FED. RD. DIV. NO.	FEDERAL PROJECT NO.		SHEET NO.
6	BR 2024(522)		1
STATE	STATE DIST.	COUNTY	
TEXAS	ABL	JONES	
CONT.	SECT.	JOB	HIGHWAY
1360	01	030	FM 1226

INDEX OF SHEETS

SHEET NO. *DESCRIPTION*

SEE SHEET 2 FOR INDEX OF SHEETS

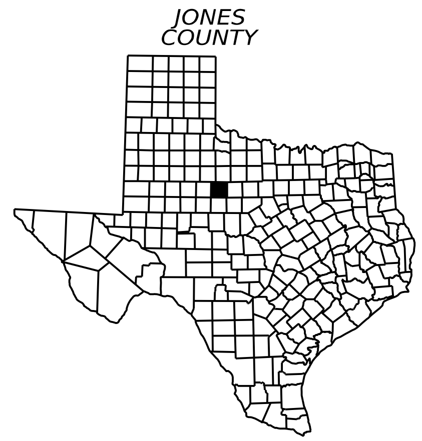
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT

PROJECT NO. BR 2024(522)

FUNCTIONAL CLASSIFICATION = RURAL MAJOR COLLECTOR
DESIGN SPEED = 70 MPH
CURRENT A.D.T. (2021) = 253
PROJECTED A.D.T. (2041) = 354
EXISTING NBI # = 08-128-0-1360-01-004
PROPOSED NBI # = 08-128-0-1360-01-008



JONES COUNTY
FM 1226

LIMITS: AT CALIFORNIA CREEK

NET LENGTH OF ROADWAY:	*565.00 FT.=*	*0.107 MI.*
NET LENGTH OF BRIDGE:	*135.00 FT.=*	*0.026 MI.*
TOTAL OF PROJECT:	*700.00 FT.=*	*0.133 MI.*

LETTING DATE: NOVEMBER 2023
DATE CONTRACTOR BEGAN WORK:
DATE WORK WAS COMPLETED:
DATE OF ACCEPTANCE:
FINAL CONTRACT COST: $
CONTRACTOR :

CERTIFICATION FOR FINAL PLANS

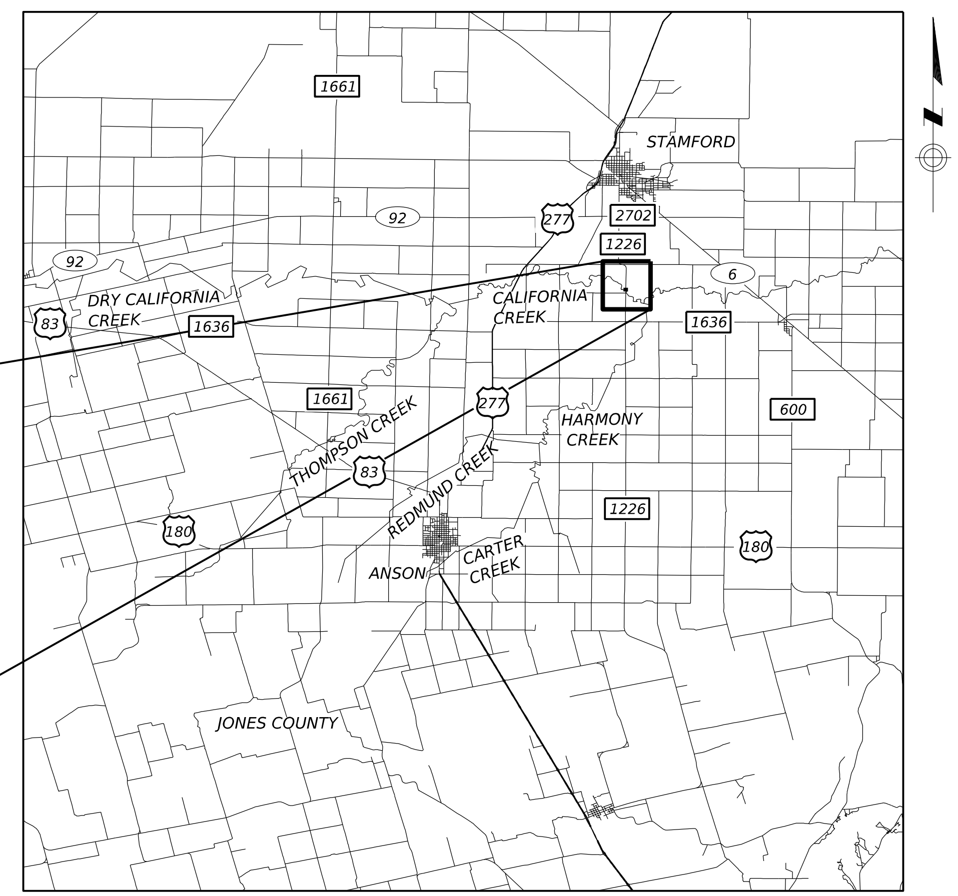
THIS PROJECT WAS BUILT ACCORDING TO THE PLANS AND SPECIFICATIONS. THESE FINAL PLANS REFLECT THE WORK DONE AND THE QUANTITIES SHOWN THEREON AND ON THE FINAL ESTIMATE ARE FINAL QUANTITIES.

AREA ENGINEER *DATE*

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

THE DISTRICT TRAFFIC SAFETY COMMITTEE HAS REVIEWED THE TRAFFIC CONTROL PLAN FOR THIS PROJECT AND IT IS IN COMPLIANCE WITH CURRENT TRAFFIC CONTROL STANDARDS.

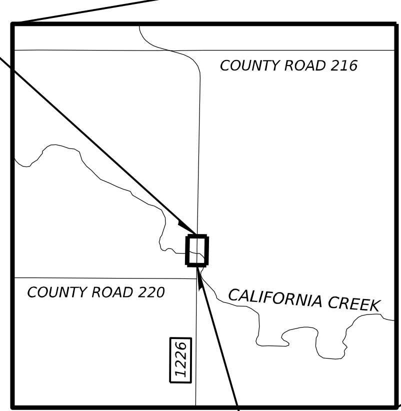
DocuSigned by:
Michael Wittie, P.E. 8/30/2023
62A1809BE662415...
COMMITTEE CHAIRMAN *DATE*



VICINITY MAP

N.T.S

BEGIN PROJECT
BEGIN CSJ 1360-01-030
STA. 217+50.00
REF MRKR = 260+0.130



END PROJECT
END CSJ 1360-01-030
STA. 224+50.00
REF MRKR = 260+0.262

PROJECT VICINITY MAP

N.T.S

EXCEPTIONS:	*NONE*
EQUATIONS:	*NONE*
RAILROAD CROSSINGS:	*NONE*

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 , October 23, 2023

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

Texas Department of Transportation

SUBMITTED FOR LETTING: 5/11/2023

BLAKE STATON, P.E.
GARVER, LLC

STATE OF TEXAS
Blake W. Staton
121491
LICENSED
PROFESSIONAL ENGINEER

RECOMMENDED FOR LETTING: 8/30/2023
DocuSigned by:
Zachary Hall
ZACHARY HALL, E.I.T.
TXDOT PROJECT MANAGER

RECOMMENDED FOR LETTING: 8/31/2023
DocuSigned by:
Michael Haithcock
MICHAEL HAITHCOCK, P.E.
DIRECTOR OF TP&D

RECOMMENDED FOR LETTING: 8/31/2023
DocuSigned by:
11C7B898887A427...
BRYCE M. TURENTINE, P.E.
AREA ENGINEER

APPROVED FOR LETTING: 8/31/2023
DocuSigned by:
Thomas G. Allbritton, P.E.
THOMAS G. ALLBRITTON, P.E.
DISTRICT ENGINEER

DATE: 5/11/2023 1:31:52 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/01_General/01_010_FM1226_GEN_TTL_01.dgn

COUNTY JONES
HWY. NO. FM 1226
PROJ. NO.
LETTING DATE SEPT 2023
DATE ACCEPTED

SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3		PROJECT LAYOUT
4-5		TYPICAL SECTIONS
6, 6A-6E		GENERAL NOTES
7, 7A		ESTIMATE AND QUANTITY SHEET
8		SUMMARY OF QUANTITIES
9		BRIDGE SUMMARY
		TRAFFIC CONTROL PLAN
10		ROAD CLOSURE AND DETOUR PLAN
		TRAFFIC CONTROL STANDARDS
11-22	#	BC(1)-21 THRU BC(12)-21
23	#	TCP(3-1)-13
24	#	TCP(3-3)-14
25	#	WZ(RCD)-13
26	#	WZ(STPM)-23
		ROADWAY DETAILS
27		CONTROL INDEX SHEET
28		HORIZONTAL ALIGNMENT DATA
29		REMOVAL LAYOUT
30-31		PLAN & PROFILE
		ROADWAY STANDARDS
32	#	GF(31)-19
33-34	#	GF(31)TRTL3-20
35	#	RAPMS-22 (MOD)
36	#	BED-14
37	#	SGT(10S)31-16
38	#	SGT(11S)31-18
39	#	SGT(12S)31-18
40	#	SGT(15)31-20
		DRAINAGE DETAILS
41		DRAINAGE AREA MAP
42-45		HYDRAULIC DATA SHEET
46		SCOUR DATA SHEET

SHEET NO.		DESCRIPTION
		BRIDGE DETAILS
47		BRIDGE LAYOUT
48		TYPICAL SECTION
49		ESTIMATED QUANTITIES AND CAP ELEVATIONS
50-51		TEST HOLE PROFILES
52		ABUTMENT #1 OR #4
53		INTERIOR BENTS #2 - #3
54		FRAMING PLAN (SPANS 1-3)
55		135.00" PRESTR CONC SLAB BEAM UNIT (SPANS 1-3)
56		PSBND
57		CWD-15 (ABL)
58		SIDD-14 (ABL)
		BRIDGE STANDARDS
59	*	BAS-A
60-61	*	CSAB
62-63	*	FD
64-65	*	PBC-RC
66-67	*	PPBC-RC
68	*	PSB-4SB15
69	*	PSB-5SB15
70	*	PSBEB
71	*	PSBRA
72	*	SEJ-M
73-74	*	SRR
75-77	*	TYPE T223
		TRAFFIC DETAILS
78		SUMMARY OF SMALL SIGNS
79		SIGNING & PAVEMENT MARKING LAYOUT
		TRAFFIC STANDARDS
80-84	#	D & OM(1)-20 THRU D & OM(5)-20
85	#	D & OM(VIA)-20
86	#	PM(1)-22
87	#	PM(2)-22
88	#	SMD(GEN)-08
89-91	#	SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
92	#	TSR(3)-13
93	#	TSR(4)-13
		ENVIRONMENTAL ISSUES
94-95		STORMWATER POLLUTION PREVENTION PLAN (SWP3)
96		ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)
97		ENVIRONMENTAL LAYOUT SHEET
98		SW3P NOTIFICATION BOARD
		ENVIRONMENTAL STANDARDS
99	#	EC(1)-16
100	#	EC(2)-16
101	#	EC(3)-16
102-104	#	EC(9)-16

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED
PROFESSIONAL ENGINEER

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

ALVARO J. LOPEZ, P.E. 5/11/23
ALVARO J. LOPEZ — DATE

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A POUND SIGN (#), HAVE BEEN SELECTED BY ME, OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

ADRIAN RANGEL, P.E. 5/11/2023
ADRIAN RANGEL — DATE

STATE OF TEXAS
Blake W. Staton
121491
LICENSED
PROFESSIONAL ENGINEER
5/11/2023

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

INDEX OF SHEETS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
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STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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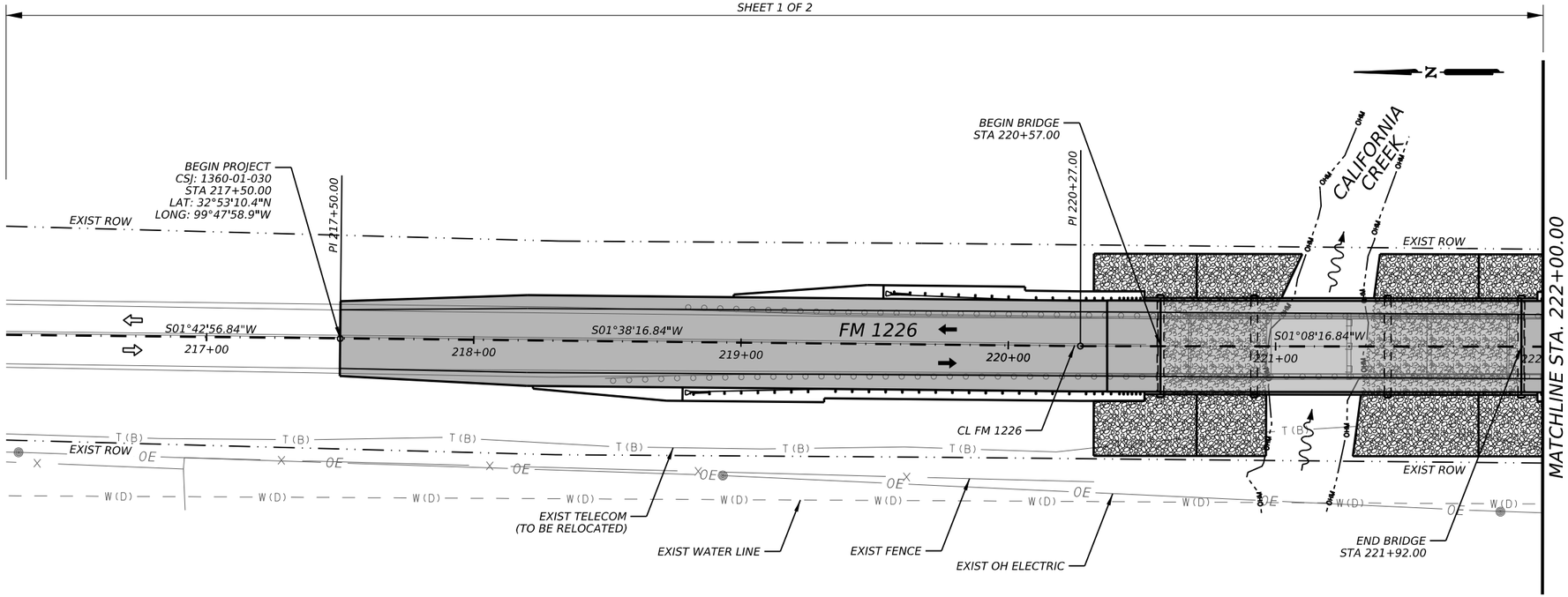
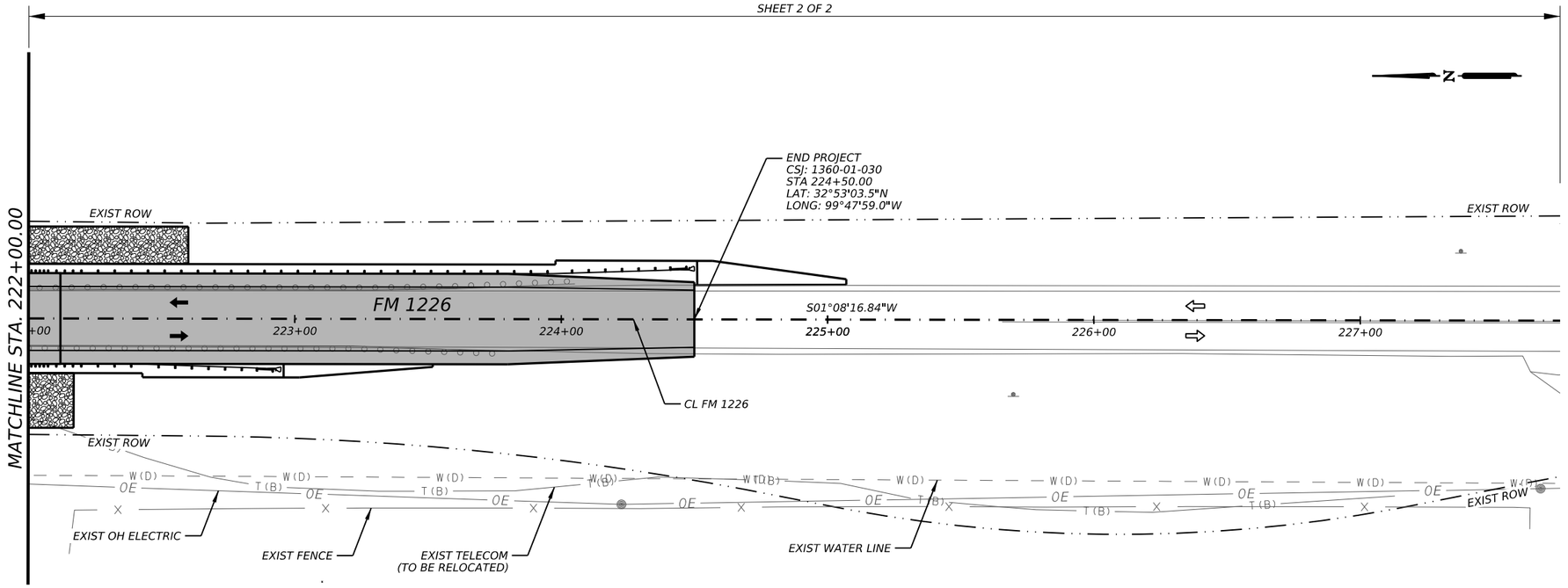
SHEET 1 OF 2



SHEET 2 OF 2



NOTE:
REFER TO HORIZONTAL ALIGNMENT DATA SHEET FOR ADDITIONAL INFORMATION.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER

Adrian Rangel
5/11/2023

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FM 1226
AT CALIFORNIA CREEK

PROJECT LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		3
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/11/2023 1:32:23 PM
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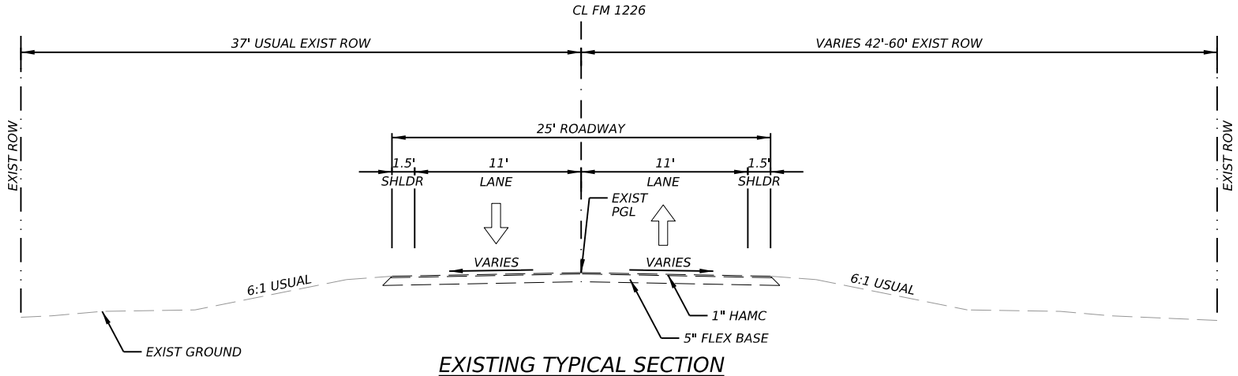
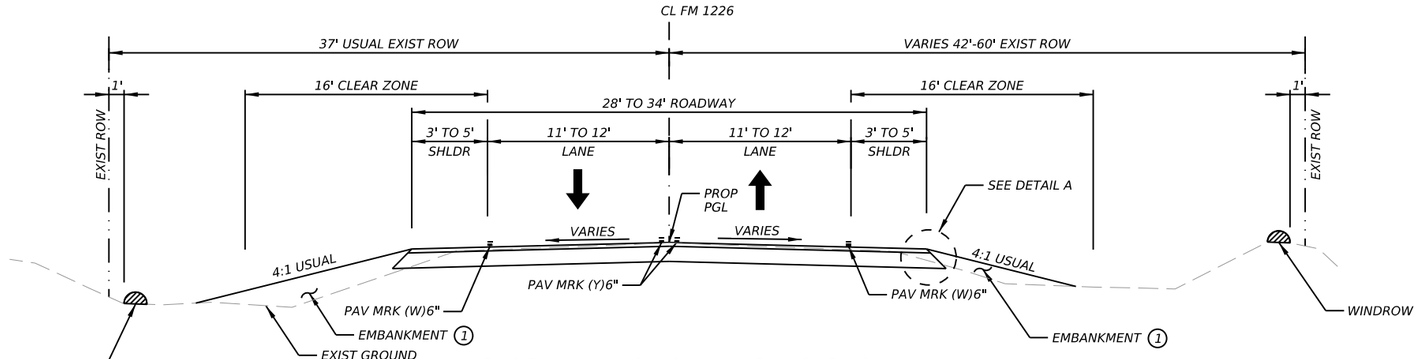


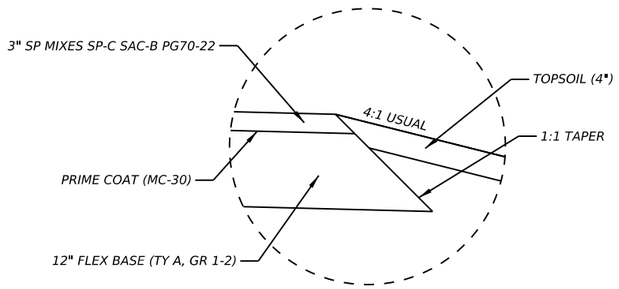
EXISTING TYPICAL SECTION

STA 217+50.00 TO STA 224+50.00
EXIST BRIDGE STA 220+67.40 TO STA 221+87.40



PROPOSED TRANSITION TYPICAL SECTION

STA 217+50.00 TO STA 218+20.00
STA 223+80.00 TO STA 224+50.00



DETAIL A

LEGEND:

DIRECTION OF TRAFFIC

(1) FILL MATERIAL SHALL CONSIST OF LEAN CLAY WITH A LIQUID LIMIT LESS THAN 50 AND PLASTICITY INDEX (PI) BETWEEN 4 AND 25. NEW FILL SHALL BE BENCHED INTO EXISTING SLOPE AND COMPACTED USING DENSITY CONTROL PER ITEM 132. THE FILL MATERIAL PLACED BELOW THE ORIGINAL GROUND SURFACE ASSOCIATED WITH BENCHING WILL NOT BE MEASURED FOR SEPARATE PAYMENT.

NOT TO SCALE

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED PROFESSIONAL ENGINEER
Adrian Rangel
6/1/2023

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3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
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TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

TYPICAL SECTIONS

SHEET 1 OF 2

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6	(SEE TITLE SHEET)		4
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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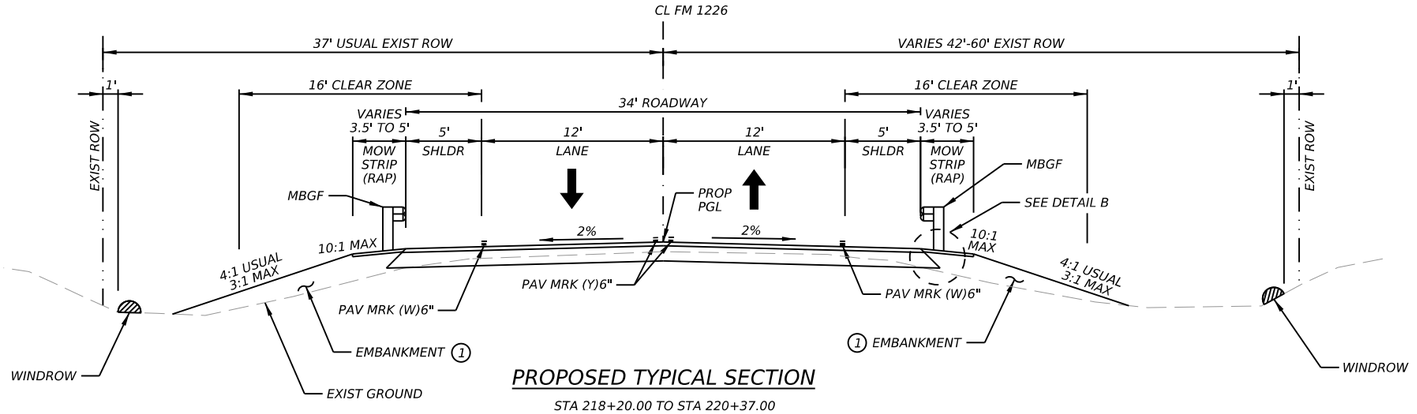
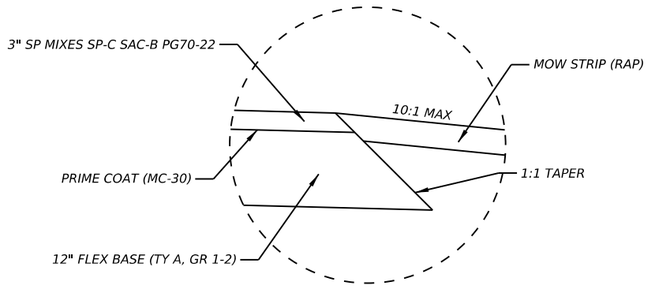
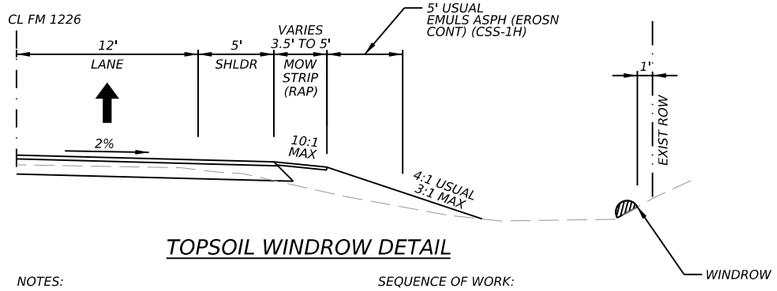


PROPOSED TYPICAL SECTION

STA 218+20.00 TO STA 220+37.00
STA 222+12.00 TO STA 223+80.00



DETAIL B



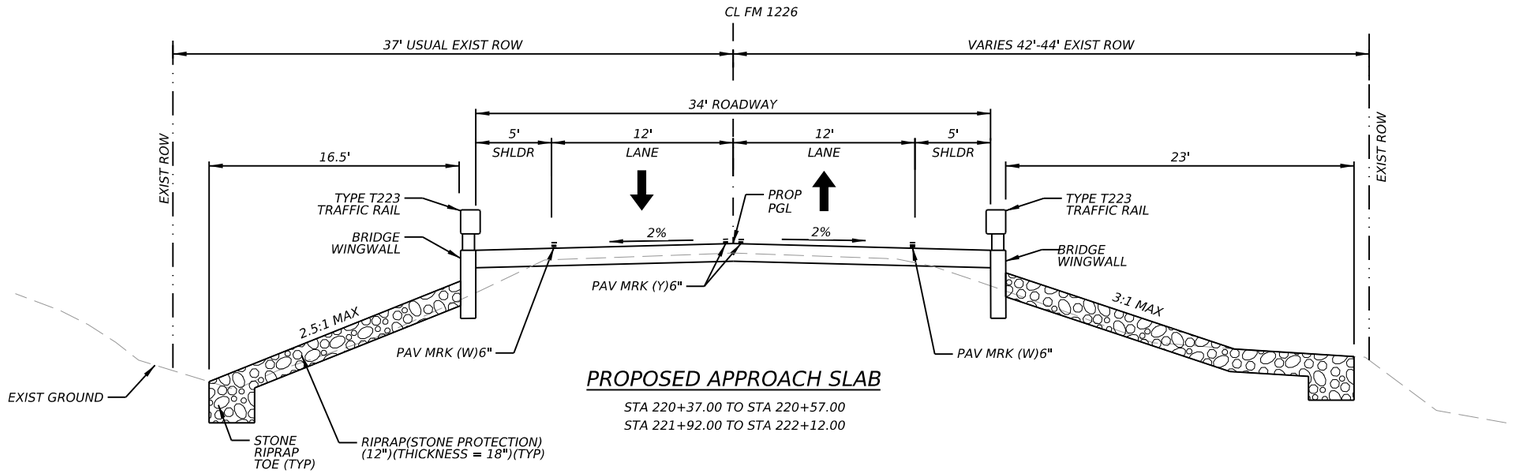
TOPSOIL WINDROW DETAIL

NOTES:

1. ALL WINDROW AND EMULSION WORK SHALL BE SUBSIDIARY TO ITEM 132.

SEQUENCE OF WORK:

1. BLADE EXISTING VEGETATION APPROXIMATELY 1' FROM THE ROW AS APPROVED BY THE ENGINEER.
2. ADD EMBANKMENT AS SHOWN UP TO THE EDGE OF PAVEMENT.
3. SPREAD WINDROW UP TO EDGE OF PAVEMENT.
4. APPLY EMULS ASPH (EROSN CONT) (CSS-1H) AT A RATE OF 0.15 GAL/SY RESIDUAL.



PROPOSED APPROACH SLAB

STA 220+37.00 TO STA 220+57.00
STA 221+92.00 TO STA 222+12.00

LEGEND:

← DIRECTION OF TRAFFIC

(1) FILL MATERIAL SHALL CONSIST OF LEAN CLAY WITH A LIQUID LIMIT LESS THAN 50 AND PLASTICITY INDEX (PI) BETWEEN 4 AND 25. NEW FILL SHALL BE BENCHED INTO EXISTING SLOPE AND COMPACTED USING DENSITY CONTROL PER ITEM 132. THE FILL MATERIAL PLACED BELOW THE ORIGINAL GROUND SURFACE ASSOCIATED WITH BENCHING WILL NOT BE MEASURED FOR SEPARATE PAYMENT.

NOT TO SCALE

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER
Adrian Rangel
6/1/2023

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

TYPICAL SECTIONS

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		5
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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Project Number: See Title Sheet
Control: 1360-01-030
County: Jones
Highway: FM 1226

ABILENE DISTRICT GENERAL NOTES
2014 SPECIFICATIONS

General

Contractor questions on this project are to be addressed to the following individual(s):

Bryce Turentine, P.E. / Phone: 325-690-9821 / Bryce.Turentine@txdot.gov
Chad Carter, P.E. / Phone: 325-676-6850 / Chad.W.Carter@txdot.gov
(Abilene Area Office)

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

For Q&A's on Proposals navigate to
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors
Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

All relevant project documentation including contract time, cross sections,etc will be posted on the districts FTP website. https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

Modified Standards
None

Failure to make necessary corrections to SW3P based on SW3P inspections will be cause for withholding the monthly estimate until such corrections have been made.
#
Failure to make necessary corrections to traffic control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections have been made.

Provide ingress/egress to the adjacent properties in areas under construction. Phased construction of driveways and streets shall be required to provide uninterrupted access to adjacent properties. Coordinate work with the property owners before beginning any construction in the vicinity of the drive.

Cut neat, straight lines with vertical faces along pavement edges or along joints between existing asphalt or concrete pavement and new pavement perpendicular or parallel to the direction of traffic by methods described in applicable bid items, or as directed. Provide clean edges or joints without jagged appearance or chunks broken out. This work is considered subsidiary to various bid items.

Project Number: See Title Sheet
Control: 1360-01-030
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Environmental

Endangered and Protected Species

1. Migratory Bird Treaty Act (MBTA) - Establishment of a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703)

Best Management Practices

1. Comply with the SW3P and associated sheets.
2. Migratory Birds:
   a. Bird nesting season is typically 15Feb through 15Sep annually.
   b. The Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, or anywhere they are encountered.
   c. Perform all tree trimming and other vegetation clearing activities during the non-breeding season (typically 15Sep-15Feb annually). Perform any inactive nest removal and bird exclusion methods to prevent birds from establishing nests. Phasing of work during construction may be necessary to stay in compliance.
   d. When active nests are unexpectedly encountered on-site during construction, the Contractor will stop work and immediately notify the Engineer. Take measures to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the Migratory Bird Treaty Act, Texas Parks and Wildlife Code, and TxDOT policy.
   e. The Engineer will notify the Contractor when work may resume.
   f. The Contractor should be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between 15Feb and 15Sep. The Contractor can discuss other preventative measures with the Engineer and/or District Environmental Staff.
3. Other Best Management Practices for State Protected Species * (Update for specific county SGCN species) *
   a. If Black Tailed Prairie Dog (BTPD) burrows or pocket gopher mounds are found near or within the project area, place barrier fencing to discourage the individual animals of moving into or through the construction area.
   b. While seeding or revegetating, if BTPD or pocket gopher mounds are discovered near or within the planned area, a vegetative barrier should be planted to discourage the dispersal of the species within the TxDOT ROW.
   c. If any animals are within the project area, avoid harming when encountered. Let them leave the area without harassment. Avoid any unnecessary impacts to dens or burrows.
   d. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
   e. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for the presence of wildlife prior to backfilling.
   f. Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

CONT	SECT	JOB	HIGHWAY
1360	01	030	FM 1226
DIST	COUNTY		SHEET NO.
ABL	JONES		6

g. If Texas tortoises (Gopherus berlandieri) or box turtles (Terrepene spp.) are present in a project area, they should be removed from the area and relocated between 100 and 200 meters from the project area.
h. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided.

Item 5, "Control of Work"
Use Method C for construction surveying.

All known utilities are identified in the plans, including the crossing of power lines. Use this information to identify potential issues with power poles and power lines prior to bidding.

Make necessary arrangements with utility owners regarding temporary protections such as bracing power poles, and de-energizing power lines. The Department will not reimburse the cost of such temporary protections to the Contractor, unless the Engineer determines that inadequate information was available at the time the project was bid. **"Call Before You Dig" "Call 811"**

Provide notification to the District Traffic Engineering Section by telephone at 325-676-6991 and by email at ABL_TrafficFix@txdot.gov when planning drilling or excavation work in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 72 hours in advance of performing the work.

Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work. Preserve and document the marked utility locations to prevent unnecessary secondary notifications. Notify the Engineer of conflicts between proposed work and underground utilities.

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

Item 6, "Control of Materials"
Lead abatement will be performed by the Contractor at the steel pile cutoff point beneath grade. Flame cutting or saw cutting will be allowed only at the cutoff point locations. Lead abatement shall be subsidiary to bridge removal.

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

Project Number: See Title Sheet
Control: 1360-01-030
County: Jones
Highway: FM 1226

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

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

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

Item 7, "Legal Relations and Responsibilities"
Do not initiate activities in a project specific location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Be responsible for any and all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the department with a copy of all consultation(s) or approval(s) from the USACE prior to initiating activities.

The contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determination(s) that their activities do not affect a USACE permit area. Maintain copies of their determination(s) for review by the department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either **(1)** or **(2)** below.

(1) Restricted Use of Materials for the Previously Evaluated Permit Areas. Document both the project specific location (PSL) and their authorization. Maintain copies for review by the department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the department with a copy of all USACE coordination or approval(s) prior to initiating any activities for an area within the project limits that has not been

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evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
b. Unsuitable excavation or excess excavation [“Waste”] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is **1.31** acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the government that operates a separate storm sewer system.

Provide one SW3P Notification Board for this project. Notification Boards are to be placed at locations within the right-of-way but outside the clear zone as directed by the Engineer. Consider this work to be subsidiary to the various bid items of the contract.

The Contractor's attention is directed to the Texas Aggregate Quarry Pit Safety Act. Any pit or quarry meeting the definition of an unacceptable unsafe location as defined in the Act is subject to regulations set forth in this Act. A copy of the Texas Administrative Code, Title 43, Part, 1, Chapter 21, Subchapter M may be viewed at https://texreg.sos.state.tx.us/public/readtac$ext.ViewTAC?tac_view=5&ti=43&pt=1&ch=21&sch=M&rl=Y

No significant traffic generator events identified.

Hard hats are required at all times during construction when construction personnel are in TxDOT Right-of-Way.

Patrol vehicles must be clearly marked to correspond with the officer’s agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

LIGHTING STANDARDS FOR HIGHWAY MAINTENANCE OR CONSTRUCTION VEHICLES AND SERVICE VEHICLES

VEHICLE LIGHTING SUMMARY

Vehicle	Color of Flashing Lights	Transportation Code
Police Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Fire/EMS Vehicles	Red/Blue/White/Amber	547.305 & 547.702
Volunteer Fire/EMS	Red/Blue/White/Amber	547.305 & 547.702
School	Bus Red/White (rooftop) /Amber	547.305 & 547.701
Highway Maintenance or Construction Vehicles and Service Vehicles	Amber/Blue	547.105 & TxDOT Lighting Standards

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Item 8 “Prosecution and Progress”
Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process and/or execute all contracts at the same time.

The Contractor is hereby authorized to begin work prior to the expiration of the number of calendar days provided in the Special Provision to Item 8, Article 8.1. Notify the Engineer in writing of the date to begin work. Time charges will commence when work begins or on the expiration of the number of calendar days provided, whichever occurs first.

Coordinate and update the work schedule with the project inspector daily. Give a minimum of 24 hours of notice to project inspector if work requiring inspection or testing is to be performed. Failure to do so may cause that work to be delayed or postponed if TxDOT personnel are not available. Work performed without suitable inspection, as determined by the Engineer, may be ordered removed and replaced at Contractor’s expense.

Item 9, “Measurement and Payment”
The progress payment period shall end on the 25th of each month, unless directed by the Area Office Engineer. Material on Hand (MOH) is due two business days before estimate cut off.

Item 160, “Topsoil”
Salvage existing topsoil in windrows along the limits of the disturbed area, or as directed.

Item 164, “Seeding for Erosion Control”
Quantities shown are approximate; limits of the temporary and permanent seeding will be determined during construction.

Temporary seeding will be required in several small areas as work progresses to comply with the storm water pollution prevention plan and may require multiple mobilizations of seeding crew.

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Item 168, "Vegetative Watering"
Water rate for this project shall be ¼" of water per acre every two weeks for a 3-month period.

Item 204, "Sprinkling for Dust Control"
Sprinkle for dust control as directed. Payment for this item will be subsidiary to the various bid items.

Item 216, "Proof Rolling"
Perform proof rolling only as directed. Payment for this item will be made only when proof rolling is performed as directed.

Item 247, "Flexible Base"
If in the opinion of the Engineer, the material is of satisfactory quality the addition of four (4) percent fly ash by weight may be used to meet strength requirements. Modify the construction methods in accordance with Item 265 "Fly Ash or Lime-Fly Ash Treatment (Road Mixed)". Provide materials from an approved source. Meet all other material requirements of item 247. This work is subsidiary to item 247.

The flexible base material in this contract has been estimated to be ***646*** cubic yards (compacted). The estimated quantity of flexible base is for the roadway and driveways. The measured area for payment is the crown width only. The tapers, etc., are not included in the measurements for the flexible base and are considered subsidiary to this item.

Item 416, "Drilled Shaft Foundations"
All soil, water, and slurry removed from drilled shafts shall be captured and disposed of properly. No discharge of these materials into, or in close proximity to, the surrounding water will be allowed.

Item 420, "Concrete Substructures"
In addition to the elements shown in table 1, the following elements are Plans Quantity Elements.

- Bent Concrete

Item 420, 427, "Concrete Substructures" & "Surface Finishes for Concrete"
Provide a Surface Area 1 finish using an Adhesive Grout Coating or Rub Finish as directed.

Item 421, "Hydraulic Cement Concrete"
Use a cement meeting the requirements of Ty II when Mix Design Option 7 is selected for cast in place concrete.

Class C fly ash and Type I cement will not be allowed for any mix unless approved by the Engineer.

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As a minimum, curing facility includes concrete curing tank, heater and a concrete recording thermometer. Provide a recorder with the capability to chart temperatures for 24 hours, 7 days and 30 day periods of time.

Air Entrainment requirements are waived with exception to bridge deck concrete, and rails, top slabs of direct traffic culverts and approach slabs. Air Entrainment is required for all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.).

Item 440, "Reinforcement for Concrete"
Provide epoxy coated reinforcement for all reinforcement in abutment caps, wingwalls, and backwalls (drilled shaft reinforcement excluded); interior bent caps (column and drilled shaft reinforcement excluded); cast-in-place portions of bridge deck (PCP reinforcement and bridge girder reinforcement excluded); bridge railing; and approach slab.

Item 502, "Barricades, Signs and Traffic Handling"
Mobile traffic control in accordance with TPC 3 series will be required for placement of short duration, short term, intermediate term, and long-term traffic control.

Provide the Engineer with written notification seven (7) days in advance of major traffic changes. A major traffic change is defined as the temporary (greater than one day) or permanent relocation of traffic lanes typically in an urban setting. The notice will, at a minimum, include the expected date, time and scope of the traffic change. The Department will utilize the information provided to inform the traveling public of the changes. Failure to provide advance notice, or to provide accurate information, will result in delaying the work until such time that the public has been notified.

Additional signs, barricades and traffic handling may be necessary to complete the work shown herein and will be provided by the contractor as required and will be considered subsidiary to this item.

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

The Contractor's person responsible for TCP compliance must be available by local telephone and have a response time within 45 minutes.

Work will not be allowed on both sides of the roadbed at the same time.

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Equip all work vehicles within 30 feet of the traveled way with a functioning amber strobe light or rotating beacon visible from all directions.

Repair barricades within the timeline shown on the barricade inspection report. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department. Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Conflicting guide signs shall be covered as approved by the Engineer. This work shall be subsidiary to Item 502.

Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls"
On site concrete washout shall not be allowed on this project.

Item 540, "Metal Beam Guard Fence"
Steel posts for metal beam guard fence may be field cut to proper rail height with a power saw when approved by the engineer.

Core drill 1 ¼ diameter holes through existing slab. Percussion or impact drilling is not permitted. Patch spalls, when directed by the engineer, in accordance with item 429, "Concrete Structure Repair", at the contractor's expense.

The Department will furnish TY B (RAP) for metal beam guard fence mow stripes stockpiled on TxDOT ROW at the southeast corner of US 277 and Co Rd 297 intersection north of Anson, TX.

Item 585, "Ride Quality for Pavement Surfaces"
The Engineer reserves the right to prohibit corrective work and assess the penalty for each occurrence of localized roughness per Article 585.3.4.2.3.2.

Use pay adjustment schedule **(3 (three))** for Ride Quality bonus/penalty calculation.

Item 644, "Small Roadside Sign Supports and Assemblies"
Use the latest edition of the "Standard Highway Sign Designs for Texas" for Sign types for which design details are not shown on the plans.

Sign placement shall be in accordance with the latest edition of the TMUTCD & TxDOT's Sign Crew Field Book located at the following addresses.
TMUTCD - https://www.txdot.gov/business/resources/signage/tmutcd.html
TxDOT's Sign Crew Field Book - http://onlinemanuals.txdot.gov/txdotmanuals/sfb/index.htm

Before final sign installation, stake all sign locations for approval by the engineer.

All triangle slip base small sign mounts installed under this item shall utilize clamp type bases.

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Remove entire small sign foundation.

Deliver and stockpile all signs to be salvaged to the Jones County maintenance yard, located approximately 15.2 miles from the south end of the project.

Item 658, "Delineator and Object Marker Assemblies"
Delineators and object marker assemblies will use winged channel posts. The winged channel posts will be 1.12 lb/ft and 6.5 ft in length.

All MBGF delineation shall be GF2 mounted on posts.
Use a minimum 2 inch long lag screws with washers to attach flexible GF2 barrier reflectors to wooden post. For steel posts, use an approved adhesive, or other method approved by Engineer.

Concrete Barrier Reflectors shall be equivalent to Shure-tite CTB "Cup Mount" Delineator (8"). Attach delineators to concrete rail with concrete anchors as approved by the Engineer.

Item 662, "Work Zone Pavement Markings"
Place work zone pavement markings (flexible tabs) prior to the seal coat operation.

Dispose of tabs and paper in an approved trash receptacle. (Reference Standard **SW3P**, waste material)

Item 666, "Retro reflectorized Pavement Markings"
All longitudinal pavement markings (including profile pavement markings) must meet minimum retro reflectivity requirements.

Establish a true and correct alignment with a method approved by the Engineer. This work will be considered subsidiary.

Contractor is responsible for re-establishing location and alignment for new pavement markings matching pavement marking alignment prior to construction activities. This work will be considered subsidiary.

Item 672, "Raised Pavement Markers"
Provide a complete system of raised pavement markers at locations indicated on the plans and as directed by the engineer. The plans are intended to show typical conditions, which can be extended to similar conditions throughout this project as approved or directed.

Bituminous adhesive shall be used on this project.

Item 677, "Eliminating Existing Pavement Markings and Markers"
Remove the existing raised pavement markings (RPMs) and profile pavement markings as the work progresses, or as directed by the Engineer. Removal methods shall be approved by the Engineer. Properly dispose of materials removed. Removal of existing profile pavement

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markings will be paid for directly. Removal of RPMs will not be paid for directly but will be subsidiary to the pertinent bid items.

Item 3077, "Superpave Mixtures"
Furnish aggregate for final surfaces with a minimum surface aggregate classification of "**B**".

The Engineer reserves the right to test all sources even if the source is listed in the Bituminous Source Rated Quality Catalog.

Provide the testing lab samples to calibrate the ignition oven no later than five **(5)** working days prior to mix design verification.

Paving operations will not be allowed to begin until TxDOT has tested and obtained passing Hamburg results on the trial batch.

A maximum of 0.50% anti-stripping agent will be allowed for each specified mix type.

Dilution of tack coat is not allowed.

Do not exceed a laydown width of 16' per pass.

Substitute Binders will not be allowed unless RAP is used in the production of the mixture.

RAP will not be allowed in surface mixes.

A warm mix additive will be required for hotmix hauls over 50 miles.

Unless otherwise directed by the engineer, a warm mix additive will be required when paving during November 1st through March 15th.

The maximum allowable dust / asphalt ratio that will be allowed is 0.6 to 1.2.

The use of a tapered longitudinal joint will be required for pavement thicker than 2 inches.

Use a self-propelled, wheel-mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver on this project. Minimum requirements for the MTV are a storage capacity of approximately 25 tons, a pivoting discharge conveyor, and a means of completely remixing the ACP prior to placement.

Provide PG 64-22 tack coat at a rate of 0.10 gal/sy.

The Contractor will be required to tack 100% of the surfaces with uniform coverage prior to the subsequent lift. The type and grade of tack will be approved by the Engineer prior to use.

Tack all vertical joints unless otherwise directed.

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Cement and kiln dust will not be allowed to be used as mineral fillers.

Final surface of driveway shall not be placed prior to adjoining surface.

Item 6185, "Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)"
Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA) will not be considered a major item of work on this project.

TMA,s will only be paid while workers are present or to protect a blunt object.

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project. The Contractor must get approval from the Engineer for any changes in the number of TMA as shown in the plans.

If a TMA is used for both mobile and stationary traffic control on the same day, it will be paid for as stationary for that day.

BASIS OF ESTIMATE FOR STATIONARY TMAs				
		TMA (Stationary)		
Phase	Standard	Required	Additional	TOTAL
Basis of Estimate for Mobile TMAs				
		TMA (Mobile)		
Phase	Standard	Required	Additional	TOTAL
	TCP(3-1)-13	2		2
	TCP(3-3)-14	2		2

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ABL	JONES		6E

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1360-01-030 **DISTRICT** Abilene **COUNTY** Jones
HIGHWAY FM 1226

			CONTROL SECTION JOB		**1360-01-030**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184882**		
			COUNTY		**Jones**		
			HIGHWAY		**FM 1226**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	830.000		830.000	
	105-6057	REMOVE STAB BS & ASPH PAV (5"-10")	SY	1,511.000		1,511.000	
	110-6001	EXCAVATION (ROADWAY)	CY	609.000		609.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	339.000		339.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	SY	2,739.000		2,739.000	
	168-6001	VEGETATIVE WATERING	MG	24.000		24.000	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	35.000		35.000	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	646.000		646.000	
	310-6009	PRIME COAT (MC-30)	GAL	582.000		582.000	
	400-6005	CEM STABIL BKFL	CY	34.000		34.000	
	416-6002	DRILL SHAFT (24 IN)	LF	360.000		360.000	
	416-6004	DRILL SHAFT (36 IN)	LF	210.000		210.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY	24.000		24.000	
	420-6030	CL C CONC (CAP)(HPC)	CY	18.000		18.000	
	420-6038	CL C CONC (COLUMN)(HPC)	CY	6.400		6.400	
	422-6008	REINF CONC SLAB (SLAB BEAM)(HPC)	SF	4,879.000		4,879.000	
	422-6016	APPROACH SLAB (HPC)	CY	54.800		54.800	
	425-6011	PRESTR CONC SLAB BEAM (4SB15)	LF	534.000		534.000	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	534.000		534.000	
	427-6004	SILICONE RESIN PAINT FINISH	SF	712.000		712.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	661.000		661.000	
	450-6007	RAIL (TY T223)(HPC)	LF	294.000		294.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	72.000		72.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000		6.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	75.000		75.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	25.000		25.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	100.000		100.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	160.000		160.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	160.000		160.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	520.000		520.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	520.000		520.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	325.000		325.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	550.000		550.000	
	542-6005	RM MTL BM GD FEN TRANS (T101)	EA	4.000		4.000	

Estimate & Quantity Sheet

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		CONTROL SECTION JOB		**1360-01-030**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00184882**			
		COUNTY		**Jones**			
		HIGHWAY		**FM 1226**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2.000		2.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2.000		2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	4.000		4.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000		6.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	7.000		7.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	74.000		74.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	74.000		74.000	
	666-6225	PAVEMENT SEALER 6"	LF	400.000		400.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	1,400.000		1,400.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	190.000		190.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	250.000		250.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	12.000		12.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	400.000		400.000	
	3077-6023	SP MIXESSP-CSAC-B PG70-22	TON	320.000		320.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	60.000		60.000	
	08	CONTRACTOR FORCE ACCOUNT LEAD ABATEMENT (NON-PARTICIPATING)	LS	1.000		1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

SUMMARY OF ASPHALT SURFACE AREAS

LOCATION	STATION	TO	STATION	LENGTH	WIDTH	AREA	247 FL BS (CMP IN PLC) (TYA GR1-2) (FINAL POS)	310 PRIME COAT (MC-30)	3077 SP MIXES SP-C SAC-B PG70-22
				FT	FT	SY	SY	SY	SY
FM 1226	217+50		218+20	70	31 AVG	242	242	242	242
	218+20		220+37	217	34	820	820	820	820
	BRIDGE & APPROACH SLAB								
	222+12		223+80	168	34	635	635	635	635
	223+80		224+50	70	31 AVG	242	242	242	242
					PROJECT TOTALS	1939	1939	1939	1939

FOR CONTRACTOR'S INFORMATION ONLY

BASIS OF ESTIMATE

ITEM	DESCRIPTION	RATE	AREA (SY)	QUANTITY	UNIT
247 6041	FL BS (CMP IN PLC)(TYA GR1-2)(FINAL POS)	12" TH	1939	646	CY
310 6009	PRIME COAT (MC-30)	0.30 GAL/SY	1939	582	GAL
3077 6023	SP MIXES SP-C SAC-B PG70-22	330 LBS/SY (3" TH)	1939	320	TON

SUMMARY OF ROADWAY ITEMS

ITEM NO.	110	132	540	540	544
DESCRIPTION CODE	6001	6006	6001	6006	6001
LOCATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT)(TY C)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)
	CY	CY	LF	EA	EA
BEGIN TO 222+00.00	354	227	125	2	2
222+00.00 TO END	255	112	200	2	2
PROJECT TOTALS	609	339	325	4	4

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

ITEM NO.	662	662	6001	6185
DESCRIPTION CODE	6109	6111	6002	6003
LOCATION	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)
	EA	EA	EA	HR
BEGIN TO END	74	74	2	60
PROJECT TOTALS	74	74	2	60

SUMMARY OF REMOVAL ITEMS

ITEM NO.	104	105	496	542	542	544	644
DESCRIPTION CODE	6054	6057	6010	6001	6005	6003	6076
LOCATION	REMOVING CONCRETE (MOW STRIP)	REMOVE STAB BS & ASPH PAV (5"-10")	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FEN TRANS (T101)	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM
	LF	SY	EA	LF	EA	EA	EA
BEGIN TO END	830	1511	1	550	4	4	4
PROJECT TOTALS	830	1511	1	550	4	4	4

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS

ITEM NO.	644	644	658	658	666	666	666	666	672	678
DESCRIPTION CODE	6001	6004	6014	6062	6225	6309	6318	6321	6009	6002
LOCATION	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	PAVEMENT SEALER 6"	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")
	EA	EA	EA	EA	LF	LF	LF	LF	EA	LF
BEGIN TO END	2	2	6	7	400	1400	190	250	12	400
PROJECT TOTALS	2	2	6	7	400	1400	190	250	12	400

SUMMARY OF EROSION CONTROL ITEMS

ITEM NO.	164	168	169	506	506	506	506	506	506	506
DESCRIPTION CODE	6023	6001	6002	6002	6003	6011	6020	6024	6042	6043
LOCATION	CELL FBR MLCH SEED(PERM)(RURAL) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY B)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	MG	SY	LF	LF	LF	SY	SY	LF	LF
BEGIN TO END	2739	24	35	75	25	100	160	160	520	520
PROJECT TOTALS	2739	24	35	75	25	100	160	160	520	520

Baseline Station	Station Quantities Cut Area	Cut Volume	Fill Area	Fill Volume	Mass Ordinate
217+50.00	11.4	0	2.9	0	0
217+75.00	21.2	15.1	7.7	4.9	10.2
218+00.00	19.7	18.9	10.4	8.4	20.7
218+25.00	17.3	17.1	10.8	9.8	28.0
218+50.00	17.8	16.2	13.2	11.1	33.1
218+75.00	19.2	17.1	14.8	13.0	37.2
219+00.00	19.1	17.7	14.5	13.5	41.4
219+25.00	18.4	17.4	19.4	15.7	43.1
219+50.00	17.6	16.7	22.4	19.3	40.5
219+75.00	17.1	16.1	24.4	21.7	34.9
220+00.00	18.8	16.6	27.5	24.1	27.4
220+25.00	19.3	17.6	30.6	26.9	18.1
220+50.00	18.0	17.3	42.5	33.8	1.6
220+57.00	16.5	4.5	57.8	13.0	-6.9
220+75.00	271.0	95.8	0	0	88.9
BRIDGE					
221+75.00	133.5	0	0	0	88.9
221+92.00	11.1	45.5	52.7	0	134.5
222+00.00	15.1	3.9	24.5	11.4	127.0
222+25.00	26.0	19.0	19.0	20.1	125.9
222+43.00	26.2	22.9	14.8	11.3	137.5
222+50.00	26.3	24.2	13.4	3.7	158.0
222+75.00	26.3	24.4	11.3	11.5	170.9
223+00.00	26.4	24.4	9.7	9.7	185.6
223+25.00	26.6	24.6	6.6	7.5	202.7
223+50.00	27.7	25.1	5.5	5.6	222.2
223+75.00	29.1	26.3	7.2	5.9	242.6
224+00.00	28.3	26.6	9.4	7.7	261.5
224+25.00	26.4	25.3	10.1	9.0	277.8
224+50.00	22.7	12.2	11.4	10.0	280.0
224+75.00	0	0	4.1	7.2	272.8
225+00.00	0	0	0.9	2.3	270.5
225+07.00	0	0	0.3	0.2	270.3
Grand Total:	609		339		

FOR CONTRACTOR'S INFORMATION ONLY

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER
Adrian Rangel
6/1/2023

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2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

SUMMARY OF QUANTITIES

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		8
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

SUMMARY OF BRIDGES											
CSJ	PLAN PROFILE SHEET	BRIDGE NBI#		DESIGN		BRIDGE LOCATION	STATION		LENGTH	CLEAR RDWY WIDTH	LOADING
		EXISTING	PROPOSED	EXISTING	PROPOSED		BEGIN	END	FT	FT	
1360-01-030	47	08-128-0-1360-01-004	08-128-0-1360-01-008	120.00' FOUR SPAN CONC. PAN GIRDER BRIDGE ON STEEL PILE BENTS	135.00' CONC. SLAB BEAM (4SB15 & 5SB15) BRIDGE SUPPORTED ON CONC. ABUTMENTS AND MULTI-COLUMN BENTS	FM 1226 AT CALIFORNIA CREEK	220+57.00	221+92.00	135'	34'-0" (NOM)	HL-93

SUMMARY OF BRIDGES (CONTINUED)													
400	416	416	420	420	420	422	422	425	425	427	432	450	454
6005	6002	6004	6014	6030	6038	6008	6016	6011	6012	6004	6031	6007	6018
CEM STABIL BKFL	DRILL SHAFT (24 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC) (2)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	APPROACH SLAB (HPC)	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	SILICONE RESIN PAINT FINISH (1)	RIPRAP (STONE PROTECTION) (12 IN)	RAIL (TY T223) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
CY	LF	LF	CY	CY	CY	SF	CY	LF	LF	SF	CY	LF	LF
34	360	210	24.0	18.0	6.4	4,879	54.8	534.00	534.00	712	661	294.0	72

(1) SEE "CONCRETE WATERPROOFING DETAILS" SHEET FOR MORE INFORMATION.

(2) PRECAST INTERIOR BENT CAPS, PER STANDARD PBC-RC, WILL BE REQUIRED. AT THE CONTRACTOR'S OPTION, PRESTRESSED PRECAST BENT CAPS, PER STANDARD PPBC-RC, MAY BE USED AT THE CONTRACTOR'S EXPENSE.

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FM 1226
AT CALIFORNIA CREEK

BRIDGE SUMMARY

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		9
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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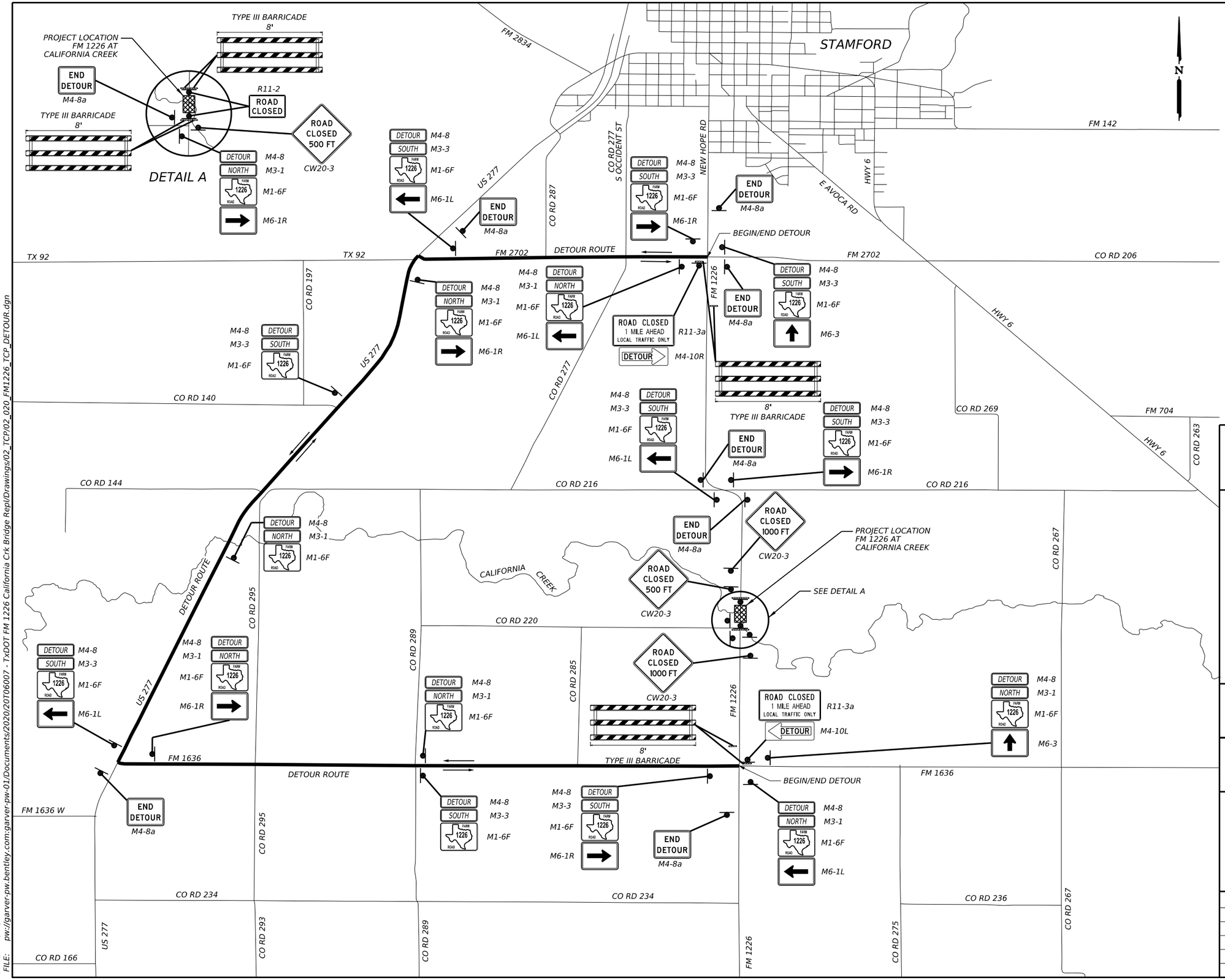

SEQUENCE OF CONSTRUCTION:

1. *PLACE ADVANCE WARNING SIGNS, TRAFFIC CONTROL DEVICES, TEMPORARY EROSION CONTROL DEVICES, AND CLOSE ROAD TO TRAFFIC.*
2. *BLADE AND STOCKPILE IN A WINDROW PARALLEL TO THE ROW THE TOP 4" OF EXISTING TOPSOIL. PLACE WINDROW OUT OF THE WAY OF CONSTRUCTION.*
3. *REMOVE EXISTING STRUCTURE.*
4. *CONSTRUCT NEW BRIDGE AND APPROACHES.*
5. *PLACE OBJECT MARKERS, TOPSOIL SEEDING, AND PERMANENT EROSION CONTROL DEVICES.*
6. *REMOVE TEMPORARY TRAFFIC CONTROL DEVICES, ADVANCE WARNING SIGNS, TEMPORARY EROSION CONTROL DEVICES, AND OPEN ROAD TO TRAFFIC.*
7. *INSTALL PERMANENT PAVEMENT MARKINGS USING MOBILE OPERATIONS TCP(3-1)-13 AND TCP(3-3)-14.*

NOTES:

1. *FM 1226 WILL BE CLOSED AT CALIFORNIA CREEK BRIDGE. NO THROUGH TRAFFIC UNTIL SUBSTANTIAL COMPLETION AS APPROVED BY THE AREA ENGINEER.*
2. *TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR LOCAL PROPERTY OWNERS.*
3. *SEE BC STANDARD FOR SIGN SPACING.*
4. *SEE GENERAL NOTES REGARDING CLOSURE.*
5. *TRAFFIC CONTROL SHOWN HEREON IS THE MINIMUM REQUIREMENT FOR THIS PROJECT WILL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE TEXAS MUTCD AND STANDARD (BC) SHEETS.*
6. *IF THE CONSTRAINTS DO NOT ALLOW COMPLETION OF ALL CONSTRUCTION PRIOR TO OPENING THE ROADWAY TO TRAFFIC, ADVANCE SIGNS AS DIRECTED BY THE ENGINEER WILL BE INSTALLED AND MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETED.*
7. *REFER TO GENERAL NOTES FOR ADDITIONAL INFORMATION.*
8. *CONTRACTOR SHALL MAINTAIN ACCESS TO PROPERTIES AT ALL TIMES DURING CONSTRUCTION.*

N.T.S.

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FM 1226
AT CALIFORNIA CREEK

ROAD CLOSURE AND DETOUR PLAN

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		10
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	ABL	JONES		11

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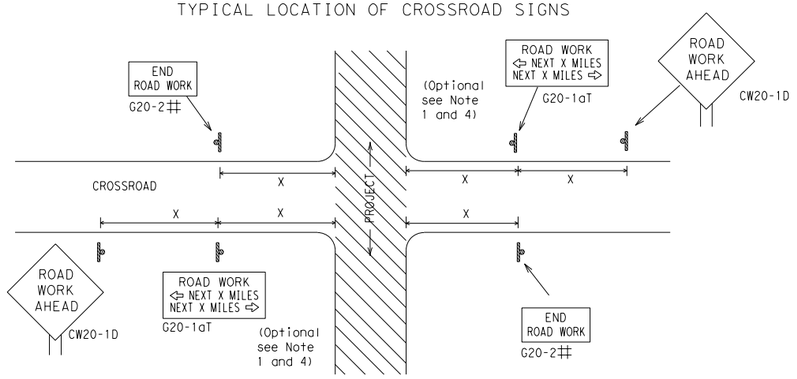
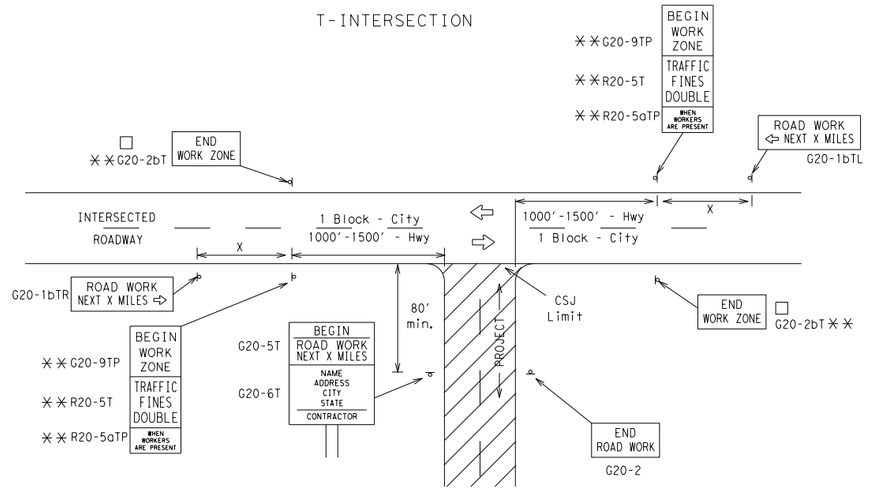
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

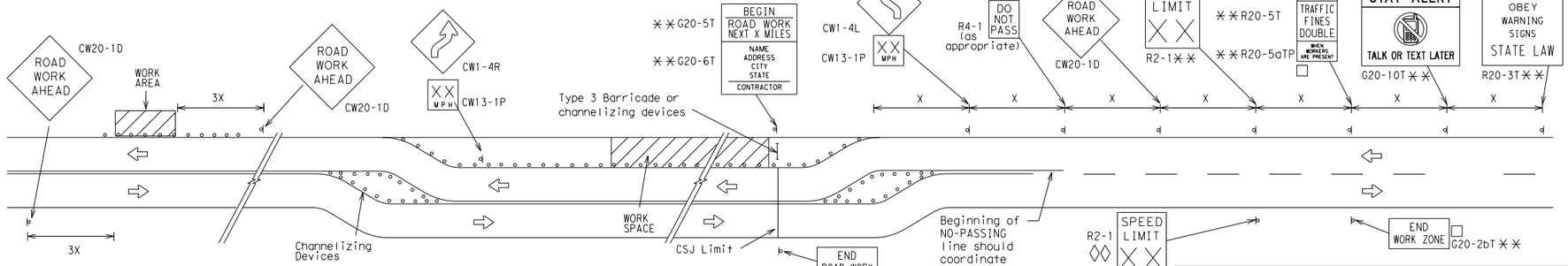
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

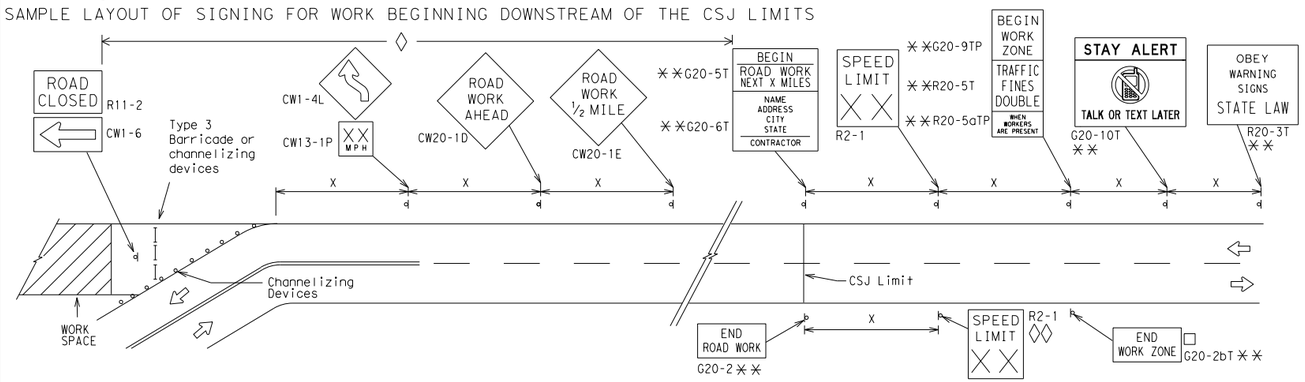
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

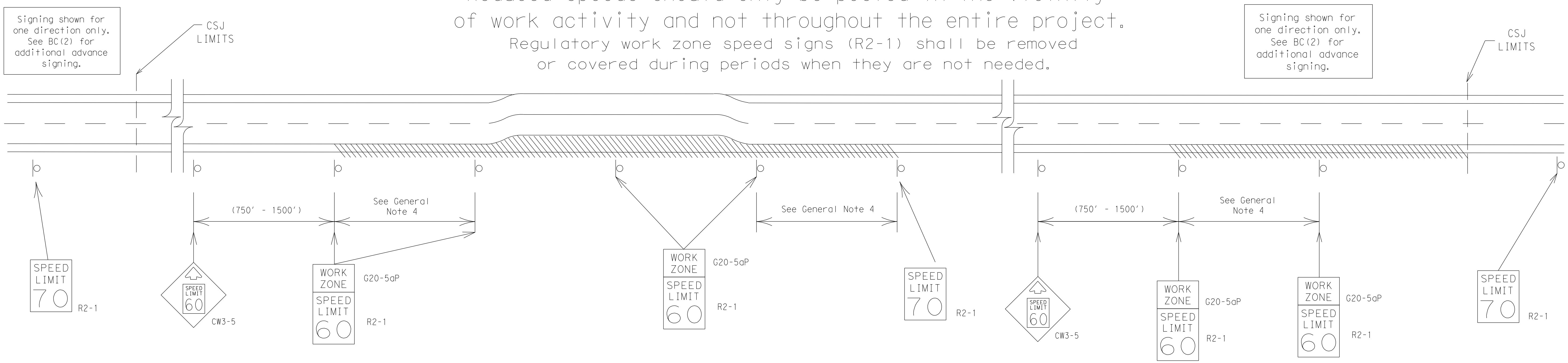
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	JONES		12

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

SHEET 3 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT 1360	SECT 01	JOB 030	HIGHWAY FM 1226
REVISIONS 9-07 8-14 7-13 5-21	DIST ABL		COUNTY JONES	SHEET NO. 13

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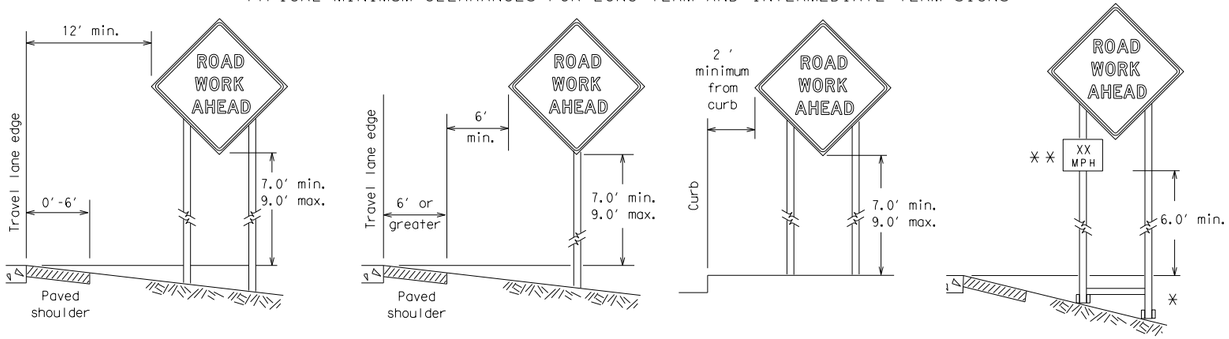
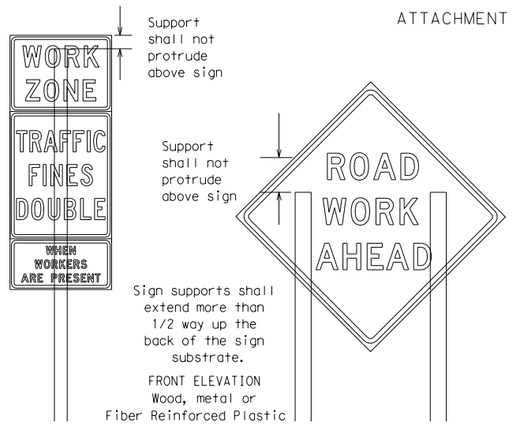
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

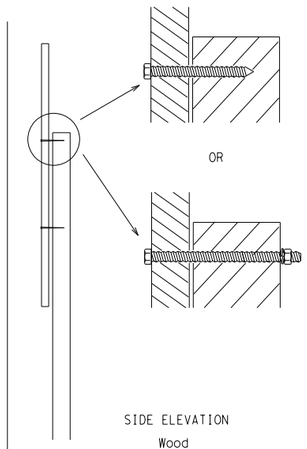


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





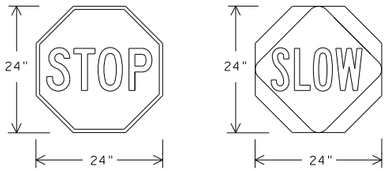
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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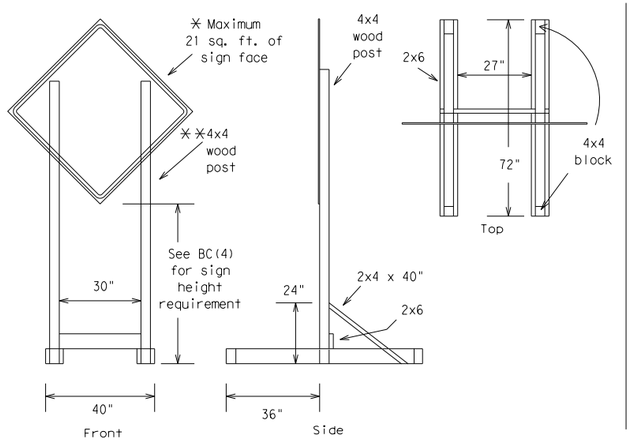
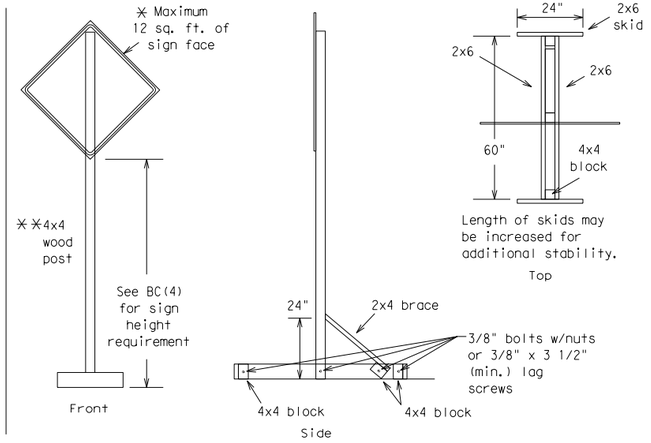
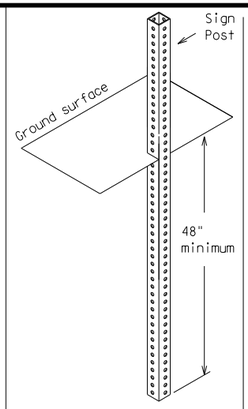
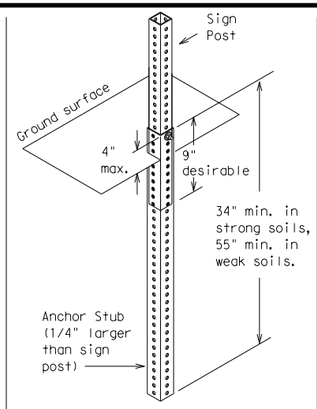


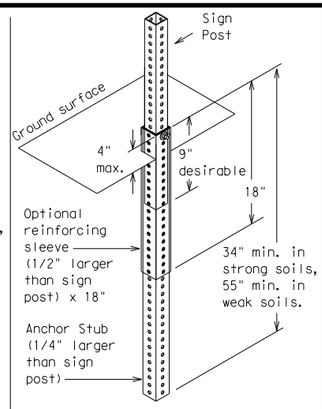


SKID MOUNTED WOOD SIGN SUPPORTS

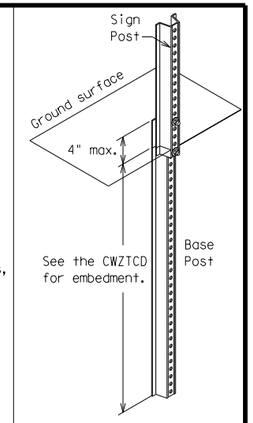
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







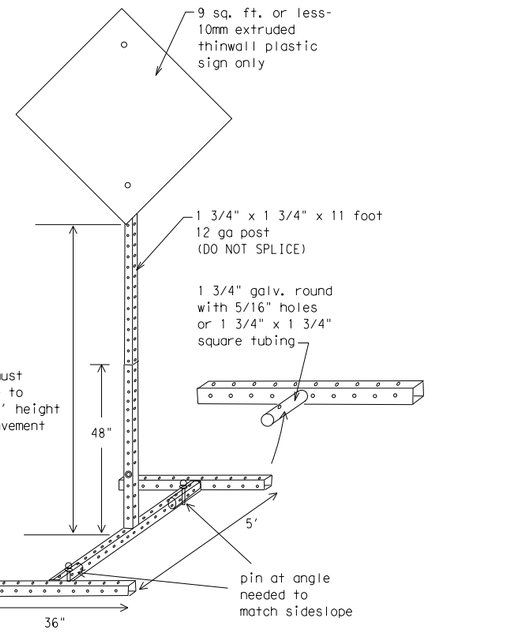
PERFORATED SQUARE METAL TUBING

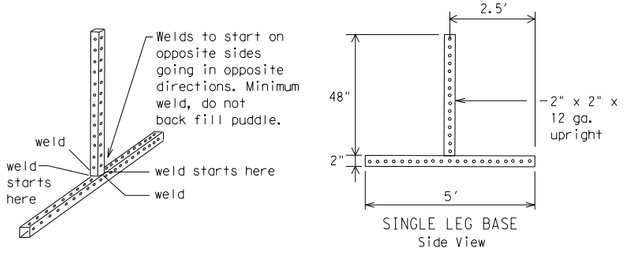


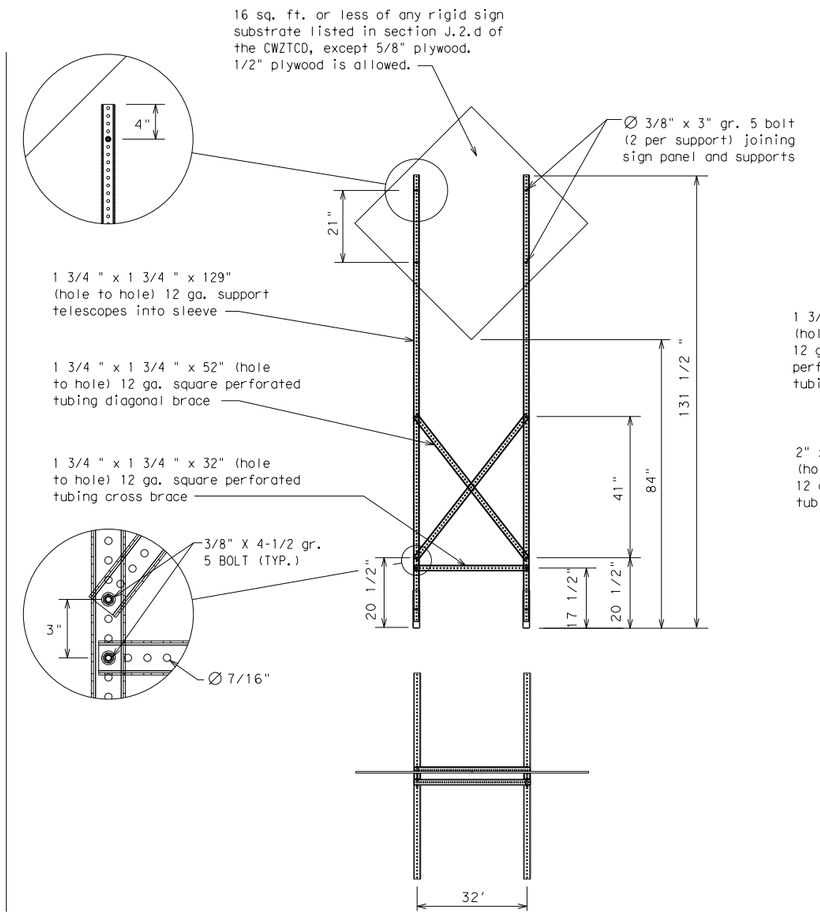
WING CHANNEL
Lap-splice/base bolted anchor

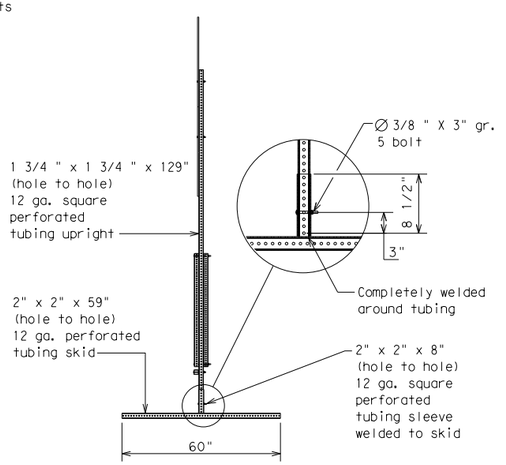
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

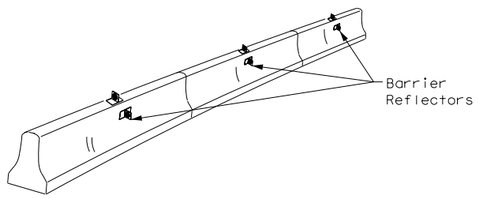
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	JONES		16

100

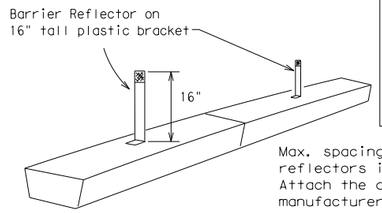
DATE: 5/11/2023 1:37:46 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/02_TCP/STANDARDS/02_01_bc-(7-12)-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

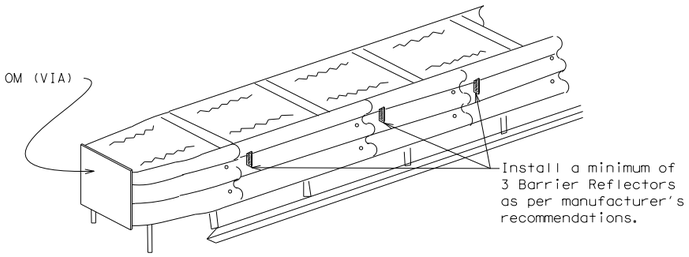


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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



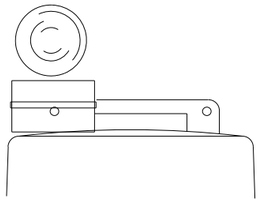
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

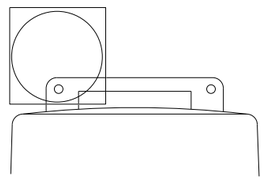


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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



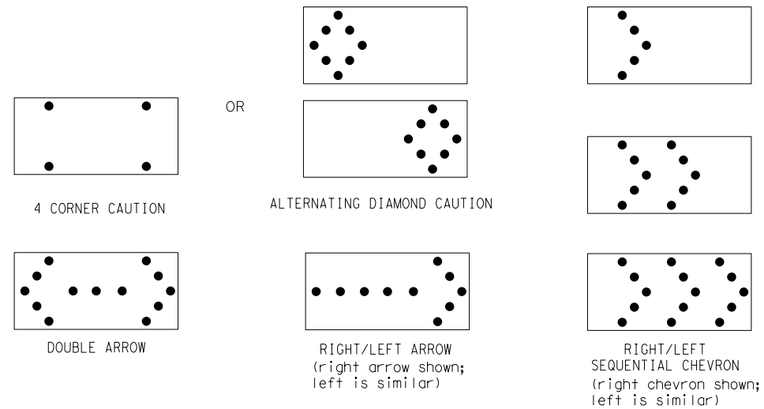
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	JONES		17

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

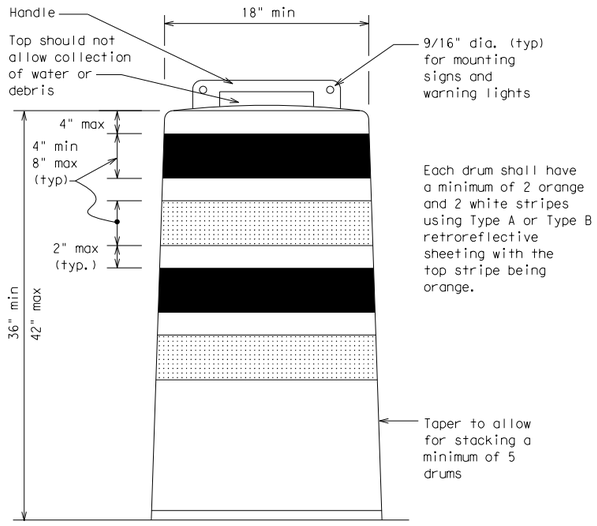
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

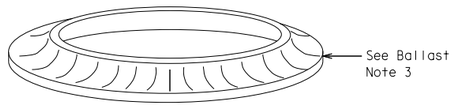
RETROREFLECTIVE SHEETING

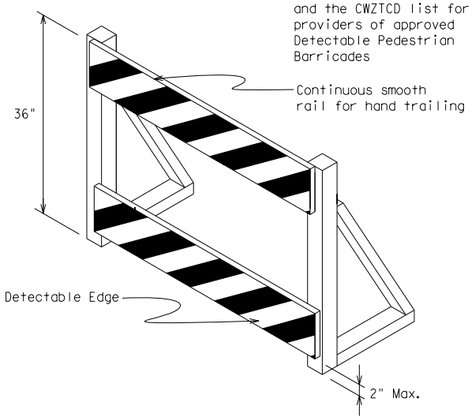
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

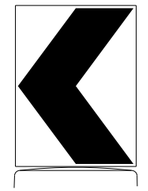




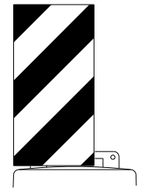


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	ABL	JONES		18
7-13				

102

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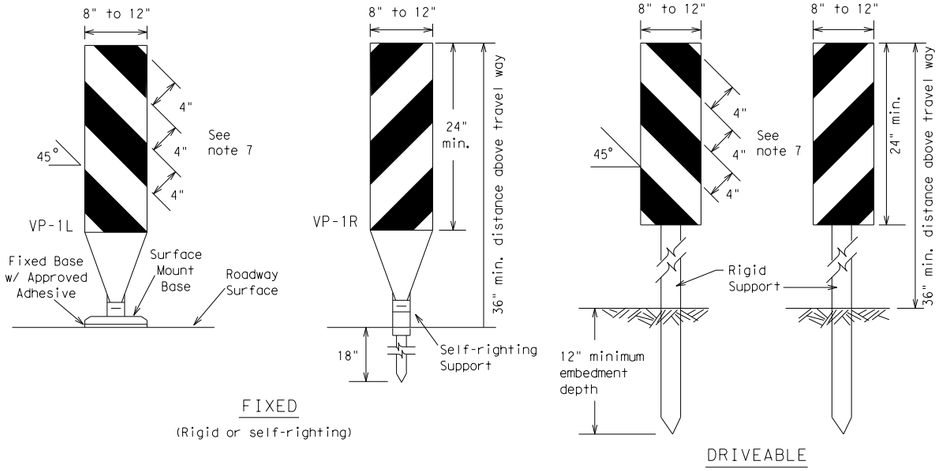
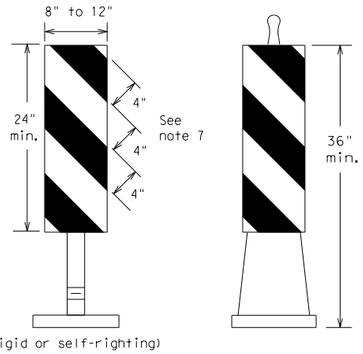


FIXED
(Rigid or self-righting)

DRIVEABLE

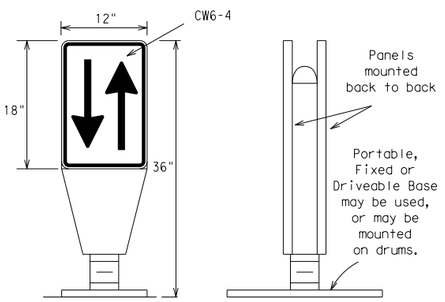


(Rigid or self-righting)

PORTABLE

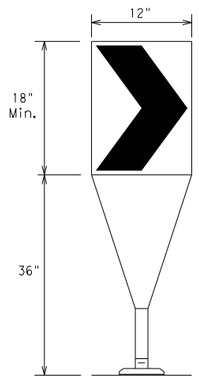
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



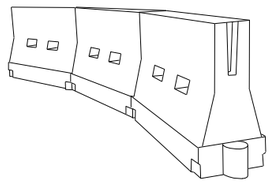
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	JONES		19

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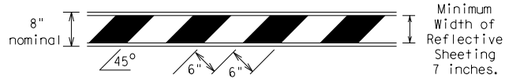
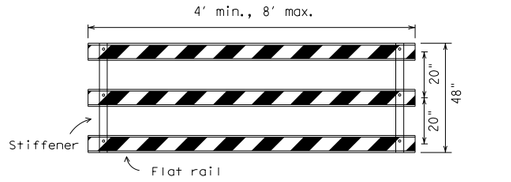
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



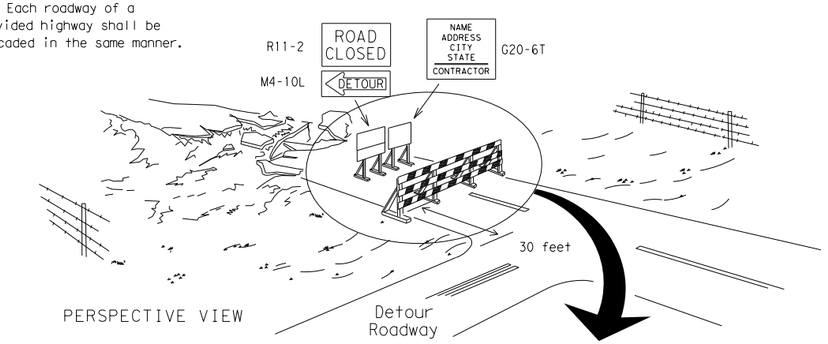
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

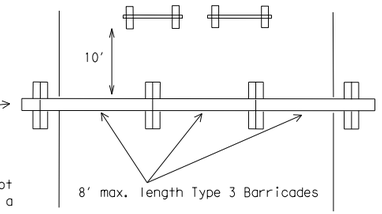
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

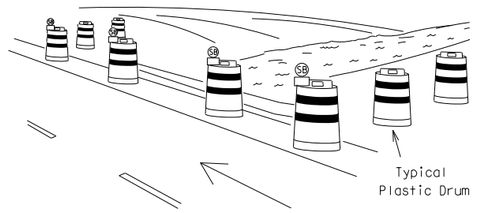
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

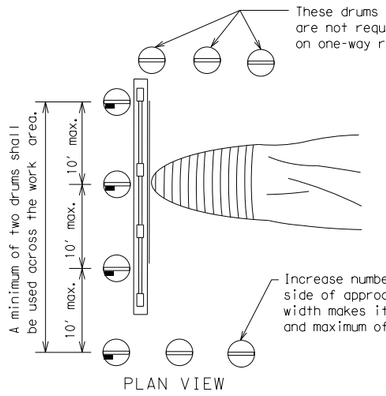
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

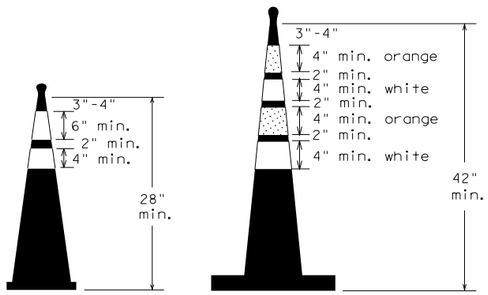
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

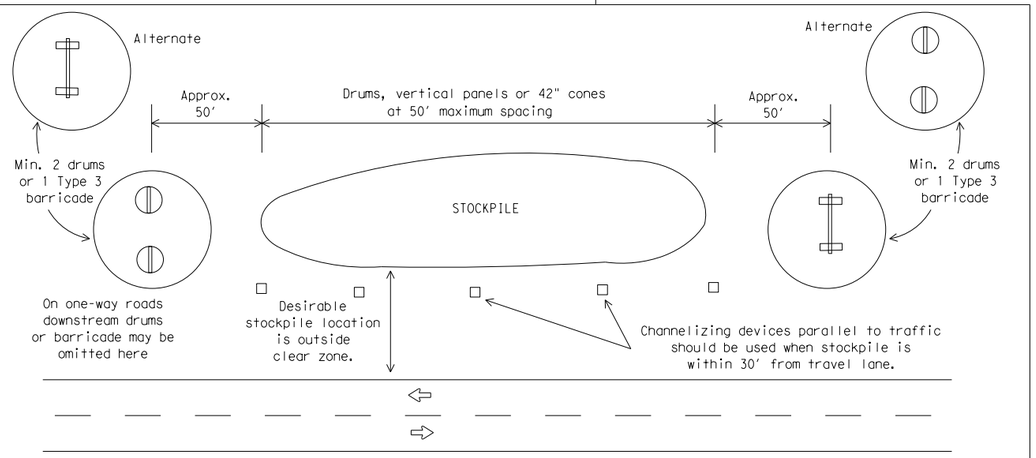
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1360	01	030	FM 1226
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ABL	JONES		20

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

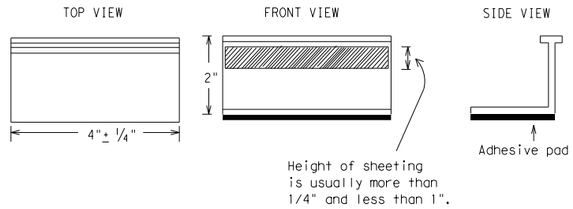
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		21

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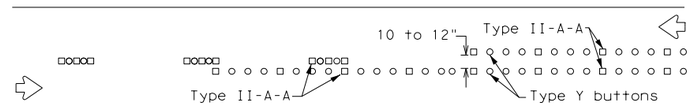
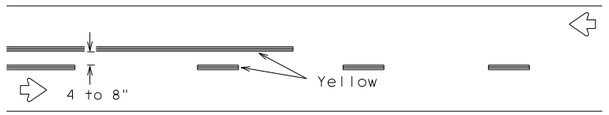
PAVEMENT MARKING PATTERNS

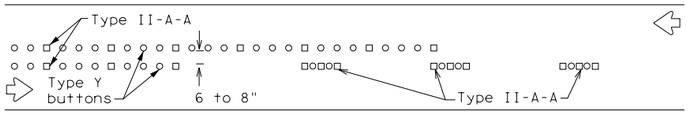
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



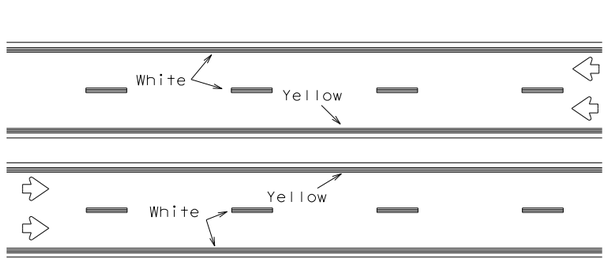
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



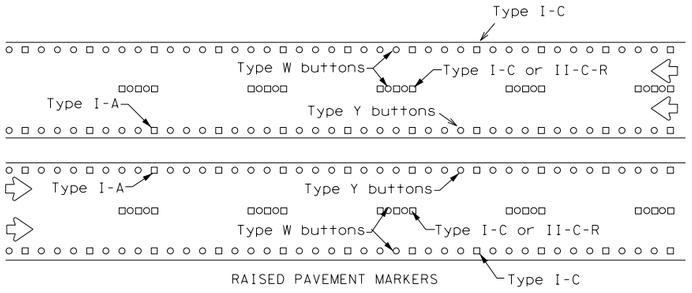
RAISED PAVEMENT MARKERS - PATTERN B

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

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



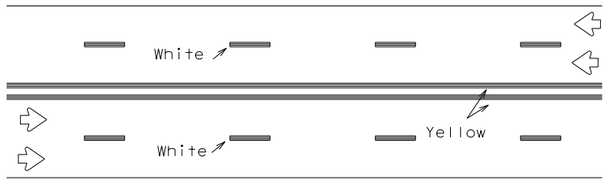
REFLECTORIZED PAVEMENT MARKINGS



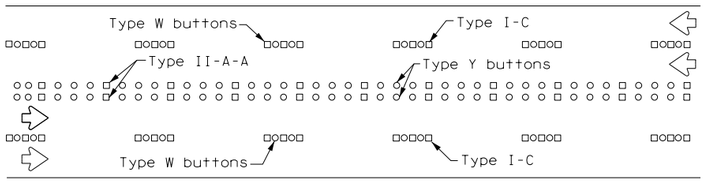
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



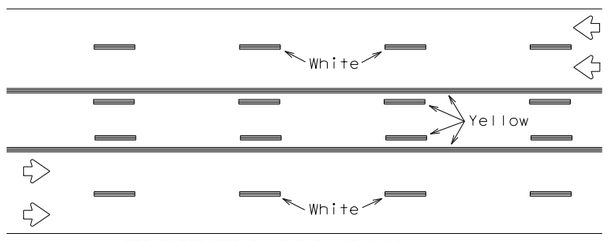
REFLECTORIZED PAVEMENT MARKINGS



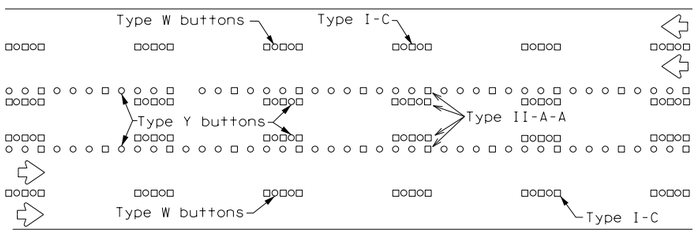
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

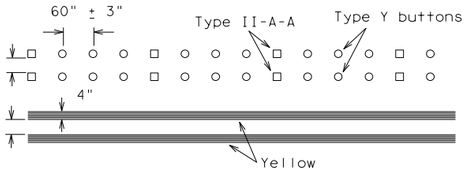
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

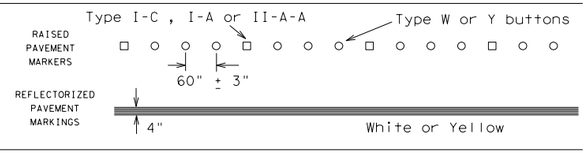
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

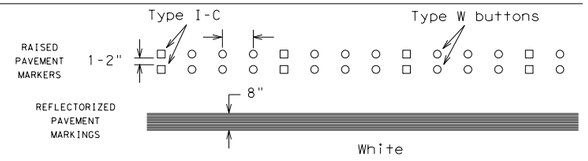


EDGE LINE OR SINGLE NO-PASSING LINE



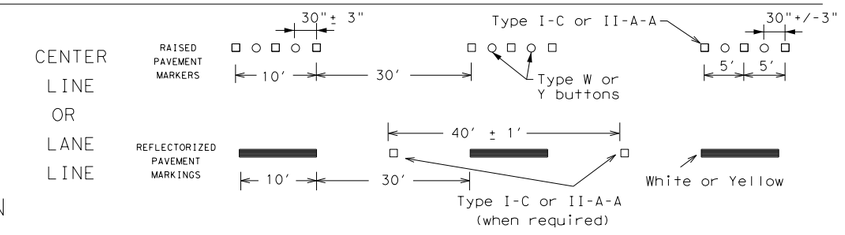
WIDE LINE

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

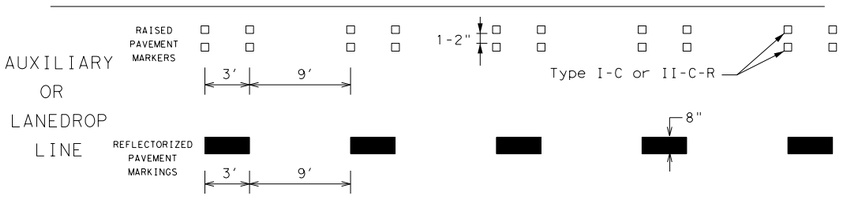


BROKEN LINES

CENTER LINE OR LANE LINE

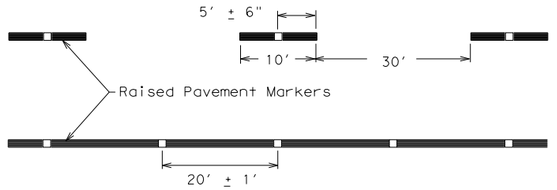


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		22

106

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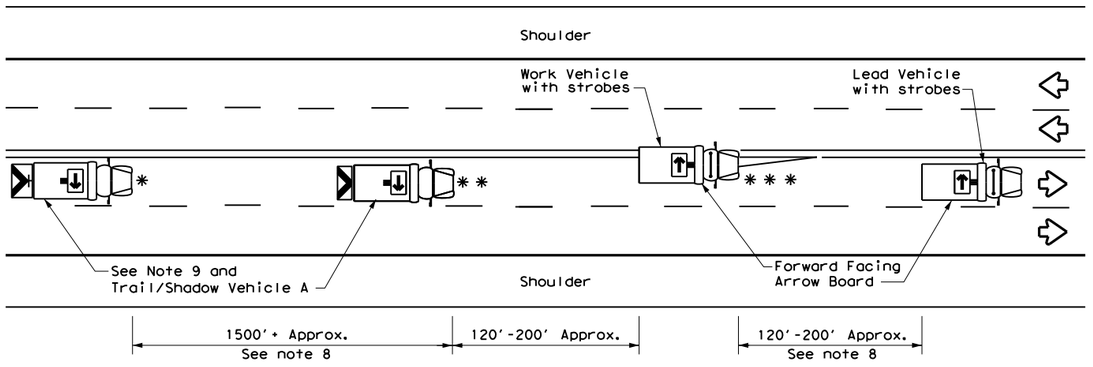
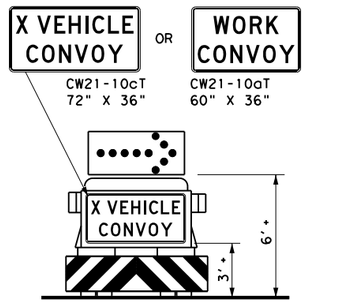


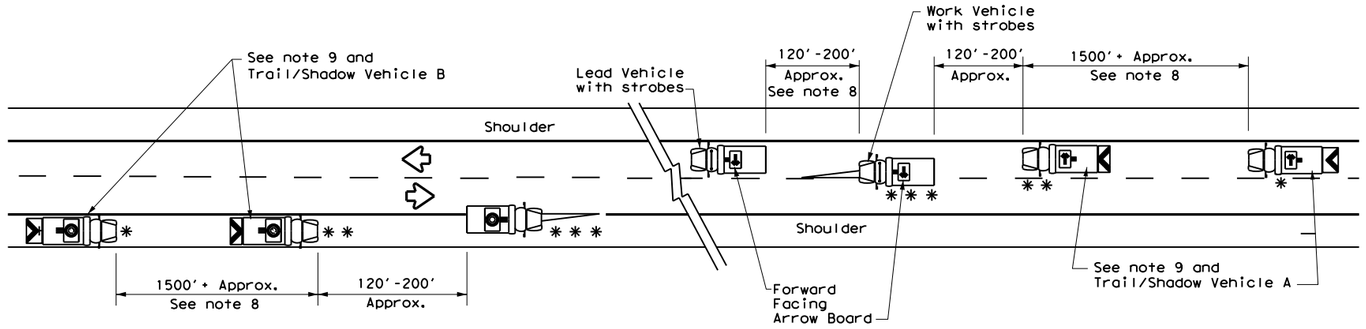
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

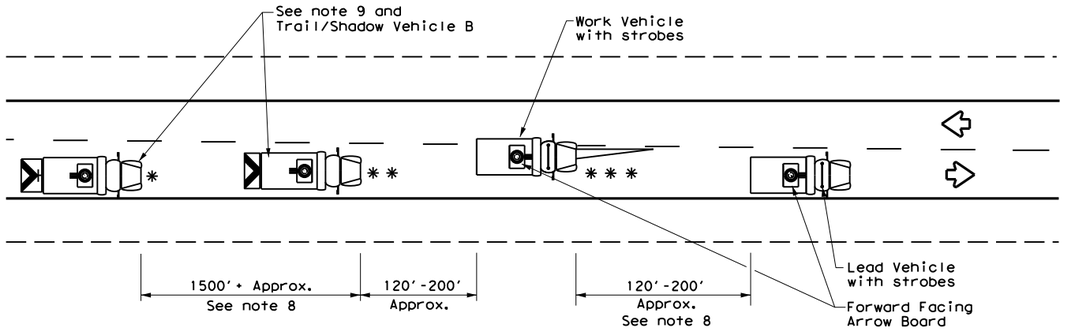


WORK ON SHOULDER

WORK ON TRAVEL LANE

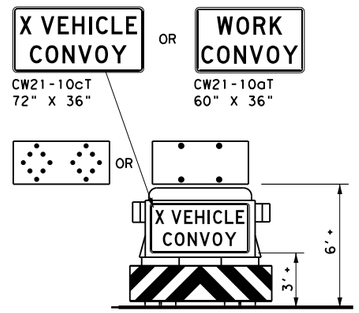
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

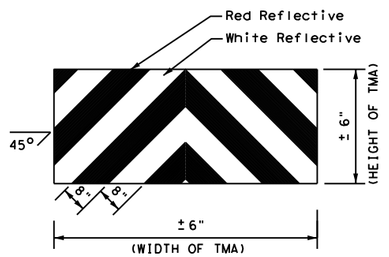
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		23

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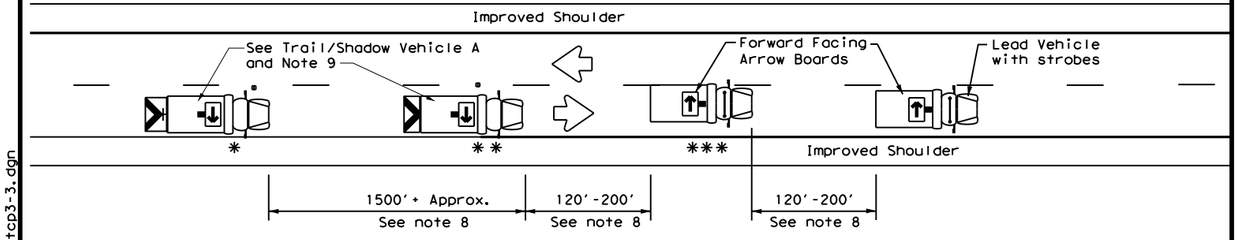
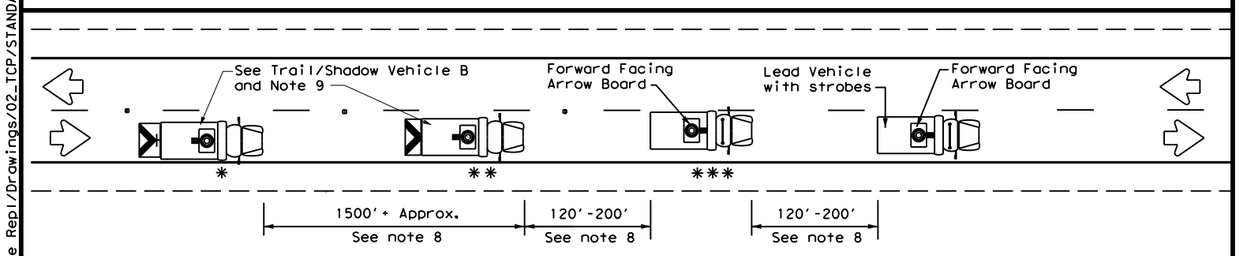


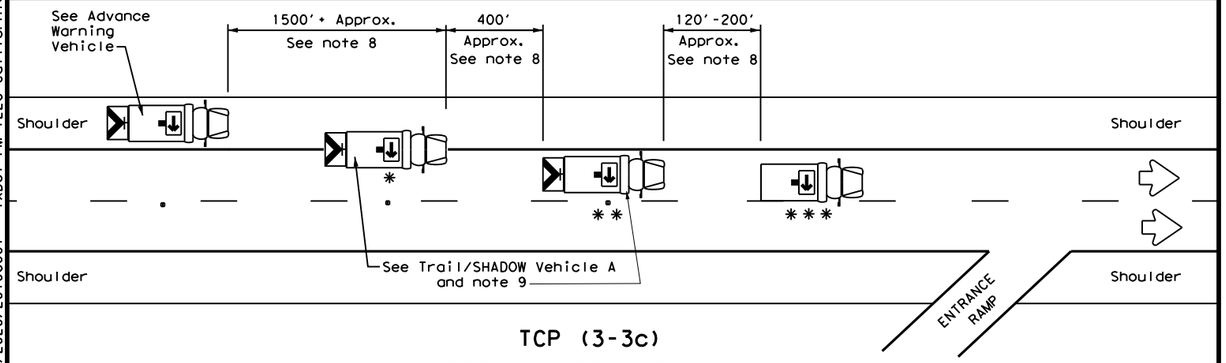
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



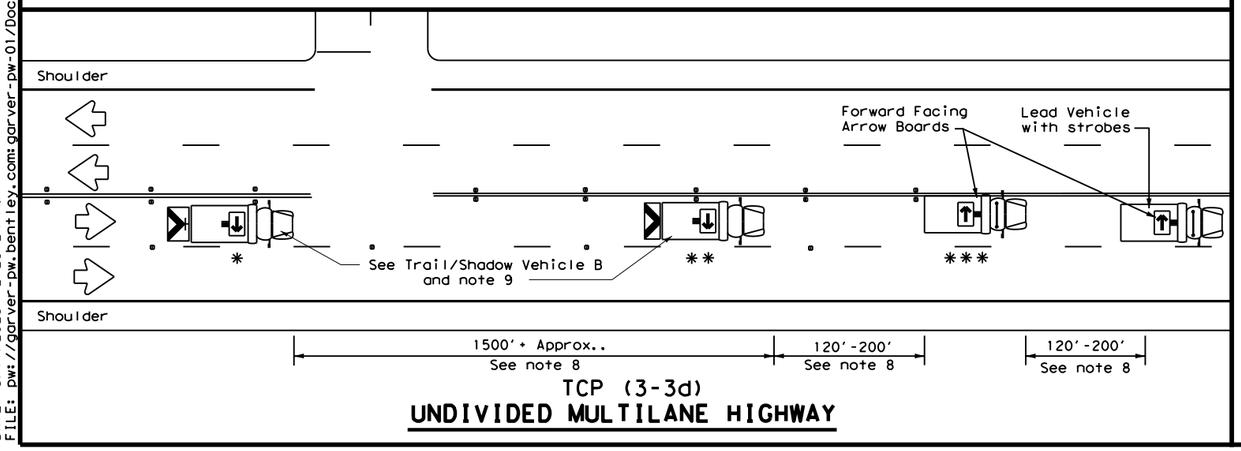
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



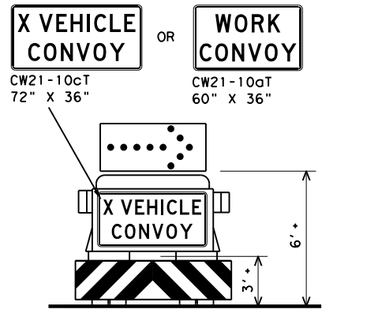
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



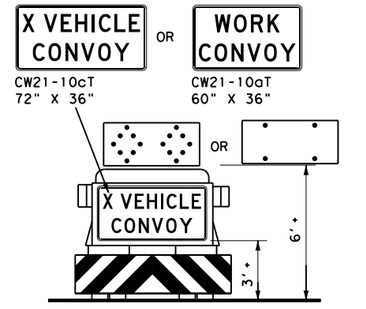
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



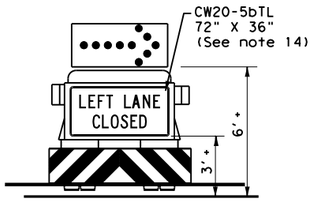
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

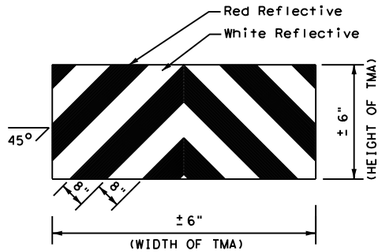


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ABL	JONES		24
1-97 7-14				

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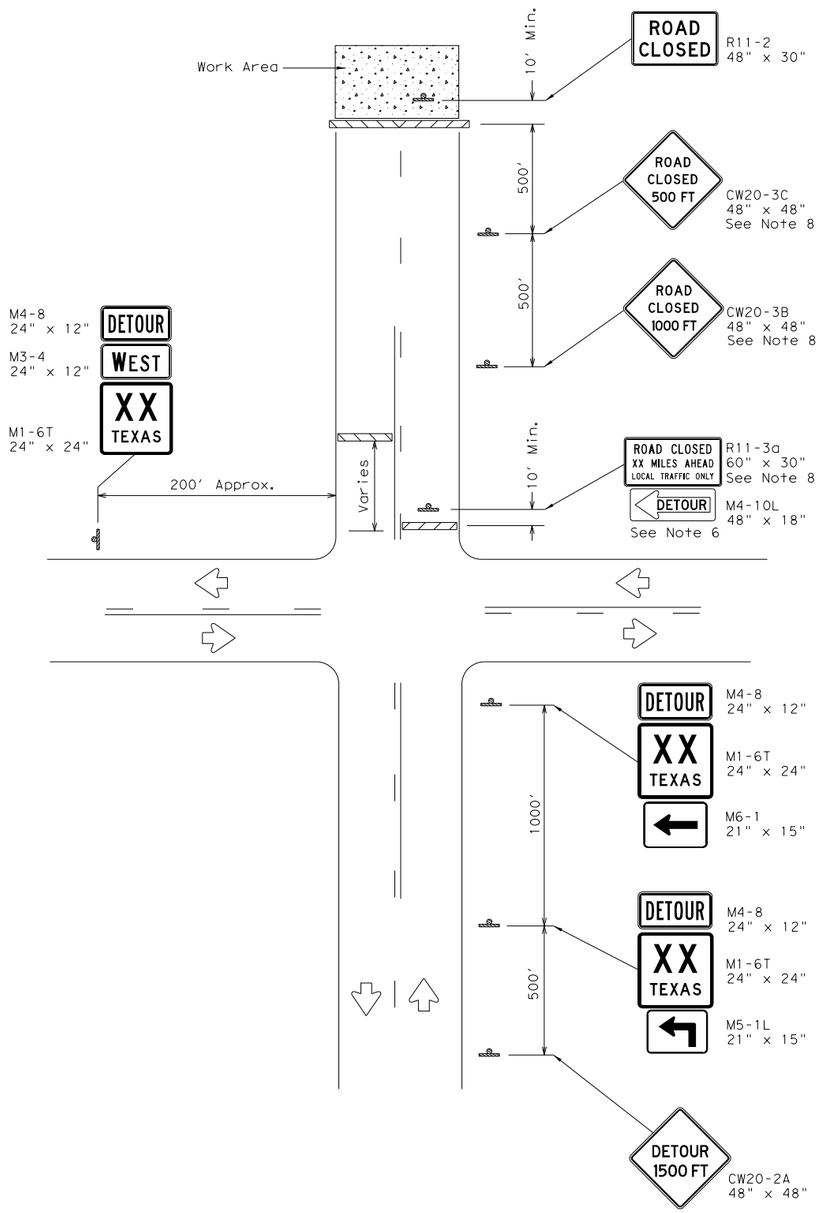
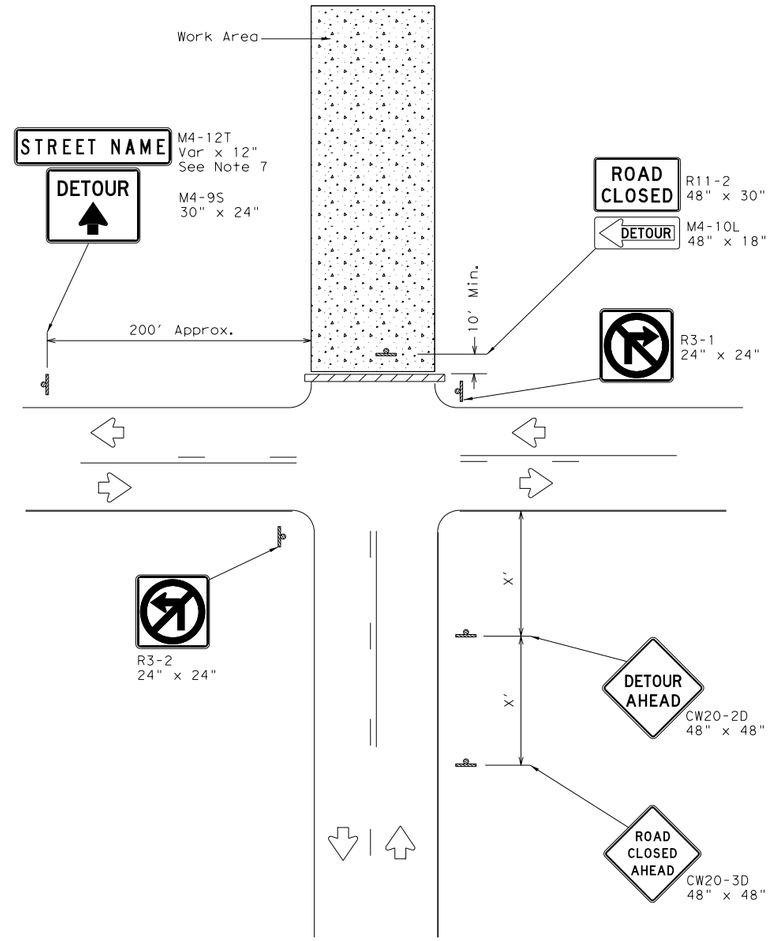


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	ABL	JONES		25

DATE: 5/11/2023 2:23:33 PM
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WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

TABS: 4" to 12" — 20' ± 6" — Type Y-2

TAPE: 4" to 12" — 6" — 20' ± 6" — Yellow — 4.5' ± 6"

SINGLE NO-PASSING LINE or CHANNELIZATION LINE

TABS: 20' ± 6" — Type Y-2 or W

TAPE: 6" — 20' ± 6" — 4.5' ± 6" — Yellow or White

BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

TABS: 40' ± 1' — Type Y-2 or W — 1' ± 3"

TAPE: 6" — 40' ± 1' — 4.5' ± 6" — Yellow or White

WIDE DOTTED LINES

(FOR LANE DROP LINES)

TABS: 12' ± 6" — 4" ± 1" — 3' ± 3" — Type W

TAPE: 12" — 12' ± 6" — 3' ± 3" — White

WIDE GORE MARKINGS

TABS: 20' ± 6" — 4" ± 1" — Type W

TAPE: 12" — 20' ± 6" — 4.5' ± 6" — White

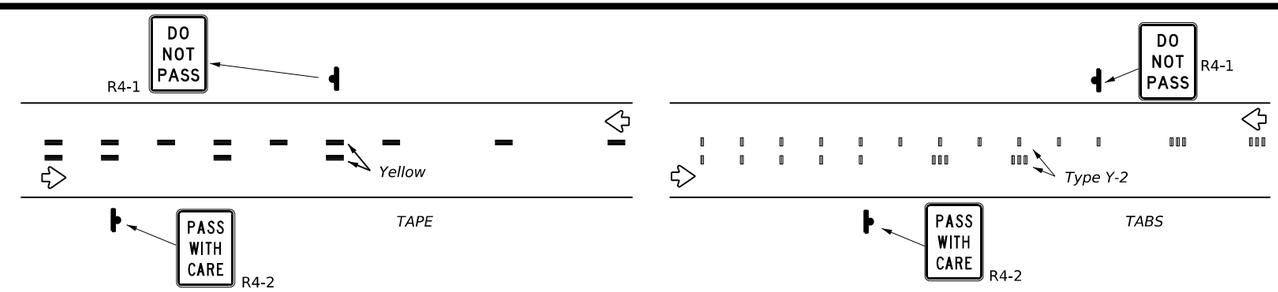
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

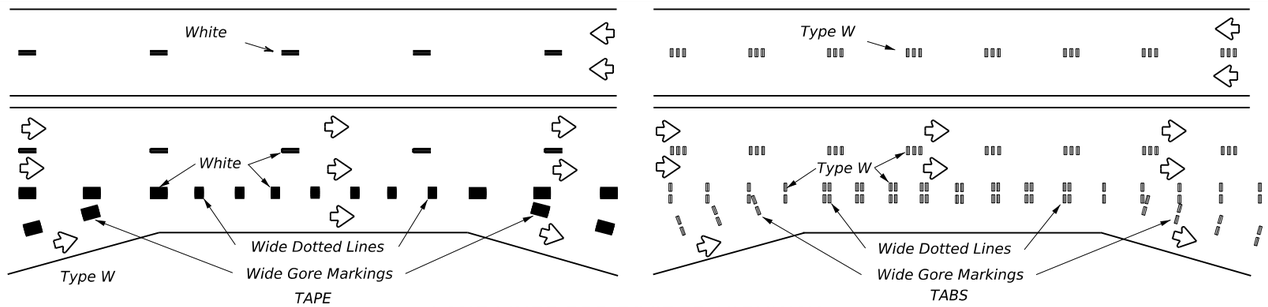
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

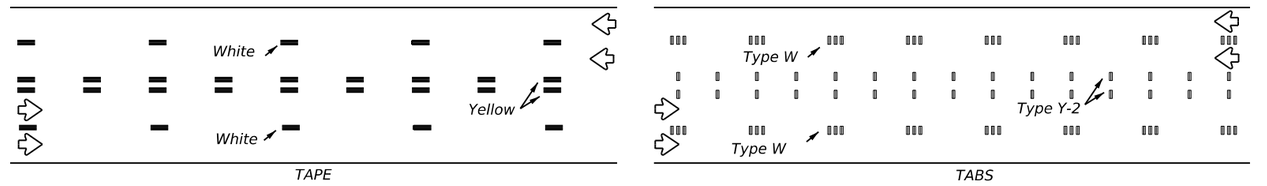
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



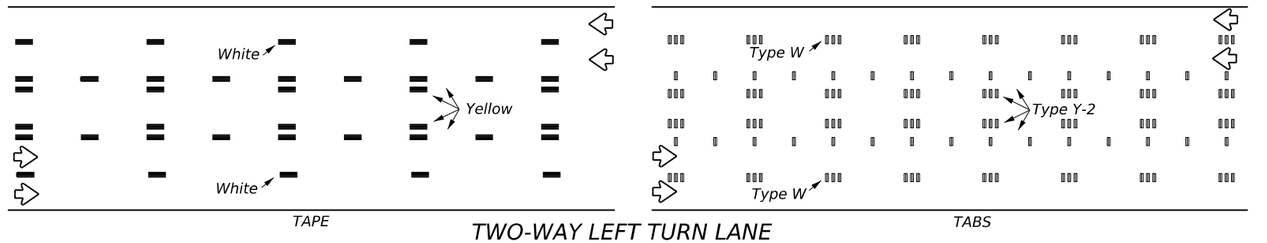
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



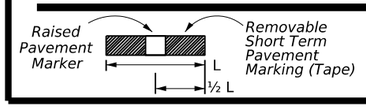
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	ABL	JONES		26
3-03				

111

SURVEY CONTROL POINTS - SURFACE COORDINATES				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	7,007,236.35'	1,569,743.90'	1,548.43'	TXDOT TYPE II SET IN CONCRETE
CP-2	7,008,169.59'	1,569,710.60'	1,551.79'	TXDOT TYPE II SET IN CONCRETE
CP-3	7,009,335.18'	1,569,801.54'	1,554.63'	TXDOT TYPE II SET IN CONCRETE

SURVEY CONTROL POINTS - GRID COORDINATES				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	7,006,395.58'	1,569,555.55'	1,548.43'	TXDOT TYPE II SET IN CONCRETE
CP-2	7,007,328.71'	1,569,522.26'	1,551.79'	TXDOT TYPE II SET IN CONCRETE
CP-3	7,008,494.16'	1,569,613.19'	1,554.63'	TXDOT TYPE II SET IN CONCRETE

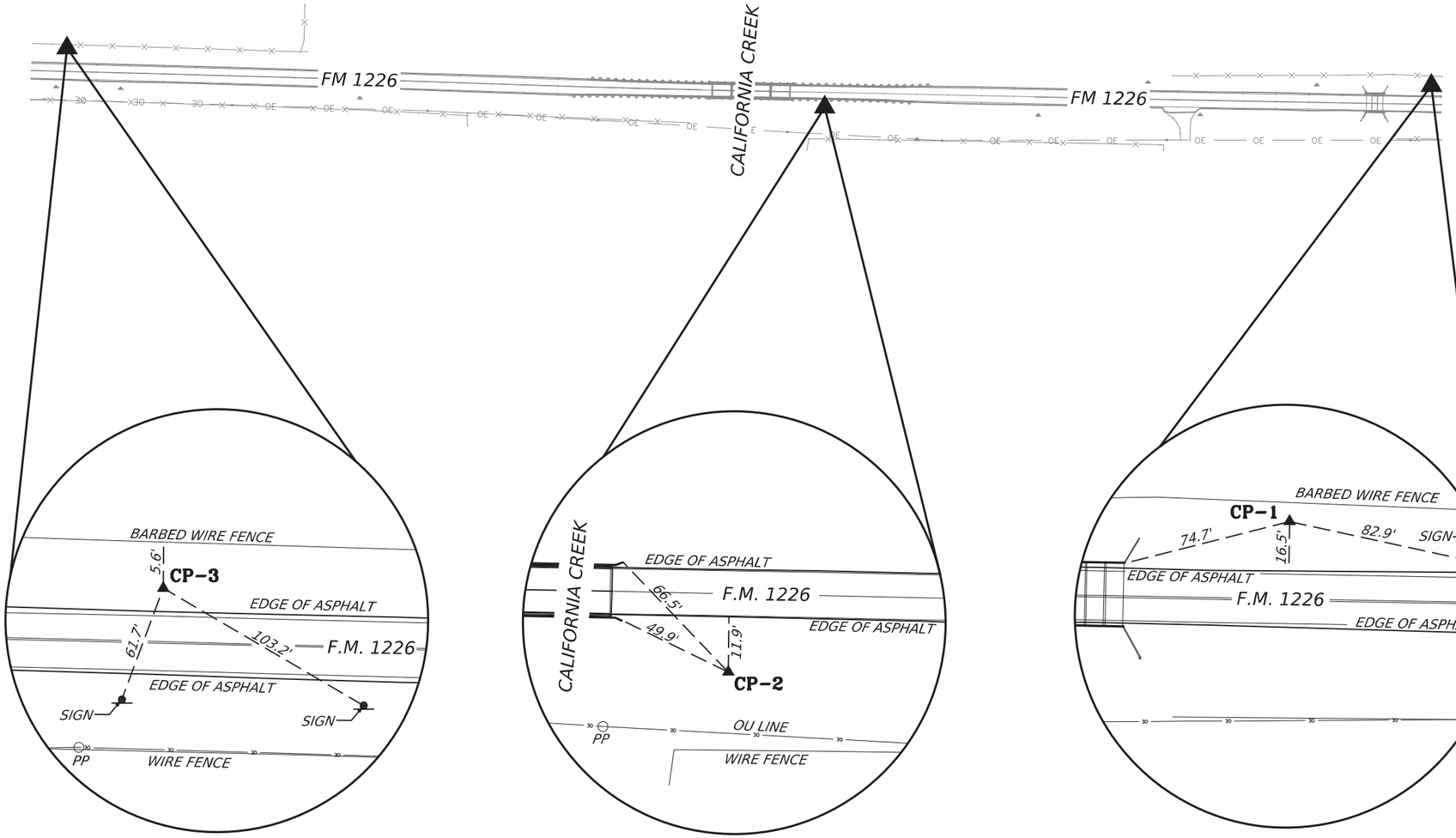
N

1. FOR ALL BEARING AND COORDINATE BASIS, TO THE TEXAS COORDINATE SYSTEM, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM OF 1983 (2011) EPOCH 2010.0.

2. ALL COORDINATES SHOWN HEREON ARE SURFACE COORDINATES AND CAN BE ADJUSTED TO GRID BY USING A COMBINED GRID TO SURFACE SCALE FACTOR OF 1.00012.

3. ALL ELEVATIONS SHOWN HEREON ARE NORTH AMERICAN VERTICAL DATUM (NAVD) 88 GEOID 18 AND WERE DERIVED FROM GPS OBSERVATIONS.

4. UNITS: U.S. SURVEY FEET.



NOT-TO-SCALE
MEASUREMENTS SHOWN IN US SURVEY FEET

NOT-TO-SCALE
MEASUREMENTS SHOWN IN US SURVEY FEET

NOT-TO-SCALE
MEASUREMENTS SHOWN IN US SURVEY FEET

0 100' 200'
SCALE: 1" = 200'

05/09/23

STATE OF TEXAS REGISTERED CHRIS CONRAD 5623 PROFESSIONAL LAND SURVEYOR

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3301 HANCOCK DRIVE #6
AUSTIN, TEXAS 78731
(512) 451-8591
www.mcgroy.com

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

CONTROL INDEX SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		27
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: $DATE$ $TIME$
FILE: $FILE$

FM1226_CL

Beginning chain FM1226_CL description

	STATION	X	Y
POT	210+92.3596 R1	1569765.1300	7009317.5608
PI	217+50.0000 R1	1569745.4391	7008660.2153
Tangential Direction:	S01°42'56.84"W		
Tangential Length:	657.6404		
PI	217+50.0000 R1	1569745.4391	7008660.2153
PI	220+27.0000 R1	1569737.5212	7008383.3284
Tangential Direction:	S01°38'16.84"W		
Tangential Length:	277.0000		
PI	220+27.0000 R1	1569737.5212	7008383.3284
PI	229+91.3267 R1	1569718.3689	7007419.1920
Tangential Direction:	S01°08'16.84"W		
Tangential Length:	964.3266		
PI	229+91.3267 R1	1569718.3689	7007419.1920
POT	231+40.7012 R1	1569715.8273	7007269.8391
Tangential Direction:	S00°58'29.77"W		
Tangential Length:	149.3745		

Ending chain FM1226_CL description

DATE: 5/11/2023 1:37:32 PM
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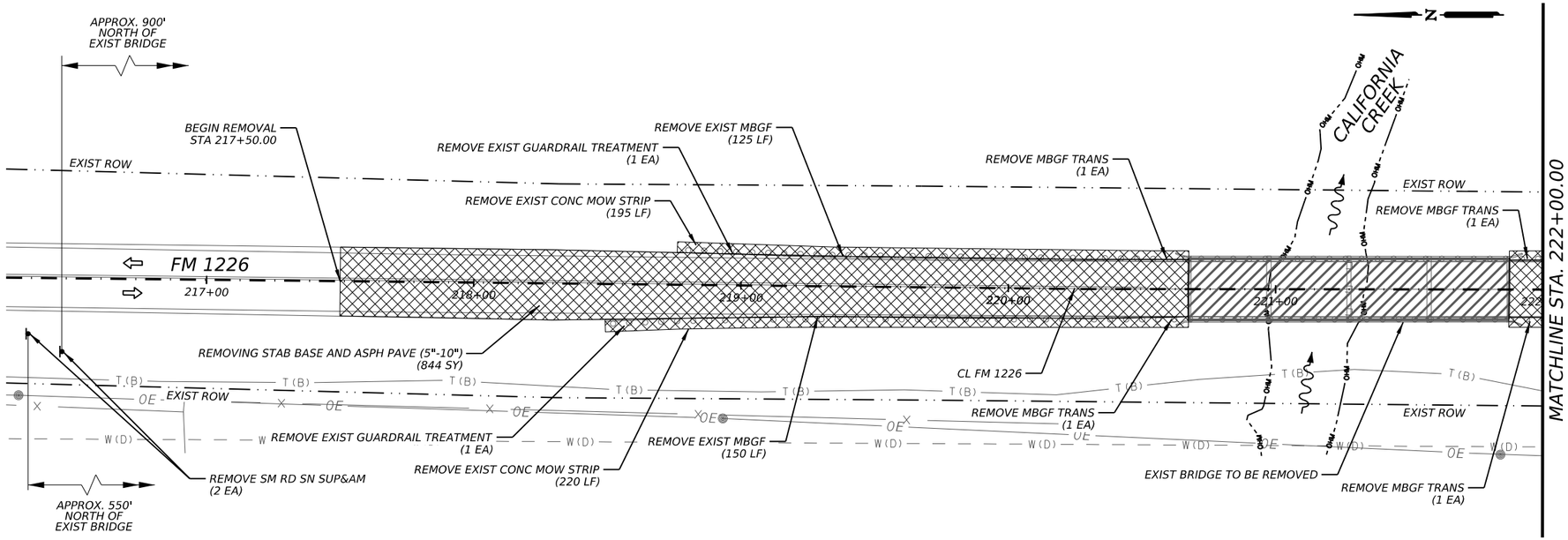
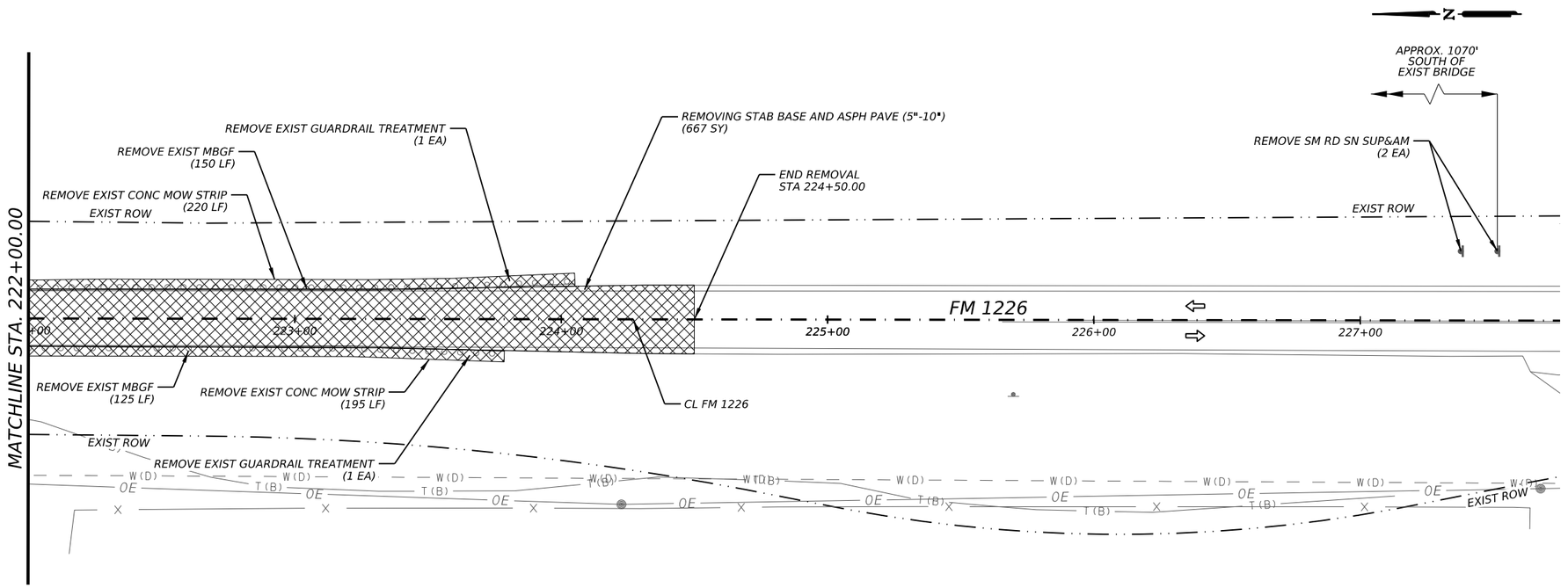
FM 1226
AT CALIFORNIA CREEK

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		28
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226





LEGEND:

- REMOV STR (BRIDGE 100 - 499 FT LENGTH)
- REMOVING STAB BASE & ASPH PAV (5"-10")
- REMOVE CONC (RIPRAP)
- REMOVE SMALL SIGN

NOTES:

1. ANY METAL BEAM GUARD FENCE, TERMINAL ANCHOR SECTIONS, OR GUARDRAIL END TREATMENTS REMOVED ARE TO BE RETAINED BY THE CONTRACTOR.
2. PAYMENT FOR SAW CUTS WILL NOT BE MADE DIRECTLY. SAW CUTS WILL BE SUBSIDIARY TO ITEM 105.

0 25' 50'

SCALE: 1" = 50'

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FM 1226
AT CALIFORNIA CREEK

REMOVAL LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		29
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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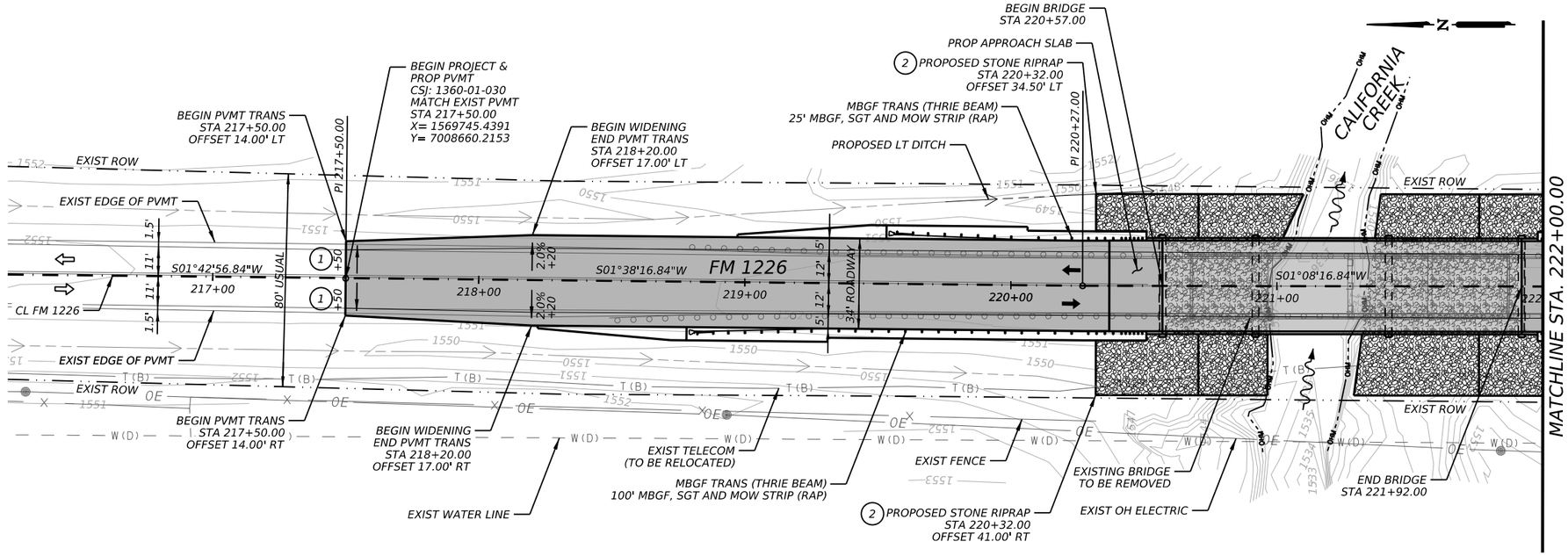


LEGEND:

- EXIST TOPOGRAPHY
- PROPOSED FEATURES
- CENTERLINES AND CONTROL LINES
- EXIST ROW
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- EXIST FENCE
- FLOW ARROW
- OHM — ORDINARY HIGH WATER BOUNDARY
- PROP STONE PROTECTION
- PROPOSED DITCH
- EXISTING DITCH

NOTES:

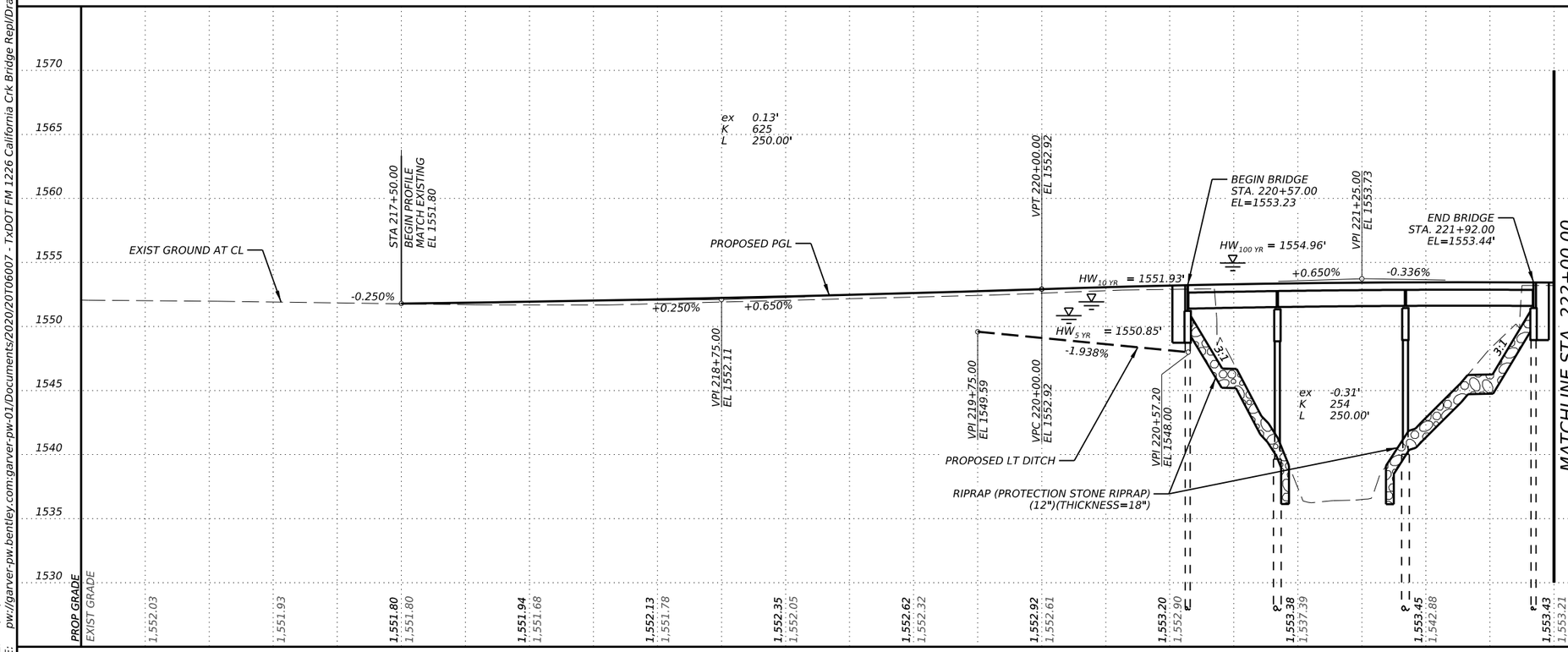
1. ALL STATIONS AND OFFSETS ARE FROM CENTERLINE OF FM 1226

(1) MATCH EXISTING CROSS SLOPE

(2) SEE PROPOSED BRIDGE LAYOUT FOR RIPRAP TYPE AND DEPTH. SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR STONE RIPRAP QUANTITIES.

0 25' 50'

SCALE: 1" = 50'



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Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

PLAN & PROFILE

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		30
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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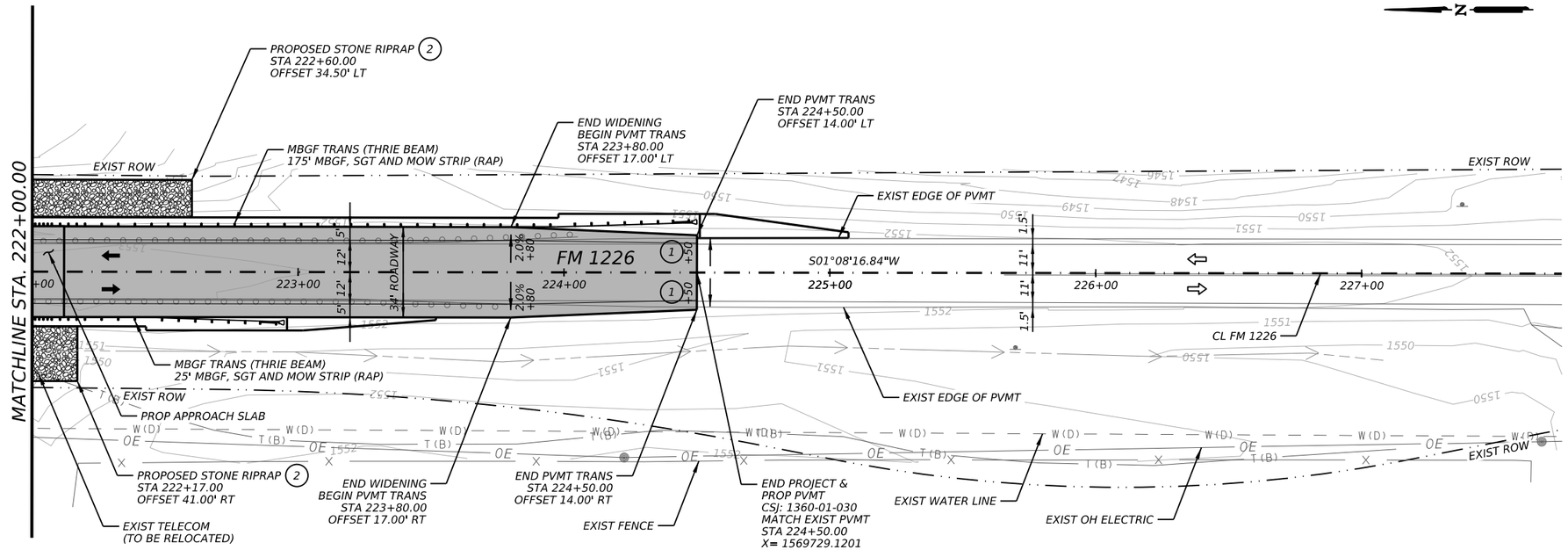

LEGEND:

- EXIST TOPOGRAPHY
- PROPOSED FEATURES
- CENTERLINES AND CONTROL LINES
- EXIST ROW
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- EXIST FENCE
- FLOW ARROW
- OHM — ORDINARY HIGH WATER BOUNDARY
- PROP STONE PROTECTION
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- EXISTING DITCH

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1. ALL STATIONS AND OFFSETS ARE FROM CENTERLINE OF FM 1226

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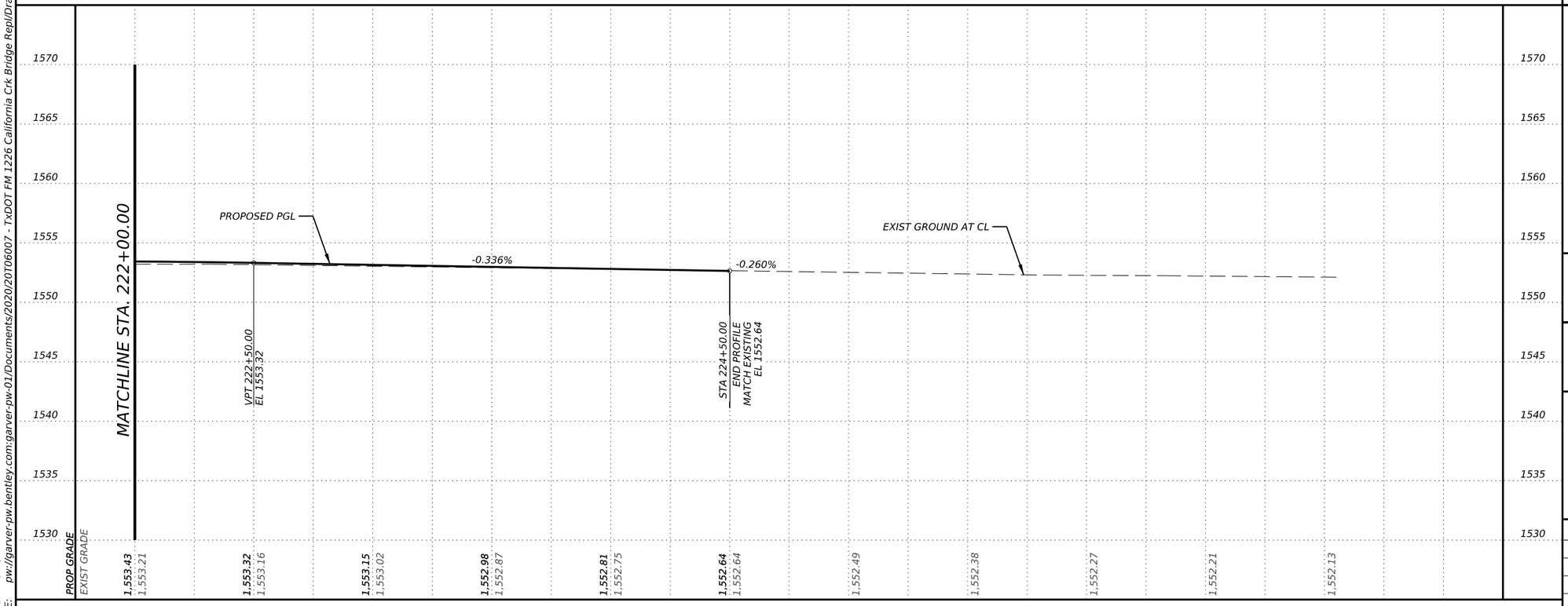
(2) SEE PROPOSED BRIDGE LAYOUT FOR RIPRAP TYPE AND DEPTH. SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR STONE RIPRAP QUANTITIES.

0 25' 50'

SCALE: 1" = 50'



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FM 1226
AT CALIFORNIA CREEK

PLAN & PROFILE

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		31
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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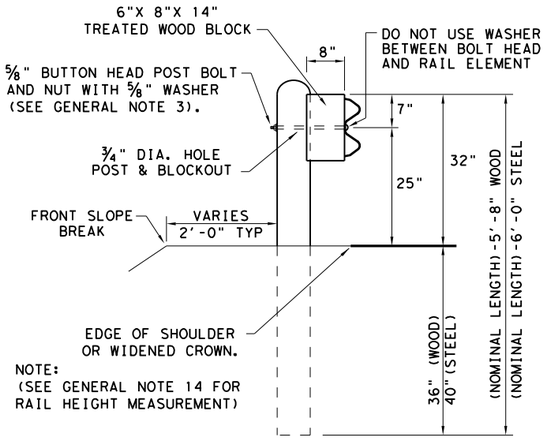
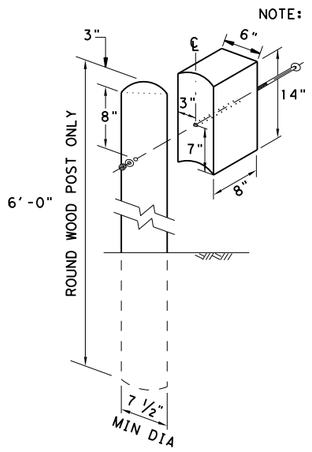
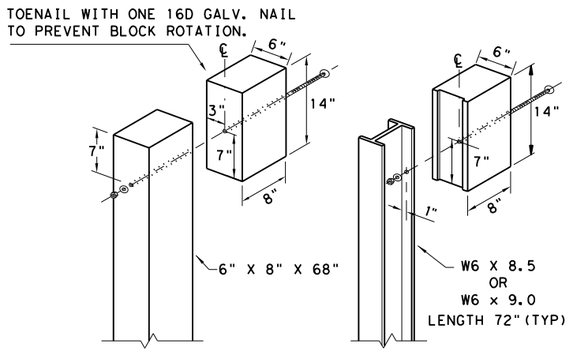


TYPICAL POST PLACEMENT



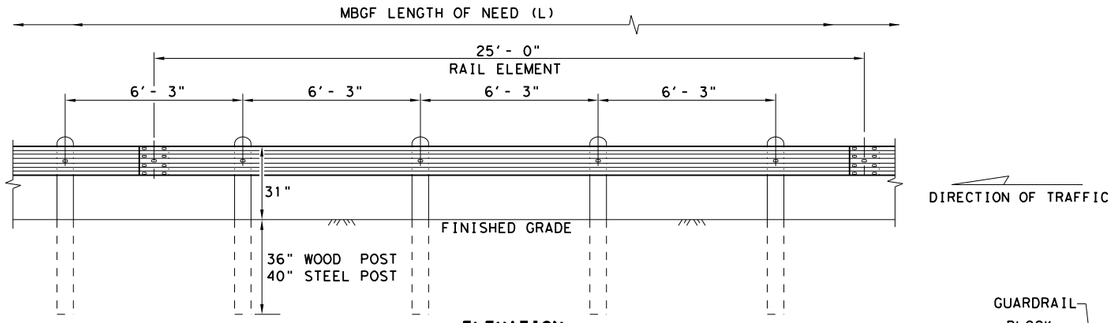
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

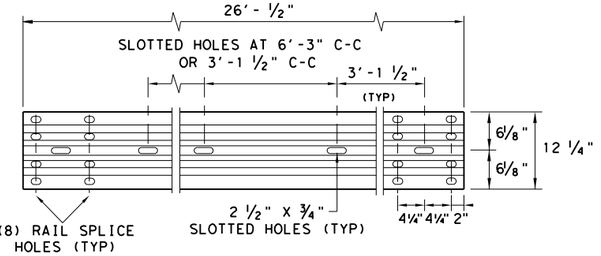
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

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



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

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

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

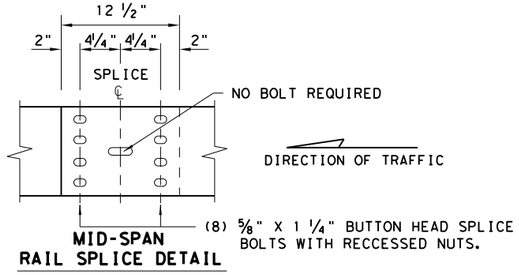
SPLICE BOLT LENGTH — VARIES

FBB01 = 1 ¼"
FBB02 = 2"
⅝"

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

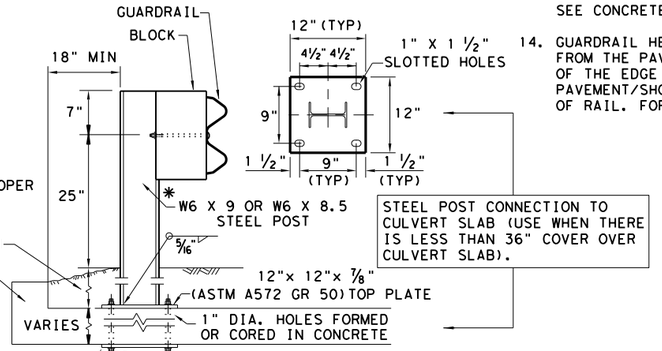
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

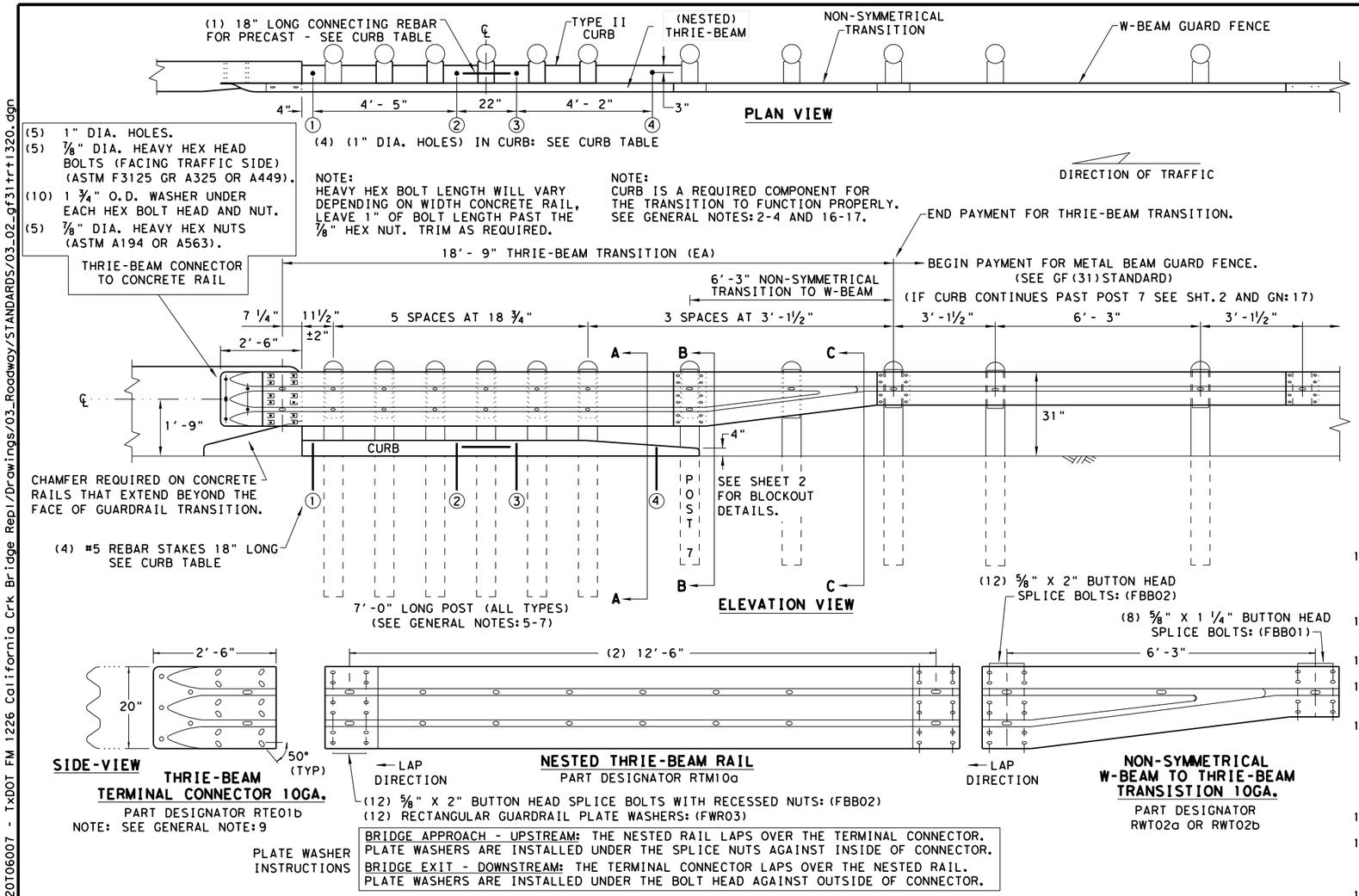
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		32

DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/03_Roadway/STANDARDS/03_02_gf31tr1320.dgn



GENERAL NOTES

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

THRIE-BEAM TERMINAL - CURB TABLE

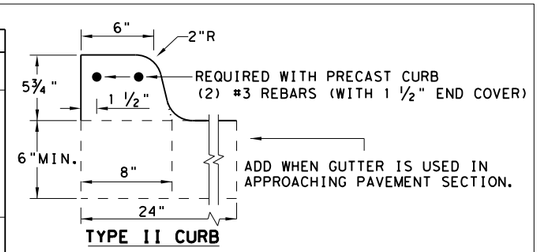
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.

* NOTES: NOT NEEDED FOR CAST-IN-PLACE.
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.
PERCUSSION DRILLING IS NOT PERMITTED WITH:
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.



TYPE II CURB

NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

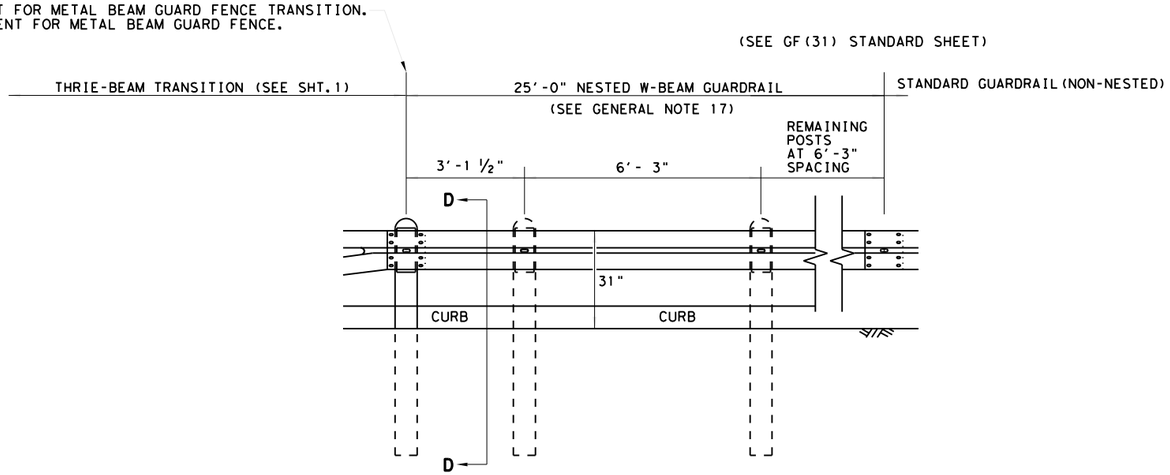
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

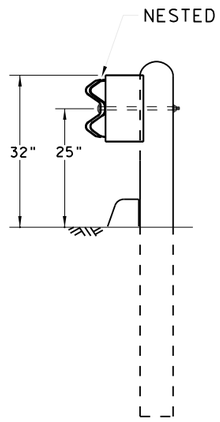
FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1360	01	030	FM 1226	
	DIST	COUNTY		SHEET NO.	
	ABL	JONES		33	

DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/03_Roadway/STANDARDS/03_02_gf31trt1320.dgn

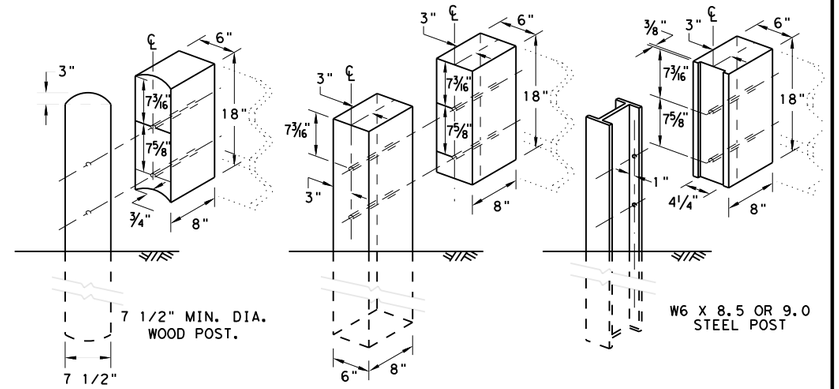
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
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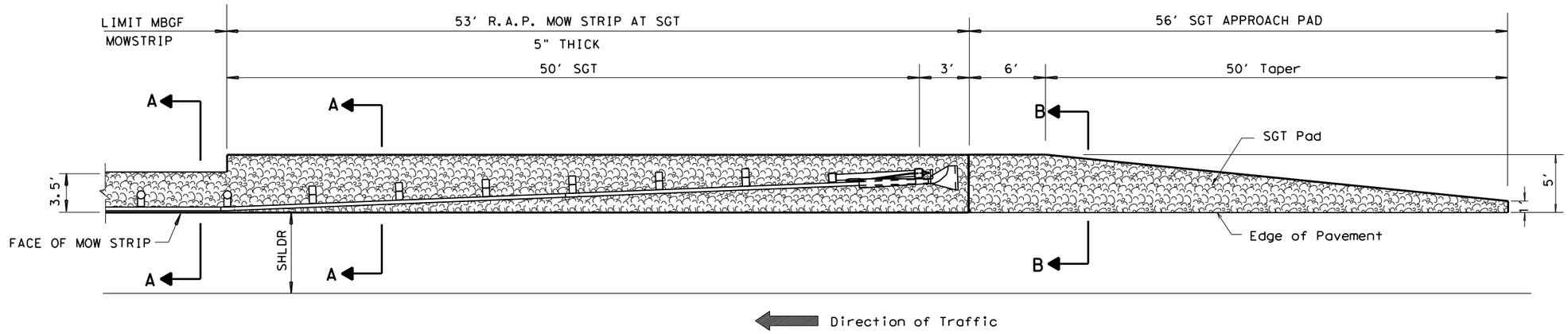
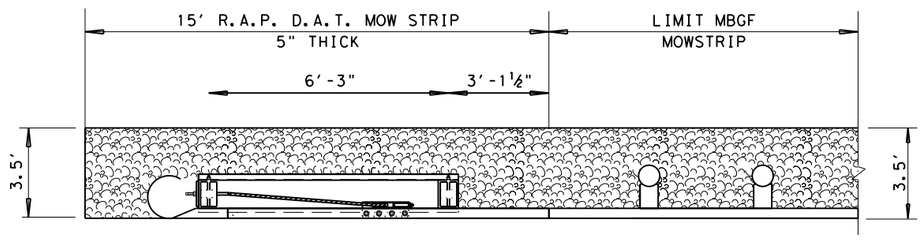
	ABL	JONES		34	



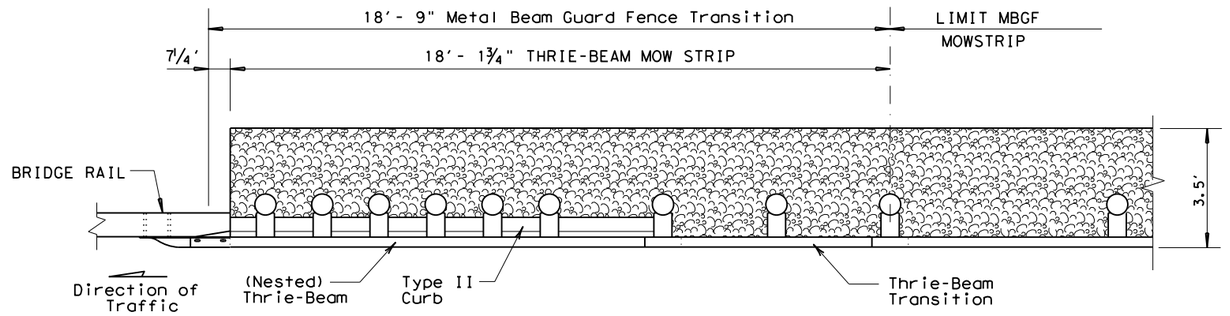
PLAN VIEW OF MOW STRIP AT SGT

18'- 1¾" THRIE-BEAM MOW STRIP

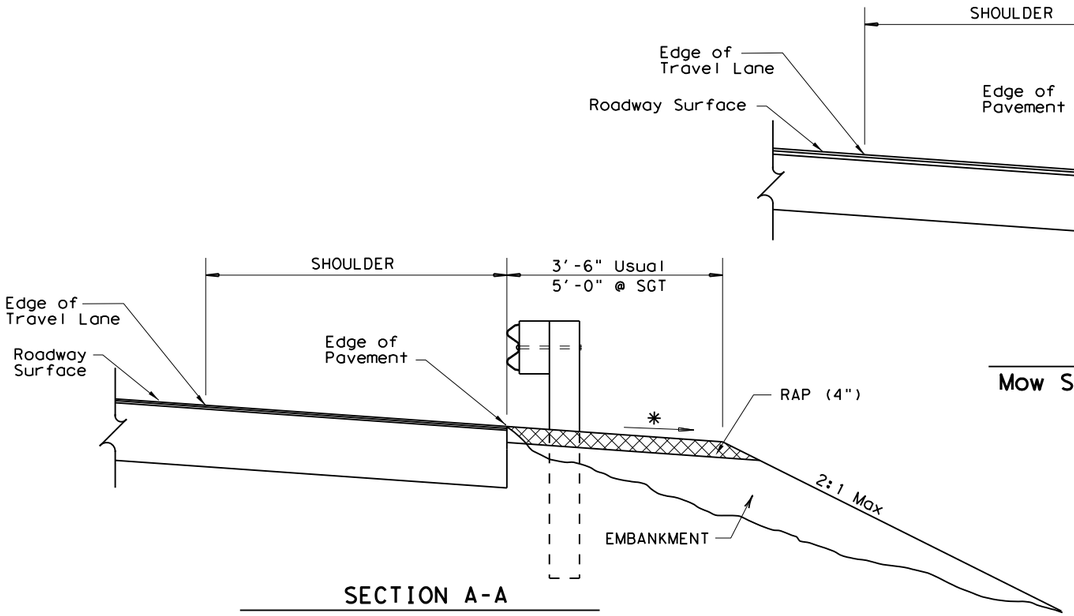
PLAN VIEW OF SGT APPROACH PAD



PLAN VIEW OF MOW STRIP AT DAT

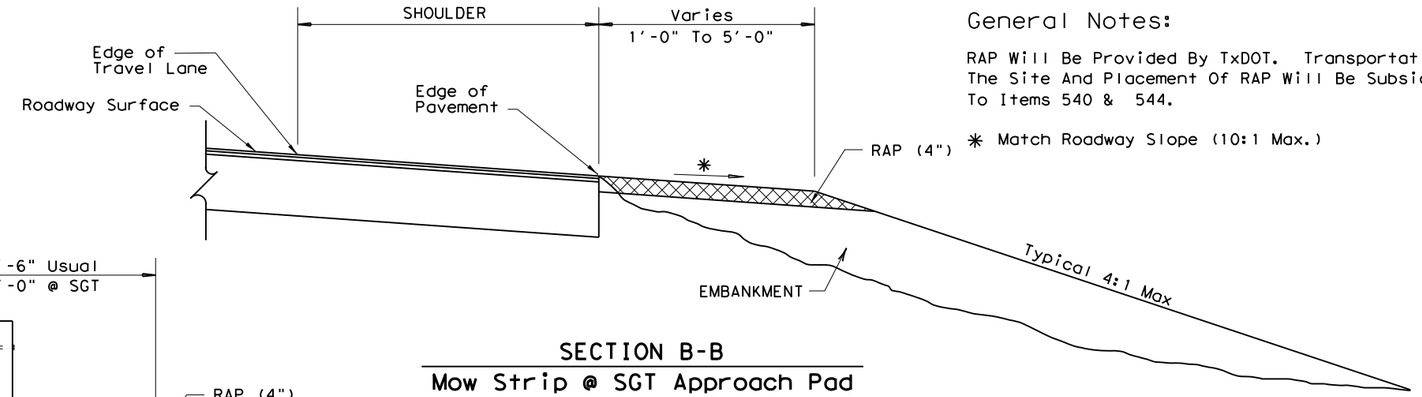


PLAN VIEW OF THRIE-BEAM MOW STRIP



SECTION A-A

Mow Strip @ MBGF & SGT



SECTION B-B

Mow Strip @ SGT Approach Pad

General Notes:

RAP Will Be Provided By TxDOT. Transportation To The Site And Placement Of RAP Will Be Subsidiary To Items 540 & 544.

✱ Match Roadway Slope (10:1 Max.)

ROADWAY DETAILS
R.A.P. MOW STRIPS
RAPMS-22 (MOD)

NO SCALE

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1226
STATE	COUNTY		SHEET NO.
TEXAS	JONES		35
DISTRICT	CONTROL	SECTION	JOB
ABL	1360	01	030

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED PROFESSIONAL ENGINEER
Adrian Rangel
5/11/2023

REV. DATE: 02/2014

FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/03*03*Roadway/STANDARDS/03*03*RAPMS-22.dgn
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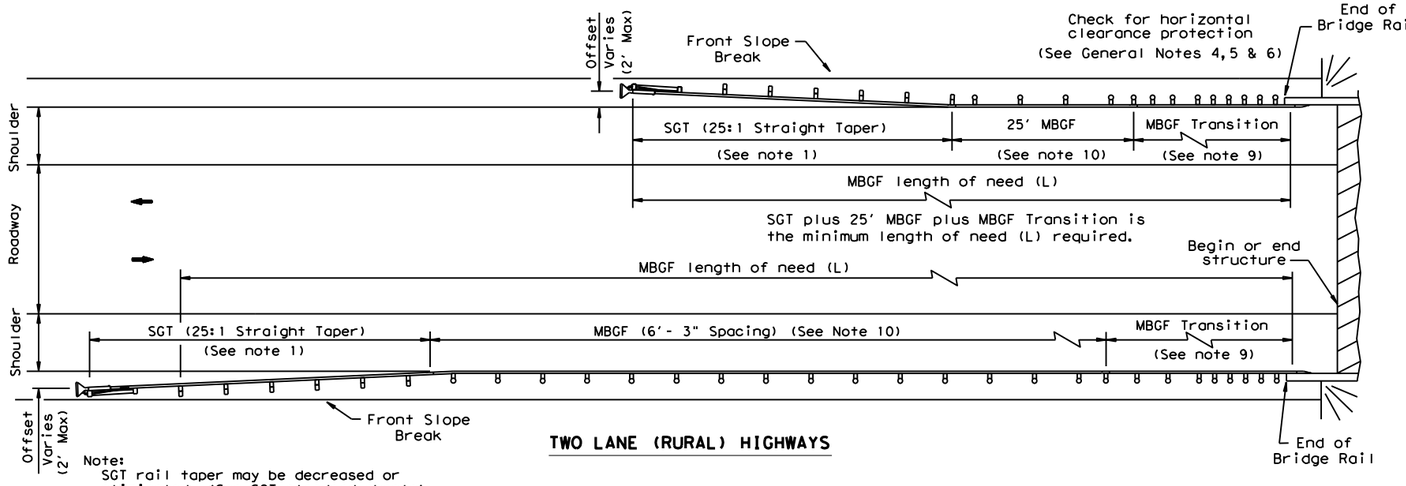
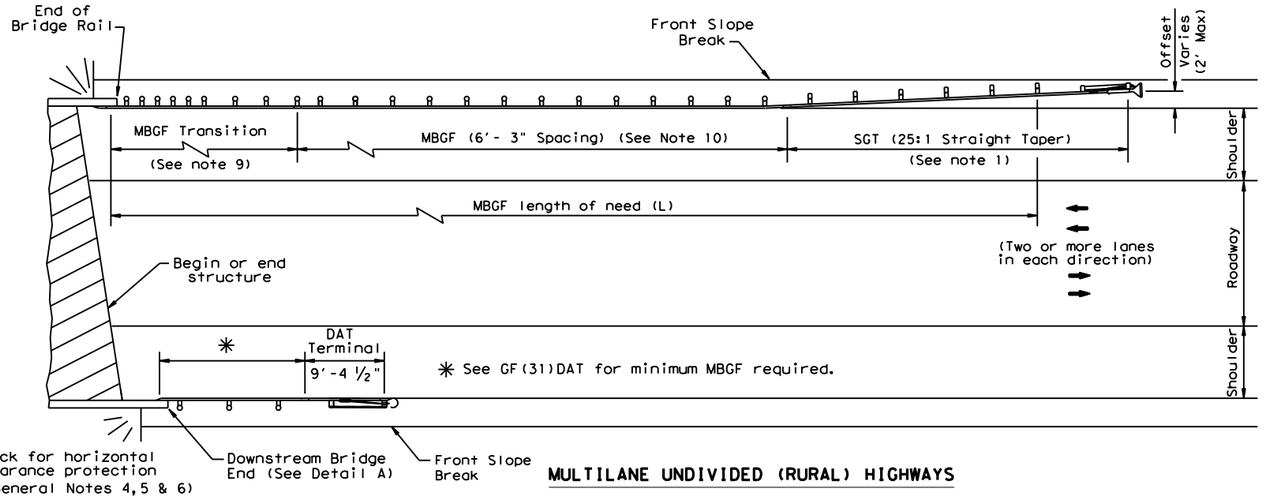
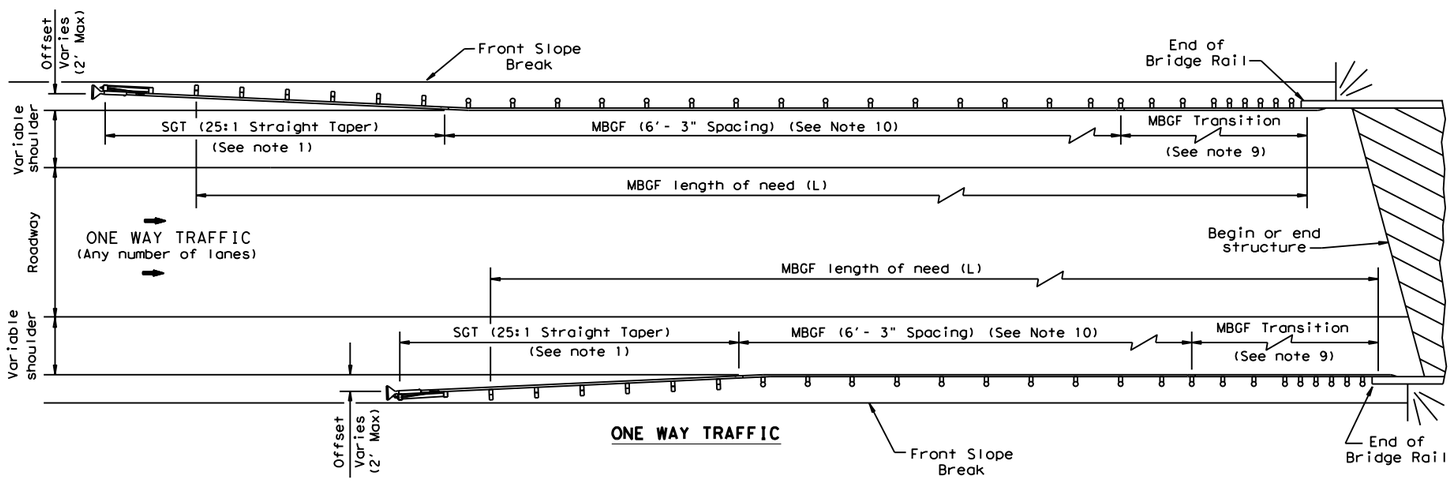


TWO LANE (RURAL) HIGHWAYS

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



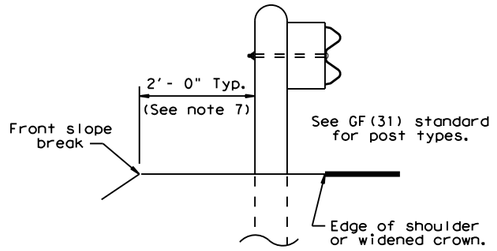
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation | Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	ABL	JONES		36

DATE: 5/11/2023
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NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

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

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

ⅬⅥ" DIA. YIELDING HOLES

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

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

POST 40" DEPTH (TYP 1-8)

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

6'-1⅜"

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

ⅬⅥ" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

SECTION VIEW A-A

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

POST(2)

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

POST 17"- ½" HEIGHT

4'- 9 ½"

ⅬⅥ" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT		CK: KM	DW: VP		CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY			SHEET NO.	
	ABL	JONES			37	

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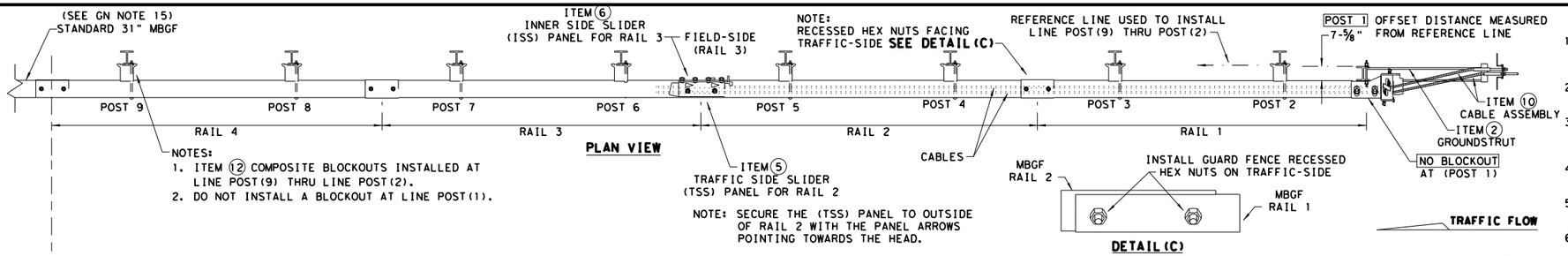

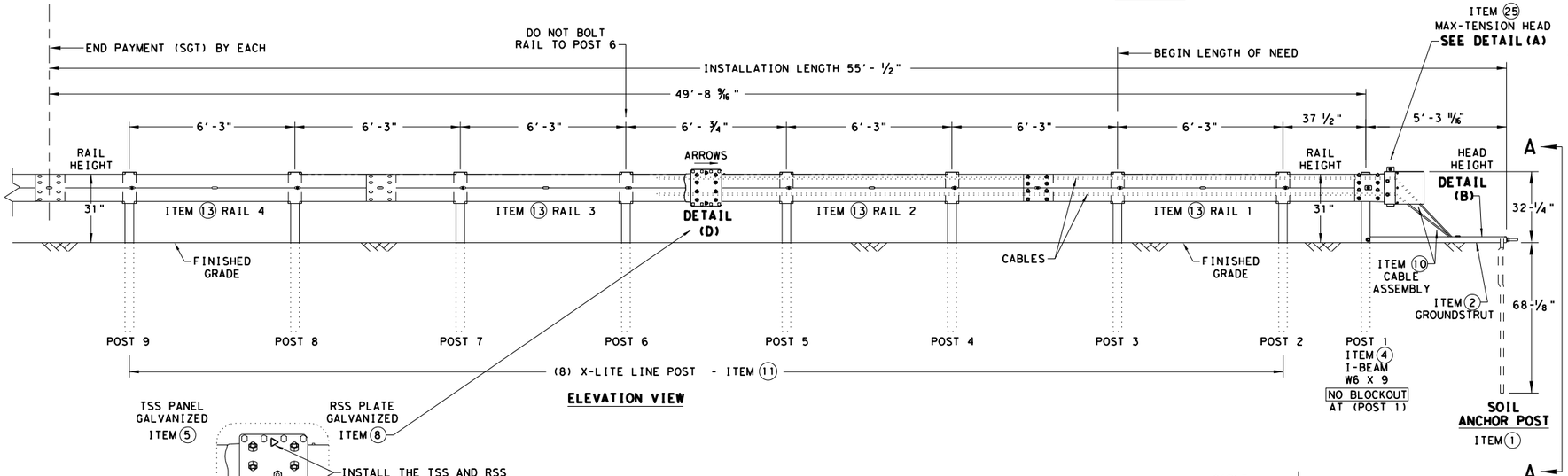

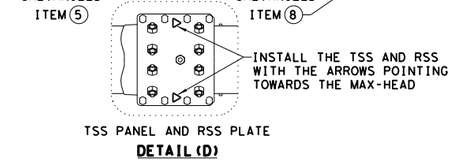

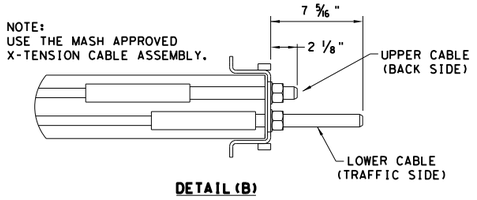

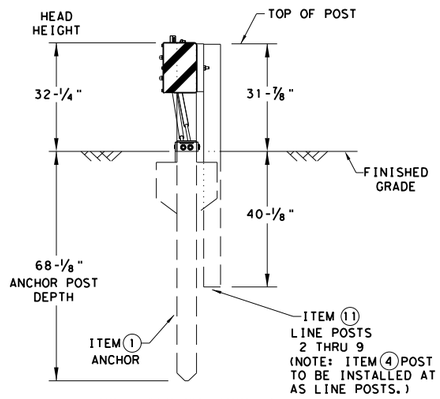

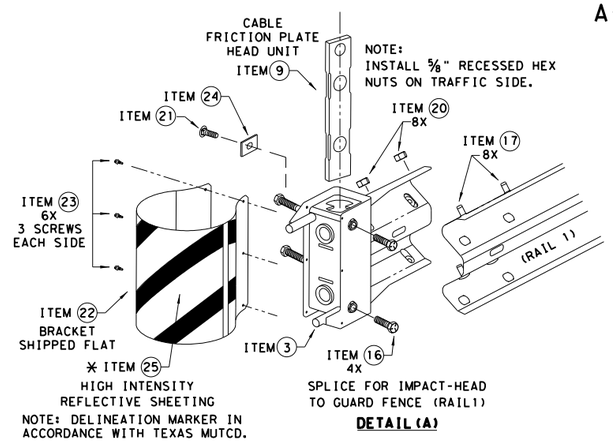

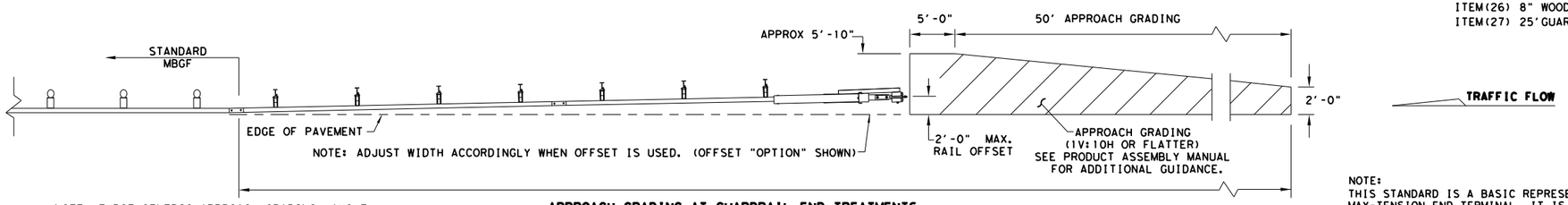

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	ABL	JONES		38

DATE: 5/11/2023
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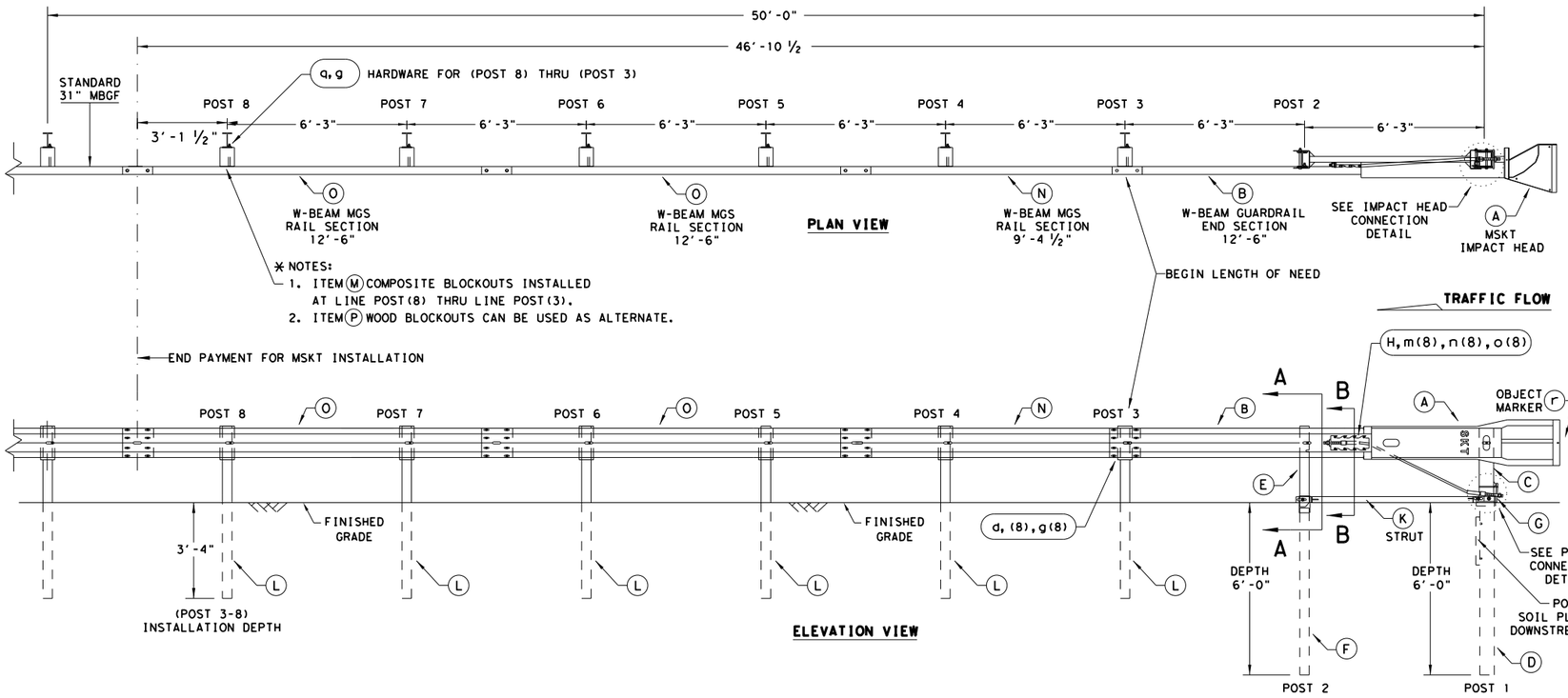
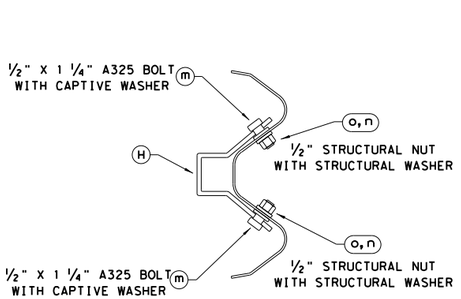
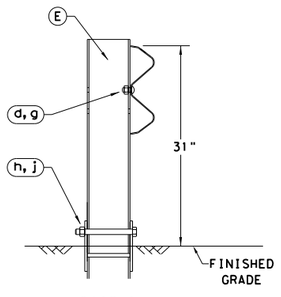


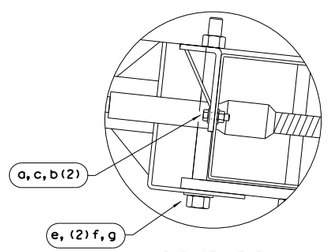
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



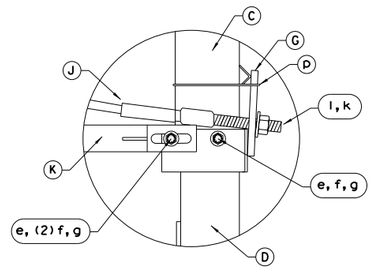
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

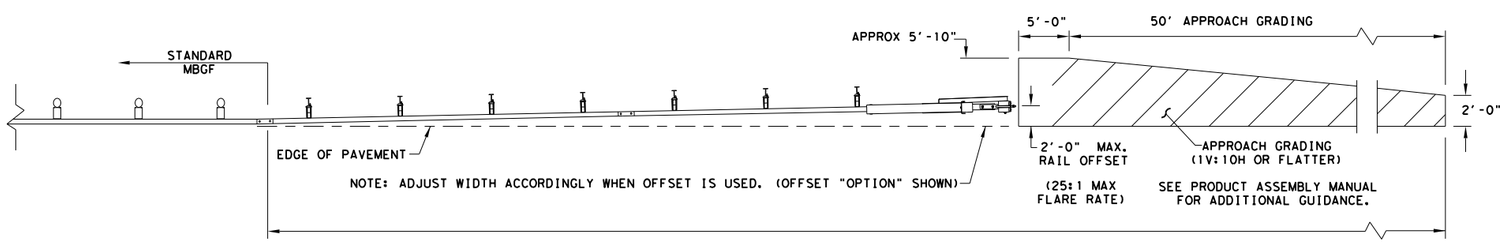
GENERAL NOTES

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

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

SEE NOTES: *

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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	DIST	COUNTY		SHEET NO.	
	ABL	JONES		39	

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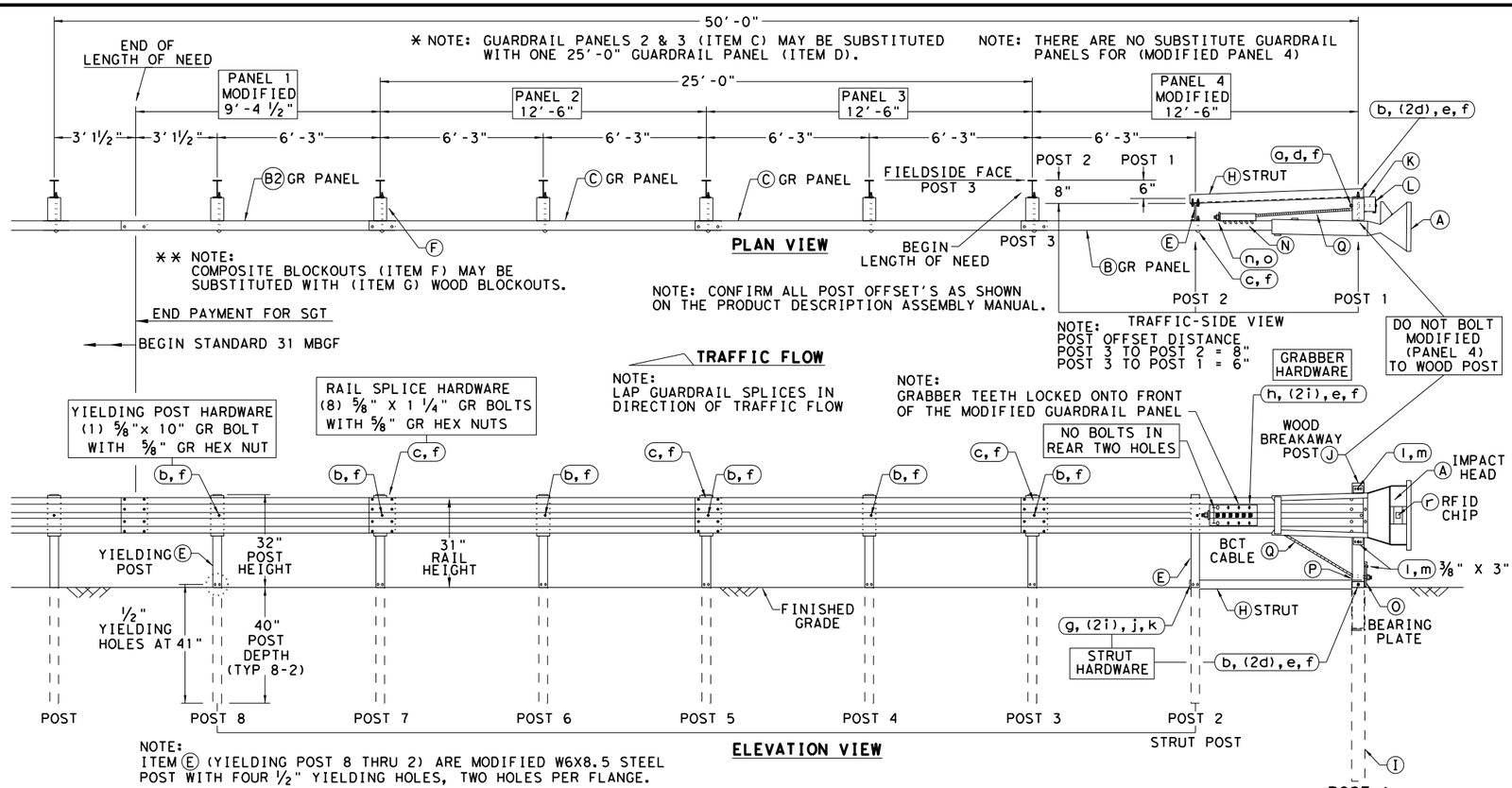
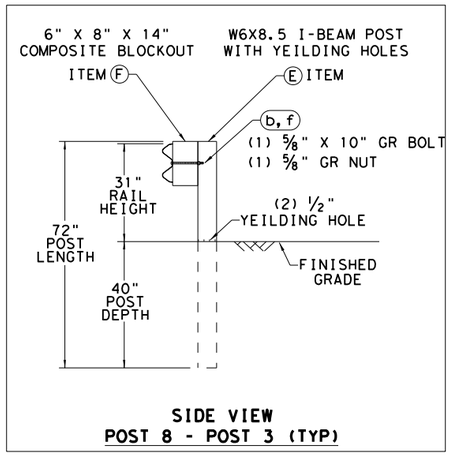


GENERAL NOTES

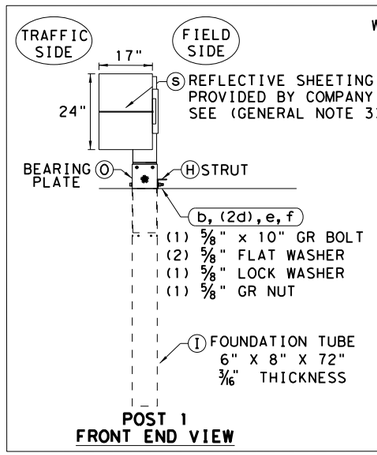
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

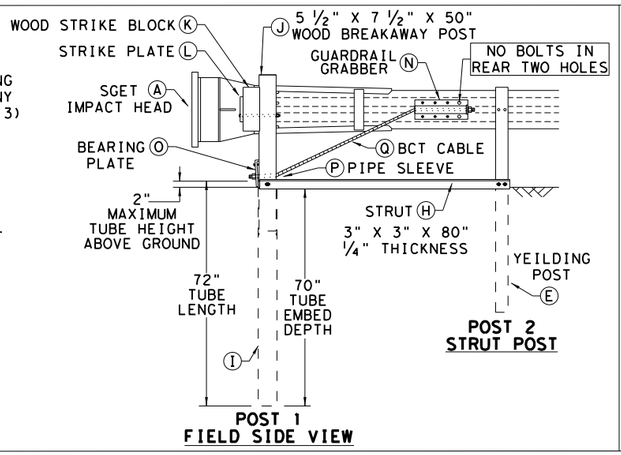
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



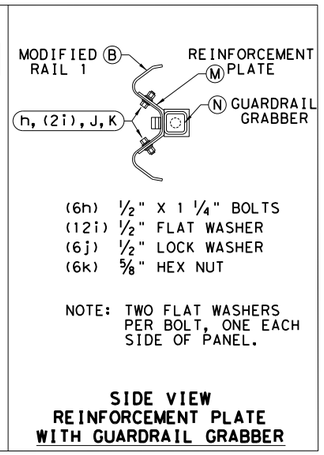
SIDE VIEW
POST 8 - POST 3 (TYP)



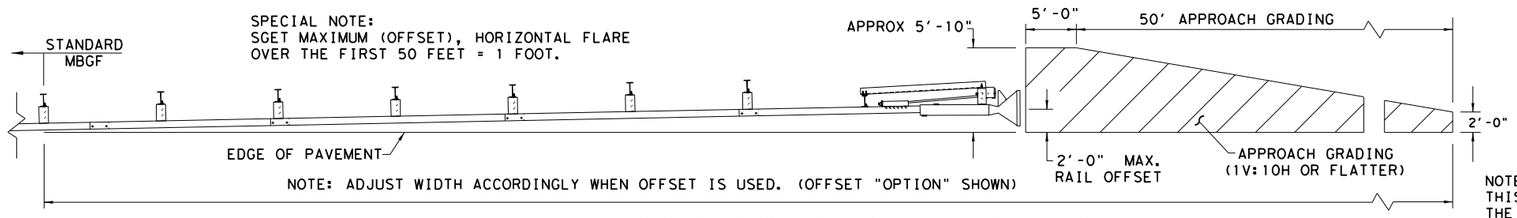
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

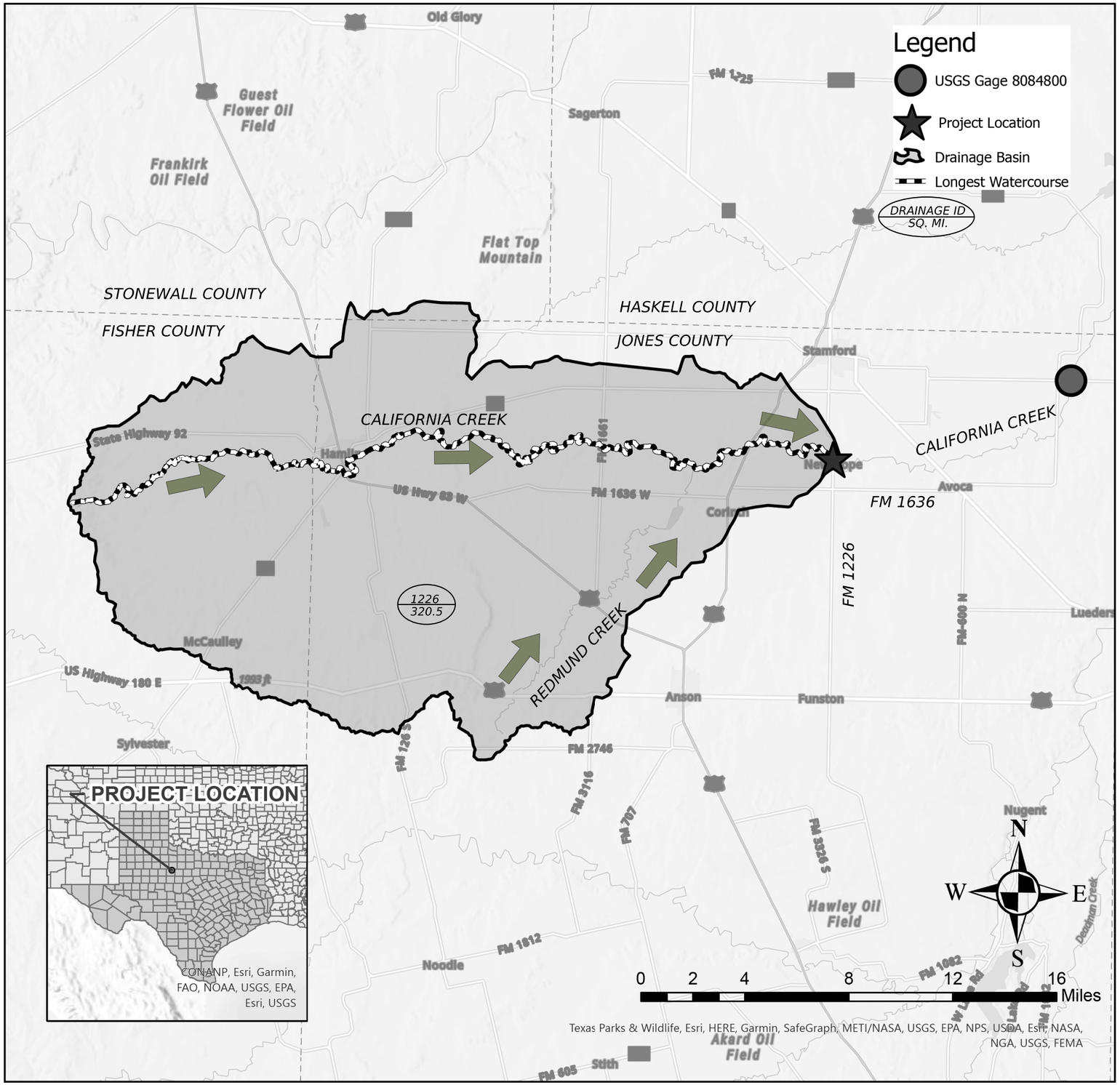
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT		CK: KM	DW: VP		CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1360	01	030		FM 1226	
	DIST	COUNTY			SHEET NO.	
	ABL	JONES			40	



DRAINAGE AREA MAP
FM 1226 AT CALIFORNIA CREEK

NOTES:

1. CALIFORNIA CREEK HAS A DESIGNATED SPECIAL FLOOD HAZARD AREA (SFHA) ZONE A FLOODPLAIN WITH NO FLOODWAY THROUGHOUT THE PROJECT REACH WHICH INDICATES THAT BASE FLOOD ELEVATIONS (BFE) HAVE NOT BEEN DETERMINED. IT CAN BE FOUND IN THE FLOOD INSURANCE RATE MAP (FIRM) PANEL NUMBER 48253C0100F EFFECTIVE 10/04/2011.
2. DRAINAGE AREA BOUNDARY WAS DELINEATED USING U.S. GEOLOGICAL SURVEY HYDROLOGIC UNIT CODE 8 (USGS HUC-8) WATERSHED BOUNDARY. THE HUC WATERSHED WAS MODIFIED TO REPRESENT THE DRAINAGE AREA FOR THE PROJECT LOCATION. THE TOTAL DRAINAGE AREA FOR THE PROJECT LOCATION IS 320.5 SQUARE MILES.
3. THE PEAK FLOWS WERE OBTAINED USING THE TRANSPOSITION OF GAGE DATA METHOD IN CONJUNCTION WITH THE TEXAS EM REGRESSION METHOD.
4. H&H FILES SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR "RONALD YOUNG" WITH JONES COUNTY ON 5/11/2023.

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FM 1226
AT CALIFORNIA CREEK

DRAINAGE AREA MAP

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		41
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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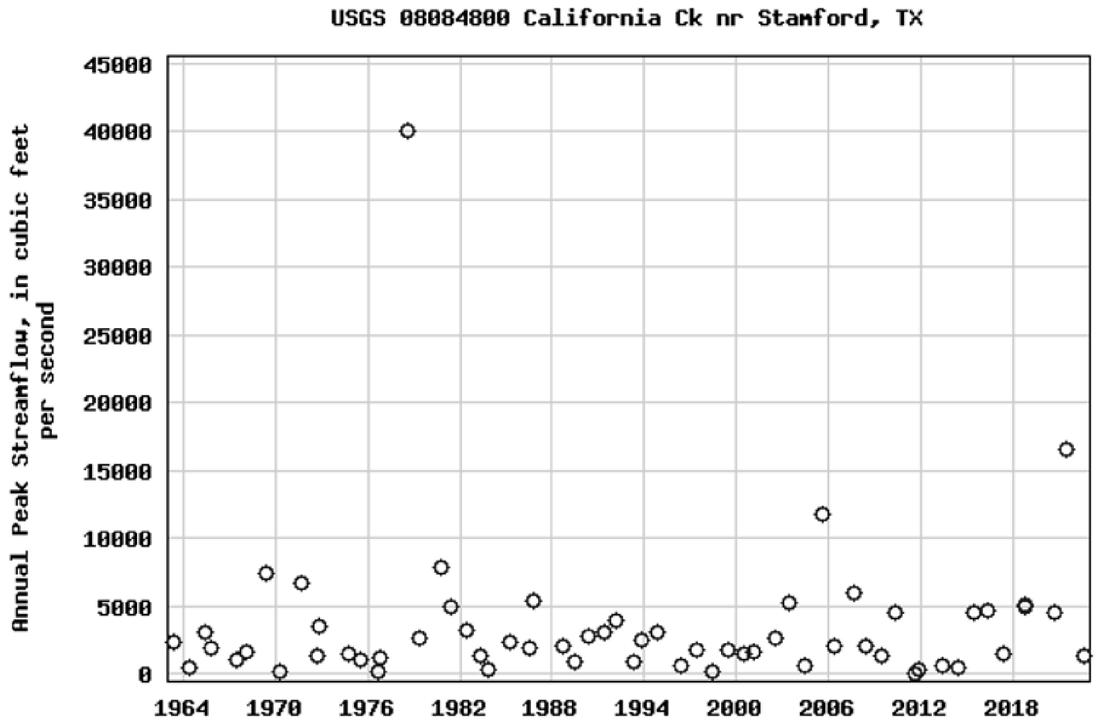
USGS GAUGE (08084800) DATA

YEAR	PEAK STREAM FLOW (CFS)	LOG Q
1963	2,350	3.371
1964	412	2.615
1965	3,040	3.483
1966	1,950	3.290
1967	1,020	3.009
1968	1,610	3.207
1969	7,420	3.870
1970	202	2.305
1971	6,650	3.823
1972	1,260	3.100
1973	3,500	3.544
1974	1,500	3.176
1975	977	2.990
1976	168	2.225
1977	1,200	3.079
1978	40,000	4.602
1979	2,640	3.422
1980	7,870	3.896
1981	4,950	3.695
1982	3,240	3.511
1983	1,370	3.137
1984	320	2.505
1985	2,350	3.371
1986	1,850	3.267
1987	5,450	3.736
1988	2,080	3.318
1989	885	2.947
1990	2,760	3.441
1991	3,120	3.494
1992	3,920	3.593

YEAR	PEAK STREAM FLOW (CFS)	LOG Q
1993	822	2.915
1994	2,490	3.396
1995	3,040	3.483
1996	619	2.792
1997	1,720	3.236
1998	84	1.924
1999	1,700	3.230
2000	1,390	3.143
2001	1,640	3.215
2002	2,560	3.408
2003	5,210	3.717
2004	578	2.762
2005	11,700	4.068
2006	2,040	3.310
2007	5,990	3.777
2008	2,060	3.314
2009	1,250	3.097
2010	4,550	3.658
2011	38	1.580
2012	231	2.364
2013	639	2.806
2014	437	2.640
2015	4,440	3.647
2016	4,630	3.666
2017	1,480	3.170
2018	5,070	3.705
2019	4,910	3.691
2020	4,450	3.648
2021	16,600	4.220
2022	1,380	3.140



NOTES

1. THE LOG PEARSON TYPE III DISTRIBUTION WAS FITTED TO THE ANNUAL PEAK STREAMFLOWS TO CALCULATE PEAK FLOWS AT THE USGS GAUGE (08084800) LOCATED 16 MILES DOWNSTREAM OF THE FM 1226 BRIDGE.

2. BULLETIN 17B METHODOLOGY WAS USED TO CALCULATE PROBABILISTIC FLOWS BASED ON THE USGS GAUGE DATA AS DESCRIBED IN TXDOT HYDRAULIC DESIGN MANUAL DATED SEPTEMBER 2019.

3. PROBABILISTIC PEAK FLOWS AT THE GAGE WERE TRANSPOSED TO PROJECT LOCATION FROM GAGE LOCATION. TRANSPOSED FLOW VALUES WERE UTILIZED FOR PROPOSED BRIDGE DESIGN.

4. THE FLOW VALUES SHOWN IN THE TABLE ON THIS PAGE REPRESENT TOTAL WATERSHED FLOW TO THE PROJECT LOCATION. THE FLOW REACHING THE LOCATION IS SPLIT INTO THREE CONVEYANCE PATHS IN THE HYDRAULIC MODEL: THE MAIN CHANNEL BRIDGE, A BRIDGE CLASS CULVERT IN THE SOUTH APPROACH, AND FLOW OVERTOPPING THE ROADWAY. THE FLOW PASSING THROUGH THE MAIN CHANNEL BRIDGE IS NOTED IN FURTHER DETAIL ON SHEET 2 OF 4.

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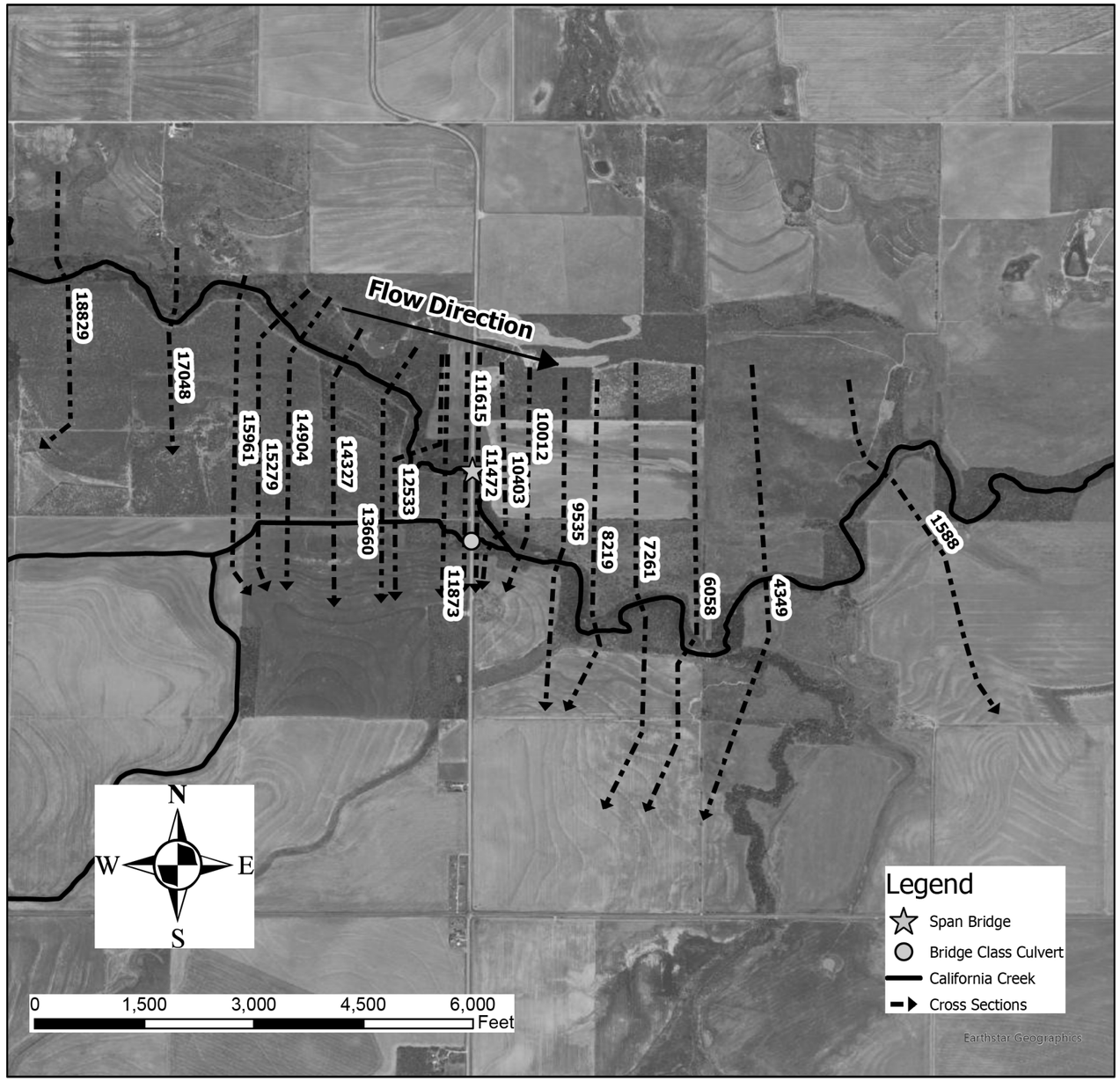
2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

HYDRAULIC DATA SHEET

SHEET 1 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		42
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226



CROSS SECTION LOCATION MAP

NOTES:

1) THE ARMY CORPS OF ENGINEERS HEC-RAS PROGRAM VERSION 6.3.1 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE EXISTING AND PROPOSED BRIDGE CROSSING.

2) THE FM 1226 ROAD CROSSING OF CALIFORNIA CREEK IS LOCATED IN FEMA DESIGNATED ZONE A SPECIAL FLOOD HAZARD AREA IN JONES COUNTY ON MAP PANEL 48253C0100F EFFECTIVE 10/04/2011.

3) THE TOPOGRAPHIC INFORMATION FOR THE MODEL WAS DEVELOPED USING USGS ONE METER LIDAR DATA. TOPOGRAPHIC SURVEY DATA COLLECTED IN FEBRUARY 2023 WAS USED TO REPRESENT THE ROADWAY. SURVEY DATA COLLECTED IN MARCH 2023 WAS USED TO SUPPLEMENT THE LIDAR IN THE CALIFORNIA CREEK CHANNEL.

4) A PROPOSED 36-INCH TALL BRIDGE RAILING WAS MODELED AS FULLY BLOCKED IN THE PROPOSED HYDRAULIC MODEL.

5) THE PROPOSED BRIDGE HAS BEEN DESIGNED TO MEET OR EXCEED EXISTING HYDRAULIC PERFORMANCE.

6) THE PROFILE VIEW OF THE UPSTREAM HYDRAULIC CROSS SECTION CAN BE FOUND ON SHEET 4 OF 4 OF THE HYDRAULIC DATA SHEETS.

7) INCONSISTENCIES IN THE RATING CURVES BELOW ARE REFLECTIVE OF MULTIPLE CONVEYANCE PATHS DURING FLOOD CONDITIONS (E.G. ROADWAY OVERTOPPING AND RELIEF STRUCTURES) BEING HYDRAULICALLY ACTIVATED AT VARIOUS WATER SURFACE ELEVATIONS.

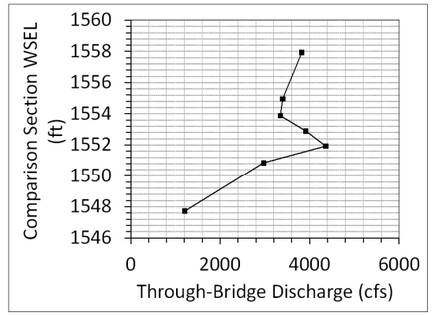
8) A COPY OF THE REPORT AND HYDRAULIC MODEL WILL BE SENT TO THE FLOODPLAIN ADMINISTRATORS OF JONES COUNTY ON 5/11/2023.

Proposed Bridge Comparison Table

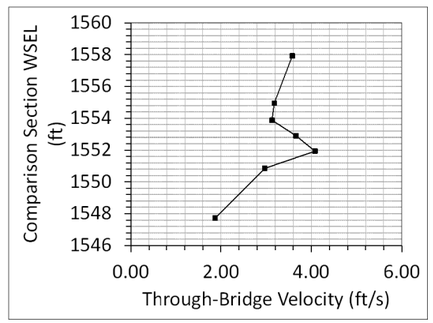
Design Storm	*WSEL (ft)*	*Through-Bridge Flow (cfs)*	*Through-Bridge Velocity (ft/s)*
2-YR	*1547.72*	*1211*	*1.87*
5-YR	*1550.85*	*2971*	*2.97*
10-YR	*1551.93*	*4360*	*4.08*
25-YR	*1552.90*	*3915*	*3.66*
50-YR	*1553.88*	*3346*	*3.13*
100-YR	*1554.96*	*3398*	*3.18*
500-YR	*1557.93*	*3825*	*3.58*

THE VALUES IN THIS TABLE ARE THE RESULTS FROM THE INTERNAL MULTIPLE-OPENING WINDOW IN THE HYDRAULIC MODEL FOR FLOW THROUGH THE BRIDGE CONVEYANCE PATH FOR THE NOTED AEP STORM.

Proposed Through-Bridge Conveyance Curve



Proposed Through-Bridge Velocity Curve



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2023 ***Texas Department of Transportation***

FM 1226
AT CALIFORNIA CREEK

HYDRAULIC DATA SHEET

SHEET 2 OF 4

FED. RD. DIV. NO.	*FEDERAL AID PROJECT*		*SHEET NO.*
6	*(SEE TITLE SHEET)*		*43*
STATE	*DISTRICT*	*COUNTY*	
TEXAS	*ABL*	*JONES*	
CONTROL	*SECTION*	*JOB*	*HIGHWAY*
1360	*01*	*030*	*FM 1226*

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HYDRAULIC COMPUTATIONS

HYDRAULIC ANALYSIS												
RIVER STATION	EXISTING MODEL						PROPOSED MODEL					
	DESIGN 5 YEAR			CHECK 100 YEAR			DESIGN 5 YEAR			CHECK 100 YEAR		
	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)
18829	3560	4.71	1556.75	21810	5.07	1560.89	3560	4.71	1556.75	21810	5.07	1560.89
17048	3560	4.06	1555.1	21810	6.47	1559.02	3560	4.06	1555.10	21810	6.47	1559.02
15961	3560	3.9	1554.26	21810	4.13	1558.23	3560	3.90	1554.26	21810	4.13	1558.23
15279	3560	4.58	1553.62	21810	4.91	1557.80	3560	4.58	1553.62	21810	4.91	1557.80
14904	3560	4.97	1553.21	21810	4.36	1557.59	3560	4.97	1553.21	21810	4.37	1557.58
14327	3560	4.3	1552.68	21810	4.43	1557.26	3560	4.30	1552.68	21810	4.43	1557.26
13660	3560	3.85	1552.22	21810	4.63	1556.87	3560	3.86	1552.22	21810	4.63	1556.87
12533	3560	3.87	1551.43	21810	5.08	1556.10	3560	3.87	1551.42	21810	5.08	1556.10
11873	3560	3.74	1550.98	21810	6.29	1555.40	3560	3.74	1550.97	21810	6.29	1555.40
11615	3560	3.32	1550.86	21810	7.36	1554.97	3560	3.33	1550.85	21810	7.37	1554.96
	CALIFORNIA CREEK BRIDGE						CALIFORNIA CREEK BRIDGE					
11472	3560	3.48	1550.64	21810	6.63	1554.96	3560	3.48	1550.64	21810	6.63	1554.96
10403	3560	3.44	1550.13	21810	5.59	1553.93	3560	3.44	1550.13	21810	5.59	1553.93
10012	3560	3.91	1549.84	21810	5.47	1553.57	3560	3.91	1549.84	21810	5.47	1553.57
9535	3560	3.95	1549.56	21810	4.25	1553.30	3560	3.95	1549.56	21810	4.25	1553.30
8219	3560	3.32	1548.83	21810	4.75	1552.49	3560	3.32	1548.83	21810	4.75	1552.49
7261	3560	4.45	1548.17	21810	4.74	1551.89	3560	4.45	1548.17	21810	4.74	1551.89
6058	3560	3.47	1547.49	21810	4.11	1551.26	3560	3.47	1547.49	21810	4.11	1551.26
4349	3560	4.61	1546.26	21810	5.50	1550.17	3560	4.61	1546.26	21810	5.50	1550.17
1588	3560	4.05	1544.2	21810	4.96	1548.10	3560	4.05	1544.20	21810	4.96	1548.10

EXISTING FM1226 MAIN BRIDGE OUTPUT												
Reach	River Sta	Profile	Plan	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)	BR Sluice Coef
1	11546	5	Existing	1550.96	1550.75	956.29	-	2960.62	1551.69	0	0.22	-
1	11546	100	Existing	1555.22	1550.75	956.29	-	10112.85	1551.69	6973.43	0.09	-
PROPOSED FM1226 MAIN BRIDGE OUTPUT												
Reach	River Sta	Profile	Plan	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)	BR Sluice Coef
1	11546	5	Proposed	1550.95	1551.27	1069.07	-	2971.25	1551.45	0	0.22	-
1	11546	100	Proposed	1555.2	1551.27	1069.07	-	10119.58	1551.45	6721.24	0.07	-

EXISTING FM1226 3-8X8 RCB CULVERT OUTPUT													
Reach	River Sta	Profile	Plan	E.G. US. (ft)	W.S. US. (ft)	E.G. IC (ft)	E.G. OC (ft)	Min El Weir Flow (ft)	Q Culv Group (cfs)	Q Weir (cfs)	Delta WS (ft)	Culv Vel US (ft/s)	Culv Vel DS (ft/s)
1	11546	5	Existing	1550.93	1550.92	1544.83	1550.93	1550.56	558.37	41.01	0.19	2.91	2.91
1	11546	100	Existing	1555.23	1555.16	1555.19	1555.23	1550.56	508.13	11189.02	0.09	2.65	2.65
PROPOSED FM1226 3-8X8 RCB CULVERT OUTPUT													
Reach	River Sta	Profile	Plan	E.G. US. (ft)	W.S. US. (ft)	E.G. IC (ft)	E.G. OC (ft)	Min El Weir Flow (ft)	Q Culv Group (cfs)	Q Weir (cfs)	Delta WS (ft)	Culv Vel US (ft/s)	Culv Vel DS (ft/s)
1	11546	5	Proposed	1550.92	1550.92	1544.78	1550.92	1550.56	549.22	39.53	0.18	2.86	2.86
1	11546	100	Proposed	1555.23	1555.17	1555.19	1555.23	1550.56	513.99	11274.61	0.09	2.68	2.68

Bridge X-ing	RI	Proposed Freeboard
FM1226 @ CALIFORNIA CREEK	5-yr	0.17
	100-yr	-3.94

NOTES:

1) USACE HEC-RAS VERSION 6.3.1 UTILIZED FOR THE ANALYSIS.
2) MULTI-OPENING ANALYSIS USED TO REPRESENT FLOW THROUGH 3 CONVEYANCE PATHS, THE MAIN CHANNEL BRIDGE AND THE 3-8'X8' RCB BRIDGE CLASS CULVERT, AS WELL AS ROADWAY OVERTOPPING REPRESENTED BY WEIR FLOW.
3) WEIR OVERTOPPING OF ROADWAY APPROACHES OBSERVED IN 5-YR THROUGH 500-YR FLOWS.
4) THE "Q TOTAL" FLOW RATES IN THIS TABLE REPRESENT THE FULL WATERSHED FLOW RATES FOR THE NOTED AEP STORMS. THE MULTIPLE OPENING ANALYSIS MODEL WAS USED TO DETERMINE THE FLOW THROUGH THE MAIN CHANNEL BRIDGE.
5) THE BRIDGE WAS DESIGNED TO MEET OR EXCEED EXISTING HYDRAULIC CONDITIONS. DESIGN STORM OF 5-YEAR AEP IS USED FOR DOCUMENTATION ON THESE SHEETS BECAUSE THE 5-YEAR IS THE LARGEST PROBABILISTIC STORM THAT DOES NOT IMPINGE ON THE LOW CHORD. THE 5-YEAR STORM DOES OVERTOP THE ROADWAY IN THE SOUTH APPROACH, NEAR THE 3--8'X8' RCB THAT WILL REMAIN IN PLACE.

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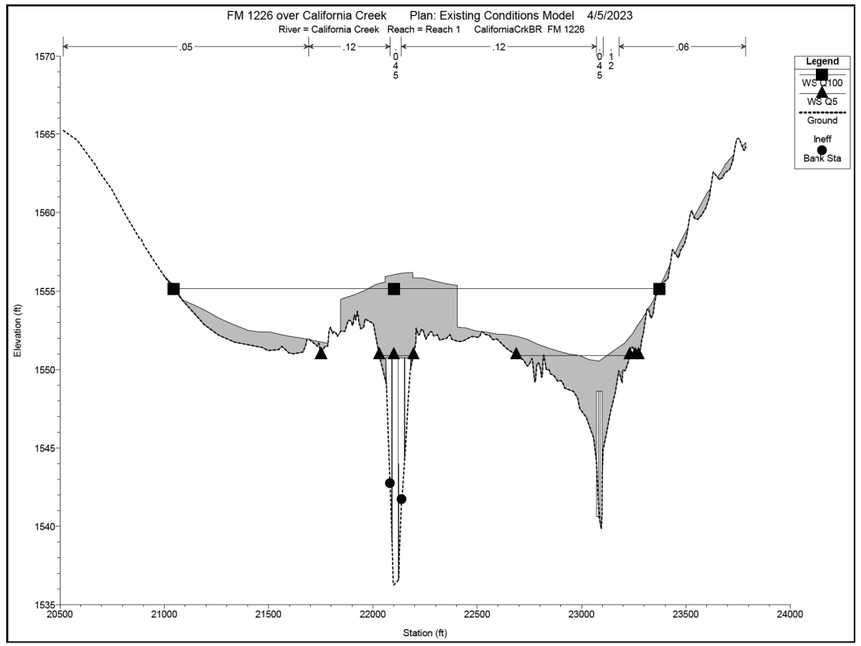
FM 1226
AT CALIFORNIA CREEK

HYDRAULIC DATA SHEET

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		44
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226



EXISTING STREAM CROSS-SECTION AT STRUCTURE

Design Storm	WSEL Upstream (ft)		
	Existing (1)	Proposed (2)	Difference (2)-(1)
2-YR	1547.73	1547.72	-0.01
5-YR	1550.86	1550.85	-0.01
10-YR	1552.02	1551.93	-0.09
25-YR	1552.97	1552.90	-0.07
50-YR	1553.91	1553.88	-0.03
100-YR	1554.97	1554.96	-0.01
500-YR	1557.93	1557.93	0.00

Design Storm	Velocity Upstream (fps)		
	Existing (1)	Proposed (2)	Difference (2)-(1)
2-YR	2.32	2.32	0.00
5-YR	3.32	3.33	0.01
10-YR	4.28	4.38	0.10
25-YR	5.95	6.08	0.13
50-YR	6.82	6.86	0.04
100-YR	7.36	7.37	0.01
500-YR	8.65	8.64	-0.01

Design Event (5-YR)	Crossing Capacity at California Creek (cfs)
Existing Capacity	2960.62
Proposed Capacity	2971.25

THESE FLOW RATES REPRESENT FLOW THROUGH THE MAIN CHANNEL BRIDGE ONLY, NOT THE TOTAL WATERSHED FLOW.

NOTES:

1. FM 1226 AT CALIFORNIA CREEK IS A DESIGNATED SPECIAL FLOOD HAZARD (SFHA) ZONE A FLOODPLAIN WITH NO FLOODWAY THROUGHOUT THE PROJECT REACH WHICH INDICATES THAT BASE FLOOD ELEVATIONS (BFE) HAVE NOT BEEN DETERMINED. IT CAN BE FOUND ON FLOOD INSURANCE RATE MAP (FIRM) NUMBER 48253C0100F, EFFECTIVE DATE OCTOBER 4, 2011.

2. USACE HEC-RAS VERSION 6.3.1 WAS USED FOR THE HYDRAULIC ANALYSIS.

3. MULTI-OPENING ANALYSIS USED TO REPRESENT FLOW THROUGH TWO CONVEYANCE PATHS: BRIDGE-CLASS RELIEF CULVERT AND MAIN CHANNEL MUTI-SPAN BRIDGE.

4. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

5. THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING A NORMAL DEPTH OF 0.0007 FT/FT FOR ALL DESIGN FREQUENCIES WHICH IS BASED ON BOTTOM SLOPE OF CHANNEL AS DETERMINED BY LIDAR.

6. A COPY OF THE REPORT AND HYDRAULIC MODEL WILL BE SENT TO THE FLOODPLAIN ADMINISTRATORS OF JONES COUNTY ON 5/11/2023.

7. THE PROJECT FLOWS WERE TRANSPOSED FROM NEARBY USGS GAGE STATION 8084800 AND COMPARED TO THE TX OMEGA EM REGRESSION EQUATIONS.

8. THE DESIGN INTENDS TO MEET OR EXCEED PRE-PROJECT CONDITIONS. THE 5-YR AEP STORM PASSES THE PROPOSED BRIDGE WITH A CHECK FLOOD OF 100-YR EVENT FOR ANALYSIS:

Q5 = 2971 CFS Q10 = 4360 CFS Q100 = 3398 CFS

V5 = 2.97 FPS V10 = 4.08 FPS V100 = 3.18 FPS

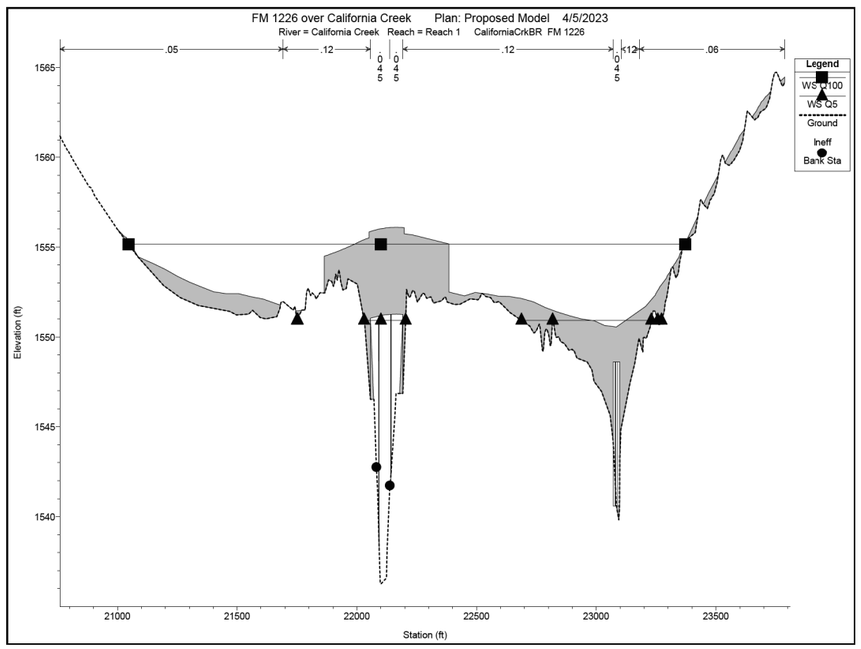
HW5 = 1550.85 FT HW10 = 1551.93 FT HW100 =1554.96 FT

9. NEARBY USGS GAGE 8084800 FLOW DATA WAS TRANSPOSED TO THE PROJECT LOCATION AND CHECKED BY THE TEXAS EM REGRESSION METHOD FOR THE HYDROLOGIC MODELING

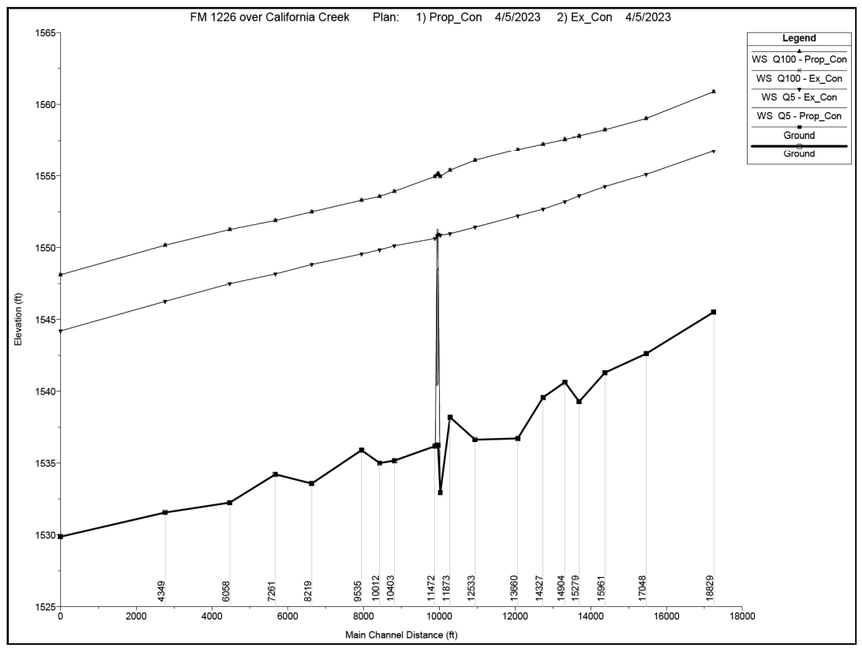
REFERENCES

1. TXDOT'S HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019)

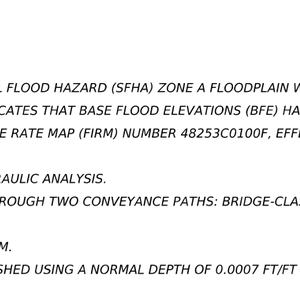
2. TOPOGRAPHIC DATA SOURCE: USGS TX RED RIVER FEMA R6 1M Lidar AND LOCAL SURVEY



PROPOSED STREAM CROSS-SECTION AT STRUCTURE



STREAM PROFILE



05/11/2023

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2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

HYDRAULIC DATA SHEET

SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		45
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

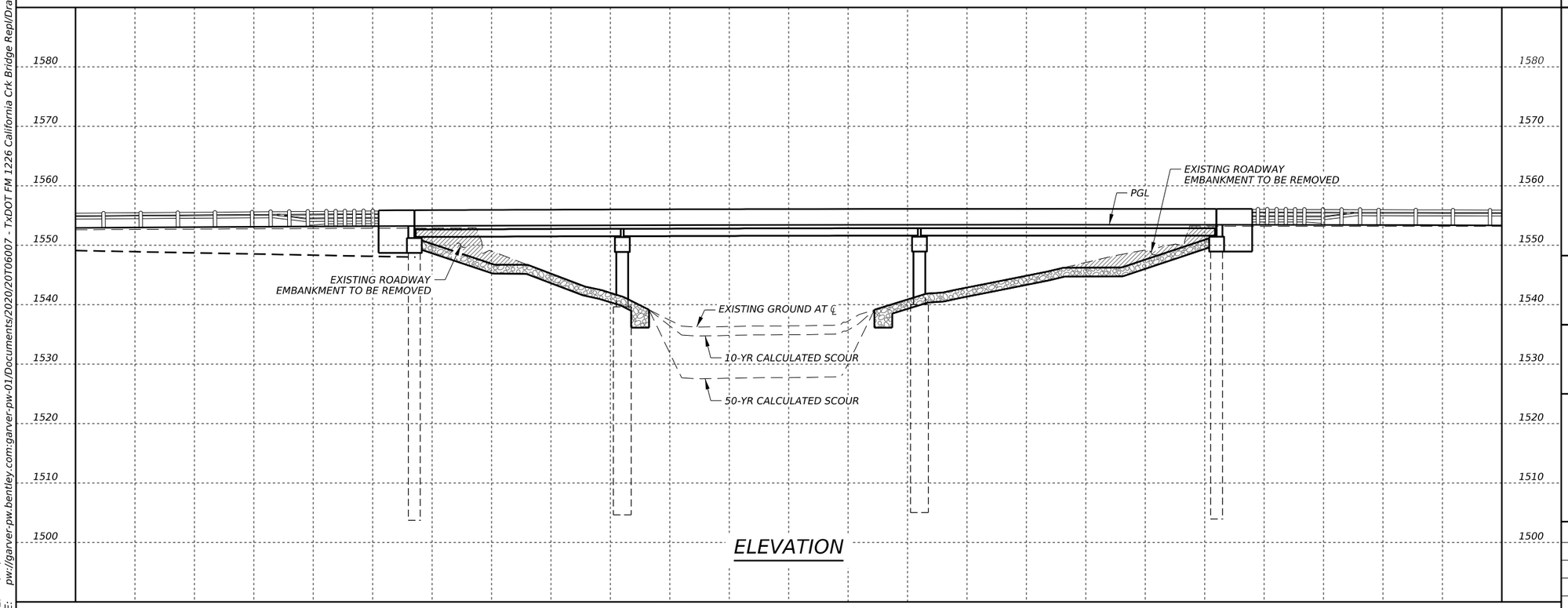
CHANNEL MATERIAL	
CHANNEL BED MATERIAL DESCRIPTION	CLAY
D50	<0.2 MM
BASIS OF CHANNEL BED MATERIAL DESCRIPTION	ASSUMED D50
NON-ERODABLE STRATA	N/A

SUMMARY OF RETURN PERIODS	
HYDRAULIC DESIGN FLOOD	MEET OR EXCEED
SCOUR DESIGN FLOOD	Q OT(<10YR)
SCOUR CHECK FLOOD	Q 50YR

NOTE:
ACCORDING TO TABLE 5-3 IN THE TXDOT GEOTECHNICAL MANUAL (GM), THE SCOUR DESIGN FLOOD WAS DETERMINED TO BE THE FLOW RATE AT WHICH THE BRIDGE BEGINS TO OVERTOP ("Q OT").

	SUMMARY OF CALCULATED SCOUR DEPTHS			
	CONTRACTION SCOUR (ft)	PIER SCOUR (ft)	ABUTMENT SCOUR (ft)	TOTAL SCOUR (ft)
	SCOUR DESIGN FLOOD (Q OT <10-YR)			
LEFT OVERBANK	1.6	-	0.0	1.6
PIER 1	1.5	5.3	-	6.8
PIER 2	1.5	4.9	-	6.4
RIGHT OVERBANK	3.2	-	0.0	3.2
	SCOUR CHECK FLOOD (Q 50-YR)			
LEFT OVERBANK	2.4	-	0.0	2.4
PIER 1	8.7	6.1	-	14.8
PIER 2	8.7	4.4	-	13.1
RIGHT OVERBANK	2.2	-	0.0	2.2

NOTES:
1. THE HYDRAULIC ANALYSIS WAS CONDUCTED USING USACE HEC-RAS VERSION 6.3.1.
2. SCOUR COMPUTATIONS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL, TXDOT SCOUR EVALUATION GUIDE, AND FHWA HEC-18 PROCEDURES.
3. FOR ADDITIONAL INFORMATION, SEE THE CSJ 1360-01-030 FM 1226 HYDROLOGY AND HYDRAULICS REPORT BY GARVER LLC.



ELEVATION

0 10' 20'
SCALE: 1" = 20'

STATE OF TEXAS
GEORGE H. AMEN
106655
LICENSED
PROFESSIONAL ENGINEER
05/11/2023

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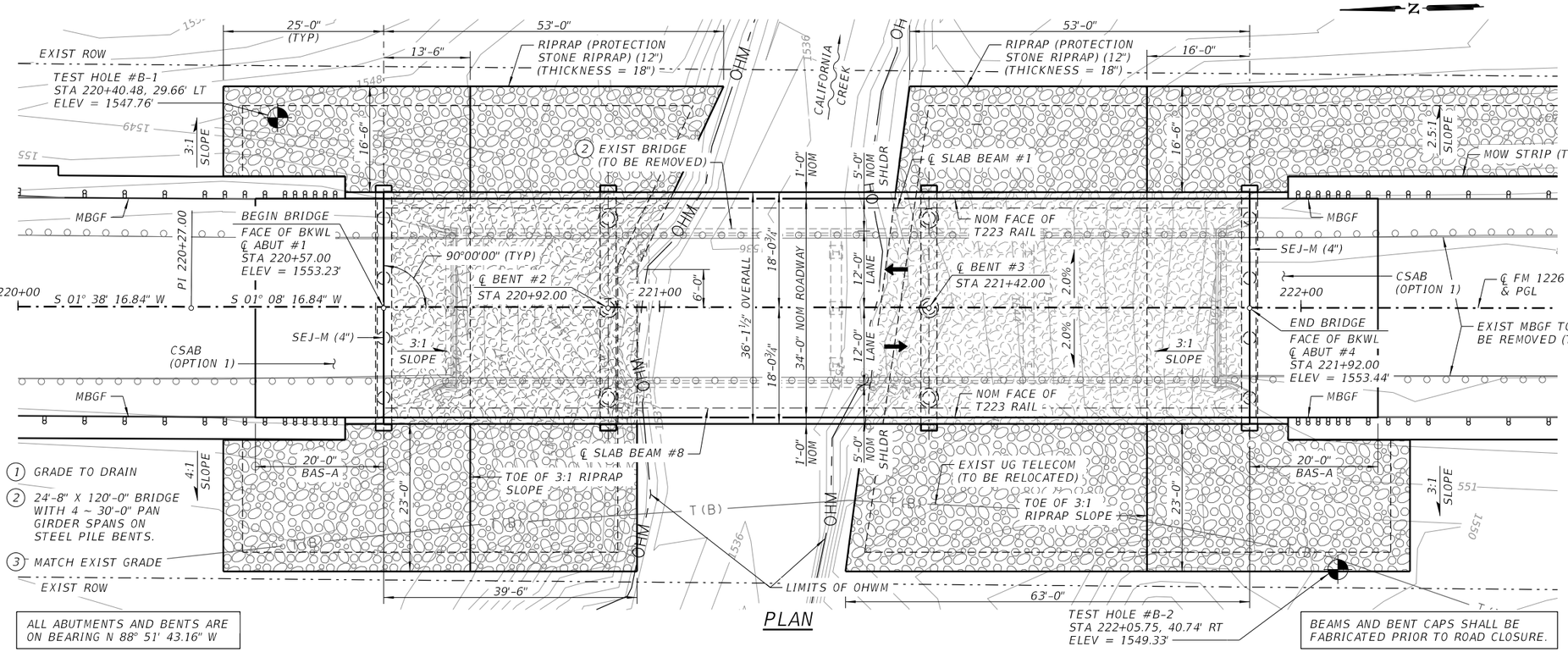
FM 1226
AT CALIFORNIA CREEK

SCOUR DATA SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		46
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226



GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).

BRIDGE NOT DESIGNED FOR OVERLAY.

ALL DIMENSIONS ARE HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR VERTICAL GRADE AND CROSS-SLOPE WHERE APPROPRIATE.

SEE PSBEB STANDARD FOR BEAM END BEARING DETAILS.

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

SAW-CUT GROOVING FINAL SURFACE TEXTURE ON THE BRIDGE DECK AND APPROACH SLAB IS REQUIRED.

SEE "TEST HOLE PROFILES" SHEETS FOR SUBSURFACE INFORMATION.

CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF ALL UTILITIES PRIOR TO CONSTRUCTION AND FABRICATION. ENGINEER SHALL BE NOTIFIED OF ANY CONFLICTS IMMEDIATELY.

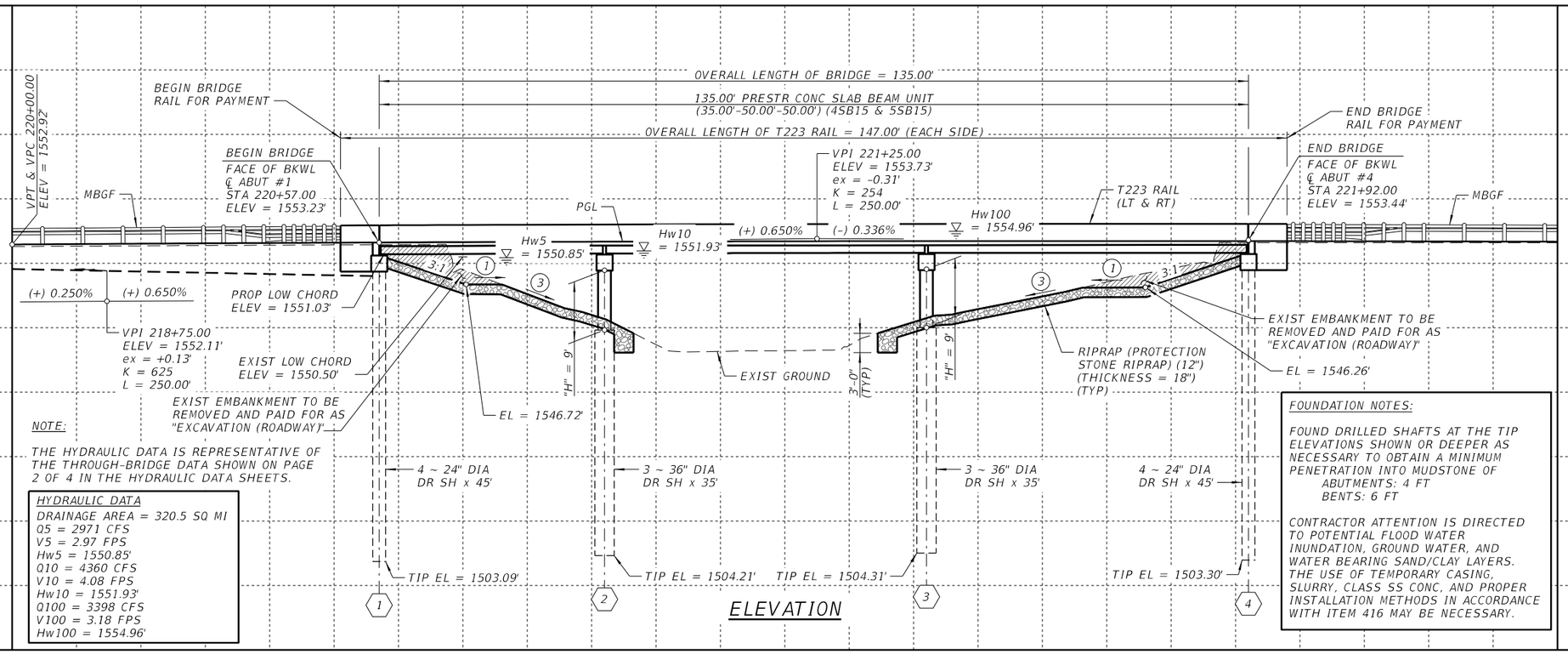
SEE "TYPICAL SECTION" SHEET FOR TYPICAL TRANSVERSE SECTION.

SEE ROADWAY PLANS FOR RIPRAP LIMITS NOT SHOWN.

FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 70 MPH
ADT (2021): 253
ADT (2041): 354
EXIST NBI NO.: 08-128-0-1360-01-004
PROP NBI NO.: 08-128-0-1360-01-008

HL93 LOADING

0 10' 20'
SCALE: 1" = 20'



NOTE:

THE HYDRAULIC DATA IS REPRESENTATIVE OF THE THROUGH-BRIDGE DATA SHOWN ON PAGE 2 OF 4 IN THE HYDRAULIC DATA SHEETS.

HYDRAULIC DATA
DRAINAGE AREA = 320.5 SQ MI
Q5 = 2971 CFS
V5 = 2.97 FPS
Hw5 = 1550.85'
Q10 = 4360 CFS
V10 = 4.08 FPS
Hw10 = 1551.93'
Q100 = 3398 CFS
V100 = 3.18 FPS
Hw100 = 1554.96'

FOUNDATION NOTES:

FOUND DRILLED SHAFTS AT THE TIP ELEVATIONS SHOWN OR DEEPER AS NECESSARY TO OBTAIN A MINIMUM PENETRATION INTO MUDSTONE OF
ABUTMENTS: 4 FT
BENTS: 6 FT

CONTRACTOR ATTENTION IS DIRECTED TO POTENTIAL FLOOD WATER INUNDATION, GROUND WATER, AND WATER BEARING SAND/CLAY LAYERS. THE USE OF TEMPORARY CASING, SLURRY, CLASS SS CONC, AND PROPER INSTALLATION METHODS IN ACCORDANCE WITH ITEM 416 MAY BE NECESSARY.

ELEVATION

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED
PROFESSIONAL ENGINEER
Alvaro J. Lopez
5/11/23

SUPERSTRUCTURE INV/OPR RATINGS 1.09/1.51

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FM 1226
AT CALIFORNIA CREEK

BRIDGE LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		47
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/11/2023 1:53:10 PM
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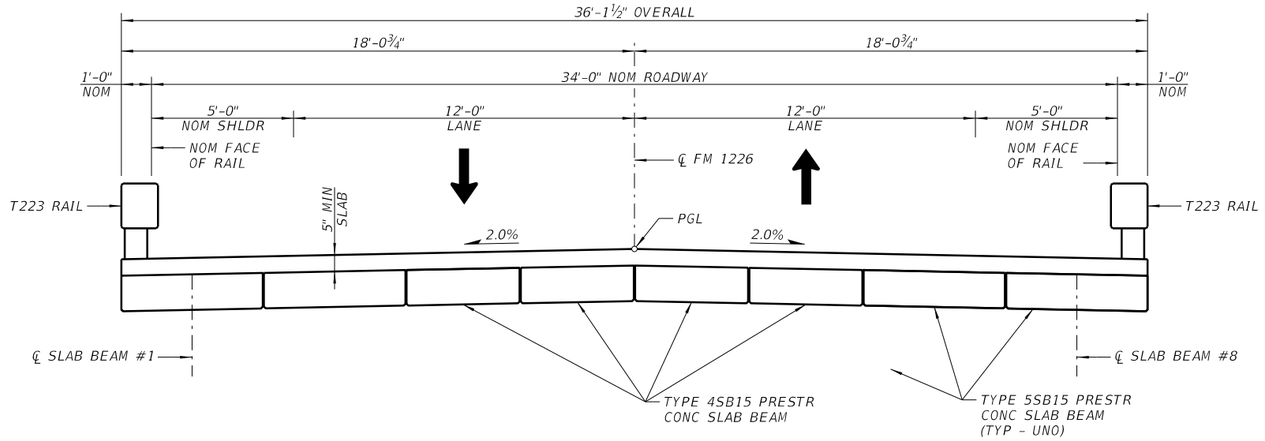

TYPICAL TRANSVERSE SECTION

HL93 LOADING

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED PROFESSIONAL ENGINEER
5/11/23

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AT CALIFORNIA CREEK

TYPICAL SECTION

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		48
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/11/2023 1:53:17 PM
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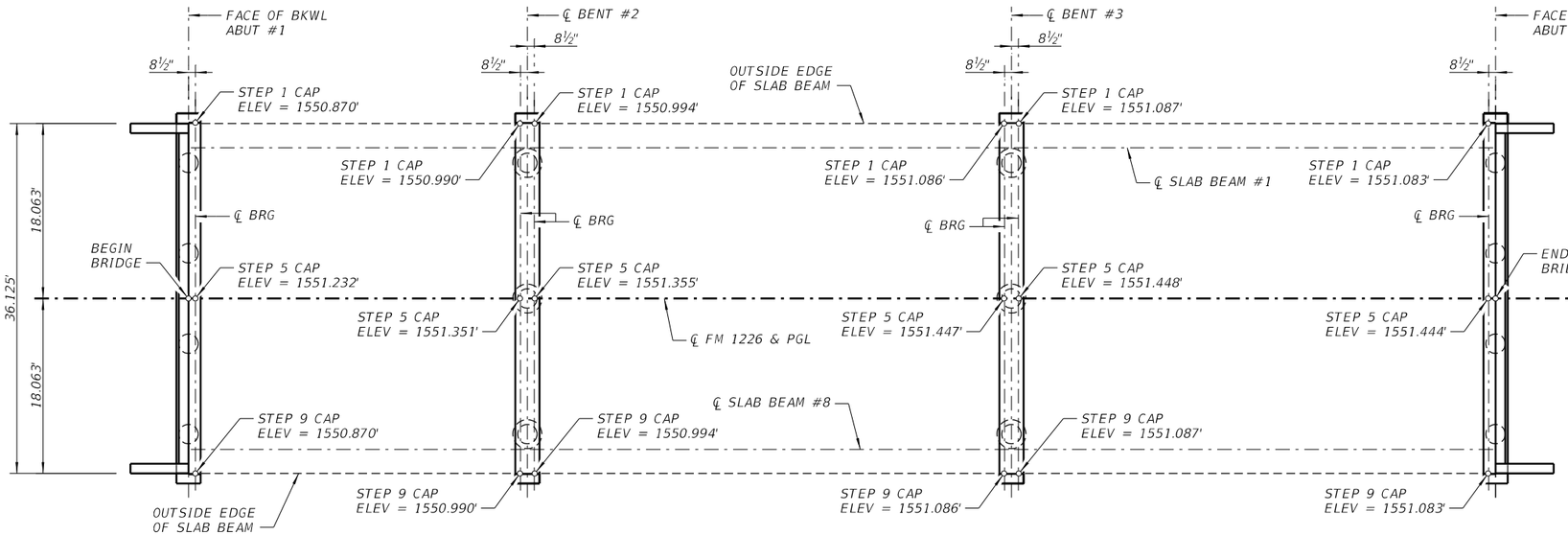
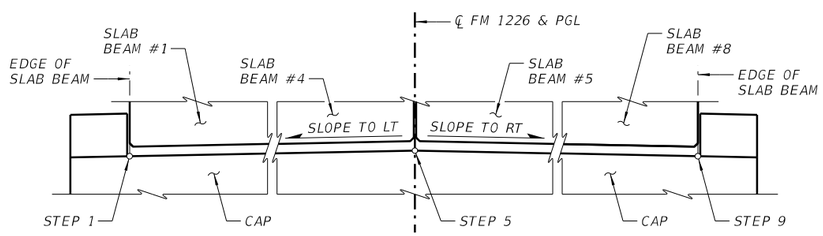
SUMMARY OF ESTIMATED QUANTITIES

BID CODES	400	416	416	420	420	420	422	422	425	425	427	432	450	454
BRIDGE ELEMENT \ BID ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (24 IN)	DRILL SHAFT (36 IN)	CL C CONC (ABUT)(HPC)	CL C CONC (CAP)(HPC) (2)	CL C CONC (COLUMN)(HPC)	REINF CONC SLAB (SLAB BEAM) (HPC)	APPROACH SLAB (HPC)	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	SILICONE RESIN PAINT FINISH (1)	RIPRAP (STONE PROTECTION) (12 IN)	RAIL (TY T223) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	CY	LF	LF	CY	CY	CY	SF	CY	LF	LF	SF	CY	LF	LF
2 - ABUTMENTS	34	360		24.0				54.8			218	661	24.0	72
2 - INTERIOR BENTS			210		18.0	6.4					494			
1 - 135.00' PRESTR CONC SLAB BEAM UNIT							4,879		534.00	534.00			270.0	
TOTAL	34	360	210	24.0	18.0	6.4	4,879	54.8	534.00	534.00	712	661	294.0	72



PLAN OF CAP ELEVATIONS



COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS

(LOOKING FORWARD STATION)

(1) SEE "CONCRETE WATERPROOFING DETAILS" SHEET FOR MORE INFORMATION.

(2) PRECAST INTERIOR BENT CAPS, PER STANDARD PBC-RC, WILL BE REQUIRED. AT THE CONTRACTOR'S OPTION, PRESTRESSED PRECAST BENT CAPS, PER STANDARD PPBC-RC, MAY BE USED AT THE CONTRACTOR'S EXPENSE.

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED PROFESSIONAL ENGINEER
Alvaro J. Lopez
5/11/23

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FM 1226
AT CALIFORNIA CREEK

ESTIMATED QUANTITIES AND CAP ELEVATIONS

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		49
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/11/2023 1:53:21 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/FM1226_BRIDGE_S103_EQ

DRILLING LOG

WinCore Version 3.1

County	Jones	Hole	BR-1	District	Abilene
Highway	FM1226 at California Creek	Structure	Bridge	Date	02/23/23
CSJ	1360-01-030	Station	220+40.48	Grnd. Elev.	1547.76 ft
		Offset	29.66' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Lean, soft to stiff, moist, reddish brown, dark brown and gray, w/ gravel at 0'-2', ferrous stains at 2'-5' and 10'-15' (CL)			21	37	20		% Passing #200 Sieve: 89.5
5		14 (6) 26 (6)				14	41	24		% Passing #200 Sieve: 91.1
10		15 (6) 23 (6)				16	42	23		% Passing #200 Sieve: 96.4
15		8 (6) 10 (6)				20	39	23		% Passing #200 Sieve: 85.4
1531.8			CLAY, Lean w/ Sand, very stiff, moist, reddish brown, w/ ferrous stains and calcareous nodules at 16'-20' and gravel at 23'-25' (CL)							
20		16 (6) 28 (6)				12	31	16		% Passing #200 Sieve: 79.1
25		38 (6) 41 (6)								25ft-30ft: REC:44.5%, RQD:41%
1522.3			MUDSTONE, very hard, dry to moist, reddish brown, angle fractures at 42' 10", 46' 7", 47', 47' 7", 48' and 77' 11"	130.1		7		149		
30		50 (0.5) 50 (0)								30ft-35ft: REC:55%, RQD:53%
35		50 (0) 50 (0)		126.9		14		140		35ft-40ft: REC:43%, RQD:27%
40		50 (1) 50 (1)								40ft-45ft: REC:55%, RQD:41.5%
45		50 (0.5) 50 (0)		120.6		13		138		45ft-50ft: REC:57.5%, RQD:21%
50		50 (1) 50 (0.5)								50ft-55ft: REC:57.5%, RQD:57%

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotary was initiated at 25'. (Longitude, Latitude) (99°47'58.60"W, 32°53'7.50"N)

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

Driller: Cris **Logger:** BK **Organization:** HVJ Associates, Inc.

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DRILLING LOG

WinCore Version 3.1

County	Jones	Hole	BR-1	District	Abilene
Highway	FM1226 at California Creek	Structure	Bridge	Date	02/23/23
CSJ	1360-01-030	Station	220+40.48	Grnd. Elev.	1547.76 ft
		Offset	29.66' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			MUDSTONE, very hard, dry to moist, reddish brown, angle fractures at 42' 10", 46' 7", 47', 47' 7", 48' and 77' 11"	1073.6		9		142		55ft-60ft: REC:58.5%, RQD:42%
55		50 (0.3) 50 (0)								
60		50 (0.5) 50 (0)		128.9		8		149		60ft-65ft: REC:58%, RQD:42%
65		50 (0.5) 50 (0)								65ft-70ft: REC:53%, RQD:28%
70		50 (0.5) 50 (0)								70ft-75ft: REC:52%, RQD:27%
75		50 (0.5) 50 (0)				9				75ft-80ft: REC:58%, RQD:44.5%
80		50 (0.5) 50 (0)								80ft-85ft: REC:44%, RQD:10.5%
85		50 (0.5) 50 (0.5)								85ft-90ft: REC:58%, RQD:55.5%
1457.8		50 (0.5) 50 (0)								
90										

Remarks: Water level was not encountered below the existing grade during drilling operations. Wet rotary was initiated at 25'. (Longitude, Latitude) (99°47'58.60"W, 32°53'7.50"N)

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

Driller: Cris **Logger:** BK **Organization:** HVJ Associates, Inc.

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STATE OF TEXAS
ARTHUR ARANDA II
128894
LICENSED
PROFESSIONAL ENGINEER

05/05/2023

HVJ ASSOCIATES
1700 E. Yandell Dr.
El Paso, TX 79902
(915) 249-6121
Firm Reg. #: F-000646

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

TEST HOLE PROFILES

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		50
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/5/2023 5:22:33 PM
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DRILLING LOG

WinCore Version 3.1	County	Jones	Hole	BR-2	District	Abilene
	Highway	FM1226 at California Creek	Structure	Bridge	Date	02/22/23
	CSJ	1360-01-030	Station	222+05.75	Grnd. Elev.	1549.33 ft
			Offset	40.74' RT	GW Elev.	1532.33 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Lean, soft to stiff, moist, reddish brown and brown, w/ roots at 0'-2' (CL)			10	25	9		% Passing #200 Sieve: 93.5
5		13 (6) 12 (6)				7	26	12		% Passing #200 Sieve: 89.1
10		5 (6) 5 (6)								
1534.8		5 (6) 6 (6)								
15			SAND, Poorly Graded w/ silt, loose, moist, reddish brown, w/ gravel at 16'-22' (SP-SM)			18	0	0		% Passing #200 Sieve: 10.1
20		7 (6) 7 (6)								
1527.3			CLAY, Lean, stiff to hard, moist, reddish brown, w/ gravel at 22'-25' and clayey silt at 32'-35' (CL)			29	15			
25		50 (5.5) 50 (2.3)								
30		12 (6) 13 (6)				13	42	25		% Passing #200 Sieve: 96.2
1513.8		50 (5) 50 (3)				18	36	16		% Passing #200 Sieve: 81.0
35			MUDSTONE, hard to very hard, dry to moist, reddish brown, angle fracture at 39' 2", horizontal fractures at 50'-55'							35ft-40ft: REC:33%, RQD:11%
40		50 (0) 50 (0)			266.7	15			143	40ft-45ft: REC:35%, RQD:0%
45		50 (0.5) 50 (0)								45ft-50ft: REC:21%, RQD:0%
50		50 (2) 50 (2.3)				8				50ft-55ft: REC:44%, RQD:0%

Remarks: Water level was encountered at 17' below the existing grade during drilling operations; at 12' after 5 minutes and 10 minutes. (Longitude, Latitude) (99°47'59.44"W, 32°53'5.87"N)

Driller: Cris Logger: BK Organization: HVJ Associates, Inc.

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DRILLING LOG

WinCore Version 3.1	County	Jones	Hole	BR-2	District	Abilene
	Highway	FM1226 at California Creek	Structure	Bridge	Date	02/22/23
	CSJ	1360-01-030	Station	222+05.75	Grnd. Elev.	1549.33 ft
			Offset	40.74' RT	GW Elev.	1532.33 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			MUDSTONE, hard to very hard, dry to moist, reddish brown, angle fracture at 39' 2", horizontal fractures at 50'-55'			8				
55		50 (1) 50 (0)								55ft-60ft: REC:52%, RQD:36%
60		50 (1) 50 (1)			423	10			146	60ft-65ft: REC:58%, RQD:55.5%
65		50 (0.5) 50 (0)			360.2	9			149	65ft-70ft: REC:55%, RQD:51.5%
70		50 (1) 50 (0)			802	8			150	70ft-75ft: REC:59%, RQD:18.5%
75		50 (0.5) 50 (0)								75ft-80ft: REC:58%, RQD:43%
1469.3 80		50 (1) 50 (0)	LIMESTONE, very hard, moist, white, angle fracture at 86'		1382.4	8			148	80ft-85ft: REC:54%, RQD:28%
85		50 (0) 50 (0.3)								85ft-90ft: REC:58%, RQD:38%
1459.3 90		50 (0) 50 (0)								

Remarks: Water level was encountered at 17' below the existing grade during drilling operations; at 12' after 5 minutes and 10 minutes. (Longitude, Latitude) (99°47'59.44"W, 32°53'5.87"N)

Driller: Cris Logger: BK Organization: HVJ Associates, Inc.

g:\midland\active projects\geo\gint logs\mg2010066.1.6.gpj

STATE OF TEXAS
ARTHUR ARANDA II
128894
LICENSED
PROFESSIONAL ENGINEER

05/05/2023

HVJ ASSOCIATES
1700 E. Yandell Dr.
El Paso, TX 79902
(915) 249-6121
Firm Reg. #: F-000646

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

TEST HOLE PROFILES

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		51
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/5/2023 5:22:46 PM
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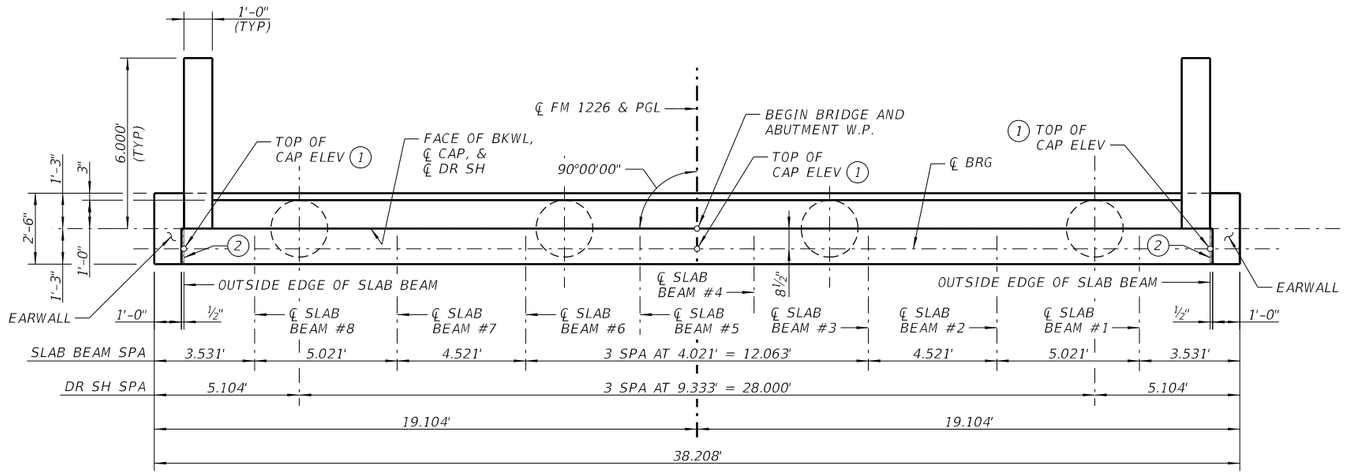
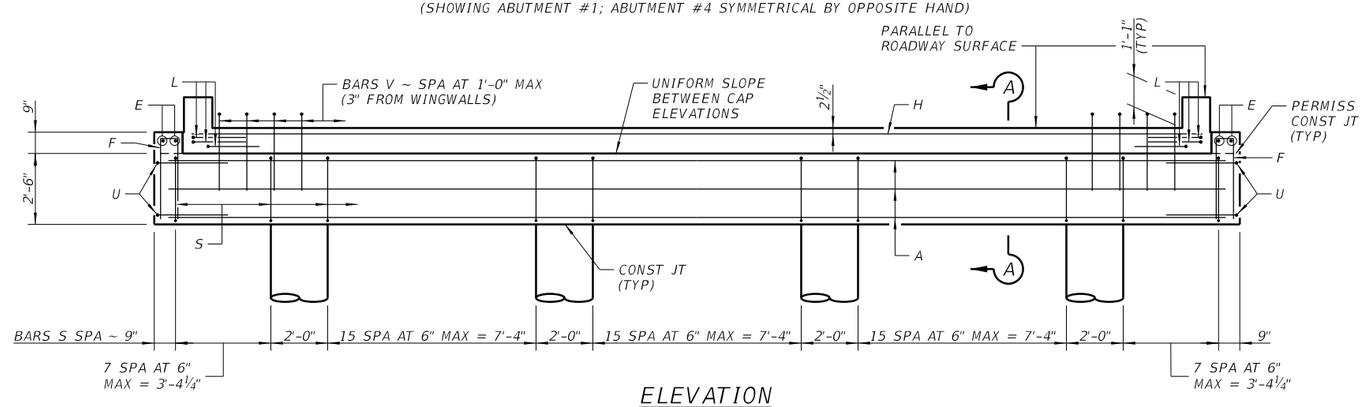


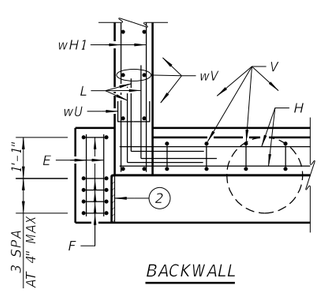
PLAN

(LOOKING BACK STATION)
(SHOWING ABUTMENT #1; ABUTMENT #4 SYMMETRICAL BY OPPOSITE HAND)

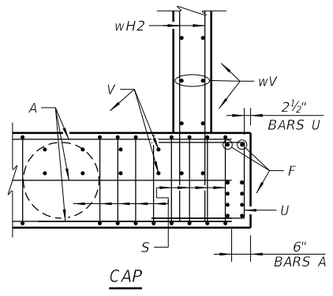


ELEVATION

(LOOKING BACK STATION)
(SHOWING ABUTMENT #1; ABUTMENT #4 SYMMETRICAL BY OPPOSITE HAND)



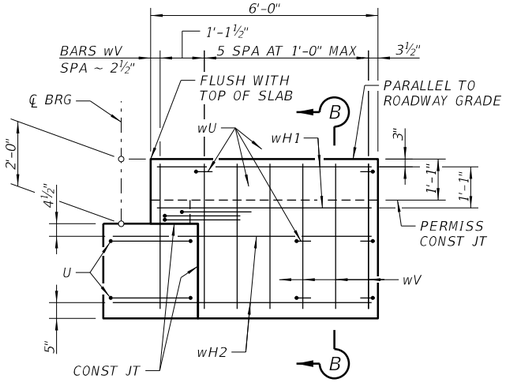
BACKWALL



CAP

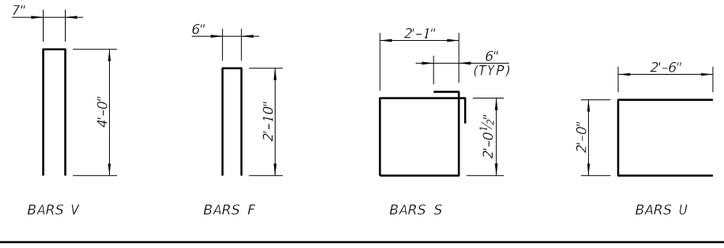
CORNER DETAILS

(DRILLED SHAFT REBAR NOT SHOWN FOR CLARITY)

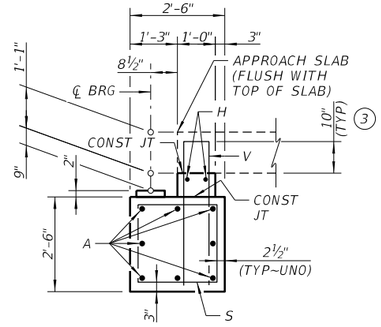


WINGWALL ELEVATION

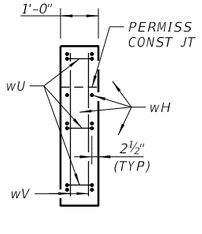
(EARWALL NOT SHOWN FOR CLARITY)



BARS V | BARS F | BARS S | BARS U | BARS L | BARS wU



SECTION A-A



SECTION B-B

TABLE OF ESTIMATED QUANTITIES - ONE ABUTMENT				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	8	#11	37'-2"	1,580
E	4	#4	2'-1"	6
F	10	#4	6'-2"	41
H	2	#6	35'-8"	107
L	6	#6	4'-0"	36
S	64	#5	9'-3"	617
U	4	#6	7'-0"	42
V	35	#5	8'-7"	313
wH1	8	#6	5'-7"	67
wH2	8	#6	6'-10"	82
wU	12	#4	1'-7"	13
wV	28	#5	3'-9"	110
REINFORCING STEEL			LB	3,014
CL C CONC (ABUT)(HPC)			CY	12.0
(4) SILICONE RESIN PAINT FINISH			SF	109

(1) SEE "ESTIMATED QUANTITIES AND CAP ELEVATIONS" SHEET FOR CAP ELEVATIONS.

(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP.

(3) INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.

(4) SEE "CONCRETE WATERPROOFING DETAILS" SHEET FOR MORE INFORMATION.

HL93 LOADING

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED
PROFESSIONAL ENGINEER
5/11/23

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Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

ABUTMENT #1 OR #4

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		52
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).

SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.

SEE FD STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.

SEE SRR STANDARD FOR RIPRAP ATTACHMENT DETAILS.

SEE TYPE T223 STANDARD FOR RAIL ANCHORAGE IN WINGWALLS.

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

CALCULATED DRILLED SHAFT FOUNDATION LOAD:
ABUTMENT 1: 55 TONS/DR SH
ABUTMENT 4: 67 TONS/DR SH

MATERIAL NOTES:

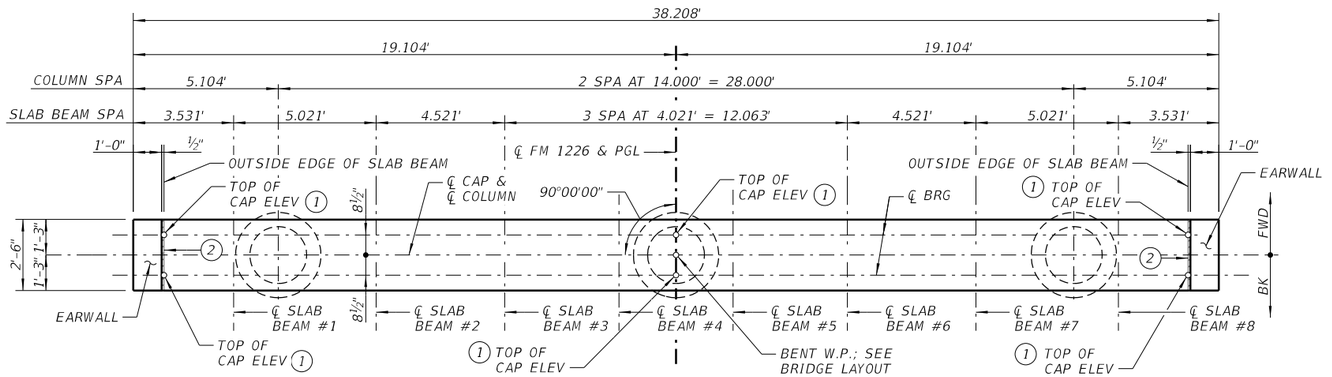
PROVIDE CLASS "C" (HPC) CONCRETE (f'c = 3,600 PSI).

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.

LEGEND:

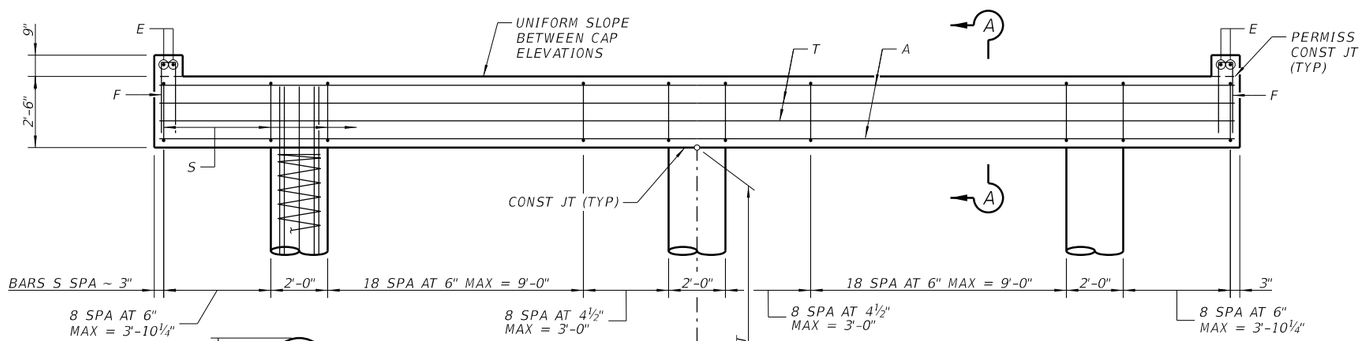
UNO - UNLESS NOTED OTHERWISE

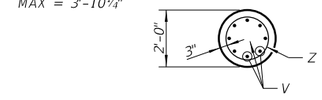
DATE: 5/11/2023 1:53:46 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/FM1226_BRIDGE_S201_AB

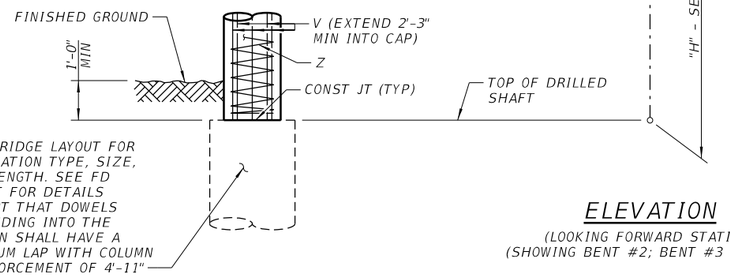


PLAN

(LOOKING FORWARD STATION)
(SHOWING BENT #2; BENT #3 SIMILAR)

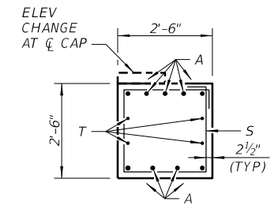




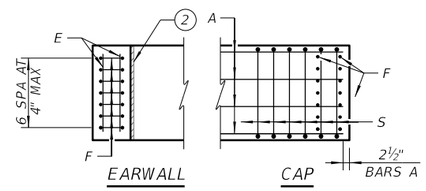


ELEVATION

(LOOKING FORWARD STATION)
(SHOWING BENT #2; BENT #3 SIMILAR)



SECTION A-A



CAP END DETAIL

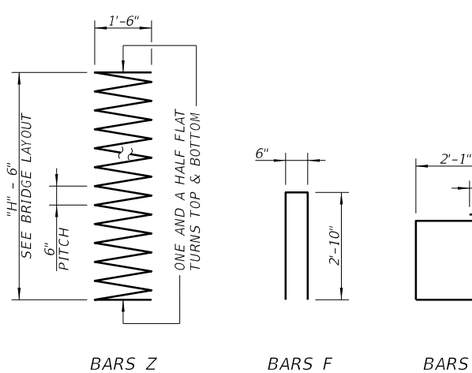


TABLE OF ESTIMATED QUANTITIES - ONE CAP

BAR	NO.	SIZE	LENGTH	WEIGHT
A	9	#11	37'-9"	1,805
E	4	#4	2'-1"	6
F	14	#4	6'-2"	58
S	72	#5	9'-4"	701
T	4	#5	37'-9"	157
REINFORCING STEEL			LB	2,727
CL C CONC (CAP)(HPC)			CY	9.0
(4) SILICONE RESIN PAINT FINISH			SF	247

TABLE OF COLUMN QUANTITIES (3)

BENT	"H"	BARS V 24 ~ #7		BARS Z 3 ~ #3		REINF STEEL	CL C CONC (COLUMN)(HPC)
-	HEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	9'	11'-3"	552	94'-8"	107	659	3.2
3	9'	11'-3"	552	94'-8"	107	659	3.2

(1) SEE "ESTIMATED QUANTITIES AND CAP ELEVATIONS" SHEET FOR CAP ELEVATIONS.

(2) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP.

(3) FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 9'-6"
REINFORCING STEEL, 60 LB
CLASS C CONC (COLUMN) (HPC), 0.35 CY

(4) SEE "CONCRETE WATERPROOFING DETAILS" SHEET FOR MORE INFORMATION.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).

SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.

SEE FD STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.

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

PRECAST INTERIOR BENT CAPS, PER STANDARD PBC-RC, WILL BE REQUIRED. AT THE CONTRACTOR'S OPTION, PRESTRESSED PRECAST BENTS CAPS, PER STANDARD PPBC-RC MAY BE USED AT THE CONTRACTOR'S EXPENSE.

CALCULATED DRILLED SHAFT FOUNDATION LOAD:
BENT 2: 112 TONS/DR SH
BENT 3: 128 TONS/DR SH

MATERIAL NOTES:

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

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.

HL93 LOADING

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

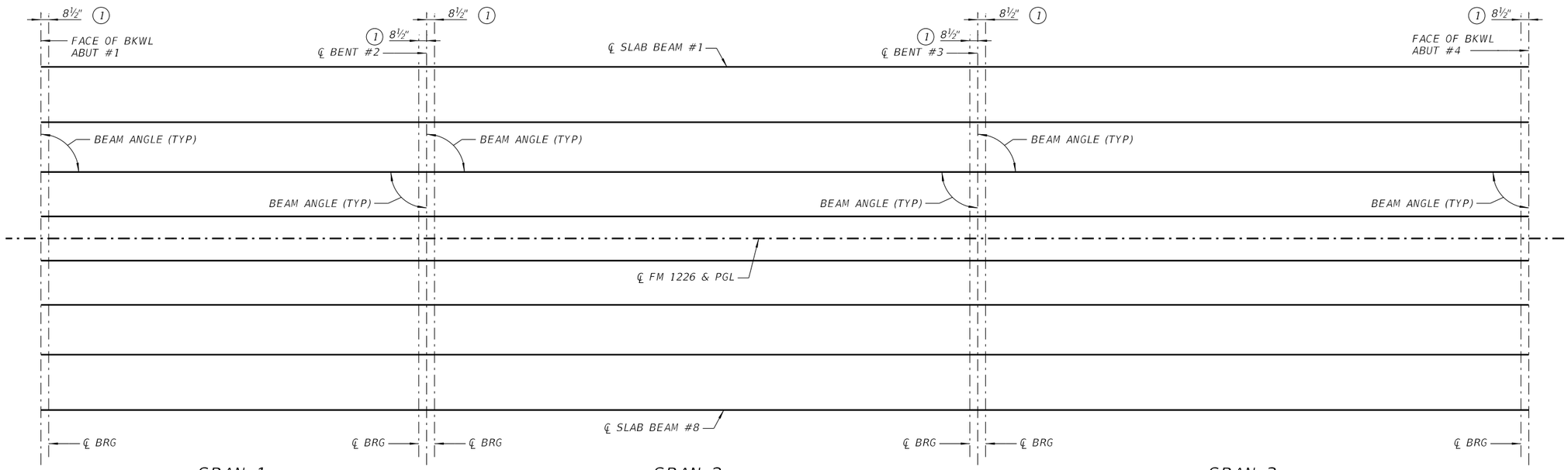
2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

INTERIOR BENTS #2 - #3

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		53
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226



SPAN 1
(4SB15 AND 5SB15)

SPAN 2
(4SB15 AND 5SB15)

SPAN 3
(4SB15 AND 5SB15)

FRAMING PLAN

(1) SEE PSBEB STANDARD FOR ORIENTATION OF DIMENSIONS.

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

HL93 LOADING

BENT REPORT

ABUT #1 (N 88 51 43.16 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1 15.5729 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			

BENT #2 (N 88 51 43.16 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1 15.5729 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			
SPAN 2	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			

BENT #3 (N 88 51 43.16 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1 15.5729 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			
SPAN 3	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			

ABUT #4 (N 88 51 43.16 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1 15.5729 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.0000	90	00	00.00
	BEAM	2	5.0208	90	00	00.00
	BEAM	3	4.5208	90	00	00.00
	BEAM	4	4.0208	90	00	00.00
	BEAM	5	4.0208	90	00	00.00
	BEAM	6	4.0208	90	00	00.00
	BEAM	7	4.5208	90	00	00.00
	BEAM	8	5.0208	90	00	00.00
	TOTAL		31.1456			

BEAM REPORT

BEAM REPORT, SPAN 1

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	35.0000	33.5833	34.5002	0.00356
BEAM	2	35.0000	33.5833	34.5002	0.00356
BEAM	3	35.0000	33.5833	34.5002	0.00356
BEAM	4	35.0000	33.5833	34.5002	0.00356
BEAM	5	35.0000	33.5833	34.5002	0.00356
BEAM	6	35.0000	33.5833	34.5002	0.00356
BEAM	7	35.0000	33.5833	34.5002	0.00356
BEAM	8	35.0000	33.5833	34.5002	0.00356

BEAM REPORT, SPAN 2

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	50.0000	48.5833	49.5001	0.00189
BEAM	2	50.0000	48.5833	49.5001	0.00189
BEAM	3	50.0000	48.5833	49.5001	0.00189
BEAM	4	50.0000	48.5833	49.5001	0.00189
BEAM	5	50.0000	48.5833	49.5001	0.00189
BEAM	6	50.0000	48.5833	49.5001	0.00189
BEAM	7	50.0000	48.5833	49.5001	0.00189
BEAM	8	50.0000	48.5833	49.5001	0.00189

BEAM REPORT, SPAN 3

		HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	50.0000	48.5833	49.5000	-0.00009
BEAM	2	50.0000	48.5833	49.5000	-0.00009
BEAM	3	50.0000	48.5833	49.5000	-0.00009
BEAM	4	50.0000	48.5833	49.5000	-0.00009
BEAM	5	50.0000	48.5833	49.5000	-0.00009
BEAM	6	50.0000	48.5833	49.5000	-0.00009
BEAM	7	50.0000	48.5833	49.5000	-0.00009
BEAM	8	50.0000	48.5833	49.5000	-0.00009

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED
PROFESSIONAL ENGINEER

5/11/23

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(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

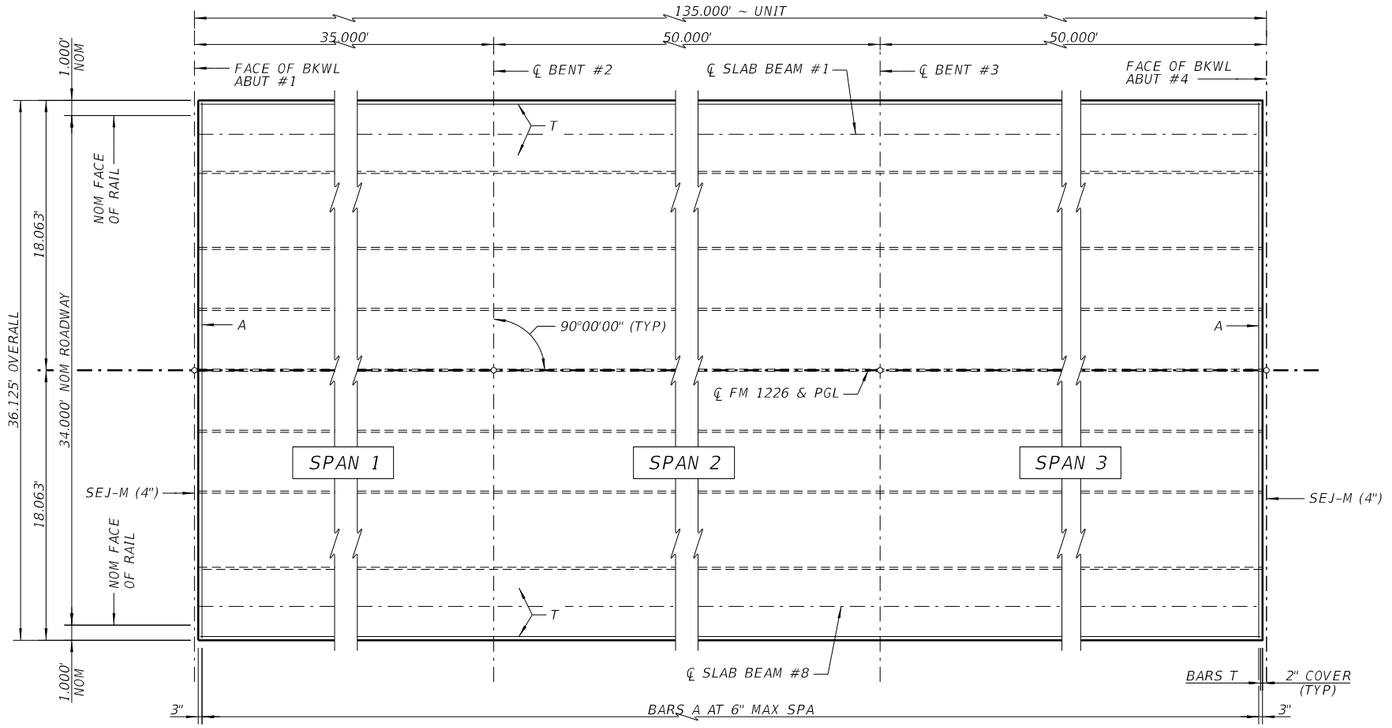
FRAMING PLAN (SPANS 1-3)

SHEET 1 OF 1

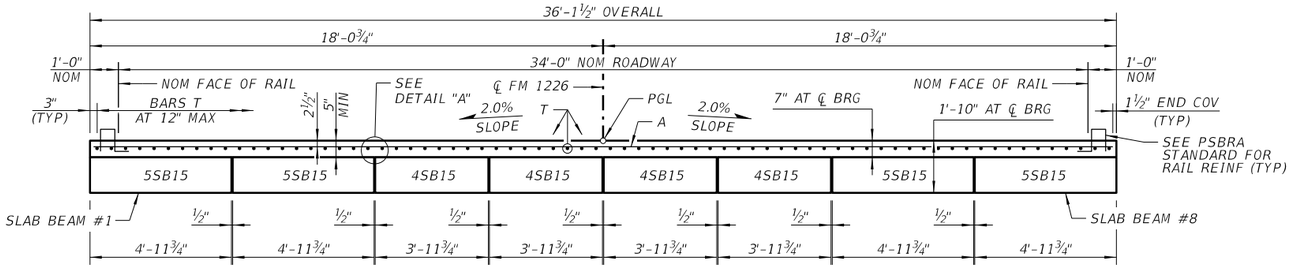
FED. RD. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.
6	(SEE TITLE SHEET)	54

STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

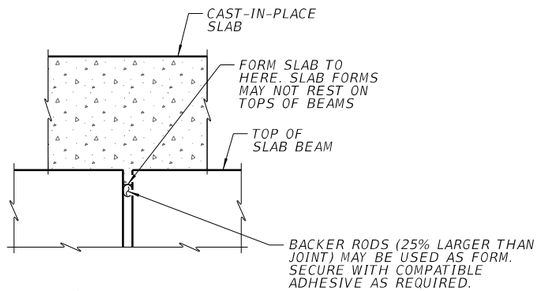
DATE: 5/11/2023 1:53:55 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/FM1226_BRIDGE_5301_SF



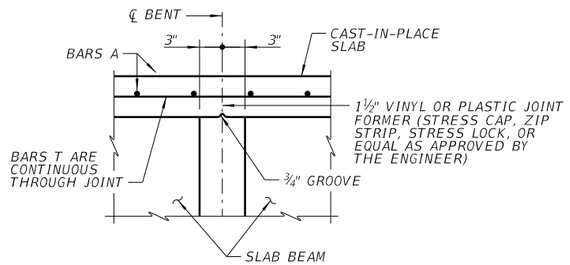
PLAN



TYPICAL TRANSVERSE SECTION



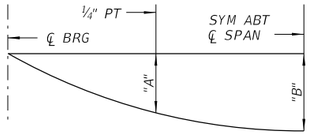
DETAIL "A"



CONTINUOUS SLAB DETAIL

TABLE OF DEAD LOAD DEFLECTIONS

SPAN	BEAM	"A"	"B"
		FT	FT
1	ALL	0.006	0.009
2-3	1-2	0.027	0.039
	3-6	0.028	0.039
	7-8	0.027	0.039



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (EC = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD VERIFICATION.

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONC SLAB (SLAB BEAM) (HPC)	PRESTRESSED CONCRETE SLAB BEAMS (2)		REINF STEEL (1)
		(TY 4SB15)	(TY 5SB15)	
-	SF	LF	LF	LB
1	1,265	138.00	138.00	3,542
2	1,807	198.00	198.00	5,060
3	1,807	198.00	198.00	5,060
TOTAL	4,879	534.00	534.00	13,662

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).

SEE PSBRA AND TYPE T223 STANDARD FOR RAIL ANCHORAGE DETAILS.

SEE PSBEB STANDARD FOR GIRDER END DETAILS.

SEE SEJ-M STANDARD FOR EXPANSION JOINT DETAILS.

SEE BRIDGE LAYOUT FOR SURFACE TEXTURE REQUIREMENTS.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

(1) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

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

BAR TABLE

BAR	SIZE
A	#5
T	#4

MATERIAL NOTES:

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

PROVIDE GRADE 60 EPOXY COATED REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
EPOXY COATED ~ #4 = 2'-5"
~ #5 = 3'-0"

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

HL93 LOADING

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED PROFESSIONAL ENGINEER
5/11/23

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

135.00' PRESTR CONC SLAB BEAM UNIT (SPANS 1-3)

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		55
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

DATE: 5/11/2023 1:53:59 PM
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DATE: 5/11/2023 1:54:03 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/psbsts05-22.dgn

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
California Creek Bridge	1	3-6	4SB15		10	0.6	270	5.00	5.00	0	0.00	0	0	0	0	0	0	0	4.000	5.000
	1	1-2, 7-8	5SB15		10	0.6	270	5.00	5.00	0	0.00	0	0	0	0	0	0	0	4.000	5.000
	2-3	3-6	4SB15		20	0.6	270	5.00	5.00	6	2.50	20	6	4	2	0	0	0	4.000	5.000
	2-3	1-2, 7-8	5SB15		24	0.6	270	5.00	5.00	8	2.50	24	8	4	4	0	0	0	4.000	5.000

OPTIONAL DESIGN

DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR ②: Moment	LIVE LOAD DISTRIBUTION FACTOR ②: Shear
1.456	-1.733	586	0.367	0.367
1.424	-1.678	698	0.431	0.431
2.758	-3.232	1043	0.362	0.362
2.702	-3.135	1245	0.425	0.425

LOAD RATING FACTORS

STRENGTH I: Inv	STRENGTH I: Opr	SERVICE III: Inv
1.43	1.85	1.44
1.17	1.51	1.09
1.26	1.64	1.12
1.34	1.74	1.13

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

② Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

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

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

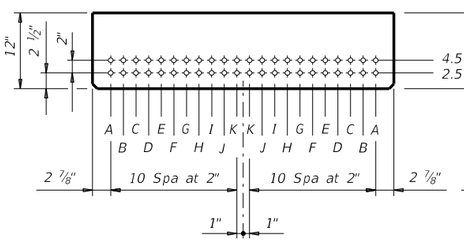
Strand debonding must comply with Item 424.4.2.2.2.4.

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

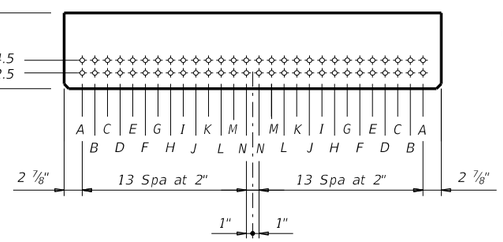
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

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

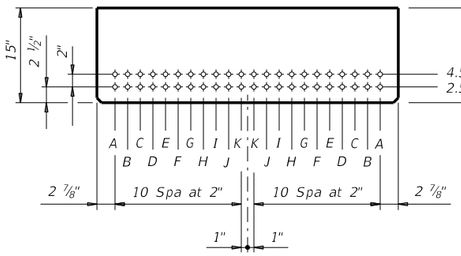
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



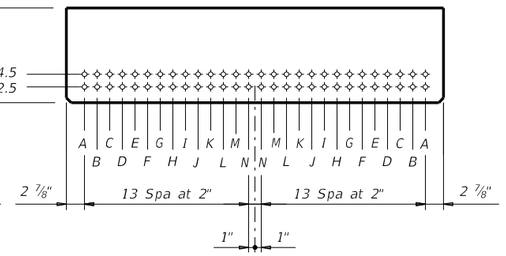
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

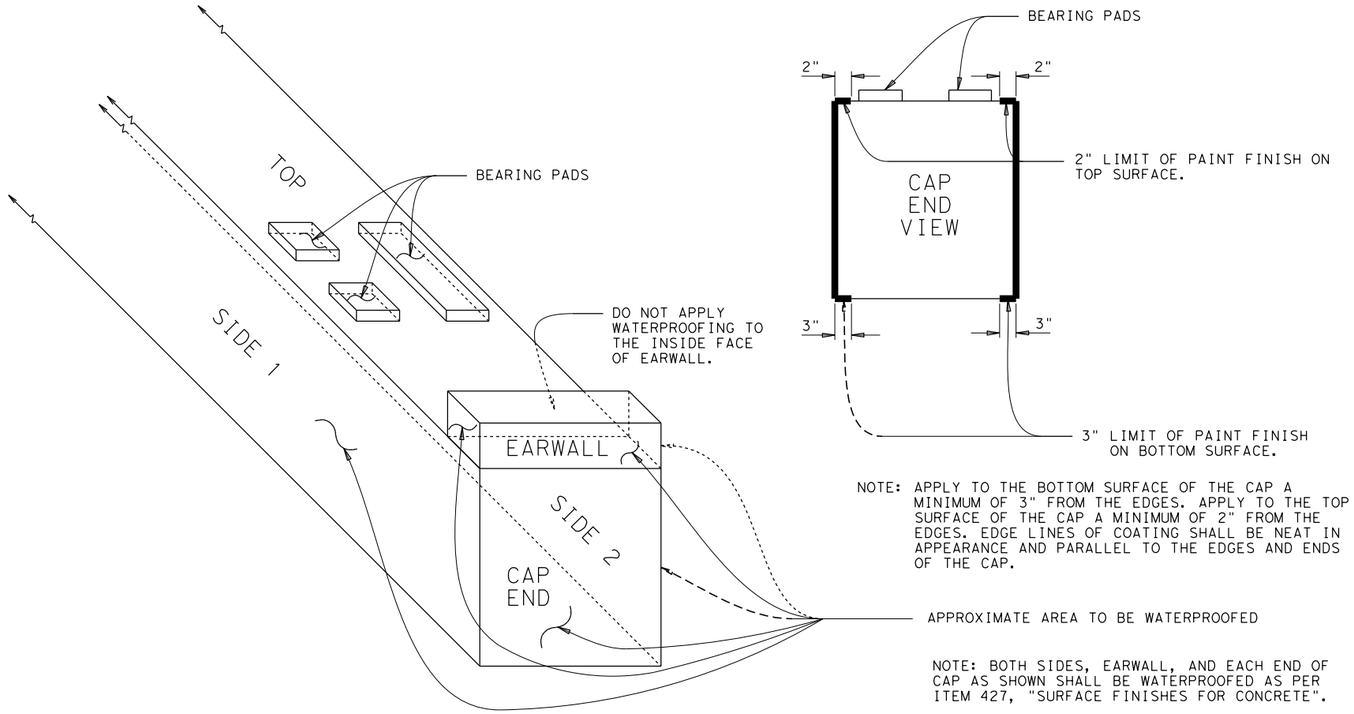
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DESIGNS (NON-STANDARD SPANS)

PSBND

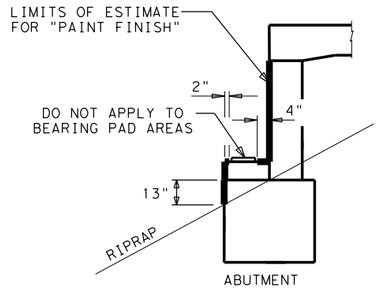
FILE: psbsts05-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
3-22: Added Load Rating.	DIST	COUNTY		SHEET NO.
	ABL	JONES		56



NOTE: BOTH SIDES, EARWALL, AND EACH END OF CAP AS SHOWN SHALL BE WATERPROOFED AS PER ITEM 427, "SURFACE FINISHES FOR CONCRETE".

NOTE: APPLY TO THE BOTTOM SURFACE OF THE CAP A MINIMUM OF 3" FROM THE EDGES. APPLY TO THE TOP SURFACE OF THE CAP A MINIMUM OF 2" FROM THE EDGES. EDGE LINES OF COATING SHALL BE NEAT IN APPEARANCE AND PARALLEL TO THE EDGES AND ENDS OF THE CAP.

TYPICAL WATERPROOFING DETAIL AT INTERIOR BENTS



NOTE: THE FACE OF BACKWALL AND THE TOP, FRONT, EARWALLS, AND ENDS OF THE CAP AS SHOWN SHALL BE WATERPROOFED AS PER ITEM 427, "SURFACE FINISHES FOR CONCRETE".

DO NO APPLY TO THE INSIDE FACE OF EARWALL

TYPICAL WATERPROOFING DETAIL AT ABUTMENTS

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED PROFESSIONAL ENGINEER
Alvaro J. Lopez
5/11/23

CONCRETE WATERPROOFING DETAILS
CWD-15

Texas Department of Transportation

NO SCALE

SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1226
STATE	COUNTY		SHEET NO.
TEXAS	JONES		57
DISTRICT	CONTROL	SECTION	JOB
ABL	1360	01	030

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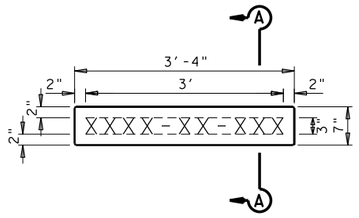
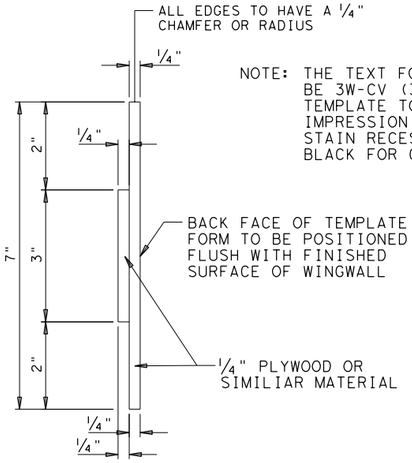
STRUCTURE ID TEMPLATES



NOTE: THE SYMBOLS XXXX-XX-XXX REPRESENT THE STRUCTURE NUMBER WHICH IS SHOWN IN THE TABLE TO THE RIGHT.

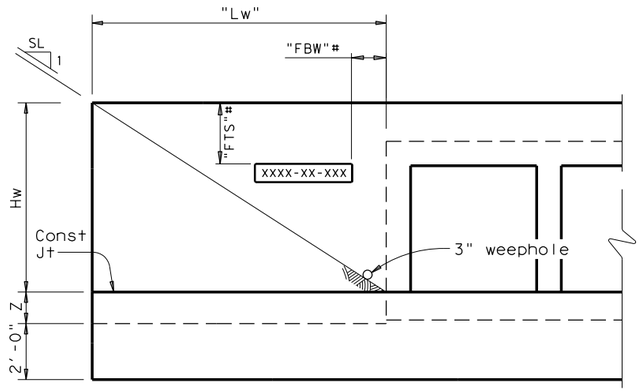
ALL CHARACTERS ARE REQUIRED, AND ARE TO BE FORMATTED EXACTLY AS SHOWN IN THE STRUCTURE NUMBER COLUMN TO THE RIGHT.

STRUCTURE ID TEMPLATE NUMBERS							
NBI NUMBER	LOCATION	STRUCTURE NUMBER	"WL"	"Lw"	"Hw"	"FBW"#	"FTS"#
08-128-0-1360-01-008	FM1226 OVER CALIFORNIA CREEK	1360-01-008	6'	NA	2'-0"	VARIOUS	VARIOUS

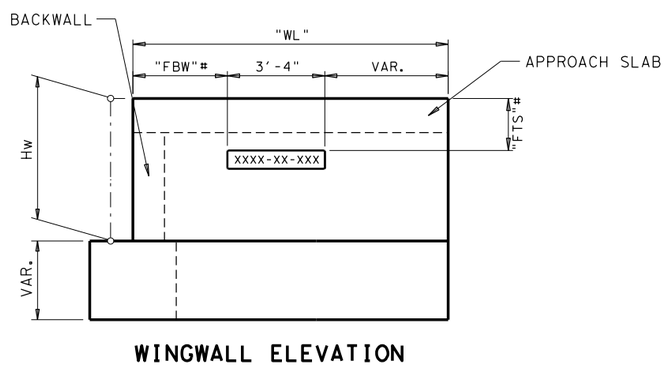


NOTE: THE TEXT FOR ALL TEMPLATES SHOULD BE 3W-CV (3") CLEAR VIEW FONT. TEMPLATE TO PROVIDE A RECESSED IMPRESSION INTO CAST CONCRETE. STAIN RECESSED NUMERAL SURFACES BLACK FOR CONTRAST.

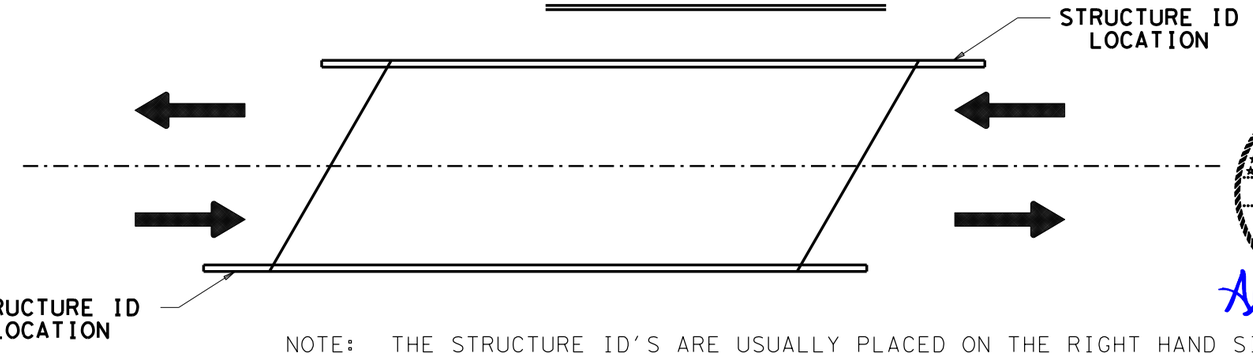
SECTION A-A



PARALLEL WING ELEVATION



WINGWALL ELEVATION



NOTE: THE STRUCTURE ID'S ARE USUALLY PLACED ON THE RIGHT HAND SIDE OF APPROACHES. THIS PLACES THE ID'S ON DIAGONAL CORNERS. THE STRUCTURE ID'S WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BRIDGE ITEMS.

FIELD LOCATE TO AVOID CONFLICT WITH REINFORCEMENT AND RIPRAP. THE ENGINEER SHALL APPROVE INSTALLATION LOCATION PRIOR TO PLACEMENT.

STATE OF TEXAS
ALVARO J. LOPEZ
102216
LICENSED PROFESSIONAL ENGINEER
Alvaro J Lopez
5/11/23

STRUCTURE ID DETAILS SIDD-14

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1226
STATE	COUNTY		SHEET NO.
TEXAS	JONES		58
DISTRICT	CONTROL	SECTION	JOB
ABL	1360	01	030

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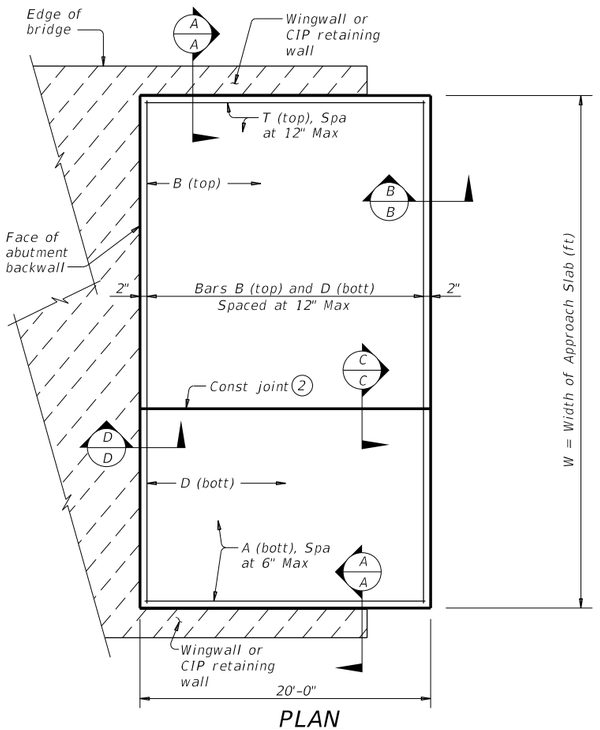
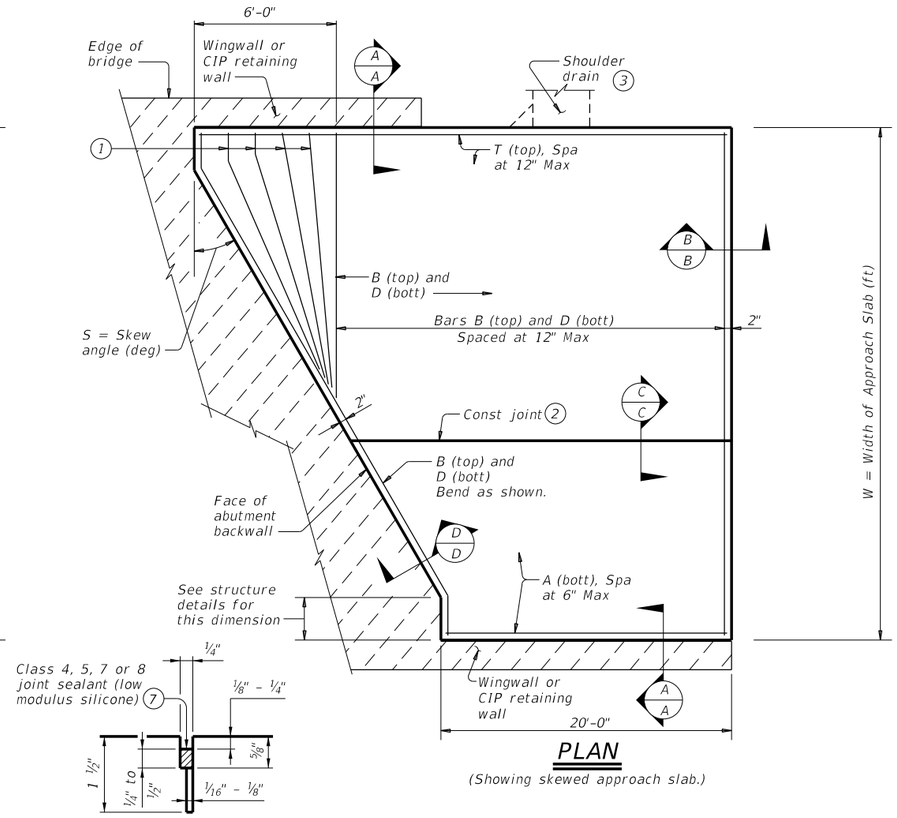


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

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

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

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

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

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

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

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

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

(7) Place in accordance with Item 438.

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

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

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

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

Provide Grade 60 reinforcing steel.

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

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

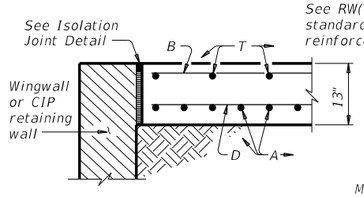
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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

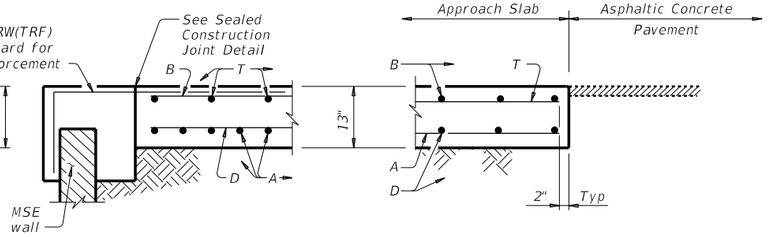
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

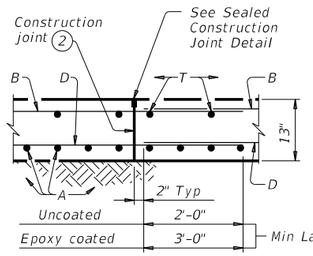
Cover dimensions are clear dimensions, unless noted otherwise.



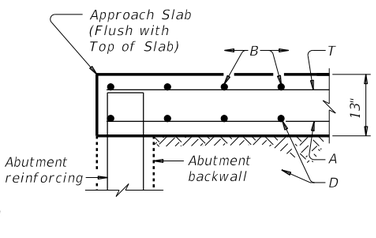
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL



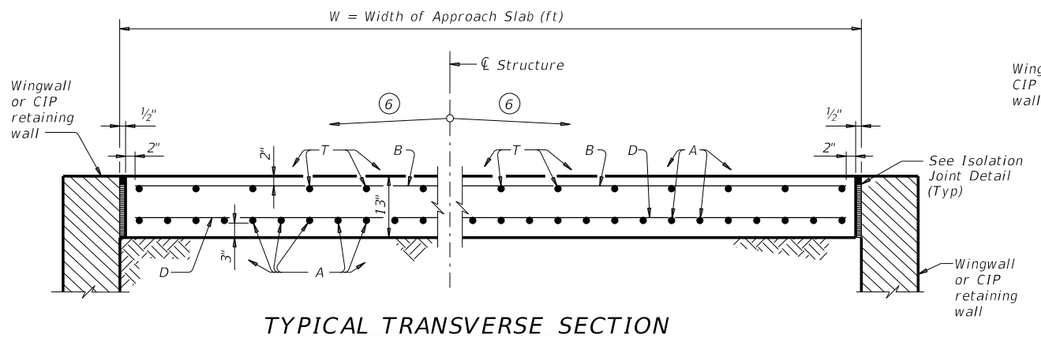
SECTION C-C (5)



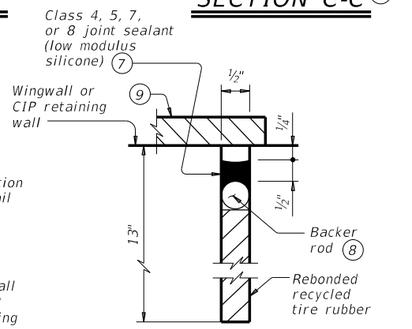
SECTION D-D

SECTION A-A

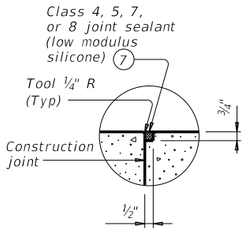
SECTION B-B



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	ABL	JONES		59

DATE: 5/11/2023 1:54:19 PM
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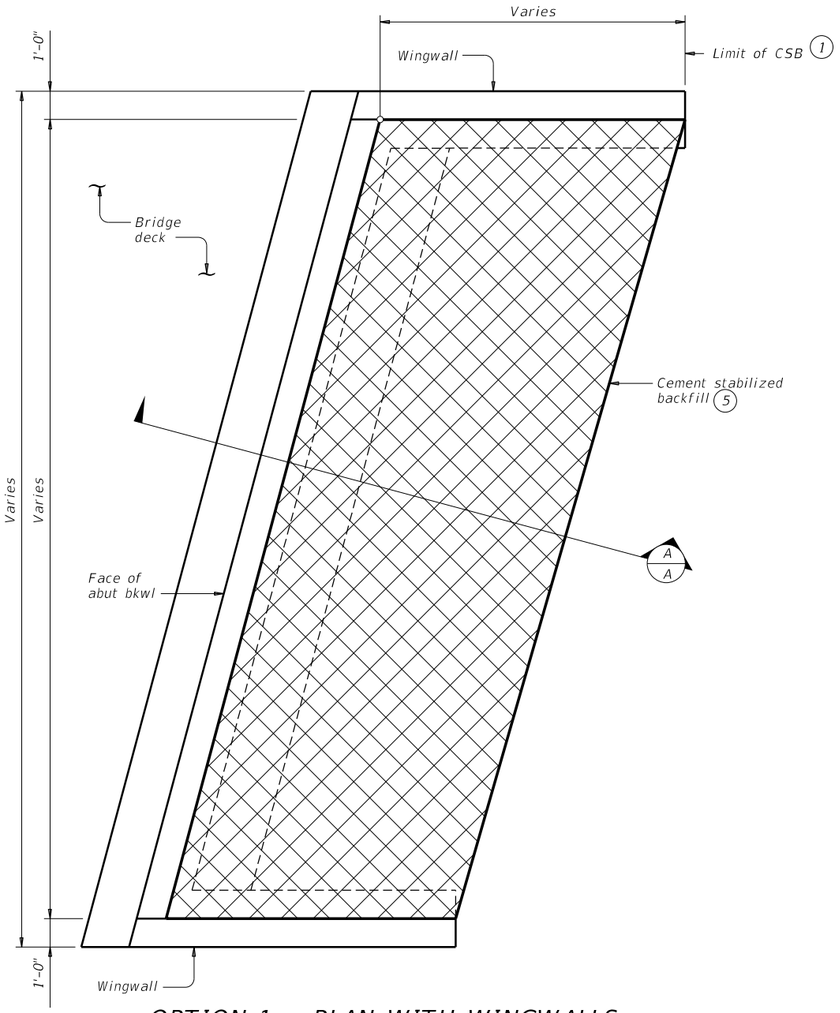
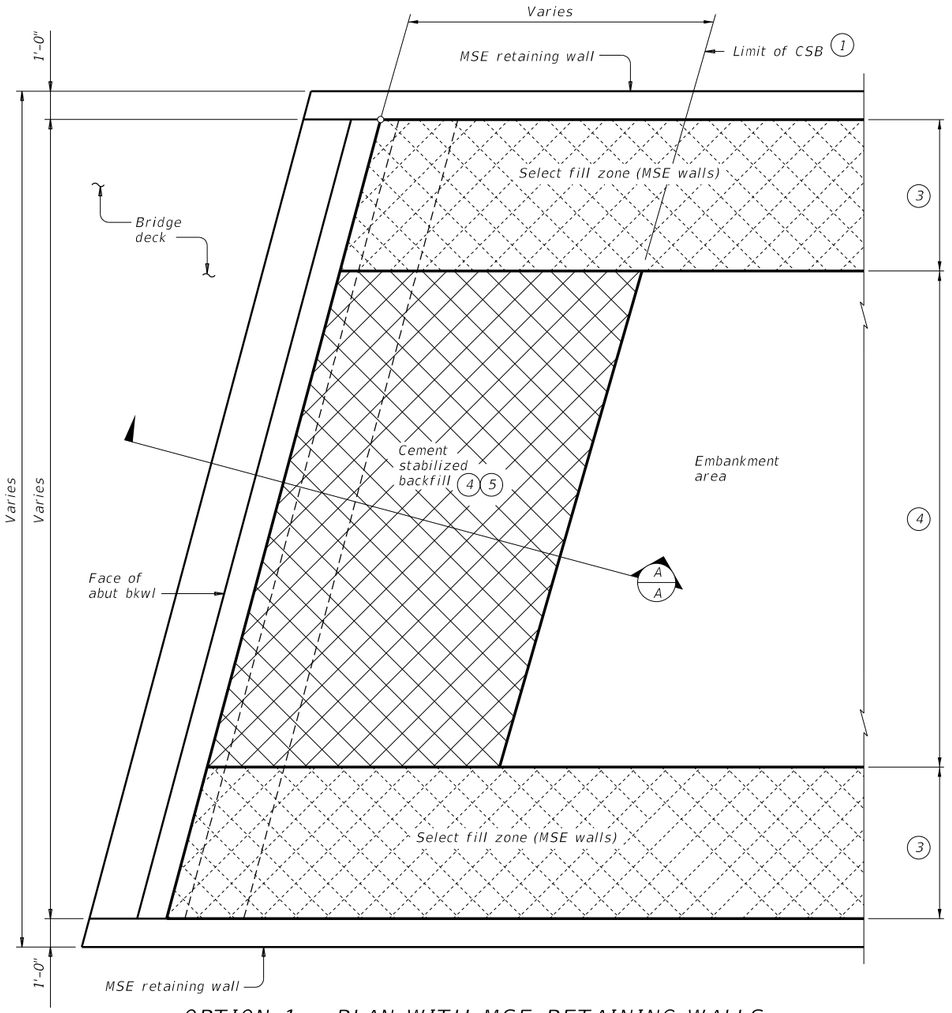


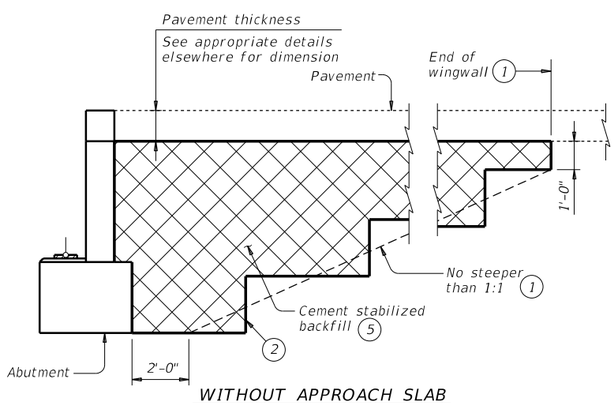
OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.

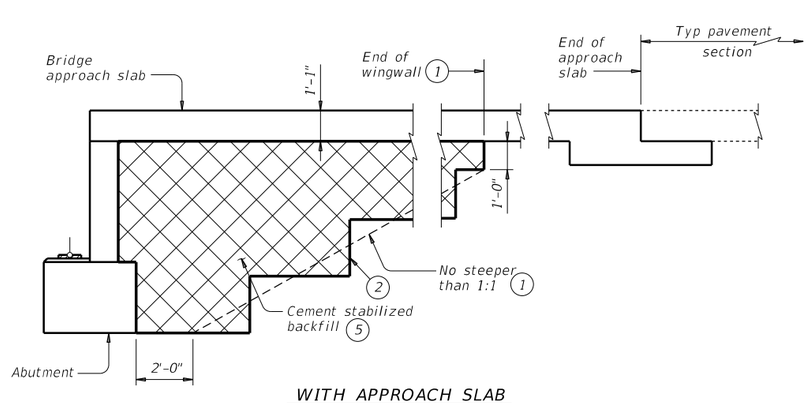


OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

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).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment fill with a PI greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays.

Construct abutment backfill in accordance with Item 400, "Excavation and Backfill for Structures".

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

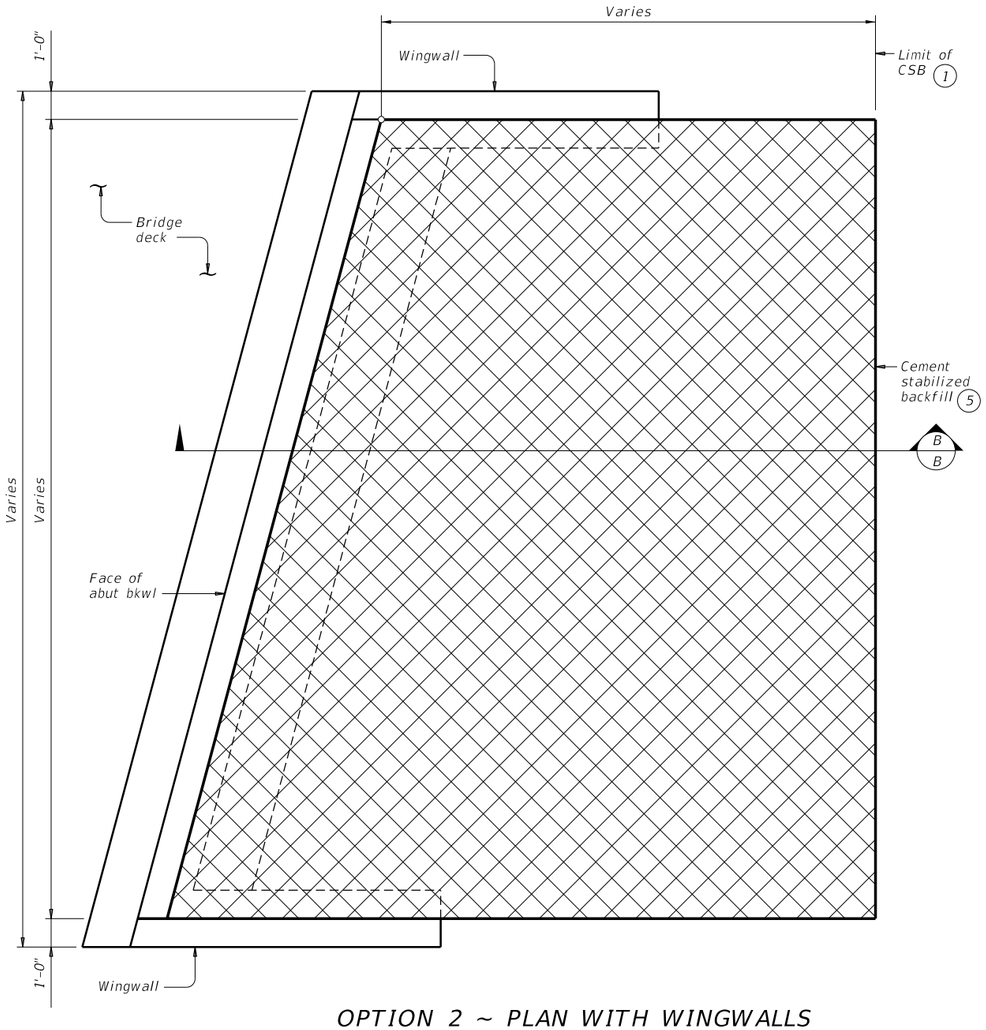
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

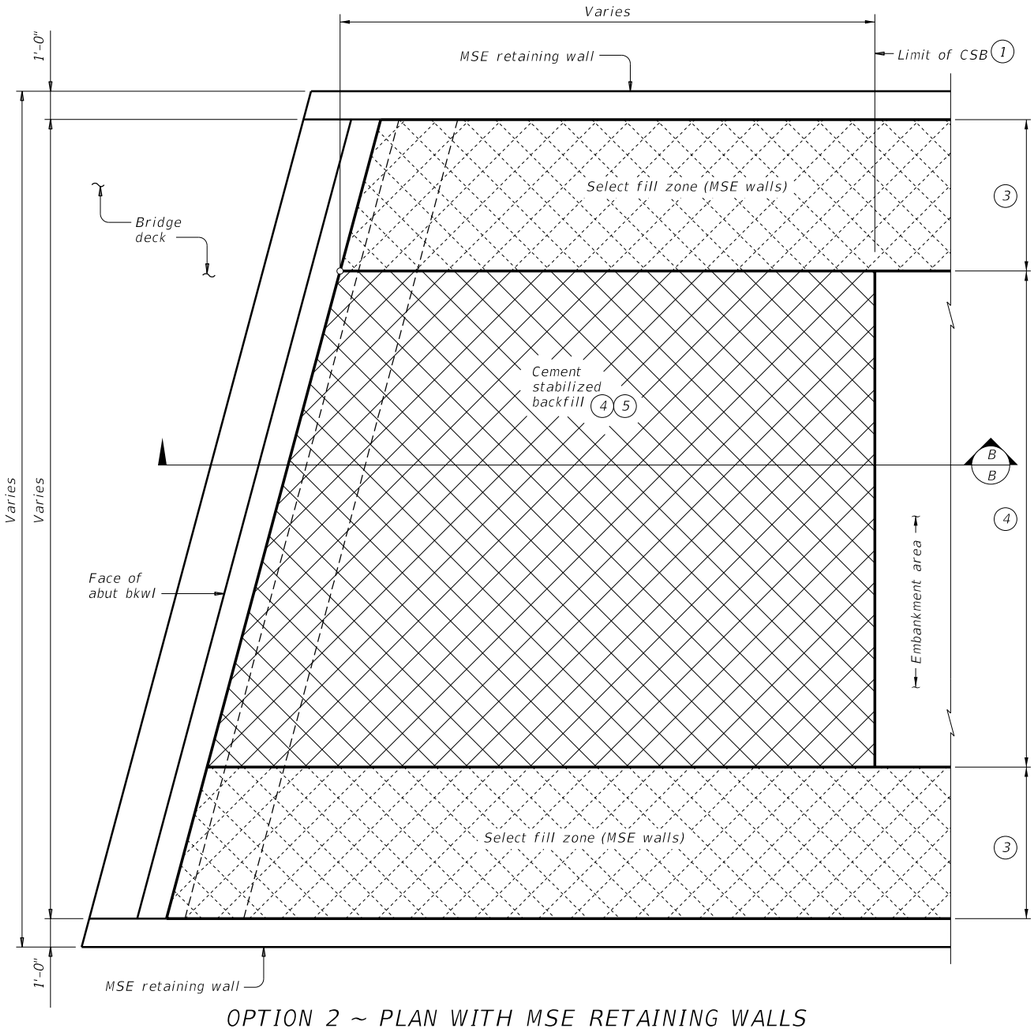
FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	ABL	JONES		60

DATE: 5/11/2023 1:54:20 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/Standards/MS-CSAB-23



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

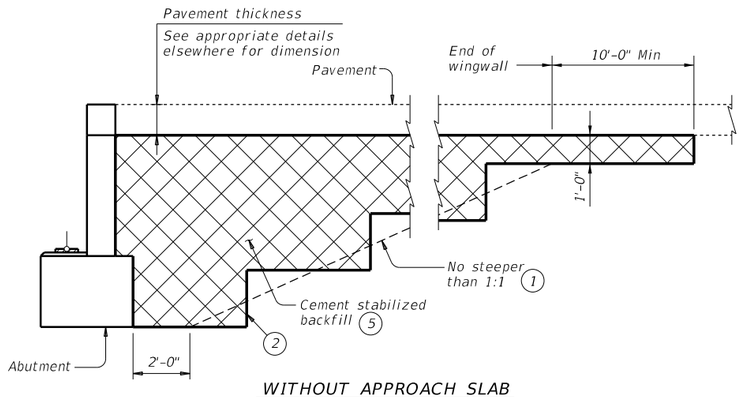
(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

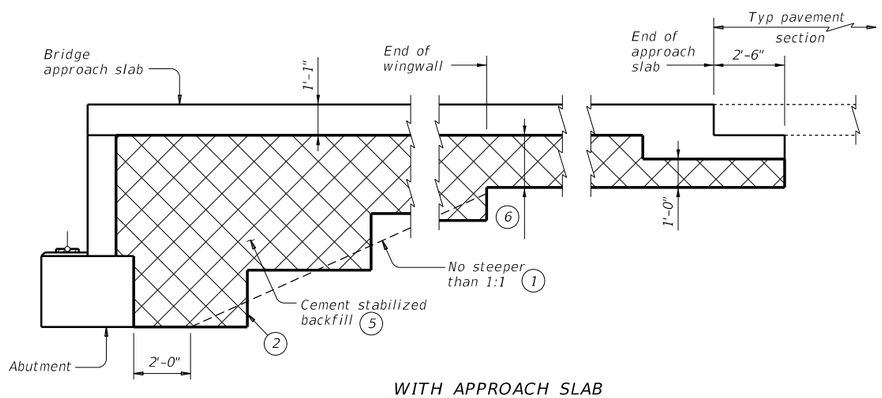
(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans, flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill, then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



WITHOUT APPROACH SLAB



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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	ABL	JONES		61

DATE: 5/11/2023 1:54:24 PM
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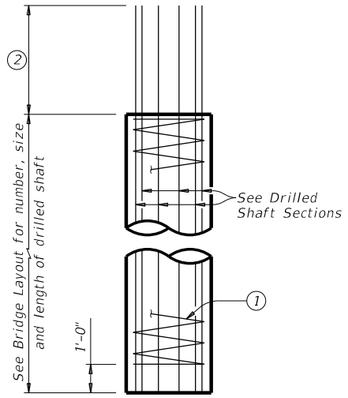
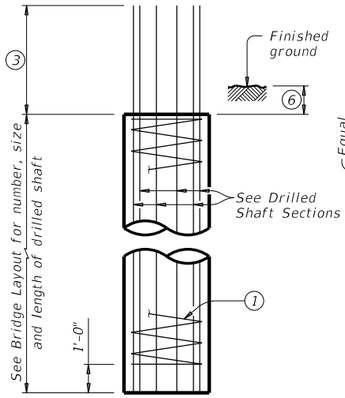
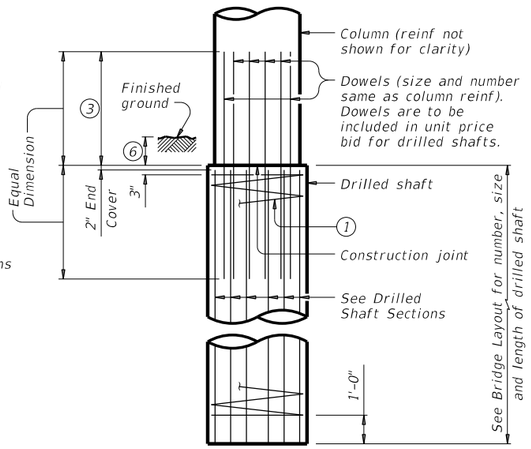


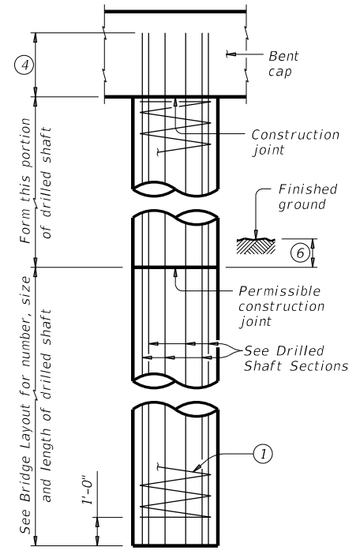
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



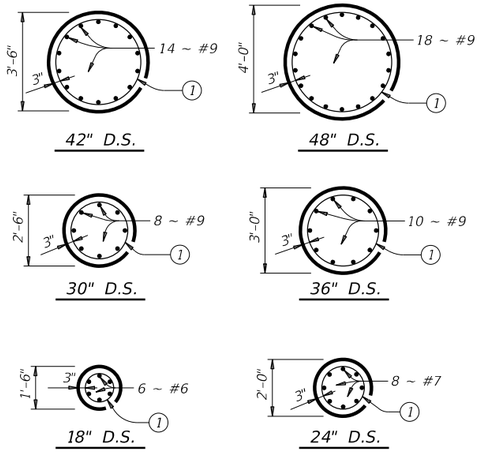
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

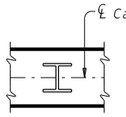


DRILLED SHAFT SECTIONS

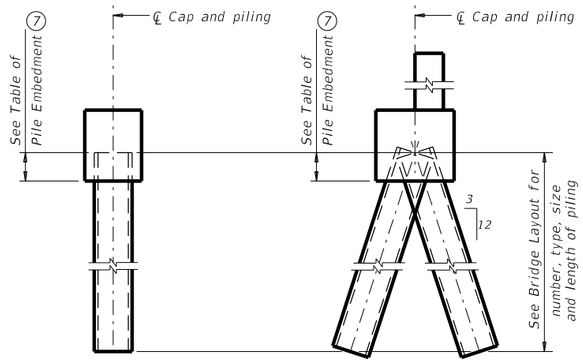
DRILLED SHAFT DETAILS

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

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

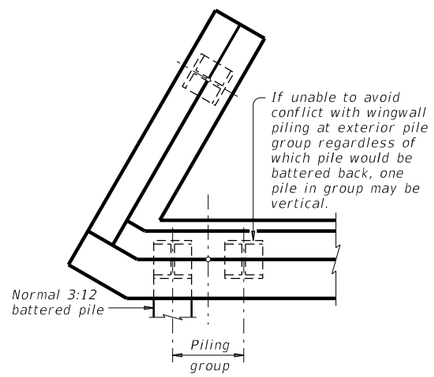


ORIENTATION OF STEEL H-PILING

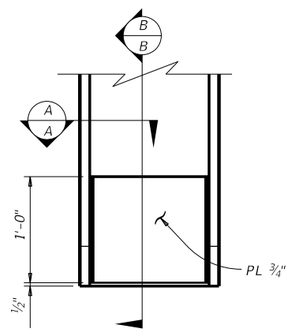


VERTICAL PILE BATTERED PILE

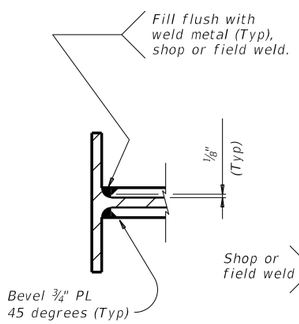
PILING DETAILS
(Concrete or steel H)



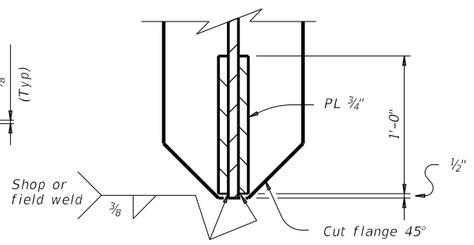
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



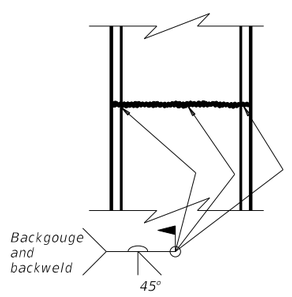
SECTION A-A

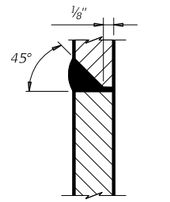


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

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





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

SHEET 1 OF 2

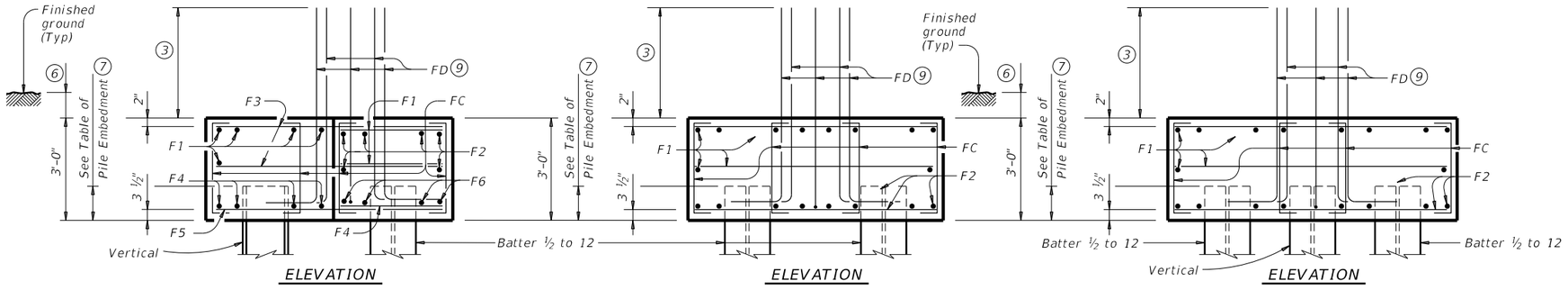
Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

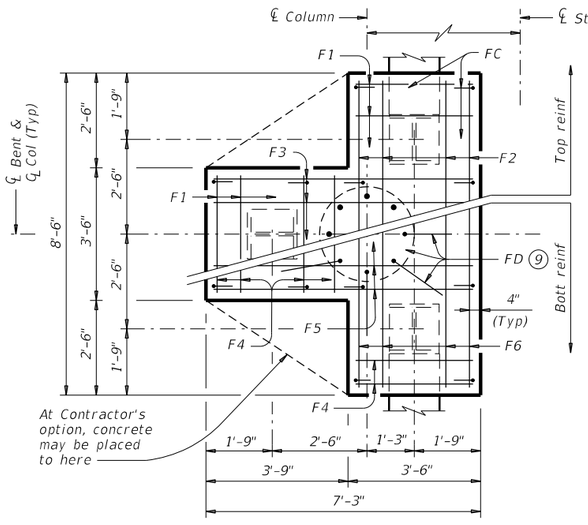
FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	ABL	JONES		62



ELEVATION

ELEVATION

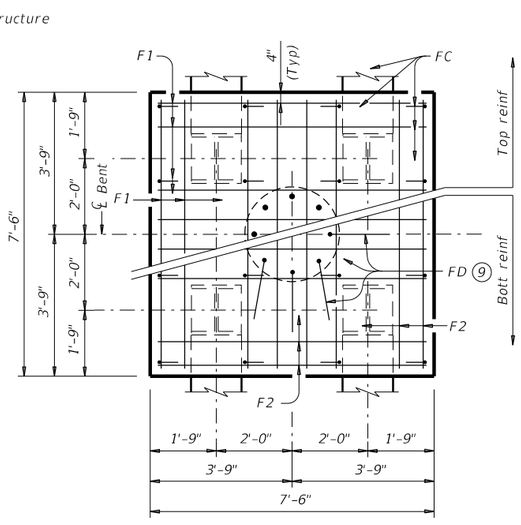
ELEVATION



PLAN

THREE PILE FOOTING (8)

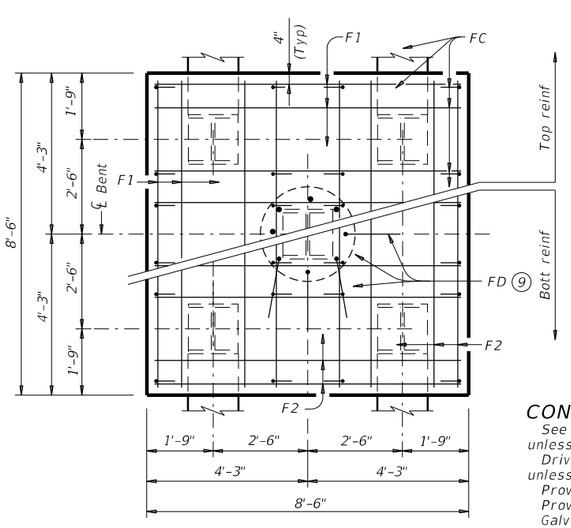
For 36" Dia and smaller columns.



PLAN

FOUR PILE FOOTING (8)

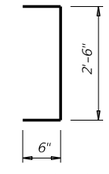
For 42" Dia and smaller columns.



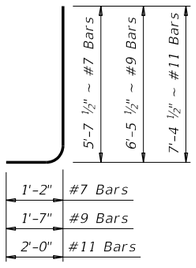
PLAN

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	ABL	JONES		63

DATE: 5/11/2023 1:54:24 PM
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DATE: 5/11/2023 1:54:28 PM
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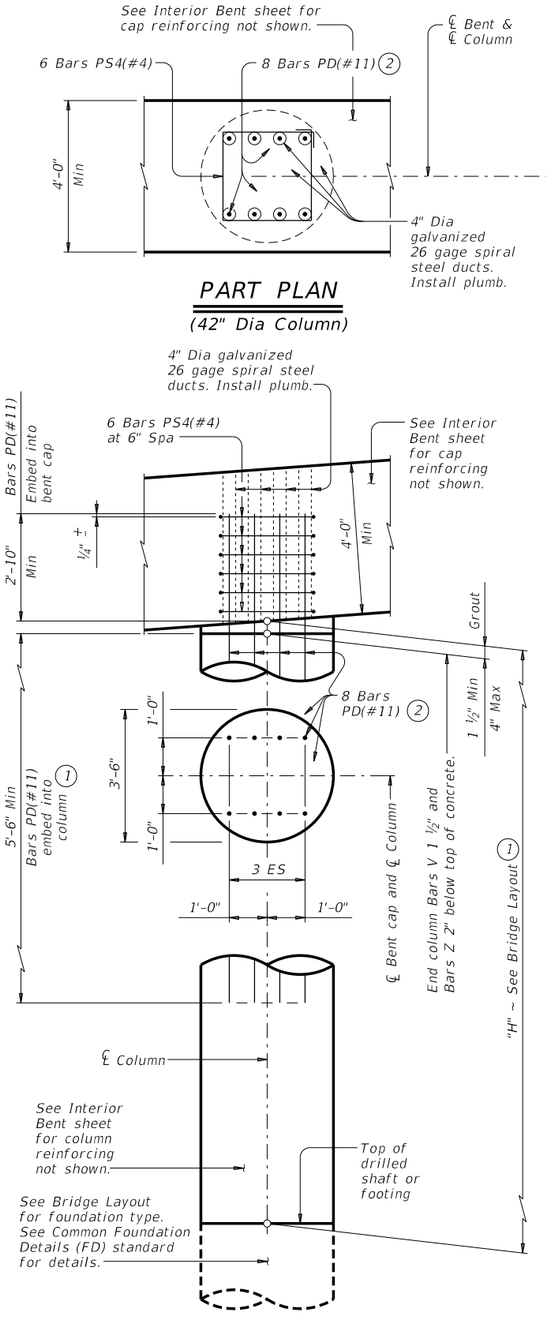
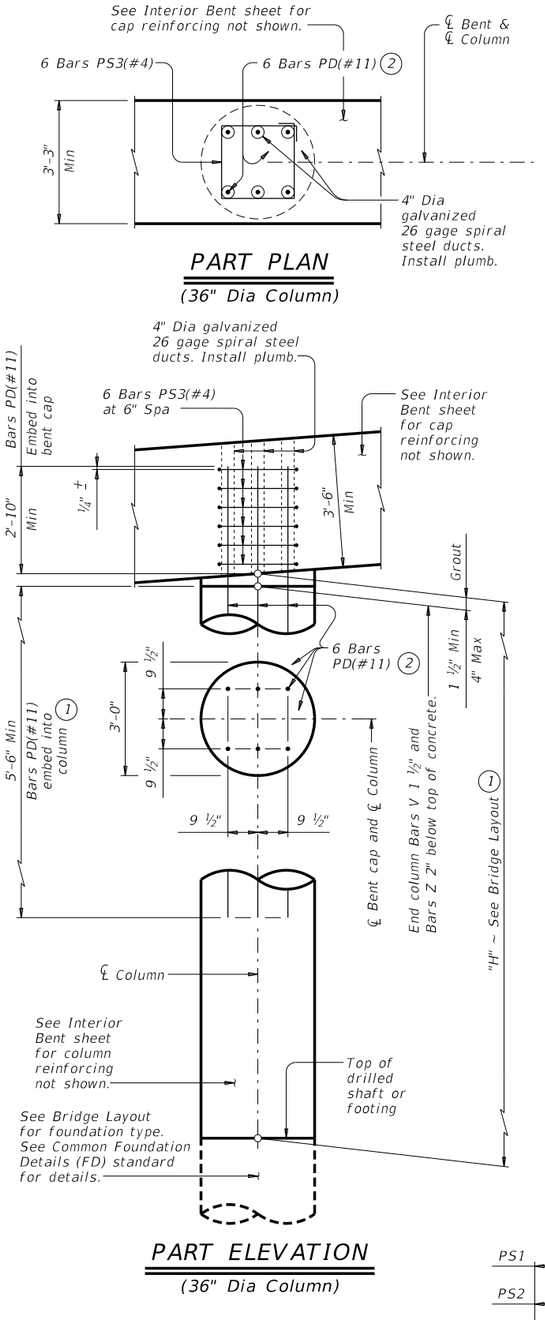
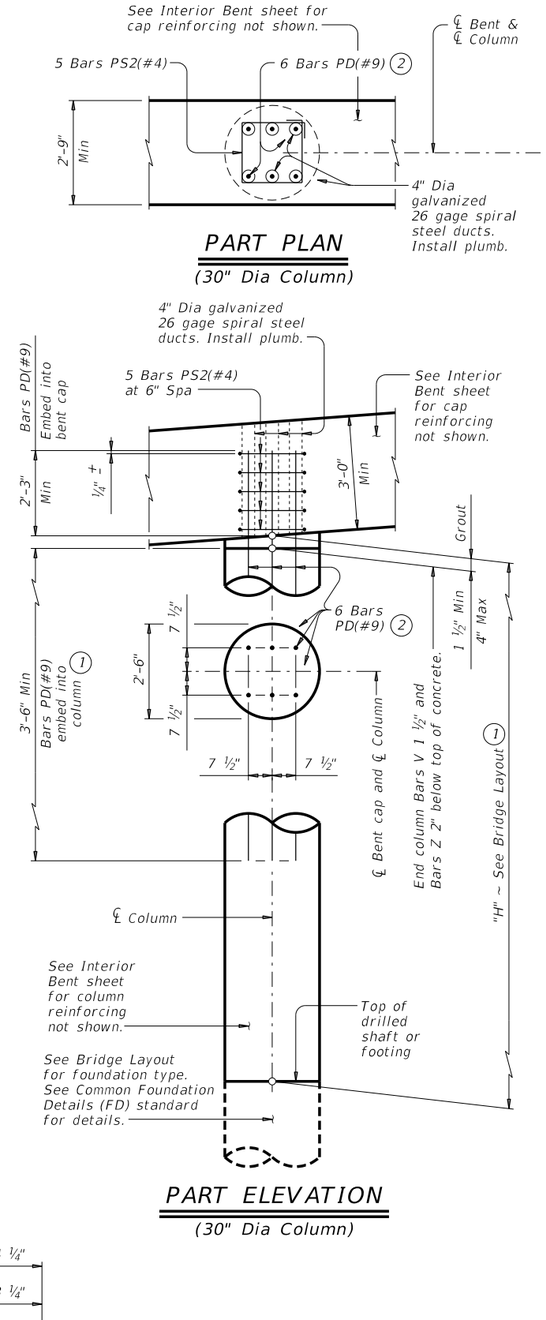
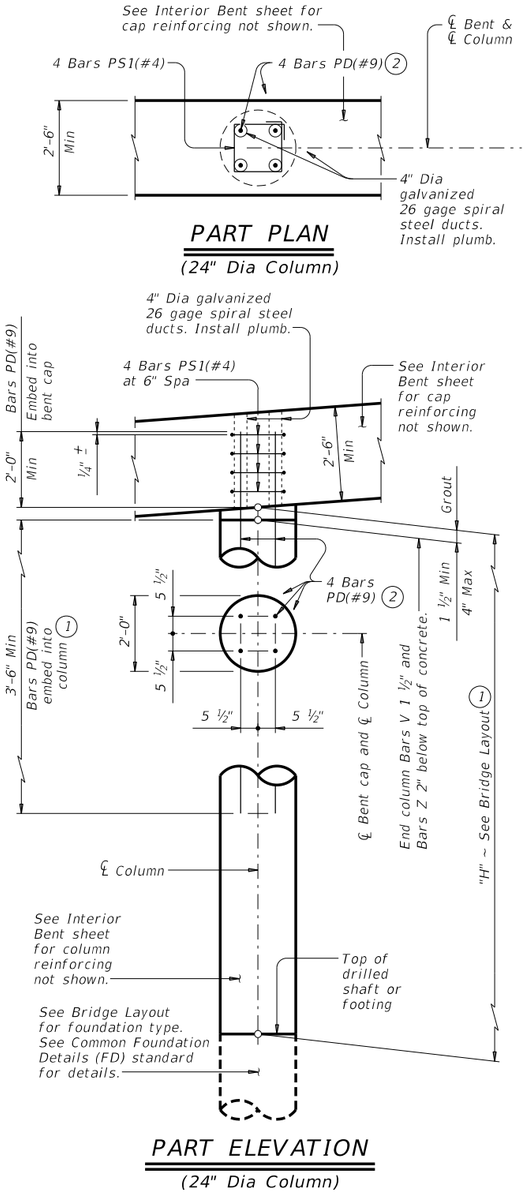


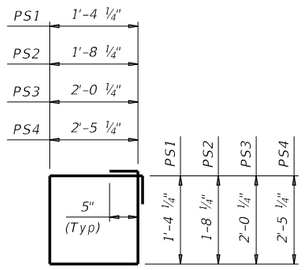






(1) Bars PD may need to be embedded in footing or drilled shaft for short columns.

(2) Location tolerance of dowels in columns/drilled shafts is ¼" from plan location, transversely and longitudinally.



BARS PS (#4)

HL93 LOADING SHEET 1 OF 2

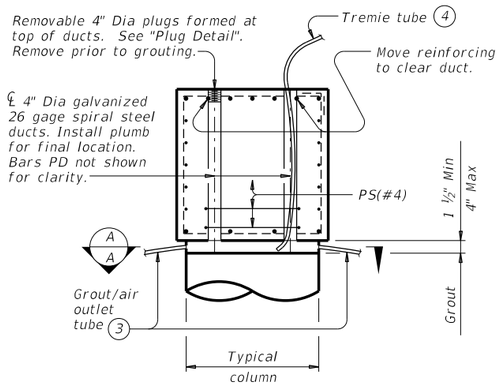
Texas Department of Transportation

Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

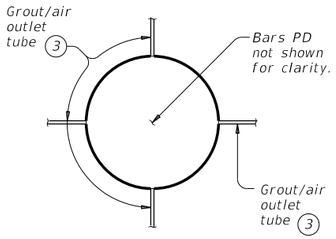
PBC-RC

FILE: pbcstd01-21.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: General Notes	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		64

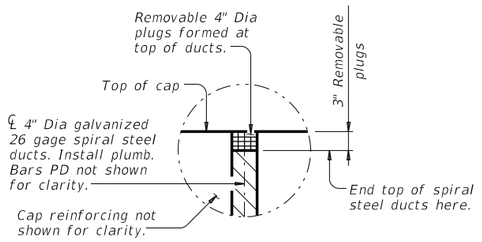


TYPICAL SECTION THRU CAP

(Showing example of ducts and cap reinforcing.)

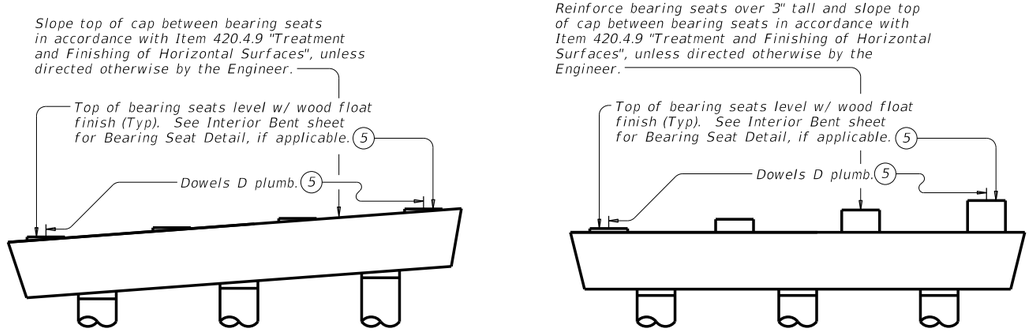


SECTION A-A



PLUG DETAIL

(Plug is used to keep concrete out of ducts during concrete placement. Remove prior to grouting)



CAP SET AT SLOPE

CAP SET LEVEL

EXAMPLES OF PRECAST BENTS WITH DOWELS D

(3) Provide at least 4 grout/air outlet tubes equally spaced around the perimeter of the column. Install at bottom of cap to avoid air entrapment. Seal off tubes sequentially when a steady flow of grout without air occurs. Secondary tubes to help drain water, located at top of column, may also be installed.

(4) Continuous gravity-flow grouting through a tremie tube is recommended. With this method, lower a flexible tremie tube through one of the vertical ducts to the bottom of the bedding layer and fill the connection from the bottom upward with a continuous flow of grout. This method requires a sufficient amount of grout to be mixed prior to grouting and that the funnel connected to the tremie tube have adequate volume capacity (4 quarts Min is recommended). A valve may be used to stop the flow during grouting to allow refilling the funnel or to tamp the grout. The tube should remain within the grout and gradually withdrawn as the level of the grout rises in the ducts. It is critical to ensure a continuous flow of grout to avoid air entrapment. Alternative methods, including pressure grouting with low pressure pumps, may be used provided they are proved effective in providing void-free connections during the mock-up phase.

(5) Unless otherwise shown.

CONSTRUCTION NOTES:

Cap Fabrication:

Construct and cure cap in accordance with Item 420, "Concrete Substructures". If fabricated at an offsite location, construct and cure cap in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Secure ducts to prevent their movement during concrete placement. Location tolerance of ducts is ¼" from plan location, transversely and longitudinally. Seal ducts to prevent intrusion of concrete.

Bearing seats may be precast with the cap. Bearing seats over 3" in height must be reinforced as per Item 420.4.9. Do not locate lift points at bearing seats if bearing seats are precast.

Cap concrete must achieve a compressive strength of 2,500 psi prior to lifting. Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps. Caps that become cracked or otherwise damaged may be rejected.

Cap-to-Column Connection:

Make a trial batch of grout using the same material, equipment and personnel to be used for actual grouting operations and grout a mock-up of the connection at least one week before grouting and in the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the same level required for the actual grouting.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to grouting. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Surfaces in contact with grout must be clean and in a saturated, surface-dry condition, immediately prior to grouting. Provide water tight forms. Fill the forms with water and drain just prior to grouting. Ponding or free-standing water is not permitted. Use compressed air to blow out excess water.

Mix grout in accordance with the manufacturer's directions. Evidence of frothing, foaming, or segregation is cause for rejection. Transport grout from mixer to final location by wheel barrow, bucket or pumping.

Perform sampling and testing of grout by trained personnel at the Contractor's expense and while witnessed by the Engineer. Grouted connections must be free of voids.

Trowel finish top surface of cap anchorage ducts flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

Friction collars may be removed, if used, and beams placed on the cap after the grout obtains a compressive strength of 2,500 psi. Subsequent loading can occur when the grout reaches its final required 28 day compressive strength.

MATERIAL NOTES:

Provide a pre-qualified grout from TxDOT's Material Producer List "Cementitious Grouts and Mortars for Miscellaneous Applications", conforming to DMS-4675.

Provide semi-rigid spirally crimped, corrugated duct of galvanized, cold rolled steel conforming to ASTM A653. Corrugations must have a minimum amplitude of 0.094".

Grout tubes and forms must be approved prior to grouting.

Provide Grade 60 reinforcing steel. Epoxy coat or galvanize all reinforcement if column reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

The Contractor has the option to provide precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses precast caps.

Submit shop drawings of precast caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Precast Concrete Bent Cap Option shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

See Interior Bent sheet for details and notes not shown.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

FILE: pbcstd01-21.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TxDOT
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REVISIONS 12-21: General Notes	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		65

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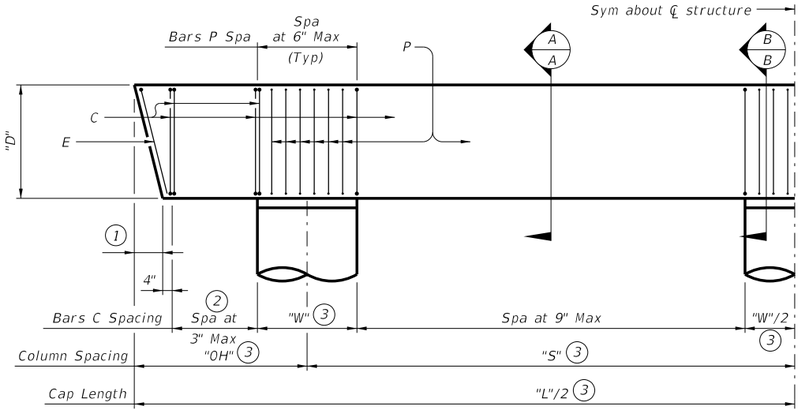
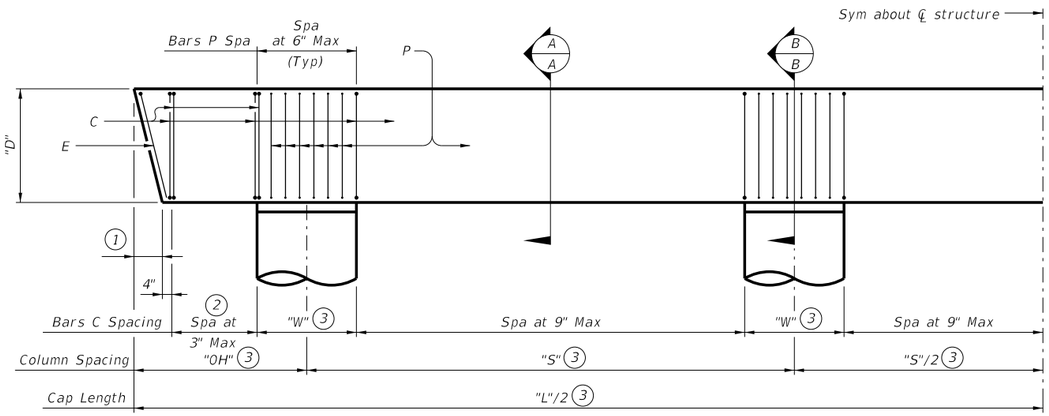


SHOWING 3 COLUMN BENT

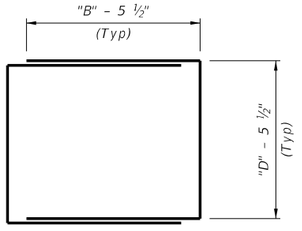


SHOWING 4 COLUMN BENT

TABLE OF CAP DESIGNS

OPTIONAL DESIGN

SUPERSTRUCTURE TYPE	CAP DIMENSIONS			CONCRETE		PRESTRESSING STRANDS				REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)
	CAP WIDTH "B" (ft-in)	CAP DEPTH "D" (ft-in)	CORRUGATED PIPE INSIDE DIAMETER (ft-in)	RELEASE STRENGTH f'_{ci} (ksi)	MINIMUM 28 DAY COMP STRENGTH f'_c (ksi)	LAYERS OF PS STRANDS	TOTAL NO. PS STRANDS	SIZE (in)	STRENGTH (ksi)	(ft-kips)
Slab Beams	3'-0"	2'-6"	1'-6"	4.0	5.0	12	24	0.6	270	1,201
Decked Slab Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
Box Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
X-Beams	4'-0"	3'-6"	2'-6"	5.2	6.5	16	32	0.6	270	2,671
I-Girders (Tx28-Tx54)	4'-0"	3'-6"	2'-6"	4.0	5.0	16	32	0.6	270	2,484
I-Girders (Tx62)	4'-6"	4'-0"	3'-0"	4.0	5.0	20	40	0.6	270	3,634



BARS C(#5)
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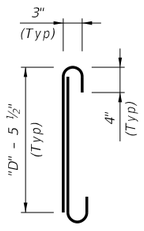

BARS P(#3)
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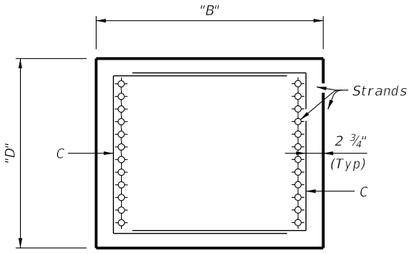
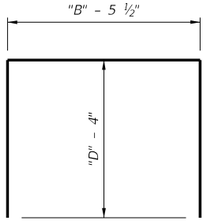
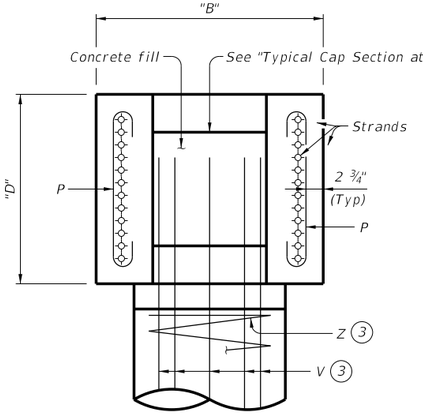


SECTION A-A



BARS E(#5)

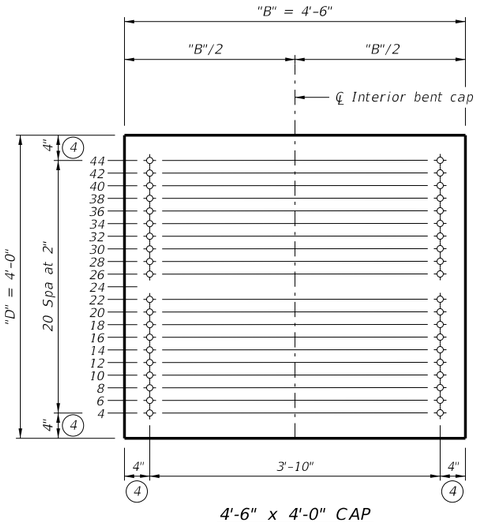
1. Variable. See Interior Bents sheet for dimension. When dimension is 0", omit Bars E and reduce end cover to Bars C to 3". Measured parallel to top of cap cross-slope.
2. Double Bars C. (Typ)
3. See Interior Bents sheet for details not shown.
4. Dimensioned to center of strand.



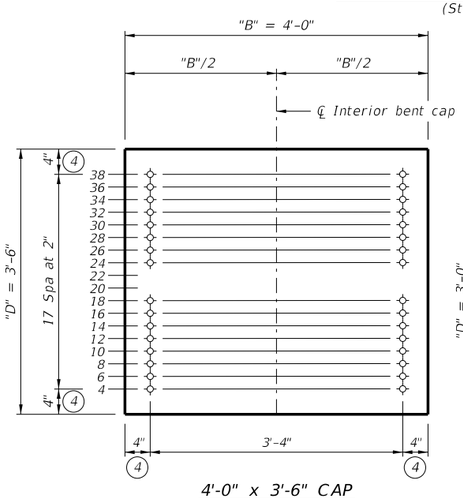
SECTION B-B

INTERIOR BENT HALF ELEVATION

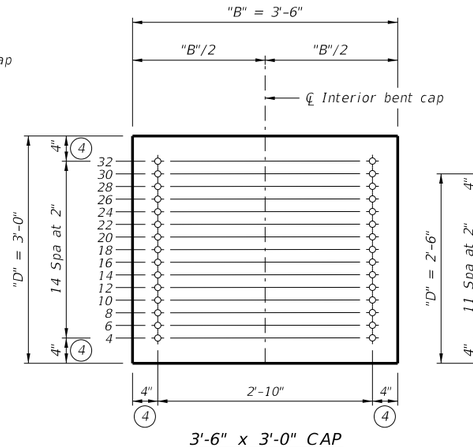
(Strands not shown for clarity.)



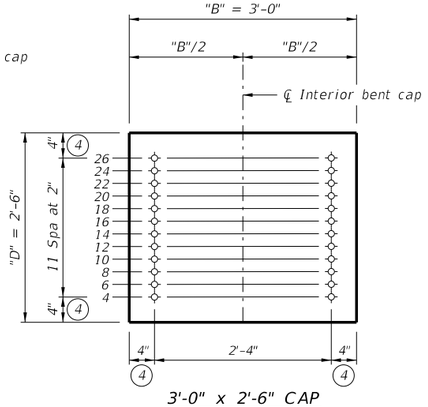
4'-6" x 4'-0" CAP
Used with I-girders (Tx62)



4'-0" x 3'-6" CAP
Used with I-girders (Tx28-Tx54) and X-beams



3'-6" x 3'-0" CAP
Used with decked slab beams and box beams



3'-0" x 2'-6" CAP
Used with slab beams

INTERIOR BENT CAP SECTIONS

(Showing strands only.)

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS

PPBC-RC

FILE: ppbcstd1-21.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
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REVISIONS 12-21: General Notes	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		66

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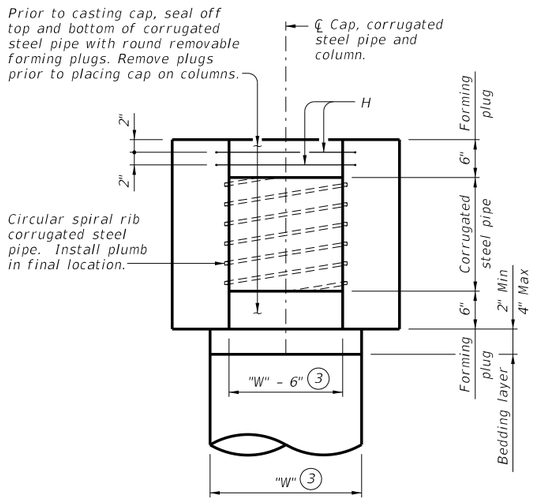


TYPICAL CAP SECTION AT COLUMN

Showing example of cap and corrugated steel pipe at column. Cap and column reinforcing not shown for clarity.

(3) See Interior Bents sheet for details not shown.

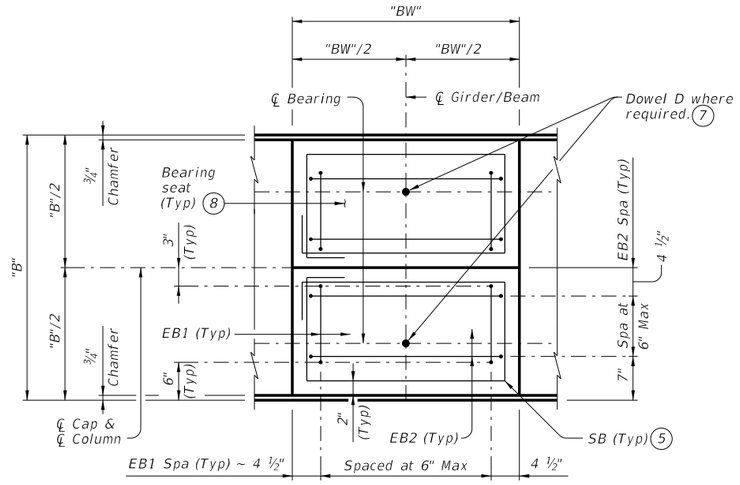
(5) Omit Bars SB for pedestal heights ("PH") under 1'-0".

(6) Shown for structures without skew. Details are for "PH" heights greater than 3" and less than 18". Details are shown for standard X-Beams and I-Girders. Submit details as part of the shop drawing submittal for skewed structures and for pedestals greater than 18" in height.

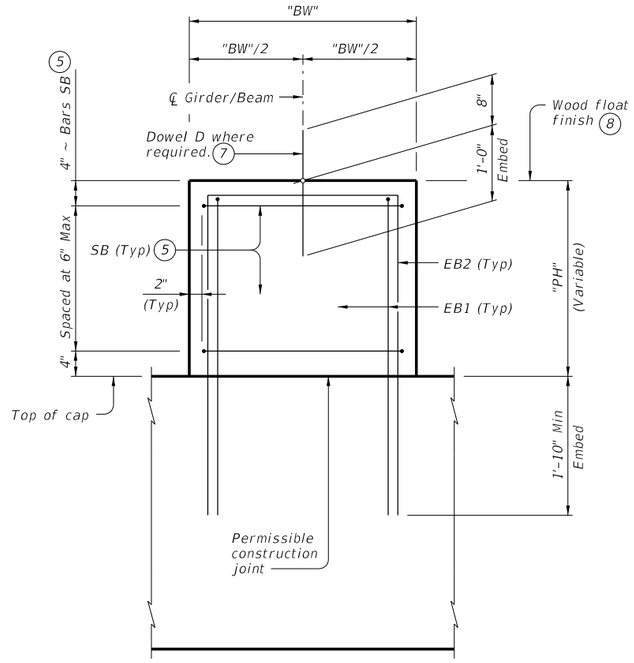
(7) See Interior Bents sheet for placement of dowels. Place dowels plumb.

(8) See Interior Bents sheet, Bearing Seat Detail for slope.

SUPERSTRUCTURE TYPE	BEARING DIMENSIONS "BW" (ft-in)
X-Beams	6'-0"
I-Girders (Tx28-Tx54)	3'-0"
I-Girders (Tx62)	3'-0"



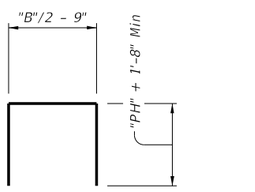
PLAN



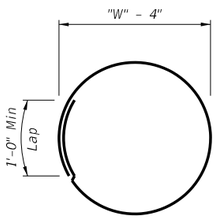
ELEVATION

PEDESTAL DETAILS (6)

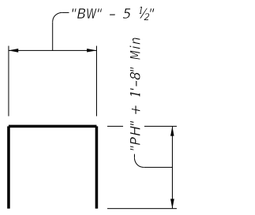
Clean bearing surface and all loose material before placing bearing pad. Reinforce bearing seats/pedestals over 3" in height as shown.



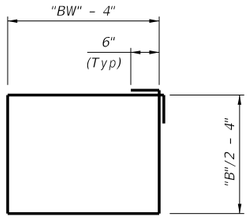
BARS EB1(#5) (6)



BARS H(#4)



BARS EB2(#5) (6)



BARS SB(#5) (5) (6)

CONSTRUCTION NOTES:

Cap Fabrication:

Fabricate in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Secure corrugated metal pipes to prevent their movement during concrete placement. Location tolerance of pipes is ¼" from plan location, transversely and longitudinally. Seal pipes to prevent intrusion of concrete.

Chamfer or round all exposed corners ¾".

Repair cracks exceeding 0.005 in. in width as directed. The fabricator must take approved corrective actions if cracks greater than 0.005 in. form. All work, material, and engineering related to these cracks will be at the Contractor's expense.

Caps can be set level or at grade. If required or needed, build bearing seats/pedestals to achieve final grade. Bearing seats/pedestals may be precast with the initial cast. Bearing seats/pedestals that conflict with column locations may not be precast with cap. Do not locate lift points at bearing seats/pedestals if bearing seats/pedestals are precast. If bearing seats/pedestals are not precast, cast in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces". Do not slope the top of caps between bearing areas from the center slightly towards the edge. If pedestal reinforcement is not present, drill and epoxy anchor Bars EB1 and EB2 into top of cap in accordance with Item 420.4.7.10, "Installation of Dowels and Anchor Bolts".

If earwalls are required, see Interior Bents sheet for details.

If shear keys are required elsewhere in plans, submit details. Shear keys may not be precast. Drill and epoxy shear key anchor reinforcement into top of cap in accordance with Item 420.4.7.10 "Installation of Dowels and Anchor Bolts".

Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps.

Cap-to-Column Connection:

Construct a mock-up of the column-to-cap connection that must demonstrate the ability of the Contractor to provide a connection free of voids. In the presence of the Engineer, use trial batch of concrete fill using the same material, equipment, and personnel to be used for actual concrete operations and fill the mock-up at least one week before casting concrete. Field test the trial batch of concrete fill to the same levels required for the actual concrete fill depth.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to concrete fill depth. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Provide mortar tight forms. Ensure the top of the column is in a saturated surface dry (SSD) condition just before placing concrete fill. Deposit concrete such that all voids in the bedding layer and bent cap are completely filled. Deposit concrete through the top opening of the cap pocket in a manner that deposits concrete from the bedding layer on the bottom of the connection upward. Vibrate concrete in the pocket in accordance with Item 420.4.7.9, "Consolidation". Trowel finish top surface of cap pockets flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

MATERIAL NOTES:

Provide 12 gage, Type I, lock-seam, helical corrugated pipe conforming to Item 460, "Corrugated Metal Pipe".

Provide Grade 60 reinforcing steel. Do not epoxy coat reinforcement even if column reinforcement is epoxy coated.

Provide Class "H" (HPC) concrete for cap concrete.

Provide Class "C" or "S" concrete for cap-to-column connection concrete fill.

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

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress loss calculated according to Research Report FHWA/TX-12/0-6374-2 Table 6.6 using a relative humidity of 60 percent.

The Contractor has the option to provide prestressed, precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses prestressed, precast bent caps.

Submit shop drawings of prestressed, precast bent caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Corrugated pipe and concrete fill are subsidiary to Item 420, "Concrete Substructures" or Item 425, "Precast Prestressed Concrete Structural Members", whichever is designated as the bid item.

See standard Interior Bents sheet for details and notes not shown.

These details can only be used as an alternate to standard Interior Bents with round columns for slab beams, decked slab beams, box beams, X-beams, and I-girder standard designed structures.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS

PPBC-RC

FILE: ppbcstd1-21.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: General Notes	1360	01	030	FM 1226
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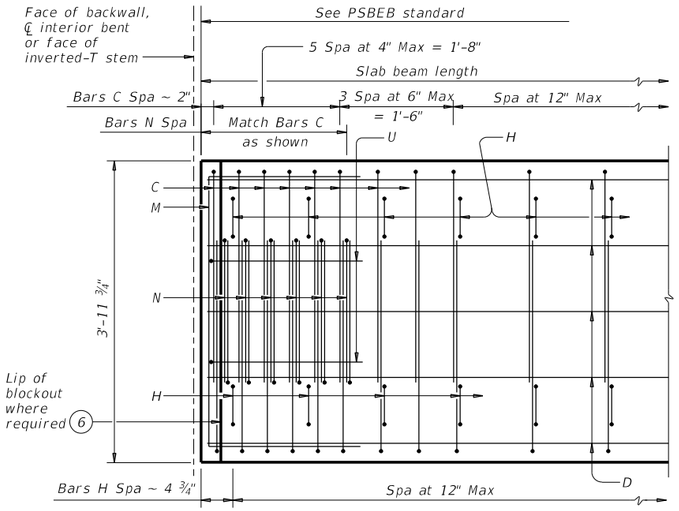

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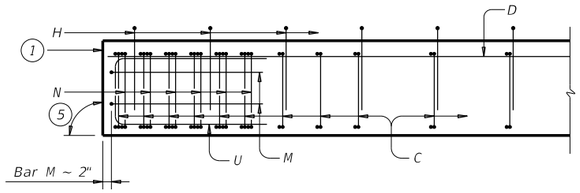
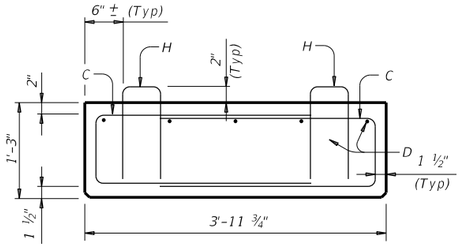


ELEVATION



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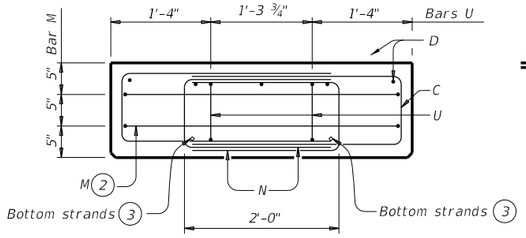
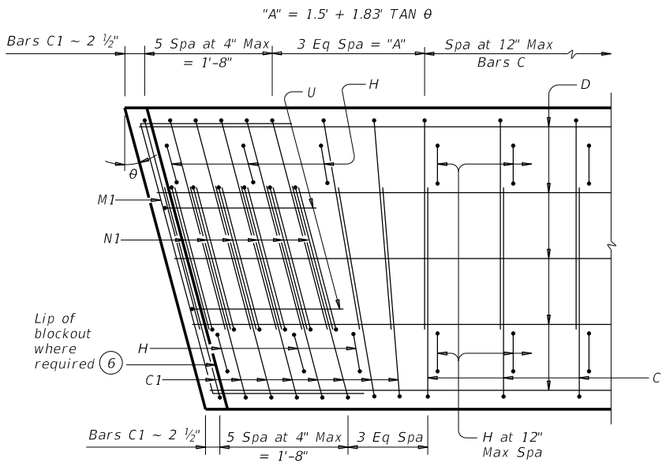


END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

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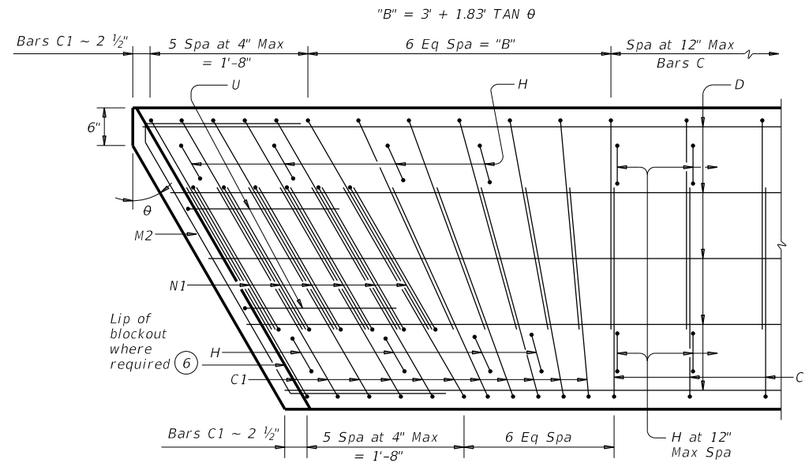
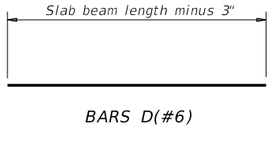
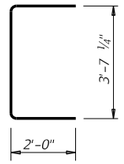


PART SKEW PLAN

(Showing θ over 15° to 30° Skew)



BARS D(#6)



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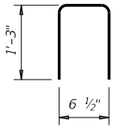

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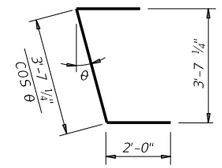

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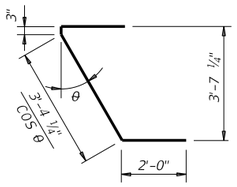

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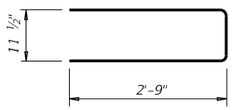

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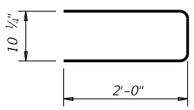
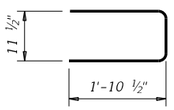


BARS U(#5)



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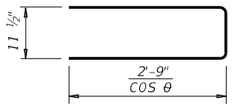

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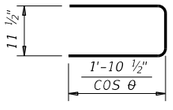

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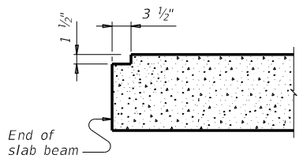


ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	716.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	13,429
Weight (4)	lb/ft	746

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

Provide Grade 60 reinforcing steel.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

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

(4) Assumes 150 pcf weight density of concrete.

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

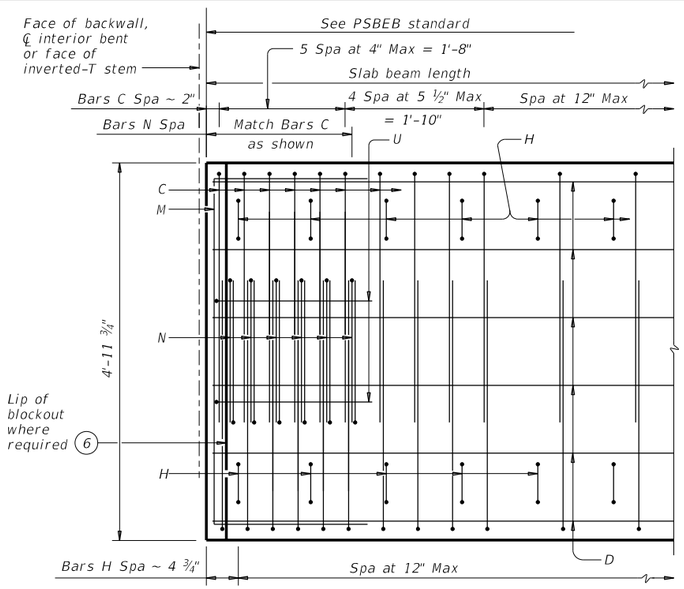
PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 4SB15)

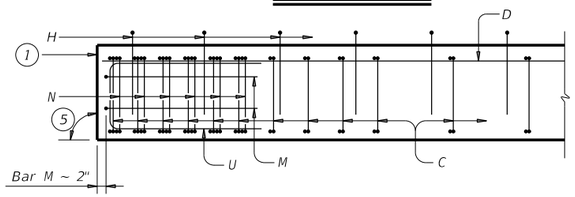
PSB-4SB15

FILE: psbsts02-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		68

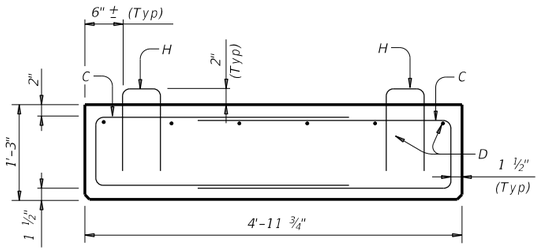
DATE: 5/11/2023 1:54:40 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/Standards/psbsts04-17



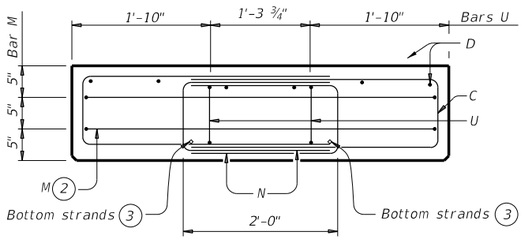
PART PLAN



ELEVATION

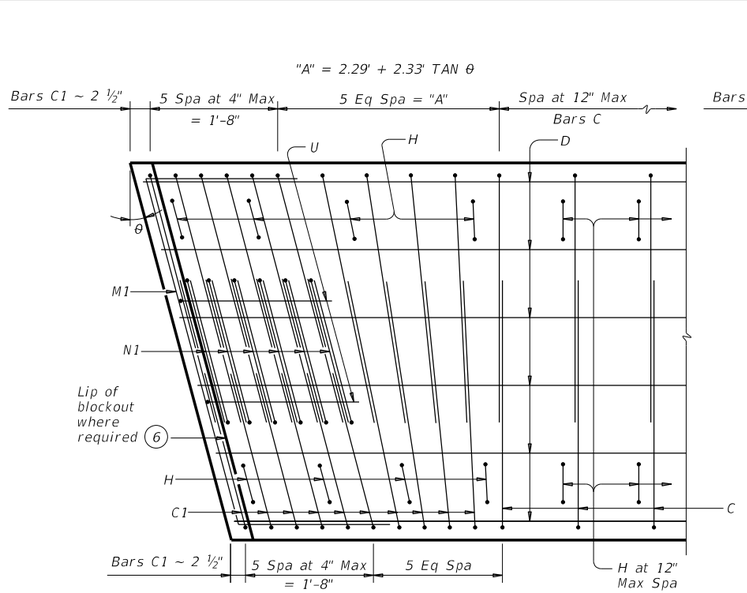


SECTION



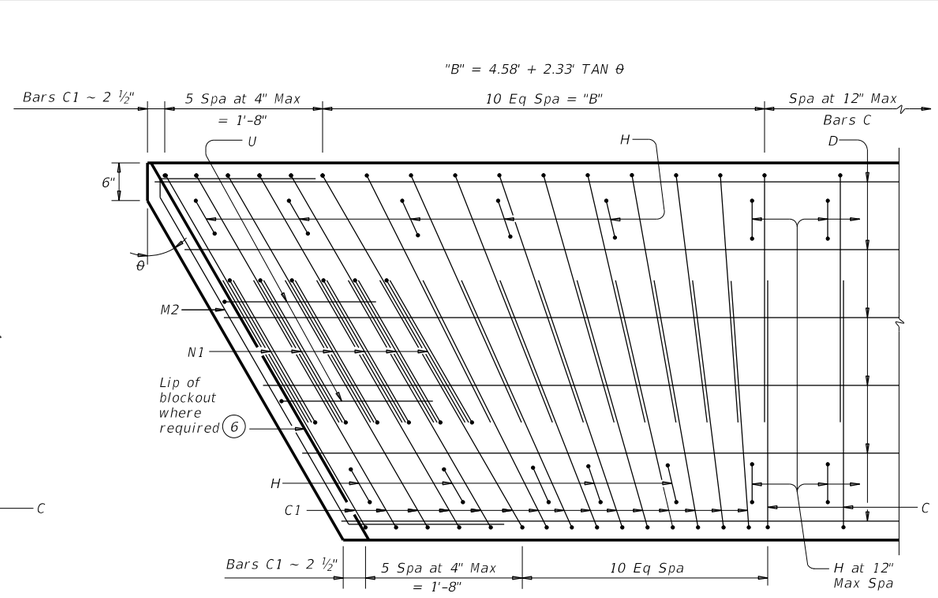
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

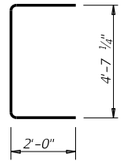
(Showing θ over 0° to 15° skew)



PART SKEW PLAN

(Showing θ over 15° to 30° skew)

BARS D(#6)



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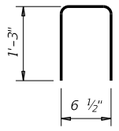

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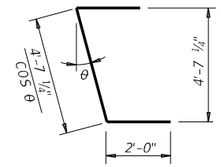

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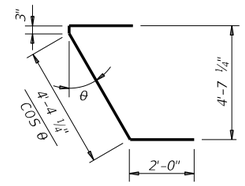

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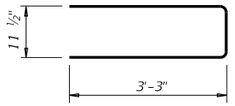

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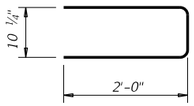
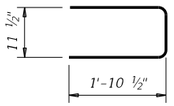


BARS U(#5)



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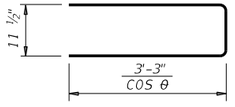

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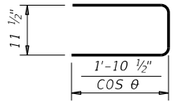
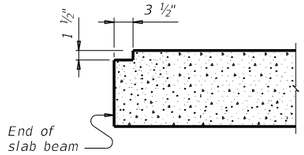


BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

Provide Grade 60 reinforcing steel.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

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

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

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

(4) Assumes 150 pcf weight density of concrete.

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		69

DATE: 5/11/2023 1:54:44 PM
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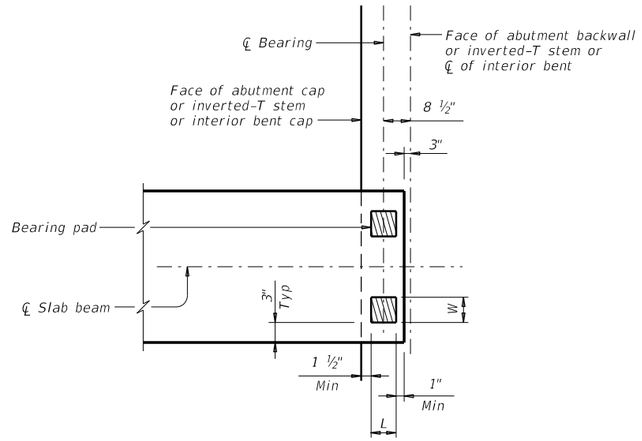
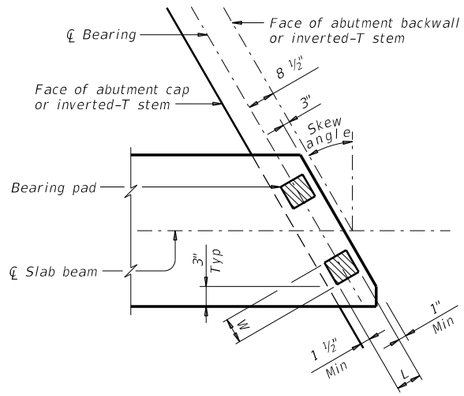
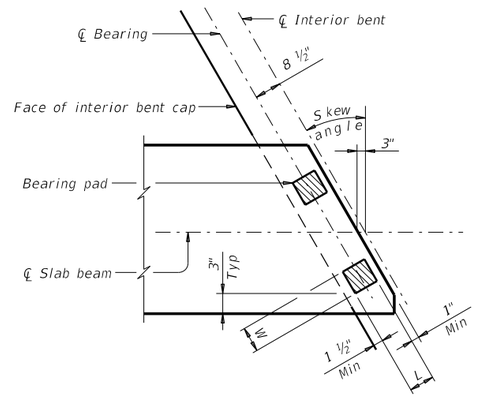


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



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



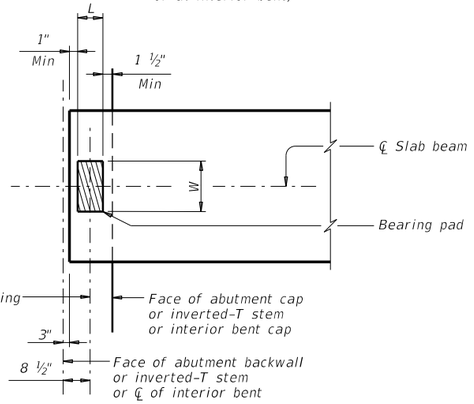
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

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

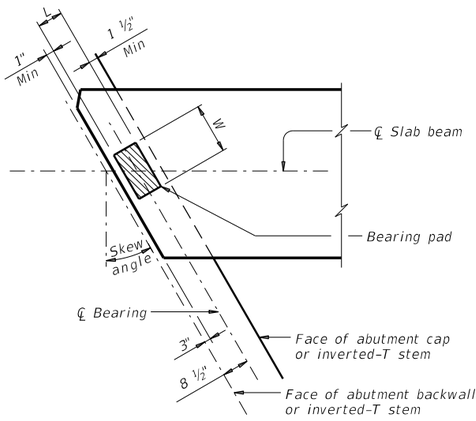
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

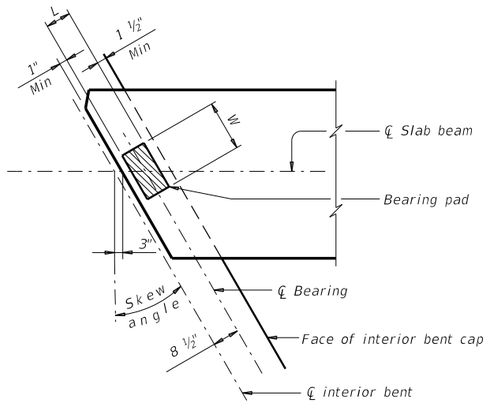
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



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



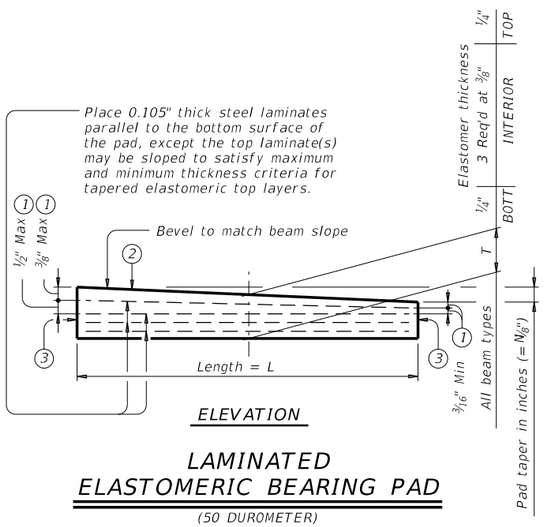
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

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



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

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

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

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		70

DATE: 5/11/2023 1:54:48 PM
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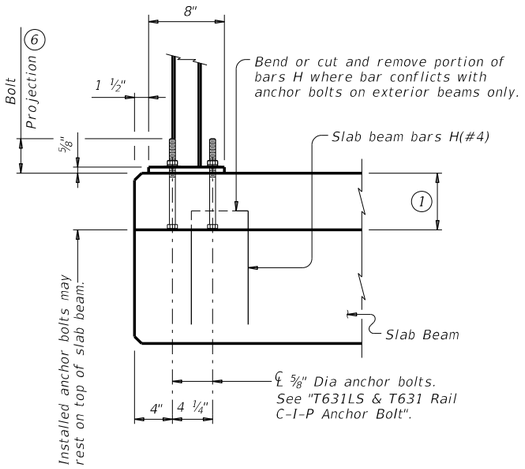
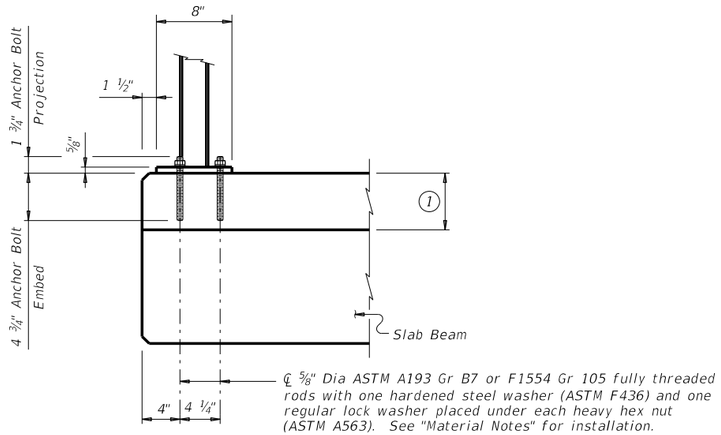
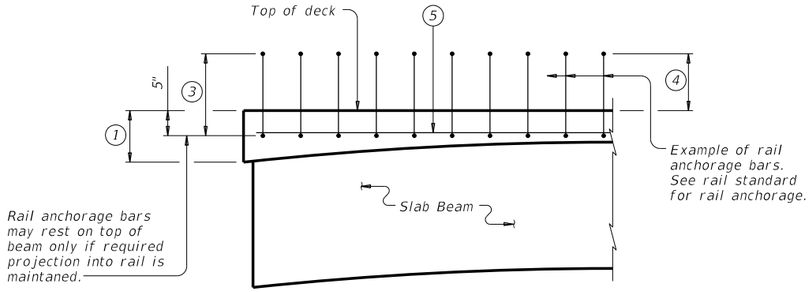


CAST-IN-PLACE ANCHORAGE OPTION

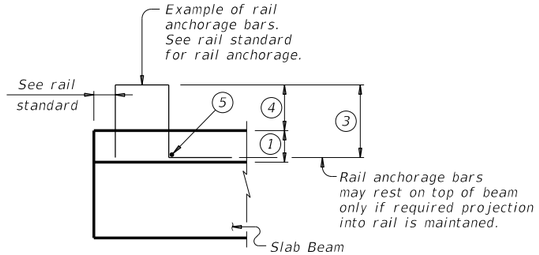


ADHESIVE ANCHORAGE OPTION

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



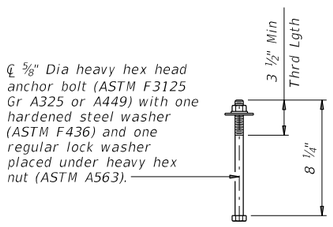
PART SPAN ELEVATION



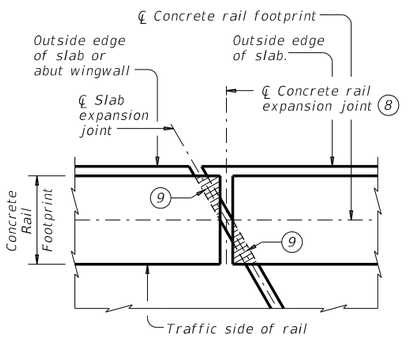
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

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

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

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

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

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

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

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

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

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

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

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	ABL	JONES		71

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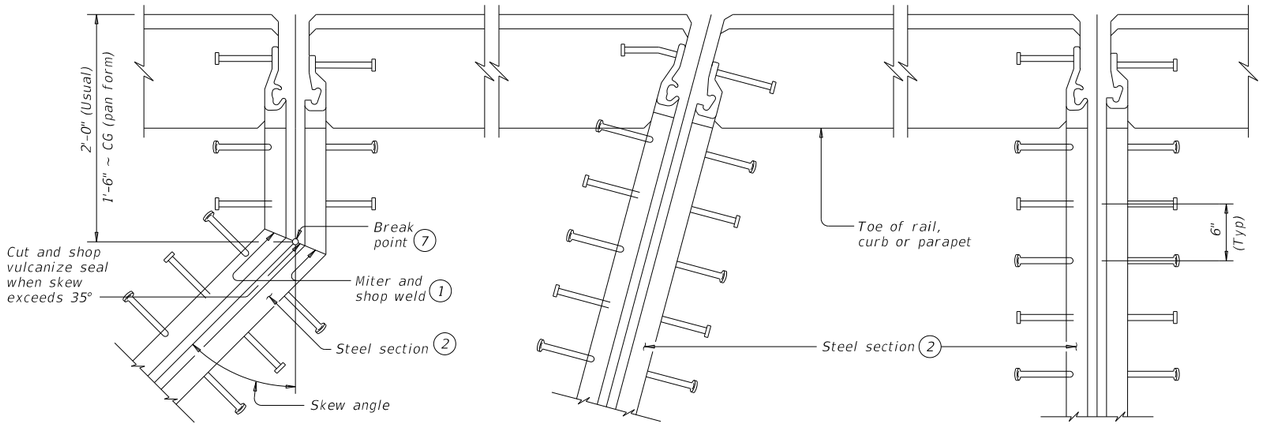
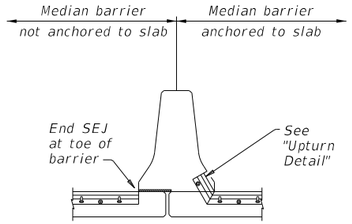
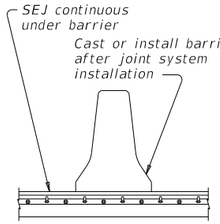


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

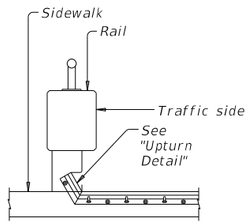
PLANS OF END CONDITIONS



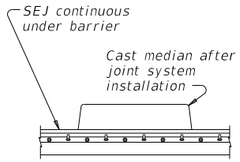
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



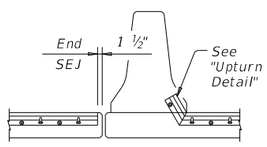
AT MEDIAN BARRIER



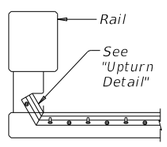
AT SIDEWALK BEHIND BRIDGE RAIL



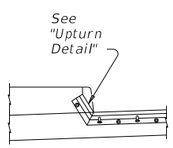
AT RAISED MEDIAN



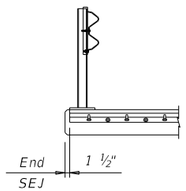
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

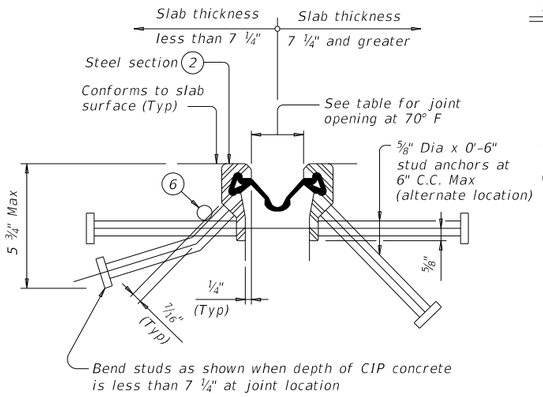


AT SIDEWALK

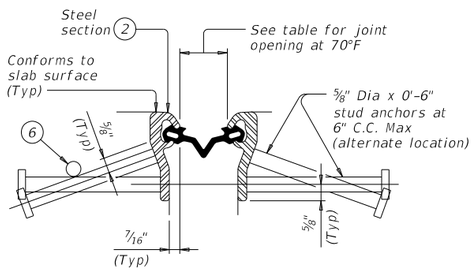


AT STEEL POST BRIDGE RAIL

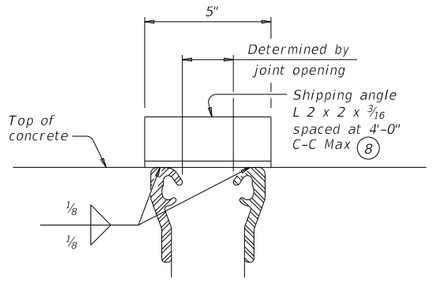
TYPICAL SECTIONS (5)



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



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



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

SHIPPING ANGLE

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

TABLE OF SEALED EXPANSION JOINT INFORMATION

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

REDUCED LONGITUDINAL MOVEMENT RANGE

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

DESIGN NOTES:

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

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

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

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

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

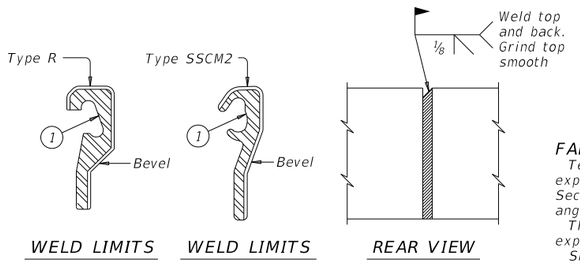
(4) Reduce for sidewalk or parapet heights less than 6".

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

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

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

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

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

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

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

Weld studs in accordance with AWS D1.1.

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

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

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

CONSTRUCTION NOTES:

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

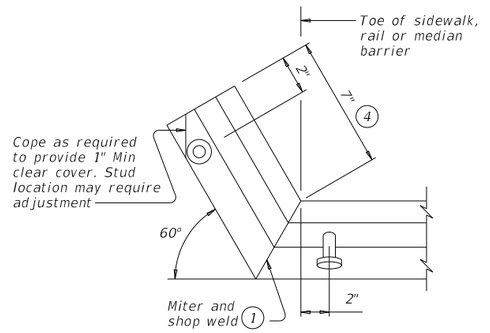
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

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

GENERAL NOTES:

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

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



UPTURN DETAIL

Texas Department of Transportation | Bridge Division Standard

SEALED EXPANSION JOINT TYPE M
WITHOUT OVERLAY

SEJ-M

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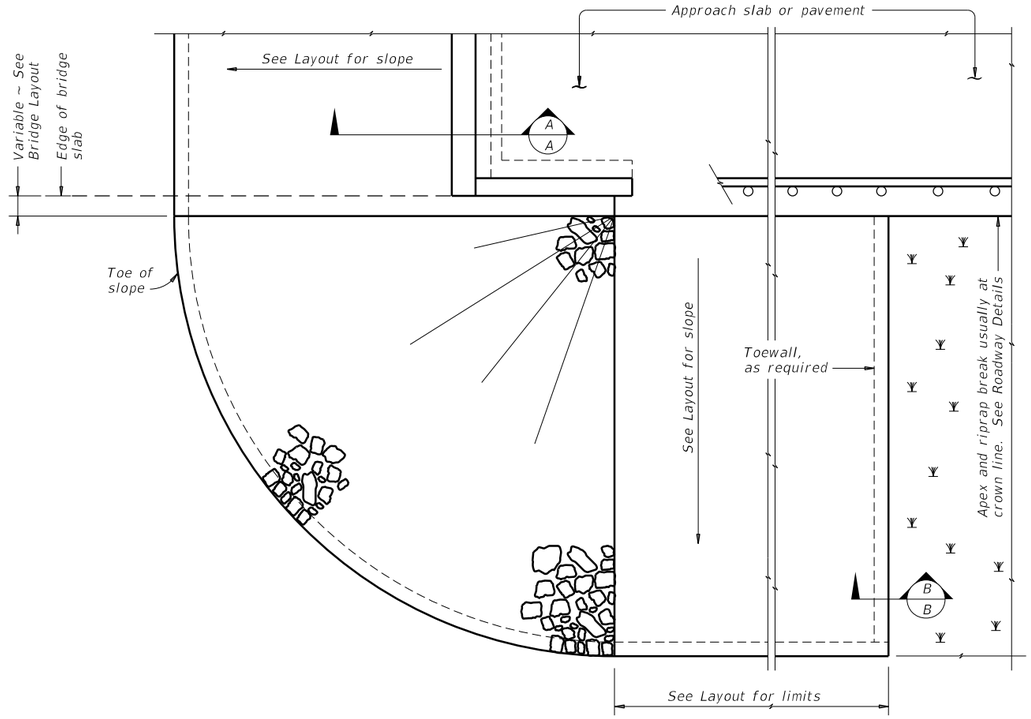
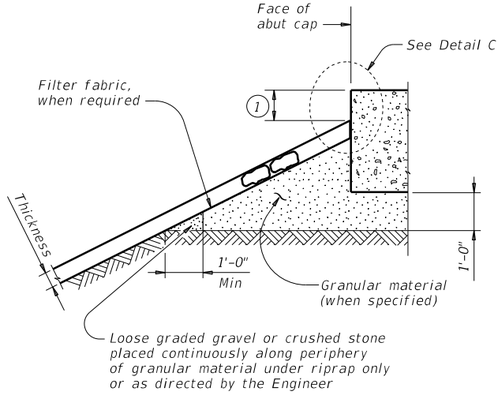
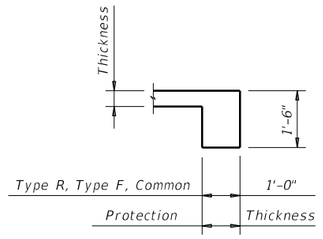


PLAN

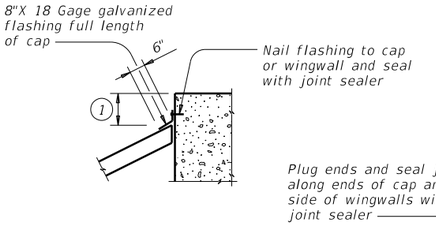


SECTION A-A AT CAP

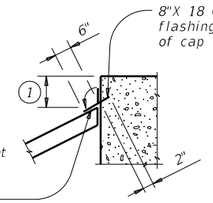


SECTION B-B

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

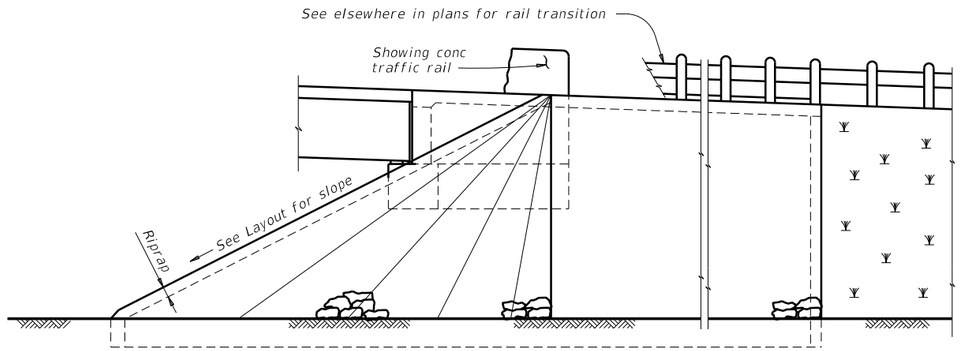


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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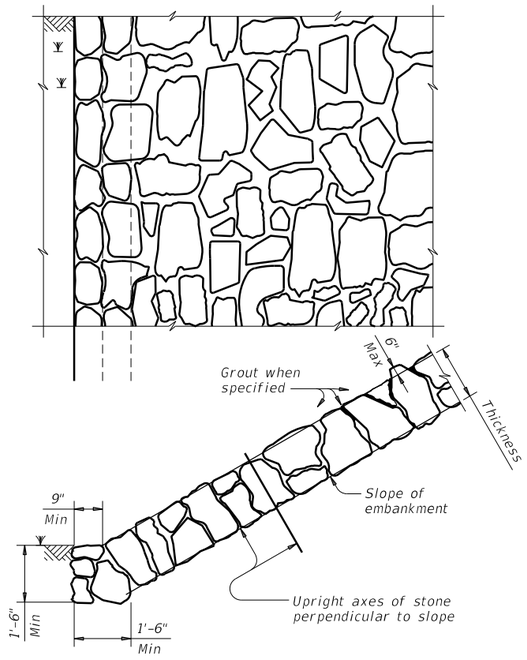


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

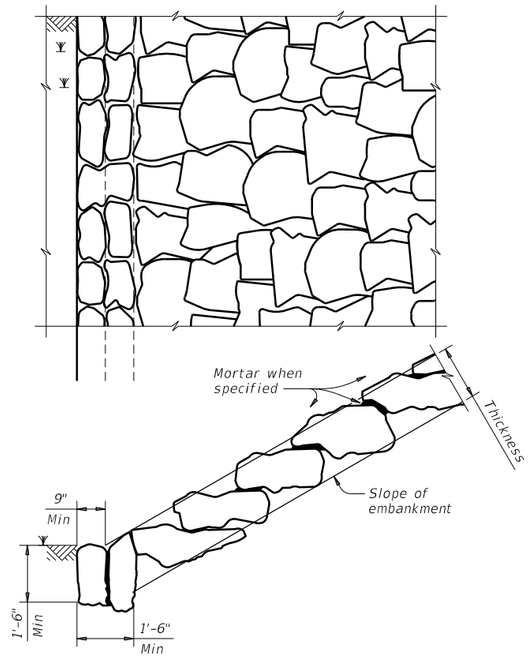


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

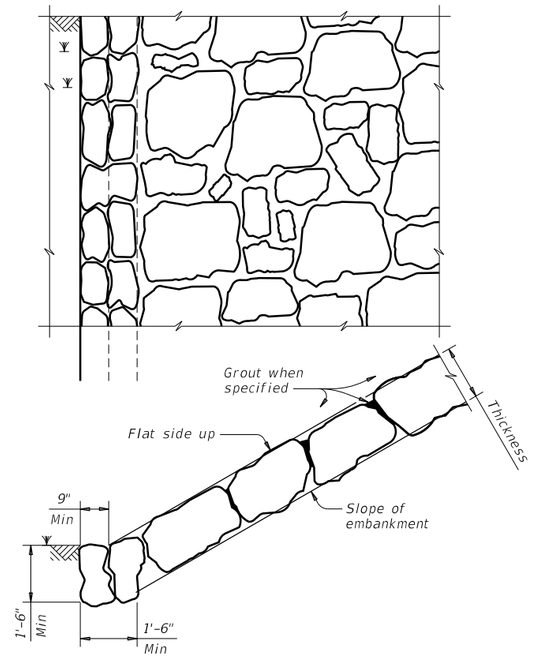


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

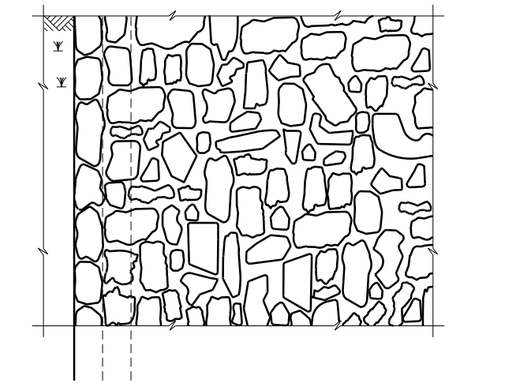


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

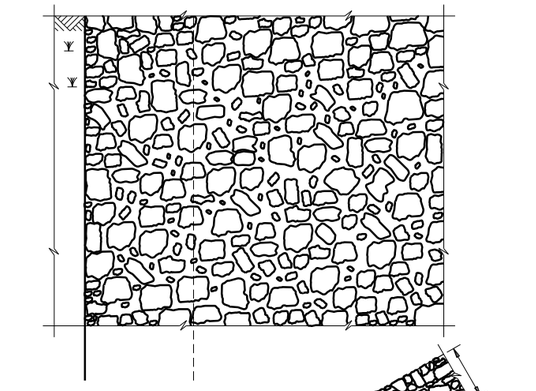


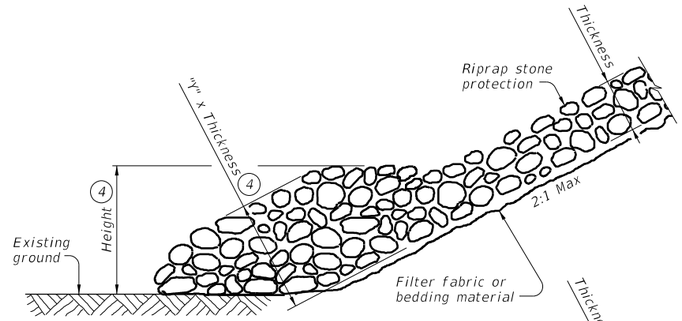
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

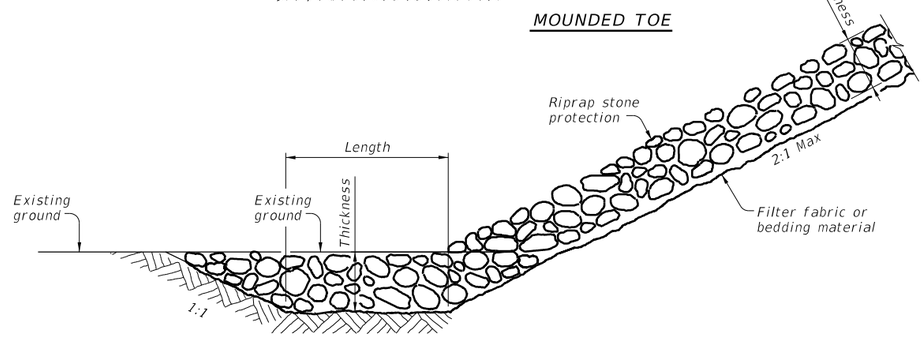
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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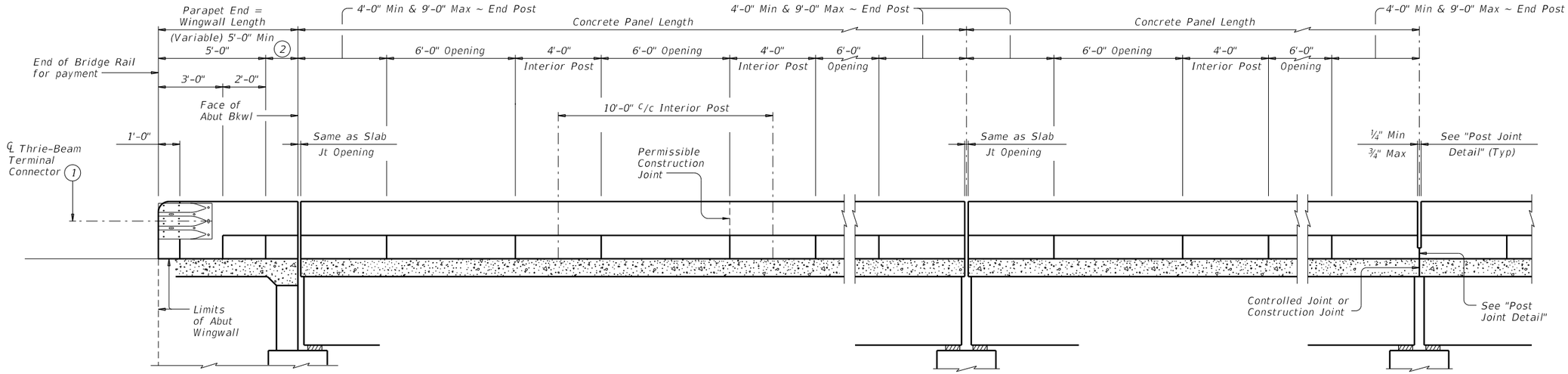
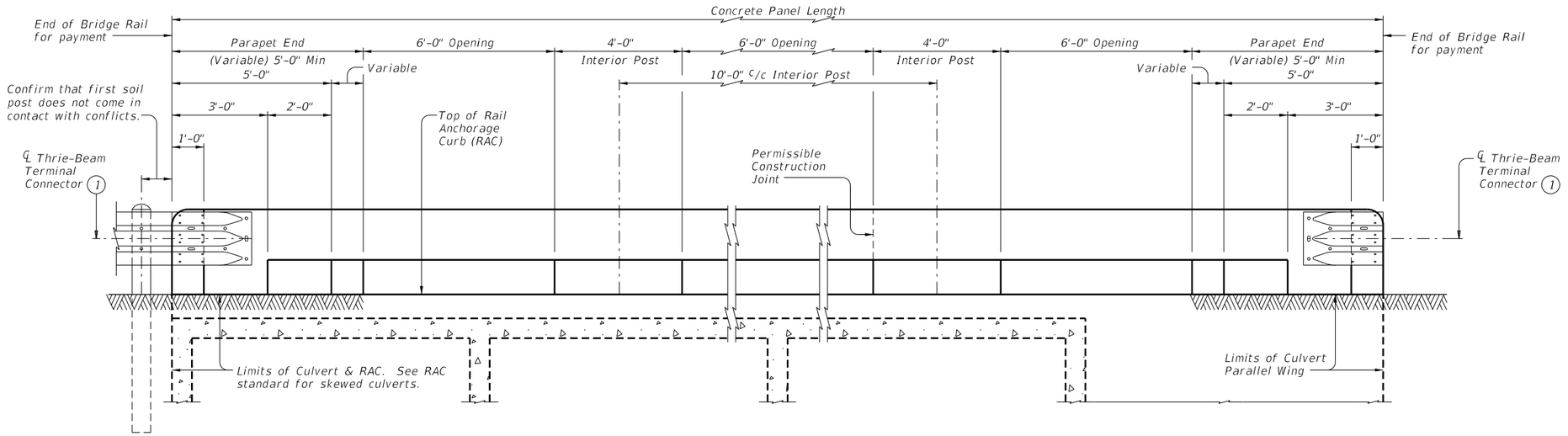


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

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

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

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
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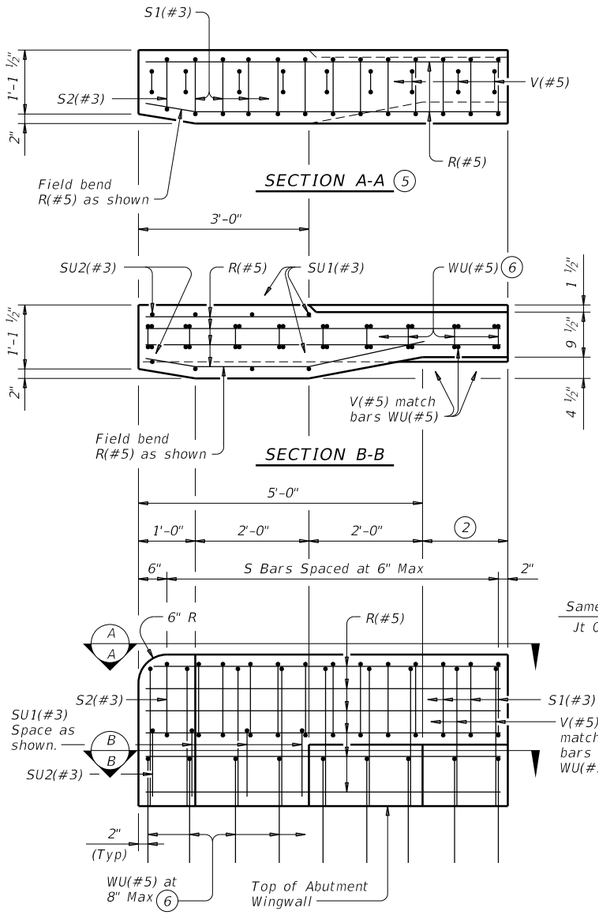
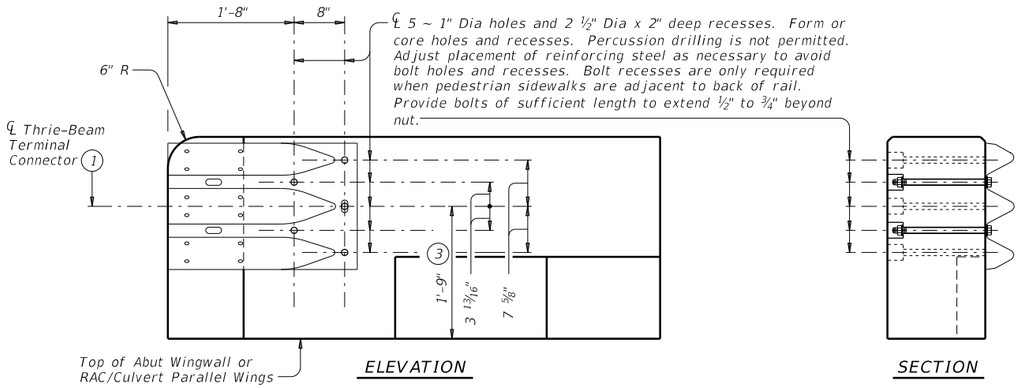
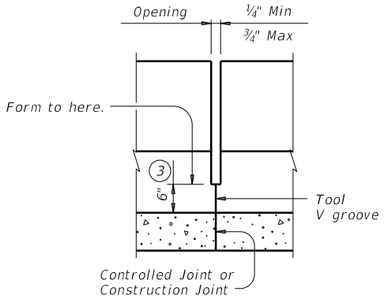


PARAPET END AT ABUT WINGWALL (6)

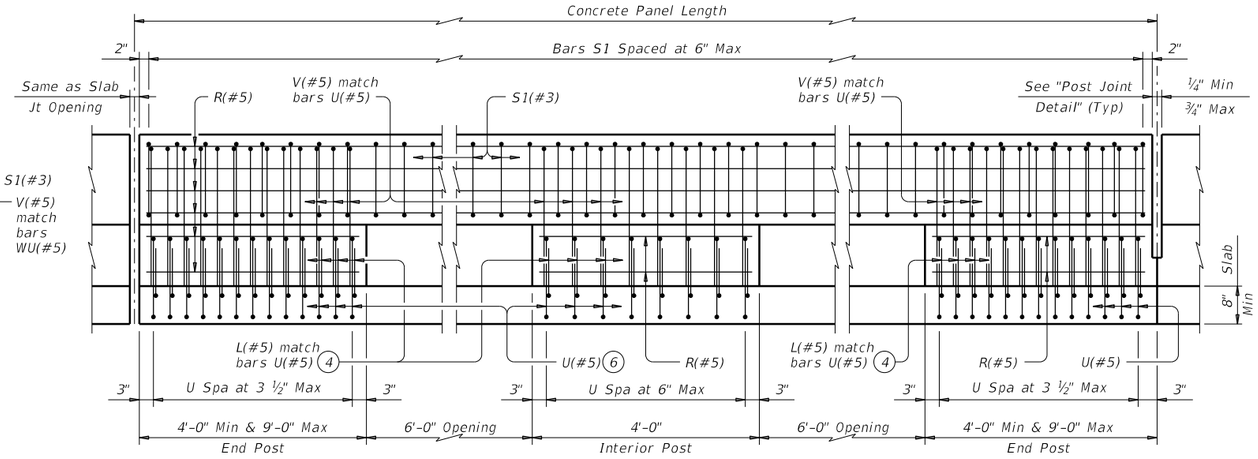


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS | AT 4' INTERIOR POST | AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

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

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

(3) Increase 2" for structures with overlay.

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

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

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

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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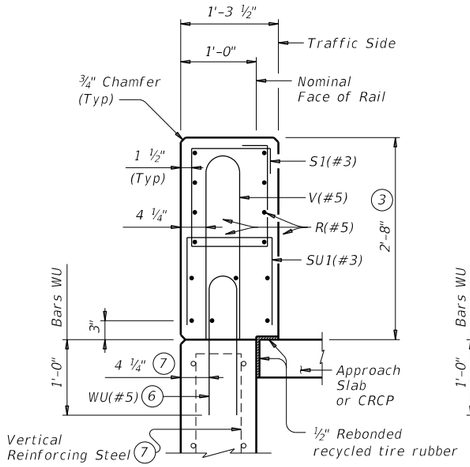
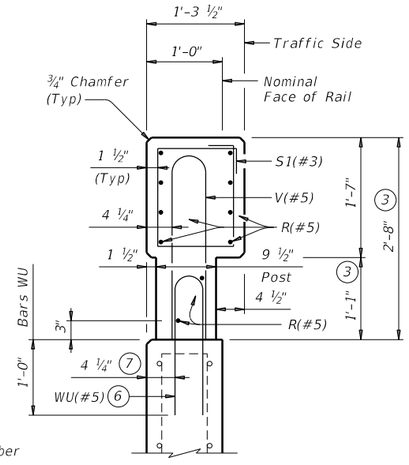
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		76

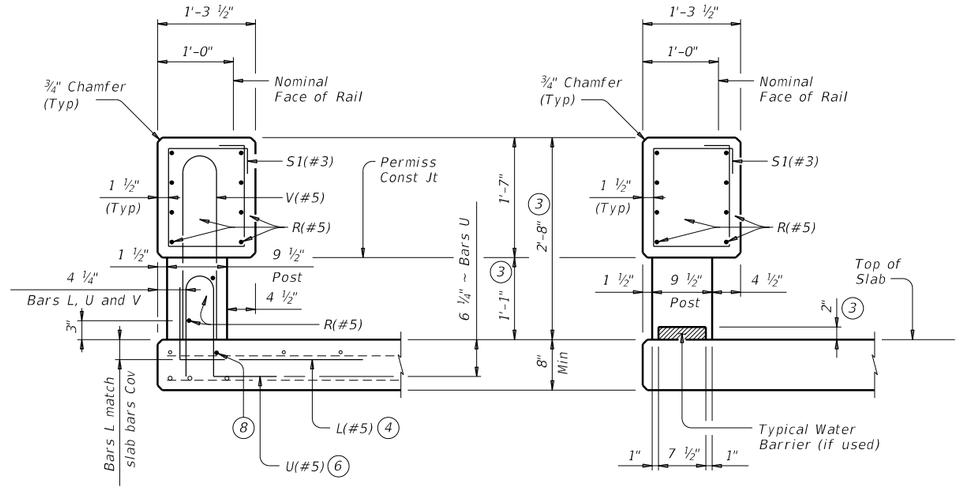
DATE: 5/11/2023 1:55:02 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/07_Bridge/Standards/rlstd005-19.dgn



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

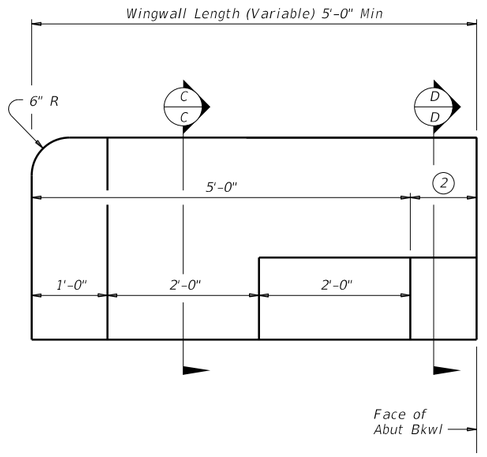


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

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

(3) Increase 2" for structures with overlay.

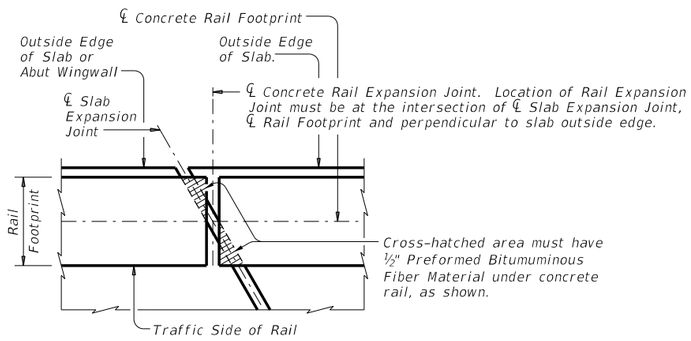
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

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

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

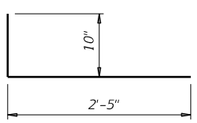
Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

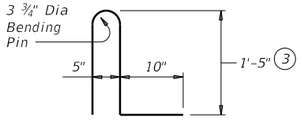
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

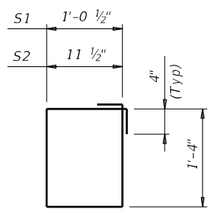
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



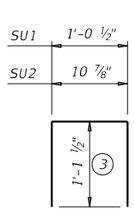
BARS L (#5)



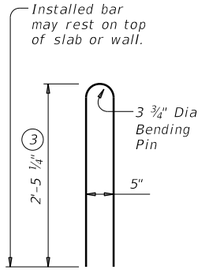
BARS U (#5) (9)



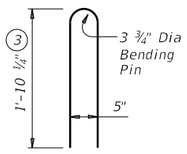
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		77

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"x36"	X		10 BWG	1	SA	P		
1	2	I-3	California Creek	42"x18"	X		10 BWG	1	SA	T		
1	2	I-3	California Creek	42"x18"	X		10 BWG	1	SA	T		
1	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"x36"	X		10 BWG	1	SA	P		

ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
Adrian Rangel
5/11/2023

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

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

http://www.txdot.gov/

NOTE:

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
4-16 8-16	DIST	COUNTY		SHEET NO.
	ABL	JONES		78

18

DATE: 5/11/2023 1:39:50 PM
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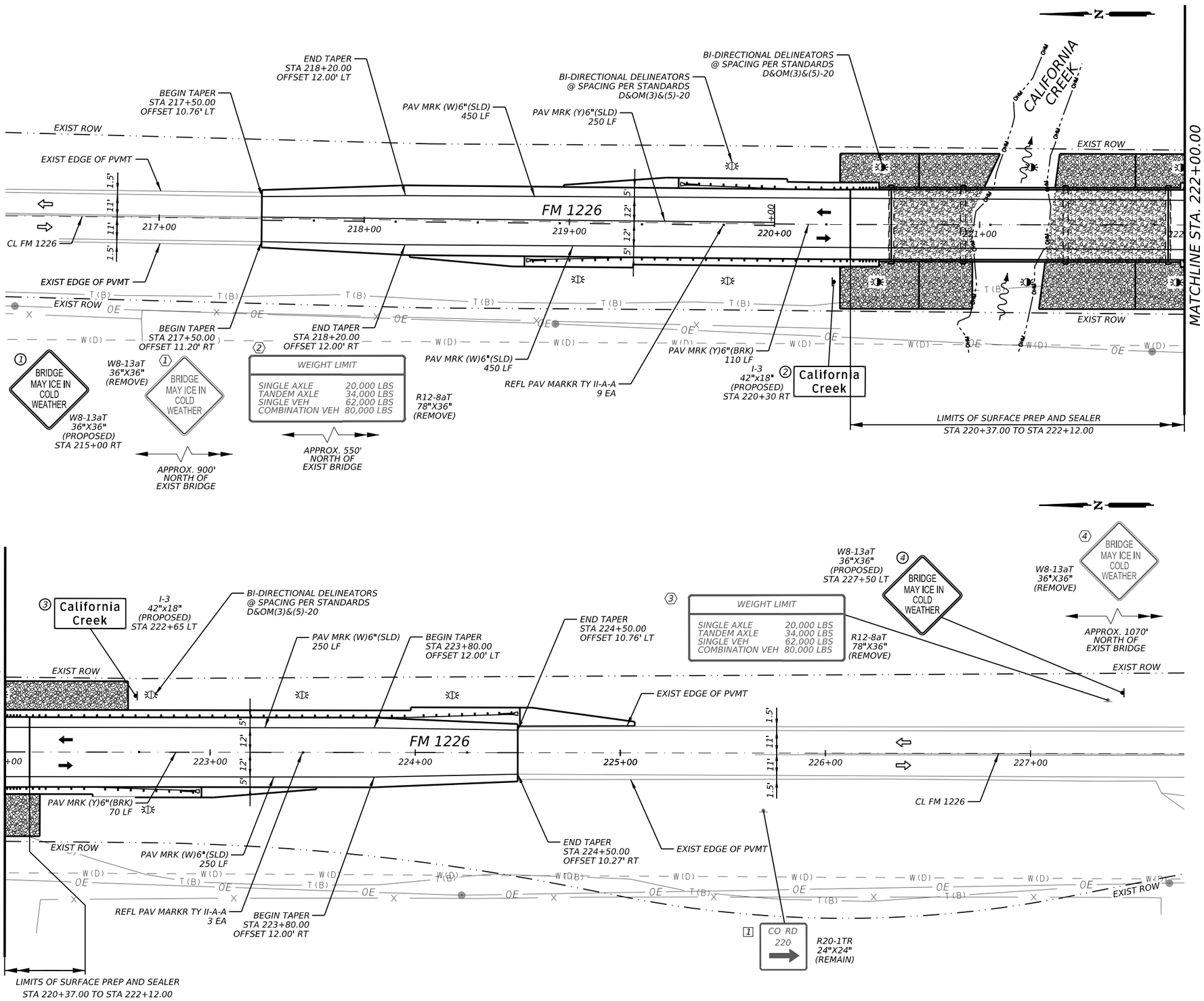

LEGEND:

- INSL DEL ASSM (D-SW)SZ1(BRF)GF2(BI)
- INSL DEL ASSM (D-SW)SZ(BRF)CTB(BI)
- REFL PAV MARKR TY II-A-A
- PROPOSED SIGN
- EXISTING SIGN
- EXISTING SIGN TO REMAIN
- EXISTING SIGN TO BE REMOVED
- PROPOSED SIGN NUMBER
- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC

NOTES:

1. SEE TXDOT STD D&OM FOR ADDITIONAL INFORMATION ON DELINEATOR PLACEMENT.
2. GF1 BARRIER REFLECTORS TO BE INSTALLED ALONG MBGF.
3. CTB REFLECTORS TO BE INSTALLED ALONG BRIDGE RAILS.
4. ALL STATIONS AND OFFSETS ARE FROM CENTERLINE OF FM 1226
5. ALL SIGNS DISPLACED BY CONSTRUCTION ACTIVITIES SHALL BE REPLACED ACCORDING TO TMUCTD WITH A NEW SIGN AND SIGN ASSEMBLY.
6. SEE SUMMARY OF SMALL SIGNS FOR MORE INFORMATION.
7. SEE SUMMARY OF REMOVAL ITEMS ON THE SUMMARY OF QUANTITIES SHEET FOR SIGN REMOVAL QUANTITIES.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER

Adrian Rangel
5/11/2023

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

SIGNING & PAVEMENT MARKING LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		79
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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DATE: 5/11/2023 1:40:00 PM
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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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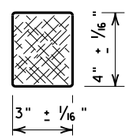
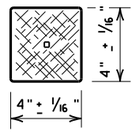
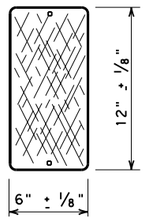
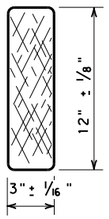
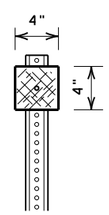
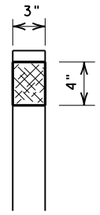
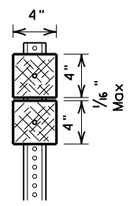
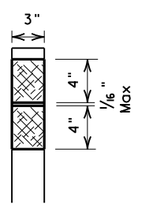
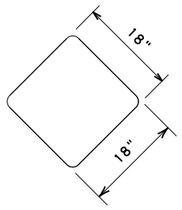
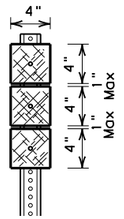
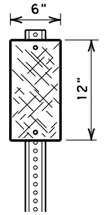
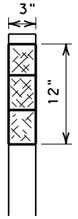
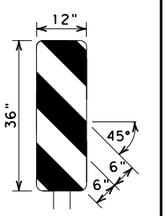
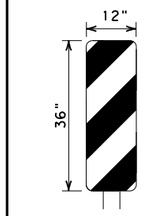
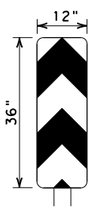
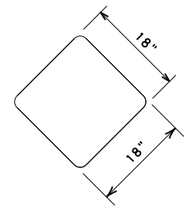
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

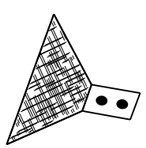
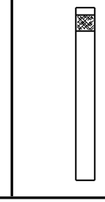
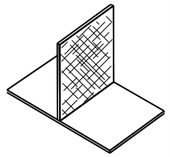
DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

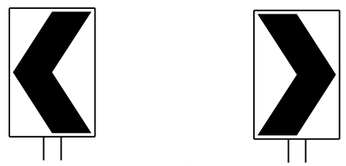
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



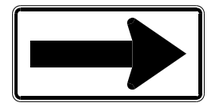
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ABL	JONES		80

20A

DATE: 5/11/2023 1:40:13 PM
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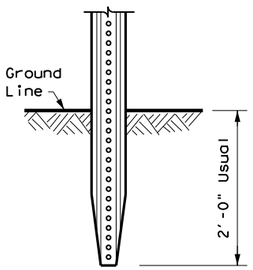
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

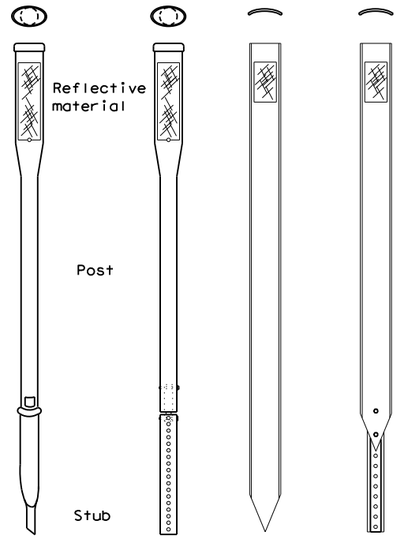


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

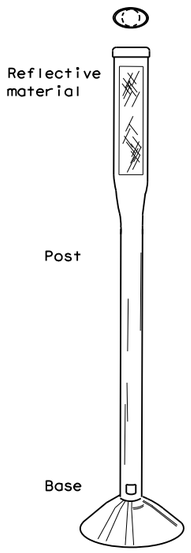
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



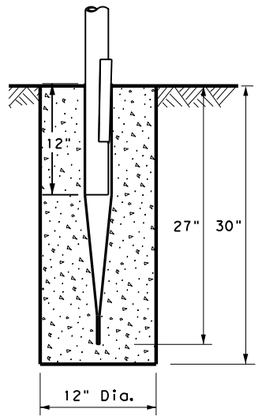
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

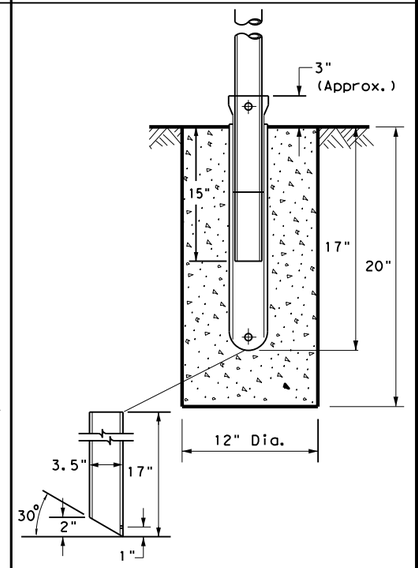
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

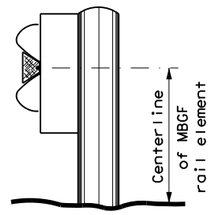
NOTE

1. Install per manufacturer's recommendations.

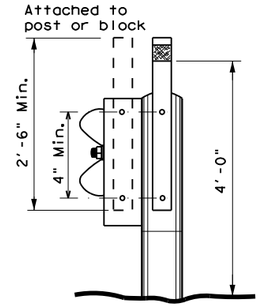
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

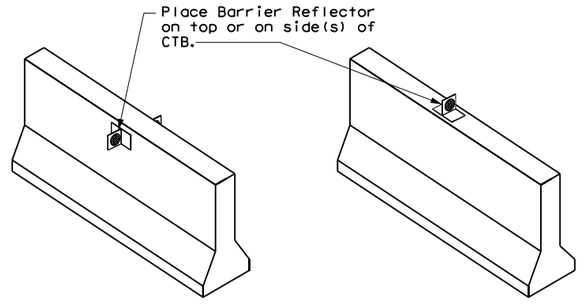
GF1



GF2



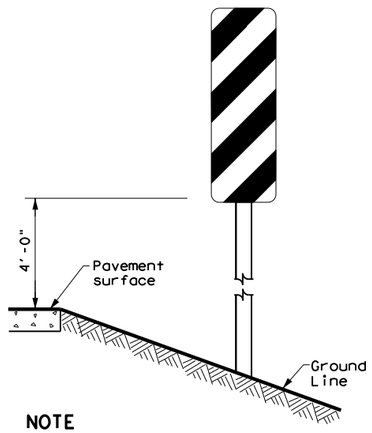
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

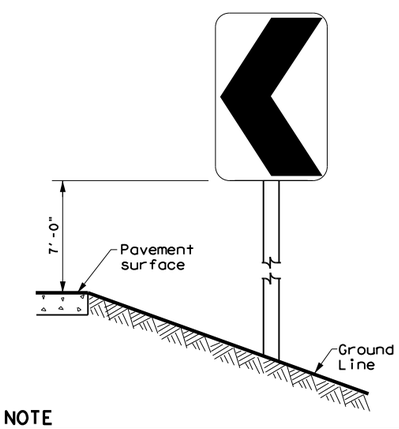
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

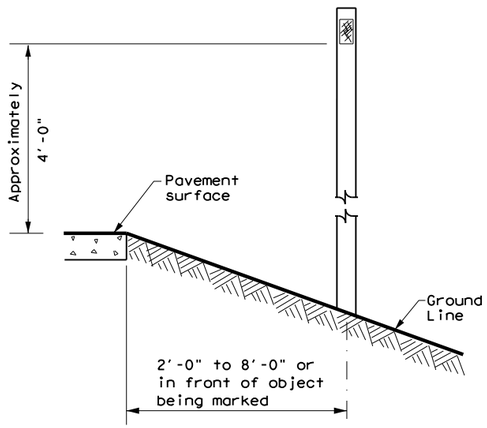
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ABL	JONES		81

20B

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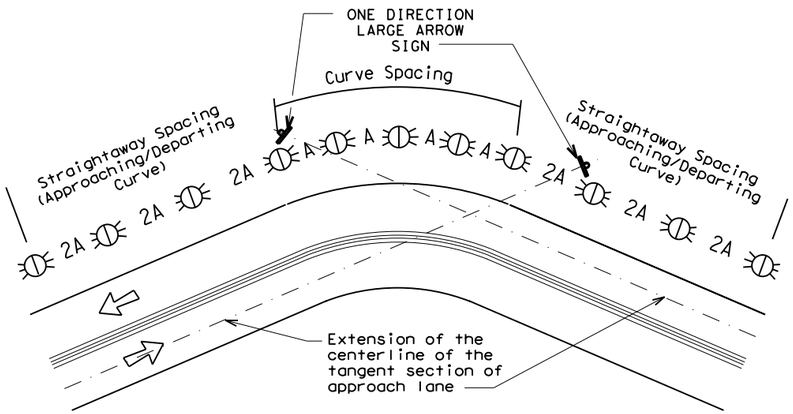
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

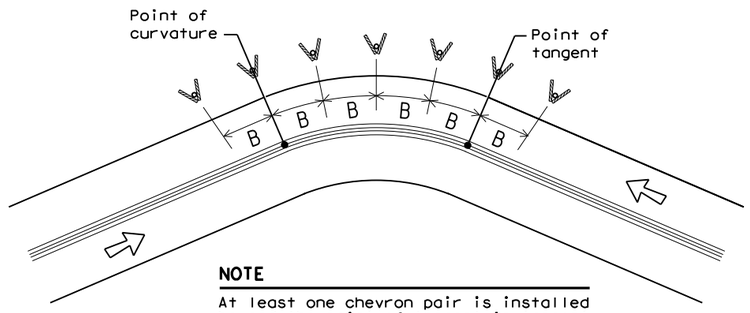
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

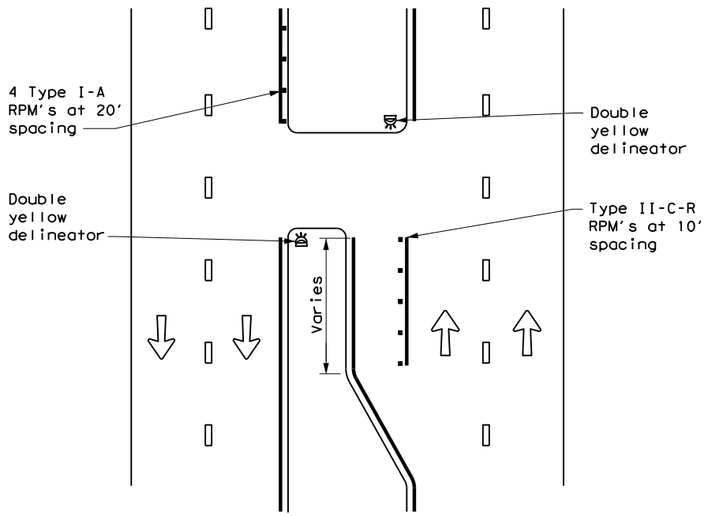
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	ABL	JONES		82

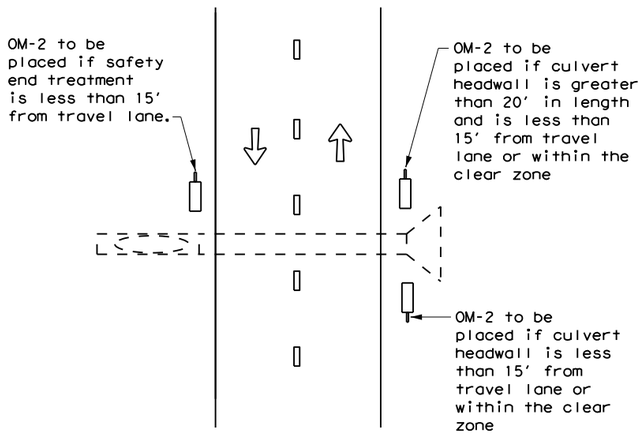
20C

CROSSOVERS



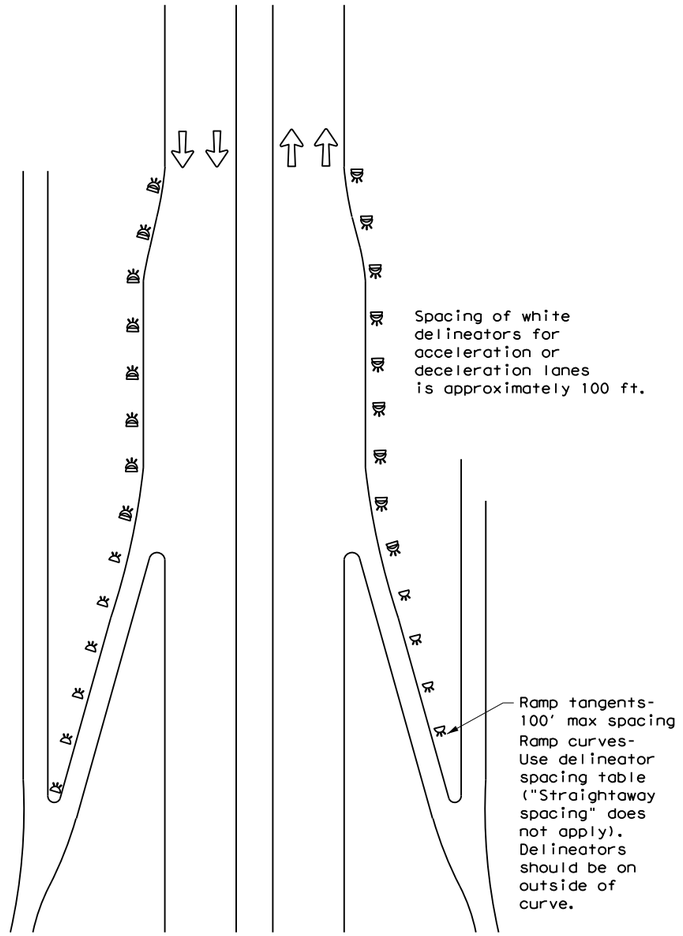
DETAIL 1

FOR CULVERTS WITH MBGF



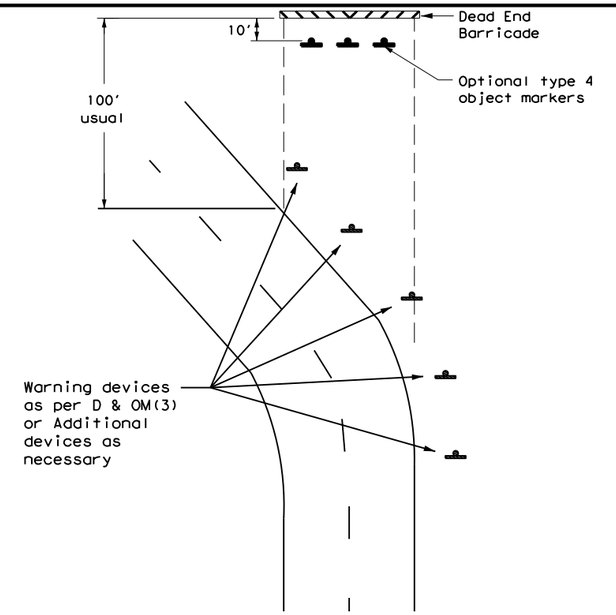
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



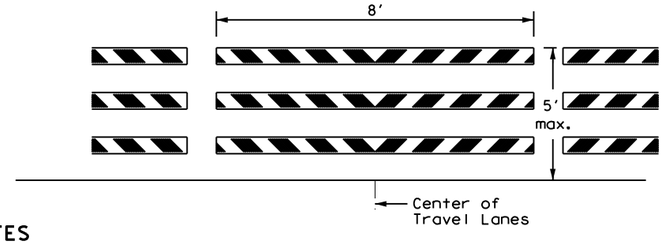
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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3-15	DIST	COUNTY		SHEET NO.
7-20	ABL	JONES		83

20D

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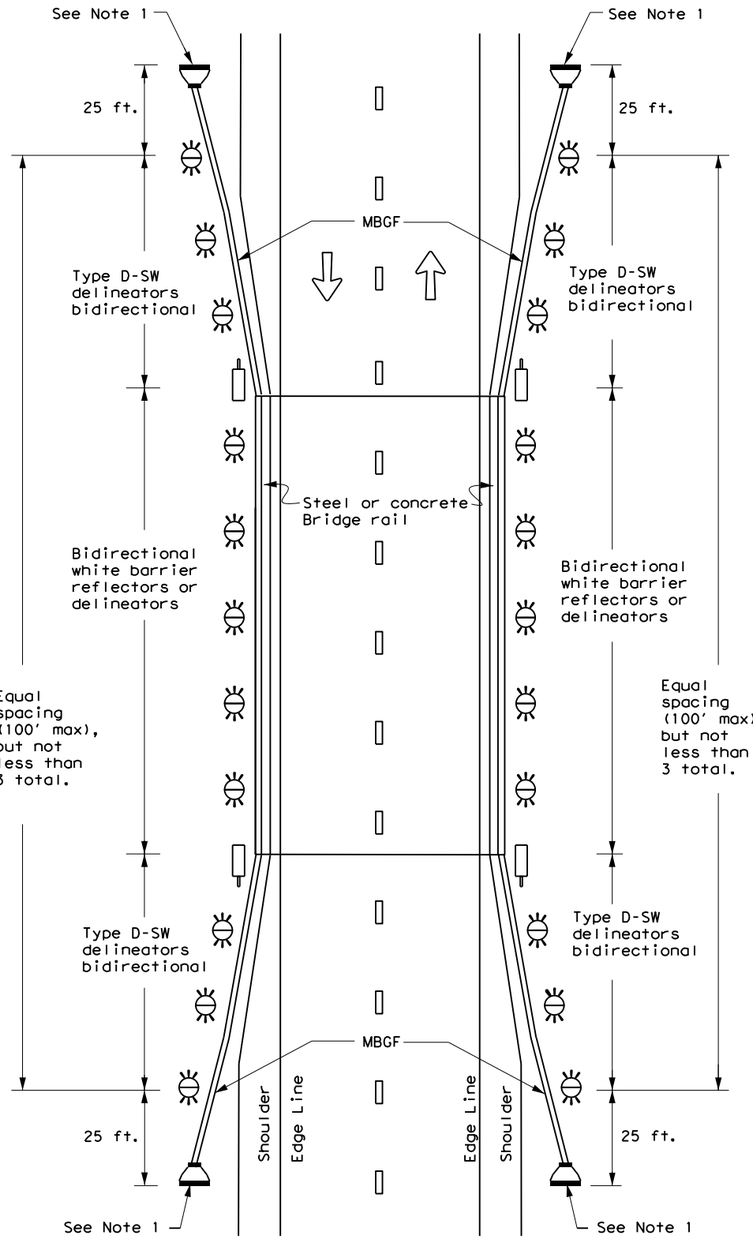
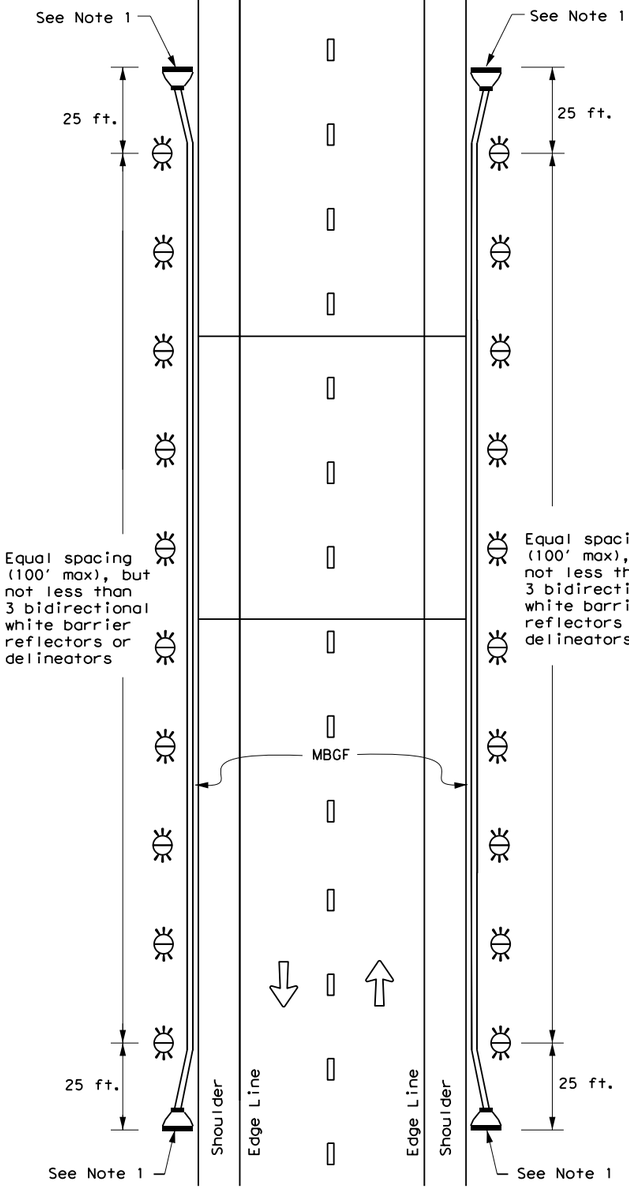
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

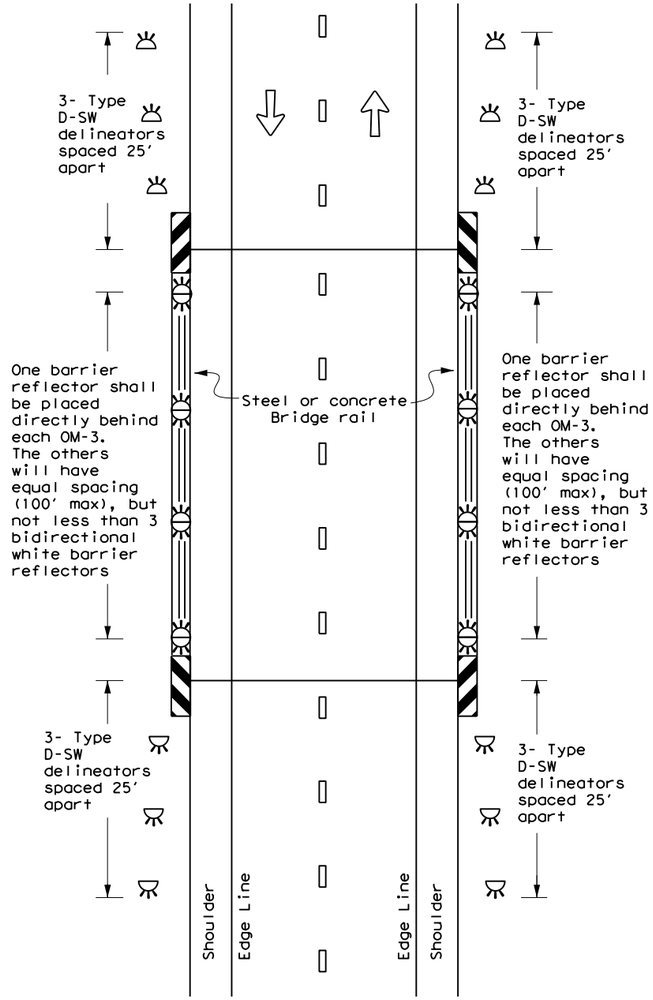
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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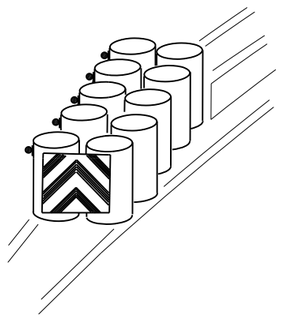
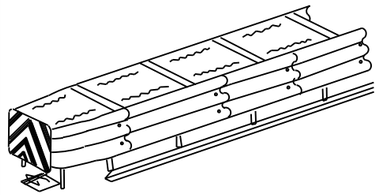
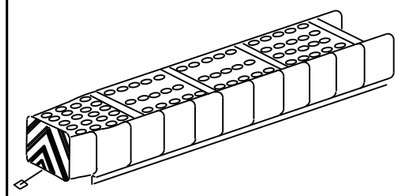
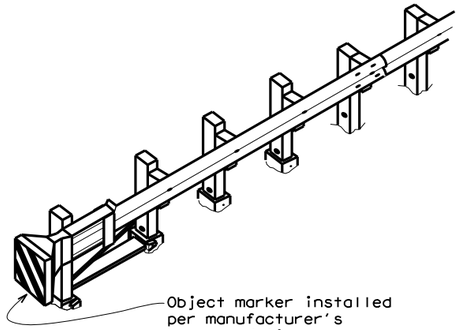
7-20	DIST	COUNTY		SHEET NO.
	ABL	JONES		84

20E

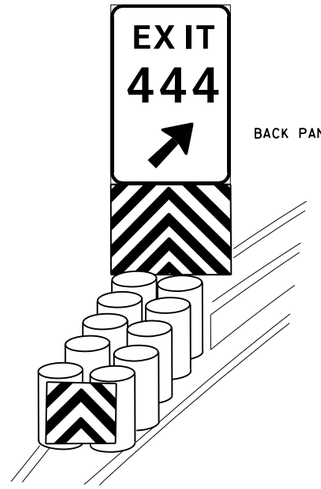




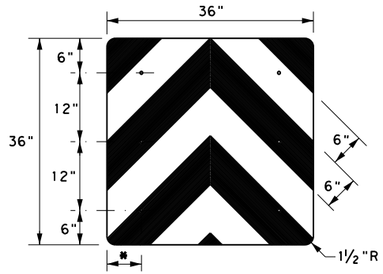


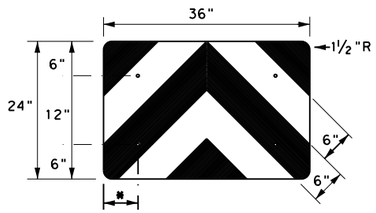


Object marker installed per manufacturer's recommendations.

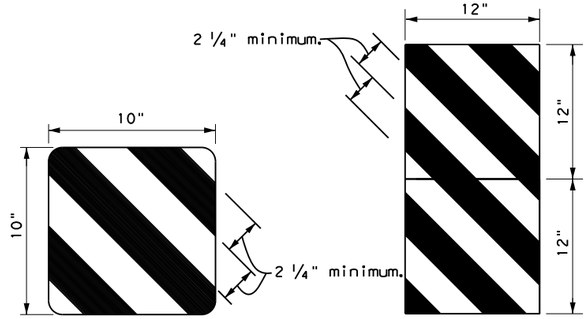


BACK PANEL (OPTIONAL)

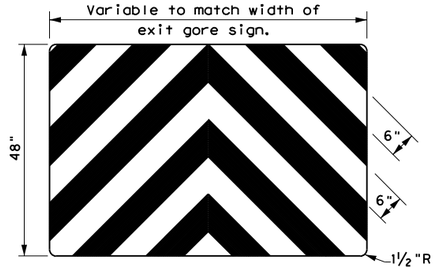


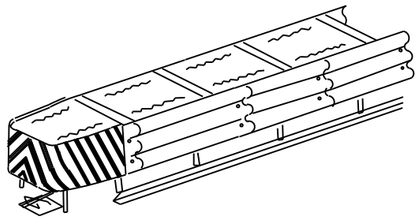


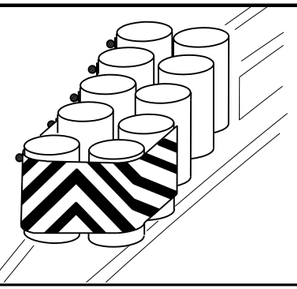
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

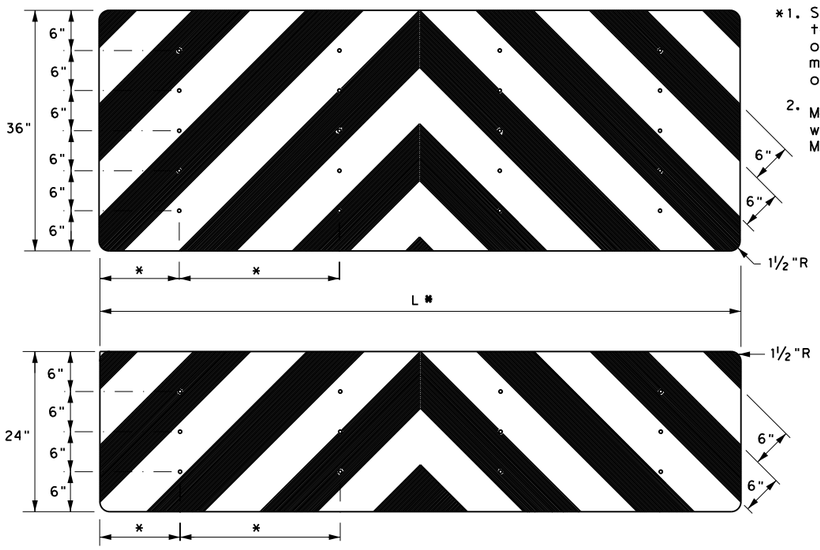


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	ABL	JONES		85
4-98 7-20				

20G

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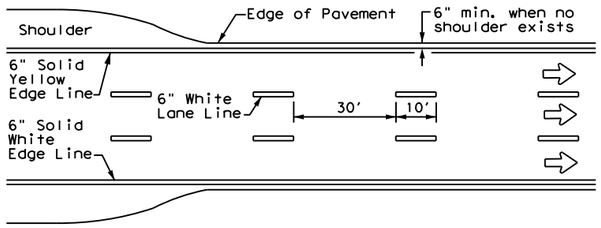
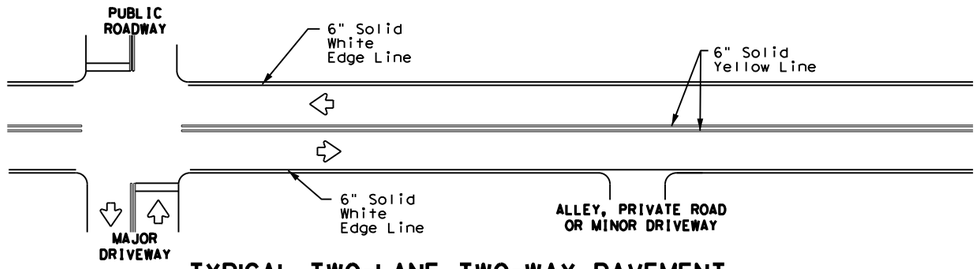
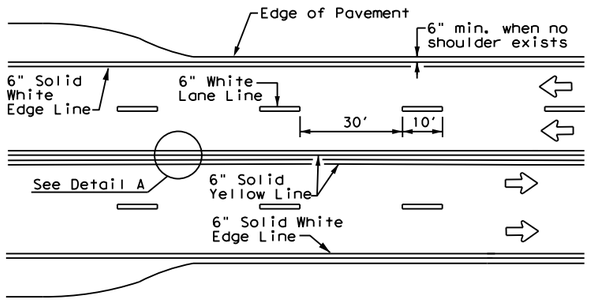
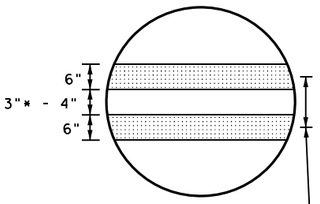


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





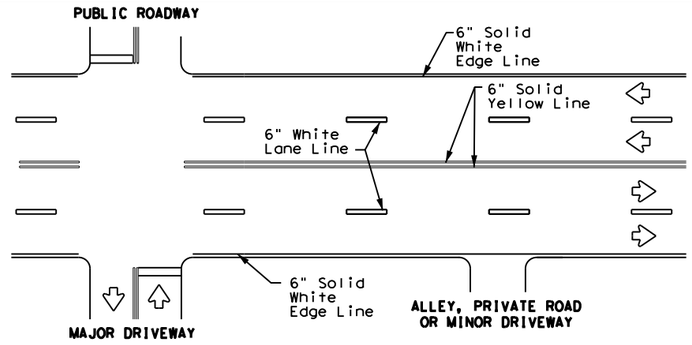
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

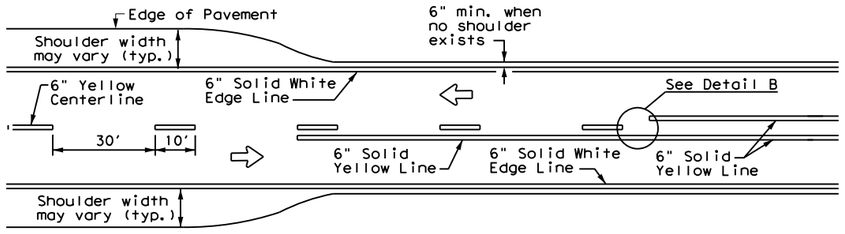
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

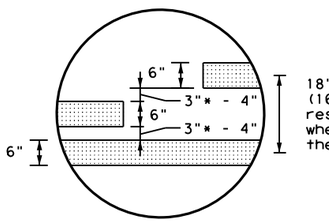
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

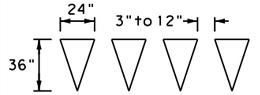


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



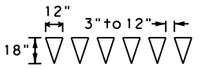
DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

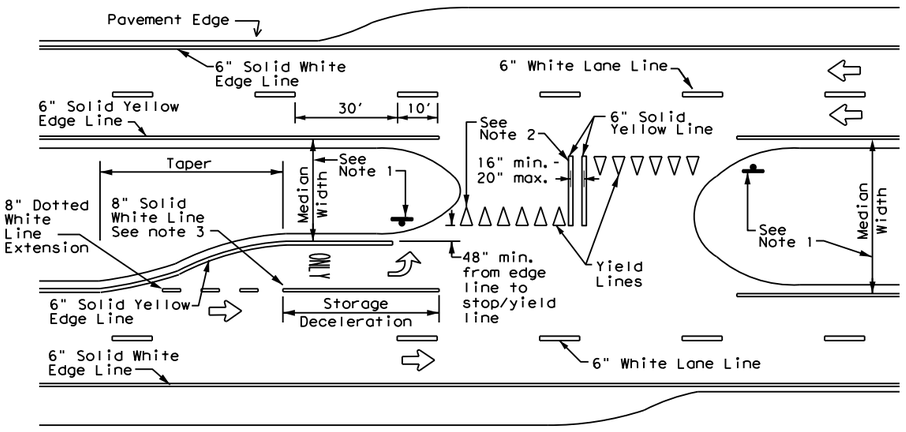


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

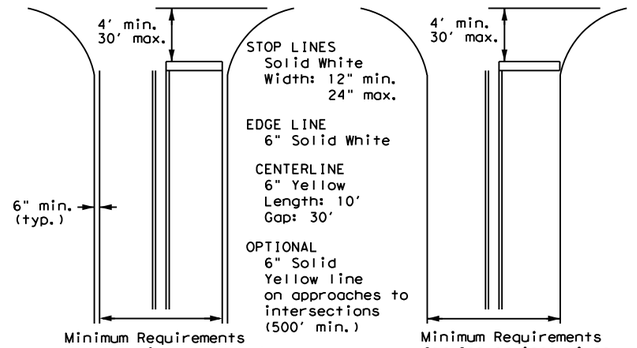
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

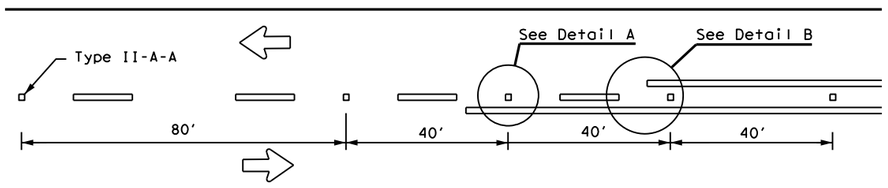
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

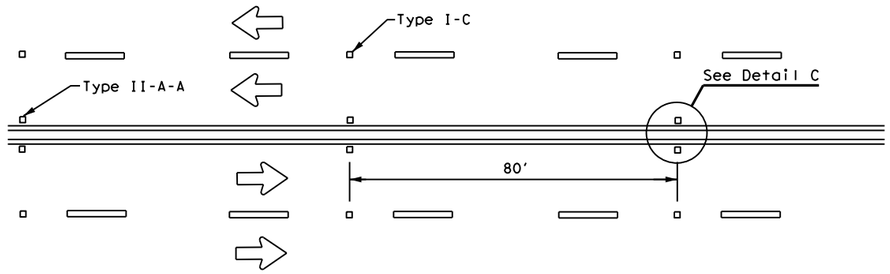
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	ABL	JONES		86
5-00 2-12				

22A

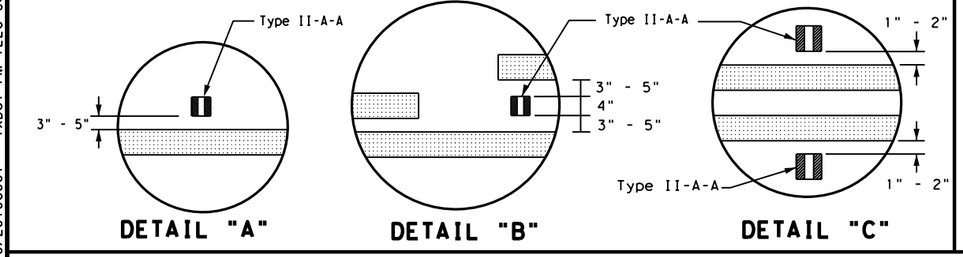
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

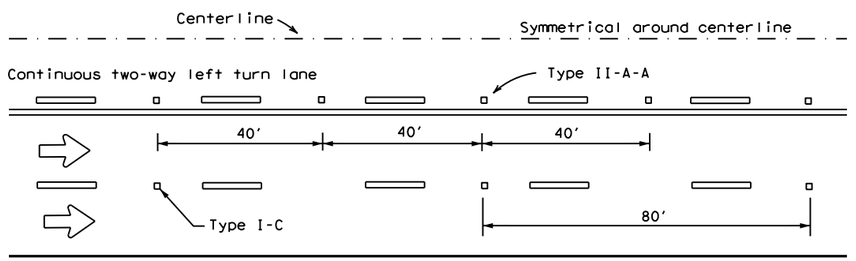


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

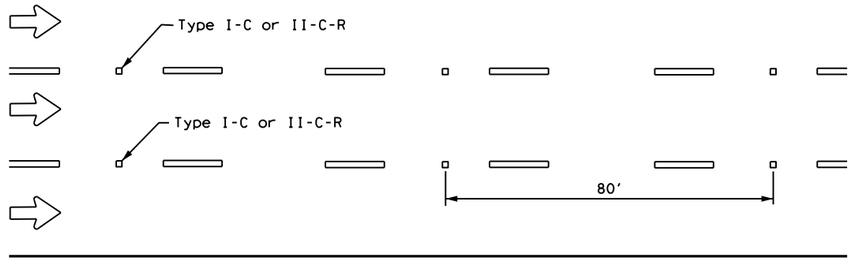


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



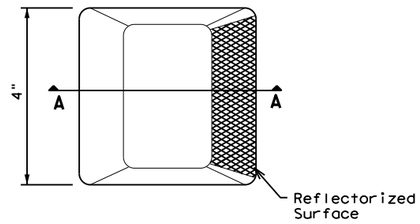
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

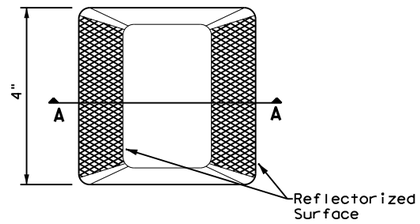
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

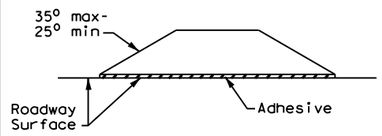
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

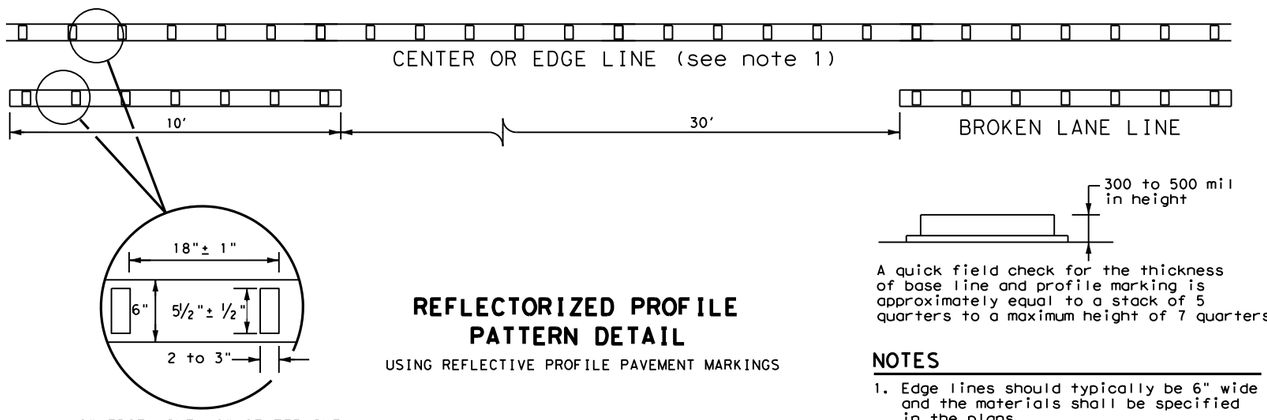


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	ABL	JONES		87
5-00 2-12				

22B

DATE: 5/11/2023 1:41:20 PM
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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

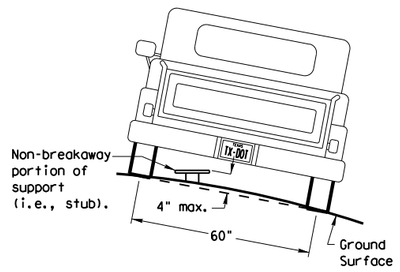
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

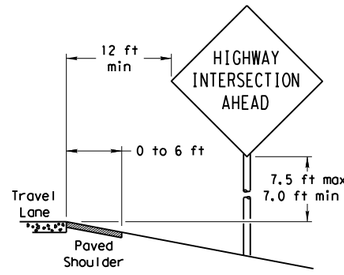
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

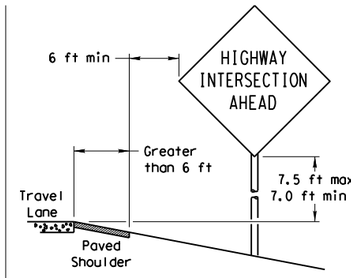
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

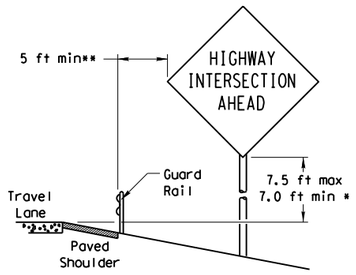
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



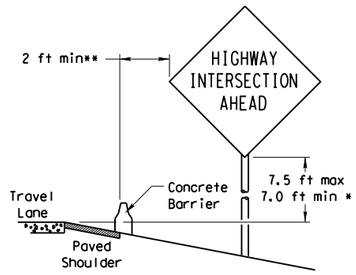
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



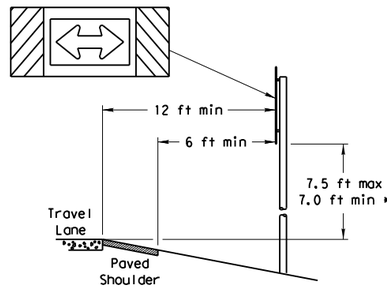
BEHIND GUARDRAIL



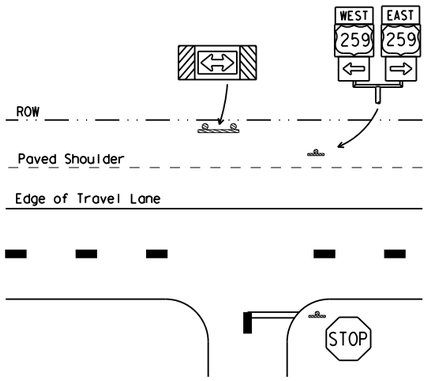
BEHIND CONCRETE BARRIER

****Sign clearance based on distance required for proper guard rail or concrete barrier performance.**

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

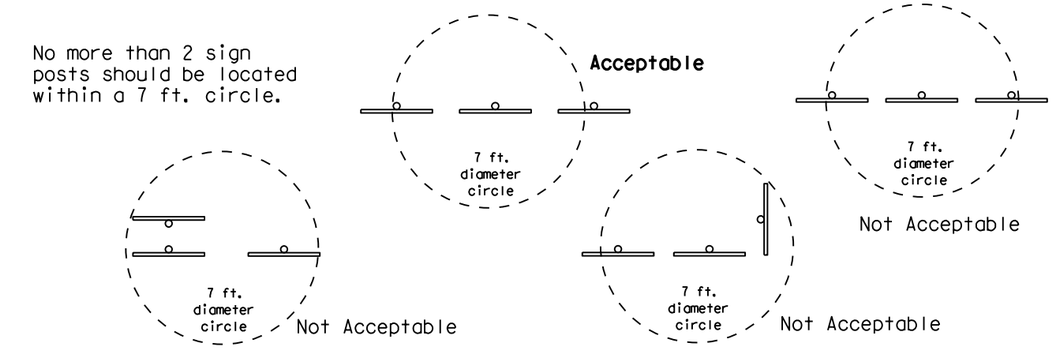
(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

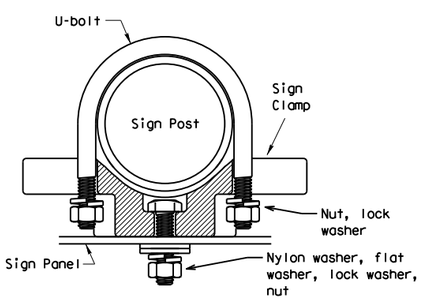
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

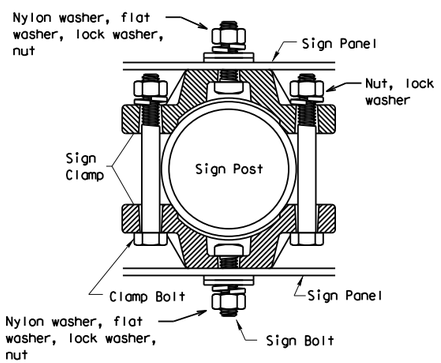


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

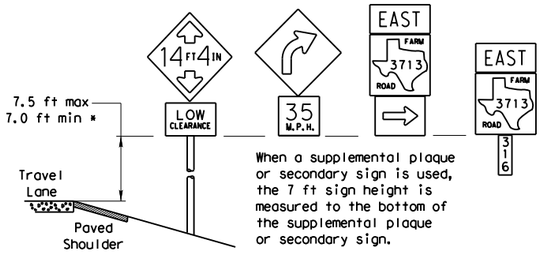
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



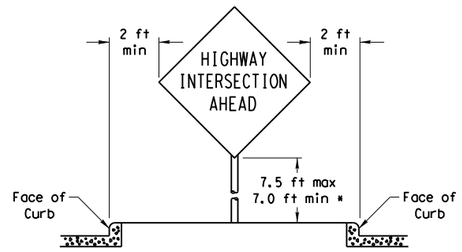
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



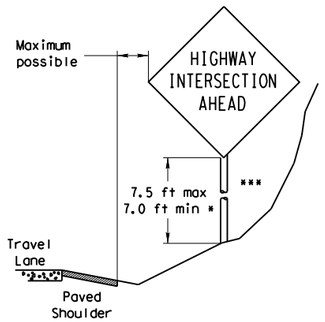
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		88

DATE: 5/11/2023 1:41:39 PM
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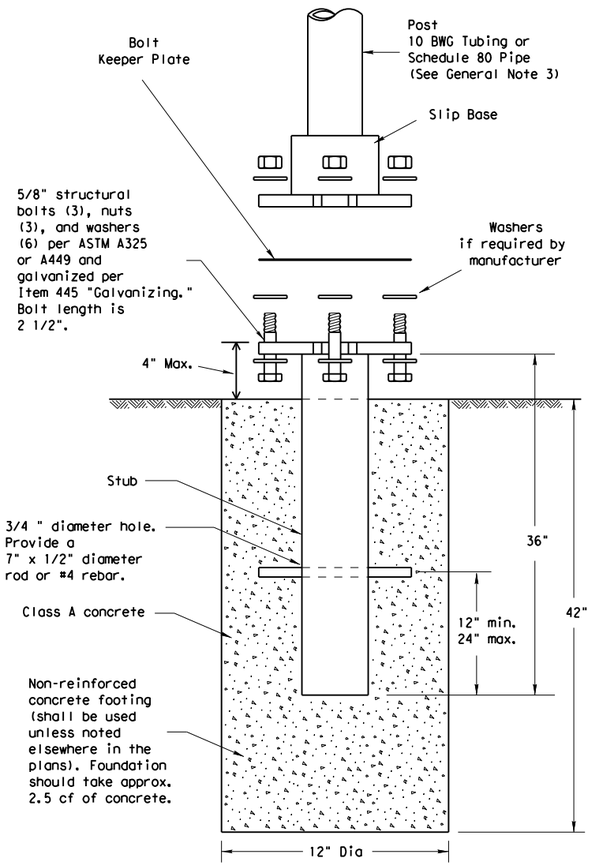
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

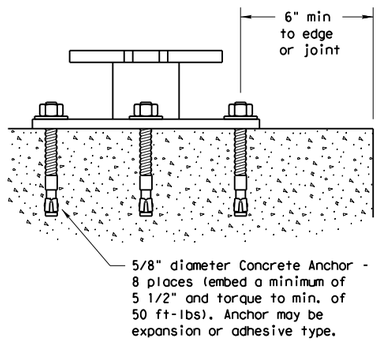
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1360	01	030	FM 1226

DIST	COUNTY	SHEET NO.
ABL	JONES	89

DATE: 5/11/2023 1:41:49 PM
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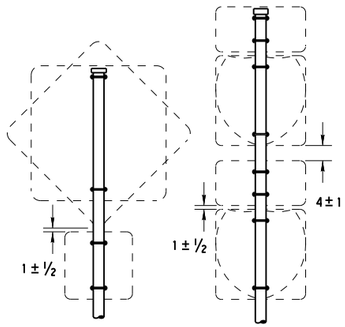
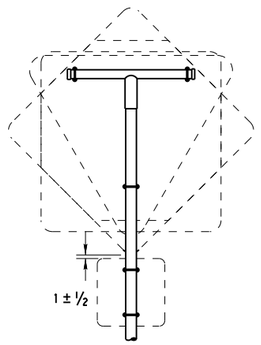


SM RD SGN ASSM TY XXXXX(1)XX(P)



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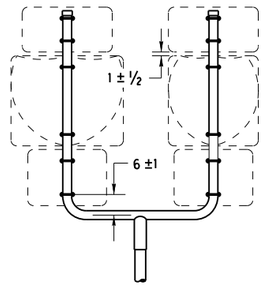

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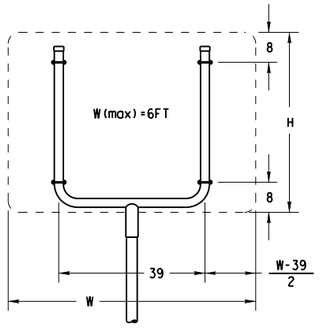

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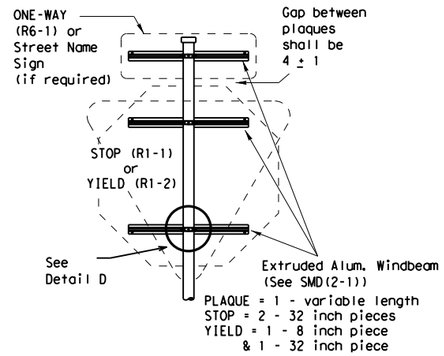
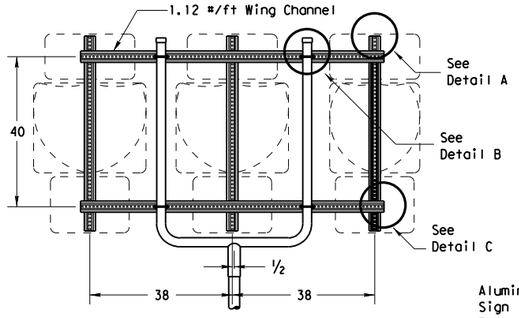
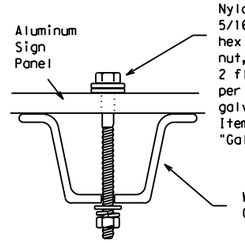


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)

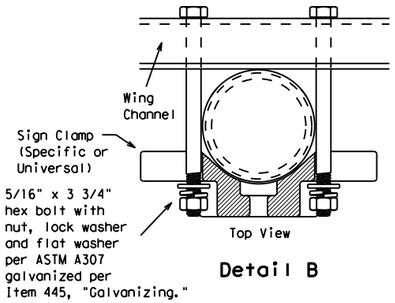


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



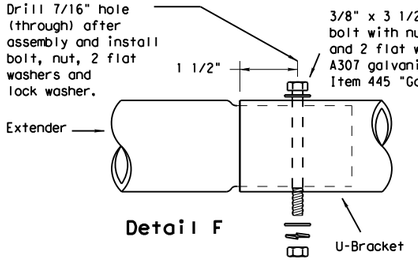
Top View

Detail A



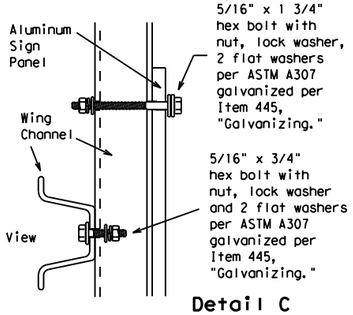
Top View

Detail B

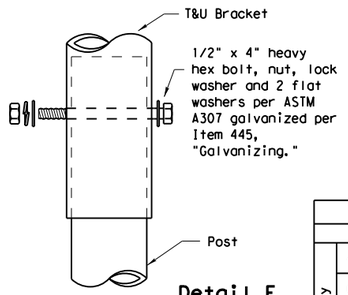


Detail F

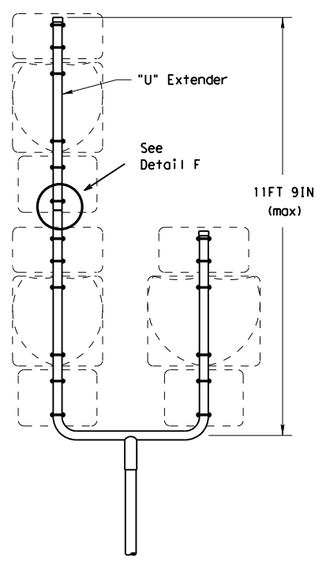
Splices shall only be allowed behind the sign substrate.



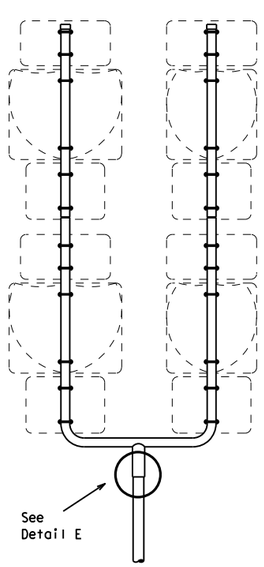
Detail C



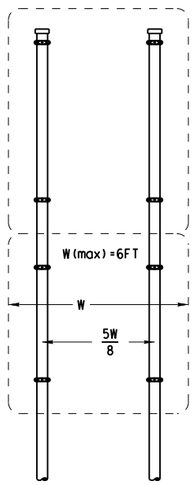
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

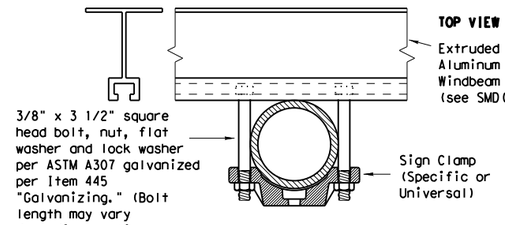


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

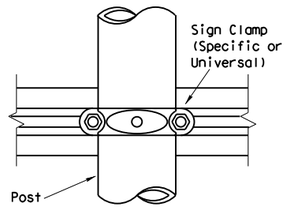


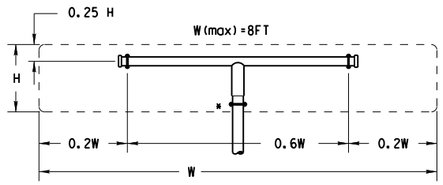
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

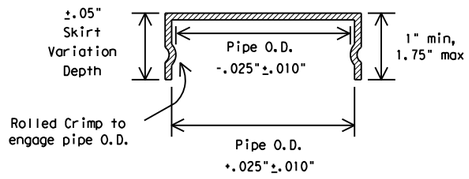




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

CONT	SECT	JOB	HIGHWAY
1360	01	030	FM 1226

DIST	COUNTY	SHEET NO.
ABL	JONES	90

9-08 REVISIONS

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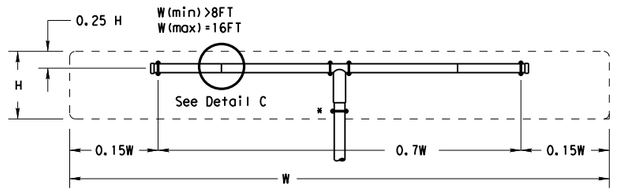
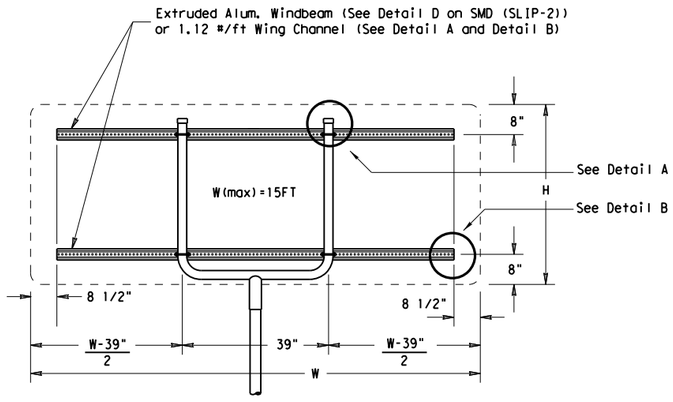


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



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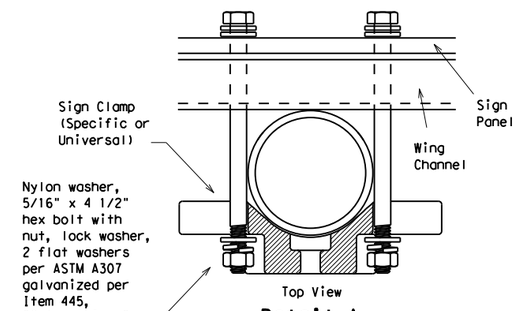
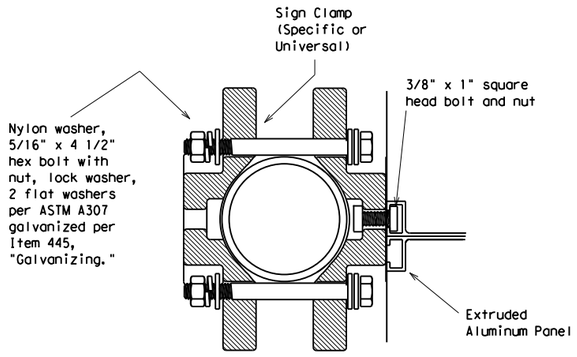
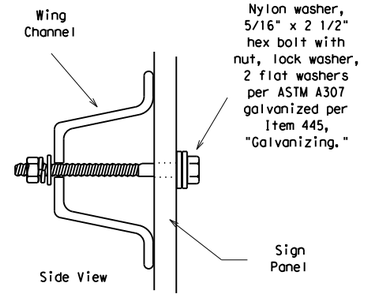


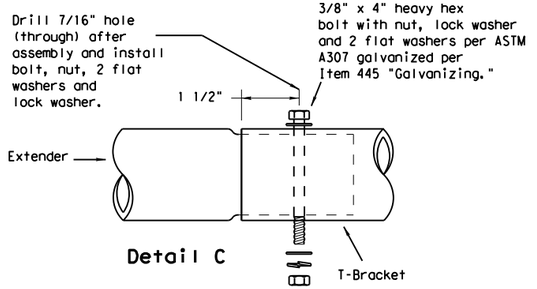
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

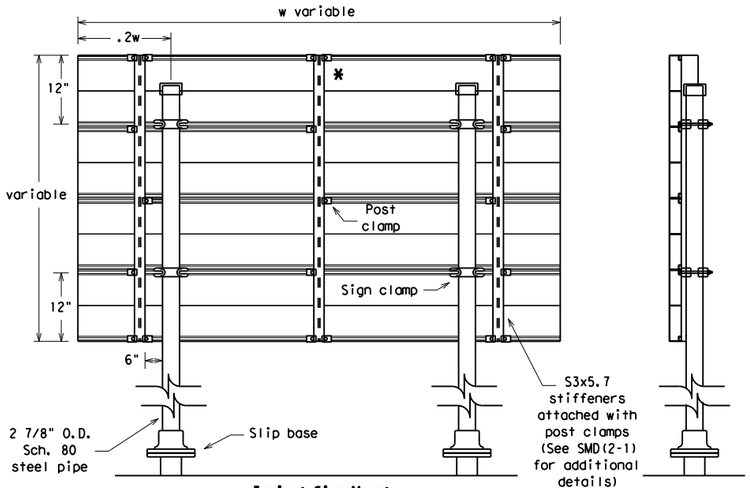


Detail B



Detail C

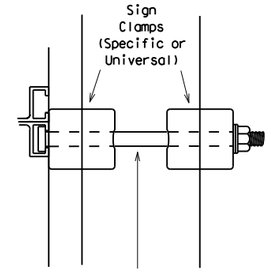
Splices shall only be allowed behind the sign substrate.



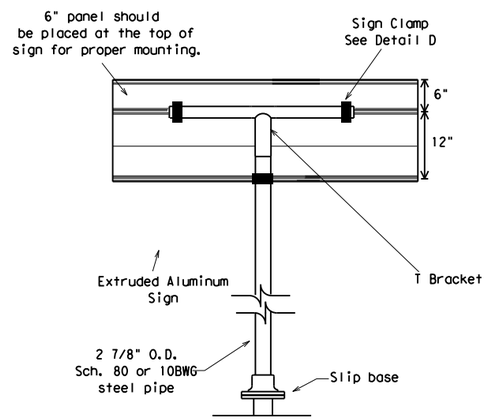
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

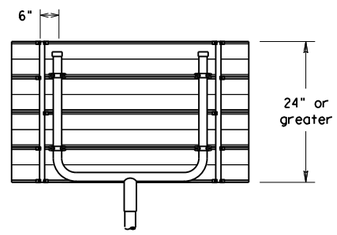
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. See table above.
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

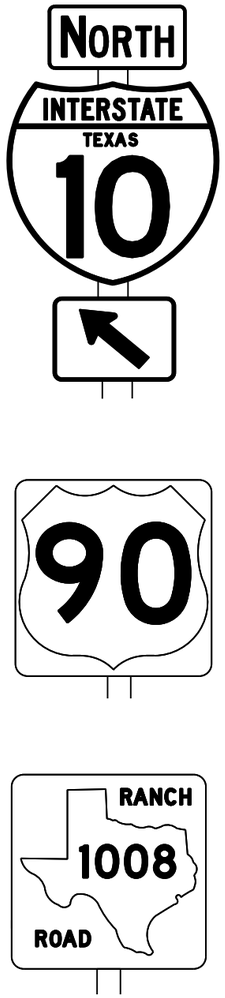
SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		91

DATE: 5/11/2023 1:42:08 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/08_Traffic/STANDARDS/08_11_tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

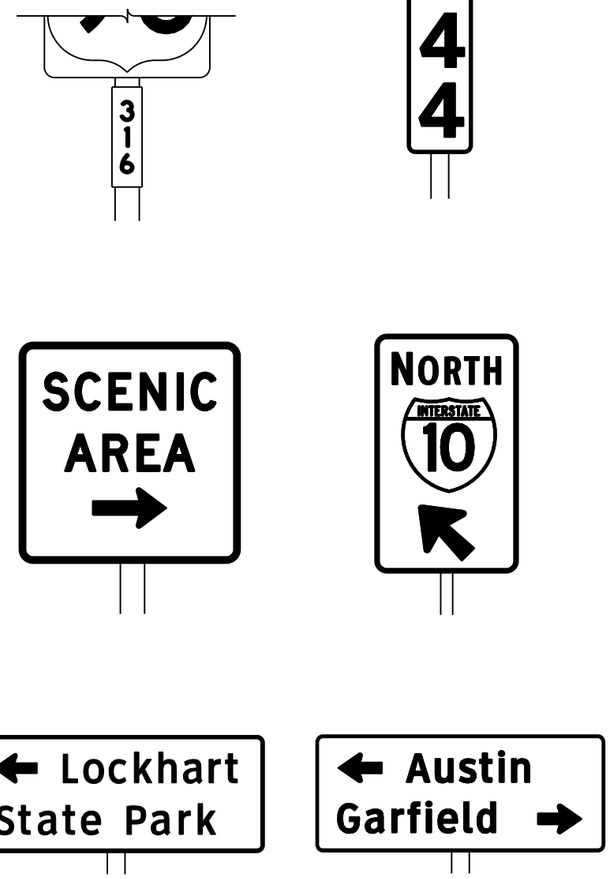
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

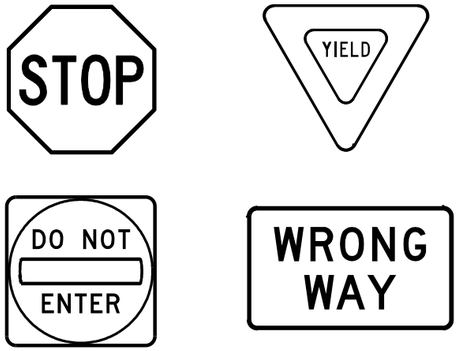
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ABL	JONES		92

DATE: 5/11/2023 1:42:17 PM
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/08_Traffic/STANDARDS/08_12_tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

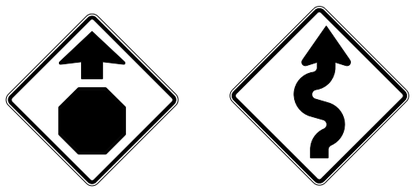
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

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

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ABL	JONES		93

4

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

CSJ: 1360-01-030

1.2 PROJECT LIMITS:

From: 375' NORTH OF CALIFORNIA CREEK

To: 325' SOUTH OF CALIFORNIA CREEK

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 32°53'10.4" N ,(Long) 99°47'58.9" W

END: (Lat) 32°53'03.5" N ,(Long) 99°47'59.0" W

1.4 TOTAL PROJECT AREA (Acres): 1.31

1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.31

1.6 NATURE OF CONSTRUCTION ACTIVITY:

CONSTRUCTION TO REPLACE EXISTING BRIDGE AND APPROACHES CONSISTING OF GRADING, DRAINAGE, PAVEMENT, SIGNING AND PAVEMENT MARKINGS.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Spur loam, moist, 0 to 1% slopes, occasionally flooded	92% spur and similar soils, 8% minor components, well drained, negligible runoff rate, and none - deposition erosion potential
Spur soils, broken, 0 to 1% slopes	100% spur and similar soils, well drained, negligible runoff rate, and Class 1 erosion potential

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☒ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s
CONCRETE WASH OUT	96

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☒ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☒ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☒ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☒ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☒ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☒ Solvents, paints, adhesives, etc. from various construction activities
- ☒ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☒ Contaminated water from excavation or dewatering pump-out water
- ☒ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☒ Long-term stockpiles of material and waste
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
CALIFORNIA CREEK (1232A); IMPAIRED FISH COMMUNITY, PAINT CREEK (1232C); NOT IMPAIRED	CLEAR FORK BRAZOS RIVER (1232); IMPAIRED FOR BACTERIA
NO TMDLs OR I-PLANS	WERE IDENTIFIED

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER

Adrian Rangel
9/13/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(SEE TITLE SHEET)		94
STATE	STATE DIST.	COUNTY	
TEXAS	ABL	JONES	
CONT.	SECT.	JOB	HIGHWAY NO.
1360	01	030	FM 1226

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- [X] [ ] Protection of Existing Vegetation
- [ ] [ ] Vegetated Buffer Zones
- [X] [ ] Soil Retention Blankets
- [ ] [ ] Geotextiles
- [ ] [ ] Mulching/ Hydromulching
- [ ] [ ] Soil Surface Treatments
- [X] [ ] Temporary Seeding
- [ ] [X] Permanent Planting, Sodding or Seeding
- [X] [ ] Biodegradable Erosion Control Logs
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [X] [X] Vertical Tracking
- [ ] [ ] Interceptor Swale
- [ ] [X] Riprap
- [ ] [ ] Diversion Dike
- [ ] [ ] Temporary Pipe Slope Drain
- [ ] [X] Embankment for Erosion Control
- [ ] [ ] Paved Flumes
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [ ] [ ] Inlet Protection
- [X] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [X] [ ] Sediment Control Fence
- [X] [ ] Stabilized Construction Exit
- [ ] [ ] Floating Turbidity Barrier
- [ ] [ ] Vegetated Buffer Zones
- [ ] [ ] Vegetated Filter Strips
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____
- [ ] [ ] Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- [ ] [ ] Sediment Trap
  - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - [ ] 3,600 cubic feet of storage per acre drained
- [ ] [ ] Sedimentation Basin
  - [X] Not required (<10 acres disturbed)
  - [ ] Required (>10 acres) and implemented.
    - [ ] Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - [ ] 3,600 cubic feet of storage per acre drained
  - [ ] Required (>10 acres), but not feasible due to:
    - [ ] Available area/Site geometry
    - [ ] Site slope/Drainage patterns
    - [ ] Site soils/Geotechnical factors
    - [ ] Public safety
    - [ ] Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
RIPRAP	220+32.00	220+84.50
RIPRAP	221+54.00	222+17.00
PERMANENT PLANTING, SODDING OR SEEDING	217+50.00	224+50.00
VERTICAL TRACKING	217+50.00	224+50.00
EMBANKMENT FOR EROSION CONTROL	217+50.00	224+50.00

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- [X] Excess dirt/mud on road removed daily
- [X] Haul roads dampened for dust control
- [X] Loaded haul trucks to be covered with tarpaulin
- [X] Stabilized construction exit
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- [ ] Chemical Management
- [X] Concrete and Materials Waste Management
- [X] Debris and Trash Management
- [X] Dust Control
- [X] Sanitary Facilities
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____
- [ ] Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

VEGETATED BUFFER ZONE IS NOT FEASIBLE DUE TO SITE RESTRICTIONS. EROSION CONTROL LOGS AND SEDIMENT CONTROL FENCE HAVE BEEN INCORPORATED INTO THE PROJECT SWP3.

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER
Adrian Rangel
9/13/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	(SEE TITLE SHEET)		95
STATE	STATE DIST.	COUNTY	
TEXAS	ABL	JONES	
CONT.	SECT.	JOB	HIGHWAY NO.
1360	01	030	FM 1226

PREPARED BY (NAME OF DESIGNER)
DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/10*Environmental/10*020*FM1226*ENV*EPIC.dgn

I. STORM WATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Storm water Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

☐ No Action Required ☒ Required Action

Action 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, Streets, and Bridges (2014 Edition, Section 7.6., Page 44). The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
2. Prevent storm water pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
3. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
4. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
5. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATER BODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. 1232A - CALIFORNIA CREEK

2.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☒ Mulch	☐ Triangular Filter Dike	☐ Sedimentation Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw & Hay Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost & Mulch
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Sand Filter Systems
☒ Temporary Erosion Control Logs (BIOLOGS)	☒ Temporary Erosion Control Logs (BIOLOGS)	☐ Temporary Erosion Control Logs (BIOLOGS)
☒ Preservation of Natural Resources	☐ Sediment Traps	☒ PermanentVegetation (Planting, Sodding, or Seeding)
☒ Construction Exits	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☐ No Action Required ☒ Required Action

Action No.

1. Please refer to the General Notes for further details.
2.
3.
4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. USE NATIVE VEGITATION - E.O. 13112
2.
3.
4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Migratory Bird Treat Act (MGBTA) for the protection of Birds, their young, and nests.
2. Please refer to the General Notes for further details.
3.
4.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Action No.

1. Lead Base Paint is present on this structure. Proper Abatement structures must be taken before or during demolotion of this bridge.
2.
3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.

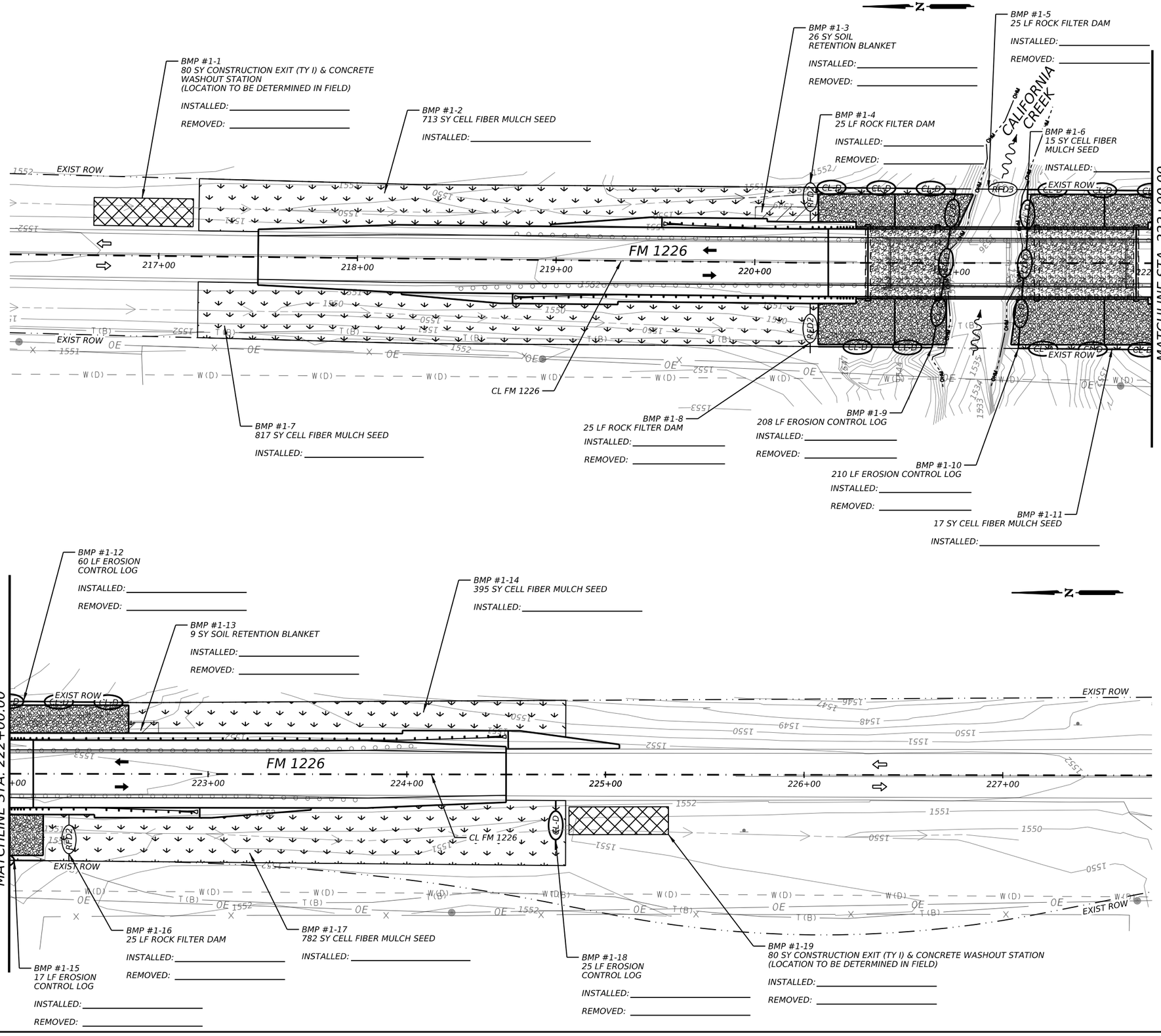
FM 1226
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
EPIC

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	(SEE TITLE SHEET)		FM 1226
STATE	COUNTY		SHEET NO.
TEXAS	JONES		96
DISTRICT	CONTROL	SECTION	JOB
ABL	1360	01	030

REV. DATE: 02/2015



LEGEND:

- TEMPORARY & PERMANENT SEEDING
- CONSTRUCTION EXIT/ENTRANCE AND CONCRETE WASHOUT
- SOIL RETENTION BLANKET (TY B)(CL I)
- CL-D — EROSION CONTROL LOG
- RFD2 — TYPE 2 ROCK FILTER DAM
- RFD3 — TYPE 3 ROCK FILTER DAM
- PROPOSED DITCH
- EXISTING DITCH

NOTES:

1. LOCATIONS OF EROSION CONTROL DEVICES, INCLUDING CONSTRUCTION ENTRANCES, CONSTRUCTION EXITS AND CONCRETE WASHOUTS, ARE APPROXIMATIONS. ACTUAL LOCATIONS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
2. EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY AND SHALL REMAIN IN PLACE UNTIL CONSTRUCTION IS COMPLETE.
3. EROSION CONTROL DEVICE INSTALLATION, MAINTENANCE, AND REMOVAL SHALL BE IN ACCORDANCE WITH TXDOT STANDARDS FOR EROSION CONTROL.
4. SEE DAILY WORK REPORTS FOR INITIAL STABILIZATION TIME FRAMES.
5. TOPSOIL TO BE STOCKPILED IN WINDROWS ALONG ROW. ALL WINDROW WORK SHALL BE SUBSIDIARY TO ITEM 132.
6. THIS SHEET IS PROVIDED AS PART OF THE SW3P PERMIT AND WILL BE USED BY DEPARTMENT PERSONNEL DURING CONSTRUCTION ACTIVITIES TO DOCUMENT THE INSTALLATION AND MAINTENANCE OF ANY BMP'S USED ON THIS PROJECT.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER

Adrian Rangel
6/1/2023

GARVER
3755 S. Capital of Texas Highway
Suite 325
Austin, TX 78704
(512) 485-0009
TBPELS Firm 5713

2023 Texas Department of Transportation

FM 1226
AT CALIFORNIA CREEK

ENVIRONMENTAL LAYOUT SHEET

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6	(SEE TITLE SHEET)		97
STATE	DISTRICT	COUNTY	
TEXAS	ABL	JONES	
CONTROL	SECTION	JOB	HIGHWAY
1360	01	030	FM 1226

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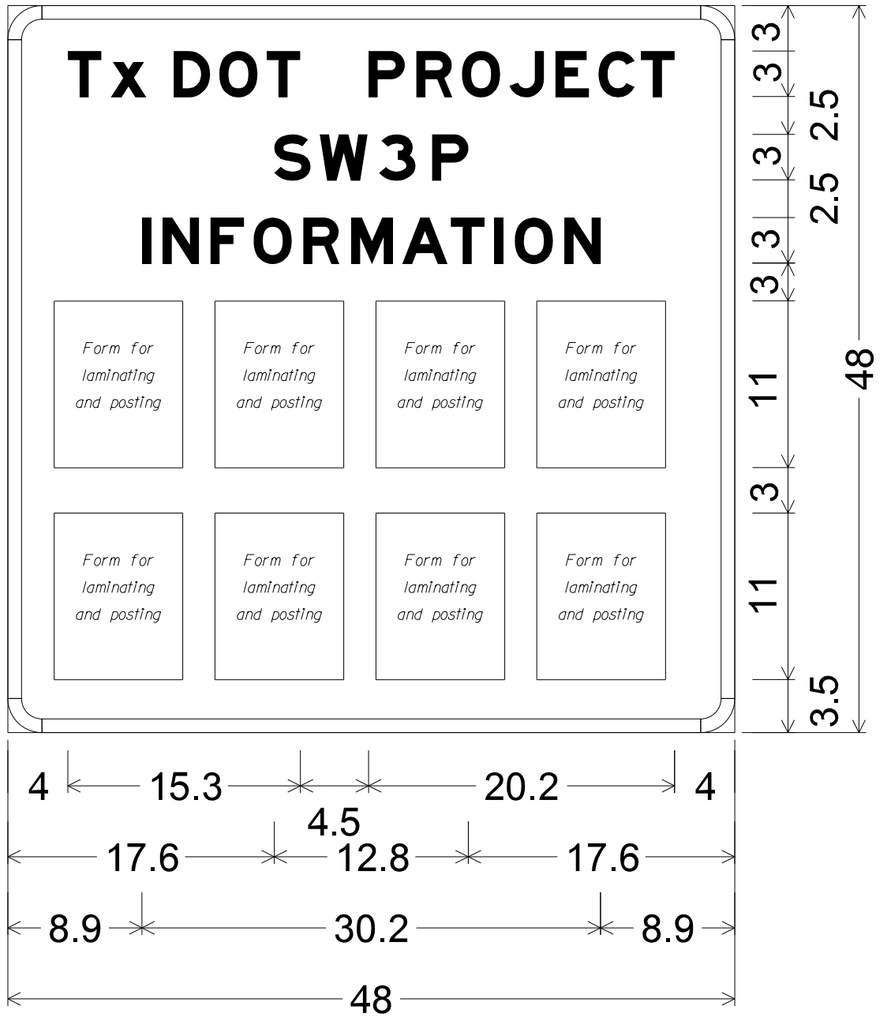

2.3" Radius, 0.9" Border, White on Blue;
[TxDOT PROJECT] E Mod;
[SW3P] E Mod;
[INFORMATION] E Mod;

NOTE:

The Forms needed for laminating and posting to the SW3P Notification Board will be provided by the Engineer. The total number of forms may vary. Notification Boards are to be constructed from Plywood, ½ or ⅝-inch thick, in accordance with TxDOT Departmental Material Specification (DMS)-7100. 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 sign will be placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.

STATE OF TEXAS
ADRIAN RANGEL
124879
LICENSED
PROFESSIONAL ENGINEER
Adrian Rangel
5/11/2023

SW3P NOTIFICATION BOARD DETAIL

Texas Department of Transportation

NO SCALE SHEET 1 OF 1

FHWA DIVISION	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM 1226
STATE	COUNTY		SHEET NO.
TEXAS	JONES		98
DISTRICT	CONTROL	SECTION	JOB
ABL	1360	01	030

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DATE 5/11/2023
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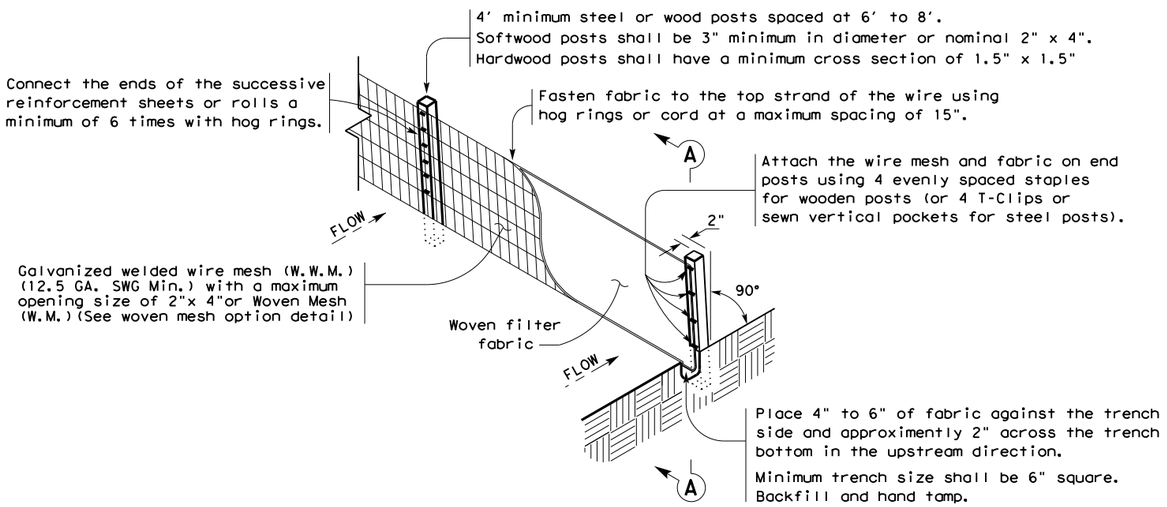
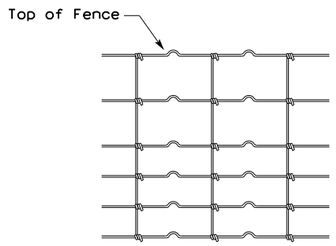
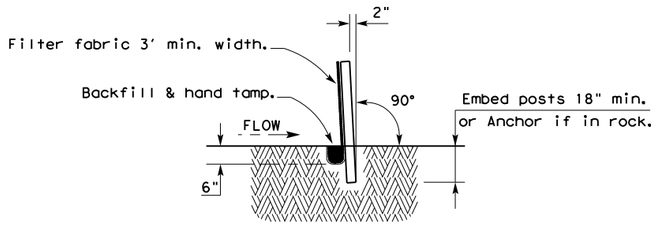


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

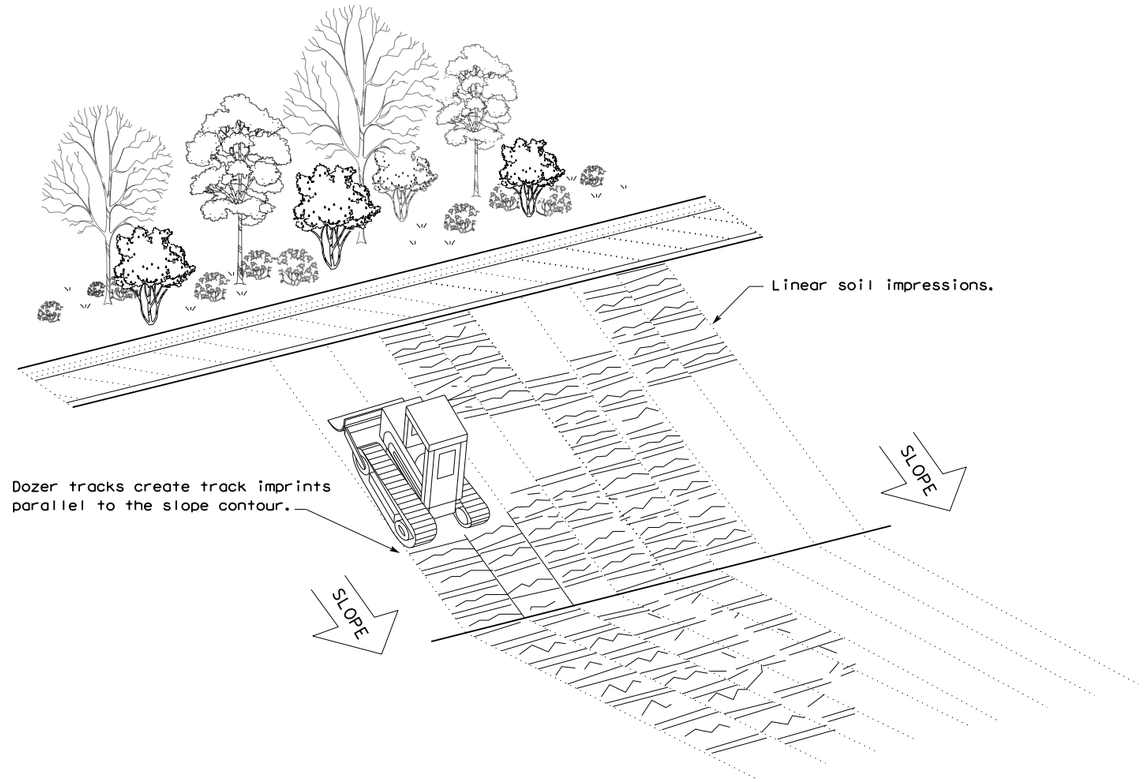
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		99

DATE: 5/11/2023
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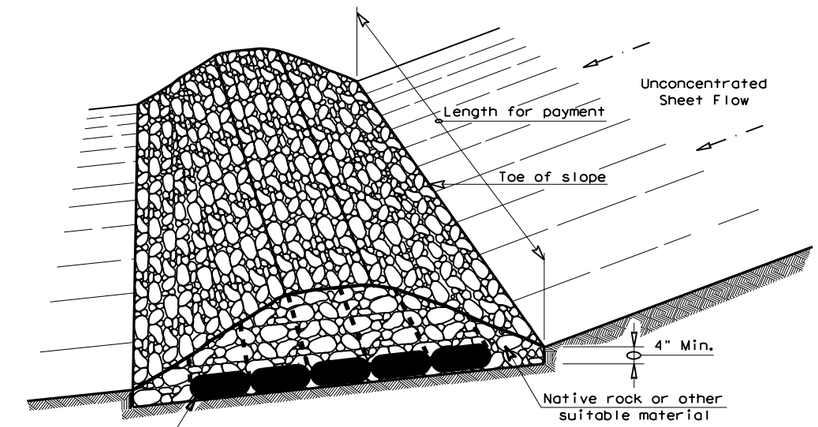
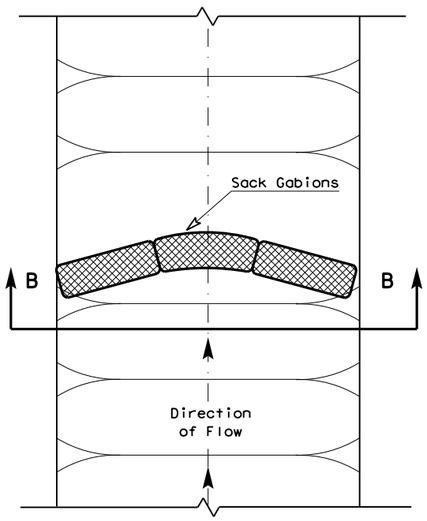
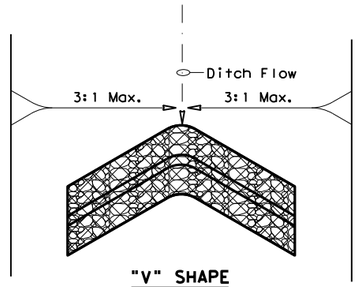


FILTER DAM AT TOE OF SLOPE

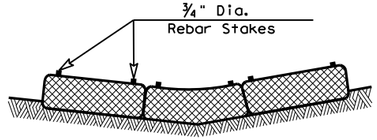
RFD1



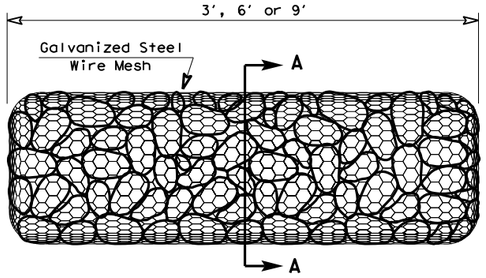
PLAN VIEW



"V" SHAPE PLAN VIEW

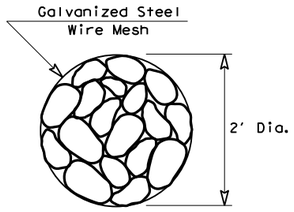


SECTION B-B

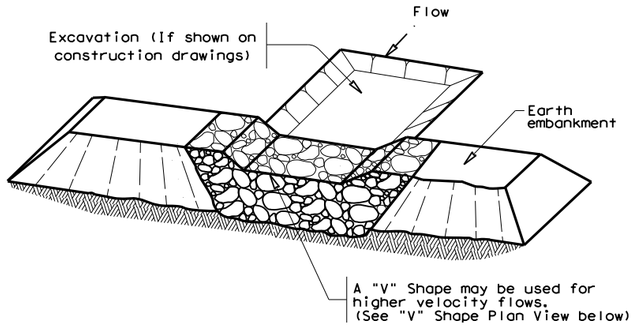


TYPE 4 (SACK GABIONS)

RFD4

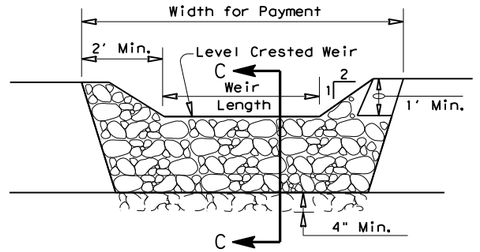


SECTION A-A

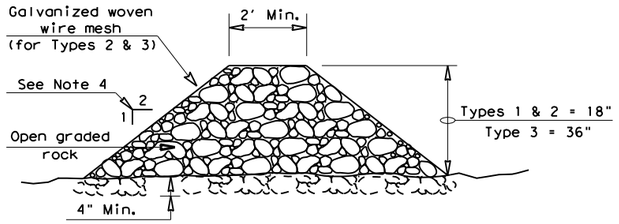


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

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

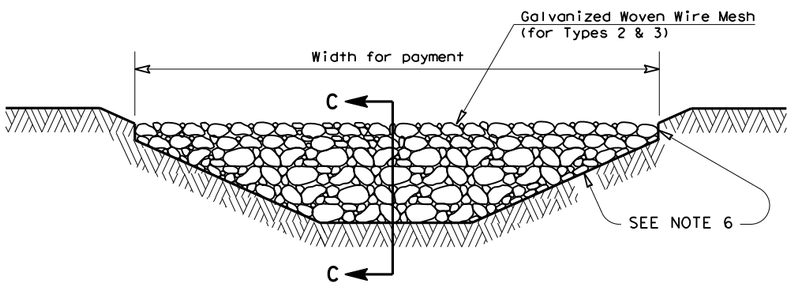
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity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

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

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

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

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



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

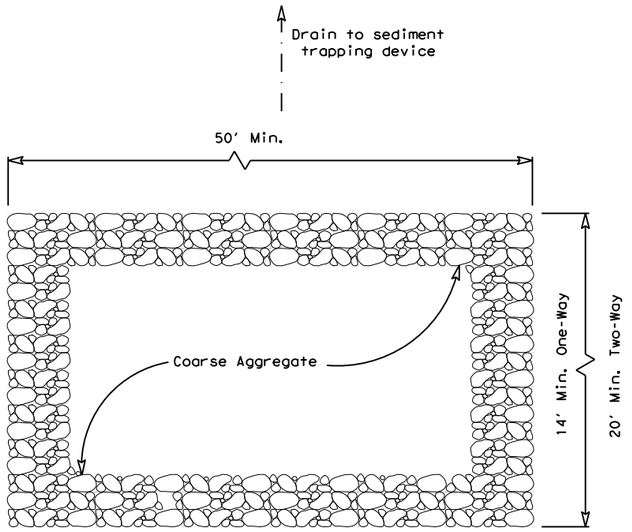
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

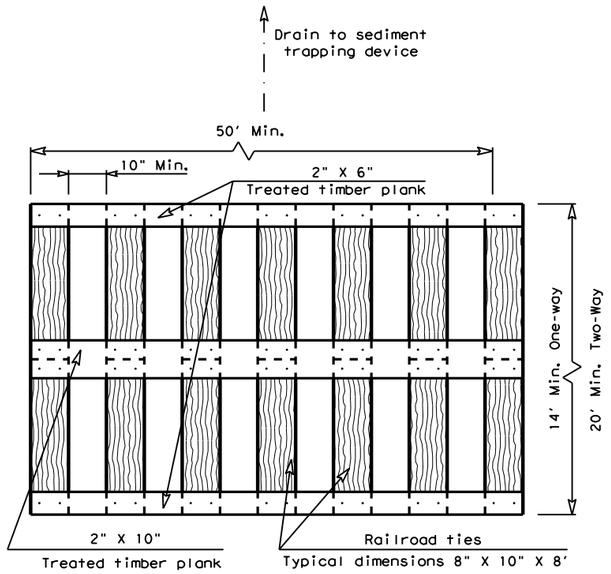
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		100

DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/10_Environmental/STANDARDS/10_03_ec316.dgn



PLAN VIEW



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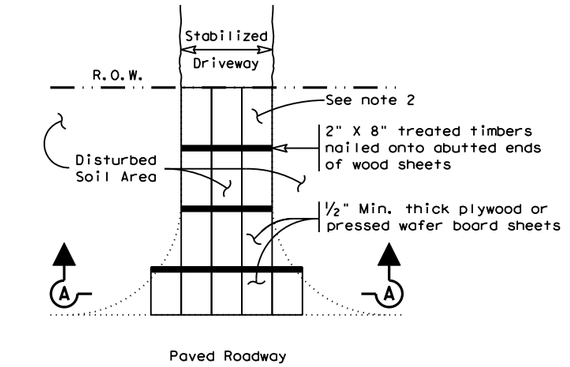
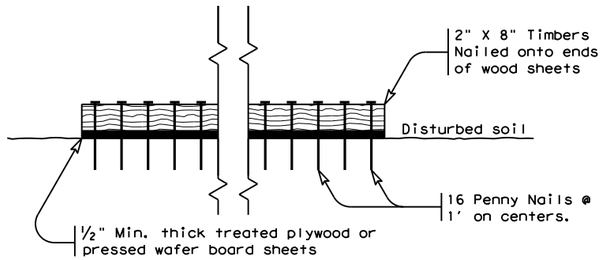


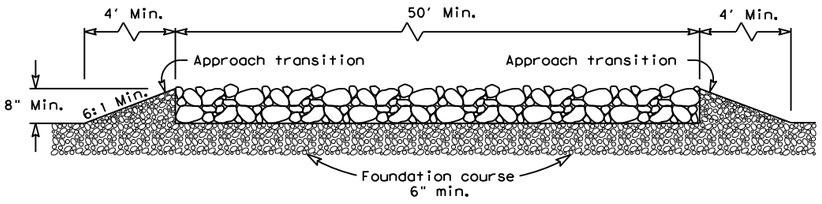
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

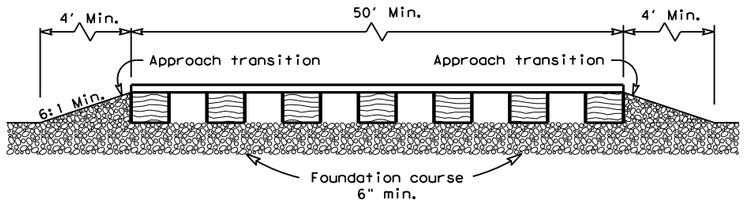
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

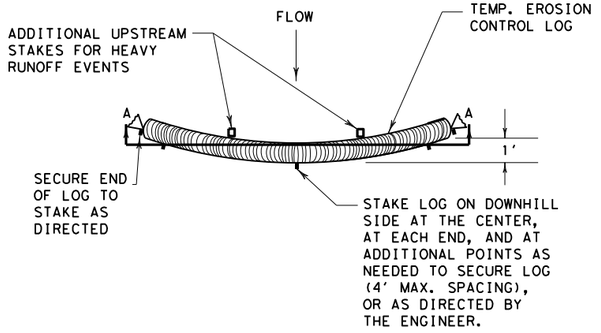
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

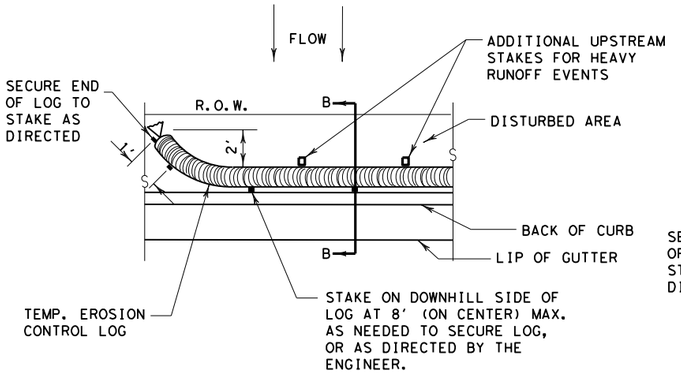
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		101

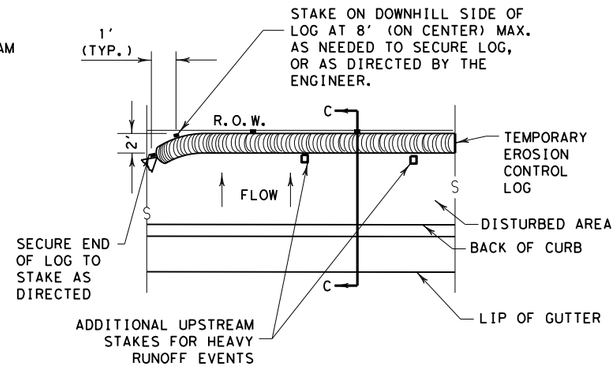
DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/10_Environmental/STANDARDS/10_04_ec916.dgn



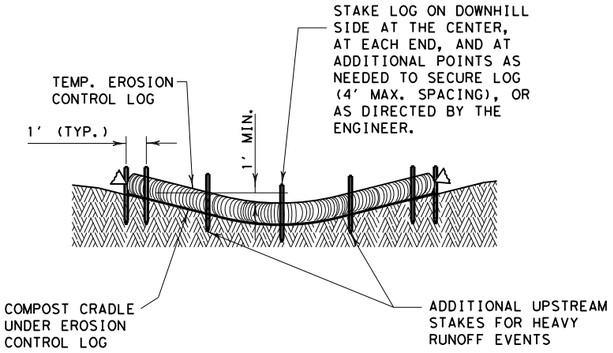
PLAN VIEW



PLAN VIEW



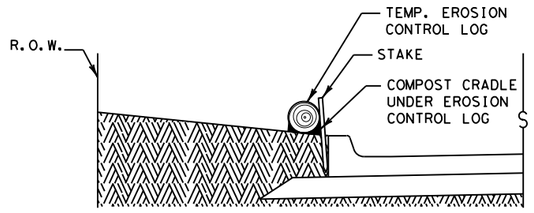
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

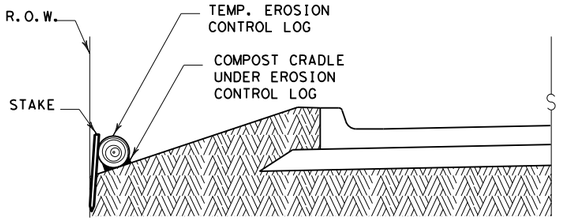
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

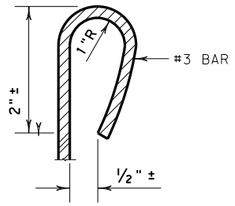
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



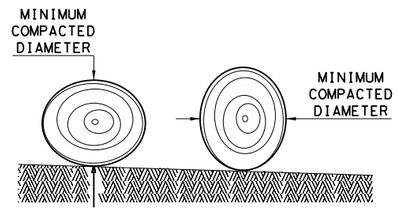
REBAR STAKE DETAIL

LEGEND

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

GENERAL NOTES:

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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.

Texas Department of Transportation

Design Division Standard

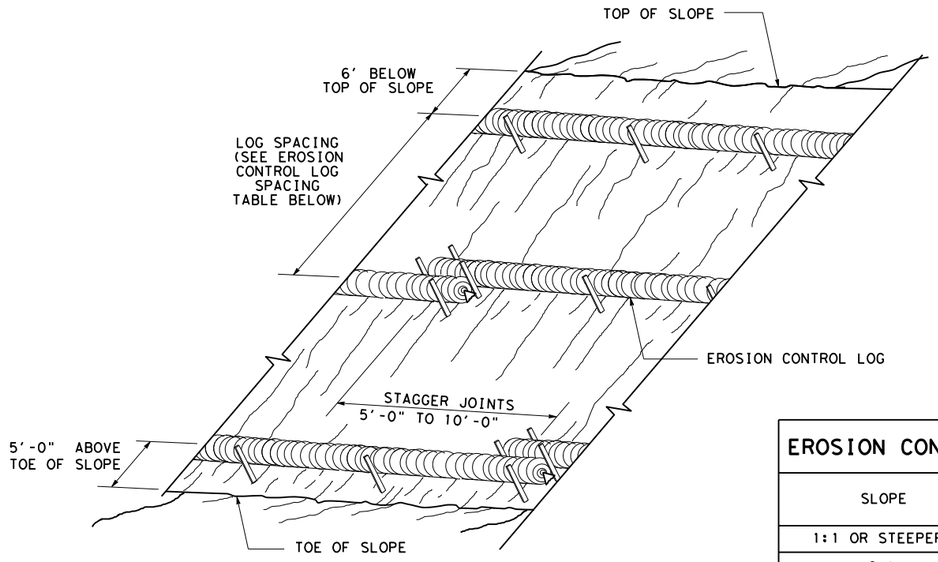
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

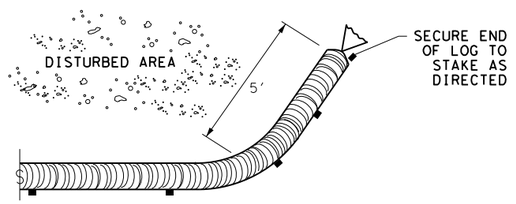
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	1360	01	030		FM 1226		
	DIST	COUNTY				SHEET NO.	
	ABL	JONES				102	

DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/10_Environmental/STANDARDS/10_04_ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

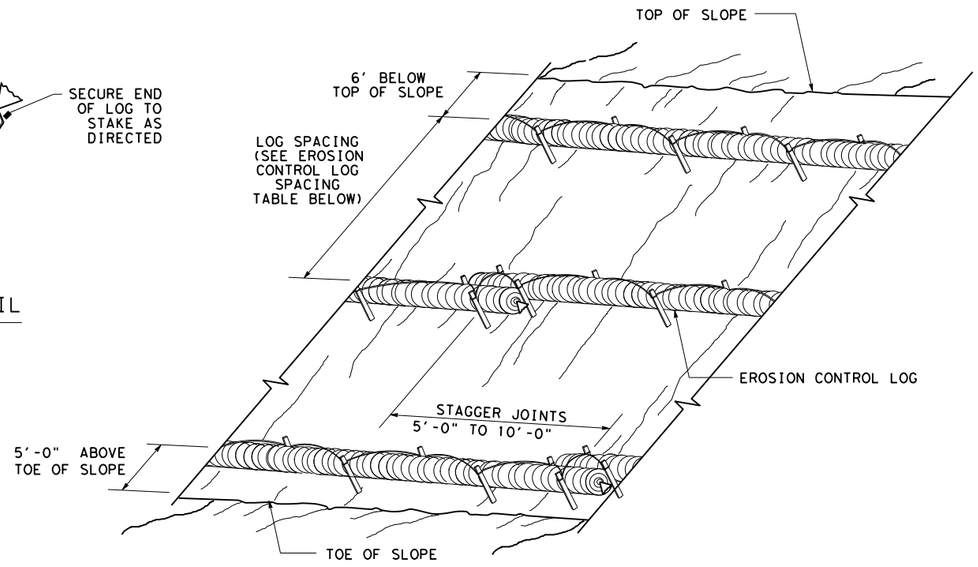
CL-SST



END SECTION RAP DETAIL

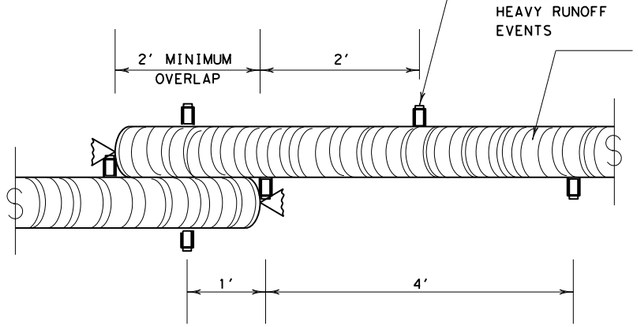
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

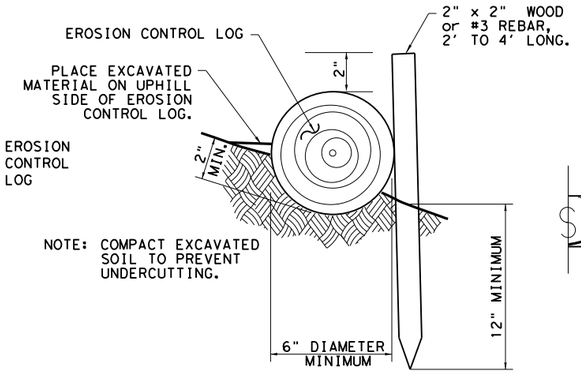
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

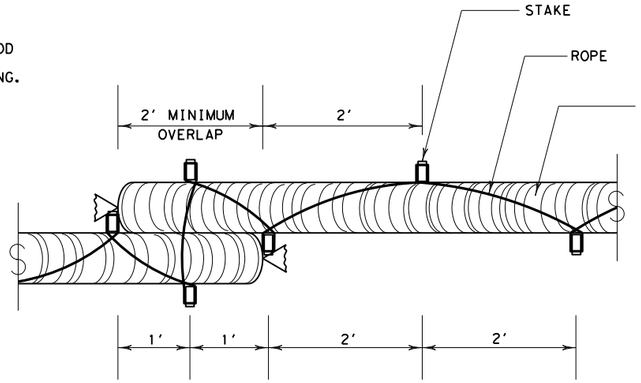


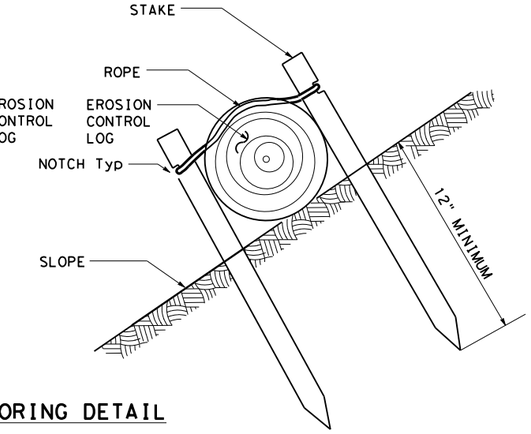


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

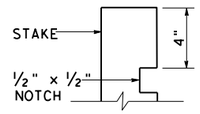
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



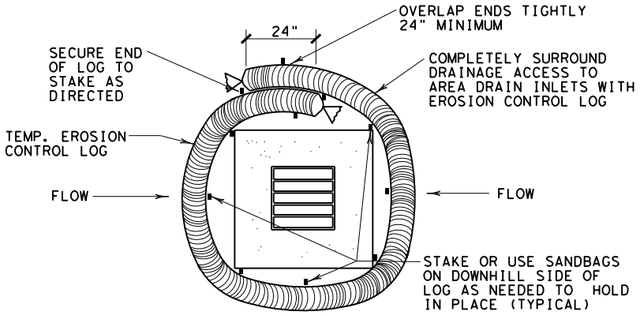
STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

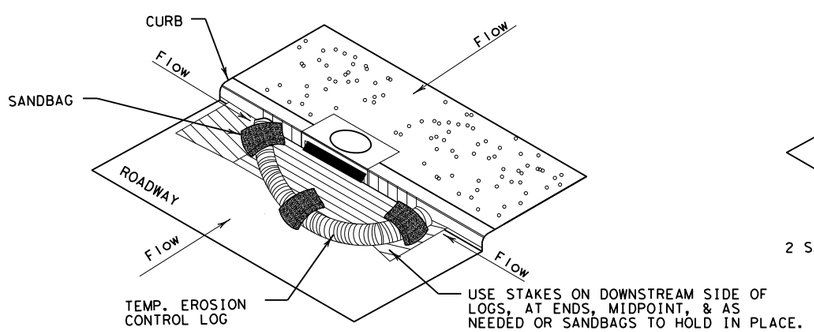
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	1360	01	030	FM 1226
	DIST	COUNTY		SHEET NO.
	ABL	JONES		103

DATE: 5/11/2023
FILE: pw://garver-pw.bentley.com:garver-pw-01/Documents/2020/20T06007 - TxDOT FM 1226 California Crk Bridge Repl/Drawings/10_Environmental/STANDARDS/10_04_ec916.dgn



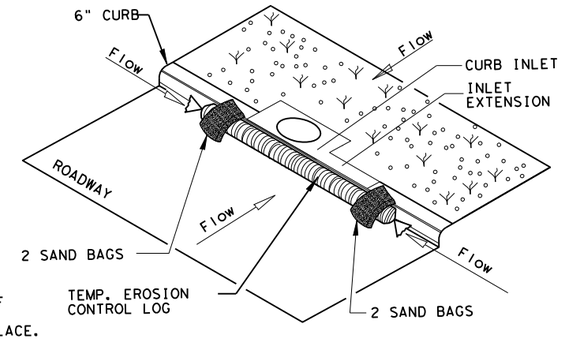
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

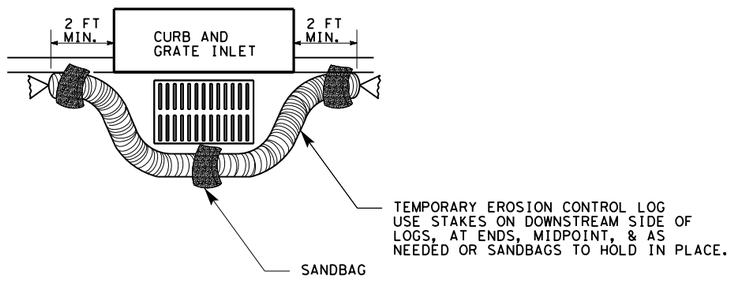
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

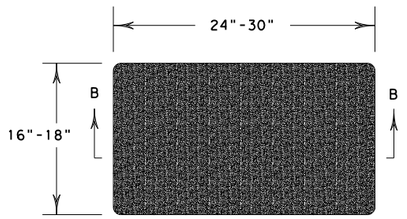
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	1360	01	030		FM 1226	
	DIST	COUNTY				SHEET NO.
	ABL	JONES				104