DESIGN	FED.RD. DIV.NO.	PROJECT NO.			
ERR	6	BR 2022 (309), ETC			
GRAPHICS	STATE	CONT	SECT	JOB	HIGHWAY NO.
BKT	TEXAS	0918	18	133, ETC	CR 1420, ETC
CHECK	CHECK	DIST	COUNTY		SHEET NO.
HAR	MHS	DAL	NAVARRO		1

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 (309), ETC
CCSJ: 0918-18-133, ETC
CR 1420, ETC

NAVARRO COUNTY

LIMITS: CR NW 1420 AT MILL CREEK
CSJ: 0918-18-133

TOTAL LENGTH OF PROJECT =					
ROADWAY	= 424.94	FT. =	0.080	MI.
BRIDGE	= 120.00	FT. =	0.023	MI.
TOTAL	= 544.94	FT. =	0.103	MI.

LIMITS: CR NW 2250 AT RUSH CREEK TRIBUTARY
CSJ: 0918-18-136

TOTAL LENGTH OF PROJECT =					
ROADWAY	= 303.45	FT. =	0.057	MI.
BRIDGE	= 45.00	FT. =	0.009	MI.
TOTAL	= 348.45	FT. =	0.066	MI.

LIMITS: CR SW 2305 AT PIN OAK CREEK
CSJ: 0918-18-137

TOTAL LENGTH OF PROJECT =					
ROADWAY	= 328.33	FT. =	0.062	MI.
BRIDGE	= 115.00	FT. =	0.022	MI.
TOTAL	= 443.33	FT. =	0.084	MI.

LIMITS: CR SW 3110 AT RUSH CREEK
CSJ: 0918-18-138

TOTAL LENGTH OF PROJECT =					
ROADWAY	= 506.00	FT. =	0.096	MI.
BRIDGE	= 50.00	FT. =	0.009	MI.
TOTAL	= 556.00	FT. =	0.105	MI.

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REPLACE BRIDGE AND APPROACHES

CSJ: 0918-18-133
DESIGN SPEEDS = MOIEC
ADT(2024) 15
ADT(2044) 25
FUNCTIONAL CLASS LOCAL

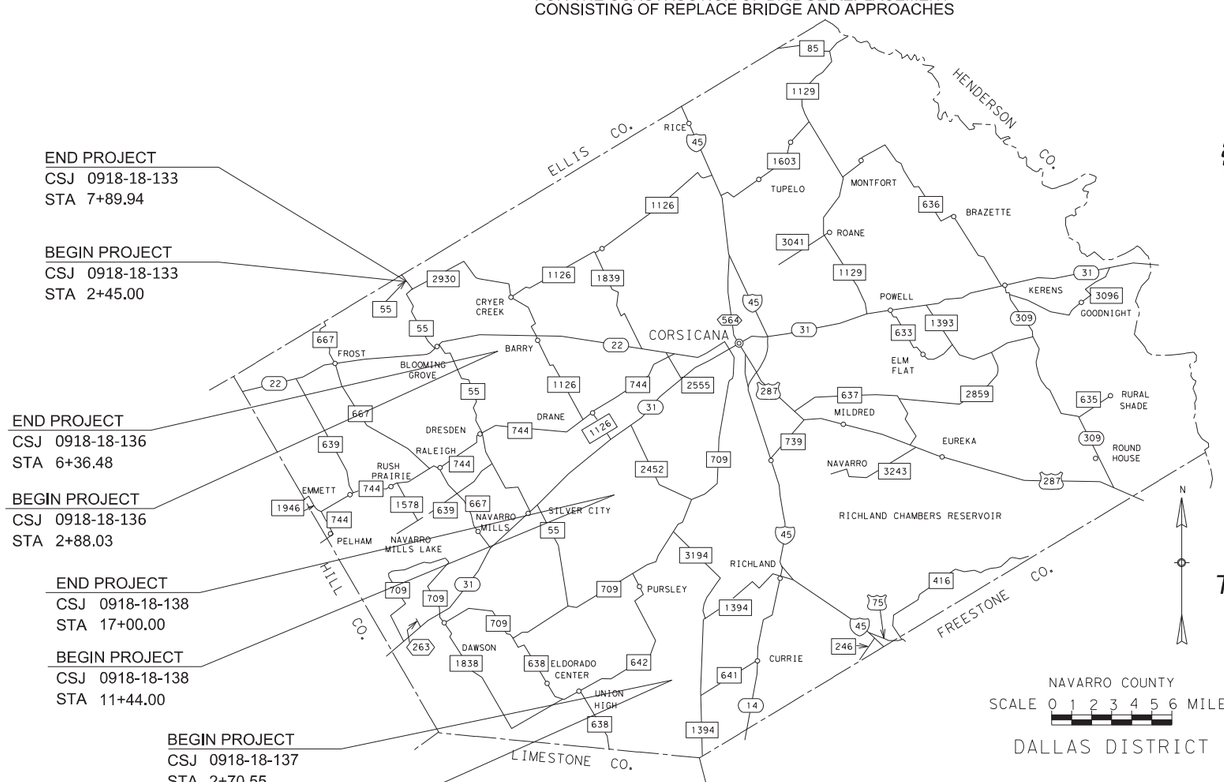
CSJ: 0918-18-136
DESIGN SPEEDS = MOIEC
ADT(2024) 55
ADT(2044) 75
FUNCTIONAL CLASS LOCAL

CSJ: 0918-18-137
DESIGN SPEEDS = MOIEC
ADT(2024) 15
ADT(2044) 25
FUNCTIONAL CLASS LOCAL

CSJ: 0918-18-138
DESIGN SPEEDS = MOIEC
ADT(2024) 65
ADT(2044) 85
FUNCTIONAL CLASS LOCAL

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, OCTOBER 23, 2023)



EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

NAVARRO COUNTY
SCALE 0 1 2 3 4 5 6 MILES
DALLAS DISTRICT

TEXAS DEPARTMENT OF TRANSPORTATION

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED PROFESSIONAL ENGINEER
$$DATE$$

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

SUBMITTED FOR LETTING 1/2/2024

_____ , P.E.
CONSULTANT DESIGN ENGINEER OR PROJECT MANAGER

RECOMMENDED 1/2/2024
DocuSigned by:
James P. Campbell , P.E.
98671C109B6A4C3...
...ORTATION PLANNING & DEVELOPMENT

RECOMMENDED 1/2/2024
DocuSigned by:
Juan A. Paredes, P.E. , P.E.
4A97FFA3D5654BC...

APPROVED 1/2/2024
DocuSigned by:
Casson Clemens , P.E.
A879E0D10CD6464...
...EER

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____ , P.E.
Signature of Registrant & Date

INDEX OF SHEETS

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER

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

Edwin R. Rydell, P.E., P.E. 11/27/2023
Edwin R. Rydell, P.E. Date

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER

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

Sarah DeMoya, P.E., P.E. 11/28/2023
Sarah DeMoya, P.E. Date

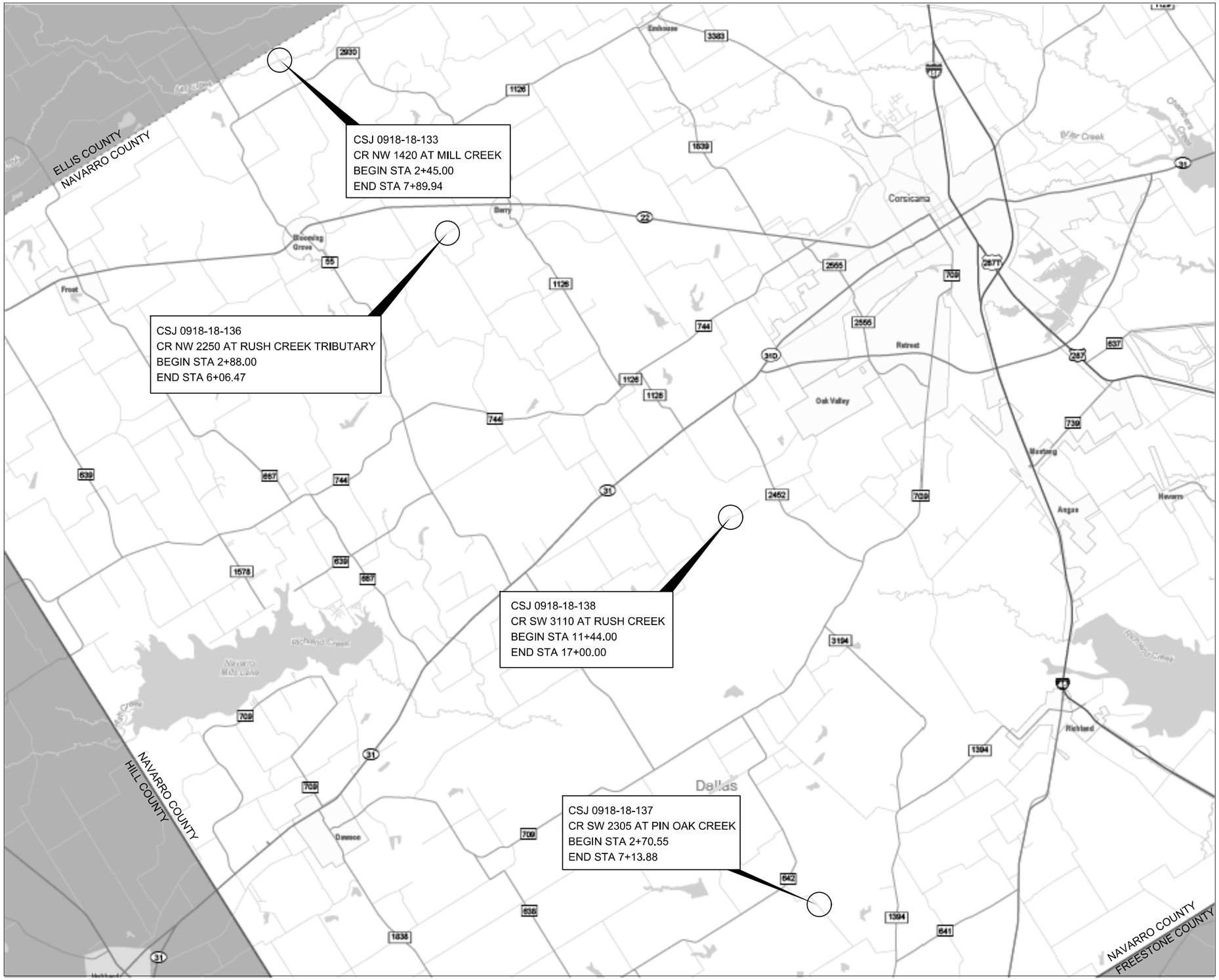
HDR Engineering, Inc
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

INDEX OF SHEETS

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
ERR	6	(SEE TITLE SHEET)		CR1420,ETC
GRAPHICS BKT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK MHS	TEXAS	DALLAS	NAVARRO	2
CHECK MHS	CONTROL 0918	SECTION 18	JOB 133, ETC	

DN: ERR | CK: BKT | DW: HAR | CK: MHS



N

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

PROJECT LOCATION MAP

N.T.S.

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, etc	CR 1420, etc
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		3

DATE: November 27, 2023
FILE: 001-S-PLO-01.dgn
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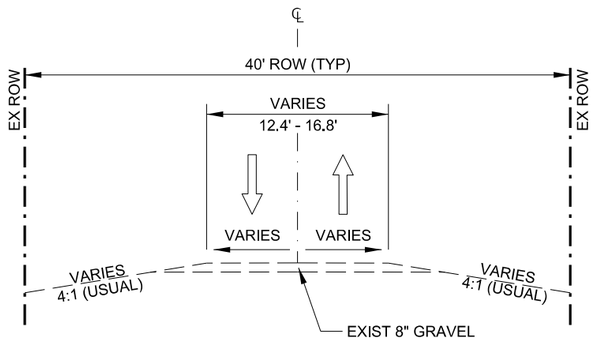
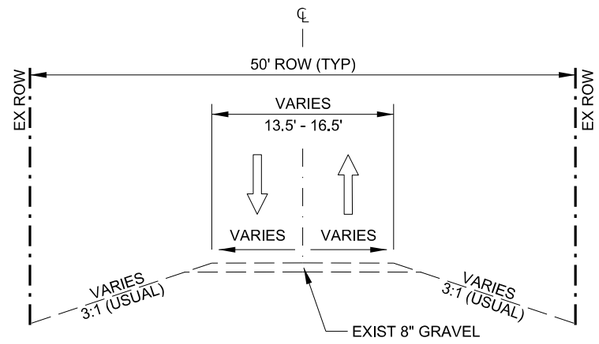


EXIST CR NW 1420
TYPICAL SECTION

STA 2+45.00 TO STA 4+25.16
STA 5+24.94 TO STA 7+89.94



EXIST CR NW 2250
TYPICAL SECTION

STA 2+88.00 TO STA 4+19.00
STA 4+55.90 TO STA 6+06.47

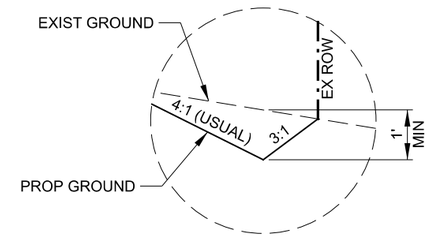
LEGEND

- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) PRIME COAT
- PROPOSED TRAFFIC PATTERN
- EXISTING TRAFFIC PATTERN

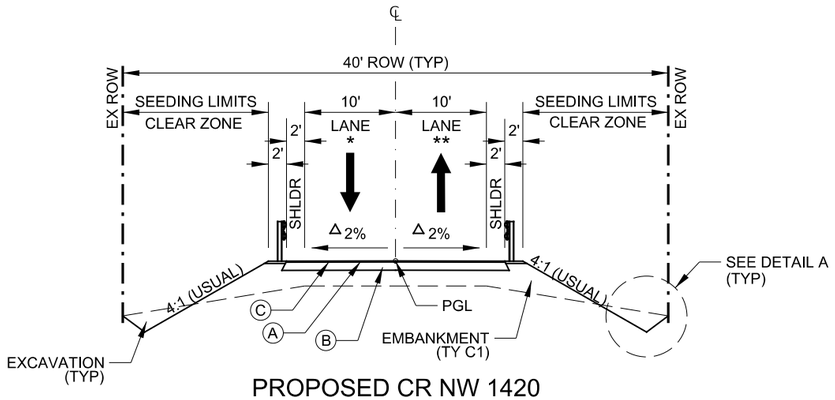
NOTE:

△ 1. NORMAL CROSS SLOPE SHALL BE A 2% NORMAL CROWN. AT THE BEGIN AND END, A CROSS SLOPE TRANSITION SHALL BE COMPLETED TO TIE INTO THE EXISTING ROADWAY CROSS SLOPES. THIS TRANSITION LENGTH SHALL BE AS SHOWN IN THE PLAN AND PROFILE SHEETS.

2. SEE PLAN AND PROFILE SHEETS FOR LIMITS OF MBGF AND MOW STRIP.



DETAIL A



PROPOSED CR NW 1420
TYPICAL SECTION

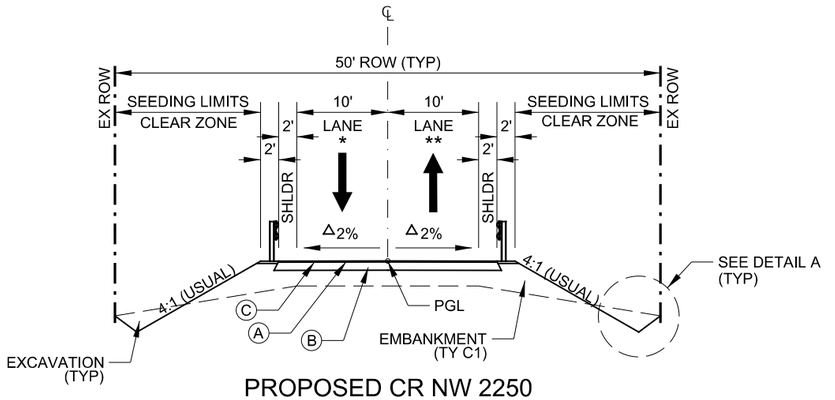
STA 2+45.00 TO STA 3+98.00
STA 5+37.00 TO STA 7+89.94

LANE WIDTHS

STA 2+93.00 TO STA 3+43.00	*7.25' - 10.00' LT	**7.94' - 10.00' RT
STA 3+43.00 TO STA 3+98.00	*10.00' LT	**10.00' RT
STA 5+38.00 TO STA 5+58.00	*10.00' LT	**10.00' RT
STA 6+08.00 TO STA 6+58.00	*10.00' - 8.70' LT	**10.00' - 8.10' RT

MBGF AND MOW STRIPS

STA 3+35 TO STA 3+98 (LT)
STA 3+15 TO STA 3+70 (RT)
STA 5+37 TO STA 6+30 (LT)
STA 5+37 TO STA 6+16 (RT)



PROPOSED CR NW 2250
TYPICAL SECTION

STA 2+88.00 TO STA 4+95.00
STA 4+80.00 TO STA 6+06.47

LANE WIDTHS

STA 2+88.29 TO STA 3+38.29	*5.95' - 10.00' LT	**7.40' - 10.00' RT
STA 3+38.29 TO STA 4+15.00	*10.00' LT	**10.00' RT
STA 4+60.00 TO STA 5+56.47	*10.00' LT	**10.00' RT
STA 5+56.47 TO STA 6+06.47	*10.00' - 6.80' LT	**10.00' - 6.92' RT

MBGF AND MOW STRIPS

STA 3+08 TO STA 3+95 (LT)
STA 3+40 TO STA 3+95 (RT)
STA 4+80 TO STA 5+20 (LT)
STA 4+80 TO STA 5+69 (RT)

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

TYPICAL SECTIONS

N.T.S.

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		4

DATE: November 27, 2023
FILE: 001_G_TYP-01.dgn
11:32:34 AM

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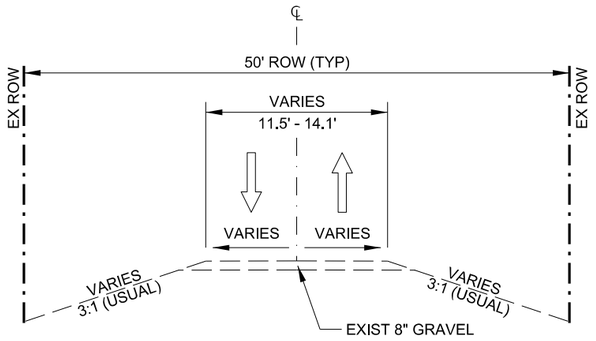
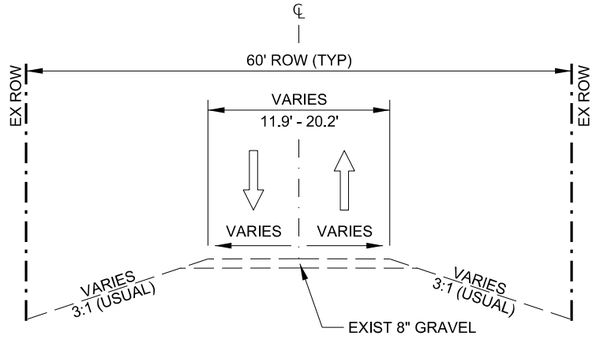


EXIST CR SW 2305 TYPICAL SECTION

STA 2+70.55 TO STA 4+55.34
STA 5+51.79 TO STA 7+13.88



EXIST CR SW 3110 TYPICAL SECTION

STA 11+44.00 TO STA 13+95.81
STA 14+35.37 TO STA 17+00.00

LEGEND

- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) PRIME COAT
- PROPOSED TRAFFIC PATTERN
- EXISTING TRAFFIC PATTERN

NOTE:

△ 1. NORMAL CROSS SLOPE SHALL BE A 2% NORMAL CROWN. AT THE BEGIN AND END, A CROSS SLOPE TRANSITION SHALL BE COMPLETED TO TIE INTO THE EXISTING ROADWAY CROSS SLOPES. THIS TRANSITION LENGTH SHALL BE AS SHOWN IN THE PLAN AND PROFILE SHEETS.

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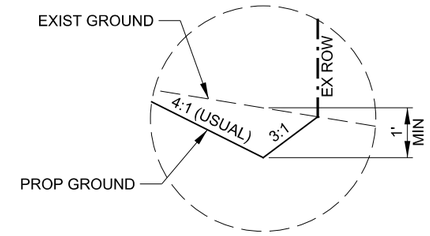
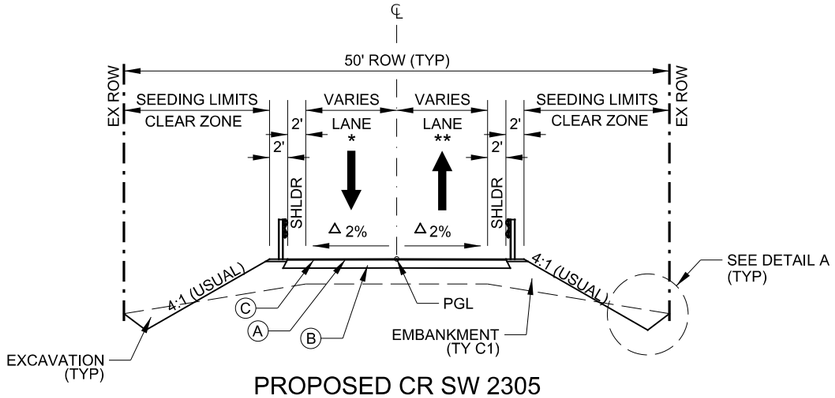


DETAIL A



PROPOSED CR SW 2305 TYPICAL SECTION

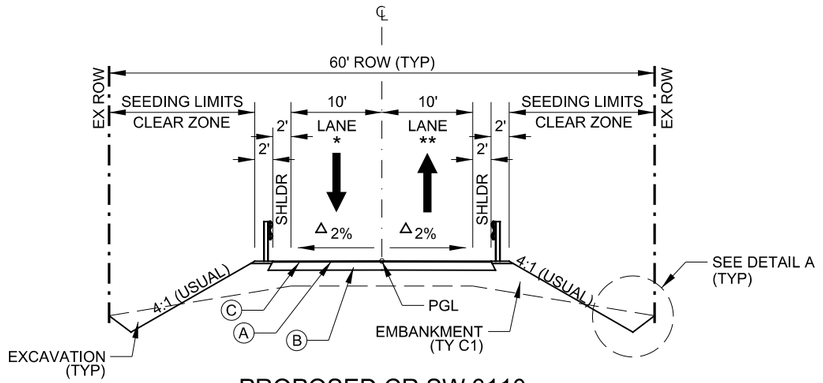
STA 2+70.55 TO STA 4+27.00
STA 5+82.00 TO STA 7+13.88

LANE WIDTHS

STA 2+70.55 TO STA 2+71.65	*7.25' - 10.00' LT	**6.80' - 10.00' RT
STA 2+71.65 TO STA 4+27.00	*10.00' LT	**10.00' RT
STA 5+82.00 TO STA 6+62.78	*10.00' LT	**10.00' RT
STA 6+62.78 TO STA 7+12.78	*10.00' - 6.95' LT	**10.00' RT

MBGF AND MOW STRIPS

STA 3+52 TO STA 4+27 (LT)
STA 3+04 TO STA 4+27 (RT)
STA 5+82 TO STA 7+14 (LT)
STA 5+82 TO STA 6+63 (RT)



PROPOSED CR SW 3110 TYPICAL SECTION

STA 11+44.00 TO STA 13+71.00
STA 14+61.00 TO STA 17+00.00

LANE WIDTHS

STA 11+44.00 TO STA 11+94.00	*9.60' - 10.00' LT	**10.70' - 10.00' RT
STA 11+94.00 TO STA 13+91.00	*10.00' LT	**10.00' RT
STA 14+61.00 TO STA 16+50.00	*10.00' LT	**10.00' RT
STA 16+50.00 TO STA 17+00.00	*10.00' - 6.78' LT	**10.00' - 7.45' RT

MBGF AND MOW STRIPS

STA 12+88 TO STA 13+71 (LT)
STA 12+88 TO STA 13+71 (RT)
STA 14+61 TO STA 15+83 (LT)
STA 14+61 TO STA 15+45 (RT)

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

TYPICAL SECTIONS

N.T.S. SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		5

DATE: November 27, 2023
FILE: 001_G_TYP-02.dgn
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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
164	Drill Seed (Perm) (R) (C)	N/A	See Specifications		4211 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	0.22 Ton
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	626.4 MG
310	Prime Coat	N/A	0.20	Gal/SY	704.2 Gal

*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 1.5 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		4211 SY
166*	Fertilizer (12-6-6)	500	Lb/Ac	0.22 Ton
168	Vegetative Watering (Warm)**	12	MG/Ac/Day	626.4 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 CSJ 0918-18-133, 0.44 acres for CSJ 0918-18-136, 0.50 acres for CSJ 0918-18-137, and 0.49 acres for CSJ 0918-18-138. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

This project required permits with environmental resources agencies. 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.

Install traffic marking signs prior to sealcoat application and remove within three days after placement of traffic markings.

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

County: Navarro

Highway: CR NW 1420, etc.

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):

Juan Paredes, P.E. Juan.Paredes@txdot.gov
Amanda McKittrick, P.E. Amanda.McKittrick@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.

Cross sections may be requested by posting a question to the above Letting Pre-Bid Q&A web page. 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).

The following standard detail sheet has been modified:
TRF – Traffic Rail Foundation (MOD)

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 structure with surface coatings which contain hazardous constituents which are (50%) black asphaltic waterproofing materials on three (3) metal columns and seven (7) metal longitudinal support beams. 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 an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

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

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

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

Perform all electrical work in accordance with the National Electrical Code and Texas Department of Transportation Specifications.

Consult with appropriate electric company representatives according to their respective area to coordinate electrical services installations.

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 Five-Day Workweek in accordance with Article 8.3.1.1.

For contractor's mobilization, begin work within 60 calendar days after the authorization date to begin work.

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 from Sta. 2+45.00 to Sta. 7+89.94 (CSJ 0918-18-133), Sta. 2+88.03 to Sta. 6+36.48 (CSJ 0918-18-136), Sta. 2+70.55 to Sta. 7+13.88 (CSJ 0918-18-137), and Sta. 11+44.00 to Sta. 17+00.00 (CSJ 0918-18-138) along the centerline of construction.

Item 105:
Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly, but is subsidiary to this item.

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

Properly dispose of unsalvageable material at your own expense.

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.

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

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, is 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 316:

	AC20-5TR, AC20-XP AC15-P	CRS-2P	RC-250
JANUARY			REQUIRES INTERMEDIATE COURSE TO BE PLACED
FEBRUARY			
MARCH		REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS	
APRIL			
MAY	REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS		
JUNE			
JULY			
AUGUST			
SEPTEMBER		REFER TO STANDARD SPECIFICATIONS ITEM 316 FOR TEMPERATURE REQUIREMENTS	
OCTOBER			
NOVEMBER			REQUIRES INTERMEDIATE COURSE TO BE PLACED
DECEMBER			

RC-250 is only allowed as a first course in accordance with table above.

Utilize an asphalt distributor capable of providing a transversely varied asphalt rate. The Engineer will select the pavements where the transversely varied asphalt rate is required. When a transversely varied rate is required, the asphalt rate outside of the wheel paths will be between 22 and 32% higher than the asphalt rate applied in the wheel paths. Provide calibration documents to the Engineer that include a description of the spray bar(s) and nozzles that will be used and the percentage difference in asphalt rate achieved by each tested spray bar and nozzle arrangement. The nozzles proposed for use shall be clearly stamped or marked from the factory identifying the manufacturer.

First Course			
ITEM	APPLICATION		
	1st Course		
*Asphalt Type	CRS-2P	AC20-5TR, AC20-XP, AC15-P	RC-250 #
*Asph. Rate (Gal/SY)	0.50	0.42	0.28
Aggregate Type	B or L	B or L	B or L
Aggregate Grade	3	3	5
Aggr. Rate (CY/SY)	1:105	1:105	1:125
Min. Cure Time	14 days (Emulsion)		

When RC-250 is used as the 1st course, an intermediate course will be required and will be placed as soon as temperature allows which will be before 2nd Course is placed.

Intermediate Seal	
ITEM	APPLICATION
	Intermediate Course
*Asphalt Type	CRS-2P
*Asph. Rate (Gal/SY)	0.44
Aggregate Type	B or L
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

Second Course	
ITEM	APPLICATION
	2nd Course
*Asphalt Type	AC20-5TR, AC20-XP, AC15-P
*Asph. Rate (Gal/SY)	0.36
Aggregate Type	PB or PL
Aggregate Grade	4
Aggr. Rate (CY/SY)	1:120

* The information above is intended to provide general guidance and as a basis of estimate. Based on the season and weather conditions at the time, the engineer will determine the asphalt type and rates to be used at the time of application.

In addition to the temperature requirements of this Item, AC Asphalts used in Surface Treatments and Sealcoats must be placed between May 15 and August 31. Emulsions may be substituted for AC Asphalts outside this timeframe only with the approval of the Engineer.

Item 400:
Structural Excavation is not paid for directly but is considered subsidiary to pertinent Items.

When placing concrete storm drain pipe on slopes of greater than 10 percent, provide cement stabilized backfill to a depth shown on the plans.

Item 407:
Furnish steel that meets ASTM A690 for steel sheet piling. Apply a marine-grade immersion coating system recommended by the manufacturer for marine, immersion service, and meeting the requirements of NORSOK Standard M-501, Coating System No. 7. Submit product data sheets and obtain approval of coating system before purchasing and applying the coating. Apply coating system to entire area of sheet pile. Provide coating thickness that follows coating manufacturer's directions. Apply coating in the shop and repair any field damage to the coating in accordance with coating manufacturer's directions. Considered subsidiary to this item.

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.

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 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, and slabs.

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 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 423:
All retaining walls will have a uniform texture and appearance.

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

Square foot surface area of retaining wall is measured from the top of retaining wall to the top of the leveling pad. Footing adjustments made to accommodate the available optional retaining walls are not measured.
Supply drainage aggregate meeting the requirements of this item for use as filter material with the retaining wall.

Cement-Stabilized Backfill (CSB) is not permitted.

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

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

The contractor has the option of constructing any of the types of retaining walls for which details and specifications are included in the plans. Footing adjustments made to accommodate the available optional retaining walls are not measured. Regardless of option or options chosen, use the same fascia pattern throughout the entire project, including cast in place full height retaining walls or retaining wall type abutments.

Submit detailed drawings depicting the patterns and matching of precast with cast-in-place for approval.

At contractor's expense, repair all damage to the precast units (such as chips) as required to match the fascia pattern.

Use Embankment Type C2 as non-select embankment backfill as defined under Item 423.2.4.1. For non-select embankment fill behind retaining walls provide and install fill in accordance with Item 132, Type C2.

For cut walls, the backfill between the select fill zone and the existing ground shall be either select material as required for the select fill zone or backfill meeting or exceeding the requirements of Item 132, type C2. Place material in accordance with Item 132, Type C2 requirements. If existing ground is laid back (i.e. not vertical), the lay back shall be done as a series of equal height benches so as to prevent the formation of a smooth surface at the material interface.

Avoid distinct vertical joints between select backfill and embankment (Non-Select) backfill as required by Section 423.3.4. This may be conveniently done by providing a zone of material behind the strap zone (1’ min width) in which alternating lifts of select and non-select materials are interlaced.

Items 423 and 427:
Unless otherwise noted on the plans, provide a striated finish on all retaining walls and retaining wall type bridge abutments. Supply form liners providing a finish similar to that derived from Lithotex Formliner Pattern T-2150, "Fractured Fin-Grooved", by the I. M. Scofield Company,

Pattern P/C 30717, "¾ inch deep Fractured Fin", by Simons, Pattern 373 "Fractured Fin", by Greenstreak, “Adams Rib – Pattern 16950” by Fitzgerald or equal. Maximum depth of the striations is ¾ inch.
For cast in place walls, cast the top two feet smooth.

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 427:
Finish concrete structures surface area I with an opaque sealer of the color(s) shown elsewhere in the plans in accordance Item 427.

Apply a 4-SF sample of each color on the project surfaces for approval. Adjust color as required by Engineer to compensate for surroundings and natural lighting conditions on the project site.

Ensure that surfaces are free of weak surface material, curing compounds and other surface contaminants prior to coating.

FORM LINER FINISHES: Place architectural concrete treatments as shown. Placement is subsidiary to this item.

Where used, provide fractured fin/ribs/striations that are continuous with no apparent curves or discontinuities. Variations of the fractured ribs from true vertical exceeding ¼" for each 4'-0" of panel height are not acceptable.

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

No horizontal splices in the form liner are permitted. Vertical splices may occur only in valleys between fractured ribs.

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

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

County: Navarro

Highway: CR NW 1420, etc.

Tool or replace areas requiring surface treatment that do not match their associated sample panels. Upon completion, tooled or replaced panels must match the associated sample panel. Tooling or replacement is at the contractor's expense.

Item 440:
Provide reinforcing steel with epoxy coating meeting the requirements of item 440 for the following bridge components: approach slab, slab, 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.

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 446:
Paint all structural steel using protective “System II" paint in accordance with Item 446. Paint colors are shown elsewhere in the plans.

After all concrete placement has been completed, remove any concrete or other contaminate from the beam by hand cleaning methods so as not to damage the primer and then water blast / wash with a minimum of 2,500 psi pressure.

Item 464:
The concrete collars and the connections of pipes to existing or proposed concrete boxes or pipe will not be paid for directly but will be considered subsidiary to the various bid items.

Item 496:
Concrete pavement removed as a result of removing the inlets will not be paid for directly but will be considered as subsidiary to Item 496.

Inlet grates and manhole covers become the property of the contractor for disposal.

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, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor’s Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

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

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

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 commence work on the road before sunrise. 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.

Additional lanes may be closed, started earlier, or extended later with written permission of the Engineer.

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 over flow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, “Temporary Erosion, Sedimentation, and Environmental Controls.”

Item 514:
Provide High Performance Concrete (HPC) and epoxy coated reinforcing for all Permanent Concrete Traffic Barrier located on bridge approaches or bridge slabs.

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

Item 677:
A water blasting method approved by the Engineer will be the only method allowed for the removal of permanent and temporary pavement markings except on a sealcoat surface. A 2 foot wide sealcoat will be required on sealcoat surfaces to eliminate permanent and temporary pavement markings.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-18-133, ETC **DISTRICT** Dallas **COUNTY** Navarro
HIGHWAY CR 1420, CR 2305, CR 3110, CR 4821

				0918-18-133		0918-18-136		0918-18-137		0918-18-138		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB											
		PROJECT ID		**A00059551**		**A00064849**		**A00064850**		**A00064851**			
		COUNTY		**Navarro**		**Navarro**		**Navarro**		**Navarro**			
		HIGHWAY		**CR 1420**		**CR 4821**		**CR 2305**		**CR 3110**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.400		3.200		4.400		5.600		18.600	
	105-6048	REMOVING STAB BASE & ASPH PAV (4"-11")	SY	770.000		568.200		475.100		938.000		2,751.300	
	110-6001	EXCAVATION (ROADWAY)	CY	216.200		39.800		78.300		80.300		414.600	
	132-6025	EMBANKMENT (FINAL) (DENS CONT) (TY C1)	CY	114.800		213.600		166.200		725.200		1,219.800	
	132-6026	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	CY	21.200		84.100		96.200		56.400		257.900	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	826.000		1,039.000		1,114.000		1,232.000		4,211.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	826.000		1,039.000		1,114.000		1,232.000		4,211.000	
	164-6051	DRILL SEED (TEMP)(WARM OR COOL)	SY	826.000		1,039.000		1,114.000		1,232.000		4,211.000	
	168-6001	VEGETATIVE WATERING	MG	245.800		309.100		331.400		366.500		1,252.800	
	247-6304	FL BS (CMP IN PLACE) (TY D GR 1-2)(10")	SY	1,006.200		562.700		725.200		1,227.600		3,521.700	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	201.200		112.500		145.000		245.500		704.200	
	316-6024	ASPH (CRS-2P)	GAL	315.300		176.300		227.200		384.600		1,103.400	
	316-6029	ASPH (RC-250)	GAL	93.900		52.500		67.700		114.600		328.700	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)	CY	2.700		1.500		1.900		3.300		9.400	
	316-6419	ASPH (AC-15P, AC-20-5TR OR AC-20XP)	GAL	503.100		281.400		362.600		613.800		1,760.900	
	316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	CY	8.400		4.700		6.000		10.200		29.300	
	316-6435	AGGR (TY-B GR-4 OR TY-L GR-4 SAC-B)	CY	9.200		5.200		6.600		11.200		32.200	
	400-6005	CEM STABIL BKFL	CY	24.000		24.000		23.000		23.400		94.400	
	407-6006	SHEET PILING (PZ - 40)	SF							3,332.000		3,332.000	
	416-6002	DRILL SHAFT (24 IN)	LF	288.000		150.000		234.000		249.000		921.000	
	416-6004	DRILL SHAFT (36 IN)	LF	237.000				186.000				423.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	17.400		18.400		18.100		18.400		72.300	
	420-6030	CL C CONC (CAP)(HPC)	CY	13.200				13.300				26.500	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	9.400				7.600				17.000	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	4.900								4.900	
	422-6008	REINF CONC SLAB (SLAB BEAM)(HPC)	SF	3,120.000		1,170.000		2,990.000		1,300.000		8,580.000	
	422-6016	APPROACH SLAB (HPC)	CY	39.000		41.000		39.000		38.500		157.500	
	423-6005	RETAINING WALL (SPREAD FOOTING)	SF	255.300								255.300	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	592.500		222.500		567.500		247.500		1,630.000	
	432-6010	RIPRAP (CONC)(CL B)(5 IN)	CY							21.500		21.500	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	190.000		184.000		230.700		173.600		778.300	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	14.600		10.400		19.100		17.600		61.700	
	450-6005	RAIL (TY T221)(HPC)	LF			114.000						114.000	
	450-6018	RAIL (TY T631)	LF	304.800				254.000		124.000		682.800	
	464-6005	RC PIPE (CL III)(24 IN)	LF			42.000						42.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA			2.000						2.000	
	496-6007	REMOV STR (PIPE)	LF			38.000						38.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-18-133, ETC **DISTRICT** Dallas **COUNTY** Navarro
HIGHWAY CR 1420, CR 2305, CR 3110, CR 4821

				0918-18-133		0918-18-136		0918-18-137		0918-18-138		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB											
		PROJECT ID		**A00059551**		**A00064849**		**A00064850**		**A00064851**			
		COUNTY		**Navarro**		**Navarro**		**Navarro**		**Navarro**			
		HIGHWAY		**CR 1420**		**CR 4821**		**CR 2305**		**CR 3110**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA			1.000				1.000		2.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000				1.000				2.000	
	500-6001	MOBILIZATION	LS	0.270		0.150		0.250		0.330		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4.000		2.000		4.000		3.000		13.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	132.000		165.000		122.000		142.000		561.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	28.000		26.000		21.000		53.000		128.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	160.000		191.000		143.000		195.000		689.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	156.000		153.000		156.000		156.000		621.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	156.000		153.000		156.000		156.000		621.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,090.000		743.000		984.000		1,006.000		3,823.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,090.000		743.000		984.000		1,006.000		3,823.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	125.000		75.000		275.000		275.000		750.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA			4.000						4.000	
	540-6009	MTL BEAM GD FEN TRANS (T6)	EA	4.000				4.000		4.000		12.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		4.000		4.000		16.000	
	552-6001	WIRE FENCE (TY A)	LF			154.300		109.800		613.500		877.600	
	552-6005	GATE (TY 1)	EA			1.000				2.000		3.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA							6.000		6.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		6.000		6.000				18.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	4.000		4.000		4.000		4.000		16.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	12.000		12.000		12.000		12.000		48.000	
	666-6225	PAVEMENT SEALER 6"	LF	2,180.000		1,167.000		1,769.000		2,224.000		7,340.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	1,090.000		530.000		885.000		1,112.000		3,617.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,090.000		637.000		885.000		1,112.000		3,724.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	2,180.000		1,167.000		1,769.000		2,224.000		7,340.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1.000		1.000		1.000		1.000		4.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000								1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000								1.000	

DW: ERR | CK: BKT | DW: HAR | CK: MHS

CSJ 0918-18-133, ETC SUMMARY OF ROADWAY ITEMS

SPEC NO.	100	110	132	132	247	310	316	316	316	316	316	316	400	422	432
ITEM NO.	6002	6001	6025	6026	6304	6027	6024	6029	6403	6419	6434	6435	6005	6016	6010
ITEM DESCRIPTION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C1)	EMBANKMENT (FINAL) (DENS CONT) (TY C2)	FL BS (CMP IN PLACE) (TY D GR 1&2)(10")	PRIME COAT (MC-30 OR AE-P)	ASPH (CRS-2P)	ASPH (RC-250)	AGGR (TY-B GR-5 OR TY-L GR-5)	ASPH (AC-15P, AC-20-5TR, AC-20XP)	AGGR (TY-B GR-4 OR TY-PL GR-4) (SAC-B)	AGGR (TY-B GR-4 OR TY-L GR-4) (SAC-B)	CEM STABIL BKFL	APPROACH SLAB (HPC)	RIPRAP (CONC) (CL B) (5 IN)
UNIT	STA	CY	CY	CY	SY	GAL	GAL	GAL	CY	GAL	CY	CY	CY	CY	CY
0918-18-133	5.4	216.2	114.8	21.2	1,006.2	201.2	315.3	93.9	2.7	503.1	8.4	9.2	24.0	39.0	
0918-18-136	3.2	39.8	213.6	84.1	562.7	112.5	176.3	52.5	1.5	281.4	4.7	5.2	24.0	41.0	
0918-18-137	4.4	78.3	166.2	96.2	725.2	145.0	227.2	67.7	1.9	362.6	6.0	6.6	23.0	39.0	
0918-18-138	5.6	80.3	725.2	56.4	1,227.6	245.5	384.6	114.6	3.3	613.8	10.2	11.2	23.4	38.5	21.5
TOTAL	18.6	414.6	1219.8	257.9	3,521.7	704.2	1,103.4	328.7	9.4	1,760.9	29.3	32.2	94.4	157.5	21.5

CSJ 0918-18-133, ETC SUMMARY OF ROADWAY ITEMS (CONT)

SPEC NO.	432	* 432	464	467	540	540	540	544	552	552
ITEM NO.	6031	6045	6005	6390	6001	6006	6009	6001	6001	6005
ITEM DESCRIPTION	RIPRAP (STONE PROTECTION) (12 IN)	RIPRAP (MOW STRIP) (4 IN)	RC PIPE (CL III) (24 IN)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	MTL BEAM GD FEN TRANS (T6)	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY A)	GATE (TY 1)
UNIT	CY	CY	LF	EA	LF	EA	EA	EA	LF	EA
0918-18-133	190.0	13.6			125		4	4		
0918-18-136	184.0	10.4	42	2	75	4		4	154.3	1
0918-18-137	230.7	19.1			275		4	4	109.8	
0918-18-138	173.6	17.6			275		4	4	613.5	2
TOTAL	778.3	60.7	42	2	750	4	12	16	877.6	3

CSJ 0918-18-133, ETC WALL ITEMS

SPEC NO.	420	423	* 432	* 450
ITEM NO.	6066	6005	6045	6018
ITEM DESCRIPTION	CL C CONC (RAIL FOUNDATION)	RETAINING WALL (SPREAD FOOTING)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY T631)
UNIT	CY	SF	CY	LF
0918-18-133	4.9	255.3	1	45.5
TOTAL	4.9	255.3	1	45.5

CSJ 0918-18-133, ETC SUMMARY OF TRAFFIC CONTROL ITEMS

SPEC NO.	6001
ITEM NO.	6002
ITEM DESCRIPTION	PORTABLE CHANGEABLE MESSAGE SIGN
UNIT	EA
0918-18-133	2
0918-18-136	2
0918-18-137	2
0918-18-138	2
TOTAL	8

CSJ 0918-18-133, ETC SUMMARY OF EROSION CONTROL ITEMS

SPEC NO.	161	164	164	168	506	506	506	506	506	506	506
ITEM NO.	6017	6035	6051	6001	6002	6003	6011	6020	6024	6038	6039
ITEM DESCRIPTION	COMPOST MANUF TOPSOIL (BIP) (4")	DRILL SEEDING (PERM) (RURAL) (CLAY)	DRILL SEED (TEMP)(WARM OR COOL)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
UNIT	SY	SY	SY	MG	LF	LF	LF	SY	SY	LF	LF
0918-18-133	826	826	826	245.8	132	28	160	156	156	1090	1090
0918-18-136	1039	1039	1039	309.1	165	26	191	153	153	743	743
0918-18-137	1114	1114	1114	331.4	122	21	143	156	156	984	984
0918-18-138	1232	1232	1232	366.5	142	53	195	156	156	1,006	1,006
TOTAL	4,211	4,211	4,211	1,252.8	561	128	689	621	621	3,823	3,823

CSJ 0918-18-133, ETC SUMMARY OF STRIPING ITEMS

SPEC NO.	658	658	658	666	666	666	678
ITEM NO.	6014	6047	6062	6309	6321	6225	6002
ITEM DESCRIPTION	INSTL DEL ASSM (D-SW)SZ (BR)CTB (BI)	INSTL OM ASSM (OM-2Y)(WC)GND	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PAVEMENT SEALER 6"	PAV SURF PREP FOR MRK (6")
UNIT	EA	EA	EA	LF	LF	LF	LF
0918-18-133	6	4	12	1090	1090	2180	2180
0918-18-136	6	4	12	530	637	1167	1167
0918-18-137	6	4	12	885	885	1769	1769
0918-18-138	6	4	12	1112	1112	2224	2224
TOTAL	24	16	48	3,617	3,724	7,340	7,340

CSJ 0918-18-133, ETC SUMMARY OF REMOVAL ITEMS

SPEC NO.	105	496	496	496
ITEM NO.	6048	6007	6009	6010
ITEM DESCRIPTION	REMOVING STAB BASE & ASPH PAV (4"-11")	REMOV STR (PIPE)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)
UNIT	SY	LF	EA	EA
0918-18-133	770.0			1
0918-18-136	568.2	38	1	
0918-18-137	475.1			1
0918-18-138	938.0		1	
TOTAL	2,751.3	38	2	2

* BID ITEM IS SHOWN IN MULTIPLE DISCIPLINES

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		8

DATE: January 11, 2024
FILE: 001_G_SUM-01.dgn
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DES	ERR	CK	BKT	DW	HAR	CK	MHS

CSJ 0918-18-133

STA	DISTANCE	END AREAS		110-6001 EXCAVATION	132-6025 EMBANKMENT	132-6026 EMBANKMENT	
		EXCAVATION	EMBANKMENT	EXCAVATION (ROADWAY)	(FINAL)(DENS CONT)(TY C1)	(FINAL)(DENS CONT)(TY C2)	
	FT	SF	SF	CY	CY	CY	
2+45.00		21.86	0.6				
	5			4.10	0.10		
2+50.00		22.38	0.52				
	50			43.48	0.87		
3+00.00		24.58	0.42				
	50			30.96	5.00		
3+50.00		8.86	4.98				
	50			14.19	15.43		
4+00.00		6.46	11.68				
	17			4.22		7.60	
4+17.00		6.93	12.38				
5+37.00		1.59	30.91				
	13			0.76		13.60	
5+50.00		1.55	25.6				
	50			3.74	42.54		
6+00.00		2.49	20.34				
	50			16.80	25.01		
6+50.00		15.65	6.67				
	50			31.97	10.33		
7+00.00		18.88	4.49				
	50			36.31	8.67		
7+50.00		20.34	4.87				
	18.47			13.83	3.26		
7+68.47		20.1	4.67				
	21.47			15.87	3.62		
7+89.94		19.82	4.43				
			TOTAL	216.20	114.80	21.20	

CSJ 0918-18-136

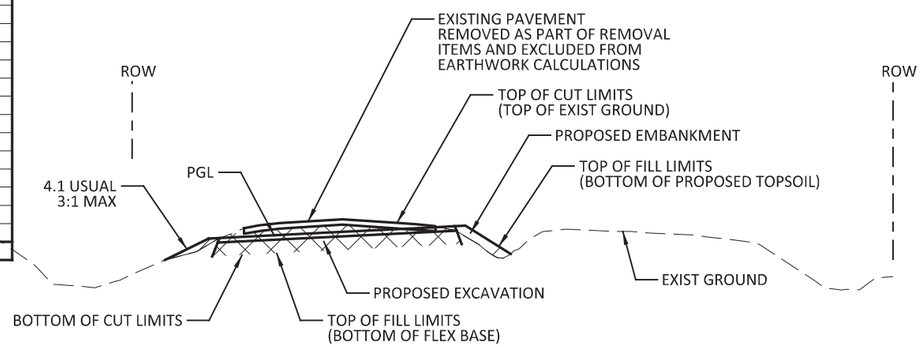
STA	DISTANCE	END AREAS		110-6001 EXCAVATION	132-6025 EMBANKMENT	132-6026 EMBANKMENT	
		EXCAVATION	EMBANKMENT	EXCAVATION (ROADWAY)	(FINAL)(DENS CONT)(TY C1)	(FINAL)(DENS CONT)(TY C2)	
	FT	SF	SF	CY	CY	CY	
2+88.03		10.33	3.13				
	11.97			4.67	2.15		
3+00.00		10.76	6.58				
	38.98			11.10	11.74		
3+38.98		4.62	9.68				
	11.02			1.53	4.13		
3+50.00		2.89	10.56				
	50			4.44	56.02		
4+00.00		1.91	49.94				
	8.88			0.73		16.64	
4+08.88		2.54	51.27				
4+66.00		0.93	53.16				
	34			1.37		67.46	
5+00.00		1.24	53.92				
	50			1.81	94.42		
5+50.00		0.72	48.05				
	50			11.31	45.06		
6+00.00		11.5	0.62				
	6.47			2.82	0.11		
6+06.47		12.02	0.26				
			TOTAL	39.80	213.60	84.10	

CSJ 0918-18-137

STA	DISTANCE	END AREAS		110-6001 EXCAVATION	132-6025 EMBANKMENT	132-6026 EMBANKMENT	
		EXCAVATION	EMBANKMENT	EXCAVATION (ROADWAY)	(FINAL)(DENS CONT)(TY C1)	(FINAL)(DENS CONT)(TY C2)	
	FT	SF	SF	CY	CY	CY	
2+71.06		17.33	1.31				
	28.94			15.67	3.11		
3+00.00		11.91	4.49				
	38.42			11.67	18.88		
3+38.42		4.49	22.04				
	11.58			1.45	10.58		
3+50.00		2.25	27.32				
	50			4.58	59.21		
4+00.00		2.7	36.63				
	39.89			3.41		58.40	
4+39.89		1.92	42.37				
5+66.91		2.28	36.39				
	33.09			2.94		37.80	
6+00.00		2.51	25.3				
	50			11.86	39.16		
6+50.00		10.3	16.99				
	50			20.82	28.48		
7+00.00		12.19	13.77				
	13.88			5.92	6.75		
7+13.88		10.83	12.49				
			TOTAL	78.30	166.20	96.20	

CSJ 0918-18-138

STA	DISTANCE	END AREAS		110-6001 EXCAVATION	132-6025 EMBANKMENT	132-6026 EMBANKMENT	
		EXCAVATION	EMBANKMENT	EXCAVATION (ROADWAY)	(FINAL)(DENS CONT)(TY C1)	(FINAL)(DENS CONT)(TY C2)	
	FT	SF	SF	CY	CY	CY	
11+44.00		22.43	0.19				
	6			4.51	0.13		
11+50.00		18.12	1.02				
	27			13.83	8.33		
11+77.00		9.54	15.63				
	33			7.19	26.71		
12+00.00		2.23	28.07				
	50			3.72	77.31		
12+50.00		1.79	55.43				
	50			3.19	116.65		
13+00.00		1.66	70.55				
	50			3.11	113.47		
13+50.00		1.7	52				
	35			3.91		53.47	
13+85.00		4.33	30.5				
14+47.05		2.74	26.76				
	2.95			0.30		2.93	
14+50.00		2.77	27.51				
	50			4.04	80.28		
15+00.00		1.59	59.19				
	50			2.98	120.06		
15+50.00		1.63	70.48				
	50			3.31	111.83		
16+00.00		1.94	50.3				
	50			6.55	58.42		
16+50.00		5.13	12.79				
	50			23.65	11.95		
17+00.00		20.41	0.12				
			TOTAL	80.30	725.20	56.40	



NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		9

DATE: November 27, 2023
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GENERAL NOTES

THE CONTRACTOR'S OPERATION SHALL BE SUCH THAT THE SAFETY OF THE TRAVELING PUBLIC IS OF PRIME IMPORTANCE AND SHALL GENERALLY CONFORM TO THE FOLLOWING:

1. REFER TO THE TCP DETOURS AND CORRESPONDING PLAN SHEETS FOR MORE DETAILED INFORMATION.
2. INSTALL ALL BARRICADES, SIGNS, AND WARNING LIGHTS AS SHOWN AND IN ACCORDANCE WITH STANDARD "BC" SHEETS AND THE TEXAS MUTCD, AND AS DIRECTED BY TXDOT.
3. ALL ADVANCED WARNING SIGNS TO BE SET PRIOR TO START OF CONSTRUCTION ACTIVITIES AND TO REMAIN IN PLACE UNTIL ALL CONSTRUCTION ACTIVITIES ARE COMPLETE AND ACCEPTED BY TXDOT. THE CONTRACTOR WILL COORDINATE WITH TXDOT IN ESTABLISHING THE LOCATION OF SIGNS.
4. ADDITIONAL SIGNS, BARRICADES, OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT, AS DIRECTED BY TXDOT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES, OR TRAFFIC CONTROL DEVICES SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".
5. CONTRACTOR SHALL NOTIFY TXDOT AT LEAST TWO WEEKS PRIOR TO START OF CONSTRUCTION.
6. INSTALL REQUIRED SWPPP MEASURES WITHIN CONSTRUCTION LIMITS AND LOCATIONS AS SHOWN IN THE PLANS OR AS DIRECTED BY TXDOT.
7. WORK SHALL BE WITHIN EXISTING ROW. CONTRACTOR SHALL COORDINATE WITH TXDOT FOR ANY WORK OUTSIDE THE EXISTING ROW WHICH MAY BE NECESSARY DURING THE CONSTRUCTION.
8. ACCESS SHALL BE MAINTAINED TO ALL PROPERTY OWNERS AT ALL TIMES DURING CONSTRUCTION UNLESS OTHERWISE APPROVED BY TXDOT.
9. ALL EXISTING SIGNS ON OPEN ROADWAYS THAT ARE NOT IN CONFLICT WITH THE CONSTRUCTION AND TRAFFIC SHALL REMAIN IN PLACE UNLESS OTHERWISE DIRECTED BY TXDOT.
10. REMOVE OR COVER EXISTING SIGNS THAT ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLANS.
11. CONTRACTOR SHALL ERECT ALL REQUIRED CONSTRUCTION AND TRAFFIC CONTROL SIGNS PRIOR TO CLOSURE AND DETOUR OF ANY TRAFFIC.
12. CONTRACTOR SHALL COORDINATE PLACEMENT OF FINAL PAVEMENT MARKINGS WITH TXDOT. FINAL PAVEMENT MARKINGS SHALL BE PLACED ON THE FINAL SURFACE COURSE, WHEN APPROVED BY TXDOT.
13. CONSTRUCTION EXITS WILL BE LOCATED BY THE CONTRACTOR AND SUBMITTED FOR APPROVAL BY TXDOT.
14. CONTRACTOR SHALL COORDINATE WITH TXDOT FOR DRIVEWAY TIE-INS OR ANY WORK OUTSIDE OF THE ROW. A RIGHT-OF-ENTRY OR TEMPORARY CONSTRUCTION EASEMENT MAY BE REQUIRED FOR THESE CONDITIONS AND NO WORK SHALL PROCEED WITHOUT PRIOR APPROVAL FROM TXDOT.
15. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) A MINIMUM OF 7 DAYS IN ADVANCE OF THE CLOSING OF THE OFF-SYSTEM BRIDGE.

GENERAL PHASING DESCRIPTION

PRE-PHASE

PLACE ADVANCED WARNING SIGNS AND BMP'S AS INDICATED ON TCP AND SWPPP SHEETS.

PHASE 1

1. SET PCMS TO NOTIFY OF UPCOMING BRIDGE CLOSURE.
2. SET DETOUR SIGNAGE PER THE DETOUR PLANS.
3. CLOSE THE BRIDGE AND START DETOURING TRAFFIC.
4. CONSTRUCT BRIDGE AND APPROACHES.
5. OPEN NEWLY CONSTRUCTED BRIDGE AND APPROACHES.
6. REMOVE ALL DETOUR SIGNAGE.
7. REMOVE ADVANCED WARNING SIGNS AND BMP'S.

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

TRAFFIC CONTROL NARRATIVE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		10

DATE: November 27, 2023
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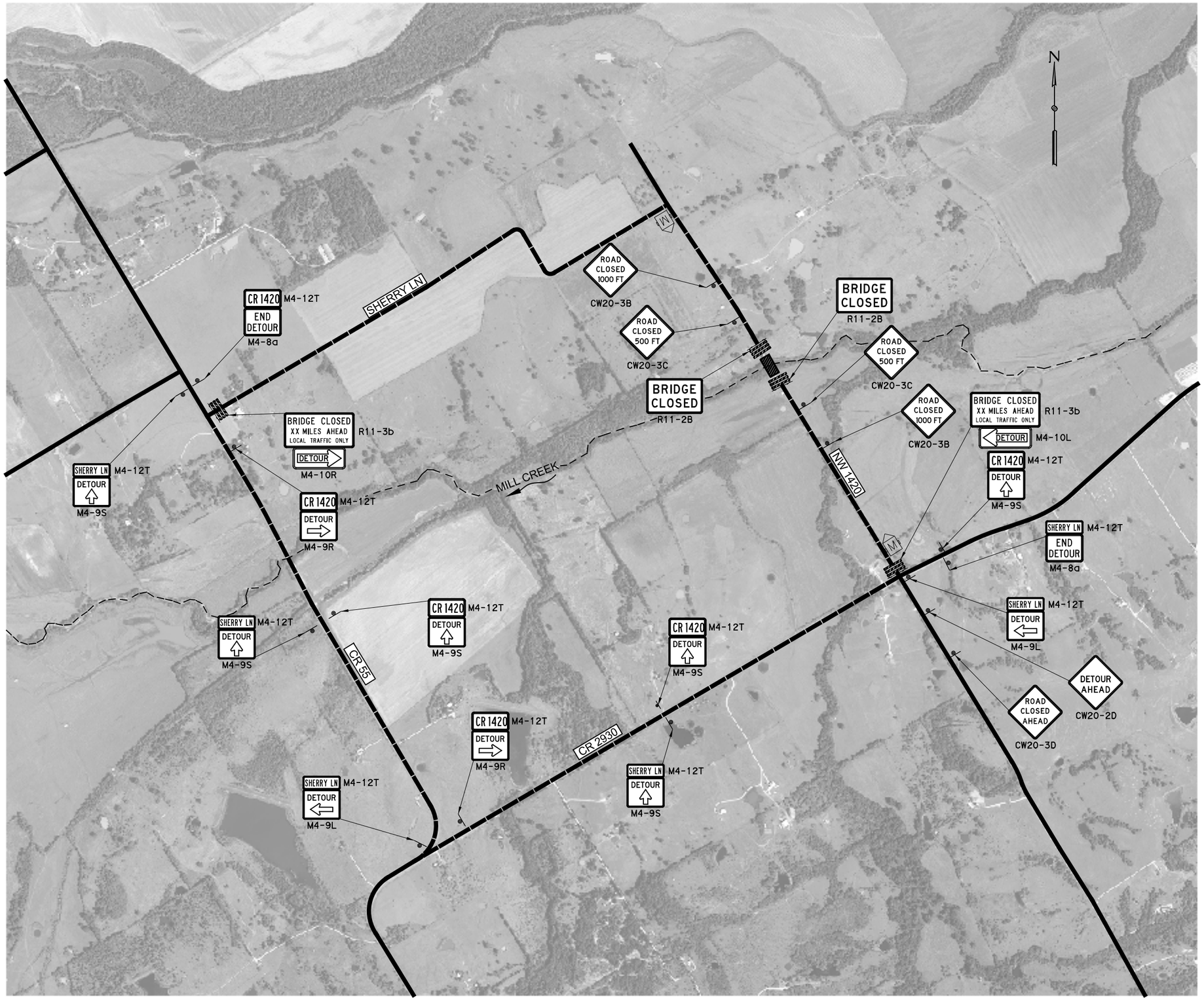

LEGEND

- DETOUR ROUTE
- ADJACENT ROADWAYS
- WATERWAY
- SIGN
- BARRICADE, TYPE III
- WORK/BRIDGE LOCATION
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES

PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE POSTED 1 WEEK PRIOR TO CLOSURE AND SHALL READ:

CR NW 1420 CLOSED AT
MILL CREEK FROM
_____ TO _____

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

TRAFFIC CONTROL PLAN
DETOUR
MILL CREEK BRIDGE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		11

DATE: November 27, 2023
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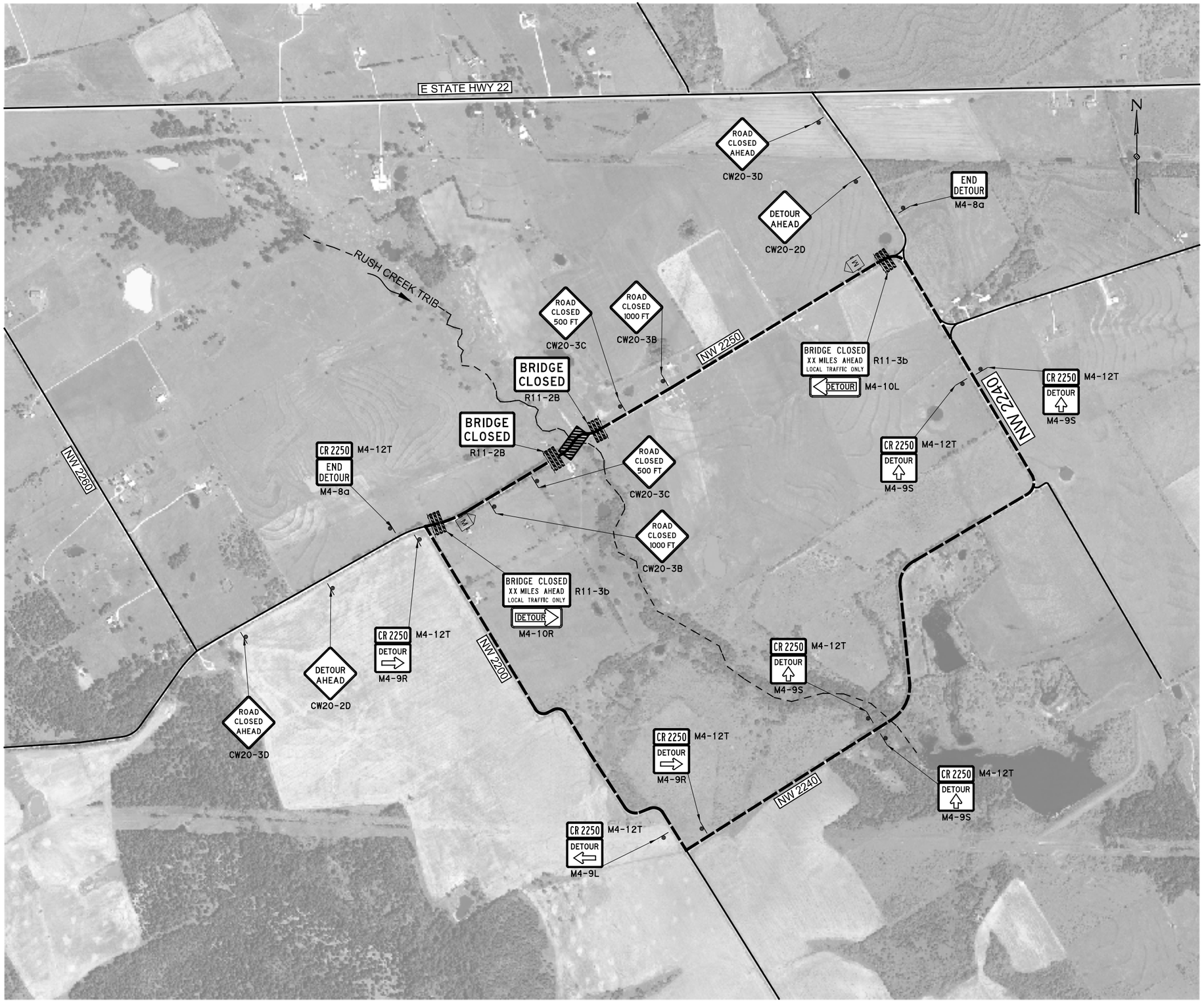

LEGEND

- DETOUR ROUTE
- ADJACENT ROADWAYS
- WATERWAY
- SIGN
- BARRICADE, TYPE III
- WORK/BRIDGE LOCATION
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES

PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE POSTED 1 WEEK PRIOR TO CLOSURE AND SHALL READ:

CR NW 2250 CLOSED AT
RUSH CREEK FROM
_____ TO _____

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

TRAFFIC CONTROL PLAN
DETOUR
RUSH CREEK TRIBUTARY BRIDGE

NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		12

DATE: November 27, 2023
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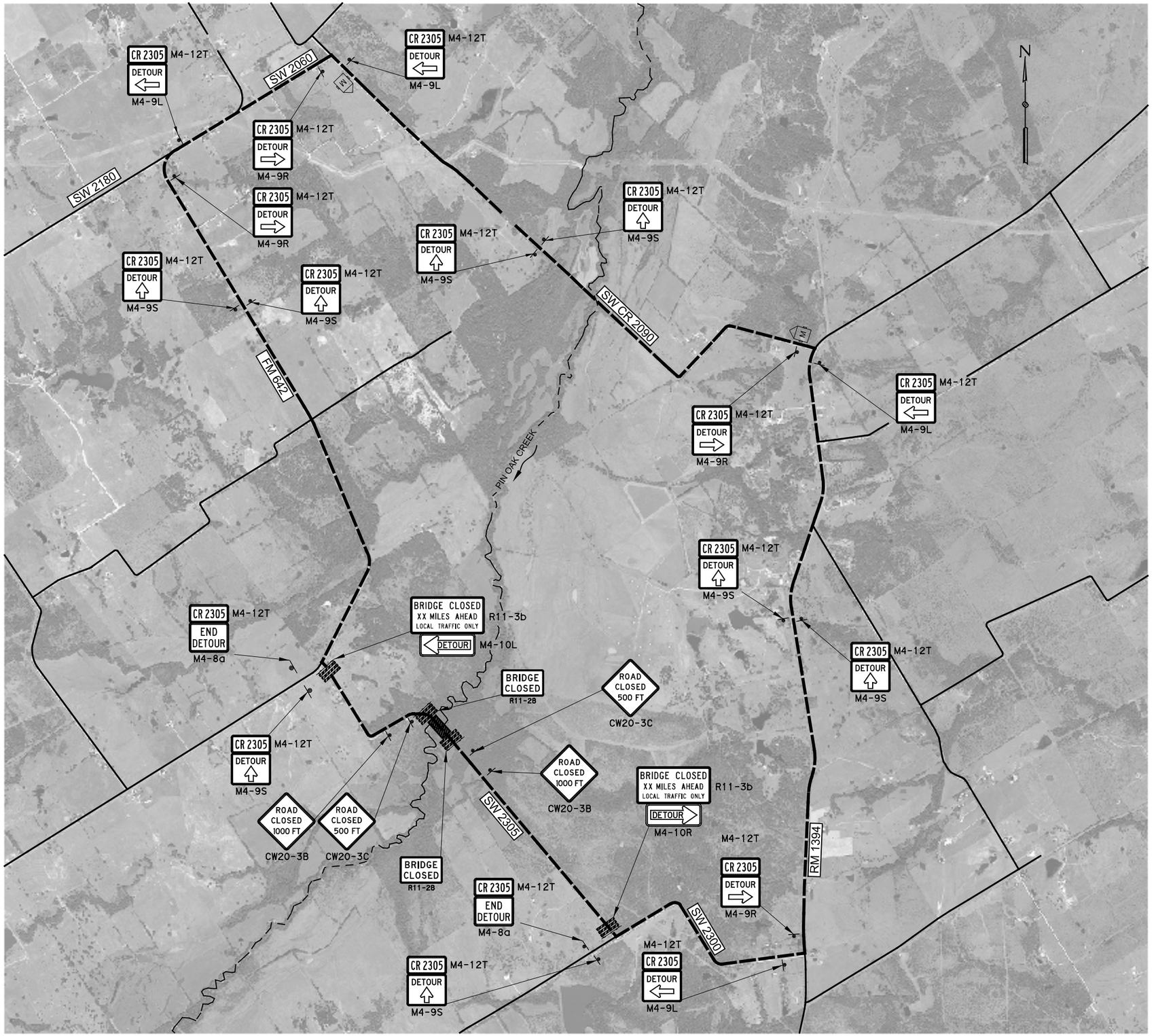


LEGEND

- DETOUR ROUTE
- ADJACENT ROADWAYS
- WATERWAY
- SIGN
- BARRICADE, TYPE III
- WORK/BRIDGE LOCATION
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES

PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE POSTED 1 WEEK PRIOR TO CLOSURE AND SHALL READ:

CR SW 2305 CLOSED AT
PIN OAK CREEK FROM
_____ TO _____

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305

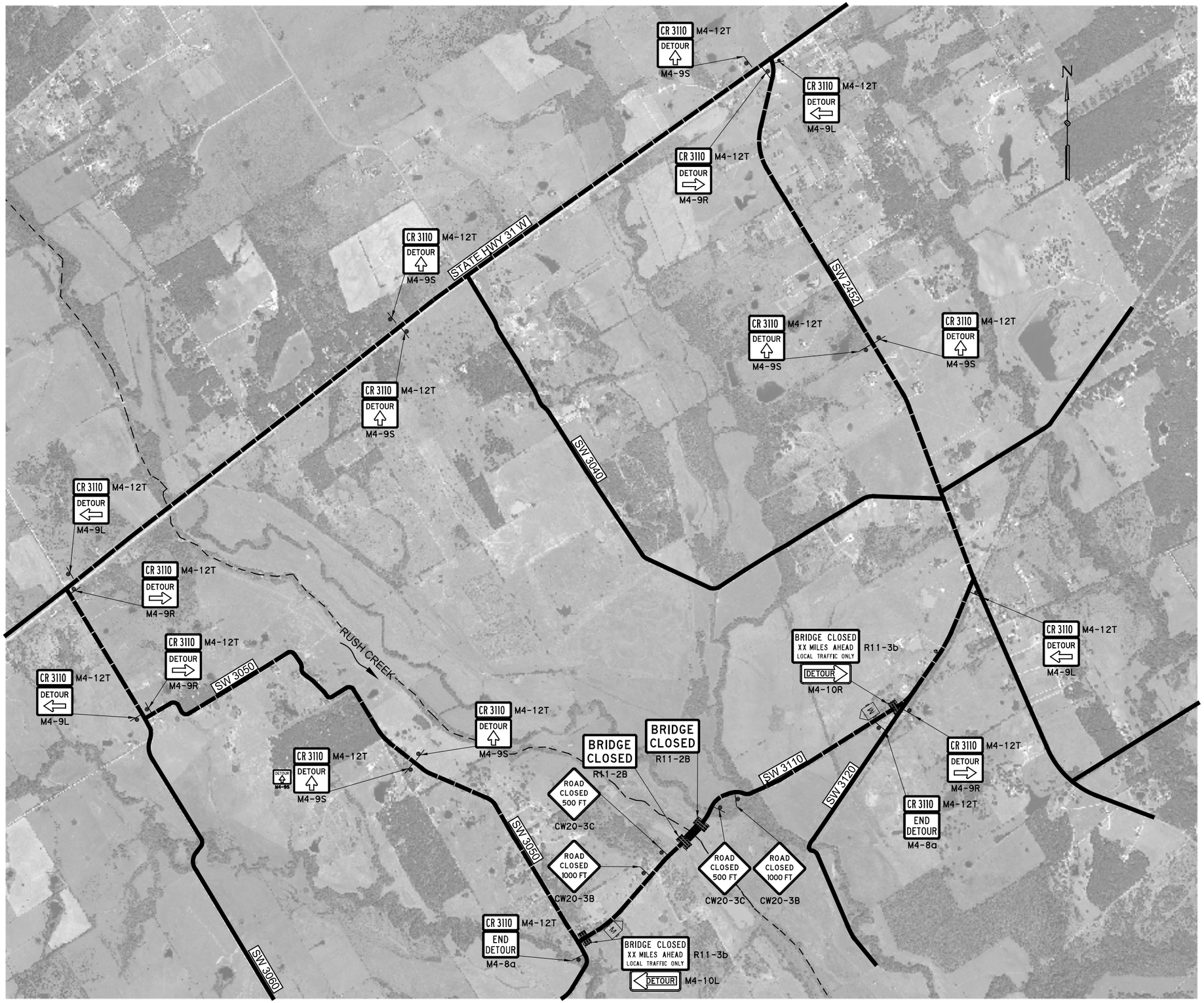
TRAFFIC CONTROL PLAN
DETOUR
PIN OAK CREEK BRIDGE

NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		13

DATE: November 27, 2023
FILE: I:\37_S DETOUR.dgn
11:33:27 AM

DN: ERR CK: BKT DW: CK:



LEGEND

- DETOUR ROUTE
- ADJACENT ROADWAYS
- WATERWAY
- SIGN
- BARRICADE, TYPE III
- WORK/BRIDGE LOCATION
- PORTABLE CHANGEABLE MESSAGE SIGN

NOTES

PORTABLE CHANGEABLE MESSAGE SIGNS SHALL BE POSTED 1 WEEK PRIOR TO CLOSURE AND SHALL READ:

CR SW 3110 CLOSED AT
RUSH CREEK FROM
_____ TO _____

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

TRAFFIC CONTROL PLAN
DETOUR
RUSH CREEK BRIDGE

NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		14

DATE: November 27, 2023
FILE: 138_S_DETOUR.dgn
11:33:35 AM

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

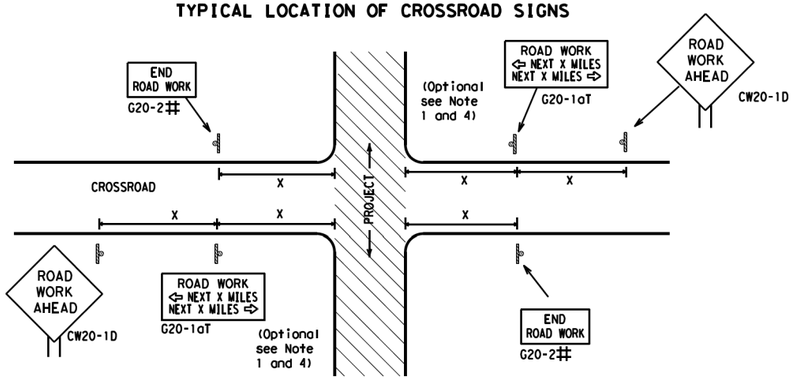
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

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	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		15

DATE: November 27, 2023
FILE: bc-21_01.dgn

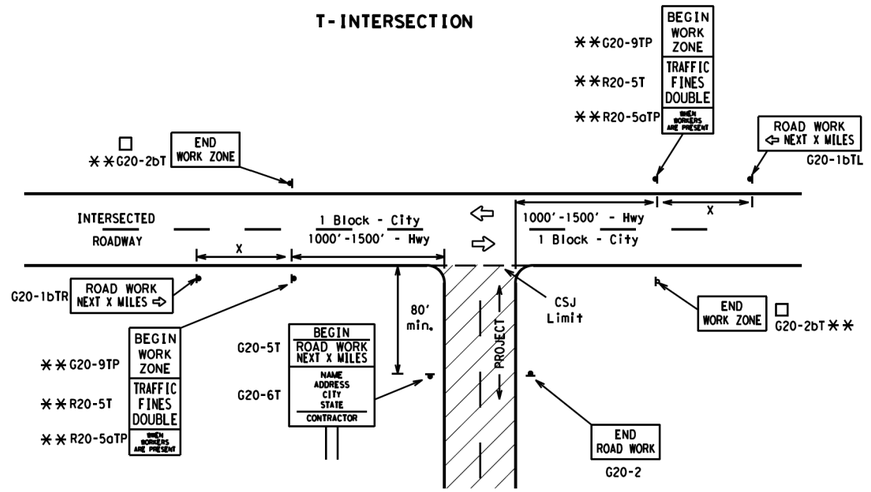
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

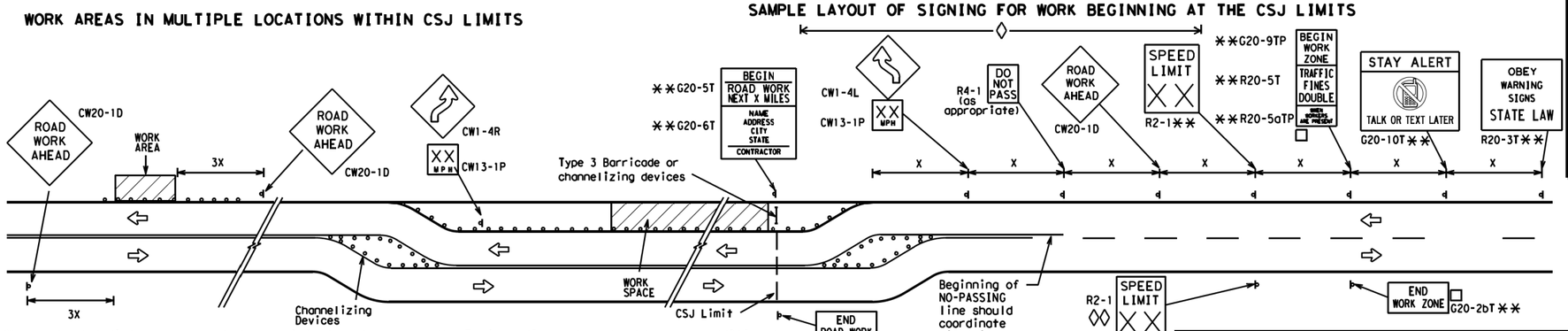
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

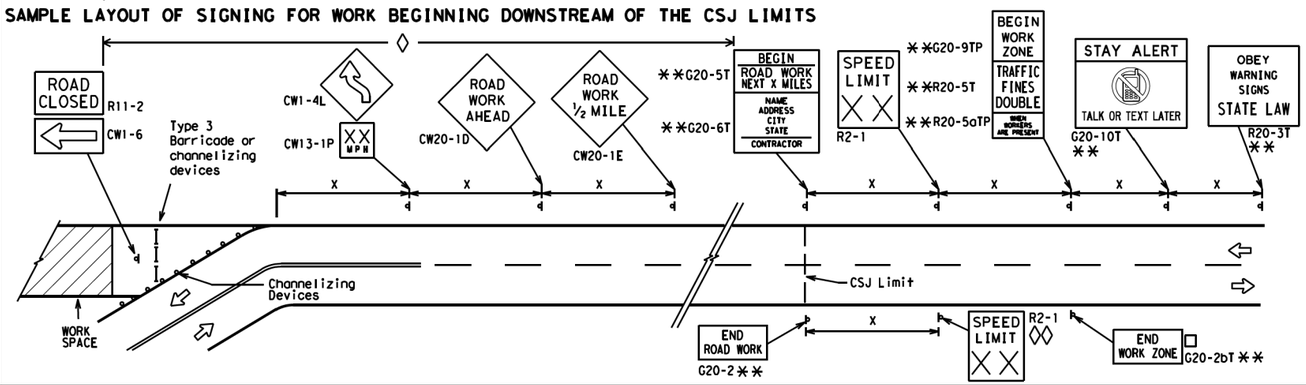
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



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.

SHEET 2 OF 12

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	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		16

96

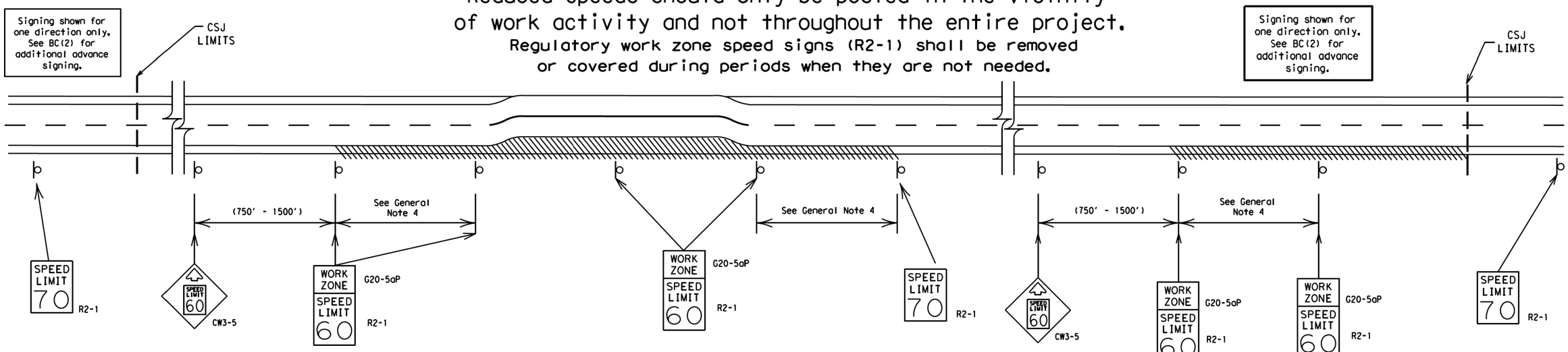
DATE: November 27, 2023
FILE: bc-21_02.dgn

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

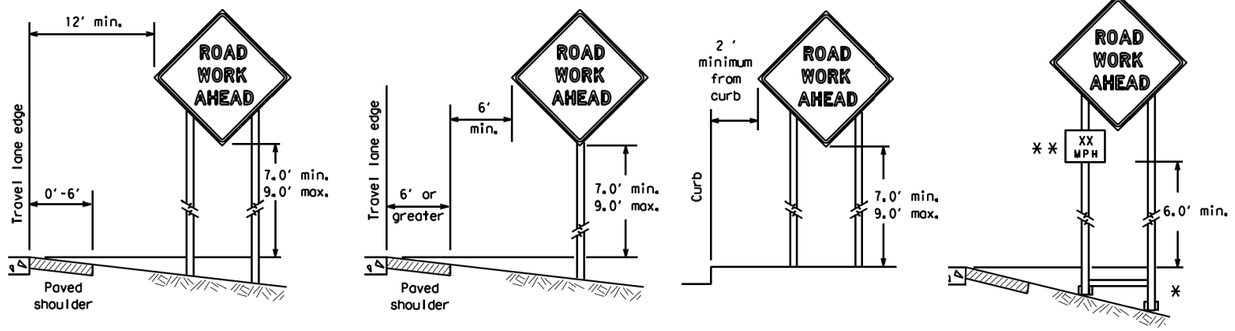
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

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	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		17

DATE: November 27, 2023
FILE: bc-21_03.dgn

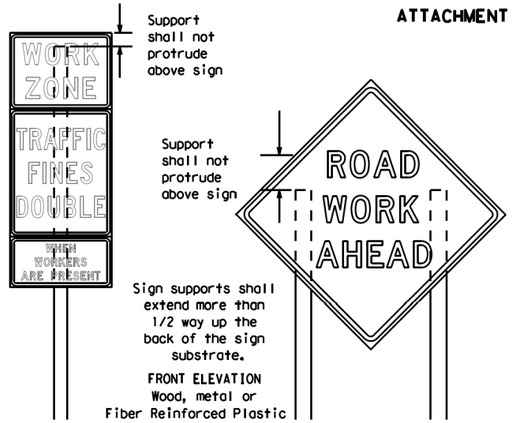
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

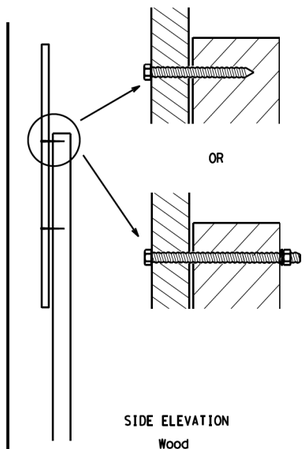


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

* * 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





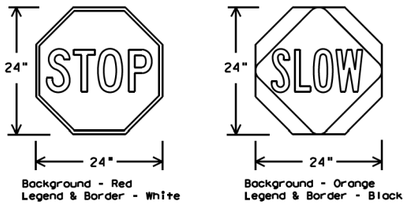
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

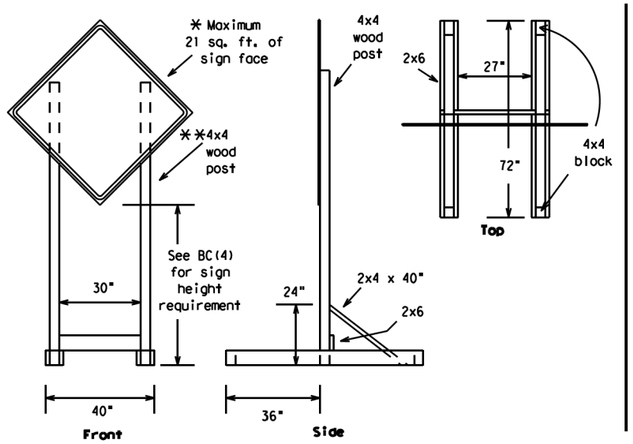
Traffic Safety Division Standard

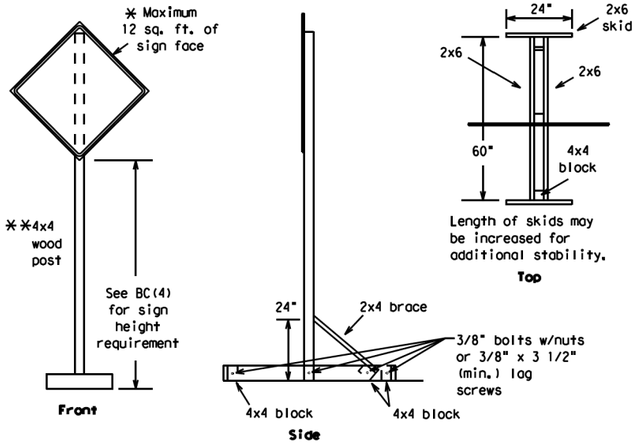
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		18

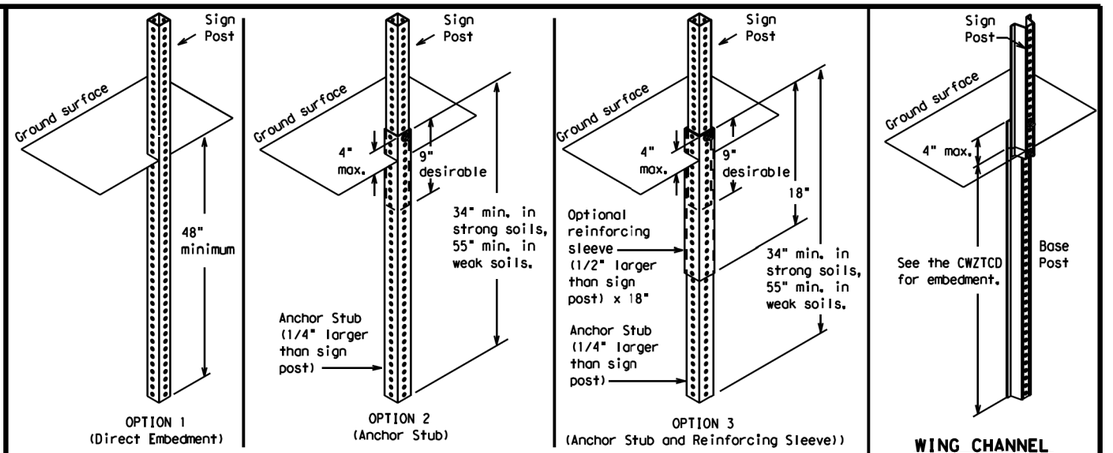
DATE: November 27, 2023
FILE: bc-21_04.dgn





SKID MOUNTED WOOD SIGN SUPPORTS

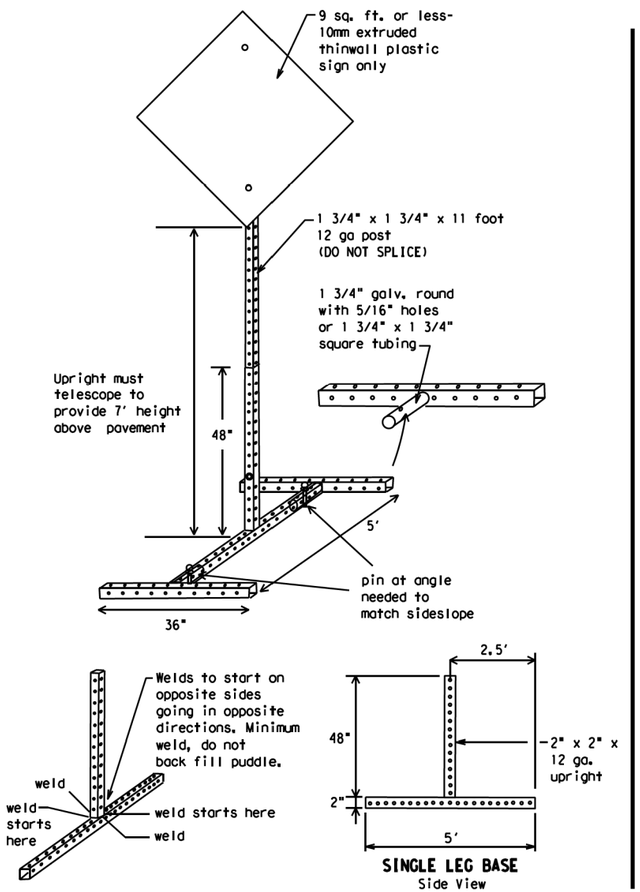
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

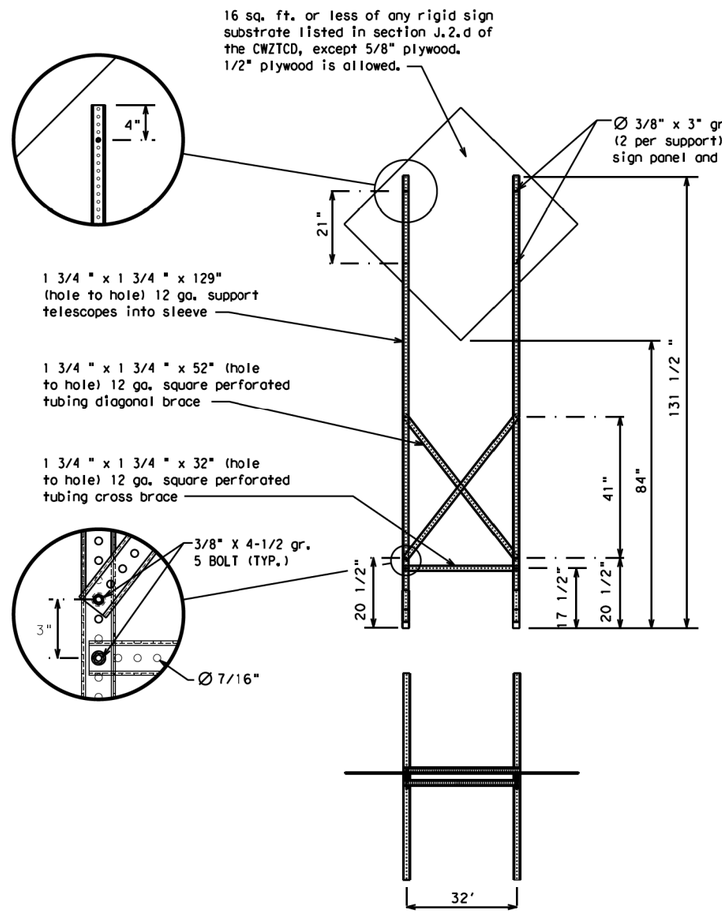


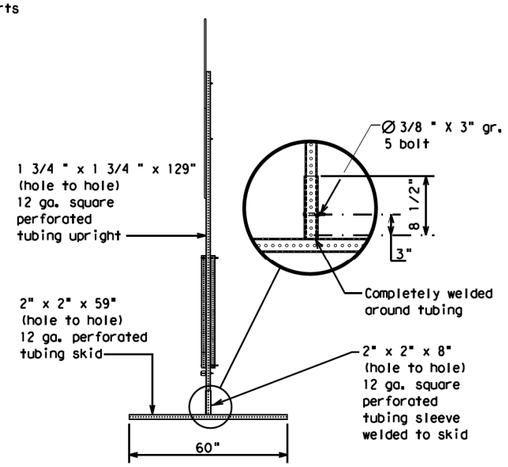
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		19

DATE: November 27, 2023
FILE: bc-21_05.dgn

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM-XX AM
STAY IN LANE *				

** 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

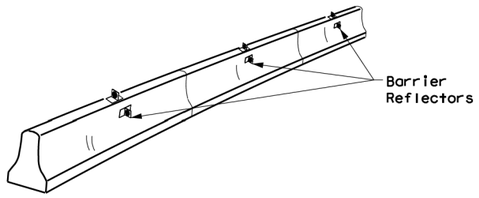
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		20

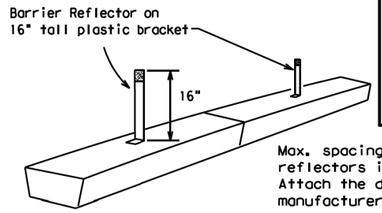
DATE: November 27, 2023
FILE: bc-21_06.dgn

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.

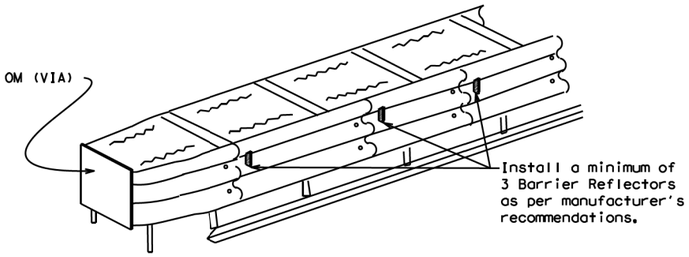


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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.

LOW PROFILE CONCRETE BARRIER (LPCB)

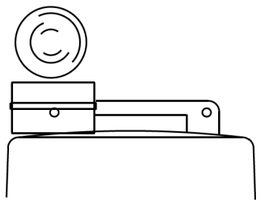


DELINEATION OF END TREATMENTS

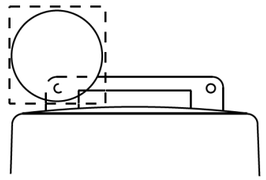
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

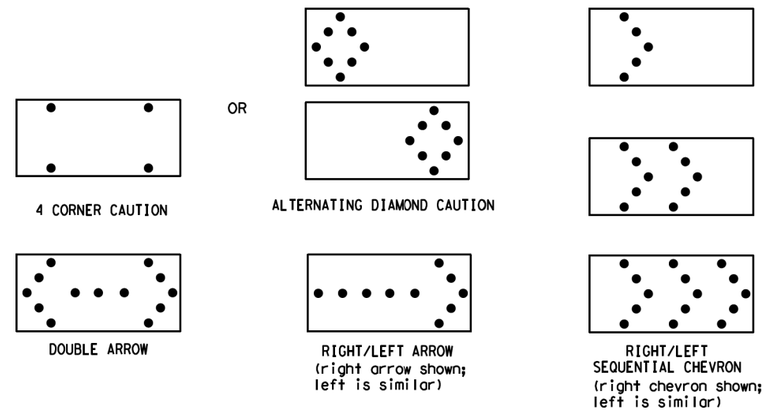
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		21

DATE: November 27, 2023
FILE: bc-21_07.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:

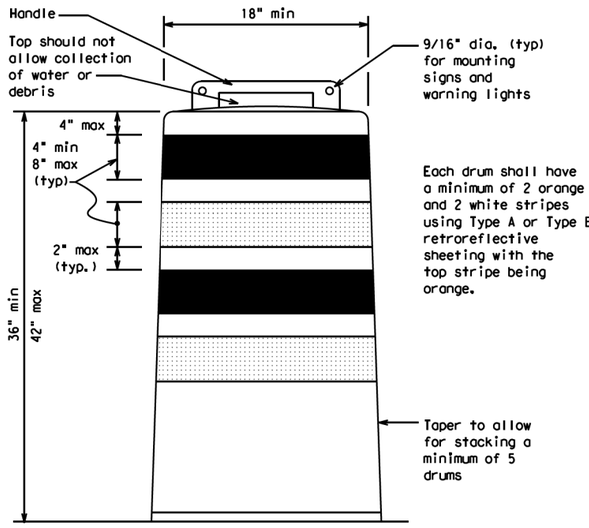
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

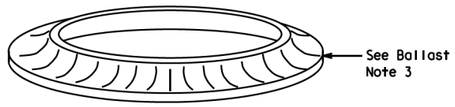
RETROREFLECTIVE SHEETING

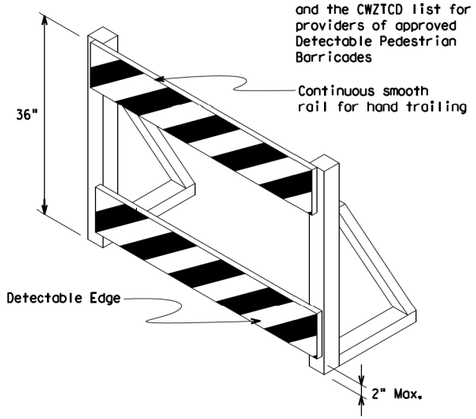
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

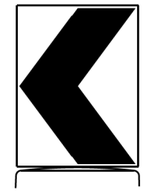




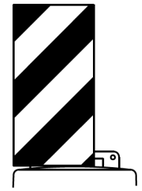


DETECTABLE PEDESTRIAN BARRICADES

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

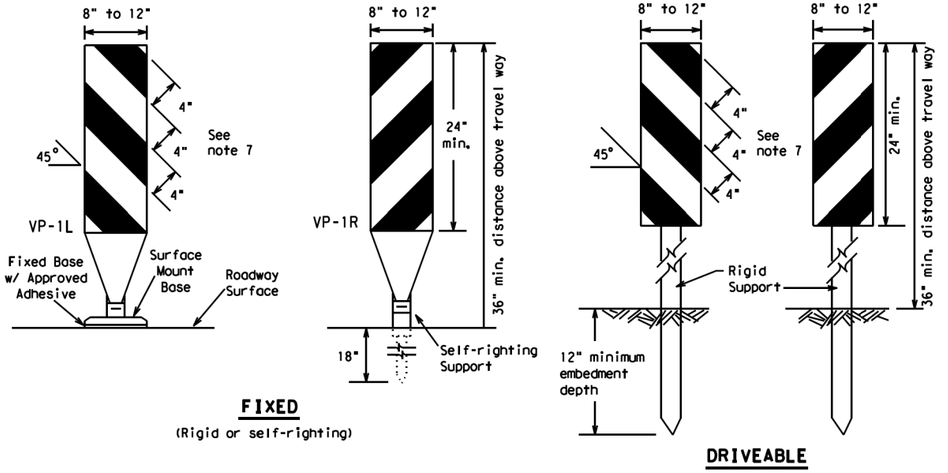
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	DAL	NAVARRO		22
7-13				

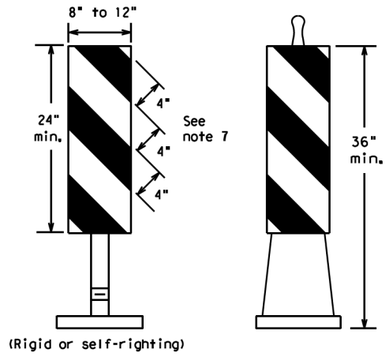
102

DATE: November 27, 2023
FILE: bc-21_08.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

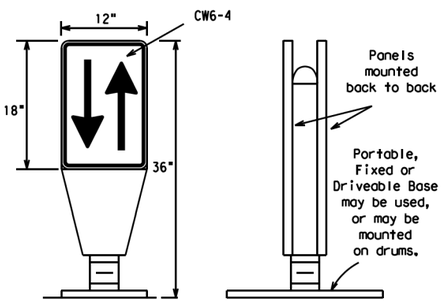


(Rigid or self-righting)

PORTABLE

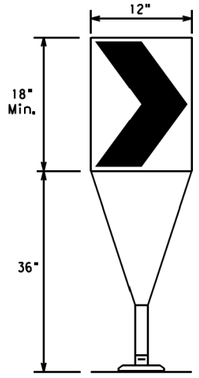
VERTICAL PANELS (VPs)

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.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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.



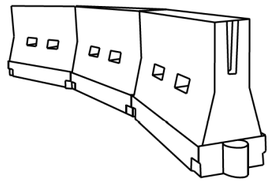
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

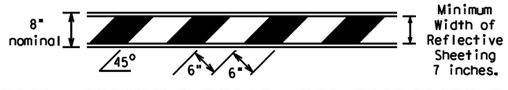
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	NAVARRO		23

DATE: November 27, 2023
FILE: bc-21_09.dgn

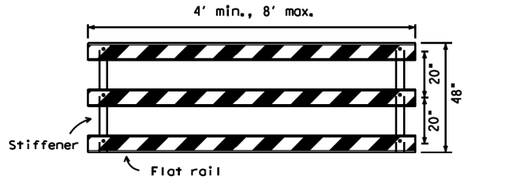
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



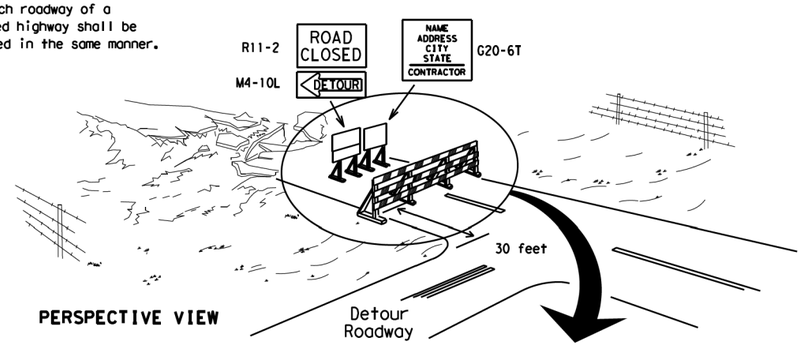
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

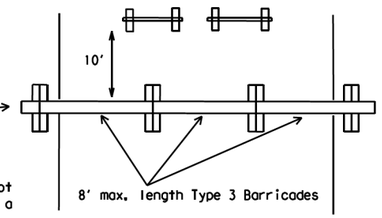
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

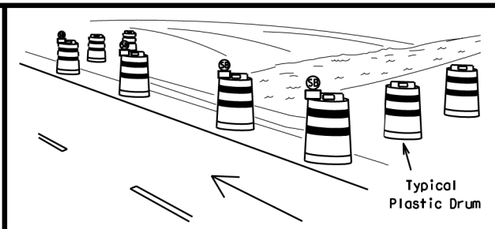
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

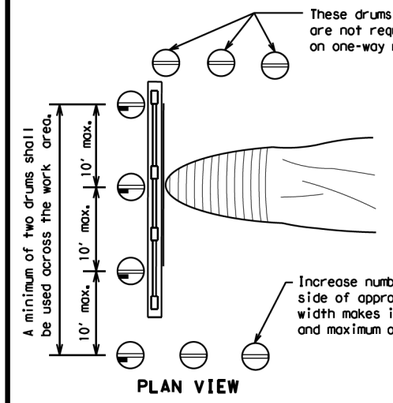
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

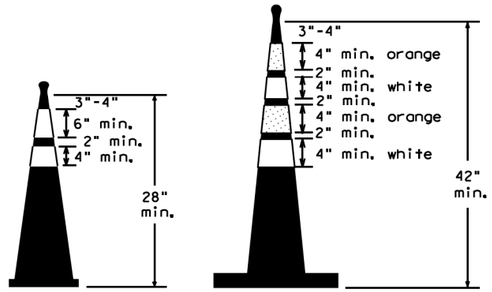
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

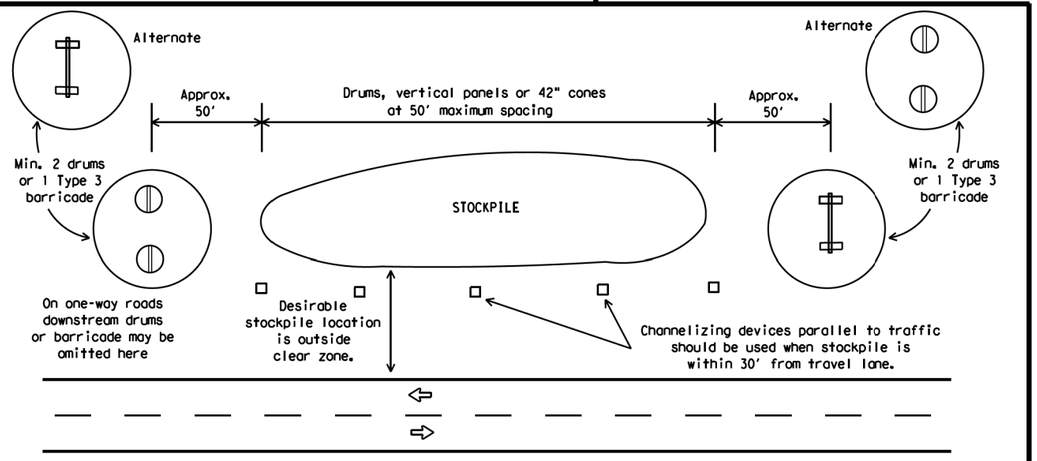


Two-Piece cones | One-Piece cones | Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		24

104

DATE: November 27, 2023
FILE: bc-21_10.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.

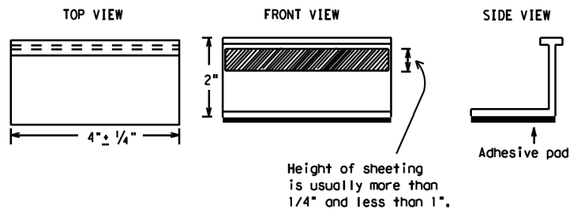
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

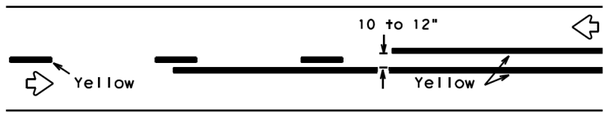
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	DAL	NAVARRO		25
11-02 8-14				

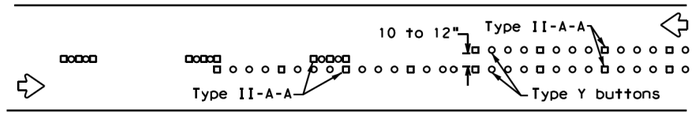
105

DATE: November 27, 2023
FILE: bc-21_11.dgn

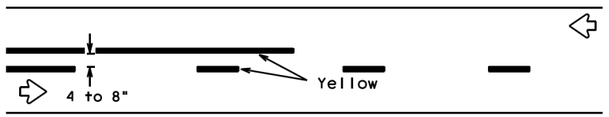
PAVEMENT MARKING PATTERNS



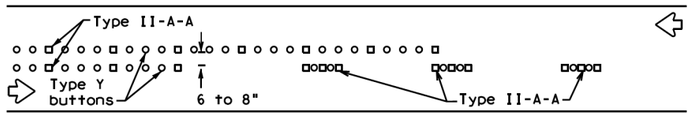
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



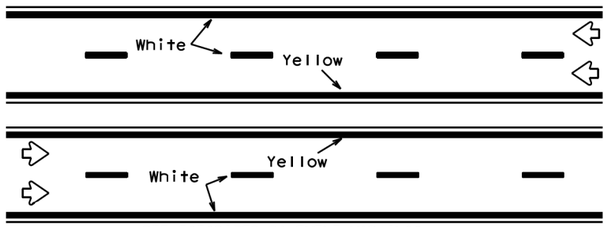
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



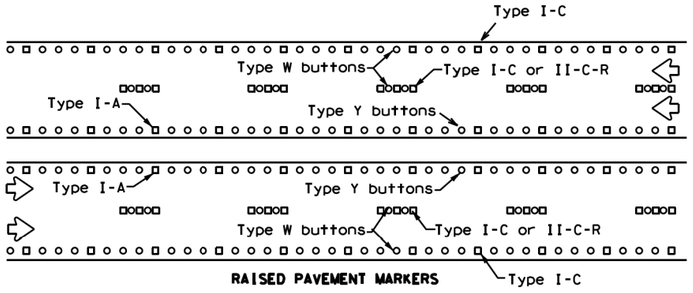
RAISED PAVEMENT MARKERS - PATTERN B

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



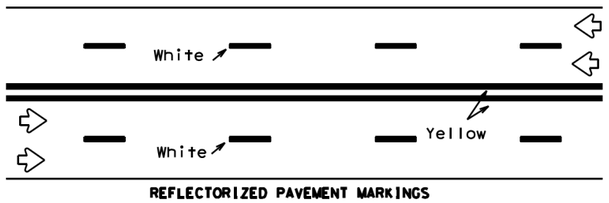
REFLECTORIZED PAVEMENT MARKINGS



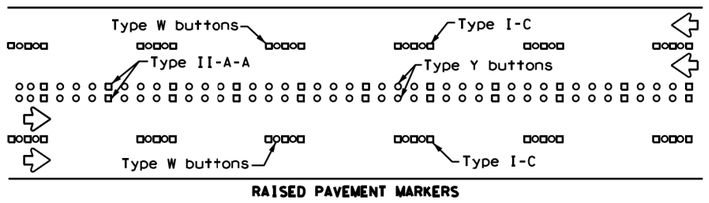
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



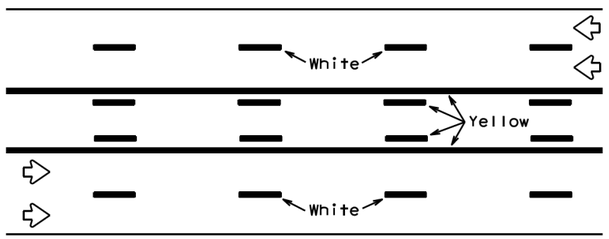
REFLECTORIZED PAVEMENT MARKINGS



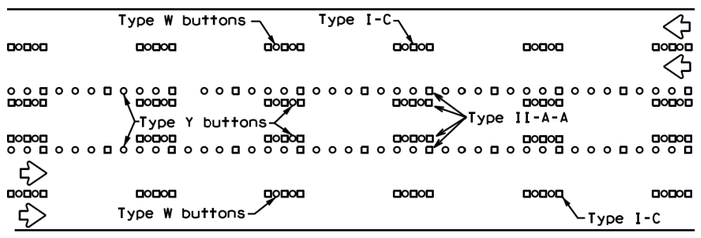
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

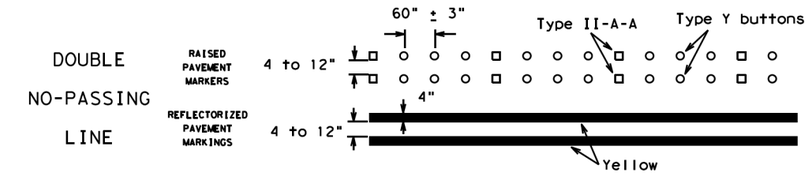
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

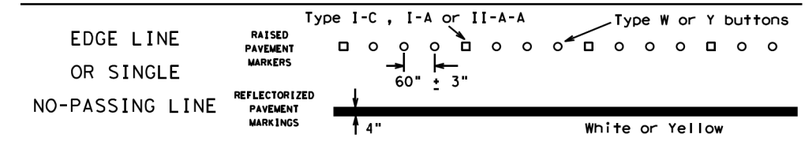
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

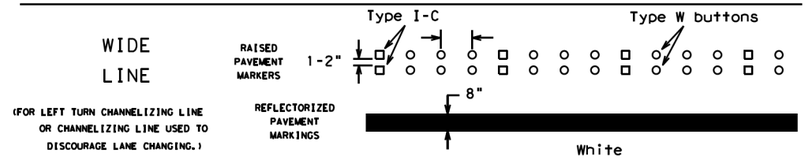


EDGE LINE OR SINGLE NO-PASSING LINE



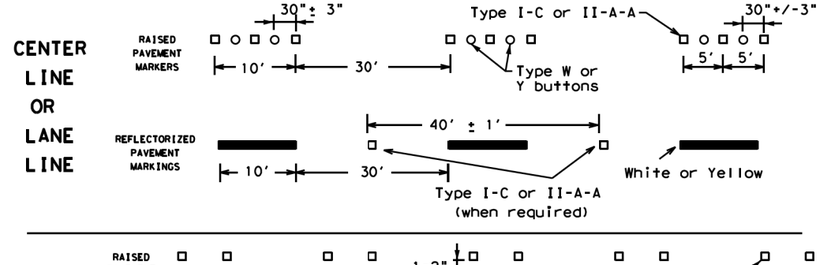
WIDE LINE

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

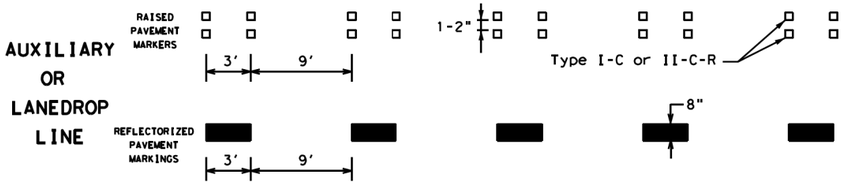


BROKEN LINES

CENTER LINE OR LANE LINE

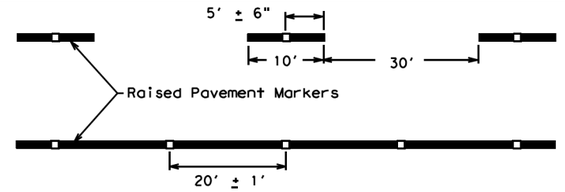


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

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	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		26

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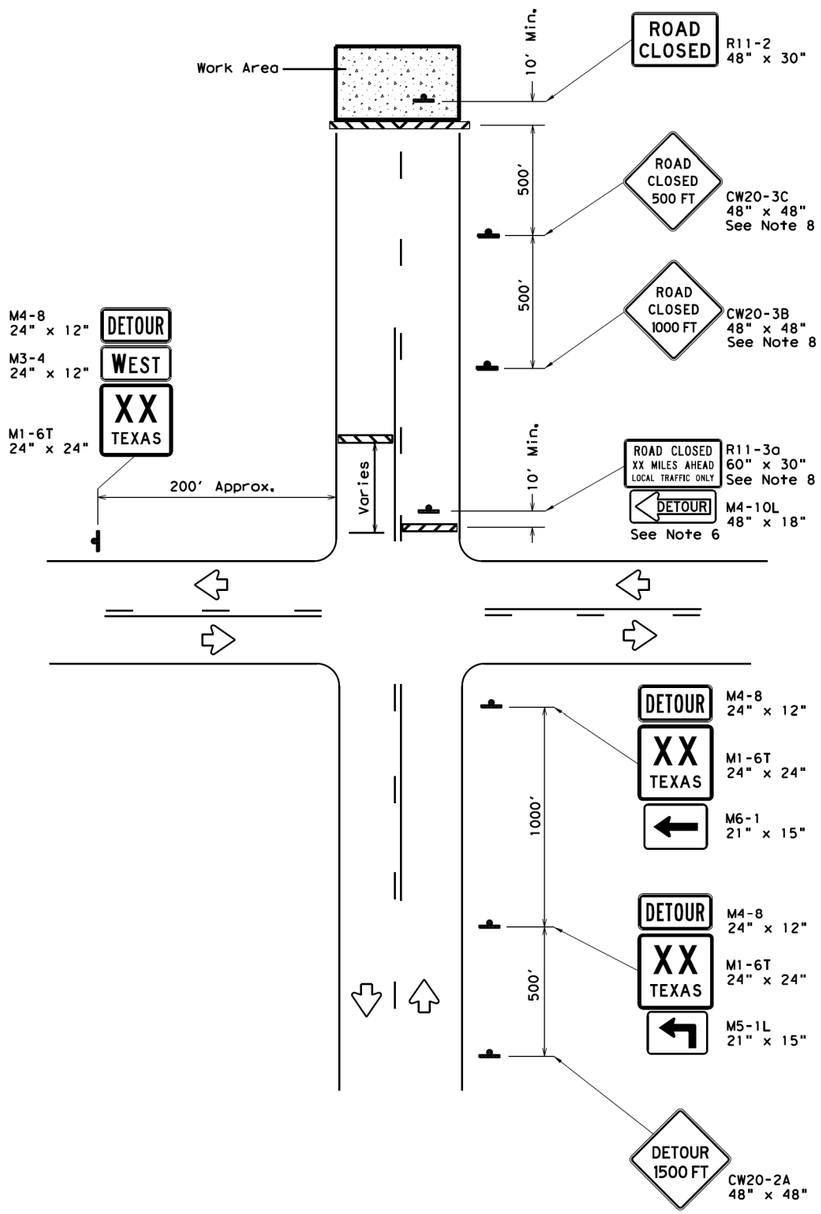
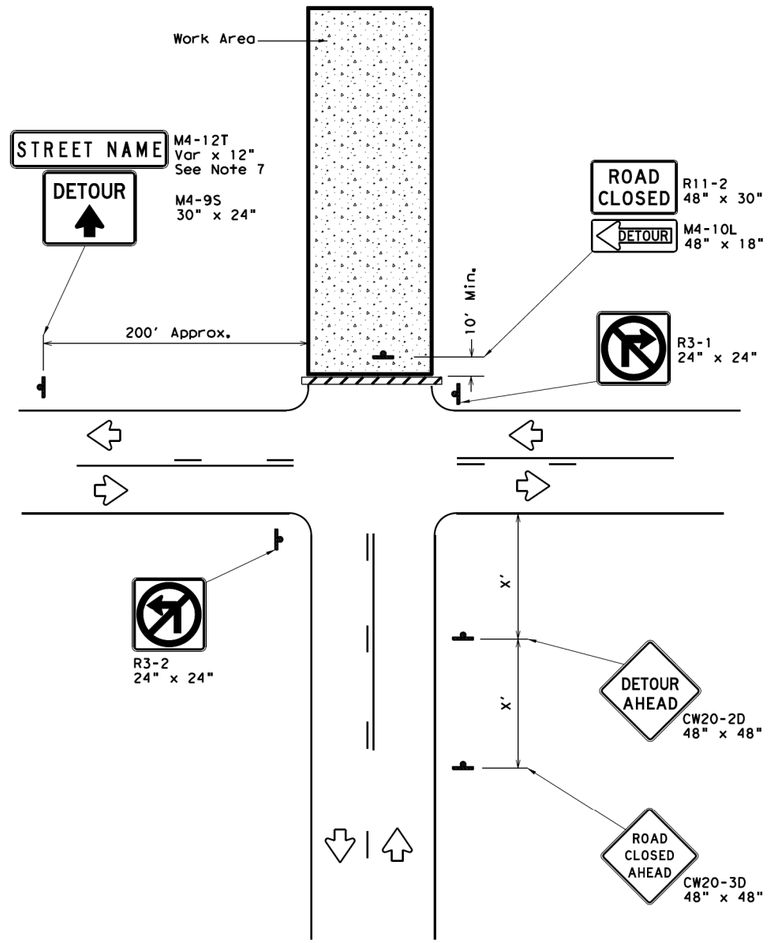
DATE: November 27, 2023
FILE: bc-21_12.dgn



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	18	133, ETC	CR 1420, ETC
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	DAL	NAVARRO		27

DATE: November 27, 2023
FILE: wzrcd-13.dgn

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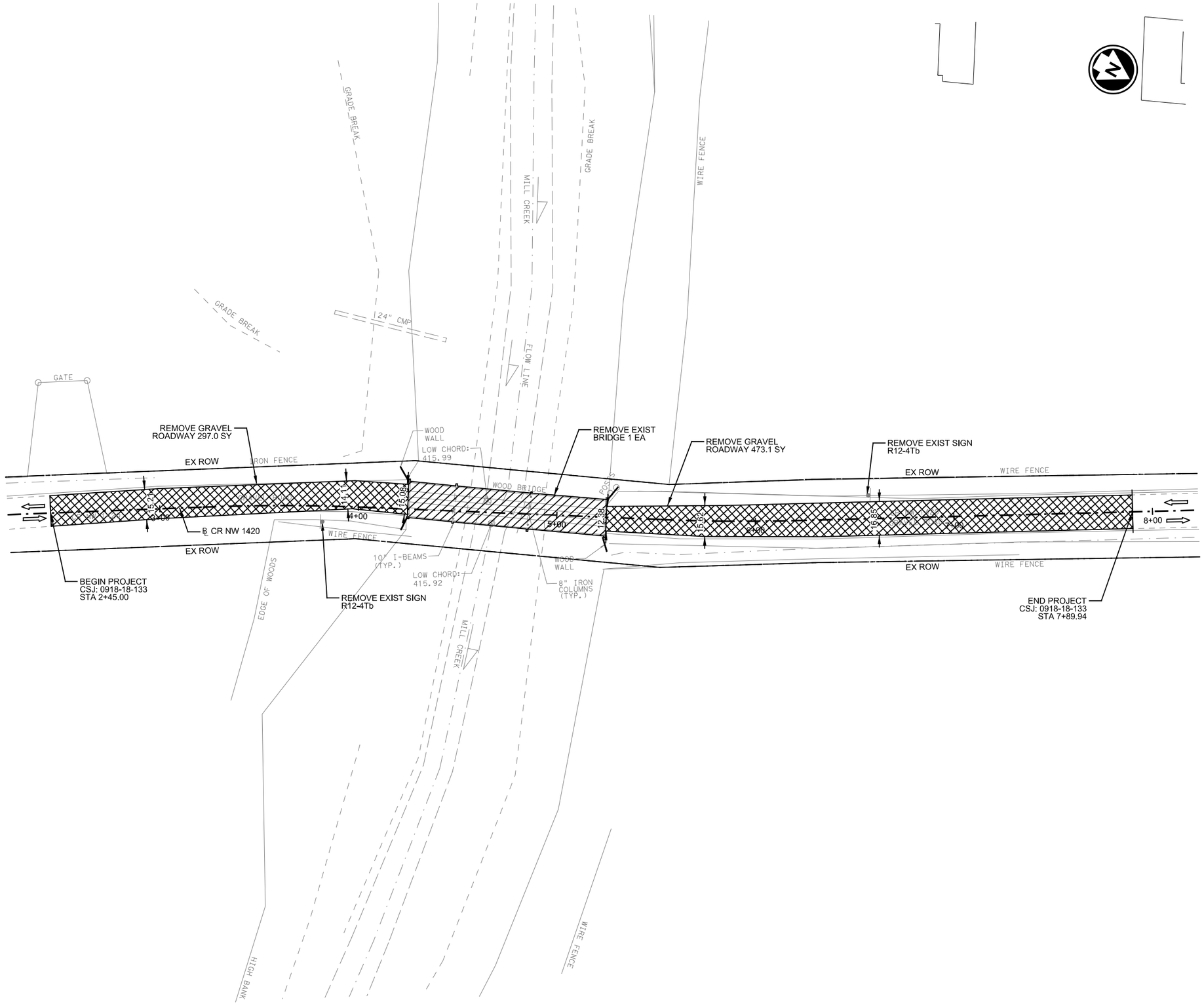

LEGEND

- REMOVAL OF EXIST GRAVEL (4" - 10")
- REMOVAL OF LARGE STRUCTURE
- RIP RAP REMOVAL
- EXIST TRAFFIC PATTERN

NOTES

1. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
2. SEE SIGNING PLANS FOR ROADSIDE SIGN REMOVALS.
3. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
4. PLACE NEW FENCE AND GATES PRIOR TO REMOVAL OF ANY EXISTING FENCES OR GATES.
5. REMOVAL OF FENCES AND GATES ARE SUBSIDIARY TO THE VARIOUS BID ITEMS.

EXIST NBI: 18-175-0-AA01-56-003

0 25 50 75 100

SCALE IN FEET

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

BRIDGE REPLACEMENT AT MILL CREEK BRIDGE REMOVAL PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		28

DATE: November 27, 2023 11:36:26 AM
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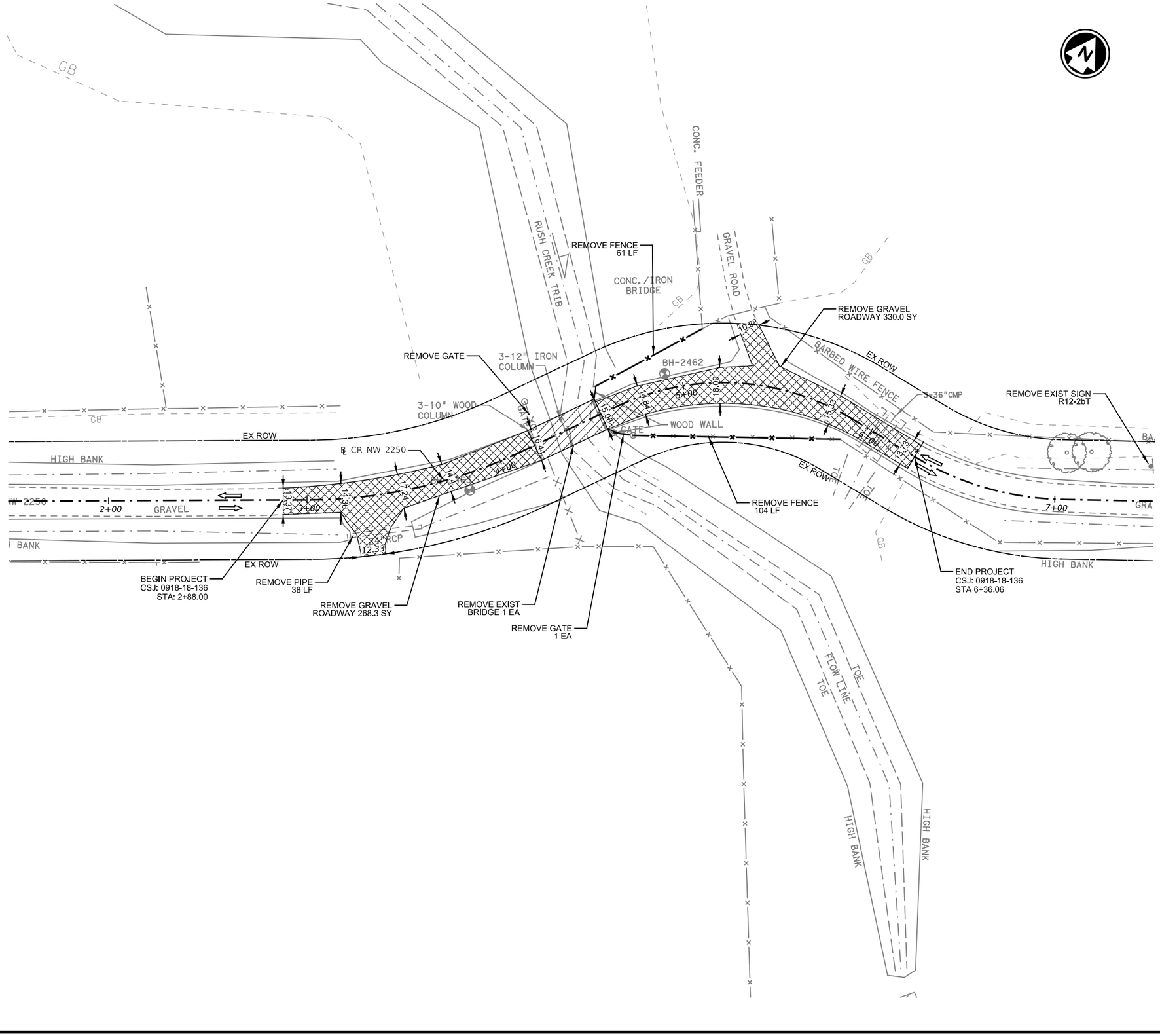

LEGEND

- REMOVAL OF EXIST GRAVEL (4" - 10")
- REMOVAL OF LARGE STRUCTURE
- RIP RAP REMOVAL
- EXIST TRAFFIC PATTERN

NOTES

1. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
2. SEE SIGNING PLANS FOR ROADSIDE SIGN REMOVALS.
3. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
4. PLACE NEW FENCE AND GATES PRIOR TO REMOVAL OF ANY EXISTING FENCES OR GATES.
5. REMOVAL OF FENCES AND GATES ARE SUBSIDIARY TO THE VARIOUS BID ITEMS.

EXIST NBI: 18-175-0-AA01-47-002

0 25 50 75 100

HORIZ. SCALE IN FEET

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER

12/15/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

BRIDGE REPLACEMENT AT RUSH CREEK TRIBUTARY REMOVAL PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		29

DATE: December 15, 2023
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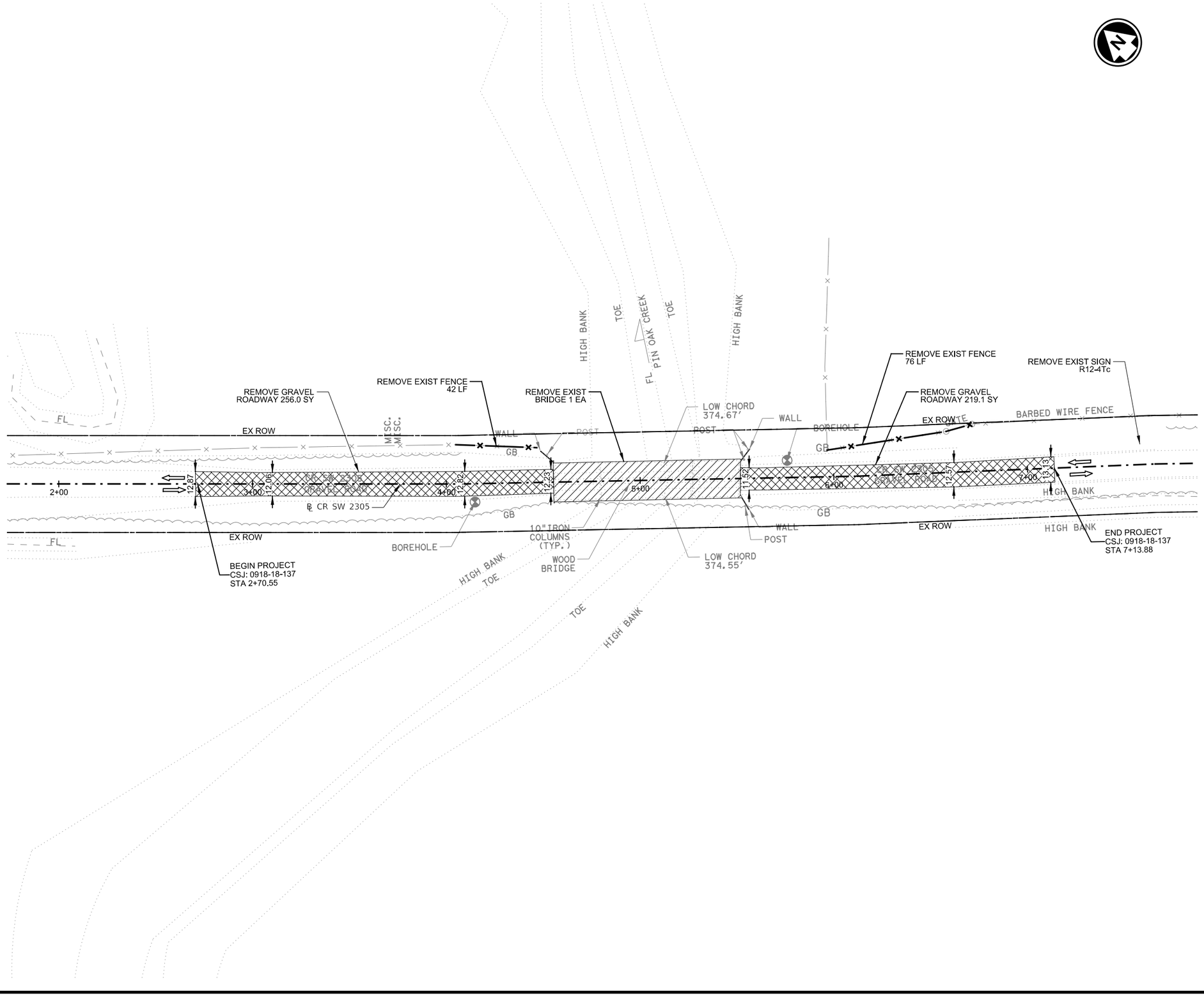

LEGEND

- REMOVAL OF EXIST GRAVEL (4" - 10")
- REMOVAL OF LARGE STRUCTURE
- RIP RAP REMOVAL
- EXIST TRAFFIC PATTERN

NOTES

1. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
2. SEE SIGNING PLANS FOR ROADSIDE SIGN REMOVALS.
3. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
4. PLACE NEW FENCE AND GATES PRIOR TO REMOVAL OF ANY EXISTING FENCES OR GATES.
5. REMOVAL OF FENCES AND GATES ARE SUBSIDIARY TO THE VARIOUS BID ITEMS.

EXIST NBI: 18-175-0-AA05-52-001

0 25 50 75 100

HORIZ. SCALE IN FEET

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305

BRIDGE REPLACEMENT AT PIN OAK CREEK REMOVAL PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		30

DATE: November 27, 2023
FILE: 137-S-REM-01.dgn
11:36:48 AM

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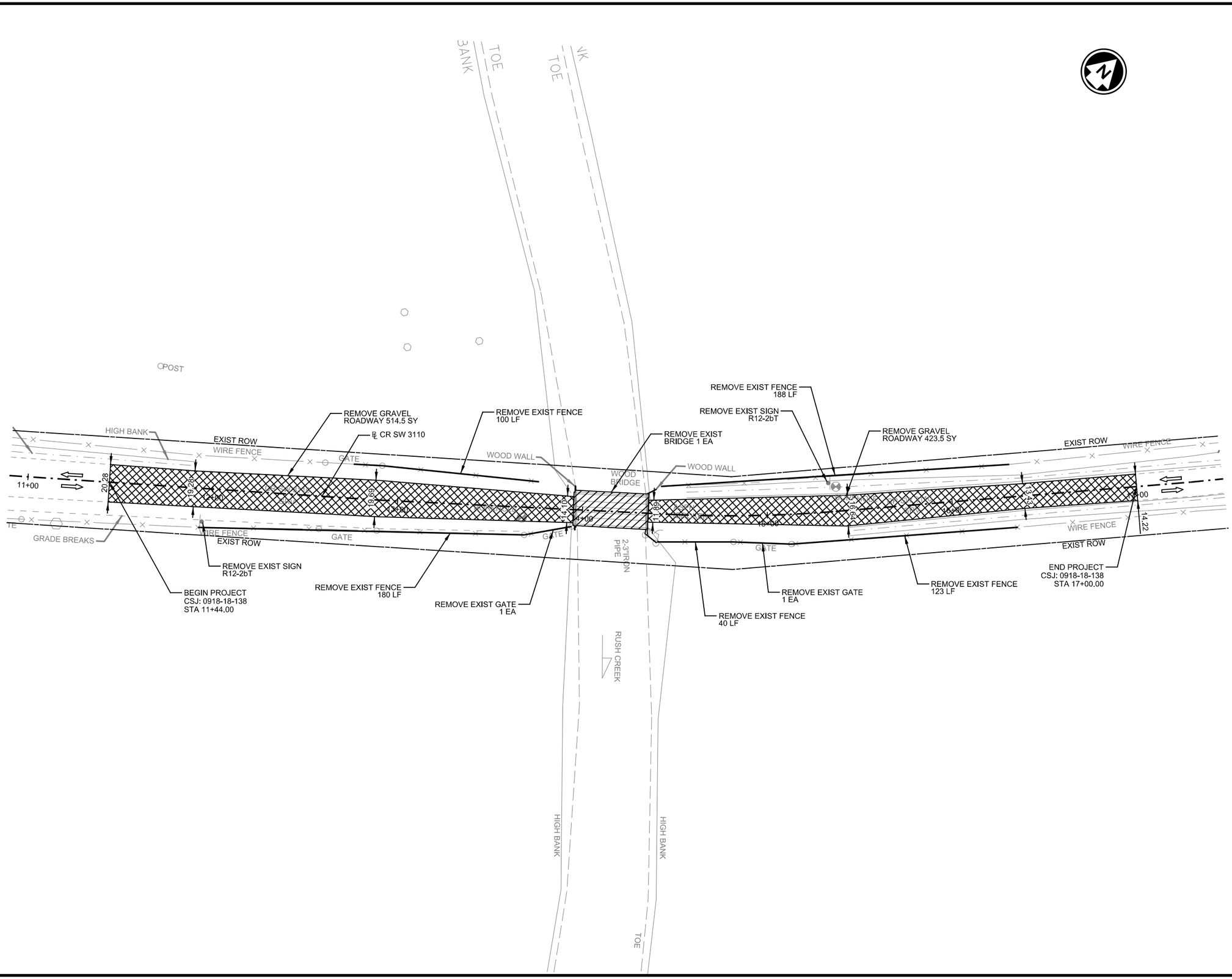


LEGEND

- REMOVAL OF EXIST GRAVEL (4" - 10")
- REMOVAL OF LARGE STRUCTURE
- RIP RAP REMOVAL
- EXIST TRAFFIC PATTERN

NOTES

1. CONTRACTOR TO PROTECT IN PLACE EXISTING UTILITIES. UNLESS OTHERWISE NOTED.
2. SEE SIGNING PLANS FOR ROADSIDE SIGN REMOVALS.
3. SEE ROADWAY TYPICAL SECTIONS FOR EXISTING PAVEMENT STRUCTURE INFORMATION.
4. PLACE NEW FENCE AND GATES PRIOR TO REMOVAL OF ANY EXISTING FENCES OR GATES.
5. REMOVAL OF FENCES AND GATES ARE SUBSIDIARY TO THE VARIOUS BID ITEMS.

EXIST NBI: 18-175-0-AA05-76-003

0 25 50 75 100

HORIZ. SCALE IN FEET

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

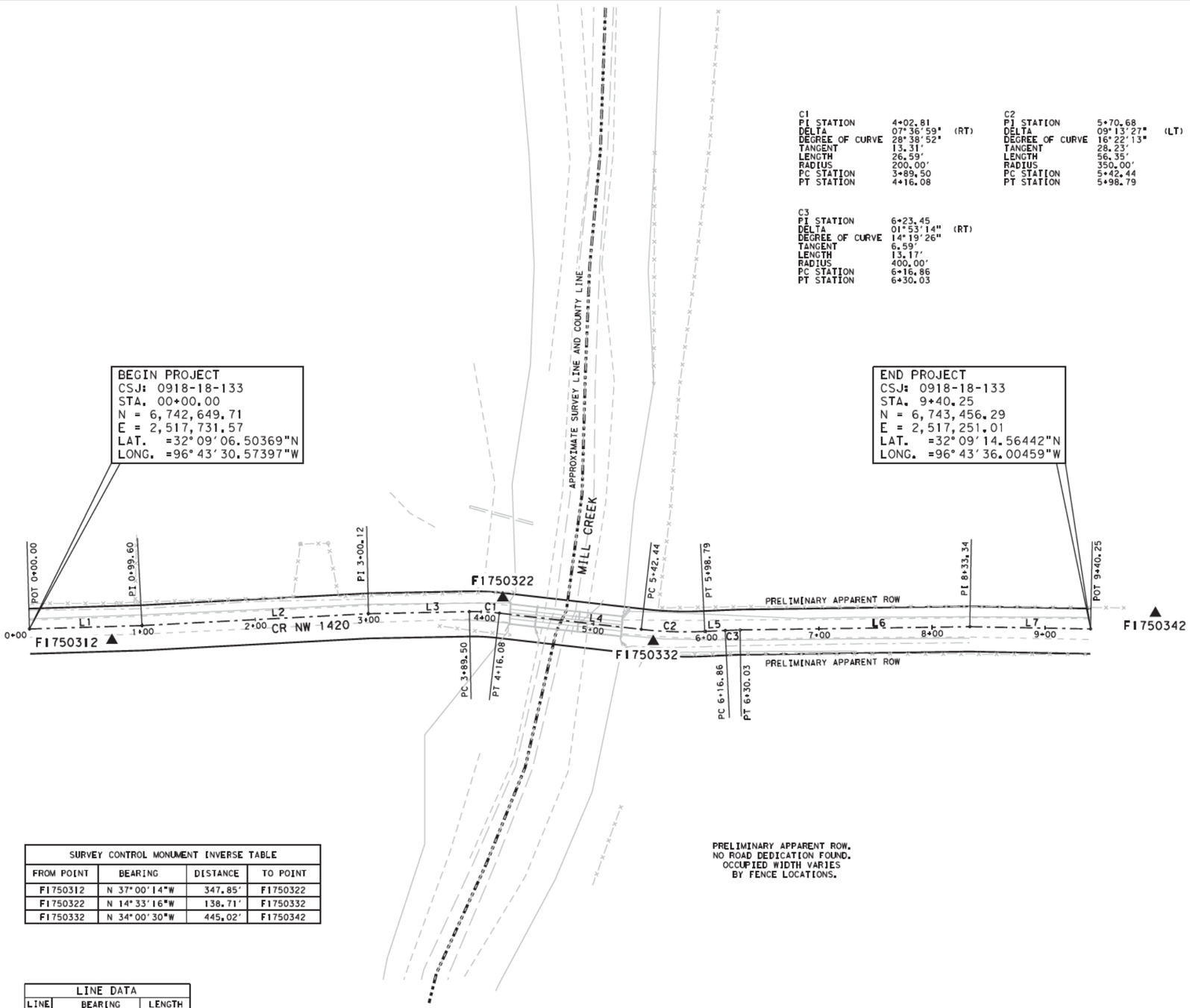
BRIDGE REPLACEMENT AT RUSH CREEK REMOVAL PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		31

DATE: November 27, 2023
FILE: 138-S-REM-01.dgn
11:37:00 AM

PLANS SUBMITTAL
DRC: | DSC: | DDW: DD | DSC: JL



PRELIMINARY APPARENT ROW.
NO ROAD DEDICATION FOUND.
OCCUPIED WIDTH VARIES
BY FENCE LOCATIONS.

C1
PI STATION	4+02.81	
DELTA	07°36'59"	(RT)
DEGREE OF CURVE	28°38'52"	
TANGENT	13.31'	
LENGTH	26.59'	
RADIUS	200.00'	
PC STATION	3+89.50	
PT STATION	4+16.08	

C2
PI STATION	5+70.68	
DELTA	09°13'27"	(LT)
DEGREE OF CURVE	16°22'13"	
TANGENT	28.23'	
LENGTH	56.35'	
RADIUS	350.00'	
PC STATION	5+42.44	
PT STATION	5+98.79	

C3
PI STATION	6+23.45	
DELTA	01°53'14"	(RT)
DEGREE OF CURVE	14°19'26"	
TANGENT	6.59'	
LENGTH	13.17'	
RADIUS	400.00'	
PC STATION	6+16.86	
PT STATION	6+30.03	

0 50 100 150 200
HORIZ. SCALE IN FEET

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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. 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 OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023
JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

SURVEY CONTROL MONUMENT INVERSE TABLE
FROM POINT	BEARING	DISTANCE	TO POINT
F1750312	N 37°00'14"W	347.85'	F1750322
F1750322	N 14°33'16"W	138.71'	F1750332
F1750332	N 34°00'30"W	445.02'	F1750342

LINE DATA
LINE	BEARING	LENGTH
L1	N 32°30'00" W	99.60'
L2	N 33°48'40" W	200.52'
L3	N 31°53'19" W	89.38'
L4	N 24°16'20" W	126.36'
L5	N 33°29'47" W	18.07'
L6	N 31°36'34" W	203.31'
L7	N 29°44'13" W	106.91'

SURVEY CONTROL MONUMENTATION TABLE
POINT	SURFACE NORTHING(Y)	SURFACE EASTING(X)	GRID NORTHING(Y)	GRID EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
F1750312	6,742,717.60	2,517,702.97	6,742,879.43	2,517,763.40	416.25'	0+72.63	12.35'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750312"
F1750322	6,742,995.39	2,517,493.61	6,743,157.23	2,517,554.03	416.98'	4+17.60	-13.77'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750322"
F1750332	6,743,129.65	2,517,458.75	6,743,291.49	2,517,519.17	416.49'	5+54.00	9.84'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750332"
F1750342	6,743,498.55	2,517,209.84	6,743,660.40	2,517,270.26	425.06'	9+97.36	-14.76'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750342"

(-) DENOTES OFFSET LEFT

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc.
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420 @ MILL CREEK

SURVEY CONTROL INDEX

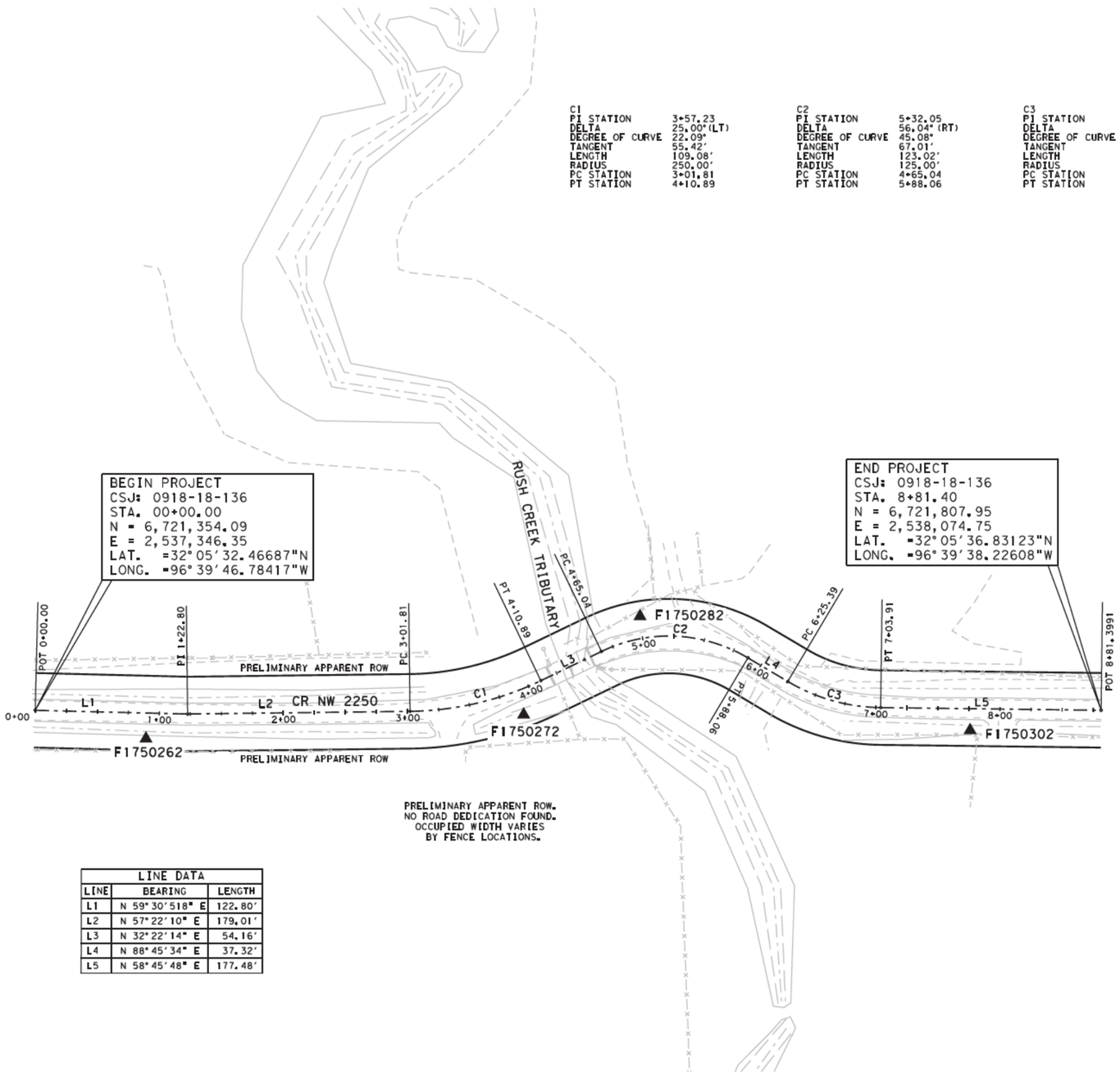
SCALE:1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		32

DATE: 11/9/2023 9:05:55 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\MILLS\CM\MILL_SurveyControl Index.dgn

PLANS SUBMITTAL
DD JL
DRC DRC DRW DRC

C1		C2		C3	
PI STATION	3+57.23	PI STATION	5+32.05	PI STATION	6+65.57
DELTA	25.00° (LT)	DELTA	56.04° (RT)	DELTA	30.00° (LT)
DEGREE OF CURVE	22.09°	DEGREE OF CURVE	45.08°	DEGREE OF CURVE	38.02°
TANGENT	55.42'	TANGENT	67.01'	TANGENT	40.19'
LENGTH	109.08'	LENGTH	123.02'	LENGTH	78.53'
RADIUS	250.00'	RADIUS	125.00'	RADIUS	150.00'
PC STATION	3+01.81	PC STATION	4+65.04	PC STATION	6+25.39
PT STATION	4+10.89	PT STATION	5+88.06	PT STATION	7+03.91



PRELIMINARY APPARENT ROW.
NO ROAD DEDICATION FOUND.
OCCUPIED WIDTH VARIES
BY FENCE LOCATIONS.

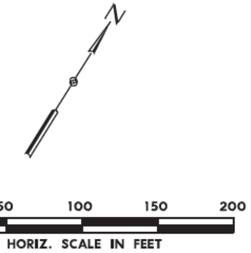
LINE DATA		
LINE	BEARING	LENGTH
L1	N 59°30'518" E	122.80'
L2	N 57°22'10" E	179.01'
L3	N 32°22'14" E	54.16'
L4	N 88°45'34" E	37.32'
L5	N 58°45'48" E	177.48'

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
F1750262	N 54°25'13"E	304.74'	F1750272
F1750272	N 17°55'04"E	122.69'	F1750282
F1750282	N 77°07'34"E	281.04'	F1750302

SURVEY CONTROL MONUMENTATION TABLE

POINT	SURFACE NORTHING(Y)	SURFACE EASTING(X)	GRID NORTHING(Y)	GRID EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
F1750262	6,721,381.78	2,537,434.15	6,721,543.09	2,537,495.05	499.02'	0+89.70	20.68'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750262"
F1750272	6,721,559.09	2,537,682.00	6,721,720.41	2,537,742.90	494.48'	3+88.31	19.74'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750272"
F1750282	6,721,675.83	2,537,719.74	6,721,837.15	2,537,780.65	493.08'	5+00.83	-17.80'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750282"
F1750302	6,721,738.44	2,537,993.72	6,721,899.77	2,538,054.63	495.65'	7+76.07	17.41'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750302"

(-) DENOTES OFFSET LEFT



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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. 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.

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

11/09/2023

JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc.
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250 @ RUSH CREEK TRIBUTARY

SURVEY CONTROL INDEX

SCALE:1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		33

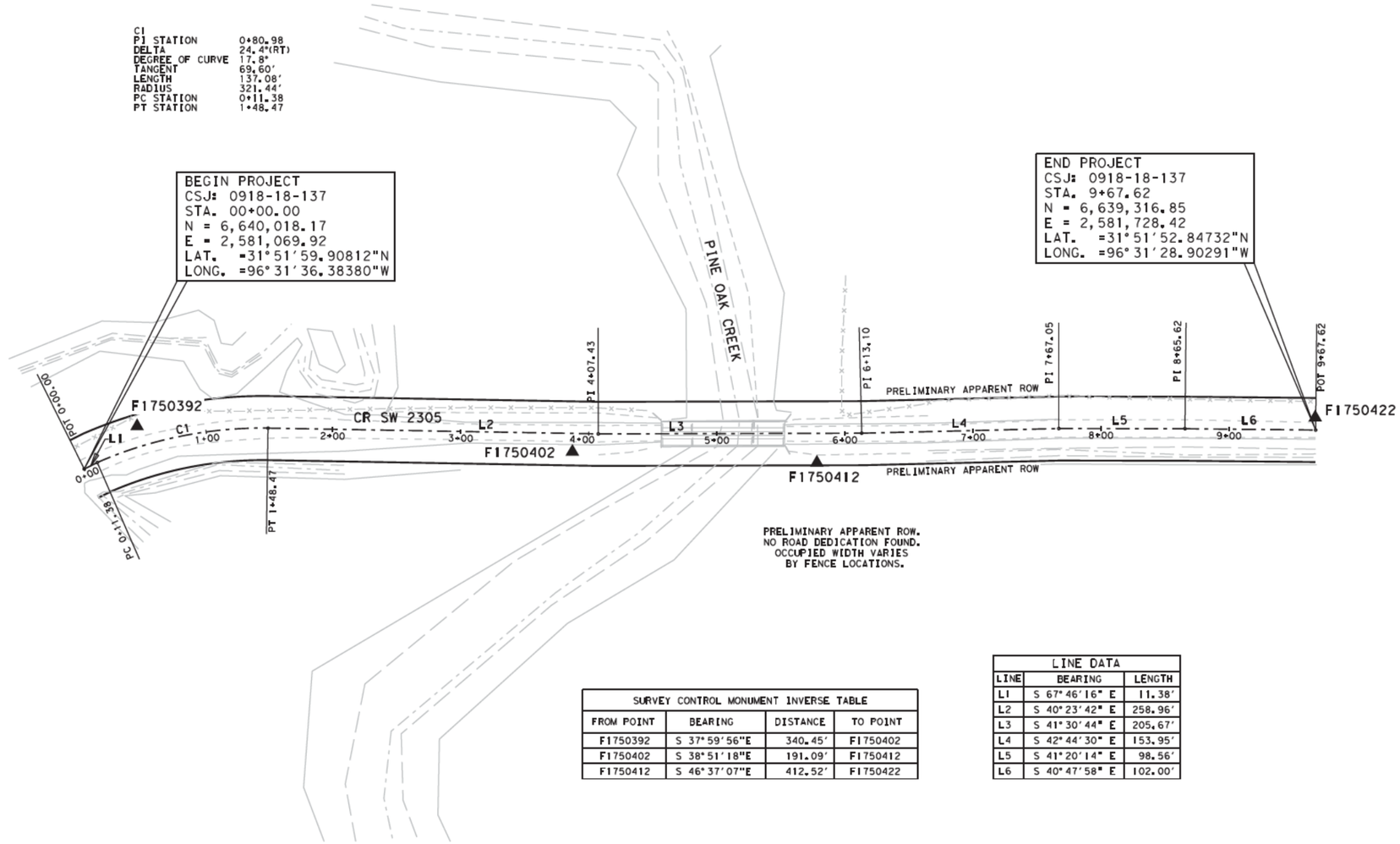
DATE: 11/9/2023 9:06:29 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\RUSH TRIB\SCM\RUSH TRIB SurveyControl Index.dgn

PLANS SUBMITTAL
DD | DW: | DC: | DC: | JL

C1
PI STATION 0+80.98
DELTA 24.4°(RT)
DEGREE OF CURVE 17.8°
TANGENT 69.60'
LENGTH 137.08'
RADIUS 321.44'
PC STATION 0+11.38
PT STATION 1+48.47

BEGIN PROJECT
CSJ: 0918-18-137
STA. 00+00.00
N = 6,640,018.17
E = 2,581,069.92
LAT. =31°51'59.90812"N
LONG. =96°31'36.38380"W

END PROJECT
CSJ: 0918-18-137
STA. 9+67.62
N = 6,639,316.85
E = 2,581,728.42
LAT. =31°51'52.84732"N
LONG. =96°31'28.90291"W



PRELIMINARY APPARENT ROW.
NO ROAD DEDICATION FOUND.
OCCUPIED WIDTH VARIES
BY FENCE LOCATIONS.

SURVEY CONTROL MONUMENT INVERSE TABLE			
FROM POINT	BEARING	DISTANCE	TO POINT
F1750392	S 37°59'56"E	340.45'	F1750402
F1750402	S 38°51'18"E	191.09'	F1750412
F1750412	S 46°37'07"E	412.52'	F1750422

LINE DATA		
LINE	BEARING	LENGTH
L1	S 67°46'16" E	11.38'
L2	S 40°23'42" E	258.96'
L3	S 41°30'44" E	205.67'
L4	S 42°44'30" E	153.95'
L5	S 41°20'14" E	98.56'
L6	S 40°47'58" E	102.00'

SURVEY CONTROL MONUMENTATION TABLE								
POINT	SURFACE NORTHING(Y)	SURFACE EASTING(X)	GRID NORTHING(Y)	GRID EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
F1750392	6,640,009.33	2,581,122.34	6,640,168.70	2,581,184.28	374.39'	0+49.45	-15.97'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "1750392"
F1750402	6,639,741.05	2,581,331.93	6,639,900.41	2,581,393.88	375.17'	3+86.32	14.40'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "1750402"
F1750412	6,639,592.24	2,581,451.81	6,639,751.60	2,581,513.77	375.26'	5+76.92	22.87'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "1750412"
F1750422	6,639,308.90	2,581,751.63	6,639,468.25	2,581,813.59	374.39'	9+87.70	-12.38'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "1750422"

(-) DENOTES OFFSET LEFT

0 50 100 150 200
HORIZ. SCALE IN FEET

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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM POST PROCESSING OF STATIC GPS OBSERVATIONS THROUGH LEICA INFINITY SOFTWARE HOLDING TXDOT COORS STATIONS TXNA, TXFD & TXWA.

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

4. VERTICAL CONTROL WAS DERIVED FROM POST PROCESSING OF STATIC GPS OBSERVATIONS THROUGH LEICA INFINITY SOFTWARE HOLDING TXDOT COORS STATIONS TXNA, TXFD & TXWA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023
JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc.
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305 @ PINE OAK CREEK

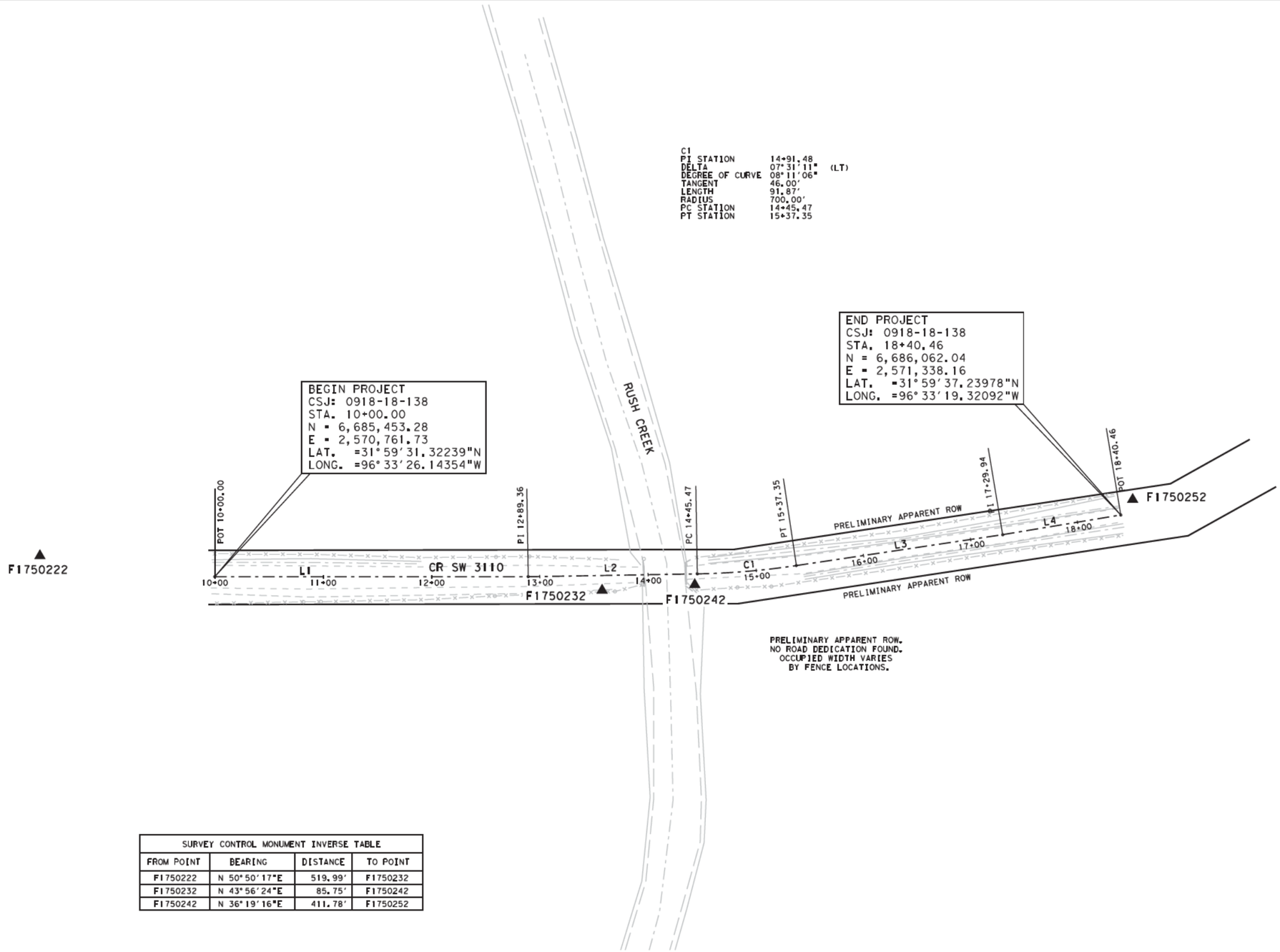
SURVEY CONTROL INDEX

SCALE:1"=100' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		34

DATE: 11/9/2023 9:06:07 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\PineOak\SCM\PINE OAK_SurveyControl Index.dgn

PLANS SUBMITTAL
DRC | DRC | DW: DD | DRC: JL



C1
PI STATION 14+91.48
DELTA 07°31'11" (LT)
DEGREE OF CURVE 08°11'06"
TANGENT 46.00'
LENGTH 91.87'
RADIUS 700.00'
PC STATION 14+45.47
PT STATION 15+37.35

PRELIMINARY APPARENT ROW.
NO ROAD DEDICATION FOUND.
OCCUPIED WIDTH VARIES
BY FENCE LOCATIONS.

0 50 100 150 200
HORIZ. SCALE IN FEET

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 0.999976.

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

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

4. VERTICALAL 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 OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023
JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

SURVEY CONTROL MONUMENT INVERSE TABLE

FROM POINT	BEARING	DISTANCE	TO POINT
F1750222	N 50°50'17"E	519.99'	F1750232
F1750232	N 43°56'24"E	85.75'	F1750242
F1750242	N 36°19'16"E	411.78'	F1750252

LINE DATA

LINE	BEARING	LENGTH
L1	N 47°20'11" E	289.36'
L2	N 46°21'13" E	156.11'
L3	N 38°50'02" E	192.59'
L4	N 37°49'46" E	110.52'

SURVEY CONTROL MONUMENTATION TABLE

POINT	SURFACE NORTHING(Y)	SURFACE EASTING(X)	GRID NORTHING(Y)	GRID EASTING(X)	ELEVATION	STATION	OFFSET	DESCRIPTION
F1750222	6,685,358.01	2,570,629.95	6,685,518.46	2,570,691.64	365.19'	8+38.53	-19.25'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750222"
F1750232	6,685,686.39	2,571,033.13	6,685,846.85	2,571,094.84	358.26'	13+57.32	13.68'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750232"
F1750242	6,685,748.14	2,571,092.63	6,685,908.60	2,571,154.34	358.89'	14+42.99	10.07'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750242"
F1750252	6,686,079.91	2,571,336.53	6,686,240.38	2,571,398.24	354.92'	18+53.57	-12.25'	SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750252"

(-) DENOTES OFFSET LEFT

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110 @ RUSH CREEK

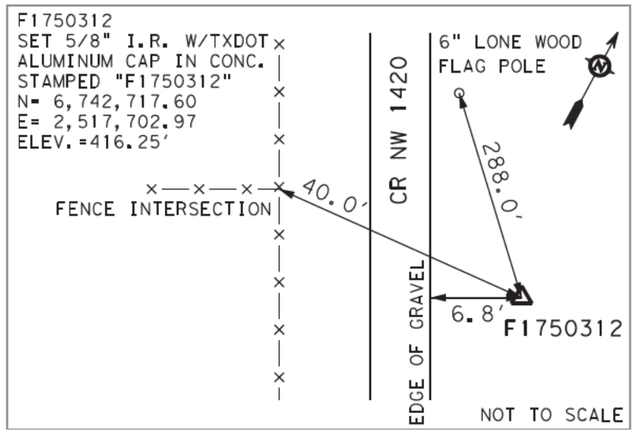
SURVEY CONTROL INDEX

SCALE:1"=100' SHEET 1 OF 1

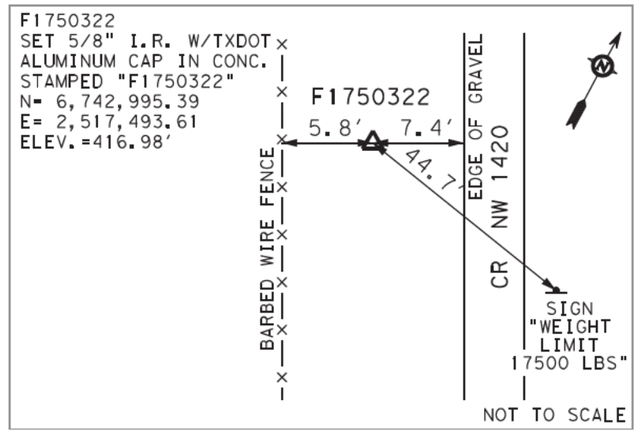
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		35

DATE: 11/9/2023 9:06:18 AM
FILE: S:\2022\2022132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\RUSH CREEK\SCM\RUSH_SurveyControl Index.dgn

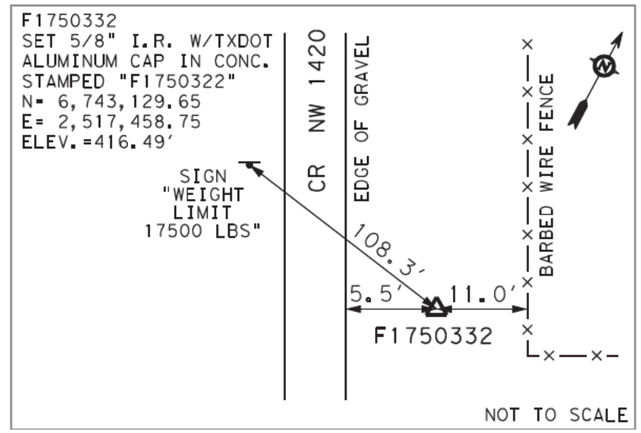
PLANS SUBMITTAL
DRC | DD | DRC | JL



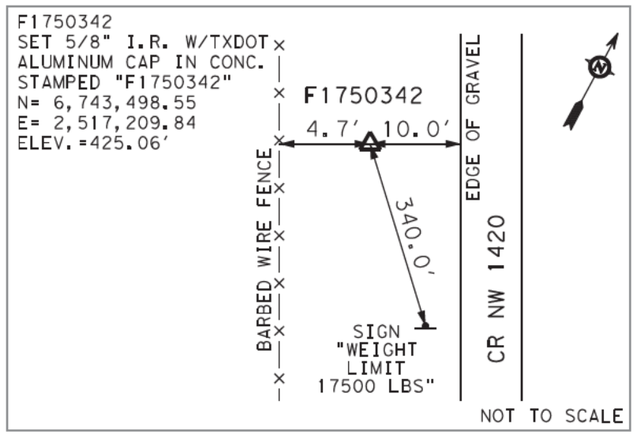
ALONG CR NW 1420, 0.10 MILE (415 FEET) SOUTHEAST OF THE BRIDGE CROSSING MILL CREEK, 6.8 FEET EAST OF THE ROAD.



ALONG CR NW 1420, 70 FEET SOUTHEAST OF THE BRIDGE CROSSING MILL CREEK, 7.4 FEET WEST OF THE ROAD.



ALONG CR NW 1420, 75 FEET NORTHWEST OF THE BRIDGE CROSSING MILL CREEK, 5.5 FEET EAST OF THE ROAD.



ALONG CR NW 1420, 0.10 MILE (510 FEET) NORTHWEST OF THE BRIDGE CROSSING MILL CREEK, 10.0 FEET WEST OF THE ROAD.

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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. 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 OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023

JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc.
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420 @ MILL CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

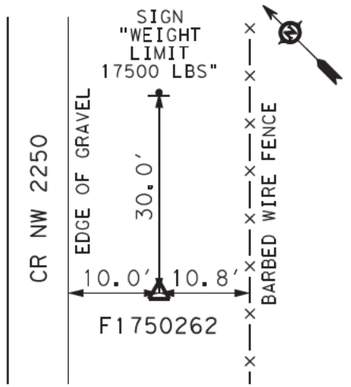
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		36

DATE: 11/9/2023 9:06:01 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\MILL\SCM\MILL_Hortzontal&Vertical.dgn

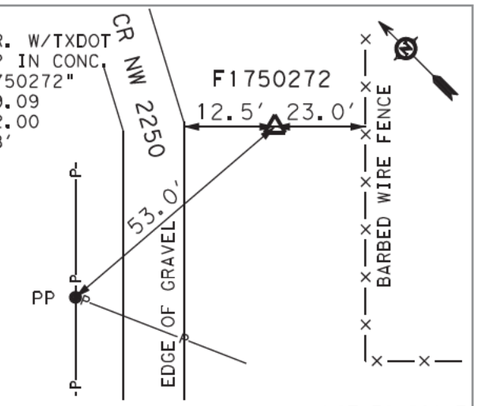
PLANS SUBMITTAL
DRC | DC | DW: DC | DD: JL

F1750262
SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750262"
N= 6,721,381.78
E= 2,537,434.15
ELEV. =499.02'



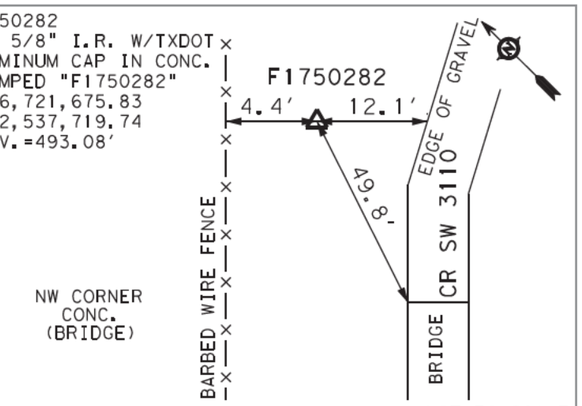
ALONG CR NW 2250, 0.10 MILE (350 FEET) SOUTHWEST OF THE BRIDGE CROSSING RUSH CREEK TRIBUTARY, 10.0 FEET SOUTH OF THE ROAD.

F1750272
SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750272"
N= 6,721,559.09
E= 2,537,682.00
ELEV. =494.48'



ALONG CR NW 2250, 50 FEET SOUTHWEST OF THE BRIDGE CROSSING RUSH CREEK TRIBUTARY, 12.5 FEET SOUTH OF THE ROAD.

F1750282
SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750282"
N= 6,721,675.83
E= 2,537,719.74
ELEV. =493.08'



ALONG CR NW 2250, 49.8 FEET NORTHEAST OF THE BRIDGE CROSSING RUSH CREEK TRIBUTARY, 12.1 FEET NORTH OF THE ROAD.

F1750302
SET 5/8" I.R. W/TXDOT ALUMINUM CAP IN CONC. STAMPED "F1750302"
N= 6,721,738.44
E= 2,537,993.72
ELEV. =495.65'

ALONG CR NW 2250, 0.10 MILE (350 FEET) NORTHEAST OF THE BRIDGE CROSSING RUSH CREEK TRIBUTARY, 9.0 FEET SOUTH OF THE ROAD.

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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM TXDOT RTN (VRS) GPS OBSERVATIONS BASED ON TXDOT REGIONAL REFERENCE POINT TXNA. 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.

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023
JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250 @ RUSH CREEK TRIBUTARY

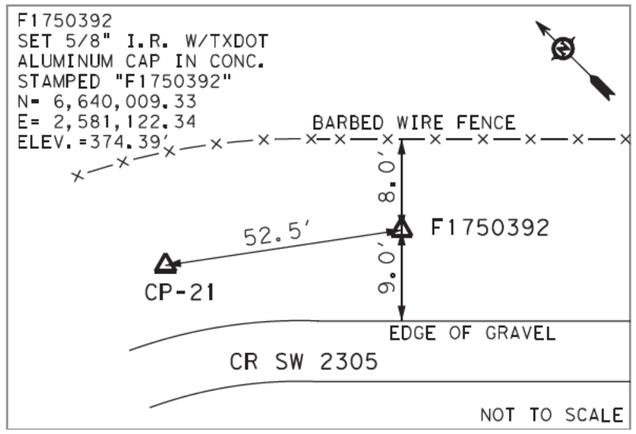
HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 1 OF 1

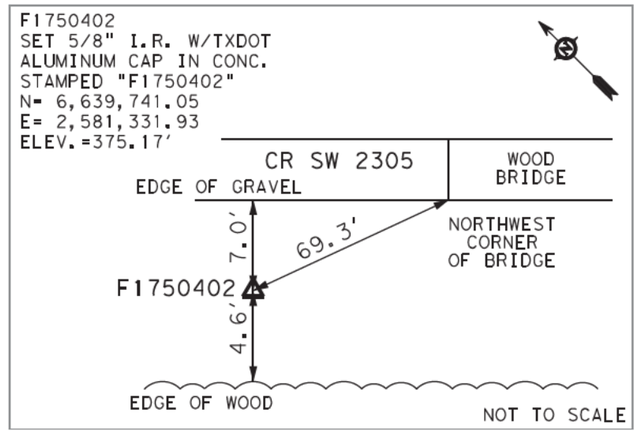
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		37

DATE: 11/9/2023 9:06:34 AM
FILE: S:\2022\2022013\2-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\RUSH TRIB\SCM\RUSH TRIB_Horizontal&Vertical.dgn

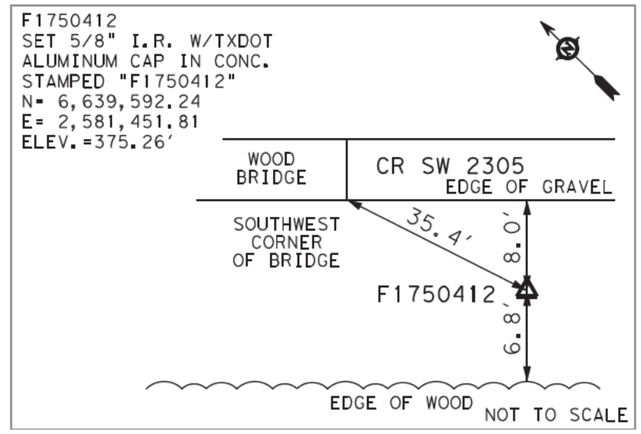
PLANS SUBMITTAL
DD | DC | JL
DW: | DC: | DC:



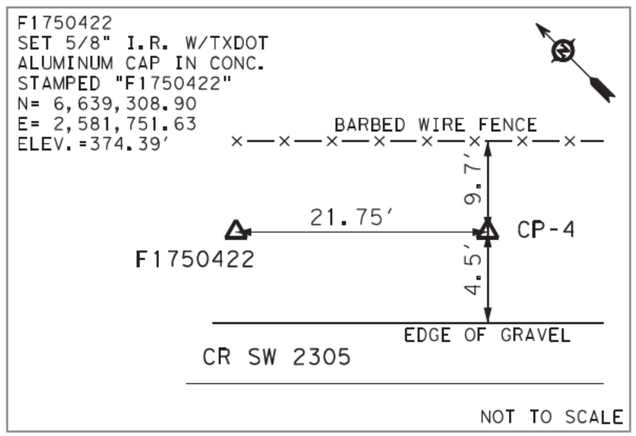
ALONG CR SW 2305, 0.10 MILE (470 FEET) NORTHWEST OF THE BRIDGE CROSSING PINE OAK CREEK, 9.0 FEET EAST OF THE ROAD.



ALONG CR SW 2305,69.3 FEET NORTHWEST OF THE BRIDGE CROSSING PINE OAK CREEK, 7.0 FEET WEST OF THE ROAD.



ALONG CR SW 2305, 35.4 FEET SOUTHEAST OF THE BRIDGE CROSSING PINE OAK CREEK, 8.0 FEET WEST OF THE ROAD.



ALONG CR SW 2305, 0.10 MILE (480 FEET) SOUTHEAST OF THE BRIDGE CROSSING PINE OAK CREEK, 4.5 FEET EAST OF THE ROAD.

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 0.999976.

2. HORIZONTAL CONTROL WAS DERIVED FROM POST PROCESSING OF STATIC GPS OBSERVATIONS THROUGH LEICA INFINITY SOFTWARE HOLDING TXDOT COORS STATIONS TXNA, TXFD & TXWA.

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

4. VERTICAL CONTROL WAS DERIVED FROM POST PROCESSING OF STATIC GPS OBSERVATIONS THROUGH LEICA INFINITY SOFTWARE HOLDING TXDOT COORS STATIONS TXNA, TXFD & TXWA. VERTICAL SURVEY METHOD: DIGITAL LEVELING

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023

JACOB J. LUPHER — DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc
Firm Registration No. F-754
4848 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305 @ PINE OAK CREEK

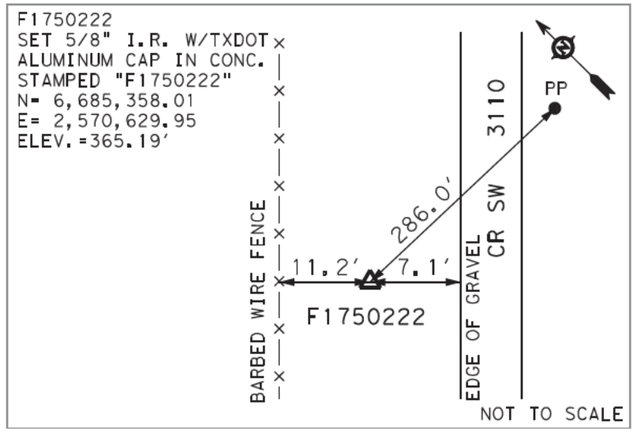
HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 1 OF 1

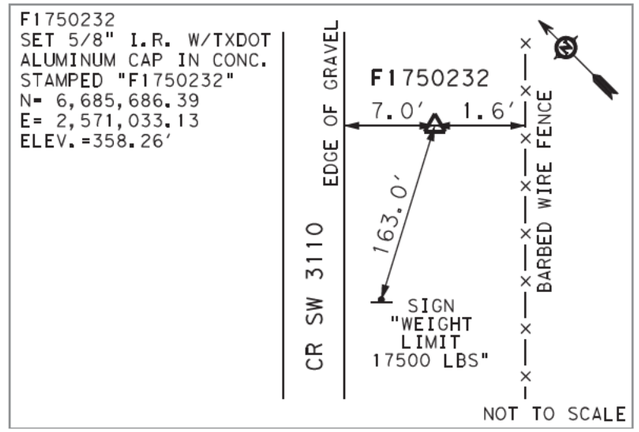
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		38

DATE: 11/9/2023 9:06:13 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\PineOak\SCM\PINE OAK_Horizontal&Vertical.dgn

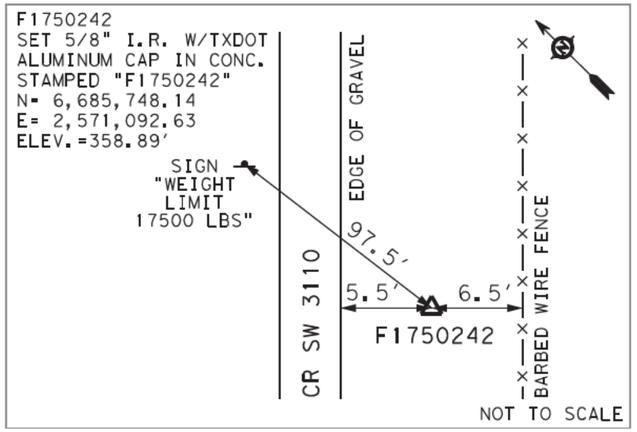
PLANS SUBMITTAL
DD | DC | JL
DRC | DRC | DRC



ALONG CR SW 3110, 0.10 MILE (590 FEET) SOUTHWEST OF THE BRIDGE CROSSING RUSH CREEK, 7.1 FEET NORTH OF THE ROAD.



ALONG CR SW 3110, 75 FEET SOUTHWEST OF THE BRIDGE CROSSING RUSH CREEK, 7.0 FEET SOUTH OF THE ROAD.



ALONG CR SW 3110, 20 FEET NORTHEAST OF THE BRIDGE CROSSING RUSH CREEK, 5.5 FEET SOUTH OF THE ROAD.

ALONG CR SW 3110, 0.10 MILE (430 FEET) NORTHEAST OF THE BRIDGE CROSSING RUSH CREEK, 4.7 FEET NORTH OF THE ROAD.

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 0.999976.

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

6. FIELD SURVEYS WERE PERFORMED BETWEEN OCTOBER, 2022 AND DECEMBER, 2022.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION. SURVEY DATE: DECEMBER, 2022

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

11/09/2023

JACOB J. LUPHER DATE
REGISTERED PROFESSIONAL LAND SURVEYOR
TEXAS REGISTRATION NO. 6606

THIS SURVEY INFORMATION HAS BEEN ACCEPTED INTO THIS PS&E.

NO.	DATE	REVISION	APPR BY

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

HDR Engineering, Inc
Firm Registration No. F-754
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Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110 @ RUSH CREEK

HORIZONTAL AND VERTICAL CONTROL SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC.	CR 1420, ETC.
DIST	COUNTY		SHEET NO.
DALLAS	NAVARRO		39

DATE: 11/9/2023 9:06:24 AM
FILE: S:\2022\2220132-NAVARRO COUNTY BRIDGE REPLACEMNTS\CADD\RUSH CREEK\SCM\RUSH Hortizontal&Vertical.dgn

DN: ERR CK: BKT DW: CK:

CSJ: 0918-18-133 - CR NW 1420

Element: Linear			
POT	0+00.00 R1	6742649.7106	2517731.5704
PI	2+14.45 R1	6742829.4085	2517614.5258
Tangential Direction:	N33°04'40.2"W		
Tangential Length:	214.45		
Element: Linear			
PI	2+14.45 R1	6742829.4085	2517614.5258
PC	3+22.02 R1	6742920.5317	2517557.3782
Tangential Direction:	N32°05'37.6"W		
Tangential Length:	107.56		
Element: Circular			
PC	3+22.02 R1	6742920.5317	2517557.3782
PI	3+62.33 R1	6742954.6858	2517535.9585
CC		6743451.8384	2518404.5577
PT	4+02.60 R1	6742990.4534	2517517.3576
Radius:	1000.00		
Delta:	04°37'02.2" Right		
Degree of Curvature(Arc):	05°43'46.5"		
Length:	80.59		
Tangent:	40.32		
Chord:	80.56		
Middle Ordinate:	0.81		
External:	0.81		
Tangent Direction:	N32°05'37.6"W		
Radial Direction:	N57°54'22.4"E		
Chord Direction:	N29°47'06.5"W		
Radial Direction:	N62°31'24.6"E		
Tangent Direction:	N27°28'35.4"W		
Element: Linear			
PT	4+02.60 R1	6742990.4534	2517517.3576
PC	5+52.43 R1	6743123.3848	2517448.2272
Tangential Direction:	N27°28'35.4"W		
Tangential Length:	149.83		
Element: Circular			
PC	5+52.43 R1	6743123.3848	2517448.2272
PI	5+86.02 R1	6743153.1824	2517432.7311
CC		642661.9999	2516561.0271
PT	6+19.58 R1	6743181.8730	2517415.2706
Radius:	1000.00		
Delta:	03°50'50.0" Left		
Degree of Curvature(Arc):	05°43'46.5"		
Length:	67.15		
Tangent:	33.59		
Chord:	67.13		
Middle Ordinate:	0.56		
External:	0.56		
Tangent Direction:	N27°28'35.4"W		
Radial Direction:	N62°31'24.6"E		
Chord Direction:	N29°24'00.5"W		
Radial Direction:	N58°40'34.5"E		
Tangent Direction:	N31°19'25.5"W		

CSJ: 0918-18-133 - CR NW 1420 (CONT)

Element: Linear			
PT	6+19.58 R1	6743181.8730	2517415.2706
PC	8+52.10 R1	6743380.4994	2517294.3912
Tangential Direction:	N31°19'25.5"W		
Tangential Length:	232.52		
Element: Circular			
PC	8+52.10 R1	6743380.4994	2517294.3912
PI	8+65.95 R1	6743392.3294	2517287.1917
CC		6743900.3725	2518148.6347
PT	8+79.79 R1	6743404.3543	2517280.3225
Radius:	1000.00		
Delta:	01°35'12.6" Right		
Degree of Curvature(Arc):	05°43'46.5"		
Length:	27.70		
Tangent:	13.85		
Chord:	27.69		
Middle Ordinate:	0.10		
External:	0.10		
Tangent Direction:	N31°19'25.5"W		
Radial Direction:	N58°40'34.5"E		
Chord Direction:	N30°31'49.2"W		
Radial Direction:	N60°15'47.1"E		
Tangent Direction:	N29°44'12.9"W		
Element: Linear			
PT	8+79.79 R1	6743404.3543	2517280.3225
POT	9+47.50 R1	6743463.1427	2517246.7400
Tangential Direction:	N29°44'12.9"W		
Tangential Length:	67.70		

CSJ: 0918-18-133 - WALL

Element: Circular			
PC	10+00.00 R1	6742968.8551	2517544.9513
PI	10+15.95 R1	6742982.7612	2517537.1379
CC		6743451.8384	2518404.5577
PT	10+31.90 R1	6742996.9128	2517529.7784
Radius:	986.00'		
Delta:	01°51'13" Right		
Degree of Curvature(Arc):	05°48'39.4"		
Length:	31.90		
Tangent:	15.95		
Chord:	31.90		
Middle Ordinate:	0.13		
External:	0.13		
Tangent Direction:	N29°19'48.5"W		
Radial Direction:	N60°40'11.5"E		
Chord Direction:	N28°24'12.0"W		
Radial Direction:	N62°31'24.6"E		
Tangent Direction:	N27°28'35.4"W		
Element: Linear			
PT	10+31.90 R1	6742996.9128	2517529.7784
POT	10+47.55 R1	6743010.7959	2517522.5586
Tangential Direction:	N27°28'35.4"W		
Tangential Length:	15.65		

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		40

DATE: November 27, 2023
FILE: 001-S-HAL-01.dgn
11:37:08 AM

CSJ: 0918-18-136 - CR NW 2250

Element: Linear			
POT	0+00.00	6721354.0910	2537346.3513
PI	1+22.80	6721416.3910	2537452.1755
Tangential Direction:	N59°30'50.8"E		
Tangential Length:	122.80		
Element: Linear			
PI	1+22.80	6721416.3910	2537452.1755
PC	3+01.81	6721512.9160	2537602.9305
Tangential Direction:	N57°22'10.2"E		
Tangential Length:	179.01		
Element: Circular			
PC	3+01.81	6721512.9160	2537602.9305
PI	3+57.23	6721542.8001	2537649.6041
CC		6721723.4573	2537468.1257
PT	4+10.89	6721589.6088	2537679.2762
Radius:	250.00		
Delta:	24°59'55.8" Left		
Degree of Curvature(Arc):	22°55'05.9"		
Length:	109.08		
Tangent:	55.42		
Chord:	108.21		
Middle Ordinate:	5.93		
External:	6.07		
Tangent Direction:	N57°22'10.2"E		
Radial Direction:	S32°37'49.8"E		
Chord Direction:	N44°52'12.3"E		
Radial Direction:	S57°37'45.6"E		
Tangent Direction:	N32°22'14.4"E		
Element: Linear			
PT	4+10.89	6721589.6088	2537679.2762
PC	4+65.04	6721635.3485	2537708.2707
Tangential Direction:	N32°22'14.4"E		
Tangential Length:	54.16		
Element: Circular			
PC	4+65.04	6721635.3485	2537708.2707
PI	5+32.05	6721691.9442	2537744.1468
CC		6721568.4242	2537813.8460
PT	5+88.06	6721693.3949	2537811.1398
Radius:	125.00		
Delta:	56°23'19.8" Right		
Degree of Curvature(Arc):	45°50'11.8"		
Length:	123.02		
Tangent:	67.01		
Chord:	118.12		
Middle Ordinate:	14.83		
External:	16.83		
Tangent Direction:	N32°22'14.4"E		
Radial Direction:	S57°37'45.6"E		
Chord Direction:	N60°33'54.2"E		
Radial Direction:	S01°14'25.9"E		
Tangent Direction:	N88°45'34.1"E		

CSJ: 0918-18-136 - CR NW 2250 (CONT)

Element: Linear			
PT	5+88.06	6721693.3949	2537811.1398
PC	6+25.39	6721694.2029	2537848.4518
Tangential Direction:	N88°45'34.1"E		
Tangential Length:	37.32		
Element: Circular			
PC	6+25.39	6721694.2029	2537848.4518
PI	6+65.57	6721695.0729	2537888.6292
CC		6721844.1678	2537845.2044
PT	7+03.91	6721715.9127	2537922.9903
Radius:	150.00		
Delta:	29°59'45.8" Left		
Degree of Curvature(Arc):	38°11'49.9"		
Length:	78.53		
Tangent:	40.19		
Chord:	77.64		
Middle Ordinate:	5.11		
External:	5.29		
Tangent Direction:	N88°45'34.1"E		
Radial Direction:	S01°14'25.9"E		
Chord Direction:	N73°45'41.2"E		
Radial Direction:	S31°14'11.7"E		
Tangent Direction:	N58°45'48.3"E		
Element: Linear			
PT	7+03.91	6721715.9127	2537922.9903
POT	8+81.40	6721807.9514	2538074.7455
Tangential Direction:	N58°45'48.3"E		
Tangential Length:	177.48		

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

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4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		41

DATE: November 27, 2023
FILE: 001-S-HAL-02.dgn
11:37:17 AM

DN: ERR CK: BKT DW: CK:

DES: ERR CK: BKT DWN: CHK:

CSJ: 0918-18-137 - CR SW 2305

Element: Linear			
POT	0+00.00 R1	6640018.1693	2581069.9170
PC	0+11.38 R1	6640013.8628	2581080.4546
Tangential Direction:	S67°46'16.0"E		
Tangential Length:	11.38		
Element: Circular			
PC	0+11.38 R1	6640013.8628	2581080.4546
PI	0+80.98 R1	6639984.4246	2581143.5216
CC		6639722.5892	2580944.4947
PT	1+48.47 R1	6639931.5353	2581188.7629
Radius:	321.44		
Delta:	24°26'03.7" Right		
Degree of Curvature(Arc):	17°49'28.4"		
Length:	137.08		
Tangent:	69.60		
Chord:	136.05		
Middle Ordinate:	7.28		
External:	7.45		
Tangent Direction:	S64°58'40.5"E		
Radial Direction:	S25°01'19.5"W		
Chord Direction:	S52°45'38.6"E		
Radial Direction:	S49°27'23.2"W		
Tangent Direction:	S40°32'36.8"E		
Element: Linear			
PT	1+48.47 R1	6639931.5353	2581188.7629
PI	4+06.33 R1	6639735.1413	2581355.8716
Tangential Direction:	S40°23'38.3"E		
Tangential Length:	257.87		
Element: Linear			
PI	4+06.33 R1	6639735.1413	2581355.8716
PI	6+12.00 R1	6639581.1327	2581492.1864
Tangential Direction:	S41°30'44.7"E		
Tangential Length:	205.67		
Element: Linear			
PI	6+12.00 R1	6639581.1327	2581492.1864
PI	7+65.96 R1	6639468.0664	2581596.6736
Tangential Direction:	S42°44'30.2"E		
Tangential Length:	153.95		
Element: Linear			
PI	7+65.96 R1	6639468.0664	2581596.6736
PI	8+64.52 R1	6639394.0605	2581661.7748
Tangential Direction:	S41°20'14.2"E		
Tangential Length:	98.56		
Element: Linear			
PI	8+64.52 R1	6639394.0605	2581661.7748
POT	9+66.52 R1	6639316.8462	2581728.4228
Tangential Direction:	S40°47'57.7"E		
Tangential Length:	102.00		

CSJ: 0918-18-138 - CR SW 3110

Element: Linear			
POT	10+00.00 R1	6685453.2844	2570761.7304
PI	12+89.36 R1	6685649.3849	2570974.5134
Tangential Direction:	N 47°20'11.0" E		
Tangential Length:	289.36		
Element: Linear			
PI	12+89.36 R1	6685649.3849	2570974.5134
PC	14+45.47 R1	6685757.1321	2571087.4760
Tangential Direction:	N 46°21'13.1" E		
Tangential Length:	156.11		
Element: Circular			
PC ( )	14+45.47 R1	6685757.1321	2571087.4760
PI ( )	14+91.48 R1	6685788.8828	2571120.7636
CC ( )		6686263.6617	2570604.3324
PT ( )	15+37.35 R1	6685824.7167	2571149.6097
Radius:	700.00		
Delta:	07°31'11.2" Left		
Degree of Curvature (Arc):	08°11'06.4"		
Length:	91.87		
Tangent:	46.00		
Chord:	91.81		
Middle Ordinate:	1.51		
External:	1.51		
Back Tangent Direction:	N 46°21'13.1" E		
Back Radial Direction:	S 43°38'46.9" E		
Chord Direction:	N 42°35'37.5" E		
Ahead Radial Direction:	S 51°09'58.1" E		
Ahead Tangent Direction:	N 38°50'01.9" E		
Element: Linear			
PT	15+37.35 R1	6685824.7167	2571149.6097
PI	17+29.94 R1	6685974.7413	2571270.3786
Tangential Direction:	N 38°50'01.9" E		
Tangential Length:	192.59		
Element: Linear			
PI	17+29.94 R1	6685974.7413	2571270.3786
POT	18+40.46 R1	6686062.0374	2571338.1644
Tangential Direction:	N 37°49'46.1" E		
Tangential Length:	110.52		

STATE OF TEXAS
EDWIN R RYDELL
81553
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4828 Loop Central Drive, Suite 800
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713.622.9264

Texas Department of Transportation

CR SW 2305 / CR SW 3110

HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		42

DATE: November 27, 2023
FILE: 001-S-HAL-03.dgn
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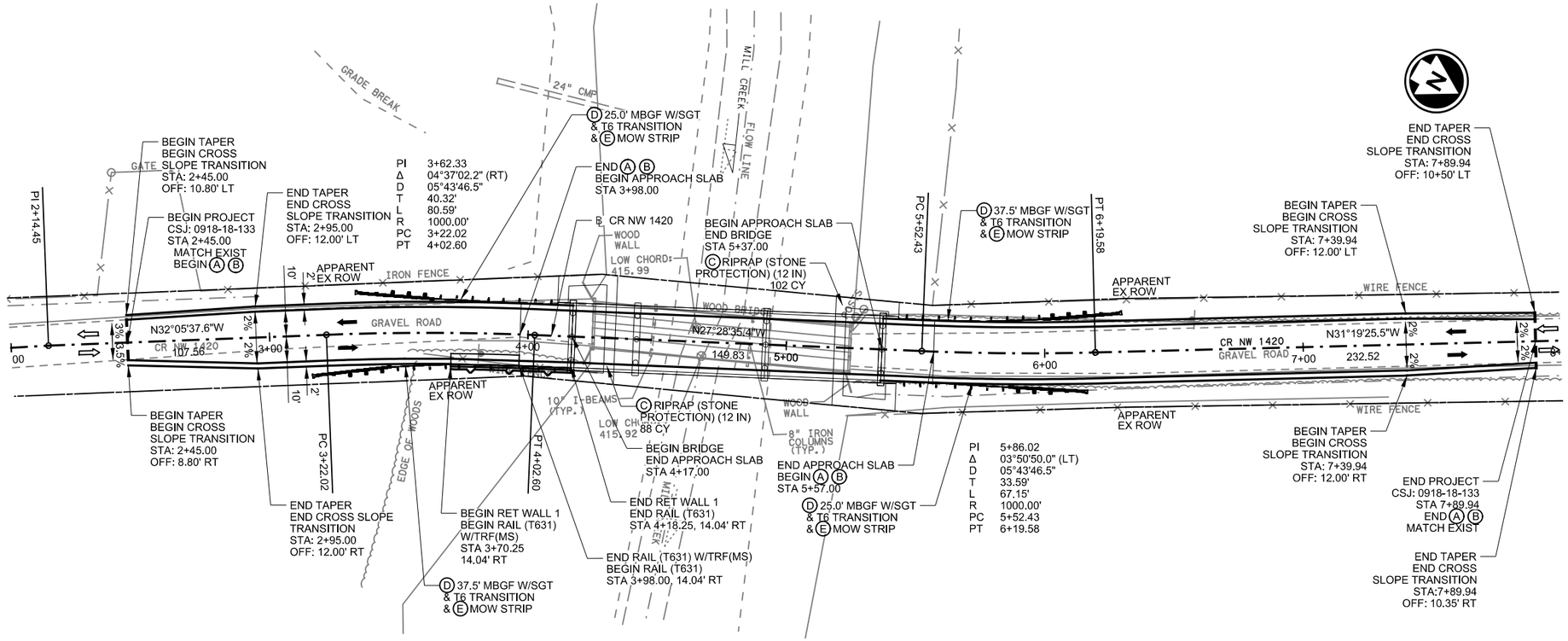


LEGEND

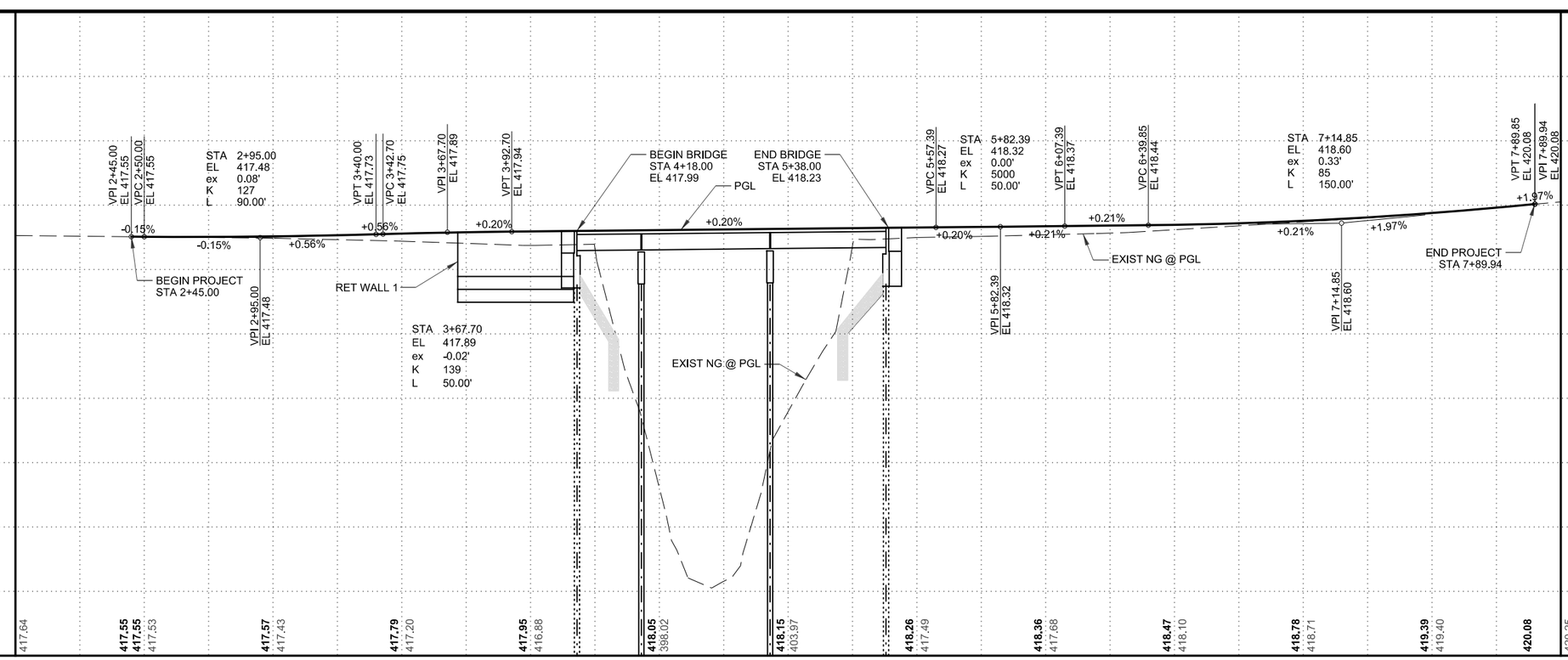
- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) RIPRAP (STONE PROTECTION)(12 IN)
- (D) METAL BEAM GUARD FENCE
- (E) RIPRAP(MOWSTRIP)(4")
- (F) RIPRAP (CONC) (CL B)(5 IN)
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- (X) DRIVEWAY NUMBER

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. ALL STATIONS AND OFFSETS ARE FROM THE ℄ OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. PLACE FENCE AND GATES PRIOR TO REMOVAL OF EXISTING FENCES AND GATES.

0 25 50 75 100
HORIZ SCALE: 1" = 50'

0 5 10 15 20
VERT. SCALE 1" = 10'



435 435

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Texas Department of Transportation

CR NW 1420

BRIDGE REPLACEMENT AT MILL CREEK BRIDGE PLAN AND PROFILE

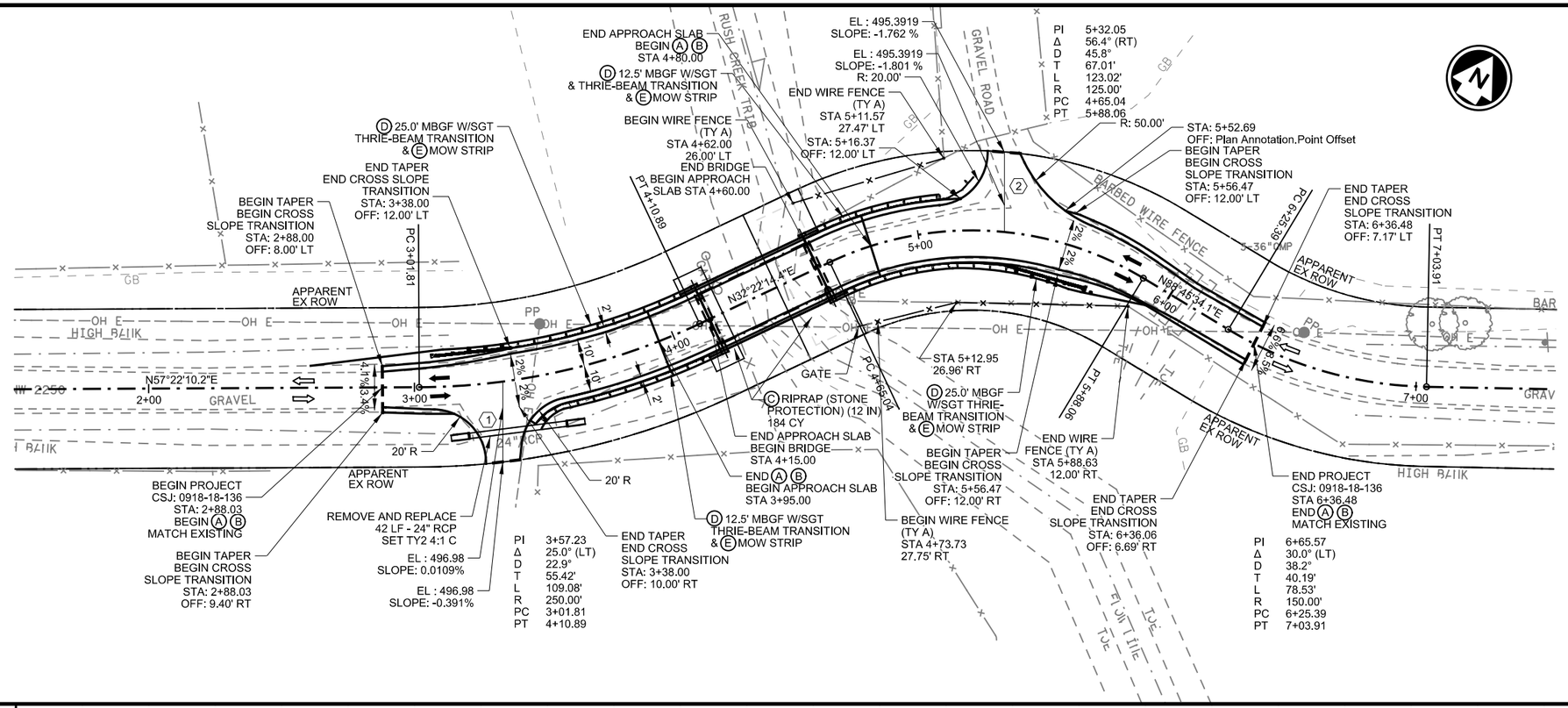
SCALE:1"=50'-H
1"=10'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, etc	CR 1420, etc
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		43

DATE: November 27, 2023
FILE: 133-S-PLAN-01.dgn
11:37:37 AM

DSN: ERR | DSC: BKT | DRW: MHS | CKL



LEGEND

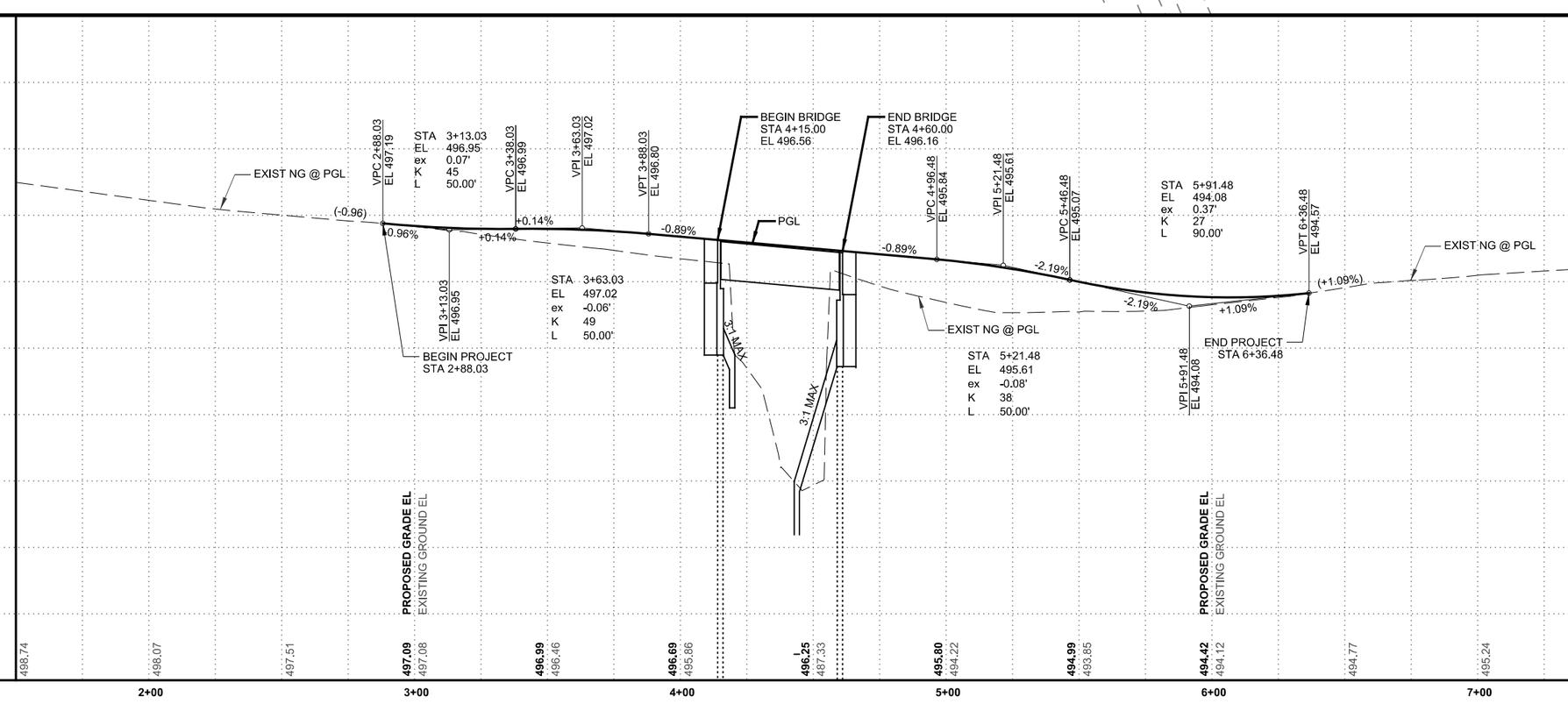
- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) RIPRAP (STONE PROTECTION)(12 IN)
- (D) METAL BEAM GUARD FENCE
- (E) RIPRAP(MOWSTRIP)(4")
- (F) RIPRAP (CONC) (CL B)(5 IN)
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- (X) DRIVEWAY NUMBER

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. ALL STATIONS AND OFFSETS ARE FROM THE ℄ OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. PLACE FENCE AND GATES PRIOR TO REMOVAL OF EXISTING FENCES AND GATES.

0 50 100 150 200
HORIZ. SCALE: 1"=50'

0 5 10
VERT. SCALE: 1"=5'



DATE: November 27, 2023
FILE: 136-S-PLAN-01.dgn
11:37:48 AM

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Texas Department of Transportation

CR NW 2250

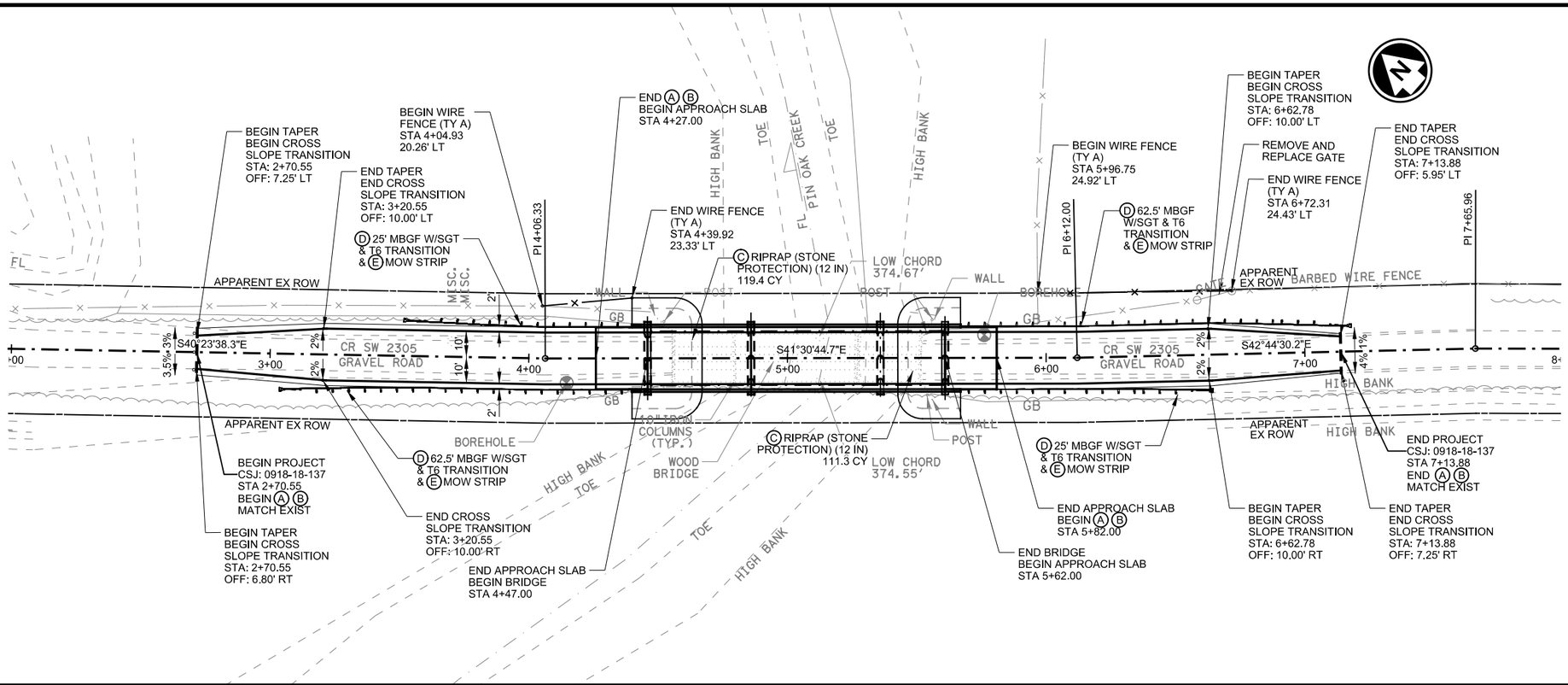
BRIDGE REPLACEMENT AT RUSH CREEK TRIBUTARY PLAN AND PROFILE

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		44

DN: ERR | CK: BKT | DW: MHS | CK:



LEGEND

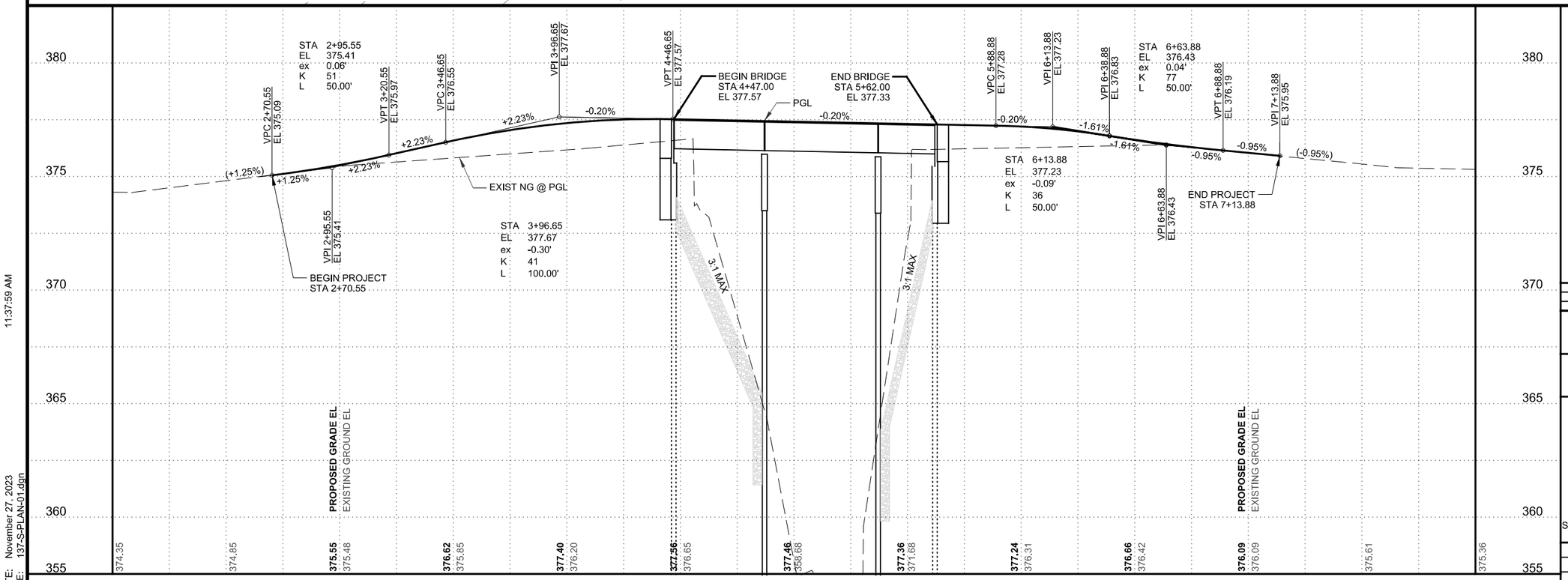
- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) RIPRAP (STONE PROTECTION)(12 IN)
- (D) METAL BEAM GUARD FENCE
- (E) RIPRAP(MOWSTRIP)(4")
- (F) RIPRAP (CONC) (CL B)(5 IN)
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- (X) DRIVEWAY NUMBER

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. ALL STATIONS AND OFFSETS ARE FROM THE ℄ OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. PLACE FENCE AND GATES PRIOR TO REMOVAL OF EXISTING FENCES AND GATES.

0 25 50 75 100
HORIZ SCALE: 1"=50'

0 5 10
VERT. SCALE: 1"=5'



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CR SW 2305

BRIDGE REPLACEMENT AT PIN OAK CREEK PLAN AND PROFILE

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		45

DATE: November 27, 2023
FILE: 137-S-PLAN-01.dgn
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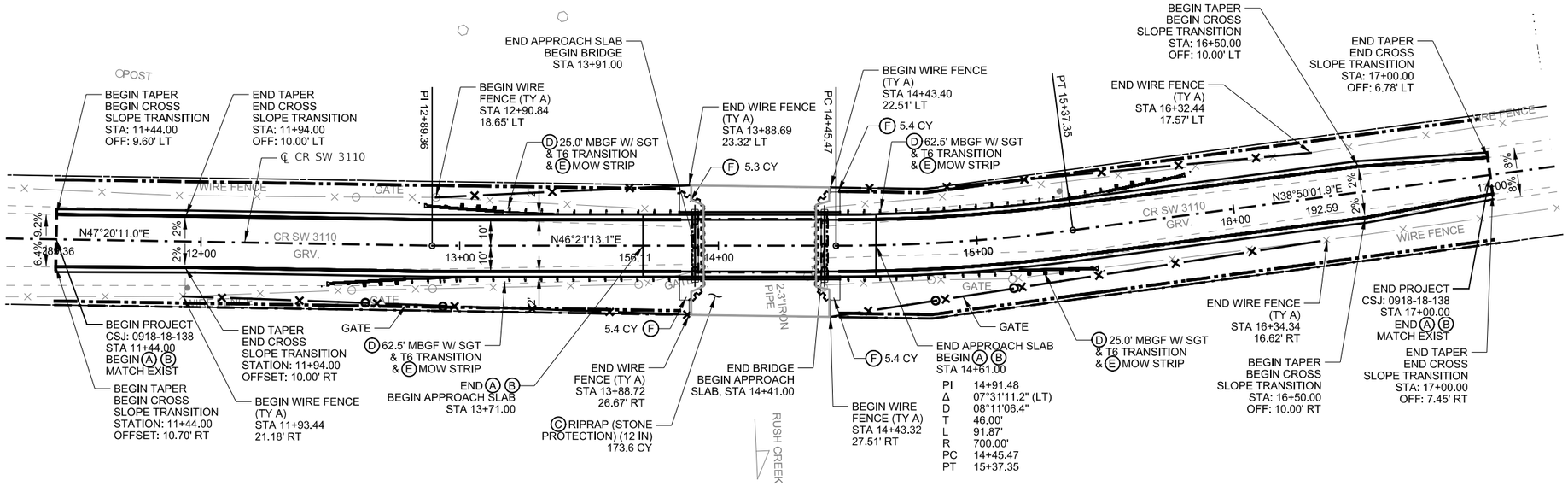


LEGEND

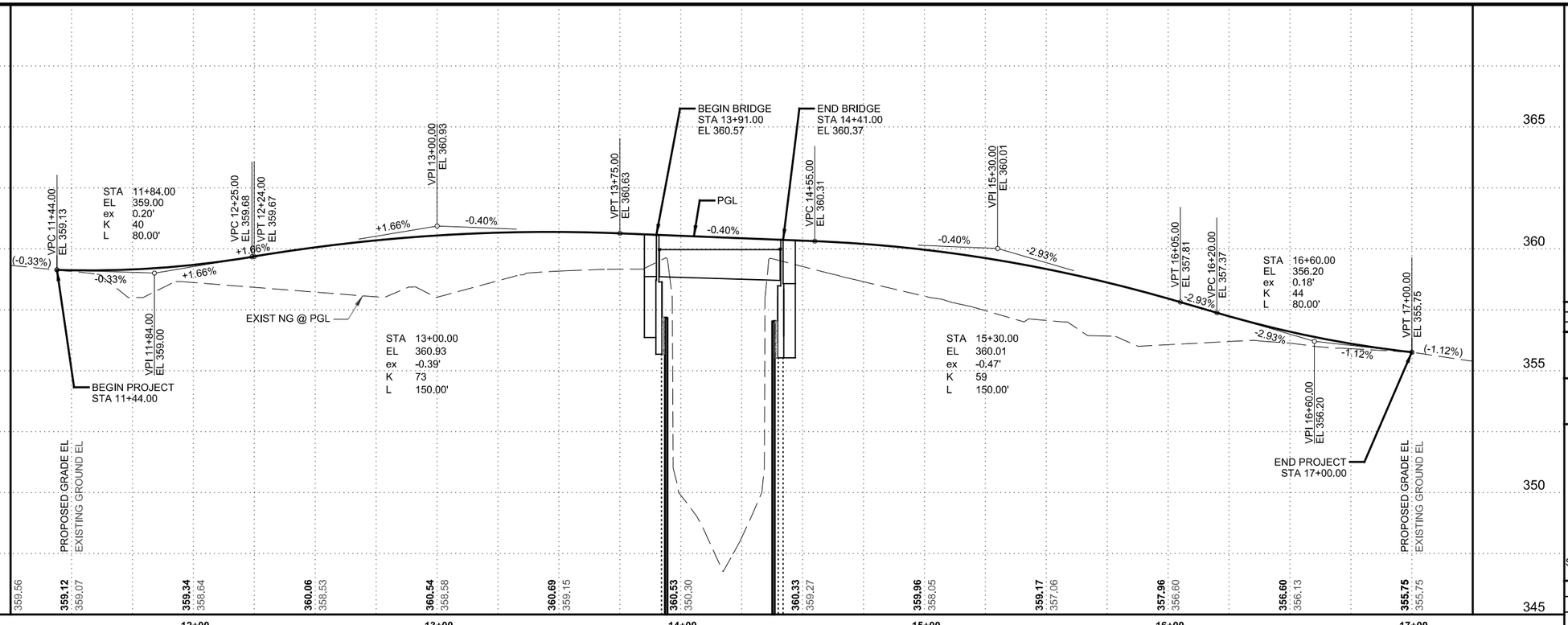
- (A) 2 COURSE SURFACE TREATMENT
- (B) 10" FL-BS (CMP IN PLC)(TY D GR 1&2)
- (C) RIPRAP (STONE PROTECTION)(12 IN)
- (D) METAL BEAM GUARD FENCE
- (E) RIPRAP(MOWSTRIP)(4")
- (F) RIPRAP (CONC) (CL B)(5 IN)
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- (X) DRIVEWAY NUMBER

NOTES:

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR CURVE INFORMATION.
2. SEE TYPICAL SECTIONS FOR ADDITIONAL PAVEMENT INFORMATION.
3. ALL STATIONS AND OFFSETS ARE FROM THE ℄ OF CONSTRUCTION UNLESS OTHERWISE NOTED.
4. PLACE FENCE AND GATES PRIOR TO REMOVAL OF EXISTING FENCES AND GATES.

0 25 50 75 100
HORIZ. SCALE" 1"=50'

0 5 10
VERT. SCALE: 1"=5'



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STATE OF TEXAS
11/28/2023

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CR SW 3110

BRIDGE REPLACEMENT AT RUSH CREEK PLAN AND PROFILE

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

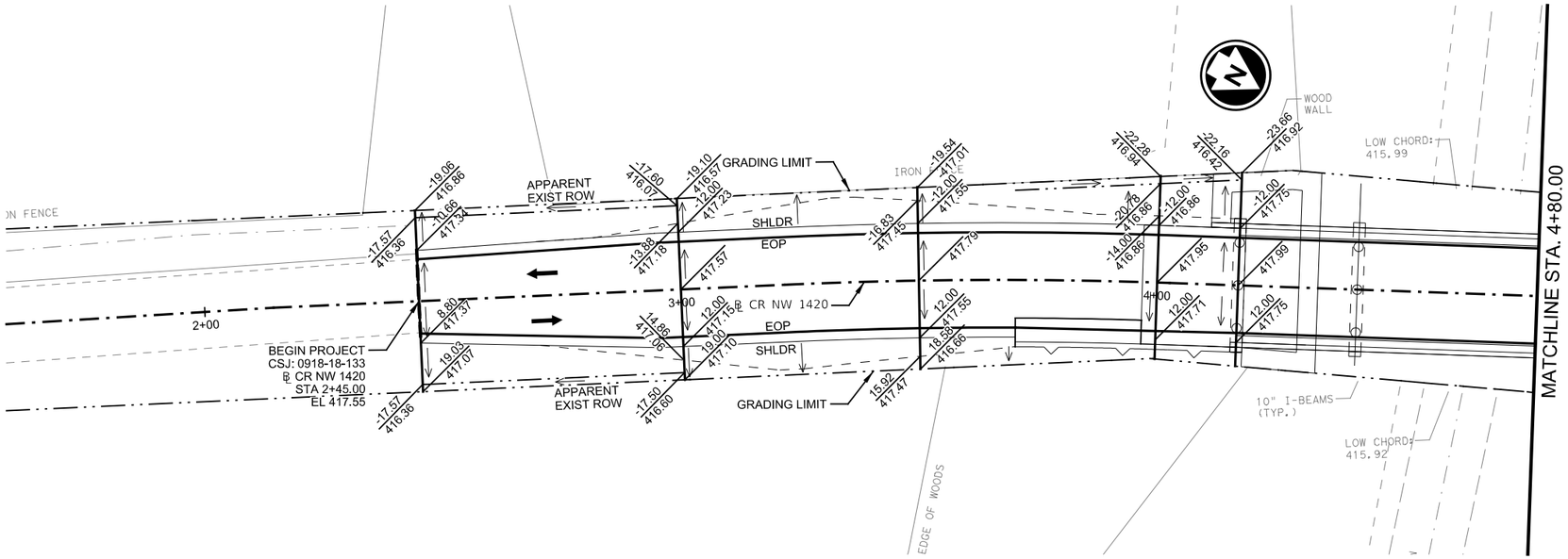
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		46

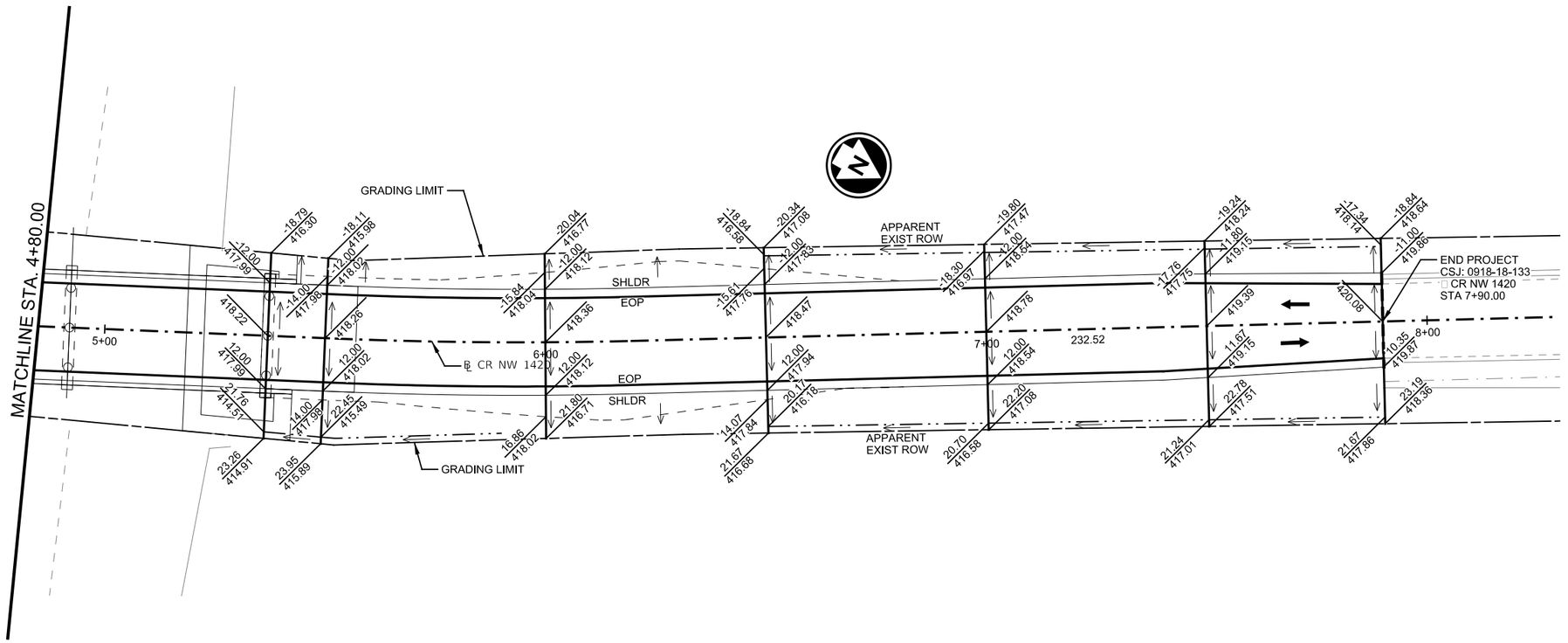
DATE: November 27, 2023
FILE: 138-S-PLAN-01.dgn
11:38:11 AM

DSN: ERR | CK: BKT | DW: HAR | CK: MHS

LEGEND

PROPOSED TRAFFIC PATTERN





0 15 30 45 60

HORIZ. SCALE: 1" = 30'

STATE OF TEXAS
EDWIN R RYDELL
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11/28/2023

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CR NW 1420

BRIDGE REPLACEMENT AT MILL CREEK BRIDGE GRADING PLAN

SCALE:1"=30' SHEET 1 OF 1

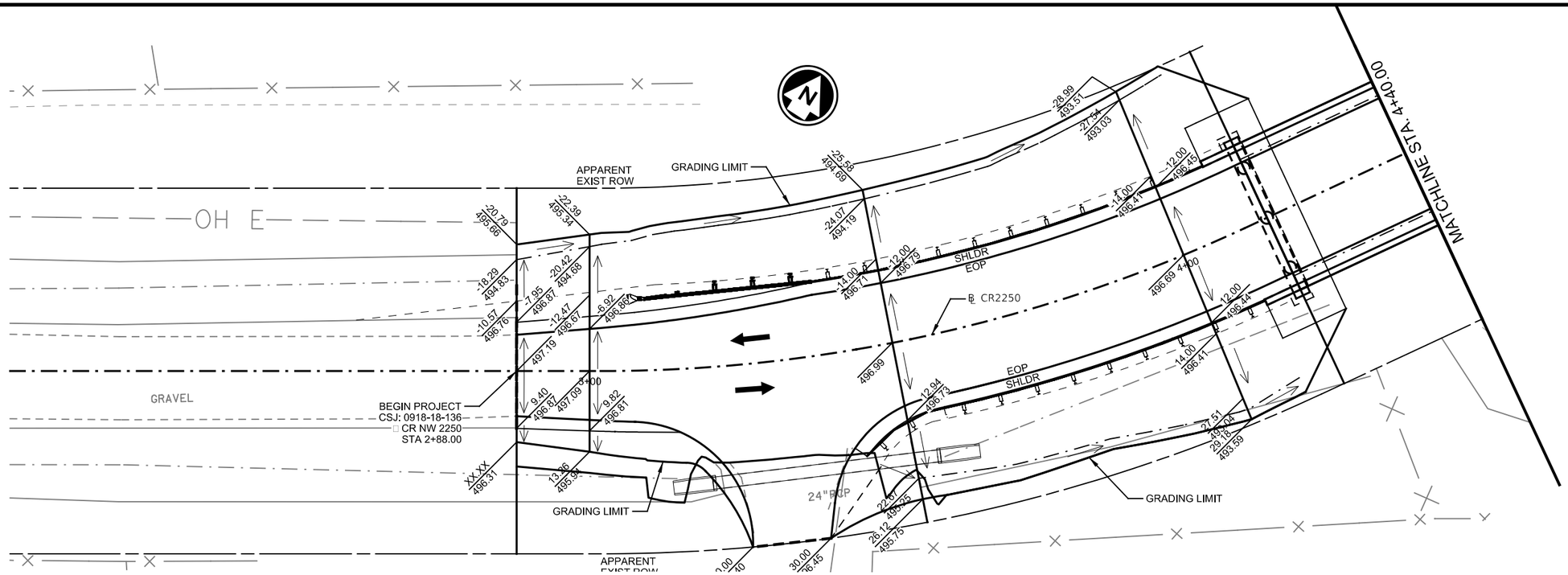
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		47

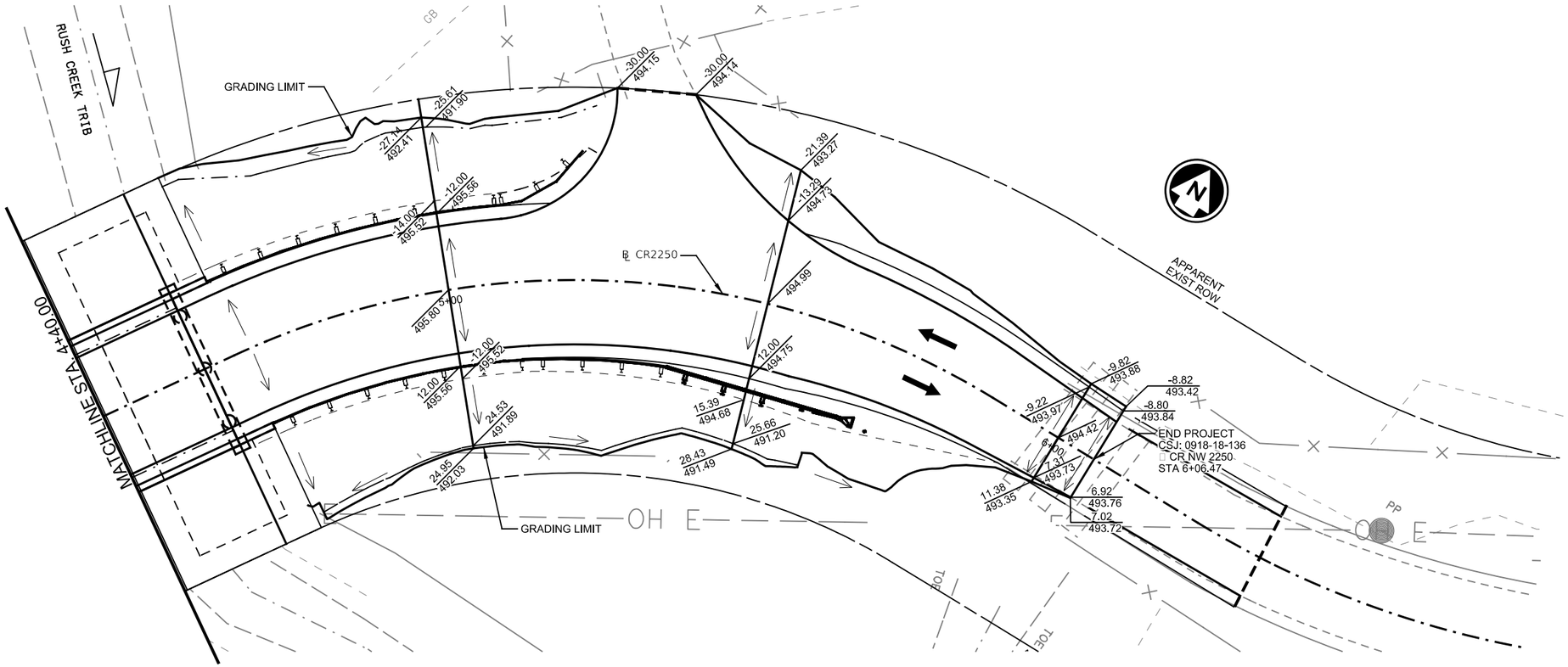
DATE: November 27, 2023
FILE: 133-S-GRD-01.dgn
11:38:21 AM

DN: ERR CK: BKT DW: MHS CK:

LEGEND

PROPOSED TRAFFIC PATTERN





0 10 20 30 40

HORIZ SCALE: 1"=20'

STATE OF TEXAS
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NO.	DATE	REVISION	APPR BY

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4828 Loop Central Drive, Suite 800
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713.622.9264

Texas Department of Transportation

CR NW 2250

BRIDGE REPLACEMENT AT RUSH CREEK TRIBUTARY GRADING PLAN

SCALE:1"=20' SHEET 1 OF 1

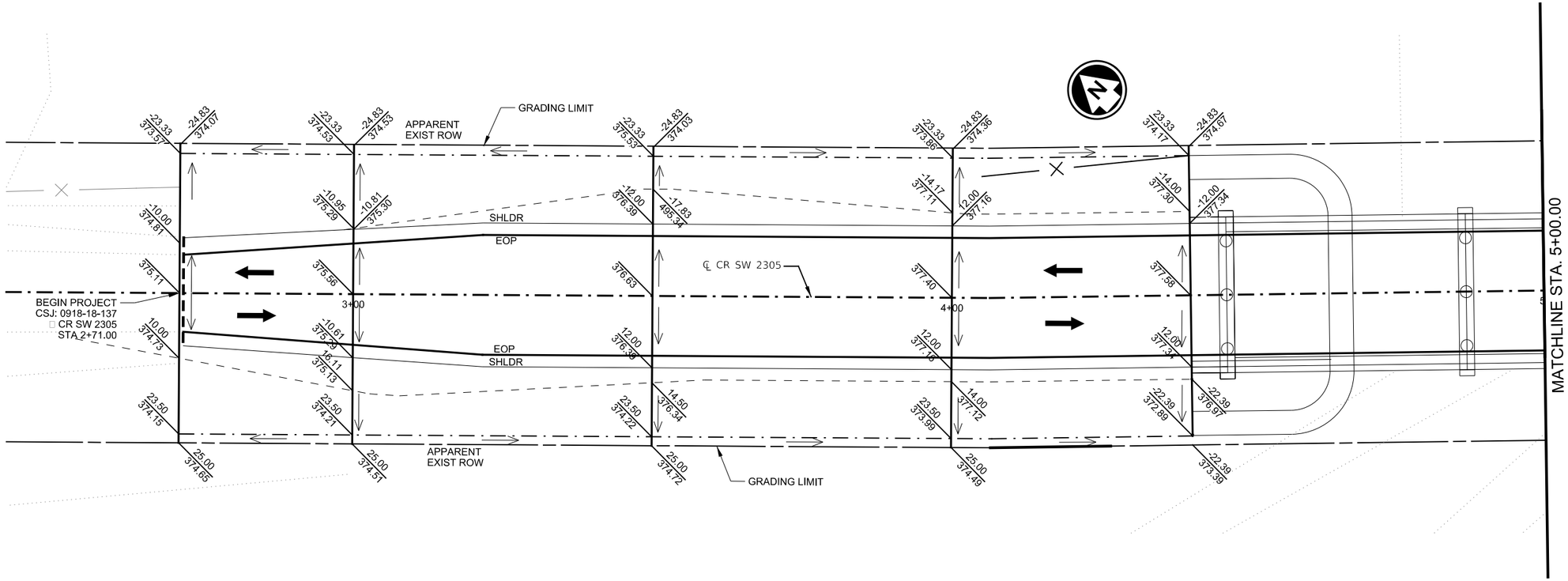
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		48

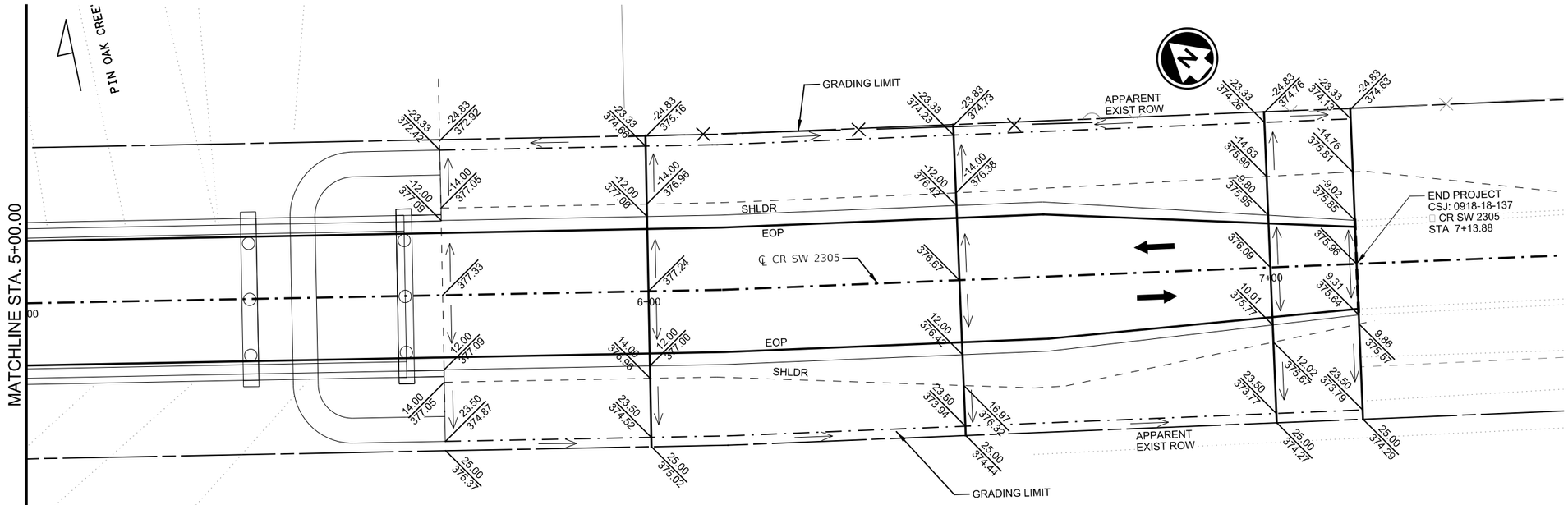
DATE: November 27, 2023
FILE: 136-S-GRD-01.dgn
11:38:30 AM

DSN: ERR | DSC: BKT | DWN: HAR | CHK: MHS

LEGEND

PROPOSED TRAFFIC PATTERN





0 10 20 30 40

HORIZ SCALE: 1"=20'

STATE OF TEXAS
EDWIN R RYDELL
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CR SW 2305

BRIDGE REPLACEMENT AT PIN OAK CREEK GRADING PLAN

SCALE:1"=20' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		49

DATE: November 27, 2023
FILE: 137-S-GRD-01.dgn
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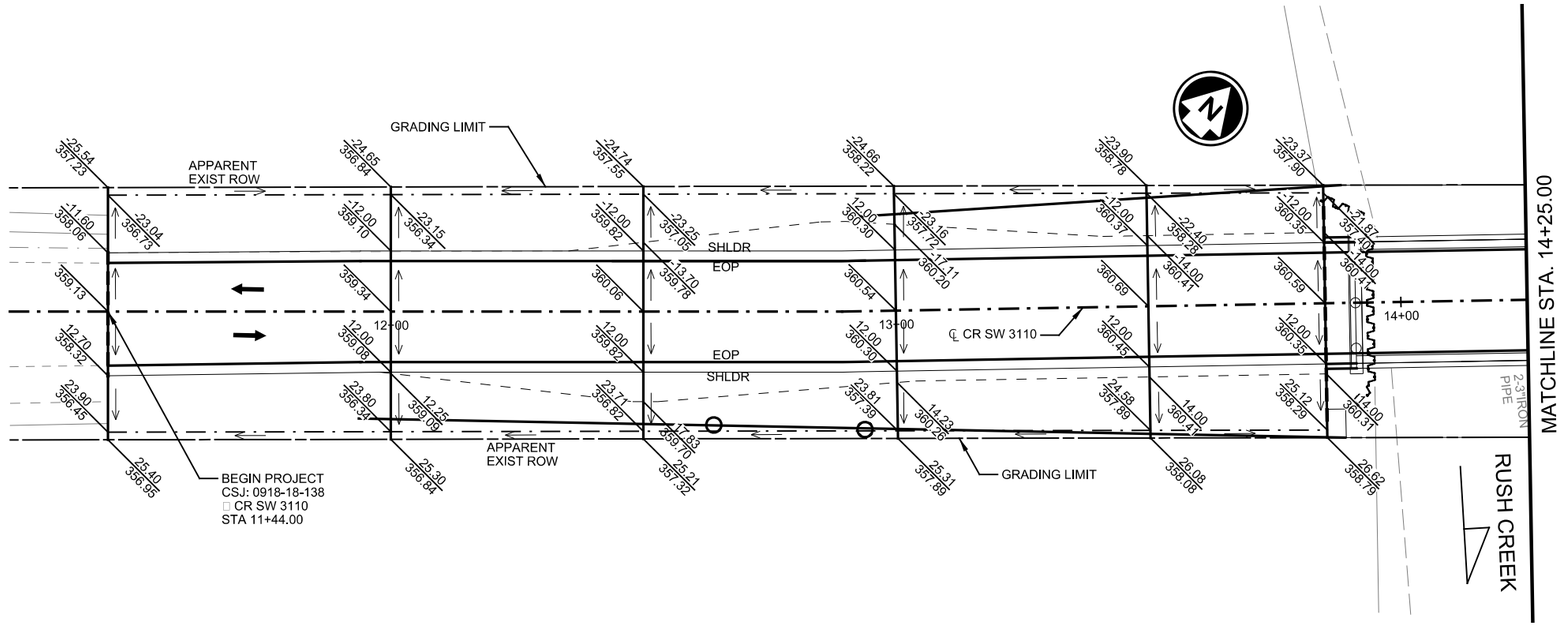
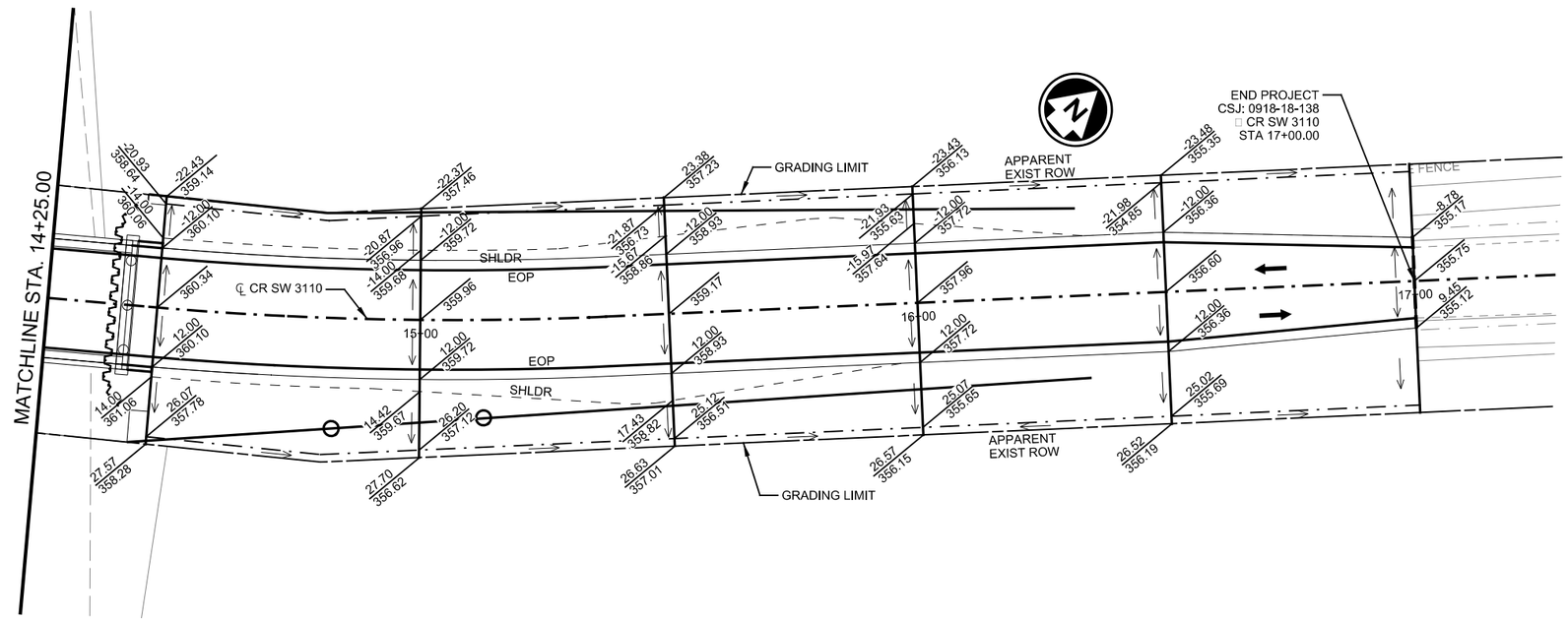
DES: ERR CK: BKT DW: MHS CK:

LEGEND

PROPOSED TRAFFIC PATTERN





0 15 30 45 60

HORIZ. SCALE: 1" = 30'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

BRIDGE REPLACEMENT AT RUSH CREEK GRADING PLAN

SCALE:1"=30'

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		50

DATE: November 27, 2023
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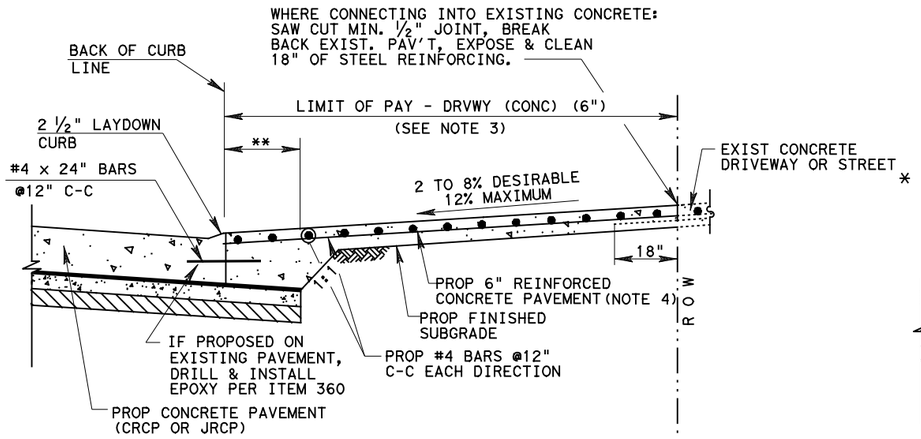
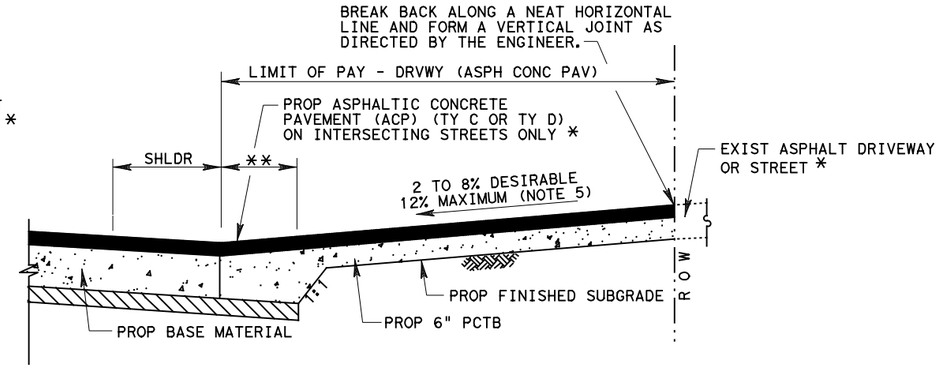


PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE CURB AND GUTTER ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ PCTB AT ASPHALT ROADWAY

NOTES:

1. ALSO SEE SHEET 2 OF 2 FOR DRIVEWAY SLOPES WITH PROPOSED SIDEWALKS.
2. FOR INTERSECTIONS BUILT WITH CRCP PAVEMENT SEE CRCP DETAIL.
3. FAST TRACK CONCRETE IS PAID AS DRVWY (CONC) (FAST TRACK).
4. THICKNESS OF DRIVEWAY IS 6 INCHES FOR REGULAR AND FAST TRACK CONCRETE.
5. MAXIMUM SLOPE IS: 12% RESIDENTIAL 8% OTHERS

LEGEND:

PCTB- PORTLAND CEMENT TREATED BASE

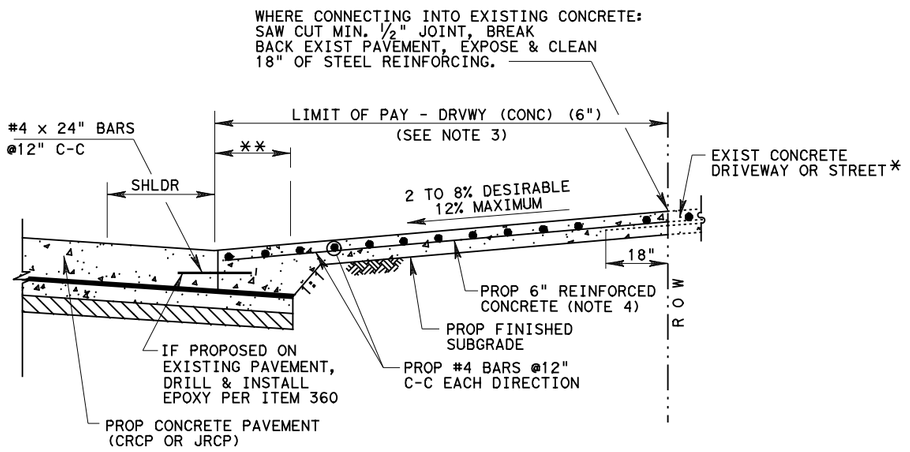
JRCP- JOINTED REINFORCED CONCRETE PAVEMENT

CRCP- CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

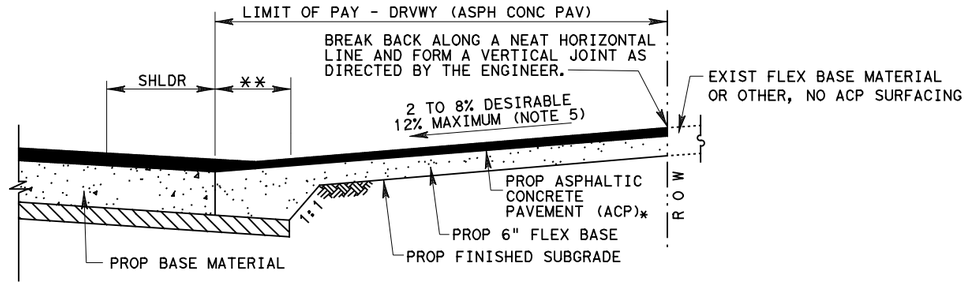
ACP- ASPHALTIC CONCRETE PAVEMENT

* FOR STREET INTERSECTIONS REFER TO PAVING DETAILS AND INTERSECTION DETAILS FOR REINFORCING STEEL AND SECTION REQUIREMENTS.

** PROPOSED LIMIT OF ROADWAY BASE AND/OR SUBGRADE



PROPOSED DRIVEWAY DETAIL
REINFORCED CONCRETE AT CONCRETE ROADWAY



PROPOSED DRIVEWAY DETAIL
ASPHALT W/ FLEX BASE AT ASPHALT ROADWAY

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

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Firm Registration No. F-754
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Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

DRIVEWAY DETAILS

N.T.S. SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		51

DN: ERR CK: BKT DW: CK:

DATE: November 27, 2023
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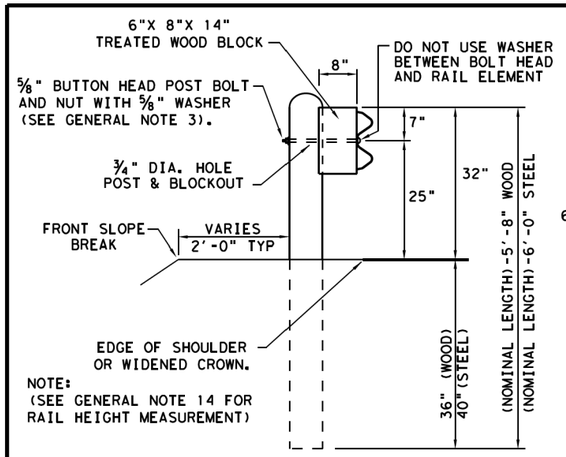
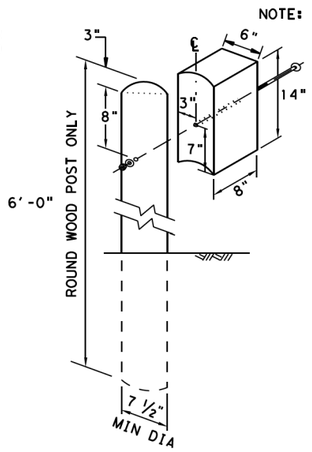
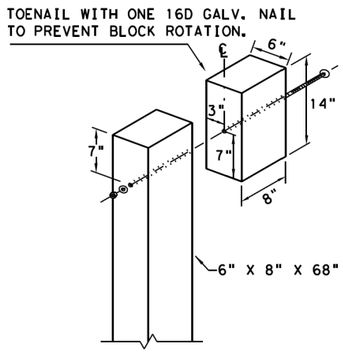


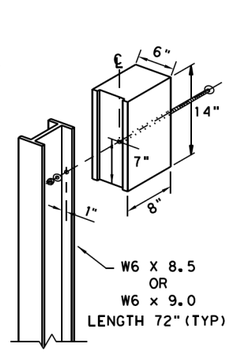
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

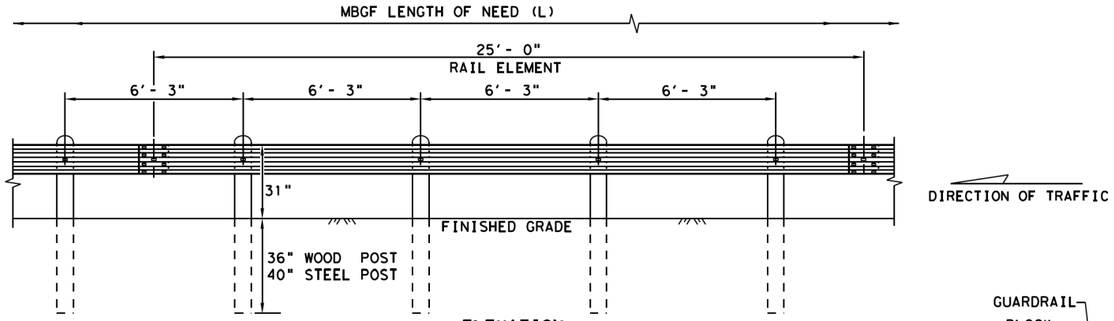


WOOD BLOCK TO RECTANGULAR WOOD POST



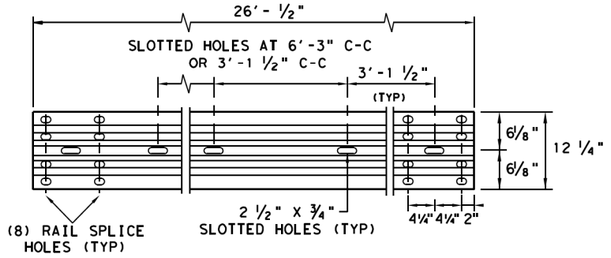
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



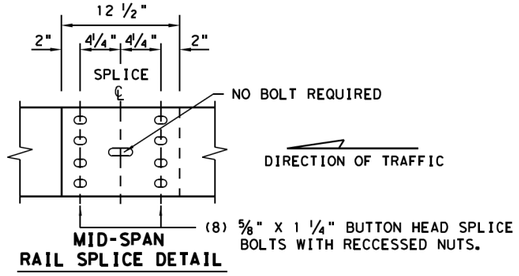
ELEVATION MID-SPAN RAIL SPLICE

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



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

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



MID-SPAN RAIL SPLICE DETAIL

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

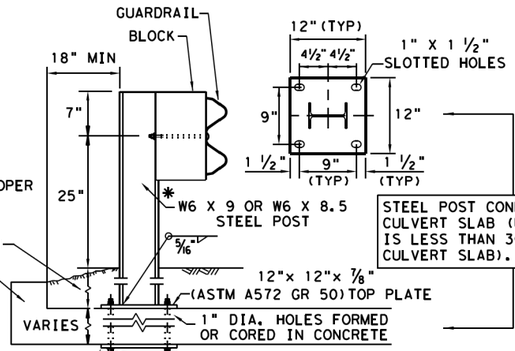
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

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

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

BUTTON HEAD BOLT

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

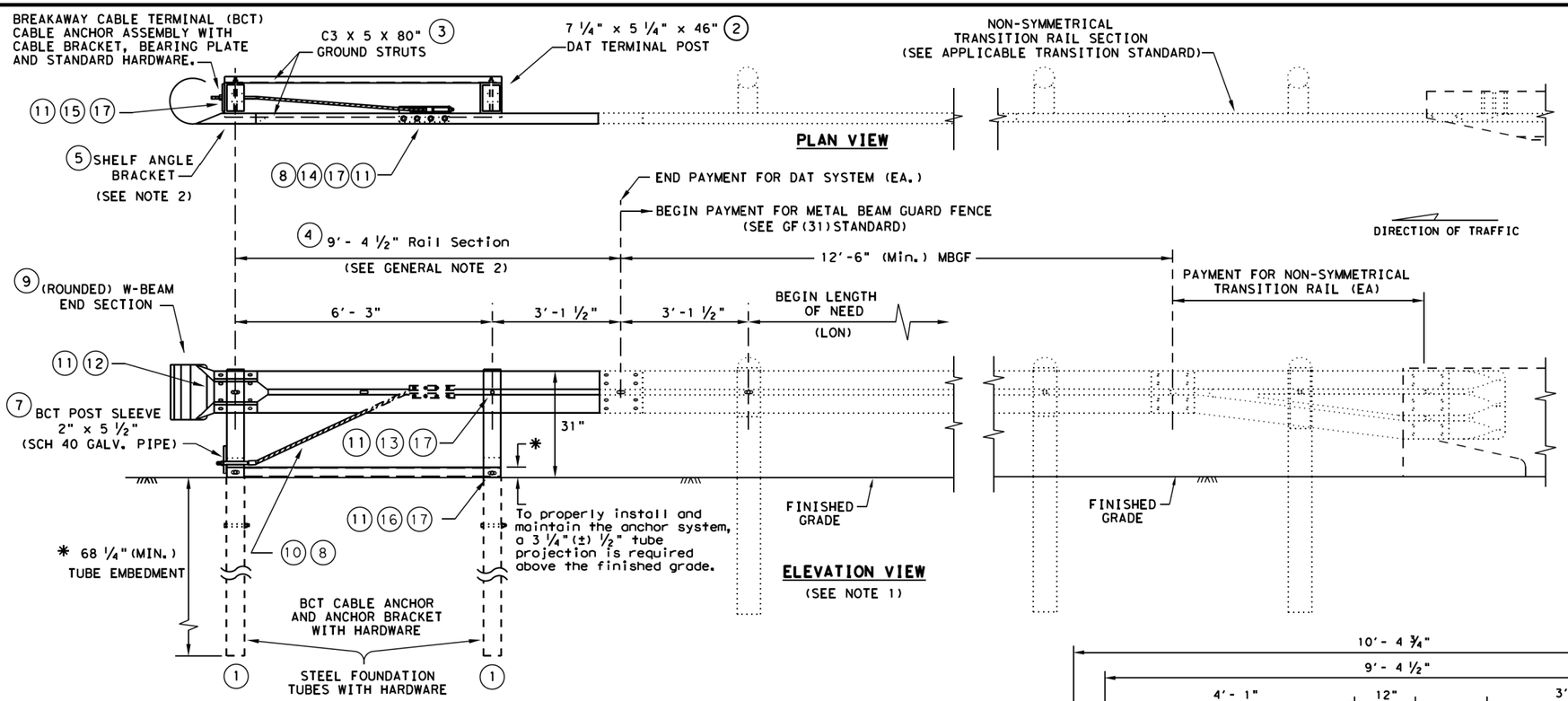
Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		52

DATE: November 27, 2023
FILE: gf3119.dgn

DATE: November 27, 2023
FILE: gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

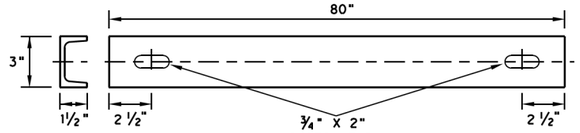
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

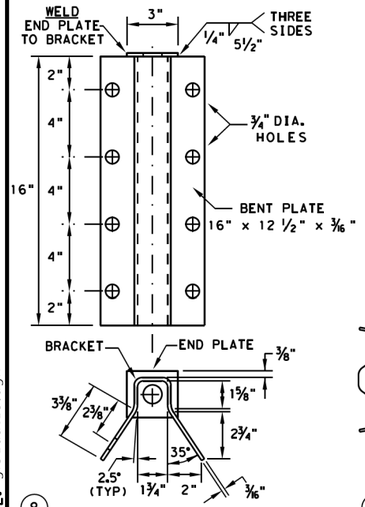
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

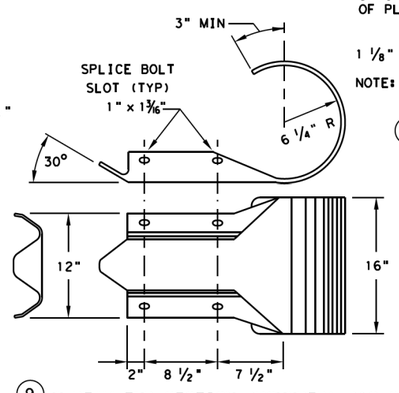
(4) TERMINAL RAIL ELEMENT FOR DAT



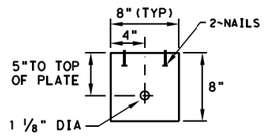
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

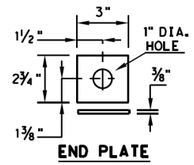


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

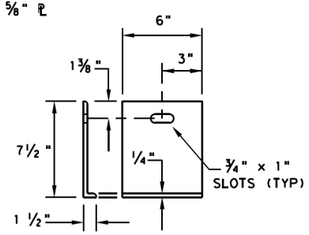


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

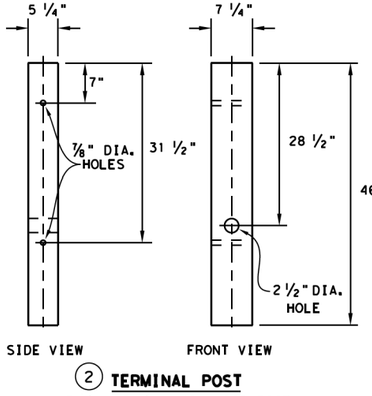
(6) BEARING PLATE
8"x 8"x 5/8" ℄



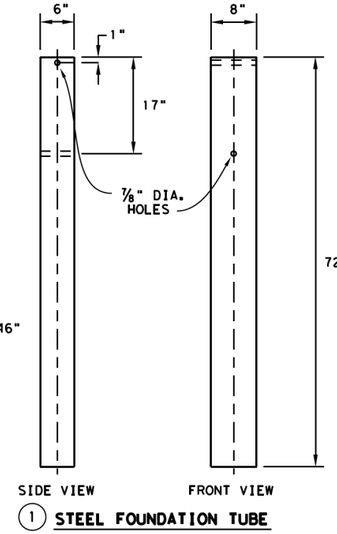
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST

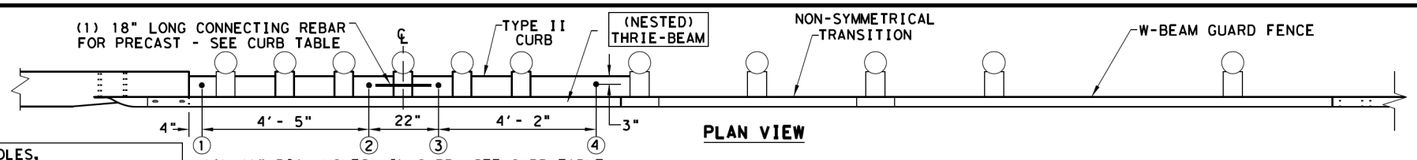


(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	18	133, ETC	CR 1420, ETC	
	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		53	



PLAN VIEW

(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

END PAYMENT FOR THRIE-BEAM TRANSITION.

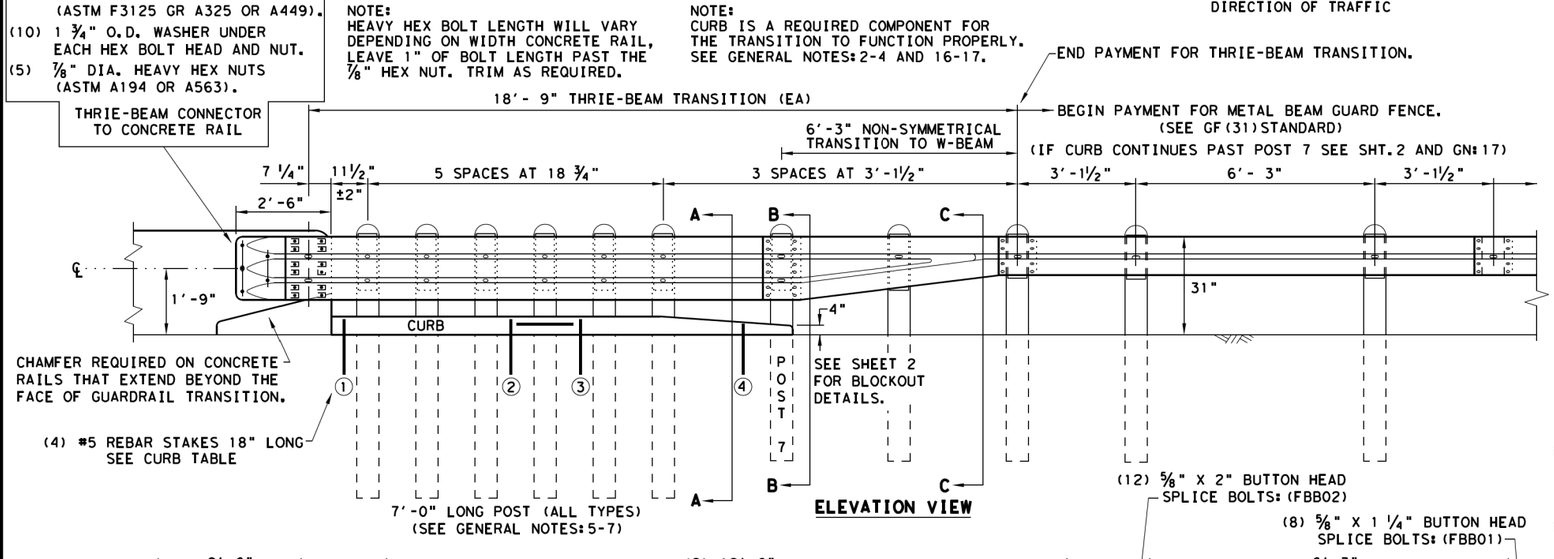
18'- 9" THRIE-BEAM TRANSITION (EA)

BEGIN PAYMENT FOR METAL BEAM GUARD FENCE. (SEE GF(31)STANDARD)

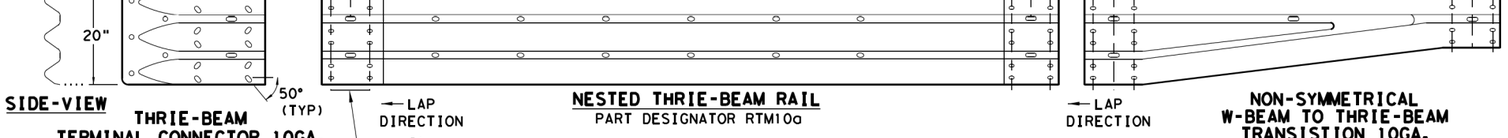
6'-3" NON-SYMMETRICAL TRANSITION TO W-BEAM

(IF CURB CONTINUES PAST POST 7 SEE SHT.2 AND GN:17)

THRIE-BEAM CONNECTOR TO CONCRETE RAIL



ELEVATION VIEW



SIDE-VIEW

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

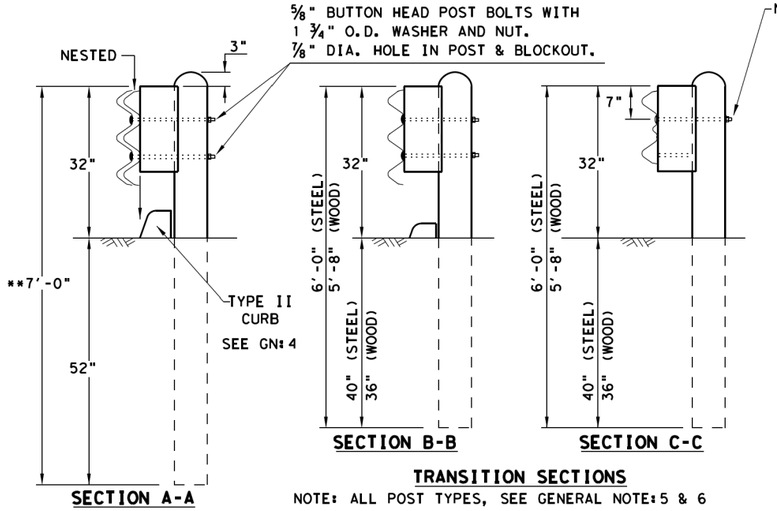
NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

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

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

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.



SECTION A-A

SECTION B-B

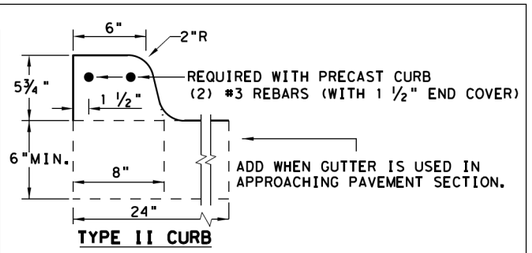
SECTION C-C

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

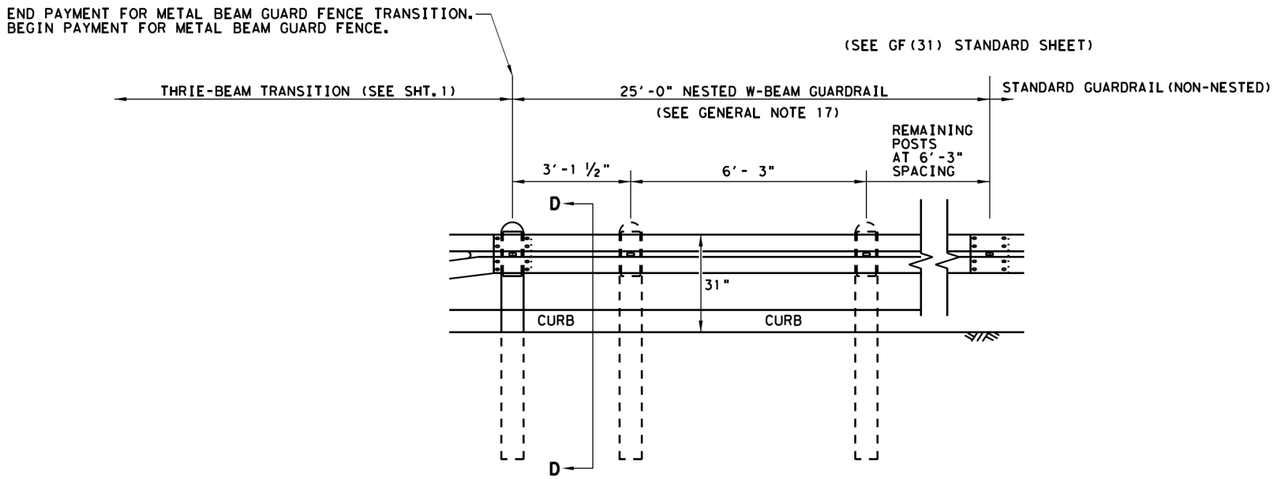
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

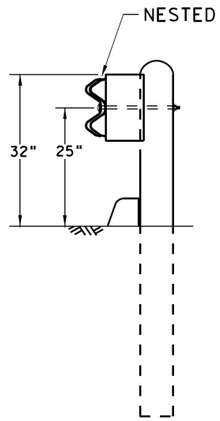
FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		54

DATE: November 27, 2023
FILE: gf31tr1320_1.dgn

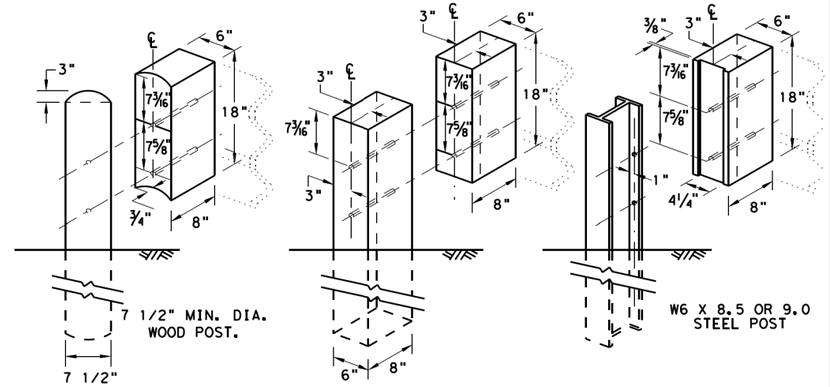
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

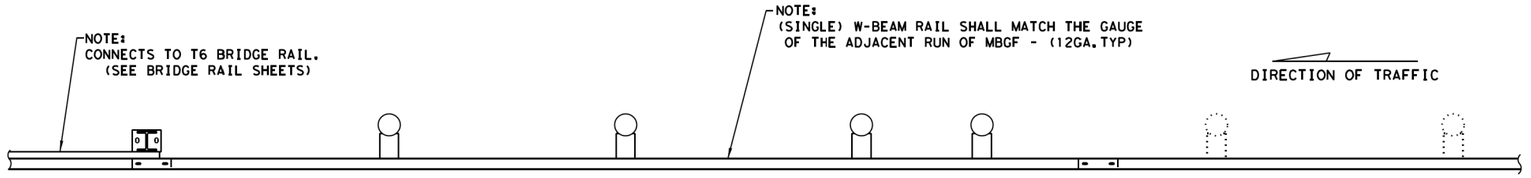
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

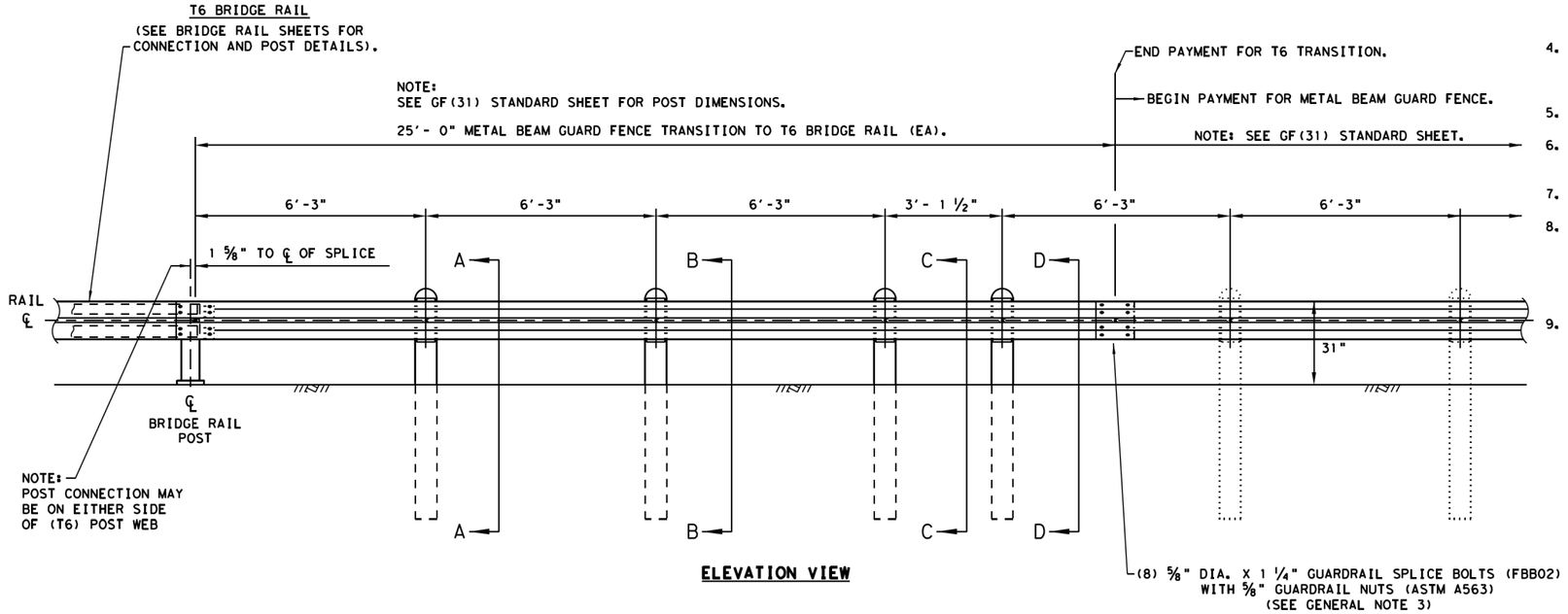
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	18	133, ETC	CR 1420, ETC	
	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		55	

DATE: November 27, 2023
FILE: gf31trtl320_2.dgn

DATE:
FILE:



PLAN VIEW

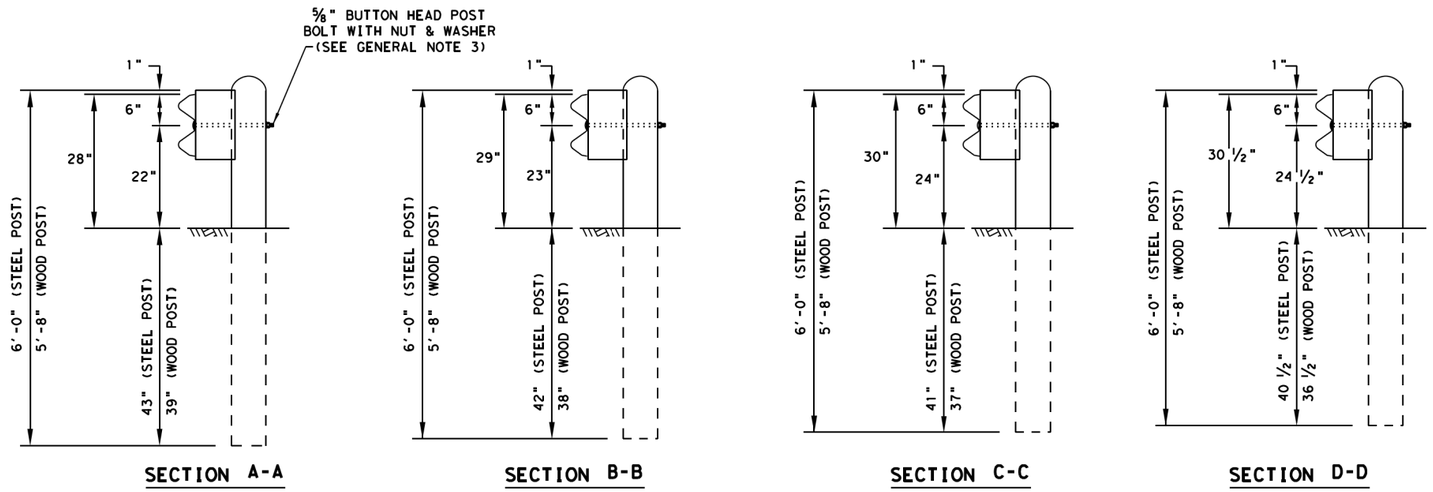


ELEVATION VIEW

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 ELEMENT 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 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR.A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. 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.
9. REFER TO STANDARD GF(31) & APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

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



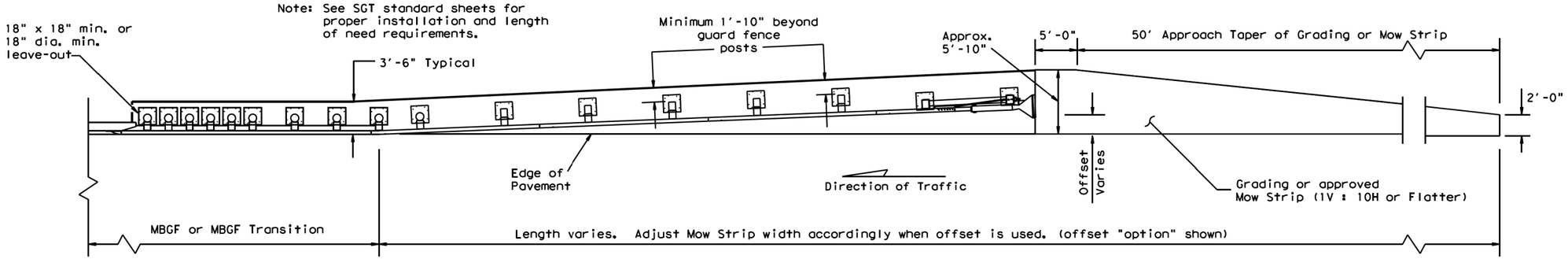
Texas Department of Transportation

Design Division Standard

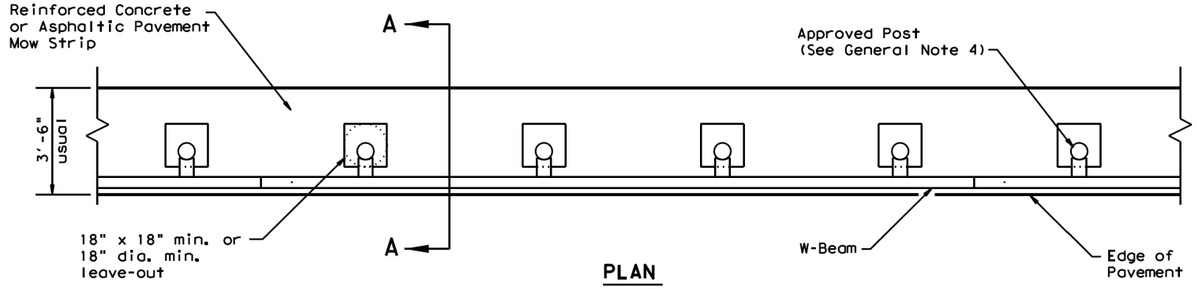
METAL BEAM GUARD FENCE TRANSITION (T6)

GF(31)T6-19

FILE: gf31t619.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		56

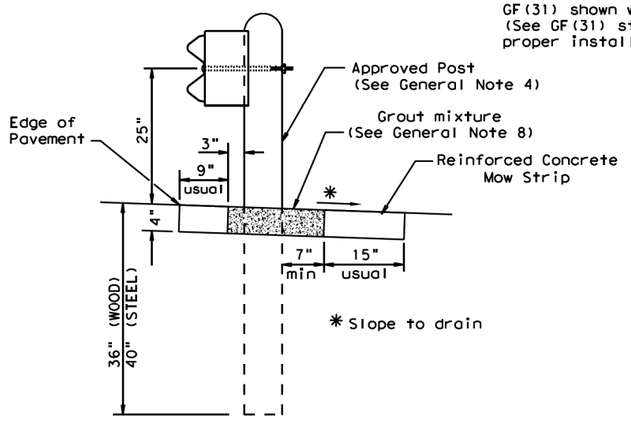


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



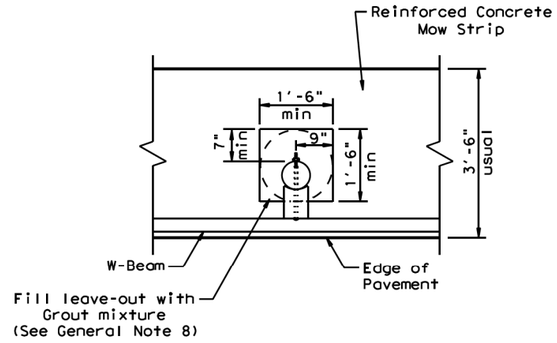
PLAN

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



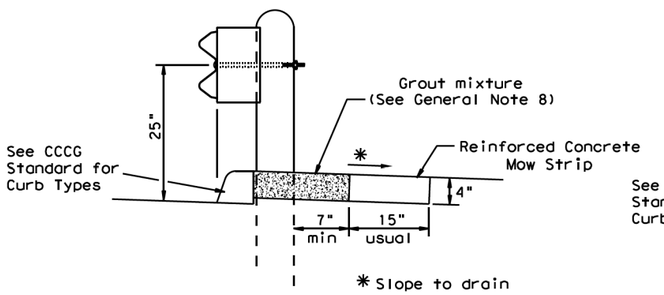
SECTION A-A

Typical



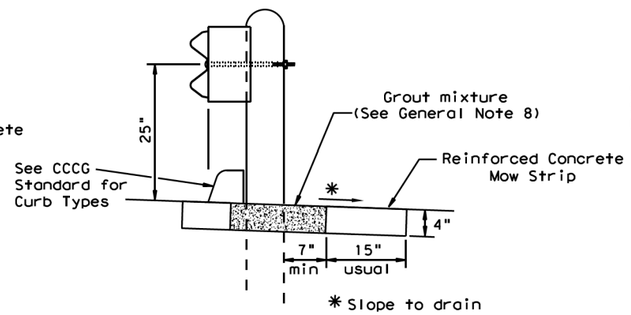
MOW STRIP DETAIL

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



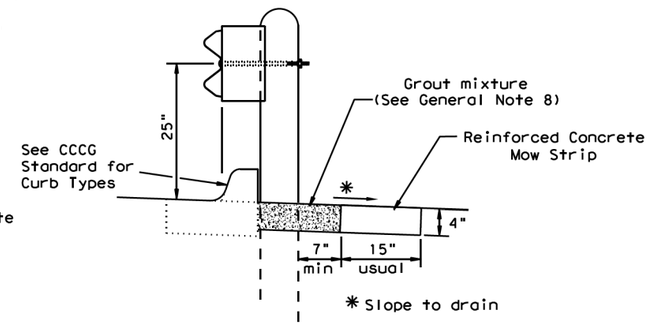
CURB OPTION (1)

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.

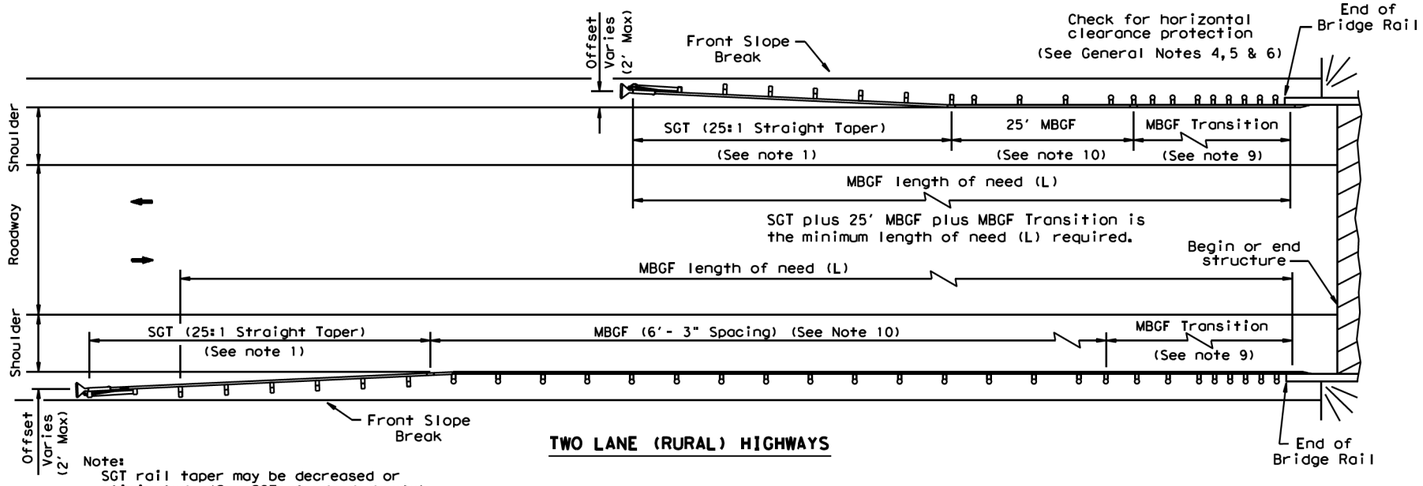
Texas Department of Transportation — Design Division Standard

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

GF(31)MS-19

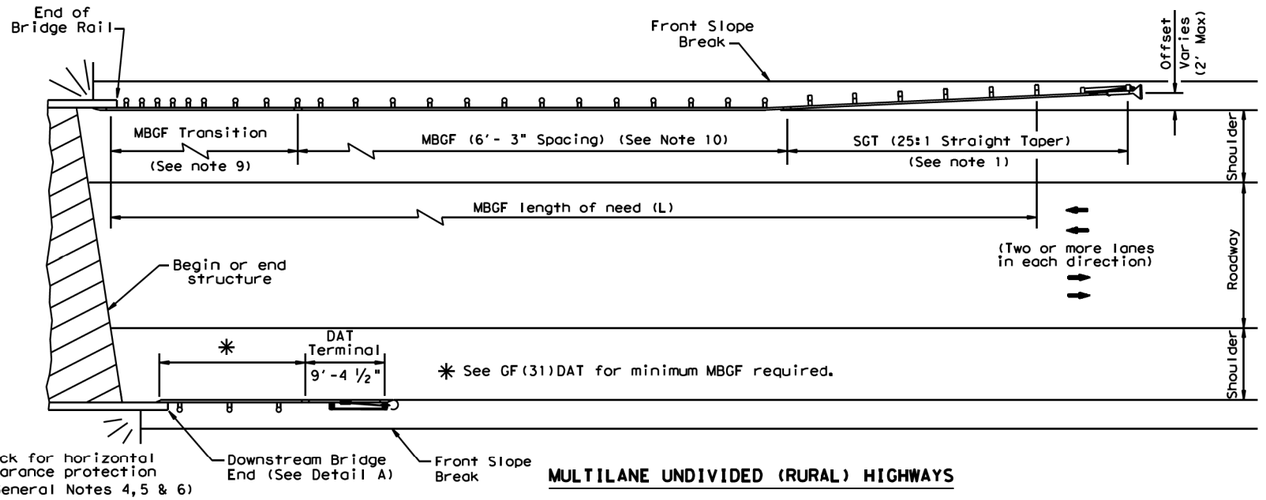
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		57

DATE: November 27, 2023
FILE: gf31ms19.dgn

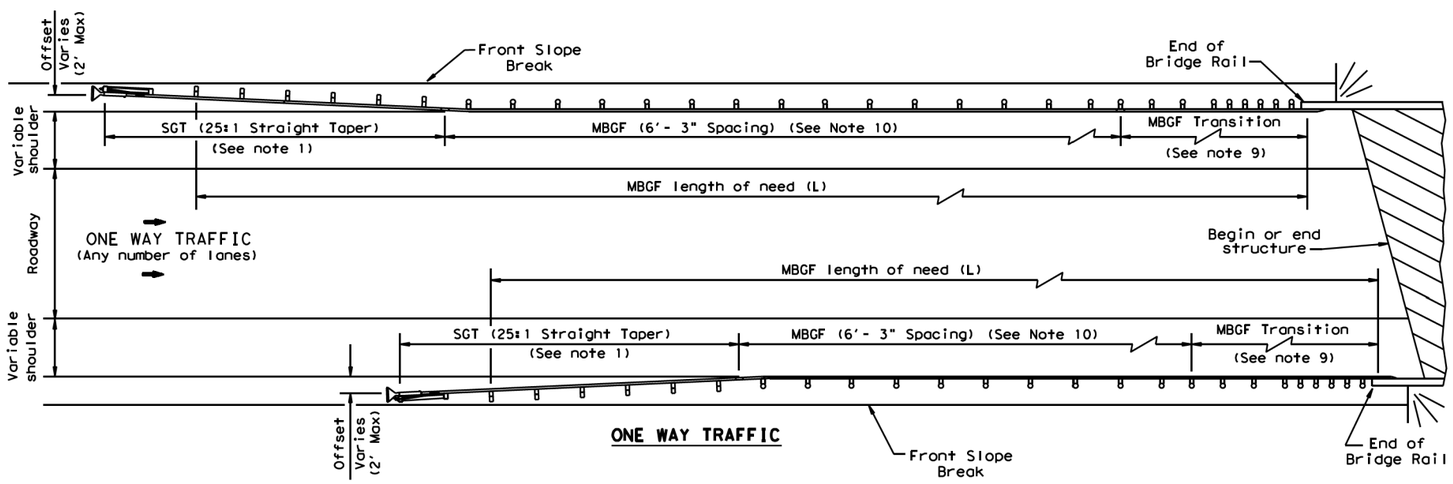


TWO LANE (RURAL) HIGHWAYS

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



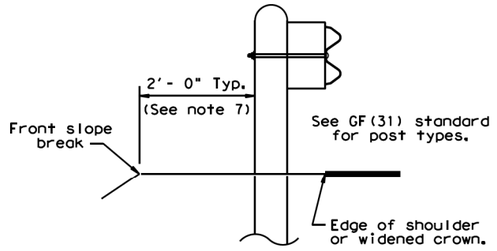
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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 REVISED APRIL 2014 SEE (MEMO 0414)	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		58

DATE: November 27, 2023
FILE: bed14.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A
ANGLE STRUT PN: 15202G
16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

PLAN VIEW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2) 1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

B B A A

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

POST 40" DEPTH (TYP 1-8)

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

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

ELEVATION VIEW

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

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

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G
ANGLE STRUT PN: 15202G
(2) ⅝" WASHERS PN 4372G
(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1
SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT
(1) ⅝" x 1-½" HEX HD BOLT-GR-5 PN: 105286
(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2
SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G
ANCHOR PLATE WASHER ½" THICK PN: 15206G
1" ROUND WASHER F463 PN: 4902G
(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G
(2) ⅝" ROUND WASHER (WIDE) PN: 3240G
ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6
1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.
ANCHOR PADDLE PN: 15204A
(2) ⅝" HEX NUT A563 GR.DH PN: 3245G
W-BEAM FLATTENED (4 PLIES)
ANGLE STRUT PN: 15202G
SEE NOTE: A
(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G
(4) ¾" FLAT WASHER (TYP) PN: 3701G
(2) ¾" HEX NUT (TYP) PN: 3704G
(2) ANCHOR POST ANGLE PN: 15201G
6'-1⅜" POST DEPTH

DETAIL 3
AT POST(0)
6'-5 ⅜" (W6 X 15)
I-BEAM POST PN: 15205A

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6
4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B
6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

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

8" 6" 14"
⅝" HGR NUT PN: 3340G
⅝" X 10" HGR POST BOLT PN: 3500G
13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES
FINISHED GRADE
(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"
6" X 8" X 14" BLOCKOUT WOOD
⅝" X 10" HGR POST BOLT PN: 3500G
⅝" HGR NUT PN: 3340G
POST HEIGHT 32"
31" RAIL HEIGHT
40"
FINISHED GRADE
LINE POST (3, 4, 5, 6, 7 & 8)

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

6" X 8" X 14" BLOCKOUT WOOD
W-BEAM RAIL 25'-0"
⅝" X 10" HGR POST BOLT PN: 3500G
⅝" HGR NUT PN: 3340G
POST HEIGHT 32"
31" RAIL HEIGHT
40"
FINISHED GRADE
POST(2)

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

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

POST 17"- ½" HEIGHT
4'-9 ½"
13/16" DIA. YIELDING HOLES
40"
POST(1)

FRONT VIEW POST(1)
4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

STANDARD MBGF
APPROX 5'-10"
5'-0"
50' APPROACH GRADING
2'-0"
EDGE OF PAVEMENT
NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)
2'-0" MAX. RAIL OFFSET
APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		59

DATE: November 27, 2023
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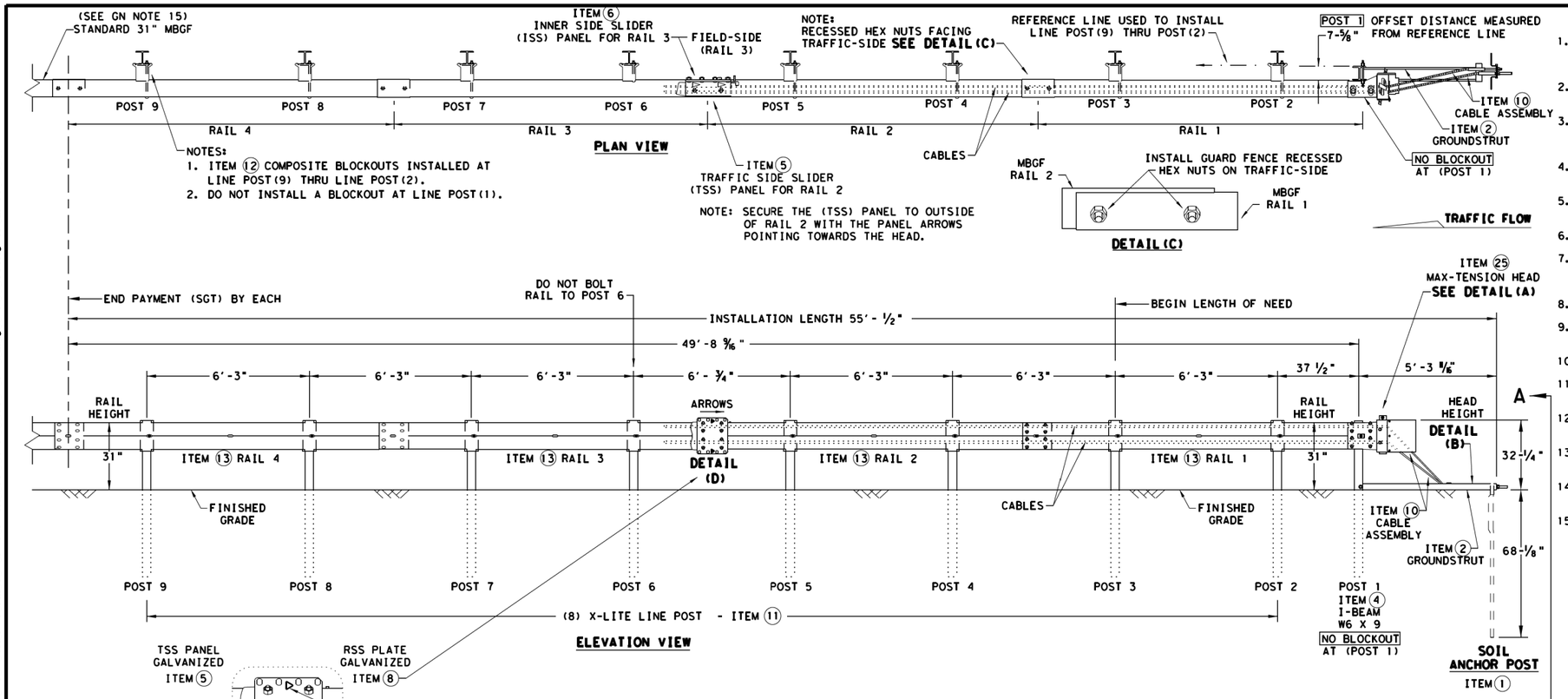

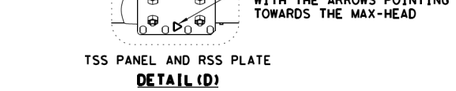

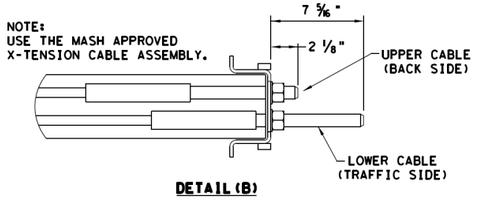

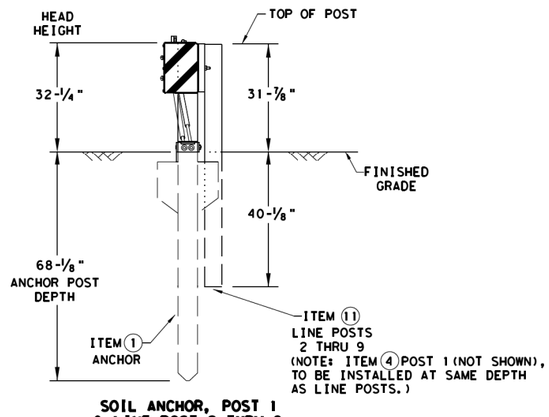

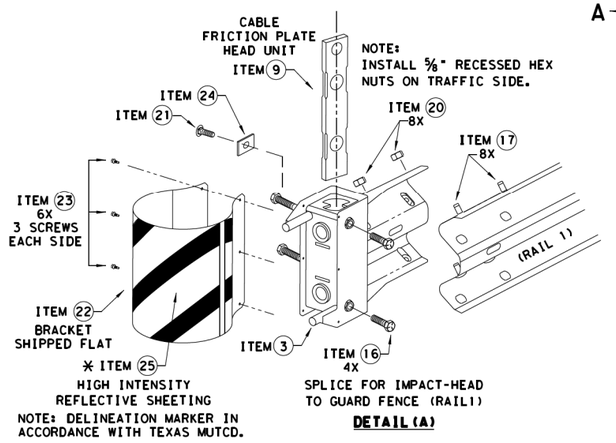

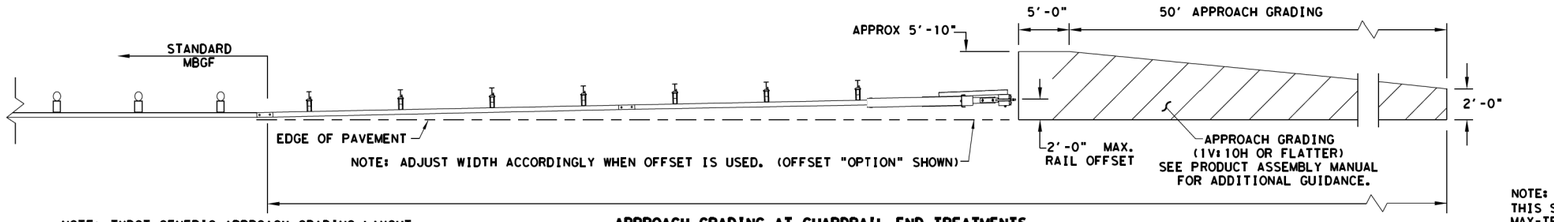

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		60

DATE: November 27, 2023
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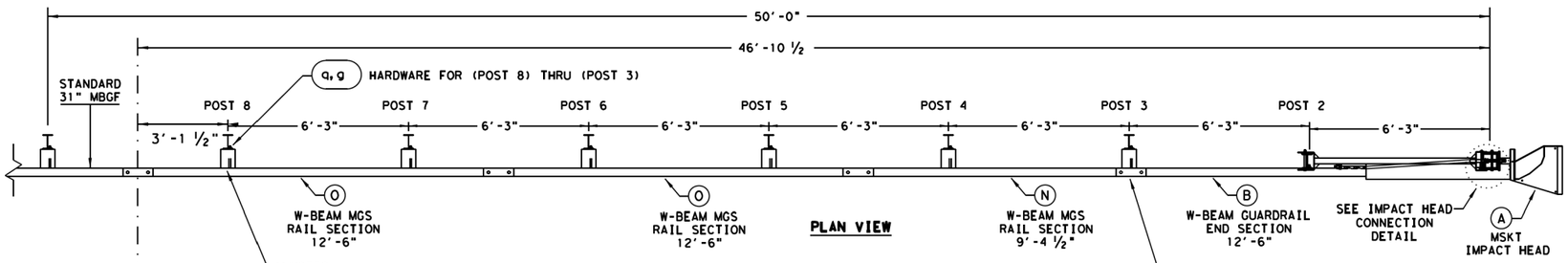
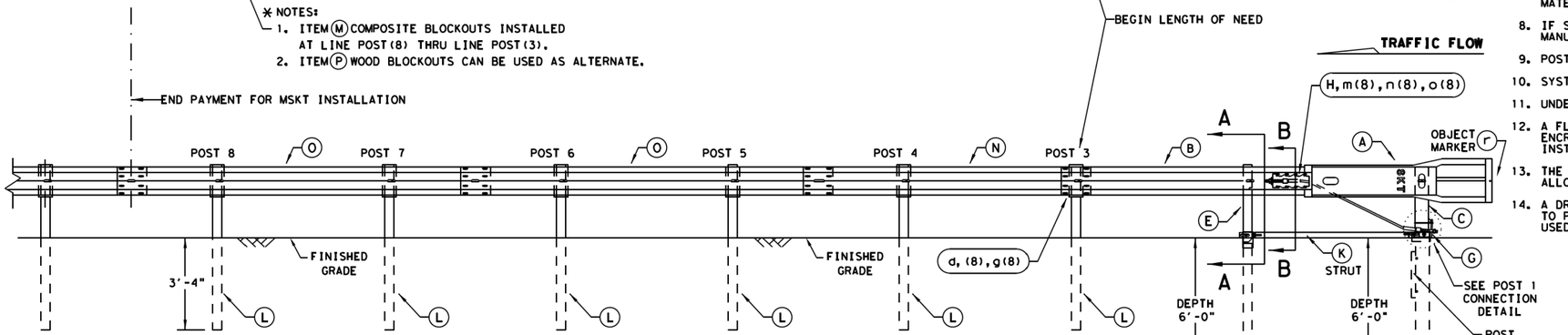
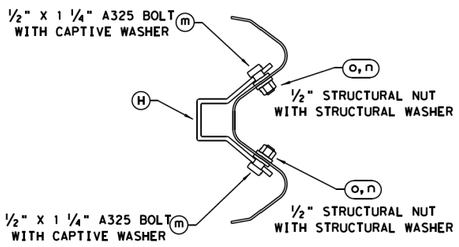
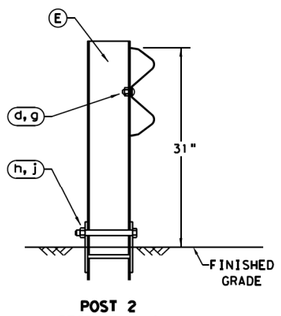
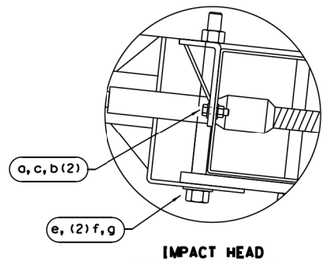


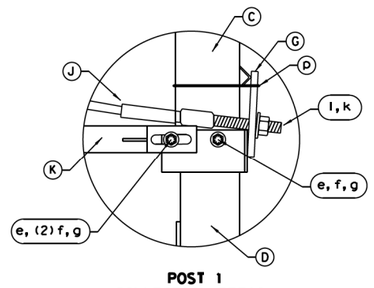


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



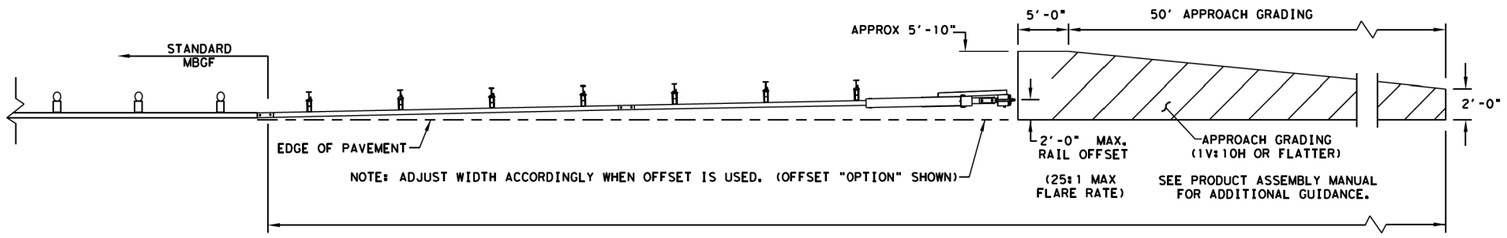






SEE NOTES: *

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



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.

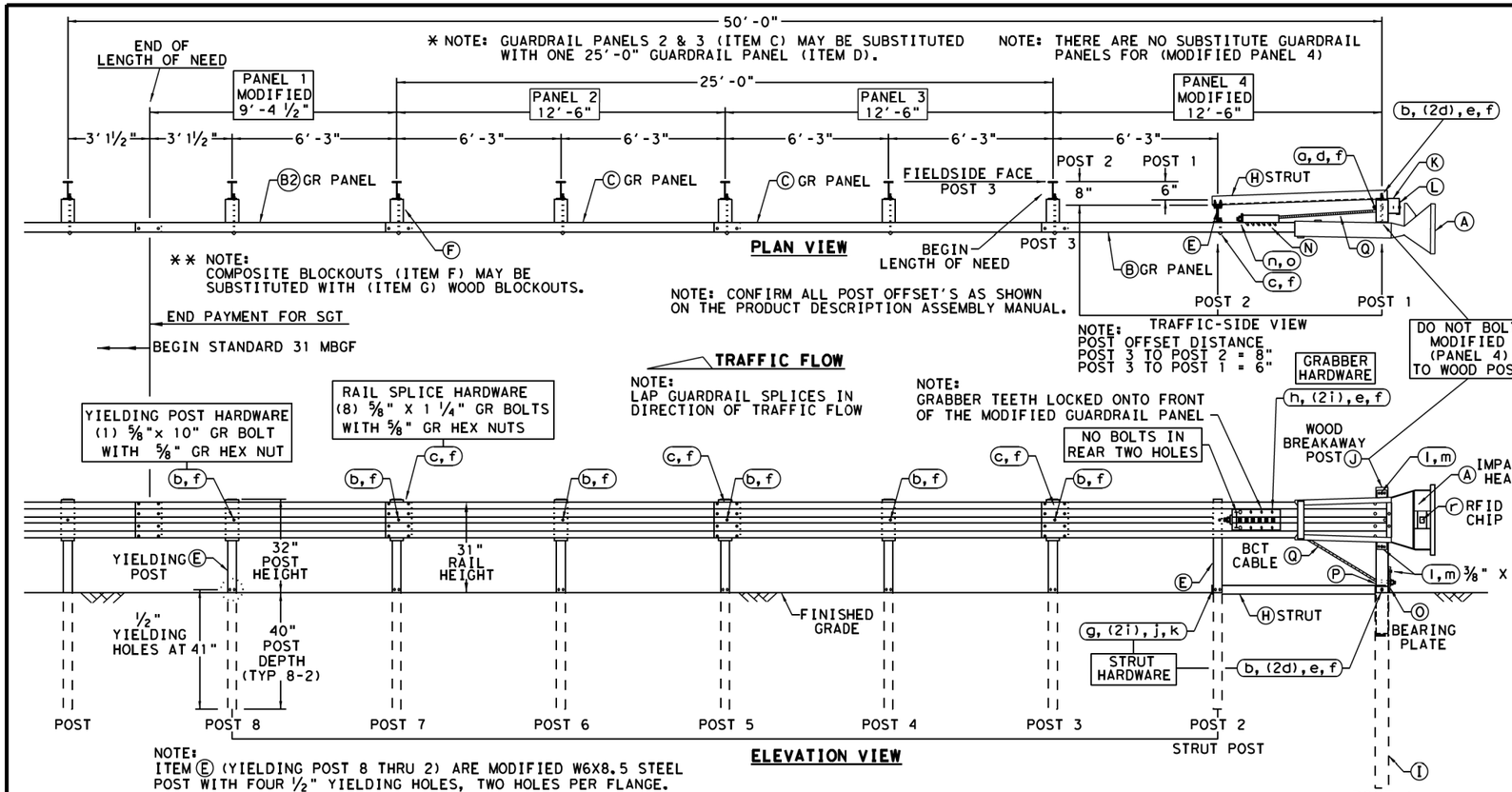
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

Texas Department of Transportation — Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0918	18	133, ETC	CR 1420, ETC	
	DIST	COUNTY		SHEET NO.	
	DAL	NAVARRO		61	

DATE: November 27, 2023
FILE: sgt12s3118.dgn

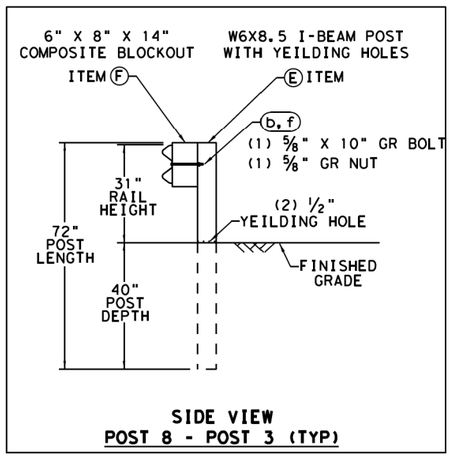


GENERAL NOTES

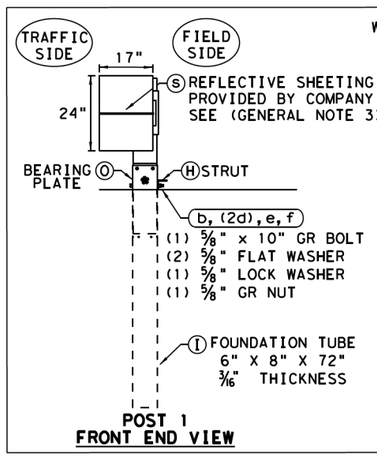
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

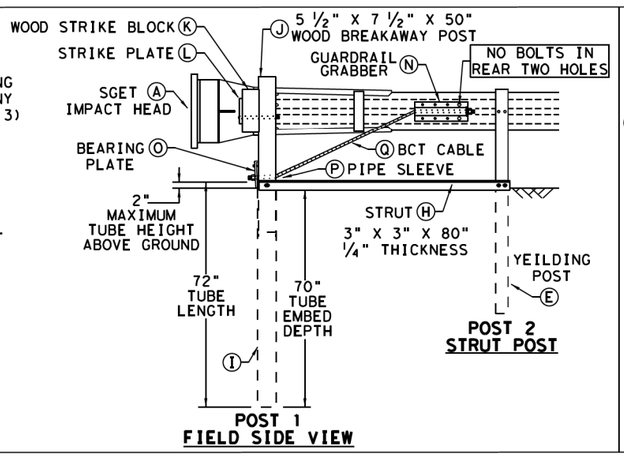
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

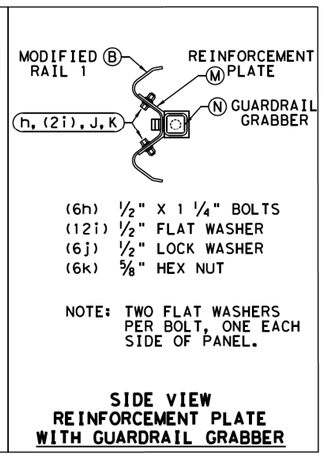


POST 1
FRONT END VIEW

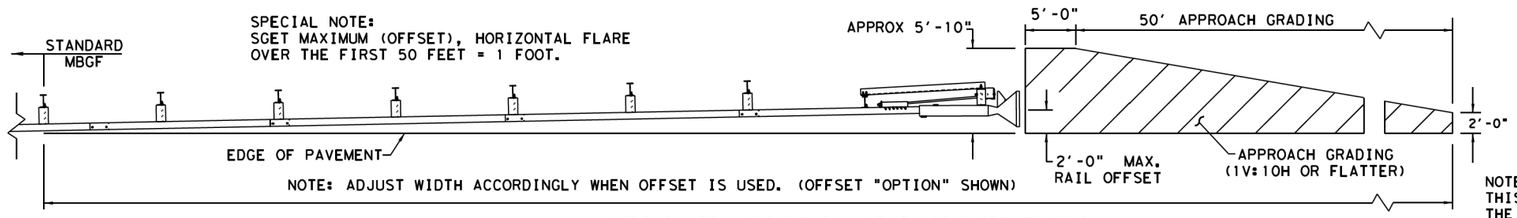


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

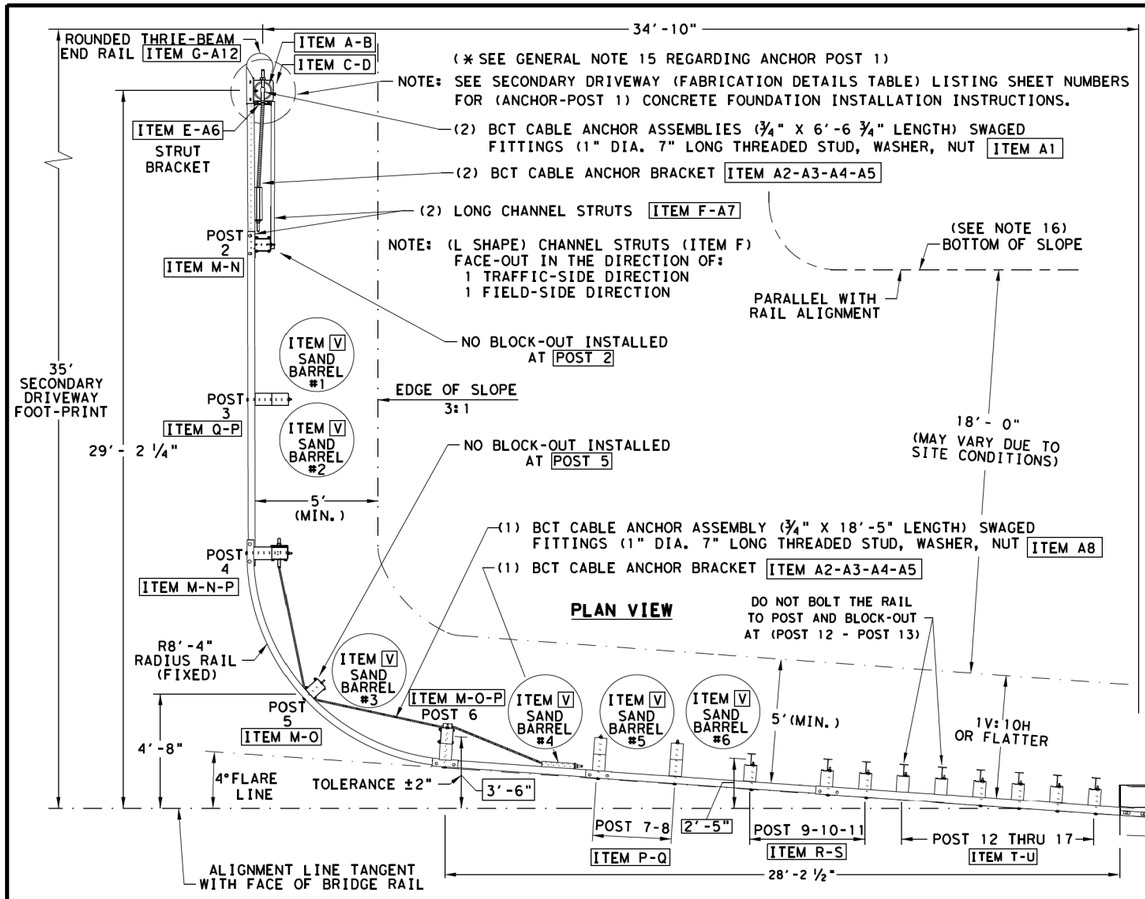
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

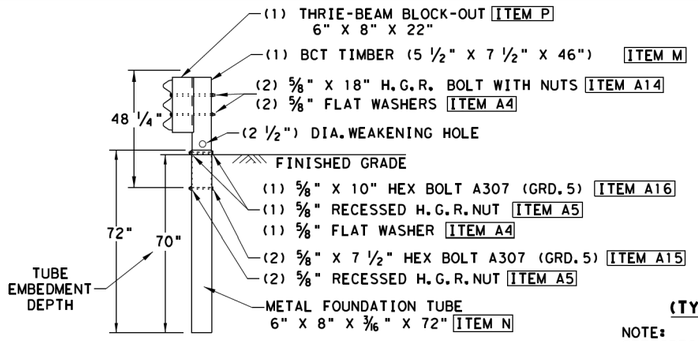
Texas Department of Transportation — Design Division Standard

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	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		62

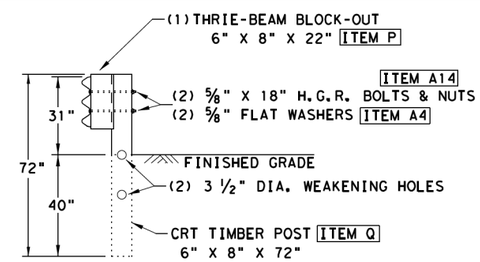
DATE: November 27, 2023
FILE: sgt153120.dgn





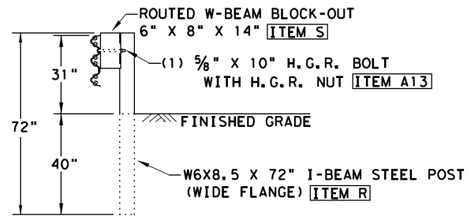
SECTION VIEW (A-A)
TIMBER POST WITH METAL FOUNDATION TUBE
(TYP) BCT POSTS 2-4-5-6

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

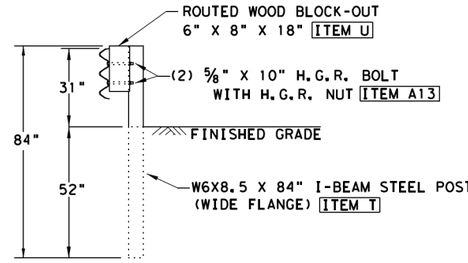


SECTION VIEW (B-B)
(TYP) CRT TIMBER POSTS 3-7-8

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



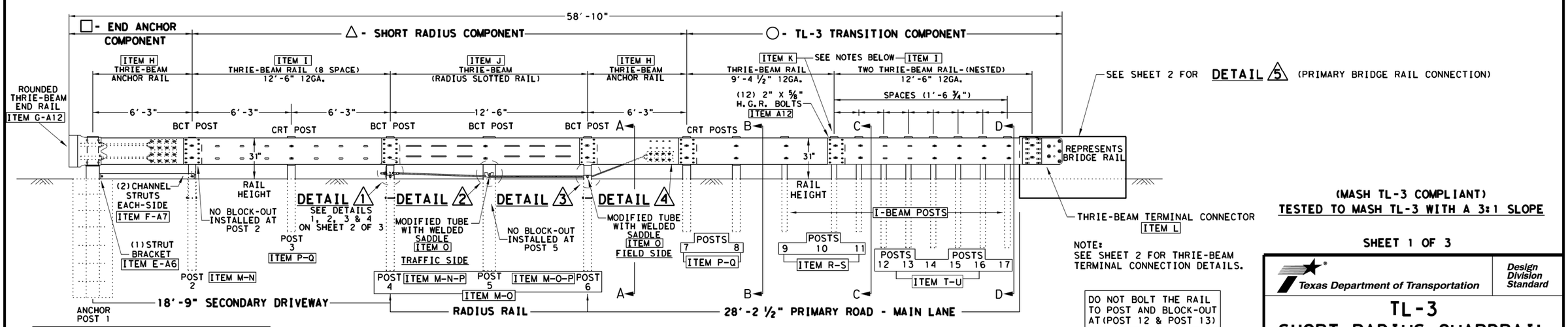
SECTION VIEW C-C
(TYP) AT POSTS 9-10-11



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

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

NOTE: FOR POST 12 & 13



SEE SHEET 2 FOR **DETAIL 5** (PRIMARY BRIDGE RAIL CONNECTION)

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

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

NOTE: FOR POST 12 & 13

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

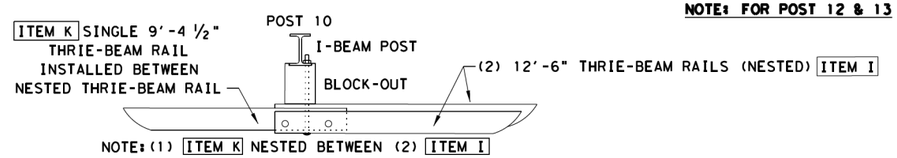
SHEET 1 OF 3

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

FULL-LENGTH ELEVATION VIEW

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

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



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

NESTED-GUARDRAIL SPLICE AT POST 10

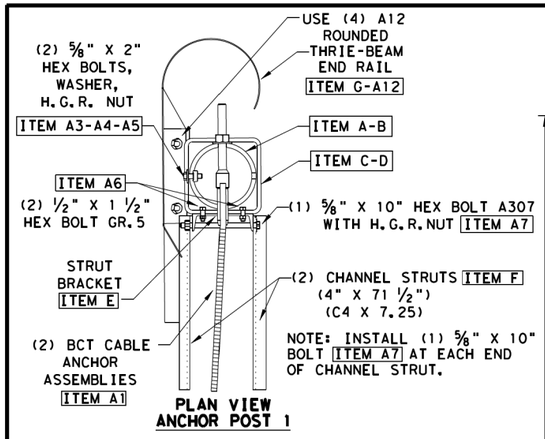
Texas Department of Transportation

Design Division Standard

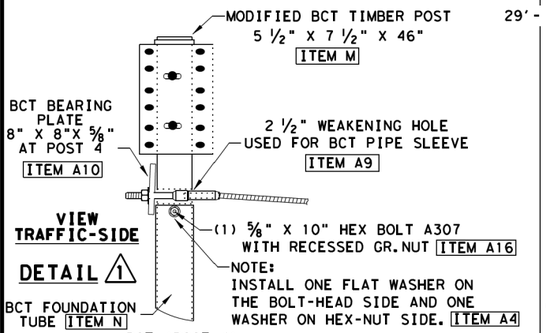
TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT
SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		63

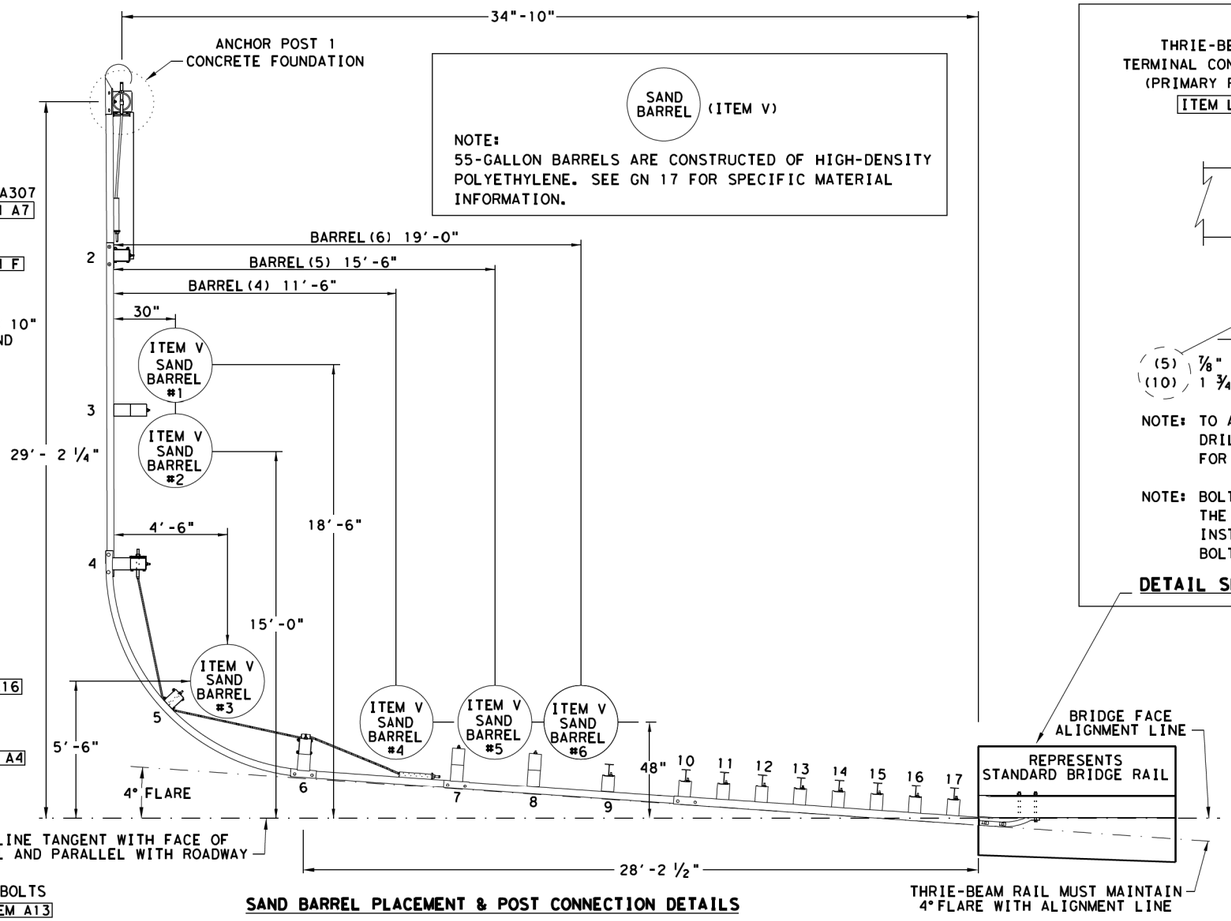
DATE: November 27, 2023
FILE: srgtl321_1.dgn



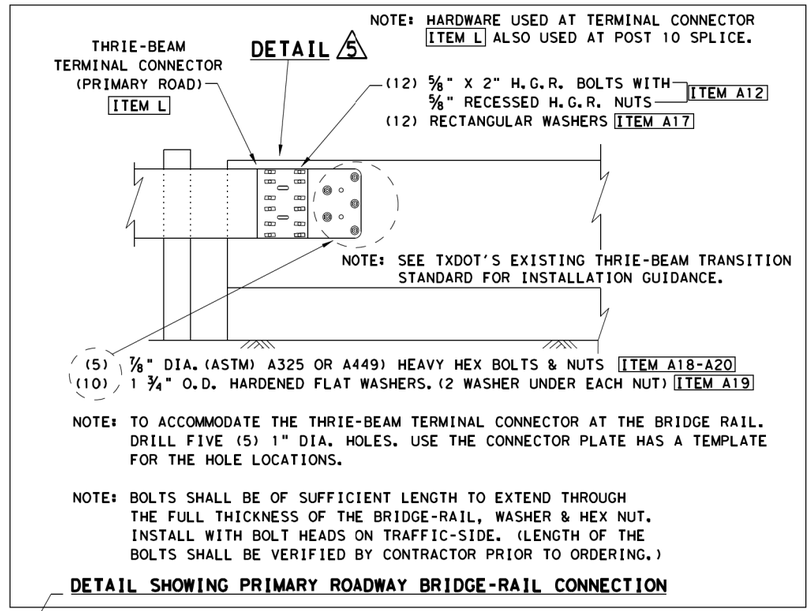
PLAN VIEW ANCHOR POST 1



BCT (POST 4) TIMBER POST WITH METAL FOUNDATION TUBE



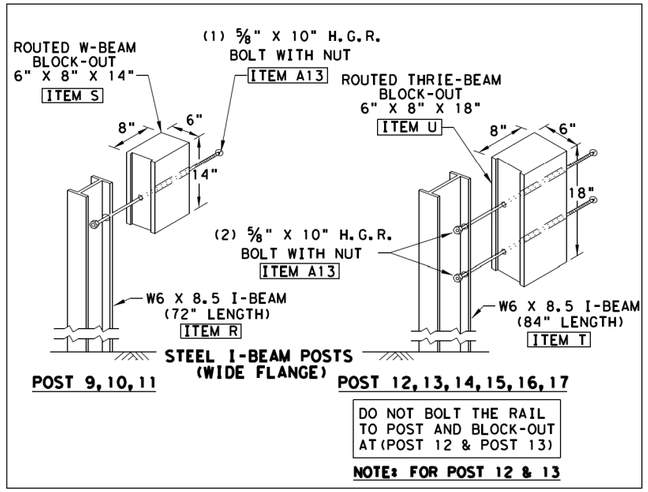
SAND BARREL PLACEMENT & POST CONNECTION DETAILS

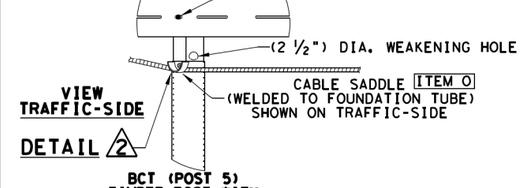


NOTE: TO ACCOMMODATE THE THRIE-BEAM TERMINAL CONNECTOR AT THE BRIDGE RAIL. DRILL FIVE (5) 1" DIA. HOLES. USE THE CONNECTOR PLATE HAS A TEMPLATE FOR THE HOLE LOCATIONS.

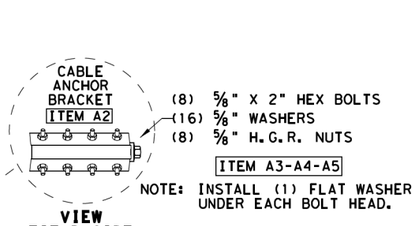
NOTE: BOLTS SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE BRIDGE-RAIL, WASHER & HEX NUT. INSTALL WITH BOLT HEADS ON TRAFFIC-SIDE. (LENGTH OF THE BOLTS SHALL BE VERIFIED BY CONTRACTOR PRIOR TO ORDERING.)

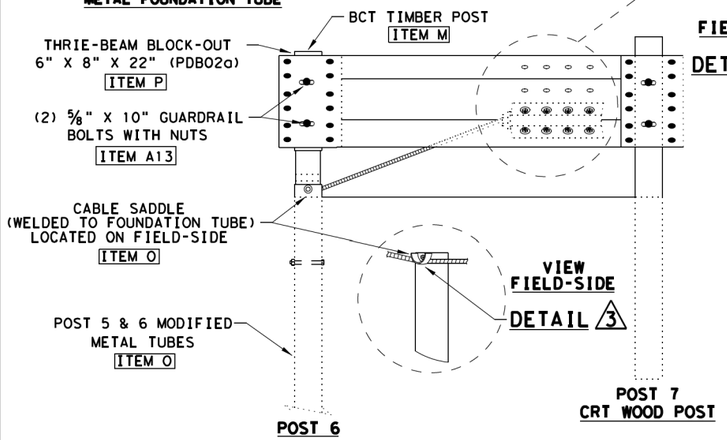
DETAIL SHOWING PRIMARY ROADWAY BRIDGE-RAIL CONNECTION

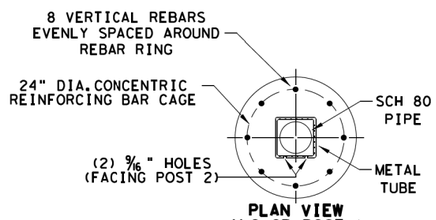


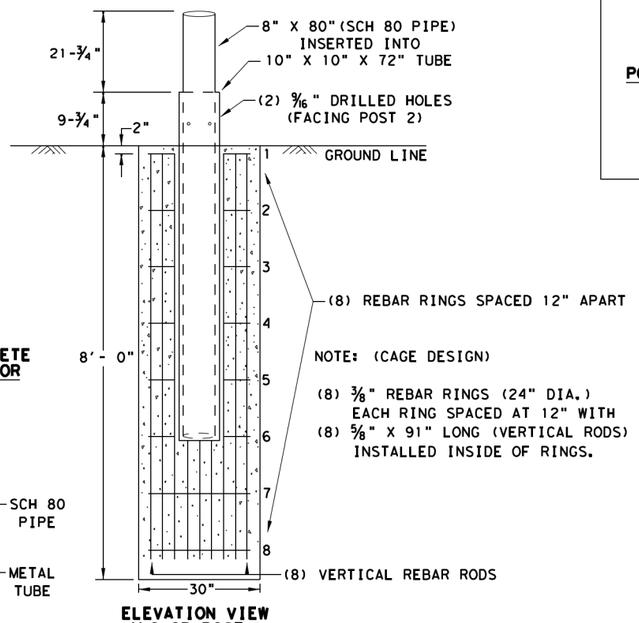


BCT (POST 5) TIMBER POST WITH METAL FOUNDATION TUBE









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

Texas Department of Transportation — Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		64

DATE: November 27, 2023
FILE: srgt1321_2.dgn

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

GENERAL NOTES

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

NOTE: SEE SHEET 1 OF 3.

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

SPECIAL APPLICATION NOTES.

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

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

DATE: November 27, 2023
FILE: srgtl321_3.dgn

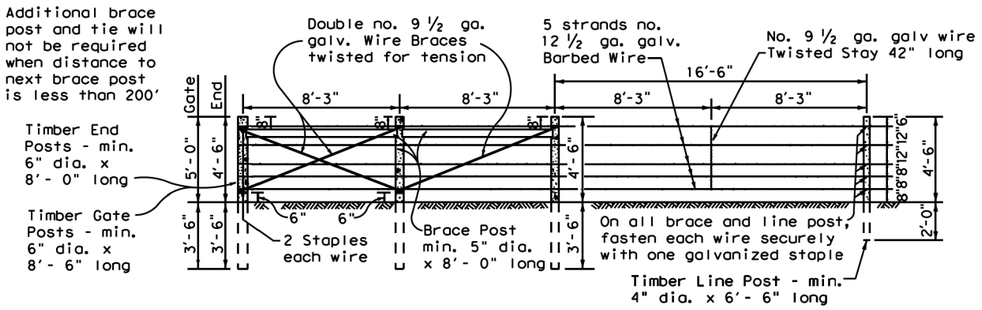
SHEET 3 OF 3

Texas Department of Transportation — Design Division Standard

TL-3 SHORT RADIUS GUARDRAIL MASH COMPLIANT

SRG(TL-3)-21

FILE: srgtl321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		65

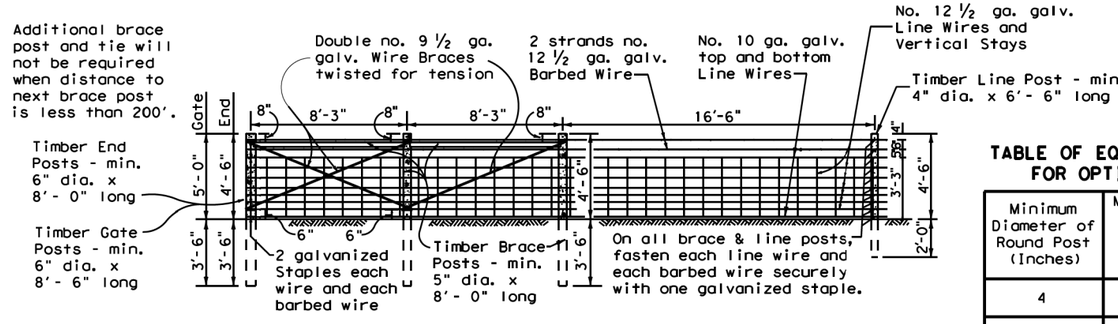


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

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

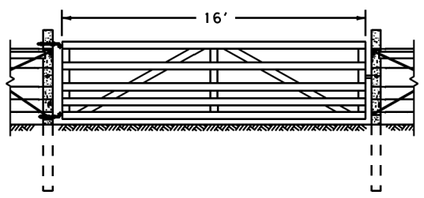
TYPE "B" FENCE

(See General Note 6)

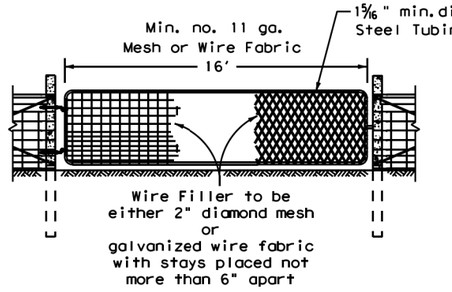
TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

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

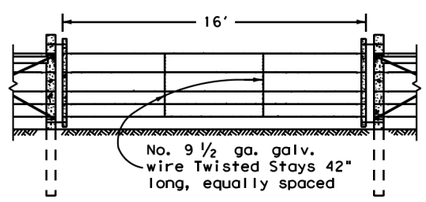
Metal gate shall consist of 5 panels not less than 4'- 4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the Engineer.



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

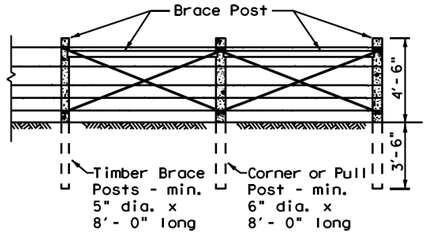


DETAIL TYPE 3 GATE

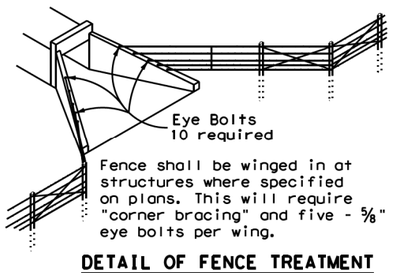
GENERAL NOTES

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.

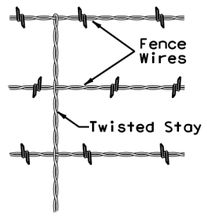
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood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

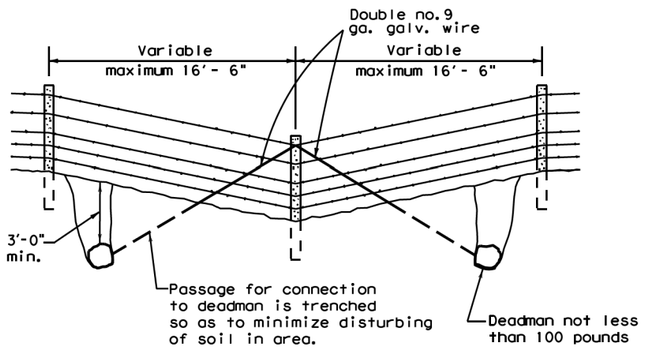


DETAIL OF STAY

(Barbed wire fence)

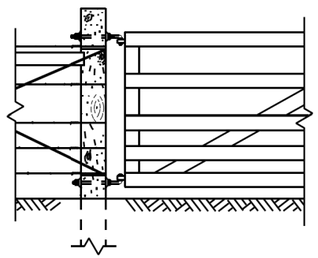
Loop to be made from two strands twisted no. 9 ½ ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

DETAIL FASTENER TYPE 3 GATE

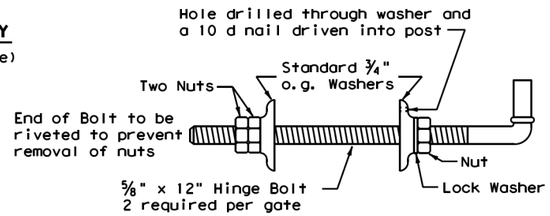


DETAIL OF FENCE SAG

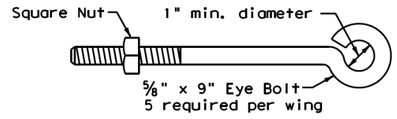
(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF EYE BOLT

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE

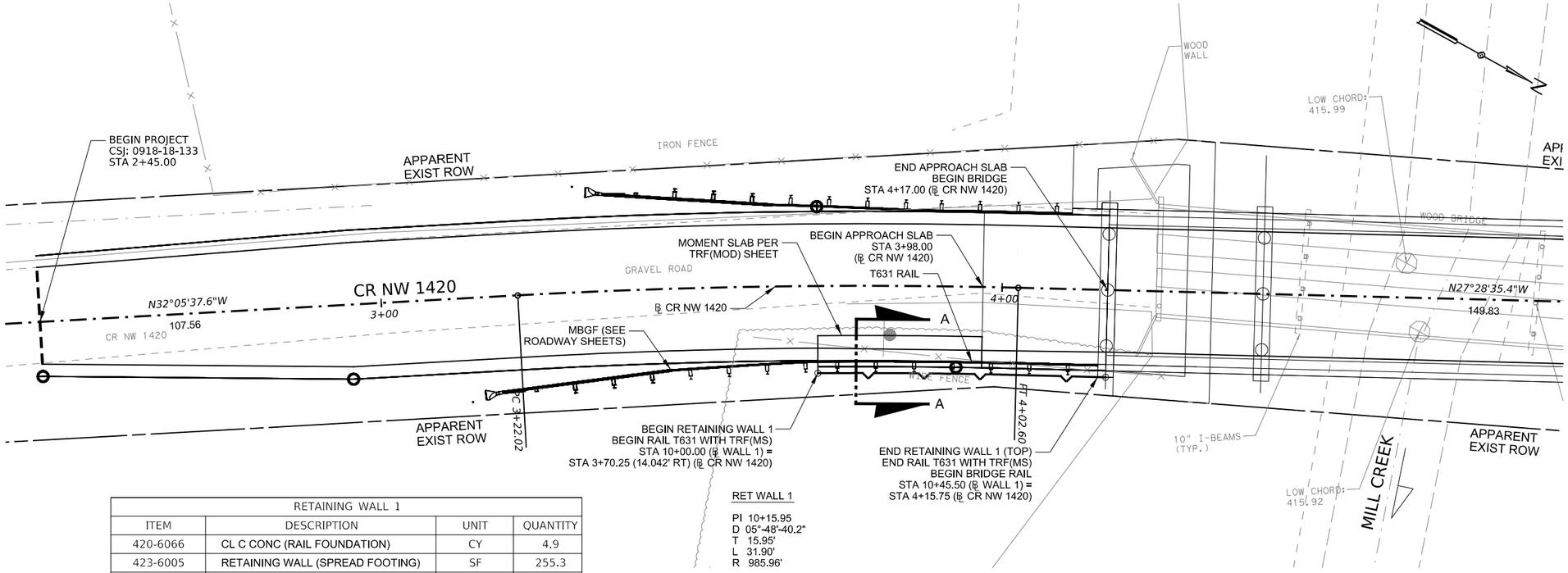
(WOOD POSTS)

WF (1) - 10

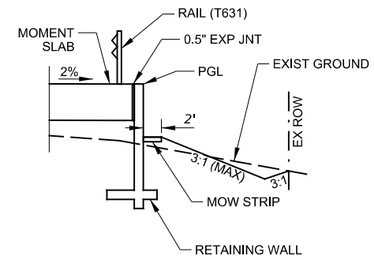
FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		66

DATE: November 27, 2023
FILE: $FILE$

DW: ERR | CK: BKT | DW: HAR | CK: MHS



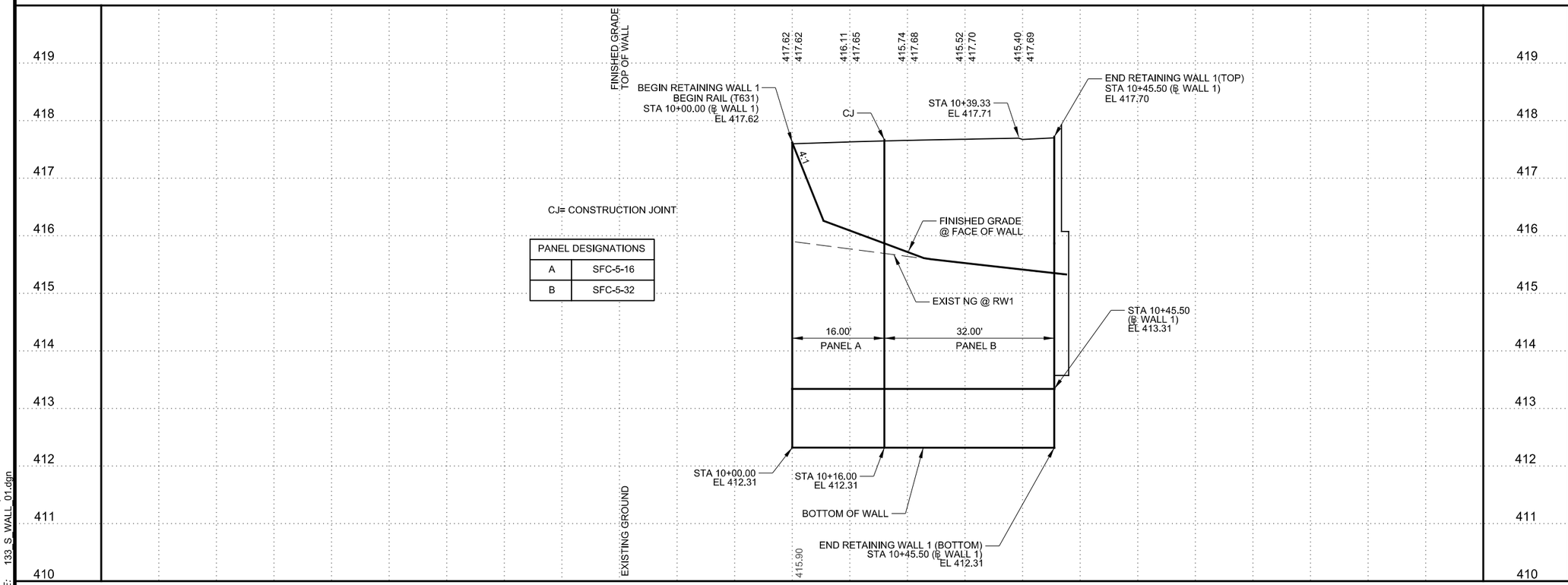
RETAINING WALL 1			
ITEM	DESCRIPTION	UNIT	QUANTITY
420-6066	CL C CONC (RAIL FOUNDATION)	CY	4.9
423-6005	RETAINING WALL (SPREAD FOOTING)	SF	255.3
432-6045	RIPRAP (MOW STRIP) (4 IN)	CY	1
450-6023	RAIL (TY T631)	LF	45.5



SECTION A-A
NTS

NOTES:

1. SEE RW-SFC AND RW-SF STANDARD FOR ADDITIONAL REINFORCING, NOTES AND INFORMATION.
2. SEE TRF(MOD) SHEET FOR DETAILS AT INTERFACE WITH TRF(MS) AND BAS-A.
3. SEE ABUTMENT DETAILS FOR ADDITIONAL REINFORCING AT ABUTMENT CAP.
4. T631 RAIL IS NOT DIRECTLY ANCHORED TO RETAINING WALL. T631 RAIL LIMITS OFF BRIDGE ARE SHOWN HERE FOR CLARITY.



PANEL DESIGNATIONS	
A	SFC-5-16
B	SFC-5-32

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

MILL CREEK BRIDGE

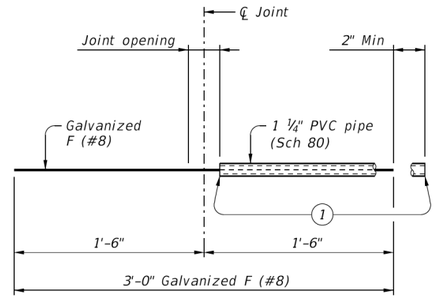
RETAINING WALL 1

SCALE:1"=20'-H
1"=2'-V

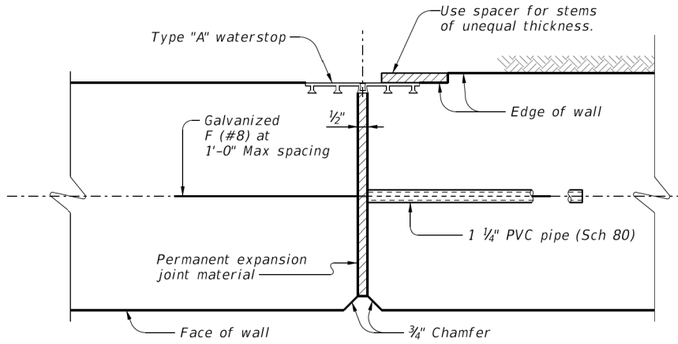
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918		133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		67

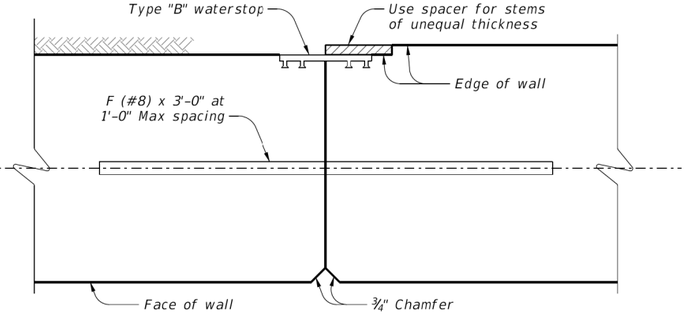
DATE: November 28, 2023
FILE: 133_S_WALL_01.dgn



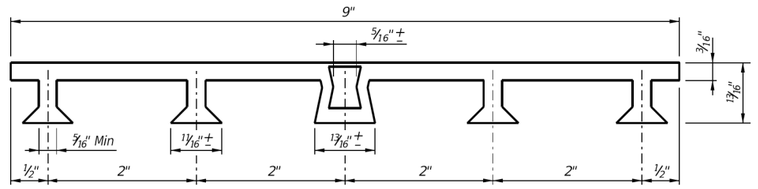
BAR F (#8) ASSEMBLY DETAIL



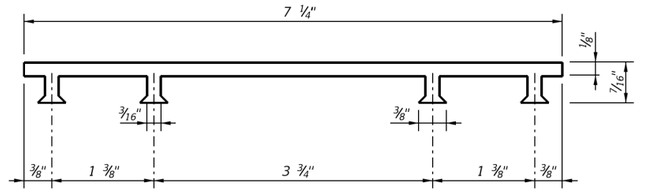
EXPANSION JOINT



CONSTRUCTION JOINT

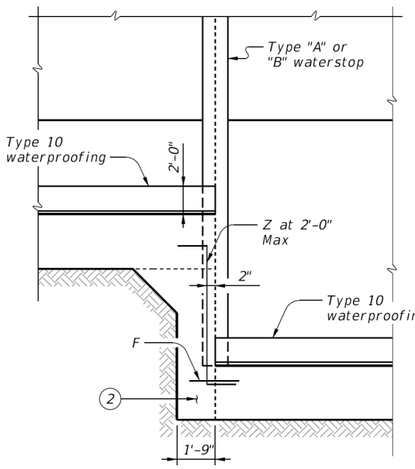


PVC WATERSTOP TYPE "A"

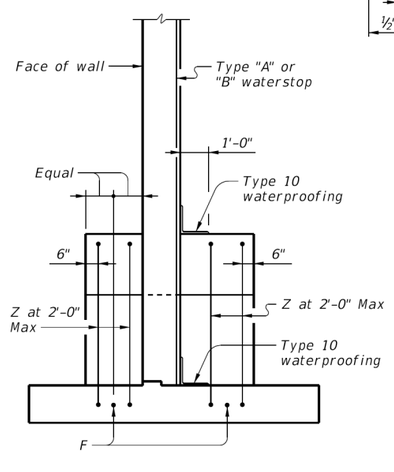


PVC WATERSTOP TYPE "B"

Note: Dimensions and shapes may vary slightly depending on manufacturer.

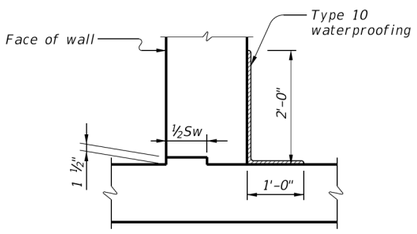


PARTIAL ELEVATION

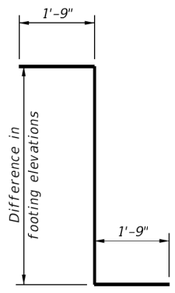


PARTIAL SECTION

SHOWING WATERSTOP AT FOOTING ELEVATION TRANSITION

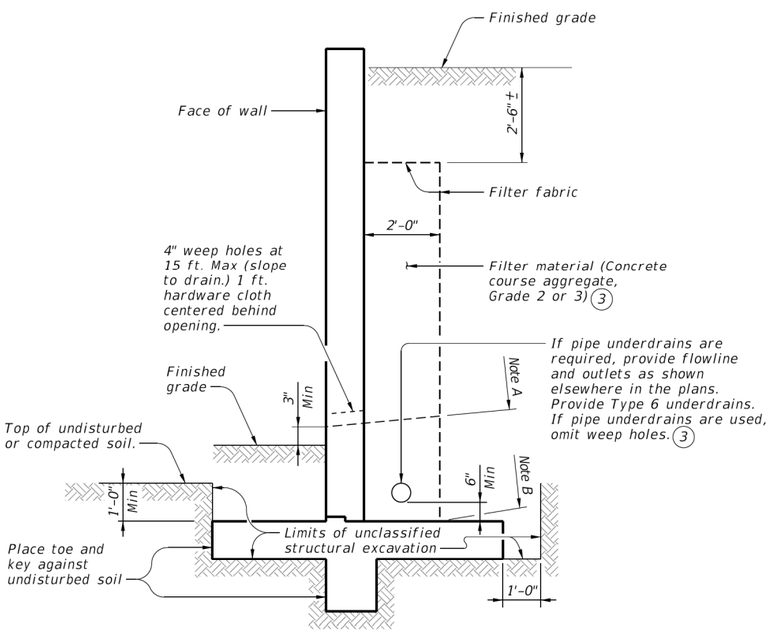


JOINT AND WATERSTOP DETAILS



BARS Z (#5)

(Omit Bars Z when difference in top of footing elevations is less than 2 ft).



DRAINAGE DETAILS AND EXCAVATION DIAGRAM

Note A: Stop coarse aggregate at this level when weep holes are used.

Note B: Use coarse aggregate to here when underdrains are used.

1. Tape ends of 1 ¼" PVC Schedule 80 to prevent concrete or mortar from seeping in.
2. Class C unreinforced concrete when difference in top of footing elevations is less than 2 feet. Omit when Dowel Bars F can be placed between adjacent footings with 4-inch cover top and bottom. Footing elevation difference not to exceed 4 feet.
3. Underdrain pipe to be in accordance with Item 556, "Pipe Underdrains."

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi.)
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Walls are designed assuming unit weight of soil = 120 pcf and a friction angle = 30 degrees for foundation and retained soil.

The undisturbed or compacted soil depth in front of walls must not measure less than Kd + Ft + 1 foot as measured upwards from bottom of key.

Retaining walls are detailed to be placed on grades up to 10% with level footing, with no changes in reinforcing steel. Steeper grades can be accommodated by shortening Bars A and Bars B and increasing the length of legs of Bars U by the same amount. No change in quantities will be required.

Retaining walls may be placed on horizontal curves by adjusting lengths of Bars T and Bars H in the footing. Minor revisions to concrete quantities may be required as a result.

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

Texas Department of Transportation

Bridge Division Standard

SPREAD FOOTING RETAINING WALL MISCELLANEOUS DETAILS

RW(SF)

FILE: RW-SF-22.dgn	DN: TAR	CK: RLE	DW: JER	CK: TAR
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
8-22: Updated underdrain requirements.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		68

DATE: November 27, 2023
FILE: RW-SF-22_1.dgn

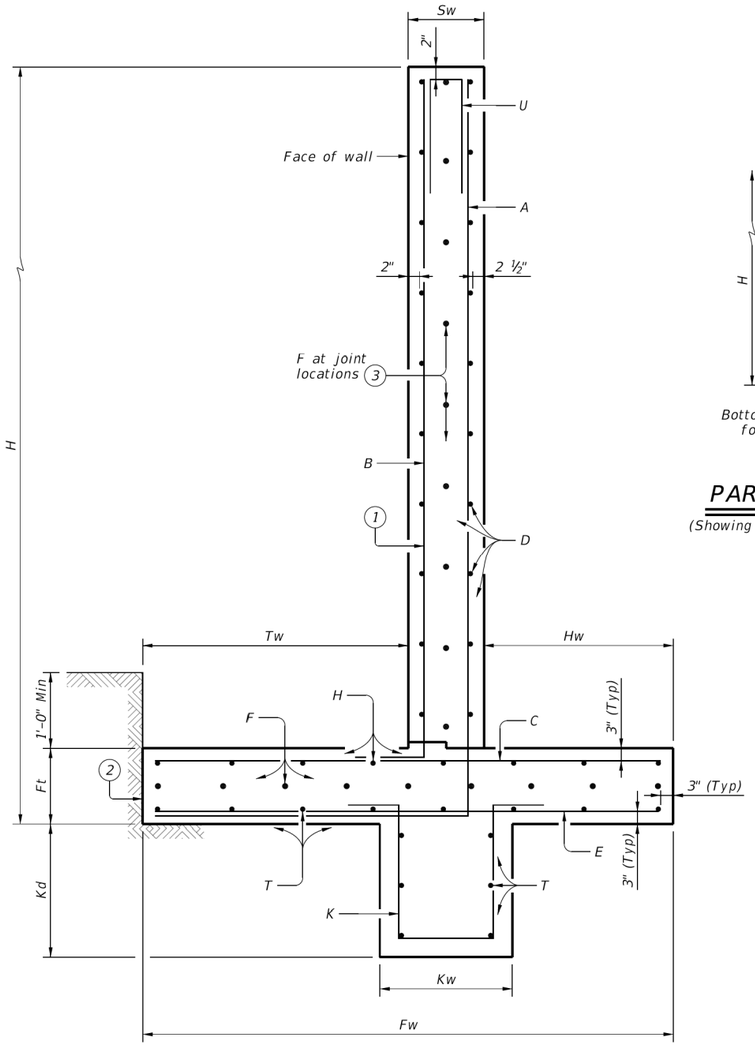
DATE: November 27, 2023
FILE: RW-SFC-22_1.dgn

PROPERTIES

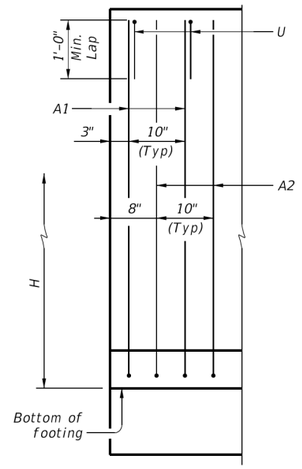
Wall Height "H"	WALL DIMENSIONS							MAX SOIL PRESS
(Ft)	Fw	Tw	Sw	Hw	Ft	Kw	Kd	T/SF
2	5'-0"	1'-0"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.218
4	5'-0"	1'-0"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.321
6	5'-6"	1'-6"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.395
8	7'-4"	1'-9"	1'-1"	4'-6"	1'-0"	1'-0"	1'-0"	0.500
10	8'-8"	2'-4"	1'-1"	5'-3"	1'-2"	1'-6"	1'-6"	0.590
12	10'-4"	2'-11"	1'-2"	6'-3"	1'-4"	1'-9"	1'-9"	0.684
14	11'-8"	3'-6"	1'-4"	6'-10"	1'-7"	2'-0"	2'-0"	0.769
16	13'-1"	4'-0"	1'-6"	7'-7"	1'-9"	2'-0"	2'-0"	0.853
18	14'-7"	4'-6"	1'-8"	8'-5"	1'-9"	2'-0"	2'-0"	0.937
20	16'-5"	5'-0"	1'-10"	9'-7"	2'-0"	2'-0"	2'-0"	1.039

REINFORCING STEEL FOR ONE 32' PANEL (DESIGN C)

Wall Height "H"	Bars A1					Bars A2					Bars B					Bars C					Bars E					Bars K					D (#5) at 12" Max.		Dowel F at 12" Max.		H (#5) at 12" Max.		T (#5) at 12" Max.		U ~ 39 #5 at 10" Max		QUANTITY FOR ONE 32' PANEL		Wall Height "H"
	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Weight	No.	Weight	No.	Weight	No.	Weight	Length	Weight	Conc (CY)	REINF (LB)	
(Ft)																																									(Ft)
2	39	#4	10"	3'-2"	83	39	#4	10"	3'-2"	83	39	#4	10"	1'-11"	50	39	#4	10"	4'-6"	118	39	#4	10"	4'-6"	118	39	#4	10"	3'-10"	100	4	132	8	65	6	198	6	198	2'-0"	82	8.3	1227	2
4	39	#4	10"	5'-2"	135	39	#4	10"	5'-2"	135	39	#4	10"	3'-11"	103	39	#4	10"	4'-6"	118	39	#4	10"	4'-6"	118	39	#4	10"	3'-10"	100	8	263	10	81	6	198	6	198	6'-0"	245	10.7	1694	4
6	39	#4	10"	7'-8"	200	39	#4	10"	7'-8"	200	39	#4	10"	5'-11"	155	39	#4	10"	5'-0"	131	39	#4	10"	5'-0"	131	39	#4	10"	3'-10"	100	12	395	12	97	6	198	6	198	8'-5"	343	13.7	2148	6
8	39	#4	10"	10'-0"	261	39	#4	10"	10'-0"	261	39	#4	10"	7'-11"	207	39	#4	10"	6'-10"	179	39	#4	10"	6'-10"	179	39	#4	10"	3'-10"	100	16	526	16	129	8	263	8	263	8'-6"	346	18.9	2714	8
10	39	#4	10"	12'-7"	512	39	#4	10"	12'-7"	328	39	#4	10"	9'-9"	255	39	#5	10"	8'-2"	333	39	#4	10"	8'-2"	213	39	#4	10"	5'-4"	139	20	658	20	161	10	329	10	329	8'-6"	346	26.0	3603	10
12	39	#5	10"	15'-3"	621	39	#4	10"	15'-3"	398	39	#4	10"	11'-7"	302	39	#5	10"	9'-10"	400	39	#4	10"	9'-10"	257	39	#4	10"	6'-1"	159	24	789	23	185	11	362	11	362	8'-7"	350	34.8	4185	12
14	39	#5	10"	18'-0"	733	39	#4	10"	18'-0"	469	39	#4	10"	13'-4"	348	39	#5	10"	11'-2"	455	39	#4	10"	11'-2"	291	39	#4	10"	6'-10"	179	28	920	27	217	13	428	13	428	8'-9"	356	46.3	4824	14
16	39	#5	10"	20'-8"	841	39	#5	10"	20'-8"	841	39	#4	10"	15'-2"	396	39	#6	10"	12'-7"	738	39	#4	10"	12'-7"	329	39	#4	10"	6'-10"	179	32	1052	30	241	14	460	14	460	8'-11"	363	57.3	5900	16
18	39	#6	10"	23'-4"	1367	39	#5	10"	23'-4"	950	39	#4	10"	17'-2"	448	39	#7	10"	14'-1"	1124	39	#4	10"	14'-1"	368	39	#4	10"	6'-10"	179	36	1183	34	273	16	526	16	526	9'-1"	370	67.1	7314	18
20	39	#6	10"	26'-0"	1524	39	#6	10"	26'-0"	1524	39	#4	10"	18'-11"	493	39	#7	10"	17'-11"	1429	39	#4	10"	17'-11"	467	39	#4	10"	6'-10"	179	38	1249	36	289	17	559	17	559	9'-3"	377	82.8	8649	20

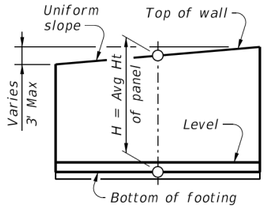


SECTION

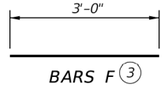


PARTIAL WALL ELEVATION

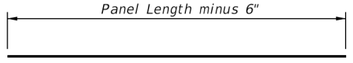
(Showing vertical reinforcing pattern in back face.)



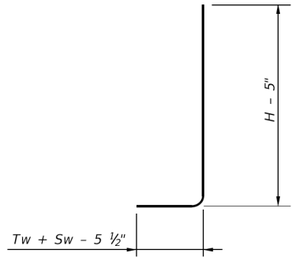
H DEFINITION



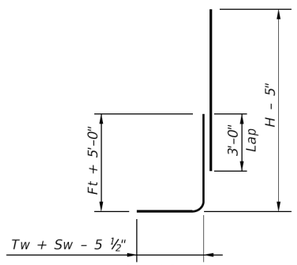
BARS F (3)



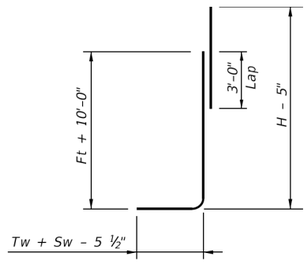
BARS D, H, and T



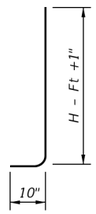
BARS A1 & A2



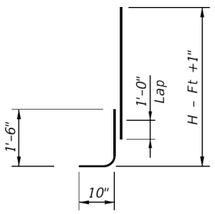
OPTIONAL BARS A1 (4)



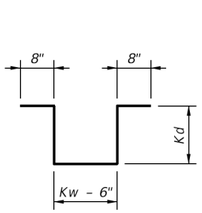
OPTIONAL BARS A2 (4)



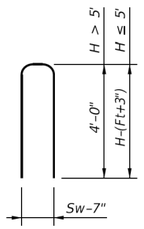
BARS B



OPTIONAL BARS B (4)



BARS K



BARS U

1. Place vertical bars inside of horizontal bars (Typical both faces).
2. Place footing toe against undisturbed soil.
3. See Retaining Wall Miscellaneous Details (RW(SF)) standard for size.
4. Optional bars splices not included in above table.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi.)
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Walls are designed assuming unit weight of soil = 120 pcf and a friction angle = 30 degrees for foundation and retained soil.
See Retaining Wall Miscellaneous Details (RW(SF)) standard for details and notes not shown.
These details provide designs for wall heights of 2 to 20 feet. For heights not shown, round up "H" to determine wall dimensions and reinforcing. (For example, a 9-foot high wall would use the 10-foot high dimensions and reinforcing.)
Quantities are based on "H" being average height of panel.
Retaining walls are designed to be coded as follows on Retaining Wall Layout Sheets:

C - 15 - 32
- 32: Panel length ~ 32 ft. is standard; 28 ft. requires special quantities.
- 15: Average height (H) of panel.
- C: Design A = No surcharge or slope above wall.
  Design B = No surcharge; slopes to 3:1.
  Design C = Traffic surcharge; no slope above wall.

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

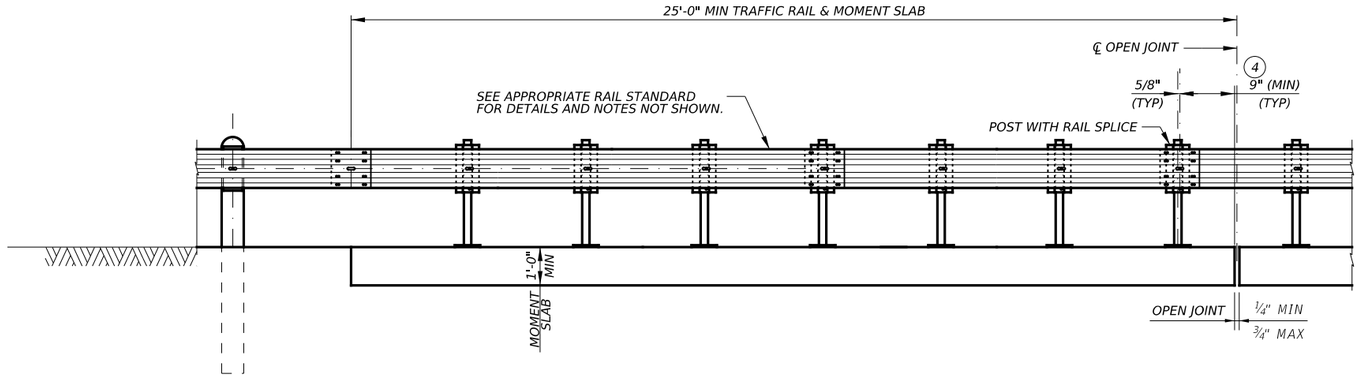
Texas Department of Transportation

Bridge Division Standard

SPREAD FOOTING RETAINING WALL

RW(SFC)

FILE: RW-SFC-22.dgn	DN: TAR	CK: RLE	DW: JER	CK: TAR
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
8-22: Constructability update.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		69



ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

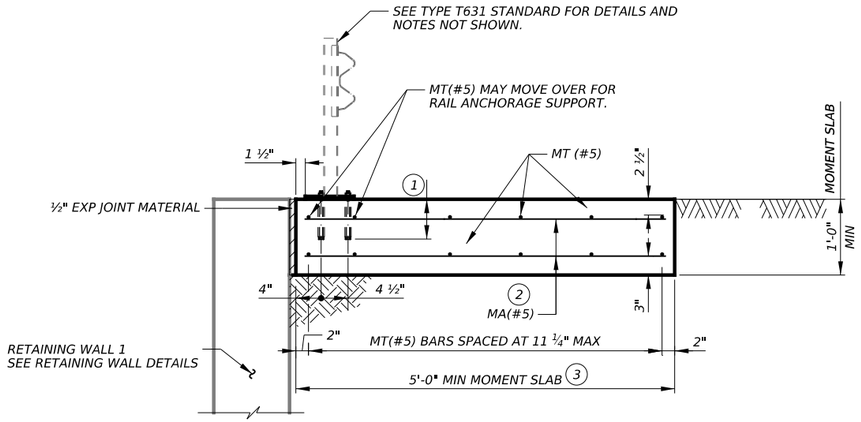
(REINFORCING NOT SHOWN FOR CLARITY.)

(1) 6 ¼" MINIMUM BOLT EMBEDMENT. REFER TO TXDOT STANDARD TYPE T631 FOR ALL INFORMATION RELATED TO ANCHOR BOLTS NOT SHOWN.

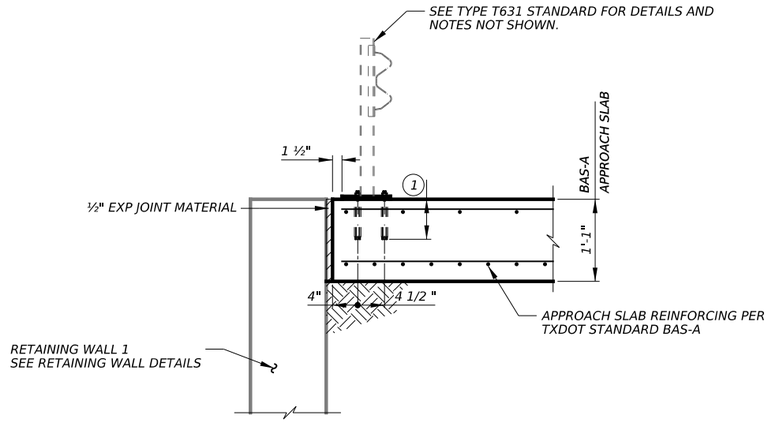
(2) MA(#5) SPACE LONGITUDINALLY ALONG MOMENT SLAB AT 12" MAX. (SPACED 2 ½" LONGITUDINALLY FROM OUTSIDE EDGE OF MOMENT SLAB).

(3) APPROXIMATE MOMENT SLAB CONCRETE = 0.19 CY/LF AND REINFORCEMENT = 22.4 LB/LF.

(4) THE POST NEAREST TO A SLAB JOINT OR END OF STRUCTURE MAY BE SHIFTED UP TO 9" IN ORDER TO SATISFY THE MINIMUM OFFSET DIMENSION. DRILL A NEW ¾" DIA HOLE ON THE CENTERLINE OF W-BEAM FOR SHIFTED POST. PAINT HOLE WITH TWO COATS OF ZINC-RICH PAINT CONFORMING TO THE ITEM "GALVANIZING". ALL OTHER POSTS MUST REMAIN ON THE TYPICAL SPACING.



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)



SECTION OF TRAFFIC RAIL ON BAS-A APPROACH SLAB

CONSTRUCTION NOTES:

LOCATE MOMENT SLAB (TRF-MS) OPEN JOINTS NEAR POSTS WITH RAIL SPLICES WITH SLOTTED HOLES MAINTAINING NO LESS THAN MINIMUM RAIL LENGTH. PROVIDE MOMENT SLAB (TRF-MS) WITH OPEN JOINTS AT NO GREATER THAN 100' SPACING UNLESS OTHERWISE SHOWN ON THE PLANS OR APPROVED BY THE ENGINEER.

MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE.
PROVIDE GRADE 60 REINFORCING STEEL.
PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED OR GALVANIZED ~ #5 = 2'-4"

GENERAL NOTES:

USE OF THESE DETAILS WILL RESULT IN A MOMENT SLAB (TRF-MS) FOUNDATION THAT IS ACCEPTABLE FOR TRAFFIC RAILS WHICH ARE MASH TL-2, TL-3, OR TL-4 COMPLIANT.

THE FOUNDATION DESIGN RESISTANCE IS BASED ON THE CURRENT AASHTO BRIDGE RAILING REQUIREMENTS WITH THE ASSUMPTION OF FAIR TO GOOD SOIL SUPPORT CONDITIONS. POOR SOIL CONDITIONS WILL REQUIRE SUITABLY DEEPER AND/OR WIDER FOUNDATIONS.

SEE T631 RAIL STANDARD AND BAS-A APPROACH SLAB STANDARD FOR DETAILS AND NOTES NOT SHOWN.

PAYMENT FOR MOMENT SLAB (TRF-MS) WILL BE BY CLASS "C" CONCRETE FOR RAIL FOUNDATIONS.

THE ASSOCIATED BRIDGE RAILING WILL BE PAID FOR BY THE LINEAR FOOT WHICH INCLUDES STEEL SHAPES, FASTENERS, AND ANCHOR BOLTS.

EXCAVATION WILL BE SUBSIDIARY TO OTHER ITEMS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

Texas Department of Transportation

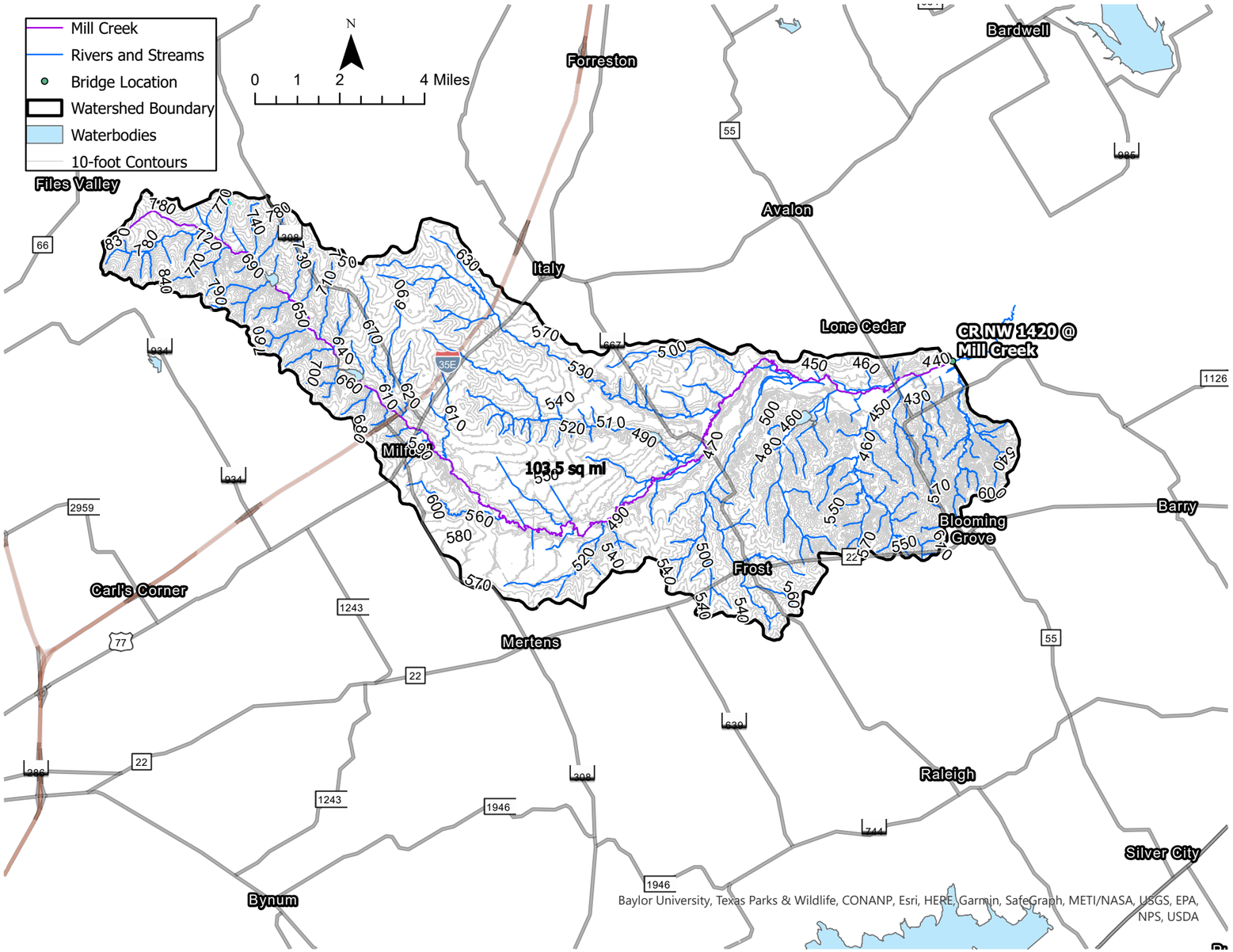
Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS
FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

TRF (MOD)

FILE: RL-TRF-20.dgn	DN: CMM	CK: WJC	DW: RA	CK: WJC
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
07-20: Added moment slab with rail foundation lengths.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		70

DATE: 6/21/2023 2:44:49 PM
FILE: DOCUMENT NAME



Hydrologic Data Summary Comparison

AEP	ARI	HMS Results (Design)	USGS Fact Sheet 022-01	Omega EM Regression Equations	TR-55 Graphical Peak
(%)	(yr)	(cfs)	(cfs)	(cfs)	(cfs)
50	2	9,860	-	4,079	-
20	5	13,662	-	8,981	-
10	10	17,152	-	12,818	-
4	25	22,369	21,582	19,145	-
2	50	26,702	27,556	24,808	25,008
1	100	31,432	34,270	31,526	29,621

NOTES:

1.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C150D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

2.) PEAK DISCHARGE RATES FOR MILL CREEK WERE COMPUTED USING HEC-HMS AND VALIDATED WITH REGIONAL REGRESSION EQUATIONS AND TR-55 GRAPHICAL PEAK.

3.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMINARY HYDROLOGIC/HYDRAULIC REPORT FOR MILL CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

4.) ELLIS, HILL, JOHNSON, & NAVARRO COUNTIES LIDAR FROM TNRIS (2022-01-13, 1M/50CM RESOLUTION)

5.) ELEVATIONS ARE BASED ON NAVD 1988

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-28-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

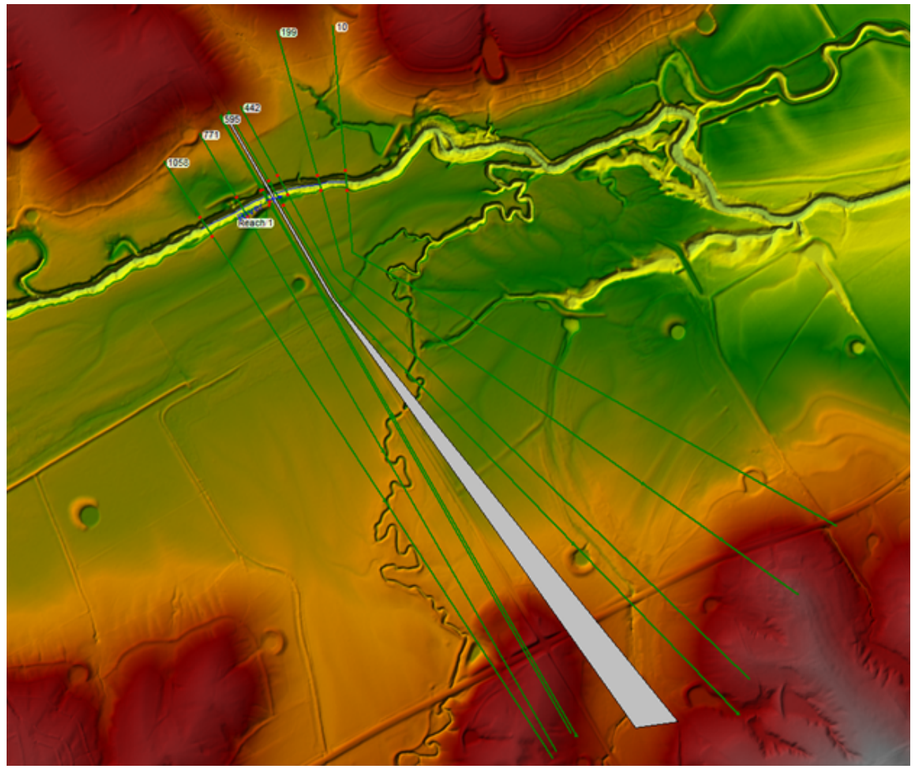
DRAINAGE AREA MAP
MILL CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		71

DATE: Monday, November 20, 2023 11:17:21 AM
FILE: 133_S_DAM.dgn

Cross-section Layout



NOTES:
1.) HEC-RAS v. 6.2 WAS USED FOR THIS HYDRAULIC ANALYSIS OF EXISTING AND PROPOSED CONDITIONS.

2.) THE DOWNSTREAM BOUNDARY CONDITION WAS SET USING NORMAL DEPTH WITH A SLOPE OF 0.001 FT/FT.

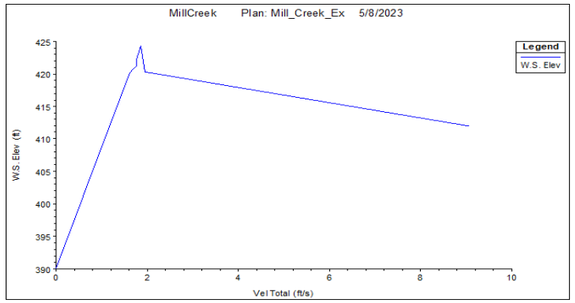
3.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C150D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

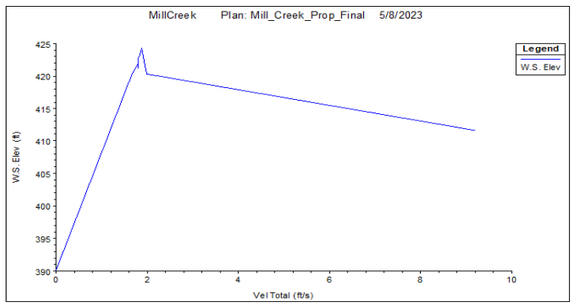
4.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMNARY HYDROLOGIC/HYDRAULIC REPORT FOR MILL CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

5.) COORDINATION WITH THE NAVARRO COUNTY FLOODPLAIN ADMINISTRATOR OCCURRED ON AUGUST 18TH, 2022.

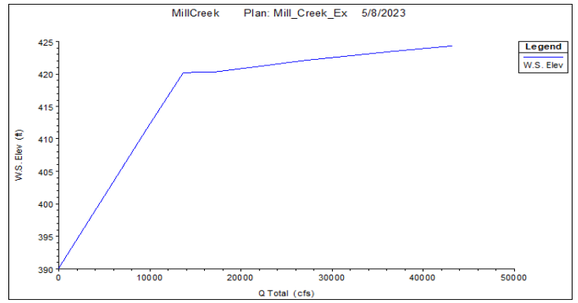
6.) ELEVATIONS ARE BASED ON NAVD 1988.

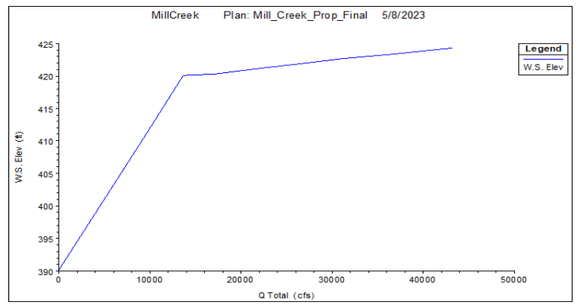
Velocity Curves (Existing and Proposed Conditions)



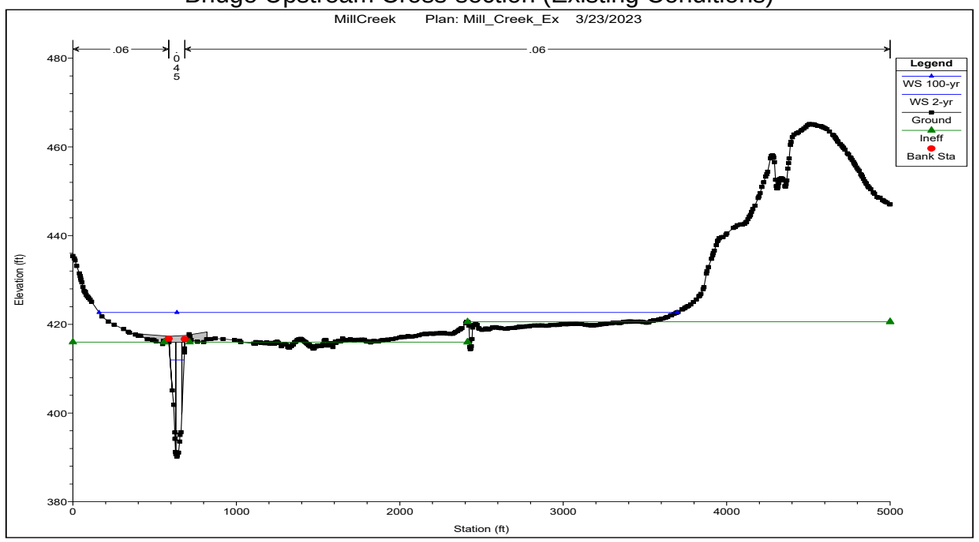


Conveyance Curves (Existing and Proposed Conditions)

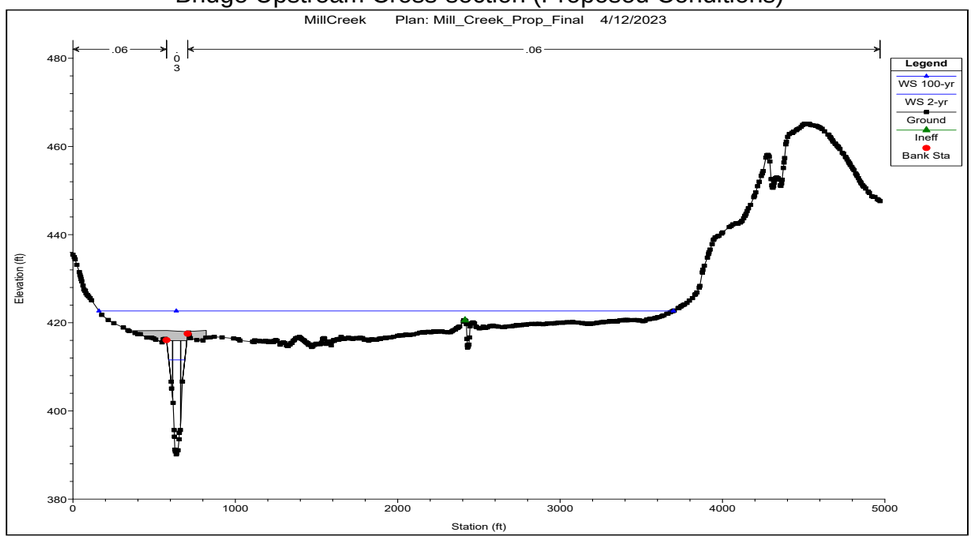


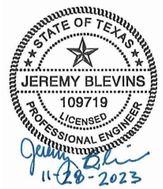


Bridge Upstream Cross-section (Existing Conditions)



Bridge Upstream Cross-section (Proposed Conditions)





NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

BRIDGE HYDRAULIC DATA
MILL CREEK

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		72

DATE: Monday, November 20, 2023 11:17:27 AM
FILE: 133_S_BHD_01.dgn
11:17:27 AM

CK:
DW:
CK:
DN:

Existing Conditions HEC-RAS Results

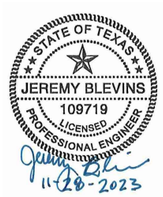
HEC-RAS Plan: Mill_Creek_Ex River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1058	2-yr	9860.20	388.47	414.02	405.23	414.75	0.001707	6.87	1521.35	352.13	0.33
Reach 1	1058	5-yr	13662.40	388.47	420.30	407.20	420.35	0.000212	2.67	11030.85	2664.27	0.12
Reach 1	1058	10-yr	17152.20	388.47	420.55	408.83	420.63	0.000291	3.16	11696.24	2711.53	0.14
Reach 1	1058	25-yr	22369.00	388.47	421.49	411.10	421.57	0.000299	3.34	14240.03	2821.51	0.15
Reach 1	1058	50-yr	26701.60	388.47	422.18	412.98	422.26	0.000303	3.46	16131.57	2924.79	0.15
Reach 1	1058	100-yr	31431.70	388.47	422.87	417.91	422.95	0.000306	3.57	18036.95	3099.45	0.15
Reach 1	771	2-yr	9860.20	387.82	412.80	405.38	413.99	0.003888	8.76	1153.18	228.82	0.49
Reach 1	771	5-yr	13662.40	387.82	420.24	408.79	420.29	0.000218	2.68	10715.61	2444.81	0.13
Reach 1	771	10-yr	17152.20	387.82	420.46	411.30	420.54	0.000303	3.20	11252.79	2470.50	0.15
Reach 1	771	25-yr	22369.00	387.82	421.40	414.60	421.48	0.000307	3.35	14223.25	3069.93	0.15
Reach 1	771	50-yr	26701.60	387.82	422.09	416.44	422.17	0.000314	3.49	16487.62	3456.27	0.15
Reach 1	771	100-yr	31431.70	387.82	422.78	417.41	422.86	0.000312	3.59	18913.21	3565.74	0.15
Reach 1	595	2-yr	9860.20	390.10	412.35	404.50	413.43	0.002427	8.34	1181.62	86.47	0.40
Reach 1	595	5-yr	13662.40	390.10	420.15	406.94	420.24	0.000301	3.36	9052.68	2916.94	0.15
Reach 1	595	10-yr	17152.20	390.10	420.34	408.87	420.47	0.000426	4.03	9469.94	3120.87	0.17
Reach 1	595	25-yr	22369.00	390.10	421.27	411.32	421.41	0.000463	4.36	13129.66	3418.69	0.18
Reach 1	595	50-yr	26701.60	390.10	421.98	413.17	422.10	0.000428	4.30	15576.93	3480.70	0.18
Reach 1	595	100-yr	31431.70	390.10	422.69	418.66	422.80	0.000401	4.27	18046.77	3538.54	0.17
Reach 1	582	2-yr	9860.20	390.14	412.19	404.73	413.37	0.002731	8.71	1131.82	85.77	0.42
Reach 1	582	5-yr	13662.40	390.14	420.13	407.23	420.24	0.000291	3.62	8955.55	2981.23	0.15
Reach 1	582	10-yr	17152.20	390.14	420.31	409.20	420.46	0.000415	4.35	9349.16	3065.92	0.17
Reach 1	582	25-yr	22369.00	390.14	421.25	411.77	421.40	0.000449	4.67	13097.50	3403.63	0.18
Reach 1	582	50-yr	26701.60	390.14	421.96	418.42	422.09	0.000418	4.61	15556.13	3479.77	0.18
Reach 1	582	100-yr	31431.70	390.14	422.67	418.83	422.79	0.000393	4.58	18039.04	3538.18	0.17
Reach 1	570		Bridge									
Reach 1	513	2-yr	9860.20	390.14	411.72	404.73	412.99	0.003007	9.03	1092.09	84.37	0.44
Reach 1	513	5-yr	13662.40	390.14	420.10	407.23	420.16	0.000176	2.81	13154.98	3535.62	0.11
Reach 1	513	10-yr	17152.20	390.14	420.28	409.21	420.35	0.000248	3.36	13754.13	3550.29	0.13
Reach 1	513	25-yr	22369.00	390.14	421.23	411.76	421.29	0.000242	3.42	17049.87	3660.61	0.13
Reach 1	513	50-yr	26701.60	390.14	421.94	418.26	422.00	0.000240	3.49	19607.13	3830.04	0.13
Reach 1	513	100-yr	31431.70	390.14	422.65	415.47	422.71	0.000228	3.48	22888.66	3919.22	0.13
Reach 1	442	2-yr	9860.20	389.98	411.25	405.36	412.69	0.003833	9.64	1023.30	87.93	0.50
Reach 1	442	5-yr	13662.40	389.98	420.10	407.93	420.14	0.000180	2.43	13324.35	3463.38	0.11
Reach 1	442	10-yr	17152.20	389.98	420.27	409.89	420.32	0.000256	2.92	13918.29	3498.70	0.14
Reach 1	442	25-yr	22369.00	389.98	421.21	412.53	421.27	0.000247	3.00	17315.37	3661.97	0.14
Reach 1	442	50-yr	26701.60	389.98	421.92	418.05	421.98	0.000237	3.03	19941.58	3716.84	0.13
Reach 1	442	100-yr	31431.70	389.98	422.63	418.47	422.68	0.000228	3.06	22608.00	3808.43	0.13
Reach 1	199	2-yr	9860.20	388.34	409.01	405.22	411.25	0.006644	12.00	821.90	73.48	0.63
Reach 1	199	5-yr	13662.40	388.34	420.07	407.84	420.10	0.000127	2.23	16449.20	4220.65	0.09
Reach 1	199	10-yr	17152.20	388.34	420.23	409.90	420.27	0.000179	2.67	17120.92	4227.18	0.11
Reach 1	199	25-yr	22369.00	388.34	421.18	412.52	421.21	0.000168	2.68	21209.44	4386.52	0.11
Reach 1	199	50-yr	26701.60	388.34	421.89	418.28	421.92	0.000165	2.72	24351.17	4457.23	0.11
Reach 1	199	100-yr	31431.70	388.34	422.60	418.71	422.63	0.000159	2.74	27536.06	4502.16	0.11
Reach 1	10	2-yr	9860.20	388.31	404.36	404.36	409.11	0.016956	17.48	564.16	59.32	1.00
Reach 1	10	5-yr	13662.40	388.31	420.06	407.36	420.07	0.000070	1.37	20905.98	4353.60	0.07
Reach 1	10	10-yr	17152.20	388.31	420.22	409.14	420.23	0.000100	1.65	21586.36	4362.97	0.08
Reach 1	10	25-yr	22369.00	388.31	421.16	411.50	421.18	0.000100	1.74	25738.90	4416.39	0.08
Reach 1	10	50-yr	26701.60	388.31	421.87	413.22	421.89	0.000100	1.80	28892.84	4468.29	0.09
Reach 1	10	100-yr	31431.70	388.31	422.58	417.75	422.60	0.000100	1.86	32115.97	4606.72	0.09

Proposed Conditions HEC-RAS Results

HEC-RAS Plan: Mill_Creek_Prop_Final River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1058	2-yr	9860.20	388.47	413.59	405.23	414.38	0.001872	7.14	1397.74	239.57	0.35
Reach 1	1058	5-yr	13662.40	388.47	420.27	407.20	420.33	0.000216	2.69	10962.14	2661.13	0.12
Reach 1	1058	10-yr	17152.20	388.47	420.52	408.83	420.60	0.000295	3.18	11611.62	2708.36	0.15
Reach 1	1058	25-yr	22369.00	388.47	421.47	411.10	421.55	0.000302	3.35	14184.97	2820.56	0.15
Reach 1	1058	50-yr	26701.60	388.47	422.16	412.98	422.25	0.000305	3.47	16092.07	2922.49	0.15
Reach 1	1058	100-yr	31431.70	388.47	422.86	417.91	422.94	0.000307	3.58	18008.62	3096.38	0.15
Reach 1	771	2-yr	9860.20	387.82	412.27	405.38	413.61	0.003476	9.27	1067.22	176.46	0.52
Reach 1	771	5-yr	13662.40	387.82	420.20	408.79	420.27	0.000199	2.88	10635.04	2437.80	0.14
Reach 1	771	10-yr	17152.20	387.82	420.42	411.30	420.51	0.000280	3.45	11146.53	2462.86	0.16
Reach 1	771	25-yr	22369.00	387.82	421.37	414.79	421.46	0.000285	3.63	14121.49	3059.81	0.16
Reach 1	771	50-yr	26701.60	387.82	422.06	416.43	422.16	0.000293	3.80	16390.67	3450.31	0.17
Reach 1	771	100-yr	31431.70	387.82	422.76	417.41	422.85	0.000293	3.90	18831.20	3563.16	0.17
Reach 1	595	2-yr	9860.20	390.10	411.97	404.50	413.05	0.002218	8.34	1182.46	101.09	0.43
Reach 1	595	5-yr	13662.40	390.10	420.12	406.94	420.23	0.000240	3.48	9124.57	2880.52	0.15
Reach 1	595	10-yr	17152.20	390.10	420.30	409.08	420.45	0.000345	4.20	9513.20	3056.21	0.18
Reach 1	595	25-yr	22369.00	390.10	421.23	411.72	421.40	0.000387	4.62	13121.76	3410.42	0.19
Reach 1	595	50-yr	26701.60	390.10	421.94	413.54	422.10	0.000367	4.61	15587.59	3477.29	0.19
Reach 1	595	100-yr	31431.70	390.10	422.65	418.59	422.79	0.000349	4.62	18076.00	3535.41	0.19
Reach 1	582	2-yr	9860.20	390.14	411.84	404.72	413.00	0.002453	8.63	1142.84	100.32	0.45
Reach 1	582	5-yr	13662.40	390.14	420.11	407.35	420.22	0.000244	3.52	9075.41	2969.67	0.15
Reach 1	582	10-yr	17152.20	390.14	420.29	409.49	420.45	0.000351	4.24	9458.04	3059.34	0.18
Reach 1	582	25-yr	22369.00	390.14	421.23	412.07	421.39	0.000386	4.62	13182.69	3401.97	0.19
Reach 1	582	50-yr	26701.60	390.14	421.94	418.20	422.09	0.000366	4.61	15645.73	3478.54	0.19
Reach 1	582	100-yr	31431.70	390.14	422.65	418.64	422.79	0.000348	4.62	18135.36	3535.80	0.19
Reach 1	570		Bridge									
Reach 1	513	2-yr	9860.20	390.14	411.49	404.73	412.72	0.002629	8.88	1110.78	98.24	0.47
Reach 1	513	5-yr	13662.40	390.14	420.09	407.34	420.15	0.000153	2.78	13277.07	3534.86	0.12
Reach 1	513	10-yr	17152.20	390.14	420.27	409.45	420.34	0.000217	3.34	13862.38	3549.20	0.14
Reach 1	513	25-yr	22369.00	390.14	421.21	412.02	421.29	0.000216	3.45	17156.13	3659.01	0.14
Reach 1	513	50-yr	26701.60	390.14	421.92	417.98	422.00	0.000216	3.55	19712.37	3824.40	0.15
Reach 1	513	100-yr	31431.70	390.14	422.63	418.45	422.70	0.000207	3.57	22992.73	3918.94	0.14
Reach 1	442	2-yr	9860.20	389.98	410.88	405.36	412.42	0.003267	9.95	991.21	85.83	0.52
Reach 1	442	5-yr	13662.40	389.98	420.09	407.93	420.13	0.000165	2.61	13291.70	3461.14	0.12
Reach 1	442	10-yr	17152.20	389.98	420.25	409.89	420.32	0.000235	3.15	13870.91	3496.28	0.15
Reach 1	442	25-yr	22369.00	389.98	421.20	412.53	421.27	0.000230	3.25	17267.99	3661.08	0.15
Reach 1	442	50-yr	26701.60	389.98	421.91	418.07	421.97	0.000223	3.30	19896.67	3716.38	0.15
Reach 1	442	100-yr	31431.70	389.98	422.62	418.53	422.68	0.000216	3.35	22564.32	3806.70	0.15
Reach 1	199	2-yr	9860.20	388.34	409.01	405.22	411.25	0.006644	12.00	821.90	73.48	0.63
Reach 1	199	5-yr	13662.40	388.34	420.07	407.84	420.10	0.000127	2.23	16449.20	4220.65	0.09
Reach 1	199	10-yr	17152.20	388.34	420.23	409.90	420.27	0.000179	2.67	17121.05	4227.18	0.11
Reach 1	199	25-yr	22369.00	388.34	421.18	412.52	421.21	0.000168	2.68	21209.44	4386.52	0.11
Reach 1	199	50-yr	26701.60	388.34	421.89	418.28	421.92	0.000165	2.72	24351.17	4457.23	0.11
Reach 1	199	100-yr	31431.70	388.34	422.60	418.71	422.63	0.000159	2.74	27536.06	4502.16	0.11
Reach 1	10	2-yr	9860.20	388.31	404.36	404.36	409.11	0.016956	17.48	564.16	59.32	1.00
Reach 1	10	5-yr	13662.40	388.31	420.06	407.36	420.07	0.000070	1.37	20905.98	4353.60	0.07
Reach 1	10	10-yr	17152.20	388.31	420.22	409.14	420.23	0.000100	1.65	21586.36	4362.97	0.08
Reach 1	10	25-yr	22369.00	388.31	421.16	411.50	421.18	0.000100	1.74	25738.90	4416.39	0.08
Reach 1	10	50-yr	26701.60	388.31	421.87	413.22	421.89	0.000100	1.80	28892.84	4468.29	0.09
Reach 1	10	100-yr	31431.70	388.31	422.58	417.75	422.60	0.000100	1.86	32115.97	4606.72	0.09



NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

BRIDGE HYDRAULIC DATA
MILL CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		73

DATE: Monday, November 20, 2023 11:17:33 AM
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	SCOUR CALCULATIONS				
	Design Flood				Check Flood
	25-yr	50-yr	100-yr	200-yr	500-yr
	MC	MC	MC	MC	MC
CONTRACTION SCOUR CONDITION					
D_{50} (mm)	0.036	0.036	0.036	0.036	0.036
Y1 (ft)	17.57	18.28	18.99	19.66	20.6
Ku	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	0.88	0.89	0.9	0.9	0.91
V1 (ft/s)	4.62	4.61	4.62	4.62	4.62
V1 / Vc	5.25	5.18	5.13	5.13	5.08
Condition	Live-Bed	Live-Bed	Live-Bed	Live-Bed	Live-Bed
LIVE-BED CONTRACTION SCOUR					
Q1 (cfs)	10725.88	11148.51	11598.68	12019.04	12584.91
Q2 (cfs)	7106.93	7122.73	7217.69	7334.49	7555.14
Y0 (ft)	14.97	15.69	16.39	17.06	17.99
Y1 (ft)	17.57	18.28	18.99	19.66	20.6
Y2 (ft)	12.49	12.59	12.79	13.02	13.45
W1 (ft)	132.21	132.21	132.21	132.21	132.21
W2 (ft)	130.05	130.05	130.05	130.05	130.05
K1	0.69	0.69	0.69	0.69	0.69
Ys (ft)	-2.48	-3.1	-3.6	-4.04	-4.54
PIER SCOUR					
V1 (ft/s)	6.15	6.13	6.12	6.1	6.09
Y1 (ft)	30.03	30.74	31.45	32.12	33.06
g (ft/s)	32.2	32.2	32.2	32.2	32.2
Fr	0.198	0.24	0.25	0.19	0.187
a (ft)	2	2	2	2	2
L (ft)	26	26	26	26	26
θ	0	0	0	0	0
K1	1	1	1	1	1
K2	1	1	1	1	1
K3	1.1	1.1	1.1	1.1	1.1
Red Factor					
Ys (ft)	5.66	5.67	5.68	5.69	5.71
Total Ys (ft)	5.66	5.67	5.68	5.69	5.71

Channel Material	
Channel Bed Description	45 ft of Clay, 15ft of Shale
D50	0.036 mm (avg)
Basis of Channel Bed Material Description	Soil Boring Samples
Non-Erodible Strata	< 4 in./100 blows (Non-Erodible)

Summary of Return Periods	
DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN CHECK FLOOD	500-year

Summary of Scour Calculations					
Storm (-yr)	25	50	100	200	500
Contraction Scour (ft)	-2.48	-3.1	-3.6	-4.04	-4.54
Pier Scour (ft)	5.66	5.67	5.68	5.69	5.71
Total Scour (ft)	5.66	5.67	5.68	5.69	5.71

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Upstream Approach River Station 595															
A (sqft)		2322.75			2417.26			2511.09			2599.44		2566.8	2722.85	18544.69
WP (ft)		146.37			146.37			146.37			146.37		448.81	146.37	3067.36
n	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06
Q (cfs)		10725.88			11148.51			11598.68			12019.04		3602.7	12584.91	27010.8
V (ft/s)		4.62			4.61			4.62			4.62		1.4	4.62	1.46
y (ft)															
W (ft)		132.21			132.21			132.21			132.21		448.41	132.21	3062.37
WSEL (ft)		421.23			421.94			422.65			423.32			424.26	
Vavg (ft/s)		1.7			1.71			1.74			1.77			1.81	

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Contracted Section at Bridge River Station 582															
A (sqft)		2288.09			2381.03			2473.36			2560.31		2520.61	2681.7	18679.71
WP (ft)		143.88			143.88			143.88			143.88		446.39	143.88	3068.57
n	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06
Q (cfs)		10559.61			10984.63			11423.44			11823.31		3503.67	12395.61	27299.12
V (ft/s)		4.62			4.61			4.62			4.62		1.39	4.62	1.46
y (ft)															
W (ft)		130.05			130.05			130.05			130.05		446.22	130.05	3064.63
WSEL (ft)		421.23			421.94			422.65			423.32			424.25	
Vavg (ft/s)		1.7			1.71			1.73			1.76			1.81	

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-28-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
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Texas Department of Transportation

CR NW 1420

BRIDGE SCOUR DATA
MILL CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		74

DATE: Monday, November 20, 2023 11:17:39 AM
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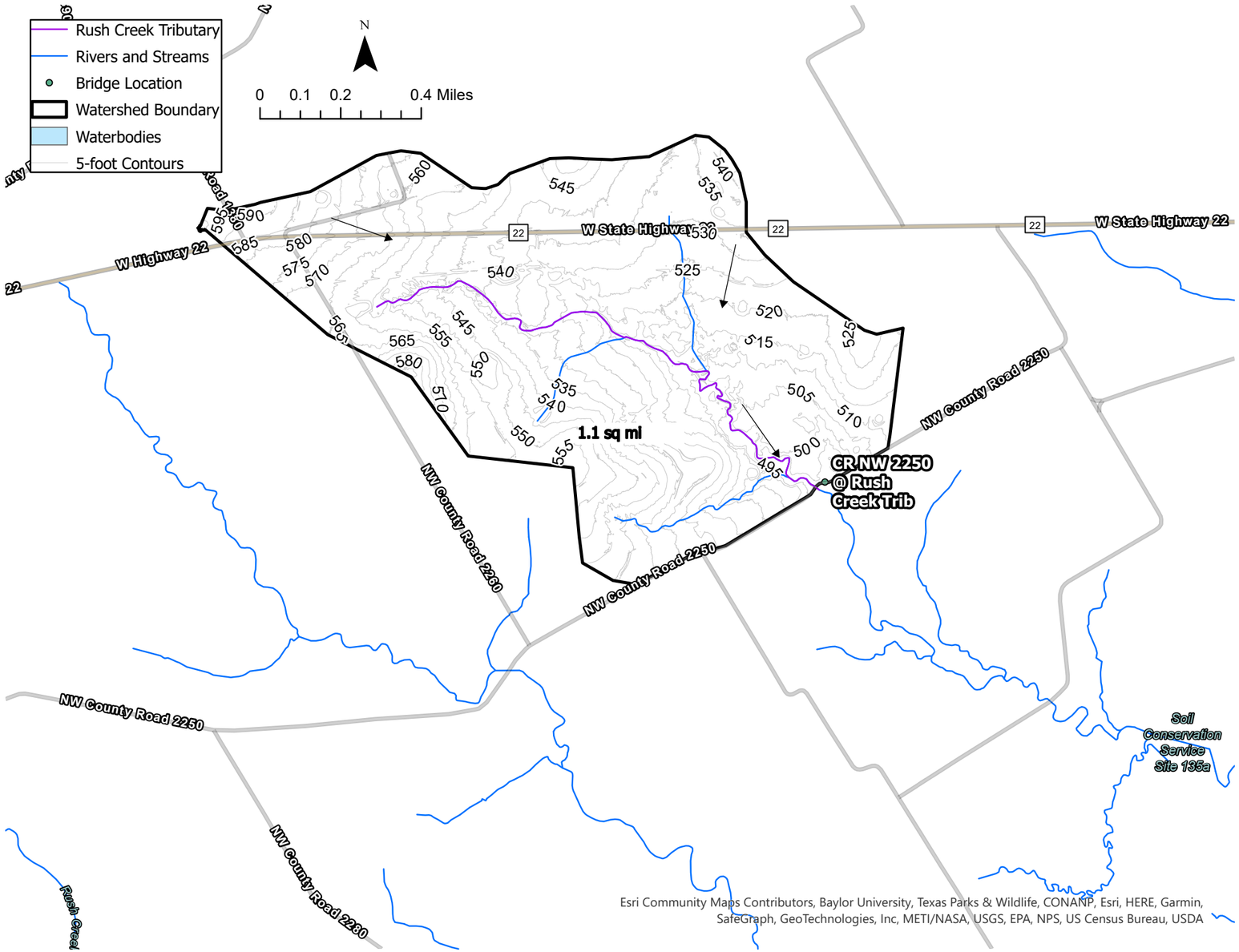

Hydrologic Data Summary Comparison

AEP	ARI	HMS Results (Design)	USGS Fact Sheet 022-01	Omega EM Regression Equations	TR-55 Graphical Peak
(%)	(yr)	(cfs)	(cfs)	(cfs)	(cfs)
50	2	451	-	263	-
20	5	615	-	497	-
10	10	761	-	659	-
4	25	973	1,228	897	-
2	50	1,142	1,545	1,092	1,676
1	100	1,326	1,890	1,316	2,411

NOTES:

1.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0350D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

2.) PEAK DISCHARGE RATES FOR RUSH CREEK TRIBUTARY WERE COMPUTED USING HEC-HMS AND VALIDATED WITH REGIONAL REGRESSION EQUATIONS AND TR-55 GRAPHICAL PEAK.

3.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMINARY HYDROLOGIC/HYDRAULIC REPORT FOR RUSH CREEK TRIBUTARY" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

4.) ELLIS, HILL, JOHNSON, & NAVARRO COUNTIES LIDAR FROM TNRIS (2022-01-13, 1M/50CM RESOLUTION)

5.) ELEVATIONS ARE BASED ON NAVD 1988

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-20-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

DRAINAGE AREA MAP
RUSH CREEK TRIBUTARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		75

DATE: Monday, November 20, 2023 11:51:34 AM
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NOTES:
1.) HEC-RAS v. 6.2 WAS USED FOR THIS HYDRAULIC ANALYSIS OF EXISTING AND PROPOSED CONDITIONS.

2.) THE DOWNSTREAM BOUNDARY CONDITION WAS SET USING NORMAL DEPTH WITH A SLOPE OF 0.003 FT/FT.

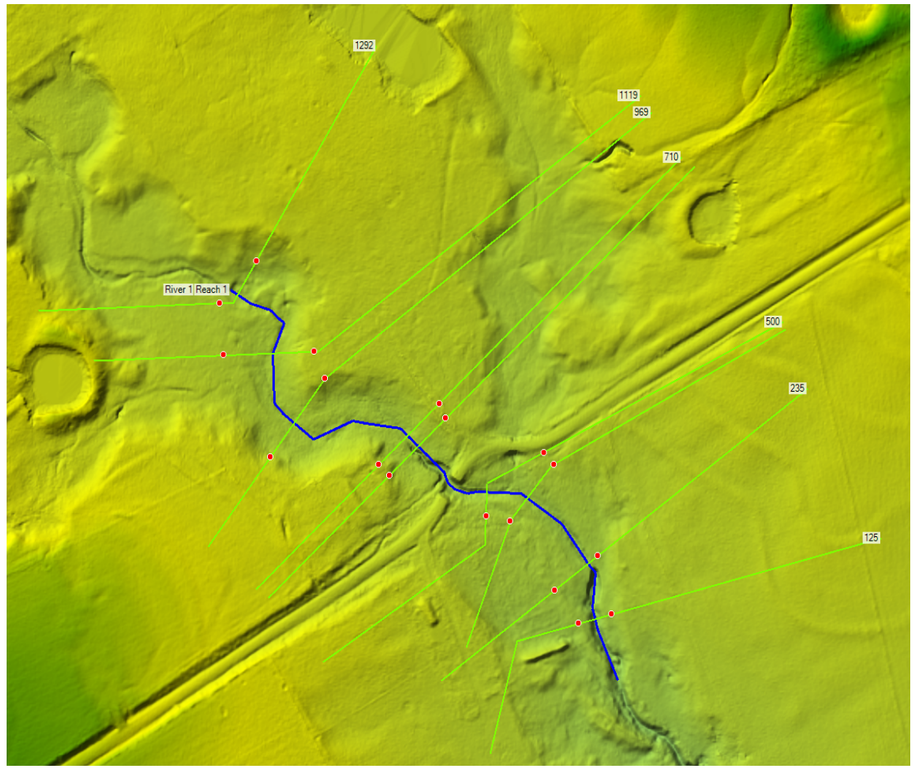
3.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0350D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

4.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMNARY HYDROLOGIC/HYDRAULIC REPORT FOR RUSH CREEK TRIBUTARY" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

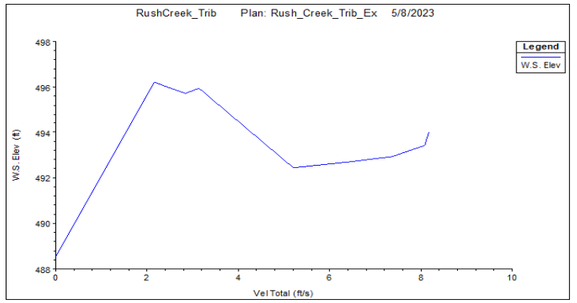
5.) COORDINATION WITH THE NAVARRO COUNTY FLOODPLAIN ADMINISTRATOR OCCURRED ON AUGUST 18TH, 2022.

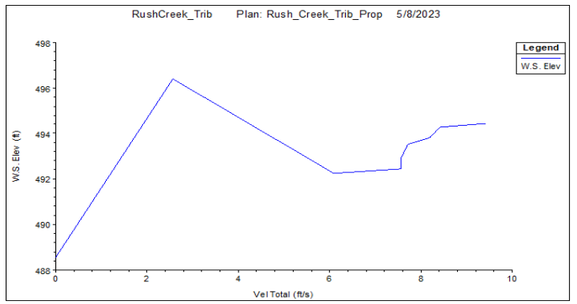
6.) ELEVATIONS ARE BASED ON NAVD 1988.

Cross-Section Layout

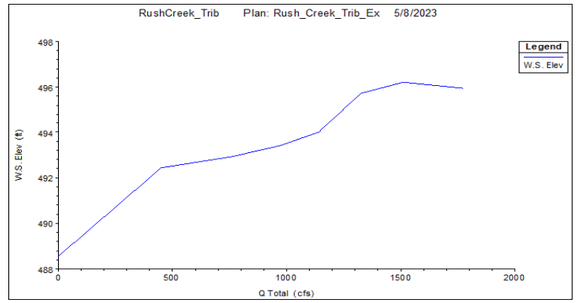


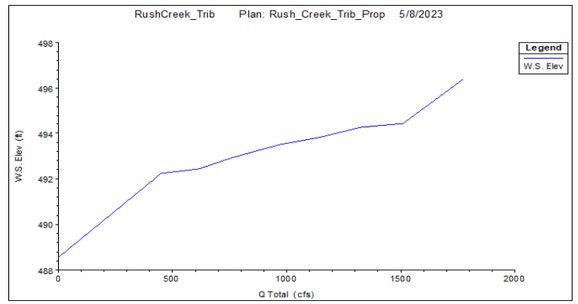
Velocity Curves (Existing and Proposed Conditions)



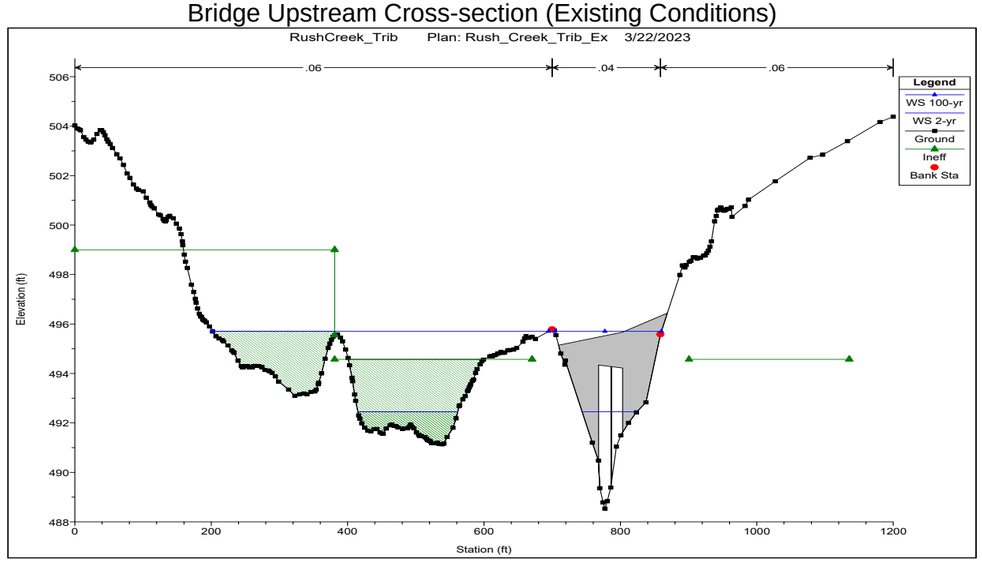


Conveyance Curves (Existing and Proposed Conditions)

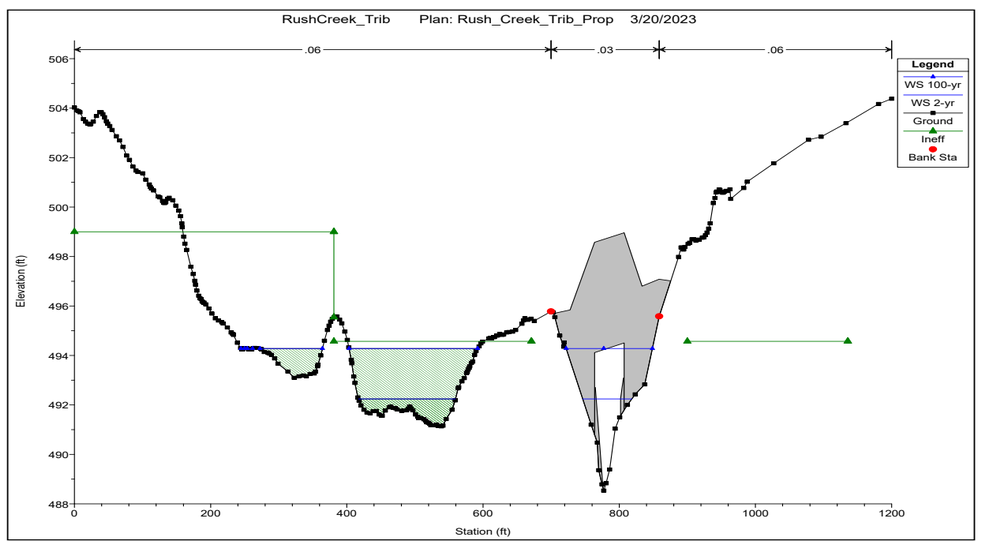




Bridge Upstream Cross-section (Existing Conditions)



Bridge Upstream Cross-section (Proposed Conditions)



STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-28-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

BRIDGE HYDRAULIC DATA
RUSH CREEK TRIBUTARY

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		76

DATE: Monday, November 20, 2023 11:51:40 AM
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DW:
CK:
DW:

DATE: Monday, November 20, 2023 11:51:45 AM
FILE: 136_S_BHD_02.dgn 11:51:45 AM

Existing Conditions HEC-RAS Results

HEC-RAS Plan: Rush_Creek_Trib_Ex River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1292	2-yr	450.80	490.94	494.22	492.41	494.26	0.000768	1.72	286.65	226.22	0.21
Reach 1	1292	5-yr	614.60	490.94	494.64	492.66	494.69	0.000727	1.88	379.08	308.19	0.21
Reach 1	1292	10-yr	760.70	490.94	495.00	492.85	495.05	0.000641	1.92	528.73	381.18	0.20
Reach 1	1292	25-yr	972.80	490.94	495.53	493.11	495.57	0.000488	1.88	733.77	389.48	0.18
Reach 1	1292	50-yr	1141.70	490.94	495.97	493.33	496.01	0.000387	1.81	908.93	396.06	0.16
Reach 1	1292	100-yr	1326.30	490.94	496.43	493.53	496.46	0.000320	1.77	1090.48	402.76	0.15
Reach 1	1119	2-yr	450.80	491.24	493.98	492.88	494.05	0.002045	2.23	202.34	137.72	0.32
Reach 1	1119	5-yr	614.60	491.24	494.42	493.11	494.50	0.001776	2.34	263.10	182.20	0.30
Reach 1	1119	10-yr	760.70	491.24	494.79	493.31	494.88	0.001484	2.38	324.88	251.74	0.29
Reach 1	1119	25-yr	972.80	491.24	495.36	493.57	495.45	0.001102	2.35	443.79	322.70	0.26
Reach 1	1119	50-yr	1141.70	491.24	495.84	493.73	495.91	0.000857	2.28	565.39	417.02	0.23
Reach 1	1119	100-yr	1326.30	491.24	496.31	493.88	496.38	0.000690	2.22	709.37	485.44	0.21
Reach 1	969	2-yr	450.80	490.65	493.71	492.65	493.78	0.001637	2.14	210.94	148.40	0.29
Reach 1	969	5-yr	614.60	490.65	494.18	492.85	494.26	0.001401	2.26	271.68	214.66	0.28
Reach 1	969	10-yr	760.70	490.65	494.59	493.01	494.68	0.001229	2.33	326.64	284.19	0.27
Reach 1	969	25-yr	972.80	490.65	495.20	493.21	495.29	0.001010	2.36	411.79	353.32	0.25
Reach 1	969	50-yr	1141.70	490.65	495.70	493.36	495.78	0.000868	2.35	485.90	381.45	0.23
Reach 1	969	100-yr	1326.30	490.65	496.18	493.52	496.27	0.000785	2.35	563.52	452.96	0.22
Reach 1	710	2-yr	450.80	489.00	493.25	491.87	493.34	0.001731	2.34	192.38	256.97	0.30
Reach 1	710	5-yr	614.60	489.00	493.79	492.21	493.88	0.001546	2.46	249.70	374.97	0.29
Reach 1	710	10-yr	760.70	489.00	494.25	492.43	494.34	0.001347	2.50	304.02	416.63	0.28
Reach 1	710	25-yr	972.80	489.00	494.92	492.71	495.01	0.001089	2.50	389.49	477.42	0.26
Reach 1	710	50-yr	1141.70	489.00	495.46	492.89	495.55	0.000917	2.46	463.84	513.38	0.24
Reach 1	710	100-yr	1326.30	489.00	495.95	493.09	496.05	0.000926	2.46	538.28	634.31	0.24
Reach 1	680	2-yr	450.80	488.54	493.20	491.60	493.29	0.001756	2.33	193.84	294.37	0.30
Reach 1	680	5-yr	614.60	488.54	493.74	492.02	493.83	0.001518	2.43	253.38	355.22	0.29
Reach 1	680	10-yr	760.70	488.54	494.21	492.30	494.30	0.001317	2.46	309.83	399.53	0.28
Reach 1	680	25-yr	972.80	488.54	494.89	492.64	494.98	0.001018	2.36	470.91	515.06	0.25
Reach 1	680	50-yr	1141.70	488.54	495.45	492.86	495.51	0.000699	2.12	695.65	598.74	0.21
Reach 1	680	100-yr	1326.30	488.54	495.96	493.05	496.01	0.000516	1.95	933.08	667.26	0.18
Reach 1	572.7348		Bridge									
Reach 1	500	2-yr	450.80	488.77	492.15	491.12	492.24	0.002010	2.36	193.55	182.66	0.32
Reach 1	500	5-yr	614.60	488.77	492.31	491.33	492.44	0.002749	2.93	214.63	190.29	0.38
Reach 1	500	10-yr	760.70	488.77	492.49	491.51	492.66	0.003058	3.29	238.55	195.73	0.41
Reach 1	500	25-yr	972.80	488.77	492.70	491.73	492.92	0.003570	3.79	266.18	200.60	0.45
Reach 1	500	50-yr	1141.70	488.77	492.85	491.91	493.11	0.003944	4.16	285.72	214.94	0.47
Reach 1	500	100-yr	1326.30	488.77	492.99	492.09	493.30	0.004367	4.54	304.35	239.63	0.50
Reach 1	414	2-yr	450.80	487.98	492.08	490.93	492.13	0.001352	1.96	289.95	293.92	0.26
Reach 1	414	5-yr	614.60	487.98	492.21	491.15	492.29	0.001880	2.38	330.37	300.02	0.31
Reach 1	414	10-yr	760.70	487.98	492.40	491.32	492.48	0.002000	2.56	385.75	307.86	0.33
Reach 1	414	25-yr	972.80	487.98	492.61	491.64	492.71	0.002216	2.81	451.17	316.17	0.35
Reach 1	414	50-yr	1141.70	487.98	492.76	491.89	492.87	0.002352	2.98	499.57	321.83	0.36
Reach 1	414	100-yr	1326.30	487.98	492.91	492.03	493.03	0.002452	3.16	548.37	334.54	0.37
Reach 1	235	2-yr	450.80	487.19	490.12	490.12	490.55	0.024444	5.25	85.81	217.25	1.00
Reach 1	235	5-yr	614.60	487.19	490.36	490.36	490.60	0.013500	4.31	181.57	238.93	0.76
Reach 1	235	10-yr	760.70	487.19	490.50	490.36	490.76	0.012428	4.52	215.38	242.15	0.74
Reach 1	235	25-yr	972.80	487.19	490.75	490.49	491.00	0.009480	4.50	277.02	247.22	0.67
Reach 1	235	50-yr	1141.70	487.19	490.94	490.59	491.19	0.008110	4.53	323.60	250.53	0.63
Reach 1	235	100-yr	1326.30	487.19	491.13	490.69	491.38	0.007130	4.58	371.95	253.92	0.61
Reach 1	125	2-yr	450.80	484.11	489.52	487.79	489.68	0.003005	3.23	139.50	169.77	0.40
Reach 1	125	5-yr	614.60	484.11	489.74	488.44	489.89	0.002998	3.34	242.93	193.70	0.40
Reach 1	125	10-yr	760.70	484.11	489.97	488.88	490.13	0.003001	3.58	288.30	204.68	0.41
Reach 1	125	25-yr	972.80	484.11	490.25	489.29	490.44	0.003004	3.86	347.74	211.51	0.42
Reach 1	125	50-yr	1141.70	484.11	490.46	489.60	490.66	0.003004	4.06	392.14	217.05	0.42
Reach 1	125	100-yr	1326.30	484.11	490.67	489.78	490.88	0.003002	4.25	437.88	221.48	0.43

Proposed Conditions HEC-RAS Results

HEC-RAS Plan: Rush_Creek_Trib_Prop River: River 1 Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1292	2-yr	450.80	490.94	494.20	492.41	494.24	0.000792	1.73	282.87	222.42	0.21
Reach 1	1292	5-yr	614.60	490.94	494.62	492.66	494.67	0.000750	1.90	374.31	306.51	0.21
Reach 1	1292	10-yr	760.70	490.94	494.97	492.85	495.02	0.000671	1.96	517.54	380.68	0.20
Reach 1	1292	25-yr	972.80	490.94	495.45	493.11	495.50	0.000538	1.94	705.41	388.40	0.19
Reach 1	1292	50-yr	1141.70	490.94	495.83	493.33	495.88	0.000458	1.92	852.87	393.96	0.17
Reach 1	1292	100-yr	1326.30	490.94	496.27	493.53	496.31	0.000377	1.88	1026.52	400.41	0.16
Reach 1	1119	2-yr	450.80	491.24	493.95	492.88	494.03	0.002154	2.27	198.61	136.23	0.33
Reach 1	1119	5-yr	614.60	491.24	494.39	493.11	494.47	0.001851	2.37	258.91	176.27	0.31
Reach 1	1119	10-yr	760.70	491.24	494.76	493.31	494.85	0.001576	2.43	317.77	249.17	0.29
Reach 1	1119	25-yr	972.80	491.24	495.27	493.57	495.36	0.001238	2.45	423.28	311.30	0.27
Reach 1	1119	50-yr	1141.70	491.24	495.67	493.73	495.76	0.001042	2.44	519.77	386.40	0.25
Reach 1	1119	100-yr	1326.30	491.24	496.13	493.88	496.21	0.000829	2.37	651.87	462.44	0.23
Reach 1	969	2-yr	450.80	490.65	493.66	492.65	493.73	0.001795	2.20	204.75	141.14	0.30
Reach 1	969	5-yr	614.60	490.65	494.14	492.85	494.22	0.001491	2.31	266.18	209.79	0.28
Reach 1	969	10-yr	760.70	490.65	494.54	493.01	494.63	0.001314	2.38	319.43	278.17	0.27
Reach 1	969	25-yr	972.80	490.65	495.09	493.21	495.19	0.001130	2.46	396.08	346.96	0.26
Reach 1	969	50-yr	1141.70	490.65	495.50	493.36	495.60	0.001037	2.50	456.46	369.75	0.25
Reach 1	969	100-yr	1326.30	490.65	495.98	493.52	496.08	0.000922	2.50	530.77	408.85	0.24
Reach 1	710	2-yr	450.80	489.00	493.13	491.87	493.23	0.002093	2.51	179.88	223.15	0.33
Reach 1	710	5-yr	614.60	489.00	493.71	492.21	493.81	0.001709	2.55	240.87	368.54	0.31
Reach 1	710	10-yr	760.70	489.00	494.16	492.43	494.27	0.001486	2.59	293.73	408.74	0.29
Reach 1	710	25-yr	972.80	489.00	494.77	492.71	494.88	0.001262	2.63	369.73	471.53	0.28
Reach 1	710	50-yr	1141.70	489.00	495.21	492.89	495.32	0.001144	2.66	428.78	488.51	0.27
Reach 1	710	100-yr	1326.30	489.00	495.72	493.09	495.83	0.000989	2.64	502.42	569.57	0.25
Reach 1	680	2-yr	450.80	488.54	493.09	491.60	493.18	0.001192	2.48	181.59	264.96	0.33
Reach 1	680	5-yr	614.60	488.54	493.67	492.02	493.77	0.000935	2.50	245.39	349.12	0.30
Reach 1	680	10-yr	760.70	488.54	494.13	492.30	494.23	0.000809	2.53	300.24	390.69	0.29
Reach 1	680	25-yr	972.80	488.54	494.75	492.64	494.84	0.000690	2.54	416.92	490.39	0.27
Reach 1	680	50-yr	1141.70	488.54	495.20	492.86	495.28	0.000557	2.44	590.41	558.77	0.25
Reach 1	680	100-yr	1326.30	488.54	495.72	493.05	495.79	0.000412	2.25	821.26	652.28	0.22
Reach 1	572.7348		Bridge									
Reach 1	500	2-yr	450.80	488.77	492.13	491.10	492.22	0.001126	2.34	194.93	179.38	0.32
Reach 1	500	5-yr	614.60	488.77	492.28	491.31	492.41	0.001562	2.92	215.39	189.19	0.38
Reach 1	500	10-yr	760.70	488.77	492.46	491.49	492.63	0.001742	3.28	239.66	194.96	0.41
Reach 1	500	25-yr	972.80	488.77	492.66	491.71	492.88	0.002043	3.79	267.47	199.75	0.45
Reach 1	500	50-yr	1141.70	488.77	492.81	491.89	493.07	0.002264	4.16	287.17	211.83	0.48
Reach 1	500	100-yr	1326.30	488.77	492.95	492.07	493.26	0.002513	4.56	305.97	235.57	0.51
Reach 1	414	2-yr	450.80	487.98	492.08	490.93	492.13	0.001352	1.96	289.95	293.92	0.26
Reach 1	414	5-yr	614.60	487.98	492.21	491.15	492.29	0.001880	2.38	330.37	300.02	0.31
Reach 1	414	10-yr	760.70	487.98	492.40	491.32	492.48	0.002000	2.56	385.75	307.86	0.33
Reach 1	414	25-yr	972.80	487.98	492.61	491.64	492.71	0.002216	2.81	451.17	316.17	0.35
Reach 1	414	50-yr	1141.70	487.98	492.76	491.89	492.87	0.002352	2.98	499.57	321.83	0.36
Reach 1	414	100-yr	1326.30	487.98	492.91	492.03	493.03	0.002452	3.16	548.37	334.54	0.37
Reach 1	235	2-yr	450.80	487.19	490.12	490.12	490.55	0.024444	5.25	85.81	217.25	1.00
Reach 1	235	5-yr	614.60	487.19	490.36	490.36	490.60	0.013500	4.31	181.57	238.93	0.76
Reach 1	235	10-yr	760.70	487.19	490.50	490.36	490.76	0.012428	4.52	215.38	242.15	0.74
Reach 1	235	25-yr	972.80	487.19	490.75	490.49	491.00	0.009480	4.50	277.02	247.22	0.67
Reach 1	235	50-yr	1141.70	487.19	490.94	490.59	491.19	0.008110	4.53	323.60	250.53	0.63
Reach 1	235	100-yr	1326.30	487.19	491.13	490.69	491.38	0.007130	4.58	371.95	253.92	0.61
Reach 1	125	2-yr	450.80	484.11	489.52	487.79	489.68	0.003005	3.23	139.50	169.77	0.40
Reach 1	125	5-yr	614.60	484.11	489.74	488.44	489.89	0.002998	3.34	242.93	193.70	0.40
Reach 1	125	10-yr	760.70	484.11	489.97	488.88	490.13	0.003001	3.58	288.30	204.68	0.41
Reach 1	125	25-yr	972.80	484.11	490.25	489.29	490.44	0.003004	3.86	347.74	211.51	0.42
Reach 1	125	50-yr	1141.70	484.11	490.46	489.60	490.66	0.003004	4.06	392.14	217.05	0.42
Reach 1	125	100-yr	1326.30	484.11	490.67	489.78	490.88	0.003002	4.25	437.88	221.48	0.43

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-20-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

BRIDGE HYDRAULIC DATA
RUSH CREEK TRIBUTARY

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		77

	SCOUR CALCULATIONS				
	Design Flood				Check Flood
	25-yr	50-yr	100-yr	200-yr	500-yr
	MC	MC	MC	MC	MC
CONTRACTION SCOUR CONDITION					
D_{50} (mm)	0.057	0.057	0.057	0.057	0.057
Y1 (ft)	2.83	3.1	3.42	3.47	3.83
Ku	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	0.76	0.77	0.78	0.79	0.8
V1 (ft/s)	2.63	2.66	2.64	2.58	1.31
V1 / Vc	3.46	3.45	3.38	3.27	1.64
Condition	Live-Bed	Live-Bed	Live-Bed	Live-Bed	Live-Bed
LIVE-BED CONTRACTION SCOUR					
Q1 (cfs)	972.8	1147.7	1326.3	1509	855.47
Q2 (cfs)	972.8	1147.7	1326.3	1509	685.63
Y0 (ft)	2.9	3.2	6.24	23.59	5.11
Y1 (ft)	2.83	3.1	3.42	3.47	3.83
Y2 (ft)	6.04	6.89	11.53	31.89	9.36
W1 (ft)	130.63	138.45	147.12	169.02	169.77
W2 (ft)	43.5	43.49	25.27	6.79	35.3
K1	0.69	0.69	0.69	0.69	0.69
Ys (ft)	3.14	3.69	5.29	8.3	4.25
PIER SCOUR					
V1 (ft/s)					
Y1 (ft)					
g (ft/s)					
Fr					
a (ft)					
L (ft)					
θ					
K1					
K2					
K3					
Red Factor					
Ys (ft)					
Total Ys (ft)	3.14	3.69	5.29	8.3	4.25

Channel Material	
Channel Bed Description	15-20 ft of Clay, 40-45 ft of Shale
D50	0.057 mm (avg)
Basis of Channel Bed Material Description	Soil Boring Samples
Non-Erodible Strata	<4 in/100 blows (Non-Erodbile)

Summary of Return Periods	
DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN CHECK FLOOD	500-year

Summary of Scour Calculations					
Storm (-yr)	25	50	100	200	500
Contraction Scour (ft)	3.14	3.69	5.29	8.3	4.25
Pier Scour (ft)	0	0	0	0	0
Total Scour (ft)	3.14	3.69	5.29	8.3	4.25

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Upstream Approach River Station 710															
A (sqft)		369.73			428.78			502.42			585.72		1320.95	650.92	0.65
WP (ft)		131.32			138.95			147.91			169.99		488.89	170.81	3.95
n	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06	0.06	0.04	0.06
Q (cfs)		972.8			1141.7			1326.3			1509		920.26	855.47	0.07
V (ft/s)		2.63			2.66			2.64			2.58		0.7	1.31	0.11
y (ft)															
W (ft)		130.63			138.21			147.12			169.02		488.38	169.77	3.93
WSEL (ft)		494.77			495.21			495.72			496.24			496.62	
Vavg (ft/s)		2.63			2.66			2.64			2.58			0.9	

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Contracted Section at Bridge River Station 680															
A (sqft)		380.69			445.13			525.17			608.14		1479	657.62	5.62
WP (ft)		139.91			147.91			156.55			159.83		319.17	159.83	11.52
n	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06
Q (cfs)		965.68			1084.18			1183.66			1257.19		346.41	1427.92	1.47
V (ft/s)		2.54			2.44			2.25			2.07		0.62	2.17	0.26
y (ft)															
W (ft)		139.02			146.97			155.55			158.83		519.15	158.83	11.48
WSEL (ft)		494.75			495.2			495.72			496.25			496.56	
Vavg (ft/s)		2.33			1.93			1.61			1.41			1.45	

STATE OF TEXAS
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CR NW 2250

BRIDGE SCOUR DATA
RUSH CREEK TRIBUTARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		78

DATE: Monday, November 20, 2023 11:51:51 AM
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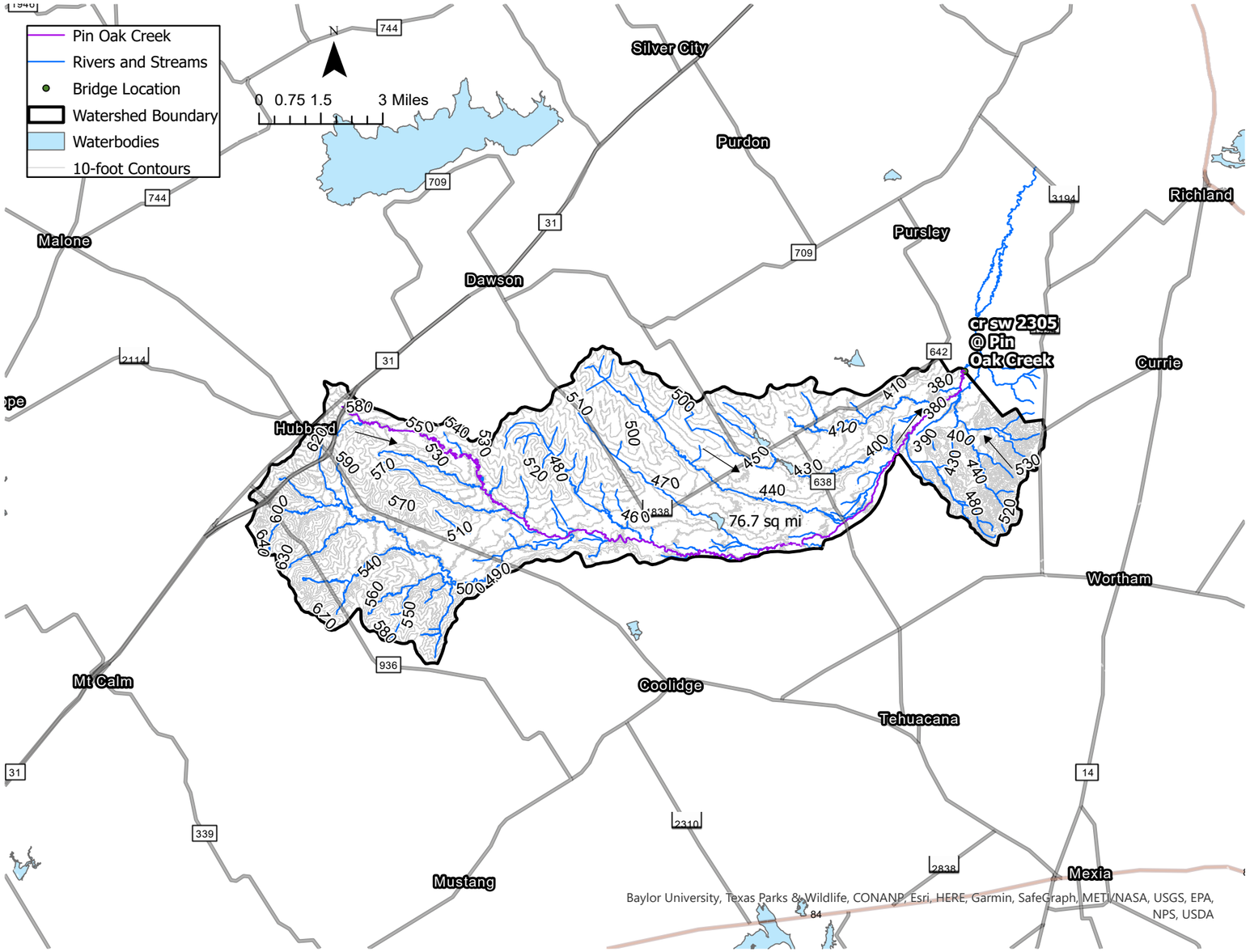

Hydrologic Data Summary Comparison					
AEP	ARI	HMS Results (Design)	USGS Fact Sheet 022-01	Omega EM Regression Equations	TR-55 Graphical Peak
(%)	(yr)	(cfs)	(cfs)	(cfs)	(cfs)
50	2	5,181	-	2,920	-
20	5	7,500	-	6,041	-
10	10	9,669	-	8,458	-
4	25	12,908	12,054	12,302	-
2	50	15,601	15,082	15,646	18,179
1	100	18,544	18,474	19,509	21,653

NOTES:

1.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0725D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

2.) PEAK DISCHARGE RATES FOR PIN OAK CREEK WERE COMPUTED USING HEC-HMS AND VALIDATED WITH REGIONAL REGRESSION EQUATIONS AND TR-55 GRAPHICAL PEAK.

3.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMINARY HYDROLOGIC/HYDRAULIC REPORT FOR PIN OAK CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

4.) ELLIS, HILL, JOHNSON, & NAVARRO COUNTIES LIDAR FROM TNRIS (2022-01-13, 1M/50CM RESOLUTION)

5.) ELEVATIONS ARE BASED ON NAVD 1988

STATE OF TEXAS
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CR SW 2305

DRAINAGE AREA MAP
PIN OAK CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		79

DATE: Monday, November 20, 2023 11:53:46 AM
FILE: 137_S_DAM.dgn

NOTES:
1.) HEC-RAS v. 6.2 WAS USED FOR THIS HYDRAULIC ANALYSIS OF EXISTING AND PROPOSED CONDITIONS.

2.) THE DOWNSTREAM BOUNDARY CONDITION WAS SET USING NORMAL DEPTH WITH A SLOPE OF 0.0001 FT/FT.

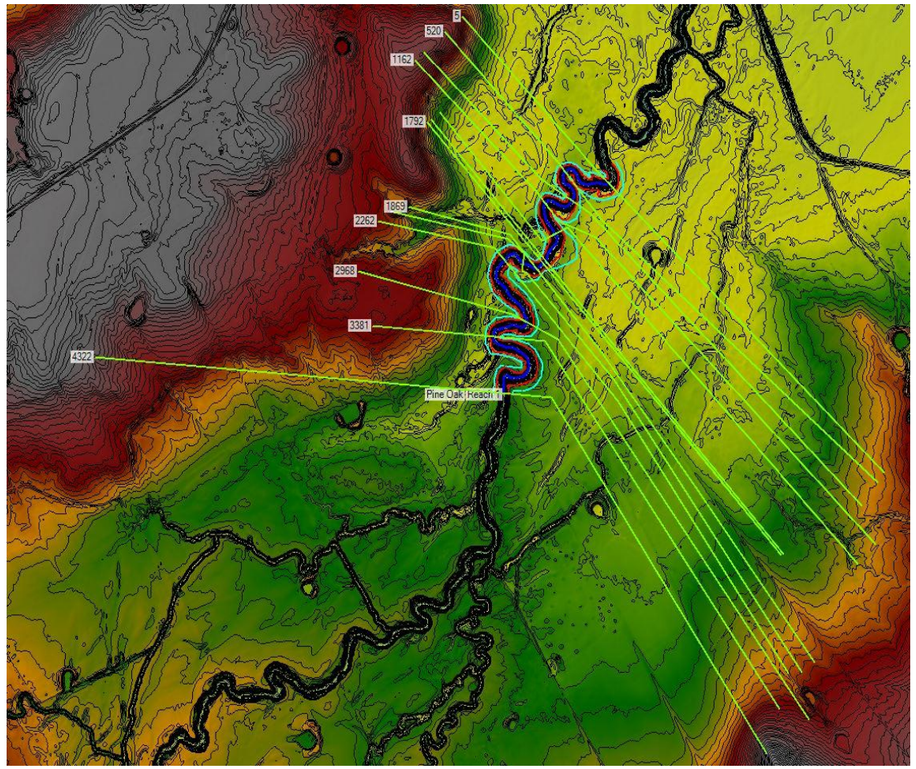
3.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0725D DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

4.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMNARY HYDROLOGIC/HYDRAULIC REPORT FOR PIN OAK CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

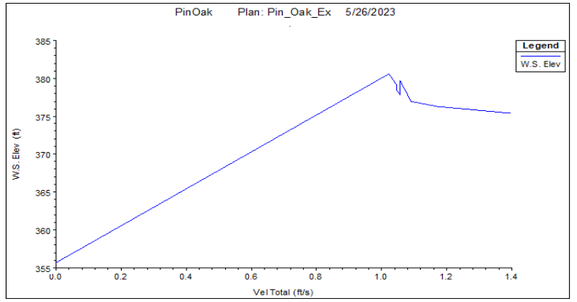
5.) COORDINATION WITH THE NAVARRO COUNTY FLOODPLAIN ADMINISTRATOR OCCURRED ON AUGUST 18TH, 2022.

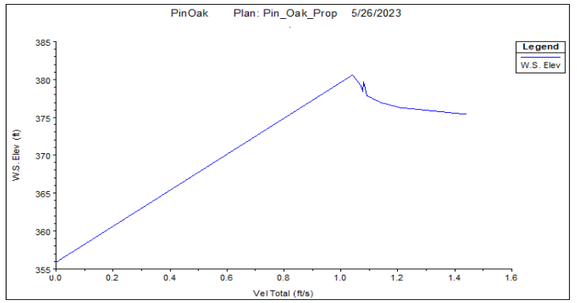
6.) ELEVATIONS ARE BASED ON NAVD 1988.

Cross-section Layout

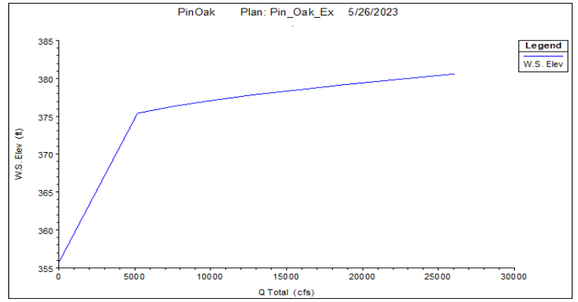


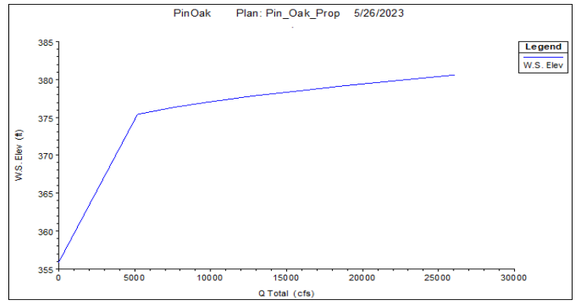
Velocity Curves (Existing and Proposed Conditions)



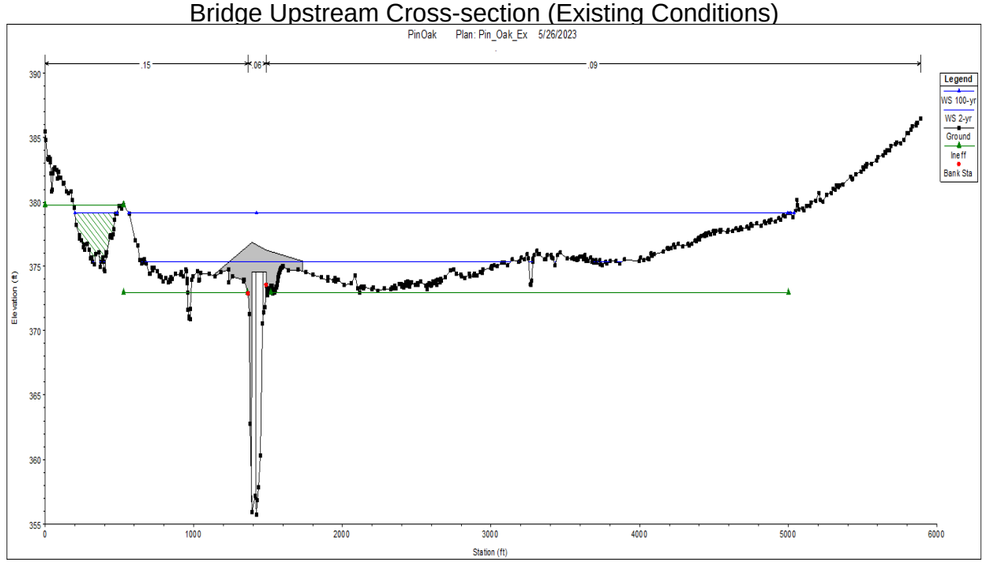


Conveyance Curves (Existing and Proposed Conditions)

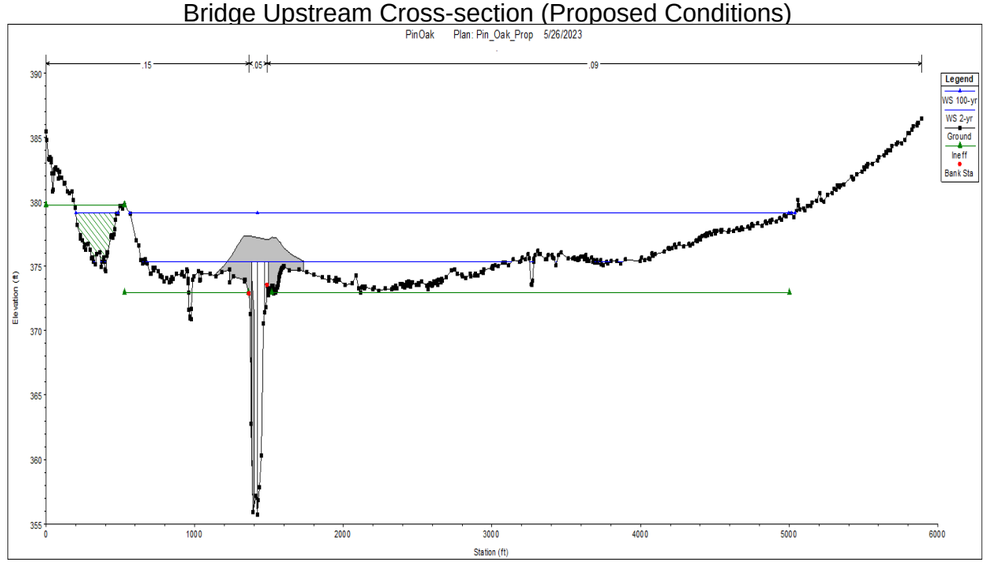




Bridge Upstream Cross-section (Existing Conditions)



Bridge Upstream Cross-section (Proposed Conditions)



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CR SW 2305

BRIDGE HYDRAULIC DATA
PIN OAK CREEK

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		80

DATE: Monday, November 20, 2023 11:53:51 AM
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Existing Conditions HEC-RAS Results

HEC-RAS Plan: Pin_Oak_Ex River: Pin Oak Reach: Pin Oak

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Pin Oak	4322	2-yr	5181.30	357.76	377.35	367.27	377.39	0.000472	2.31	6952.42	3689.40	0.13
Pin Oak	4322	5-yr	7499.50	357.76	378.23	369.54	378.26	0.000398	2.25	10362.88	4067.97	0.12
Pin Oak	4322	10-yr	9669.00	357.76	378.37	371.32	378.42	0.000578	2.74	10950.20	4119.13	0.15
Pin Oak	4322	25-yr	12907.80	357.76	379.11	373.32	379.15	0.000542	2.77	14095.97	4385.44	0.15
Pin Oak	4322	50-yr	15601.40	357.76	379.66	376.89	379.70	0.000511	2.78	16552.17	4564.81	0.14
Pin Oak	4322	100-yr	18544.30	357.76	380.22	377.28	380.25	0.000489	2.80	19128.96	4661.49	0.14
Pin Oak	3381	2-yr	5181.30	357.79	376.32	366.67	376.64	0.001412	4.64	1581.66	3010.66	0.23
Pin Oak	3381	5-yr	7499.50	357.79	376.90	368.58	377.44	0.002353	6.17	1927.41	3282.80	0.30
Pin Oak	3381	10-yr	9669.00	357.79	377.66	370.14	377.76	0.000779	3.69	8411.78	3443.14	0.18
Pin Oak	3381	25-yr	12907.80	357.79	378.46	372.38	378.54	0.000712	3.66	11249.66	3684.50	0.17
Pin Oak	3381	50-yr	15601.40	357.79	379.06	374.13	379.13	0.000663	3.63	13498.14	3863.10	0.16
Pin Oak	3381	100-yr	18544.30	357.79	379.66	377.08	379.72	0.000613	3.58	15837.75	3972.51	0.16
Pin Oak	2968	2-yr	5181.30	357.71	376.02	364.98	376.19	0.000725	3.36	2079.20	2896.94	0.17
Pin Oak	2968	5-yr	7499.50	357.71	376.77	366.65	376.87	0.000603	3.16	6606.50	3374.65	0.16
Pin Oak	2968	10-yr	9669.00	357.71	377.39	368.06	377.48	0.000591	3.23	8736.66	3471.86	0.16
Pin Oak	2968	25-yr	12907.80	357.71	378.20	370.07	378.28	0.000570	3.30	11615.83	3695.02	0.16
Pin Oak	2968	50-yr	15601.40	357.71	378.80	371.27	378.88	0.000552	3.34	13891.08	3839.56	0.15
Pin Oak	2968	100-yr	18544.30	357.71	379.41	372.46	379.48	0.000528	3.36	16289.21	4002.35	0.15
Pin Oak	2262	2-yr	5181.30	355.89	375.57	364.19	375.71	0.000656	3.08	2097.49	2645.88	0.16
Pin Oak	2262	5-yr	7499.50	355.89	376.47	365.85	376.56	0.000527	2.91	6758.82	3468.53	0.15
Pin Oak	2262	10-yr	9669.00	355.89	377.14	367.21	377.21	0.000503	2.94	9138.75	3679.06	0.15
Pin Oak	2262	25-yr	12907.80	355.89	377.99	368.93	378.06	0.000468	2.97	12390.28	3985.04	0.14
Pin Oak	2262	50-yr	15601.40	355.89	378.62	370.24	378.68	0.000441	2.97	14916.31	4170.30	0.14
Pin Oak	2262	100-yr	18544.30	355.89	379.25	371.77	379.30	0.000415	2.96	17538.28	4376.67	0.14
Pin Oak	2018	2-yr	5181.30	354.38	375.44	363.06	375.54	0.000630	2.49	2650.71	2829.44	0.15
Pin Oak	2018	5-yr	7499.50	354.38	376.37	365.04	376.43	0.000479	2.33	7428.12	3607.19	0.13
Pin Oak	2018	10-yr	9669.00	354.38	377.04	366.68	377.09	0.000454	2.37	9899.55	3888.41	0.13
Pin Oak	2018	25-yr	12907.80	354.38	377.89	370.01	377.94	0.000428	2.43	13304.74	4335.72	0.13
Pin Oak	2018	50-yr	15601.40	354.38	378.53	371.83	378.57	0.000402	2.44	15995.00	4528.48	0.13
Pin Oak	2018	100-yr	18544.30	354.38	379.16	372.66	379.20	0.000377	2.45	18797.18	4811.51	0.12
Pin Oak	1869	2-yr	5181.30	355.71	375.37	363.18	375.46	0.000457	2.67	4590.08	2707.67	0.13
Pin Oak	1869	5-yr	7499.50	355.71	376.28	364.80	376.36	0.000490	2.90	7568.05	3670.26	0.14
Pin Oak	1869	10-yr	9669.00	355.71	376.95	366.12	377.03	0.000471	2.94	10045.57	3948.56	0.14
Pin Oak	1869	25-yr	12907.80	355.71	377.82	367.91	377.88	0.000448	2.98	13392.73	4299.63	0.14
Pin Oak	1869	50-yr	15601.40	355.71	378.46	369.23	378.52	0.000430	3.00	16062.75	4548.92	0.13
Pin Oak	1869	100-yr	18544.30	355.71	379.10	370.65	379.15	0.000404	2.99	18885.47	4745.72	0.13
Pin Oak	1850		Bridge									
Pin Oak	1792	2-yr	5181.30	355.58	375.30	366.00	375.35	0.000618	2.50	6911.17	4867.90	0.15
Pin Oak	1792	5-yr	7499.50	355.58	376.23	368.28	376.26	0.000459	2.30	10930.20	5520.65	0.13
Pin Oak	1792	10-yr	9669.00	355.58	376.91	370.16	376.93	0.000391	2.22	14039.14	5789.15	0.12
Pin Oak	1792	25-yr	12907.80	355.58	377.79	374.71	377.81	0.000341	2.18	18195.34	6183.74	0.11
Pin Oak	1792	50-yr	15601.40	355.58	378.43	374.98	378.45	0.000317	2.18	21371.75	6580.11	0.11
Pin Oak	1792	100-yr	18544.30	355.58	379.08	375.30	379.10	0.000292	2.17	24672.46	6666.13	0.11
Pin Oak	1754	2-yr	5181.30	355.91	375.29		375.32	0.000490	2.00	7963.41	4180.99	0.13
Pin Oak	1754	5-yr	7499.50	355.91	376.22		376.24	0.000374	1.89	12071.84	4527.64	0.12
Pin Oak	1754	10-yr	9669.00	355.91	376.90		376.92	0.000328	1.86	15229.16	4710.35	0.11
Pin Oak	1754	25-yr	12907.80	355.91	377.78		377.79	0.000290	1.86	19436.00	4904.41	0.10
Pin Oak	1754	50-yr	15601.40	355.91	378.42		378.44	0.000270	1.87	22641.26	5107.11	0.10
Pin Oak	1754	100-yr	18544.30	355.91	379.07		379.08	0.000255	1.90	25969.42	5155.42	0.10
Pin Oak	1474	2-yr	5181.30	352.70	375.19		375.21	0.000201	1.68	9992.10	4519.22	0.09
Pin Oak	1474	5-yr	7499.50	352.70	376.12		376.14	0.000183	1.69	14311.64	4787.87	0.09
Pin Oak	1474	10-yr	9669.00	352.70	376.81		376.82	0.000175	1.71	17610.71	4877.33	0.08
Pin Oak	1474	25-yr	12907.80	352.70	377.69		377.70	0.000174	1.79	22021.93	5142.98	0.08
Pin Oak	1474	50-yr	15601.40	352.70	378.33		378.35	0.000171	1.82	25366.89	5242.26	0.08
Pin Oak	1474	100-yr	18544.30	352.70	378.98		379.00	0.000172	1.88	28870.86	5488.87	0.09
Pin Oak	1162	2-yr	5181.30	354.80	375.14		375.16	0.000155	1.52	10775.26	4376.75	0.08
Pin Oak	1162	5-yr	7499.50	354.80	376.08		376.10	0.000148	1.57	14997.34	4600.92	0.08
Pin Oak	1162	10-yr	9669.00	354.80	376.77		376.78	0.000148	1.62	18194.81	4714.50	0.08
Pin Oak	1162	25-yr	12907.80	354.80	377.65		377.66	0.000149	1.70	22395.87	4831.50	0.08
Pin Oak	1162	50-yr	15601.40	354.80	378.29		378.31	0.000151	1.76	25542.49	4939.27	0.08
Pin Oak	1162	100-yr	18544.30	354.80	378.94		378.95	0.000154	1.83	28814.22	5125.91	0.08
Pin Oak	850	2-yr	5181.30	354.95	375.09		375.10	0.000195	1.70	10744.03	4375.15	0.09
Pin Oak	850	5-yr	7499.50	354.95	376.03		376.04	0.000178	1.70	14943.08	4585.69	0.08
Pin Oak	850	10-yr	9669.00	354.95	376.71		376.73	0.000171	1.73	18145.62	4751.21	0.08
Pin Oak	850	25-yr	12907.80	354.95	377.59		377.60	0.000170	1.79	22362.54	4831.27	0.08
Pin Oak	850	50-yr	15601.40	354.95	378.24		378.25	0.000168	1.84	25498.84	4901.94	0.08
Pin Oak	850	100-yr	18544.30	354.95	378.88		378.90	0.000168	1.89	28686.96	4976.53	0.08
Pin Oak	520	2-yr	5181.30	354.96	374.94		374.96	0.000159	1.60	10789.05	4168.78	0.08
Pin Oak	520	5-yr	7499.50	354.96	375.87		375.89	0.000157	1.67	14804.10	4469.18	0.08
Pin Oak	520	10-yr	9669.00	354.96	376.55		376.57	0.000157	1.72	17868.95	4531.54	0.08
Pin Oak	520	25-yr	12907.80	354.96	377.43		377.44	0.000158	1.80	21864.95	4631.33	0.08
Pin Oak	520	50-yr	15601.40	354.96	378.07		378.08	0.000159	1.85	24887.83	4829.45	0.08
Pin Oak	520	100-yr	18544.30	354.96	378.71		378.72	0.000165	1.94	28028.87	4950.14	0.08
Pin Oak	5	2-yr	5181.30	354.78	374.85	364.57	374.86	0.000200	1.52	9901.06	3914.69	0.09
Pin Oak	5	5-yr	7499.50	354.78	375.78	366.68	375.80	0.000200	1.61	13702.44	4291.27	0.09
Pin Oak	5	10-yr	9669.00	354.78	376.46	368.78	376.48	0.000200	1.68	16674.91	4462.35	0.09
Pin Oak	5	25-yr	12907.80	354.78	377.33	372.38	377.35	0.000200	1.77	20637.82	4616.00	0.09
Pin Oak	5	50-yr	15601.40	354.78	377.98	373.03	377.99	0.000200	1.83	23636.87	4723.11	0.09
Pin Oak	5	100-yr	18544.30	354.78	378.61	373.42	378.63	0.000200	1.89	26680.88	4821.09	0.09

Proposed Conditions HEC-RAS Results

HEC-RAS Plan: Pin_Oak_Prop River: Pin Oak Reach: Pin Oak

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Pin Oak	4322	2-yr	5181.30	357.76	377.33	367.27	377.37	0.000483	2.33	6881.20	3684.17	0.13
Pin Oak	4322	5-yr	7499.50	357.76	378.22	369.54	378.26	0.000400	2.25	10342.66	4065.23	0.12
Pin Oak	4322	10-yr	9669.00	357.76	378.37	371.32	378.41	0.000581	2.74	10929.96	4117.98	0.15
Pin Oak	4322	25-yr	12907.80	357.76	379.11	373.32	379.15	0.000543	2.77	14086.73	4385.13	0.15
Pin Oak	4322	50-yr	15601.40	357.76	379.66	376.89	379.70	0.000512	2.78	16544.09	4564.54	0.14
Pin Oak	4322	100-yr	18544.30	357.76	380.22	377.28	380.25	0.000490	2.80	19121.99	4661.28	0.14
Pin Oak	3381	2-yr	5181.30	357.79	376.29	366.67	376.61	0.001431	4.66	1561.35	2962.62	0.23
Pin Oak	3381	5-yr	7499.50	357.79	376.89	368.58	377.44	0.002364	6.18	1920.53	3280.95	0.30
Pin Oak	3381	10-yr	9669.00	357.79	377.65	370.14	377.75	0.000787	3.71	8375.12	3440.81	0.18
Pin Oak	3381	25-yr	12907.80	357.79	378.46	372.38	378.54	0.000714	3.67	11235.61	3683.59	0.17
Pin Oak	3381	50-yr	15601.40	357.79	379.05	374.13	379.13	0.000665	3.64	13487.07	3862.62	0.17
Pin Oak	3381	100-yr	18544.30	357.79	379.65	377.08	379.72	0.000614	3.58	15829.03	3971.25	0.16
Pin Oak	2968	2-yr	5181.30	357.71	375.98	364.98	376.15	0.000735	3.38	2052.73	2860.98	0.17
Pin Oak	2968	5-yr	7499.50	357.71	376.75	366.65	376.86	0.000611	3.18	6554.91	3373.66	0.16
Pin Oak	2968	10-yr	9669.00	357.71	377.38	368.06	377.47	0.000598	3.25	8689.31	3470.29	0.16
Pin Oak	2968	25-yr	12907.80	357.71	378.20	370.07	378.28	0.000572	3.31	11598.25	3692.88	0.16
Pin Oak	2968	50-yr	15601.40	357.71	378.80	371.27	378.88	0.000553	3.35	13877.73	3839.26	0.15
Pin Oak	2968	100-yr	18544.30	357.71	379.41	372.46	379.48	0.000529	3.36	16278.82	4001.72	0.15
Pin Oak	2262	2-yr	5181.30	355.89	375.52	364.19	375.66	0.000668	3.10	2068.63	2482.29	0.16
Pin Oak	2262	5-yr	7499.50	355.89	376.45	365.85	376.54	0.000537	2.93	6683.49	3464.69	0.15
Pin Oak	2262	10-yr	9669.00	355.89	377.12	367.21	377.20	0.000510	2.96	9072.55	3674.40	0.15
Pin Oak	2262	25-yr	12907.80	355.89	377.98	368.93	378.05	0.000471	2.97	12367.22	3982.72	0.14
Pin Oak	2262	50-yr	15601.40	355.89	378.61	370.24	378.67	0.000442	2.97	14899.75	4168.47	0.14
Pin Oak	2262	100-yr	18544.30	355.89	379.25	371.77	379.30	0.000416	2.96	17525.71	4374.84	0.14
Pin Oak	2018	2-yr	5181.30	354.38	375.42	363.06	375.51	0.000446	2.51	2626.24	2769.42	0.15
Pin Oak	2018	5-yr	7499.50	354.38	376.36	365.04	376.43	0.000373	2.46	7379.53	3601.74	0.14
Pin Oak	2018	10-yr	9669.00	354.38	377.02	366.68	377.09	0.000368	2.56	9844.66	3883.18	0.14
Pin Oak	2018	25-yr	12907.80	354.38	377.89	370.01	377.95	0.000356	2.66	13283.47	4333.27	0.14
Pin Oak	2018	50-yr	15601.40	354.38	378.52	371.83	378.58	0.000342	2.70	15973.55	4527.53	0.14
Pin Oak	2018	100-yr	18544.30	354.38	379.16	372.64	379.21	0.000327	2.74	18773.80	4809.67	0.14
Pin Oak	1869	2-yr	5181.30	355.71	375.36	363.18	375.46	0.000344	2.78	4564.08	2693.29	0.14
Pin Oak	1869	5-yr	7499.50	355.71	376.27	364.80	376.37	0.000390	3.10	7530.93	3668.29	0.15
Pin Oak	1869	10-yr	9669.00	355.71	376.94	366.12	377.03	0.000391	3.21	9989.65	3943.97	0.15
Pin Oak	1869	25-yr	12907.80	355.71	377.81	367.91	377.90	0.000384	3.31	13364.39	4297.46	0.15
Pin Oak	1869	50-yr	15601.40	355.71	378.45	369.23	378.53	0.000375	3.37	16030.69	4547.21	0.15
Pin Oak	1869	100-yr	18544.30	355.71	379.10	370.65	379.16	0.000359	3.38	18851.73	4742.93	0.15
Pin Oak	1850		Bridge									
Pin Oak	1792	2-yr	5181.30	355.58	375.29	366.00	375.36	0.000516	2.74	6869.84	4858.54	0.16
Pin Oak	1792	5-yr	7499.50	355.58	376.22	368.28	376.26	0.000404	2.59	10894.25	5517.18	0.14
Pin Oak	1792	10-yr	9669.00	355.58	376.90	370.17	376.94	0.000353	2.53	14006.44	5785.68	0.14
Pin Oak	1792	25-yr	12907.80	355.58	377.78	374.82	377.81	0.000314	2.51	18164.99	6181.74	0.13
Pin Oak	1792	50-yr	15601.40	355.58	378.42	375.15	378.45	0.000295	2.52	21340.98	6576.02	0.13
Pin Oak	1792	100-yr	18544.30	355.58	379.07	375.31	379.10	0.000274	2.52	24642.78	6665.97	0.12
Pin Oak	1754	2-yr	5181.30	355.91	375.29		375.32	0.000491	2.00	7959.45	4180.51	0.13
Pin Oak	1754	5-yr	7499.50	355.91	376.22		376.24	0.000375	1.89	12066.31	4527.21	0.12
Pin Oak	1754	10-yr	9669.00	355.91	376.90		376.91	0.000329	1.87	15222.26	4710.25	0.11
Pin Oak	1754	25-yr	12907.80	355.91	377.78		377.79	0.000290	1.86	19427.76	4904.02	0.10
Pin Oak	1754	50-yr	15601.40	355.91	378.42		378.43	0.000270	1.88	22631.29	5106.00	0.10
Pin Oak	1754	100-yr	18544.30	355.91	379.07		379.08	0.000256	1.90	25958.42	5155.37	0.10
Pin Oak	1474	2-yr	5181.30	352.70	375.19		375.21	0.000201	1.68	9987.55	4519.13	0.09
Pin Oak	1474	5-yr	7499.50	352.70	376.12		376.14	0.000183	1.69	14305.51	4787.73	0.09
Pin Oak	1474	10-yr	9669.00	352.70	376.81		376.82	0.000176	1.71	17603.13	4876.70	0.08
Pin Oak	1474	25-yr	12907.80	352.70	377.69		377.70	0.000175	1.79	22012.51	5142.68	0.09
Pin Oak	1474	50-yr	15601.40	352.70	378.33		378.35	0.000171	1.83	25356.17	5242.10	0.08
Pin Oak	1474	100-yr	18544.30	352.70	378.98		378.99	0.000172	1.88	28858.46	5488.70	0.09
Pin Oak	1162	2-yr	5181.30	354.80	375.14		375.16	0.000156	1.53	10770.45	4376.45	0.08
Pin Oak	1162	5-yr	7499.50	354.80	376.08		376.09	0.000148	1.57	14991.30	4600.56	0.08
Pin Oak	1162	10-yr	9669.00	354.80	376.76		376.78	0.000149	1.62	18187.33	4714.13	0.08
Pin Oak	1162	25-yr	12907.80	354.80	377.64		377.66	0.000150	1.70	22386.88	4831.21	0.08
Pin Oak	1162	50-yr	15601.40	354.80	378.29		378.30	0.000151	1.76	25532.09	4938.78	0.08
Pin Oak	1162	100-yr	18544.30	354.80	378.94		378.95	0.000154	1.83	28802.33	5125.71	0.08
Pin Oak	850	2-yr	5181.30	354.95	375.08		375.10	0.000192	1.69	10741.76	4375.02	0.08
Pin Oak	850	5-yr	7499.50	354.95	376.03		376.04	0.000175	1.69	14939.86	4585.53	0.08
Pin Oak	850	10-yr	9669.00	354.95	376.71		376.72	0.000168	1.71	18141.12	4751.02	0.08
Pin Oak	850	25-yr	12907.80	354.95	377.59		377.60	0.000167	1.78	22356.65	4831.16	0.08
Pin Oak	850	50-yr	15601.40	354.95	378.24		378.25	0.000165	1.82	25492.11	4901.82	0.08
Pin Oak	850	100-yr	18544.30	354.95	378.88		378.89	0.000164	1.86	28679.36	4976.42	0.08
Pin Oak	520	2-yr	5181.30	354.96	374.94		374.96	0.000159	1.60	10789.05	4168.78	0.08
Pin Oak	520	5-yr	7499.50	354.96	375.87		375.89	0.000157	1.67	14804.10	4469.18	0.08
Pin Oak	520	10-yr	9669.00	354.96	376.55		376.57	0.000157	1.72	17868.95	4531.54	0.08
Pin Oak	520	25-yr	12907.80	354.96	377.43		377.44	0.000158	1.80	21864.95	4631.33	0.08
Pin Oak	520	50-yr	15601.40	354.96	378.07		378.08	0.000159	1.85	24887.83	4829.45	0.08
Pin Oak	520	100-yr	18544.30	354.96	378.71		378.72	0.000165	1.94	28028.87	4950.14	0.08
Pin Oak	5	2-yr	5181.30	354.78	374.85	364.57	374.86	0.000200	1.52	9901.06	3914.69	0.09
Pin Oak	5	5-yr	7499.50	354.78	375.78	366.68	375.80	0.000200	1.61	13702.44	4291.27	0.09
Pin Oak	5	10-yr	9669.00	354.78	376.46	368.78	376.48	0.000200	1.68	16674.91	4462.35	0.09
Pin Oak	5	25-yr	12907.80	354.78	377.33	372.38	377.35	0.000200	1.77	20637.82	4616.00	0.09
Pin Oak	5	50-yr	15601.40	354.78	377.98	373.03	377.99	0.000200	1.83	23636.87	4723.11	0.09
Pin Oak	5	100-yr	18544.30	354.78	378.61	373.42	378.63	0.000200	1.89	26680.88	4821.09	0.09

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-28-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305

BRIDGE HYDRAULIC DATA
PIN OAK CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		81

DATE: Monday, November 20, 2023 11:53:57 AM
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	SCOUR CALCULATIONS				
	Design Flood				Check Flood
	25-yr	50-yr	100-yr	200-yr	500-yr
	MC	MC	MC	MC	MC
CONTRACTION SCOUR CONDITION					
₁ (mm)	0.044	0.044	0.044	0.044	0.044
Y1 (ft)	10.97	11.6	12.23	12.82	13.66
Ku	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	0.87	0.88	0.89	0.9	0.91
V1 (ft/s)	2.66	2.7	2.74	2.77	2.82
V1 / Vc	3.06	3.07	3.11	3.08	3.10
Condition	Live-Bed	Live-Bed	Live-Bed	Live-Bed	Live-Bed
LIVE-BED CONTRACTION SCOUR					
Q1 (cfs)	6902.82	7421.92	7930.42	8398.68	9135.39
Q2 (cfs)	2202.26	2228.07	2255.87	2300.25	2345.52
Y0 (ft)	9.19	9.83	10.47	11.07	11.91
Y1 (ft)	10.97	11.6	12.23	12.82	13.66
Y2 (ft)	6.5	6.52	6.56	6.66	6.72
W1 (ft)	236.81	236.81	236.81	236.81	236.81
W2 (ft)	122.39	122.39	122.39	122.39	122.39
K1	0.69	0.69	0.69	0.69	0.69
Ys (ft)	-2.69	-3.31	-3.91	-4.41	-5.19
PIER SCOUR					
V1 (ft/s)	4.01	4.07	4.08	4.09	4.04
Y1 (ft)	21.21	21.85	22.49	23.09	23.93
g (ft/s)	32.2	32.2	32.2	32.2	32.2
Fr	0.153	0.153	0.152	0.15	0.146
a (ft)	2	2	2	2	2
L (ft)	26	26	26	26	26
θ	0	0	0	0	0
K1	1	1	1	1	1
K2	1	1	1	1	1
K3	1	1	1	1	1
Red Factor					
Ys (ft)	4.49	4.54	4.56	4.58	4.58
Total Ys (ft)	4.49	4.54	4.56	4.58	4.58

Channel Material	
Channel Bed Description	20 ft of Sand, 10 ft of Clay, 25ft of Shale; 35 ft of Clay, 25 ft of Shale
D50	0.044 mm (avg)
Basis of Channel Bed Material Description	Soil Boring Samples
Non-Erodible Strata	<4 in/100 blows (Non-Erodbile)

Summary of Return Periods	
DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN CHECK FLOOD	500-year

Summary of Scour Calculations					
Storm (-yr)	25	50	100	200	500
Contraction Scour (ft)	-2.69	-3.31	-3.91	-4.41	-5.19
Pier Scour (ft)	4.49	4.54	4.56	4.58	4.58
Total Scour (ft)	4.49	4.54	4.56	4.58	4.58

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Upstream Approach River Station 2018															
A (sqft)		2596.79			2746.66			2897.13			3036.83		4621.36	3233.83	18438.38
WP (ft)		251.73			251.73			251.73			251.73		689.45	251.73	3842.06
n	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09
Q (cfs)		6902.82			7421.92			7930.42			8398.68		1957.89	9135.39	15010.03
V (ft/s)		2.66			2.7			2.74			2.77		0.53	2.82	0.81
y (ft)															
W (ft)		236.81			236.81			236.81			236.81		1106.12	236.81	3840.85
WSEL (ft)		377.89			378.52			379.16			379.75			380.58	
Vavg (ft/s)		0.97			0.98			0.99			1.01			1.03	

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Contracted Section at Bridge River Station 1869															
A (sqft)		1808.7			1886.83			1965.51			2038.41		6035.53	2141.6	18475.95
WP (ft)		133.46			133.46			133.46			133.46		1189.47	133.46	3760.6
n	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09	0.15	0.05	0.09
Q (cfs)		5984.92			6352.17			6647.06			6915.35		3136.03	7192.6	15774.68
V (ft/s)		3.31			3.37			3.38			3.39		0.52	3.36	0.85
y (ft)															
W (ft)		122.39			122.39			122.39			122.39		1186.91	122.39	3759.46
WSEL (ft)		377.81			378.45			379.10			379.69			380.53	
Vavg (ft/s)		0.97			0.97			0.98			1			0.98	

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Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305

BRIDGE SCOUR DATA
PIN OAK CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		82

DATE: Monday, November 20, 2023 11:54:03 AM
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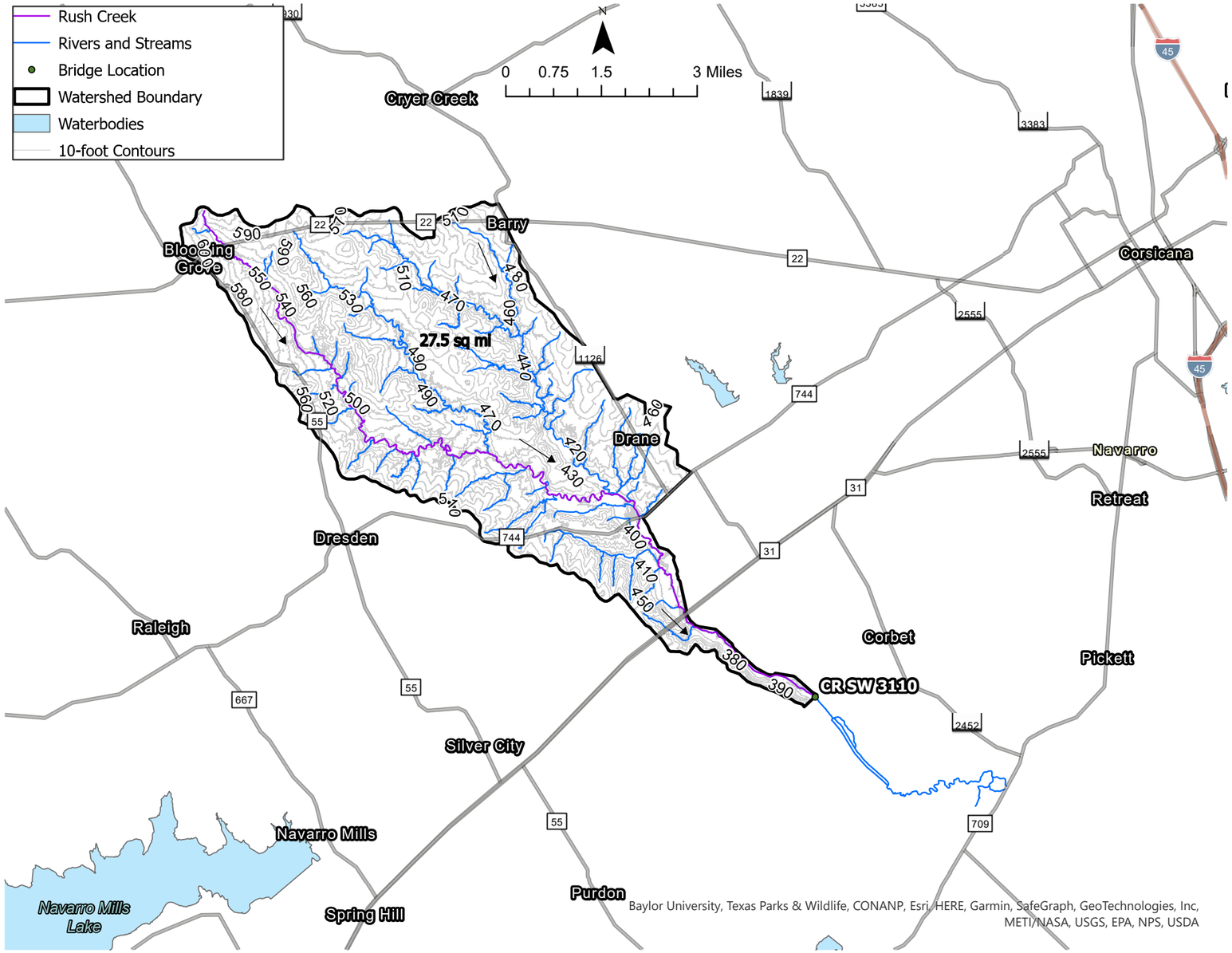


Hydrologic Data Summary Comparison

AEP	ARI	HMS Results (Design)	USGS Fact Sheet 022-01	Omega EM Regression Equations	TR-55 Graphical Peak
(%)	(yr)	(cfs)	(cfs)	(cfs)	(cfs)
50	2	3,064	-	1,744	-
20	5	4,292	-	3,670	-
10	10	5,436	-	5,155	-
4	25	7,146	8,065	7,535	-
2	50	8,574	9,818	9,614	11,064
1	100	10,179	11,703	12,047	13,337

NOTES:

1.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0550 DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

2.) PEAK DISCHARGE RATES FOR RUSH CREEK WERE COMPUTED USING HEC-HMS AND VALIDATED WITH REGIONAL REGRESSION EQUATIONS AND TR-55 GRAPHICAL PEAK.

3.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMINARY HYDROLOGIC/HYDRAULIC REPORT FOR RUSH CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

4.) ELLIS, HILL, JOHNSON, & NAVARRO COUNTIES LIDAR FROM TNRIS (2022-01-13, 1M/50CM RESOLUTION)

5.) ELEVATIONS ARE BASED ON NAVD 1988

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-20-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

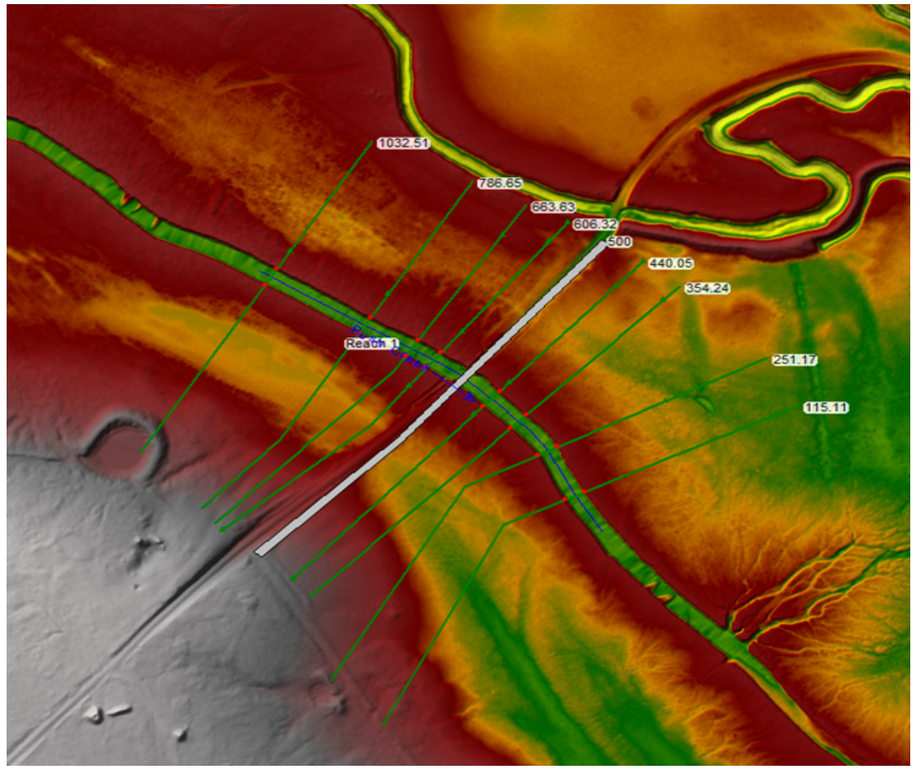
DRAINAGE AREA MAP
RUSH CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		83

DATE: Monday, November 20, 2023 11:55:50 AM
FILE: 138_S_DAM.dgn

Cross-section Layout



NOTES:
1.) HEC-RAS v. 6.2 WAS USED FOR THIS HYDRAULIC ANALYSIS OF EXISTING AND PROPOSED CONDITIONS.

2.) THE DOWNSTREAM BOUNDARY CONDITION WAS SET USING NORMAL DEPTH WITH A SLOPE OF 0.00025 FT/FT.

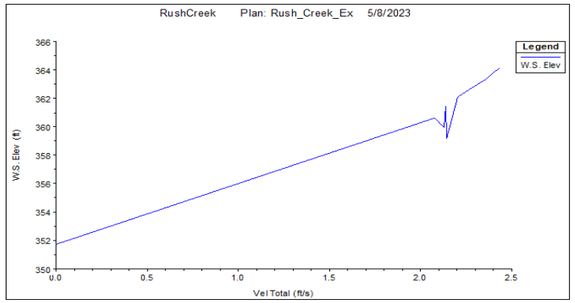
3.) ACCORDING TO FLOOD INSURANCE RATE MAP PANEL NO. 48349C0550 DATED JUNE 5TH, 2012, THE PROJECT IS LOCATED WITHIN SPECIAL FLOOD HAZARD AREA ZONE A WITH NO DEFINED BASE FLOOD ELEVATIONS.

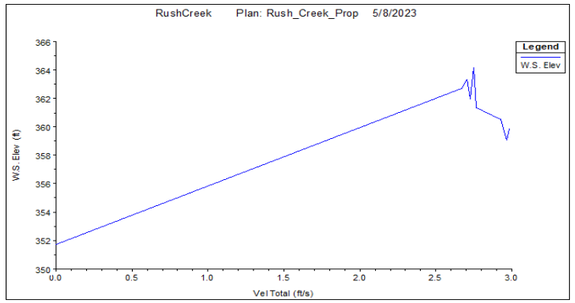
4.) FOR MORE INFORMATION, REFER TO REPORT "PRELIMNARY HYDROLOGIC/HYDRAULIC REPORT FOR RUSH CREEK" PREPARED BY HDR ENGINEERING, INC. AND DATED APRIL 14, 2023.

5.) COORDINATION WITH THE NAVARRO COUNTY FLOODPLAIN ADMINISTRATOR OCCURRED ON AUGUST 18TH, 2022.

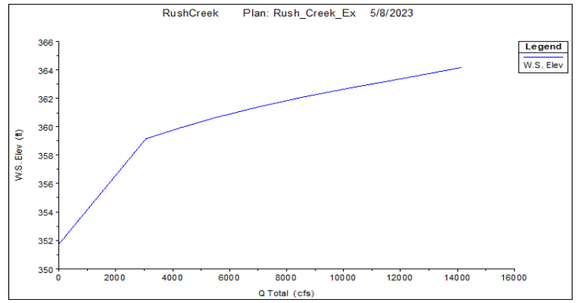
6.) ELEVATIONS ARE BASED ON NAVD 1988.

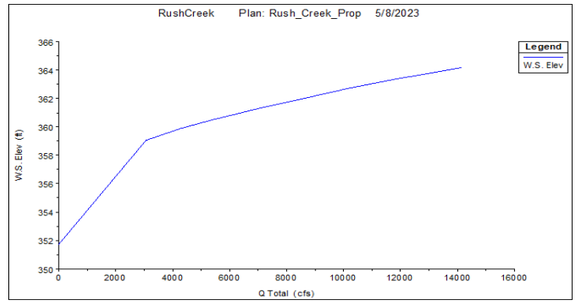
Velocity Curves (Existing and Proposed Conditions)



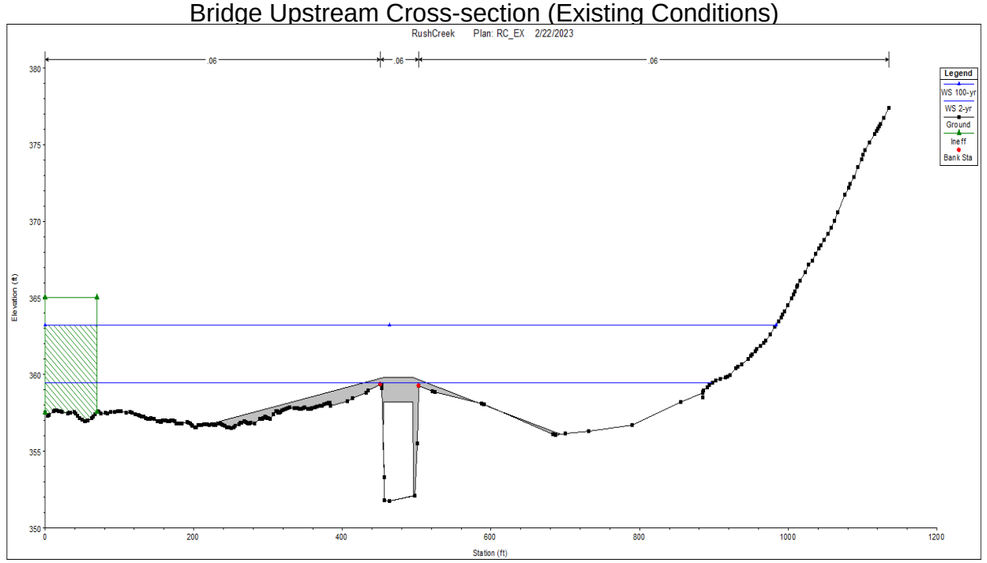


Conveyance Curves (Existing and Proposed Conditions)

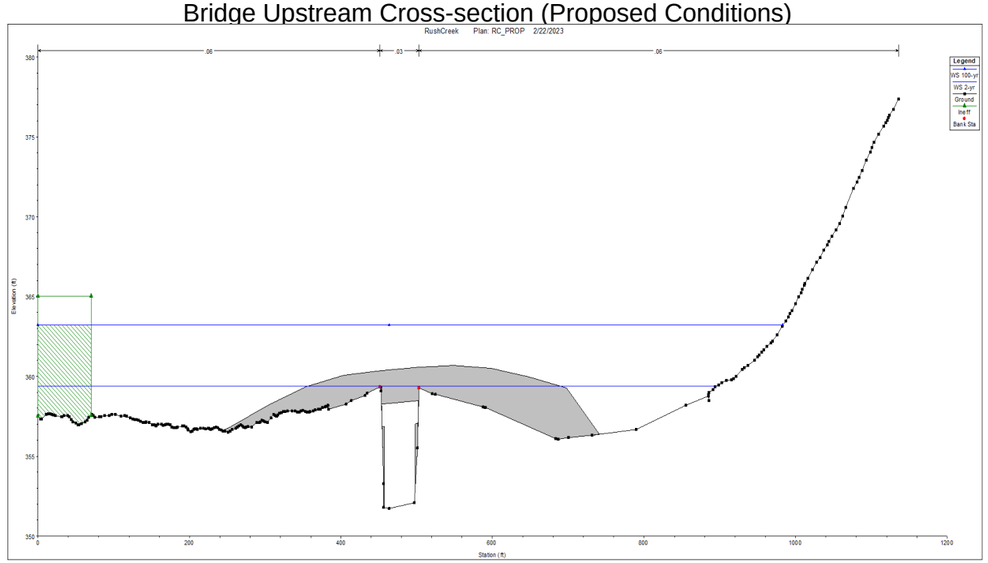




Bridge Upstream Cross-section (Existing Conditions)



Bridge Upstream Cross-section (Proposed Conditions)



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CR SW 3110

BRIDGE HYDRAULIC DATA
RUSH CREEK

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		84

DATE: Monday, November 20, 2023 11:55:56 AM
FILE: 138_S_BHD_01.dgn 11:55:56 AM

CK:
DW:
CK:
DN:

Existing Conditions HEC-RAS Results

HEC-RAS Plan: Rush_Creek_Ex River: Rush Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1032.51	2-yr	3063.80	352.13	359.82	357.89	359.97	0.001297	4.24	1331.05	816.80	0.29
Reach 1	1032.51	5-yr	4292.30	352.13	360.52	358.42	360.70	0.001410	4.74	1669.56	834.73	0.31
Reach 1	1032.51	10-yr	5436.00	352.13	361.22	358.83	361.40	0.001337	4.90	2012.24	843.91	0.31
Reach 1	1032.51	25-yr	7146.40	352.13	362.00	359.35	362.21	0.001376	5.30	2404.79	852.14	0.32
Reach 1	1032.51	50-yr	8573.90	352.13	362.59	359.80	362.82	0.001401	5.59	2706.91	860.15	0.32
Reach 1	1032.51	100-yr	10178.50	352.13	363.21	360.16	363.46	0.001432	5.90	3027.94	872.68	0.33
Reach 1	786.65	2-yr	3063.80	352.69	359.40	357.96	359.58	0.001924	4.78	1211.92	864.33	0.35
Reach 1	786.65	5-yr	4292.30	352.69	360.10	358.55	360.30	0.001868	5.09	1574.51	876.19	0.36
Reach 1	786.65	10-yr	5436.00	352.69	360.85	358.89	361.04	0.001600	5.07	1967.40	889.26	0.33
Reach 1	786.65	25-yr	7146.40	352.69	361.64	359.41	361.85	0.001572	5.39	2390.60	902.22	0.34
Reach 1	786.65	50-yr	8573.90	352.69	362.24	359.69	362.46	0.001546	5.61	2717.35	909.63	0.34
Reach 1	786.65	100-yr	10178.50	352.69	362.86	360.00	363.09	0.001523	5.84	3062.58	917.52	0.34
Reach 1	663.63	2-yr	3063.80	352.21	359.23	358.01	359.36	0.001462	4.26	1594.48	875.11	0.31
Reach 1	663.63	5-yr	4292.30	352.21	359.98	358.47	360.09	0.001203	4.17	2194.58	904.14	0.28
Reach 1	663.63	10-yr	5436.00	352.21	360.77	358.79	360.87	0.000908	3.91	2840.09	919.35	0.25
Reach 1	663.63	25-yr	7146.40	352.21	361.58	359.12	361.68	0.000830	4.00	3509.35	932.21	0.24
Reach 1	663.63	50-yr	8573.90	352.21	362.19	359.42	362.29	0.000786	4.08	4019.91	938.51	0.24
Reach 1	663.63	100-yr	10178.50	352.21	362.82	359.64	362.93	0.000753	4.18	4555.59	947.36	0.24
Reach 1	606.32	2-yr	3063.80	351.73	359.16	357.81	359.25	0.001734	3.28	1653.26	875.94	0.22
Reach 1	606.32	5-yr	4292.30	351.73	359.93	358.22	360.00	0.001367	3.08	2288.83	919.68	0.20
Reach 1	606.32	10-yr	5436.00	351.73	360.74	358.47	360.80	0.000982	2.80	2981.40	938.68	0.17
Reach 1	606.32	25-yr	7146.40	351.73	361.55	358.82	361.61	0.000874	2.82	3693.88	955.95	0.17
Reach 1	606.32	50-yr	8573.90	351.73	362.16	359.02	362.23	0.000819	2.86	4239.08	968.42	0.16
Reach 1	606.32	100-yr	10178.50	351.73	362.79	359.23	362.87	0.000773	2.90	4813.15	977.99	0.16
Reach 1	500		Bridge									
Reach 1	440.05	2-yr	3063.80	351.70	359.18	357.19	359.21	0.000838	2.21	2189.55	949.26	0.16
Reach 1	440.05	5-yr	4292.30	351.70	359.93	357.53	359.97	0.000736	2.23	2836.29	962.92	0.15
Reach 1	440.05	10-yr	5436.00	351.70	360.55	357.76	360.59	0.000677	2.27	3380.31	970.03	0.15
Reach 1	440.05	25-yr	7146.40	351.70	361.39	358.05	361.44	0.000625	2.34	4123.14	985.63	0.14
Reach 1	440.05	50-yr	8573.90	351.70	362.01	358.26	362.06	0.000600	2.41	4683.27	995.13	0.14
Reach 1	440.05	100-yr	10178.50	351.70	362.66	358.40	362.72	0.000582	2.48	5268.78	1005.23	0.14
Reach 1	354.24	2-yr	3063.80	351.50	359.12	357.03	359.16	0.000482	2.60	2511.73	966.80	0.18
Reach 1	354.24	5-yr	4292.30	351.50	359.87	357.45	359.92	0.000455	2.73	3204.68	980.05	0.18
Reach 1	354.24	10-yr	5436.00	351.50	360.50	357.64	360.54	0.000438	2.83	3786.97	990.71	0.18
Reach 1	354.24	25-yr	7146.40	351.50	361.34	358.06	361.39	0.000421	2.97	4581.82	1005.37	0.18
Reach 1	354.24	50-yr	8573.90	351.50	361.97	358.27	362.02	0.000414	3.09	5180.13	1016.48	0.18
Reach 1	354.24	100-yr	10178.50	351.50	362.61	358.49	362.67	0.000409	3.22	5805.16	1026.00	0.18
Reach 1	251.17	2-yr	3063.80	351.40	359.04	357.16	359.10	0.000673	3.09	2139.03	1073.32	0.21
Reach 1	251.17	5-yr	4292.30	351.40	359.80	357.56	359.86	0.000627	3.21	2769.51	1095.53	0.21
Reach 1	251.17	10-yr	5436.00	351.40	360.43	357.89	360.49	0.000599	3.32	3302.88	1114.62	0.21
Reach 1	251.17	25-yr	7146.40	351.40	361.27	358.21	361.34	0.000566	3.45	4037.29	1138.03	0.21
Reach 1	251.17	50-yr	8573.90	351.40	361.90	358.49	361.97	0.000562	3.61	4602.18	1170.57	0.21
Reach 1	251.17	100-yr	10178.50	351.40	362.54	358.70	362.62	0.000558	3.76	5202.96	1204.62	0.21
Reach 1	115.11	2-yr	3063.80	351.00	359.01	356.46	359.03	0.000250	1.94	3349.39	1148.13	0.13
Reach 1	115.11	5-yr	4292.30	351.00	359.77	356.75	359.80	0.000250	2.07	4182.15	1167.30	0.13
Reach 1	115.11	10-yr	5436.00	351.00	360.40	357.07	360.43	0.000250	2.18	4884.28	1186.11	0.13
Reach 1	115.11	25-yr	7146.40	351.00	361.25	357.40	361.28	0.000250	2.32	5845.80	1214.79	0.13
Reach 1	115.11	50-yr	8573.90	351.00	361.88	357.63	361.91	0.000250	2.42	6573.11	1228.37	0.13
Reach 1	115.11	100-yr	10178.50	351.00	362.53	357.82	362.56	0.000250	2.53	7332.93	1239.98	0.14

Proposed Conditions HEC-RAS Results

HEC-RAS Plan: Rush_Creek_Prop River: Rush Creek Reach: Reach 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1032.51	2-yr	3063.80	352.13	359.80	357.89	359.95	0.001327	4.28	1319.49	814.96	0.30
Reach 1	1032.51	5-yr	4292.30	352.13	360.50	358.42	360.68	0.001433	4.76	1659.69	834.35	0.31
Reach 1	1032.51	10-yr	5436.00	352.13	361.09	358.83	361.29	0.001468	5.08	1948.06	842.84	0.32
Reach 1	1032.51	25-yr	7146.40	352.13	361.88	359.35	362.10	0.001480	5.44	2345.49	850.71	0.33
Reach 1	1032.51	50-yr	8573.90	352.13	362.48	359.80	362.72	0.001493	5.72	2649.33	858.84	0.33
Reach 1	1032.51	100-yr	10178.50	352.13	363.21	360.16	363.46	0.001432	5.90	3028.38	872.71	0.33
Reach 1	786.65	2-yr	3063.80	352.69	359.35	357.96	359.55	0.002015	4.87	1190.17	862.01	0.36
Reach 1	786.65	5-yr	4292.30	352.69	360.07	358.55	360.27	0.001924	5.15	1557.87	875.72	0.36
Reach 1	786.65	10-yr	5436.00	352.69	360.67	358.89	360.88	0.001848	5.36	1870.04	885.65	0.36
Reach 1	786.65	25-yr	7146.40	352.69	361.48	359.41	361.71	0.001747	5.61	2305.29	899.47	0.36
Reach 1	786.65	50-yr	8573.90	352.69	362.09	359.69	362.33	0.001689	5.80	2638.32	908.05	0.35
Reach 1	786.65	100-yr	10178.50	352.69	362.86	360.00	363.09	0.001522	5.84	3063.13	917.53	0.34
Reach 1	663.63	2-yr	3063.80	352.21	359.14	358.18	359.35	0.001253	5.22	1522.17	857.32	0.38
Reach 1	663.63	5-yr	4292.30	352.21	359.92	358.67	360.10	0.001051	5.17	2141.62	902.81	0.35
Reach 1	663.63	10-yr	5436.00	352.21	360.54	358.99	360.71	0.000933	5.17	2651.59	914.62	0.34
Reach 1	663.63	25-yr	7146.40	352.21	361.39	359.43	361.54	0.000824	5.23	3348.63	929.23	0.32
Reach 1	663.63	50-yr	8573.90	352.21	362.02	359.69	362.17	0.000770	5.31	3872.77	936.69	0.32
Reach 1	663.63	100-yr	10178.50	352.21	362.80	359.93	362.95	0.000674	5.26	4537.72	947.13	0.30
Reach 1	606.32	2-yr	3063.80	351.73	359.06	358.04	359.28	0.001057	5.08	1568.64	863.12	0.35
Reach 1	606.32	5-yr	4292.30	351.73	359.86	358.54	360.04	0.000917	5.01	2227.40	917.63	0.33
Reach 1	606.32	10-yr	5436.00	351.73	360.49	358.97	360.67	0.000815	5.01	2772.72	931.19	0.32
Reach 1	606.32	25-yr	7146.40	351.73	361.35	359.35	361.50	0.000725	5.06	3515.54	952.15	0.30
Reach 1	606.32	50-yr	8573.90	351.73	361.98	359.60	362.13	0.000681	5.14	4075.05	964.43	0.30
Reach 1	606.32	100-yr	10178.50	351.73	362.77	359.88	362.91	0.000596	5.08	4790.46	977.69	0.28
Reach 1	500		Bridge									
Reach 1	440.05	2-yr	3063.80	351.70	359.14	357.48	359.23	0.000571	3.63	2157.00	948.67	0.26
Reach 1	440.05	5-yr	4292.30	351.70	359.89	357.88	359.98	0.000534	3.79	2807.56	962.13	0.26
Reach 1	440.05	10-yr	5436.00	351.70	360.52	358.23	360.61	0.000508	3.92	3353.98	969.75	0.25
Reach 1	440.05	25-yr	7146.40	351.70	361.36	358.62	361.45	0.000484	4.11	4098.69	985.26	0.25
Reach 1	440.05	50-yr	8573.90	351.70	361.98	358.93	362.08	0.000473	4.26	4659.72	994.67	0.25
Reach 1	440.05	100-yr	10178.50	351.70	362.63	359.16	362.73	0.000465	4.43	5245.75	1004.69	0.25
Reach 1	354.24	2-yr	3063.80	351.50	359.12	357.03	359.16	0.000482	2.60	2511.73	966.80	0.18
Reach 1	354.24	5-yr	4292.30	351.50	359.87	357.45	359.92	0.000455	2.73	3204.68	980.05	0.18
Reach 1	354.24	10-yr	5436.00	351.50	360.50	357.64	360.54	0.000438	2.83	3786.97	990.71	0.18
Reach 1	354.24	25-yr	7146.40	351.50	361.34	358.06	361.39	0.000421	2.97	4581.82	1005.37	0.18
Reach 1	354.24	50-yr	8573.90	351.50	361.97	358.27	362.02	0.000414	3.09	5180.13	1016.48	0.18
Reach 1	354.24	100-yr	10178.50	351.50	362.61	358.49	362.67	0.000409	3.22	5805.16	1026.00	0.18
Reach 1	251.17	2-yr	3063.80	351.40	359.04	357.16	359.10	0.000673	3.09	2139.03	1073.32	0.21
Reach 1	251.17	5-yr	4292.30	351.40	359.80	357.56	359.86	0.000627	3.21	2769.51	1095.53	0.21
Reach 1	251.17	10-yr	5436.00	351.40	360.43	357.89	360.49	0.000599	3.32	3302.88	1114.62	0.21
Reach 1	251.17	25-yr	7146.40	351.40	361.27	358.21	361.34	0.000566	3.45	4037.29	1138.03	0.21
Reach 1	251.17	50-yr	8573.90	351.40	361.90	358.49	361.97	0.000562	3.61	4602.18	1170.57	0.21
Reach 1	251.17	100-yr	10178.50	351.40	362.54	358.70	362.62	0.000558	3.76	5202.96	1204.62	0.21
Reach 1	115.11	2-yr	3063.80	351.00	359.01	356.46	359.03	0.000250	1.94	3349.39	1148.13	0.13
Reach 1	115.11	5-yr	4292.30	351.00	359.77	356.75	359.80	0.000250	2.07	4182.15	1167.30	0.13
Reach 1	115.11	10-yr	5436.00	351.00	360.40	357.07	360.43	0.000250	2.18	4884.28	1186.11	0.13
Reach 1	115.11	25-yr	7146.40	351.00	361.25	357.40	361.28	0.000250	2.32	5845.80	1214.79	0.13
Reach 1	115.11	50-yr	8573.90	351.00	361.88	357.63	361.91	0.000250	2.42	6573.11	1228.37	0.13
Reach 1	115.11	100-yr	10178.50	351.00	362.53	357.82	362.56	0.000250	2.53	7332.93	1239.98	0.14

STATE OF TEXAS
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713.622.9264

Texas Department of Transportation

CR SW 3110

BRIDGE HYDRAULIC DATA
RUSH CREEK

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		85

DATE: Monday, November 20, 2023 11:56:02 AM
FILE: 138_S_BHD_02.dgn 11:56:02 AM

	SCOUR CALCULATIONS				
	Design Flood				Check Flood
	25-yr	50-yr	100-yr	200-yr	500-yr
	MC	MC	MC	MC	MC
CONTRACTION SCOUR CONDITION					
D_{50} (mm)	0.021	0.021	0.021	0.021	0.021
Y1 (ft)	8.32	8.93	9.56	10.15	11.01
Ku	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	0.65	0.66	0.67	0.67	0.68
V1 (ft/s)	4	4.08	4.18	4.28	4.38
V1 / Vc	6.15	6.18	6.24	6.39	6.44
Condition	Live-Bed	Live-Bed	Live-Bed	Live-Bed	Live-Bed
LIVE-BED CONTRACTION SCOUR					
Q1 (cfs)	1614.36	1767.2	1939.46	2106.79	2342.84
Q2 (cfs)	562.39	611.32	667.09	722.76	803.07
Y0 (ft)	6.19	7.22	7.86	8.45	9.32
Y1 (ft)	8.32	8.93	9.56	10.15	11.01
Y2 (ft)	3.24	3.45	3.68	3.9	4.22
W1 (ft)	48.54	48.54	48.54	48.54	48.54
W2 (ft)	51.48	51.48	51.48	51.48	51.48
K1	0.69	0.69	0.69	0.69	0.69
Ys (ft)	-3.36	-3.77	-4.18	-4.55	-5.1
PIER SCOUR					
V1 (ft/s)					
Y1 (ft)					
g (ft/s)					
Fr					
a (ft)					
L (ft)					
θ					
K1					
K2					
K3					
Red Factor					
Ys (ft)					
Total Ys (ft)	0	0	0	0	0

Channel Material	
Channel Bed Description	35 ft of Clay, 25ft of Shale
D50	0.021 mm (avg)
Basis of Channel Bed Material Description	Soil Boring Samples
Non-Erodible Strata	<4 in/100 blows (Non-Erodbile)

Summary of Return Periods	
DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN FLOOD	25,50,100,200-year
SCOUR DESIGN CHECK FLOOD	500-year

Summary of Scour Calculations					
Storm (-yr)	25	50	100	200	500
Contraction Scour (ft)	-3.36	-3.77	-4.18	-4.55	-5.1
Pier Scour (ft)	0	0	0	0	0
Total Scour (ft)	0	0	0	0	0

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Upstream Approach River Station 663															
A (sqft)		394.43			424.85			463.06			491.51		2817.74	533.23	3004.16
WP (ft)		55.92			55.92			55.92			55.92		340.82	55.92	479.28
n	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06
Q (cfs)		2062.29			2256.22			2437.11			2656.35		4867.58	2965.41	6315.01
V (ft/s)		5.23			5.31			5.26			5.4		2.17	5.56	2.1
y (ft)															
W (ft)		48.54			48.54			48.54			48.54		437.59	48.54	478.9
WSEL (ft)		361.39			362.02			362.80			363.39			364.25	
Vavg (ft/s)		2.13			2.21			2.24			2.34			2.45	

	Design Flood												Check Flood		
	25-yr			50-yr			100-yr			200-yr			500-yr		
	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB	LOB	MC	ROB
Contracted Section at Bridge River Station 606															
A (sqft)		442.63			475.06			515.9			546.17		3054.32	590.57	2954
WP (ft)		59.88			59.88			59.88			59.88		381.47	59.88	493.82
n	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06	0.06	0.03	0.06
Q (cfs)		2240.8			2443.11			2621.52			2843.85		5342.7	3153.83	5651.47
V (ft/s)		5.06			5.14			5.08			5.21		2.07	5.34	1.91
y (ft)															
W (ft)		51.48			51.48			51.48			51.48		451.33	51.48	493.15
WSEL (ft)		361.35			361.98			362.77			363.36			364.22	
Vavg (ft/s)		2.03			2.1			2.12			2.21			2.31	

STATE OF TEXAS
JEREMY BLEVINS
109719
LICENSED
PROFESSIONAL ENGINEER
11-28-2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

BRIDGE SCOUR DATA
RUSH CREEK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		86

DATE: Monday, November 20, 2023 11:56:07 AM
FILE: 138_S_BSD.dgn
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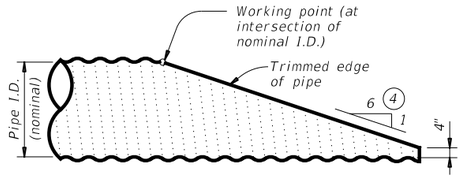
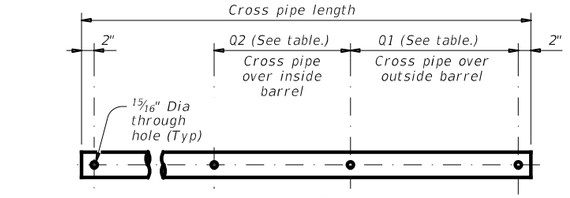
DATE:
FILE:



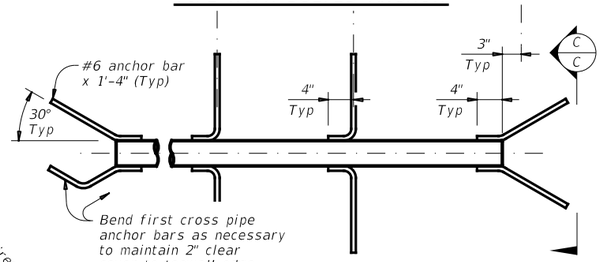
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

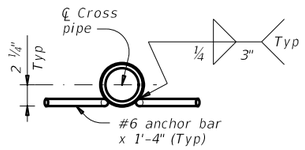
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

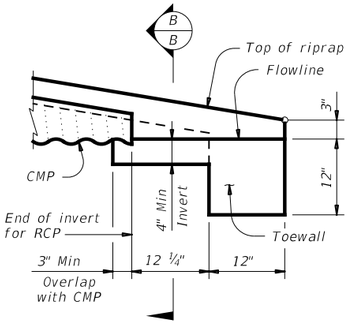


PIPE WITH ANCHOR BARS



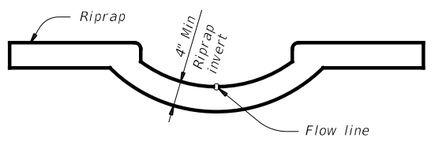
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

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

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

MATERIAL NOTES:

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

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

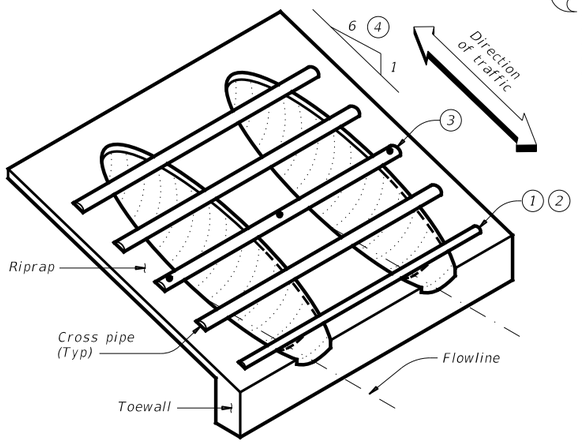
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

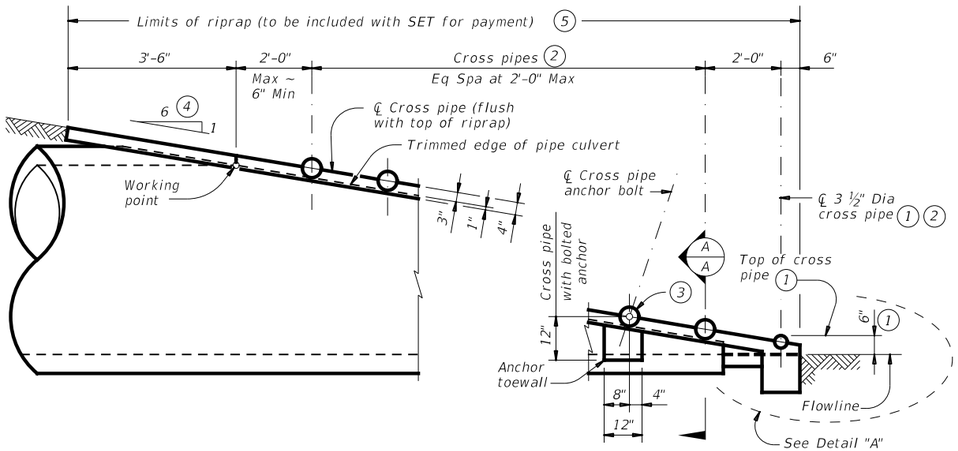
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

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

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

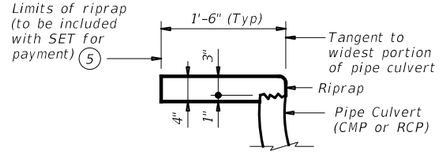


ISOMETRIC VIEW OF TYPICAL INSTALLATION

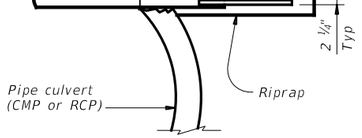


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

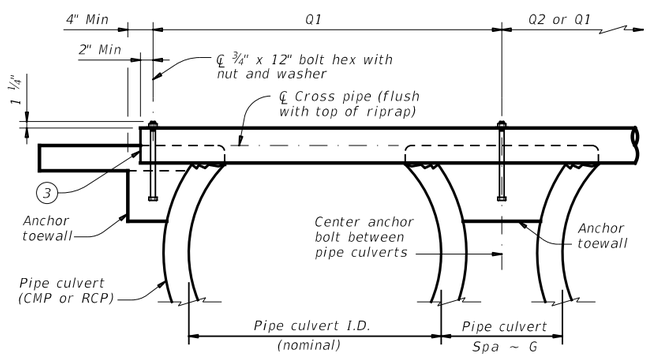
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

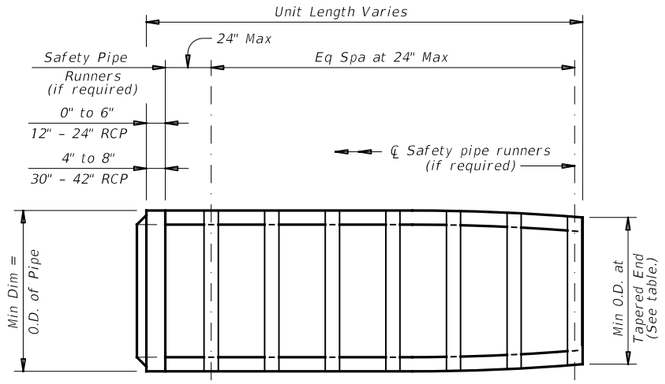
Texas Department of Transportation

Bridge Division Standard

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

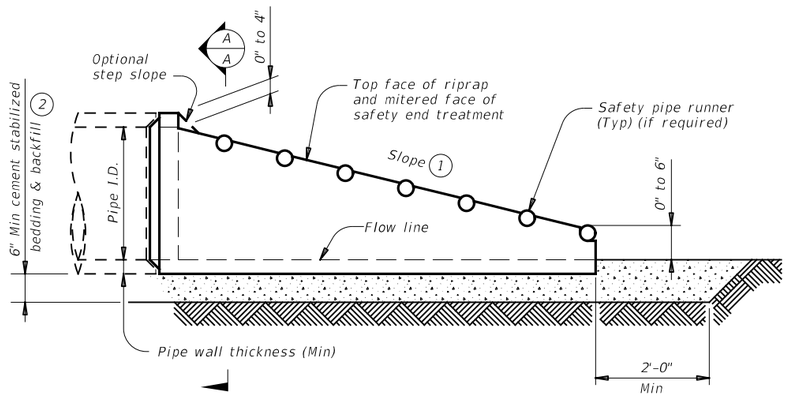
SETP-PD

FILE: CD-SETP-PD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		87



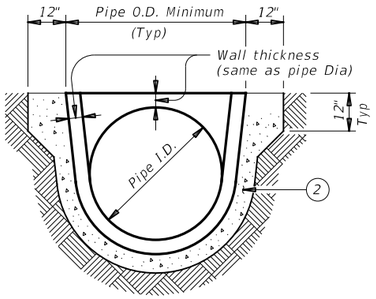
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

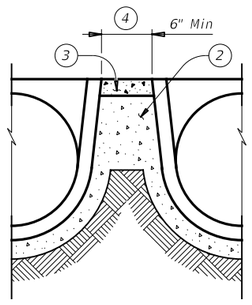


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

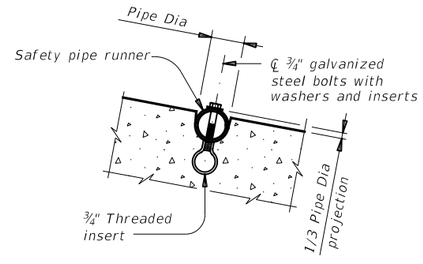
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

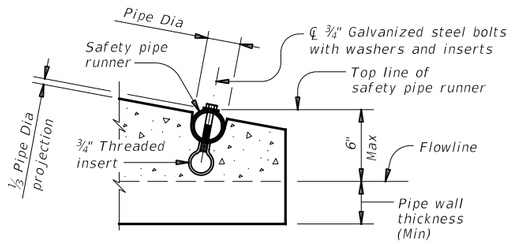
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

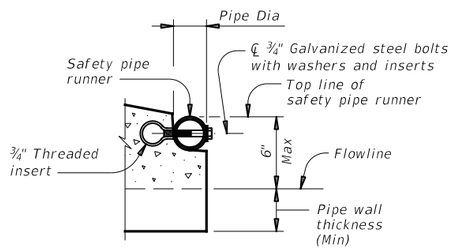


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'–0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'–8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'–3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'–6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'–1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'–4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'–7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

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

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

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

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

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

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280–2F, "Safety Treatment of Roadside Parallel–Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: CD-PSET-RP-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		88

DATE:
FILE:

DATE:
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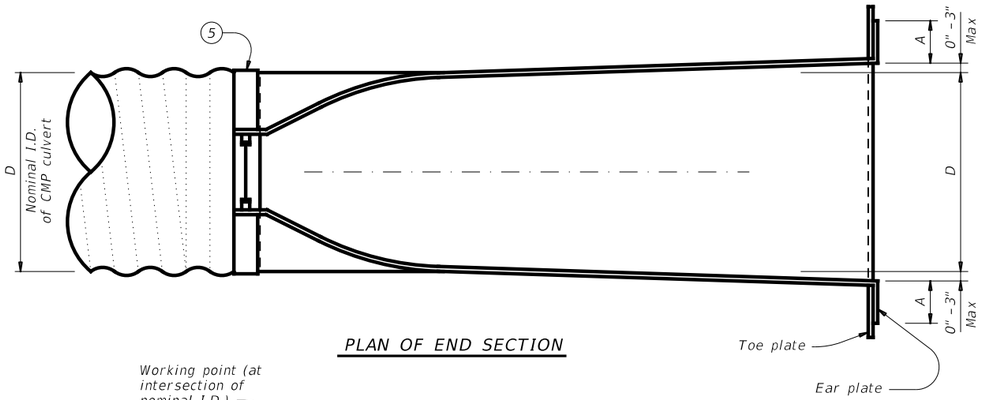
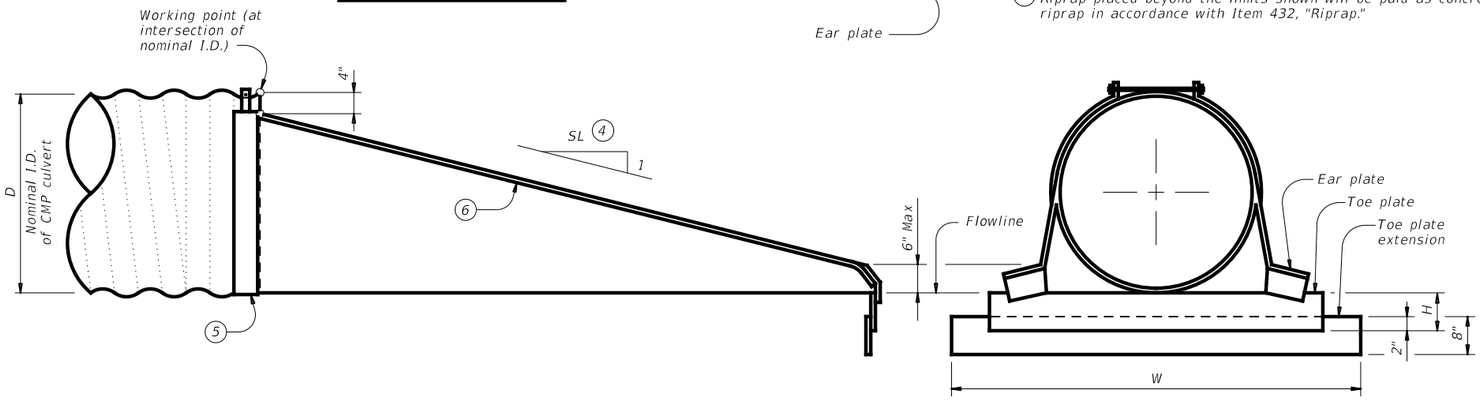


PLAN OF END SECTION



SIDE ELEVATION OF END SECTION

END ELEVATION OF END SECTION

1. Provide size of pipe runner as shown in the tables. Cross pipe is the same size as the pipe runner. Cross pipe stub out and bottom anchor pipe are the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Length table.
2. Values shown are minimum requirements.
3. Provide all 3-piece apron sections with 12 gage sides and 10 gage center panels.
4. Recommended values of slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.
5. Connection between corrugated metal pipe (CMP) culvert and galvanized prefabricated end section may be with strap and bolt as shown or other combinations of threaded rods and/or coupling bands.
6. Reinforce upper edge of prefabricated end section with minimum $\frac{3}{8}$" dia smooth or deformed bar (pre-galvanized).
7. Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap."

CROSS PIPE LENGTHS, PIPE RUNNER LENGTHS, AND REQUIRED PIPE SIZES (1)

D (Nominal) (Culvert I.D.)	Cross Pipe Length	3:1 Side Slope		4:1 Side Slope		6:1 Side Slope	
		Pipe Runner Length	Pipe Runner Size	Pipe Runner Length	Pipe Runner Size	Pipe Runner Length	Pipe Runner Size
≤ 24"	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30"	3' – 11"	5' – 0"	3.500 x 0.216	7' – 1"	3.500 x 0.216	11' – 3"	4.500 x 0.237
36"	4' – 5"	6' – 7"	3.500 x 0.216	9' – 2"	3.500 x 0.216	14' – 4"	4.500 x 0.237
42"	4' – 11"	8' – 2"	3.500 x 0.216	11' – 2"	4.500 x 0.237	17' – 4"	4.500 x 0.237
48"	5' – 5"	9' – 9"	3.500 x 0.216	13' – 3"	4.500 x 0.237	20' – 4"	5.563 x 0.258
54"	5' – 11"	11' – 3"	4.500 x 0.237	15' – 4"	4.500 x 0.237	23' – 5"	5.563 x 0.258
60"	6' – 5"	12' – 10"	4.500 x 0.237	17' – 4"	4.500 x 0.237	26' – 5"	5.563 x 0.258

PREFABRICATED END SECTION INFORMATION

D (Nominal) (Culvert I.D.)	Pipe Runner Required	H (2)	A (2)	W (2)	Gage (2)
≤ 24"	No	6"	9"	D + 24"	16
30"	Skew > 15°	9"	12"	D + 32"	14
36"	All skews	9"	12"	D + 32"	14
≥ 42	All skews	12"	16"	D + 40"	12/10 (3)

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTH (1)

HSS Size	STD Size	Max Pipe Runner Length
2.375 x 0.154	2"	N/A
3.500 x 0.216	3"	10' – 0"
4.500 x 0.237	4"	19' – 8"
5.563 x 0.258	5"	34' – 2"

MATERIAL NOTES:

Provide pipe runners, cross pipes, and anchor pipes conforming to ASTM A1085, A500 Gr B, A53 (Type E or S, Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except reinforcement, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specification.

Toe plate extensions are required only when shown elsewhere in the plans.

Concrete riprap is required only when pipe runners are required, unless otherwise shown in the plans. Provide concrete riprap in accordance with Item 432, "Riprap." Use Bottom Anchor Toewall Option B1 when an alternate end section with pre-attached pipe runners is supplied.

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

GENERAL NOTES:

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

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

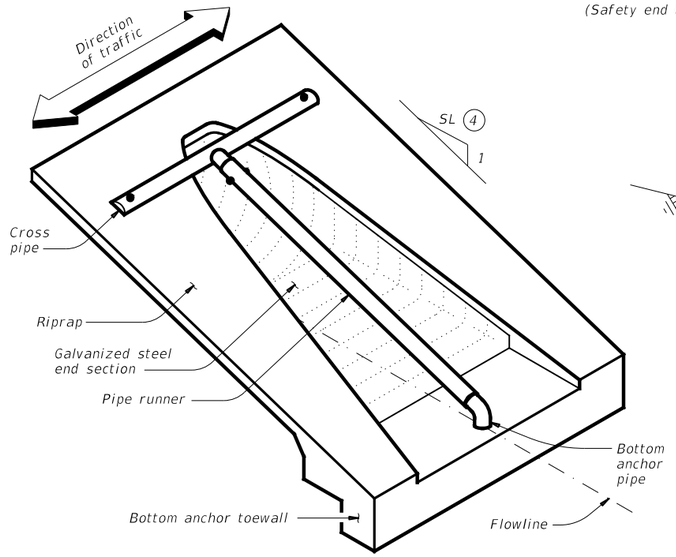
Alternate styles of end sections, including those with pre-attached pipe runners, may be supplied. Alternate styles must meet all of the following: design values shown in tables for pipe runner size; H, A, W, and gage for end section; and material requirements noted.

All pipe runners, calculations, and dimensions are based on the End Section shown on this standard. Alternate styles of end sections will require that appropriate adjustments be made to the values presented on this standard.

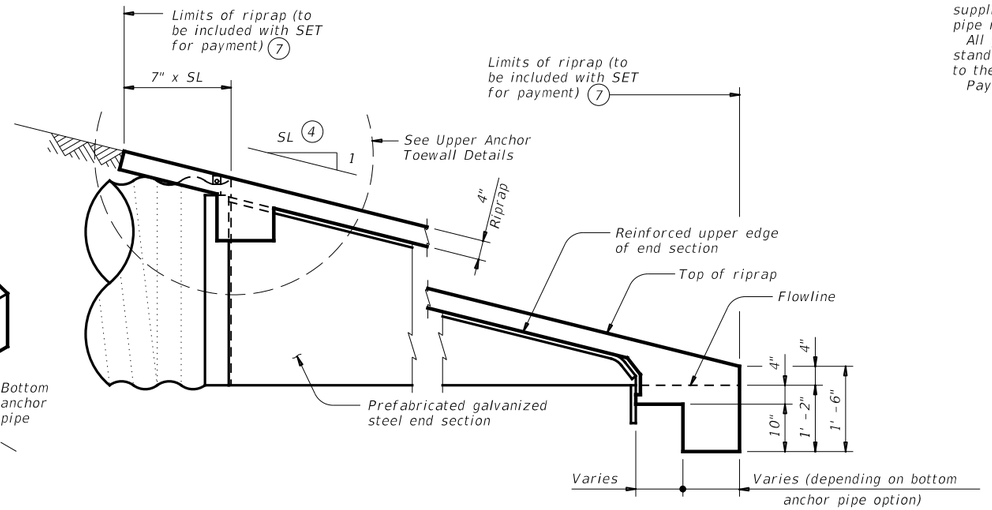
Payment for riprap and toewall is included in price bid for each safety end treatment.

PREFABRICATED GALVANIZED STEEL END SECTION DETAILS

(Safety end treatment and riprap not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Pipe runners are not shown for clarity.)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

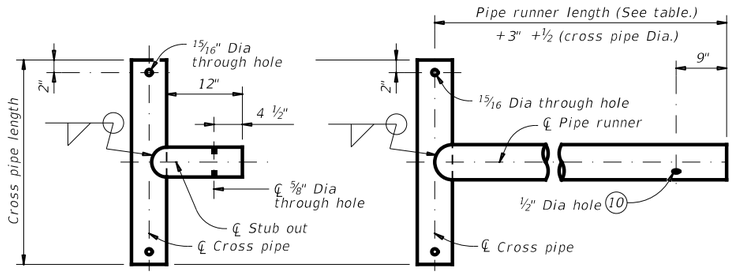
PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

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

GS-ES-CD

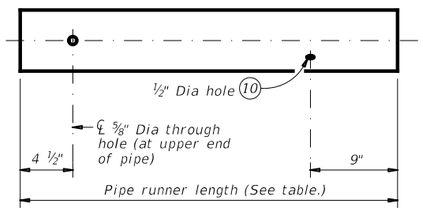
FILE: CD-GSES-CD-20.dgn	DN: TxDOT	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		89

DATE:
FILE:

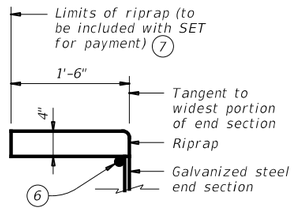


OPTION A1 OPTION A2

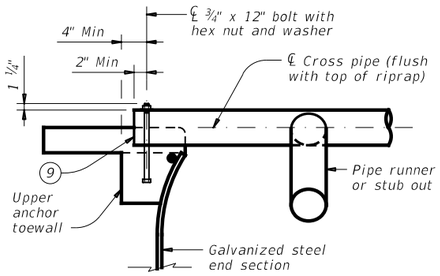
CROSS PIPE AND CONNECTIONS DETAILS



PIPE RUNNER DETAILS

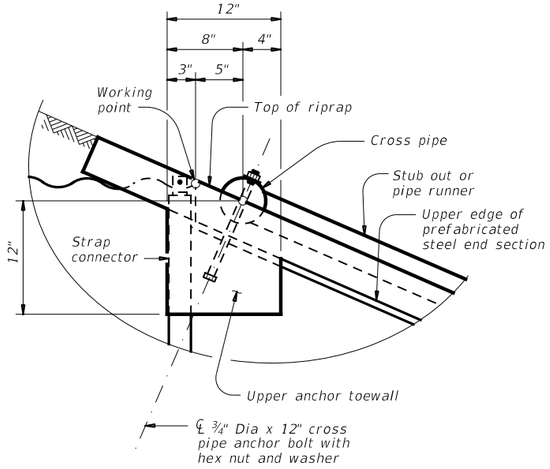


SHOWING TYPICAL RIPRAP

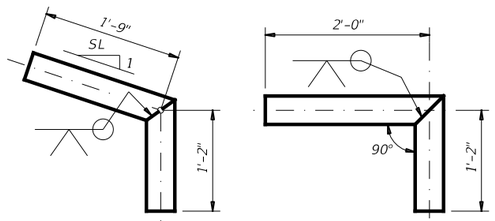


SHOWING CROSS PIPE AND UPPER ANCHOR TOEWALL

SECTION A-A

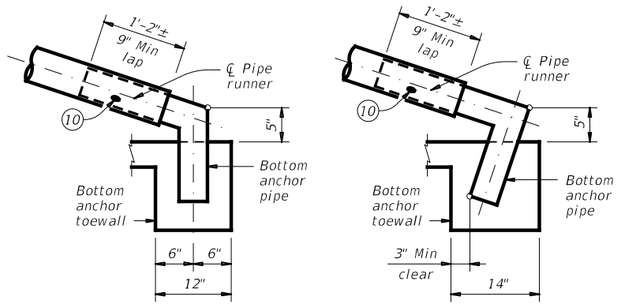


UPPER ANCHOR TOEWALL DETAILS



OPTION B1 OPTION B2

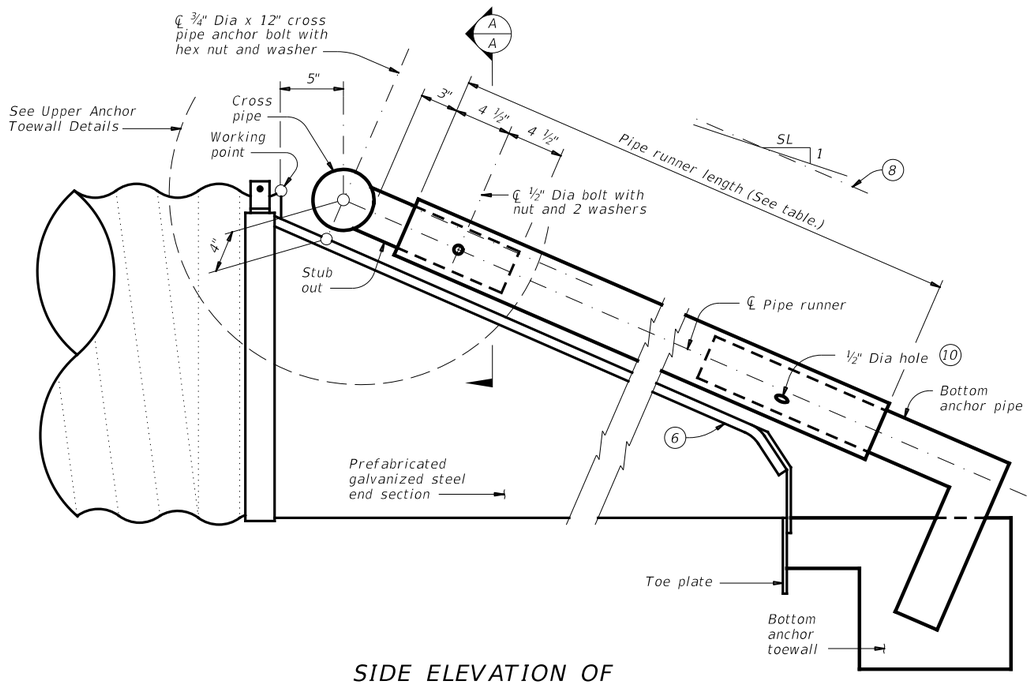
BOTTOM ANCHOR PIPE DETAILS (11)



OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(End section and riprap are not shown for clarity.)



SIDE ELEVATION OF PIPE RUNNER INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Pipe Option B2. Riprap not shown for clarity.)

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (12)

Nominal Culvert I.D.	3:1 Side Slope	4:1 Side Slope	6:1 Side Slope
12"	0.5	0.6	0.9
15"	0.6	0.7	1.0
18"	0.6	0.8	1.1
21"	0.7	0.8	1.2
24"	0.7	0.9	1.3
27"	0.8	1.0	1.4
30"	0.9	1.1	1.5
33"	0.9	1.1	1.6
36"	1.0	1.2	1.7
42"	1.1	1.4	1.9
48"	1.2	1.5	2.1
54"	1.3	1.7	2.3
60"	1.5	1.8	2.6

(6) Reinforce upper edge of prefabricated end section with minimum ⅜" dia smooth or deformed bar (pre-galvanized).

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

(8) Note that actual slope of pipe runner may vary slightly from side slope of riprap and upper edge of prefabricated end section.

(9) Take care of ensure that riprap concrete does not flow into the crosspipe so as to permit disassembly of the bolted connection to allow cleanout access.

(10) After installation, inspect the ⅜" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

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

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

Texas Department of Transportation

Bridge Division Standard

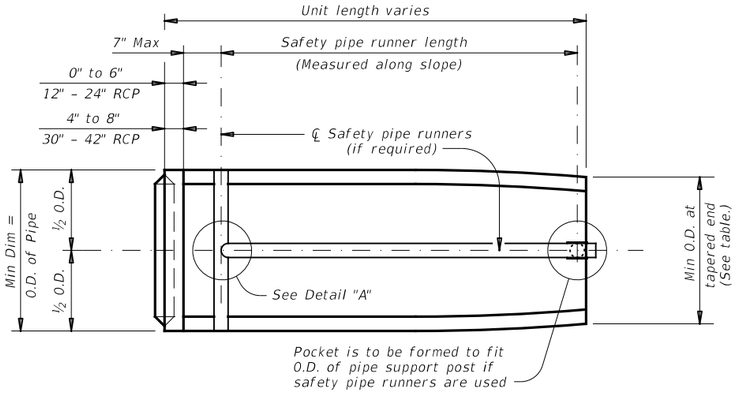
PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

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

GS-ES-CD

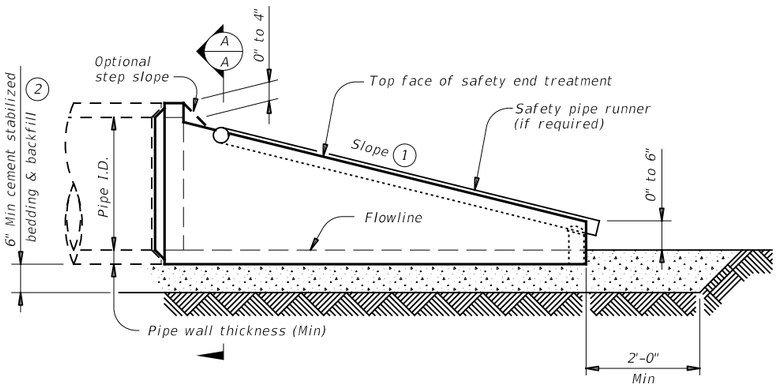
FILE: CD-GSES-CD-20.dgn	DN: TxDOT	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		90

DATE:
FILE:



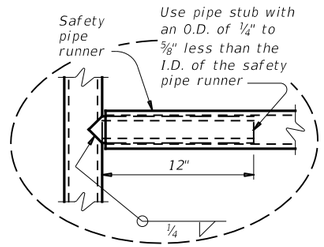
PLAN VIEW

(Showing spigot end connection.)

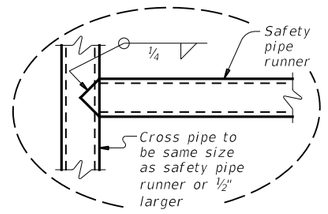


LONGITUDINAL ELEVATION

(Showing spigot end connection.)

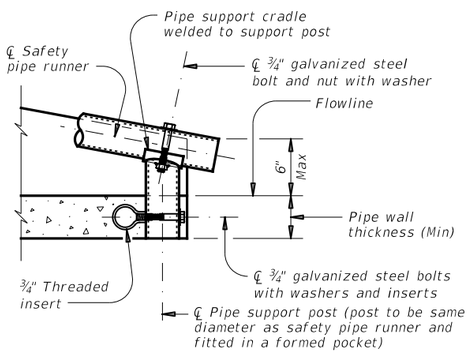


OPTION A



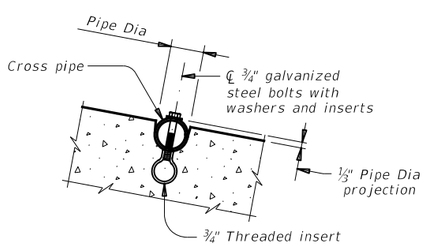
OPTION B

DETAIL A



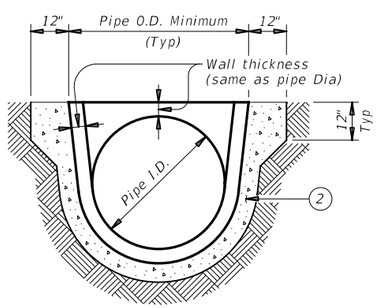
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

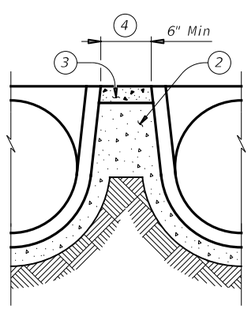


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

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

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

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

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

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

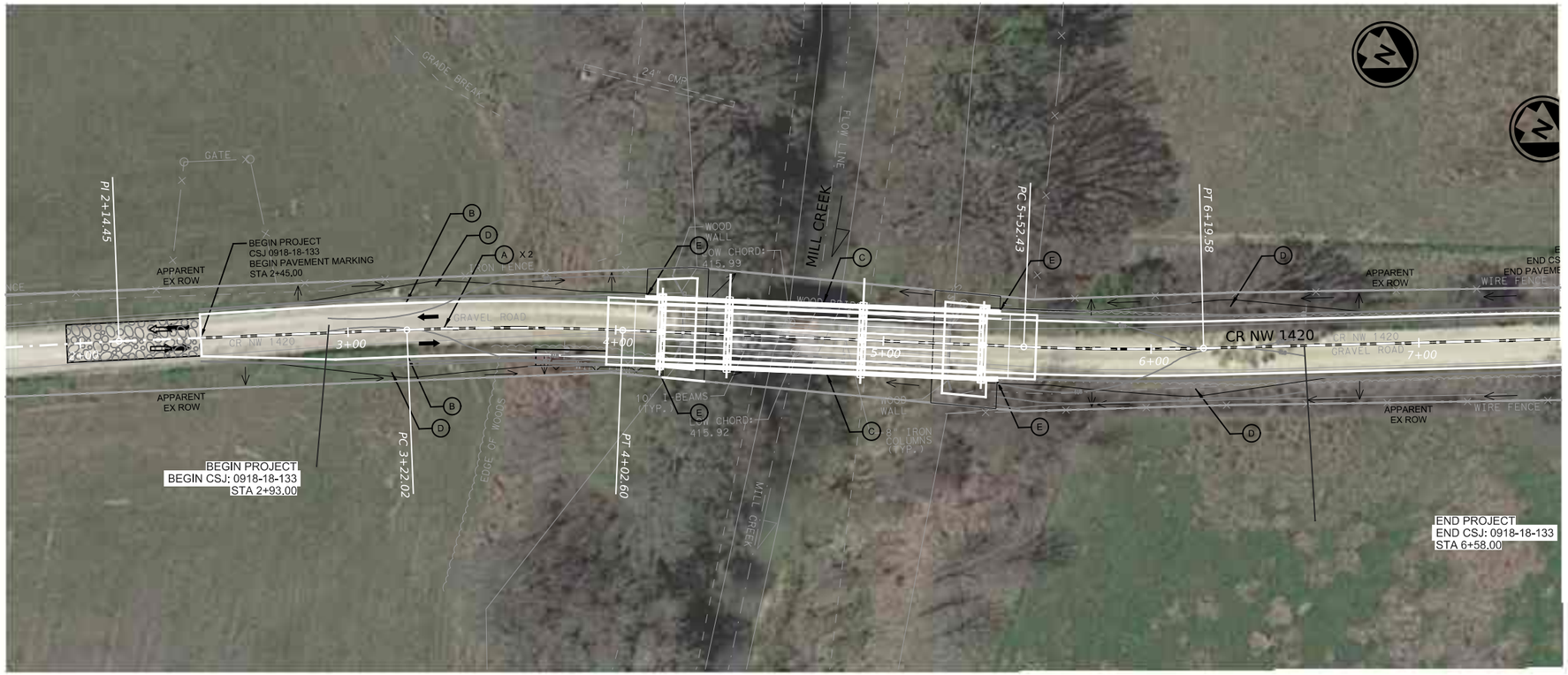
TYPE II ~ CROSS DRAINAGE

PSET-RC

FILE: CD-PSET-RC-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		91

100% SUBMITTAL

DW:	CK:	DW:	CK:
00	KP	BE	BE



UTILITY LEGEND

- POTENTIAL CONFLICT
- CONFIRMED CONFLICT
- CLEARED CONFLICT

- EXISTING OH ELEC (LONE STAR TRANSMISSION)
- EXISTING OH ELEC (NAVARRO COUNTY ELECTRIC)
- EXISTING OH ELEC (ONCOR DISTRIBUTION)
- EXISTING OH ELEC (ONCOR TRANSMISSION)
- EXISTING UG GAS (ATMOS MIDTX)
- EXISTING UG GAS (ONEOK PIPELINE)
- EXISTING UG WATER (CORBET WATER)
- EXISTING UG FO (ATT)
- EXISTING UG FO (ZAYO)
- EXISTING UG TELE (ATT)
- EXISTING UG TELE (UNKNOWN)

- PROPOSED BRIDGE/ROADWAY WORK
- EXISTING TOPO FEATURES
- PROPOSED TEMPORARY TCP WORK

- COMM HANDHOLE
- COMM MANHOLE
- ELEC BOX
- ELEC HH
- ELEC POLE - SURVEY
- ELEC POLE - QLD
- PROPOSED ELEC POLE
- STREET LIGHT POLE
- ELEC VAULT
- ELEC GUY WIRE
- TELE MH
- TELE HH
- TELE PEDESTAL
- TELE CABINET
- GAS MARKER
- GAS VALVE
- GAS VENT
- WATER METER
- WATER VALVE
- WATER VAULT
- FIRE HYDRANT
- WASTEWATER MH
- WASTEWATER CLEAN OUT
- WASTEWATER VAULT

0 25 50 75 100

HORIZ. SCALE IN FEET

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STATE OF TEXAS
BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER

11/27/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420 (1410)

UTILITY LAYOUT
MILL CREEK

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		92

DATE: November 27, 2023
FILE: 133-U-PLAN-01.dgn

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DW:	CK:	DW:	CK:
OO	KP	BE	BE

UTILITY LEGEND

- POTENTIAL CONFLICT
- CONFIRMED CONFLICT
- CLEARED CONFLICT

- EXISTING OH ELEC (LONE STAR TRANSMISSION)
- EXISTING OH ELEC (NAVARRO COUNTY ELECTRIC)
- EXISTING OH ELEC (ONCOR DISTRIBUTION)
- EXISTING OH ELEC (ONCOR TRANSMISSION)
- EXISTING UG GAS (ATMOS MIDTX)
- EXISTING UG GAS (ONEOK PIPELINE)
- EXISTING UG WATER (CORBET WATER)
- EXISTING UG FO (ATT)
- EXISTING UG FO (ZAYO)
- EXISTING UG TELE (ATT)
- EXISTING UG TELE (UNKNOWN)

- PROPOSED BRIDGE/ROADWAY WORK
- EXISTING TOPO FEATURES
- PROPOSED TEMPORARY TCP WORK

- COMM HANDHOLE
- COMM MANHOLE
- ELEC BOX
- ELEC HH
- ELEC POLE - SURVEY
- ELEC POLE - QLD
- PROPOSED ELEC POLE
- STREET LIGHT POLE
- ELEC VAULT
- ELEC GUY WIRE
- TELE MH
- TELE HH
- TELE PEDESTAL
- TELE CABINET
- GAS MARKER
- GAS VALVE
- GAS VENT
- WATER METER
- WATER VALVE
- WATER VAULT
- FIRE HYDRANT
- WASTEWATER MH
- WASTEWATER CLEAN OUT
- WASTEWATER VAULT

0 25 50 75 100
HORIZ. SCALE IN FEET

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BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER
11/27/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

UTILITY LAYOUT
RUSH CREEK TRIBUTARY

SCALE:1"=50'-H
1"=5'-V
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		93

DATE: November 27, 2023
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100% SUBMITTAL

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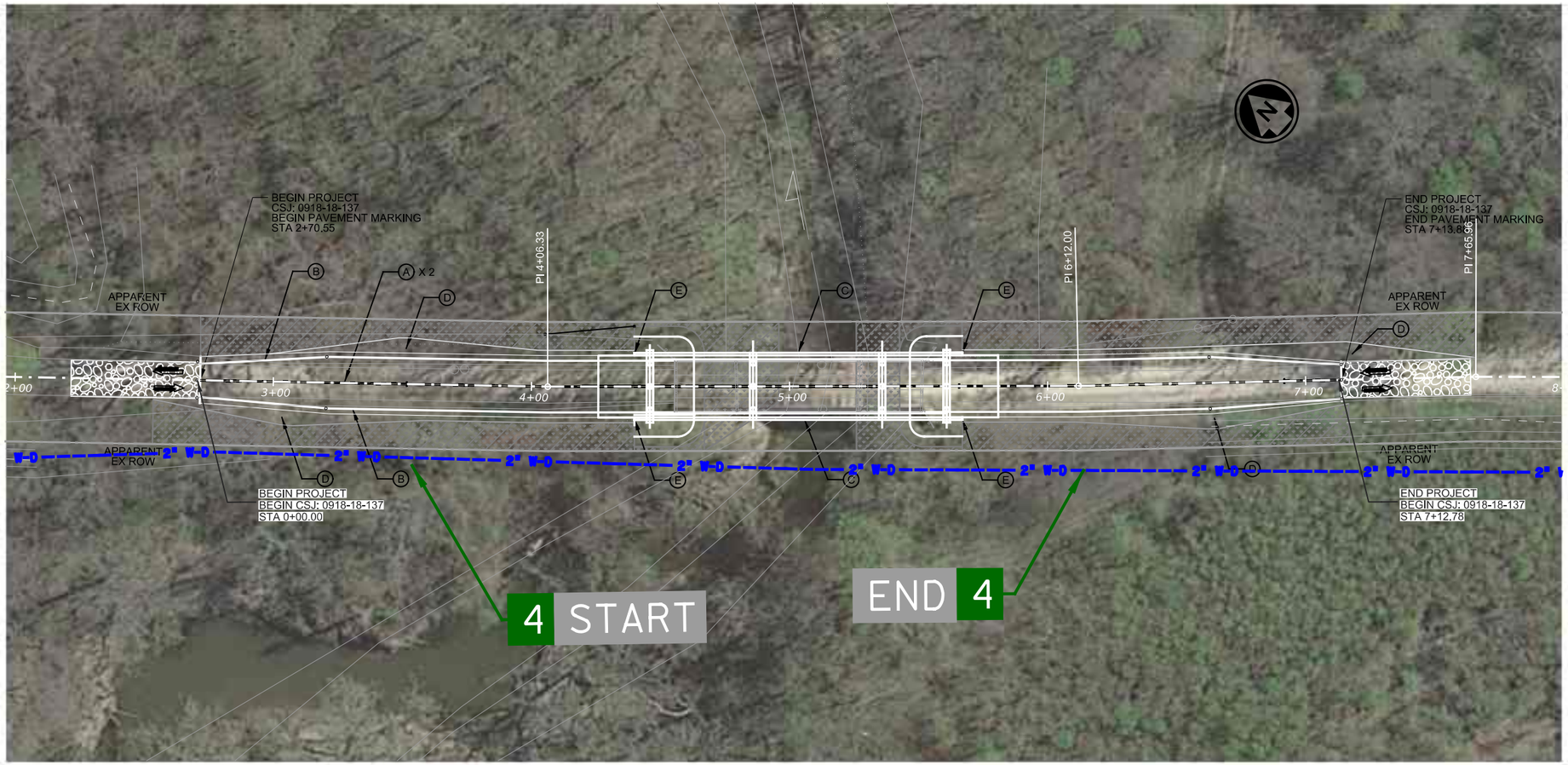
OO	KP	BE	BE



UTILITY LEGEND

- POTENTIAL CONFLICT
- CONFIRMED CONFLICT
- CLEARED CONFLICT

- OH E — EXISTING OH ELEC (LONE STAR TRANSMISSION)
- OH E1 — EXISTING OH ELEC (NAVARRO COUNTY ELECTRIC)
- OH E2 — EXISTING OH ELEC (ONCOR DISTRIBUTION)
- OH E3 — EXISTING OH ELEC (ONCOR TRANSMISSION)
- X" G — EXISTING UG GAS (ATMOS MIDTX)
- X" G1 — EXISTING UG GAS (ONEOK PIPELINE)
- X" W — EXISTING UG WATER (CORBET WATER)
- UG FO — EXISTING UG FO (ATT)
- UG FO1 — EXISTING UG FO (ZAYO)
- UG T — EXISTING UG TELE (ATT)
- UG T1 — EXISTING UG TELE (UNKNOWN)

- PROPOSED BRIDGE/ROADWAY WORK
- EXISTING TOPO FEATURES
- PROPOSED TEMPORARY TCP WORK

COMM HANDHOLE	GAS MARKER
COMM MANHOLE	GAS VALVE
ELEC BOX	GAS VENT
ELEC HH	WATER METER
ELEC POLE - SURVEY	WATER VALVE
ELEC POLE - QLD	WATER VAULT
PROPOSED ELEC POLE	FIRE HYDRANT
STREET LIGHT POLE	WASTEWATER MH
ELEC VAULT	WASTEWATER CLEAN OUT
ELEC GUY WIRE	WASTEWATER VAULT
TELE MH	
TELE HH	
TELE PEDESTAL	
TELE CABINET	

0 25 50 75 100
HORIZ. SCALE IN FEET

STATE OF TEXAS
BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER

11/27/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc.
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 2305

UTILITY LAYOUT
PIN OAK CREEK

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		94

DATE: November 27, 2023
FILE: 137-U-PLAN-01.dgn

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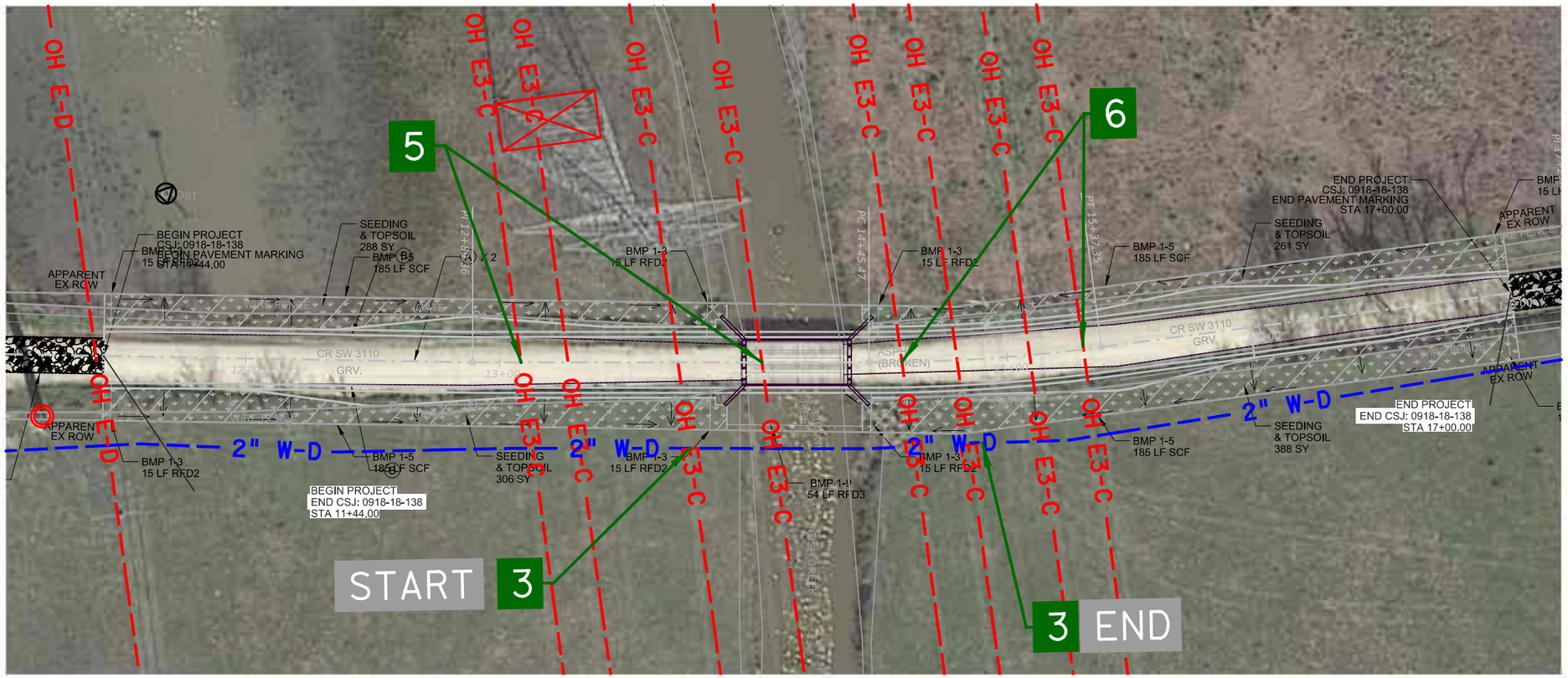
100% SUBMITTAL

DW:	CK:	DW:	CK:
OO	KP	BE	BE



UTILITY LEGEND

- POTENTIAL CONFLICT
- CONFIRMED CONFLICT
- CLEARED CONFLICT

- EXISTING OH ELEC (LONE STAR TRANSMISSION)
- EXISTING OH ELEC (NAVARRO COUNTY ELECTRIC)
- EXISTING OH ELEC (ONCOR DISTRIBUTION)
- EXISTING OH ELEC (ONCOR TRANSMISSION)
- EXISTING UG GAS (ATMOS MIDTX)
- EXISTING UG GAS (ONEOK PIPELINE)
- EXISTING UG WATER (CORBET WATER)
- EXISTING UG FO (ATT)
- EXISTING UG FO (ZAYO)
- EXISTING UG TELE (ATT)
- EXISTING UG TELE (UNKNOWN)
- PROPOSED BRIDGE/ROADWAY WORK
- EXISTING TOPO FEATURES
- PROPOSED TEMPORARY TCP WORK

- COMM HANDHOLE
- COMM MANHOLE
- ELEC BOX
- ELEC HH
- ELEC POLE - SURVEY
- ELEC POLE - QLD
- PROPOSED ELEC POLE
- STREET LIGHT POLE
- ELEC VAULT
- ELEC GUY WIRE
- TELE MH
- TELE HH
- TELE PEDESTAL
- TELE CABINET
- GAS MARKER
- GAS VALVE
- GAS VENT
- WATER METER
- WATER VALVE
- WATER VAULT
- FIRE HYDRANT
- WASTEWATER MH
- WASTEWATER CLEAN OUT
- WASTEWATER VAULT

0 25 50 75 100
HORIZ. SCALE IN FEET

STATE OF TEXAS
BRYAN E. ELKAN
108256
LICENSED
PROFESSIONAL ENGINEER
11/27/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR SW 3110

UTILITY LAYOUT
RUSH CREEK

SCALE:1"=50'-H
1"=5'-V

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		95

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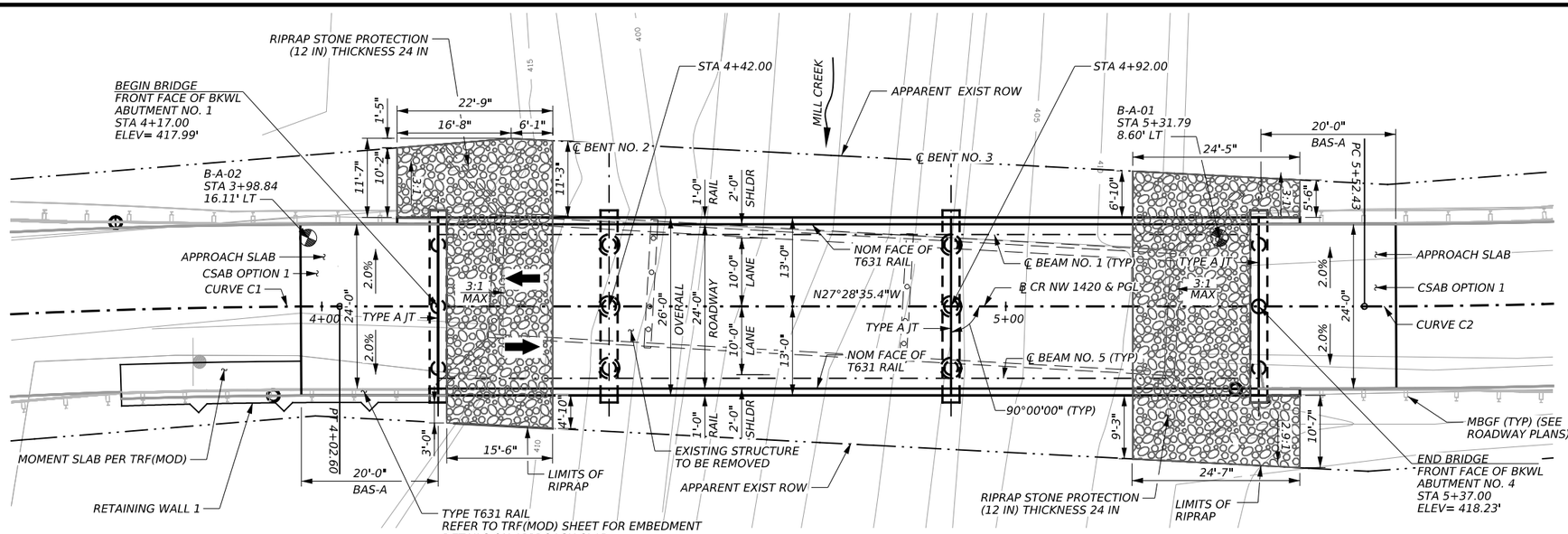


PLAN
SCALE:1"=20'

ALL ABUTMENTS AND BENTS ON BEARING N 62° 31' 24.6" E

HORIZ CURVE DATA CURVE C1	
PI	3+62.33
Δ	04°37'02.2" (RT)
D	05°43'46.5"
T	40.32'
L	80.59'
R	1000.00'
PC	3+22.02
PT	4+02.60

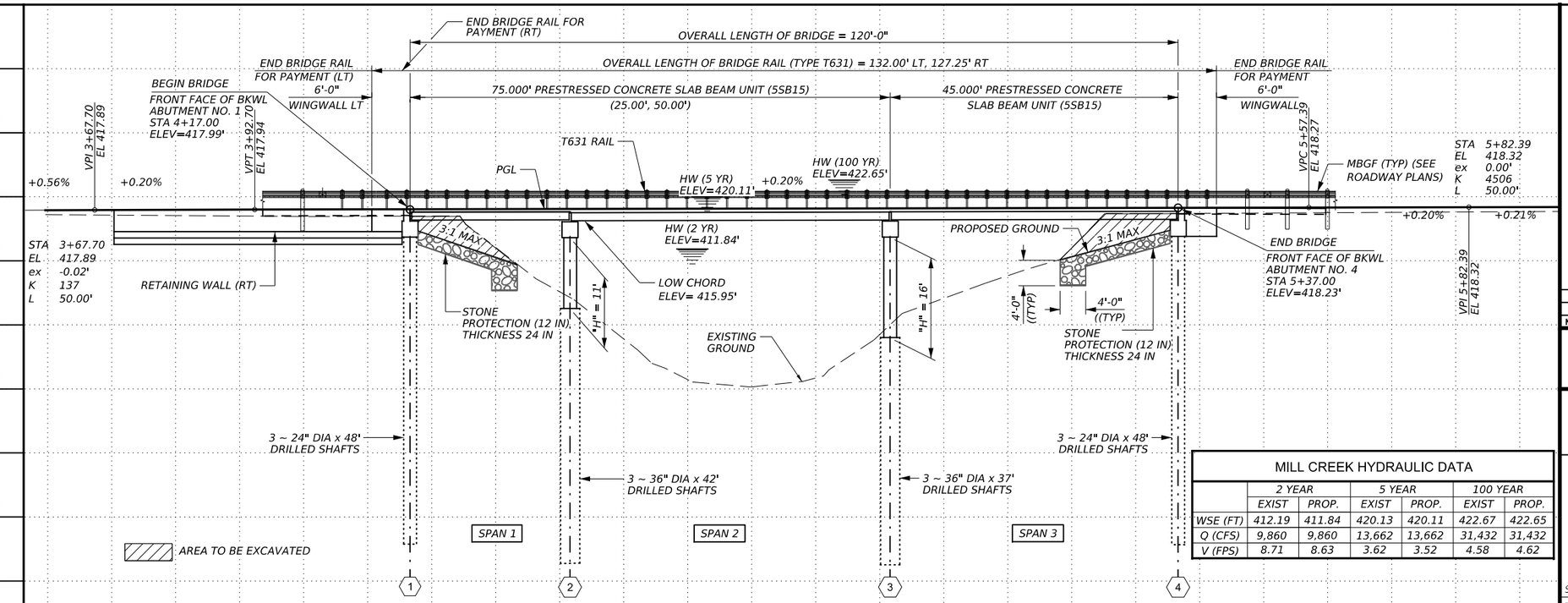
HORIZ CURVE DATA CURVE C2	
PI	5+86.02
Δ	03°50'50.0" (LT)
D	05°43'46.5"
T	33.59'
L	67.15'
R	1000.00'
PC	5+52.43
PT	6+19.58

NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION AND TXDOT BRIDGE DESIGN MANUAL LRFD, 2022.
2. SEE BORING LOGS SHEETS FOR SOIL BORING LOCATIONS AND DATA.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.
4. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLABS IS NOT REQUIRED.
5. EXISTING 3 - SIMPLE SPAN STEEL I-BEAM BRIDGE (100'-6" X 18'-4"), TIMBER DECK TO BE REMOVED PER ITEM 496. EXISTING SUBSTRUCTURE (STEEL ABUTMENT CAPS, STEEL PIPE PILES, TIMBER RETAINING WALLS) TO BE REMOVED TO 2' BELOW EXISTING GROUND.
6. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
7. FOUND DRILLED SHAFTS PER THE LENGTHS SHOWN OR LONGER AS NECESSARY TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS PENETRATION INTO COMPETENT SHALE.
8. SPECIAL EXCAVATION METHODS INCLUDING SLURRY, CASING OR BOTH MAY BE REQUIRED TO MAINTAIN STABLE EXCAVATION FOR DRILLED SHAFT INSTALLATION. IF CASING LENGTH EXCEEDS 10FT, NOTIFY ENGINEER OF RECORD.

FUNC CLASS= LOCAL
DESIGN SPEED: MOIEC
ADT (2024): 15
ADT (2044): 25

EXIST. NBI: 18-175-0-AA01-56-003
NEW NBI: 18-175-0-AA01-56-004

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.08/1.72



ELEVATION
SCALE:1"=20'

MILL CREEK HYDRAULIC DATA						
	2 YEAR		5 YEAR		100 YEAR	
	EXIST	PROP.	EXIST	PROP.	EXIST	PROP.
WSE (FT)	412.19	411.84	420.13	420.11	422.67	422.65
Q (CFS)	9,860	9,860	13,662	13,662	31,432	31,432
V (FPS)	8.71	8.63	3.62	3.52	4.58	4.62

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
Christopher Monopolis 12/12/2023

NO.	DATE	REVISION	APPROVED

HDR
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713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR NW 1420
MILL CREEK BRIDGE
BRIDGE LAYOUT
NBI: 18-175-0-AA01-56-004

SCALE:1"=20' 1 OF 1

FILE: SEE PATH	DN: CMM	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		96

DATE: December 11, 2023
FILE: 133BLY01.dgn
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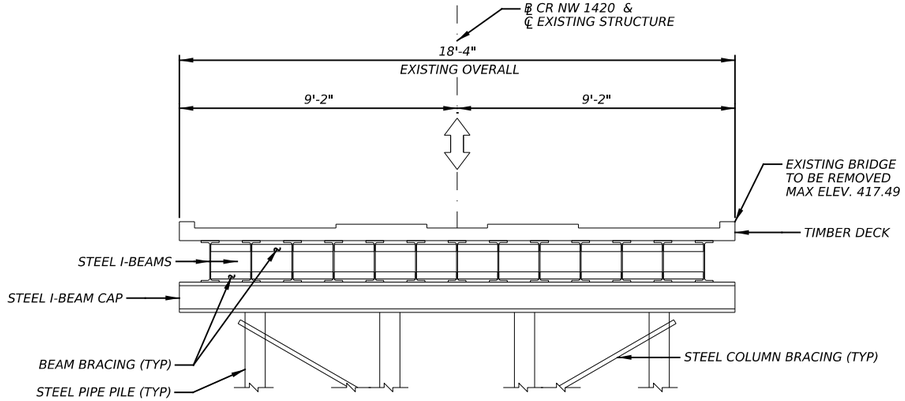
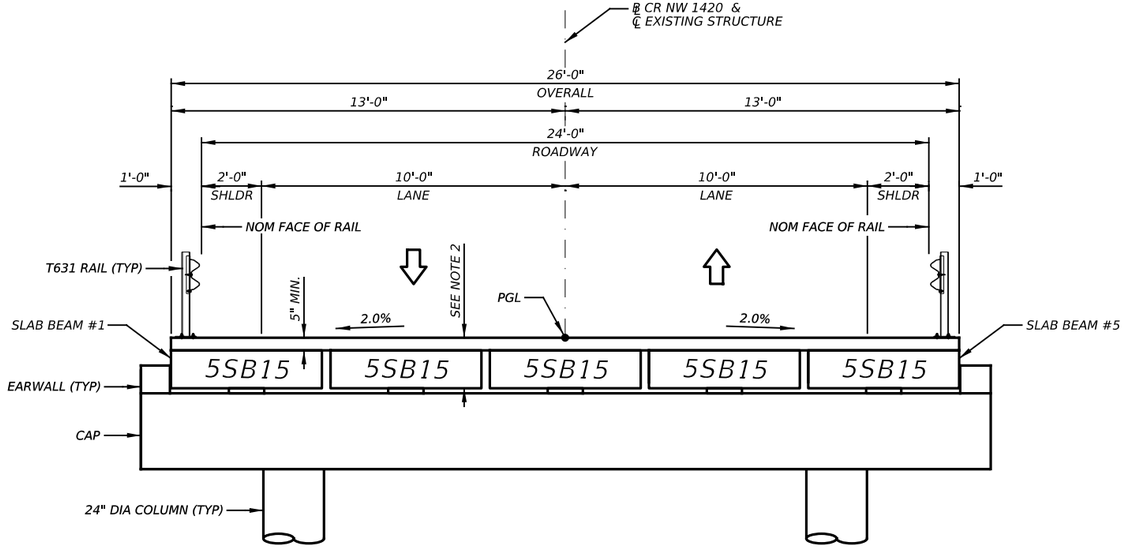


EXISTING BRIDGE TYPICAL SECTION
FOR REMOVAL
SCALE:1"=5'



PROPOSED TYPICAL SECTION
SCALE:1"=5'

NOTES:

1. EXISTING TYPICAL SECTION IS DRAWN BASED ON LIMITED GEOMETRIC INFORMATION AVAILABLE FROM PONTEX REPORT AND PHOTOS FROM INSPECTION REPORTS. BEAM DEPTHS AND DECK THICKNESSES ARE ASSUMED; THE CONTRACTOR SHALL DETERMINE THESE MEASURMENTS IN THE FIELD AS NEEDED.

2. ASSUMED SECTION DEPTHS:
   1'-8 1/4" AT CL BRG IN SPAN 1
   1'-10" AT CL BRG IN SPAN 2
   1'-9 1/2" AT CL BRG IN SPAN 3
   DECK THICKNESS SHALL NOT EXCEED 7".

HL93 LOADING

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
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Texas Department of Transportation

Dallas District Bridge

CR NW 1420
MILL CREEK BRIDGE
TYPICAL SECTION

1 OF 1

FILE: SEE PATH	DN: CMM	CK: EOB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		97

DATE: Friday, November 10, 2023 01:59:03 PM
FILE: 133TYP01.dgn
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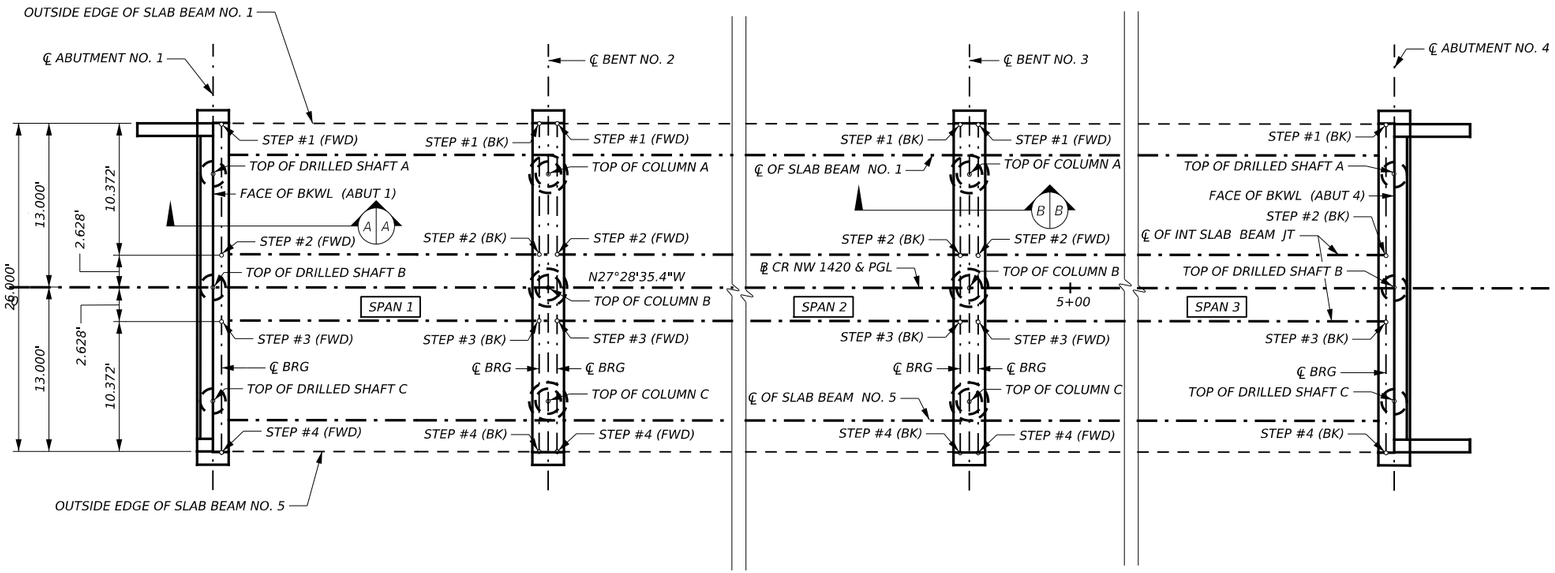
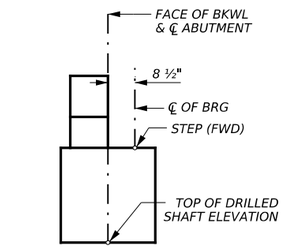
SUMMARY OF BRIDGE ITEMS

BRIDGE ELEMENT / BID ITEM DESCRIPTION	416 6002	416 6004	420 6014	420 6030	420 6038	422 6008	425 6012	450 6018
	DRILL SHAFT (24 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T631)
	LF	LF	CY	CY	CY	SF	LF	LF
CR NW 1420 MILL CREEK								
2 - ABUTMENTS	288		17.4					19.3
2 - INTERIOR BENTS		237		13.2	9.4			
1 - 75.000' PRESTR CONC SLAB BEAM UNIT						1950	370.00	150.0
1 - 45.000' PRESTR CONC SLAB BEAM UNIT						1170	222.50	90.0
TOTAL	288	237	17.4	13.2	9.4	3120	592.50	259.3

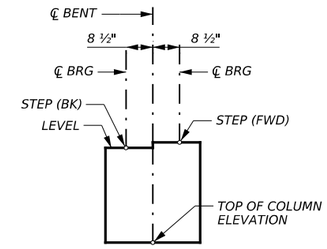


PLAN OF STEP LOCATIONS



SECTION A-A

ABUTMENT 1 SHOWN, ABUTMENT 4 SIMILAR (OPPOSITE HAND)

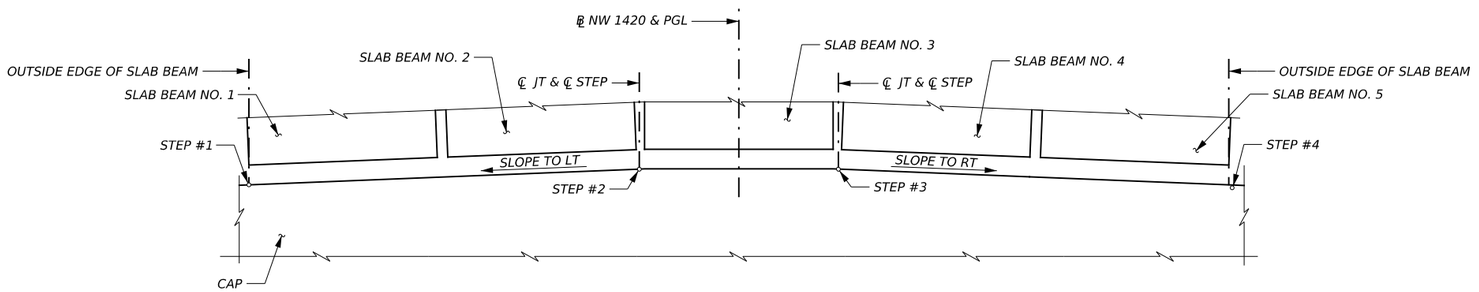


SECTION B-B

BENT 3 SHOWN, BENT 2 SIMILAR

SUBSTRUCTURE	CAP ELEVATIONS (FT)			
	STEP #1	STEP #2	STEP #3	STEP #4
ABUTMENT 1 (FWD)	415.876	416.083	416.083	415.876
BENT 2 (BK)	415.923	416.131	416.131	415.923
BENT 2 (FWD)	415.780	415.988	415.988	415.780
BENT 3 (BK)	415.878	416.085	416.085	415.878
BENT 3 (FWD)	415.922	416.130	416.130	415.922
ABUTMENT 4 (BK)	416.009	416.217	416.217	416.009

SUBSTRUCTURE	TOP OF COLUMN/DRILLED SHAFT ELEVATIONS		
	A	B	C
ABUTMENT 1	413.456	413.583	413.456
BENT 2	413.360	413.488	413.360
BENT 3	413.458	413.585	413.458
ABUTMENT 4	413.589	413.717	413.589



TRANSVERSE SECTION AT STEP LOCATIONS

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
12/12/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation © 2023

Dallas District Bridge

CR NW 1420

MILL CREEK BRIDGE
ESTIMATED QUANTITIES AND CAP ELEVATIONS

1 OF 1

FILE: SEE PATH	DN: AD	CK: CMM	DW: RA	CK: CMM
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		98

DATE: December 11, 2023
FILE: 133ESQ01.dgn
3:49:04 PM

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-A-01	District	Dallas
Highway	CR 1420	Structure	@ Mill Creek	Date	10-26-22
CSJ	0918-18-133	Station	5+31.79	Grnd. Elev.	417.26 ft
		Offset	8.60' (LT)	GW Elev.	372.26 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, Grayish Brown, Hard to Very Stiff, Dry (CL)							
5		34 (6) 40 (6)				10.8	36	23		
10		19 (6) 19 (6)				15.6				-200 = 93.4%
402.3 15		11 (6) 11 (6)				15.2	60	45		
			CLAY, Fat Clay, Dk. Brown to Dk. Grayish Brown, Stiff, Dry to Moist (CH)							
20		6 (6) 8 (6)				24.4				-200 = 85.7%
25		8 (6) 10 (6)				24.5	54	39		-200 = 87.8%
387.3 30		6 (6) 6 (6)				22.7				-200 = 84.0%
			CLAY, Fat Clay w/ Sand, Gray, Med. Stiff to Very Stiff, Moist to Wet (CH)							
35		4 (6) 5 (6)				23.6	56	45		
40		21 (6) 30 (6)				27.1				-200 = 72.8% Sulfate = Less than 100 ppm
372.3 45		50 (3) 50 (1.5)				24.8	68	50		
			SHALE, Shale, Gray to Dk. Gray, Hard, Wet (Comprised of Fat Clay) (CH)							
50		50 (2.5) 50 (1.5)				24.8				-200 = 90.5%
55		50 (3.5) 50 (1.5)				21.3	72	47		
357.3 60		50 (1) 50 (0.5)				21.4				-200 = 98.5%

Remarks: Boring Loc: N,E = 6743101.105, 2517450.120 (Surf Coord) (Info from Surveyor)

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:** RR **Organization:** B2Z Engineering

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincore

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-A-02	District	Dallas
Highway	CR 1420	Structure	@ Mill Creek	Date	10-12-22
CSJ	0918-18-133	Station	3+98.84	Grnd. Elev.	416.76 ft
		Offset	16.10' (LT)	GW Elev.	368.76 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 Grayish Brown, Stiff to Very Stiff, Dry (CL)							
5		12 (6) 14 (6)				9.7				-200 = 78.0%
10		23 (6) 23 (6)				8.8	41	27		
401.8 15		28 (6) 24 (6)				7.9				-200 = 59.9%
			CLAY, Sandy Fat Clay, Grayish Brown to Dk. Grayish Brown, w/ Traces of Fine Gravel, Very Stiff to Stiff, Dry to Moist (CH)							
20		8 (6) 10 (6)				17.9	53	31		Sulfate = Less than 100ppm
391.8 25		7 (6) 8 (6)				20.9				-200 = 70.9%
			CLAY, Fat Clay w/ Sand, Dk. Brown, Stiff, Moist (CH)							
386.8 30		10 (6) 11 (6)				20.0	44	30		-200 = 94.8%
			CLAY, Lean Clay, Brown, Stiff, Moist (CL)							
35		8 (6) 9 (6)				24.6				-200 = 92.8%
376.8 40		20 (6) 33 (6)				19.8	90	73		
			CLAY, Fat Clay, Dk. Gray, Very Stiff, Moist (CH)							
371.8 45		50 (3) 50 (1.5)				18.0				-200 = 94.2%
			SHALE, Shale, Dk. Gray to Black, Hard, Moist to Wet (Comprised of Fat Clay) (CH)							
50		50 (2.5) 50 (0.5)				19.0	71	51		
55		50 (2.5) 50 (1.5)				18.3				-200 = 98.1%
356.8 60		50 (1.5) 50 (1)				19.0	76	54		

Remarks: Boring Loc: N,E = 6742979.633, 2517504.830 (Surf Coord) (Info from Surveyor)

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:** RR **Organization:** B2Z Engineering

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincore

STATE OF TEXAS
DAVID A. SAENZ
102365
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

B2Z ENGINEERING, LLC.
900 S. STEWART RD., SUITE 4,
MISSION, TX, 78572
Registration No. F-11187

Texas Department of Transportation

Dallas District Bridge

CR NW 1420
MILL CREEK BRIDGE
BORING LOGS

1 OF 1

FILE: SEE PATH	DN: CMM	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		99

DATE: Monday, November 13, 2023 03:17:37 PM
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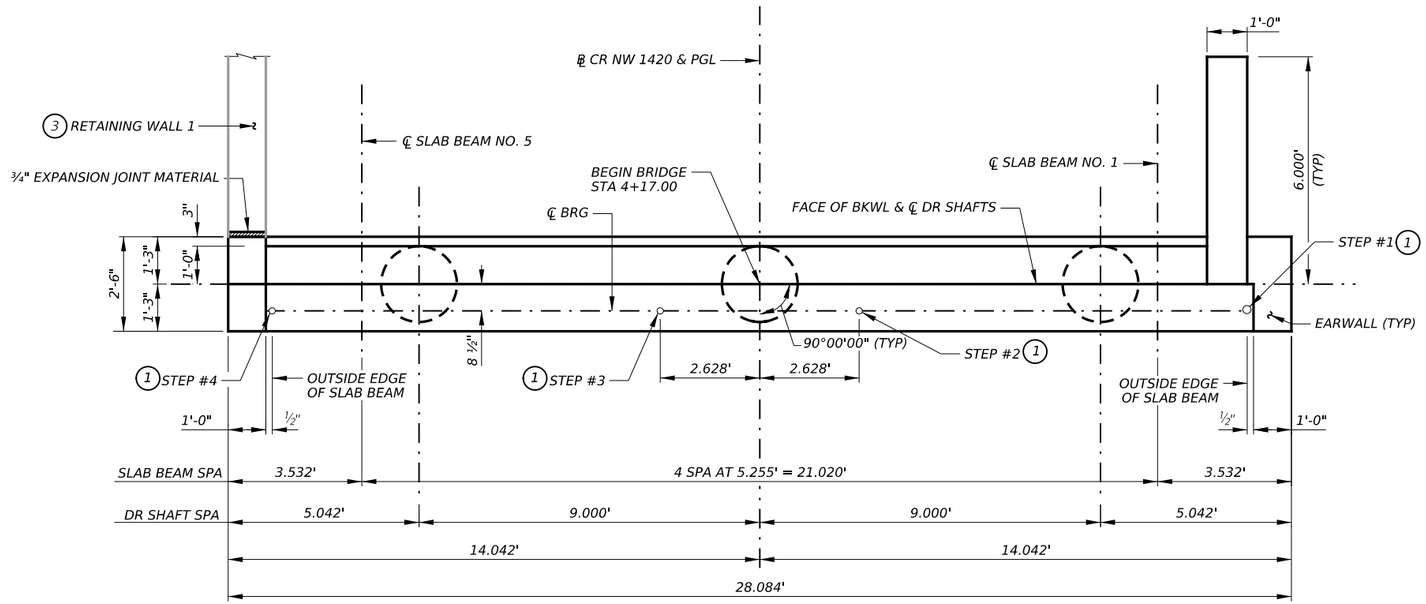
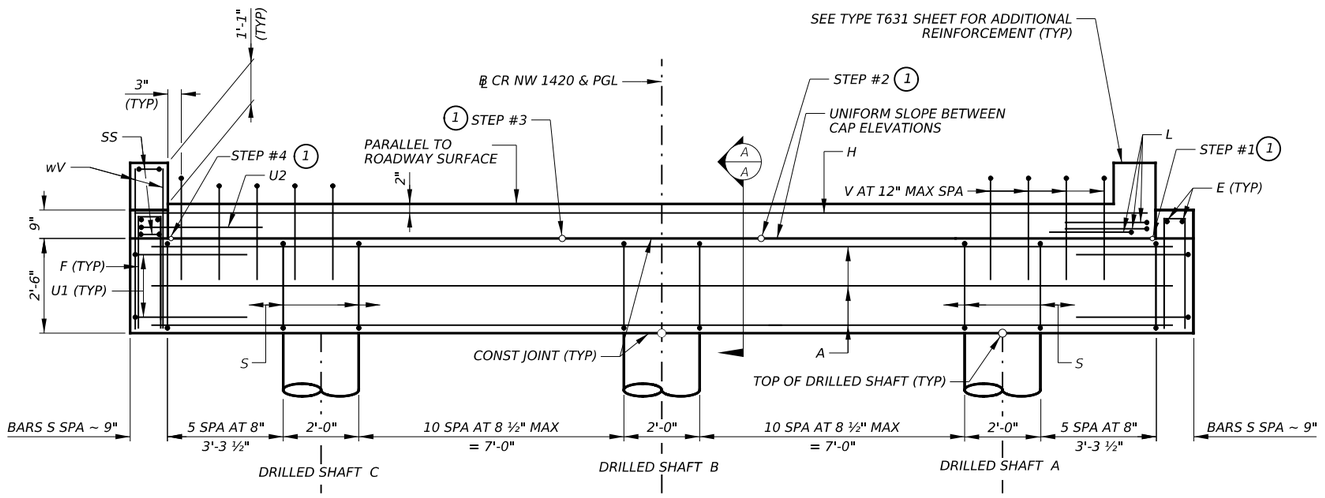
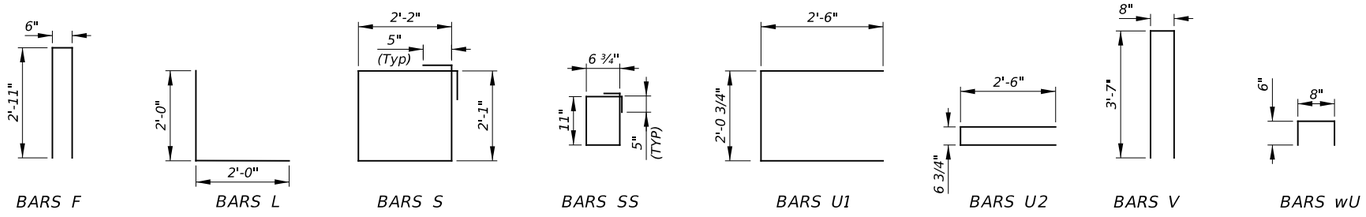
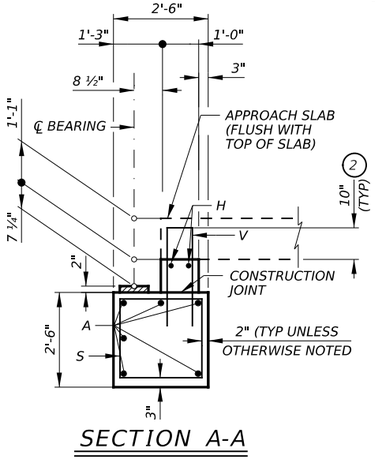


PLAN



ELEVATION





SECTION A-A

1. STEP ELEVATIONS ARE BASED ON SECTION DEPTHS SHOWN ON SPAN DETAILS. SEE ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS SHEET FOR STEP ELEVATIONS.
2. INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.
3. SEE RETAINING WALL DETAILS SHEET.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (F'C = 3,600 PSI).
PROVIDE GRADE 60 REINFORCING STEEL.

GENERAL NOTES:

DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATION, 9TH EDITION (2020) AND TXDOT LRFD BRIDGE DESIGN MANUAL (JAN 2023).
DESIGNED FOR NORMAL EMBANKMENT HEADER SLOPE OF 3:1.
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 STONE RIPRAP (SRR) STANDARD FOR RIPRAP ATTACHMENT DETAILS.
SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS AND
SEE TRF(MOD) SHEET FOR RAIL ANCHORAGE IN BAS-A APPROACH SLAB AND TRF(MS) MOMENT SLAB.
CALCULATED FOUNDATION LOAD = 41 TONS/DS

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

HL93 LOADING

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Dallas District Bridge

CR NW 1420

MILL CREEK BRIDGE
ABUTMENT NO. 1

1 OF 2

FILE: SEE PATH	DN: CMH	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		100

DATE: Thursday, November 16, 2023 11:00:24 AM
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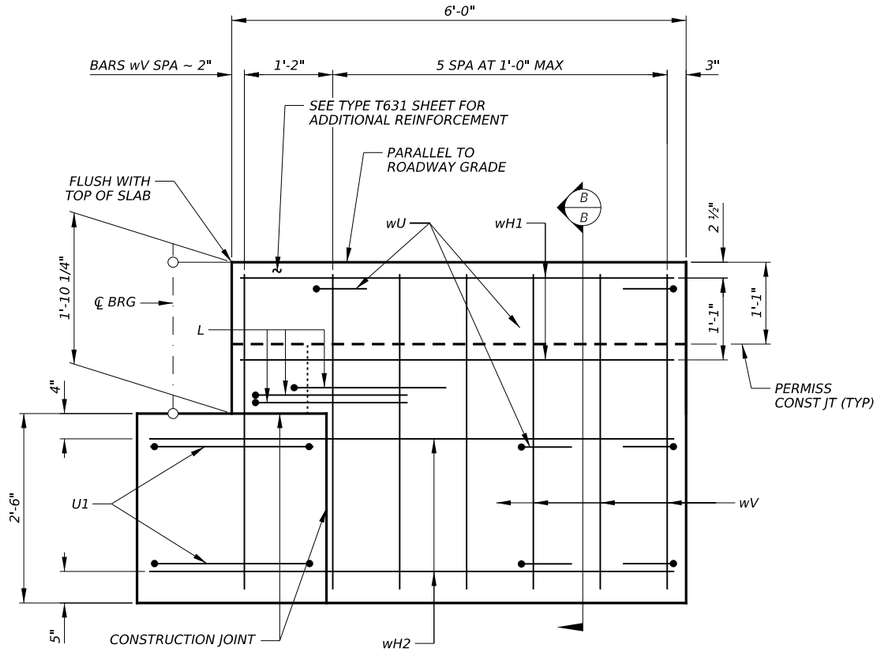
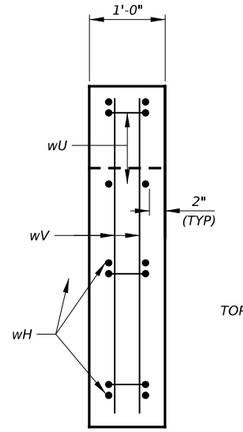
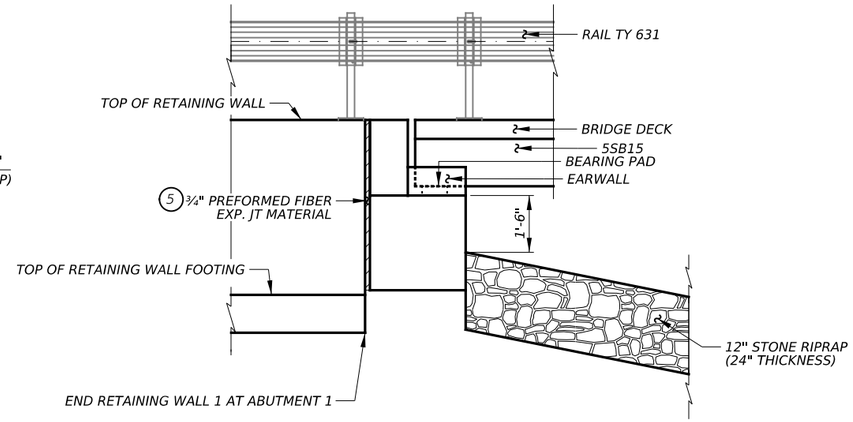


WINGWALL ELEVATION

(EARWALL NOT SHOWN FOR CLARITY.)



SECTION B-B



RETAINING WALL AT ABUTMENT ELEVATION (3)

(3) SEE RETAINING WALL DETAILS SHEETS.

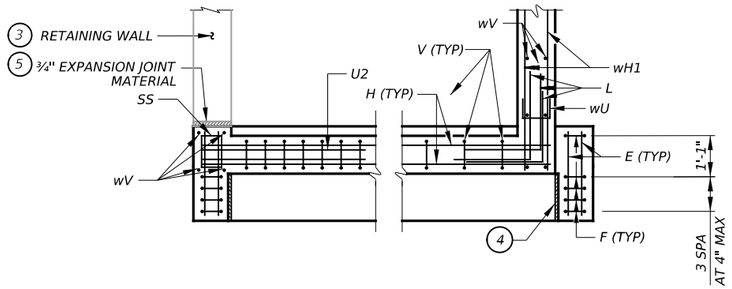
(4) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP. (TYP)

(5) SUBSIDIARY TO RETAINING WALL BID ITEM.

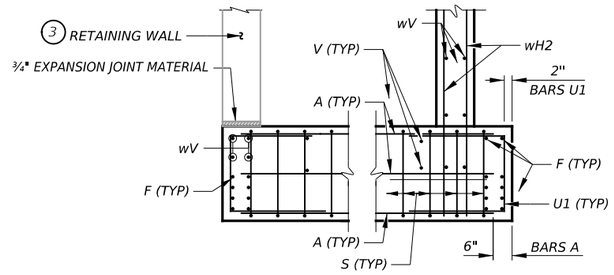
TABLE OF ESTIMATED ABUTMENT QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	27'-1"	863
E	4	#4	2'-2"	6
F	9	#4	6'-4"	38
H	2	#5	26'-8"	56
L	3	#6	4'-0"	18
S	34	#4	9'-4"	212
SS	2	#4	3'-10"	5
U1	4	#6	7'-1"	43
U2	1	#5	5'-7"	6
V	25	#5	7'-10"	204
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	18	#5	4'-1"	77
REINFORCING STEEL			LB	1,611
CL C CONC (ABUT)(HPC)			CY	8.2

HL93 LOADING



BACKWALL



CAP

CORNER DETAILS

11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

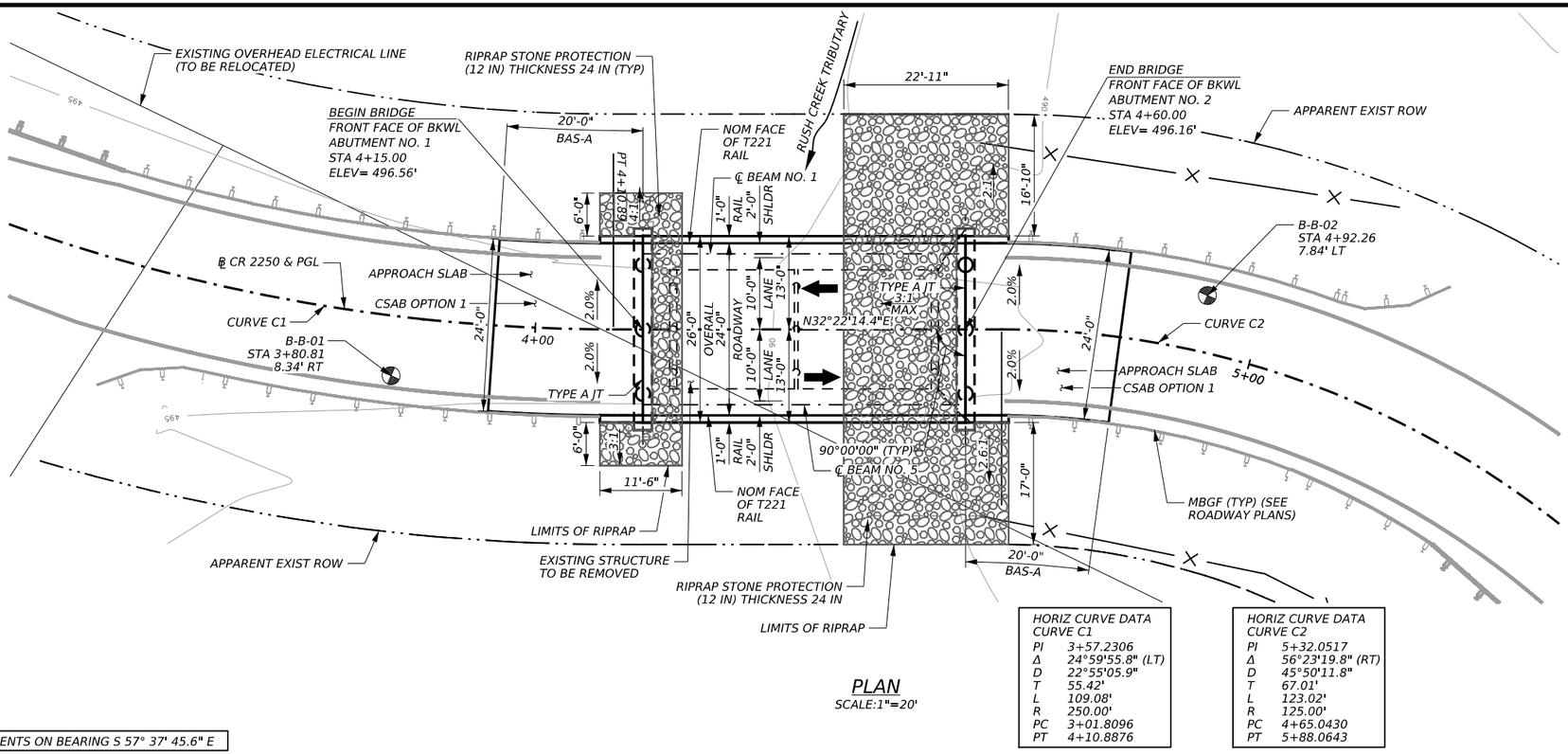
CR NW 1420

MILL CREEK BRIDGE ABUTMENT NO. 1

2 OF 2

FILE: SEE PATH	DN: CMM	CK: WJC	DW: RA	CK: WJC
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		101

DATE: Friday, November 17, 2023 02:39:15 PM
FILE: 133ADT02.dgn 2:39:15 PM

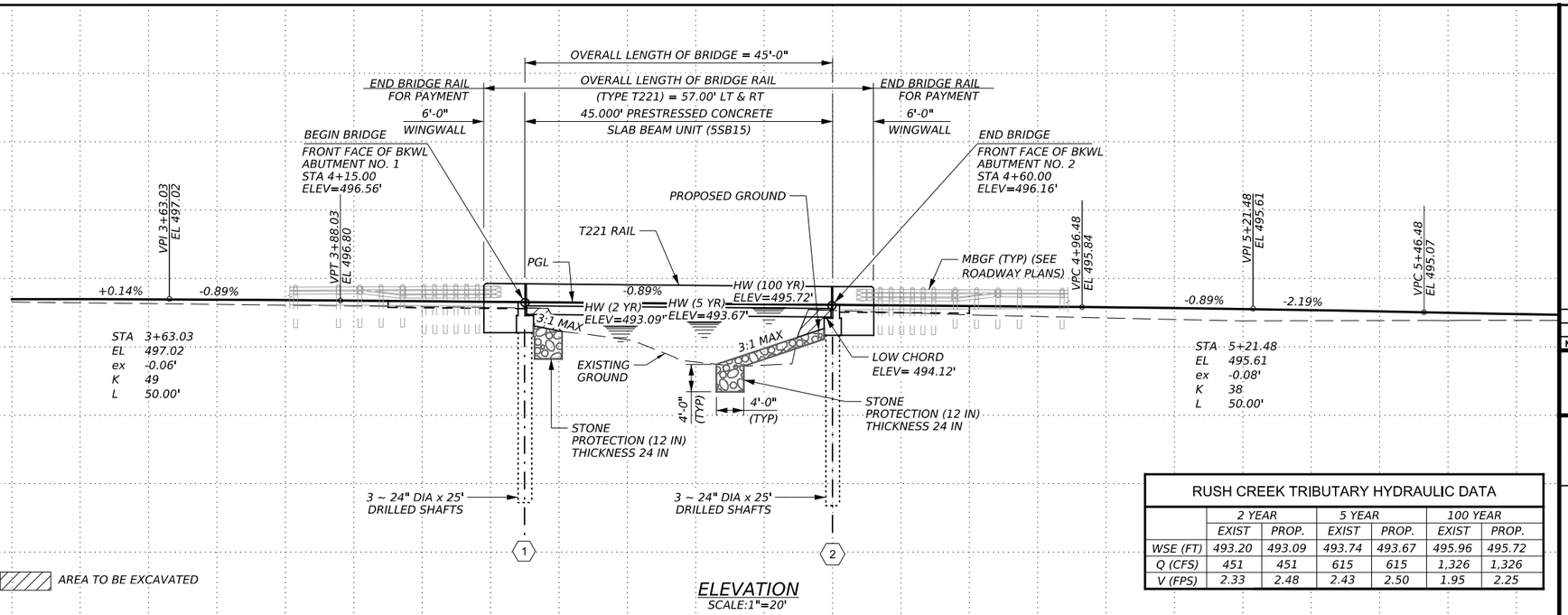


PLAN
SCALE:1"=20'

ALL ABUTMENTS ON BEARING S 57° 37' 45.6" E

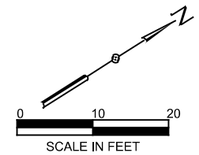
HORIZ CURVE DATA CURVE C1	
PI	3+57.2306
Δ	24°59'55.8" (LT)
D	22°55'05.9"
T	55.42'
L	109.08'
R	250.00'
PC	3+01.8096
PT	4+10.8876

HORIZ CURVE DATA CURVE C2	
PI	5+32.0517
Δ	56°23'19.8" (RT)
D	45°50'11.8"
T	67.01'
L	123.02'
R	125.00'
PC	4+65.0430
PT	5+88.0643



ELEVATION
SCALE:1"=20'

RUSH CREEK TRIBUTARY HYDRAULIC DATA						
	2 YEAR		5 YEAR		100 YEAR	
	EXIST	PROP.	EXIST	PROP.	EXIST	PROP.
WSE (FT)	493.20	493.09	493.74	493.67	495.96	495.72
Q (CFS)	451	451	615	615	1,326	1,326
V (FPS)	2.33	2.48	2.43	2.50	1.95	2.25



NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION AND TXDOT BRIDGE DESIGN MANUAL LRFD, 2022.
2. SEE BORING LOGS SHEETS FOR SOIL BORING LOCATIONS AND DATA.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.
4. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLABS IS NOT REQUIRED.
5. EXISTING 2 - SIMPLE SPAN STEEL PIPE STRINGER BRIDGE (37'-0" X 16'-7"), TIMBER DECK TO BE REMOVED PER ITEM 496. EXISTING SUBSTRUCTURE (STEEL ABUTMENT CAPS, STEEL PIPE PILES, TIMBER RETAINING WALLS) TO BE REMOVED TO 2' BELOW EXISTING GROUND.
6. FOUND DRILLED SHAFTS PER THE LENGTHS SHOWN OR LONGER AS NECESSARY TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS PENETRATION INTO COMPETENT SHALE.
7. SPECIAL EXCAVATION METHODS INCLUDING SLURRY, CASING OR BOTH MAY BE REQUIRED TO MAINTAIN STABLE EXCAVATION FOR DRILLED SHAFT INSTALLATION. IF CASING LENGTH EXCEEDS 10FT, NOTIFY ENGINEER OF RECORD.

FUNC CLASS= LOCAL
DESIGN SPEED: MOIEC
ADT (2024): 55
ADT (2044): 75

EXIST. NBI: 18-175-0-AA01-47-002
NEW NBI: 18-175-0-AA01-47-003

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.08/1.73

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation © 2023

Dallas District Bridge

CR NW 2250
RUSH CREEK TRIBUTARY BRIDGE
BRIDGE LAYOUT
NBI: 18-175-0-AA01-47-003

SCALE:1"=20' 1 OF 1

FILE: SEE PATH	DN: CMM	CK: WJC	DW: RA	CK: WJC
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		102

DATE: Friday, November 17, 2023 09:42:12 AM
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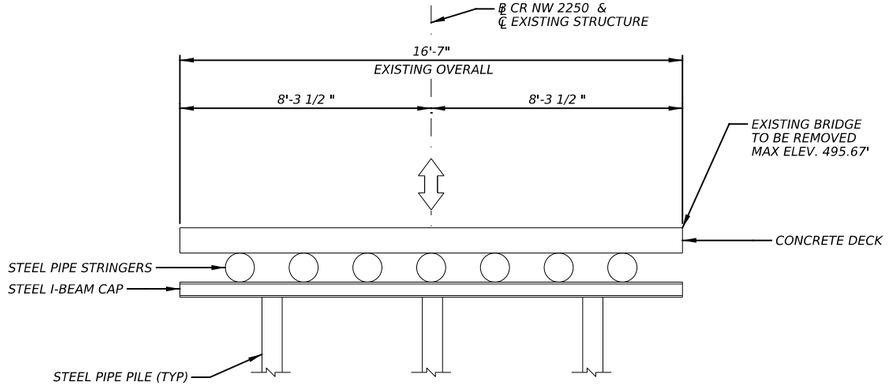
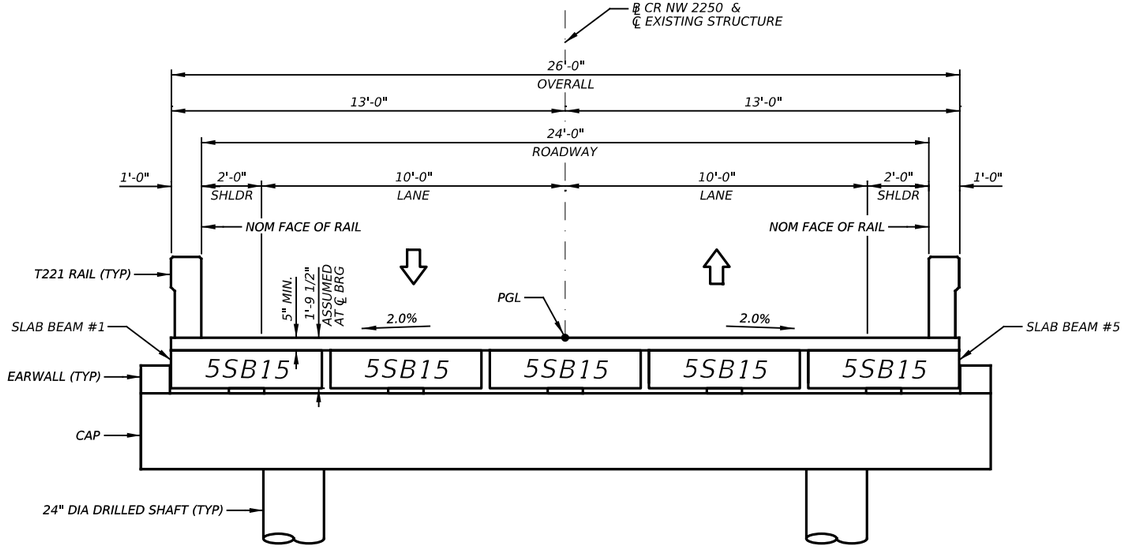


EXISTING BRIDGE TYPICAL SECTION FOR REMOVAL

SCALE:1"=5'



PROPOSED TYPICAL SECTION

SCALE:1"=5'

NOTES:

1. EXISTING TYPICAL SECTION IS DRAWN BASED ON LIMITED GEOMETRIC INFORMATION AVAILABLE FROM PONTEX REPORT AND PHOTOS FROM INSPECTION REPORTS. BEAM DEPTHS AND DECK THICKNESSES ARE ASSUMED; THE CONTRACTOR SHALL DETERMINE THESE MEASURMENTS IN THE FIELD AS NEEDED.
2. DECK THICKNESS SHALL NOT EXCEED 7".

HL93 LOADING

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR NW 2250
RUSH CREEK TRIBUTARY BRIDGE
TYPICAL SECTION

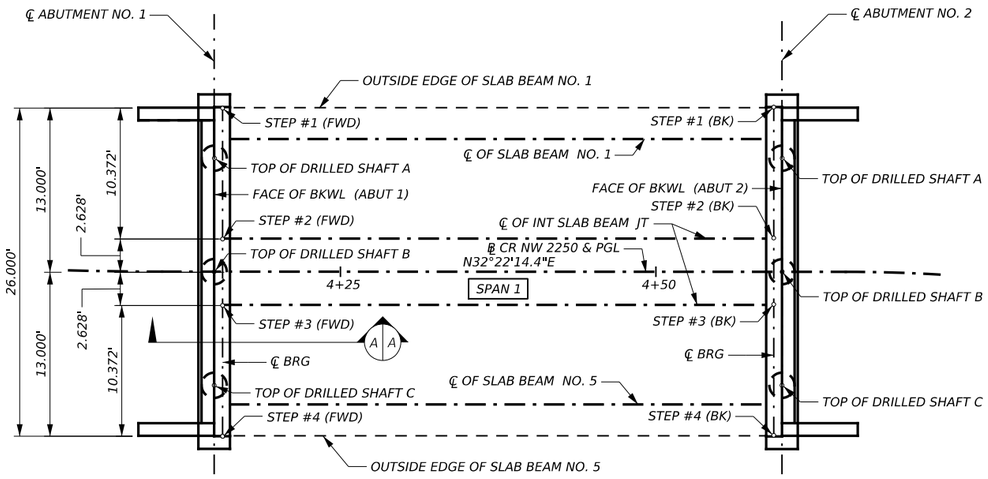
1 OF 1

FILE: SEE PATH	DN: CMM	CK: WJC	DW: RA	CK: WJC
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		103

DATE: Friday, November 10, 2023 03:18:19 PM
FILE: 136TYP01.dgn 3:18:19 PM

SUMMARY OF BRIDGE ITEMS

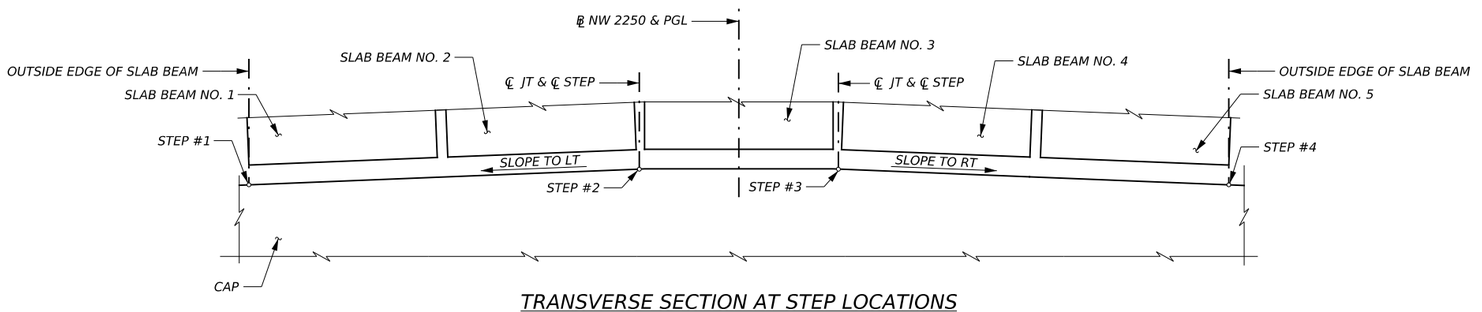
BRIDGE ELEMENT / BID ITEM DESCRIPTION	416 6002	420 6014	422 6008	425 6012	450 6005
	DRILL SHAFT (24 IN)	CL C CONC (ABUT)(HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T221) (HPC)
	LF	CY	SF	LF	LF
CR NW 2250 RUSH CREEK TRIBUTARY					
2 - ABUTMENTS	150	18.4			24.0
1 - 45.000' PRESTR CONC SLAB BEAM UNIT			1170	222.50	90.0
TOTAL	150	18.4	1170	222.50	114.0



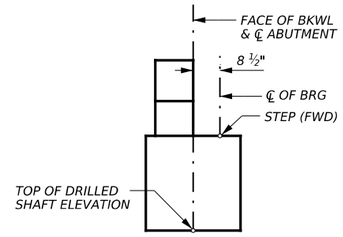
PLAN OF STEP LOCATIONS

SUBSTRUCTURE	CAP ELEVATIONS (FT)			
	STEP #1	STEP #2	STEP #3	STEP #4
ABUTMENT 1 (FWD)	494.337	494.544	494.544	494.337
ABUTMENT 2 (BK)	493.951	494.158	494.158	493.951

SUBSTRUCTURE	TOP OF DRILLED SHAFT ELEVATIONS		
	A	B	C
ABUTMENT 1	491.917	492.044	491.917
ABUTMENT 2	491.531	491.658	491.531



TRANSVERSE SECTION AT STEP LOCATIONS



SECTION A-A

ABUTMENT 1 SHOWN, ABUTMENT 2
SIMILAR (OPPOSITE HAND)

STATE OF TEXAS
CHRISTOPHER M. MONOPOLIS
145595
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR NW 2250

RUSH CREEK TRIBUTARY BRIDGE ESTIMATED QUANTITIES AND CAP ELEVATIONS

1 OF 1

FILE: SEE PATH	DN: AD	CK: CMM	DW: RA	CK: CMM
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		104

DATE: Friday, November 17, 2023 09:47:15 AM
FILE: 136ESQ01.dgn
9:47:15 AM

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-B-01	District	Dallas
Highway	CR 2250	Structure	@ Rush Creek Trib	Date	10-27-22
CSJ	0918-18-136	Station	3+80.81	Grnd. Elev.	495.75 ft
		Offset	8.34' (RT)	GW Elev.	469.75 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, Lt. Brown to Brown, Very Stiff, Dry (CL)							
5		19 (6) 20 (6)				3.9	29	14		-200 = 68.4%
485.8 10		14 (6) 14 (6)				11.0				-200 = 96.4% Sulfates = Less than 100 ppm
			CLAY, Lean Clay, Brown, Very Stiff, Dry to Moist (CL)							
480.8 15		50 (3) 50 (1.5)				15.4	32	14		
			SHALE, Shale, Grayish Brown to Dk. Gray, Hard, Moist to Wet (Comprised of Lean Clay w/ Sand, Sandy Lean Clay and Lean Clay) (CL)							
20		50 (1.5) 50 (1)				16.4				-200 = 78.3%
25		50 (2) 50 (1.5)				17.2	47	29		
30		50 (0.5) 50 (0.5)				32.7				-200 = 79.9*%
35		50 (0.5) 50 (0.5)				38.4	44	28		
40		50 (0.5) 50 (0.5)				31.8				-200 = 85.0%
45		50 (0.5) 50 (0.5)				40.4	42	26		
50		50 (0.5) 50 (0.5)				39.4				-200 = 64.2%
55		50 (0.5) 50 (0)				39.5	41	25		
435.8 60		50 (0.5) 50 (0)				37.8				-200 = 90.3%

Remarks: Boring Loc: N,E = 6721559.954, 2537668.142 (Surf Coord) (Info from Surveyor)

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: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-B-02	District	Dallas
Highway	CR 2250	Structure	@ Rush Creek Trib	Date	10-27-22
CSJ	0918-18-136	Station	4+92.26	Grnd. Elev.	493.63 ft
		Offset	7.84' (LT)	GW Elev.	467.63 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, Brown, w/ Traces of Fine Gravel, Dense, Dry (SC)							
5		38 (6) 30 (6)				6.6				-200 = 33.0%
483.6 10		44 (6) 50 (3.5)				12.6	27	10		-200 = 64.0%
			CLAY, Sandy Lean Clay, Brown to Dk. Brown, Hard, Dry to Moist (CL)							
15		26 (6) 35 (6)				8.4				-200 = 50.7%
473.6 20		50 (2) 50 (1)				18.2	48	29		Sulfates = 980 ppm
			SHALE, Shale, Dk. Gray to Black, Hard, Moist to Wet (Comprised of Lean Clay w/ Sand) (CL)							
25		50 (1.5) 50 (1)				22.0				-200 = 80.3%
30		50 (0.5) 50 (0)				39.9	41	23		
35		50 (1) 50 (0.5)				40.1				-200 = 72.4%
40		50 (0.5) 50 (0.5)				39.6	44	29		
448.6 45		50 (0.5) 50 (0)				38.8				-200 = 85.1%
			SHALE, Shale, Dk. Gray, Hard, Wet (Comprised of Fat Clay) (CH)							
50		50 (0.5) 50 (0)				49.3	52	34		
55		50 (0.5) 50 (0)				47.5				-200 = 88.5%
433.6 60		50 (0.5) 50 (0)				50.9	52	34		

Remarks: Boring Loc: N,E = 6721662.107, 2537719.660 (Surf Coord) (Info from Surveyor)

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: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

STATE OF TEXAS
DAVID A. SAENZ
102365
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

B2Z ENGINEERING, LLC.
900 S. STEWART RD., SUITE 4,
MISSION, TX, 78572
Registration No. F-11187

Texas Department of Transportation © 2023

Dallas District Bridge

CR NW 2250
RUSH CREEK TRIBUTARY BRIDGE
BORING LOGS

1 OF 1

FILE: SEE PATH	DN: CMM	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		105

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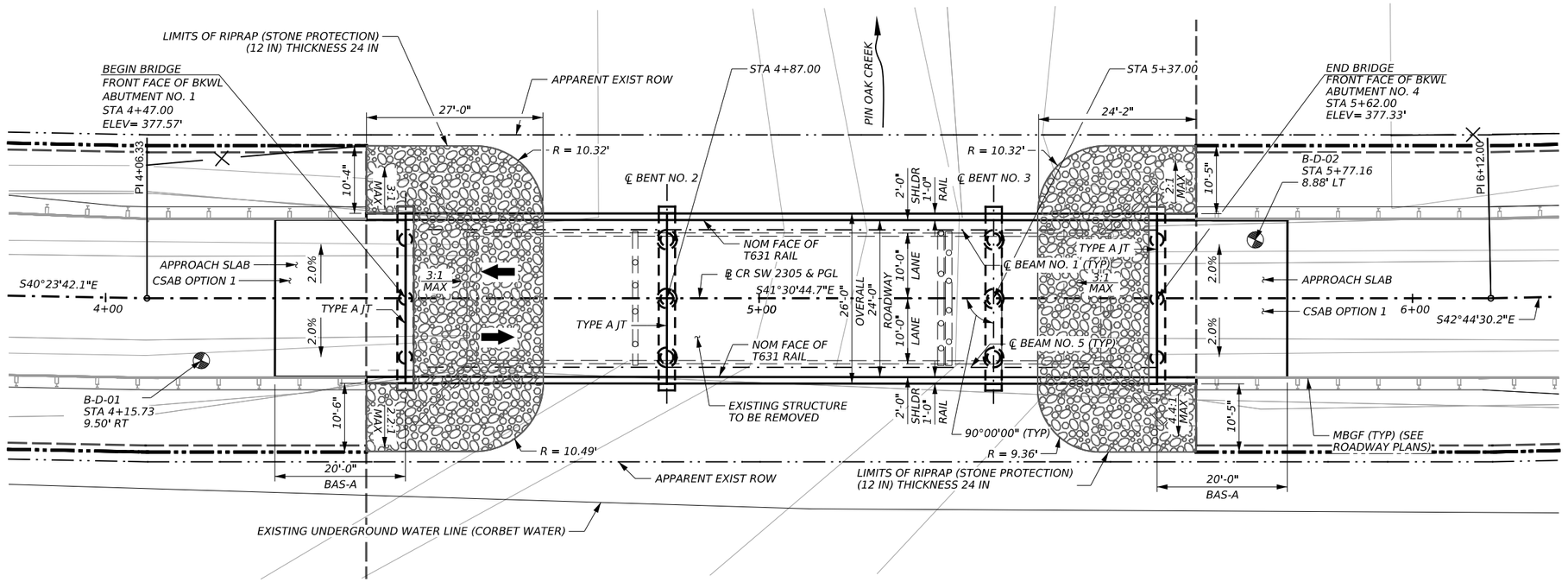
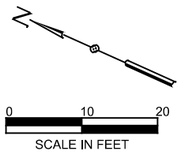


PLAN
SCALE:1"=20'



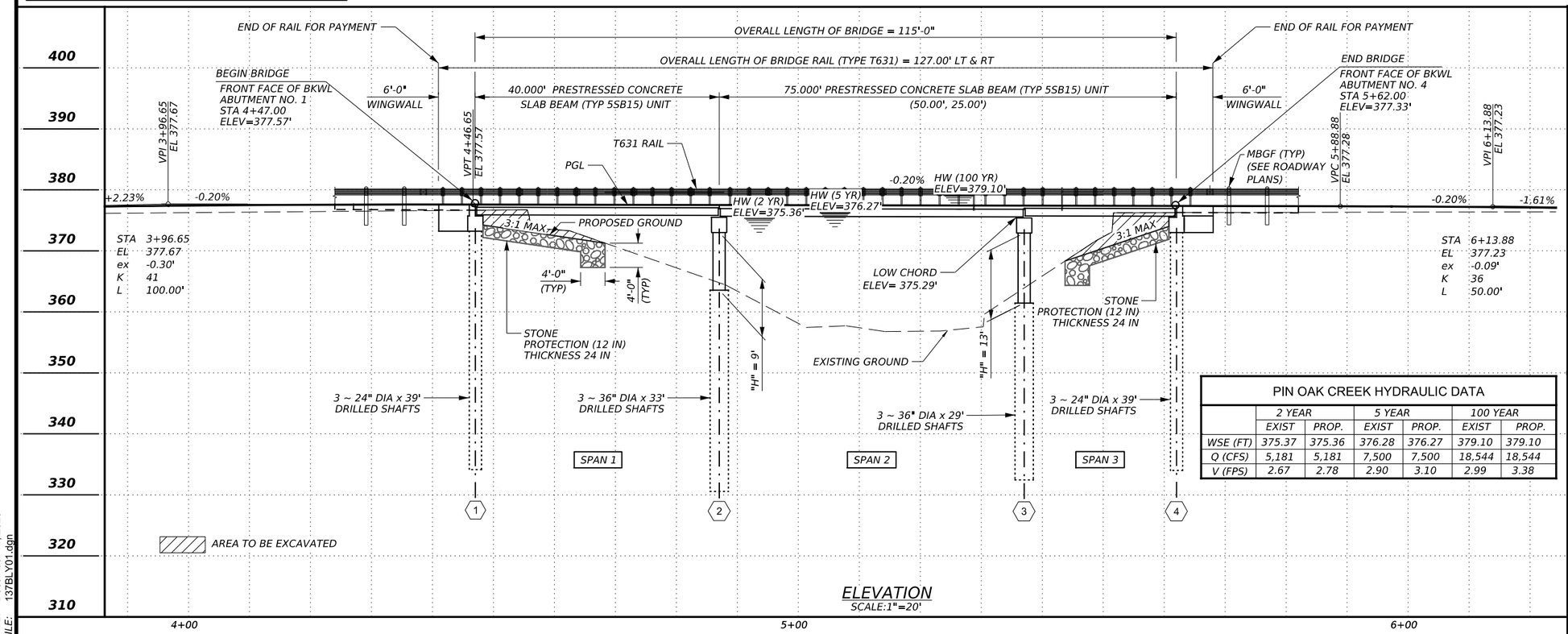
NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION 2020 AND TXDOT BRIDGE DESIGN MANUAL LRFD 2023.
2. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.
3. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLABS IS NOT REQUIRED.
4. EXISTING 3 - SIMPLE SPAN STEEL I-BEAM BRIDGE (97'-0" X 20'-2 1/2"),TIMBER DECK TO BE REMOVED PER ITEM 496. EXISTING SUBSTRUCTURE (STEEL ABUTMENT CAPS, STEEL PIPE PILES TIMBER RETAINING WALLS) TO BE REMOVED TO 2' BELOW EXISTING GROUND.
5. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
6. SEE BORING LOGS SHEETS FOR BORING LOCATION AND DATA.
7. FOUND DRILLED SHAFTS PER THE LENGTHS SHOWN OR LONGER AS NECESSARY TO OBTAIN A MINIMUM OF THREE SHAFT DIAMETERS PENETRATION INTO COMPETENT SHALE.
8. SPECIAL EXCAVATION METHODS INCLUDING SLURRY, CASING OR BOTH MAY BE REQUIRED TO MAINTAIN STABLE EXCAVATION FOR DRILLED SHAFT INSTALLATION. IF CASING LENGTH EXCEEDS 10FT, NOTIFY ENGINEER OF RECORD.

FUNC CLASS= LOCAL
DESIGN SPEED: MOIEC
ADT (2024): 15
ADT (2044): 25

EXIST. NBI: 18-175-0-AA05-52-001
NEW NBI: 18-175-0-AA05-52-002

ALL ABUTMENTS AND BENTS ON BEARING N 48° 29' 15.3" E

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.11/1.71



ELEVATION
SCALE:1"=20'

PIN OAK CREEK HYDRAULIC DATA						
	2 YEAR		5 YEAR		100 YEAR	
	EXIST	PROP.	EXIST	PROP.	EXIST	PROP.
WSE (FT)	375.37	375.36	376.28	376.27	379.10	379.10
Q (CFS)	5,181	5,181	7,500	7,500	18,544	18,544
V (FPS)	2.67	2.78	2.90	3.10	2.99	3.38

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.822.9264

Texas Department of Transportation

Dallas District Bridge

CR SW 2305
PIN OAK CREEK BRIDGE
BRIDGE LAYOUT

SCALE:1"=20'

1 OF 1

FILE: SEE PATH	DN: AD	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		106

DATE: December 11, 2023
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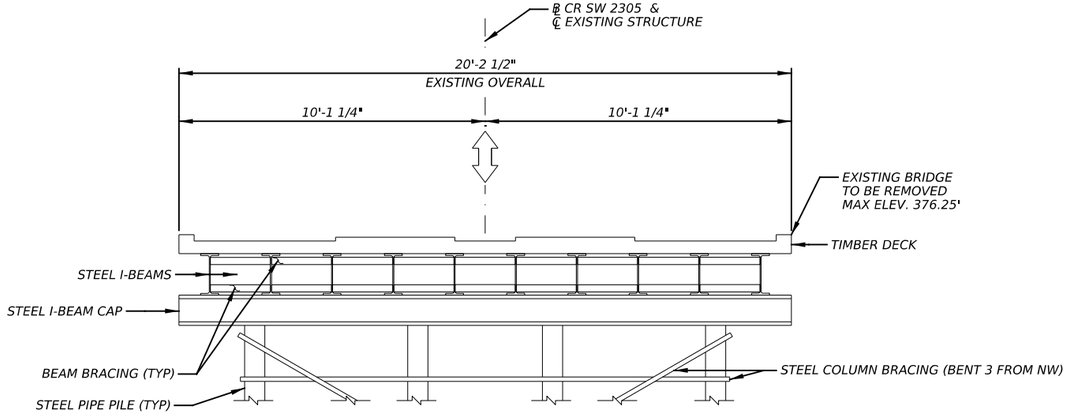
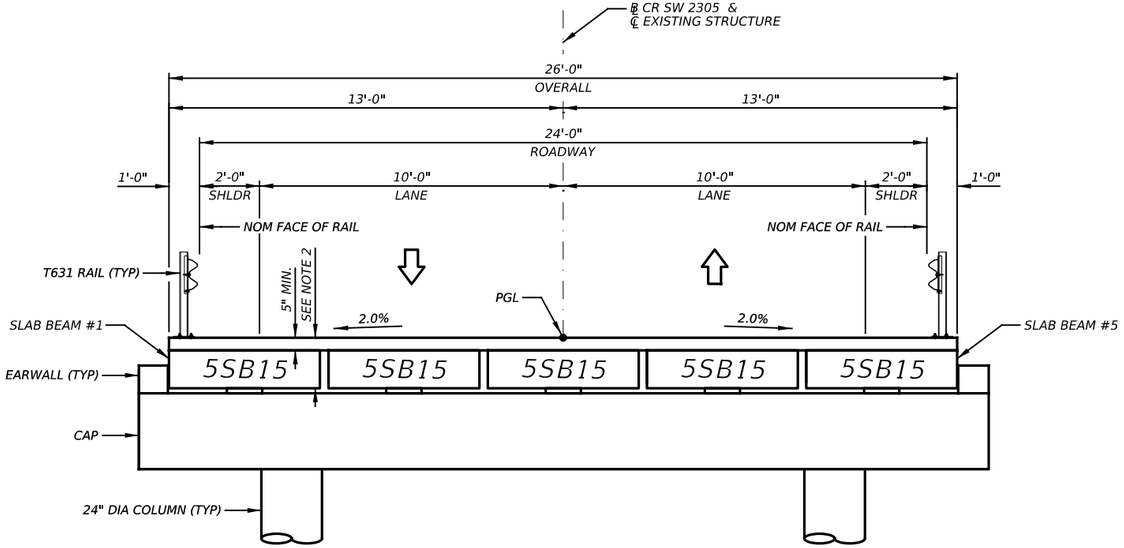


EXISTING BRIDGE TYPICAL SECTION FOR REMOVAL

SCALE:1"=5'



PROPOSED TYPICAL SECTION

SCALE:1"=5'

NOTES:

1. EXISTING TYPICAL SECTION IS DRAWN BASED ON LIMITED GEOMETRIC INFORMATION AVAILABLE FROM PONTEX REPORT AND PHOTOS FROM INSPECTION REPORTS. BEAM DEPTHS AND DECK THICKNESSES ARE ASSUMED; THE CONTRACTOR SHALL DETERMINE THESE MEASURMENTS IN THE FIELD AS NEEDED.

2. ASSUMED SECTION DEPTHS:
   1'-8 3/4" AT CL BRG IN SPAN 1
   1'-10" AT CL BRG IN SPAN 2
   1'-8 1/4" AT CL BRG IN SPAN 3
   DECK THICKNESS SHALL NOT EXCEED 7".

HL93 LOADING

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation
Dallas District Bridge

CR SW 2305
PIN OAK CREEK BRIDGE
TYPICAL SECTION

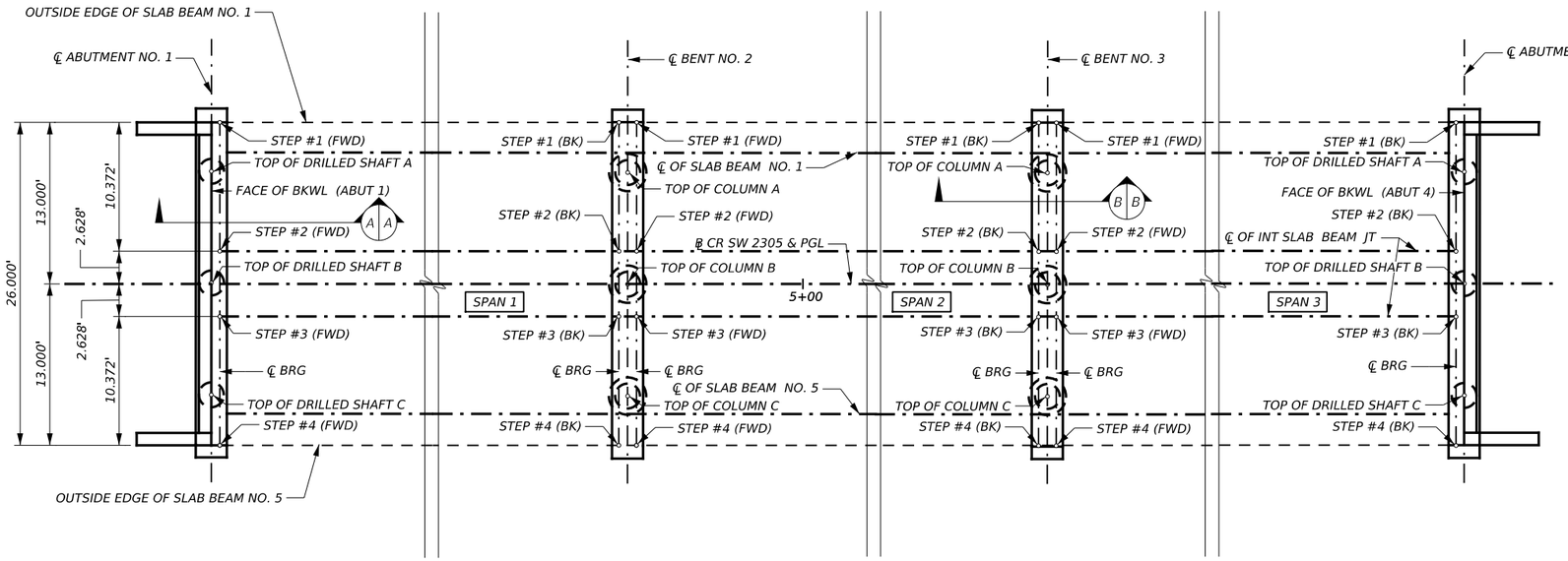
1 OF 1

FILE: SEE PATH	DN: AD	CK: EOB	DW: RA	CK: EOB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		107

DATE: Monday, November 13, 2023 02:36:14 PM
FILE: 13TTYP01.dgn 2:36:14 PM

SUMMARY OF BRIDGE ITEMS

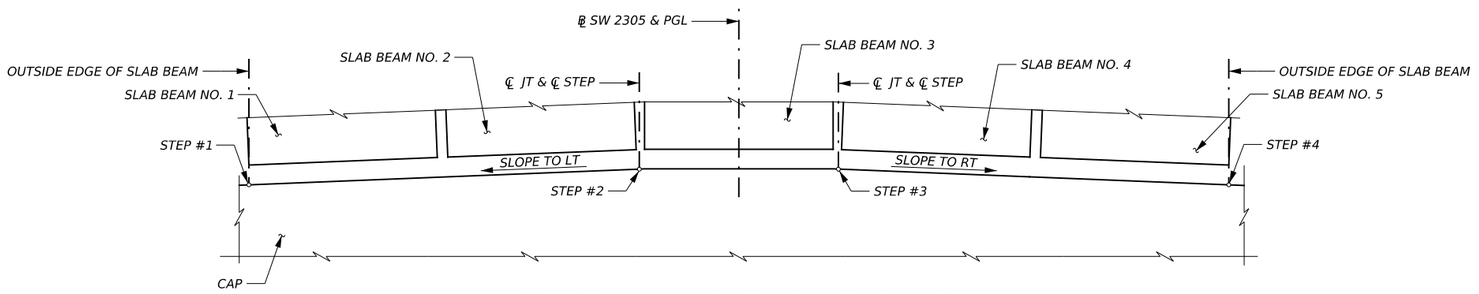
BRIDGE ELEMENT / BID ITEM DESCRIPTION	0416 6002	0416 6004	0420 6014	420 6030	420 6038	0422 6008	0425 6012	0450 6018
	DRILL SHAFT (24 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC)	CL C CONC (CAP) (HPC)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T631)
	LF	LF	CY	CY	CY	SF	LF	LF
CR SW 2305 PIN OAK CREEK								
2 - ABUTMENTS	234		18.1					24.0
2- INTERIOR BENTS		186		13.3	7.6			
1 - 40.00' PRESTR CONC SLAB BEAM UNIT						1040	197.50	80.0
1 - 75.00' PRESTR CONC SLAB BEAM UNIT						1950	370.00	150.0
TOTAL	234	186	18.1	13.3	7.6	2990	567.50	254.0



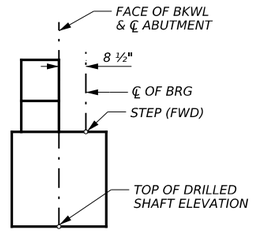
PLAN OF STEP LOCATIONS

SUBSTRUCTURE	CAP ELEVATIONS (FT)			
	STEP #1	STEP #2	STEP #3	STEP #4
ABUTMENT 1 (FWD)	375.412	375.619	375.619	375.412
BENT 2 (BK)	375.333	375.541	375.541	375.333
BENT 2 (FWD)	375.226	375.434	375.434	375.226
BENT 3 (BK)	375.127	375.335	375.335	375.127
BENT 3 (FWD)	375.270	375.478	375.478	375.270
ABUTMENT 4 (BK)	375.222	375.429	375.429	375.222

SUBSTRUCTURE	TOP OF COLUMN/DRILLED SHAFT ELEVATIONS		
	A	B	C
ABUTMENT 1	372.992	373.119	372.992
BENT 2	372.806	372.934	372.806
BENT 3	372.707	372.835	372.707
ABUTMENT 4	372.802	372.929	372.802

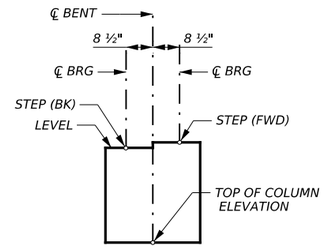


TRANSVERSE SECTION AT STEP LOCATIONS



SECTION A-A

ABUTMENT 1 SHOWN, ABUTMENT 4
SIMILAR (OPPOSITE HAND)



SECTION B-B

BENT 3 SHOWN, BENT 2 SIMILAR

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER
12/15/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR SW 2305

PIN OAK CREEK BRIDGE
ESTIMATED QUANTITIES AND CAP ELEVATIONS

1 OF 1

FILE: SEE PATH	DN: AD	CK: CMM	DW: RA	CK: CMM
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		108

DATE: December 15, 2023
FILE: 137ESQ01.dgn
10:08:44 AM

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-D-01	District	Dallas
Highway	CR 2305	Structure	@ Pin Oak Creek	Date	11-1-22
CSJ	0918-18-137	Station	4+15.73	Grnd. Elev.	375.79 ft
		Offset	9.50' (RT)	GW Elev.	N/A

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, Brown to Dk. Gray, Loose to Med. Dense to Very Loose, Dry to Moist (SC)							
5		9 (6) 10 (6)				7.3				-200 = 47.1%
10		12 (6) 13 (6)				16.9	63	47		
15		3 (6) 3 (6)				13.1				-200 = 40.8%
355.8 20		5 (6) 7 (6)				22.4	37	25		-200 = 62.2%
			CLAY, Sandy Lean Clay, Brown to Lt. Brown, Med. Stiff to Very Stiff, Moist (CL)							
25		15 (6) 18 (6)				25.1				-200 = 56.2%
345.8 30		50 (4.5) 50 (3.5)				30.3	71	44		
			SHALE, Shale, Clayey, Brown to Gray, Hard, Moist (Comprised of Fat Clay w/ Sand) (CH)							
340.8 35		50 (2.5) 50 (2.5)				23.8				-200 = 70.3%
			SHALE, Shale, Gray to Dk. Gray, Hard, Moist (Comprised of Fat Clay w/ Sand & Fat Clay) (CH)							
40		50 (2.5) 50 (1)				24.5	88	53		
45		50 (2.5) 50 (3)				23.2				-200 = 80.9%
50		50 (2.5) 50 (2.5)				22.5	93	71		
55		50 (2) 50 (2)				22.4				-200 = 90.4%
315.8 60		50 (2.5) 50 (2.5)				21.5	103	82		

Remarks: Boring Loc: N,E = 6639722.624, 2581354.253 (Surf Coord) (Info from Surveyor)

The ground water elevation was not determined during the course of this boring.

Driller: NR **Logger: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

DRILLING LOG

WinCore Version 3.3

County	Navarro	Hole	B-D-02	District	Dallas
Highway	CR 2305	Structure	@ Pin Oak Creek	Date	11-1-22
CSJ	0918-18-137	Station	5+77.16	Grnd. Elev.	375.91 ft
		Offset	8.88' (LT)	GW Elev.	N/A

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, Brown to Dk. Grayish Brown to Lt. Brown, Very Stiff to Stiff, Dry to Moist (CL)							
5		14 (6) 16 (6)				7.7	28	8		
10		12 (6) 12 (6)				13.6				-200 = 66.0%
15		8 (6) 8 (6)				15.7	49	29		
20		9 (6) 11 (6)				18.7				-200 = 69.7%
350.9 25		16 (6) 19 (6)				31.8	65	41		-200 = 78.2%
			CLAY, Fat Clay w/ Sand, Lt. Brown to Gray, Very Stiff to Hard, Moist (CH)							
30		36 (6) 50 (5.5)				23.0				-200 = 78.9%
340.9 35		50 (2.5) 50 (2.5)				21.9	74	46		
			SHALE, Shale, Dk. Gray, Hard, Moist (Comprised of Fat Clay) (CH)							
40		50 (2.5) 50 (2.5)				20.1				-200 = 88.3%
45		50 (2.5) 50 (2)				20.6	70	47		
50		50 (2.5) 50 (2)				21.4				-200 = 91.6%
55		50 (2) 50 (2)				18.4	92	84		
315.9 60		50 (3) 50 (2.5)				19.6				-200 = 89.4%

Remarks: Boring Loc: N,E = 6639613.931, 2581475.014 (Surf Coord) (Info from Surveyor)

The ground water elevation was not determined during the course of this boring.

Driller: NR **Logger: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

STATE OF TEXAS
DAVID A. SAENZ
102365
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

B2Z ENGINEERING, LLC.
900 S. STEWART RD., SUITE 4,
MISSION, TX, 78572
Registration No. F-11187

Texas Department of Transportation

Dallas District Bridge

CR SW 2305
PIN OAK CREEK BRIDGE
BORING LOGS

1 OF 1

FILE: SEE PATH	DN: CMM	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		109

DATE: Monday, November 13, 2023 01:22:22 PM
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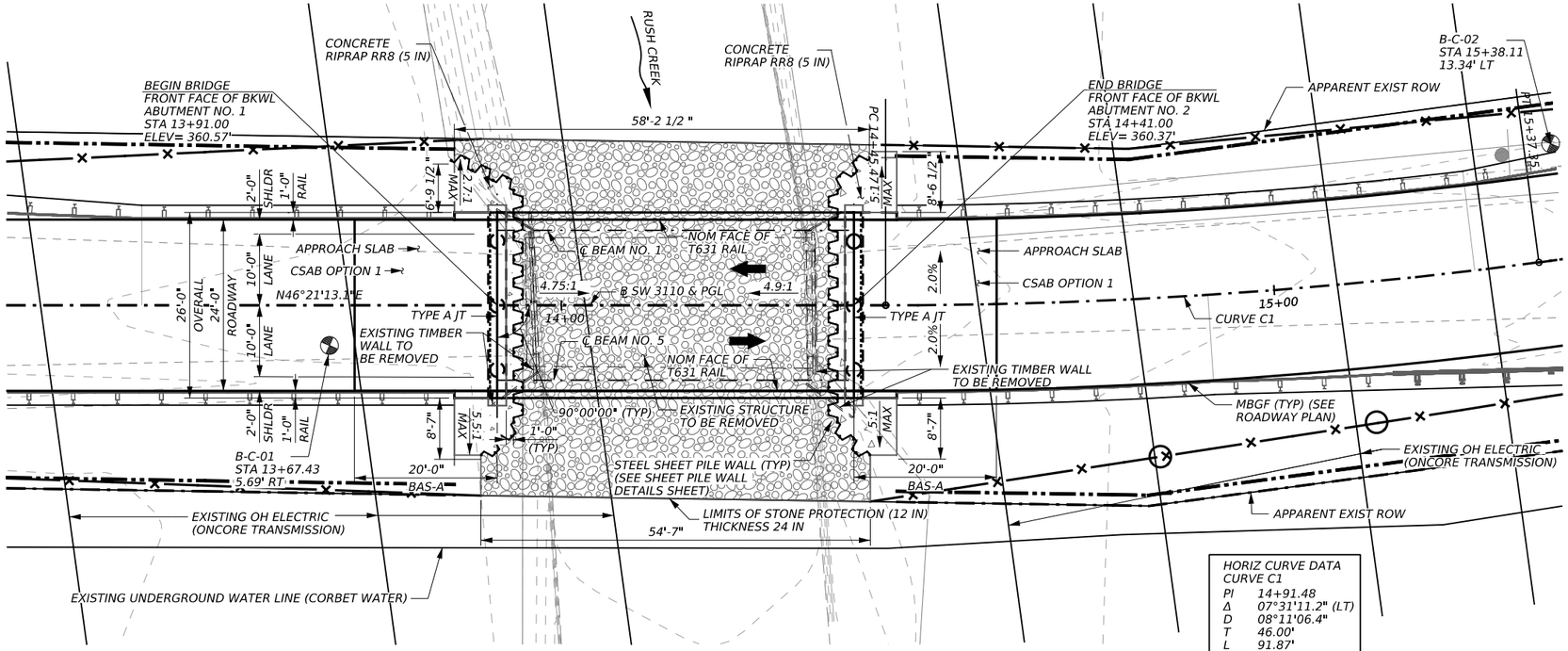


PLAN
SCALE:1"=20'

HORIZ CURVE DATA CURVE C1	
PI	14+91.48
Δ	07°31'11.2" (LT)
D	08°11'06.4"
T	46.00'
L	91.87'
R	700.00'
PC	14+45.47
PT	15+37.35

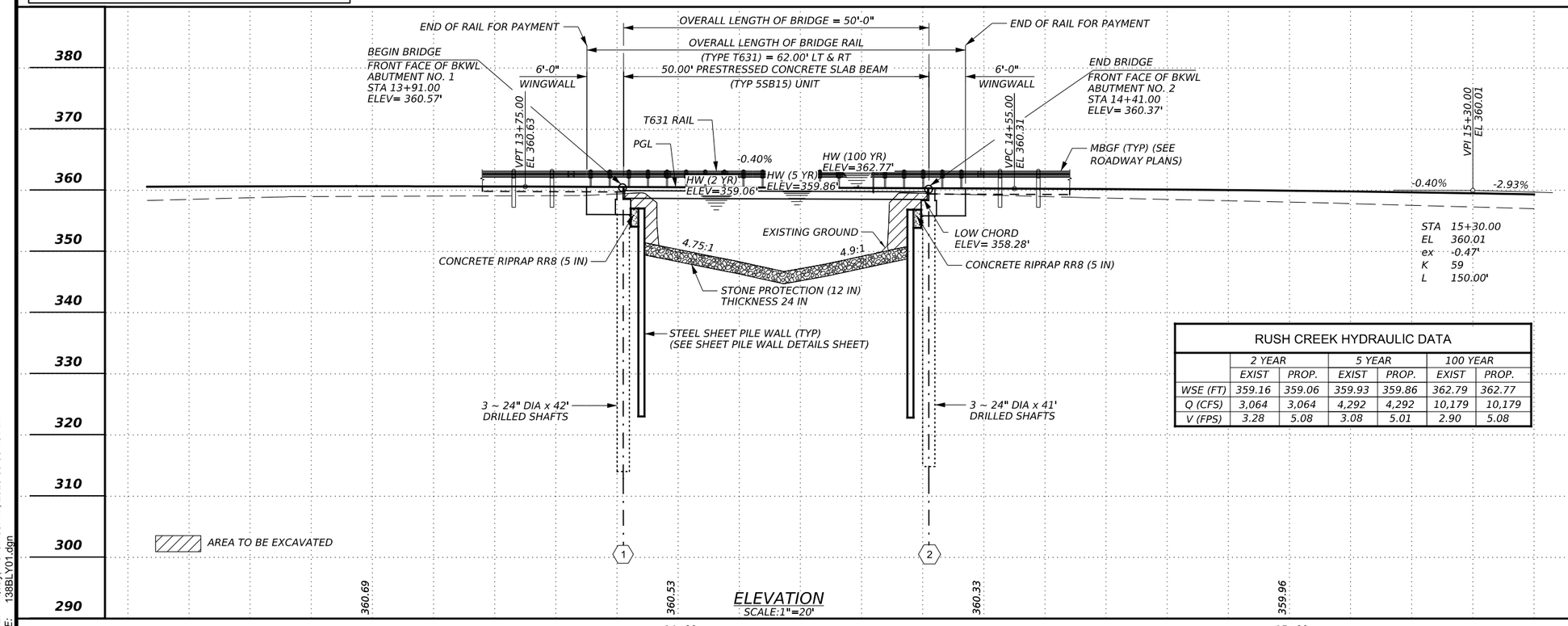
NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION 2020 AND TXDOT BRIDGE DESIGN MANUAL LRFD 2023.
2. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.
3. SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLABS IS NOT REQUIRED.
4. EXISTING 1- SIMPLE SPAN STEEL I-BEAM BRIDGE (40'-0" X 18'-2 1/2"), TIMBER DECK TO BE REMOVED PER ITEM 496. EXISTING SUBSTRUCTURE (STEEL ABUTMENT CAPS, STEEL PILES, TIMBER RETAINING WALLS) TO BE REMOVED TO 2' BELOW EXISTING GROUND. DO NOT PULL EXISTING PILE FOUNDATIONS, TO BE REMOVED TO 2FT BELOW FINAL GRADE. AND GROUT THE INNER SPACE OF THE EXISTING STEEL PILES.
5. SEE BORING LOGS SHEETS FOR BORING LOCATION AND DATA.
6. FOUND DRILLED SHAFTS PER THE LENGTHS SHOWN OR LONGER AS NECESSARY TO OBTAIN A MINIMUM OF THREE SHAFTS DIAMETER PENETRATION INTO COMPETENT SHALE.
7. SPECIAL EXCAVATION METHODS INCLUDING SLURRY, CASING OR BOTH MAY BE REQUIRED TO MAINTAIN STABLE EXCAVATION FOR DRILLED SHAFT INSTALLATION. IF CASING LENGTH EXCEEDS 10FT, NOTIFY ENGINEER OF RECORD.

FUNC CLASS= LOCAL
DESIGN SPEED: MOIEC
ADT (2024): 65
ADT (2044): 85

EXIST. NBI: 18-175-0-AA05-76-003
NEW NBI: 18-175-0-AA05-76-004

ALL ABUTMENTS AND BENTS ON BEARING N 43° 38' 46.90" W

HL93 LOADING
SUPERSTRUCTURE INV/OPR RATINGS: 1.11/1.72



ELEVATION
SCALE:1"=20'

STA	15+30.00
EL	360.01
ex	-0.47'
K	59
L	150.00'

RUSH CREEK HYDRAULIC DATA						
	2 YEAR		5 YEAR		100 YEAR	
	EXIST	PROP.	EXIST	PROP.	EXIST	PROP.
WSE (FT)	359.16	359.06	359.93	359.86	362.79	362.77
Q (CFS)	3,064	3,064	4,292	4,292	10,179	10,179
V (FPS)	3.28	5.08	3.08	5.01	2.90	5.08

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
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Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation
© 2023
Dallas District Bridge

CR SW 3110

RUSH CREEK BRIDGE
BRIDGE LAYOUT

NBI: 18-175-0-AA05-76-004

SCALE:1"=20' 1 OF 1

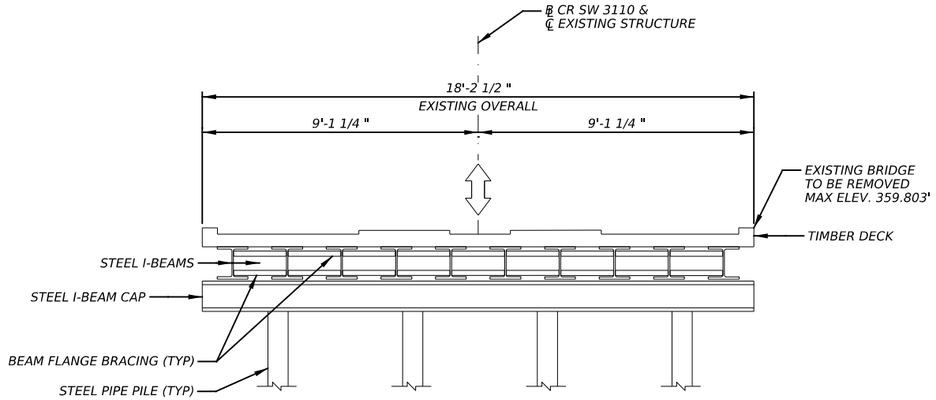
FILE: SEE PATH	DN: AD	CK: WJC	DW: RA	CK: WJC
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		110

DATE: Friday, November 17, 2023 09:30:13 AM
FILE: 138BLY01.dgn
9:30:13 AM

NOTES:

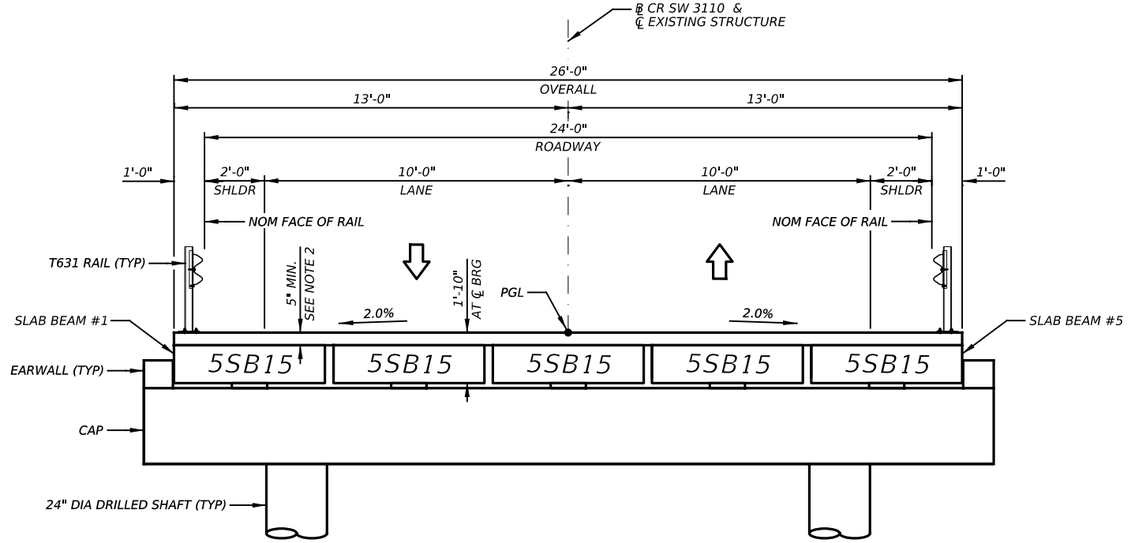
1. EXISTING TYPICAL SECTION IS DRAWN BASED ON LIMITED GEOMETRIC INFORMATION AVAILABLE FROM PONTEX REPORT AND PHOTOS FROM INSPECTION REPORTS. BEAM DEPTHS AND DECK THICKNESSES ARE ASSUMED; THE CONTRACTOR SHALL DETERMINE THESE MEASURMENT IN THE FIELD AS NEEDED.

2. DECK THICKNESS SHALL NOT EXCEED 7".



EXISTING BRIDGE TYPICAL SECTION FOR REMOVAL

SCALE:1"=5'



PROPOSED TYPICAL SECTION

SCALE:1"=5'

HL93 LOADING

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR SW 3110

RUSH CREEK BRIDGE TYPICAL SECTION

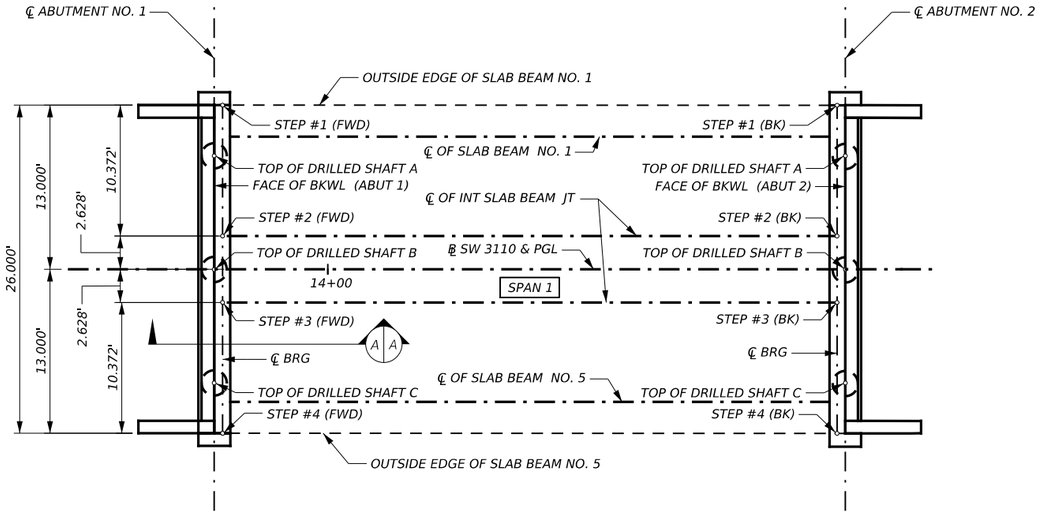
1 OF 1

FILE: SEE PATH	DN: AD	CK: WJC	DW: RA	CK: WJC
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		111

DATE: Monday, November 13, 2023 11:26:43 AM
FILE: I381TYP01.dgn 11:26:43 AM

SUMMARY OF BRIDGE ITEMS

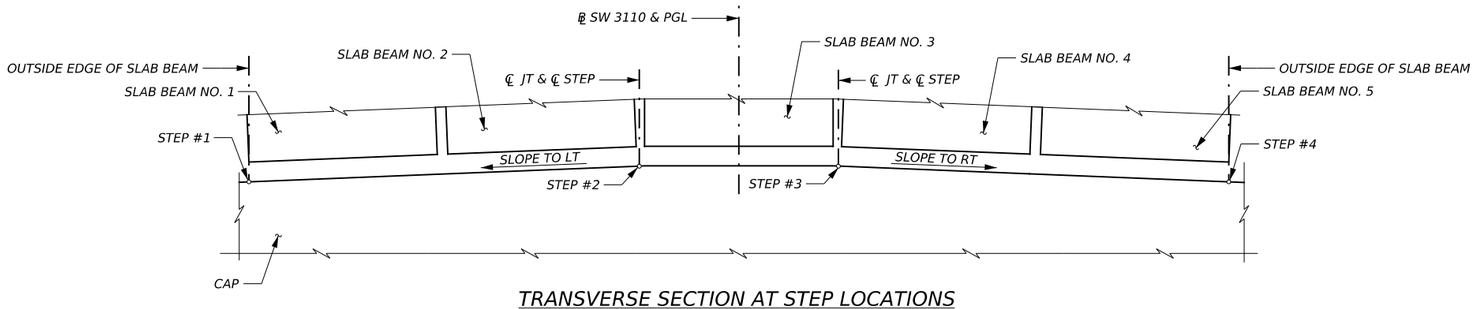
BRIDGE ELEMENT / BID ITEM DESCRIPTION	0407 6006	0416 6002	0420 6014	0422 6008	0425 6012	0450 6018
	SHEET PILING (PZ-40)	DRILL SHAFT (24 IN)	CL C CONC (ABUT) (HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T631)
	SF	LF	CY	SF	LF	LF
CR SW 3110 RUSH CREEK						
2 - ABUTMENTS	3332	249	18.4			
1 - 50.00' PRESTR CONC SLAB BEAM UNIT				1300	247.50	124
TOTAL	3332	249	18.4	1300	247.50	124



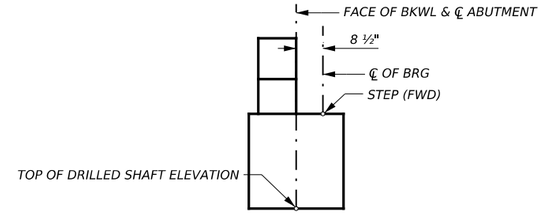
PLAN OF STEP LOCATIONS

SUBSTRUCTURE	CAP ELEVATIONS (FT)			
	STEP #1	STEP #2	STEP #3	STEP #4
ABUTMENT 1 (FWD)	358.303	358.511	358.511	358.303
ABUTMENT 4 (BK)	358.109	358.316	358.316	358.109

SUBSTRUCTURE	TOP OF DRILLED SHAFT ELEVATIONS		
	A	B	C
ABUTMENT 1	355.883	356.011	355.883
ABUTMENT 4	355.689	355.816	355.689



TRANSVERSE SECTION AT STEP LOCATIONS



SECTION A-A

ABUTMENT 1 SHOWN, ABUTMENT 2 SIMILAR (OPPOSITE HAND)

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
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Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

Dallas District Bridge

CR SW 3110

RUSH CREEK BRIDGE
ESTIMATED QUANTITIES AND CAP ELEVATIONS

1 OF 1

FILE: SEE PATH	DN: AD	CK: CMM	DW: RA	CK: CMM
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		112

DATE: Monday, November 13, 2023 11:09:48 AM
FILE: 138ESQ01.dgn 11:09:48 AM

DRILLING LOG

WinCore
Version 3.3

County	Navarro	Hole	B-C-01	District	Dallas
Highway	CR 3110	Structure	@ Rush Creek	Date	11-16-22
CSJ	0918-18-138	Station	13+67.43	Grnd. Elev.	358.74 ft
		Offset	5.69' (RT)	GW Elev.	315.74 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC LL PI	Properties Wet Den. (pcf)	Additional Remarks
		4 (6) 6 (6)	CLAY, Fat Clay w/ Sand, Brown, w/ Traces of Fine Gravel, Med. Stiff, Moist (CH)				26.8	-200 = 74.0%
5								
348.7 10		6 (6) 7 (6)					30.1 70 44	-200 = 91.4%
			CLAY, Fat Clay, Dk. Brown to Grayish Brown, Med. Stiff to Stiff, Moist (CH)					
15		6 (6) 7 (6)					29.7	-200 = 87.7%
20		8 (6) 10 (6)					25.0 80 58	
333.7 25		7 (6) 9 (6)					24.2	-200 = 71.3%
			CLAY, Fat Clay w/ Sand, Grayish Brown, w/ Calcareous Nodules & Streaks, Stiff, Moist (CH)					
30		9 (6) 11 (6)					28.5 67 42	
323.7 35		50 (3) 50 (3.5)					23.8	-200 = 95.9%
			SHALE, Shale, Clayey, Dk. Grayish Brown, Hard, Moist (Comprised of Fat Clay) (CH)					
318.7 40		50 (1) 50 (0.5)					22.8 71 50	
			SHALE, Shale, Dk. Gray to Black, Hard, Moist to Wet (Comprised of Fat Clay) (CH)					
45		50 (2) 50 (2.5)					21.8	-200 = 91.0%
50		50 (2) 50 (1.5)					36.0 93 63	
55		50 (2) 50 (1.5)					32.3	-200= 99.5%
298.7 60		50 (3) 50 (2.5)					33.4 105 74	

Remarks: Boring Loc: N,E =6685699.140, 2571034.934 (Surf Coord) (Info from Surveyor)

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: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

DRILLING LOG

WinCore
Version 3.3

County	Navarro	Hole	B-C-02	District	Dallas
Highway	CR 3110	Structure	@ Rush Creek	Date	11-17-22
CSJ	0918-18-138	Station	15+38.11	Grnd. Elev.	355.95 ft
		Offset	13.34' (LT)	GW Elev.	316.95 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC LL PI	Properties Wet Den. (pcf)	Additional Remarks
		4 (6) 5 (6)	CLAY, Fat Clay, Grayish Brown to Dk. Gray, w/ Traces of Fine Gravel & Calcareous Nodules, Med. Stiff to Stiff, Moist (CH)				21.2 50 34	
5								
10		6 (6) 7 (6)					28.9	-200 = 90.4%
15		7 (6) 9 (6)					23.9 71 49	-200 = 87.4%
20		6 (6) 10 (6)					26.4	-200 = 85.7%
25		4 (6) 6 (6)					24.4 74 55	
326. 30		14 (6) 19 (6)					30.8	-200 = 77.3%
			CLAY, Fat Clay w/ Sand, Gray, Very Stiff, Moist (CH)					
321. 35		50 (1) 50 (1)					21.3 57 26	
			SHALE, Shale, Gray to Dk. Gray, Hard, Moist to Wet (Comprised of Fat Clay w/ Sand & Fat Clay) (CH)					
40		50 (1) 50 (1)					38.5	-200 = 84.2%
45		50 (2) 50 (1)					44.3 79 56	
50		50 (2) 50 (1.5)					38.3	-200 = 84.8%
55		50 (2) 50 (1)					40.2 107 80	
296. 60		50 (2.5) 50 (1.5)					30.2	-200 = 98.3%

Remarks: Boring Loc: N,E = 6685833.678, 2571139.692 (Surf Coord) (Info from Surveyor)

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: RR** **Organization: B2Z Engineering**

B:\JOBS\HDR\Contract # 36-8IDP5068 (TxDOT) - On & Off-System Bridge PS&E - Statewide & Houston\TO#3 - 5 Brg Near Corsicana TX (HDR WA#8)\TechProd\Design\15 GEOTECHNICAL\Borings\From Lab\8. Wincor

STATE OF TEXAS
DAVID A. SAENZ
102365
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

B2Z ENGINEERING, LLC.
900 S. STEWART RD., SUITE 4,
MISSION, TX, 78572
Registration No. F-11187

Texas Department of Transportation
© 2023

Dallas District Bridge

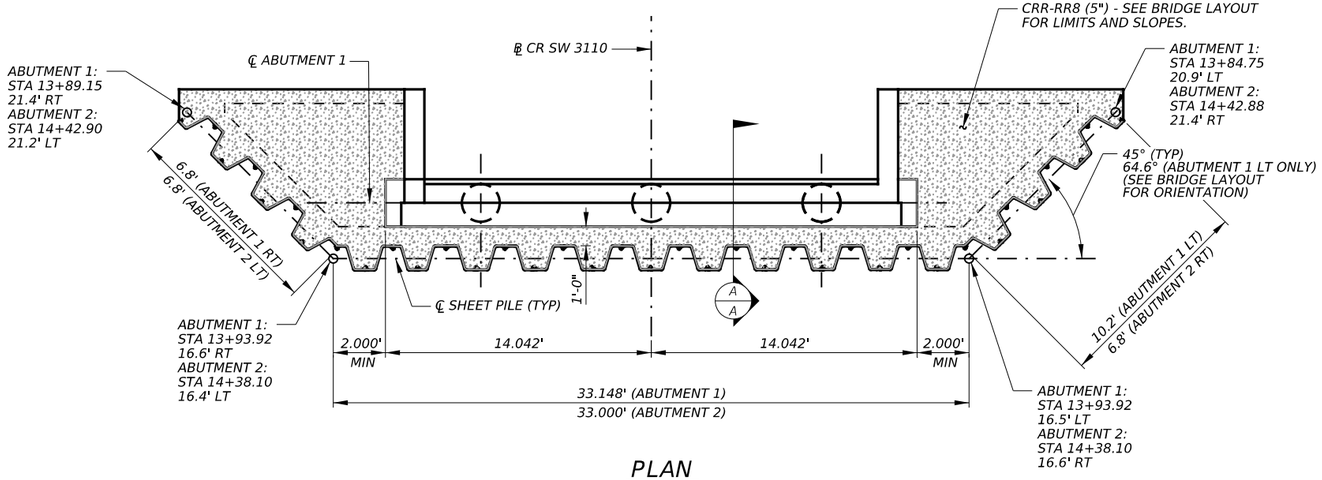
CR SW 3110
RUSH CREEK BRIDGE
BORING LOGS

1 OF 1

FILE: SEE PATH	DN: AD	CK: EDB	DW: RA	CK: EDB
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		113

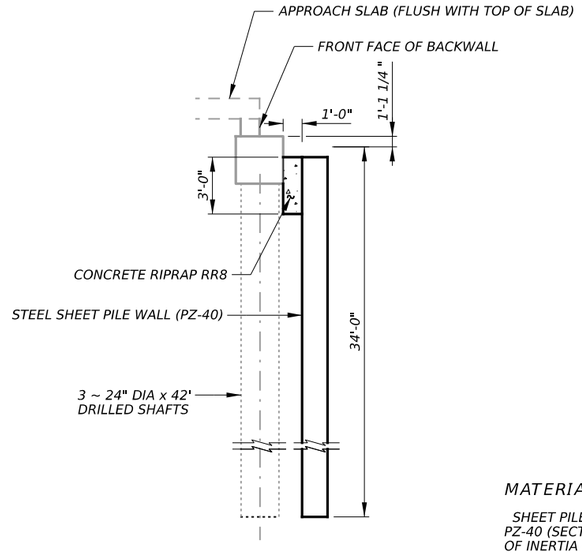
DATE: Monday, November 13, 2023 10:46:19 AM
FILE: 138BOR01.dgn
10:46:19 AM

SHEET PILE WALL QUANTITY			
	LENGTH	HEIGHT	AREA
LOCATION	FT	FT	SF
ABUTMENT 1	51	34	1734
ABUTMENT 2	47	34	1598

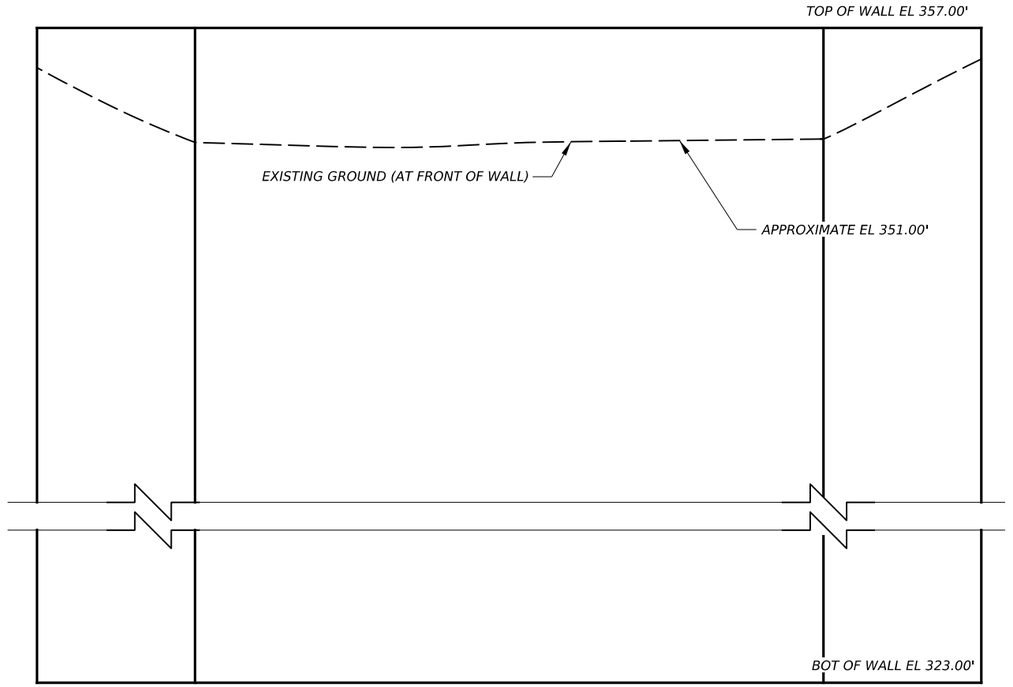


PLAN

(ABUTMENT 1 SHOWN, ABUTMENT 2 SIMILAR)



SECTION A-A



ELEVATION

(FACING ABUTMENT)
ABUTMENT 1 SHOWN, ABUTMENT 2 SIMILAR

MATERIAL NOTES:

SHEET PILE SHALL BE HOT ROLLED GRADE 50 STEEL, PZ-40 (SECTION MODULUS 60.7 IN³/FT AND MOMENT OF INERTIA 490.85 IN⁴/FT).

SHEET PILE WITH NORSOK COATING FOR MARINE ENVIRONMENTS, SUBSIDIARY TO SHEET PILE, SEE GENERAL NOTES.

FOR SHEET PILE WALL CORNER DETAILS REFER TO SSPC STANDARD.

HL93 LOADING

STATE OF TEXAS
SARAH A. DE MOYA
108548
LICENSED
PROFESSIONAL ENGINEER
11/20/2023

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation
© 2023

Dallas District Bridge

CR SW 3110

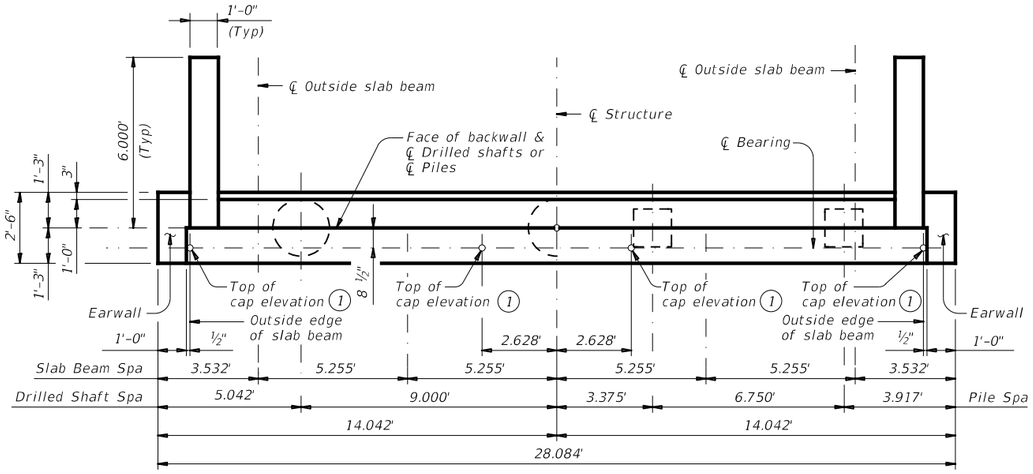
RUSH CREEK BRIDGE
SHEET PILE WALL DETAILS

1 OF 1

FILE: SEE PATH	DN: AD	CK: SADM	DW: RA	CK: SADM
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		114

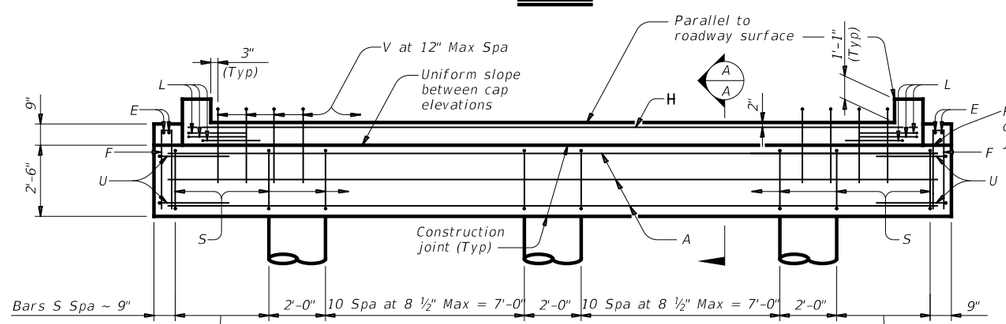
DATE: Thursday, November 16, 2023 10:32:28 AM
FILE: 138PWDT01.dgn

DATE: Wednesday, September 06, 2023 11:09:57 AM
FILE: psbste09-17 (3).dgn

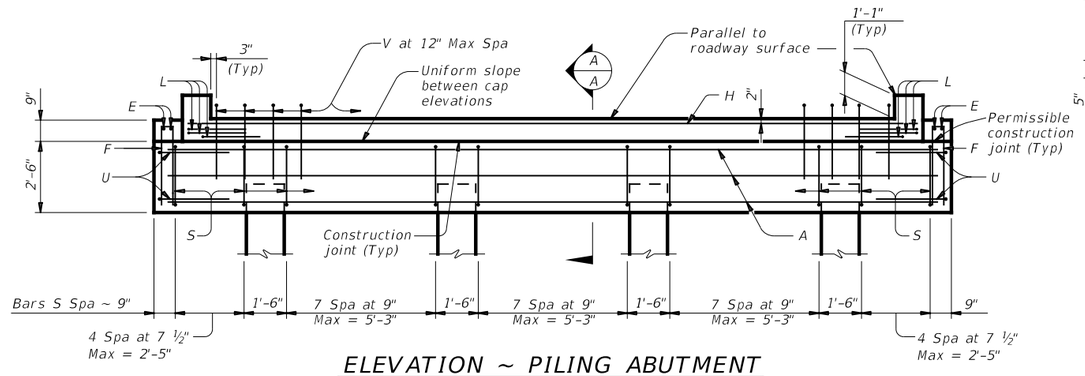


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN

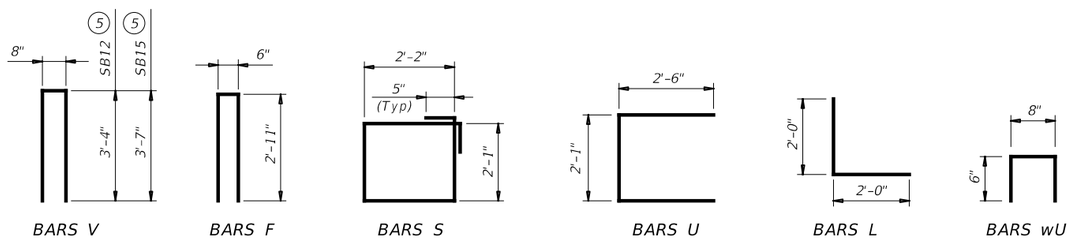


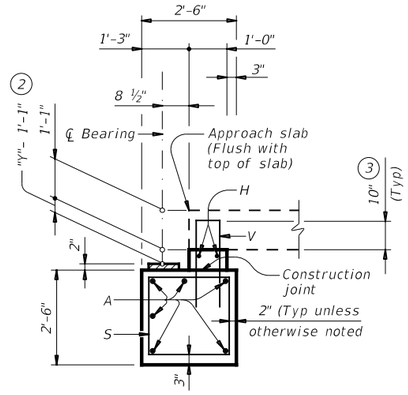
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

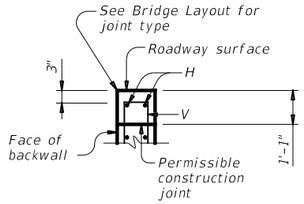
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





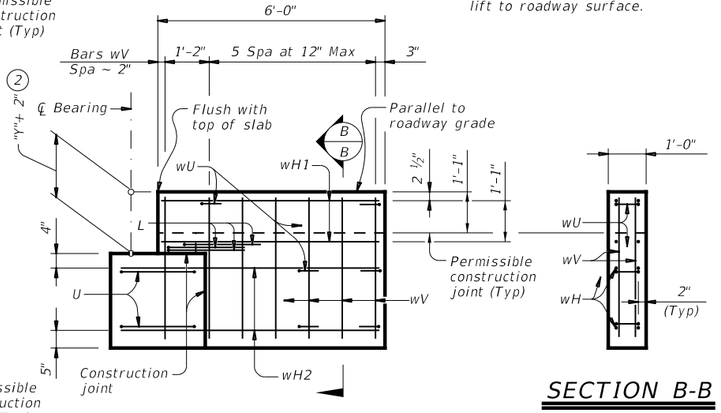
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

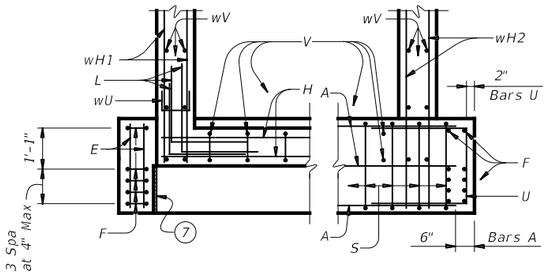
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



CORNER DETAILS

BACKWALL — CAP

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

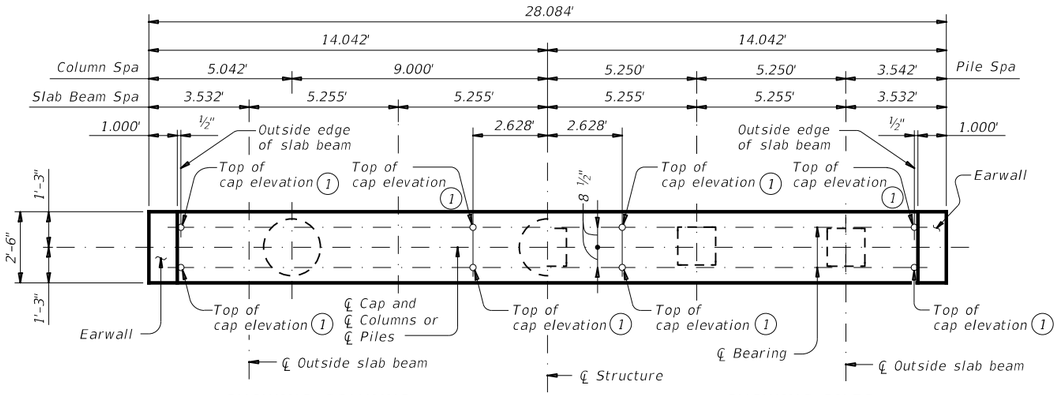
Texas Department of Transportation

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	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		115

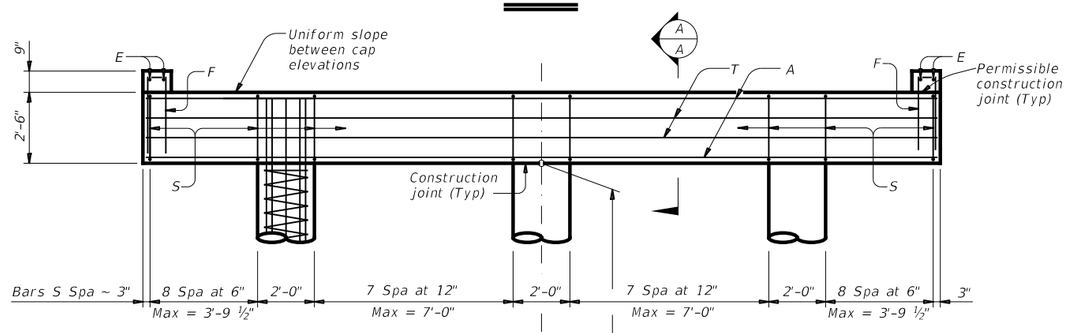
DATE: Wednesday, September 06, 2023 11:09:59 AM
FILE: psbste21-17 (1).dgn

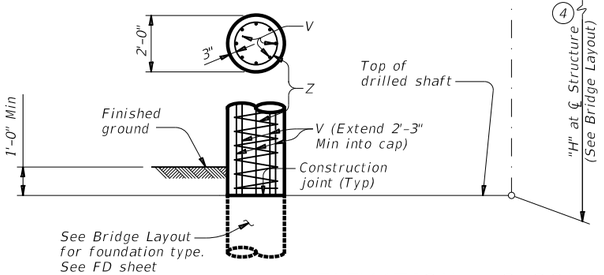


SHOWING COLUMNS

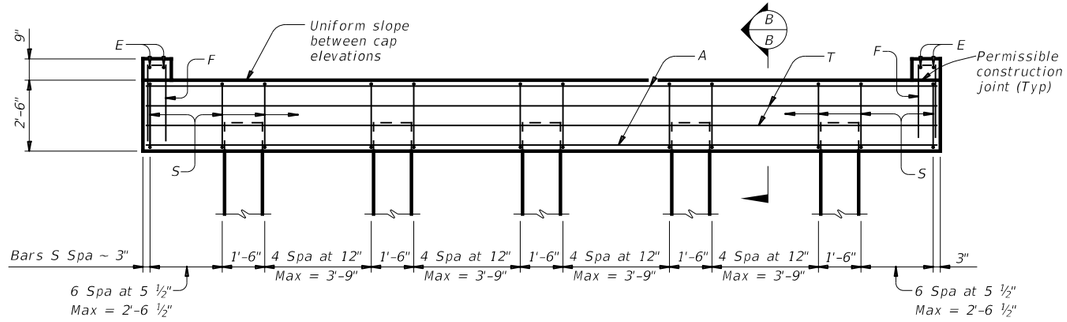
PLAN

SHOWING PILES



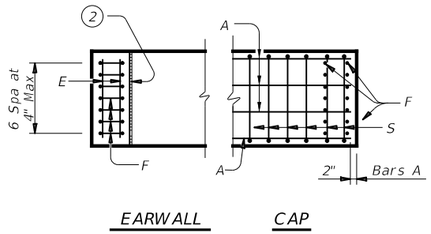


ELEVATION ~ 3 COLUMN BENT



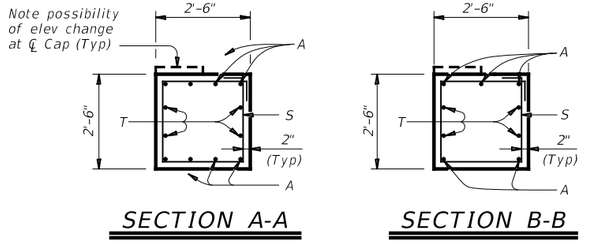
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.



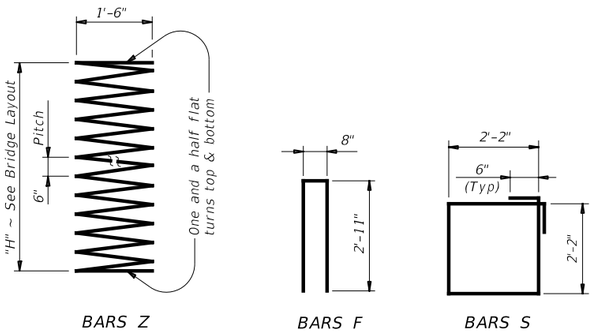
EARWALL CAP

CAP END DETAIL



SECTION A-A

SECTION B-B



BARS Z BARS F BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	57	61	34	37
30	66	71	40	42
35	73	79	44	47
40	80	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	27'-9"	1,180
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,267
Cl "C" Conc (Cap)			CY	6.6
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	27'-9"	737
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
Reinforcing Steel			Lb	1,263
Cl "C" Conc (Cap)			CY	6.6

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) 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)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

These bent 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

INTERIOR BENTS
PRESTR CONCRETE SLAB BEAM
24' ROADWAY
BPSB-24

FILE: psbste21-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		116

DATE: Wednesday, September 06, 2023 11:10:00 AM
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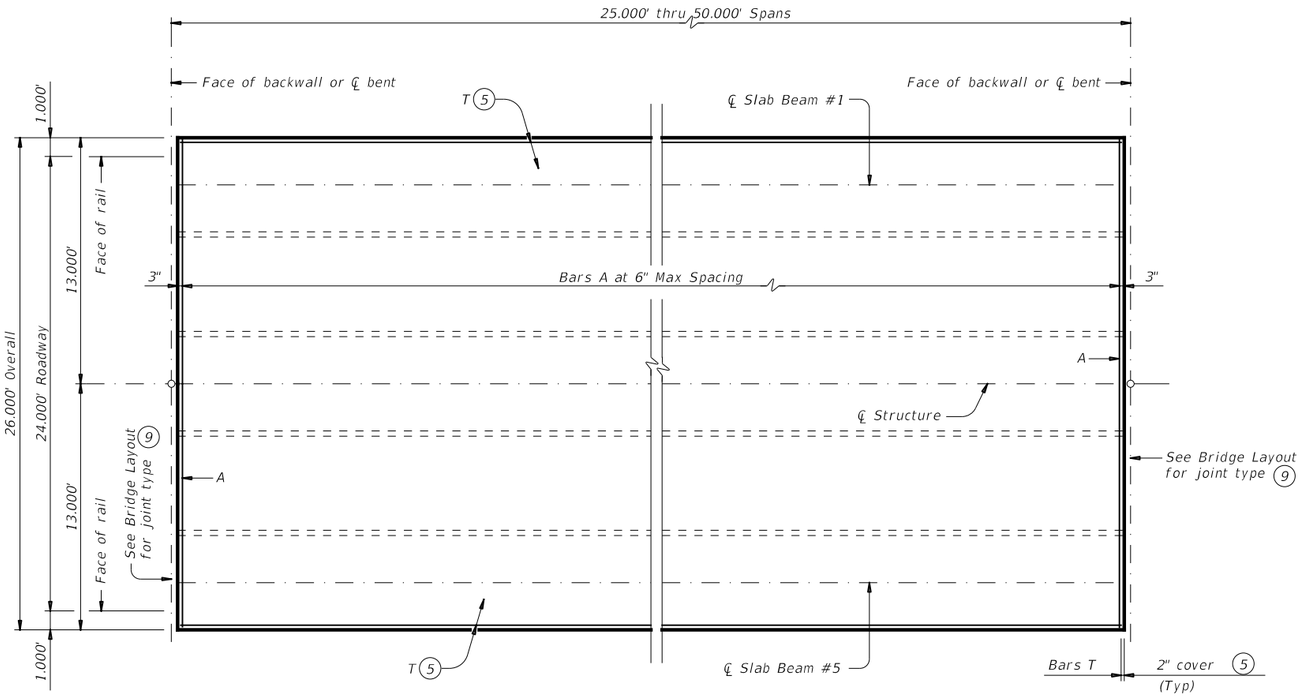
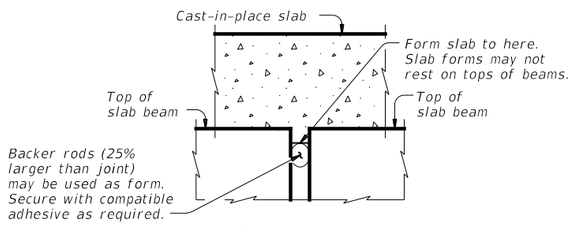
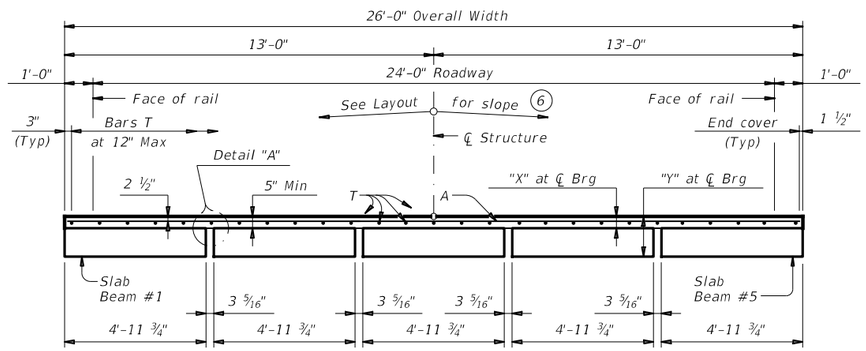


PLAN



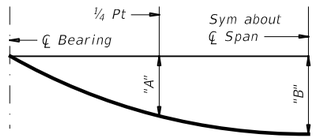
DETAIL "A"



TYPICAL TRANSVERSE SECTION

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"

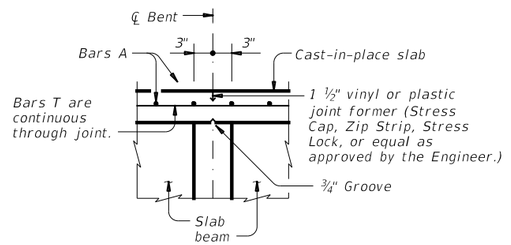


DEAD LOAD DEFLECTION DIAGRAM

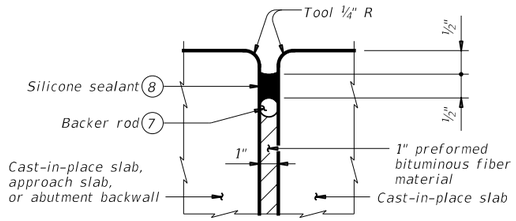
NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

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	122.50	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".

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

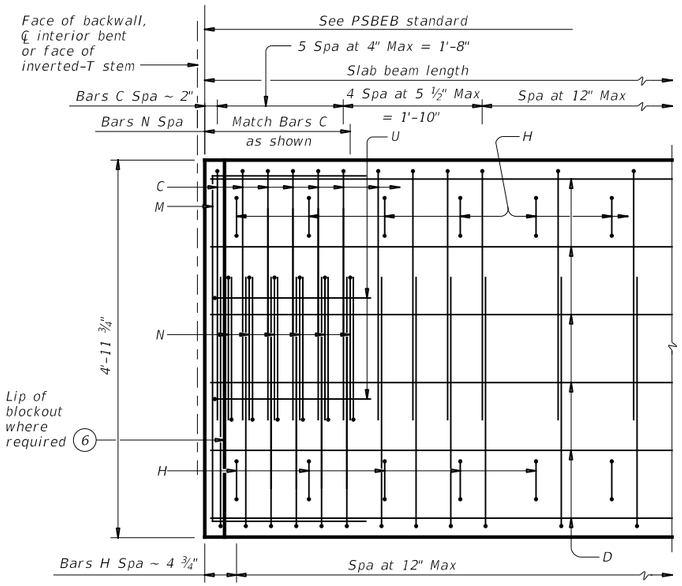
PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY

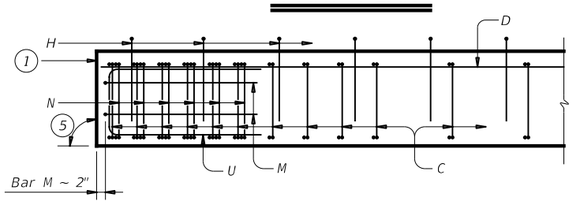
SPSB-24

FILE: psbste30-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		117

DATE: Wednesday, September 06, 2023 11:10:01 AM
FILE: psbsts04-17 (2).dgn 11:10:01 AM



PART PLAN



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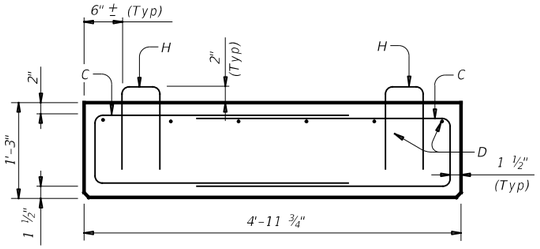

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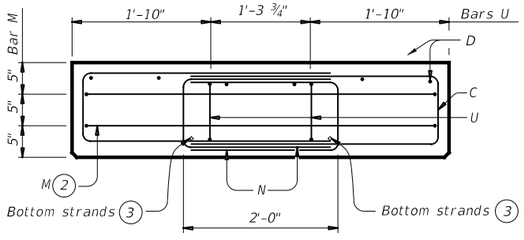
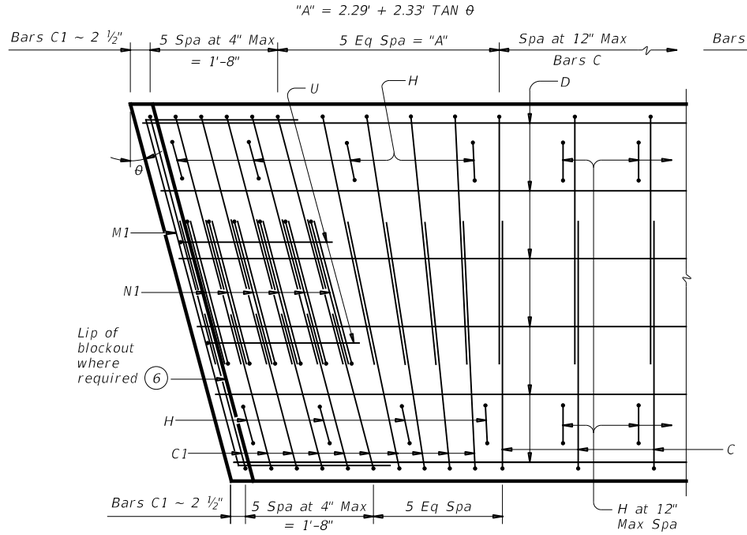


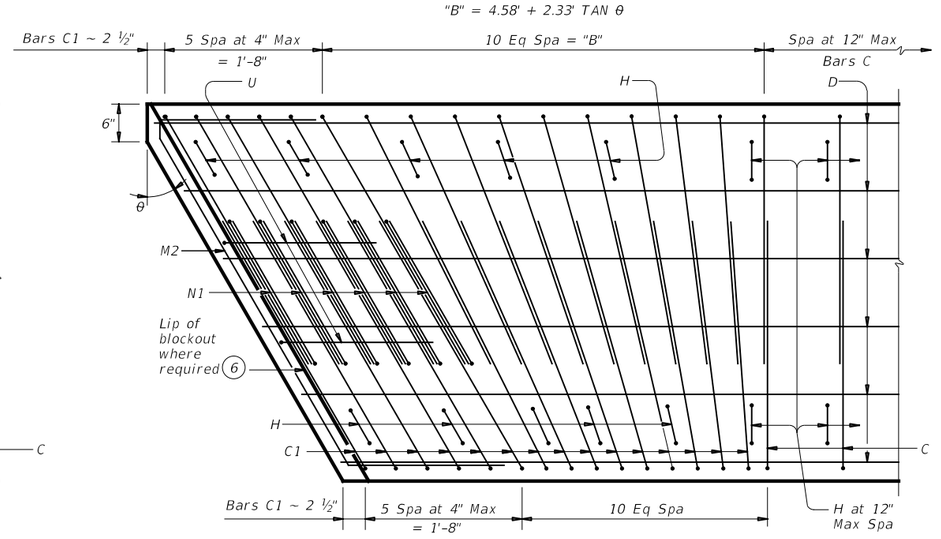
END MAT REINFORCING

Bars H not shown for clarity.



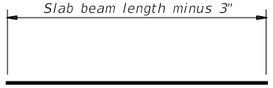
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

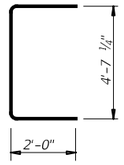


PART SKEW PLAN

(Showing θ over 15° to 30° skew)



BARS D(#6)



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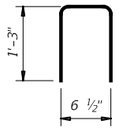

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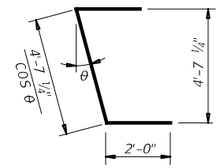

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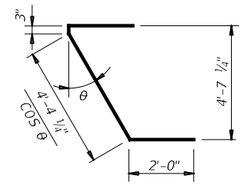

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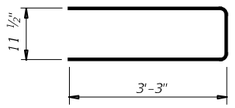

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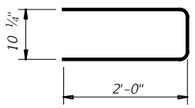
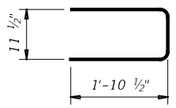


BARS U(#5)



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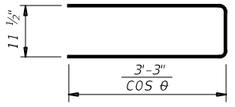

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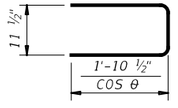
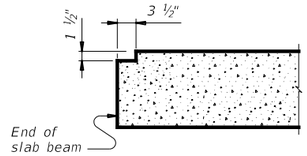


BARS N1(#4)



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	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		118

DATE: Wednesday, September 06, 2023 11:10:02 AM
FILE: psbsts08-21 (1).dgn

STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																			OPTIONAL DESIGN					LOAD RATING FACTORS		
				PRESTRESSING STRANDS							DEBONDED STRANDS PER ROW								CONCRETE						STRENGTH I		SERVICE III
	SPAN LENGTH	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e" ℄	"e" END	TOT NO. DEB	DIST FROM BOTTOM	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRGTH ①	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR ②			
	(ft)					(in)	fpu (ksi)	(in)	(in)		(in)	TOTAL	DE-BONDED	3	6	9	12	15	f'ci (ksi)	f'c (ksi)	fct (ksi)	fcb (ksi)	(kip-ft)	Moment	Shear	Inv	Opr	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.

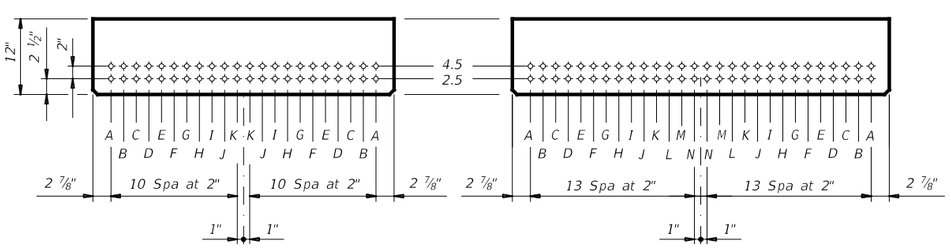
② Portion of full HL93.

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.

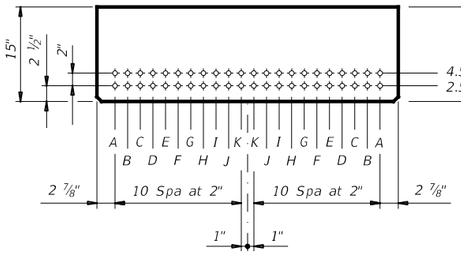
FABRICATION NOTES:

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.

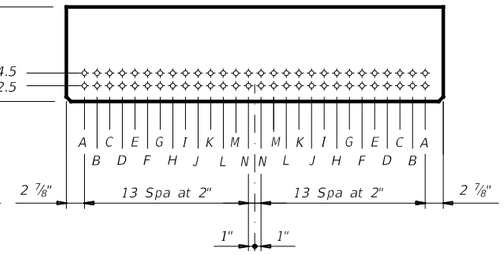


TxDOT 4SB12 SLAB BEAM

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	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		119

DATE: Wednesday, September 06, 2023 11:10:03 AM
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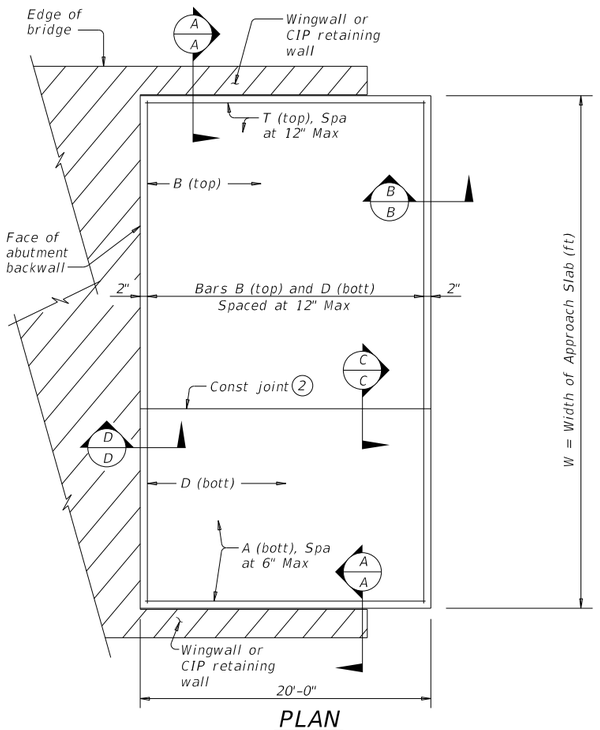
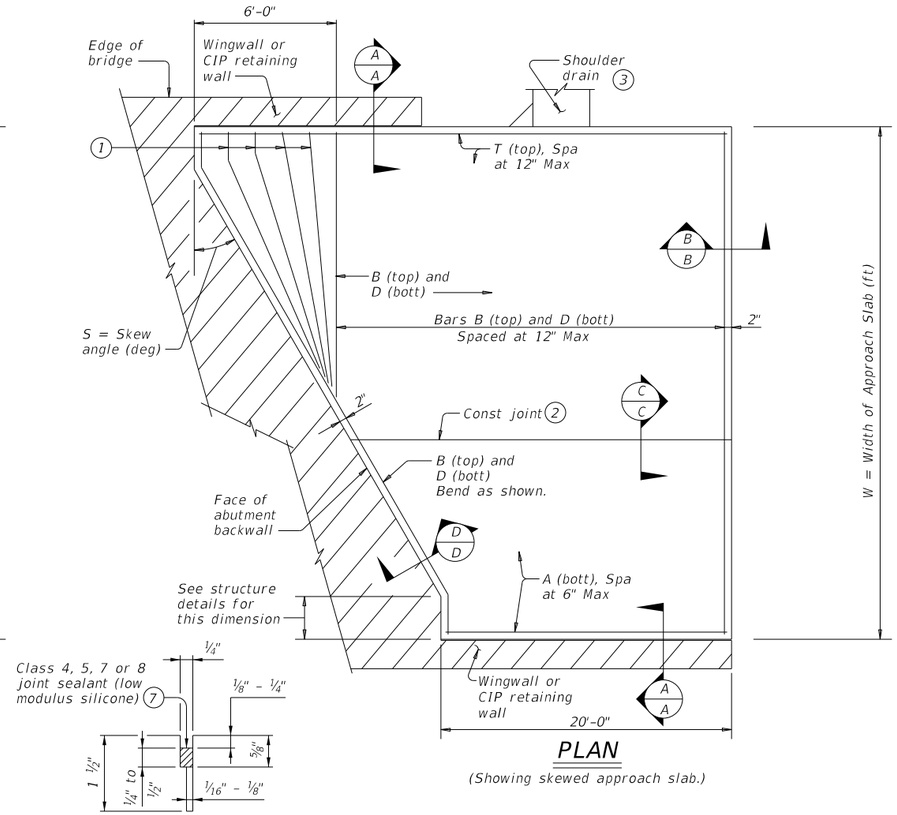


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

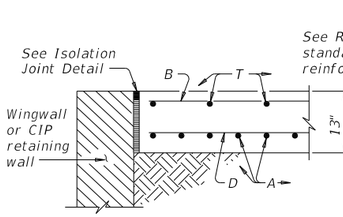
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

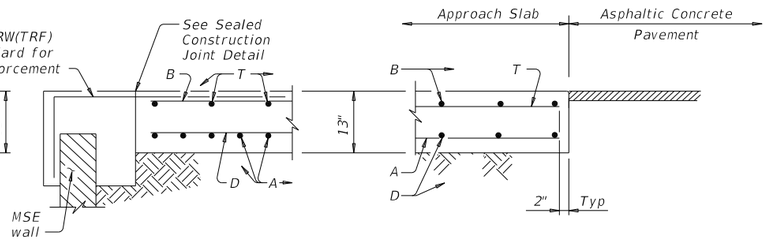
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

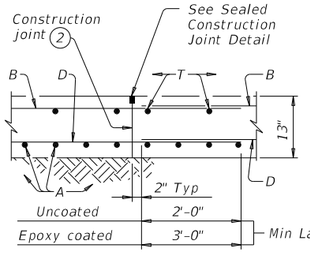
Cover dimensions are clear dimensions, unless noted otherwise.

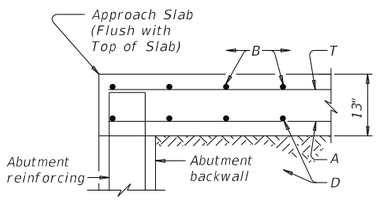


SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



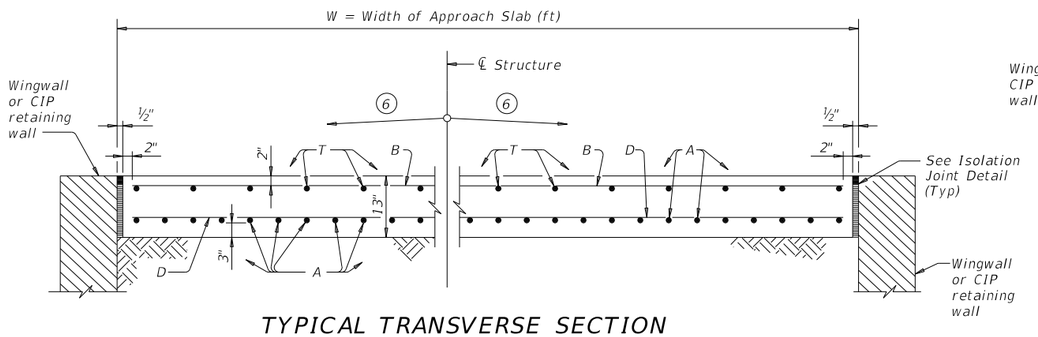


SECTION A-A

SECTION B-B

SECTION C-C (5)

SECTION D-D



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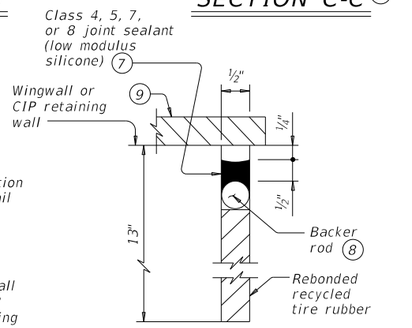
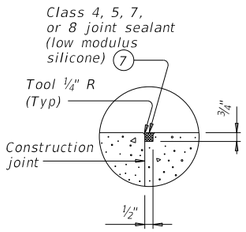


ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

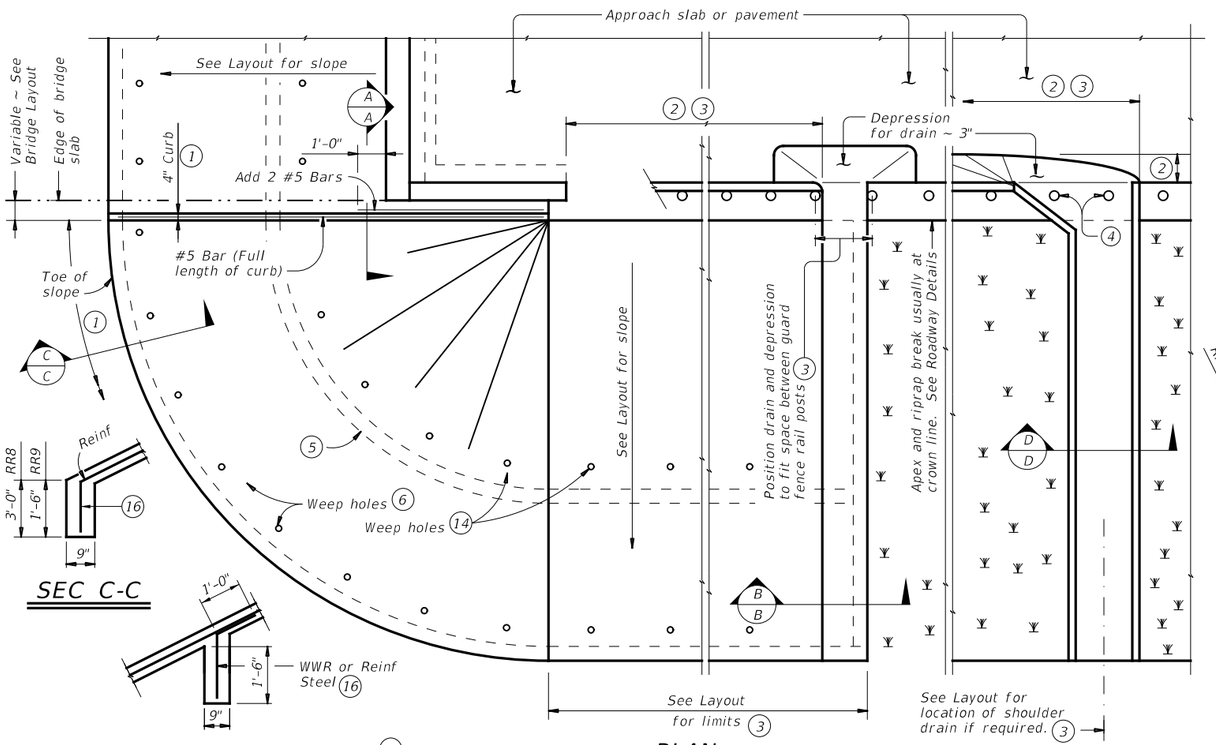
BRIDGE APPROACH SLAB

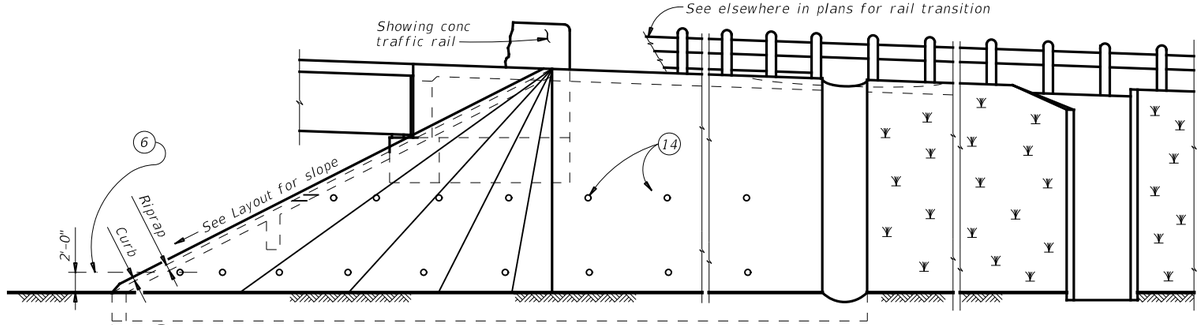
ASPHALTIC CONCRETE PAVEMENT

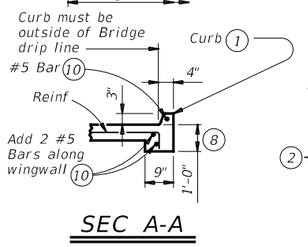
BAS-A

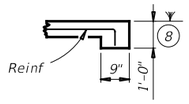
FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		120

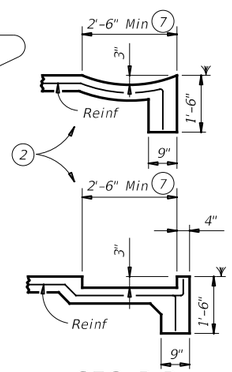
DATE: Wednesday, September 06, 2023 11:10:04 AM
FILE: crrstde1-19 (1).dgn

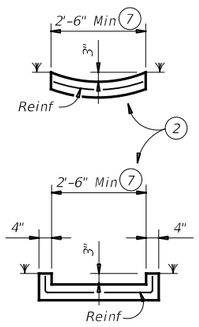


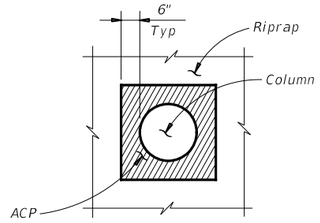


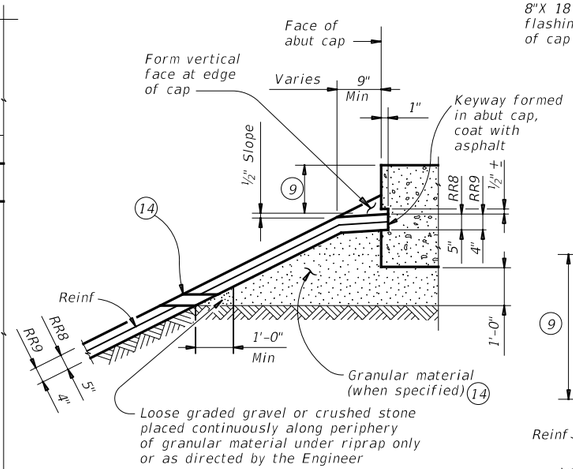


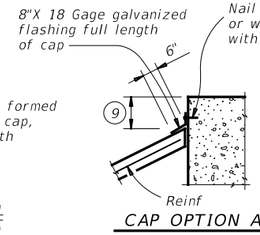


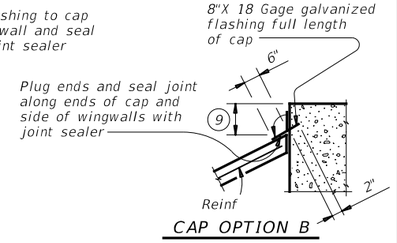


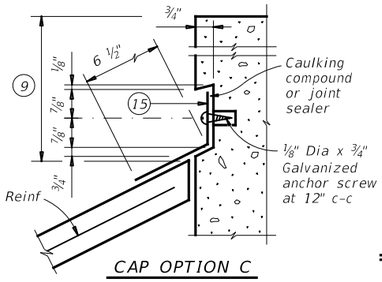


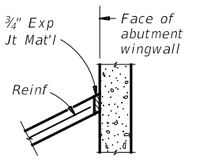






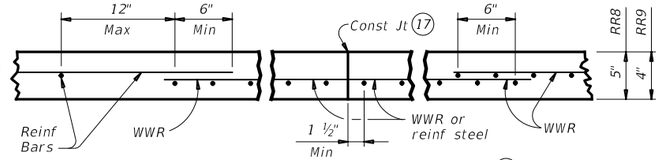






SECTIONS THRU RIPRAP AT CAP

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.



See General Notes for optional synthetic fiber reinforcement.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

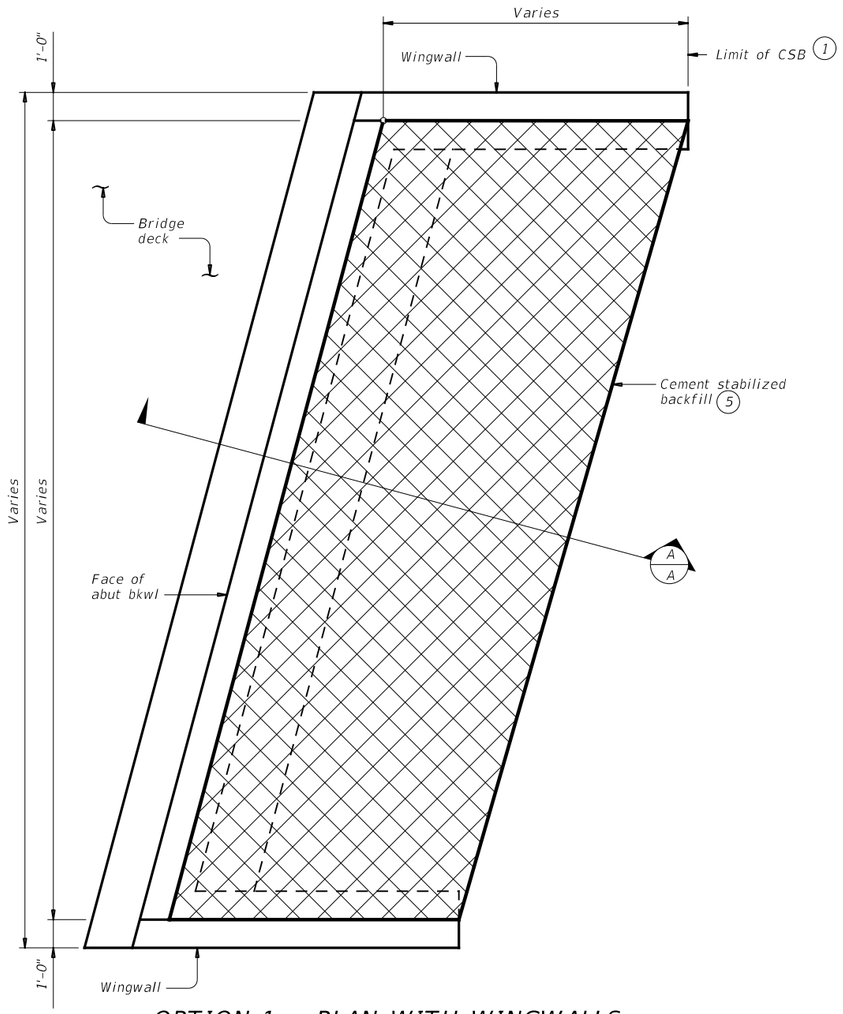
Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

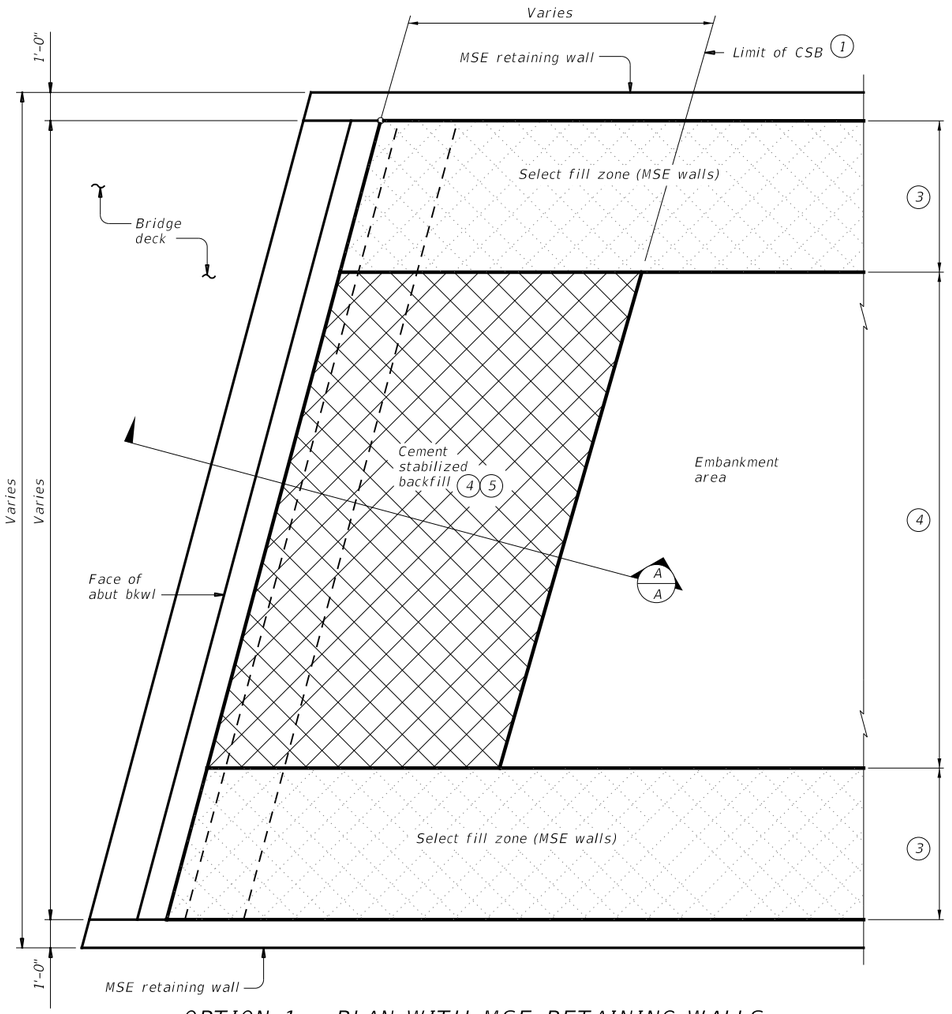
CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		121

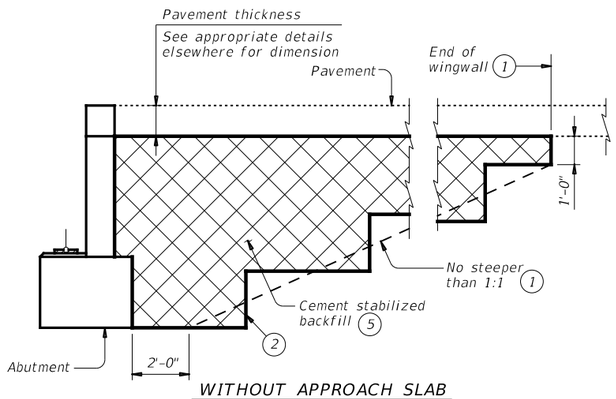


OPTION 1 ~ PLAN WITH WINGWALLS

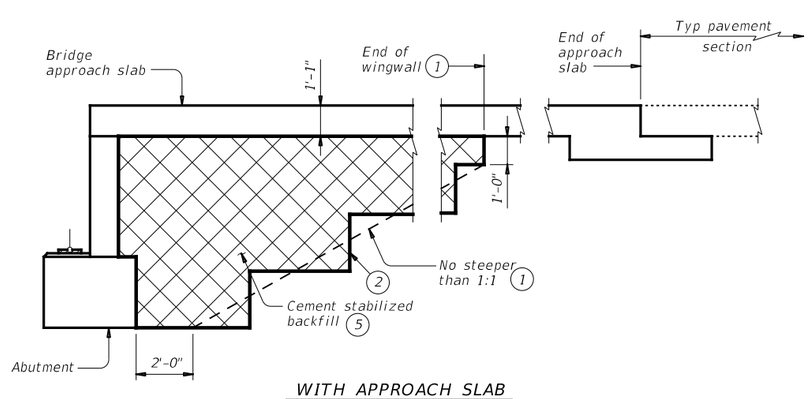
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		122

DATE: Wednesday, September 06, 2023 11:10:05 AM
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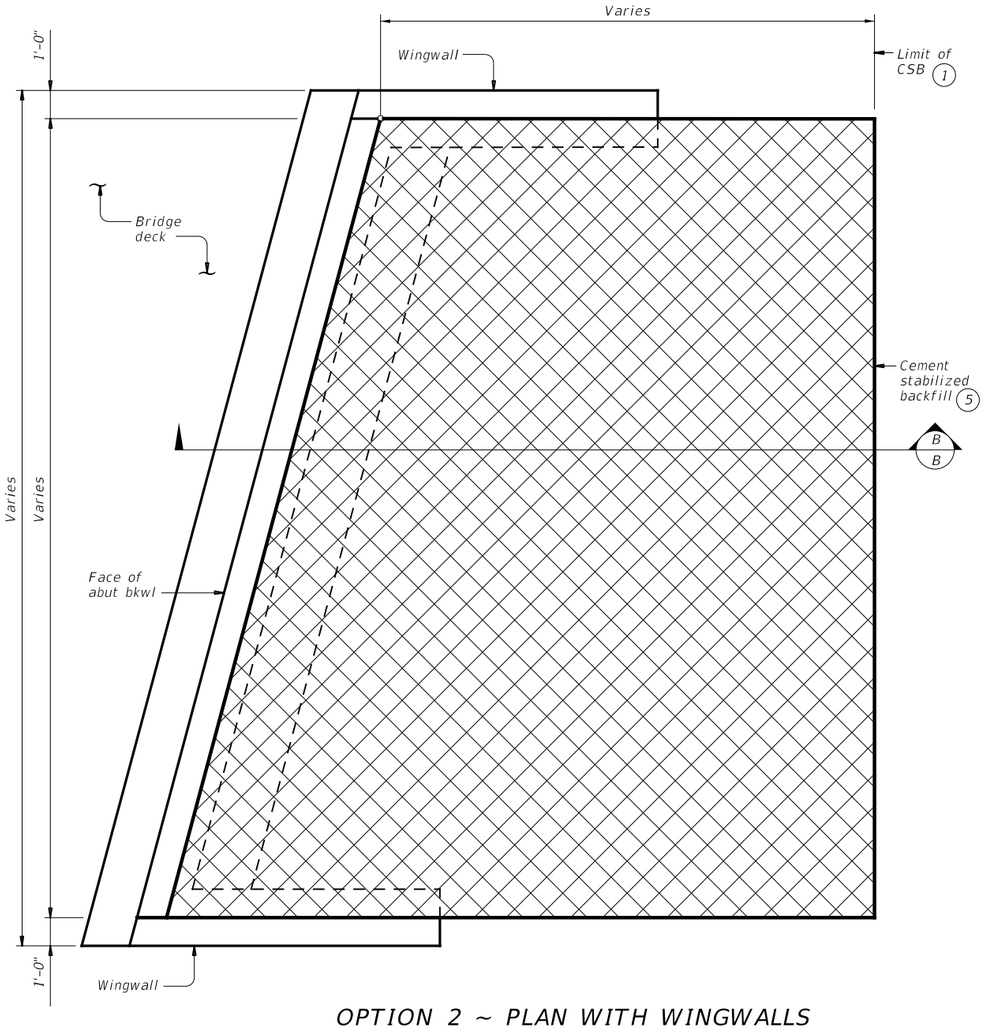
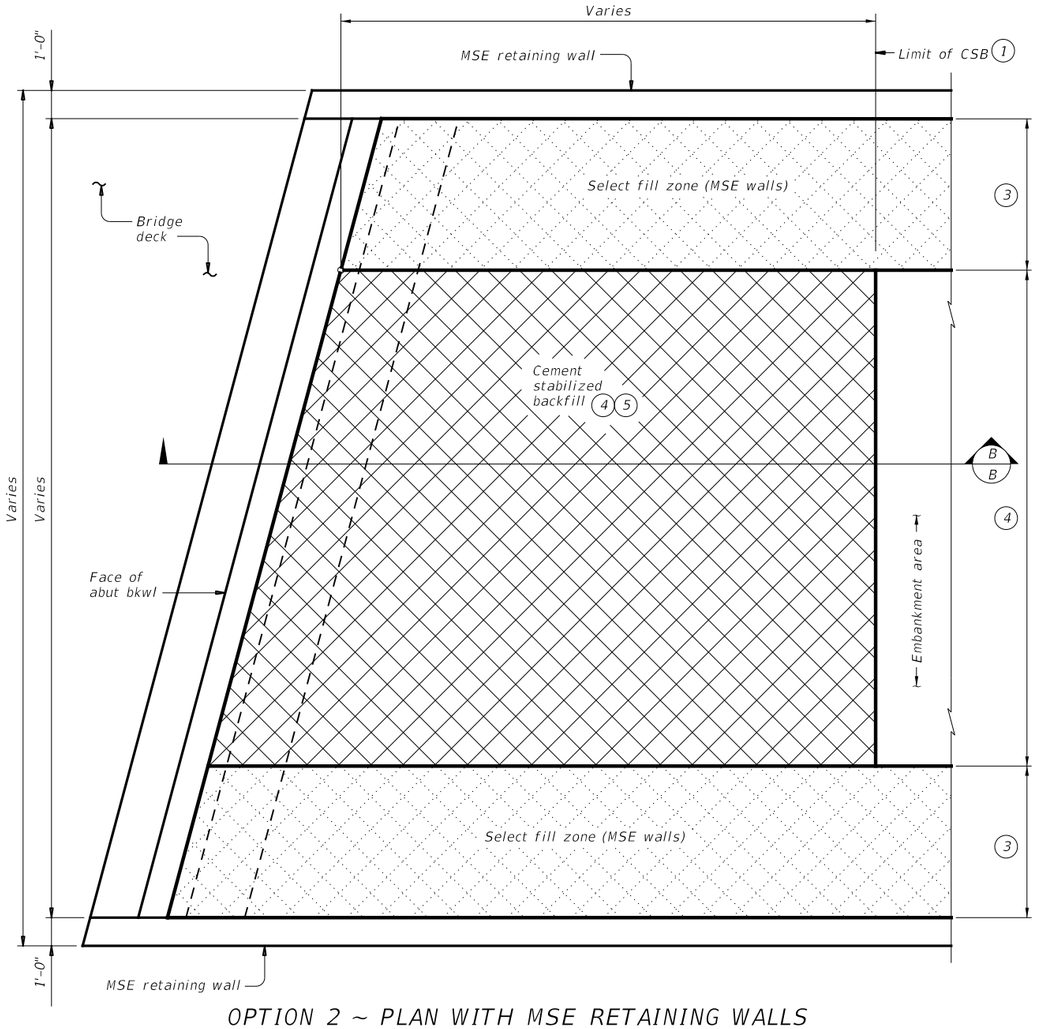


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

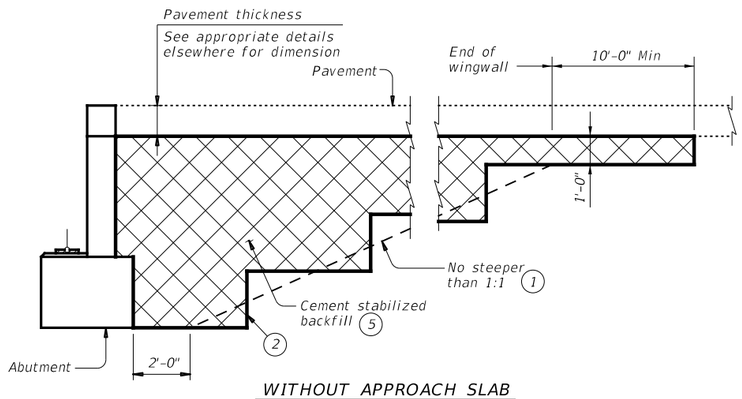
(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



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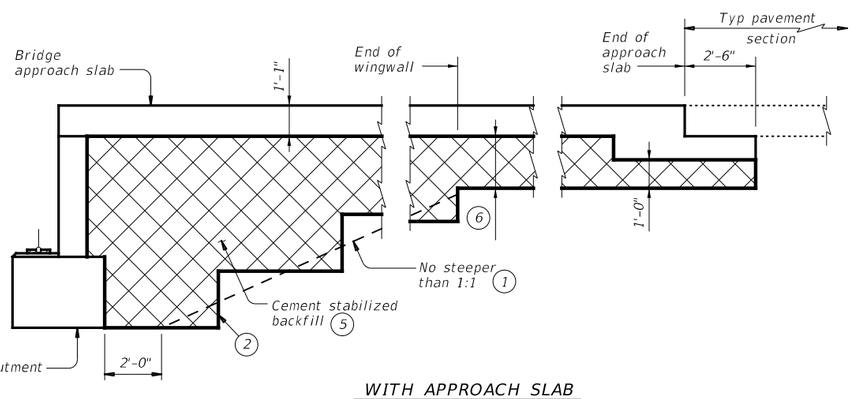


WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

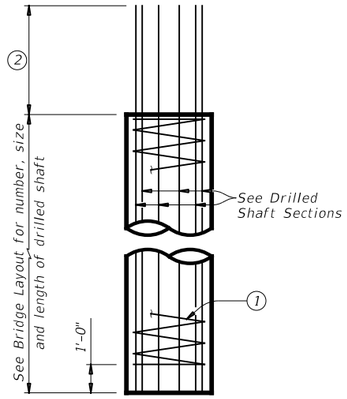
Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

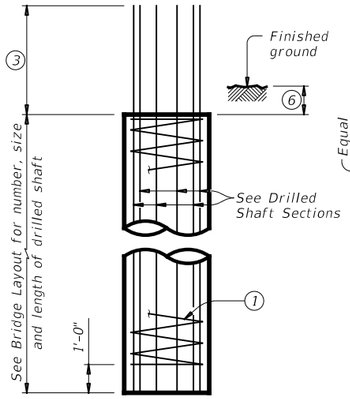
BRIDGE ABUTMENT

CSAB

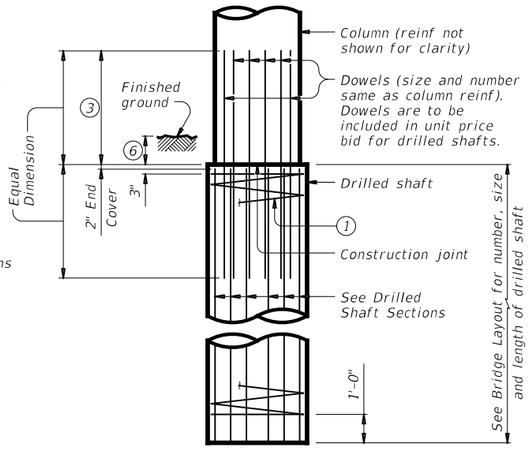
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		123



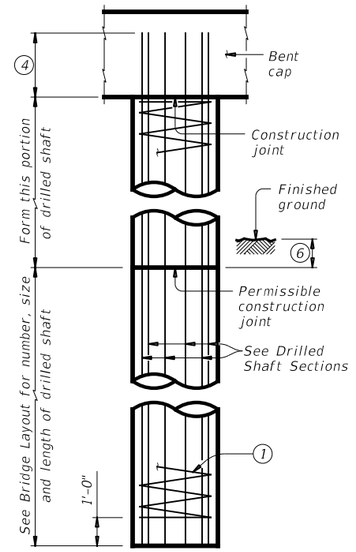
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



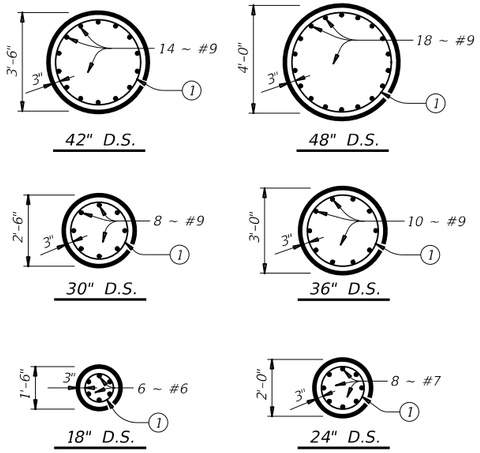
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

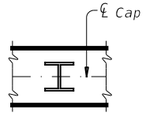


DRILLED SHAFT SECTIONS

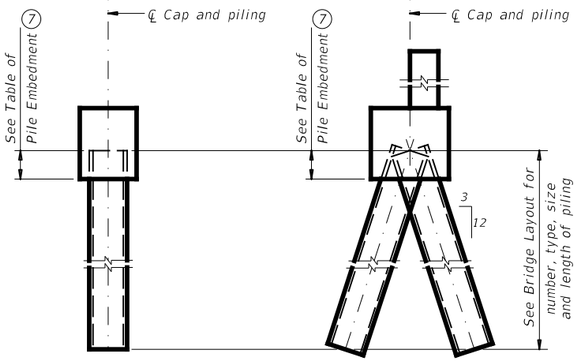
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

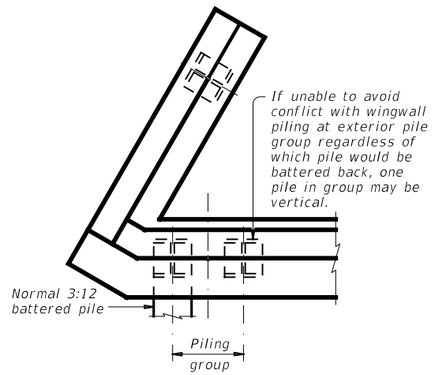
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



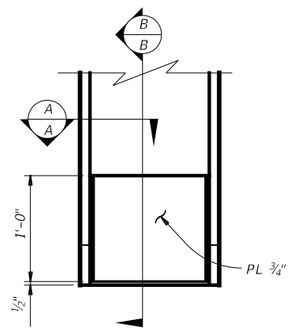
ORIENTATION OF STEEL H-PILING



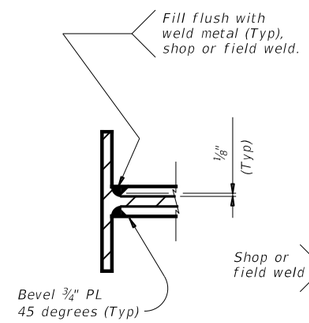
PILING DETAILS
(Concrete or steel H)



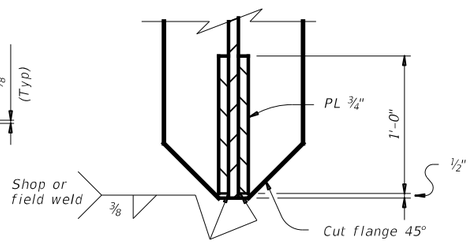
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



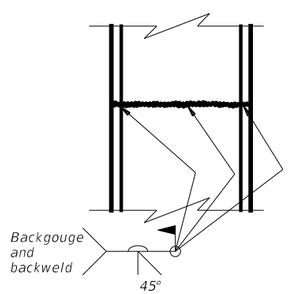
SECTION A-A

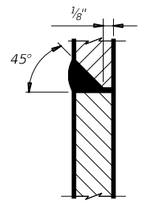


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

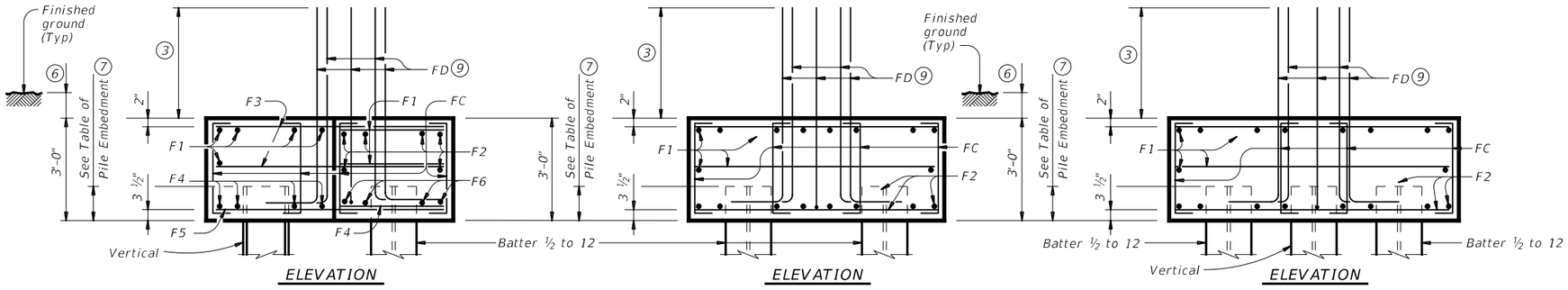
COMMON FOUNDATION DETAILS

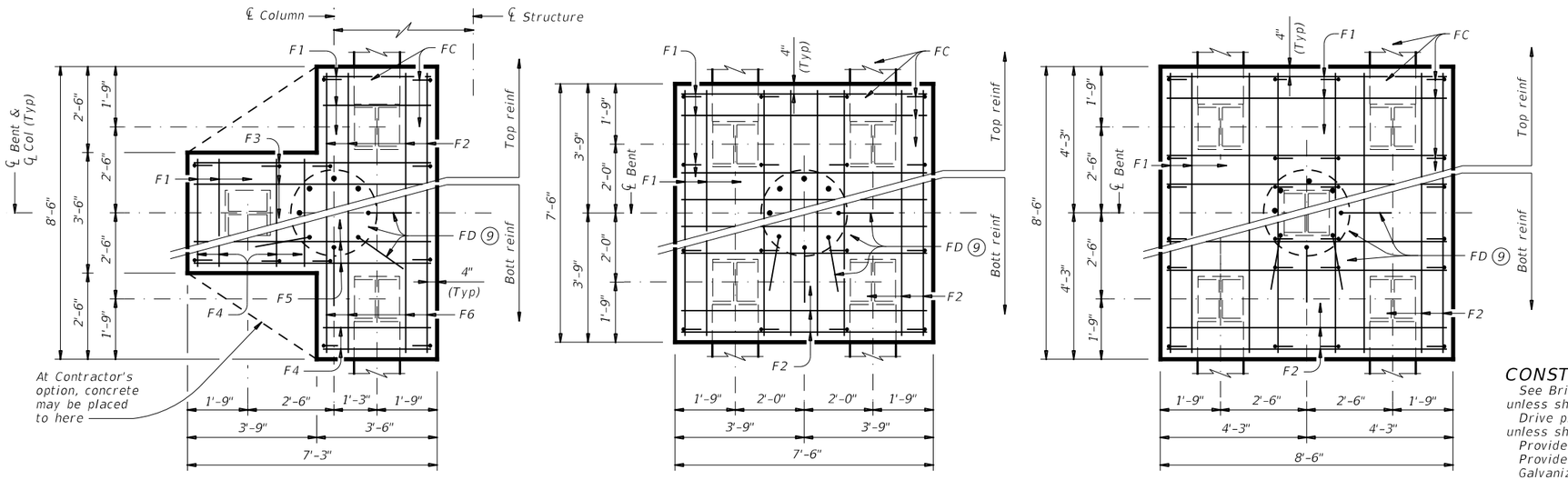
FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		124

DATE: Wednesday, September 06, 2023 11:10:06 AM
FILE: fdstde01-20 (1).dgn 11:10:06 AM

DATE: Wednesday, September 06, 2023 11:10:07 AM
FILE: fdstde01-20 (1).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.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

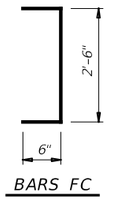
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

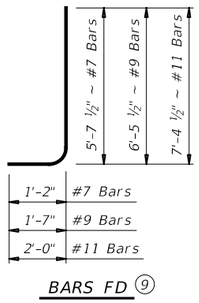
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

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



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.

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

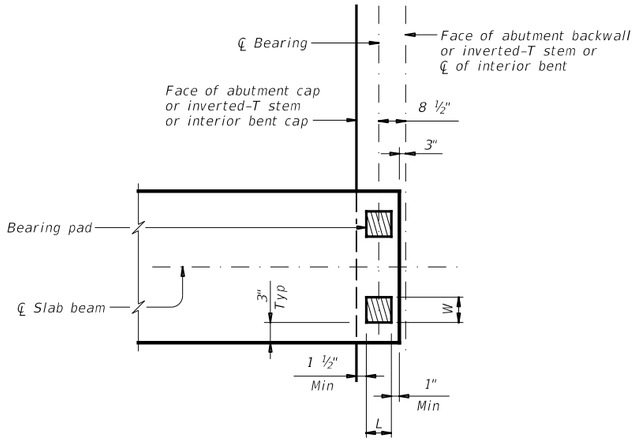
Bridge Division Standard

COMMON FOUNDATION DETAILS

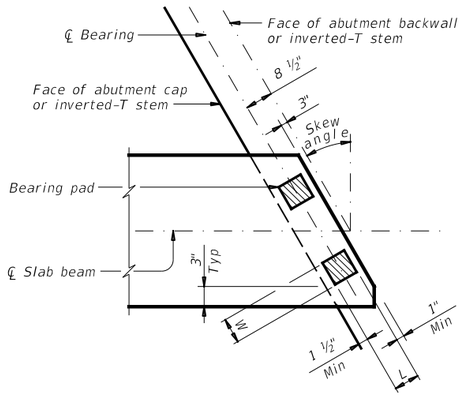
FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		125

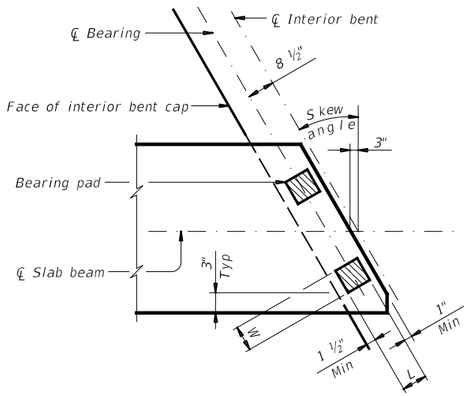
DATE: Wednesday, September 06, 2023 11:10:07 AM
FILE: psbste06-17 (2).dgn



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)



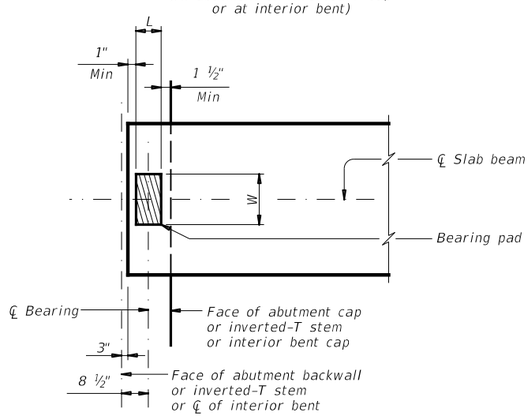
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

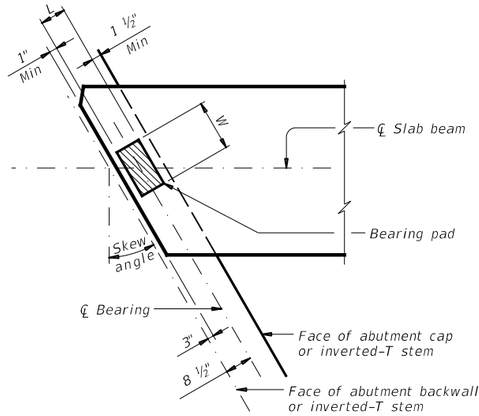
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

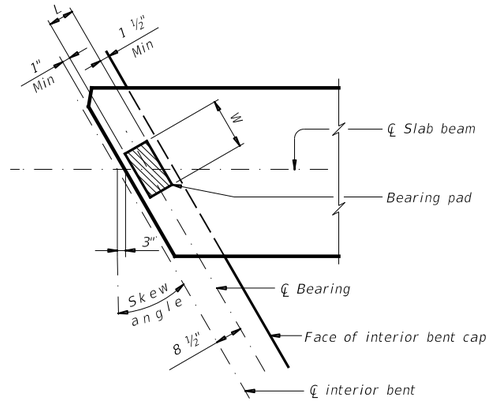
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



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)

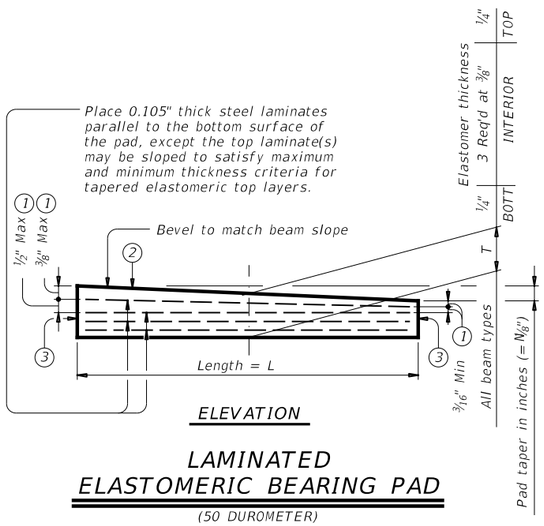
GENERAL NOTES:

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".



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

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.

(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 $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

HL93 LOADING

Texas Department of Transportation

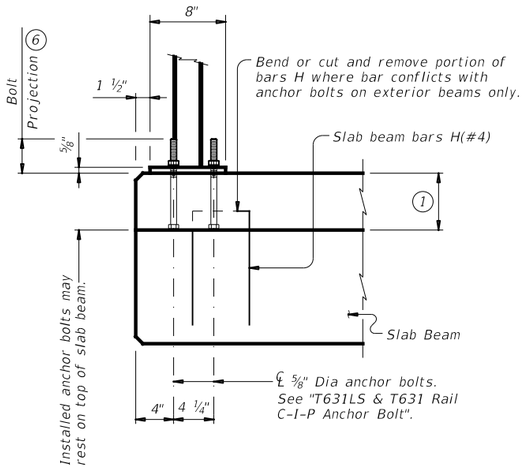
Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

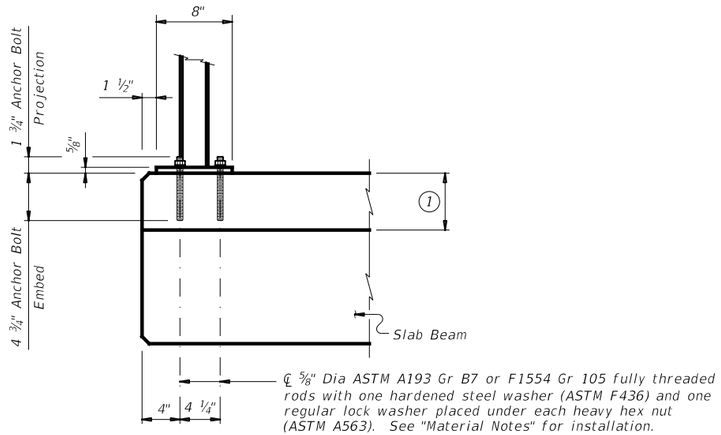
PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		126



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 bitumuminous 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 5/8" 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 5/8" 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.

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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	18	133, ETC	CR 1420, ETC.
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		127

DATE: Wednesday, September 06, 2023 11:10:08 AM
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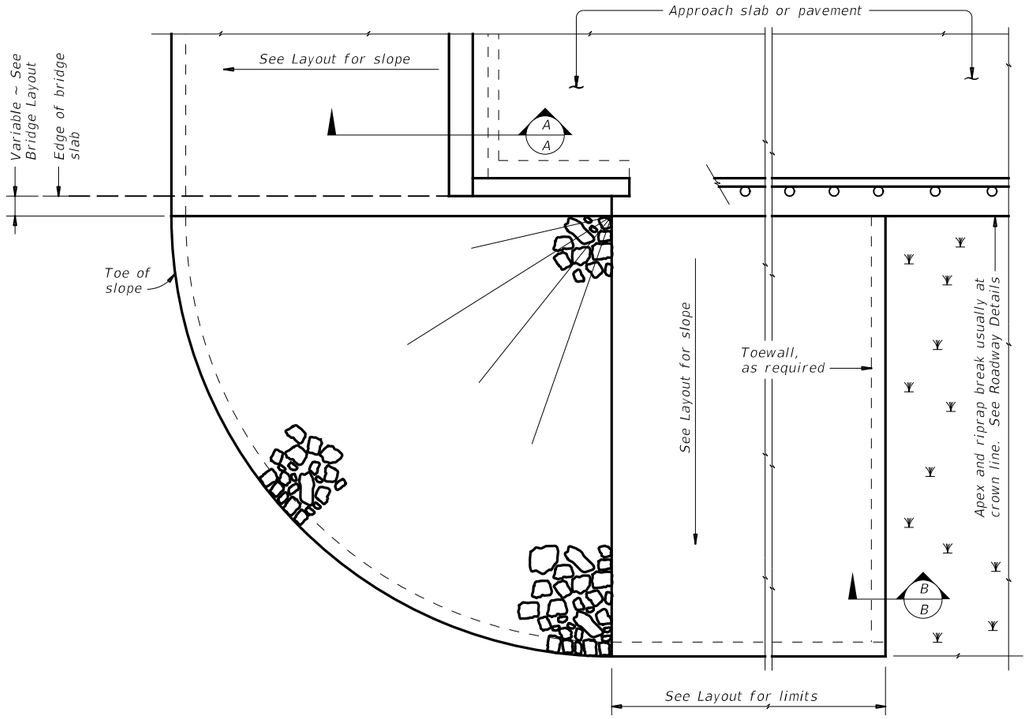
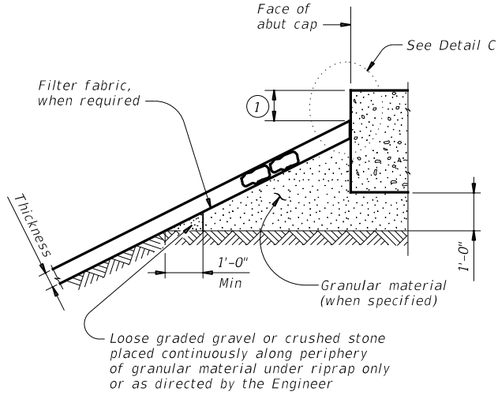
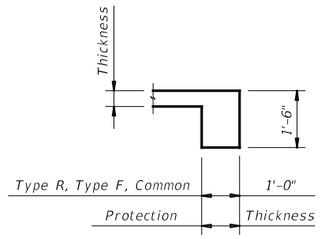


PLAN

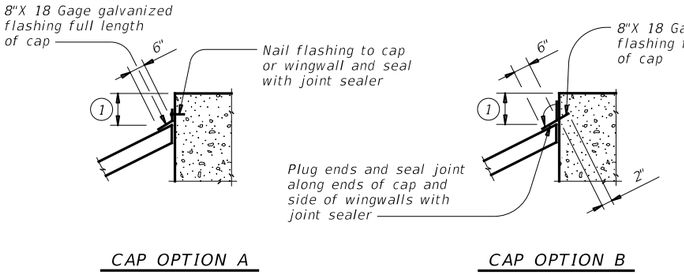


SECTION A-A AT CAP



SECTION B-B

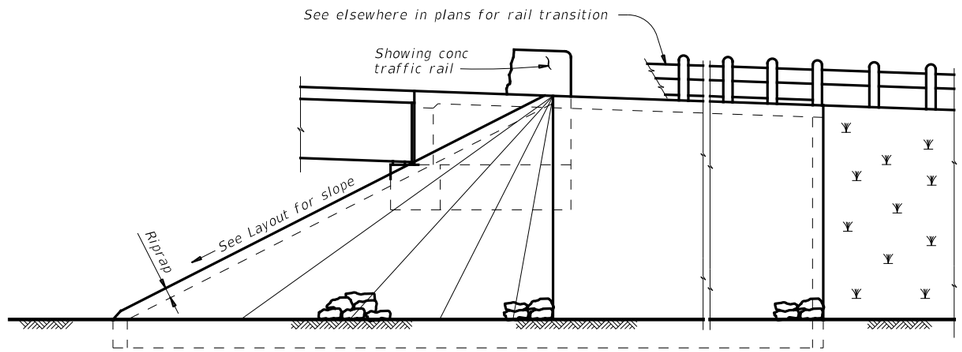
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

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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	18	133, ETC	CR 1420, ETC.		
	DIST	COUNTY		SHEET NO.		
	DAL	NAVARRO		128		

DATE: Wednesday, September 06, 2023 11:10:09 AM
FILE: srrstde1-19 (1).dgn 11:10:09 AM

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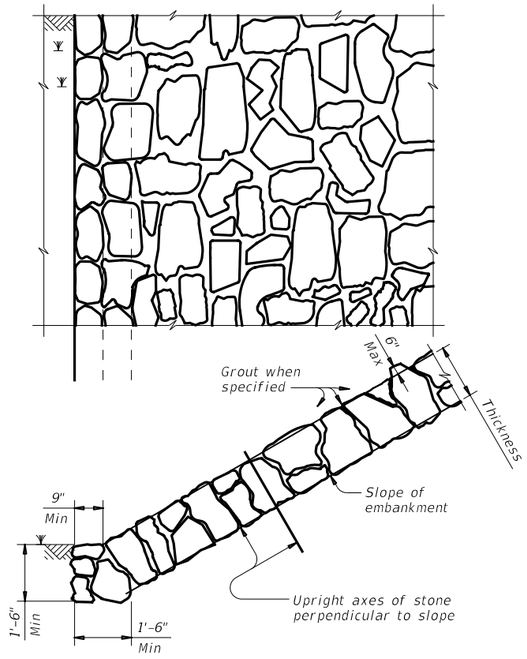


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

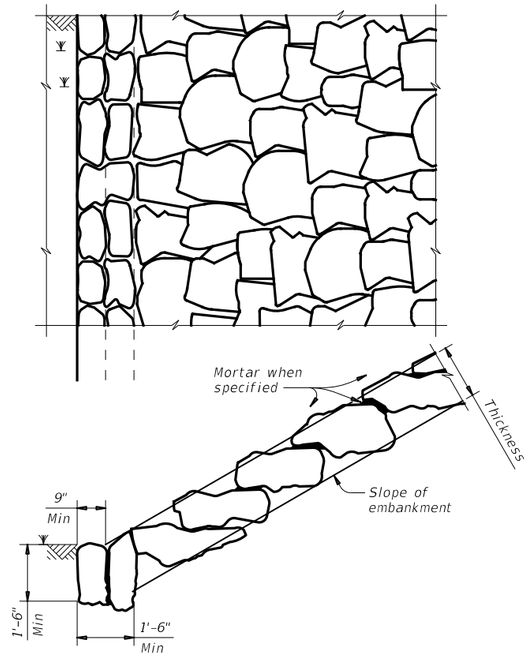


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

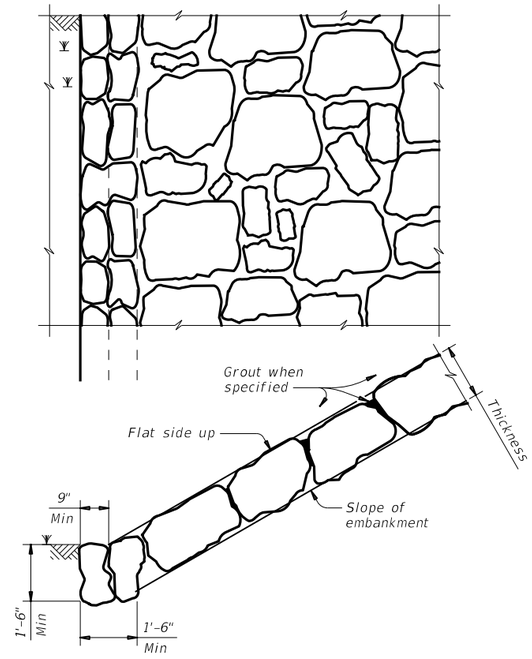


FIGURE 3 ~ TYPE F STONE RIPRAP

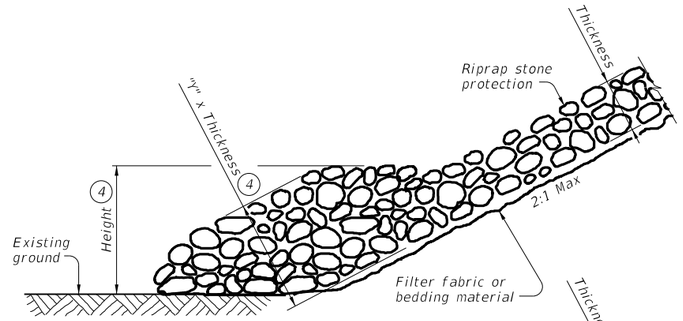
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

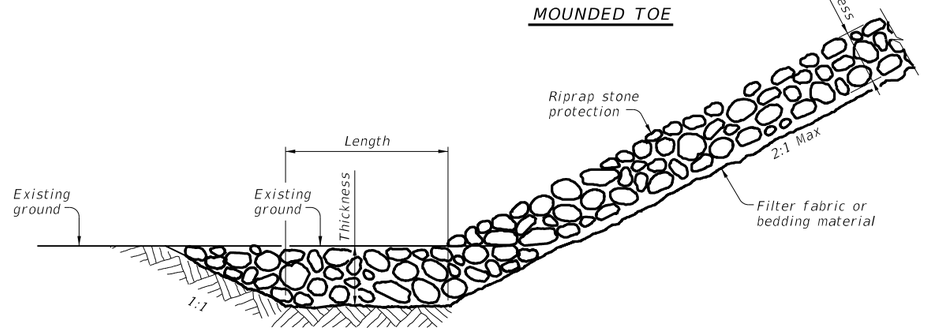
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

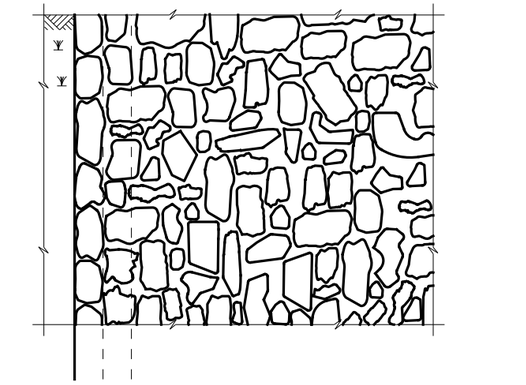


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

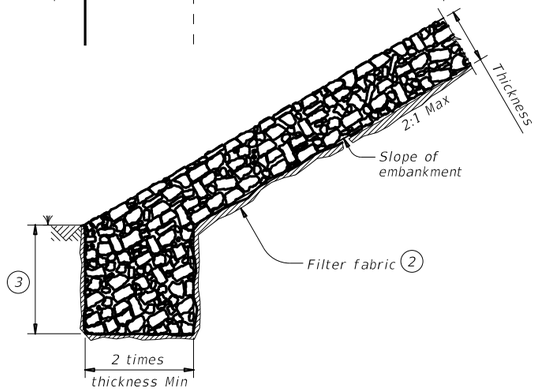


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

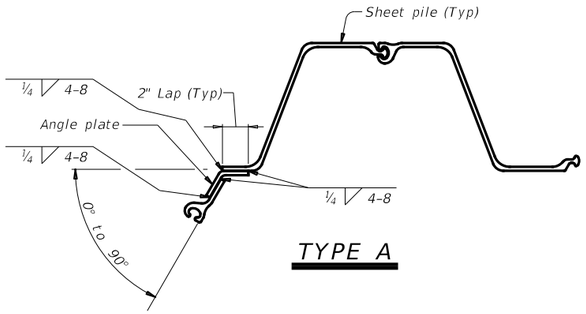
Texas Department of Transportation

Bridge Division Standard

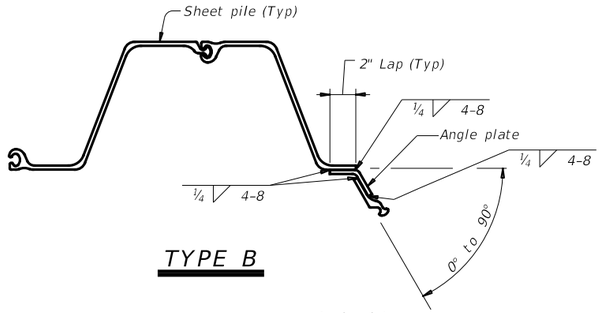
STONE RIPRAP

SRR

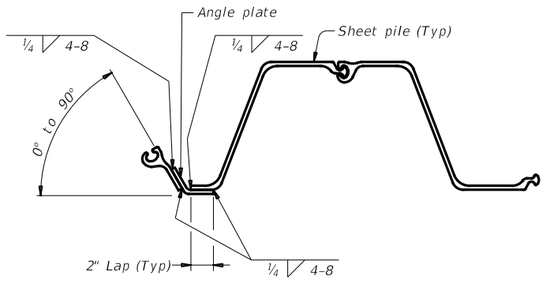
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		129



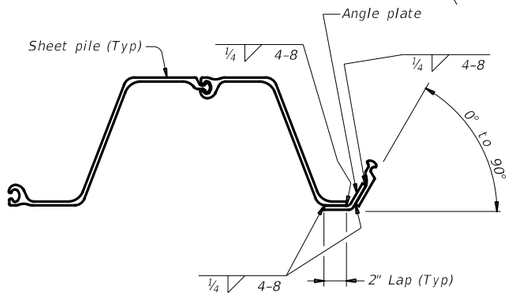
TYPE A



TYPE B

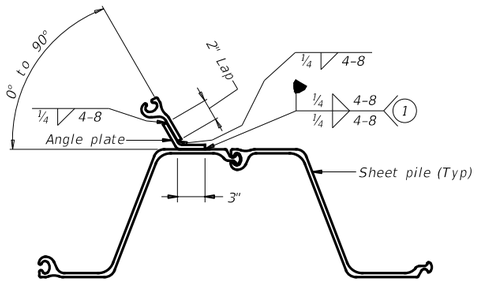


TYPE C



TYPE D

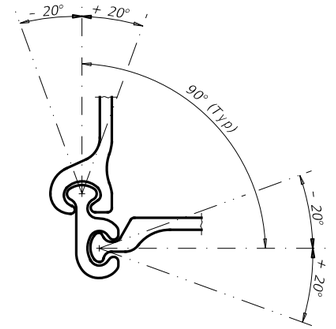
ANGLE PLATE DETAIL



TYPE E

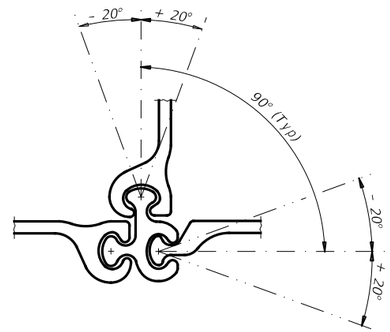
OPTION 1: PLATE WITH WELD

(1) Remove paint at weld locations. Clean welded seam in accordance with Section 446.4.7.3.2.2. Stripe coat seam with intermediate coat and appearance coat in accordance with Item 446, "Field Cleaning and Painting Steel."



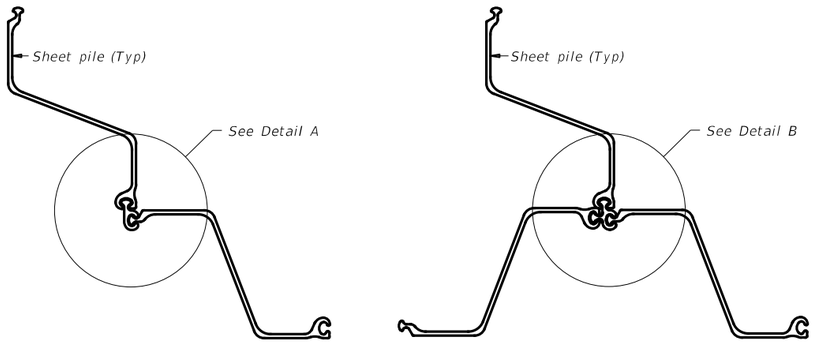
DETAIL A

(Shown PZ 90® by PilePro®)



DETAIL B

(Shown PZ Tee® by PilePro®)



OPTION 2: PREFABRICATED

GENERAL NOTES:

The Contractor may use a prefabricated connector as shown above. The connectors shown are PZ 90® and PZ Tee®, which are produced by PilePro® (www.pilepro.com). An equivalent connector may also be used. Install the connector using the Manufacturer's guidelines. In brief, these are:

1. Thread the connector to the pile while the sheet pile is out of the ground. The connector will extend the full length of the sheet pile.
2. Tack weld the connector in place.
3. Drive the sheet pile with connector using normal procedures.

Provide sheet piling in accordance with Item 407, "Steel Piling".

Paint connector using same requirements for sheet piling, as shown elsewhere in the plans.

Texas Department of Transportation

Bridge Division Standard

STEEL SHEET PILING CORNER DETAILS

SSPC

FILE: sspcstde-19.dgn	DN: TxDOT	CK: JGD	DW: AMS	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		130

DATE: Wednesday, September 06, 2023 11:10:11 AM
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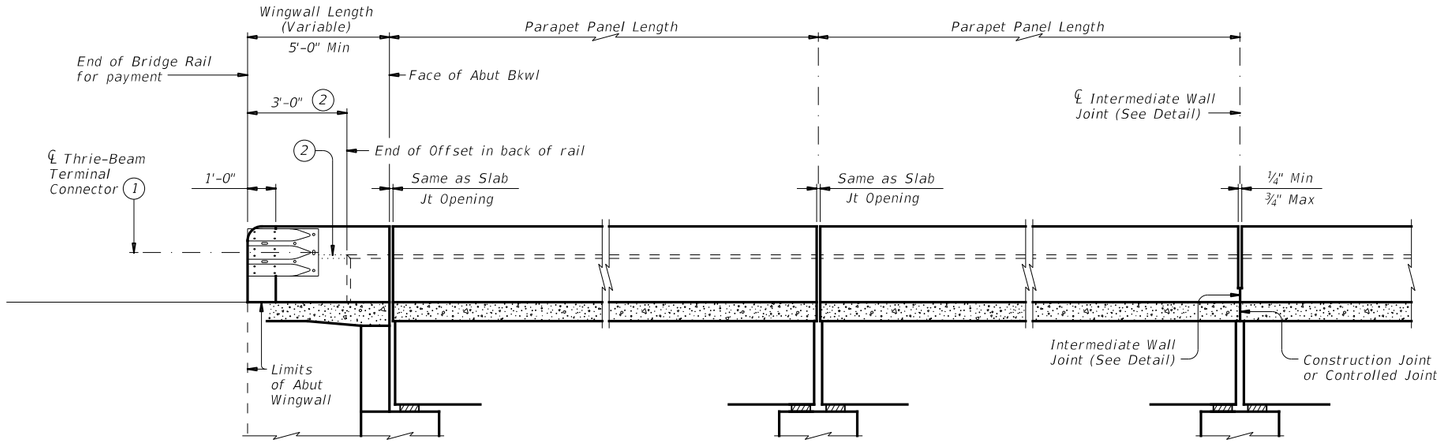
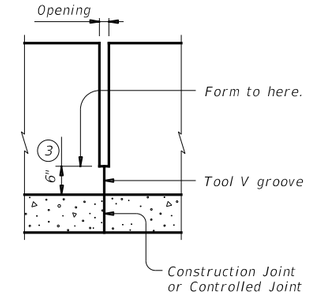
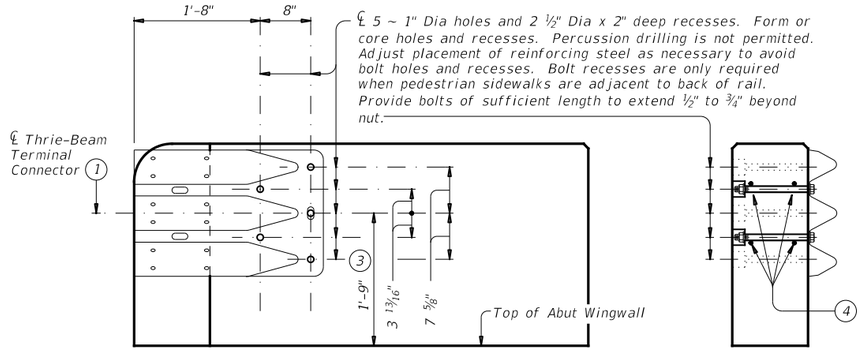


ROADWAY ELEVATION OF RAIL



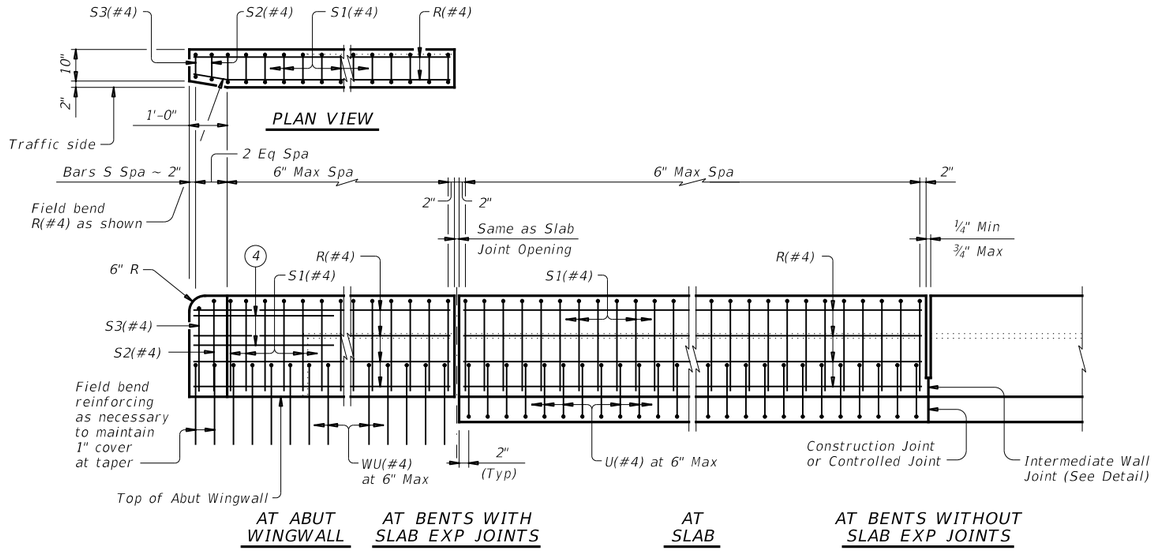
INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

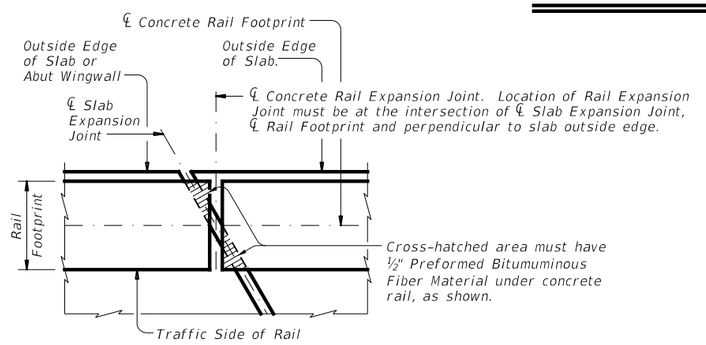


TERMINAL CONNECTION DETAILS

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.

SHEET 1 OF 2

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	18	133, ETC	CR 1420, ETC.
		DIST	COUNTY		SHEET NO.
		DAL	NAVARRO		131

DATE: Wednesday, September 06, 2023 11:10:12 AM
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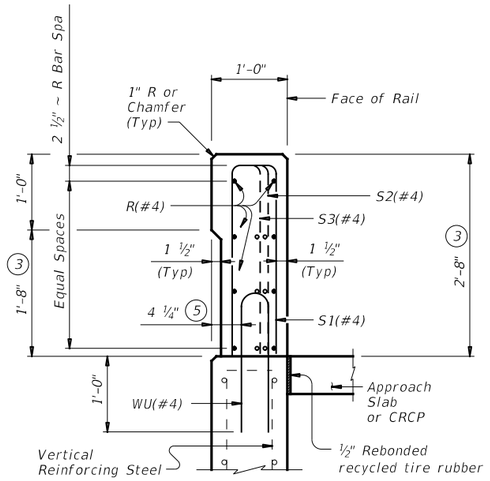
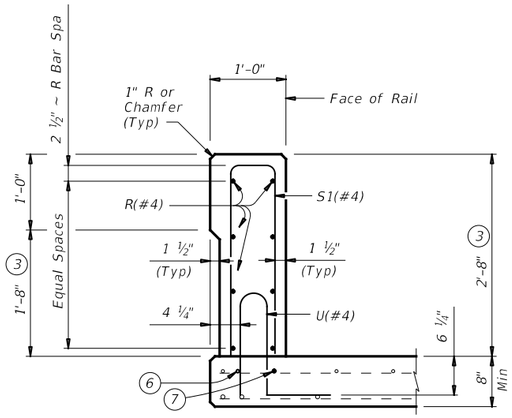


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



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.

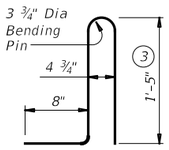
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

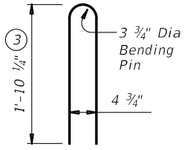
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 370 plf.

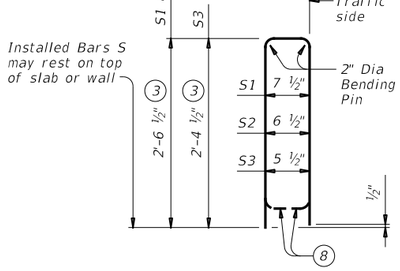
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



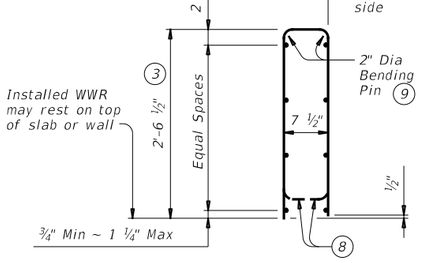
BARS U (#4)



BARS WU (#4)

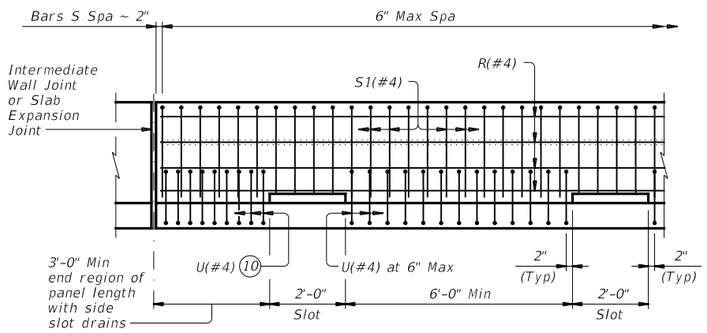


BARS S (#4)



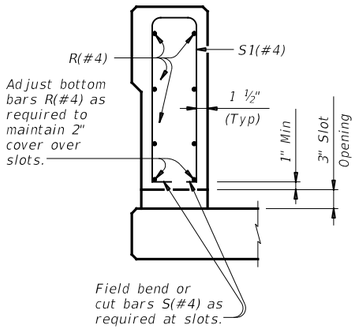
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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

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.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

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	18	133, ETC	CR 1420, ETC.
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	DAL	NAVARRO		132

DATE: Wednesday, September 06, 2023 11:10:13 AM
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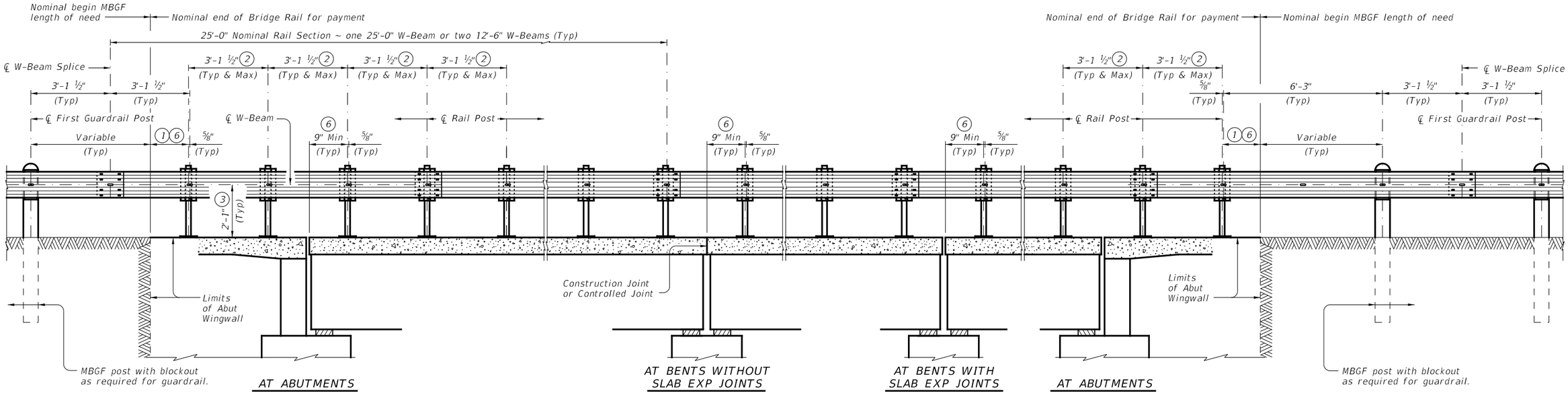
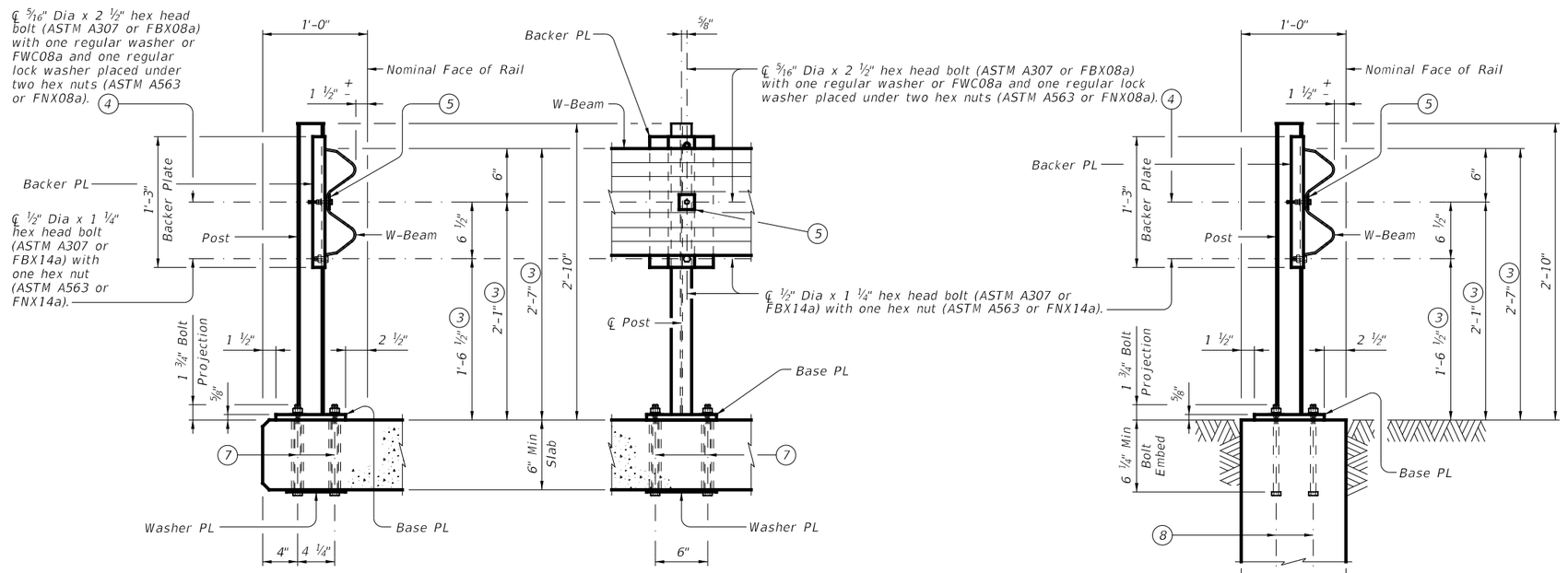


ROADWAY ELEVATION OF RAIL

Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.

RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07/2020: Allowing 9'-4 ½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	0918	18	133, ETC	CR 1420, ETC.
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		133

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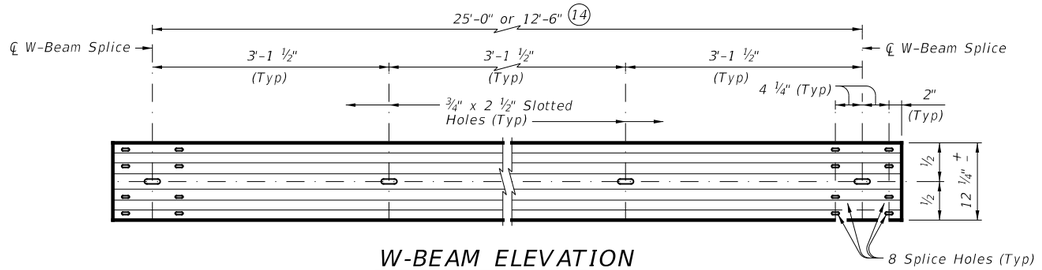
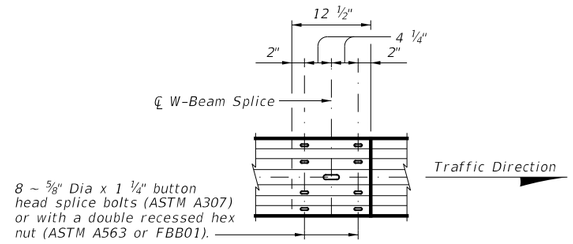
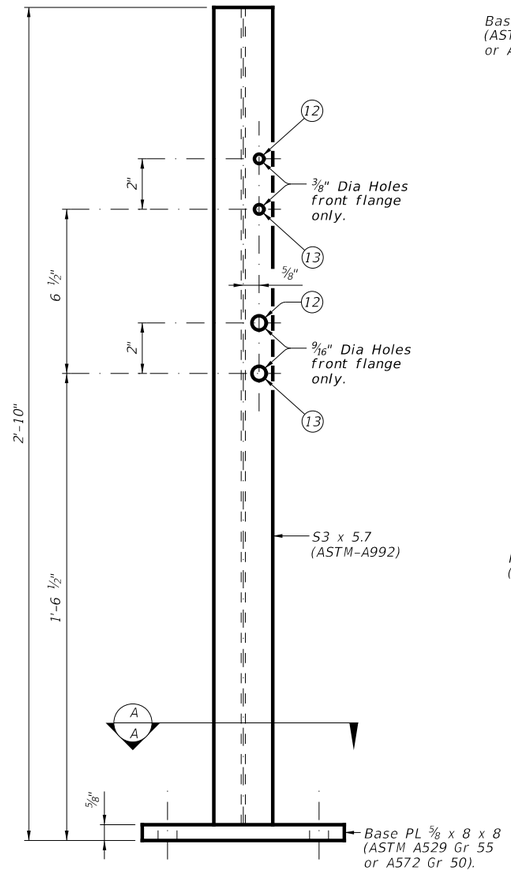


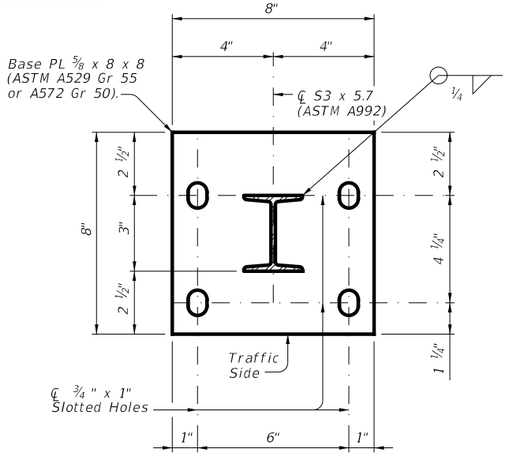
W-BEAM ELEVATION



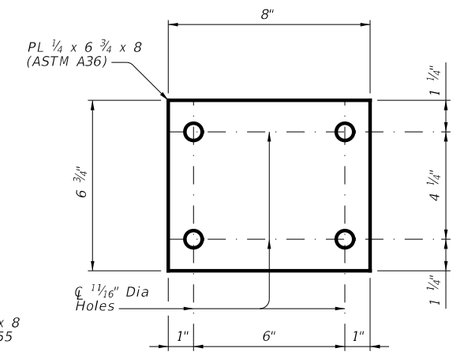
W-BEAM SPLICE ELEVATION



POST ELEVATION

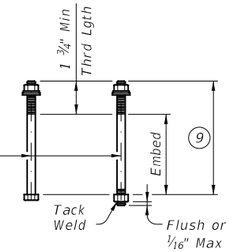


SECTION A-A



WASHER PLATE DETAIL

℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

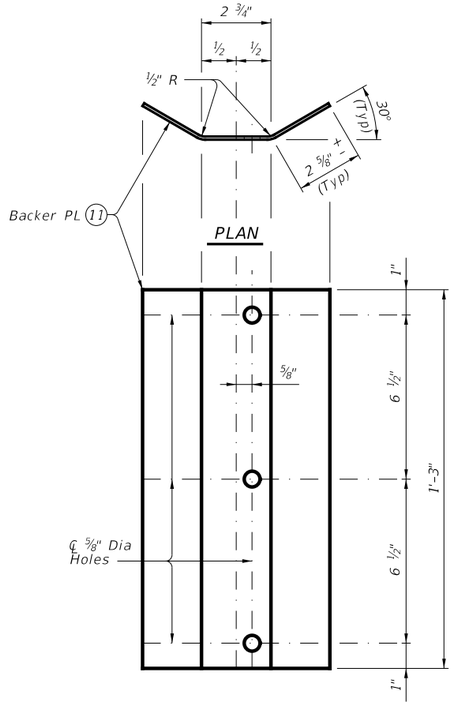
(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment installed tangent to the primary roadway.

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

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.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system 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."

W-beam must 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" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 20 plf total.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

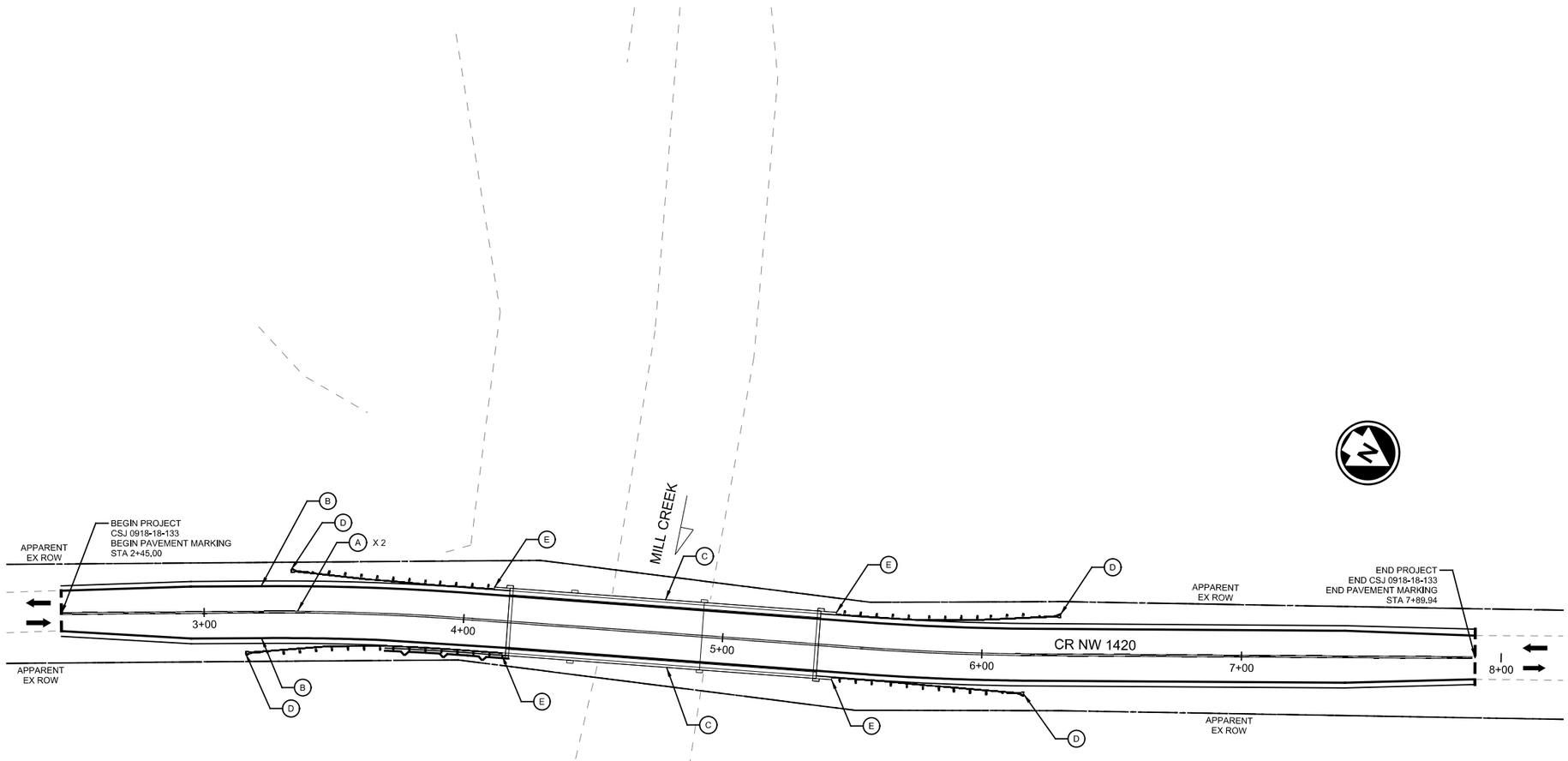
TYPE T631

FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC.
07/2020: Allowing 9'-4 ½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		134

DN: ERR CK: BKT DW: CK:

LEGEND

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (C) DEL ASSM (D-SW)SZ(BR)CTB(BI)
- (D) DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- (E) OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC



0 20 40 60 80

HORIZ. SCALE 1" = 40'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER

11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

SIGNING AND PAVEMENT MARKING LAYOUT

SCALE:1"=40' SHEET 1 OF 4

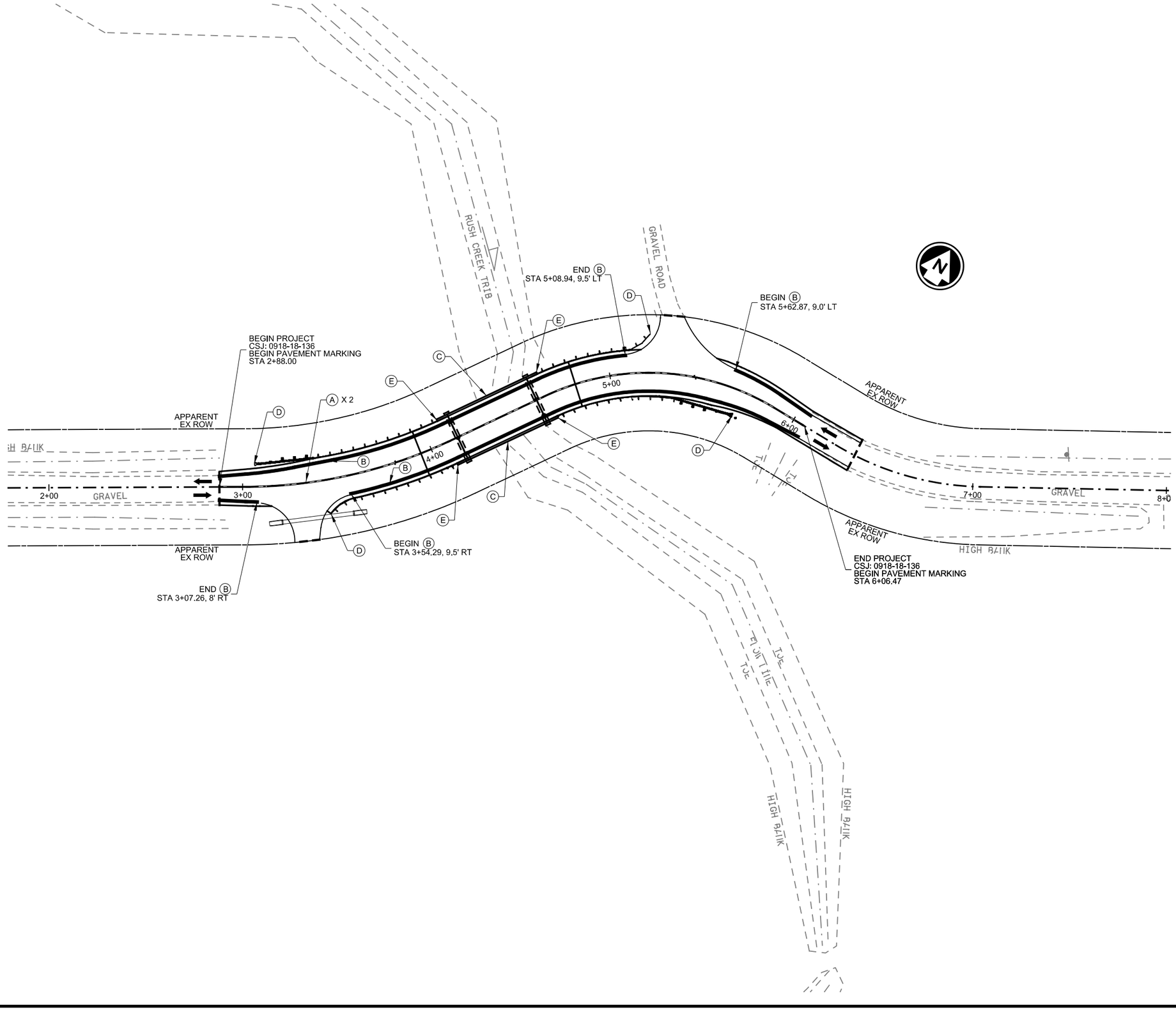
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		135

DATE: December 11, 2023
FILE: 133-S-PM-01.dgn
2:27:40 PM

DN: ERR CK: BKT DW: CK:

LEGEND

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (C) DEL ASSM (D-SW)SZ(BR)CTB(BI)
- (D) DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- (E) OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC



0 25 50 75 100

HORIZ. SCALE 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

SIGNING AND PAVEMENT MARKING LAYOUT

SCALE:1"=50' SHEET 2 OF 4

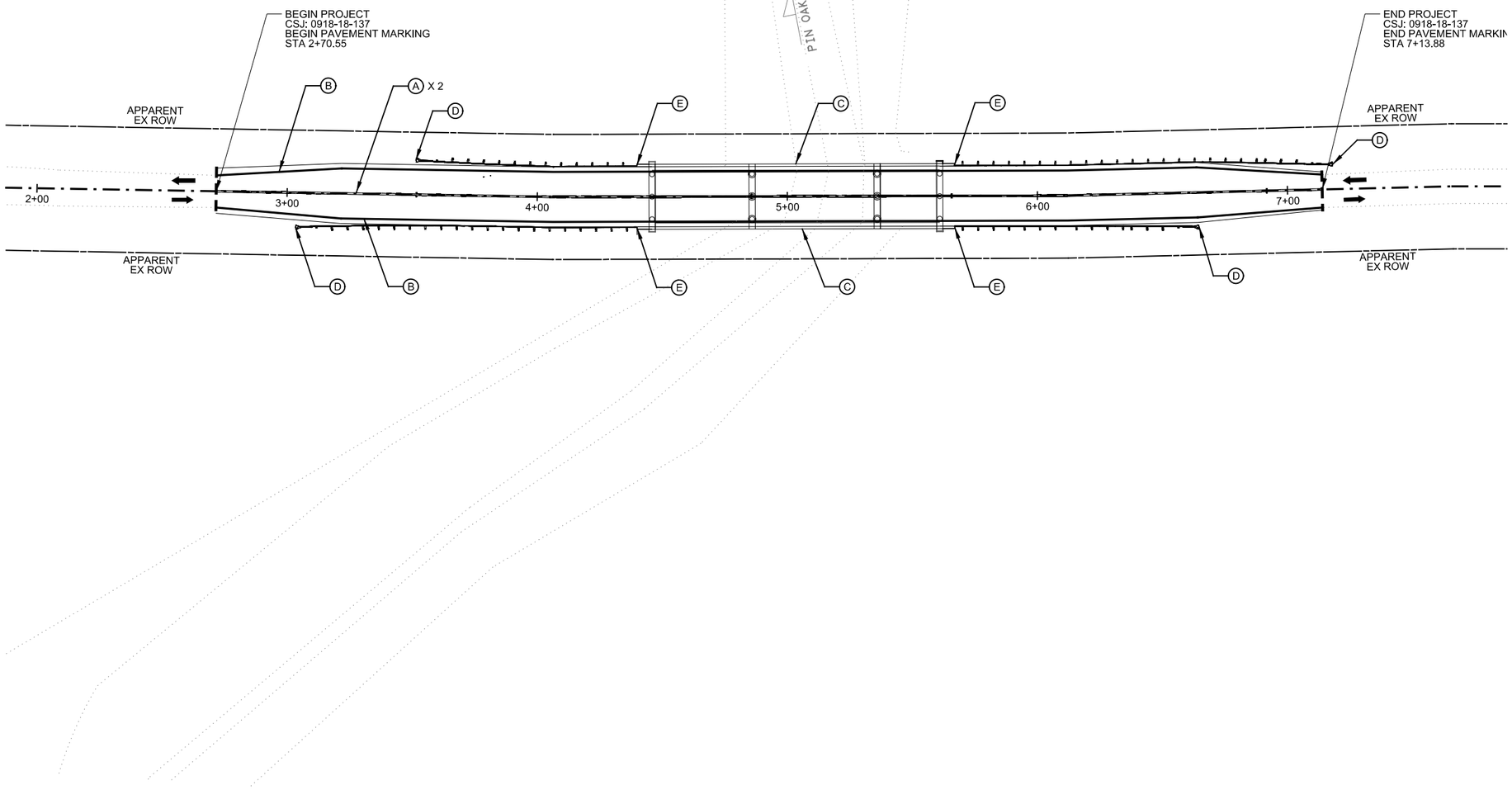
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		136

DATE: December 11, 2023
FILE: 136-S-PM-01.dgn
2:27:49 PM

DN: ERR CK: BKT DW: CK:

LEGEND

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (C) DEL ASSM (D-SW)SZ(BR)CTB(BI)
- (D) DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- (E) OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC



0 25 50 75 100

HORIZ. SCALE: 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER

11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2305

SIGNING AND PAVEMENT MARKING LAYOUT

SCALE:1"=50'

SHEET 3 OF 4

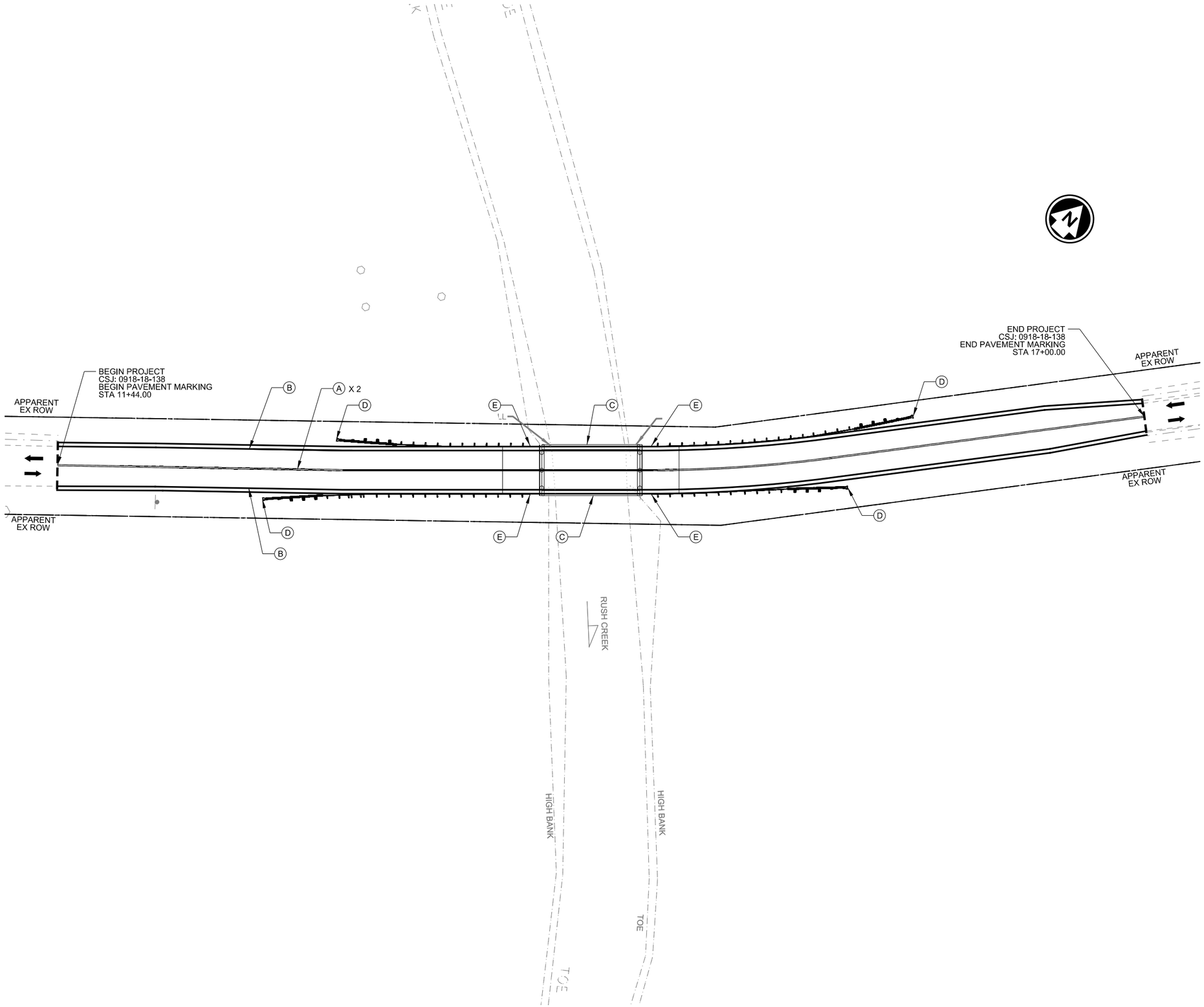
CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		137

DATE: December 11, 2023
FILE: 137-S-PM-01.dgn
2:27:58 PM

DN: ERR CK: BKT DW: CK:

LEGEND

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD)(100MIL)
- (B) RE PM W/RET REQ TY I (W) 6" (SLD)(100MIL)
- (C) DEL ASSM (D-SW)SZ(BR)CTB(BI)
- (D) DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- (E) OM ASSM (OM-2Y)(WC)GND
- DIRECTION OF TRAFFIC



0 25 50 75 100

HORIZ. SCALE: 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 3110

SIGNING AND PAVEMENT MARKING LAYOUT

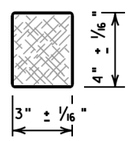
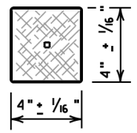
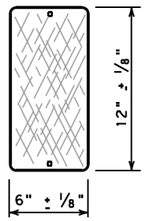
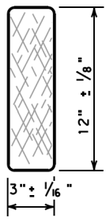
SCALE:1"=50'

SHEET 4 OF 4

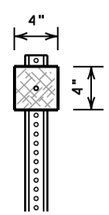
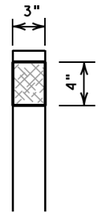
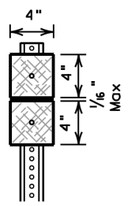
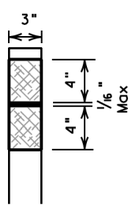
CONT	SECT	JOB	HIGHWAY
0918		133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		138

DATE: December 11, 2023
FILE: 138-S-PM-01.dgn

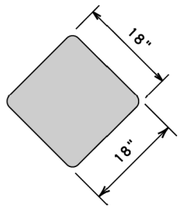
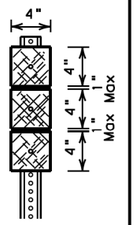
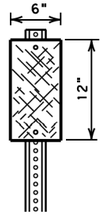
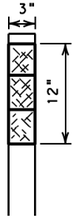
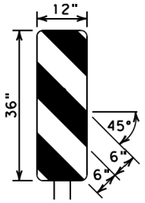
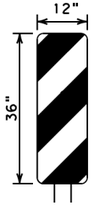
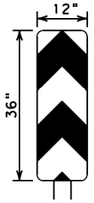
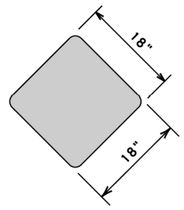
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

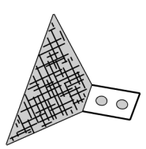
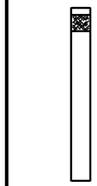
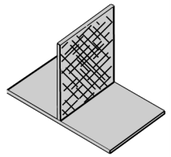
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

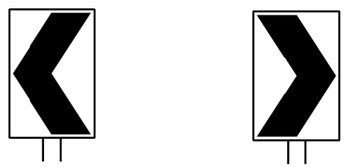
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

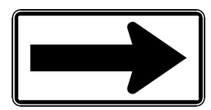
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	NAVARRO		139

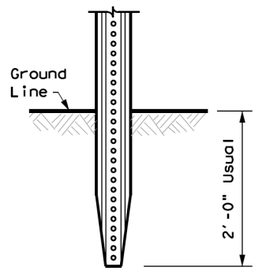
20A

DATE: November 27, 2023
FILE: dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

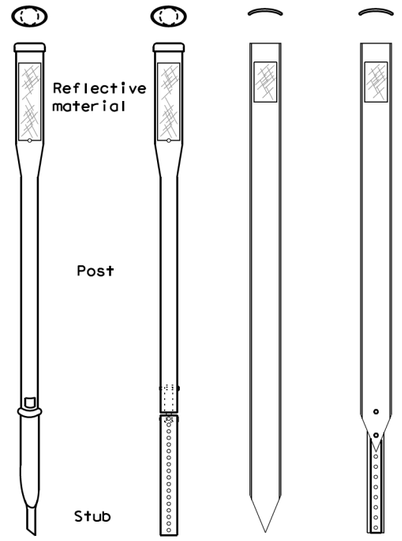


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

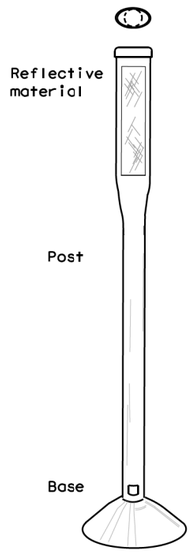
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



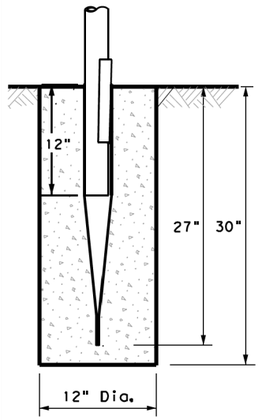
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

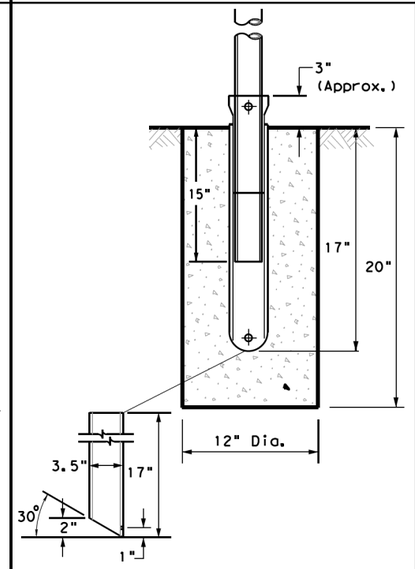
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

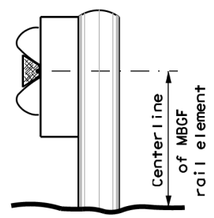
NOTE

1. Install per manufacturer's recommendations.

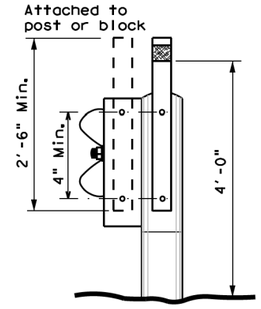
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

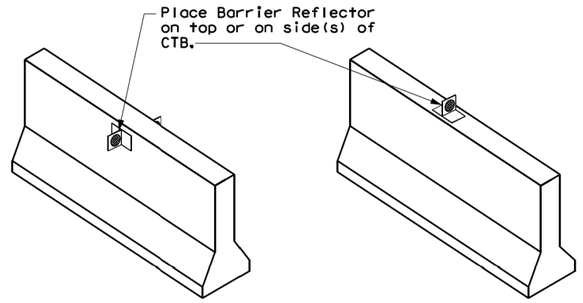
GF1



GF2



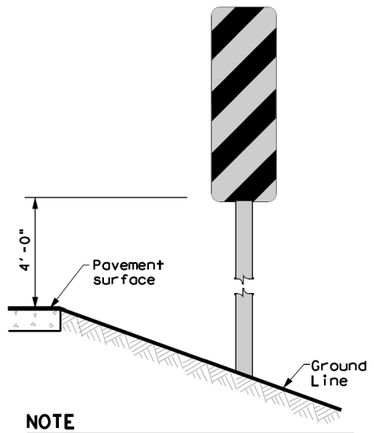
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

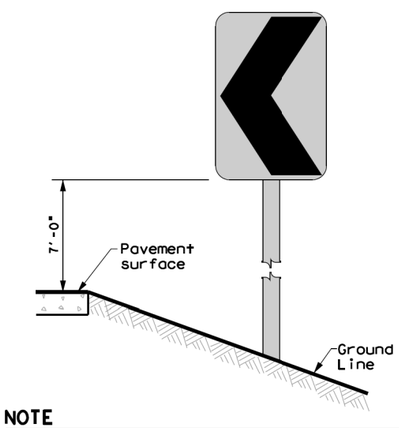
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

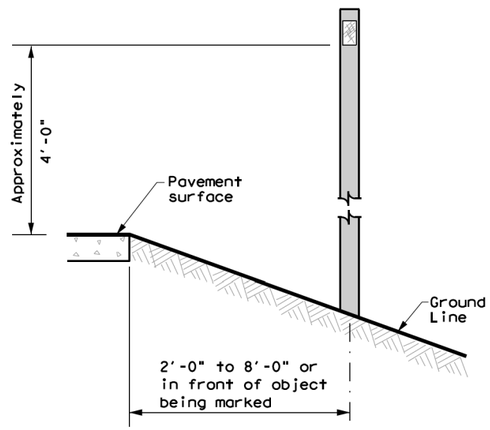
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

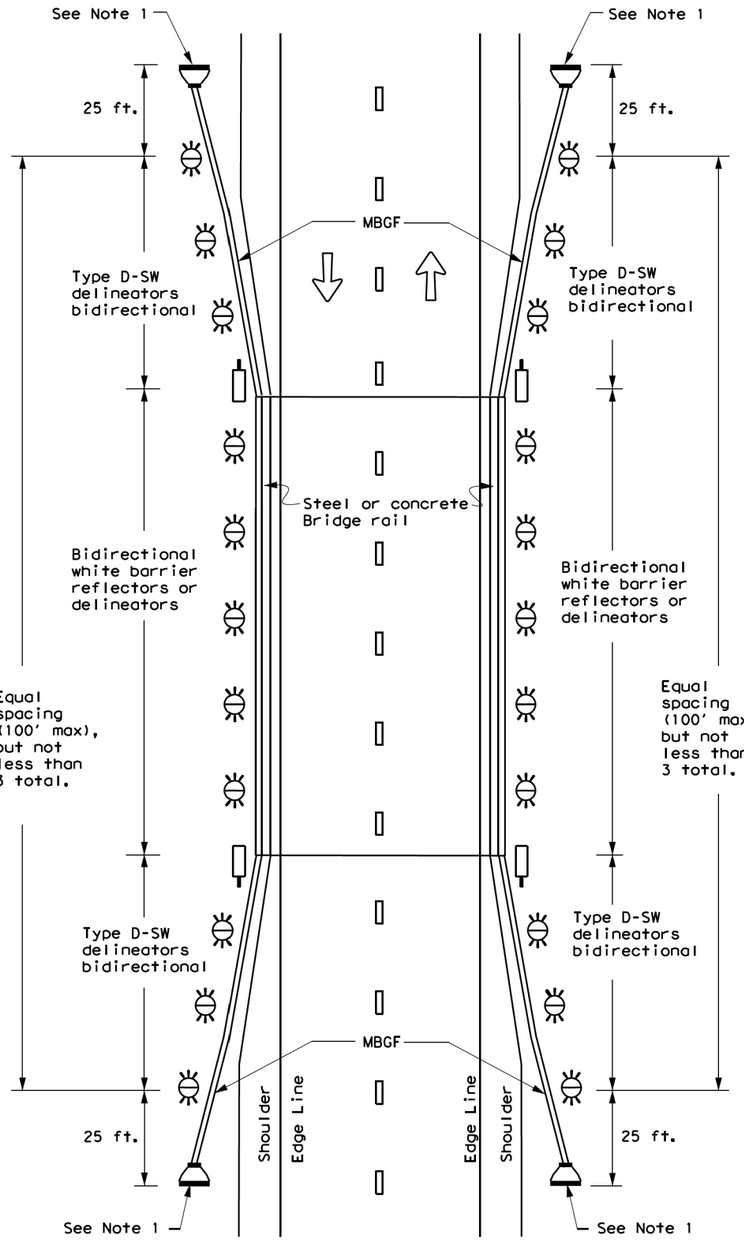
D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	NAVARRO		140

20B

DATE: November 27, 2023
FILE: dom2-20.dgn

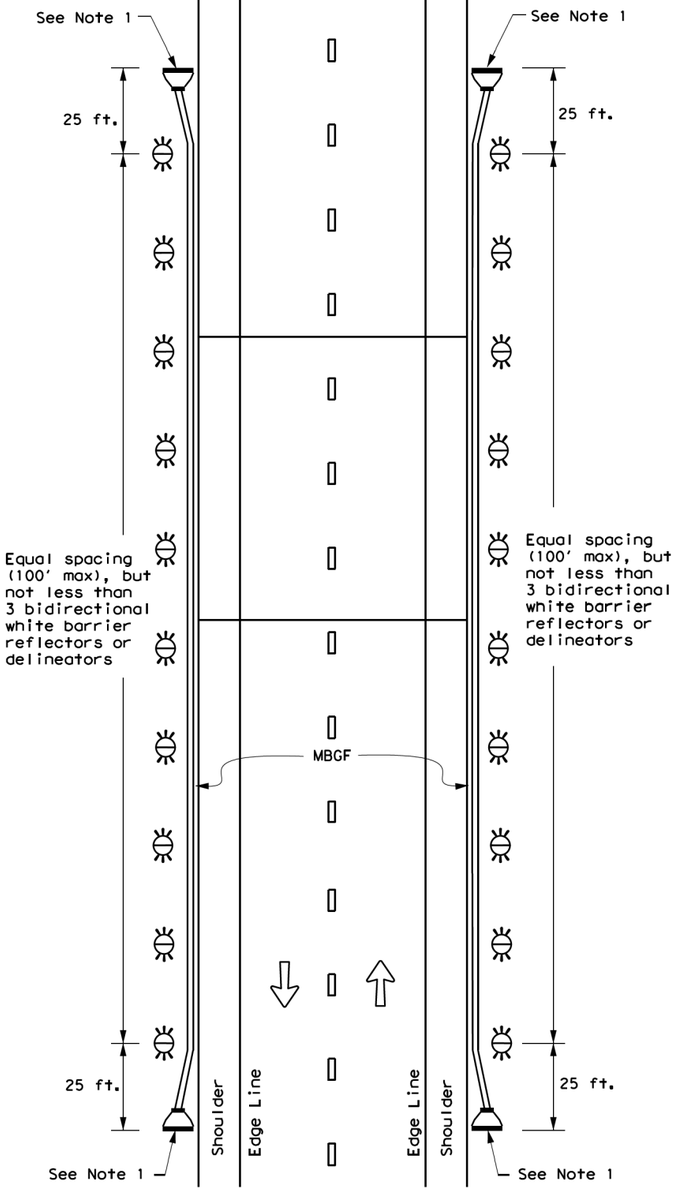
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

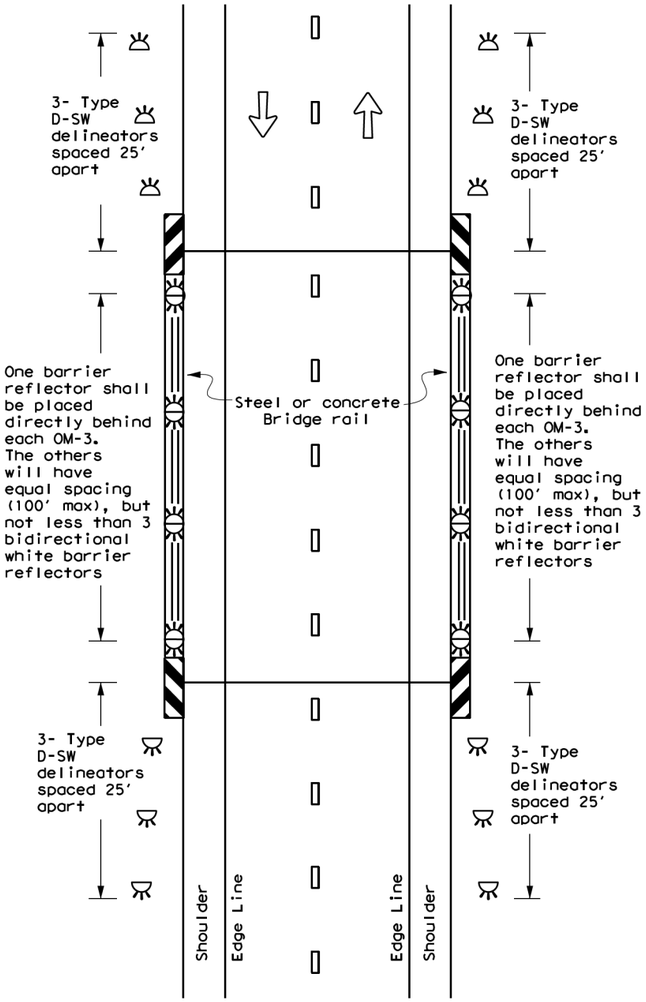
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

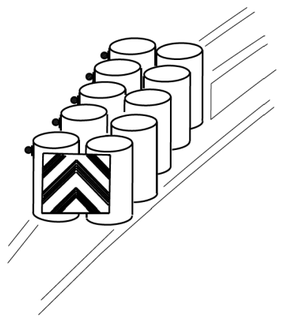
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

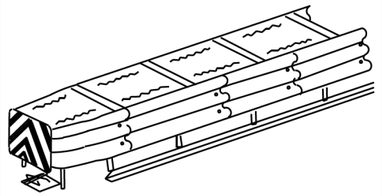
D & OM(5)-20

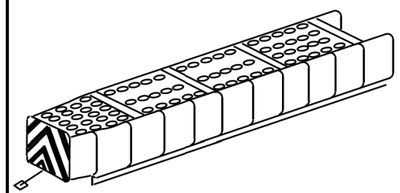
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
7-20	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		141

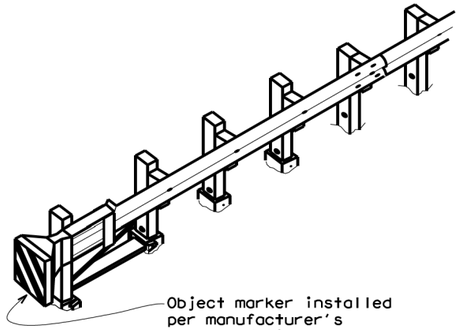
20E

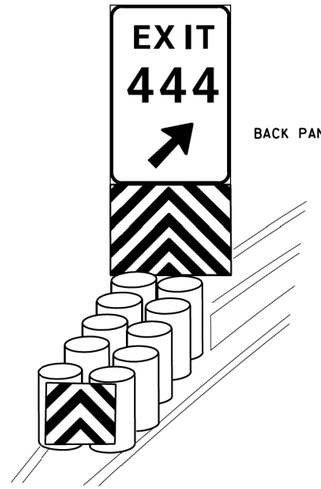
DATE: November 27, 2023
FILE: dom5-20.dgn

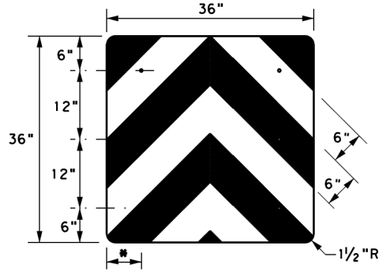


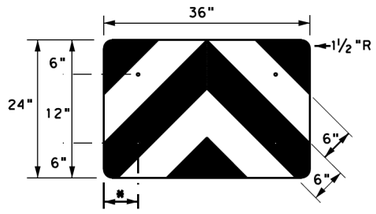




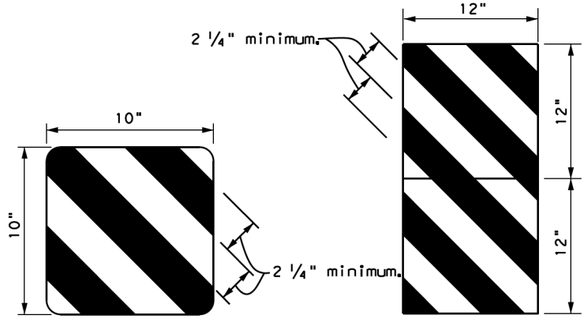




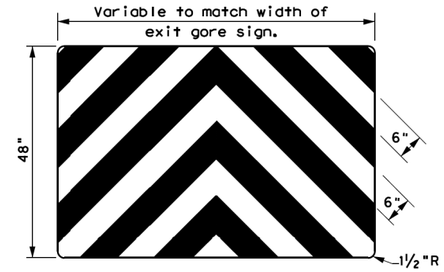


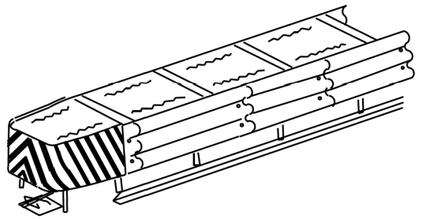


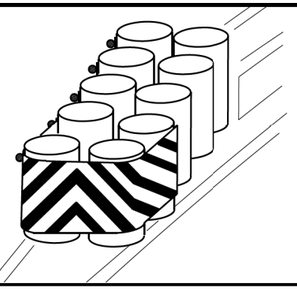
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

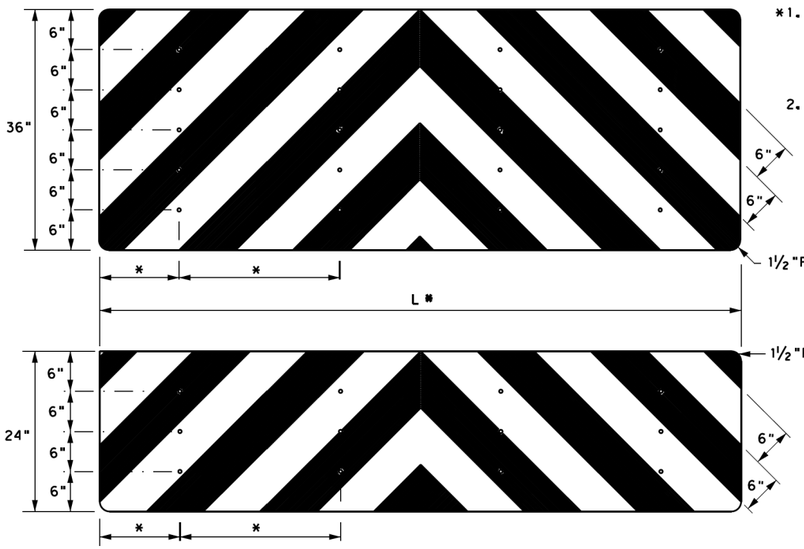


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

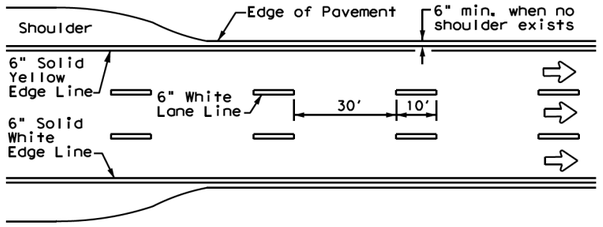
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

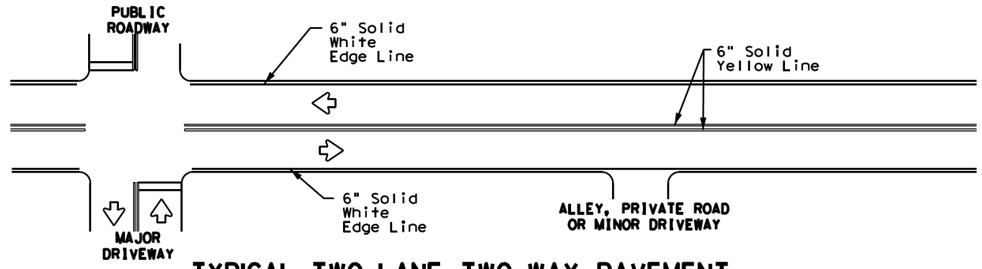
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	DAL	NAVARRO		142
4-98 7-20				

20G

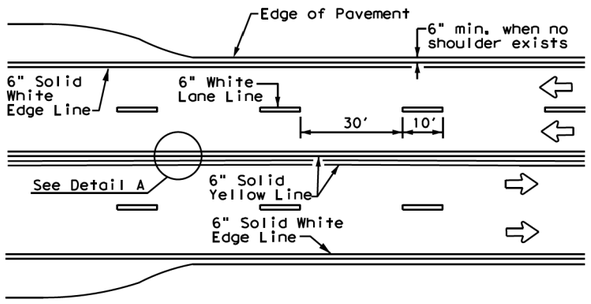
DATE: November 27, 2023
FILE: domvia-20-1.dgn

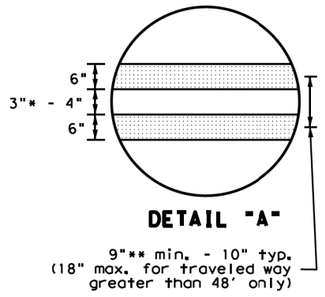


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





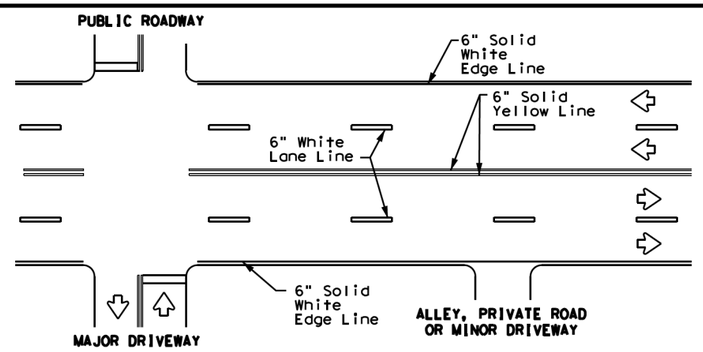
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

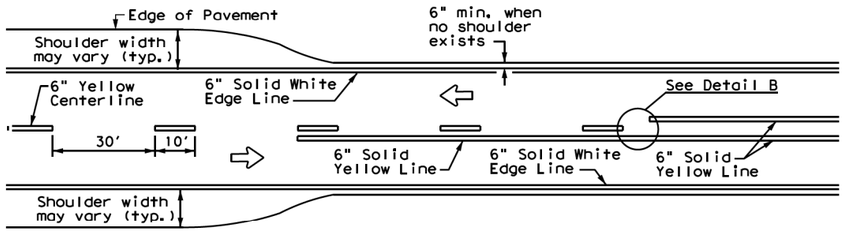
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

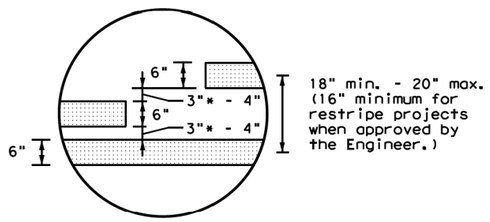
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

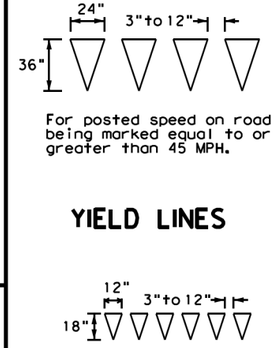


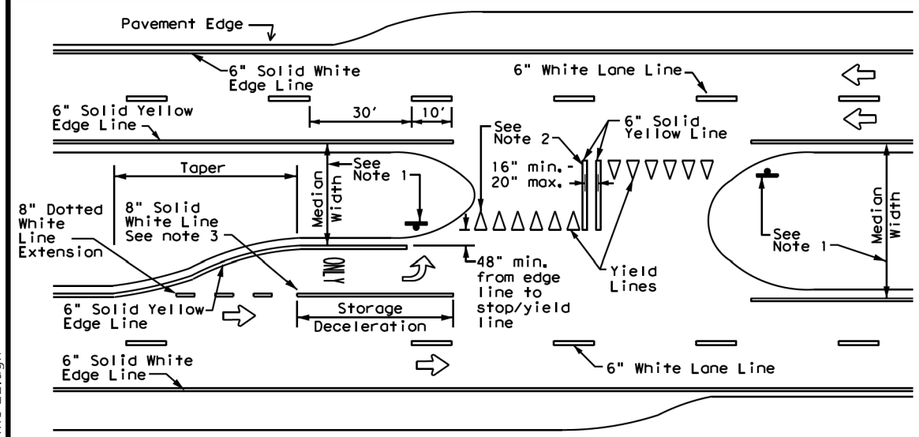
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

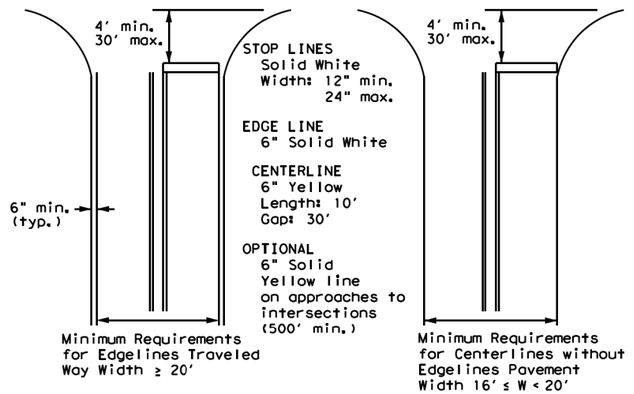
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

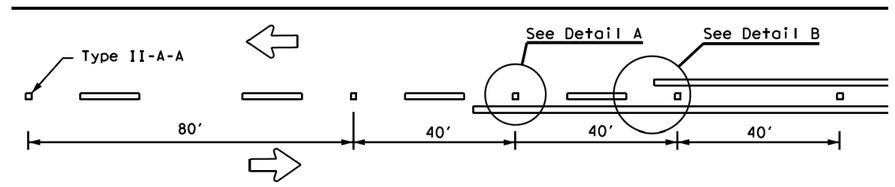
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0918	18	133, ETC	CR 1420, ETC
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	DAL	NAVARRO		143

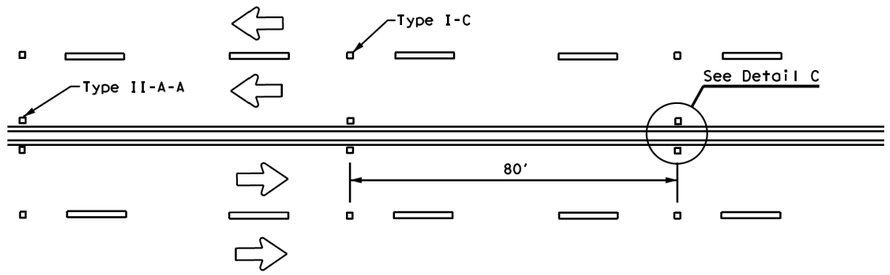
22A

DATE: November 27, 2023
FILE: pm1-22.dgn

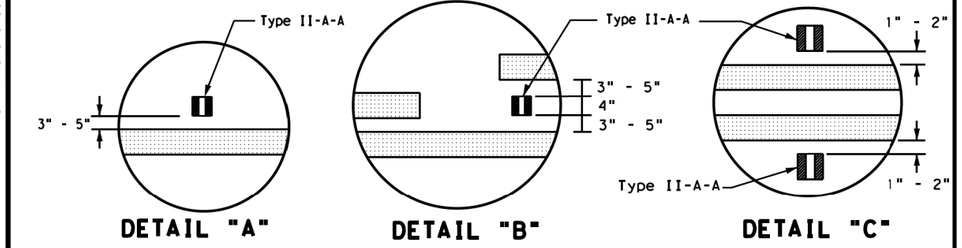
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

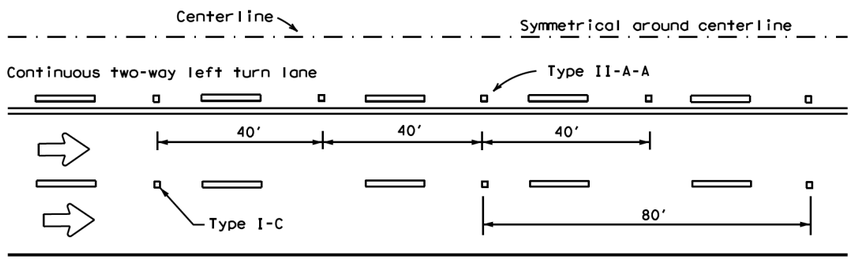


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

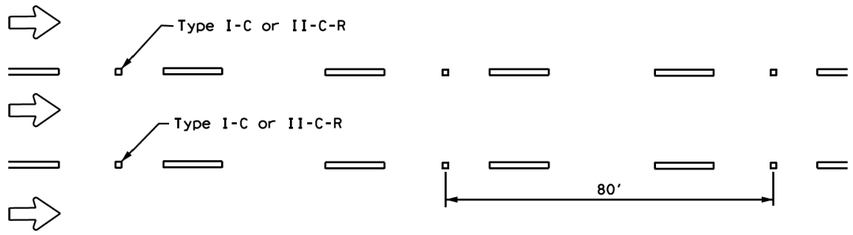


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



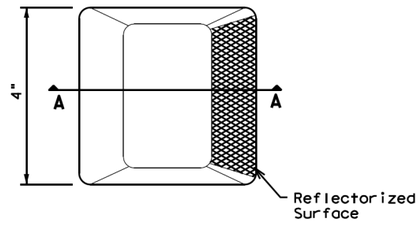
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

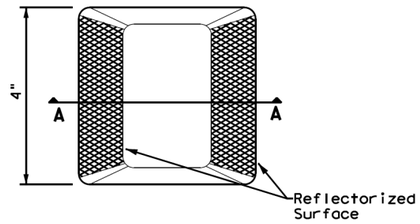
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

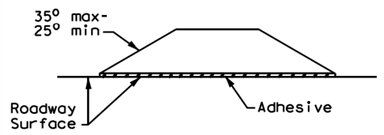
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

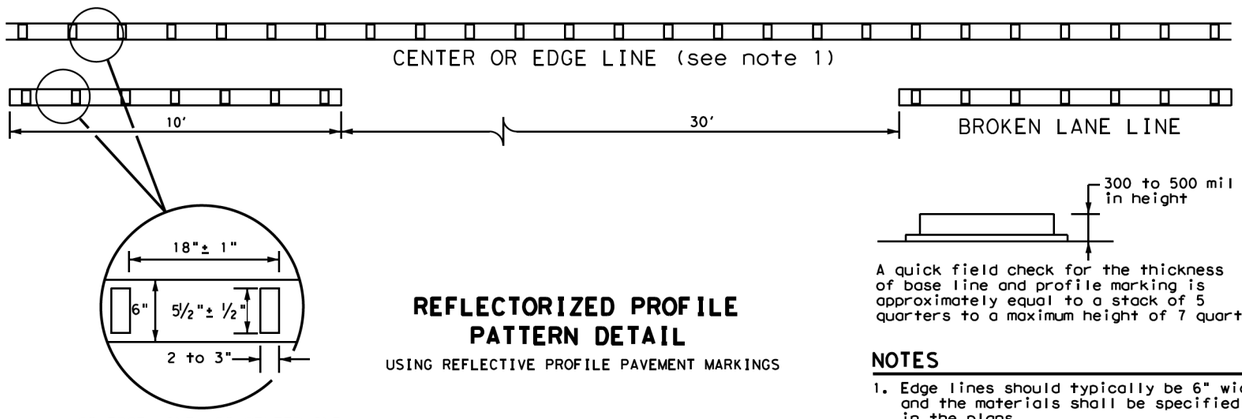


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	DAL	NAVARRO		144
5-00 2-12				

22B

DATE: November 27, 2023
FILE: pm2-22.dgn

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.)

☐ 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 4+18 to 5+38 - Mill Creek - Stream Impacts- NWP 14
2. Bridge - STA 4+15 to 4+60 - Rush Creek Trib- Stream Impacts-NWP 14
3. Bridge - STA 4+47 to 5+62 - Pin Oak Creek - Stream Impacts- NWP 14
4. Wetland - STA 11+00 to 13+00 Lt - Wetland Adjacent to Rush Creek - Wetland Impacts- NWP 14
5. Bridge - STA 13+91 to 14+41 - Rush 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:

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:

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: Texas heelsplitter, southern crawfish frog, Woodhouse's toad, eastern spotted skunk, long-tailed weasel, swamp rabbit, eastern box turtle, prairie skink, timber (canebrake) rattlesnake, and western box turtle. Follow the special note on the EPIC sheet and the BMPs listed below to protect these species.

2. A freshwater mussel survey was completed on September 18, 2023. Contractor and TxDOT to implement the follow required conservation measures for the Texas heelsplitter:

3. A Texas heelsplitter (federally proposed endangered) was detected during freshwater mussel surveys and relocation which occurred on October 13, 2023. If in-stream work activities have not commenced by July 1, 2024, a qualitative mussel survey will occur prior to in-water work to ensure that the action area is free of USFWS-proposed or listed mussels that may have recolonized the area or otherwise have been deposited during high-flow events since the initial salvage mussel survey.

4. TxDOT will hold a pre-construction meeting with its employees and contractors working on this project. TxDOT shall provide specific instructions on the implementation of TxDOT's Voluntary Conservation Measures (VCMs). TxDOT shall also provide pre-construction awareness training to project construction staff, which includes information on protected species and habitat that may occur in the project area and outside the ROW and requirements to avoid effects to these species and their habitats.

See page 2. for continuation

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. CR 2250 over Rush Creek Tributary (NBI 18-175-AA14-70-002) at STA 4+15.00 - ACM (50%) black asphaltic waterproofing materials on three (3) metal columns and seven (7) metal longitudinal support beams.- Abatement Required

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

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
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	NAVARRO	
CONTROL	SECTION	JOB	SHEET NO.
0918	18	133, etc.	145

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

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

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

PAGE 2 CONTINUED

5. If temporary work pad areas or temporary crossings are used, all temporary fill placed within the OHWM must be non-erodible during a two-year flood event (i.e., temporary fill material must not travel downstream if Mill Creek experiences floodwaters typical of a two-year flood event). Permanent discharge of work pad fill material into Mill Creek is prohibited.

6. All drill tailings, slurry, and associated fluids are not allowed to discharge into Mill Creek and must be disposed of in upland areas away from Mill Creek that are not easily inundated by flooding. All spoil materials must be removed from the floodplain by the end of each workday.

7. Contractor and TxDOT must implement all Conservation Measures from the USFWS Biological Opinion.

8. 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 1.2 Vegetation BMP
c. Section 1.4 Water Quality BMP
d. Section 2.4.3 Freshwater Mussel BMP
e. Section 2.4.4 Insect Pollinator BMP
f. Section 2.6.1 Aquatic Amphibian and Reptile BMP (barrier fencing not required)
g. Section 2.6.2 Terrestrial Amphibian and Reptile BMP

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
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MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
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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

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

Dallas District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		CR
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	NAVARRO	
CONTROL	SECTION	JOB	SHEET NO.
0918	18	133 etc.	145A

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 projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-18-133 (CR 1420)

1.2 PROJECT LIMITS:
From: CR NW 1420 AT MILL CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.090650 ,(Long) 96.433057

END: (Lat) 32.091456 ,(Long) 96.433600

1.4 TOTAL PROJECT AREA (Acres): 1.94

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.94

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSTRUCTION OF BRIDGE REPLACEMENT, CONSISTING OF REPLACE BRIDGES AND APPROACHES

1.7 MAJOR SOIL TYPES:

Soil Type	Description
TRINITY CLAY 0% TO 3% SLOPES	100%, MODERATELY WELL DRAINED, HIGH RUNOFF,SLIGHT EROSION POTENTIAL AND VERY SLOW INFILTRATION RATE

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
X 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
X Blade existing topsoil into windrows, prep ROW, clear and grub
X 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)
X 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
☐ 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
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
MILL CREEK	* CHAMBERS CREEK (0814); IMPAIRED FOR BACTERIA
NO TMDLs or I-PLANS WERE INDENTIFIED	

* Add (*) for impaired waterbodies with pollutant in ().

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
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		146
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	133	CR NW 1420

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

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [X] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [X] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [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
- [ ] [ ] Other: _____
- [ ] [ ] 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
RIPRAP (STONE PROTECTION) 12IN	4+17.00	4+32.05
RIPRAP (STONE PROTECTION) 12IN	5+37.00	5+61.58

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [ ] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [ ] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
CHAMBERS CREEK- NO BUFFER, RFD2 AND SILT FENCE	2+45.00	4+53.84
CHAMBERS CREEK- NO BUFFER, RFD2 AND SILT FENCE	4+84.24	7+89.80

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		147
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	133	CR NW 1420

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 projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-18-136 (CR 2250)

1.2 PROJECT LIMITS:
From: CR NW 2250 AT RUSH CREEK TRIB

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 31.515991 ,(Long) 96.313638

END: (Lat) 31.515285 ,(Long) 96.312890

1.4 TOTAL PROJECT AREA (Acres): 1.94

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.94

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSTRUCTION OF BRIDGE REPLACEMENT, CONSISTING OF REPLACE BRIDGES AND APPROACHES

1.7 MAJOR SOIL TYPES:

Soil Type	Description
GOWEN FINE SANDY LOAM, 0% TO 1% SLOPE	71%, MODERATELY WELL DRAINED, HIGH RUNOFF,SLIGHT EROSION POTENTIAL AND VERY SLOW INFILTRATION RATE

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
X 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
X Blade existing topsoil into windrows, prep ROW, clear and grub
X 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)
X 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:

☐ Sediment laden stormwater from stormwater conveyance over disturbed area
☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☐ Transported soils from offsite vehicle tracking
☐ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☐ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
RUSH CREEK TRIB	* RICHLAND CREEK ABOVE (0837); IMPAIRED FOR BACTERIA
NO TMDLs or I-PLANS WERE INDENTIFIED	

* Add (*) for impaired waterbodies with pollutant in ().

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
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		148
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	136	CR NW 2240

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

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [X] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [X] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [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
- [ ] [ ] Other: _____
- [ ] [ ] 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
RIPRAP (STONE PROTECTION) 12IN	4+15.00	4+26.05
RIPRAP (STONE PROTECTION) 12IN	4+60.00	4+82.92

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [ ] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [ ] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
RICHLAND CREEK- NO BUFFER, RFD2 AND SILT FENCE	2+60.89	4+32.64
RICHLAND CREEK- NO BUFFER, RFD2 AND SILT FENCE	4+65.51	5+23.39
RICHLAND CREEK- NO BUFFER, RFD2 AND SILT FENCE	4+58.81	6+06.48
RICHLAND CREEK- NO BUFFER, RFD2 AND SILT FENCE	5+23.69	6+06.48

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		149
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	136	CR NW 2240

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 projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-18-137 (CR 2305)

1.2 PROJECT LIMITS:
From: CR SW 2305 AT PIN OAK CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.053247 ,(Long) 96.394678

END: (Lat) 32.053683 ,(Long) 96.393823

1.4 TOTAL PROJECT AREA (Acres): 1.94

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.94

1.6 NATURE OF CONSTRUCTION ACTIVITY:

1.7 MAJOR SOIL TYPES:

Soil Type	Description
GOWEN CLAY LOAM, 0% TO 2% SLOPES	96%, MODERATELY WELL DRAINED, NEGLIGIBLE RUNOFF, AND SLIGHT EROSION POTENTIAL

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- X 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
- X Blade existing topsoil into windrows, prep ROW, clear and grub
- X 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)
- X 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
- ☐ 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
- ☐
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
PIN OAK CREEK	PIN OAK CREEK (0836A); NOT IMPAIRED

* Add (*) for impaired waterbodies with pollutant in ().

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
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		150
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	137	CR SW 2305

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

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [X] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [X] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [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
- [ ] [ ] Other: _____
- [ ] [ ] 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
RIPRAP (STONE PROTECTION) 12IN	4+47.00	4+74.00
RIPRAP (STONE PROTECTION) 12IN	5+62.00	5+82.00

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [ ] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [ ] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
PIN OAK CREEK- NO BUFFER, RFD2 AND SILT FENCE	2+71.43	4+96.44
PIN OAK CREEK- NO BUFFER, RFD2 AND SILT FENCE	2+53.38	4+96.44
PIN OAK CREEK- NO BUFFER, RFD2 AND SILT FENCE	5+25.99	7+16.44
PIN OAK CREEK- NO BUFFER, RFD2 AND SILT FENCE	5+25.99	7+65.96

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

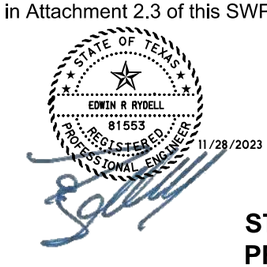
Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.



STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		151
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	137	CR SW 2305

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 projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-18-138 (CR 3110)

1.2 PROJECT LIMITS:
From: CR NW 3110 AT RUSH CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 31.593132 ,(Long) 96.593724

END: (Lat) 31.593724 ,(Long) 96.331932

1.4 TOTAL PROJECT AREA (Acres): 1.94

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.94

1.6 NATURE OF CONSTRUCTION ACTIVITY:

1.7 MAJOR SOIL TYPES:

Soil Type	Description
TRINITY CLAY 0% TO 1% SLOPES	100%, MODERATELY WELL DRAINED, HIGH RUNOFF,SLIGHT EROSION POTENTIAL AND VERY SLOW INFILTRATION RATE

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- X 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
- X Blade existing topsoil into windrows, prep ROW, clear and grub
- X 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)
- X 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
- ☐ 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
- ☐
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
RUSH CREEK	*RICHLAND CREEK ABOVE (0837); IMPAIRED FOR BACTERIA
NO TMLs or I-PLANS WERE NOT IDENTIFIED	

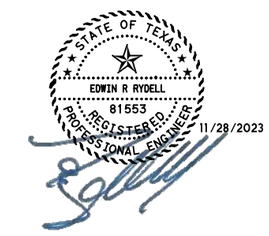
* Add (*) for impaired waterbodies with pollutant in ().

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: _____



STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		152
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	138	CR SW 3110

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

- [X] [X] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [X] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [X] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [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
- [ ] [ ] Other: _____
- [ ] [ ] 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
RIPRAP (STONE PROTECTION) 12IN	13+91.00	14+41.00

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [ ] Daily street sweeping
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [X] Chemical Management
- [ ] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
RICHLAND CREEK- NO BUFFER, RFD2 AND SILT FENCE	11+44.93	13+88.64
CHAMBERS CREEK- NO BUFFER, RFD2 AND SILT FENCE	14+47.15	17+00.06

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

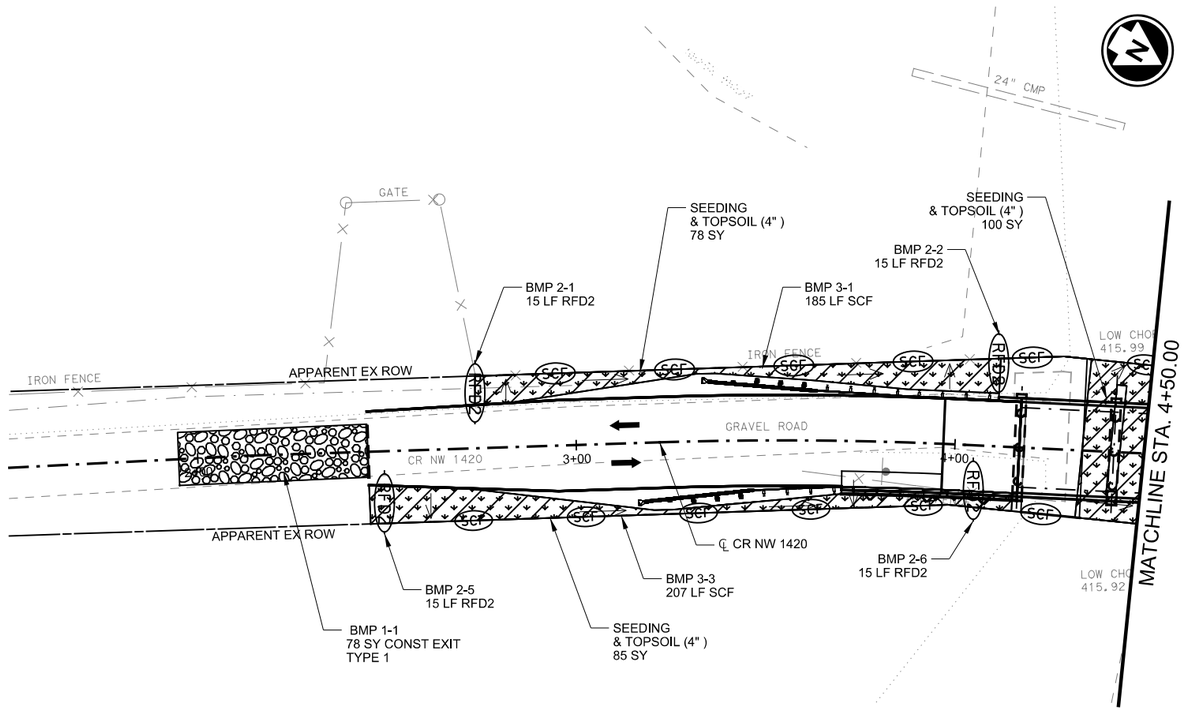
STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

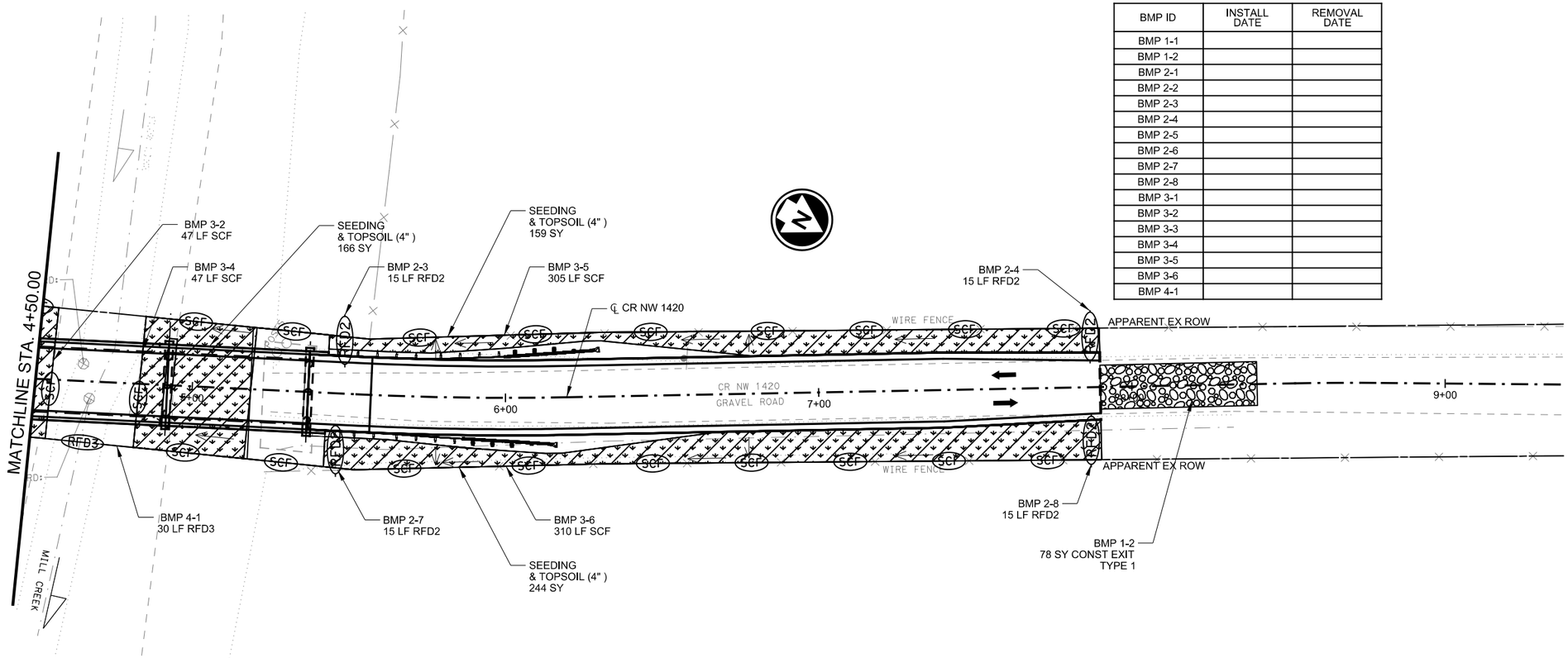
July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		153
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	NAVARRO	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	18	138	CR SW 3110

DISTURBED DATE:
STABILIZED DATE:





BMP ID	INSTALL DATE	REMOVAL DATE
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BMP 1-2		
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 3-1		
BMP 3-2		
BMP 3-3		
BMP 3-4		
BMP 3-5		
BMP 3-6		
BMP 4-1		

LEGEND

- TRAFFIC DIRECTION
- TRAFFIC DIRECTION
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM, TYPE 2
- RFD3 — ROCK FILTER DAM, TYPE 3
- PERMANENT SEEDING
- TEMPORARY SEEDING
- CONSTRUCTION EXIT, TYPE 1
- WATER FLOW DIRECTION

NOTES:

1. BMPS SHALL BE INSTALLED NO SOONER THAN TWO WEEKS PRIOR TO SOIL DISTURBANCE OR POTENTIAL POLLUTANT GENERATING ACTIVITIES IN THEIR CONTROL AREA.
2. LOCATIONS OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
3. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY IN THEIR CONTROL AREA, AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
4. EROSION CONTROL DEVICE INSTALLATION, MAINTENANCE AND REMOVAL SHALL BE IN ACCORDANCE WITH TXDOT STANDARDS FOR EROSION CONTROL.
5. OVERALL SW3P INSTALLATION SHALL FOLLOW TCP PHASING AND CONSTRUCTION SEQUENCE.
6. CONSTRUCTION EXITS CAN BE PLACED AND RELOCATED BY THE CONTRACTOR ACCORDING TO CONSTRUCTION PHASING WITH APPROVAL OF THE ENGINEER.

0 20 40 60 80
HORIZ. SCALE 1" = 40'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 1420

STORM WATER POLLUTION PREVENTION PLAN

SCALE:1"=40' SHEET 1 OF 1

CONT.	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		154

DES: ERR CK: BKT DW: CK:

DATE: November 27, 2023
FILE: 133-S-ECP-01.dgn
11:44:42 AM

DN: ERR CK: BKT DW: CK:

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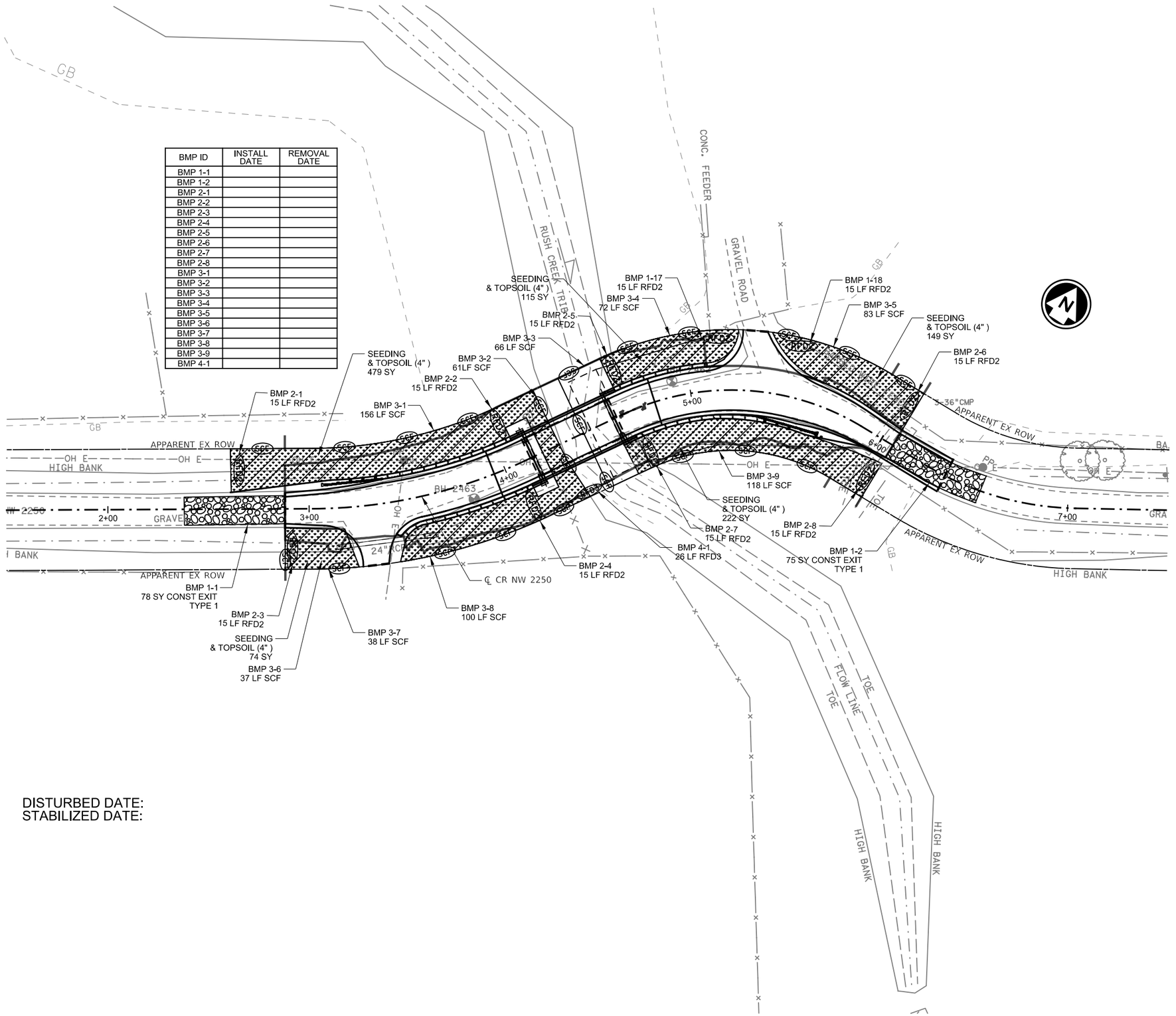
BMP 1-2		
BMP 2-1		
BMP 2-2		
BMP 2-3		
BMP 2-4		
BMP 2-5		
BMP 2-6		
BMP 2-7		
BMP 2-8		
BMP 3-1		
BMP 3-2		
BMP 3-3		
BMP 3-4		
BMP 3-5		
BMP 3-6		
BMP 3-7		
BMP 3-8		
BMP 3-9		
BMP 4-1		



DISTURBED DATE:
STABILIZED DATE:

LEGEND

- TRAFFIC DIRECTION
- TRAFFIC DIRECTION
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM, TYPE 2
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0 25 50 75 100

HORIZ. SCALE: 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2250

STORM WATER POLLUTION PREVENTION PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		155

DATE: November 27, 2023
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DISTURBED DATE:
STABILIZED DATE:

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BMP 2-1		
BMP 2-2		
BMP 2-3		
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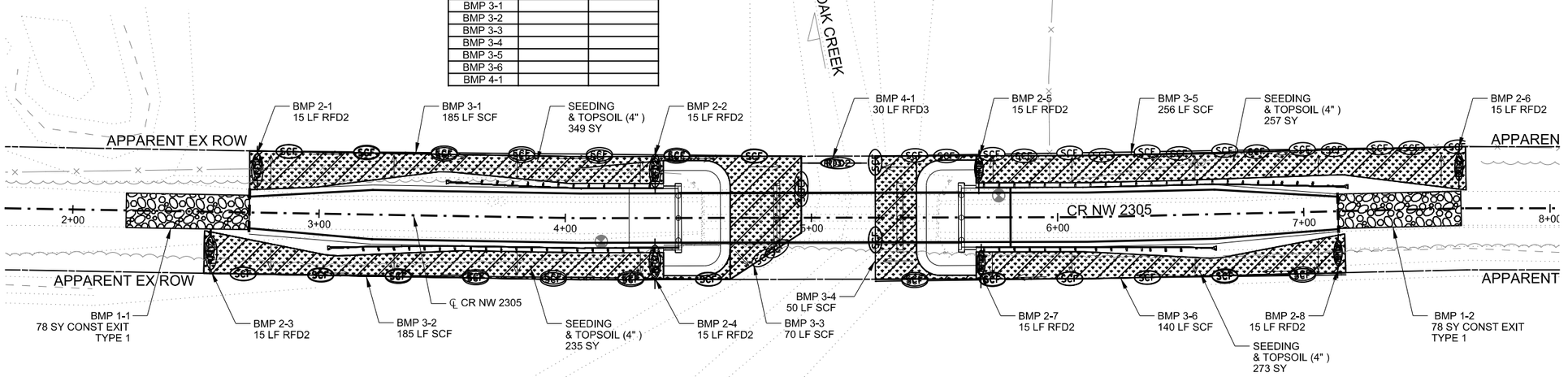
BMP 3-6		
BMP 4-1		



LEGEND

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0 25 50 75 100
HORIZ. SCALE: 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
11/28/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

CR NW 2305

STORM WATER POLLUTION PREVENTION PLAN

SCALE:1"=50' SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0918	18	133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		156

DATE: November 27, 2023
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STABILIZED DATE:

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BMP 1-2		
BMP 2-1		
BMP 2-2		
BMP 2-3		
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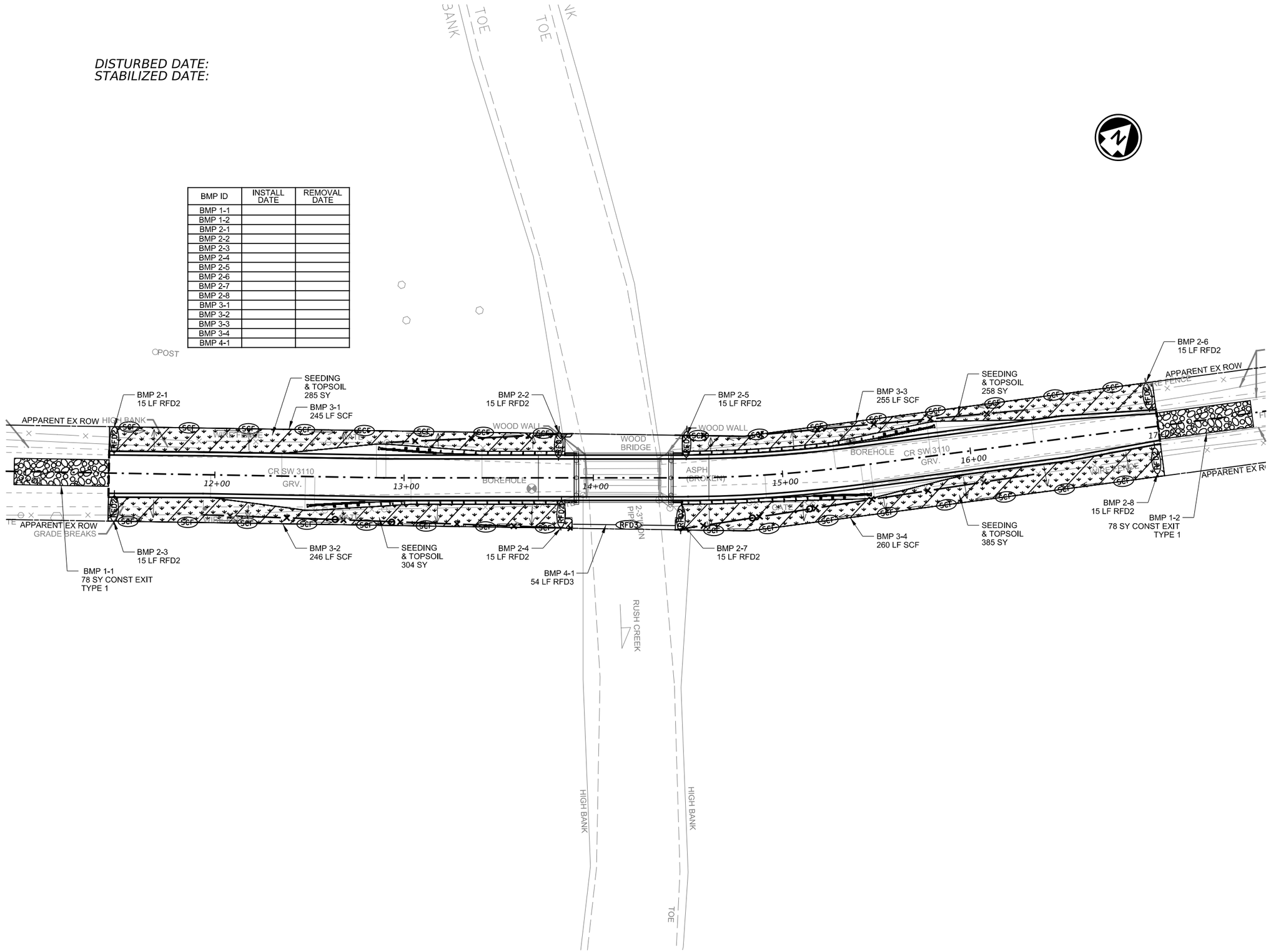

LEGEND

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0 25 50 75 100

HORIZ. SCALE: 1" = 50'

STATE OF TEXAS
EDWIN R RYDELL
81553
REGISTERED
PROFESSIONAL ENGINEER
12/15/2023

NO.	DATE	REVISION	APPR BY

HDR Engineering, Inc
Firm Registration No. F-754
4828 Loop Central Drive, Suite 800
Houston, Texas 77081-2220
713.622.9264

Texas Department of Transportation

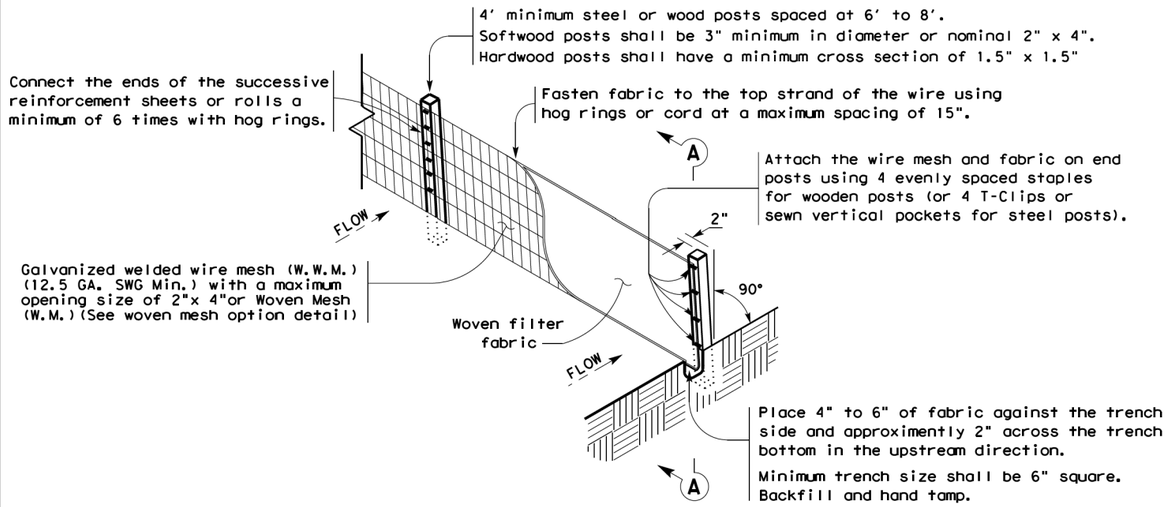
CR NW 3110

STORM WATER POLLUTION PREVENTION PLAN

SCALE:1"=50' SHEET 1 OF 1

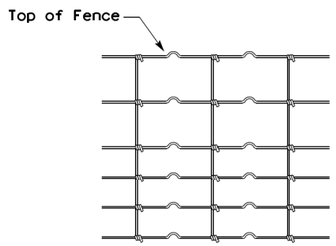
CONT	SECT	JOB	HIGHWAY
0918		133, ETC	CR 1420, ETC
DIST	COUNTY		SHEET NO.
DAL	NAVARRO		157

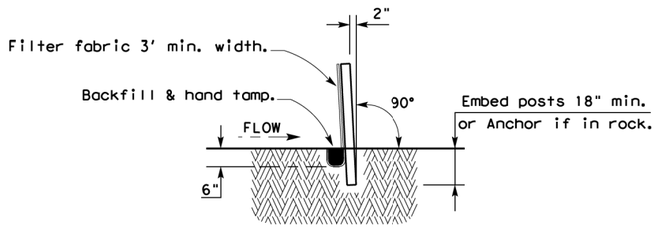
DATE: December 15, 2023
FILE: 136-S-ECP-01.dgn



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.

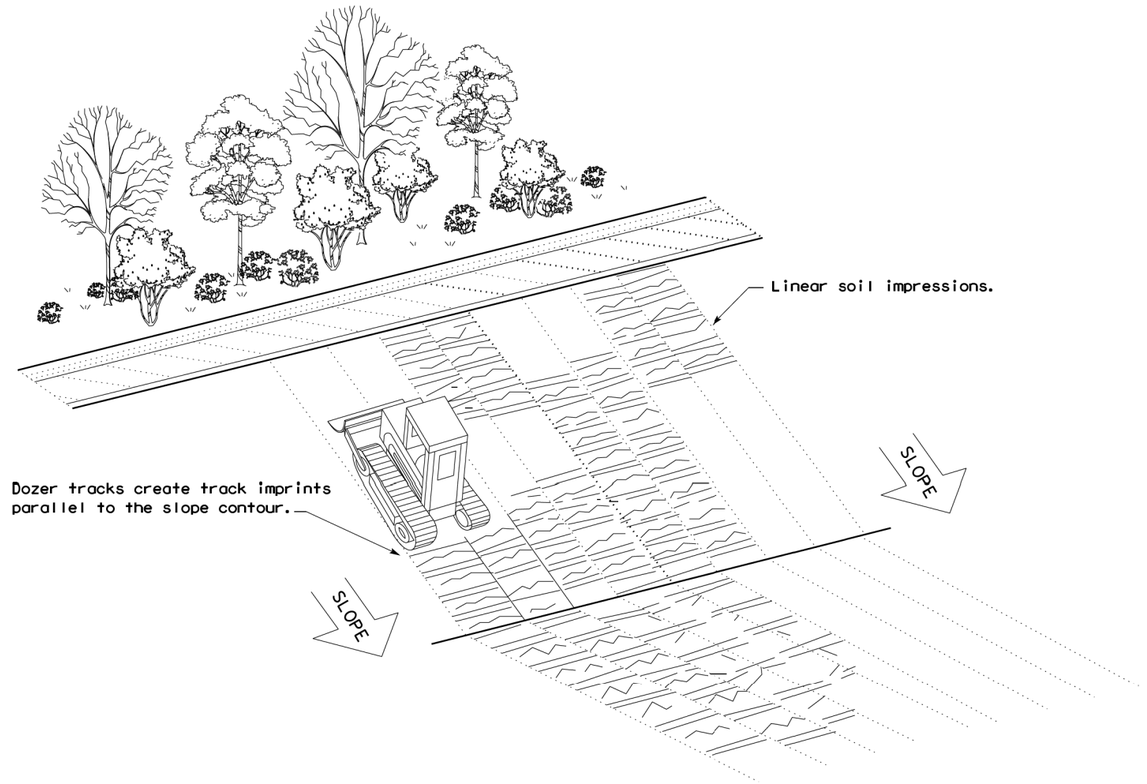
LEGEND

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

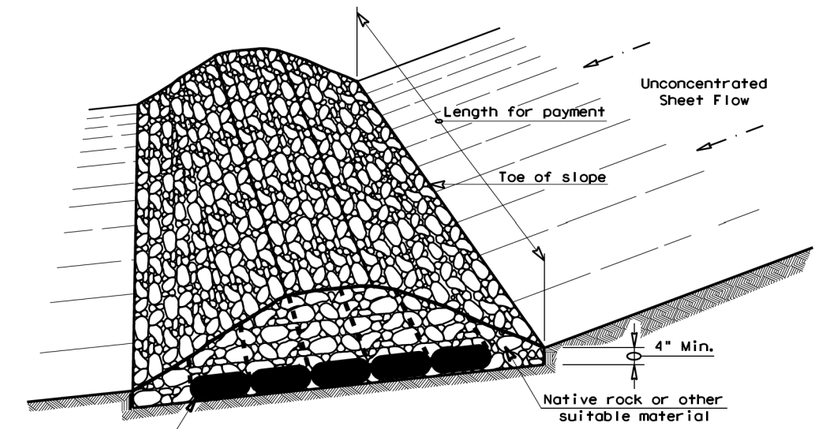
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

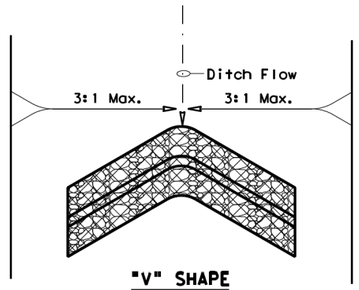
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0918	18	133, ETC	CR 1420, ETC		
	DIST	COUNTY		SHEET NO.		
	DAL	NAVARRO		158		

DATE November 27, 2023
FILE ec116.dgn

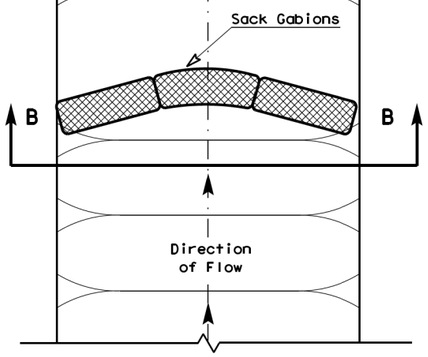


FILTER DAM AT TOE OF SLOPE

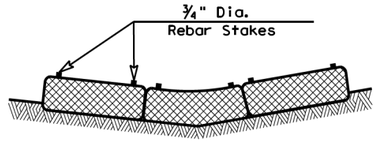
RFD1



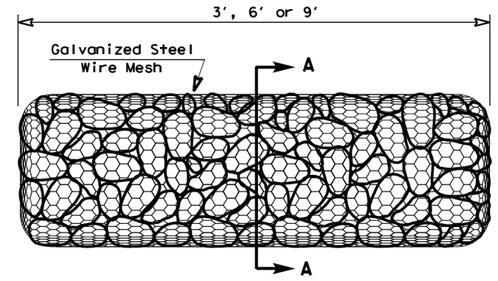
"V" SHAPE PLAN VIEW



PLAN VIEW

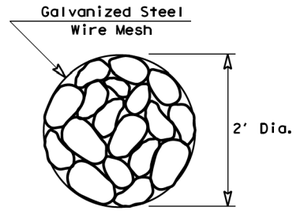


SECTION B-B

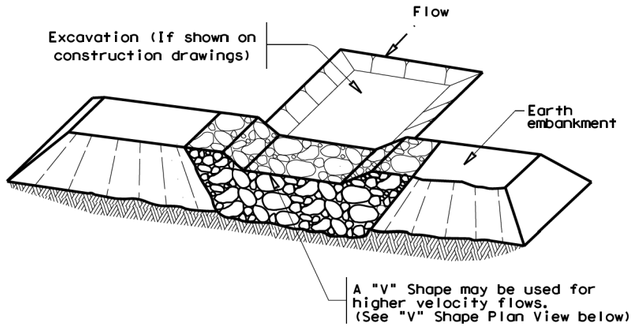


TYPE 4 (SACK GABIONS)

RFD4

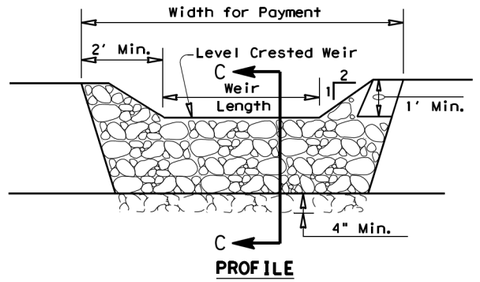


SECTION A-A

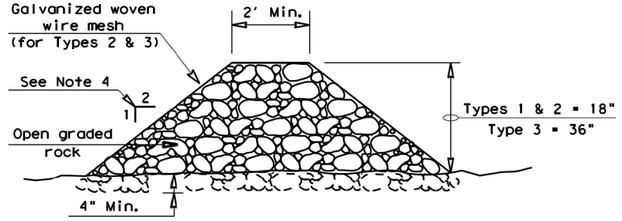


FILTER DAM AT SEDIMENT TRAP

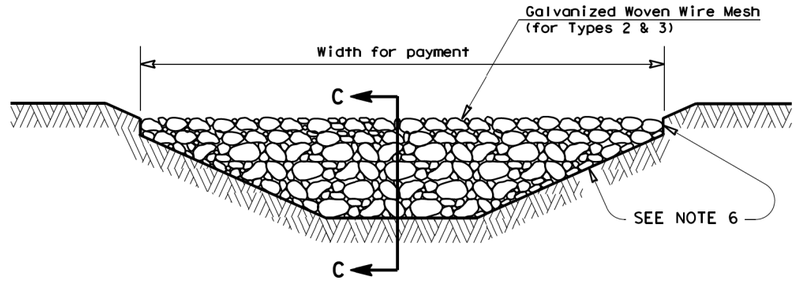
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

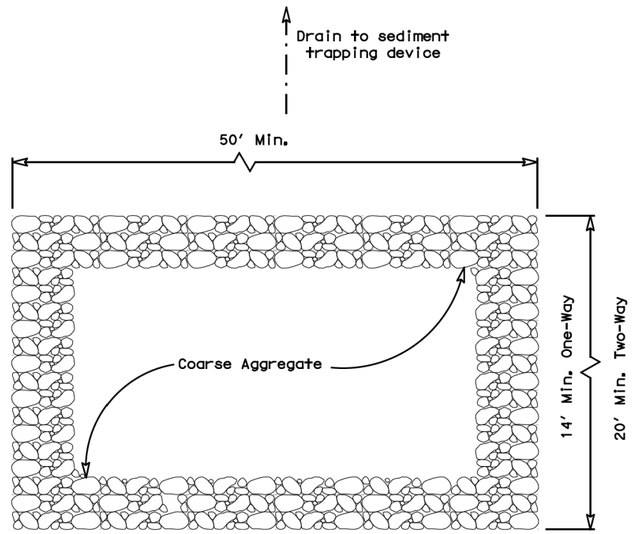
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

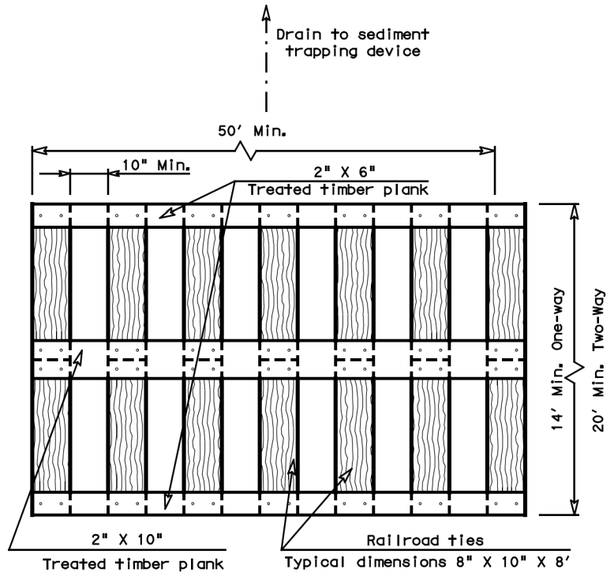
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		159

DATE: November 27, 2023
FILE: ec216.dgn



PLAN VIEW



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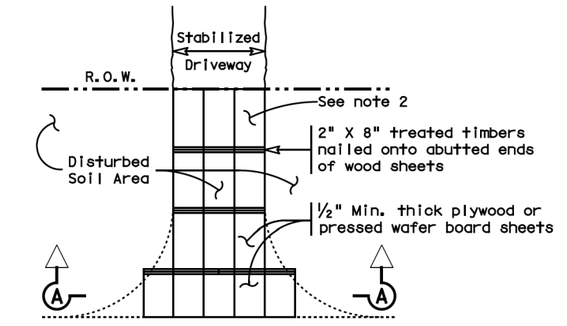
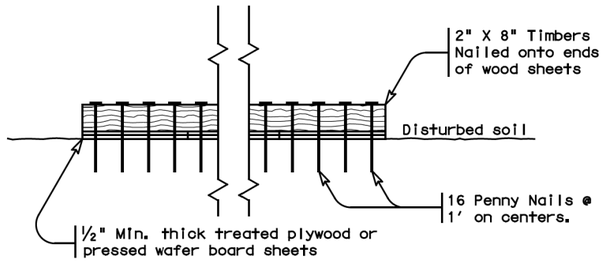


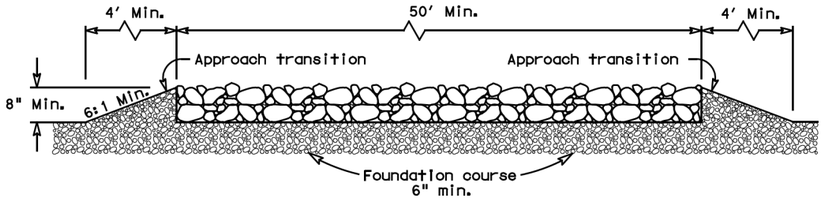
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

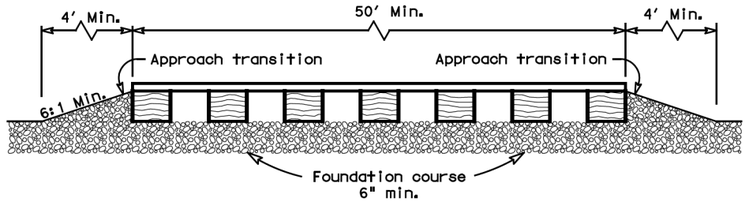
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

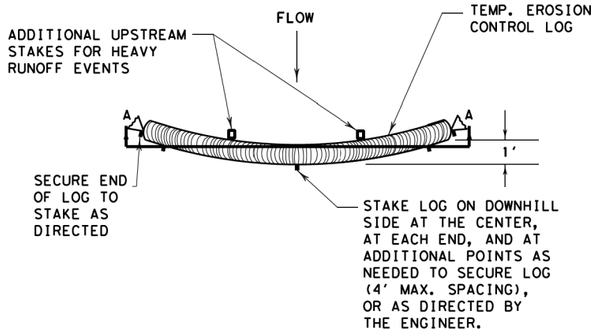
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

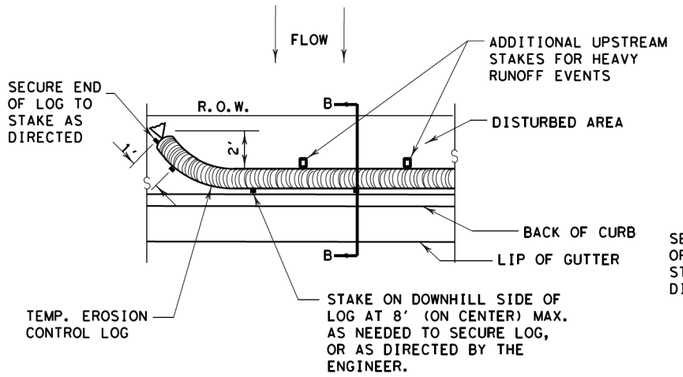
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	18	133, ETC	CR 1420, ETC
	DIST	COUNTY		SHEET NO.
	DAL	NAVARRO		160

DATE: November 27, 2023
FILE: ec316.dgn



PLAN VIEW



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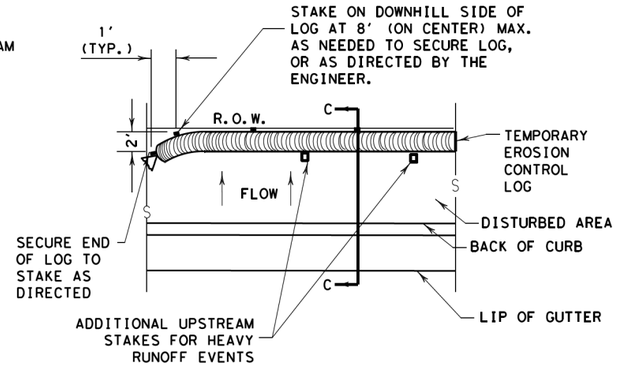

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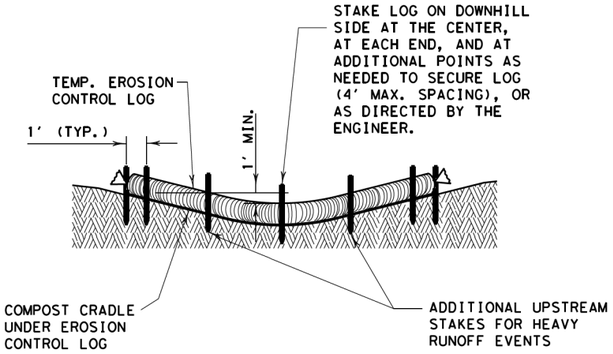
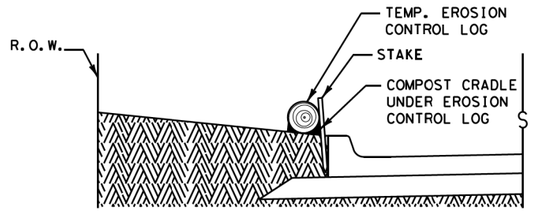


SECTION A-A

EROSION CONTROL LOG DAM

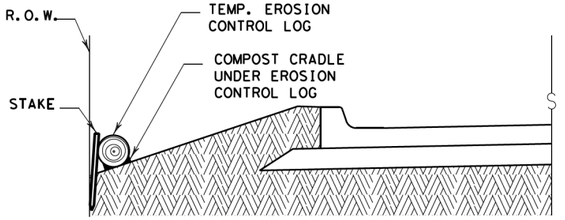
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

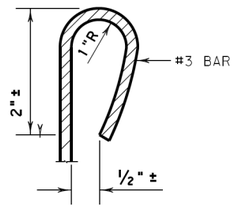
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

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

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.

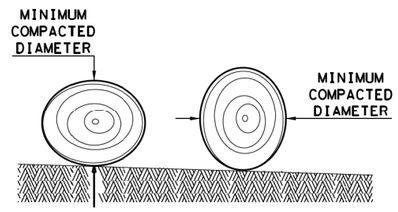
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

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	18	133, ETC		CR 1420, ETC	
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	DAL	NAVARRO			161	

DATE: November 27, 2023
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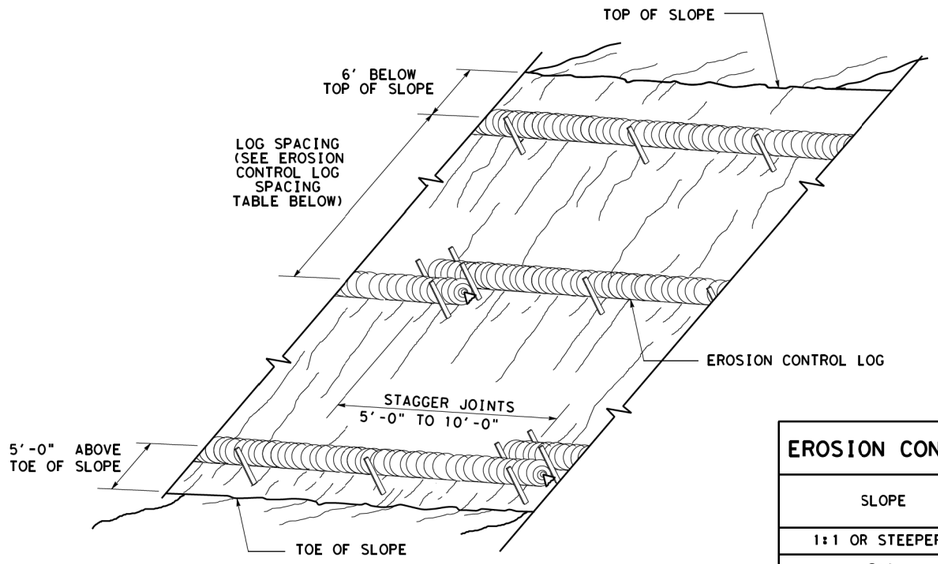
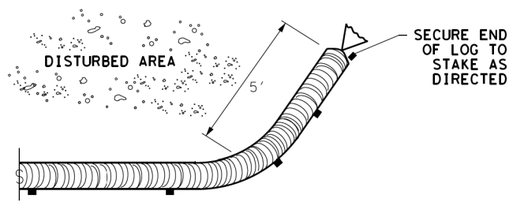


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

CL-SST

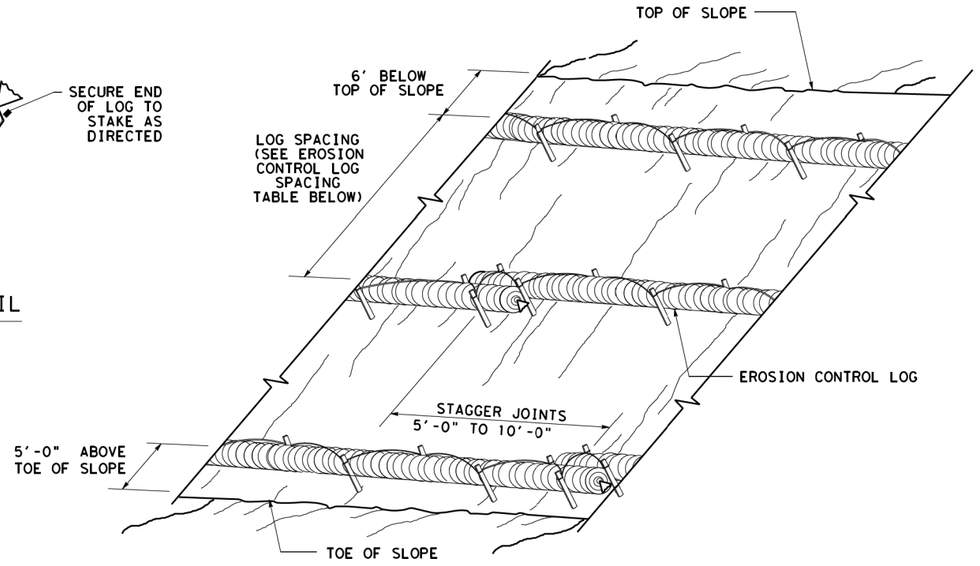


END SECTION RAP DETAIL

EROSION CONTROL LOG SPACING TABLE

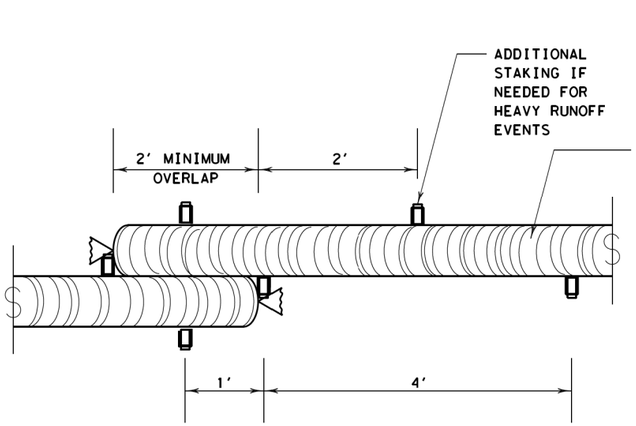
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

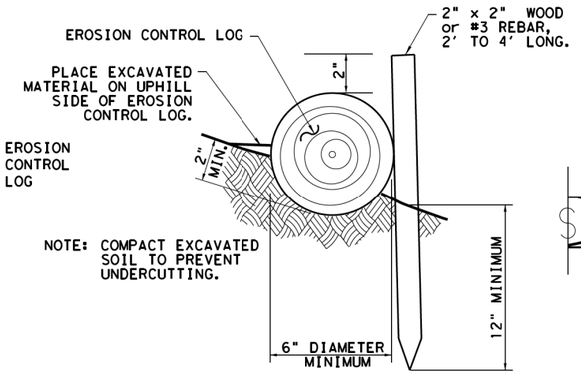
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL



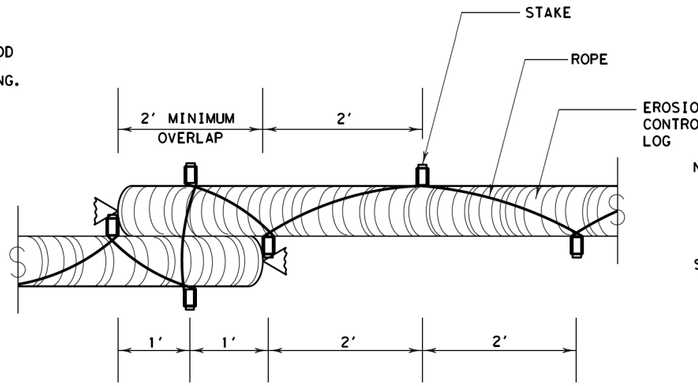


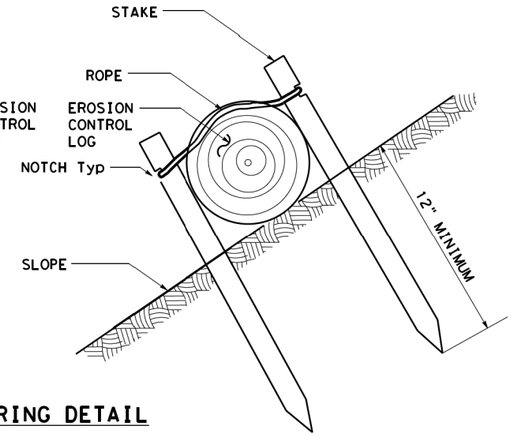
STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

TRENCH DEPTH TABLE

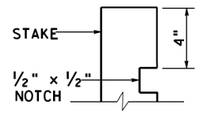
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN:TxDOT		CK:KM	DW:LS/PT		CK:LS
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REVISIONS	0918	18	133, ETC		CR 1420, ETC	
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	DAL	NAVARRO			162	

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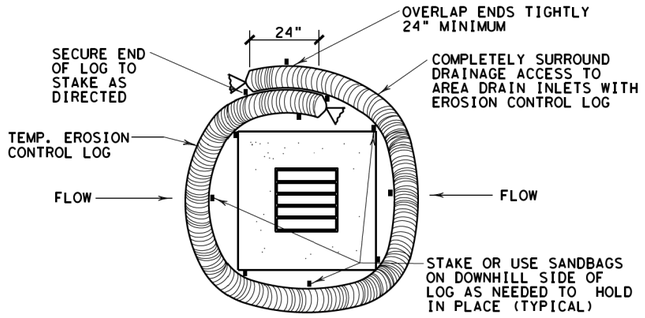
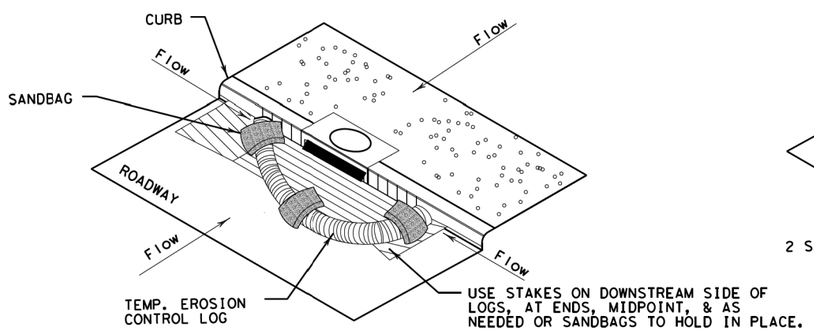
FILE: ec916_2.dgn



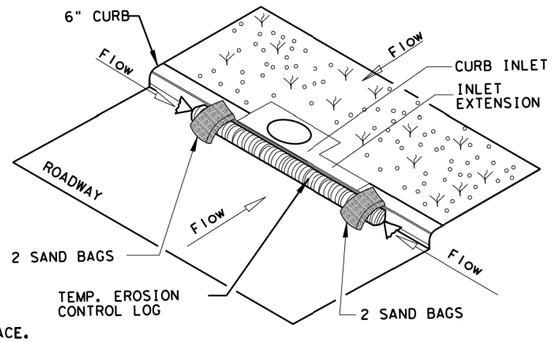
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

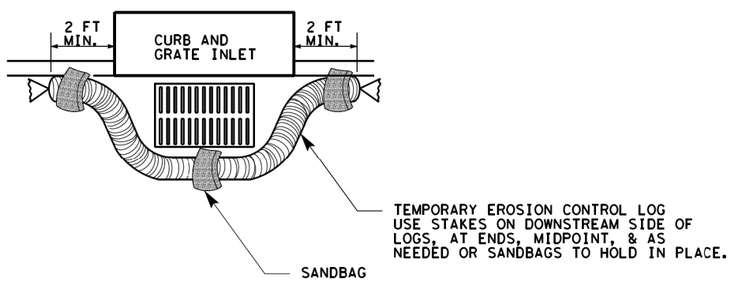
CL-CI



EROSION CONTROL LOG AT CURB INLET

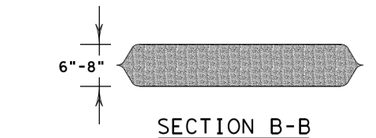
CL-CI

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.

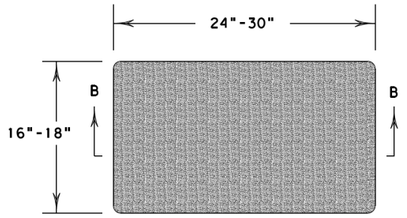


EROSION CONTROL LOG AT CURB & GRADE INLET

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
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REVISIONS	0918	18	133, ETC		CR 1420, ETC	
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	DAL	NAVARRO				163

DATE: November 27, 2023
FILE: ec916_3.dgn

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.

VEGETATION ESTABLISHMENT SHEET

(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		CR 1420, ETC
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DAL	NAVARRO	164
CHECK	CONTROL	SECTION	JOB	
XXX	0918	18	133, ETC	
CHECK				
XXX				

DATE