

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	PROJECT INDEX

**STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION**

**PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT**

FEDERAL PROJECT: BR 2021(519)
CR 2001

LAMPASAS COUNTY

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

LIMITS: ON CR 2001 AT LUCY CREEK

CR 2001	0923-10-020
ROADWAY =	310.00 FT = 0.059 MI.
BRIDGE =	90.00 FT = 0.017 MI.
TOTAL =	400.00 FT = 0.076 MI.

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS AND CONTRACT.

P. E.

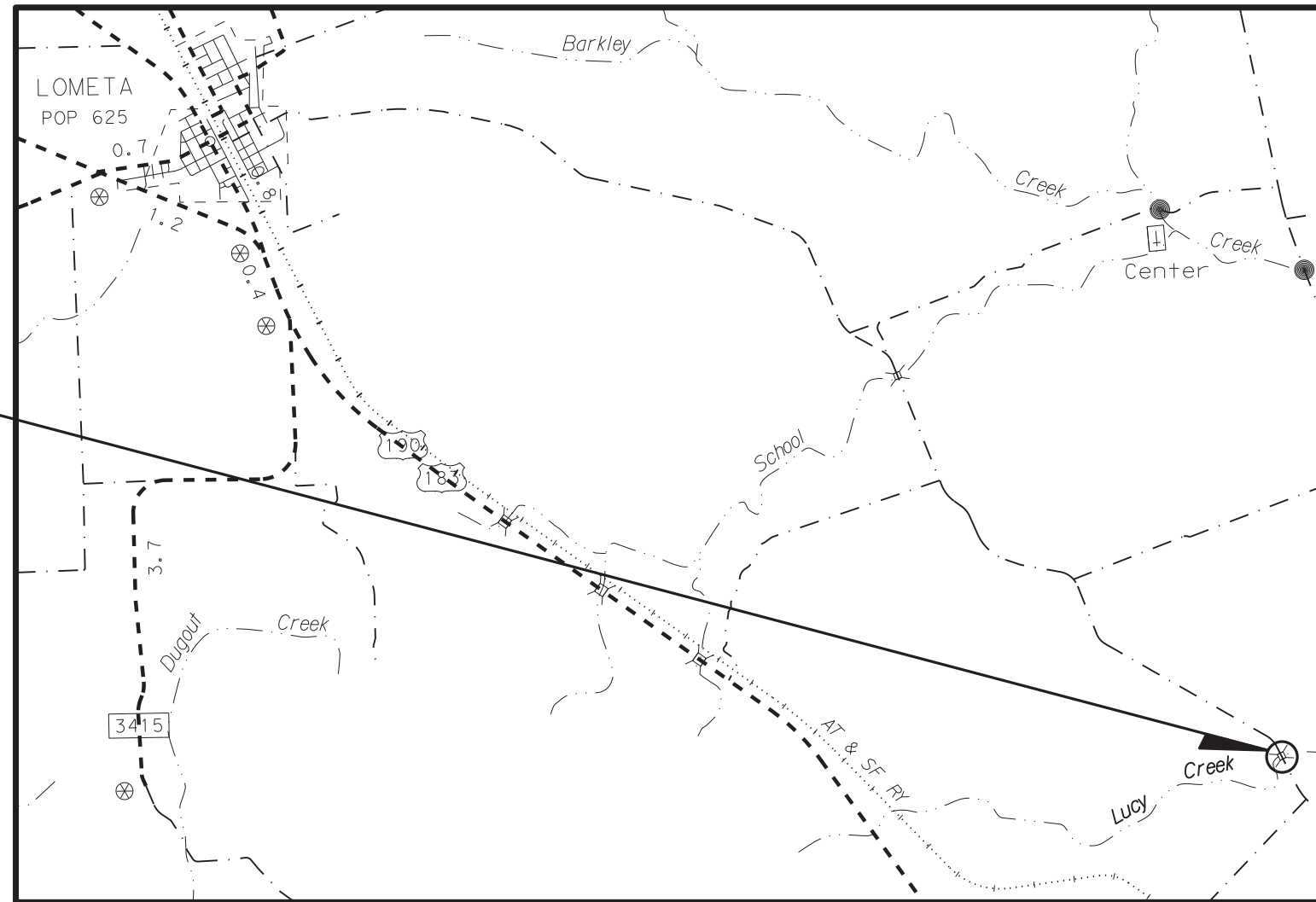
DATE

BEGIN PROJECT
STA 8+00.00
0923-10-020

END PROJECT
STA 12+00.00
0923-10-020

VOLUME 2

CONTRACT CSJ: 0923-06-086



NO EXCEPTIONS
EQUATIONS: NONE
NO RAILROAD CROSSINGS

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 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, MAY, 2012)

FEDERAL AID PROJECT NO.			
BR 2022(435), ETC			
CONT	SECT	JOB	HIGHWAY
0923	06	086, ETC	CR 146, ETC
DIST	COUNTY		SHEET NO.
BWD	BROWN, ETC		1

FUNCTIONAL CLASSIFICATION = RURAL MINOR COLLECTOR
DESIGN SPEED = MEETS OR IMPROVES EXISTING
A.D.T.(2017) = 103
A.D.T.(2033) = 200

FINAL PLANS

LETTING DATE: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED & ACCEPTED: _____
FINAL CONTRACT COST: \$ _____
CONTRACTOR: _____

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

2/25/2022

CONCURRENCE:

DocuSigned by:

Judge Randall J. Hoyer
120717904D1C4BC...
COUNTY JUDGE



4/2/2022

SUBMITTED FOR LETTING:

DocuSigned by:

SA S.T.T., P.E.
77D14777834646F...
DISTRICT DESIGN ENGINEER

4/2/2022

RECOMMENDED FOR LETTING:

DocuSigned by:

SA S.T.T., P.E.
77D14777834646F...
DISTRICT DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

4/2/2022

RECOMMENDED FOR LETTING:

DocuSigned by:

Elias Rmeili, P.E.
BB9FD402431A4A3...
DISTRICT ENGINEER

INDEX OF SHEETS

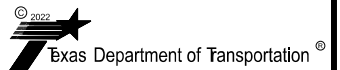
SHEET NO.	DESCRIPTION
GENERAL	
1	TITLE SHEET
2	PROJECT INDEX
3	TYPICAL SECTION
4	OMITTED
5	OMITTED
6	SURVEY CONTROL
TRAFIC CONTROL PLAN	
7-8	TRAFFIC CONTROL PLAN
TRAFIC CONTROL STANDARDS	
9-20	BC(1) - BC(12) - 21
ROADWAY PLAN	
21	ROADWAY QUANTITIES
22	PLAN PROFILE
ROADWAY STANDARDS	
23	BED-14
24	GF (31)-19
25	GF (31)TR TL2-19
26	SGT(10S)31-16
27	SGT(11S)31-18
28	SGT(12S)31-18
29	D & OM(1)-20
30	D & OM(2)-20
31	D & OM(3)-20
32	D & OM(5)-20
33	D & OM(VIA)-20
34	WF(1)-10
35	WF(2)-10
BRIDGE DETAILS	
36	HYDROLOGY AND HYDRAULICS
37	BRIDGE LAYOUT
38	TEST HOLE DATA
39	ESTIMATED QUANTITIES AND CAP ELEVATIONS
BRIDGE STANDARDS	
40-41	ABB-24
42-43	SBBS-B34-24
44	BBSDS-B34-24
45-47	BB-B34
48	BBEB
49	BBRAS
50-51	CSAB
52-53	FD
54-56	TYPE T223
STORM WATER POLLUTION PREVENTION PLAN	
57	EPIC
57A	ENVIRONMENTAL GENERAL NOTES
58	SW3P
59	SW3P LAYOUT
60	TEMPORARY CROSSING DETAIL
STORM WATER POLLUTION PREVENTION STANDARDS	
61	EC(1)-16
62	EC(2)-16
63-65	EC(9)-16



JH Scantling, P.E.

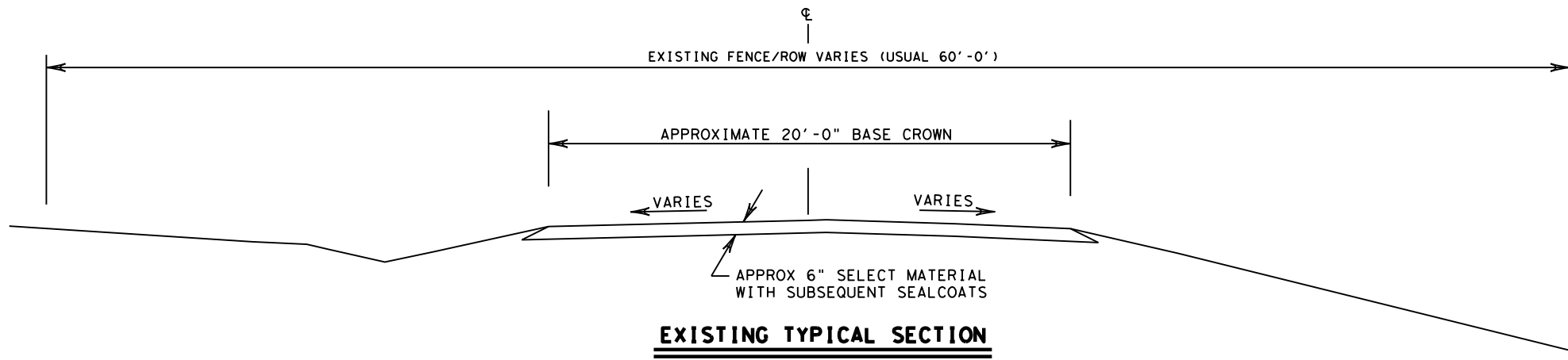
04/02/2022
THE STANDARD SHEETS LISTED ON THIS SHEET HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

**CR 2001
PROJECT INDEX**

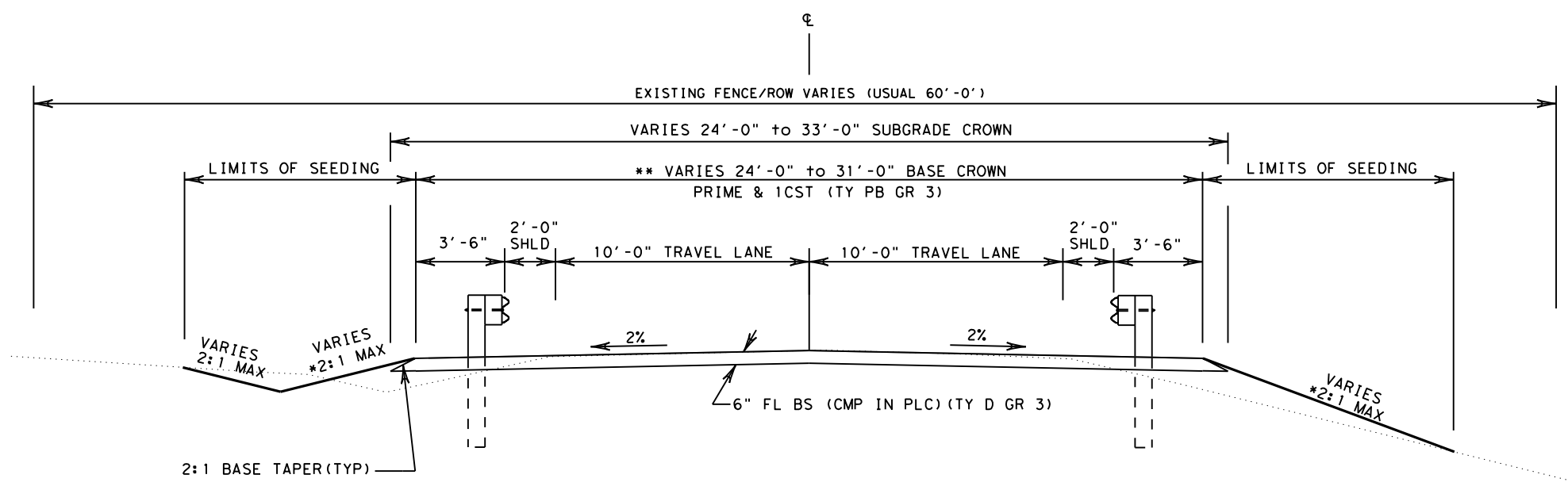


CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		2

DNE: CK: DW: CK:



EXISTING TYPICAL SECTION



PROPOSED TYPICAL SECTION

- * BEHIND GUARDRAIL ONLY
- ** SEE PLAN & PROFILE FOR OFFSETS

STA 8+50.00 to STA 9+52.50
 STA 10+42.50 to STA 11+50.00
 TRANSITIONS ARE ESTIMATED AT 26.0 CY/TRANSITION
 PROPOSED BRIDGE STA 9+52.50 to STA 10+42.50
 TRANSITION FROM EXISTING WIDTH TO PROPOSED WIDTH
 STA 8+00.00 to STA 8+50.00
 STA 11+50.00 to STA 12+00.00

SUPER TABLE	LT	RT
STA 8+00.00	MATCH EXISTING	
STA 8+50.00	-2.0%	-2.0%
STA 11+50.00	-2.0%	-2.0%
STA 12+00.00	MATCH EXISTING	

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
*	0247 6055	FL BS (CMP IN PLC) (TY D GR 3) (FNAL POS)	CY	174

* ORDINARY COMPACTION



J.H. Scantling, P.E.

04/02/2022

**CR 2001
TYPICAL SECTION
0923-10-020**



CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	3	

DATE: 1/28/2022 4:59:08 PM
 FILE: D:\cr2001\TYPICAL_SECTION.dgn

TxDOT - Brownwood District CR 2001 at Lampasas County
 Texas State Plane NAD83(2011)
 Texas Central Zone 4203 NAVD88
 Project Vertical Datum Geiod 12B
 CSF-1.00012 TxDOT VRS
 US Survey Feet

CSJ 0923-10-20

Monument/Target Number	Surface Northing	Surface Easting	Elevation	Description	Grid Northing	Grid Easting	*Latitude (N)	*Longitude (W)	Station	Offset
CP1	10393022.174	2938068.111	1300.714	NAIL	10391775.161	2937715.585	3109 38.43277	98 17 00.14248	NA	NA
CP2	10392543.463	2938266.115	1281.115	NAIL	10391296.507	2937913.565	3109 33.65977	98 16 57.96566	NA	NA

NAIL - 60D Nail

*Lat/*Long conversion from NGS Coordinate Conversion and Transformation Tool (NCAT)

TxDOT Brownwood District
 Chet M. Glasscock, RPLS
 Travis Jordan
 George Trott

Beginning chain PROP description

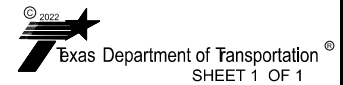
Point 581 N 10,392,917.55 E 2,938,102.61 Sta 7+69.53
 Course from 581 to 582 S 26° 27' 05.11" E Dist 171.97
 Point 582 N 10,392,763.58 E 2,938,179.21 Sta 9+41.50
 Course from 582 to 583 S 26° 09' 00.09" E Dist 112.00
 Point 583 N 10,392,663.05 E 2,938,228.58 Sta 10+53.50
 Course from 583 to 584 S 25° 51' 05.11" E Dist 172.04
 Point 584 N 10,392,508.22 E 2,938,303.59 Sta 12+25.54

Ending chain PROP description



04/02/2022

CR 2001
 SURVEY CONTROL
 0923-10-020

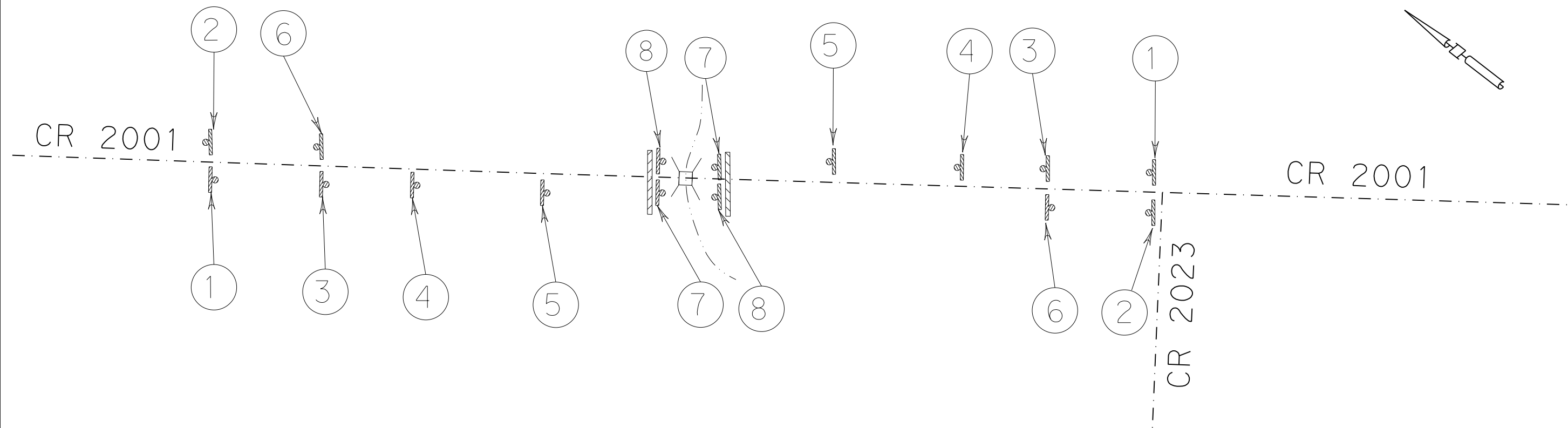


CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		6

OK
 DW:
 OK
 ENK

DATE: 11/6/2021 10:19:36 PM
 FILE: D:\cr2001\TRAFFIC CONTROL PLAN.dgn

DWG: CK: CK: CK:



GENERAL NOTES:

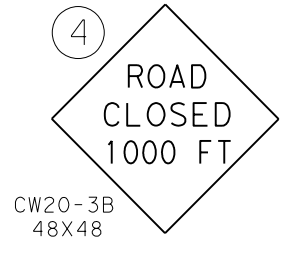
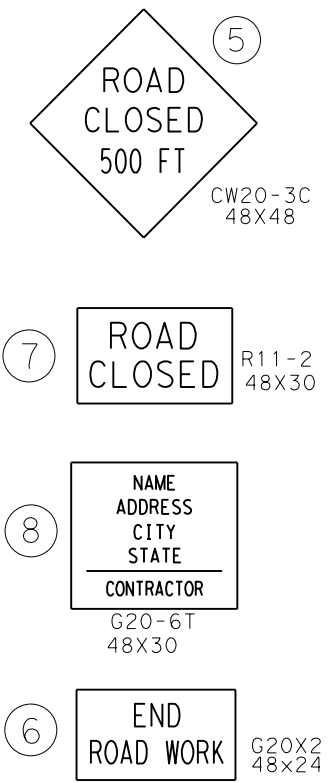
SIGNS SHALL BE PLACED IN ACCORDANCE WITH THE BARRICADE AND CONSTRUCTION STANDARDS OR AS DIRECTED BY THE ENGINEER.

OTHER SIGNS AS DETAILED IN THE BARRICADE AND CONSTRUCTION STANDARDS AND IN THE MUTCD 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."

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

SEQUENCE OF WORK

- 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 NOT 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.



LEGEND

SIGN AND SIGN SUPPORT

TYPE III BARRICADE

NTS



04/02/2022

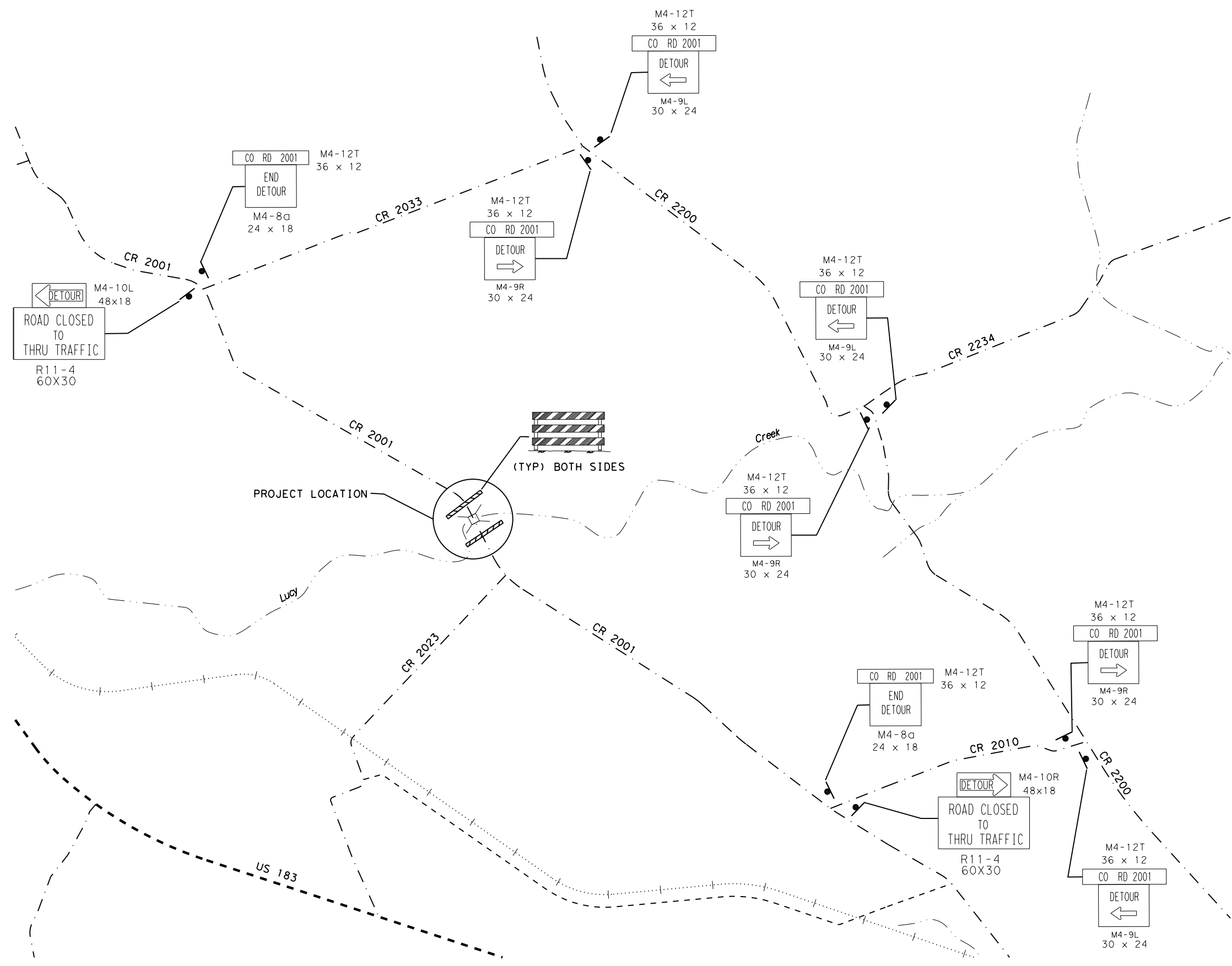
**CR 2001
 TCP
 0923-10-020**



CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		7

DATE: 11/6/2021 10:19:53 PM
 FILE: D:\gr2001\TRAFFIC CONTROL PLAN.dgn

DWG: CKC
 CKC
 DNS



LEGEND

- SIGN AND SIGN SUPPORT
- TYPE III BARRICADE

GENERAL NOTES

SIGNS SHALL BE PLACED IN ACCORDANCE WITH THE BARRICADE AND CONSTRUCTION STANDARDS OR AS DIRECTED BY THE ENGINEER.

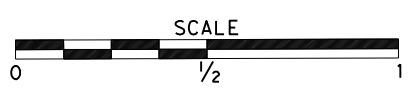
OTHER SIGNS AS DETAILED IN THE BARRICADE AND CONSTRUCTION STANDARDS AND IN THE TMUTCD MAY BE USED AS REQUIRED BY THE ENGINEER.

DETOUR LENGTH = 7.00 MI



04/02/2022

**CR 2001
 TCP
 0923-10-020**



© 2022
 Texas Department of Transportation
 SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		8

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:34:03 PM
 FILE: D:\PR33\standard-ds\BC(1)-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:


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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

- Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
- Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

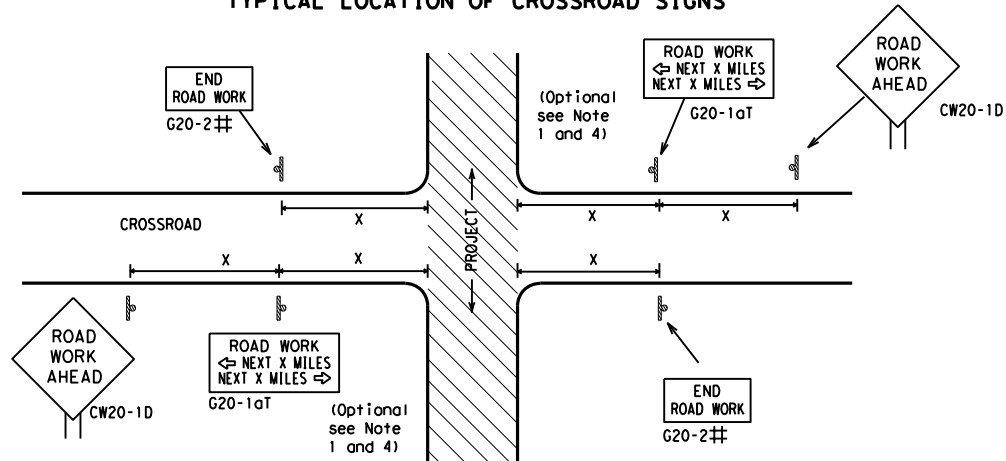
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC (1) - 21			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CK:	TxDOT
		DW:	TxDOT
		CR:	TxDOT
REVISIONS		CONT	SECT
4-03	7-13	0923	10
9-07	8-14		020
5-10	5-21		CR 2001
		DIST	COUNTY
		BWD	LAMPASAS
			SHEET NO.
			9

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

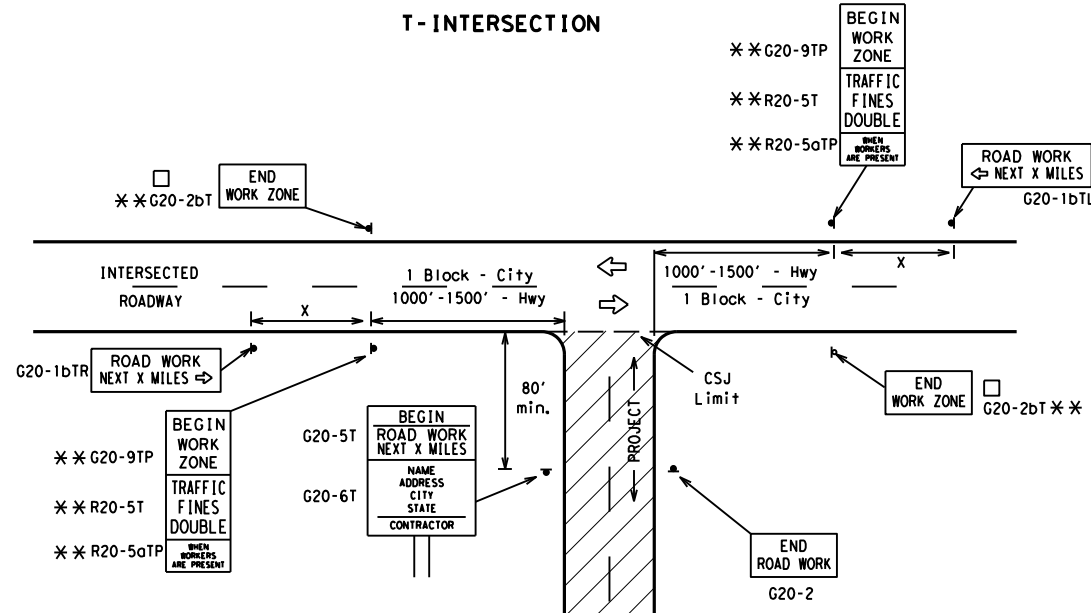
TYPICAL LOCATION OF CROSSROAD SIGNS



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

- 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.
- 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.
- 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.
- 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.
- Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
- 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

- 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.
- If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

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

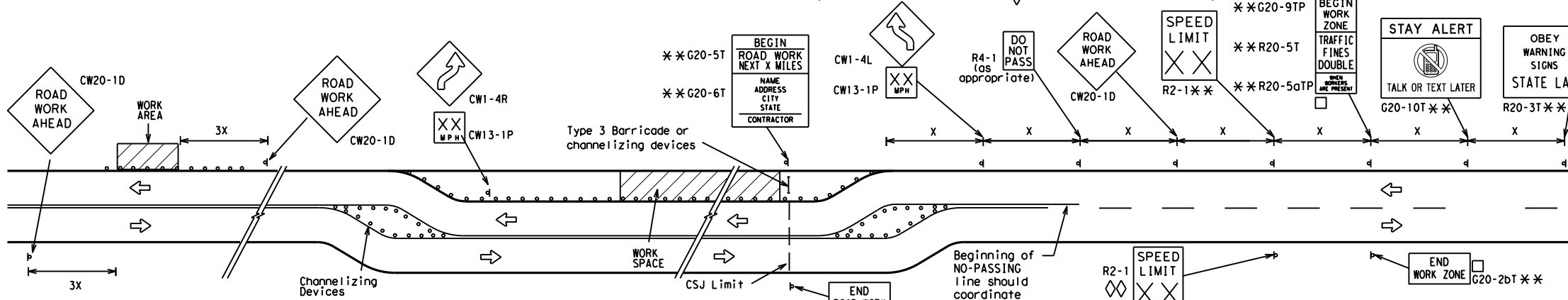
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

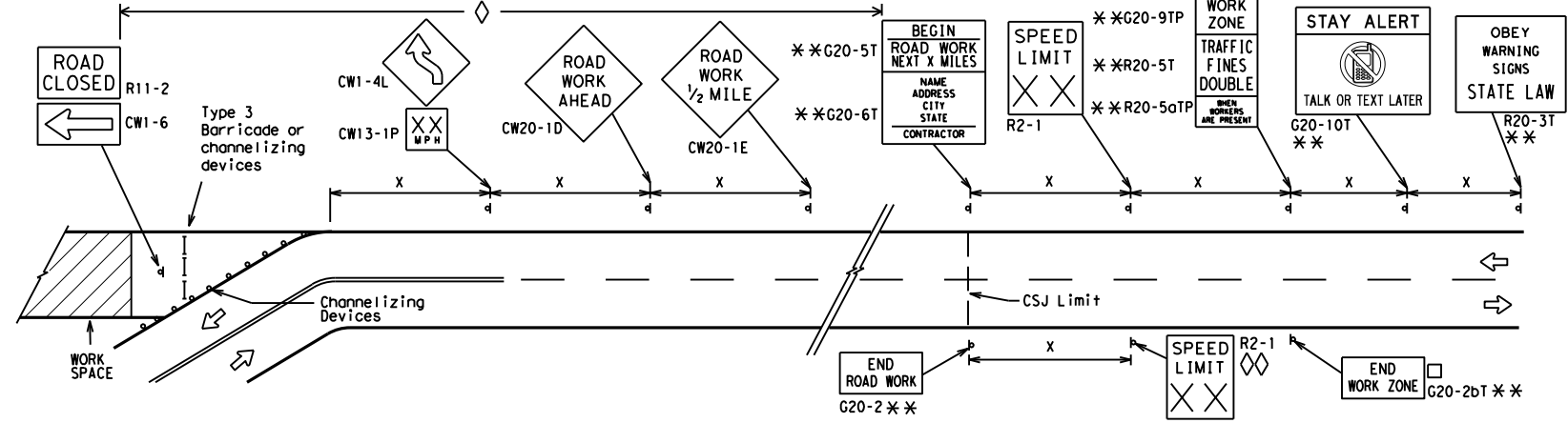
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	BWD	LAMPASAS	10	

DATE: 11/6/2021 1:34:49 PM
 FILE: D:\PR33\standard\BC(1)-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:35:01 PM
FILE: D:\PR33\standard\BC(1)-21.dgn

SHEET 3 OF 12



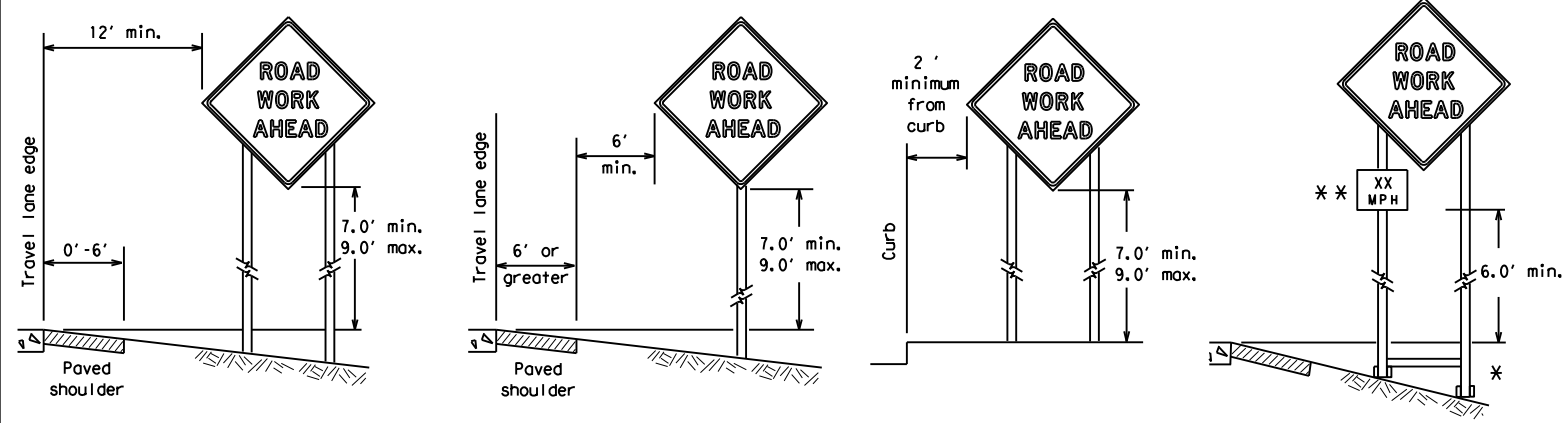
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

FILE:	bc-21.dgn	DW:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0923	10	020	CR 2001				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	BWD	LAMPASAS	11					

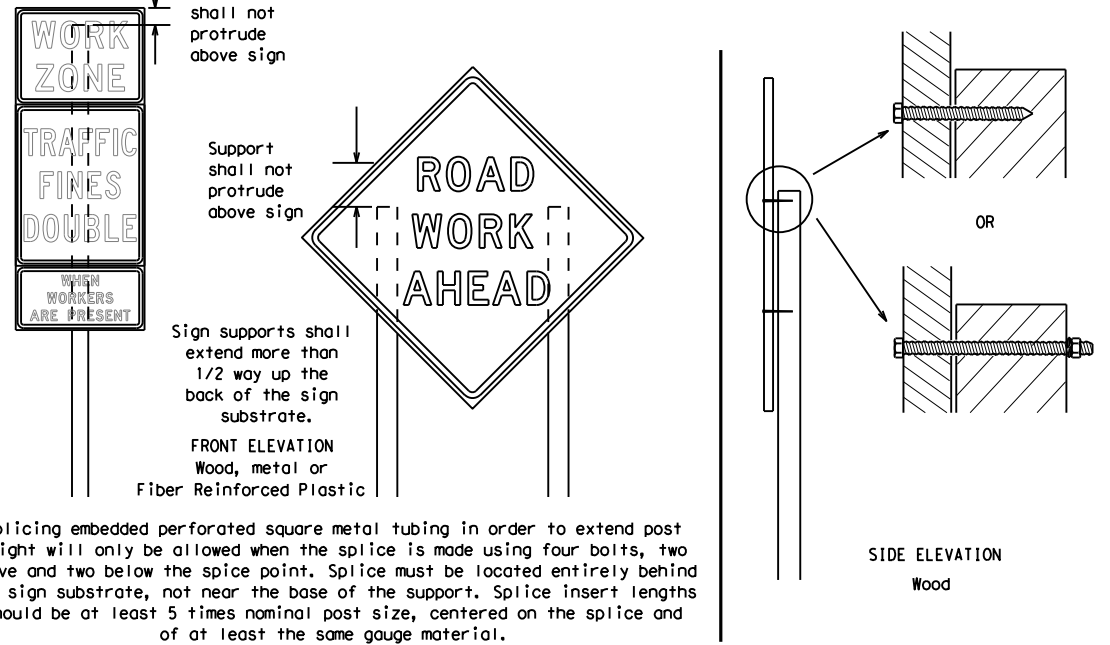
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.
 ** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



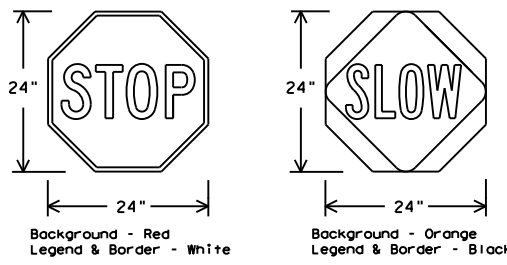
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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 CWZTC 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.
- 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

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTC) 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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 CWZTC lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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 CWZTC list.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

SHEET 4 OF 12



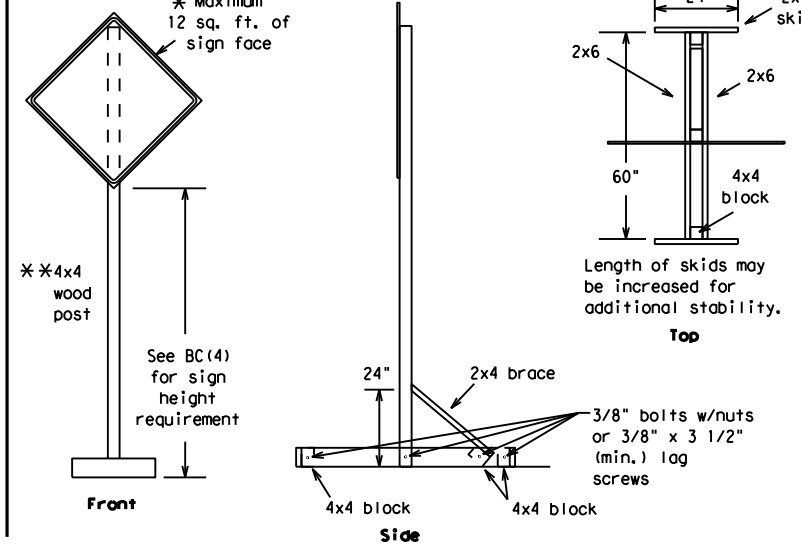
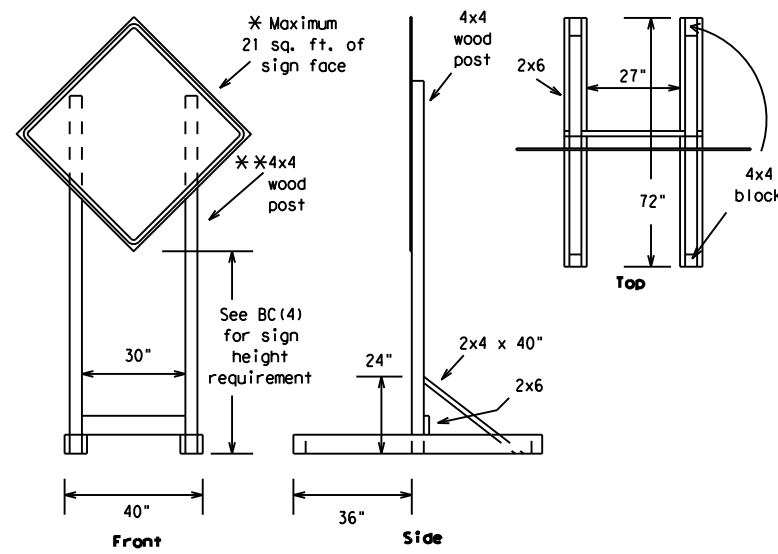
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0923	10	020	CR	2001			
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	BWD	LAMPASAS	12					

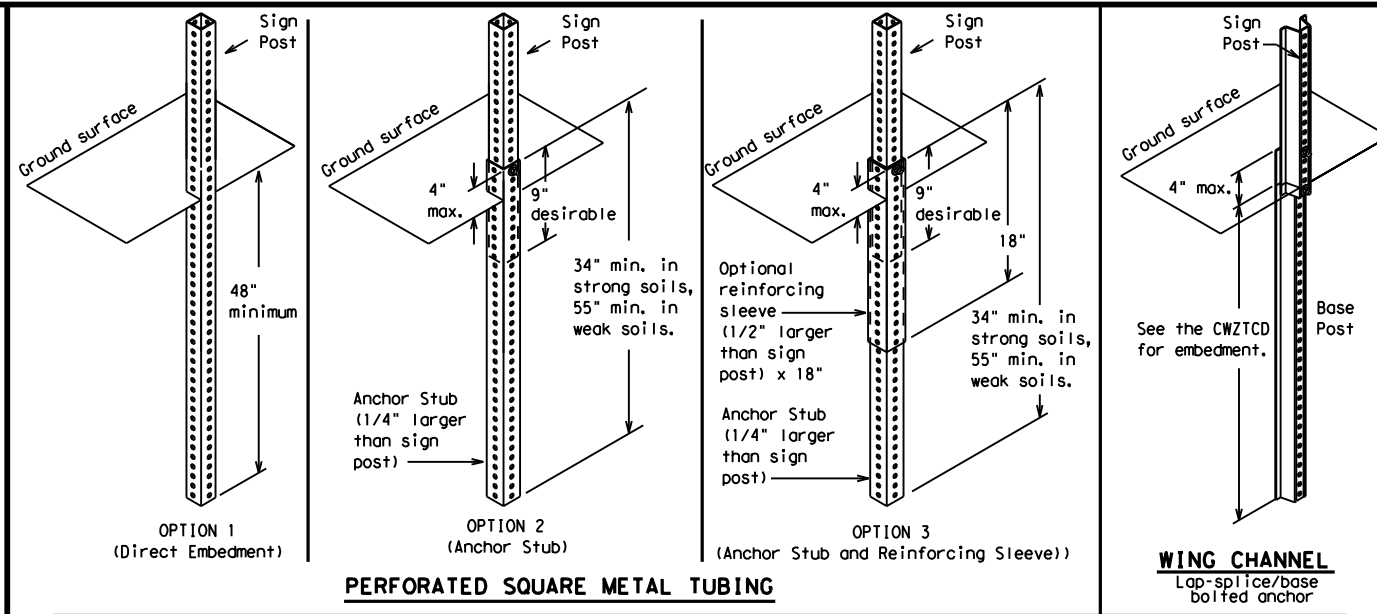
DATE: 11/6/2021 1:35:23 PM
 FILE: D:\NPR33\standard\BC(1)-21.dgn

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



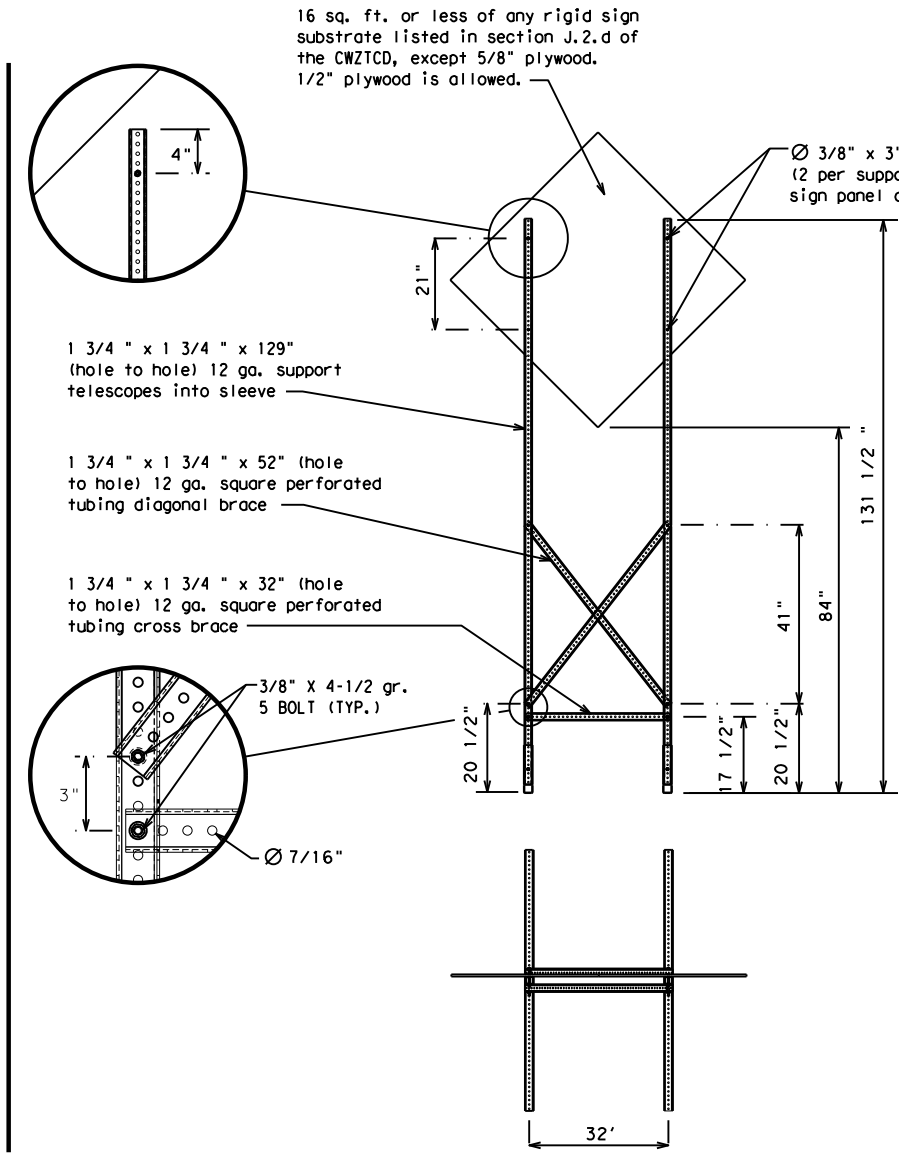
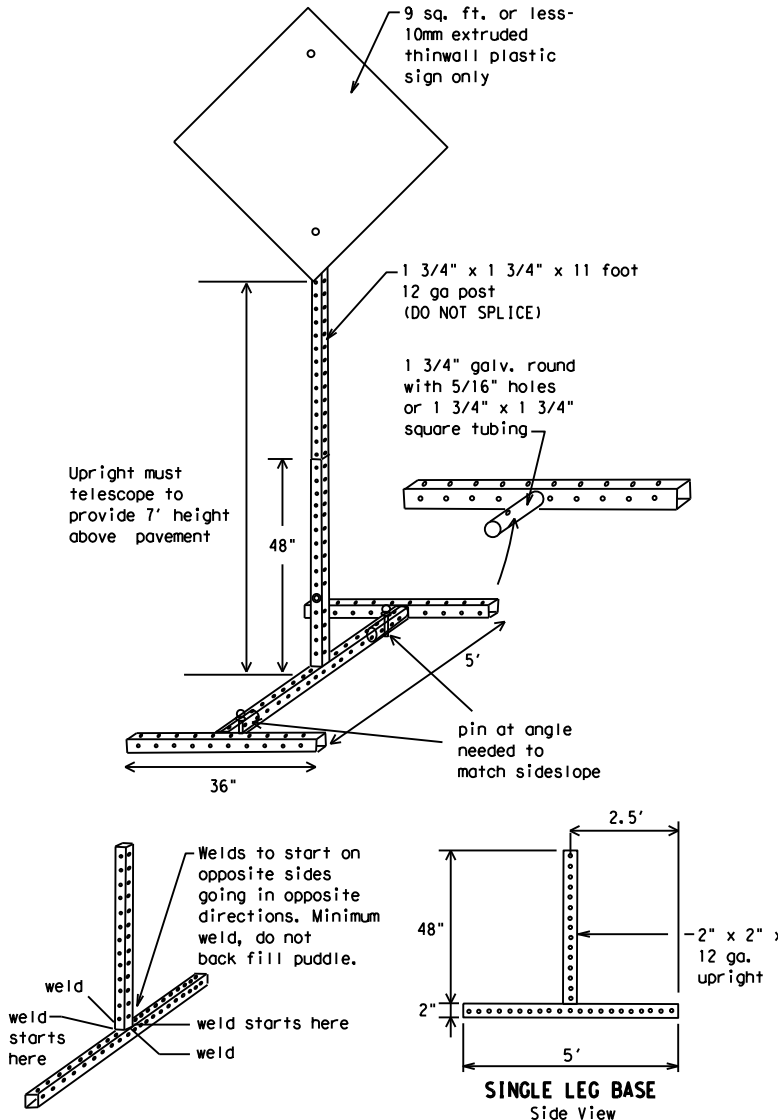
SKID MOUNTED WOOD SIGN SUPPORTS

* 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

- 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.
- No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- 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.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CR:	TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS	0923	10	020	CR	2001				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	BWD	LAMPASAS	13					

DATE: 11/6/2021 1:36:35 PM
FILE: D:\PR33\standards\BC(1)-21.dgn

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
PREPARE TO STOP
END SHOULDER USE
WATCH FOR WORKERS

Location List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:36:49 PM
FILE: D:\PR33\standards\BC(1)-21.dgn

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Hour(s)	HR, HRS	Time Minutes	TIME MIN
Information	INFO	Upper Level	UPR LEVEL
It Is	ITS	Vehicles (s)	VEH, VEHS
Junction	JCT	Warning	WARN
Left	LFT	Wednesday	WED
Left Lane	LFT LN	Weight Limit	WT LIMIT
Lane Closed	LN CLOSED	West	W
Lower Level	LWR LEVEL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

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



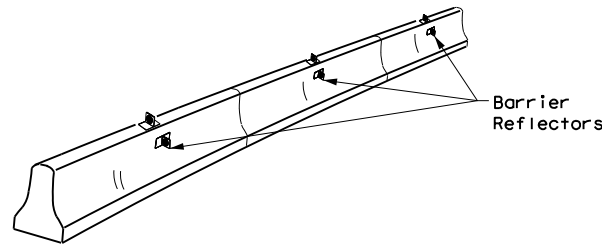
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	BWD	LAMPASAS	14	

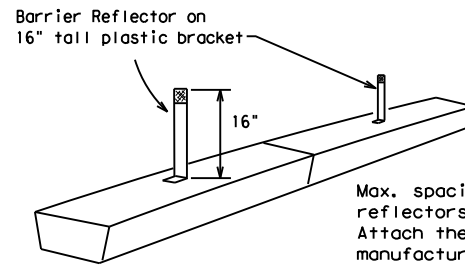
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

- 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).
- 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)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

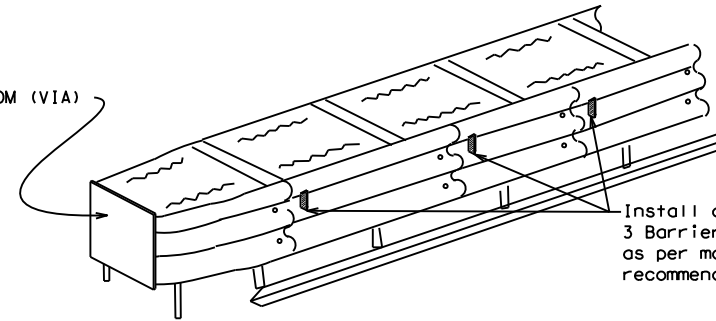


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

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 appropriate 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

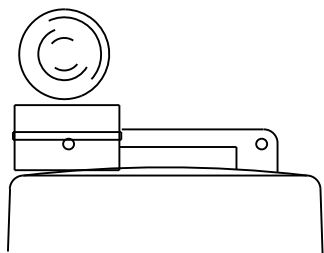
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

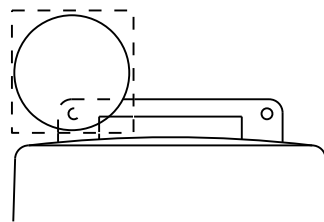
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

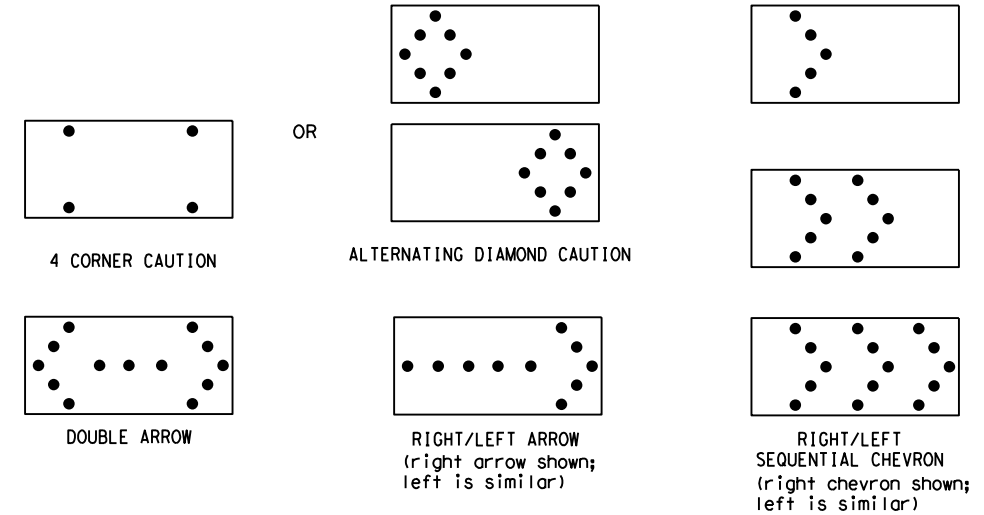


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

DATE: 11/6/2021 1:37:08 PM
 FILE: D:\NPR33\standard\BC(1)-21.dgn

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.



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

BC (7) -21

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0923	10	020	CR 2001				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	BWD	LAMPASAS	15					

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:37:29 PM
 FILE: D:\PR33\standard\BC(1)-21.dgn

GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

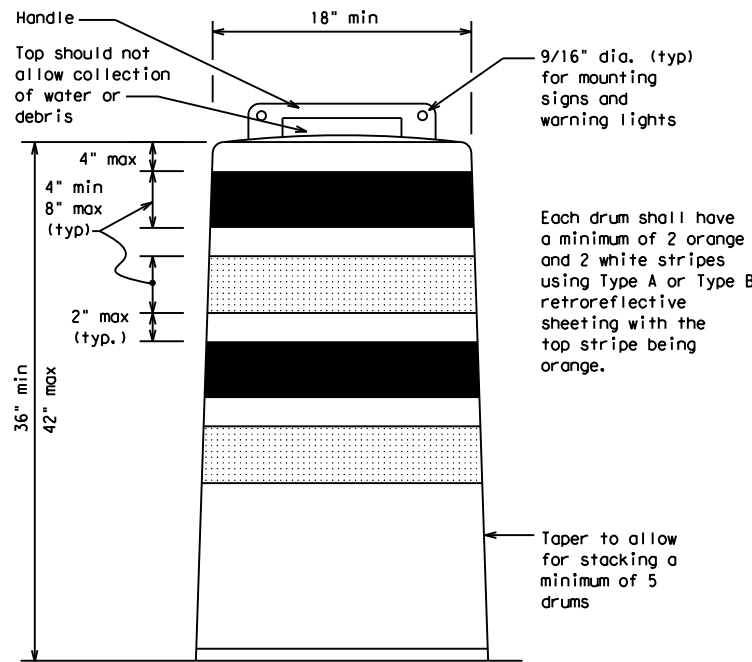
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

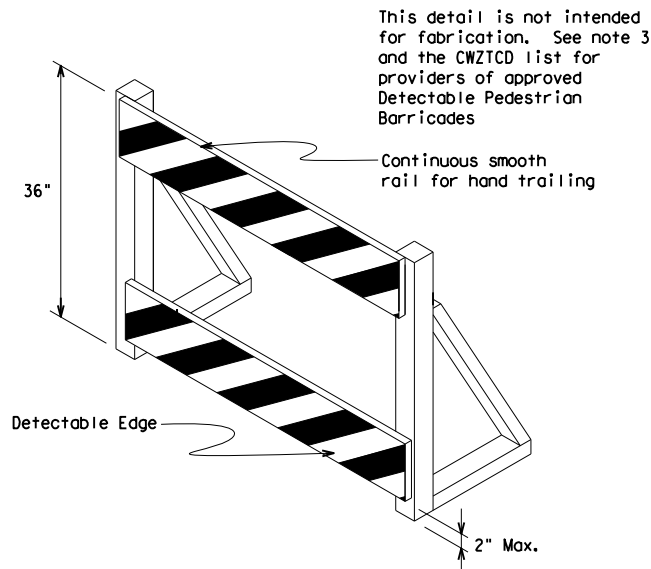
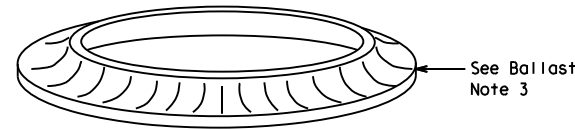
- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall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

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



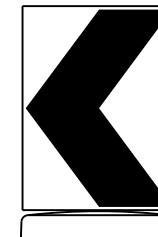
Each drum shall have a minimum of 2 orange and 2 white stripes using Type A or Type B retroreflective sheeting with the top stripe being orange.



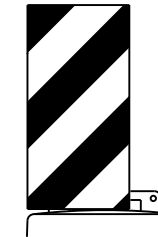
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.

SHEET 8 OF 12

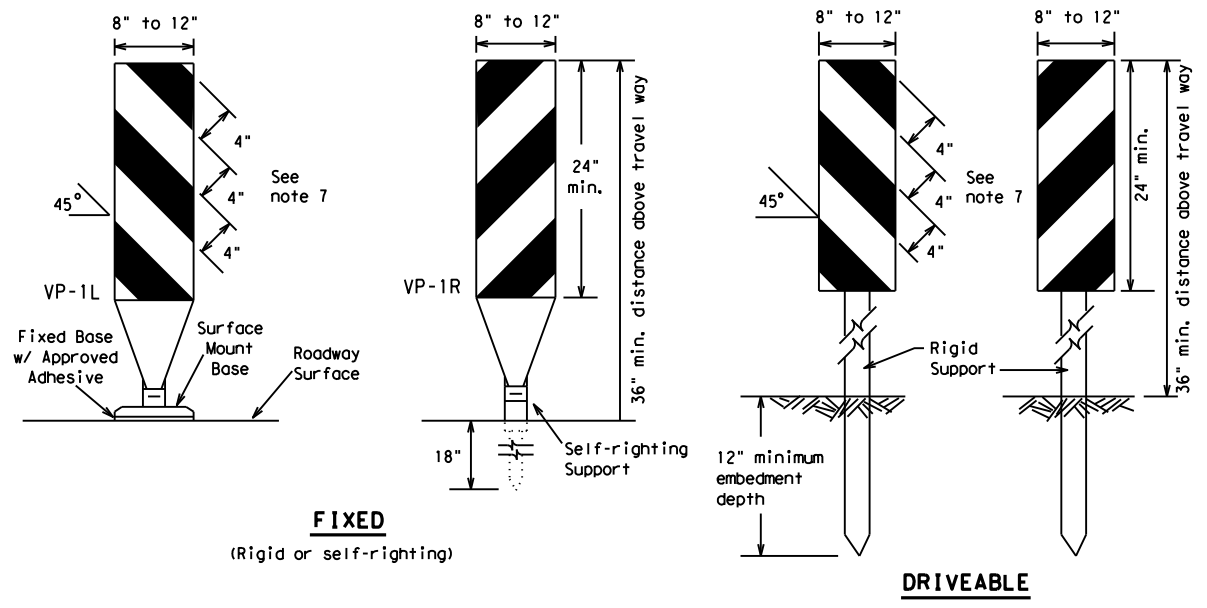


BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

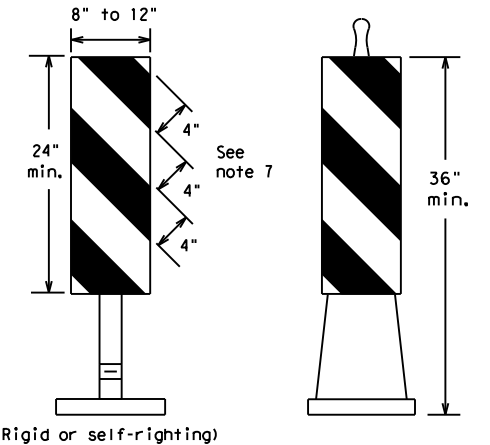
FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
4-03 8-14	DIST	COUNTY	SHEET NO.	
9-07 5-21	BWD	LAMPASAS	16	
7-13				

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



FIXED
(Rigid or self-righting)

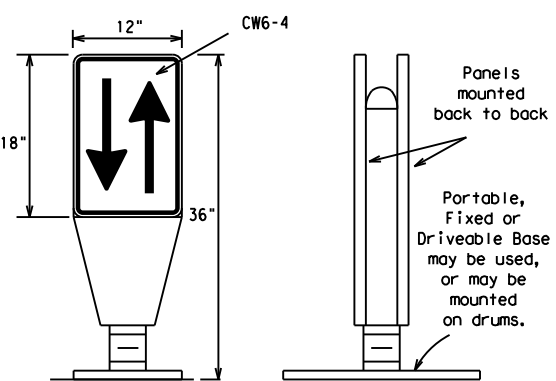
DRIVEABLE



PORTABLE

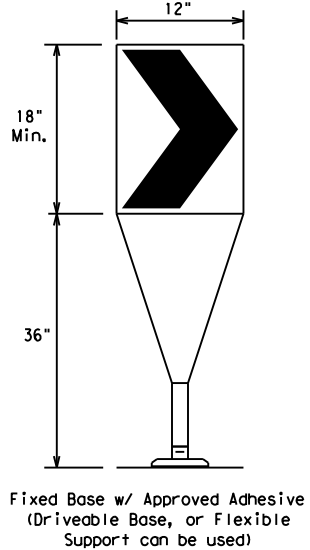
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

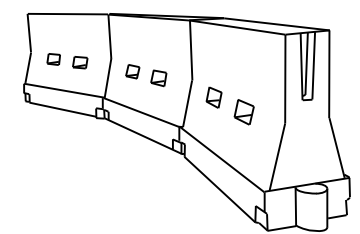
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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



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

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- 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.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- 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.
- 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = 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



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		0923	10	020	CR	2001			
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	BWD	LAMPASAS		17				

DATE: 11/6/2021 1:37:54 PM
FILE: D:\PR33\standards\BC(1)-21.dgn

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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.

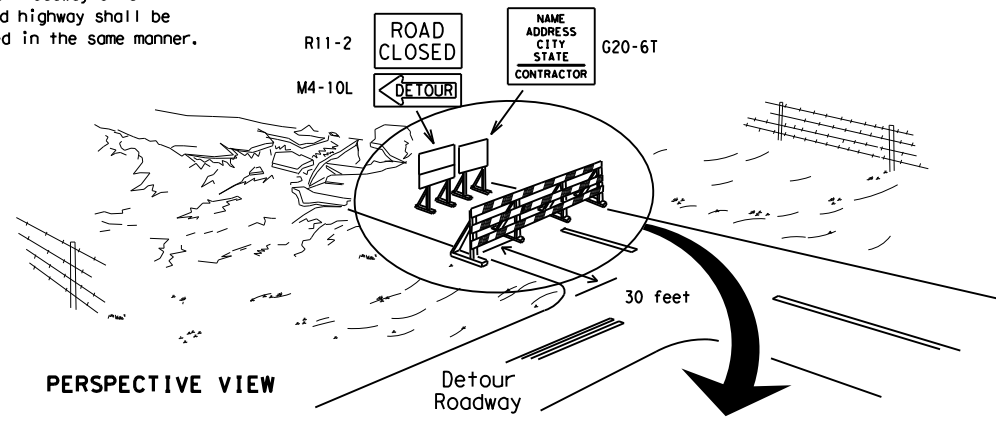


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



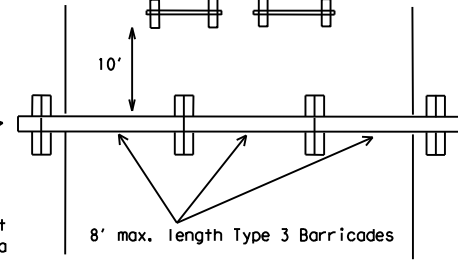
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

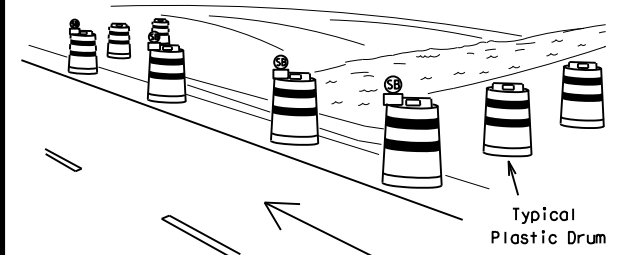
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



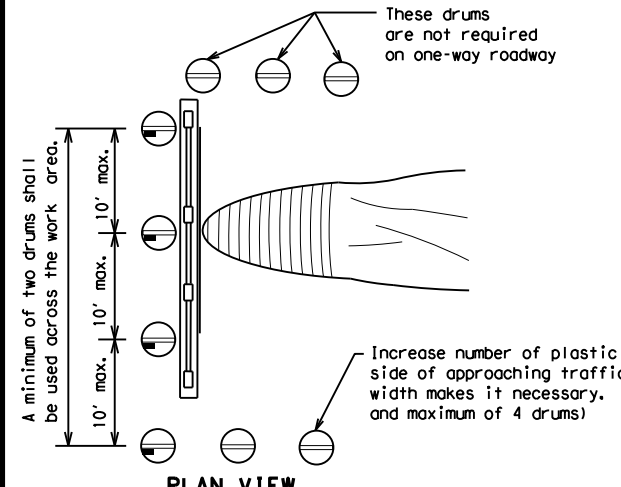
PLAN VIEW

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

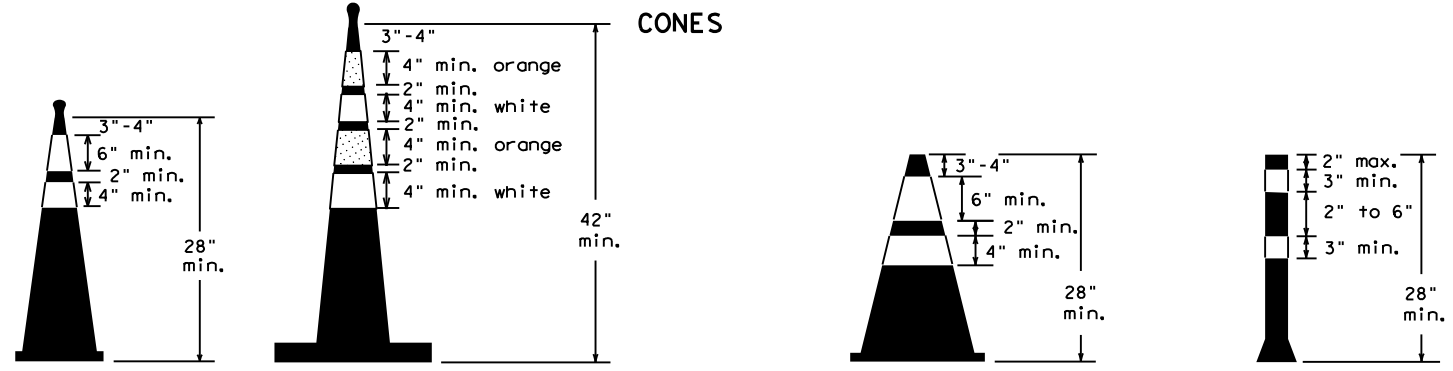


PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

1. Where positive redirection 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.



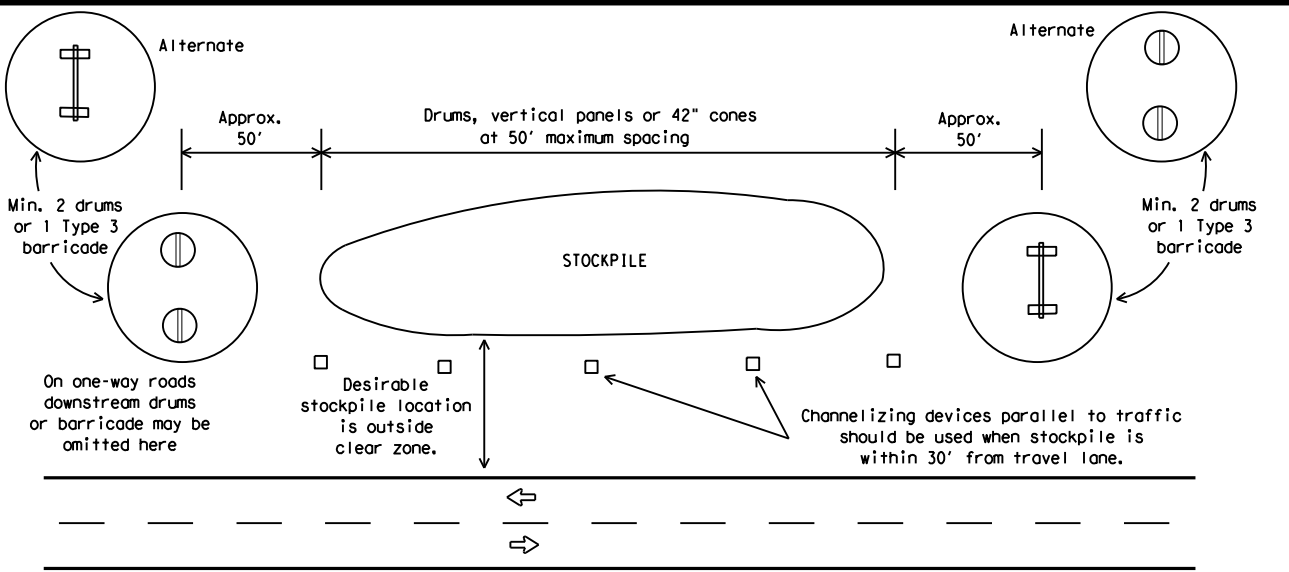
Two-Piece cones

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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	BWD	LAMPASAS	18	

DATE: 11/6/2021 1:38:06 PM
 FILE: D:\NPR33\standards\BC(10)-21.dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

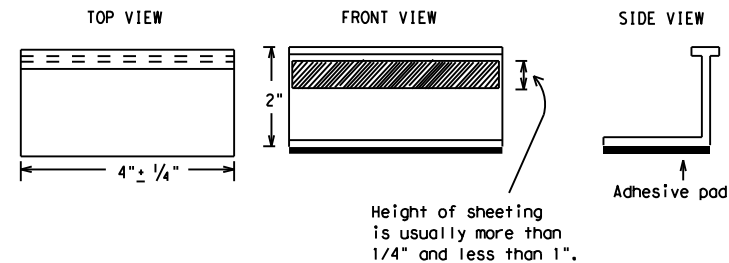
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	BWD	LAMPASAS	19	
11-02 8-14				

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:38:18 PM
FILE: D:\PR33\standard\ds\BC(11)-21.dgn

PAVEMENT MARKING PATTERNS



REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



REFLECTORIZED PAVEMENT MARKINGS - 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.



RAISED PAVEMENT MARKERS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN B

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



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



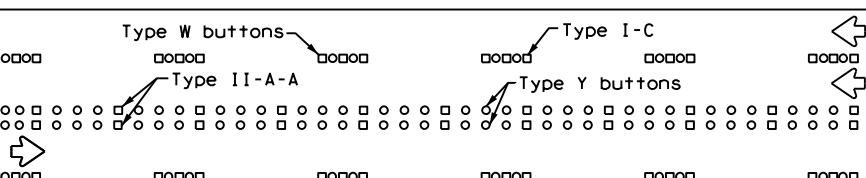
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



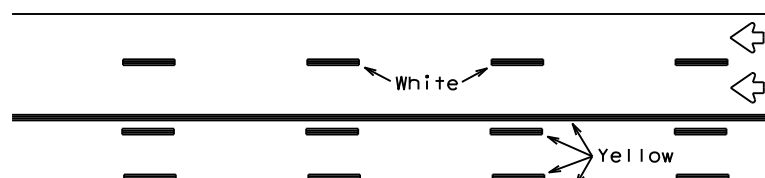
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



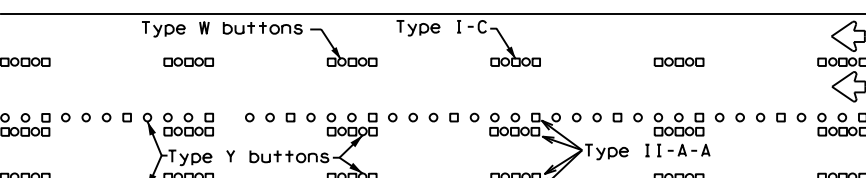
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



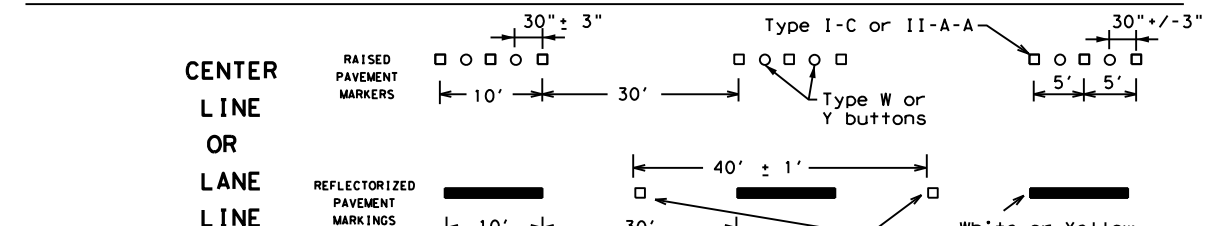
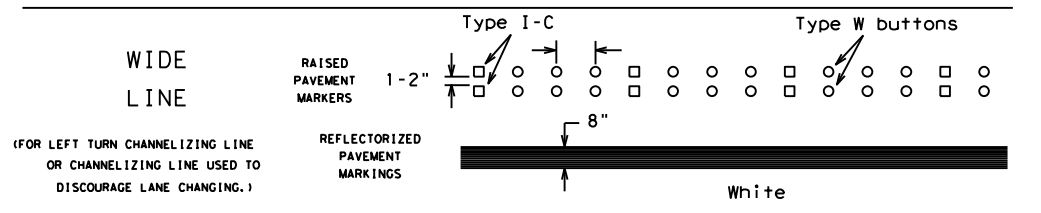
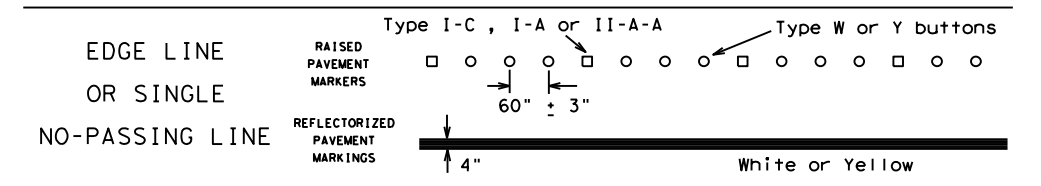
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

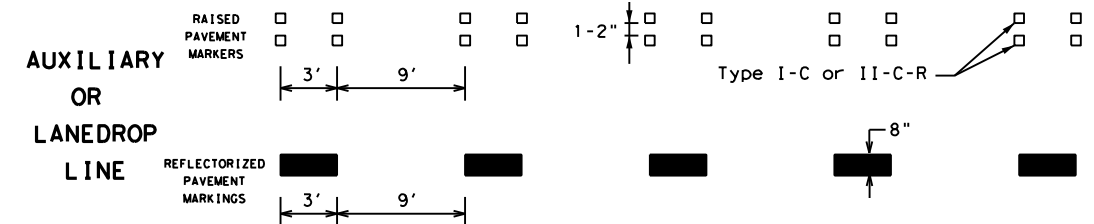
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

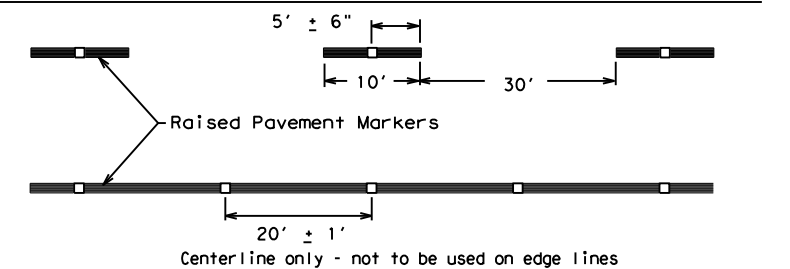


BROKEN LINES



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	BWD	LAMPASAS	20	
11-02 8-14				

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."

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TXDOT for any purpose whatsoever. TXDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 11/6/2021 1:38:42 PM
FILE: D:\PR33\standards\BC(12)-21.dgn

100 6002 PREP ROW

STATION	STA
8+00.00 TO 12+00.00	4.0
TOTAL	4.0

496 6009 REMOV (BRIDGE 0-99 FT LENGTH)

STATION	EA
10+00	1.0
TOTAL	1.0

540 6002 MTL W-BEAM GD FEN

LOCATION	LF
APPROACH RT	25
DEPARTURE LT	25
APPROACH LT	25
DEPARTURE RT	25
TOTAL	100

540 6007 MTL BEAM GD FEN TRANS (TL2)

LOCATION	EACH
APPROACH RT	1
DEPARTURE LT	1
APPROACH LT	1
DEPARTURE RT	1
TOTAL	4

544 6001 GUARDRAIL END TREATMENT (INSTALL)

LOCATION	EACH
APPROACH RT	1
DEPARTURE LT	1
APPROACH LT	1
DEPARTURE RT	1
TOTAL	4

552 6001 WIRE FENCE (TY A)

STATION	LF
8+00.00 LT TO 12+00.00 LT	402
TOTAL	402

PLACE WIRE FENCE AS DIRECTED BY THE ENGINEER. WIRE FENCE (TY A) IS TO BE USED FOR TEMPORARY FENCE AND QUANTITIES ARE APPROXIMATE AND MAY BE ADJUSTED. WILL REQUIRE APPROXIMATELY 4 CORNERS.

552 6004 WIRE FENCE (TY D)

STATION	LF
8+00.00 LT TO 8+50.00 LT	50
8+50.00 LT TO 9+40.00 LT	90
10+54.00 LT TO 11+50.00 LT	96
11+50.00 LT TO 12+00.00 LT	50
TOTAL	286

QUANTITIES ARE APPROXIMATE AND MAY BE ADJUSTED. PLACE WIRE FENCE AS DIRECTED BY THE ENGINEER. WILL REQUIRE APPROXIMATELY 6 CORNERS.

552 6008 WIRE FENCE (WATER GAP)

STATION	LF
9+40 LT TO 10+54 LT	114
TOTAL	114

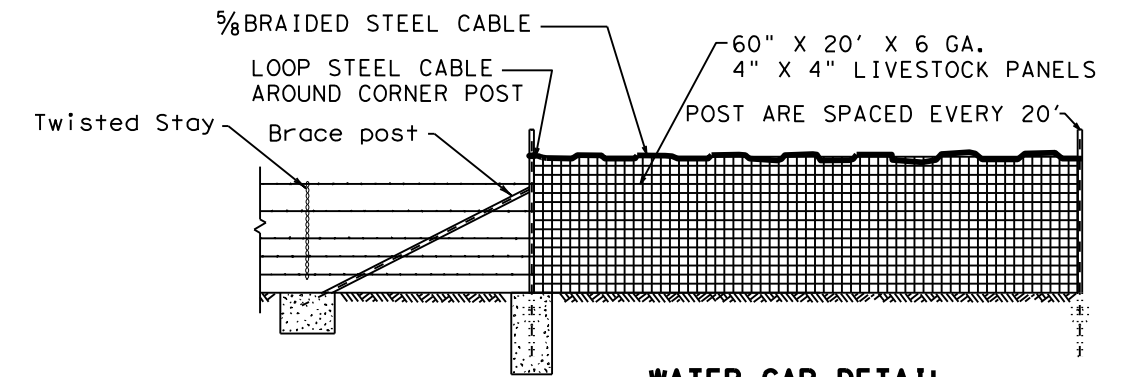
INSTALL WATER GAP AS SHOWN OR AS DIRECTED BY THE ENGINEER.

658 6014 INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)

LOCATION	EACH
T223 RAIL RT	3
T223 RAIL LT	3
TOTAL	6

658 6062 INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)

LOCATION	EACH
APPROACH RT	3
DEPARTURE LT	3
APPROACH LT	3
DEPARTURE RT	3
TOTAL	12



WATER GAP DETAIL



JH Scantling, P.E.




**CR 2001
ROADWAY
QUANTITIES
0923-10-020**



04/02/2022

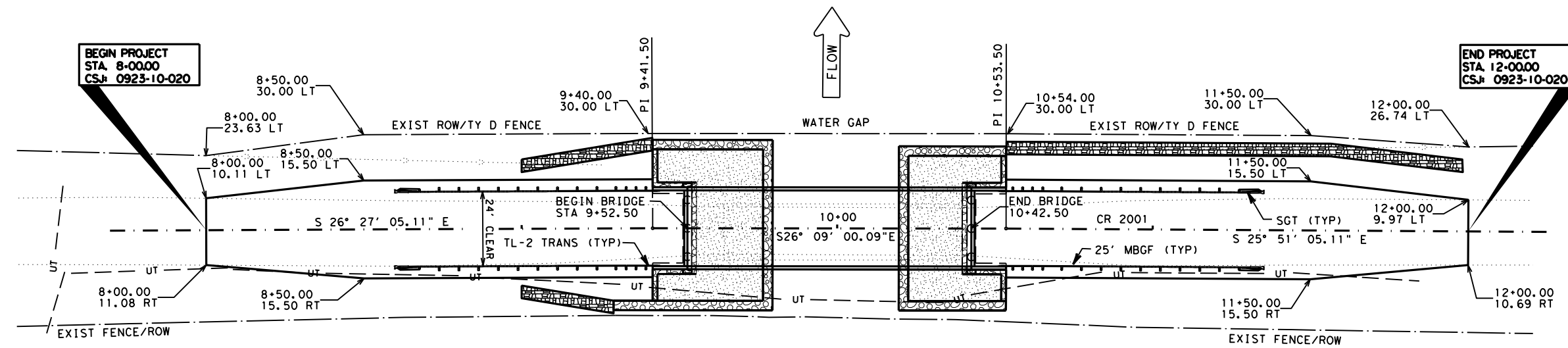
CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	21	

NOTE: UTILITY LOCATIONS ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION.

-  GABION BASKETS
-  GABION MATTRESSES
-  12" STONE PROTECTION



DPK
 DWG
 CKC



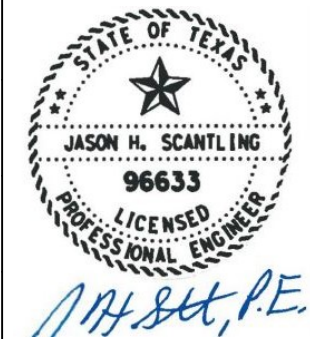
PROPOSED STRUCTURE
 STA 9+52.50 - 10+42.50
 1 SPAN (90') TY B34
 PRESTRESSED CONCRETE BOX BEAMS

EXISTING STRUCTURE
 3 Simple Span
 (1 - Steel Stringer & 2 - Timber Stringer)
 Bridge on Steel Bents
 75' IN TOTAL LENGTH

SUPER TABLE	LT	RT
STA 8+50.00	MATCH EXISTING	
STA 11+50.00	-2.0%	-2.0%
STA 12+00.00	MATCH EXISTING	

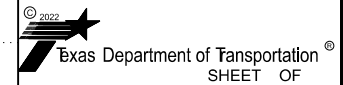
		SHEET TOTALS				EST.	FINAL	UNIT	DESCRIPTION
		128	21	8	47	204		CY	110 6001 EXCAV (RDWY)
		0	58	58	0	116		CY	110 6002 EXCAV (CHANNEL)
		4	35	35	24	98		CY	132 6005 EMBANK (TYC, OC)

SCALE
 HORIZ: 1" = 40'
 VERT: 1" = 40'



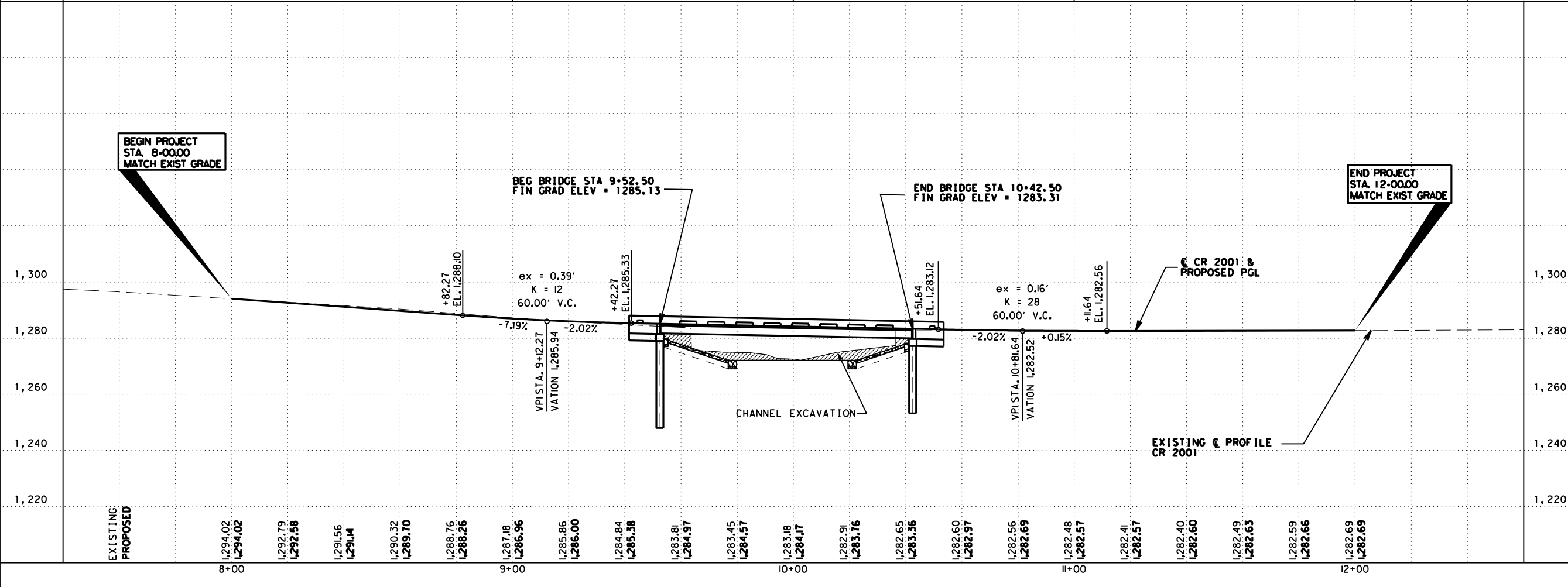
04/02/2022

CR 2001
 PLAN & PROFILE
 0923-10-020



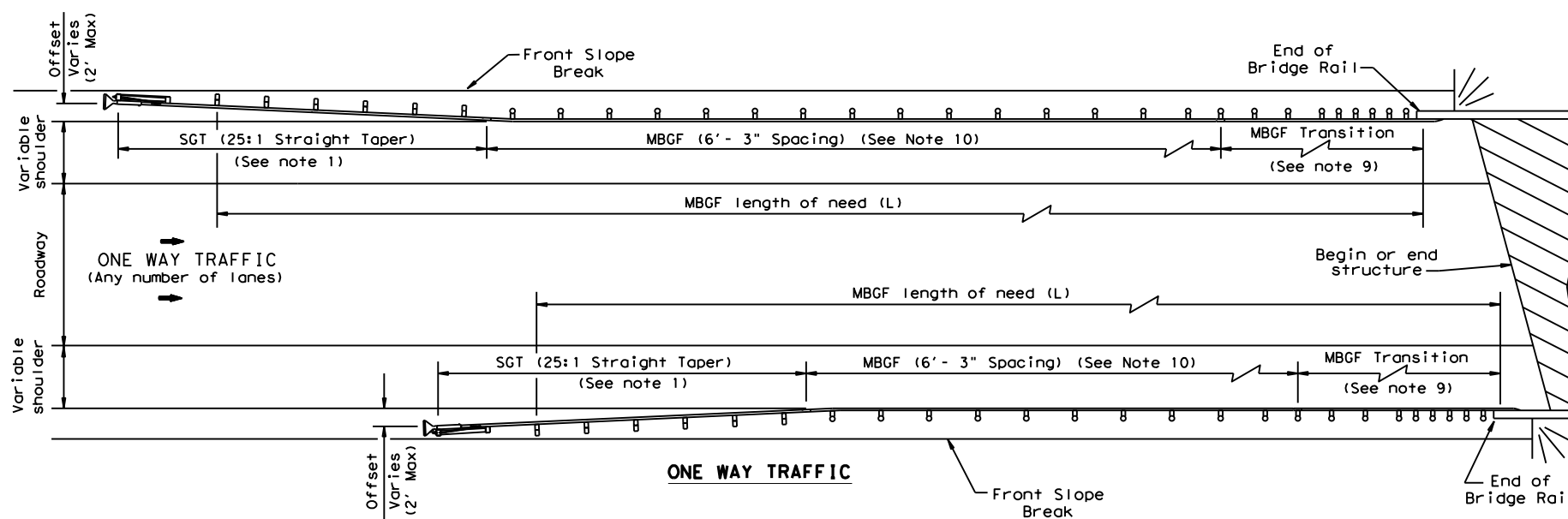
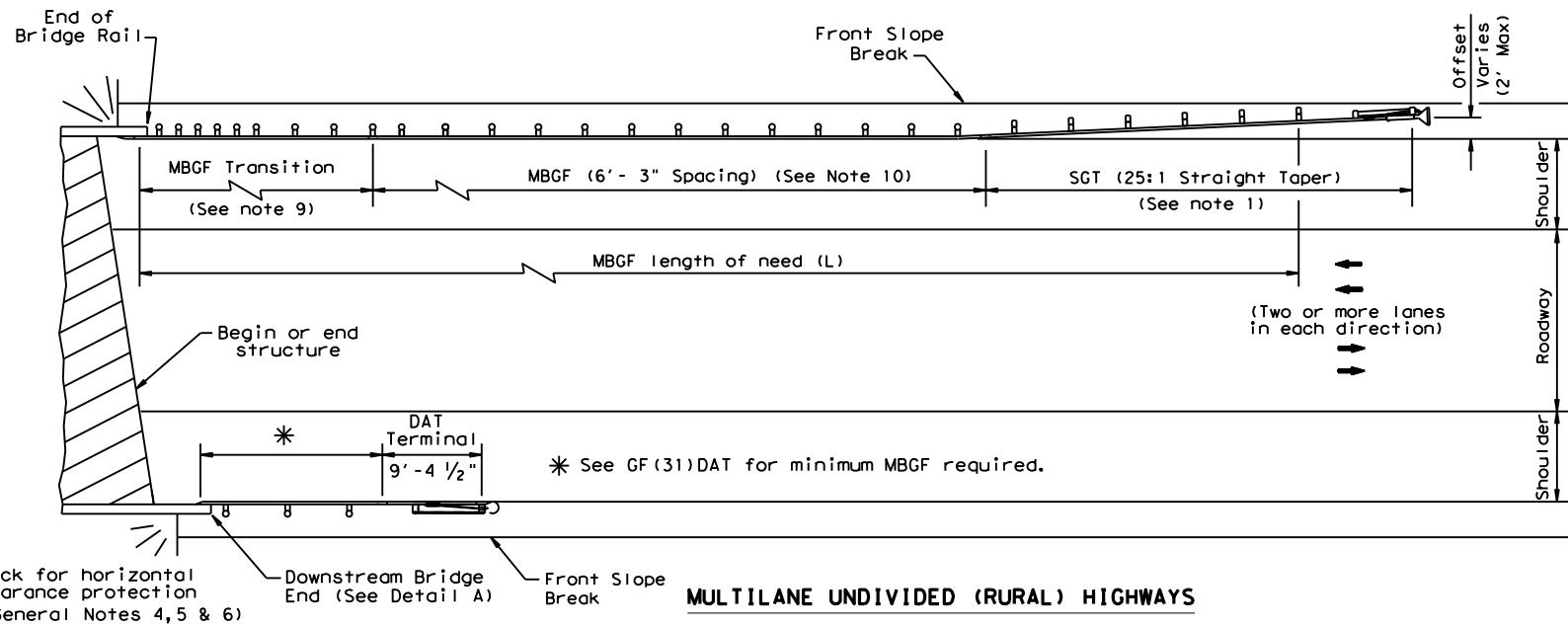
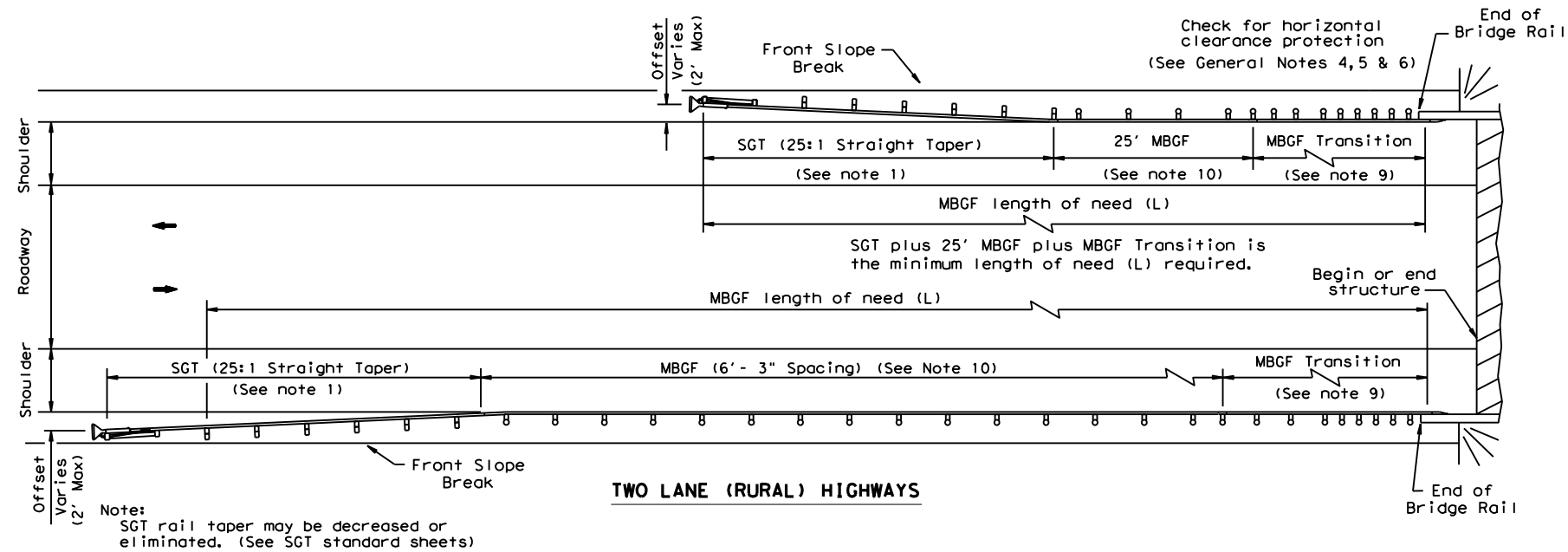
CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	22	

DATE: 2/24/2022 7:56:30 AM
 FILE: D:\cr2001\plan.dgn



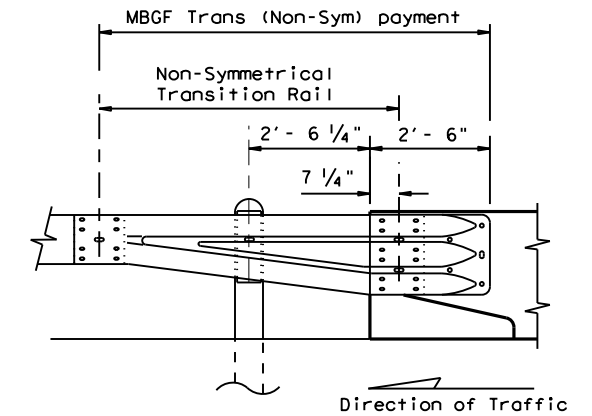
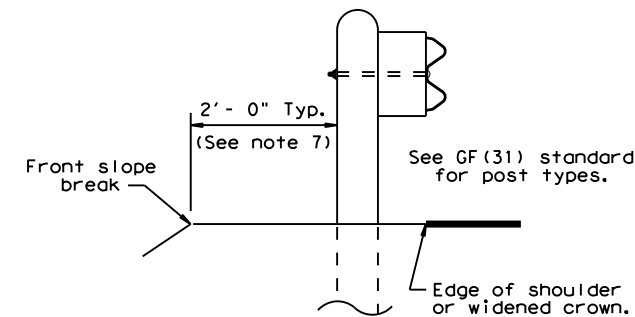
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:02:20 PM
 FILE: D:\cr2001\STANDARDS\bed14.dgn



GENERAL NOTES

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

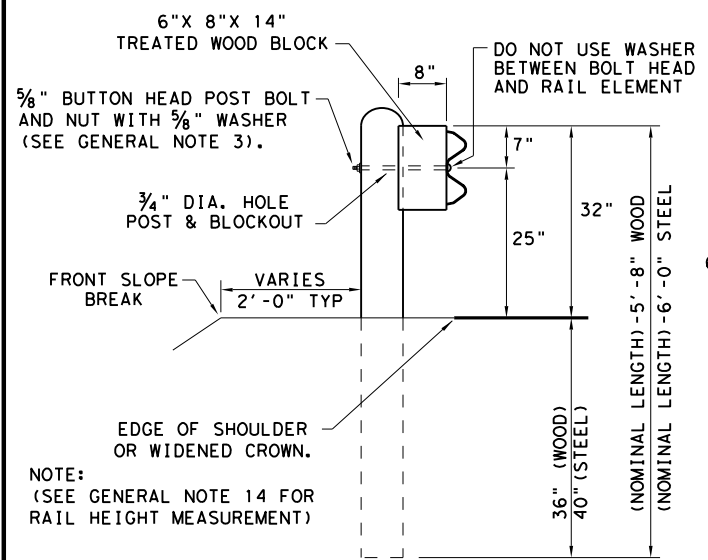


Note: All rail elements shall be lapped in the direction of adjacent traffic.

		Design Division Standard	
BRIDGE END DETAILS (METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)			
BED-14			
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP
© TxDOT: December 2011	CONT	SECT	JOB
REVISIONS	0923	10	020
REVISED APRIL 2014	DIST	COUNTY	CITY
SEE (MEMO 0414)	BWD	LAMPASAS	CR 2001
			SHEET NO.
			23

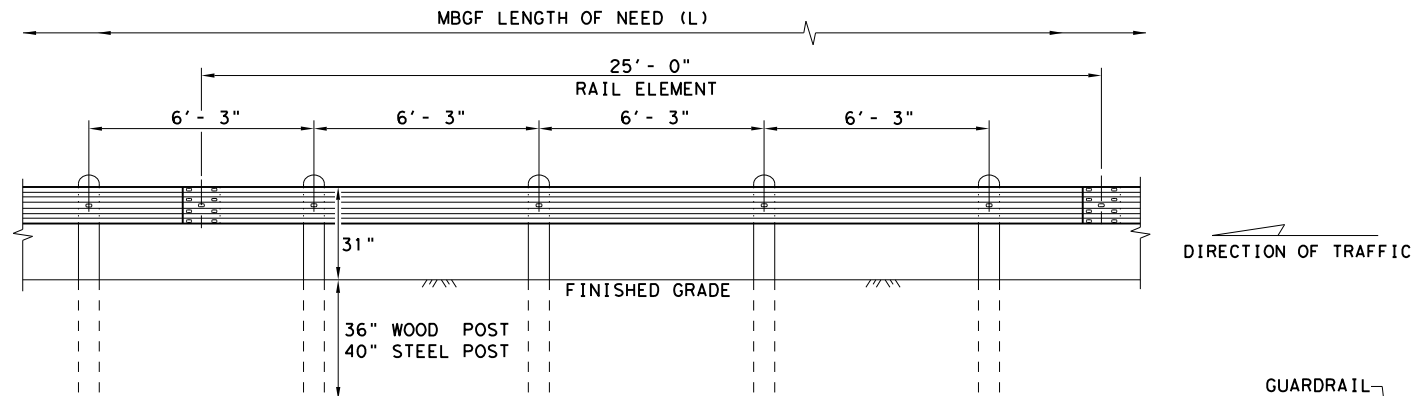
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 12/5/2021
FILE: D:\vgr2001\STANDARDS\gf3119.dgn



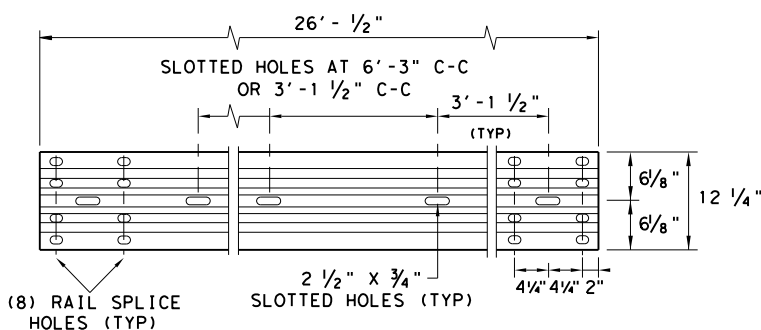
TYPICAL POST PLACEMENT

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



ELEVATION MID-SPAN RAIL SPLICE

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



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

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

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

SPLICE BOLT LENGTH VARIES

FBB01 = 1 1/4"

FBB02 = 2"

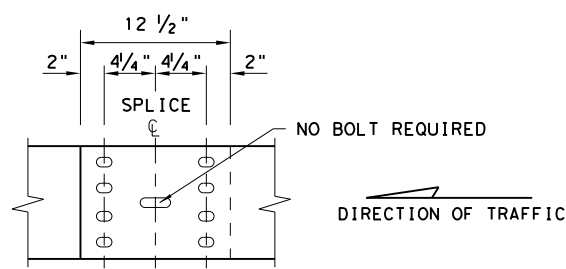
POST & BLOCK LENGTH

FBB03 = 10"

FBB04 = 18"

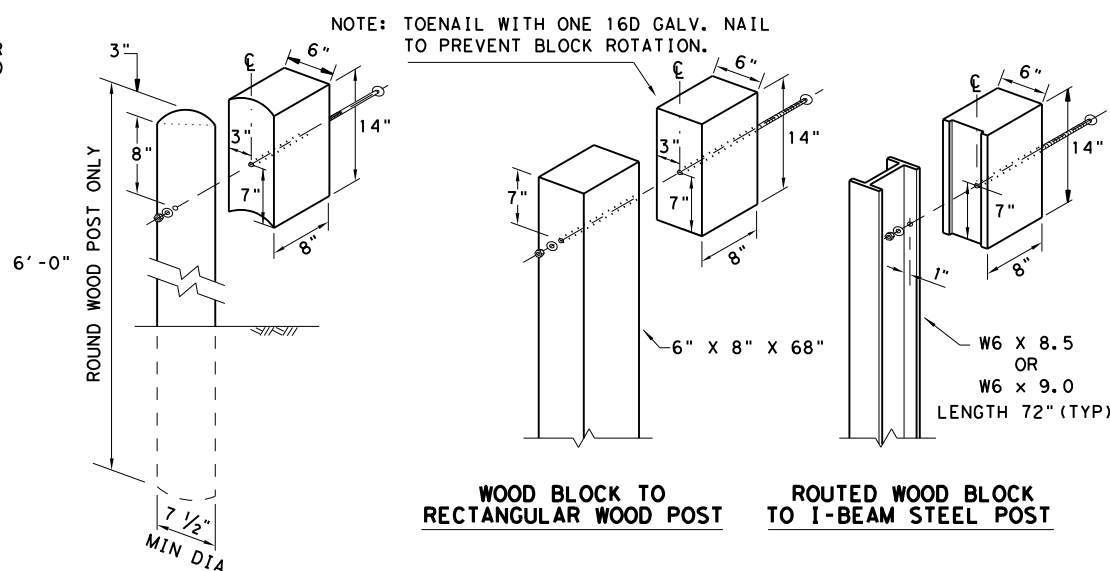
BUTTON HEAD BOLT

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.

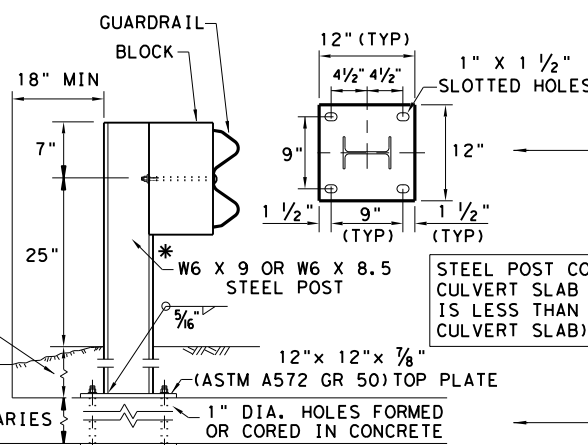


WOOD BLOCK TO RECTANGULAR WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

WOOD BLOCK TO ROUND WOOD POST

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



LOW FILL CULVERT POST

12" x 12" x 1/4" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" 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 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

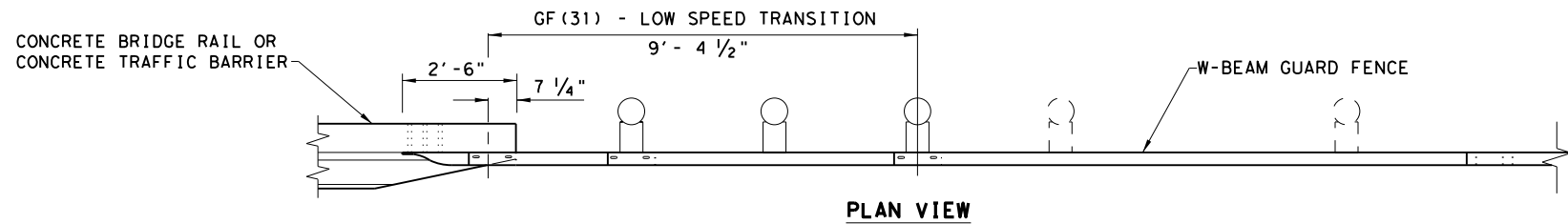
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" 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 3/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

NOTE: TRANSITIONS 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.

				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			0923	10	020
DIST	COUNTY				SHEET NO.
BWD	LAMPASAS				24

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

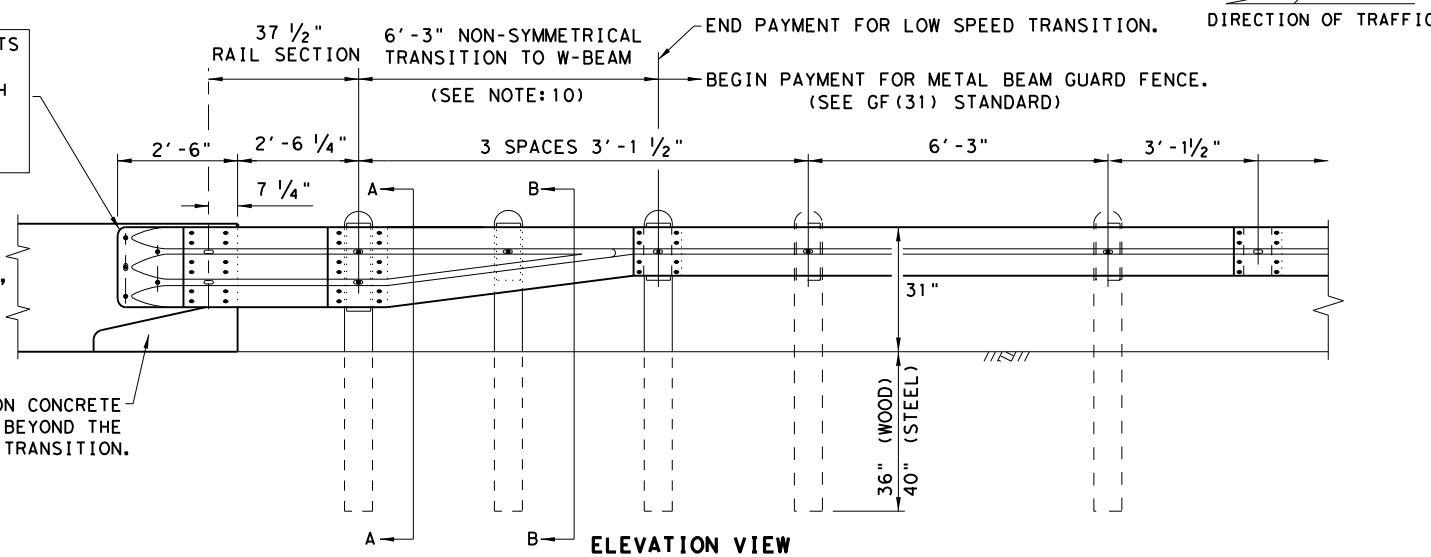
DATE: 12/5/2021 6:14:02 PM
FILE: D:\sgr2001\STANDARDS\gf31tr+1219.dgn



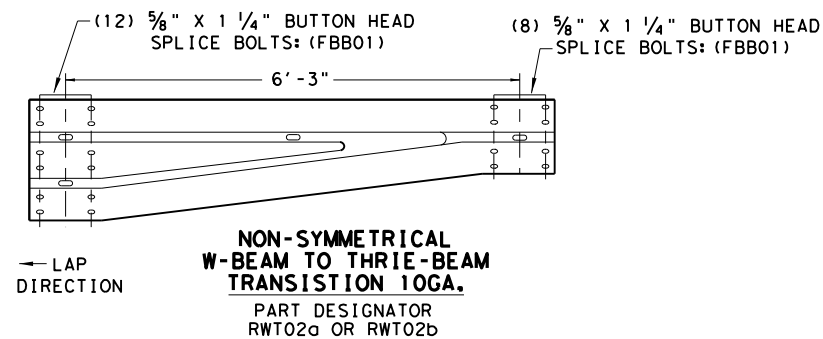
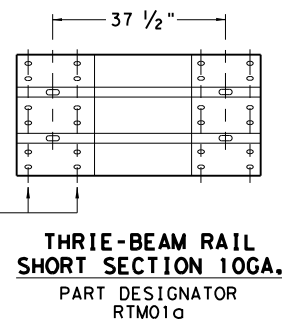
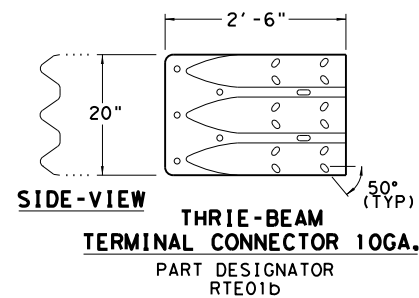
- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



- ### GENERAL NOTES
- THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
 - RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
 - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
 - BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
 - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
 - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
 - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 - UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TxDOT, MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
 - REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
 - FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

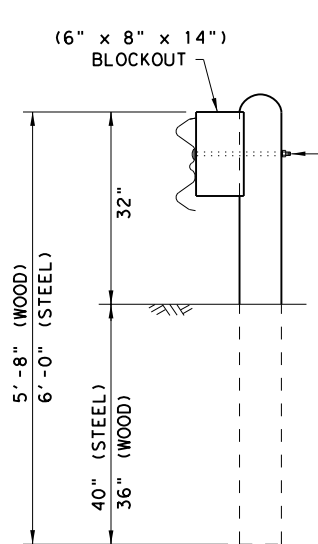
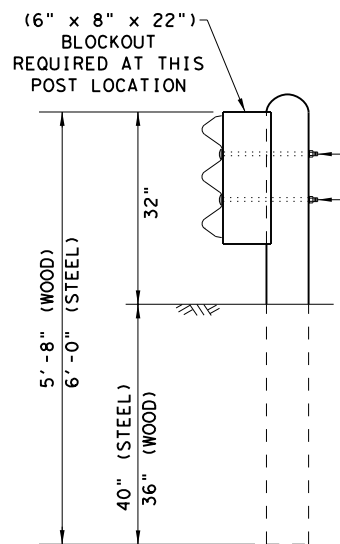


- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

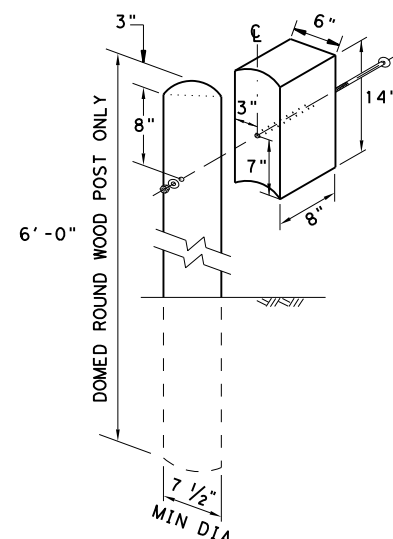
- (1) 5/8" BUTTON HEAD POST BOLT & NUT: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14a) UNDER EACH NUT

PLATE WASHER INSTRUCTIONS

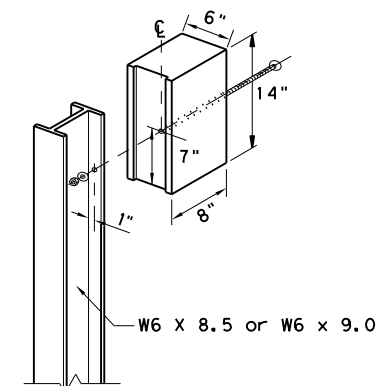
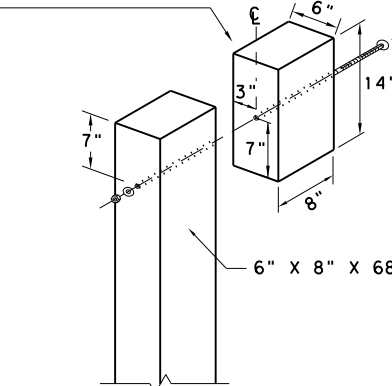
BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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



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

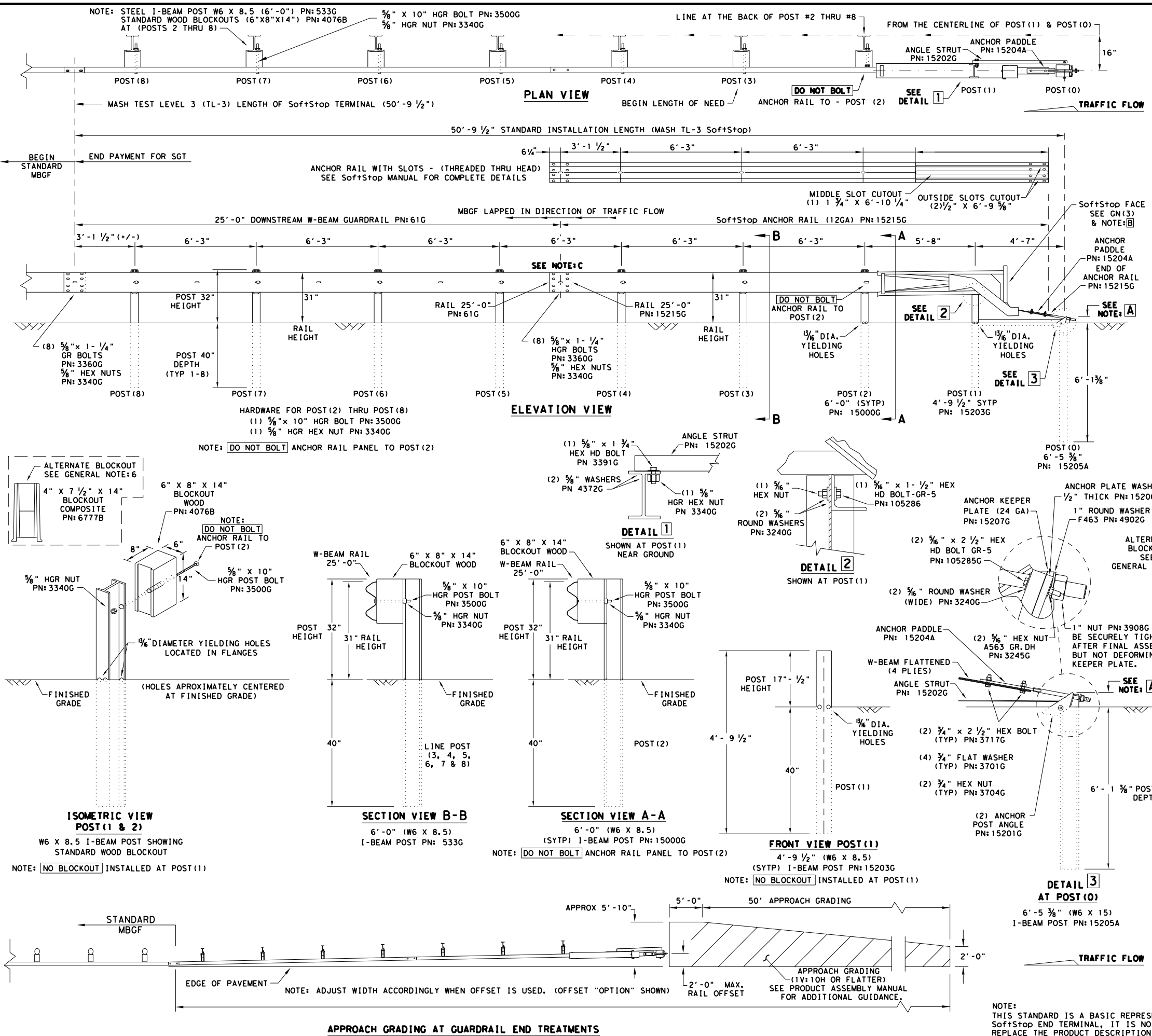


LOW-SPEED TRANSITION

		<i>Design Division Standard</i>	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT GF(31)TR TL2-19			
FILE: gf31tr+1219.dgn	DN: TxDOT	CK: KM	DW: VP
©TxDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	0923 10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	25	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:16:13 PM
 FILE: D:\cr2001\STANDARDS\sgt10s3116.dgn



- GENERAL NOTES**
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
 - 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.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - 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.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBBF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
 - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRoACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE: A THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.

NOTE: B PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
 PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)

NOTE: C W-BEAM SPLICE LOCATED BETWEEN LINE POST (4) AND LINE POST (5)
 GUARDRAIL PANEL 25'-0" PN: 61G
 ANCHOR RAIL 25'-0" PN: 15215G
 LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'-0")
15205A	1	POST #0 - ANCHOR POST (6'-5 3/8")
15203G	1	POST #1 - (SYTP) (4'-9 1/2")
15000G	1	POST #2 - (SYTP) (6'-0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 X 8.5) (6'-0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT

HARDWARE		
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

Texas Department of Transportation
 Design Division Standard

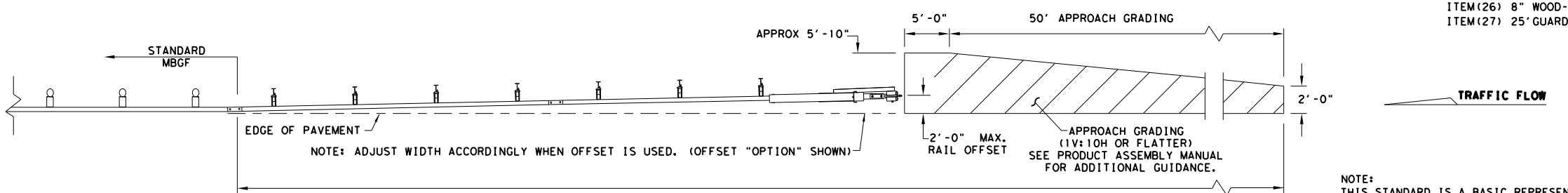
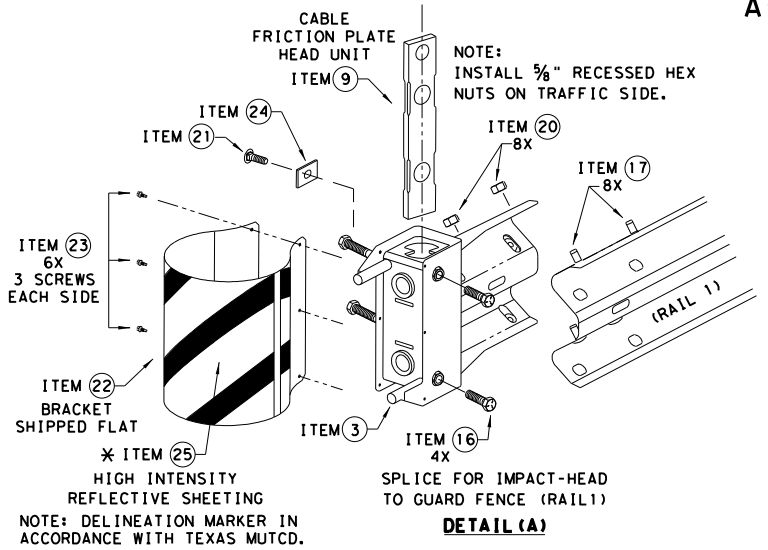
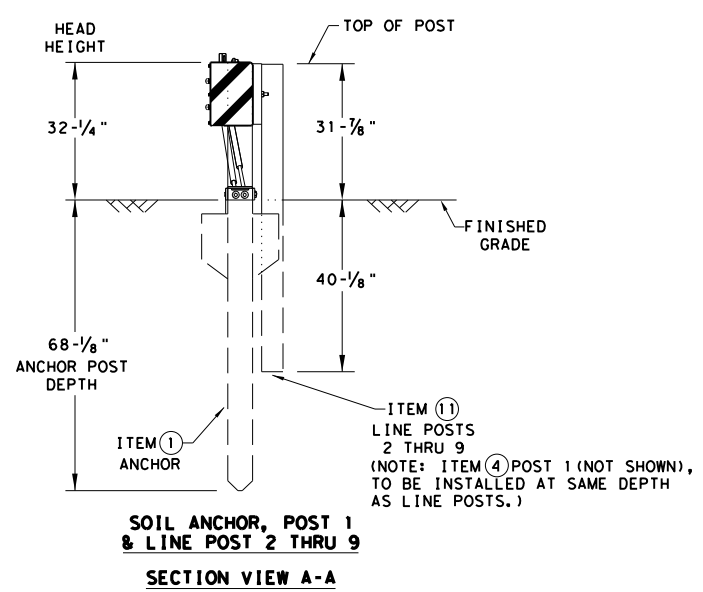
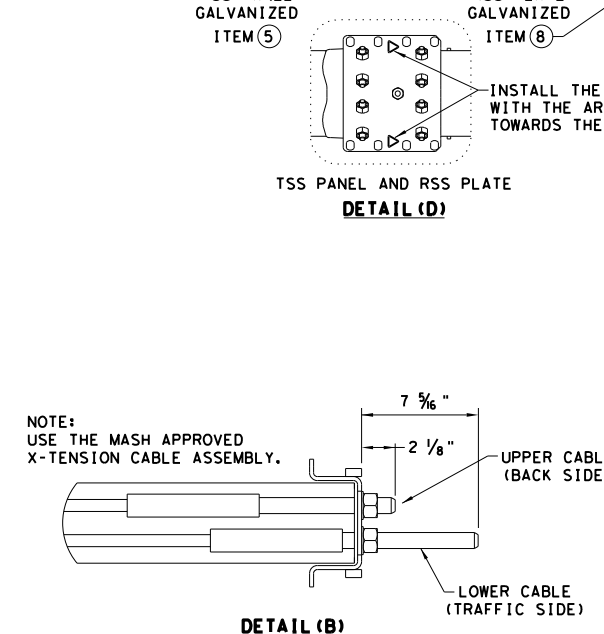
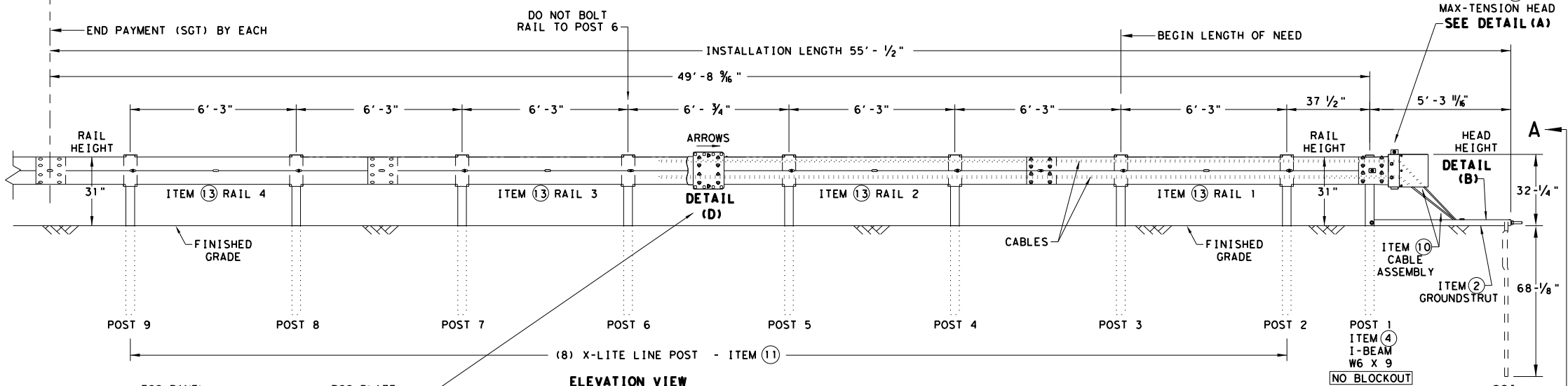
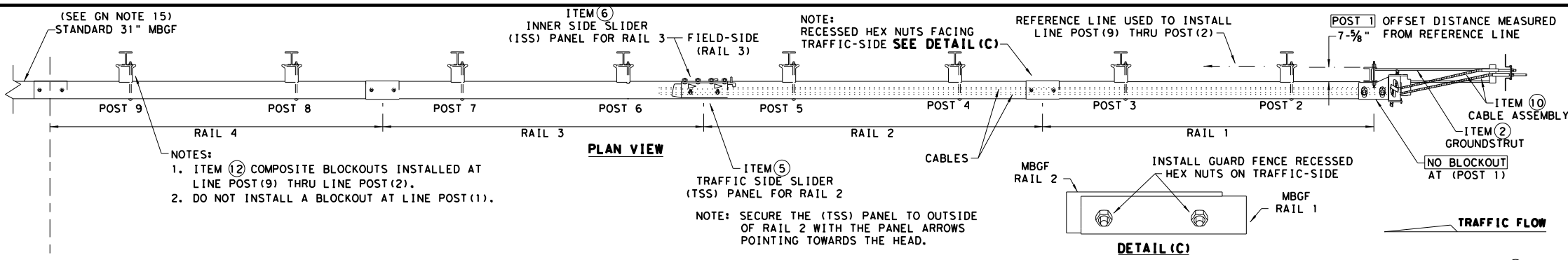
**TRINITY HIGHWAY
 SOFTSTOP END TERMINAL
 MASH - TL-3
 SGT (10S) 31-16**

FILE: sgt10s3116	DW: TxDOT	CR: KM	DW: VP	CR: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.		
BWD	LAMPASAS	26		

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

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/19/2022
 FILE: D:\sgr2001\STANDARDS\sgt11s3118.dgn



GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
- FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE MAX-TENSION INSTALLATION INSTRUCTION MANUAL, P/N MANMAX REV D (ECN 3516).
- 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.
- FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
- ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
- SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
- 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.
- REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
- IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
- POSTS SHALL NOT BE SET IN CONCRETE.
- 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.
- MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
- IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
- THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
- 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	3/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev- (D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.
 ** ALTERNATIVE ITEMS NOT SHOWN. ITEM (26) 8" WOOD-BLOCKOUTS ITEM (27) 25' GUARD FENCE PANELS

Texas Department of Transportation
 Design Division Standard

**MAX-TENSION END TERMINAL
 MASH - TL-3**

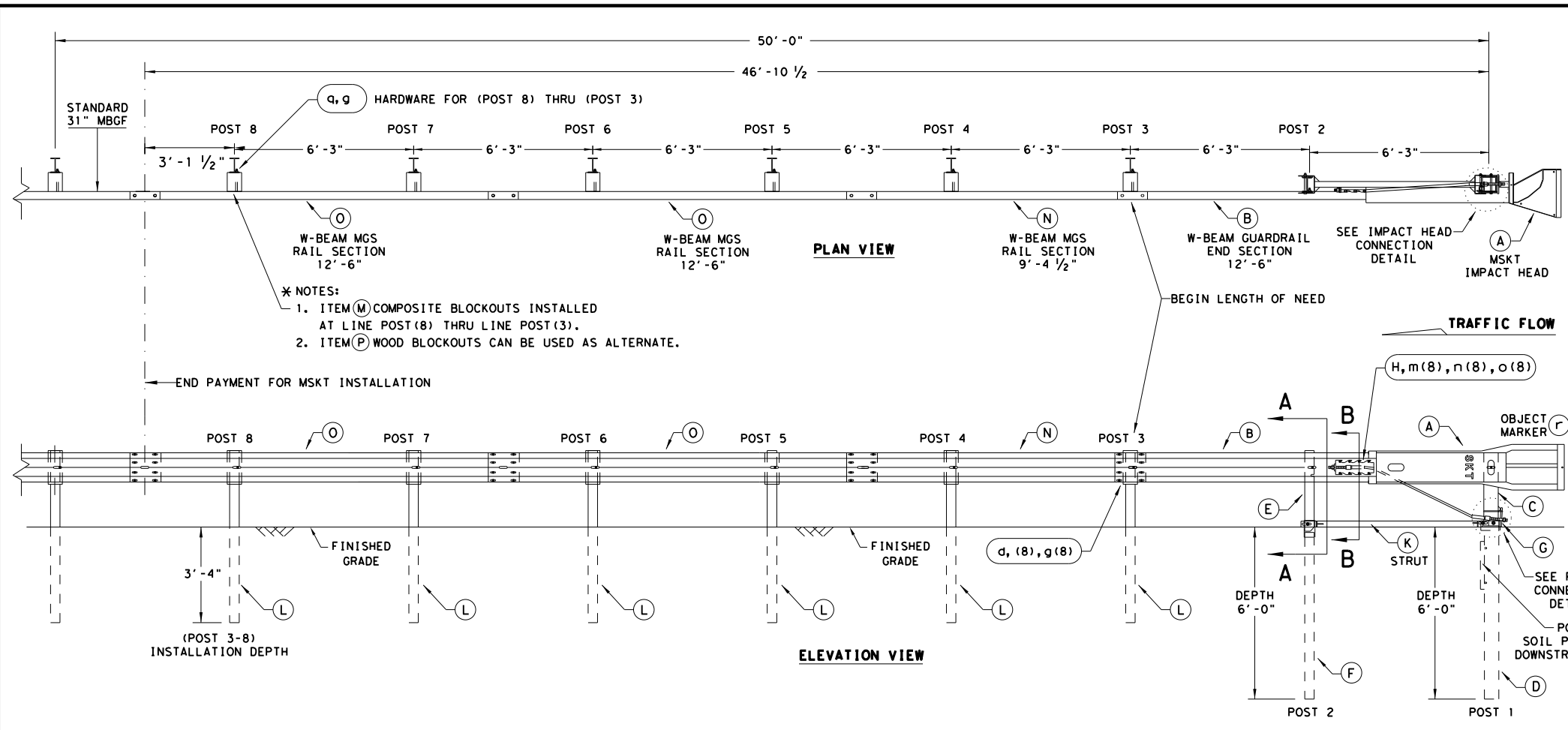
SGT (11S) 31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	06	086	CR 146
DIST	COUNTY		SHEET NO.	
BWD	BROWN		27	

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

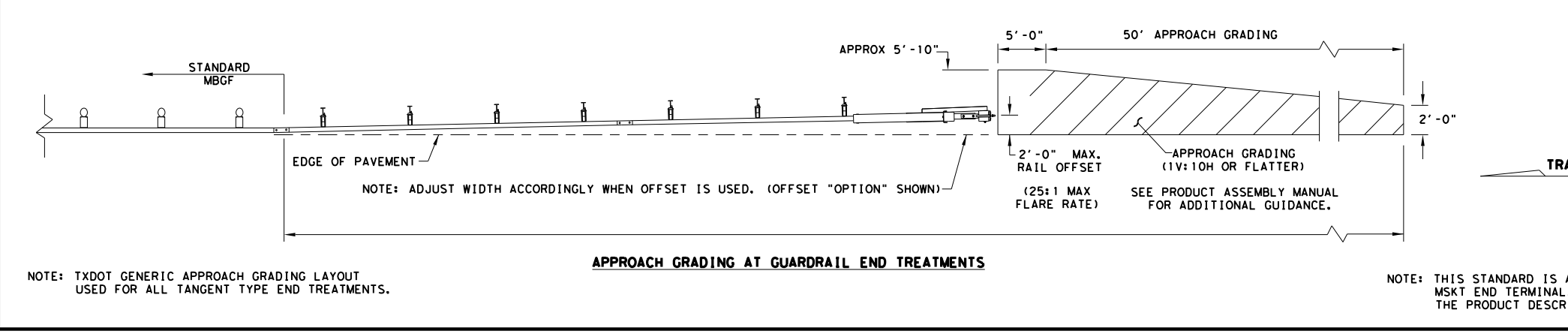
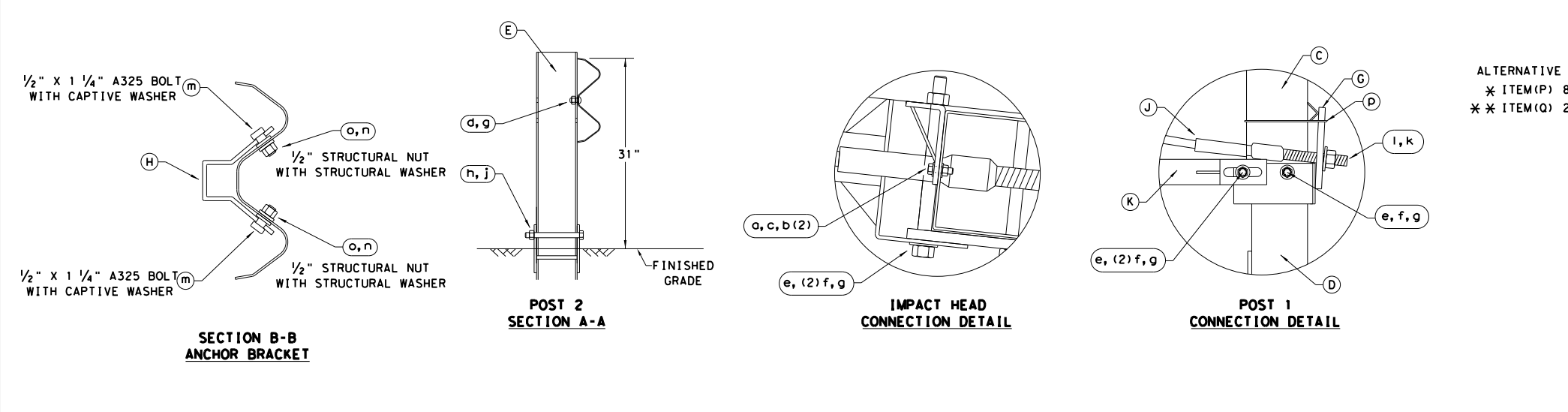
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 12/5/2021
 FILE: D:\cgr2001\STANDARDS\sgt12s3118.dgn



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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Go.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6X9 OR W6X8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
o	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
i	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT (12S) 31-18

FILE: sgt12s3118.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CL
© TXDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.	
BWD	LAMPASAS		28	

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

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

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:34:45 PM
 FILE: D:\crr2001\STANDARDS\dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE	DOUBLE	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 BRFL = 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	
SHEETING: Yellow, White or Red Type B or C reflective sheeting				SHEETING: Yellow, White or Red Type B or C Reflective Sheeting				DIRECTION: If Required BI = Bi-Directional BR = Bi-Directional with red on back	
POST TYPE: WC, YFLX, WFLX				MOUNT TYPE: GND, SRF				INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)	

OBJECT MARKERS								D & OM DESCRIPTIVE CODES			
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)		
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4	TYPE OF OBJECT MARKER 1, 2, 3, or 4 NUMBER OF REFLECTORS OR DIRECTION X = 3-Size 2 reflector unit (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	
SHEETING: Yellow-Type B _{FL} or C _{FL} Sheeting		SHEETING: Yellow - Type B or C Sheeting			SHEETING: Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			SHEETING: Red -Type B _{FL} or C _{FL} Sheeting		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	
POST TYPE: TWT		POST TYPE: WC			POST TYPE: WFLX			POST TYPE: TWT		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.	
MOUNT TYPE: WAS, WAP		MOUNT TYPE: GND			MOUNT TYPE: GND, SRF			MOUNT TYPE: WAS, WAP		Texas Department of Transportation Traffic Safety Division Standard DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION D & OM(1)-20	

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW			
DEVICE	GF1	GF2	CTB							
SHEETING: Yellow, White, Red			SHEETING: Yellow, White, Red				SHEETING: Yellow, White, Red		NOTE: 1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.	
NOTE: 1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.			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).				SIZE (W x L) 18" x 24" (Conventional) 24" x 30" (Conventional Oversize) 30" x 36" (Expressway) 36" x 48" (Freeway)		SIZE (W x L) 48" x 24" (Conventional) 60" x 30" (Expressway & Freeway)	
MOUNTING HEIGHT: 4'-0" or 7'-0"			MOUNTING HEIGHT: 7'-0" Only				MOUNTING HEIGHT: 7'-0"		REVISIONS 0923 10 020 CR 2001 10-09 3-15 DIST COUNTY SHEET NO. 4-10 7-20 BWD LAMPASAS 29	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:41:41 PM
 FILE: D:\crr2001\STANDARDS\dom2-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

TYPE OF BARRIER MOUNTS

WING CHANNEL (WC)

FLEXIBLE POSTS (YFLX, WFLX)

WEDGE ANCHOR SYSTEMS

GUARD FENCE ATTACHMENT

GND

GND

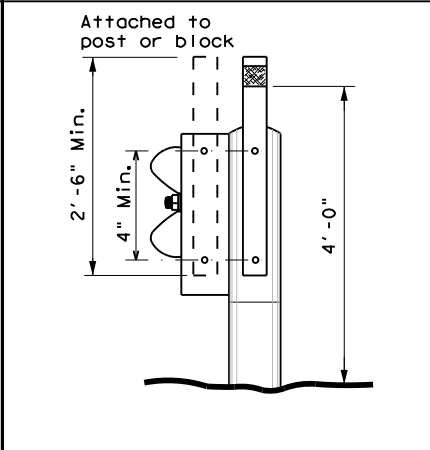
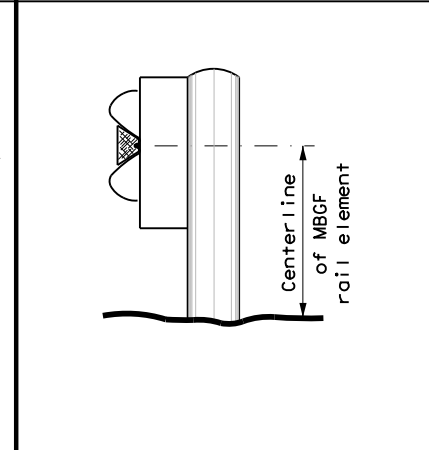
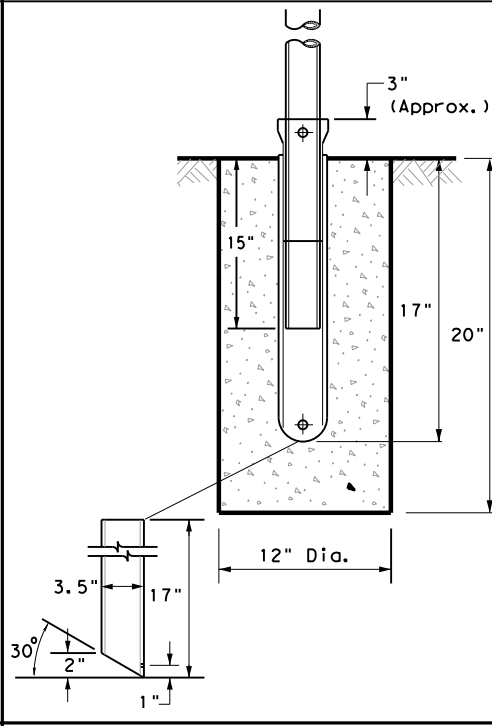
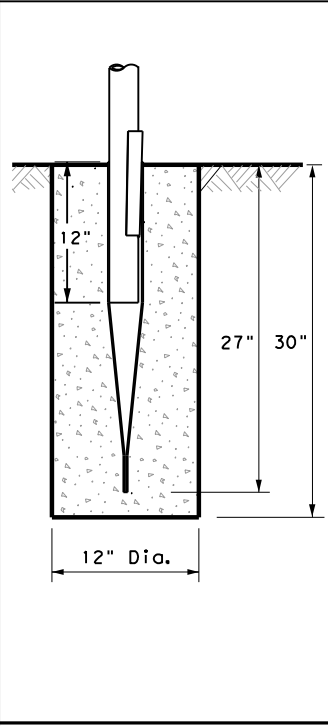
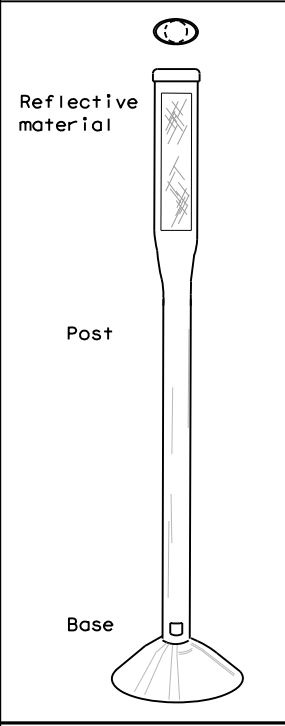
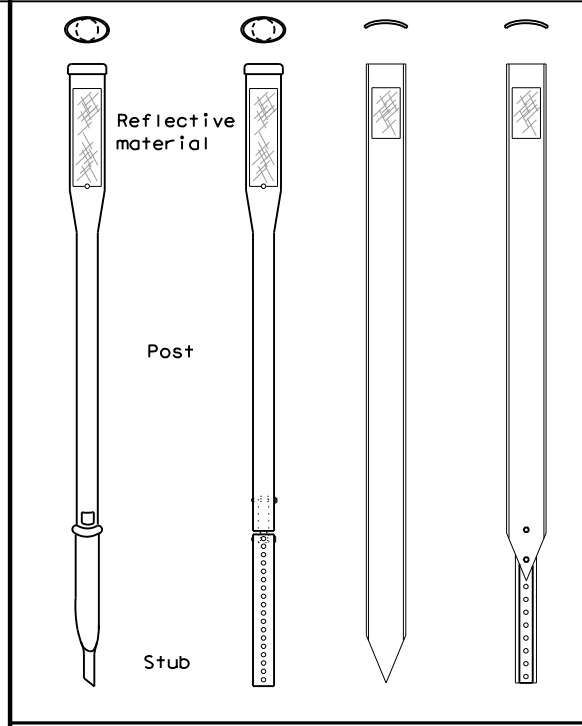
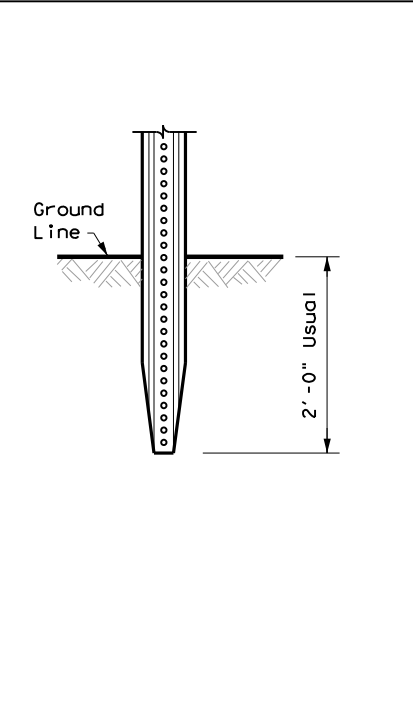
SRF

WAS

WAP

GF 1

GF 2



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.

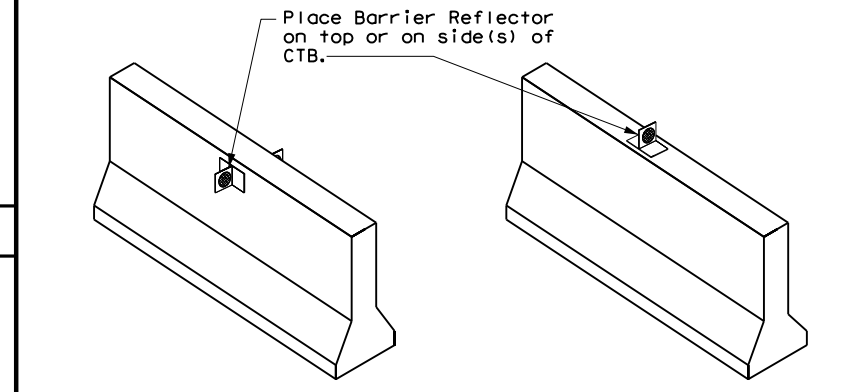
EMBEDDED SURFACE MOUNT

- 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.

STEEL PLASTIC

- NOTE**
1. Install per manufacturer's recommendations.

CONCRETE TRAFFIC BARRIER (CTB)



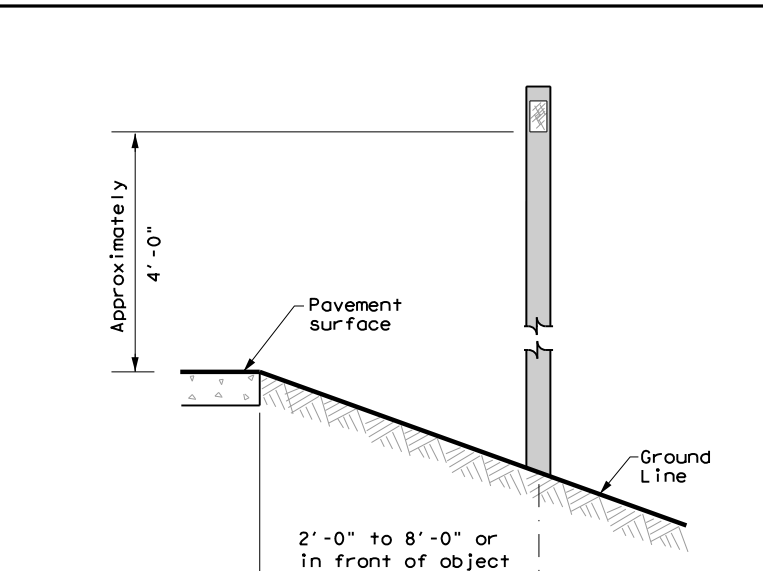
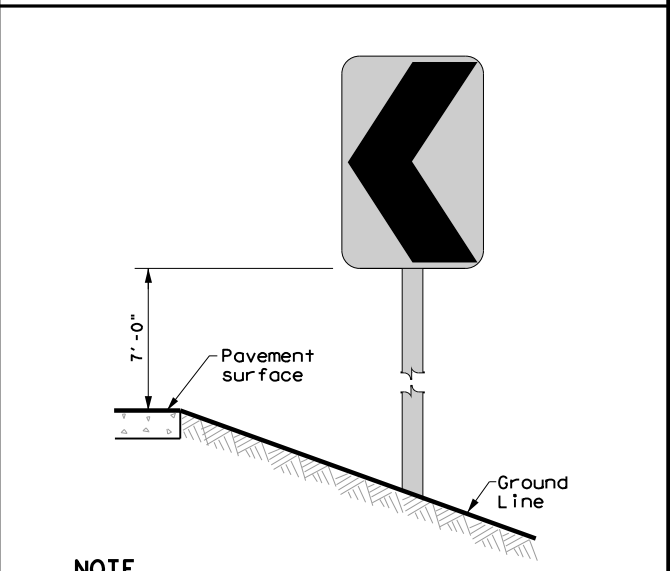
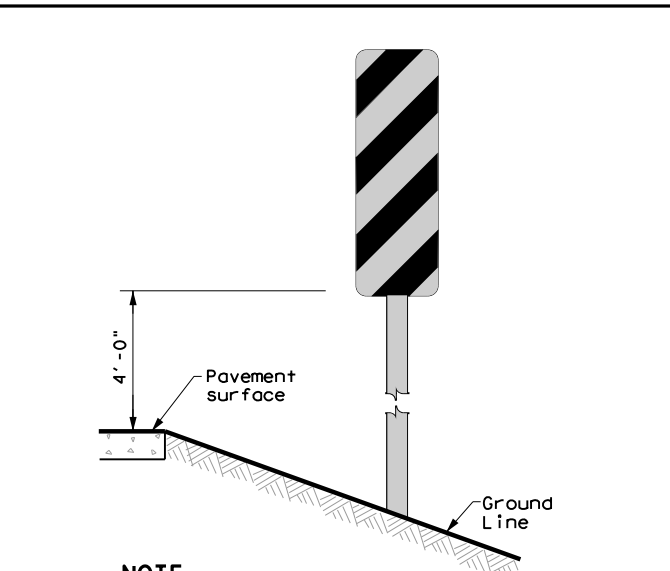
GENERAL NOTES

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

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN

DELINEATORS AND TYPE 2 OBJECT MARKERS



- 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)

- 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.

- 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	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	BWD	LAMPASAS	30	

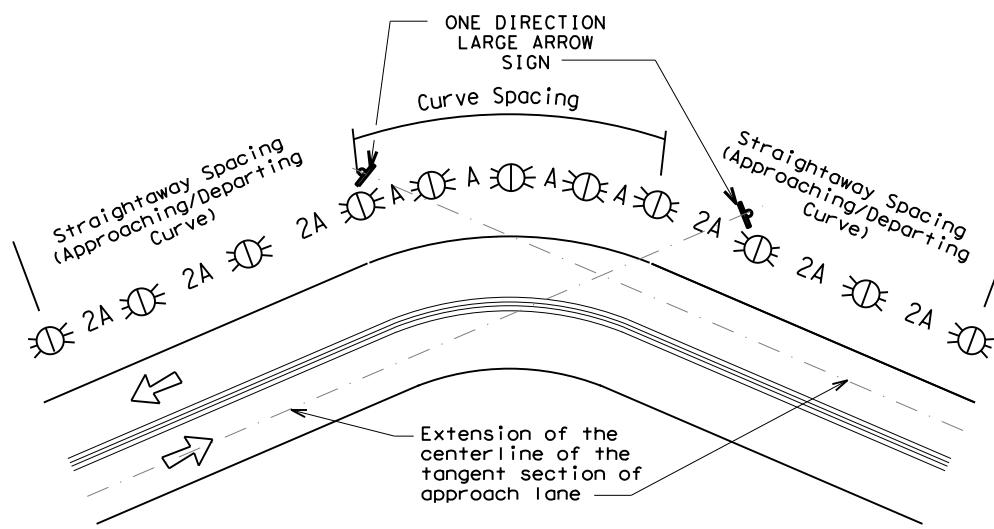
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:42:23 PM
 FILE: D:\crr2001\STANDARDS\dom3-20.dgn

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

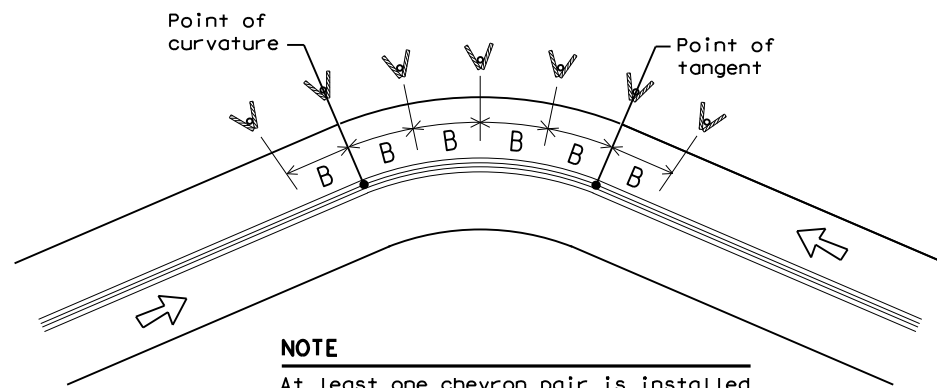
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

- 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.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

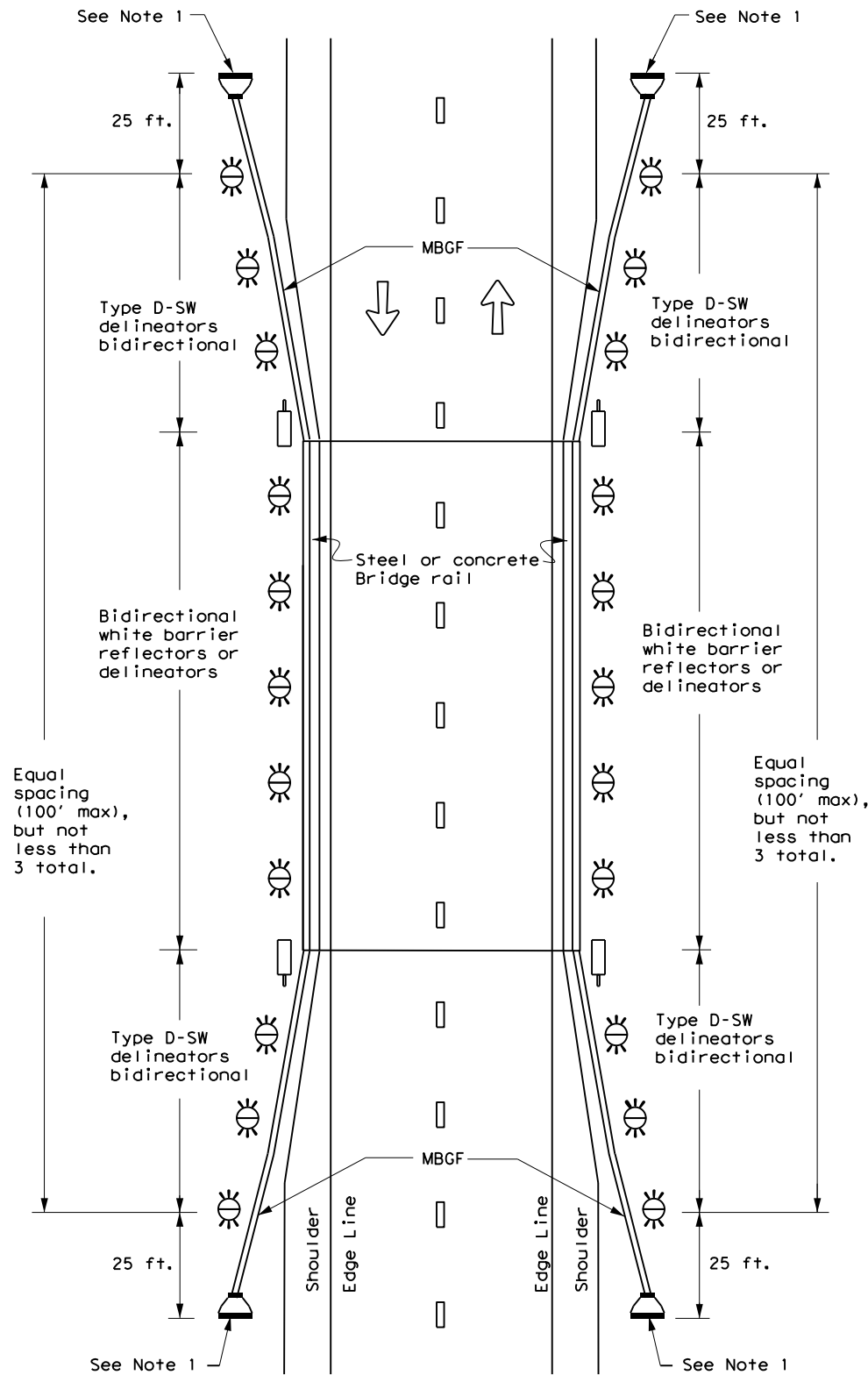
Texas Department of Transportation
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DW: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	BWD	LAMPASAS	31	

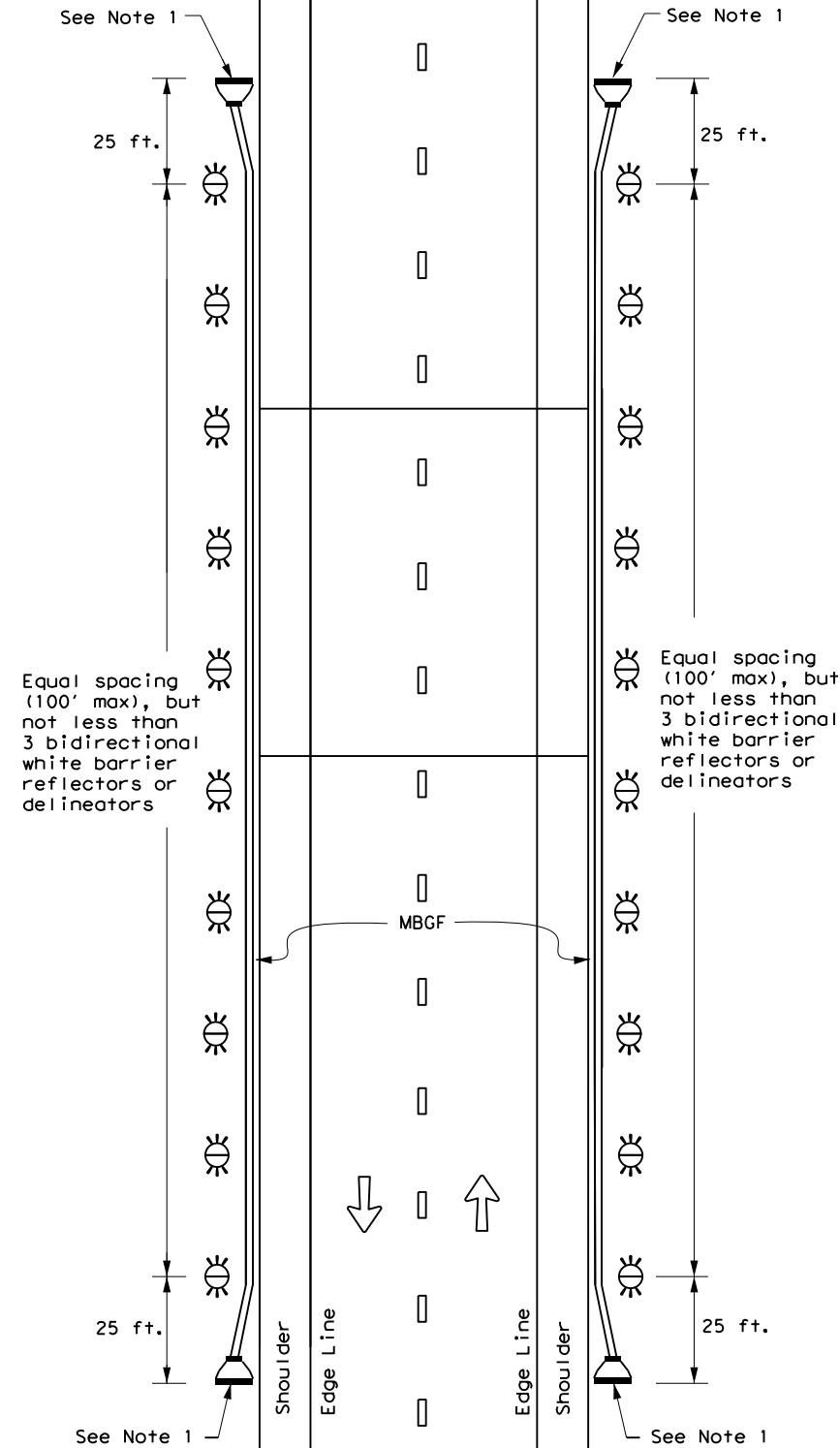
**TWO-WAY, TWO LANE ROADWAY
WITH REDUCED WIDTH APPROACH RAIL**



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.

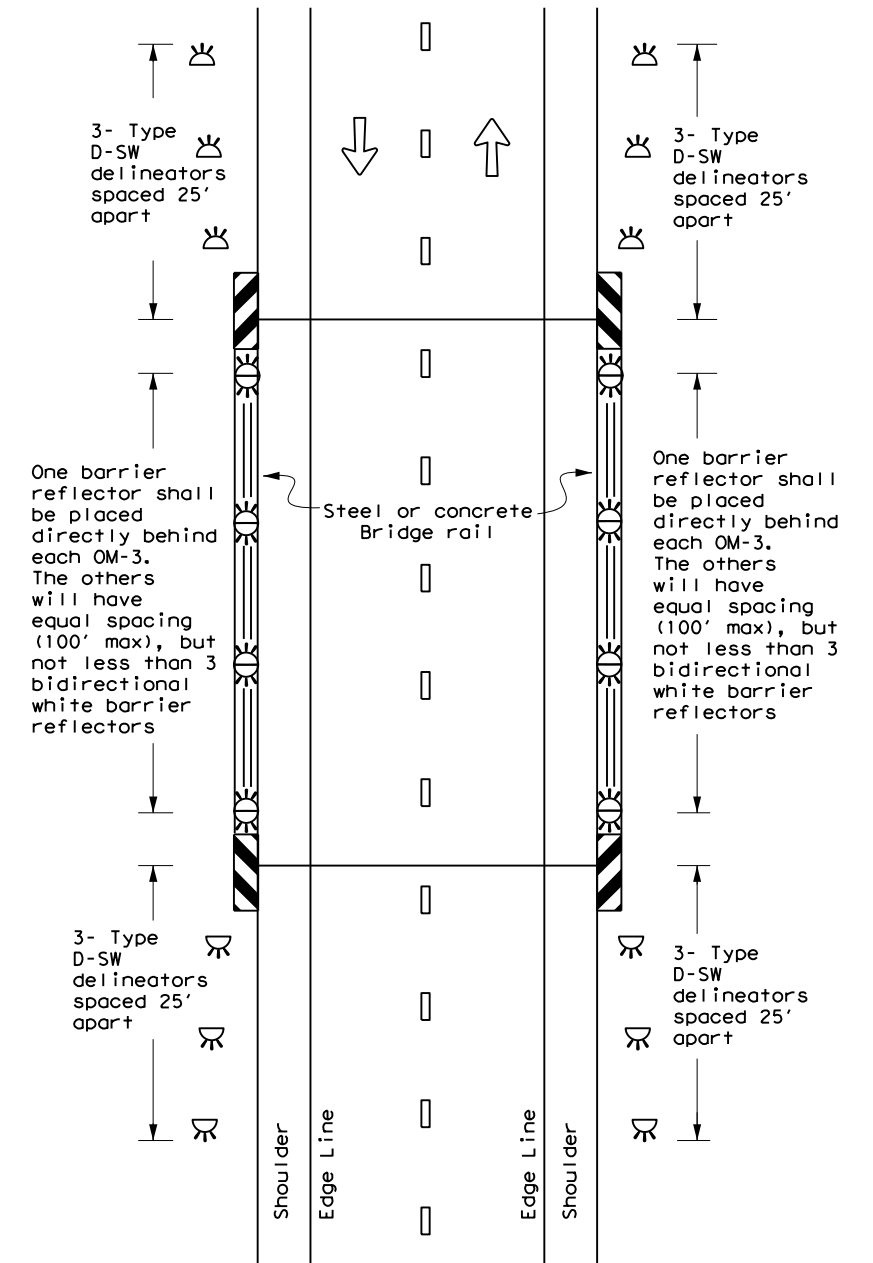
**TWO-WAY, TWO LANE ROADWAY
WITH METAL BEAM GUARD FENCE (MBGF)**



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



**DELINEATOR &
OBJECT MARKER
PLACEMENT DETAILS**

D & OM(5) - 20

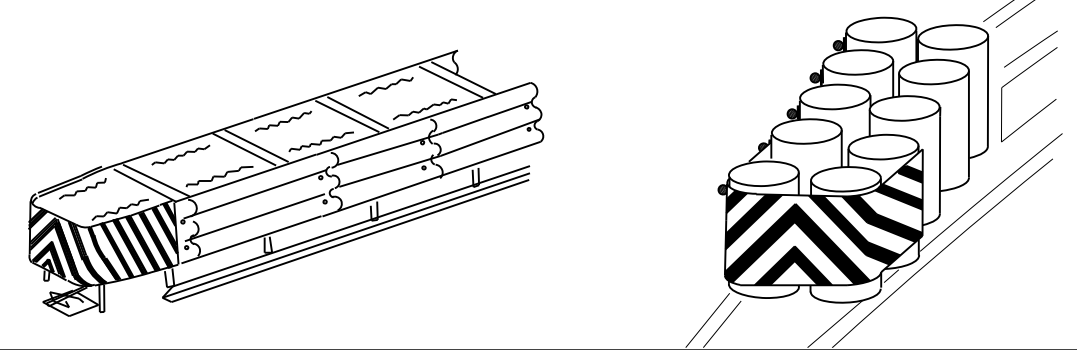
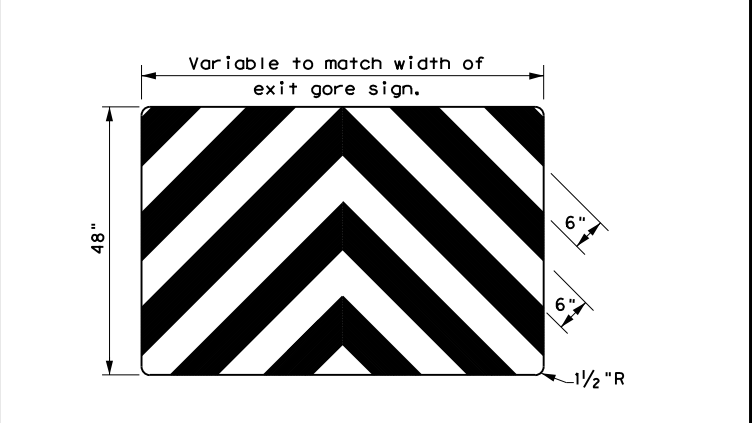
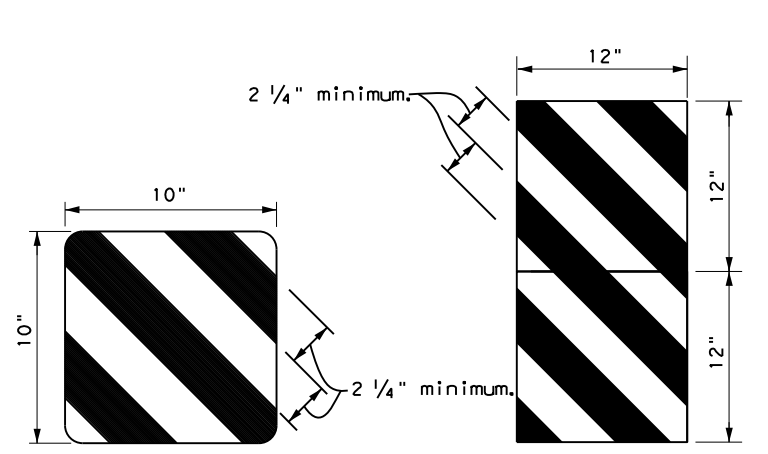
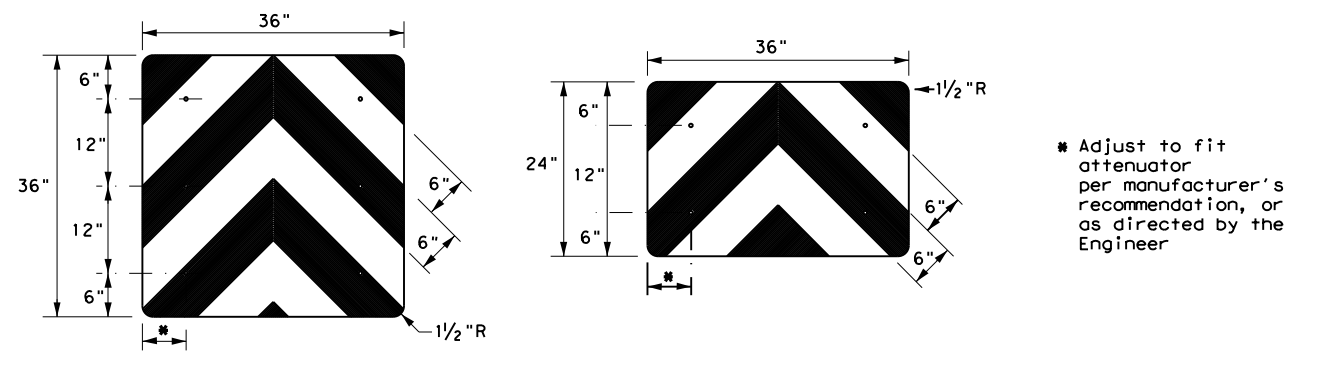
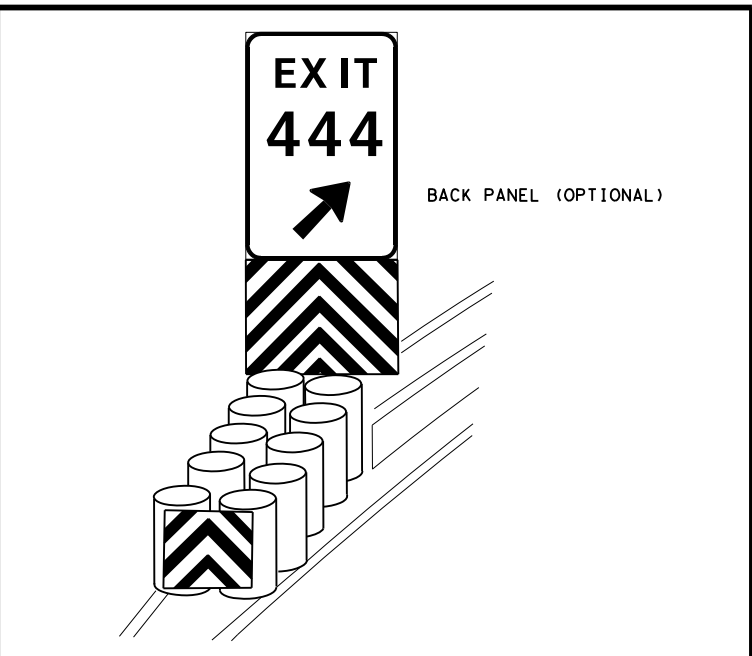
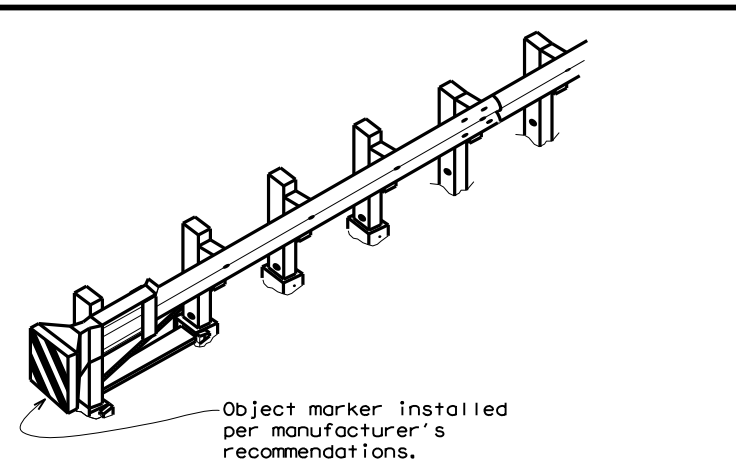
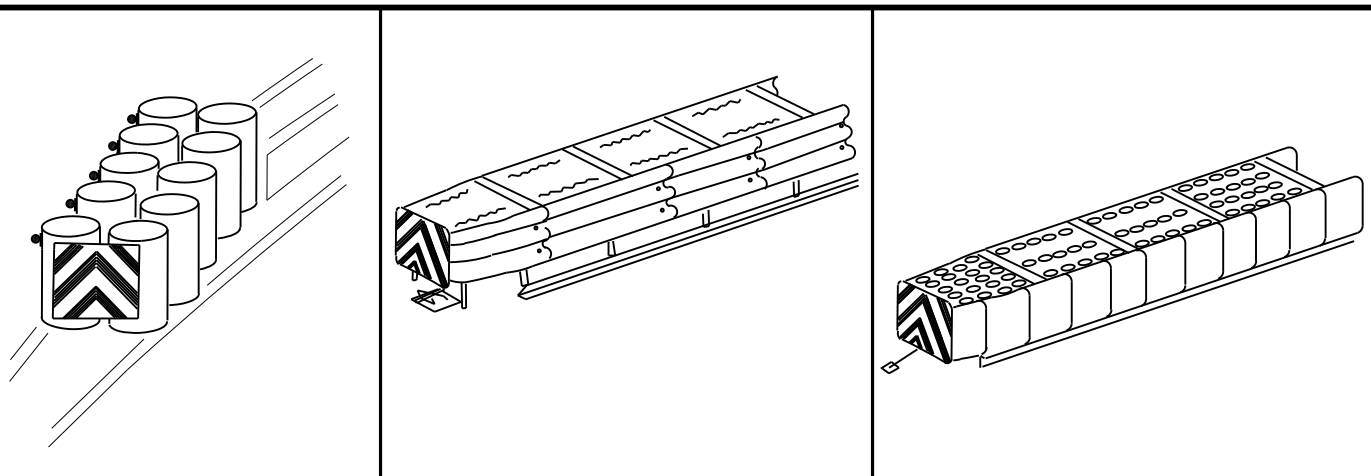
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
7-20	DIST	COUNTY	SHEET NO.	
	BWD	LAMPASAS	32	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:43:14 PM
FILE: D:\crr2001\STANDARDS\dom5-20.dgn

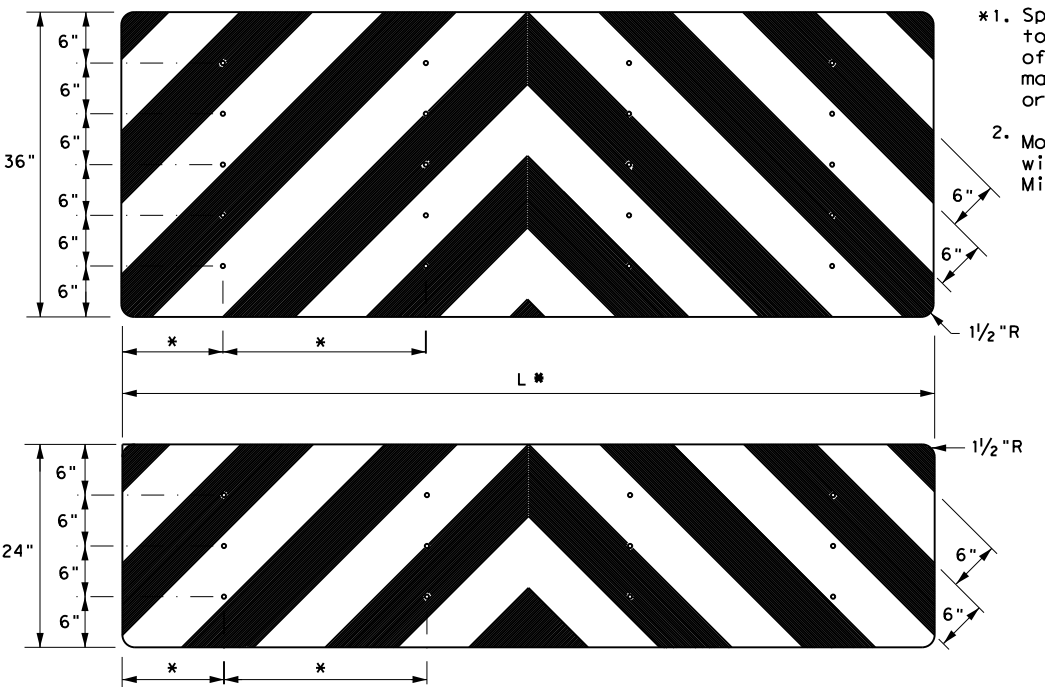
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021 6:44:56 PM
 FILE: D:\crr2001\STANDARDS\domvia-20.dgn



OBJECT MARKERS SMALLER THAN 3 FT²

- NOTES**
- Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
 - Mounting should be flush with top of attenuator. Minimum size 96" x 24".



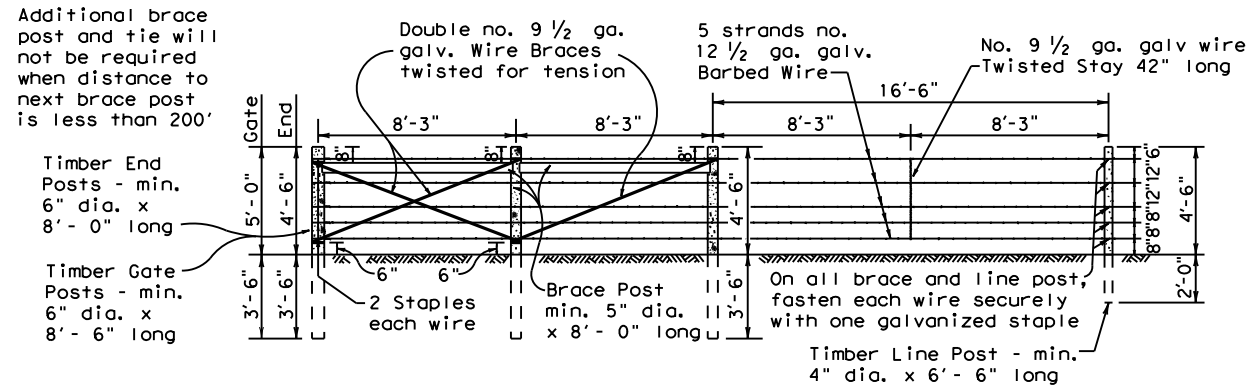
NOTES

- Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
- Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
- Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
- Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
- Object Marker at nose of attenuator is subsidiary to the attenuator.
- See D & OM (1-4) for required barrier reflectors.

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS D & OM(VIA) -20			
FILE: domvia20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT December 1989	CONT	SECT	JOB
REVISIONS		0923 10	O20
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	BWD	LAMPASAS	33
4-98 7-20			
20G			

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021
FILE: D:\cr2001\STANDARDS\wf110.dgn

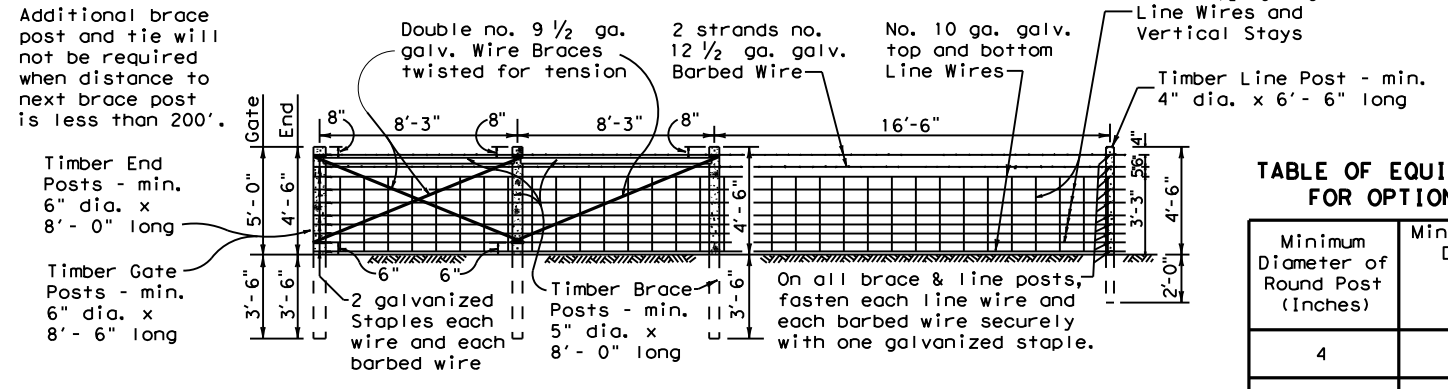


SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "A" FENCE

(See General Note 6)



SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS

Bracing Detail Used at Ends and Gates

TYPE "B" FENCE

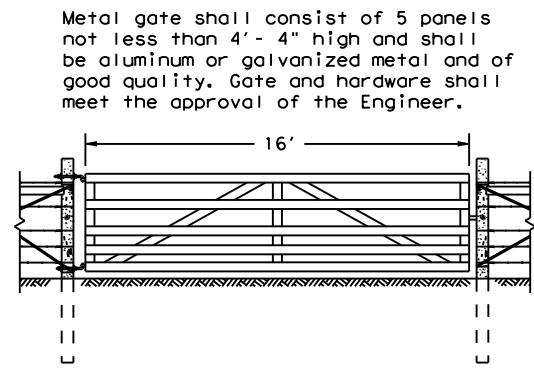
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

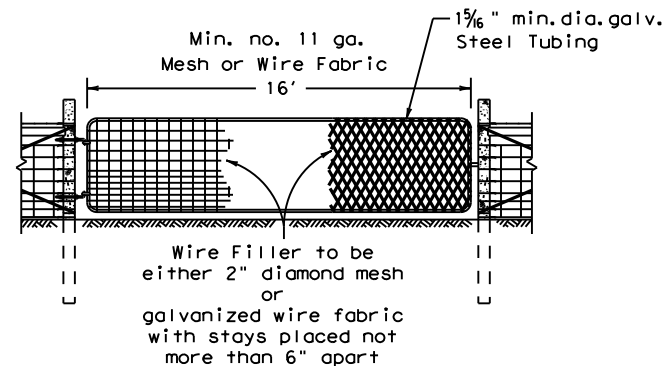
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 1/2
5	4 1/2
6	5 1/4

GENERAL NOTES

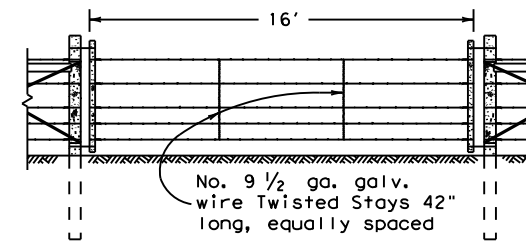
- Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
 - Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
 - Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
 - Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
 - If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'-6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'-6" below the ground surface, the holes shall be drilled a minimum of 2'-0" into the rock or to the depth whichever is the lesser depth.
 - Barbed wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.
- Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
- The location of gates and corner posts will be as indicated elsewhere on these plans.
 - Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



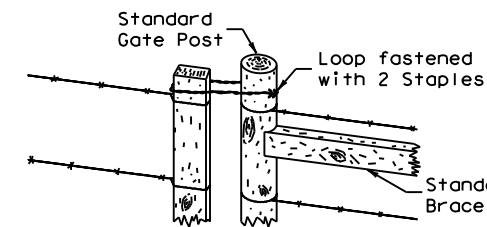
DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

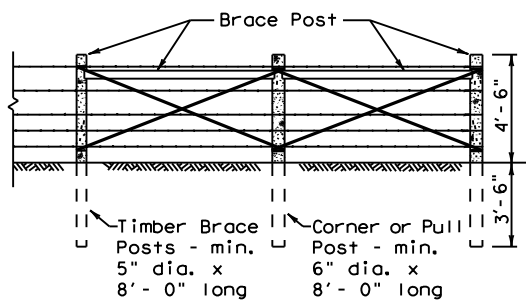


DETAIL TYPE 3 GATE

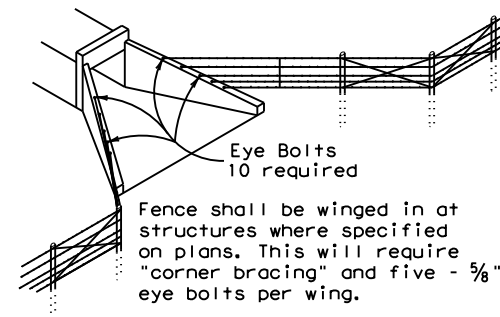


Loop to be made from two strands twisted no. 9 1/2 ga. galv. smooth wire, and to be securely fastened to gate post with two galv. staples.

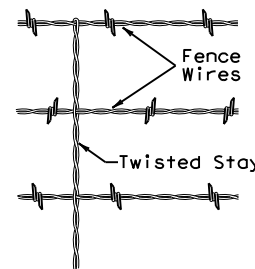
DETAIL FASTENER TYPE 3 GATE



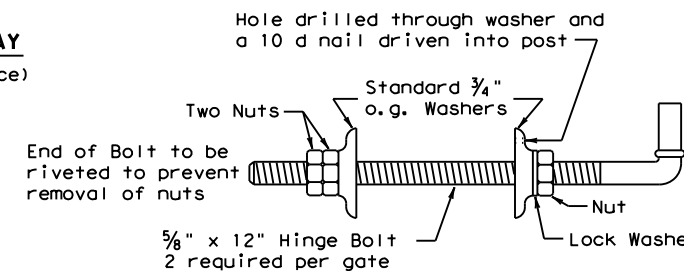
CORNER OR PULL POST ASSEMBLY



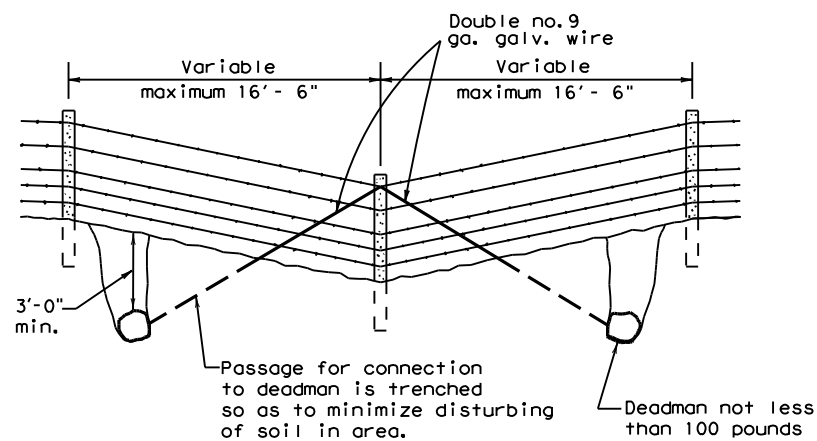
DETAIL OF FENCE TREATMENT AT STRUCTURES



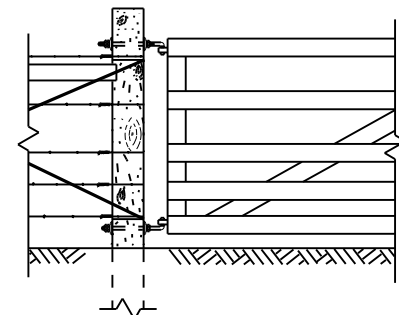
DETAIL OF STAY (Barbed wire fence)



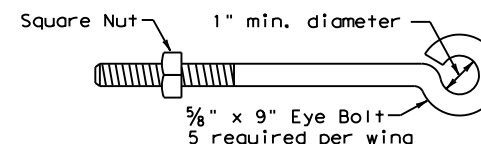
DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF FENCE SAG (Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

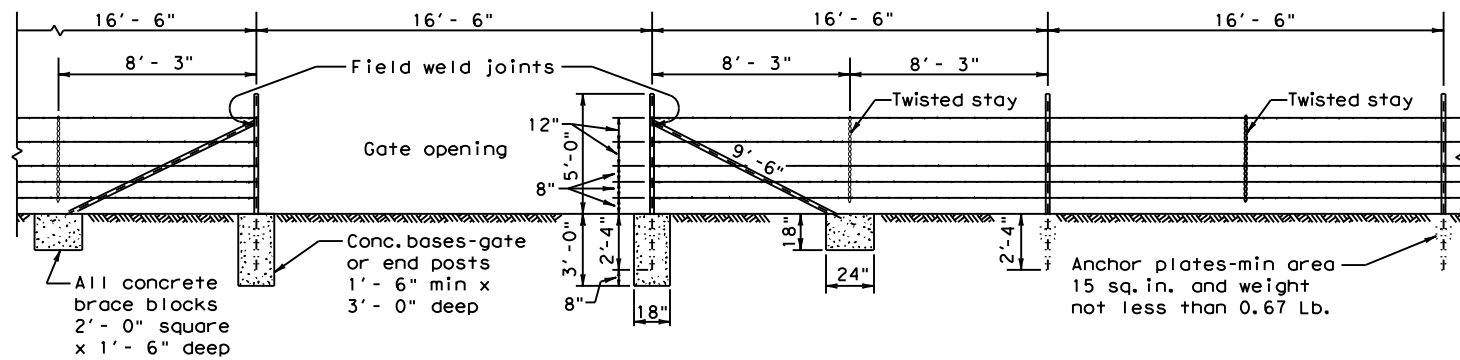
Texas Department of Transportation
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS) WF (1) - 10

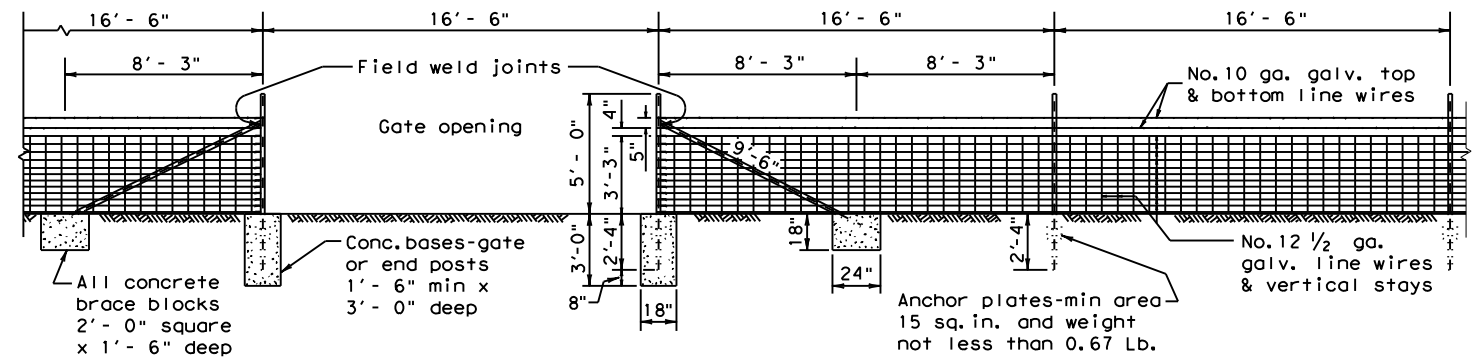
FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.	
BWD	LAMPASAS		34	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/5/2021
 FILE: D:\cr2001\STANDARDS\wf210.dgn



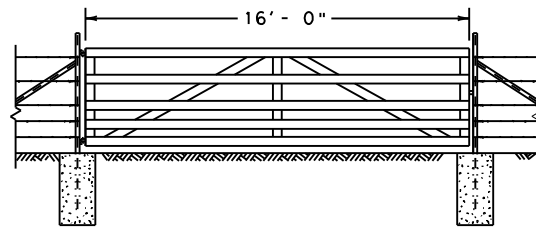
SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
 BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
 (See General Note 8)



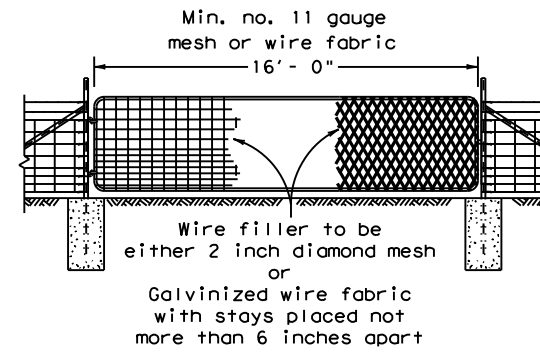
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
 BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
 (See General Note 8)

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

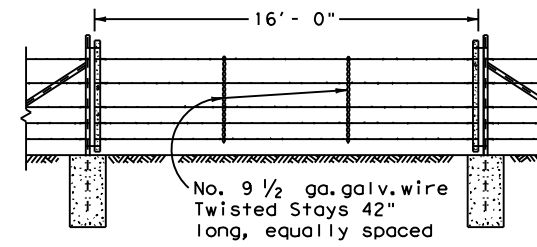
Metal gate shall consist of 5 panels not less than 4'-4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the engineer.



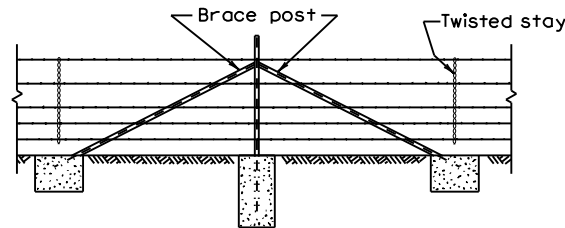
DETAIL TYPE 1 GATE



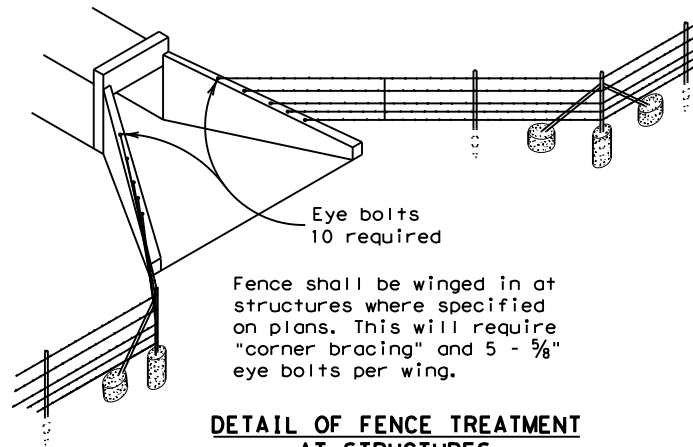
DETAIL TYPE 2 GATE



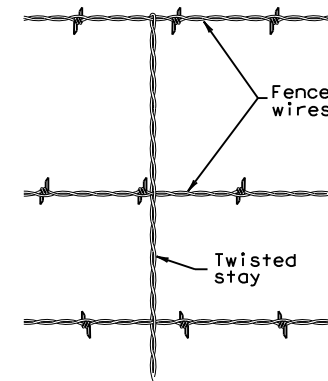
DETAIL TYPE 3 GATE



CORNER OR PULL POST ASSEMBLY

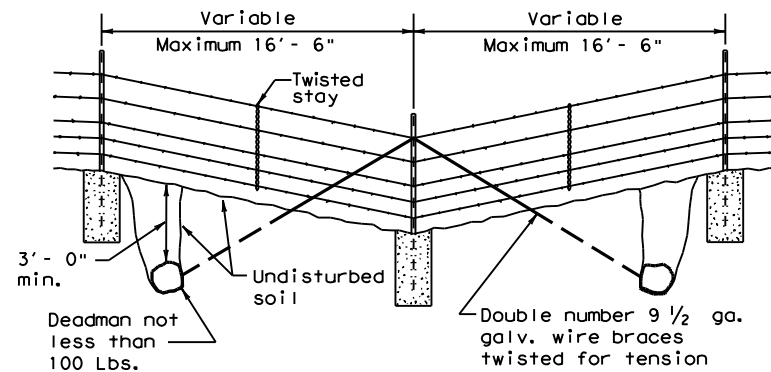


DETAIL OF FENCE TREATMENT AT STRUCTURES

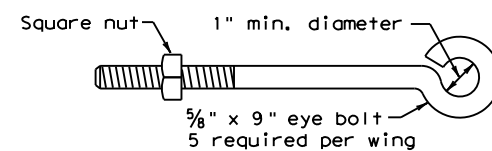


DETAIL OF STAY (Barbed Wire Fence)

- GENERAL NOTES**
- Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
 - Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
 - Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
 - Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
 - Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
 - Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1/4" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
 - If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin. ft.). These items shall be in accordance with Item 552, "Wire Fence."
 - Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.
 - Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
 - The location of gates and corner posts will be as indicated elsewhere in these plans.



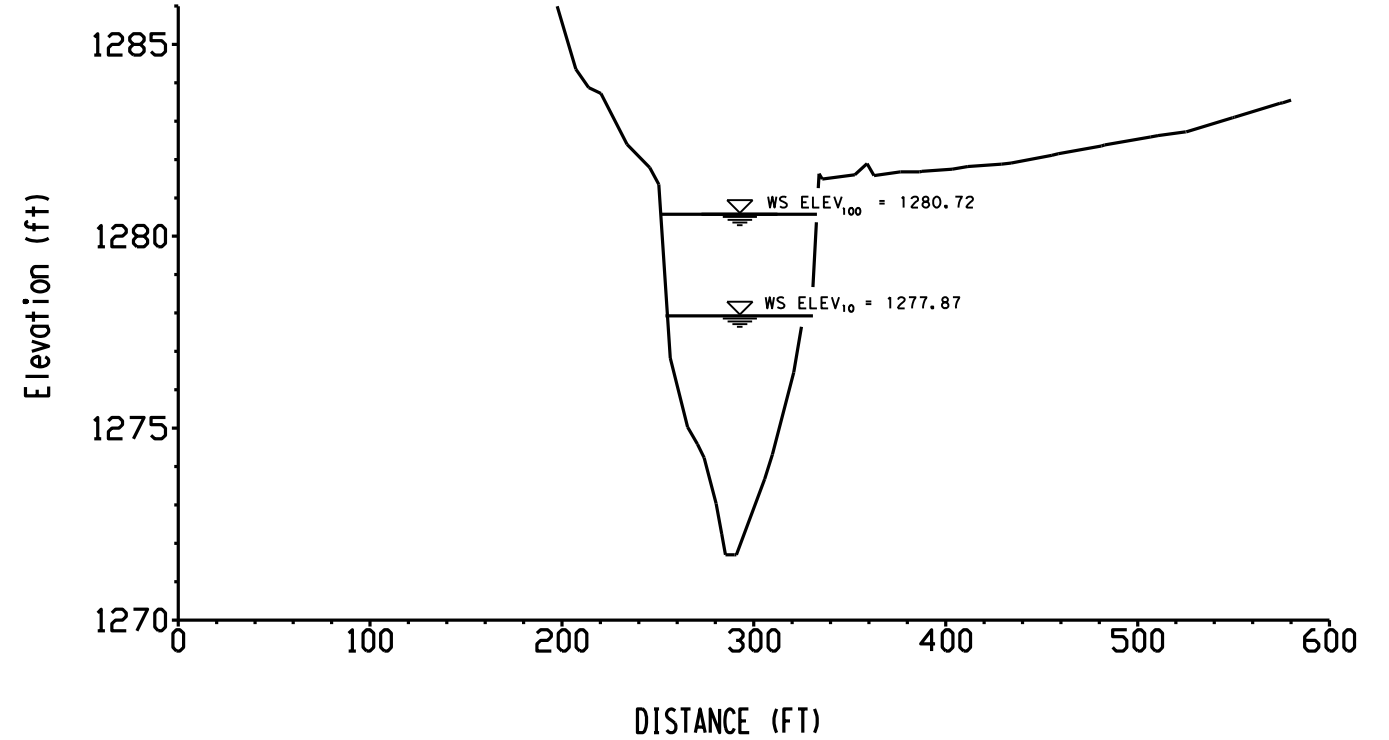
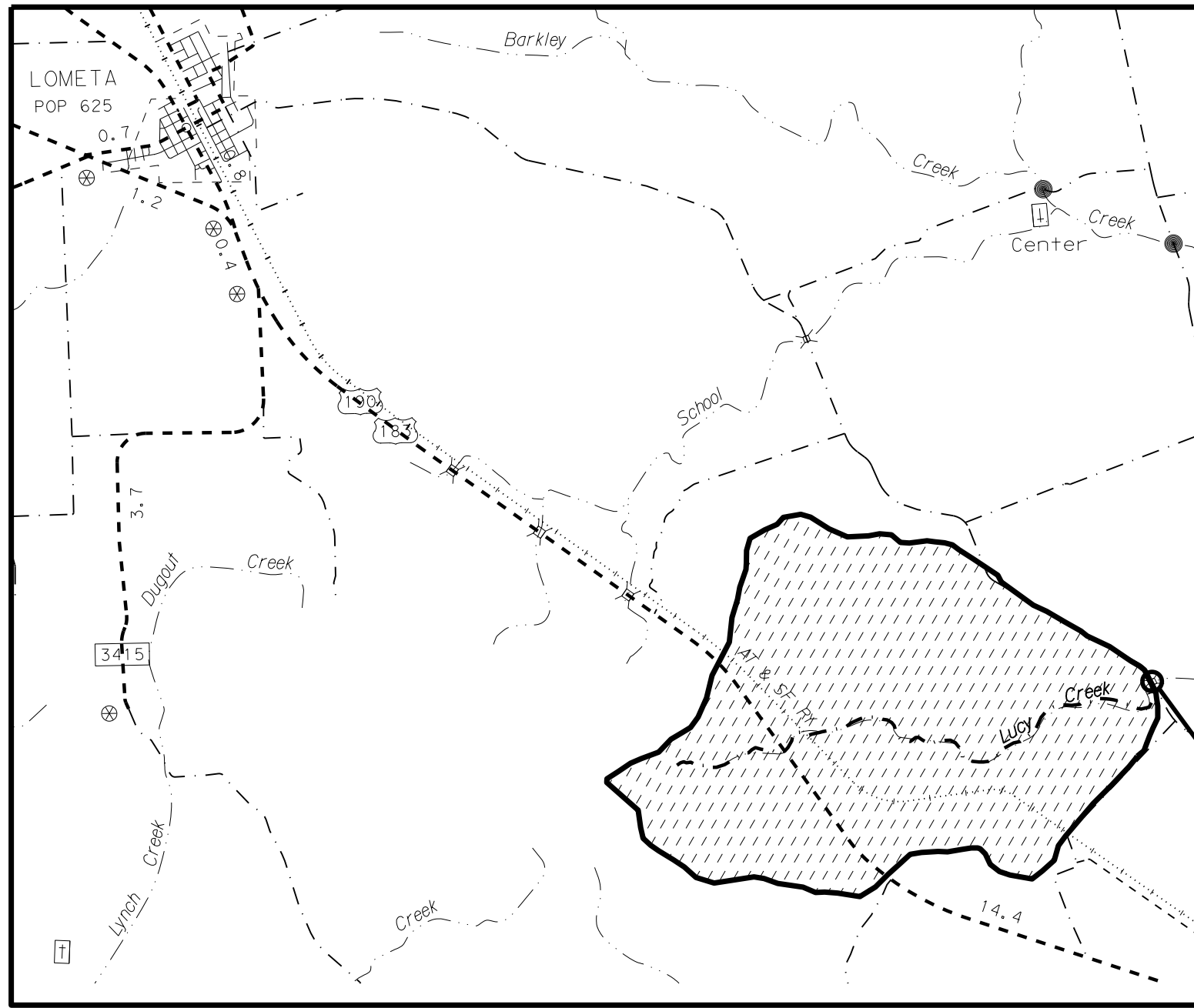
DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

				Design Division Standard	
BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS) WF (2) - 10					
FILE:	wf210.dgn	DN:	TxDOT	CK:	AM
REVISED:		CON:		SECT:	
		JOB:	0923 10	020	CR 2001
		DIST:	BWD	COUNTY:	LAMPASAS
		SHEET NO.:			35

DATE: 4/29/2022 8:46:07 AM
 FILE: D:\cr2001\HYDROLOGY AND HYDRAULICS.dgn



HORIZONTAL LOCATION MEASURED PERPENDICULAR TO FLOW OF Q₁₀ AND Q₁₀₀ EVENTS.
 SECTION 160 FT DOWNSTREAM OF PROPOSED STRUCTURE

LUCY CREEK

HEADWATER COMPUTATION METHOD:
 HEC-RAS VERSION 5.0.6

THE TAILWATER WAS DETERMINED USING NORMAL DEPTH COMPUTATION

**PROPOSED BRIDGE
 10 YEAR DISCHARGE**

Bottom Girder Elev = 1279.65
 Freeboard = 0.87 ft
 Percent of Flow Overtopping Road = 0.0%

100 YEAR DISCHARGE

Bottom Girder Elev = 1279.65
 Freeboard = 0.00 ft
 Percent of Flow Overtopping Road = 0.00%

PROJECT LOCATION



JH Scantling, P.E.

05/02/2022

LUCY CREEK

DRAINAGE AREA = 6.25 MI²
 ANNUAL PRECIPITATION IN INCHES = 30 IN
 SLOPE = 0.0116 FT/FT
 OmegaEM = -0.106

HYDROLOGIC METHOD USED: OmegaEM REGRESSION EQUATION

Q₁₀ = 1,470 CFS
 Q₁₀₀ = 3,655 CFS

LOCATON	PROPOSED STRUCTURE						EXISTING STRUCTURE					
	DESIGN 10 YR			100 YR			DESIGN 10 YR			100 YR		
	Q (cfs)	V (ft/s)	WSEL (ft)	Q (cfs)	V (ft/s)	WSEL (ft)	Q (cfs)	V (ft/s)	WSEL (ft)	Q (cfs)	V (ft/s)	WSEL (ft)
SECTION 1 160' DNSTRM OF C (END OF EXPANSION)	1470	6.6	1277.87	3655	9.6	1280.72	1470	6.6	1277.87	3655	9.6	1280.72
SECTION 2 23' DNSTRM OF C	1470	5.7	1278.43	3655	8.6	1281.45	1470	5.7	1278.43	3655	8.6	1281.45
SECTION 3 23' UPSTRM OF C	1470	4.8	1278.78	3655	7.4	1282.08	1470	4.8	1278.78	3655	6.2	1282.78
SECTION 4 100' UPSTRM OF C (WITH BRIDGE) "APPR (CONSTR)"	1470	4.7	1278.91	3655	5.0	1282.83	1470	4.7	1278.91	3655	4.7	1283.19

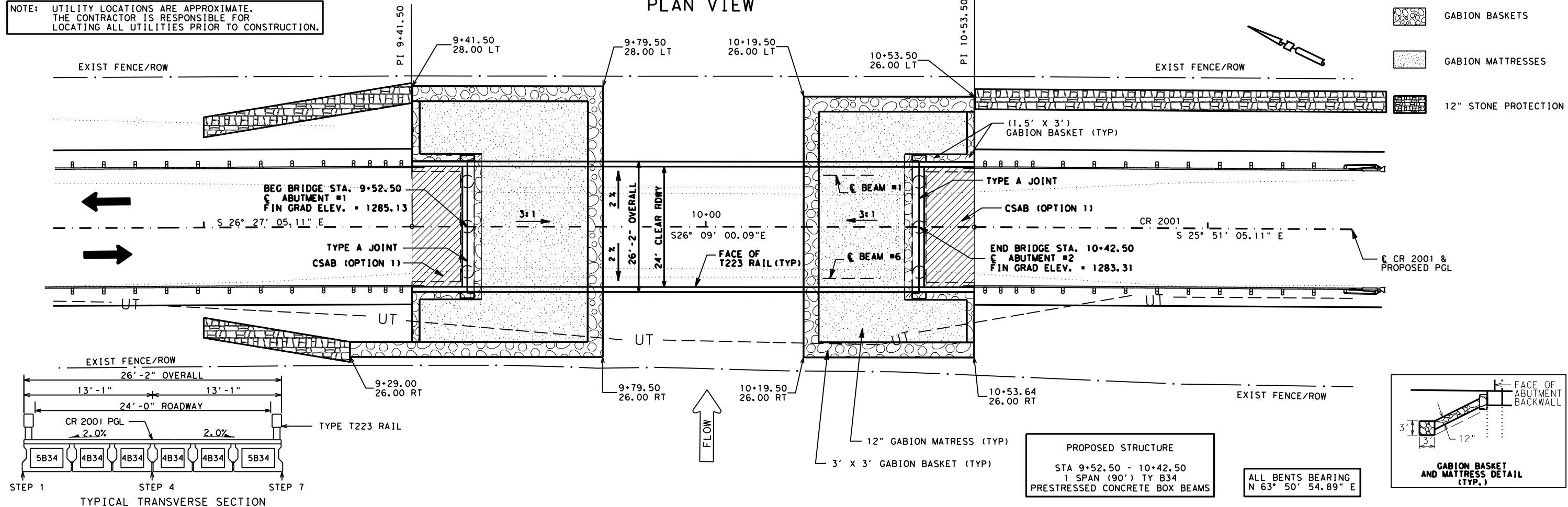
**CR 2001
 HYDROLOGY AND
 HYDRAULICS
 0923-10-020**



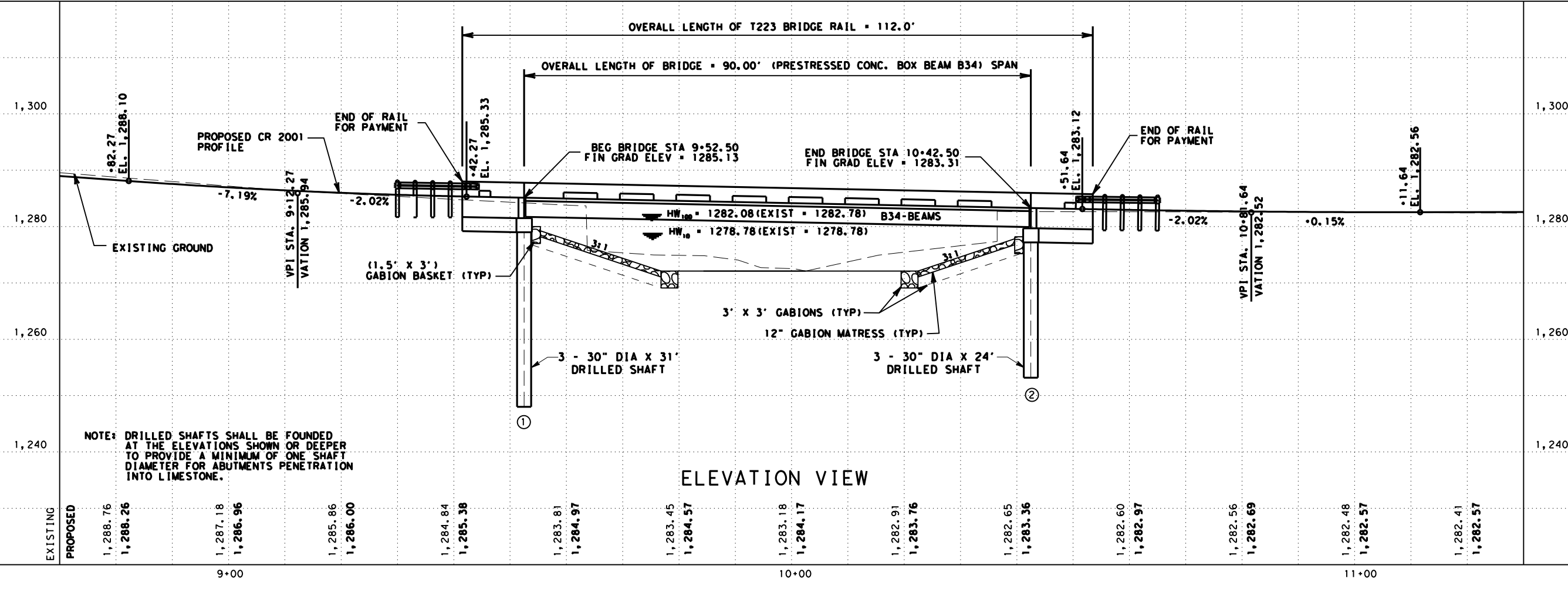
CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	36	

NOTE: UTILITY LOCATIONS ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL UTILITIES PRIOR TO CONSTRUCTION.

PLAN VIEW



ELEVATION VIEW



DESIGN SPEED: MOE
 FUNCTIONAL CLASS: RURAL
 MINOR COLLECTOR
 ADT (2017): 103
 ADT (2033): 200
 OLD NBI = 231410AA0041002
 NEW NBI = 231410AA0041004

SCALE 1:20



04/02/2022

CR 2001
 BRIDGE LAYOUT
 0923-10-020
 LUCY CREEK




©2022 Texas Department of Transportation

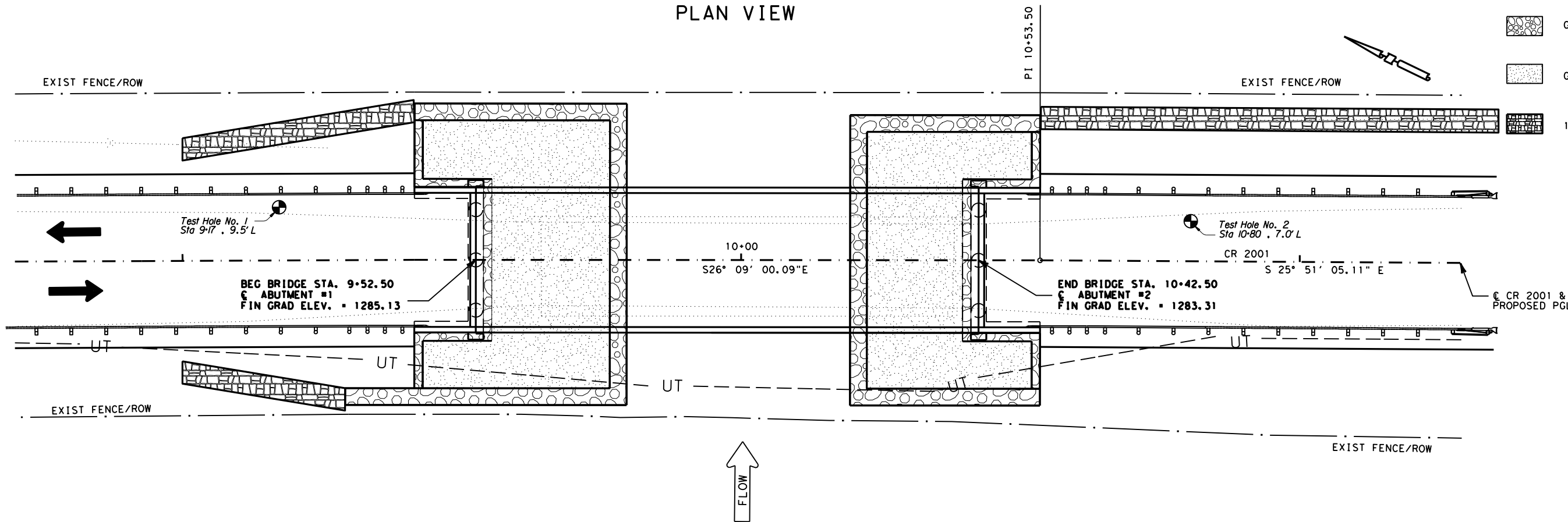
SHEET 1 OF 1

CONTRACT	JOB	HIGHWAY
0923 10	020	CR 2001
DIST	COUNTY	SHEET NO
BWD	LAMPASAS	37

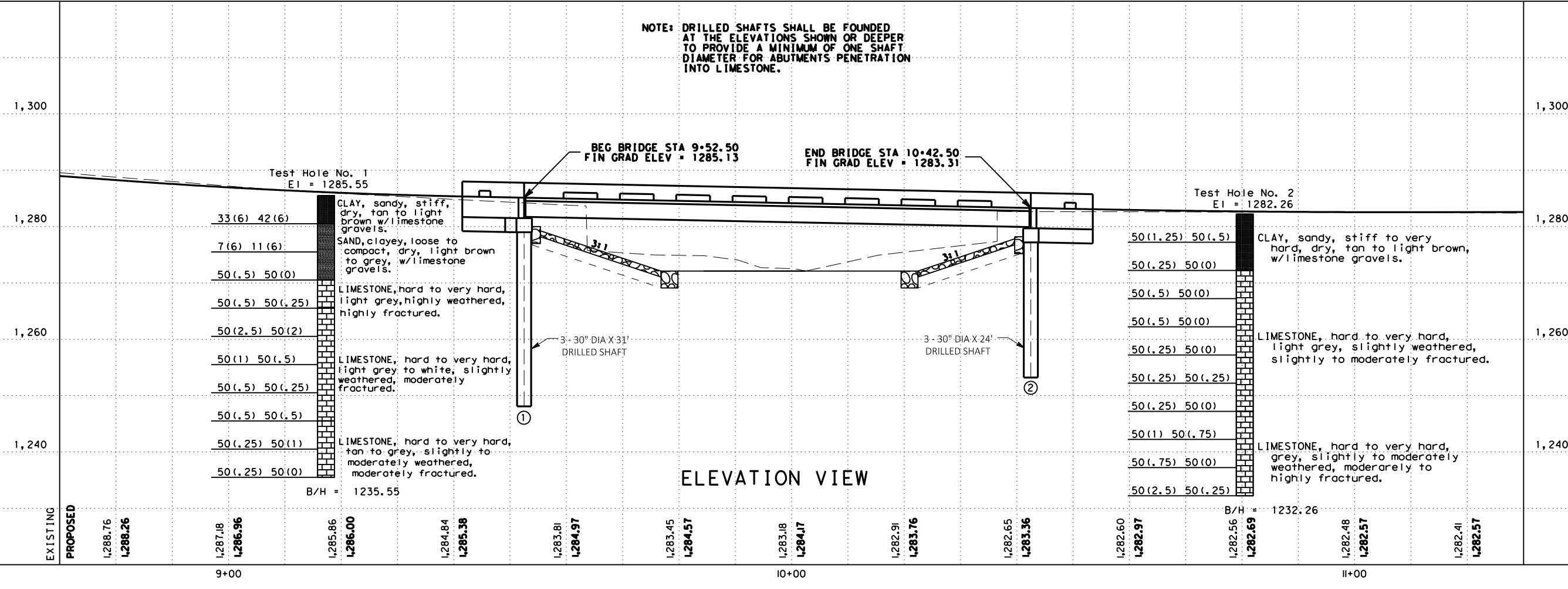
DATE: 2/24/2022 7:54:34 AM
 FILE: D:\Sgr2001\BRIDGE LAYOUT.dgn

PLAN VIEW

-  GABION BASKETS
-  GABION MATTRESSES
-  12" STONE PROTECTION

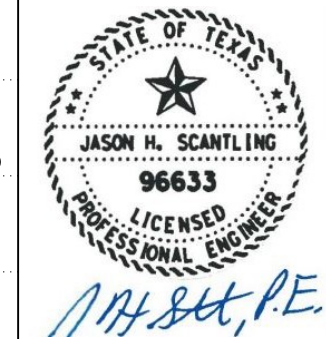


NOTE: DRILLED SHAFTS SHALL BE FOUNDED AT THE ELEVATIONS SHOWN OR DEEPER TO PROVIDE A MINIMUM OF ONE SHAFT DIAMETER FOR ABUTMENTS PENETRATION INTO LIMESTONE.



DESIGN SPEED: MOE
FUNCTIONAL CLASS: RURAL
MINOR COLLECTOR
ADT (2017): 103
ADT (2033): 200
OLD NBI = 231410AA0041002
NEW NBI = 231410AA0041004

SCALE 1:20



04/02/2022

CR 2001
TEST HOLE DATA
0923-10-020
LUCY CREEK

2022		Texas Department of Transportation	
SHEET 1 OF 1			
CONT	SEC	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	38	

DATE: 2/24/2022 7:48:03 AM
FILE: D:\cr2001\TEST HOLE DATA.dgn

SUMMARY OF ESTIMATED BRIDGE QUANTITIES CSJ: 0923-10-020

STRUCTURE UNIT	ITEM 400	ITEM 416	ITEM 420	ITEM 422	ITEM 422	ITEM 425	ITEM 425	ITEM 432	ITEM 450	ITEM 459	ITEM 459	ITEM 459
	6005 CEM STABIL BKFL CY	6003 DRILL SHAFT (30 IN) LF	6013 CL C CONC (ABUT) CY	6005 REINF CONC SLAB BOX BEAM SF	6023 SHEAR KEY CY	6005 PRESTR CONC BOX BEAM (4B34) LF	6006 PRESTR CONC BOX BEAM (5B34) LF	6031 RIPRAP (STONE PROTECTION) (12 IN) CY	6006 RAIL (TY T223) LF	6007 GABION MATTRESS (GALV) (12IN) SY	6009 GABION (3' X 3') (GALV) CY	6013 GABION (1.5' X 3') (GALV) CY
2 ABUTMENTS	68.0	165.0	34.4					35.0	44.0	278.0	84.0	24.0
90' PRESTRESSED BOX BEAM (B34)				2355.0	24.1	358.00	179.00		180.0			
TOTALS	68.0	165.0	34.4	2355.0	24.1	358.00	179.00	35.0	224.0	278.0	84.0	24.0

BEGIN AND END BRIDGE ELEVATIONS

BEGIN BRIDGE STATION 9+52.50 ELEVATION 1285.13 FT
 END BRIDGE STATION 10+42.50 ELEVATION 1283.31 FT

CAP ELEVATIONS (FT)

STEP 1 STEP 4 STEP 7
 (RIGHT) (LT.SIDE) (RT.SIDE) (LEFT)
 ABUT 1 (FWD) 1281.222 1281.487 1281.487 1281.222

STEP 1 STEP 4 STEP 7
 (RIGHT) (LT.SIDE) (RT.SIDE) (LEFT)
 ABUT 2 (BK) 1279.436 1279.701 1279.701 1279.436

ELEVATION LOCATIONS

DISTANCE FROM PGL TO STEP 1 ALONG CENTERLINE OF BEARING = 13.250 FT LT

STEP SPACING
 (ALONG C.L.
 OF BEARING)

STEP 1
 13.250 FT
 STEP 4
 13.250 FT
 STEP 7

STEP POSITIONS

STEP 1 is located to the left of BEAM 1.
 STEP 4 is located to the between BEAM 3 and BEAM 4.
 STEP 7 is located to the right of BEAM 6.

BEAM SLOPES (FT/FT)

BEAM 1 BEAM 2 BEAM 3 BEAM 4 BEAM 5 BEAM 6
 SPAN 1 -0.0202 -0.0202 -0.0202 -0.0202 -0.0202 -0.0202

BEARING PAD TAPER (IN/IN) -- FABRICATOR'S REPORT
 PERPENDICULAR TO THE CENTERLINE OF BEARING.

SUMMATION OF BEARING PAD TAPER DUE TO CROSS-SLOPE, GRADE, AND SKEW, MEASURED IN IN/IN.
 A POSITIVE TAPER INDICATES INCREASING PAD THICKNESS IN DIRECTION OF INCREASING STATIONS.
 A NEGATIVE TAPER INDICATES DECREASING PAD THICKNESS IN DIRECTION OF INCREASING STATIONS.

BEAM 1 BEAM 2 BEAM 3 BEAM 4 BEAM 5 BEAM 6
 ABUT 1 (FWD) -0.0202 -0.0202 -0.0202 -0.0202 -0.0202 -0.0202

BEAM 1 BEAM 2 BEAM 3 BEAM 4 BEAM 5 BEAM 6
 ABUT 2 (BK) -0.0202 -0.0202 -0.0202 -0.0202 -0.0202 -0.0202



JH Scantling, P.E.

04/02/2022

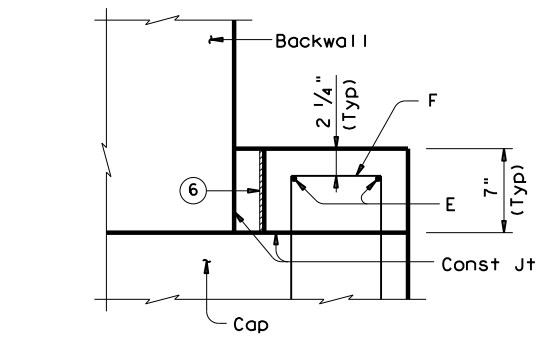
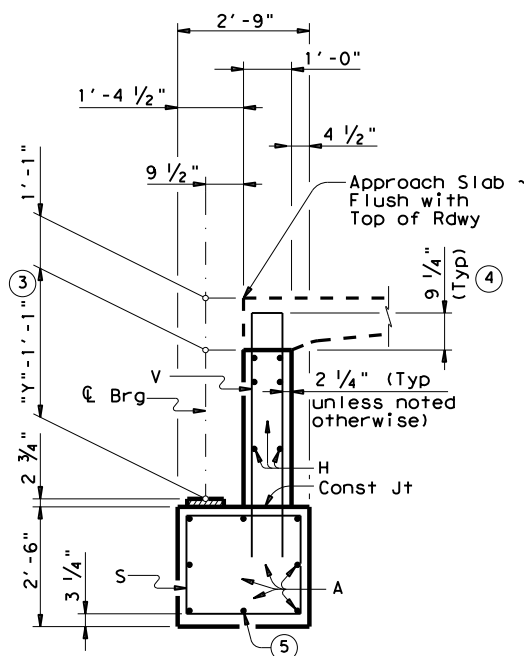
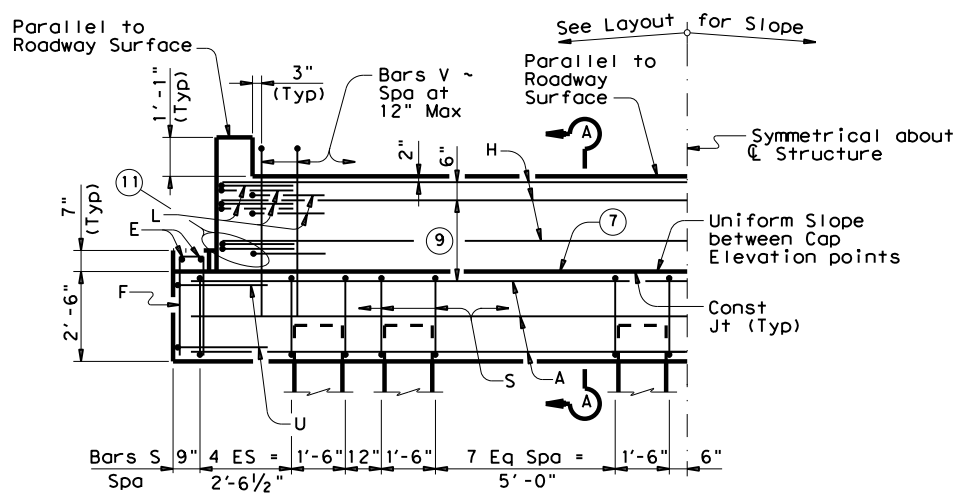
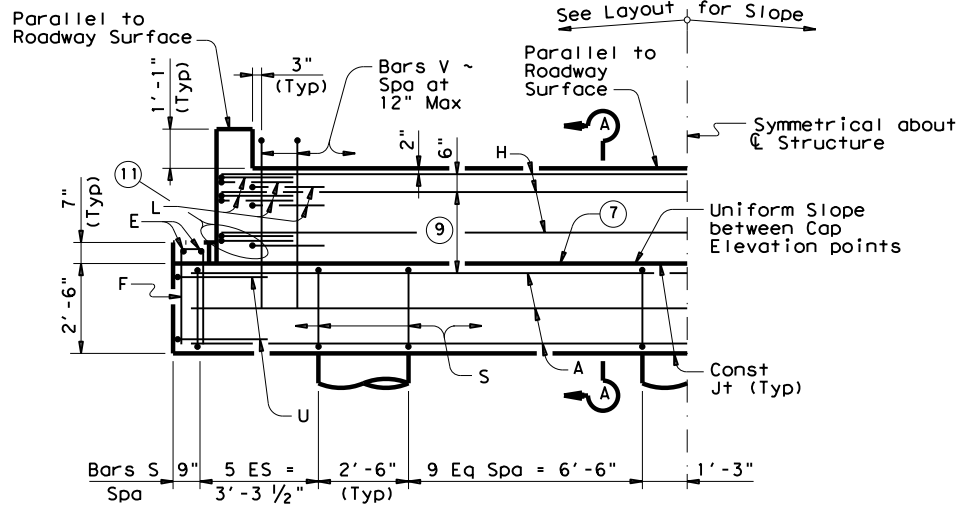
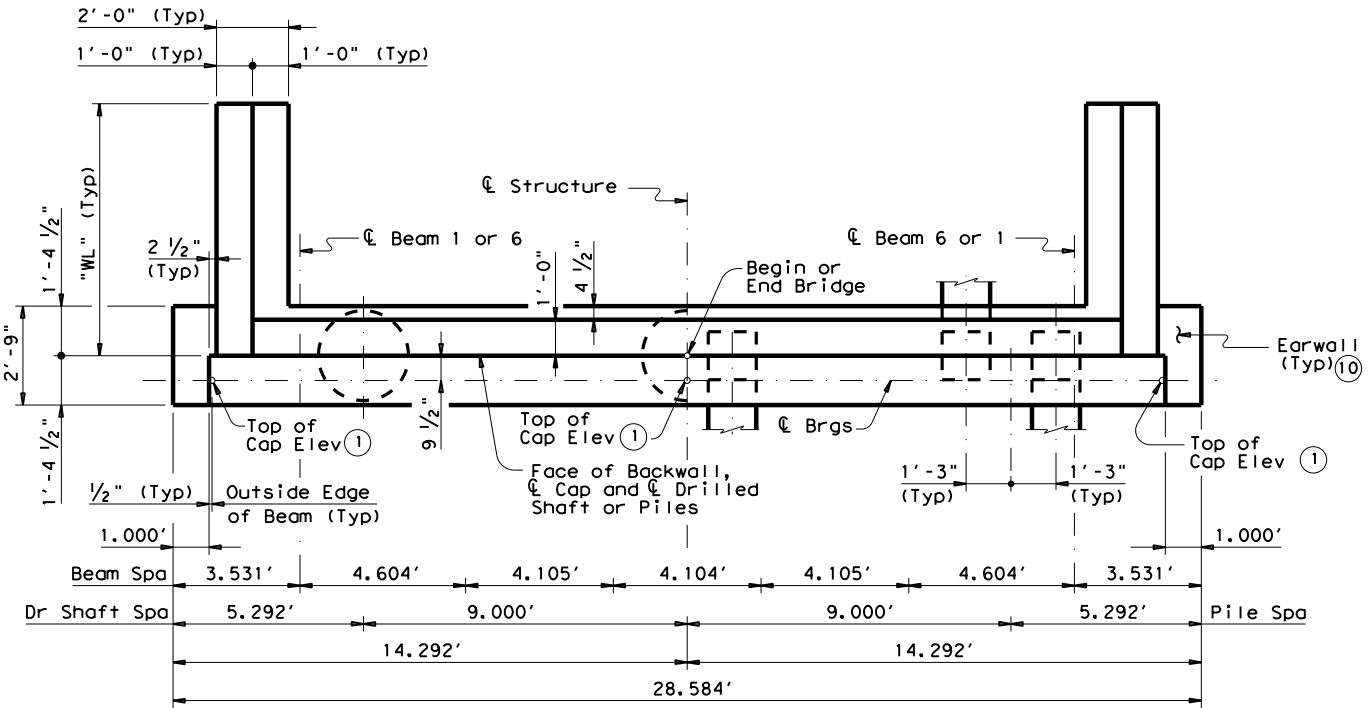
CR 2001
 ESTIMATED
 QUANTITIES AND
 CAP ELEVATIONS
 0923-10-020



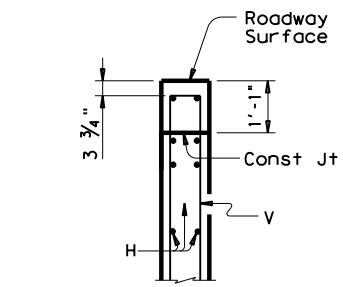
CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		39

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 3:55:11 PM
 FILE: D:\crr2001\STANDARDS\bbstd17.dgn



EARWALL ELEVATION DETAIL ⑩
 (Slope top of earwall away from beams)



BACKWALL DETAIL
 (Without Approach Slab) ②

TABLE OF WINGWALL LENGTHS "WL"	
Beam Type	"WL"
B20	8.000'
B28	10.000'
B34	11.000'

TABLE OF FOUNDATION LOADS ⑧		
Span Length	Drilled Shaft Load	Battered Pile Load
Ft	Tons/DS	Tons/Pile
30	50	38
35	55	41
40	60	43
45	64	45
50	68	47
55	73	50
60	77	52
65	81	54
70	85	56
75	89	58
80	93	60
85	97	62
90	101	64
95	105	66

- ① Top of Cap Elevations are based on section depths shown on Span Details.
- ② See Bridge Layout for Joint type and to determine if Approach Slab is present.
- ③ See Span details for "Y" value.
- ④ Increase as required to maintain 3 3/4" from Finished Grade.
- ⑤ With pile foundations, replace Bar A, located at bottom centerline of cap with 2 ~ #11 x 5'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.
- ⑥ 1/2" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.
- ⑦ Surface finish for the top of Cap will be a textured wood float finish. The surface must be level in the direction of the centerline of Beams.
- ⑧ Foundation loads are based on B34 beams.
- ⑨ Use 2 Eq Spa for B28 and B34 beams. Use 1 space for B20 beams.
- ⑩ Do not cast earwalls until beams are erected in their final position.
- ⑪ This set of Bars L only required for B28 and B34 beams.

GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications.
 Concrete strength f'c = 3,600 psi.
 All reinforcing must be Grade 60.
 Designed for normal embankment header slope of 3:1 or 2:1.
 See Bridge Layout for beam type and foundation type, size and length.
 See standard FD for all foundation details and notes.
 See applicable rail details for rail anchorage cast in wingwalls.
 See standard CRR for riprap attachment details, if applicable.
 These abutment details may be used only with the following standards:
 SBBS-B20-24 or SBBO-B20-24
 SBBS-B28-24 or SBBO-B28-24
 SBBS-B34-24 or SBBO-B34-24

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation
 Bridge Division Standard

ABUTMENTS
 PRESTR CONC BOX BEAMS
 24' RDWY

ABB-24

FILE: bbstd17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
04-11: Span length.	DIST	COUNTY	SHEET NO.	
	BWD	LAMPASAS	40	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results resulting from its use.

DATE: 12/8/2021 3:55:33 PM
 FILE: D:\crr2001\STANDARDS\bbstdel17.dgn

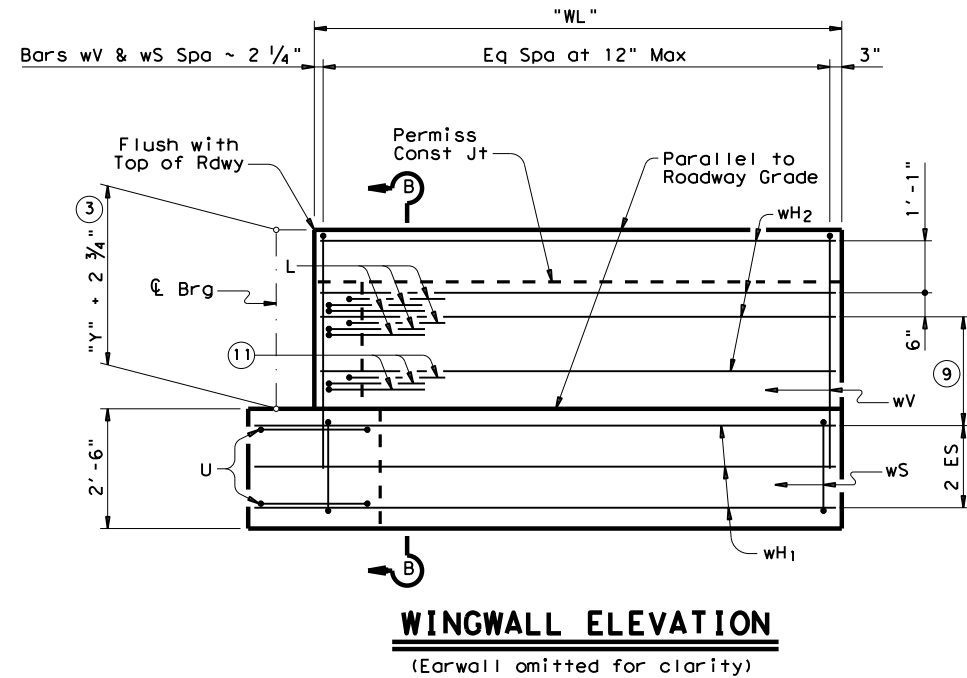
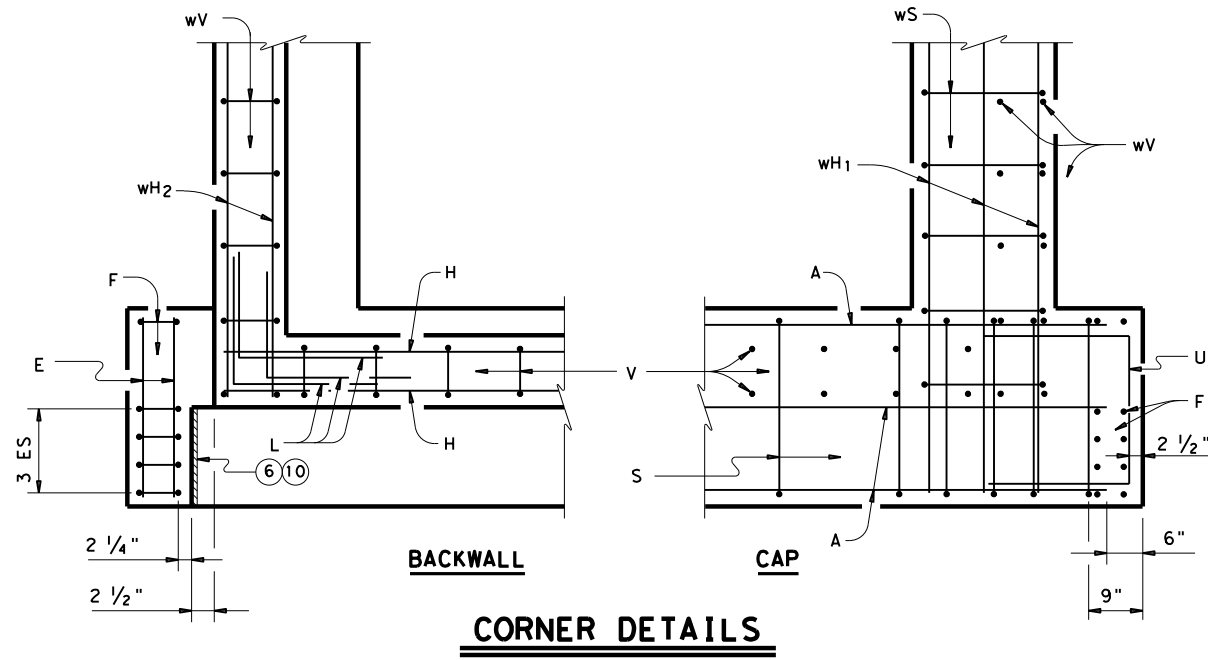


TABLE OF ESTIMATED QUANTITIES (TYPE B20 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27' - 7"	1,172
E	4	#5	2' - 5"	10
F	10	#5	6' - 1"	63
H	4	#6	25' - 10"	155
L	12	#6	4' - 0"	72
S	32	#4	9' - 8"	207
U	4	#6	7' - 3"	44
V	25	#5	7' - 6"	191
wH1	14	#6	9' - 0"	189
wH2	12	#6	7' - 8"	138
wS	18	#4	7' - 9"	93
wV	18	#5	7' - 9"	145
Reinforcing Steel				Lb 2,479
Class "C" Concrete (w/Slab)				CY 12.6
Class "C" Concrete (w/ACP)				CY 12.3

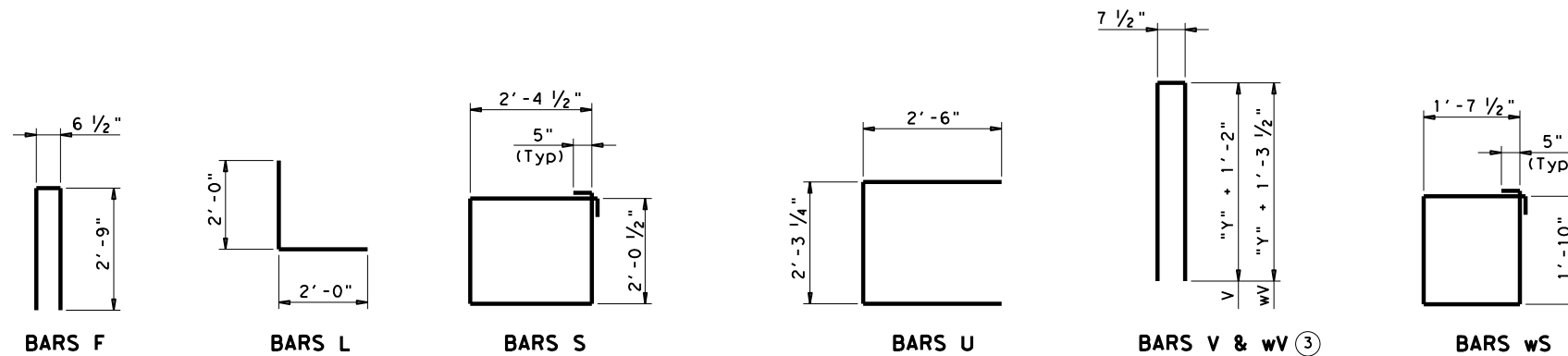
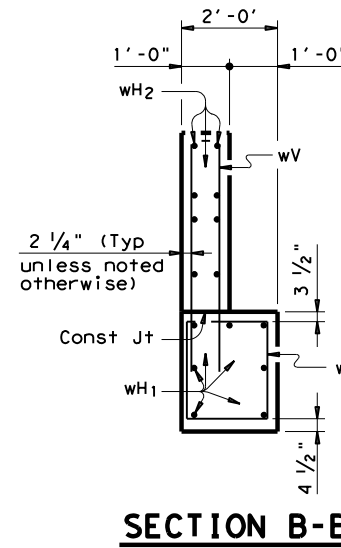
TABLE OF ESTIMATED QUANTITIES (TYPE B28 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27' - 7"	1,172
E	4	#5	2' - 5"	10
F	10	#5	6' - 1"	63
H	6	#6	25' - 10"	233
L	18	#6	4' - 0"	108
S	32	#4	9' - 8"	207
U	4	#6	7' - 3"	44
V	25	#5	8' - 9"	226
wH1	14	#6	11' - 0"	231
wH2	16	#6	9' - 8"	232
wS	22	#4	7' - 9"	114
wV	22	#5	9' - 0"	207
Reinforcing Steel				Lb 2,847
Class "C" Concrete (w/Slab)				CY 14.7
Class "C" Concrete (w/ACP)				CY 14.4

TABLE OF ESTIMATED QUANTITIES (TYPE B34 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27' - 7"	1,172
E	4	#5	2' - 5"	10
F	10	#5	6' - 1"	63
H	6	#6	25' - 10"	233
L	18	#6	4' - 0"	108
S	32	#4	9' - 8"	207
U	4	#6	7' - 3"	44
V	25	#5	9' - 10"	254
wH1	14	#6	12' - 0"	252
wH2	16	#6	10' - 8"	256
wS	24	#4	7' - 9"	124
wV	24	#5	10' - 1"	252
Reinforcing Steel				Lb 2,975
Class "C" Concrete (w/Slab)				CY 16.2
Class "C" Concrete (w/ACP)				CY 15.9

- (3) See Span details for "Y" value.
- (5) With pile foundations, replace Bar A, located at bottom centerline of cap, with 2 - #11 x 5' - 0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.
- (6) 1/2" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.
- (9) Use 2 Eq Spa for B28 and B34 beams and 1 space for B20 beams.
- (10) Do not cast earwalls until beams are erected in their final position.
- (11) This set of Bars L only required for B28 and B34 beams.
- (12) Quantities shown are for one Abutment only (with Approach Slab). With no Approach Slab, add 1.0 CY Class "C" concrete and 78 Lb reinforcing steel for 2 additional Bars H.



HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation
 Bridge Division Standard

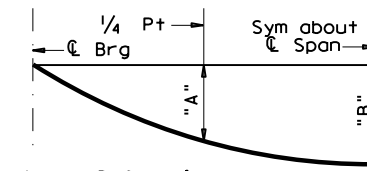
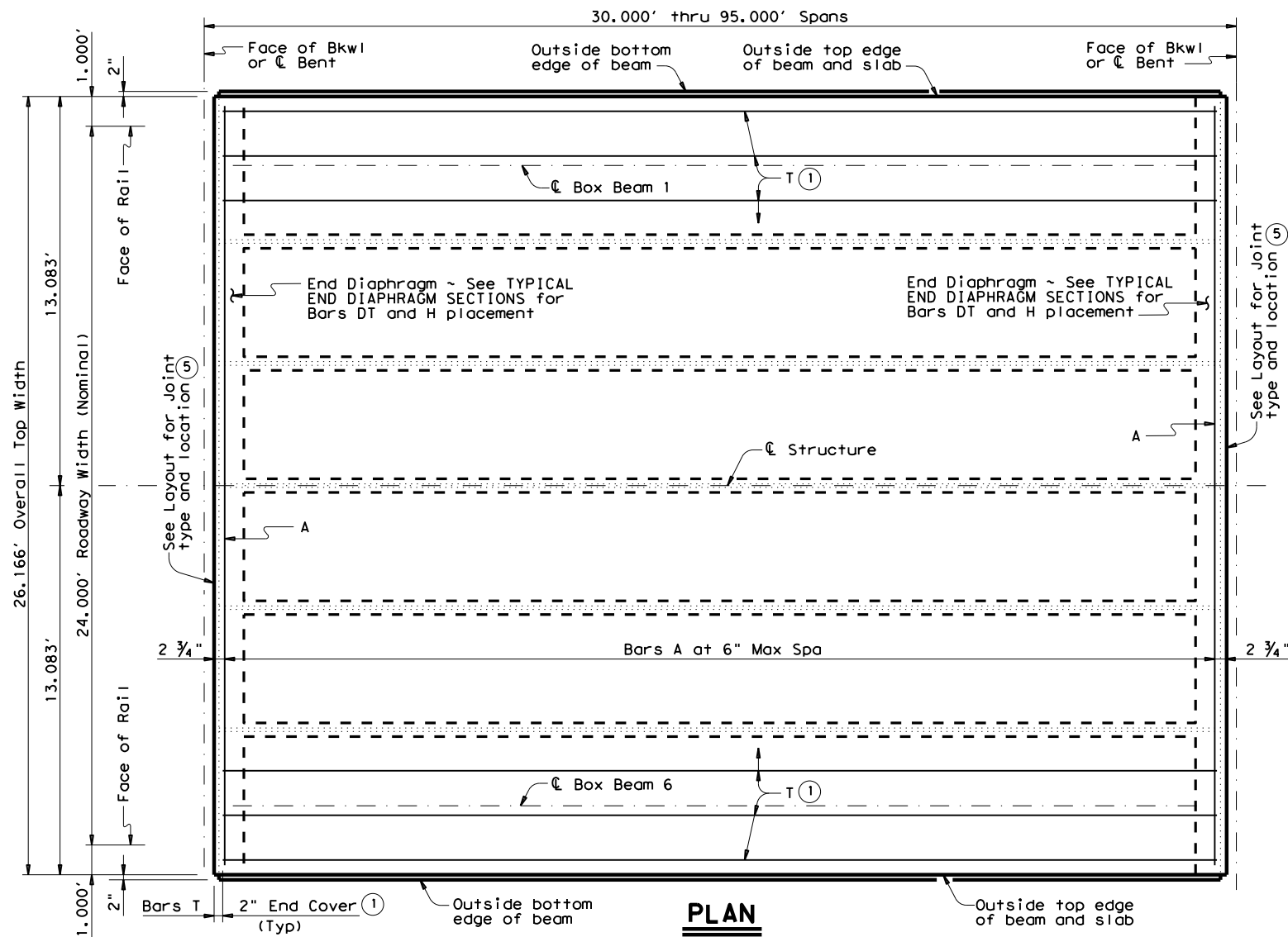
ABUTMENTS
 PRESTR CONC BOX BEAMS
 24' RDWY

ABB-24

FILE: bbstdel17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
04-11: Span length.	DIST	COUNTY	SHEET NO.	
	BWD	LAMPASAS	41	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 4:04:58 PM
 FILE: D:\crr2001\STANDARDS\bbstds23.dgn



Note: Deflections shown are due to shear key and concrete slab only, ($E_c = 5 \times 10^3$ ksi). Calculated deflections shown are theoretical and actual dimension may be less. Deflections may be adjusted based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

BAR TABLE

BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

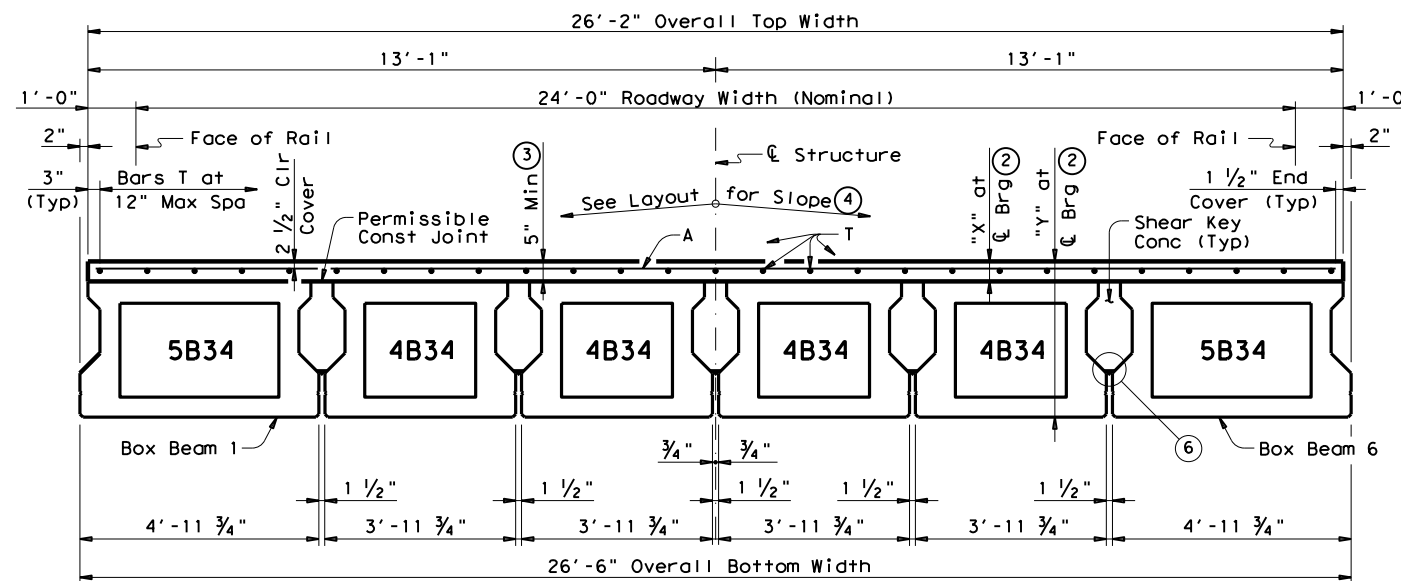
TABLE OF DEFLECTIONS AND SECTION DEPTHS

SPAN LENGTH (FT)	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT)			SECTION DEPTHS	
			SHEAR KEY	SLAB	TOTAL	"X" AT \bar{C} BRG 2	"Y" AT \bar{C} BRG 2
30	ALL	"A"	0.000	0.000	0.000	5"	3'-3"
		"B"	0.000	0.001	0.001		
35	ALL	"A"	0.000	0.001	0.001	5 1/4"	3'-3 1/4"
		"B"	0.001	0.001	0.002		
40	ALL	"A"	0.001	0.001	0.002	5 1/4"	3'-3 1/4"
		"B"	0.001	0.002	0.003		
45	ALL	"A"	0.002	0.002	0.004	5 1/4"	3'-3 1/4"
		"B"	0.002	0.003	0.005		
50	ALL	"A"	0.002	0.003	0.005	5 1/4"	3'-3 1/4"
		"B"	0.003	0.005	0.008		
55	ALL	"A"	0.003	0.005	0.008	5 1/4"	3'-3 1/4"
		"B"	0.005	0.007	0.012		
60	ALL	"A"	0.005	0.007	0.012	5 1/4"	3'-3 1/4"
		"B"	0.007	0.009	0.016		
65	ALL	"A"	0.007	0.009	0.016	5 1/2"	3'-3 1/2"
		"B"	0.010	0.013	0.023		
70	ALL	"A"	0.009	0.013	0.022	5 3/4"	3'-3 3/4"
		"B"	0.013	0.018	0.031		
75	ALL	"A"	0.012	0.017	0.029	5 3/4"	3'-3 3/4"
		"B"	0.017	0.024	0.041		
80	ALL	"A"	0.016	0.022	0.038	6"	3'-4"
		"B"	0.023	0.031	0.054		
85	ALL	"A"	0.021	0.028	0.049	6 1/2"	3'-4 1/2"
		"B"	0.029	0.039	0.068		
90	ALL	"A"	0.026	0.035	0.061	6 3/4"	3'-4 3/4"
		"B"	0.037	0.050	0.087		
95	ALL	"A"	0.033	0.044	0.077	7"	3'-5"
		"B"	0.046	0.062	0.108		

- 1 If multi-span units (with slab continuous over Interior Bents) are indicated on the Bridge Layout, Bars T must be continuous through joint. See Continuous Slab Detail.
- 2 Based on theoretical beam camber, dead load deflections of 5" Cast-in-place slab, shear key dead load and a constant grade. The contractor must adjust these values for any vertical curve.
- 3 Slab thickness at midspan of Beams may not exceed 7 inches.
- 4 This standard does not provide for changes in roadway cross slopes within the structure.
- 5 If using Type A expansion joints, the maximum distance between joints is 100 feet.
- 6 Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
 Provide Class S concrete ($f'_c = 4,000$ psi) for slab and shear key. Provide Class S (HPC) concrete if shown elsewhere in the plans.
 All reinforcing must be Grade 60.
 Two-span or three-span units, with the slab continuous over Interior Bents, may be formed with the details on this standard. Unit Length cannot exceed 3.5 times length of the shortest end span.
 Bar laps, where required, will be as follows:
 Uncoated ~ #4 = 1'-5"
 Epoxy coated ~ #4 = 2'-1"
 It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.
 This sheet does not support the use of Transition Bents.
 See railing details and standard BBRAS for rail anchorage.



HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation
 Bridge Division Standard

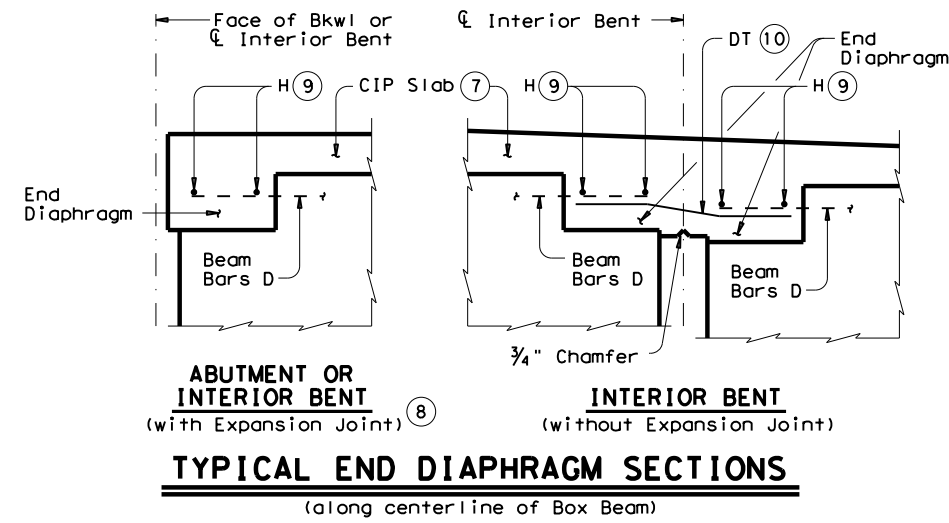
PRESTRESSED CONCRETE BOX BEAM SPANS
 TYPE B34 24' RDWY (WITH SLAB)

SBBS-B34-24

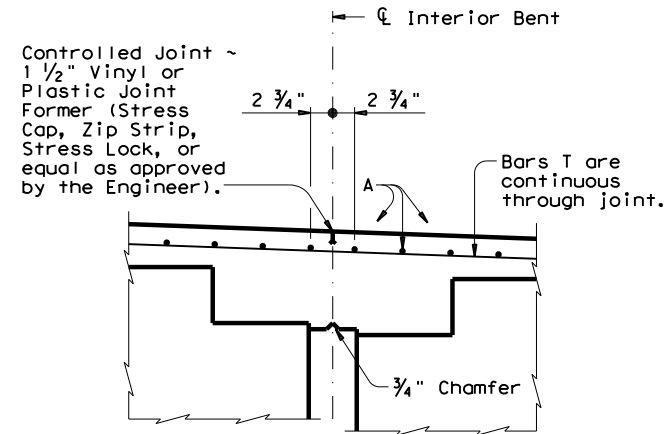
FILE: bbstds23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
04-11: Span length, 01-12: Cover, 10-15: Table of Est Quantities, Notes.	DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	42		

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

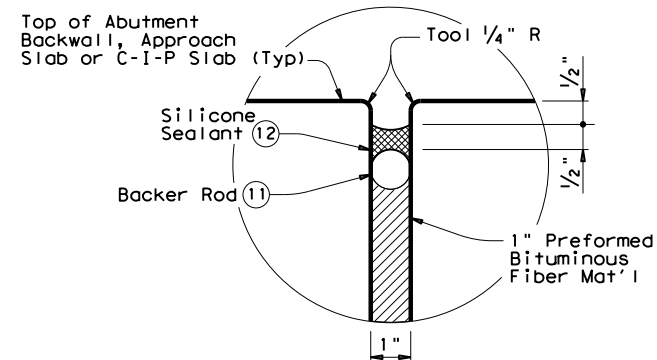
DATE: 12/8/2021 4:05:15 PM
 FILE: D:\cr2001\STANDARDS\bbstds23.dgn



TYPICAL END DIAPHRAGM SECTIONS
 (along centerline of Box Beam)



CONTINUOUS SLAB DETAIL
 (Diaphragm reinforcing not shown for clarity)



TYPE A JOINT DETAIL 5

TABLE OF ESTIMATED QUANTITIES					
SPAN LENGTH	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B34) (13)	PRESTR CONCRETE BOX BEAMS (TY 5B34) (13)	TOTAL REINF STEEL (14)
FT	CY	SF	LF	LF	Lb
30	7.9	785	118.00	59.00	1,570
35	9.3	916	138.00	69.00	1,832
40	10.6	1,047	158.00	79.00	2,094
45	12.0	1,177	178.00	89.00	2,354
50	13.3	1,308	198.00	99.00	2,616
55	14.7	1,439	218.00	109.00	2,878
60	16.0	1,570	238.00	119.00	3,140
65	17.4	1,701	258.00	129.00	3,402
70	18.7	1,832	278.00	139.00	3,664
75	20.0	1,962	298.00	149.00	3,924
80	21.4	2,093	318.00	159.00	4,186
85	22.7	2,224	338.00	169.00	4,448
90	24.1	2,355	358.00	179.00	4,710
95	25.4	2,486	378.00	189.00	4,972

- 5 If using Type A expansion joints, the maximum distance between joints is 100 ft.
- 7 Slab reinforcing omitted for clarity.
- 8 See Bridge Layout for Joint type.
- 9 Provide 1 1/2" end cover to Bars H. After all beams have been placed, weld one Bar H to two Bars D at each end of all beams.
- 10 Lap Bars DT 9" Min with each Beam Bar D at Interior Bents without Expansion Joints. Bars DT shown bent for clarity only.
- 11 Backer rod must be 25% larger than joint opening and must be compatible with the sealant.
- 12 Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints".
- 13 Fabricator must adjust beam lengths for beam slopes as required.
- 14 Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation
 Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS
 TYPE B34 24' RDWY (WITH SLAB)

SBBS-B34-24

FILE: bbstds23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
04-11: Span length.	DIST	COUNTY	SHEET NO.	
01-12: Cover.	BWD	LAMPASAS	43	
10-15: Table of Est Quantities, Notes.				

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

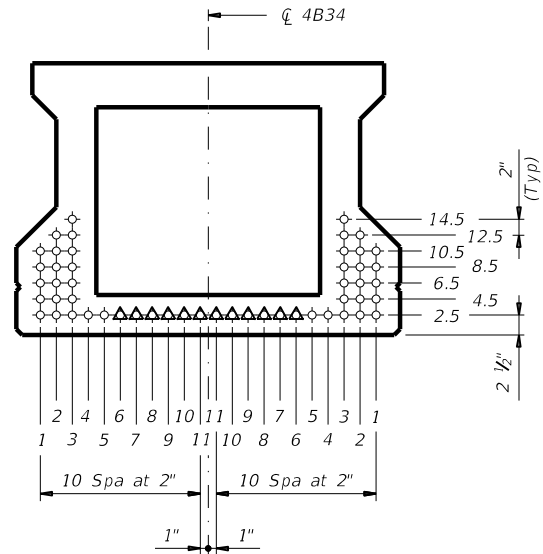
DATE: 12/8/2021 4:07:37 PM
 FILE: D:\crr2001\STANDARDS\bbstds15.dgn

STANDARD SBBS-B34-24	DESIGNED BEAMS (STRAIGHT STRANDS)																		OPTIONAL DESIGN						
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						DEBONDED STRAND PATTERN PER ROW						CONCRETE		DESIGN LOAD COMP STRESS (TOP) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR				
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)							RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	LIVE LOAD DISTRIBUTION FACTOR (2)		
												TOTAL	DE-BONDED	3	6	9	12						15	Moment	Shear
24' Roadway 5" Slab	30	1&6	5B34		8	0.6	270	13.78	13.78	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.361	-0.395	761	0.465	0.704
	30	2-5	4B34		6	0.6	270	13.58	13.58	0	2.50	6	0	0	0	0	0	0	4.000	5.000	0.405	-0.428	673	0.395	0.522
	35	1&6	5B34		8	0.6	270	13.78	13.78	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.471	-0.509	955	0.450	0.693
	35	2-5	4B34		8	0.6	270	13.58	13.58	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.528	-0.551	838	0.376	0.509
	40	1&6	5B34		10	0.6	270	13.78	13.78	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.595	-0.637	1165	0.438	0.683
	40	2-5	4B34		8	0.6	270	13.58	13.58	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.670	-0.692	1027	0.366	0.499
	45	1&6	5B34		10	0.6	270	13.78	13.78	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.735	-0.782	1401	0.427	0.675
	45	2-5	4B34		8	0.6	270	13.58	13.58	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.831	-0.852	1240	0.357	0.491
	50	1&6	5B34		10	0.6	270	13.78	13.78	0	2.50	10	0	0	0	0	0	0	4.000	5.000	0.896	-0.948	1680	0.418	0.668
	50	2-5	4B34		10	0.6	270	13.58	13.58	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.015	-1.036	1488	0.349	0.486
	55	1&6	5B34		12	0.6	270	13.78	13.78	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.071	-1.128	1893	0.410	0.661
	55	2-5	4B34		10	0.6	270	13.58	13.58	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.215	-1.234	1559	0.342	0.481
	60	1&6	5B34		12	0.6	270	13.78	13.78	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.258	-1.319	1880	0.402	0.655
	60	2-5	4B34		10	0.6	270	13.58	13.58	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.430	-1.448	1543	0.336	0.477
	65	1&6	5B34		12	0.6	270	13.78	13.78	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.460	-1.525	1961	0.396	0.650
	65	2-5	4B34		12	0.6	270	13.58	13.58	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.665	-1.680	1754	0.333	0.473
	70	1&6	5B34		14	0.6	270	13.78	13.78	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.675	-1.743	2218	0.390	0.645
	70	2-5	4B34		14	0.6	270	13.58	13.58	0	2.50	14	0	0	0	0	0	0	4.000	5.000	1.920	-1.932	2002	0.333	0.469
	75	1&6	5B34		16	0.6	270	13.78	13.78	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.903	-1.973	2486	0.384	0.640
	75	2-5	4B34		16	0.6	270	13.58	13.58	0	2.50	16	0	0	0	0	0	0	4.000	5.000	2.191	-2.200	2264	0.333	0.466
80	1&6	5B34		18	0.6	270	13.78	13.78	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.146	-2.217	2768	0.379	0.636	
80	2-5	4B34		18	0.6	270	13.58	13.58	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.479	-2.483	2539	0.333	0.463	
85	1&6	5B34		22	0.6	270	13.78	13.78	0	2.50	22	0	0	0	0	0	0	4.000	5.000	2.403	-2.476	3065	0.375	0.632	
85	2-5	4B34		22	0.6	270	13.58	13.58	4	2.50	22	4	2	2	0	0	0	4.000	5.000	2.785	-2.783	2827	0.333	0.460	
90	1&6	5B34		24	0.6	270	13.78	13.78	0	2.50	24	0	0	0	0	0	0	4.000	5.000	2.672	-2.745	3370	0.370	0.629	
90	2-5	4B34		24	0.6	270	13.42	13.36	6	2.50	22	6	4	2	0	0	0	4.000	5.400	3.107	-3.099	3129	0.333	0.457	
95	1&6	5B34		28	0.6	270	13.78	13.78	4	2.50	28	4	2	2	0	0	0	4.000	5.000	2.955	-3.028	3690	0.366	0.625	
95	2-5	4B34		28	0.6	270	13.15	13.04	6	2.50	22	6	2	0	2	2	0	4.200	5.000	3.446	-3.431	3444	0.333	0.455	

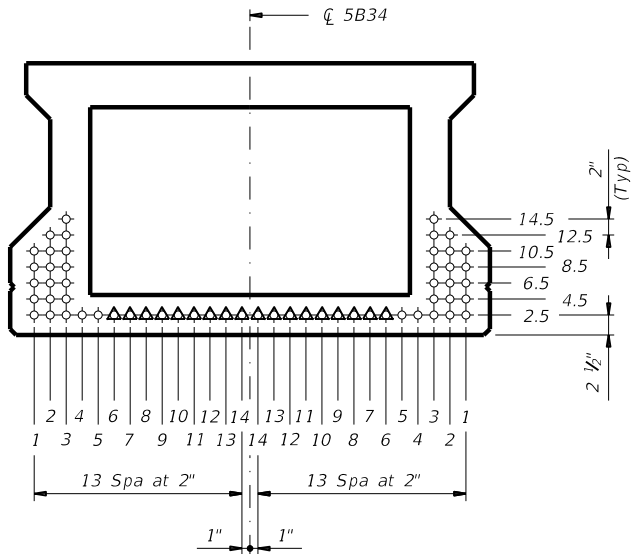
DESIGN NOTES:
 Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.
 Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

FABRICATION NOTES:
 Provide Class H concrete.
 Provide Grade 60 reinforcing steel bars.
 Use low relaxation strands, each pretensioned to 75 percent of fpu.
 When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
 Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:
 1) Locate a strand in each "1" position.
 2) Place strand symmetrically about vertical centerline of box.
 3) Space strands as equally as possible across the entire width.
 Strand debonding must comply with Item 424.4.2.2.4.
 Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.
 Full-length debonded strands are only permitted in positions marked Δ.

- ① Based on the following allowable stresses (ksi):
 Compression = 0.65 f'ci
 Tension = 0.24 √ f'ci
 Optional designs must likewise conform.
- ② Portion of full HL93.



TxDOT 4B34 BOX BEAM



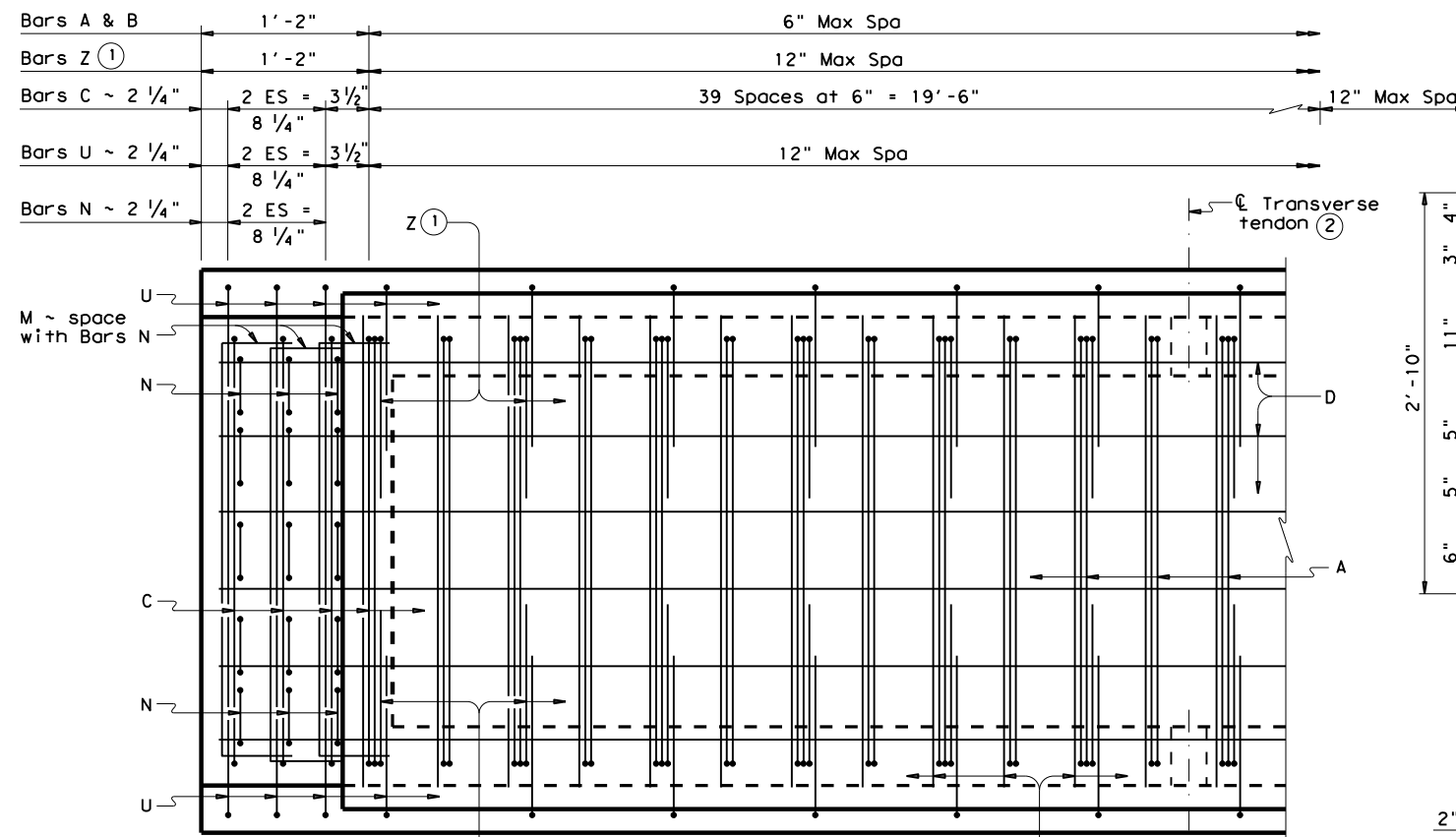
TxDOT 5B34 BOX BEAM

HL93 LOADING

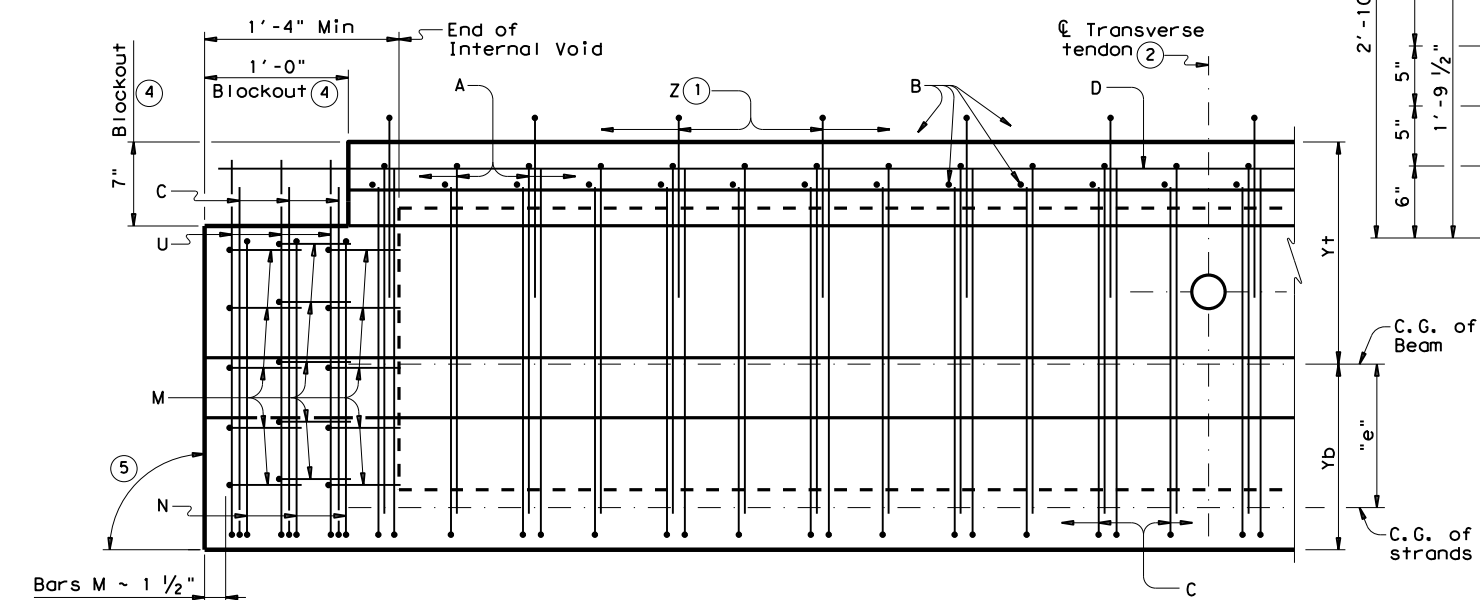
		Bridge Division Standard	
PRESTR CONC BOX BEAM STANDARD DESIGNS			
TYPE B34		24' RDWY (WITH SLAB)	
BBSDS-B34-24			
FILE: bbstds15.dgn	DN: SRW	CK: BMP	DW: SFS
©TxDOT December 2006	CONT	SECT	JOB
REVISIONS	0923	10	020
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		44

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

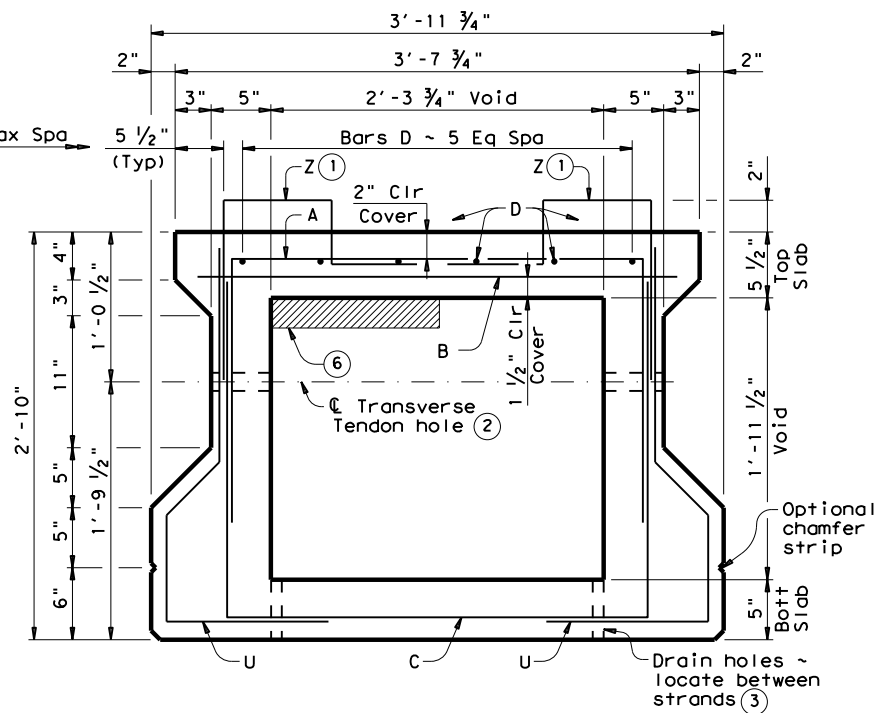
DATE: 12/8/2021 5:59:21 PM
 FILE: D:\crr2001\STANDARDS\bbstds03.dgn



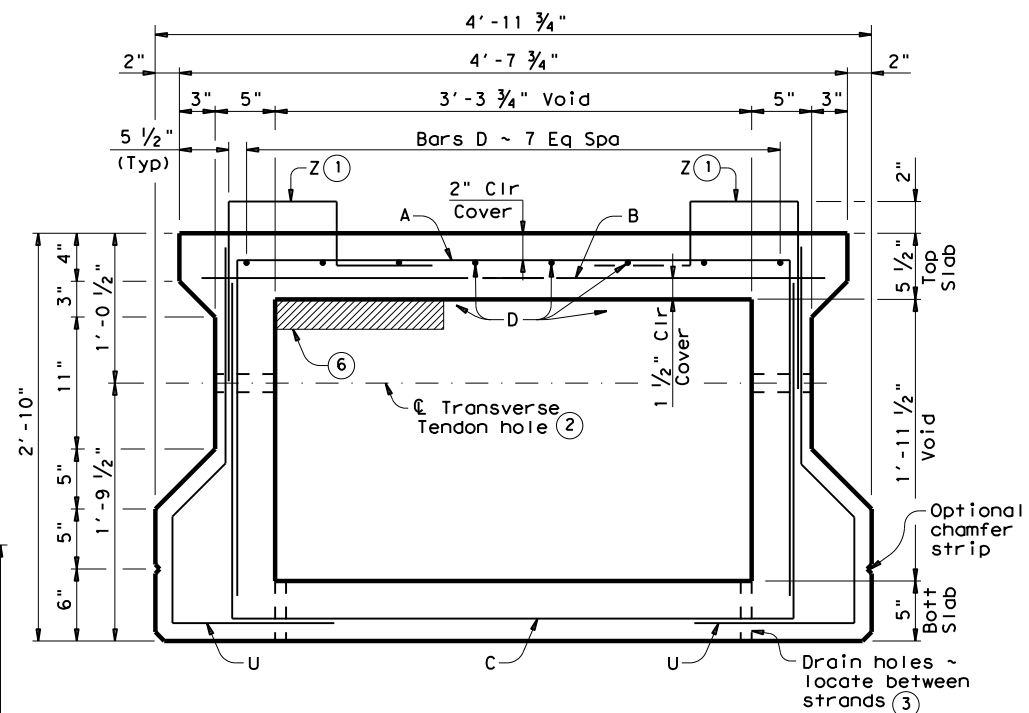
PARTIAL PLAN
(Showing Type 4B34)



ELEVATION



TYPICAL SECTION ~ TYPE 4B34



TYPICAL SECTION ~ TYPE 5B34

- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑤ 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.
- ⑥ Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRAO for void modification dimensions.
- ⑦ Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.
 Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
 1 1/4" clear cover to reinforcement is required unless noted otherwise.
 See standard BBRAS or BBRAO for railing anchorage at bridge edges to be cast in beams.
 An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be substituted for Bars A, B, C, and D.
 These details are applicable for skews up to 30 degrees only.
 Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

BEAM PROPERTIES			
		Type 4B34	Type 5B34
Area	in ²	798.8	924.8
Y top	in	17.92	17.72
Y bott	in	16.08	16.28
I	in ⁴	115,655	142,161
Weight ^⑦	lb/ft	832	963

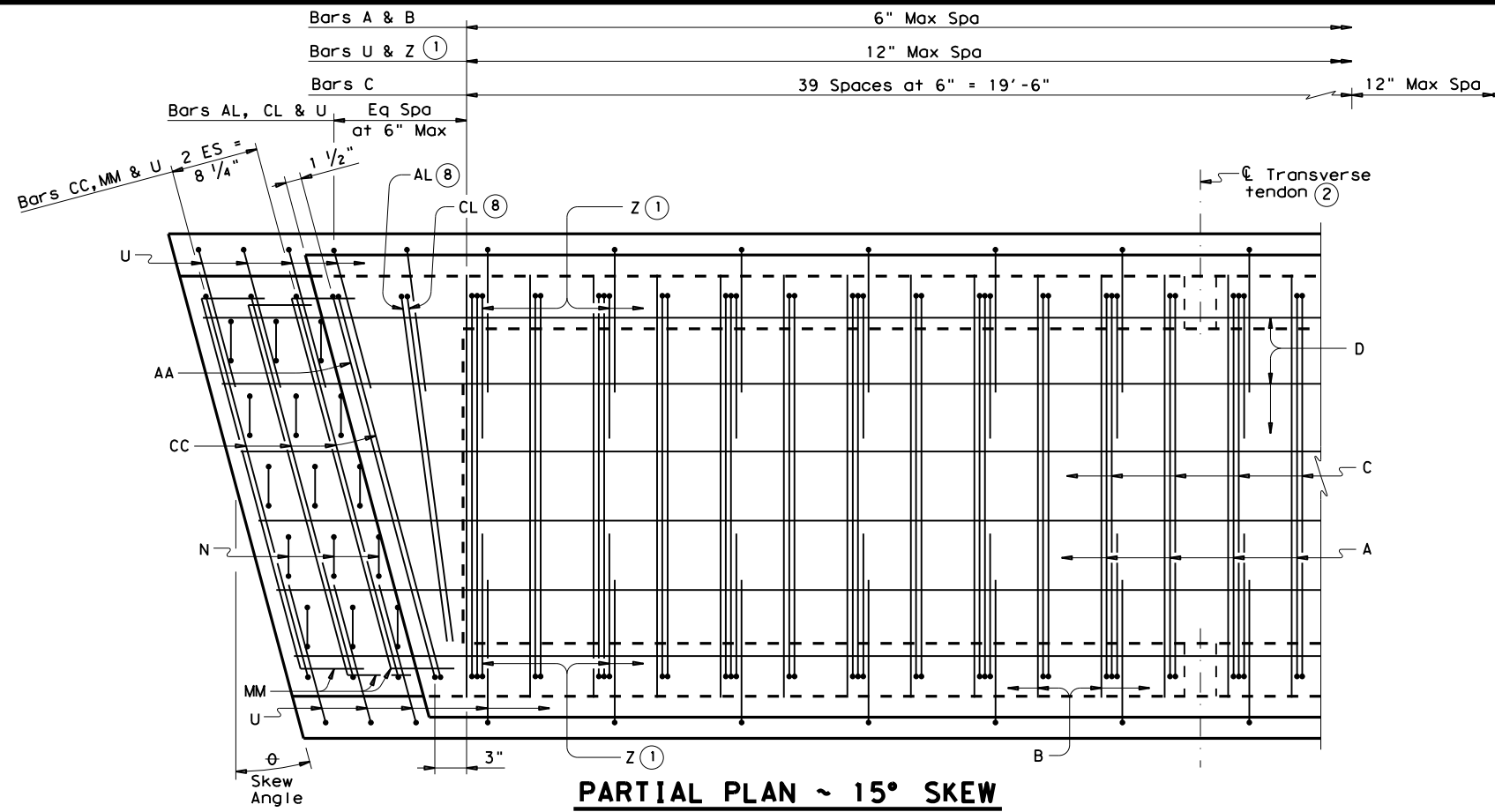
HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation
 PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B34)
 BB-B34

FILE: bbstds03.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
©TxDOT	December, 2006	CONT	SECT	JOB
REVISIONS	0923	10	020	CR 2001
01-12: Bars Z.	DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	45		

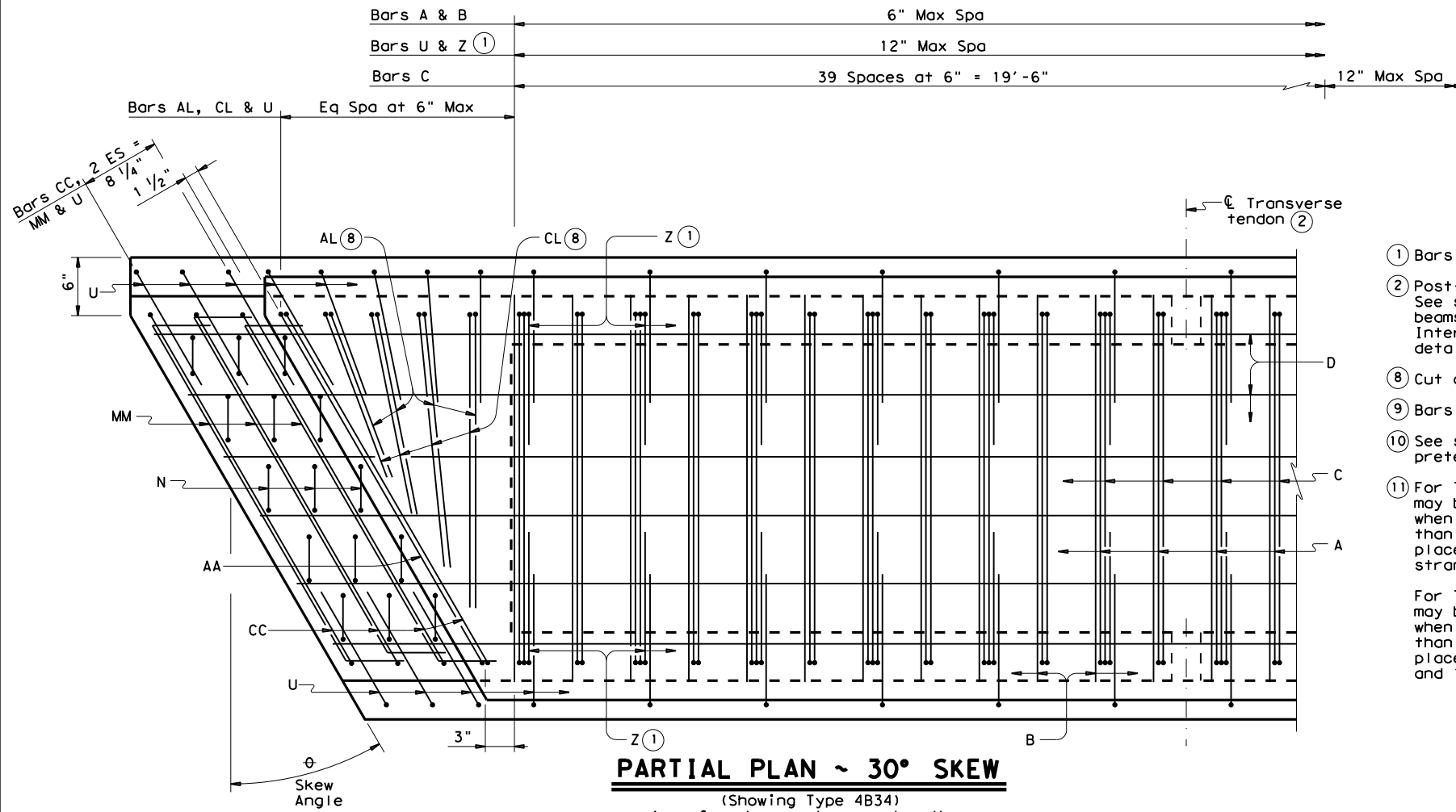
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 5:59:39 PM
 FILE: D:\crr2001\STANDARDS\bbstds03.dgn



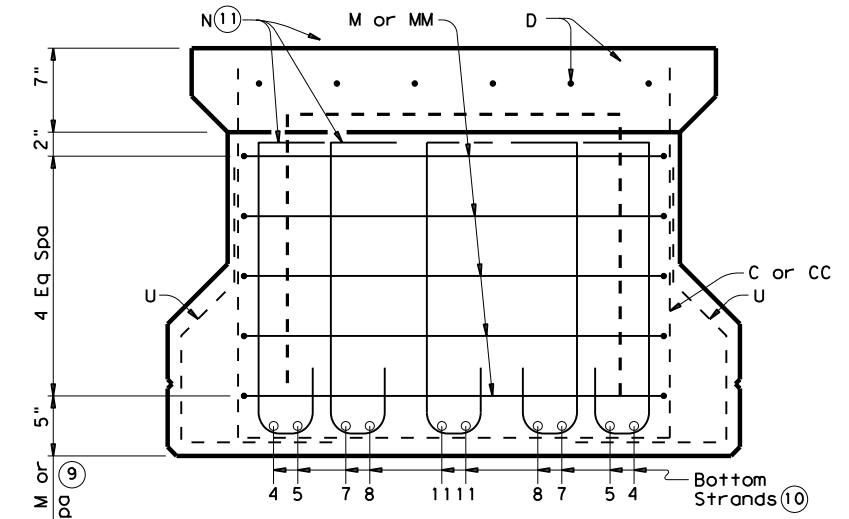
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B34)
 (use for skew angles of 15° or less)



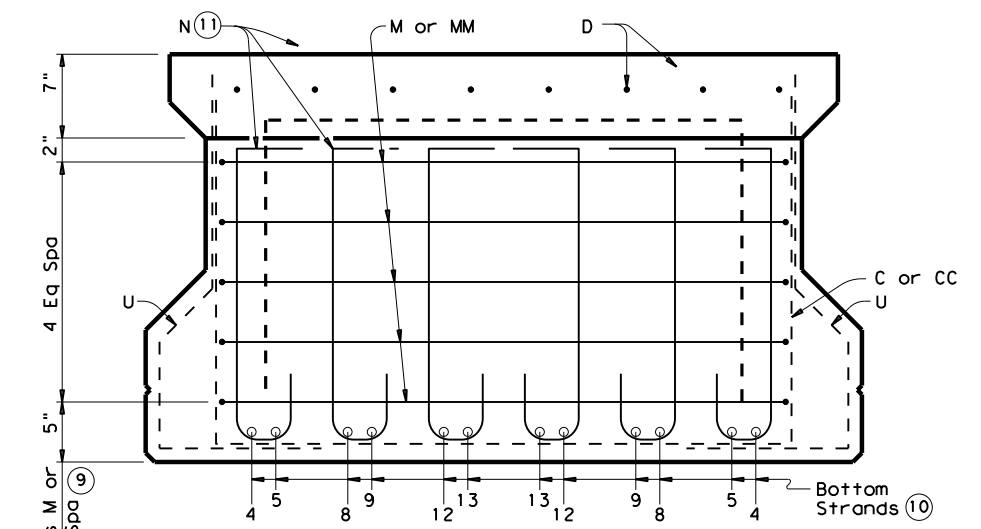
PARTIAL PLAN ~ 30° SKEW

(Showing Type 4B34)
 (use for skew angles greater than 15° and less than or equal to 30°)



SECTION THRU BLOCKOUT ~ TYPE 4B34

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B34

(Showing End Mat Reinforcing)

- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑨ Bars M may be adjusted vertically as required to avoid pretensioning strands in web.
- ⑩ See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.
- ⑪ For Type 4B34 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.

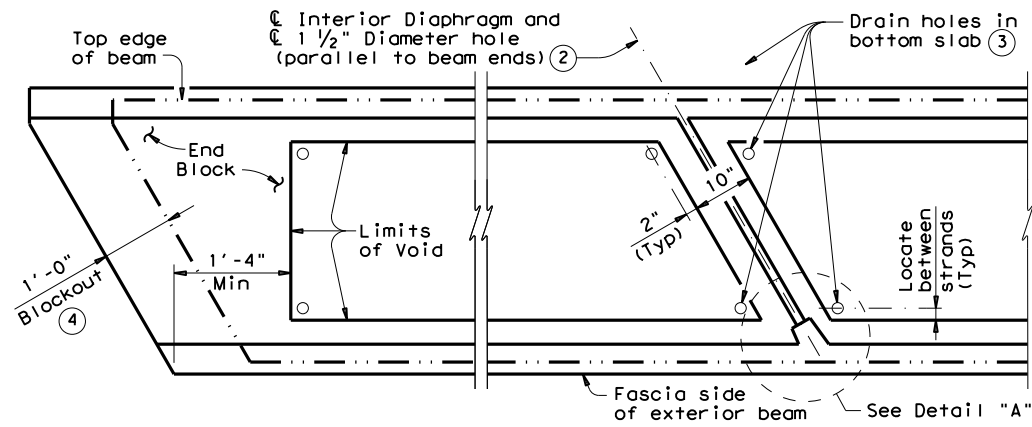
 For Type 5B34 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.

HL93 LOADING SHEET 2 OF 3

		Bridge Division Standard	
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B34)			
BB-B34			
FILE: bbstds03.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT	REVISIONS	CONT	SECT
0923	10	020	CR 2001
01-12: Bars Z.	DIST	COUNTY	SHEET NO.
BWD	LAMPASAS		46

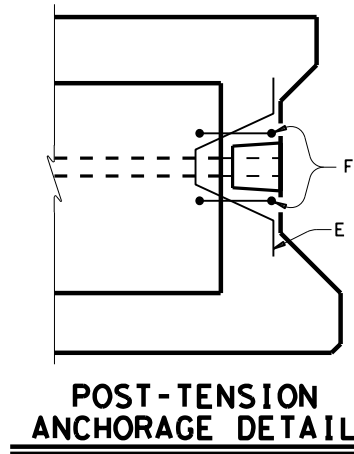
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 6:00:06 PM
 FILE: D:\crr2001\STANDARDS\bbstds03.dgn

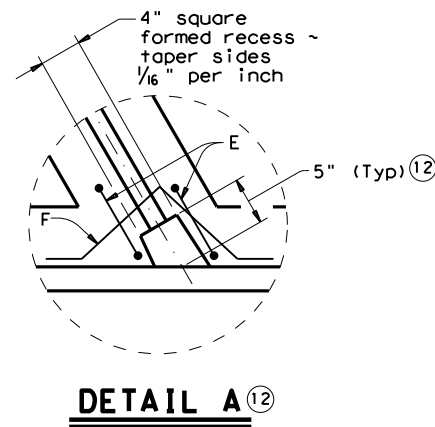


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

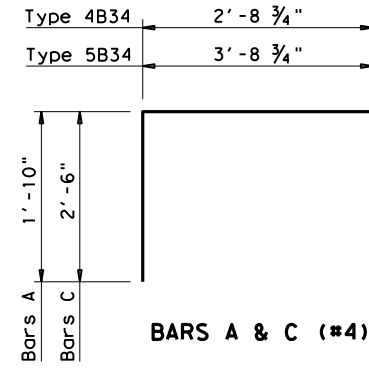
(Showing 30° skew)



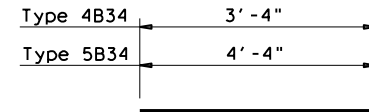
POST-TENSION ANCHORAGE DETAIL



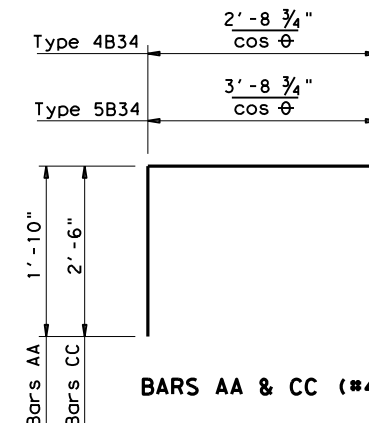
DETAIL A



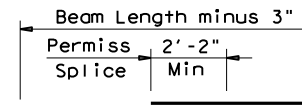
BARS A & C (#4)



BARS B (#4)

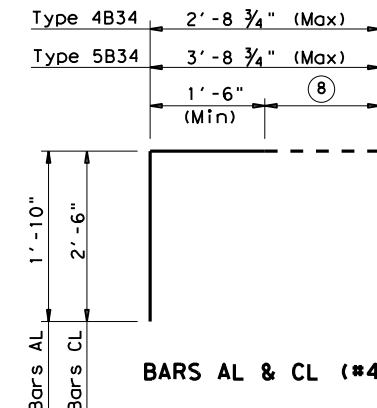


BARS AA & CC (#4)

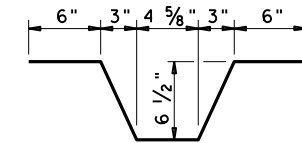


BARS D (#5)

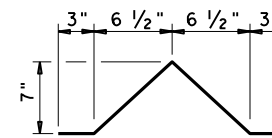
Permissible splices to be placed in middle third of span



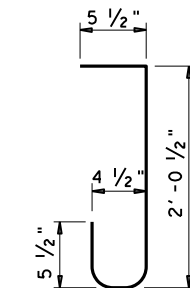
BARS AL & CL (#4)



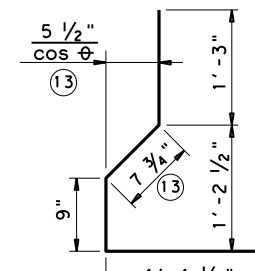
BARS E (#4)



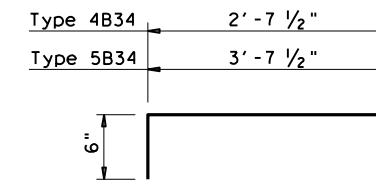
BARS F (#4)



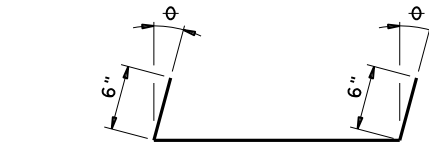
BARS N (#4)



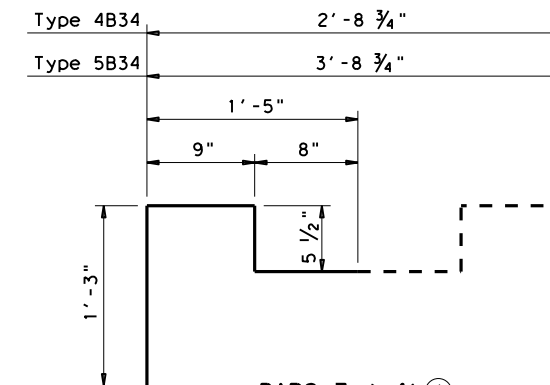
BARS U (#4)



BARS M (#4)



BARS MM (#4)



BARS Z (#4)

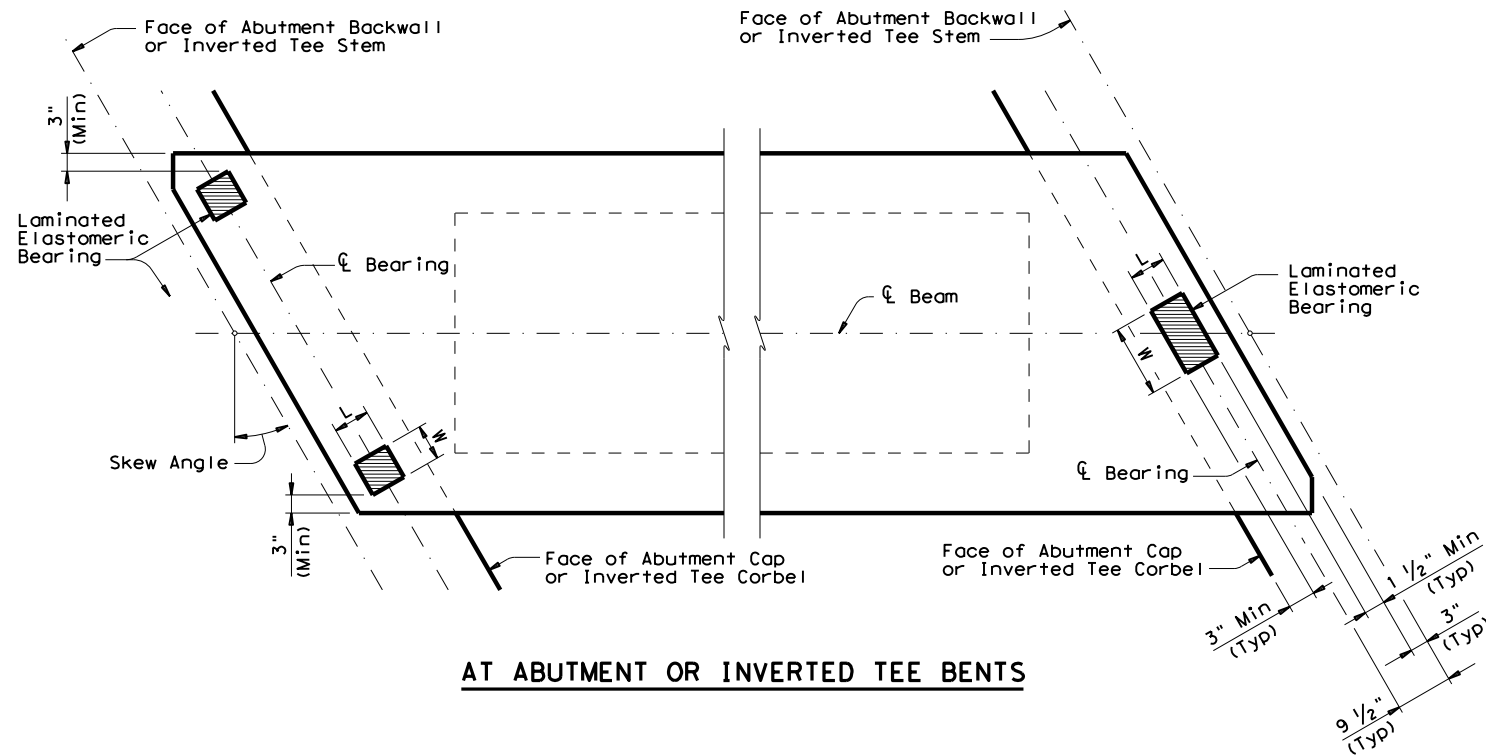
At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑫ 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.
- ⑬ Dimension will vary slightly with skew. Adjust as necessary.

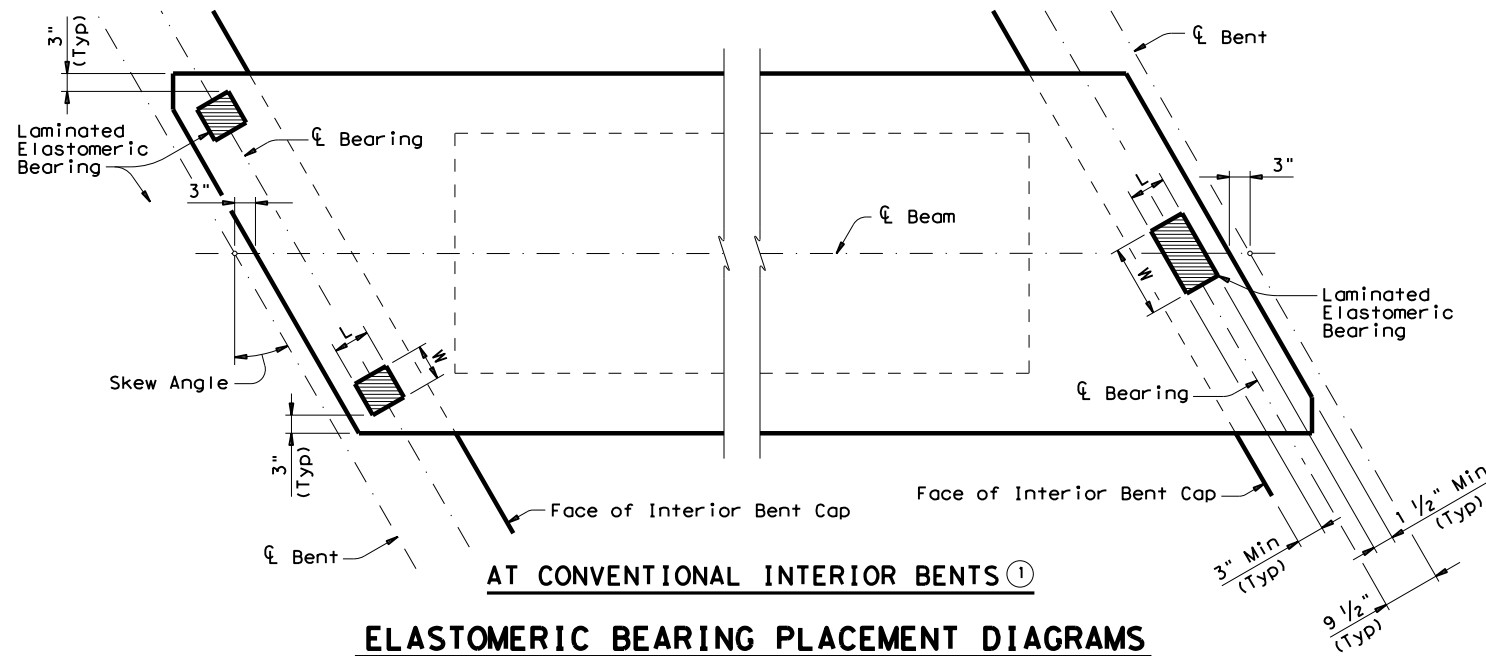
		Bridge Division Standard	
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B34)			
BB-B34			
FILE: bbstds03.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT December, 2006	CONT	SECT	HIGHWAY
REVISIONS	0923	10	020 CR 2001
01-12: Bars Z.	DIST	COUNTY	SHEET NO.
	BWD	LAMPASAS	47

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 6:09:21 PM
 FILE: D:\crr2001\STANDARDS\bbstdae08.dgn



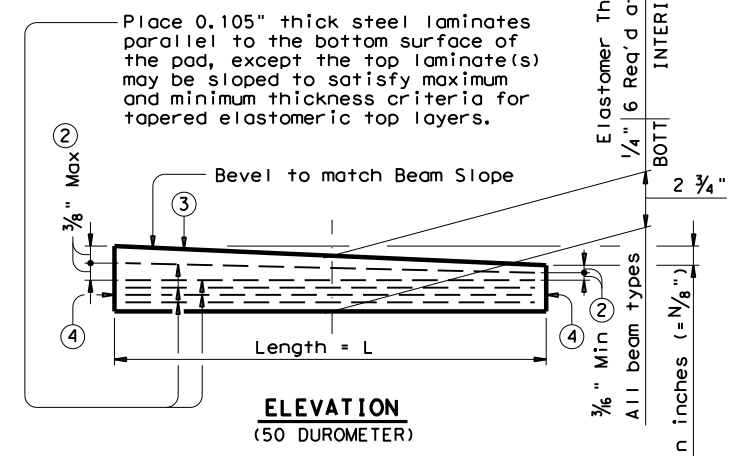
AT ABUTMENT OR INVERTED TEE BENTS



AT CONVENTIONAL INTERIOR BENTS ①

ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.



ELASTOMERIC BEARING SECTION

(50 DUROMETER)
 The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

- ① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.
- ② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark. Examples: N=0, (for 0" taper)
 N=1, (for 1/8" taper)
 N=2, (for 1/4" taper)
 (etc.)
 Fabricated pad top surface slope must not vary from plan beam slope by more than $(\frac{0.0625"}{\text{Length}})$ IN/IN.
- ④ Locate Permanent Mark here.

ELASTOMERIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

GENERAL NOTES:
 Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal \bar{C} bearing as possible within limits shown.
 Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.
 For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.
 Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings will 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 is to be included in unit price bid for "Prestressed Concrete Box Beams".
 Details are drawn showing right forward skew. See Bridge Layout for actual direction.
 These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Bridge Division Standard

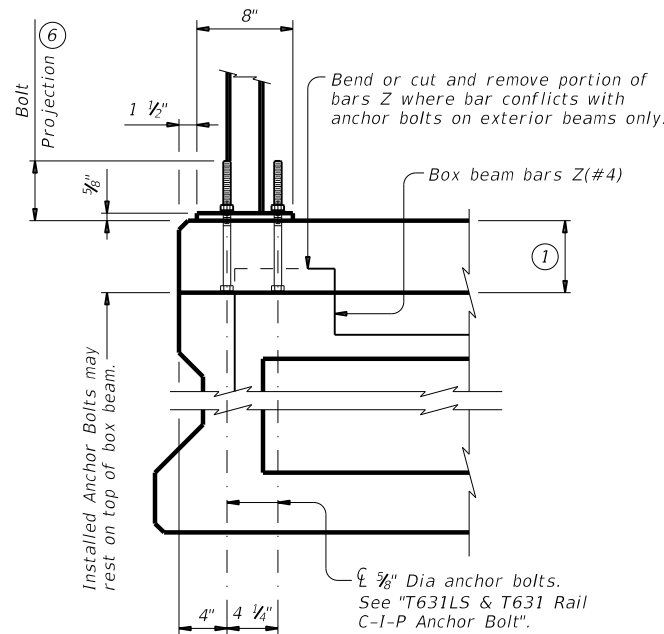
ELASTOMERIC BEARING DETAILS
PRESTR CONC BOX BEAMS

BBEB

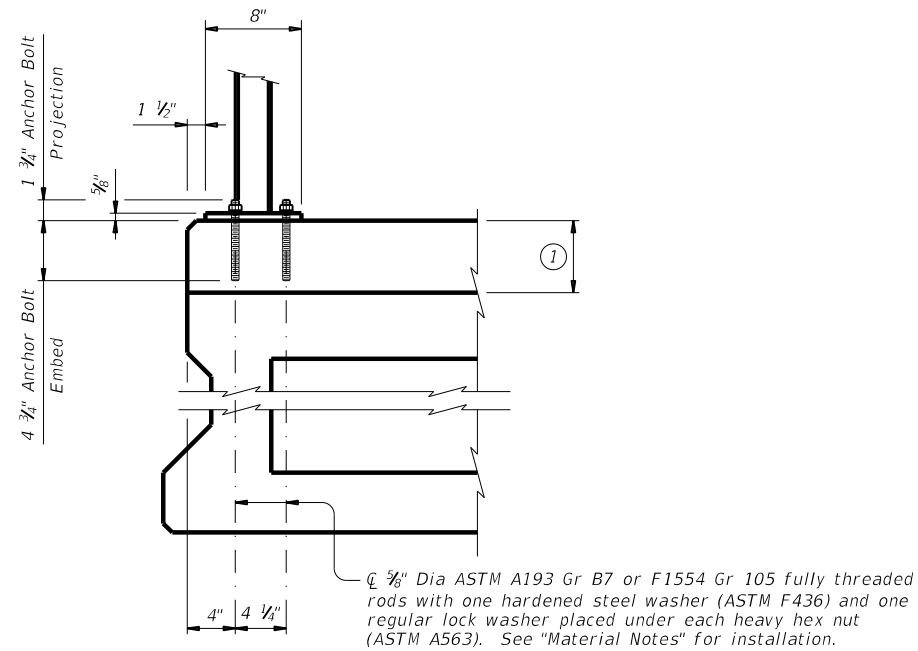
FILE: bbstdae08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.	
BWD	LAMPASAS		48	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 6:23:34 PM
 FILE: D:\crr2001\STANDARDS\bbstd09-18.dgn

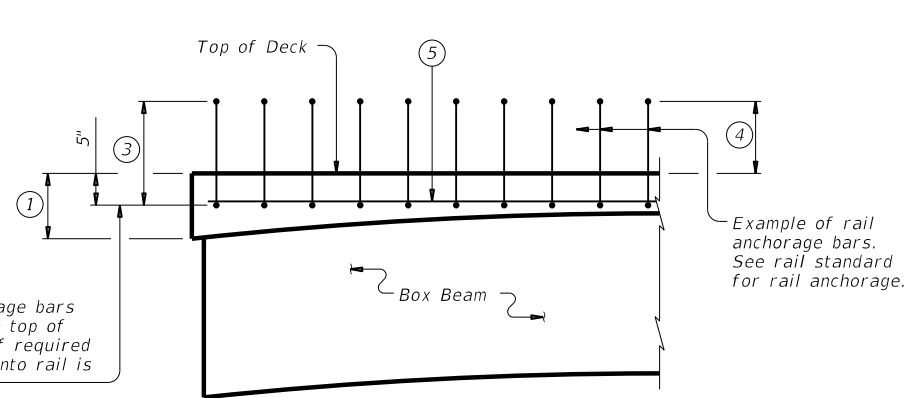


CAST-IN-PLACE ANCHORAGE OPTION

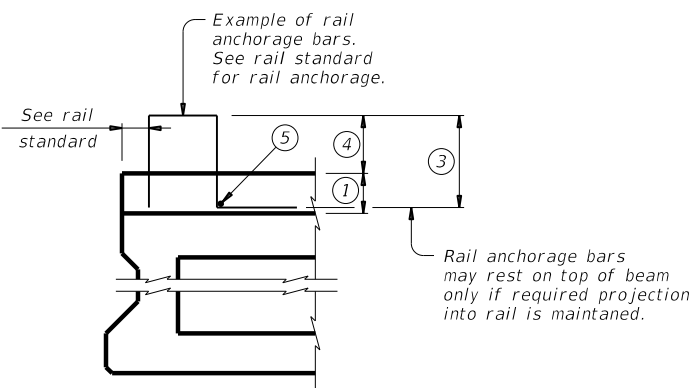


ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT ②⑦



PART SPAN ELEVATION

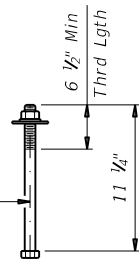


SECTION

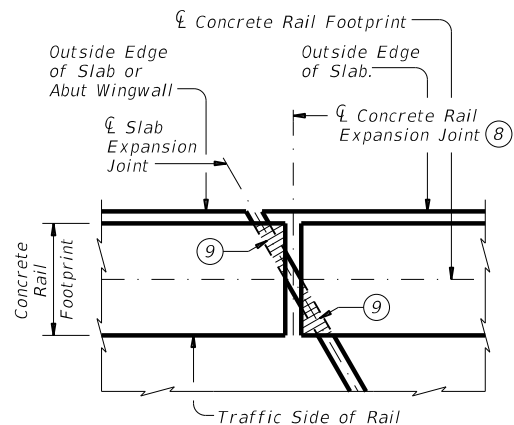
TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563).



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 or 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 1/4". 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 10", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than 1/2" 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 C Slab Expansion Joint, C Rail Footprint and perpendicular to slab outside edge.
- ⑨ Cross-hatched area must have 1/2" 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 1/2" 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 3/4". 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:

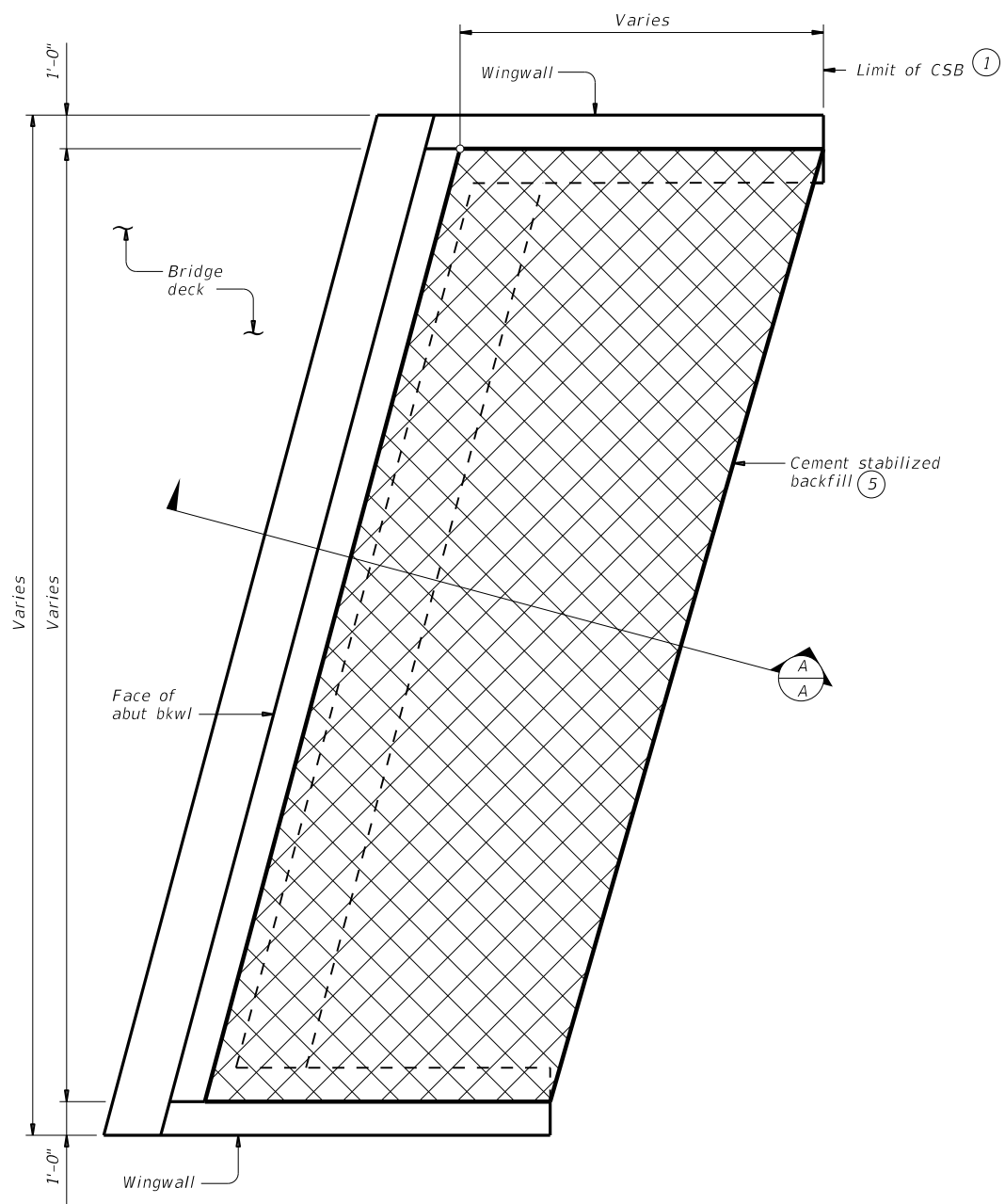
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 This standard is for use with structures with a 5" minimum cast-in-place concrete slab.
 This standard may require modification for interior rails. This standard does not apply to median barriers.
 This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on box beam bridges.
 See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

		Bridge Division Standard	
RAIL ANCHORAGE DETAILS PRESTR CONC BOX BEAMS (WITH SLAB) BBRAS			
FILE: bbstde09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
CON: December 2006	SECT:	JOB:	HIGHWAY:
0923 10		020	CR 2001
DIST:	COUNTY:	SHEET NO.	
BWD	LAMPASAS	49	

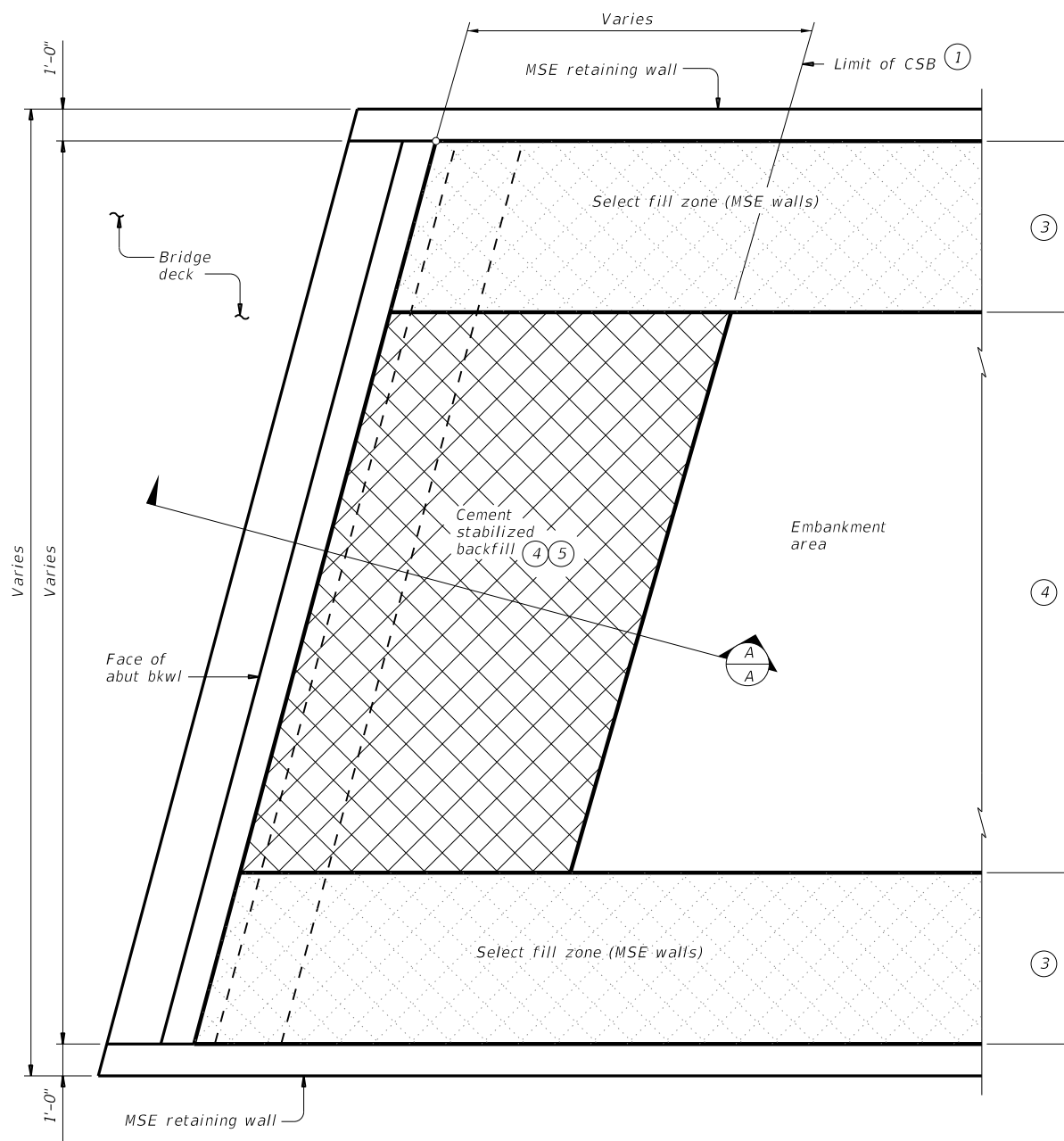
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 7:28:43 PM
 FILE: D:\crr2001\STANDARDS\csabste1-20.dgn



OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.

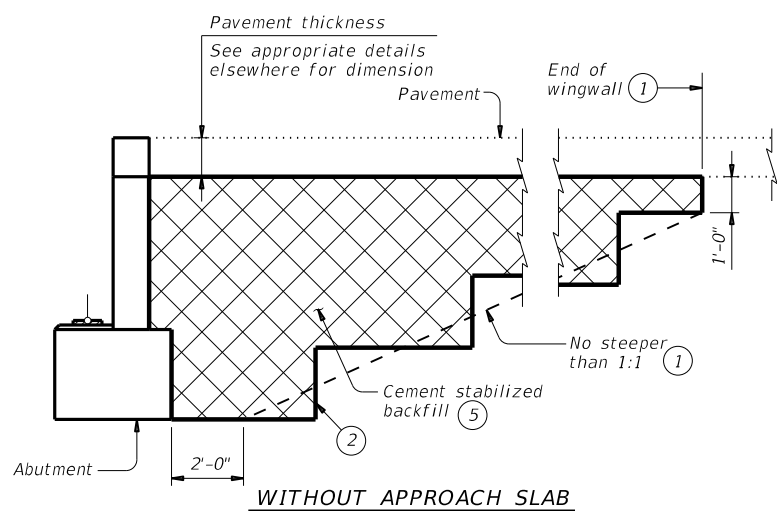


OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

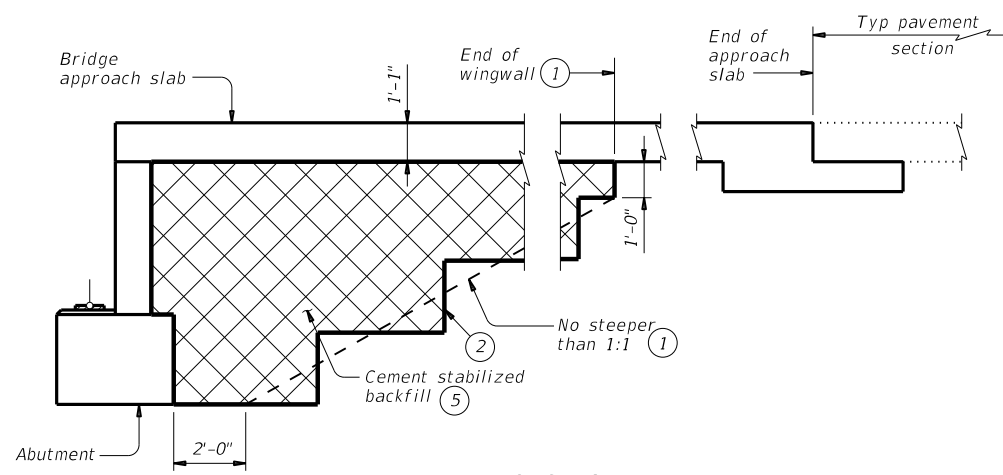
- 1 Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- 2 Bench backfill as shown with 12" (approximate) bench depths.
- 3 Where MSE retaining walls are present, adjust CSB limits to accommodate 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).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments. If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments. Details are drawn showing left forward skew. See Bridge Layout for actual skew direction. These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.



WITHOUT APPROACH SLAB



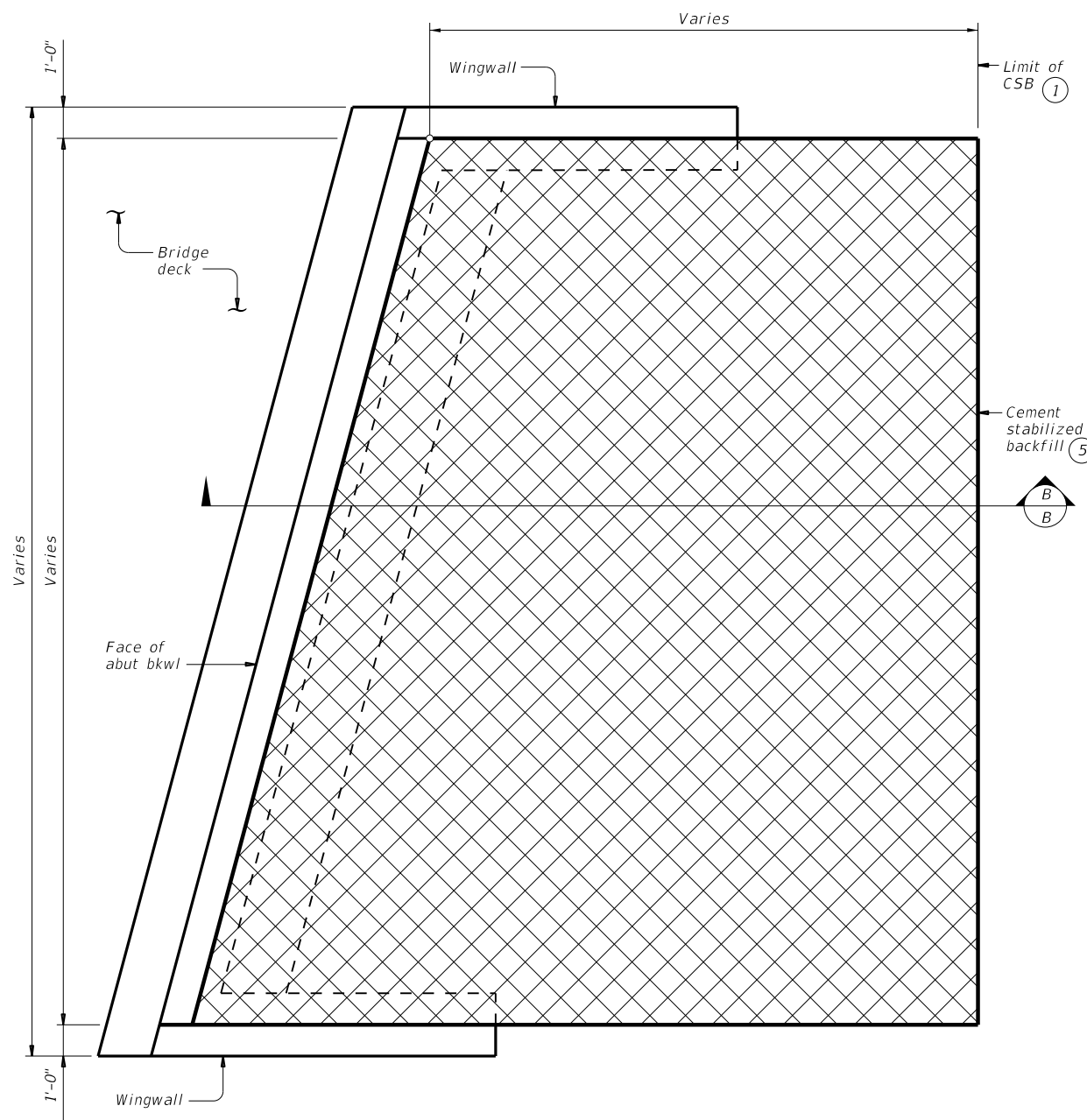
WITH APPROACH SLAB
 (Showing BAS-C, BAS-A similar.)

SECTION A-A

		Bridge Division Standard	
CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT			
CSAB			
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT	REVISIONS	CONTRACT	HIGHWAY
0923	10	020	CR 2001
02-20: Added Option 2.	DIST	COUNTY	SHEET NO.
BWD	LAMPASAS		50

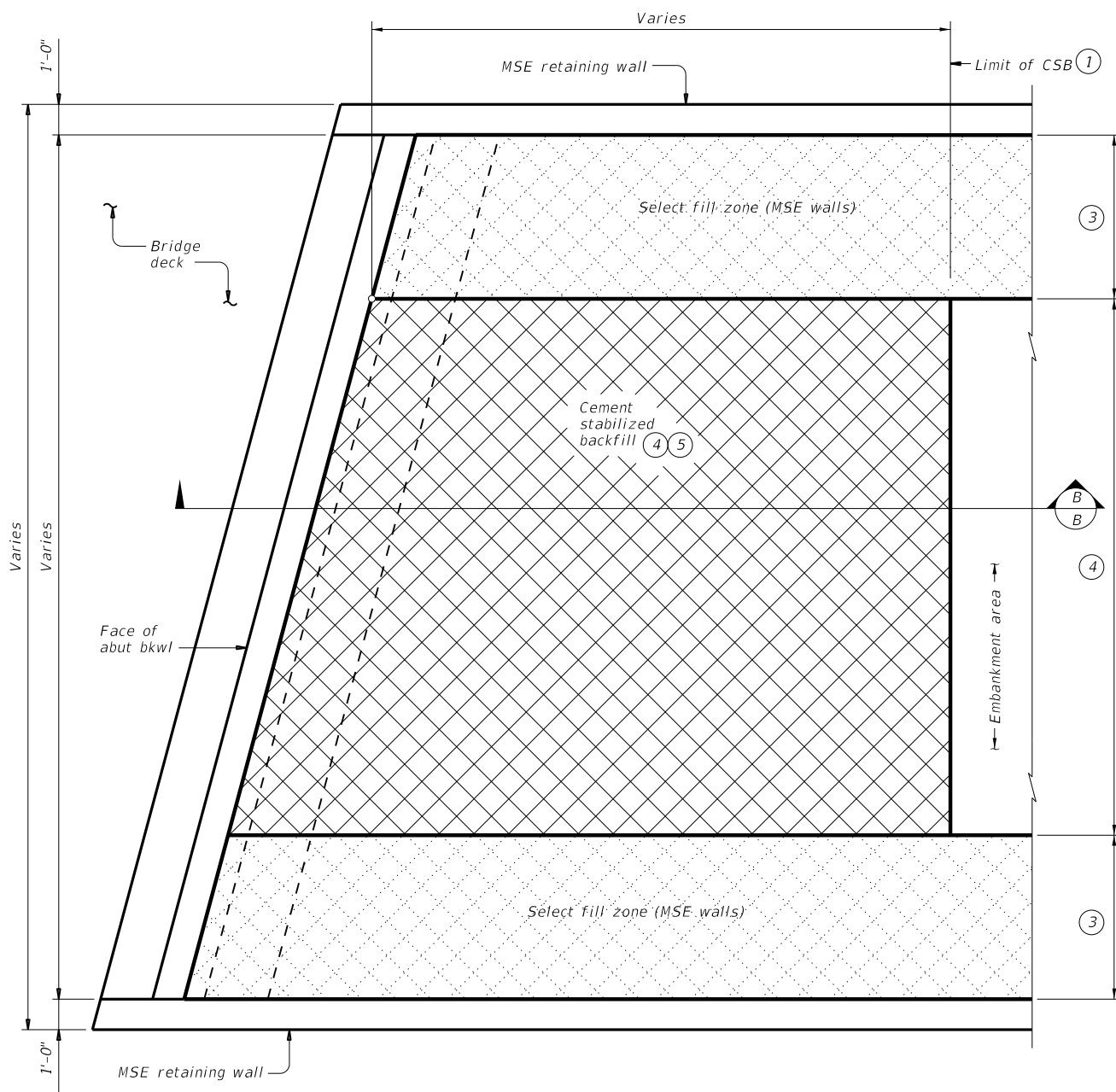
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 7:29:00 PM
 FILE: D:\scr2001\STANDARDS\csabste1-20.dgn



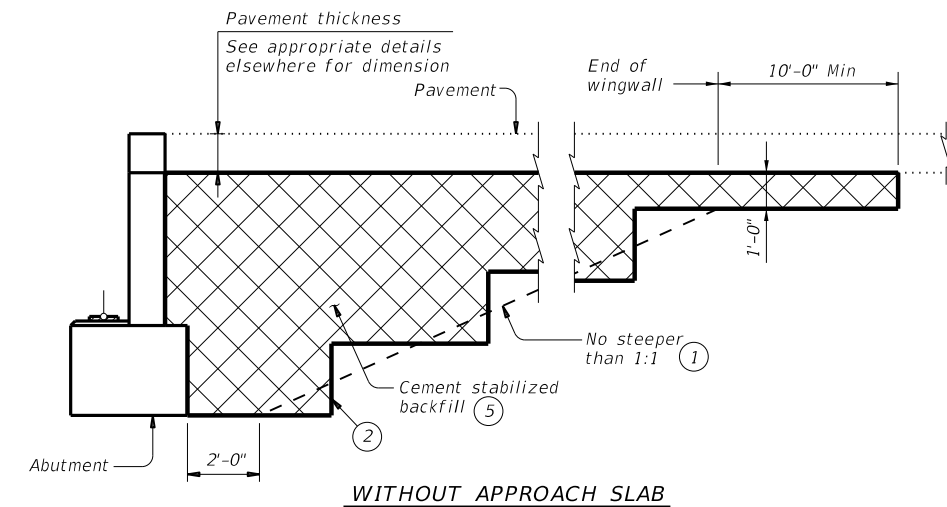
OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.

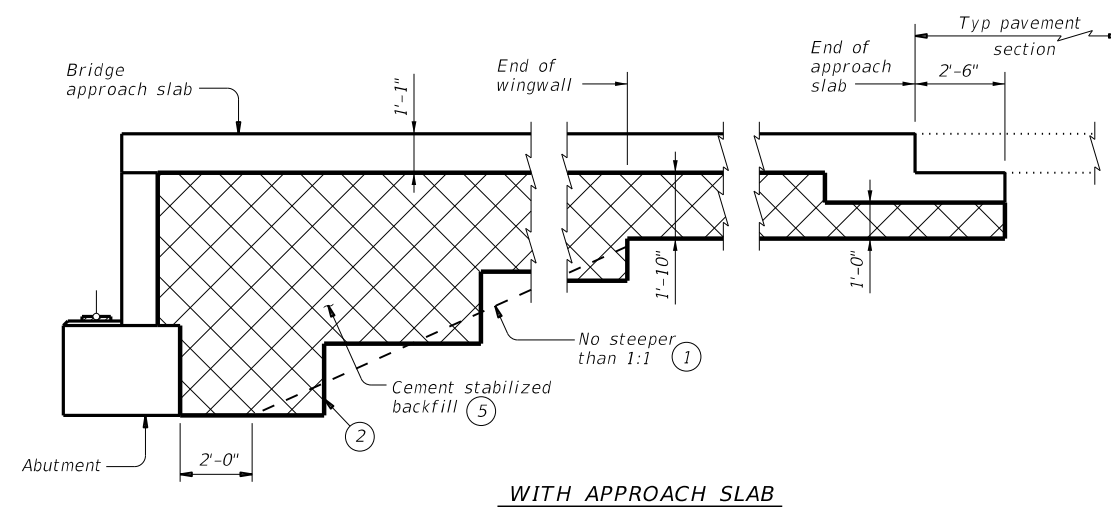


OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
 - a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
 - b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



SECTION B-B

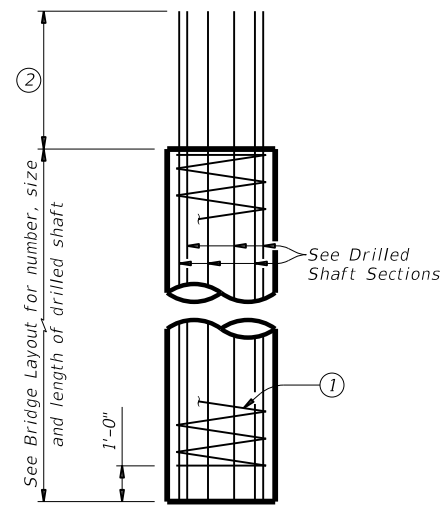
WITH APPROACH SLAB
 (Showing BAS-C, BAS-A similar.)

SHEET 2 OF 2

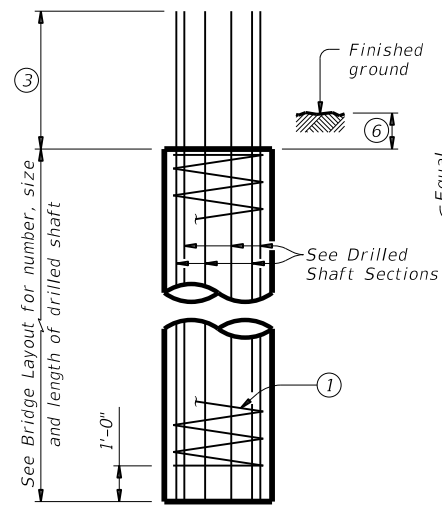
		Bridge Division Standard	
CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT			
CSAB			
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT April 2019	CONTRACT: 0923 10	SECTION: 020	HIGHWAY: CR 2001
02-20: Added Option 2.	DIST: BWD	COUNTY: LAMPASAS	SHEET NO.: 51

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

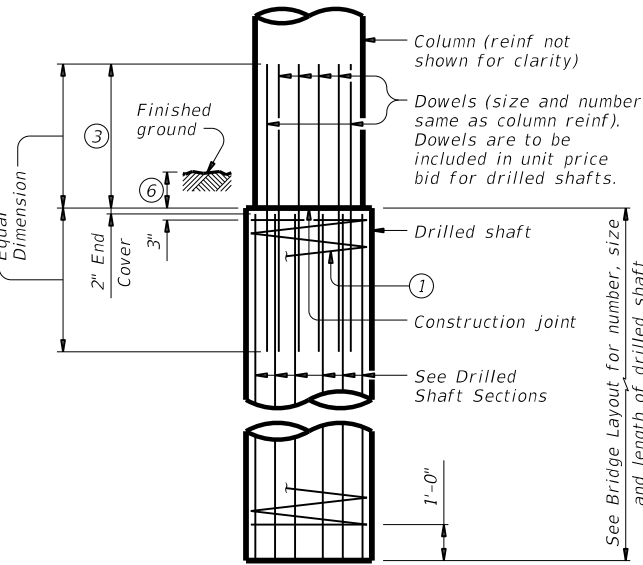
DATE: 12/8/2021 7:32:50 PM
 FILE: D:\crr2001\STANDARDS\Fastde01-20.dgn



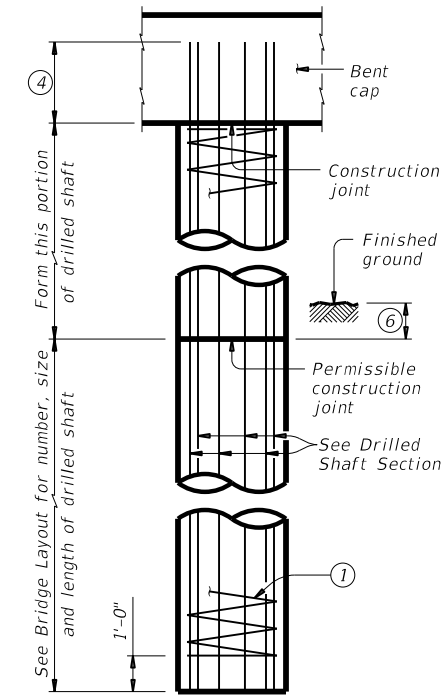
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



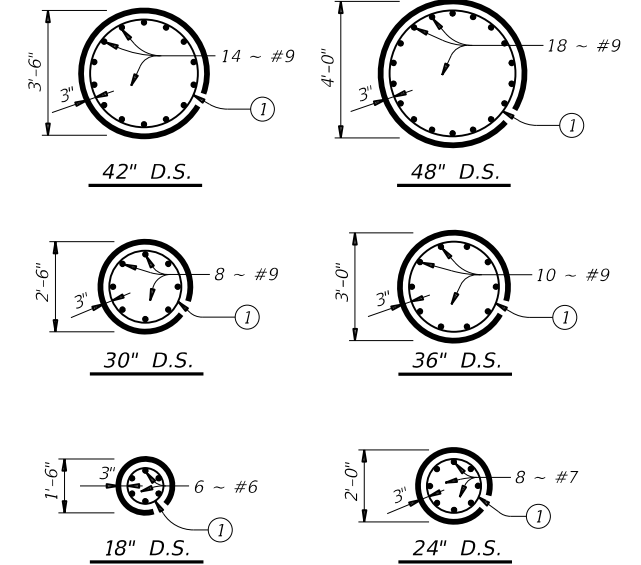
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL



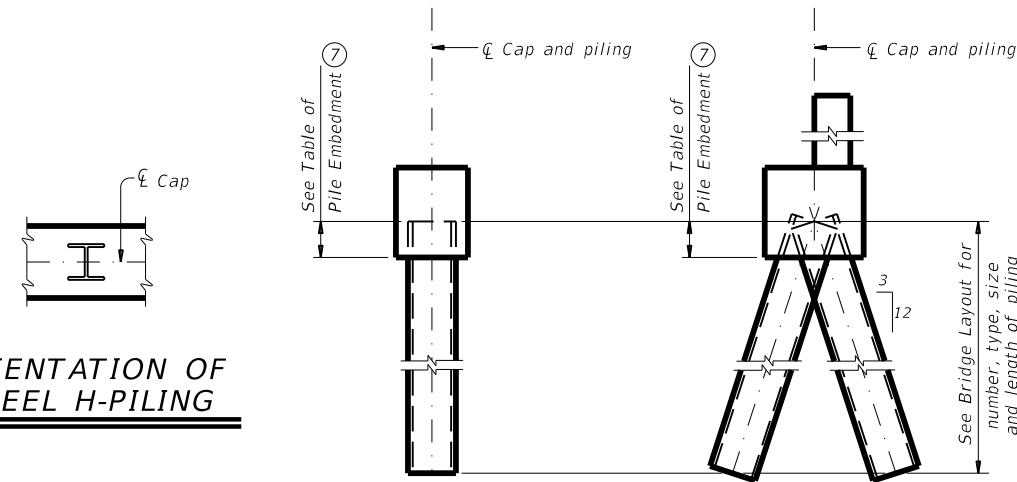
DRILLED SHAFT SECTIONS

DRILLED SHAFT DETAILS

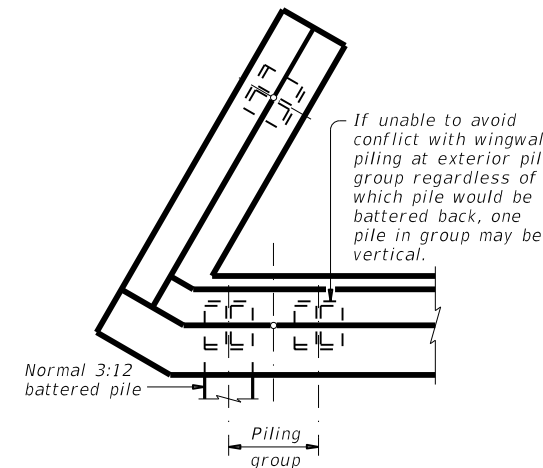
TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

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

ORIENTATION OF STEEL H-PILING



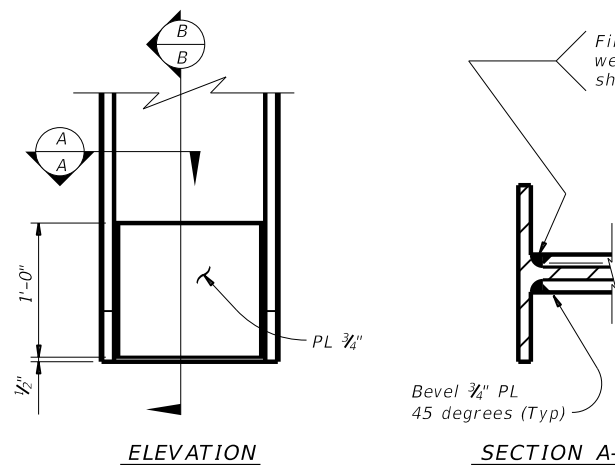
PILING DETAILS
(Concrete or steel H)



DETAIL "A"

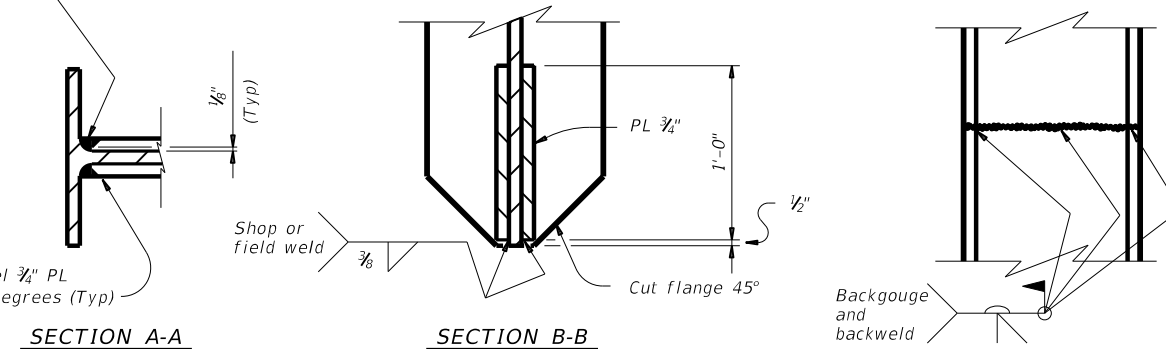
(Showing plan view of a 30° skewed abutment)

- 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.



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

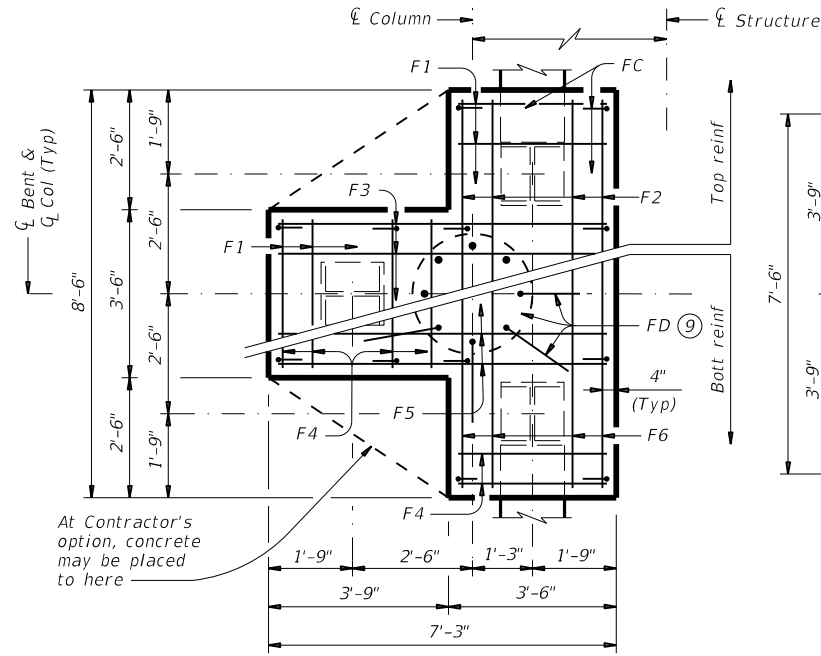
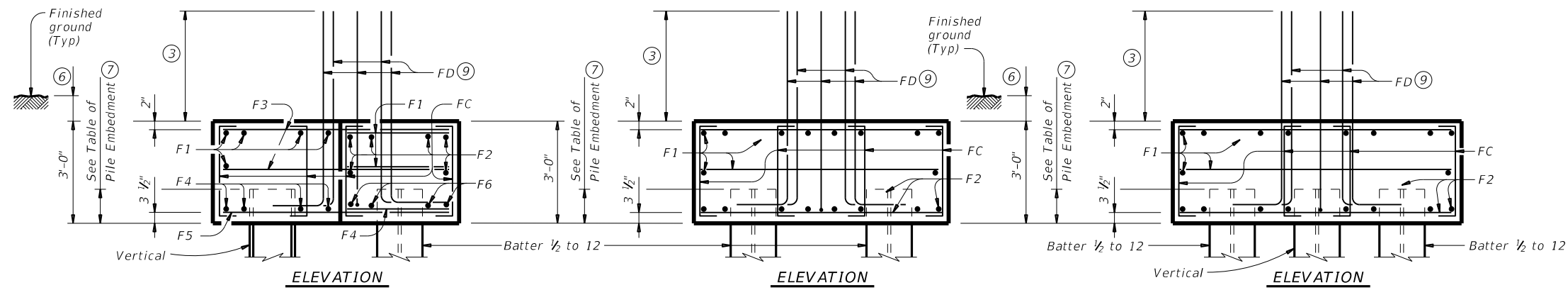
Use when required.

SHEET 1 OF 2

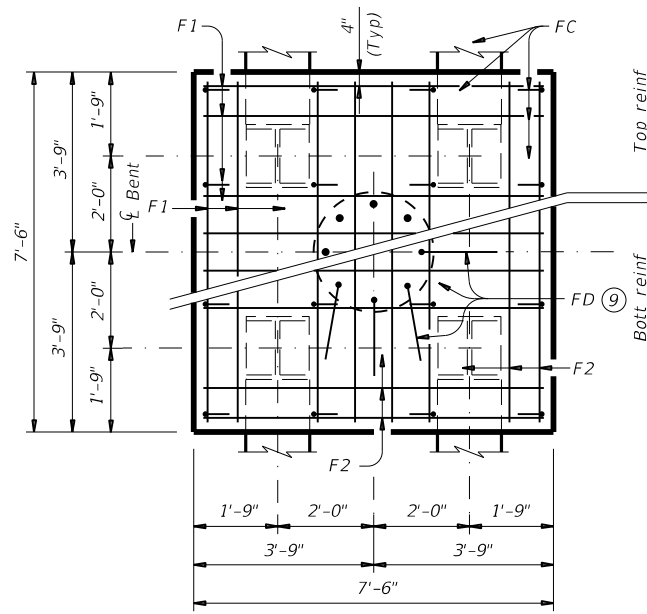
		Bridge Division Standard	
COMMON FOUNDATION DETAILS			
FD			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	HIGHWAY
0923	10	020	CR 2001
DIST: BWD		COUNTY: LAMPASAS	
SHEET NO.: 52			

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

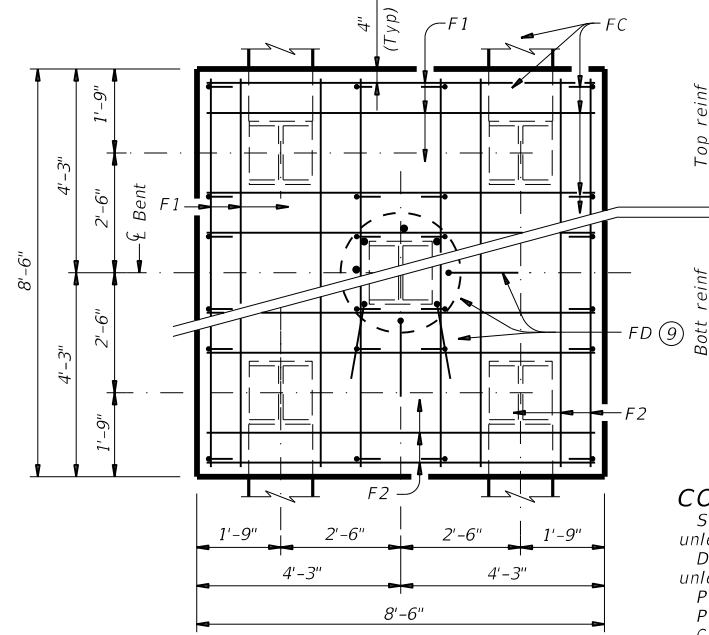
DATE: 12/8/2021 7:33:08 PM
 FILE: D:\cr2001\STANDARDS\Fastde01-20.dgn



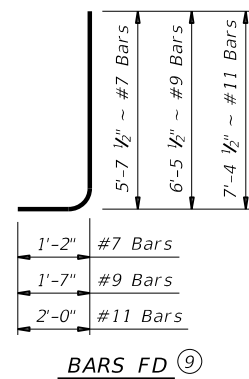
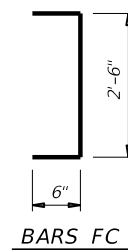
THREE PILE FOOTING^⑧
 For 36" Dia and smaller columns.



FOUR PILE FOOTING^⑧
 For 42" Dia and smaller columns.



FIVE PILE FOOTING^⑧
 For 42" Dia and smaller columns.



- 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

SHEET 2 OF 2



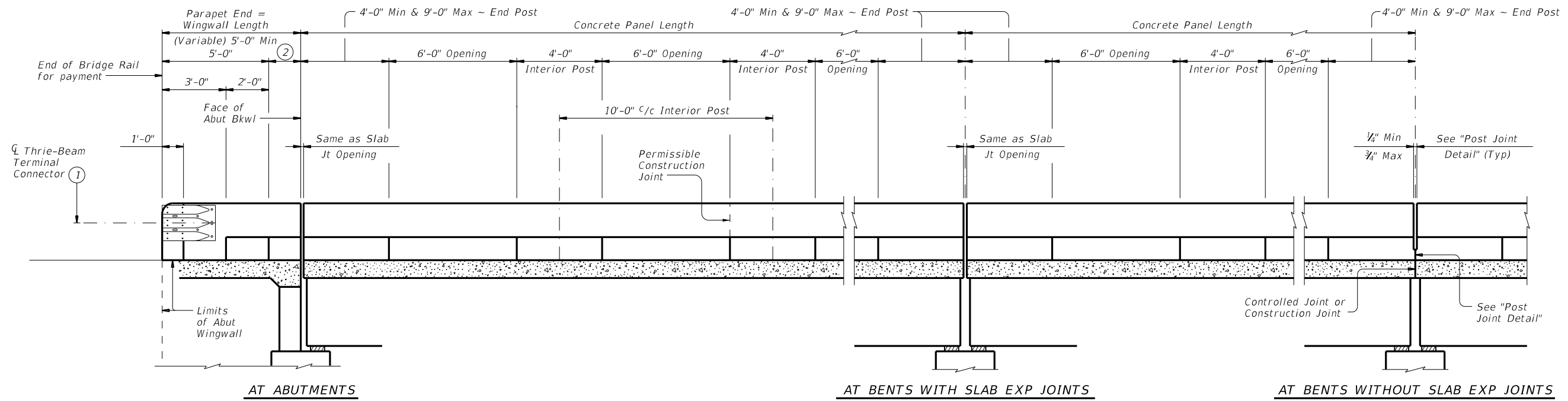
COMMON FOUNDATION DETAILS

FD

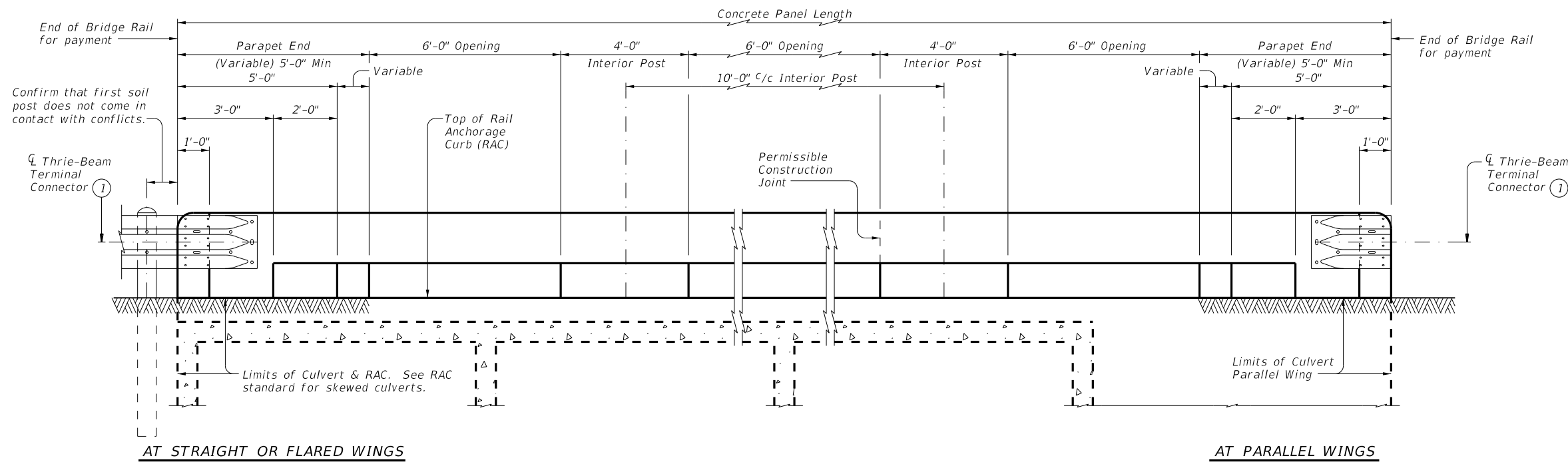
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0923	10	020	CR 2001
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	BWD	LAMPASAS	53	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 7:37:20 PM
 FILE: D:\cgr2001\STANDARDS\1std005-19.dgn



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.

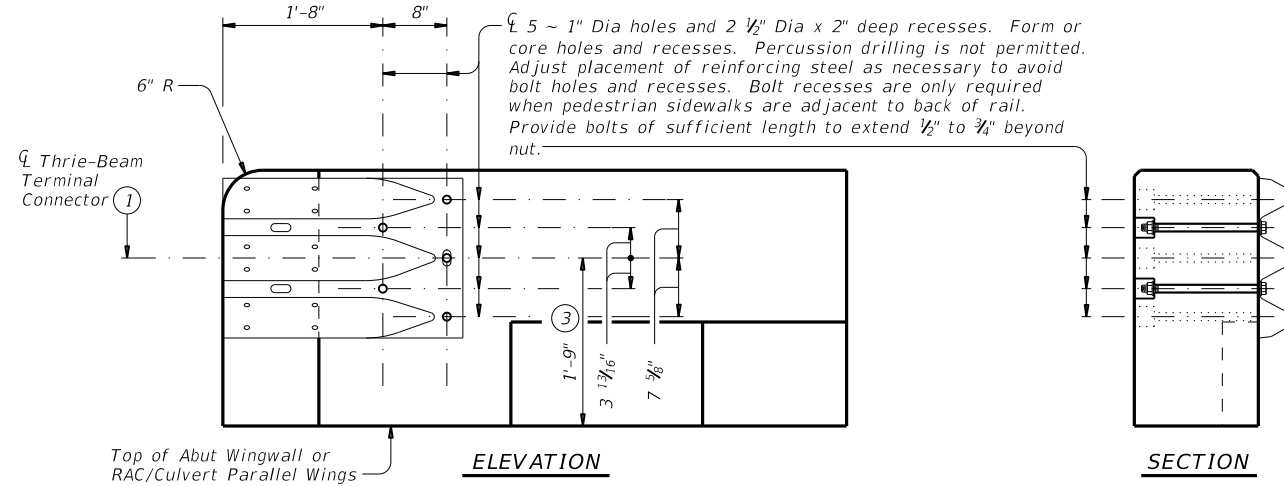
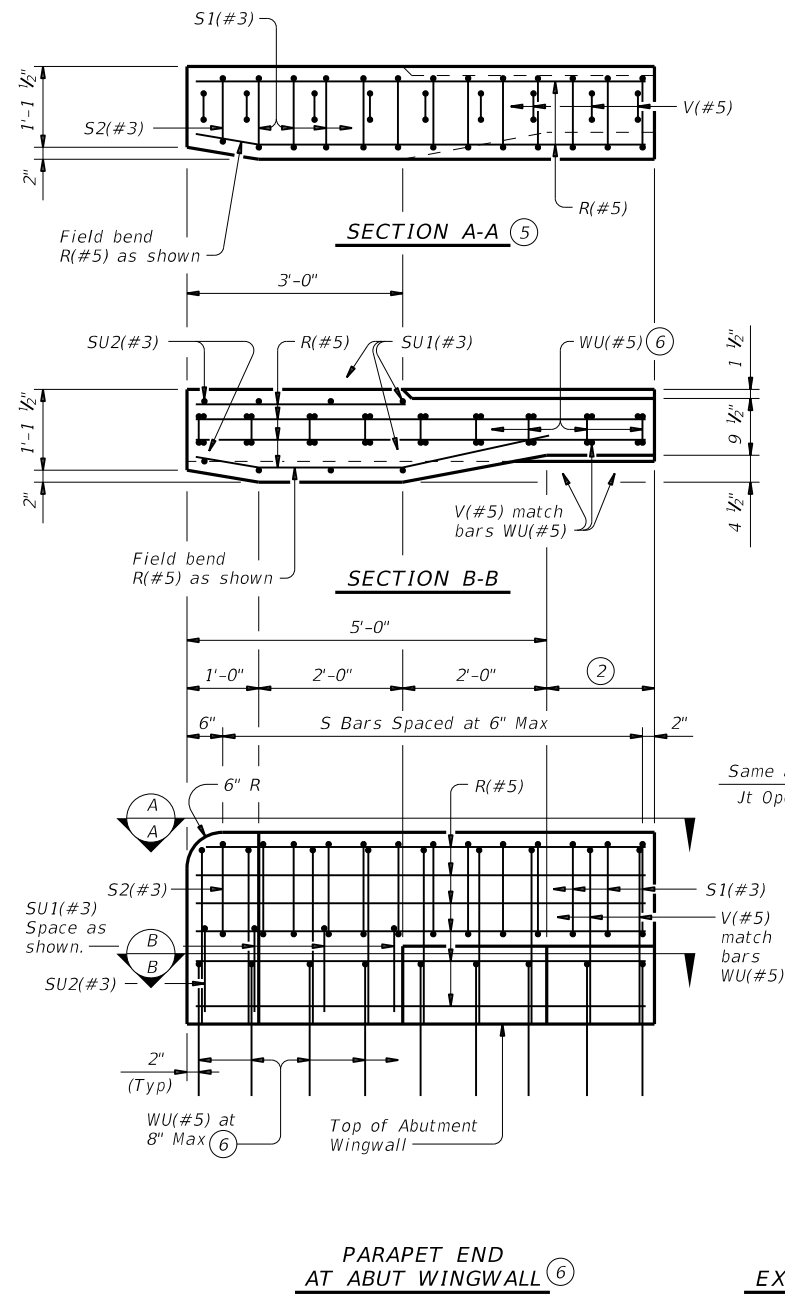
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)

SHEET 1 OF 3

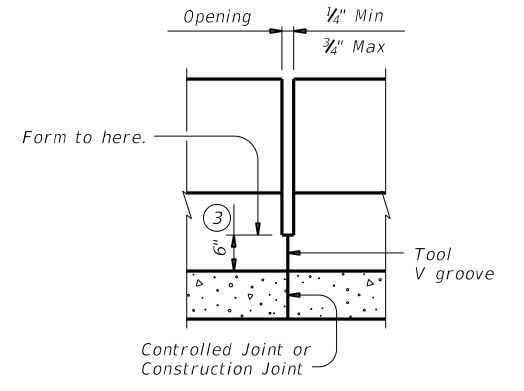
				Bridge Division Standard	
<h1>TRAFFIC RAIL</h1>					
<h2>TYPE T223</h2>					
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES	
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0923	10	020	CR 2001	
	DIST	COUNTY	SHEET NO.		
	BWD	LAMPASAS	54		

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/8/2021 7:37:37 PM
FILE: D:\cgr2001\STANDARDS\1std005-19.dgn

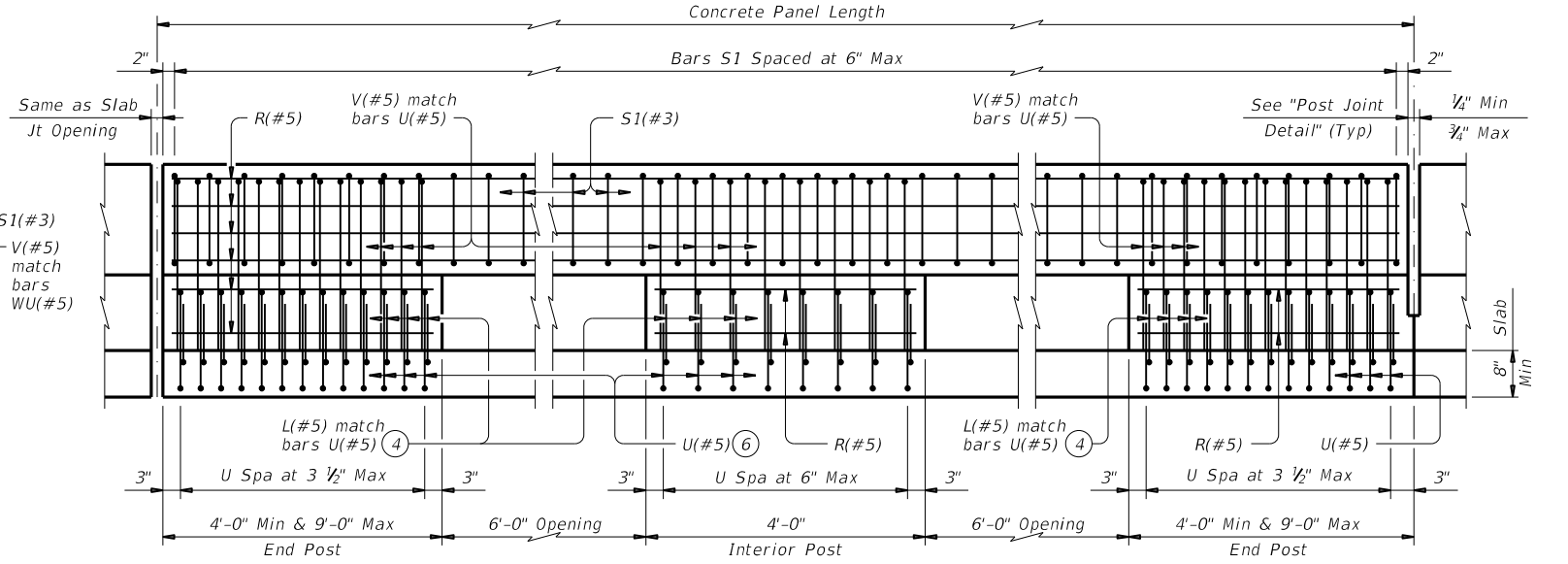


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

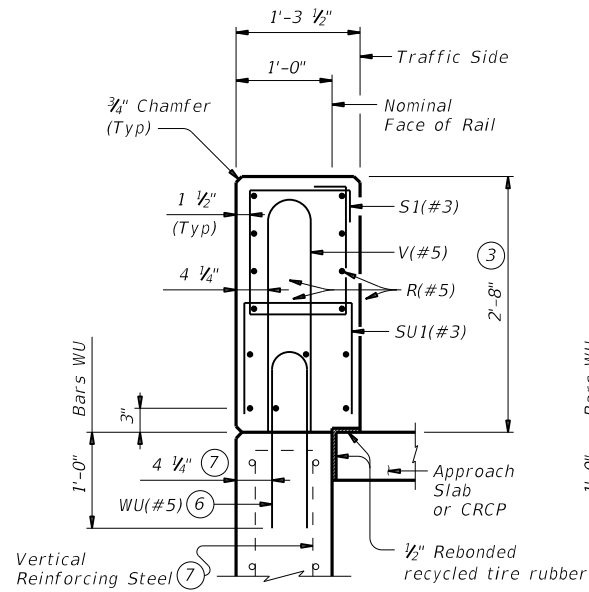
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

SHEET 2 OF 3

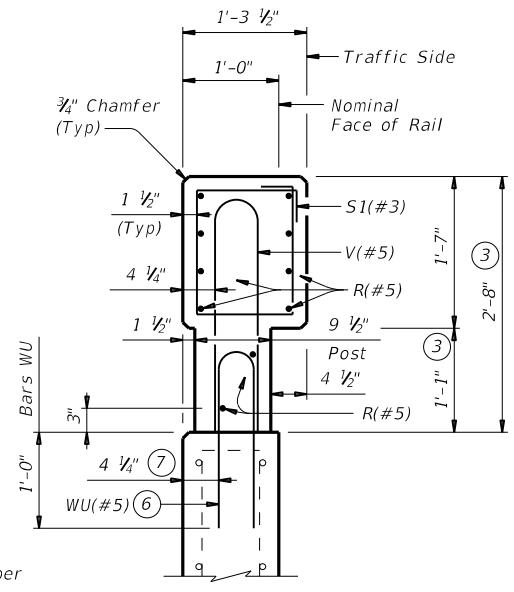
		Bridge Division Standard	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT	SECT	HIGHWAY
REVISIONS	0923 10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	55	

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results from its use.

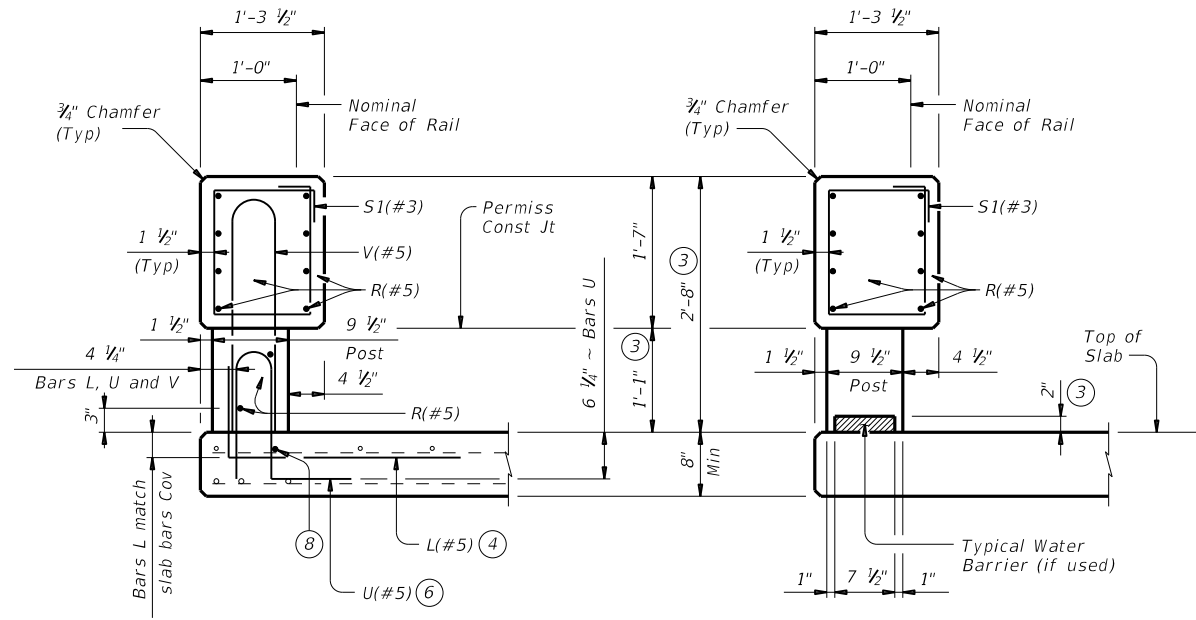
DATE: 12/8/2021 7:37:53 PM
 FILE: D:\crr2001\STANDARDS\1std005-19.dgn



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

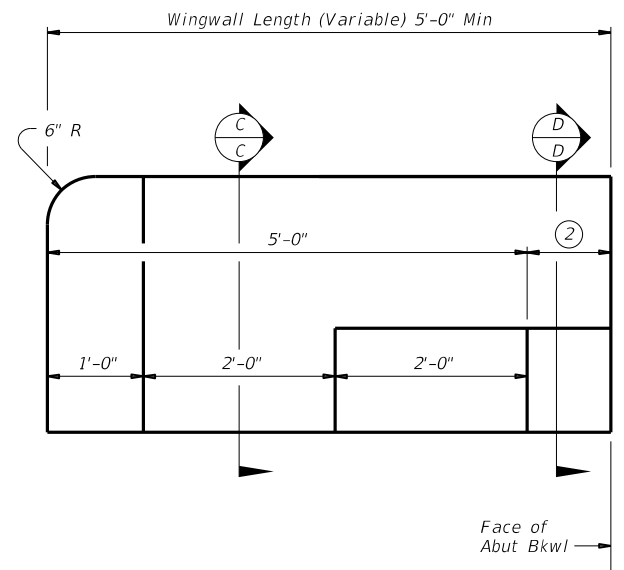


SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB



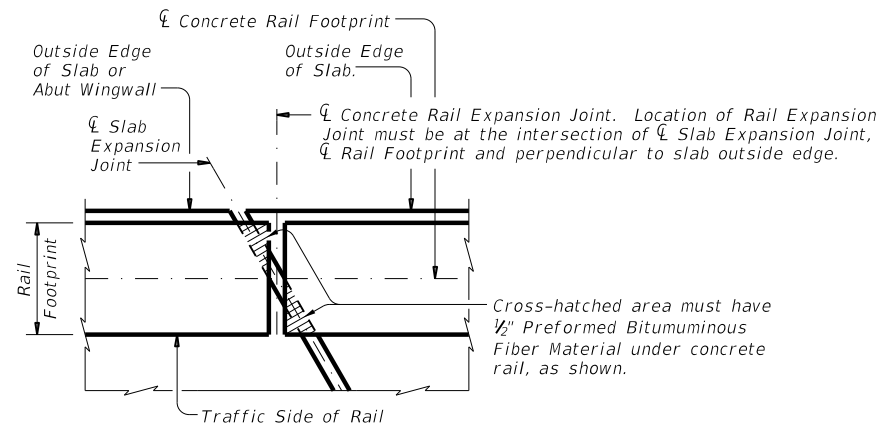
ELEVATION AT
ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

SECTIONS THRU RAIL

Sections on box culverts 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 1/4" 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.

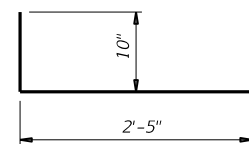
MATERIAL NOTES:

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"

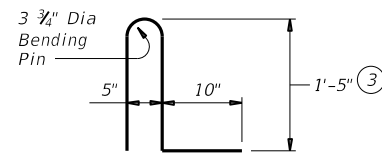
GENERAL NOTES:

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 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.

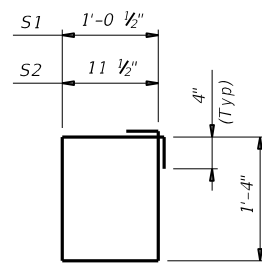
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



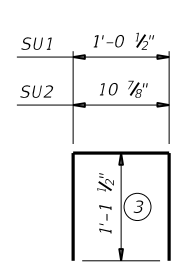
BARS L (#5)



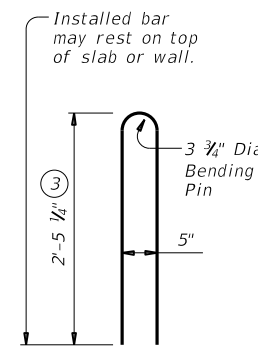
BARS U (#5) ⑨



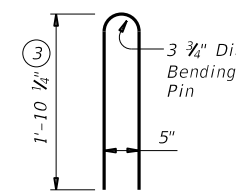
BARS S (#3)



BARS SU (#3)



BARS V (#5) ⑨



BARS WU (#5)

		Bridge Division Standard	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT: 0923	SECT: 10	JOB: 020
REVISIONS	0923	10	020
DIST: BWD	COUNTY: LAMPASAS	SHEET NO: 56	

During the planning phase of project development the following environmental permits, issues, and commitments have been developed during coordination with resource agencies, local governmental entities, and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities, as additional environmental clearances may be required.

I. Clean Water Act, Sec. 402 Texas Pollutant Discharge Elimination System

(Addresses CGP and MS4 Storm Water requirements for the project.)
(In the event that the Contractor implements a PSL on or within one mile of the project, a Site Notice and/or a NOI will apply.)

No Action Required Required Action

Action No. 1 Commitment No. 1
The project disturbs less than one acre of surface area. The contractor is responsible for the PSL as defined in the Standard Specifications for construction and Maintenance of Highways, Street, and Bridges (2014 Edition, Section 7.7.6, Page 42). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractor's PSL.

The EPIC must be updated if the disturbed area increases to one or more acres during the course of construction (refer to following sections). It may become necessary to post MS4 operators that receives discharge from the a site notice and/or NOI for the project and/or PSL. project: -N/A-

II. Clean Water Act, Section 401 and 404 Compliance

(Addresses Nationwide Permits, Individual Permits, and Wetlands.)
(Filling, dredging, or excavating in any water bodies, rivers, creeks, streams, wetlands, or wet area is prohibited unless specified in the USACE permit and approved by the Engineer.)
(When temporary fills implemented, only stated TxDOT standards will be used unless written authorization for an alternative is obtained from the Engineer. No equipment is allowed in any stream channel below the Ordinary High Water Mark except on temporary stream crossings or drill pads.)

No Action Required 404 Permit and 401 Certification Required

Table with 4 columns: Permit, Required Action, Waters of the US, App. Plan Sheet(s). Row 1: NWP 14, Adher to permit including general and regional conditions, Lucy Creek, Bridge Plan/Profile/SW3P sheets

Best Management Practices for applicable 401 General Conditions:

General Condition 12 - Categories I and II BMPs required

Category I (Erosion Control)

- Temporary Vegetation, Blankets, Matting, Mulch, Sod, Interceptor Swale, Diversion Dike, Erosion Control Compost, Mulch Filter Berms and Socks, Compost Filter Berms and Socks, Compost Blankets

Category II (Sedimentation Control)

- Sand Bag Berm, Rock Berm, Silt Fence, Hay Bale Dike, Triangular Filter Dike, Brush Berms, Stone Outlet Sediment Traps, Sediment Basins, Erosion Control Compost, Mulch Filter Berms and Socks, Compost Filter Berms and Socks

General Condition 25 - Category III BMPs required

Category III (Post-Construction TSS Control)

- Retention/Irrigation, Constructed Wetlands, Extended Detention Basin, Wet Basins, Vegetative Filter Strips, Vegetation-Lined Ditches, Grassy Swales, Sand Filter Systems, Erosion Control Compost, Mulch filter Berms and Socks, Compost Filter Berms and Socks, Sedimentation Chambers

III. Cultural Resources

(Addresses any special circumstances associated with cultural resources, such as archeological or historic sites.)
(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

Table with 3 columns: Action No., Station (Rt/Lt), Commitment. Row 1: 1, ---, ---

IV. Vegetation Resources

(Addresses any special circumstances associated with vegetation, such as large trees to be avoided, or mitigation that will occur as part of the project.)

No Action Required Required Action

Table with 3 columns: Action No., Station (Rt/Lt), Commitment. Row 1: 1, All, Avoid non-mow locations for stockpiles and equipment parking/storage. Row 2: 2, Project Limits, 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.

V. Federal Listed, Proposed, Threatened, Endangered Species, Critical Habitat, State Listed Species, Candidate Species, and Migratory Bird Treaty Act (MBTA)

(Addresses any special habitat that may need to be avoided, lists any threatened or endangered species where habitat was observed and might be impacted within the project area, and lists any precautions such as nesting seasons for migratory birds.)

No Action Required Required Action

Table with 2 columns: Species Potentially within Project Area & Description, Habitat Description. Row 1: ---, This project has potential Golden-cheeked Warbler (GCWA) habitat within the disturbed area and adjacent. With this adjacent habitat and the listing status of the GCWA a Programmatic Agreement with United States Fish and Wildlife Service has been signed and has conditions to follow as a result. These Voluntary Conservation Measures (VCMs) are outlined in the Environmental General Notes.

The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. Migration patterns would not be affected by the proposed project. The contractor will remove all old migratory bird nests from any structure where work would be done from September 1 through the end of February. In addition, the contractor will be prepared to prevent migratory birds from building nests between March 1 and August 31, per the Environmental Permits, Issues, and Commitments (EPIC) plans. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young shall be avoided.

VI. Hazardous Material or Contamination Issues

(Addresses any previously identified high risk sites associated with hazardous materials that may be encountered during construction.)

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.

Contractor will follow all applicable storage and management requirements for liquid oil products, liquid petroleum products, and other chemical liquids as per 40 CFR 112 (a.k.a. SPCC) and/or TCEQ Construction General Permit for storm water management.

Contact the Engineer if any of the following are detected: Dead or distressed vegetation (not identified as normal), Trash piles, drums, canisters, barrels, etc., Undesirable smells/odors, Underground storage tanks, Evidence of leaching or seepage of substances, Any other evidence indicating possible hazardous materials or contamination discovered on-site

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structure not including box culverts)?

Yes No

If "No", then no further action is required. If "Yes", then TxDOT is responsible for completing an asbestos assessment/inspection. Are the results of the asbestos inspection positive (is asbestos present)?

Yes No

If "Yes", then TxDOT must retain a Texas Department of State Health Services (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 abatement and/or 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.

Bridges on this project may contain Lead-Containing Paint (LCP) or other items that contain lead. The location of (LCP) is identified in the General Notes. Item 6.10.1.2 in the 2014 TxDOT Standard Specifications shall be utilized for this project.

VII. Other Environmental Issues

(Addresses any other environmental issues that may not have been covered in other sections.)

No Action Required Required Action

Table with 3 columns: Action No., Station (Rt/Lt), Commitment. Row 1: 1, ---, ---

LIST OF ABBREVIATIONS

- BMP: Best Management Practice, CGP: Construction General Permit, DSHS: Texas Department of State Health Services, FEMA: Federal Emergency Management Agency, FHWA: Federal Highway Administration, MOA: Memorandum of Agreement, MOU: Memorandum of Understanding, MS4: Municipal Separate Stormwater Sewer System, MBTA: Migratory Bird Treaty Act, NOI: Notice of Intent, NOT: Notice of Termination, NWP: Nationwide Permit, SPCC: Spill Prevention Control and Countermeasure, SW3P: Storm Water Pollution Prevention Plan, PCN: Pre-Construction Notification, PSL: Project Specific Location, TCEQ: Texas Commission on Environmental Quality, TPDES: Texas Pollutant Discharge Elimination System, TPWD: Texas Parks and Wildlife Department, TxDOT: Texas Department of Transportation, T&E: Threatened and Endangered Species, USACE: U.S. Army Corp of Engineers, USFWS: U.S. Fish and Wildlife Service

CR 2001 ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)

Table with 4 columns: CONT, SECT, JOB, HIGHWAY. Row 1: 0923, 10, 020, CR 2001. Row 2: DIST, COUNTY, SHEET NO. Row 3: BWD, LAMPASAS, 57

SPECIFIC SPECIES

Golden-cheeked Warbler

- See species specific requirements below:

GOLDEN-CHEEKED WARBLER BMPs

Golden-cheeked Warbler

- The following voluntary conservation measures will be implemented for this project:
- Limit the operation of heavy machinery to paved areas, areas free of native vegetation, and to areas with slopes that are less than 33 percent consisting of stable soils.
 - Confirm the presence of listed species at or near the project site through pre-construction surveys or assume they are present and implement appropriate protection measures.
 - Minimize impacts to listed species and their habitats by limiting grading or topsoil removal to areas where this activity is absolutely necessary for construction activities.
 - Schedule the most effective amount of personnel and equipment to complete construction to reduce the time of disturbance to listed species.
 - Review temporary roadside material storage locations and notify contractors of the areas with potential to support habitat for rare, threatened, and endangered species and of the conservation need to avoid these areas.
 - Avoid use of non-native invasive plant species.
 - Sterilize equipment for tree trimming between trees in areas affected by surface transferable bacterial, viral, and fungal diseases.
 - Do not disturb, destroy, or remove active nests during the nesting season.
 - Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
 - Limit the use of machinery in habitat that may support ground-nesting birds during the spring and early summer months.
 - Coordinate with ENV and the District Environmental Coordinators prior to grading and blading activities for wildfire management and control.
 - Train maintenance crews on how to handle hazardous chemicals if used, and encourage them to use them sparingly and only when absolutely necessary.
 - Retain existing vegetation whenever possible.
 - Use general good housekeeping practices and do not leave waste behind on the job site.

GOLDEN-CHEEKED WARBLER BMPs CONT.

- Use care to avoid spills, leaks and drips of equipment and cleaning fluids when cleaning tools, servicing equipment or doing routine maintenance.
- Projects that would involve clearing or trimming of individual trees or shrubs in or near (within 300 feet of) potential habitat would be phased so that any clearing activities would occur outside the breeding season (between September 1st and February 28th) to minimize impacts to GCW.
- TxDOT personnel and project contractors, as appropriate, will be informed of these Programmatic Consultation requirements.
- Projects that would require trimming or removal of more than a few individual trees or shrubs or linear strips of woody vegetation will be inspected by qualified TxDOT biologists. Biologists would determine if areas of vegetation to be disturbed meet the criteria for potential GCW habitat and make an effect call based on the potential impacts in order to determine if a project-specific consultation is warranted.

GENERAL BEST MANAGEMENT PRACTICES

Water Quality BMPs

In addition to BMPs for a TCEQ Storm Water Pollution Prevention Plan and/or 401 water quality permit:

- Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.

When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soil around the crossing.

If questions arise regarding any of these BMPs or if a species is encountered; please contact the Brownwood District Environmental Coordinator, Andrew Chisholm at 325-643-0442 or andrew.chisholm@txdot.gov

CR 2001 ENVIRONMENTAL GENERAL NOTES

LIST OF ABBREVIATIONS

BMP: Best Management Practice
 PA: Programmatic Agreement (TPWD and TxDOT)
 MBTA: Migratory Bird Treaty Act
 SW3P/SWPPP: Storm Water Pollution Prevention Plan
 PSL: Project Specific Location
 TCEQ: Texas Commission on Environmental Quality
 TPWD: Texas Parks and Wildlife Department
 WHAB: Wildlife Habitat Assessment Branch
 SGCN: Species of Greatest Conservation Need
 ROW: Right-of-Way (TxDOT ROW)



CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST		COUNTY	SHEET NO.
BWD		LAMPASAS	57A

Prepared by *****
 DATE: 2/24/2022 1:39:29 PM
 FILE: D:\cr2001\ENVIRONMENTAL_GENERAL_NOTES_092310020.dgn
 UPDATED 6/22/2017

SITE DESCRIPTION

PROJECT LIMITS:

CSJ 0923-10-020 On CR 2001 at Lucy Creek
 Latitude = 31.159833
 Longitude = -98.282984

LOCATION MAPS:

Refer to title sheet for project location map.

PROJECT DESCRIPTION:

CSJ 0923-10-020
 Replace bridge and approaches.

MAJOR SOIL DISTURBING ACTIVITIES:

The major soil disturbing activities for this project will consist of preparation of R.O.W., removing existing structure, excavation work, embankment work for the construction of the bridge and roadway, and placement and removal of erosion controls.

TOTAL PROJECT AREA: 0.54 AC.

TOTAL AREA TO BE DISTURBED: 0.42 AC.

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

CSJ 0923-10-020
 Surrounding land is used as pasture rangeland. 85% of the R.O.W. vegetative cover is predominantly comprised of various native grasses and wild flowers.

NAME OF RECEIVING WATERS:

CSJ 0923-10-020
 Runoff from project ultimately flows into stream segment Number 1217 of the Brazos River Basin.

EROSION AND SEDIMENT CONTROLS

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion controls will be maintained in good working order. If a repair is necessary, it will be made at the earliest possible date, but no later than seven (7) calendar days after the ground has dried sufficiently to prevent further damage from equipment. The areas around creeks and drainage ways shall have priority over other areas on the project site.

INSPECTION: An inspection will be performed by a TxDOT inspector at least once every seven (7) calendar days. An inspection and maintenance report will be made per each inspection. Stormwater controls will be modified as directed by the Engineer based on these reports.

WASTE MATERIALS: Any waste materials generated during construction will be disposed of in accordance with existing federal, state, and local laws.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a minimum, any products in the following categories are considered to be hazardous: Fuels, Lubricating products, Asphalt products, or Concrete curing compounds and any additives. In the event of a spill which may be hazardous, clean-up will be done in accordance with federal, state, and local regulations.

SANITARY WASTE: Sanitary waste from portable units will be collected by a licensed sanitary waste management contractor.

OFF SITE VEHICLE TRACKING AND DUST CONTROL:
 DUST CONTROL AS NEEDED- PER ENGINEER
 HAUL ROADS DAMPENED FOR DUST CONTROL
 LOADED HAUL TRUCKS TO BE COVERED WITH TARPULIN
 EXCESS DIRT ON ROAD REMOVED DAILY
 STABILIZED CONSTRUCTION ENTRANCE

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body or stream bed. Construction staging area and vehicle maintenance area shall be constructed by the contractor in a manner to minimize the runoff pollutants. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, false work, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

For off R.O.W. facilities the contractor shall comply with TCEQ requirements.

The contractor is responsible for ensuring that all subcontractors are aware of and comply with all components for the SW3P.

Furnish one SW3P permit posting sign and sign support as detailed on the SW3P Sheet. Install this sign in a location selected by the Engineer. The sign and support should be removed upon completion of the project and is the property of the Contractor. The purchase of the sign and support, installation, relocation(s) if determined necessary by the Engineer and removal at project end shall be subsidiary to Item 506.

Sedimentation Basins - Since the area disturbed is less than 10 acres per drainage area; a sedimentation basin is not required.

Best Management Practices:

- | | | |
|---|---|--|
| Erosion | Sedimentation | Post-Construction TSS |
| <input checked="" type="checkbox"/> Temporary Vegetation | <input checked="" type="checkbox"/> Silt Fence | <input checked="" type="checkbox"/> Vegetative Filter Strips |
| <input checked="" type="checkbox"/> Blankets/Matting | <input checked="" type="checkbox"/> Rock Berm | <input type="checkbox"/> Retention/Irrigation Systems |
| <input type="checkbox"/> Mulch | <input type="checkbox"/> Triangular Filter Dike | <input type="checkbox"/> Extended Detention Basin |
| <input type="checkbox"/> Sodding | <input type="checkbox"/> Sand Bag Berm | <input type="checkbox"/> Constructed Wetlands |
| <input type="checkbox"/> Interceptor Swale | <input type="checkbox"/> Straw Bale Dike | <input type="checkbox"/> Wet Basin |
| <input type="checkbox"/> Diversion Dike | <input type="checkbox"/> Brush Berms | <input type="checkbox"/> Erosion Control Compost |
| <input type="checkbox"/> Erosion Control Compost | <input type="checkbox"/> Erosion Control Compost | <input type="checkbox"/> Mulch Filter Berm and Socks |
| <input checked="" type="checkbox"/> Mulch Filter Berm and Socks | <input checked="" type="checkbox"/> Mulch Filter Berm and Socks | <input type="checkbox"/> Compost Filter Berm and Socks |
| <input type="checkbox"/> Compost Filter Berm and Socks | <input type="checkbox"/> Compost Filter Berm and Socks | <input type="checkbox"/> Vegetation Lined Ditches |
| | <input type="checkbox"/> Stone Outlet Sediment Traps | <input type="checkbox"/> Sand Filter Systems |
| | <input type="checkbox"/> Sediment Basins | |

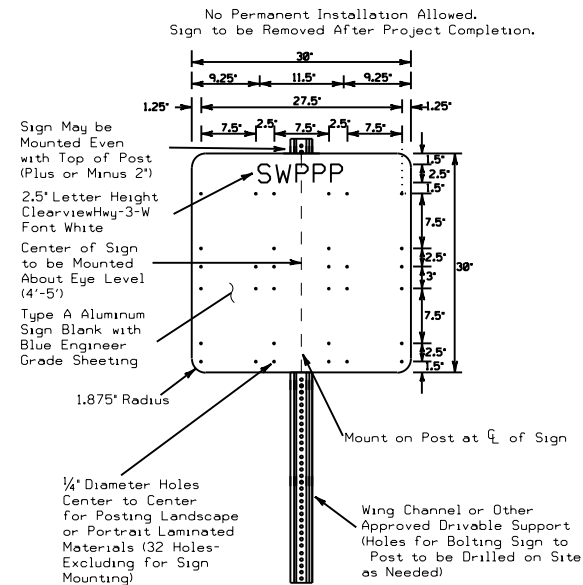
NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

- The order of activities will be as follows:
1. Preserve existing vegetative cover as much as possible.
 2. Install temporary sediment control fencing and other items as shown on plans prior to any soil disturbing activities.
 3. Perform bridge work, roadway work, and perform any necessary excavation, embankment and grading, temporary seeding, and signage.
 4. Place permanent seeding as shown in the plans and as directed by the Engineer.

STORM WATER MANAGEMENT:

Storm water will be carried to cross drainage structures by side road ditches and culverts which will empty into the various natural runoff channels.

STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING



Texas Department of Transportation
 Brownwood District Office
 2495 Highway 183 North
 Brownwood Texas, 76802



04/02/2022
**CR 2001
 BROWNWOOD DIST.
 STORM WATER
 POLLUTION
 PREVENTION PLAN**






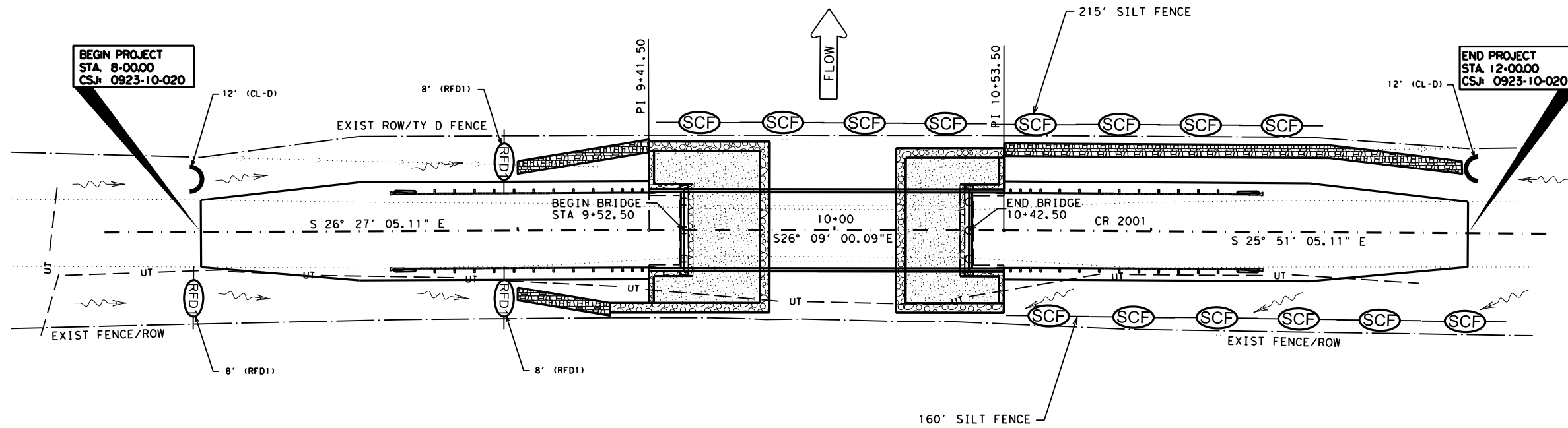
CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	58	

EXACT LOCATION & QUANTITIES OF SW3P ITEMS TO BE DETERMINED IN THE FIELD

SHEET SUMMARY									
164-6003	164-6009	164-6011	169-6007	506-6011	506-6053	506-6038	506-6039	506-6041	506-6043
BROADCAST SEED (PERM) (RURAL)(CLAY) SY	BROADCAST SEED (TEMP) (WARM) SY	BROADCAST SEED (TEMP) (COOL) SY	SOIL RETENTION BLANKETS (CL 2) (TY G) SY	ROCK FILTER DAMS (REMOVE) LF	ROCK FILTER DAMS (INSTALL) (TY 2) (6:1) LF	TEMP SEDIMENT CONT FENCE INSTLL LF	TEMP SEDIMENT CONT FENCE REMOVE LF	BIODEG EROSN CONT LOGS INSTL (12") LF	BIODEG EROSN CONT LOGS REMOVE LF
930.0	465.0	465.0	300.0	24.0	24.0	375.0	375.0	24.0	24.0

NOTE: PLACE SOIL RETENTION BLANKET AS DIRECTED BY THE ENGINEER. QUANTITIES ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD.





-  GABION BASKETS
-  GABION MATTRESSES
-  12" STONE PROTECTION



STATE OF TEXAS
 JASON H. SCANTLING
 96633
 LICENSED PROFESSIONAL ENGINEER
J.H. Scantling, P.E.

04/02/2022

CR 2001
 SW3P
 LAYOUT
 0923-10-020

LEGEND	
DIRECTION OF FLOW	
SILT FENCE	
ROCK FILTER DAM	
EROSION CONTROL LOG	

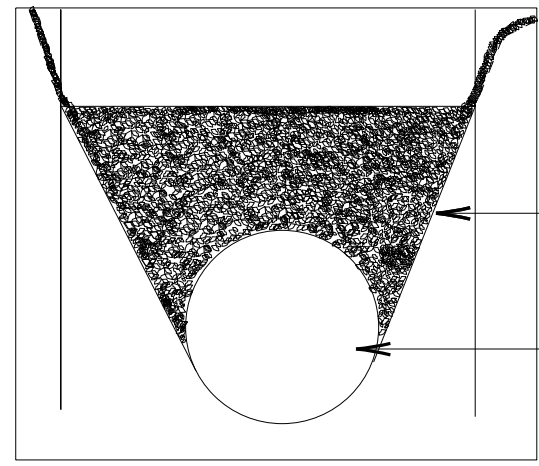
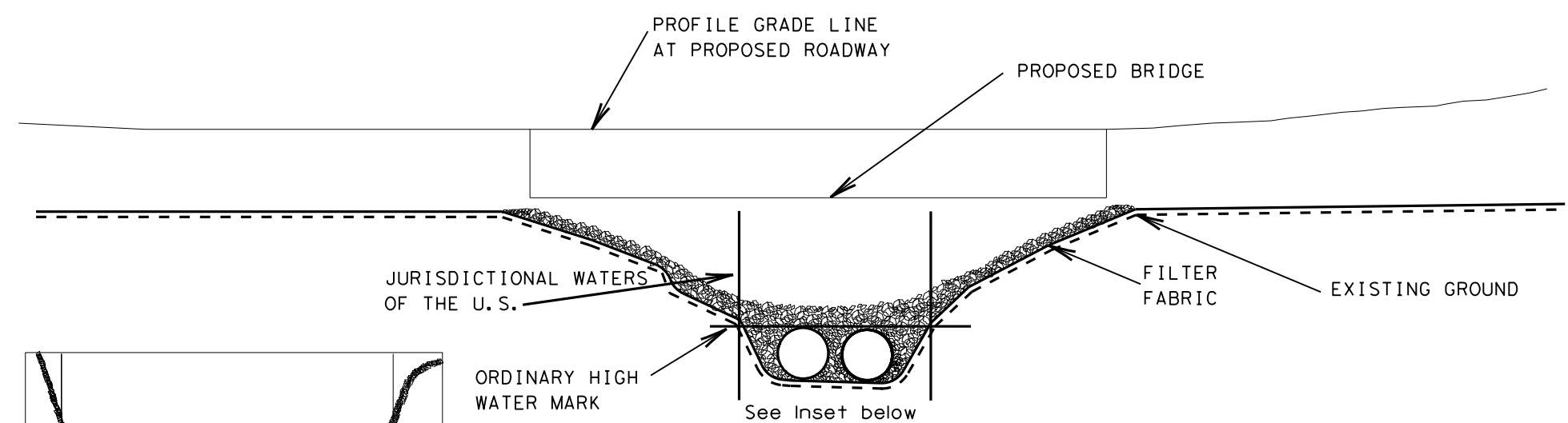
DATE: 12/10/2021 1:47:01 PM
 FILE: D:\cr2001\SW3P LAYOUT.dgn

© 2022 Texas Department of Transportation
 SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	59	

DNE:
 CK:
 DW:
 CK:

TEMPORARY CROSSING



Inset

Note: Temporary crossing will not be paid for directly but will be considered subsidiary to pertinent items.

DRAWING NOT TO SCALE



JH Scantling, P.E.

04/02/2022

CR 2001
TEMP CROSSING
DETAIL
0923-10-020

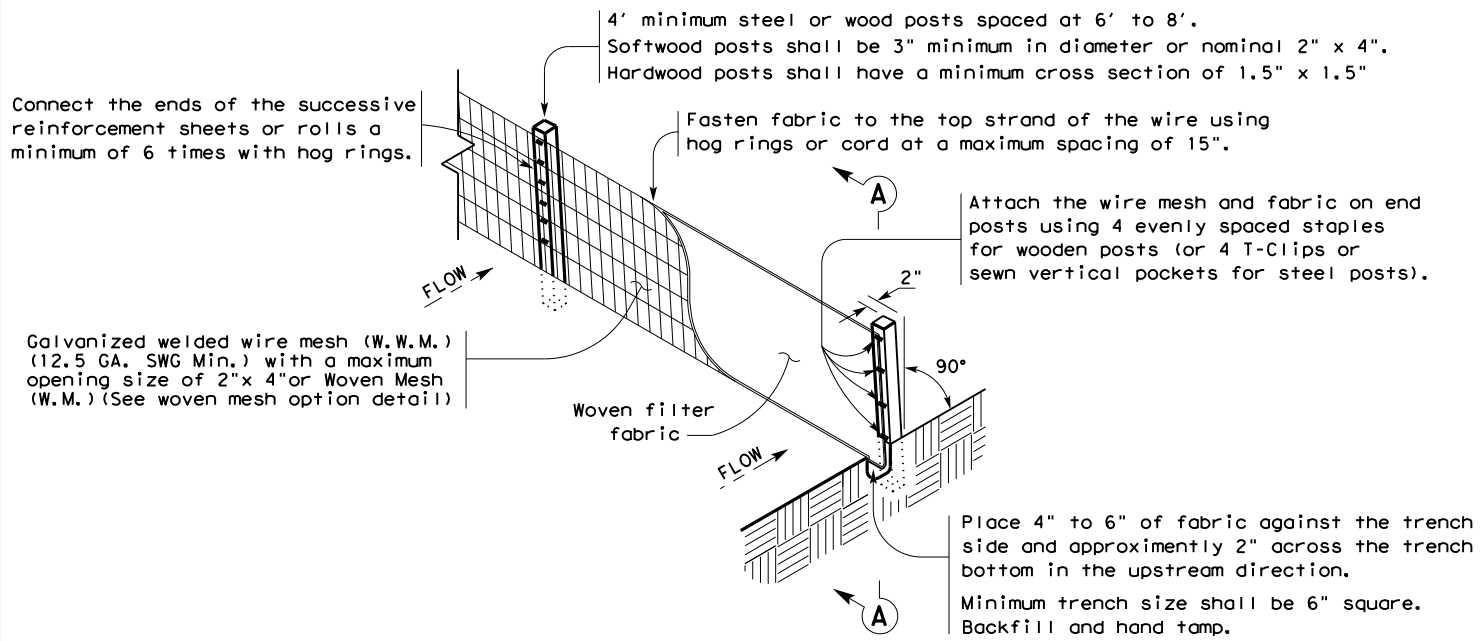


CONT	SECT	JOB	HIGHWAY
0923	10	020	CR 2001
DIST	COUNTY		SHEET NO.
BWD	LAMPASAS		60

DATE: 12/10/2021 2:35:57 PM
 FILE: D:\cr2001\TEMP CROSSING DETAIL.dgn

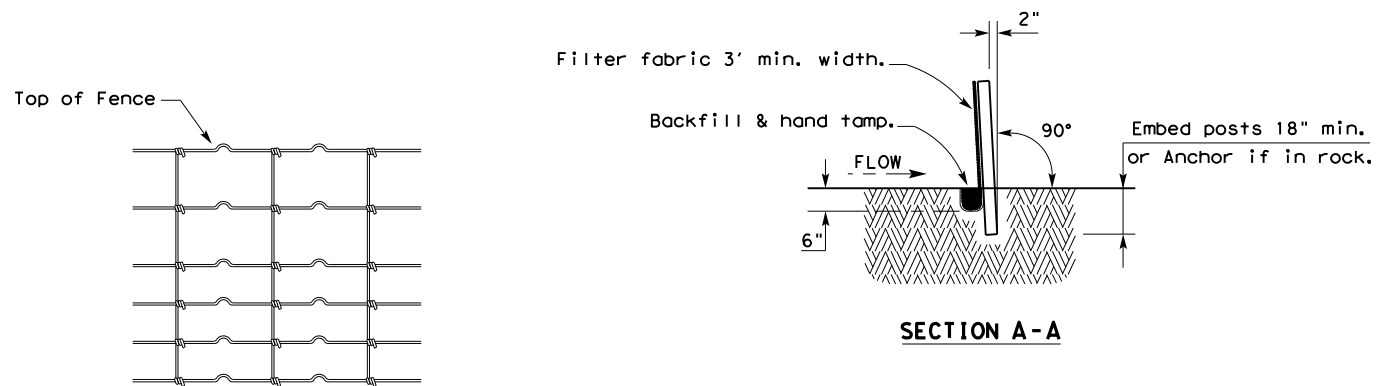
DISCLAIMER: This standard is made by TxDOT for any purpose whatsoever. The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

10/18/2021
DF1EE2001\STANDARDS\ec116.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF



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/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

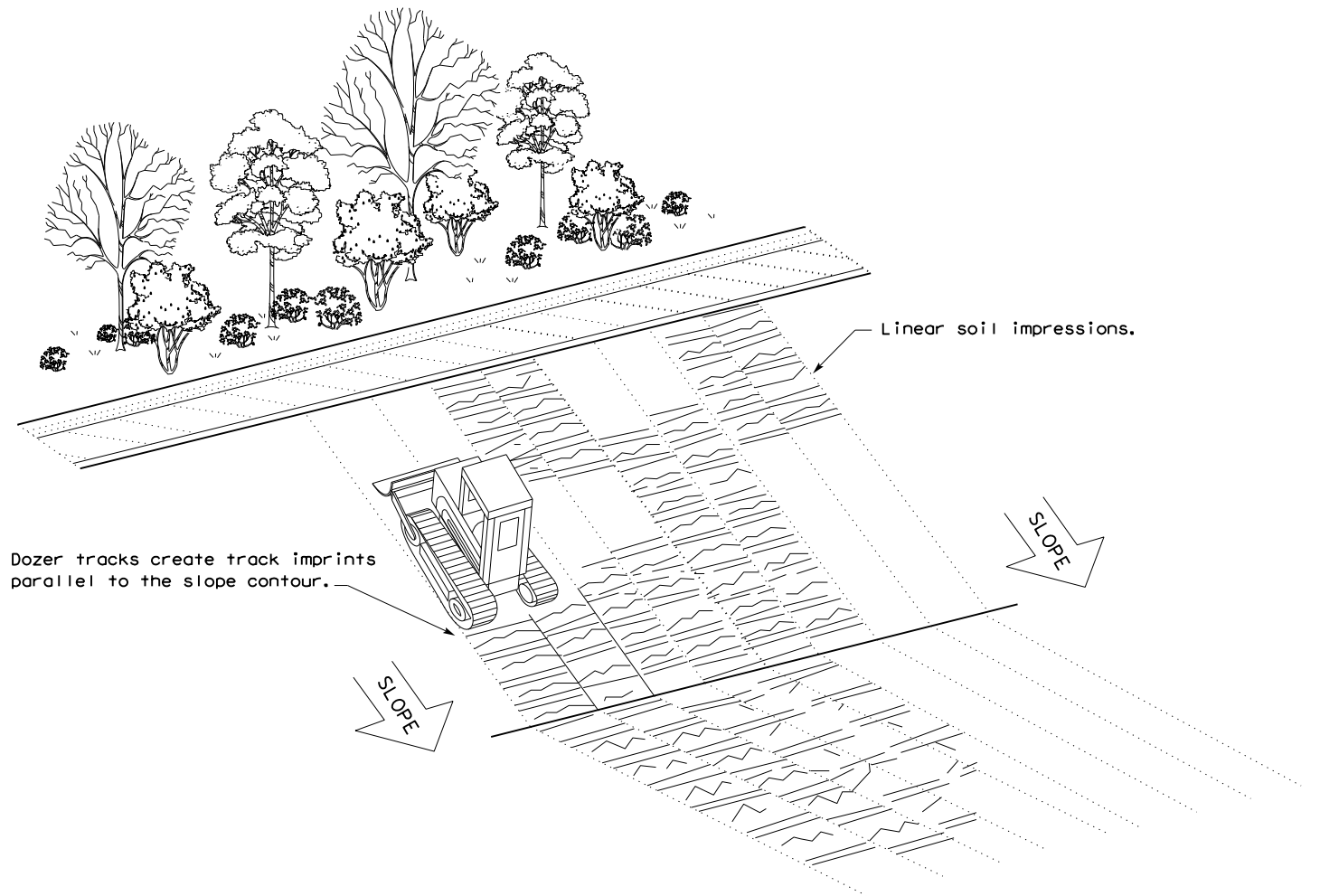
LEGEND

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.

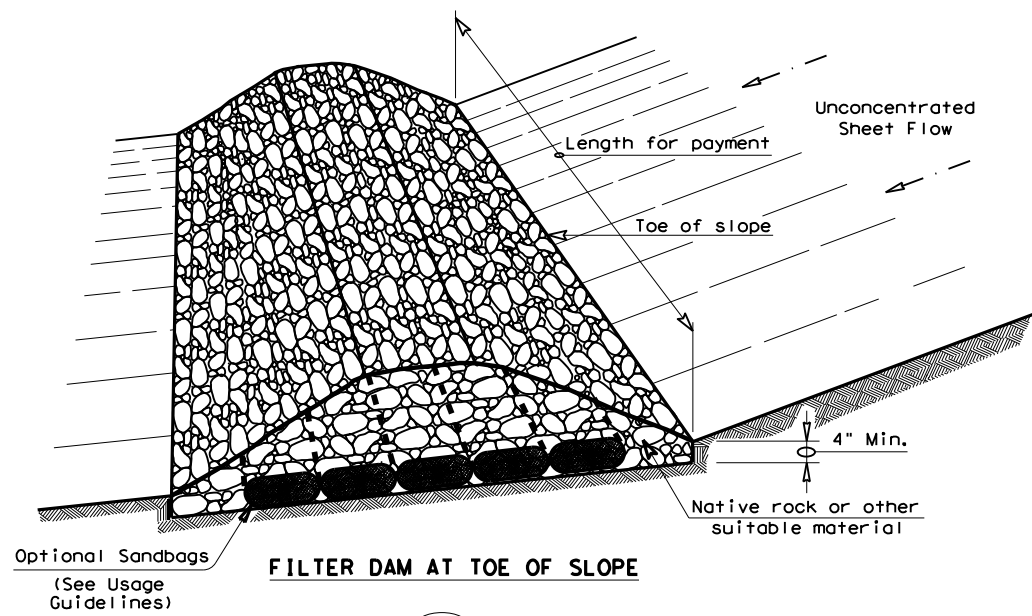


VERTICAL TRACKING

				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	0923	10	020	CR 2001	
	DIST	COUNTY		SHEET NO.	
	BWD	LAMPASAS		61	

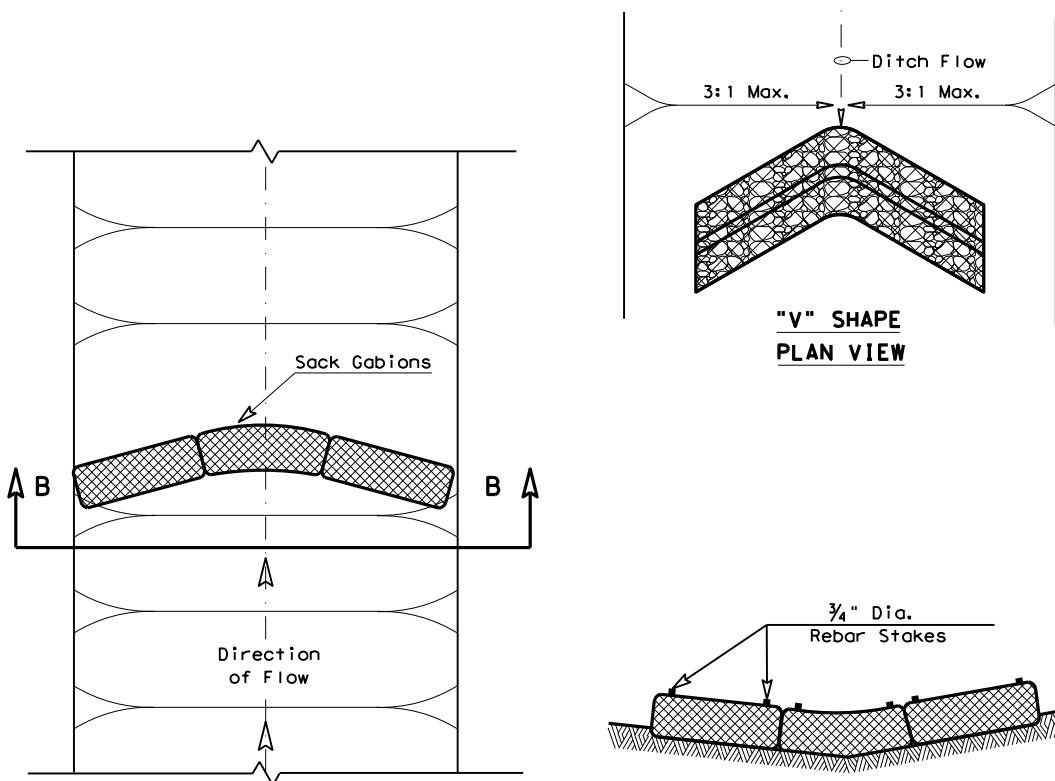
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/10/2021
FILE: D:\cr2001\STANDARDS\ec216.dgn



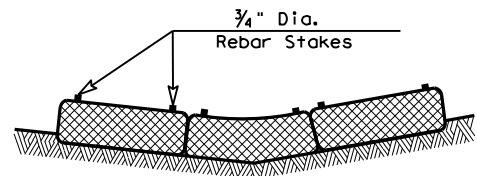
FILTER DAM AT TOE OF SLOPE

(RFD1)

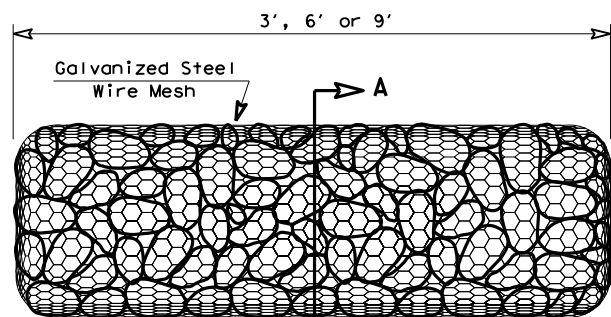


"V" SHAPE PLAN VIEW

PLAN VIEW

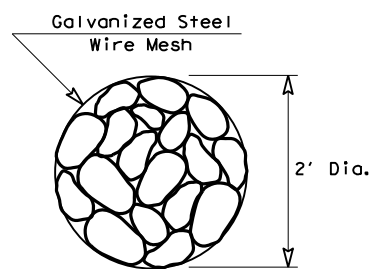


SECTION B-B

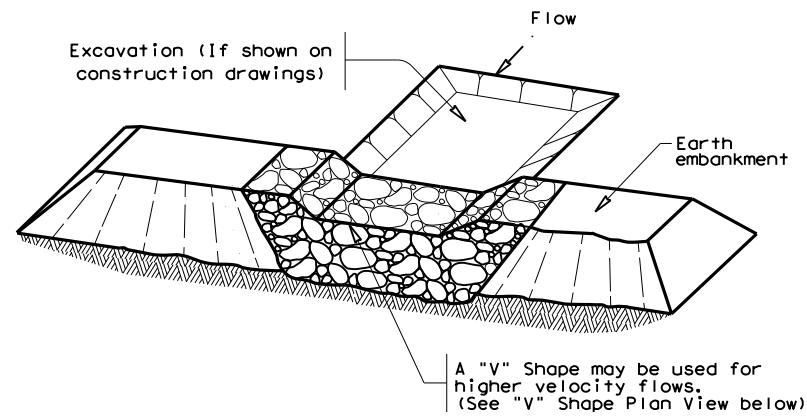


TYPE 4 (SACK GABIONS)

(RFD4)

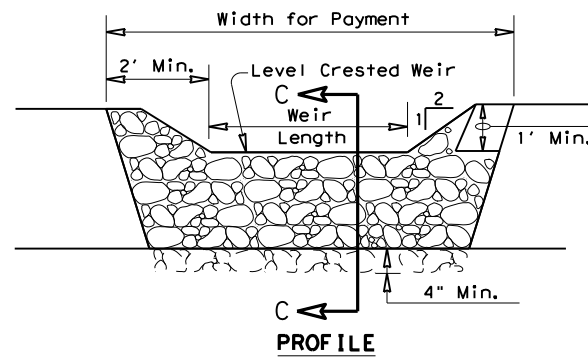


SECTION A-A

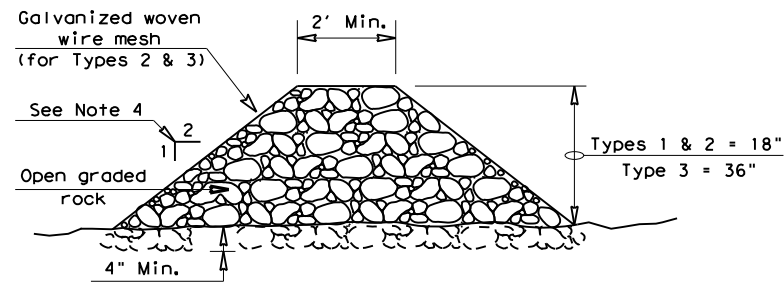


FILTER DAM AT SEDIMENT TRAP

(RFD1) OR (RFD2)



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

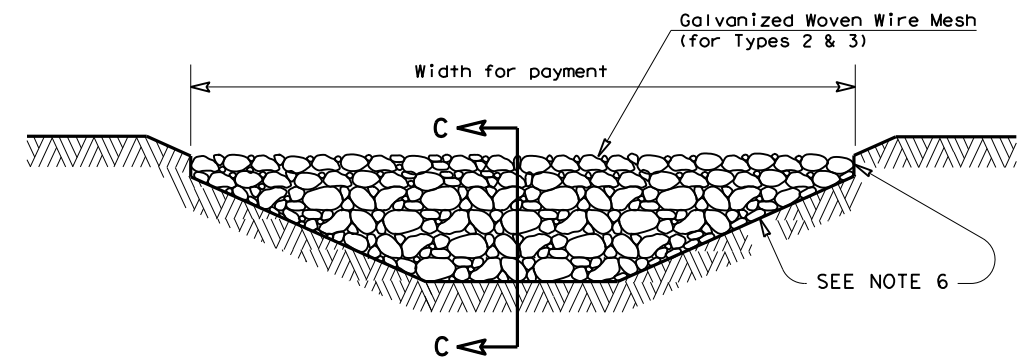
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

(RFD1) OR (RFD2) OR (RFD3)

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

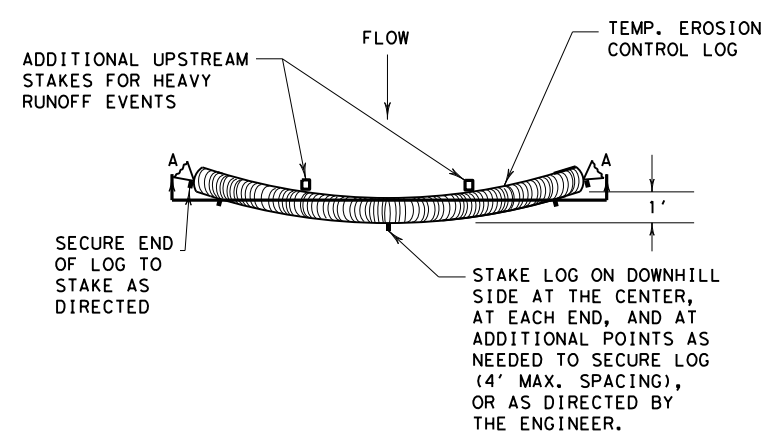
PLAN SHEET LEGEND

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

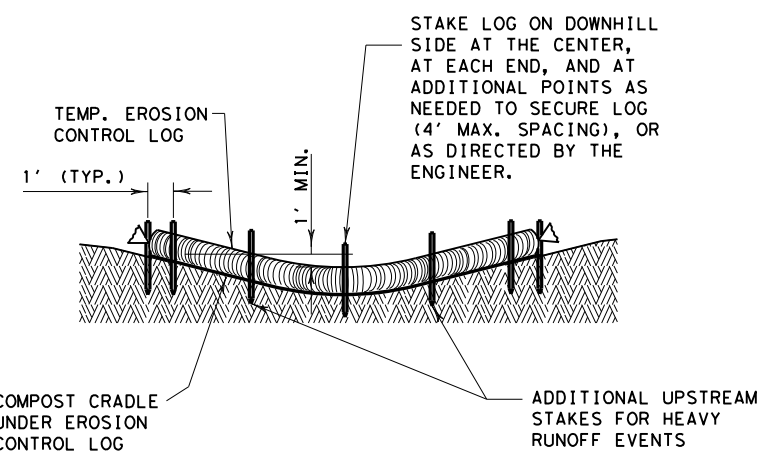
		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES ROCK FILTER DAMS EC(2) - 16			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0923	10	020
	DIST	COUNTY	SHEET NO.
	BWD	LAMPASAS	62

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/10/2021
FILE: D:\cr2001\STANDARDS\ec916.dgn

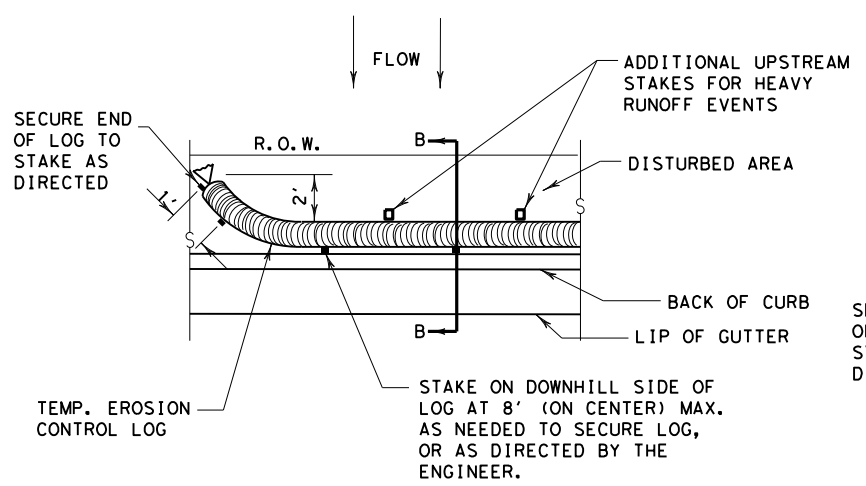


PLAN VIEW

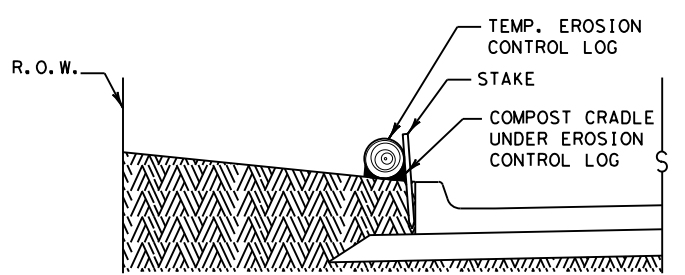


SECTION A-A
EROSION CONTROL LOG DAM

CL-D

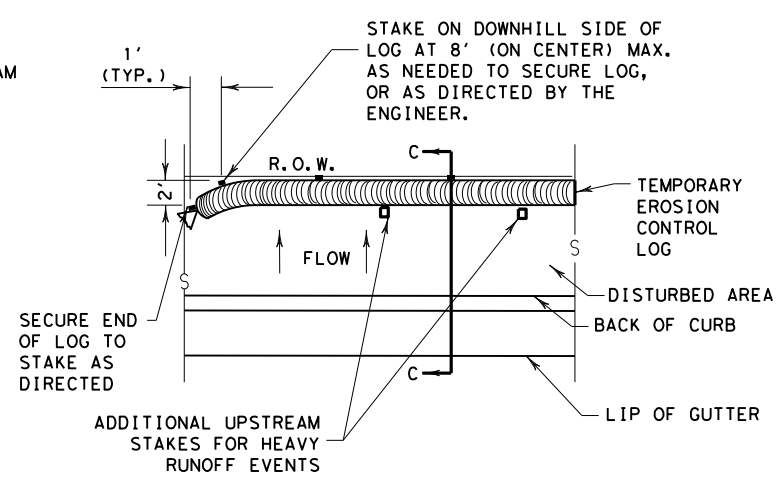


PLAN VIEW

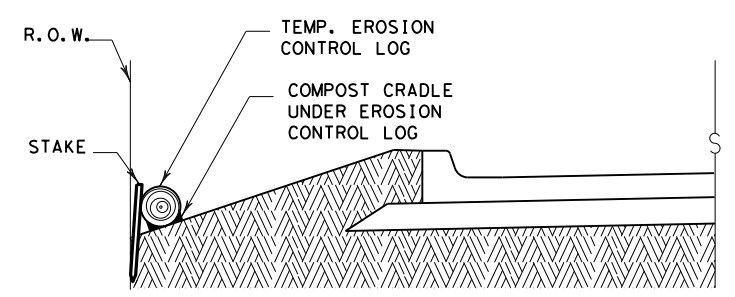


SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



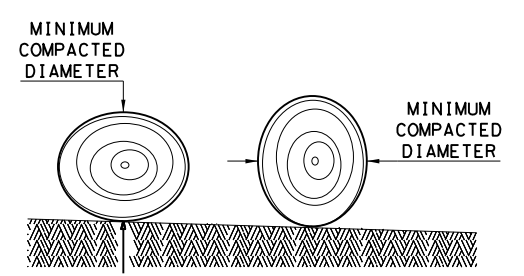
PLAN VIEW



SECTION C-C

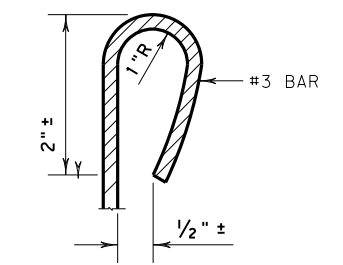
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
 - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
 - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
 - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
 - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
 - CL-DI EROSION CONTROL LOG AT DROP INLET
 - CL-CI EROSION CONTROL LOG AT CURB INLET
 - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

GENERAL NOTES:

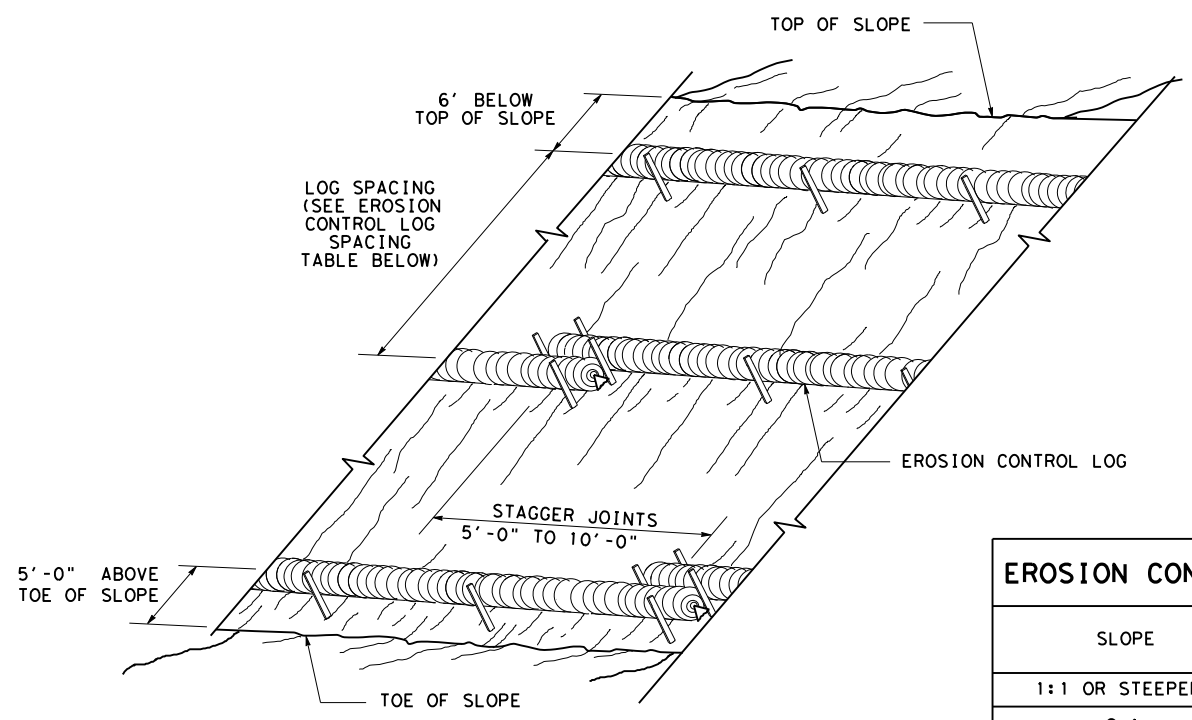
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SHEET 1 OF 3

		<i>Design Division Standard</i>	
<p>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</p> <p>EROSION CONTROL LOG</p> <p>EC (9) - 16</p>			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS	0923	10	020
	DIST	COUNTY	SHEET NO.
	BWD	LAMPASAS	63

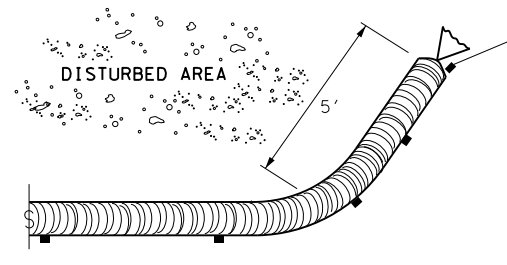
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/10/2021
 FILE: D:\cr2001\STANDARDS\ec916.dgn



**EROSION CONTROL LOGS ON SLOPES
 STAKE AND TRENCHING ANCHORING**

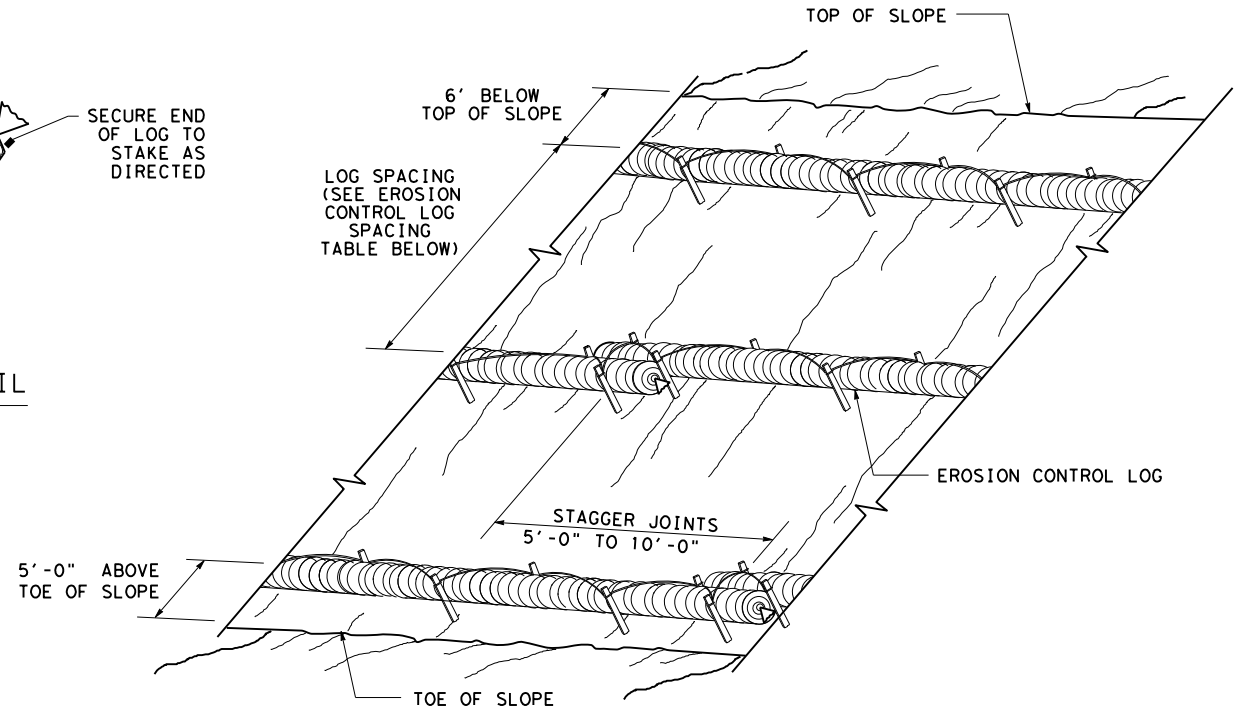
CL-SST



END SECTION RAP DETAIL

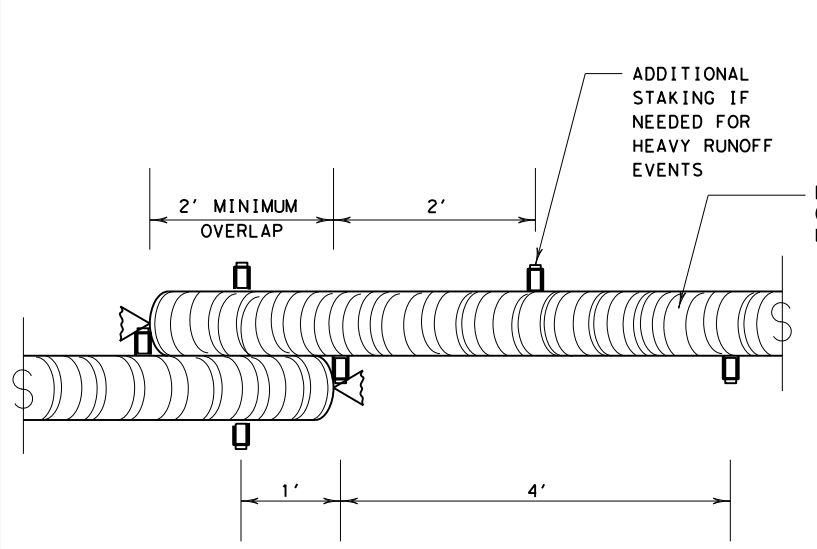
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
 SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
 HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



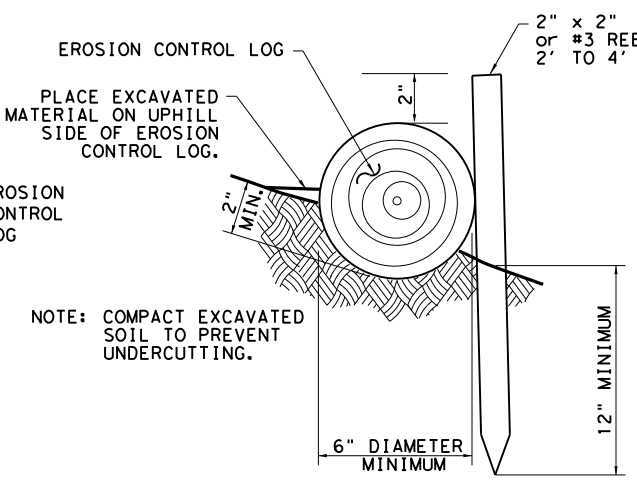
**EROSION CONTROL LOGS ON SLOPES
 STAKE AND LASHING ANCHORING**

CL-SSL

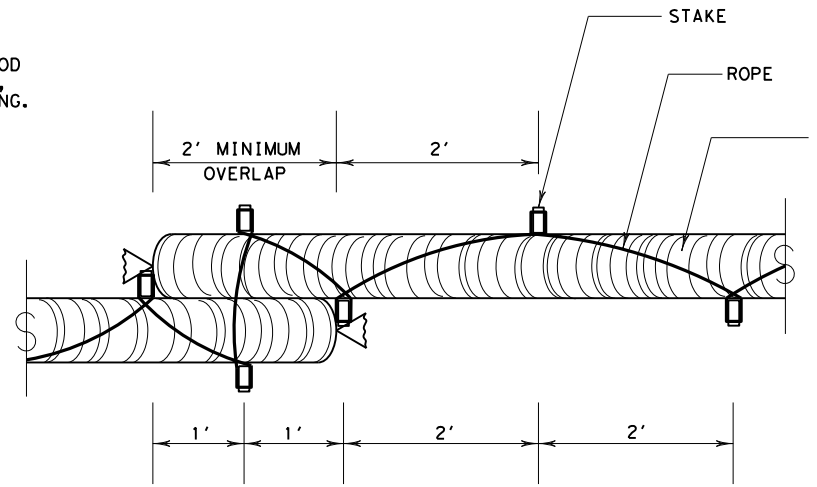


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

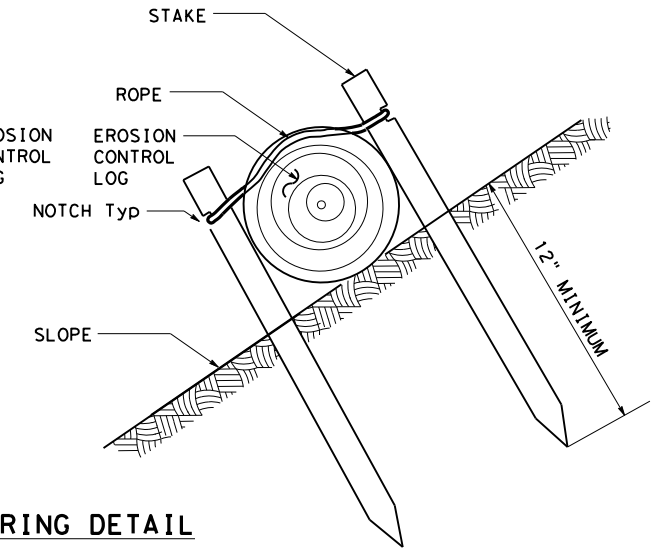


NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.



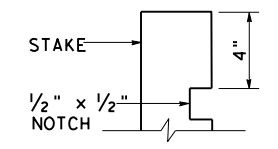
STAKE AND LASHING ANCHORING DETAIL

CL-SSL



LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

TRENCH DEPTH TABLE



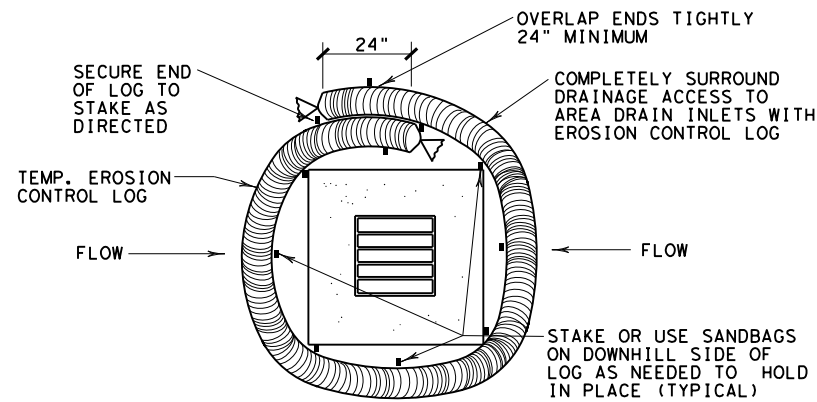
STAKE NOTCH DETAIL

SHEET 2 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0923 10	020	CR 2001
DIST	COUNTY	SHEET NO.	
BWD	LAMPASAS	64	

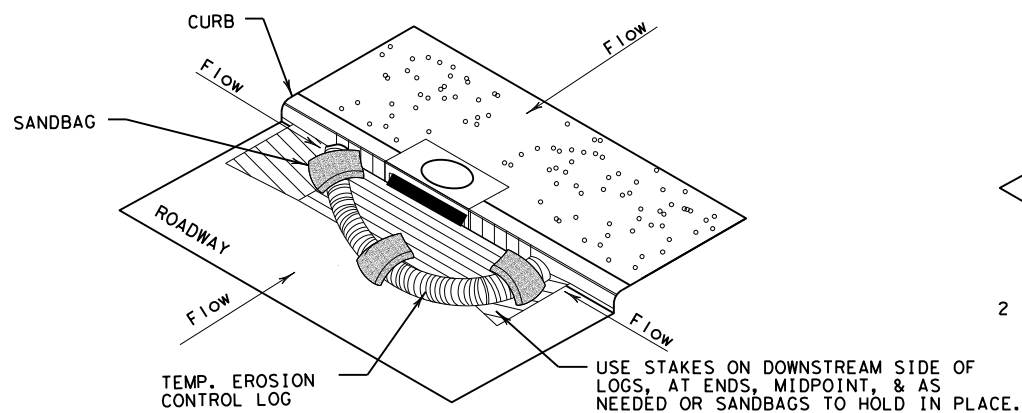
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 12/10/2021
 FILE: D:\cr2001\STANDARDS\ec916.dgn



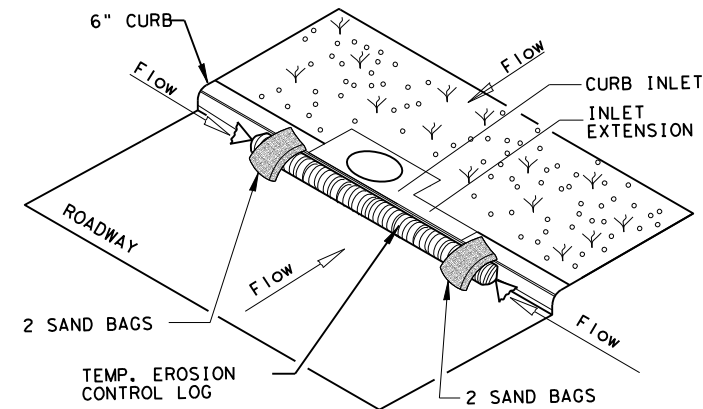
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

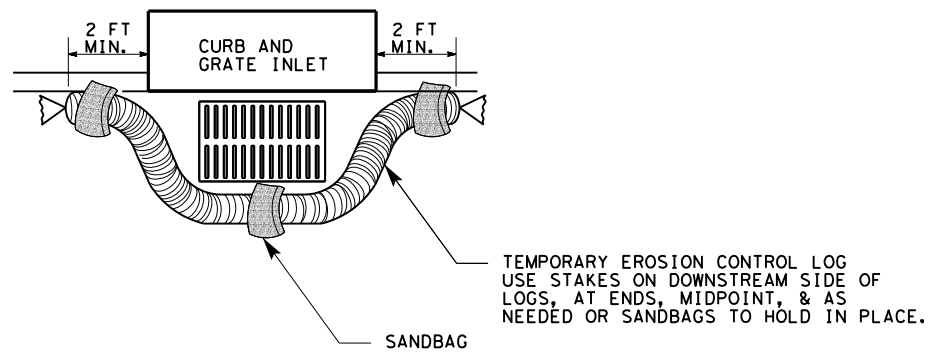
CL-CI



EROSION CONTROL LOG AT CURB INLET

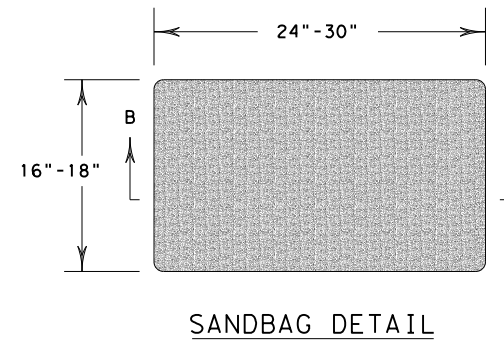
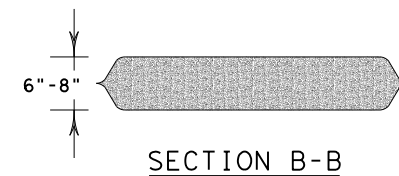
CL-CI

NOTE:
 EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

		<i>Design Division Standard</i>	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT: 0923	SECT: 10	JOB: 020
REVISIONS	DIST: BWD	COUNTY: LAMPASAS	CR 2001
			SHEET NO. 65