INDEX OF SHEETS

SEE SHEET NO. 2

FINAL PLANS	
Letting Date:	
Name of Contractor:	
Date Work Began:	
Date Work Completed:	
Date Work Accepted:	
Final Contract Cost:	

Project was built according to the Plans & Specifications.
These final plans reflect the work done and the quantities shown thereon and on the Final Estimate are Final Quantities.

Area Engineer Date

Summary of Change Orders:

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

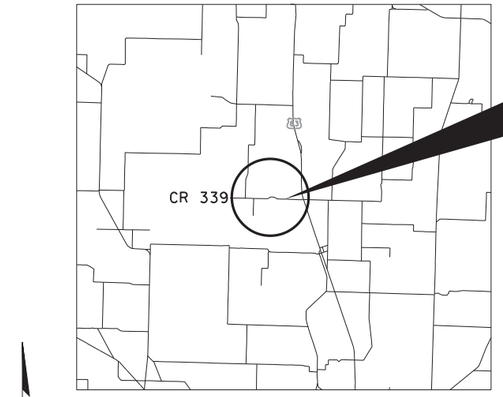
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT BR 2024(802)

CR 339, ETC.
RUNNELS COUNTY

LIMITS: FROM CR 339 AT COYOTE CREEK
AND CR 370 AT OAK CREEK

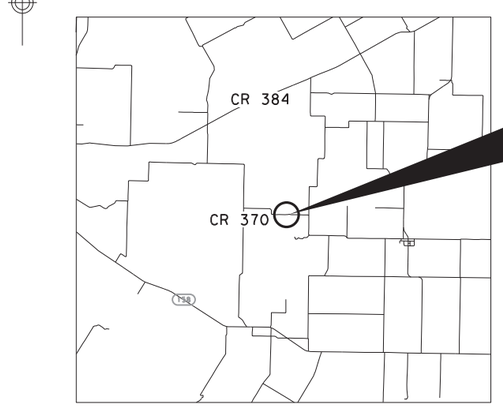
FOR THE CONSTRUCTION OF BRIDGE REPLACEMENTS
CONSISTING OF BRIDGE REPLACEMENT AND APPROACHES



CR 339 AT COYOTE CREEK

BEGIN PROJECT
C-S-J 0907-013-024
STA 15+48.00
TRM 000+0.000
DFO 0.556
MILE POINT 0.556
LATITUDE 31.869517°
LONGITUDE -99.967614°

END PROJECT
STA 19+01.00
TRM 000+0.000
DFO 0.514
MILE POINT 0.514
LATITUDE 31.869509°
LONGITUDE -99.966899°



CR 370 AT OAK CREEK

BEGIN PROJECT
C-S-J 0907-013-025
STA 15+85.00
TRM 000+0.000
DFO 1.076
MILE POINT 1.076
LATITUDE 31.880077°
LONGITUDE -100.183939°

END PROJECT
STA 19+35.00
TRM 000+0.000
DFO 1.1.166
MILE POINT 1.166
LATITUDE 31.880122°
LONGITUDE -100.182406°

EXCEPTIONS
NONE

EQUATIONS
NONE

RAILROAD CROSSINGS
NONE

CR 339
FUNCTIONAL CLASS = RURAL TWO-LANE LOCAL
TERRAIN = ROLLING
DESIGN SPEED = 30
CURRENT ADT (2018) = 17
FUTURE ADT (2042) = 39

CR 370
FUNCTIONAL CLASS = RURAL TWO-LANE LOCAL
TERRAIN = ROLLING
DESIGN SPEED = 30
CURRENT ADT (2018) = 23
FUTURE ADT (2042) = 39

FEDERAL-AID PROJECT NUMBER			
BR 2024(802)			
CONT.	SECT.	JOB	HIGHWAY
0907	13	024, ETC	CR 339, ETC
DIST.	COUNTY		SHEET NO.
SJT	RUNNELS		1

CR 339
NET LENGTH OF PROJECT
CSJ: 0907-13-024
ROADWAY = 218.0 FT = 0.041 MI
BRIDGE = 135.0 FT = 0.026 MI
TOTAL = 353.0 FT = 0.067 MI

CR 370
NET LENGTH OF PROJECT
CSJ: 0907-13-025
ROADWAY = 230.0 FT = 0.044 MI
BRIDGE = 120.0 FT = 0.023 MI
TOTAL = 350.0 FT = 0.067 MI

DOCUMENT IS NOT INTENDED FOR REVIEW AND NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES
MICHAEL D. VERHOEF
128002
TEXAS SERIAL NUMBER
7/30/2024
DATE

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 AND SPECIFICATION ITEMS 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).

2024
Texas Department of Transportation

SUBMITTED FOR LETTING: 8/1/2024

DocuSigned by:
Nicholas Greenly
DDF89C6522AF49E...
District Design Engineer

RECOMMENDED FOR LETTING: 8/1/2024

DocuSigned by:
826185212F51427...
District Director of TP&D

APPROVED FOR LETTING: 8/1/2024

DocuSigned by:
BC10B17FA709437...
District Engineer

DATE: 7/30/2024 1:09:15 PM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/01-General/SABRIDGE-TITLE.dgn

SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3, 3A		GENERAL NOTES
4 - 5		TYPICAL SECTIONS
6		QUANTITY SUMMARY
7		ESTIMATE & QUANTITY
		TRAFFIC CONTROL PLAN
8		SEQUENCE OF CONSTRUCTION
9		CR 339 DETOUR LAYOUT
10		CR 370 DETOUR LAYOUT
		TRAFFIC CONTROL STANDARDS
11 - 22	*	BC (1) - 21 THRU BC (12) - 21
23	*	TCP (1-1) - 18
24	*	TCP (2-1) - 18
25	*	WZ (BRK) - 13
26	*	WZ (RCD) - 13
		ROADWAY DETAILS
27		CR 339 CONTROL INDEX SHEET
28 - 29		CR 370 CONTROL INDEX SHEET
30		CR 339 CONTROL DETAIL SHEET
31		CR 370 CONTROL DETAIL SHEET
32		HORIZONTAL ALIGNMENT DATA SHEET
33		CR 339 REMOVAL LAYOUT
34		CR 370 REMOVAL LAYOUT
35		CR 339 ROADWAY PLAN & PROFILE
36		CR 370 ROADWAY PLAN & PROFILE
		ROADWAY STANDARDS
37	*	GF (31) - 19
38	*	GF (31) MS - 19
39	*	SGT (10S) 31 - 16
40	*	SGT (11S) 31 - 18
		DRAINAGE
41		DRAINAGE AREA MAP CR 370 AT OAK CREEK
42		HYDRAULIC DATA CR 370 AT OAK CREEK
43		HEC-RAS COMPUTATIONS CR 370 AT OAK CREEK
44		DRAINAGE AREA MAP CR 339 AT COYOTE CREEK
45		HYDRAULIC DATA CR 339 AT COYOTE CREEK
46		HEC-RAS COMPUTATIONS CR 339 AT COYOTE CREEK
		UTILITIES
47 - 48		SAN ANGELO BRIDGES EXISTING UTILITY PLANS
		BRIDGE
49 - 52		SOIL BORING LOGS
53		BRIDGE LAYOUT COYOTE CREEK BRIDGE
54		BRIDGE SUMMARY OF QUANTITIES AND CAP ELEV COYOTE CREEK BRIDGE
55		BRIDGE LAYOUT OAK CREEK BRIDGE
56		BRIDGE SUMMARY OF QUANTITIES AND CAP ELEV OAK CREEK BRIDGE

SHEET NO.		DESCRIPTION
		BRIDGE STANDARDS
57	*	APSB-24
58	*	APSB-24-15
59	*	BAS-A
60	*	BPSB-24
61	*	BPSB-24-15
62 - 63	*	CSAB
64 - 65	*	FD
66	*	NBIS
67	*	PSB-5SB12
68	*	PSB-5SB15
69	*	PSBEB
70	*	PSBRA
71	*	PSBSD
72	*	SEJ-M
73	*	SPSB-24
74	*	SPSB-24-15 (MOD)
75 - 76	*	SRR
77 - 79	*	TYPE T223
		TRAFFIC STANDARDS
80	*	D&OM (1) - 20
81	*	D&OM (2) - 20
82	*	D&OM (3) - 20
83	*	D&OM (4) - 20
84	*	D&OM (5) - 20
85	*	D&OM (6) - 20
86	*	SMD (2-1) - 08
		ENVIRONMENTAL
87 - 88		SW3P Notes CR 339
89 - 90		SW3P Notes CR 370
91		EPIC CR 339
92		EPIC CR 370
93		CR 339 SW3P LAYOUT
94		CR 370 SW3P LAYOUT
95	*	EC (1) - 16

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

Michael Verhoff 8/1/24

MICHAEL D. VERHOEF, P.E. DATE

100% SUBMITTAL

DOCUMENT IS FOR REVIEW AND NOT INTENDED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.
MICHAEL D. VERHOEF
128002
TEXAS SERIAL NUMBER
8/1/2024
DATE

STATE OF TEXAS · MICHAEL D. VERHOEF · 128002 · LICENSED PROFESSIONAL ENGINEER

08/01/24

Michael Verhoff

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

INDEX OF SHEETS

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	2

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SABRIDGE-INDEX.dgn

GENERAL NOTES

The following Standard Sheets have been modified: SPSB-24-15

Locate the project bulletin board at an approved location within the project limits such as at a field office, staging area, or stockpile, and make accessible to the public at all times. Do not remove the bulletin board from the project until approved. If a construction site notice is required for the project, post a copy at each geographically separated work location.

In those instances where fixed features require, vary the governing slopes indicated in these plans from within the limits to the extent determined.

If Contractor elects to establish a pit within 200 ft. of a public road, construct a barrier or other device in accordance with Natural Resources Code, Chapter 133, and Section 133.041.

Do not use salt water with solids in excess of 10,000 parts per million, as determined by evaporation.

Contractor questions on this project are to be addressed by the following individual:

Klinton Kuntz, P.E.; email Klinton.Kuntz@txdot.gov and Mitchell Gatlin, P.E.; email Thomas.Gatlin@txdot.gov

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

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

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.

A copy of the 3D model or cross-sections and earthwork data may be obtained by qualified bidders by sending a request to the following set of email addresses:

Klinton Kuntz, P.E. and Mitchell Gatlin, P.E.; emails Klinton.Kuntz @txdot.gov and Thomas.Gatlin@txdot.gov

County: Runnels **Sheet:** 3

Highway: CR 339, etc. **Control:** 0907-13-024, etc.

Data as provided is for non-construction purposes only and it is the responsibility of the prospective bidder to validate this information with the appropriate plans and Specifications.

Item 5, “Control of the Work”

State Highway right of way markers destroyed by the Contractor shall be replaced by a Texas Registered Professional Land Surveyor (RPLS) at no cost to the State. Provide written documentation from the RPLS attesting to the replacement of the right of way markers.

Make suitable advance notification to affected non-participating municipalities regarding Class B underground facilities, call the Department’s San Angelo District Traffic Office at telephone number (325) 947-9208 to have the Department’s existing traffic signal and illumination utilities located, and call the Department’s San Angelo District Maintenance Office at telephone number (325) 947-9322 to have the Department’s existing irrigation utilities located.

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, “Control of Materials”

When allowed, store materials and equipment in approved areas within the right of way.

Access the work area from the right of way.

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

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

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

Item 7, “Legal Relations and Responsibilities”

No significant traffic generator events have been identified.

Item 8, "Prosecution and Progress"

Submit the sequence of work and estimated progress schedule on paper or as a Portable Document Format (PDF) electronic file compatible with Adobe Systems Incorporated "Acrobat Reader XI". Construction schedules shall be submitted using the "Critical Path Method" per Section 5.5.2

Item 9, "Measurement and Payment"

The progress payment period shall end two working days before the last working day of the month. Deliver invoices to be paid as material on hand on or before the end of the progress payment period.

For projects that include a disadvantaged business enterprises (DBE) goal, provide a conversion rate for units of payment for work subcontracted to DBE if units of payments differ from those shown on the plans.

Item 110, "Excavation"

The Engineer will define unsuitable material.

Item 132, "Embankment"

Furnish Type C material that meets the requirements of the following table:

Grading Requirements Cumulative % Retained On Square Sieves						Soil Constants		Bar Linear Shrinkage
3"	2"	7/8"	3/8"	No. 4	No. 40	L.L. Max	P.I. Max	

Item 247, "Flexible Base"

Stockpile flexible base produced for this project separately from any other stockpiled material and label stockpile with project number, material type, and grade.

Place flexible base in lifts of 8 in. maximum.

Provide 24 hours written notice of intent to begin crushing operations. Materials produced prior to this notice will not be accepted.

Compact using ordinary compaction.

Item 400, "Excavation and Backfill for Structures"

If excavating beyond the dimensions shown on the plans, furnish and install cement stabilized backfill in such areas at no cost.

Use Class C bedding.

County: Runnels **Sheet:** 3A

Highway: CR 339, etc. **Control:** 0907-13-024, etc.

Item 432, "Riprap"

Furnish and install 1/2-in. thick joint filler board conforming to DMS-6310, "Joint Sealants and Fillers" between concrete riprap and adjacent existing concrete, and where directed.

Item 450, "Railing", Item 451, "Retrofit Railing", Item 514, "Permanent Concrete Traffic Barrier"

Furnish and install barrier reflectors on the top of concrete railing.

Obtain approval of drilled holes in existing concrete before placing anchor bars with epoxy.

Construct traffic and combination railings to increased heights to accommodate future overlay.

Existing slab bars are not epoxy coated.

Construct side slot drains at spacing as shown in the plans or as directed.

Item 451, "Retrofit Railing", Item 496, "Removing Structures", Item 542, "Removing Metal Beam Guard Fence"

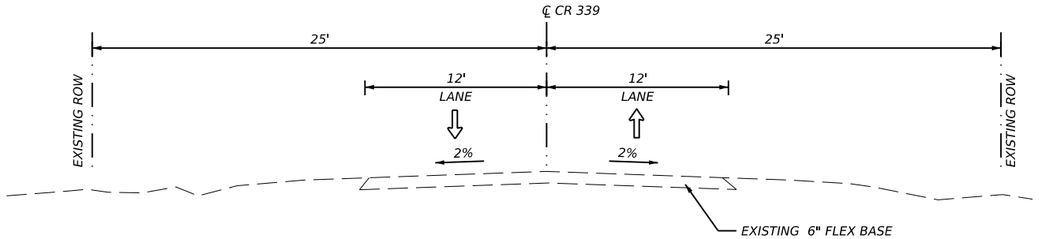
No rail elements to be removed have metal components coated with lead-containing paint (hazardous materials).

Item 496, "Removing Structures"

This item shall include the complete removal and proper disposal of existing structures, including but not limited to the following: culvert barrels, railing, wingwalls, headwalls, retaining walls, safety end treatments, pipe runners, riprap, deck, overlay, approach slabs, joints, beams, bracing, drains, conduits, pipes, bents, abutments, columns, pilings, footings, web-walls, drilled shafts, reinforcing steel, bridge protective assemblies, clearance signs, etc. Portions of the structure at least 2 ft. below the permanent ground line may be left in place as directed.

Item 502, "Barricades, Signs and Traffic Handling"

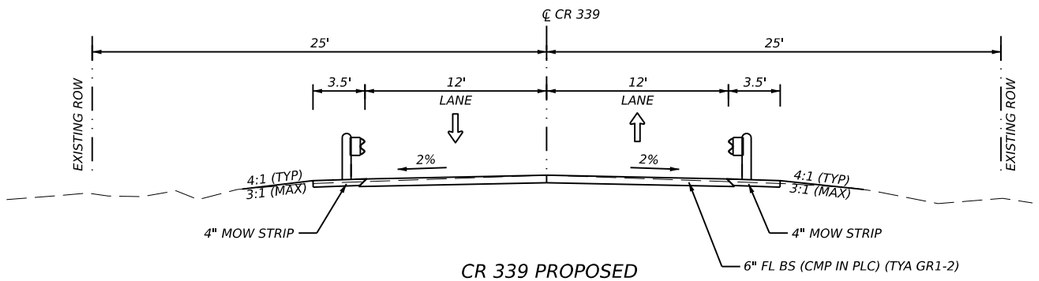
The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be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



CR 339 EXISTING

NTS

STA 15+58.00 TO STA 16+64.70
STA 17+85.91 TO STA 18+93.00



CR 339 PROPOSED

NTS

STA 15+58.00 TO STA 16+58.00
STA 17+93.00 TO STA 18+93.00
STA 16+58.00 TO STA 17+93.00 SEE NOTE 1

NOTE:

1. REFER TO BRIDGE LAYOUT FOR BRIDGE TYPICAL SECTION.

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 339
TYPICAL SECTIONS

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	4

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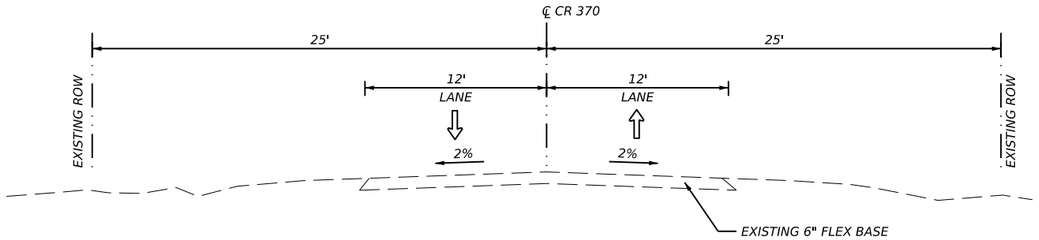
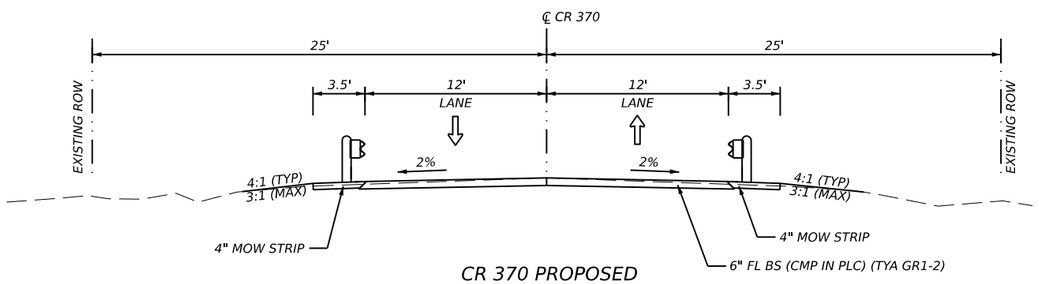
SABRIDGE-GEN-ROADWAY-TYP-CR339.dgn



CR 370 EXISTING

NTS

STA 15+85.00 TO STA 17+15.92
STA 18+07.05 TO STA 19+35.00



CR 370 PROPOSED

NTS

STA 15+85.00 TO STA 17+02.00
STA 18+22.00 TO STA 19+35.00
STA 17+02.00 TO STA 18+22.00 SEE NOTE 1

NOTE:

1. REFER TO BRIDGE LAYOUT FOR BRIDGE TYPICAL SECTION.

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

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Texas Department of Transportation

CR 370
TYPICAL SECTIONS

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	5

SUMMARY OF ROADWAY ITEMS

LOCATION	100 7002 PREPARING ROW STA	110 7001 EXCAV (ROADWAY) CY	132 7006 EMBANK (FNL) (DC) (TY C) CY	247 7044 FL BS (CMP IN PLC) (TY A GR 1-2) (6") SY	432 7044 RIPRAP (STONE PROTECTION) (21 IN) CY	432 7013 RIPRAP (MOW STRIP) (4 IN) CY	540 7001 MTL W-BEAM GD FEN (TIM POST) LF	540 7005 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	544 7001 GUARDRAIL END TREATMENT (INSTALL) EA
CR 339 CSJ: 0907-13-024	4.5	58	60	385	78	20	100	4	4
CR 370 CSJ: 0907-13-025	4.5	253	136	455	220	20	100	4	4
PROJECT TOTALS	9	311	196	840	298	40	200	8	8

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	503 7002 PORTABLE CHANGEABLE MESSAGE SIGN EA	505 7001 TMA (STATIONARY) DAY
CR 339 CSJ: 0907-13-024	2	7
CR 370 CSJ: 0907-13-025	2	7
PROJECT TOTALS	4	14

SUMMARY OF REMOVAL ITEMS

LOCATION	105 7028 RMV (8") TRT/UNTRT BASE & ASPH PAV SY	496 7010 REMOV STR (BRIDGE 100 - 499 FT LENGTH) EA
CR 339 CSJ: 0907-13-024	343	1
CR 370 CSJ: 0907-13-025	378	1
PROJECT TOTALS	721	2

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	506 7039 TEMP SDMT CONT FENCE (INSTALL) LF	506 7041 TEMP SDMT CONT FENCE (REMOVE) LF
CR 339 CSJ: 0907-13-024	60	60
CR 370 CSJ: 0907-13-025	60	60
PROJECT TOTALS	120	120

SUMMARY OF BRIDGE ITEMS

NBI: 07-200-0-AA03-39-002

LOCATION	400 7010 CEM STABIL BKFL CY	416 7004 DRILL SHAFT (24 IN) LF	420 7012 CL C CONC (ABUT) CY	420 7022 CL C CONC (CAP) CY	420 7038 CL C CONC (COLUMN) CY	422 7001 REINF CONC SLAB SF	422 7013 APPROACH SLAB CY	425 7017 PRESTR CONC SLAB BEAM (5SB15) LF	450 7008 RAIL (TY T223) LF	454 7001 TYPE A JOINT LF	496 7009 REMOV STR (BRIDGE 0 - 99 FT LENGTH) EA	4171 7001 INSTALL BRIDGE IDENTIFICATION NUMBERS EA
CR 339 CSJ: 0907-13-024												
2 - ABUTMENTS	27	180	19.0				43		24.0	81		2
3 - BENTS		366		20.7	5.2							
75.00' PRESTR CONCRETE SLAB BEAM UNIT 1						1950		369.96	150.0		0.5	
60.00' PRESTR CONCRETE SLAB BEAM UNIT 2						1560		294.96	120.0		0.5	
PROJECT TOTALS	27	546	19.0	20.7	5.2	3510	43	664.92	294.0	81	1	2

* THIS ITEM IS SUBSIDIARY TO ITEM 420 - CONCRETE STRUCTURES

SUMMARY OF BRIDGE ITEMS

NBI: 07-200-0-AA03-70-003

LOCATION	400 7010 CEM STABIL BKFL CY	416 7004 DRILL SHAFT (24 IN) LF	420 7012 CL C CONC (ABUT) CY	420 7022 CL C CONC (CAP) CY	420 7038 CL C CONC (COLUMN) CY	422 7001 REINF CONC SLAB SF	422 7013 APPROACH SLAB CY	425 7017 PRESTR CONC SLAB BEAM (5SB15) LF	450 7008 RAIL (TY T223) LF	454 7004 SEALED EXPANSION JOINT (4 IN) (SEJ-M) LF	496 7009 REMOV STR (BRIDGE 0 - 99 FT LENGTH) EA	4171 7001 INSTALL BRIDGE IDENTIFICATION NUMBERS EA
CR 370 CSJ: 0907-13-025												
2 - ABUTMENTS	25	180	17.6				42		24.0	52		2
2 - BENTS		180		13.2	13.6							
120.00' PRESTR CONCRETE SLAB BEAM UNIT 1						3120		592.55	240.0		1	
PROJECT TOTALS	25	360	17.6	13.2	13.6	3120	42	592.55	264	52	1	2

* THIS ITEM IS SUBSIDIARY TO ITEM 420 - CONCRETE STRUCTURES

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

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Texas Department of Transportation

QUANTITY SUMMARY

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	6

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0907-13-024 **DISTRICT** San Angelo **COUNTY** Runnels
HIGHWAY CR 339, CR 370

			CONTROL SECTION JOB		**0907-13-024**		**0907-13-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00194567**		**A00194568**			
			COUNTY		**Runnels**		**Runnels**			
			HIGHWAY		**CR 339**		**CR 370**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	100-7002	PREPARING ROW		STA	4.500		4.500		9.000	
	105-7028	RMV (8") TRT/UNTRT BASE & ASPH PAV		SY	343.000		378.000		721.000	
	110-7001	EXCAV (ROADWAY)		CY	58.000		253.000		311.000	
	132-7006	EMBANK (FNL)(DC)(TY C)		CY	60.000		136.000		196.000	
	247-7044	FL BS (CMP IN PLC)(TY A GR 1-2) (6")		SY	385.000		455.000		840.000	
	400-7010	CEM STABIL BKFL		CY	27.000		25.000		52.000	
	416-7004	DRILL SHAFT (24 IN)		LF	546.000		360.000		906.000	
	420-7012	CL C CONC (ABUT)		CY	19.000		17.600		36.600	
	420-7022	CL C CONC (CAP)		CY	20.700		13.200		33.900	
	420-7038	CL C CONC (COLUMN)		CY	5.200		13.600		18.800	
	422-7001	REINF CONC SLAB		SF	3,510.000		3,120.000		6,630.000	
	422-7013	APPROACH SLAB		CY	43.000		42.000		85.000	
	425-7017	PRESTR CONC SLAB BEAM (5SB12)		LF	664.920		592.550		1,257.470	
	432-7013	RIPRAP (MOW STRIP)(4 IN)		CY	20.000		20.000		40.000	
	432-7044	RIPRAP (STONE PROTECTION)(21 IN)		CY	78.000		220.000		298.000	
	450-7008	RAIL (TY T223)		LF	294.000		264.000		558.000	
	454-7001	TYPE A JOINT		LF	81.000				81.000	
	454-7004	SEALED EXPANSION JOINT (4 IN) (SEJ - M)		LF			52.000		52.000	
	496-7009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)		EA	1.000		1.000		2.000	
	496-7010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)		EA	1.000		1.000		2.000	
	500-7001	MOBILIZATION		LS	0.500		0.500		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	3.000		3.000		6.000	
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	2.000		2.000		4.000	
	505-7001	TMA (STATIONARY)		DAY	7.000		7.000		14.000	
	506-7039	TEMP SEDMT CONT FENCE (INSTALL)		LF	60.000		60.000		120.000	
	506-7041	TEMP SEDMT CONT FENCE (REMOVE)		LF	60.000		60.000		120.000	
	540-7002	MTL W-BEAM GD FEN (STEEL POST)		LF	100.000		100.000		200.000	
	540-7005	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA	4.000		4.000		8.000	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)		EA	4.000		4.000		8.000	
	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	

GENERAL NOTES:

SIGNS SHALL BE PLACED IN ACCORDANCE WITH THE BARRICADE AND CONSTRUCTION STANDARD DRAWINGS OR AS DIRECTED BY THE ENGINEER. REFER TO THE DETOUR SIGNING LAYOUT IN THE PLANS.

OTHER SIGNS AS DETAILED IN THE BARRICADE AND CONSTRUCTION STANDARD DRAWINGS AND IN THE MOST RECENT VERSION OF THE TMUTCD MAY BE USED AS REQUIRED BY THE ENGINEER IN ORDER TO PROVIDE FOR THE SAFE PASSAGE OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".

CONTRACTOR SHALL PROVIDE ACCESS TO AND FROM DRIVEWAYS AND ALL ADJACENT PROPERTY AT ALL TIMES.

CR 339 & CR 370 TRAFFIC CONTROL SEQUENCE

THE CONTRACTOR SHALL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE AREA ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION, WHICH GENERALLY CONFORMS TO THE FOLLOWING SEQUENCE:

1. INSTALL PROJECT LIMIT SIGNING AND BARRICADES AND SW3P PRIOR TO BEGINNING ANY OTHER WORK.
2. ALL ROAD CLOSURE SIGNING SHALL BE IN PLACE PRIOR TO ANY ACTIVITIES WHICH WILL PROHIBIT THROUGH TRAFFIC AND SHALL BE PLACED MORE THAN 24 HOURS PRIOR TO SUCH ACTIVITY.
3. COMPLETE THE CONSTRUCTION OF THE BRIDGE AND APPROACHES ACCORDING TO THE PLANS AND SPECIFICATIONS AND AS DIRECTED BY THE ENGINEER.
4. THE ROADWAY SHALL BE OPEN TO THROUGH TRAFFIC AS SOON AS DETERMINED PRACTICAL BY THE ENGINEER.
5. COMPLETE ALL OTHER WORK AS DIRECTED BY THE ENGINEER.

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

REV. NO.	DATE	DESCRIPTION	BY

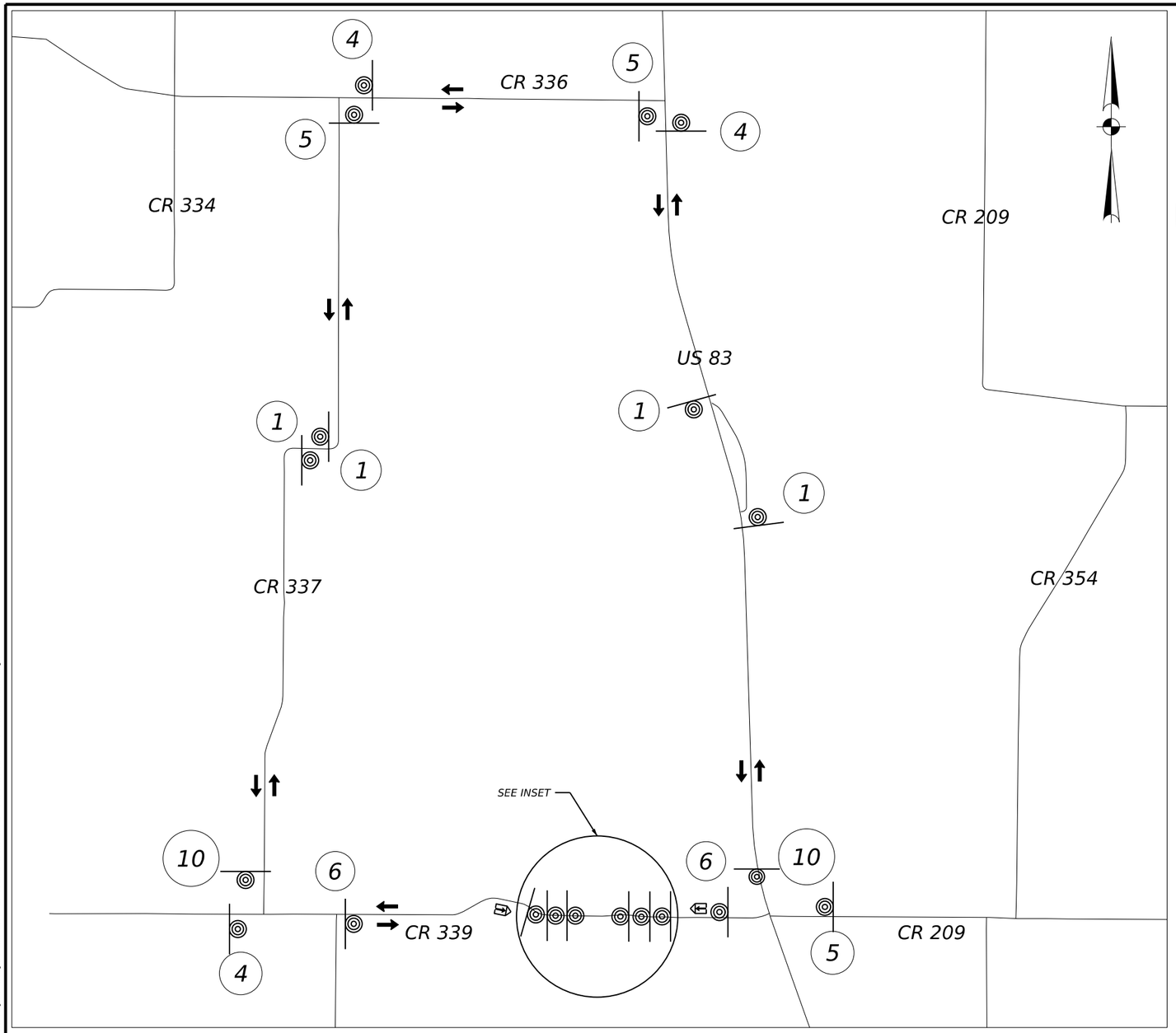
CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

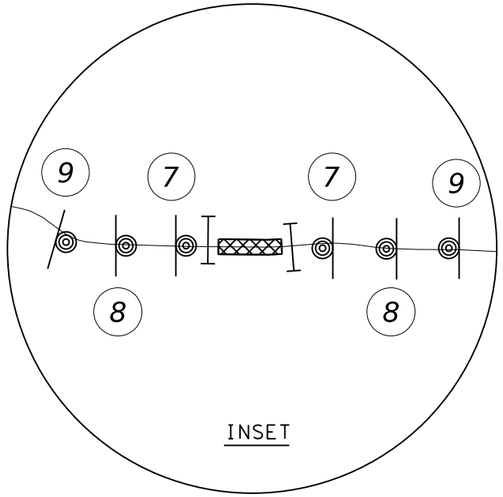
Texas Department of Transportation

SEQUENCE OF CONSTRUCTION

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	8

SABRIDGE-TCP-NAR.dgn





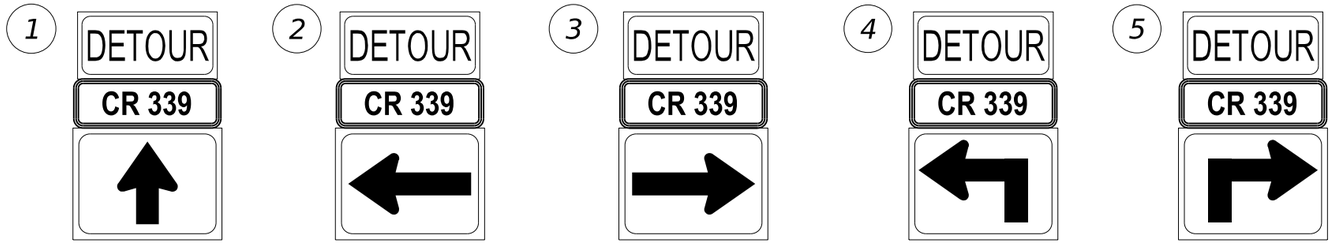
INSET

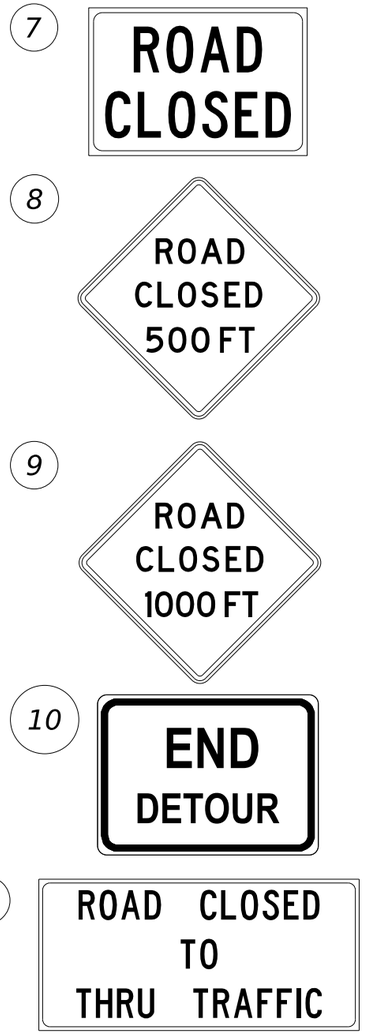
LEGEND:

- SIGN
- DIRECTION OF TRAFFIC
- PCMS
- TYPE III BARRICADE
- CONSTRUCTION ZONE

NOTE:

1. PCMS SHALL BE DEPLOYED AT PROJECT LOCATION IN EACH DIRECTION 1 WEEK PRIOR TO ROAD CLOSURE. "CR 339 TO BE CLOSED" "BEGINS [DATE] ENDS [DATE]"
2. REFER TO STANDARD BC(6)-21 FOR FURTHER INFORMATION.





100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

0 500 1000 2000

REV. NO.	DATE	DESCRIPTION	BY

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713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 339 DETOUR LAYOUT

FED. RD. DIV. NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	9

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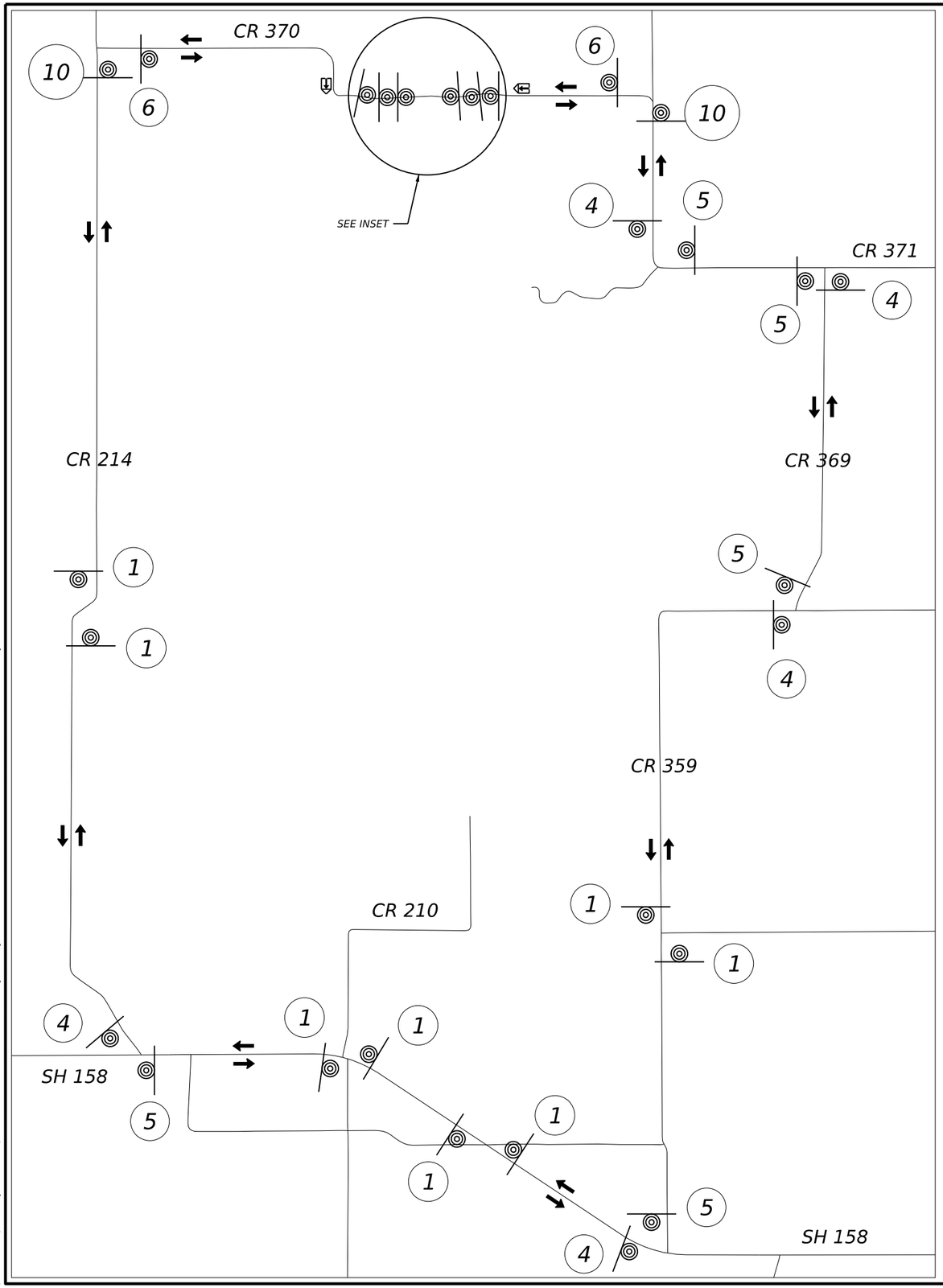
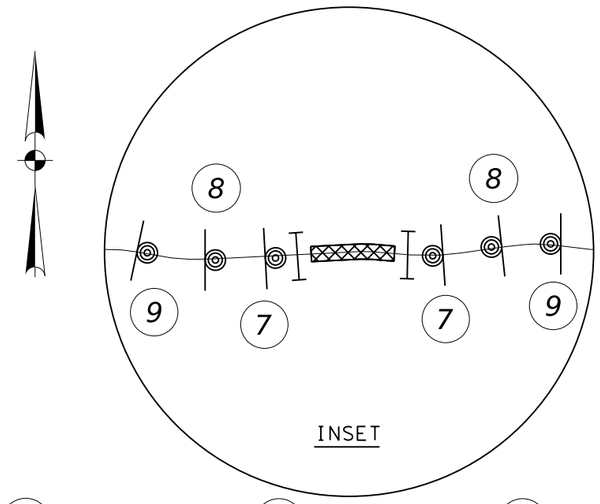
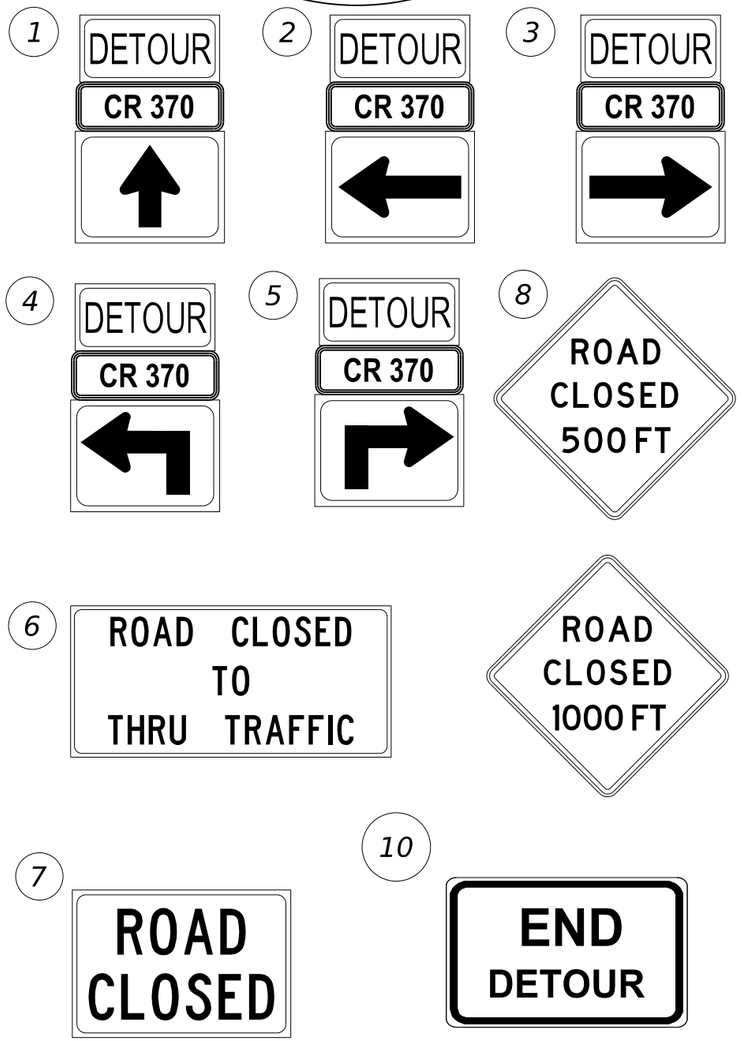




LEGEND:

- SIGN
- DIRECTION OF TRAFFIC
- PCMS
- TYPE III BARRICADE
- CONSTRUCTION ZONE



NOTE:

1. PCMS SHALL BE DEPLOYED AT PROJECT LOCATION IN EACH DIRECTION 1 WEEK PRIOR TO ROAD CLOSURE. "CR 370 TO BE CLOSED" "BEGINS [DATE] ENDS [DATE]"
2. REFER TO STANDARD BC(6)-21 FOR FURTHER INFORMATION.

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

0 500 1000 2000

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Texas Department of Transportation

CR 370 DETOUR LAYOUT

FED. RD. DIV. NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	10

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		11

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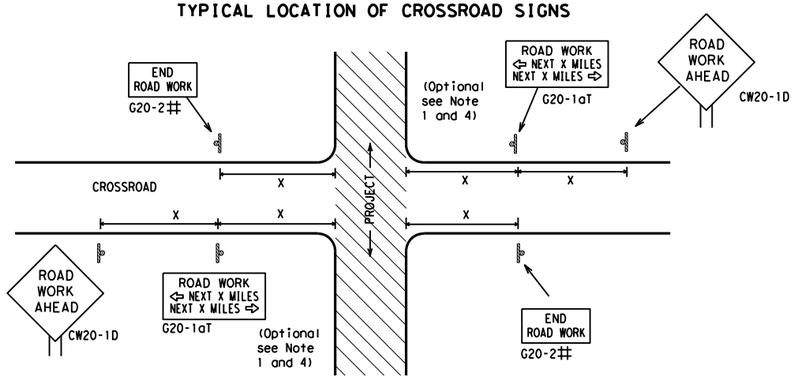
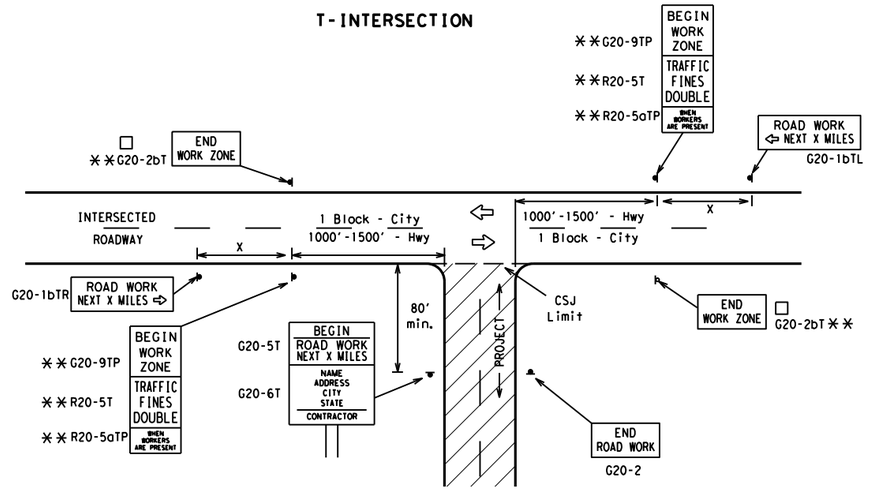
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

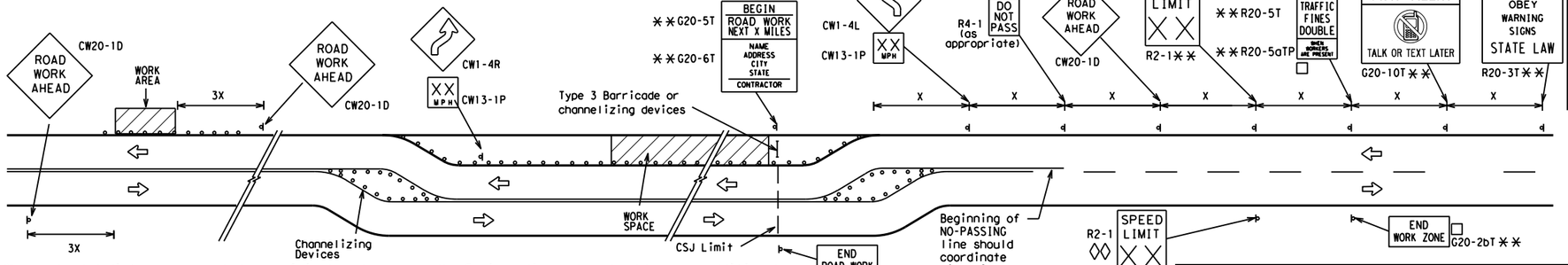
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

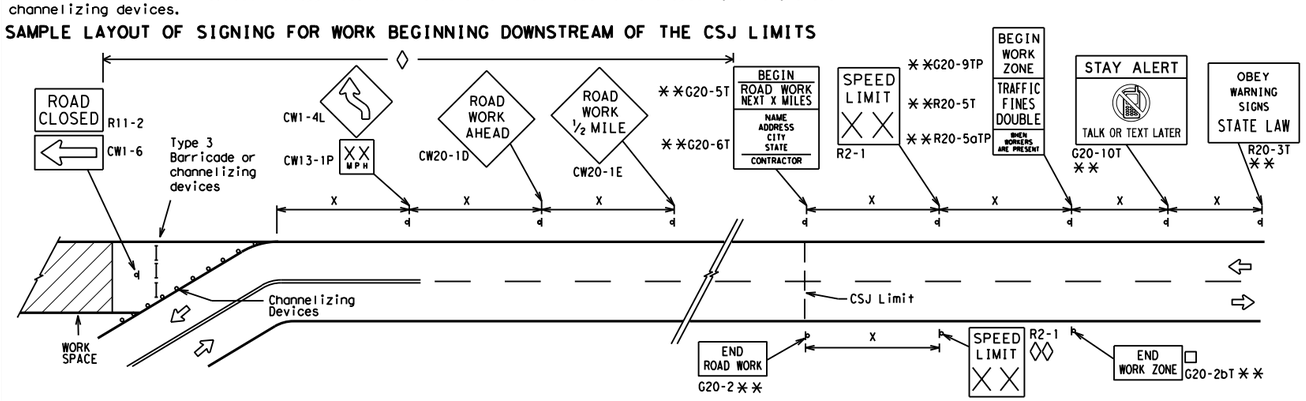
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		12

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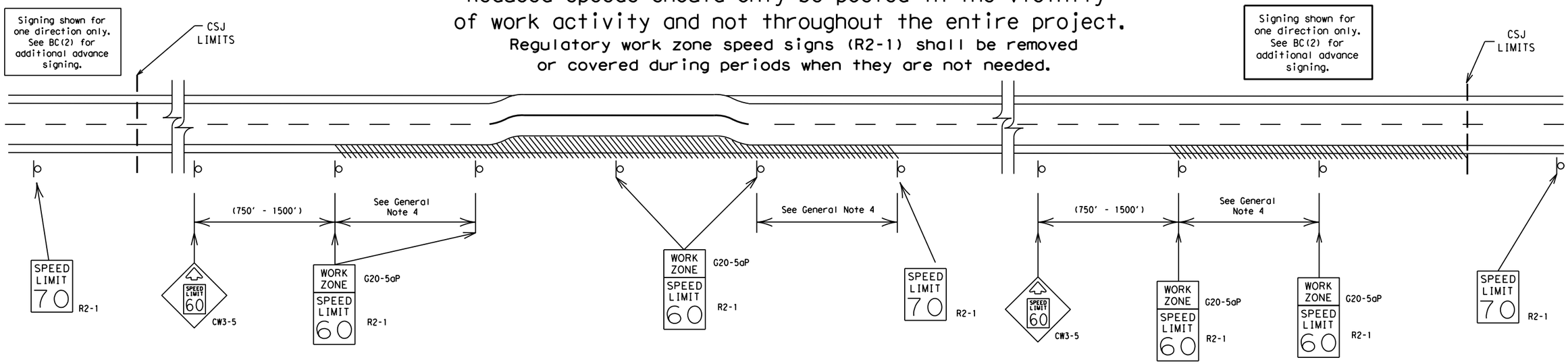
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

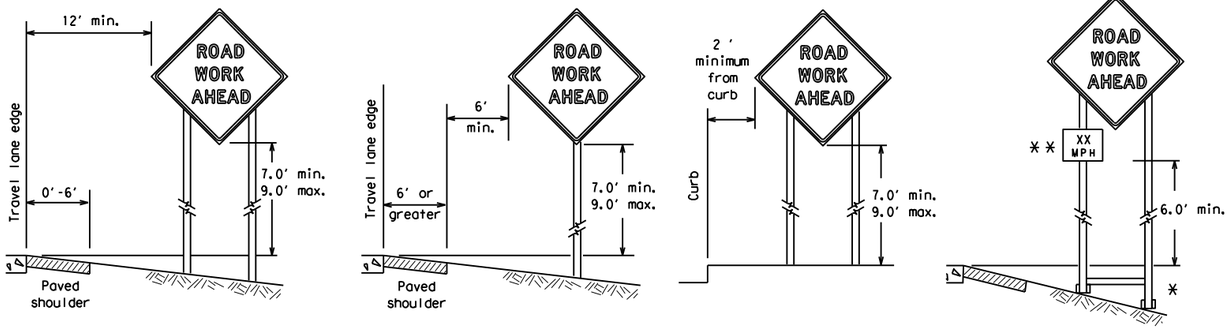
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		13

DATE: 7/30/2024 10:47:31 AM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/02-TCP/Standards/bc-21.dgn

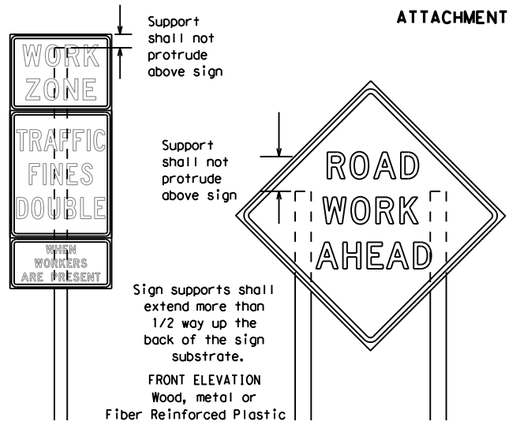
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



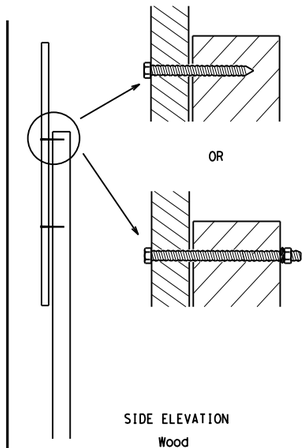
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

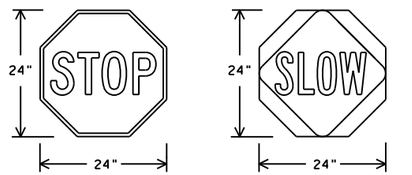


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
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
REVISIONS	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		14

DATE: 7/30/2024 10:47:33 AM
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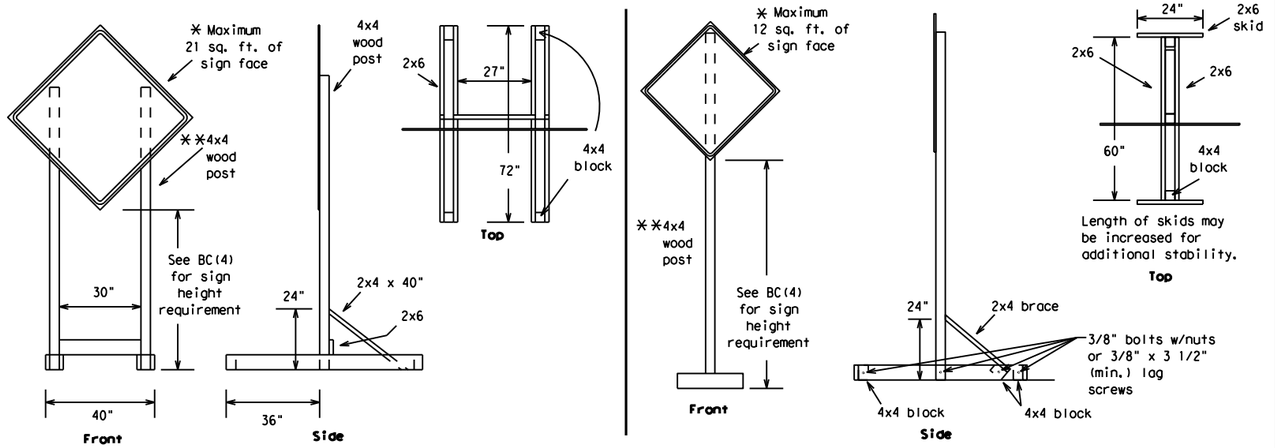
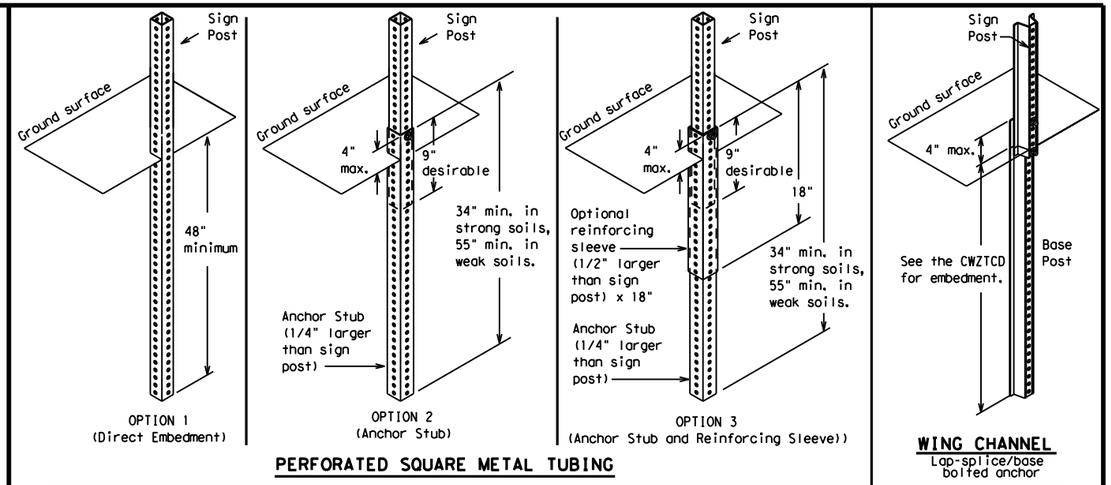


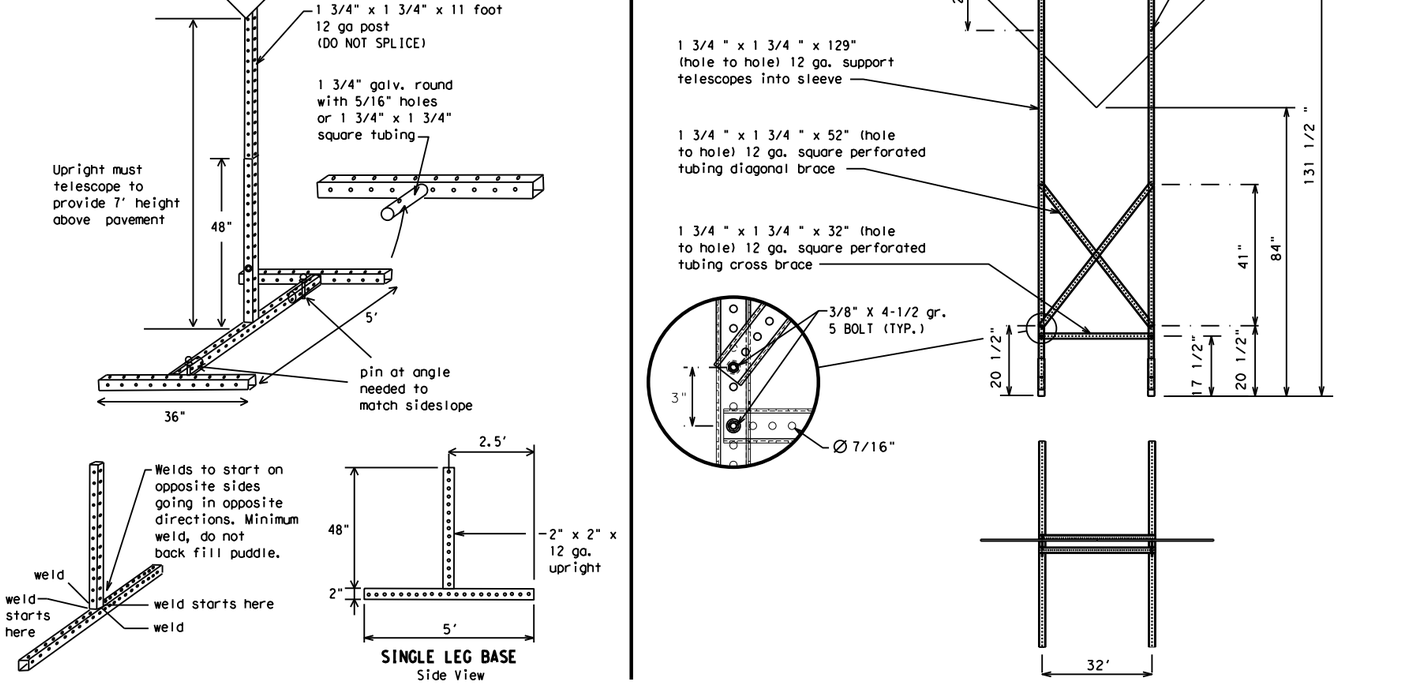
SKID MOUNTED WOOD SIGN SUPPORTS

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



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	SJT	RUNNELS		15

DATE: 7/30/2024 10:47:34 AM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

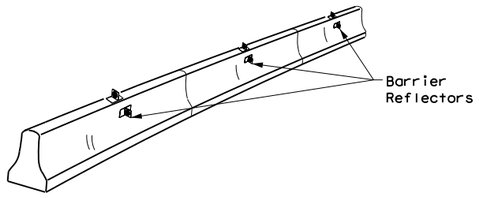
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		16

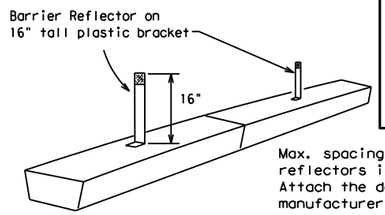
DATE: 7/30/2024 10:47:36 AM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/02-TCP/Standards/bc-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

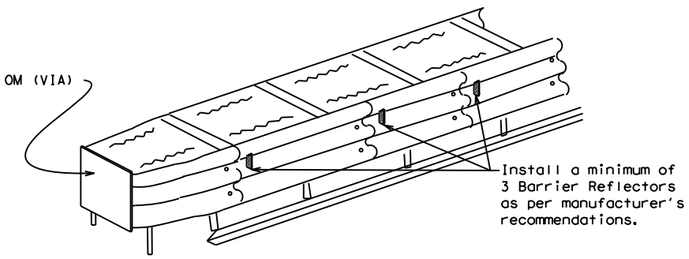


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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

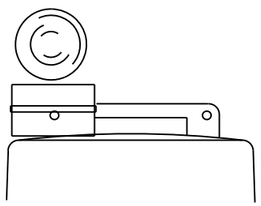
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

WARNING LIGHTS

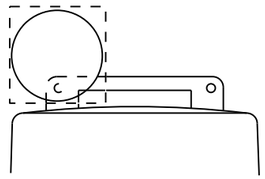
1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this 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.



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

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.



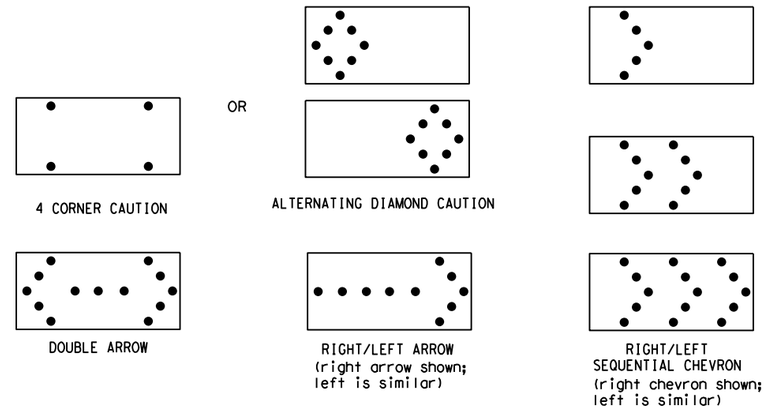
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		17

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DATE: 7/30/2024 10:47:38 AM
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

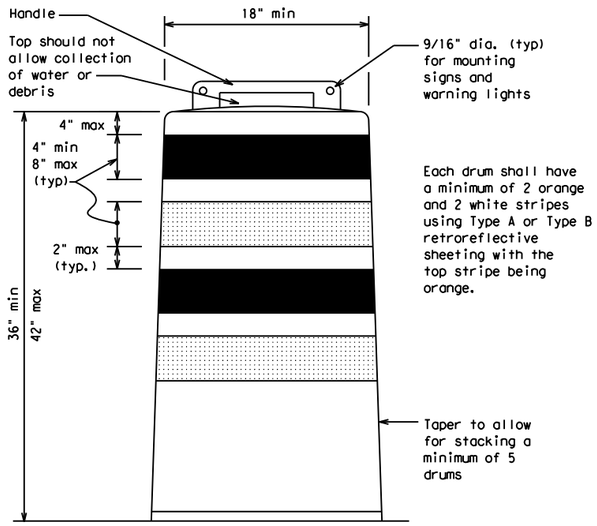
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

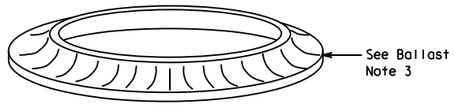
RETROREFLECTIVE SHEETING

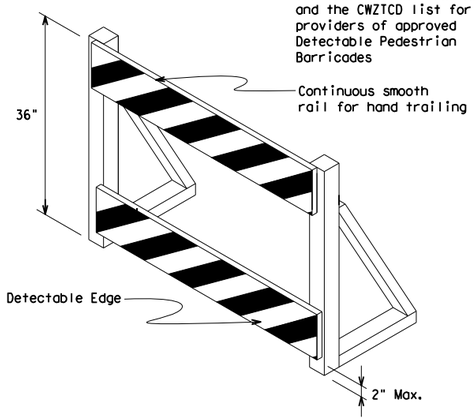
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

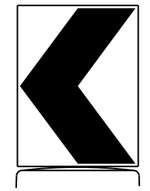




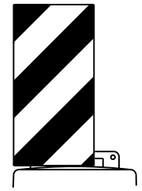


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SJT	RUNNELS		18
7-13				

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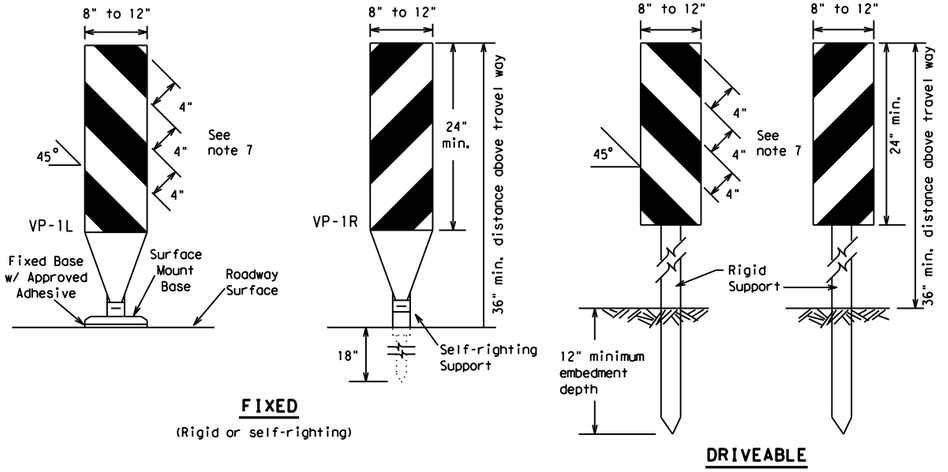
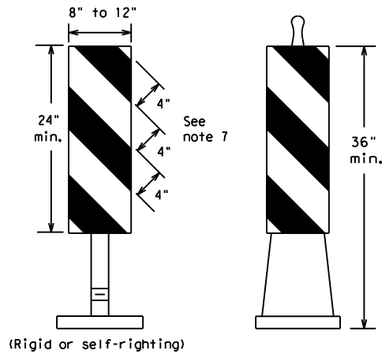


FIXED
(Rigid or self-righting)

DRIVEABLE

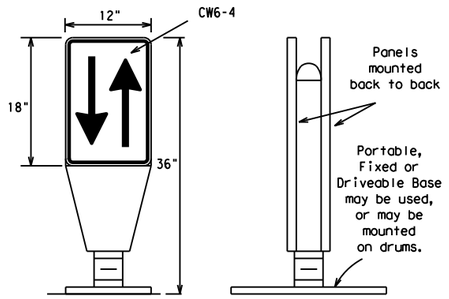


(Rigid or self-righting)

PORTABLE

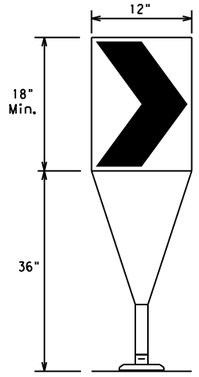
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



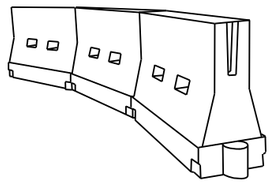
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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
REVISIONS	0907	13	024, ETC	CR 339, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		19

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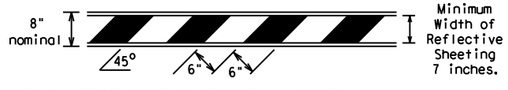
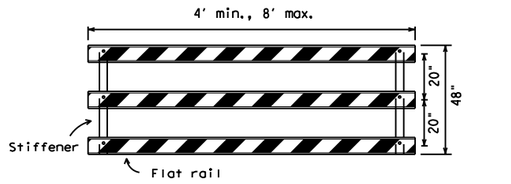
TYPE 3 BARRICADES

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.



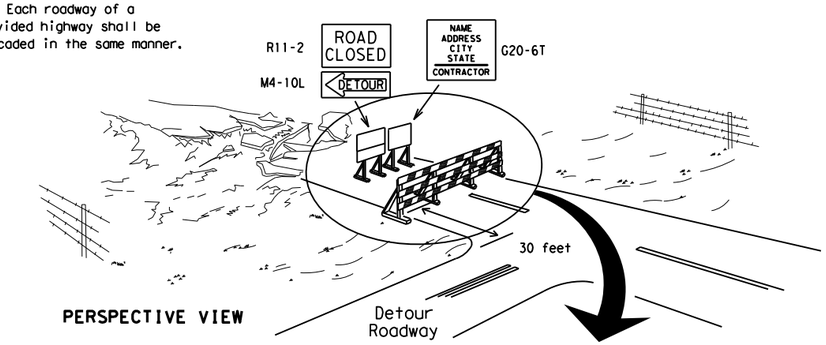
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

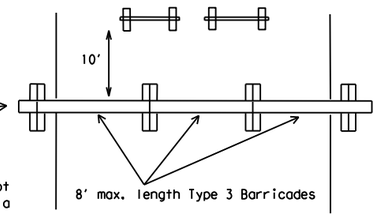
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

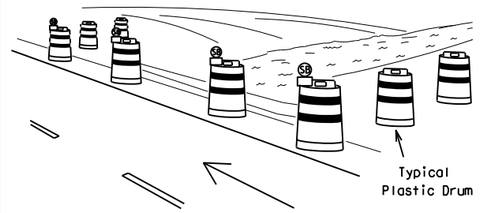
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

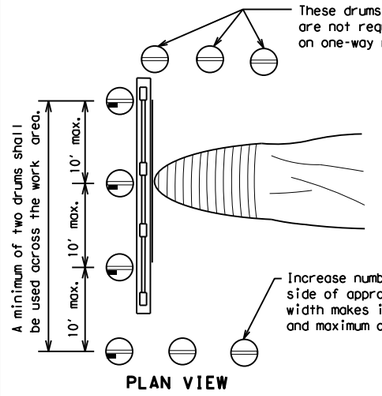
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

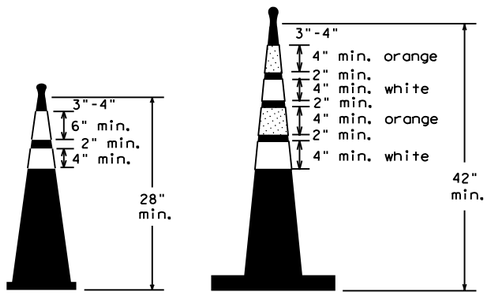
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



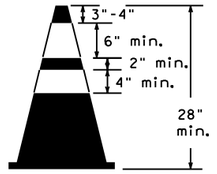
PLAN VIEW

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

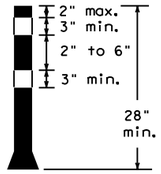
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

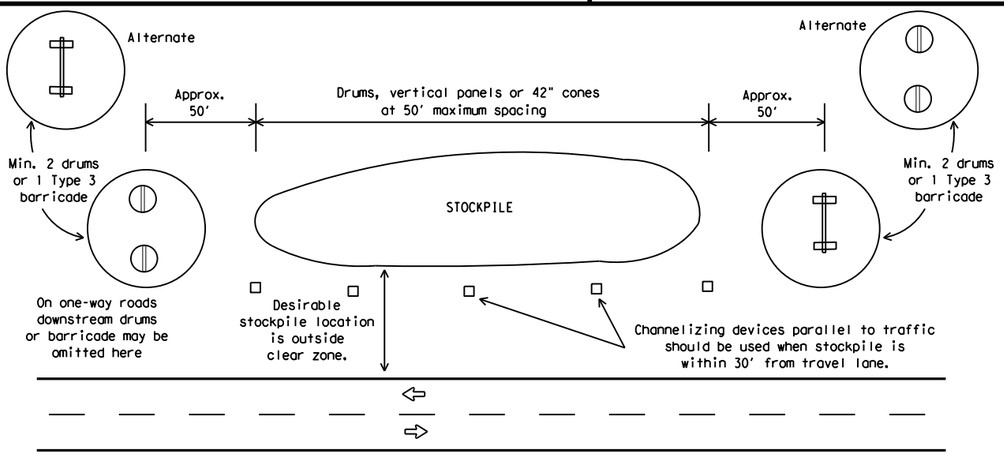


Tubular Marker

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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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		20

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DATE: 7/30/2024 10:47:44 AM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

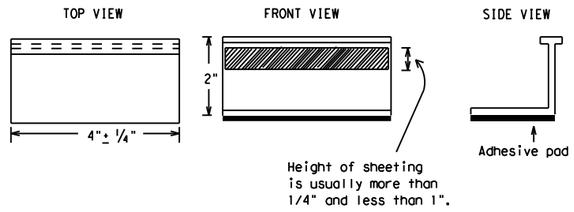
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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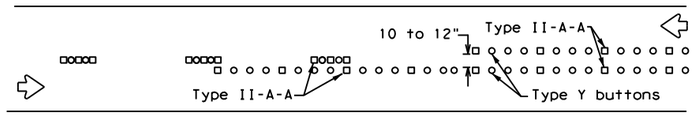
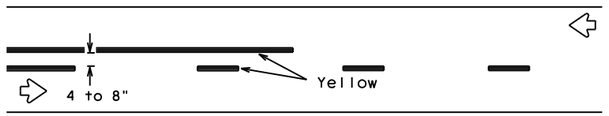
PAVEMENT MARKING PATTERNS

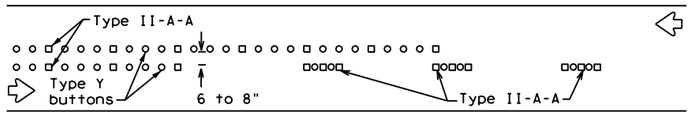
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



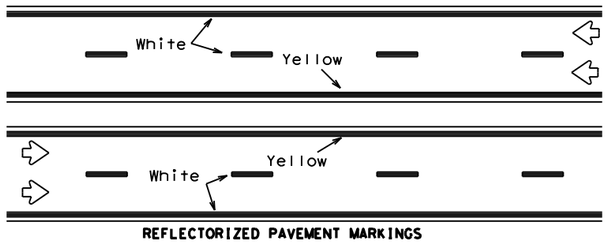
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



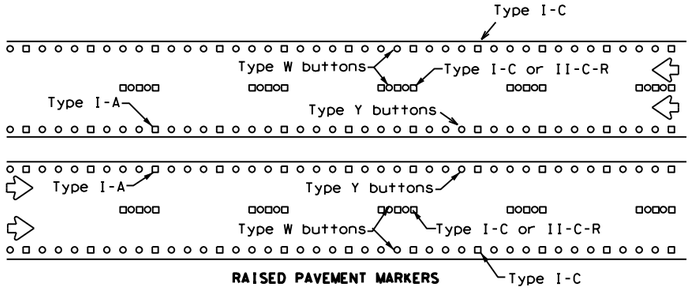
RAISED PAVEMENT MARKERS - PATTERN B

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

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



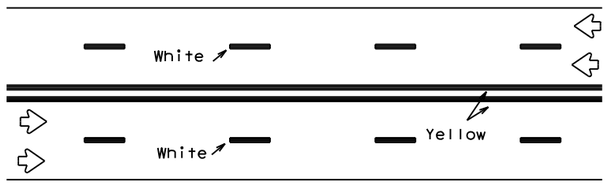
REFLECTORIZED PAVEMENT MARKINGS



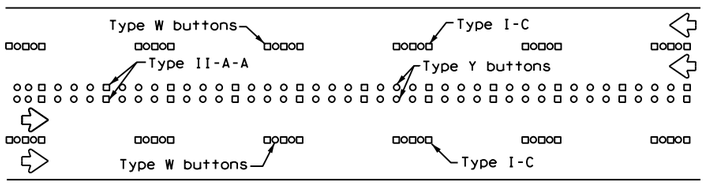
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



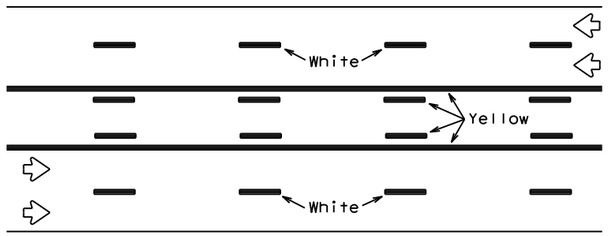
REFLECTORIZED PAVEMENT MARKINGS



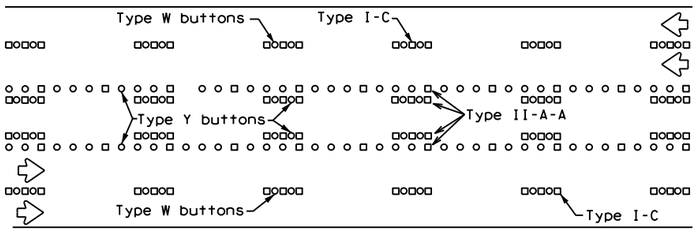
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

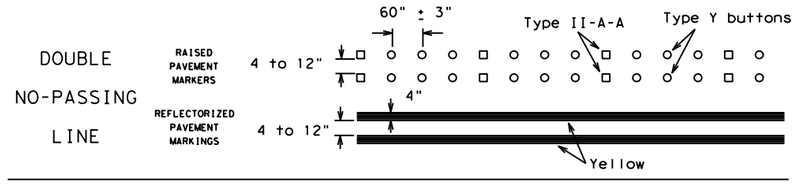
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

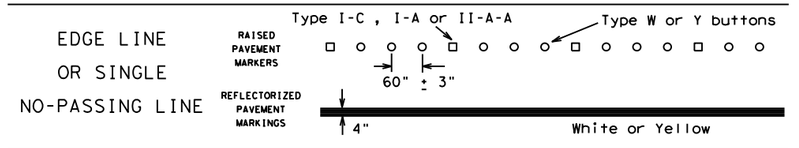
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

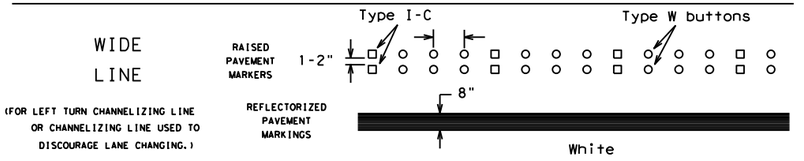


EDGE LINE OR SINGLE NO-PASSING LINE



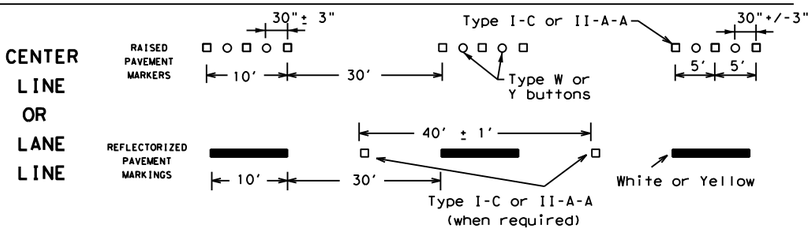
WIDE LINE

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

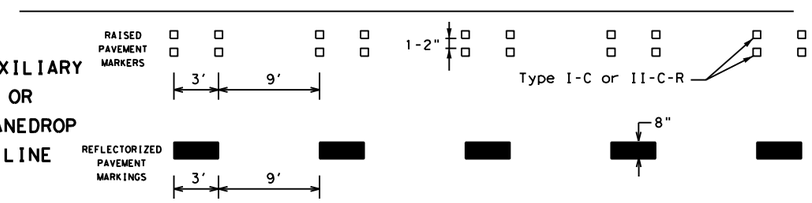


BROKEN LINES

CENTER LINE OR LANE LINE

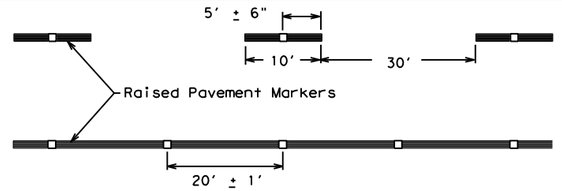


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		22

106

DATE: 7/30/2024 10:48:00 AM
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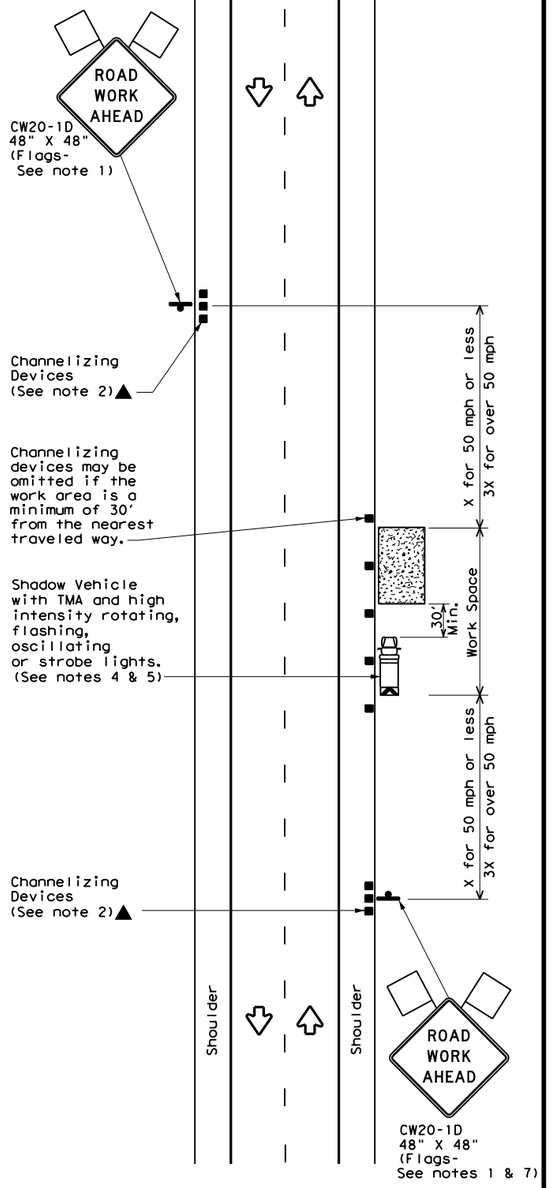
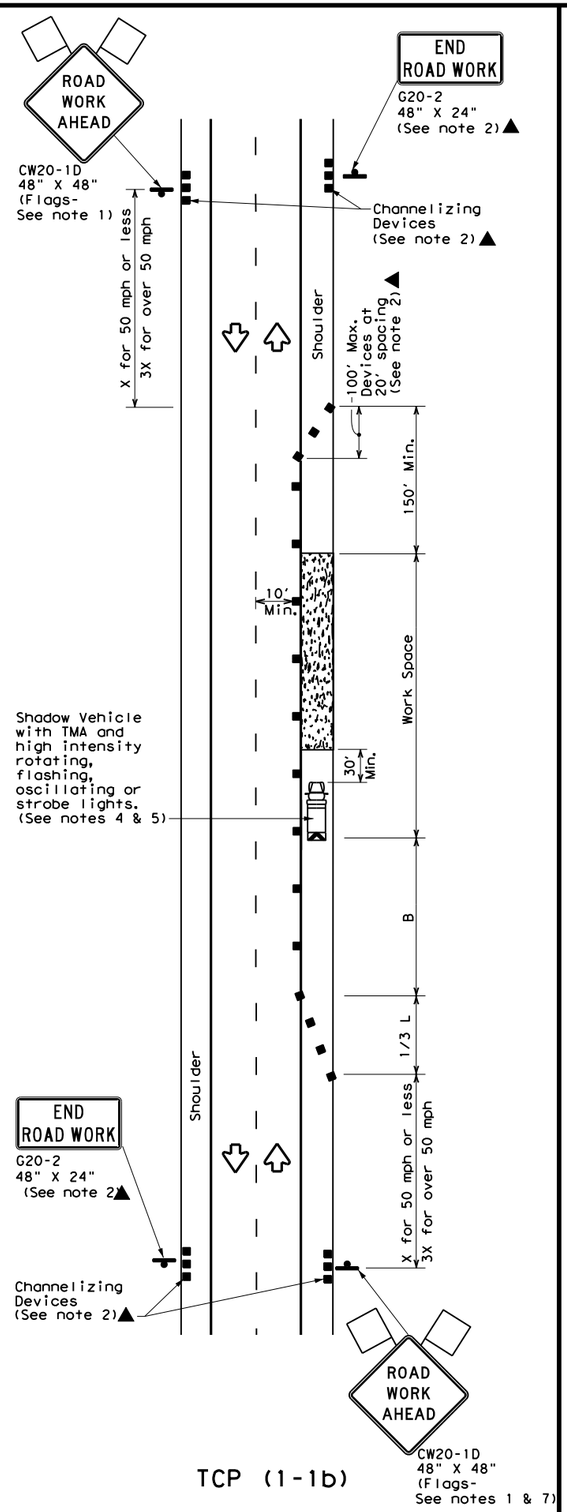


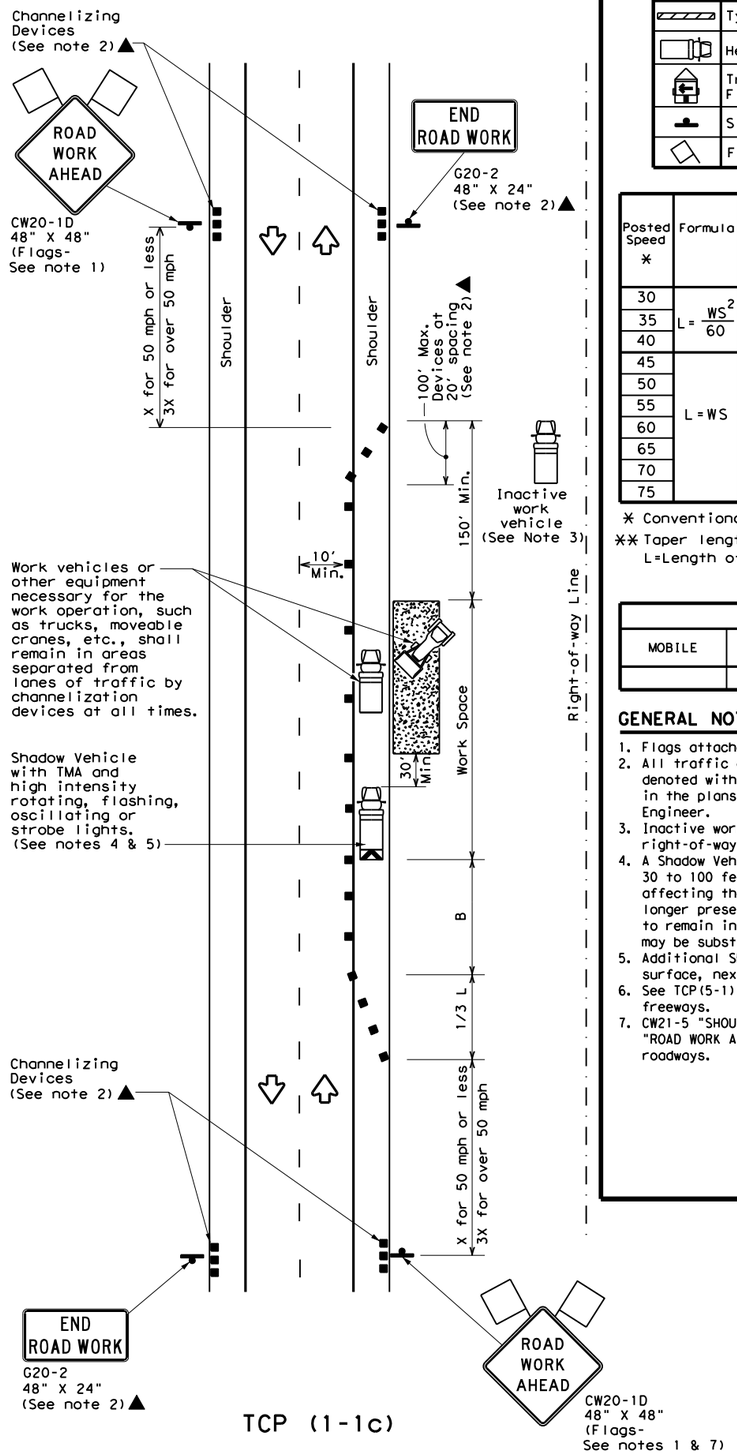
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	0907	13	024, ETC	CR 339, ETC
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	SJT	RUNNELS		23

151

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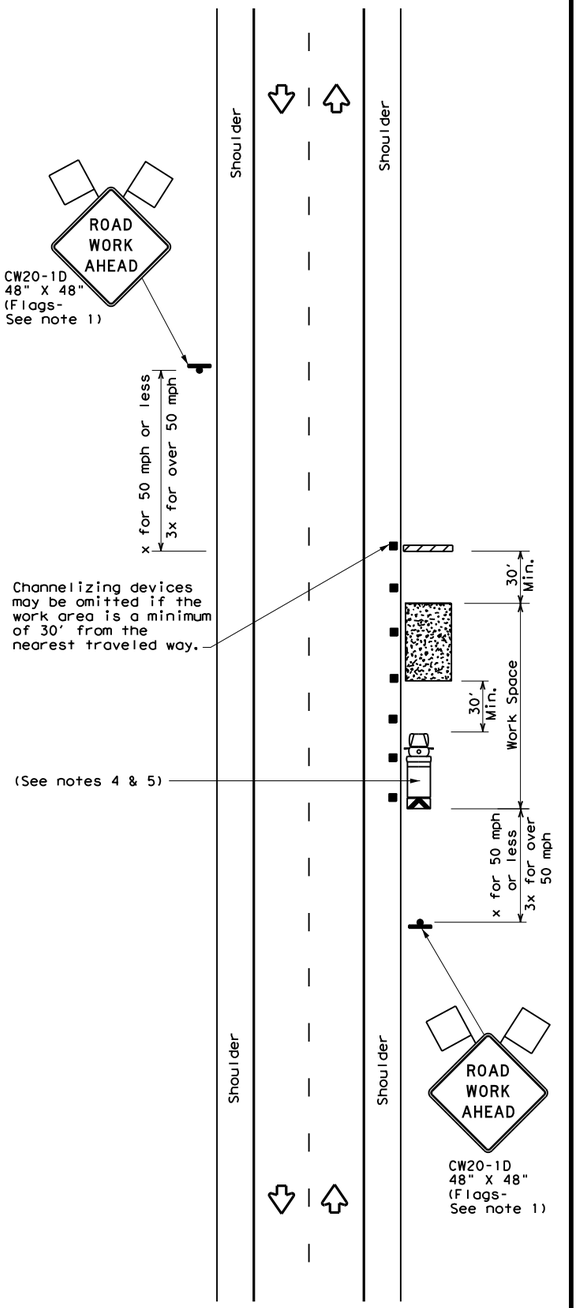
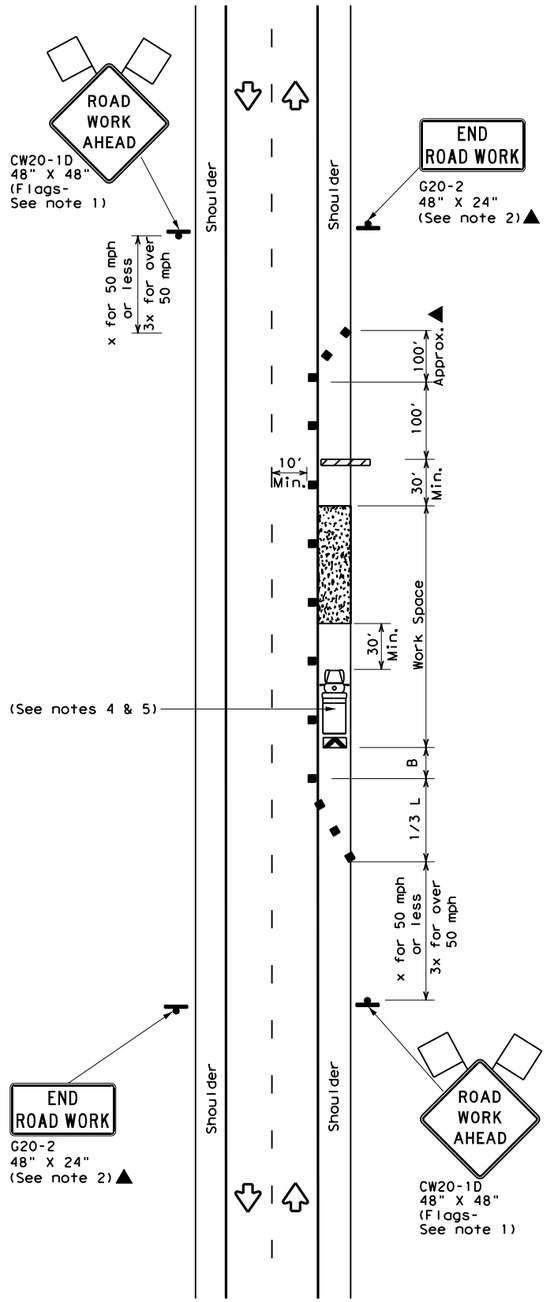


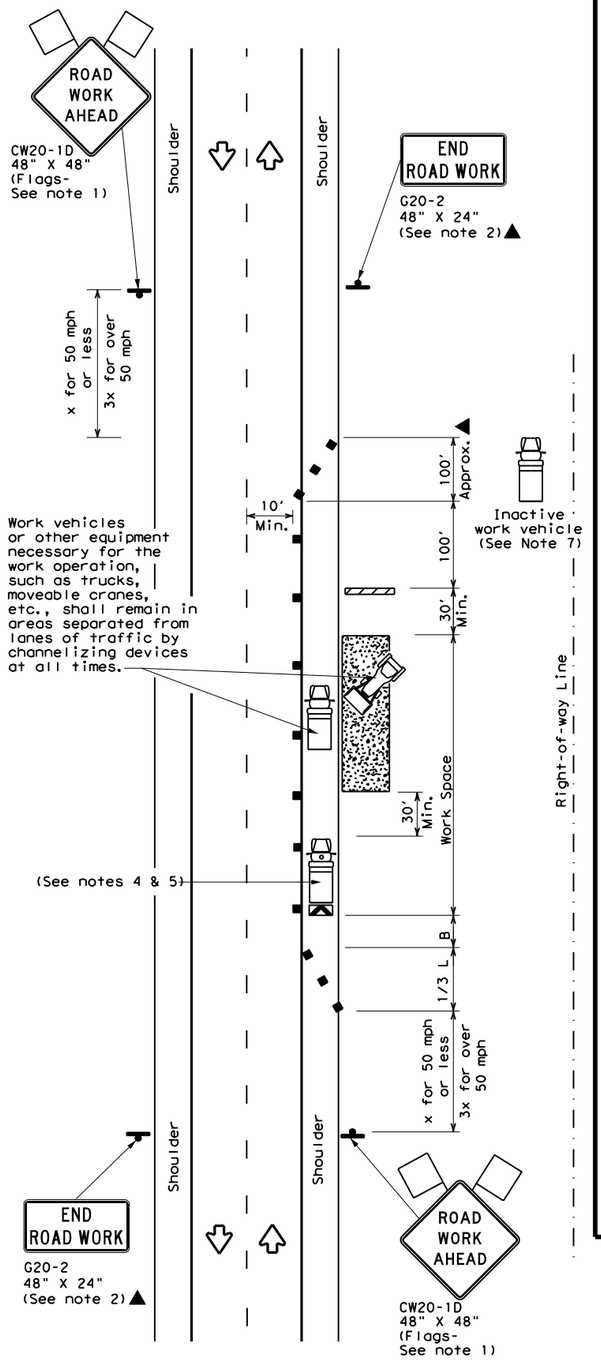
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SJT	RUNNELS		24
1-97 2-18				

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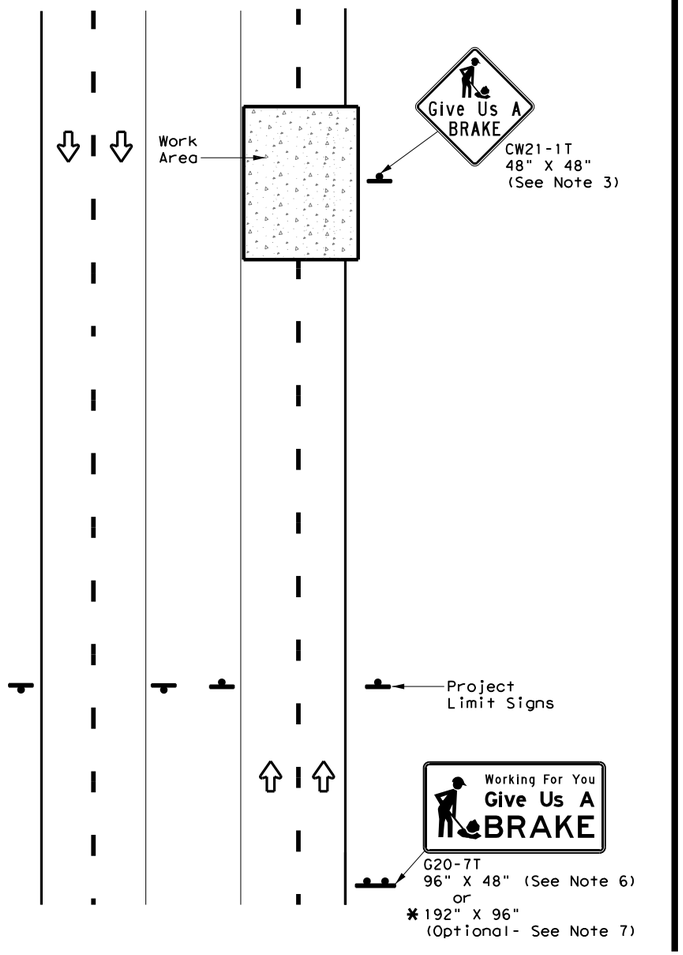
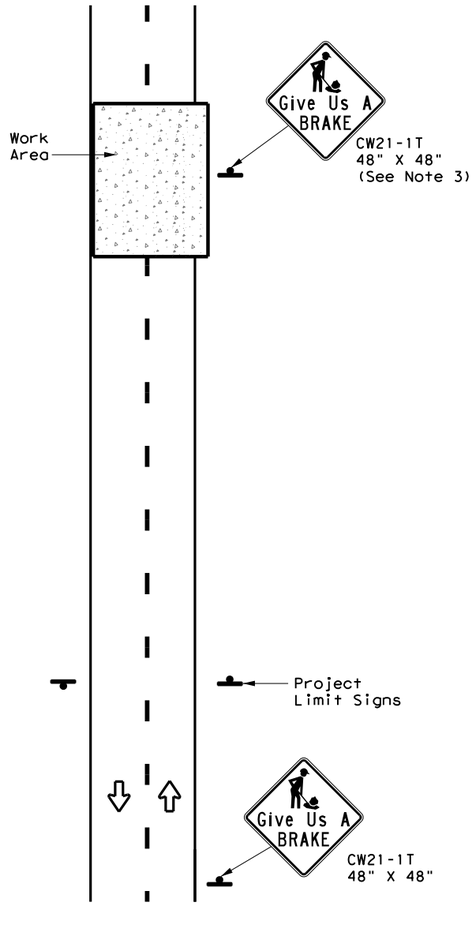


DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	SJT	RUNNELS		25

116

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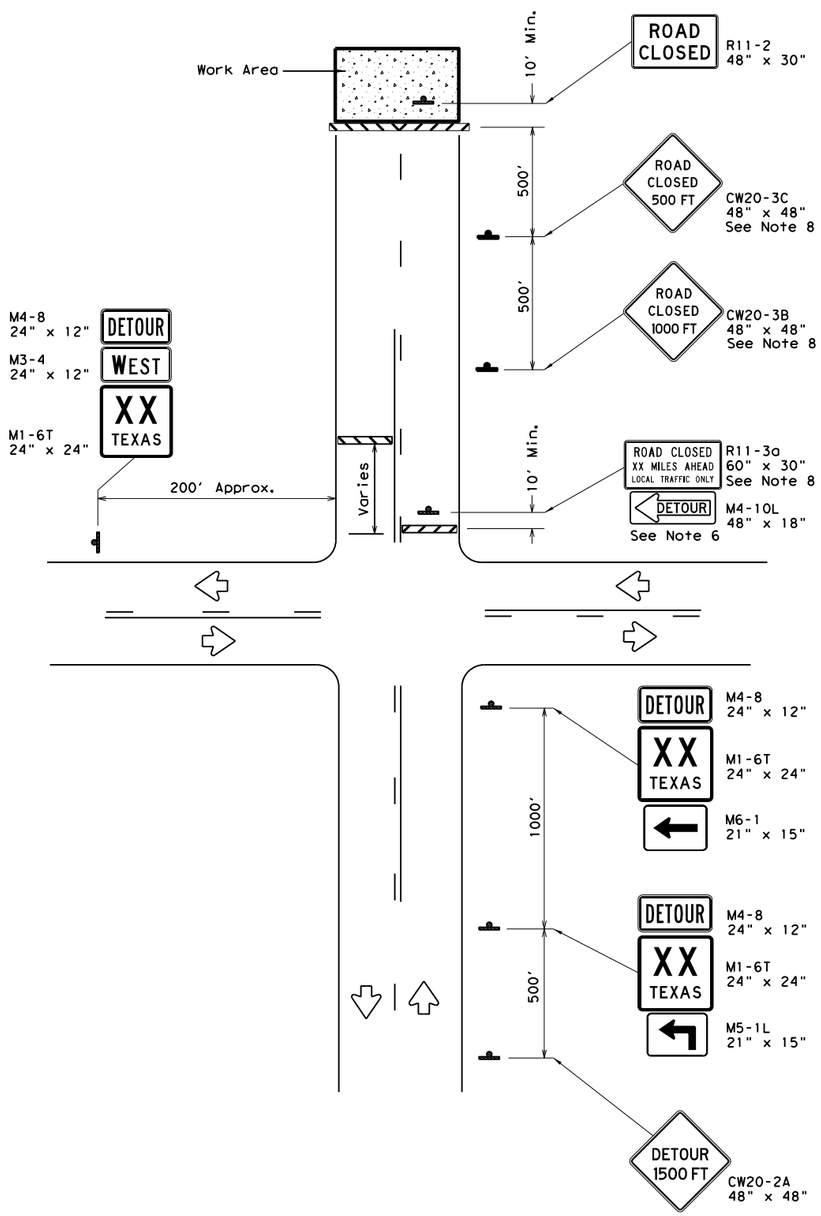
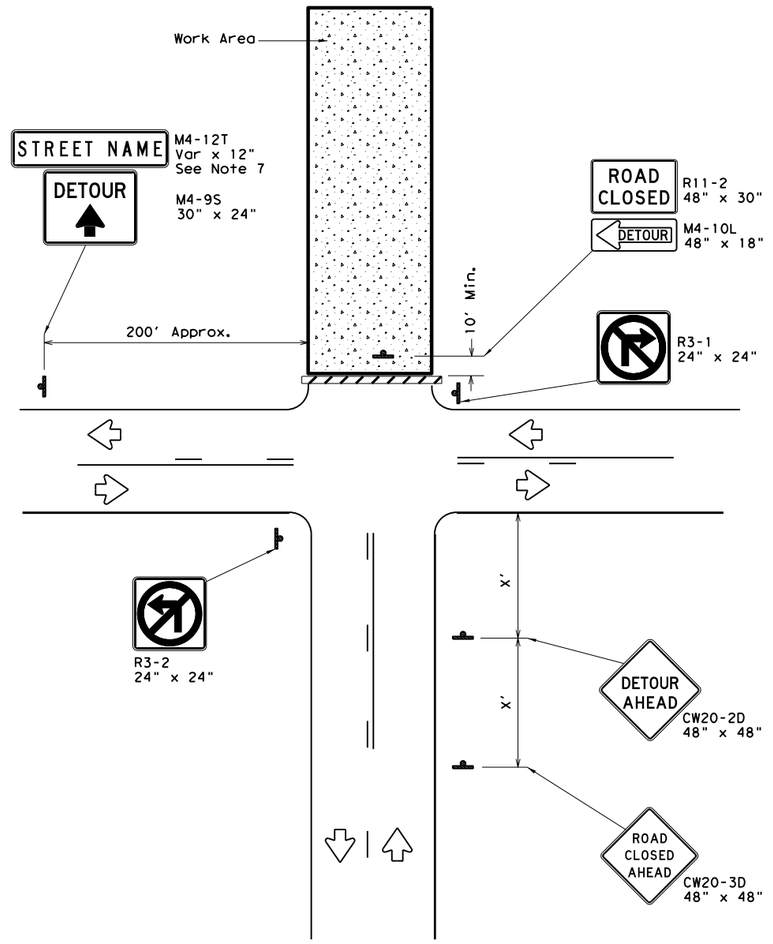


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	SJT	RUNNELS		26

Point ID	Grid Northing	Grid Easting	Surface Northing	Surface Easting	Elevation	Latitude (Global)	Longitude (Global)	Mapping Angle	Projection Scale Factor	Combined Scale Factor
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5001	10,643,873.872	2,409,833.464	10,645,151.140	2,410,122.689	1732.50	31°52'10.07823"	99°58'06.75550"	0°11'16.4"	0.999996304	0.999917378

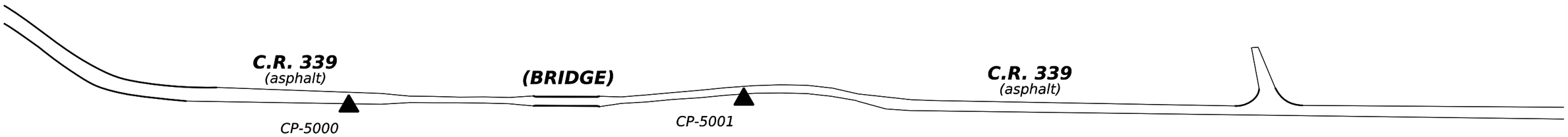
NOTES:

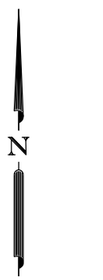
1. COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE,

AND ARE BASED ON THE AMERICAN DATUM 0F 1983, 2011 ADJUSTMENT (NAD83 2011). THEY ARE SURFACE VALUES DISPLAYED IN US SURVEY FEET AND WERE CALCULATED BY MULTIPLYING GRID X & Y COORDINATE VALUES BY THE SHELBY COUNTY SURFACE ADJUSMENT FACTOR OF 1.00012

2. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 12B

3. FIELD SERVICES WERE PERFORMED DURING AUGUST TO OCTOBER 2023, AND JANUARY 2024





0 100 200
SCALE IN FEET

NO.	DATE	REVISION	APPROV.

I HEREBY CERTIFY THAT THE CONTROL INFORMATION SHOWN HEREON WAS ESTABLISHED UNDER MY DIRECT SUPERVISIONAND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

STATE OF TEXAS REGISTERED JEFFREY L. FANSLER 4348 PROFESSIONAL LAND SURVEYOR

JEFFREY L. FANSLER
RPLS NO. 4348

DATE
7-29-2024

CobbFendley
2801 Network Boulevard, Suite 800
Frisco, Texas 75034
972.335.3214 | Fax 972.335.3202
www.cobbfendley.com
TBPELS Land Surveying Firm No. 10046700

Texas Department of Transportation

C.R. 339
CONTROL INDEX SHEET

FED RD DIV NO.	FEDERAL AID PROJECT		HIGHWAY
6			C.R. 339
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	RUNNELS	27
CONTROL	SECTION	JOB	
0907	13	024	

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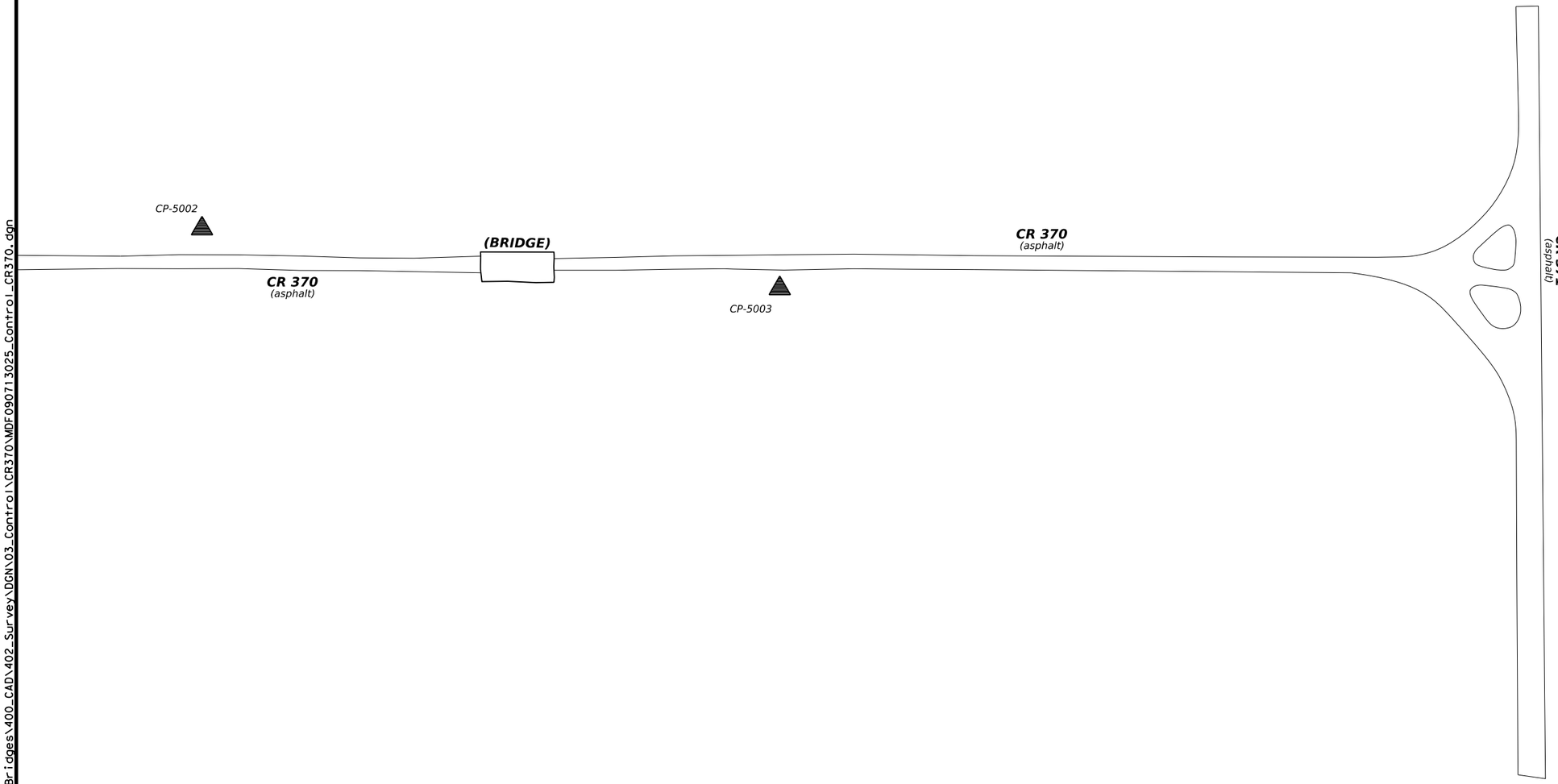


NOTES:

1. COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE,

AND ARE BASED ON THE AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011). THEY ARE SURFACE VALUES DISPLAYED IN US SURVEY FEET AND WERE CALCULATED BY MULTIPLYING GRID X & Y COORDINATE VALUES BY THE SHELBY COUNTY SURFACE ADJUSMENT FACTOR OF 1.00012

2. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 12B

3. FIELD SERVICES WERE PERFORMED DURING AUGUST TO OCTOBER 2023, AND JANUARY 2024

Point ID	Grid Northing	Grid Easting	Surface Northing	Surface Easting	Elevation	Latitude (Global)	Longitude (Global)	Mapping Angle	Projection Scale Factor	Combined Scale Factor
5002	10,650,181.650	2,346,468.875	10,648,903.782	2,346,187.333	1787.35	31°52'48.69787"	100°10'27.99456"	0°04'54.6"	0.999999158	0.999917579
5003	10,647,577.123	2,346,379.240	10,648,854.832	2,346,660.806	1787.82	31°52'48.20680"	100°10'22.50506"	0°04'57.4"	0.999999122	0.99991752

N

0 100 200
SCALE IN FEET

NO.	DATE	REVISION	APPROV.

I HEREBY CERTIFY THAT THE CONTROL INFORMATION SHOWN HEREON WAS ESTABLISHED UNDER MY DIRECT SUPERVISIONAND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JEFFREY L. FANSLER
RPLS NO. 4348

DATE
7-29-2024

CobbFendley
2801 Network Boulevard, Suite 800
Frisco, Texas 75034
972.335.3214 | Fax 972.335.3202
www.cobbfendley.com
TBPELS Land Surveying Firm No. 10046700

Texas Department of Transportation

C.R. 370
CONTROL INDEX SHEET

FED RD DIV NO.	FEDERAL AID PROJECT		HIGHWAY
6			C.R. 370
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	RUNNELS	28
CONTROL	SECTION	JOB	
0907	13	025	

DATE: 5/16/2024 10:20:54 AM
FILE: F:\Projects\2020\11020.TxDOT_11x3_PS&E\04_San_Angelo_Bridges\400_CAD\402_Survey\DGN\03_Control_CR370.dgn

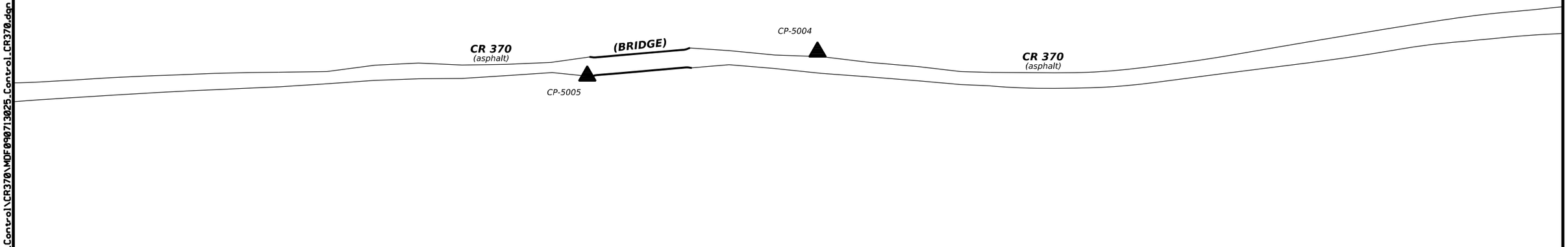
NOTES:

1. COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE,

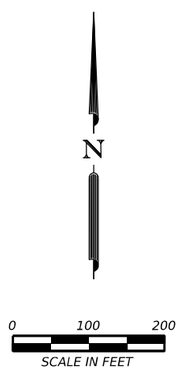
AND ARE BASED ON THE AMERICAN DATUM 0F 1983, 2011 ADJUSTMENT (NAD83 2011). THEY ARE SURFACE VALUES DISPLAYED IN US SURVEY FEET AND WERE CALCULATED BY MULTIPLYING GRID X & Y COORDINATE VALUES BY THE SHELBY COUNTY SURFACE ADJUSMENT FACTOR OF 1.00012

2. ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 12B

3. FIELD SERVICES WERE PERFORMED DURING AUGUST TO OCTOBER 2023, AND JANUARY 2024



Point ID	Grid Northing	Grid Easting	Surface Northing	Surface Easting	Elevation	Latitude (Global)	Longitude (Global)	Mapping Angle	Projection Scale Factor	Combined Scale Factor
5004	10,647,600.096	2,343,481.124	10,648,877.808	2,343,762.342	1790.99	31°52'48.47429"	100°10'56.11480"	0°04'40.1"	0.999999142	0.999917387
5005	10,647,575.750	2,343,247.150	10,648,853.459	2,343,528.340	1793.73	31°52'48.23651"	100°10'58.82863"	0°04'38.7"	0.999999124	0.999917234



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NO.	DATE	REVISION	APPROV.

I HEREBY CERTIFY THAT THE CONTROL INFORMATION SHOWN HEREON WAS ESTABLISHED UNDER MY DIRECT SUPERVISIONAND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JEFFREY L. FANSLER
RPLS NO. 4348

DATE
7-29-2024

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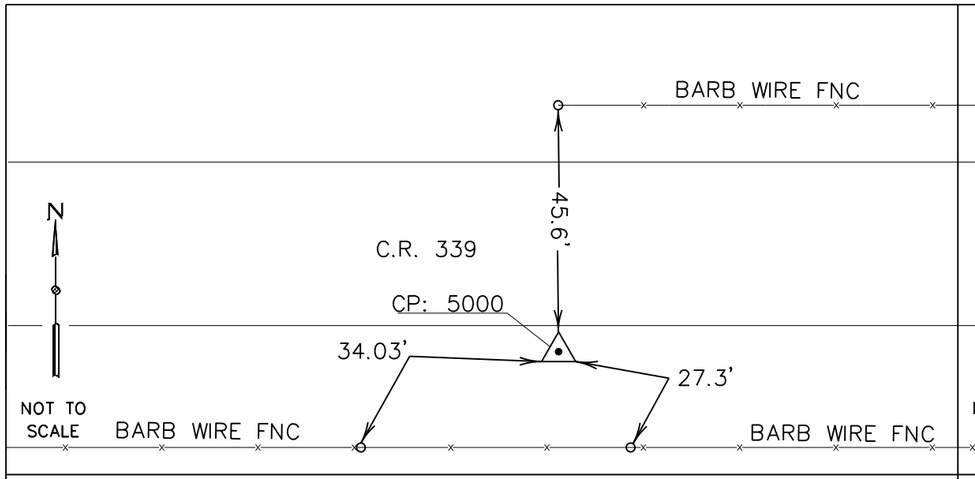
TBPELS Land Surveying Firm No. 10046700

Texas Department of Transportation

C.R. 370
CONTROL INDEX SHEET

FED RD DIV NO.	FEDERAL AID PROJECT		HIGHWAY
6			C.R. 370
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	RUNNELS	29
CONTROL	SECTION	JOB	
0907	13	025	



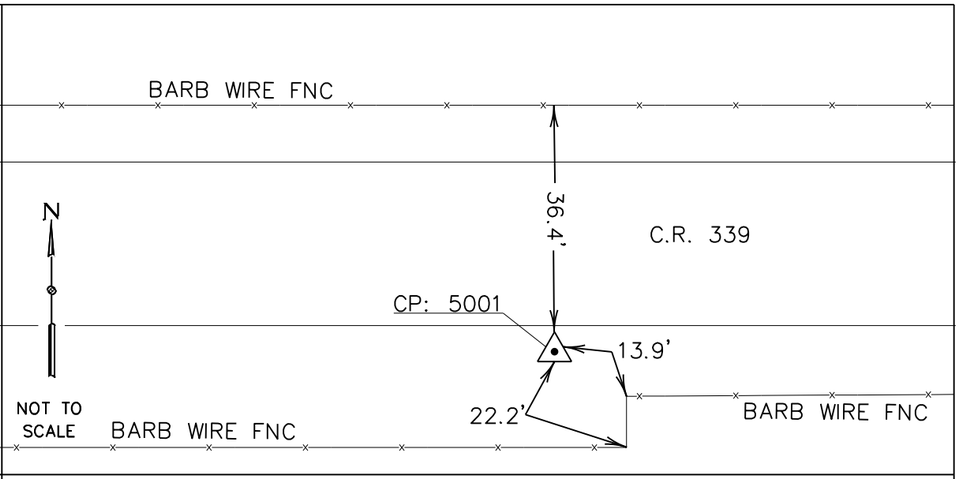
POINT 5000
SURFACE COORDINATES

N: 10,645,164.655
E: 2,410,913.548
ELEV: 1,727.09'

COORDINATE ZONE:
TEXAS CENTRAL 4203
NAD83/2011 ADJUSTMENT

LAT.: 31°52'10.18619" N
LONG.: 99°57'57.58538" W

"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE SOUTH SIDE OF C.R. 339 IN THE GRASS AND ±0.06 MILES FROM THE EAST SIDE OF THE WEST CREEK BRIDGE. ±45.6 FEET SOUTH OF A BARBED WIRE FENCE POST. ±27.3 FEET NORTHWEST OF A FENCE POST IN THE SOUTH RIGHT OF WAY LINE. ±34.03 FEET NORTHEAST OF A 4' BARB WIRE FENCE POST. ±0.46 MILES WEST OF THE INTERSECTION OF C.R. 339 & US HIGHWAY 83. ±5.72 MILES SOUTHWEST OF CENTER.



POINT 5001
SURFACE COORDINATES

N: 10,645,151.141
E: 2,410,122.689
ELEV: 1,732.50'

COORDINATE ZONE:
TEXAS CENTRAL 4203
NAD83/2011 ADJUSTMENT

LAT.: 31°52'10.07823" N
LONG.: 99°58'06.75550" W

"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE SOUTH SIDE OF C.R. 339 IN THE GRASS AND ±379 FEET WEST OF THE WEST SIDE OF THE WEST CREEK BRIDGE.. ±36.4 FEET SOUTH OF A BARBED WIRE FENCE. ±13.9 FEET NORTHWEST OF A FENCE POST FOR PI. ±22.2 FEET NORTHWEST OF A FENCE POST FOR PI. ±0.61 MILES WEST OF THE INTERSECTION OF C.R. 339 & US HIGHWAY 83. ±5.80 MILES SOUTHWEST OF WINTER.

1. COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE, AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011). THEY ARE SURFACE VALUES DISPLAYED IN US SURVEY FEET AND MAY BE CONVERTED TO STATE PLANE GRID VALUES BY DIVIDING THOSE SURFACE VALUES BY A SURFACE ADJUSTMENT FACTOR OF 1.000012.

2. ELEVATIONS SHOWN HEREON ARE BASED ON THE TxDOT VIRTURAL REFERENCE NETWORK.

3. FIELD SURVEYS WERE PERFORMED DURING OCTOBER 2023

I HEREBY CERTIFY THAT THE CONTROL INFORMATION SHOWN HEREON WAS ESTABLISHED UNDER MY DIRECT SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

STATE OF TEXAS REGISTERED JEFFREY L. FANSLER 4348 LICENSED PROFESSIONAL LAND SURVEYOR

JEFFREY L. FANSLER
RPLS No. 4348

DATE
7-29-2024

NO.	DATE	REVISION	APPR BY

CobbFendley
6500 West Freeway, Suite #300
Fort Worth, Texas 76116
817.445.1016 | fax 817.445.1017
www.cobbfendley.com
TBPELS Engineering Firm No. 274
TBPELS Land Surveying No. 10046700

Texas Department of Transportation

C.R. 339
CONTROL DETAIL SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0907	13	024	C.R. 339
DIST	COUNTY		SHEET NO.
SAN ANGELO	RUNNELS		30

DATE: 7/29/2024 1:53:54 PM
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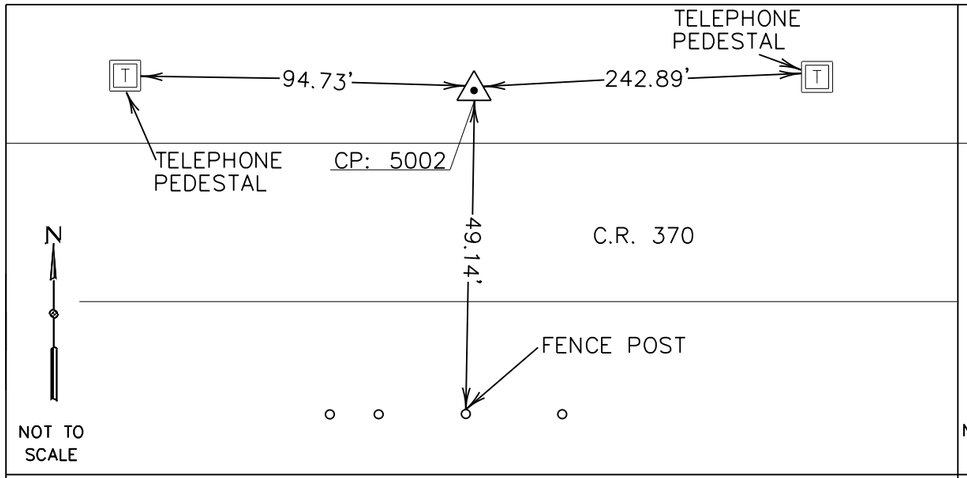
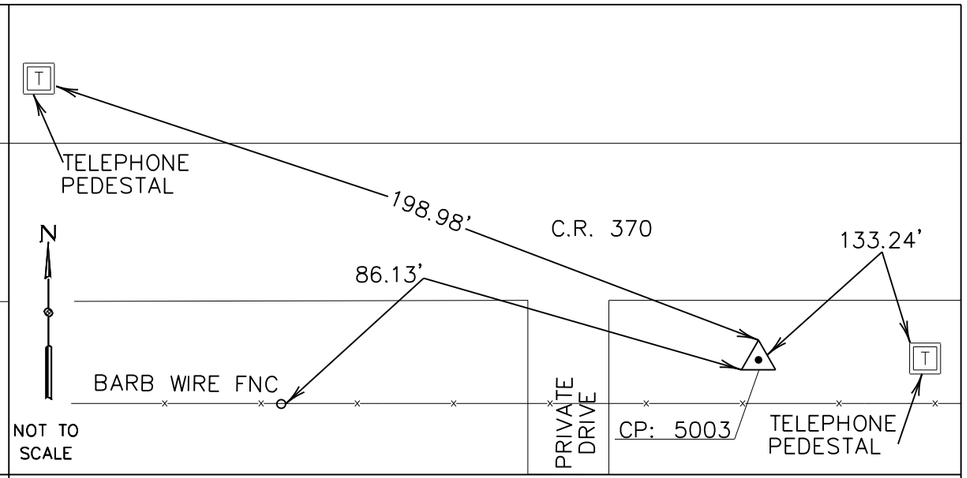
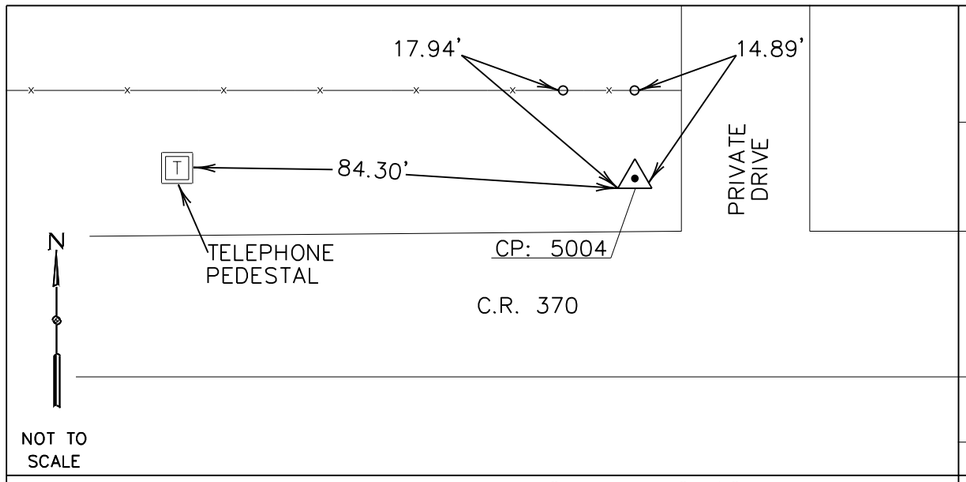
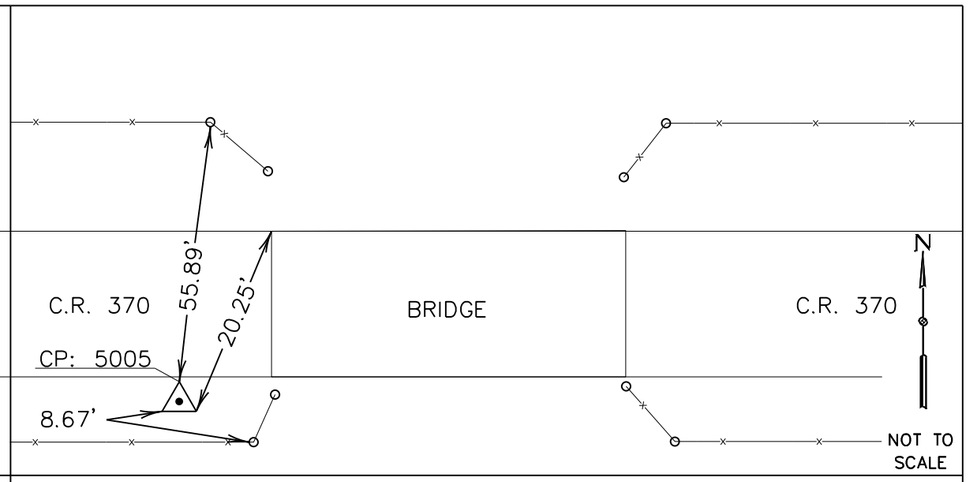




POINT 5002 SURFACE COORDINATES N: 10,648,903.782 E: 2,346,187.333 ELEV: 1,787.35'	COORDINATE ZONE: TEXAS CENTRAL 4203 NAD83/2011 ADJUSTMENT LAT.: 31°52'48.69787" N LONG.: 100°10'27.99456" W	"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE NORTH SIDE OF C.R. 370 IN THE GRASS AND ±255.92 FEET FROM THE WEST SIDE OF THE OAK CREEK BRIDGE. ±242.89 FEET WEST OF A TELEPHONE PEDESTAL. ±94.73 FEET EAST OF A TELEPHONE PEDESTAL IN THE SOUTH RIGHT OF WAY LINE. ±49.14 FEET NORTH OF A FENCE POST. ±0.21 MILES WEST OF THE INTERSECTION OF C.R. 330 & C.R. 371. ±2.84 MILES NORTHWEST OF NORTON.
POINT 5003 SURFACE COORDINATES N: 10,648,854.832 E: 2,346,660.806 ELEV: 1,787.81'	COORDINATE ZONE: TEXAS CENTRAL 4203 NAD83/2011 ADJUSTMENT LAT.: 31°52'48.20680" N LONG.: 100°10'22.50506" W	"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE SOUTH SIDE OF C.R. 370 IN THE GRASS AND ±221 FEET EAST OF THE CENTER OF THE OAK CREEK BRIDGE.. ±133.24 FEET WEST OF A TELEPHONE PEDESTAL. ±198.98 FEET SOUTH EAST OF A TELEPHONE PEDESTAL. ±86.13 FEET NORTHEAST OF A FENCE POST FOR PI. ±0.12 MILES WEST OF THE INTERSECTION OF C.R. 370 & C.R. 371. ±2.89 MILES NORTHWEST OF NORTON.





POINT 5004 SURFACE COORDINATES N: 10,648,877.808 E: 2,343,762.342 ELEV: 1,790.99'	COORDINATE ZONE: TEXAS CENTRAL 4203 NAD83/2011 ADJUSTMENT LAT.: 31°52'48.47429" N LONG.: 100°10'56.11480" W	"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE NORTH SIDE OF C.R. 370 IN THE GRASS AND ±178.10 FEET FROM THE EAST SIDE OF THE OAK CREEK BRIDGE. ±84.30 FEET EAST OF A TELEPHONE PEDESTAL. ±17.94 FEET SOUTHEAST OF A FENCE POST IN THE NORTH RIGHT OF WAY LINE. ±14.89 FEET SOUTH OF A FENCE POST. ±0.67 MILES WEST OF THE INTERSECTION OF C.R. 370 & C.R. 371. ±3.35 MILES NORTHWEST OF NORTON.
POINT 5005 SURFACE COORDINATES N: 10,648,853.459 E: 2,343,528.340 ELEV: 1,793.73'	COORDINATE ZONE: TEXAS CENTRAL 4203 NAD83/2011 ADJUSTMENT LAT.: 31°52'48.23651" N LONG.: 100°10'58.82863" W	"CFA CONTROL" 5/8" IRON ROD SET WITH ORANGE CFA CAP, FLUSH WITH GROUND, ON THE SOUTH SIDE OF C.R. 370 IN THE GRASS AND ±36.51 FEET WEST OF THE CENTER OF THE OAK CREEK BRIDGE.. ±55.89 FEET SOUTHWEST OF A FENCE POST. ±20.25 FEET SOUTHEAST FORM THE BRIDGE WEST END. ±8.67 FEET NORTHWEST OF A FENCE POST FOR PI. ±0.71 MILES WEST OF THE INTERSECTION OF C.R. 370 & C.R. 371. ±3.40 MILES NORTHWEST OF NORTON.

1. COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE, AND ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT (NAD83 2011). THEY ARE SURFACE VALUES DISPLAYED IN US SURVEY FEET AND MAY BE CONVERTED TO STATE PLANE GRID VALUES BY DIVIDING THOSE SURFACE VALUES BY A SURFACE ADJUSTMENT FACTOR OF 1.000012.

2. ELEVATIONS SHOWN HEREON ARE BASED ON THE TxDOT VIRTURAL REFERENCE NETWORK.

3. FIELD SURVEYS WERE PERFORMED DURING OCTOBER 2023

I HEREBY CERTIFY THAT THE CONTROL INFORMATION SHOWN HEREON WAS ESTABLISHED UNDER MY DIRECT SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

STATE OF TEXAS
REGISTERED
JEFFREY L. FANSLER
4348
LAND SURVEYOR

JEFFREY L. FANSLER
RPLS No. 4348

DATE
7-29-2024

NO.	DATE	REVISION	APPR BY

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6500 West Freeway, Suite #300
Fort Worth, Texas 76116
817.445.1016 | fax 817.445.1017
www.cobbfendley.com
TBPELS Engineering Firm No. 274
TBPELS Land Surveying No. 10046700

Texas Department of Transportation

C.R. 370
CONTROL DETAIL SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0907	13	025	C.R. 370
DIST	COUNTY		SHEET NO.
SAN ANGELO	TOM GREEN		31

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HORIZONTAL ALIGNMENT REPORT
Alignment name: CR339-Align Alignment description:
Report Created: Wednesday, May 15, 2024
Time: 9:10:57 AM

	STATION	X	Y
POT	10+00.00 R1	2409834.380	10645176.387
PC	12+78.03 R1	2410112.288	10645168.039
Tangential Direction:	S88°16'45.59"E		
Tangential Length:	278.03		
PC	12+78.03 R1	2410112.288	10645168.039
PI	14+42.98 R1	2410277.156	10645163.086
CC		2410445.585	10656263.033
PT	16+07.89 R1	2410442.098	10645163.034
Radius:	11100.00		
Delta:	01°42'09.610" Left		
Degree of Curvature(Arc):	00°30'58.241"		
Length:	329.86		
Tangent:	164.94		
Chord:	329.85		
Middle Ordinate:	1.23		
External:	1.23		
Tangent Back Direction:	S88°16'45.59"E		
Radial Direction:	S01°43'14.41"W		
Chord Direction:	S89°07'50.40"E		
Radial Direction:	S00°01'04.80"W		
Tangent Ahead Direction:	S89°58'55.20"E		
PT	16+07.89 R1	2410442.098	10645163.034
PC	17+98.24 R1	2410632.446	10645162.974
Tangential Direction:	S89°58'55.20"E		
Tangential Length:	190.35		
PC	17+98.24 R1	2410632.446	10645162.974
PI	18+24.24 R1	2410658.443	10645162.966
CC		2410632.635	10645762.974
PT	18+50.20 R1	2410684.343	10645165.206
Radius:	600.00		
Delta:	04°57'42.655" Left		
Degree of Curvature(Arc):	09°32'57.468"		
Length:	51.96		
Tangent:	26.00		
Chord:	51.94		
Middle Ordinate:	0.56		
External:	0.56		
Tangent Back Direction:	S89°58'55.20"E		
Radial Direction:	S00°01'04.80"W		
Chord Direction:	N87°32'13.47"E		
Radial Direction:	S04°56'37.86"E		
Tangent Ahead Direction:	N85°03'22.14"E		
PT	18+50.20 R1	2410684.343	10645165.206
PC	21+04.63 R1	2410937.829	10645187.133
Tangential Direction:	N85°03'22.14"E		
Tangential Length:	254.43		
PC	21+04.63 R1	2410937.829	10645187.133
PI	22+01.07 R1	2411033.906	10645195.444
CC		2410991.260	10644569.440
PT	22+95.97 R1	2411127.969	10645174.180
Radius:	620.00		
Delta:	17°40'55.797" Right		
Degree of Curvature(Arc):	09°14'28.517"		
Length:	191.34		
Tangent:	96.44		
Chord:	190.58		
Middle Ordinate:	7.37		
External:	7.46		
Tangent Back Direction:	N85°03'22.14"E		
Radial Direction:	S04°56'37.86"E		
Chord Direction:	S86°06'09.96"E		
Radial Direction:	S12°44'17.94"W		
Tangent Ahead Direction:	S77°15'42.06"E		
PT	22+95.97 R1	2411127.969	10645174.180
PC	23+29.42 R1	2411160.593	10645166.805
Tangential Direction:	S77°15'42.06"E		
Tangential Length:	33.45		
PC	23+29.42 R1	2411160.593	10645166.805
PI	23+81.67 R1	2411211.557	10645155.284
CC		2411270.842	10645654.499
PT	24+33.54 R1	2411263.802	10645154.548
Radius:	500.00		
Delta:	11°55'53.769" Left		
Degree of Curvature(Arc):	11°27'32.961"		
Length:	104.12		
Tangent:	52.25		
Chord:	103.93		
Middle Ordinate:	2.71		
External:	2.72		
Tangent Back Direction:	S77°15'42.06"E		
Radial Direction:	S12°44'17.94"W		
Chord Direction:	S83°13'38.94"E		
Radial Direction:	S00°48'24.17"W		
Tangent Ahead Direction:	S89°11'35.83"E		
PT	24+33.54 R1	2411263.802	10645154.548
POT	28+50.00 R1	2411680.217	10645148.685
Tangential Direction:	S89°11'35.83"E		
Tangential Length:	416.46		

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoff

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

HORIZONTAL ALIGNMENT DATA

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	32

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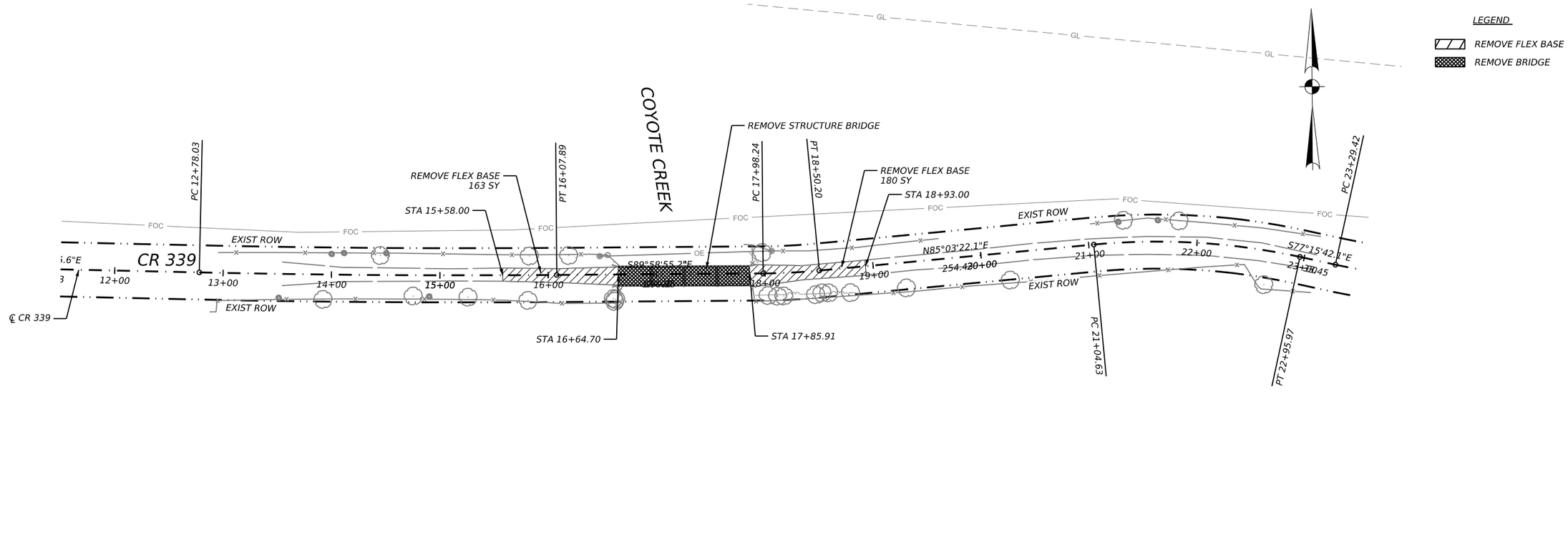
SABRIDGE-HALIGN.dgn



100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael VerHoff

0 25 50 100

1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700

13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 339
REMOVAL LAYOUT

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	33

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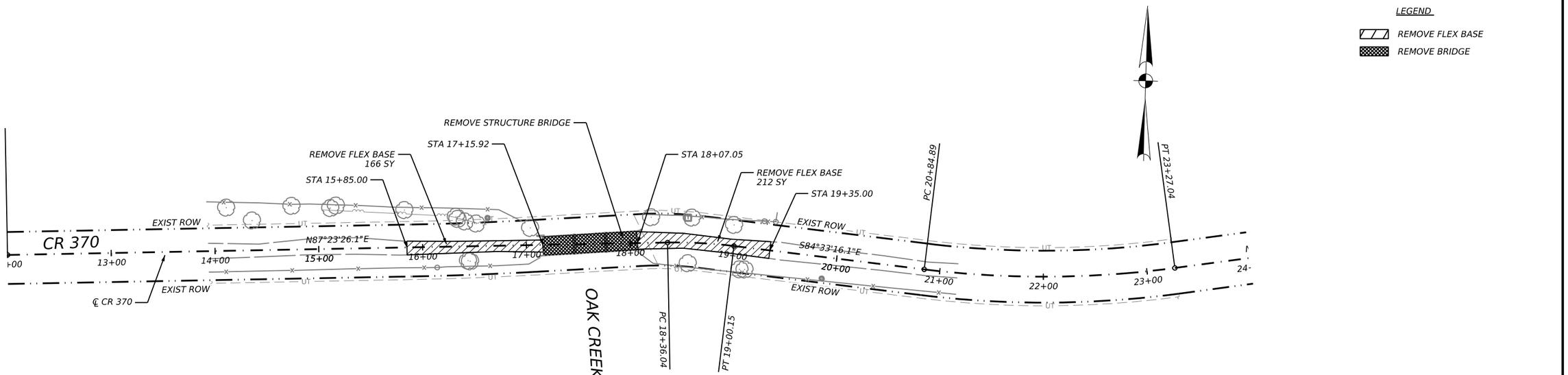
SABRIDGE-ROAD-REM-CR339.dgn



100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

0 25 50 100

1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 370 REMOVAL LAYOUT

FED. RD. DIV. NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	34

7/30/2024 10:50:23 AM
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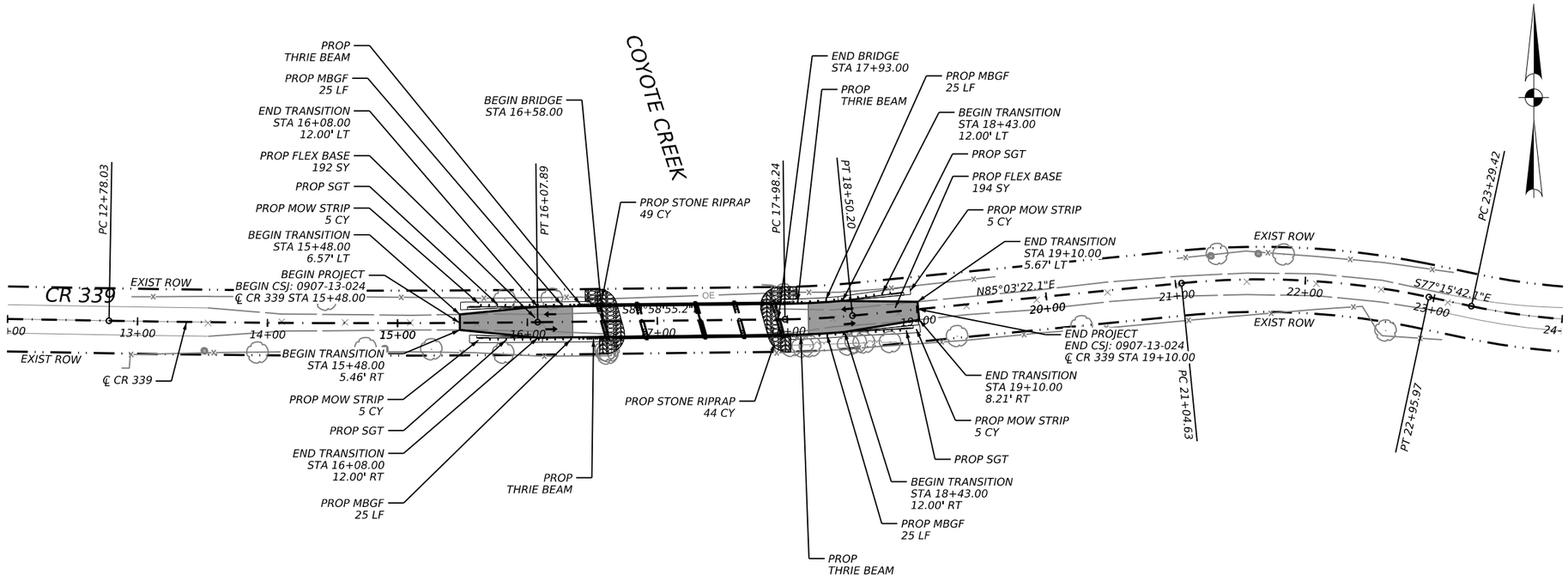

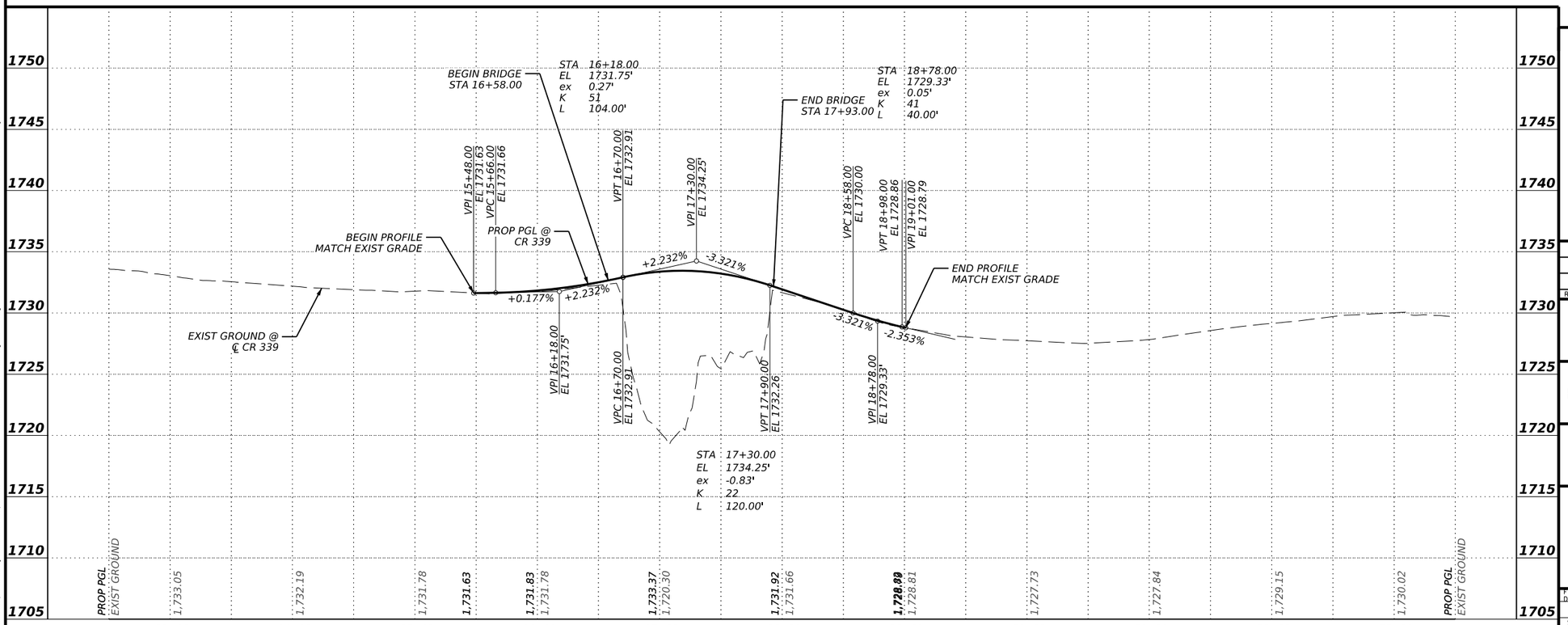

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED PROFESSIONAL ENGINEER

Michael Verhoef

0 25 50 100 (H)
0 5 10 (V)

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 339
ROADWAY PLAN & PROFILE

FED. RD. DIV. NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO. / SHEET NO.
SJT	RUNNELS	0907	13	024, ETC / 35

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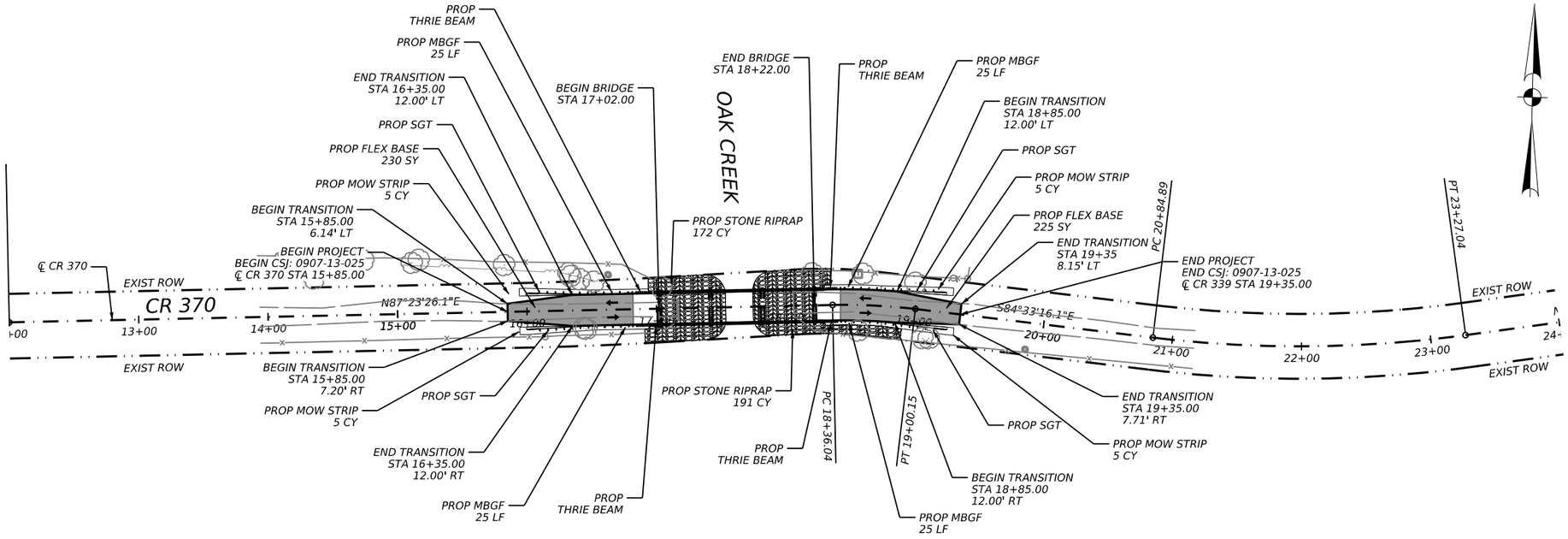
SABRIDGE-ROAD-P&P-CR339.dgn



100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
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PROFESSIONAL ENGINEER

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Houston, Texas 77040
713.462.3242
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Texas Department of Transportation

CR 370
ROADWAY PLAN & PROFILE

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	36

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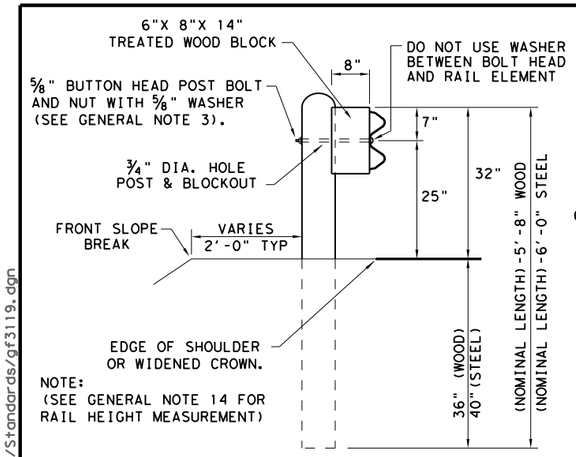
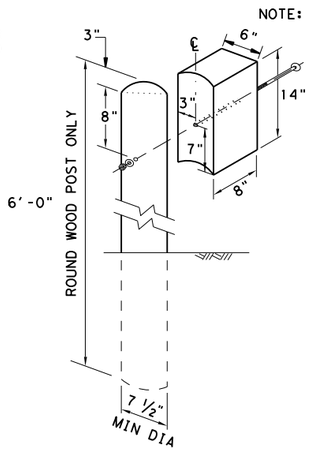
SABRIDGE-ROAD-P&P-CR370.dgn

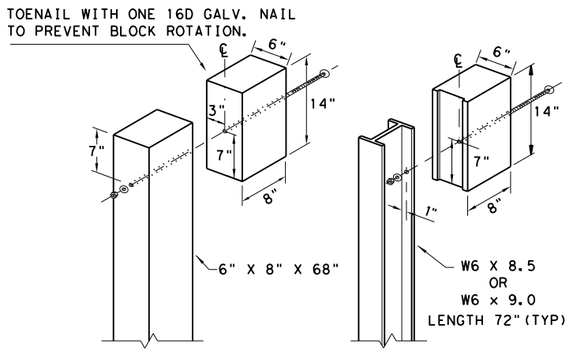
DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/05-Roadway/Standards/gf3119.dgn



TYPICAL POST PLACEMENT



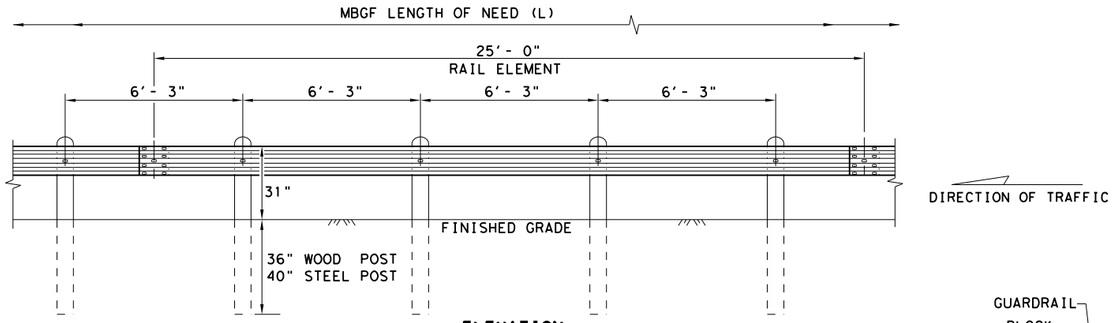
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

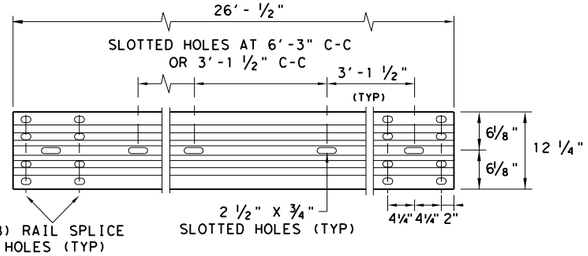
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



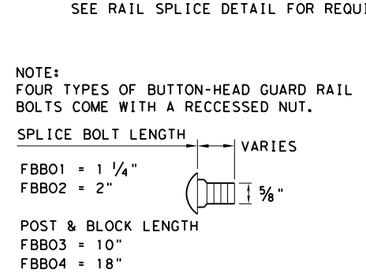
ELEVATION
MID-SPAN RAIL SPLICE

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



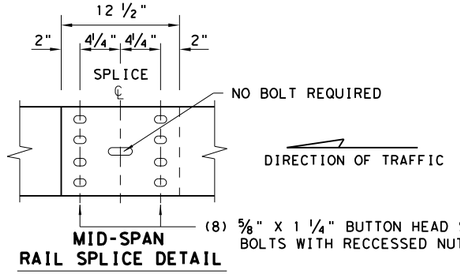
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



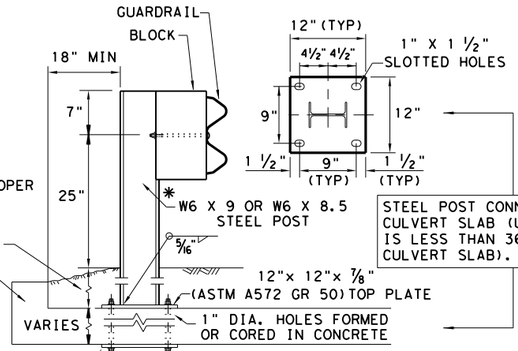
BUTTON HEAD BOLT

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.



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

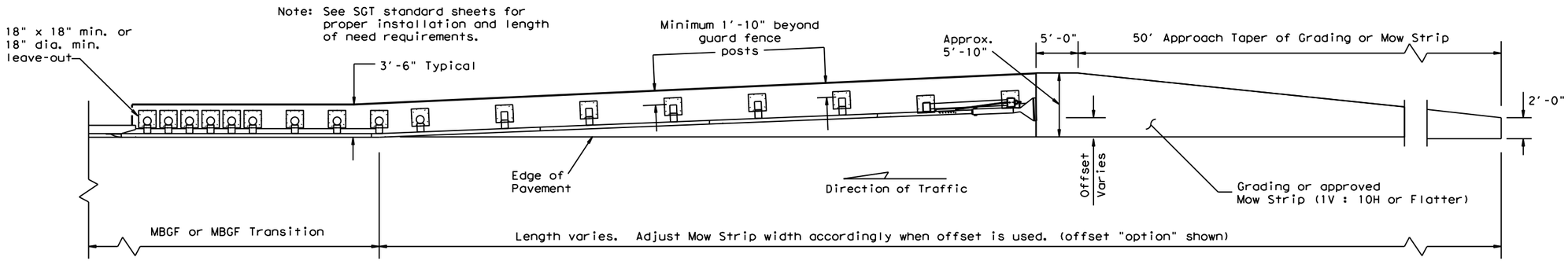
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

Texas Department of Transportation — Design Division Standard

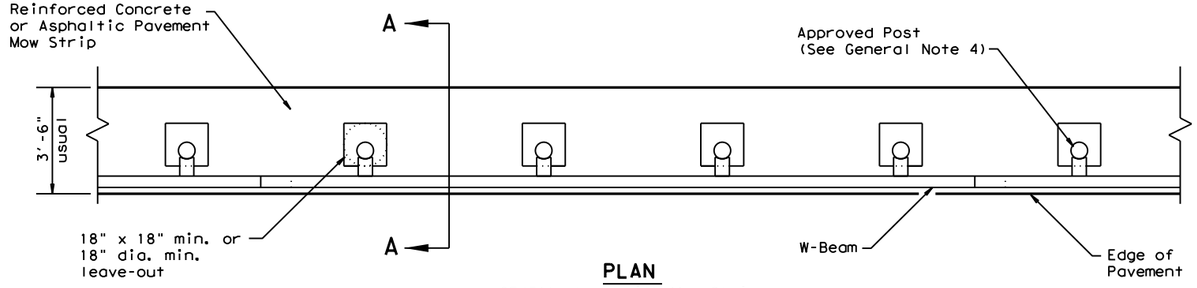
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		37

DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/05-Roadway/Standards/gf31ms19.dgn

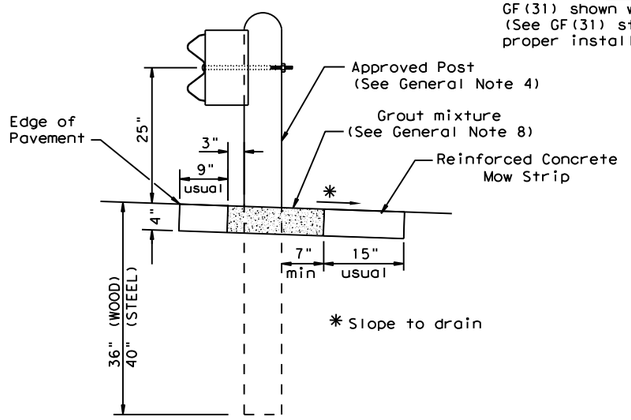


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



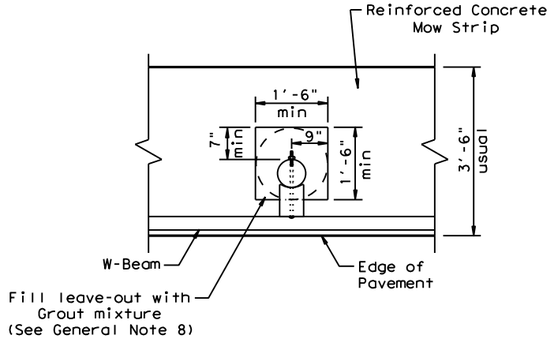
PLAN

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



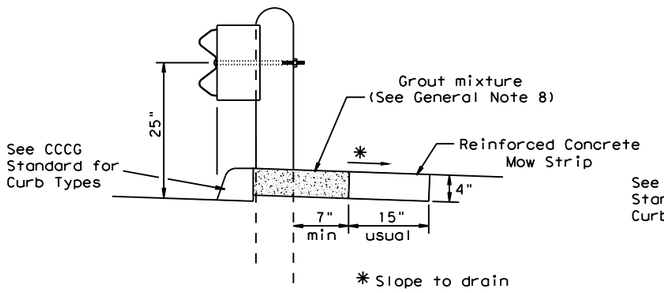
SECTION A-A

Typical



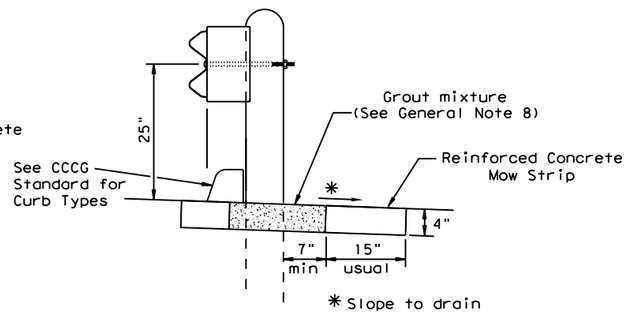
MOW STRIP DETAIL

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



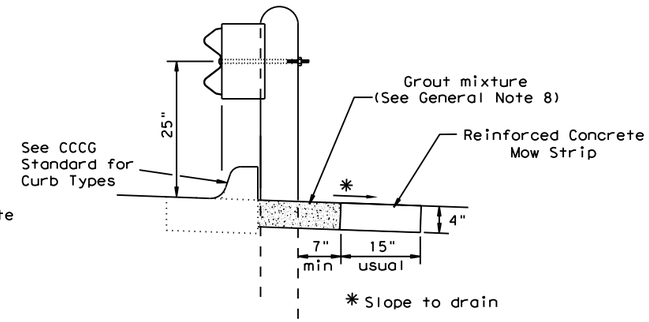
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0907	13	024, ETC		CR 339, ETC	
	DIST	COUNTY			SHEET NO.	
	SJT	RUNNELS			38	

DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/05-Roadway/Standards/sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANGLE STRUT PN: 15202G

ANCHOR PADDLE PN: 15204A

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: C

SEE NOTE: A

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

POST 40" DEPTH (TYP 1-8)

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

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

6'-1⅜"

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

ELEVATION VIEW

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

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

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST 32" HEIGHT

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0907	13	024, ETC	CR 339, ETC	
	DIST	COUNTY		SHEET NO.	
	SJT	RUNNELS		39	

DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAntonio/Roadway/Standards/sgt11s3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

PLAN VIEW

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 ⅜"

RAIL
HEIGHT
31"

ARROWS

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

DETAIL (D)

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1
ITEM (4)
I-BEAM
W6 X 9
NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 ⅝"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX.
RAIL OFFSET

APPROACH GRADING
(1V:10H OR FLATTER)
SEE PRODUCT ASSEMBLY MANUAL
FOR ADDITIONAL GUIDANCE.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

* TO BE PROVIDED BY DISTRIBUTOR
OR CONTRACTOR.

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

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

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		40

REGIONAL REGRESSION EQUATION INPUT PARAMETERS					PEAK FLOWS (cfs)						
BASIN NAME	AREA (sq. mi.)	P (in)	SLOPE (ft/ft)	OMEGA	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	500 YR
OAK CREEK	73.43	23	0.00399	-0.001	1490	3464	5225	8127	10792	14089	24274

LEGEND

- OVERALL DRAINAGE BOUNDARY
- DRAINAGE FLOW ARROWS
- OAK CREEK RESERVOIR CONTRIBUTING AREA

NOTES:

1. HYDROLOGY WAS COMPLETED USING REGIONAL REGRESSION EQUATIONS.
2. DRAINAGE AREA CONTRIBUTING TO OAK CREEK RESERVOIR WAS NOT INCLUDED IN THE REGIONAL REGRESSION EQUATIONS HYDROLOGIC ANALYSIS.

0 10,000 20,000

SCALE: 1"=20,000'

100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED PROFESSIONAL ENGINEER

Cynthia R. Carle
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TEXAS RESGISTERED ENGINEERING FIRM F-739

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

SAN ANGELO BRIDGES

DRAINAGE AREA MAP

CR 370 AT OAK CREEK

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	X		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	41

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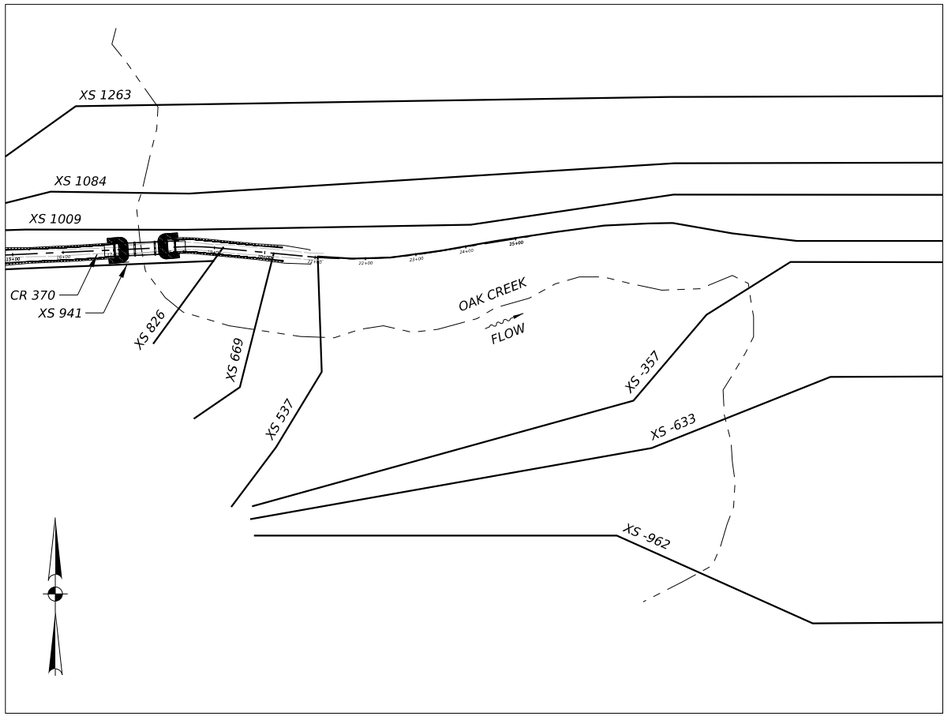


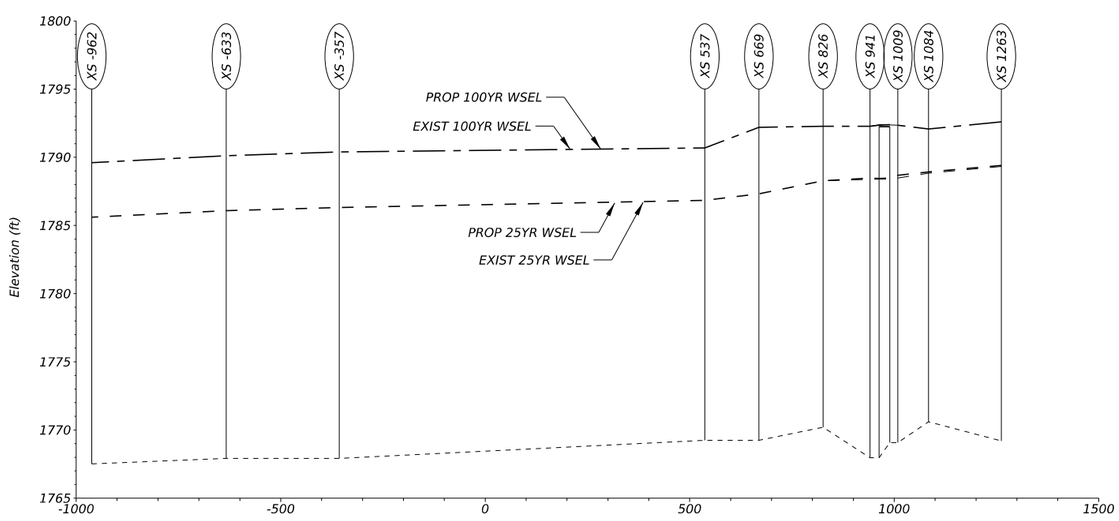
HEC-RAS CROSS SECTION LAYOUT
1" = 300'

HYDRAULIC DATA: OAK CREEK																
EXISTING CONDITIONS							PROPOSED CONDITIONS							COMPARISONS			
	25 YEAR			100 YEAR				25 YEAR			100 YEAR			25 YEAR		100 YEAR	
STATION	Q TOTAL (CFS)	WSEL (CFS)	VEL CHNL (FT/S)	Q TOTAL (CFS)	WSEL (CFS)	VEL CHNL (FT/S)	STATION	Q TOTAL (CFS)	WSEL (CFS)	VEL CHNL (FT/S)	Q TOTAL (CFS)	WSEL (CFS)	VEL CHNL (FT/S)	PR-EX WSEL (+ / -)	PR - EX VEL (+ / -)	PR-EX WSEL (+ / -)	PR - EX VEL (+ / -)
1263	8127	1789.31	3.74	14089	1792.62	4.05	1263	8127	1789.38	3.70	14089	1792.61	4.05	0.07	-0.04	-0.01	0.00
1084	8127	1788.84	5.71	14089	1792.08	6.35	1084	8127	1788.92	5.64	14089	1792.08	6.36	0.08	-0.07	0.00	0.01
1009	8127	1788.49	6.91	14089	1792.37	3.89	1009	8127	1788.69	6.34	14089	1792.36	3.90	0.20	-0.57	-0.01	0.01
979	EXIST BRIDGE						979	EXIST BRIDGE									
941	8127	1788.40	6.38	14089	1792.28	4.19	941	8127	1788.48	6.13	14089	1792.28	4.19	0.08	-0.25	0.00	0.00
826	8127	1788.29	6.39	14089	1792.26	4.05	826	8127	1788.29	6.39	14089	1792.26	4.05	0.00	0.00	0.00	0.00
669	8127	1787.34	8.94	14089	1792.22	4.56	669	8127	1787.34	8.94	14089	1792.22	4.56	0.00	0.00	0.00	0.00
537	8127	1786.83	9.43	14089	1790.69	10.03	537	8127	1786.83	9.43	14089	1790.69	10.03	0.00	0.00	0.00	0.00
-357	8127	1786.32	4.91	14089	1790.39	5.37	-357	8127	1786.32	4.91	14089	1790.39	5.37	0.00	0.00	0.00	0.00
-633	8127	1786.08	4.98	14089	1790.14	5.44	-633	8127	1786.08	4.98	14089	1790.14	5.44	0.00	0.00	0.00	0.00
-962	8127	1785.60	5.79	14089	1789.61	6.29	-962	8127	1785.60	5.79	14089	1789.61	6.29	0.00	0.00	0.00	0.00

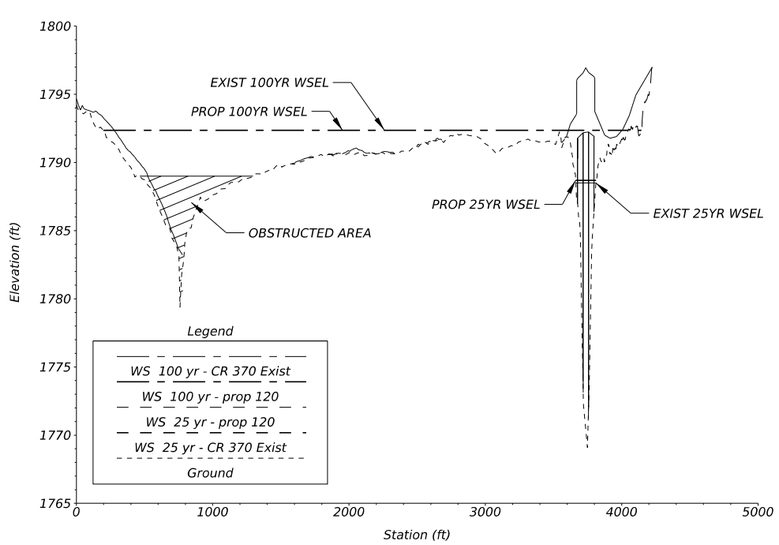
		FLOW DATA		THROUGH BRIDGE VELOCITY (FPS)
		BRIDGE Q (CFS)	OVERFLOW Q (CFS)	
25 YEAR	EXIST	8127.00	0.00	7.18
	PROP	8127.00	0.00	7.03
100 YEAR	EXIST	2745.63	11343.37	1.92
	PROP	3146.35	10942.65	2.02

NOTES:

1. HEC-RAS 6.4.1 WAS UTILIZED FOR THE HYDRAULIC ANALYSIS OF CR 370 AT OAK CREEK.
2. A TAILWATER CONDITION OF NORMAL DEPTH WITH A STREAM SLOPE OF 0.12% WAS USED.
3. CR 370 AT OAK CREEK IS LOCATED WITHIN A FEMA UNMAPPED AREA.
4. T223 BRIDGE RAIL IS MODELED AS PART OF THE ROADWAY PROFILE.
5. SEE "DRAINAGE AND SCOUR REPORT CR 370 AT OAK CREEK" DATED MARCH 2024 FOR ADDITIONAL INFORMATION.



HEC-RAS CROSS PROFILE



HEC-RAS CROSS SECTION

100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED
PROFESSIONAL ENGINEER

Cynthia R. Carle
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
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Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

SAN ANGELO BRIDGES
HYDRAULIC DATA
CR 370 AT OAK CREEK

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	X		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	42

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HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X    X  XXXXXX   XXXX      XXXX     XX     XXXX
X    X  X       X    X    X  X   X  X   X
X    X  X       X         X  X   X  X   X
XXXXXX  XXXX    X      XX XXXX   XXXXX  XXXX
X    X  X       X         X  X   X    X      X
X    X  X       X    X    X  X   X    X      X
X    X  XXXXXX   XXXX      X  X  X    X  XXXXX
```

PROJECT DATA
Project Title: San Angelo Bridges
Project File : SanAngeloBridges.prj
Run Date and Time: 3/4/2024 5:04:56 PM

Project in English units

PLAN DATA

Plan Title: CR 370 prop 120
Plan File : C:\CR370-339_SanAngelo_CF\HEC RAS\CR 370\SanAngeloBridges.p07

Geometry Title: Proposed CR 370 120'
Geometry File : C:\CR370-339_SanAngelo_CF\HEC RAS\CR 370\SanAngeloBridges.g07

Flow Title : CR 370 RRE
Flow File : C:\CR370-339_SanAngelo_CF\HEC RAS\CR 370\SanAngeloBridges.f01

Plan Summary Information:
Number of: Cross Sections = 10 Multiple Openings = 1
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: CR 370 RRE
Flow File : C:\CR370-339_SanAngelo_CF\HEC RAS\CR 370\SanAngeloBridges.f01

Flow Data (cfs)

River	Reach	RS	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	500 yr
River 1	Reach 1	1263	1490	3464	5225	8127	10792	14089	24274

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River 1	Reach 1	25 yr		Normal S = 0.0012
River 1	Reach 1	100 yr		Normal S = 0.0012

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	1263	25 yr	8127.00	1769.21	1789.38	1782.17	1789.59	0.000513	3.70	2444.40	512.47	0.23
Reach 1	1263	100 yr	14089.00	1769.21	1792.61	1784.49	1792.84	0.000387	4.05	4401.32	664.61	0.22
Reach 1	1084	25 yr	8127.00	1770.61	1788.92	1782.12	1789.42	0.001446	5.64	1440.64	213.94	0.38
Reach 1	1084	100 yr	14089.00	1770.61	1792.08	1785.39	1792.69	0.001196	6.36	2632.11	1325.93	0.37
Reach 1	1009	25 yr	8127.00	1769.10	1788.69	1780.57	1789.31	0.001025	6.34	1282.00	150.76	0.34
Reach 1	1009	100 yr	14089.00	1769.10	1792.36	1784.25	1792.49	0.000392	3.90	8976.69	3876.04	0.21
Reach 1	979	CR 370			Mult Open							
Reach 1	941	25 yr	8127.00	1767.95	1788.48	1779.57	1789.07	0.000950	6.13	1325.09	155.32	0.33
Reach 1	941	100 yr	14089.00	1767.95	1792.28	1783.04	1792.43	0.000301	4.19	9323.73	3522.71	0.19
Reach 1	826	25 yr	8127.00	1770.18	1788.29	1781.26	1788.92	0.001320	6.39	1271.18	143.53	0.38
Reach 1	826	100 yr	14089.00	1770.18	1792.26	1784.63	1792.41	0.000369	4.05	8650.92	3319.53	0.21
Reach 1	669	25 yr	8127.00	1769.25	1787.34	1781.59	1788.58	0.002524	8.94	908.85	95.03	0.51
Reach 1	669	100 yr	14089.00	1769.25	1792.22	1785.96	1792.38	0.000433	4.56	8416.34	3138.20	0.22
Reach 1	537	25 yr	8127.00	1769.25	1786.83	1781.60	1788.21	0.002851	9.43	861.50	90.86	0.54
Reach 1	537	100 yr	14089.00	1769.25	1790.69	1785.95	1792.16	0.003245	10.03	1796.59	581.73	0.59
Reach 1	-357	25 yr	8127.00	1767.94	1786.32	1777.78	1786.69	0.000795	4.91	1654.14	190.86	0.29
Reach 1	-357	100 yr	14089.00	1767.94	1790.39	1780.71	1790.82	0.000627	5.37	3010.56	445.39	0.28
Reach 1	-633	25 yr	8127.00	1767.93	1786.08	1778.41	1786.46	0.000865	4.98	1630.62	194.93	0.30
Reach 1	-633	100 yr	14089.00	1767.93	1790.14	1781.24	1790.60	0.000981	5.44	2588.49	302.26	0.33
Reach 1	-962	25 yr	8127.00	1767.51	1785.60	1776.82	1786.12	0.001202	5.79	1404.11	169.51	0.35
Reach 1	-962	100 yr	14089.00	1767.51	1789.61	1780.61	1790.23	0.001202	6.29	2239.60	242.19	0.36

CROSS SECTION
RIVER: River 1
REACH: Reach 1 RS: 1009

CROSS SECTION OUTPUT Profile #25 yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	1789.31	Element			
Vel Head (ft)	0.62	Wt. n-Val.		0.035	
W.S. Elev (ft)	1788.69	Reach Len. (ft)	67.90	67.90	67.90
Crit W.S. (ft)	1780.57	Flow Area (sq ft)		1282.00	
E.G. Slope (ft/ft)	0.001025	Area (sq ft)		1318.03	
Q Total (cfs)	8127.00	Flow (cfs)		8127.00	
Top Width (ft)	150.76	Top Width (ft)		150.76	
Vel Total (ft/s)	6.34	Avg. Vel. (ft/s)		6.34	
Max Chl Dpth (ft)	19.59	Hydr. Depth (ft)		10.68	
Conv. Total (cfs)	253830.3	Conv. (cfs)		253830.3	
Length Wtd. (ft)	67.90	Wetted Per. (ft)		127.29	
Min Ch El (ft)	1769.10	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		4.09	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.00	57.72	0.00
C & E Loss (ft)		Cum SA (acres)	0.02	6.76	0.02

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #100 yr

			Left OB	Channel	Right OB
E.G. Elev (ft)	1792.49	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.050	0.035	0.050
W.S. Elev (ft)	1792.36	Reach Len. (ft)	67.90	67.90	67.90
Crit W.S. (ft)	1784.25	Flow Area (sq ft)	6718.96	1984.86	272.87
E.G. Slope (ft/ft)	0.000392	Area (sq ft)	6718.96	1984.86	272.87
Q Total (cfs)	14089.00	Flow (cfs)	6164.42	7736.44	188.14
Top Width (ft)	3876.04	Top Width (ft)	3452.68	191.20	232.16
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	0.92	3.90	0.69
Max Chl Dpth (ft)	23.26	Hydr. Depth (ft)	1.95	10.38	1.18
Conv. Total (cfs)	711256.6	Conv. (cfs)	311199.3	390559.4	9498.0
Length Wtd. (ft)	67.90	Wetted Per. (ft)	3453.30	198.92	232.35
Min Ch El (ft)	1769.10	Shear (lb/sq ft)	0.05	0.24	0.03
Alpha	3.54	Stream Power (lb/ft s)	0.04	0.95	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	0.68	88.65	4.39
C & E Loss (ft)		Cum SA (acres)	5.63	8.86	2.19

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED
PROFESSIONAL ENGINEER
Cynthia R. Carle
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TEXAS REGISTERED ENGINEERING FIRM F-739

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

SAN ANGELO BRIDGES
HEC-RAS COMPUTATIONS
CR 370 AT OAK CREEK

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	X		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	43

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REGIONAL REGRESSION EQUATION INPUT PARAMETERS					PEAK FLOWS (cfs)						
BASIN NAME	AREA (sq. mi.)	P (in)	SLOPE (ft/ft)	OMEGA	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	500 YR
COYOTE CREEK	75.97	23	0.00224	-0.001	1303	2860	4240	6437	8404	10781	17934

TAYLOR COUNTY
RUNNELS COUNTY

FM 2595

FM 2405

WINTERS

DRAINAGE AREA
= 75.97 SQ.MI.

COYOTE CREEK

US 83

FM 384

CR 339

PROJECT LOCATION

LEGEND

OVERALL DRAINAGE BOUNDARY

DRAINAGE FLOW ARROWS

NOTE:

1. HYDROLOGY COMPLETED USING REGIONAL REGRESSION EQUATIONS.

0 3,500 7,000

SCALE: 1"=7,000'

100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED
PROFESSIONAL ENGINEER

7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
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TEXAS RESGISTERED ENGINEERING FIRM F-739

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Houston, Texas 77040
713.462.3242
www.cobbfendley.com

SAN ANGELO BRIDGES

DRAINAGE AREA MAP

CR 339 AT COYOTE CREEK

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	X		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	44

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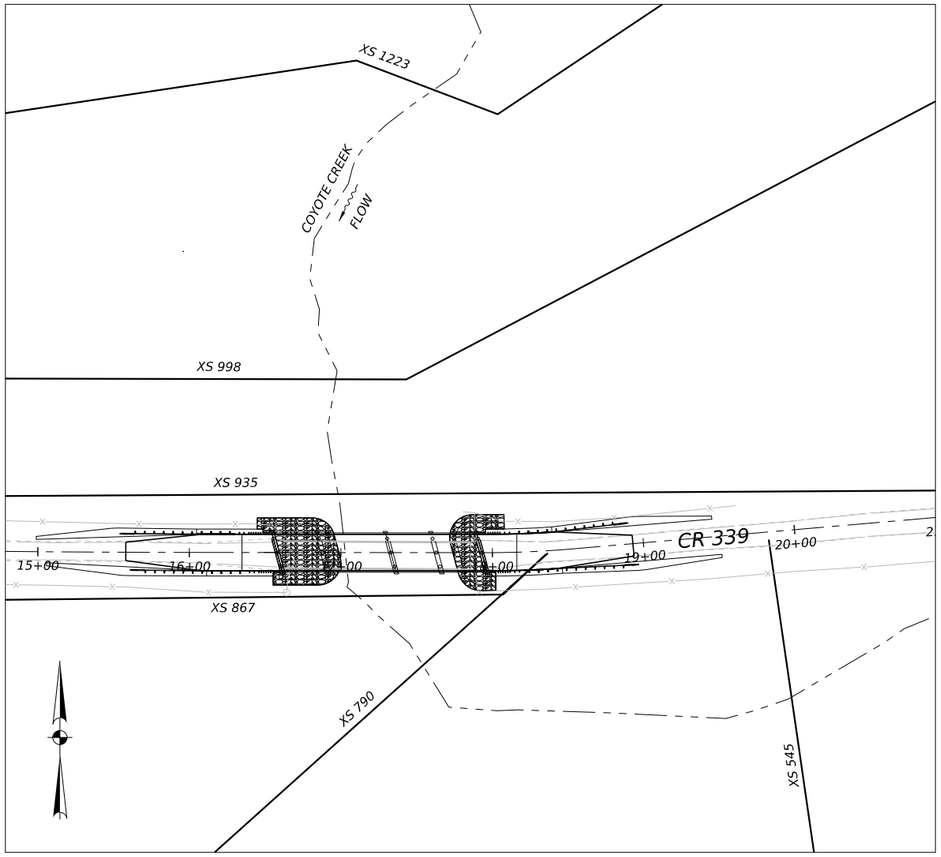


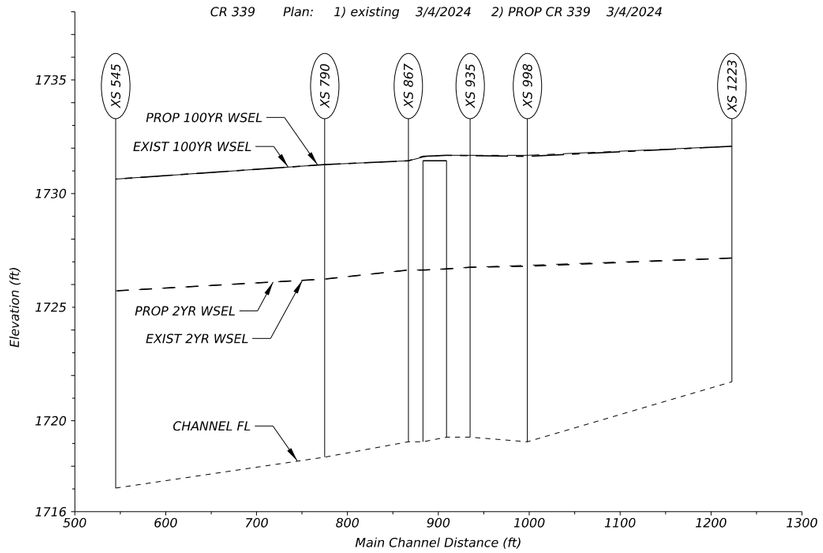
HEC-RAS CROSS SECTION LAYOUT
1" = 100'

HYDRAULIC DATA: COYOTE CREEK																
EXISTING CONDITIONS							PROPOSED CONDITIONS							COMPARISONS			
STATION	2 YEAR			100 YEAR			STATION	2 YEAR			100 YEAR			2 YEAR		100 YEAR	
	Q TOTAL (CFS)	WSEL (FT)	VEL CHNL (FT/S)	Q TOTAL (CFS)	WSEL (FT)	VEL CHNL (FT/S)		Q TOTAL (CFS)	WSEL (FT)	VEL CHNL (FT/S)	Q TOTAL (CFS)	WSEL (FT)	VEL CHNL (FT/S)	PR-EX WSEL (+ / -)	PR - EX VEL (+ / -)	PR-EX WSEL (+ / -)	PR - EX VEL (+ / -)
1223	1303	1727.17	5.46	10781	1732.07	9.94	1223	1303	1727.17	5.46	10781	1732.07	9.94	0.00	0.00	0.00	0.00
998	1303	1726.82	4.91	10781	1731.66	6.39	998	1303	1726.82	4.91	10781	1731.66	6.39	0.00	0.00	0.00	0.00
935	1303	1726.76	4.14	10781	1731.69	4.42	935	1303	1726.77	4.14	10781	1731.69	4.42	0.01	0.00	0.00	0.00
896	EXISTING BRIDGE						896	PROPOSED BRIDGE									
867	1303	1726.63	4.08	10781	1731.45	5.61	867	1303	1726.63	4.08	10781	1731.45	5.61	0.00	0.00	0.00	0.00
790	1303	1726.25	5.19	10781	1731.27	6.25	790	1303	1726.25	5.19	10781	1731.27	6.25	0.00	0.00	0.00	0.00
545	1303	1725.74	5.02	10781	1730.62	8.66	545	1303	1725.74	5.02	10781	1730.62	8.66	0.00	0.00	0.00	0.00

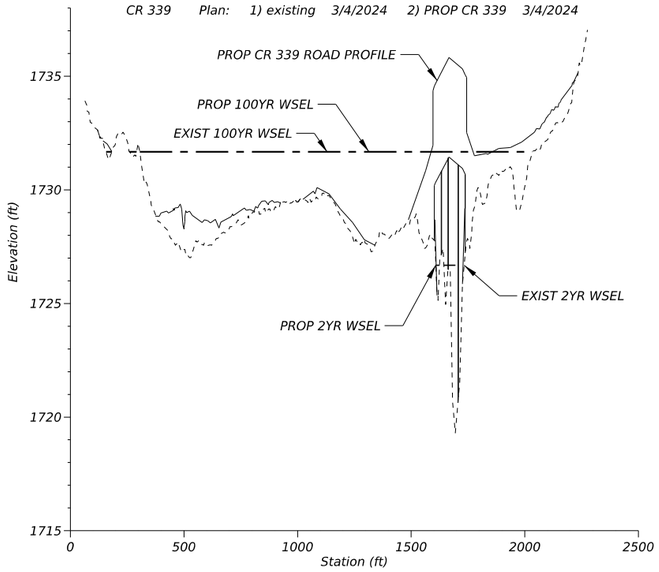
		FLOW DATA		THROUGH BRIDGE VELOCITY (FPS)
		BRIDGE Q (CFS)	OVERFLOW Q (CFS)	
2 YEAR	EXIST	1303.00	0.00	4.35
	PROP	1303.00	0.00	4.34
100 YEAR	EXIST	2959.58	7821.42	4.02
	PROP	3258.45	7522.55	3.94

NOTES:

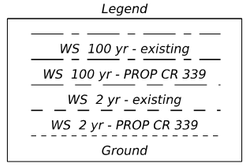
1. HEC-RAS 6.4.1 WAS UTILIZED FOR THE HYDRAULIC ANALYSIS OF CR 339 AT COYOTE CREEK.
2. A TAILWATER CONDITION OF NORMAL DEPTH WITH A STREAM SLOPE OF 0.2% WAS USED.
3. CR 339 AT COYOTE CREEK IS LOCATED WITHIN A FEMA UNMAPPED AREA.
4. T223 BRIDGE RAIL IS MODELED AS PART OF THE ROADWAY PROFILE.
5. SEE "DRAINAGE AND SCOUR REPORT CR 339 AT COYOTE CREEK" DATED MARCH 2024 FOR ADDITIONAL INFORMATION.



HEC-RAS CROSS PROFILE



HEC-RAS CROSS SECTION



100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED
PROFESSIONAL ENGINEER

Cynthia R. Carle
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TEXAS RESGISTERED ENGINEERING FIRM F-739

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13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
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Texas Department of Transportation

SAN ANGELO BRIDGES

HYDRAULIC DATA

CR 339 AT COYOTE CREEK

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	X		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	45

DATE: 7/29/2024 2:57:23 PM
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HEC-RAS HEC-RAS 6.4.1 June 2023
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

PROJECT DATA
Project Title: CR 339
Project File : CR339.prj
Run Date and Time: 2/28/2024 5:07:43 PM

Project in English units

PLAN DATA

Plan Title: EXIST CR 339
Plan File : C:\...-1\RAS\CR339.p04

Geometry Title: existing cr 339
Geometry File : C:\...-1\RAS\CR339.g04

Flow Title : CR 339 RRE
Flow File : C:\...-1\RAS\CR339.f01

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: CR 339 RRE
Flow File : C:\...-1\RAS\CR339.f01

Flow Data (cfs)

River	Reach	RS	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr	500 yr
River 1	Reach 1	1223	1303	2860	4240	6437	8404	10781	17934

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River 1	Reach 1	2 yr		Normal S = 0.002
River 1	Reach 1	100 yr		Normal S = 0.002

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	1223	2 yr	1303.00	1721.73	1727.17	1727.64	0.002669	5.46	238.44	75.36	0.54	
Reach 1	1223	100 yr	10781.00	1721.73	1732.07	1732.07	1733.14	0.003261	9.94	2425.23	1513.54	0.68
Reach 1	998	2 yr	1303.00	1719.08	1726.82	1727.15	0.001545	4.91	354.54	166.56	0.41	
Reach 1	998	100 yr	10781.00	1719.08	1731.66	1731.93	0.001243	6.39	3975.99	1383.81	0.41	
Reach 1	935	2 yr	1303.00	1719.29	1726.76	1723.80	1727.03	0.001505	4.14	314.77	95.97	0.40
Reach 1	935	100 yr	10781.00	1719.29	1731.69	1730.01	1731.83	0.000565	4.42	5576.49	1789.21	0.28
Reach 1	896		Bridge									
Reach 1	867	2 yr	1303.00	1719.07	1726.63	1723.62	1726.89	0.001369	4.08	319.28	92.49	0.39
Reach 1	867	100 yr	10781.00	1719.07	1731.45	1730.33	1731.70	0.000986	5.61	4409.53	1710.85	0.37
Reach 1	790	2 yr	1303.00	1718.41	1726.25	1726.67	0.002667	5.19	251.10	82.53	0.52	
Reach 1	790	100 yr	10781.00	1718.41	1731.27	1731.57	0.001439	6.25	3906.14	1591.35	0.44	
Reach 1	545	2 yr	1303.00	1717.05	1725.74	1722.71	1726.13	0.002001	5.02	261.77	98.24	0.46
Reach 1	545	100 yr	10781.00	1717.05	1730.62	1730.37	1731.23	0.002002	8.66	3295.56	1512.92	0.53

BRIDGE
RIVER: River 1 REACH: Reach 1 RS: 896

BRIDGE OUTPUT Profile #2 yr

			Inside BR US	Inside BR DS
E.G. US. (ft)	1727.03	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1726.76	E.G. Elev (ft)	1726.97	1726.92
Q Total (cfs)	1303.00	W.S. Elev (ft)	1726.68	1726.65
Q Bridge (cfs)	1303.00	Crit W.S. (ft)	1723.87	1723.67
Q Weir (cfs)		Max Chl Dpth (ft)	7.39	7.58
Weir Sta Lft (ft)		Vel Total (ft/s)	4.35	4.16
Weir Sta Rgt (ft)		Flow Area (sq ft)	299.55	312.85
Weir Submerg		Froude # Chl	0.43	0.39
Weir Max Depth (ft)		Specif Force (cu ft)	981.41	1037.53
Min El Weir Flow (ft)	1727.56	Hydr Depth (ft)	3.23	3.46
Min El Prs (ft)	1730.63	W.P. Total (ft)	110.23	111.30
Delta EG (ft)	0.14	Conv. Total (cfs)	28892.0	30862.2
Delta WS (ft)	0.14	Top Width (ft)	92.80	90.47
BR Open Area (sq ft)	735.37	Frctn Loss (ft)	0.04	0.03
BR Open Vel (ft/s)	4.35	C & E Loss (ft)	0.01	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.35	0.31
BR Sel Method	Energy only	Power Total (lb/ft s)	1.50	1.30

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #100 yr

			Inside BR US	Inside BR DS
E.G. US. (ft)	1731.83	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	1731.69	E.G. Elev (ft)	1731.80	1731.76
Q Total (cfs)	10781.00	W.S. Elev (ft)	1731.67	1731.64
Q Bridge (cfs)	2959.58	Crit W.S. (ft)	1730.58	1730.62
Q Weir (cfs)		Max Chl Dpth (ft)	12.38	12.57
Weir Sta Lft (ft)		Vel Total (ft/s)	2.65	2.57
Weir Sta Rgt (ft)		Flow Area (sq ft)	4061.43	4199.40
Weir Submerg		Froude # Chl	0.15	0.14
Weir Max Depth (ft)		Specif Force (cu ft)	9221.73	9411.64
Min El Weir Flow (ft)	1727.56	Hydr Depth (ft)	2.98	2.92
Min El Prs (ft)	1730.63	W.P. Total (ft)	1643.74	1720.58
Delta EG (ft)	0.13	Conv. Total (cfs)	256099.4	257077.4
Delta WS (ft)	0.25	Top Width (ft)	1364.02	1437.75
BR Open Area (sq ft)	735.37	Frctn Loss (ft)	0.04	0.02
BR Open Vel (ft/s)	4.02	C & E Loss (ft)	0.00	0.04
BR Sluice Coef		Shear Total (lb/sq ft)	0.27	0.27
BR Sel Method	Energy only	Power Total (lb/ft s)	0.73	0.69

Note: Multiple critical depths were found at this location.
The critical depth with the lowest, valid, water surface was used.

100% SUBMITTAL

STATE OF TEXAS
CYNTHIA R. CARLE
91716
LICENSED
PROFESSIONAL ENGINEER
Cynthia R. Carle
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TEXAS RESGISTERED ENGINEERING FIRM F-739

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

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SAN ANGELO BRIDGES
HEC-RAS COMPUTATIONS
CR 339 AT COYOTE CREEK

SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	X		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	46

DATE: 7/29/2024 2:58:27 PM
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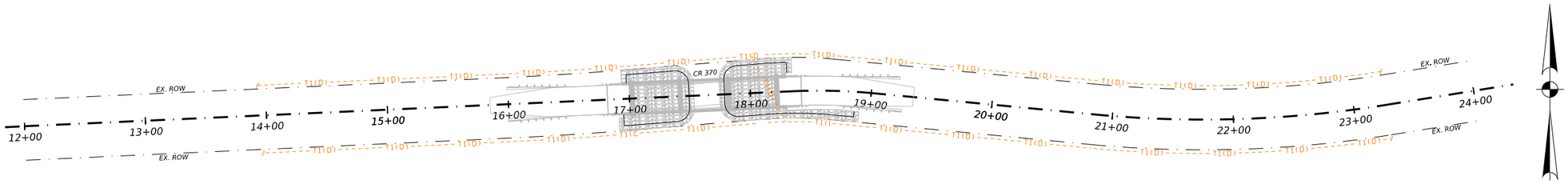

LEGEND	QUALITY LEVEL D	
	- - - FOC1(D) - - -	FIBER OPTIC - FRONTIER
	- - - - T1(D) - - -	TELECOM - TAYLOR TELECOM
	- - - - G1(D) - - -	GAS - WEST TEXAS GAS

NOTES:

1. ALL SUE LEVEL "C" AND "D" UTILITIES ARE TAKEN FROM RECORDS RESEARCH, VISIBLE SURFACE FEATURES, AND PERSONAL TESTIMONY FROM UTILITY REPRESENTATIVES.

2. DUE TO LIMITATIONS OF ELECTRONIC LOCATING EQUIPMENT, LEVEL "B" UTILITY LINES MAY NOT BE ACCURATE IN CONGESTED AREAS.

3. ALL PIPE SIZES WERE TAKEN FROM UTILITY RECORDS WHERE POSSIBLE.

STATE OF TEXAS
CHRIS C. ERNST
100220
LICENSED
PROFESSIONAL ENGINEER

07/30/2024

0 25 50 100
1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
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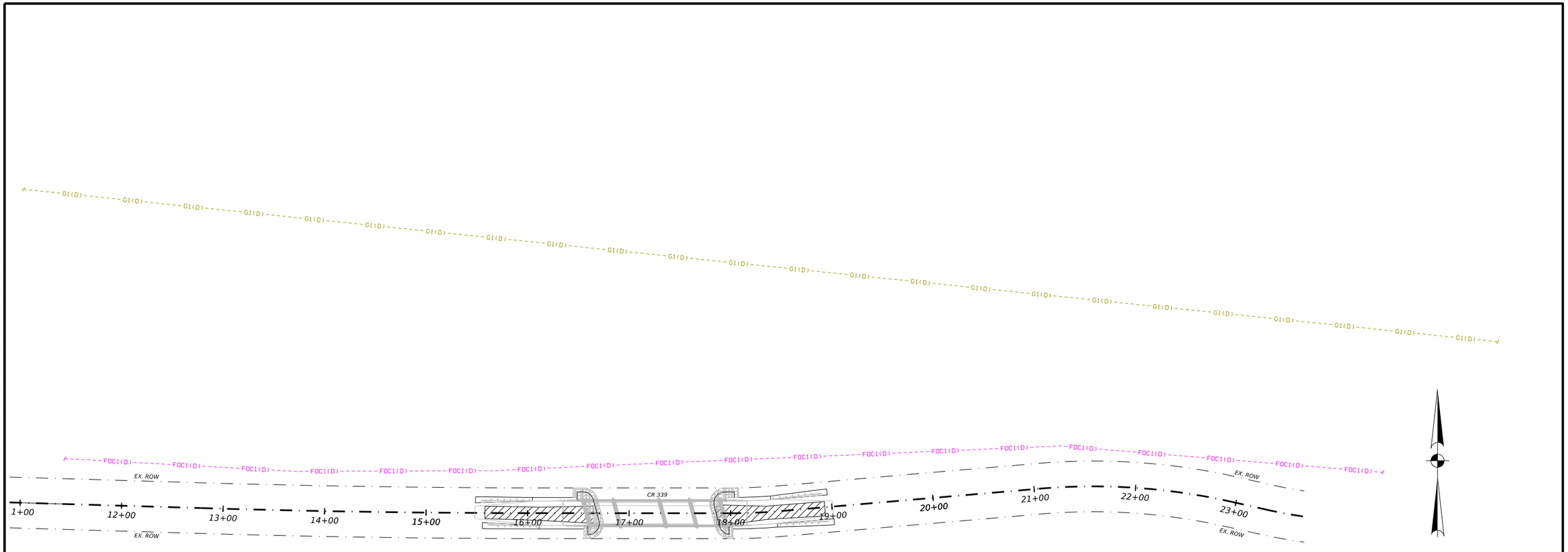
Texas Department of Transportation

SAN ANGELO BRIDGES
EXISTING UTILITY PLANS
CR 370

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	X		CR 339,ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024,ETC	47



LEGEND	QUALITY LEVEL D	
	FOC1(D)	FIBER OPTIC - FRONTIER
	T1(D)	TELECOM - TAYLOR TELECOM
	G1(D)	GAS - WEST TEXAS GAS

NOTES:

1. ALL SUE LEVEL "C" AND "D" UTILITIES ARE TAKEN FROM RECORDS RESEARCH, VISIBLE SURFACE FEATURES, AND PERSONAL TESTIMONY FROM UTILITY REPRESENTATIVES.

2. DUE TO LIMITATIONS OF ELECTRONIC LOCATING EQUIPMENT, LEVEL "B" UTILITY LINES MAY NOT BE ACCURATE IN CONGESTED AREAS.

3. ALL PIPE SIZES WERE TAKEN FROM UTILITY RECORDS WHERE POSSIBLE.

STATE OF TEXAS
CHRIS C. ERNST
100228
LICENSED
PROFESSIONAL ENGINEER

07/30/2024

0 25 50 100
1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
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Texas Department of Transportation

SAN ANGELO BRIDGES
EXISTING UTILITY PLANS
CR 339

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	x		CR 339,ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024,ETC	48

DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-1	District	San Angelo
Highway	CR 339	Structure	Bridge	Date	11/1/2023
CSJ	0907-13-024	Station	16+40.92	Grnd. Elev.	1732.07 ft
		Offset	11.32 RT	GW Elev.	1714.87 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Sandy Lean, moist to dry, brown, few Gravel and organics (CL)			11.1	37	22		SSS@0.5', N=10, -200=62.3%
1729.6			SAND, Clayey, slightly compact, dry, brown, fine grained, few Gravel, trace gypsum, Gravel seam between 8' to 9' (SC)			3.0	38	22		SSS@3', N=36, -200=35.0%
5		16 (6) 14 (6)				1.4				SSS@6.5', N=42, -200=20.6%
						1.4				SSS@8', N=6,15,50/5", -200=19.6%
10		50 (5) 50 (2)				1.4				SSS@11.1', N=50/5.75", -200=35.4%
1720.1			CLAY, Lean with Sand, very stiff, dry, light brown and gray, trace Gravel (CL)							
15		18 (6) 39 (6)				8.3	45	27		SSS@16.5', N=18,32,50/1.5", -200=80.2%
1713.1										
20		20 (6) 50 (3)	CLAY, Lean, very stiff to hard, dry, dark gray to dark brown, blocky, few Gravel, with Sand below 25' (CL)			10.8	39	22		SSS@21.3', N=31,29,50/2", -200=91.0%
25		50 (4.5) 50 (3)				10.7	43	20		SSS@25.8', N=39, 50/5" -200=76.1%
1703.1			MUDSTONE, very hard, gray, trace ferrous staining from 40.7' to 46.4' (CH)							
30		50 (0.75) 50 (0.75)				8.5	42	23		SSS@30.2', N=50/2.75", -200=99.1%
35		50 (0) 50 (0.125)				13.2				SSS@35.1', N=50/4"
40		50 (2) 50 (1.5)								

Remarks: LAT: 31.86947, LONG: -99.46750. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 50 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-1	District	San Angelo
Highway	CR 339	Structure	Bridge	Date	11/1/2023
CSJ	0907-13-024	Station	16+40.92	Grnd. Elev.	1732.07 ft
		Offset	11.32 RT	GW Elev.	1714.87 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			MUDSTONE, very hard, gray, trace ferrous staining from 40.7' to 46.4' (CH)			6.6	42	24		SSS@40.7', N=50/4.25", -200=99.4%
45		50 (3) 50 (0.5)				11.6				SSS@45.5', N=41,50/5.5"
50		50 (0.25) 50 (0.25)				14.8				SSS@50.2', N=50/2.5"
55		50 (0) 50 (0)				9.7	40	18		SSS@55.2', N=50/3.5", -200=98.2%
1671.9 60		50 (0.25) 50 (0.5)								Boring terminated at 60.2'
65										
70										
75										
80										

Remarks: LAT: 31.86947, LONG: -99.46750. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 50 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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HL-93 LOADING

100% SUBMITTAL

STATE OF TEXAS
MARCUS J. GALVAN
80192
REGISTERED PROFESSIONAL ENGINEER

08/21/2024

REV. NO.	DATE	DESCRIPTION	BY

FORESIGHT
PLANNING & ENGINEERING SERVICES, LLC
TEXAS REGISTERED ENGINEERING FIRM F-17373

Texas Department of Transportation

SAN ANGLEO BRIDGES

SOIL BORING LOGS

SHEET 1 OF 4

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	49

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DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-2	District	San Angelo
Highway	CR 339	Structure	Bridge	Date	10/31/2023
CSJ	0907-13-024	Station	18+02.00	Grnd. Elev.	1730.68 ft
		Offset	11.17 LT	GW Elev.	1711.78 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Clayey, dry, gray to brown, fine grained, few Gravel, Sandy CL layer between 6' to 8' (SC)			5.2	43	26		SSS@0.5', N=21, -200=49.9%
						3.3	26	15		SSS@3', N=15, -200=40.3%
5		12 (6) 14 (6)				6.2	40	26		SSS@6.4', N=16, -200=64.5%
10		23 (6) 16 (6)				4.2	25	14		SSS@11.5', N=38, -200=18.5%
1718.7			CLAY, Lean with Sand, hard, dry, brown to gray, blocky, trace to few Gravel (CL)							
15		50 (2) 50 (0.25)				4.2	33	20		SSS@15.4', N=22,50/2", , -200=71.8%
20		48 (6) 50 (5.5)				11.4	44	21		SSS@21.2', N=61, -200=78.2%
25		50 (0.5) 50 (0.75)				10.1				SSS@25.2', N=50/4.25"
1704.7			CLAY, Lean, hard, moist, brown and gray to dark gray (CL)							
30		44 (6) 50 (3)				11.3	46	24		SSS@31.1', N=46,42,50/3.5", -200=99.7%
35		50 (6) 50 (4.25)				10.5				SSS@36.2', N=39,48,50/4"
1691.7			MUDSTONE, hard to very hard, dark gray							
40		50 (1.25) 50 (1)								

Remarks: LAT: 31.86950, LONG: -99.96673. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 25 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-2	District	San Angelo
Highway	CR 339	Structure	Bridge	Date	10/31/2023
CSJ	0907-13-024	Station	18+02.00	Grnd. Elev.	1730.68 ft
		Offset	11.17 LT	GW Elev.	1711.78 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			MUDSTONE, hard to very hard, dark gray			11.4	35	16		SSS@40.3', N=150/5.25", -200=96.9% Drilling water loss
45		50 (2.5) 50 (0.25)								SSS@45.3', N=50/1.25" No Recovery, Drilling water loss
50		50 (1.75) 50 (0.5)				10.0	38	16		SSS@50.4', N=3.75", -200=99.3%
55		50 (1.5) 50 (2)				12.7				SSS@55.5', N=50,50/3.25"
60		50 (0) 50 (0)								SSS@60.1', N=50/1.25" No Recovery
1665.6		50 (0.125) 50 (0)								Boring terminated at 65.1'
65										
70										
75										
80										

Remarks: LAT: 31.86950, LONG: -99.96673. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 25 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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HL-93 LOADING

100% SUBMITTAL

STATE OF TEXAS
MARCUS J. GALVAN
80192
REGISTERED PROFESSIONAL ENGINEER

08/21/2024

REV. NO.	DATE	DESCRIPTION	BY

FORESIGHT
PLANNING & ENGINEERING SERVICES, LLC
TEXAS REGISTERED ENGINEERING FIRM F-17373

Texas Department of Transportation

SAN ANGLEO BRIDGES

SOIL BORING LOGS

SHEET 2 OF 4

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	50

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DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-3	District	San Angelo
Highway	CR 370	Structure	Bridge	Date	11/3/2023
CSJ	0907-13-025	Station	16+94.49	Grnd. Elev.	1793.41 ft
		Offset	12.38 RT	GW Elev.	1768.91 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			GRAVEL, Silty with Sand, dense, dry, reddish brown, fine grained, trace organics from 3' to 4', light brown below 6.4' (GM)			4.6				SSS@0', N=19, -200=41.8%
						2.9				SSS@3', N=2,50/3"
5		42 (6) 50 (4.25)				3.3				SSS@6.4', N=25, -200=31.2%
1785.4			CLAY, Sandy Lean, very stiff, moist, reddish brown, trace Gravel (CL)			4.0	27	13		SSS@8', N=14, -200=63.6%
10		24 (6) 33 (6)				4.7	29	16		SSS@11.5', N=19, -200=70.4%
1779.4			SAND, Silty, loose, moist, reddish brown, fine grained (SM)							
15		10 (6) 7 (6)				1.9	16	3		SSS@16.5', N=6, -200=32.9%
20		7 (6) 8 (6)				16.7		2		SSS@21.5', N=7, -200=44.2%
1769.4			CLAY, Lean, stiff to hard, moist, reddish brown, few Sand (CL)							
25		15 (6) 14 (6)				14.4	37	17		SSS@26.5', N=7,18,50/4.25", -200=94.1%
30		10 (6) 3 (6)				13.3				SSS@31.5', N=23,50/4"
1761.4			MUDSTONE, soft to hard, reddish brown and gray							
35		0 (6) 0 (6)				16.7	51	28		SSS@36.5', N=21,30,50/5.5", -200=99.1%
40		50 (1) 50 (2.5)								

Remarks: LAT: 31.88027, LONG: -100.18289. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 40 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-3	District	San Angelo
Highway	CR 370	Structure	Bridge	Date	11/3/2023
CSJ	0907-13-025	Station	16+94.49	Grnd. Elev.	1793.41 ft
		Offset	12.38 RT	GW Elev.	1768.91 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			MUDSTONE, soft to hard, reddish brown and gray			14.2				SSS@40.5', N=50/5"
45		50 (2.25) 50 (2.75)				14.8	42	20		SSS@45.8', N=30,50/2.75", -200=96.1%
50		4 (6) 7 (6)				14.8				SSS@51.5', N=57
55		13 (6) 13 (6)				14.8	44	23		SSS@56.5', N=50/5.5", -200=94.9%
1736.4										Boring terminated at 57.2'
60										
65										
70										
75										
80										

Remarks: LAT: 31.88027, LONG: -100.18289. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 40 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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HL-93 LOADING

100% SUBMITTAL

STATE OF TEXAS
MARCUS J. GALVAN
80192
REGISTERED PROFESSIONAL ENGINEER

08/21/2024

REV. NO.	DATE	DESCRIPTION	BY

FORESIGHT
PLANNING & ENGINEERING SERVICES, LLC
TEXAS REGISTERED ENGINEERING FIRM F-17373

Texas Department of Transportation

SAN ANGELO BRIDGES

SOIL BORING LOGS

SHEET 3 OF 4

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	51

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DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-4	District	San Angelo
Highway	CR 370	Structure	Bridge	Date	11/2/2023
CSJ	0907-13-025	Station	18+39.72	Grnd. Elev.	1792.47 ft
		Offset	14.32	GW Elev.	1779.97 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
1790.		GRAVEL, Clayey, dry, reddish brown, fine grained (GC)			1.2				SSS@0.5', N=43, -200=15.1%
		CLAY, Sandy Lean, stiff to very stiff, dry, reddish brown, trace calcareous nodules between 9' to 14', loose SC below 20' (CL)			1.8	20	6		SSS@3', N=23, -200=56.2%
5	28 (6) 20 (6)				5.0				SSS@6.4', N=15
					4.7	29	16		SSS@8', N=15, -200=78.9%
10	11 (6) 28 (6)				4.1				SSS@11.5', N=18, -200=57.0%
15	14 (6) 16 (6)				7.4	24	12		SSS@16.5', N=14, -200=64.1%
20	10 (6) 7 (6)				9.4	32	19		SSS@21.5', N=14, -200=49.1%
1768.5		CLAY, Lean, very stiff, dry to moist, reddish brown and gray, blocky, few Sand (CL)							
25	23 (6) 19 (6)				11.3	44	23		SSS@26.5', N=44,50/3", -200=89.6%
1763.5		MUDSTONE, hard, reddish brown and gray							
30	50 (3) 50 (1.5)				13.3				SSS@30.7', N=50/5.5"
35	50 (2) 50 (1)				16.1	50	27		SSS@35.5', N=27,50/3.5", -200=99.8%
40	50 (2) 50 (0.25)								

Remarks: LAT: 31.88013, LONG: -100.18256. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 45 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

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DRILLING LOG

WinCore
Version 3.3

County	Runnels	Hole	B-4	District	San Angelo
Highway	CR 370	Structure	Bridge	Date	11/2/2023
CSJ	0907-13-025	Station	18+39.72	Grnd. Elev.	1792.47 ft
		Offset	14.32	GW Elev.	1779.97 ft

Elev. (ft)	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
		MUDSTONE, hard, reddish brown and gray			14.6	43	24		SSS@40.4', N=50/4.75", -200=98.9%
45	50 (5) 50 (4)				15.0				SSS@46', N=40,50/3.25"
50	50 (3) 50 (1)				14.1	43	22		SSS@50.6', N=49,50/2", -200=99.6%
55	50 (1) 50 (1.5)				15.1				SSS@55.4', N=50/4"
1736.8									Boring terminated at 55.7'
60									
65									
70									
75									
80									

Remarks: LAT: 31.88013, LONG: -100.18256. Drill Rig: CME 75 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; Drilling Method: Continuous Flight Auger to 45 feet, Mud Rotarty thereafter. Latitude and Longitude are provided by a handheld GPS and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Blue Hole Drilling, LLC **Logger: FP** **Organization: Foresight PES, LLC**

C:\Users\JoshHubbard\Desktop\Report Updates\3_CobbFendley_San Angelo\Logs\Final\B-4.CLG

HL-93 LOADING

100% SUBMITTAL

STATE OF TEXAS
MARCUS J. GALVAN
80192
REGISTERED PROFESSIONAL ENGINEER

08/21/2024

REV. NO.	DATE	DESCRIPTION	BY

FORESIGHT
PLANNING & ENGINEERING SERVICES, LLC
TEXAS REGISTERED ENGINEERING FIRM F-17373

Texas Department of Transportation

SAN ANGLEO BRIDGES

SOIL BORING LOGS

SHEET 4 OF 4

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO. / SHEET NO.
SJT	RUNNELS	0907	13	024, ETC / 52

DATE: 7/29/2024 1:44:55 PM
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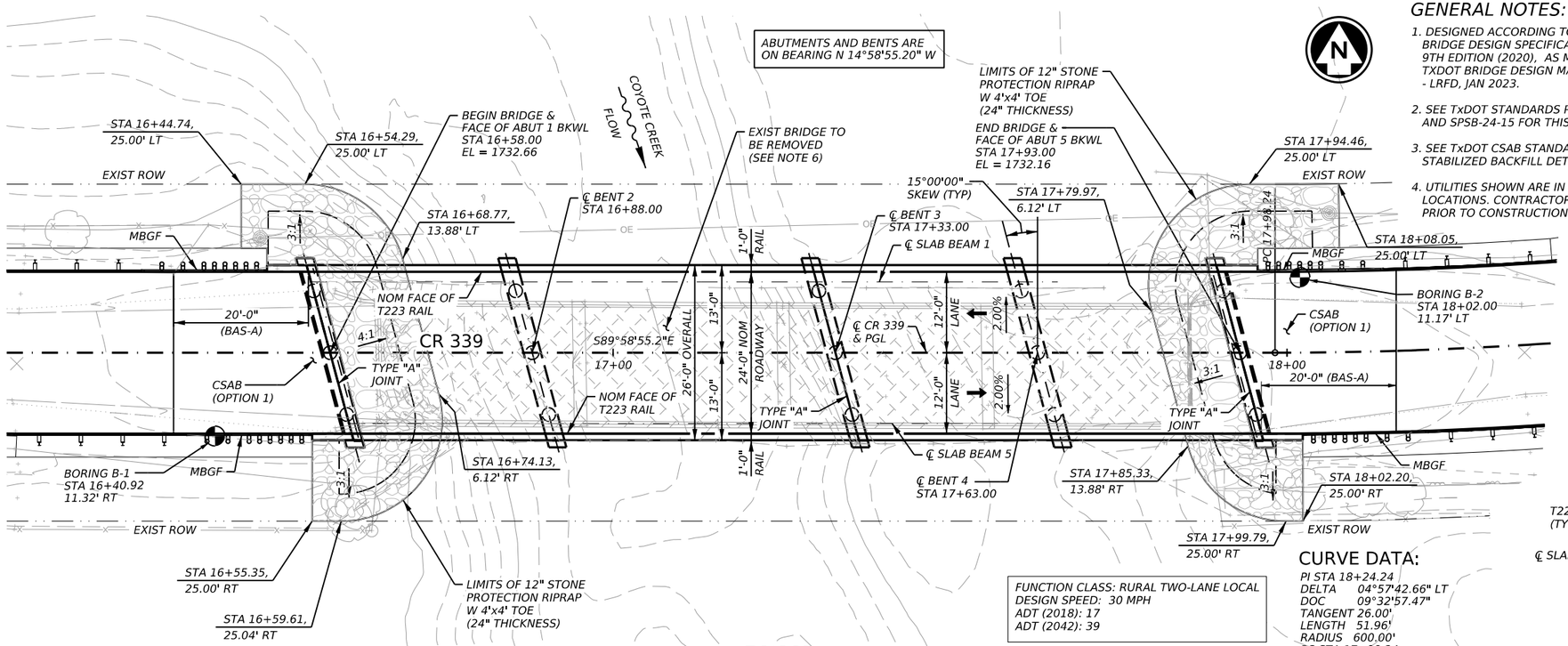


PLAN

FUNCTION CLASS: RURAL TWO-LANE LOCAL
DESIGN SPEED: 30 MPH
ADT (2018): 17
ADT (2042): 39

EXIST. NBI: 07-200-0-AA03-39-033
PROP. NBI: 07-200-0-AA03-39-002

CURVE DATA:

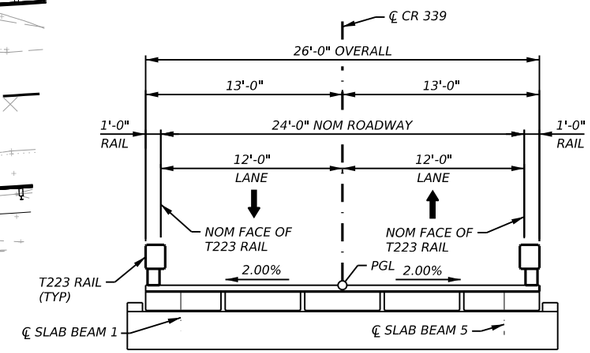
PI STA 18+24.24
DELTA 04°57'42.66" LT
DOC 09°32'57.47"
TANGENT 26.00'
LENGTH 51.96'
RADIUS 600.00'
PC STA 17+98.24
PT STA 18+50.20

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020), AS MODIFIED BY THE TXDOT BRIDGE DESIGN MANUAL - LRFD, JAN 2023.
2. SEE TxDOT STANDARDS PSBSD, APSB-24-15 AND SPSB-24-15 FOR THIS BRIDGE.
3. SEE TxDOT CSAB STANDARD FOR CEMENT STABILIZED BACKFILL DETAILS.
4. UTILITIES SHOWN ARE IN APPROXIMATE LOCATIONS. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.

GENERAL NOTES (CON'T):

5. FOR SOIL BORING INFORMATION, SEE "BORING LOG DATA" SHEETS.
6. EXISTING 90' BRIDGE CONSISTING OF 3 SPANS WITH CONCRETE CAPS, CONCRETE GIRDERS, STEEL PILES, CONCRETE FOOTINGS AND CONCRETE WALL AT THE SOUTH ABUTMENT SHALL BE REMOVED.
7. EXISTING PILING AND CONCRETE FOUNDATIONS TO BE REMOVED 2'-0" BELOW EXISTING GRADE.
8. SEE TxDOT PSBEB STANDARD FOR BEAM END AND BEARING DETAILS.
9. CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING SAND/GRAVEL SHOWN IN THE BORING LOGS. HOLE STABILITY IS THE RESPONSIBILITY OF THE CONTRACTOR.



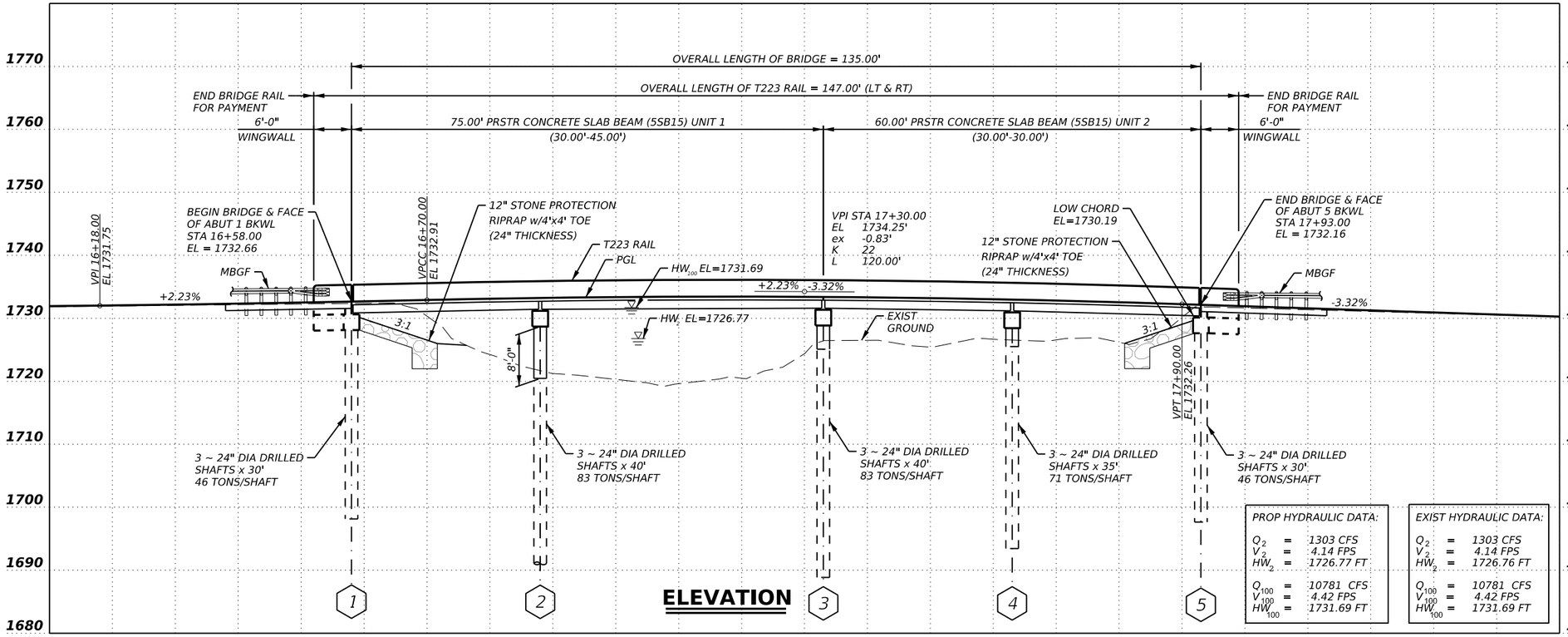
BRIDGE TYPICAL SECTION

SCALE: 1"=10'

0 10 20

SCALE: 1"=20'

HL-93 LOADING
SUPERSTRUCTURE INV/OPR: 1.23/1.59



ELEVATION

PROP HYDRAULIC DATA:

Q_2 = 1303 CFS
V_2 = 4.14 FPS
HW_2 = 1726.77 FT

Q_{100} = 10781 CFS
V_{100} = 4.42 FPS
HW_{100} = 1731.69 FT

EXIST HYDRAULIC DATA:

Q_2 = 1303 CFS
V_2 = 4.14 FPS
HW_2 = 1726.76 FT

Q_{100} = 10781 CFS
V_{100} = 4.42 FPS
HW_{100} = 1731.69 FT

100% SUBMITTAL

Darrell L. Kaderka
STATE OF TEXAS
DARRELL L. KADERKA
79298
LICENSED
PROFESSIONAL ENGINEER
7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

SAN ANGELO BRIDGES
BRIDGE LAYOUT
COYOTE CREEK BRIDGE
NBI: 07-200-0-AA03-39-002

SHEET 1 OF 1

DN: KP	FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK: DK	6	TEXAS	BR 2024(802)			CR 339, ETC
DW: CR	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK: KP	SJT	RUNNELS	0907	13	024, ETC	53

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SUMMARY OF BRIDGE QUANTITIES

ITEM	400	416	420	420	420	422	422	425	450	454	496	*
DESCRIPTION CODE	7010	7004	7012	7022	7038	7001	7013	7017	7008	7001	7009	
ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (24 IN) (1)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC SLAB BEAM (5SB15)	RAIL (TY T223)	TYPE A JOINT (2)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	CY	LF	CY	CY	CY	SF	CY	LF	LF	LF	EA	EA
2 ~ ABUTMENTS	27	180	19.0				43		24.0	81		2
3 ~ BENTS		345		20.7	2.8							
75.00' PRESTR CONCRETE SLAB BEAM UNIT 1						1950		369.99	150.0		0.5	
60.00' PRESTR CONCRETE SLAB BEAM UNIT 2						1560		295.03	120.0		0.5	
TOTAL	27	525	19.0	20.7	2.8	3510	43	665.01	294.0	81	1	2

* THIS ITEM IS SUBSIDIARY TO ITEM 420 - CONCRETE STRUCTURES

CAP ELEVATIONS

	STEP #1	STEP #3	STEP #4	STEP #6
ABUT 1(FWD)	1730.524	1730.734	1730.734	1730.524
BENT 2 (BK)	1731.092	1731.302	1731.302	1731.092
BENT 2 (FWD)	1731.029	1731.239	1731.239	1731.029
BENT 3 (BK)	1731.185	1731.395	1731.395	1731.185
BENT 3 (FWD)	1731.259	1731.469	1731.469	1731.259
BENT 4 (BK)	1730.865	1731.075	1731.075	1730.865
BENT 4 (FWD)	1730.835	1731.045	1731.045	1730.835
ABUT 5 (BK)	1730.049	1730.259	1730.259	1730.049

(1) DRILLED SHAFTS EXTEND TO THE BOTTOM OF THE CAP FOR BENTS 3 AND 4. REFER TO NOTE 5 ON THE COMMON FOUNDATION DETAILS (FD) STANDARD.

(2) TYPE "A" JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES."

HL-93 LOADING

100% SUBMITTAL

Darrell L. Kaderka

STATE OF TEXAS
DARRELL L. KADERKA
79298
LICENSED
PROFESSIONAL ENGINEER

7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

SAN ANGELO BRIDGES

BRIDGE SUMMARY OF QUANTITIES AND CAP ELEV COYOTE CREEK BRIDGE

SHEET 1 OF 1

DN: KP	FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
CK: DK	6	TEXAS	BR 2024(802)		CR 339, ETC	
DW: CR	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK: KP	SJT	RUNNELS	0907	13	024, ETC	54

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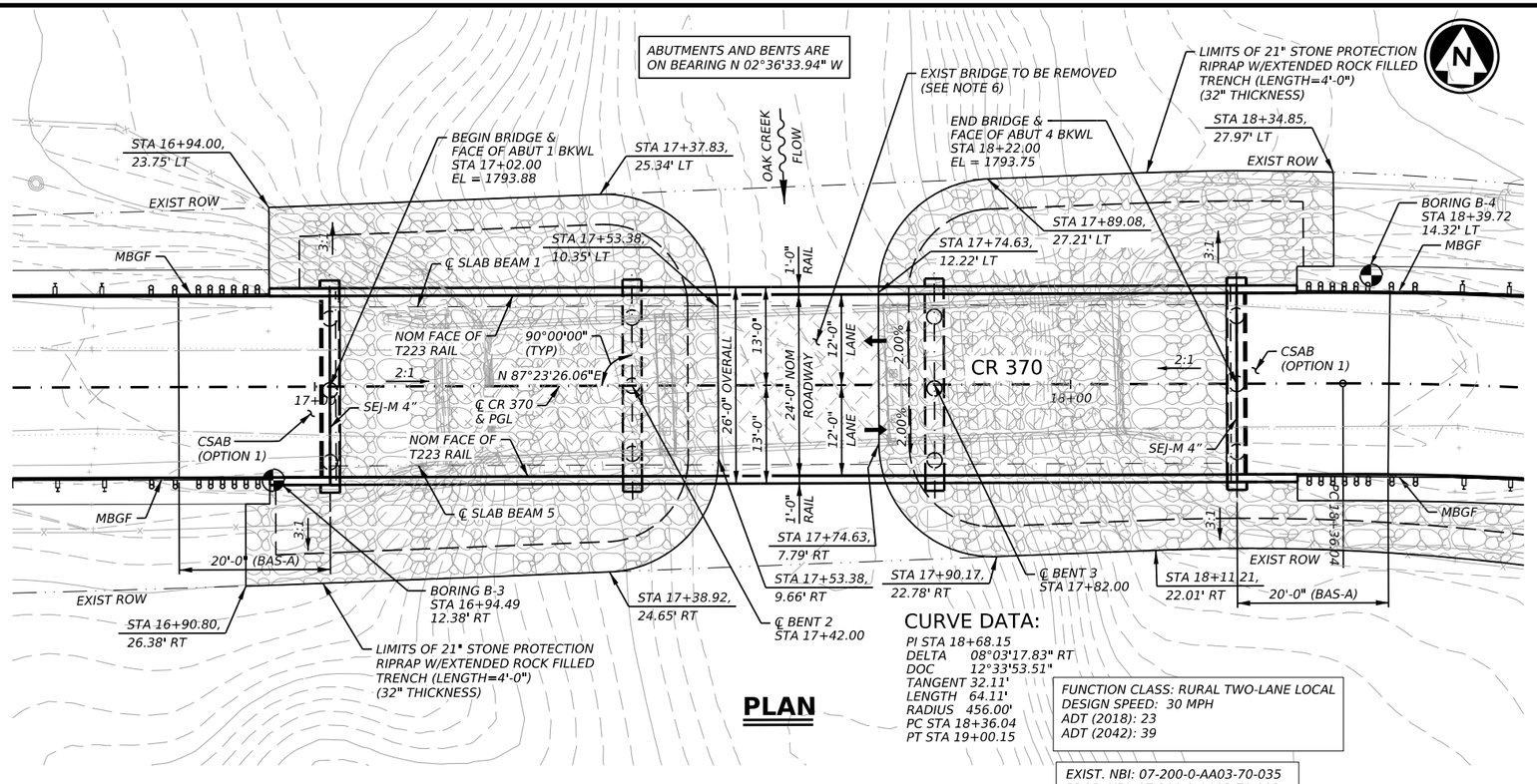
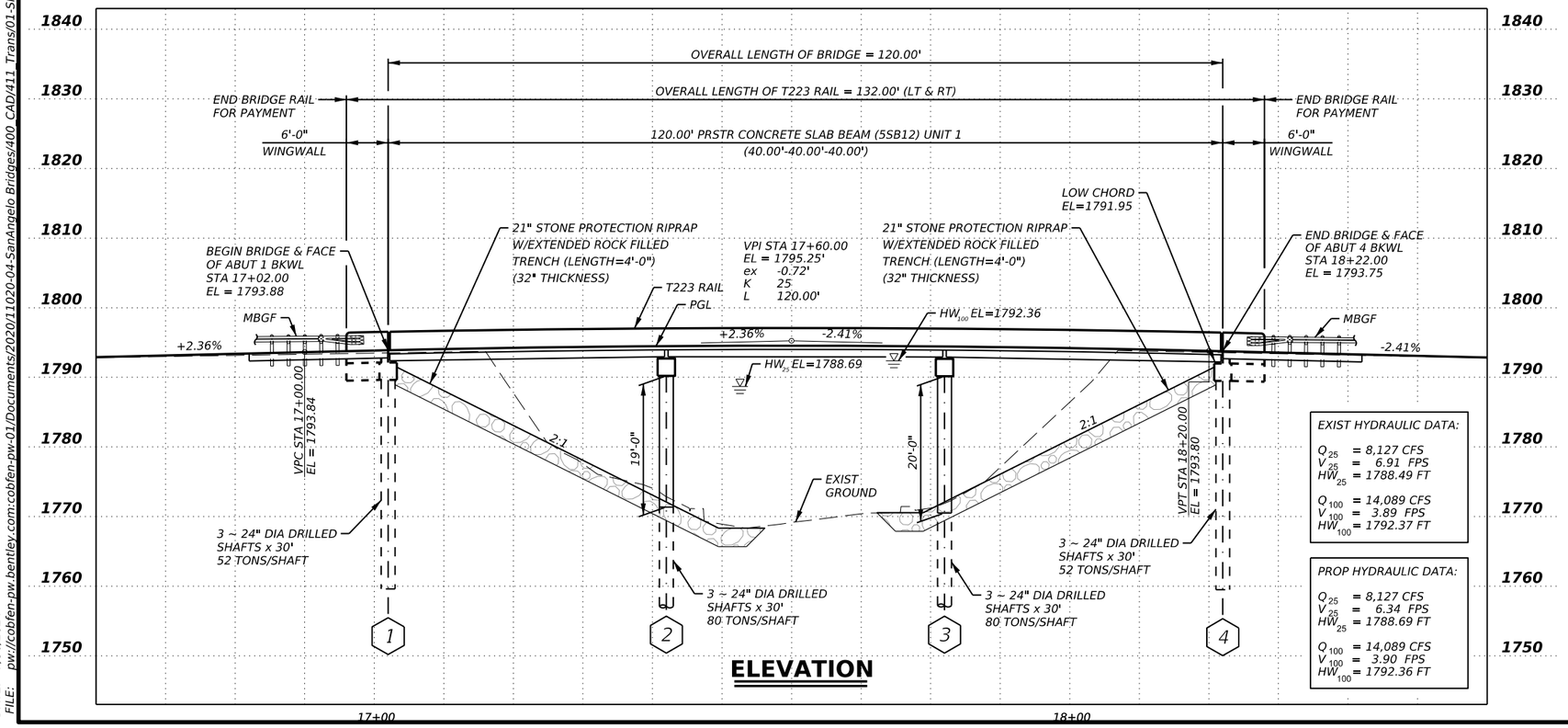


CURVE DATA:

PI STA 18+68.15
DELTA 08°03'17.83" RT
DOC 12°33'53.51"
TANGENT 32.11'
LENGTH 64.11'
RADIUS 456.00'
PC STA 18+36.04
PT STA 19+00.15

FUNCTION CLASS: RURAL TWO-LANE LOCAL
DESIGN SPEED: 30 MPH
ADT (2018): 23
ADT (2042): 39

EXIST. NBI: 07-200-0-AA03-70-035
PROP. NBI: 07-200-0-AA03-70-003



ELEVATION

EXIST HYDRAULIC DATA:
Q_{25} = 8,127 CFS
V_{25} = 6.91 FPS
HW_{25} = 1788.49 FT
Q_{100} = 14,089 CFS
V_{100} = 3.89 FPS
HW_{100} = 1792.37 FT

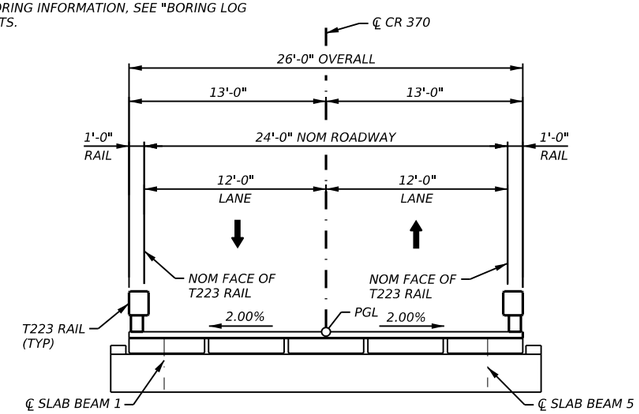
PROP HYDRAULIC DATA:
Q_{25} = 8,127 CFS
V_{25} = 6.34 FPS
HW_{25} = 1788.69 FT
Q_{100} = 14,089 CFS
V_{100} = 3.90 FPS
HW_{100} = 1792.36 FT

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020), AS MODIFIED BY THE TXDOT BRIDGE DESIGN MANUAL - LRFD, JAN 2023.
2. SEE TxDOT STANDARDS PSBSD, APSB-24, BPSB-24 AND SPSB-24 FOR THIS BRIDGE.
3. SEE TxDOT CSAB STANDARD FOR CEMENT STABILIZED BACKFILL DETAILS.
4. UTILITIES SHOWN ARE IN APPROXIMATE LOCATIONS. CONTRACTOR SHALL VERIFY PRIOR TO CONSTRUCTION.
5. FOR SOIL BORING INFORMATION, SEE "BORING LOG DATA" SHEETS.

GENERAL NOTES (CON'T):

6. EXISTING 90' BRIDGE CONSISTING OF 3 SPANS WITH CONCRETE CAPS, CONCRETE GIRDERS, STEEL PILES, CONCRETE FOOTINGS AND CONCRETE WALL AT THE SOUTH ABUTMENT SHALL BE REMOVED.
7. EXISTING PILING AND CONCRETE FOUNDATIONS TO BE REMOVED 2'-0" BELOW EXISTING GRADE OR AS REQUIRED IMPROVEMENT PER SITE CONDITIONS.
8. SEE TxDOT PSBEB STANDARD FOR BEAM END AND BEARING DETAILS.



BRIDGE TYPICAL SECTION

SCALE: 1"=10'

0 10 20

SCALE: 1"=20'

HL-93 LOADING
SUPERSTRUCTURE INV/OPR: 1.34/1.74

100% SUBMITTAL

Darrell L. Kaderka

STATE OF TEXAS
DARRELL L. KADERKA
79298
LICENSED
PROFESSIONAL ENGINEER

7/30/2024

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

SAN ANGELO BRIDGES
BRIDGE LAYOUT
OAK CREEK BRIDGE
NBI: 07-200-0-AA03-70-003

SHEET 1 OF 1

DN: KP	FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
CK: DK	6	TEXAS	BR 2024(802)		CR 339, ETC
DW: CR	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK: KP	SJT	RUNNELS	0907	13	024, ETC	55

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SUMMARY OF BRIDGE QUANTITIES

ITEM	400	416	420	420	420	422	422	425	450	454	496	*
DESCRIPTION CODE	7010	7004	7012	7022	7038	7001	7013	7017	7008	7004	7009	
ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB	PRESTR CONC SLAB BEAM (5SB12)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	CY	LF	CY	CY	CY	SF	CY	LF	LF	LF	EA	EA
2 ~ ABUTMENTS	25	180	17.6				42		24.0	52		2
2 ~ BENTS		180		13.2	13.6							
120.00' PRESTR CONCRETE SLAB BEAM UNIT 1						3120		592.55	240.0		1	
TOTAL	25	360	17.6	13.2	13.6	3120	42	592.55	264.0	52	1	2

* THIS ITEM IS SUBSIDIARY TO ITEM 420 - CONCRETE STRUCTURES

CAP ELEVATIONS

	STEP #1	STEP #3	STEP #4	STEP #6
ABUT 1(FWD)	1791.934	1792.144	1792.144	1791.934
BENT 2 (BK)	1792.505	1792.715	1792.715	1792.505
BENT 2 (FWD)	1792.515	1792.725	1792.725	1792.515
BENT 3 (BK)	1792.473	1792.683	1792.683	1792.473
BENT 3 (FWD)	1792.460	1792.670	1792.670	1792.460
ABUT 4 (BK)	1791.805	1792.015	1792.015	1791.805

HL-93 LOADING

100% SUBMITTAL

Darrell L. Kaderka

STATE OF TEXAS
DARRELL L. KADERKA
79298
LICENSED
PROFESSIONAL ENGINEER

7/29/2024

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

SAN ANGELO BRIDGES

BRIDGE SUMMARY OF QUANTITIES AND CAP ELEV OAK CREEK BRIDGE

SHEET 1 OF 1

DN: KP	FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
CK: DK	6	TEXAS	BR 2024(802)		CR 339, ETC	
DW: CR	STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK: KP	SJT	RUNNELS	0907	13	024, ETC	56

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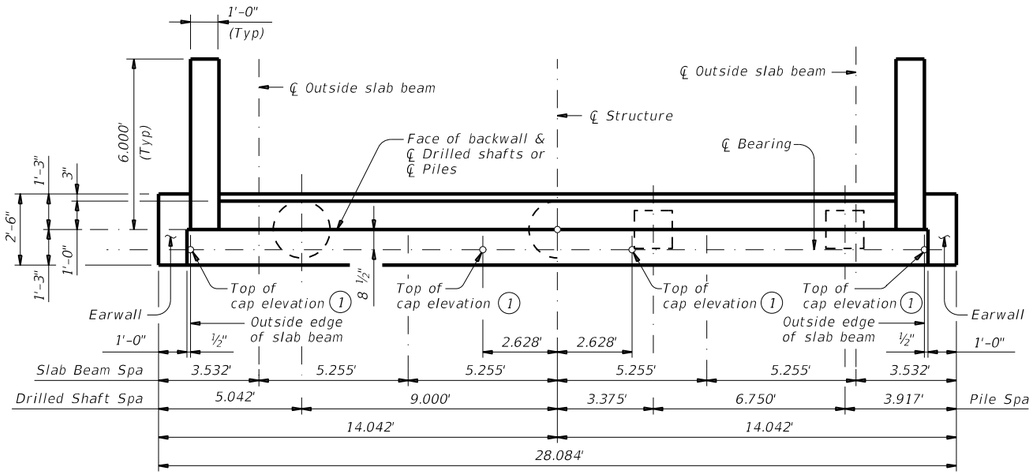
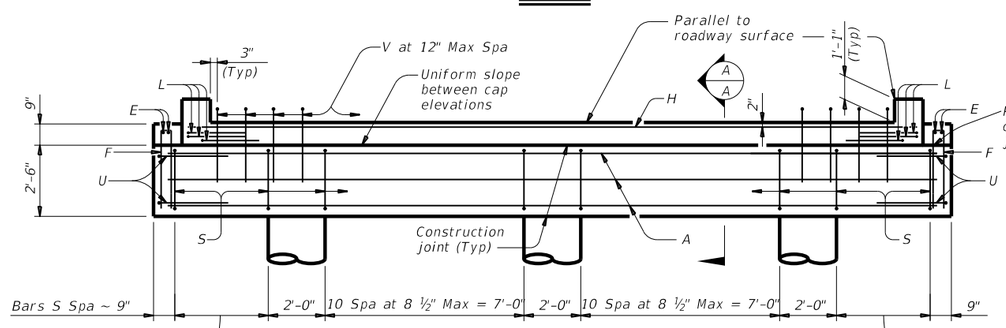
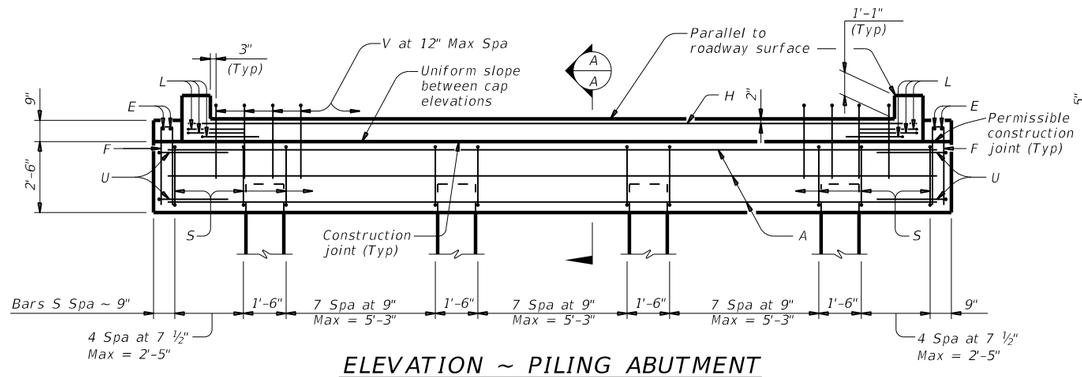


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN

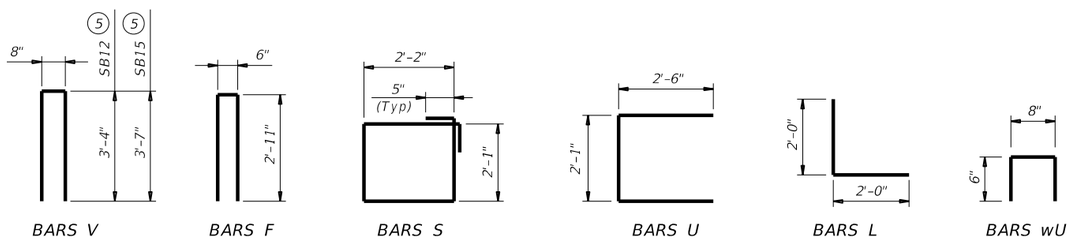


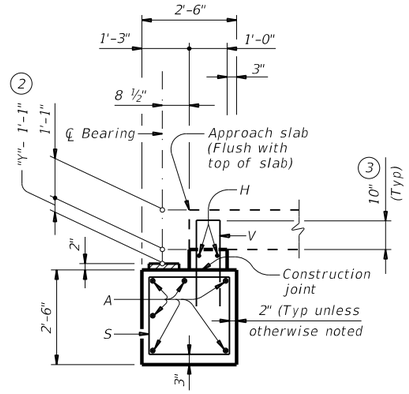
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

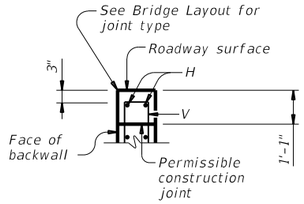
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





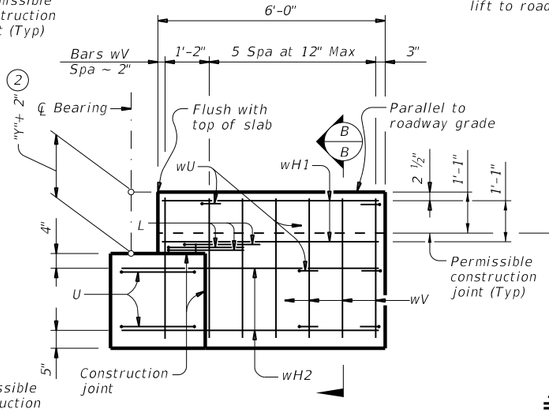
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

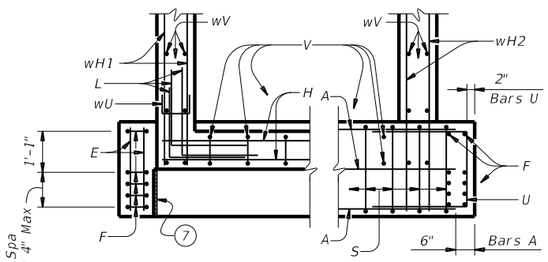
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL — CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45		59		44
50		63		47

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	27'-1"	27'-1"	863	863
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	25'-8"	25'-8"	54	54
L	6	#6	4'-0"	4'-0"	36	36
S	34	#4	9'-4"	9'-4"	212	212
U	4	#6	7'-1"	7'-1"	43	43
V	25	#5	7'-4"	7'-10"	191	204
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,725	1,745
Cl "C" Conc (Abut)				CY	8.8	9.2

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) See Span Details for "Y".

(3) Increase as required to maintain 3" from finished grade.

(4) See Bridge Layout to determine if approach slab is present.

(5) See Bridge Layout for beam type used in the superstructure.

(6) Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.

(7) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-24 only.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS PRESTR CONC SLAB BEAM 24' ROADWAY

APSB-24

FILE: PSB-APSB2400-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		57

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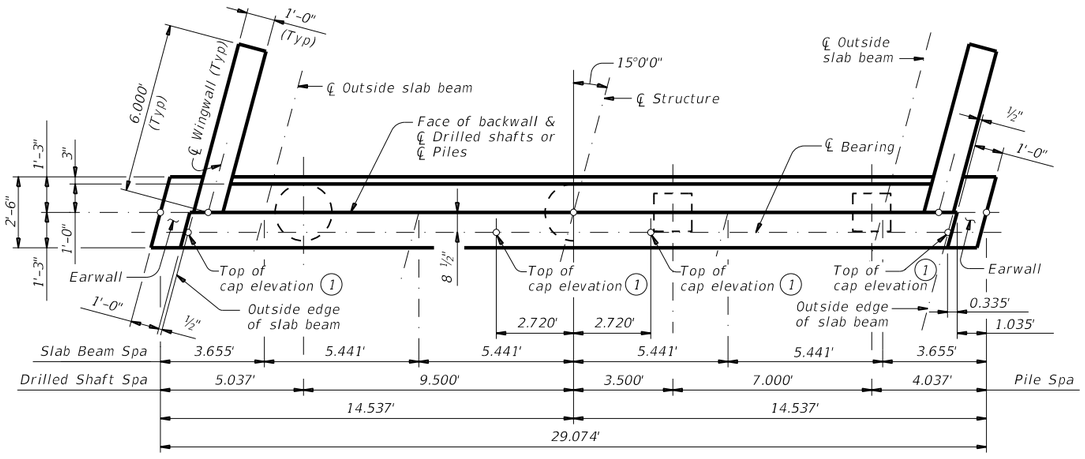
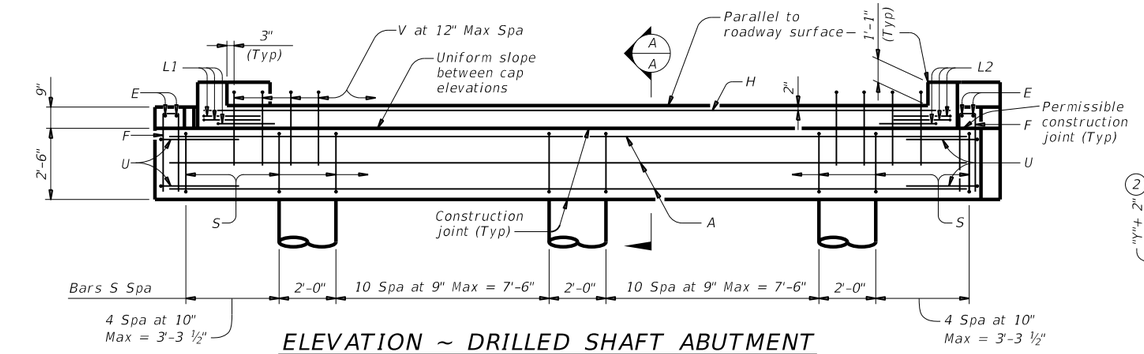
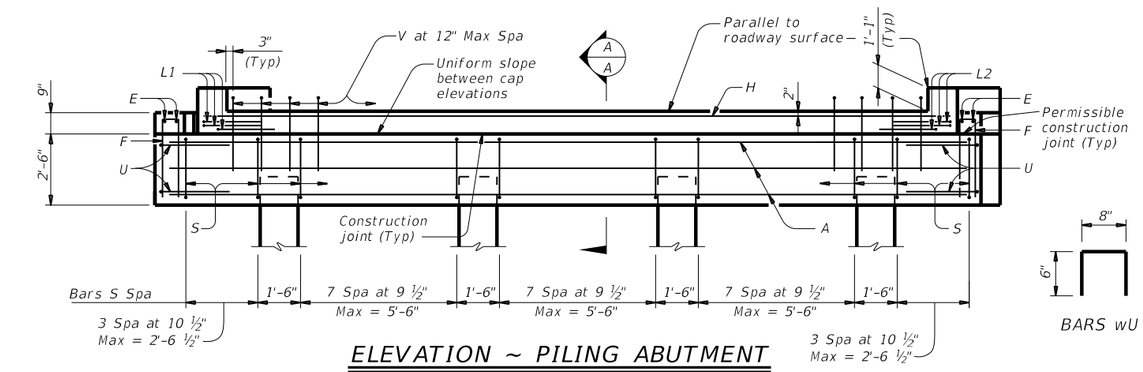


SHOWING DRILLED SHAFTS SHOWING PILES

PLAN

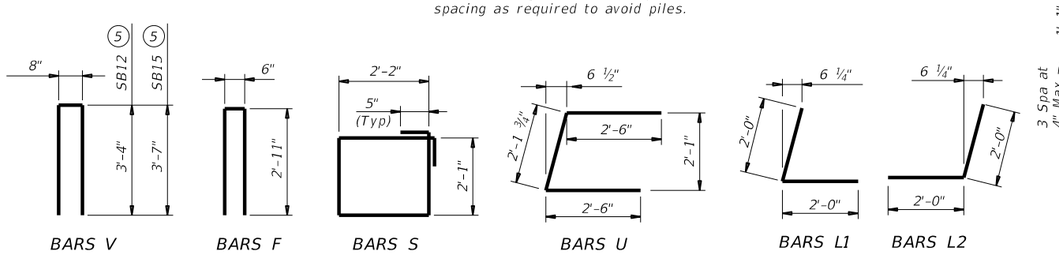


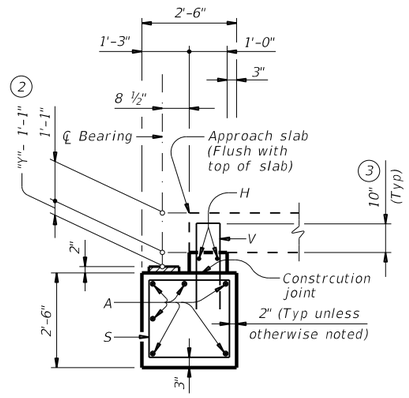
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

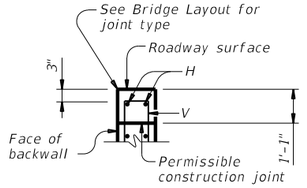
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





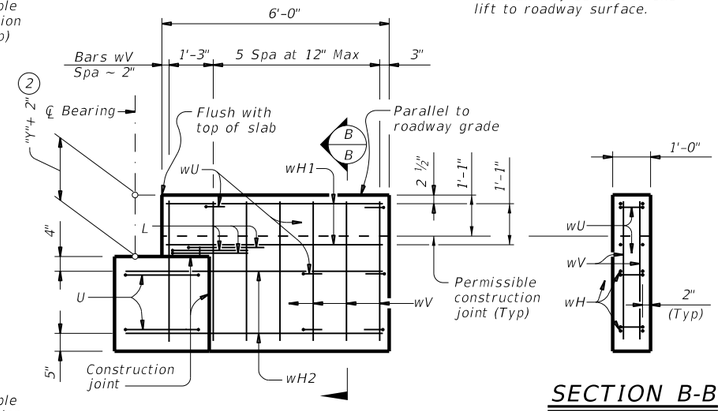
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

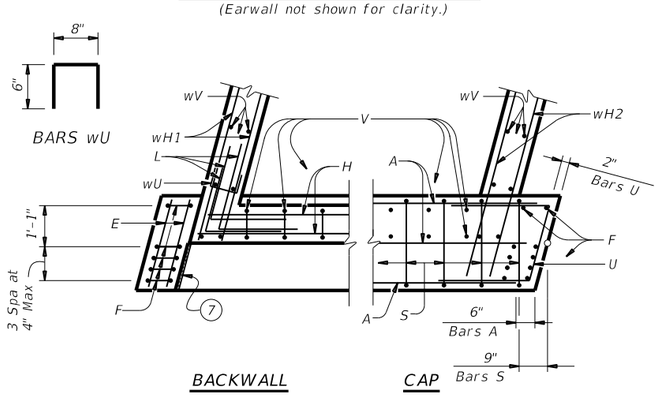
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	44	46	33	35
35	48	51	36	38
40	52	55	39	41
45		59		45
50		63		48

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	28'-1"	28'-1"	895	895
E	4	#4	2'-3"	2'-3"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	26'-7"	26'-7"	56	56
L1	3	#6	4'-0"	4'-0"	18	18
L2	3	#6	4'-0"	4'-0"	18	18
S	32	#4	9'-4"	9'-4"	200	200
U	4	#6	7'-2"	7'-2"	43	43
V	26	#5	7'-4"	7'-10"	199	212
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,755	1,775
Cl "C" Conc (Abut)				CY	9.1	9.5

(1) *Top of cap elevations are based on section depths shown on Span Details.*

(2) *See Span Details for "Y".*

(3) *Increase as required to maintain 3" from finished grade.*

(4) *See Bridge Layout to determine if approach slab is present.*

(5) *See Bridge Layout for beam type used in the superstructure.*

(6) *Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 56 Lb reinforcing steel for 2 additional Bars H.*

(7) *½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)*

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.

These abutment details may be used with standard SPSB-24-15 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS PRESTR CONC SLAB BEAM 24' ROADWAY 15° SKEW

APSB-24-15

FILE: PSB-APSB2415-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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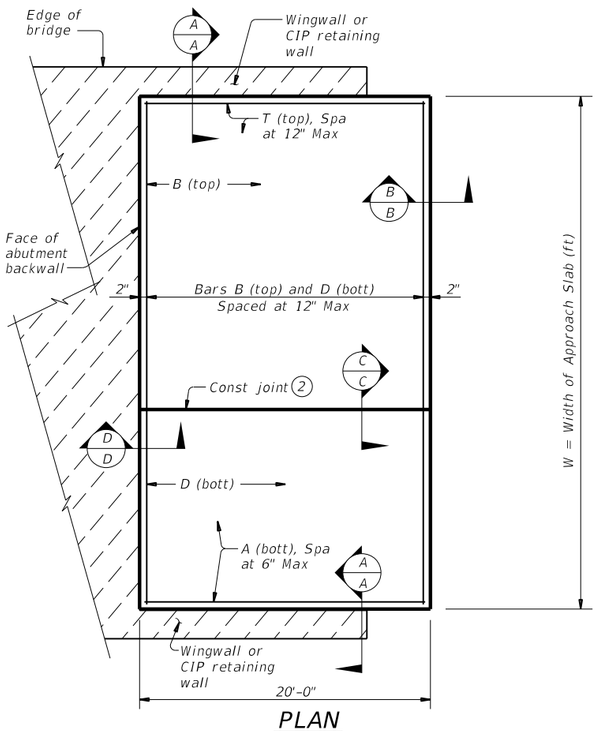
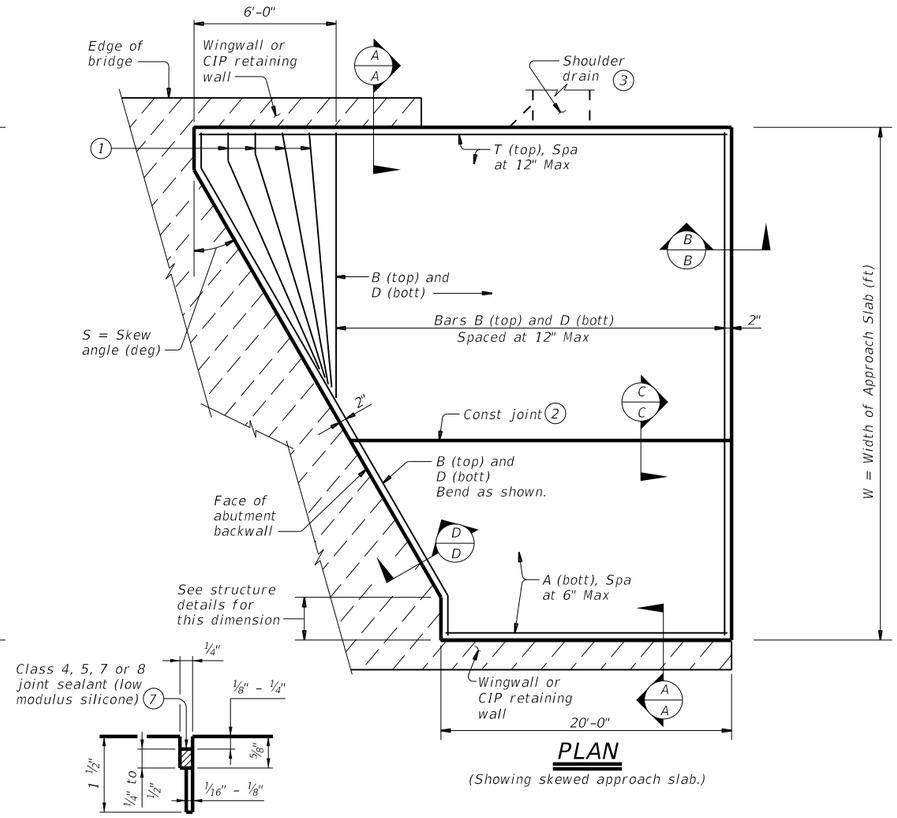


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

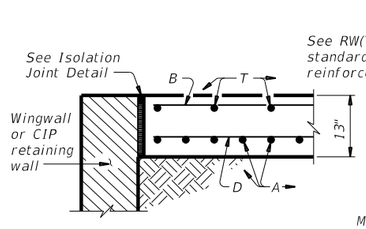
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

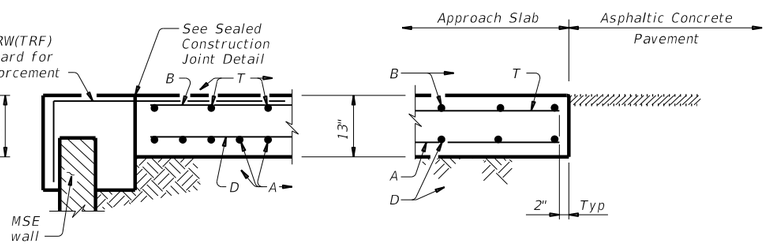
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

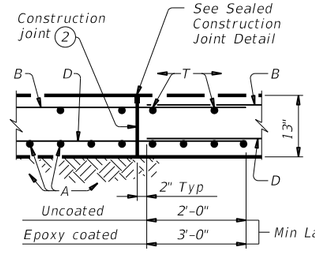
Cover dimensions are clear dimensions, unless noted otherwise.



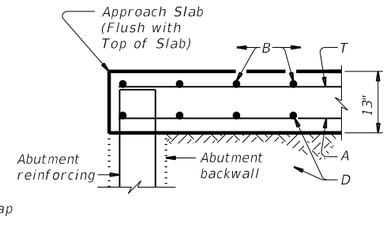
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



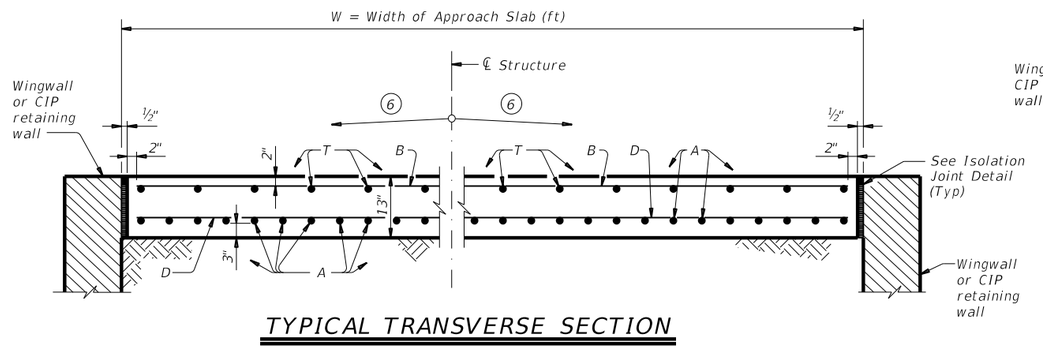
SECTION C-C (5)



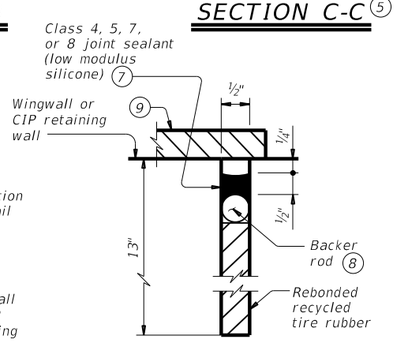
SECTION D-D

SECTION A-A

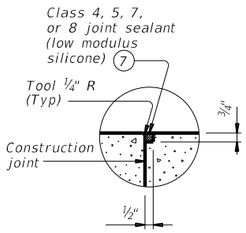
SECTION B-B



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: MS-BAS-A-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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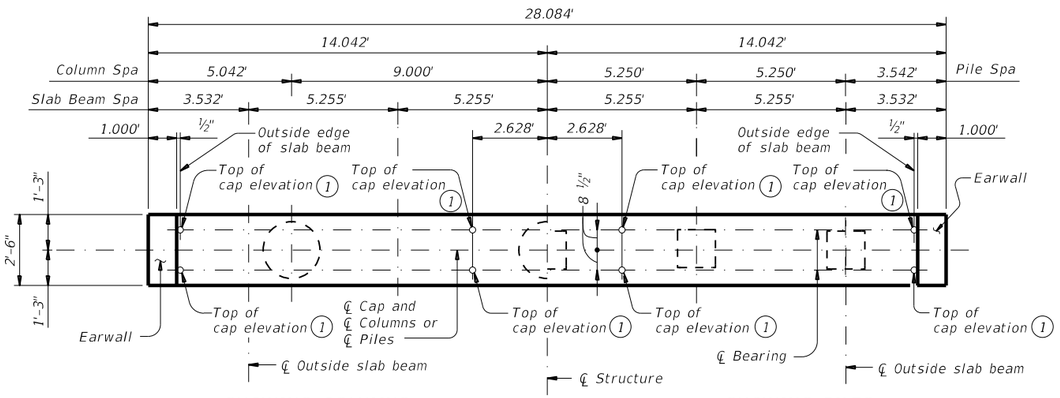
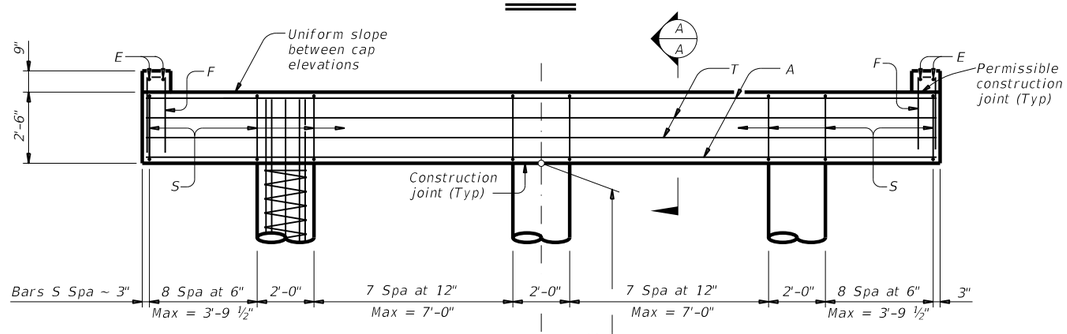
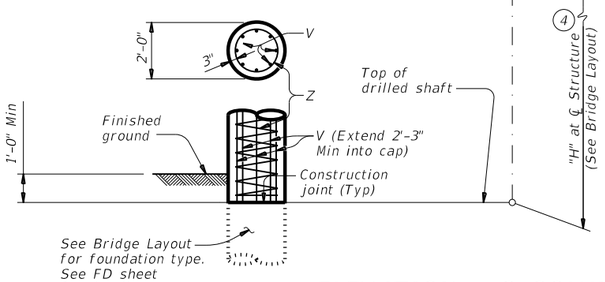
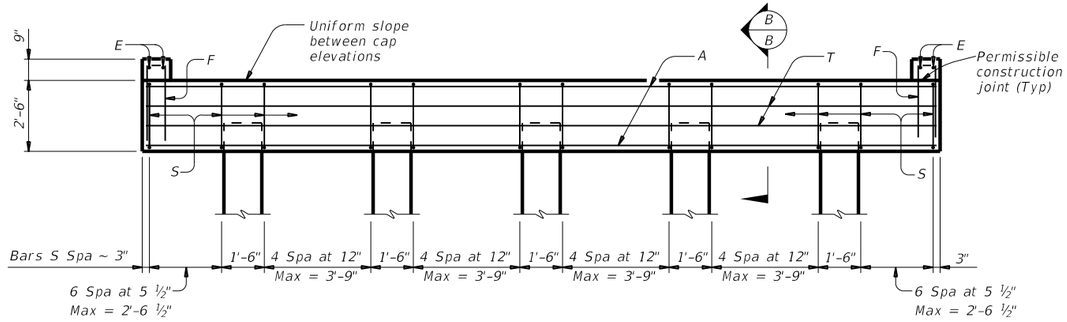




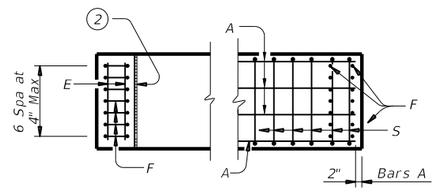


ELEVATION ~ 3 COLUMN BENT



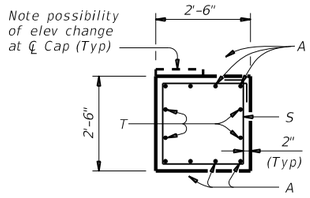
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.

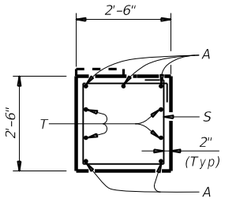


EARWALL CAP

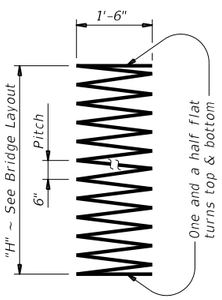
CAP END DETAIL



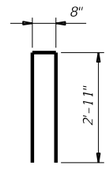
SECTION A-A



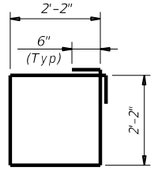
SECTION B-B



BARS Z



BARS F



BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	57	61	34	37
30	66	71	40	42
35	73	79	44	47
40	80	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	27'-9"	1,180
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,267
Cl "C" Conc (Cap)			CY	6.6
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	27'-9"	737
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
Reinforcing Steel			Lb	1,263
Cl "C" Conc (Cap)			CY	6.6

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

These bent details may be used with standard SPSB-24 only.

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

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS PRESTR CONC SLAB BEAM 24' ROADWAY

BPSB-24

FILE: PSB-BPSB2400-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	SJT	RUNNELS		60

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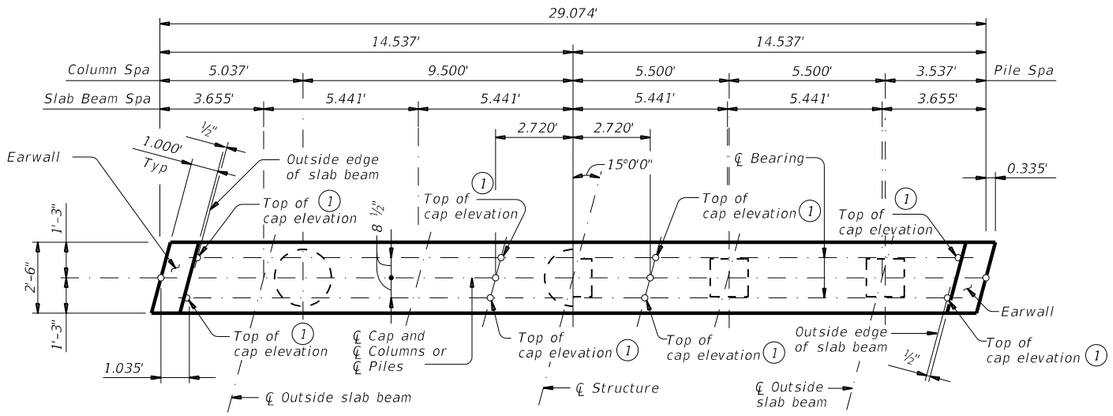
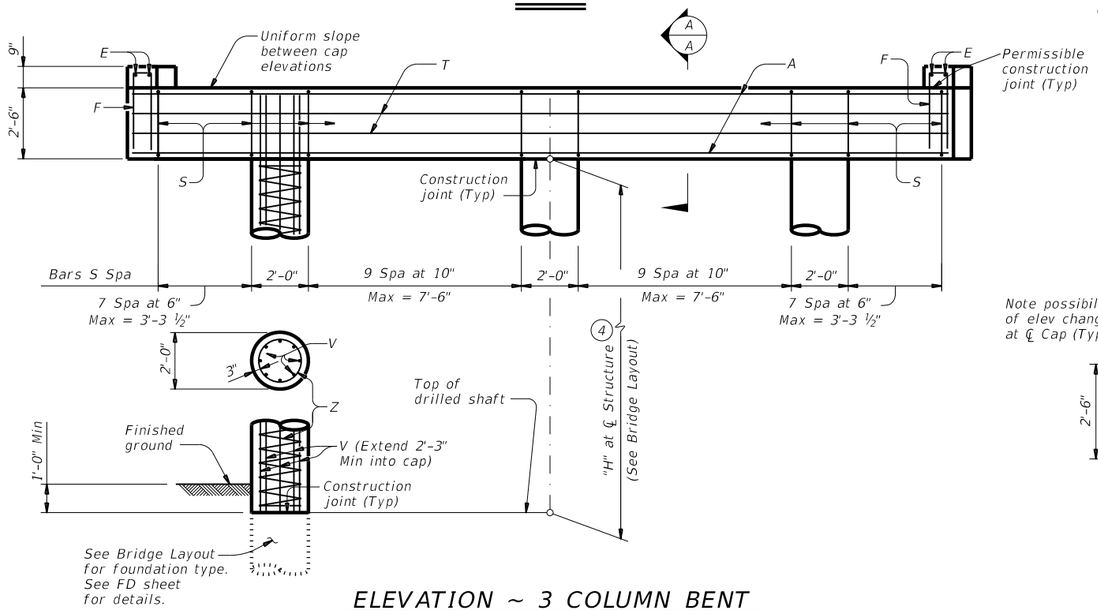
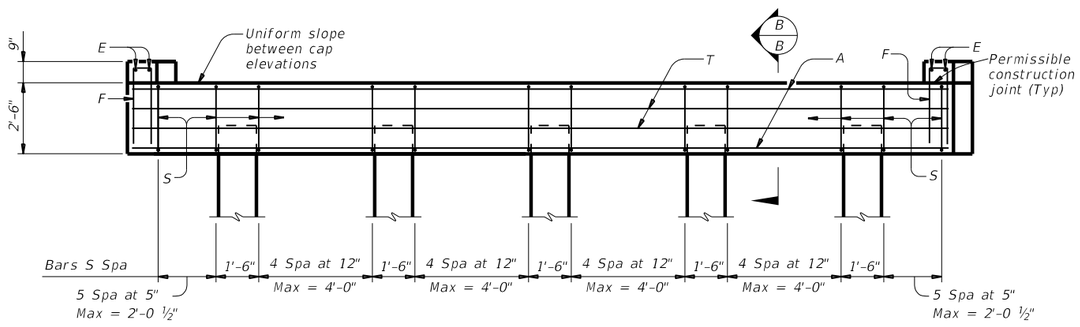


PLAN

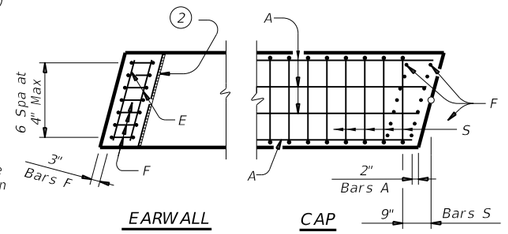


ELEVATION ~ 3 COLUMN BENT



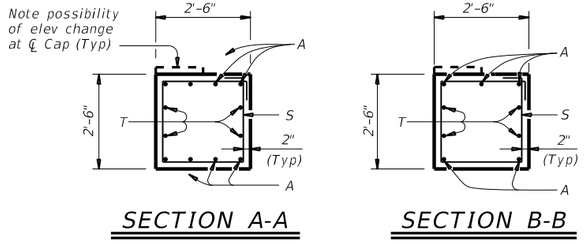
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.

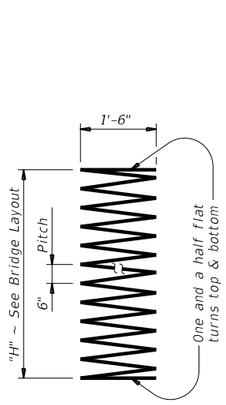


EARWALL CAP

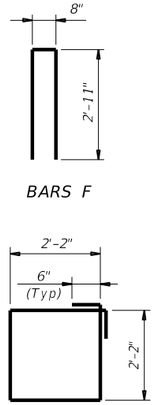
CAP END DETAIL



SECTION A-A SECTION B-B



BARS Z



BARS F BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	58	61	35	37
30	66	71	40	43
35	74	79	44	47
40	81	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	28'-9"	1,222
E	4	#4	2'-3"	6
F	14	#4	6'-4"	61
S	36	#5	9'-8"	363
T	4	#5	28'-9"	120
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,333
Cl "C" Conc (Cap)			CY	6.9
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	28'-9"	764
E	4	#4	2'-3"	6
F	14	#4	6'-6"	61
S	32	#5	9'-8"	323
T	4	#5	28'-9"	120
Reinforcing Steel			Lb	1,274
Cl "C" Conc (Cap)			CY	6.9

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.

These bent details may be used with standard SPSB-24-15 only.

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

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

INTERIOR BENTS PRESTR CONC SLAB BEAM

24' ROADWAY 15° SKEW

BPSB-24-15

FILE: PSB-BPSB2415-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		61

DATE: 7/29/2024 1:47:21 PM
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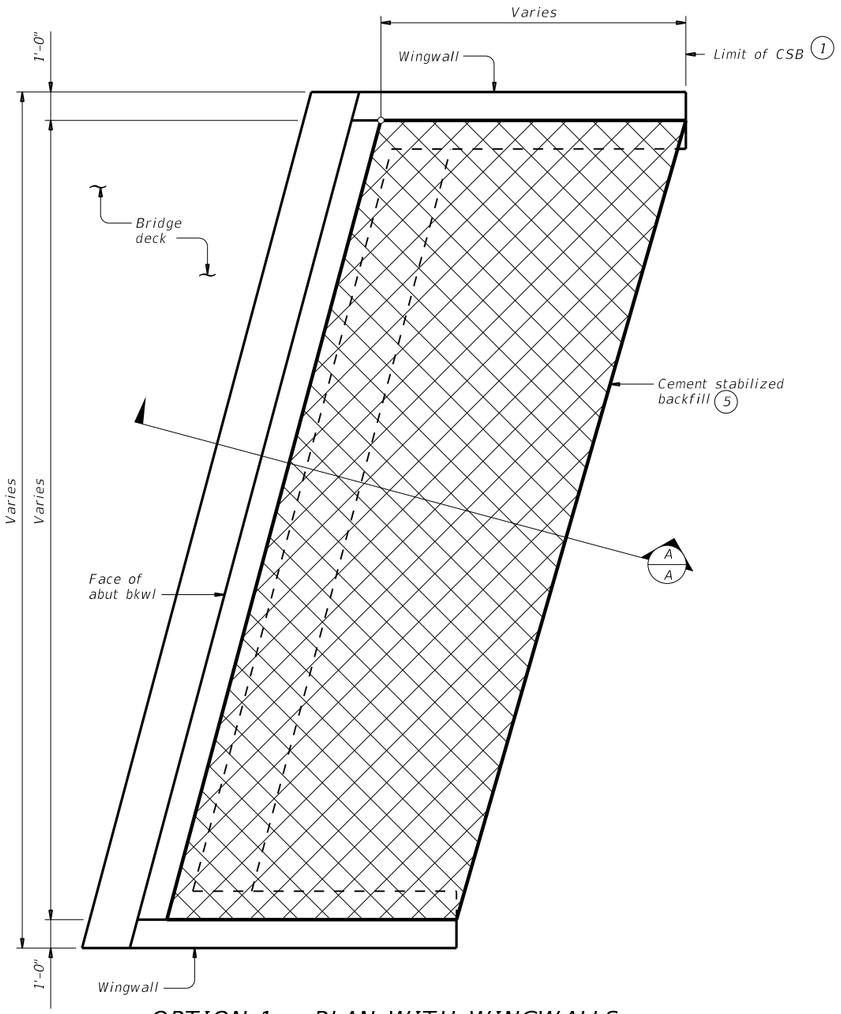
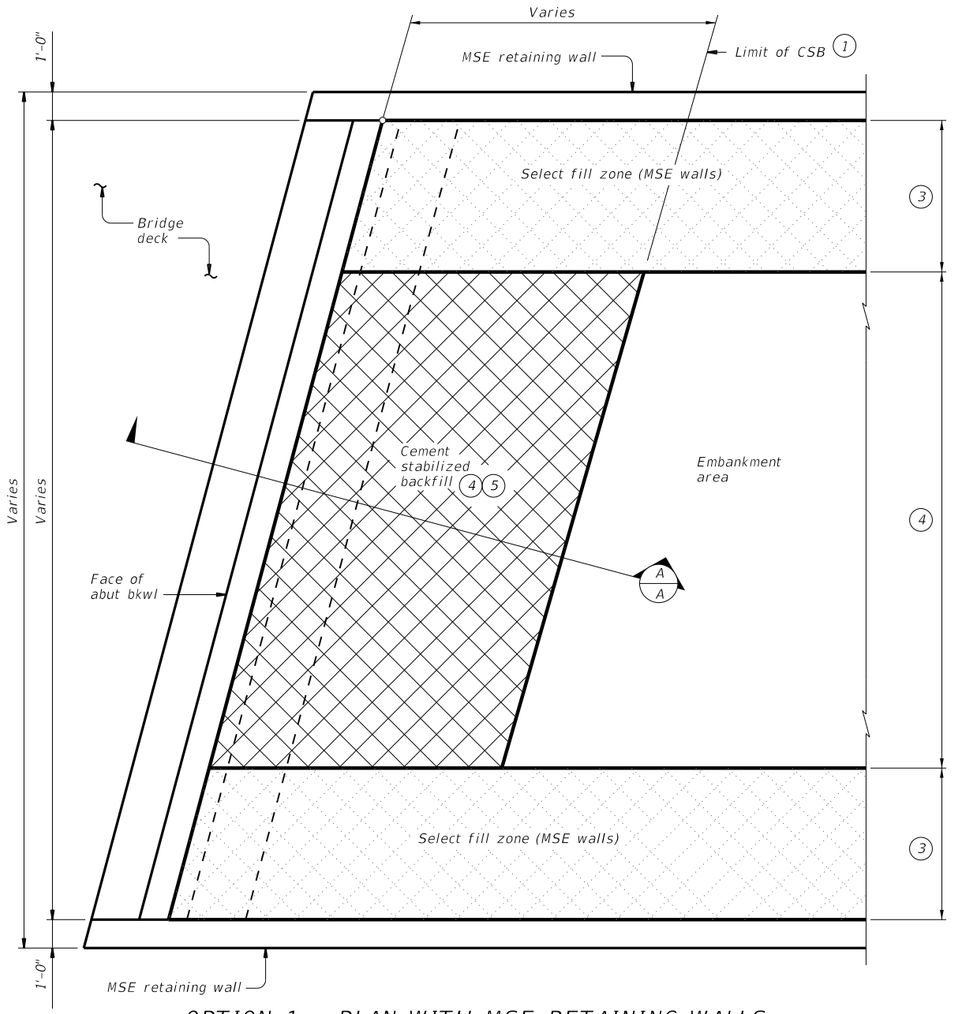
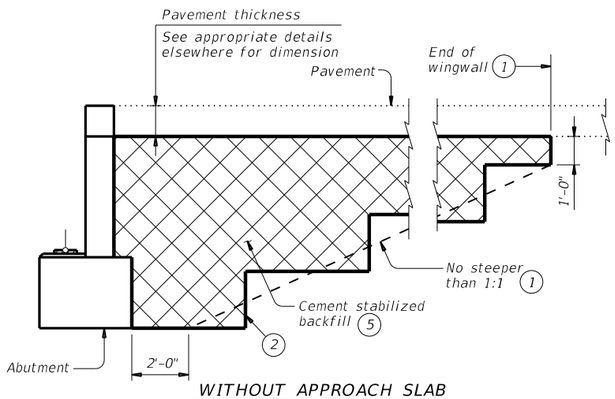


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



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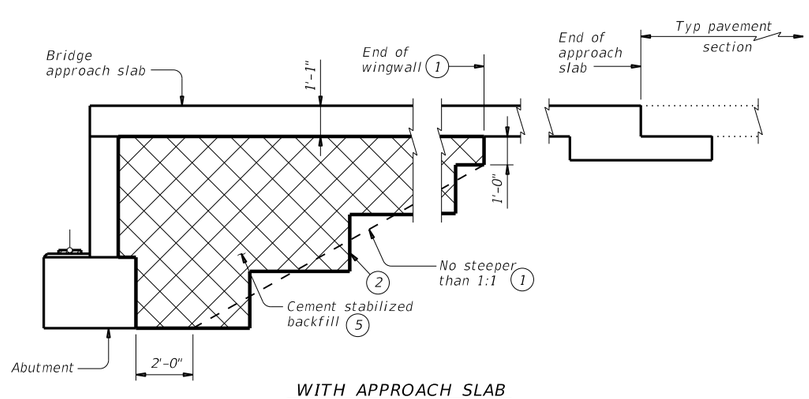

WITH APPROACH SLAB

(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	0907	13	024, ETC	CR 339, ETC
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		62

DATE: 7/29/2024 1:47:21 PM
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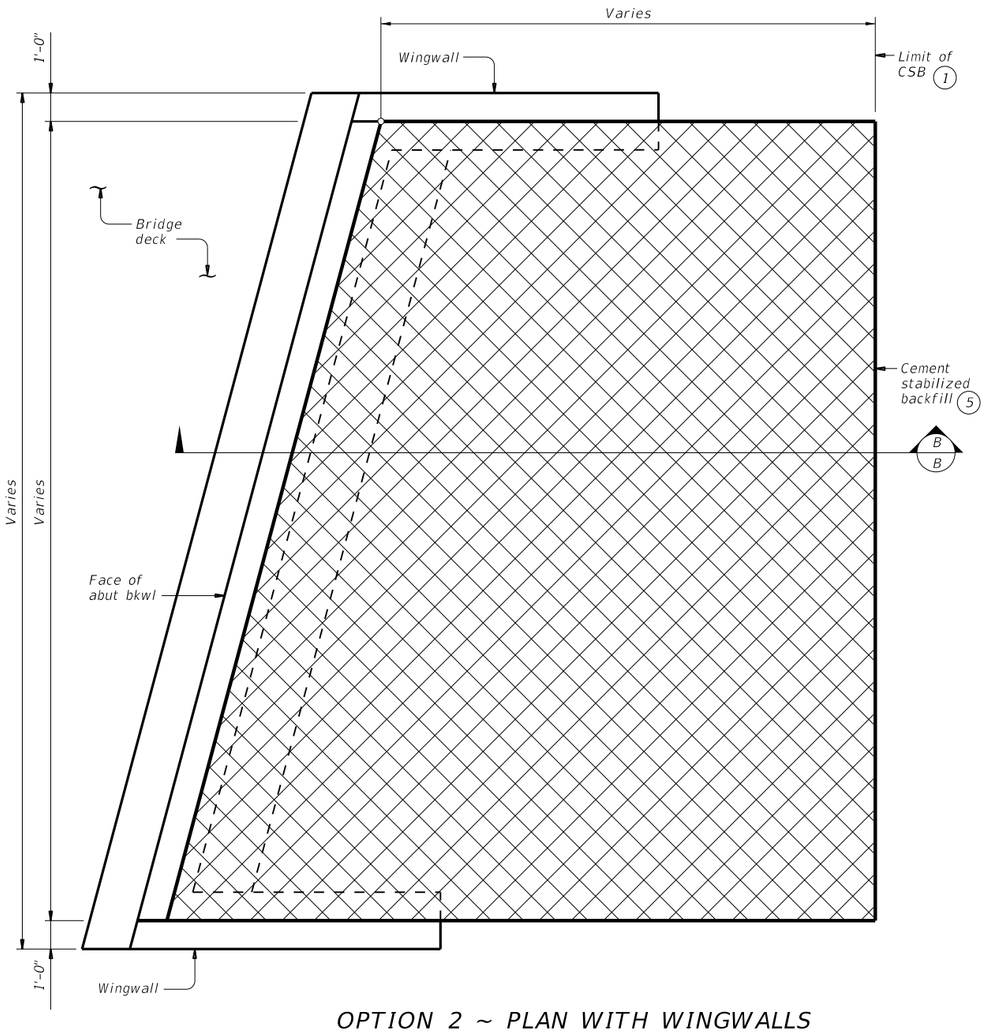
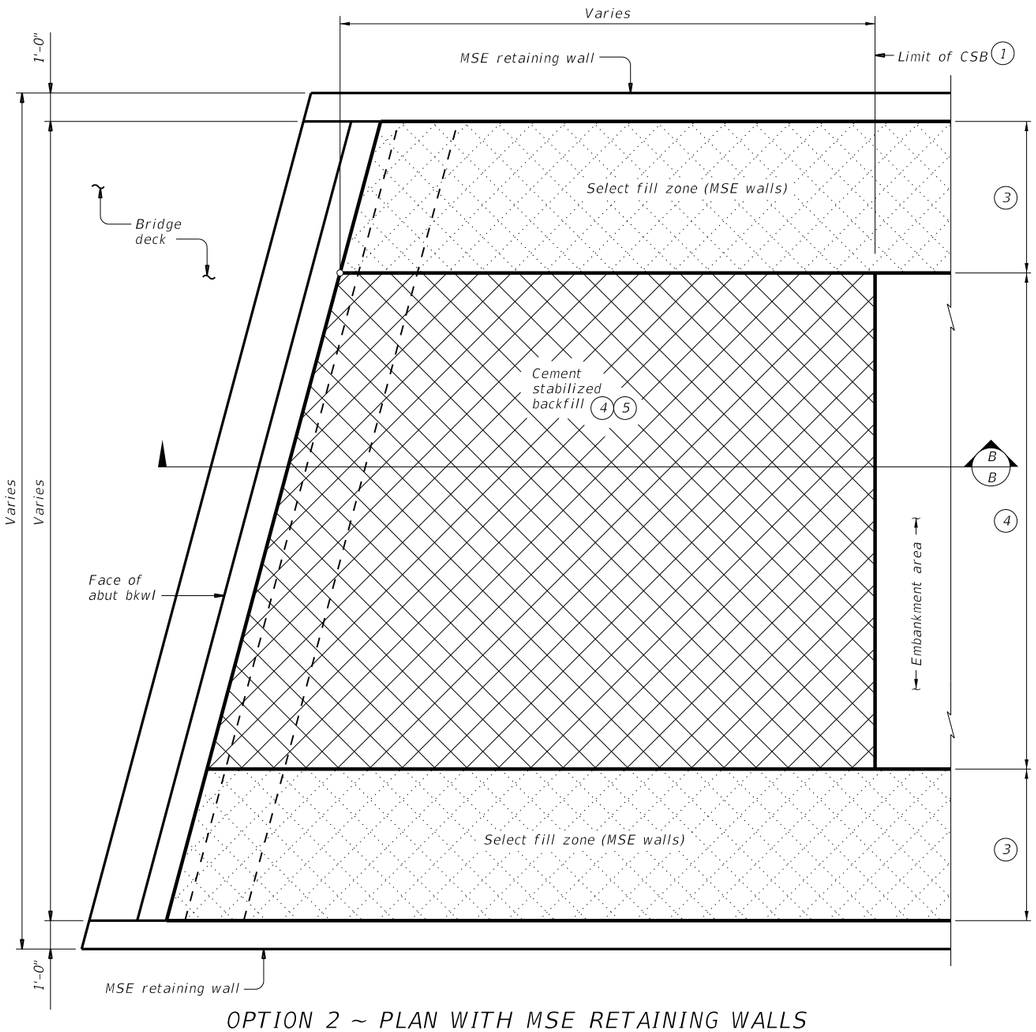


OPTION 2 ~ PLAN WITH WINGWALLS

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.*

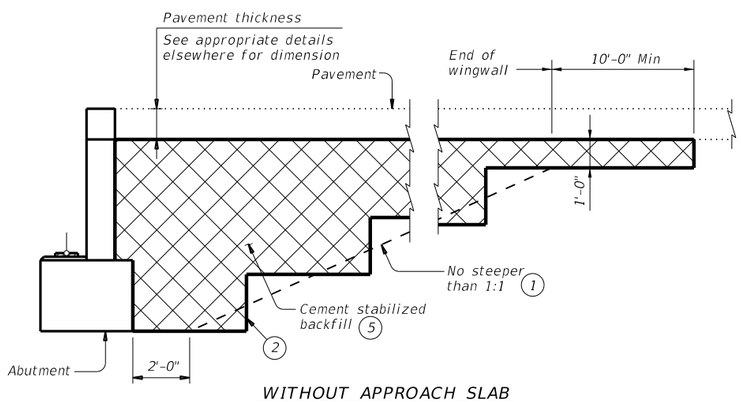
(2) *Bench backfill as shown with 12" (approximate) bench depths.*

(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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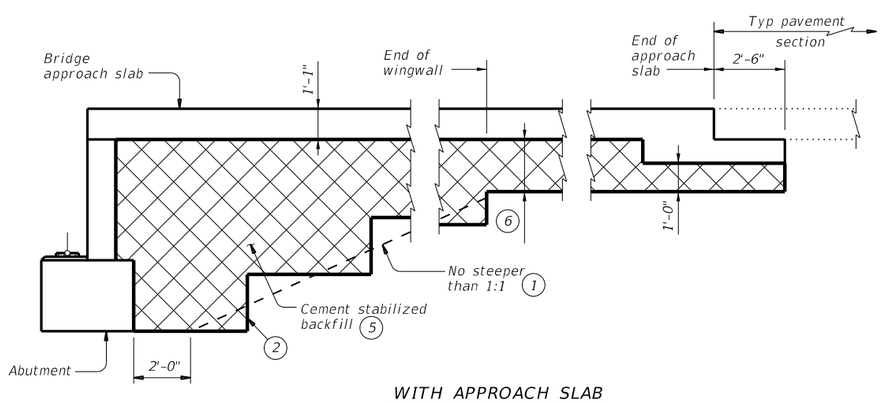

WITH APPROACH SLAB

(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	0907	13	024, ETC	CR 339, ETC
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		63

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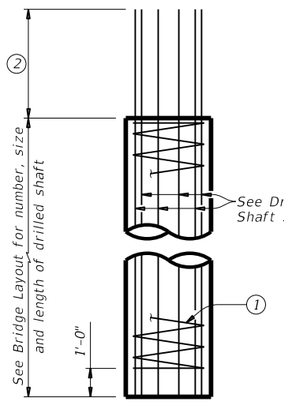
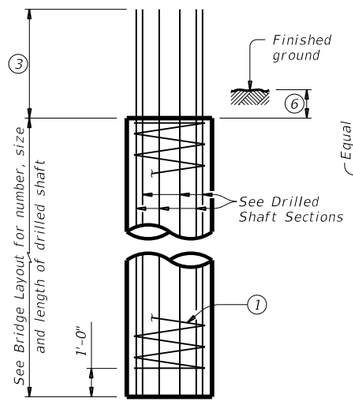
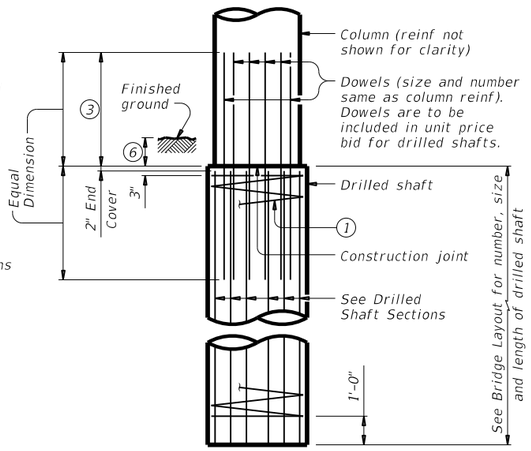


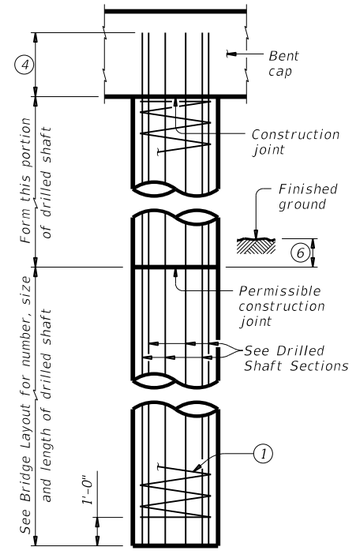
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



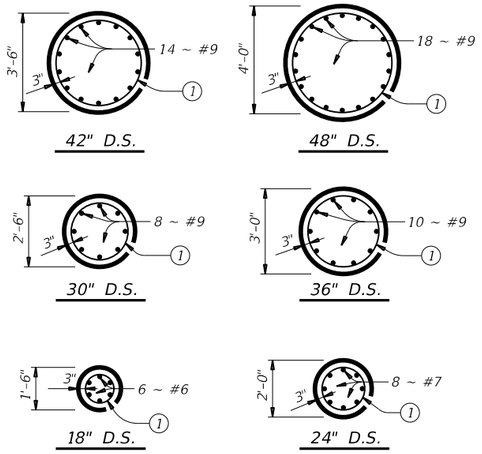
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

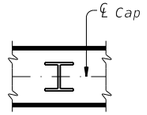


DRILLED SHAFT SECTIONS

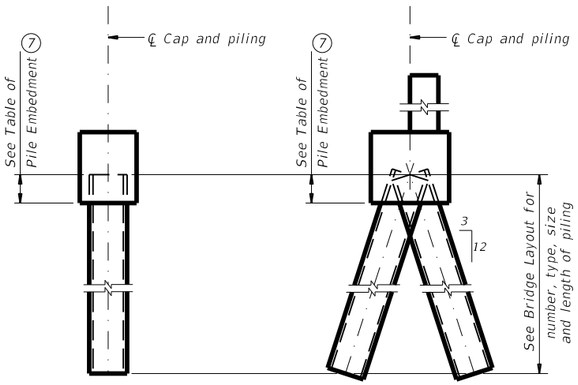
DRILLED SHAFT DETAILS

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"

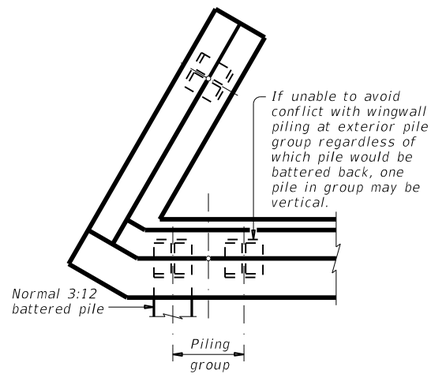
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



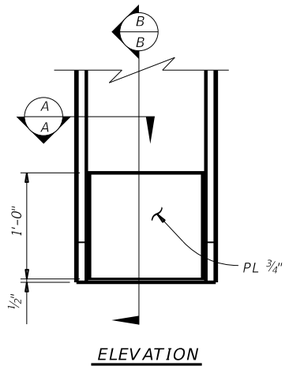
ORIENTATION OF STEEL H-PILING



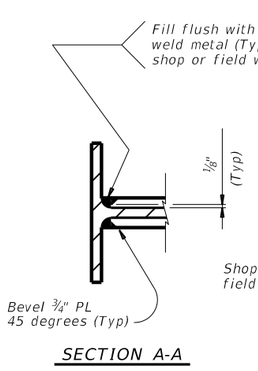
PILING DETAILS
(Concrete or steel H)



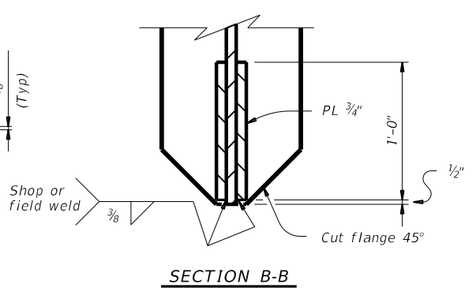
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



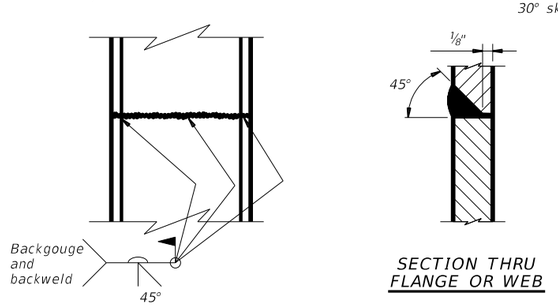
SECTION A-A



SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



STEEL H-PILE SPLICE DETAIL

Use when required.

SECTION THRU FLANGE OR WEB

(1) #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: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-20: Added #11 bars to the FD bars.	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		64

DATE: 7/29/2024 1:47:36 PM
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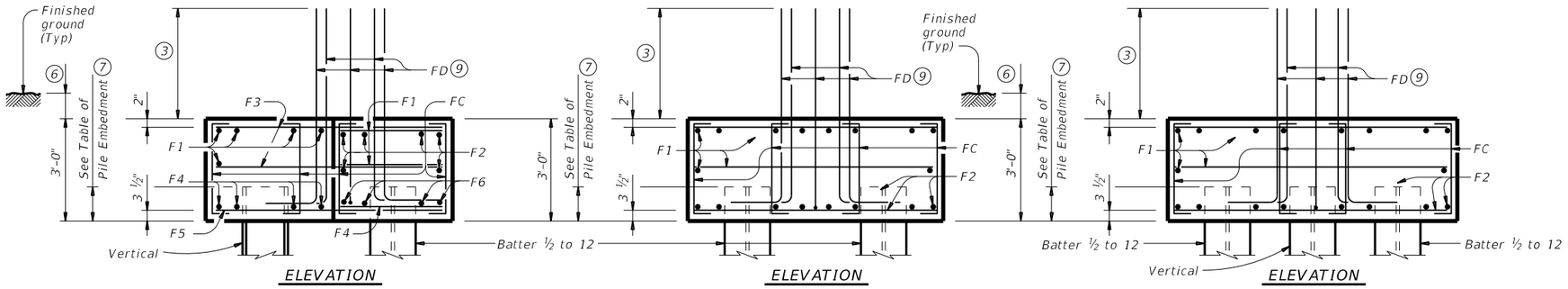
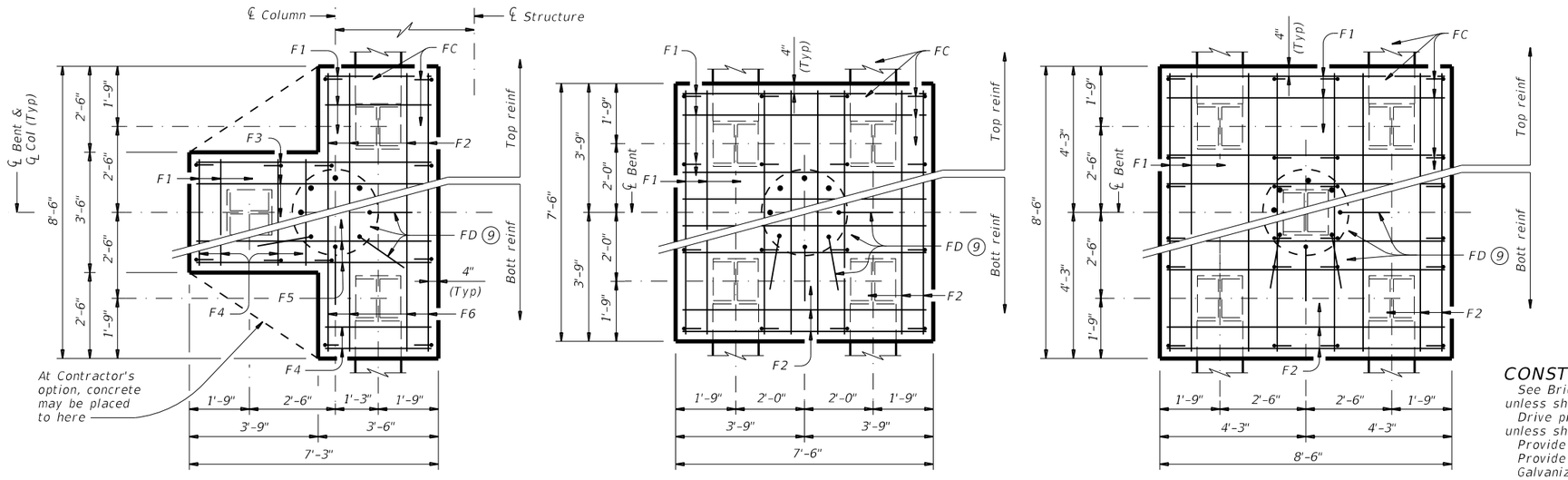




THREE PILE FOOTING (8)

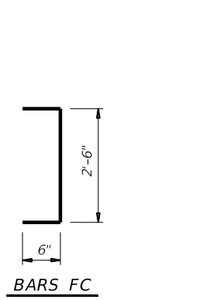
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

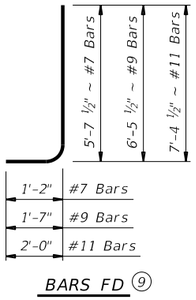
For 42" Dia and smaller columns.

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

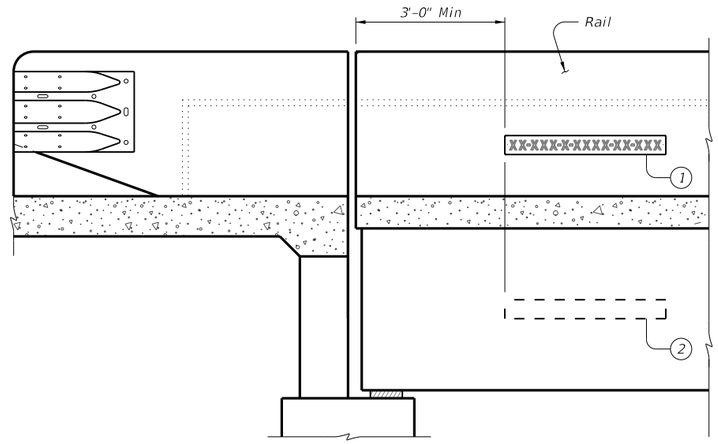
Bridge Division Standard

COMMON FOUNDATION DETAILS

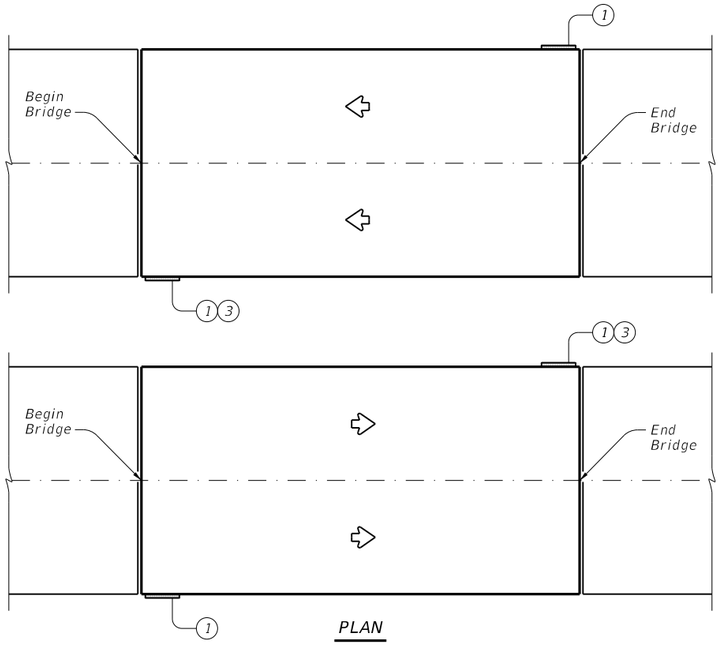
FD

FILE: MS-FD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		65

DATE: 7/29/2024 1:47:48 PM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/Bridges/400_CAD/411_Trans/01-Sheets/07-Br Idge/Standards/MS-NBIS-23.dgn

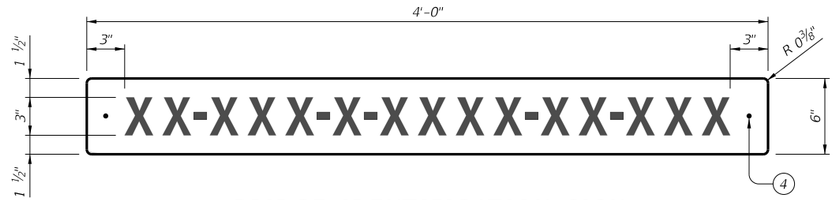


ELEVATION

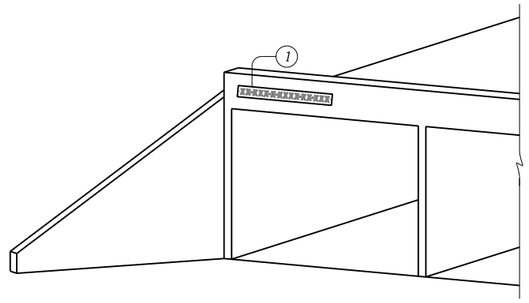


PLAN

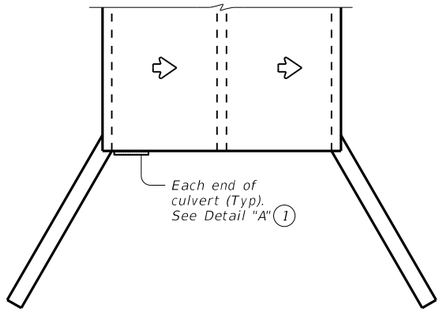
BRIDGE SIGN LOCATIONS



BRIDGE IDENTIFICATION SIGN

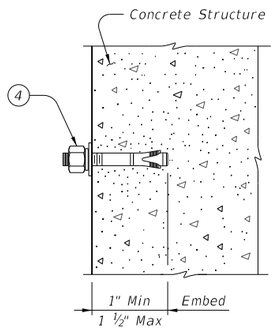


DETAIL "A"



PLAN

BRIDGE CLASS CULVERT SIGN PLACEMENT



ANCHOR DETAIL

SHEETING REQUIREMENTS

Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

(1) Bridge identification sign location

(2) Alternate sign placement location for exterior concrete beams.

(3) If adjacent bridges are less than 2 feet apart, these signs may be omitted.

(4) ¼" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

SIGN NOTES:

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

MATERIAL NOTES:

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide ¼" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environments, provide both stainless steel anchor bodies and expansion wedges.

GENERAL NOTES:

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

Texas Department of Transportation

Bridge Division Standard

NBIS BRIDGE IDENTIFICATION SIGN STANDARD

NBIS

FILE: MS-NBIS-23.dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		66

DATE: 7/29/2024 1:48:01 PM
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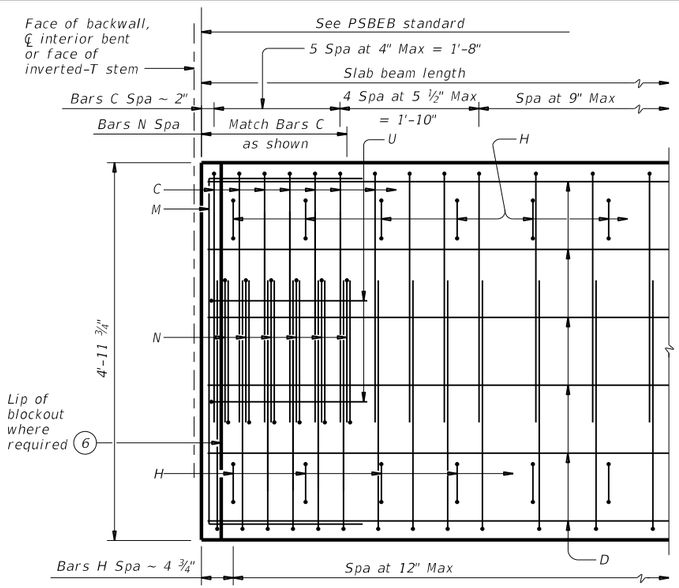
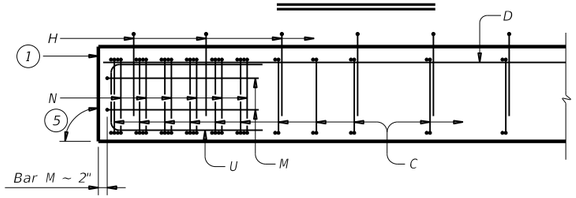


PART PLAN



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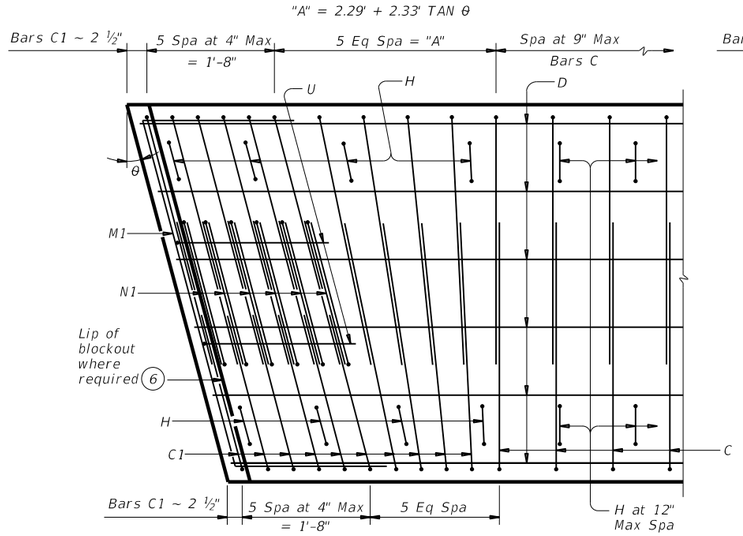
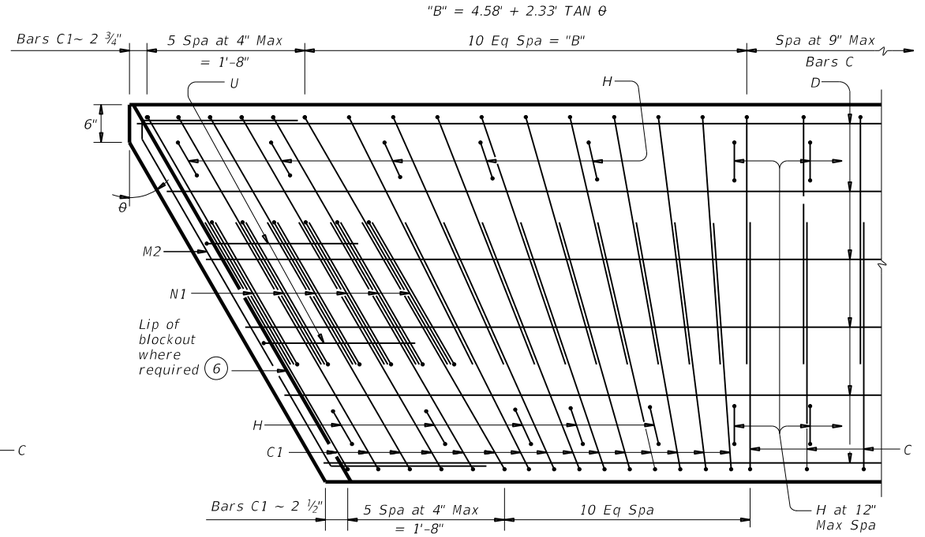


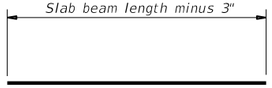
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)

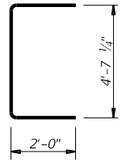


PART SKEW PLAN

(Showing θ over 15° to 30° Skew)



BARS D(#6)



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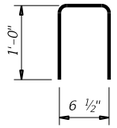

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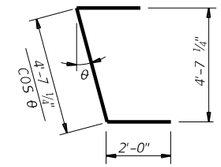

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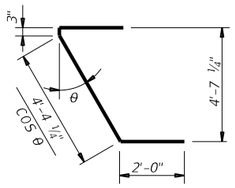

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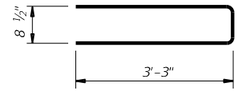

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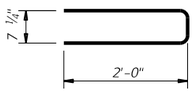

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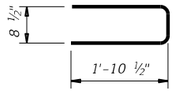

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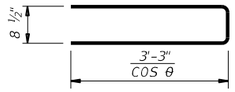

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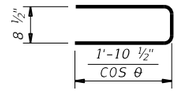

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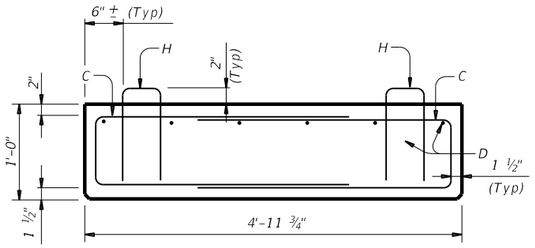

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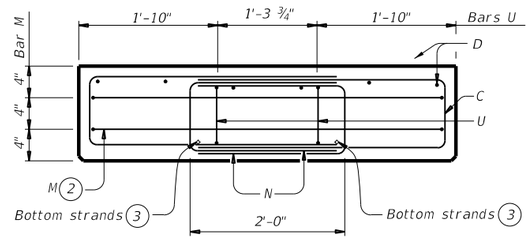
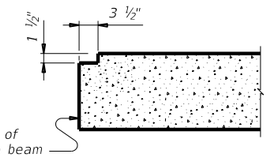


END MAT REINFORCING

Bars H not shown for clarity.



ELEVATION OF BLOCKOUT 6

BEAM PROPERTIES		
Area	in^2	717.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	8,604
Weight (4)	lb/ft	747

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS (TYPE 5SB12)

PSB-5SB12

FILE: PSB-5SB12-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		67

DATE: 7/29/2024 1:48:14 PM
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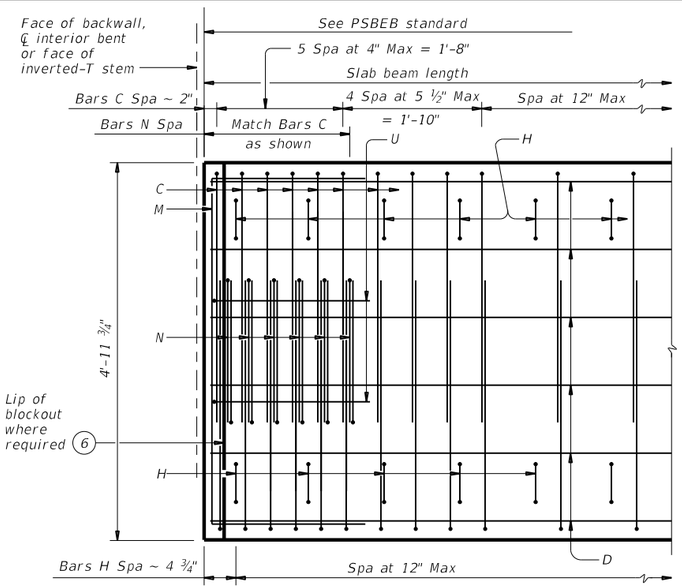
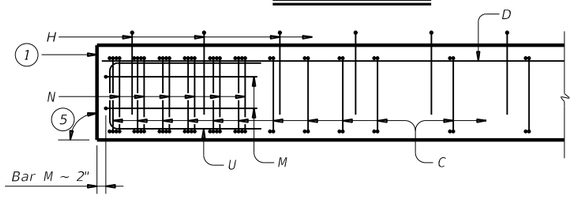


PART PLAN



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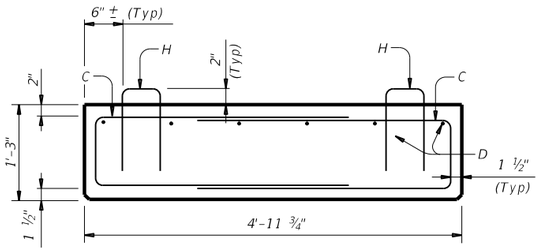

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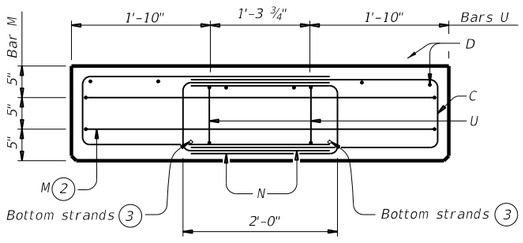
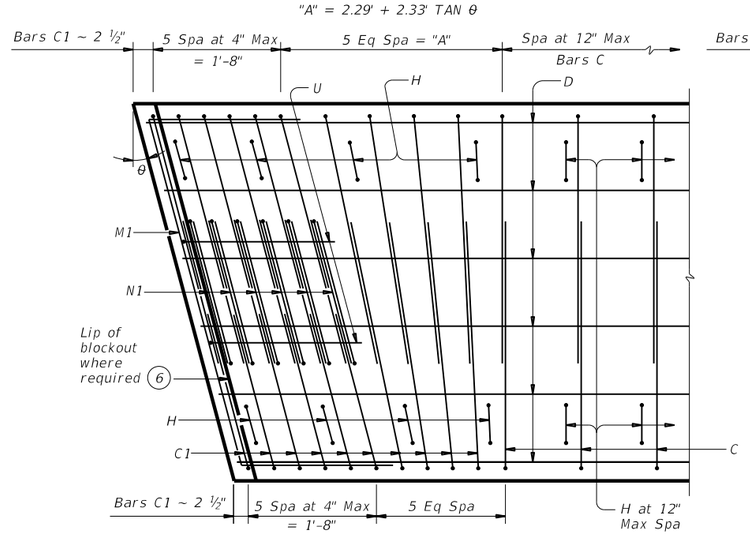


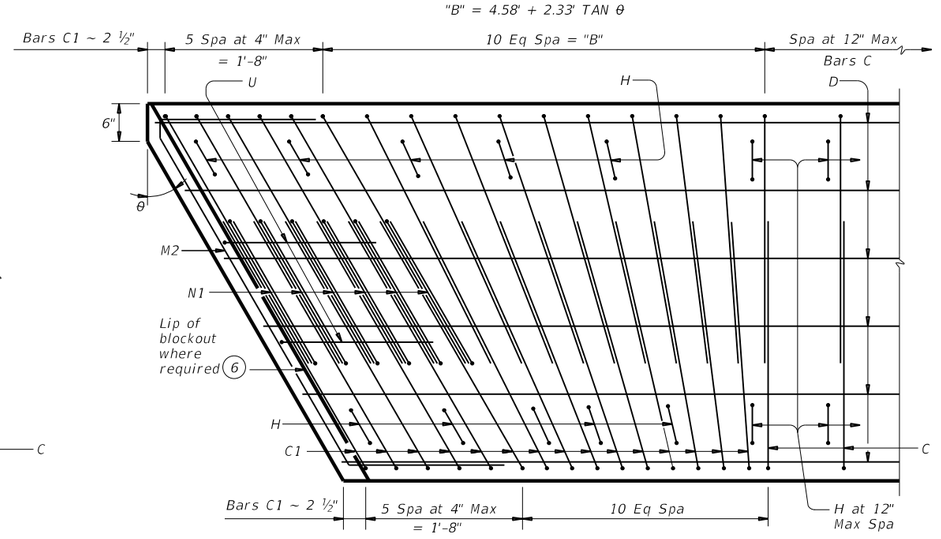
END MAT REINFORCING

Bars H not shown for clarity.



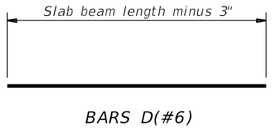
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

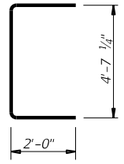


PART SKEW PLAN

(Showing θ over 15° to 30° skew)



BARS D(#6)



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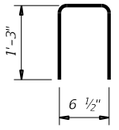

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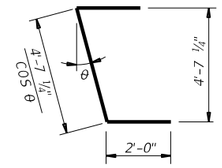

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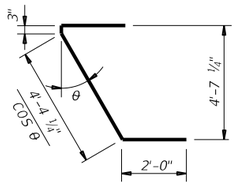

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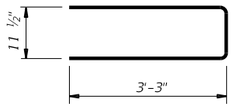

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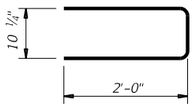

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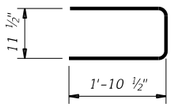

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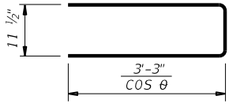

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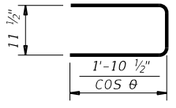

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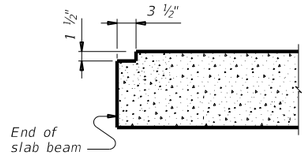

ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

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

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.
(2) Adjust bars M vertically to avoid strands.
(3) See sheet PSBND or PSBSD for strand locations.
(4) Assumes 150 pcf weight density of concrete.
(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS (TYPE 5SB15)

PSB-5SB15

FILE: PSB-5SB15-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		68

DATE: 7/29/2024 1:48:26 PM
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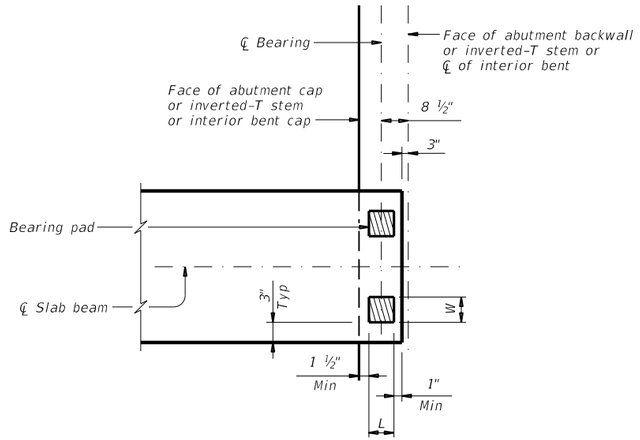
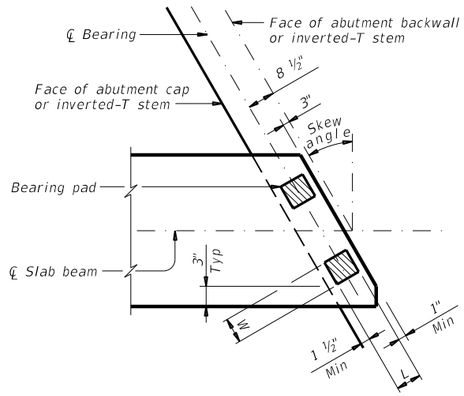
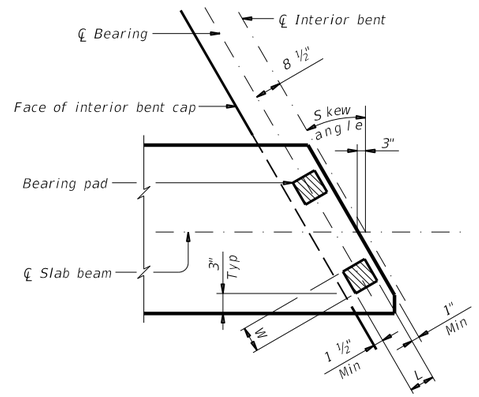


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



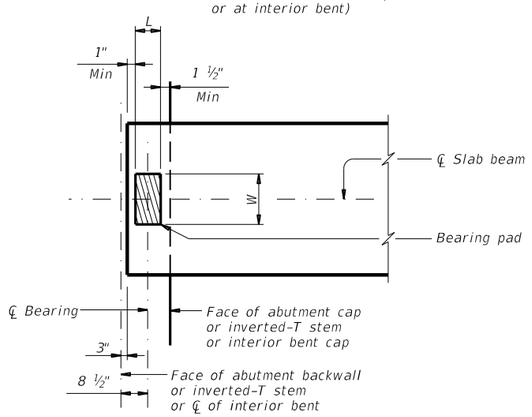
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

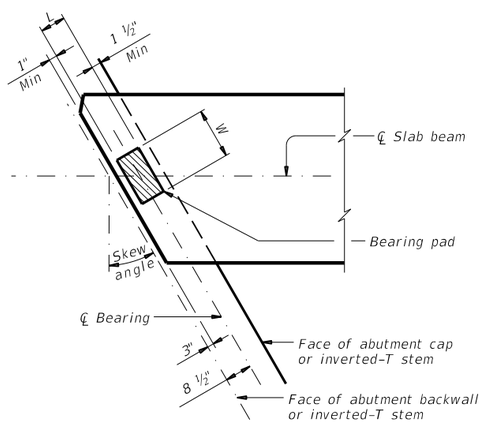
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

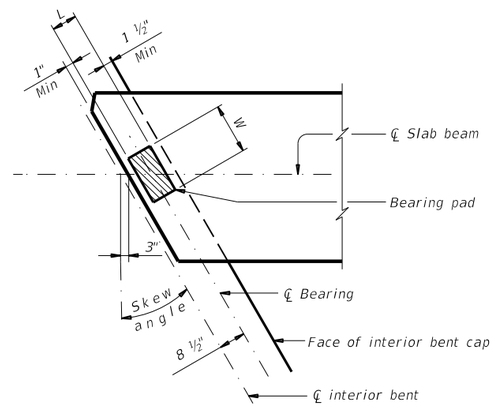
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



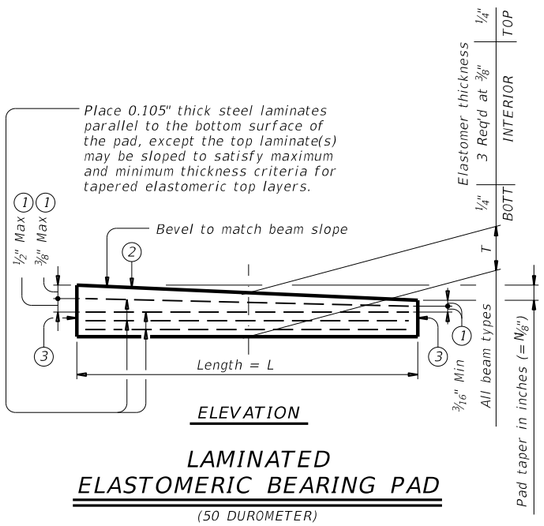
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

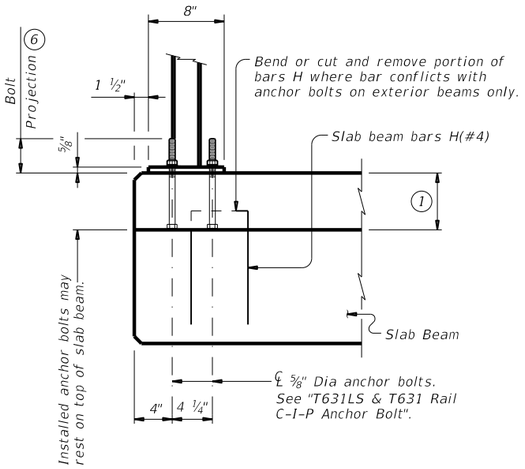
ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

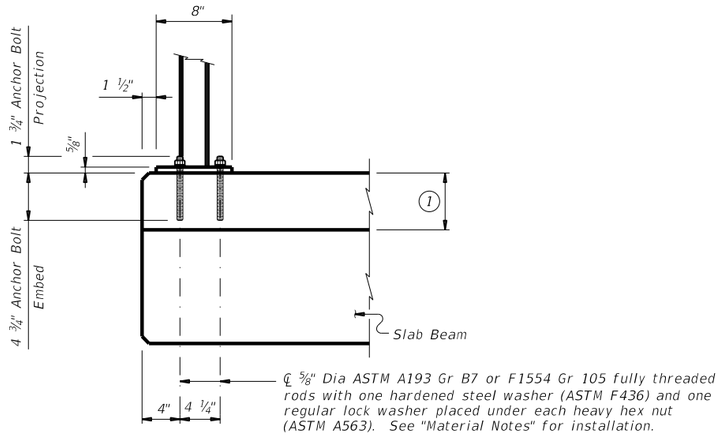
PSBEB

FILE: PSB-PSBEB-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		69

DATE: 7/29/2024 1:48:39 PM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/07-Br Idge/Standards/PSB-PSBRA-18.dgn

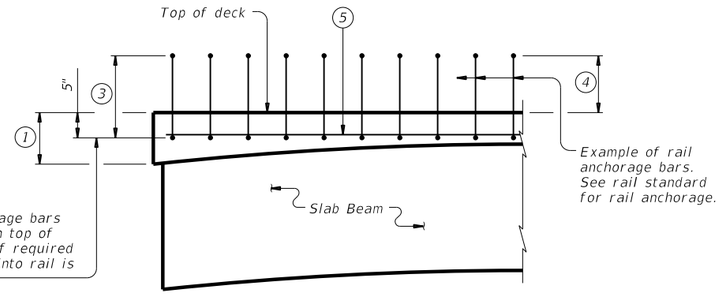


CAST-IN-PLACE ANCHORAGE OPTION

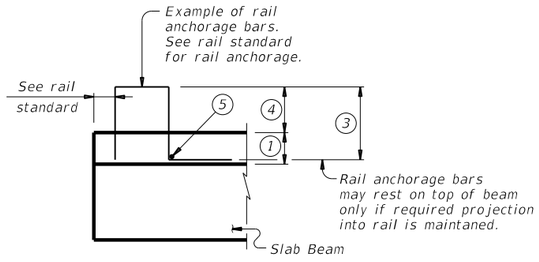


ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)



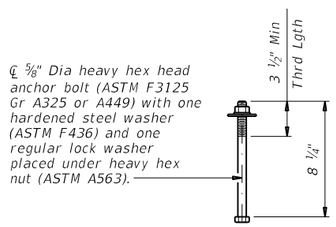
PART SPAN ELEVATION



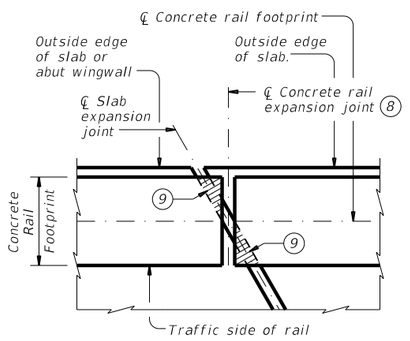
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be 5/8" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: PSB-PSBRA-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH		
©TxDOT January 2017	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0907	13	024, ETC		CR 339, ETC	
03-18: Updated adhesive anchor notes.	DIST	COUNTY			SHEET NO.	
	SJT	RUNNELS			70	

DATE: 7/29/2024 1:48:52 PM
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DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	LIVE LOAD DISTRIBUTION FACTOR (2): Shear
24' ROADWAY SB12 BEAM	25	ALL	5SB12	0.914	-1.217	448	0.450	0.450
	30	ALL	5SB12	1.292	-1.685	530	0.450	0.450
	35	ALL	5SB12	1.730	-2.219	675	0.450	0.450
	40	ALL	5SB12	2.218	-2.796	820	0.440	0.440
24' ROADWAY SB15 BEAM	25	ALL	5SB15	0.725	-0.897	551	0.450	0.450
	30	ALL	5SB15	1.020	-1.244	574	0.450	0.450
	35	ALL	5SB15	1.361	-1.640	708	0.450	0.450
	40	ALL	5SB15	1.739	-2.068	864	0.440	0.440
	45	ALL	5SB15	2.179	-2.574	1054	0.440	0.440
	50	ALL	5SB15	2.680	-3.153	1276	0.440	0.440
28' ROADWAY SB12 BEAM	25	ALL	5SB12	0.903	-1.184	444	0.430	0.430
	30	ALL	5SB12	1.276	-1.639	508	0.430	0.430
	35	ALL	5SB12	1.708	-2.159	647	0.430	0.430
	40	ALL	5SB12	2.200	-2.744	799	0.430	0.430
28' ROADWAY SB15 BEAM	25	ALL	5SB15	0.716	-0.874	529	0.430	0.430
	30	ALL	5SB15	1.007	-1.212	570	0.430	0.430
	35	ALL	5SB15	1.343	-1.598	680	0.430	0.430
	40	ALL	5SB15	1.725	-2.032	842	0.430	0.430
	45	ALL	5SB15	2.149	-2.508	1013	0.420	0.420
	50	ALL	5SB15	2.643	-3.073	1227	0.420	0.420
30' ROADWAY SB12 BEAM	25	ALL	4SB12	0.904	-1.187	341	0.340	0.340
	30	ALL	4SB12	1.277	-1.646	407	0.340	0.340
	35	ALL	4SB12	1.711	-2.169	518	0.340	0.340
	40	ALL	4SB12	2.205	-2.758	640	0.340	0.340
30' ROADWAY SB15 BEAM	25	ALL	4SB15	0.723	-0.888	431	0.350	0.350
	30	ALL	4SB15	1.017	-1.231	438	0.350	0.350
	35	ALL	4SB15	1.346	-1.605	545	0.340	0.340
	40	ALL	4SB15	1.729	-2.043	675	0.340	0.340
	45	ALL	4SB15	2.166	-2.542	823	0.340	0.340
	50	ALL	4SB15	2.665	-3.115	998	0.340	0.340

LOAD RATING FACTORS

STRUCTURE	STRENGTH I: Inv	STRENGTH I: Opr	SERVICE III: Inv
24' ROADWAY SB12 BEAM	1.40	1.82	1.71
	1.25	1.62	1.29
	1.33	1.73	1.23
	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	1.77	2.29	2.41
	1.23	1.59	1.45
	1.15	1.49	1.14
	1.32	1.71	1.19
	1.34	1.73	1.08
	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	1.47	1.91	1.80
	1.32	1.71	1.37
	1.18	1.53	1.02
	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	1.85	2.40	2.53
	1.29	1.67	1.53
	1.21	1.57	1.22
	1.36	1.76	1.24
	1.41	1.82	1.16
	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	1.38	1.79	1.67
	1.32	1.71	1.37
	1.24	1.60	1.08
	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	1.69	2.19	2.32
	1.16	1.50	1.37
	1.21	1.57	1.21
	1.47	1.91	1.38
	1.33	1.73	1.06
	1.32	1.71	1.02

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

Full-length debonded strands are not permitted in positions "A" and "B".

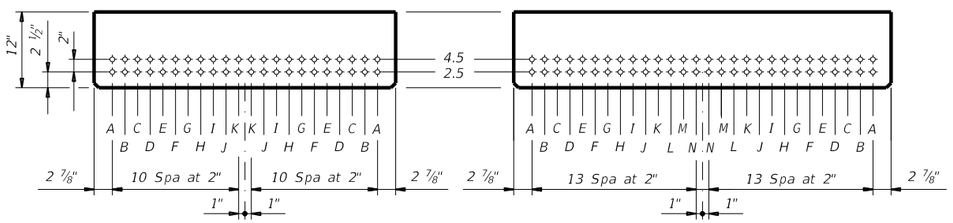
Strand debonding must comply with Item 424.4.2.2.2.4.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

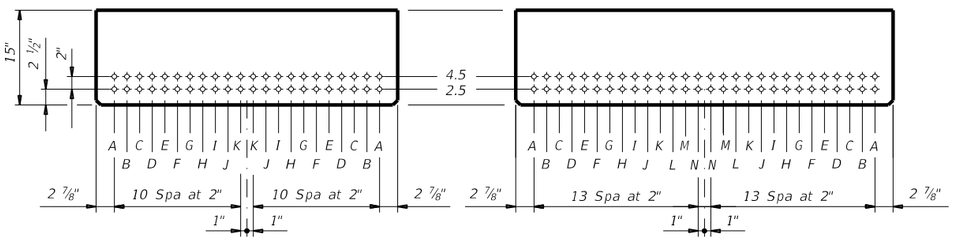
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.

Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM

TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS
(TYPE SB12 OR SB15)
24', 28' & 30' ROADWAY
PSBSD

FILE: PSB-PSBSD-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		71

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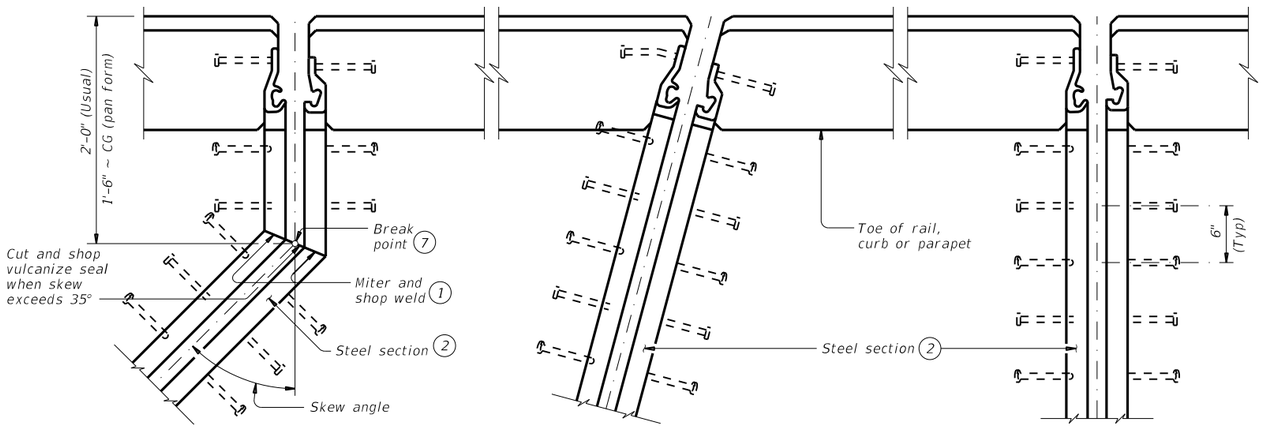
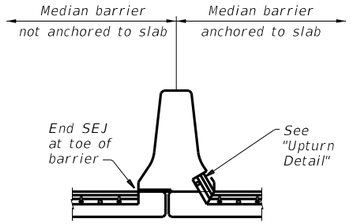
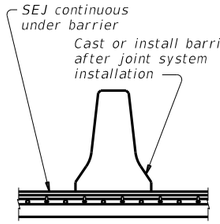


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

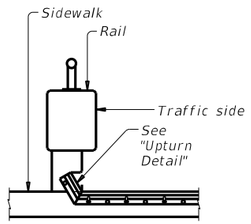
PLANS OF END CONDITIONS



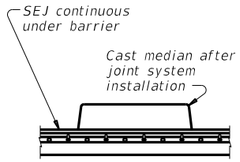
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



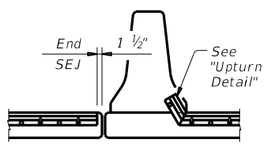
AT MEDIAN BARRIER



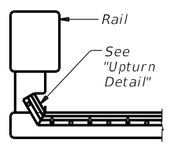
AT SIDEWALK BEHIND BRIDGE RAIL



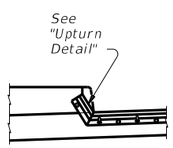
AT RAISED MEDIAN



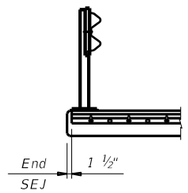
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

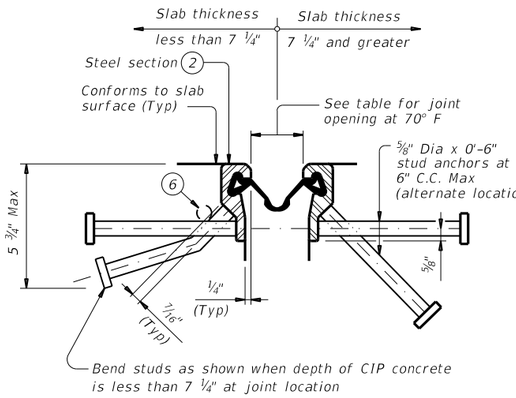


AT SIDEWALK

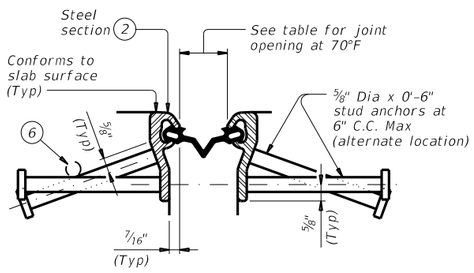


AT STEEL POST BRIDGE RAIL

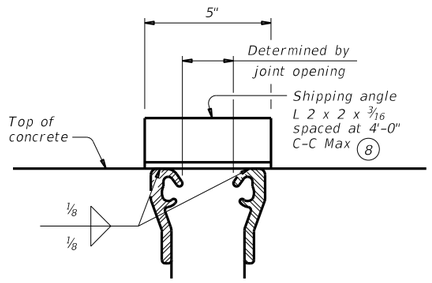
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

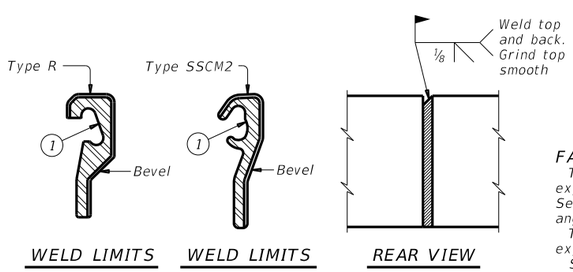
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

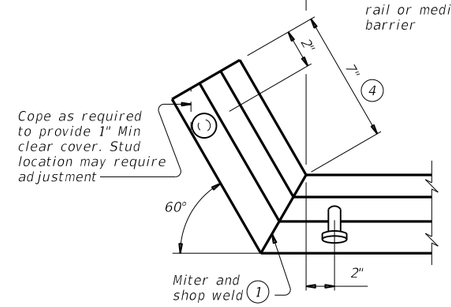
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M
WITHOUT OVERLAY

SEJ-M

FILE: MS-SEJ-M-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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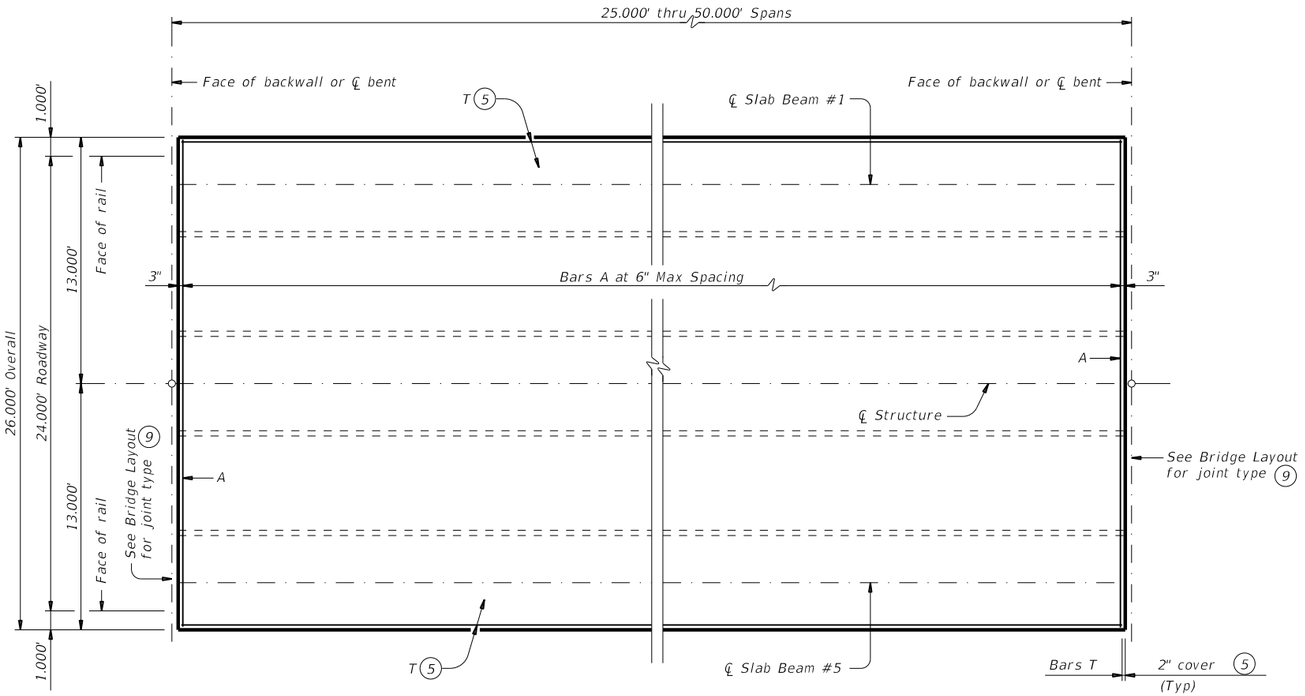
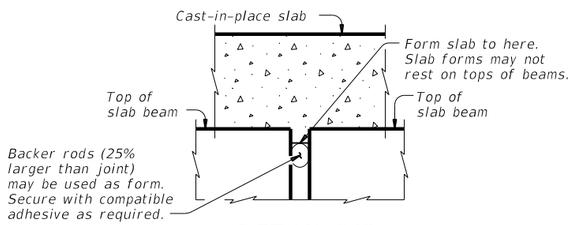
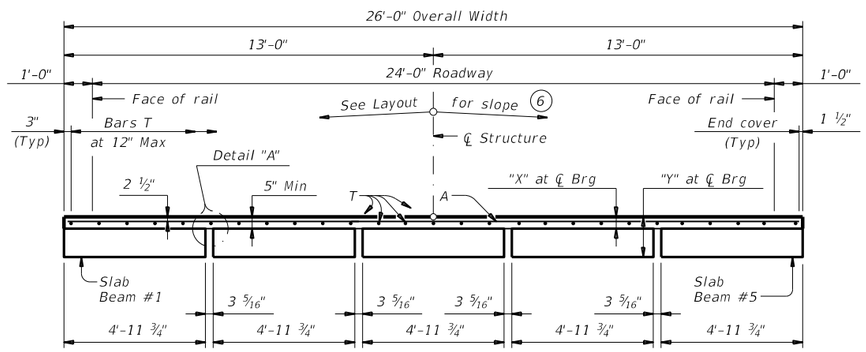


PLAN



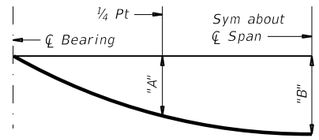
DETAIL "A"



TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"

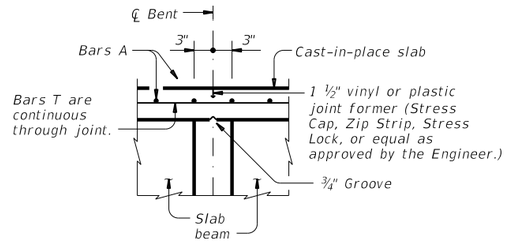


DEAD LOAD DEFLECTION DIAGRAM

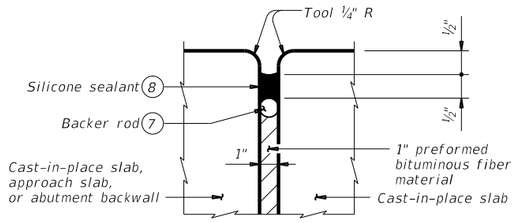
NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL (2) REINF STEEL
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM SPANS
(TYPE SB12 OR SB15)
24' ROADWAY
SPSB-24

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	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		73

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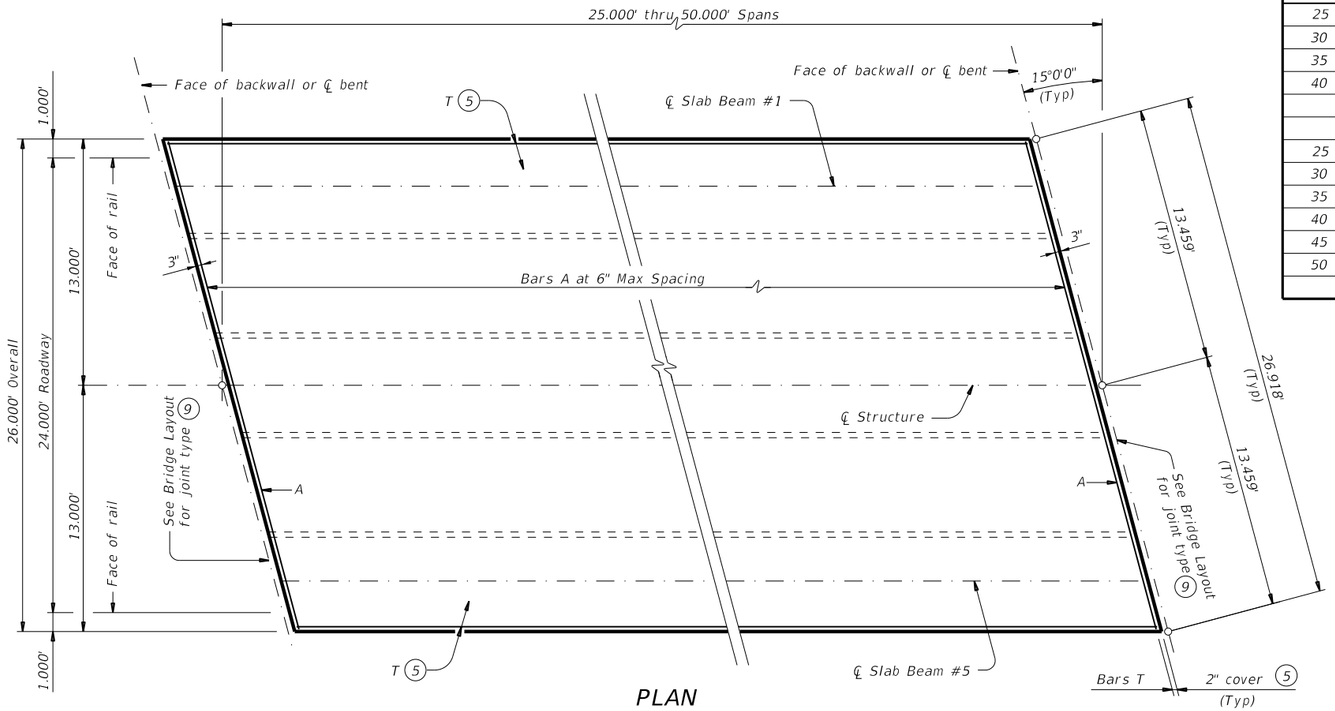
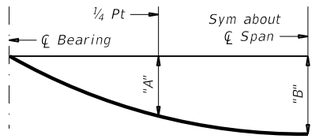


PLAN

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection "A"	Dead Load Deflection "B"	Section Depths (3) "X"	Section Depths (3) "Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1) ABUT TO INT BT	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1) INT BT TO INT BT	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1) ABUT TO ABUT	TOTAL (2) REINF STEEL
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.46	122.50	122.41	1,820
30	780	147.46	147.50	147.41	2,180
35	910	172.46	172.50	172.41	2,550
40	1,040	197.46	197.50	197.41	2,910
45	1,170	222.46	222.50	222.41	3,280
50	1,300	247.46	247.50	247.41	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

BAR TABLE

BAR	SIZE
A	#5
T	#4

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

⚠ The proposed vertical curve on CR339 Bridge over Coyote Creek has been evaluated for use with this standard with no objectionable conditions identified.

Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.

See applicable rail details for rail anchorage in slab.

Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.

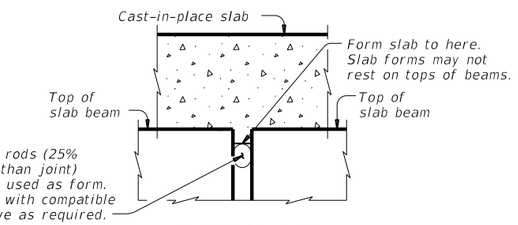
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

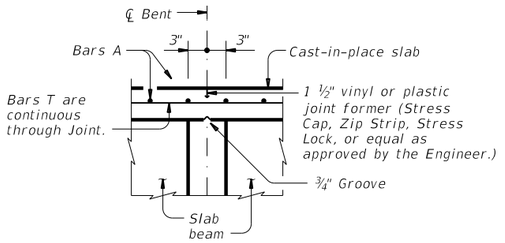
MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-0"
Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

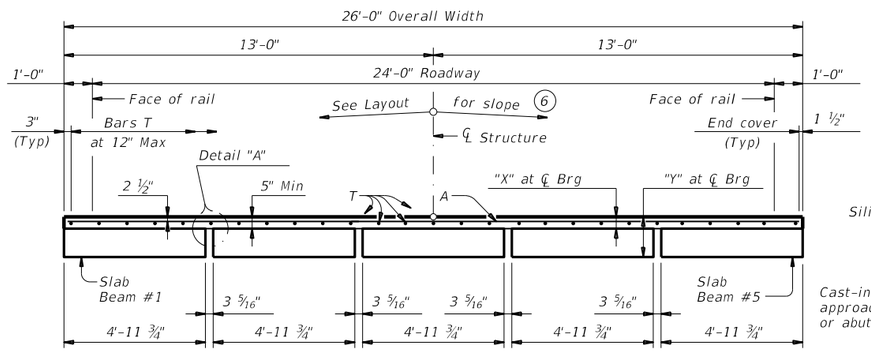
HL93 LOADING



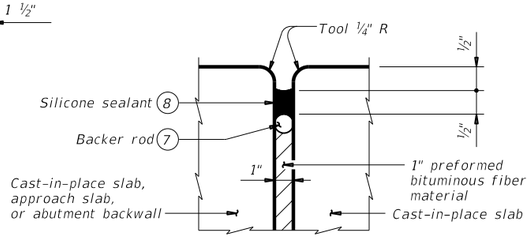
DETAIL "A"



CONTINUOUS SLAB DETAIL



TYPICAL TRANSVERSE SECTION



TYPE A JOINT DETAIL (9)

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
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Houston, Texas 77040
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Darrell L. Kaderka
STATE OF TEXAS
DARRELL L. KADERKA
79298
LICENSED PROFESSIONAL ENGINEER
7/29/2024

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM SPANS
(TYPE SB12 OR SB15)
24' ROADWAY 15° SKEW
SPSB-24-15 (MOD)

FILE: PSB-SPSB2415-17 (MOD).dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
⚠ EDIT NOTE 05/09/24 DLK	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		74

DATE: 7/29/2024 1:49:44 PM
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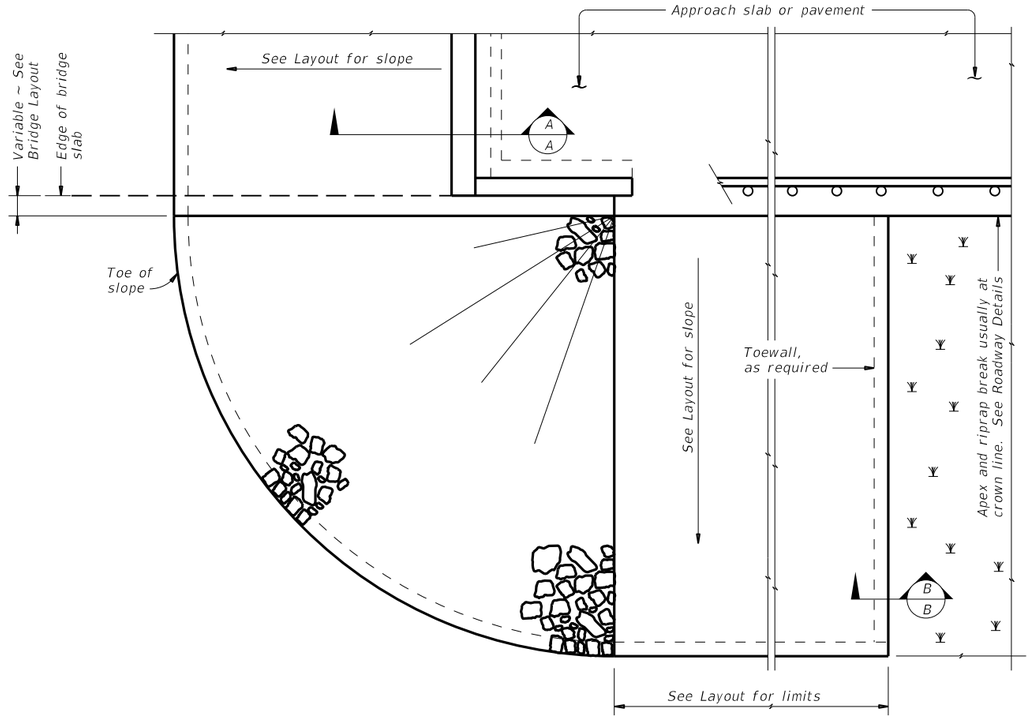
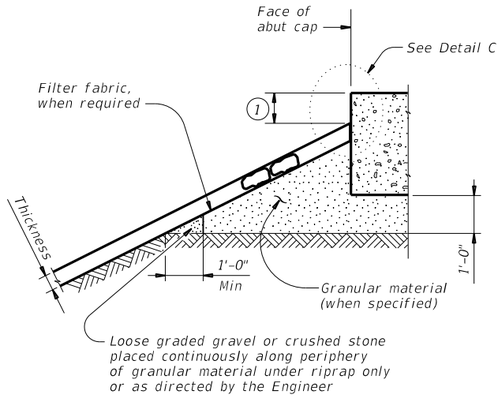
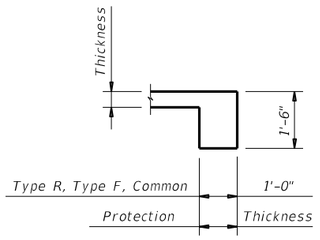


PLAN

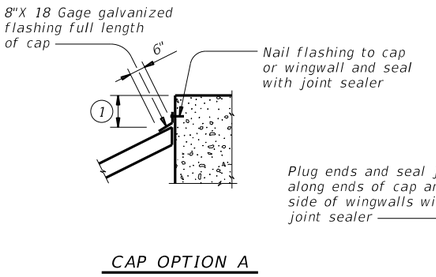


SECTION A-A AT CAP



SECTION B-B

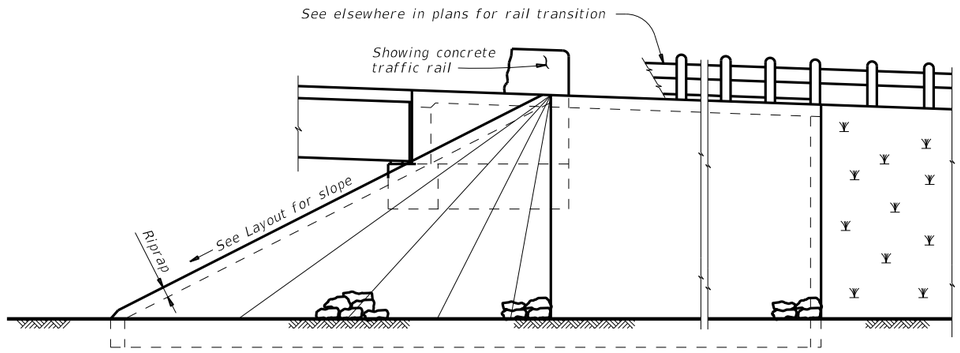
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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STONE RIPRAP

SRR

FILE: MS-SRR-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
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	SJT	RUNNELS		75

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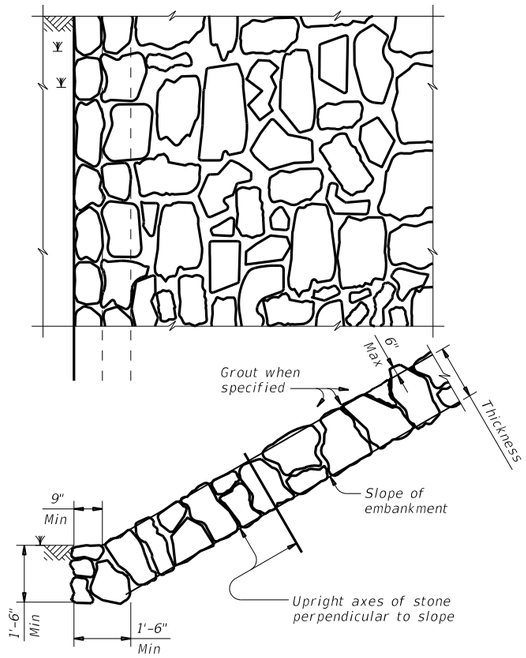


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

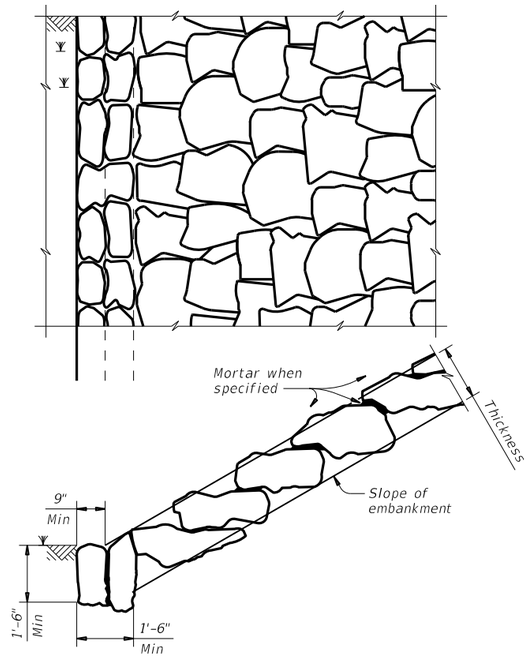


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

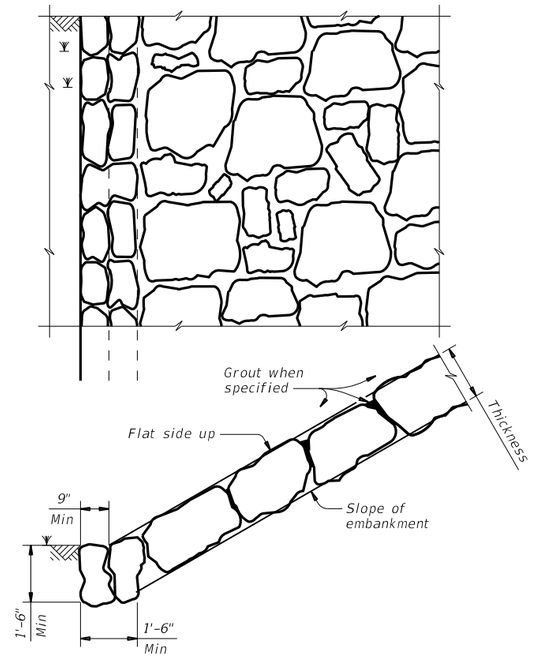


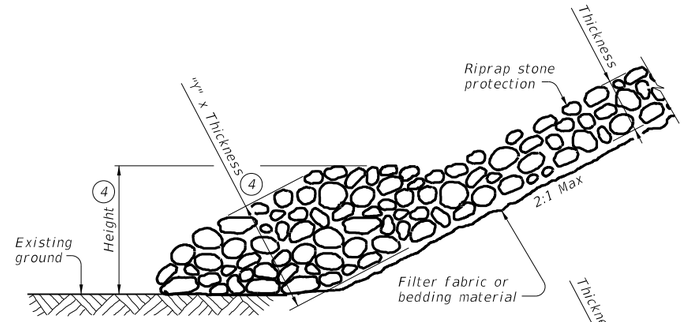
FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

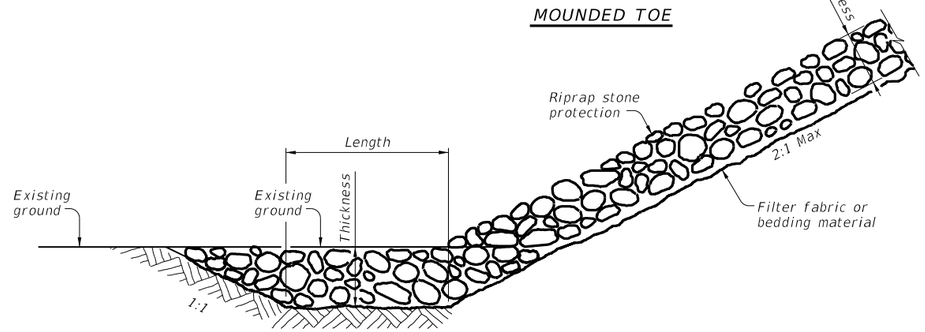
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

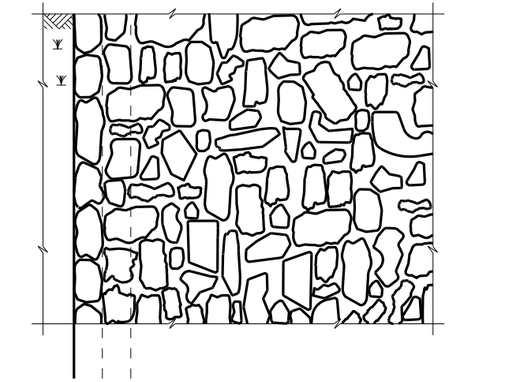


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

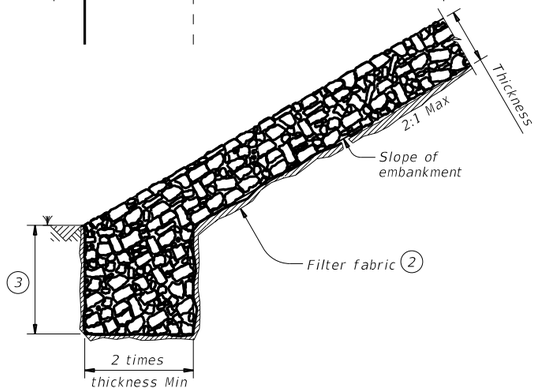


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

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STONE RIPRAP

SRR

FILE: MS-SRR-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	SJT	RUNNELS		76

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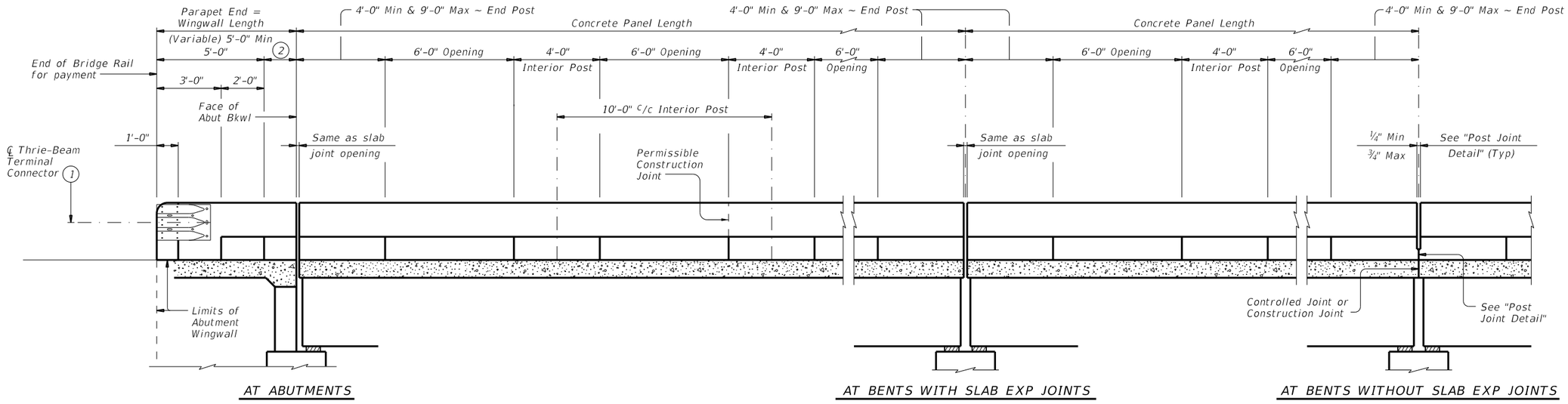
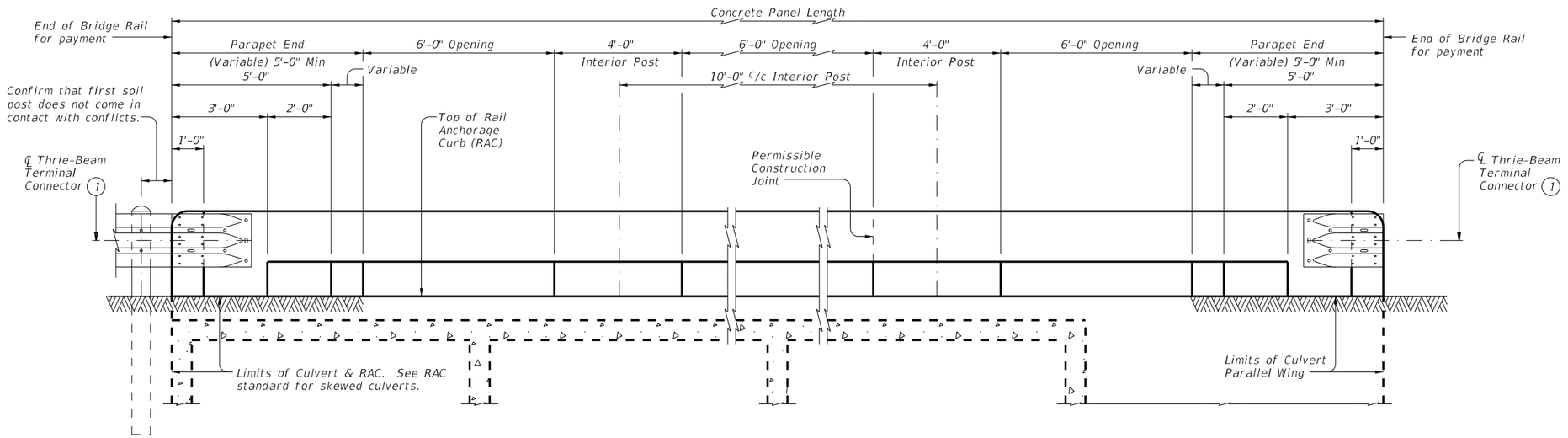


ROADWAY ELEVATION OF RAIL ON BRIDGE



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

FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
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	SJT	RUNNELS		77

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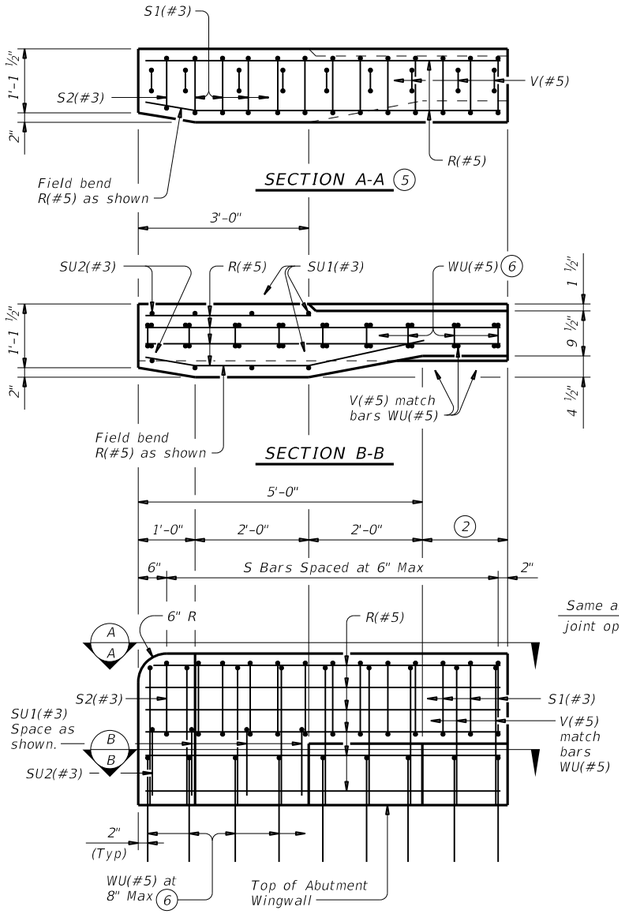
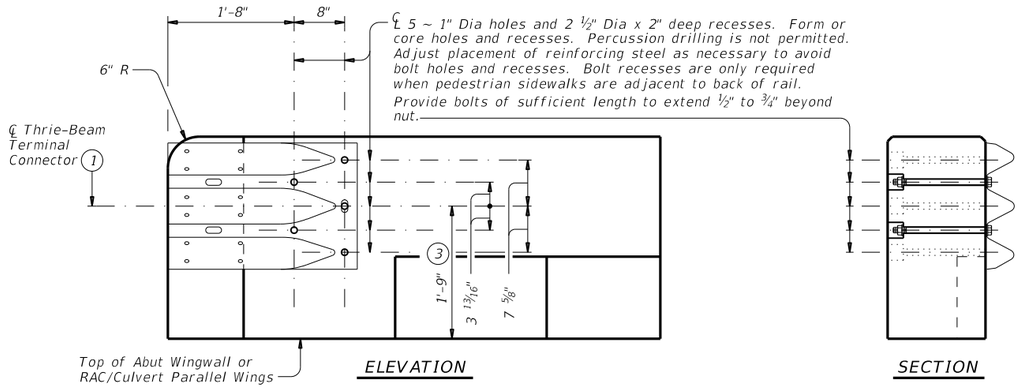


SECTION A-A (5)

SECTION B-B

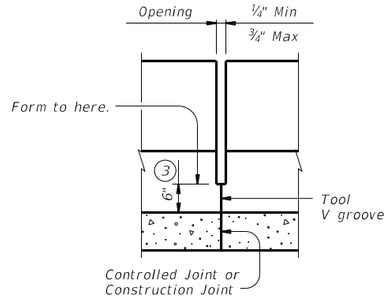
PARAPET END AT ABUT WINGWALL (6)



ELEVATION

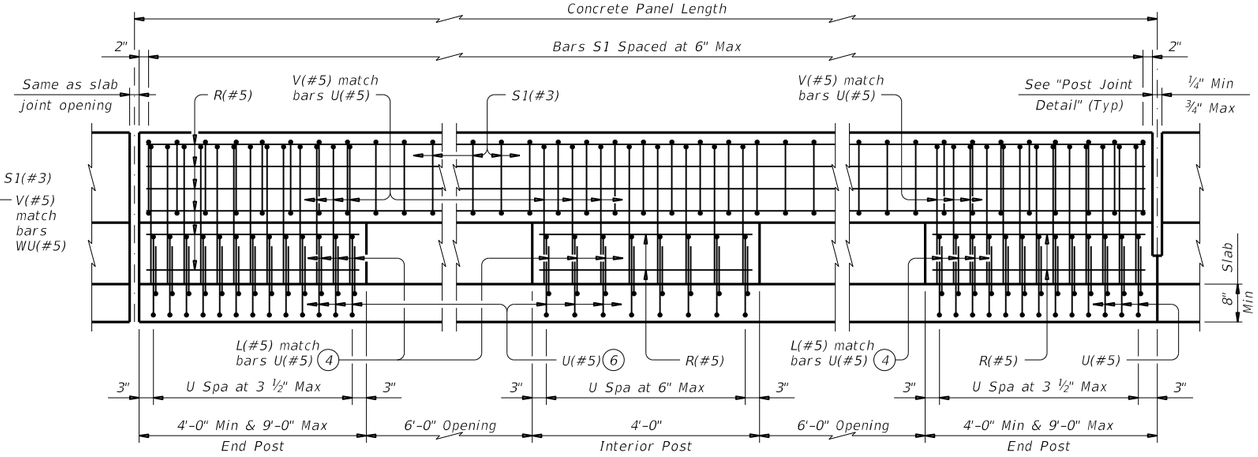
SECTION

TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

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Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	SJT	RUNNELS		78

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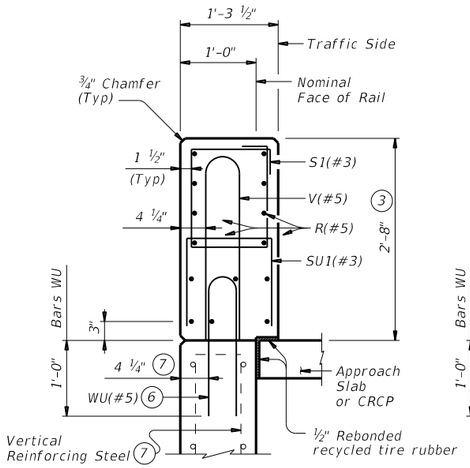
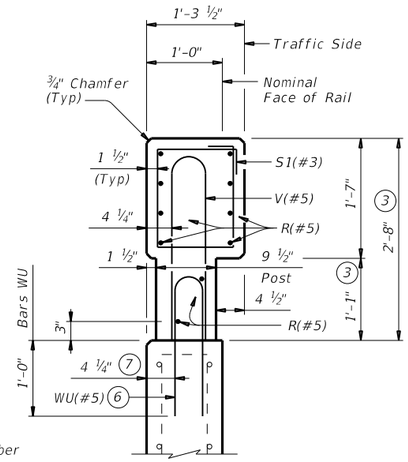
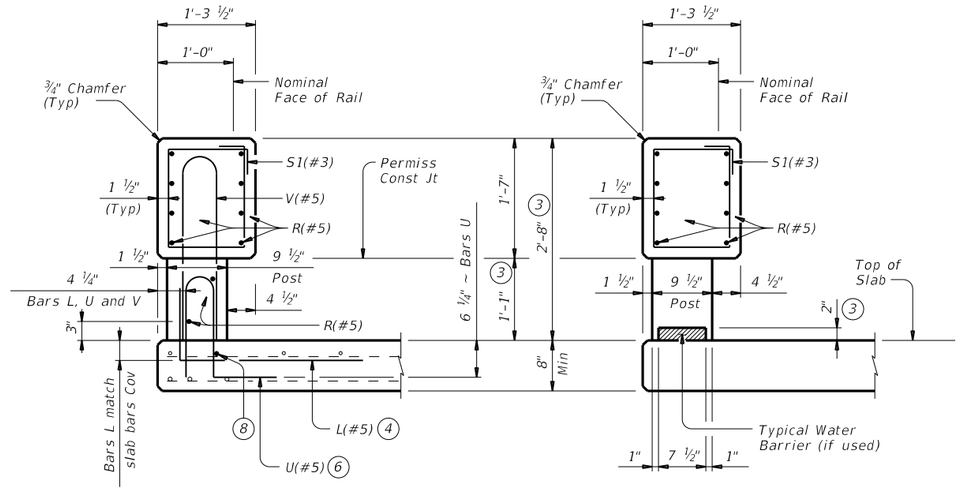


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

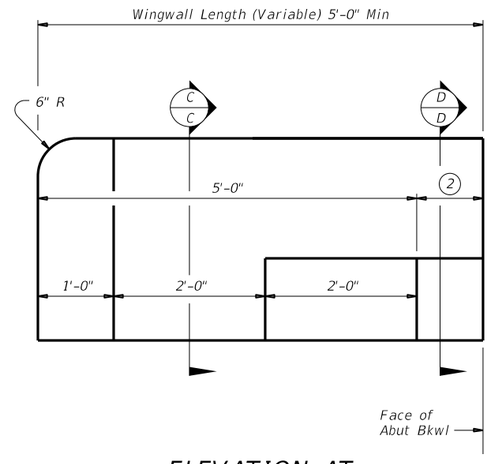


AT POST
ON BRIDGE SLAB

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.*

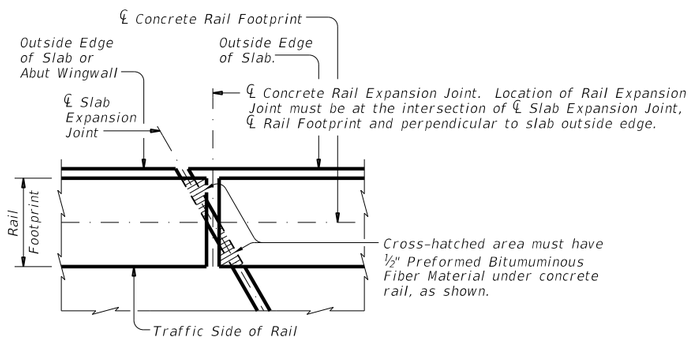
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(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.

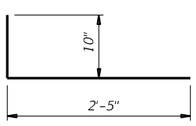
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

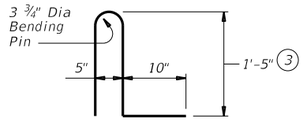
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

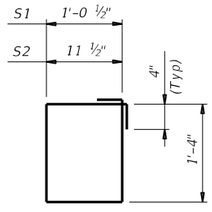
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



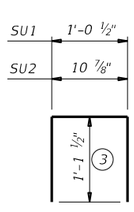
BARS L (#5)



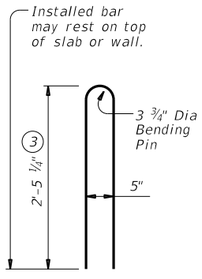
BARS U (#5) (9)



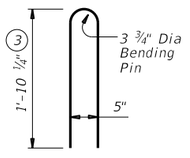
BARS S (#3)



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

FILE: RL-T223-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		79

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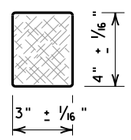
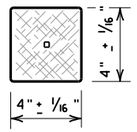
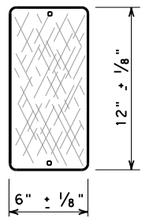
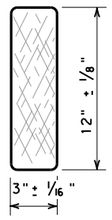
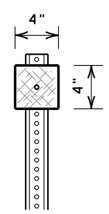
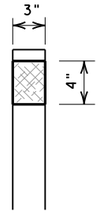
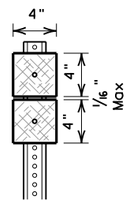
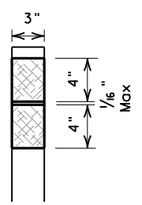
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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

DEVICE	SINGLE		DOUBLE	
				
	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

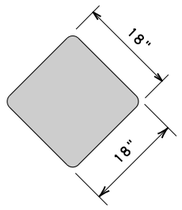
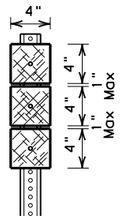
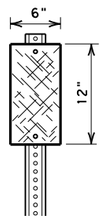
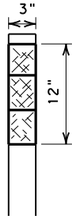
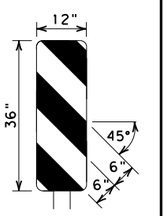
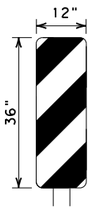
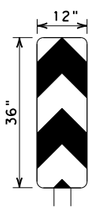
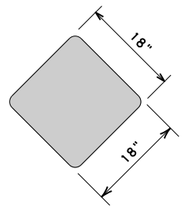
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

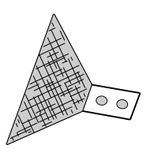
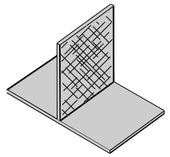
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

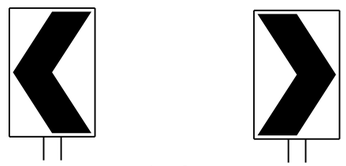
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

DEVICE	GF1	GF2	CTB
			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



W1-8

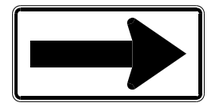
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

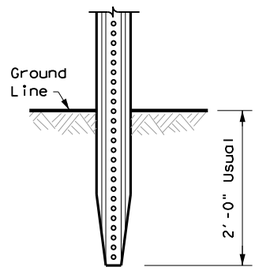
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SJT	RUNNELS		80

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

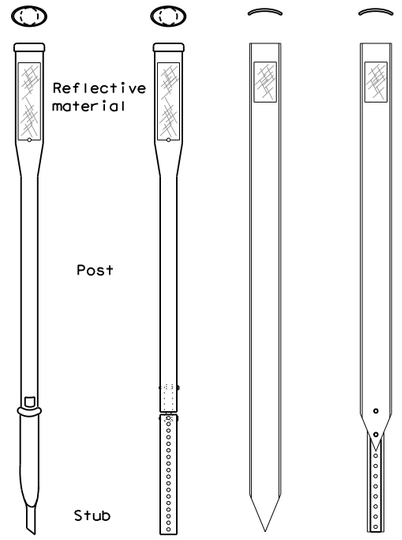


NOTES

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.

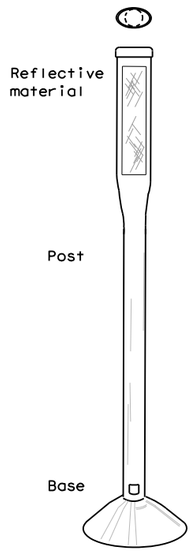
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



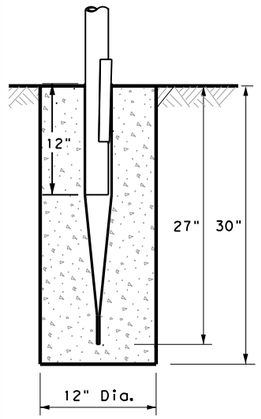
SURFACE MOUNT

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.

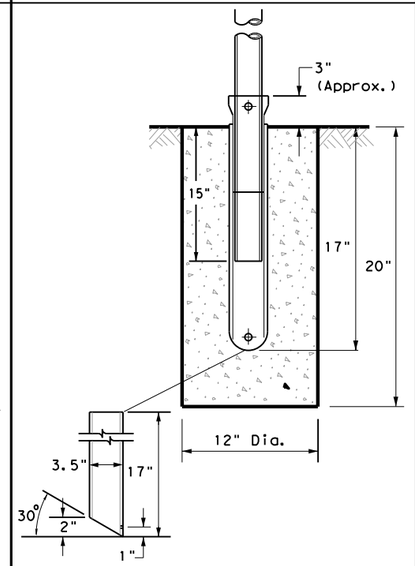
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

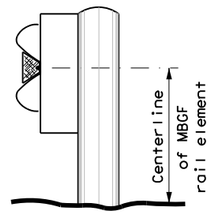
NOTE

1. Install per manufacturer's recommendations.

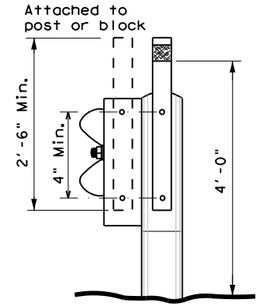
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

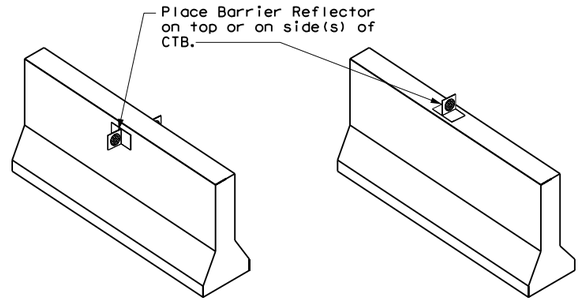
GF1



GF2



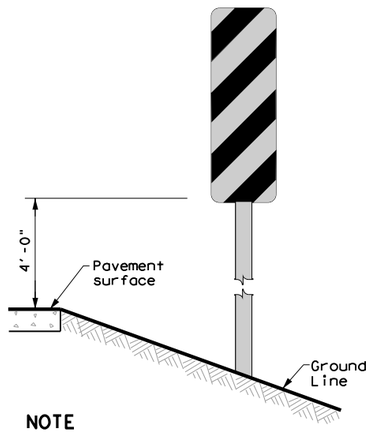
CONCRETE TRAFFIC BARRIER (CTB)



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.

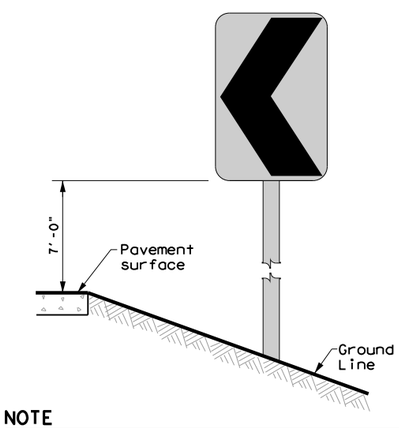
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

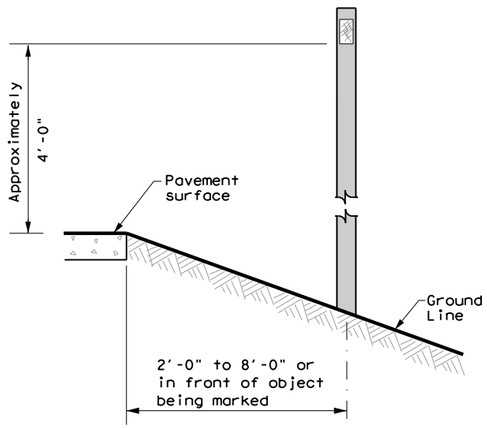
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
REVISIONS	0907	13	024, ETC	CR 339, ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SJT	RUNNELS		81

20B

DATE: 7/30/2024 10:52:24 AM
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DATE: 7/30/2024 10:52:44 AM
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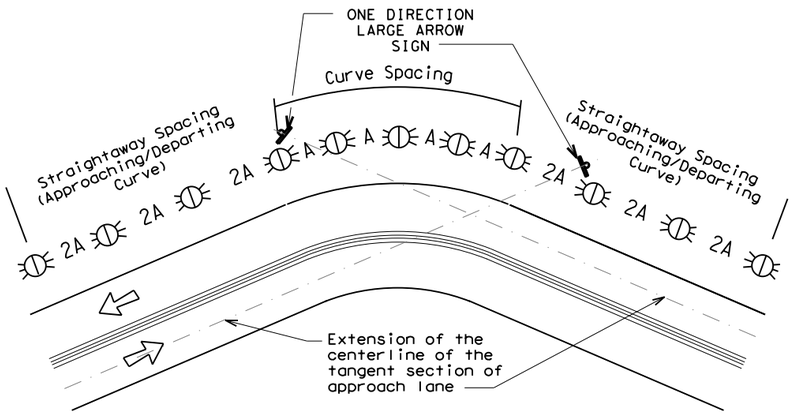
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

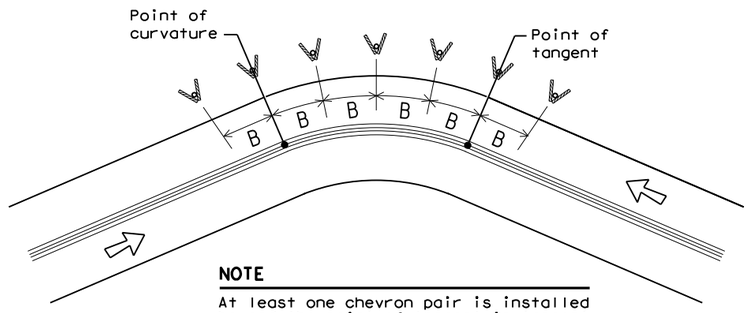
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
REVISIONS	0907	13	024, ETC	CR 339, ETC
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		82

20C

DATE: 7/30/2024 10:52:56 AM
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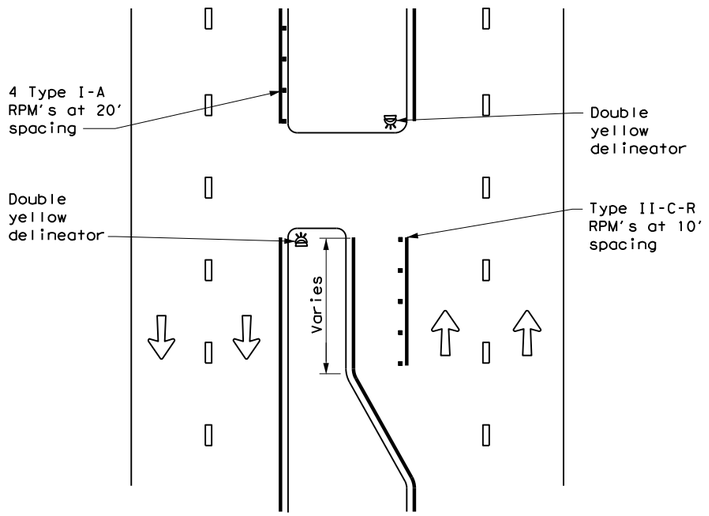
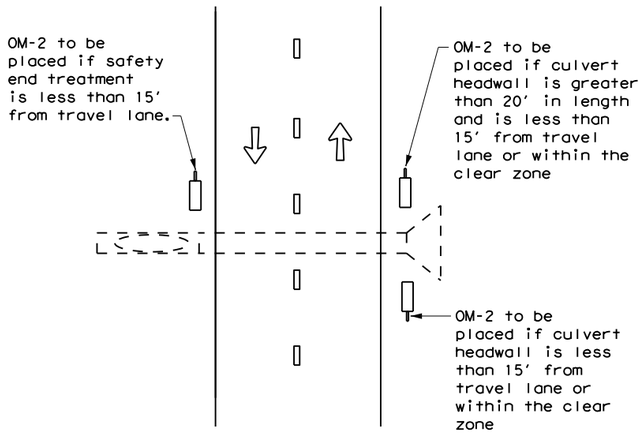
CROSSOVERS



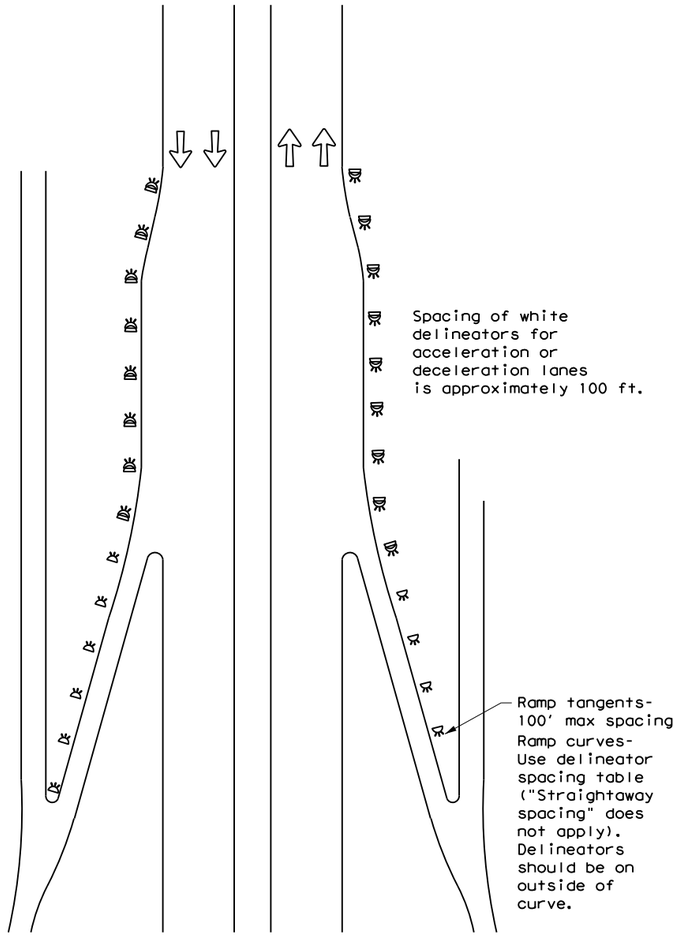
DETAIL 1

FOR CULVERTS WITHOUT MBGF



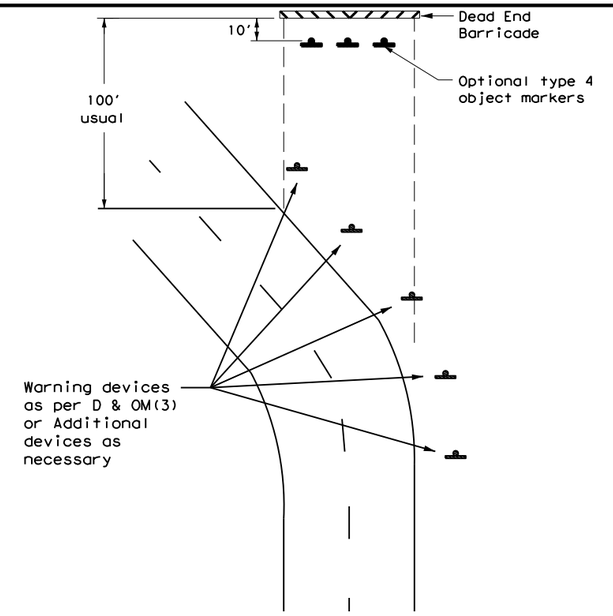
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



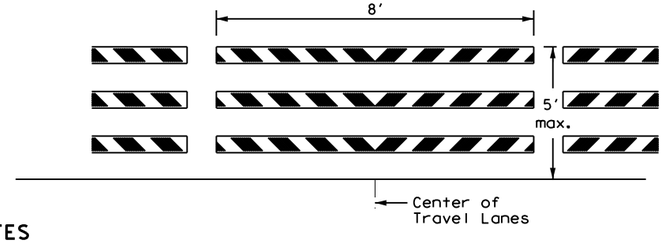
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

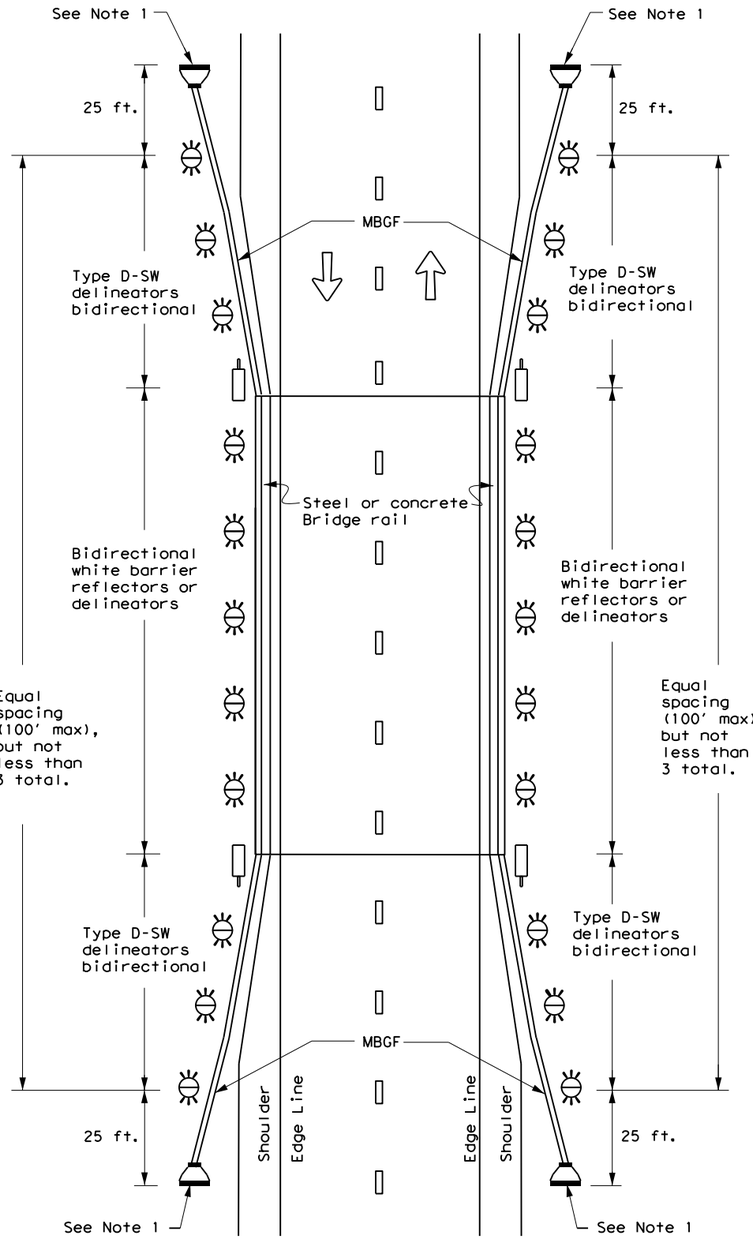
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
3-15 7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		83

20D

DATE: 7/30/2024 10:53:09 AM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/05-Roadway/Standards/dom5-20.dgn

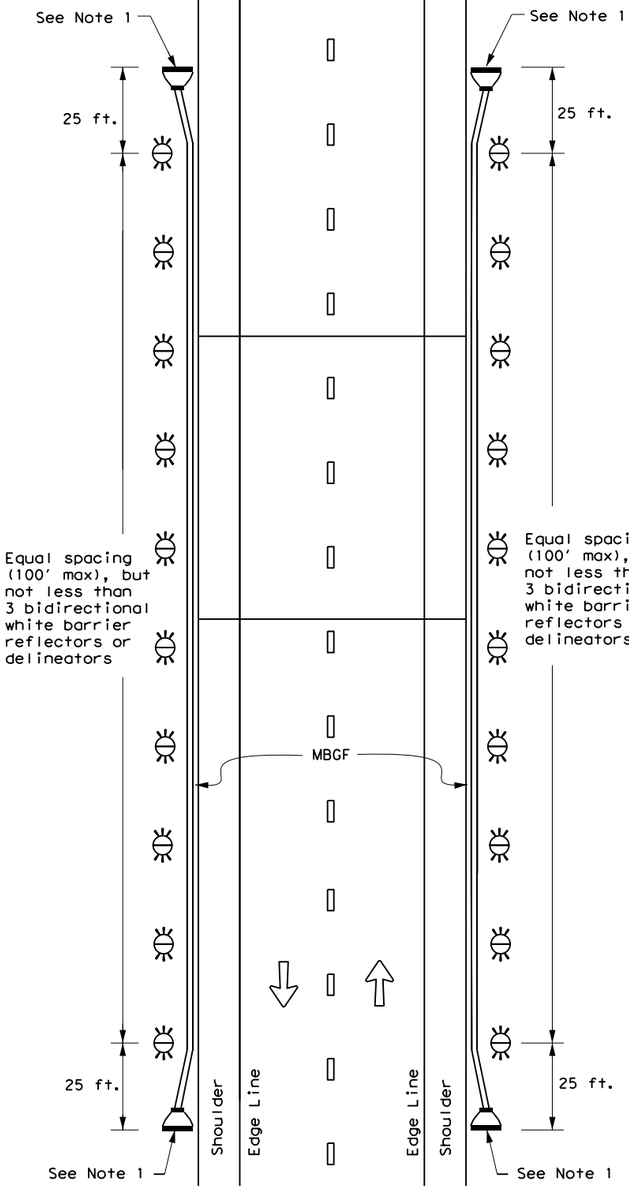
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

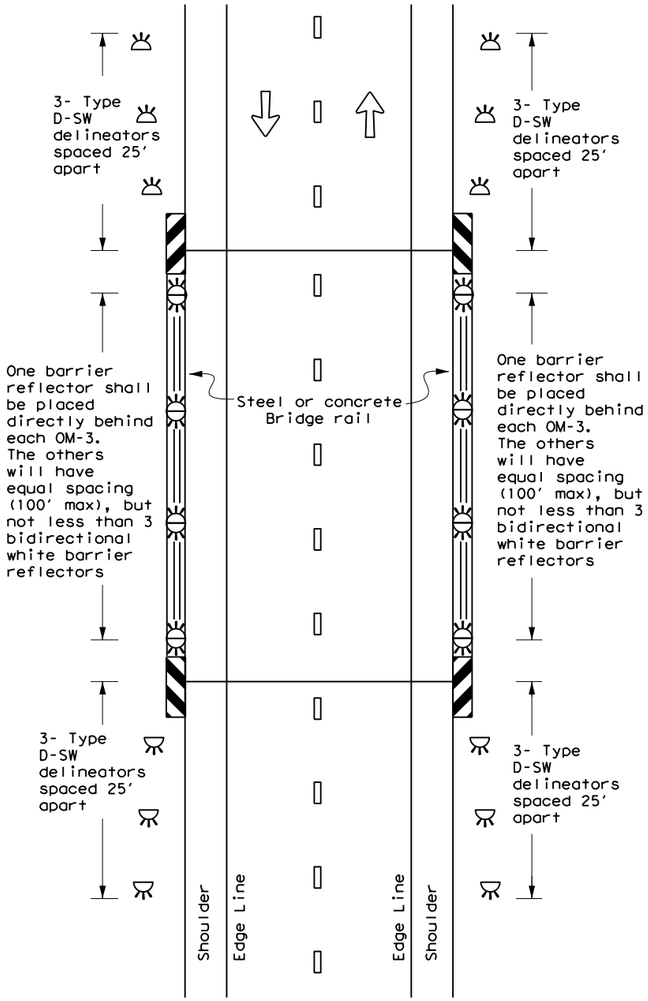
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

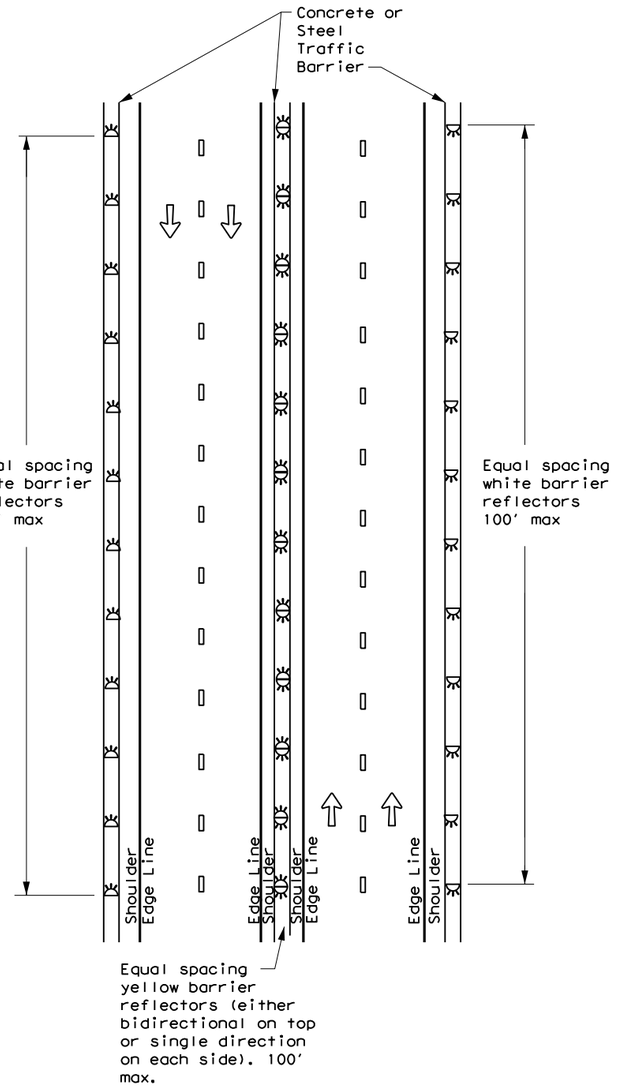
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		84

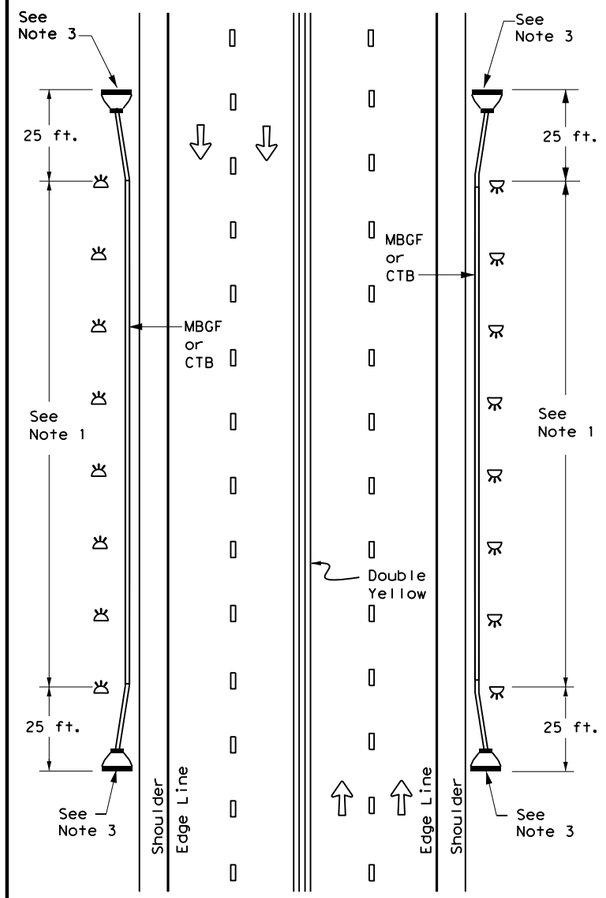
20E

DATE: 7/30/2024 10:53:22 AM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/05-Roadway/Standards/dom6-20.dgn

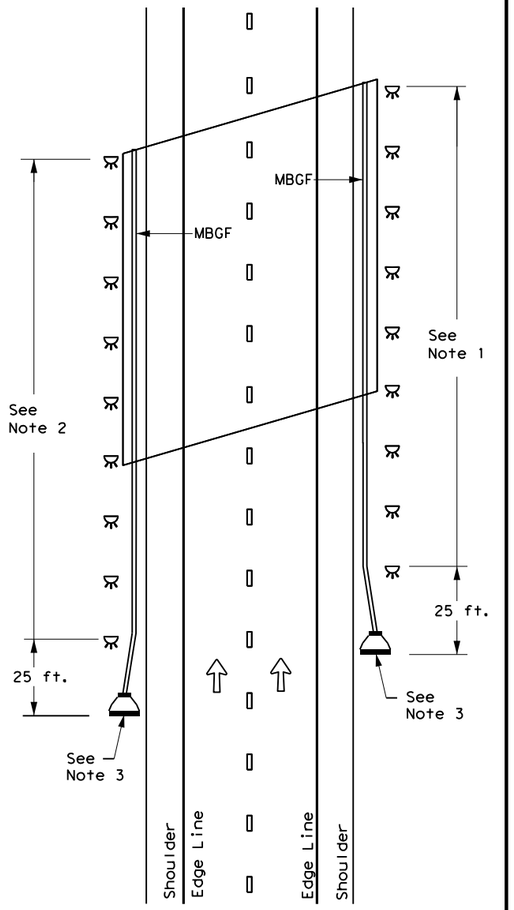
CONTINUOUS CONCRETE OR STEEL BARRIER



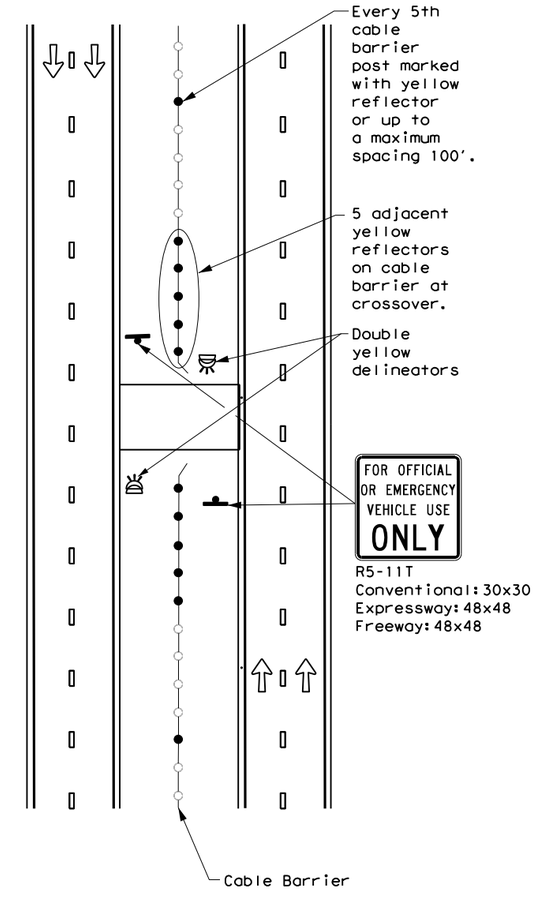
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. 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.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

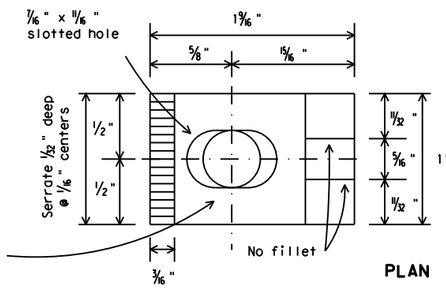
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

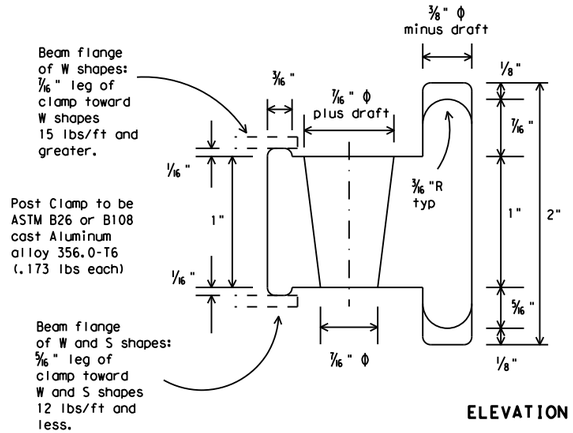
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		85

DATE: 7/30/2024 10:53:35 AM
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400#CAD/411#Trans/01-Sheets/05-Roadway/Standards/smd21-08.dgn



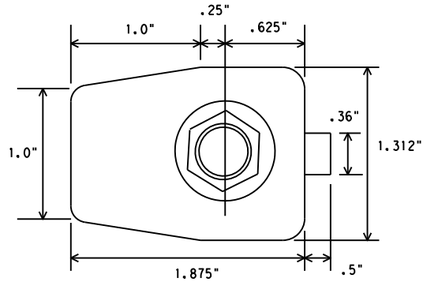
PLAN

NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

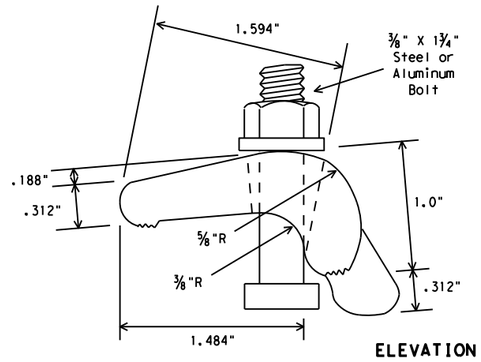


ELEVATION

POST CLAMP DETAIL

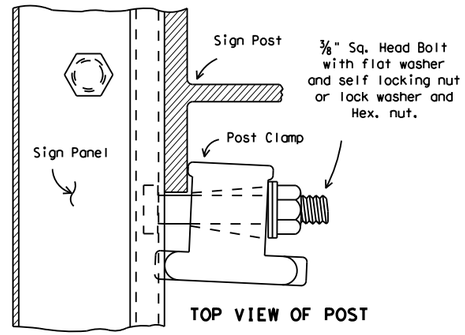


PLAN

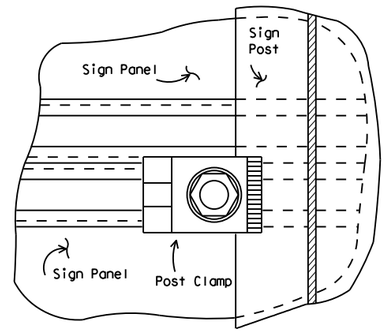


ELEVATION

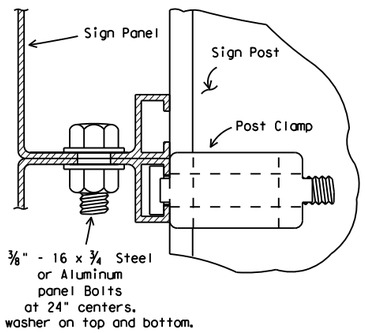
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

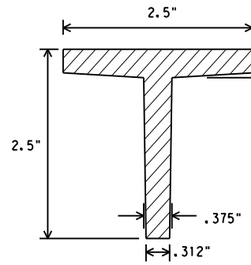
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

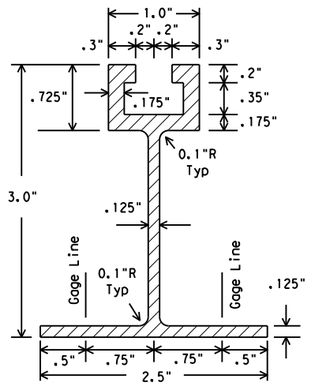


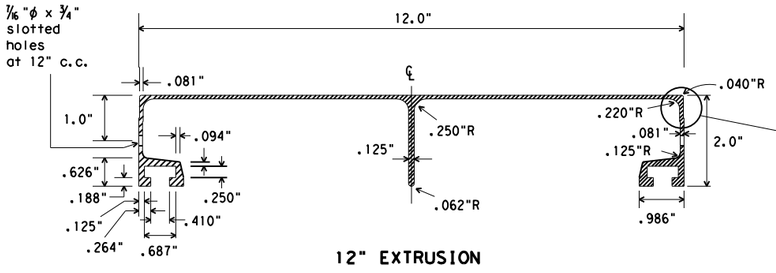
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

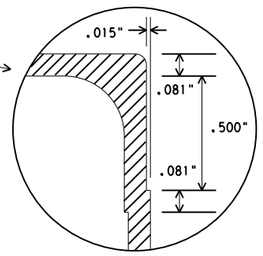
WINDBEAM CROSS SECTION

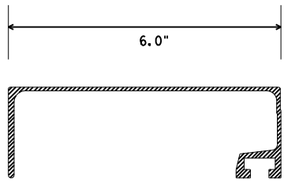
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



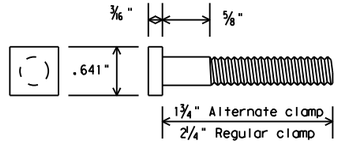


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08				

CONT	SECT	JOB	HIGHWAY
0907	13	024, ETC	CR 339, ETC

DIST	COUNTY	SHEET NO.
SJT	RUNNELS	86

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0907-13-024

1.2 PROJECT LIMITS:
From: CR 339 AT COYOTE CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 31.873005 ,(Long) -99.966704

END: (Lat) 31.873022 ,(Long) -99.965600

1.4 TOTAL PROJECT AREA (Acres): 1.2269

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.0169

1.6 NATURE OF CONSTRUCTION ACTIVITY:
REPLACE BRIDGE

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- ☐ Mobilization
- X Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- X Remove existing pavement
- X Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☐ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- X Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☐ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☐ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☐ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024(802)		87
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	13	024, ETC	CR 339, ETC

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☒ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024(802)		88
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	13	024, ETC	CR 339, ETC

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0907-13-025

1.2 PROJECT LIMITS:
From: CR 370 AT OAK CREEK

To:

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 31.883589 ,(Long) -100.182488

END: (Lat) 31.883608 ,(Long) -100.181362

1.4 TOTAL PROJECT AREA (Acres): 1.4515

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.2315

1.6 NATURE OF CONSTRUCTION ACTIVITY:
REPLACE BRIDGE

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- ☐ Mobilization
- X Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- X Remove existing pavement
- X Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☐ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- X Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☐ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☐ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☐ Sanitary waste from onsite restroom facilities
- ☐ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☐ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024(802)		89
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	13	024, ETC	CR 339, ETC

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☒ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2024(802)		90
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	13	024, ETC	CR 339, ETC

DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/09-Environmental/epic-CR339.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. 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.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. CR 339 AT COYOTE CREEK

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. Only remove woody vegetation between October 1 and February 14.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC - CR 339

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0907	13	024, ETC	CR 339, ETC
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	SJT	RUNNELS		91

DATE: 7/30/2024
FILE: pw://cobfen-pw.bentley.com:cobfen-pw-01/Documents/2020/11020-04-SanAngelo Bridges/400_CAD/411_Trans/01-Sheets/09-Environmental/epic-CR370.dgn

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1.

2.

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Action No.

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Action No.

1.

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VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

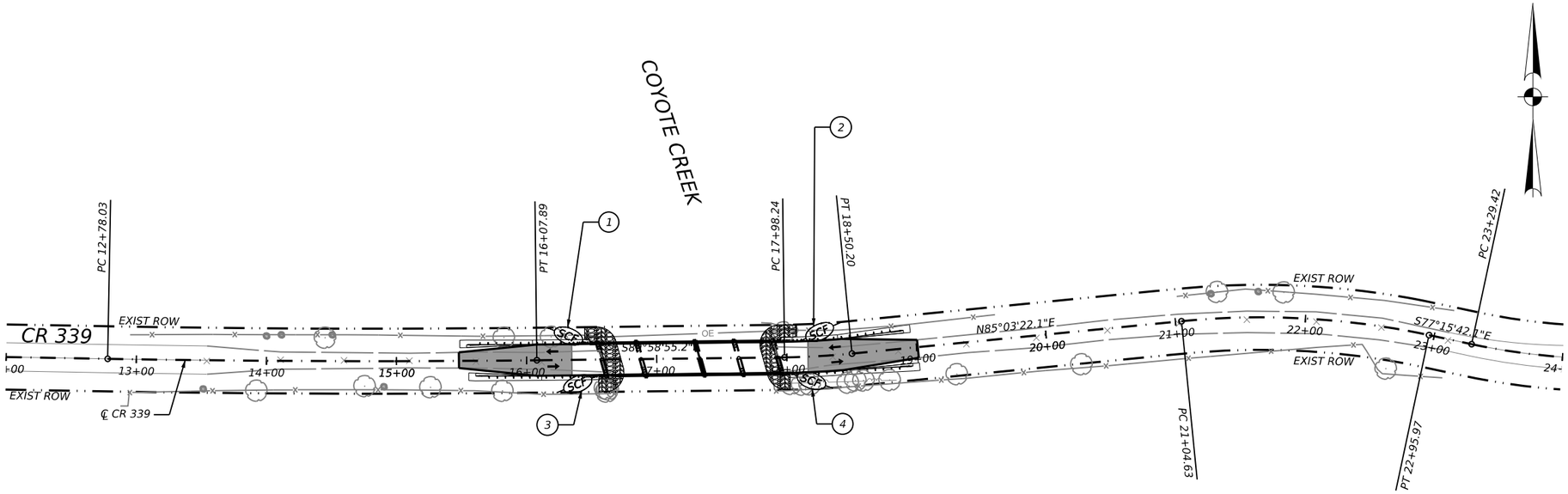
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC - CR 370

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0907	13	024, ETC	CR 339, ETC
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	SJT	RUNNELS		92



LEGEND

- PROP 8" FLEX BASE
- PROP STONE RIPRAP
- PROP MBGF
- SCF — SEDIMENT CONTROL FENCE

1. 15 LF SEDIMENT CONTROL FENCE
   INSTALLED: _____
   REMOVED: _____
2. 15 LF SEDIMENT CONTROL FENCE
   INSTALLED: _____
   REMOVED: _____
3. 15 LF SEDIMENT CONTROL FENCE
   INSTALLED: _____
   REMOVED: _____
4. 15 LF SEDIMENT CONTROL FENCE
   INSTALLED: _____
   REMOVED: _____

100% SUBMITTAL

07/30/24

STATE OF TEXAS
MICHAEL D. VERHOEF
128002
LICENSED
PROFESSIONAL ENGINEER

Michael Verhoef

0 25 50 100
1" = 100'

REV. NO.	DATE	DESCRIPTION	BY

CobbFendley
TBPELS Engineering Firm No. 274
Land Surveying Firm No. 10046700
13430 Northwest Freeway, Ste. 1100
Houston, Texas 77040
713.462.3242
www.cobbfendley.com

Texas Department of Transportation

CR 339
SW3P LAYOUT

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.	
6	TEXAS	BR 2024(802)		CR 339, ETC	
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SJT	RUNNELS	0907	13	024, ETC	93

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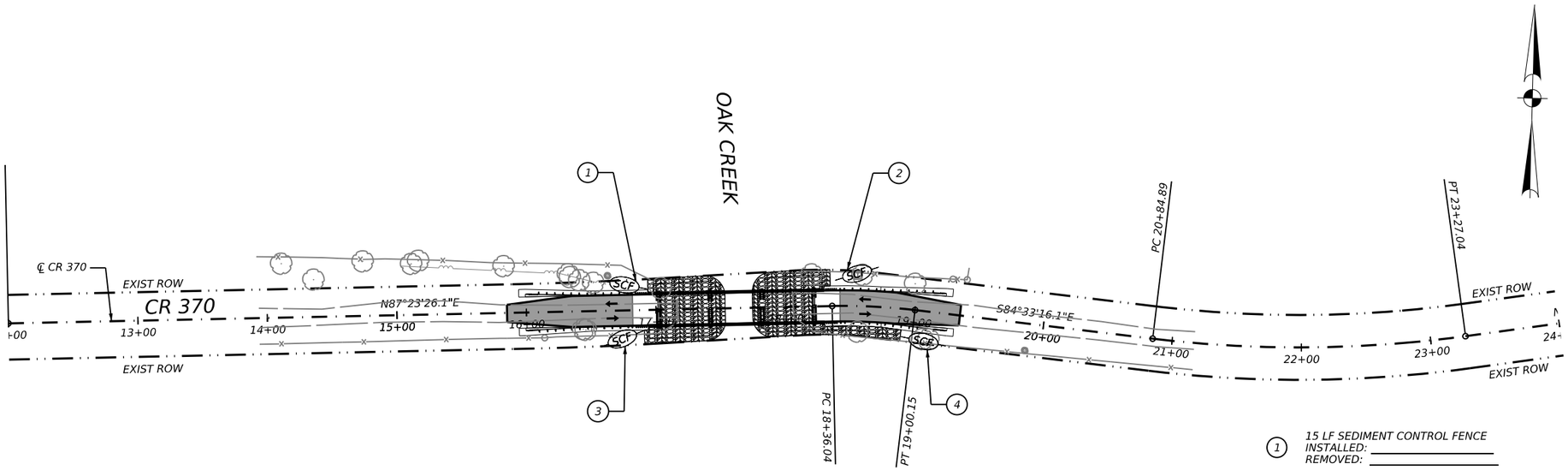
SABRIDGE-ROAD-SW3P-CR339.dgn



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CR 370
SW3P LAYOUT

FED.RD. DIV.NO.	STATE	PROJECT NO.		HIGHWAY NO.
6	TEXAS	BR 2024(802)		CR 339, ETC
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO. / SHEET NO.
SJT	RUNNELS	0907	13	024, ETC / 94

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SABRIDGE-ROAD-SW3P-CR370.dgn

DATE 7/30/2024
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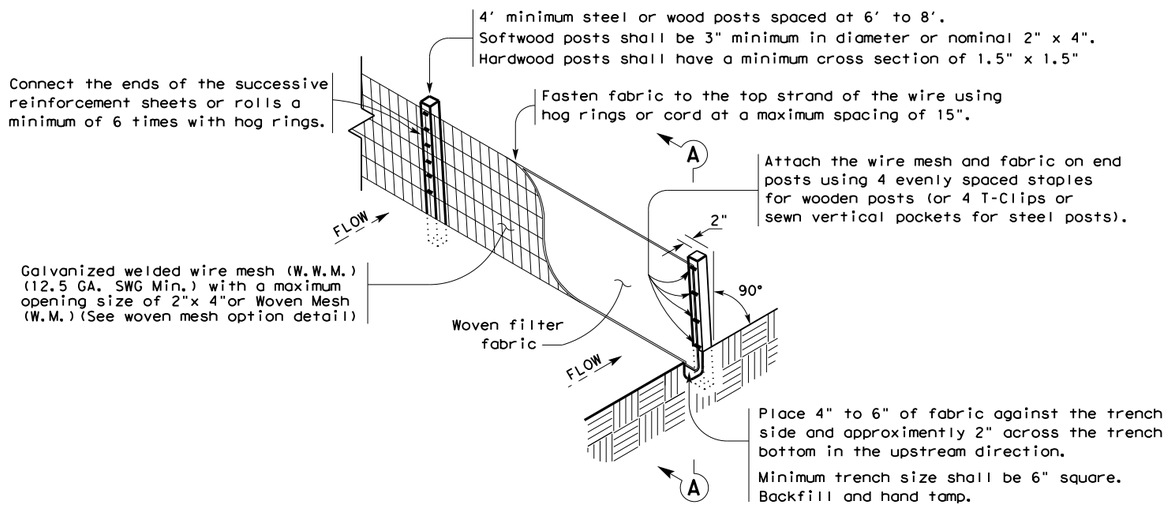
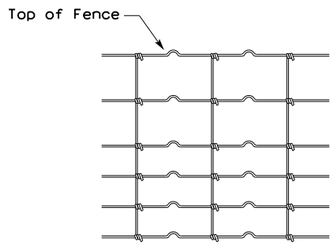
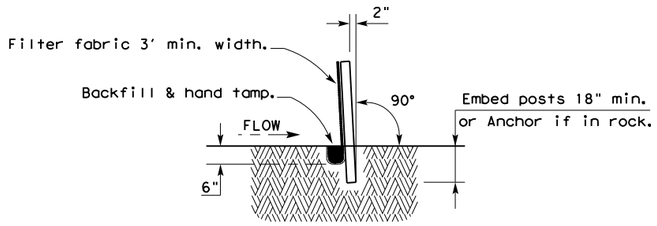


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

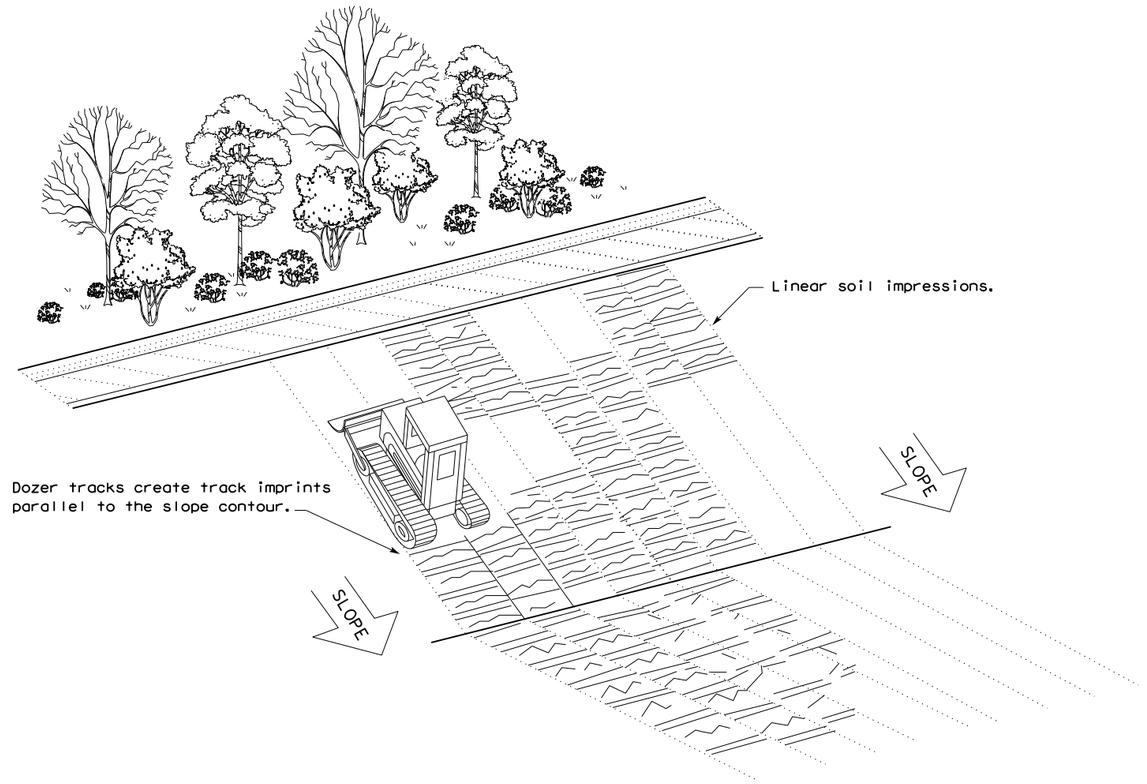
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	13	024, ETC	CR 339, ETC
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		95