DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
LTRA	6	BR 2021(911)		BARNES BRIDGE RD
GRAPHICS LTRA	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK LTRA	TEXAS	DALLAS	DALLAS	1
CHECK LTRA	CONTROL	SECTION	JOB	
	0918	47	288	

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 2021(911)
CSJ: 0918-47-288

BARNES BRIDGE RD

DALLAS COUNTY

LIMITS: BARNES BRIDGE ROAD AT DUCK CREEK

TOTAL LENGTH OF PROJECT =

ROADWAY	= 430.00 FT.	= 0.081 MI
BRIDGE	= 320.00 FT.	= 0.061 MI
TOTAL	= 750.00 FT.	= 0.142 MI

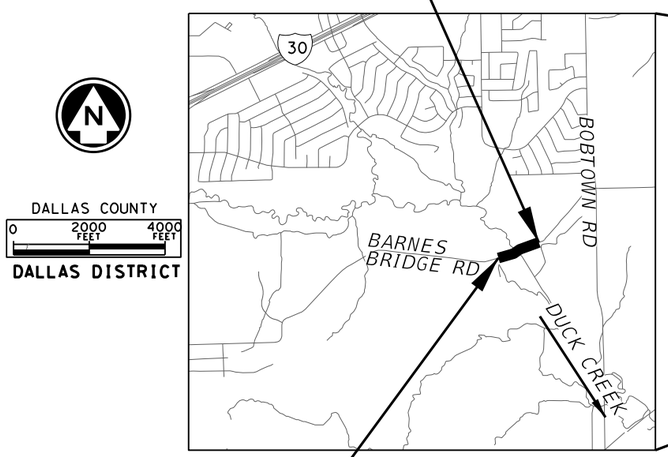
FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF: REPLACE BRIDGE AND APPROACHES

DESIGN SPEED = 35 MPH
ADT 700 (2022)
ADT 900 (2042)
FUNCTIONAL CLASS: LOCAL (URBAN STREET)

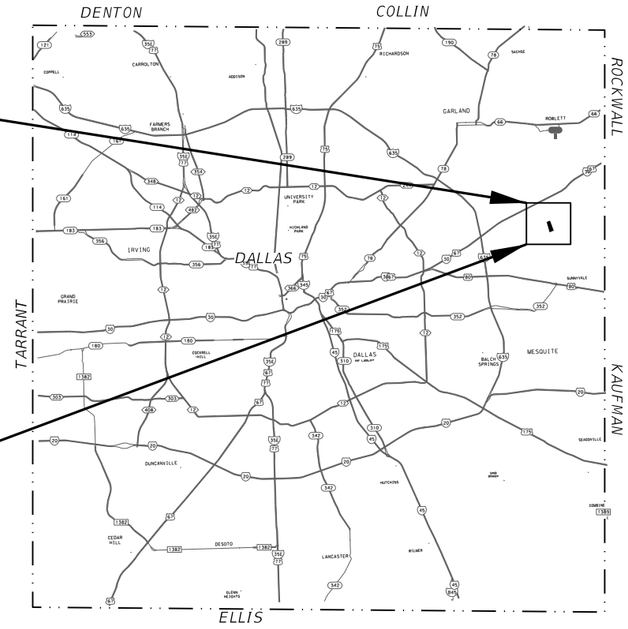
NOTE:

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024, 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)

END PROJECT
CSJ 0918-47-288
STA 19+57.00



BEGIN PROJECT
CSJ 0918-47-288
STA 12+07.00



EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____, P.E.
Signature of Registrant & Date

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

SUBMITTED FOR LETTING 6-25-2024

Jason N. Verner, P.E.
CONSULTANT DESIGN ENGINEER OR PROJECT MANAGER

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/25/2024

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING 6/26/2024
DocuSigned by: James P. Campbell, P.E.
98671F7DDBA14C5...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

RECOMMENDED FOR LETTING 6/26/2024
DocuSigned by: _____, P.E.
91B8F2112C2C469...
AREA ENGINEER

APPROVED FOR LETTING: 6/26/2024
DocuSigned by: Cesson Clemens, P.E.
A879E0B702CD464...
DISTRICT ENGINEER

DATE: 6/25/2024
TIME: 5:25:00 PM
FILE NAME: ...\01-GEN\BarnesTitle.dgn

SHEETS	DESCRIPTION
	I. GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3	PROJECT LAYOUT
4	TYPICAL SECTIONS
5, 5A-5E	GENERAL NOTES
6, 6A	ESTIMATE & QUANTITY SHEET
7	SUMMARY OF QUANTITIES
8	EARTHWORKS SUMMARY
9	SUMMARY OF SMALL SIGNS
	II. TRAFFIC CONTROL PLAN
10	TRAFFIC CONTROL PLAN-NARRATIVE
11	TRAFFIC CONTROL PLAN-ADVANCED WARNING SIGNS
12 - 23	*BC(1)-21 THRU BC(12)-21
24	*WZ (RCD)-13
25	OMITTED
	III. ROADWAY DETAILS
26	REMOVAL PLAN
27	SURVEY CONTROL INDEX
28	SURVEY CONTROL DATA
29 - 30	PLAN & PROFILE
31	GRADING DETAILS
32	*BED-14
33	*CCCG-22
34	*GF(31)-19
35	*GF(31) DAT-19
36	*GF(31)MS-19
37	*GF(31)TRTL2-19
38 - 39	*GF(31)TRTL3-20
40	*SGT(10S)31-16
41	*SGT(12S)31-18
42	*SGT(15)31-20
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	V. DRAINAGE DETAILS
43	MISCELLANEOUS DRAINAGE DETAIL
44 - 45	*SETP-CD
46	*SETP-PD
47	*PSET-RP
48	*PSET-SP
49	*PSET-SC
	VI. UTILITIES
50	EXISTING UTILITIES EXHIBIT

SHEETS	DESCRIPTION
	VII. BRIDGES
51 - 55	HYDRAULIC DATA SHEETS AT DUCK CREEK
56 - 58	BRIDGE SCOUR DATA AT DUCK CREEK
59 - 62	BORE LOG DUCK CREEK BRIDGE
63	ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS DUCK CREEK BRIDGE
64	BRIDGE LAYOUT DUCK CREEK BRIDGE
65	TYPICAL SECTION DUCK CREEK BRIDGE
66	FOUNDATION LAYOUT DUCK CREEK BRIDGE
67 - 68	ABUTMENT 1 DETAILS DUCK CREEK BRIDGE
69 - 70	ABUTMENT 7 DETAILS DUCK CREEK BRIDGE
71	BENT 2 DETAILS DUCK CREEK BRIDGE
72	BENT 3 DETAILS DUCK CREEK BRIDGE
73	BENT 4 DETAILS DUCK CREEK BRIDGE
74	BENT 5 DETAILS DUCK CREEK BRIDGE
75	BENT 6 DETAILS DUCK CREEK BRIDGE
76	FRAMING PLAN UNIT 1 (SPAN 1 TO 3) DUCK CREEK BRIDGE
77	FRAMING PLAN UNIT 2 (SPAN 4 TO 6) DUCK CREEK BRIDGE
78 - 79	140.00' PRESTRESSED X-BEAM UNIT 1 DUCK CREEK BRIDGE
80 - 81	180.00' PRESTRESSED X-BEAM UNIT 2 DUCK CREEK BRIDGE
82	XBND DUCK CREEK BRIDGE
83	*BAS-A
84 - 85	*CSAB
86 - 87	*FD
88 - 91	*PCP
92	*PCP-FAB
93 - 94	*PMDF
95	*SEJ-B
96 - 97	*SRR
98 - 100	*T223
101 - 103	*XB20
104	*XBBR-MS
105	*XBEB
106	*XBSK
107	*XBTS
	VIII. TRAFFIC ITEMS
108	SIGN AND STRIPING PLAN
109	*D&OM(1)-20
110	*D&OM(2)-20
111	*D&OM(3)-20
112	*D&OM(5)-20
113	*D&OM(VIA)-20
114	*PM(1)-22
115	*PM(2)-22
116	*SMD (GEN)-08
117	*SMD (SLIP-1)-08 (DAL)
118	*SMD (SLIP-2)-08
119	*SMD (SLIP-3)-08
120	*TSR(3)-13
121	*TSR(4)-13
122	*2-LANE-HWY-CURVE-SIGNING-MARKINGS (DAL)
	IX. RAILROAD
	NONE
	X. ENVIRONMENTAL ISSUES
123	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) (DAL)
124 - 125	STORM WATER POLLUTION PREVENTION PLAN (SWP3)
126	SW3P LAYOUT
127	*EC(1)-16
128	*EC(2)-16
129	*EC(3)-16
130	*VEGETATION ESTABLISHMENT SHEET (DAL)
131	*SW3P SIGN SHEET (DAL)
	XI. MISCELLANEOUS ITEMS
	NONE

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

BY: JASON N VERNER , P.E . #95935, DATE: 6/27/2024

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/27/2024

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

INDEX OF SHEETS

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK			
JNV			

SHEET NO. 2

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Alignment Name: CL BARNES
Alignment Description:
Alignment Style: Alignment \ Baseline

	Station	Northing	Easting
Element: Linear			
POT ( )	10+00.000 R1	6990856.110	2562115.860
PC ( )	13+39.070 R1	6990948.393	2562442.130

Tangential Direction: N74° 12'24.422"E
Tangential Length: 339.070

Element: Circular

PC	( )	13+39.070 R1	6990948.393	2562442.130
PI	( )	14+41.206 R1	6990976.191	2562540.411
CC	( )	6991439.141	2562303.325	
PRC	( )	15+40.676 R1	6991039.693	2562620.408

Radius: 510.000
Delta: 22° 38'57.852" Left
Degree of Curvature (Arc): 11° 14'04.080"
Length: 201.606

Tangent: 102.137
Chord: 200.296
Middle Ordinate: 9.930
External: 10.127
Back Tangent Direction: N74° 12'24.422"E
Back Radial Direction: S15° 47'35.578"E
Chord Direction: N62° 52'55.496"E
Ahead Radial Direction: S38° 26'33.430"E
Ahead Tangent Direction: N51° 33'26.570"E

Element: Circular

PRC	( )	15+40.676 R1	6991039.693	2562620.408
PI	( )	16+25.964 R1	6991092.719	2562687.208
CC	( )	6990640.245	2562937.490	
PT	( )	17+09.689 R1	6991121.126	2562767.627

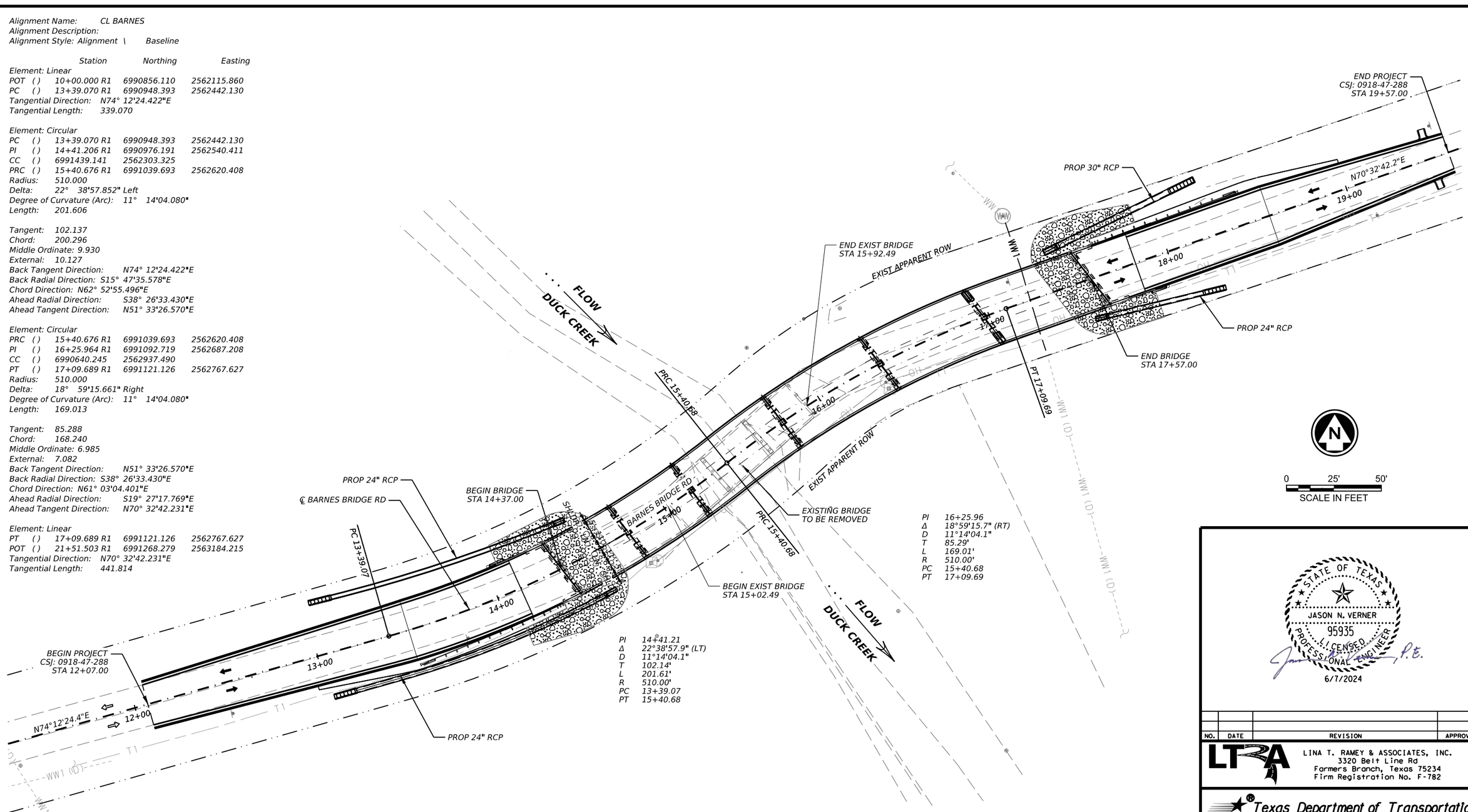
Radius: 510.000
Delta: 18° 59'15.661" Right
Degree of Curvature (Arc): 11° 14'04.080"
Length: 169.013

Tangent: 85.288
Chord: 168.240
Middle Ordinate: 6.985
External: 7.082
Back Tangent Direction: N51° 33'26.570"E
Back Radial Direction: S38° 26'33.430"E
Chord Direction: N61° 03'04.401"E
Ahead Radial Direction: S19° 27'17.769"E
Ahead Tangent Direction: N70° 32'42.231"E

Element: Linear

PT	( )	17+09.689 R1	6991121.126	2562767.627
POT	( )	21+51.503 R1	6991268.279	2563184.215

Tangential Direction: N70° 32'42.231"E
Tangential Length: 441.814



PI 14+41.21
Δ 22°38'57.9" (LT)
D 11°14'04.1"
T 102.14'
L 201.61'
R 510.00'
PC 13+39.07
PT 15+40.68

PI 16+25.96
Δ 18°59'15.7" (RT)
D 11°14'04.1"
T 85.29'
L 169.01'
R 510.00'
PC 15+40.68
PT 17+09.69

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/7/2024

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

PROJECT LAYOUT

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY	SHEET NO.
DRAWN LTR	TEXAS	DAL	DALLAS	3
CHECK JNV	CONTROL	SECTION	JOB	
	0918	47	288	

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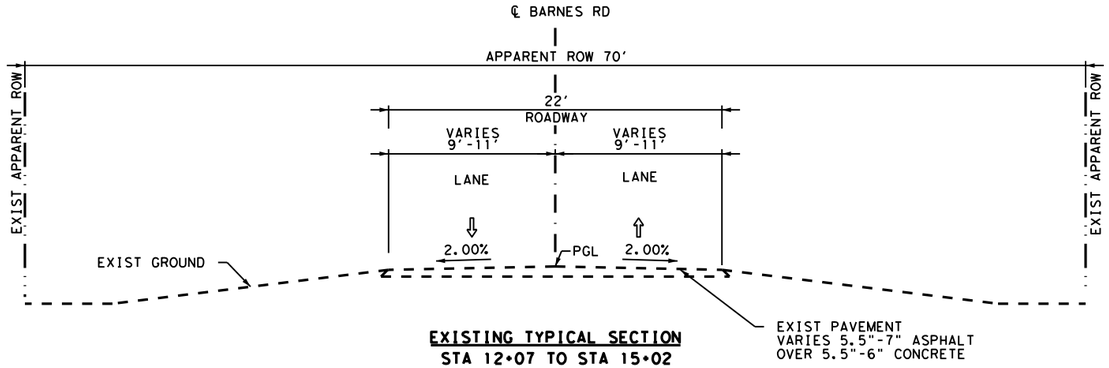
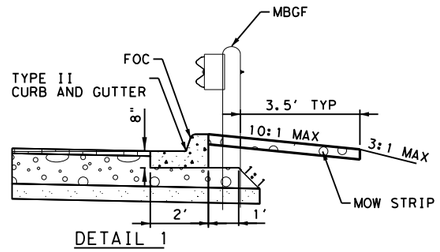
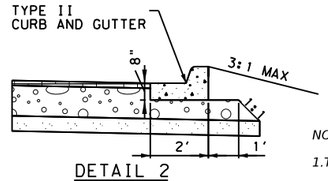


EXISTING TYPICAL SECTION
STA 12+07 TO STA 15+02
STA 15+92 TO STA 19+57
(EXISTING BRIDGE FROM STA 15+02 TO STA 15+92)



DETAIL 1

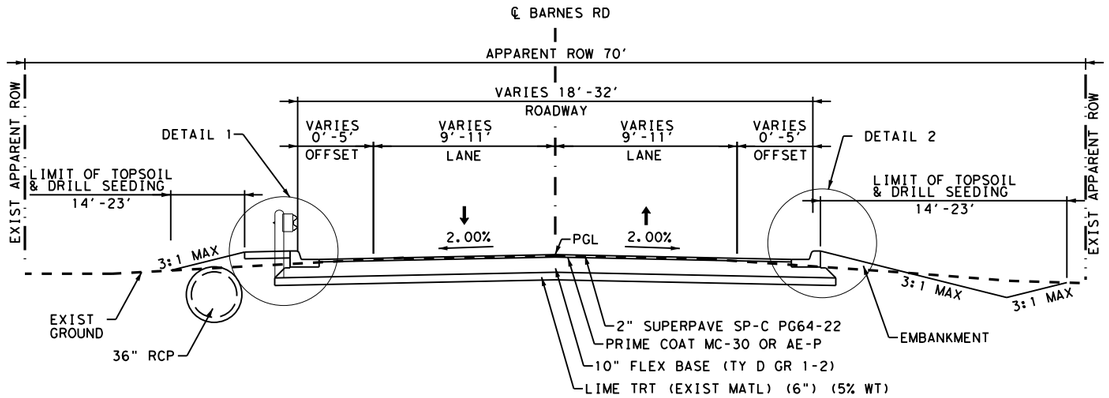


DETAIL 2

NOTE:

1.TY II CURB (MONOLITHIC) ON APPROACH SLAB.

2.REFER TO TXDOT STD "GF(31) TR TL3-20" FOR DETAILS ON CURB AND APPROACH SLAB CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS.



PROPOSED TYPICAL SECTION
STA 12+07 TO STA 14+13
STA 17+82 TO STA 19+57
(PROPOSED BRIDGE FROM STA 14+37 TO STA 17+57)
(PROPOSED APPROACH SLAB FROM STA 14+13 TO STA 14+37)
(PROPOSED APPROACH SLAB FROM STA 17+57 TO STA 17+82)

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

TYPICAL SECTIONS

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY
DRAWN LTR	TEXAS	DAL	DALLAS
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

SHEET NO. 4

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SPECIFICATION DATA

Table 1: Soil Constants Requirements

Item	Description	Plasticity Index		Note
		Max	Min	
132	EMBANK (FNL)(DC)(TY C1)	40	8	1

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.

Table 2: Basis of Estimate for Permanent Construction

Item	Description	Thickness	Rate		Quantity
164	Drill Seed (Perm_Rural_C/S))	N/A	See Specifications		2,212 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	0.1 Ton
168	Vegetative Watering (Warm)**	N/A	12	TGL/Ac/Day	329 TGL
260	Quick Lime (slurry)			5% by wt.	18 Ton
310	Prime Coat	N/A	0.20	Gal/SY	223 Gal
344	SP MIXES	See Plans	110	Lbs./SY/In	123 Ton

*For contractor's information only
**Use Summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Plan Sheet for estimated daily rates.
***Portland Concrete Cement

Note: (1) Base material weight based on 1.50 Ton/CY (dry- compacted)
(2) Asphalt weight based on 110 Lbs./SY/In
(3) Subgrade weight based on _1.48__Ton/CY (dry-compacted)
(4) Item 310 Residual Asphalt 0.20 Gal/SY

Table 3: Basis of Estimate for Temporary Erosion Control Items

Item	Description	Rate		Quantity
164	Drill Seed (Temp_Warm_Cool)	See Specifications		2,212 SY
166*	Fertilizer (12-6-6)	500	Lb/Ac	0.1 Ton
168	Vegetative Watering (Warm)**	12	TGL/Ac/Day	329 TGL

*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 _1.097_ acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

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.

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):

Nathan Petter, P.E. *Email address: Nathan.Petter@txdot.gov*
Dung Nguyen, P.E. *Email address: Dung.Nguyen@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).

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:
Contractor is responsible for the health and safety of his employees and compliance with all OSHA standards and regulations.

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.

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.

This project contains a __60__day delay for material procurement(SP 008-004).

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. 12+07.00 to Sta. 19+57.00 along the centerline of construction. No other Prep ROW areas will be considered for payment.

Item 104:
In those areas where the pavement is not to be overlaid, provide a smooth surface after the curb removal. Planing or grinding is considered an acceptable method at these locations. Measurement and payment is in accordance with this item.

Sawing of concrete is not paid for directly, but is considered subsidiary to this item.

Items 105, 251, 305, and 354:
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.

Item 105:
Take possession of recycled asphalt pavement from the project and recycle the material.

Properly dispose of unsalvageable material at Contractor's 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 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.

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 260:
Furnish and distribute MS-2 smoothly and evenly at the rate of 0.20 gallons per square yard (spray rate) to cure lime, as directed.

Provide Quick Lime Slurry and apply lime by slurry placement method.

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

Item 320:
Use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It shall have a minimum storage capacity of approximately 25 tons. It shall be equipped with a pivoting discharge conveyor and shall completely and thoroughly remix the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver shall have a surge storage insert with a minimum capacity of 20 tons.

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

Item 344:
Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B

Item 400:
Structural Excavation is not paid for directly but is considered subsidiary to pertinent Items unless otherwise shown on the plans.

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. Existing concrete shall be in a surface saturated dry (SSD) at the time new concrete is placed against it. Use of bonding agents in prohibited.

BENT NUMBERING:

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

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

NATIONAL BRIDGE INVENTORY NUMBERS:

Provide National Bridge Inventory (NBI) numbers on all bridge structures and bridge class culverts.

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

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

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

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

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

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

Item 421:
Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Provide High Performance Concrete (HPC) of the class specified for the following bridge components: approach slabs, abutments, bents, columns, slabs, sidewalks and medians.

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

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

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

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

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

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

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

Item 440:
Provide reinforcing steel with epoxy coating meeting the requirements of item 440 for the following bridge components: approach slab, slab, sidewalk, median, concrete traffic barrier, and rail. Alternative materials will be considered as shown in the *TXDOT Bridge Design Manual-LRFD Chapter 3 Section 2.*

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

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

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

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

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

Item 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.

When excavation is required next to a pavement lane carrying traffic and the widening is not completed by the end of the work day, backfill against the edge of the pavement with at least a 3:1 slope using an acceptable material to support vehicular traffic. Carefully remove and

dispose of this material when work resumes. Backfilling pavement edges, and the materials required for the work will be subsidiary to this item.

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

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.

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.

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

County: Dallas

Highway: Barnes Bridge Rd

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 529:
Provide grooved joints at 10-foot intervals and ¾ inch expansion joint material for doweled curb at the same locations as on the existing pavement.

For Curb and Gutter sections, provide grooved joints at 10-foot intervals and ¾ inch expansion joint material at a maximum of 50-foot centers and at all radius points and inlets.

Curb and Gutter transitions will be paid for by the foot at the unit price for the corresponding curb or curb and gutter section.

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

Item 585:
Use Surface Test Type A.

Items 644:
Affix a sign identification decal to the back of all signs in accordance with Item 643.

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

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-47-288 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY BARNES BRIDGE RD

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0918-47-288**			
		PROJECT ID		**A00129735**			
		COUNTY		**Dallas**			
		HIGHWAY		**BARNES BRIDGE RD**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-7002	PREPARING ROW	STA	7.500		7.500	
	104-7001	REMOV CONC (PAV)	SY	1,457.000		1,457.000	
	104-7049	REMOV CONC (OTHER APPURTENANCES)	SY	153.000		153.000	
	105-7053	RMV (2"-8") TRT/UNTRT BASE & ASPH PAV	SY	1,457.000		1,457.000	
	110-7001	EXCAV (ROADWAY)	CY	1,473.000		1,473.000	
	132-7008	EMBANK (FNL)(DC)(TY C1)	CY	1,506.000		1,506.000	
	161-7002	COMPOST MANUF TOPSOIL (4")	SY	2,212.000		2,212.000	
	164-7012	DRILL SEED (PERM_URBAN_CLAY)	SY	2,212.000		2,212.000	
	164-7015	DRILL SEED (TEMP_WARM_COOL)	SY	2,212.000		2,212.000	
	168-7001	VEGETATIVE WATERING	TGL	658.000		658.000	
	247-7102	FL BS (CMP IN PLC)(TY D GR 1-2) (10")	SY	1,219.000		1,219.000	
	260-7003	LIME (QUICKLIME (SLURRY))	TON	18.000		18.000	
	260-7006	LIME TRT (EXIST MATL)(6")	SY	1,406.000		1,406.000	
	310-7013	PRIME COAT(MC-30 OR AE-P)	GAL	223.000		223.000	
	344-7011	SP MIXES SP-C SAC-B PG64-22	TON	123.000		123.000	
	400-7010	CEM STABIL BKFL	CY	111.000		111.000	
	416-7006	DRILL SHAFT (36 IN)	LF	866.000		866.000	
	420-7005	CL A CONC (CURB OUTLET)(TY II)	EA	2.000		2.000	
	420-7013	CL C CONC (ABUT)(HPC)	CY	39.200		39.200	
	420-7023	CL C CONC (CAP)(HPC)	CY	79.500		79.500	
	420-7039	CL C CONC (COLUMN)(HPC)	CY	38.400		38.400	
	422-7002	REINF CONC SLAB (HPC)	SF	10,880.000		10,880.000	
	422-7014	APPROACH SLAB (HPC)	CY	65.000		65.000	
	425-7035	PRESTR CONC X-BEAM (5XB20)	LF	1,267.630		1,267.630	
	432-7013	RIPRAP (MOW STRIP)(4 IN)	CY	14.000		14.000	
	432-7041	RIPRAP (STONE PROTECTION)(12 IN)	CY	446.000		446.000	
	450-7009	RAIL (TY T223)(HPC)	LF	682.000		682.000	
	454-7006	SEALED EXPANSION JOINT (4 IN) (SEJ - B)	LF	102.000		102.000	
	464-7005	RC PIPE (CL III)(24 IN)	LF	324.000		324.000	
	464-7007	RC PIPE (CL III)(30 IN)	LF	68.000		68.000	
	467-7325	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	3.000		3.000	
	467-7328	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	3.000		3.000	
	467-7345	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-7348	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	1.000		1.000	
	496-7009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		8.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0918-47-288 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY BARNES BRIDGE RD

			CONTROL SECTION JOB		**0918-47-288**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129735**		
			COUNTY		**Dallas**		
			HIGHWAY		**BARNES BRIDGE RD**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	506-7002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	160.000		160.000	
	506-7011	ROCK FILTER DAMS (REMOVE)	LF	160.000		160.000	
	506-7020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	172.000		172.000	
	506-7024	CONSTRUCTION EXITS (REMOVE)	SY	172.000		172.000	
	506-7039	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,574.000		1,574.000	
	506-7041	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,574.000		1,574.000	
	529-7009	CONC CURB & GUTTER (TY II)	LF	762.000		762.000	
	540-7001	MTL W-BEAM GD FEN (TIM POST)	LF	50.000		50.000	
	540-7006	MTL BEAM GD FEN TRANS (TL2)	EA	4.000		4.000	
	540-7015	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	4.000		4.000	
	658-7013	INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB (BI)	EA	6.000		6.000	
	658-7019	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	8.000		8.000	
	666-7347	PAVEMENT SLER 6"	LF	1,475.000		1,475.000	
	666-7411	REFL PAV MRK TY I (W)6"(SLD)(100MIL)	LF	1,500.000		1,500.000	
	666-7423	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	LF	1,500.000		1,500.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	19.000		19.000	
	678-7002	PAV SURF PREP FOR MRK (6")	LF	1,475.000		1,475.000	
	730-7019	FULL - WIDTH MOWING	CYC	2.000		2.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF REMOVAL ITEMS				
LOCATION	104 7001	104 7049	105 7053	496 7009
	REMOV CONC (PAV)	REMOV CONC (OTHER APPURTENANCES)	RMV (2"-8") TRT/UNTRT BASE & ASPH PAV	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	SY	SY	SY	EA
BARNES BRIDGE RD	1457	153	1457	1
PROJECT TOTALS	1457	153	1457	1

SUMMARY OF ROADWAY ITEMS															
LOCATION	100 7002	247 7102	260 7003	260 7006	310 7013	344 7011	422 7014	432 7013	432 7041	502 7001	529 7009	540 7001	540 7006	540 7015	544 7001
	PREPARING ROW	FL BS (CMP IN PLC)(TY D GR 1-2) (10")	LIME (QUICKLIME (SLURRY))	LIME TRT (EXIST MATL)(6")	PRIME COAT(MC-30 OR AE-P)	SP MIXES SP-C SAC-B PG64-22	APPROACH SLAB (HPC)	RIPRAP (MOW STRIP)(4 IN)	RIPRAP (STONE PROTECTION) (12 IN)	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONC CURB & GUTTER (TY II)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (TL2)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)
	STA	SY	TON	SY	GAL	TON	CY	CY	CY	MO	LF	LF	EA	EA	EA
BARNES BRIDGE RD	7.50	1219	18	1406	223	123	65	14	446	8	762	50	4	2	2
PROJECT TOTALS	7.50	1219	18	1406	223	123	65	14	446	8	762	50	4	2	2

SUMMARY OF DRAINAGE ITEMS							
LOCATION	420 7005	464 7005	464 7007	467 7325	467 7328	467 7345	467 7348
	CL A CONC (CURB OUTLET)(TY II)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(30 IN)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (30 IN) (RCP) (3: 1) (C)	SET (TY II) (30 IN) (RCP) (6: 1) (P)
	EA	LF	LF	EA	EA	EA	EA
BARNES BRIDGE RD	2	324	68	3	3	1	1
PROJECT TOTALS	2	324	68	3	3	1	1

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS								
LOCATION	644 7001	658 7013	658 7019	666 7347	666 7411	666 7423	672 7004	678 7002
	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	PAVEMENT SLER 6"	REFL PAV MRK TY I (W)6"(SLD)(100MIL)	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")
	EA	EA	EA	LF	LF	LF	EA	LF
BARNES BARNES RD	4	6	8	1475	1500	1500	19	1475
PROJECT TOTALS	4	6	8	1475	1500	1500	19	1475

SUMMARY OF EROSION CONTROL ITEMS										
LOCATION	161 7002	164 7012	164 7015	168 7001	506 7002	506 7011	506 7020	506 7024	506 7039	506 7041
	COMPOST MANUF TOPSOIL (4")	DRILL SEED (PERM_URBAN_CLAY)	DRILL SEED (TEMP_WARM_COOL)	*VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	TGL	LF	LF	SY	SY	LF	LF
BARNES BRIDGE RD	2212	2212	2212	658	160	160	156	156	1431	1431
10% ADDITIONAL QUANTITY **	0	0	0	0	0	0	16	16	143	143
PROJECT TOTALS	2212	2212	2212	658	160	160	172	172	1574	1574

* VEGETATIVE WATERING MEASURED WITH A RATE OF 12,000 GALLONS PER ACRE PER DAY DURING A 60-DAY PERIOD FOR SEEDING.

* *ADDITIONAL QUANTITIES INCLUDED TO ALLOW FOR PERIODIC REPLACEMENT DUE TO NORMAL WEAR OR DIFFERING SITE CONDITIONS.

NOTES:

1-EARTH WORK QUANTITIES ARE SHOWN IN THE "EARTHWORKS SUMMARY"SHEET.

2-BRIDGE QUANTITIES ARE SHOWN IN THE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS DUCK CREEK BRIDGE"SHEET.

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

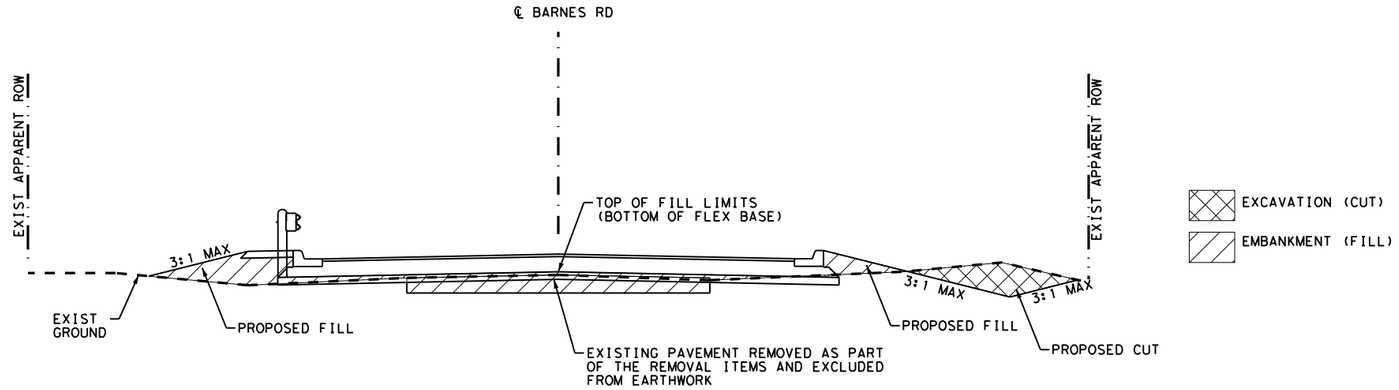
BARNES BRIDGE RD

SUMMARY OF QUANTITIES

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY / SHEET NO.
DRAWN LTR	TEXAS	DAL	DALLAS / 7
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

DATE: 6/21/2024 9:42:33 AM
FILE: c:\pwworkingdir\traengineers-pw.bentley.com_ltraengineers-pw-01\pmullaly@ltraengineers.com\dms21926\BarnesQTY.dgn

EARTHWORK SUMMARY			
STATION RANGE	ITEM 0110 7001	ITEM 0132 7008	ITEM 400-7010
	EXCAV (ROADWAY)	EMBANK (FNL)(DC)(TY C1)	CEM STABIL BKFL
	CY	CY	CY
12+07.00 to 12+25.00	5.5	8.9	0.0
12+25.00 to 12+50.00	8.8	17.6	0.0
12+50.00 to 12+75.00	9.0	27.4	0.0
12+75.00 to 13+00.00	11.8	45.5	0.0
13+00.00 to 13+25.00	7.3	78.0	0.0
13+25.00 to 13+50.00	0.0	114.0	0.0
13+50.00 to 13+75.00	0.0	148.0	0.0
13+75.00 to 14+00.00	0.0	177.9	0.0
14+00.00 to 14+25.00	0.0	188.8	55.4
14+25.00 to 14+37.00	0.0	186.6	
BRIDGE 14+37.00 to 17+57.00	1400.0	0.0	0.0
17+57.00 to 17+75.00	0.0	140.6	55.4
17+75.00 to 18+00.00	0.0	126.8	
18+00.00 to 18+25.00	2.4	99.3	0.0
18+25.00 to 18+50.00	5.0	62.2	0.0
18+50.00 to 18+75.00	4.7	37.7	0.0
18+75.00 to 19+00.00	4.8	23.6	0.0
19+00.00 to 19+25.00	5.7	13.3	0.0
19+25.00 to 19+50.00	6.1	7.7	0.0
19+50.00 to 19+57.00	1.8	1.7	0.0
PROJECT TOTAL	1473	1506	111



EARTHWORK TYPICAL SECTION
NOT TO SCALE

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/12/2024

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

EARTHWORKS SUMMARY

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT / COUNTY	SHEET NO.
DRAWN LTR	TEXAS	DAL / DALLAS	8
CHECK JNV	CONTROL	SECTION / JOB	
	0918	47 / 288	

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	1	W1-4L		36"X36"	X		10BWG	1	SA	P		
		W13-1P		18"X18"	X							
	2	W8-13aT		36"X36"	X		10BWG	1	SA	P		
	3	W8-13aT		36"X36"	X		10BWG	1	SA	P		
	4	W1-4L		36"X36"	X		10BWG	1	SA	P		
		W13-1P		18"X18"	X							

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

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

http://www.txdot.gov/

NOTE:

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
4-16 8-16	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		9

18

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GENERAL

1. THE EXISTING BRIDGE IS CLOSED AND EXISTING DETOURS ARE IN PLACE.
2. DRIVEWAY ACCESS MUST BE MAINTAINED THROUGHOUT THE DURATION OF THE PROJECT.
3. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL ONLY BE PLACED IN AREAS WHERE SOIL DISTURBANCE IS EXPECTED TO OCCUR WITHIN TWO WEEKS. TEMPORARY SW3P EROSION CONTROL MEASURES SHALL BE REMOVED IN EACH AREA WITHIN TWO WEEKS OF VEGETATION ESTABLISHMENT OR AS APPROVED BY THE ENGINEER.

4. TEMPORARY AND POSITIVE DRAINAGE MUST BE MAINTAINED AT ALL TIMES.

5. INSTALLING BARRICADES AND ADVANCED WARNING SIGNS PER THE TMUTCD AND BC STANDARDS AND ANY ADDITIONAL BARRICADES, SIGNS, OR WARNINGS DEEMED NECESSARY BY THE ENGINEER AND/OR DICTATED BY FIELD CONDITION WILL BE SUBSIDIARY TO THE BARRICADES BID ITEM 502.

6. MAINTAIN TEMPORARY SIGNS AND COVER/REMOVE EXISTING SIGNS OR PAVEMENT MARKINGS THAT CONFLICT TO AVOID CONFUSION. THIS IS TO BE SUBSIDIARY TO BARRICADE ITEM 502.

7. ANY ALTERATION OF THE SEQUENCE OF OPERATION NEEDS TO HAVE WRITTEN APPROVAL FROM THE ENGINEER, AND ANY ADDITIONAL COST OR TIME IS AT THE CONTRACTOR'S EXPENSE.

PHASE BARNES BRIDGE RD AT DUCK CREEK

PHASE 1A

1. INSTALL ADVANCE WARNING SIGNS BARRICADES AND OTHER TRAFFIC CONTROL DEVICES USED FOR TRAFFIC HANDLING AS INDICATED ON THE PLANS AND AS DIRECTED BY THE ENGINEER. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE STANDARD DETAILS FROM THE TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

2. INSTALL AND MAINTAIN THE STORM WATER POLLUTION PREVENTION PLAN (SW3P) FOR THE PROJECT SITE IN ACCORDANCE WITH THE SPECIFIC OR GENERAL STORM WATER PERMIT REQUIREMENTS. PREVENT WATER POLLUTION FROM STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY ENTERING ANY SURFACE WATER OR PRIVATE PROPERTY ON OR ADJACENT TO THE PROJECT. LIMIT THE DISTURBANCE TO THE AREA SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

3. REMOVE EXISTING STRUCTURE ON BARNES BRIDGE RD AT DUCK CREEK, APPROACHES AND ROADWAY.

PHASE 1B

1. CONSTRUCT BARNES BRIDGE RD BRIDGE AT DUCK CREEK, ROADWAY, AND PERTINENT ITEMS TO THE LIMITS SHOWN ON THE PLANS.

2. GRADE, FERTILIZE, AND SEED EXPOSED SOIL.

PHASE 1C

1. PERFORM SITE CLEANUP AND PERMANENTLY STABILIZE DISTURBED AREAS.

2. REMOVE SW3P DEVICES

3. REMOVE ALL ADVANCE WARNING SIGNS, BARRICADES, AND OTHER TRAFFIC CONTROL DEVICES USED FOR TRAFFIC HANDLING AND MOVE TRAFFIC TO PERMANENT CONFIGURATION.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

TRAFFIC CONTROL PLAN -NARRATIVE

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY / SHEET NO.
DRAWN LTR	TEXAS	DAL	DALLAS / 10
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

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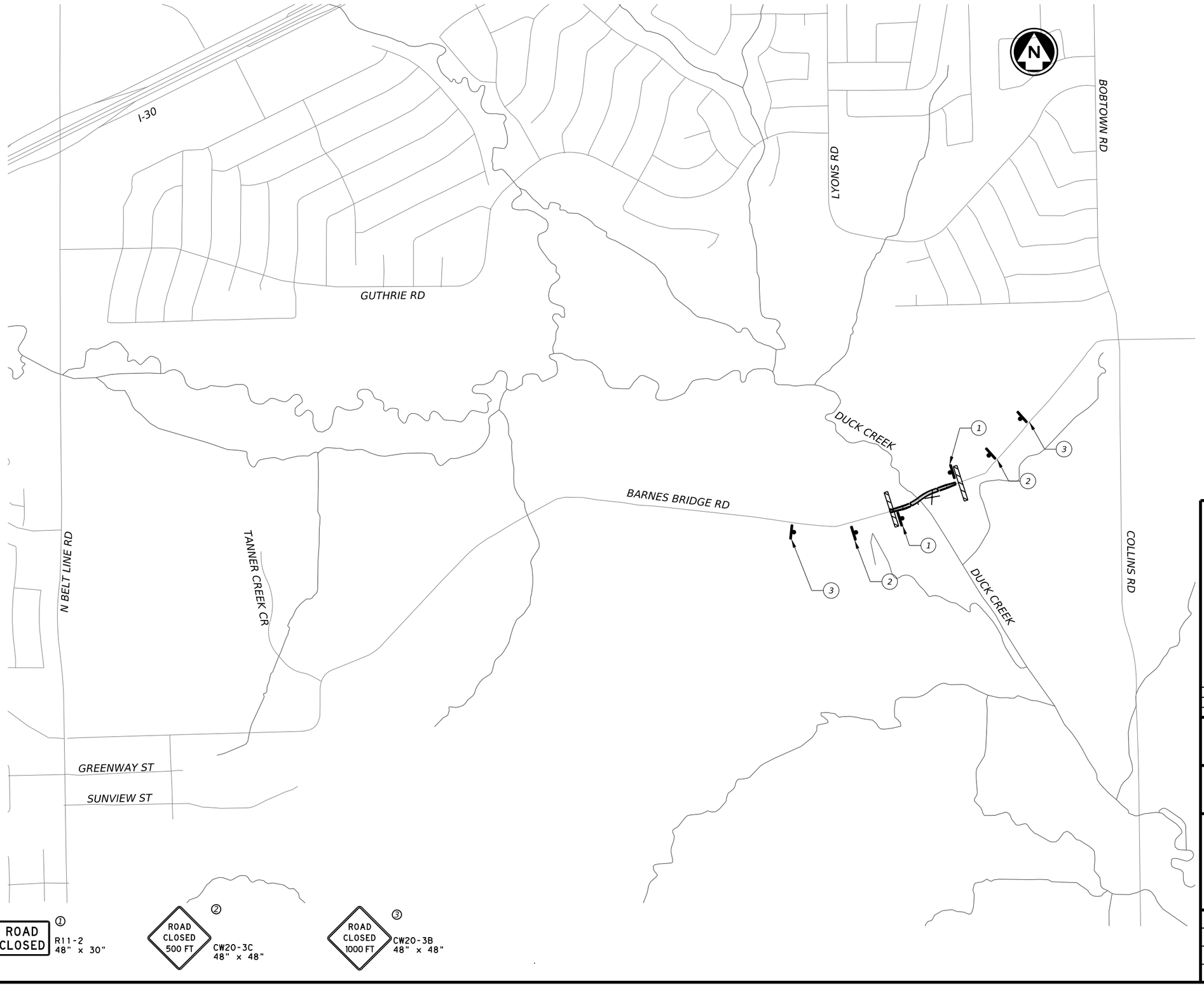

0 200 1000

SCALE IN FEET

LEGEND

TYPE 3 BARRICADE

SIGN

EXISTING BRIDGE

NOTES:

1.ALL SIGNS DEVICES LOCATION AND SPACING SHALL/SHOULD CONFORM TO THE TMUTCD, THE BC AND WZ STANDARD DRAWINGS.

2. SEE PHASE NARRATIVE FOR SEQUENCE OF CONSTRUCTION.

3. EXISTING ROADWAY CLOSED FOR MORE THAN 2-YEARS. COORDINATE ADVANCED WARNING SIGN LOCATIONS WITH EXISTING SIGN PLACEMENT.

① ROAD CLOSED — R11-2, 48" x 30"

② ROAD CLOSED 500 FT — CW20-3C, 48" x 48"

③ ROAD CLOSED 1000 FT — CW20-3B, 48" x 48"

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

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LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

TRAFFIC CONTROL PLAN -ADVANCED WARNING SIGNS

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY
DRAWN LTR	TEXAS	DAL	DALLAS
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

SHEET NO. 11

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0918	47	288	BBR
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	DAL	DALLAS		12

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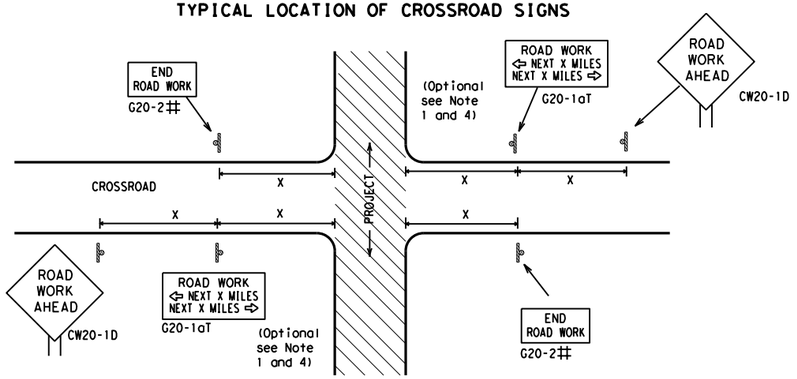
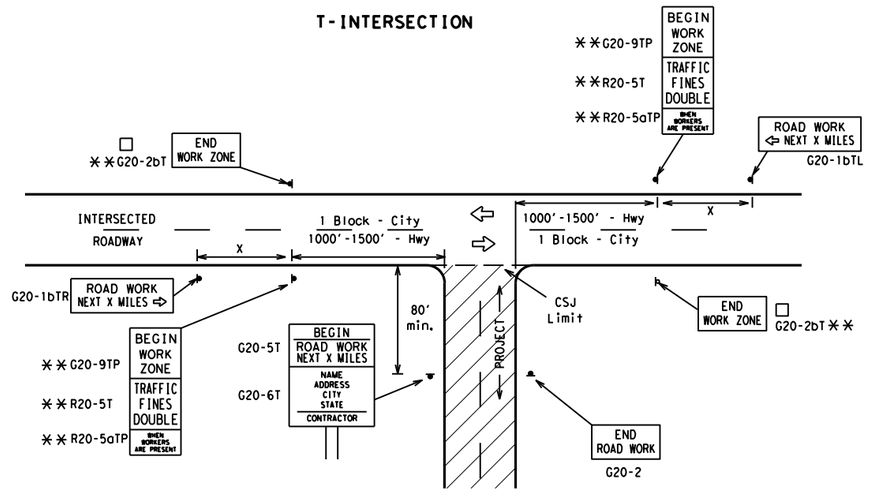
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

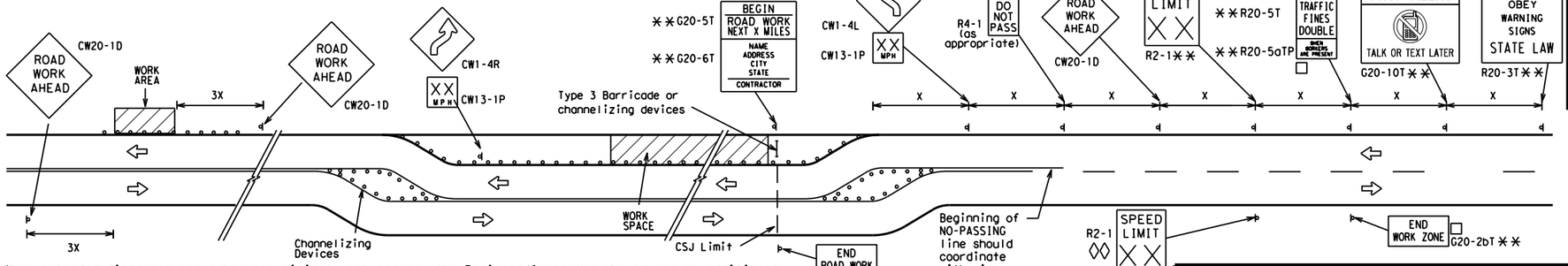
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

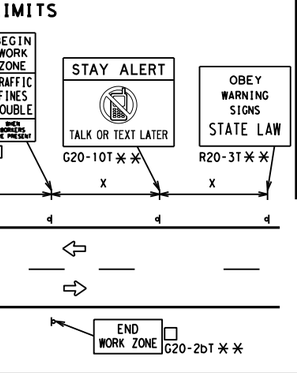
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

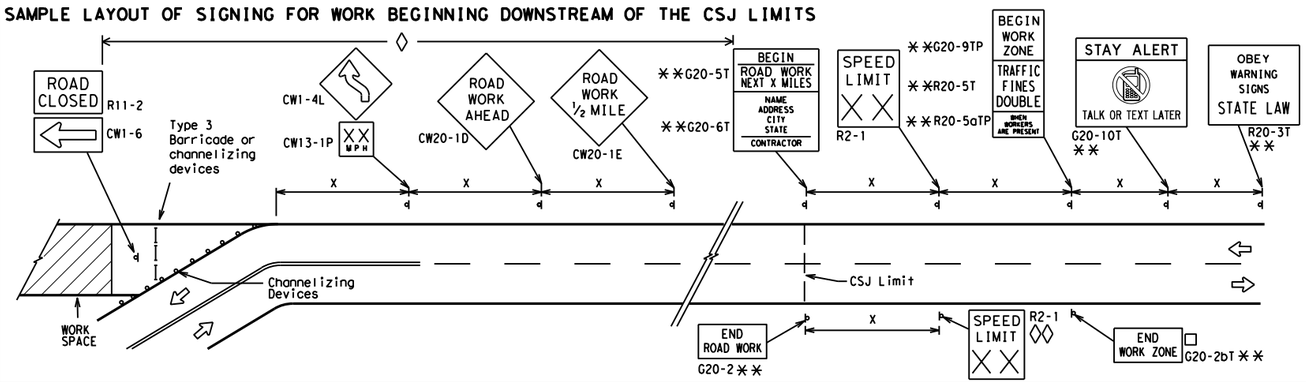


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		13

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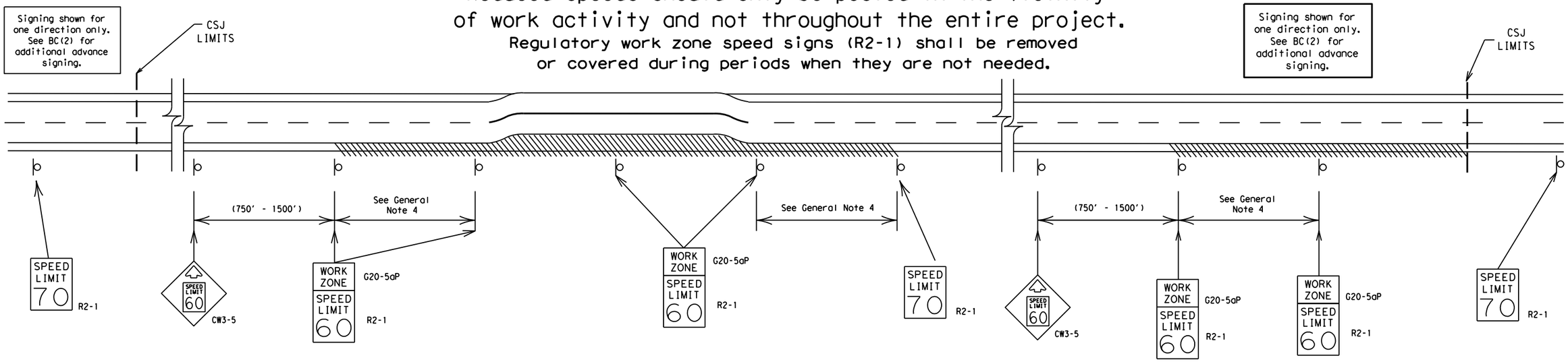
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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REVISIONS	0918	47	288	BBR
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7-13 5-21	DAL	DALLAS		14

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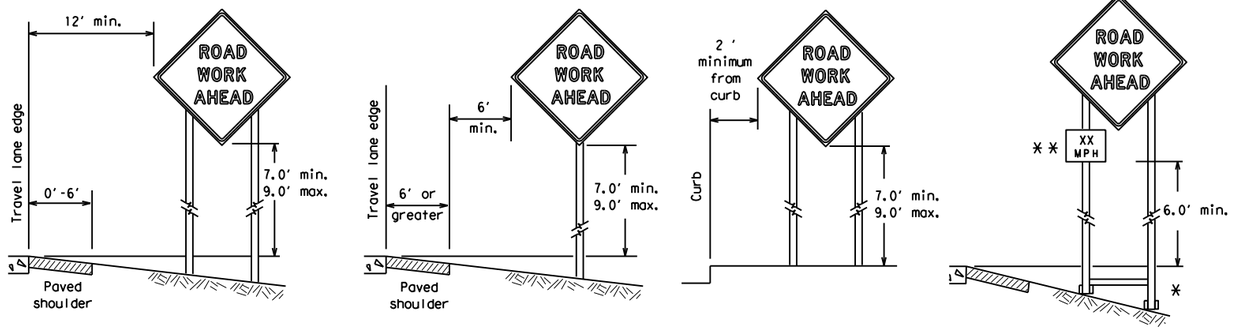
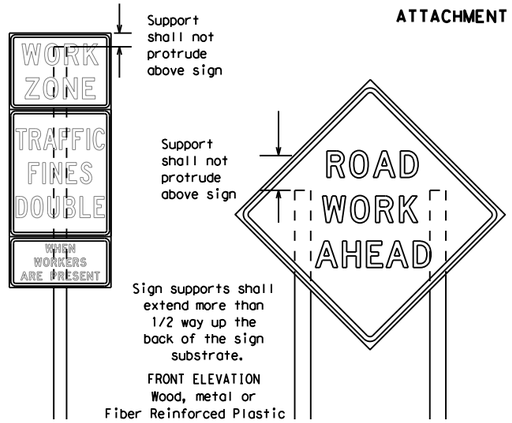
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

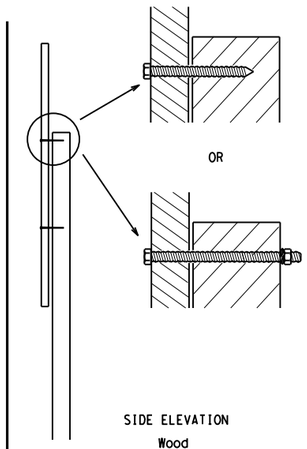


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





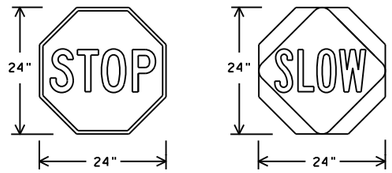
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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
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7-13 5-21	DAL	DALLAS		15

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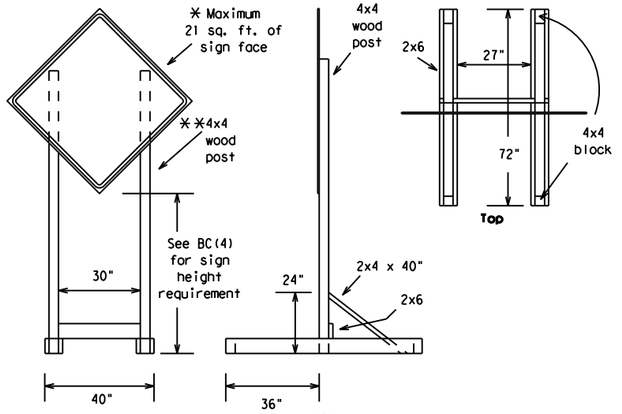
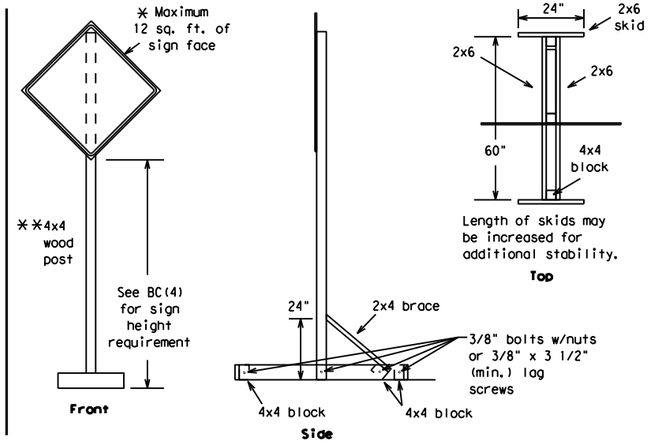
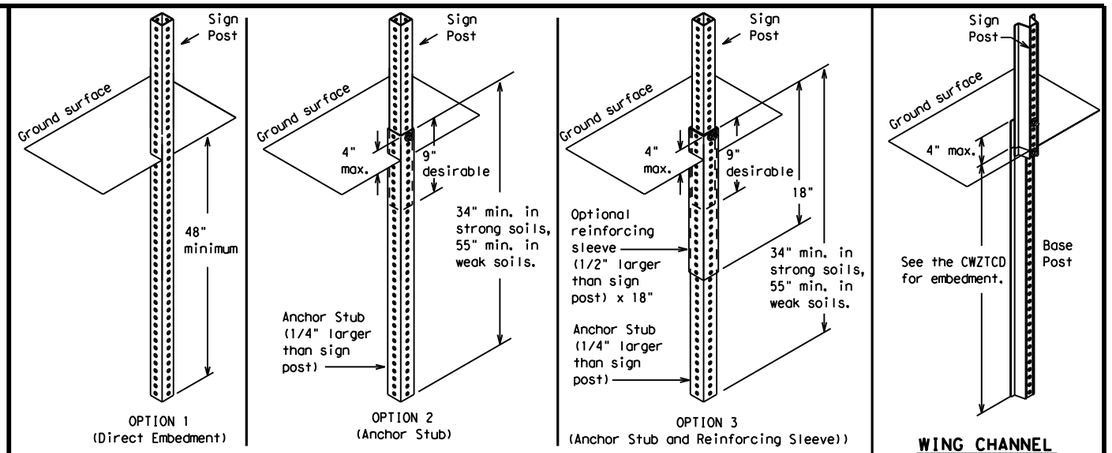




SKID MOUNTED WOOD SIGN SUPPORTS

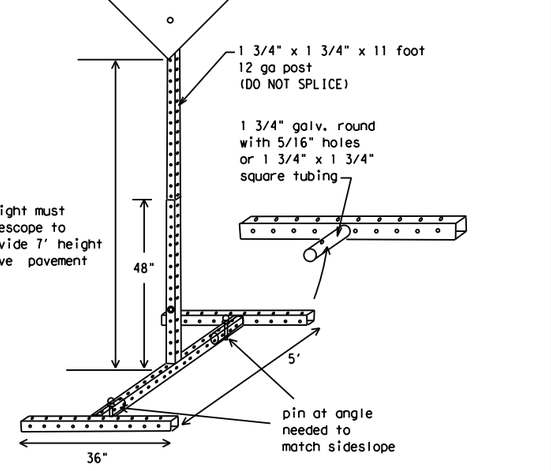
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

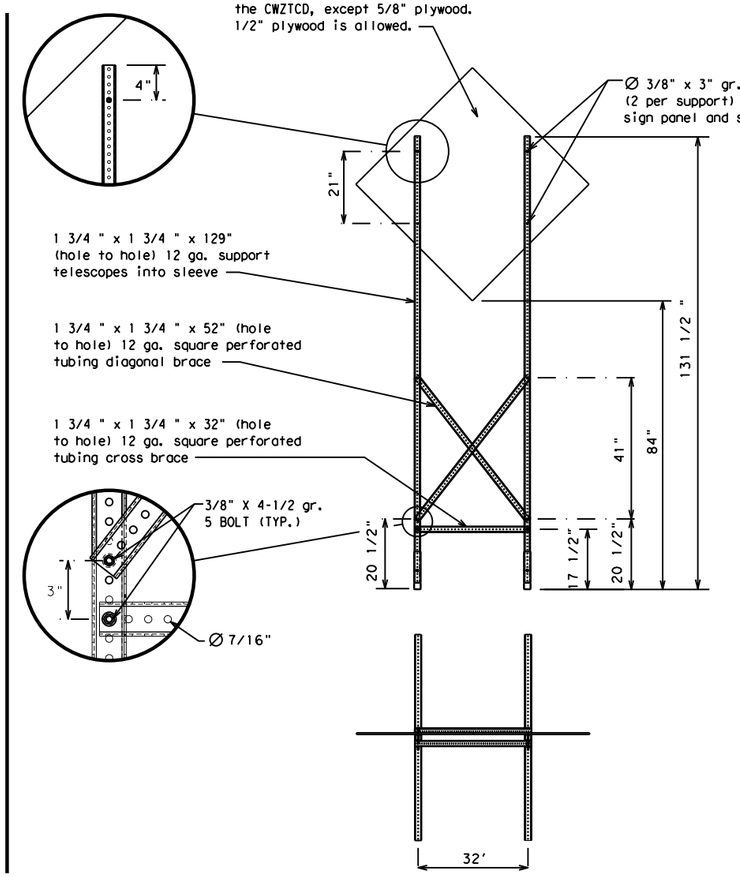


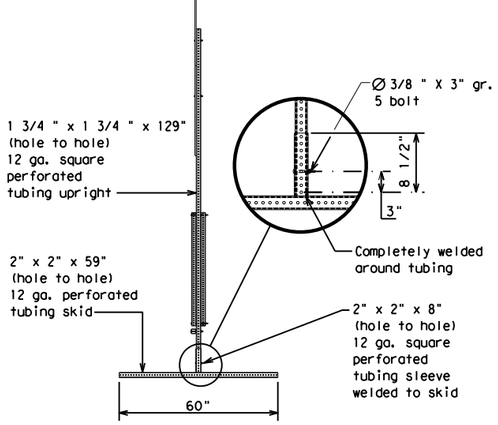
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		16

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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 *				

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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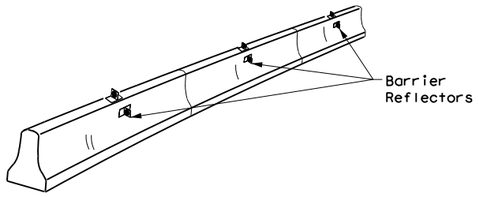
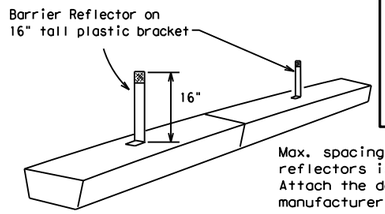
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

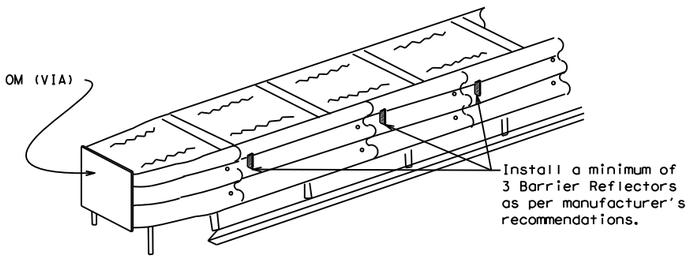


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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)

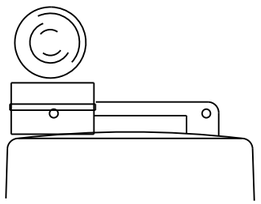


DELINEATION OF END TREATMENTS

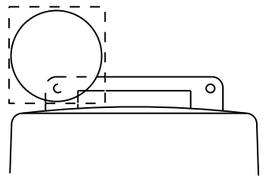
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

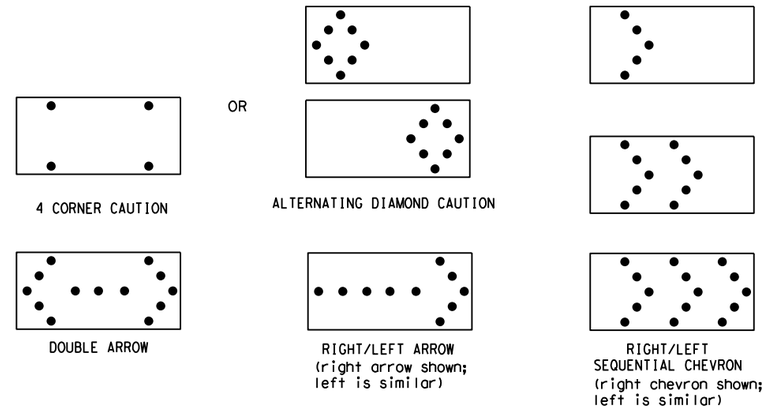
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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	47	288	BBR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		18

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

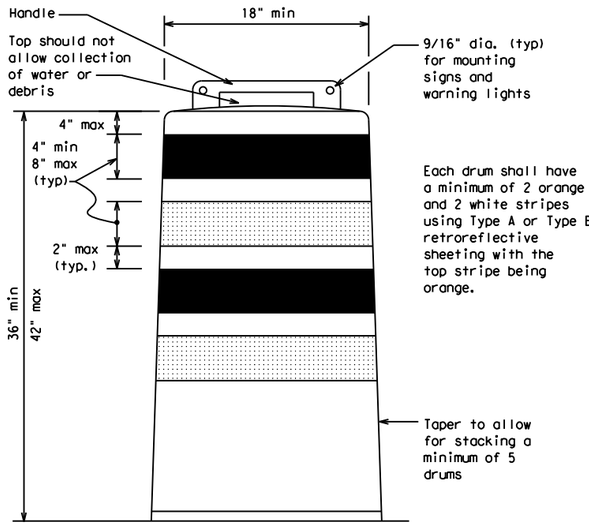
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

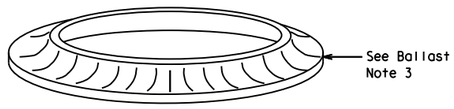
RETROREFLECTIVE SHEETING

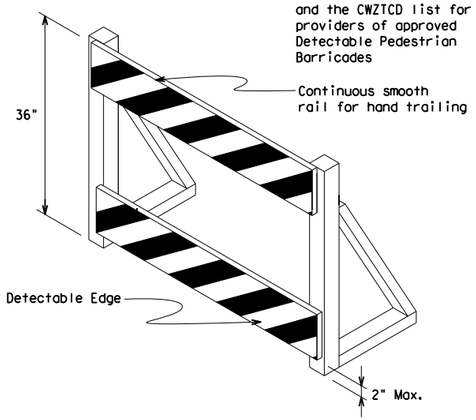
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

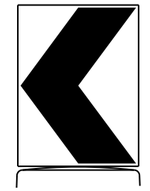




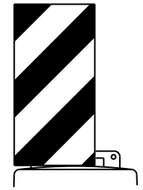


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 5-21	DAL	DALLAS		19
7-13				

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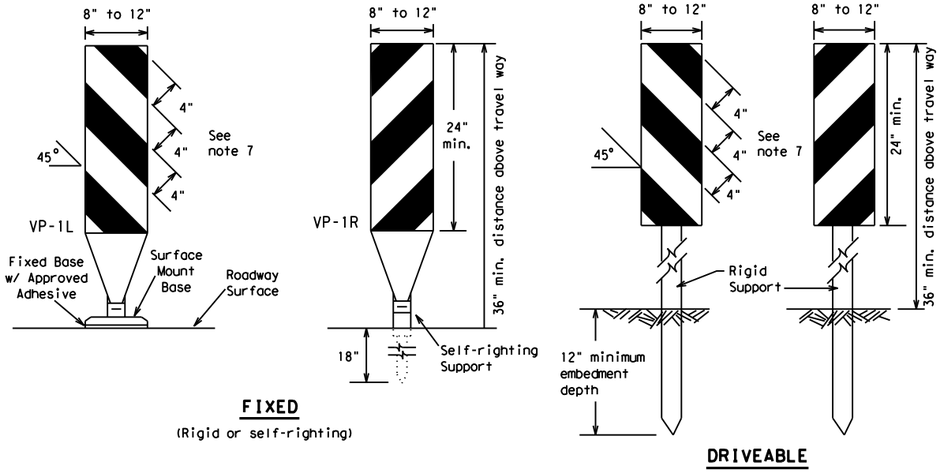
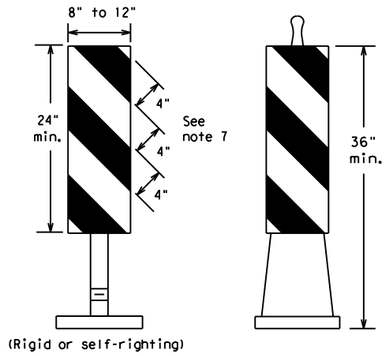


FIXED
(Rigid or self-righting)

DRIVEABLE

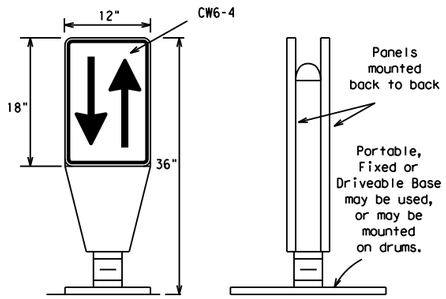


(Rigid or self-righting)

PORTABLE

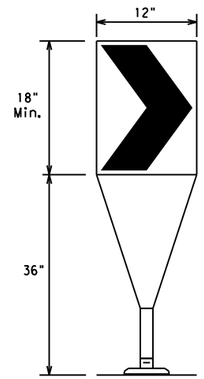
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



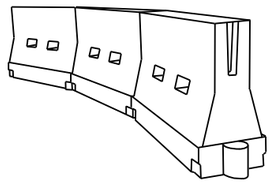
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

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
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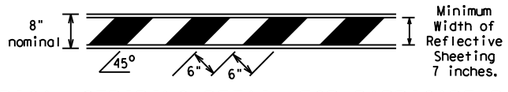
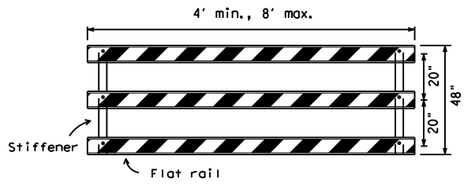
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



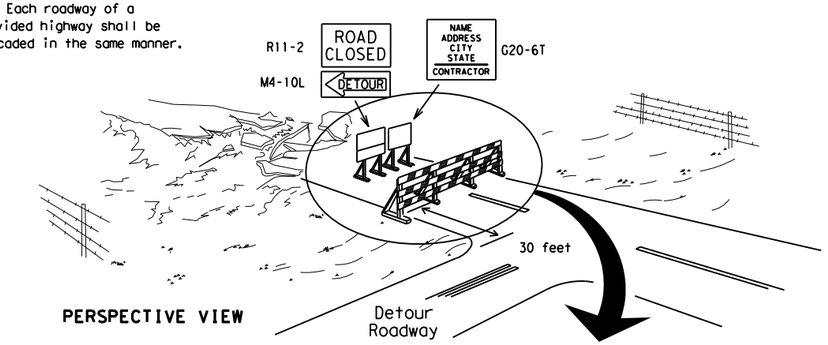
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

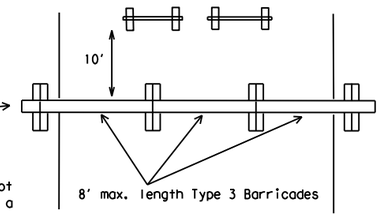
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

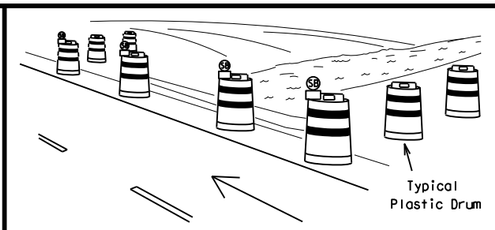
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

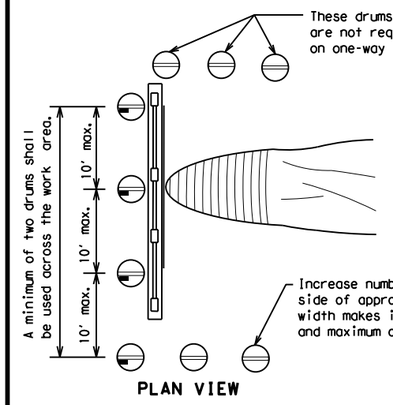
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

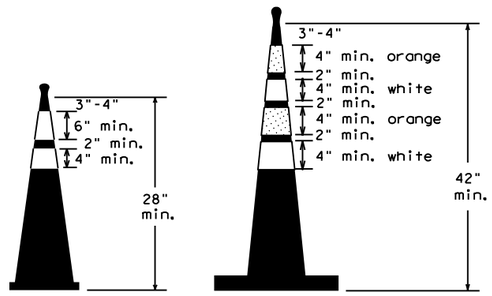
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



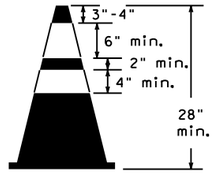
PLAN VIEW

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

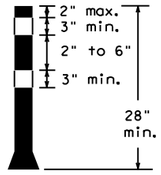
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

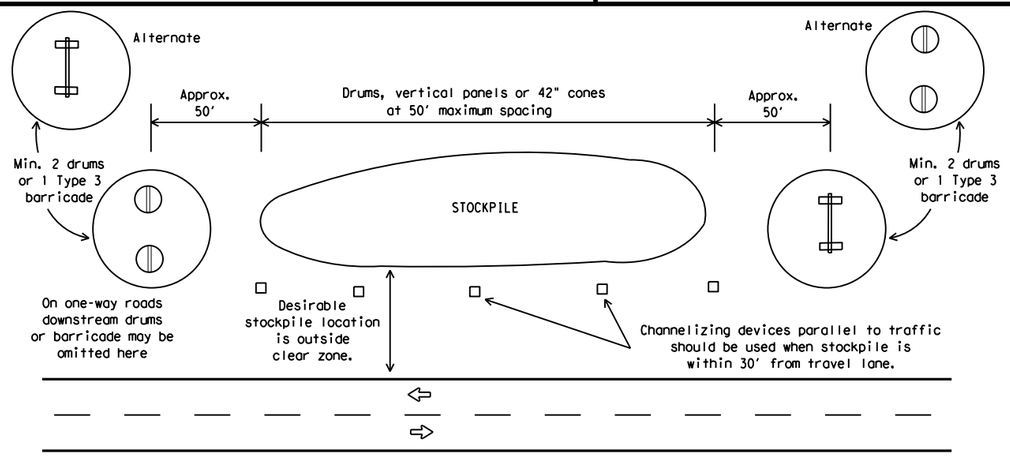


Tubular Marker

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
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

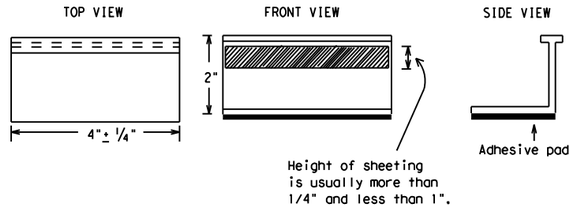
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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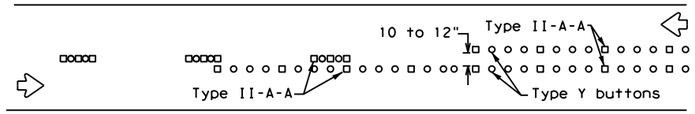
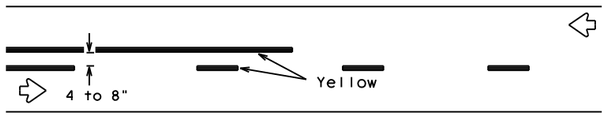
PAVEMENT MARKING PATTERNS

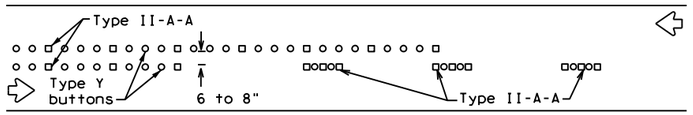
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



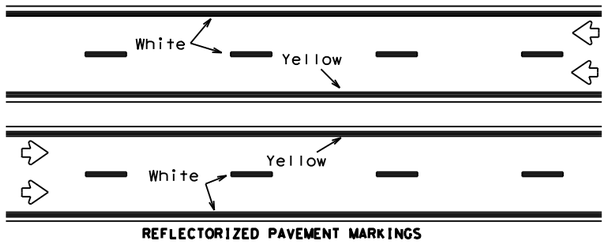
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



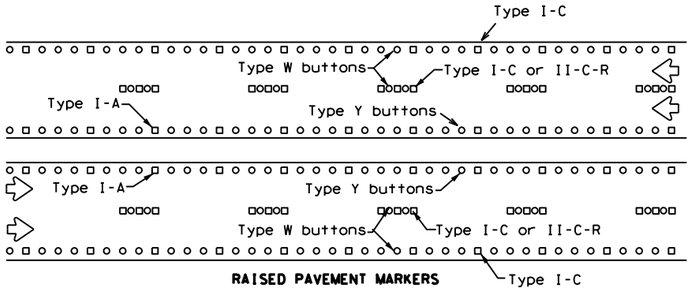
RAISED PAVEMENT MARKERS - PATTERN B

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

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



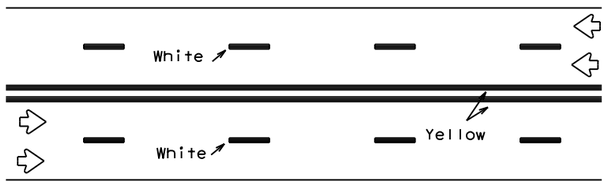
REFLECTORIZED PAVEMENT MARKINGS



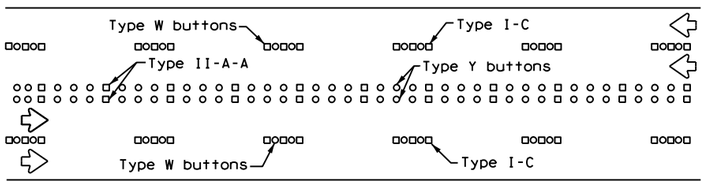
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



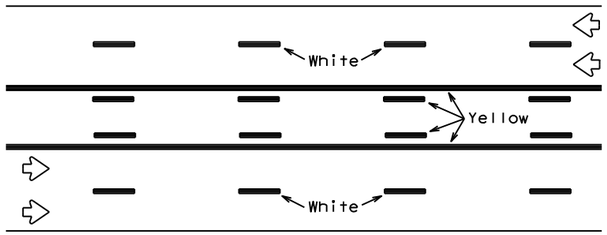
REFLECTORIZED PAVEMENT MARKINGS



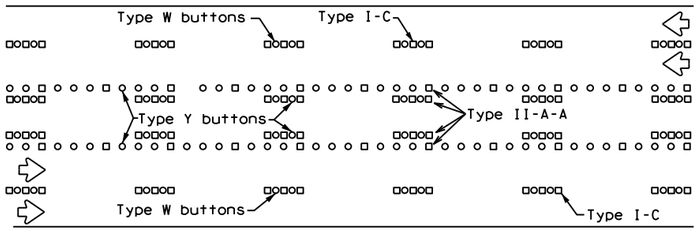
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

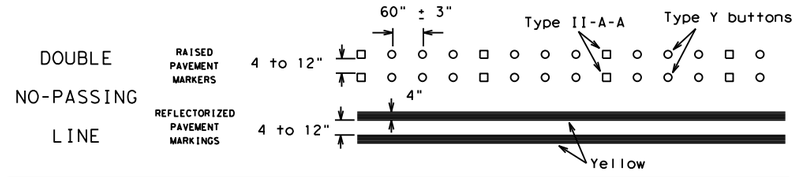
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

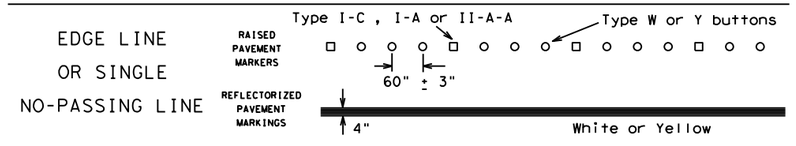
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

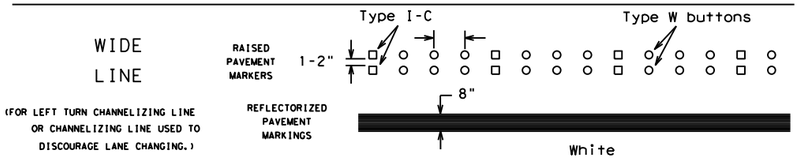


EDGE LINE OR SINGLE NO-PASSING LINE



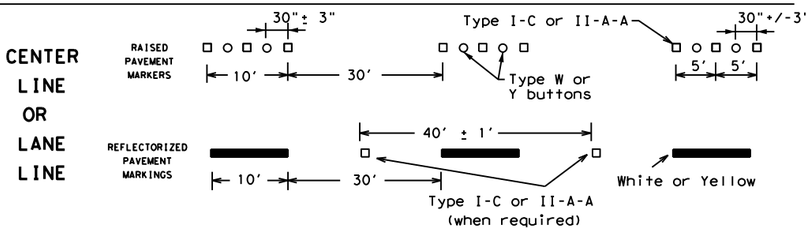
WIDE LINE

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

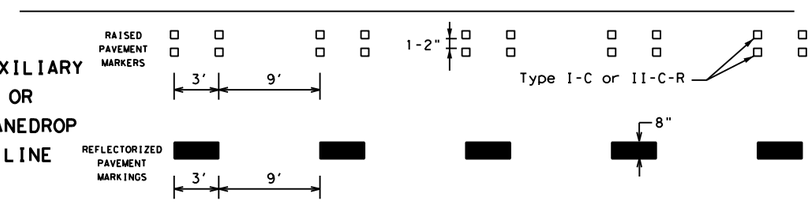


BROKEN LINES

CENTER LINE OR LANE LINE

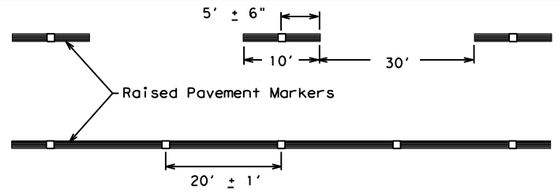


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21	0918	47	288	BBR
2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	DAL	DALLAS		23

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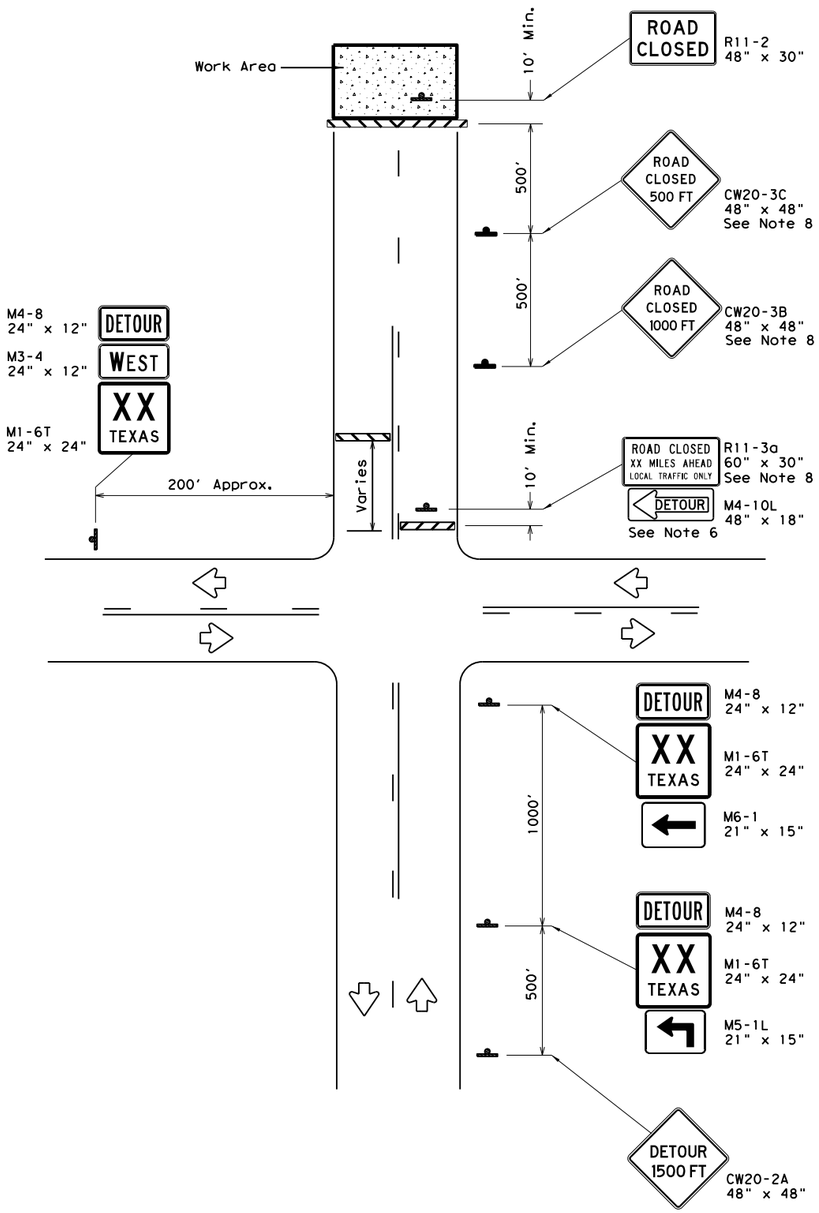
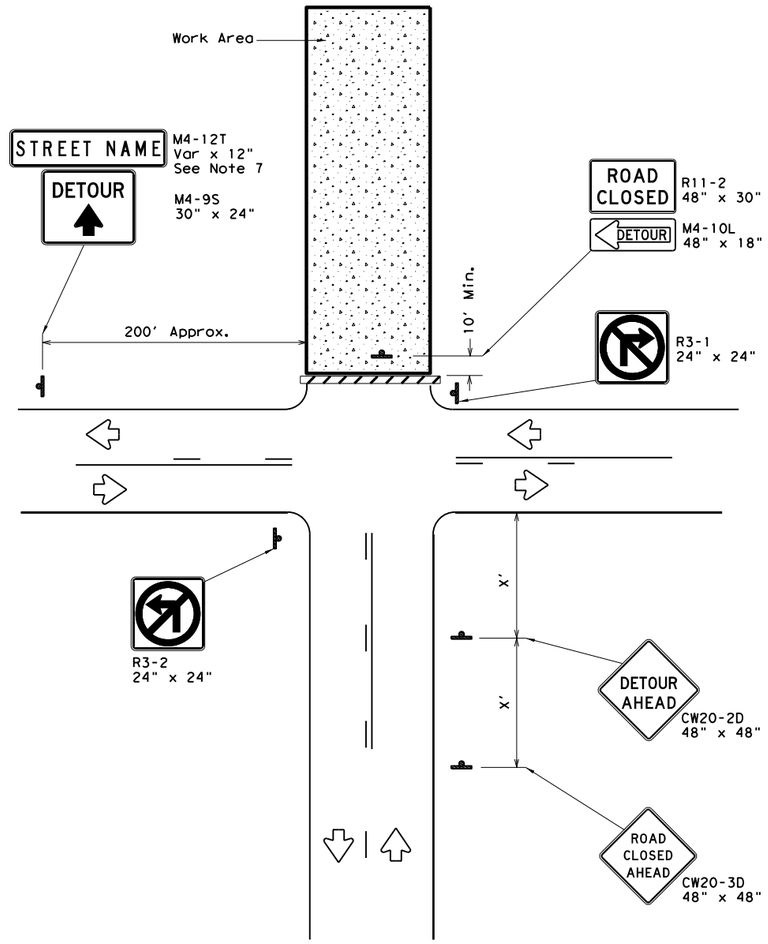


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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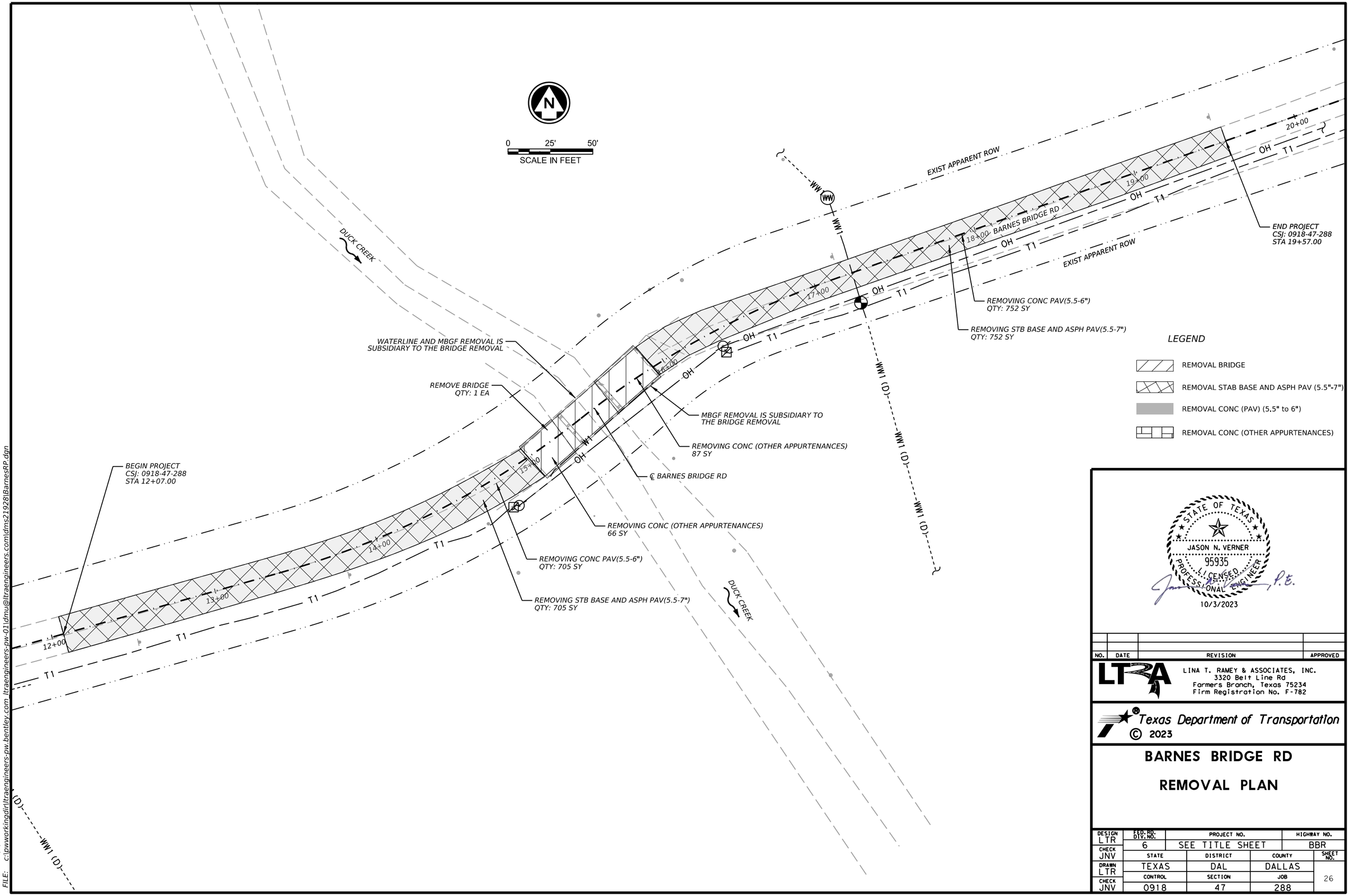
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	DAL	DALLAS		24



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STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

REMOVAL PLAN

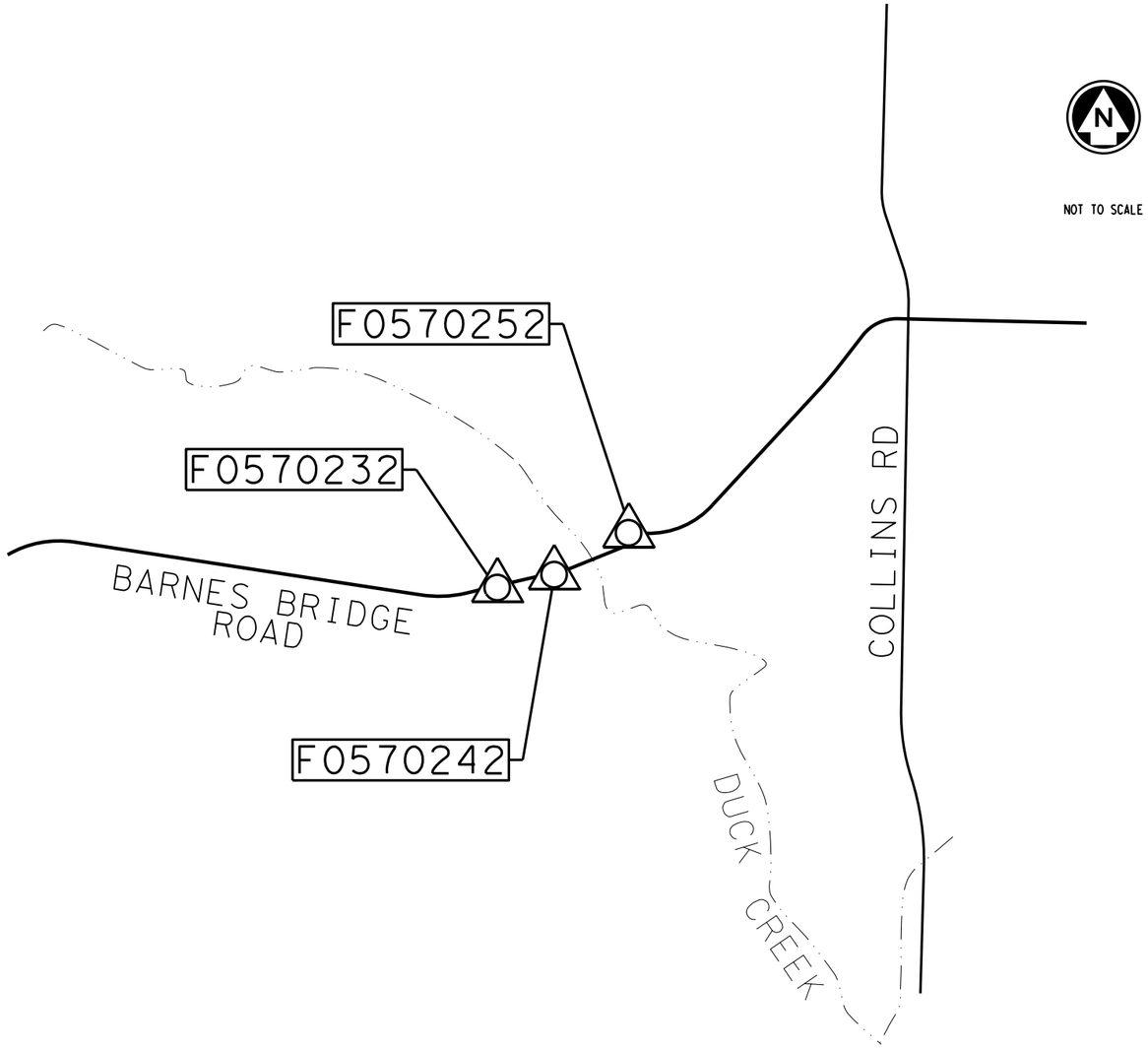
DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY
DRAWN LTR	TEXAS	DAL	DALLAS
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

SHEET NO. 26

PRIMARY CONTROL POINTS								
CONTROL POINT	SURFACE COORDINATES		GRID COORDINATES		LATITUDE	LONGITUDE	ELEVATION	DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING				
F0570232	6,990,891.06	2,562,184.77	6,989,936.89	2,561,835.07	32°49'43.85911"	96°34'05.51647"	426.64	SET TxDOT 3-1/2" ALUMINUM DISK IN CONCRETE
F0570242	6,990,977.45	2,562,565.75	6,990,023.27	2,562,215.99	32°49'44.64443"	96°34'01.03402"	429.80	SET TxDOT 3-1/2" ALUMINUM DISK IN CONCRETE
F0570252	6,991,257.69	2,563,064.70	6,990,303.47	2,562,714.87	32°49'47.32576"	96°33'55.12747"	429.41	SET TxDOT 3-1/2" ALUMINUM DISK IN CONCRETE

NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE(4202), NORTH AMERICAN DATUM OF 1983(NAD83) 2011 ADJUSTMENT, EPOCH 2010(GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.000136506
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK TXDA(DALLAS) & TXKA(KAUFMAN), BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS
3. UNIT OF MEASURE IS U.S. SURVEY FOOT
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK TXDA(DALLAS) & TXKA(KAUFMAN)
5. FIELD SURVEYS WERE PERFORMED DURING AUGUST 2022



STATE OF TEXAS
REGISTERED
CHRISTOPHER R. FREEMAN
5701
PROFESSIONAL
LAND SURVEYOR

DATE: 09-18-2023

Christopher R Freeman

CHRISTOPHER R. FREEMAN - R.P.L.S. NO. 5701

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

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

SURVEY CONTROL INDEX

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
LTR	6	SEE TITLE SHEET		BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	27
DRAWN	CONTROL	SECTION	JOB	
LTR	0918	47	288	
CHECK				
JNV				

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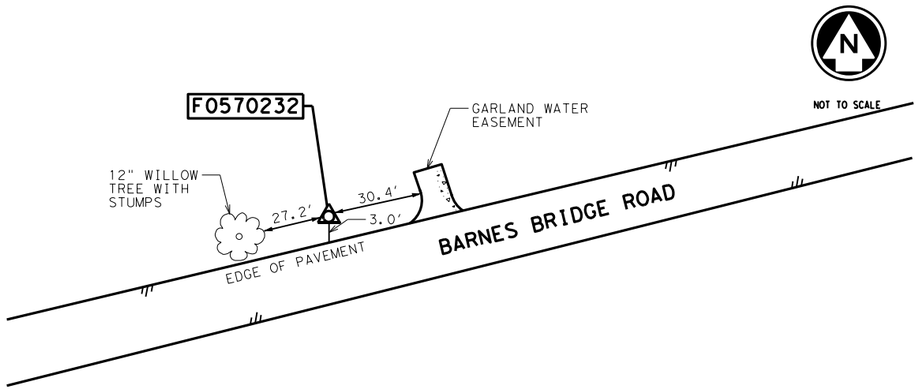
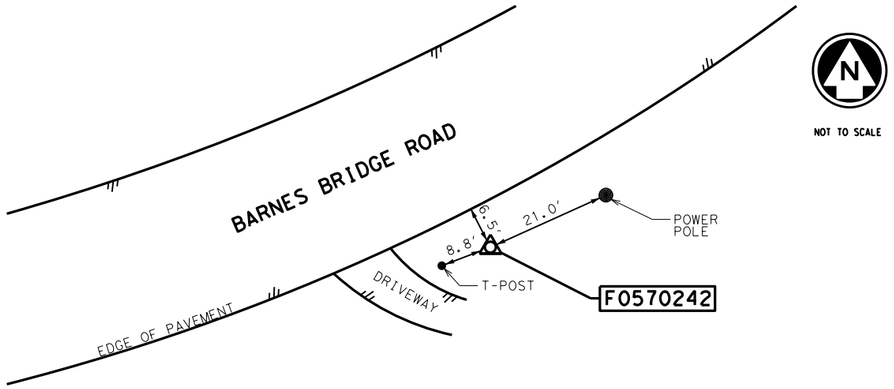


CONTROL POINT: F0570232

CP# F0570232 IS A 3-1/2" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE NORTH SIDE OF BARNES BRIDGE ROAD, +/- 428.3' SOUTHWEST FROM BARNES BRIDGE

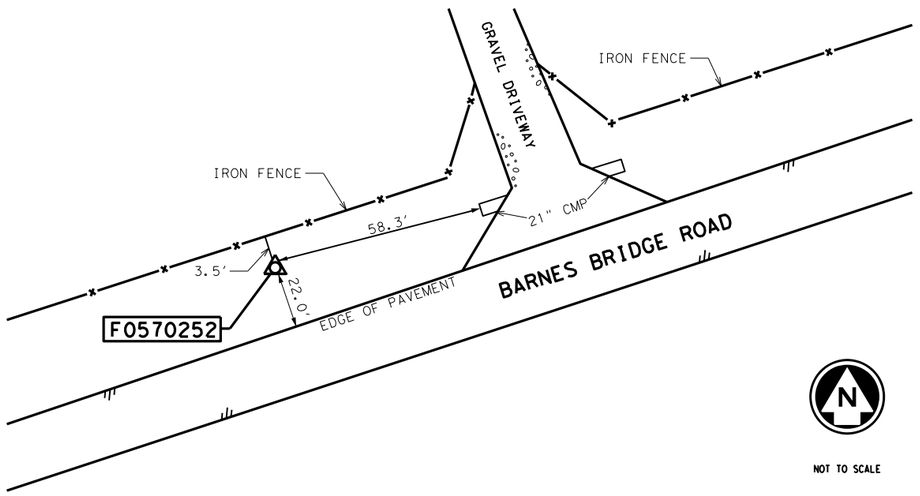
SURFACE COORDINATES:		GRID COORDINATES:			
NORTHING:	6,990,891.06	NORTHING:	6,989,936.89	LATITUDE:	32°49'43.85911"
EASTING:	2,562,184.77	EASTING:	2,561,835.07	LONGITUDE:	96°34'05.51647"
ELEVATION:	426.64	ELEVATION:	426.64		



CONTROL POINT: F0570242

CP# F0570242 IS A 3-1/2" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE SOUTH SIDE OF BARNES BRIDGE RD, +/- 58.8' SOUTHWEST FROM BARNES BRIDGE

SURFACE COORDINATES:		GRID COORDINATES:			
NORTHING:	6,990,977.45	NORTHING:	6,990,023.27	LATITUDE:	32°49'44.64443"
EASTING:	2,562,565.75	EASTING:	2,562,215.99	LONGITUDE:	96°34'01.03402"
ELEVATION:	429.80	ELEVATION:	429.80		



CONTROL POINT: F0570252

CP# F0570252 IS A 3-1/2" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE NORTH SIDE OF BARNES BRIDGE ROAD, +/- 440.5' SOUTHWEST FROM BARNES BRIDGE

SURFACE COORDINATES:		GRID COORDINATES:			
NORTHING:	6,991,257.69	NORTHING:	6,990,303.47	LATITUDE:	32°49'47.32576"
EASTING:	2,563,064.70	EASTING:	2,562,714.87	LONGITUDE:	96°33'55.12747"
ELEVATION:	429.41	ELEVATION:	429.41		

NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS NORTH CENTRAL ZONE(4202), NORTH AMERICAN DATUM OF 1983(NAD83) 2011 ADJUSTMENT, EPOCH 2010(GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.000136506
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK TXDA(DALLAS) & TXKA(KAUFMAN), BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS
3. UNIT OF MEASURE IS U.S. SURVEY FOOT
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK TXDA(DALLAS) & TXKA(KAUFMAN)
5. FIELD SURVEYS WERE PERFORMED DURING AUGUST 2022

STATE OF TEXAS · REGISTERED · CHRISTOPHER R. FREEMAN · 5701 · PROFESSIONAL · LAND SURVEYOR

DATE: 09-18-2023

CHRISTOPHER R. FREEMAN - R.P.L.S. NO. 5701

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

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

SURVEY CONTROL DATA

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK			SHEET NO.
JNV			28

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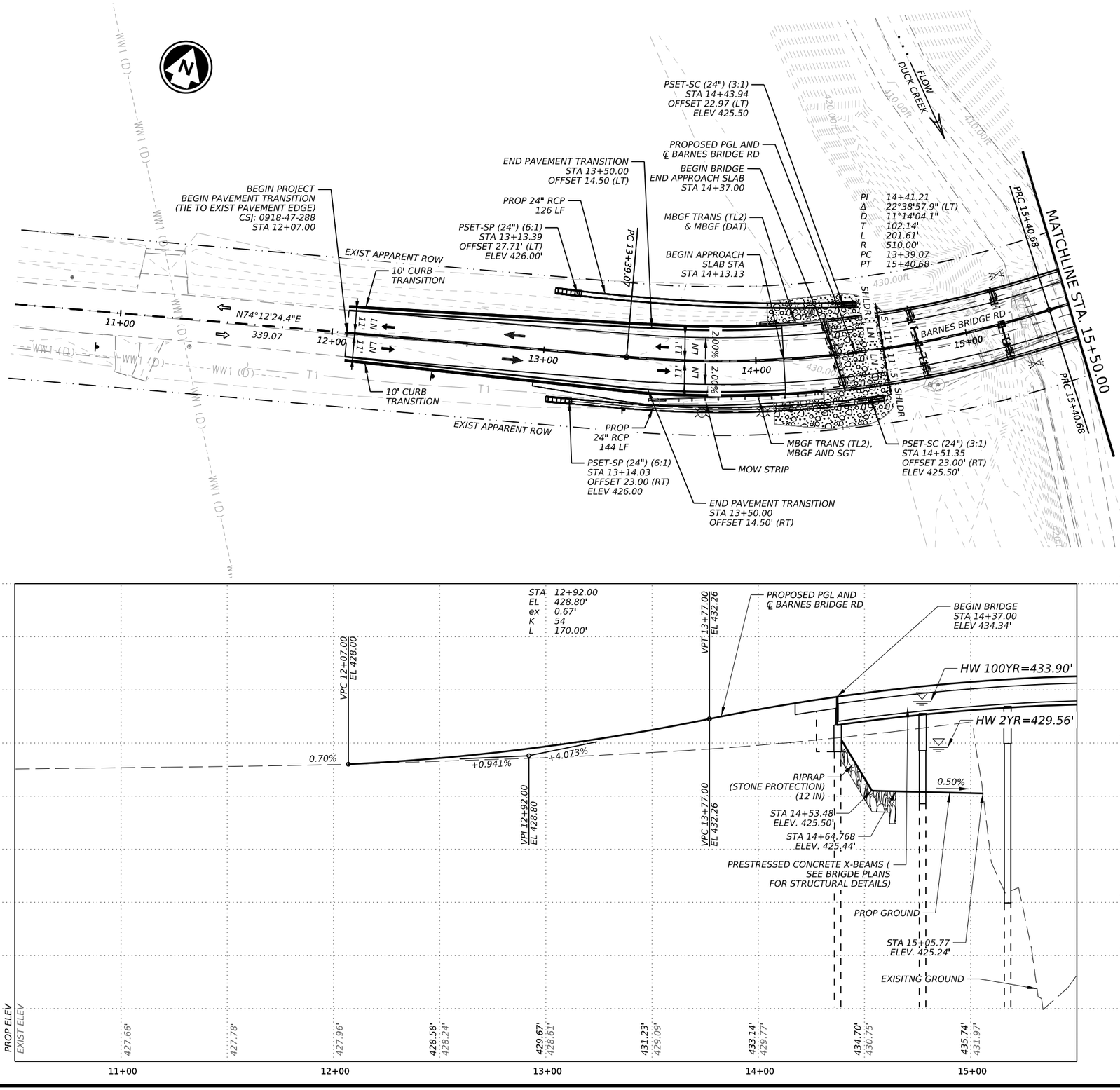
DN: LTR



HORIZ: 0 25 50 SCALE IN FEET

VERT: 0 5 10 SCALE IN FEET

NOTES:

1. ALL UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO VERIFY BEFORE CONSTRUCTION.
2. THIS BRIDGE IS CURRENTLY CLOSED TO TRAFFIC.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/7/2024

NO.	DATE	REVISION	APPROVED

LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

PLAN & PROFILE

SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
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CHECK			
JNV			

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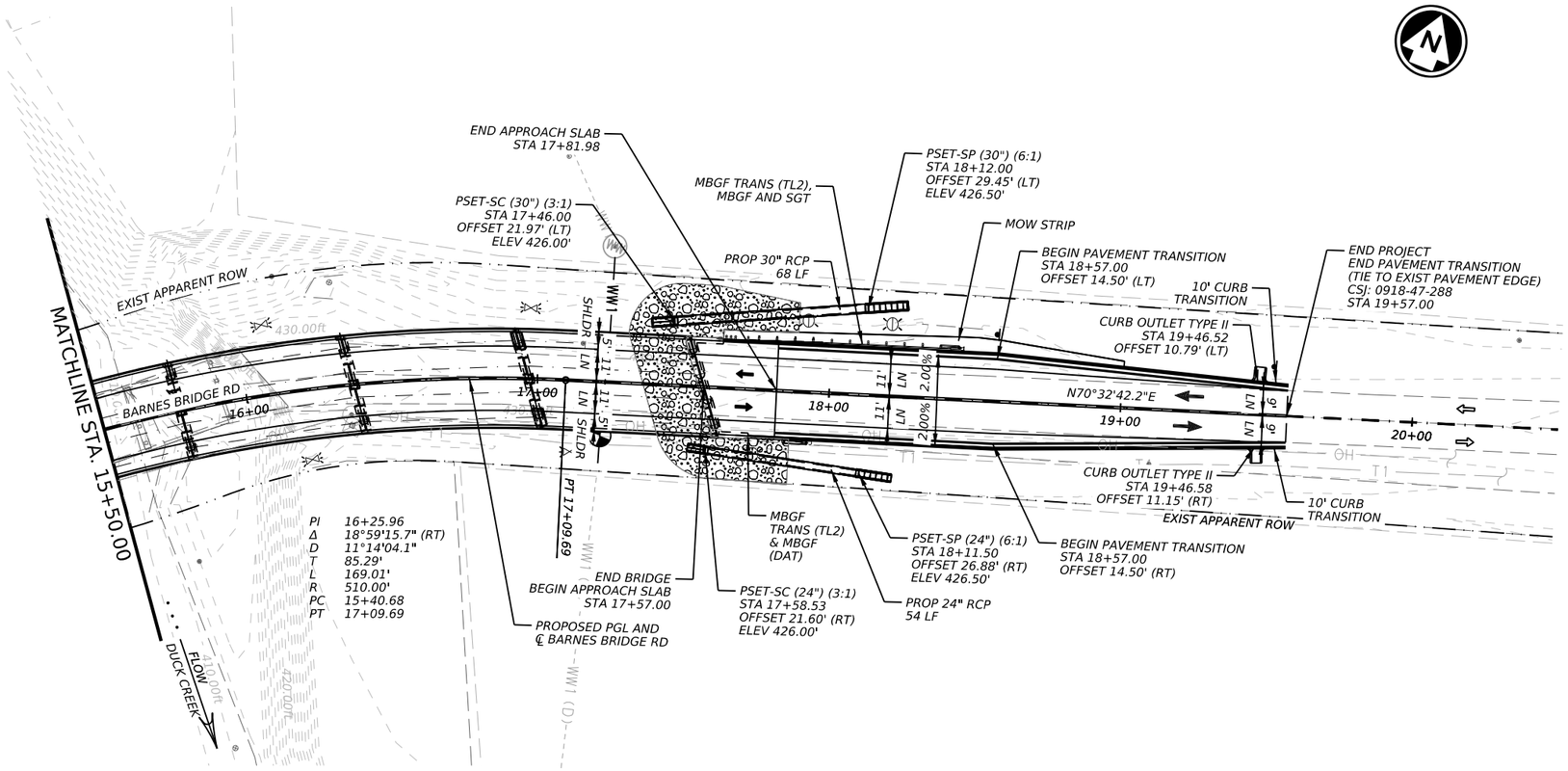

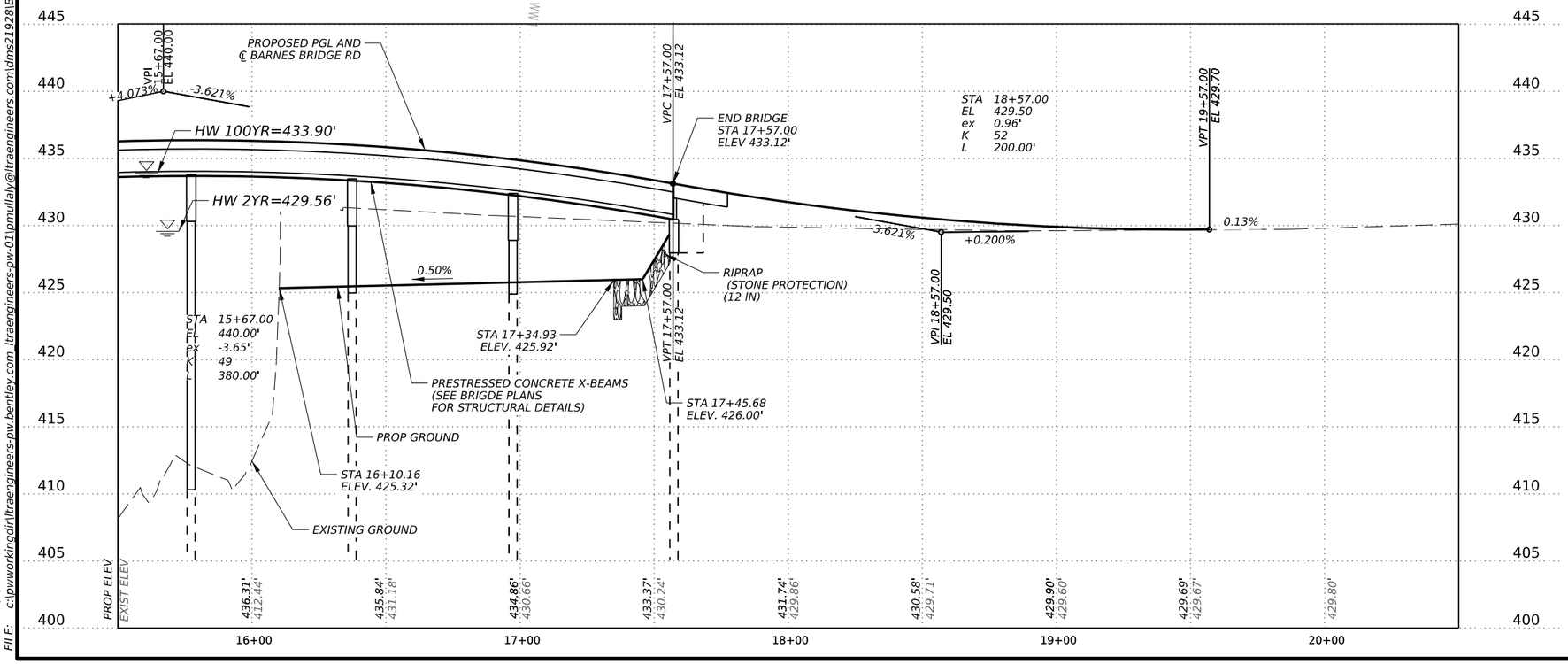

HORIZ: 0 25 50 SCALE IN FEET

VERT: 0 5 10 SCALE IN FEET

NOTES:

1. ALL UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION. CONTRACTOR TO VERIFY BEFORE CONSTRUCTION.
2. THIS BRIDGE IS CURRENTLY CLOSED TO TRAFFIC

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/7/2024

NO.	DATE	REVISION	APPROVED

LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

PLAN & PROFILE

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
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CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
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CHECK			
JNV			

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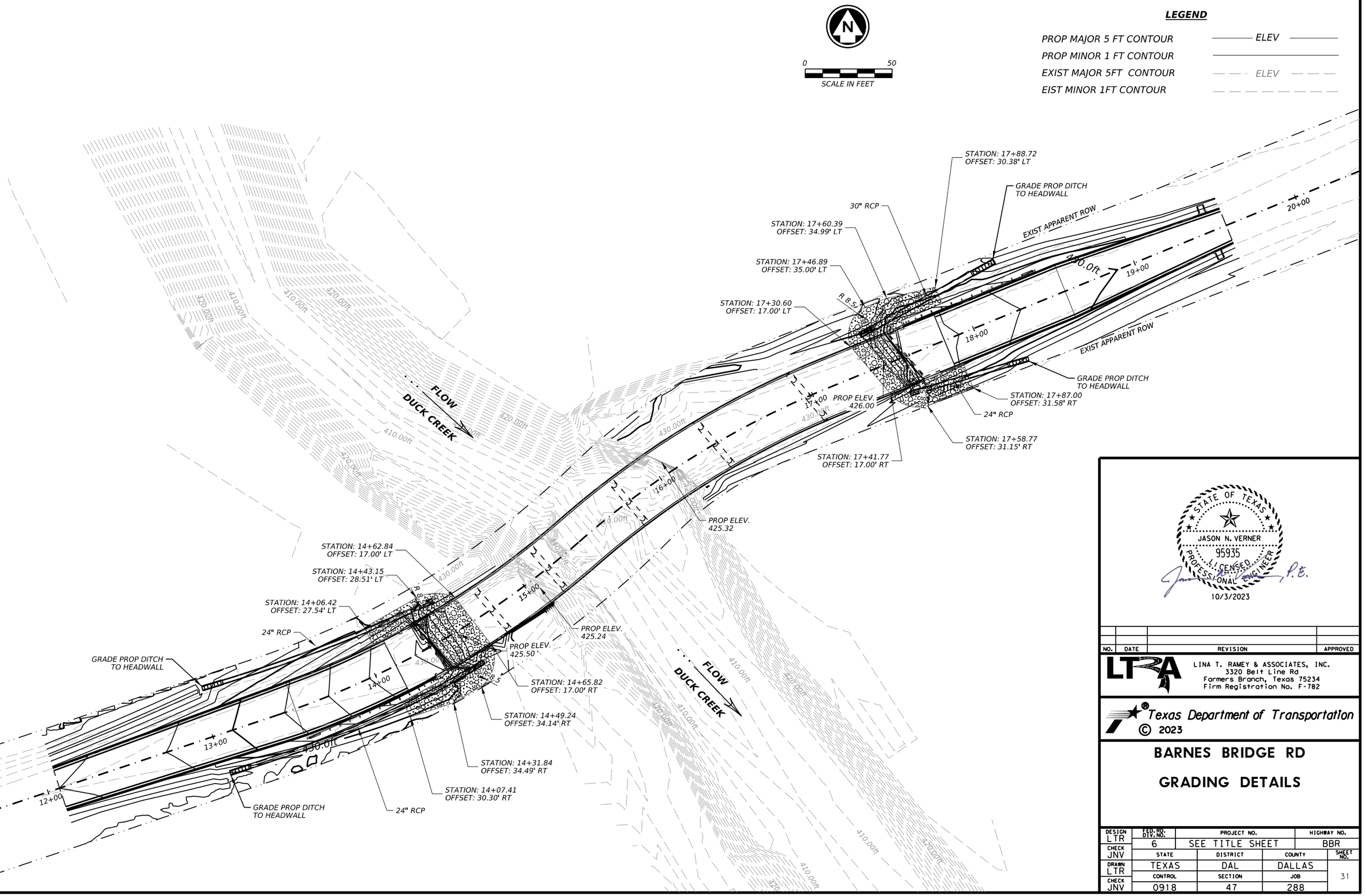

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STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
P.E.
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

GRADING DETAILS

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK			SHEET NO.
JNV			31

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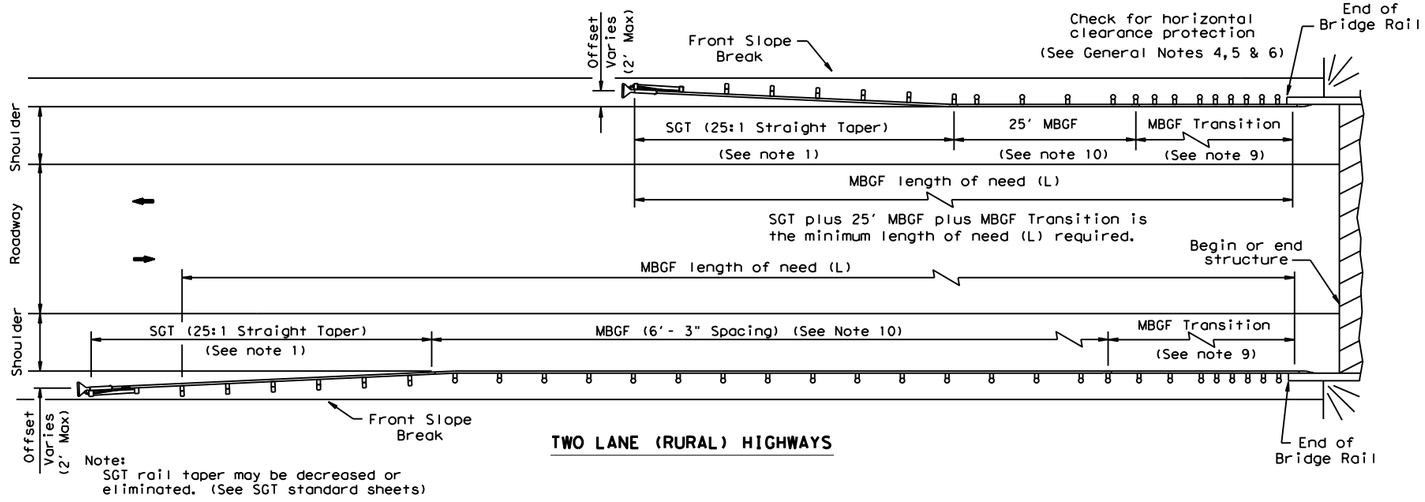
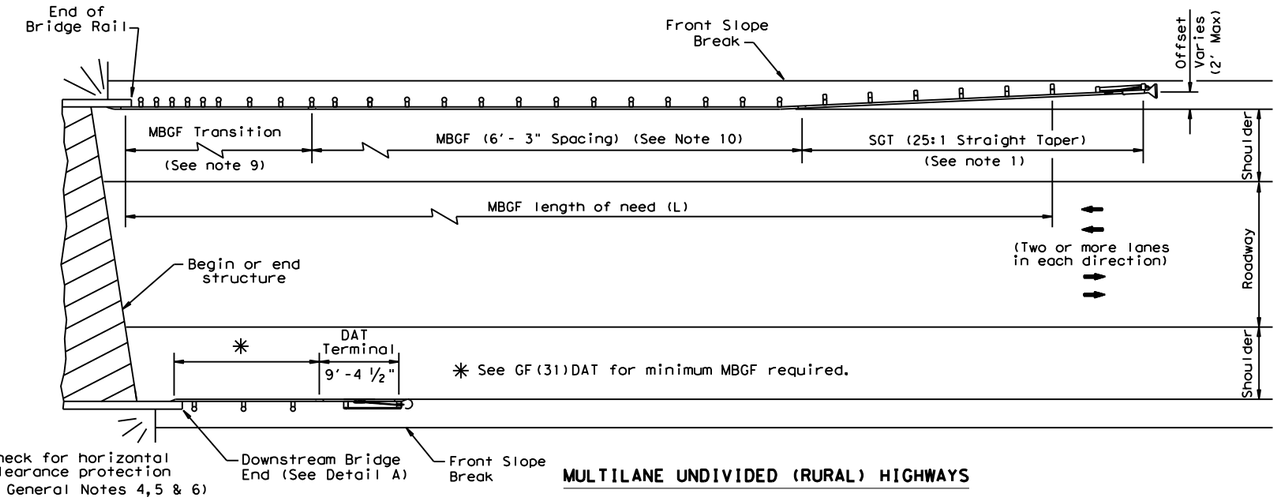
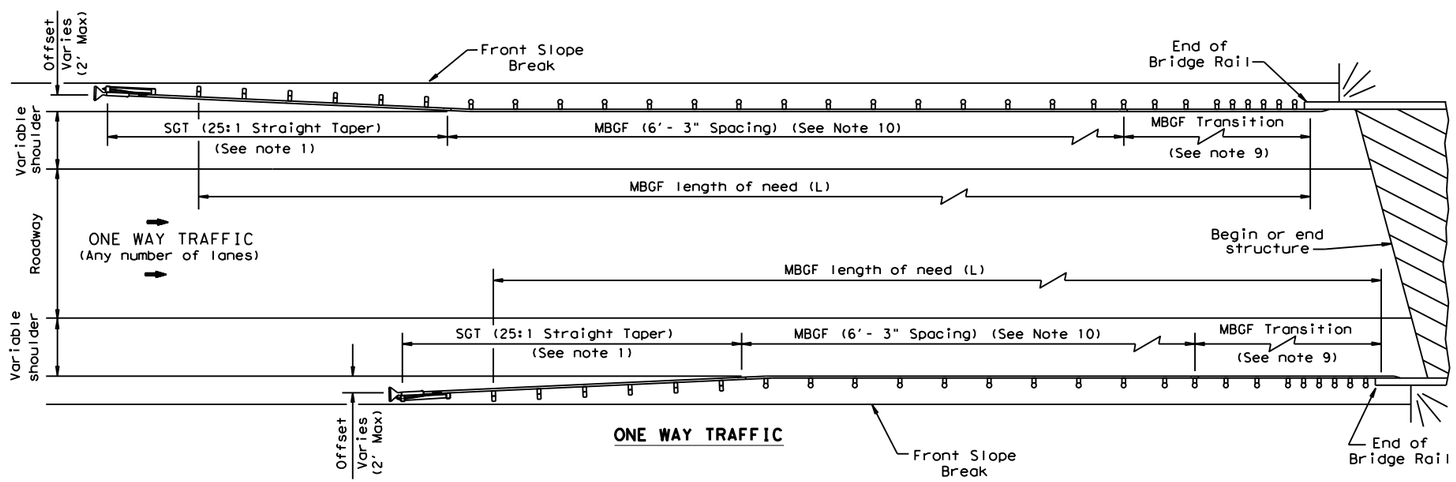


TWO LANE (RURAL) HIGHWAYS

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



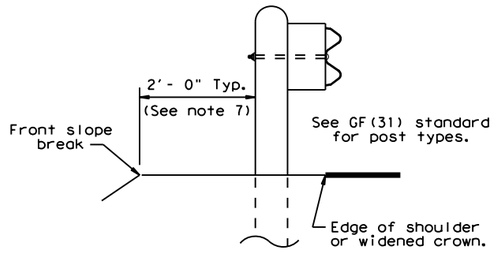
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation | Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		32

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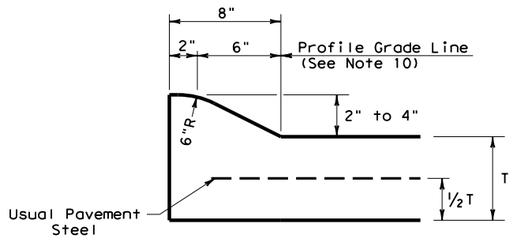
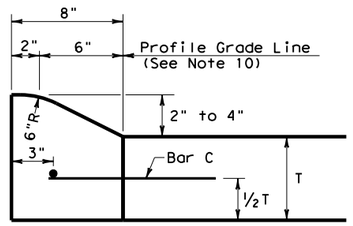


TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



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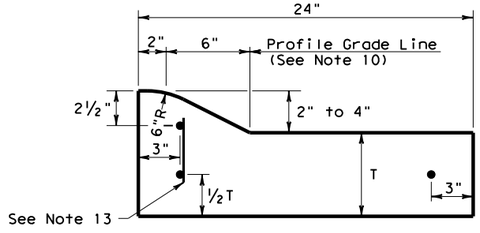
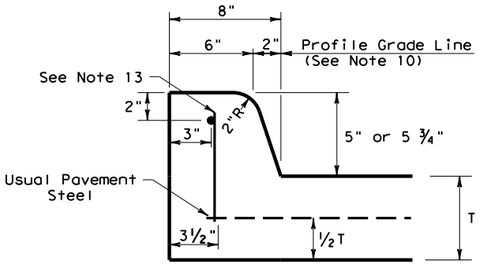


TYPE I CURB AND GUTTER
2" - 4" HEIGHT



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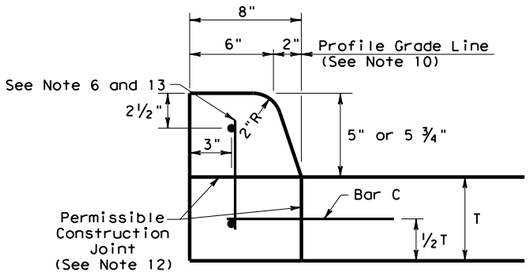
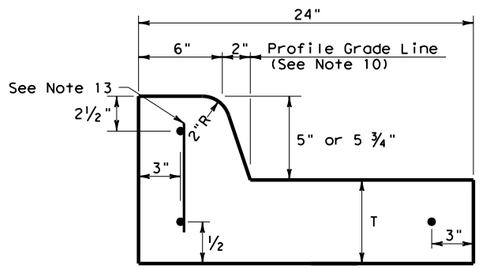
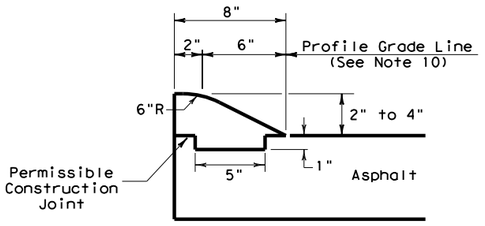
5" - 5 ¾" HEIGHT



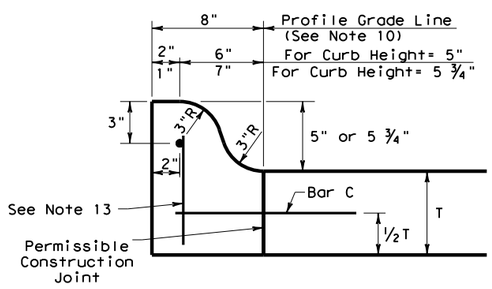
TYPE II CURB
5" - 5 ¾" HEIGHT



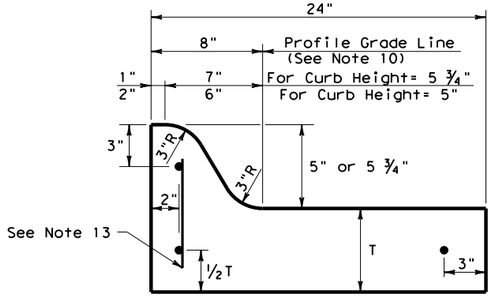
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



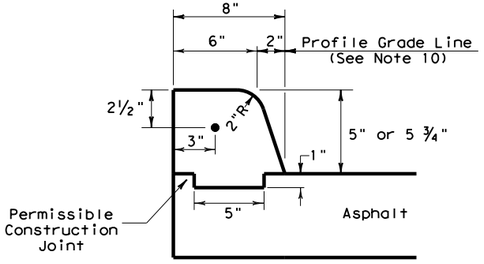
TYPE III CURB (KEYED)
2" - 4" HEIGHT



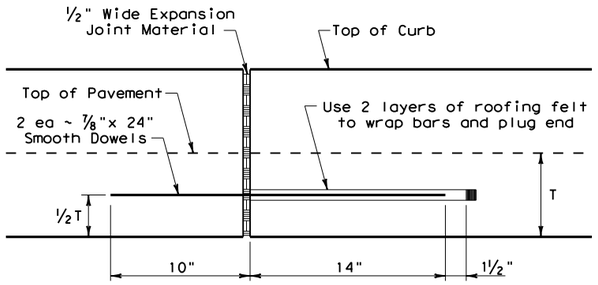
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

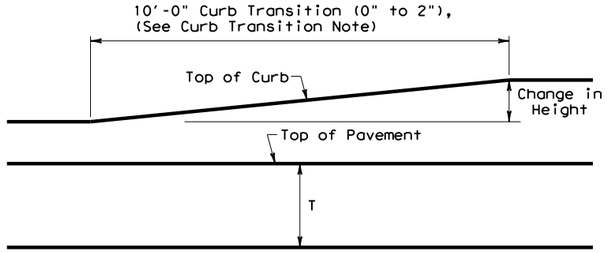


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

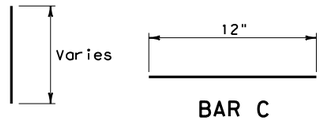
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
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	DAL	DALLAS		33

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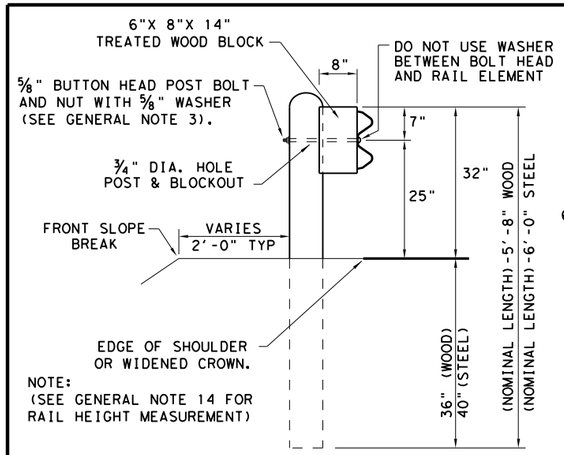
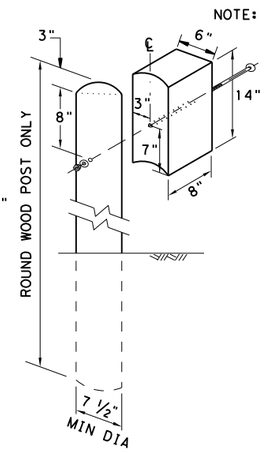
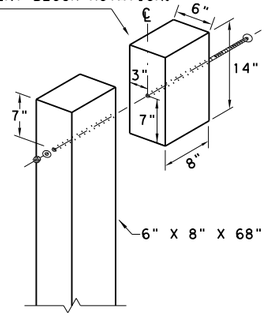


TYPICAL POST PLACEMENT

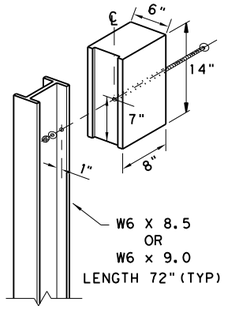


WOOD BLOCK TO ROUND WOOD POST

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

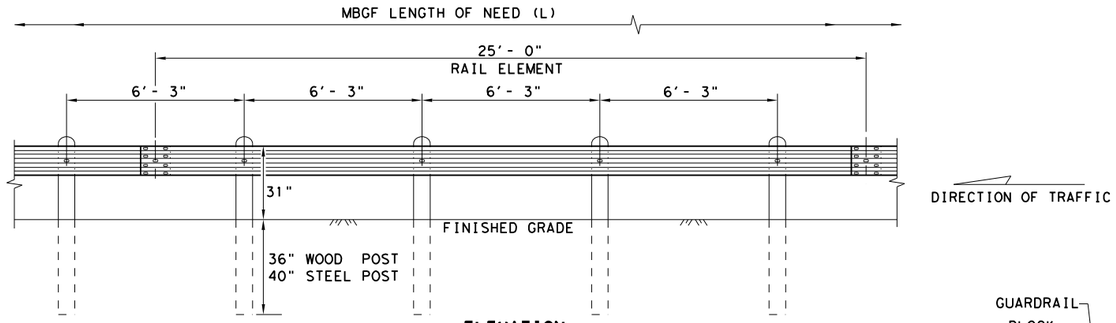


WOOD BLOCK TO RECTANGULAR WOOD POST



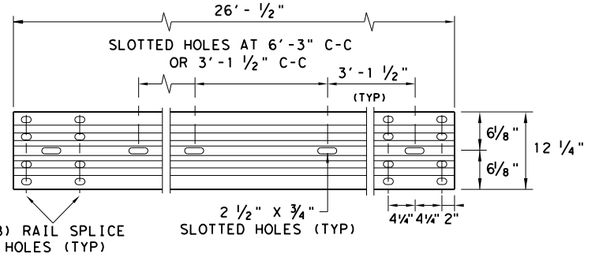
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

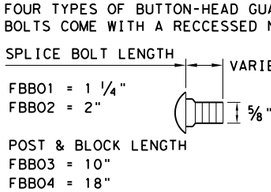
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

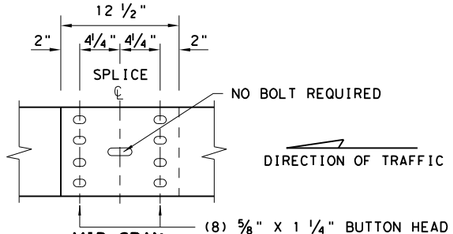
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



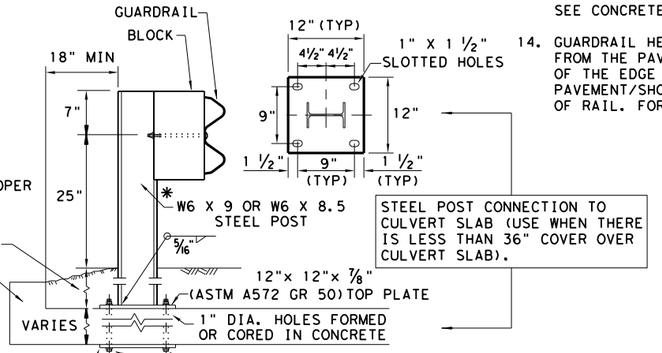
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

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
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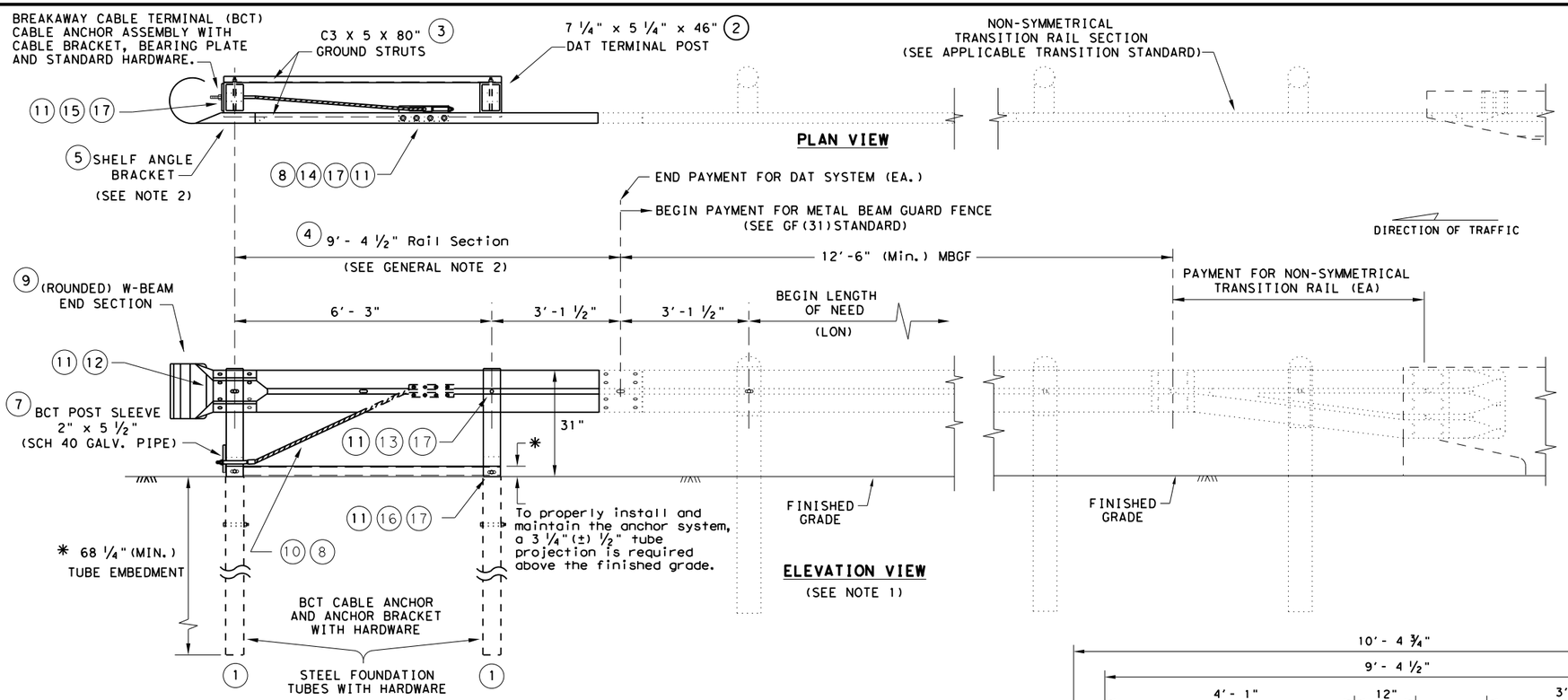


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

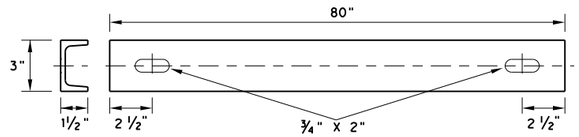
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

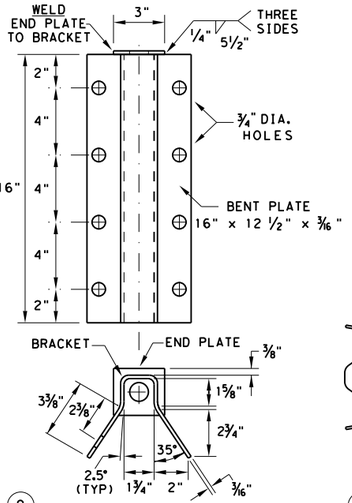
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

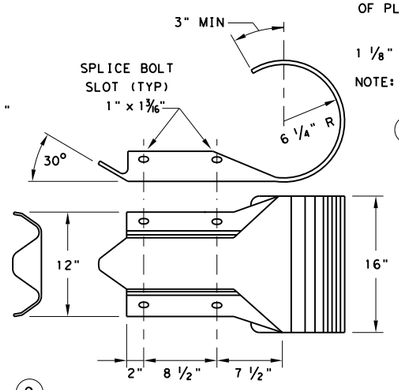
(4) TERMINAL RAIL ELEMENT FOR DAT



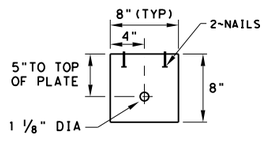
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

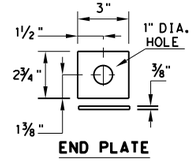


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

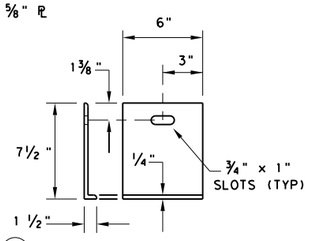


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

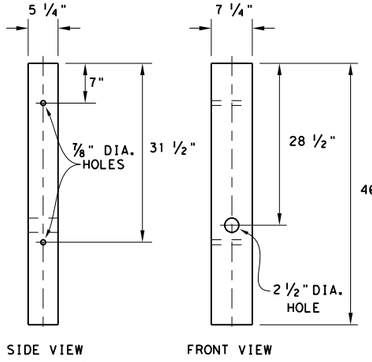
(6) BEARING PLATE
8"x 8"x 5/8" PL



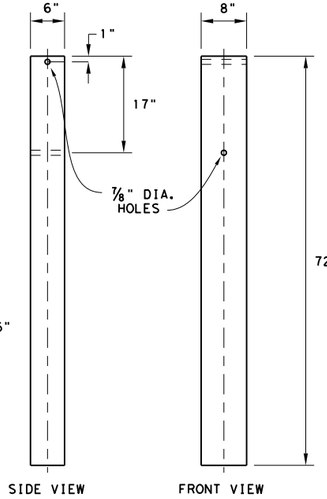
END PLATE



(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	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		35

DATE: 10/19/2023
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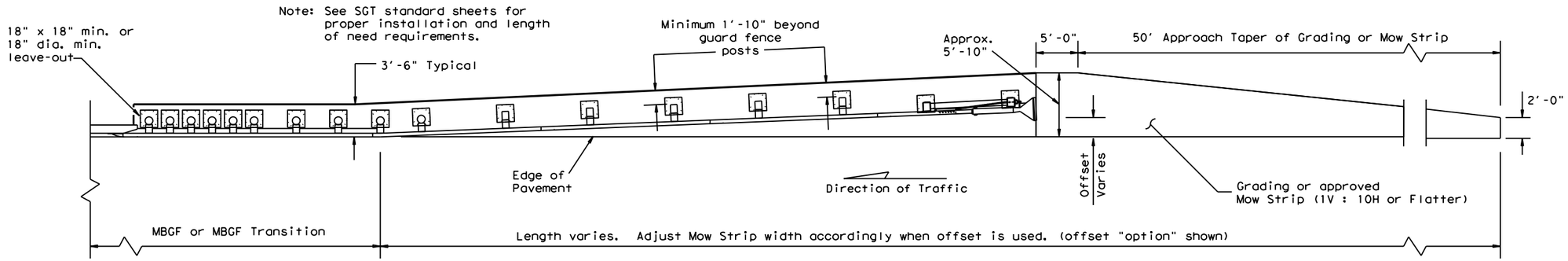
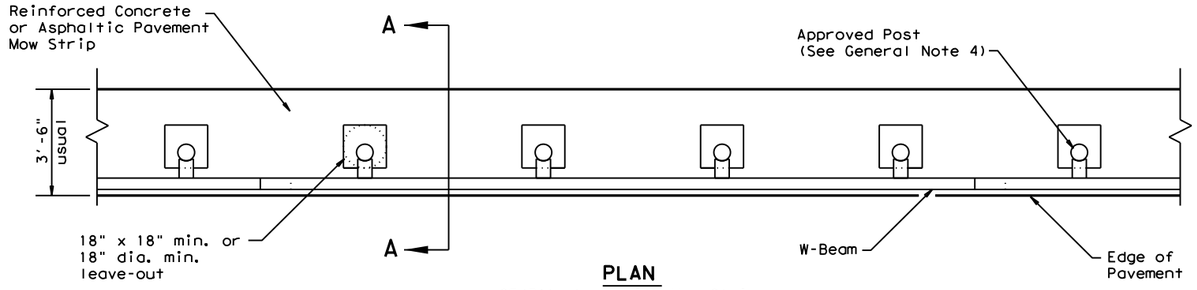
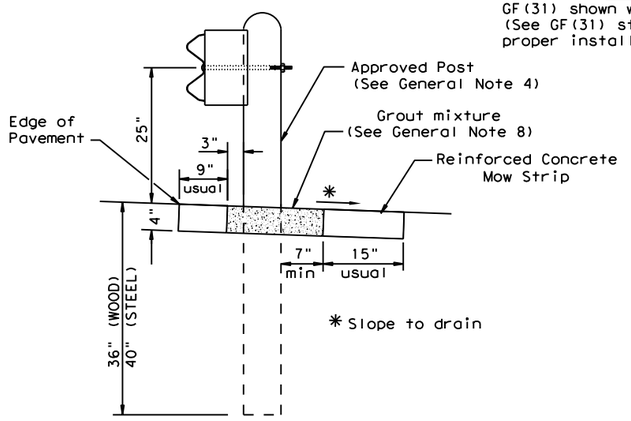


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



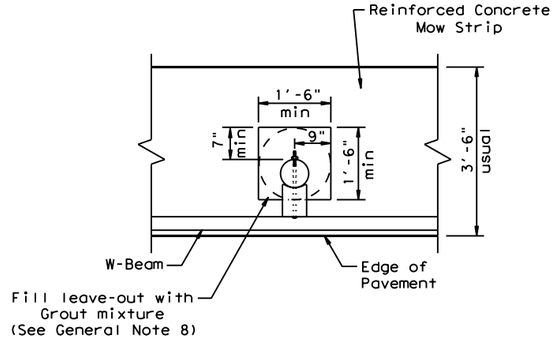
PLAN

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



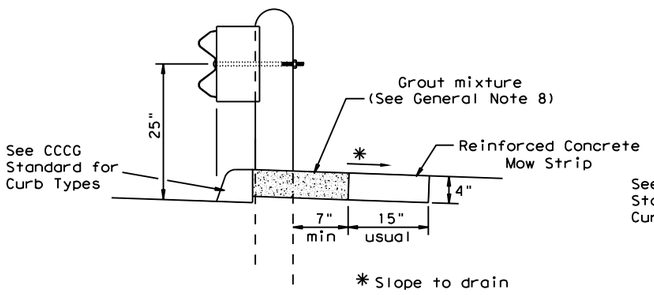
SECTION A-A

Typical



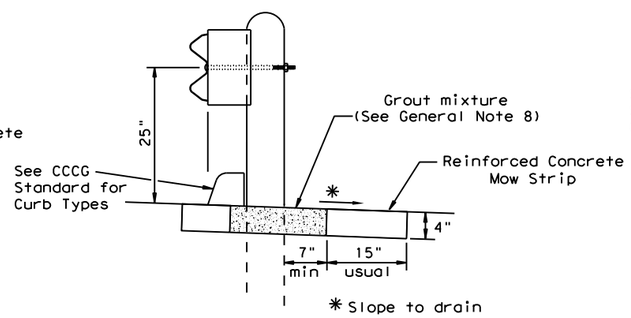
MOW STRIP DETAIL

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



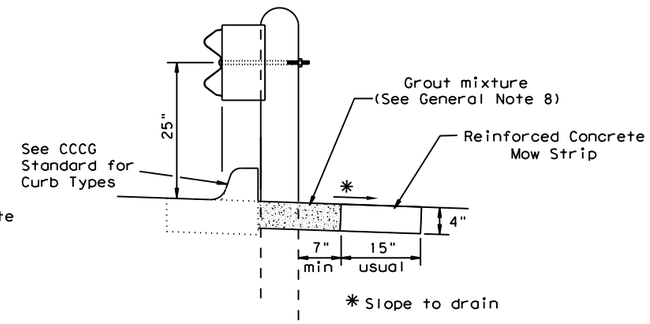
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I 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
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		36

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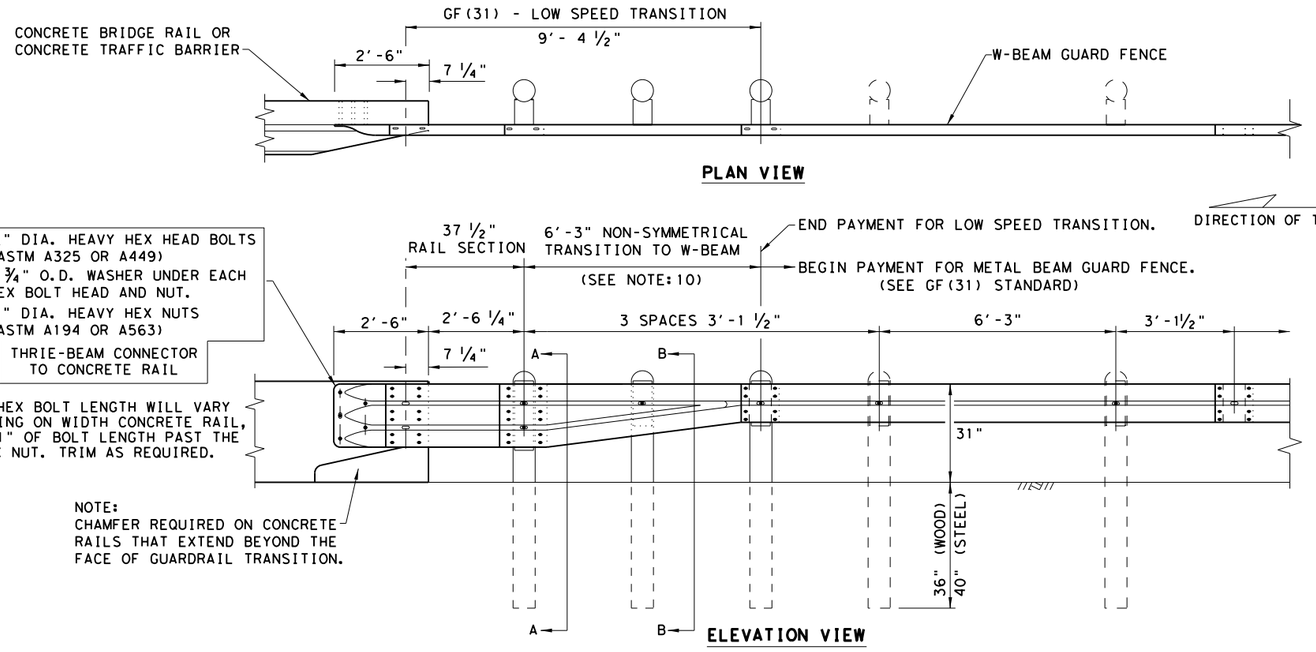


GENERAL NOTES

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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. 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.
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 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

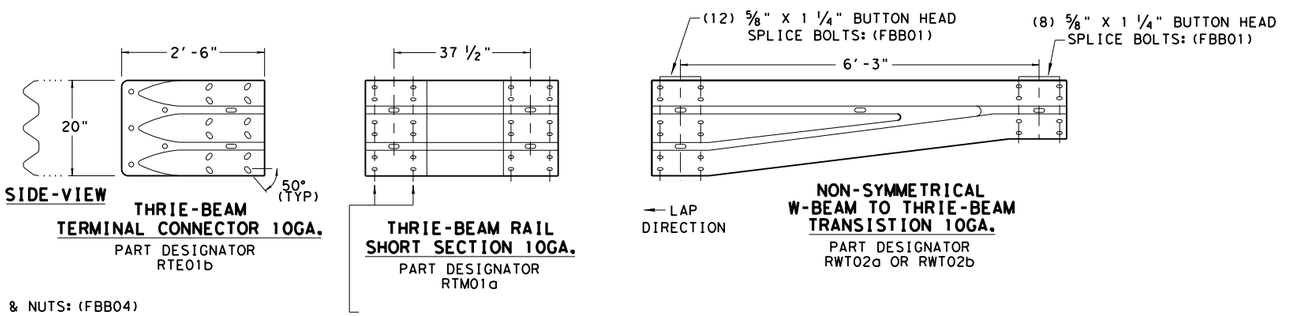
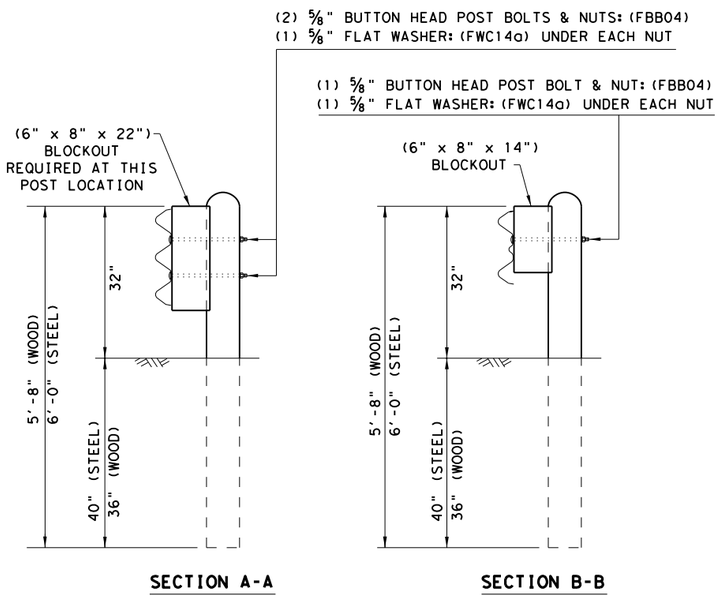
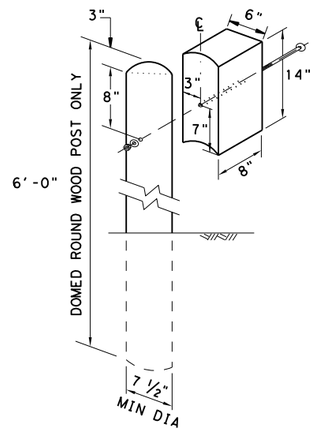
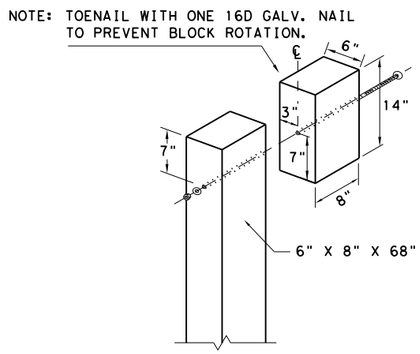


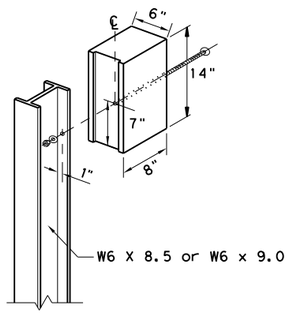
PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE SHORT 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.









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

LOW-SPEED TRANSITION

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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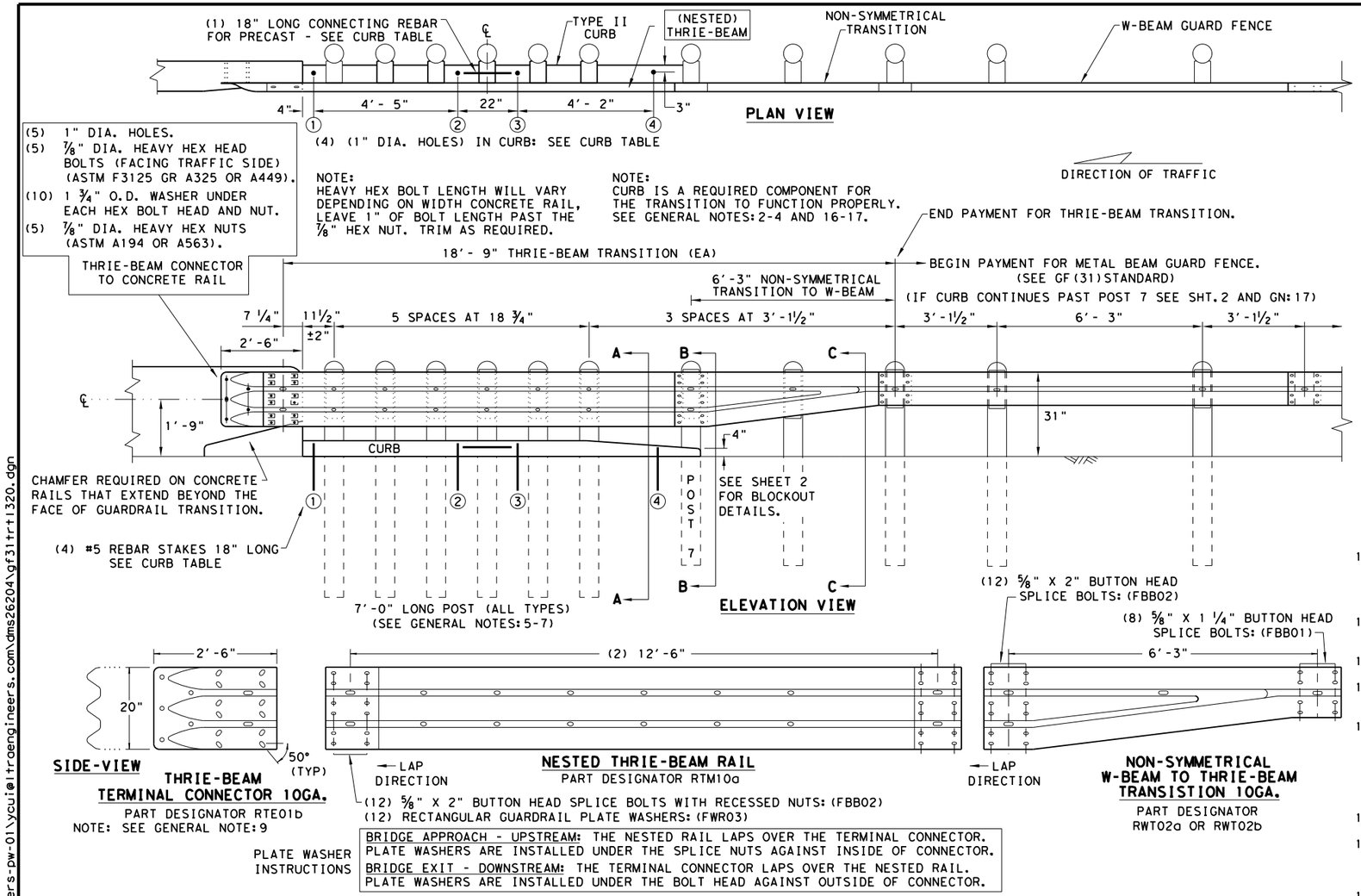


GENERAL NOTES

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.

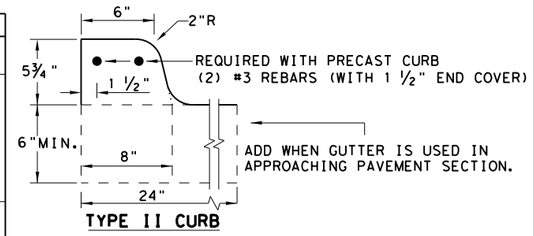
THRIE-BEAM TERMINAL - CURB TABLE

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

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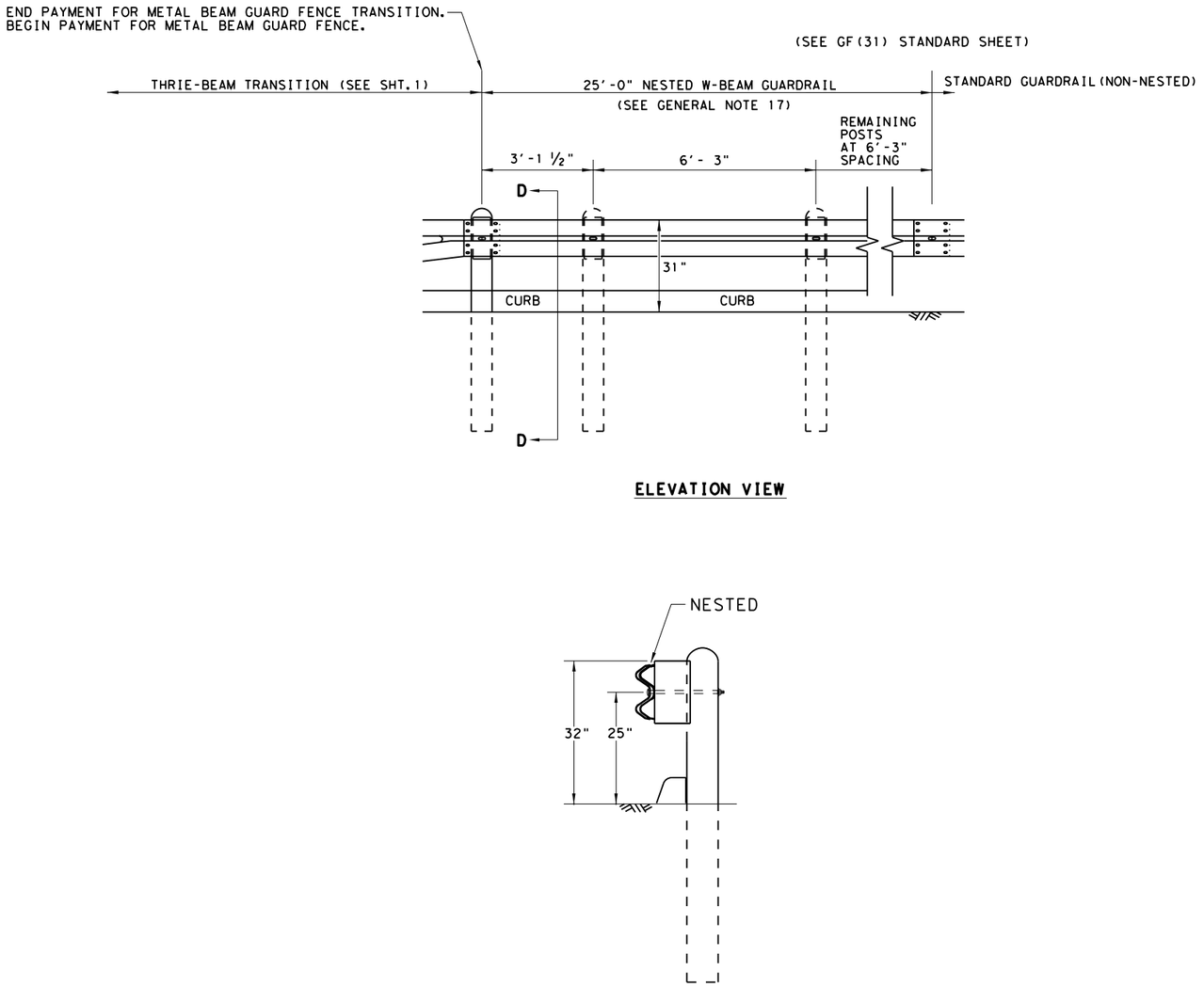
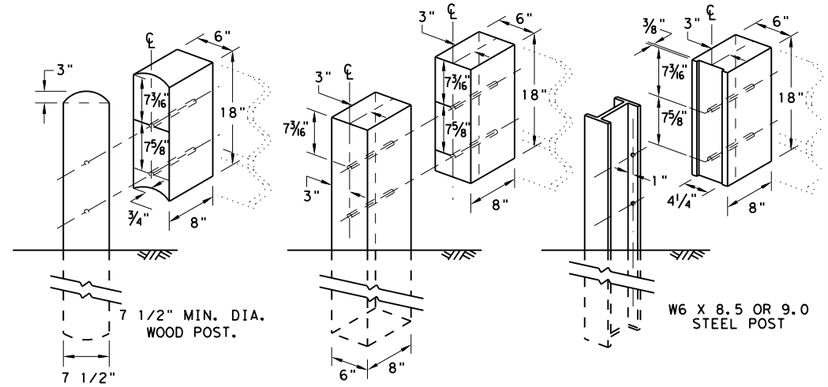
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW

SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

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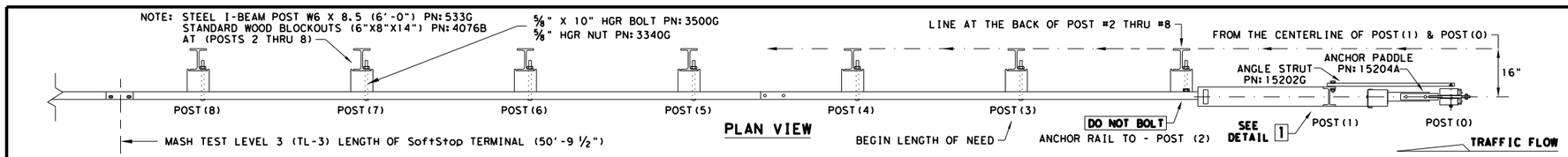
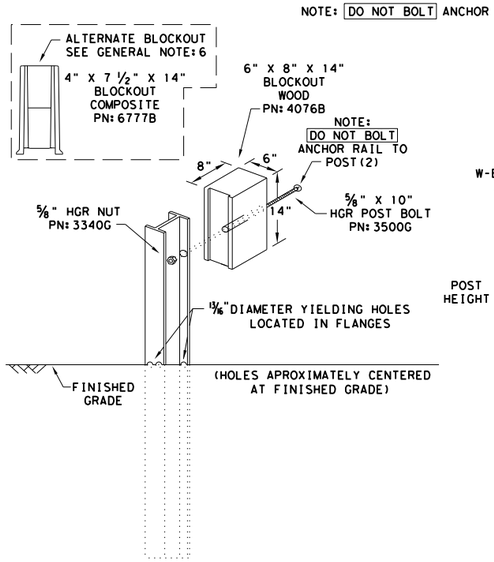
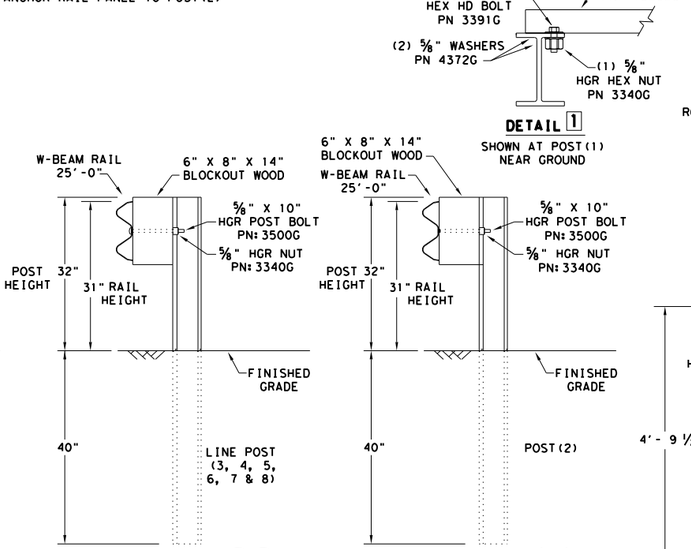




ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



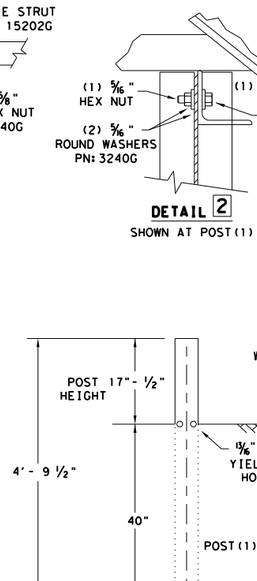
SECTION VIEW B-B

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

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)

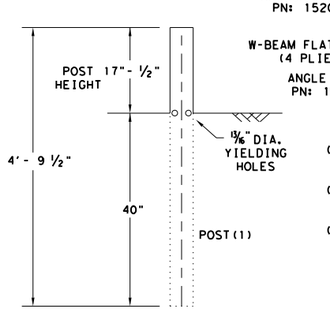


DETAIL 1

SHOWN AT POST(1) NEAR GROUND

DETAIL 2

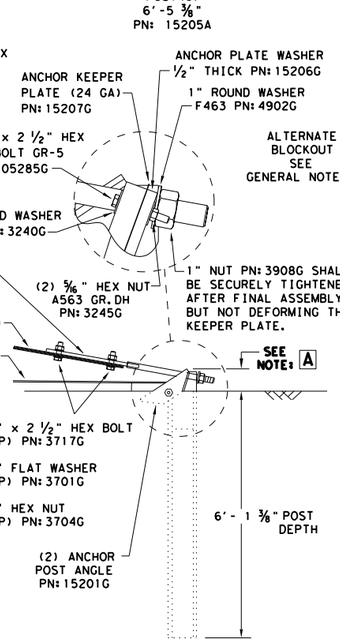
SHOWN AT POST(1)



FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

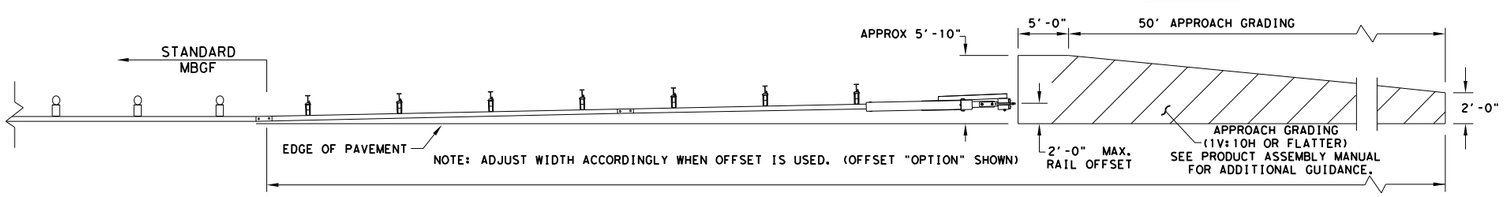


DETAIL 3
AT POST(0)

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

TRAFFIC FLOW



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
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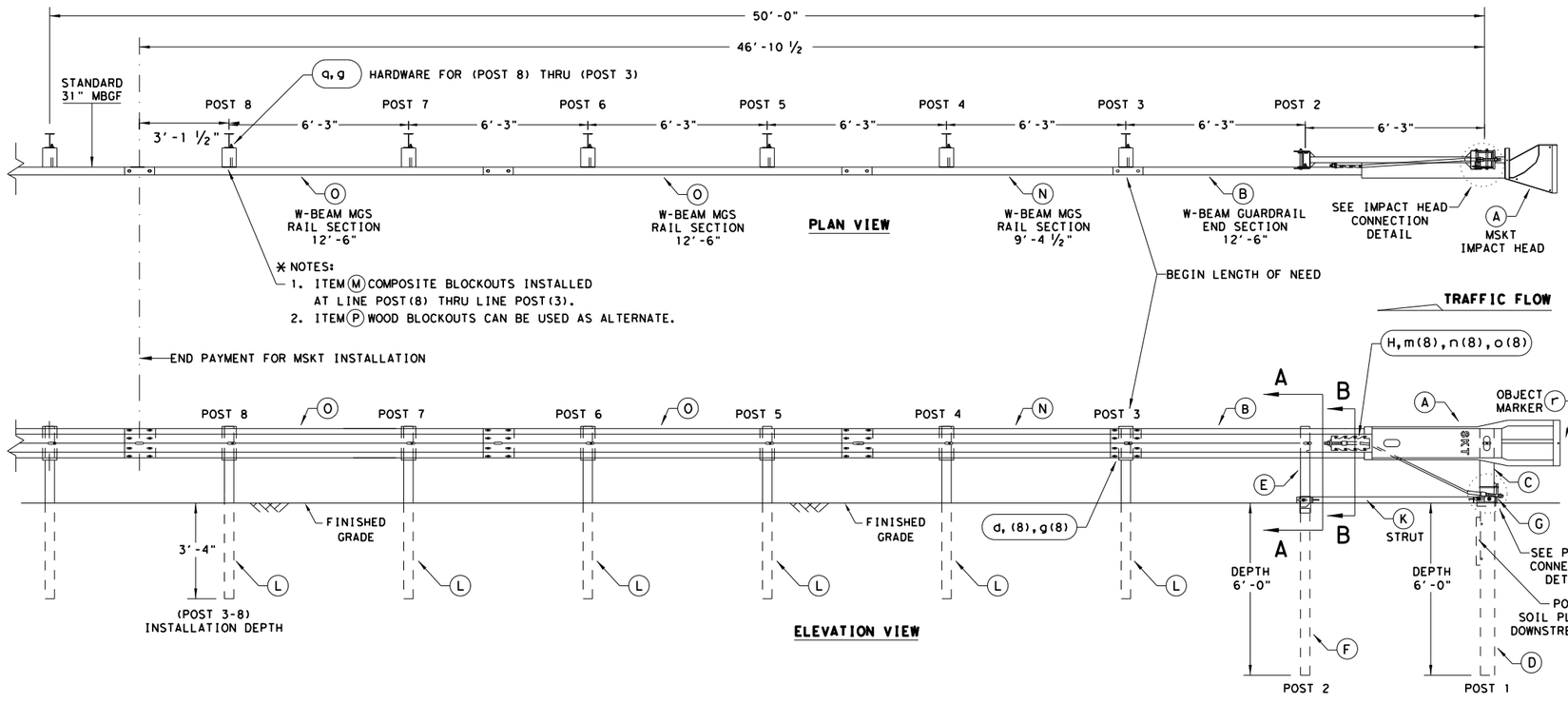
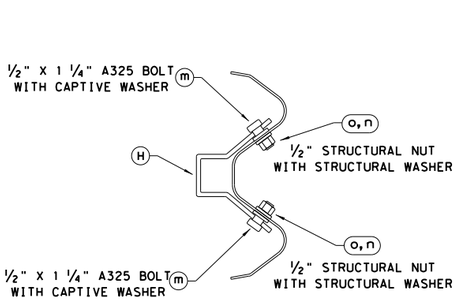
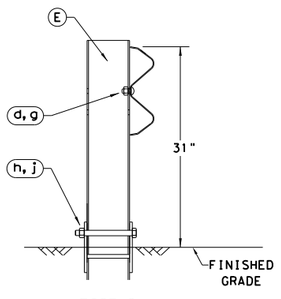
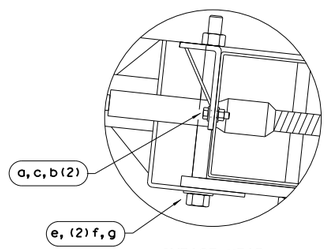
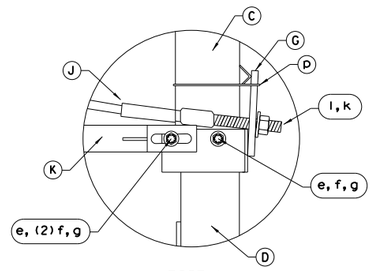


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









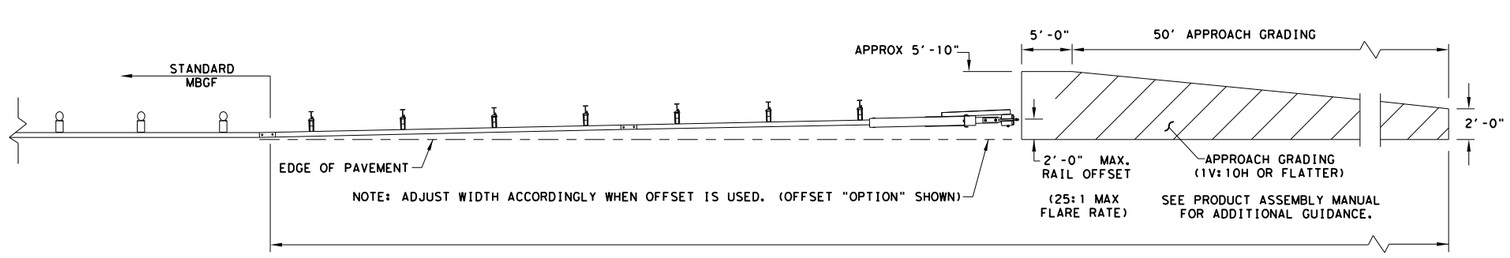
GENERAL NOTES

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

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

SEE NOTES: *

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

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

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	DAL	DALLAS		41	

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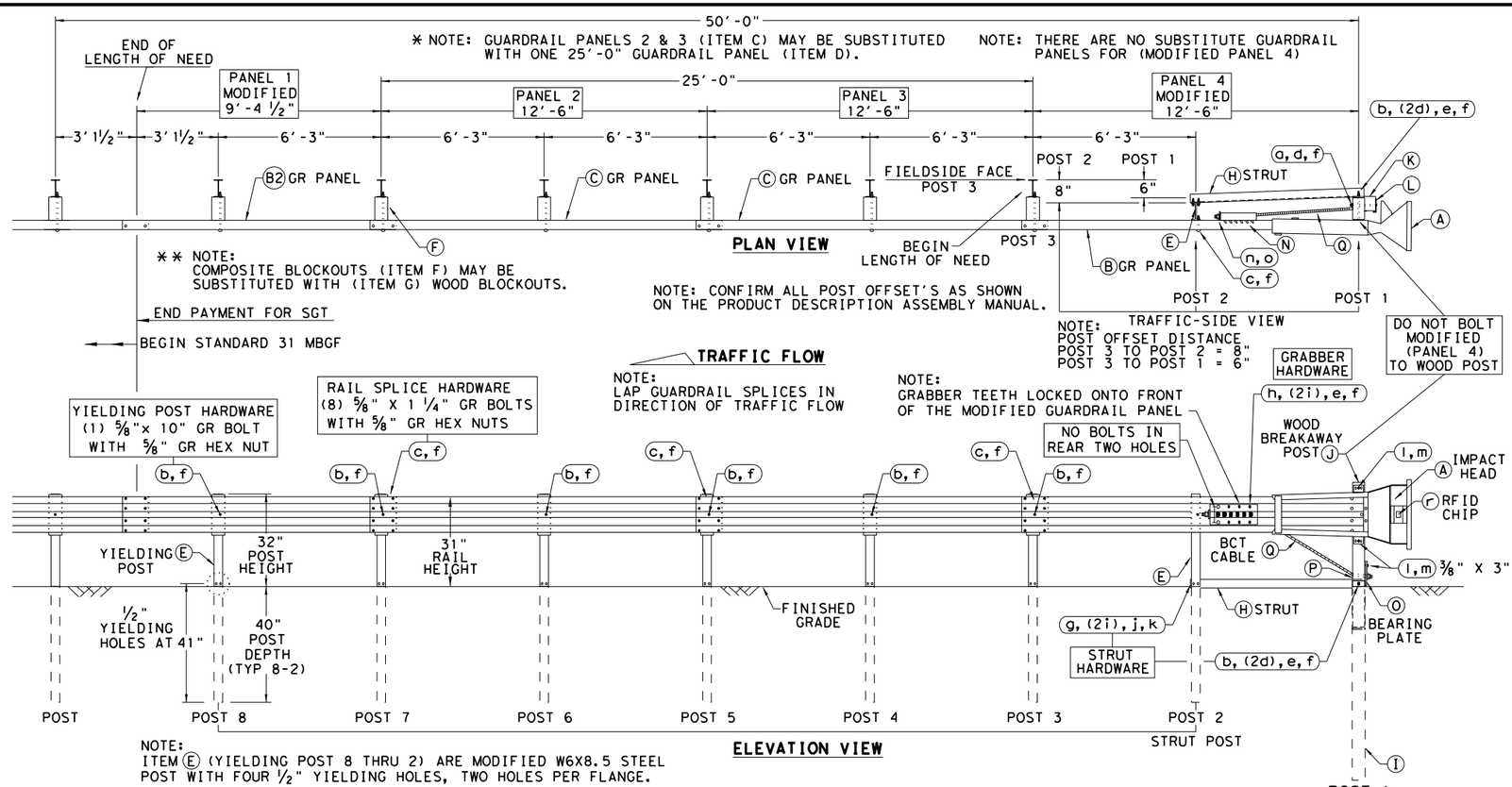
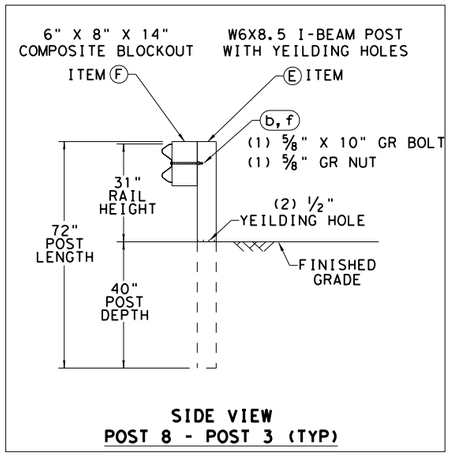


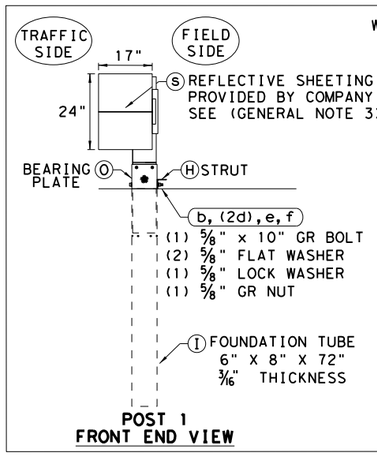
GENERAL NOTES

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



SIDE VIEW
POST 8 - POST 3 (TYP)



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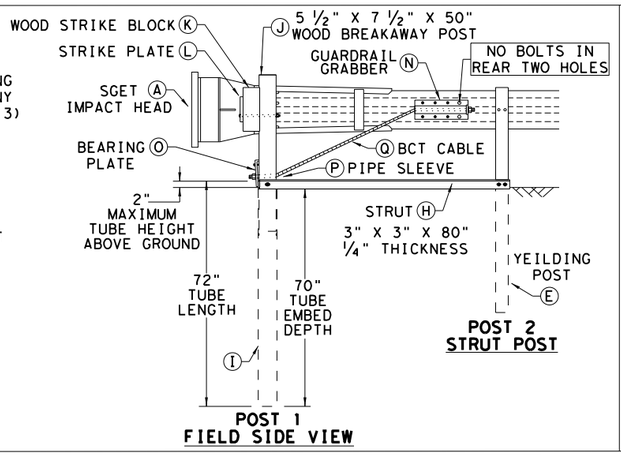
FRONT END VIEW



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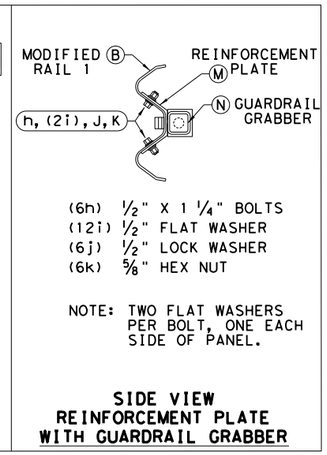
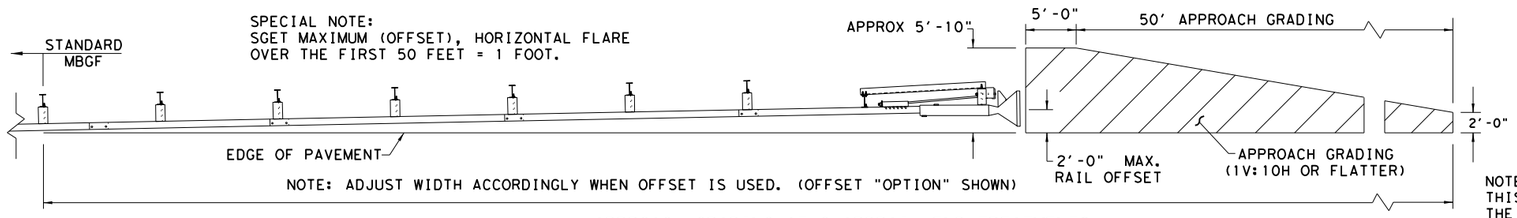
FIELD SIDE VIEW



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

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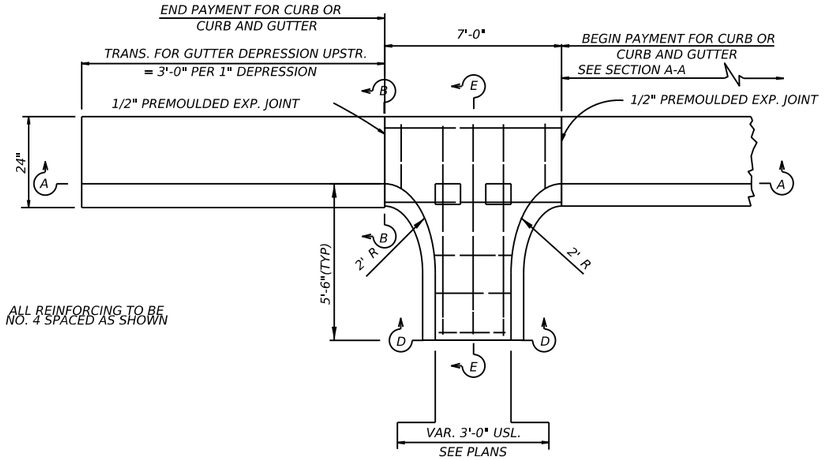

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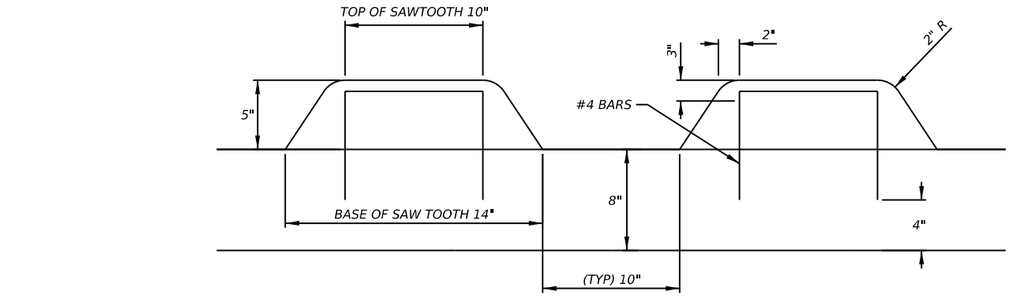

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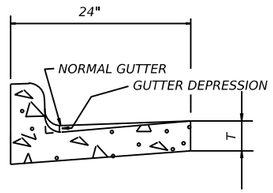


SECTION B-B

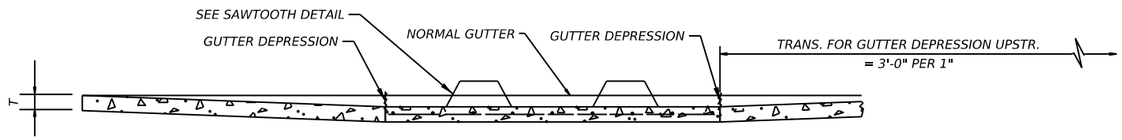
GENERAL NOTES

1-ALL CONC. SHALL BE CLASS "A". ALL EXPOSED EDGES SHALL BE TOOLED.

2-PAYMENT FOR CURB OUTLET AND CURB SHALL BE MADE AT THE UNIT PRICE BID FOR "CLASS A CONCRETE (CURB OUTLET)". NO DIRECT PAYMENT WILL BE MADE FOR REINFORCING, EXCAVATION AND EXPANSION JOINT MATERIAL. THESE ITEMS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "CLASS A CONCRETE (CURB OUTLET)". THE CURB SHALL BE THE SAME HEIGHT AND SHALL MATCH THE INSIDE FACE OF ADJACENT CURB.

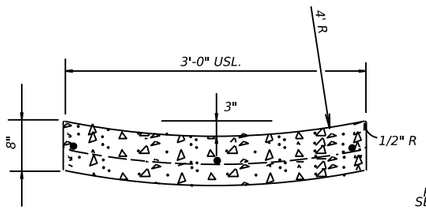
3-DIMENSION "T" SHALL BE THICKNESS OF PAVEMENT STRUCTURE AND IN NO CASE SHALL BE LESS THAN 8".

4-GUTTER DEPRESSION = 3", OR AS DIRECTED BY THE ENGINEER.



SECTION A-A

TO BE USED AT LOW POINT WHEN CURB IS CONTINOUS THROUGH CURB OUTLET



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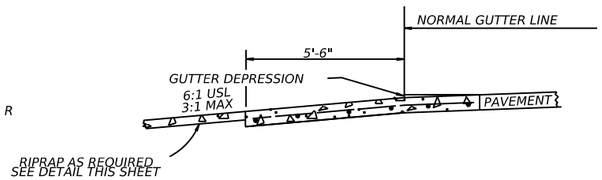

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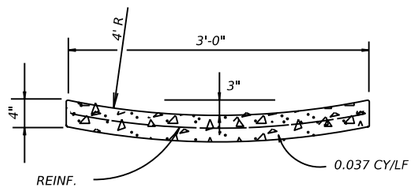
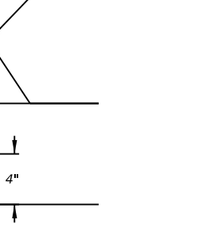


RIPRAP DETAIL



NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

DRAINAGE MISCELLANEOUS DETAIL

DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY / SHEET NO.
DRAWN LTR	TEXAS	DAL	DALLAS / 43
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

DATE: 11/1/2023 9:43:58 AM
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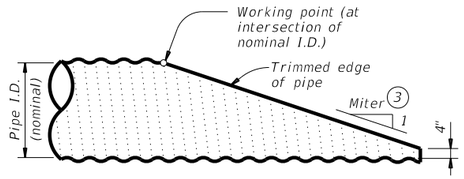
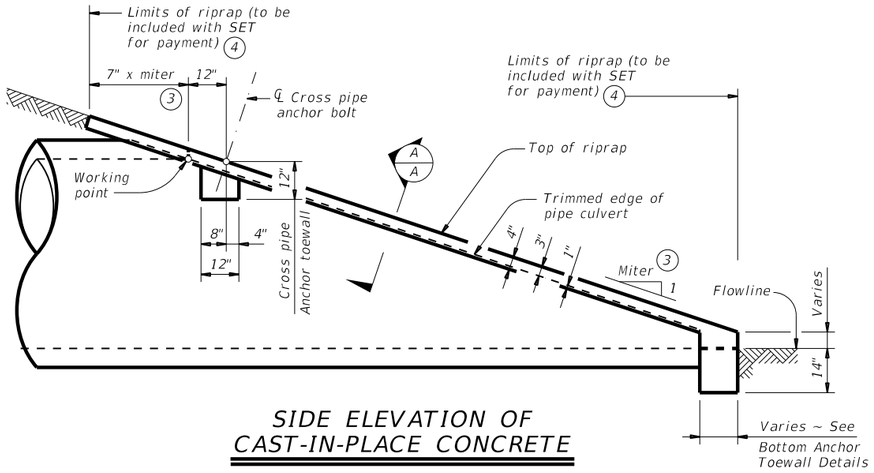


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

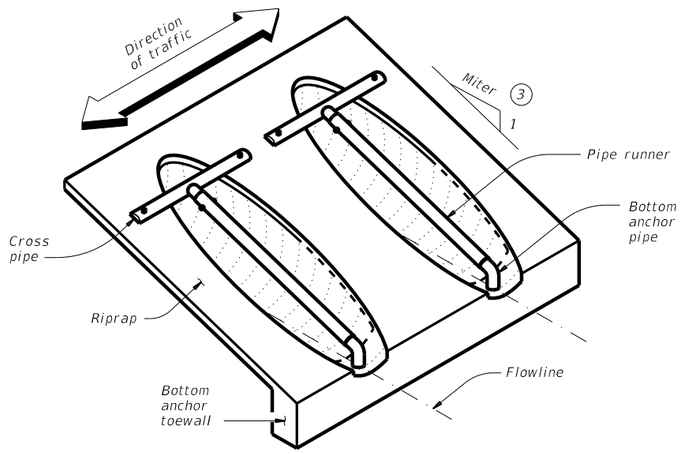
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

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

TYPICAL PIPE CULVERT MITERS (3)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

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

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

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

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

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

(3) Miter = slope of mitered end of pipe culvert.

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

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

DATE:
FILE:

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DAL	DALLAS		44

DATE:
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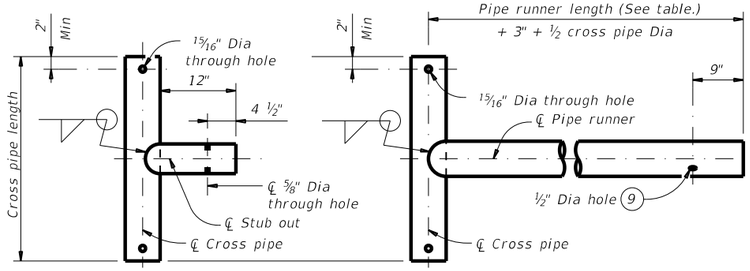
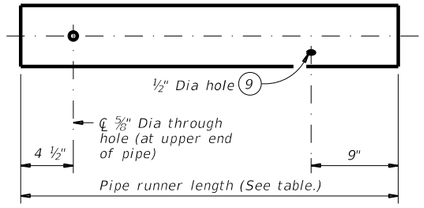


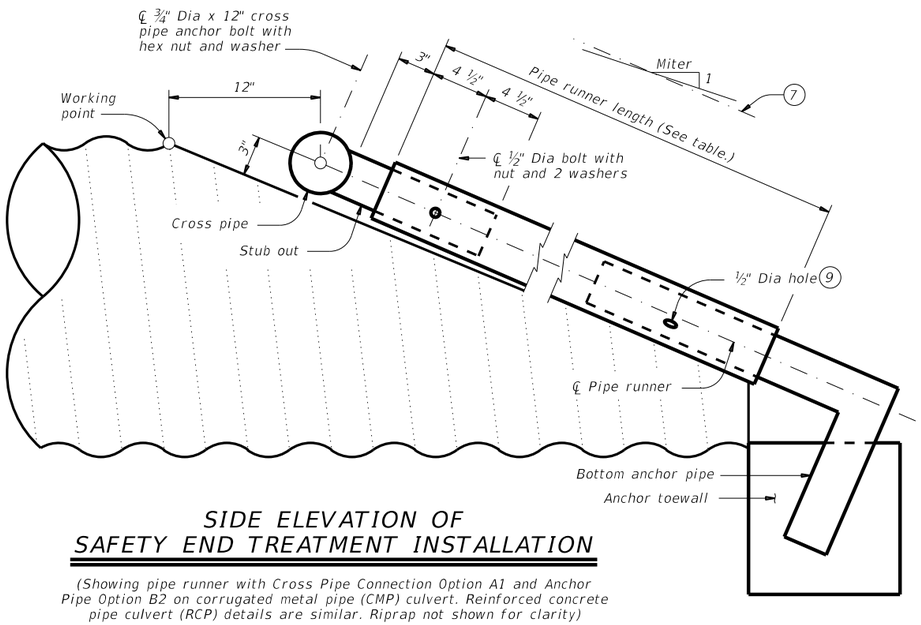
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



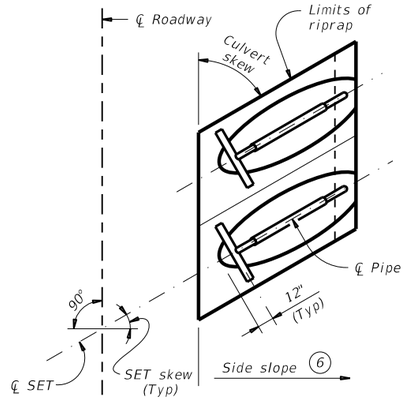
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

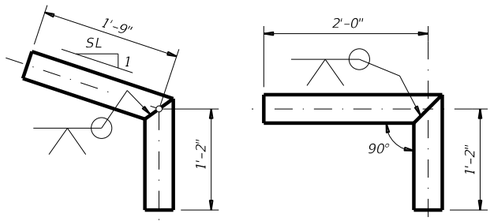


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

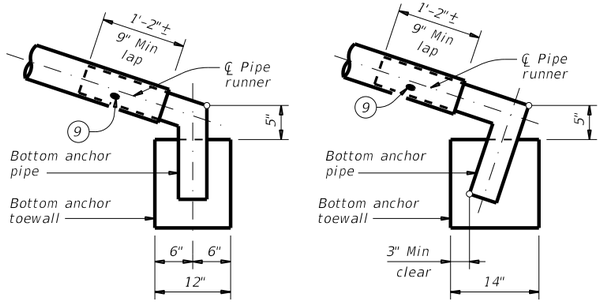


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

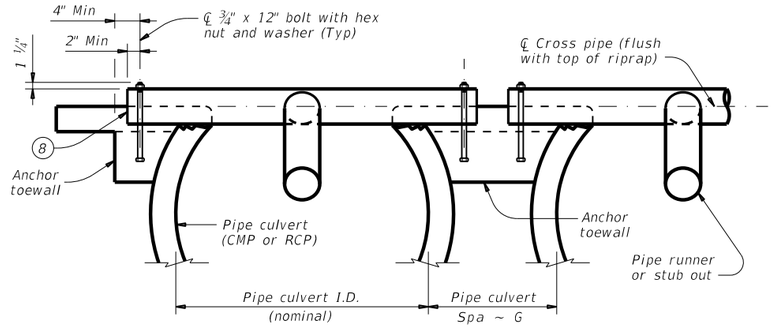
BOTTOM ANCHOR PIPE DETAILS (10)



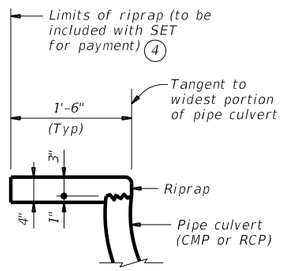
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

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

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

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

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

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

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

MATERIAL NOTES:

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

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

Provide ASTM A307 bolts and nuts.

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

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

GENERAL NOTES:

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

FILE:	setpcdse-20.dgn	DN: GAF		CK: CAT	DW: JRP	CK: GAF	
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REVISIONS		0918	47	288		BBR	
		DIST	COUNTY			SHEET NO.	
		DAL	DALLAS			45	

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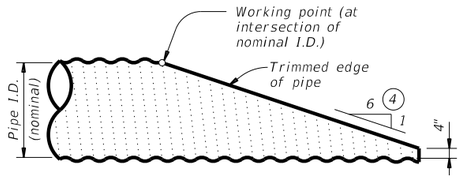
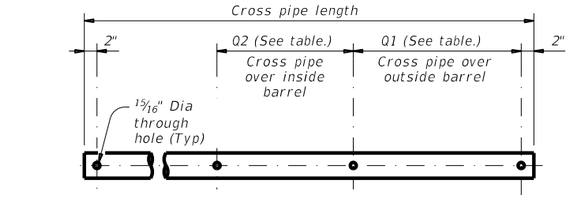


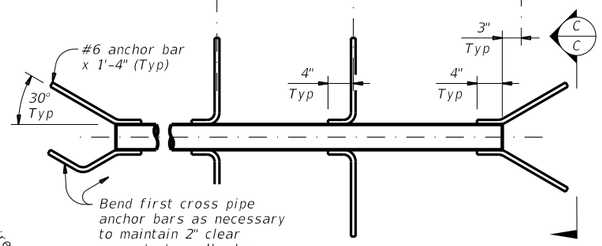
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

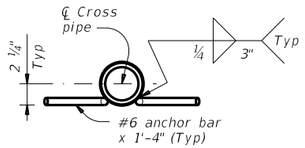
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

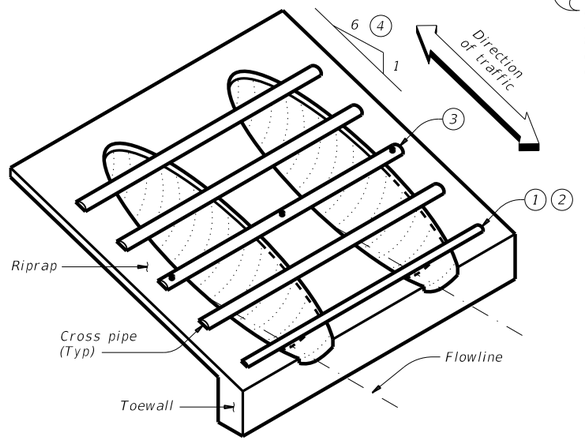


PIPE WITH ANCHOR BARS

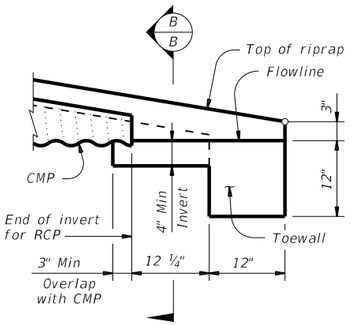


SECTION C-C

CROSS PIPE DETAILS

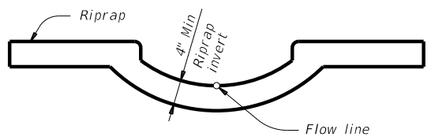


ISOMETRIC VIEW OF TYPICAL INSTALLATION



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

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

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

MATERIAL NOTES:

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

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

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

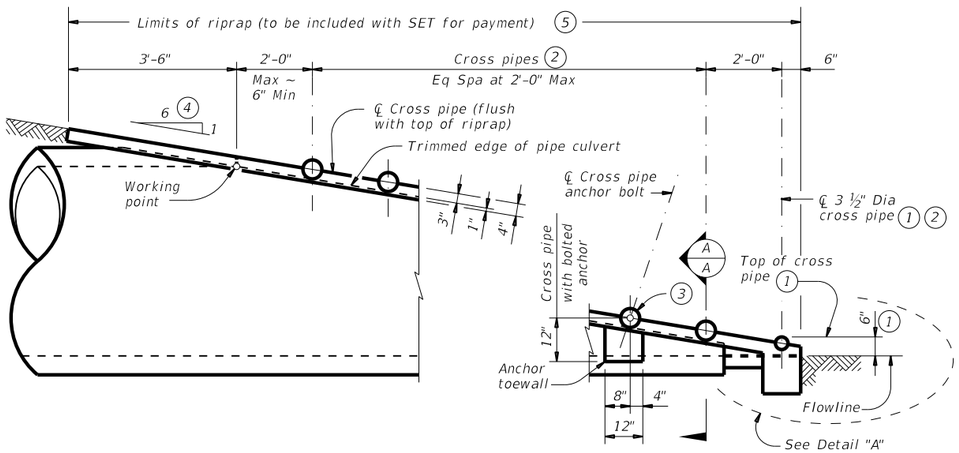
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

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

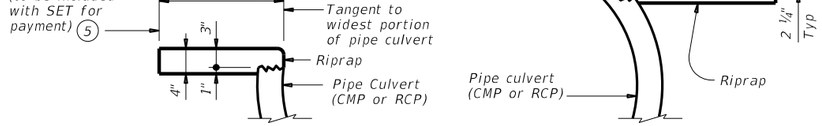
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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



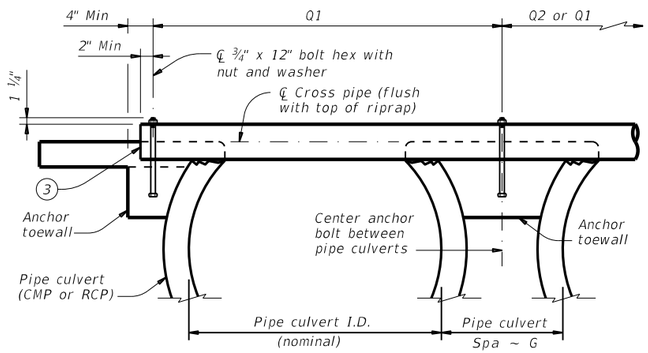
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



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: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		46

DATE: 9/29/2023 2:38:16 PM
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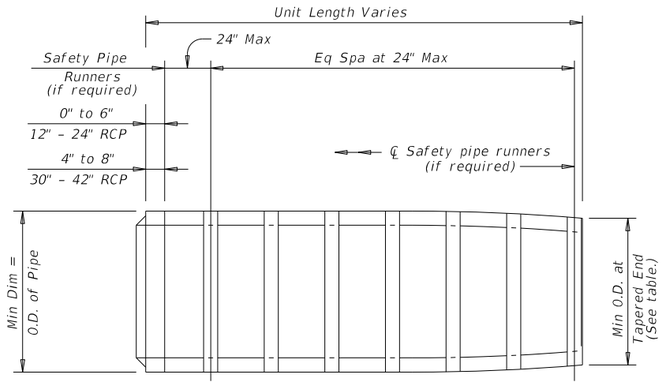
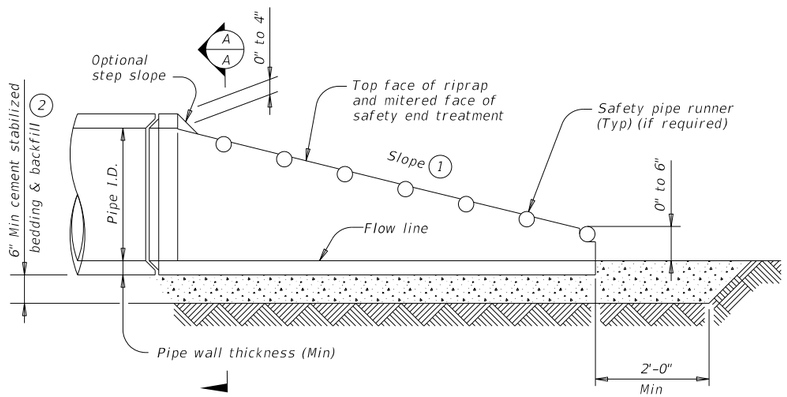


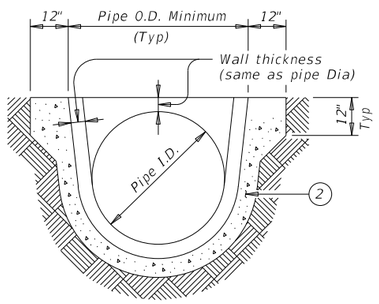
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

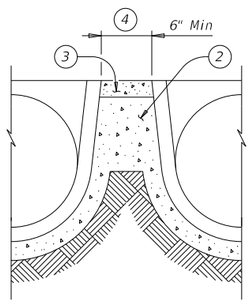


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

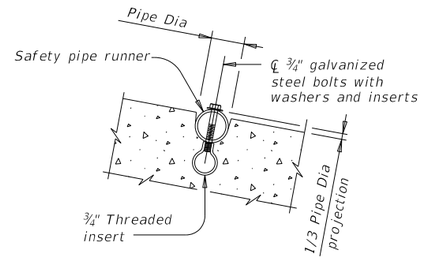
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(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."

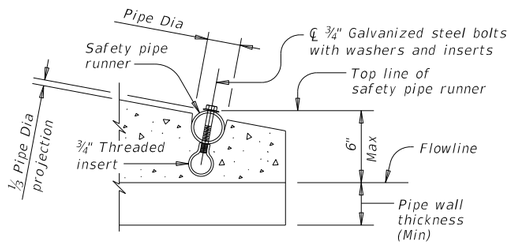
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

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

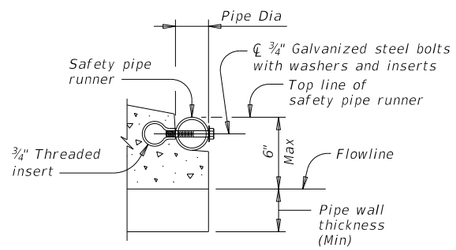


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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

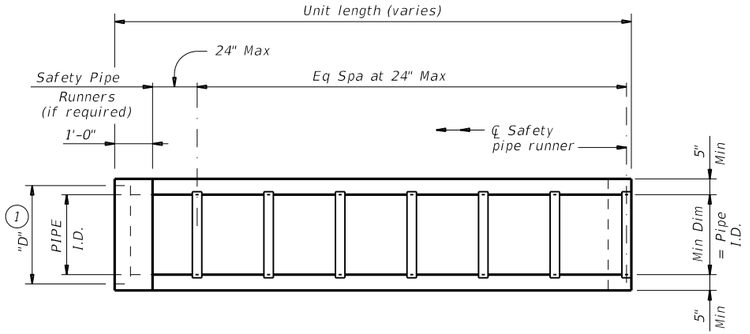
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

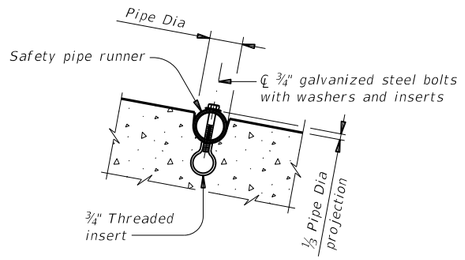
FILE:	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		47

DATE:
FILE:



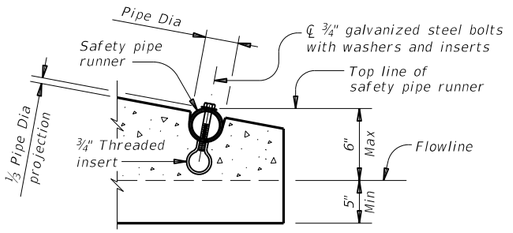
PLAN

(Showing bell end connection.)

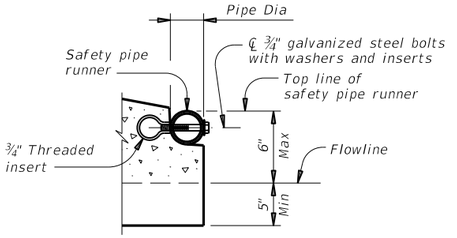


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



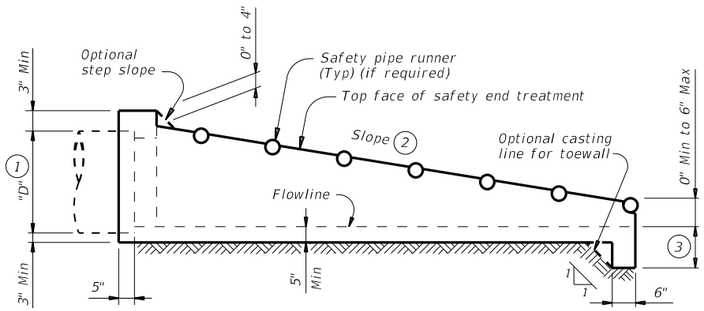
OPTION A



OPTION B

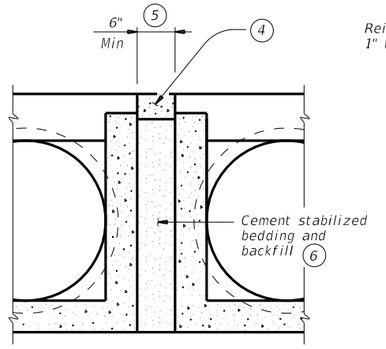
END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

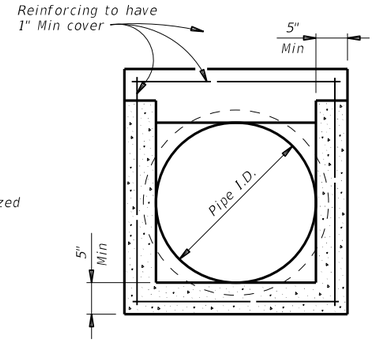


LONGITUDINAL ELEVATION

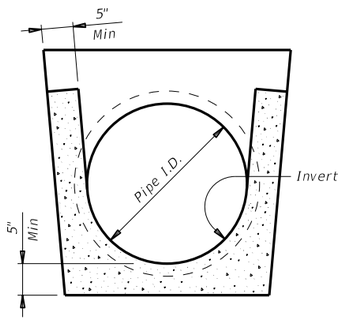
(Showing bell end connection.)



MULTIPLE PIPE INSTALLATION

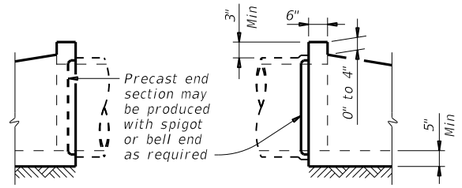


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

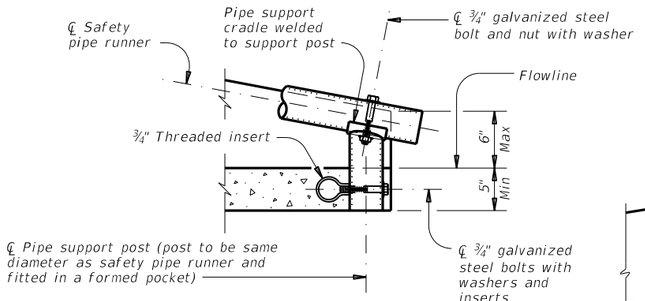
PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		48

DATE:
FILE:

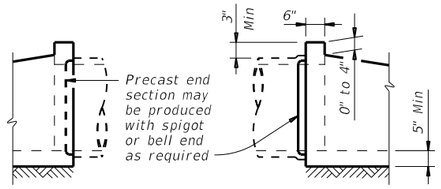
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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



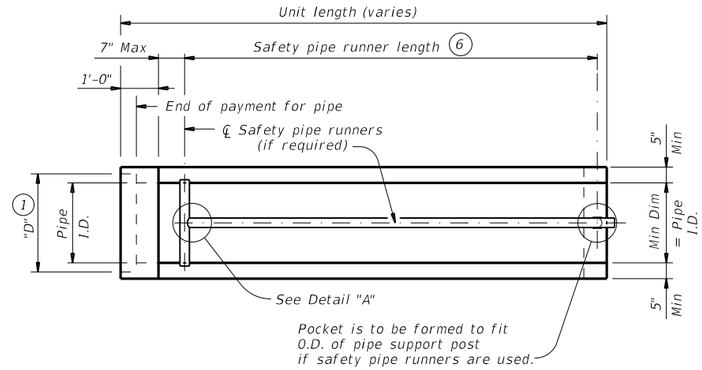
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



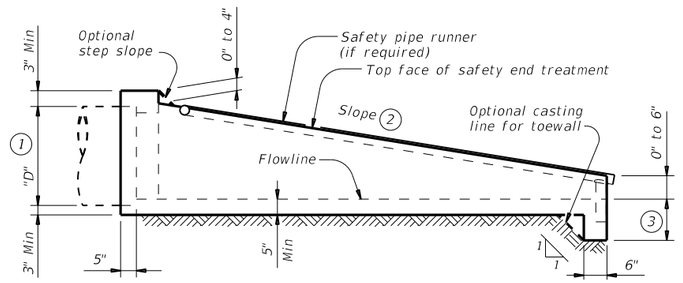
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



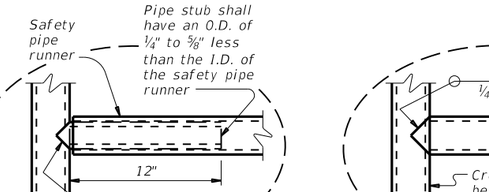
PLAN

(Showing bell end connection.)



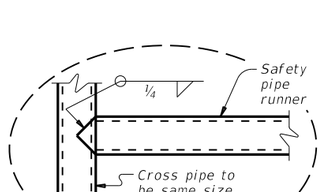
LONGITUDINAL ELEVATION

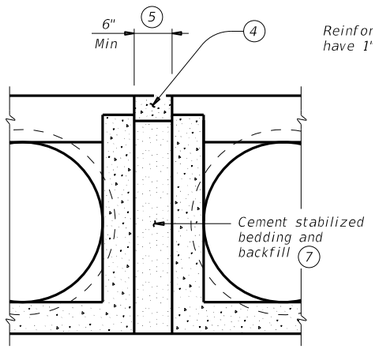
(Showing bell end connection.)



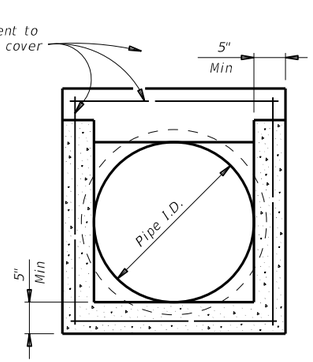
DETAIL A

(If required)

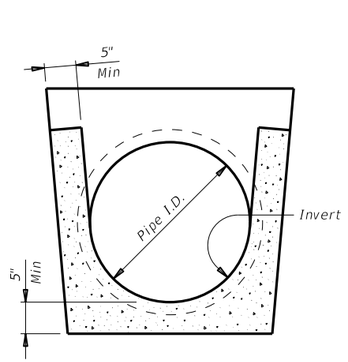




MULTIPLE PIPE INSTALLATION

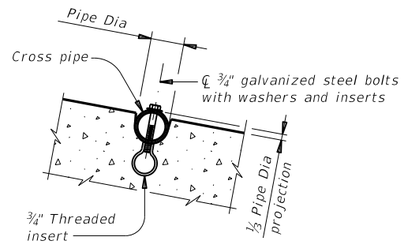


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

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

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

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

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

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

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

(6) Measured along slope.

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		49

LEGEND

TELEPHONE	T1	AT&T
WATER	W1	SUNNYVALE
WASTE WATER	WW1	GARLAND
OVERHEAD	OH	SEE TABLE

TELEPHONE PEDESTAL

POWER POLE

LINE CONTINUES

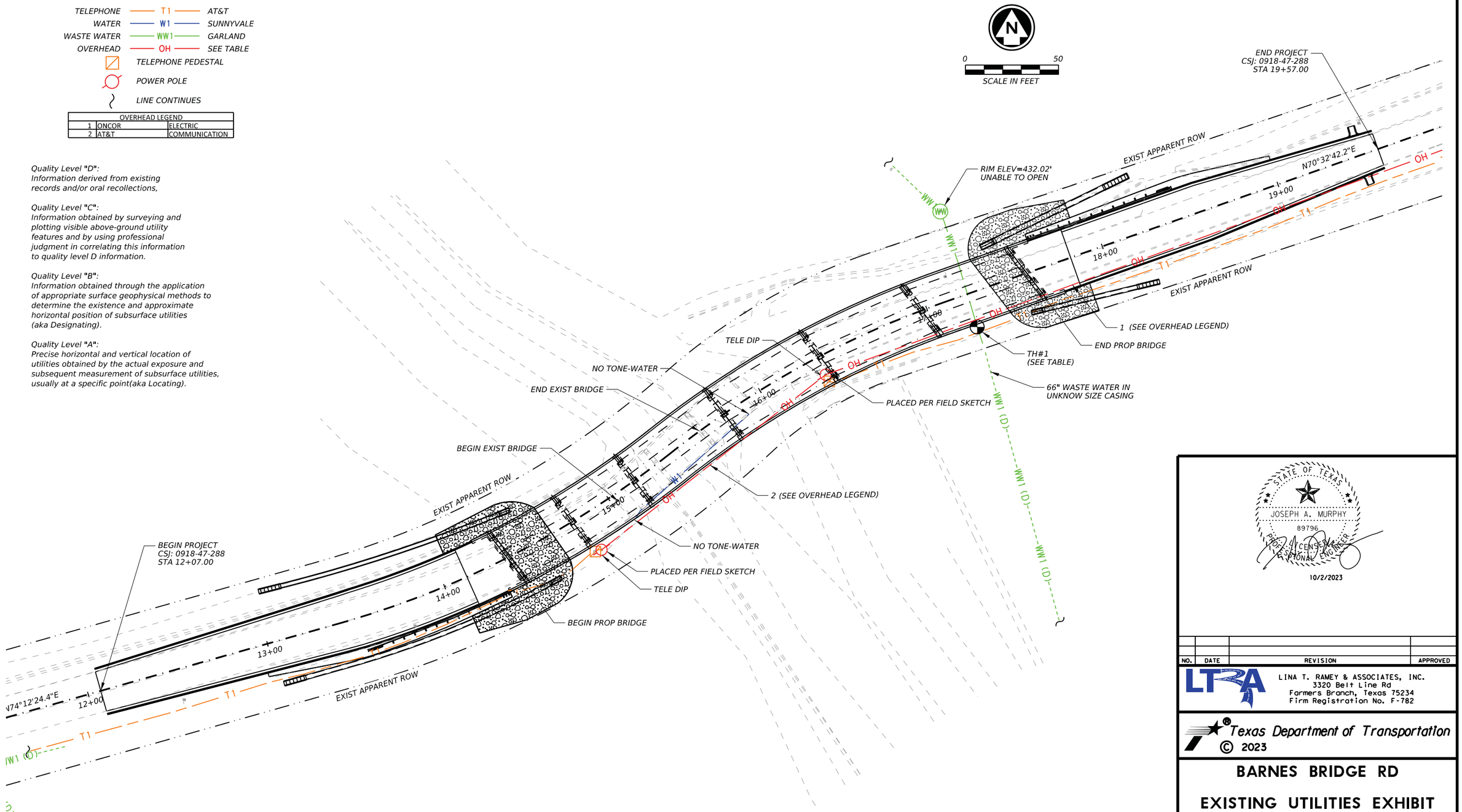
OVERHEAD LEGEND		
1	ONCOR	ELECTRIC
2	AT&T	COMMUNICATION

Quality Level "D":
Information derived from existing records and/or oral recollections,

Quality Level "C":
Information obtained by surveying and plotting visible above-ground utility features and by using professional judgment in correlating this information to quality level D information.

Quality Level "B":
Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities (aka Designating).

Quality Level "A":
Precise horizontal and vertical location of utilities obtained by the actual exposure and subsequent measurement of subsurface utilities, usually at a specific point(aka Locating).



TESTHOLE DATA

NO.	TYPE	o/s	Anticipated Utility/Owner	Date Completed	Coordinates		Ground Elevation	Top Elevation	Clearance	Material Type, Outside Diameter and Comments	Depth of Cover	Surface Material & Thickness	
					Northing	Easting							
1	Waste Water		Town of Sunnyvale	08/29/23	6991107.94	2562785.61	428.11	414.21		Unknown Size Corrigated Steel Casing	13.90	NG	

NO.	DATE	REVISION	APPROVED

STATE OF TEXAS
JOSEPH A. MURPHY
89796
LICENSED PROFESSIONAL ENGINEER
10/2/2023

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

EXISTING UTILITIES EXHIBIT

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
LTR	6	SEE TITLE SHEET		BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	50
DRAWN	CONTROL	SECTION	JOB	
LTR	0918	47	288	
CHECK				
JNV				

DATE: 10/2/2023 2:52:07 PM
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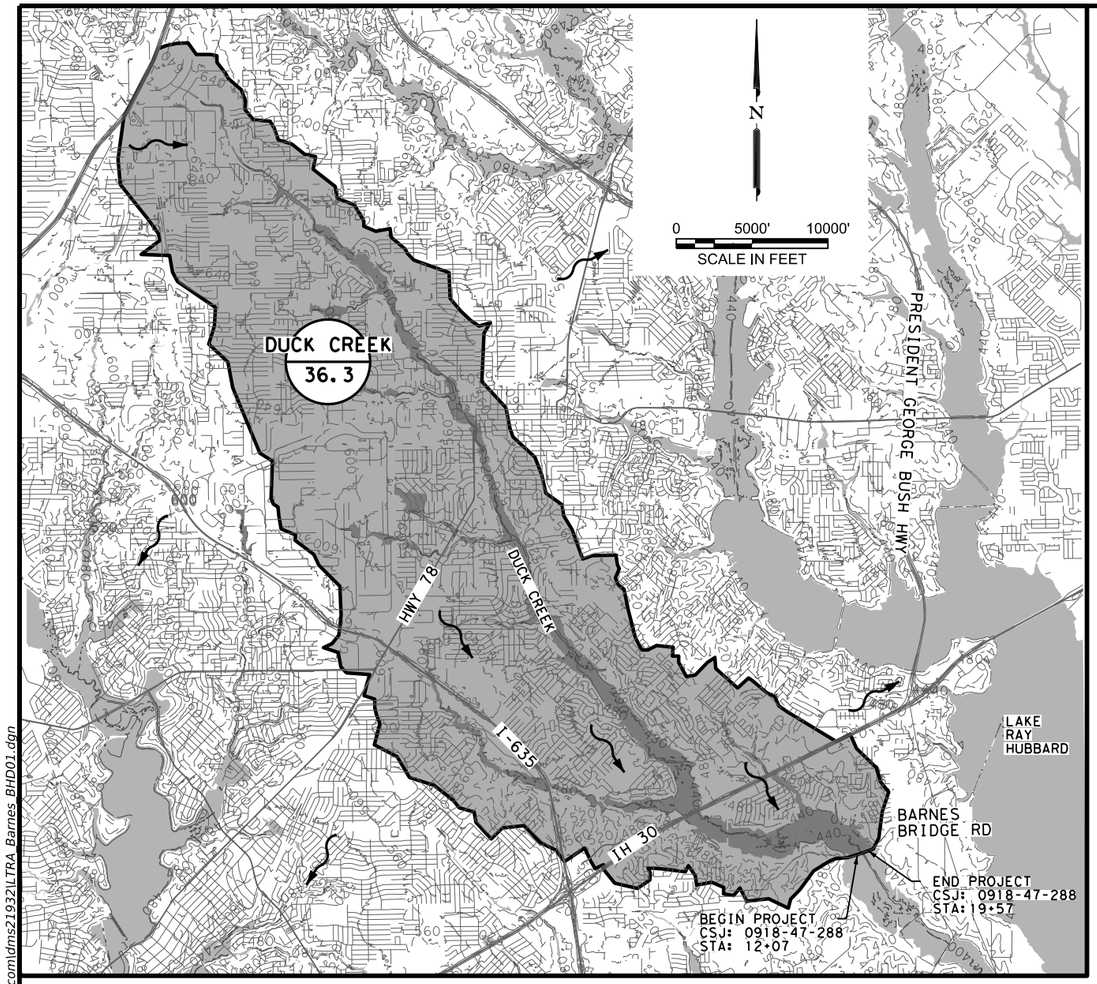
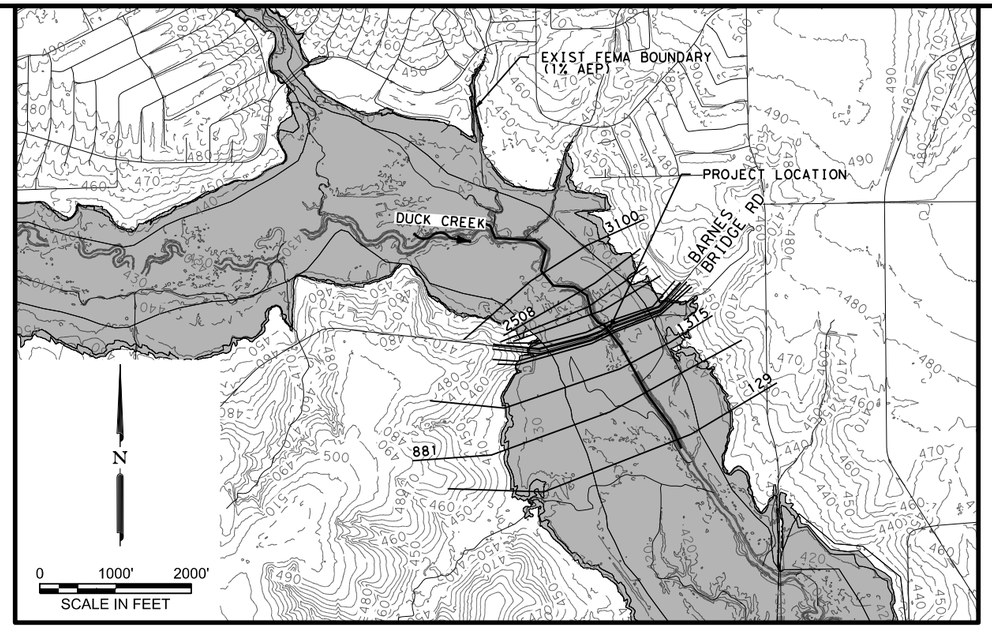


DRAINAGE AREA MAP



HEC-RAS CROSS-SECTION LOCATION MAP

LEGEND

- XXX / XX.X — DRAINAGE AREA NO. / DRAINAGE AREA SIZE (SQ.MI)
- DRAINAGE AREA BOUNDARY
- DIRECTION OF FLOW
- EXIST FEMA BOUNDARY (1% AEP)

NOAA ATLAS DATA 14, VOLUME 11, VERSION 2 (LAT: 32.829° , LONG: -96.5669°)
RAINFALL DEPTH USED FOR THE NRCS METHOD OF RUNOFF CALCULATIONS (in.)

Duration	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)
5-min	0.467	0.897	0.695	0.821	0.912	1.000
15-min	0.932	1.190	1.380	1.630	1.810	1.990
1-hr	1.700	2.170	2.530	2.990	3.320	3.650
2-hrs	2.090	2.720	3.200	3.830	4.300	4.790
3-hrs	2.330	3.060	3.620	4.380	4.950	5.560
6-hrs	2.850	3.670	4.370	5.340	6.310	6.900
12-hrs	3.220	4.320	5.180	6.360	7.290	8.290
24-hrs	3.750	5.030	6.040	7.430	8.530	9.710

NOTES:

1) CALCULATIONS ARE BASED ON THE TxDOT HYDRAULIC DESIGN MANUAL (SEP 2019) PROCEDURES.

2) THIS SITE IS DESIGNATED AS A NO FLOODWAY ZONE "AE" AS SHOWN PANEL 48113C0380L, EFFECTIVE 7/7/2014.

3) ALL ELEVATIONS ARE BASED ON THE PROJECT SURVEY AND NAVD88 VERTICAL DATUM.

4) THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING NORMAL DEPTH WITH A SLOPE = 0.00187 FT/FT.

5) TOPOGRAPHIC DATA SOURCE, USGS19-70CM-PECOS-DALLAS_3296121_DEM.

6) USACE HEC-RAS VERSION 6.2 WAS UTILIZED FOR THE ANALYSIS.

7) H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR MARK RAUSCHER ON 10/02/2023.

NRCS RUNOFF CURVE NUMBER METHOD
FREQUENCY STORM METHOD
LOSS METHOD: SCS CURVE NUMBER
TRANSFORM METHOD: SCS UNIT HYDROGRAPH
(HEC-HMS 4.9)

DA I.D.	Duck Creek (FEMA)
DRAINAGE AREA (SQ. MI.)	36.3
CURVE NUMBER	-
TIME OF CONCENTRATION (MIN)	-
LAG TIME (MIN)	-
MAIN CHANNEL LENGTH, (MI)	-
MAIN CHANNEL SLOPE, (FT/FT)	-
INITIAL ABSTRACTION (IN)	-
PEAK FLOWRATE (2-YR), (CFS)*	11,776
PEAK FLOWRATE (5-YR), (CFS)*	17,374
PEAK FLOWRATE (10-YR), (CFS)	21,424
PEAK FLOWRATE (25-YR), (CFS)*	27,206
PEAK FLOWRATE (50-YR), (CFS)	31,600
PEAK FLOWRATE (100-YR), (CFS)	35,885
STORM DURATION (HR)	-

* INTERPOLATED FLOWS

ALL FLOWS TRANSPOSED FROM FEMA FIS FLOWS

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

HYDRAULIC DATA SHEETS AT DUCK CREEK

SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
LTR	6	SEE TITLE SHEET		BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	
DRAWN	CONTROL	SECTION	JOB	51
LTR	0918	47	288	
CHECK				
JNV				

DATE: 10/3/2023 3:20:20 PM
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HYDRAULIC COMPUTATIONS (FLOODPLAIN)

River Station	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Slope (ft/ft)	Vel Total (ft/s)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
3100	2-YR	CORR EXIST	11776.00	411.07	431.32	0.001125	5.28	7.15	2228.23	792.82	0.32
3100	2-YR	PROPOSED	11776.00	411.07	431.17	0.001176	5.58	7.26	2112.25	709.15	0.33
3100	100-YR	CORR EXIST	35885.00	411.07	436.23	0.001718	3.88	10.63	9240.73	1643.44	0.42
3100	100-YR	PROPOSED	35885.00	411.07	436.21	0.001730	3.90	10.66	9210.25	1642.71	0.42
2508	2-YR	CORR EXIST	11776.00	410.75	430.97	0.000769	3.65	5.94	3226.31	1179.12	0.27
2508	2-YR	PROPOSED	11776.00	410.75	430.78	0.000821	3.91	6.09	3012.20	1109.96	0.28
2508	100-YR	CORR EXIST	35885.00	410.75	435.80	0.001120	3.31	8.65	10833.96	1668.10	0.34
2508	100-YR	PROPOSED	35885.00	410.75	435.78	0.001129	3.32	8.68	10796.54	1667.77	0.34
2268 K	2-YR	CORR EXIST	11776.00	410.45	430.82	0.000635	3.55	5.84	3316.49	1172.10	0.25
2268 K	2-YR	PROPOSED	11776.00	410.45	430.62	0.000678	3.81	5.99	3087.28	1134.61	0.26
2268 K	100-YR	CORR EXIST	35885.00	410.45	435.31	0.001226	3.78	9.53	9488.98	1429.54	0.37
2268 K	100-YR	PROPOSED	35885.00	410.45	435.28	0.001237	3.80	9.56	9449.46	1429.04	0.37
2154	2-YR	CORR EXIST	11776.00	410.35	430.18	0.001519	5.31	8.10	2216.44	1097.27	0.37
2154	2-YR	PROPOSED	11776.00	410.35	429.92	0.001657	6.05	8.36	1947.91	961.64	0.39
2154	100-YR	CORR EXIST	35885.00	410.35	434.46	0.002513	4.66	12.34	7699.69	1458.93	0.50
2154	100-YR	PROPOSED	35885.00	410.35	434.39	0.002579	4.72	12.47	7600.88	1453.71	0.50
1945	2-YR	CORR EXIST	11776.00	410.35	430.26	0.000746	3.53	6.19	3332.24	1255.47	0.27
1945	2-YR	PROPOSED	11776.00	410.35	430.00	0.000814	3.89	6.39	3026.10	1181.98	0.29
1945	100-YR	CORR EXIST	35885.00	410.35	434.29	0.001597	3.89	10.52	9219.56	1656.40	0.42
1945	100-YR	PROPOSED	35885.00	410.35	434.24	0.001611	3.91	10.55	9186.68	1654.09	0.42
1896 US ROW	2-YR	CORR EXIST	11776.00	410.35	429.74	0.001443	4.76	8.14	2472.87	1206.48	0.36
1896 US ROW	2-YR	PROPOSED	11776.00	410.35	429.53	0.001494	4.84	8.17	2432.70	1126.35	0.37
1896 US ROW	100-YR	CORR EXIST	35885.00	410.35	434.18	0.001989	3.70	11.30	9704.99	1816.64	0.45
1896 US ROW	100-YR	PROPOSED	35885.00	410.35	434.19	0.001896	3.61	11.00	9931.73	1817.11	0.44
1889	2-YR	CORR EXIST	11776.00	410.35	429.82	0.001079	3.46	7.68	3400.01	1380.80	0.33
1889	2-YR	PROPOSED	11776.00	410.35	429.56	0.000914	3.67	8.00	3210.95	1354.94	0.34
1889	100-YR	CORR EXIST	35885.00	410.35	434.23	0.001611	3.33	10.93	10762.48	1909.80	0.41
1889	100-YR	PROPOSED	35885.00	410.35	433.90	0.001503	3.44	11.94	10418.13	1850.70	0.46
1850 BR U	2-YR	CORR EXIST	11776.00	410.35	429.44	0.005966	5.62	8.71	2094.72	768.95	0.33
1850 BR U	2-YR	PROPOSED	11776.00	410.35	429.31	0.002256	5.11	8.76	2306.19	901.27	0.34
1850 BR U	100-YR	CORR EXIST	35885.00	410.35	434.23		4.00	5.70	8964.83	1831.98	0.18
1850 BR U	100-YR	PROPOSED	35885.00	410.35	433.90		4.32	8.81	8311.06	1409.17	0.28
1850 BR D	2-YR	CORR EXIST	11776.00	410.35	429.41	0.005244	5.08	7.84	2318.33	794.62	0.30
1850 BR D	2-YR	PROPOSED	11776.00	410.35	429.36	0.001791	4.54	7.65	2591.79	1037.91	0.30
1850 BR D	100-YR	CORR EXIST	35885.00	410.35	434.54		3.55	5.25	10097.55	1910.03	0.15
1850 BR D	100-YR	PROPOSED	35885.00	410.35	434.30		3.83	7.84	9365.88	1481.95	0.24
1836	2-YR	CORR EXIST	11776.00	410.35	429.51	0.001013	3.09	6.76	3810.31	1497.17	0.31
1836	2-YR	PROPOSED	11776.00	410.35	429.43	0.000827	3.17	6.96	3720.46	1528.32	0.32
1836	100-YR	CORR EXIST	35885.00	410.35	434.54	0.001181	2.78	8.86	12909.32	1995.36	0.35
1836	100-YR	PROPOSED	35885.00	410.35	434.30	0.001103	2.88	9.71	12481.74	1982.66	0.39
1818 J DS ROW	2-YR	CORR EXIST	11776.00	410.35	429.23	0.001163	4.49	7.46	2623.18	1067.91	0.34
1818 J DS ROW	2-YR	PROPOSED	11776.00	410.35	429.23	0.001163	4.49	7.46	2623.18	1067.91	0.34
1818 J DS ROW	100-YR	CORR EXIST	35885.00	410.35	433.95	0.001656	3.36	10.67	10684.62	1926.99	0.42
1818 J DS ROW	100-YR	PROPOSED	35885.00	410.35	433.95	0.001656	3.36	10.67	10684.62	1926.99	0.42
1779	2-YR	CORR EXIST	11776.00	410.35	429.16	0.001441	3.85	7.78	3057.58	1281.43	0.36
1779	2-YR	PROPOSED	11776.00	410.35	429.16	0.001441	3.85	7.78	3057.58	1281.43	0.36
1779	100-YR	CORR EXIST	35885.00	410.35	434.01	0.001594	3.04	9.94	11801.75	1990.22	0.40
1779	100-YR	PROPOSED	35885.00	410.35	434.01	0.001594	3.04	9.94	11801.75	1990.22	0.40
1315	2-YR	CORR EXIST	11776.00	409.24	427.67	0.002509	5.79	9.61	2033.93	1022.88	0.46
1315	2-YR	PROPOSED	11776.00	409.24	427.67	0.002509	5.79	9.61	2033.93	1022.88	0.46
1315	100-YR	CORR EXIST	35885.00	409.24	432.80	0.002136	3.07	10.87	11673.17	2180.60	0.45
1315	100-YR	PROPOSED	35885.00	409.24	432.80	0.002136	3.07	10.87	11673.17	2180.60	0.45
881	2-YR	CORR EXIST	11776.00	408.16	427.25	0.001383	3.72	7.64	3168.90	1586.88	0.35
881	2-YR	PROPOSED	11776.00	408.16	427.25	0.001383	3.72	7.64	3168.90	1586.88	0.35
881	100-YR	CORR EXIST	35885.00	408.16	432.10	0.001476	2.58	9.56	13921.53	2588.11	0.38
881	100-YR	PROPOSED	35885.00	408.16	432.10	0.001476	2.58	9.56	13921.53	2588.11	0.38
129	2-YR	CORR EXIST	11776.00	407.09	425.80	0.001874	4.34	8.64	2714.33	1123.88	0.41
129	2-YR	PROPOSED	11776.00	407.09	425.80	0.001874	4.34	8.64	2714.33	1123.88	0.41
129	100-YR	CORR EXIST	35885.00	407.09	430.77	0.001871	2.85	10.58	12605.06	2595.06	0.43
129	100-YR	PROPOSED	35885.00	407.09	430.77	0.001871	2.85	10.58	12605.06	2595.06	0.43

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

HYDRAULIC DATA SHEETS AT DUCK CREEK

SHEET 2 OF 5

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
LTR	6	SEE TITLE SHEET		BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	
DRAWN	CONTROL	SECTION	JOB	52
LTR	0918	47	288	
CHECK				
JNV				

DATE: 10/3/2023 3:20:37 PM
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HYDRAULIC COMPUTATIONS (FLOODWAY)

River Station	Profile	Plan	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)	Froude # Chl
3100	100-YR	CORR EXIST ENC	436.23		437.35	1643.44	5401.17	22430.69	8053.14	10.63	0.42
3100	100-YR	PROPOSED ENC	436.21		437.34	1642.71	5379.29	22472.05	8033.66	10.66	0.42
3100	100-YR ENC	CORR EXIST ENC	437.19	0.96	438.49	1031.37	4268.33	24334.99	7281.68	11.01	0.42
3100	100-YR ENC	PROPOSED ENC	437.11	0.90	438.44	1031.37	4209.84	24461.77	7213.39	11.11	0.43
2508	100-YR	CORR EXIST ENC	435.80		436.50	1668.10	5716.77	20862.86	9305.37	8.65	0.34
2508	100-YR	PROPOSED ENC	435.78		436.48	1667.77	5699.87	20905.25	9279.88	8.68	0.34
2508	100-YR ENC	CORR EXIST ENC	436.80	1.00	437.61	1227.17	4377.69	22621.05	8886.25	8.93	0.35
2508	100-YR ENC	PROPOSED ENC	436.71	0.93	437.54	1227.17	4319.71	22765.14	8800.15	9.02	0.35
2268 K	100-YR	CORR EXIST ENC	435.31		436.22	1429.54	5636.59	22592.57	7655.83	9.53	0.37
2268 K	100-YR	PROPOSED ENC	435.28		436.20	1429.04	5613.35	22643.75	7627.91	9.56	0.37
2268 K	100-YR ENC	CORR EXIST ENC	436.30	0.98	437.32	1006.70	4559.98	24282.13	7042.90	9.78	0.37
2268 K	100-YR ENC	PROPOSED ENC	436.19	0.90	437.25	1006.70	4486.83	24441.10	6957.07	9.89	0.37
2154	100-YR	CORR EXIST ENC	434.46		435.95	1458.94	6245.46	22141.63	7497.91	12.34	0.50
2154	100-YR	PROPOSED ENC	434.39		435.93	1453.72	6162.23	22299.71	7423.06	12.47	0.50
2154	100-YR ENC	CORR EXIST ENC	435.21	0.75	437.04	871.55	5136.20	24297.82	6450.98	13.03	0.52
2154	100-YR ENC	PROPOSED ENC	434.97	0.58	436.94	871.55	4936.26	24719.89	6228.85	13.42	0.53
1945	100-YR	CORR EXIST ENC	434.29		435.42	1656.41	6358.25	23185.35	6341.40	10.52	0.42
1945	100-YR	PROPOSED ENC	434.24		435.37	1654.10	6429.53	23188.32	6267.15	10.55	0.42
1945	100-YR ENC	CORR EXIST ENC	435.09	0.80	436.45	905.61	5708.03	25308.60	4868.38	11.04	0.43
1945	100-YR ENC	PROPOSED ENC	434.89	0.65	436.30	905.61	5742.75	25451.19	4691.07	11.22	0.44
1896 US ROW	100-YR	CORR EXIST ENC	434.18		435.30	1816.64	8182.80	19653.99	8048.21	11.30	0.45
1896 US ROW	100-YR	PROPOSED ENC	434.19		435.23	1817.12	8796.74	19198.91	7889.36	11.00	0.44
1896 US ROW	100-YR ENC	CORR EXIST ENC	434.97	0.79	436.33	1025.73	7166.96	21505.16	7212.88	11.90	0.46
1896 US ROW	100-YR ENC	PROPOSED ENC	434.84	0.65	436.14	1025.73	7914.00	21086.14	6884.86	11.69	0.46
1889	100-YR	CORR EXIST ENC	434.23		435.23	1909.81	7824.14	18315.76	9745.10	10.93	0.41
1889	100-YR	PROPOSED ENC	433.90		435.15	1850.71	7327.23	19707.32	8850.46	11.94	0.46
1889	100-YR ENC	CORR EXIST ENC	435.10	0.87	436.17	1168.53	6686.98	19243.47	9954.55	11.04	0.41
1889	100-YR ENC	PROPOSED ENC	434.85	0.96	436.10	1168.53	6560.24	20207.12	9117.64	11.72	0.44
1850 BR U	100-YR	CORR EXIST ENC	434.23		435.22	1831.99	9604.82	7192.10	16285.93	5.70	0.18
1850 BR U	100-YR	PROPOSED ENC	433.90		435.15	1409.17	8096.91	12840.67	14147.53	8.81	0.28
1850 BR U	100-YR ENC	CORR EXIST ENC	435.10	0.87	436.17	1168.53	8485.73	8461.63	18368.95	6.37	0.19
1850 BR U	100-YR ENC	PROPOSED ENC	434.85	0.96	436.10	779.66	5453.96	14138.21	15064.03	9.70	0.29
1850 BR D	100-YR	CORR EXIST ENC	434.54		435.18	1910.04	9581.83	7275.15	16225.87	5.25	0.15
1850 BR D	100-YR	PROPOSED ENC	434.30		435.11	1481.96	7346.08	13690.91	14048.11	7.84	0.24
1850 BR D	100-YR ENC	CORR EXIST ENC	435.31	0.77	436.10	1168.53	8459.99	8554.57	18301.75	5.84	0.18
1850 BR D	100-YR ENC	PROPOSED ENC	435.07	0.77	436.04	783.13	4627.26	15074.37	14954.57	8.63	0.27
1836	100-YR	CORR EXIST ENC	434.54		435.18	1995.36	6681.87	18020.06	11183.07	8.86	0.35
1836	100-YR	PROPOSED ENC	434.30		435.11	1982.66	5987.05	19502.16	10395.79	9.71	0.39
1836	100-YR ENC	CORR EXIST ENC	435.31	0.77	436.10	1168.53	5319.60	19835.55	10729.85	9.39	0.36
1836	100-YR ENC	PROPOSED ENC	435.07	0.77	436.04	1168.53	4804.41	21209.19	9871.40	10.16	0.40
1818 J DS ROW	100-YR	CORR EXIST ENC	433.95		434.99	1926.99	4877.34	20684.31	10323.35	10.67	0.42
1818 J DS ROW	100-YR	PROPOSED ENC	433.95		434.99	1926.99	4877.34	20684.31	10323.35	10.67	0.42
1818 J DS ROW	100-YR ENC	CORR EXIST ENC	434.93	0.99	435.96	1348.60	4193.84	21252.29	10438.88	10.44	0.40
1818 J DS ROW	100-YR ENC	PROPOSED ENC	434.93	0.99	435.96	1348.60	4193.84	21252.29	10438.88	10.44	0.40
1779	100-YR	CORR EXIST ENC	434.01		434.79	1990.22	6313.56	17741.10	11830.34	9.94	0.40
1779	100-YR	PROPOSED ENC	434.01		434.79	1990.22	6313.56	17741.10	11830.34	9.94	0.40
1779	100-YR ENC	CORR EXIST ENC	434.99	0.98	435.79	1422.10	5581.88	18394.97	11908.14	9.80	0.39
1779	100-YR ENC	PROPOSED ENC	434.99	0.98	435.79	1422.10	5581.88	18394.97	11908.14	9.80	0.39
1315	100-YR	CORR EXIST ENC	432.80		433.73	2180.60	4716.67	17599.49	13568.84	10.87	0.45
1315	100-YR	PROPOSED ENC	432.80		433.73	2180.60	4716.67	17599.49	13568.84	10.87	0.45
1315	100-YR ENC	CORR EXIST ENC	433.77	0.96	434.79	1445.21	2760.43	18818.59	14305.98	11.04	0.44
1315	100-YR ENC	PROPOSED ENC	433.77	0.96	434.79	1445.21	2760.43	18818.59	14305.98	11.04	0.44
881	100-YR	CORR EXIST ENC	432.10		432.81	2588.09	4336.86	17506.72	14041.41	9.56	0.38
881	100-YR	PROPOSED ENC	432.10		432.81	2588.09	4336.86	17506.72	14041.41	9.56	0.38
881	100-YR ENC	CORR EXIST ENC	433.06	0.97	433.88	1493.81	2056.03	18946.55	14882.41	9.85	0.39
881	100-YR ENC	PROPOSED ENC	433.06	0.97	433.88	1493.81	2056.03	18946.55	14882.41	9.85	0.39
129	100-YR	CORR EXIST ENC	430.77		431.65	2595.04	4459.53	17640.03	13785.44	10.58	0.43
129	100-YR	PROPOSED ENC	430.77		431.65	2595.04	4459.53	17640.03	13785.44	10.58	0.43
129	100-YR ENC	CORR EXIST ENC	431.72	0.95	432.74	1209.43	2169.84	19138.94	14576.22	10.93	0.43
129	100-YR ENC	PROPOSED ENC	431.72	0.95	432.74	1209.43	2169.84	19138.94	14576.22	10.93	0.43

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JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

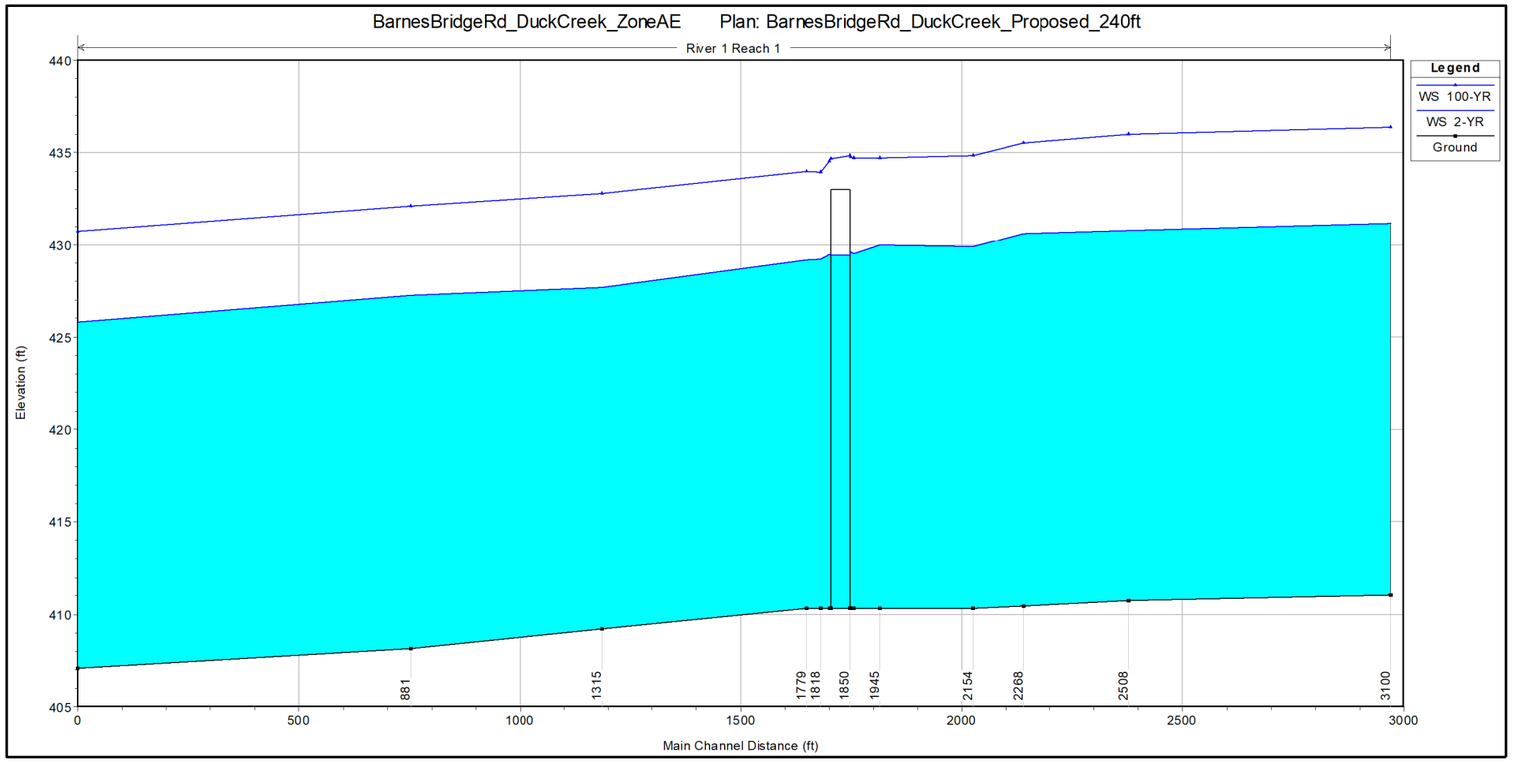
Texas Department of Transportation

BARNES BRIDGE RD

HYDRAULIC DATA SHEETS AT DUCK CREEK

SHEET 3 OF 5

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
LTR	6	SEE TITLE SHEET		BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	
DRAWN	CONTROL	SECTION	JOB	53
LTR	0918	47	288	
CHECK				
JNV				



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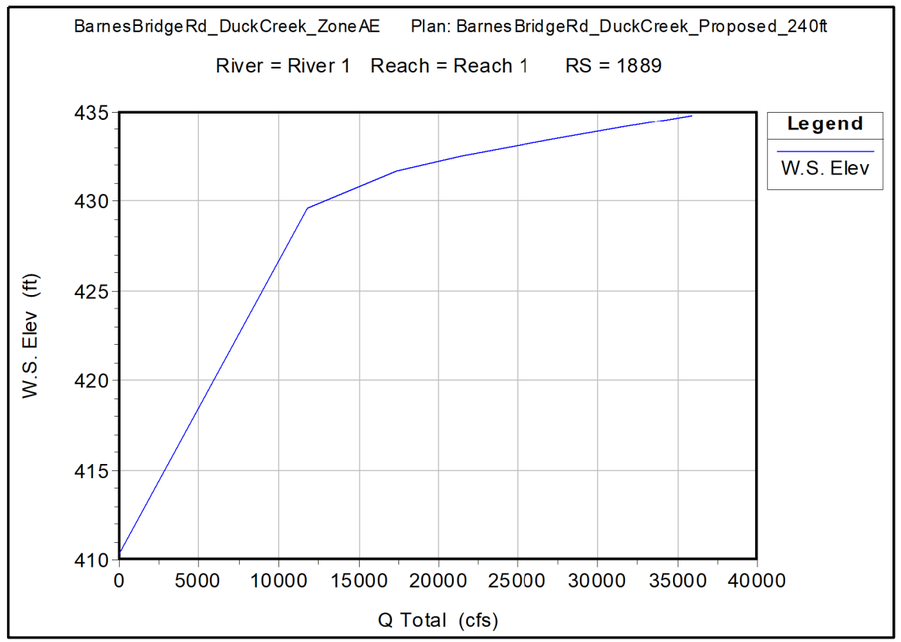
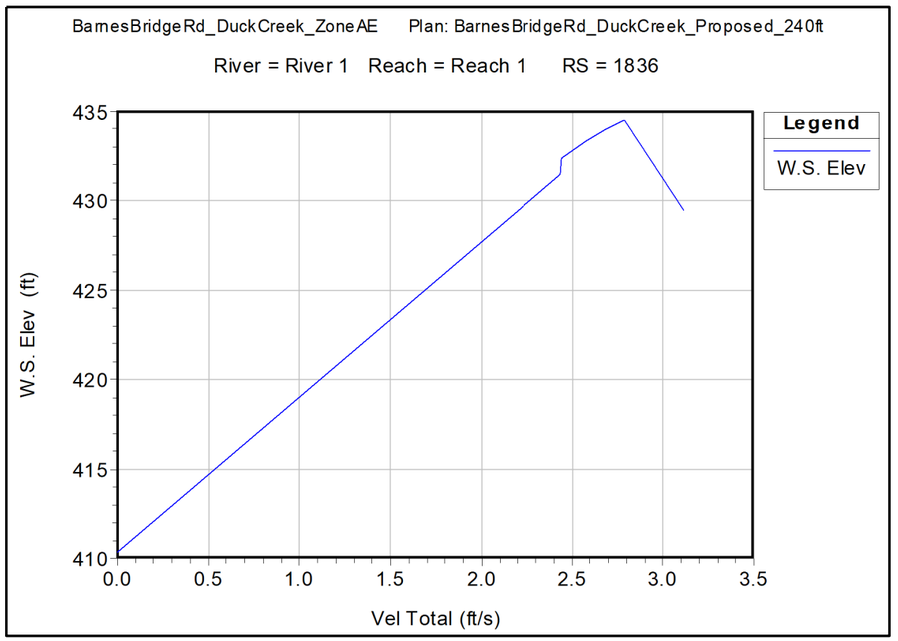


CONVEYANCE CURVE



VELOCITY CURVE

STATE OF TEXAS
JASON N. VERNER
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Farmers Branch, Texas 75234
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Texas Department of Transportation

BARNES BRIDGE RD

HYDRAULIC DATA SHEETS AT DUCK CREEK

SHEET 4 OF 5

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK			
JNV			

SHEET NO. 54

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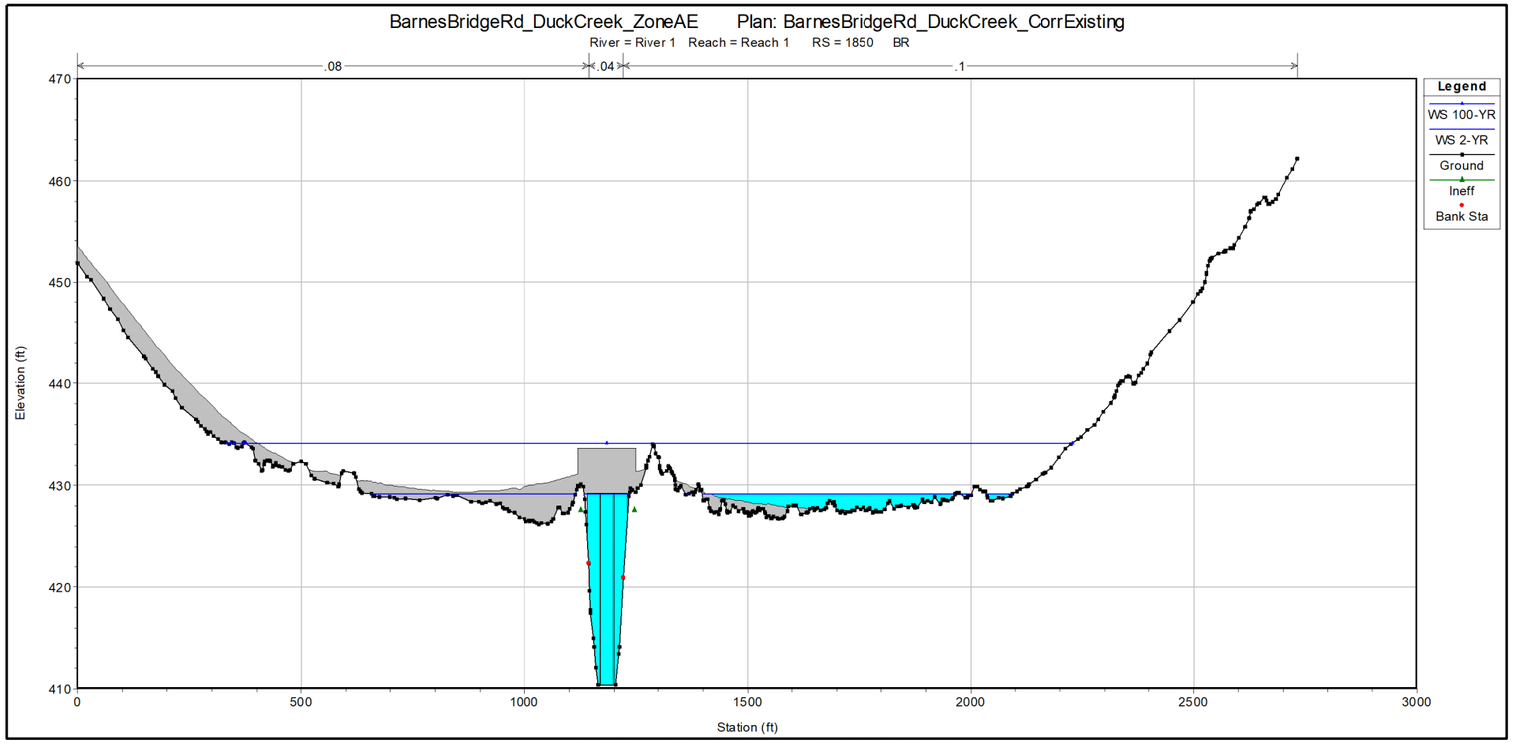
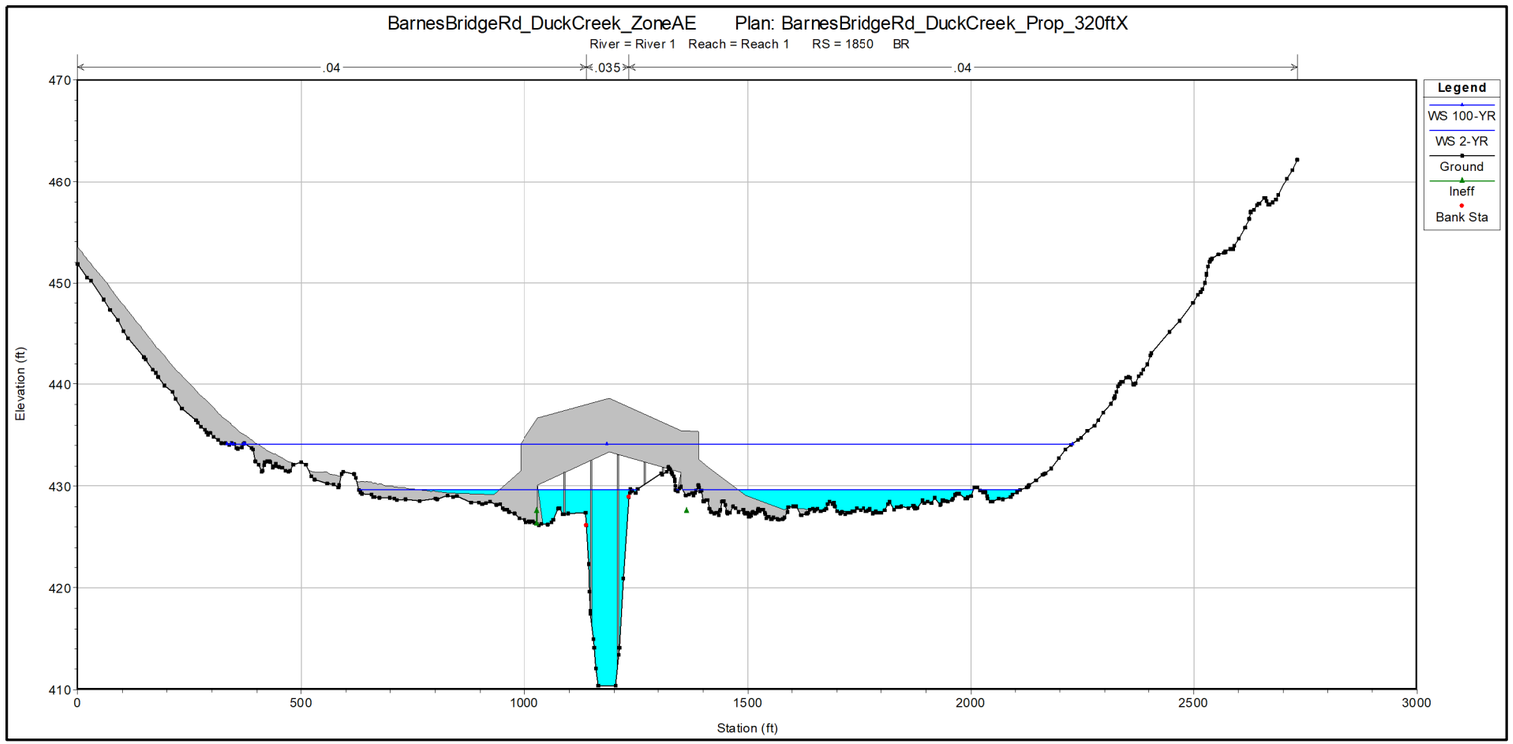


UPSTREAM FACE OF EXISTING BRIDGE



UPSTREAM FACE OF PROPOSED BRIDGE

HYDRAULIC MODELING RESULTS (INTERNAL BRIDGE CROSS-SECTIONS)

Plan: Prop Model	Duck Creek	Main RS: 1850	Profile: 2-YR	
E.G. US. (ft)	430.45	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	429.56	E.G. Elev (ft)	430.38	430.20
Q Total (cfs)	11776	W.S. Elev (ft)	429.31	429.36
Q Bridge (cfs)	11270.5	Crit W.S. (ft)	421.86	421.9
Q Weir (cfs)		Max Chl Dpth (ft)	18.96	19.01
Weir Sta Lft (ft)		Vel Total (ft/s)	5.11	4.54
Weir Sta Rgt (ft)		Flow Area (sq ft)	2306.19	2591.79
Weir Submerg		Froude # Chl	0.34	0.30
Weir Max Depth (ft)		Specif Force (cu ft)	14617.97	15069.34
Min El Weir Flow (ft)	427.53	Hydr Depth (ft)	2.56	2.50
Min El Prs (ft)	433.36	W.P. Total (ft)	982.7	1115.02
Delta EG (ft)	0.35	Conv. Total (cfs)	247942.4	278278.3
Delta WS (ft)	0.13	Top Width (ft)	901.27	1037.91
BR Open Area (sq ft)	2458.99	Frctn Loss (ft)	0.07	0.01
BR Open Vel (ft/s)	6.82	C & E Loss (ft)	0.12	0.08
BR Sluice Coef		Shear Total (lb/sq ft)	0.33	0.26
BR Sel Method	Energy only	Power Total (lb/ft s)	1.69	1.18

Plan: Prop Model	Duck Creek	Main RS: 1850	Profile: 100-YR	
E.G. US. (ft)	435.15	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	433.9	E.G. Elev (ft)	435.15	435.11
Q Total (cfs)	35885	W.S. Elev (ft)	433.9	434.3
Q Bridge (cfs)	14598.41	Crit W.S. (ft)	433.25	432.97
Q Weir (cfs)	21286.59	Max Chl Dpth (ft)	23.55	23.95
Weir Sta Lft (ft)	369.27	Vel Total (ft/s)	4.32	3.83
Weir Sta Rgt (ft)	2255.81	Flow Area (sq ft)	8311.06	9365.88
Weir Submerg	0.98	Froude # Chl	0.28	0.24
Weir Max Depth (ft)	7.63	Specif Force (cu ft)	42676.3	47734.83
Min El Weir Flow (ft)	427.53	Hydr Depth (ft)	5.90	6.32
Min El Prs (ft)	433.36	W.P. Total (ft)	2138.92	2209.04
Delta EG (ft)	0.04	Conv. Total (cfs)		
Delta WS (ft)	-0.4	Top Width (ft)	1409.17	1481.95
BR Open Area (sq ft)	2458.99	Frctn Loss (ft)		
BR Open Vel (ft/s)	5.94	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

NOTES:

1) 2-YR DESIGN STORM DOES NOT OVER-TOP THE PROPOSED BRIDGE STRUCTURE AND APPROACHES, BUT THE ADJACENT ROADWAY WILL BE INUNDATED.

2) EXISTING BRIDGE: 3-30' SPANS.

3) PROPOSED BRIDGE: 40'-40'-60'-60'-60'-60' SPANS.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
P.E.
10/31/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

HYDRAULIC DATA SHEETS AT DUCK CREEK

SHEET 5 OF 5

DESIGN LTR	FED. RD. DIV. NO. 6	PROJECT NO. SEE TITLE SHEET	HIGHWAY NO. BBR
CHECK JNV	STATE TEXAS	DISTRICT DAL	COUNTY DALLAS
DRAWN LTR	CONTROL 0918	SECTION 47	JOB 288
CHECK JNV			SHEET NO. 55

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SCOUR CALCULATIONS									
	SCOUR DESIGN FLOOD (2-YEAR)			SCOUR DESIGN FLOOD (5-YEAR)			SCOUR DESIGN FLOOD (10-YEAR)		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
CONTRACTION SCOUR CONDITION									
D50 (ft)	0.000656	0.000656	0.000656	0.000656	0.000656	0.000656	0.000656	0.000656	0.000656
y (ft)	1.52	15.18	0.63	3.20	17.50	2.38	3.58	18.09	2.93
Ku (-)	11.17	11.17	11.17	11.17	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	1.04	1.53	0.90	1.18	1.56	1.12	1.20	1.57	1.16
V1 (ft/s)	0.95	8.17	0.43	1.42	8.06	0.92	1.69	8.88	1.14
V1 / Vc	0.91	5.34	0.48	1.20	5.17	0.82	1.41	5.66	0.98
CONDITION	CLEAR-WATER	LIVE-BED	CLEAR-WATER	LIVE-BED	LIVE-BED	CLEAR-WATER	LIVE-BED	LIVE-BED	CLEAR-WATER
LIVE-BED CONTRACTION SCOUR									
Q1 (cfs)	-	10913.04	-	2914.37	12416.10	-	4128.55	14143.99	-
Q2 (cfs)	-	10504.01	-	2424.07	12035.51	-	3235.91	14095.41	-
y0 (ft)	-	16.91	-	3.16	19.2	-	3.35	19.69	-
y1 (ft)	-	15.18	-	3.20	17.32	-	3.58	18.09	-
y2 (ft)	-	16.01	-	2.66	18.57	-	2.77	19.65	-
W1 (ft)	-	88.00	-	641.31	88.00	-	682.77	88.00	-
W2 (ft)	-	77.70	-	665.45	77.70	-	731.79	77.70	-
k1 (-)	-	0.69	-	0.69	0.69	-	0.69	0.69	-
ys (ft)	-	0.00	-	0.00	0.00	-	0.00	0.00	-
CLEAR-WATER CONTRACTION SCOUR									
ku (-)	0.0077	-	0.0077	-	-	0.0077	-	-	0.0077
Q (cfs)	579.66	-	692.33	-	-	2914.42	-	-	4092.68
D50 (ft)	0.000656	-	0.000656	-	-	0.000656	-	-	0.000656
Dm (ft)	0.00082	-	0.00082	-	-	0.00082	-	-	0.00082
W (ft)	514.42	-	762.83	-	-	959.59	-	-	970.19
y0 (ft)	1.52	-	1.46	-	-	3.29	-	-	3.75
y2 (ft)	1.05	-	0.87	-	-	2.45	-	-	3.25
ys (ft)	0.00	-	0.00	-	-	0.00	-	-	0.00
PIER SCOUR									
BENT #	6	5	4	3	2	6	5	4	3	2	6	5	4	3	2
yp (ft)	19.21	19.21	19.21	19.21	19.21	21.50	21.50	21.50	21.50	21.50	22.00	22.00	22.00	22.00	22.00
Vp (ft/s)	8.92	8.92	8.92	8.92	8.92	8.95	8.95	8.95	8.95	8.95	10.21	10.21	10.21	10.21	10.21
g (ft/s²)	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
Fr (-)	0.36	0.36	0.36	0.36	0.36	0.34	0.34	0.34	0.34	0.34	0.38	0.38	0.38	0.38	0.38
a (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
L (ft)	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Theta (degree)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K1 (-)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
K2 (-)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
K3 (-)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Red. Factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
ys (ft)	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60

CHANNEL MATERIAL	
CHANNEL BED MATERIAL DESCRIPTION	CHANNEL AND BANKS INCLUDE STIFF-TO-VERY STIFF CLAY IN TOP 30 FT OF BANK. STIFF CLAY UNDERLAIN BY SHALE TO THE END OF LOG.
D50	0.000656 ft (0.2 mm)
BASIS OF CHANNEL BED MATERIAL DESCRIPTION	LABORATORY TESTS OM SOIL BORING SAMPLES.
NON-ERODIBLE STRATA	SHALE (TCP < 5 in. / 100 BLOWS) IS NON-ERODIBLE BELOW EL = 395.40 ft.

SUMMARY OF RETURN PERIODS	
DESIGN FLOOD	2-YEAR
SCOUR DESIGN FLOOD	2, 5, 10, & 25-YEAR
SCOUR DESIGN CHECK FLOOD	50-YEAR

* THE RETURN PERIOD FOR THE DESIGN FLOOD WAS OBTAINED FROM THE TxDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019. THE RETURN PERIODS FOR THE SCOUR DESIGN FLOOD AND THE SCOUR CHECK FLOOD WERE OBTAINED FROM THE TxDOT SCOUR EVALUATION GUIDE, AUGUST 2020.

ANALYSIS NOTES

THIS SCOUR EVALUATION WAS CONDUCTED USING THE TRADITIONAL HEC-18 METHOD, IN ACCORDANCE WITH THE STATE'S SCOUR EVALUATION GUIDE, AUGUST 2020.

REFER TO THE TEST HOLE DATA SHEET FOR ADDITIONAL SUBSURFACE INFORMATION.

REFER TO THE DRAINAGE AREA SHEET AND THE HYDRAULIC DATA SHEET FOR ADDITIONAL HYDROLOGIC AND HYDRAULIC INFORMATION.

THE CHANNEL MATERIAL CONTAINS MORE THAN 11% FINES BY WEIGHT. PER THE SCOUR EVALUATION GUIDE, A REDUCTION FACTOR OF 0.5 WAS APPLIED TO THE CALCULATED PIER SCOUR.

THE TOTAL CALCULATED SCOUR AT EITHER ABUTMENT IS EQUAL TO CALCULATED CONTRACTION SCOUR AT THAT LOCATION. THE TOTAL CALCULATED SCOUR AT INTERIOR BENTS IS EQUAL TO THE SUM OF THE CALCULATED CONTRACTION AND PIER SCOUR DEPTHS.

BENT #6 IS LOCATED IN THE LEFT OVERBANK.
BENT #5 IS LOCATED IN THE LEFT OVERBANK.
BENT #4 IS LOCATED IN THE MAIN CHANNEL.
BENT #3 IS LOCATED IN THE MAIN CHANNEL.
BENT #2 IS LOCATED IN THE RIGHT OVERBANK.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

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LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

BRIDGE SCOUR DATA AT DUCK CREEK

SHEET 1 OF 3

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY	SHEET NO.
JNV	TEXAS	DAL	DALLAS	56
DRAWN	CONTROL	SECTION	JOB	
LTR	0918	47	288	
CHECK				
JNV				

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SCOUR CALCULATIONS

SCOUR DESIGN FLOOD (25-YEAR) / SCOUR DESIGN CHECK FLOOD (50-YEAR)

	SCOUR DESIGN FLOOD (25-YEAR)			SCOUR DESIGN CHECK FLOOD (50-YEAR)		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
CONTRACTION SCOUR CONDITION						
D50 (ft)	0.000656	0.000656	0.000656	0.000656	0.000656	0.000656
y (ft)	4.15	18.94	3.72	4.93	19.77	4.47
Ku (-)	11.17	11.17	11.17	11.17	11.17	11.17
Vc (ft/s)	1.23	1.58	1.21	1.27	1.60	1.25
V1 (ft/s)	1.91	9.76	1.42	2.09	9.80	1.57
V1 / Vc	1.55	6.18	1.17	1.65	6.13	1.26
CONDITION	LIVE-BED	LIVE-BED	LIVE-BED	LIVE-BED	LIVE-BED	LIVE-BED
LIVE-BED CONTRACTION SCOUR						
Q1 (cfs)	5839.22	16276.93	5089.85	7676.53	17050.67	6872.80
Q2 (cfs)	4913.06	16206.70	6086.24	6497.84	17259.36	7842.80
y0 (ft)	4.09	18.94	4.52	4.70	21.29	5.21
y1 (ft)	4.15	18.94	3.72	4.93	19.77	4.47
y2 (ft)	3.54	20.56	4.27	4.15	21.77	4.94
W1 (ft)	738.05	88.00	963.21	744.98	88.00	981.53
W2 (ft)	749.61	77.70	984.39	776.71	77.70	1000.94
k1 (-)	0.69	0.69	0.69	0.69	0.69	0.69
ys (ft)	0.00	1.62	0.00	0.00	0.48	0.00
CLEAR-WATER CONTRACTION SCOUR						
ku (-)	-	-	-	-	-	-
Q (cfs)	-	-	-	-	-	-
D50 (ft)	-	-	-	-	-	-
Dm (ft)	-	-	-	-	-	-
W (ft)	-	-	-	-	-	-
y0 (ft)	-	-	-	-	-	-
y2 (ft)	-	-	-	-	-	-
ys (ft)	-	-	-	-	-	-

PIER SCOUR										
BENT #	6	5	4	3	2	6	5	4	3	2
yp (ft)	22.83	22.83	22.83	22.83	22.83	23.60	23.60	23.60	23.60	23.60
Vp (ft/s)	11.25	11.25	11.25	11.25	11.25	11.53	11.53	11.53	11.53	11.53
g (ft/s²)	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2
Fr (-)	0.41	0.41	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42
a (ft)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
L (ft)	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Theta	0	0	0	0	0	0	0	0	0	0
K1 (-)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
K2 (-)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
K3 (-)	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Red. Factor	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
ys (ft)	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60

SCOUR DESIGN FLOOD (2-YEAR)

	UPSTREAM APPROACH RIVER STATION 1896			CONTRACTED SECTION AT BRIDGE RIVER STATION 1889		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
A (sq. ft.)	751.72	1336.24	344.76	782.95	1313.68	1175.99
WP (ft)	494.81	98.52	546.28	516.58	84.47	766.65
n (-)	0.080	0.040	0.100	0.080	0.035	0.100
Q (cfs)	713.24	10913.04	149.71	579.66	10504.01	692.33
V (ft/s)	0.95	8.17	0.43	0.74	8.00	0.62
y (ft)	1.52	15.18	0.63	1.52	16.91	1.46
W (ft)	493.56	88.00	544.79	514.42	77.70	762.83
WSEL (ft)	429.53			429.56		
Vave (ft/s)	4.84			3.67		

SCOUR DESIGN FLOOD (2-YEAR)

UPSTREAM BRIDGE CROSS-SECTION: RIVER STATION 1889
AT BENTS (PIER SCOUR IS THE SAME FOR ALL BENTS)

y_s (ft)	19.21
V_c (ft/s)	8.92

SCOUR DESIGN FLOOD (5-YEAR)

	UPSTREAM APPROACH RIVER STATION 1896			CONTRACTED SECTION AT BRIDGE RIVER STATION 1889		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
A (sq. ft.)	2052.02	1539.97	2214.87	2103.31	1491.50	3218.19
WP (ft)	642.78	98.52	933.21	668.00	84.47	964.00
n (-)	0.080	0.040	0.100	0.080	0.035	0.100
Q (cfs)	2914.37	12416.10	2043.53	2424.07	12035.51	2914.42
V (ft/s)	1.42	8.06	0.92	1.15	8.07	0.92
y (ft)	3.20	17.50	2.38	3.16	19.20	3.29
W (ft)	641.31	88.00	930.77	665.45	77.70	959.59
WSEL (ft)	431.85			431.85		
Vave (ft/s)	2.99			2.57		

SCOUR DESIGN FLOOD (5-YEAR)

UPSTREAM BRIDGE CROSS-SECTION: RIVER STATION 1889
AT BENTS (PIER SCOUR IS THE SAME FOR ALL BENTS)

y_s (ft)	21.50
V_c (ft/s)	8.95

SCOUR DESIGN FLOOD (10-YEAR)

	UPSTREAM APPROACH RIVER STATION 1896			CONTRACTED SECTION AT BRIDGE RIVER STATION 1889		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
A (sq. ft.)	2444.48	1592.30	2773.27	2449.79	1530.29	3700.14
WP (ft)	684.39	98.52	948.67	734.47	84.47	974.62
n (-)	0.080	0.040	0.100	0.080	0.350	0.100
Q (cfs)	4128.55	14143.99	3151.46	3235.91	14095.41	4092.68
V (ft/s)	1.69	8.88	1.14	1.32	9.21	1.12
y (ft)	3.58	18.09	2.93	3.35	19.69	3.75
W (ft)	682.77	88.00	946.15	731.79	77.70	970.19
WSEL (ft)	432.44			432.35		
Vave (ft/s)	3.15			2.81		

SCOUR DESIGN FLOOD (10-YEAR)

UPSTREAM BRIDGE CROSS-SECTION: RIVER STATION 1889
AT BENTS (PIER SCOUR IS THE SAME FOR ALL BENTS)

y_s (ft)	22.00
V_c (ft/s)	10.21

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

BRIDGE SCOUR DATA AT DUCK CREEK

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY / SHEET NO.
JNV	TEXAS	DAL	DALLAS / 57
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK JNV			

DATE: 10/3/2023 3:21:38 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01dmu@ltraengineers.com\dms21932\LTRA Barnes_BHD07.dgn

	SUMMARY OF CALCULATED SCOUR DEPTH (ft)														
	SCOUR DESIGN FLOOD (2-YEAR)			SCOUR DESIGN FLOOD (5-YEAR)			SCOUR DESIGN FLOOD (10-YEAR)			SCOUR DESIGN FLOOD (25-YEAR)			SCOUR DESIGN CHECK FLOOD (50-YEAR)		
	CONTRACTION SCOUR	PIER SCOUR	TOTAL SCOUR	CONTRACTION SCOUR	PIER SCOUR	TOTAL SCOUR	CONTRACTION SCOUR	PIER SCOUR	TOTAL SCOUR	CONTRACTION SCOUR	PIER SCOUR	TOTAL SCOUR	CONTRACTION SCOUR	PIER SCOUR	TOTAL SCOUR
LEFT OVERBANK	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00
BENT #6	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60
BENT #5	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60
BENT #4	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	1.62	3.60	5.22	0.48	3.60	4.08
BENT #3	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	1.62	3.60	5.22	0.48	3.60	4.08
BENT #2	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60	0.00	3.60	3.60
RIGHT OVERBANK	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00	0.00	N/A	0.00

	SCOUR DESIGN FLOOD (25-YEAR)					
	UPSTREAM APPROACH RIVER STATION 1896			CONTRACTED SECTION AT BRIDGE RIVER STATION 1889		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
A (sq. ft.)	3059.38	1666.92	3583.40	3069.47	1594.85	4512.32
WP (ft)	739.76	98.52	965.74	752.35	84.47	988.85
n (-)	0.080	0.040	0.100	0.080	0.035	0.100
Q (cfs)	5839.22	16276.93	5089.85	4913.06	16206.70	6086.24
V (ft/s)	1.91	9.76	1.42	1.60	10.16	1.37
y (ft)	4.15	18.94	3.72	4.09	20.53	4.52
W (ft)	738.05	88.00	963.21	749.61	77.70	984.39
WSEL (ft)	433.29			433.18		
Vave (ft/s)	3.27			2.98		

	SCOUR DESIGN CHECK FLOOD (50-YEAR)					
	UPSTREAM APPROACH RIVER STATION 1896			CONTRACTED SECTION AT BRIDGE RIVER STATION 1889		
	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK	LEFT OVERBANK	MAIN CHANNEL	RIGHT OVERBANK
A (sq. ft.)	3673.04	1739.76	4388.29	3649.86	1654.42	5272.61
WP (ft)	746.74	98.52	984.08	779.51	84.47	1005.41
n (-)	0.080	0.040	0.100	0.080	0.035	0.100
Q (cfs)	7676.53	17050.67	6872.80	6497.84	17259.36	7842.8
V (ft/s)	2.09	9.8	1.57	1.78	10.43	1.50
y (ft)	4.93	19.77	4.47	4.70	21.29	5.21
W (ft)	744.98	88.00	981.53	776.70	77.70	1000.94
WSEL (ft)	434.12			433.95		
Vave (ft/s)	3.22			3.01		

	SCOUR DESIGN FLOOD (25-YEAR)
	UPSTREAM BRIDGE CROSS-SECTION: RIVER STATION 1889
	AT BENTS (PIER SCOUR IS THE SAME FOR ALL BENTS)
y_s (ft)	22.83
V_s (ft/s)	11.25

	SCOUR DESIGN CHECK FLOOD (50-YEAR)
	UPSTREAM BRIDGE CROSS-SECTION: RIVER STATION 1889
	AT BENTS (PIER SCOUR IS THE SAME FOR ALL BENTS)
y_s (ft)	23.60
V_s (ft/s)	11.53

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/3/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

BRIDGE SCOUR DATA AT DUCK CREEK

SHEET 3 OF 3

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY	SHEET NO.
DRAWN LTR	TEXAS	DAL	DALLAS	58
CHECK JNV	CONTROL	SECTION	JOB	
	0918	47	288	

DATE: 10/3/2023 3:21:50 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\dmu@ltraengineers.com\dms21932\LTRA Barnes_BHD08.dgn

DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-1	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	09/28/2022
CSJ	0918-47-288	Station	14+46.37	Grnd. Elev.	430.36 ft
		Offset	1.63 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
429.8			ASPHALT, 6.5 inches							
429.4			BASE, 5.5 inches			22.0	46	34		%Pass #4 Sieve: 99.9
428.4			CLAY, lean, moist, grayish brown, trace sand, iron oxides and organics (CL)			21.9	52	38		%Pass #40 Sieve: 99.3 %Pass #200 Sieve: 92.3 PP: 2.0
			CLAY, fat, very soft to stiff, moist, grayish brown, trace sand, iron oxides, trace organics and calcareous deposits (CH)			23.4				%Pass #4 Sieve: 99.9 %Pass #40 Sieve: 99.6 %Pass #200 Sieve: 97.1 PP: 1.0
	5	3 (6) 4 (6)				23.6	55	40		PP: 1.5 Sulfate Content < 100 ppm
				0	21.1	21.4			126.8	%Pass #4 Sieve: 100.0 %Pass #40 Sieve: 98.7 %Pass #200 Sieve: 96.8 PP: 1.5
	10	4 (6) 4 (6)								%Pass #4 Sieve: 99.9 %Pass #40 Sieve: 93.2 %Pass #200 Sieve: 88.4 PP: 1.5
417.4			CLAY, lean, soft to stiff, moist, grayish brown, trace sand, iron oxides, trace organics and calcareous deposits (CL)	0	18.6	23.2	45	31	124.5	%Pass #4 Sieve: 100.0 %Pass #40 Sieve: 99.7 %Pass #200 Sieve: 92.6 PP: 1.0
	15	4 (6) 4 (6)								
412.4			CLAY, fat, soft to stiff, moist, grayish brown, trace sand, iron oxides, organics and calcareous deposits (CH)	0	20.6	21.4	52	38	128.4	%Pass #4 Sieve: 99.9 %Pass #40 Sieve: 98.5 %Pass #200 Sieve: 93.1 PP: 2.5
	20	7 (6) 8 (6)								
407.4			CLAY, fat, stiff, moist, grayish brown to dark gray, with sand, trace gravel. iron oxides, organics calcareous deposits and weathered shale fragments (CH)			20.6	52	39		%Pass #4 Sieve: 99.1 %Pass #40 Sieve: 95.5 %Pass #200 Sieve: 81.4 PP: 3.0
	25	14 (6) 15 (6)								
						24.7				PP: 4.5
400.4	30	50 (1.5) 50 (2)	SHALE, weathered, soft to hard, dark gray, thinly laminated, friable, trace fossils							
						16.3				SPT: 29,35,50/2.75"
	35	50 (2.5) 50 (1)								

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6990989.648, Easting: 2562540.798 Latitude: 32.8291204, Longitude: -96.5670478.

The ground water elevation was not determined during the course of this boring.

Driller: Savage Logger: Nicholas Flynn Organization: HVJ Associates®

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DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-1	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	09/28/2022
CSJ	0918-47-288	Station	14+46.37	Grnd. Elev.	430.36 ft
		Offset	1.63 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
			SHALE, weathered, soft to hard, dark gray, thinly laminated, friable, trace fossils							
						15.5				SPT: 24,30,42
	40	50 (2.75) 50 (1.5)								
						16.3				SPT: 24,25,50/5.75"
	45	50 (2.5) 50 (1.5)								
380.4	50	50 (4) 50 (0.5)	SHALE, soft to hard, dark gray, thinly laminated, friable, trace fossils							SPT: 25,35,45
	55	50 (2.25) 50 (1)								SPT: 29,50/6"
	60	50 (3.5) 50 (3)								SPT: 25,40,50/6"
	65	50 (1.5) 50 (0.5)								SPT: 27,42,50/5"
	70	50 (1.5) 50 (0.12)								SPT: 25,42,50/6"

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6990989.648, Easting: 2562540.798 Latitude: 32.8291204, Longitude: -96.5670478.

The ground water elevation was not determined during the course of this boring.

Driller: Savage Logger: Nicholas Flynn Organization: HVJ Associates®

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STATE OF TEXAS
PALASUNTHARAM THUSHANTHAN
117402
LICENSED
PROFESSIONAL ENGINEER
10/05/2023

SHEET 1 OF 4

HVJ ASSOCIATES
HVJ North Texas-Chelliah Consultants, INC.
8701 John W Carpenter Freeway
Dallas, Texas 75247
Firm Registration No. F-17942

Texas Department of Transportation

Dallas District Bridge

BORE LOG

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		59

DATE: 9/28/2023 2:34:24 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\ycui@ltraengineers.com\dms21932\WSP Barnes BoreLogs 01.dgn

DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-1	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	09/28/2022
CSJ	0918-47-288	Station	14+46.37	Grnd. Elev.	430.36 ft
		Offset	1.63 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	Properties: Wet Den. (pcf)	Additional Remarks
			SHALE, soft to hard, dark gray, thinly laminated, friable, trace fossils							
				0	421	15.3			136.7	70ft-75ft: REC:95%, RQD:88%
75		50 (1) 50 (0.5)								
				0	484	14.8			137.5	75ft-80ft: REC:92%, RQD:92%
350.4 80		50 (1.5) 50 (0.5)								
85										
90										
95										
100										
105										

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6990989.648, Easting: 2562540.798 Latitude: 32.8291204, Longitude: -96.5670478.

The ground water elevation was not determined during the course of this boring.

Driller: Savage Logger: Nicholas Flynn Organization: HVJ Associates®

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STATE OF TEXAS
PALASUNTHARAM THUSHANTHAN
117402
LICENSED
PROFESSIONAL ENGINEER
10/05/2023

SHEET 2 OF 4

HVJ ASSOCIATES
HVJ North Texas-Chelliah Consultants, INC.
8701 John W Carpenter Freeway
Dallas, Texas 75247
Firm Registration No. F-17942

Texas Department of Transportation

Dallas District Bridge

BORE LOG

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		60

DATE: 9/28/2023 2:34:30 PM
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DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-2	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	10/3/2022
CSJ	0918-47-288	Station	16+91.67	Grnd. Elev.	430.37 ft
		Offset	1.88 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
429.9			ASPHALT, 5.5 inches							PP: 4.5
429.4			BASE, 5.5 inches							
			CLAY, lean, very soft, moist, reddish brown, trace sand, iron oxides and calcareous nodules (CL)			17.0	48	34		%Pass #4 Sieve: 99.9 %Pass #40 Sieve: 99.3 %Pass #200 Sieve: 93.5 PP: 4.5
						16.8				%Pass #4 Sieve: 99.6 %Pass #40 Sieve: 93.5 %Pass #200 Sieve: 89.0 PP: 4.5
424.4		3 (6) 3 (6)	CLAY, fat, soft to very stiff, moist, reddish to dark brown, trace sand, gravel, iron oxides, iron staining, organics and calcareous nodules (CH)			21.4	55	40		Sulfate Content < 100 ppm %Pass #4 Sieve: 96.9 %Pass #40 Sieve: 93.0 %Pass #200 Sieve: 91.1 PP: 4.5
				0	30	21.9			130.4	PP: 2.8
		6 (6) 6 (6)								
417.4			CLAY, fat, soft to very stiff, moist, grayish brown, with sand, trace gravel, iron oxides, iron staining, organics and calcareous nodules (CH)			18.1	76	60		%Pass #4 Sieve: 95.8 %Pass #40 Sieve: 86.8 %Pass #200 Sieve: 82.1 PP: 2.5
		6 (6) 8 (6)								
412.4			CLAY, fat, soft to very stiff, moist, grayish brown, brown and tan, trace sand, gravel, iron oxides, iron staining and calcareous nodules (CH)							
				0	31.4	24.8	69	54	129.2	%Pass #4 Sieve: 99.4 %Pass #40 Sieve: 97.3 %Pass #200 Sieve: 94.6 PP: 2.5
		6 (6) 8 (6)	blocky 23' to 28'							
						26.6	74	56		%Pass #4 Sieve: 100.0 %Pass #40 Sieve: 99.9 %Pass #200 Sieve: 98.8 PP: 4.5 blocky from 23 to 28 feet
		10 (6) 12 (6)								
				0	39.2	23.8			127	PP: 4.5
		10 (6) 18 (6)	laminated and trace gypsum 28' to 35'							
						25.4				PP: 4.5
395.4		50 (2.5) 50 (1.5)								

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6991113.072, Easting: 2562751.435 Latitude: 32.829456, Longitude: -96.566341.

The ground water elevation was not determined during the course of this boring.

Driller: Savage Logger: Nicholas Flynn Organization: HVJ Associates®

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DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-2	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	10/3/2022
CSJ	0918-47-288	Station	16+91.67	Grnd. Elev.	430.37 ft
		Offset	1.88 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
			SHALE, moderately weathered, soft to hard, gray, laminated							
						16.0				SPT: 25,35,50/5"
40		50 (2) 50 (0.75)								
385.4		50 (2) 50 (1)								
45			SHALE, hard to very hard, gray, thinly laminated, fossiliferous							
						16.2				SPT: 35,50/5.25"
										45ft-50ft: REC:92%, RQD:92%
50		50 (1.5) 50 (0.75)								
				0	208	16.0			137.1	
										50ft-55ft: REC:83%, RQD:83%
55		50 (3) 50 (1)		0	348	16.1			135.2	
										55ft-60ft: REC:97%, RQD:97%
60		50 (0.5) 50 (0.25)								
				0	257	16.7			137.4	
										60ft-65ft: REC:95%, RQD:90%
65		50 (0.75) 50 (0.5)								
										65ft-70ft: REC:87%, RQD:87%
70		50 (0.5) 50 (0.25)								

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6991113.072, Easting: 2562751.435 Latitude: 32.829456, Longitude: -96.566341.

The ground water elevation was not determined during the course of this boring.

Driller: Savage Logger: Nicholas Flynn Organization: HVJ Associates®

g:\dal ps\geo\projects\20\dg-20-10213.1.1 barnes bridge rd & hampton rd, ltra\1.2_boring logs\0.1 gint files\barnes bridge rd & hampton rd, ltra.gpj

STATE OF TEXAS
PALASUNTHARAM THUSHANTHAN
117402
LICENSED
PROFESSIONAL ENGINEER
10/05/2023

SHEET 3 OF 4

HVJ ASSOCIATES
HVJ North Texas-Chelliah Consultants, INC.
8701 John W Carpenter Freeway
Dallas, Texas 75247
Firm Registration No. F-17942

Texas Department of Transportation — Dallas District Bridge

BORE LOG

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		61

DATE: 9/28/2023 2:34:36 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\ycui@ltraengineers.com\dms21932\WSP Barnes BoreLogs 03.dgn

DRILLING LOG

WinCore Version 3.1

County	Dallas	Hole	BB-BR-2	District	Dallas
Highway	Barnes Bridge Rd	Structure	Bridge	Date	10/3/2022
CSJ	0918-47-288	Station	16+91.67	Grnd. Elev.	430.37 ft
		Offset	1.88 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
355.4		50 (0.5) 50 (0.12)	SHALE, hard to very hard, gray, thinly laminated, fossiliferous							70ft-75ft: REC:93%, RQD:93%
75										
80										
85										
90										
95										
100										
105										

Remarks: PP: Pocket Penetrometer readings are in tsf. Groundwater was not encountered during drilling.
Northing: 6991113.072, Easting: 2562751.435 Latitude: 32.829456, Longitude: -96.566341.

The ground water elevation was not determined during the course of this boring.

Driller: Savage **Logger: Nicholas Flynn** **Organization: HVJ Associates®**

g:\dal ps\geo\projects\20\dg-20-10213.1.1 barnes bridge rd & hampton rd, ltra\1.2_boring logs\0.1 gint files\barnes bridge rd & hampton rd, ltra.gpj

STATE OF TEXAS
PALASUNTHARAM THUSHANTHAN
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PROFESSIONAL ENGINEER
10/05/2023

SHEET 4 OF 4

HVJ ASSOCIATES
HVJ North Texas-Chelliah Consultants, INC.
8701 John W Carpenter Freeway
Dallas, Texas 75247
Firm Registration No. F-17942

Texas Department of Transportation — Dallas District Bridge

BORE LOG

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		62

SUMMARY OF ESTIMATED QUANTITIES

BID CODE	0416 7006	0420 7013	0420 7023	0420 7039	0422 7002	0425 7035	0450 7009	0454 7006
BID ITEM DESCRIPTION / BRIDGE ELEMENT	DRILL SHAFT (36 IN)	CL C CONC (ABUT) (HPC)	CL C CONC (CAP)(HPC)	CL C CONC (COLUMN) (HPC)	REINF CONC SLAB (HPC)	PRESTR CONC BOX BEAM(5XB20)	RAIL (TY T223) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - B)
	LF	CY	CY	CY	SF	LF	LF	LF
2 - ABUTMENTS	332	39.2					42.0	
5 - BENTS	534		79.5	38.4				
1 - 140' PRESTR CONC GIRDER UNIT					4,760	553.93	280.0	67
1 - 180' PRESTR CONC GIRDER UNIT					6,120	713.70	360.0	35
TOTAL	866	39.2	79.5	38.4	10,880	1,267.63	682.0	102

BEARING SEAT ELEVATIONS (FT)

	BEAM 1 LEFT	BEAM 1 RIGHT	BEAM 2 LEFT	BEAM 2 RIGHT	BEAM 3 LEFT	BEAM 3 RIGHT	BEAM 4 LEFT	BEAM 4 RIGHT	DIST BETWN BRNG ELEVS ALONG CL BRNG (FT)
ABUT 1 (FWD)	431.103	431.247	431.327	431.470	431.495	431.399	431.368	431.271	6.0000
BENT 2 (BK)	432.077	432.220	432.273	432.415	432.414	432.318	432.261	432.165	6.0000
BENT 2 (FWD)	432.129	432.257	432.323	432.451	432.464	432.353	432.310	432.198	6.0000
BENT 3 (BK)	432.778	432.906	432.956	433.084	433.081	432.970	432.912	432.800	6.0000
BENT 3 (FWD)	432.810	432.931	432.987	433.108	433.111	432.993	432.941	432.823	6.0000
BENT 4 (BK)	433.182	433.304	433.356	433.477	433.475	433.356	433.301	433.183	6.0000
BENT 4 (FWD)	433.185	433.298	433.358	433.471	433.476	433.350	433.302	433.177	6.0000
BENT 5 (BK)	432.872	432.986	433.029	433.142	433.128	433.003	432.936	432.810	6.0000
BENT 5 (FWD)	432.856	432.948	433.012	433.102	433.109	432.965	432.916	432.770	6.0000
BENT 6 (BK)	431.877	431.968	431.992	432.082	432.045	431.900	431.806	431.660	6.0000
BENT 6 (FWD)	431.844	431.906	431.958	432.018	432.008	431.838	431.768	431.597	6.0000
ABUT 7 (BK)	430.160	430.222	430.233	430.293	430.245	430.075	429.970	429.799	6.0000

BEARING PAD TAPER -- FABRICATOR'S REPORT
PERPENDICULAR TO THE CENTERLINE OF BEARING.
SUMMATION OF BEARING PAD TAPER DUE TO CROSS-SLOPE, GRADE, AND SKEW, MEASURED IN IN/IN.
A POSITIVE TAPER INDICATES INCREASING PAD THICKNESS IN DIRECTION OF INCREASING STATIONS.
A NEGATIVE TAPER INDICATES DECREASING PAD THICKNESS IN DIRECTION OF INCREASING STATIONS.

	BEAM 1	BEAM 2	BEAM 3	BEAM 4
ABUT 1 (FWD)	0.02214	0.02149	0.02694	0.02625
BENT 2 (BK)	0.02214	0.02149	0.02694	0.02625
BENT 2 (FWD)	0.01548	0.01508	0.01767	0.01726
BENT 3 (BK)	0.01548	0.01508	0.01767	0.01726
BENT 3 (FWD)	0.00602	0.00596	0.00667	0.00662
BENT 4 (BK)	0.00602	0.00596	0.00667	0.00662
BENT 4 (FWD)	-0.00764	-0.00797	-0.00351	-0.00379
BENT 5 (BK)	-0.00764	-0.00797	-0.00351	-0.00379
BENT 5 (FWD)	-0.02100	-0.02173	-0.01303	-0.01368
BENT 6 (BK)	-0.02100	-0.02173	-0.01303	-0.01368
BENT 6 (FWD)	-0.03398	-0.03465	-0.02270	-0.02326
ABUT 7 (BK)	-0.03398	-0.03465	-0.02270	-0.02326

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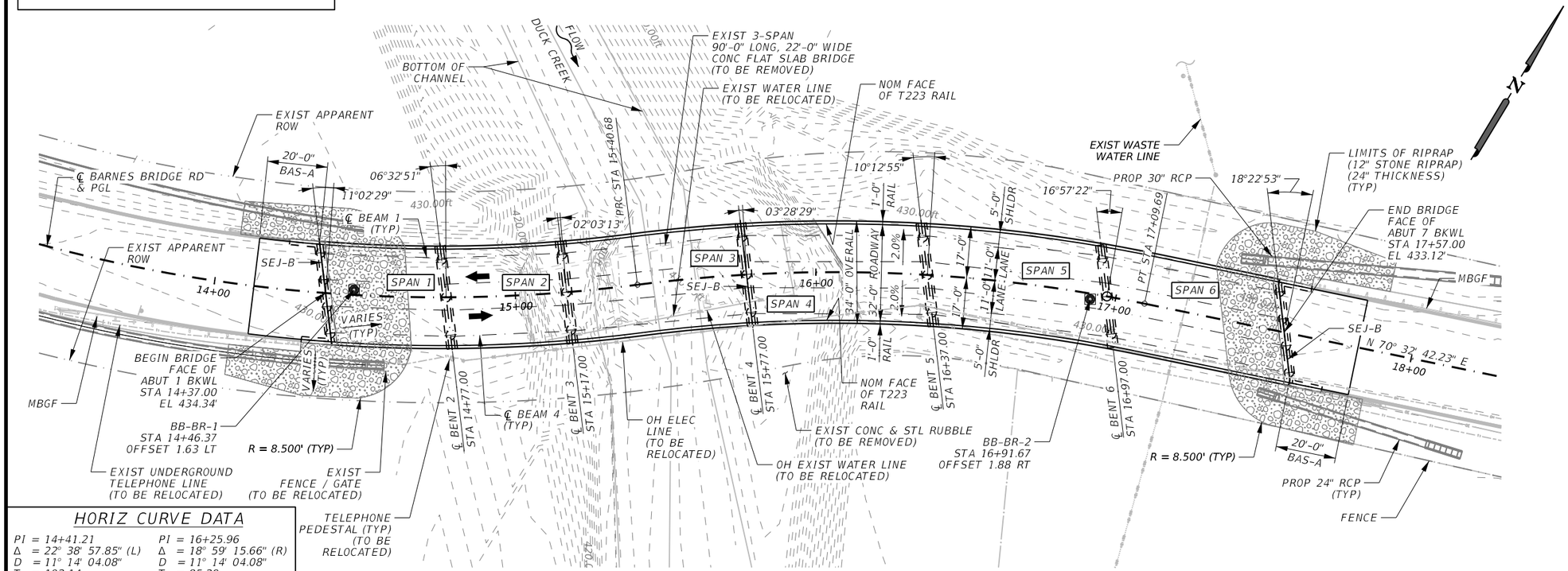
ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		63

DATE: 6/10/2024 11:12:15 AM
FILE: c:\pw\working\dir\ltraengineers-pw.bentley.com_ltraengineers-pw-01afnan.ali@wsp.com\dms21932\WSP Barnes_EQ01.dgn

ALL ABUTMENT AND BENT BEARINGS S 37° 50' 11" E



0 20 40
SCALE: 1"=40'

NOTES

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE STANDARD CSAB FOR BACKFILL BEHIND ABUTMENTS.

CONTRACTOR SHALL VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION. EXCAVATION OR DRILLING.

"D" DENOTES BENTS WITH D BARS AND SLOTTED HOLES AT EXTERIOR GIRDERS.

THE "H" VALUE IS AN ESTIMATED COLUMN HEIGHT. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHT BASED ON FIELD CONDITIONS.

SEE FOUNDATION LAYOUTS FOR HORIZONTAL CLEARANCE TO UTILITIES.

SEE ROADWAY PLANS FOR BRIDGE END DETAILS.

SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.

REFER TO ROADWAY PLANS FOR RIPRAP LIMITS.

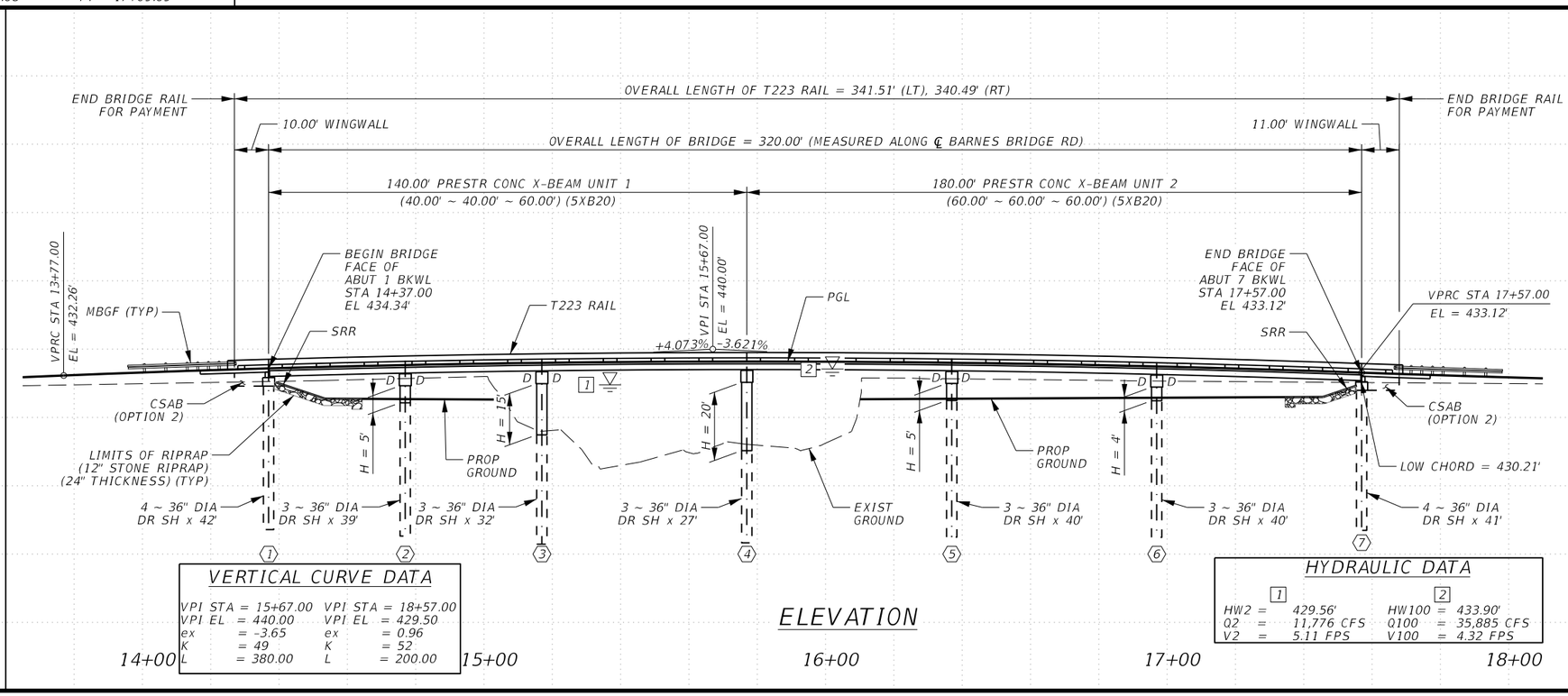
REFER TO BORE LOG SHEETS FOR BORE LOG INFORMATION.

FUNCTIONAL CLASS: LOCAL (URBAN STREET)
DESIGN SPEED: 35 MPH
ADT (2022): 700
ADT (2042): 900
PROP NBI NO.: 18-057-0-JJ00-05-003
EX. NBI NO.: 18-057-0-JJ00-05-001

HORIZ CURVE DATA

PI = 14+41.21	PI = 16+25.96
Δ = 22° 38' 57.85" (L)	Δ = 18° 59' 15.66" (R)
D = 11° 14' 04.08"	D = 11° 14' 04.08"
T = 102.14	T = 85.29
L = 201.61	L = 169.01
R = 510.00	R = 510.00
PC = 13+39.07	PRC = 15+40.68
PRC = 15+40.68	PT = 17+09.69

PLAN



ELEVATION

VERTICAL CURVE DATA

VPI STA = 15+67.00	VPI STA = 18+57.00
VPI EL = 440.00	VPI EL = 429.50
ex = -3.65	ex = 0.96
K = 49	K = 52
L = 380.00	L = 200.00

HYDRAULIC DATA

	1	2
HW2 =	429.56'	HW100 = 433.90'
Q2 =	11,776 CFS	Q100 = 35,885 CFS
V2 =	5.11 FPS	V100 = 4.32 FPS

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06/10/2024

SUPERSTRUCTURE INV/OPR RATINGS: 1.06/1.52
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Dallas, TX 75219
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BRIDGE LAYOUT

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		64

DATE: 6/10/2024 11:12:25 AM
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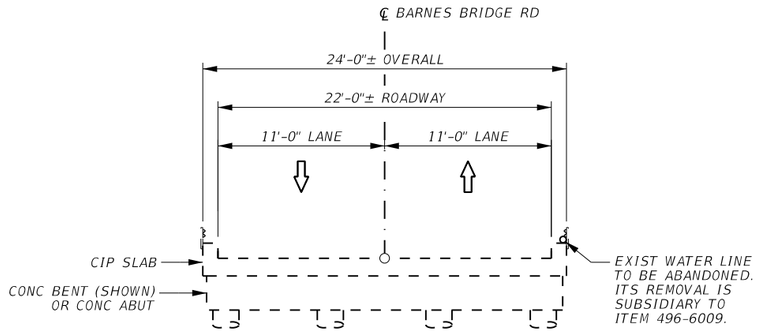
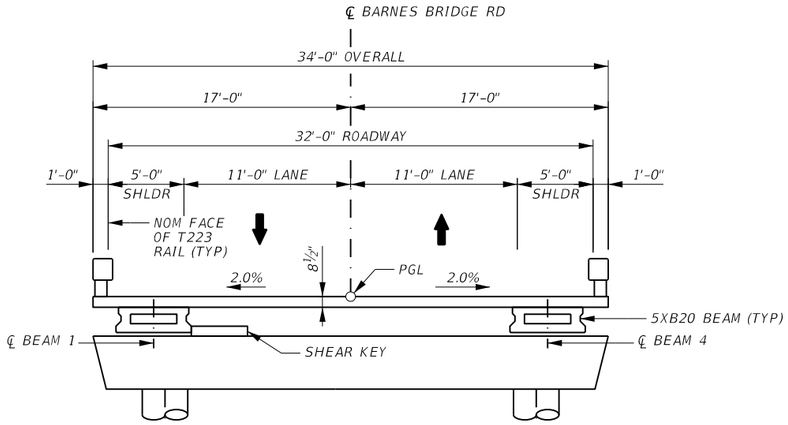


EXISTING SECTION

(3 SPANS)



TYPICAL SECTION

0 5 10

SCALE: 1"=10'

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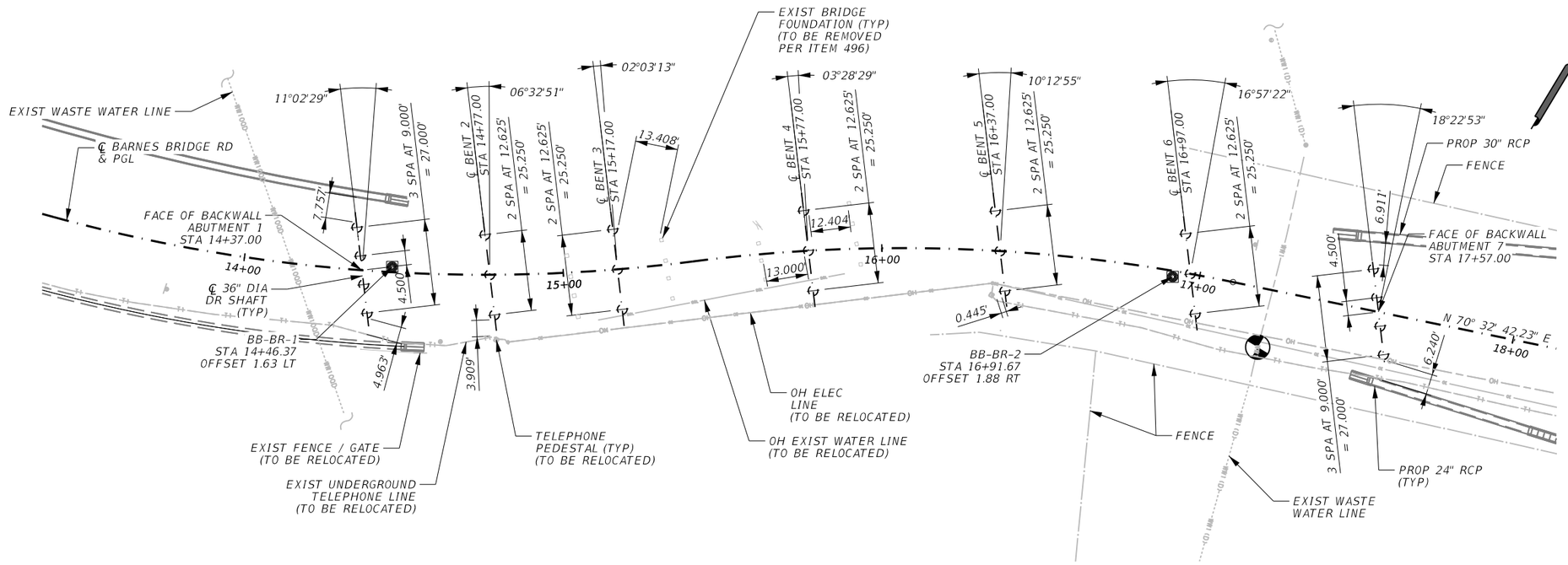
TYPICAL SECTION

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		65

DATE: 10/3/2023 12:53:11 AM
FILE: c:\pw\workingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\afnan.ali@wsp.com\dms21932\WSP Barnes_TS01.dgn

ALL ABUTMENT AND BENT BEARINGS S 37° 50' 11" E



PLAN

GENERAL NOTES:

SEE FOUNDATION DETAIL STANDARD SHEET, FD, FOR 36" DIA DRILLED SHAFT DETAILS AND NOTES NOT SHOWN.

SEE BRIDGE LAYOUT FOR DRILLED SHAFT LENGTHS, AND FOR CURVE INFORMATION NOT SHOWN. SEE BORE LOG SHEETS FOR TEST HOLE DATA.

ALL HORIZONTAL CLEAR DIMENSIONS SHOWN ARE MEASURED FROM THE FACE OF DRILLED SHAFT TO CENTERLINE OF UTILITY UNLESS OTHERWISE SHOWN.

ALL DIMENSIONS SHOWN TO DRILLED SHAFT CENTERLINES ARE MEASURED AT AND ALONG ℄ BENT OR FACE OF BACKWALL.

FOUND DRILLED SHAFTS AT THE LENGTH SHOWN ON THE BRIDGE LAYOUT OR LONGER AS NECESSARY TO PENETRATE 10 FEET INTO THE DARK GRAY SHALE.

DRILLED SHAFT MAY EXTEND TO THE BOTTOM OF CAP FOR "H" HEIGHTS OF 6 FEET AND LESS IN THE LAYOUT SHEET. NO ADJUSTMENT IN PAYMENT WILL BE MADE IF THIS OPTION IS USED.

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FOUNDATION LAYOUT

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		66

DATE: 10/3/2023 12:53:23 AM
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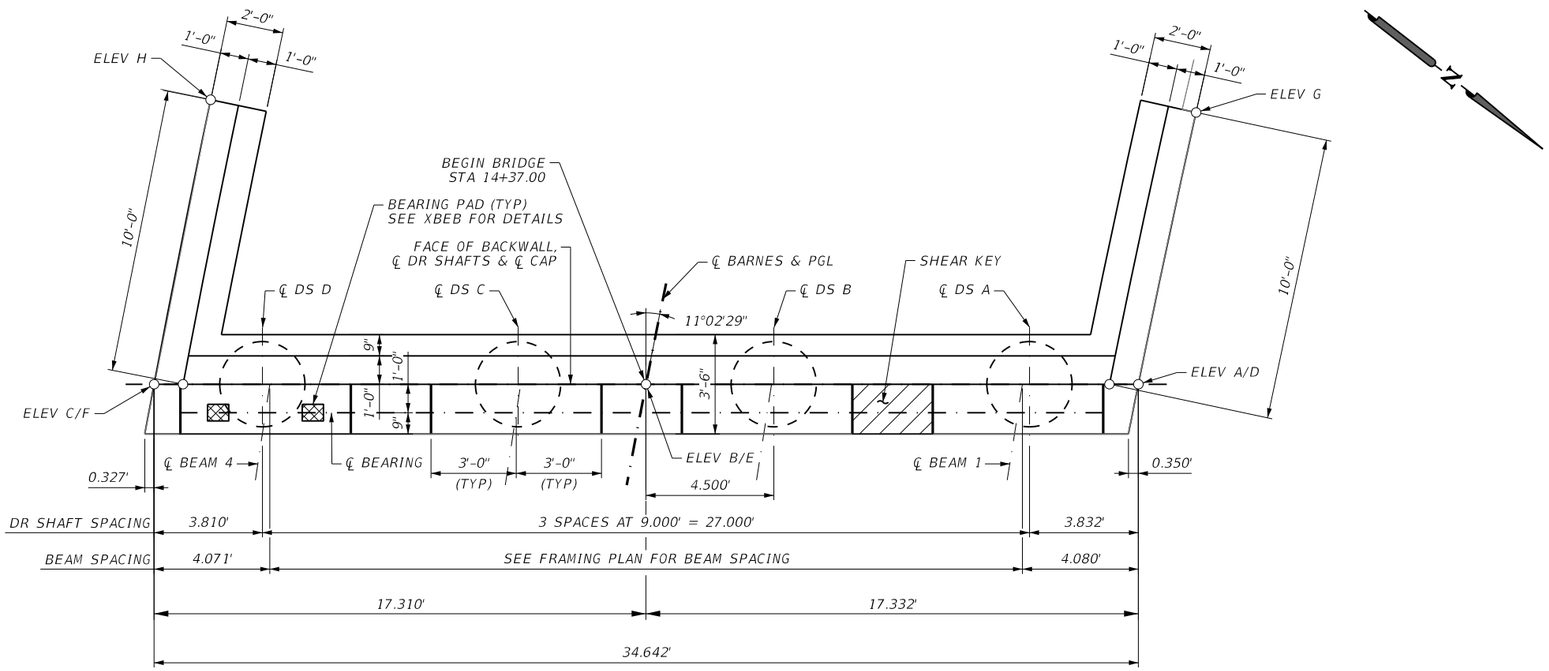
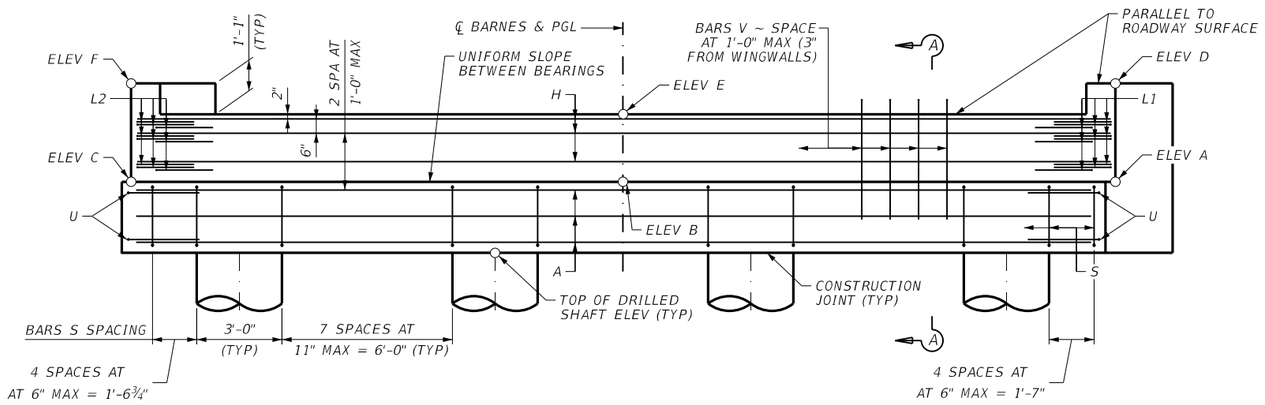


PLAN



ELEVATION

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS								TOP OF DRILLED SHAFT			
EL A	EL B	EL C	EL D	EL E	EL F	EL G	EL H	DS A	DS B	DS C	DS D
430.918	431.355	431.111	433.902	433.258	434.092	433.595	433.806	428.513	428.736	428.788	428.652

GENERAL NOTES

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE AND LENGTH.

SEE STONE RIPRAP STANDARD SHEET, SRR, FOR RIPRAP ATTACHMENT DETAILS.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.

SEE FD STANDARD FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
ABUTMENT 1: 110 TONS / DR SHAFT

MATERIAL NOTES

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

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ABUTMENT 1 DETAILS DUCK CREEK BRIDGE

SHEET 1 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		67

DATE: 10/3/2023 12:53:32 AM
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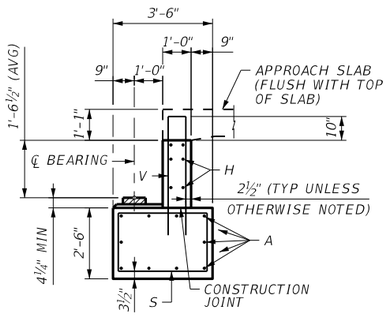
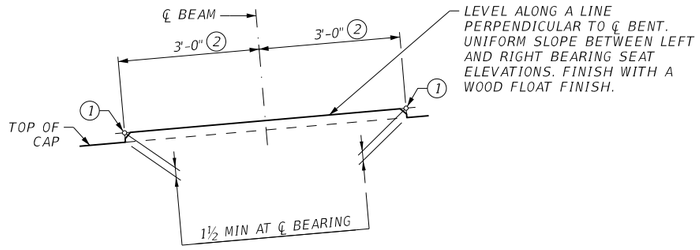


SECTION A-A



BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

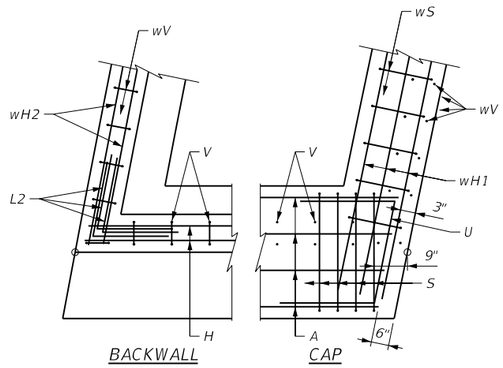
(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEAT.

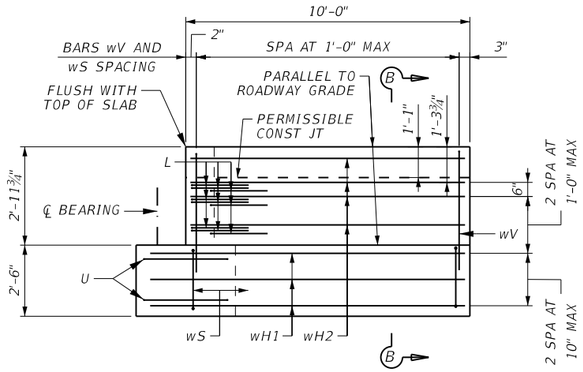
TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	10	#11	33'-8"	1,789
H	6	#6	34'-4"	309
L1	9	#6	4'-0"	54
L2	9	#6	4'-0"	54
S	34	#5	11'-2"	396
U	4	#6	8'-1"	49
V	34	#5	9'-10"	349
wH1	14	#6	11'-5"	240
wH2	16	#6	9'-8"	232
wS	22	#4	7'-6"	110
wV	22	#5	9'-10"	226
REINFORCING STEEL			LB	3,808
(3) CLASS C CONCRETE (ABUT) (HPC)			CY	19.1

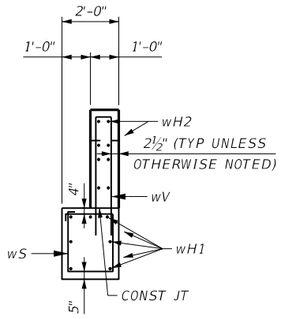


BACKWALL CAP

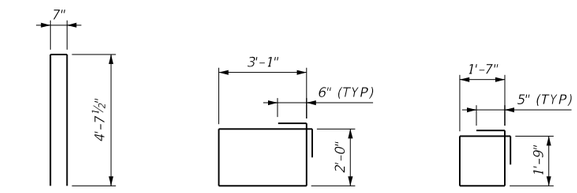
CORNER DETAILS

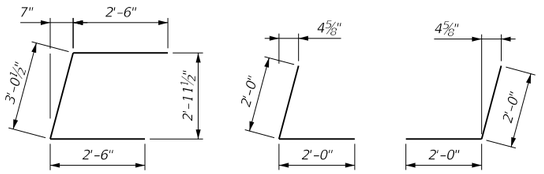


WINGWALL ELEVATION



SECTION B-B





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ABUTMENT 1 DETAILS DUCK CREEK BRIDGE

SHEET 2 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
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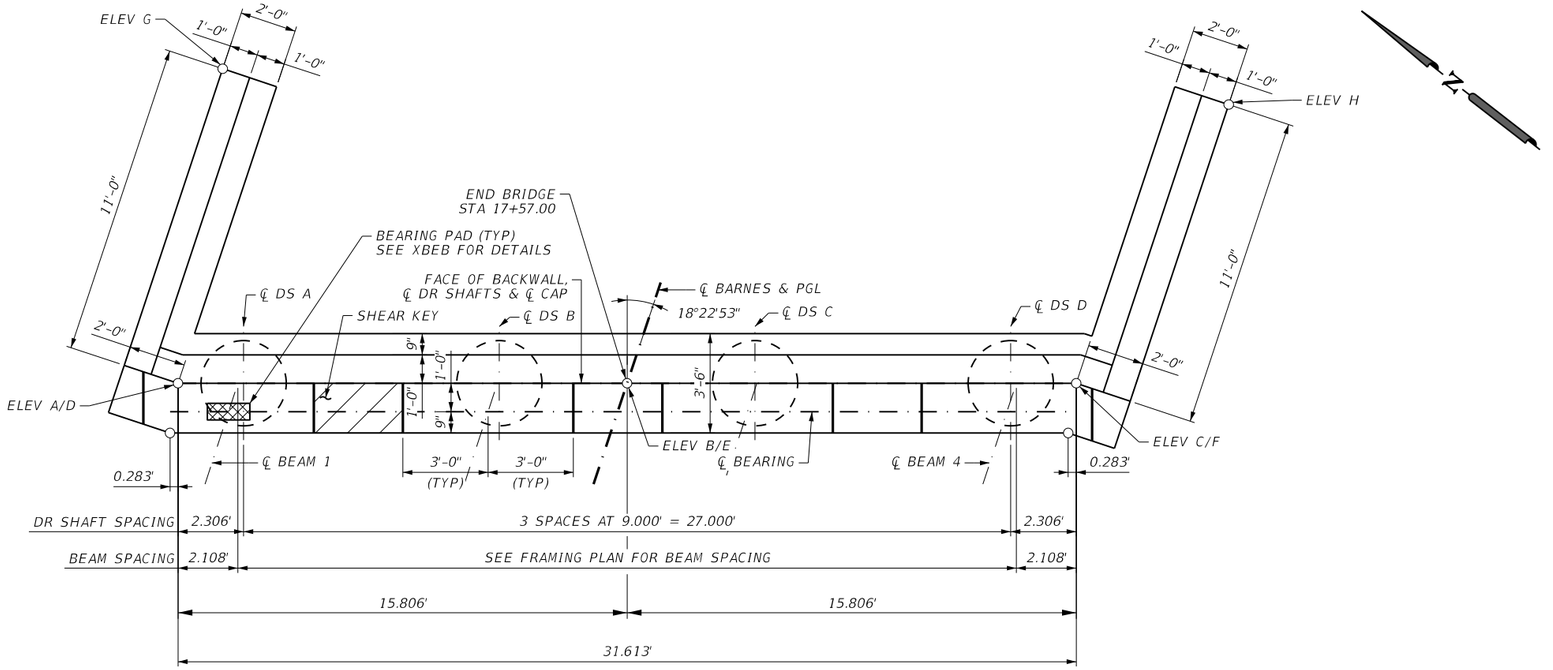
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		68



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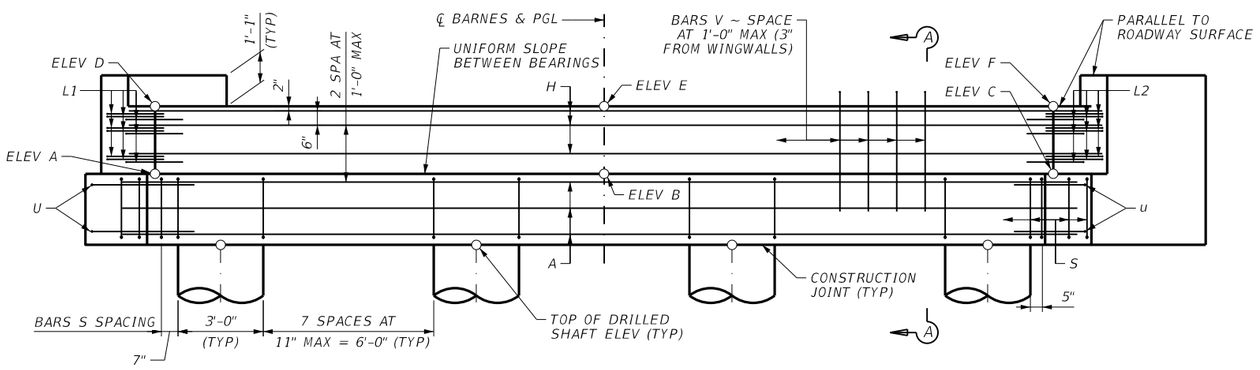

ELEVATION

GENERAL NOTES

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE AND LENGTH.

SEE STONE RIPRAP STANDARD SHEET, SRR, FOR RIPRAP ATTACHMENT DETAILS.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.

SEE FD STANDARD FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
ABUTMENT 7: 110 TONS / DR SHAFT

MATERIAL NOTES

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS								TOP OF DRILLED SHAFT			
EL A	EL B	EL C	EL D	EL E	EL F	EL G	EL H	DS A	DS B	DS C	DS D
430.024	430.136	429.660	431.915	432.037	431.557	432.563	432.202	427.542	427.612	427.501	427.230

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Texas Registered Engineering Firm F-02263

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ABUTMENT 7 DETAILS DUCK CREEK BRIDGE

SHEET 1 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		69

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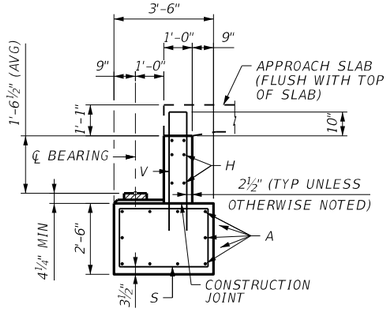

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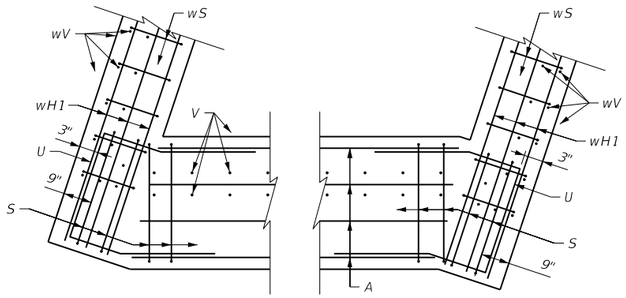
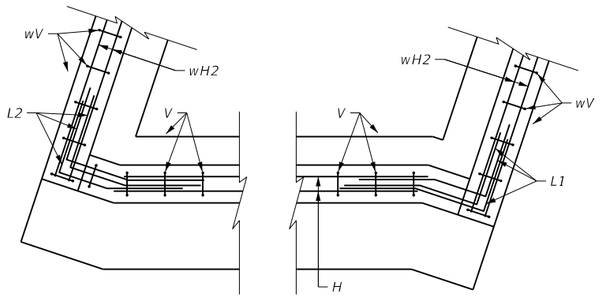


CAP

CORNER DETAILS

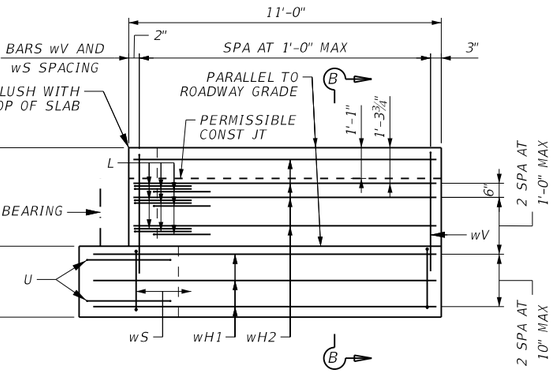


BACKWALL

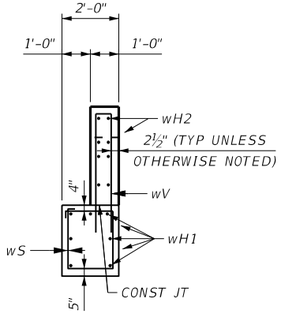
CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	10	#11	31'-7"	1,678
H	6	#6	31'-7"	285
L1	9	#6	5'-10"	79
L2	9	#6	5'-9"	78
S	32	#5	11'-2"	373
U	4	#6	11'-6"	69
V	34	#5	9'-10"	349
wH1	14	#6	12'-5"	261
wH2	16	#6	10'-8"	256
wS	22	#4	7'-6"	110
wV	22	#5	9'-10"	226
REINFORCING STEEL			LB	3,764
③ CLASS C CONCRETE (ABUT) (HPC)			CY	20.1



WINGWALL ELEVATION



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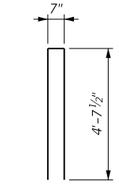
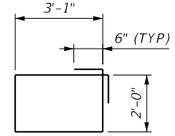
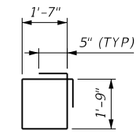


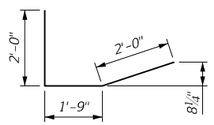
BARS V & wV



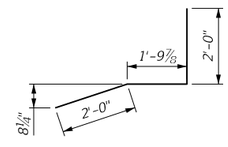
BARS S



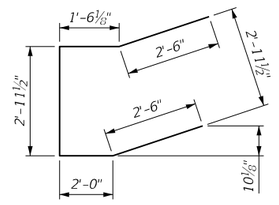
BARS wS



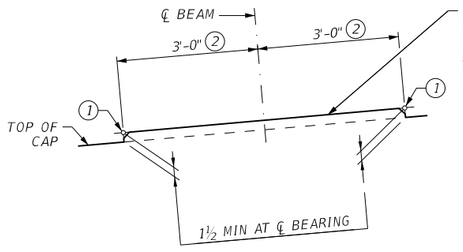
BARS L2



BARS L1



BARS U



BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

① SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

② MEASURED ALONG ℄ OF BEARING.

③ QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEAT.

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Texas Department of Transportation

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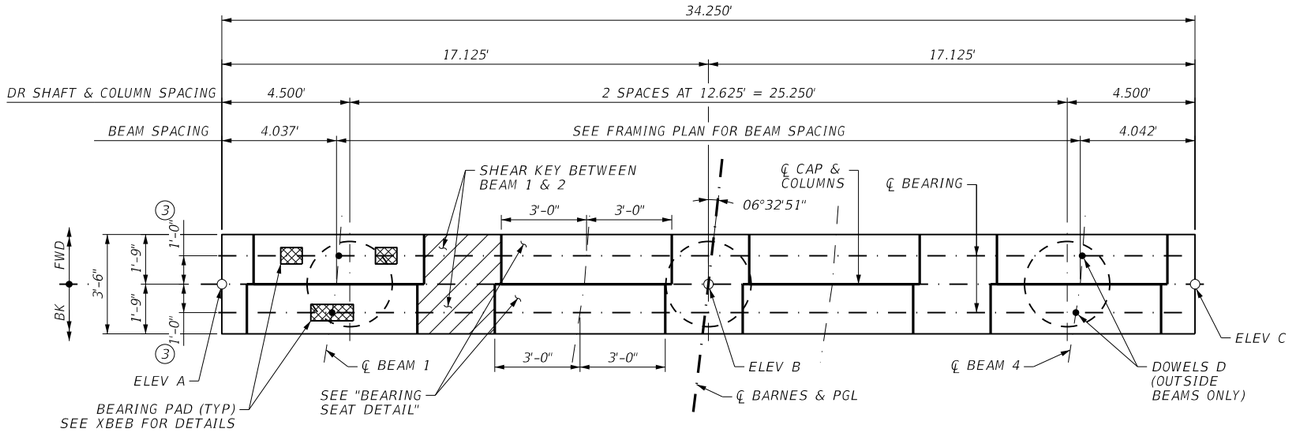
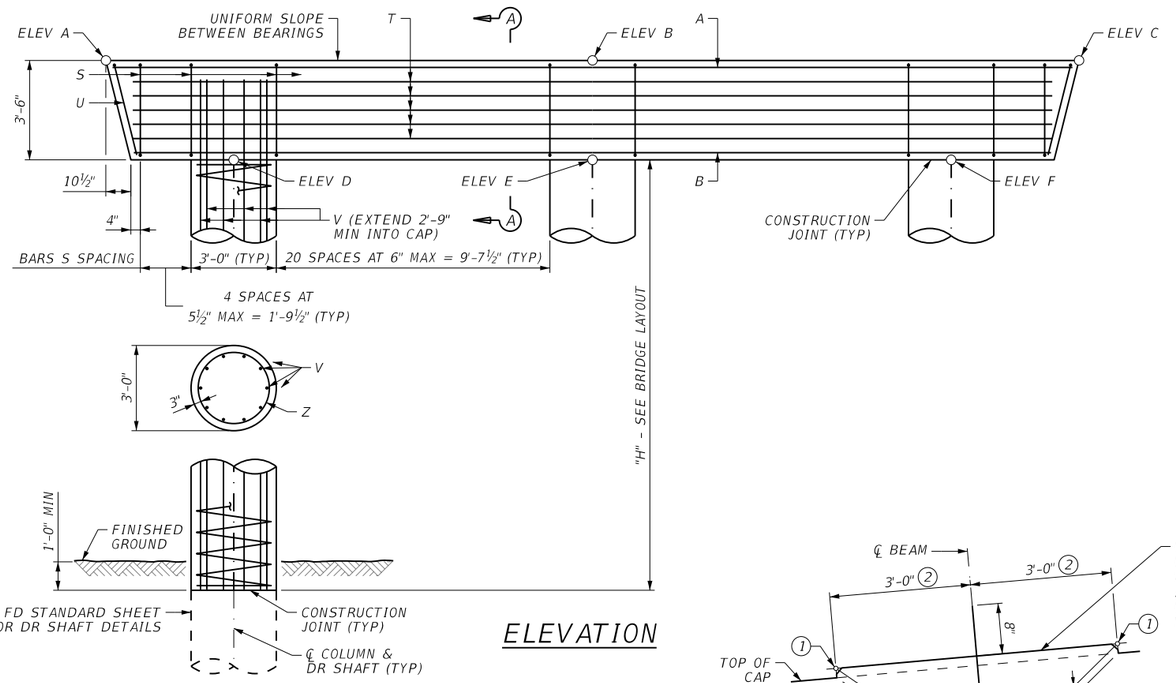
ABUTMENT 7 DETAILS DUCK CREEK BRIDGE

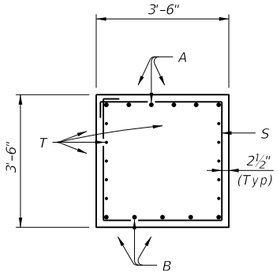
FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		70



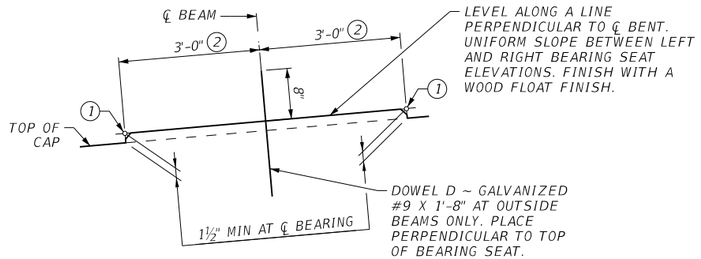
PLAN



ELEVATION



SECTION A-A



BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS			TOP OF COLUMN ELEVATIONS		
EL A	EL B	EL C	EL D	EL E	EL F
431.991	432.290	431.988	428.511	428.790	428.567

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION LENGTH.

SEE FD STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
BENT NO. 2 - 190 TONS/DR SHAFT.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE BARS D.

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	33'-6"	1,068
B	5	#11	32'-0"	850
D	4	#9	1'-8"	23
S	52	#5	13'-4"	724
T	10	#5	32'-0"	334
U	2	#5	9'-8"	20
V	30	#9	7'-9"	791
Z	3	#4	180'-8"	362
REINFORCING STEEL (5)			LB	4,172
CLASS C CONCRETE (CAP) (HPC) (6)			CY	15.9
CLASS C CONCRETE (COL) (HPC)			CY	3.9

(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) MEASURED PERPENDICULAR TO THE ℄ OF BENT.

(4) QUANTITIES ARE BASED ON THE "H" VALUES SHOWN IN THE BRIDGE LAYOUT SHEET. FOR EACH LINEAR FOOT VARIATION IN THE "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH ~ 1'-0"
BARS Z LENGTH ~ 31'-5"
REINFORCING STEEL ~ 165 LB
CLASS "C" CONCRETE (COL) ~ 0.78 CY

(5) FOR CONTRACTOR'S INFORMATION ONLY.

(6) QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEATS.

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BENT 2 DETAILS

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		71

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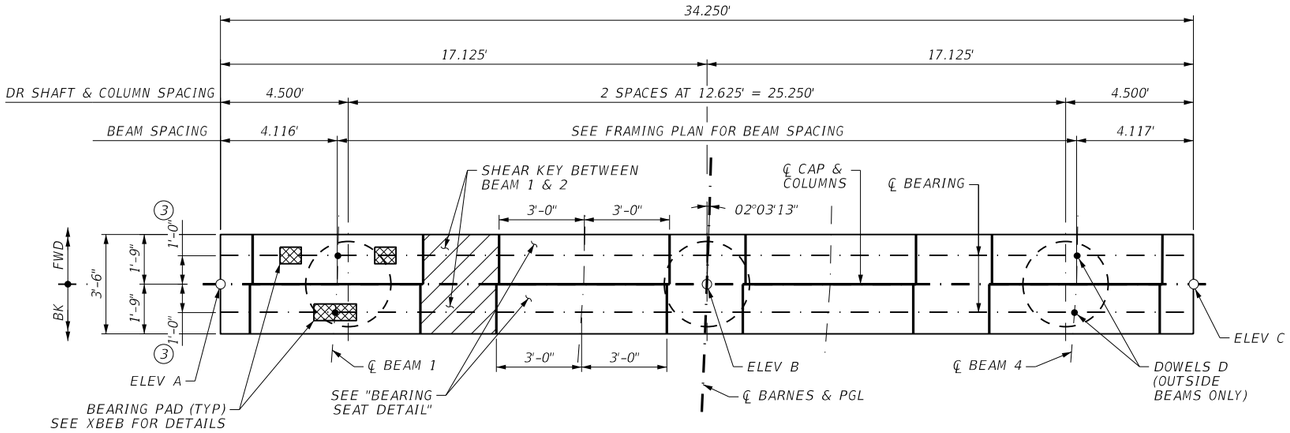

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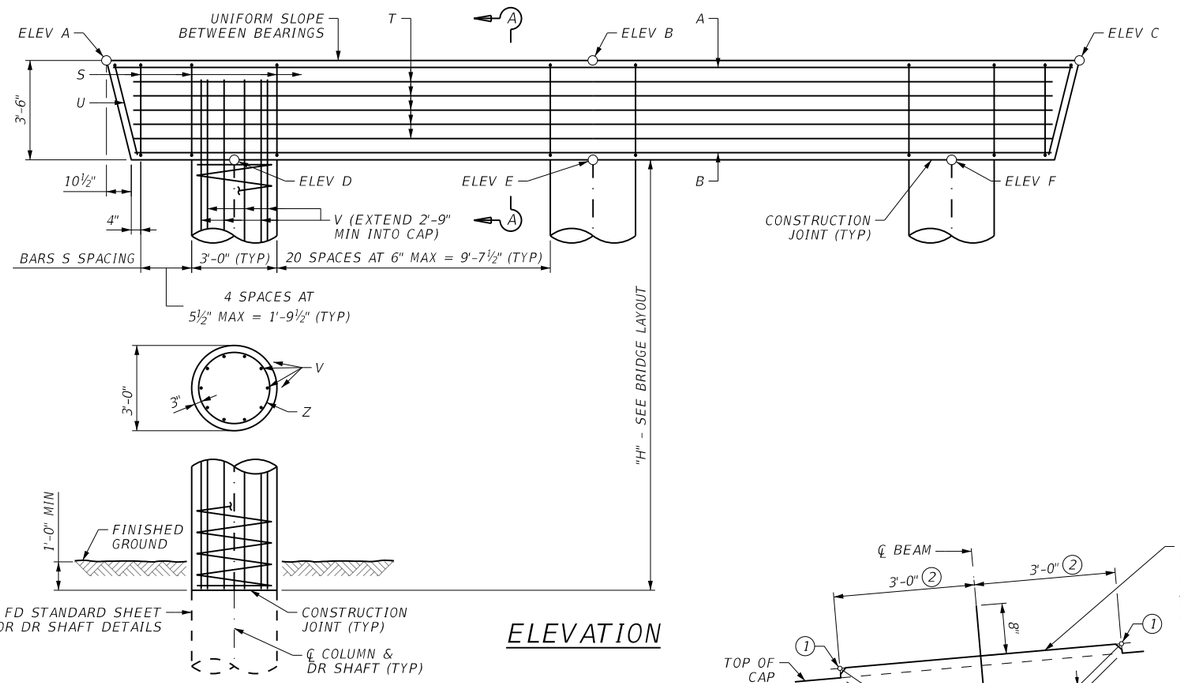

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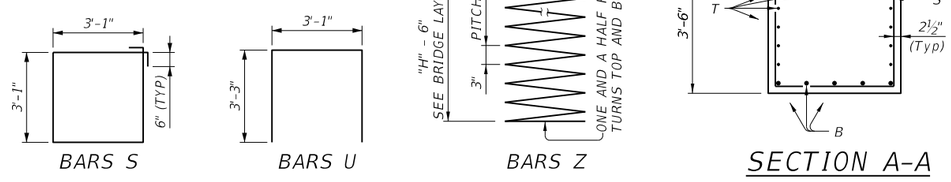

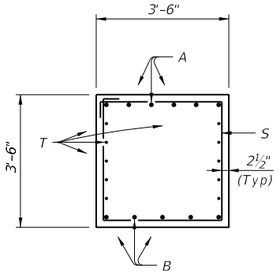

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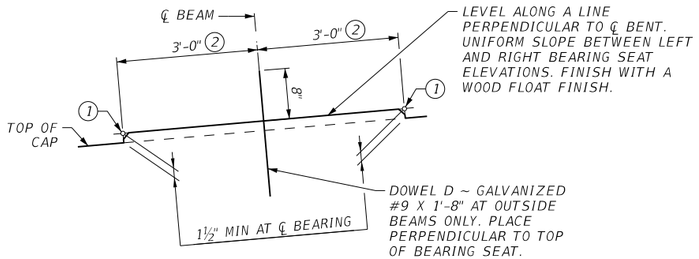

BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS			TOP OF COLUMN ELEVATIONS		
EL A	EL B	EL C	EL D	EL E	EL F
432.610	432.960	432.622	429.202	429.460	429.211

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION LENGTH.

SEE FD STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
BENT NO. 3 - 190 TONS/DR SHAFT.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE BARS D.

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	33'-6"	1,068
B	5	#11	32'-0"	850
D	4	#9	1'-8"	23
S	52	#5	13'-4"	724
T	10	#5	32'-0"	334
U	2	#5	9'-8"	20
V	30	#9	17'-9"	1,811
Z	3	#4	494'-10½"	992
REINFORCING STEEL (5)			LB	5,822
CLASS C CONCRETE (CAP) (HPC) (6)			CY	15.9
CLASS C CONCRETE (COL) (HPC)			CY	11.8

(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) MEASURED PERPENDICULAR TO THE ℄ OF BENT.

(4) QUANTITIES ARE BASED ON THE "H" VALUES SHOWN IN THE BRIDGE LAYOUT SHEET. FOR EACH LINEAR FOOT VARIATION IN THE "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH ~ 1'-0"
BARS Z LENGTH ~ 31'-5"
REINFORCING STEEL ~ 165 LB
CLASS "C" CONCRETE (COL) ~ 0.78 CY

(5) FOR CONTRACTOR'S INFORMATION ONLY.

(6) QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEATS.

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10/02/2023

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Texas Department of Transportation

Dallas District Bridge

BENT 3 DETAILS

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		72

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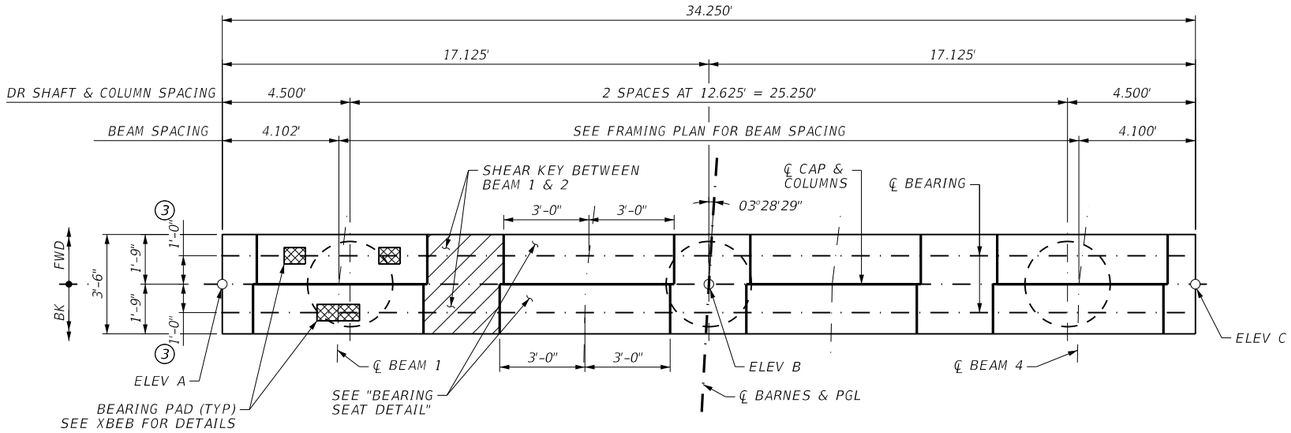

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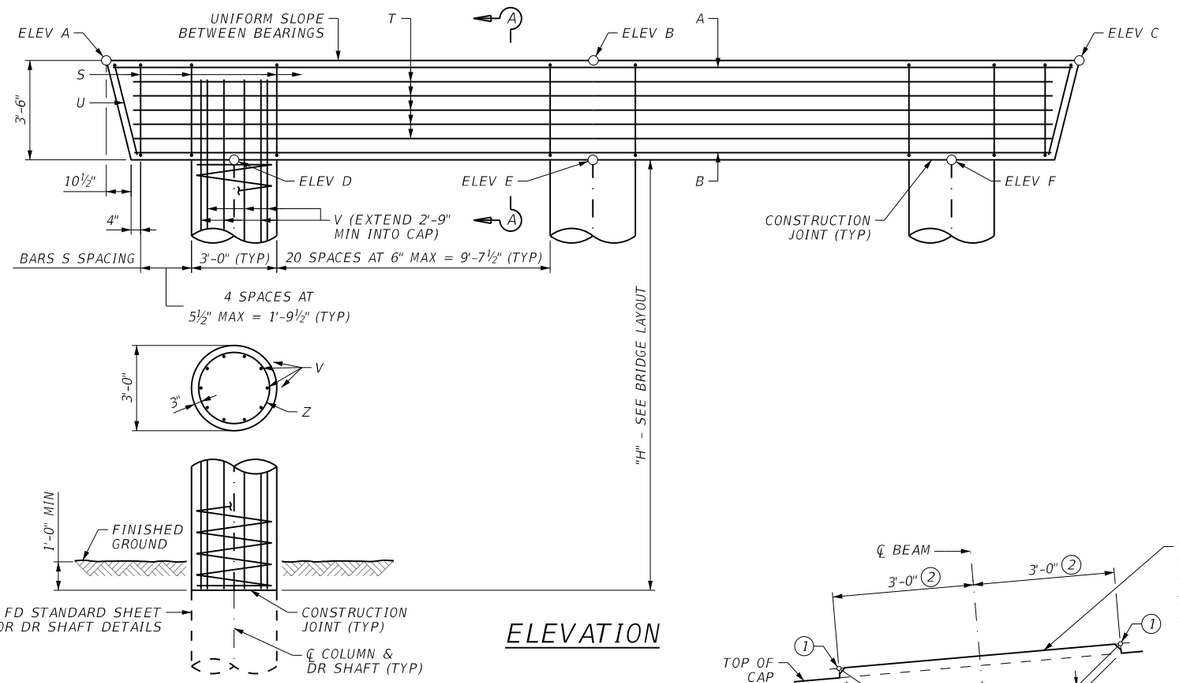

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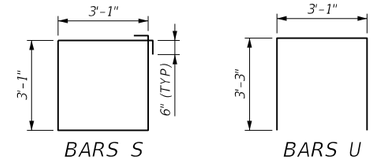

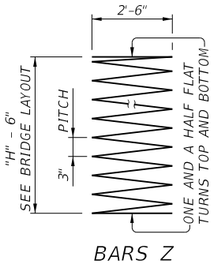

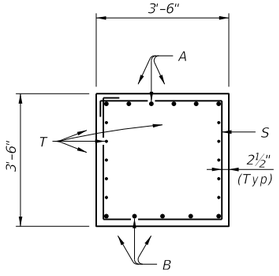

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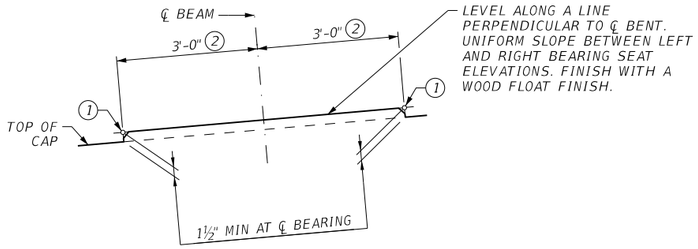

BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS			TOP OF COLUMN ELEVATIONS		
EL A	EL B	EL C	EL D	EL E	EL F
433.005	433.350	433.011	429.596	429.850	429.600

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION LENGTH.

SEE FD STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
BENT NO. 4 - 190 TONS/DR SHAFT.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	33'-6"	1,068
B	5	#11	32'-0"	850
S	52	#5	13'-4"	724
T	10	#5	32'-0"	334
U	2	#5	9'-8"	20
V	30	#9	22'-9"	2,321
Z	3	#4	652'-0"	1,307
REINFORCING STEEL (5)			LB	6,624
CLASS C CONCRETE (CAP) (HPC) (6)			CY	15.9
CLASS C CONCRETE (COL) (HPC)			CY	15.7

(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) MEASURED PERPENDICULAR TO THE ℄ OF BENT.

(4) QUANTITIES ARE BASED ON THE "H" VALUES SHOWN IN THE BRIDGE LAYOUT SHEET. FOR EACH LINEAR FOOT VARIATION IN THE "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH ~ 1'-0"
BARS Z LENGTH ~ 31'-5"
REINFORCING STEEL ~ 165 LB
CLASS "C" CONCRETE (COL) ~ 0.78 CY

(5) FOR CONTRACTOR'S INFORMATION ONLY.

(6) QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEATS.

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+1 214 521-1661
Texas Registered Engineering Firm F-02263

Texas Department of Transportation

Dallas District Bridge

BENT 4 DETAILS

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		73

DATE: 10/3/2023 12:54:26 AM
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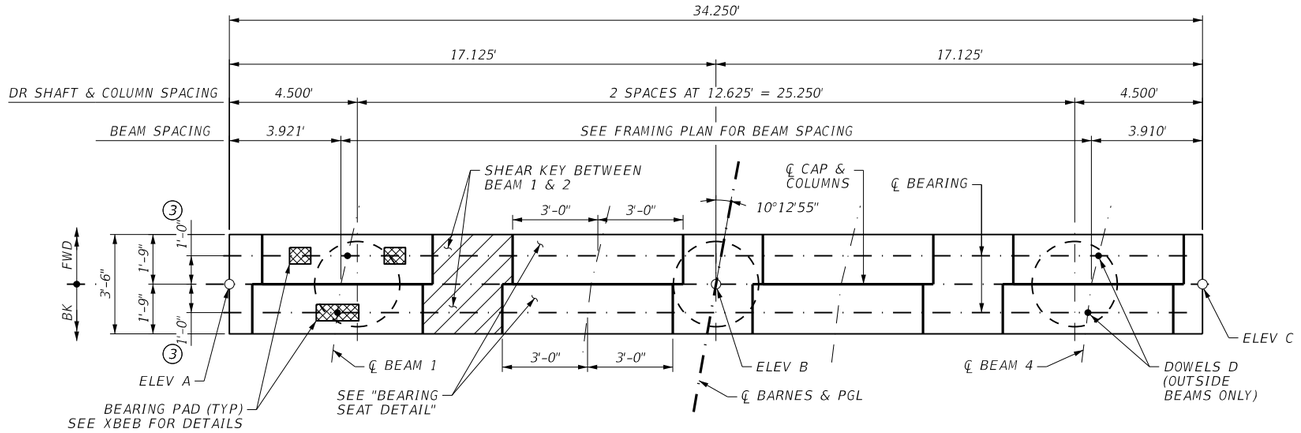
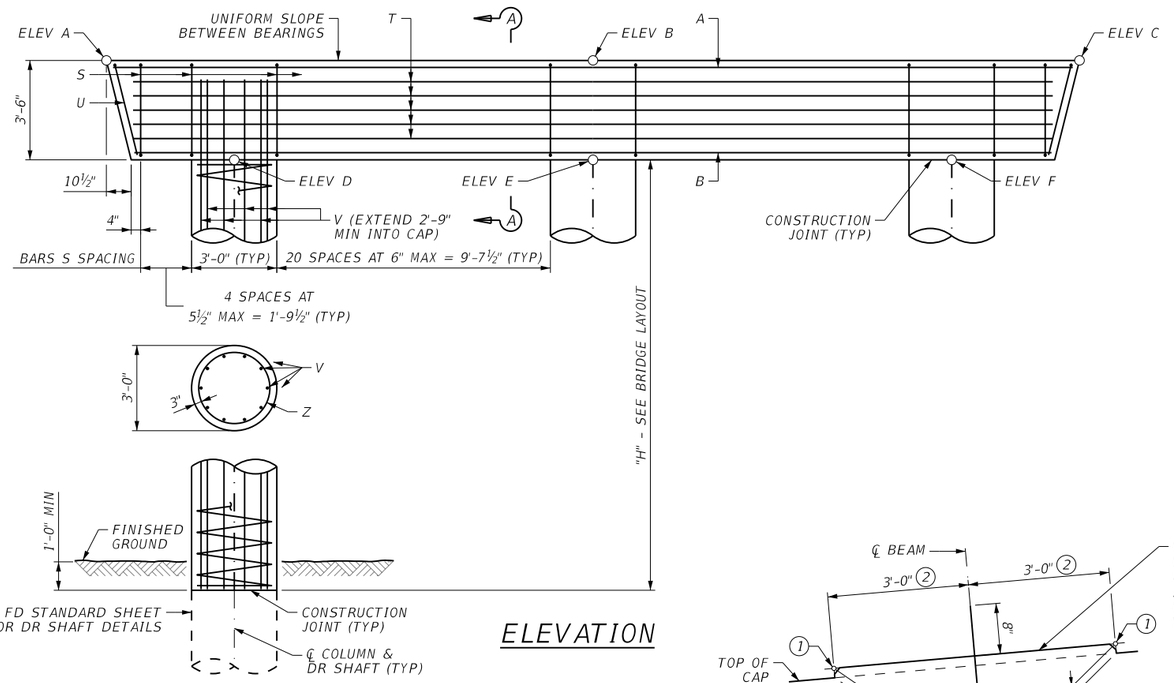
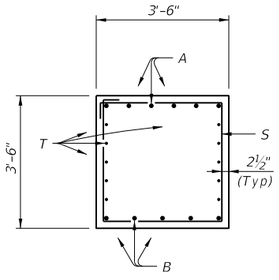


PLAN



ELEVATION



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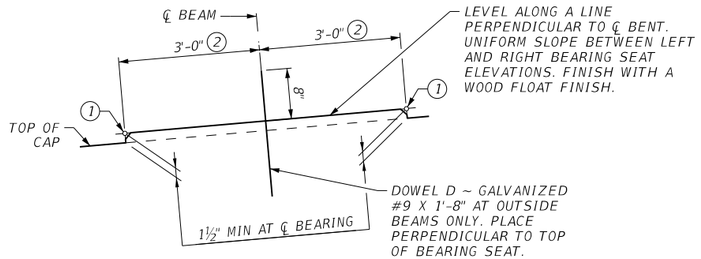

BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS			TOP OF COLUMN ELEVATIONS		
EL A	EL B	EL C	EL D	EL E	EL F
432.689	432.975	432.609	429.264	429.475	429.205

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION LENGTH.

SEE FD STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.

SEE XBSK STANDARD SHEET FOR ALL SHEAR KEY DETAILS AND NOTES.

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

CALCULATED FOUNDATION LOADS:
BENT NO. 5 - 190 TONS/DR SHAFT.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE BARS D.

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	33'-6"	1,068
B	5	#11	32'-0"	850
D	4	#9	1'-8"	23
S	52	#5	13'-4"	724
T	10	#5	32'-0"	334
U	2	#5	9'-8"	20
V	30	#9	7'-9"	791
Z	3	#4	180'-8"	362
REINFORCING STEEL (5)			LB	4,172
CLASS C CONCRETE (CAP) (HPC) (6)			CY	15.9
CLASS C CONCRETE (COL) (HPC)			CY	3.9

(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) MEASURED PERPENDICULAR TO THE ℄ OF BENT.

(4) QUANTITIES ARE BASED ON THE "H" VALUES SHOWN IN THE BRIDGE LAYOUT SHEET. FOR EACH LINEAR FOOT VARIATION IN THE "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH ~ 1'-0"
BARS Z LENGTH ~ 31'-5"
REINFORCING STEEL ~ 165 LB
CLASS "C" CONCRETE (COL) ~ 0.78 CY

(5) FOR CONTRACTOR'S INFORMATION ONLY.

(6) QUANTITY INCLUDES THE CONCRETE FOR SHEAR KEY AND BEARING SEATS.

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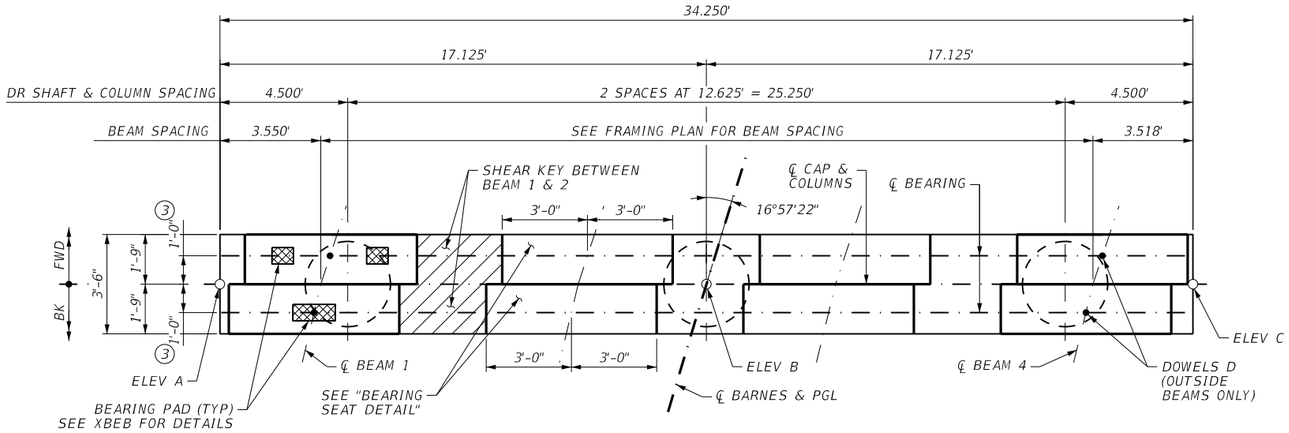
Dallas District Bridge

BENT 5 DETAILS

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		74



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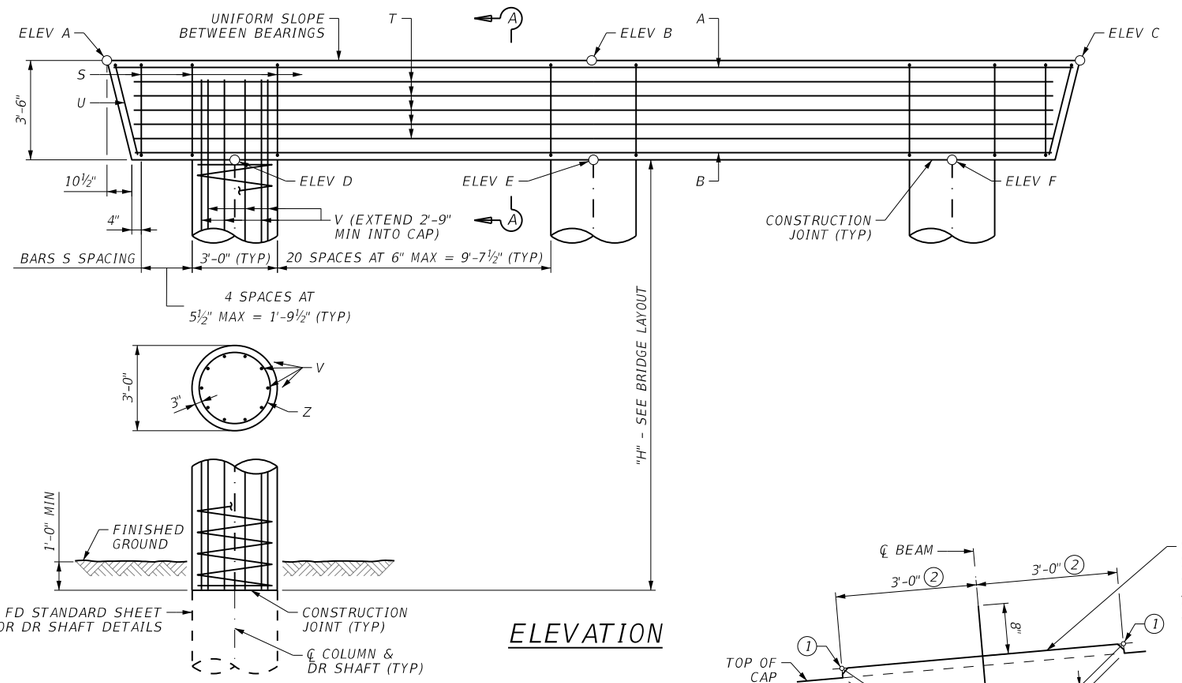
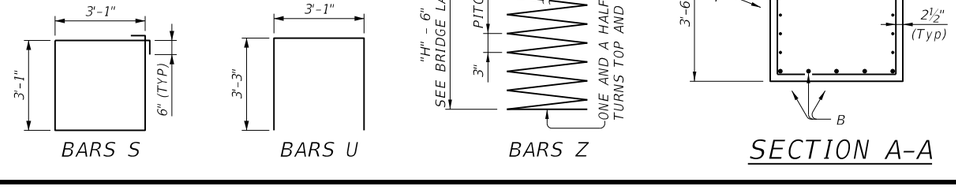
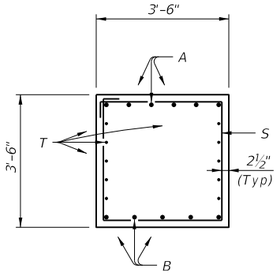
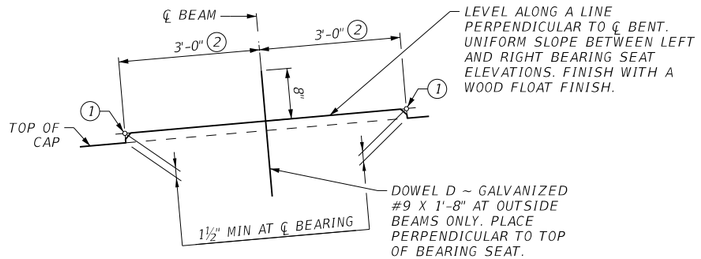


ELEVATION





SECTION A-A



BEARING SEAT DETAIL

(REMOVE ALL LOOSE MATERIAL AND CLEAN BEARING SURFACE BEFORE PLACING THE BEARING PAD.)

TABLE OF CONTROL ELEVATIONS

CONTROL ELEVATIONS			TOP OF COLUMN ELEVATIONS		
EL A	EL B	EL C	EL D	EL E	EL F
431.686	431.885	431.446	428.239	428.385	428.061

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE BRIDGE LAYOUT FOR FOUNDATION LENGTH.

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

CALCULATED FOUNDATION LOADS:
BENT NO. 6 - 190 TONS/DR SHAFT.

MATERIAL NOTES:

PROVIDE CLASS C (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE BARS D.

TABLE OF ESTIMATED QUANTITIES

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REINFORCING STEEL (5)			LB	4,172
CLASS C CONCRETE (CAP) (HPC) (6)			CY	15.9
CLASS C CONCRETE (COL) (HPC)			CY	3.1

(1) SEE "ESTIMATED QUANTITIES AND BEARING SEAT ELEVATIONS" SHEET FOR RIGHT AND LEFT ELEVATIONS.

(2) MEASURED ALONG ℄ OF BEARING.

(3) MEASURED PERPENDICULAR TO THE ℄ OF BENT.

(4) QUANTITIES ARE BASED ON THE "H" VALUES SHOWN IN THE BRIDGE LAYOUT SHEET. FOR EACH LINEAR FOOT VARIATION IN THE "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH ~ 1'-0"
BARS Z LENGTH ~ 31'-5"
REINFORCING STEEL ~ 165 LB
CLASS "C" CONCRETE (COL) ~ 0.78 CY

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Texas Department of Transportation

Dallas District Bridge

BENT 6 DETAILS

DUCK CREEK BRIDGE

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
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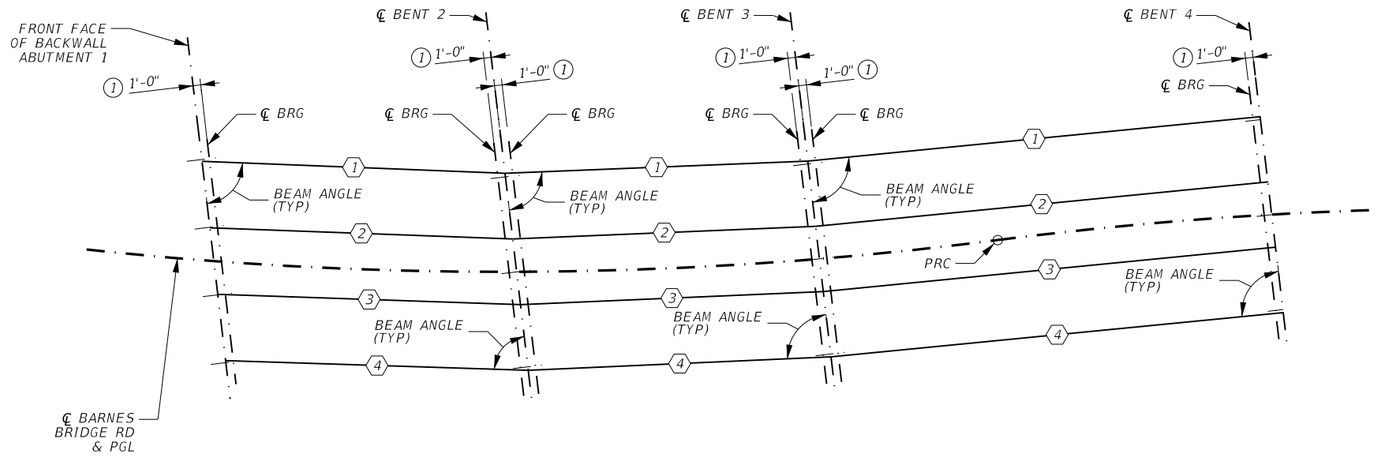
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		75



SPAN 1
(5XB20 BEAMS)

SPAN 2
(5XB20 BEAMS)

SPAN 3
(5XB20 BEAMS)

LEGEND

(X) BEAM NUMBER

(1) SEE ELASTOMERIC BEARING AND BEAM END DETAILS (XBEB) STANDARD SHEET FOR ORIENTATION OF DIMENSIONS.

(2) BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

BENT REPORT

ABUTMENT NO. 1 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.252 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	80 58 24
	BEAM 2	8.830	81 7 27
	BEAM 3	8.830	81 16 30
	BEAM 4	8.830	81 25 34
	TOTAL	26.491	

BENT NO. 2 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.088 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	80 58 24
	BEAM 2	8.724	81 7 27
	BEAM 3	8.724	81 16 30
	BEAM 4	8.724	81 25 34
	TOTAL	26.171	

BENT NO. 2 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.088 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	85 35 11
	BEAM 2	8.724	85 39 36
	BEAM 3	8.724	85 44 0
	BEAM 4	8.724	85 48 24
	TOTAL	26.171	

BENT NO. 3 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.009 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	85 35 11
	BEAM 2	8.672	85 39 36
	BEAM 3	8.672	85 44 0
	BEAM 4	8.672	85 48 24
	TOTAL	26.017	

BENT NO. 3 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.009 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	88 51 37
	BEAM 2	8.672	88 51 1
	BEAM 3	8.672	88 50 25
	BEAM 4	8.672	88 49 50
	TOTAL	26.017	

BENT NO. 4 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.023 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	88 51 37
	BEAM 2	8.683	88 51 1
	BEAM 3	8.683	88 50 25
	BEAM 4	8.683	88 49 50
	TOTAL	26.048	

BEAM REPORT

BEAM REPORT AT CENTER OF BEAM, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	40.0152	37.9901	39.5219	0.02562	N 61 11 24.88 E
BEAM 2	39.9986	37.9743	39.5048	0.02490	N 61 2 21.83 E
BEAM 3	39.9823	37.9589	39.4880	0.02420	N 60 53 18.33 E
BEAM 4	39.9662	37.9436	39.4715	0.02355	N 60 44 14.39 E

BEAM REPORT AT CENTER OF BEAM, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	39.9958	37.9898	39.5000	0.01708	N 56 34 37.33 E
BEAM 2	39.9918	37.9861	39.4959	0.01666	N 56 30 13.21 E
BEAM 3	39.9880	37.9824	39.4918	0.01624	N 56 25 49.04 E
BEAM 4	39.9842	37.9788	39.4878	0.01585	N 56 21 24.82 E

BEAM REPORT AT CENTER OF BEAM, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	59.9888	57.9884	59.4899	0.00642	N 53 18 12.03 E
BEAM 2	59.9890	57.9886	59.4901	0.00636	N 53 18 47.78 E
BEAM 3	59.9892	57.9888	59.4903	0.00627	N 53 19 23.52 E
BEAM 4	59.9894	57.9890	59.4905	0.00621	N 53 19 59.27 E

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Texas Department of Transportation

Dallas District Bridge

FRAMING PLAN

UNIT 1 (SPANS 1 - 3)
DUCK CREEK BRIDGE

SHEET 1 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		76

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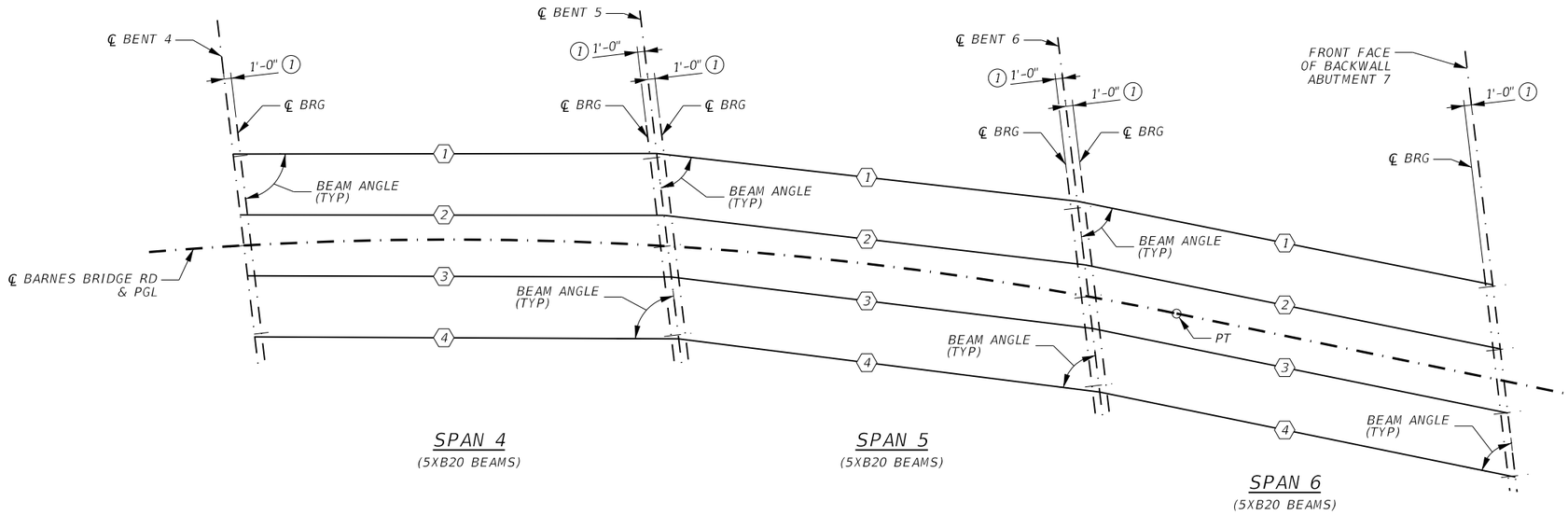

SPAN 4
(5XB20 BEAMS)

SPAN 5
(5XB20 BEAMS)

SPAN 6
(5XB20 BEAMS)

LEGEND

(X) BEAM NUMBER

(1) SEE ELASTOMERIC BEARING AND BEAM END DETAILS (XBEB) STANDARD SHEET FOR ORIENTATION OF DIMENSIONS.

(2) BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

BENT REPORT

BENT NO. 4 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.023 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 4	BEAM 1	0.000	83 19 35
	BEAM 2	8.683	83 12 33
	BEAM 3	8.683	83 5 30
	BEAM 4	8.683	82 58 28
	TOTAL	26.048	

BENT NO. 5 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.204 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 4	BEAM 1	0.000	83 19 35
	BEAM 2	8.806	83 12 33
	BEAM 3	8.806	83 5 30
	BEAM 4	8.806	82 58 28
	TOTAL	26.419	

BENT NO. 5 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.204 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 5	BEAM 1	0.000	76 45 34
	BEAM 2	8.806	76 31 21
	BEAM 3	8.806	76 17 11
	BEAM 4	8.806	76 3 2
	TOTAL	26.419	

BENT NO. 6 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.575 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 5	BEAM 1	0.000	76 45 34
	BEAM 2	9.061	76 31 21
	BEAM 3	9.061	76 17 11
	BEAM 4	9.061	76 3 2
	TOTAL	27.183	

BENT NO. 6 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.575 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 6	BEAM 1	0.000	71 52 55
	BEAM 2	9.061	71 49 0
	BEAM 3	9.061	71 45 6
	BEAM 4	9.061	71 41 11
	TOTAL	27.183	

ABUTMENT NO. 7 (S 37 50 11.20 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 13.699 L

		BEAM SPAC. ALONG CL BENT	BEAM ANGLE D M S
SPAN 6	BEAM 1	0.000	71 52 55
	BEAM 2	9.133	71 49 0
	BEAM 3	9.133	71 45 6
	BEAM 4	9.133	71 41 11
	TOTAL	27.398	

BEAM REPORT

BEAM REPORT AT CENTER OF BEAM, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	59.9442	57.9305	59.4416	-0.00539	N 58 50 13.48 E
BEAM 2	59.9587	57.9445	59.4561	-0.00568	N 58 57 16.21 E
BEAM 3	59.9734	57.9588	59.4708	-0.00600	N 59 4 18.73 E
BEAM 4	59.9884	57.9733	59.4858	-0.00633	N 59 11 21.05 E

BEAM REPORT AT CENTER OF BEAM, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	59.8794	57.8247	59.3742	-0.01694	N 65 24 14.88 E
BEAM 2	59.9382	57.8815	59.4332	-0.01763	N 65 38 27.34 E
BEAM 3	59.9980	57.9393	59.4933	-0.01837	N 65 52 38.12 E
BEAM 4	60.0588	57.9980	59.5545	-0.01914	N 66 6 47.19 E

BEAM REPORT AT CENTER OF BEAM, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	59.9602	57.8559	59.4593	-0.02911	N 70 16 54.20 E
BEAM 2	59.9826	57.8775	59.4827	-0.02981	N 70 20 48.83 E
BEAM 3	60.0050	57.8991	59.5061	-0.03044	N 70 24 43.29 E
BEAM 4	60.0275	57.9208	59.5295	-0.03104	N 70 28 37.57 E

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Texas Department of Transportation

Dallas District Bridge

FRAMING PLAN

UNIT 2 (SPANS 4 - 6)
DUCK CREEK BRIDGE

SHEET 2 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		77

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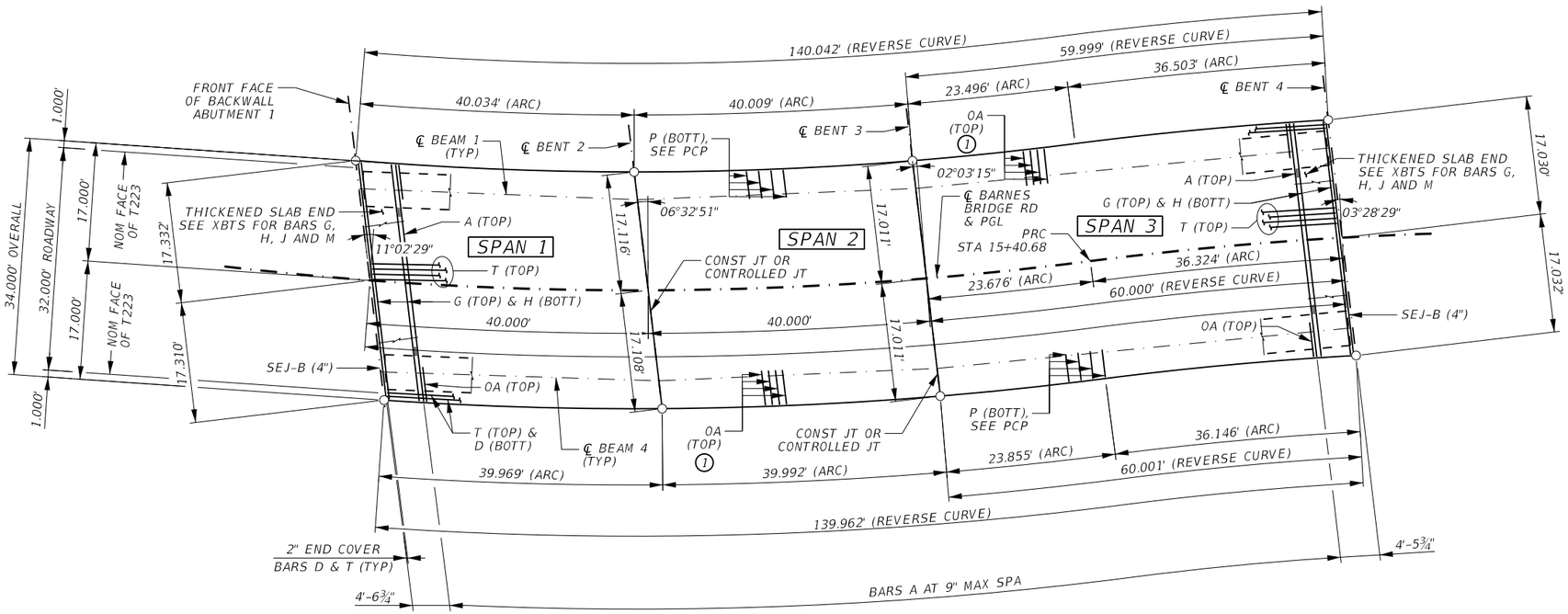

PLAN

BAR SUMMARY	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
OA	#5
P	#4
T	#4

(1) INCREASE THE LENGTH OF THE OA BARS AS REQUIRED TO EXTEND 1'-0" PAST EXTERIOR BEAM CENTERLINE, SPACED BETWEEN BARS A AT OVERHANG.

(2) BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENT MADE FOR BEAM SLOPE. SEE FRAMING PLAN SHEET FOR BEAM LENGTHS.

(3) REINFORCEMENT STEEL IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

(4) FOR CONTRACTOR'S INFORMATION ONLY.

TABLE OF ESTIMATED QUANTITIES			
SPAN	REINF CONCRETE SLAB	PRESTR CONCRETE X-BEAMS (2)	TOTAL REINF STEEL (3)(4)
NO.	SF	LF	LB
1	1,360	157.99	3,128
2	1,360	157.98	3,128
3	2,040	237.96	4,692
TOTAL	4,760	553.93	10,948

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Dallas District Bridge

140.00' PRESTRESSED X-BEAM UNIT 1 DUCK CREEK BRIDGE

SHEET 1 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		78

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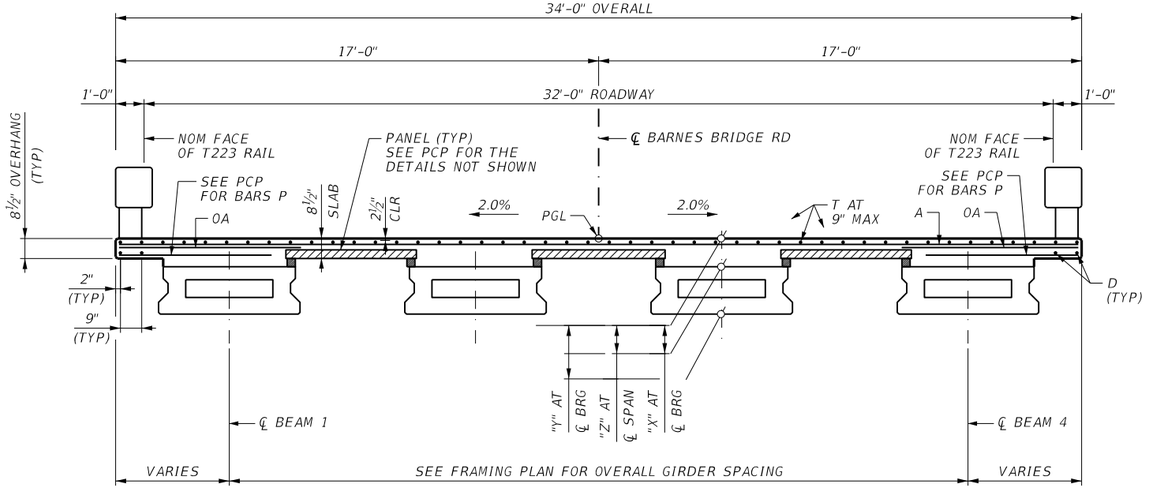


TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE OVERHANG DIMENSIONS

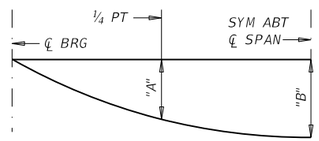
SPAN	LT EDGE		RT EDGE	
	MIN	MAX	MIN	MAX
1	3.597'	4.000'	4.000'	4.382'
2	3.672'	4.000'	4.000'	4.382'
3	4.000'	4.403'	3.565'	4.000'

TABLE OF SECTION DEPTHS

SPAN	GIRDERS	"X" @ CL BRG	"Y" @ CL BRG	"Z" @ (5) CL SPAN
1	1	11½"	2'-7½"	11½"
	2	11½"	2'-7½"	11½"
	3	11½"	2'-7½"	11¾"
	4	11½"	2'-7½"	11¾"
2	1	11½"	2'-7½"	11½"
	2	11½"	2'-7½"	11½"
	3	11½"	2'-7½"	11¾"
	4	11½"	2'-7½"	11¾"
3	1	11½"	2'-7½"	10⅜"
	2	11½"	2'-7½"	10⅜"
	3	11½"	2'-7½"	10¼"
	4	11½"	2'-7½"	10⅛"

TABLE OF DEAD LOAD DEFLECTIONS

SPAN	GIRDERS	"A"	"B"
		FT	FT
1	1	0.015	0.021
	2-4	0.016	0.023
2	1	0.015	0.021
	2-4	0.016	0.023
3	1	0.074	0.105
	2-3	0.075	0.107
	4	0.070	0.100



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE PCP AND PCP-FAB STANDARDS FOR PANEL DETAILS NOT SHOWN.

SEE XBTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.

SEE XBBR-MS STANDARD FOR MISCELLANEOUS DETAILS.

SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

SEE XBEB STANDARD FOR GIRDER END DETAILS.

SEE SEJ-B STANDARD FOR EXPANSION JOINT DETAILS.

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

MATERIAL NOTES:

PROVIDE CLASS "S" (HPC) CONCRETE (f'c = 4,000 psi).

PROVIDE EPOXY COATED, GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS,
EPOXY COATED ~ #4 = 2'-5"

EPOXY COATED DEFORMED WELDED WIRE REINFORCEMENT (WWR)(ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P, OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

(5) THEORETICAL DIMENSION.

STATE OF TEXAS
AFNAN ALI
139892
LICENSED
PROFESSIONAL ENGINEER

10/02/2023

HL93 LOADING

WSP USA
3102 Oak Lawn Avenue, Suite 450
Dallas, TX 75219
+1 214 521-1661
Texas Registered Engineering Firm F-02263

Texas Department of Transportation

Dallas District Bridge

140.00' PRESTRESSED X-BEAM UNIT 1 DUCK CREEK BRIDGE

SHEET 2 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
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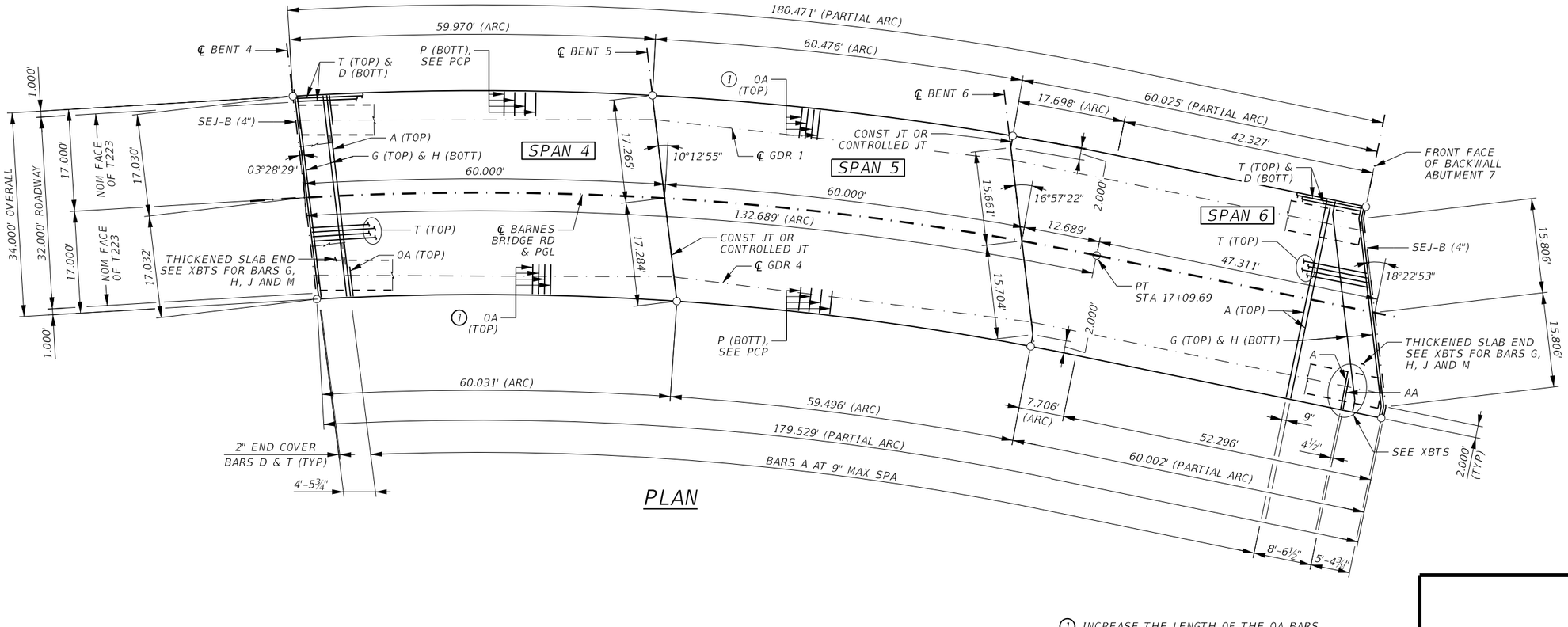

PLAN

BAR SUMMARY	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

1. INCREASE THE LENGTH OF THE 0A BARS AS REQUIRED TO EXTEND 1'-0" PAST EXTERIOR BEAM CENTERLINE, SPACED BETWEEN BARS A AT OVERHANG.
2. BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENT MADE FOR BEAM SLOPE. SEE FRAMING PLAN SHEET FOR BEAM LENGTHS.
3. REINFORCEMENT STEEL IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.
4. FOR CONTRACTOR'S INFORMATION ONLY.

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB	PRESTR (2) CONCRETE X-BEAMS	TOTAL (3) (4) REINF STEEL
NO.	SF	LF	LB
4	2,040	237.86	4,692
5	2,040	237.86	4,692
6	2,040	237.98	4,692
TOTAL	6,120	713.70	14,076

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STATE OF TEXAS

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Texas Registered Engineering Firm F-02263

Texas Department of Transportation

Dallas District Bridge

180.00' PRESTRESSED X-BEAM UNIT 2 DUCK CREEK BRIDGE

SHEET 1 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
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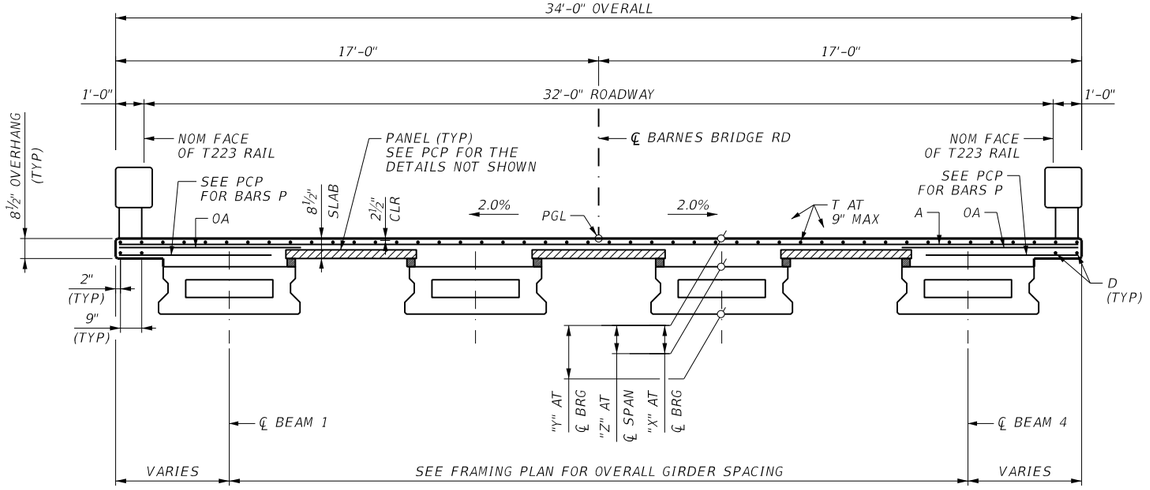


TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE OVERHANG DIMENSIONS

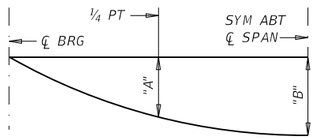
SPAN	LT EDGE		RT EDGE	
	MIN	MAX	MIN	MAX
4	4.000'	4.859'	3.094'	4.000'
5	4.000'	4.858'	3.092'	4.000'
6	4.000'	4.203'	3.939'	4.000'

TABLE OF SECTION DEPTHS

SPAN	GIRDERS	"X" @ CL BRG	"Y" @ CL BRG	"Z" @ CL SPAN (5)
4	1	11½"	2'-7½"	10½"
	2	11½"	2'-7½"	10½"
	3	11½"	2'-7½"	10⅛"
	4	11½"	2'-7½"	10"
5	1	11½"	2'-7½"	10½"
	2	11½"	2'-7½"	10½"
	3	11½"	2'-7½"	10⅛"
	4	11½"	2'-7½"	10"
6	1	11½"	2'-7½"	10⅜"
	2	11½"	2'-7½"	10⅜"
	3	11½"	2'-7½"	10¼"
	4	11½"	2'-7½"	10¼"

TABLE OF DEAD LOAD DEFLECTIONS

SPAN	GIRDERS	"A"	"B"
		FT	FT
4	1	0.078	0.111
	2	0.075	0.106
	3	0.075	0.107
	4	0.066	0.093
5	1	0.077	0.110
	2-3	0.075	0.106
	4	0.066	0.093
6	1	0.073	0.103
	2-3	0.074	0.106
	4	0.071	0.101



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION, 2020 AND TXDOT BRIDGE DESIGN MANUAL, 2023.

SEE PCP AND PCP-FAB STANDARDS FOR PANEL DETAILS NOT SHOWN.

SEE XBTS STANDARD FOR THICKENED SLAB END DETAILS AND QUANTITY ADJUSTMENTS.

SEE XBBR-MS STANDARD FOR MISCELLANEOUS DETAILS.

SAW-CUT GROOVING OF THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.

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SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

SEE XBEB STANDARD FOR GIRDER END DETAILS.

SEE SEJ-B STANDARD FOR EXPANSION JOINT DETAILS.

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

MATERIAL NOTES:

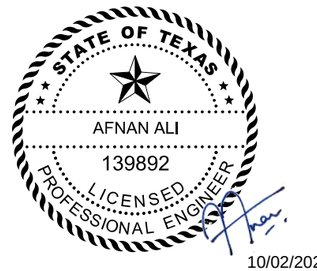
PROVIDE CLASS "S" (HPC) CONCRETE (f'c = 4,000 psi).

PROVIDE EPOXY COATED, GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS,
EPOXY COATED ~ #4 = 2'-5"

EPOXY COATED DEFORMED WELDED WIRE REINFORCEMENT (WWR)(ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A, D, OA, P, OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

(5) THEORETICAL DIMENSION.



10/02/2023

HL93 LOADING

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3102 Oak Lawn Avenue, Suite 450
Dallas, TX 75219
+1 214 521-1661
Texas Registered Engineering Firm F-02263

Texas Department of Transportation

Dallas District Bridge

180.00' PRESTRESSED X-BEAM UNIT 2 DUCK CREEK BRIDGE

SHEET 2 OF 2

FILE: SEE PATH	DN: AA	CK: JDS	DW: RC	CK: AA
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																	OPTIONAL DESIGN					LOAD RATING FACTORS		
				PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW								CONCRETE							
	SPAN	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRENGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ②		STRENGTH I		SERVICE III
												TOTAL	DE-BONDED	3	6	9	12	15						Moment	Shear	Inv	Opr	Inv
Duck Creek Bridge	1 & 2	ALL	5XB20		12	0.6	270	7.03	7.03	0	0.00	0	0	0	0	0	0	0	4.000	5.000	1.396	-1.770	1327	0.698	0.851	1.18	1.52	1.07
	3 - 6	ALL	5XB20		34	0.6	270	6.68	6.60	6	2.50	28	6	2	2	2	0	0	4.900	5.100	3.176	-3.759	2576	0.639	0.842	1.62	2.13	1.06

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 in accordance with 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 bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.

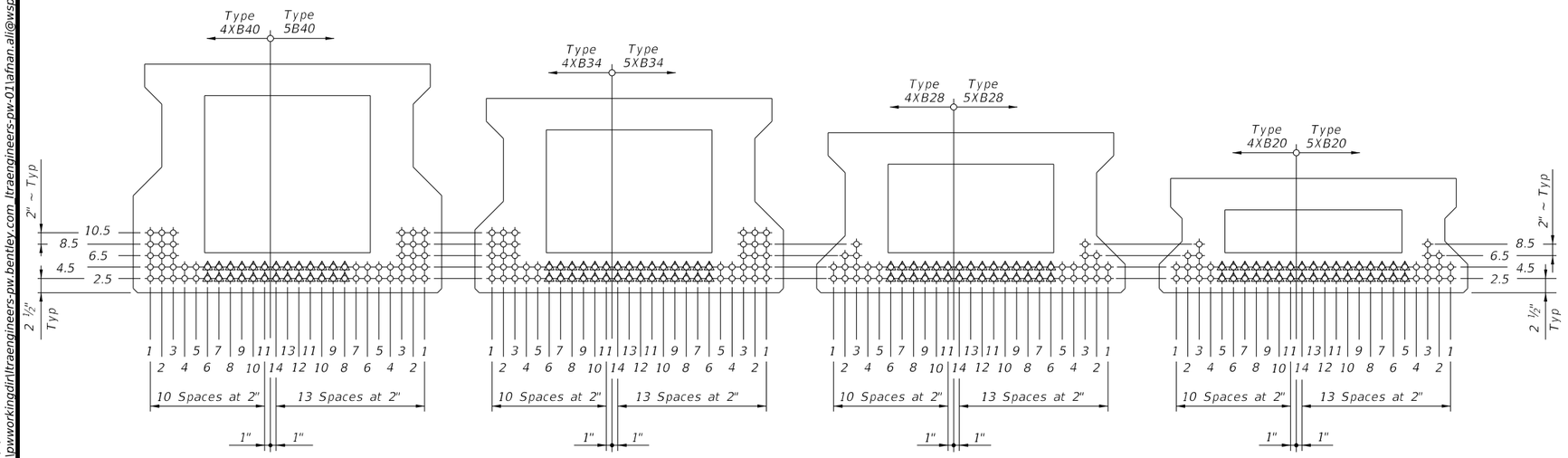
2) Place strand symmetrically about vertical centerline of box.

3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △. Double wrap full-length debonded strands.



TxDOT XB40 BEAMS

TxDOT XB34 BEAMS

TxDOT XB28 BEAMS

TxDOT XB20 BEAMS

HL93 LOADING

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

10/02/2023

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+1 214 521-1661
Texas Registered Engineering Firm F-02263

Texas Department of Transportation

Dallas District Bridge

PRESTRESSED CONCRETE X-BEAM DESIGNS DUCK CREEK BRIDGE

XBND

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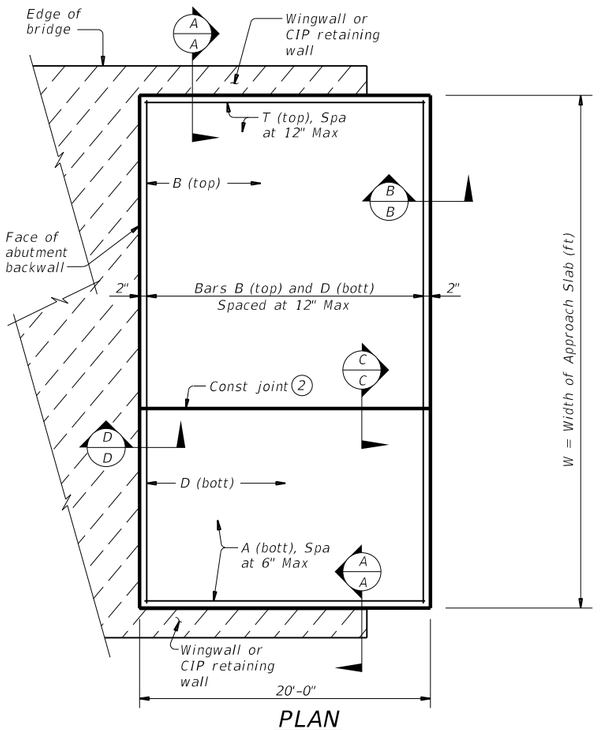
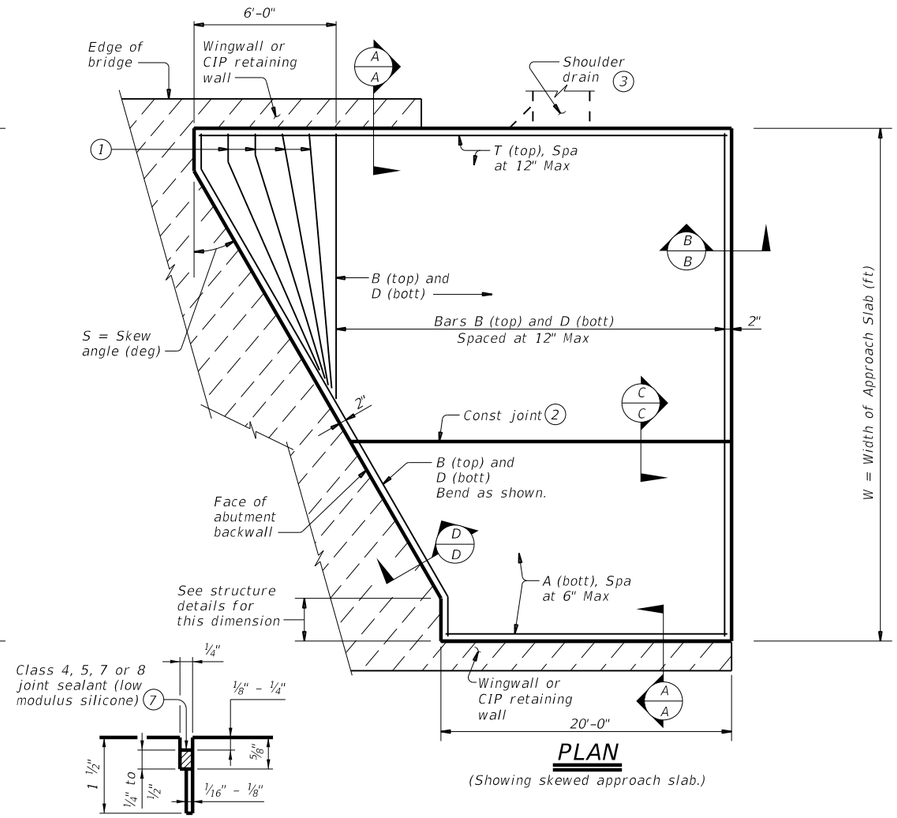


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

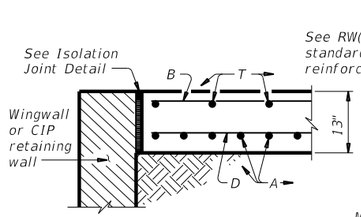
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

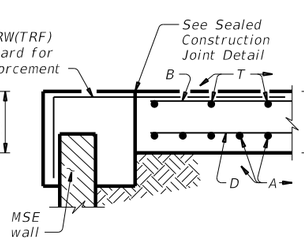
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

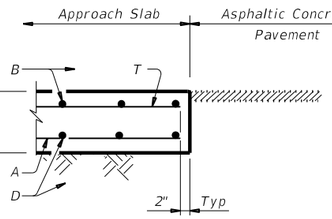
Cover dimensions are clear dimensions, unless noted otherwise.

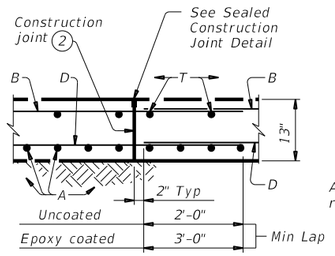


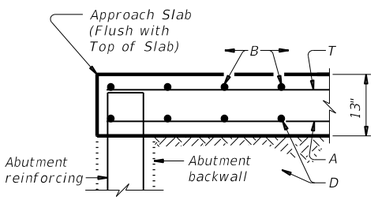
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





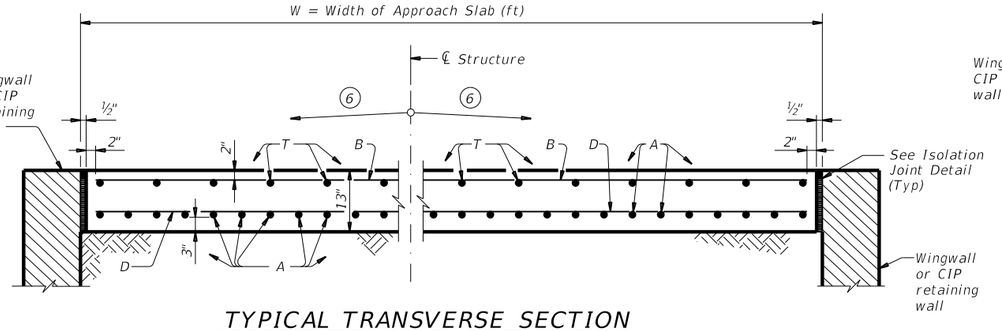


SECTION A-A

SECTION B-B

SECTION C-C (5)

SECTION D-D



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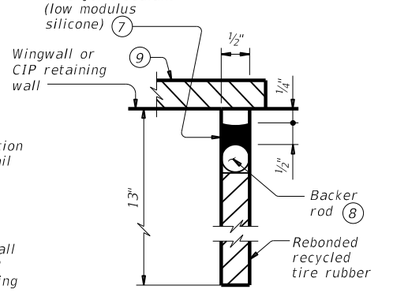
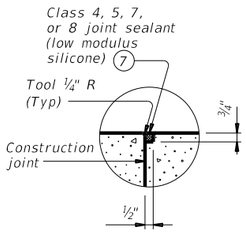


ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

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	DAL	DALLAS		83

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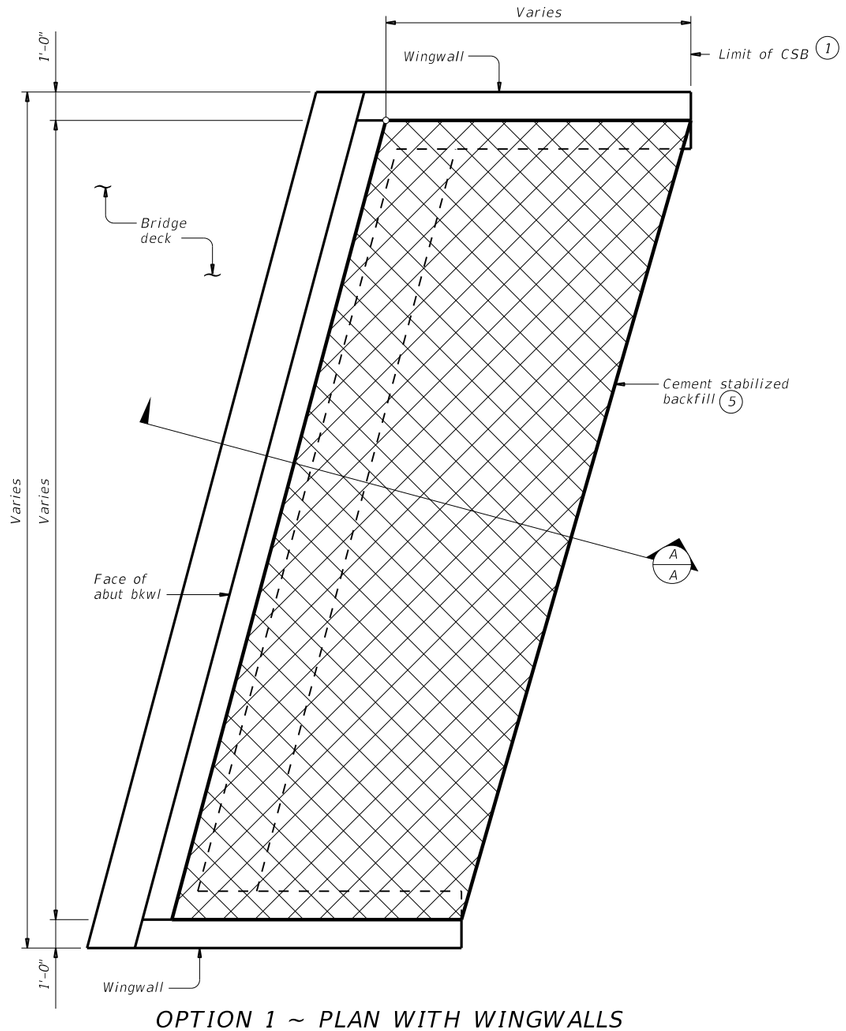
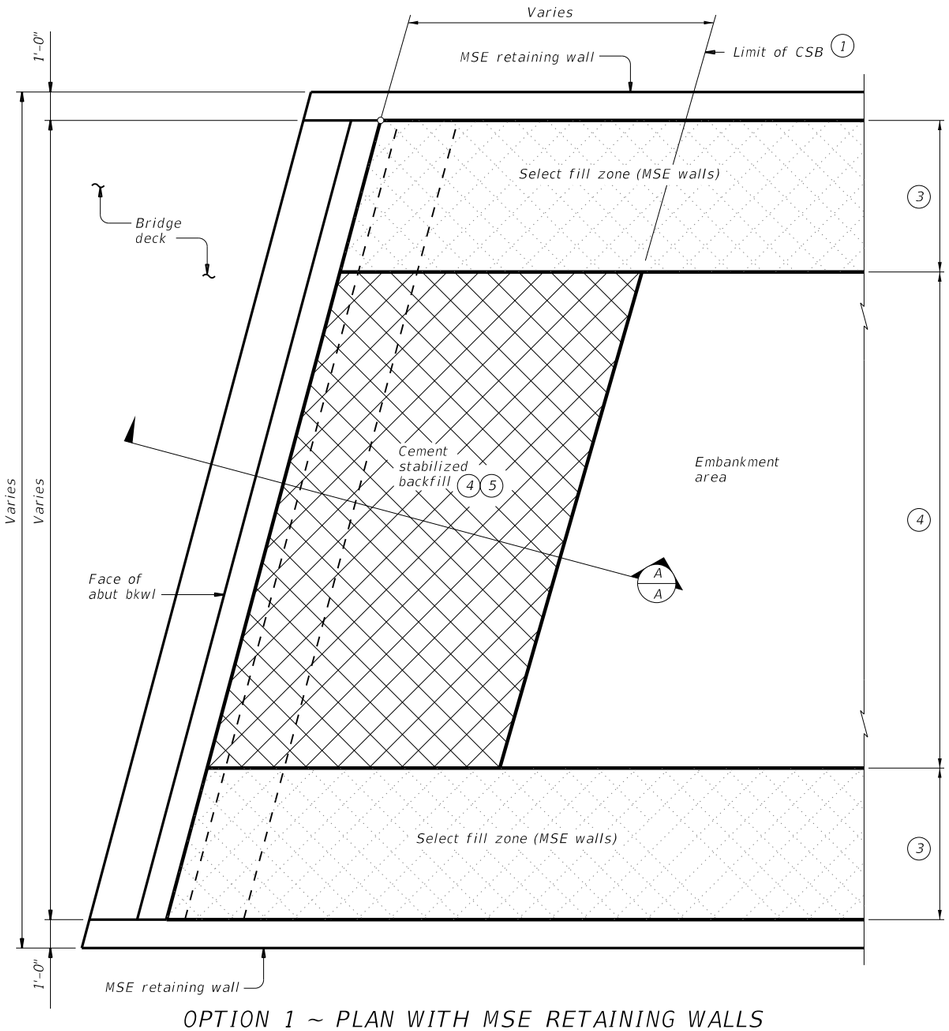
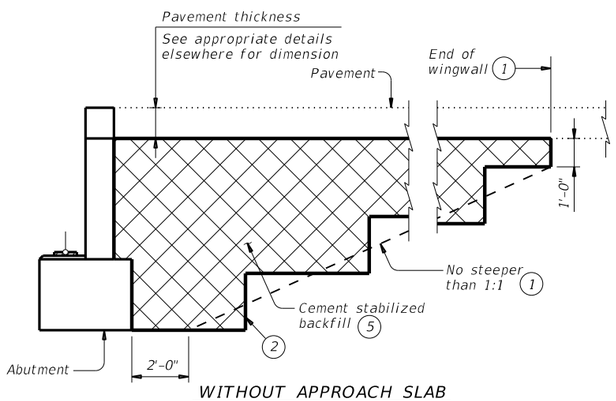


OPTION 1 ~ PLAN WITH WINGWALLS

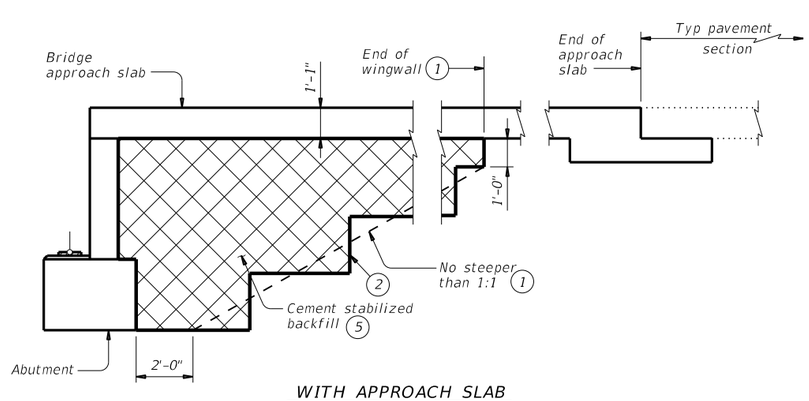
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		84

DATE: 9/29/2023 3:23:29 PM
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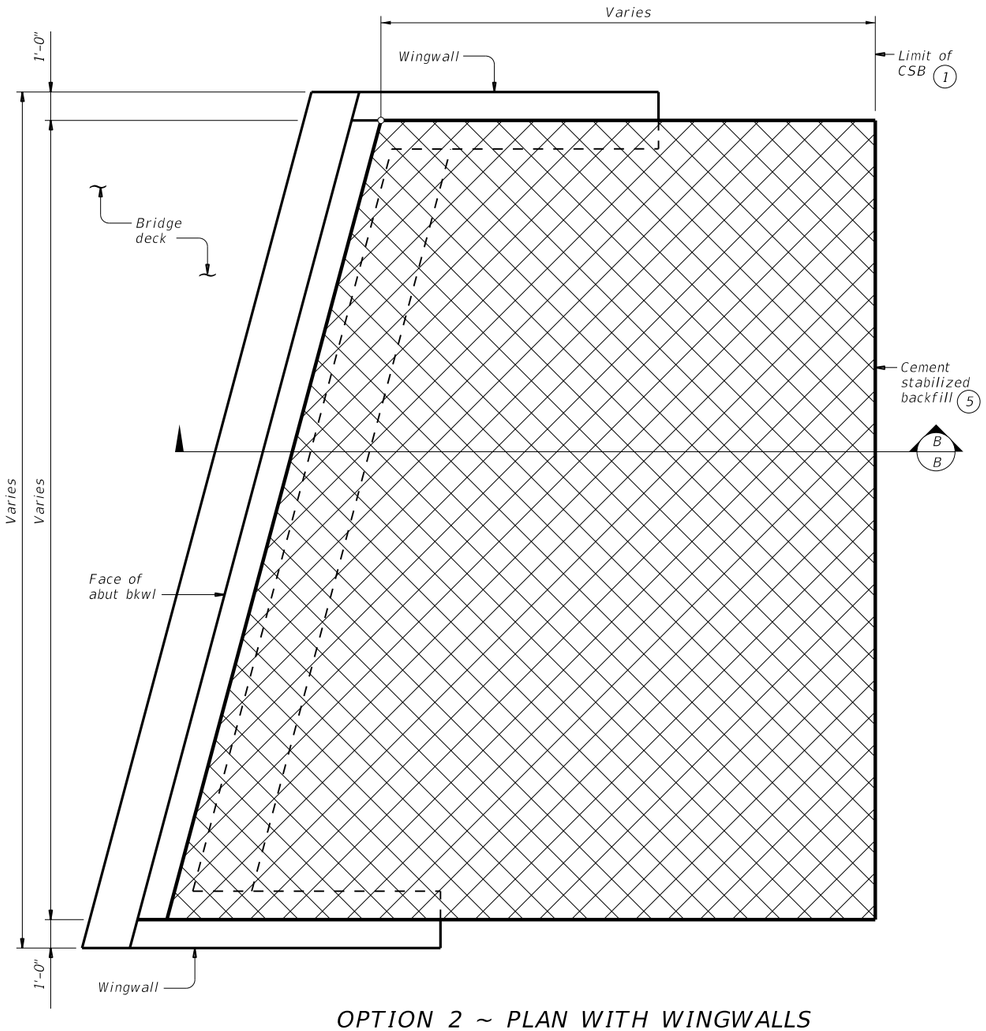
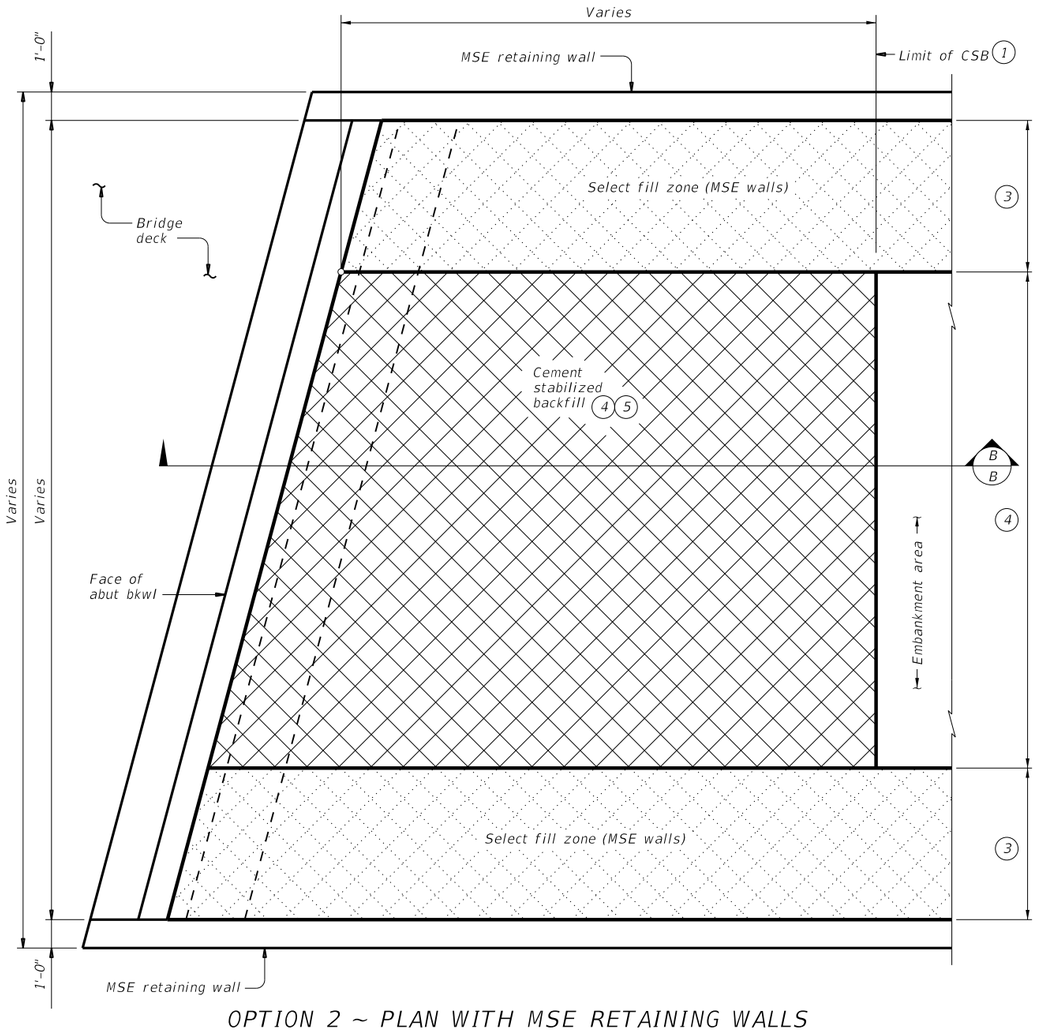


OPTION 2 ~ PLAN WITH WINGWALLS

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.

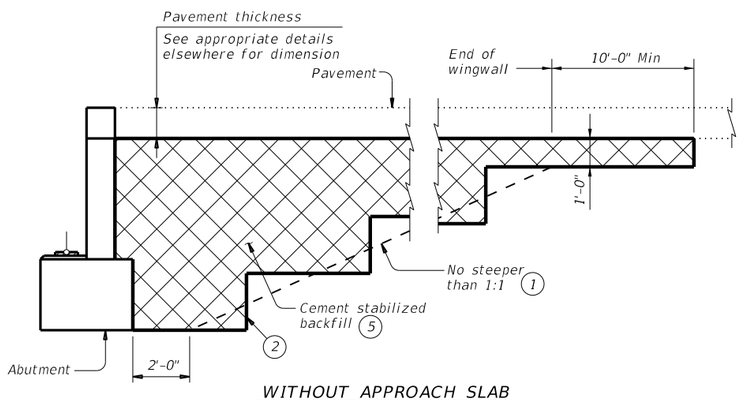
(2) Bench backfill as shown with 12" (approximate) bench depths.

(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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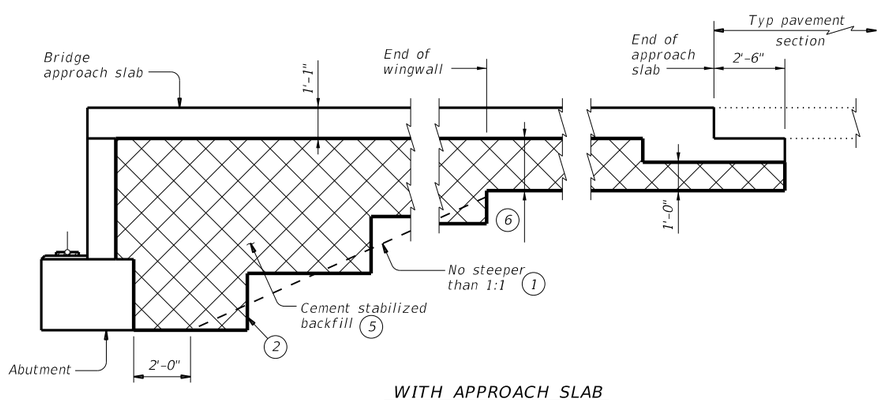

WITH APPROACH SLAB

(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	47	288	BBR
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		85

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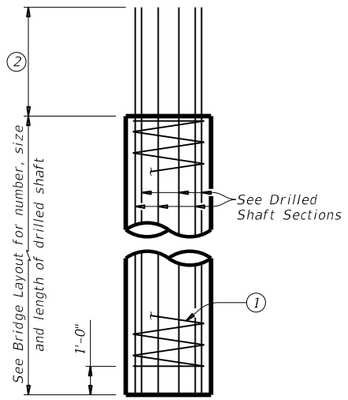
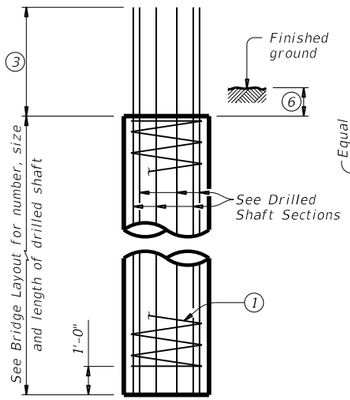
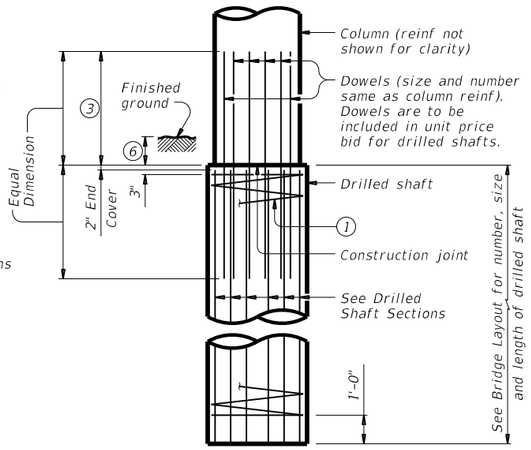


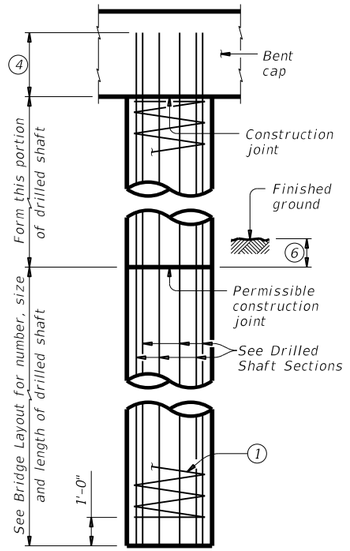
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



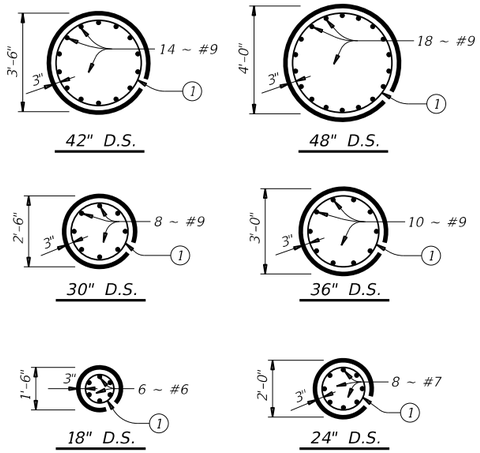
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

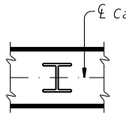


DRILLED SHAFT SECTIONS

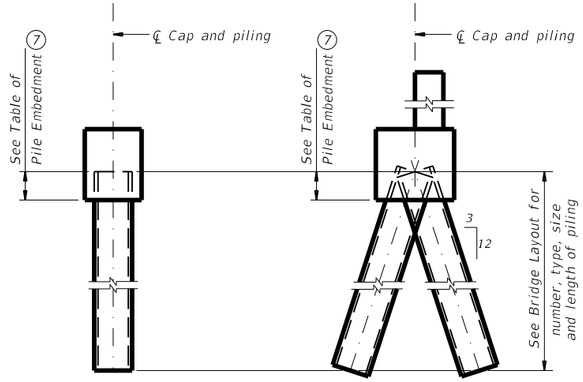
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

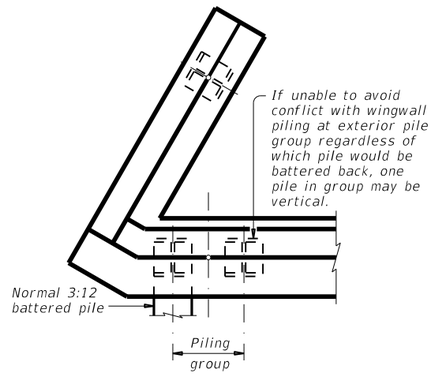


ORIENTATION OF STEEL H-PILING

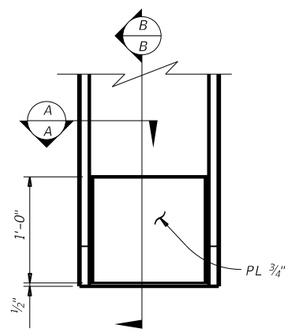


VERTICAL PILE BATTERED PILE

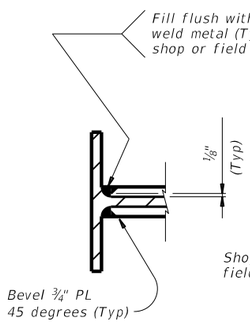
PILING DETAILS
(Concrete or steel H)



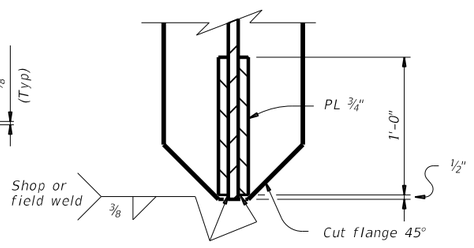
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION

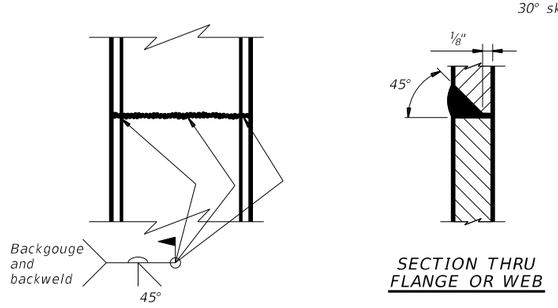


SECTION A-A



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	0918	47	288	BBR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		86

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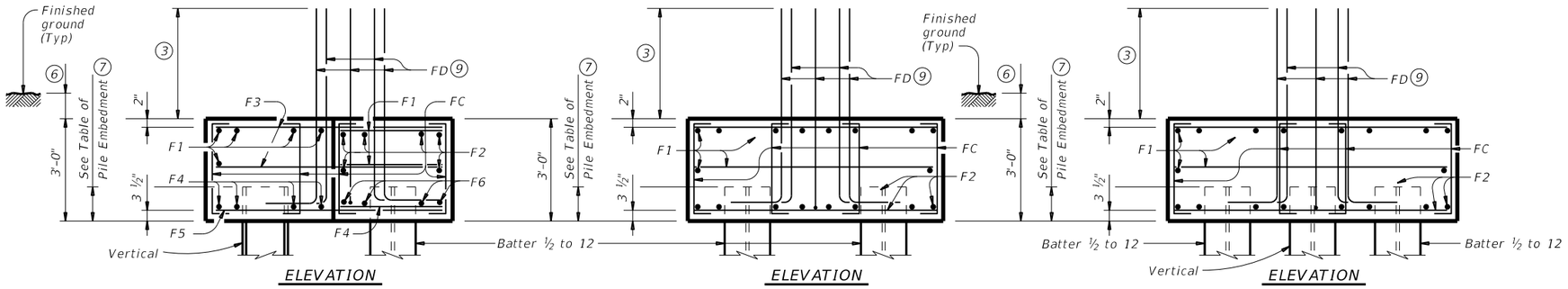
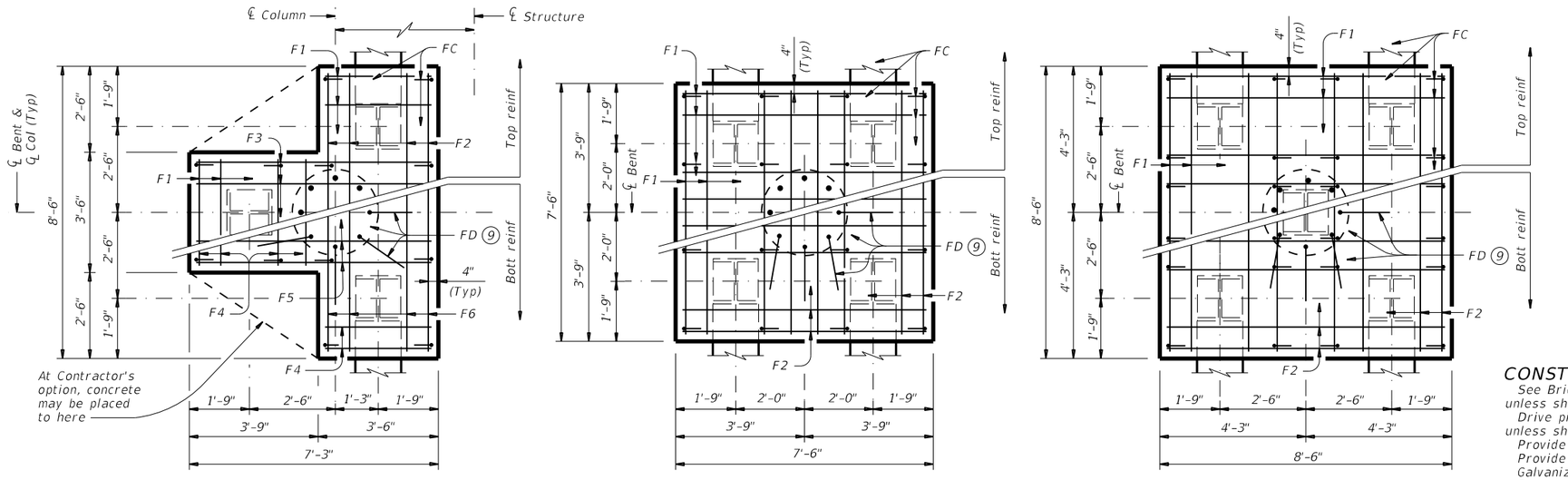




THREE PILE FOOTING (8)

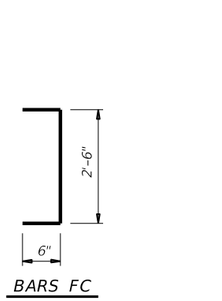
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

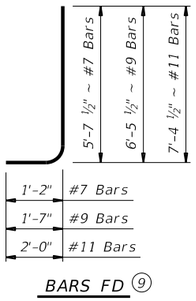
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		87

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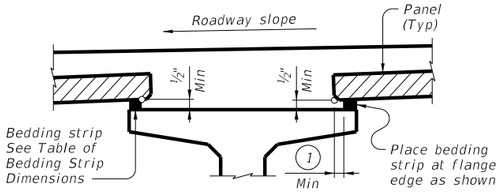
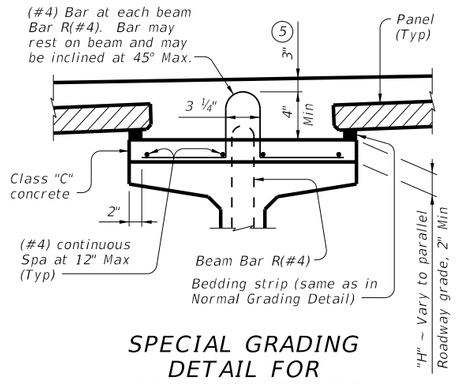


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders.
(Other beam types similar)

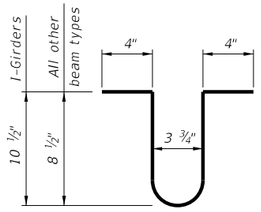


SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

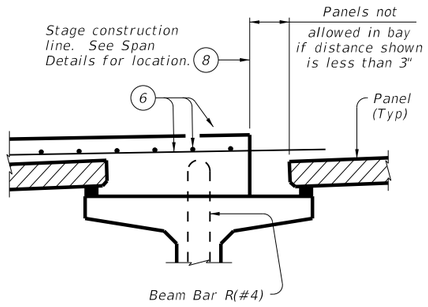
Showing prestressed concrete I-girders.
(Other beam types similar)

HAUNCH REINFORCING DETAIL

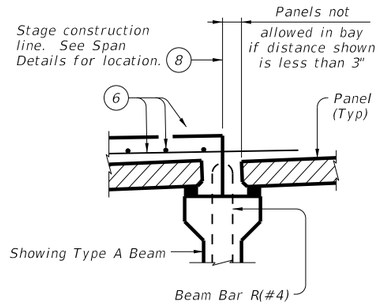
Showing prestressed concrete I-girders.
(Other beam types similar)



BARS UP (#4) (7)



PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-girders, 1 ½" Min for all other beam types.

(2) Allowed for prestressed concrete I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

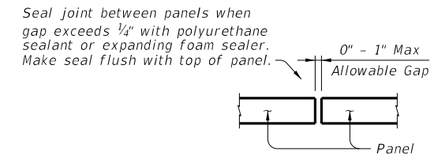
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

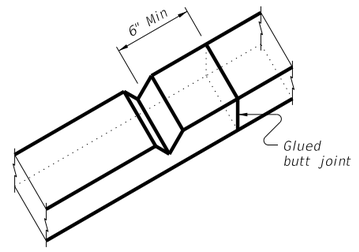
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..



PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

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PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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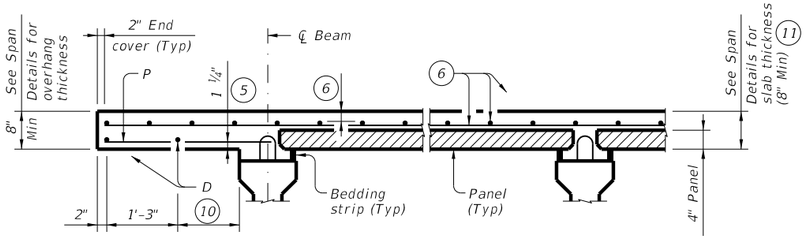
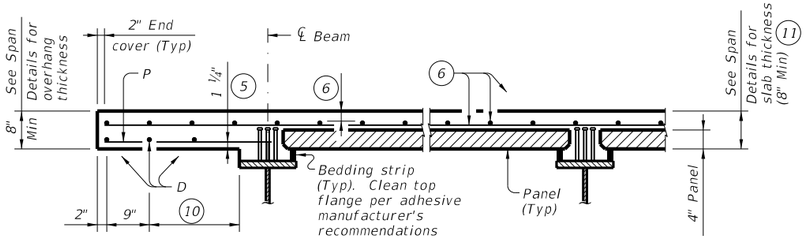
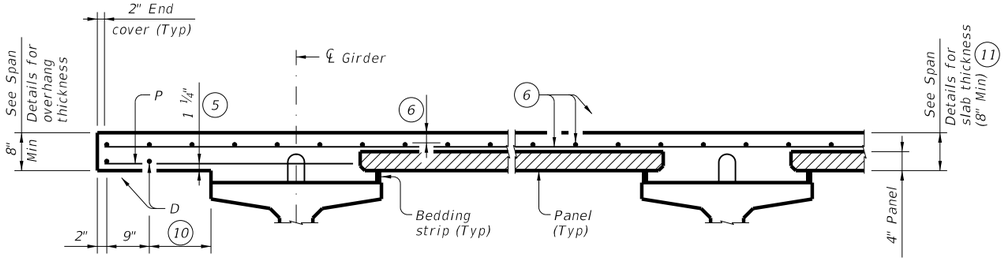


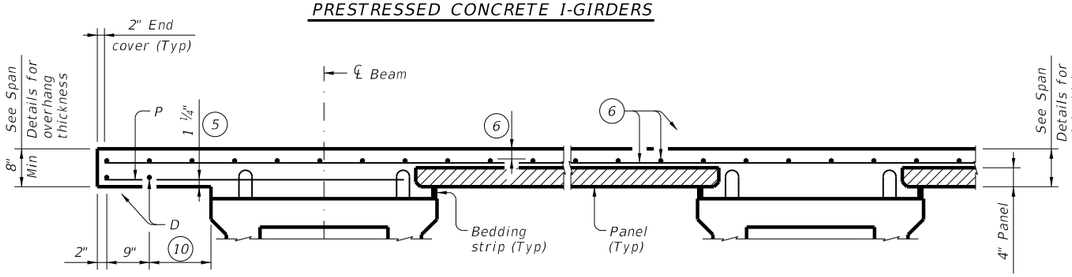
PRESTRESSED CONCRETE I-BEAMS



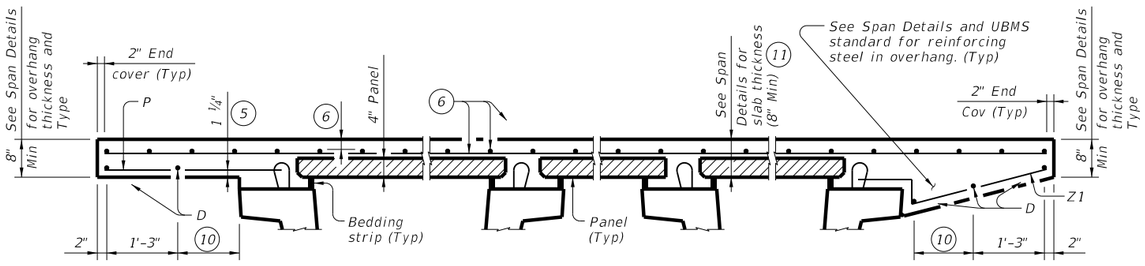
STEEL BEAMS (13)



PRESTRESSED CONCRETE I-GIRDERS



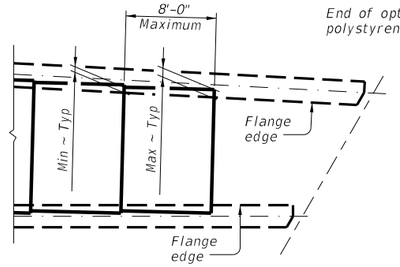
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

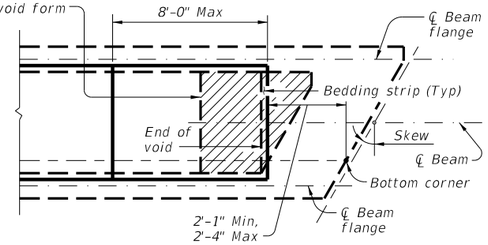
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



OVER CONC U-BEAMS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

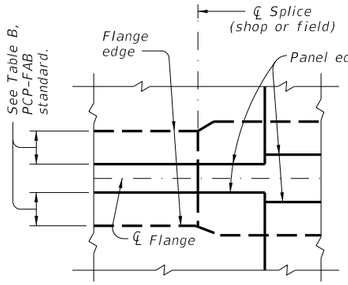
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

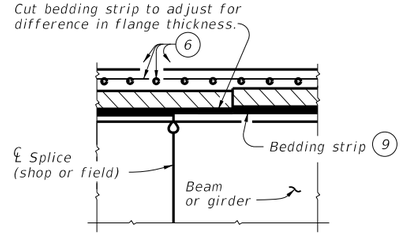
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Panels are allowed over top tension flanges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



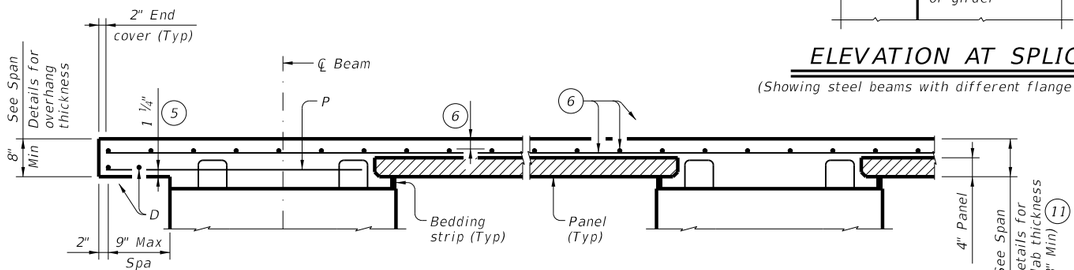
PLAN AT SPLICE

(Showing steel beams with flange width transition)



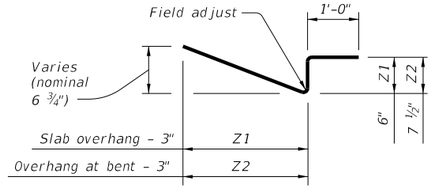
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4) (12)

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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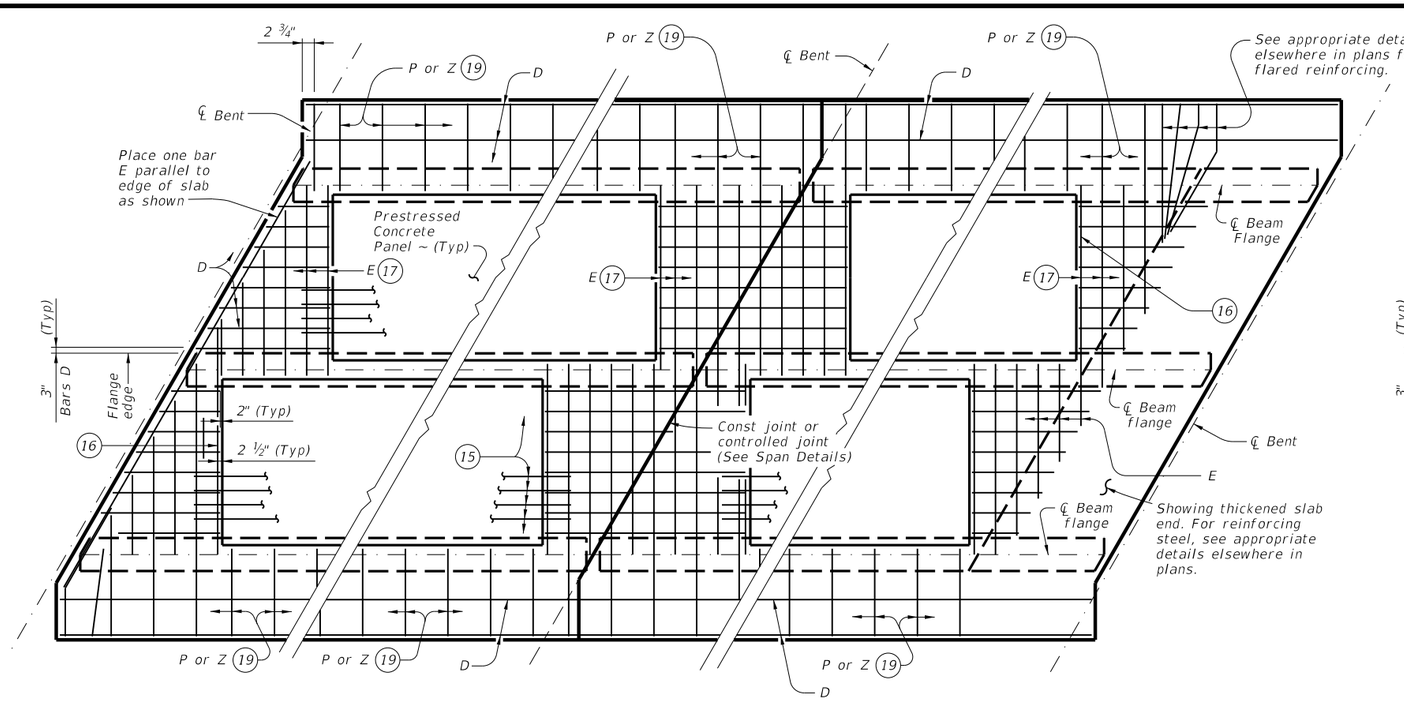
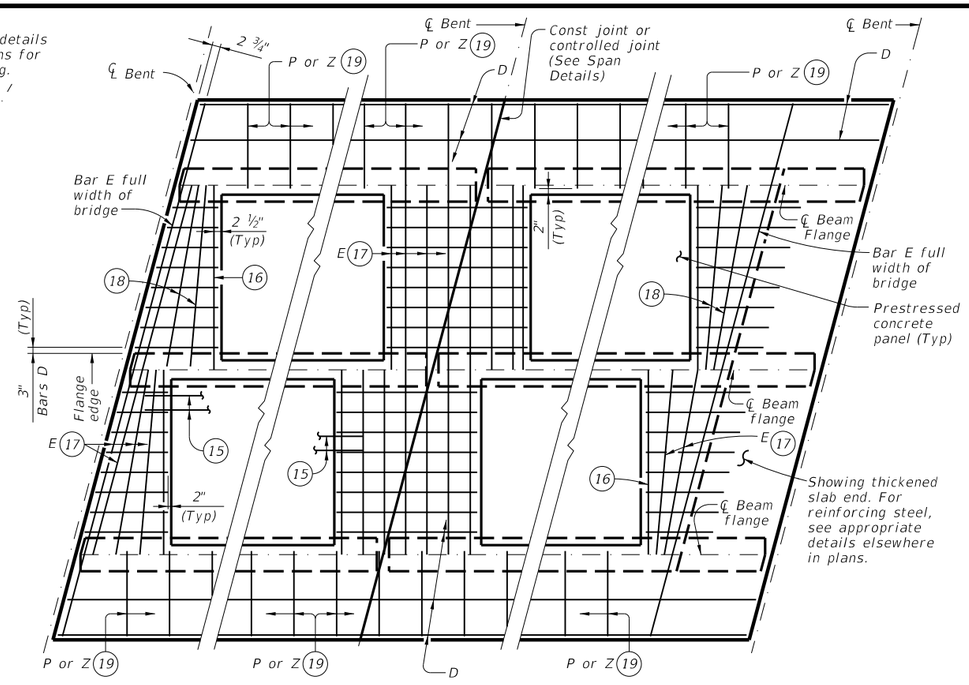


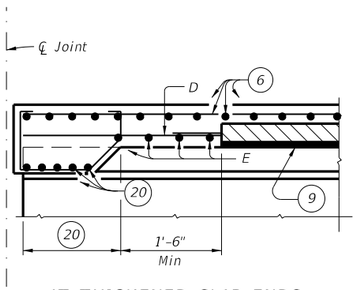
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

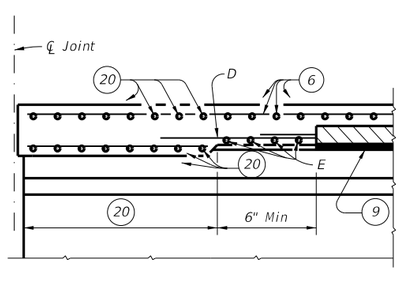


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

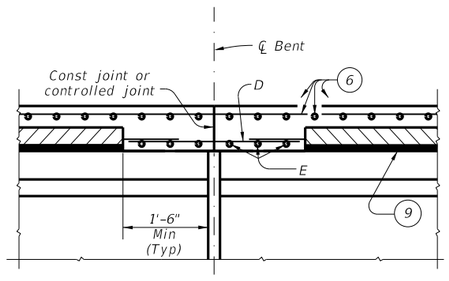
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



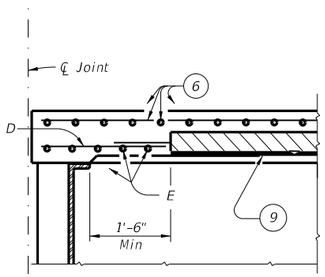
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



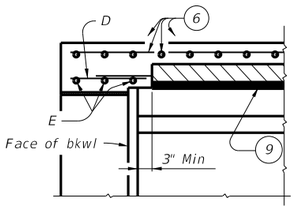
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



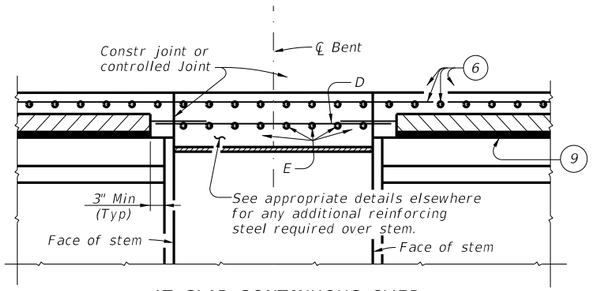
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

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Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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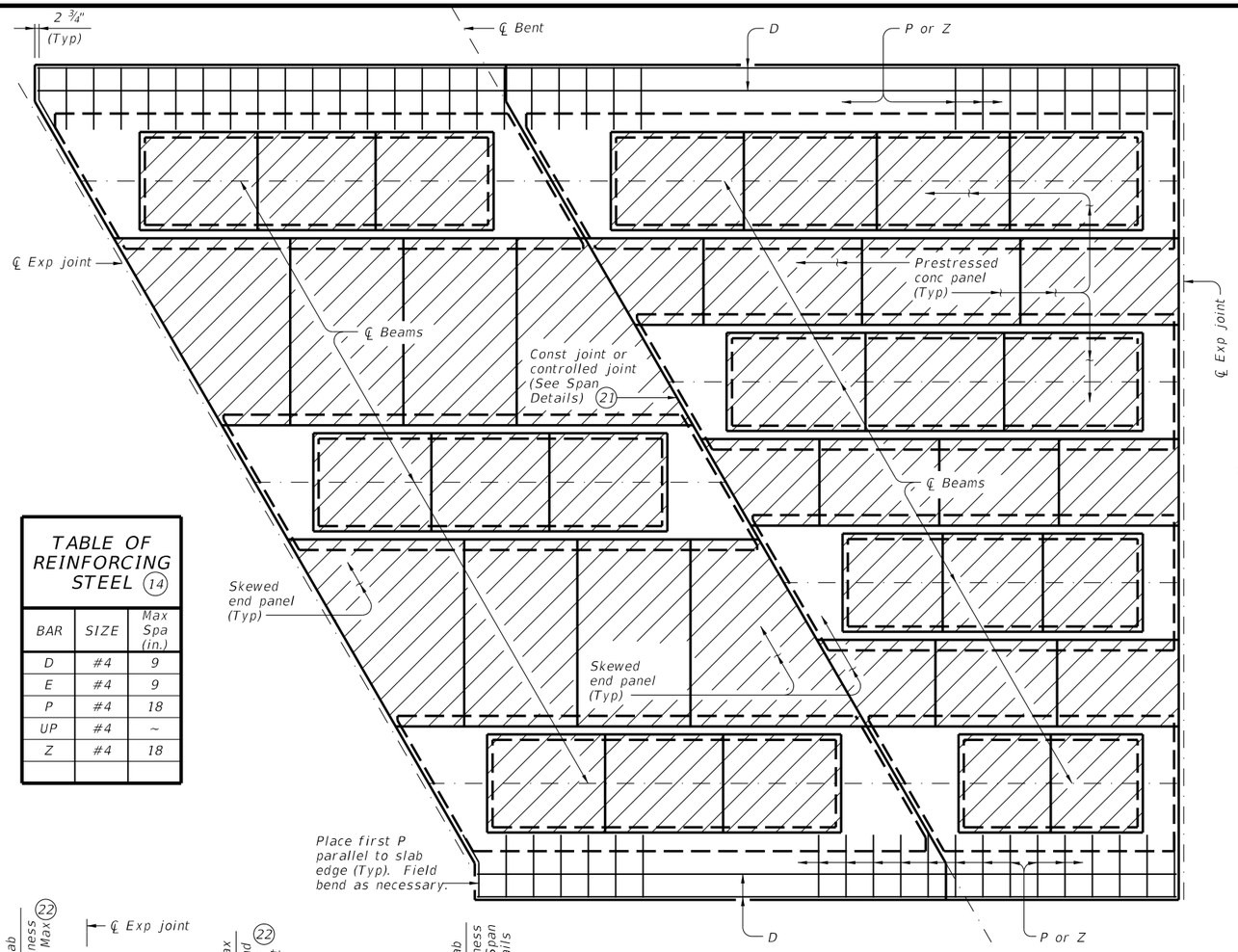
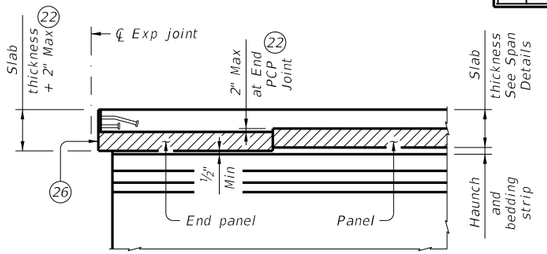


OPTION 2 ~ PLAN OF SLAB

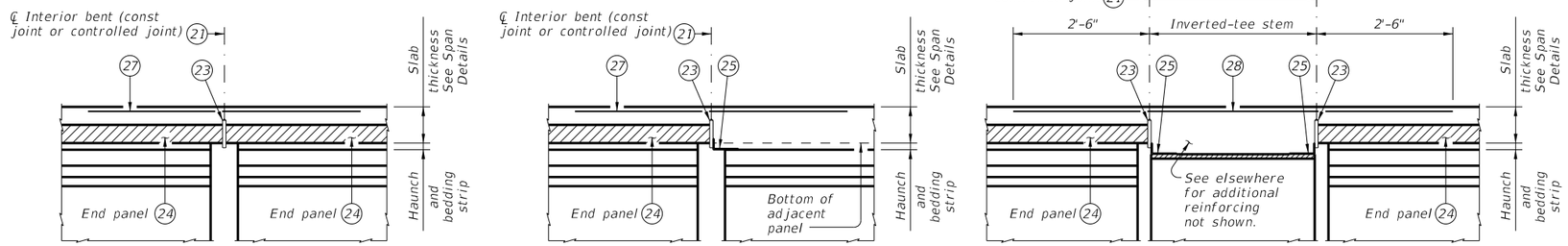
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

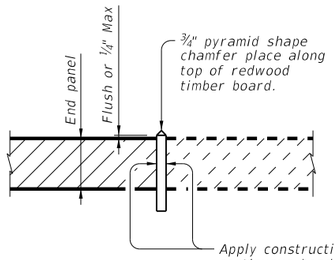


JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.

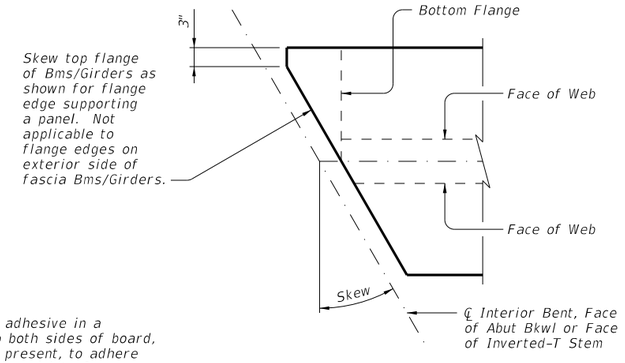


OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Beam/I-Girder, U-Beams and Steel Beams similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab Bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and OA from standard IGTS in the slab.

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PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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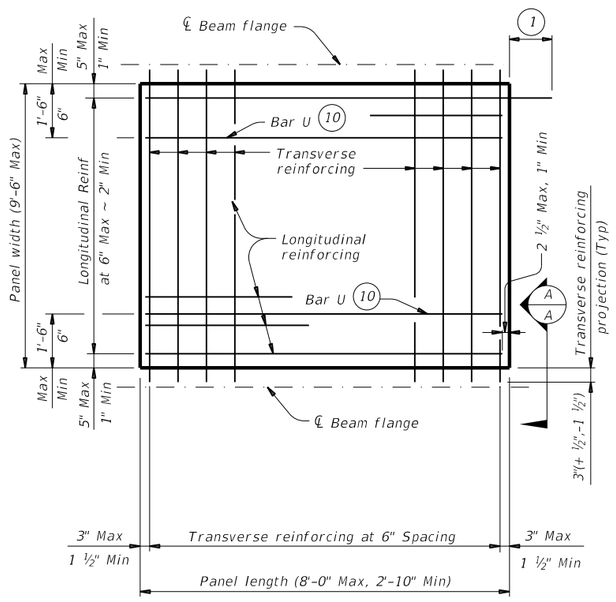
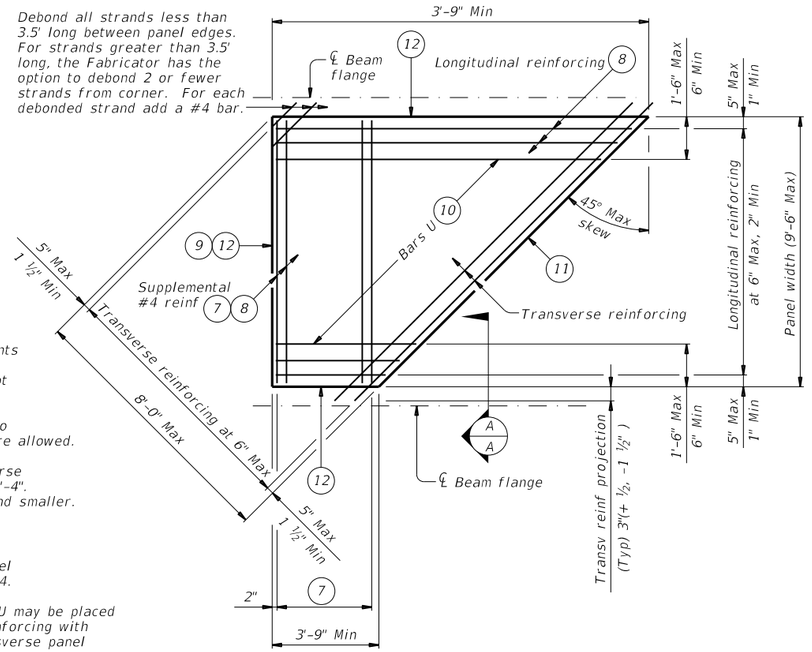


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

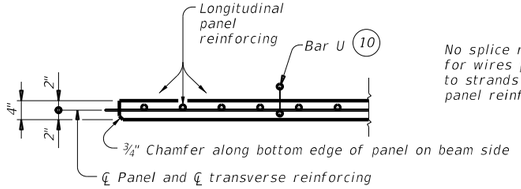
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

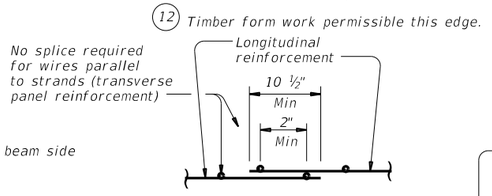
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

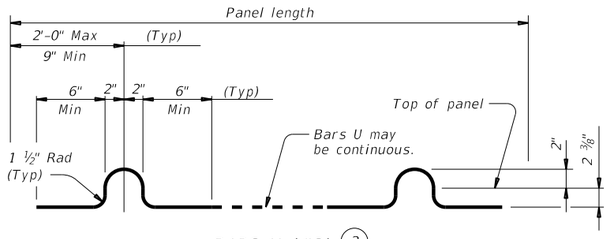


SECTION A-A

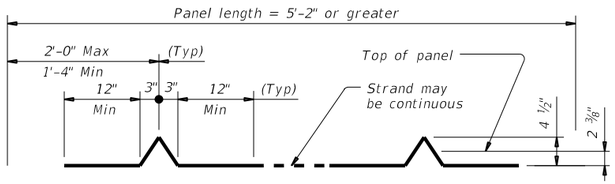
(Not showing supplemental #4 bars for skewed end panels.)



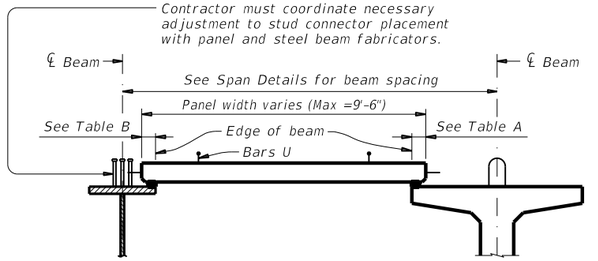
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



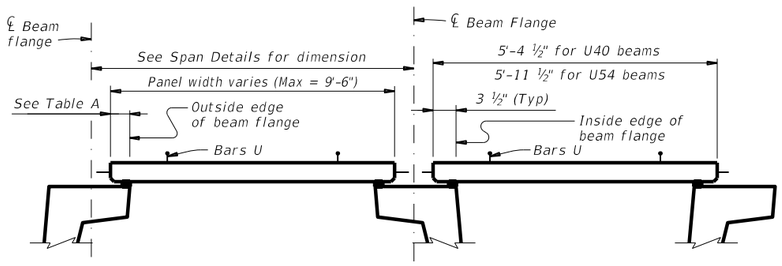
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		92

DATE: 9/29/2023, 3:24:20 PM
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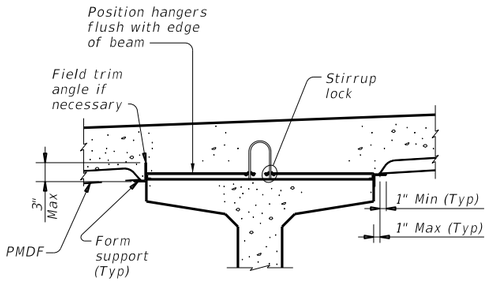
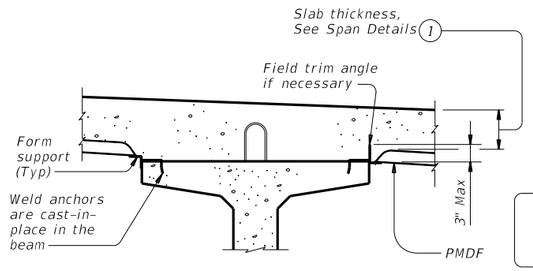
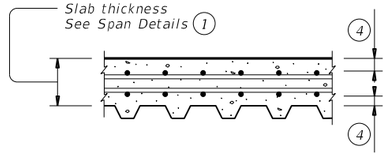


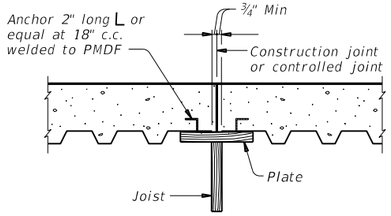
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

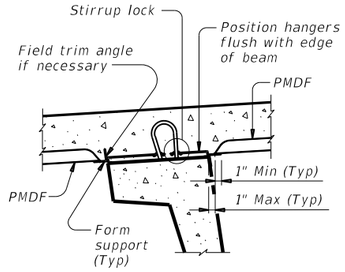


TYP LONGITUDINAL SLAB SECTION

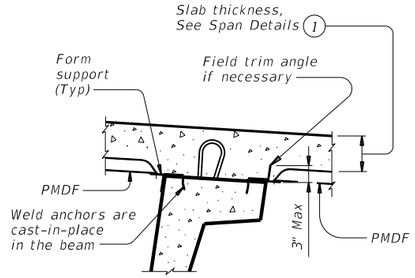


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

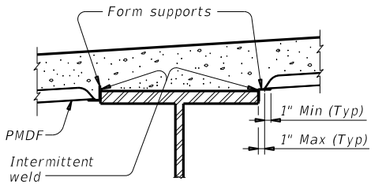
SECTION THRU CONSTRUCTION JOINT



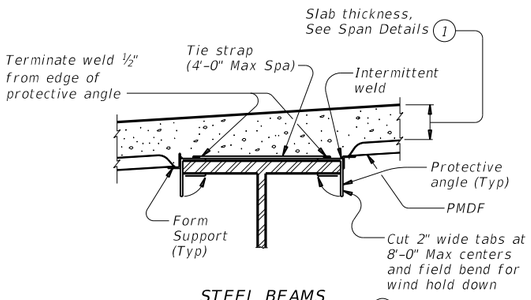
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

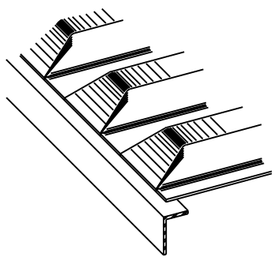


STEEL BEAMS AT COMPRESSION FLANGES

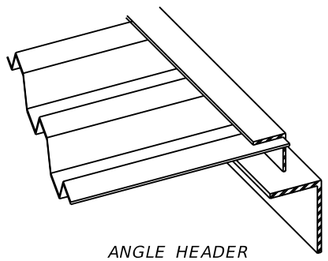


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES

SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	DAL	DALLAS		93

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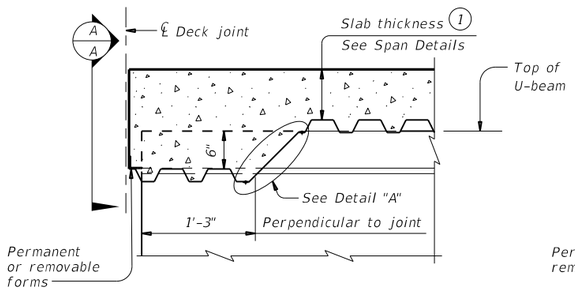
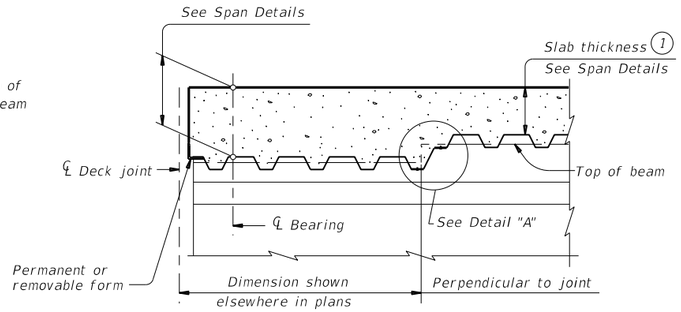
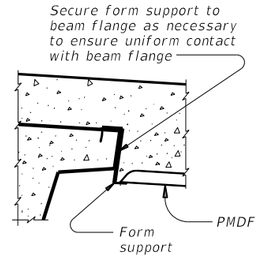


AT THICKENED SLAB END FOR U-BEAMS

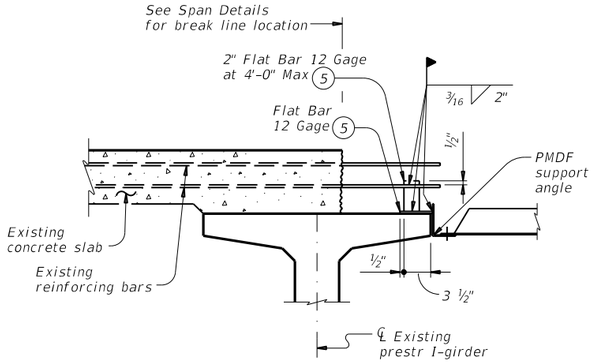


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

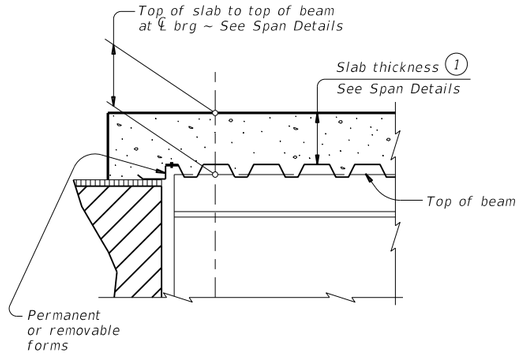
Showing I-beam block-out. No block-out for I-girders or steel beams.



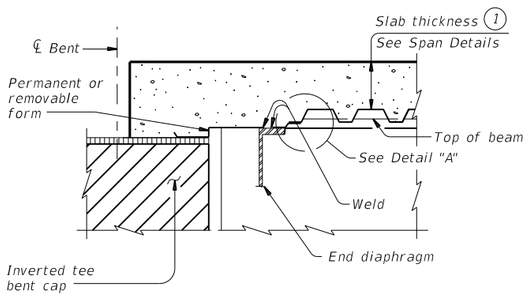
SECTION A-A



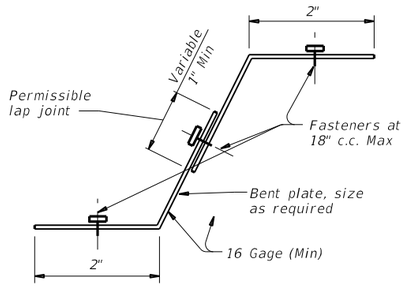
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



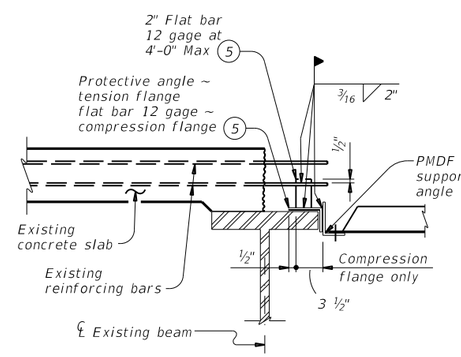
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

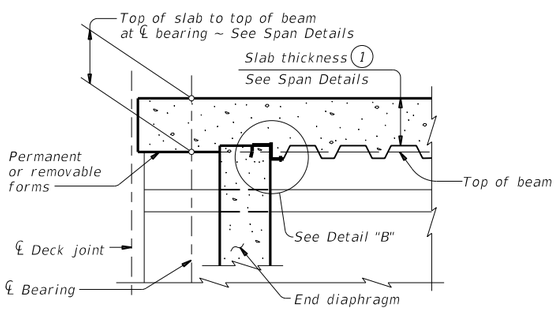


DETAIL "A"

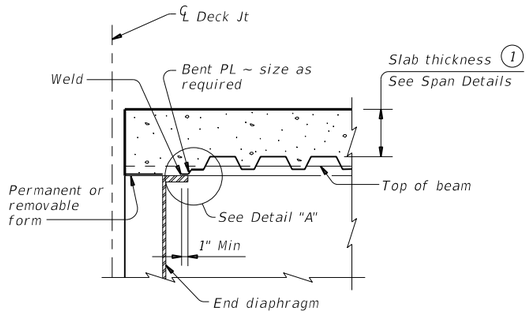


SHOWING STEEL BEAMS

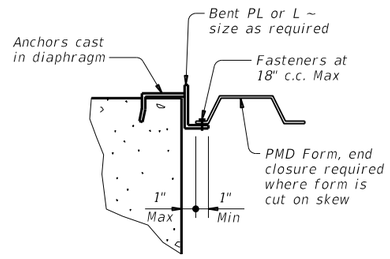
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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12-21: Updated max deflection for RR.	DAL	DALLAS		94

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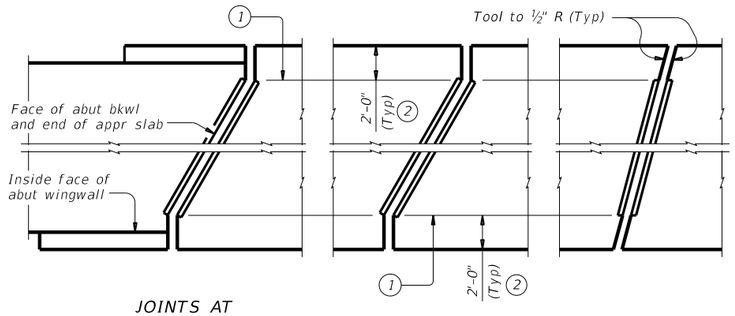
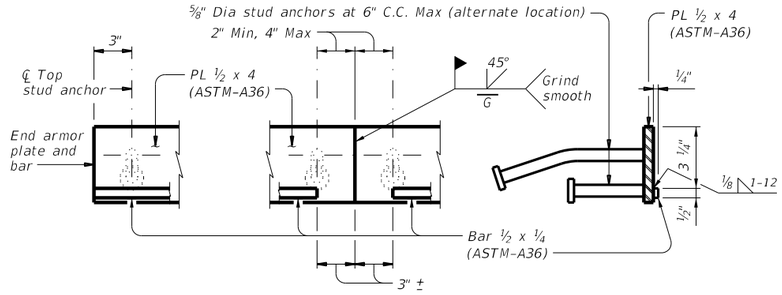


JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

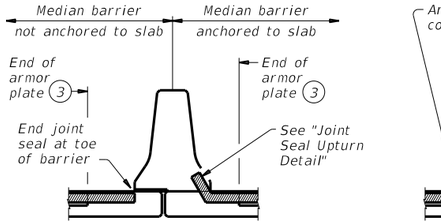
PLANS OF ARMOR PLATES



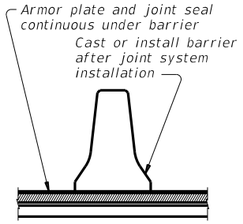
END VIEW | FIELD SPLICE | SECTION

(Studs are not shown for clarity.)

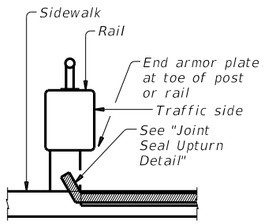
ELEVATION OF ARMOR PLATE



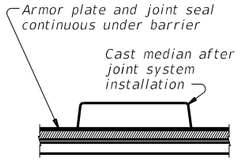
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



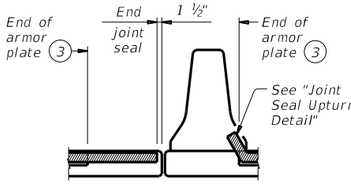
AT MEDIAN BARRIER



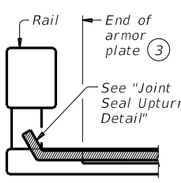
AT SIDEWALK BEHIND BRIDGE RAIL



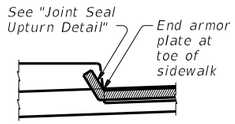
AT RAISED MEDIAN



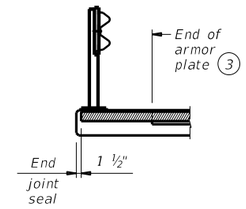
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

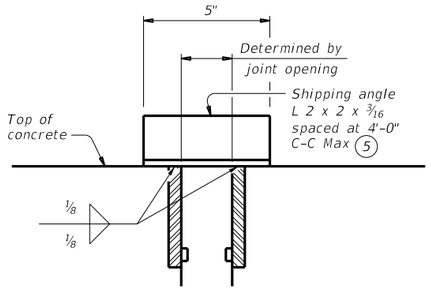


AT SIDEWALK



AT STEEL POST BRIDGE RAIL

TYPICAL SECTIONS OF ARMOR PLATES AND SEALS (4)

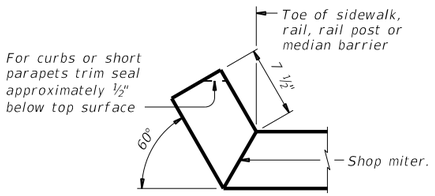


SHOWING ARMOR PLATE

(Studs not shown for clarity)

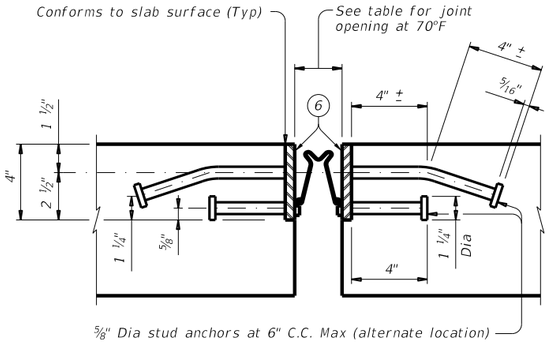
SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.



JOINT SEAL UPTURN DETAIL

Upturn seal only. Terminate armor plates as shown in "Plans of Armor Plates" and "Typical Sections of Armor Plates & Seals."



JOINT SECTION

Showing R J Watson strip seal. Other strip seals are similar.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (7)	STRIP SEAL 4" JOINT	
		Seal Type	Joint Opening (8)
D.S. Brown	As shown	V-400	2 ¼"
R.J. Watson	As shown	SF-400	2 ½"
SSI	As shown	SSS-400	2 ½"
Watson Bowman Acme	As shown	SPS-400	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE 4"
0	4.0"
15	4.0"
30	3.5"
45	2.8"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

1. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
2. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
3. See "Plans of Armor Plates".
4. Other conditions affecting the joint profile should be noted elsewhere.
5. Align shipping angle perpendicular to joint.
6. Coat with Manufacturer's supplied epoxy primer above bar before installing sealant.
7. Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
8. These openings are also the recommended minimum installation openings.

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

Splice and install seal in accordance with the Manufacturer's directions and with the adhesive provided by the Manufacturer.

Splice in joint seal may be performed in the field.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-B is 6 ½".

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Bridge Division Standard

SEALED EXPANSION JOINT TYPE B WITHOUT OVERLAY

SEJ-B

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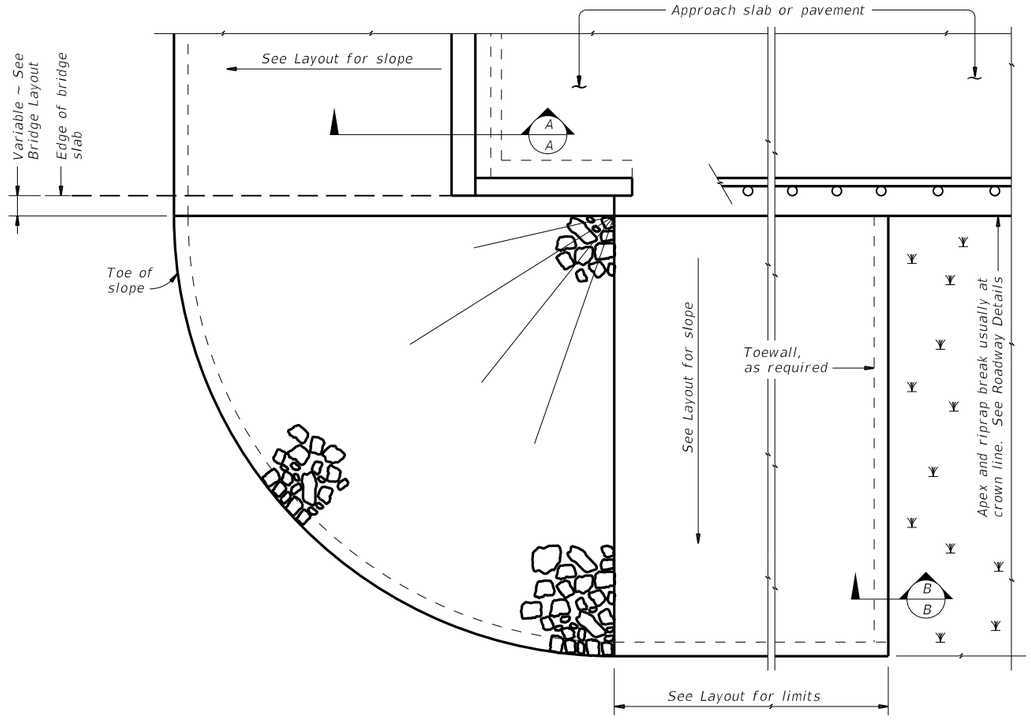
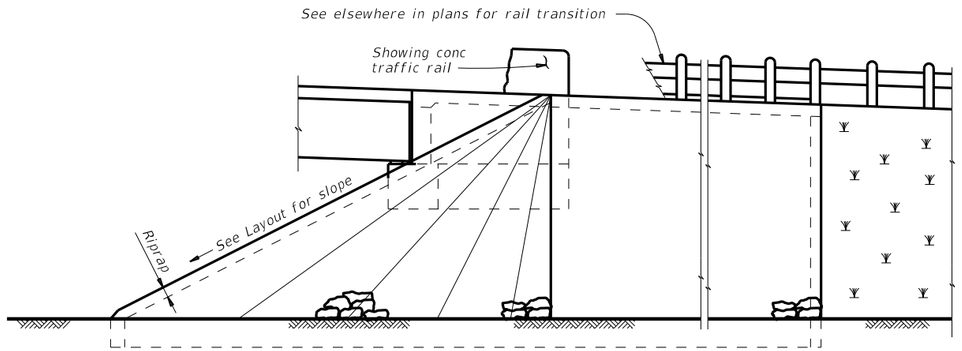
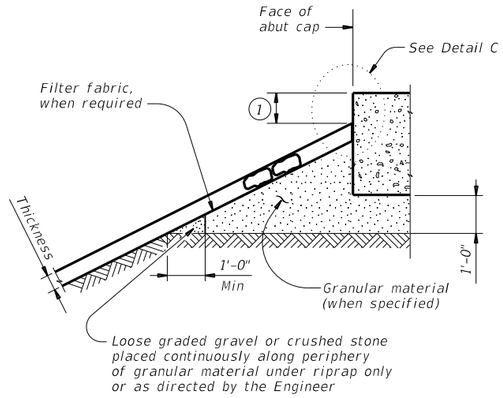


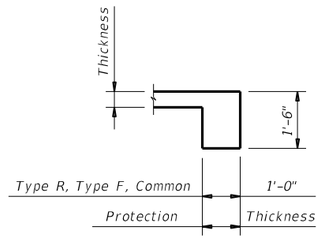
PLAN



ELEVATION

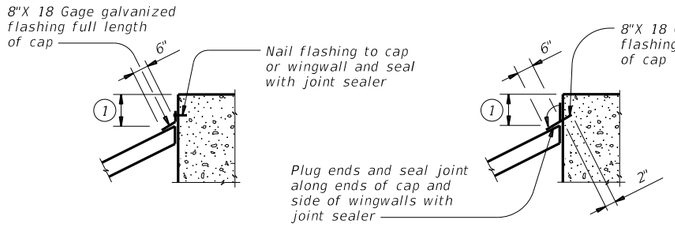


SECTION A-A AT CAP



SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C

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.

(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.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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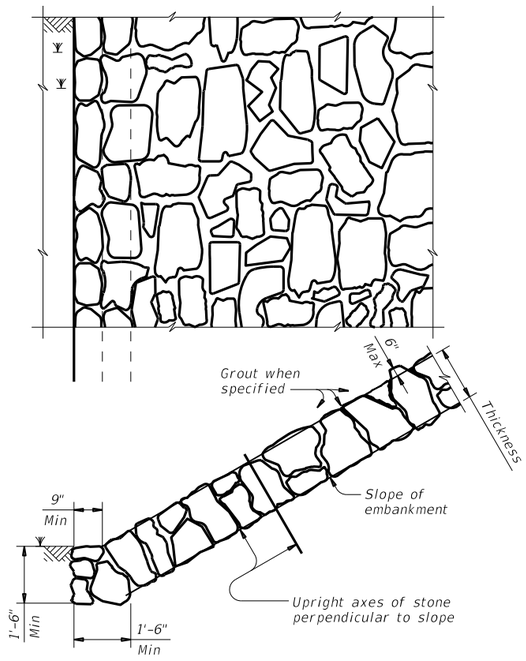


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

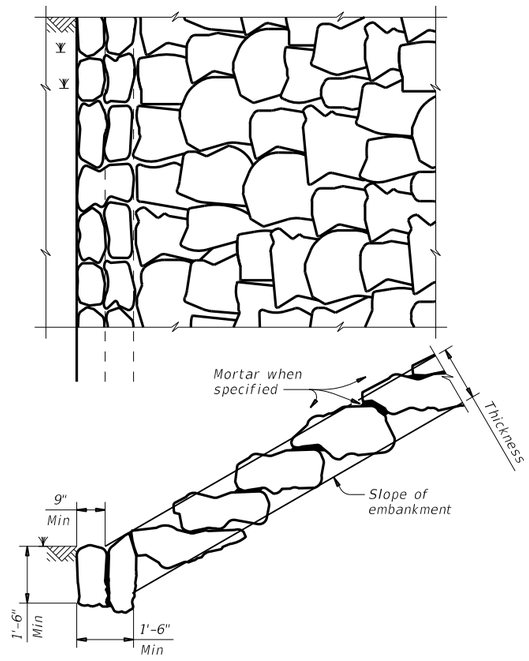


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

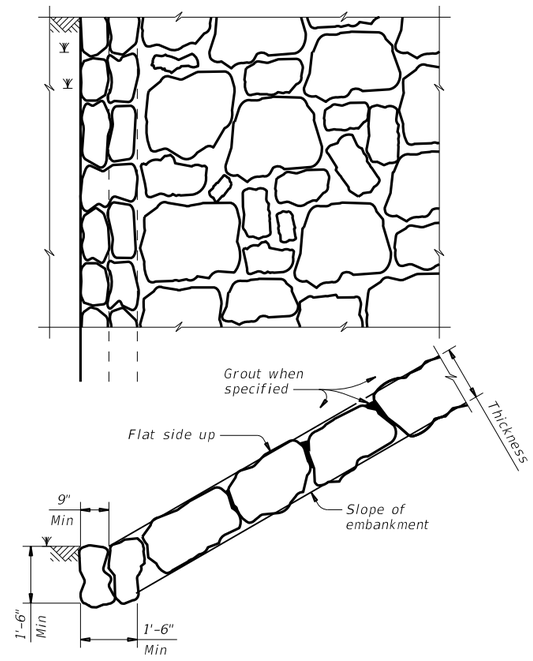
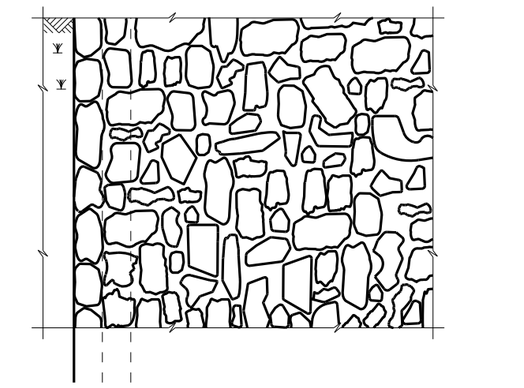
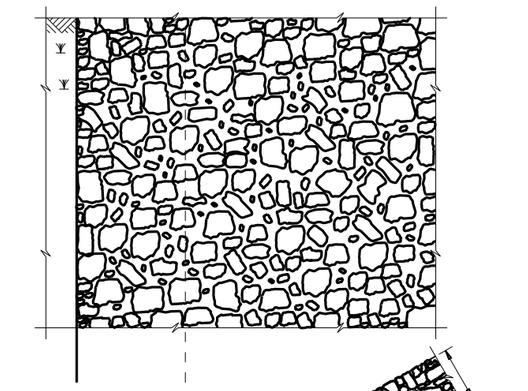


FIGURE 3 ~ TYPE F STONE RIPRAP
grouted





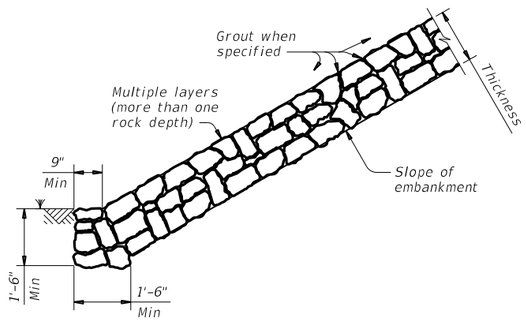


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

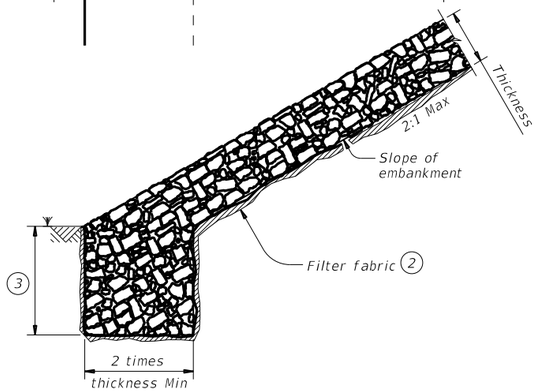


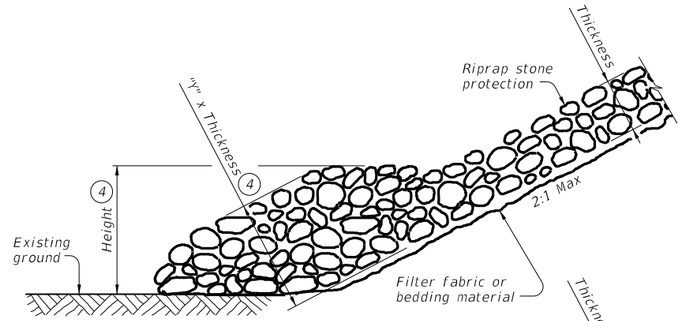
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

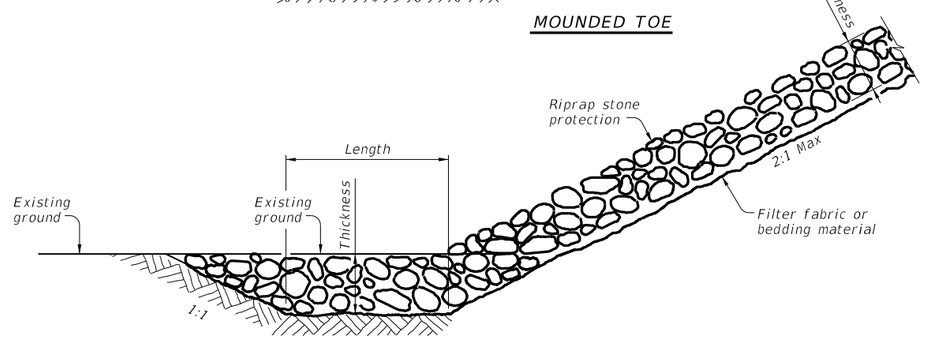
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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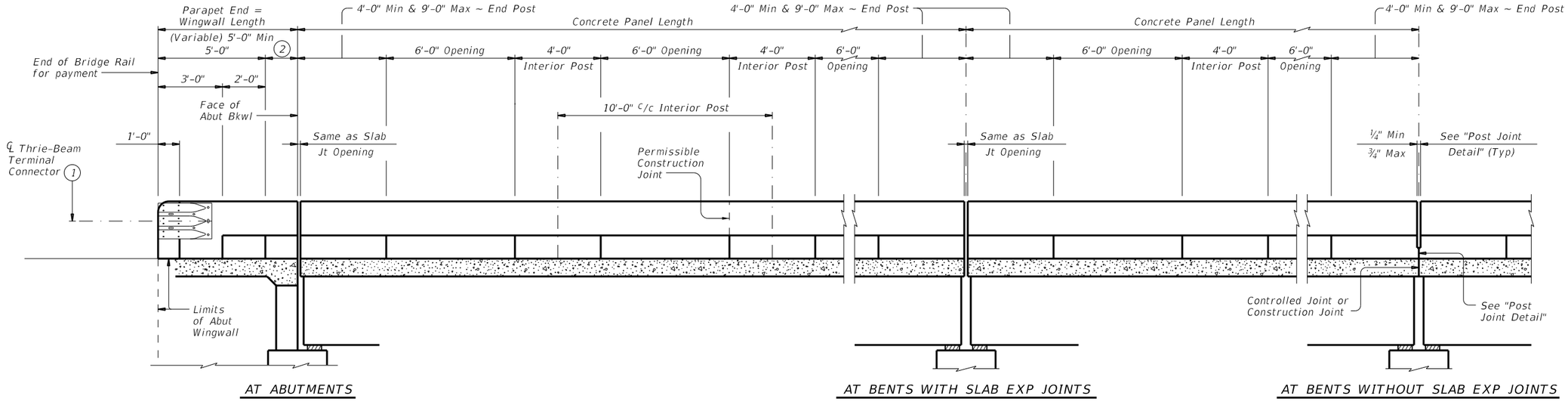
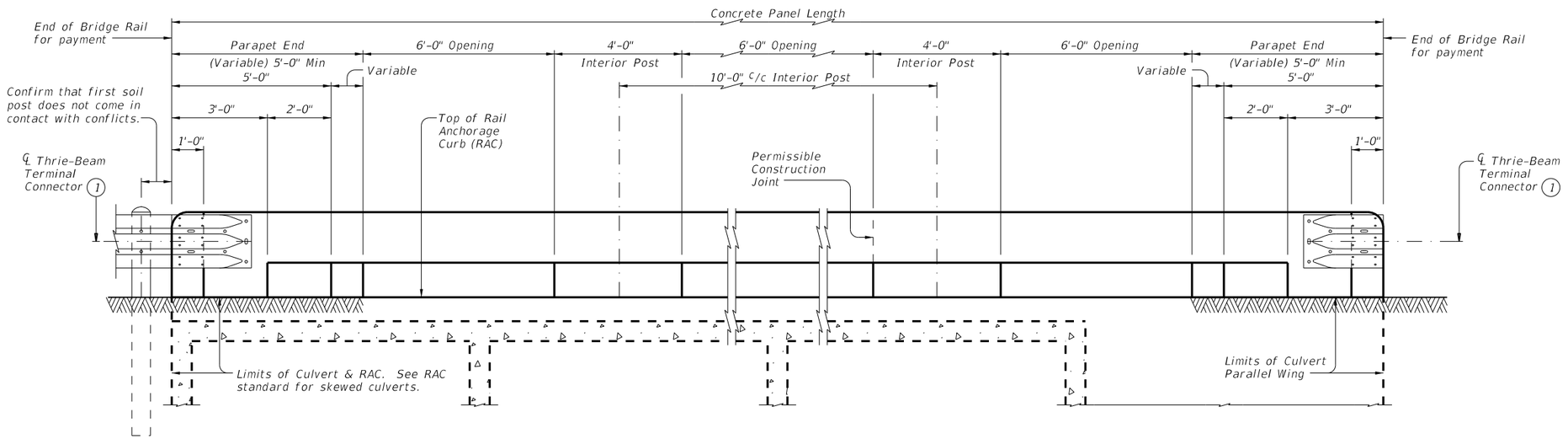


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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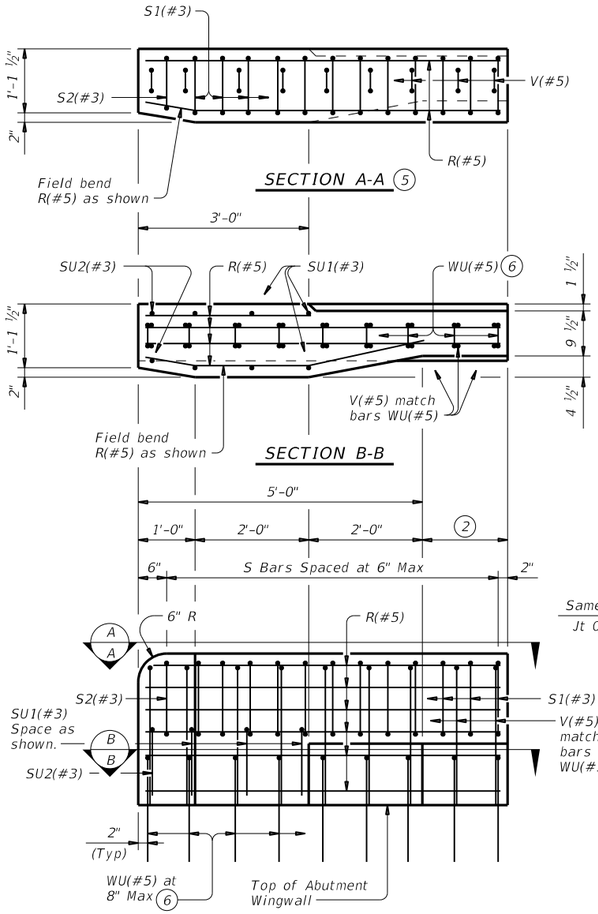
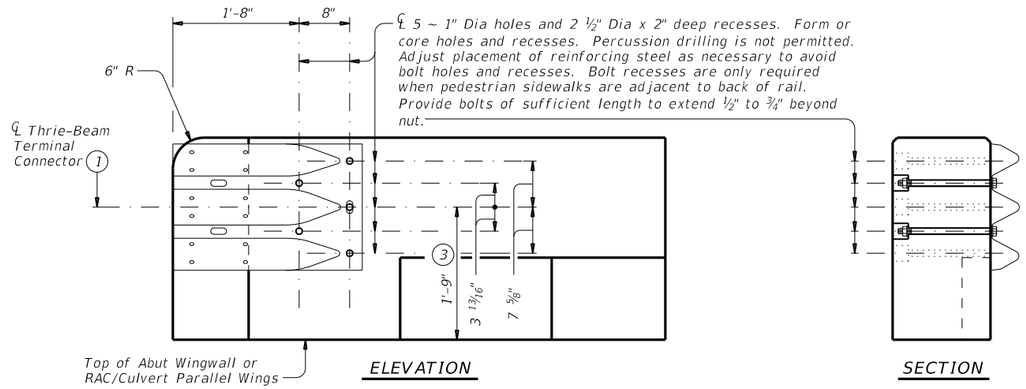
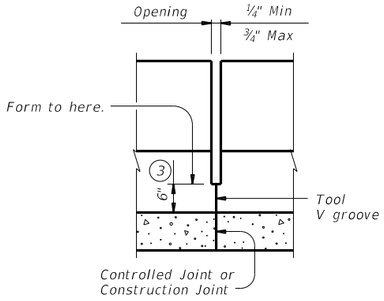


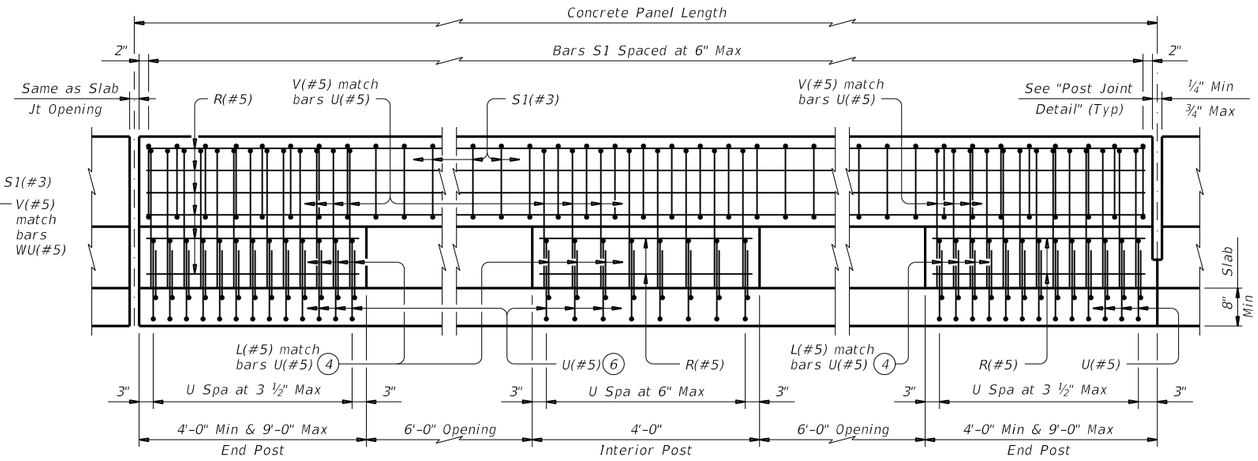


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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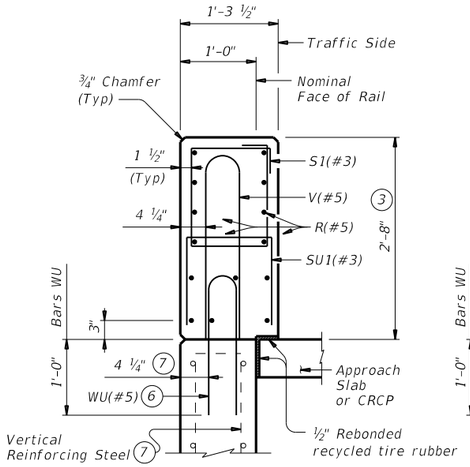
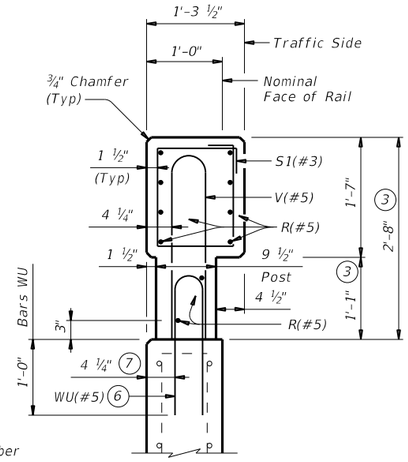
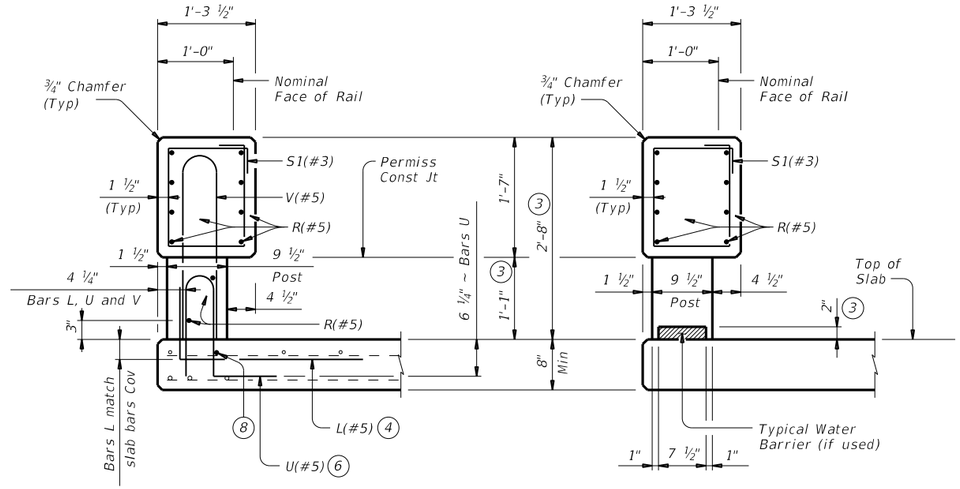


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

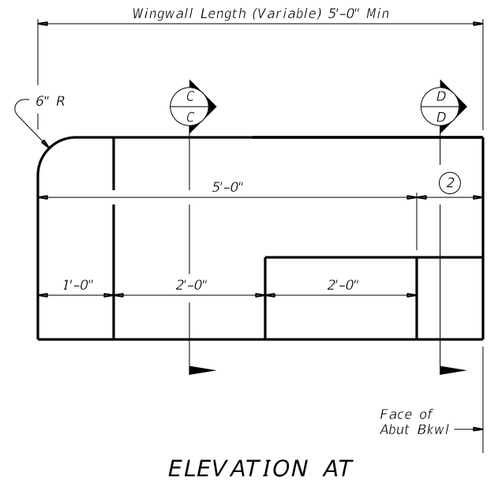


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) *Wingwall Length minus 5'-0" (Varies)*

(3) *Increase 2" for structures with overlay.*

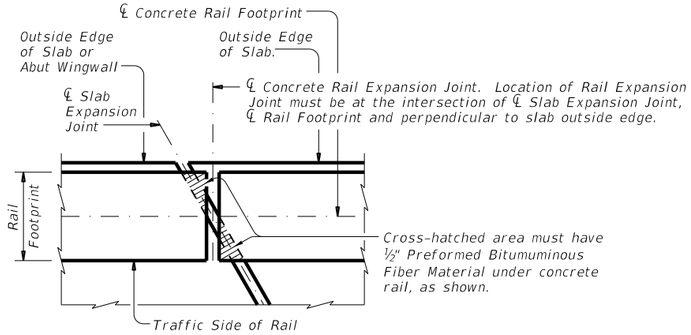
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(6) *Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.*

(7) *When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.*

(8) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(9) *At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.*



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

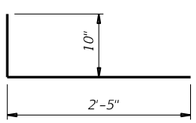
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

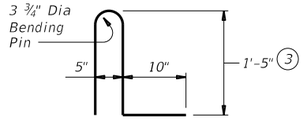
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

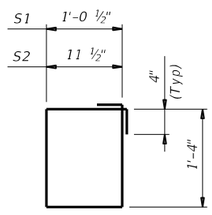
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



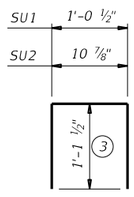
BARS L (#5)



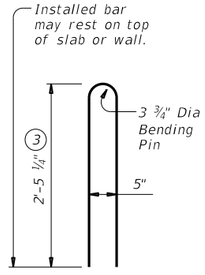
BARS U (#5) (9)



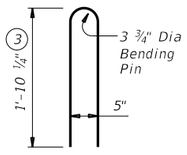
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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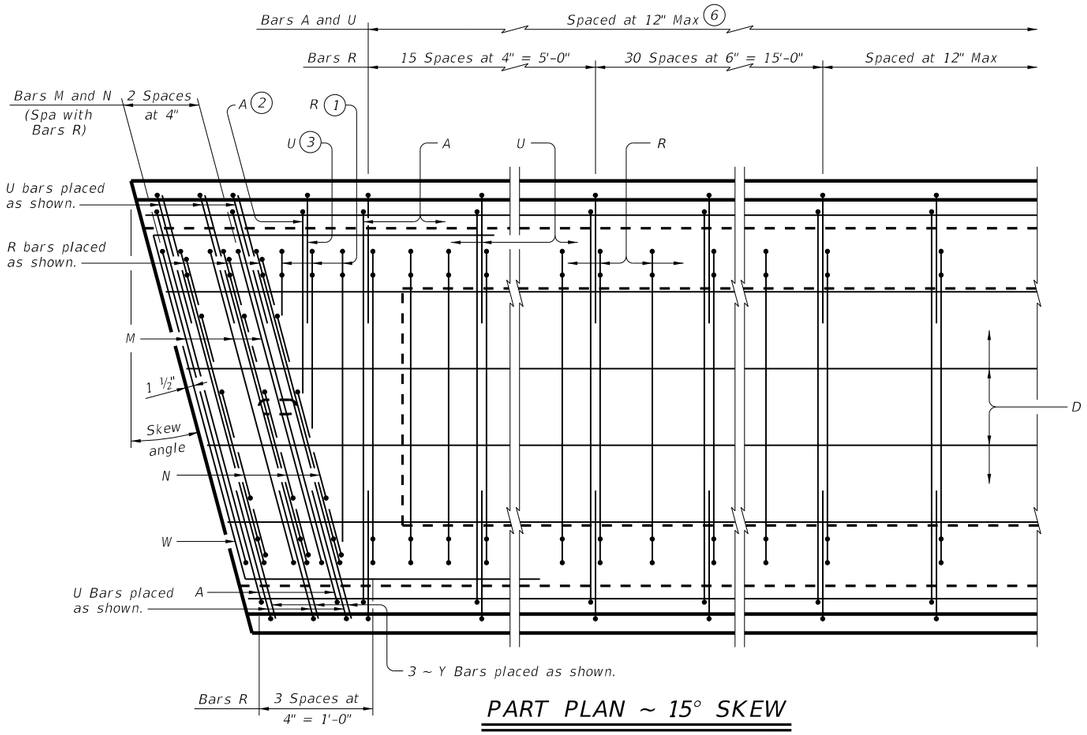
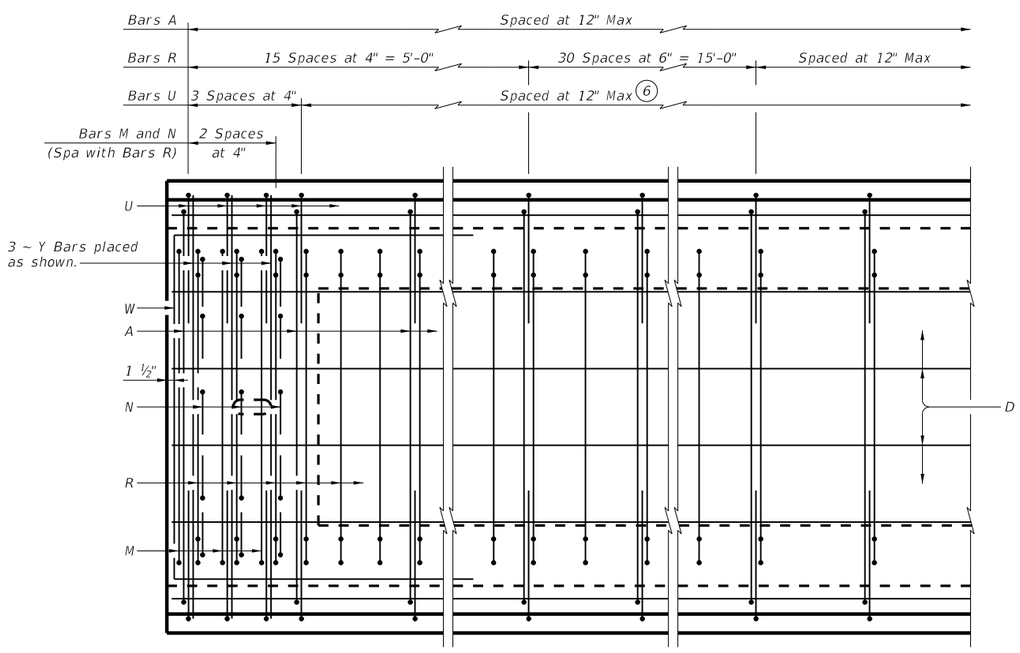


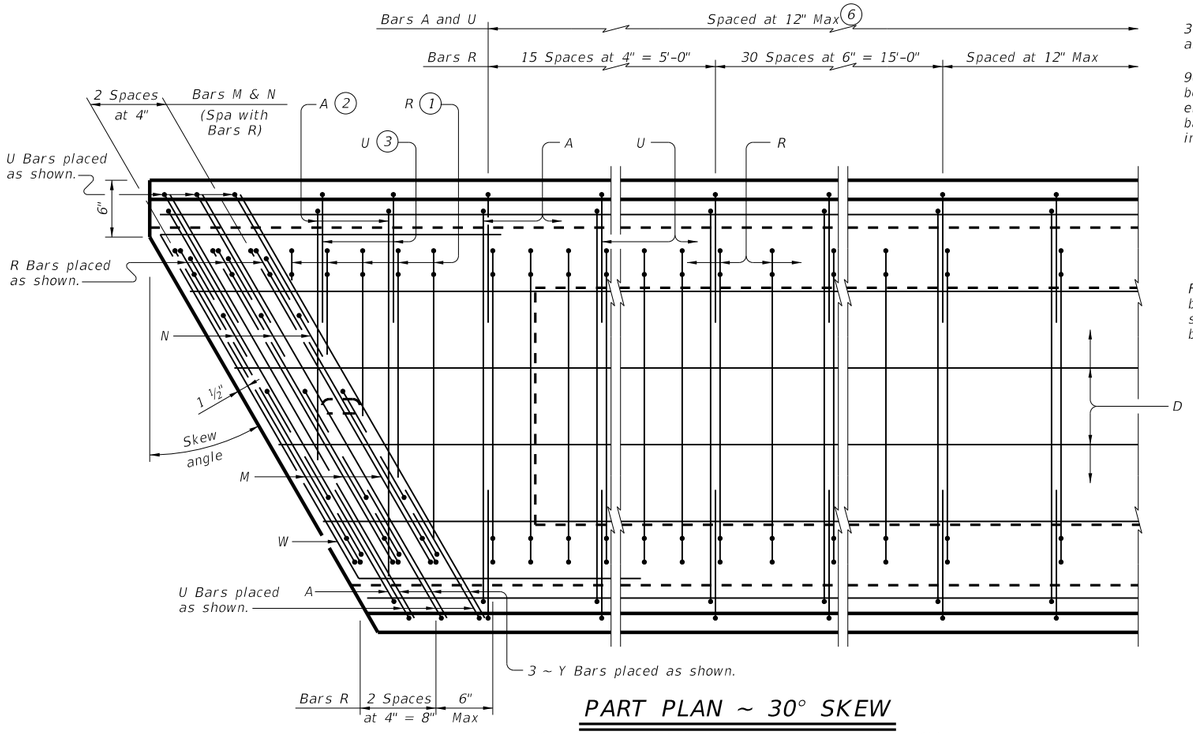
PART PLAN ~ 15° SKEW

(Showing Type 4XB20 with skew angles over 0° to 15°.)



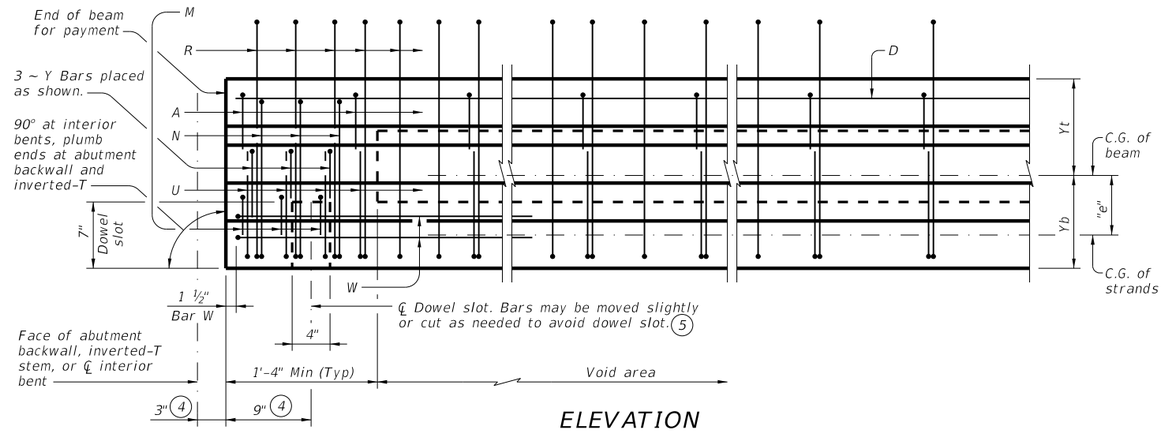
PART PLAN

(Showing Type 4XB20.)



PART PLAN ~ 30° SKEW

(Showing Type 4XB20 with skew angles over 15° to 30°.)



ELEVATION

HL93 LOADING

1. Bars R spaced at 4" Max. Cut Bars R as necessary to provide 2" clear between adjacent bars as shown.
2. Bars A spaced with Bars U. Cut Bars A as necessary to provide 2" clear between adjacent bars as shown.
3. Bars U spaced at 8" Max as shown.
4. Measured perpendicular to ℄ interior bents, abutment backwall, or inverted-T stem.
5. ℄ 4" x 1 ½" Vertical slotted hole at doweled beam end (labeled [D] on Bridge Layout.) Required for outside beam only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅜") at base. If holes are formed with sheet metal, forms may be left in place.
6. Terminate Bars U 5' from beam ends or 3' beyond the last debonded strands, whichever is greater.

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS

(TYPE XB20)

XB20

FILE: XB20-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		101

DATE: 9/29/2023 3:25:11 PM
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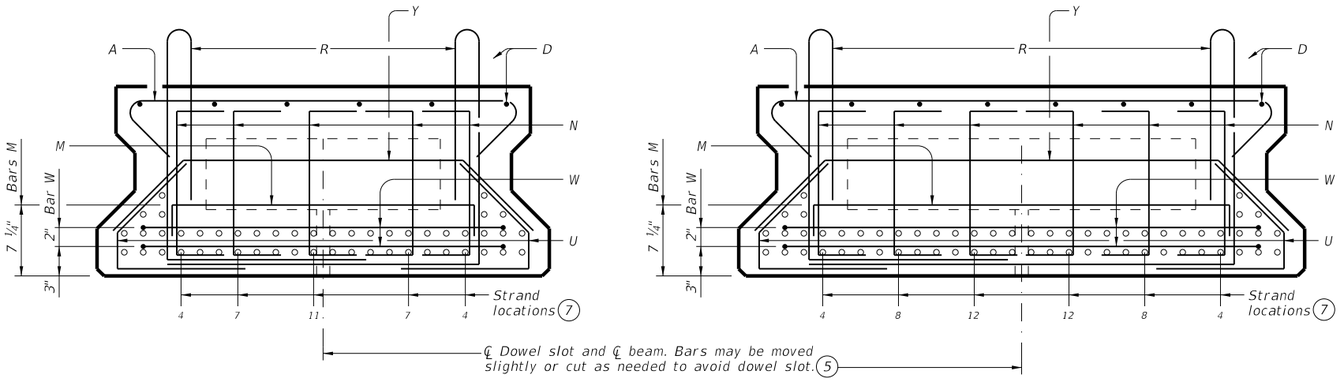
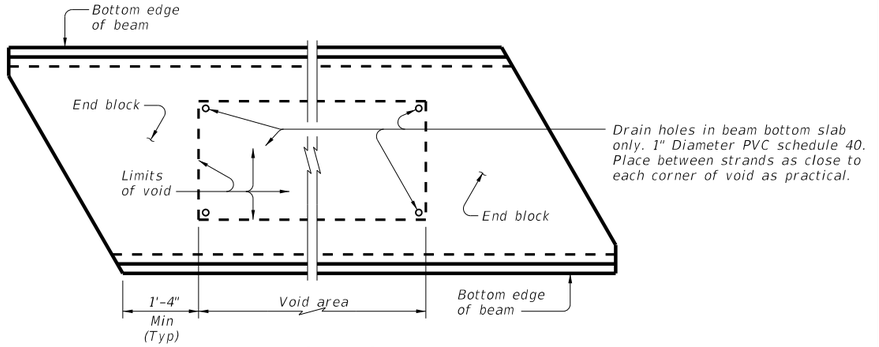


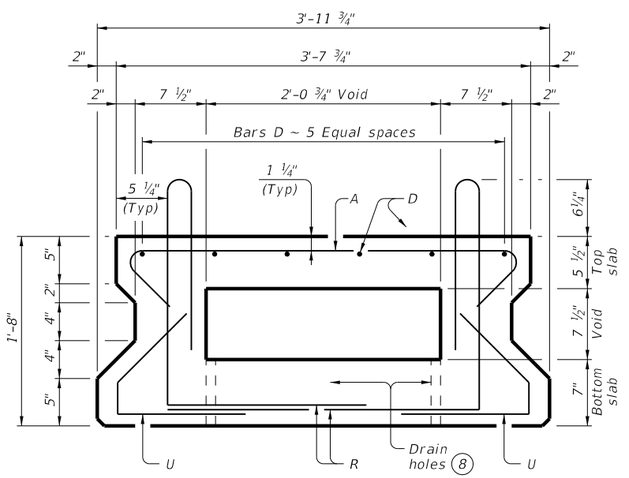
END BLOCK SECTION ~ TYPE 4XB20

END BLOCK SECTION ~ TYPE 5XB20

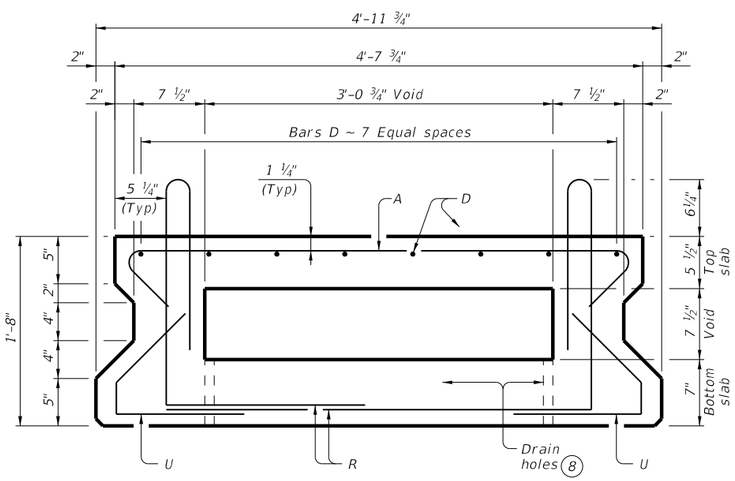


PLAN OF VOID

(Showing 30° skew.)



TYPICAL SECTION ~ TYPE 4XB20



TYPICAL SECTION ~ TYPE 5XB20

(5) ℄ 4" x 1 ½" Vertical slotted hole at doweled beam end (labeled [D] on Bridge Layout.) Required for outside beam only or as shown on substructure details. Anchorage hole may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

(7) See Prestressed Concrete X-Beam Designs (Non-Standard Spans) (XBND) standard or the appropriate Prestressed Concrete X-Beam Standard Designs (XBSD-##) standard sheet for locations of pretensioning strands.

(8) Drain holes 1" diameter PVC schedule 40 pipe as shown between strands in all beam void corners. See "Plan of Void."

(9) Based on 155 pcf weight density of concrete. Weight of end blocks is not included.

BEAM PROPERTIES

		Type 4XB20	Type 5XB20
Area	in^2	689	839
Y Top	in	10.47	10.47
Y Bottom	in	9.53	9.53
I	in^4	29,124	36,621
Weight (9)	lb/ft	742	903

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS

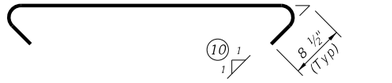
(TYPE XB20)

XB20

FILE: XB20-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		102

DATE:
FILE:

Type 4XB20	3'-5 ¼"	Normal
Type 5XB20	4'-5 ¼"	Normal
Type 4XB20	3'-5 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	4'-5 ¼" ÷ Cos skew	At Skewed Beam Ends

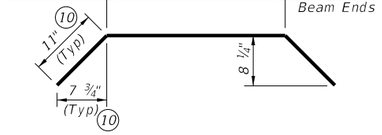


BARS A (#4)

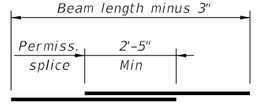
Type 4XB20	2'-9 ¼"	Normal
Type 5XB20	3'-9 ¼"	Normal
Type 4XB20	2'-9 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-9 ¼" ÷ Cos skew	At Skewed Beam Ends

BARS M (#5)

Type 4XB20	2'-4 ¼"	Normal
Type 5XB20	3'-4 ¼"	Normal
Type 4XB20	2'-4 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-4 ¼" ÷ Cos skew	At Skewed Beam Ends

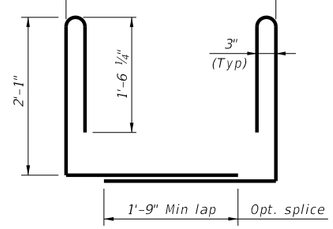


BARS Y (#5)

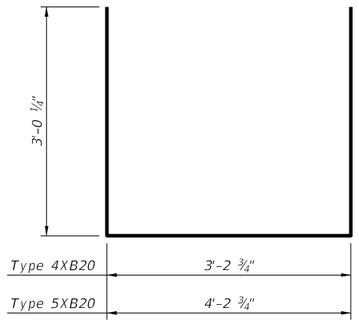


BARS D (#5)
(Place splices in middle third of span.)

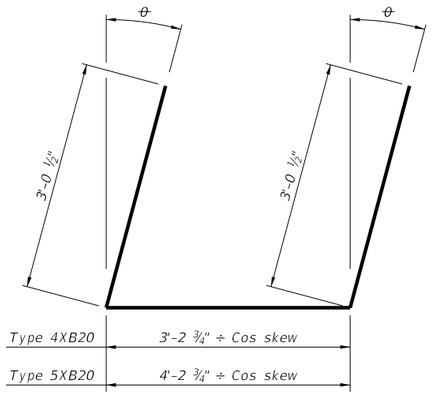
Type 4XB20	2'-9 ¼"	Normal
Type 5XB20	3'-9 ¼"	Normal
Type 4XB20	2'-9 ¼" ÷ Cos skew	At Skewed Beam Ends
Type 5XB20	3'-9 ¼" ÷ Cos skew	At Skewed Beam Ends



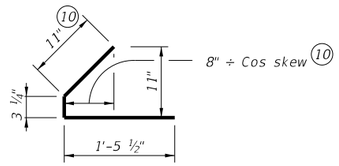
BARS R (#4)



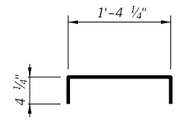
BARS W (#5)
(For square beam ends)



BARS W (#5)
(For skewed beam ends)



BARS U (#4)



BARS N (#4)

10 Dimension will vary slightly with skew. Adjust as necessary.

MATERIAL NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed welded wire reinforcement (WWR) (ASTM A1064) may be substituted for all or some of Bars A, D, R, and U.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two-stage monolithic casting is required when conventional concrete is used. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
When approved by the Engineer, self-consolidating concrete may be placed in a one-stage monolithic casting.
1 ¼" clear cover to reinforcement is required unless noted otherwise.
These details are applicable for skews up to 30 degrees only.
Chamfer bottom beam corners ¾" or round to a ¾" radius.
Punch through all drain holes, removing any blockage, before beams are shipped.

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

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE X-BEAM DETAILS
(TYPE XB20)

XB20

FILE: XB20-22.dgn		DN: JMH	CK: TAR	DW: JER	CK: TAR		
©TxDOT August 2022		CONT	SECT	JOB		HIGHWAY	
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		DAL	DALLAS			103	

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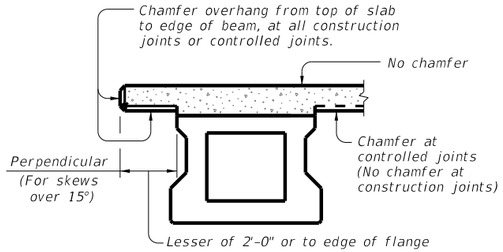
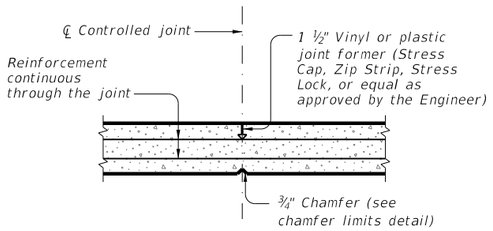
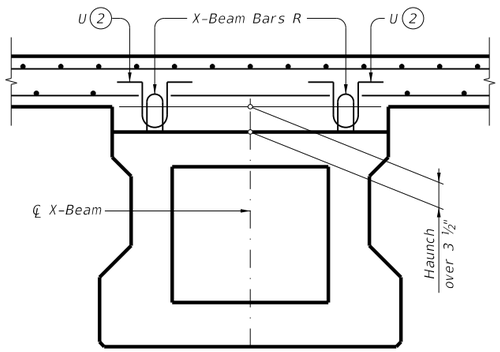


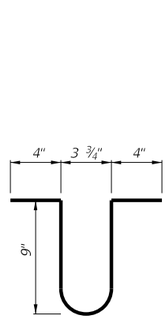
CHAMFER LIMITS DETAIL (1)



CONTROLLED JOINT DETAIL

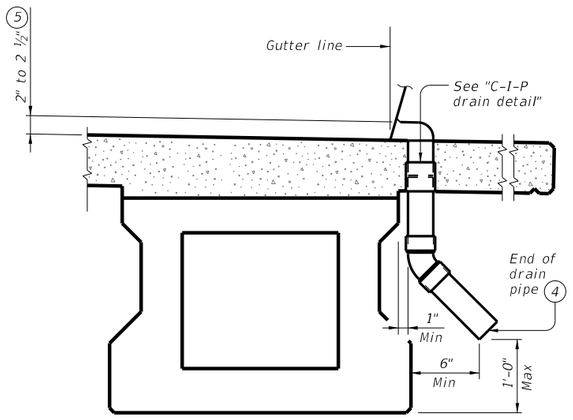
(Saw-cutting is not allowed)



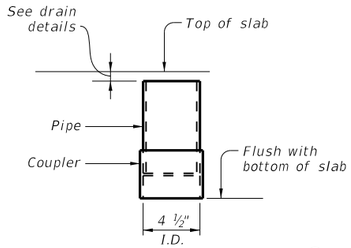


BARS U (#4)

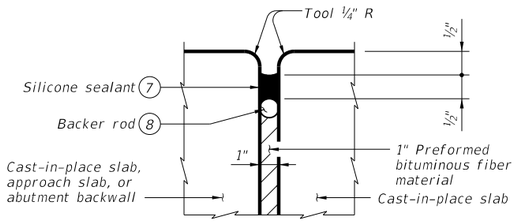
HAUNCH REINFORCING DETAIL



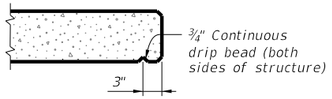
DRAIN DETAIL (6)



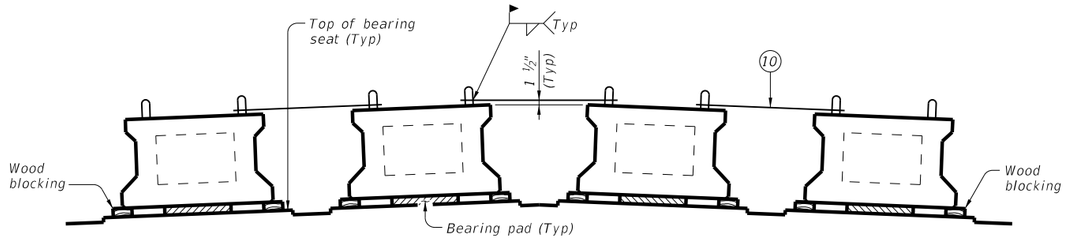
C-I-P DRAIN DETAIL (3)



TYPE A JOINT DETAIL (9)

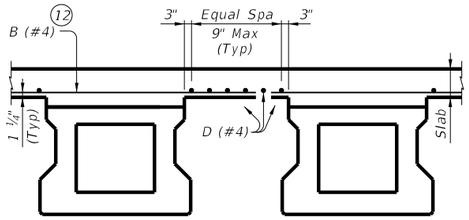


DRIP BEAD DETAIL



MINIMUM BEAM BLOCKING & BRACING DETAIL

Provide blocking at both sides of all beam ends supported by one bearing pad. Leave blocking in place for at least 4 days after slab is cast and afterwards remove at the Contractor's convenience.



TYPICAL TRANSVERSE SLAB SECTION WITHOUT PCP (11)

Top reinforcing steel not shown for clarity.

(1) See span details for type of joint and joint locations.

(2) Space Bars U with beam Bars R in all areas where measured haunch exceeds 3 ½".

(3) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

(4) Water may not be discharged onto beams.

(5) Drain entrance formed in rail or sidewalk.

(6) All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481, "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside beam face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

(7) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(8) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(9) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

(10) Weld a (#5) bar at each beam end as shown immediately after erection and prior to PCP placement. These bars are in addition to slab reinforcement.

(11) Provide Grade 60 reinforcing steel. Provide laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

(12) Bars B (#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor may end alternating Bars B (#4) at centerline outside girder.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Specifications.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, joint formers, etc.) shown on this sheet are subsidiary to other bid items.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems and/or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

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

MINIMUM ERECTION AND BRACING REQUIREMENTS WITH MISC. SLAB DETAILS

PRESTRESSED CONCRETE X-BEAMS

XBBR-MS

FILE: XBBRMS-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
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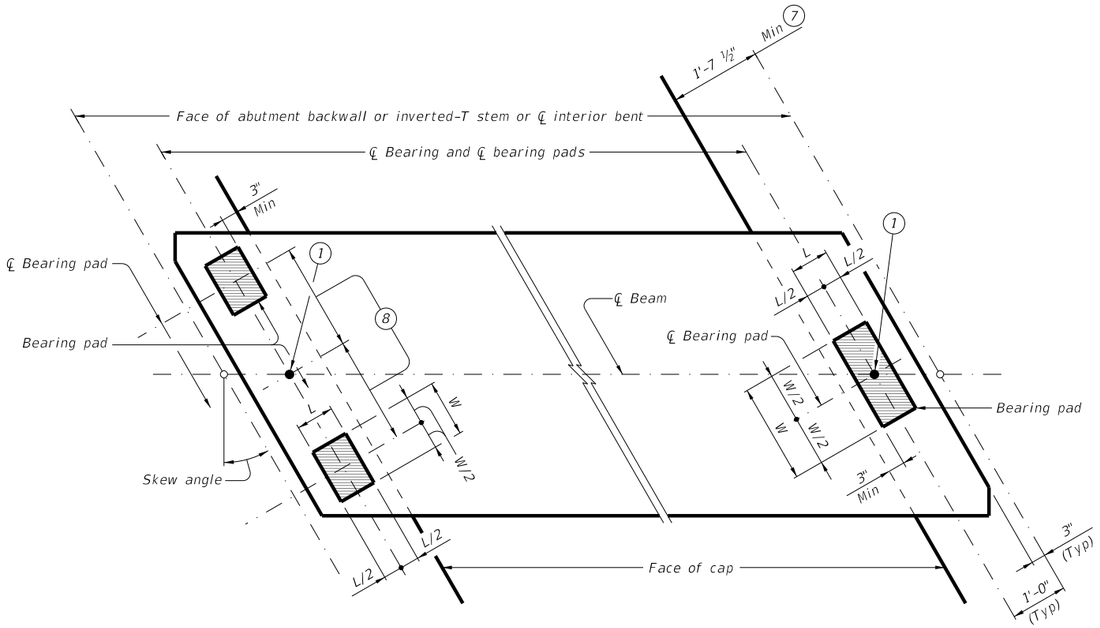
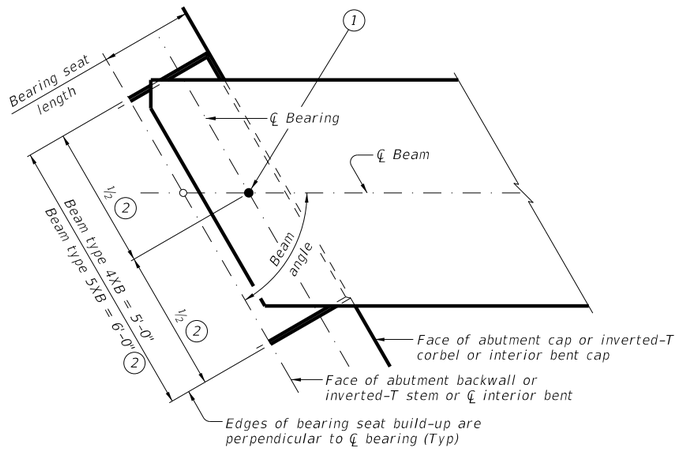


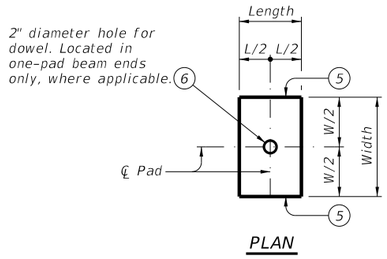
BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.

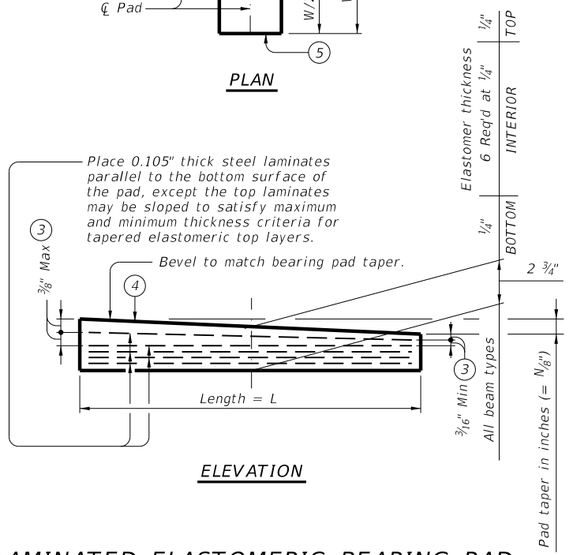


BEARING SEAT DIMENSIONS

Used when shown on abutment and/or bent details.



PLAN



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

TABLE OF BEARING PAD DIMENSIONS

BEARING TYPE (4)	BEAM TYPE	ONE PAD		TWO PADS	
		L	W	L	W
XB20-"N"	4XB20	7"	18"	7"	9"
	5XB20	7"	18"	7"	9"
XB28-"N"	4XB28	7"	18"	7"	10"
	5XB28	7"	18"	7"	10"
XB34-"N"	4XB34	7"	21"	7"	11"
	5XB34	7"	21"	7"	11"
XB40-"N"	4XB40	7"	21"	7"	12"
	5XB40	7"	21"	7"	12"

(1) Dowel at doweled beam end [labeled (D) on Bridge Layout.] Required for outside beam only or as shown on substructure details.

(2) Measured along ℄ of bearing.

(3) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(4) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. Include the value of "N" (amount of taper in 1/8" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" 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.

(5) Locate permanent mark here.

(6) Provide 2" diameter hole only at locations required. See substructure details for location.

(7) Minimum dimension required for the bearings shown on this standard.

(8) 4XB beams = 1'-2" along ℄ bearing (Typ.)
5XB beams = 1'-8" along ℄ bearing (Typ.)

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal ℄ bearing as possible within limits shown.

Constant thickness bearings may be used for moderate pad tapers up to 0.008 ft/ft.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. Provide copy of the bearing layout to the Engineer.

See Bearing Pad Taper Report sheet for Fabricator's Report of bearing pad taper.

Cost of furnishing and installing elastomeric bearings is to be included in unit price bid for "Prestressed Concrete X-Beams."

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS
PRESTRESSED CONCRETE X-BEAMS

XBEB

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©TxDOT August 2022 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DAL	DALLAS		105

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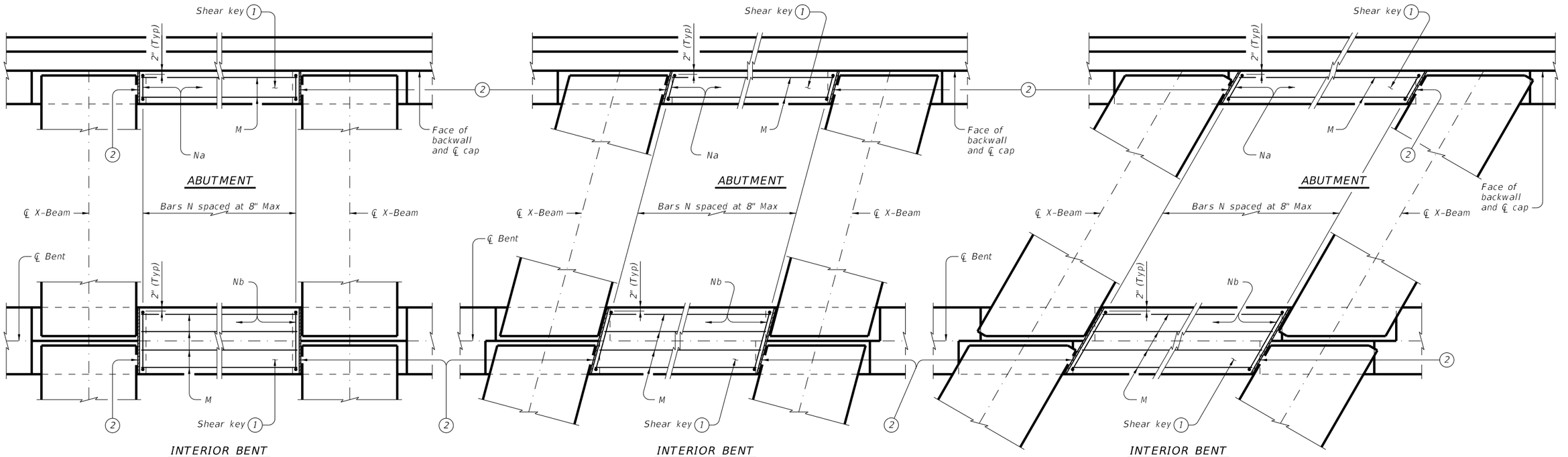


PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps.

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps.

PARTIAL PLANS WITH 30° SKEW

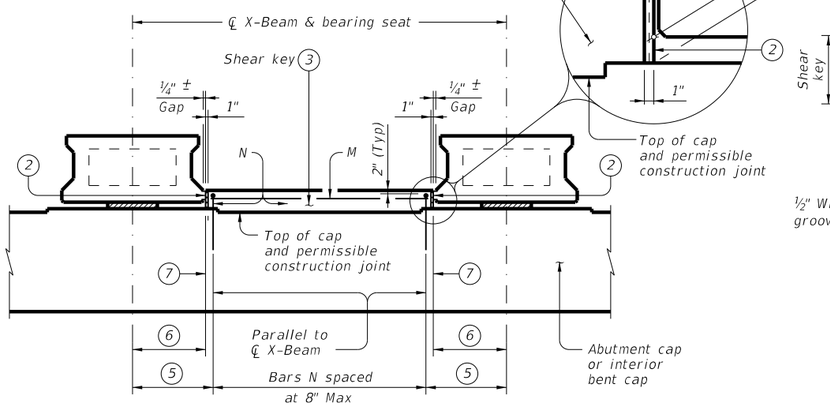
Showing shear keys on 3'-6" wide caps.

(1) Place shear keys on the upstream side of structure between outside beam and next adjacent beam, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad (Typ.)

(3) Leave a ¼" gap plus or minus between beam and face of wear pad. Cast wear pad with shear key, smooth side facing beam. Care must be taken to keep concrete from flowing under beam. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.



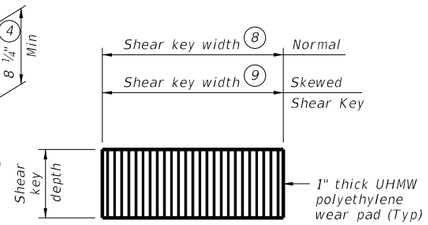
PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

Showing shear key with beam Type 5XB28.
Other XB beam types similar.

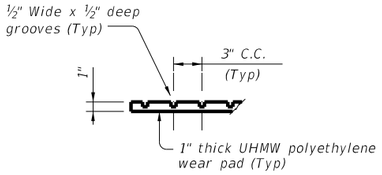
(5) With no skew = 2'-10", measured along ℄ cap.
With skew = 2'-10" ÷ Cos skew, measured along ℄ cap.

(6) With no skew = 2'-6 ¼", measured along ℄ cap.
With skew = 2'-6 ¼" ÷ Cos skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of polyethylene wear pad facing beam.

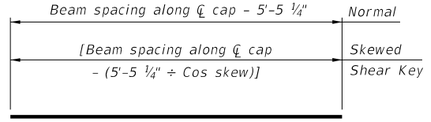


ELEVATION

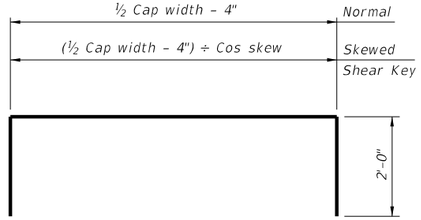


PART SECTION

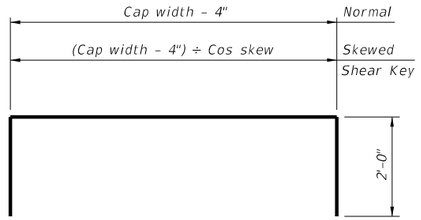
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

(8) Abutments = ½ cap width.
Interior bents = cap width.

(9) Abutments = ½ cap width ÷ Cos skew.
Interior bents = cap width ÷ Cos skew.

CONSTRUCTION NOTES:

Provide Class C concrete (f'c = 3,600 psi.) Provide Class C (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 30 degrees and less.
This standard is only applicable for 5XB X-Beams.
Modify details for bearing conditions, beam type, and beam spacing not shown on this standard. Details do not account for pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class C concrete.

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

Texas Department of Transportation

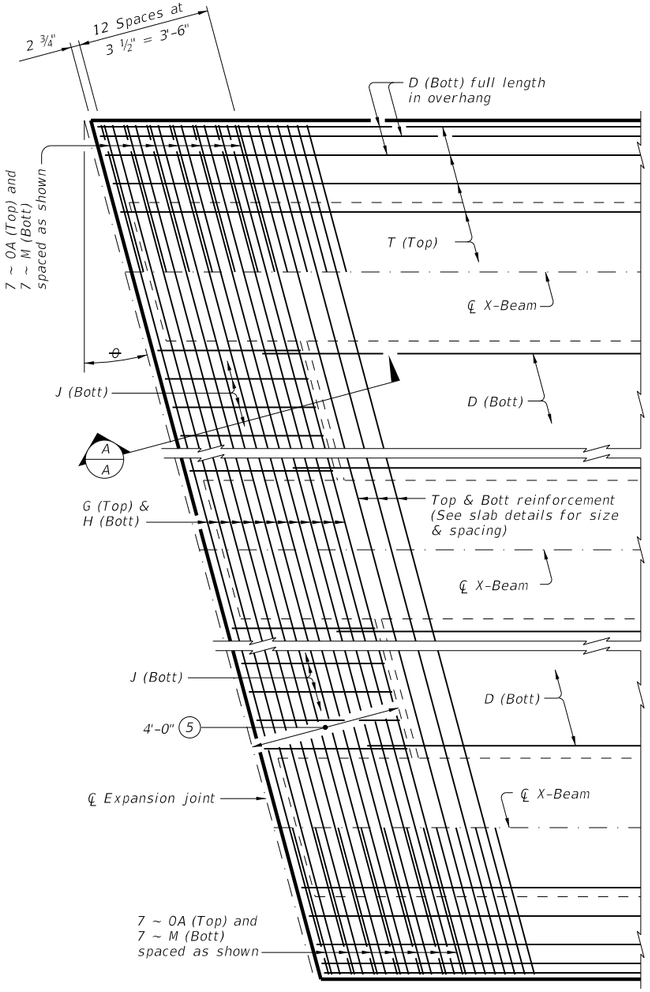
Bridge Division Standard

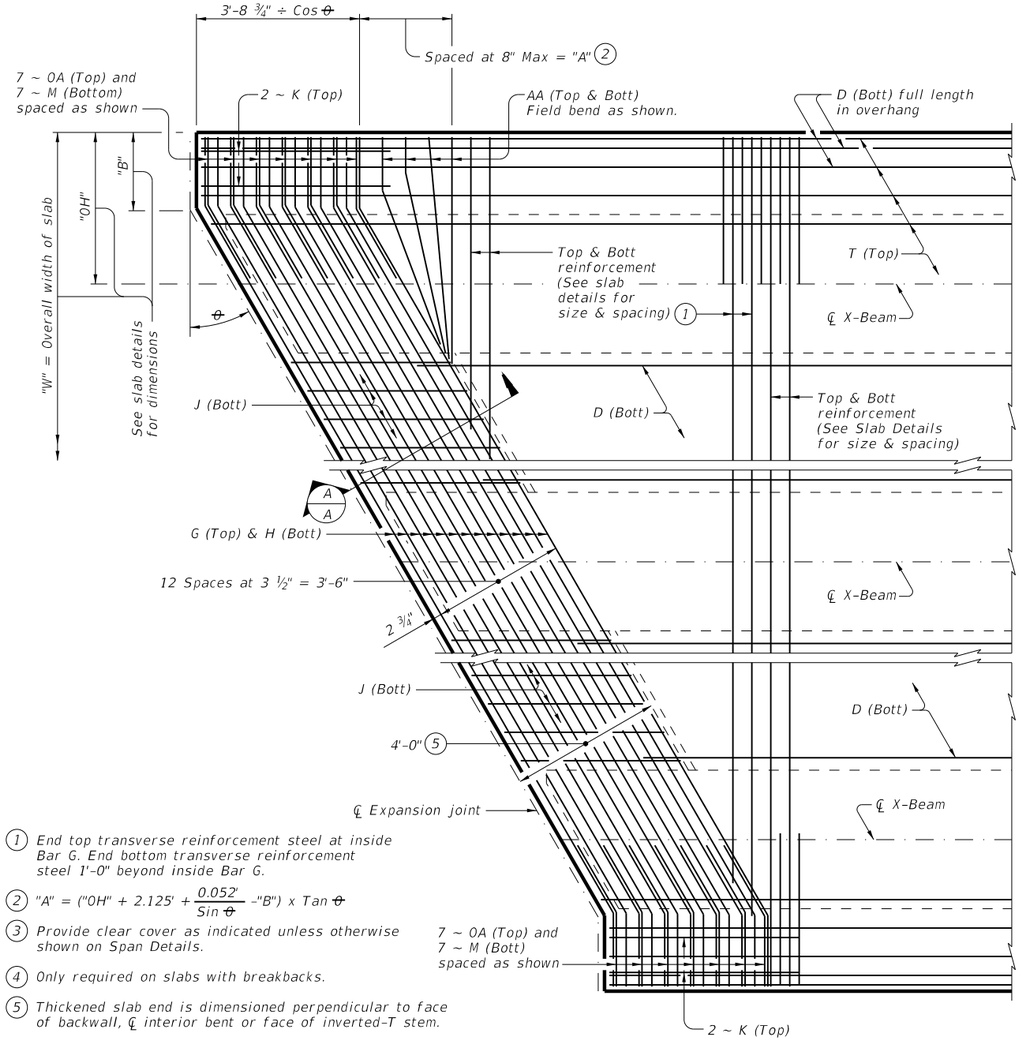
SHEAR KEY DETAILS
PRESTRESSED CONCRETE X-BEAMS

XBSK

FILE: XBSK-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		106

DATE: 9/29/2023 3:25:58 PM
FILE: c:\pwworkingdir\ltroengineers-pw.bentley.com_ltroengineers-pw-01\dmu@ltroengineers.com\D0cuments\xbts-22.dgn





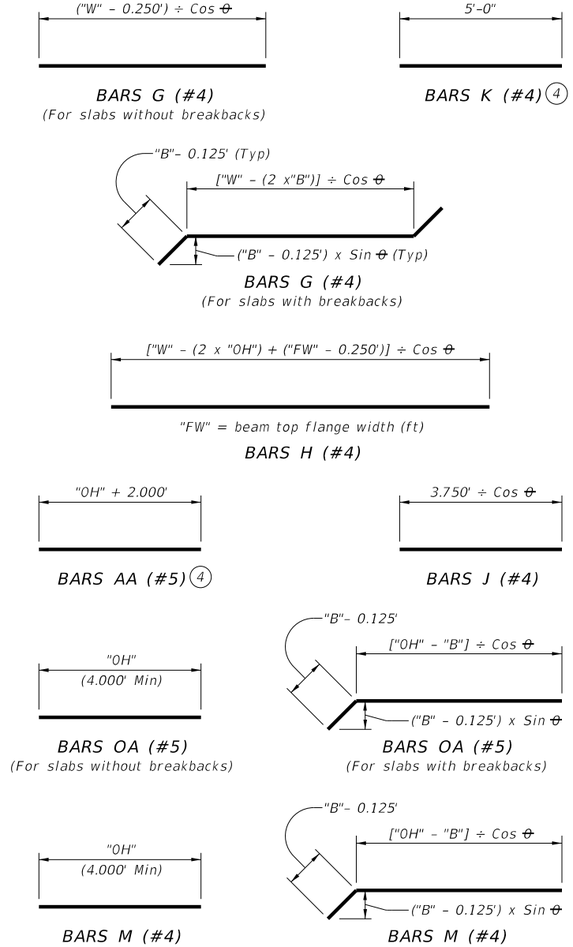
(1) End top transverse reinforcement steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) $"A" = ("0H" + 2.125' + \frac{0.052'}{\sin\theta} - "B") \times \tan\theta$

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

(5) Thickened slab end is dimensioned perpendicular to face of backwall, ℄ interior bent or face of inverted-T stem.



MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel on the slab details is shown to be epoxy coated, then Bars AA, G, K, H, J, M, and 0A must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7" Epoxy Coated ~ #4 = 2'-5"

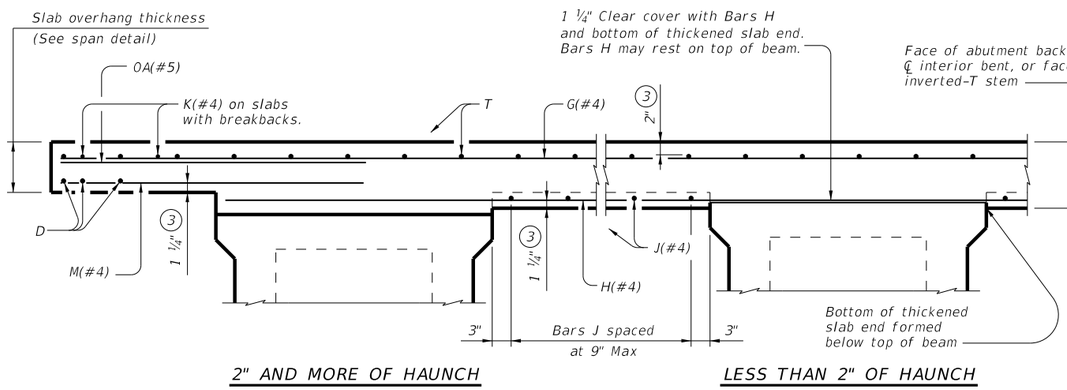
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete X-Beam Spans.
Use these details in conjunction with the span details and Prestressed Concrete Panels (PCP) standard (if prestressed conc. panels are used).

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

HL93 LOADING

PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



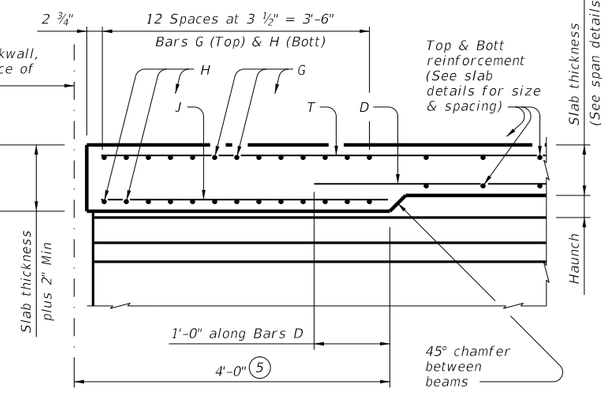
2" AND MORE OF HAUNCH

LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing prestressed concrete X-Beams at ℄ bearing)

PARTIAL PLAN FOR SLABS WITH BREAKBACK



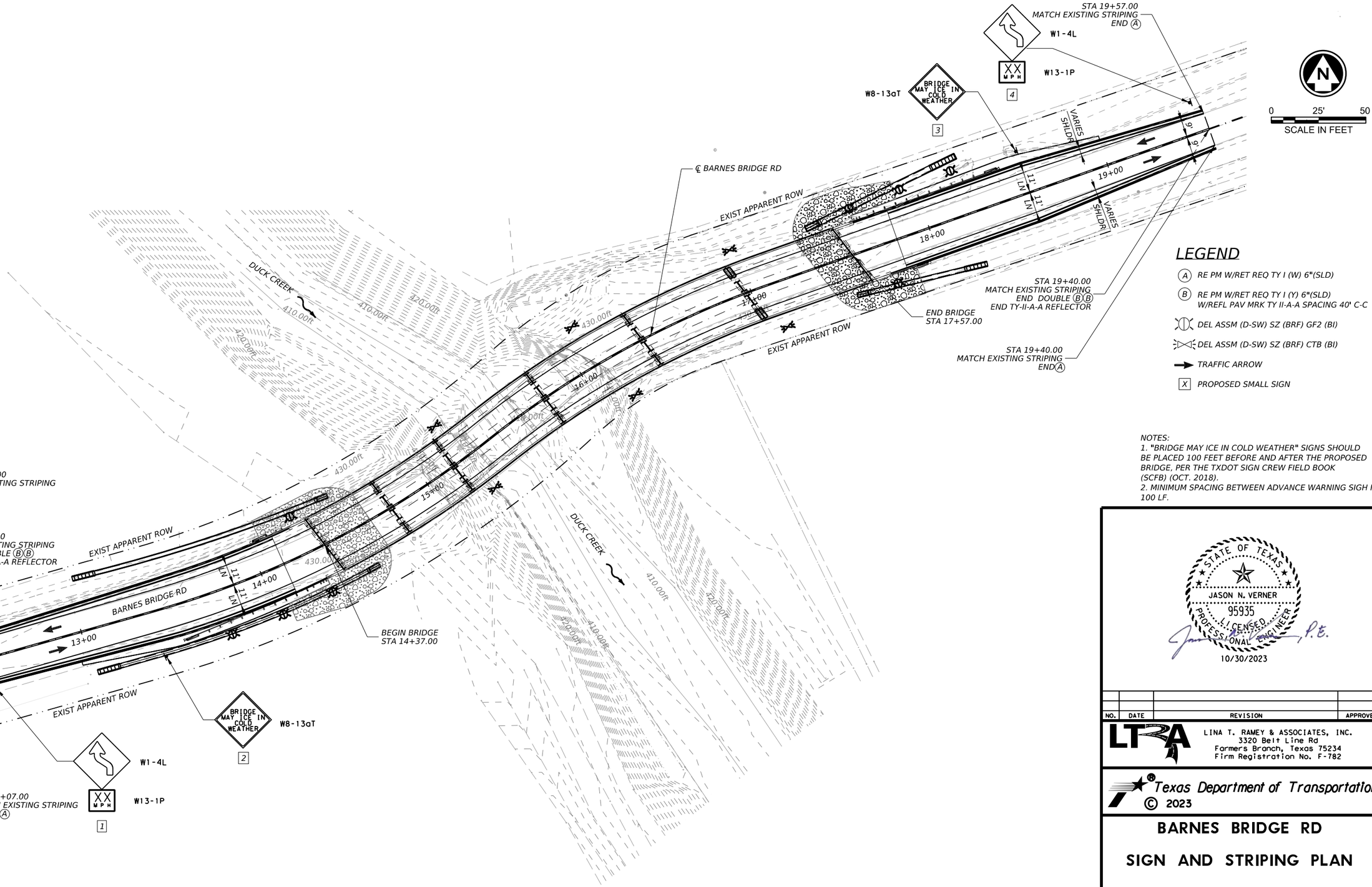
SECTION A-A

(Showing with 2" and more of haunch)

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS
PRESTRESSED CONCRETE X-BEAM SPANS
XBTS

FILE: XBTS-22.dgn	DN: JMH	CK: TAR	DW: JER	CK: TAR
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		107



LEGEND

- (A) RE PM W/RET REQ TY I (W) 6"(SLD)
- (B) RE PM W/RET REQ TY I (Y) 6"(SLD) W/REFL PAV MRK TY II-A-A SPACING 40' C-C
- DEL ASSM (D-SW) SZ (BRF) GF2 (BI)
- DEL ASSM (D-SW) SZ (BRF) CTB (BI)
- TRAFFIC ARROW
- [X] PROPOSED SMALL SIGN

NOTES:
1. "BRIDGE MAY ICE IN COLD WEATHER" SIGNS SHOULD BE PLACED 100 FEET BEFORE AND AFTER THE PROPOSED BRIDGE, PER THE TXDOT SIGN CREW FIELD BOOK (SCFB) (OCT. 2018).
2. MINIMUM SPACING BETWEEN ADVANCE WARNING SIGH IS 100 LF.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
10/30/2023

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

Texas Department of Transportation

BARNES BRIDGE RD

SIGN AND STRIPING PLAN

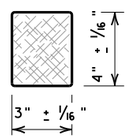
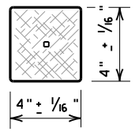
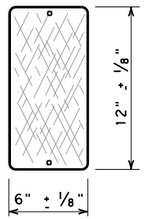
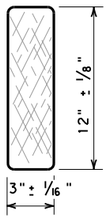
DESIGN	FED.RD. DIV.NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK JNV	STATE	DISTRICT	COUNTY
DRAWN LTR	TEXAS	DAL	DALLAS
CHECK JNV	CONTROL	SECTION	JOB
	0918	47	288

SHEET NO. 108

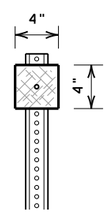
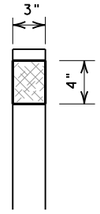
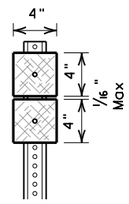
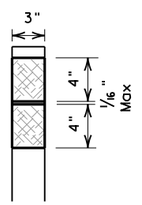
DATE: 10/30/2023 11:28:46 AM
FILE: c:\pw\workingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\dmu@ltraengineers.com\dms21933\BarnesSPM.dgn

DATE: 9/29/2023 3:26:30 PM
FILE: c:\pwworkingdir\itraengineers-pw.bentley.com_itraengineers-pw-01\dmu@ftraengineers\d0m1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

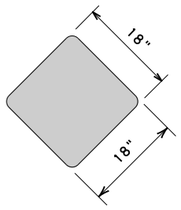
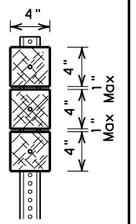
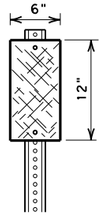
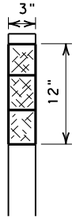
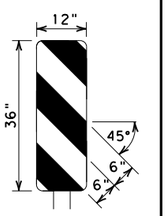
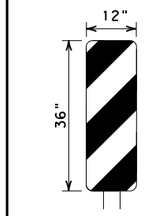
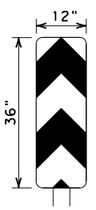
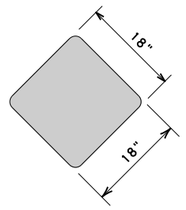
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

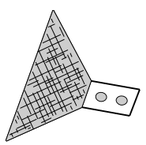
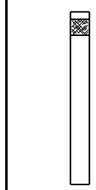
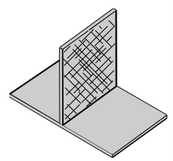
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

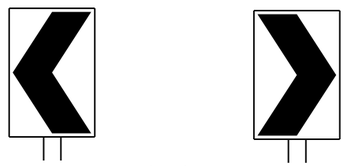
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE

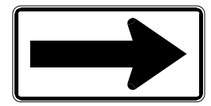


SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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



SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

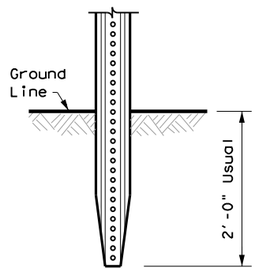
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		109

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

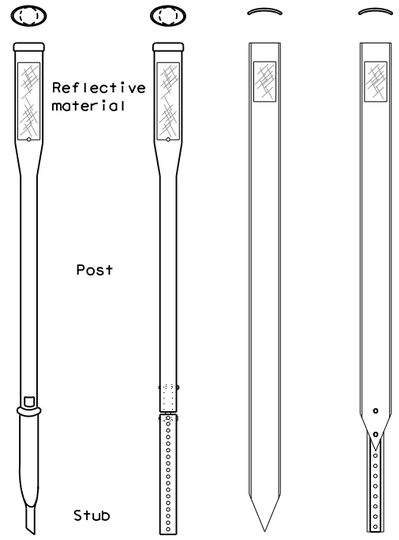


NOTES

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.

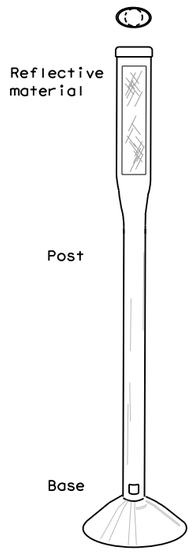
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



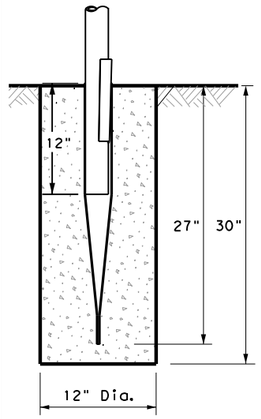
SURFACE MOUNT

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.

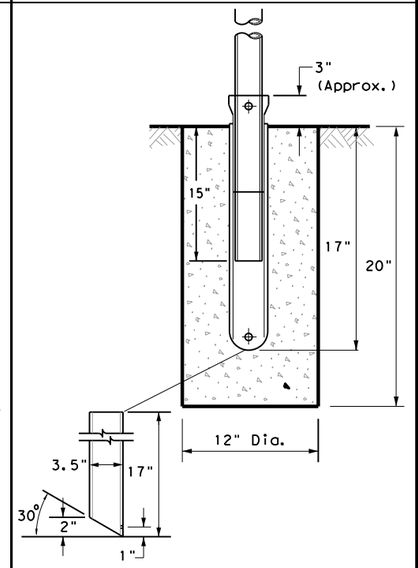
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

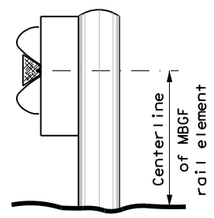
NOTE

1. Install per manufacturer's recommendations.

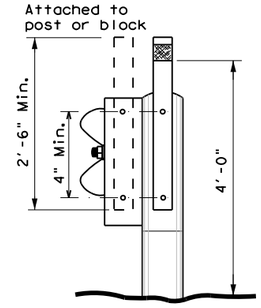
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

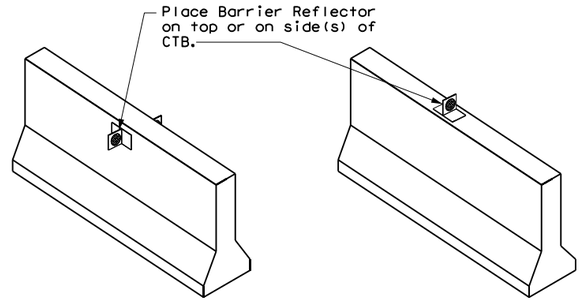
GF1



GF2



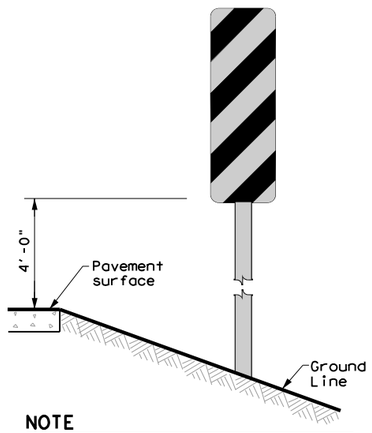
CONCRETE TRAFFIC BARRIER (CTB)



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.

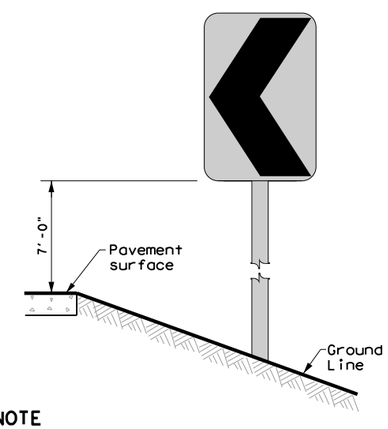
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

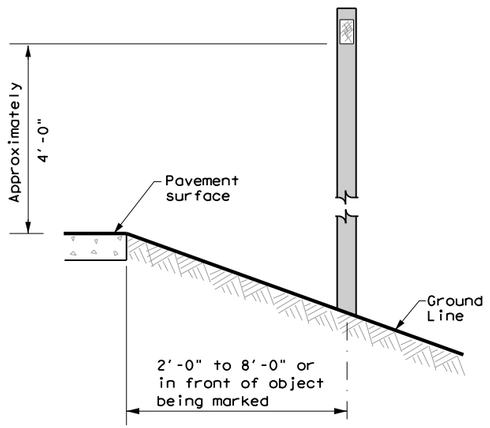
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		110

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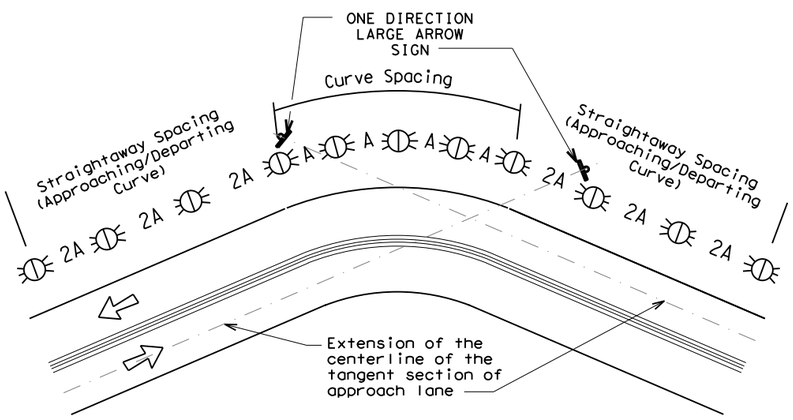
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

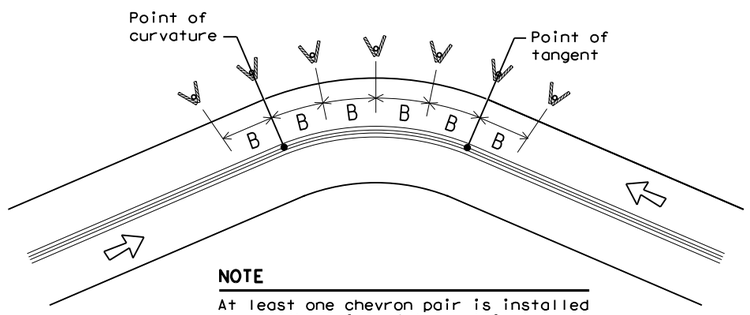
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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8-15 7-20	DAL	DALLAS		111

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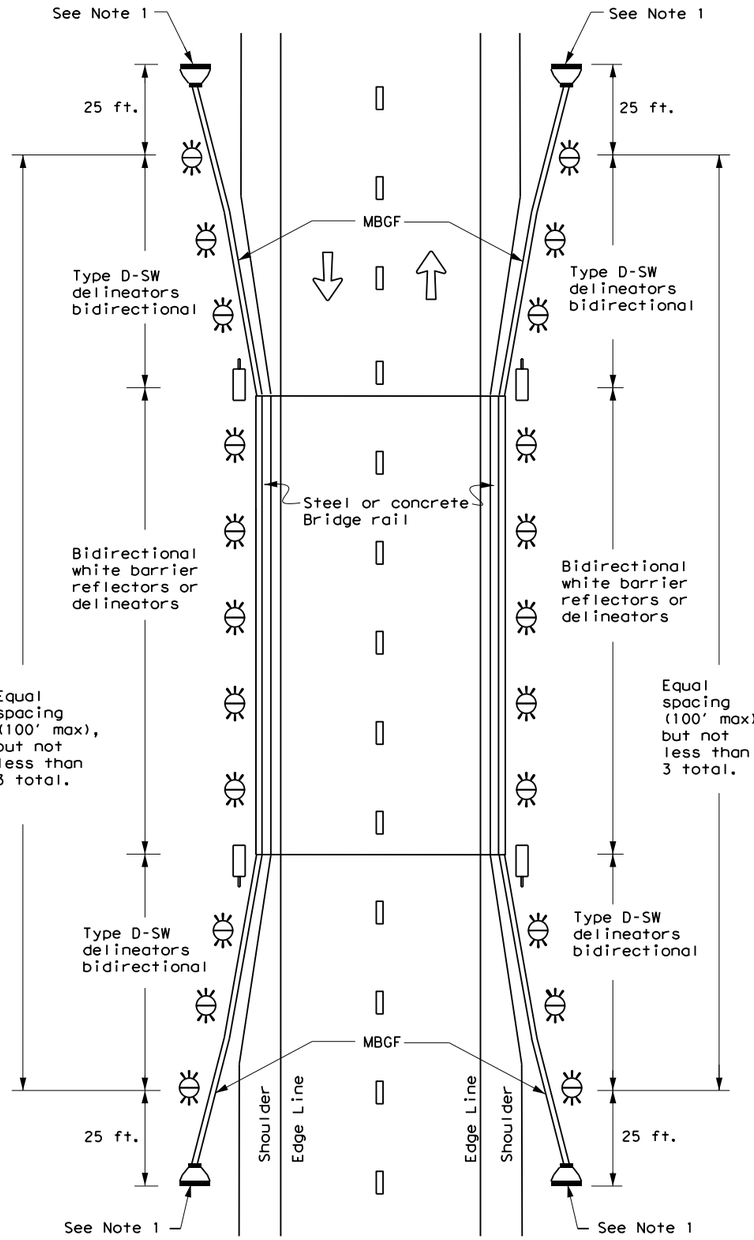
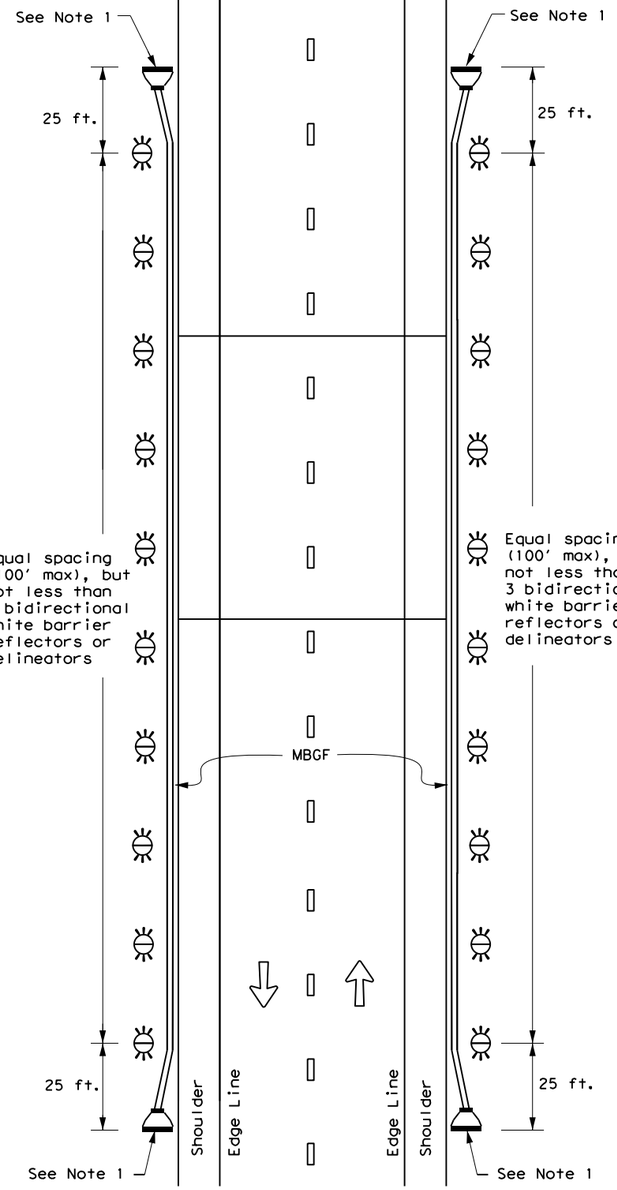
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

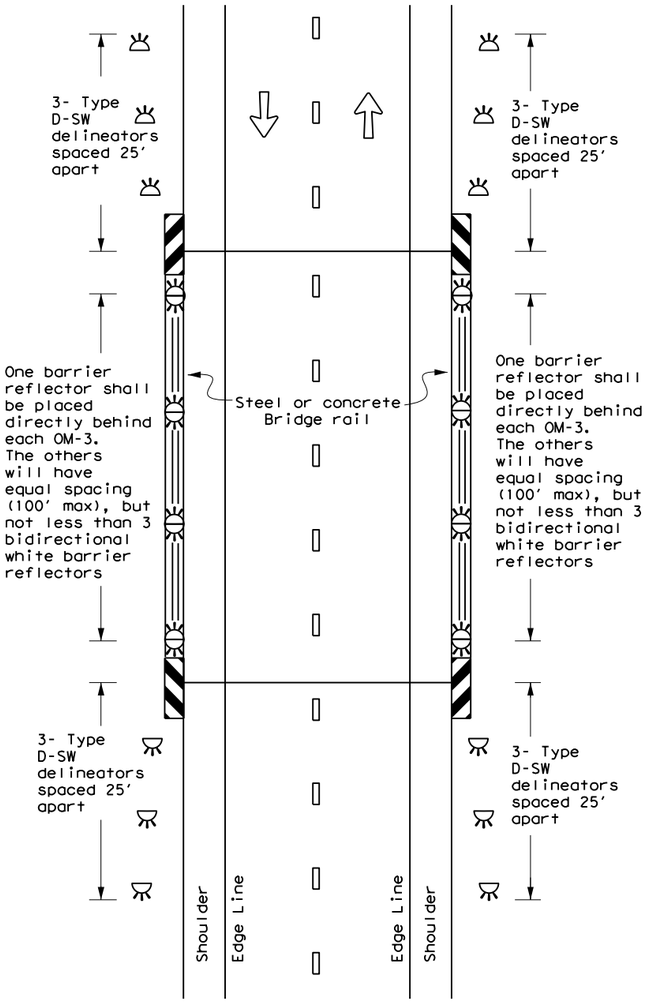
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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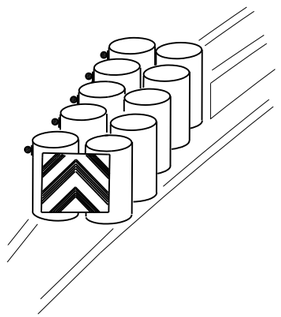
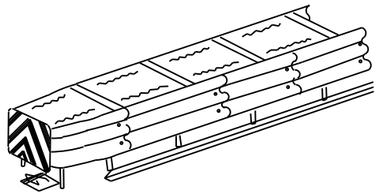
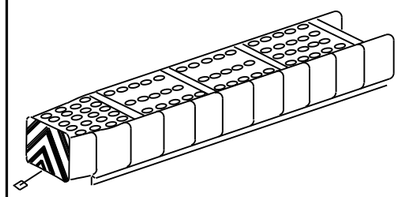
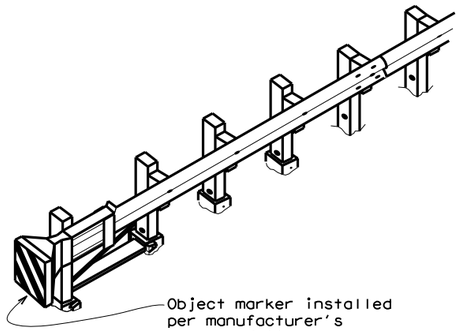
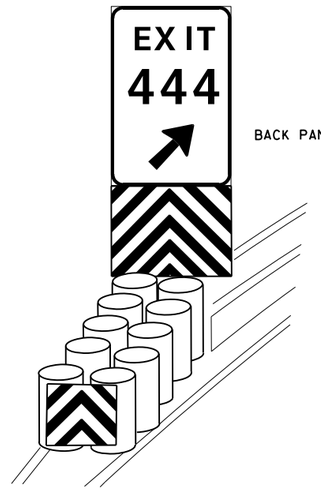
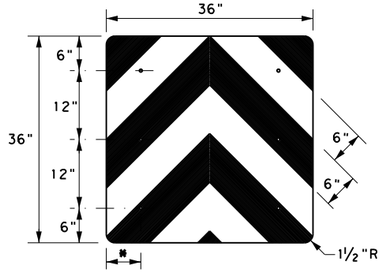


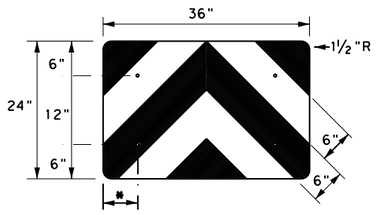




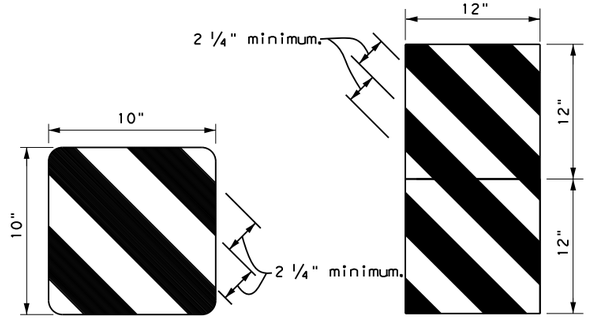




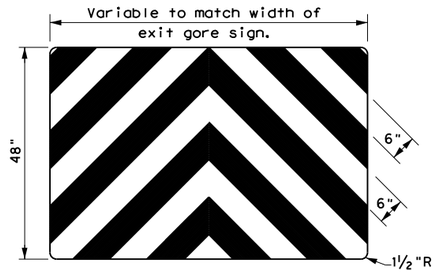


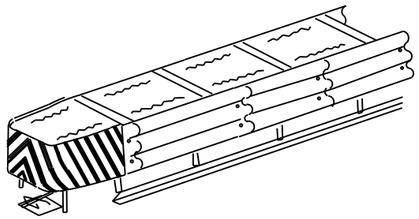


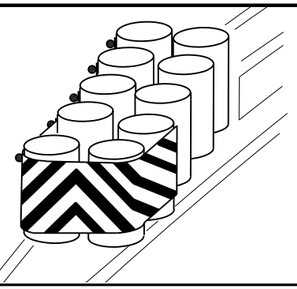
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

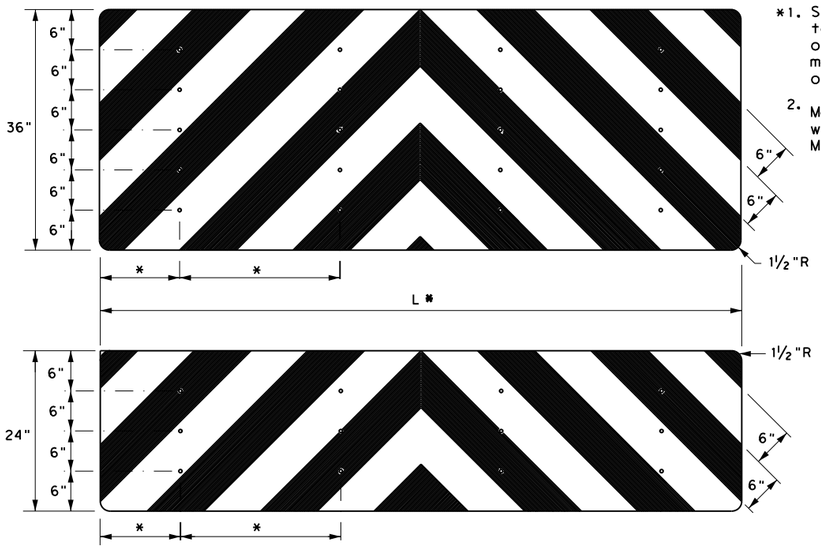


OBJECT MARKERS SMALLER THAN 3 FT^2









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

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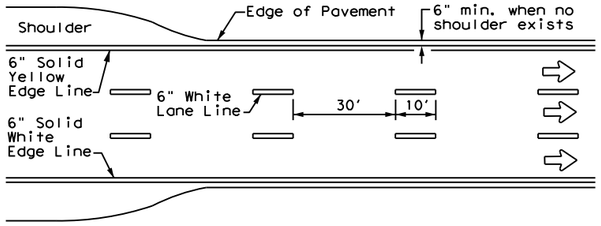
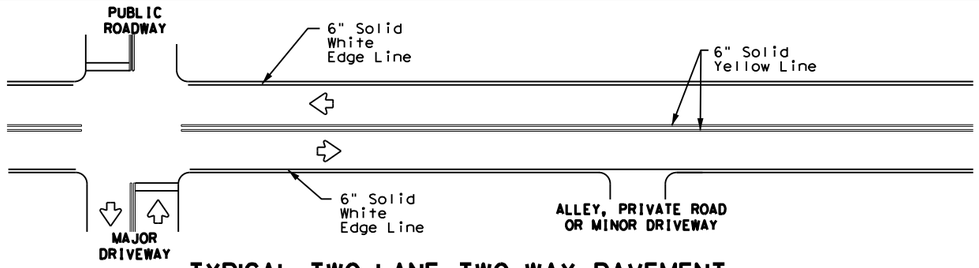
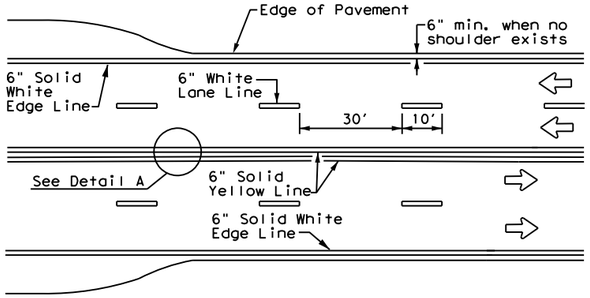
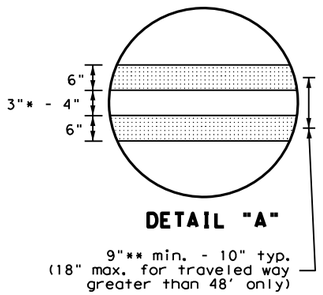


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





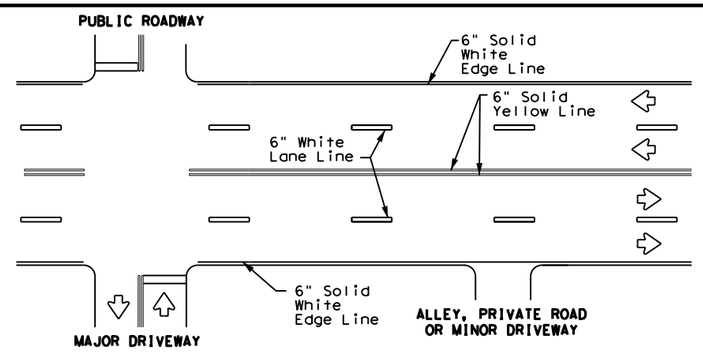
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

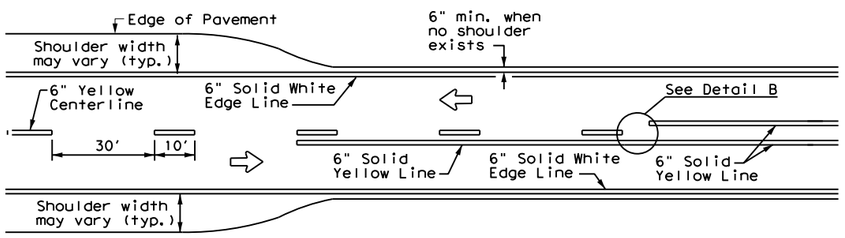
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

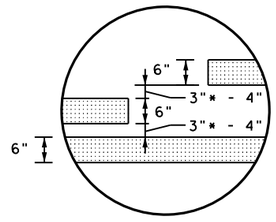
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



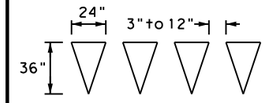
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

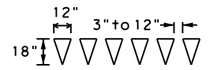
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

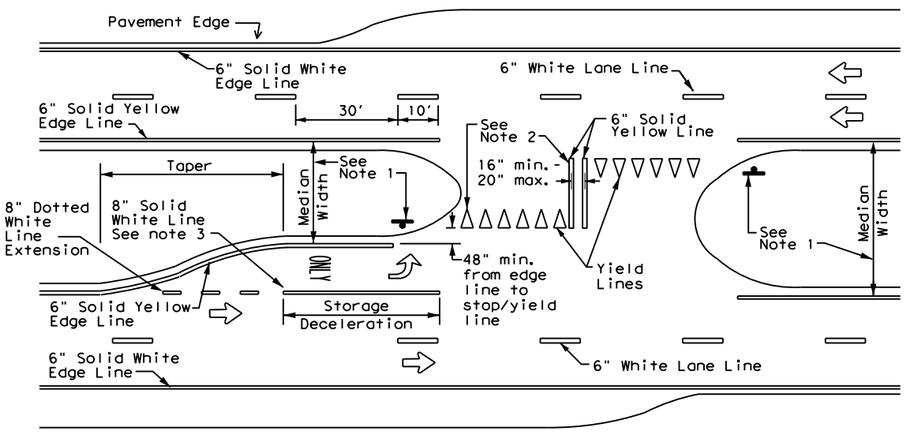


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

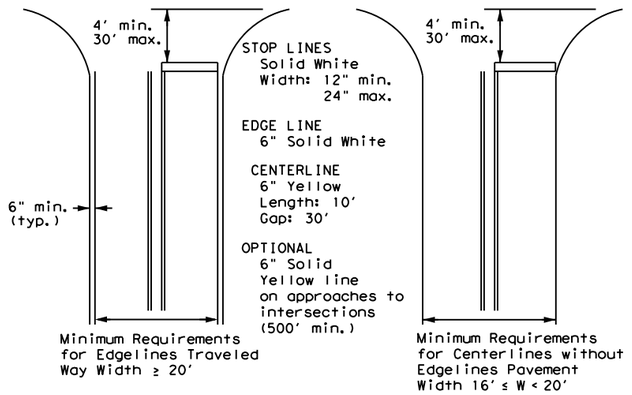
GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

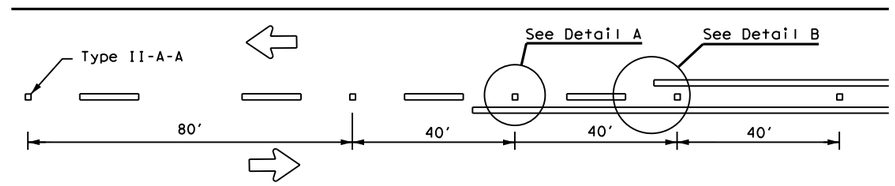
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	DAL	DALLAS		114
5-00 2-12				

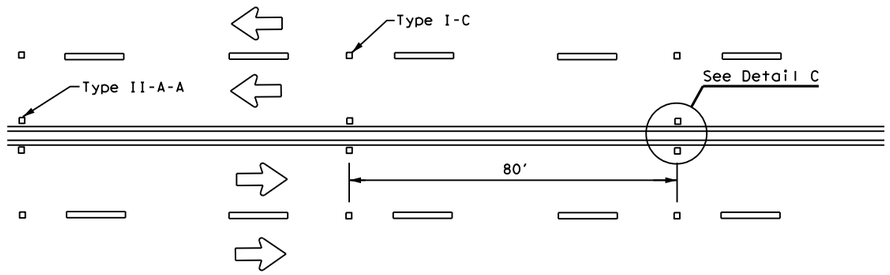
22A

DATE: 9/29/2023 3:27:45 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\dmu\d1918262\pm2-22.dgn

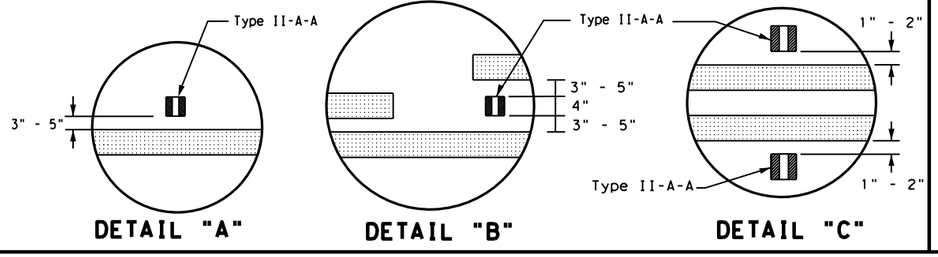
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

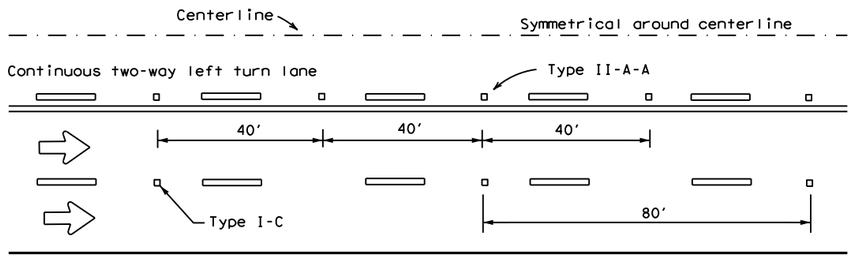


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

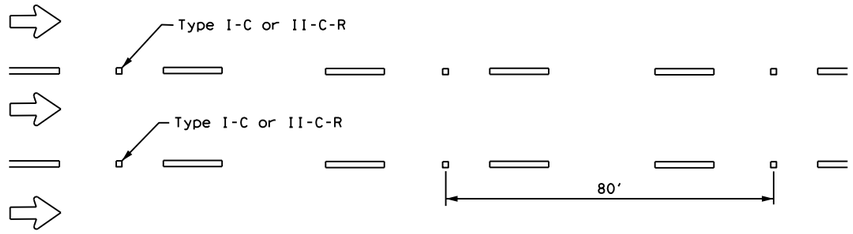


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



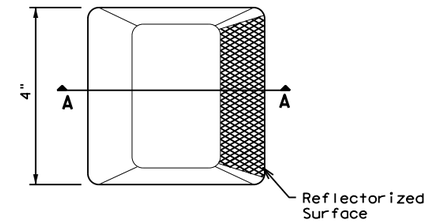
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

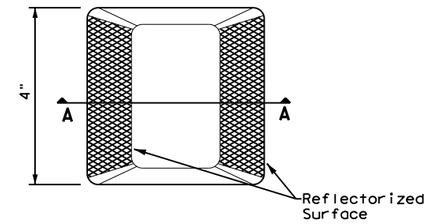
See Note 3.

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

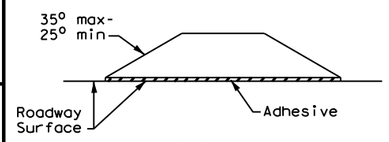
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

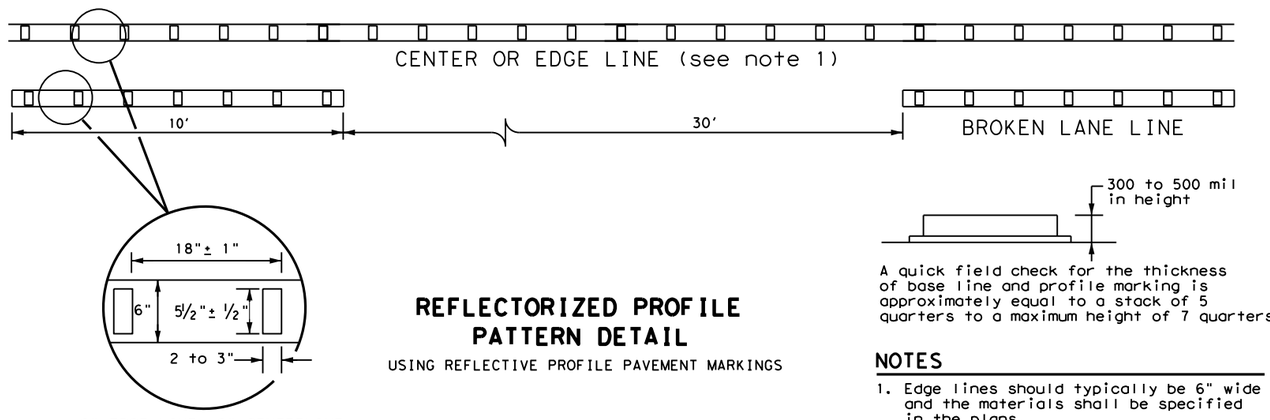


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		115

22B

DATE: 10/3/2023 4:15:16 PM
FILE: c:\pwworkingdir\itraengineers-pw.bentley.com#itraengineers-pw-01\dmu@itraengineers.com\dms26207\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

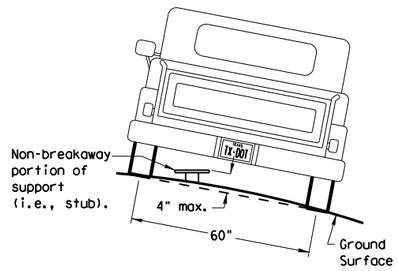
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

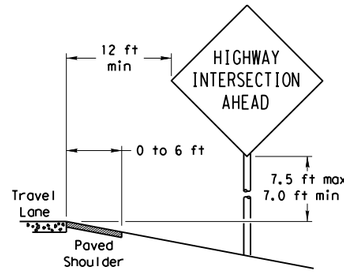
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

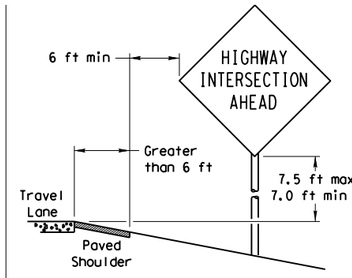
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

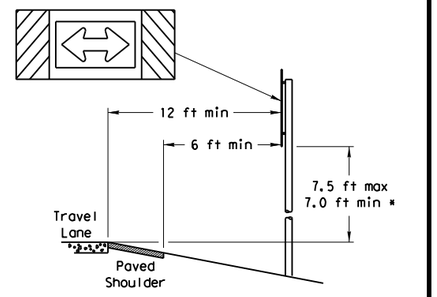
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



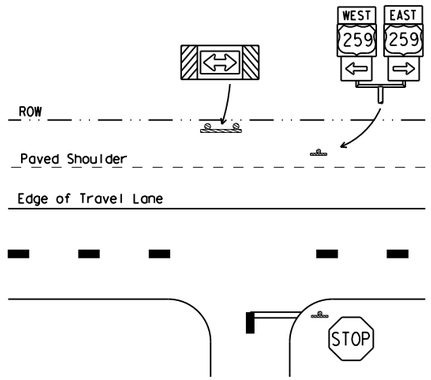
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

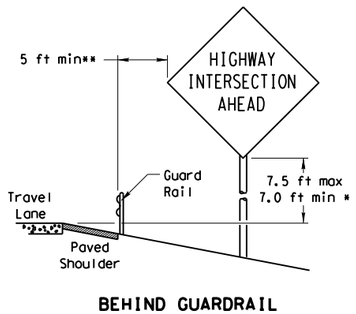
T-INTERSECTION



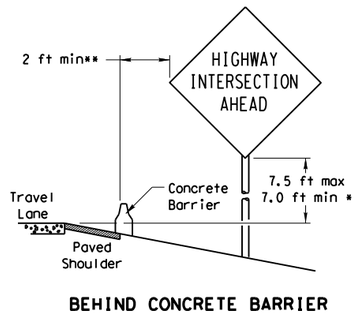
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

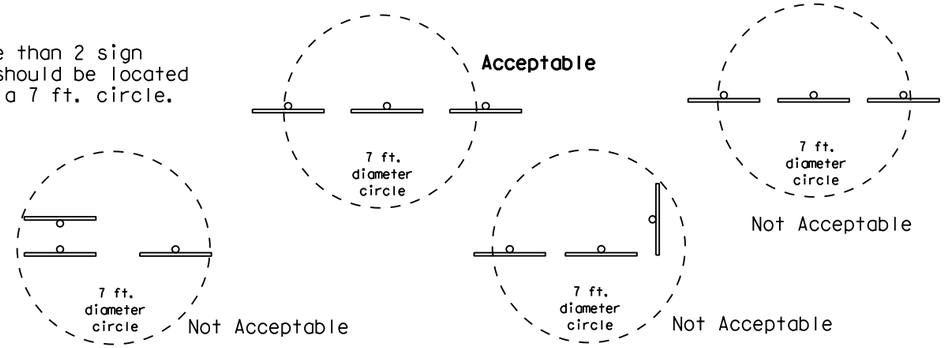
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

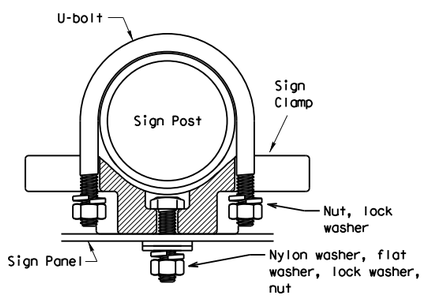
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

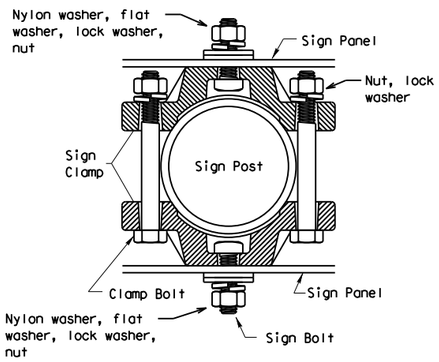


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

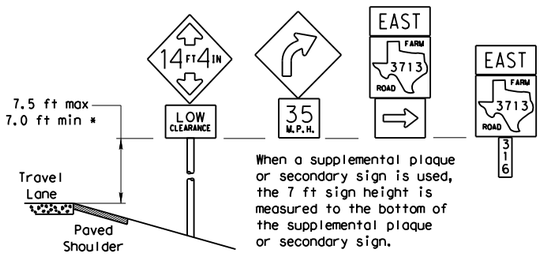
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



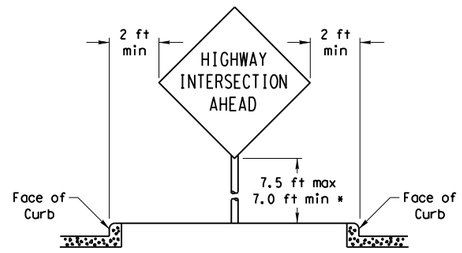
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



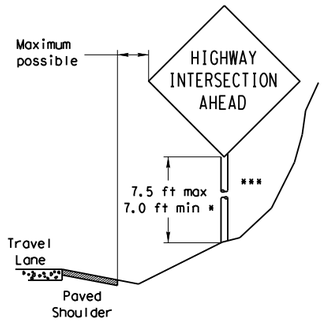
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

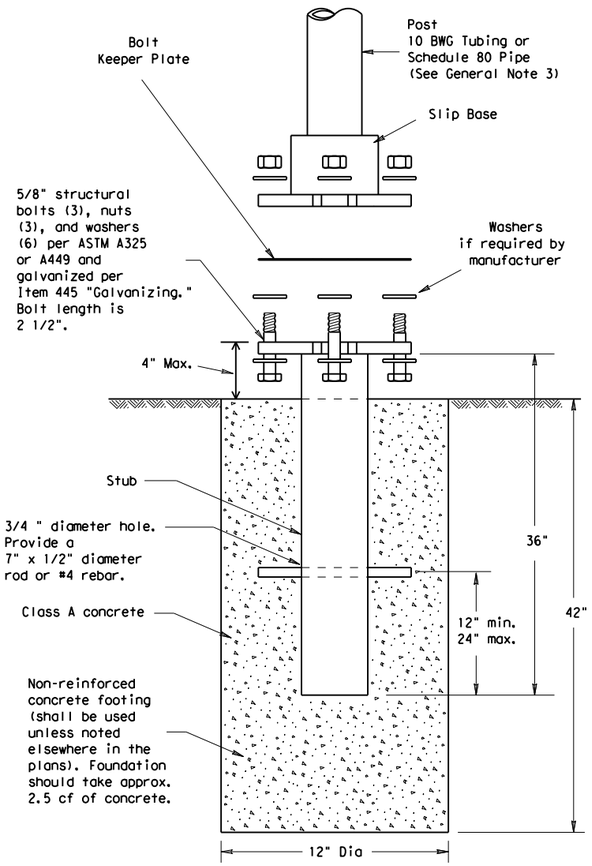
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

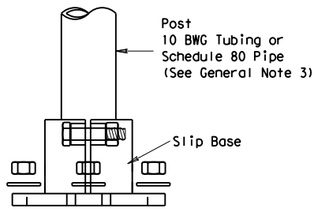
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		116

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

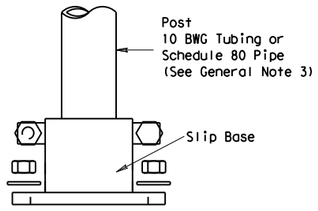


SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

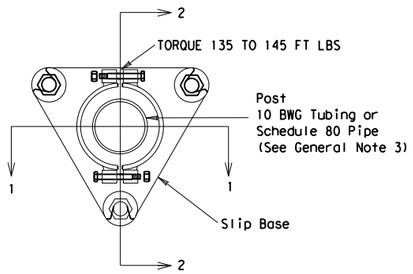
NOTE
The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.



SIDE VIEW 1-1



SIDE VIEW 2-2



TOP VIEW

DETAIL A

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is:
   http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

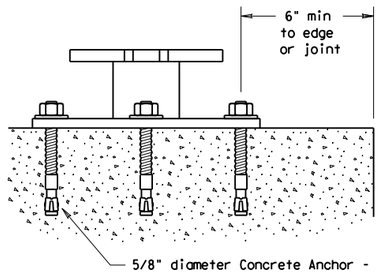
Foundation

1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

ADDED DETAIL A FOR CLAMP BASE

10-2010

Texas Department of Transportation
Dallas District Standard

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08(DAL)

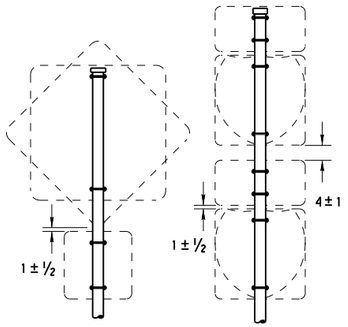
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS
12-10 (DISTRICT) ADDED CLAMP BASE DETAIL FOR SLIP BASE INSTALLATION

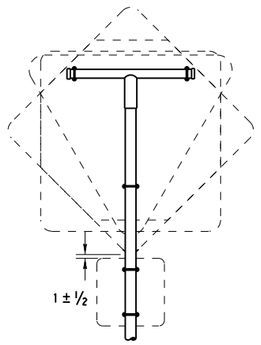
CONT	SECT	JOB	HIGHWAY
0918	47	288	BBR

DIST	COUNTY	SHEET NO.
DAL	DALLAS	117

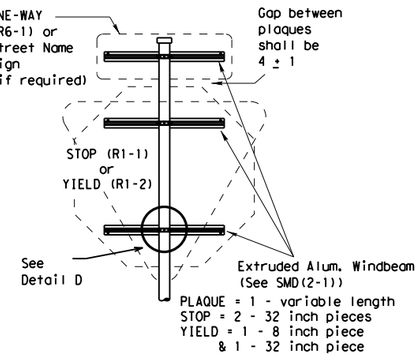
DATE:
FILE:



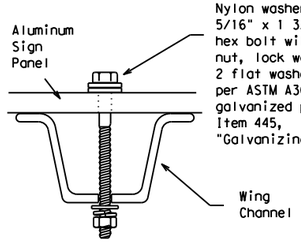
SM RD SGN ASSM TY XXXXX(1)XX(P)



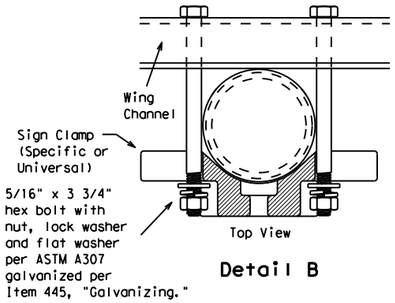
SM RD SGN ASSM TY XXXXX(1)XX(T)



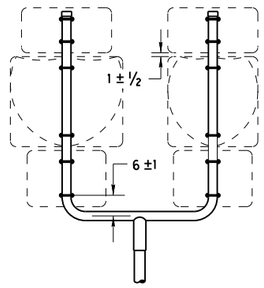
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



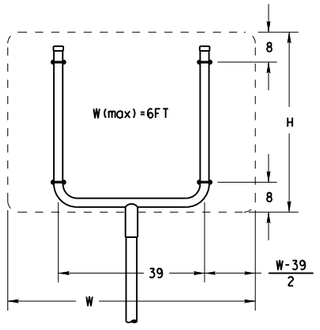
Detail A



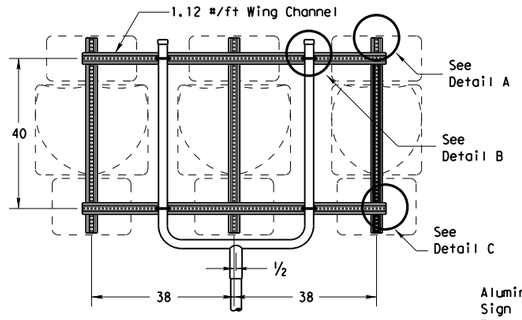
Detail B



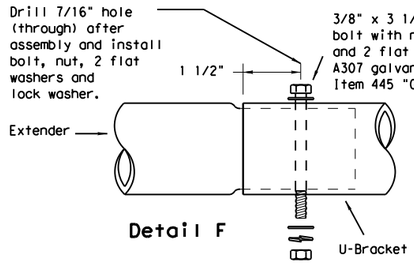
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

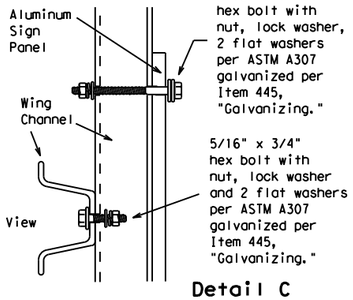


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

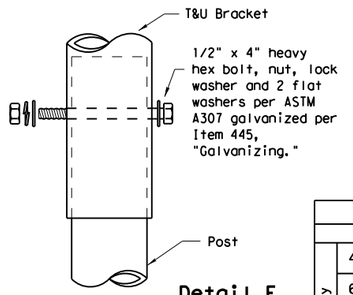


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



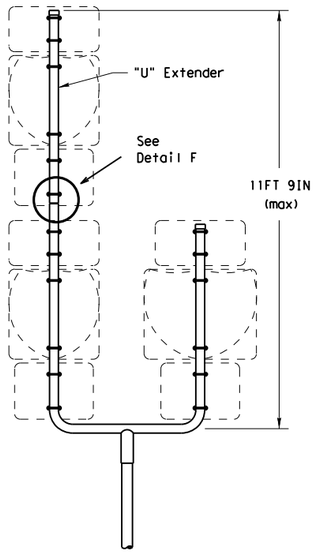
Detail E

GENERAL NOTES:

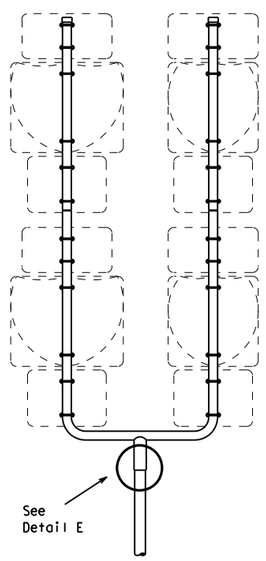
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

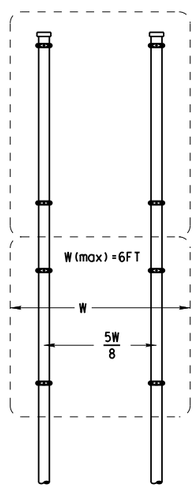
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



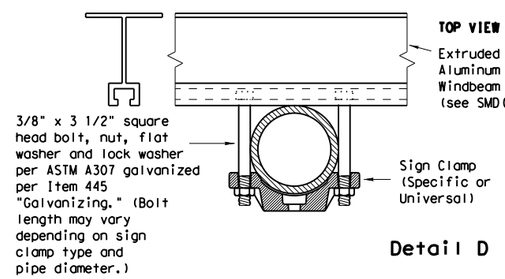
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



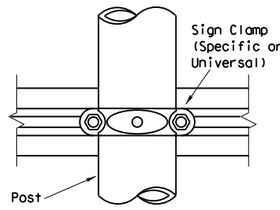
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



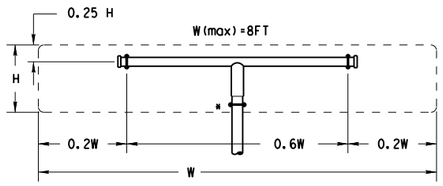
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



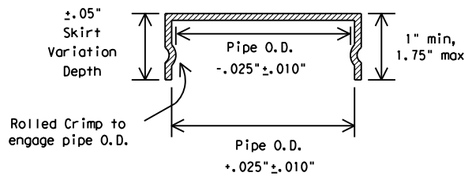
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

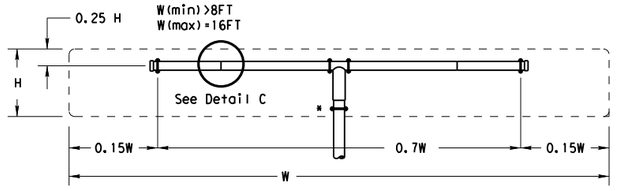
CONT	SECT	JOB	HIGHWAY
0918	47	288	BBR

DIST	COUNTY	SHEET NO.
DAL	DALLAS	118

9-08 REVISIONS

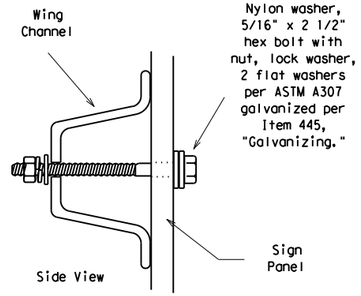
DATE:
FILE:

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 damages resulting from its use.

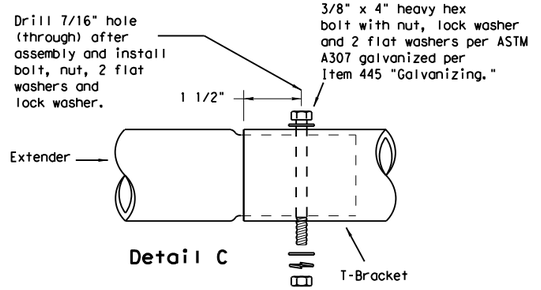


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)



Detail B



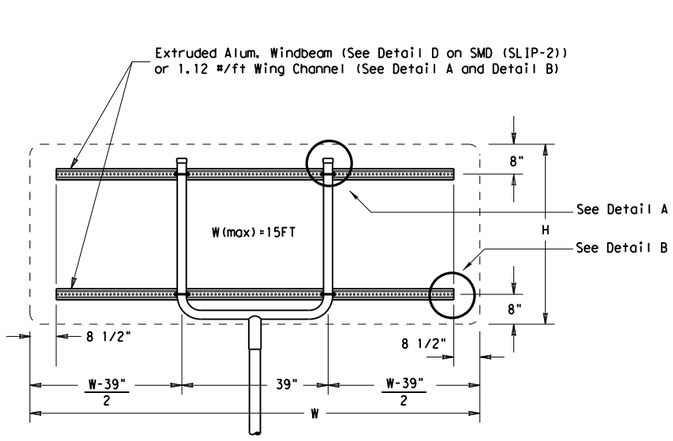
Detail C

Splices shall only be allowed behind the sign substrate.

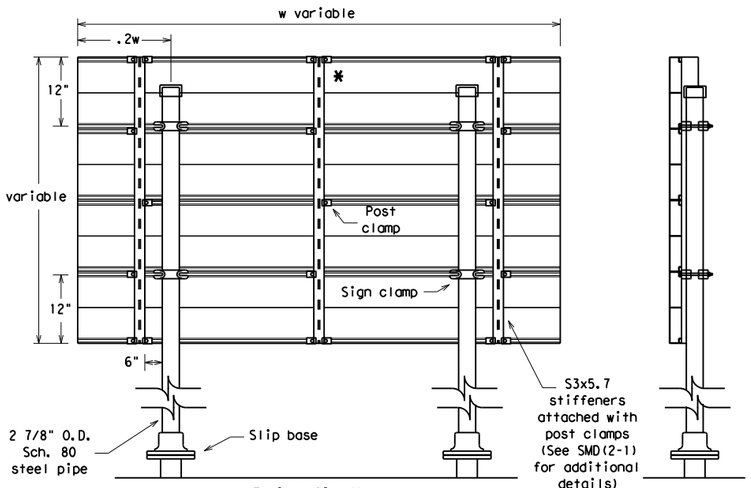
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

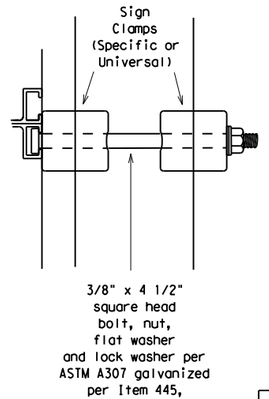


Typical Sign Mount

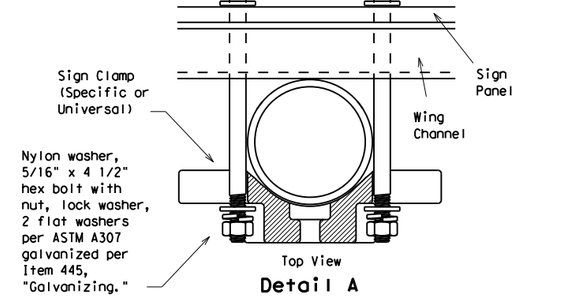
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

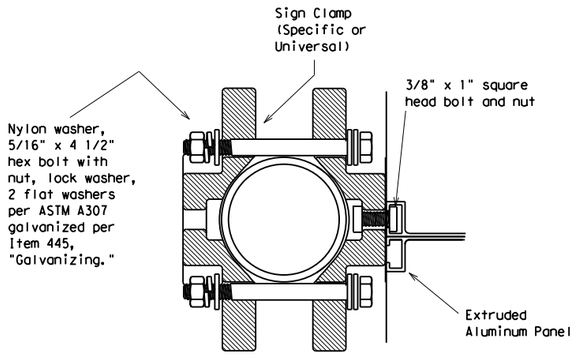
See Detail E for clamp installation



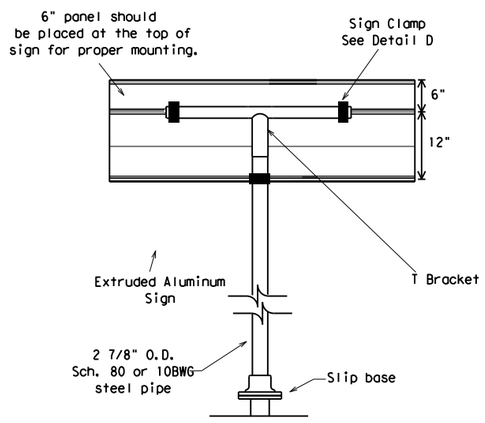
Detail E



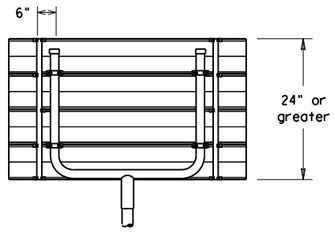
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0918	47	288	BBR

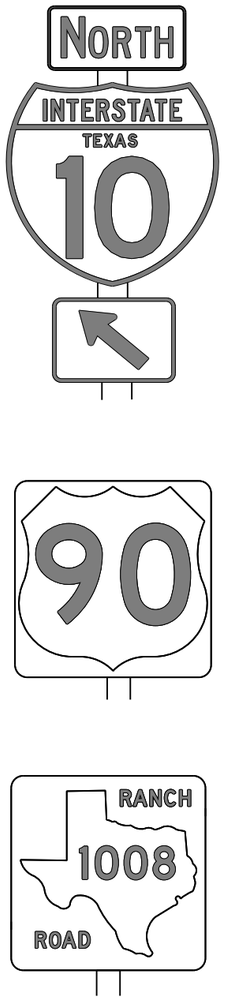
DIST	COUNTY	SHEET NO.
DAL	DALLAS	119

DATE:
FILE:

DATE: 10/3/2023 4:35:00 PM
FILE: c:\pwworkingdir\ltraengineers-pw.bentley.com_ltraengineers-pw-01\dmu@ltraengineers.com\D0cm%20Rdm%2620704f9-1f92d\Correct results or damages resulting from its use.

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

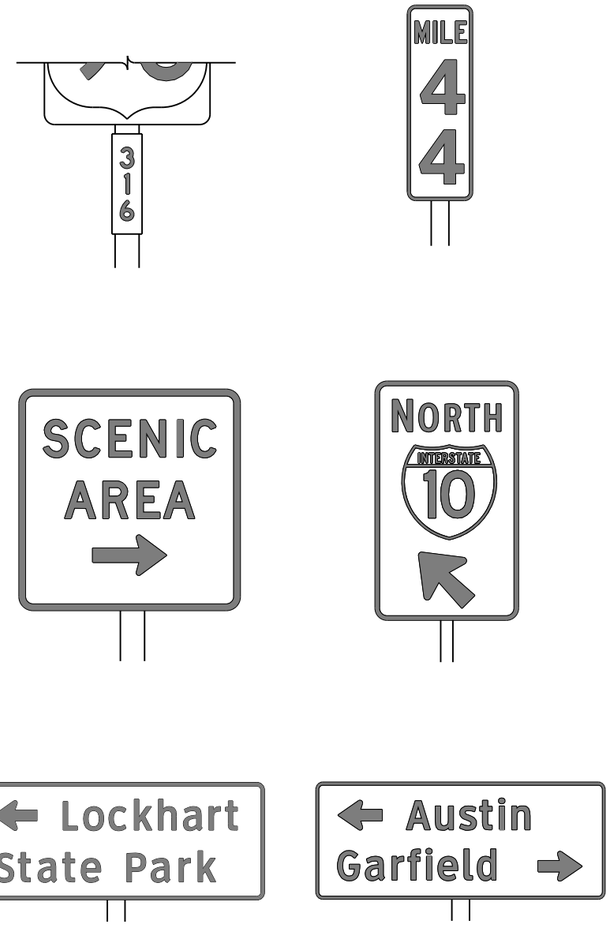
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

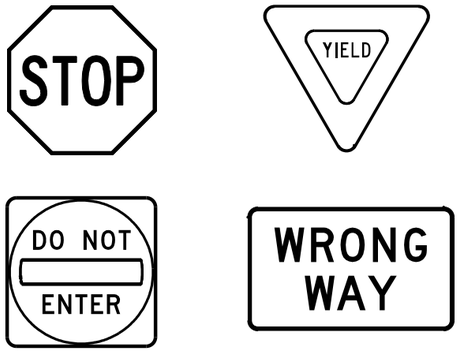
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DAL	DALLAS		120

DATE: 12/8/2005 4:32:32 PM
FILE: c:\projects\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

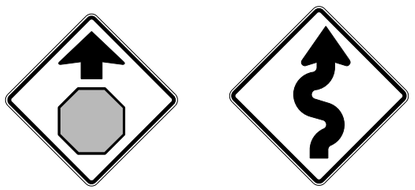
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

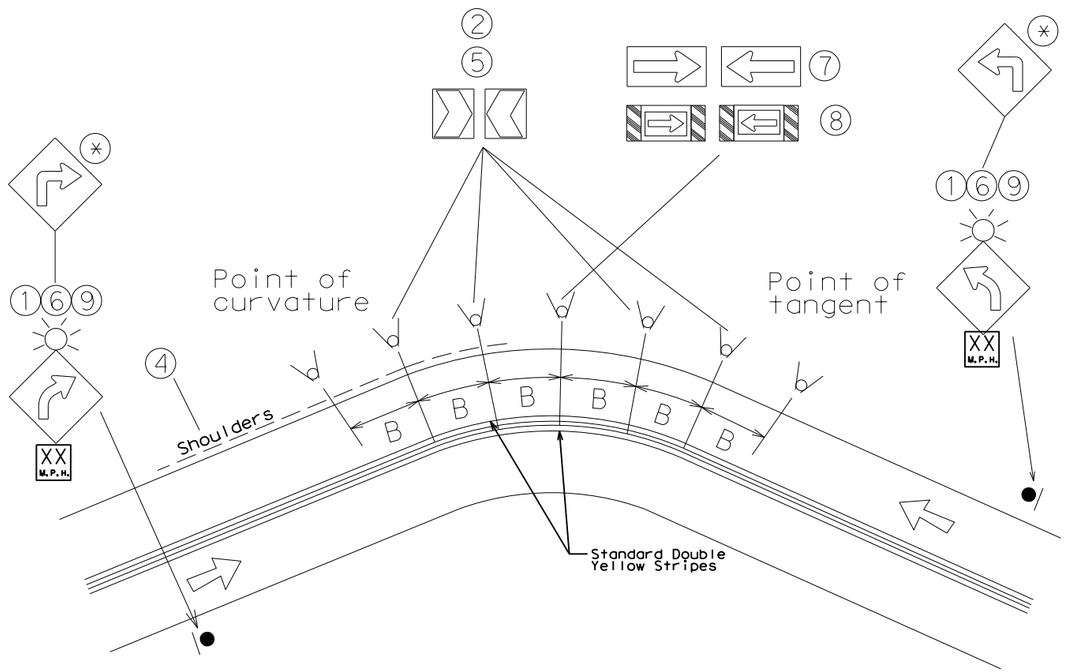
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DAL	DALLAS		121

4

Dallas District Standard for Two-Lane Highway Curve Signing/Markings



Curve Safety Sequence

Applicable Minimum Measures

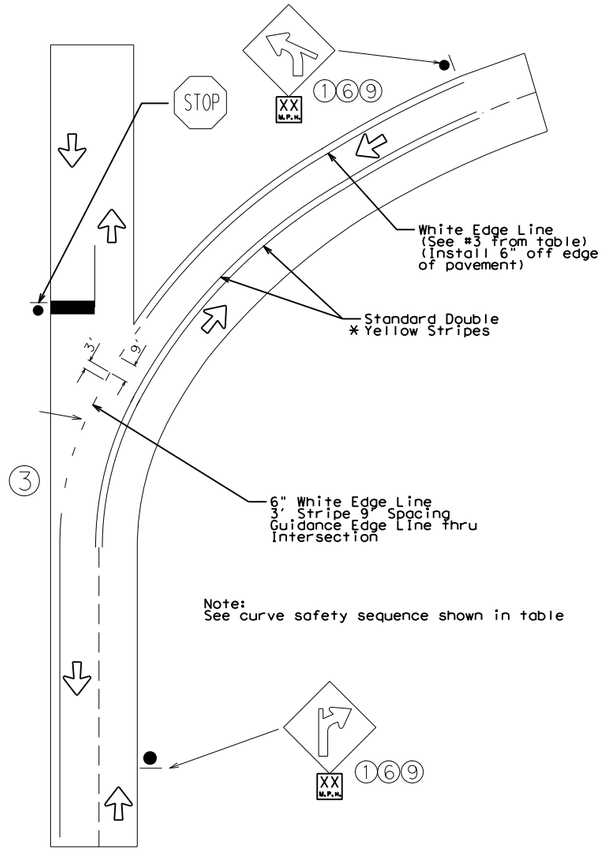
Advisory Speed 55 mph or higher	Advisory Speed 40-50 mph	Advisory speed 35 mph or less		Curve signing, delineation and pavement markings (listed in order from minimum to maximum level of treatment as needed)
+	+	+	1	Advance warning (36" x 36") and advisory mph (18" x 18")
+	+	+	2	Chevron alignment signs if advisory speed is 15 mph or greater than posted speed
	+	+	3	Edge lines
			3a	Pavement width 24' or greater 6" solid white edge line
			3b	Pavement width 20' - 24' 4" solid white edge line
			3c	Pavement width 20' or less no edge line
		Supplemental Measures		
		#	4	Add shoulders and edge line (see #3a)
		#	5	Yellow high intensity flourescent chevron alignment signs - add reflective sheeting to sign support from bottom edge of sign
#	#	#	6	Large advance warning (48" x 48") and advisory mph (30" x 30")
#	#	#	7	Arrow sign (48" x 24")
		#	8	Large arrow sign with diagonals (96" x 36")
		#	9	Add flashers to advance warning signs
#	#	#	10	Surface treatment to improve friction
			**	The W1-1R or L sign shall only be used when the advisory speed is
				30 mph or less

+ = required
# = optional

Applications 4 - 10 are additional supplemental applications which may be added as directed by the Area Engineer.

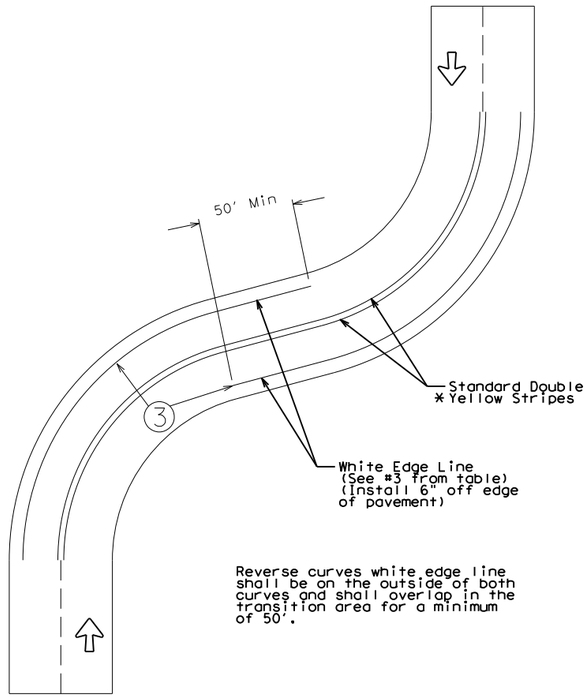
Note:
"B" - Chevron Spacing
referenced from D&OM(3)-15B

Typical Curve Treatment with Intersection



Note:
See curve safety sequence shown in table

Typical Reverse Curve Edge Line Treatment



Reverse curves white edge line shall be on the outside of both curves and shall overlap in the transition area for a minimum of 50'.

* Standard Double Yellow Stripes shall be dropped through a non-signalized intersection within the city limit. Outside the city limit, the Standard Double Yellow Strip shall be carried through all non-signalized intersections.

Notes:
1. Two methods will be used to determine the appropriate advisory speed for curves, the GPS Method(existing curves) and the Design Method (new curves).
2. Notify the Traffic Engineering Section for all requests on advisory speeds for existing curves.

OCT-2014 UPDATED NOTES
JAN-2016 NOTE ADDED
SEPT-2016 NOTE ADDED FOR STRIPING IN CURVE
MAR-2017 REMOVED REFERENCE TO DELINEATORS
MAY-2019 MODIFIED SIGN SIZE

Texas Department of Transportation

TWO-LANE HIGHWAY CURVE SIGNING & MARKINGS

DALLAS DISTRICT STANDARD

SCALE: NTS SHEET 1 OF 1

DESIGN/CK	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
BLS	6	BR 2021(911)		BBR
CHECK BLS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK FRC	TEXAS	DALLAS	VARIOUS	
CHECK ARO	CONTROL	SECTION	JOB	122
	0918	47	288	

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damage resulting from its use.

I. STORMWATER POLLUTION PREVENTION PLAN-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.
List adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

1. Town of Sunnyvale Phase II MS4 - Contact Johnny Meeks

☐ 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. 14+57 to 16+97 - Duck Creek - Stream Impacts

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action Number:

1.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751 & 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action Number:

1.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS TREATY ACT.

☐ No Action Required ☒ Required Action

Action Number:

1. The following species could occur in the project area: Texas fawnsfoot, Texas heelsplitter, Woodhouse's toad, American eel, eastern spotted skunk, long-tailed weasel, swamp rabbit, western hog-nosed skunk, eastern box turtle, prairie skink, pygmy rattlesnake, timber rattlesnake, western box turtle, western chicken turtle and Texas garter snake. Follow the special note on the EPIC sheet and the BMPs listed below to protect these species.

2. Freshwater mussel survey is required for Texas fawnsfoot, and Texas heelsplitter, at Duck Creek (STA. 15+40.68). TxDOT to complete the survey during the months of April to October prior to the start of construction.

3. 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. Section 1.2 Vegetation BMP
   b. Section 1.4 Water Quality BMP
   c. Section 2.4.3 Freshwater Mussel BMP
   d. Section 2.6.1 Aquatic Amphibian and Reptile BMP
   e. Section 2.6.2 Terrestrial Amphibian and Reptile BMP

Special Notes:

1. Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.
2. If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediated area, and contact the Engineer immediately.
3. The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corp of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):
Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Safety Data Sheets (SDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canisters, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (bridge class structures not including box culverts)?
☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?
☒ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Action Number:

1. Barnes Bridge Road at Duck Creek (NBI 18-057-0-JJ00-05-001) at STA 15+40.68: Silver LBP (1900ppm) on steel bridge rails and ACM abatement required for fiberboard prior to renovation/demolition activities.

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

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

 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		VA
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	DALLAS	
CONTROL	SECTION	JOB	SHEET NO.
0918	47	288	123

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0918-47-288 (Barnes Bridge Rd)

1.2 PROJECT LIMITS:
From: STA: 12+07.00

To: STA: 19+57.00

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.82898° ,(Long) 96.56740°

END: (Lat) 32.82966° ,(Long) 96.56553°

1.4 TOTAL PROJECT AREA (Acres): 1.193

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.097

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Replacement of Bridge and Roadway Approaches

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Silty Clay	0-1% Slopes

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- [x] PSLs determined during preconstruction meeting
- [ ] PSLs determined during construction
- [ ] No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- [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
- [x] Install culverts, culvert extensions, SETs
- [x] Install mow strip, MBGF, bridge rail
- [x] Place flex base
- [x] Rework slopes, grade ditches
- [x] Blade windrowed material back across slopes
- [x] Revegetation of unpaved areas
- [x] Achieve site stabilization and remove sediment and erosion control measures
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- [x] Sediment laden stormwater from stormwater conveyance over disturbed area
- [x] Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- [x] Solvents, paints, adhesives, etc. from various construction activities
- [x] Transported soils from offsite vehicle tracking
- [x] Construction debris and waste from various construction activities
- [x] Contaminated water from excavation or dewatering pump-out water
- [x] Sanitary waste from onsite restroom facilities
- [x] Trash from various construction activities/receptacles
- [x] Long-term stockpiles of material and waste
- [x]
- [x] Other: Concrete saw-cutting, and concrete pouring and washout- dust, liquid and slurry.
- [ ] 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

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- [x] Development of plans and specifications
- [x] Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- [x] Post Construction Site Notice
- [x] Submit NOI/CSN to local MS4
- [x] Perform SWP3 inspections
- [x] Maintain SWP3 records and update to reflect daily operations
- [x] Complete and submit Notice of Termination to TCEQ
- [x] Maintain SWP3 records for 3 years
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- [x] Day To Day Operational Control
- [x] Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- [x] Post Construction Site Notice
- [x] Submit NOI/CSN to local MS4
- [x] Maintain schedule of major construction activities
- [x] Install, maintain and modify BMPs
- [x] Complete and submit Notice of Termination to TCEQ
- [x] Maintain SWP3 records for 3 years
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity
1. Town of Sunnyvale Phase II MS4 - Contact Johnny Meeks

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/21/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		124
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	DALLAS	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	47	288	BBR

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [x] [x] Protection of Existing Vegetation
- [x] [x] Vegetated Buffer Zones
- [ ] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [x] [ ] Temporary Seeding
- [ ] [x] Permanent Planting, Sodding or Seeding
- [ ] [ ] Biodegradable Erosion Control Logs
- [x] [ ] Rock Filter Dams/ Rock Check Dams
- [x] [ ] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [ ] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [ ] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [x] [x] Other: Vegetation Lined Ditches
- [ ] [ ] 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
- [x] [x] 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

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- [ ] [ ] Sediment Trap
  - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - [ ] 3,600 cubic feet of storage per acre drained
- [ ] [ ] Sedimentation Basin
  - [x] Not required (<10 acres disturbed)
  - [ ] Required (>10 acres) and implemented.
    - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - [ ] 3,600 cubic feet of storage per acre drained
  - [ ] Required (>10 acres), but not feasible due to:
    - [ ] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [ ] Public safety
    - [ ] Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
PERMANENT DRILL SEEDING	12+07.00	15+00.00
PERMANENT DRILL SEEDING	16+00.00	19+57.00

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
- [x] Concrete and Materials Waste Management
- [x] Debris and Trash Management
- [x] Dust Control
- [x] Sanitary Facilities
- [x] Other: Avoid storing portable sanitary units, concrete washouts or chemicals within 50 feet upgradient of a receiving water or drainage conveyance without adequate pollution controls.
- [x] Other: Capture saw-cutting debris and concrete slurry for proper disposal.
- [x] Other: Maintain paved surfaces free of project sedimentation and debris.
- [ ] 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
SCF (To protect Duck Creek during construction of bridge)	14+38.78	15+24.07
SCF (To protect Duck Creek during construction of bridge)	15+97.66	17+55.16

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [ ] Fire hydrant flushings
- [x] Irrigation drainage
- [x] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [x] Potable water sources
- [x] Springs
- [x] Uncontaminated groundwater
- [x] Water used to wash vehicles or control dust
- [x] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

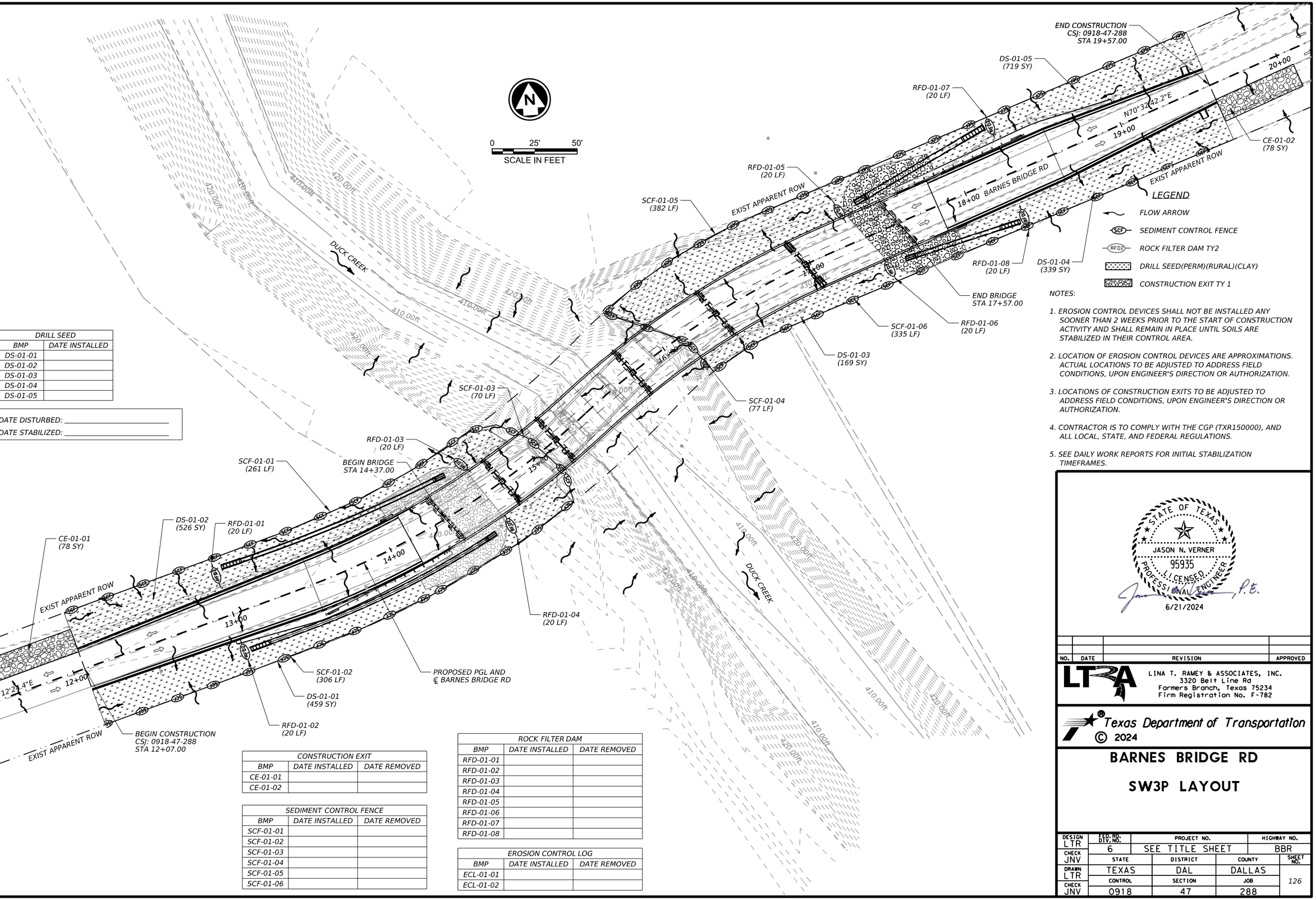
STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
6/21/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		125
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	DALLAS	
CONT.	SECT.	JOB	HIGHWAY NO.
0918	47	288	BBR



DRILL SEED	
BMP	DATE INSTALLED
DS-01-01	
DS-01-02	
DS-01-03	
DS-01-04	
DS-01-05	

DATE DISTURBED: _____

DATE STABILIZED: _____

CONSTRUCTION EXIT		
BMP	DATE INSTALLED	DATE REMOVED
CE-01-01		
CE-01-02		

SEDIMENT CONTROL FENCE		
BMP	DATE INSTALLED	DATE REMOVED
SCF-01-01		
SCF-01-02		
SCF-01-03		
SCF-01-04		
SCF-01-05		
SCF-01-06		

ROCK FILTER DAM		
BMP	DATE INSTALLED	DATE REMOVED
RFD-01-01		
RFD-01-02		
RFD-01-03		
RFD-01-04		
RFD-01-05		
RFD-01-06		
RFD-01-07		
RFD-01-08		

EROSION CONTROL LOG		
BMP	DATE INSTALLED	DATE REMOVED
ECL-01-01		
ECL-01-02		

LEGEND

- FLOW ARROW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TY2
- DRILL SEED(PERM)(RURAL)(CLAY)
- CONSTRUCTION EXIT TY 1

NOTES:

1. EROSION CONTROL DEVICES SHALL NOT BE INSTALLED ANY SOONER THAN 2 WEEKS PRIOR TO THE START OF CONSTRUCTION ACTIVITY AND SHALL REMAIN IN PLACE UNTIL SOILS ARE STABILIZED IN THEIR CONTROL AREA.
2. LOCATION OF EROSION CONTROL DEVICES ARE APPROXIMATIONS. ACTUAL LOCATIONS TO BE ADJUSTED TO ADDRESS FIELD CONDITIONS, UPON ENGINEER'S DIRECTION OR AUTHORIZATION.
3. LOCATIONS OF CONSTRUCTION EXITS TO BE ADJUSTED TO ADDRESS FIELD CONDITIONS, UPON ENGINEER'S DIRECTION OR AUTHORIZATION.
4. CONTRACTOR IS TO COMPLY WITH THE CGP (TXR150000), AND ALL LOCAL, STATE, AND FEDERAL REGULATIONS.
5. SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIMEFRAMES.

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
P.E.
6/21/2024

NO.	DATE	REVISION	APPROVED

LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

BARNES BRIDGE RD

SW3P LAYOUT

DESIGN	FED. RD. DIV. NO.	PROJECT NO.	HIGHWAY NO.
LTR	6	SEE TITLE SHEET	BBR
CHECK	STATE	DISTRICT	COUNTY
JNV	TEXAS	DAL	DALLAS
DRAWN	CONTROL	SECTION	JOB
LTR	0918	47	288
CHECK			SHEET NO.
JNV			126

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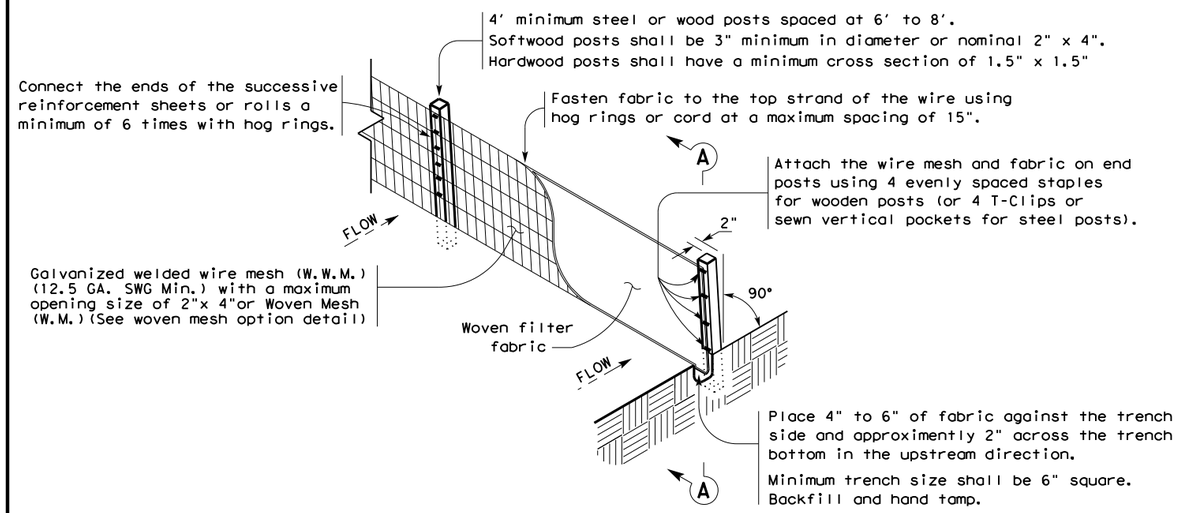
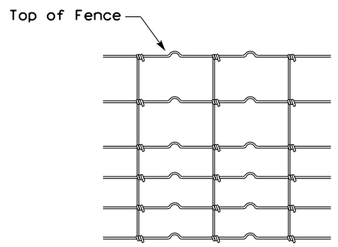
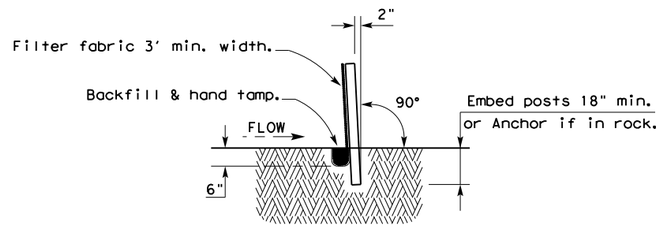


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

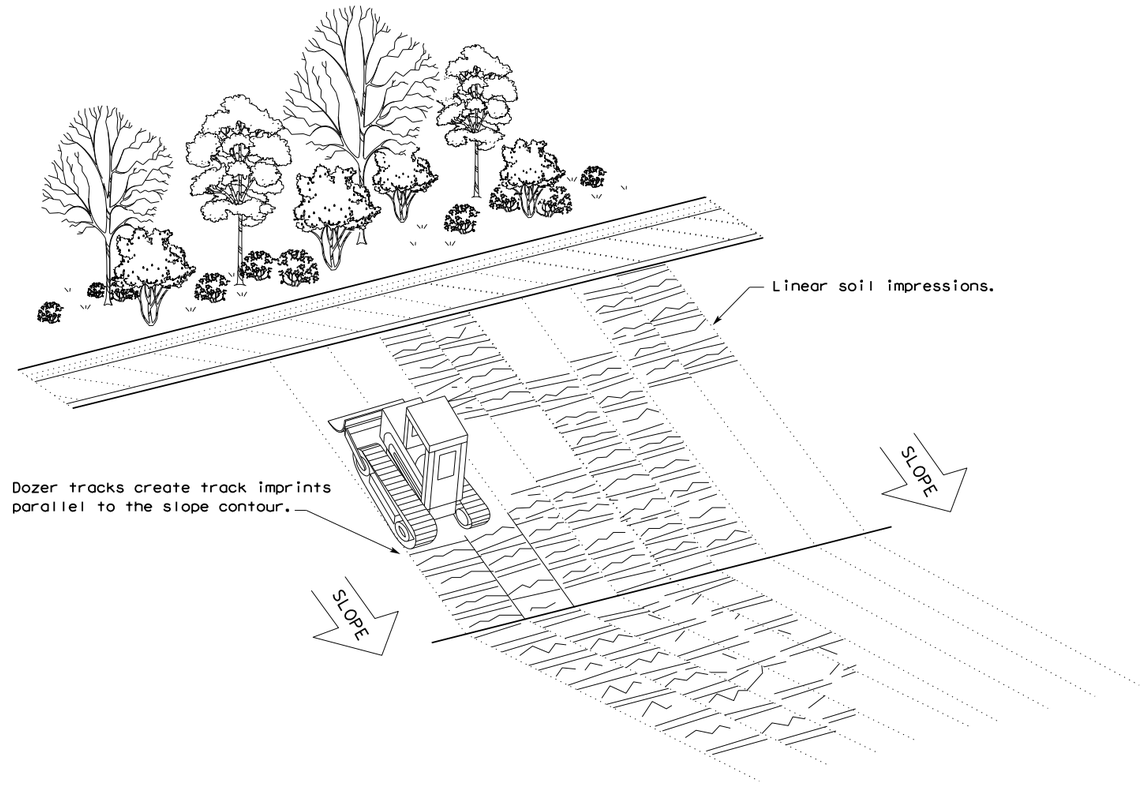
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		127

9/8/2023
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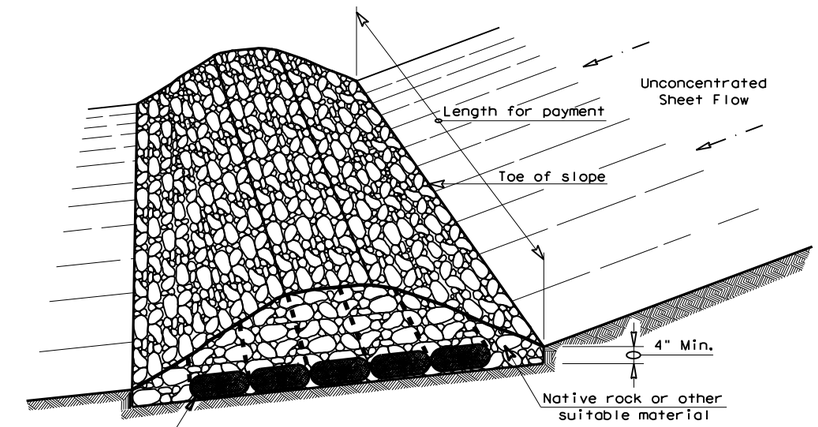
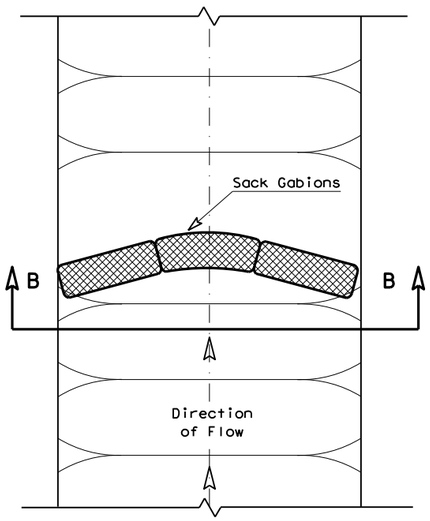
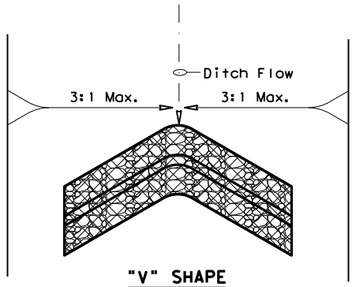


FILTER DAM AT TOE OF SLOPE

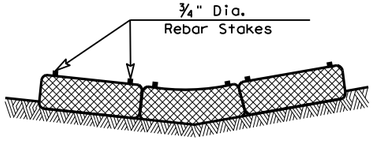
RFD1



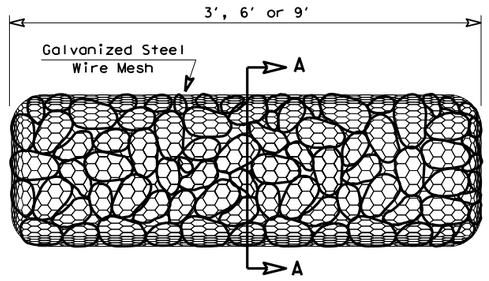
PLAN VIEW



"V" SHAPE PLAN VIEW

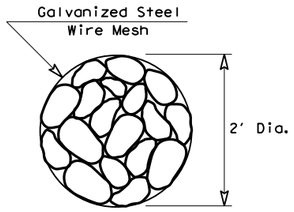


SECTION B-B

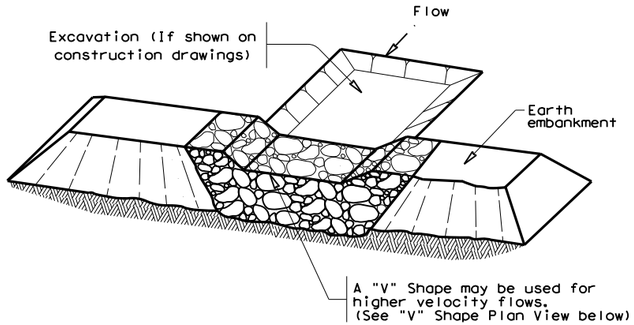


TYPE 4 (SACK GABIONS)

RFD4

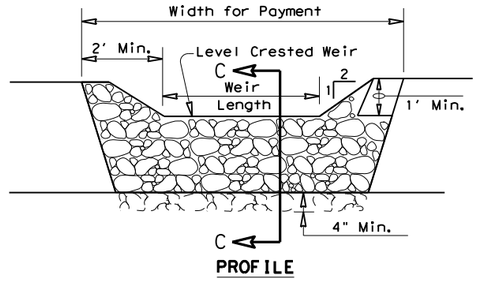


SECTION A-A

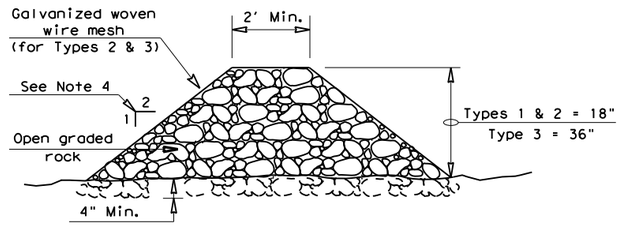


FILTER DAM AT SEDIMENT TRAP

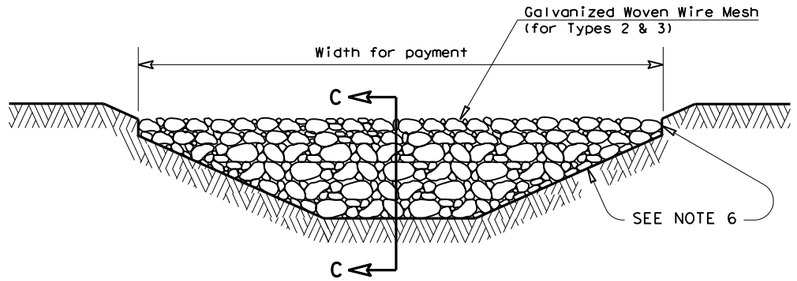
RFD1 — OR — RFD2



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
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		128

DATE: 9/29/2023
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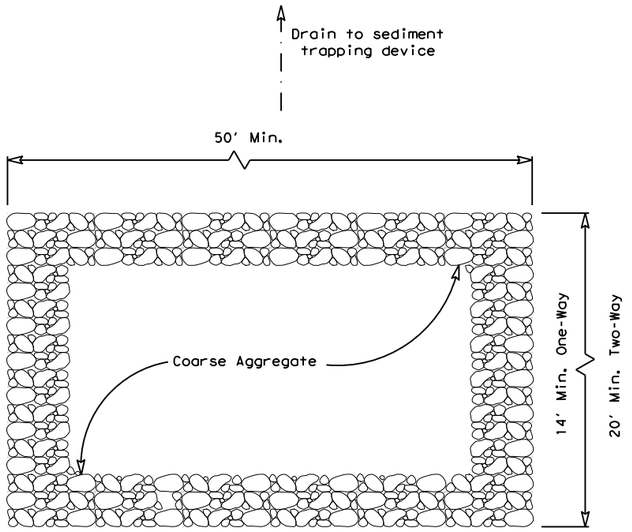
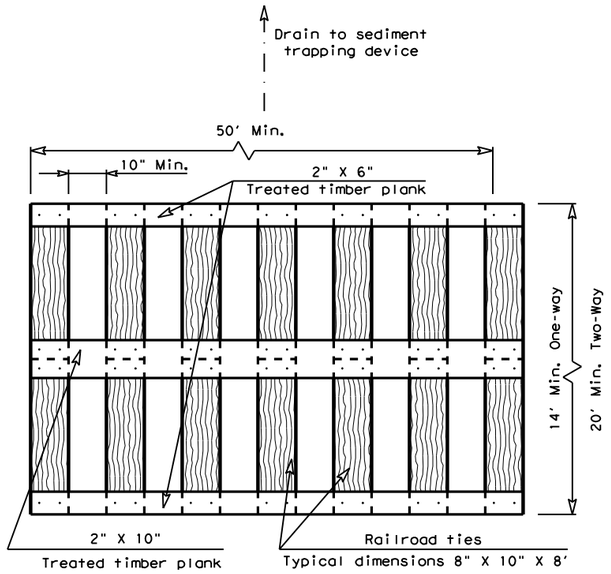
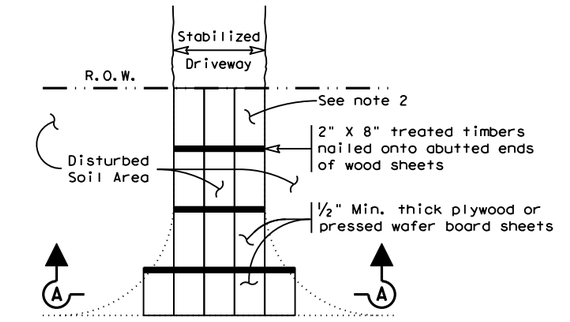


PLAN VIEW



PLAN VIEW



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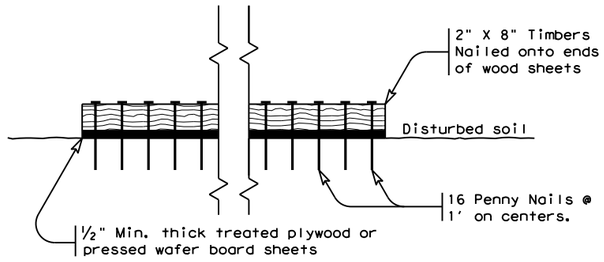
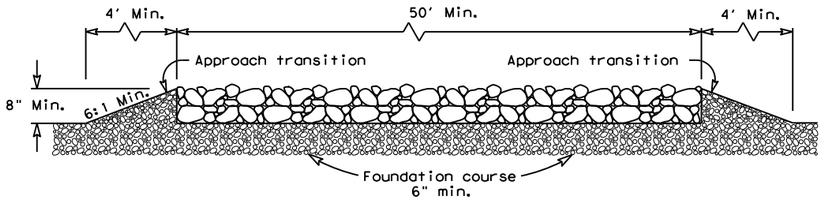


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

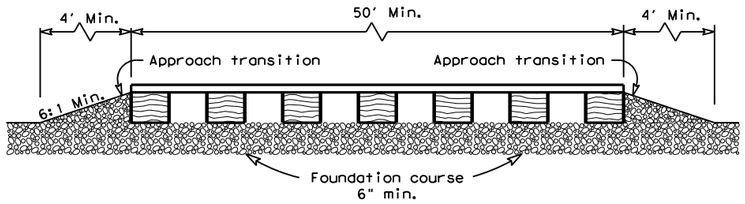
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0918	47	288	BBR
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		129

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)	Pure Live Seed Rate**	PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN)(CLAY)	Pure Live Seed Rate**	TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)	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					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.

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 TGL

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.

**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.

ROADSIDE MOWING ITEM 730* PROJECT MAINTENANCE AC

MOWING NOTES:
1. During project construction, once seed is established, use mowing to promote permanent grasses by mowing any remaining temporary grasses.
2. Also mow established turf and ROW grasses in designated areas of project limits as specified or directed by Engineer.
3. Remove litter and debris prior to mowing.
4. Do not mow on wet ground when soil rutting can occur.
5. Hand-trim around obstructions and stormwater control devices as needed.
6. Maintain paved surfaces free of tracked soils and clipped vegetation.

SEQUENCE OF WORK:

- CULTIVATE SURFACE SOIL.
- PREPARE / PLACE TOPSOIL, OR
- PREPARE / PLACE COMPOST MANUFACTURED TOPSOIL.
- APPLY FERTILIZER AND THEN PLACE SEEDING, OR
- PLACE SOD AND THEN APPLY FERTILIZER.
- CONDUCT VEGETATIVE WATERING.
- CONDUCT ROADSIDE MOWING, AS DIRECTED.

Texas Department of Transportation

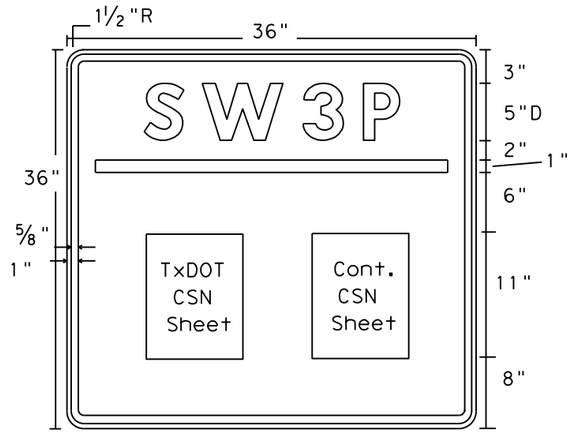
VEGETATION ESTABLISHMENT SHEET

(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		BBR
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DAL	DALLAS	
CHECK	CONTROL	SECTION	JOB	130
XXX	0918	47	288	
CHECK				
XXX				

DATE



SW3P SIGN

TxDOT & Contractor Construction Site Note (CSN)

Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

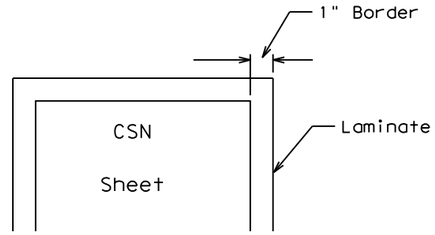
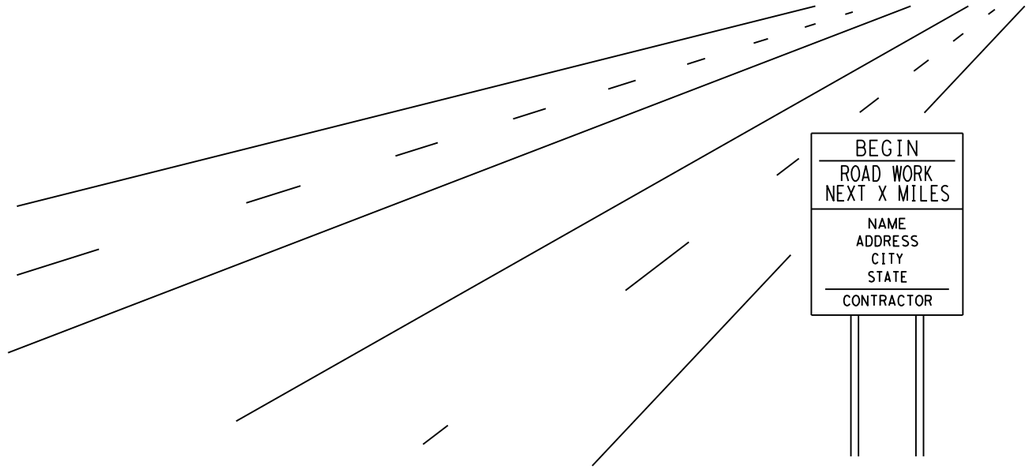
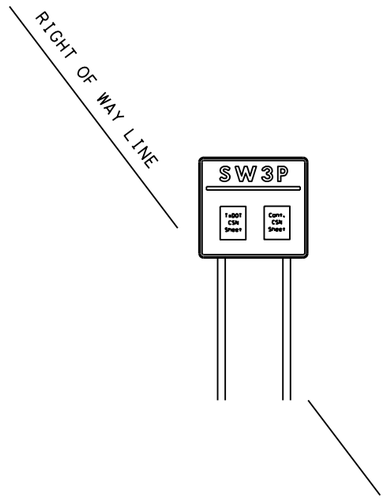


Figure 1





DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE:	DN: TxDOT	CK:	DW:	CK:	
© TxDOT 2016	DISTRICT	PROJECT			SHEET
	DAL	SEE TITLE SHEET			131
REVISION DATE: 10-16-15	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	DALLAS		0918	47	288	BBR

LEVELS DISPLAYED
PATH: