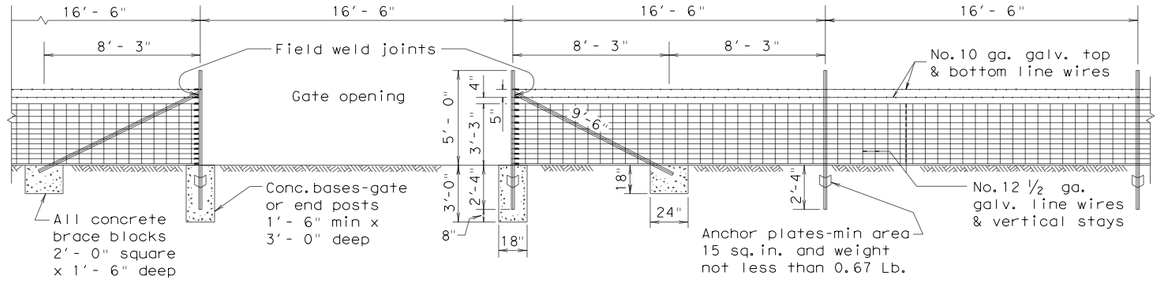
FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		58

DATE: 2/16/2023
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\03_ROADWAY\StdDetails\wf210.dgn

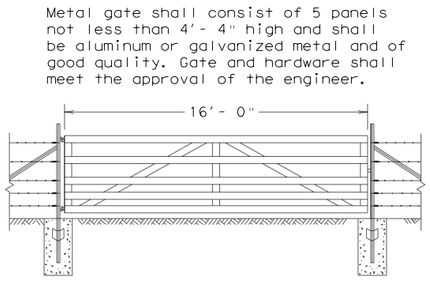


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
(See General Note 8)

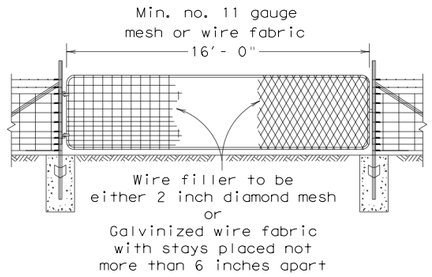
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



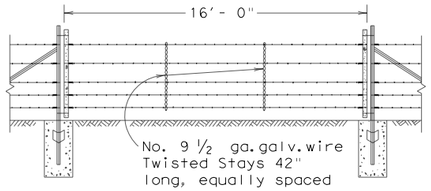
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
(See General Note 8)



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

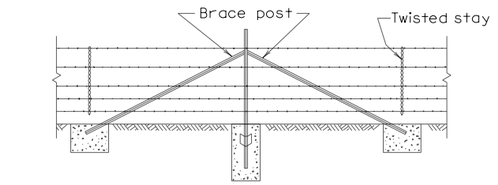


DETAIL TYPE 3 GATE

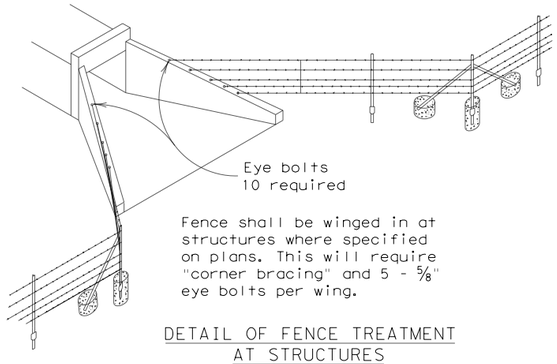
GENERAL NOTES

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.

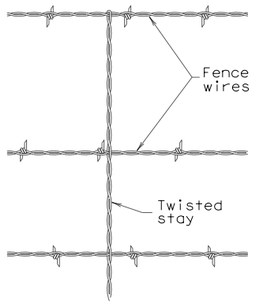
   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.



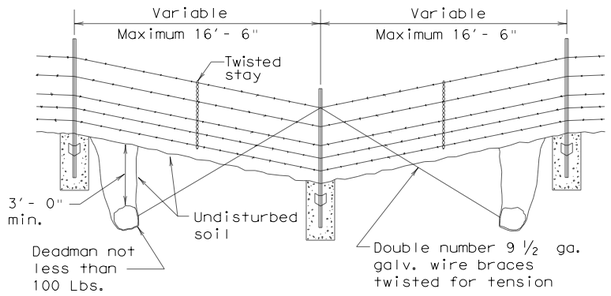
CORNER OR PULL POST ASSEMBLY



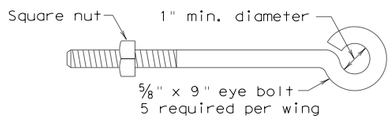
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



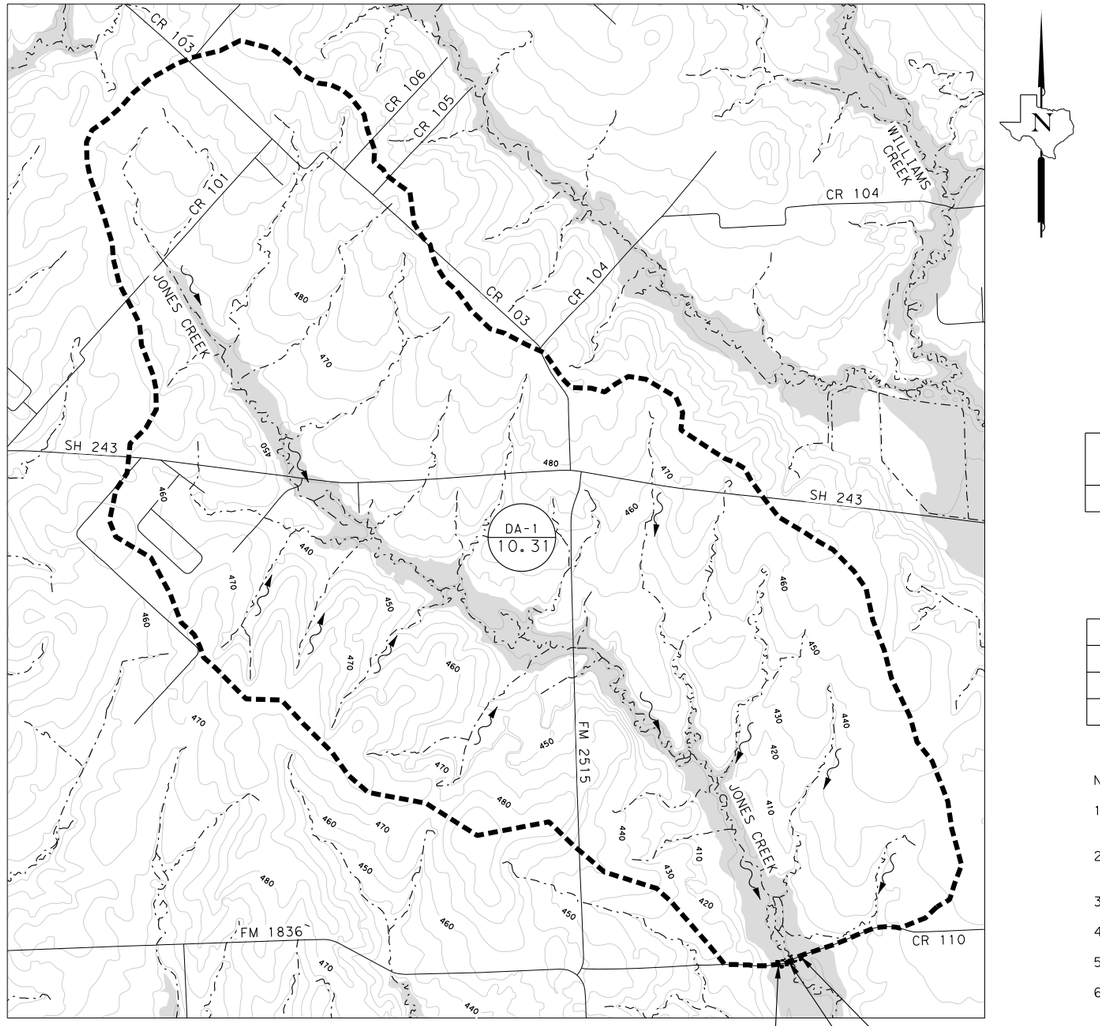
DETAIL OF EYE BOLT

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	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		59



LEGEND

- DRAINAGE AREA BOUNDARY
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE A AREA
- X-X / XX.XX — WATERSHED NAME / AREA (SQ. MI)

DA ID	STREAM NAME	ROADWAY	AREA (SQ. MI)	CURVE NUMBER	TIME OF CONCENTRATION (MIN)	LAG TIME (MIN)
DA 1	JONES CREEK	CR-110	10.31	70	395.6	238

NRCS UNIT HYDROGRAPH METHOD IN HEC-HMS			
PEAK DISCHARGE (CFS)			
2-YR	10-YR	50-YR	100-YR
1,244.5	2,700.4	4,726.0	5,737.4

NOTES:

1. RUNOFF COMPUTATIONS PERFORMED WITH HEC-HMS 4.3 AND VERIFIED BY OMEGA EM REGRESSION EQUATION ANALYSIS.
2. RAINFALL DEPTHS WERE OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) ATLAS 14, VOLUME 11.
3. STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING TEMPORAL DISTRIBUTION.
4. RUNOFF VOLUME WAS COMPUTED USING THE SCS CURVE NUMBER LOSS MODEL.
5. SOURCE OF TOPOGRAPHY DATA: 2013 USGS 10FT DEM AND PROJECT TOPOGRAPHIC SURVEY.
6. TIME OF CONCENTRATION (Tc) WAS COMPUTED USING NRCS METHOD.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wan zhang 2/16/2023

0 2,000 4,000
SCALE: 1"=4,000'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

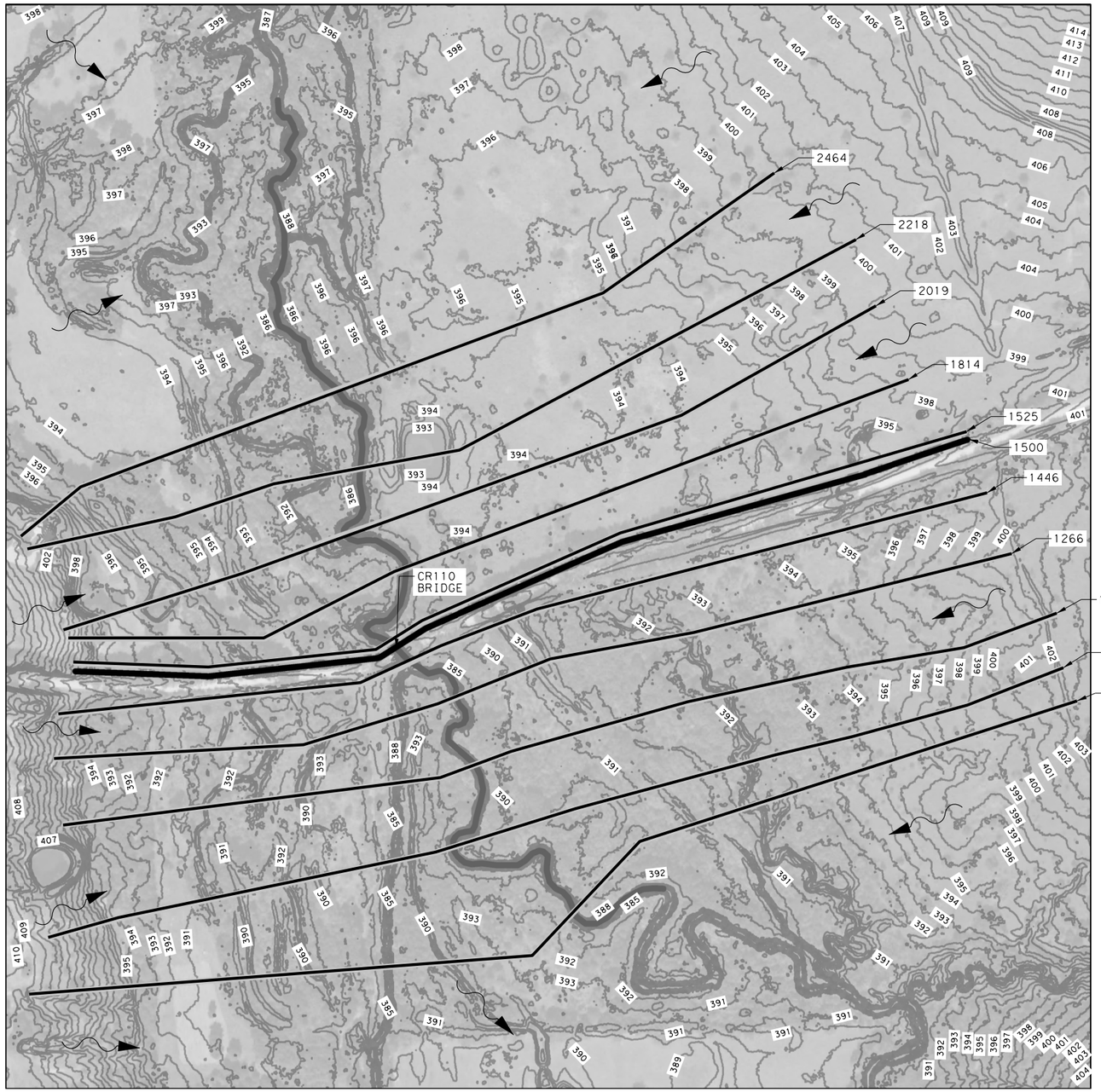
CR 110
DRAINAGE AREA MAP
JONES CREEK

SHEET 1 OF 1

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	DN	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	WZ	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
DW:	DW	DAL	KAUFMAN	0918	11	100,ETC	60
CK DW:	WZ						

CR110_DRAP00_01.dgn

RMorfin
2/16/2023 4:57:16 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR110_DRAP00_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.00205 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0350D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	- -		
	- -		
	- -		
	- -		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 110
HYDRAULIC DATA
JONES CREEK

SHEET 1 OF 4

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	61

HYDRAULIC MODEL RESULTS

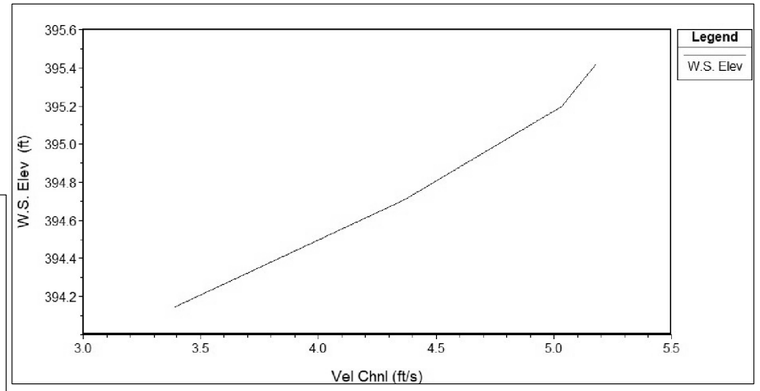
HEC-RAS RESULTS FOR CR-110 BRIDGE (MULTIPLE OPENING) AT JONES CREEK														
HEC-RAS STATION	2-YEAR FLOW (CFS)		2-YEAR WSEL (FT)			2-YEAR VELOCITY (FT/S)		100-YEAR FLOW (CFS)		100-YEAR WSEL (FT)			100-YEAR VELOCITY (FT/S)	
	EXISTING	PROPOSED	EXISTING	PROPOSED	DIFF.	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	DIFF.	EXISTING	PROPOSED
2464	1245	1245	395.20	395.19	-0.01	3.36	3.36	5737	5737	396.86	396.86	0.00	4.81	4.81
2218	1245	1245	394.76	394.75	-0.01	4.59	4.64	5737	5737	396.45	396.45	0.00	4.32	4.31
2019	1245	1245	394.67	394.66	-0.01	2.24	2.26	5737	5737	396.21	396.22	0.01	3.53	3.52
1814	1245	1245	394.51	394.49	-0.02	2.91	2.94	5737	5737	395.98	395.99	0.01	3.89	3.87
1525 (U/S ROW)	1245	1245	394.19	394.15	-0.04	3.25	3.39	5737	5737	395.39	395.42	0.03	5.28	5.18
1500	CR-110 BRIDGE (MULTIPLE OPENING) AT JONES CREEK													
1446 (U/S ROW)	1245	1245	393.67	393.67	0.00	4.73	4.73	5737	5737	395.06	395.06	0.00	4.81	4.81
1266	1245	1245	393.20	393.20	0.00	4.09	4.09	5737	5737	394.61	394.60	-0.01	4.64	4.64
1013	1245	1245	392.59	392.59	0.00	3.93	3.93	5737	5737	394.11	394.11	0.00	3.73	3.74
750	1245	1245	392.07	392.07	0.00	3.58	3.58	5737	5737	393.67	393.67	0.00	3.93	3.94
282	1245	1245	391.16	391.16	0.00	3.82	3.82	5737	5737	392.81	392.81	0.00	4.00	4.00

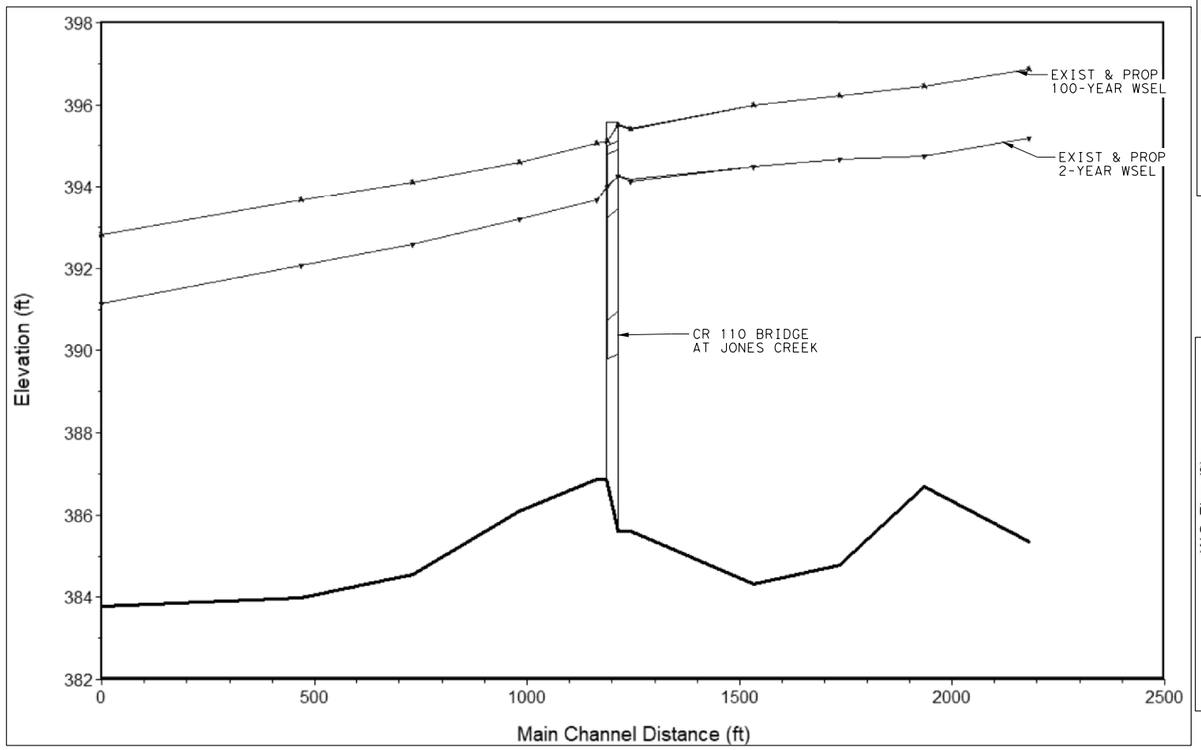
NOTES:

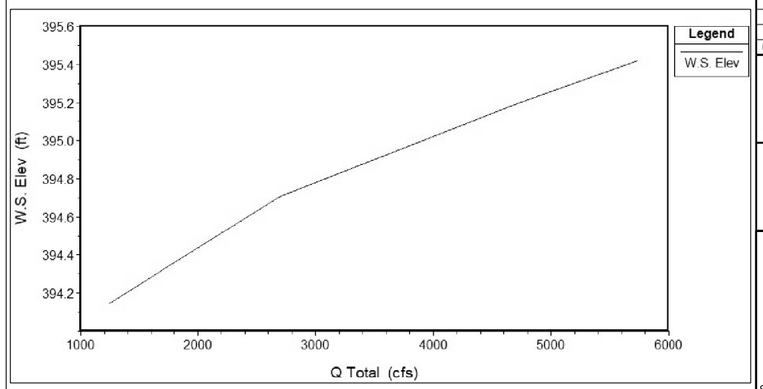
1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.00205 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0350D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

HYDRAULIC DATA JONES CREEK BRIDGE

Q2 = 812 CFS V2 = 3.39 FPS HW2 = 394.15'
Q100 = 1125 CFS V100 = 5.18 FPS HW100 = 395.42'







STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wan zhang 2/16/2023

NO.	DATE	REVISION	APPROV.
--			
--			
--			
--			

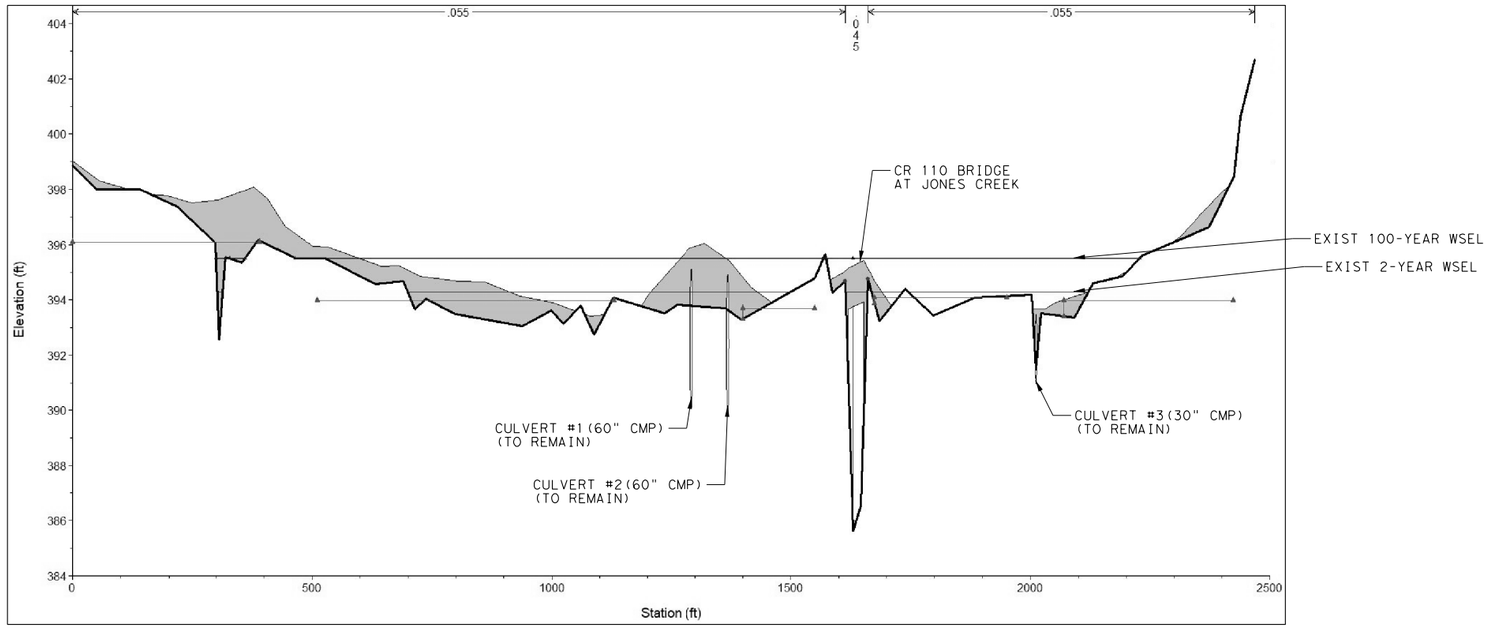
Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 110
HYDRAULIC DATA
JONES CREEK

SHEET 2 OF 4

DN: DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	62



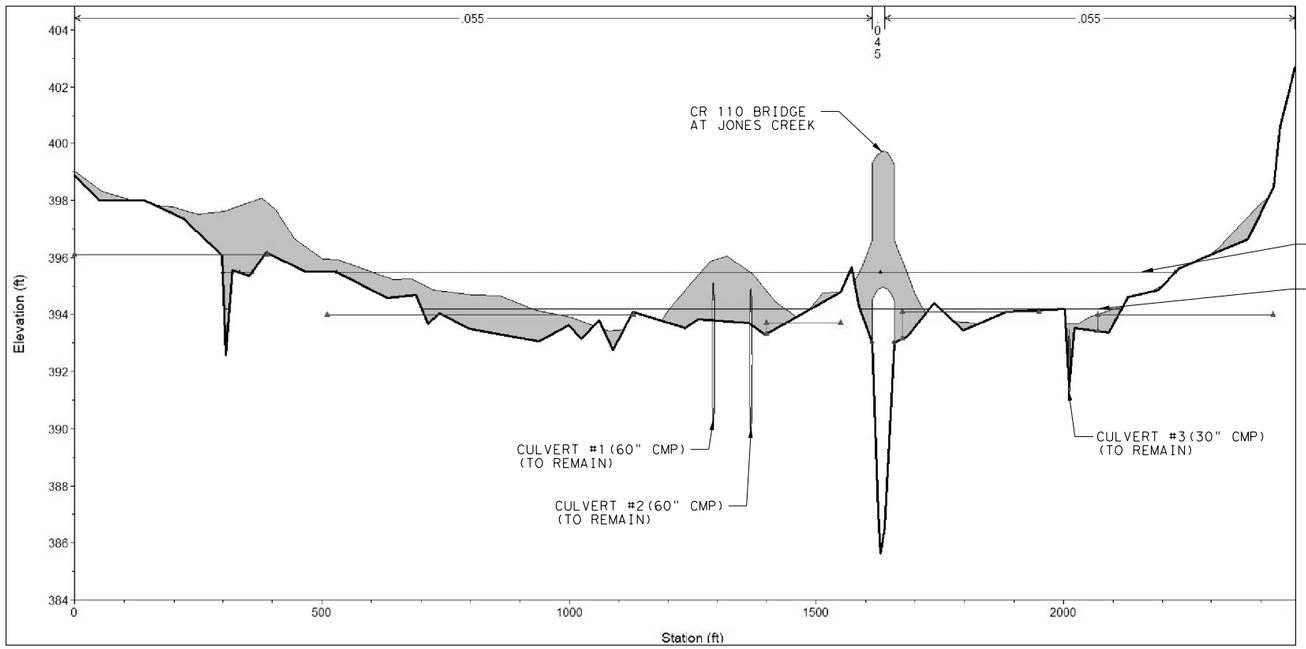
EXISTING CR 110 BRIDGE AT JONES CREEK

NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.00205 FT/FT.
4. MULTIPLE OPENING ANALYSIS WAS CONDUCTED FOR THE HYDRAULICS.
5. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0350D EFFECTIVE JULY 3, 2012.
6. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
7. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

HYDRAULIC DATA JONES CREEK BRIDGE

Q2 = 812 CFS	V2 = 3.39 FPS	HW2 = 394.15′
Q100 = 1125 CFS	V100 = 5.18 FPS	HW100 = 395.42′



PROPOSED CR 110 BRIDGE AT JONES CREEK

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 110
HYDRAULIC DATA
JONES CREEK

SHEET 3 OF 4

DN:	DN	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	WZ	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	WZ	DAL	KAUFMAN	0918	11	100,ETC		63

CR-110																	
Plan: PR Open#1:	River 1 Culvert #1	Reach 1 Profile:	RS: 1500 2-year		Plan: PR Open#1:	River 1 Culvert #2	Reach 1 Profile:	RS: 1500 2-year		Plan: PR	River 1	Reach 1 Profile:	RS: 1500 Open#2: Bridge 2-year			Plan: PR Open#3:	River 1 Culvert #3	Reach 1 Profile:	RS: 1500 2-year
Q Culv Group (cfs)	61.07	Culv Full Len (ft)			Q Culv Group (cfs)	64.15	Culv Full Len (ft)			E.G. US. (ft)	394.26	Element	Inside BR US	Inside BR DS		Q Culv Group (cfs)	13.54	Culv Full Len (ft)	24.00
# Barrels	1.00	Culv Vel US (ft/s)	3.79		# Barrels	1.00	Culv Vel US (ft/s)	3.80		W.S. US. (ft)	394.10	E.G. Elev (ft)	394.16	394.03		# Barrels	1.00	Culv Vel US (ft/s)	2.76
Q Barrel (cfs)	61.07	Culv Vel DS (ft/s)	3.75		Q Barrel (cfs)	64.15	Culv Vel DS (ft/s)	3.74		Q Total (cfs)	812.24	W.S. Elev (ft)	393.84	393.62		Q Barrel (cfs)	13.54	Culv Vel DS (ft/s)	2.76
E.G. US. (ft)	394.27	Culv Inv El Up (ft)	390.11		E.G. US. (ft)	394.27	Culv Inv El Up (ft)	389.92		Q Bridge (cfs)	812.24	Crit W.S. (ft)	391.74	392.05		E.G. US. (ft)	394.15	Culv Inv El Up (ft)	390.97
W.S. US. (ft)	394.26	Culv Inv El Dn (ft)	390.02		W.S. US. (ft)	394.26	Culv Inv El Dn (ft)	389.80		Q Weir (cfs)		Max Chl Dpth (ft)	8.23	6.75		W.S. US. (ft)	394.14	Culv Inv El Dn (ft)	390.73
E.G. DS (ft)	393.89	Culv Frctn Ls (ft)	0.05		E.G. DS (ft)	393.89	Culv Frctn Ls (ft)	0.05		Weir Sta Lft (ft)		Vel Total (ft/s)	4.57	5.15		E.G. DS (ft)	393.90	Culv Frctn Ls (ft)	0.09
W.S. DS (ft)	393.88	Culv Exit Loss (ft)	0.21		W.S. DS (ft)	393.88	Culv Exit Loss (ft)	0.21		Weir Sta Rgt (ft)		Flow Area (sq ft)	177.68	157.76		W.S. DS (ft)	393.88	Culv Exit Loss (ft)	0.10
Delta EG (ft)	0.37	Culv Entr Loss (ft)	0.11		Delta EG (ft)	0.37	Culv Entr Loss (ft)	0.11		Weir Submerg		Froude # Chl	0.28	0.35		Delta EG (ft)	0.25	Culv Entr Loss (ft)	0.06
Delta WS (ft)	0.37	Q Weir (cfs)	228.87		Delta WS (ft)	0.37	Q Weir (cfs)	228.87		Weir Max Depth (ft)		Specif Force (cu	560.30	475.90		Delta WS (ft)	0.26	Q Weir (cfs)	64.62
E.G. IC (ft)	393.23	Weir Sta Lft (ft)	917.83		E.G. IC (ft)	393.13	Weir Sta Lft (ft)	917.83		Min El Weir Flow (ft)	394.11	Hydr Depth (ft)	3.95	3.51		E.G. IC (ft)	394.14	Weir Sta Lft (ft)	1845.00
E.G. OC (ft)	394.27	Weir Sta Rgt (ft)	1490.36		E.G. OC (ft)	394.26	Weir Sta Rgt (ft)	1490.36		Min El Prs (ft)	395.59	W.P. Total (ft)	49.44	47.89		E.G. OC (ft)	394.15	Weir Sta Rgt (ft)	2101.58
Culvert Control	Outlet	Weir Submerg	0.28		Culvert Control	Outlet	Weir Submerg	0.28		Delta EG (ft)	0.38	Conv. Total (cfs)	13765.70	11534.10		Culvert Control	Outlet	Weir Submerg	0.21
Culv WS Inlet (ft)	393.93	Weir Max Depth (ft)	0.85		Culv WS Inlet (ft)	393.93	Weir Max Depth (ft)	0.85		Delta WS (ft)	0.70	Top Width (ft)	45.00	45.00		Culv WS Inlet (ft)	393.47	Weir Max Depth (ft)	0.52
Culv WS Outlet (ft)	393.88	Weir Avg Depth (ft)	0.37		Culv WS Outlet (ft)	393.88	Weir Avg Depth (ft)	0.37		BR Open Area (sq ft)	239.28	Frctn Loss (ft)	0.11	0.12		Culv WS Outlet (ft)	393.23	Weir Avg Depth (ft)	0.18
Culv Nml Depth (ft)	3.10	Weir Flow Area (sq ft)	128.64		Culv Nml Depth (ft)	2.92	Weir Flow Area (sq ft)	128.64		BR Open Vel (ft/s)	5.15	C & E Loss (ft)	0.03	0.02		Culv Nml Depth (ft)		Weir Flow Area (sq ft)	46.14
Culv Crt Depth (ft)	2.20	Min El Weir Flow	393.78		Culv Crt Depth (ft)	2.26	Min El Weir Flow	393.78		BR Sluice Coef		Shear Total	0.78	1.02		Culv Crt Depth (ft)	1.24	Min El Weir Flow	393.68
										BR Sel Method	Energy only	Power Total	3.57	5.25					

CR-110																	
Plan: PR Open#1:	River 1 Culvert #1	Reach 1 Profile:	RS: 1500 100-year		Plan: PR Open#1:	River 1 Culvert #2	Reach 1 Profile:	RS: 1500 100-year		Plan: PR	River 1	Reach 1 Profile:	RS: 1500 Open#2: Bridge 100-year			Plan: PR Open#3:	River 1 Culvert #3	Reach 1 Profile:	RS: 1500 100-year
Q Culv Group (cfs)	76.22	Culv Full Len (ft)	24.00		Q Culv Group (cfs)	78.64	Culv Full Len (ft)	24.00		E.G. US. (ft)	395.55	Element	Inside BR US	Inside BR DS		Q Culv Group (cfs)	18.70	Culv Full Len (ft)	24.00
# Barrels	1.00	Culv Vel US (ft/s)	3.88		# Barrels	1.00	Culv Vel US (ft/s)	4.01		W.S. US. (ft)	395.42	E.G. Elev (ft)	395.35	395.17		# Barrels	1.00	Culv Vel US (ft/s)	3.81
Q Barrel (cfs)	76.22	Culv Vel DS (ft/s)	3.88		Q Barrel (cfs)	78.64	Culv Vel DS (ft/s)	4.01		Q Total (cfs)	1413.58	W.S. Elev (ft)	395.17	394.91		Q Barrel (cfs)	18.70	Culv Vel DS (ft/s)	3.81
E.G. US. (ft)	395.56	Culv Inv El Up (ft)	390.11		E.G. US. (ft)	395.56	Culv Inv El Up (ft)	389.92		Q Bridge (cfs)	1125.15	Crit W.S. (ft)	393.02	393.24		E.G. US. (ft)	395.58	Culv Inv El Up (ft)	390.97
W.S. US. (ft)	395.51	Culv Inv El Dn (ft)	390.02		W.S. US. (ft)	395.51	Culv Inv El Dn (ft)	389.80		Q Weir (cfs)		Max Chl Dpth (ft)	9.56	8.04		W.S. US. (ft)	395.45	Culv Inv El Dn (ft)	390.73
E.G. DS (ft)	395.17	Culv Frctn Ls (ft)	0.08		E.G. DS (ft)	395.17	Culv Frctn Ls (ft)	0.06		Weir Sta Lft (ft)		Vel Total (ft/s)	2.60	3.14		E.G. DS (ft)	395.17	Culv Frctn Ls (ft)	0.17
W.S. DS (ft)	395.12	Culv Exit Loss (ft)	0.19		W.S. DS (ft)	395.12	Culv Exit Loss (ft)	0.21		Weir Sta Rgt (ft)		Flow Area (sq ft)	433.54	358.30		W.S. DS (ft)	395.07	Culv Exit Loss (ft)	0.13
Delta EG (ft)	0.39	Culv Entr Loss (ft)	0.12		Delta EG (ft)	0.39	Culv Entr Loss (ft)	0.12		Weir Submerg		Froude # Chl	0.19	0.26		Delta EG (ft)	0.42	Culv Entr Loss (ft)	0.11
Delta WS (ft)	0.39	Q Weir (cfs)	2650.15		Delta WS (ft)	0.39	Q Weir (cfs)	2650.15		Weir Max Depth (ft)		Specif Force (cu	949.04	790.10		Delta WS (ft)	0.37	Q Weir (cfs)	1500.11
E.G. IC (ft)	393.68	Weir Sta Lft (ft)	592.61		E.G. IC (ft)	393.56	Weir Sta Lft (ft)	592.61		Min El Weir Flow (ft)	394.11	Hydr Depth (ft)	1.71	1.38		E.G. IC (ft)	395.53	Weir Sta Lft (ft)	1845.00
E.G. OC (ft)	395.55	Weir Sta Rgt (ft)	1505.00		E.G. OC (ft)	395.57	Weir Sta Rgt (ft)	1505.00		Min El Prs (ft)	395.59	W.P. Total (ft)	266.71	265.05		E.G. OC (ft)	395.58	Weir Sta Rgt (ft)	2229.38
Culvert Control	Outlet	Weir Submerg	0.67		Culvert Control	Outlet	Weir Submerg	0.67		Delta EG (ft)	0.38	Conv. Total (cfs)	26433.30	21971.20		Culvert Control	Outlet	Weir Submerg	0.66
Culv WS Inlet (ft)	395.11	Weir Max Depth (ft)	2.13		Culv WS Inlet (ft)	394.92	Weir Max Depth (ft)	2.13		Delta WS (ft)	0.50	Top Width (ft)	253.37	258.92		Culv WS Inlet (ft)	393.47	Weir Max Depth (ft)	1.87
Culv WS Outlet (ft)	395.02	Weir Avg Depth (ft)	1.09		Culv WS Outlet (ft)	394.80	Weir Avg Depth (ft)	1.09		BR Open Area (sq ft)	239.28	Frctn Loss (ft)	0.09	0.08		Culv WS Outlet (ft)	393.23	Weir Avg Depth (ft)	1.27
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	890.04		Culv Nml Depth (ft)		Weir Flow Area (sq ft)	890.04		BR Open Vel (ft/s)	5.21	C & E Loss (ft)	0.04	0.09		Culv Nml Depth (ft)		Weir Flow Area (sq ft)	488.93
Culv Crt Depth (ft)	2.47	Min El Weir Flow	393.78		Culv Crt Depth (ft)	2.51	Min El Weir Flow	393.78		BR Sluice Coef		Shear Total	0.29	0.35		Culv Crt Depth (ft)	1.47	Min El Weir Flow	393.68
										BR Sel Method	Energy only	Power Total	0.75	1.10					

NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.00205 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0350D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 01/20/2021.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 110
HYDRAULIC DATA
JONES CREEK

SHEET 4 OF 4

DN:	DN	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	WZ	DAL	KAUFMAN	0918	11	100,ETC	64

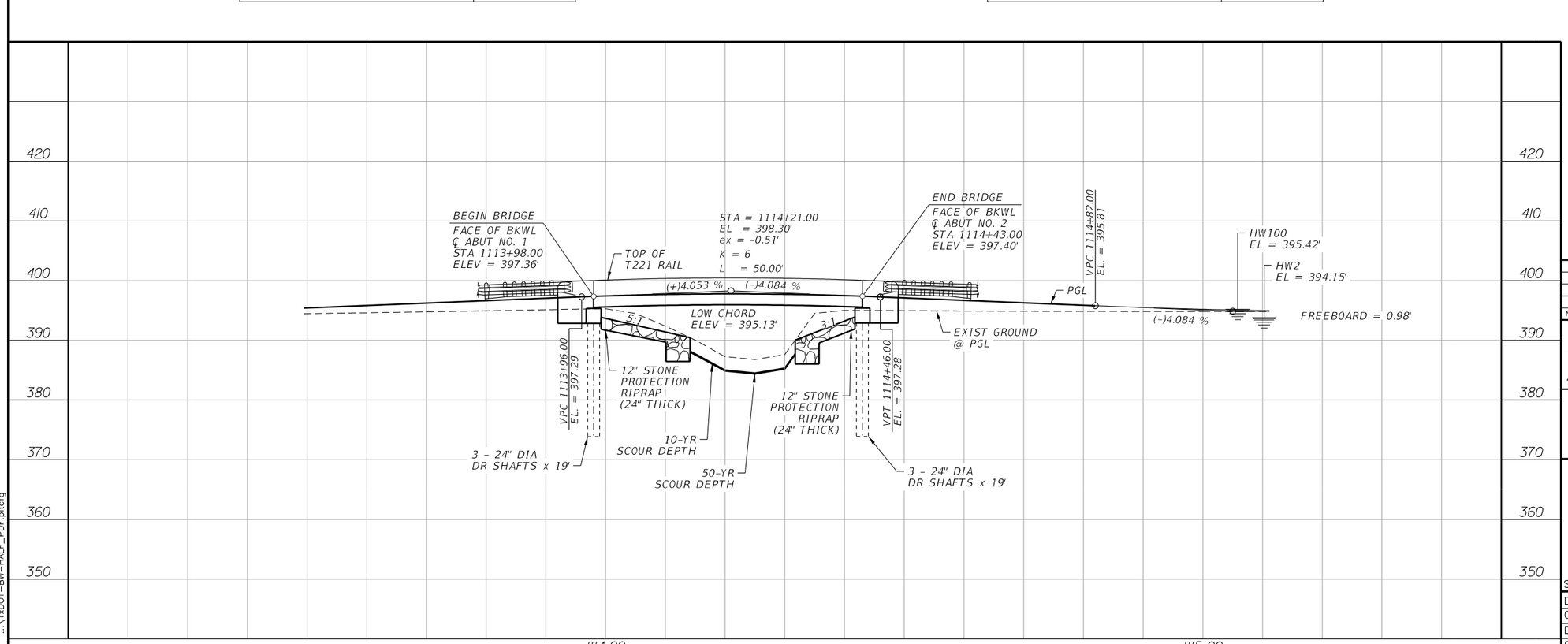
CR110_HDS00_04.dgn

Hydraulic Design Data QC (10-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft):	6.34
Approach Velocity (ft/s):	3.27
BR Average Depth (ft):	6.34
BR Opening Flow (cfs):	921
BR Top WD (ft):	45
Grain Size D50 (mm):	0.2
Approach Flow (cfs):	921
Approach Top WD (ft):	70
K1 Coefficient:	0.69
Results	
Scour Depth Ys (ft):	2.26
Critical Velocity (ft/s):	1.32
Equation:	Live

Hydraulic Design Data QS (50-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft):	6.77
Approach Velocity (ft/s):	3.72
BR Average Depth (ft):	6.77
BR Opening Flow (cfs):	1142
BR Top WD (ft):	45
Grain Size D50 (mm):	0.2
Approach Flow (cfs):	1142
Approach Top WD (ft):	70
K1 Coefficient:	0.69
Results	
Scour Depth Ys (ft):	2.41
Critical Velocity (ft/s):	1.33
Equation:	Live

NOTES:

1. SCOUR ANALYSIS IS BASED ON TXDOT GEOTECHNICAL MANUAL (GM). FHWA H.E.C.-18, "EVALUATING SCOUR AT BRIDGES", 5TH EDITION, AND TXDOT "SCOUR EVALUATION GUIDE REVISED AUGUST 2020", CHAPTER 8. ABUTMENT SCOUR EQUATIONS IN HEC-18 TEND TO OVER ESTIMATE ABUTMENT SCOUR DEPTHS. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE PROTECTION RIPRAP. NO APPRECIABLE ABUTMENT SCOUR IS ANTICIPATED.
2. THE D50 SOIL PARTICLE SIZE FOR THIS PROJECT IS THE MINIMUM SIZE ALLOWED BY THE GM. THE SOIL DATA IS FROM "THE GEOTECHNICAL INVESTIGATION FOR KAUFMAN COUNTY ON & OFF-SYSTEM BRIDGE REPLACEMENT PROJECT" REPORT.
3. THE PROPOSED BRIDGE IS A SINGLE SPAN STRUCTURE. PIER SCOUR IS NOT APPLICABLE FOR THIS BRIDGE.
4. THE TOTAL MAXIMUM CALCULATED SCOUR DEPTH IS TAKEN AS THE MAXIMUM OF HORIZONTAL CONTRACTION AND VERTICAL PRESSURE SCOUR. THE MAXIMUM SCOUR DEPTH OCCURED DURING THE 50-YR STORM AND IS 2.41'.
5. SEE "HYDROLOGY/HYDRAULIC REPORT FOR JONES CREEK" DATED NOVEMBER 4TH, 2022 FOR ADDITIONAL INFORMATION.



RMorfin
2/16/2023 4:57:30 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR110_HDSC_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

0 10 20
SCALE: 1"=20'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

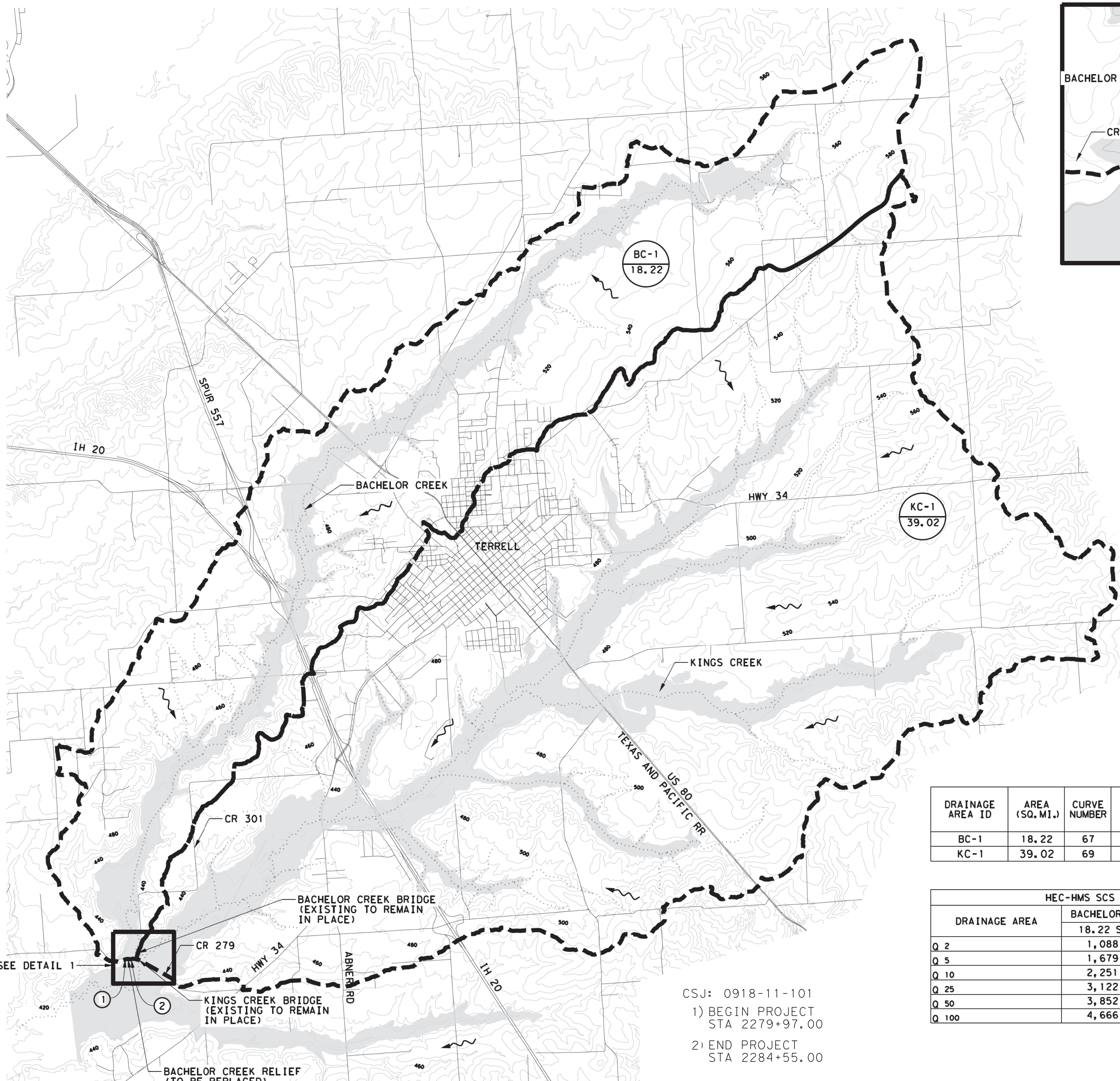
ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

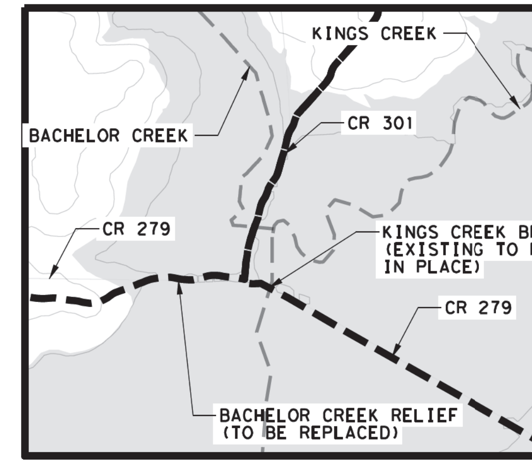
CR 110
SCOUR ANALYSIS
JONES CREEK

SHEET 1 OF 1

DN: RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	65

CR110_HDSC_01.dgn





DETAIL 1

0 3000 6000
SCALE: 1"=6000'

Symbol	Legend
X-X / XX.XX	DRAINAGE AREA ID / DRAIANAGE AREA (SQ.MI)
	DRAINAGE AREA BOUNDARY
	SURFACE RUNOFF DIRECTION
	COUNTY ROADS
	EXISTING CONTOURS
	STREAM CENTERLINE
	FEMA ZONE A AREA

NOTES:

1. RUNOFF COMPUTATIONS PERFORMED WITH HEC-HMS 4.9 AND VERIFIED BY OMEGA EM REGESSION ANALYSIS.
2. RAINFALL DEPTHS WERE OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOOA) ATLAS 14, VOLUME 11.
3. STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING TEMPORAL DISTRIBUTION.
4. RUNOFF VOLUME WAS COMPUTED USING THE SCS CURVE NUMBER LOSS MODEL.
5. SOURCE OF TOPOGRAPHIC DATA NATIONAL ELEVATION DATA SET 2013.
6. TIME OF CONCENTRATION (Tc) WAS COMPUTED USING NRCS METHOD.
7. THE NORMAL DEPTH OF 0.0011 FT/FT WAS USED AS THE DOWNSTREAM REACH BOUNDARY CONDITION FOR KINGS CREEK UPPER REACH AND BACHELOR CREEK. THE NORMAL DEPTH OF 0.0005 FT/FT WAS USED AS THE DOWNSTREAM REACH BOUNDARY CONDITION FOR KINGS CREEK LOWER REACH.

DRAINAGE AREA ID	AREA (SQ.MI.)	CURVE NUMBER	TIME OF CONCENTRATION (MIN)	LAG TIME (MIN)
BC-1	18.22	67	878	527
KC-1	39.02	69	514	308

HEC-HMS SCS METHOD		
DRAINAGE AREA	BACHELOR CREEK	KINGS CREEK
	18.22 SQ.MI.	39.02 SQ.MI.
Q 2	1,088 CFS	3,606 CFS
Q 5	1,679 CFS	5,571 CFS
Q 10	2,251 CFS	7,473 CFS
Q 25	3,122 CFS	10,311 CFS
Q 50	3,852 CFS	12,663 CFS
Q 100	4,666 CFS	15,246 CFS

CSJ: 0918-11-101
1) BEGIN PROJECT STA 2279+97.00
2) END PROJECT STA 2284+55.00

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wan zhang 2/24/2023

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

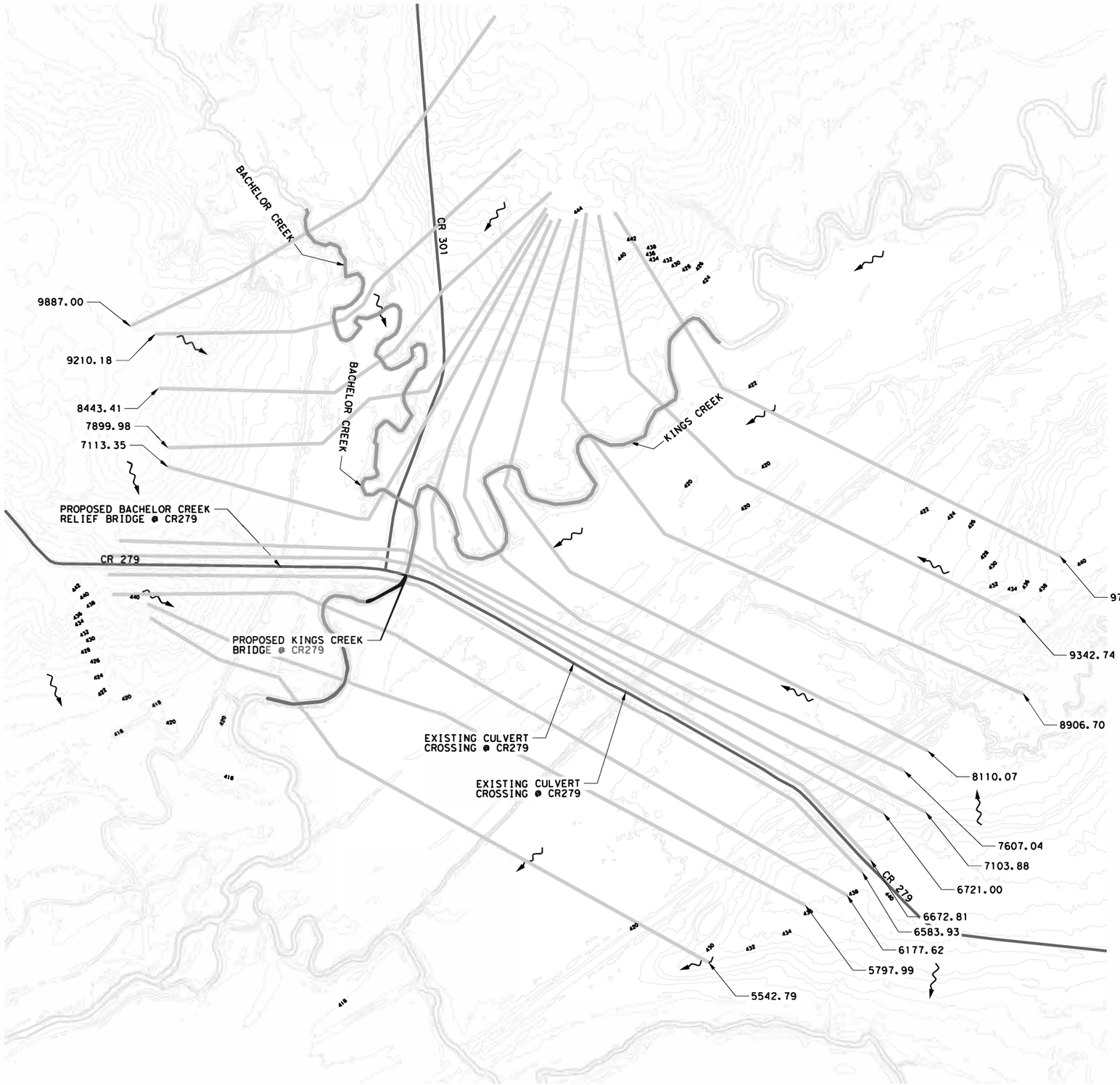
ENTECH CIVIL ENGINEERS, INC

F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
DRAINAGE AREA MAP
BACHELOR CREEK RELIEF

SHEET 1 OF 1

DN:	ST	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	AV	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	BG	STATE DIST.	COUNTY	CONTROL	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	AV	DAL	KAUFMAN	0918	11	100,ETC	66



NOTES:

1. HEC-RAS VERSION 6.3.1 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND BED SLOPE OF 0.0011 FT/FT FOR BACHELOR AND KINGS CREEK UPPER REACH AND 0.0005 FT/FT OR KINGS CREEK LOWER REACH.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0200D EFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHIC DATA NATIONAL ELEVATION DATA SET 2013.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 01/20/2021.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wan zhang
1/31/2023

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
HYDRAULIC DATA
BACHELOR CREEK RELIEF

SHEET 1 OF 4

		FED.RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	ST	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	AV						
DW:	BG	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	AV	DAL	KAUFMAN	0918	11	100,ETC	67

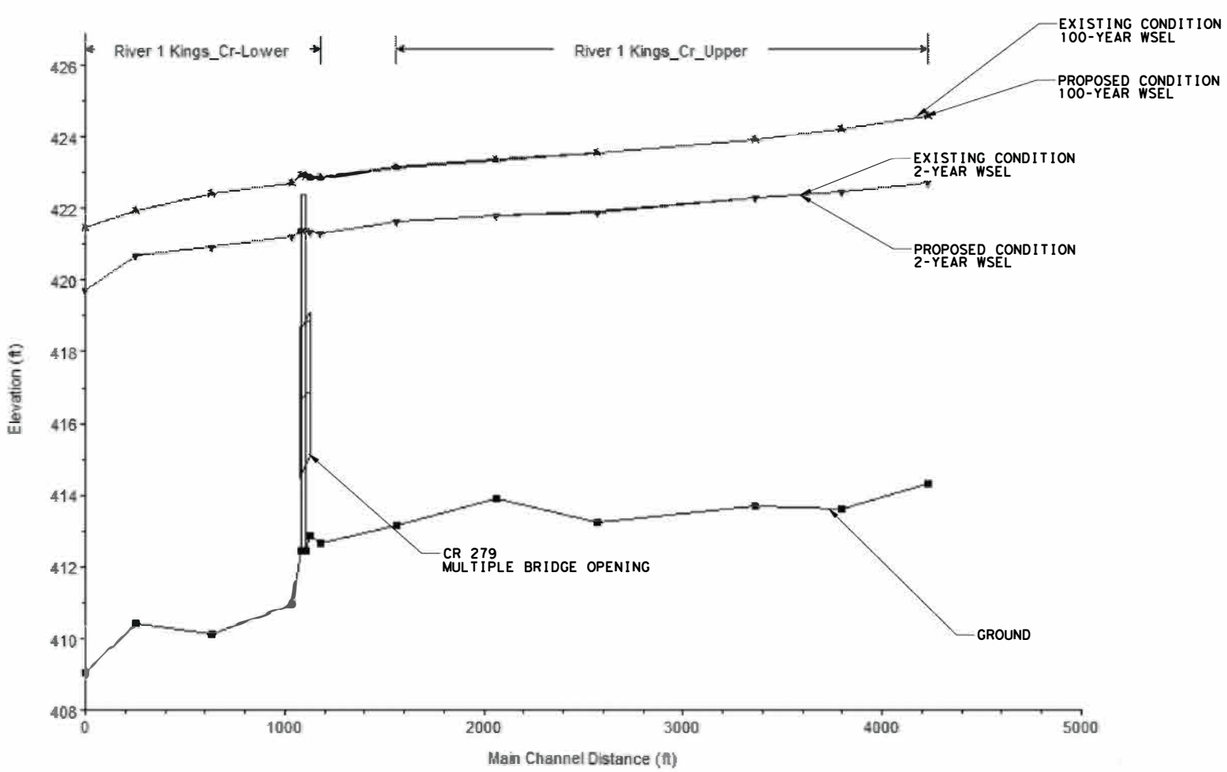
USERNAME
1/30/2023 12:15:54 PM
Z:\7061\01\04. CADD\dgn\279\Sheets\CR_279_Hydraulic_Data.dgn
...\04. CADD\pltcfg\pdf-bw.pltcfg

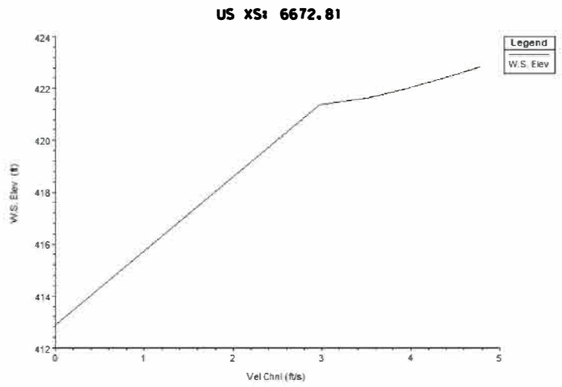
HYDRAULIC MODEL RESULTS

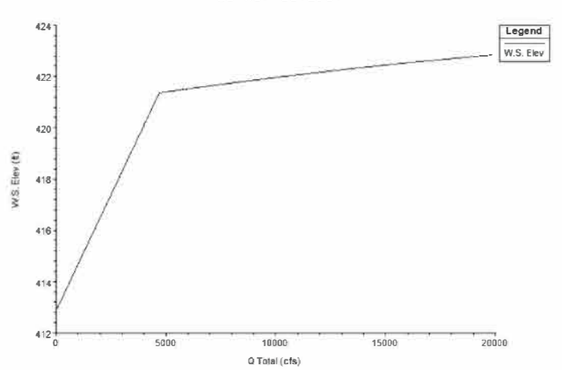
HEC-RAS STATION	REACH	2-YEAR FLOW (CFS)	2-YEAR WSEL (FT)			2-YEAR VELOCITY (FT/S)		100-YEAR FLOW (CFS)	100-YEAR WSEL (FT)			100-YEAR VELOCITY (FT/S)	
			EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED		EXISTING	PROPOSED	DIFFERENCE	EXISTING	PROPOSED
9887.00	BACHELOR	1088	423.90	423.90	0.00	5.88	5.88	4666	425.67	425.67	0.00	6.44	6.44
9210.18	BACHELOR	1088	423.51	423.51	0.00	4.36	4.36	4666	424.72	424.72	0.00	8.33	8.34
8443.41	BACHELOR	1088	422.69	422.69	0.00	5.43	5.43	4666	423.97	423.98	0.01	7.40	7.38
7899.98	BACHELOR	1088	422.34	422.34	0.00	4.46	4.47	4666	423.51	423.51	0.00	5.87	5.88
7113.35	BACHELOR	1088	421.15	421.14	-0.01	6.34	6.35	4666	423.04	423.03	-0.01	4.42	4.48
9772.00	KINGS_UPPER	3606	422.70	422.70	0.00	4.28	4.28	15246	424.57	424.57	0.00	5.96	5.96
9342.74	KINGS_UPPER	3606	422.47	422.47	0.00	3.83	3.83	15246	424.20	424.20	0.00	5.88	5.89
8906.70	KINGS_UPPER	3606	422.28	422.28	0.00	3.63	3.63	15246	423.94	423.93	-0.01	5.37	5.37
8110.07	KINGS_UPPER	3606	421.91	421.91	0.00	4.18	4.18	15246	423.54	423.54	0.00	4.73	4.74
7607.04	KINGS_UPPER	3606	421.81	421.81	0.00	3.01	3.02	15246	423.36	423.36	0.00	4.88	4.88
7103.88	KINGS_UPPER	3606	421.64	421.64	0.00	3.13	3.14	15246	423.16	423.15	-0.01	3.74	3.75
6721.00	KINGS_LOWER	4694	421.30	421.29	-0.01	5.48	5.51	19912	422.87	422.87	0.00	6.08	6.10
6672.81	KINGS_LOWER	4694	421.36	421.35	-0.01	2.95	2.96	19912	422.87	422.87	0.00	4.77	4.79
6637.00	KINGS_LOWER	BRIDGE											
6583.93	KINGS_LOWER	4694	421.20	421.20	0.00	5.00	5.00	19912	422.70	422.70	0.00	6.78	6.78
6177.62	KINGS_LOWER	4694	420.94	420.94	0.00	4.07	4.06	19912	422.42	422.42	0.00	4.84	4.84
5797.99	KINGS_LOWER	4694	420.69	420.69	0.00	5.13	5.09	19912	421.94	421.94	0.00	8.63	8.61
5542.79	KINGS_LOWER	4694	419.73	419.74	0.01	8.58	8.58	19912	421.47	421.47	0.00	9.65	9.65

NOTES:

1. HEC-RAS VERSION 6.3.1 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND BED SLOPE OF 0.0011 FT/FT FOR BACHELOR AND KINGS CREEK UPPER REACH AND 0.0005 FT/FT OR KINGS CREEK LOWER REACH.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0200D EFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHIC DATA NATIONAL ELEVATION DATA SET 2013.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 01/20/2021.







STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER
1/31/2023

NO.	DATE	REVISION	APPROV.

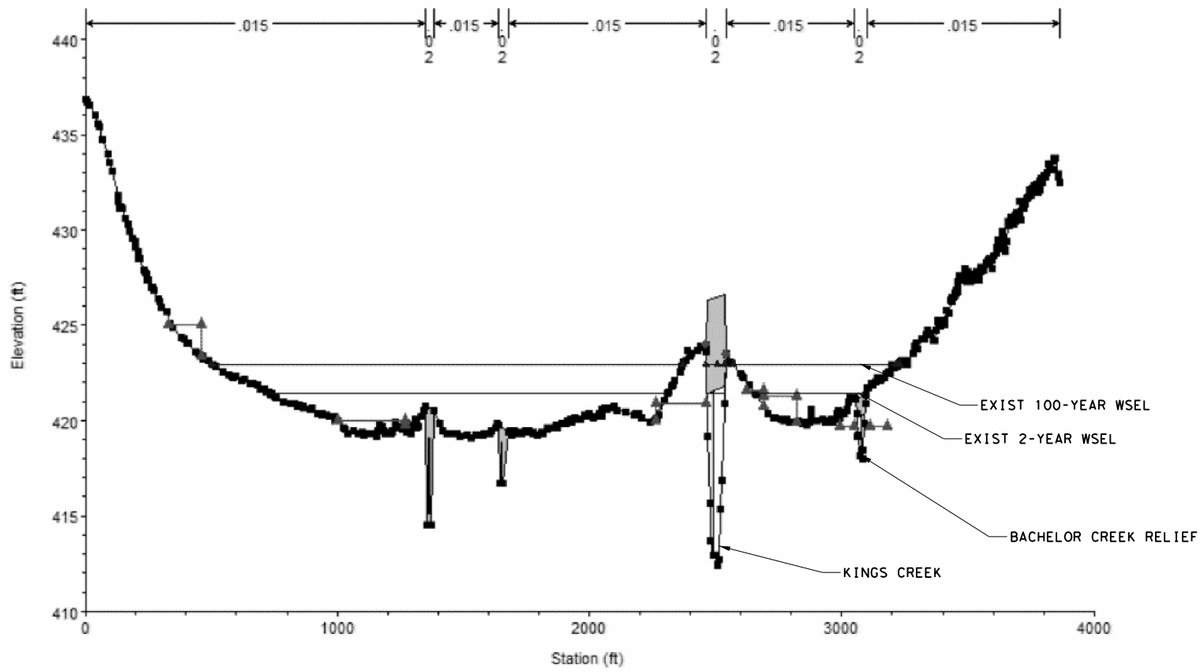
Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

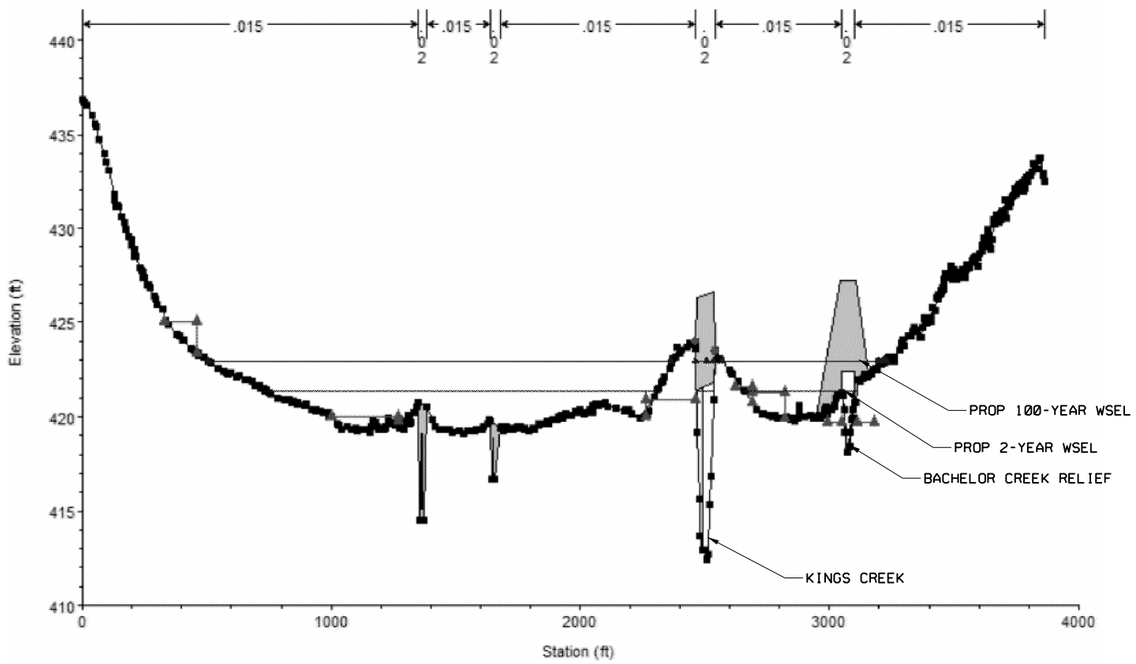
CR 279
HYDRAULIC DATA
BACHELOR CREEK RELIEF

SHEET 2 OF 4

DN: ST	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: AV	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: BG	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: AV	DAL	KAUFMAN	0918	11	100,ETC	68



EXISTING CR 279 BRIDGE AT BACHELOR CREEK



PROPOSED CR 279 BRIDGE AT BACHELOR CREEK

NOTES:

1. HEC-RAS VERSION 6.3.1 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND BED SLOPE OF 0.0011 FT/FT FOR BACHELOR AND KINGS CREEK UPPER REACH AND 0.0005 FT/FT OR KINGS CREEK LOWER REACH.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0200D EFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHIC DATA NATIONAL ELEVATION DATA SET 2013.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 01/20/2021.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang
1/31/2023

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
HYDRAULIC DATA
BACHELOR CREEK RELIEF

SHEET 3 OF 4

DN: ST	FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: AV	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: BG	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: AV	DAL	KAUFMAN	0918	11	100,ETC	69

PLAN: PROP BACHELOR CREEK RELIEF RS: 6637 PROFILE: 2 YEAR				
E.G. US. (FT)	421.31	ELEMENT	INSIDE BR US	INSIDE BR DS
W.S. US. (FT)	421.31	E.G. ELEV (FT)	421.30	421.30
Q TOTAL (CFS)	88.81	W.S. ELEV (FT)	421.28	421.27
Q BRIDGE (CFS)	88.81	CRIT W.S. (FT)	419.55	419.56
Q WEIR (CFS)		MAX CHL DPTH (FT)	3.17	3.16
WEIR STA LFT (FT)		VEL TOTAL (FT/S)	1.18	1.18
WEIR STA RGT (FT)		FLOW AREA (SQ FT)	75.24	75.09
WEIR SUBMERG		FROUDE # CHL	0.00	0.00
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)	86.49	86.24
MIN EL WEIR FLOW (FT)	422.23	HYDR DEPTH (FT)	1.68	1.68
MIN EL PRS (FT)	422.40	W.P. TOTAL (FT)	45.19	45.14
DELTA EG (FT)	0.02	CONV. TOTAL (CFS)	7853.7	7832.4
DELTA WS (FT)	0.03	TOP WIDTH (FT)	44.71	44.67
BR OPEN AREA (SQ FT)	130.27	FRCTN LOSS (FT)	0.00	0.00
BR OPEN VEL (FT/S)	1.18	C & E LOSS (FT)	0.00	0.01
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)	0.01	0.01
BR SEL METHOD	ENERGY	POWER TOTAL (LB/FT S)	0.02	0.02

PLAN: PROP BACHELOR CREEK RELIEF RS: 6637 PROFILE: 100 YEAR				
E.G. US. (FT)	422.92	ELEMENT	INSIDE BR US	INSIDE BR DS
W.S. US. (FT)	422.92	E.G. ELEV (FT)	422.89	422.86
Q TOTAL (CFS)	314.16	W.S. ELEV (FT)	422.83	422.86
Q BRIDGE (CFS)	287.31	CRIT W.S. (FT)	420.61	420.60
Q WEIR (CFS)		MAX CHL DPTH (FT)	4.72	4.75
WEIR STA LFT (FT)		VEL TOTAL (FT/S)	1.91	0.55
WEIR STA RGT (FT)		FLOW AREA (SQ FT)	150.29	522.35
WEIR SUBMERG		FROUDE # CHL	0.16	0.04
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)	275.70	774.87
MIN EL WEIR FLOW (FT)	422.23	HYDR DEPTH (FT)	2.52	2.46
MIN EL PRS (FT)	422.40	W.P. TOTAL (FT)	161.75	317.06
DELTA EG (FT)	0.06	CONV. TOTAL (CFS)	12521.0	79222.1
DELTA WS (FT)	0.06	TOP WIDTH (FT)	59.72	211.93
BR OPEN AREA (SQ FT)	130.27	FRCTN LOSS (FT)	0.00	0.00
BR OPEN VEL (FT/S)	2.21	C & E LOSS (FT)	0.03	0.00
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)	0.04	0.00
BR SEL METHOD	ENERGY	POWER TOTAL (LB/FT S)	0.07	0.00

PLAN: PROP KINGS CREEK RS: 6637 PROFILE: 2 YEAR				
E.G. US. (FT)	421.35	ELEMENT	INSIDE BR US	INSIDE BR DS
W.S. US. (FT)	421.28	E.G. ELEV (FT)	421.26	421.26
Q TOTAL (CFS)	1984.27	W.S. ELEV (FT)	421.22	421.24
Q BRIDGE (CFS)	1247.76	CRIT W.S. (FT)	417.60	417.59
Q WEIR (CFS)		MAX CHL DPTH (FT)	8.79	8.80
WEIR STA LFT (FT)		VEL TOTAL (FT/S)	1.39	1.16
WEIR STA RGT (FT)		FLOW AREA (SQ FT)	900.22	1074.55
WEIR SUBMERG		FROUDE # CHL	0.14	0.12
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)	1747.18	1933.71
MIN EL WEIR FLOW (FT)	419.82	HYDR DEPTH (FT)	1.50	1.65
MIN EL PRS (FT)	421.81	W.P. TOTAL (FT)	620.77	674.51
DELTA EG (FT)	0.06	CONV. TOTAL (CFS)	130109.4	155516.0
DELTA WS (FT)	0.05	TOP WIDTH (FT)	749.59	652.90
BR OPEN AREA (SQ FT)	425.93	FRCTN LOSS (FT)	0.01	0.01
BR OPEN VEL (FT/S)	3.14	C & E LOSS (FT)	0.02	0.00
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)	0.02	0.02
BR SEL METHOD	ENERGY	POWER TOTAL (LB/FT S)	0.03	0.02

PLAN: PROP KINGS CREEK RS: 6637 PROFILE: 100 YEAR				
E.G. US. (FT)	422.94	ELEMENT	INSIDE BR US	INSIDE BR DS
W.S. US. (FT)	422.81	E.G. ELEV (FT)	422.76	422.68
Q TOTAL (CFS)	9044.84	W.S. ELEV (FT)	422.76	422.68
Q BRIDGE (CFS)	1186.82	CRIT W.S. (FT)	421.58	421.55
Q WEIR (CFS)		MAX CHL DPTH (FT)	10.32	10.24
WEIR STA LFT (FT)		VEL TOTAL (FT/S)	0.43	0.49
WEIR STA RGT (FT)		FLOW AREA (SQ FT)	2785.56	2429.18
WEIR SUBMERG		FROUDE # CHL	0.02	0.03
WEIR MAX DEPTH (FT)		SPECIF FORCE (CU FT)	5151.67	4598.48
MIN EL WEIR FLOW (FT)	419.22	HYDR DEPTH (FT)	2.74	2.75
MIN EL PRS (FT)	421.81	W.P. TOTAL (FT)	1177.99	1046.30
DELTA EG (FT)	0.08	CONV. TOTAL (CFS)	471328.0	404344.3
DELTA WS (FT)	0.15	TOP WIDTH (FT)	1018.45	882.84
BR OPEN AREA (SQ FT)	425.93	FRCTN LOSS (FT)	0.01	0.03
BR OPEN VEL (FT/S)	2.79	C & E LOSS (FT)	0.02	0.01
BR SLUICE COEF		SHEAR TOTAL (LB/SQ FT)	0.05	0.07
BR SEL METHOD	ENERGY	POWER TOTAL (LB/FT S)	0.02	0.04

NOTES:

1. HEC-RAS VERSION 6.3.1 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND BED SLOPE OF 0.0011 FT/FT FOR BACHELOR AND KINGS CREEK UPPER REACH AND 0.0005 FT/FT OR KINGS CREEK LOWER REACH.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0200D EFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHIC DATA NATIONAL ELEVATION DATA SET 2013.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 01/20/2021.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
1/31/2023

NO.	DATE	REVISION	APPROV.

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
HYDRAULIC DATA
BACHELOR CREEK RELIEF

SHEET 4 OF 4

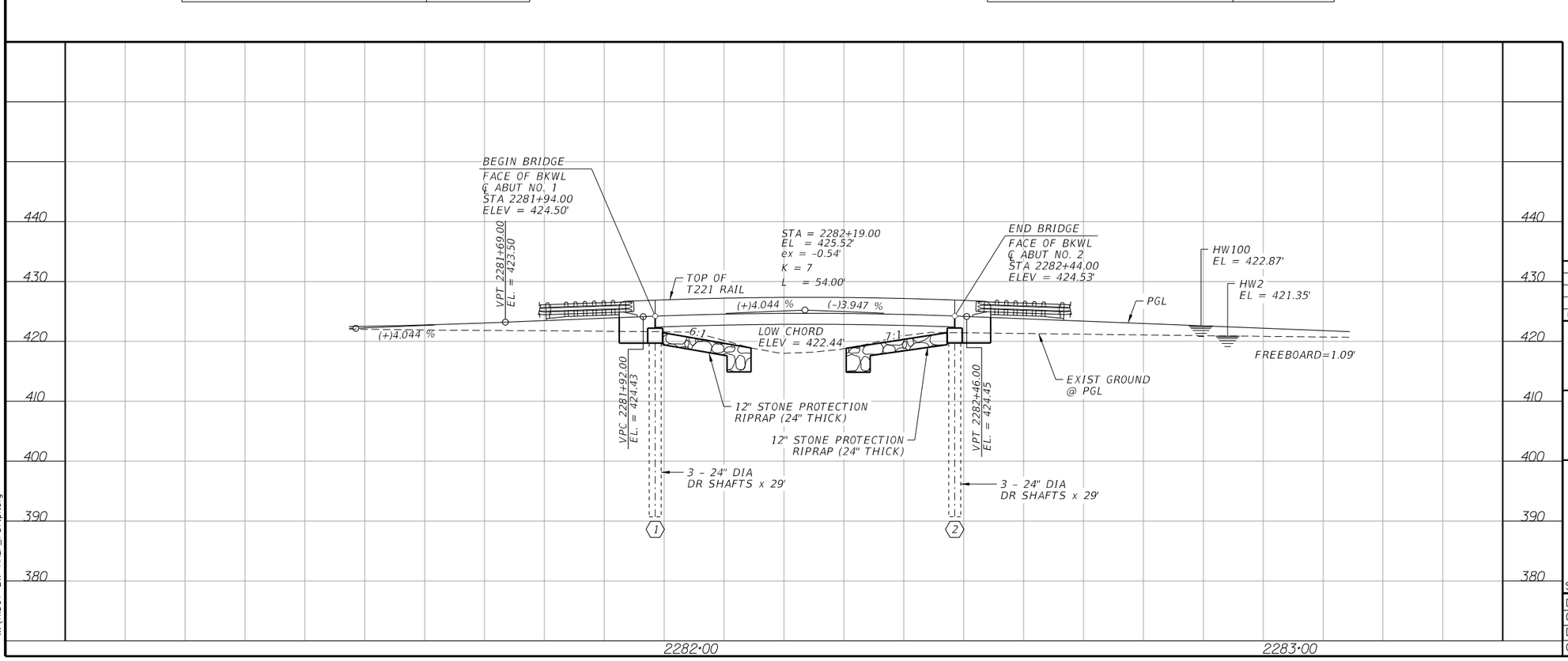
DN: ST	FED.RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: AV	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: BG	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: AV	DAL	KAUFMAN	0918	11	100,ETC	70

Hydraulic Design Data QC (10-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft) :	1.81
Approach Velocity (ft/s) :	1.99
BR Average Depth (ft) :	1.69
BR Opening Flow (cfs) :	88.81
BR Top WD (ft) :	44.67
Grain Size D50 (mm) :	0.2
Approach Flow (cfs) :	82.67
Approach Top WD (ft) :	23.05
K1 Coefficient :	0.69
Results	
Scour Depth Ys (ft) :	-0.46
Critical Velocity (ft/s) :	1.07
Equation :	Live

Hydraulic Design Data QS (50-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft) :	3.27
Approach Velocity (ft/s) :	2.74
BR Average Depth (ft) :	2.52
BR Opening Flow (cfs) :	287.31
BR Top WD (ft) :	50
Grain Size D50 (mm) :	0.2
Approach Flow (cfs) :	214.14
Approach Top WD (ft) :	23.9
K1 Coefficient :	0.69
Results	
Scour Depth Ys (ft) :	0.01
Critical Velocity (ft/s) :	1.18
Equation :	Live

NOTES:

1. SCOUR ANALYSIS IS BASED ON TXDOT GEOTECHNICAL MANUAL (GM). FHWA H.E.C.-18, "EVALUATING SCOUR AT BRIDGES", 5TH EDITION, AND TXDOT "SCOUR EVALUATION GUIDE REVISED AUGUST 2020", CHAPTER 8. ABUTMENT SCOUR EQUATIONS IN HEC-18 TEND TO OVER ESTIMATE ABUTMENT ESTIMATE ABUTMENT SCOUR DEPTHS. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE PROTECTION RIPRAP. NO APPRECIABLE ABUTMENT SCOUR IS ANTICIPATED.
2. THE D50 SOIL PARTICLE SIZE FOR THIS PROJECT IS THE MINIMUM SIZE ALLOWED BY THE GM. THE SOIL DATA IS FROM "THE GEOTECHNICAL INVESTIGATION FOR KAUFMAN COUNTY ON & OFF-SYSTEM BRIDGE REPLACEMENT PROJECT" REPORT.
3. THE PROPOSED BRIDGE IS A SINGLE SPAN STRUCTURE. PIER SCOUR IS NOT APPLICABLE FOR THIS BRIDGE.
4. THE TOTAL MAXIMUM CALCULATED SCOUR DEPTH IS TAKEN AS THE MAXIMUM OF HORIZONTAL CONTRACTION AND VERTICAL PRESSURE SCOUR. THE MAXIMUM SCOUR DEPTH OCCURED DURING THE 50-YR STORM AND IS 2.64'.
5. SEE "HYDROLOGY/HYDRAULIC REPORT FOR MUDDY CEDAR TRIBUTARY" DATED NOVEMBER 4TH, 2022 FOR ADDITIONAL INFORMATION.



STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

0 10 20
SCALE: 1"=20'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

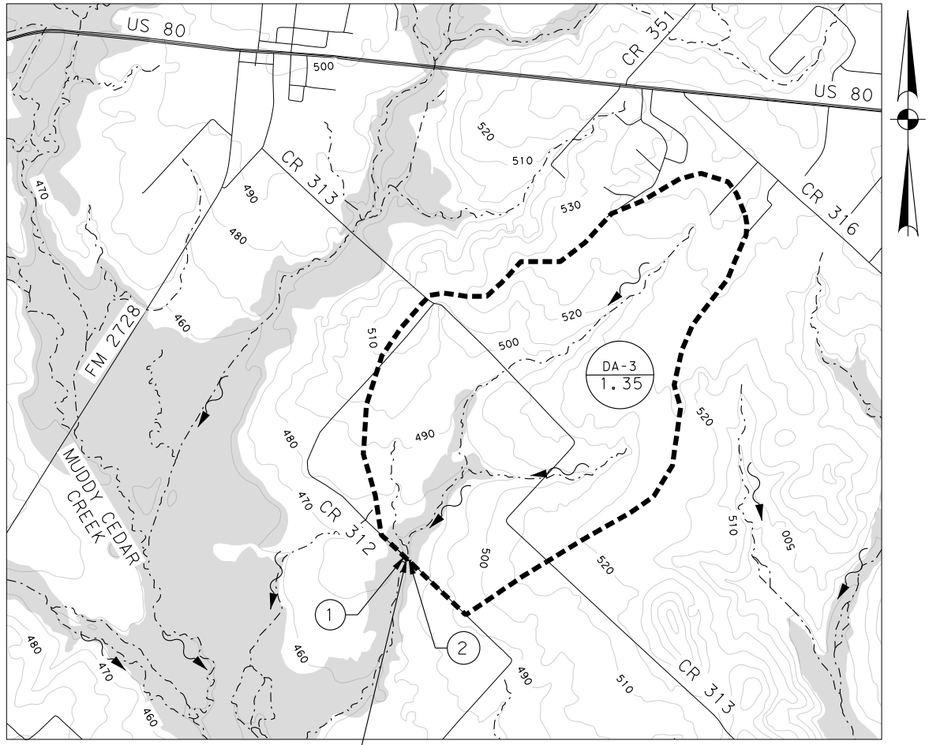
ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
SCOUR ANALYSIS
BACHELOR CREEK RELIEF

SHEET 1 OF 1

DN:	DN	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	CK*DN	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	DW	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	CK*DW	DAL	KAUFMAN	0918	11	100,ETC	71

CR279_HDSC_01.dgn



BRIDGE AT MUDDY CEDAR CREEK TRIBUTARY

CSJ: 0918-11-103

① BEGIN PROJECT STA 313+97.00

② END PROJECT STA 316+42.00

LEGEND

- DRAINAGE AREA BOUNDARY
- SURFACE RUNOFF DIRECTION
- EXISTING CONTOURS
- FEMA ZONE A AREA
- X-X / XX.XX — WATERSHED NAME / AREA (SQ. MI)

DA ID	STREAM NAME	ROADWAY	AREA (SQ. MI)	CURVE NUMBER	TIME OF CONCENTRATION (MIN)	LAG TIME (MIN)
DA 3	MUDDY CEDAR CREEK TRIBUTARY	CR-312	1.35	66	102.8	62

NRCS UNIT HYDROGRAPH METHOD IN HEC-HMS			
PEAK DISCHARGE (CFS)			
2-YR	10-YR	50-YR	100-YR
343.9	794.8	1,390.6	1,672.0

NOTES:

1. RUNOFF COMPUTATIONS PERFORMED WITH HEC-HMS 4.3 AND VERIFIED BY OMEGA EM REGRESSION EQUATION ANALYSIS.
2. RAINFALL DEPTHS WERE OBTAINED FROM NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) ATLAS 14, VOLUME 11.
3. STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING TEMPORAL DISTRIBUTION.
4. RUNOFF VOLUME WAS COMPUTED USING THE SCS CURVE NUMBER LOSS MODEL.
5. SOURCE OF TOPOGRAPHY DATA: 2013 USGS 10FT DEM AND PROJECT TOPOGRAPHIC SURVEY.
6. TIME OF CONCENTRATION (Tc) WAS COMPUTED USING NRCS METHOD.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED PROFESSIONAL ENGINEER
wan zhang 2/16/2023

0 1,500 3,000
SCALE: 1"=3,000'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

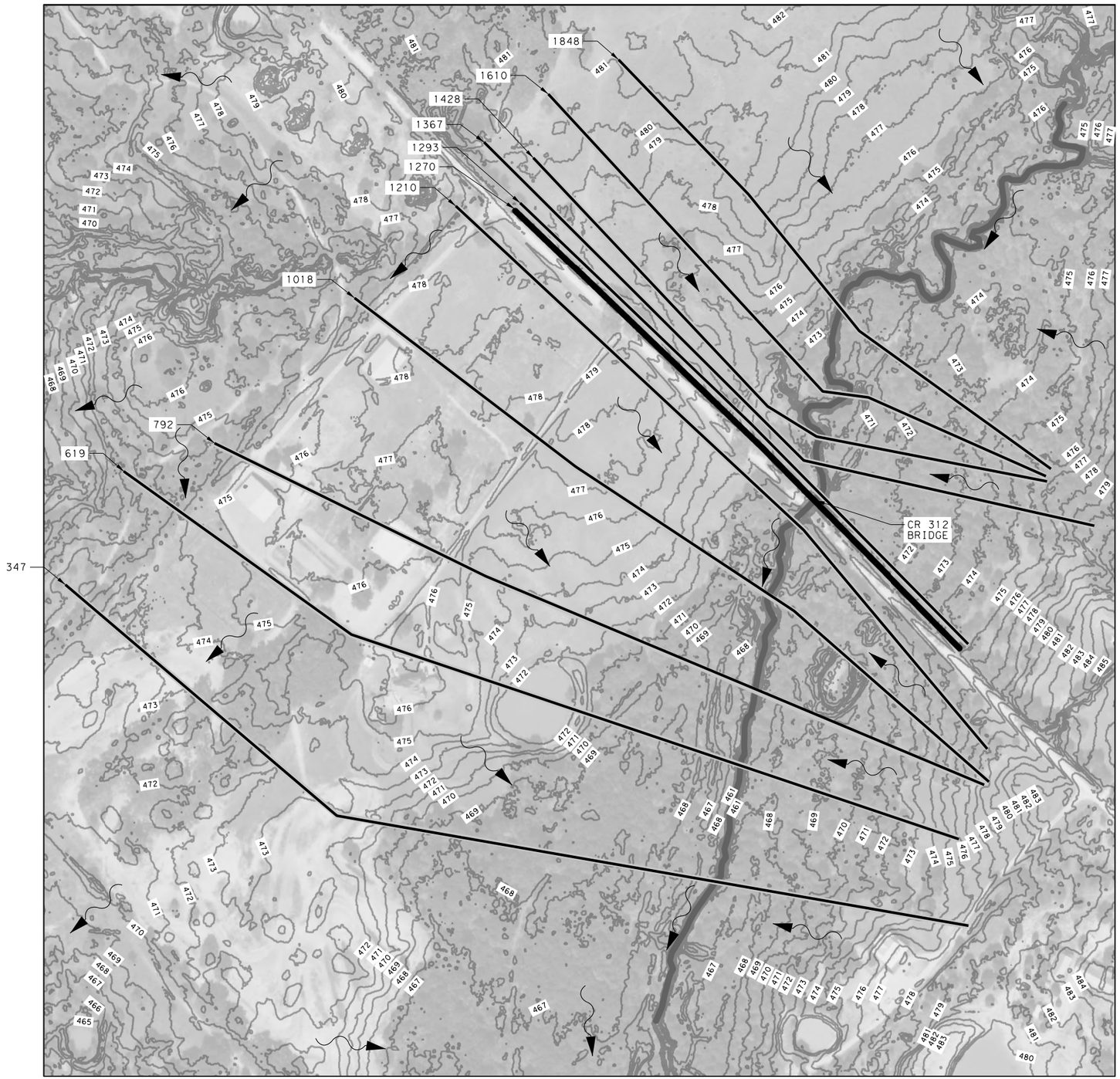
ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 312
DRAINAGE AREA MAP
MUDDY CEDAR CREEK TRIBUTARY

SHEET 1 OF 1

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	WZ						
DW:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	WZ	DAL	KAUFMAN	0918	11	100,ETC	72

RMorfin
2/16/2023 4:57:35 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR312_DRAP00_01.dgn
...\xDOT-BW-HALF_PDF.pltcfg



NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.0066 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0225D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

SCALE; NTS

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 312
HYDRAULIC DATA
MUDDY CEDAR CREEK TRIBUTARY

SHEET 1 OF 4

DN: RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	73

RMorfin
2/16/2023 4:57:36 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR312_HDS00_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

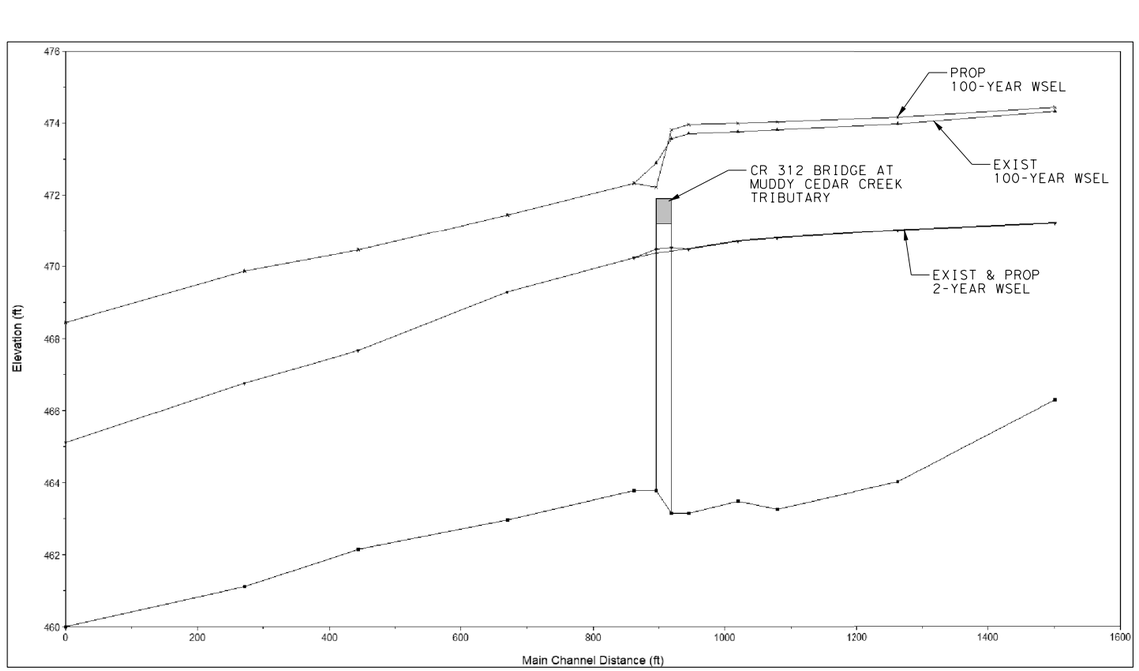
HEC-RAS RESULTS FOR CR-312 AT MUDDY CEDAR CREEK TRIBUTARY														
HEC-RAS STATION	2-YEAR FLOW (CFS)		2-YEAR WSEL (FT)			2-YEAR VELOCITY (FT/S)		100-YEAR FLOW (CFS)		100-YEAR WSEL (FT)			100-YEAR VELOCITY (FT/S)	
	EXISTING	PROPOSED	EXISTING	PROPOSED	DIFF.	EXISTING	PROPOSED	EXISTING	PROPOSED	EXISTING	PROPOSED	DIFF.	EXISTING	PROPOSED
1848	344	344	471.25	471.23	-0.02	5.91	5.95	1672	1672	474.34	474.45	0.11	3.82	3.54
1610	344	344	471.03	471.01	-0.02	2.54	2.55	1672	1672	473.98	474.16	0.18	3.54	3.21
1428	344	344	470.83	470.80	-0.03	2.72	2.73	1672	1672	473.82	474.04	0.22	3.02	2.70
1367	344	344	470.74	470.71	-0.03	2.87	2.90	1672	1672	473.78	474.01	0.23	2.85	2.51
1293 (U/S ROW)	344	344	470.51	470.48	-0.03	3.55	3.58	1672	1672	473.72	473.97	0.25	2.82	2.47
1270	CR-312 BRIDGE AT MUDDY CEDAR CREEK TRIBUTARY													
1210 (D/S ROW)	344	344	470.25	470.25	0.00	3.72	3.72	1672	1672	472.34	472.34	0.00	5.98	5.98
1018	344	344	469.30	469.30	0.00	4.57	4.57	1672	1672	471.44	471.44	0.00	5.25	5.25
792	344	344	467.68	467.68	0.00	5.47	5.47	1672	1672	470.47	470.47	0.00	5.52	5.52
619	344	344	466.76	466.76	0.00	4.82	4.82	1672	1672	469.87	469.87	0.00	5.28	5.28
347	344	344	465.13	465.13	0.00	5.30	5.30	1672	1672	468.45	468.45	0.00	6.95	6.95

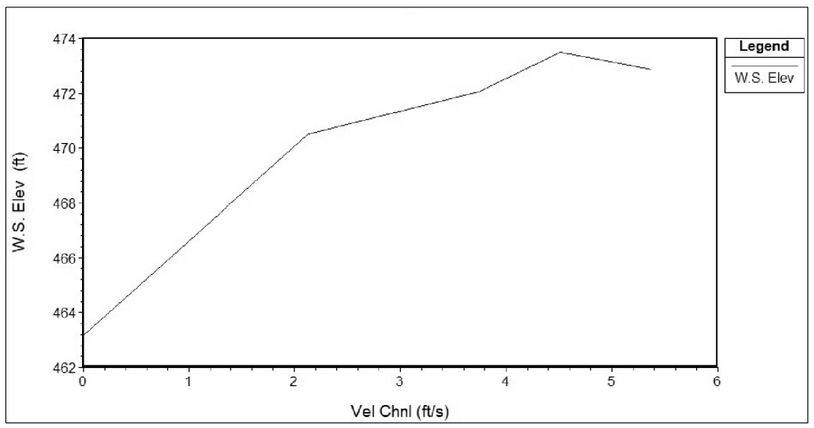
NOTES:

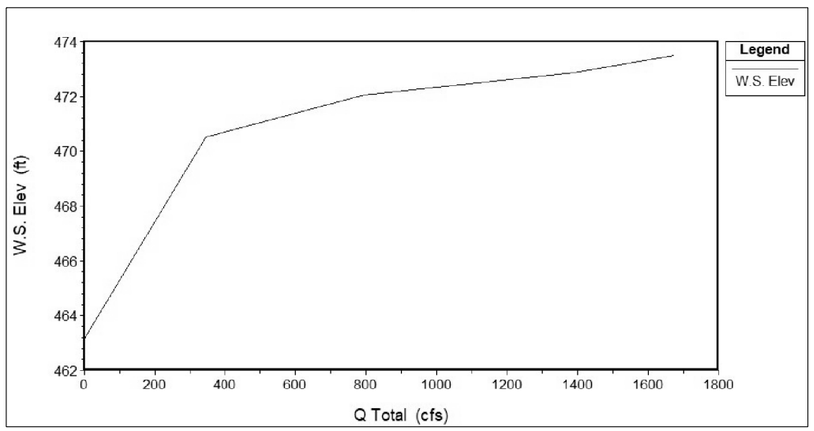
1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.0066 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0225D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

HYDRAULIC DATA MUDDY CEDAR CREEK TRIBUTARY BRIDGE

Q2 = 344 CFS V2 = 3.58 FPS HW2 = 470.48'
Q100 = 1672 CFS V100 = 2.79 FPS HW100 = 473.74'







STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

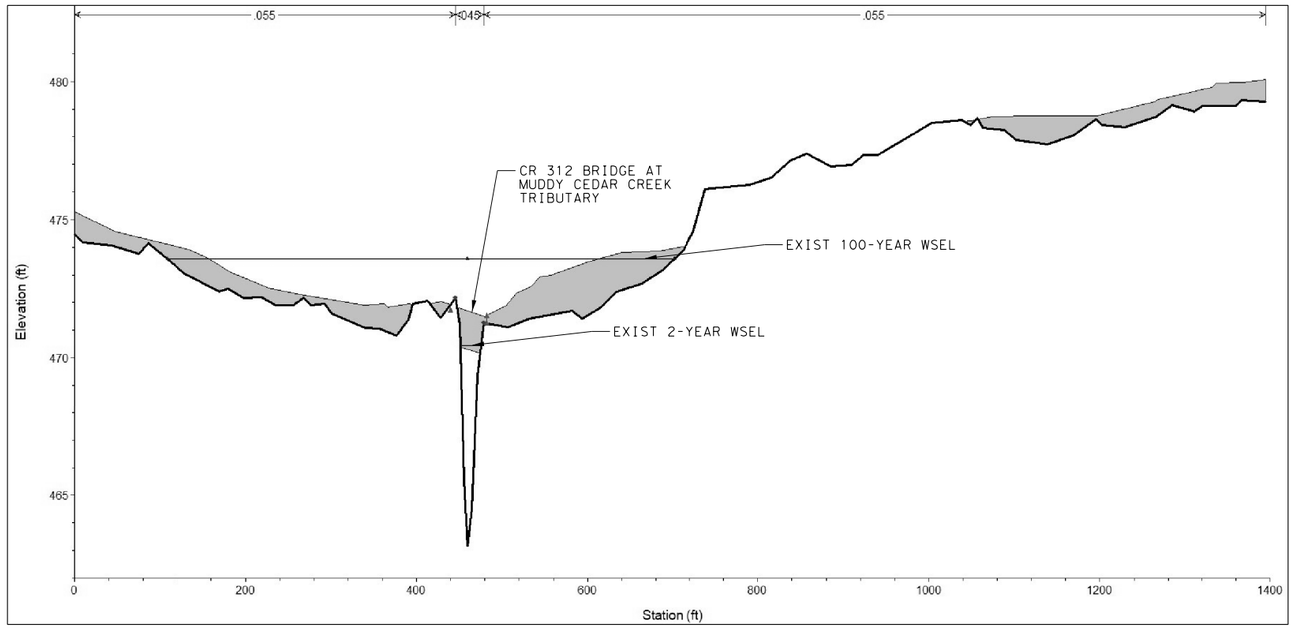
CR 312
HYDRAULIC DATA
MUDDY CEDAR CREEK TRIBUTARY

SHEET 2 OF 4

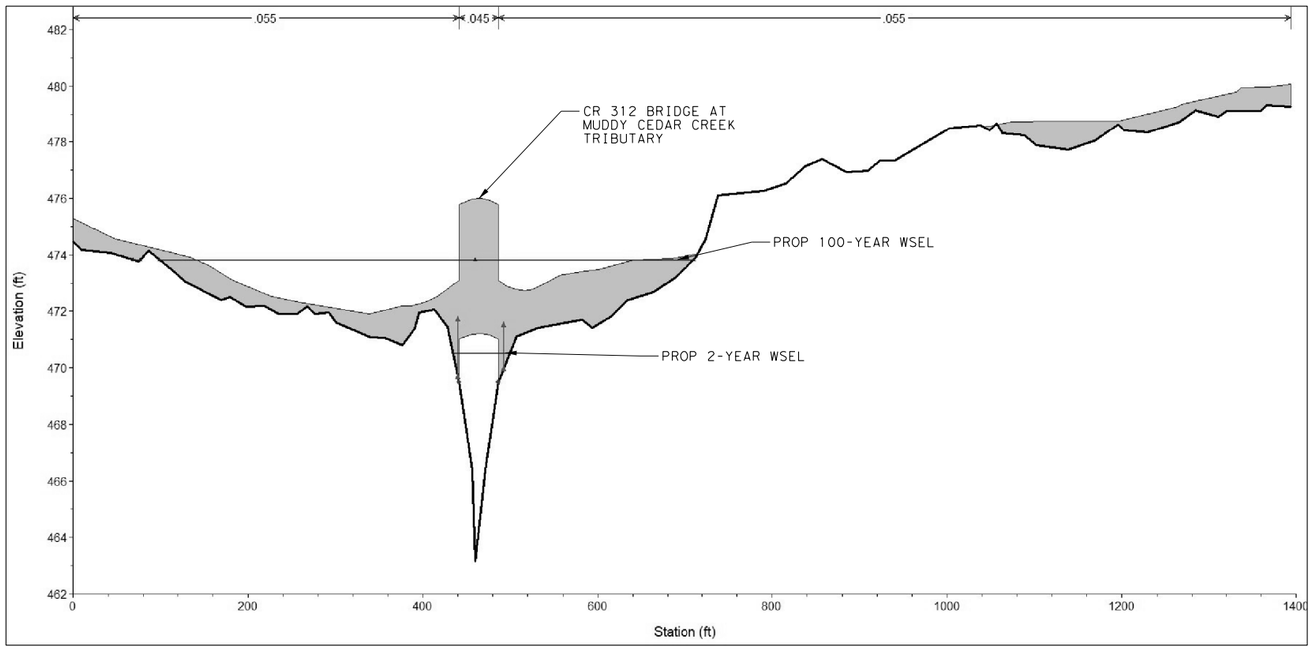
DN:	RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	WZ	DAL	KAUFMAN	0918	11	100,ETC	74

CR312_HDS00_02.dgn

RMorfin
2/16/2023 4:57:41 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR312_HDS00_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



EXISTING CR 312 BRIDGE AT MUDDY CEDAR CREEK TRIBUTARY



PROPOSED CR 312 BRIDGE AT MUDDY CEDAR CREEK TRIBUTARY

NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.0066 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0350D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

HYDRAULIC DATA MUDDY CEDAR CREEK TRIBUTARY BRIDGE

Q2 = 344 CFS V2 = 3.58 FPS HW2 = 470.48'
Q100 = 1672 CFS V100 = 2.79 FPS HW100 = 473.74'

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wan zhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 312
HYDRAULIC DATA
MUDDY CEDAR CREEK TRIBUTARY

SHEET 3 OF 4

DN: RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	75

CR312_HDS00_03.dgn

RMorfin
2/16/2023 4:57:44 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR312_HDS00_03.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

CR-312				
Plan: PR	River 1	Reach 1 RS: 1270	Profile: 2-year	
E.G. US. (ft)	470.68	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	470.48	E.G. Elev (ft)	470.58	470.56
Q Total (cfs)	343.90	W.S. Elev (ft)	470.51	470.48
Q Bridge (cfs)	343.90	Crit W.S. (ft)	467.46	467.52
Q Weir (cfs)		Max Chl Dpth (ft)	7.35	6.70
Weir Sta Lft (ft)		Vel Total (ft/s)	2.13	2.16
Weir Sta Rgt (ft)		Flow Area (sq ft)	161.44	159.00
Weir Submerg		Froude # Chl	0.14	0.15
Weir Max Depth (ft)		Specif Force (cu ft)	382.28	370.35
Min El Weir Flow (ft)	471.92	Hydr Depth (ft)	3.59	3.53
Min El Prs (ft)	471.72	W.P. Total (ft)	49.54	48.78
Delta EG (ft)	0.21	Conv. Total (cfs)	11716.40	11863.50
Delta WS (ft)	0.23	Top Width (ft)	45.00	45.00
BR Open Area (sq ft)	211.16	Frctn Loss (ft)	0.02	0.05
BR Open Vel (ft/s)	2.16	C & E Loss (ft)	0.00	0.04
BR Sluice Coef		Shear Total (lb/sq ft)	0.18	0.17
BR Sel Method	Energy only	Power Total (lb/ft s)	0.37	0.37

CR-312				
Plan: PR	River 1	Reach 1 RS: 1270	Profile: 100-year	
E.G. US. (ft)	473.80	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	473.74	E.G. Elev (ft)	473.70	473.22
Q Total (cfs)	1672.00	W.S. Elev (ft)	473.49	472.30
Q Bridge (cfs)	958.47	Crit W.S. (ft)	470.42	470.46
Q Weir (cfs)		Max Chl Dpth (ft)	10.33	8.52
Weir Sta Lft (ft)		Vel Total (ft/s)	3.05	7.03
Weir Sta Rgt (ft)		Flow Area (sq ft)	548.28	237.90
Weir Submerg		Froude # Chl	0.20	0.46
Weir Max Depth (ft)		Specif Force (cu ft)	1335.78	1101.68
Min El Weir Flow (ft)	471.92	Hydr Depth (ft)	1.41	1.71
Min El Prs (ft)	471.72	W.P. Total (ft)	486.40	234.98
Delta EG (ft)	1.12	Conv. Total (cfs)	20708.30	12388.50
Delta WS (ft)	1.41	Top Width (ft)	389.79	139.16
BR Open Area (sq ft)	211.16	Frctn Loss (ft)	0.27	0.26
BR Open Vel (ft/s)	4.54	C & E Loss (ft)	0.21	0.29
BR Sluice Coef		Shear Total (lb/sq ft)	0.46	1.15
BR Sel Method	Energy only	Power Total (lb/ft s)	1.40	8.09

NOTES:

1. HEC-RAS 6.2 USED FOR THE ANALYSIS.
2. ALL ELEVATIONS BASED ON THE NAV88 VERTICAL DATUM.
3. THE STARTING WATER SURFACE ELEVATION WAS BASED ON NORMAL DEPTH CALCULATION AND A BED SLOPE OF 0.0066 FT/FT.
4. SITE IS DESIGNATED AS FEMA ZONE A AS ON PANEL 48257C0225D EFFECTIVE JULY 3, 2012.
5. SOURCE OF TOPOGRAPHY DATA: USDA/NRCS-NGCE 2016 LIDAR AND PROJECT TOPOGRAPHIC SURVEY.
6. COORDINATION WITH THE LOCAL FLOODPLAIN ADMINISTRATOR WAS PERFORMED ON 07/30/2022.

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 312
HYDRAULIC DATA
MUDDY CEDAR CREEK TRIBUTARY

SHEET 4 OF 4

DN: RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	76

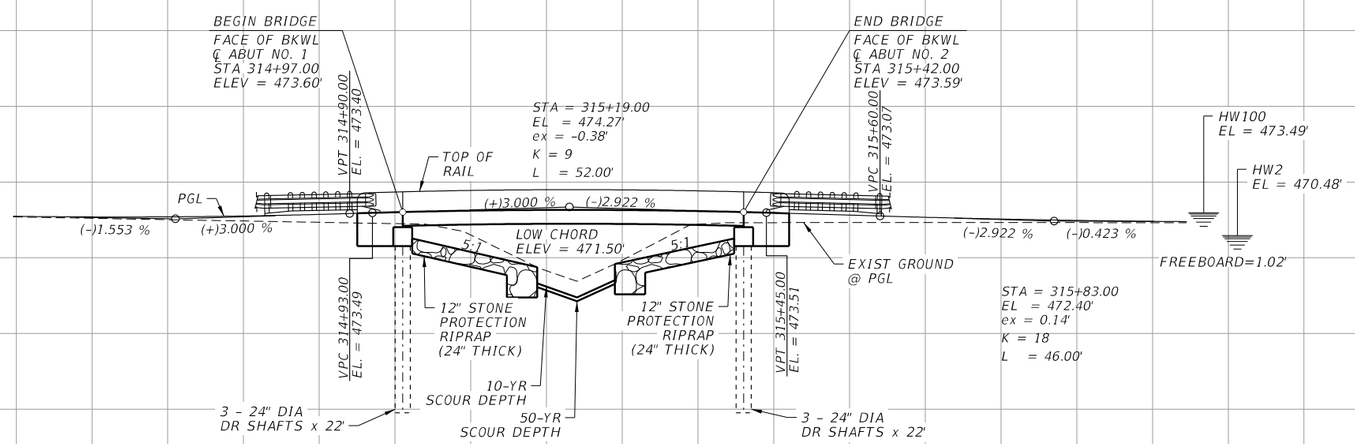
CR312_HDS00_04.dgn

Hydraulic Design Data QC (10-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft) :	4.40
Approach Velocity (ft/s) :	3.28
BR Average Depth (ft) :	4.40
BR Opening Flow (cfs) :	575
BR Top WD (ft) :	45
Grain Size D50 (mm) :	0.2
Approach Flow (cfs) :	575
Approach Top WD (ft) :	80
K1 Coefficient :	0.69
Results	
Scour Depth Ys (ft) :	2.14
Critical Velocity (ft/s) :	1.24
Equation :	Live

Hydraulic Design Data QS (50-yr)	
Contraction Scour	
	Input Data
	Channel
Average Depth (ft) :	5.41
Approach Velocity (ft/s) :	2.95
BR Average Depth (ft) :	5.41
BR Opening Flow (cfs) :	637
BR Top WD (ft) :	45
Grain Size D50 (mm) :	0.2
Approach Flow (cfs) :	637
Approach Top WD (ft) :	80
K1 Coefficient :	0.69
Results	
Scour Depth Ys (ft) :	2.64
Critical Velocity (ft/s) :	1.29
Equation :	Live

NOTES:

1. SCOUR ANALYSIS IS BASED ON TXDOT GEOTECHNICAL MANUAL (GM). FHWA H.E.C.-18, "EVALUATING SCOUR AT BRIDGES", 5TH EDITION, AND TXDOT "SCOUR EVALUATION GUIDE REVISED AUGUST 2020", CHAPTER 8. ABUTMENT SCOUR EQUATIONS IN HEC-18 TEND TO OVER ESTIMATE ABUTMENT ESTIMATE ABUTMENT SCOUR DEPTHS. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE PROTECTION RIPRAP. NO APPRECIABLE ABUTMENT SCOUR IS ANTICIPATED.
2. THE D50 SOIL PARTICLE SIZE FOR THIS PROJECT IS THE MINIMUM SIZE ALLOWED BY THE GM. THE SOIL DATA IS FROM "THE GEOTECHNICAL INVESTIGATION FOR KAUFMAN COUNTY ON & OFF-SYSTEM BRIDGE REPLACEMENT PROJECT" REPORT.
3. THE PROPOSED BRIDGE IS A SINGLE SPAN STRUCTURE. PIER SCOUR IS NOT APPLICABLE FOR THIS BRIDGE.
4. THE TOTAL MAXIMUM CALCULATED SCOUR DEPTH IS TAKEN AS THE MAXIMUM OF HORIZONTAL CONTRACTION AND VERTICAL PRESSURE SCOUR. THE MAXIMUM SCOUR DEPTH OCCURED DURING THE 50-YR STORM AND IS 2.64'.
5. SEE "HYDROLOGY/HYDRAULIC REPORT FOR MUDDY CEDAR TRIBUTARY" DATED NOVEMBER 4TH, 2022 FOR ADDITIONAL INFORMATION.



RMorfin
2/16/2023 4:57:49 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\05_DRAINAGE\CR312_HDSC_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

STATE OF TEXAS
WAN ZHANG
98668
LICENSED
PROFESSIONAL ENGINEER
wanzhang 2/16/2023

0 10 20
SCALE: 1"=20'

NO.	DATE	REVISION	APPROV.
--			
--			
--			
--			

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 312
SCOUR ANALYSIS
MUDDY CEDAR CREEK TRIBUTARY

SHEET 1 OF 1

DN: RC	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: WZ	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: WZ	DAL	KAUFMAN	0918	11	100,ETC	77

CR312_HDSC_01.dgn

SUMMARY OF ESTIMATED QUANTITIES (1)

ITEM / DESCRIPTION	0416 6002	0420 6014	0422 6002	0425 6012	0450 6005	0454 6003
	DRILL SHAFT (24 IN)	CL C CONC (ABUT) (HPC)	REINF CONC SLAB (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T221) (HPC)	ARMOR JOINT
	LF	CY	SF	LF	LF	LF
ABUTMENTS (1 AND 2)	114	19				46
45.00' PRESTR CONC SLAB BEAM UNIT TYPE 5SB15			1170	221.41	114	
TOTAL	114	19	1170	221.41	114	46

(1) PROP NBI NUMBER: 18-130-0-AA03-47-003

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 110
JONES CREEK
ESTIMATED QUANTITIES

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		78

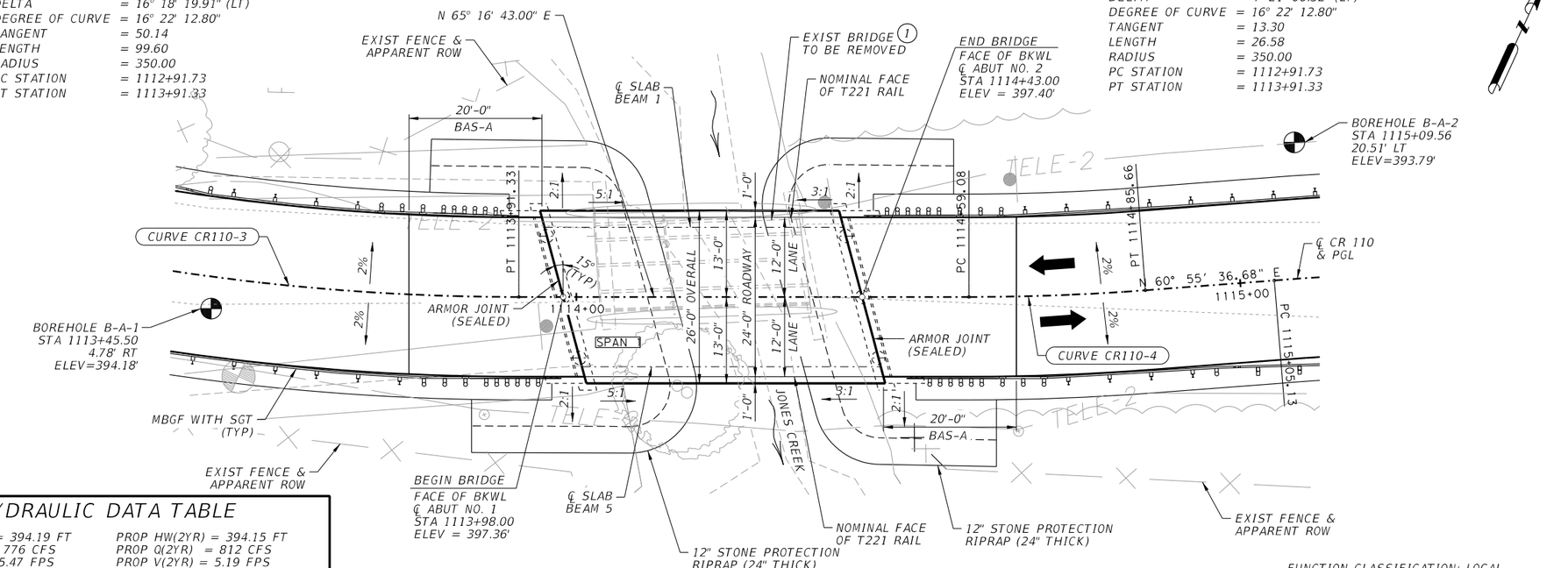
CR110_BREQ_01.dgn

HORIZONTAL DATA (CURVE CR110-3)

PI STATION	= 1113+41.87
DELTA	= 16° 18' 19.91" (LT)
DEGREE OF CURVE	= 16° 22' 12.80"
TANGENT	= 50.14
LENGTH	= 99.60
RADIUS	= 350.00
PC STATION	= 1112+91.73
PT STATION	= 1113+91.33

HORIZONTAL DATA (CURVE CR110-4)

PI STATION	= 1114+72.38
DELTA	= 4° 21' 06.32" (LT)
DEGREE OF CURVE	= 16° 22' 12.80"
TANGENT	= 13.30
LENGTH	= 26.58
RADIUS	= 350.00
PC STATION	= 1112+91.73
PT STATION	= 1113+91.33



PLAN

SCALE: 1"=20'

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL AND DETAILING GUIDE.
2. ALL ABUTMENTS AT BEARING N 39° 43' 17" W.
3. BORING LOG LOCATIONS ARE APPROXIMATE
4. REFER TO UTILITY PLAN FOR UTILITIES NOT CALLED OUT IN THE LAYOUT AND EXISTING UTLILITY RELOCATION.
5. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR RIPRAP LIMITS AND QUANTITIES.
6. SAW-CUT GROOVING OF THE BRIDGE DECK IS NOT REQUIRED.

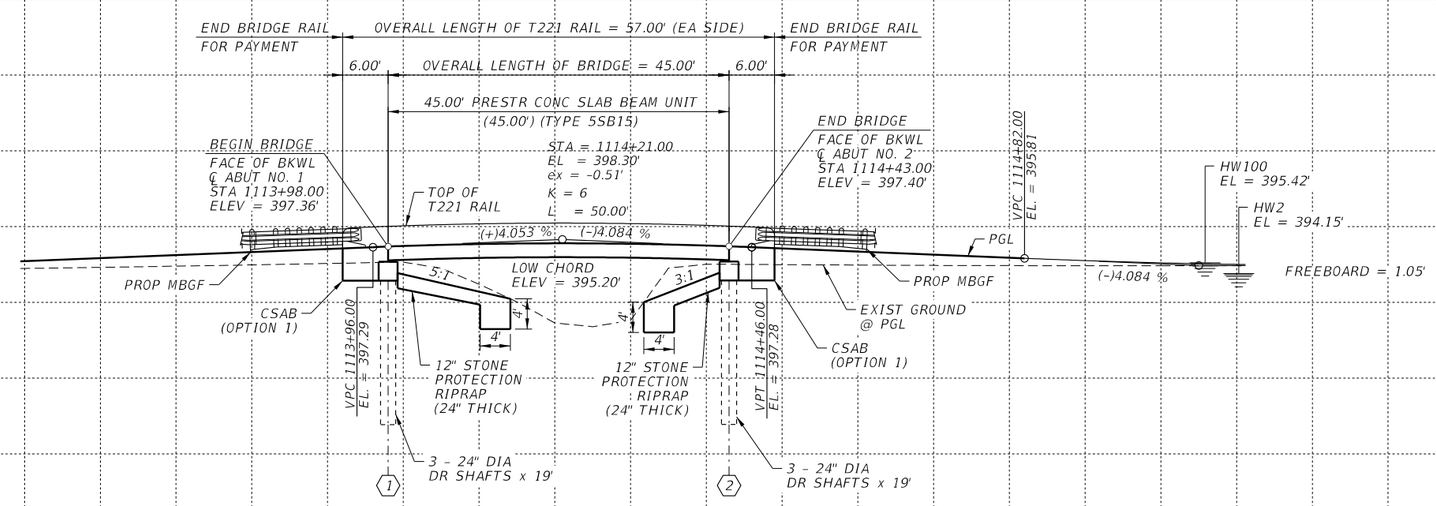
HYDRAULIC DATA TABLE

EXIST HW(2YR) = 394.19 FT	PROP HW(2YR) = 394.15 FT
EXIST Q(2YR) = 776 CFS	PROP Q(2YR) = 812 CFS
EXIST V(2YR) = 5.47 FPS	PROP V(2YR) = 5.19 FPS
EXIST HW(100YR) = 395.39 FT	PROP HW(100YR) = 395.42 FT
EXIST Q(100YR) = 907 CFS	PROP Q(100YR) = 1125 CFS
EXIST V(100YR) = 6.10 FPS	PROP V(100YR) = 5.21 FPS

(1) EXIST 2-SPAN TIMBER DECK, STEEL STRINGER BRIDGE ON STEEL PILE BENT (33'-4" x 16'-1") TO BE REMOVED. EXISTING SUBSTRUCTURE TO BE REMOVED 2' BELOW FINISHED GROUND

FUNCTION CLASSIFICATION: LOCAL
DESIGN SPEED: <15 MPH (MEETS OR EXCEEDS EXISTING)
EXISTING ADT: 30 (2023)
FUTURE ADT: 40 (2043)

EXIST NBI NUMBER: 18-130-0-AA03-47-001
PROP NBI NUMBER: 18-130-0-AA03-47-003



ELEVATION

SCALE: 1"=20'

1114+00 1115+00

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED PROFESSIONAL ENGINEER
Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation — Dallas District Bridge

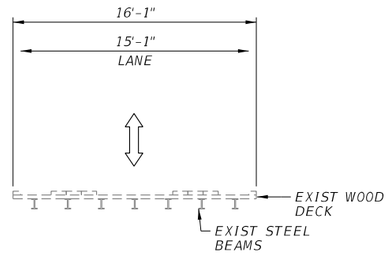
CR 110
JONES CREEK
BRIDGE LAYOUT

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		79

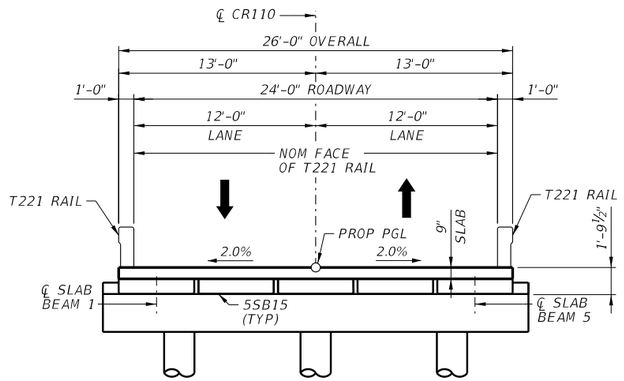
CR110_BRLY_01.dgn

RMorfin
2/16/2023 4:57:52 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR110_BRLY_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



EXISTING BRIDGE SECTION

TO BE REMOVED



PROPOSED BRIDGE TYPICAL SECTION

SCALE 1"=10'

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas
District
Bridge

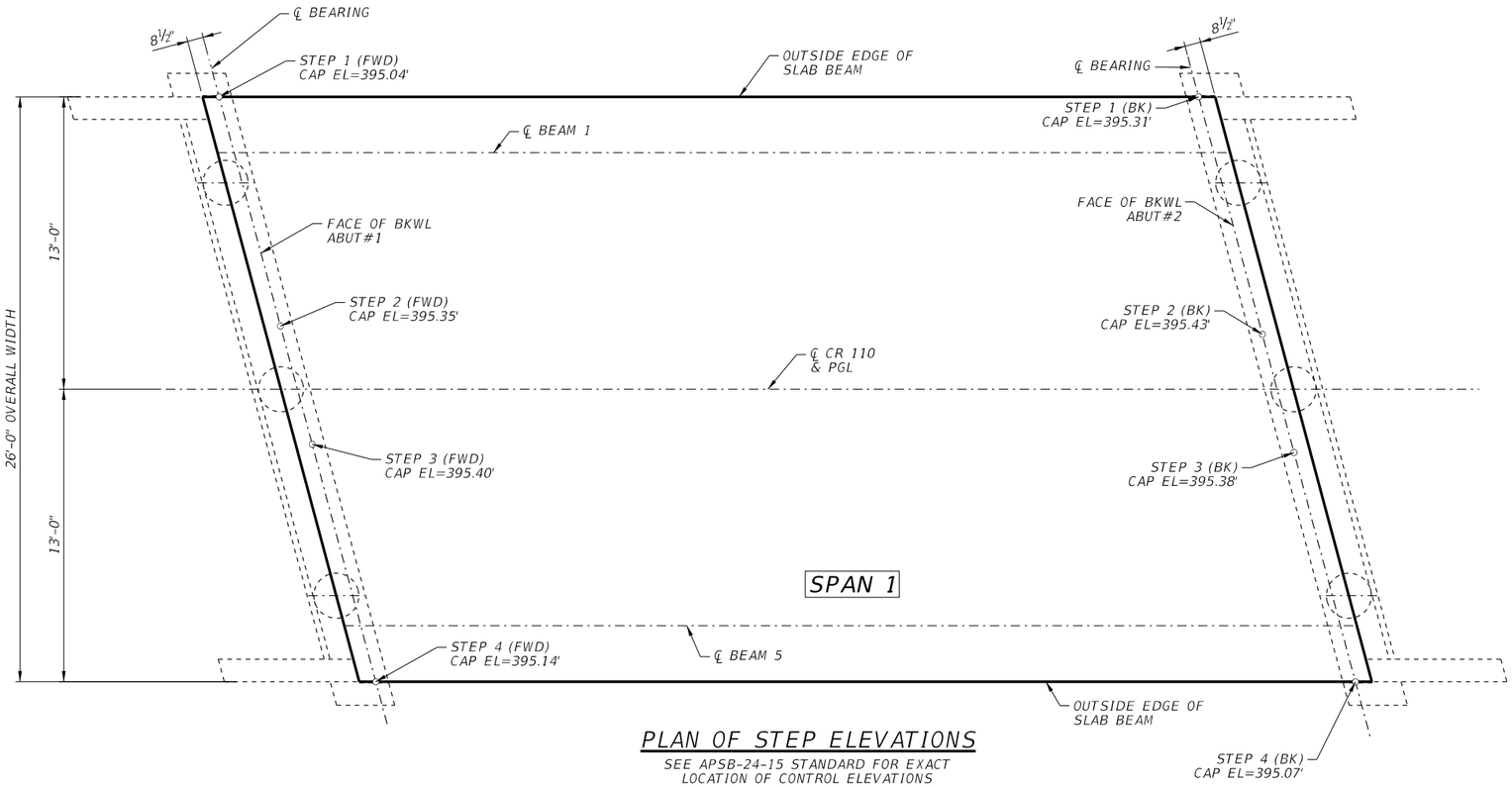
CR 110
JONES CREEK
TYPICAL SECTIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		80

CR110_BRTY_01.dgn

RMorfin
2/16/2023 4:57:53 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR110_BRTY_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



PLAN OF STEP ELEVATIONS

SEE APSB-24-15 STANDARD FOR EXACT
LOCATION OF CONTROL ELEVATIONS

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas
District
Bridge

CR 110
JONES CREEK
CAP ELEVATIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		81

CR110_BRCE_01.dgn

RMorfin
2/16/2023 4:57:54 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR110_BRCE_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-A-01	District	Dallas
Highway	CR 110	Structure	Bridge	Date	7-12-22
CSJ	0918-11-100	Station	1113+45.50	Grnd. Elev.	394.18 ft
		Offset	4.78' RT	GW Elev.	380.18 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
			CLAY, Sandy Lean Clay, Dk. Brown to Brown, Med. Stiff to Stiff, Dry to Moist (CL)							
5		8 (6) 9 (6)				15.1				-200 = 57.6%
10		11 (6) 16 (6)				18.3	32	14		-200 = 57.8%
15		6 (6) 7 (6)				21.7				-200 = 60.7%
374.2 20		50 (1) 50 (0.5)				16.5	48	33		
			SHALE, Shale, Lt. Gray to Dk. Gray to Gray, Hard, Wet (Comprised Primarily of Fat Clay) (CH)							
25		50 (1) 50 (0.5)				62.3				-200 = 97.6%
30		50 (1) 50 (0.5)				54.9	53	34		
35		50 (1.5) 50 (1.5)				38.8				-200 = 96.7%
40		50 (1) 50 (0.5)				43.0	51	34		
45		50 (1) 50 (0)				44.5				-200 = 97.6%
50		50 (0) 50 (0)				51.0	49	32		
339.2 55		50 (0) 50 (0)				39.8				-200 = 44.1%
			SAND, Clayey Sand, Lt. Gray to Gray, Very Dense, Wet (SC)							
60		50 (2) 50 (1)				34.2	32	15		

Remarks: XY Coord. - 2690180.0464, 6887816.5394 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\A - CR 110\B-A-01 & B-A-02.CLG

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-A-01	District	Dallas
Highway	CR 110	Structure	Bridge	Date	7-12-22
CSJ	0918-11-100	Station	1113+45.50	Grnd. Elev.	394.18 ft
		Offset	4.78' RT	GW Elev.	380.18 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Clayey Sand, Lt. Gray to Gray, Very Dense, Wet (SC)							
65		50 (1.5) 50 (1)				28.2				-200 = 30.3%
70		50 (2) 50 (1)				24.6	29	12		
75		50 (1.5) 50 (0.5)				48.0				-200 = 34.8%
314.2 80		50 (1.5) 50 (0.5)				37.8	40	23		
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2690180.0464, 6887816.5394 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\A - CR 110\B-A-01 & B-A-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 110
JONES CREEK
BORING LOGS

Sheet 1 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		82

CR110_BRLS_01.dgn

RMorfin
2/16/2023 4:57:55 PM
N:\P5072-18-19-4\CAD_BR_11-100\DGN\07_BRIDGES\CR110_BRLS_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-A-02	District	Dallas
Highway	CR 110	Structure	Bridge	Date	7-13-22
CSJ	0918-11-100	Station	1115+09.56	Grnd. Elev.	393.79 ft
		Offset	20.51' LT	GW Elev.	374.79 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
			CLAY, Lean Clay w/ Sand to Sandy Lean Clay, Dk. Grayish Brown to Brown, Med. Stiff to Stiff, Dry to Moist (CL)							
5		5 (6) 5 (6)				8.4				-200 = 78.8%
10		7 (6) 9 (6)				19.2	39	23		-200 = 63.9%
378.8 15		7 (6) 9 (6)				20.2				-200 = 47.9%
			SAND, Clayey Sand, Grayish Brown, Loose, Moist (SC)							
373.8 20		50 (1.5) 50 (0.5)				18.8	55	37		
			SHALE, Shale, Lt. Gray to Gray, Hard, Moist to Wet (Comprised of Fat Clay) (CH)							
25		50 (1) 50 (0.5)				55.8				-200 = 94.3%
30		50 (1) 50 (0.5)				52.5	56	35		
35		50 (1.5) 50 (0.5)				51.9				-200 = 97.0%
40		50 (1) 50 (0)				49.6	57	37		
45		50 (1) 50 (0)				51.1				-200 = 95.5%
50		50 (1.5) 50 (1)				52.3	58	32		
338.8 55		50 (1.5) 50 (0.5)				59.8				-200 = 59.0%
			SHALE, Shale, Lt. Gray, Hard, Wet (Comprised of Sandy Lean Clay) (CL)							
60		50 (1.5) 50 (0)				44.7	40	25		

Remarks: XY Coord. - 2690317.6860, 6887907.4571 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\A - CR 110\B-A-01 & B-A-02.CLG

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-A-02	District	Dallas
Highway	CR 110	Structure	Bridge	Date	7-13-22
CSJ	0918-11-100	Station	1115+09.56	Grnd. Elev.	393.79 ft
		Offset	20.51' LT	GW Elev.	374.79 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
			SHALE, Shale, Lt. Gray, Hard, Wet (Comprised of Sandy Lean Clay) (CL)							
328.8 65		50 (0.5) 50 (0)				34.3				-200 = 37.2%
			SAND, Clayey Sand, Lt. Gray to Gray, Very Dense to Dense, Wet (SC)							
70		50 (0) 50 (0)				26.1	30	15		
75		50 (3) 50 (3)				42.8				-200 = 33.1%
313.8 80		30 (6) 50 (5)				41.6	39	21		
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2690317.6860, 6887907.4571 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\A - CR 110\B-A-01 & B-A-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 110
JONES CREEK
BORING LOGS

Sheet 2 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		83

CR110_BRLS_02.dgn

SUMMARY OF ESTIMATED QUANTITIES (1)

ITEM / DESCRIPTION	0416 6002	0420 6014	0422 6002	0425 6012	0450 6005	0454 6003
	DRILL SHAFT (24 IN)	CL C CONC (ABUT) (HPC)	REINF CONC SLAB (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T221) (HPC)	ARMOR JOINT
	LF	CY	SF	LF	LF	LF
ABUTMENTS (1 AND 2)	174	18.4				44
50.00' PRESTR CONC SLAB BEAM UNIT TYPE 5SB15			1300	247.50	124	
TOTAL	174	18.4	1300	247.50	124	44

(1) PROP NBI NUMBER: 18-130-0-AA02-62-005

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation | Dallas District Bridge

CR 279
BACHELOR CREEK RELIEF
ESTIMATED QUANTITIES

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		84

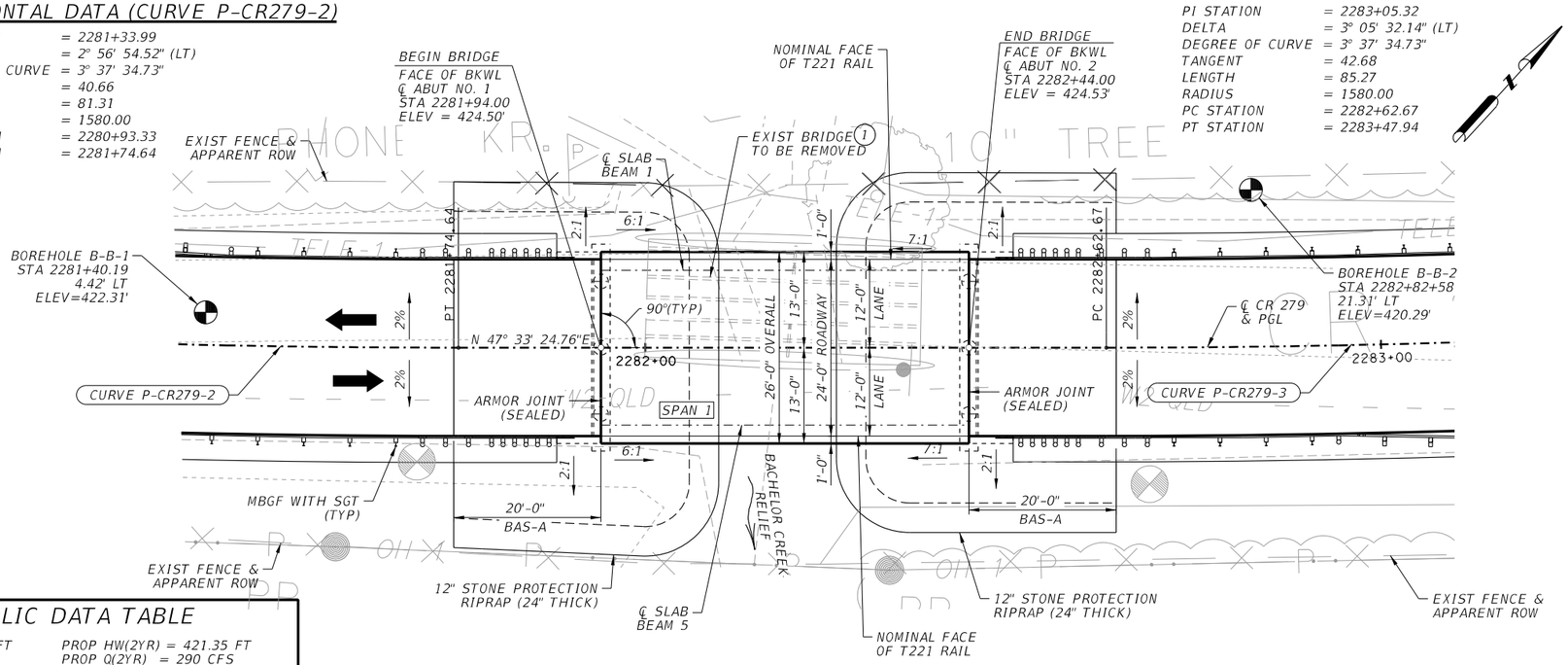
CR279_BREQ_01.dgn

HORIZONTAL DATA (CURVE P-CR279-2)

PI STATION	= 2281+33.99
DELTA	= 2° 56' 54.52" (LT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 40.66
LENGTH	= 81.31
RADIUS	= 1580.00
PC STATION	= 2280+93.33
PT STATION	= 2281+74.64

HORIZONTAL DATA (CURVE P-CR279-3)

PI STATION	= 2283+05.32
DELTA	= 3° 05' 32.14" (LT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 42.68
LENGTH	= 85.27
RADIUS	= 1580.00
PC STATION	= 2282+62.67
PT STATION	= 2283+47.94



PLAN
SCALE: 1"=20'

HYDRAULIC DATA TABLE

EXIST HW(2YR) = 421.36 FT	PROP HW(2YR) = 421.35 FT
EXIST Q(2YR) = 113 CFS	PROP Q(2YR) = 290 CFS
EXIST V(2YR) = 5.00 FPS	PROP V(2YR) = 0.71 FPS
EXIST HW(100YR) = 422.87 FT	PROP HW(100YR) = 422.87 FT
EXIST Q(100YR) = 1304 CFS	PROP Q(100YR) = 1746 CFS
EXIST V(100YR) = 1.02 FPS	PROP V(100YR) = 1.47 FPS

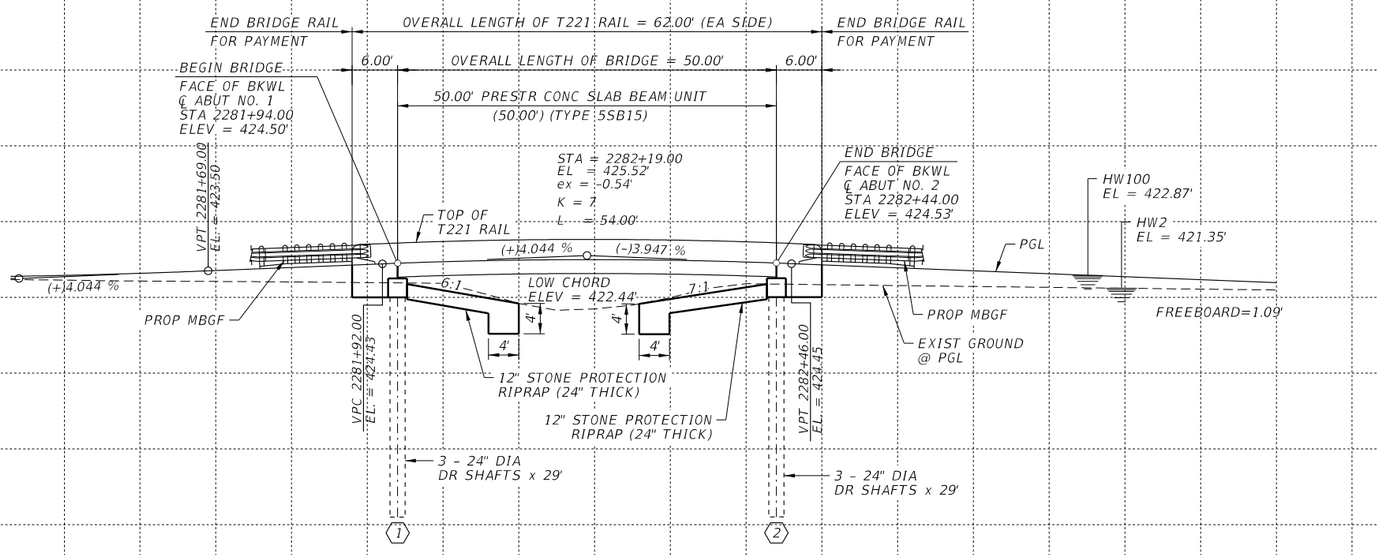
GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL AND DETAILING GUIDE.
2. ALL ABUTMENTS AT BEARING N 42° 26' 35.24" W.
3. BORING LOG LOCATIONS ARE APPROXIMATE
4. REFER TO UTILITY PLAN FOR UTILITIES NOT CALLED OUT IN THE LAYOUT AND EXISTING UTLILITY RELOCATION.
5. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR RIPRAP LIMITS AND QUANTITIES.
6. SAW-CUT GROOVING OF THE BRIDGE DECK IS NOT REQUIRED.

(1) EXIST 2 SPAN TIMBER DECK, STEEL STRINGER BRIDGE ON STEEL PILE BENTS (37'-1" x 16'-2") TO BE REMOVED. EXISTING SUBSTRUCTURE TO BE REMOVED 2' BELOW FINISHED GROUND.

FUNCTION CLASSIFICATION: LOCAL
DESIGN SPEED: 20 MPH (MEETS OR EXCEEDS EXISTING)
EXISTING ADT: 25 (2023)
FUTURE ADT: 35 (2043)

EXIST NBI NUMBER: 18-130-0-AA02-62-002
PROP NBI NUMBER: 18-130-0-AA02-62-005



ELEVATION
SCALE: 1"=20'

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation
Dallas District Bridge

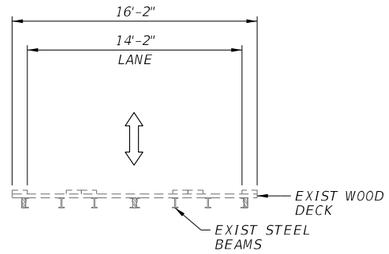
CR 279
BACHELOR CREEK RELIEF
BRIDGE LAYOUT

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		85

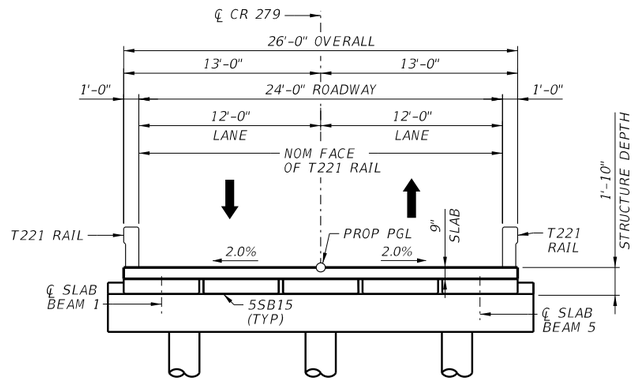
CR279_BRLY_01.dgn

RMorfin
2/16/2023 4:58:07 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR279_BRLY_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



EXISTING BRIDGE SECTION

TO BE REMOVED



PROPOSED BRIDGE TYPICAL SECTION

SCALE 1"=10'

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

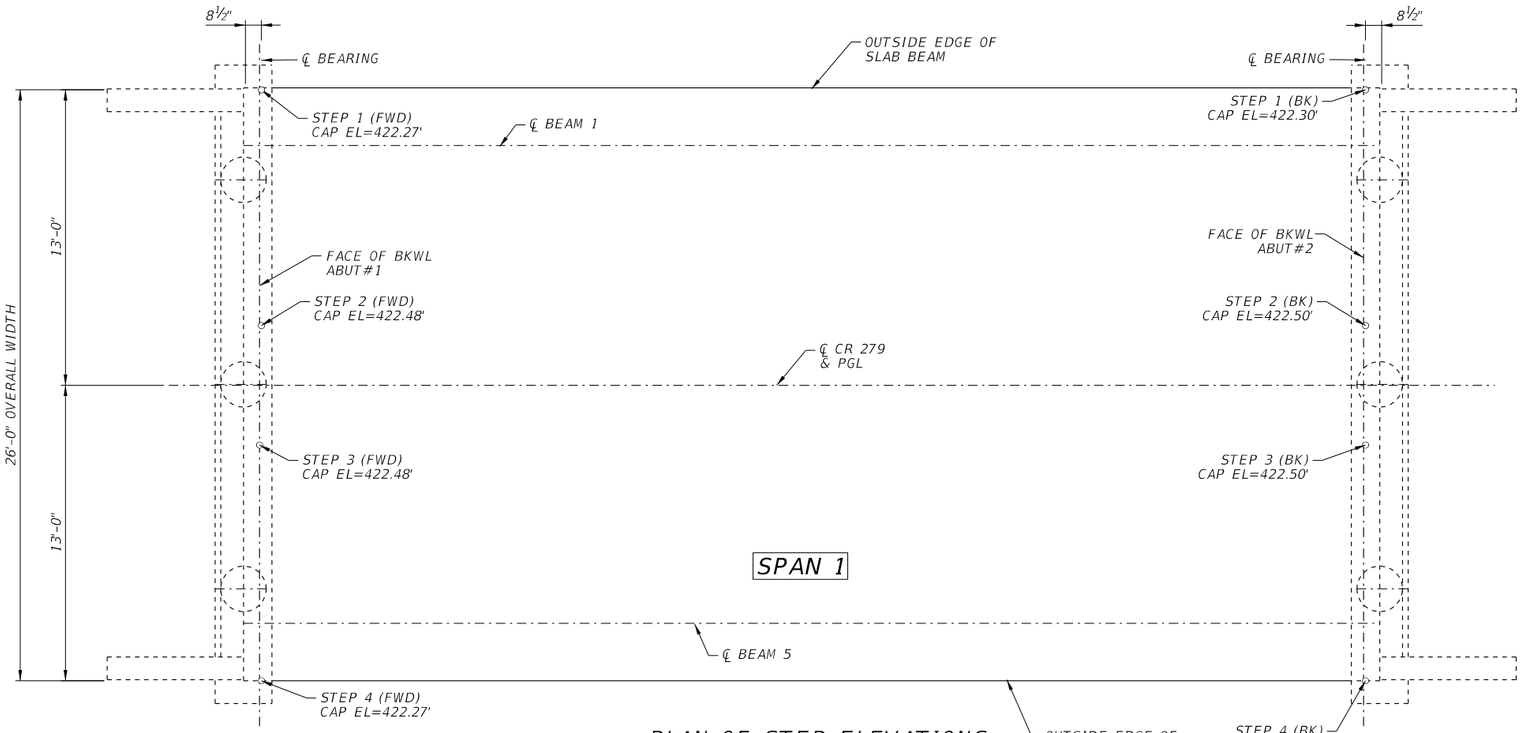
Dallas District Bridge

CR 279
BACHELOR CREEK RELIEF
TYPICAL SECTIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		86

CR279_BRTY_01.dgn



PLAN OF STEP ELEVATIONS

SEE APSB-24 STANDARD FOR EXACT LOCATION OF CONTROL ELEVATIONS

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 279
BACHELOR CREEK RELIEF
CAP ELEVATIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		87

CR279_BRCE_01.dgn

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-B-01	District	Dallas
Highway	CR 279	Structure	Bridge	Date	7-14-22
CSJ	0918-11-101	Station	2281+40.19	Grnd. Elev.	422.31 ft
		Offset	4.42' LT	GW Elev.	398.31 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Clayey Sand, Lt. Brown, Med. Dense, Dry (SC)							
5		11 (6) 12 (6)				4.6	21	8		-200 = 34.2%
412.3 10		10 (6) 12 (6)				14.8				-200 = 51.4%
			CLAY, Sandy Lean Clay, Lt. Grayish Brown to Grayish Brown, Stiff to Very Stiff, Dry to Moist (CL)							
15		13 (6) 19 (6)				10.3	37	26		
20		11 (6) 13 (6)				21.6				-200 = 58.2%
25		12 (6) 23 (6)				19.1	28	17		
392.3 30		47 (6) 49 (6)				27.6				-200 = 89.0%
			CLAY, Fat Clay, Grayish Brown to Gray, Hard, Moist to Wet (CH)							
35		47 (6) 50 (5)				41.7	65	45		
40		50 (6) 47 (6)				31.8				-200 = 91.5%
377.3 45		50 (3.5) 50 (1)				55.3	67	46		
			SHALE, Shale, Gray, Hard, Wet (Comprised of Fat Clay and Fat Clay w/ Sand) (CH)							
50		50 (0.5) 50 (0.5)				61.8				-200 = 91.2%
55		50 (0.5) 50 (0.5)				46.0	50	36		
60		50 (1) 50 (0.5)				60.9				-200 = 82.0%

Remarks: XY Coord. - 2651966.9360, 6930037.5840 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\B - CR 279\B-B-01 & B-B-02.CLG

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-B-01	District	Dallas
Highway	CR 279	Structure	Bridge	Date	7-14-22
CSJ	0918-11-101	Station	2281+40.19	Grnd. Elev.	422.31 ft
		Offset	4.42' LT	GW Elev.	398.31 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
			SHALE, Shale, Gray, Hard, Wet (Comprised of Fat Clay and Fat Clay w/ Sand) (CH)							
65		50 (1.5) 50 (0.5)				56.1	70	47		
70		50 (1) 50 (0.5)				51.5				-200 = 89.7%
75		50 (1) 50 (0.5)				53.1	75	53		
342.3 80		50 (0.5) 50 (0.5)				41.8				-200 = 49.3%
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2651966.9360, 6930037.5840 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\B - CR 279\B-B-01 & B-B-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 279
BACHELOR CREEK RELIEF
BORING LOGS

Sheet 1 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		88

CR279_BRLS_01.dgn

RMorfin
2/16/2023 4:58:09 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR279_BRLS_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-B-02	District	Dallas
Highway	CR 279	Structure	Bridge	Date	7-15-22
CSJ	0918-11-101	Station	2282+82.58	Grnd. Elev.	420.29 ft
		Offset	21.31' LT	GW Elev.	399.29 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
			CLAY, Lean Clay w/ Sand, Dk. Brown to Brown, Very Stiff, Dry (CL)							
5		11 (6) 22 (6)				13.6	35	23		-200 = 76.0%
410.3 10		10 (6) 12 (6)				19.3				-200 = 34.0%
			SAND, Clayey Sand, Brown to Lt. Brown, Med. Dense, Dry to Moist (SC)							
15		11 (6) 14 (6)				13.9	36	22		
400.3 20		6 (6) 7 (6)				16.5				-200 = 51.7%
			CLAY, Sandy Lean Clay, Lt. Brown to Lt. Grayish Brown, Med. Stiff to Very Stiff, Moist to Wet (CL)							
25		13 (6) 19 (6)				21	42	27		
390.3 30		28 (6) 50 (5.5)				24.8				-200 = 94.4%
			CLAY, Fat Clay, Gray, Hard, Wet (CH)							
385.3 35		50 (3) 50 (2.5)				47.5	55	40		
			SHALE, Shale, Gray to Dk. Gray, Hard, Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)							
40		50 (2.5) 50 (2.5)				51.2				-200 = 76.3%
45		50 (2) 50 (0.5)				52.0	56	37		
50		50 (1) 50 (0.5)				67.9				-200 = 88.7%
55		50 (0.5) 50 (0.5)				47.9	45	30		
60		50 (1) 50 (0)				65.0				-200 = 79.5%

Remarks: XY Coord. - 2652060.5143, 6930145.7070 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\B - CR 279\B-B-01 & B-B-02.CLG

DRILLING LOG

WinCore Version 3.3

County	Kaufman	Hole	B-B-02	District	Dallas
Highway	CR 279	Structure	Bridge	Date	7-15-22
CSJ	0918-11-101	Station	2282+82.58	Grnd. Elev.	420.29 ft
		Offset	21.31' LT	GW Elev.	399.29 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
			SHALE, Shale, Gray to Dk. Gray, Hard, Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)							
65		50 (1) 50 (0.5)				56.5	62	44		
70		50 (1) 50 (0.5)				56.5				-200 = 84.1%
75		50 (3) 50 (2)				60.3	67	48		
340.3 80		50 (1) 50 (0.5)				48.3				-200 = 51.7%
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2652060.5143, 6930145.7070 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\B - CR 279\B-B-01 & B-B-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 279
BACHELOR CREEK RELIEF
BORING LOGS

Sheet 2 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		89

CR279_BRLS_02.dgn

RMorfin
2/16/2023 4:58:14 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR279_BRLS_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

SUMMARY OF ESTIMATED QUANTITIES (1)

ITEM / DESCRIPTION	0416 6002	0420 6014	0422 6002	0425 6012	0450 6005	0454 6003
	DRILL SHAFT (24 IN)	CL C CONC (ABUT) (HPC)	REINF CONC SLAB (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T221) (HPC)	ARMOR JOINT
	LF	CY	SF	LF	LF	LF
ABUTMENTS (1 AND 2)	132	18.4				44
45.00' PRESTR CONC SLAB BEAM UNIT TYPE 5SB15			1170	222.50	114	
TOTAL	132	18.4	1170	222.50	114	44

(1) PROP NBI NUMBER: 18-130-0-AA03-12-003

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC

F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas
District
Bridge

CR 312
MUDDY CEDAR CREEK TRIBUTARY
ESTIMATED QUANTITIES

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		90

CR312_BREQ_01.dgn

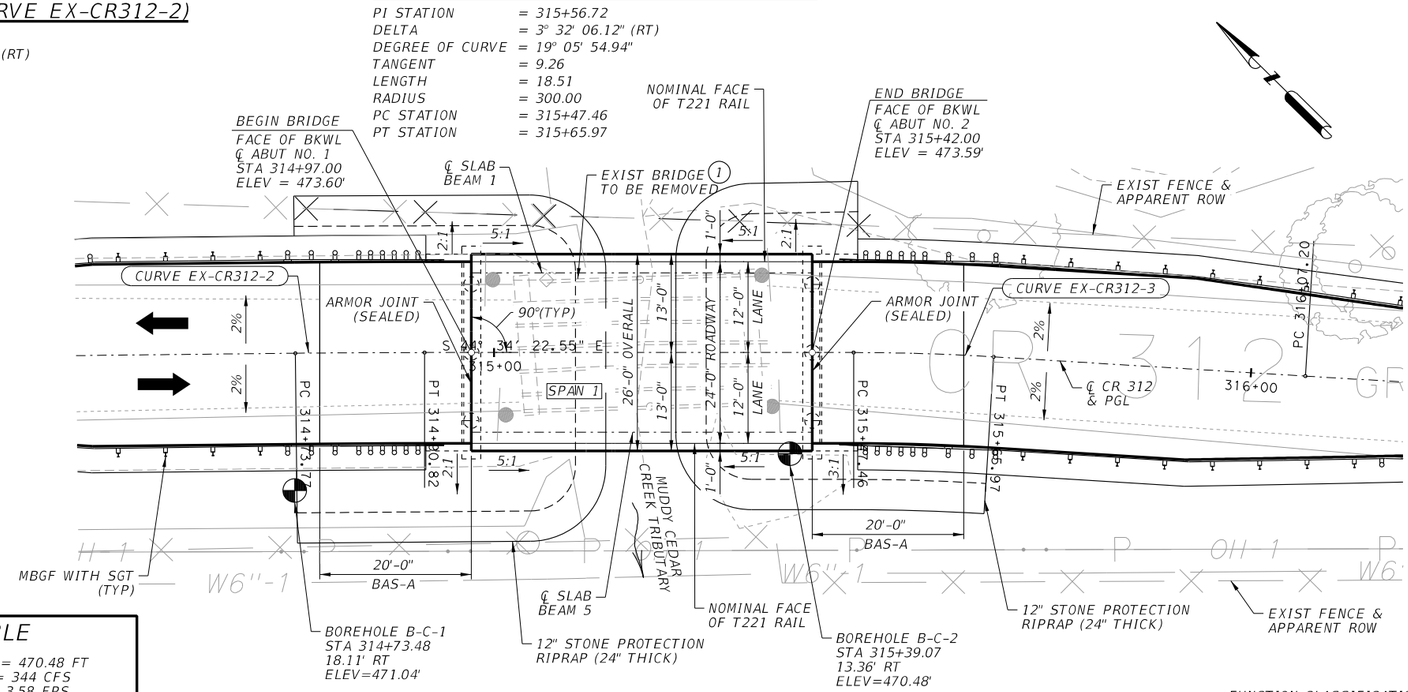
RMorfin
2/16/2023 4:58:19 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR312_BREQ_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

HORIZONTAL DATA (CURVE EX-CR312-2)

PI STATION	= 314+82.29
DELTA	= 0° 37' 34.73" (RT)
DEGREE OF CURVE	= 3° 37' 34.73"
TANGENT	= 8.52
LENGTH	= 17.05
RADIUS	= 1580.00
PC STATION	= 314+73.77
PT STATION	= 314+90.82

HORIZONTAL DATA (CURVE EX-CR312-3)

PI STATION	= 315+56.72
DELTA	= 3° 32' 06.12" (RT)
DEGREE OF CURVE	= 19° 05' 54.94"
TANGENT	= 9.26
LENGTH	= 18.51
RADIUS	= 300.00
PC STATION	= 315+47.46
PT STATION	= 315+65.97



PLAN

SCALE: 1"=20'

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (HL93 LOADING) (9TH EDITION) AND MODIFIED BY THE TXDOT LRFD BRIDGE DESIGN MANUAL AND DETAILING GUIDE.
2. ALL ABUTMENTS AT BEARING N 45°25'37.45" E.
3. BORING LOG LOCATIONS ARE APPROXIMATE
4. REFER TO UTILITY PLAN FOR UTILITIES NOT CALLED OUT IN THE LAYOUT AND EXISTING UTLILITY RELOCATION.
5. REFER TO ROADWAY PLAN & PROFILE SHEETS FOR RIPRAP LIMITS AND QUANTITIES.
6. SAW-CUT GROOVING OF THE BRIDGE DECK IS NOT REQUIRED.

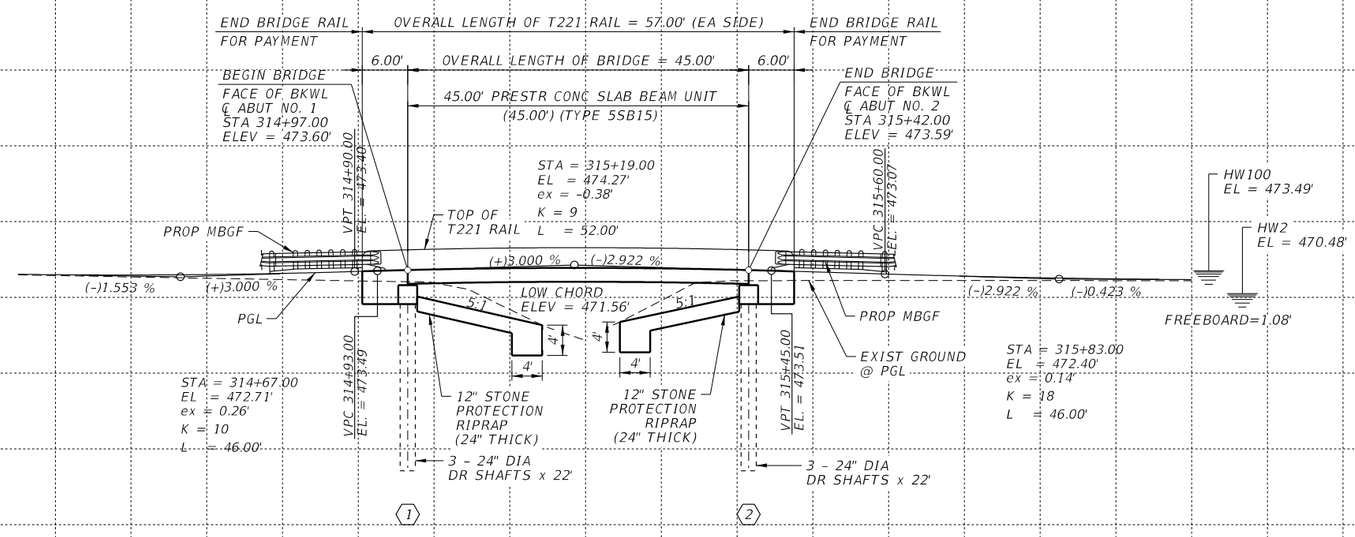
HYDRAULIC DATA TABLE

EXIST HW(2YR) = 470.68 FT	PROP HW(2YR) = 470.48 FT
EXIST Q(2YR) = 344 CFS	PROP Q(2YR) = 344 CFS
EXIST V(2YR) = 3.40 FPS	PROP V(2YR) = 3.58 FPS
EXIST HW(100YR) = 473.66 FT	PROP HW(100YR) = 473.74 FT
EXIST Q(100YR) = 1672 CFS	PROP Q(100YR) = 1672 CFS
EXIST V(100YR) = 2.92 FPS	PROP V(100YR) = 2.79 FPS

(1) EXIST SINGLE TIMBER DECK, STEEL STRINGER BRIDGE ON CONCRETE ABUTMENTS (32' x 18'-2") TO BE REMOVED. EXISTING SUBSTRUCTURE TO BE REMOVED 2' BELOW FINISHED GROUND.

FUNCTION CLASSIFICATION: LOCAL
DESIGN SPEED: 15 MPH (MEETS OR EXCEEDS EXISTING)
EXISTING ADT: 30 (2023)
FUTURE ADT: 40 (2023)

EXIST NBI NUMBER: 18-130-0-AA03-12-001
PROP NBI NUMBER: 18-130-0-AA03-12-003



ELEVATION

SCALE: 1"=20'

LLOYD WOLF
73649
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
Lloyd M. Wolf, P.E.
2/16/2023

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation — Dallas District Bridge

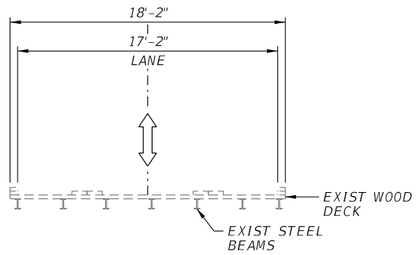
CR 312
MUDDY CEDAR CREEK TRIBUTARY
BRIDGE LAYOUT

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		91

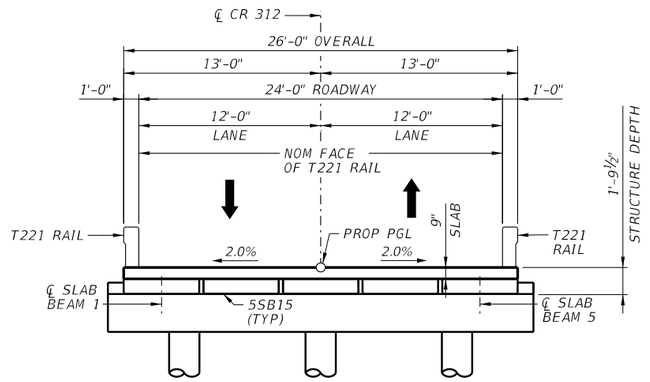
CR312_BRLY_01.dgn

RMorfin
2/16/2023 4:58:21 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR312_BRLY_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



EXISTING BRIDGE SECTION

TO BE REMOVED



PROPOSED BRIDGE TYPICAL SECTION

SCALE 1"=10'

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

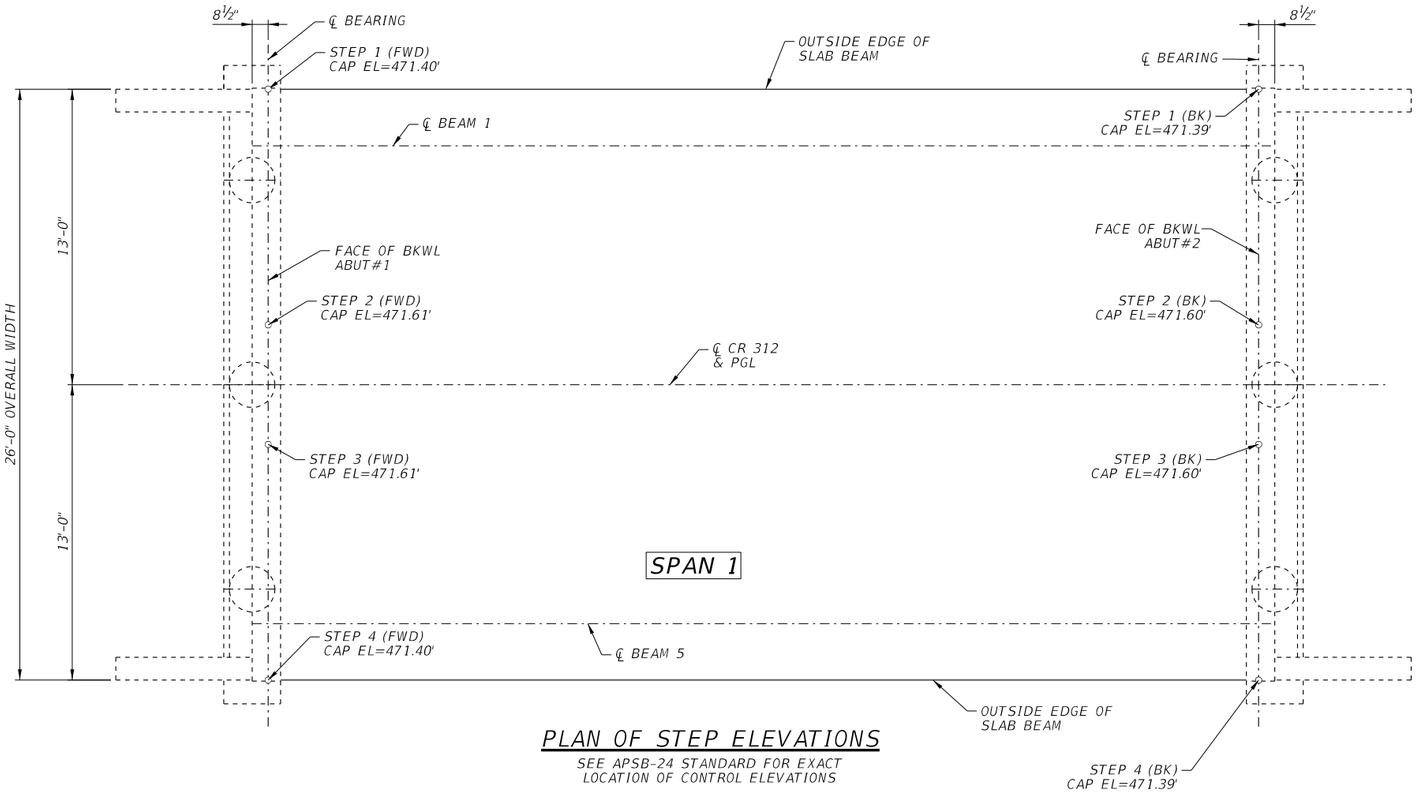
Dallas District Bridge

CR 312
MUDDY CEDAR CREEK TRIBUTARY
TYPICAL SECTIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		92

CR312_BRTY_01.dgn



PLAN OF STEP ELEVATIONS

SEE APSB-24 STANDARD FOR EXACT
LOCATION OF CONTROL ELEVATIONS

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas
District
Bridge

CR 312
MUDDY CEDAR CREEK TRIBUTARY
CAP ELEVATIONS

Sheet 1 of 1 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		93

CR312_BRCE_01.dgn

RMorfin
2/16/2023 4:58:23 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR312_BRCE_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DRILLING LOG

WinCore
Version 3.3

County	Kaufman	Hole	B-C-01	District	Dallas
Highway	CR 312	Structure	Bridge	Date	8-16-22
CSJ	0918-11-102	Station	314+73.48	Grnd. Elev.	471.04 ft
		Offset	18.11' RT	GW Elev.	439.04 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
		33 (6) 37 (6)	SAND, Clayey Sand, Lt. Brown to Lt. Grayish Brown, Dense, Dry (SC)			3.7				-200 = 44.3%
5										
461. 10		15 (6) 14 (6)				5.8	38	22		-200 = 60.0%
		16 (6) 19 (6)	CLAY, Sandy Lean Clay, Lt. Gray to Grayish Brown, Very Stiff, Dry to Moist (CL)			28.3				-200 = 59.1%
15										
451. 20		25 (6) 31 (6)				27.6	64	38		
		50 (3.5) 50 (3.5)	CLAY, Fat Clay w/ Sand, Gray to Dk. Brown, Hard, Moist (CH)			22.4				-200 = 74.5%
25										
441. 30		50 (1) 50 (0.5)				19.2	55	34		
		50 (1) 50 (0.5)	SHALE, Shale, Dk. Gray to Gray, Hard, Moist to Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)			98.7				-200 = 70.9%
35										
40		50 (1) 50 (0.5)				85.8	71	46		
		50 (1.5) 50 (0)				89.8				-200 = 82.0%
45										
50		50 (1) 50 (0.5)				99.7	76	49		
		50 (1) 50 (0)				85.5				-200 = 43.9%
55										
60		50 (1) 50 (0)				85.9	71	44		

Remarks: XY Coord. - 2688828.6750, 6944230.5032 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\C - CR 312\B-C-01 & B-C-02.CLG

DRILLING LOG

WinCore
Version 3.3

County	Kaufman	Hole	B-C-01	District	Dallas
Highway	CR 312	Structure	Bridge	Date	8-16-22
CSJ	0918-11-102	Station	314+73.48	Grnd. Elev.	471.04 ft
		Offset	18.11' RT	GW Elev.	439.04 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
65		50 (1.5) 50 (0.5)	SHALE, Shale, Dk. Gray to Gray, Hard, Moist to Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)			82.1				-200 = 83.0%
70		50 (1.5) 50 (0.5)				80.5	72	43		
75		50 (1) 50 (0)								
391. 80		50 (1.5) 50 (0.5)								
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2688828.6750, 6944230.5032 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\C - CR 312\B-C-01 & B-C-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 312
MUDDY CEDAR CREEK TRIBUTARY
BORING LOGS

Sheet 1 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		94

CR312_BRLS_01.dgn

RMorfin
2/16/2023 4:58:24 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR312_BRLS_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DRILLING LOG

WinCore
Version 3.3

County	Kaufman	Hole	B-C-02	District	Dallas
Highway	CR 312	Structure	Bridge	Date	8-17-22
CSJ	0918-11-102	Station	315+39.07	Grnd. Elev.	470.48 ft
		Offset	13.36' RT	GW Elev.	422.48 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
		35 (6) 40 (6)	CLAY, Sandy Lean Clay, Lt. Gray, Hard to Stiff, Dry (CL)			8.8	40	24		
5		9 (6) 9 (6)				10.3				-200 = 53.5%
10		15 (6) 16 (6)				34.8	86	57		-200 = 95.4%
455.5 15		35 (6) 27 (6)	CLAY, Fat Clay to Fat Clay w/ Sand, Lt. Gray to Brown, Very Stiff to Hard, Dry to Moist (CH)			30.2				-200 = 70.4%
20		50 (5) 50 (2.5)				22.3	65	46		
25		50 (0.5) 50 (0.5)				19.5				-200 = 62.9%
440.5 30		50 (1) 50 (0.5)	SHALE, Shale, Gray to Dk. Gray, Hard, Moist to Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)			20.0	59	39		
35		50 (1.5) 50 (1)				20.6				-200 = 68.0%
40		50 (2) 50 (1)				22	64	44		
45		22 (6) 50 (5.5)				19.5				-200 = 80.8%
50		50 (1.5) 50 (0.5)				46.5	67	50		
55		50 (1) 50 (0)				66.5				-200 = 80.5%
60										

Remarks: XY Coord. - 2688878.0207, 6944187.3241 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\C - CR 312\B-C-01 & B-C-02.CLG

DRILLING LOG

WinCore
Version 3.3

County	Kaufman	Hole	B-C-02	District	Dallas
Highway	CR 312	Structure	Bridge	Date	8-17-22
CSJ	0918-11-102	Station	315+39.07	Grnd. Elev.	470.48 ft
		Offset	13.36' RT	GW Elev.	422.48 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
65		50 (1.5) 50 (0.5)	SHALE, Shale, Gray to Dk. Gray, Hard, Moist to Wet (Comprised Primarily of Fat Clay w/ Sand) (CH)			73.3	64	44		
70		50 (1.5) 50 (0.5)				69.2				-200 = 77.1%
75		50 (1) 50 (0.5)				73.5	68	47		
390.5 80		50 (1) 50 (0.5)				75.5				-200 = 81.6%
85										
90										
95										
100										
105										
110										
115										
120										

Remarks: XY Coord. - 2688878.0207, 6944187.3241 (Provided By Client).

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: NR **Logger: JR** **Organization: B2Z Engineering**

B:\JOBS\Entech\TxDOT 36-8IDP5072 - On & Off-System Bridge PS&E - Statewide & Houston\WA#2 (Entech WA#4) - Kaufman County\TechProd\Borings\Info from Lab\8. Wincore\C - CR 312\B-C-01 & B-C-02.CLG

STATE OF TEXAS
LLOYD WOLF
73649
LICENSED
PROFESSIONAL ENGINEER

Lloyd M. Wolf, P.E.
2/16/2023

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

Texas Department of Transportation

Dallas District Bridge

CR 312
MUDDY CEDAR CREEK TRIBUTARY
BORING LOGS

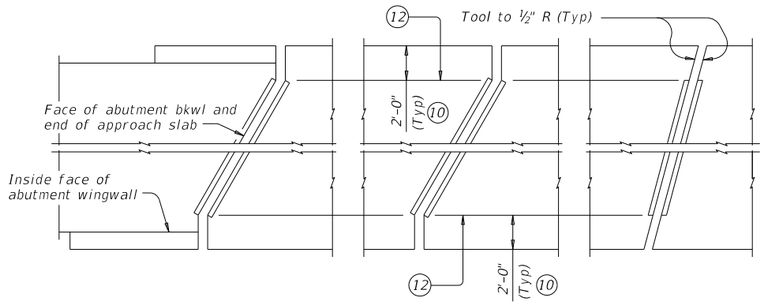
Sheet 2 of 2 Sheets

FILE: SEE PATH	DN: RM	CK: LW	DW: RM	CK: LW
©TxDOT	CONT	SECT	JOB	HIGHWAY
	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		95

CR312_BRLS_02.dgn

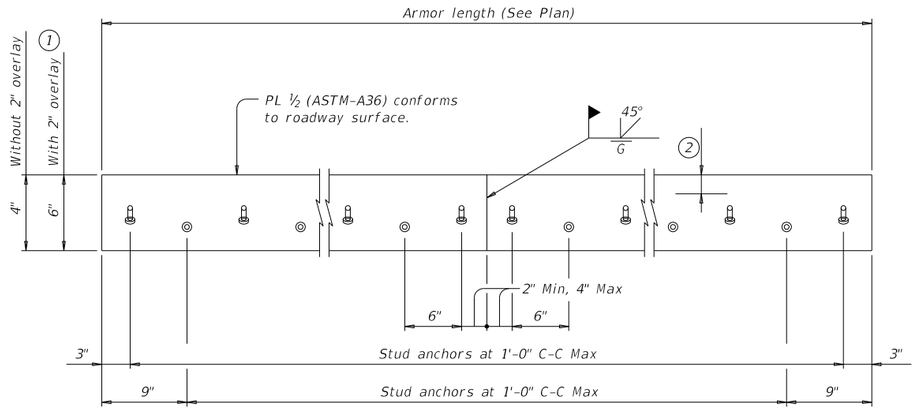
RMorfin
2/16/2023 4:58:28 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\CR312_BRLS_02.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

DATE: 2/16/2023 4:58:33 PM
FILE: N:\P5072-18-19-4\CADD_BR 11-100\DGN\07_BRIDGES\StdDetails\ajstde01-19.dgn



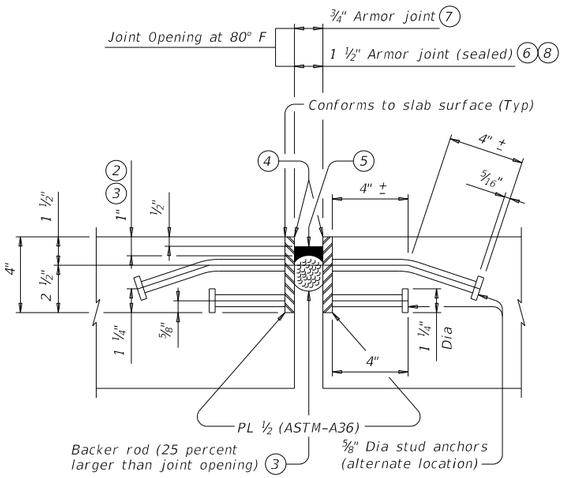
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

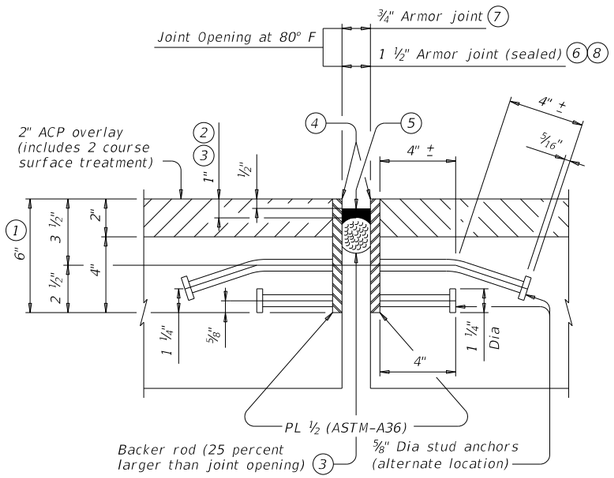


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



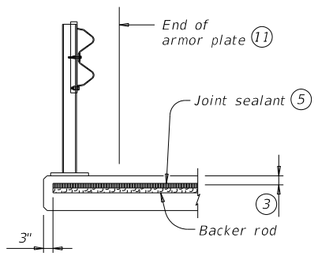
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



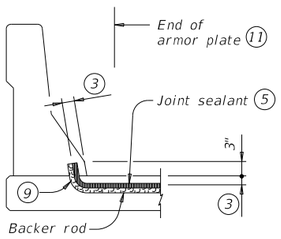
SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

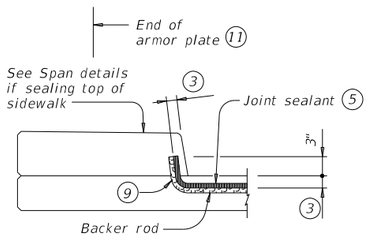
Showing Armor Joint (Sealed)



AT STEEL POST BRIDGE RAIL



AT CONCRETE BRIDGE RAIL



AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

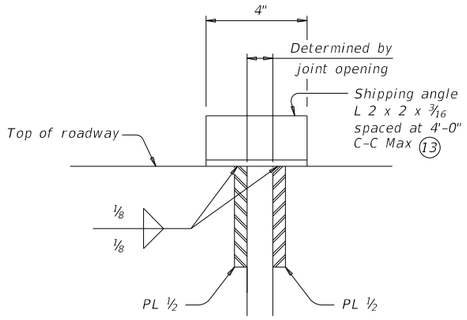
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.

These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION
With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY 1	22.90 plf

Texas Department of Transportation

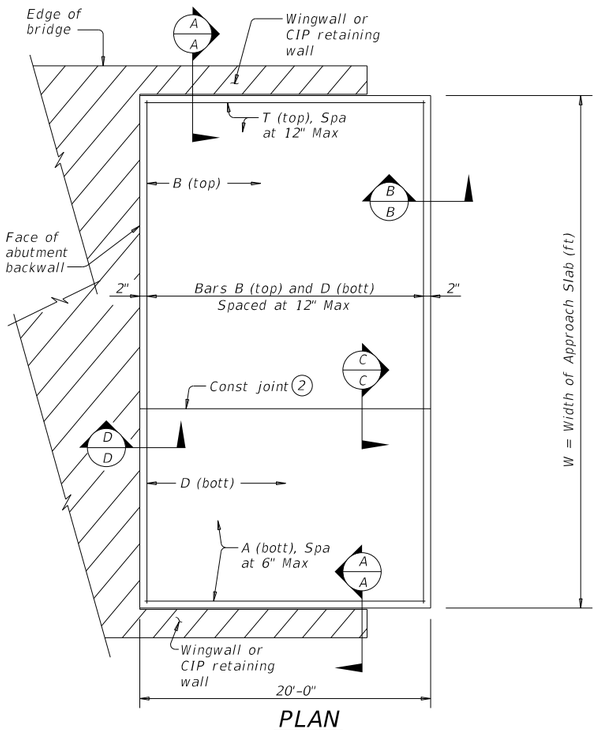
Bridge Division Standard

ARMOR JOINT DETAILS

AJ

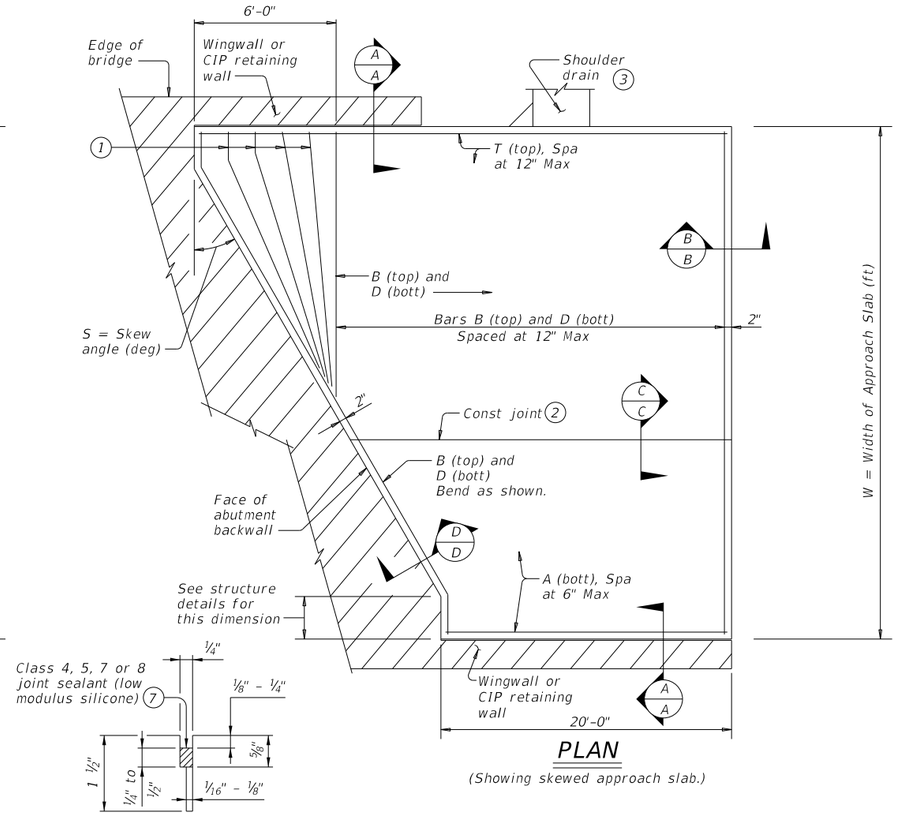
FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		96

DATE: 2/16/2023 4:58:34 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\basaste1-20.dgn



PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

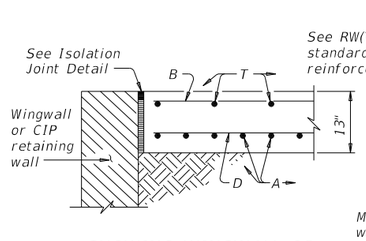
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

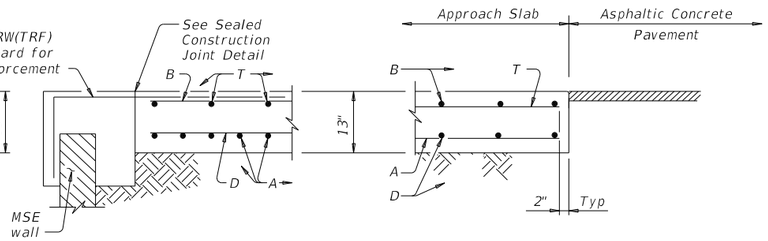
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

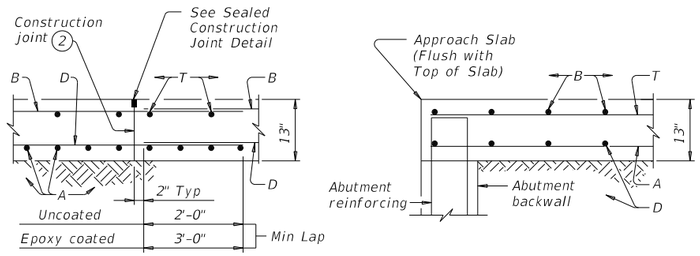
Cover dimensions are clear dimensions, unless noted otherwise.



SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL

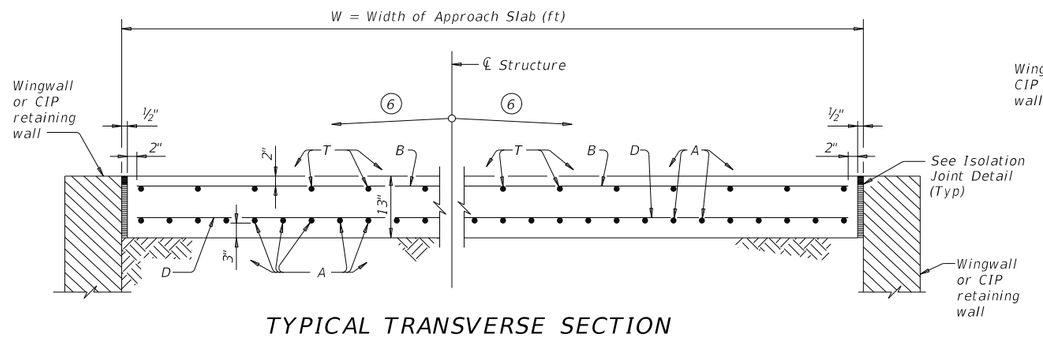


SECTION C-C (5)

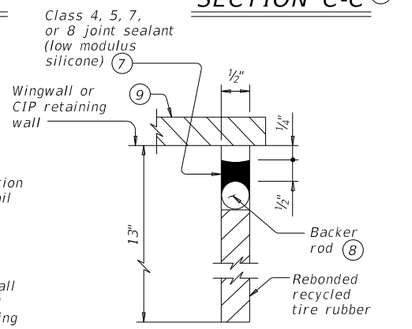
SECTION D-D

SECTION A-A

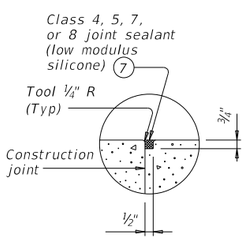
SECTION B-B



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

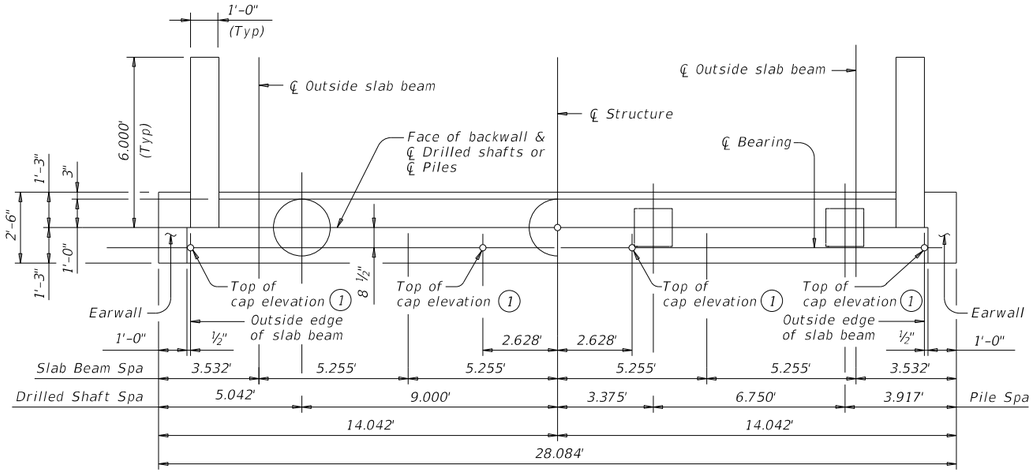
BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		97

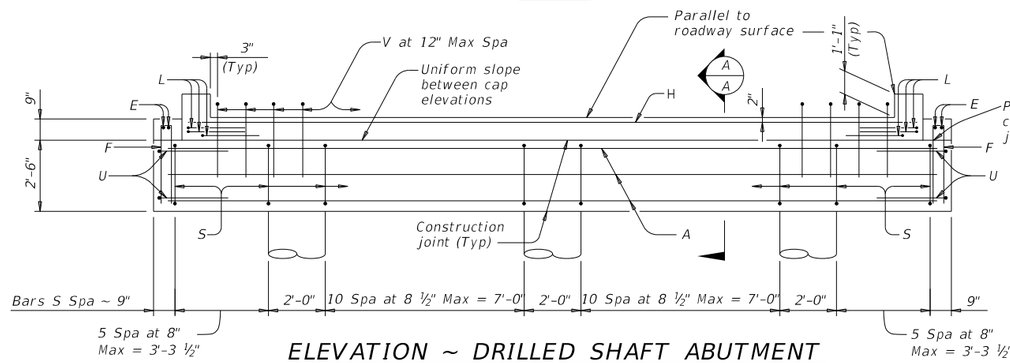
DATE: 2/16/2023 4:58:35 PM
FILE: N:\PSGTZ-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste09-17.dgn



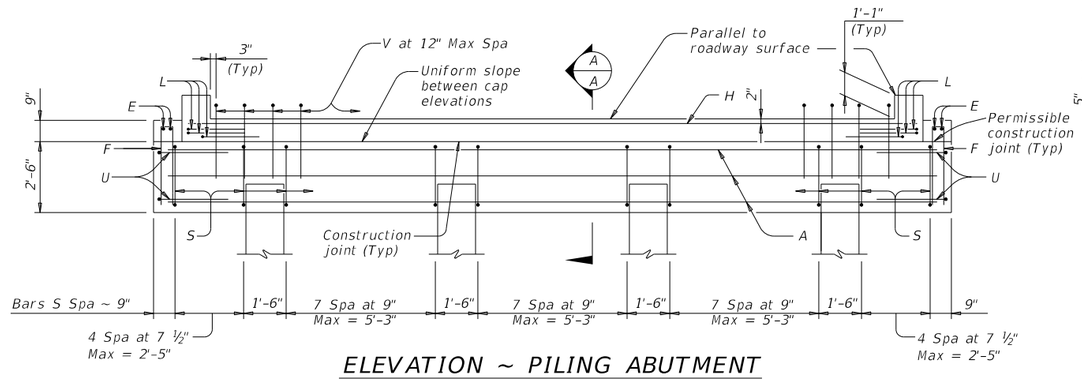
SHOWING DRILLED SHAFTS

PLAN

SHOWING PILES

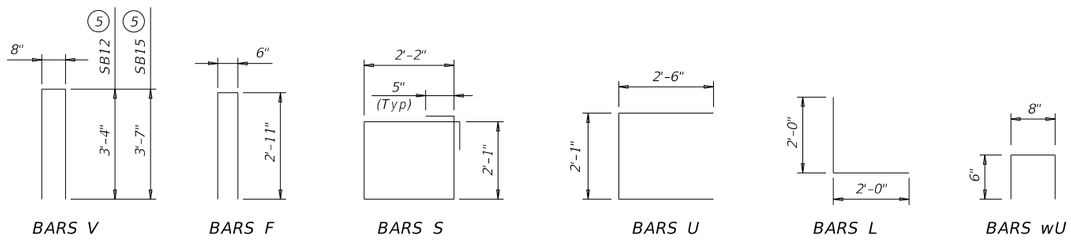


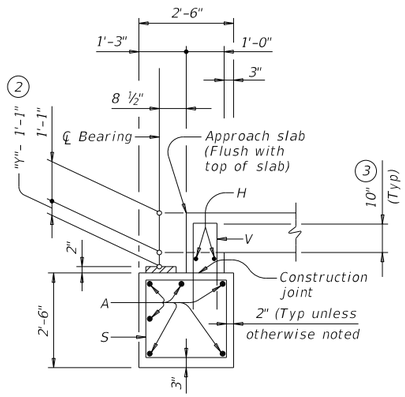
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

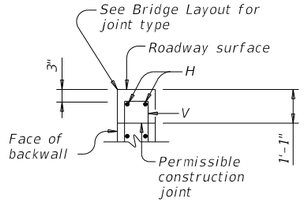
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





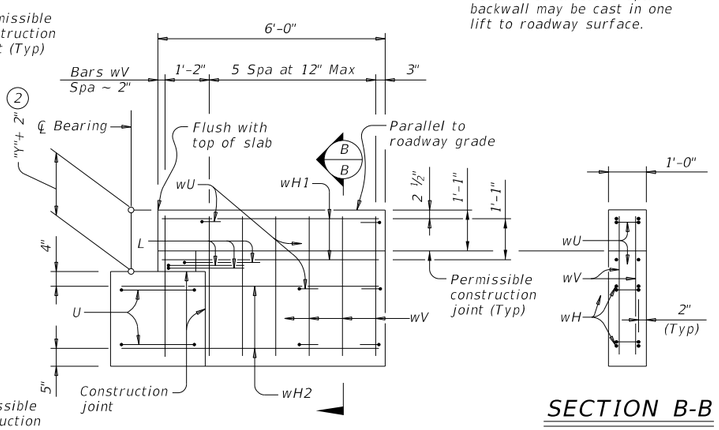
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

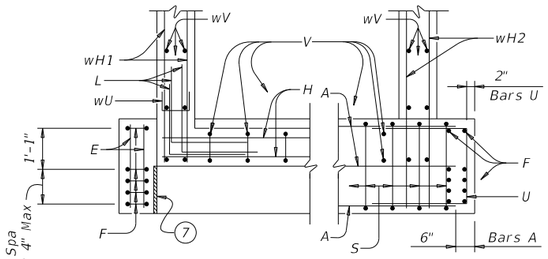
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45		59		44
50		63		47

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	27'-1"	27'-1"	863	863
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	25'-8"	25'-8"	54	54
L	6	#6	4'-0"	4'-0"	36	36
S	34	#4	9'-4"	9'-4"	212	212
U	4	#6	7'-1"	7'-1"	43	43
V	25	#5	7'-4"	7'-10"	191	204
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,725	1,745
Cl "C" Conc (Abut)				CY	8.8	9.2

(1) *Top of cap elevations are based on section depths shown on Span Details.*

(2) *See Span Details for "Y".*

(3) *Increase as required to maintain 3" from finished grade.*

(4) *See Bridge Layout to determine if approach slab is present.*

(5) *See Bridge Layout for beam type used in the superstructure.*

(6) *Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.*

(7) *½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)*

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-24 only.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

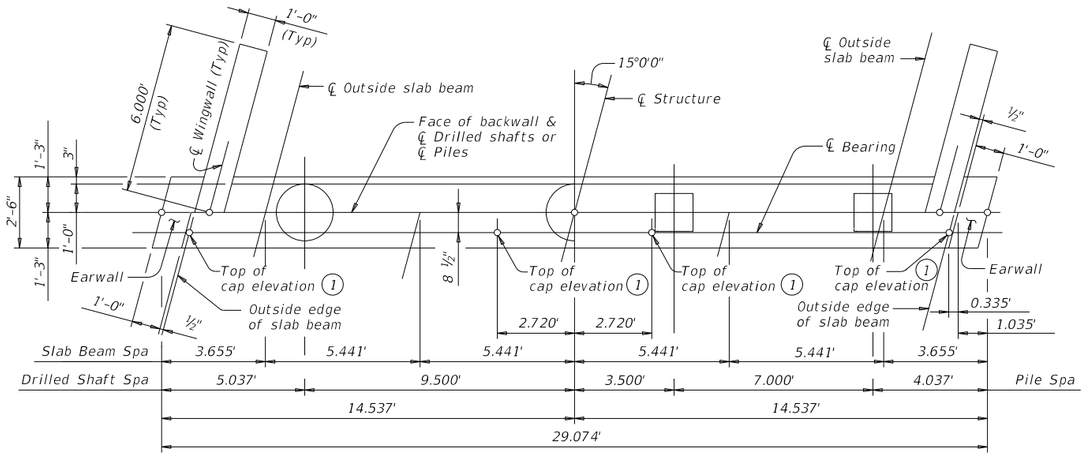
PRESTR CONCRETE SLAB BEAM

24' ROADWAY

APSB-24

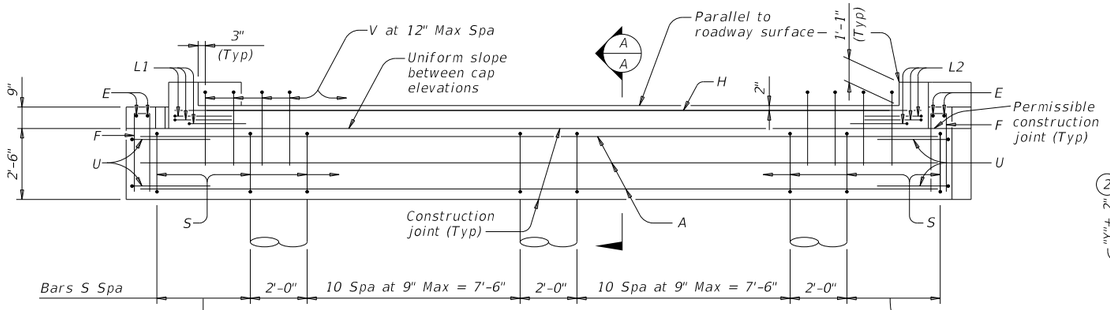
FILE: psbste09-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		98

DATE: 2/16/2023 4:58:36 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste10-17.dgn

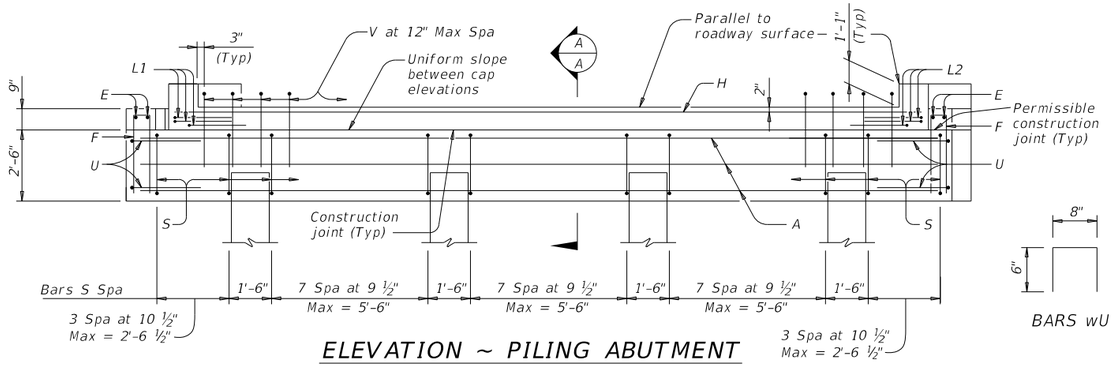


SHOWING DRILLED SHAFTS SHOWING PILES

PLAN

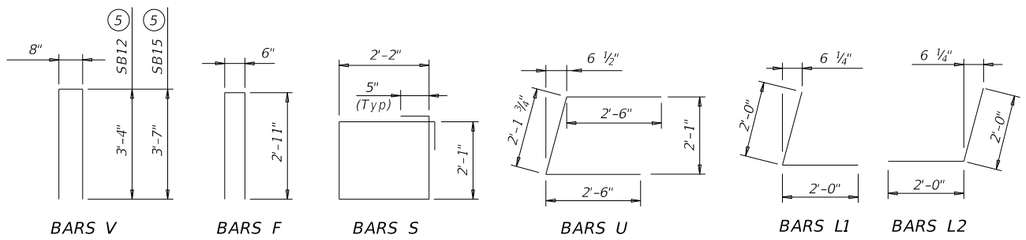


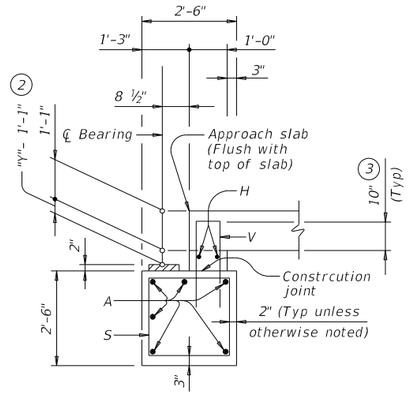
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

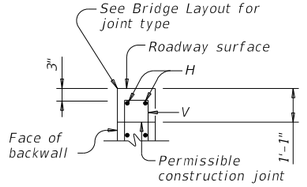
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





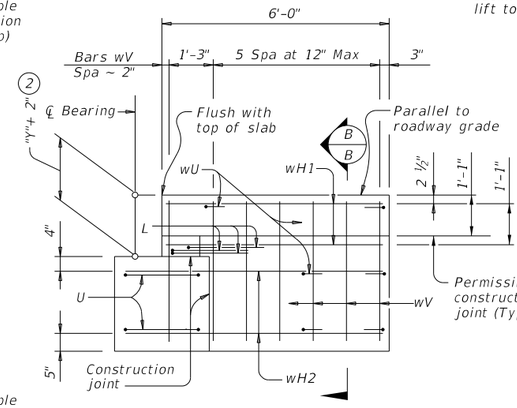
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



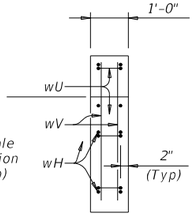
BACKWALL DETAIL (4)

(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.

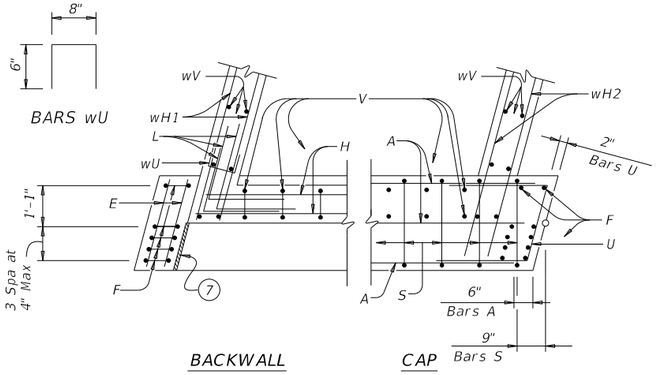


WINGWALL ELEVATION

(Earwall not shown for clarity.)



SECTION B-B



CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	44	46	33	35
35	48	51	36	38
40	52	55	39	41
45		59		45
50		63		48

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	28'-1"	28'-1"	895	895
E	4	#4	2'-3"	2'-3"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	26'-7"	26'-7"	56	56
L1	3	#6	4'-0"	4'-0"	18	18
L2	3	#6	4'-0"	4'-0"	18	18
S	32	#4	9'-4"	9'-4"	200	200
U	4	#6	7'-2"	7'-2"	43	43
V	26	#5	7'-4"	7'-10"	199	212
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,755	1,775
Cl "C" Conc (Abut)				CY	9.1	9.5

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) See Span Details for "Y".

(3) Increase as required to maintain 3" from finished grade.

(4) See Bridge Layout to determine if approach slab is present.

(5) See Bridge Layout for beam type used in the superstructure.

(6) Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 56 Lb reinforcing steel for 2 additional Bars H.

(7) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.

These abutment details may be used with standard SPSB-24-15 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'_c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

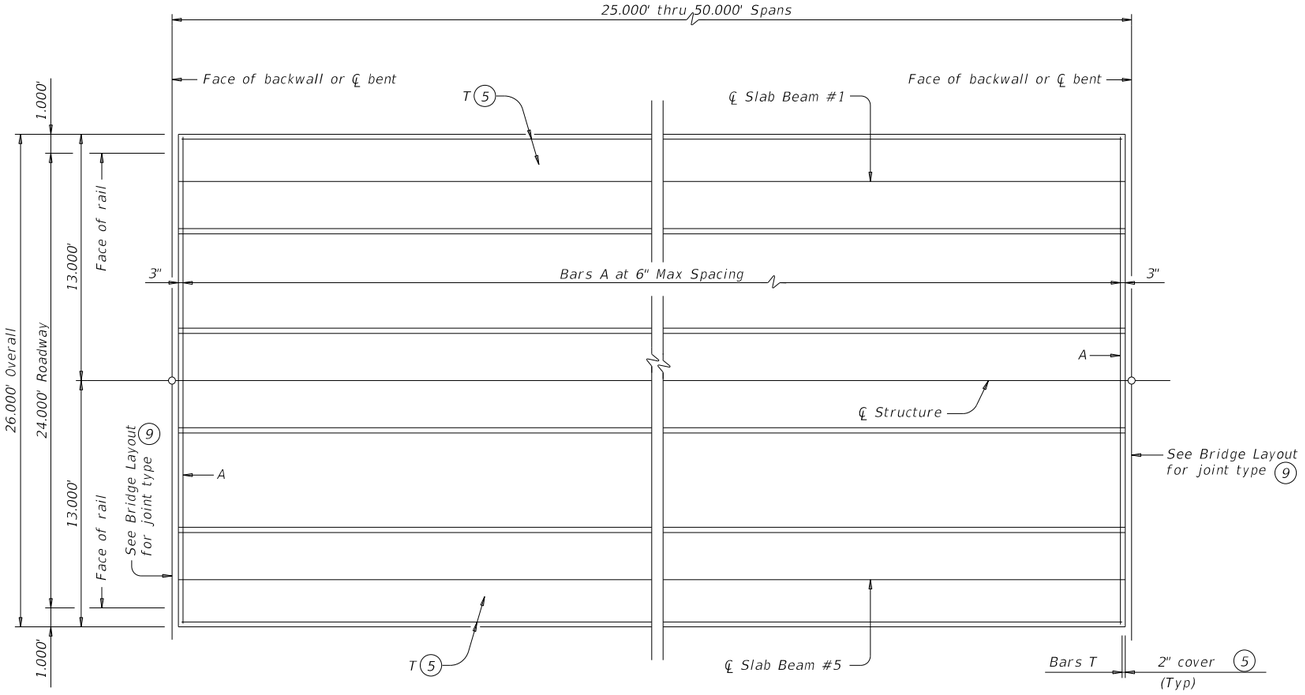
PRESTR CONCRETE SLAB BEAM

24' ROADWAY 15° SKEW

APSB-24-15

FILE: psbste10-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		99

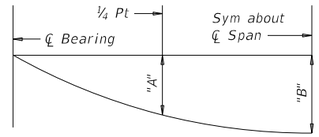
DATE: 2/16/2023 4:58:37 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste30-17.dgn



PLAN

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL REINF STEEL (2)
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

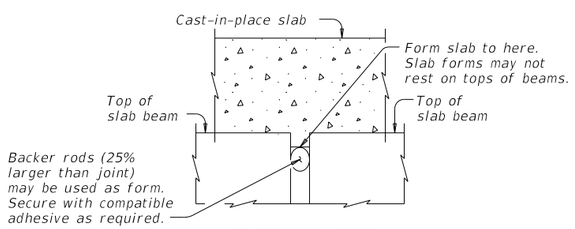
(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 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.

(8) 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.

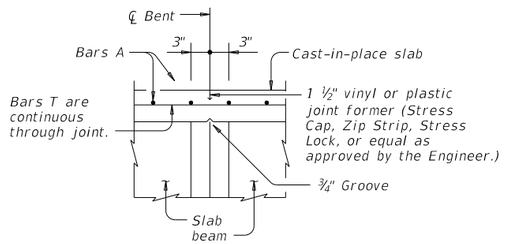
(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".



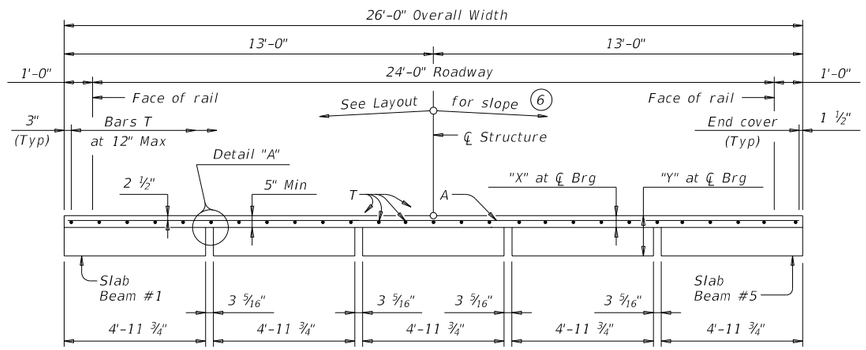
DETAIL "A"

BAR TABLE

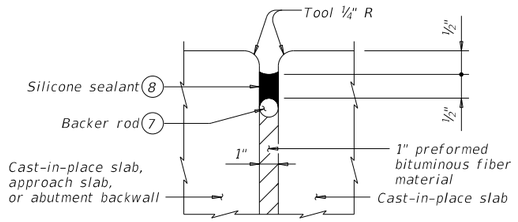
BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPICAL TRANSVERSE SECTION



TYPE A JOINT DETAIL (9)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

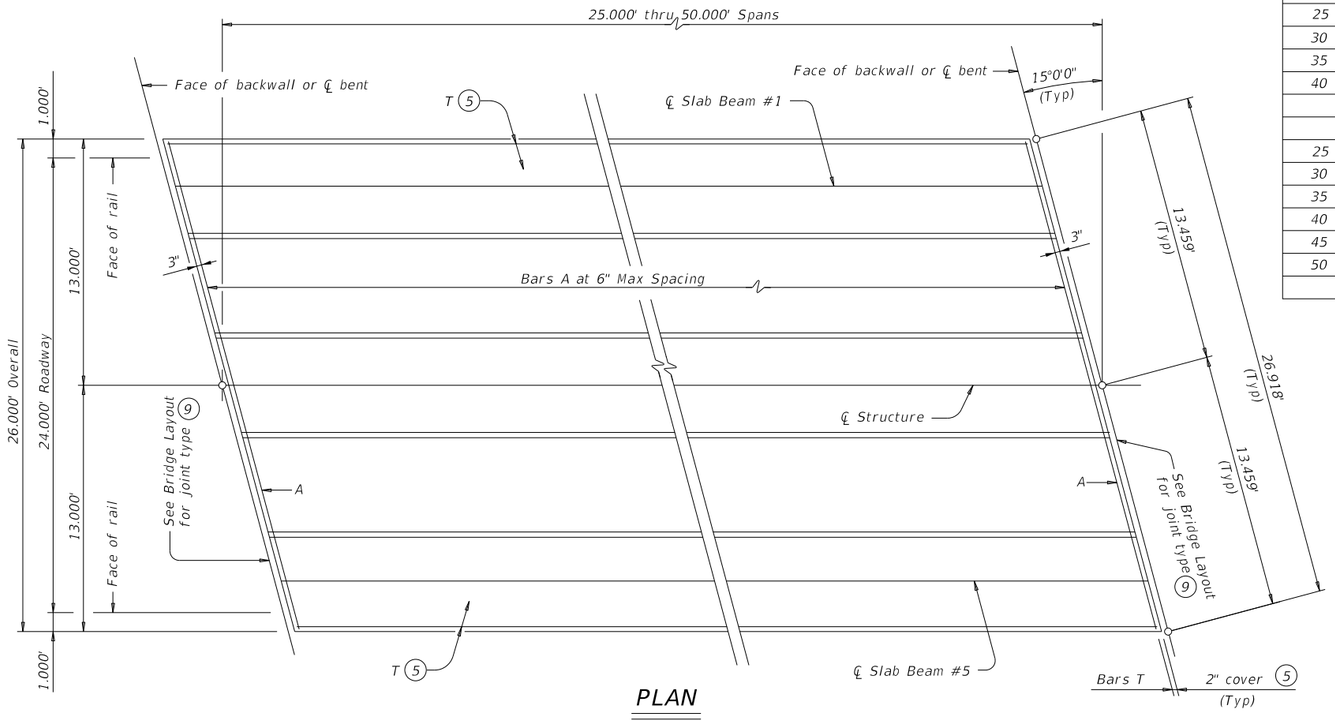
PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY

SPSB-24

FILE: psbste30-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		100

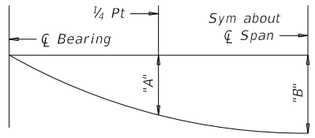
DATE: 2/16/2023 4:58:38 PM
FILE: N:\PSD72-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste31-17.dgn



PLAN

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL (2) REINF STEEL
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.46	122.50	122.41	1,820
30	780	147.46	147.50	147.41	2,180
35	910	172.46	172.50	172.41	2,550
40	1,040	197.46	197.50	197.41	2,910
45	1,170	222.46	222.50	222.41	3,280
50	1,300	247.46	247.50	247.41	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

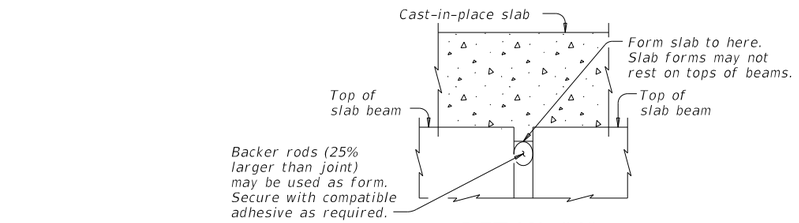
(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) 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.

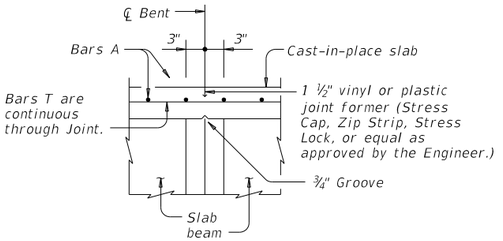
(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

BAR TABLE

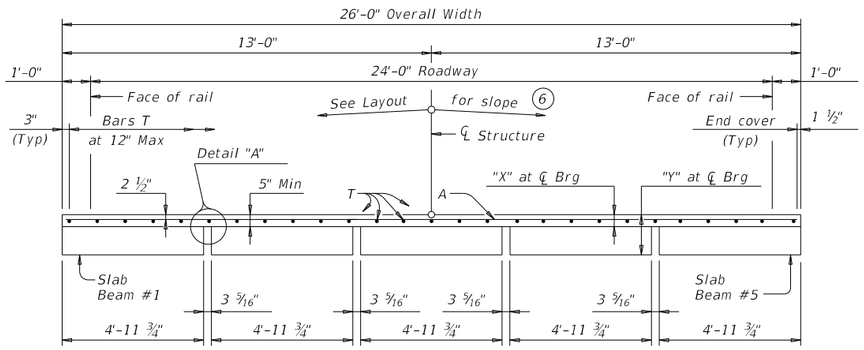
BAR	SIZE
A	#5
T	#4



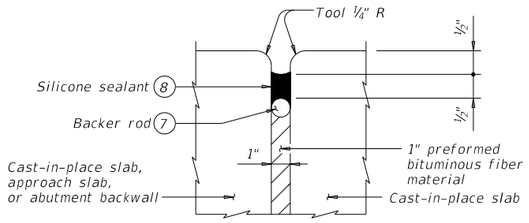
DETAIL "A"



CONTINUOUS SLAB DETAIL



TYPICAL TRANSVERSE SECTION



TYPE A JOINT DETAIL (9)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard does not provide for vertical curves in roadway grade within the structure.

Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.

See applicable rail details for rail anchorage in slab.

Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:

Uncoated	~ #4 = 1'-7"
	~ #5 = 2'-0"
Epoxy coated	~ #4 = 2'-5"
	~ #5 = 3'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

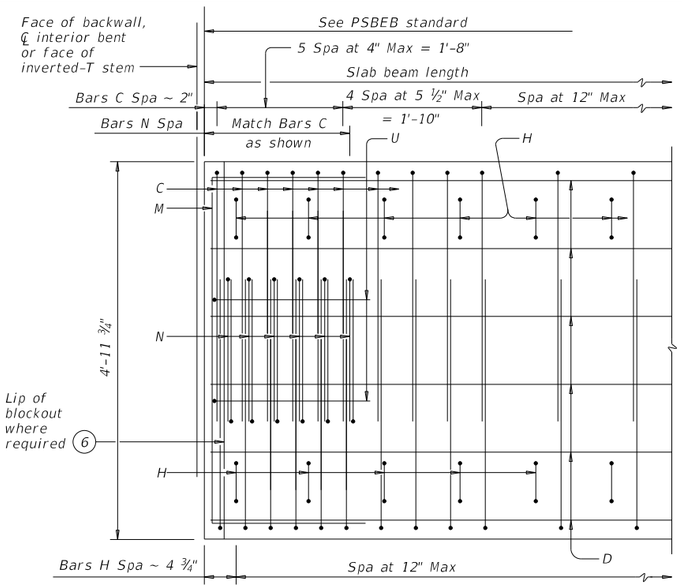
PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY 15° SKEW

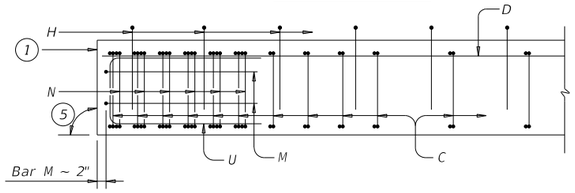
SPSB-24-15

FILE: psbste31-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		101

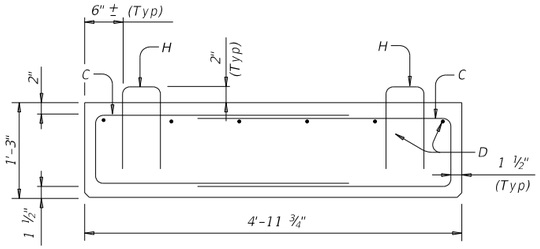
DATE: 2/16/2023 4:58:38 PM
FILE: N:\PSOT2-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbsts04-17.dgn



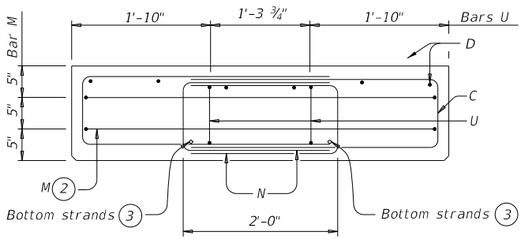
PART PLAN



ELEVATION

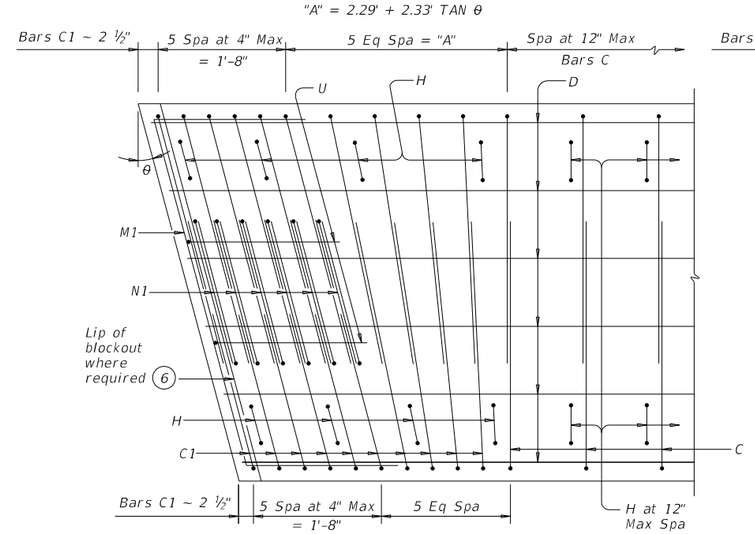


SECTION



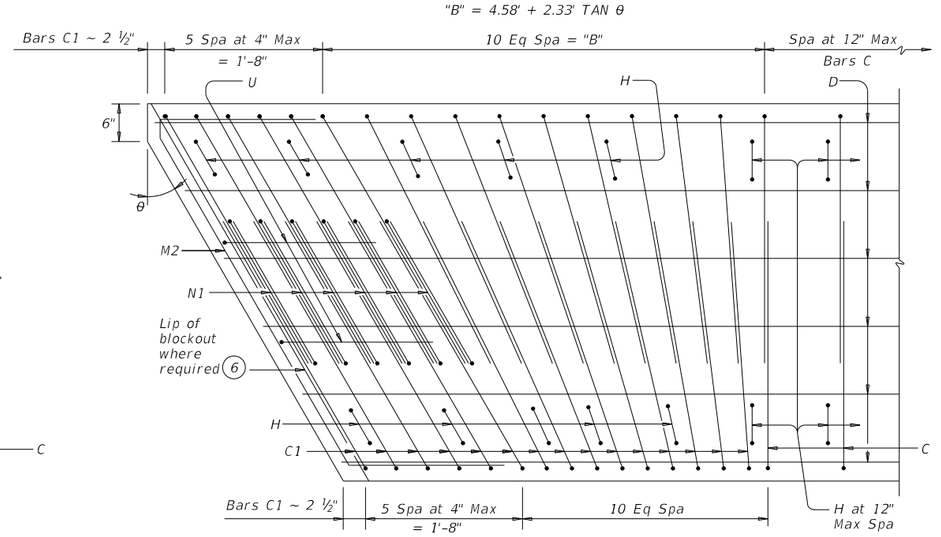
END MAT REINFORCING

Bars H not shown for clarity.



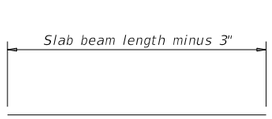
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

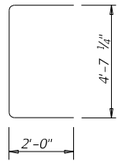


PART SKEW PLAN

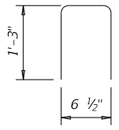
(Showing θ over 15° to 30° skew)



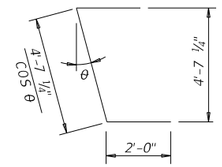
BARS D(#6)



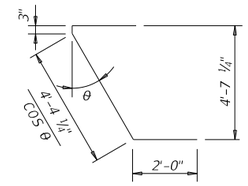
BARS M(#4)



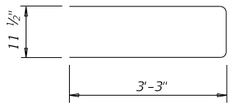
BARS H(#4)



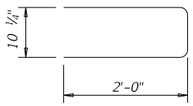
BARS M1(#4)



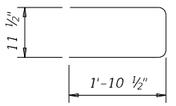
BARS M2(#4)



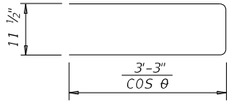
BARS C(#4)



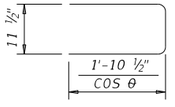
BARS U(#5)



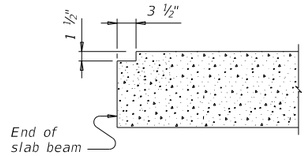
BARS N(#4)



BARS C1(#4)



BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

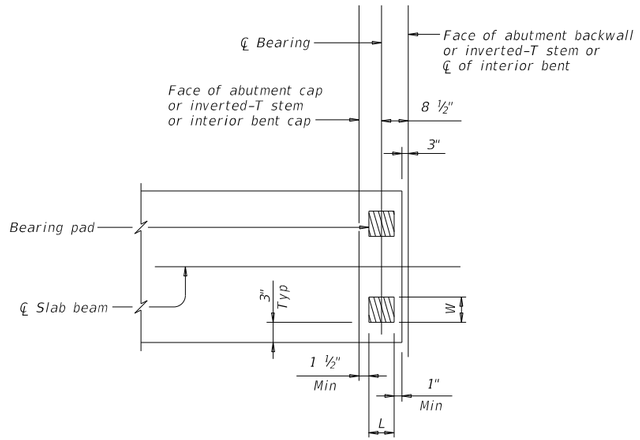
PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

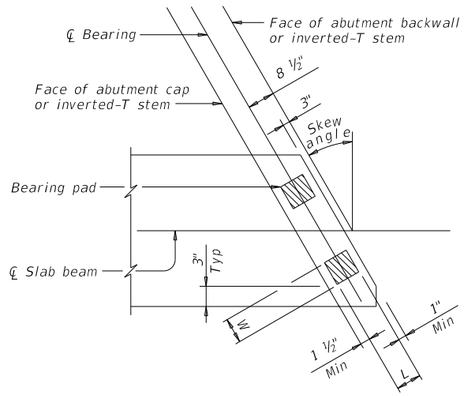
PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		102

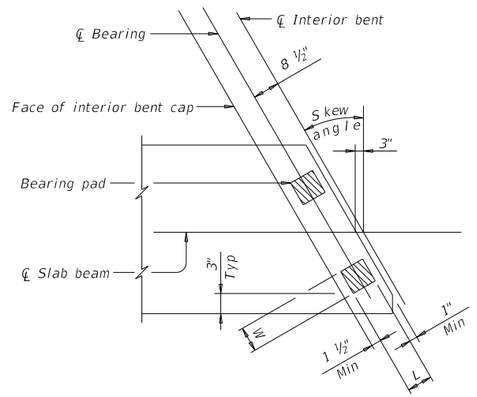
DATE: 2/16/2023 4:58:39 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste06-17.dgn



TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



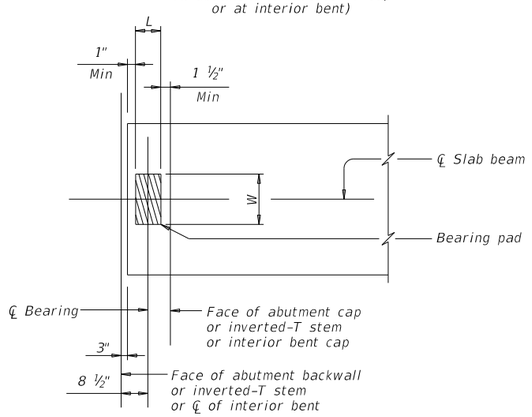
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

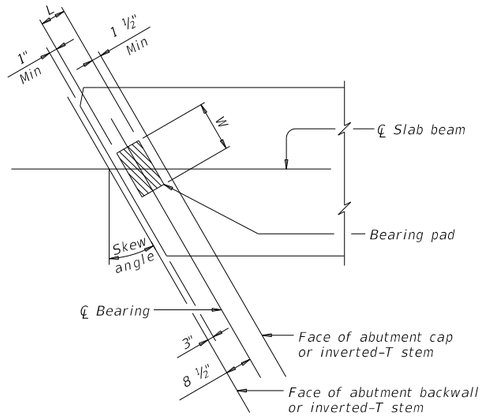
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

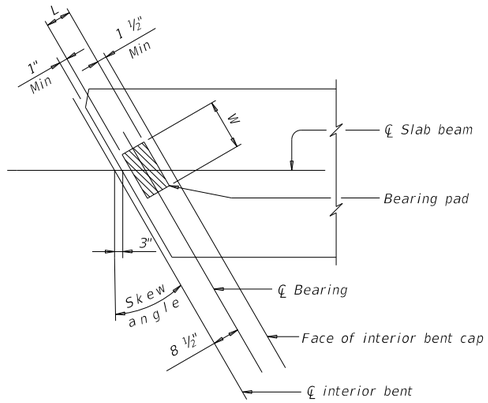
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



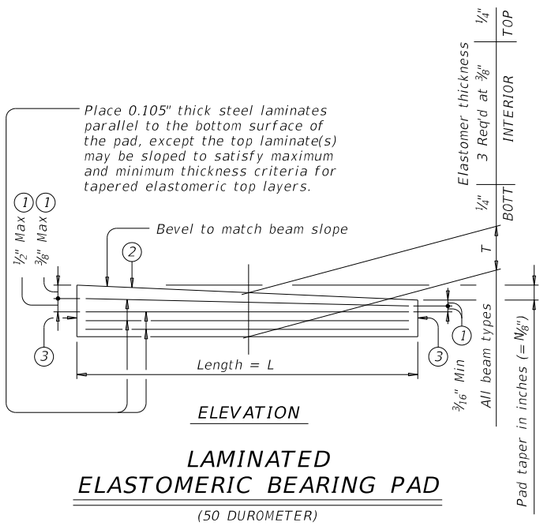
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) 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 beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

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 must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

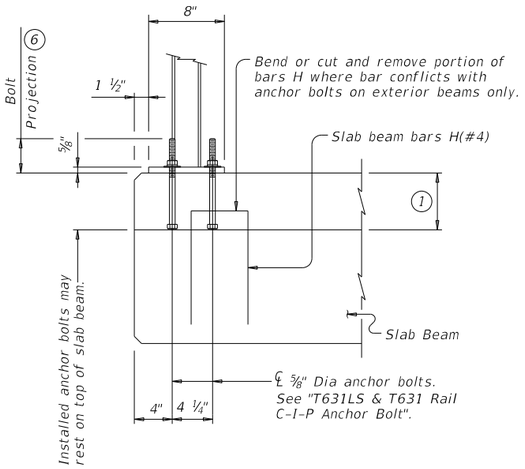
ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

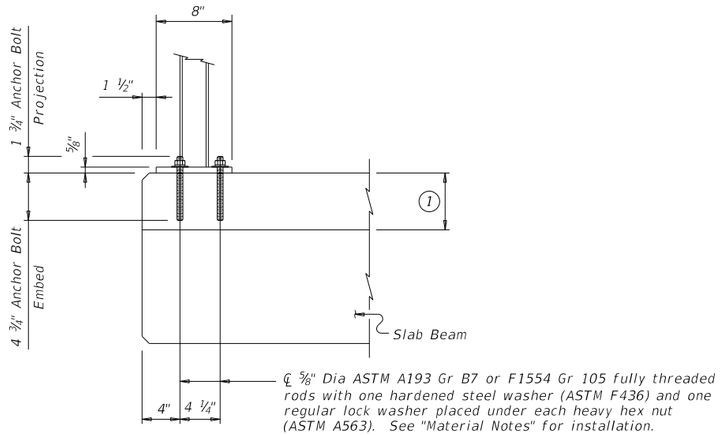
PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		103

DATE: 2/16/2023 4:58:40 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbste07-18.dgn



CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

PART SPAN ELEVATION

SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

T631LS & T631 RAIL C-I-P ANCHOR BOLT

PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		104

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	OPTIONAL DESIGN: DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	OPTIONAL DESIGN: REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	OPTIONAL DESIGN: LIVE LOAD DISTRIBUTION FACTOR ② Moment	OPTIONAL DESIGN: LIVE LOAD DISTRIBUTION FACTOR ② Shear	LOAD RATING FACTORS: STRENGTH I Inv	LOAD RATING FACTORS: STRENGTH I Opr	LOAD RATING FACTORS: SERVICE III Inv
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.914	-1.217	448	0.450	0.450	1.40	1.82	1.71
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.292	-1.685	530	0.450	0.450	1.25	1.62	1.29
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.730	-2.219	675	0.450	0.450	1.33	1.73	1.23
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.218	-2.796	820	0.440	0.440	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.725	-0.897	551	0.450	0.450	1.77	2.29	2.41
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.020	-1.244	574	0.450	0.450	1.23	1.59	1.45
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.361	-1.640	708	0.450	0.450	1.15	1.49	1.14
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.739	-2.068	864	0.440	0.440	1.32	1.71	1.19
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.179	-2.574	1054	0.440	0.440	1.34	1.73	1.08
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000	2.680	-3.153	1276	0.440	0.440	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.903	-1.184	444	0.430	0.430	1.47	1.91	1.80
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.276	-1.639	508	0.430	0.430	1.32	1.71	1.37
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.708	-2.159	647	0.430	0.430	1.18	1.53	1.02
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.200	-2.744	799	0.430	0.430	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.716	-0.874	529	0.430	0.430	1.85	2.40	2.53
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.007	-1.212	570	0.430	0.430	1.29	1.67	1.53
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.343	-1.598	680	0.430	0.430	1.21	1.57	1.22
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.725	-2.032	842	0.430	0.430	1.36	1.76	1.24
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.149	-2.508	1013	0.420	0.420	1.41	1.82	1.16
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000	2.643	-3.073	1227	0.420	0.420	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.904	-1.187	341	0.340	0.340	1.38	1.79	1.67
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.277	-1.646	407	0.340	0.340	1.32	1.71	1.37
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.711	-2.169	518	0.340	0.340	1.24	1.60	1.08
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	2.205	-2.758	640	0.340	0.340	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.723	-0.888	431	0.350	0.350	1.69	2.19	2.32
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	1.017	-1.231	438	0.350	0.350	1.16	1.50	1.37
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.346	-1.605	545	0.340	0.340	1.21	1.57	1.21
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.729	-2.043	675	0.340	0.340	1.47	1.91	1.38
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000	2.166	-2.542	823	0.340	0.340	1.33	1.73	1.06
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000	2.665	-3.115	998	0.340	0.340	1.32	1.71	1.02

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

Full-length debonded strands are not permitted in positions "A" and "B".

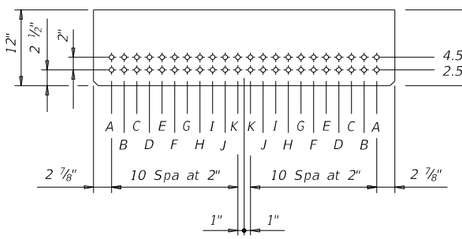
Strand debonding must comply with Item 424.4.2.2.2.4.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

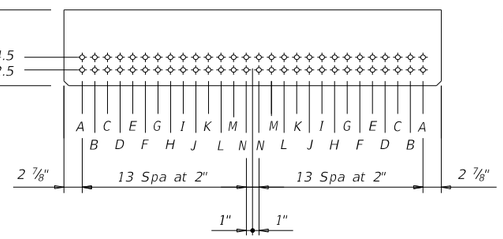
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.

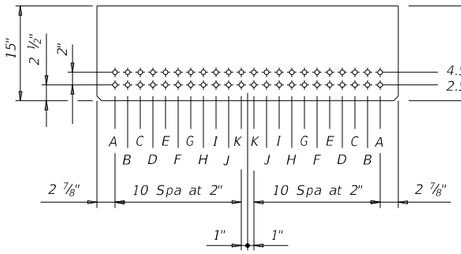
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



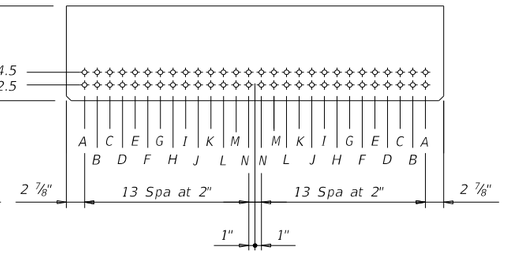
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

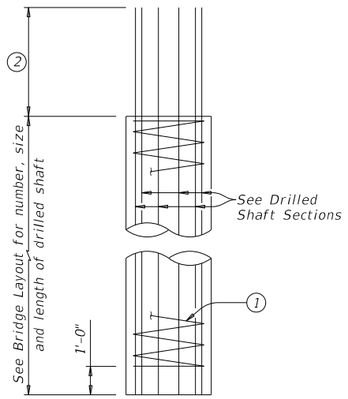
24', 28' & 30' ROADWAY

PSBSD

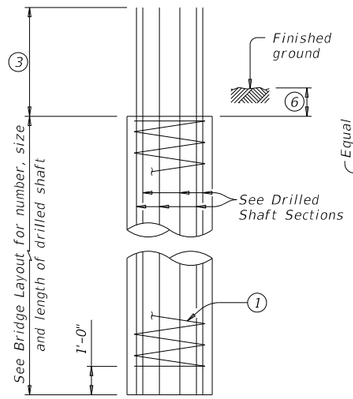
FILE: psbsts08-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		105

DATE: 2/16/2023 4:58:41 PM
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\psbsts08-21.dgn

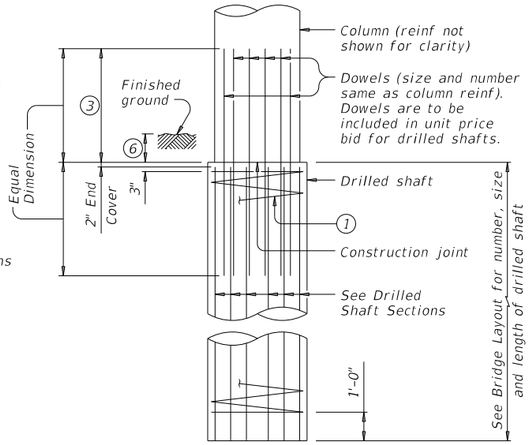
DATE: 2/16/2023 4:58:42 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\fdstde01-20.dgn



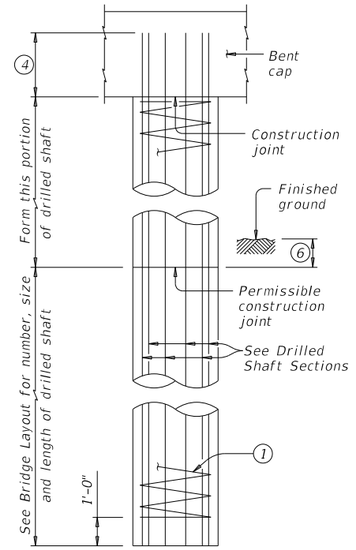
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



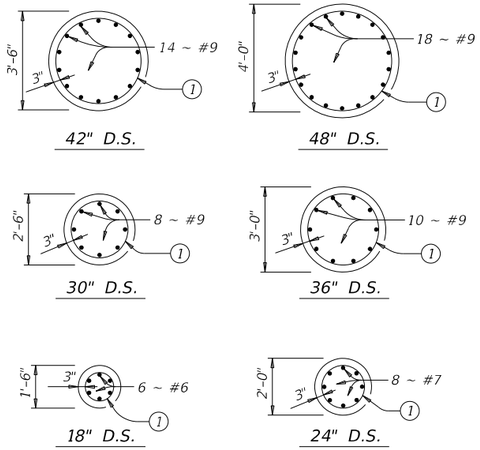
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

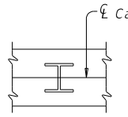


DRILLED SHAFT SECTIONS

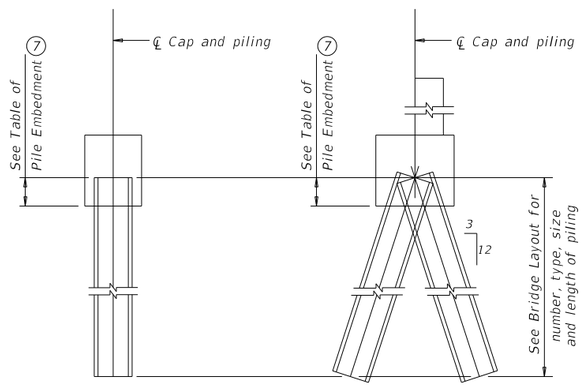
DRILLED SHAFT DETAILS

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.



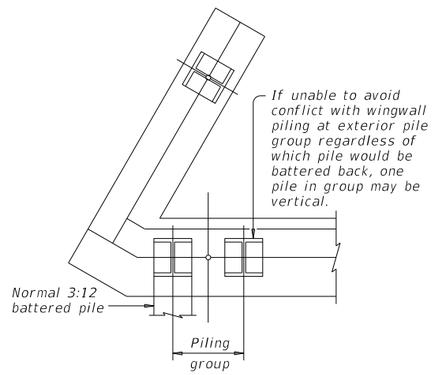
ORIENTATION OF STEEL H-PILING



VERTICAL PILE BATTERED PILE

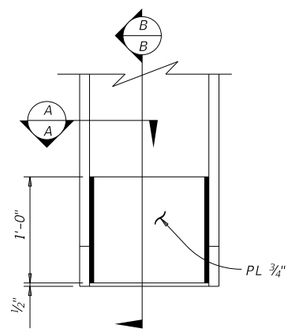
PILING DETAILS

(Concrete or steel H)

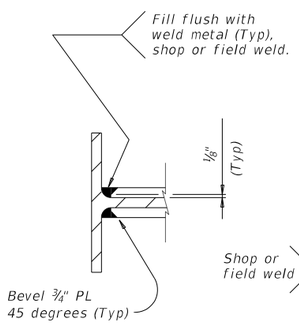


DETAIL "A"

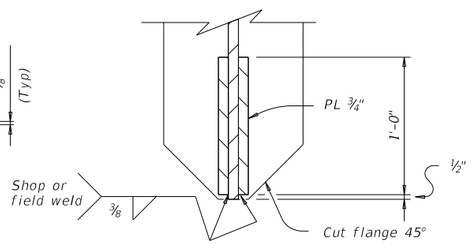
(Showing plan view of a 30° skewed abutment)



ELEVATION



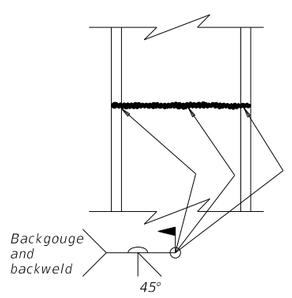
SECTION A-A

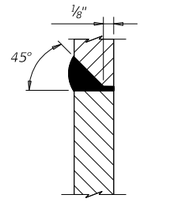


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





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.

SHEET 1 OF 2

Texas Department of Transportation

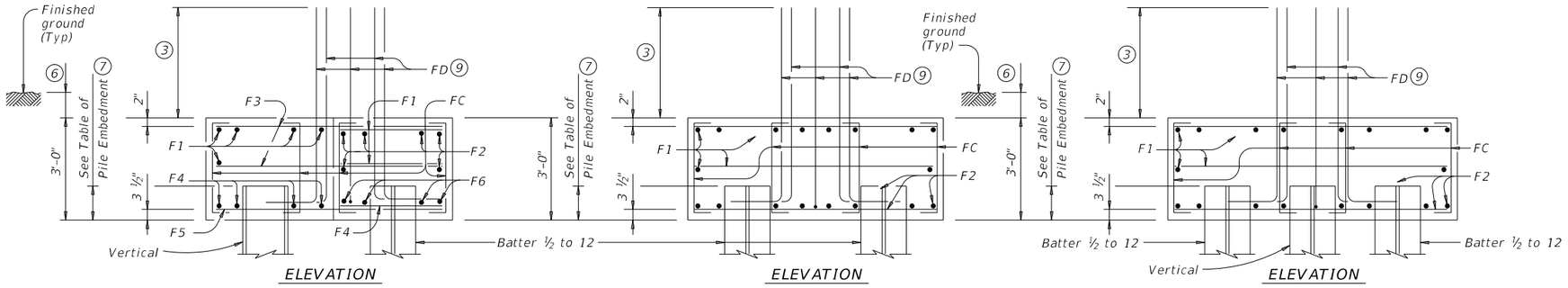
Bridge Division Standard

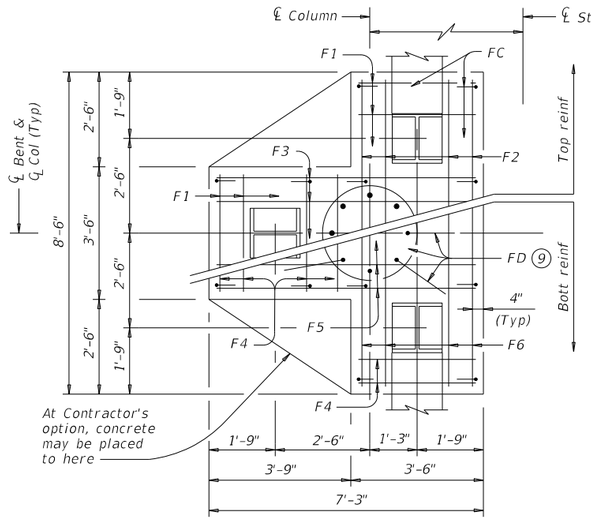
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		106

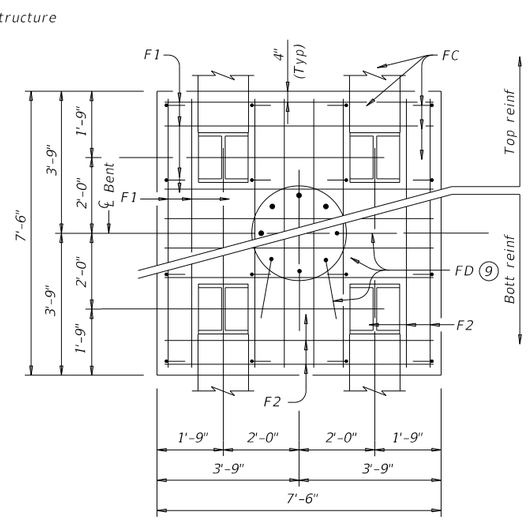
DATE: 2/16/2023 4:58:42 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\fdstde01-20.dgn





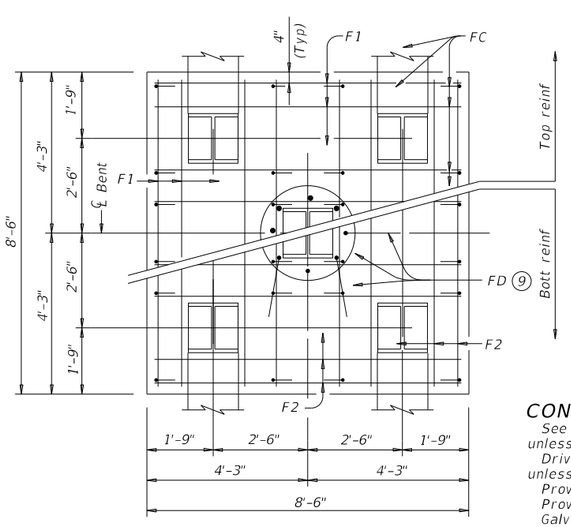
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



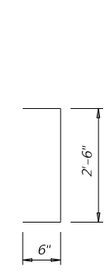
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

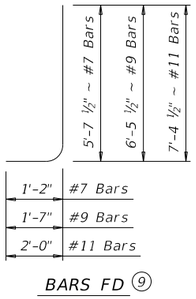


FIVE PILE FOOTING (8)

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

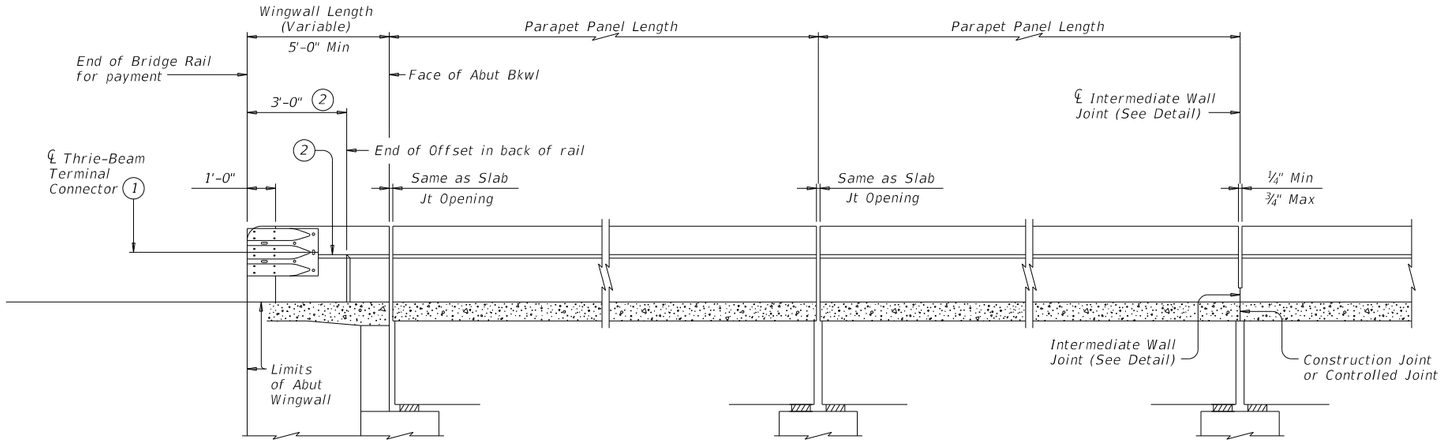
Bridge Division Standard

COMMON FOUNDATION DETAILS

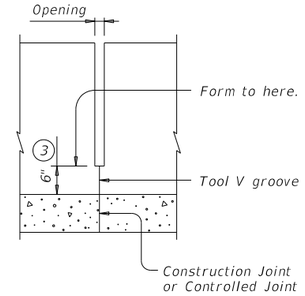
FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		107

DATE: 2/16/2023 4:58:43 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\rlstd004-19.dgn

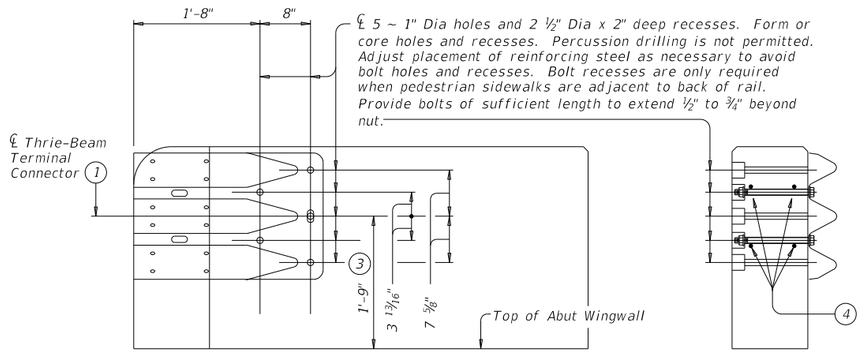


ROADWAY ELEVATION OF RAIL



INTERMEDIATE WALL JOINT DETAIL

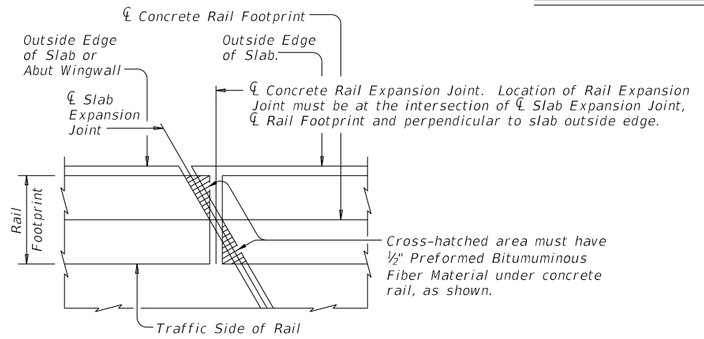
Provide at all interior bents without slab expansion joints.



TERMINAL CONNECTION DETAILS

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. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
3. Increase 2" for structures with overlay.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

Texas Department of Transportation

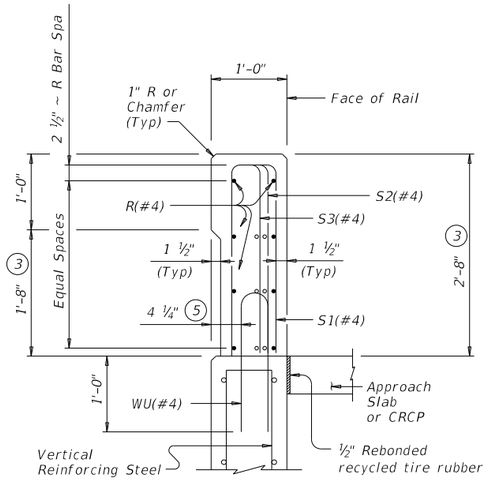
Bridge Division Standard

TRAFFIC RAIL

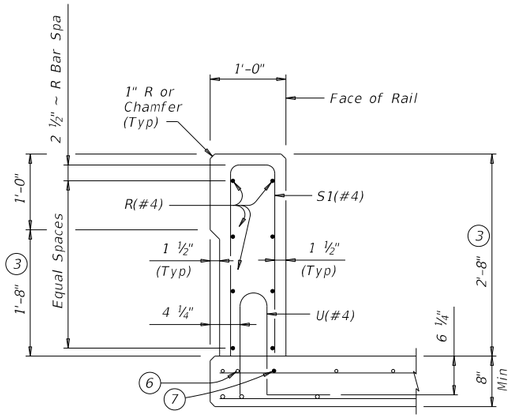
TYPE T221

FILE: rlstd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		108

DATE: 2/16/2023 4:58:44 PM
FILE: N:\PS072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\ristd004-19.dgn



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(3) Increase 2" for structures with overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractors expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) Bend or cut as required to clear drain slots.

(9) No longitudinal wires may be in top center of cage.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Chamfer all exposed concrete corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM 1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other that shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

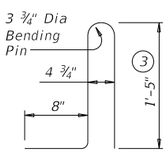
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

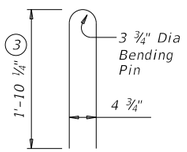
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 370 plf.

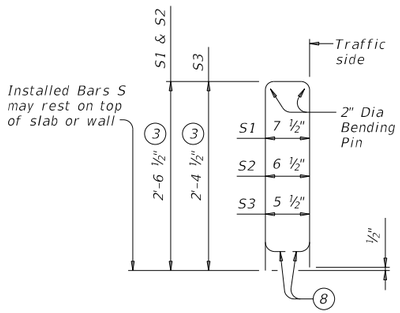
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



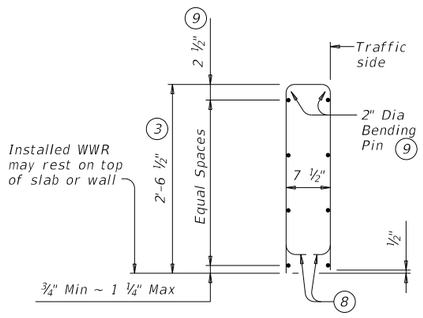
BARS U (#4)



BARS WU (#4)

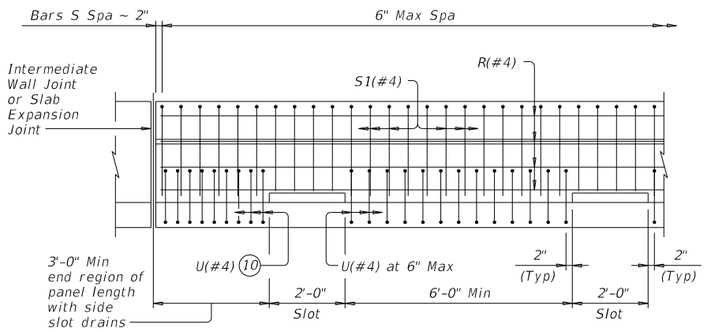


BARS S (#4)

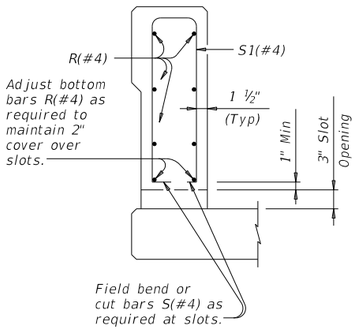


OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL



SECTION THRU OPTIONAL SIDE SLOT DRAIN

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.

Texas Department of Transportation

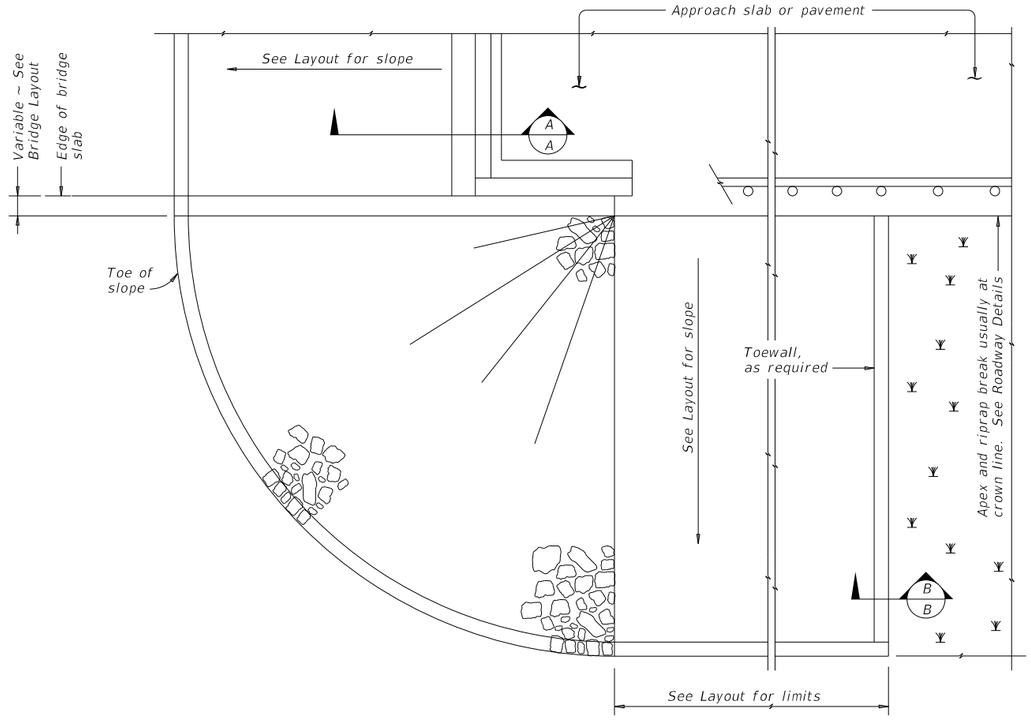
Bridge Division Standard

TRAFFIC RAIL

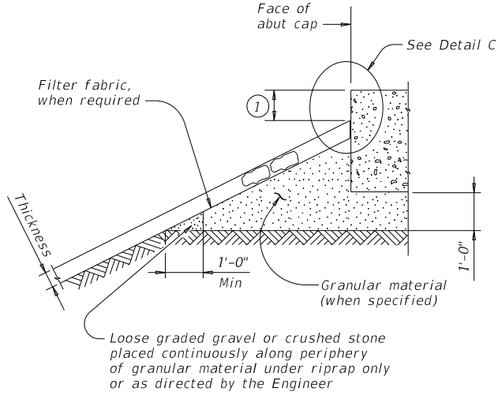
TYPE T221

FILE: ristd004-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		109

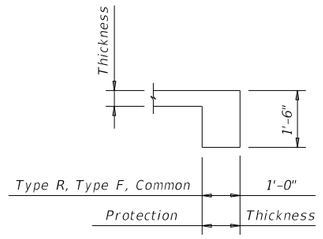
DATE: 2/16/2023 4:58:45 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\SrdDetails\srrstde1-19.dgn



PLAN

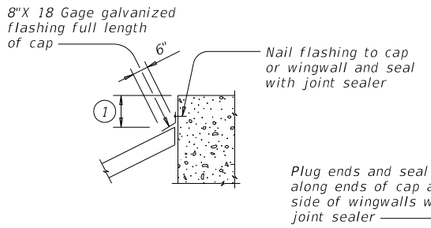


SECTION A-A AT CAP

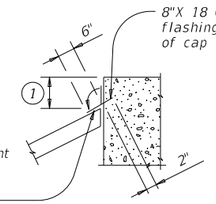


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

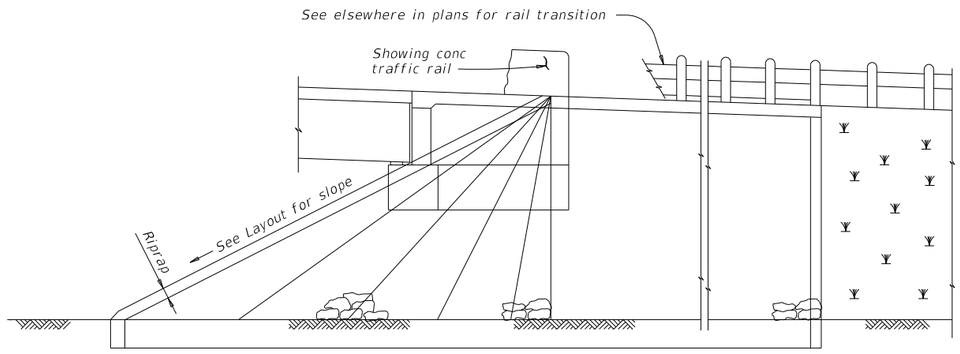


CAP OPTION A



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	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		110

DATE: 2/16/2023 4:58:45 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\07_BRIDGES\StdDetails\srrstde1-19.dgn

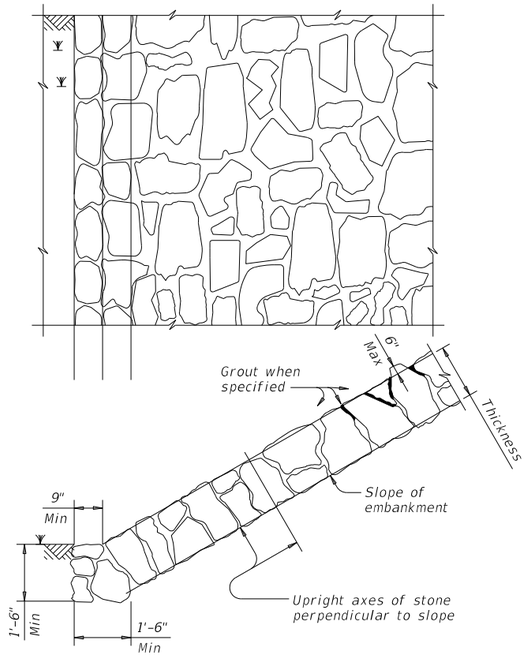


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

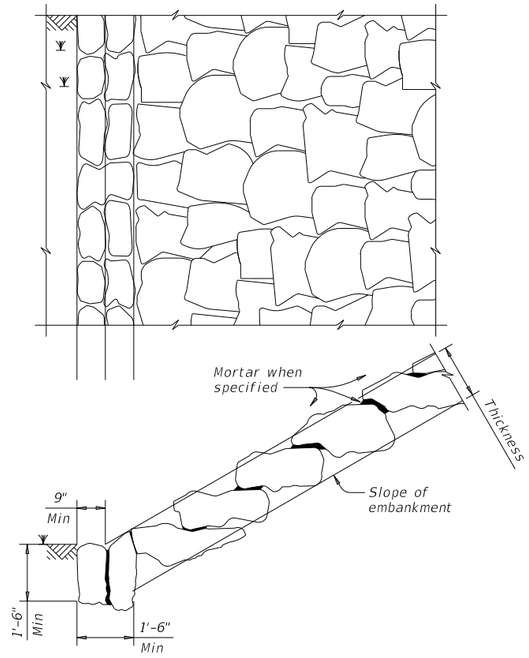


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

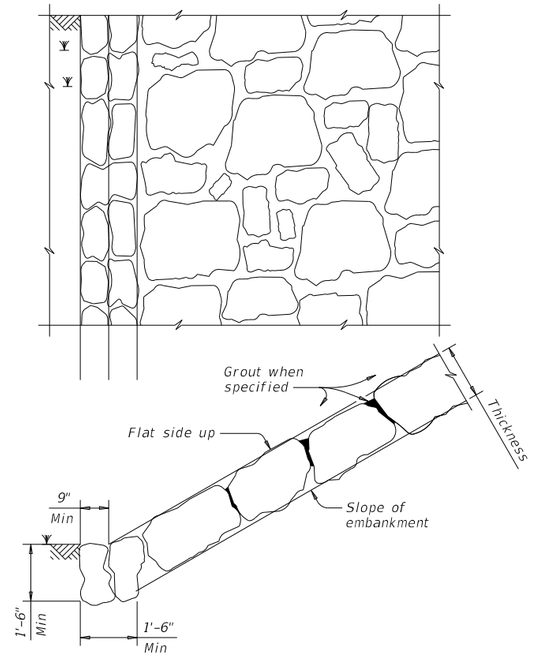


FIGURE 3 ~ TYPE F STONE RIPRAP

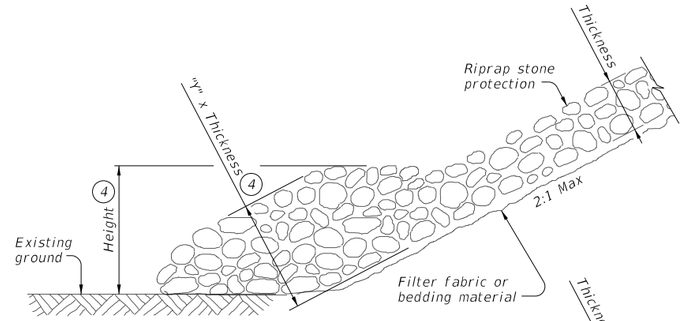
grouted

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

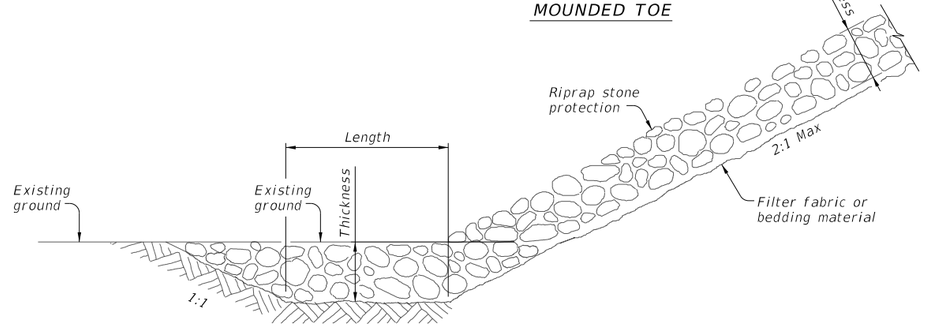
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

4 "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

5 List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS 5

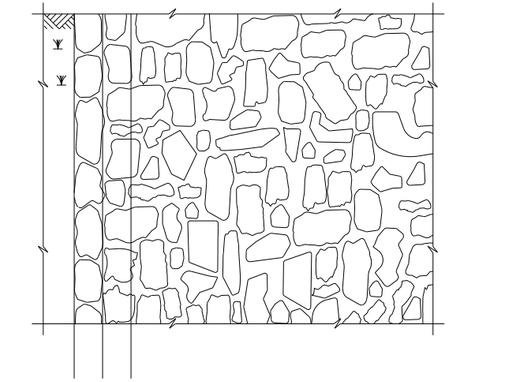


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

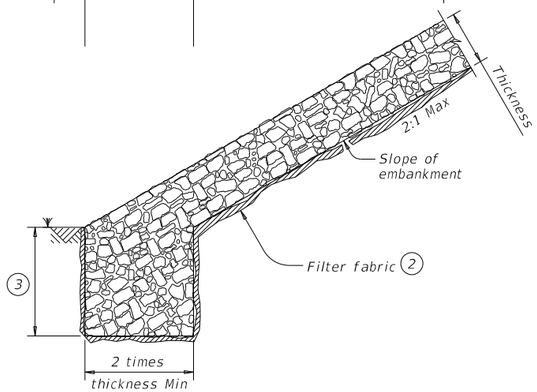


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

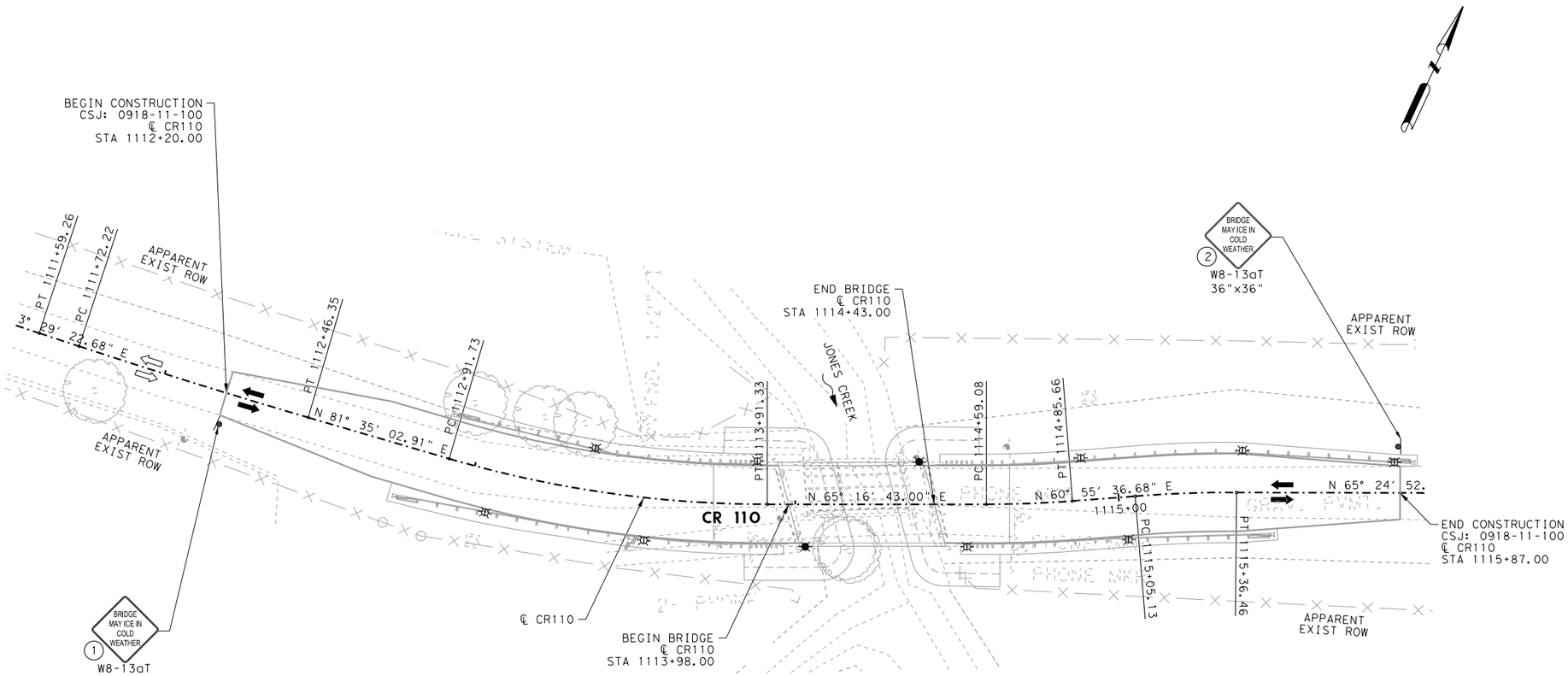
STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		111

LEGEND:

- (#) PROPOSED SMALL SIGN
- DEL ASSM (D-SW)SW1(BRF)CTB(BI)
- DEL ASSM (D-SW)SW1(BRF)GF1(BI)



STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/16/2023

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

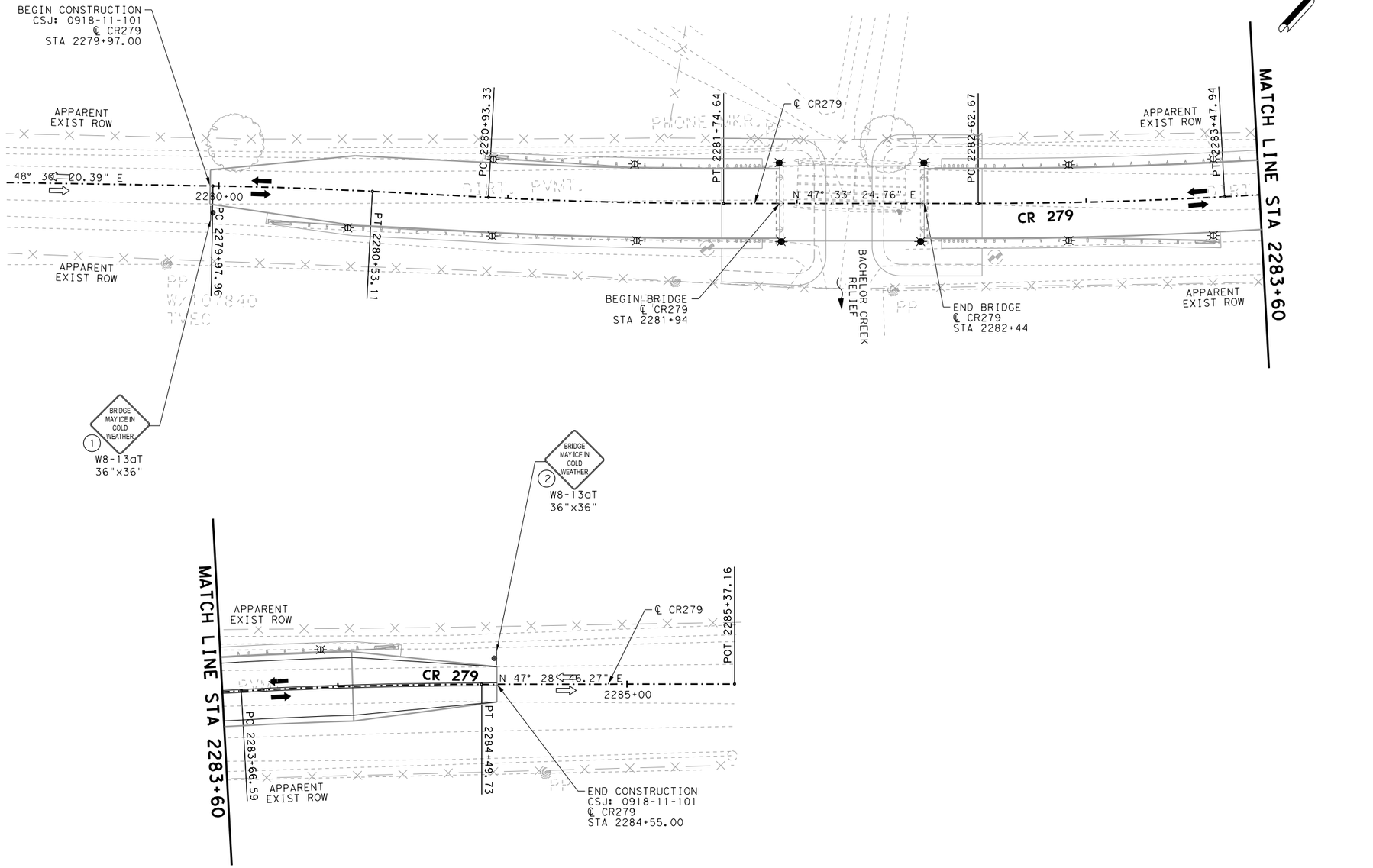
CR 110
SIGNING & PAVEMENT MARKINGS

SHEET 1 OF 3

		FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
DN:	RM	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
CK DN:	RC	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
DW:	RM	DAL	KAUFMAN	0918	11	100,ETC	112
CK DW:	RC						

CR110_SPML_01.dgn

RMorfin
2/16/2023 4:58:47 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\CR110_SPML_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg



LEGEND:

(#) PROPOSED SMALL SIGN

DEL ASSM (D-SW)SW1(BRF)CTB(BI)

DEL ASSM (D-SW)SW1(BRF)GF1(BI)

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER

2/16/2023

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

CR 279
SIGNING & PAVEMENT MARKINGS

SHEET 2 OF 3

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	113

CR279_SPML_01.dgn

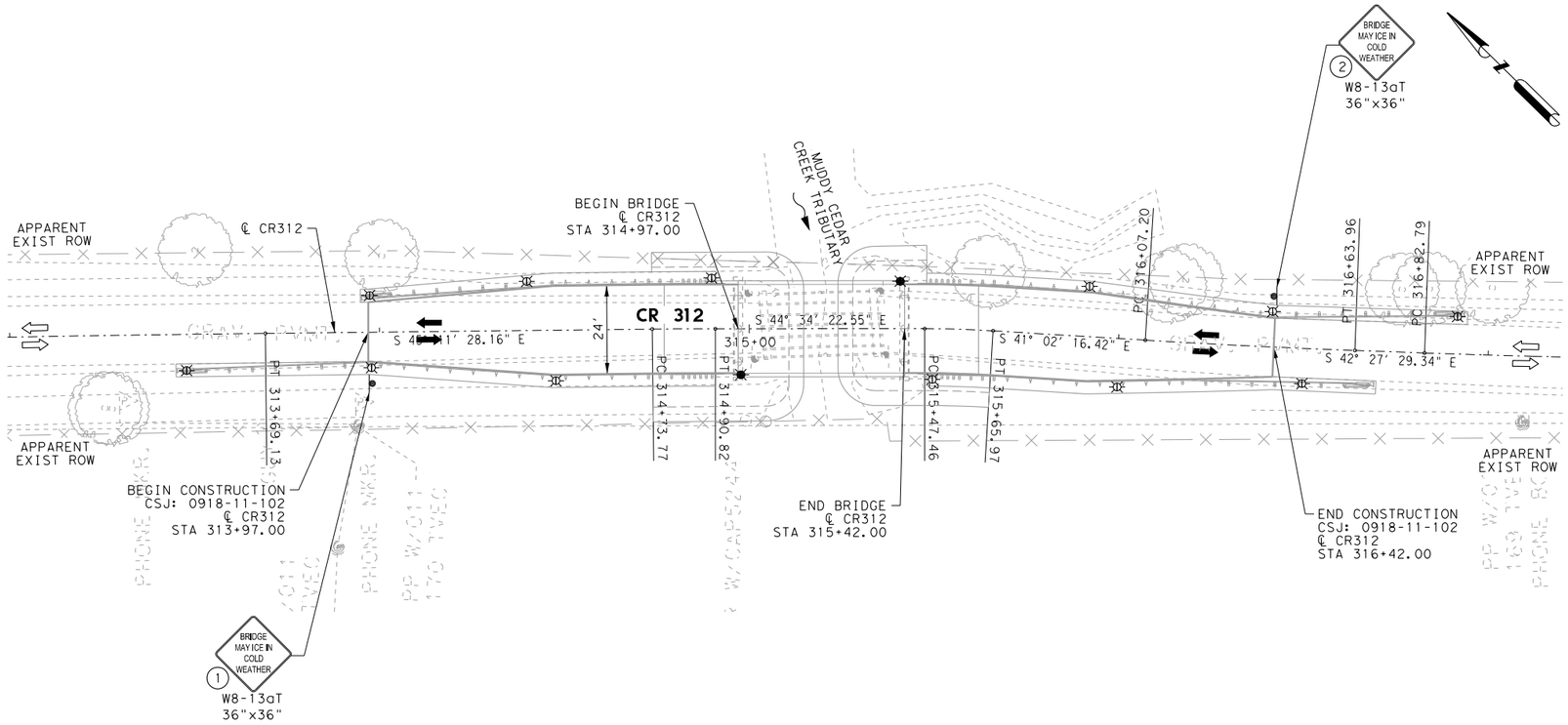
RMorfin
2/16/2023 4:58:49 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\CR279_SPML_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

LEGEND:

(#) PROPOSED SMALL SIGN

DEL ASSM (D-SW)SW1(BRF)CTB(BI)

DEL ASSM (D-SW)SW1(BRF)GF1(BI)



STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/16/2023

0 20 40

SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

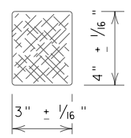
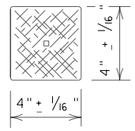
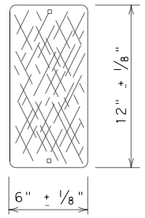
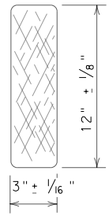
CR 312
SIGNING & PAVEMENT MARKINGS

SHEET 3 OF 3

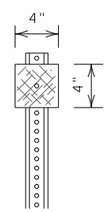
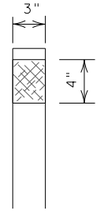
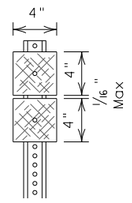
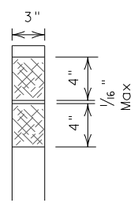
DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	114

RMorfin
2/16/2023 4:58:55 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\CR312_SPML_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

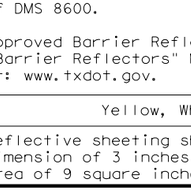
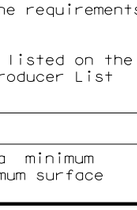
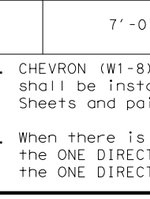
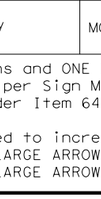
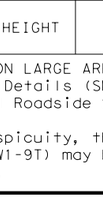
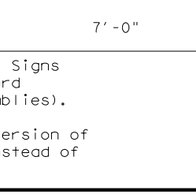
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

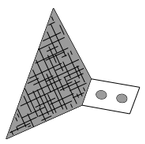
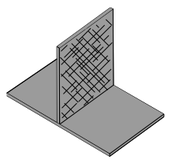
TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

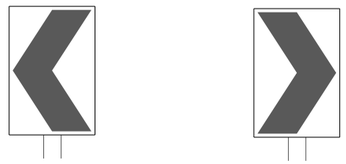
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

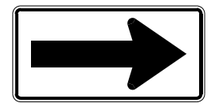
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
NOTE	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"	

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	0918	11	100,ETC.	CR 110,ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	KAUFMAN		115

20A

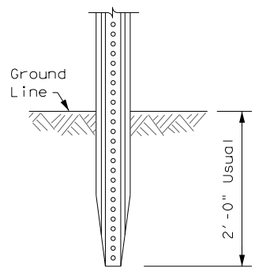
DATE: 2/16/2023 4:58:56 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\dom1-20.dgn

DATE: 2/16/2023 4:58:57 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

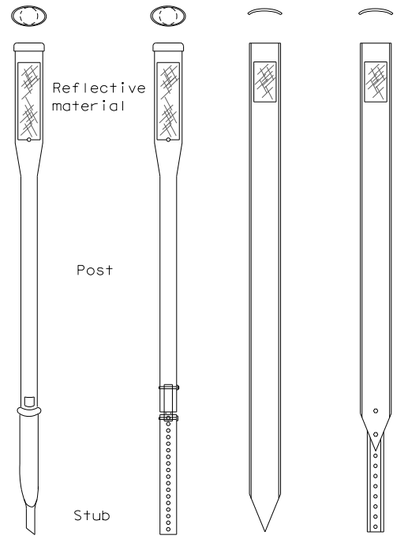


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

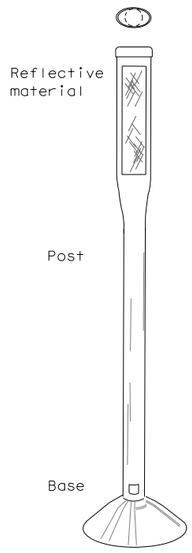
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



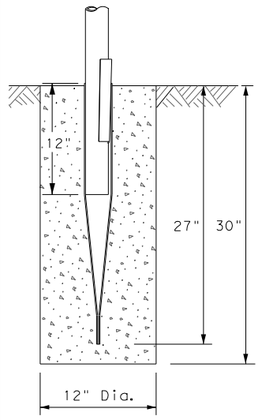
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

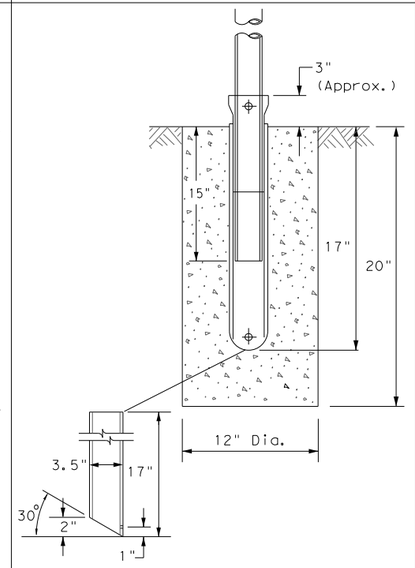
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

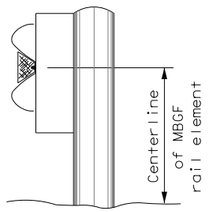
NOTE

1. Install per manufacturer's recommendations.

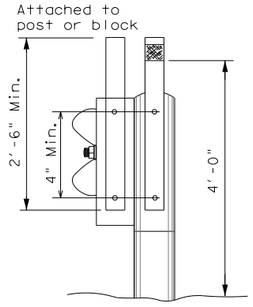
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

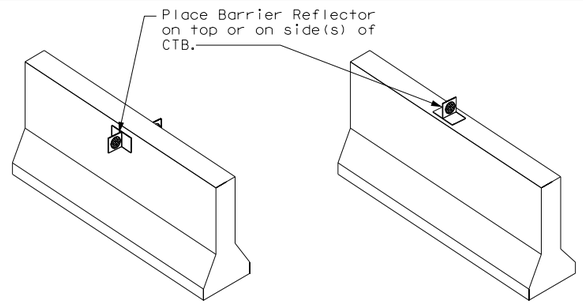
GF1



GF2



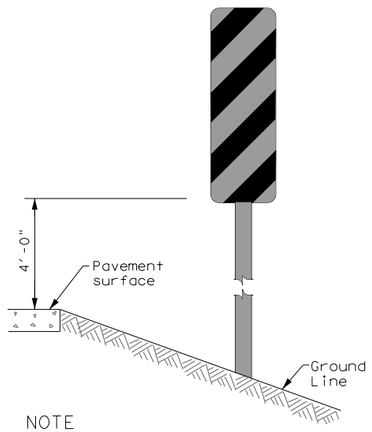
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

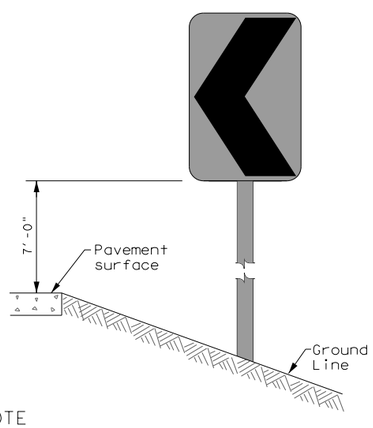
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

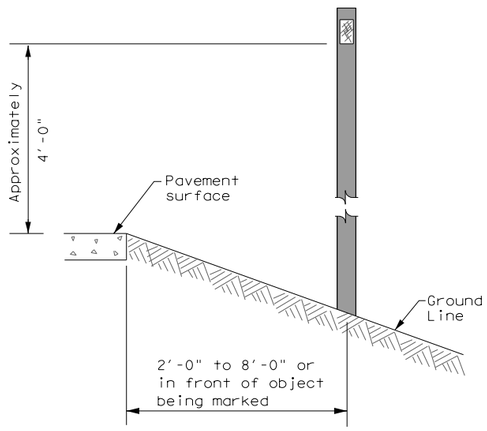
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

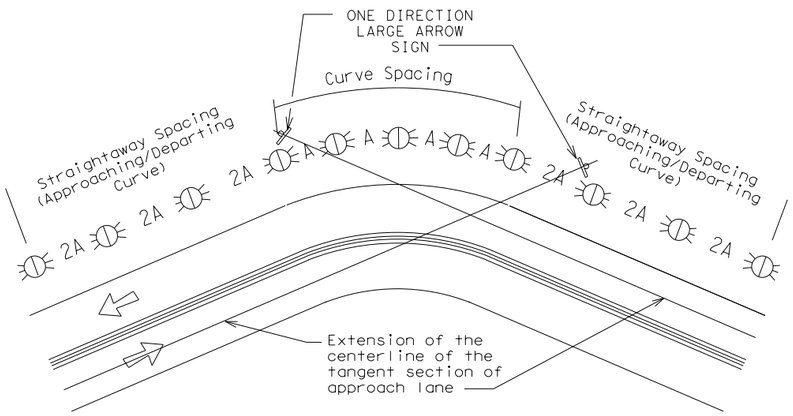
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	KAUFMAN		116

20B

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

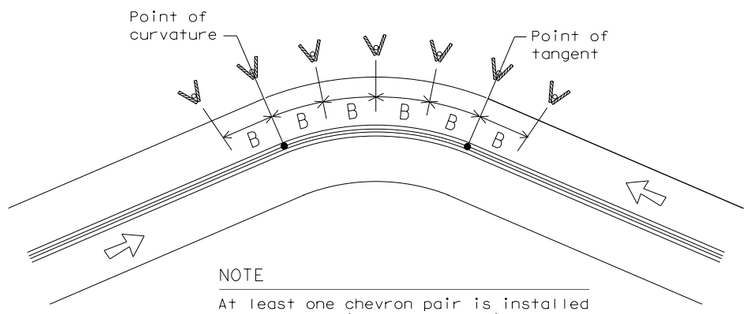
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

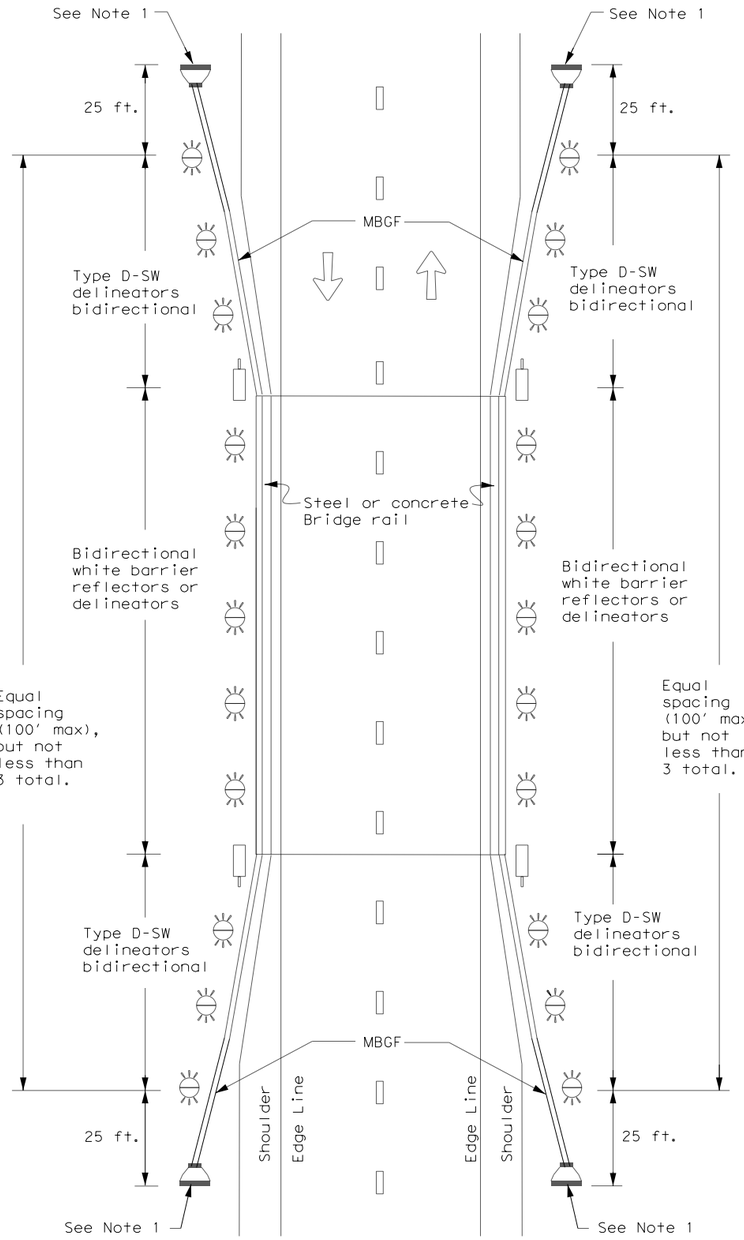
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		117

20C

DATE: 2/16/2023 4:59:02 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\dom3-20.dgn

DATE: 2/16/2023 4:59:03 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\dom5-20.dgn

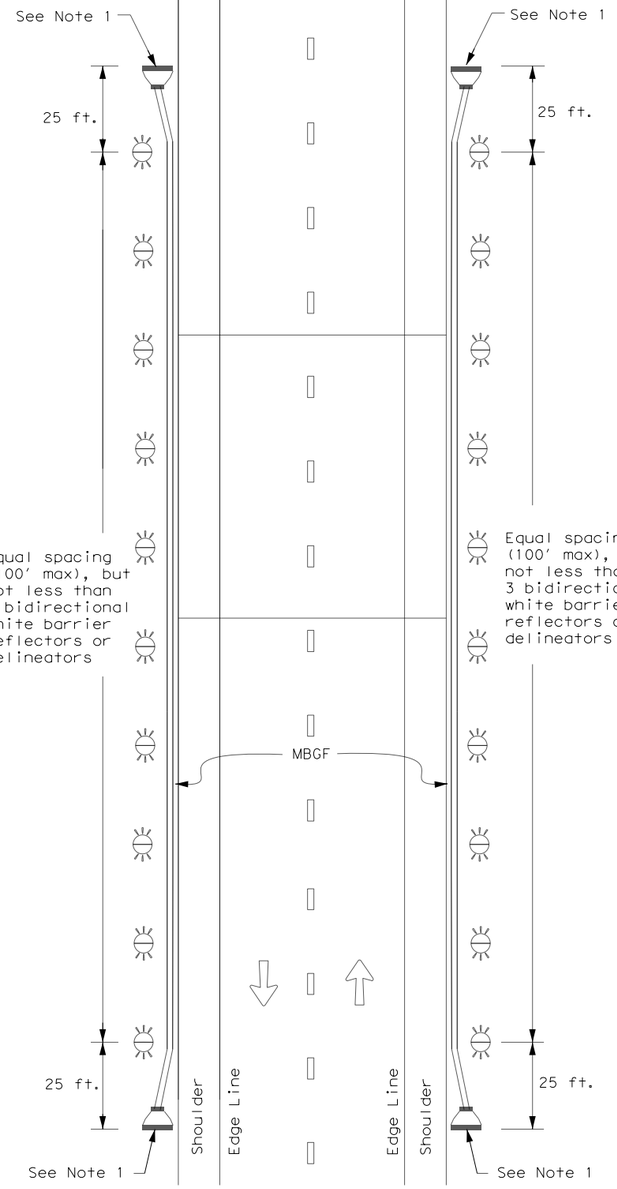
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

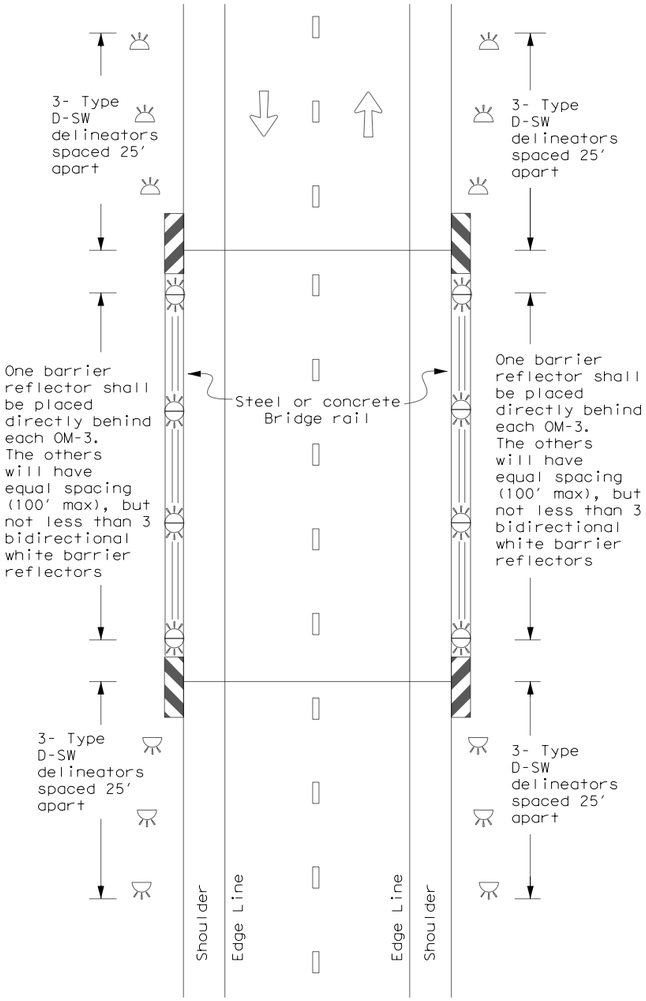
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
7-20	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		118

20E

DATE: 2/16/2023 4:59:03 PM
FILE: N:\P5072-18-19-4\CADD*BR*11-100\DGN\08*TRAFFIC\D*PVMT*MRK\StdDetails\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

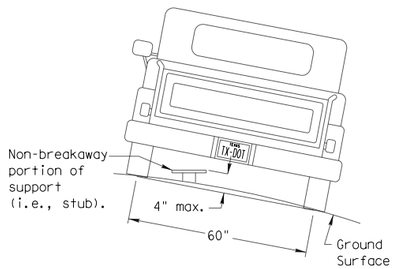
Post Type
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

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))

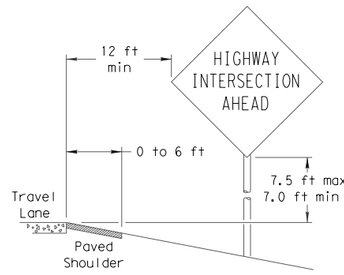
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

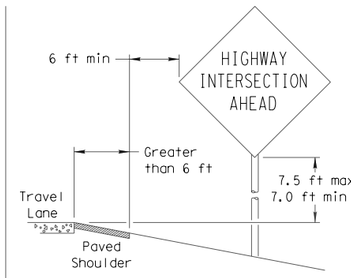
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

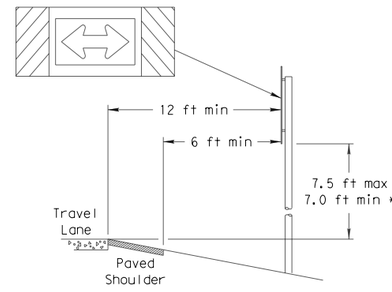
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



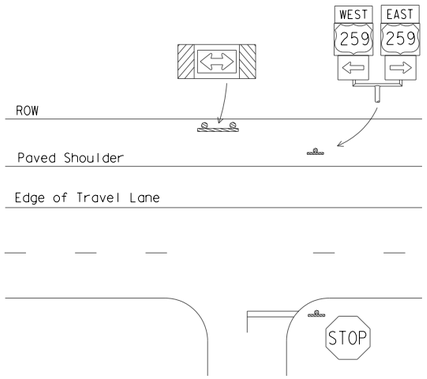
GREATER THAN 6 FT. WIDE

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.

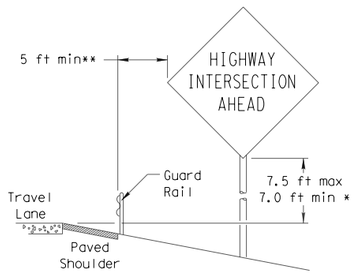
T-INTERSECTION



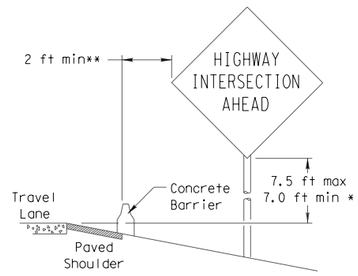
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

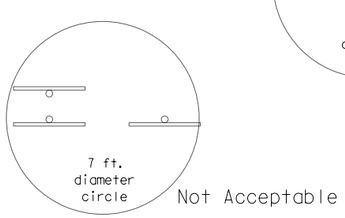
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

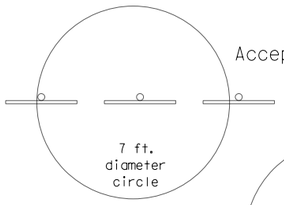
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

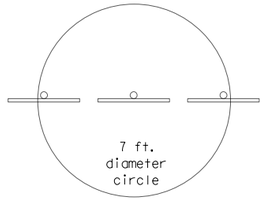
No more than 2 sign posts should be located within a 7 ft. circle.



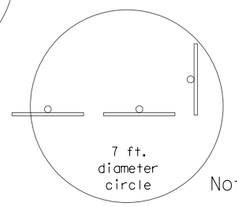
Not Acceptable



Acceptable



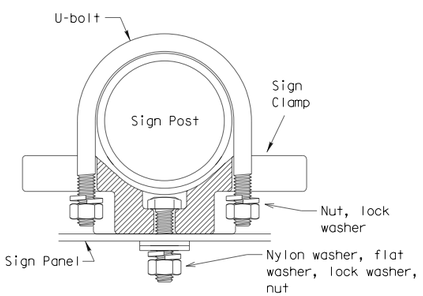
Not Acceptable



Not Acceptable

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

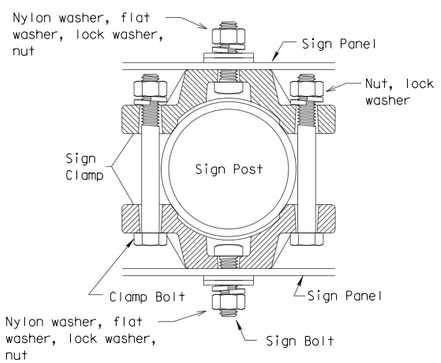


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

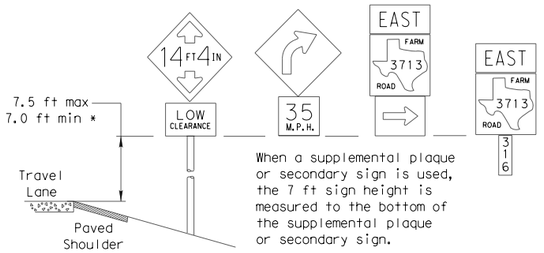
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



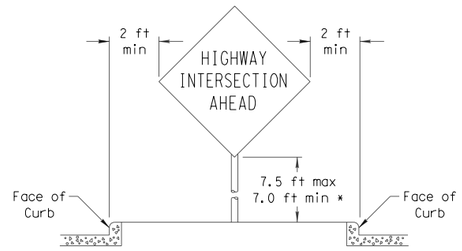
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



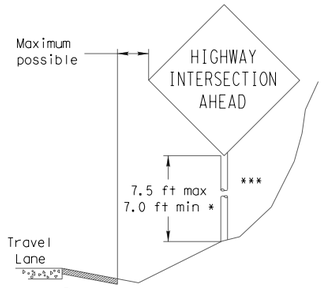
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

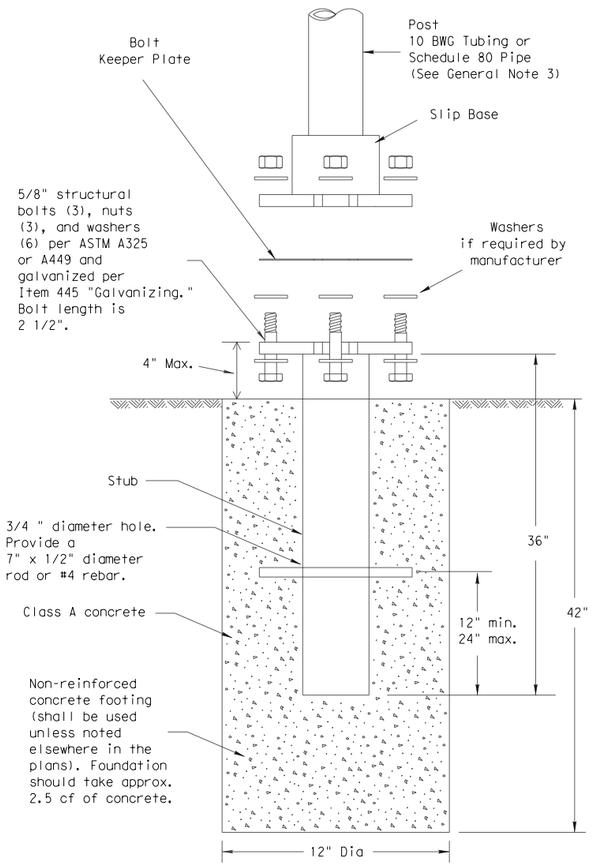
SMD(GEN)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0918	11	100,ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		119

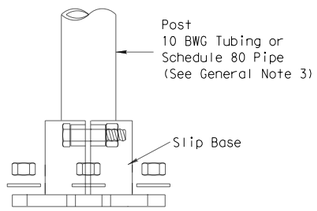
26A

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

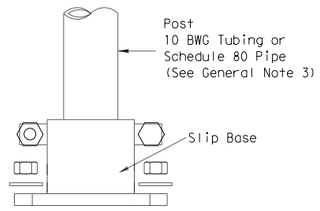


SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

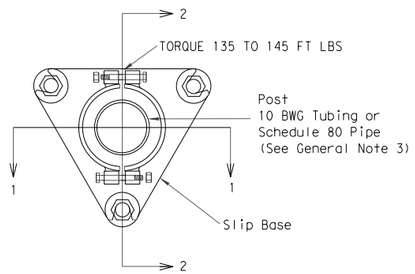
NOTE
The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.



SIDE VIEW 1-1



SIDE VIEW 2-2



TOP VIEW

DETAIL A

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.

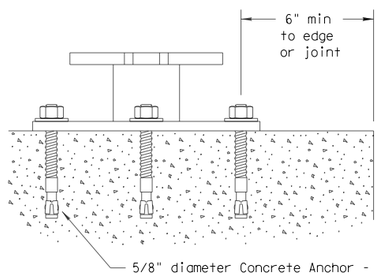
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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.

ADDED DETAIL A FOR CLAMP BASE
10-2010

Texas Department of Transportation
Dallas District Standard

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

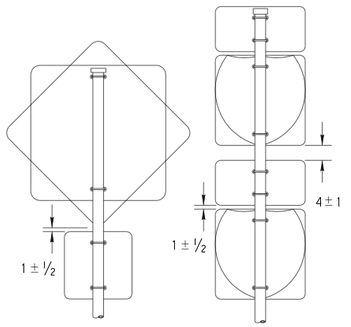
SMD(SLIP-1)-08(DAL)

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

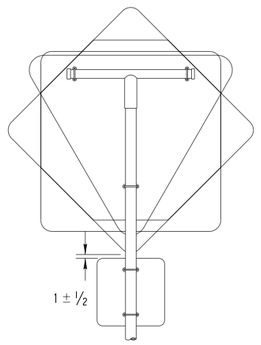
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0918	11	100,ETC.	CR 110, ETC.
12-10 (DISTRICT) ADDED CLAMP BASE DETAIL FOR SLIP BASE INSTALLATION	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		120

26B

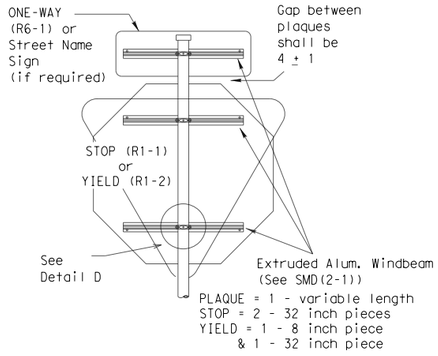
DATE: 2/16/2023 4:59:04 PM
FILE: N:\PS072-18-19-4\CADD*BR*11-100\DGN\08*TRAFFIC\D*PWMT*MRK\StdDetails\smds1da1.DGN



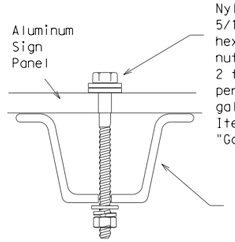
SM RD SGN ASSM TY XXXXX(1)XX(P)



SM RD SGN ASSM TY XXXXX(1)XX(T)

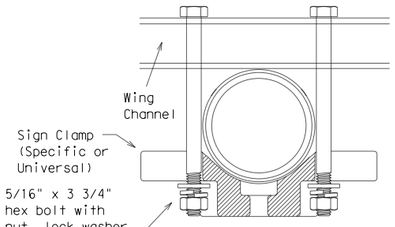


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Top View

Detail A



Top View

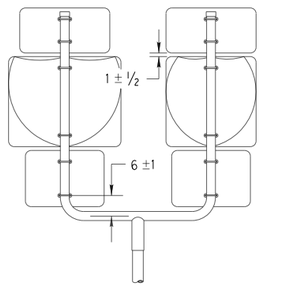
Detail B

GENERAL NOTES:

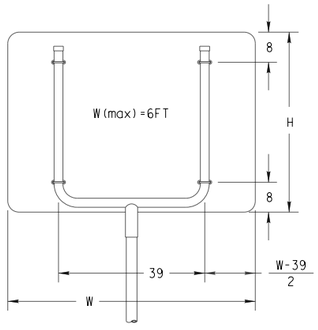
1.

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

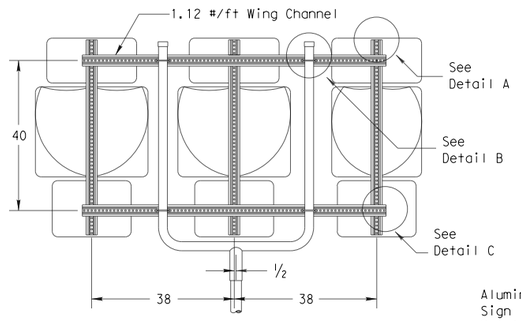
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



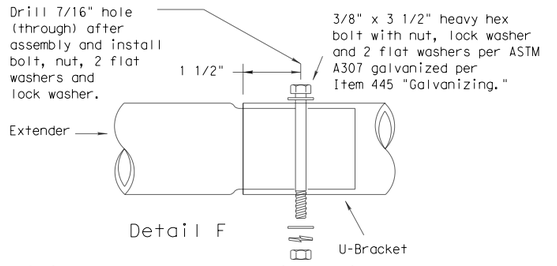
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

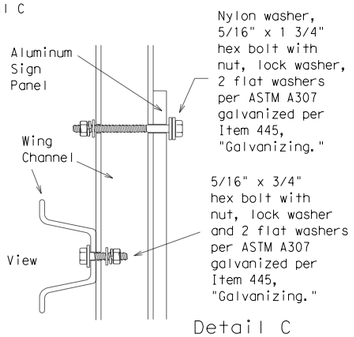


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



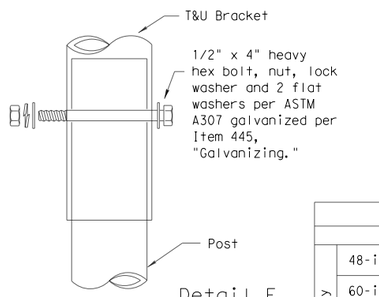
Detail F

Splices shall only be allowed behind the sign substrate.

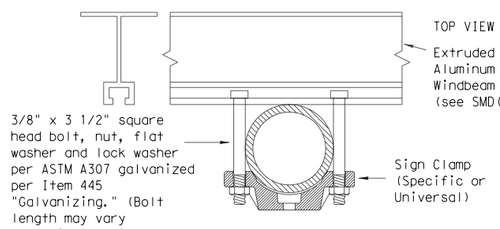


SIDE VIEW

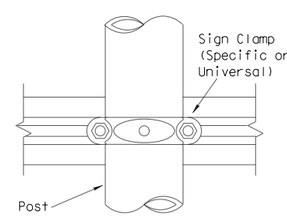
Detail C



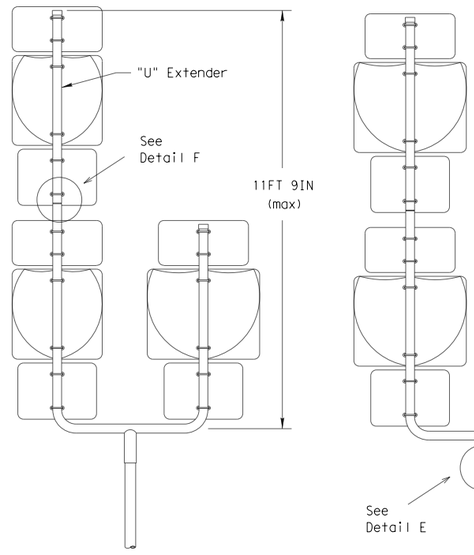
Detail E



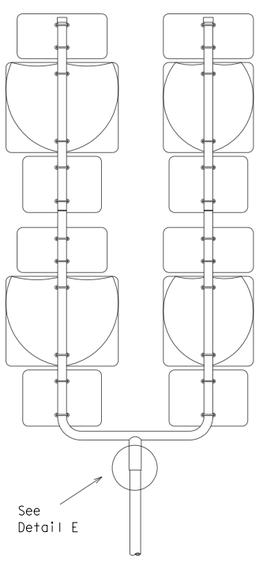
Detail D



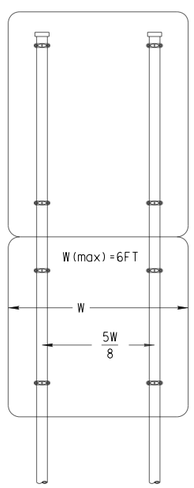
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



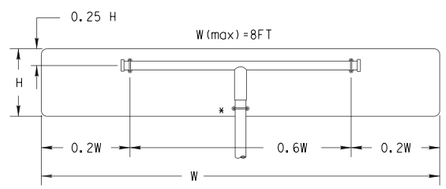
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



SM RD SGN ASSM TY S80(1)XX(U-2EXT)



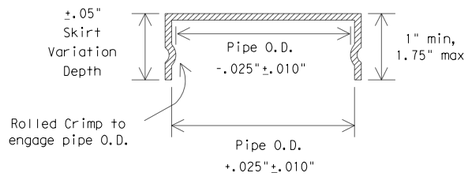
SM RD SGN ASSYM TY XXXXX(2)XX(P)



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

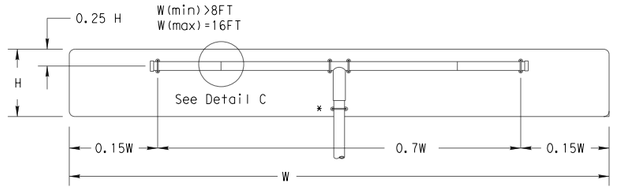
SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0918	11	100,ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		121

26C

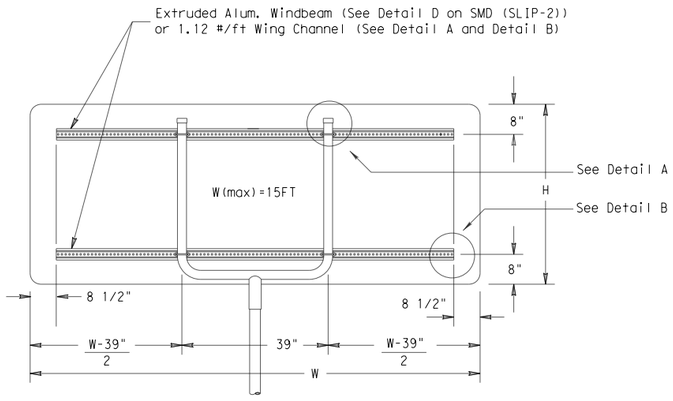
DATE: 2/16/2023 4:59:04 PM
FILE: N:\P5072-18-19-4\CADD*BR*11-100\DGN\08*TRAFFIC\D*PVMT*MRK\StdDetails\smds2.dgn

DATE: 2/16/2023 4:59:05 PM
FILE: N:\PS072-18-19-4\CADD*BR*11-100\DGN\08*TRAFFIC\D*PVMT*MRK\StdDetails\smds3.dgn

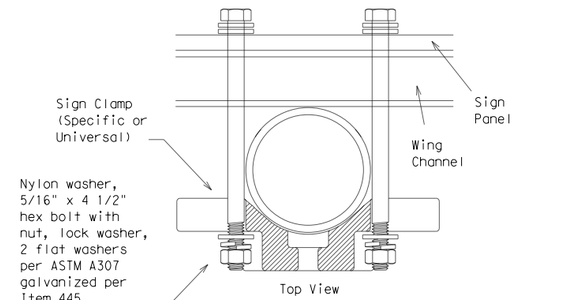


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

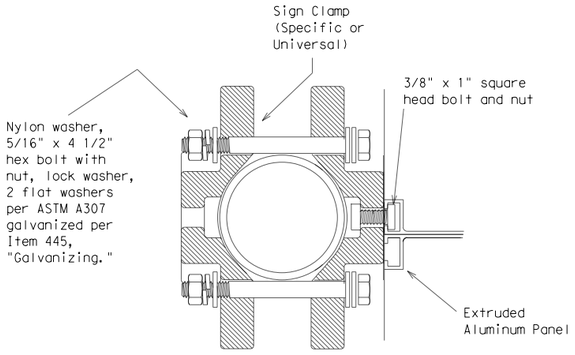
(* - See Note 12)



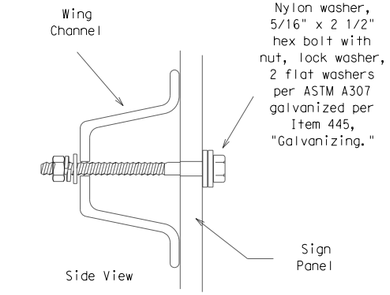
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



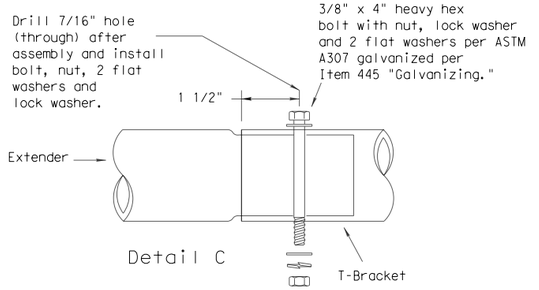
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

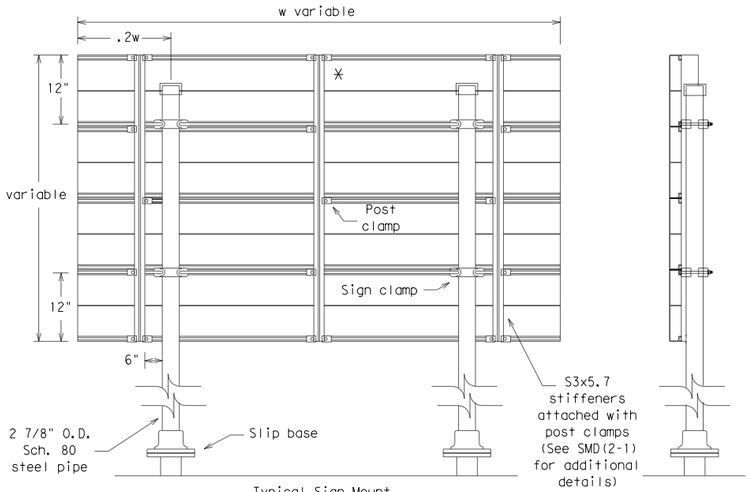


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

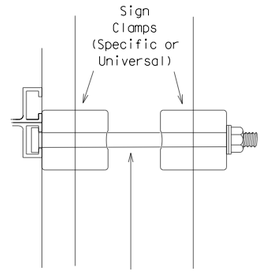


Typical Sign Mount

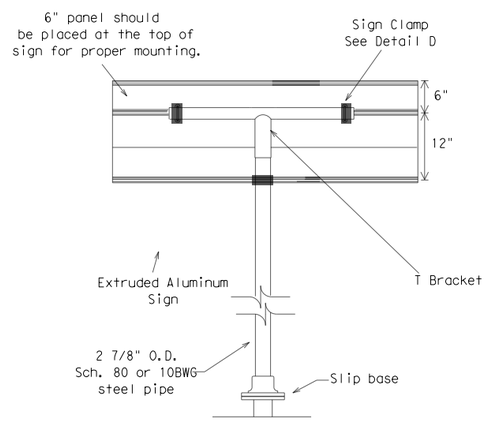
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

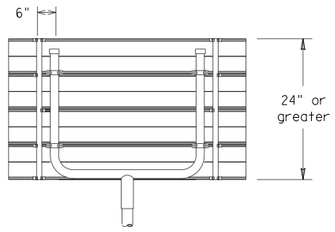
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0918	11	100,ETC.	CR 110,ETC.

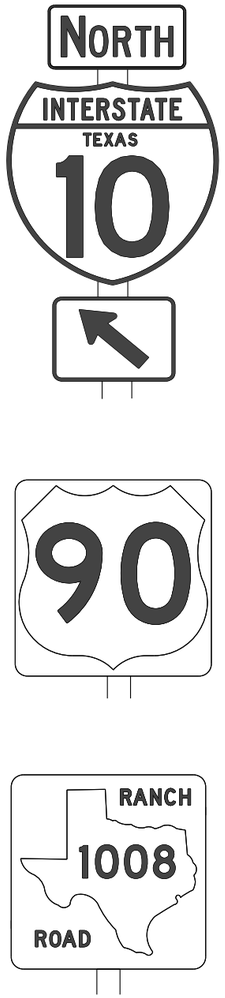
DIST	COUNTY	SHEET NO.
DAL	KAUFMAN	122

26D

DATE: 2/16/2023 4:59:06 PM
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

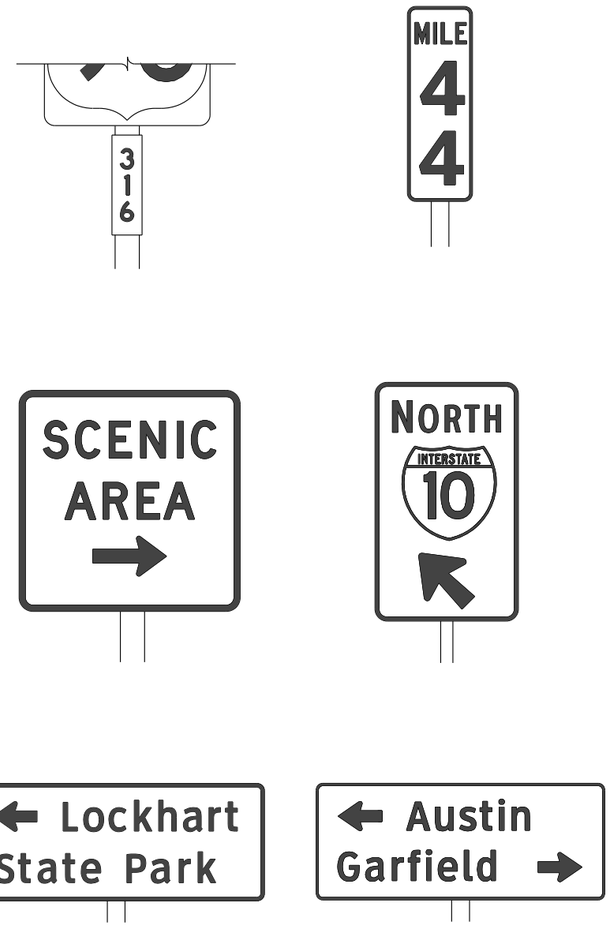
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

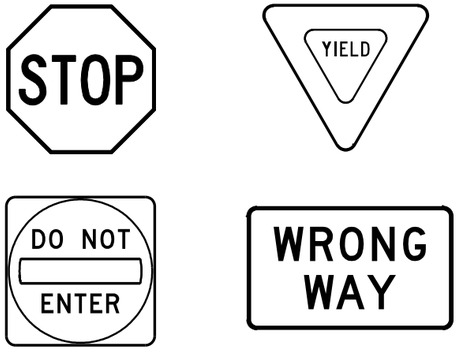
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100,ETC.	CR 110,ETC.
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DAL	KAUFMAN		123

DATE: 2/16/2023 4:59:06 PM
FILE: N:\5072-18-19-4\CADD_BR_11-10\DGN\08_TRAFFIC\D_PVMT_MRK\StdDetails\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

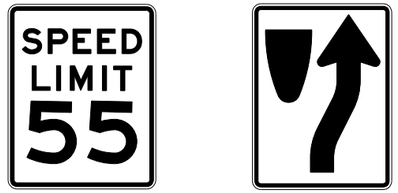


REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

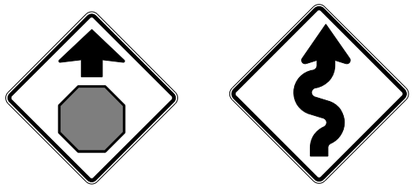
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



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	0918	11	100,ETC.	CR 110,ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		124

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

Notes To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.
3. All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.

Filled Out: xx/xx/xxxx
Prepared by: Name/Section

I. STORMWATER POLLUTION PREVENTION PLAN-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 adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

1. Kaufman County Phase II MS4 contact Kathy Morris, Public Works Director

2.

☐ No Action Required ☒ Required Action

Action Number:

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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= 3(a)

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. Bridge - STA 114+20 - Jones Creek - Stream Impacts - NWP 14

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 for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

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 Number:

1.

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 Number:

1.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

1. The following species could occur in the project area: Monarch butterfly, black bear, trocolored bat, eastern liger salamander, southern crawfish frog, Strecker's chorus frog, Woodhouse's toad, eastern spotted skunk, long-tailed weasel, mountain lion, swamp rabbit, eastern box turtle, slender glass lizard, and western chicken turtle. Follow the special notes and BMPs listed below to protect these species.

2. Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf
   a. Minimize impacts to wetland habitats including isolated ephemeral pools.
   b. Section 2.6.1 Aquatic Amphibian and Reptile BMP (barrier fencing not required)
   c. Section 2.6.2 Terrestrial Amphibian and Reptile BMP
   d. Section 1.4 Water Quality BMP
   e. Section 1.2 Vegetation BMP

Special Notes:

1. Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
2. 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 immediated area, and contact the Engineer immediately.
3. The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SWSP:	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 Corp 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 Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, 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, canisters, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (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 Number:

1. CR 110 over Jones Creek (NBI 181300AA034 7001) at STA 1114+21 silver/black LBP (700ppm) on steel beams. LBP abatement on steel beams required only at cut locations prior to demolition activities.
2.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action Number:

1.

GENERAL NOTE:

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LAST REVISION: 1/15/15

CR 110 at Jones Creek

 Texas Department of Transportation
Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		CR 110, etc.
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Kaufman	
CONTROL	SECTION	JOB	SHEET NO.
0918	11	100, etc.	125

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

I. STORMWATER POLLUTION PREVENTION PLAN-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 adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

1. Kaufman County Phase II MS4 contact Kathy Morris, Public Works Director

2.

☐ No Action Required ☒ Required Action

Action Number:

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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# 3(a)

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. Bridge - STA 2282+20 - Bachelor Creek Relief - Stream Impacts - NWP 14

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 for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

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 Number:

1.

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 Number:

1.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

1. The following species could occur in the project area: Monarch butterfly, triccolored bat, eastern tiger salamander, southern crawfish frog, Strecker's chorus frog, Woodhouse's toad, eastern spotted skunk, long-tailed weasel, swamp rabbit, eastern box turtle, slender glass lizard, western box turtle, and western chicken turtle. Follow the special notesand BMPs listed below to protect these species.

2. Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf
   a. Minimize impacts to wetland habitats including isolated ephemeral pools.
   b. Section 2.6.1 Aquatic Amphibian and Reptile BMP (barrier fencing not required)
   c. Section 2.6.2 Terrestrial Amphibian and Reptile BMP
   d. Section 1.4 Water Quality BMP
   e. Section 1.2 Vegetation BMP

Special Notes:

1. Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
2. 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 immediated area, and contact the Engineer immediately.
3. The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

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 Corp 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 Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, 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, canisters, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (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 Number:

1.

2.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action Number:

1.

GENERAL NOTE:

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LAST REVISION: 1/15/15

CR 279 at Bachelor Creek Relief

 Texas Department of Transportation
Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		CR 110, etc.
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Kaufman	SHEET NO.
CONTROL	SECTION	JOB	
0918	11	100, etc.	126

Notes To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.
3. All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.

Filled Out: XX/XX/XXXX
Prepared by: Name/Section

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

I. STORMWATER POLLUTION PREVENTION PLAN-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 adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

1. Kaufman County Phase II MS4 contact Kathy Morris, Public Works Director

2.

☐ No Action Required ☒ Required Action

Action Number:

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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# 3(a)

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. Bridge - STA 315+20 - Muddy Cedar Creek Tributary - Stream Impacts - NWP 14

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 for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

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 Number:

1.

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 Number:

1.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

1. The following species could occur in the project area: Monarch butterfly, triccolored bat, eastern tiger salamander, southern crawfish frog, Strecker's chorus frog, Woodhouse's toad, eastern spotted skunk, long-tailed weasel, swamp rabbit, eastern box turtle, slender glass lizard, and western box turtle. Follow the special notesand BMPs listed below to protect these species.

2. Contractor to implement the following BMPs from "Beneficial Management Practices: Avoiding, Minimizing, and Mitigating Impacts of Transportation Projects on State Natural Resources" available at https://ftp.txdot.gov/pub/txdot-info/env/toolkit/300-01-bmp.pdf
   a. Minimize impacts to wetland habitats and isolated ephemeral pools.
   b. Section 2.6.1 Aquatic Amphibian and Reptile BMP (barrier fencing not required)
   c. Section 2.6.2 Terrestrial Amphibian and Reptile BMP
   d. Section 1.4 Water Quality BMP
   e. Section 1.2 Vegetation BMP

Special Notes:

1. Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
2. 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 immediated area, and contact the Engineer immediately.
3. The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

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 Corp 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 Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, 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, canisters, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (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 Number:

1.

2.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action Number:

1.

GENERAL NOTE:

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LAST REVISION: 1/15/15

CR 312 at Muddy Cedar Creek Tributary

 Texas Department of Transportation
Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		CR 110, etc.
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Kaufman	
CONTROL	SECTION	JOB	SHEET NO.
0918	11	100, etc.	127

Notes To Designer:
1. *Do not alter Sheet Design or Font style, size or weight - match text attributes.*
2. *If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.*
3. *All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.*

Filled Out: XX/XX/XXXX
Prepared by: Name/Section

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-11-100, etc.

1.2 PROJECT LIMITS:
From: CR 110 at Jones Creek

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.538756 ,(Long) -96.159448

END: (Lat) 32.539058 ,(Long) -96.158260

1.4 TOTAL PROJECT AREA (Acres): 0.54

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.51

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Construction of bridge replacement consisting of replacing bridge and approaches.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Gowen clay loam, 0 to 1% Slopes	100% Gowen clay, well drained, negligible rate of runoff
	Poor grass throughout. 77% vegetative density

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- [x] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- [x] Mobilization
- [x] Install sediment and erosion controls
- [ ] Blade existing topsoil into windrows, prep ROW, clear and grub
- [ ] Remove existing pavement
- [x] Grading operations, excavation, and embankment
- [x] Excavate and prepare subgrade for proposed pavement widening
- [ ] Remove existing culverts, safety end treatments (SETs)
- [ ] Remove existing metal beam guard fence (MBGF), bridge rail
- [x] Install proposed pavement per plans
- [ ] Install culverts, culvert extensions, SETs
- [x] Install mow strip, MBGF, bridge rail
- [x] Place flex base
- [x] Rework slopes, grade ditches
- [x] Blade windrowed material back across slopes
- [x] Revegetation of unpaved areas
- [x] Achieve site stabilization and remove sediment and erosion control measures
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [x] Sediment laden stormwater from stormwater conveyance over disturbed area
- [x] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [x] Solvents, paints, adhesives, etc. from various construction activities
- [x] Transported soils from offsite vehicle tracking
- [x] Construction debris and waste from various construction activities
- [x] Contaminated water from excavation or dewatering pump-out water
- [x] Sanitary waste from onsite restroom facilities
- [x] Trash from various construction activities/receptacles
- [ ] Long-term stockpiles of material and waste
- [x] Other: Concrete pouring and washout
- [ ] Other: _____
- [ ] Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Jones Creek	Flows into Cedar Creek (0818B*), then Cedar Creek Reservoir(0818*)

* Add (*) for impaired waterbodies with pollutant in ().

*Impaired by Bacteria in water (Recreation use)

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- [x] Development of plans and specifications
- [x] Perform SWP3 inspections
- [x] Maintain SWP3 records and update to reflect daily operations
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [x] Day To Day Operational Control
- [x] Maintain schedule of major construction activities
- [x] Install, maintain and modify BMPs
- [ ] Other: _____
- [ ] Other: _____

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/24/2023

CR 110 at Jones Creek

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	SEE TITLE SHEET	128

STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- X ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ X Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- X X Other: Preservation of natural resources
- ☐ X Other: Compost manufactured topsoil
- ☐ X Other: Vegetation lined ditches
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- X ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- X ☐ Other: Rock bedding at construction exits
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
No permanent controls are planned.		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- X Other: Dampen disturbed soil areas as needed for dust control.
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- X Other: Avoid storing portable sanitary units, concrete washouts or chemicals within 50-ft upgradient of a receiving water without adequate pollution controls.
- X Other: Capture saw cutting debris and concrete slurry for proper disposal.
- X Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
Jones Creek: Vegetative Buffer Not feasible due to type of work which includes excavation at bridge near creek to remove exisiting bridge, build new bridge and installing of stone riprap.		
Sediment fence, rock filter dams, & erosion control logs.	**1112+20**	**1115+87**

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/24/2023

CR 110 at Jones Creek

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		129
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-11-100, etc.

1.2 PROJECT LIMITS:
From: CR 279 at Bachelor Creek Relief

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.656816 ,(Long) -96.280390

END: (Lat) 32.657647 ,(Long) -96.279275

1.4 TOTAL PROJECT AREA (Acres): 0.52

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.49

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Construction of bridge replacement consisting of replacing bridge and approaches.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Axtell fine sandy loam 2 to 5% slopes 8.5% of area	90% axtell sandy loam, moderately well drained. high runoff
Gowen clay loam 0 to 1% slopes 91.5% of area	100% Gowen clay, well drained, negligible rate of runoff
	Average grass,Pasture throughout. 73% vegetative density

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- [x] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- [x] Mobilization
- [x] Install sediment and erosion controls
- [ ] Blade existing topsoil into windrows, prep ROW, clear and grub
- [ ] Remove existing pavement
- [x] Grading operations, excavation, and embankment
- [x] Excavate and prepare subgrade for proposed pavement widening
- [ ] Remove existing culverts, safety end treatments (SETs)
- [ ] Remove existing metal beam guard fence (MBGF), bridge rail
- [x] Install proposed pavement per plans
- [ ] Install culverts, culvert extensions, SETs
- [x] Install mow strip, MBGF, bridge rail
- [x] Place flex base
- [x] Rework slopes, grade ditches
- [x] Blade windrowed material back across slopes
- [x] Revegetation of unpaved areas
- [x] Achieve site stabilization and remove sediment and erosion control measures
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [x] Sediment laden stormwater from stormwater conveyance over disturbed area
- [x] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [x] Solvents, paints, adhesives, etc. from various construction activities
- [x] Transported soils from offsite vehicle tracking
- [x] Construction debris and waste from various construction activities
- [x] Contaminated water from excavation or dewatering pump-out water
- [x] Sanitary waste from onsite restroom facilities
- [x] Trash from various construction activities/receptacles
- [ ] Long-term stockpiles of material and waste
- [x] Other: Concrete pouring and washout
- [ ] Other: _____
- [ ] Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Bachelor Creek Relief	Flows into Kings Creek (0818C*), then Cedar Creek Reservoir (0818*)

* Add (*) for impaired waterbodies with pollutant in ().

*Impaired by Bacteria in water (Recreation use)

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- [x] Development of plans and specifications
- [x] Perform SWP3 inspections
- [x] Maintain SWP3 records and update to reflect daily operations
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [x] Day To Day Operational Control
- [x] Maintain schedule of major construction activities
- [x] Install, maintain and modify BMPs
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/24/2023

CR 279 at Bachelor Creek Relief

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		130
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- X ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ X Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- X X Other: Preservation of natural resources
- ☐ X Other: Compost manufactured topsoil
- ☐ X Other: Vegetation lined ditches
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- X ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- X ☐ Other: Rock bedding at construction exits
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
No permanent controls are planned.		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- X Other: Dampen disturbed soil areas as needed for dust control.
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- X Other: Avoid storing portable sanitary units, concrete washouts or chemicals within 50-ft upgradient of a receiving water without adequate pollution controls.
- X Other: Capture saw cutting debris and concrete slurry for proper disposal.
- X Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
Bachelor Creek Relief: Vegetative Buffer Not feasible due to type of work which includes excavation at bridge near creek to remove existing bridge, build new bridge and installing of stone riprap.		
Sediment fence, rock filter dams, & erosion control logs.	**2279+97**	**2284+55**

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/24/2023

CR 279 at Bachelor Creek Relief

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		131
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-11-100, etc.

1.2 PROJECT LIMITS:
From: CR 312 at Muddy Cedar Creek Tributary

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.694053 ,(Long) -96.159410

END: (Lat) 32.693557 ,(Long) -96.158874

1.4 TOTAL PROJECT AREA (Acres): 0.31

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.30

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Construction of bridge replacement consisting of replacing bridge and approaches.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Crockett , 2 to 5% slopes 82% of Area	Moderately well drained, High runoff
Kemp, fequently flooded 18% of Area	Bars on flood plains, moderately well drained, neglible runoff
	Average grass,Pasture throughout. 73% vegetative density

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- [x] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- [x] Mobilization
- [x] Install sediment and erosion controls
- [ ] Blade existing topsoil into windrows, prep ROW, clear and grub
- [ ] Remove existing pavement
- [x] Grading operations, excavation, and embankment
- [x] Excavate and prepare subgrade for proposed pavement widening
- [ ] Remove existing culverts, safety end treatments (SETs)
- [ ] Remove existing metal beam guard fence (MBGF), bridge rail
- [x] Install proposed pavement per plans
- [ ] Install culverts, culvert extensions, SETs
- [x] Install mow strip, MBGF, bridge rail
- [x] Place flex base
- [x] Rework slopes, grade ditches
- [x] Blade windrowed material back across slopes
- [x] Revegetation of unpaved areas
- [x] Achieve site stabilization and remove sediment and erosion control measures
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [x] Sediment laden stormwater from stormwater conveyance over disturbed area
- [x] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [x] Solvents, paints, adhesives, etc. from various construction activities
- [x] Transported soils from offsite vehicle tracking
- [x] Construction debris and waste from various construction activities
- [x] Contaminated water from excavation or dewatering pump-out water
- [x] Sanitary waste from onsite restroom facilities
- [x] Trash from various construction activities/receptacles
- [ ] Long-term stockpiles of material and waste
- [x] Other: Concrete pouring and washout
- [ ] Other: _____
- [ ] Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Muddy Cedar Creek	Flows into Cedar Creek (0818B*), then Cedar Creek Reservoir (0818*)

* Add (*) for impaired waterbodies with pollutant in ().

*Impaired by Bacteria in water (Recreation use)

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- [x] Development of plans and specifications
- [x] Perform SWP3 inspections
- [x] Maintain SWP3 records and update to reflect daily operations
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [x] Day To Day Operational Control
- [x] Maintain schedule of major construction activities
- [x] Install, maintain and modify BMPs
- [ ] Other: _____
- [ ] Other: _____

RODOLFO CHAPA 105922 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS
2/24/2023

CR 312 at Muddy Cedar Creek Tributary

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		132
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- X ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ X Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- X X Other: Preservation of natural resources
- ☐ X Other: Compost manufactured topsoil
- ☐ X Other: Vegetation lined ditches
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- X ☐ Biodegradable Erosion Control Logs
- X ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- X ☐ Other: Rock bedding at construction exits
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
No permanent controls are planned.		

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- X Other: Dampen disturbed soil areas as needed for dust control.
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- X Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- X Sanitary Facilities
- X Other: Avoid storing portable sanitary units, concrete washouts or chemicals within 50-ft upgradient of a receiving water without adequate pollution controls.
- X Other: Capture saw cutting debris and concrete slurry for proper disposal.
- X Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
Muddy Cedar Creek Tributary: Vegetative Buffer Not feasible due to type of work which includes excavation at bridge near creek to remove exisiting bridge, build new bridge and installing of stone riprap.		
Sediment fence, rock filter dams, & erosion control logs.	**313+50**	**317+00**

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/24/2023

CR 312 at Muddy Cedar Creek Tributary

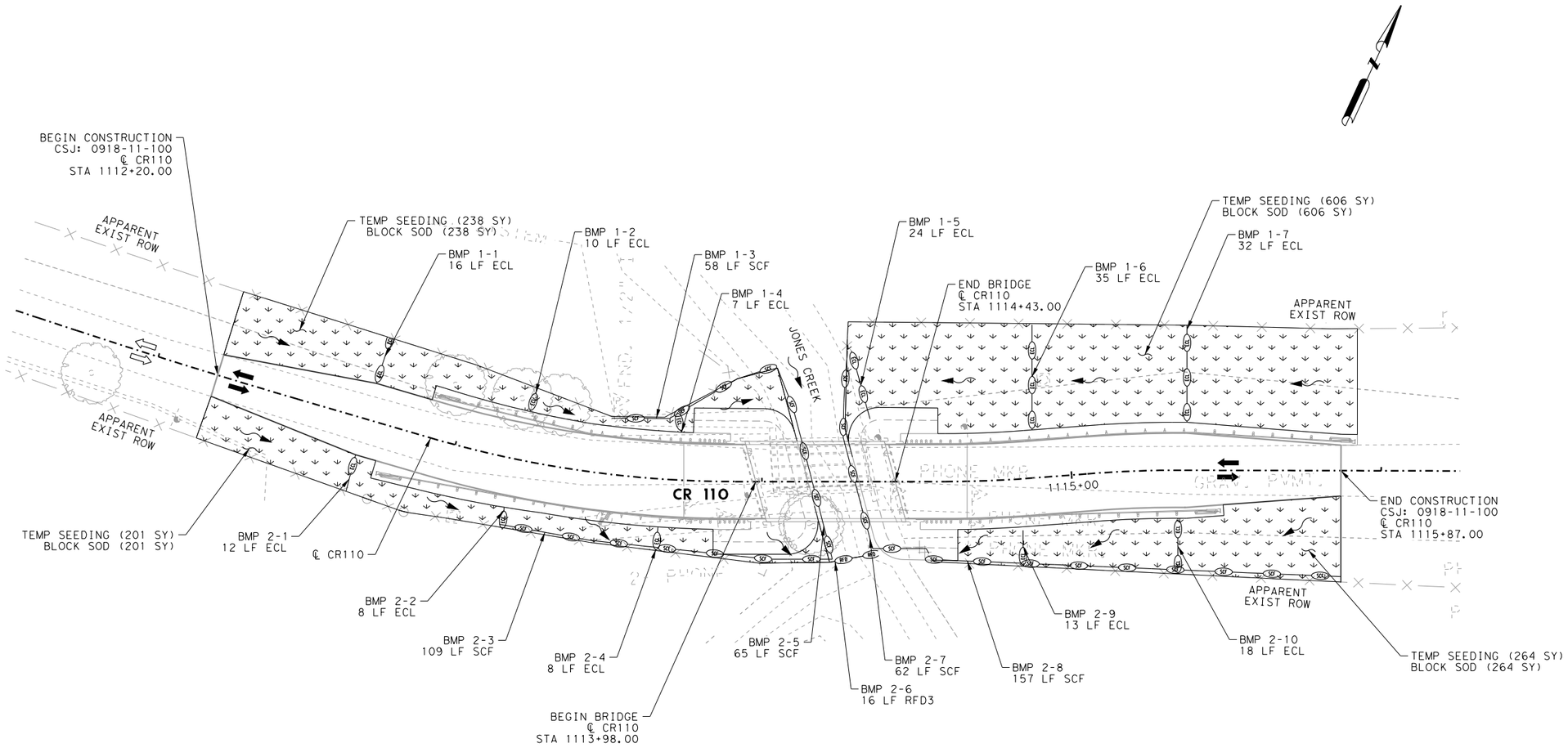
STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		133
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	KAUFMAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	11	100, ETC.	CR 110, ETC.

LEGEND:

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- RFD — ROCK FILTER DAM
- DIRECTION OF FLOW
- TEMP SEEDING & BLOCK SOD



NOTES:

1. BMP'S SHALL BE INSTALLED NO SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBANCE OR POTENTIAL POLLUTANT-GENERATING ACTIVITIES IN THEIR CONTROL AREA.
2. CONSTRUCTION EXITS TO BE FIELD DETERMINED AND APPROVED BY ENGINEER.
3. SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIMEFRAMES.
4. TO THE EXTENT FEASIBLE, PRESERVE EXISTING VEGETATION AND MAINTAIN A VEGETATIVE BUFFER ALONG STREAM BANK TO MINIMIZE EXPOSURE OF DISTURBED SOILS.

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

0 20 40
SCALE: 1"=40'

BMP ID	INSTALL DATE	REMOVAL DATE
BMP 1-1		
BMP 1-2		
BMP 1-3		
BMP 1-4		
BMP 1-5		
BMP 1-6		
BMP 1-7		

BMP ID	INSTALL DATE	REMOVAL DATE
BMP 2-1		
BMP 2-2		
BMP 2-3		
BMP 2-4		
BMP 2-5		
BMP 2-6		
BMP 2-7		
BMP 2-8		
BMP 2-9		
BMP 2-10		

DATE DISTURBED: _____

DATE STABILIZED: _____

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH
CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

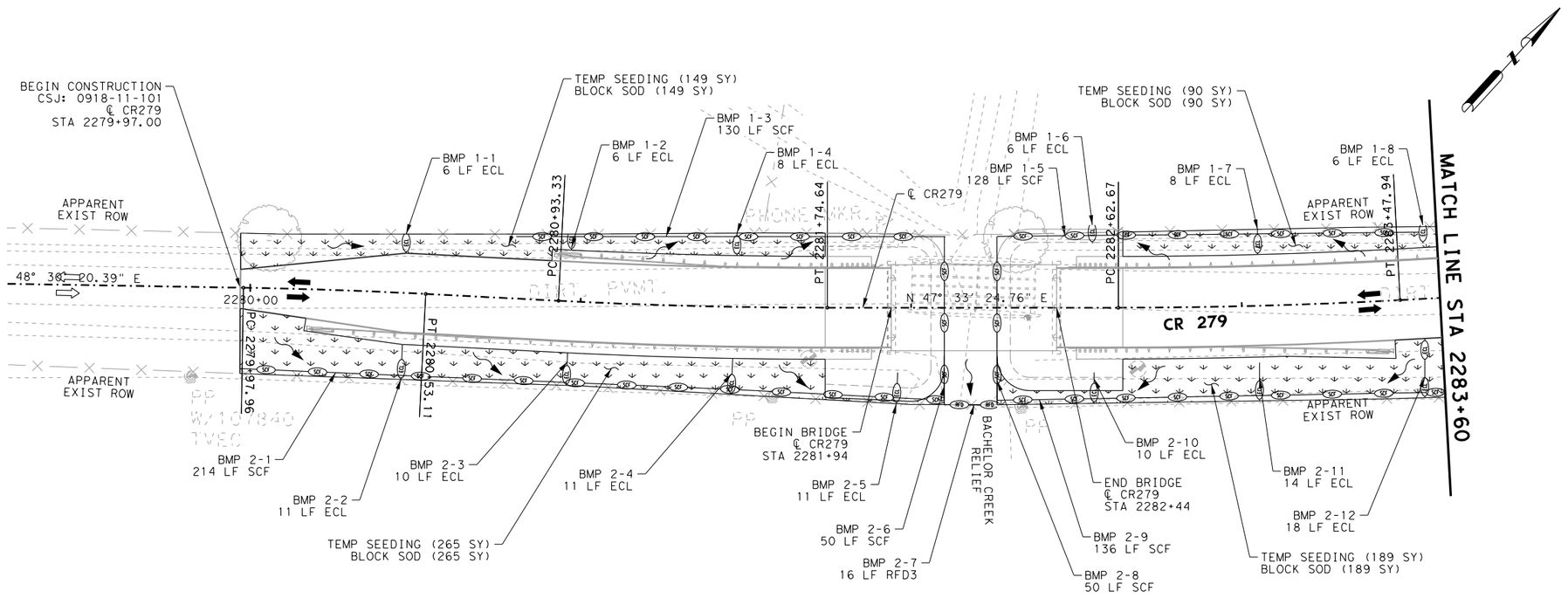
SW3P LAYOUT
CR 110

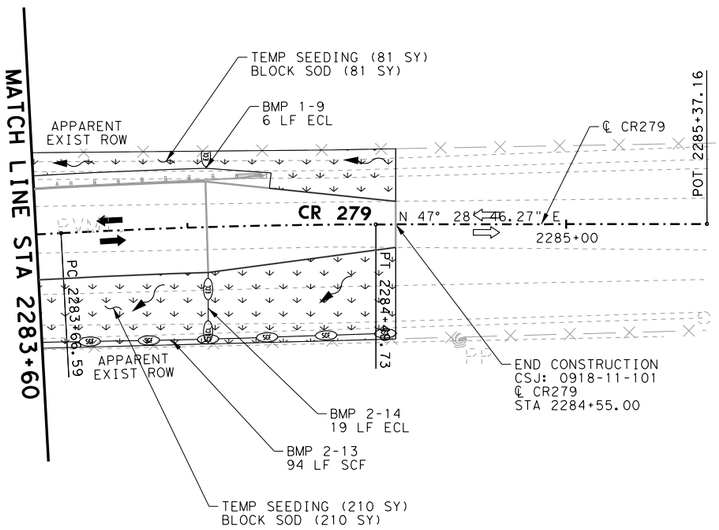
SHEET 1 OF 3

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC	134

RMorfin
2/16/2023 4:59:15 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\CR110_SWPL_01.dgn
...\TXDOT-BW-HALF_PDF.pltcfg

CR110_SWPL_01.dgn





DATE DISTURBED: _____

DATE STABILIZED: _____

LEGEND:

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- RFD — ROCK FILTER DAM
- DIRECTION OF FLOW
- TEMP SEEDING & BLOCK SOD

NOTES:

1. BMP'S SHALL BE INSTALLED NO SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBANCE OR POTENTIAL POLLUTANT-GENERATING ACTIVITIES IN THEIR CONTROL AREA.
2. CONSTRUCTION EXITS TO BE FIELD DETERMINED AND APPROVED BY ENGINEER.
3. SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIMEFRAMES.
4. TO THE EXTENT FEASIBLE, PRESERVE EXISTING VEGETATION AND MAINTAIN A VEGETATIVE BUFFER ALONG STREAM BANK TO MINIMIZE EXPOSURE OF DISTURBED SOILS.

BMP ID	INSTALL DATE	REMOVAL DATE
BMP 1-1		
BMP 1-2		
BMP 1-3		
BMP 1-4		
BMP 1-5		
BMP 1-6		
BMP 1-7		
BMP 1-8		
BMP 1-9		

BMP ID	INSTALL DATE	REMOVAL DATE
BMP 2-1		
BMP 2-2		
BMP 2-3		
BMP 2-4		
BMP 2-5		
BMP 2-6		
BMP 2-7		
BMP 2-8		
BMP 2-9		
BMP 2-10		
BMP 2-11		
BMP 2-12		
BMP 2-13		
BMP 2-14		

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED
PROFESSIONAL ENGINEER
2/16/2023

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway,
Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

SW3P LAYOUT
CR 279

SHEET 2 OF 2

DN:	RM	FED.RD. DIV.NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK DN:	RC	6	TEXAS	SEE TITLE SHEET				CR 110,ETC
DW:	RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK DW:	RC	DAL	KAUFMAN	0918	11	100,ETC		135

CR279_SWPL_01.dgn

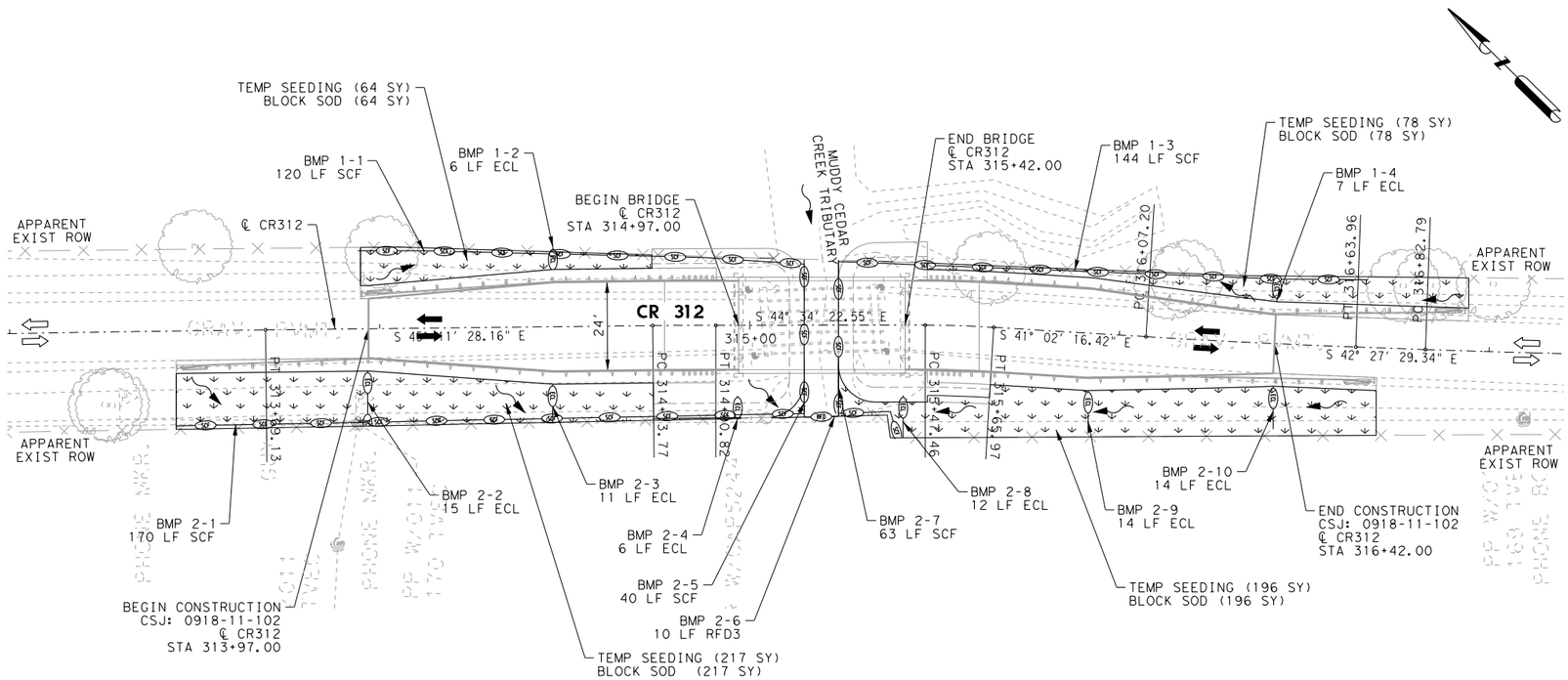
RMorfin
2/16/2023 4:59:16 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\CR279_SWPL_01.dgn
...\X001-BW-HALF_PDF.pltcfg

LEGEND:

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOG
- RFD — ROCK FILTER DAM
- DIRECTION OF FLOW
- TEMP SEEDING & BLOCK SOD

NOTES:

1. BMP'S SHALL BE INSTALLED NO SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBANCE OR POTENTIAL POLLUTANT-GENERATING ACTIVITIES IN THEIR CONTROL AREA.
2. CONSTRUCTION EXITS TO BE FIELD DETERMINED AND APPROVED BY ENGINEER.
3. SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIMEFRAMES.
4. TO THE EXTENT FEASIBLE, PRESERVE EXISTING VEGETATION AND MAINTAIN A VEGETATIVE BUFFER ALONG STREAM BANK TO MINIMIZE EXPOSURE OF DISTURBED SOILS.



BMP ID	INSTALL DATE	REMOVAL DATE
BMP 1-1		
BMP 1-2		
BMP 1-3		
BMP 1-4		

BMP ID	INSTALL DATE	REMOVAL DATE
BMP 2-1		
BMP 2-2		
BMP 2-3		
BMP 2-4		
BMP 2-5		
BMP 2-6		
BMP 2-7		
BMP 2-8		
BMP 2-9		
BMP 2-10		

DATE DISTURBED: _____

DATE STABILIZED: _____

STATE OF TEXAS
RODOLFO CHAPA
105922
LICENSED PROFESSIONAL ENGINEER
2/16/2023

0 20 40
SCALE: 1"=40'

NO.	DATE	REVISION	APPROV.
	--		
	--		
	--		
	--		

Texas Department of Transportation

ENTECH CIVIL ENGINEERS, INC
F-6932
15021 Katy Freeway, Suite 500
Houston, Texas, 77094
281-945-0069 PH
281-945-0081 FX

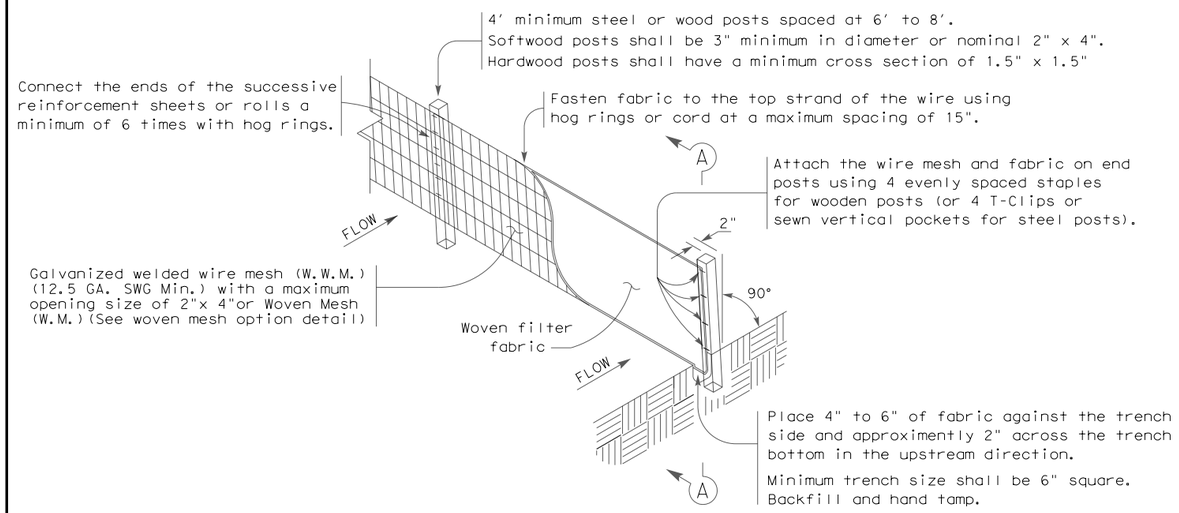
SW3P LAYOUT
CR 312

SHEET 3 OF 3

DN: RM	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK DN: RC	6	TEXAS	SEE TITLE SHEET			CR 110,ETC
DW: RM	STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK DW: RC	DAL	KAUFMAN	0918	11	100,ETC	136

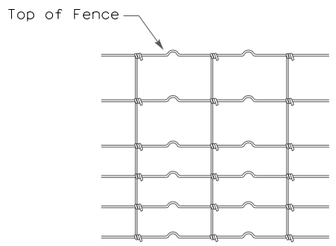
RMorfin
2/16/2023 4:59:17 PM
N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\CR312_SWPL_01.dgn
...\TxDOT-BW-HALF_PDF.pltcfg

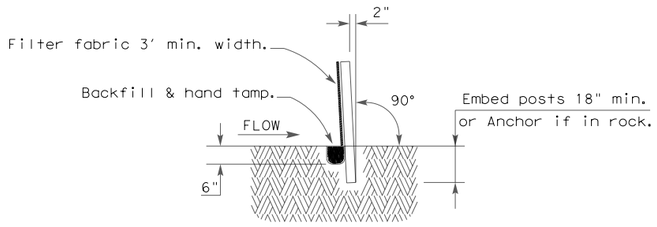
2/16/2023
N:\VPS072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\StdDetails\ec116.dgn



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.

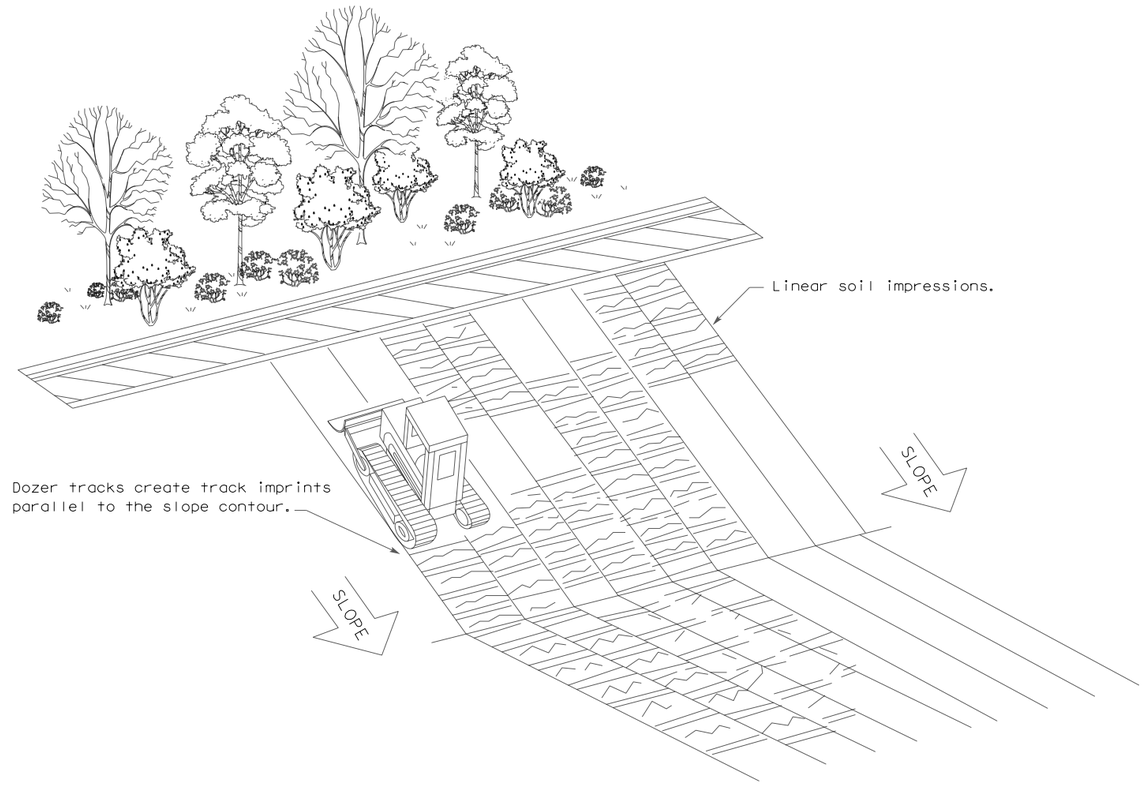
LEGEND

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

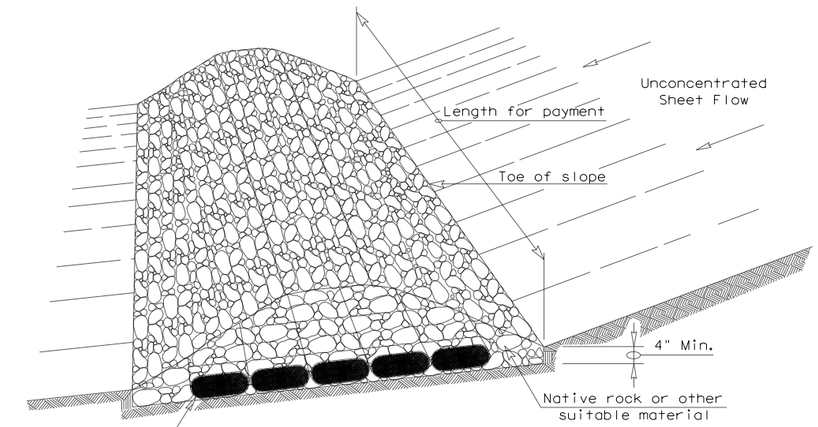
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

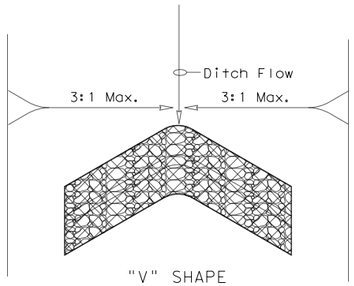
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		137

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\StdDetails\ec216.dgn

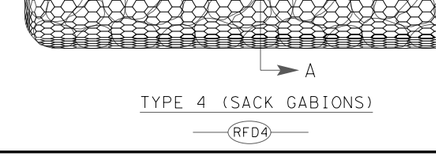


FILTER DAM AT TOE OF SLOPE

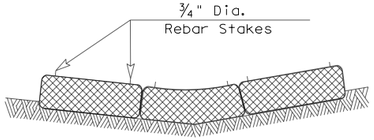
RFD1



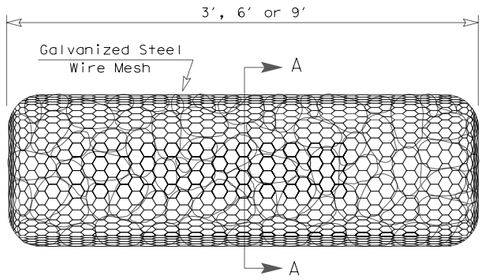
"V" SHAPE
PLAN VIEW



PLAN VIEW

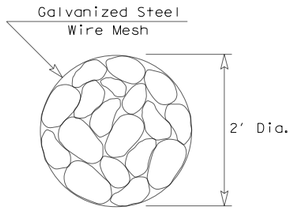


SECTION B-B

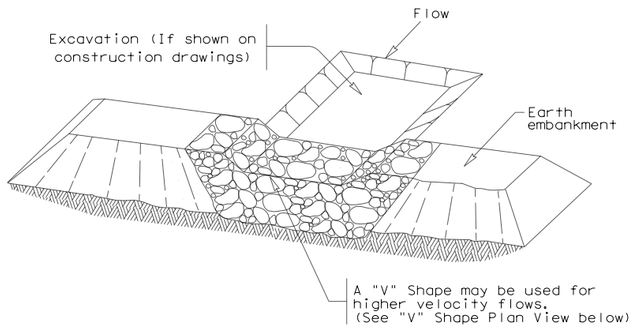


TYPE 4 (SACK GABIONS)

RFD4

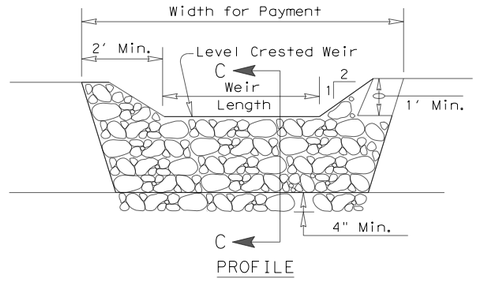


SECTION A-A

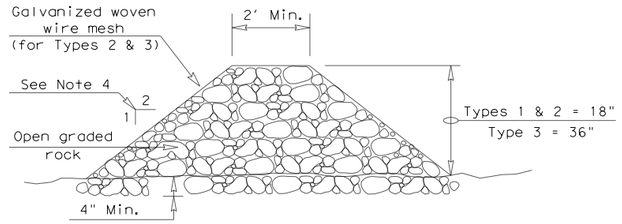


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

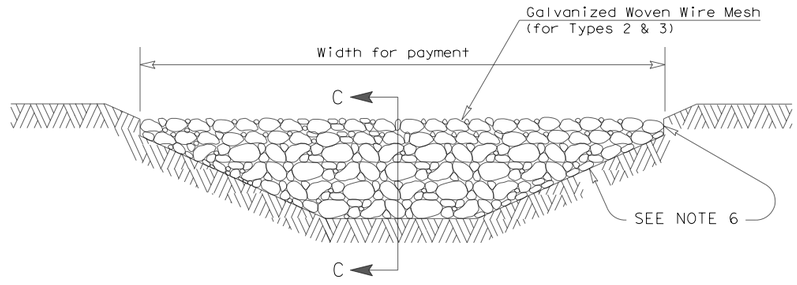
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

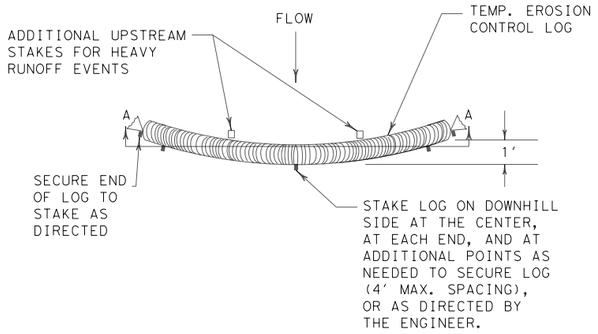
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

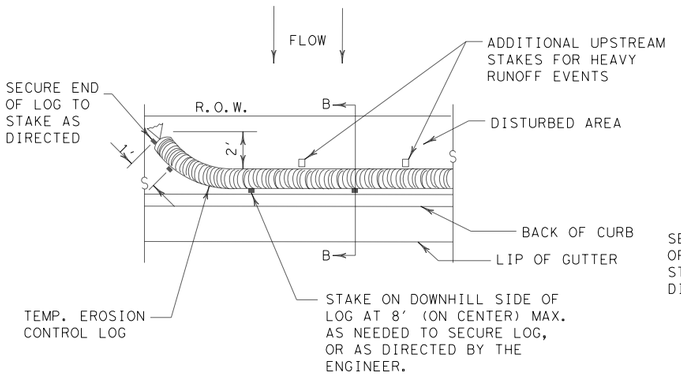
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	dal	KAUFMAN		138

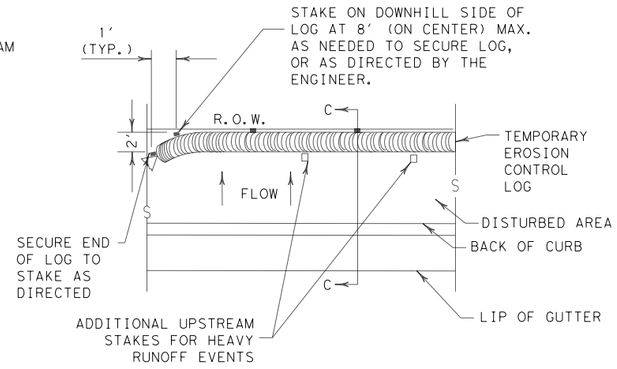
DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\StdDetails\ec916.dgn



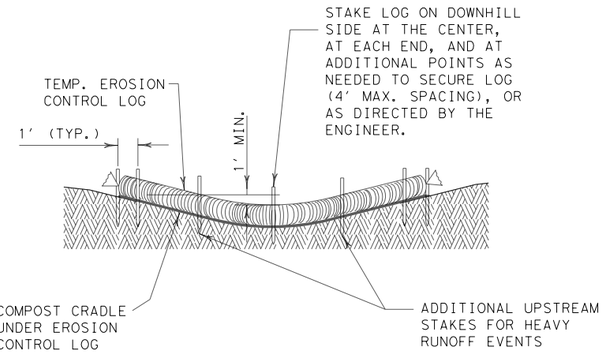
PLAN VIEW



PLAN VIEW



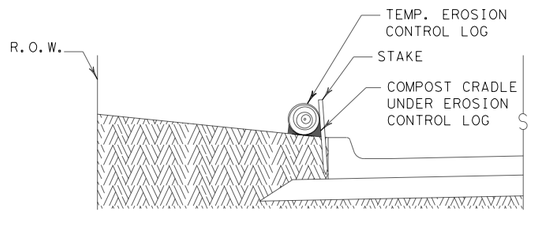
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

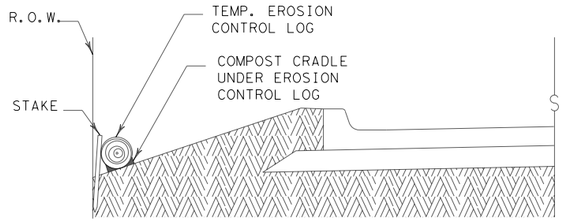
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



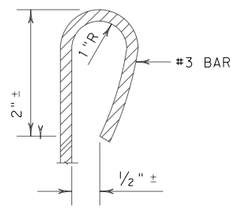
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

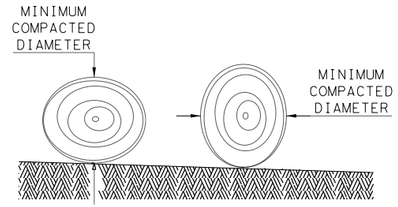
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

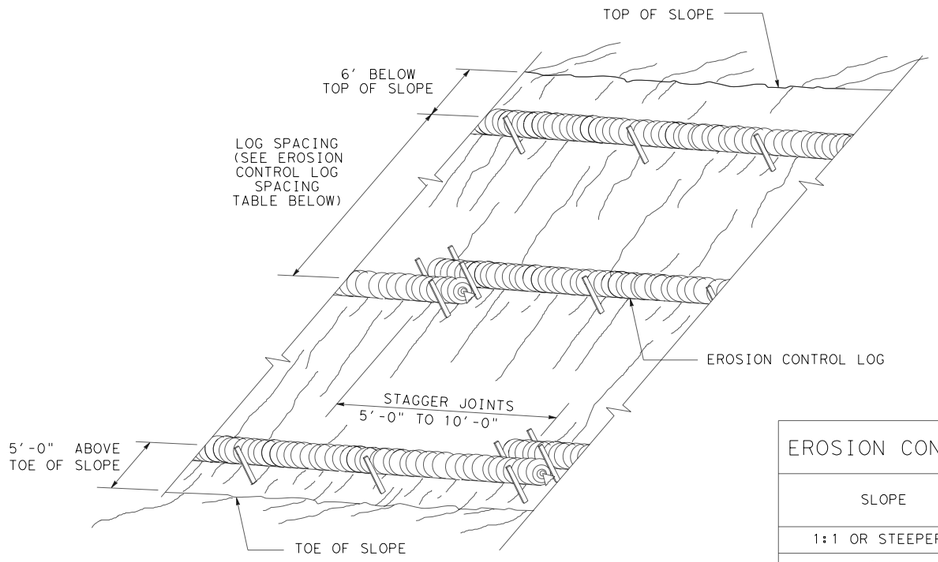
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

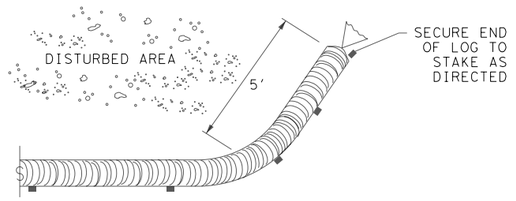
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	11	100, ETC.	CR 110, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	KAUFMAN		139

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\StdDetails\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

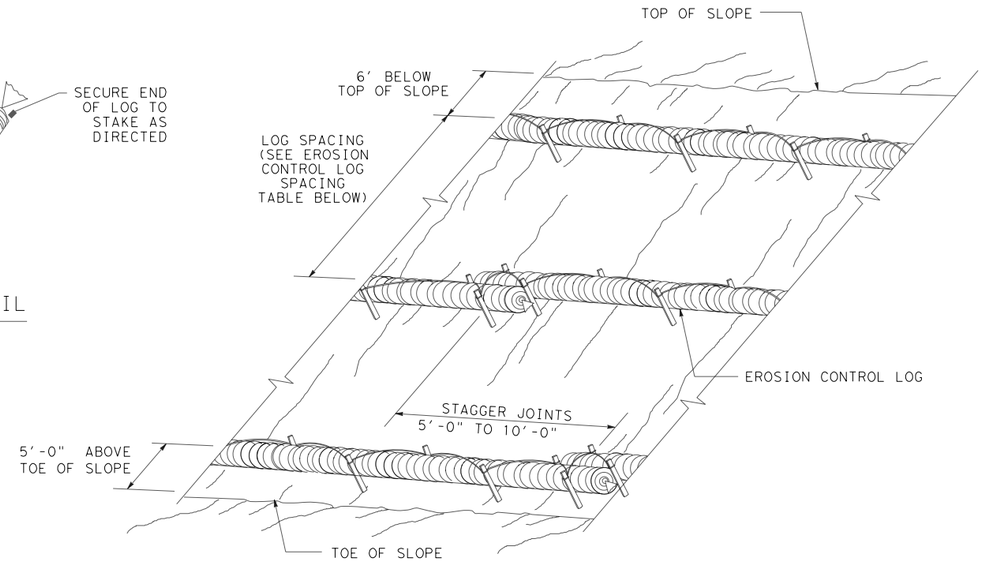
CL-SST



END SECTION RAP DETAIL

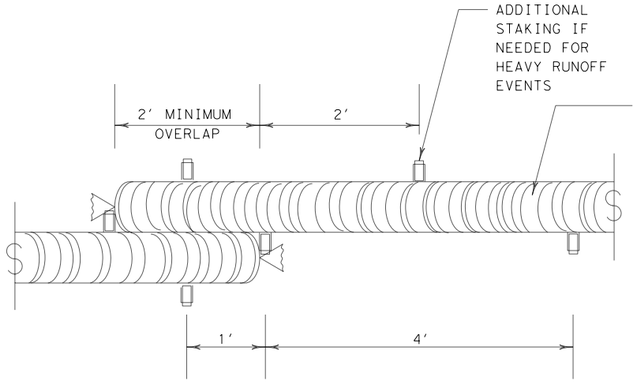
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

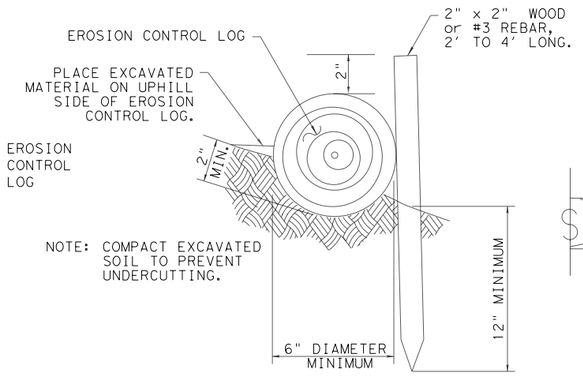
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

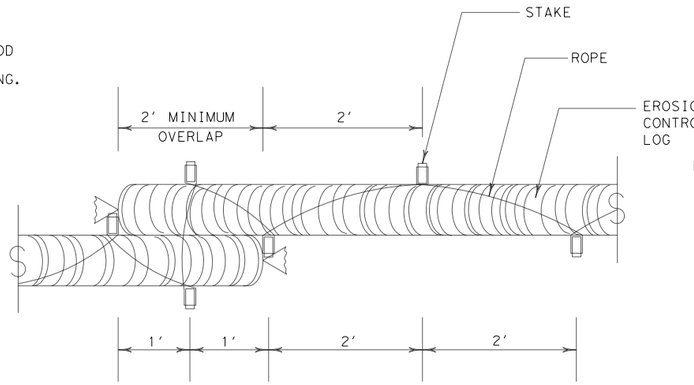




STAKE AND TRENCHING ANCHORING DETAIL

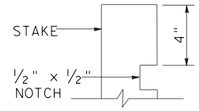
CL-SST

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

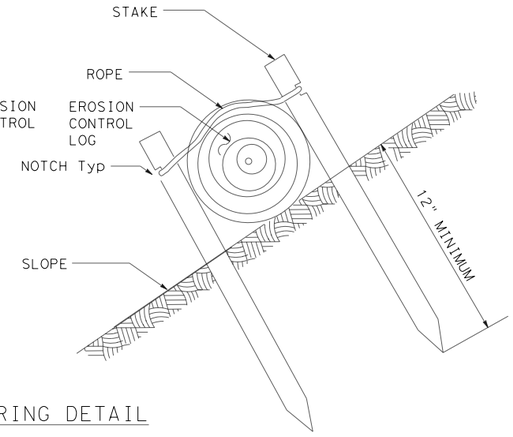


STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL



Texas Department of Transportation | Design Division Standard

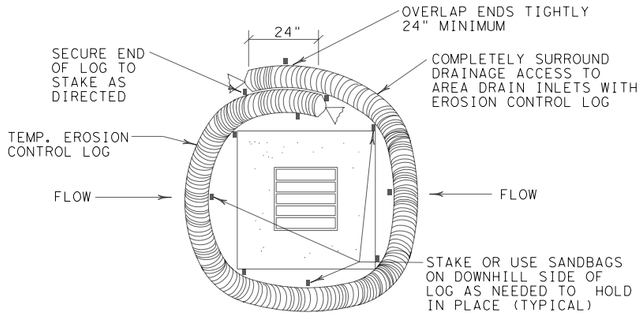
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

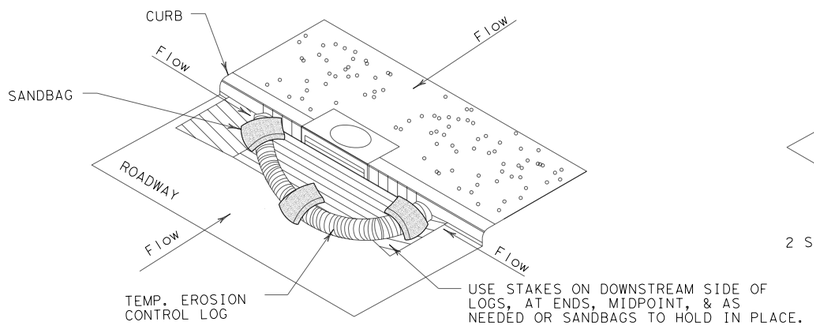
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0918	11	100,ETC.		CR 110,ETC.	
	DIST	COUNTY			SHEET NO.	
	DAL	KAUFMAN			140	

DATE: 2/16/2023
FILE: N:\P5072-18-19-4\CADD_BR_11-100\DGN\09_ENVIRONMENTAL\StdDetails\ec916.dgn



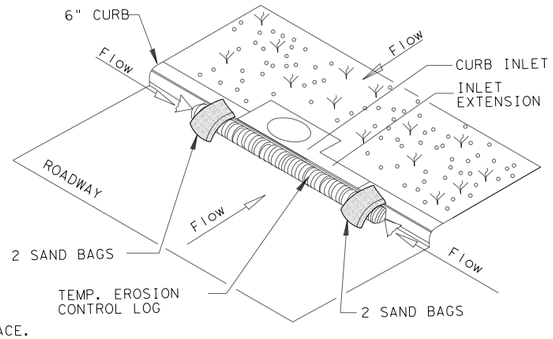
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

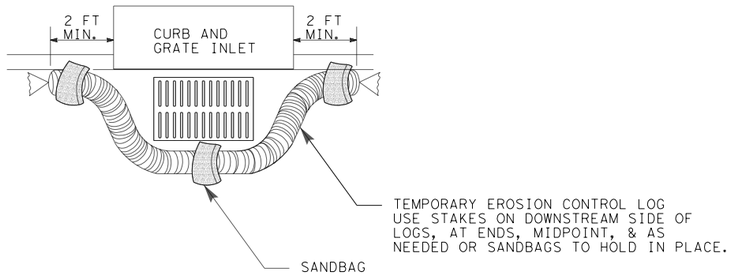
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

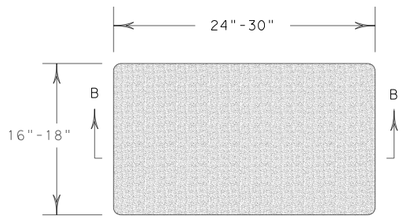
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS			
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0918	11	100, ETC.	CR 110, ETC.			
	DIST	COUNTY		SHEET NO.			
	DAL	KAUFMAN		141			

USER ID

SURFACE PREPARATION ITEM 160* TOPSOIL SY / ITEM 161* COMPOST MANUF. TOPSOIL (BOS) (4") SY

SURFACE PREPARATION

Prepare planting area surface BEFORE placing Topsoil, Compost, Fertilizer, Seed and/or Sod.
Once project area has been completed to final lines, grade and compaction, remove objectionable materials from planting area surface and cultivate existing surface to a depth of 4 inches, unless otherwise specified or directed.

Refer to Items 160 and 161 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.

TOPSOIL NOTES:
1. When Topsoil is specified under Item 160, use suitable material salvaged from the project ROW in accordance with Item 160 specifications, and/or secure additional good material from approved sources.
2. Topsoil shall include only the top 6 inches of its native surface, and be easily cultivated, fertile, erosion-resistant and free of objectionable materials.
3. Topsoil obtained from sites outside of the ROW must come from approved sources and have a pH between 5.5 and 8.5 su.
4. Place Topsoil on pre-cultivated surface, spread to a uniform loose cover at thickness specified, and shape per plans. Water and roll the finished surface with a light roller or other suitable equipment per Item 160.3; do not over-compact.

COMPOST NOTES:
1. When Compost Manufactured Topsoil (4") is specified under Item 161, use compost meeting all requirements of Item 161.2 and Table 1. Provide quality control (QC) documentation and obtain Engineer approval prior to compost delivery.
2. Contractor shall provide tickets/invoices that document material type, quantity and placement for all compost delivered.
3. Additional topsoil may be required to be imported to achieve the compost/topsoil mix ratio. Topsoil must meet Item 160 specifications.

APPLICATION OF COMPOST MANUFACTURED TOPSOIL (4")

AFTER Surface Preparation, uniformly spread a 1-inch layer of compost on-grade with 3 inches topsoil over pre-cultivated planting area. (25% compost and 75% topsoil = 1" compost and 3" topsoil.)
Then mix compost and topsoil together by cultivating the compost into the topsoil (by till or disk) to a 4-inch (4") depth.
Roll the finished surface with a light corrugated drum; do not over-compact.

FERTILIZER ITEM 166* FERTILIZER AC

SOIL ANALYSIS FOR FERTILIZER APPLICATION RATE

Unless otherwise stated in the plans, Contractor shall perform at least one soil analysis on each project before fertilization, and submit results to Engineer with recommended fertilizer rates based on soil analysis.
Engineer may direct sample location(s). Soil analysis may be waived if both compost and sod are used on entire project.

FERTILIZER NOTES:
1. Refer to Item 166 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Apply fertilizer BEFORE seeding, or AFTER placing sod.
3. Use fertilizer containing nitrogen (N), phosphoric acid (P) and potash (K) nutrients, unless otherwise specified. At least 50% of the Nitrogen component shall be a slow-release sulfur-coated urea as described in Item 166.3. Do not apply more than 60 lbs Nitrogen per acre without Engineer concurrence.
4. Deliver fertilizer in bags, clearly labeled to show contents, unless otherwise specified or approved prior to delivery. When non-bagged, loose fertilizer is approved, provide documentation for each load of material delivered, to validate authenticity of the material.
5. Apply fertilizer uniformly, as a dry, granular material, essentially dust-free, and do not mix with water for application as a slurry.
6. When both temporary and permanent seeding are specified for the same area, apply half of the required fertilizer before the temporary seeding operation and the other half before the permanent seeding operation.

SEEDING FOR EROSION CONTROL ITEM 164* DRILL SEEDING AC

RECOMMENDED PLANTING SEASON	PERMANENT RURAL SEED MIX ITEM 164 - DRILL SEEDING (PERM) (RURAL)(CLAY)		PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN)(CLAY)		TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)	
		Pure Live Seed Rate**		Pure Live Seed Rate**		Pure Live Seed Rate**
WARM SEASON Mar.15th, April, May, June, July, August, Sept. 15th	Green Sprangletop (Van Horn)	- 1.0 lbs/AC	Green Sprangletop (Leptochloa dubia)	- 0.3 lbs/AC	Foxtail Millet (Setaria italica)	- 34 lbs/AC
	Sideoats Grama (Haskell)	- 1.0 lbs/AC	Sideoats Grama (El Reno)(Bouteloua curtipendula)	- 3.6 lbs/AC		
	Texas Grama (Atascosa)	- 1.0 lbs/AC	Buffalograss (Texoka)(Buchloe dactyloides)	- 1.6 lbs/AC		
	Hairy Grama (Chaparral)	- 0.4 lbs/AC	Bermudagrass (Cynodon dactylon)	- 2.4 lbs/AC		
	Shortspike Windmillgrass (Welder)	- 0.2 lbs/AC				
	Little Bluestem (OK Select)	- 0.8 lbs/AC				
	Purple Prairie Clover (Cuero)	- 0.6 lbs/AC				
	Engelmann Daisy (Eldorado)	- 0.75lbs/AC				
	Illinois Bundleflower	- 1.3 lbs/AC				
	Awnless Bushsunflower (Plateau)	- 0.2 lbs/AC				
COOL SEASON Sept 16th, Oct, Nov, Dec, Jan, Feb, Mar 14th						Pure Live Seed Rate**
					Tall Fescue (Festuca arundinaceae)	- 4.5 lbs/AC
					Western Wheatgrass (Agropyron smithii)	- 5.6 lbs/AC
					Red Winter Wheat (Triticum aestivum)	- 34 lbs/AC
					Cereal Rye	- 34 lbs/AC

SEEDING NOTES:
1. When seeding is specified under Item 164, refer to TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown. Materials and construction shall meet specifications.
2. Conduct seeding upon completion of each applicable construction stage (dependent upon planting season requirements), without compensation for additional move-ins.
3. Place seed AFTER preparing planting area surface. Refer to Surface Preparation detail this sheet, as well as Topsoil Item 160 and Compost Manufactured Topsoil Item 161 when specified. Apply fertilizer per Item 166 BEFORE seeding, per specifications and this sheet, to help drill the fertilizer into the soil.
4. When temporary grasses are well-established and more than 2 inches tall, mow planting area before seeding permanent grasses; mowing for this purpose will be subsidiary. When vegetation is not already well-established, cultivate planting area to a depth as described in Item 164.3, before temporary seeding and before permanent seeding.
5. Seed material must be appropriate to the location, soil type and season. Use the seed mix species and pure live seed rates designated in Tables 1-4 of the TxDOT 2014 Standard Specifications* for Item 164, unless otherwise specified.
6. All seed shall meet labeling, delivery, analysis, and testing requirements described in Item 164.2.1. Deliver seed in labeled, unopened bags or containers to Engineer prior to planting.
7. Uniformly plant seed over the designated planting area, along the contour of slopes, and drill seed to a depth as described in Item 164.3.4.
8. Hydroseeding may be allowed, when specified or Engineer concurs.
9. Implement and continue Vegetative Watering per the schedule, rate and volume specified under Item 168.

****Note:** The amount of Pure Live Seed (PLS) in one pound of bulk seed is based on three factors: % Purity, % Germination, and % Dormant. Use the following formula to calculate PLS in bulk seed: PLS = % Purity X (% Germination + % Dormant) Ensure that the specified amount of pure live seed is placed.

TXDOT REFERENCE MATERIALS:

- * "STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES" 2014
- "A GUIDANCE TO ROADSIDE VEGETATION ESTABLISHMENT" 2004
- ONLINE TRAINING COURSE: MNT415 REVEGETATION DURING CONSTRUCTION
- DALLAS DISTRICT "VEGETATION ESTABLISHMENT GUIDELINES"

SODDING FOR EROSION CONTROL ITEM 162* BLOCK SOD (BERMUDA) SY

BLOCK OR ROLL SOD	COMMON NAME	BOTANICAL NAME
	Common Bermuda Grass	Cynodon dactylon

SODDING NOTES:
1. Refer to Item 162 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Place sod between the average date of the last freeze in the Spring and 6 weeks before the average date of the first freeze in the Fall, per the Texas Almanac for the project area.
3. Place sod only AFTER soil surface preparation is complete as detailed in this sheet. Dry soil may require pre-watering.
4. Place all sod (blocks or rolls) within 24 hours of delivery to the site, and keep moist from the time it is dug up until it is planted. Sod with dried roots will not be accepted.
5. Place sod with joints alternating on each row to prevent all joints from lining up, and place blocks firmly against adjacent blocks. Roll, tamp and trim sod per Item 162.3.
6. Place fertilizer promptly AFTER sodding operation is complete in each area.
7. Water sod immediately following placement, and continue Vegetative Watering per Item 168.

VEGETATIVE WATERING FOR ESTABLISHING SEED AND SOD ITEM 168* VEGETATIVE WATERING MG

WATERING SCHEDULE

SEASON (Usual Months)	RATE	TIME SCHEDULE	TOTAL WATER ESTIMATE
SPRING & FALL (March, April, May, October)	7,000 gallons/acre per working day	Vegetative watering for seed shall begin on the day after rainfall described below and continue for 60 consecutive working days; vegetative watering for sod shall begin on the day the sod is placed and continue for a minimum of 15 consecutive working days.	420,000 gallons/acre (60 working days)
SUMMER (June, July, August, September)	12,000 gallons/acre per working day		720,000 gallons/acre (60 working days)
WINTER (November through February)	1,000 gallons/acre per working day	Vegetative watering for seed and/or sod shall begin on the day after placement for 15 consecutive working days	15,000 gallons/acre (15 working days)

Notes: Rate and frequency may be adjusted, with the approval of the Engineer, to meet site conditions (especially with sod).
For informational purposes only: 1,000 gallons equals 1 MG

VEGETATIVE WATERING NOTES:
1. Refer to Item 168 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Use clean water free of industrial waste and other substances harmful to vegetation growth, per Item 168.2.
3. Use Vegetative Watering to keep the seed bed moist during germination; not to provide initial watering. After drill seeding, postpone watering operations until site receives at least 1/2-inch of natural rainfall in a single day. Delay watering operations for warm season grasses until soil temperature exceeds 70 degrees F.
4. For sod, water immediately.
5. All water distribution equipment shall be furnished and operated to provide water at a uniform and controllable rate. Use a metering device on all watering equipment.
6. Evenly distribute water over entire area designated for seeding and/or sodding, using even spray patterns that do not disturb seed bed and/or dislodge seed from seed bed.
7. Do not water between the hours of 12:00 p.m. and 6:00 p.m. when daytime temperatures exceed 95 degrees F.
8. After initial establishment period, continue intermittent watering of newly established seed or sod at a rate of approximately 1-inch water/week, during summer months until end of contract.
9. If 1/4-inch or more of rainfall occurs on site on any given working day, no vegetative watering will be needed on that working day. (Note: 1/4-inch rain equals 7,000 gallons of water per acre.)
10. Should the Contractor fail to apply the specified amount of water within the time allowed, any seed or sod in poor condition shall be replaced, fertilized, and watered at Contractor's expense.

ROADSIDE MOWING ITEM 730* PROJECT MAINTENANCE AC

MOWING NOTES:
1. During project construction, once seed is established, use mowing to promote permanent grasses by mowing any remaining temporary grasses.
2. Also mow established turf and ROW grasses in designated areas of project limits as specified or directed by Engineer.
3. Remove litter and debris prior to mowing.
4. Do not mow on wet ground when soil rutting can occur.
5. Hand-trim around obstructions and stormwater control devices as needed.
6. Maintain paved surfaces free of tracked soils and clipped vegetation.

SEQUENCE OF WORK:

- CULTIVATE SURFACE SOIL.
- PREPARE / PLACE TOPSOIL, OR
- PREPARE / PLACE COMPOST MANUFACTURED TOPSOIL.
- APPLY FERTILIZER AND THEN PLACE SEEDING, OR
- PLACE SOD AND THEN APPLY FERTILIZER.
- CONDUCT VEGETATIVE WATERING.
- CONDUCT ROADSIDE MOWING, AS DIRECTED.

Texas Department of Transportation

VEGETATION ESTABLISHMENT SHEET

(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		CR 110,etc.
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DALLAS	KAUFMAN	
CHECK	CONTROL	SECTION	JOB	142
XXX	0918	11	100, ETC.	
CHECK				
XXX				

DATE