FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2021(627), ETC		1
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONTROL	SECTION	JOB	HIGHWAY NO.
0003	06	096, ETC.	IH 20, ETC

INDEX OF SHEETS

SEE SHEET 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. BR 2021(627), ETC

REEVES COUNTY
IH 20, ETC

NET LENGTH OF PROJECT: 1,380 FT = 0.260 MI

LIMITS: IH 20 AT BILLINGSLEA DRAW
IH 10 AT KC DRAW

CONSTRUCTION OF BRIDGE MAINTENANCE

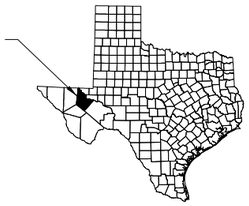
CONSISTING OF MBGF AND RETROFIT RAIL UPGRADE AND APPROACH RAILING

FUNCTIONAL CLASSIFICTATION: FREEWAY
CSJ: 0003-06-096 DESIGN SPEED = 65 MPH
ADT = 9,500 (2021)
13,100 (2041)
CSJ: 0441-09-050 DESIGN SPEED = 65 MPH
ADT = 6,400 (2021)
8,900 (2041)

CSJ: 0003-06-096
BRIDGE: 240 FT = 0.045 MI
ROAD: 250 FT = 0.047 MI

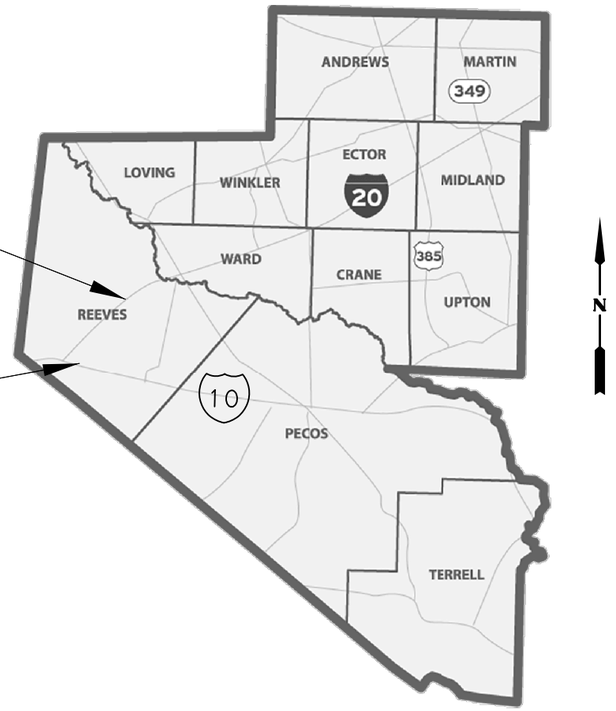
CSJ: 0441-09-050
BRIDGE: 890 FT = 0.168 MI
ROAD: 0 FT = 0.000 MI

REEVES COUNTY



① COUNTY: REEVES
CSJ: 0003-06-096
PROJECT NO.: BR 2021(627)
HIGHWAY: IH 20
LIMITS: IH BILLINGSLEA DRAW
NBI: 06-195-0-0003-06-150
ROADWAY = 250.00 LF = 0.047 MI
BRIDGE = 240.00 LF = 0.045 MI
TOTAL = 490.00 LF = 0.092 MI

② COUNTY: REEVES
CSJ: 0441-09-050
PROJECT NO.: BR 2021(628)
HIGHWAY: IH 10
LIMITS: KC DRAW & DRAW RELIEF
NBI: 06-195-0-0441-09-107
NBI: 06-195-0-0441-09-108
NBI: 06-195-0-0441-09-109
NBI: 06-195-0-0441-09-110
ROADWAY = 0.00 LF = 0.000 MI
BRIDGE = 890.00 LF = 0.168 MI
TOTAL = 890.00 LF = 0.168 MI



NOT TO SCALE

EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE
EQUATIONS: NONE

STATE OF TEXAS
THOMAS G. ASHCRAFT
81411
REGISTERED PROFESSIONAL ENGINEER

4/28/2021

CP&Y
TBPE FIRM # 1741

SUBMITTED FOR LETTING:
Consultant Engineer

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012).

COUNTY _____ PROJ. NO. _____
HWY. NO. _____ LETTING DATE _____
DATE ACCEPTED _____

FINAL PLANS

CONTRACTOR : _____

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

Texas Department of Transportation

SUBMITTED FOR LETTING: 5/4/2021
DocuSigned by: Franklin Hu, P.E.
39115832DCF44BC... AREA ENGINEER

RECOMMENDED FOR LETTING: 5/4/2021
DocuSigned by:
DIRECTOR, TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 5/4/2021
DocuSigned by: John R Speed PE
39AB22B3767E... DISTRICT ENGINEER

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cpydf_ANSIB.pltcfg
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SHEET NO.		DESCRIPTION
		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3		LOCATION MAP – IH 20 WB AT BILLINGSLEA DRAW
4		LOCATION MAP – IH 10 AT KC DRAW AND DRAW RELIEF
5 – 6		TYPICAL SECTIONS
7A–7C		GENERAL NOTES
8A–8B		QUANTITY SHEET
9		QUANTITY SUMMARIES
		TRAFFIC CONTROL PLAN
		IH 20 WB AT BILLINGSLEA DRAW
10		TRAFFIC CONTROL PLAN – NARRATIVE
11		TRAFFIC CONTROL PLAN – PHASE ONE
12		TRAFFIC CONTROL PLAN – PHASE TWO
		IH 10 AT KC DRAW AND DRAW RELIEF
13		TRAFFIC CONTROL PLAN – NARRATIVE
14		TRAFFIC CONTROL PLAN – PHASE ONE
15		TRAFFIC CONTROL PLAN – PHASE TWO
16		CRASH CUSHION SUMMARY SHEET
		TRAFFIC CONTROL STANDARD SHEETS
17 – 28	*	BC(1–12)–14
29 – 30	*	SSCB(2)–10
31	*	SLED–19
32	*	ABSORB(M)–19
33	*	TCP(2–6)–18
34	*	TCP(6–1)–12
35	*	TCP(6–7)–12
		ROADWAY PLANS
		IH 20 WB AT BILLINGSLEA DRAW
36		ROADWAY PLAN
		IH 10 AT KC DRAW AND DRAW RELIEF
37		ROADWAY PLAN
		ROADWAY STANDARD SHEETS
38	*	BED–14
39	*	GF(31)–19
40	*	GF(31)DAT–19
41	*	GF(31)MS–19
42 – 43	*	GF(31)TRTL3–20
44	*	SGT(10S)31–16
45	*	SGT(12S)31–18
		BRIDGES
		IH 20 WB AT BILLINGSLEA DRAW
46		BRIDGE ESTIMATED QUANITIES
47		BRIDGE REPAIR PLAN
48		ABUTMENT REPAIR DETAILS
49		BENT REPAIR DETAILS
50		BEAM REPAIR DETAILS
		IH 10 WB AT KC DRAW
51		BRIDGE ESTIMATED QUANITIES
52		BRIDGE REPAIR PLAN
53		ABUTMENT REPAIR DETAILS
54		BENT REPAIR DETAILS
		IH 10 EB AT KC DRAW
55		BRIDGE ESTIMATED QUANITIES
56		BRIDGE REPAIR PLAN
57		ABUTMENT REPAIR DETAILS
58 – 59		BENT REPAIR DETAILS
60		BEAM REPAIR DETAILS
		IH 10 WB AT KC DRAW RELIEF
61		BRIDGE ESTIMATED QUANITIES
62		BRIDGE REPAIR PLAN
63		ABUTMENT REPAIR DETAILS
64		BENT REPAIR DETAILS
65		BEAM REPAIR DETAILS
66		BEARING REPLACEMENT DETAILS
		IH 10 EB AT KC DRAW RELIEF
67		BRIDGE ESTIMATED QUANITIES
68		BRIDGE REPAIR PLAN
69		ABUTMENT REPAIR DETAILS
70		BENT REPAIR DETAILS
71		BEAM REPAIR DETAILS
		COMMON
72		EXPANSION JOINT REPAIR DETAILS
73		CONCRETE BEAM REPAIR DETAILS

SHEET NO.		DESCRIPTION
		BRIDGE STANDARD SHEETS
74	#	C–RAIL–R (MOD)
75 – 76	#	TYPE T552
		TRAFFIC STANDARD SHEETS
77 – 79	*	D & OM(1–3)–20
80	*	D & OM(6)–20
81	*	D & OM(VIA)–20
82	*	FPM(1)–12
		ENVIRONMENTAL ISSUES
83		SW3P NARRATIVE
84		IH 20 BILLINGSLEA EROSION CONTROL PLAN
85		IH 10 KC EROSION CONTROL PLAN
86		ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
		STANDARD SHEETS
87	*	EC(1)–16
88 – 90	*	EC(9)–16

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

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

MICHAEL J. KNAPIK, P.E.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER

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

THOMAS W. STEPHENSON, P.E.

NO.	REVISION	BY	DATE

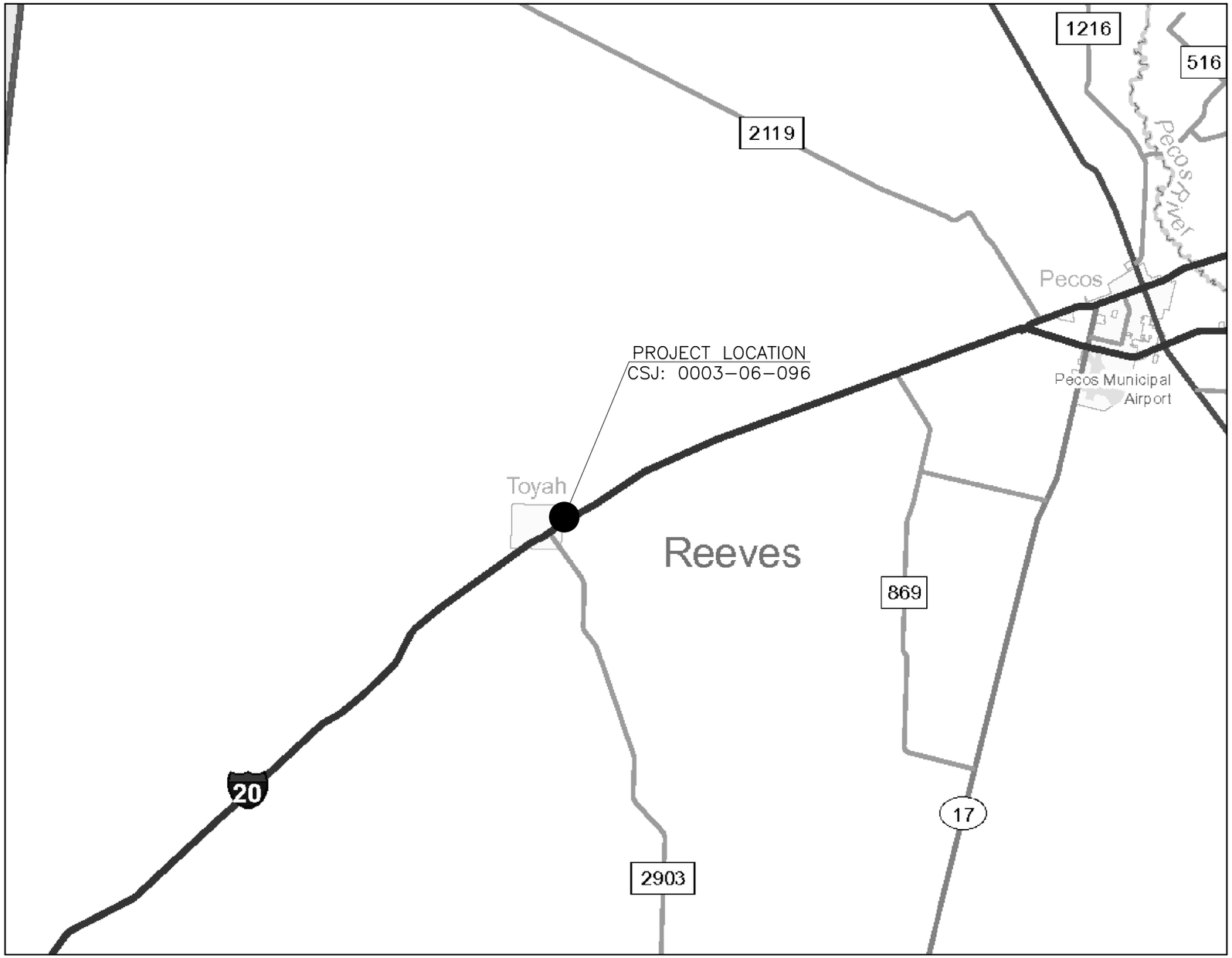
CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

INDEX OF SHEETS

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	2

SHEET 1 OF 1



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SCALE MILES

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED PROFESSIONAL ENGINEER

03/10/2021

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

LOCATION MAP
IH 20 WB AT BILLINGSLEA DRAW

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.	
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	3	

SHEET 1 OF 1

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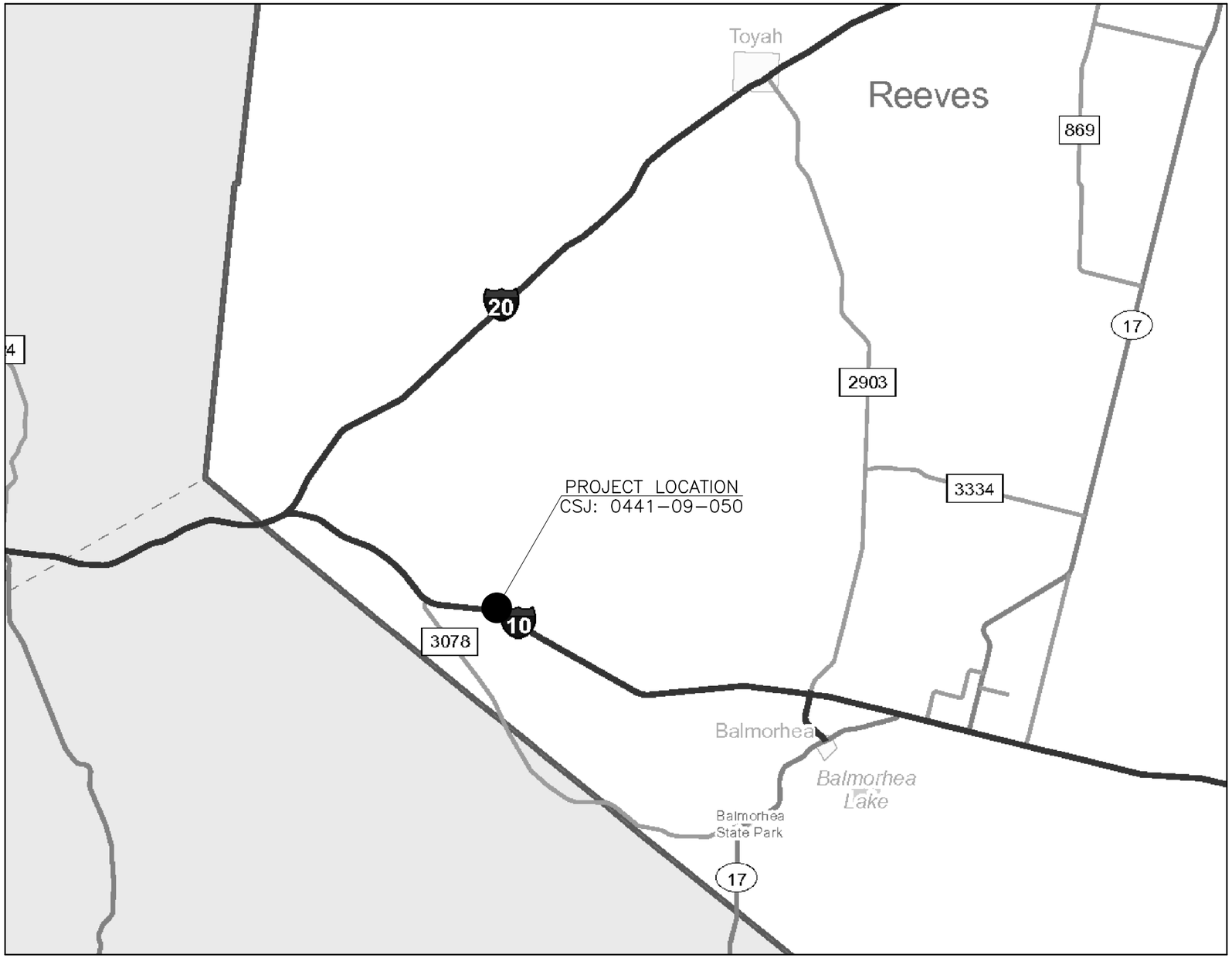

N

2.5 0 2.5 5
SCALE MILES

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

LOCATION MAP
IH 10 AT KC DRAW AND DRAW RELIEF

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	4

SHEET 1 OF 1

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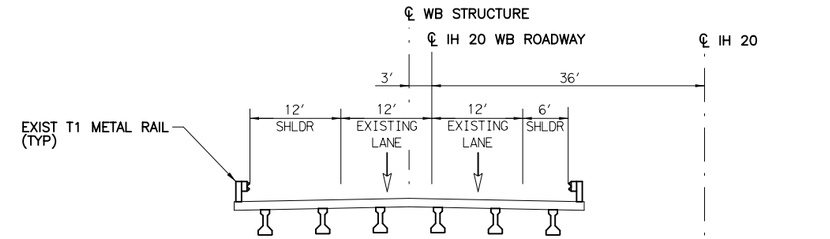
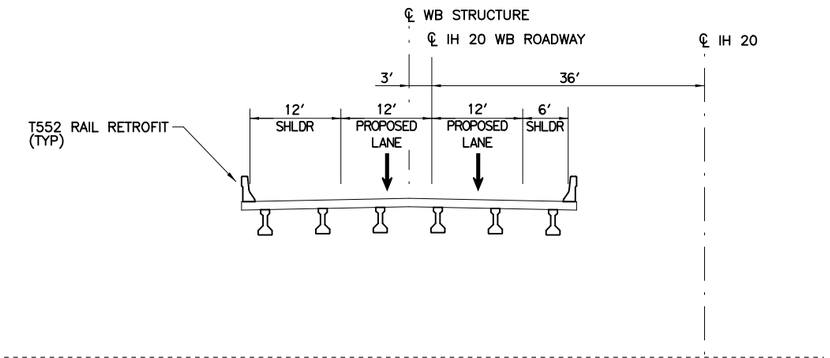


IH 20 WB AT BILLINGSLEA DRAW
EXISTING TYPICAL SECTION

℄ IH 20 WB ROADWAY: STA. 1248+70.78 TO STA. 1251+10.78



IH 20 WB AT BILLINGSLEA DRAW
PROPOSED TYPICAL SECTION

℄ IH 20 WB ROADWAY: STA. 1248+70.78 TO STA. 1251+10.78

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

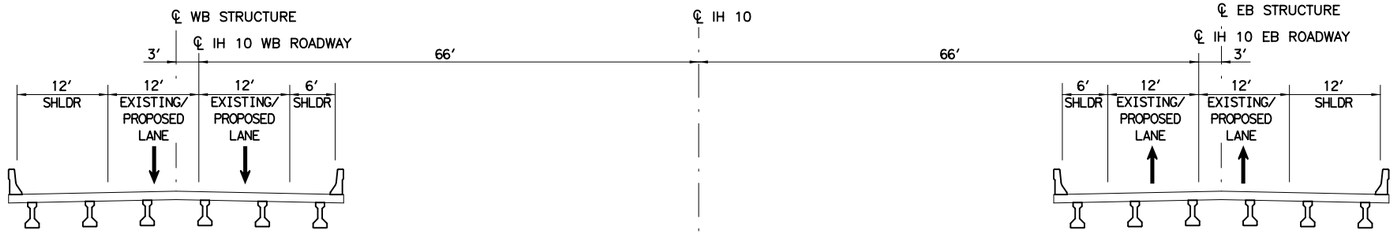
 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

TYPICAL SECTIONS

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	5

SHEET 1 OF 2



IH 10 WB AT KC DRAW & DRAW RELIEF
EXISTING/PROPOSED TYPICAL SECTION

IH 10 WB AT KC DRAW: STA. 490+30.00 TO STA. 493+30.00
IH 10 WB AT KC DRAW RELIEF: STA. 496+58.21 TO STA. 497+98.21

IH 10 EB AT KC DRAW & DRAW RELIEF
EXISTING/PROPOSED TYPICAL SECTION

IH 10 EB AT KC DRAW: STA. 490+55.00 TO STA. 493+65.00
IH 10 EB AT KC DRAW RELIEF: STA. 495+82.00 TO STA. 497+22.00

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

TYPICAL SECTIONS

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	CPY						
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	6

SHEET 2 OF 2

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Material Specification Information

Contractor questions on this project will be accepted through email and are to be addressed to the following individual(s):

- Kelly Daniel Kelly.Daniel@txdot.gov
- Robert Martinez Robert.Martinez@txdot.gov

All contractor questions will be reviewed by the Engineer. All questions and/or responses will be posted to TxDOT's Public FTP at the following Address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Item 5: Control of the Work

The following TxDOT Department standards have been modified for this project:

C-RAIL-R (MOD)

Item 6: Control of Materials

Restrict storage of equipment and materials to approved areas. The Engineer will not approve storage in any TxDOT yard.

Promptly and properly dispose of any waste generated from servicing equipment on the project.

Item 7: Legal Relations and Responsibilities

Utilities (public, private and TxDOT) exist throughout the project. Prior to any excavation, investigate to determine the utility locations within the project right of way. Contact the TxDOT Odessa Traffic Operations shop at 432-498-4690 to investigate and determine the location of any TxDOT utility that may exist within the project right of way. Exercise caution when excavating in areas where investigations have determined that utilities exist.

No significant traffic generator events identified.

As an element of ensuring public safety and convenience under Article 7.2.4, the Contractor is hereby directed to open all closed lanes and shoulder and remove all traffic control devices from any areas where work is not being actively performed unless overnight traffic control is required and approved by the engineer. Removed devices must be stored outside of the clear zones near the right of way line or removed from the right of way line entirely.

Item 8: Prosecution and Progress

The following portions of the plans may affect the Contractor's planned construction sequencing. The Contractor's attention is directed to the appropriate plan sheet or standard sheet.

County: Reeves
Highway: IH 20, Etc **Control: 0003-06-096, Etc**

-Traffic Control Plan

-Storm Water Pollution Prevention Plan

-Environmental Permit, Issues And Commitments (EPIC)

Working days will be computed and charged in accordance with Article 8. 3.1.4. "Standard Workweek."

Increased Liquidated Damages apply to this project using a Road User Cost (RUC) of $75 per Working Day.

Item 316: Seal Coat

Furnish Class B aggregate for the surface course.

Do not apply hot asphalt-rubber between August 31st and May 1st unless authorized in writing.

Place a string line or other suitable marking where needed to assure smooth neat lines or as directed.

Rates are shown in the plans.

Perform rock land and shoot test strips for each day's work at each location or as directed by the Engineer. Provide the Engineer with this information prior to the seal coat application. Provide control that is acceptable to the Engineer for yield calculations.

Ensure that all sealed expansion joints on bridges are covered by an approved method immediately prior to seal coat application. Keep the expansion joints covered until sweeping operations are complete. This work will be paid for under Item 316 as part of surface preparation.

Wet the stockpile of aggregate prior to use.

The use of a variable rate nozzle will be required on this project as determined by the engineer.

Contractor shall provide a list of stockpile locations prior to any material placed on the job site. Contractor shall have the Engineer and Odessa District Environmental Officer approve any and all stockpile locations prior to stockpiling of aggregate or other material. Stockpile locations will not be permitted on or adjacent to landscaped and non-mow areas.

As seal coat operations are completed at each location, clean and level all stockpile locations to the satisfaction of the Engineer.

Clean up paper, asphalt and excess rock after seal coat placement as each reference location is completed. Contractor shall not proceed ahead more than two reference locations before clean-up operations have been accomplished at the previous completed reference locations.

Contractor shall clean and remove asphalt from unauthorized concrete at the expense of the Contractor.

ODESSA DISTRICT BRIDGE REHABILITATION

GENERAL NOTES

Designed:	MJK	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	MJK	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	TGA	ODA	REEVES	0003	06	096, ETC.	7A

Item 354: Planing and Texturing Pavement

Unused planed material will become the Contractor's property. Dispose of this material in accordance with applicable Federal, State, and local regulations.

Item 502: Barricades, Signs, and Traffic Handling

Stop work immediately if any major traffic control element such as an advanced warning flashing panel or TMA or PCMS is not in good working order or control setup.

Maintain "No Center Line", "Do Not Pass" and "Pass With Care" signs until the permanent lane markings have been placed in accordance with plans.

Place orange fencing around sidewalk, wheelchair ramps and other pedestrian areas that pose a hazard to pedestrian traffic as directed.

Use Shoulder Drop-Off (CW8-9A) signs during construction when shoulder drop-off conditions are 3 inches or greater or as directed. Placement shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices".

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 70 mph to 60 mph. Placement of speed reduction zone signs shall comply with BC (3)-14. Speed resumption sign(s) is required at the end of a speed reduction zone.

Place chevrons, at a minimum, on every other drum used for outsides of curves, merging tapers and shifting tapers.

Vertical panels shall be self-righting.

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.

When construction operations result in a drop-off of more than 2 inches, a 3:1 or flatter slope will be required. The slope must be constructed with a compacted material capable of supporting vehicles as approved by the Engineer. This work shall be done expeditiously during daylight hours. Flaggers and appropriate signing to safely guide traffic through the work area will be required as directed by the Engineer. This shall be considered subsidiary to Item 502.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

In accordance with the Construction General Permit (CGP), erosion control and stabilization measures should be initiated as soon as practicable to include (erosion control logs).

The total disturbed area for this project is 0.0009 Acres. The disturbed area in this project, all project locations in the contract, and 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 any required authorization from the TCEQ for any Contractor PSLS for construction support activities on or off the right of way. When the total area disturbed for all projects 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 right of way, to the Engineer (or to the appropriate MS4 operator when on an off-state system route).

Upon acceptance of the project, all SW3P devices will become property of the State and maintenance responsibility is transferred to the State until final stabilization is attained.

Item 540: Metal Beam Guard Fence

Provide steel post for this project.

Item 542: Removing Metal Beam Guard Fence

Do not salvage any existing metal beam guard fence as State property; retain ownership of all material requiring removal including steel posts, metal rail, and hardware, and remove from the project.

For removal of posts embedded in concrete, remove the posts and the concrete footings; payment for removal of concrete footings is subsidiary to Item 542.

Item 658: Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Item 662: Work Zone Pavement Markings

After permanent pavement markings are placed, pull tabs from hot mix surface. Remove tabs from the project and dispose of properly.

Item 666 Retroreflectorized Pavement Markings

Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

Place Type I pavement markings with a ribbon-gun application.

Measure thickness for markings in accordance with Tex-854-B using usage rates (Part II).

Item 672: Raised Pavement Markers

Do not place raised pavement markers until the micro-surfacing has cured a minimum of 48 hours.

Item 677: Eliminating Existing Pavement Markings and Markers

Submit eliminating plan for approval by the Engineer in accordance with Item 677.

ODESSA DISTRICT BRIDGE REHABILITATION

GENERAL NOTES

Designed:	MJK	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	MJK	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	TGA	ODA	REEVES	0003	06	096, ETC.	7B

Item 3077: Superpave Mixtures

Binder:

Provide a binder that has a Performance Grade of (PG 76-22) for the SP-C mix.

Aggregate quality:

Furnish Class A aggregate for the Type SP-C mix.

Furnish aggregates for the shoulders and/or ramps that meet project SAC requirements.

Magnesium sulfate soundness loss will not be greater than 20 percent when Class A aggregate is required.

Mixture design:

Design a mixture with a gradation that has stone on stone contact and passes below the reference zone.

Test method Tex-530-C (Boil Test) will not be required.

Placement:

Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed in the surface course.

No more than 10% RAP will be allowed in non-surface courses.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Field sand will not be allowed.

Item 6001: Portable Changeable Message Sign

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer;

Item 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

General Note 7 of TCP (2-6)-18 provides for additional shadow vehicle(s) with truck mounted attenuator (TMA); one (1) additional shadow vehicle with TMA is included in the basis of estimate for this operation. The shadow vehicle(s) with TMA specified on the traffic control plan as

County: Reeves
Highway: IH 20, Etc **Control: 0003-06-096, Etc**

"required" plus the 'additional shadow vehicle' is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-1)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

The Contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

GENERAL NOTES

Designed:	MJK	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	MJK	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	TGA	ODA	REEVES	0003	06	096, ETC.		7C

SHEET 3 OF 3

QUANTITY SHEET

CONTROLLING PROJECT ID 0003-06-096 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 10, IH 20

				CONTROL SECTION JOB		**0003-06-096**		**0441-09-050**		TOTAL EST.	TOTAL FINAL
				PROJECT ID		**A00133193**		**A00133191**			
				COUNTY		**Reeves**		**Reeves**			
				HIGHWAY		**IH 20**		**IH 10**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**			EST.	FINAL	EST.	FINAL		
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY			2,060.000				2,060.000	
	316-6017	ASPH (AC-20-5TR)	GAL					1,859.000		1,859.000	
	316-6224	AGGR(TY-PB GR-4 SAC-B)	CY					42.000		42.000	
	354-6100	PLANE ASPH CONC PAV (5")	SY			100.000				100.000	
	354-6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)	SY					1,859.000		1,859.000	
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY			745.000		1,383.000		2,128.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF			105.000		94.000		199.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY			28.400				28.400	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF			250.000		758.000		1,008.000	
	451-6017	RETROFIT RAIL (TY T552)	LF			517.000				517.000	
	459-6005	GABION MATTRESSES (GALV)(6 IN)	SY					8.000		8.000	
	500-6001	MOBILIZATION	LS			100.00%				100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO			8.000				8.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF			850.000				850.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF			850.000				850.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF			120.000		480.000		600.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF			120.000		480.000		600.000	
	512-6072	PTB (FRN&INSTL)(SGL SLP)(TY 1) OR (STL)	LF			900.000		1,680.000		2,580.000	
	512-6074	PTB (MOVE)(SGL SLP)(TY 1) OR (STL)	LF			900.000		1,680.000		2,580.000	
	512-6076	PTB (REMOVE)(SGL SLP)(TY 1) OR (STL)	LF			900.000		1,680.000		2,580.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF			325.000				325.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA			2.000				2.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA			2.000				2.000	
	540-6018	MTL BM GD FEN TRANS (NON - SYM)	EA			2.000				2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF			300.000				300.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA			2.000				2.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA			2.000				2.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA			2.000				2.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA			1.000		2.000		3.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA			1.000		2.000		3.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA			1.000		2.000		3.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA			30.000		56.000		86.000	
	658-6015	INSTL DEL ASSM (D-SW)SZ (BRF)GF1	EA			8.000				8.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA			30.000		56.000		86.000	
	658-6028	INSTL DEL ASSM (D-SY)SZ (BRF)GF1	EA			8.000				8.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF			3,600.000		6,960.000		10,560.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF			1,800.000		3,480.000		5,280.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0003-06-096 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 10, IH 20

			CONTROL SECTION JOB		**0003-06-096**		**0441-09-050**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00133193**		**A00133191**			
			COUNTY		**Reeves**		**Reeves**			
			HIGHWAY		**IH 20**		**IH 10**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W		EA	135.000		261.000		396.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)		LF	450.000		870.000		1,320.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)		LF	1,800.000		3,480.000		5,280.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)		LF	1,800.000		3,480.000		5,280.000	
	672-6010	REFL PAV MRKR TY II-C-R		EA	23.000		44.000		67.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")		LF	2,600.000		5,080.000		7,680.000	
	780-6002	CNC CRACK REPAIR (DISCRETE)(INJECT)		LF			27.000		27.000	
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)		LF	90.000		232.000		322.000	
	786-6002	CARBON FIBER REINF POLYMER STRENGTHNING		SF			979.000		979.000	
	788-6001	CONCRETE BEAM REPAIR		EA	35.000		23.000		58.000	
	3077-6033	SP MIXESSP-CSAC-A PG76-22		TON	28.000				28.000	
	3077-6075	TACK COAT		GAL	15.000				15.000	
	4002-6001	REPLACE ELASTOMERIC BEARING PADS		EA			6.000		6.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	2.000		2.000		4.000	
	6185-6002	TMA (STATIONARY)		DAY	35.000		72.000		107.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	10.000		10.000		20.000	
	18	OTHER: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000				1.000	
		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 ROADWAY ITEMS

SHEET NO.	ITEM NO.	316 6017	316 6224	354 6100	354 6134	3077 6033	3077 6075
	COUNTY	ASPH (AC-20-5TR)	AGGR (TY-PB GR-4 SAC B)	PLANE ASPH CONC PAVE (5")	PLANE ASPH CONC PAV (0" TO 1/2"	SP MIXES SP-C SAC-A PG76-22	TACK COAT
	RATE	0.38 GAL/SY	120 SY/CY			550 LB/SY	0.15 GAL/SY
		SY	CY	SY	SY	TON	GAL
CSJ: 0003-06-096							
IH 20 WB (BILLINGSLEA DRAW)	REEVES	0	0	100	0	28	15
CSJ: 0003-06-096 TOTALS		0	0	100	0	28	15
CSJ: 0441-09-050	REEVES						
IH 10 WB (KC DRAW)		575	13	0	575	0	0
IH 10 EB (KC DRAW)		592	13	0	592	0	0
IH 10 WB (KC DRAW RELIEF)		346	8	0	346	0	0
IH 10 EB (KC DRAW RELIEF)		346	8	0	346	0	0
CSJ: 0441-09-050 TOTALS		1,859	42	0	1,859	0	0
PROJECT TOTAL		1,859	42	100	1,859	28	15

SUMMARY OF EROSION CONTROL

SHEET NO.	ITEM NO.	169 6001	506 6038	506 6039	506 6041	506 6043
	COUNTY	SOIL RETENTION BLANKETS (CL 1) (TY A)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL)(12")	BIODEG EROSN CONT LOGS (REMOVE)
		LF	LF	LF	LF	LF
CSJ: 0003-06-096						
IH 20 WB (BILLINGSLEA DRAW)	REEVES	2,060	850	850	120	120
CSJ: 0003-06-096 TOTALS		2,060	850	850	120	120
CSJ: 0441-09-050	REEVES					
IH 10 WB (KC DRAW)					120	120
IH 10 EB (KC DRAW)					120	120
IH 10 WB (KC DRAW RELIEF)					120	120
IH 10 EB (KC DRAW RELIEF)					120	120
CSJ: 0441-09-050 TOTALS		0	0	0	480	480
PROJECT TOTAL		2,060	850	850	600	600

SUMMARY OF MBGF

SHEET NO.	ITEM NO.	432 6045	540 6002	540 6006	540 6016	540 6018	542 6001	542 6002	544 6001	544 6003	658 6015	658 6028
	COUNTY	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	DOWNSTREAM ANCHOR TERMINAL SECTION	MTL BEAM GD FEN TRANS (NON-SYM)	REMOVE METAL BEAM GUARD FENCE	REMOVAL TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	GDRAIL END TREATMENT (REMOVE)	INSTL DEL ASSM (D-SW) SZ (BRF) GF1	INSTL DEL ASSM (D-SY) SZ (BRF) GF1
		CY	LF	EA	EA	EA	LF	EA	EA	EA	EA	EA
CSJ: 0003-06-096												
IH 20 WB (BILLINGSLEA DRAW)	REEVES	28.4	325	2	2	2	300	2	2	2	8	8
CSJ: 0003-06-096 TOTALS		28.4	325	2	2	2	300	2	2	2	8	8
CSJ: 0441-09-050	REEVES											
IH 10 WB (KC DRAW)		0	0	0	0	0	0	0	0	0	0	0
IH 10 EB (KC DRAW)		0	0	0	0	0	0	0	0	0	0	0
IH 10 WB (KC DRAW RELIEF)		0	0	0	0	0	0	0	0	0	0	0
IH 10 EB (KC DRAW RELIEF)		0	0	0	0	0	0	0	0	0	0	0
CSJ: 0441-09-050 TOTALS		0	0	0	0	0	0	0	0	0	0	0
PROJECT TOTAL		28.4	325	2	2	2	300	2	2	2	8	8

SUMMARY OF TRAFFIC CONTROL

LOCATION	ITEM NO.	512 6072	512 6074	512 6076	545 6019	545 6003	545 6005	658 6013	658 6026	662 6063	662 6095	662 6109	677 6001	6001 6002	6185 6002	6185 6005
	COUNTY	PTB (FRN&INSTL) (SGL SLP) (TY 1) OR	PTB (MOVE) (SGL SLP) (TY 1) OR (STL)	PTB (REMOVE) (SGL SLP) (TY 1) OR (STL)	CRASH CUSH ATTEN (INSTL) (S)(N)(TL3)	CRASH CUSHION ATTEN (MOVE & RESET)	CRASH CUSHION ATTEN (REMOVE)	INSTL DEL ASSM (D-SW) SZ (BRF)CTB	INSTL DEL ASSM (D-SY) SZ (BRF)CTB	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB) TY W	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
		LF	LF	LF	EA	EA	EA	EA	EA	LF	LF	LF	LF	EA	DAY	DAY
CSJ: 0003-06-096	REEVES															
TRAFFIC CONTROL PLAN (BILLINGSLEA DRAW)																
PHASE ONE		900			1			30		1800			800		17	2
PHASE TWO			900	900		1	1		30	1800	1800	135	1800		18	8
CSJ: 0003-06-096 TOTALS		900	900	900	1	1	1	30	30	3600	1800	135	2600	2	35	10
CSJ: 0441-09-050	REEVES															
TRAFFIC CONTROL PLAN (KC DRAW & DRAW RELIEF)																
PHASE ONE		1680			2			56		3480			1600		38	2
PHASE TWO			1680	1680		2	2		56	3480	3480	261	3480		34	8
CSJ: 0441-09-050 TOTALS		1680	1680	1680	2	2	2	56	56	6960	3480	261	5080	2	72	10
TOTAL		2,580	2,580	2,580	3	3	3	86	86	10,560	5,280	396	7,680	4	107	20

SUMMARY OF TRAFFIC

SHEET NO.	ITEM NO.	666 6300	666 6303	666 6315	672 6010
	COUNTY	RE PM W/RET REQ TY I (W) 4" (BRK)(100MIL)	RE PM W/RET REQ TY I (W) 4" (SLD)(100MIL)	RE PM W/RET REQ TY I (Y) 4" (SLD)(100MIL)	REFL PAV MRKR TY II-C-R
		LF	LF	LF	EA
CSJ: 0003-06-096					
IH 20 WB (BILLINGSLEA DRAW)	REEVES	450	1,800	1,800	23
CSJ: 0003-06-096 TOTALS		450	1,800	1,800	23
CSJ: 0441-09-050	REEVES				
IH 10 WB (KC DRAW & DRAW RELIEF)		450	1,800	1,800	23
IH 10 EB (KC DRAW & DRAW RELIEF)		420	1,680	1,680	21
CSJ: 0441-09-050 TOTALS		870	3,480	3,480	44
PROJECT TOTAL		1,320	5,280	5,280	67

SUMMARY OF BRIDGES

SHEET NO.	ITEM NO.	428 6001	429 6007	438 6001	451 6017	459 6005	780 6002	780 6004	786 6002	788 6001	4002 6001
	COUNTY	PENETRATING CONCRETE SURFACE TREATMENT	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING EXISTING JOINTS	RETROFIT RAIL (TY T552)	GABION MATRESSES (GALV)(6 IN)	CNC CRACK REPAIR (DISCRETE) (INJECT)	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)	CARBON FIBER REINF POLYMER STRENGTHENING	CONCRETE BEAM REPAIR	REPLACE ELASTOMERIC BEARING PADS
		SY	SF	SF	LF	SY	LF	LF	LF	EA	EA
CSJ: 0003-06-096											
IH 20 WB (BILLINGSLEA DRAW)	REEVES	745	105	250	517	0	0	90	0	35	0
CSJ: 0003-06-096 TOTALS		745	105	250	517	0	0	90	0	35	0
CSJ: 0441-09-050	REEVES										
IH 10 WB (KC DRAW)		392	15	212	0	0	0	75	611	0	0
IH 10 EB (KC DRAW)		509	65	252	0	0	0	42	368	3	0
IH 10 WB (KC DRAW RELIEF)		241	14	147	0	0	20	50	0	13	6
IH 10 EB (KC DRAW RELIEF)		241	0	147	0	8	7	65	0	7	0
CSJ: 0441-09-050 TOTALS		1,383	94	758	0	8	27	232	979	23	6
PROJECT TOTAL		2,128.0	199	1,008	517	8	27	322	979	58	6

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

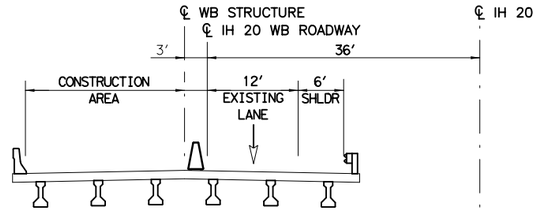
QUANTITY SUMMARIES

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	9

SHEET 1 OF 1

PHASE ONE IH 20 WB AT BILLINGSLEA DRAW

1. INSTALL EROSION CONTROL DEVICES.
2. INSTALL TRAFFIC CONTROL DEVICES.
   – REFER TO TRAFFIC CONTROL PLAN
3. PLACE WORK ZONE PAVEMENT MARKINGS.
4. REPLACE BRIDGE RAIL.
5. RESEAL JOINTS IN CONSTRUCTION AREA.
6. REPAIR BRIDGE SUBSTRUCTURE
7. REMOVE EXISTING MBGF AND INSTALL NEW MBGF.
8. REPAIR BRIDGE APPROACH PAVEMENT.
   – REFER TO ROADWAY PLAN

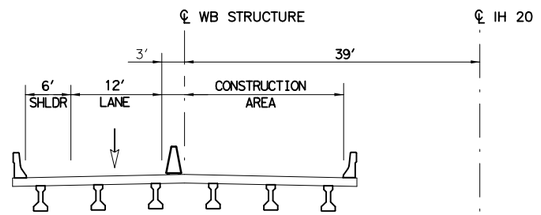


IH 20 WB AT BILLINGSLEA DRAW
PHASE ONE

℄ IH 20 WB ROADWAY: STA. 1248+70.78 TO STA. 1251+10.78

PHASE TWO IH 20 WB AT BILLINGSLEA DRAW

1. MOVE TRAFFIC CONTROL DEVICES.
   – REFER TO TRAFFIC CONTROL PLAN
2. PLACE WORK ZONE PAVEMENT MARKINGS.
3. REPLACE BRIDGE RAIL.
4. RESEAL JOINTS IN CONSTRUCTION AREA.
5. REPAIR BRIDGE SUBSTRUCTURE
6. REMOVE EXISTING MBGF AND INSTALL NEW MBGF.
7. REPAIR BRIDGE APPROACH PAVEMENT.
   – REFER TO ROADWAY PLAN
8. REMOVE PTCB/CRASH CUSHIONS.
9. APPLY FINAL PAVEMENT MARKINGS.
10. PERFORM FINAL CLEAN UP.



IH 20 WB AT BILLINGSLEA DRAW
PHASE TWO

℄ IH 20 WB ROADWAY: STA. 1248+70.78 TO STA. 1251+10.78

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

TCP NARRATIVE
IH 20 WB AT BILLINGSLEA DRAW

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.		10

SHEET 1 OF 1

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3/10/2021 8:49:10 AM mknapik
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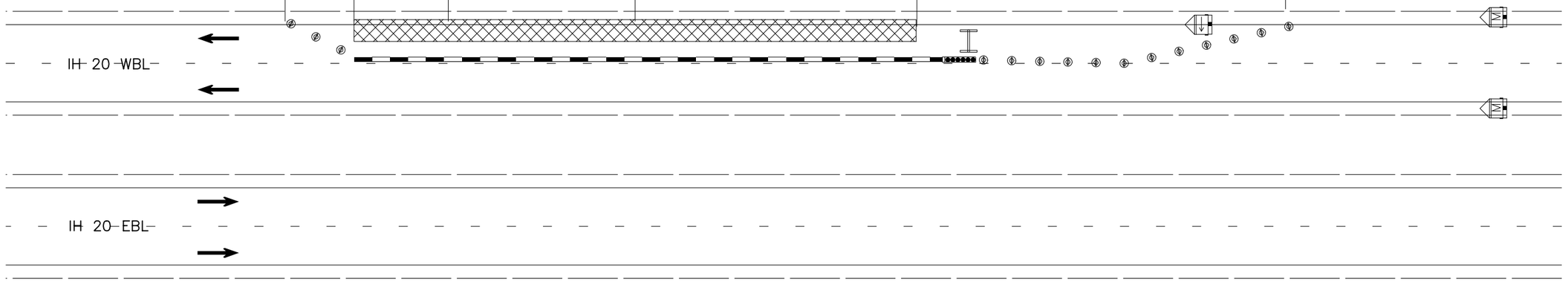
REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

100′ | WORK AREA 900′

150′ | BRIDGE | 450′



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Trailer Mounted Flashing Arrow Board		Portable Traffic Barrier
	Traffic Flow		CRASH CUSHION
	Bridge Work Area		PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

N

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

TRAFFIC CONTROL PLAN
IH 20 WB AT BILLINGSLEA DRAW
PHASE ONE

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	11

NOT TO SCALE

SHEET 1 OF 1

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cpypdf_ANSIB.pltcfg
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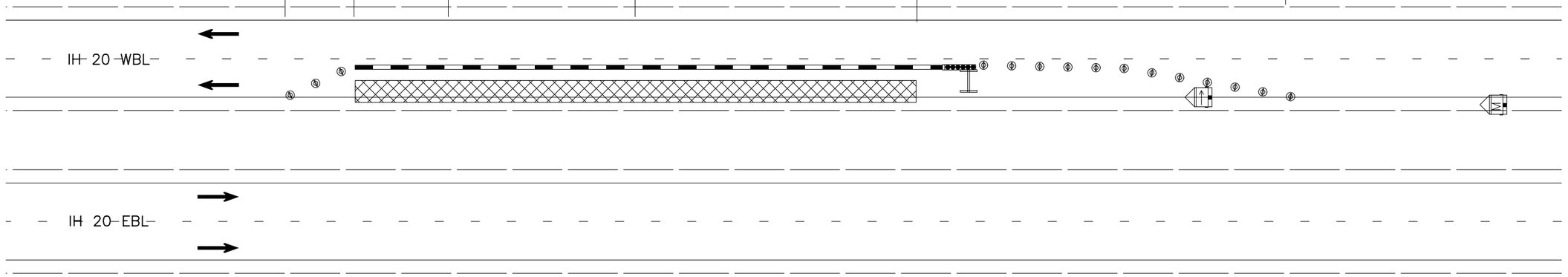
REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

100′ WORK AREA 900′

150′ BRIDGE 450′

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Trailer Mounted Flashing Arrow Board		Portable Traffic Barrier
	Traffic Flow		CRASH CUSHION
	Bridge Work Area		PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)



N

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

TRAFFIC CONTROL PLAN
IH 20 WB AT BILLINGSLEA DRAW
PHASE TWO

NOT TO SCALE

SHEET 1 OF 1

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Drawn:	CPY	ODA	REEVES	0003	06	096, ETC.	12
Checked:	CPY						

cpybw_ANSIB.tbl
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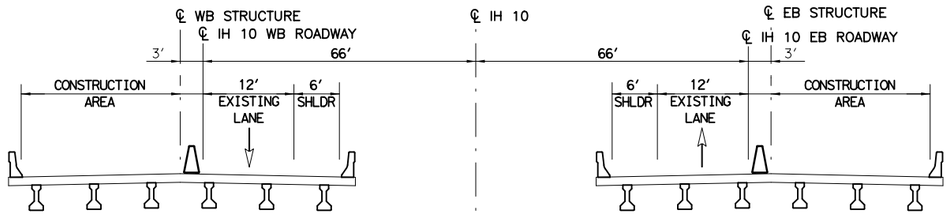
PHASE ONE IH 10 AT KC DRAW & DRAW RELIEF

1. INSTALL EROSION CONTROL DEVICES.
2. REPLACE BEARING PADS (6) SOUTH ABUTMENT OF WESTBOUND KC DRAW RELIEF BRIDGE.
   - TRAFFIC WILL HAVE TO STOPPED WITH A ROLLING CLOSURE USING TxDOT STANDARD TCP(6-7)-12.
   - TRAFFIC WILL REMAIN STOPPED FOR A MAXIMUM OF 15 MINUTE PERIODS EVERY HOUR.
   - WORK TO BE DONE BETWEEN 9 P.M. AND 5 A.M. OR AS DIRECTED BY THE ENGINEER.
   - THIS REPAIR IS TO BE COMPLETED BEFORE ADDITIONAL WORK IS DONE ON THIS BRIDGE.
3. INSTALL TRAFFIC CONTROL DEVICES.
   - REFER TO TRAFFIC CONTROL PLAN
4. PLACE WORK ZONE PAVEMENT MARKINGS.
5. RESEAL JOINTS IN CONSTRUCTION AREA.
6. REPAIR BRIDGE SUBSTRUCTURE



IH 10 WB AT KC DRAW & DRAW RELIEF PHASE ONE

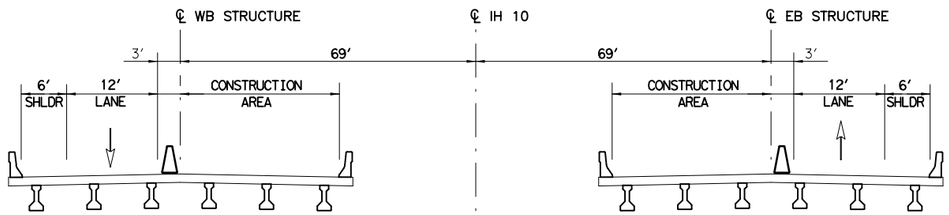
IH 10 WB AT KC DRAW: STA. 490+30.00 TO STA. 493+30.00
IH 10 WB AT KC DRAW RELIEF: STA. 496+58.21 TO STA. 497+98.21

IH 10 EB AT KC DRAW & DRAW RELIEF PHASE ONE

IH 10 EB AT KC DRAW: STA. 490+55.00 TO STA. 493+65.00
IH 10 EB AT KC DRAW RELIEF: STA. 495+82.00 TO STA. 497+22.00

PHASE TWO IH 10 AT KC DRAW & DRAW RELIEF

1. MOVE TRAFFIC CONTROL DEVICES.
   - REFER TO TRAFFIC CONTROL PLAN
2. PLACE WORK ZONE PAVEMENT MARKINGS.
3. RESEAL JOINTS IN CONSTRUCTION AREA.
4. REPAIR BRIDGE SUBSTRUCTURE
5. REMOVE PTCB/CRASH CUSHIONS.
7. MILL/REPLACE SURFACE TREATMENT ON BRIDGES
   - REFER TO ROADWAY PLAN
8. APPLY FINAL PAVEMENT MARKINGS.
9. PERFORM FINAL CLEAN UP.



IH 10 WB AT KC DRAW & DRAW RELIEF PHASE TWO

IH 10 WB AT KC DRAW: STA. 490+30.00 TO STA. 493+30.00
IH 10 WB AT KC DRAW RELIEF: STA. 496+58.21 TO STA. 497+98.21

IH 10 EB AT KC DRAW & DRAW RELIEF PHASE TWO

IH 10 EB AT KC DRAW: STA. 490+55.00 TO STA. 493+65.00
IH 10 EB AT KC DRAW RELIEF: STA. 495+82.00 TO STA. 497+22.00

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

TCP NARRATIVE
IH 10 AT KC DRAW & DRAW RELIEF

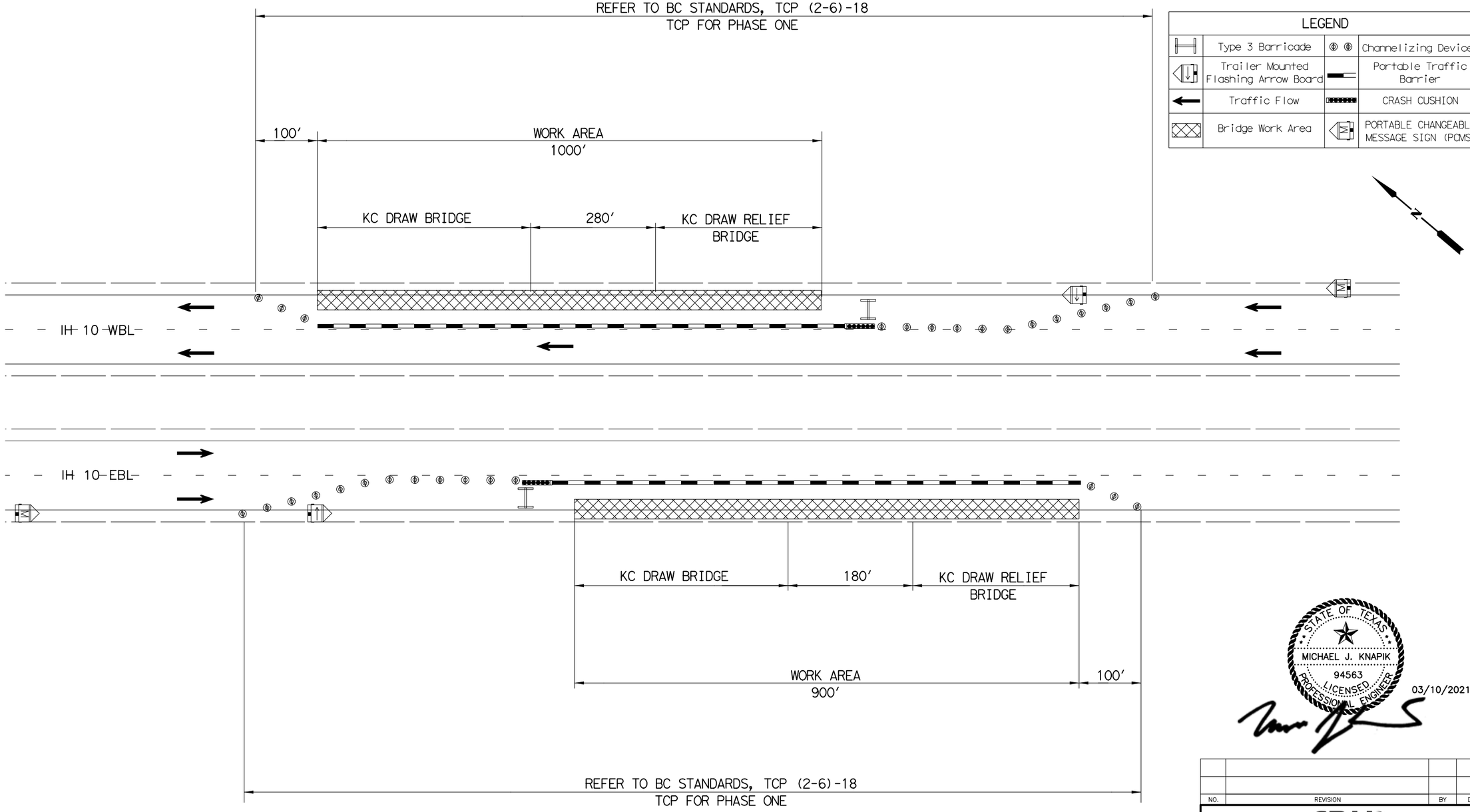
Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	13

SHEET 1 OF 1

cpybw_ANSIB.tbl
cpypf_ANSIB.pltcfg
pw:/
3/10/2021 8:49:22 AM mknapik
pw:/

REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Trailer Mounted Flashing Arrow Board		Portable Traffic Barrier
	Traffic Flow		CRASH CUSHION
	Bridge Work Area		PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)



REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

TRAFFIC CONTROL PLAN
IH 10 AT KC DRAW & DRAW RELIEF
PHASE ONE

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Drawn:	CPY	ODA	REEVES	0003	06	096, ETC.	14
Checked:	CPY						

NOT TO SCALE

SHEET 1 OF 1

cpybw_ANSIB.tbl
cpydf_ANSIB.pltcfg
pw:/
3/10/2021 8:49:25 AM mknapik
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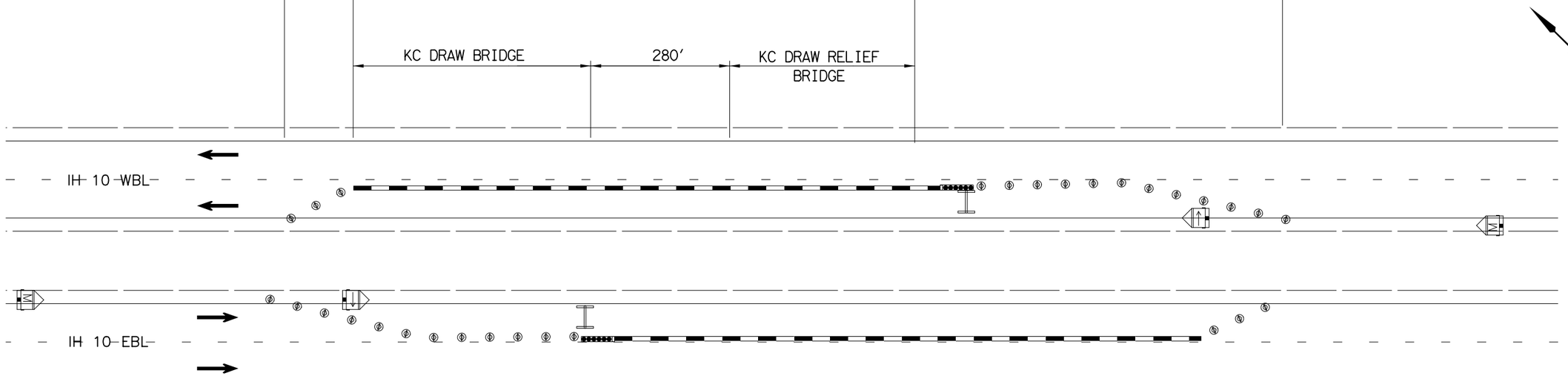
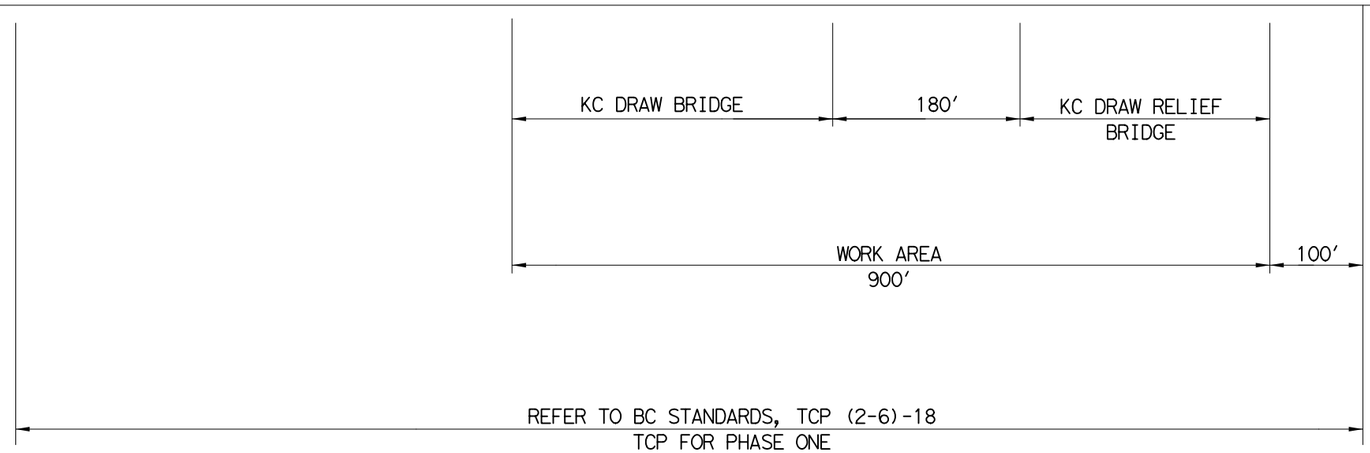
REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Trailer Mounted Flashing Arrow Board		Portable Traffic Barrier
	Traffic Flow		CRASH CUSHION
	Bridge Work Area		PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)





REFER TO BC STANDARDS, TCP (2-6)-18
TCP FOR PHASE ONE

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION
TRAFFIC CONTROL PLAN
IH 10 AT KC DRAW & DRAW RELIEF
PHASE TWO

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.	
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	15	

TEXAS REGISTERED ENGINEERING FIRM F-1741

NOT TO SCALE

SHEET 1 OF 1

cpybw_ANSIB.tbl
cpypf_ANSIB.pltcfg
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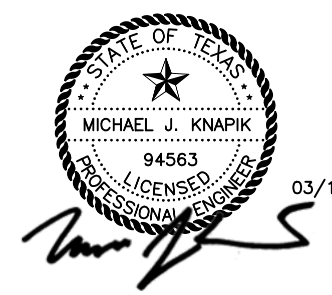
LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE / RESET: MOVE/ RESET	MOVE / RESET: FROM LOC. #	L N	L W	R N	R W	S N	S W
1	ONE	N/A	IH 20 WB AT BILLINGSLEA DRAW	STA. 1054+00	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER				X								X	
2	TWO	N/A	IH 20 WB AT BILLINGSLEA DRAW	STA. 1054+00	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER					X	X	1					X	
3	ONE	N/A	IH 10 EB AT KC DRAW	STA. 489+50	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER				X								X	
4	ONE	N/A	IH 10 WB AT KC DRAW RELIEF	STA. 499+00	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER				X								X	
5	TWO	N/A	IH 10 EB AT KC DRAW	STA. 489+50	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER					X	X	3					X	
6	TWO	N/A	IH 10 WB AT KC DRAW RELIEF	STA. 499+00	TL-3	UNI	N/A	N/A	PORTABLE TRAFFIC BARRIER					X	X	4					X	
												TOTALS	3	3	3							

LEGEND:

L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.

http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm



03/10/2021

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC	IH 20, ETC
	DIST		COUNTY	
	ODA		REEVES	
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			16

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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

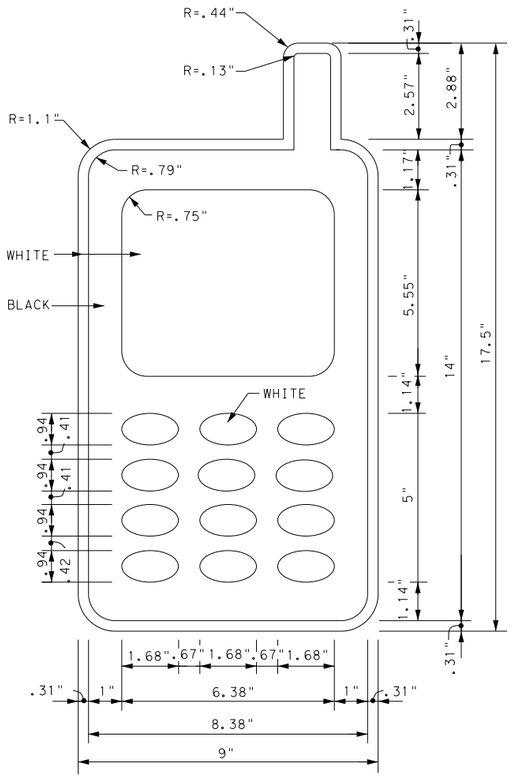
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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 APPAREL 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.



SIGN DETAIL (G20-10T)

3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
℄STAY ALERT℄ Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
℄TALK OR TEXT LATER℄ Font: C specified length;

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	ODA	REEVES		17

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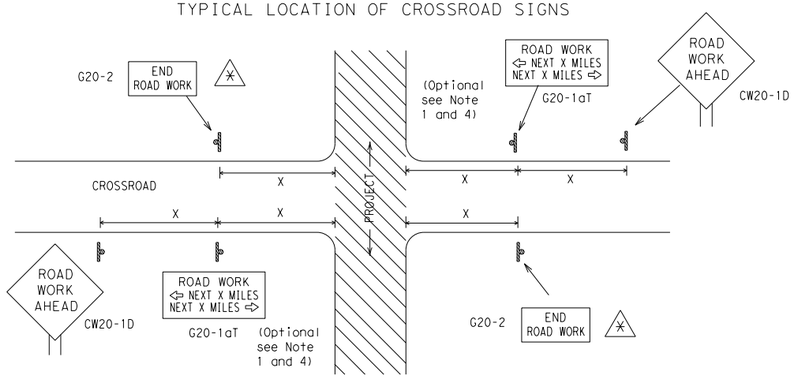
FILE: pw:\\DataPWINTO1.cpyone.com:pw_cpy\Documents\Active Projects\TXBR170048400\TXBR170048400_Plans and Drawings\8.30 CUT Sheets 8.30.09 TxDOT Standards\Traffic Control\BC(02)-14.dgn

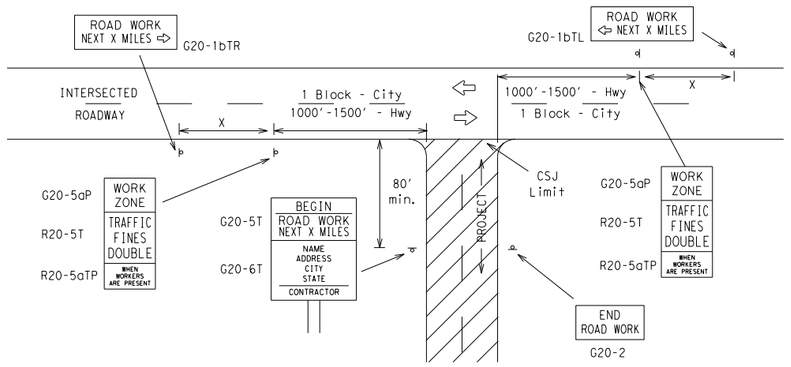
TYPICAL LOCATION OF CROSSROAD SIGNS



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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. 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			SPACING	
Sign Number or Series	Conventional Road	Expressway/ Freeway	Posted Speed	Sign Spacing "X" △
			MPH	Feet (Apprx.)
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"	30	120
			35	160
			40	240
			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
			55	500[2]
			60	600[2]
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	65	700[2]
			70	800[2]
			75	900[2]
			80	1000[2]
			*	* [3]

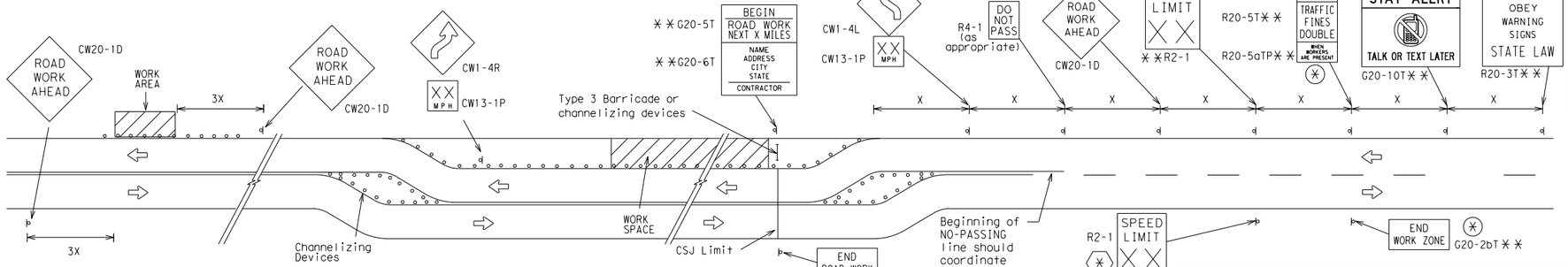
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. 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.

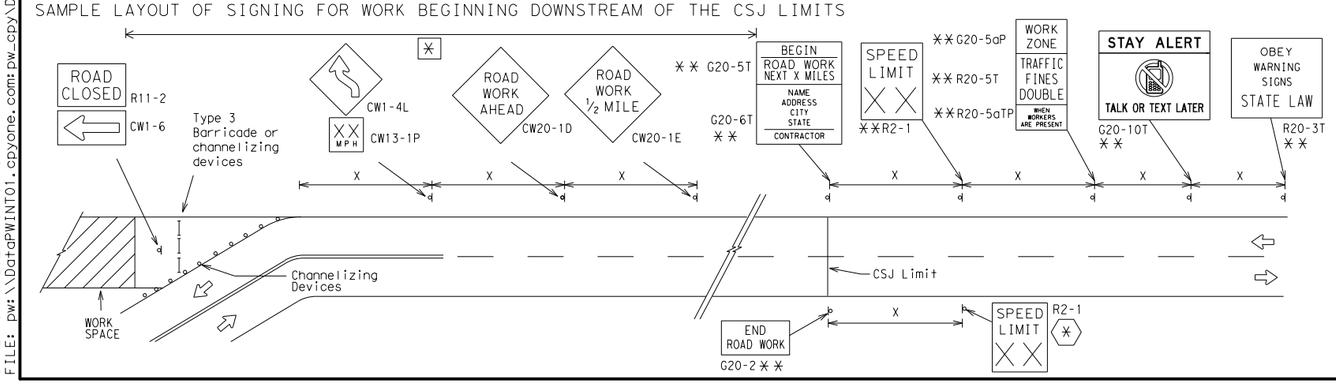
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

⚹⚹ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

▭ 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 Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ODA	REEVES		18

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.

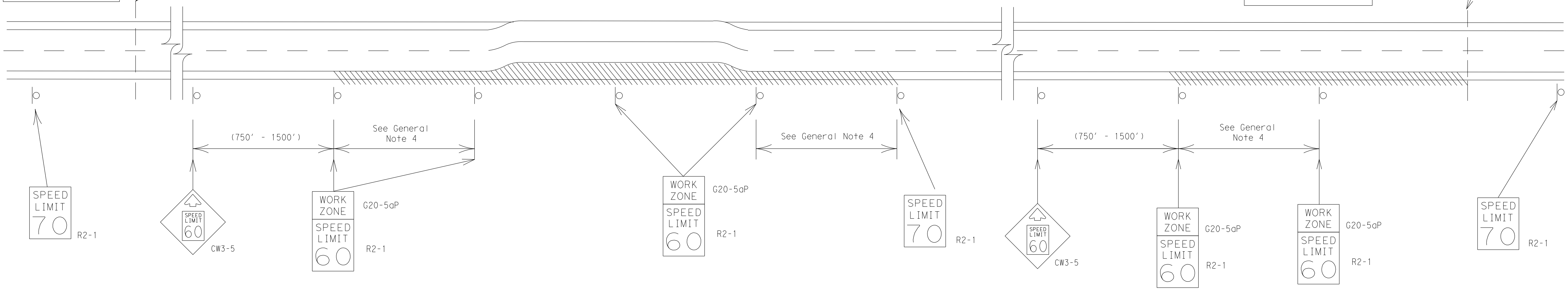
Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.

Signing shown for one direction only. See BC(2) for additional advance signing.

CSJ LIMITS

Signing shown for one direction only. See BC(2) for additional advance signing.

CSJ LIMITS



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 travelled 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.

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SHEET 3 OF 12

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
9-07 8-14	DIST		COUNTY	SHEET NO.
7-13	ODA		REEVES	19

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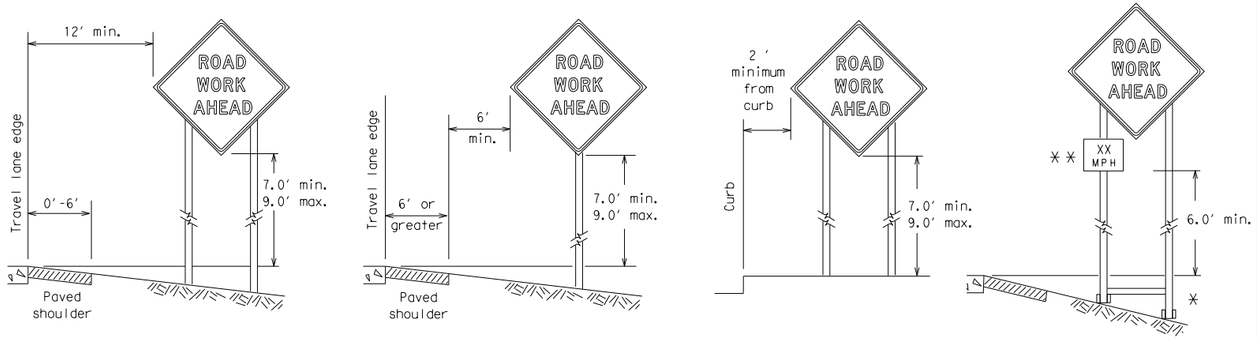
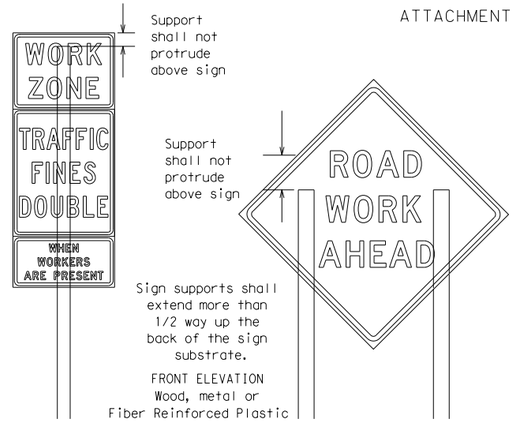
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



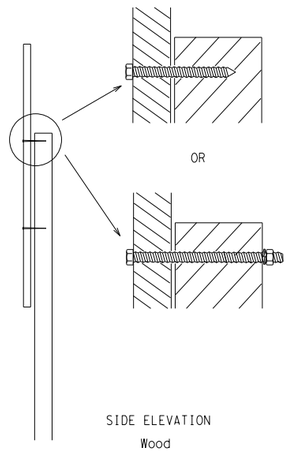
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



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

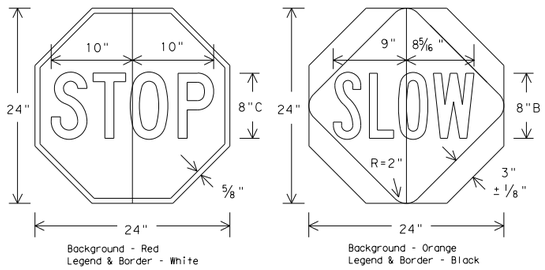


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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	ODA	REEVES		20

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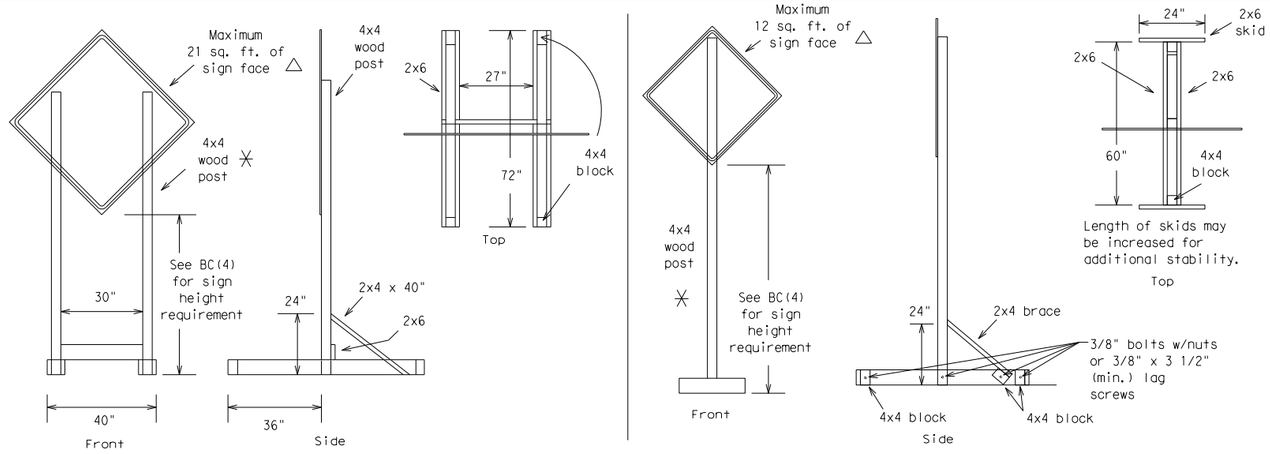
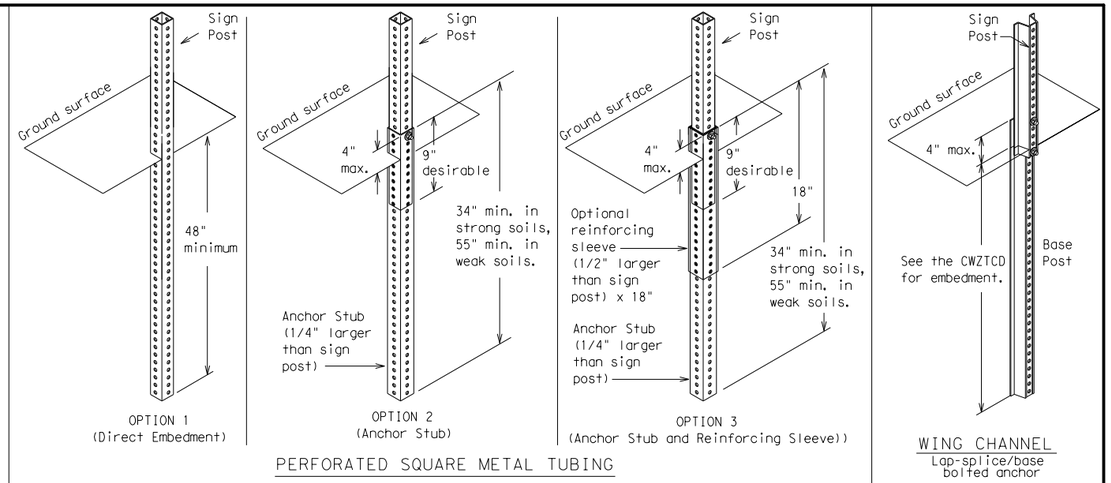


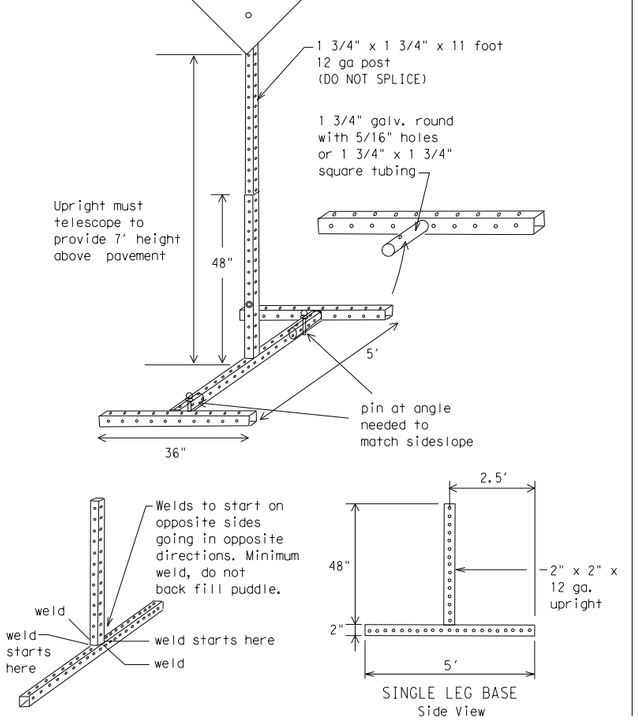
SKID MOUNTED WOOD SIGN SUPPORTS

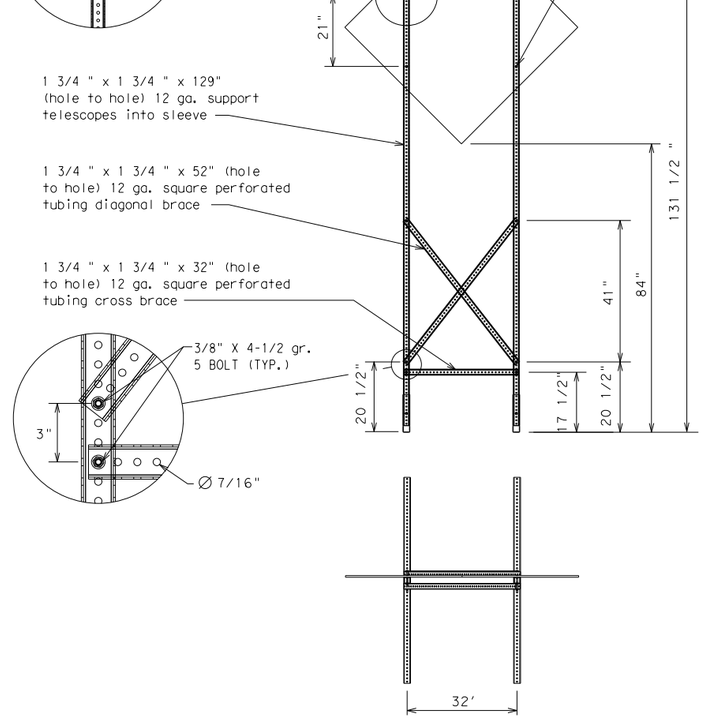
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

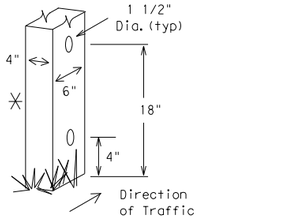


GROUND MOUNTED SIGN SUPPORTS

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

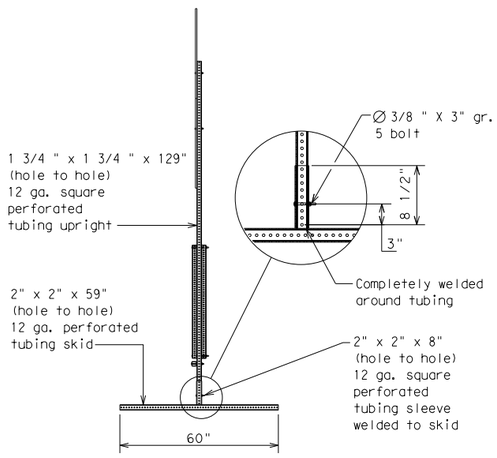






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ODA	REEVES		22

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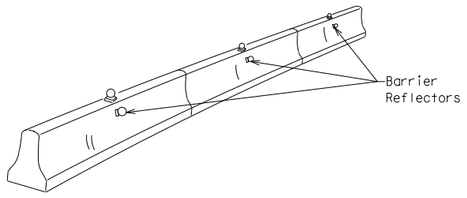
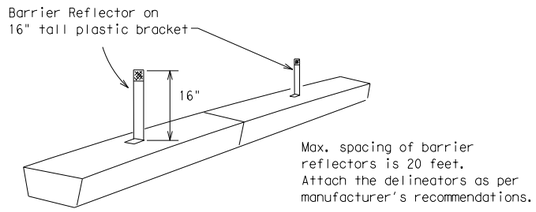
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

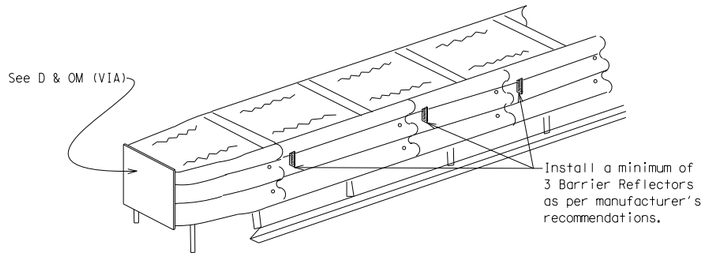


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

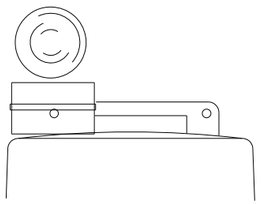


DELINEATION OF END TREATMENTS

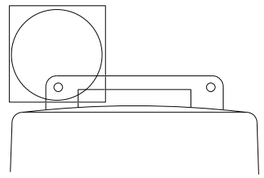
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

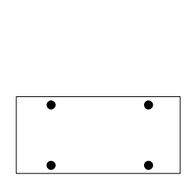
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

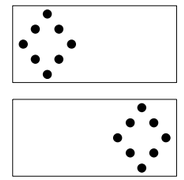
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

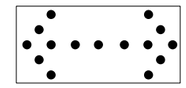


4 CORNER CAUTION

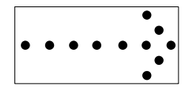
OR



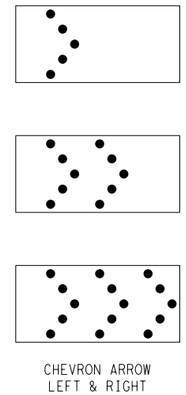
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



LEFT & RIGHT



CHEVRON ARROW
LEFT & RIGHT

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 National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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 Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	ODA	REEVES		23

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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:

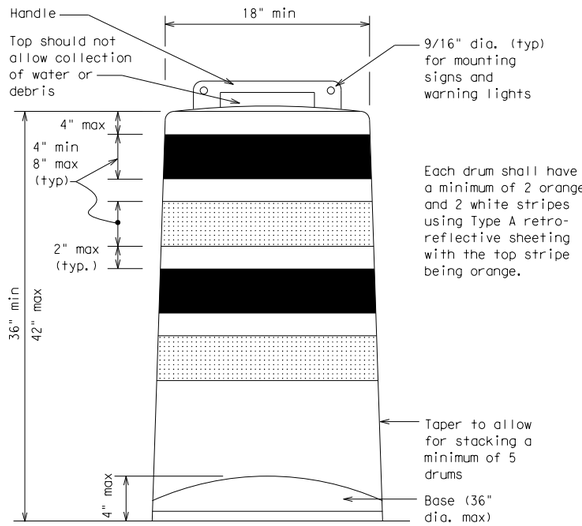
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

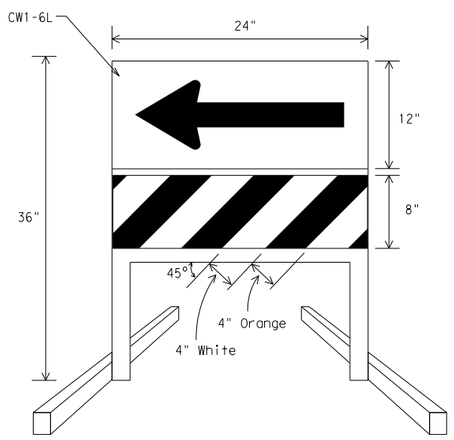
RETROREFLECTIVE SHEETING

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 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.





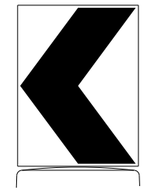
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

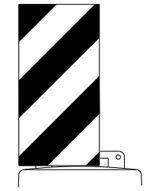
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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 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 Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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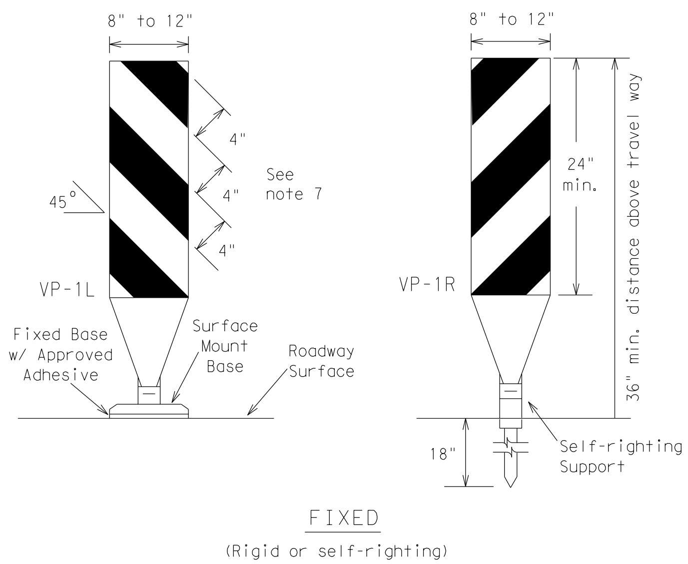
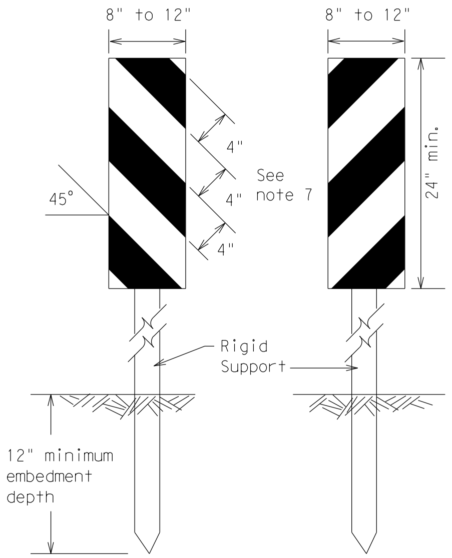
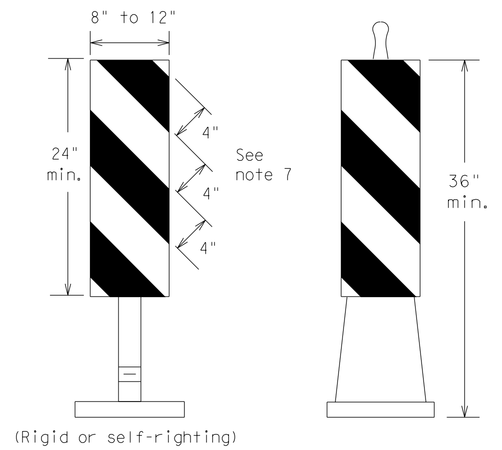
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	ODA	REEVES		24



FIXED
(Rigid or self-righting)



DRIVEABLE

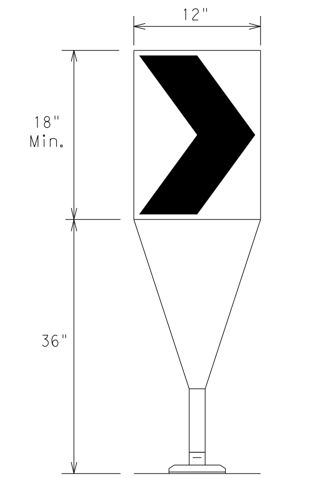


(Rigid or self-righting)

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 Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 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)



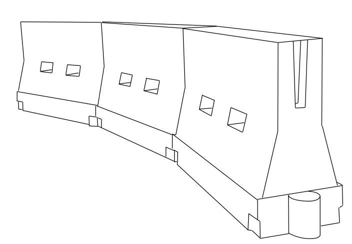
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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) placed 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 NCHRP 350 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.

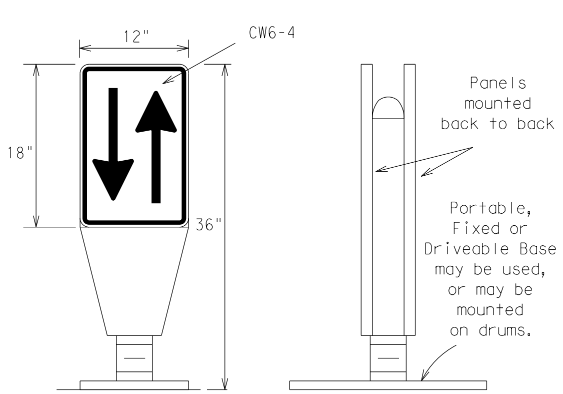
If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	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



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 nonreflective 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)

SHEET 9 OF 12

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

FILE: bc-14.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13	ODA	REEVES		25	

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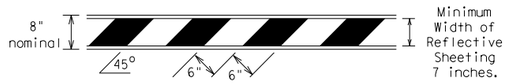
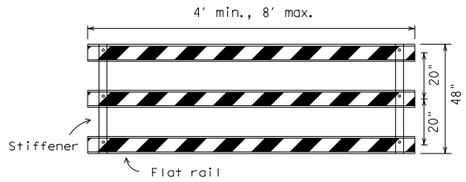
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



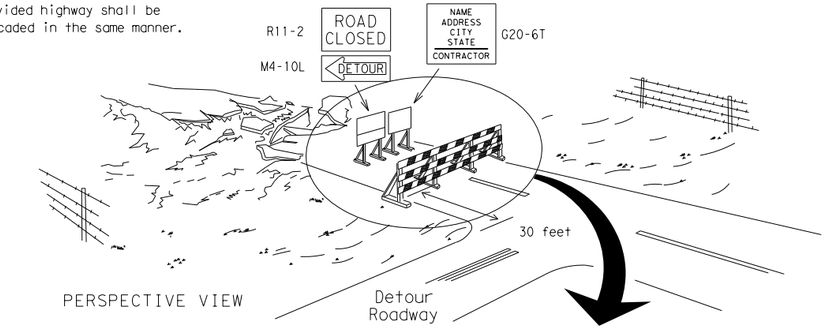
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

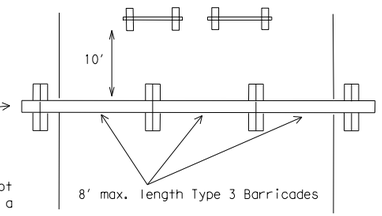
Each roadway of a divided highway shall be barricaded in the same manner.



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.

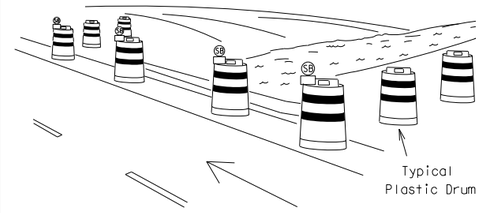
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

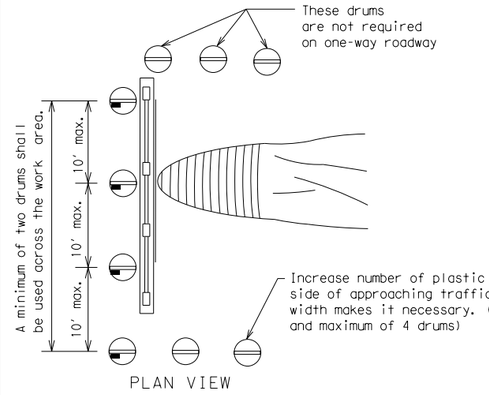
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

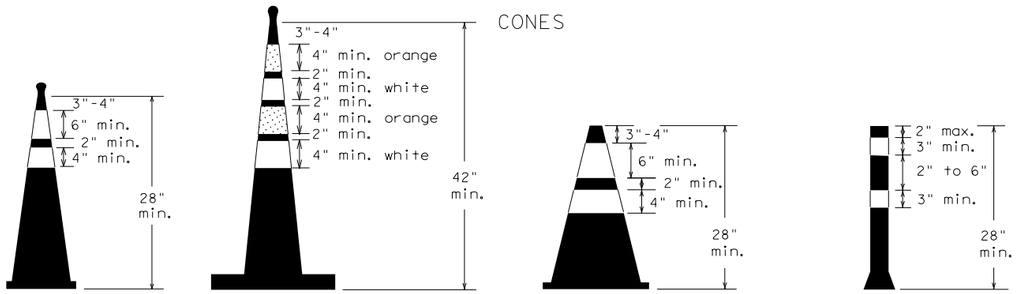
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

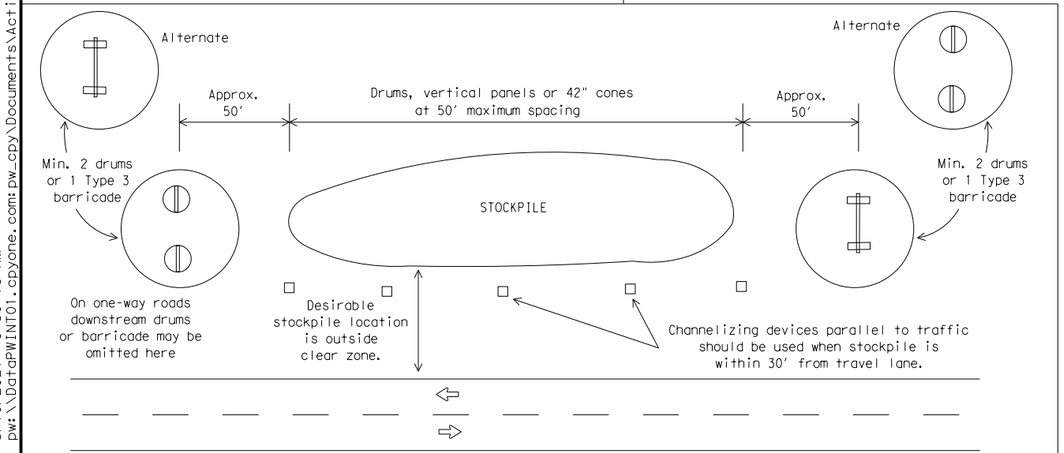
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

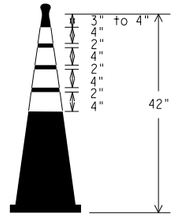
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

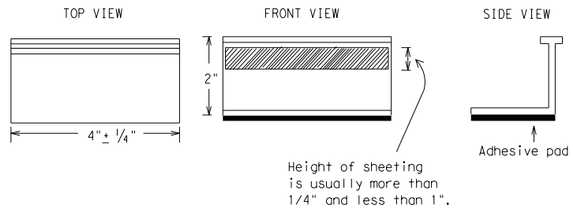
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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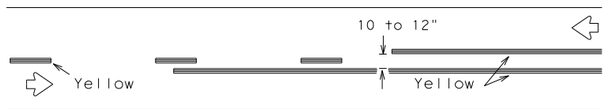
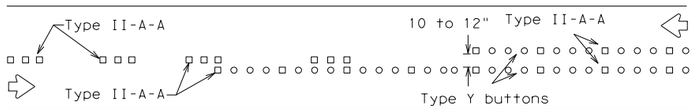
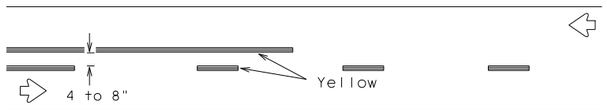
PAVEMENT MARKING PATTERNS



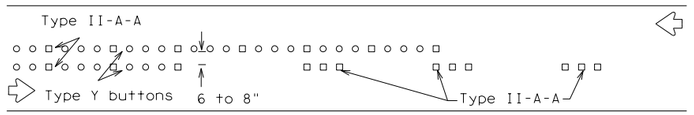
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



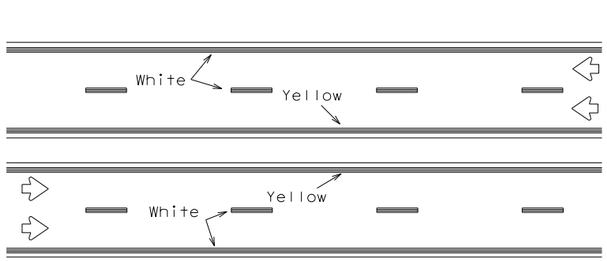
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



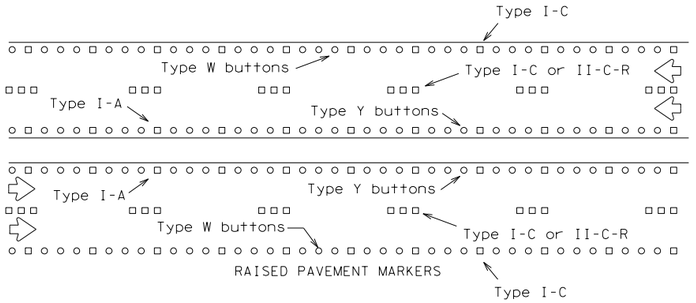
RAISED PAVEMENT MARKERS - PATTERN B

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

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



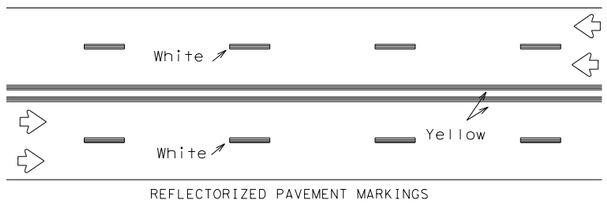
REFLECTORIZED PAVEMENT MARKINGS



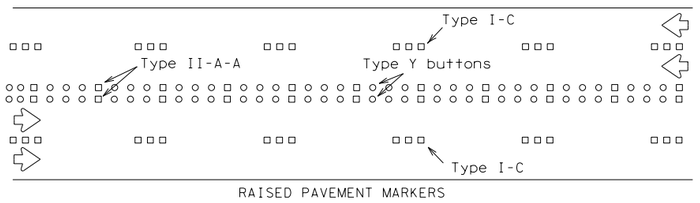
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



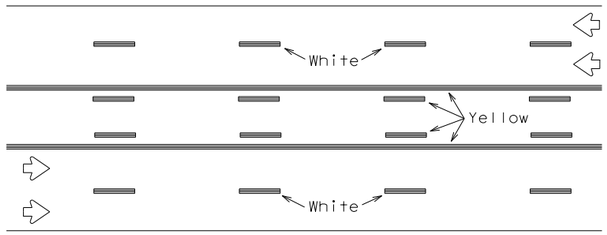
REFLECTORIZED PAVEMENT MARKINGS



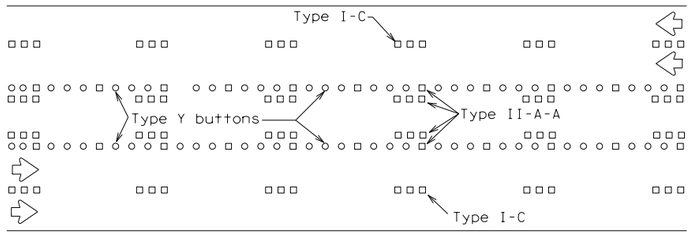
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

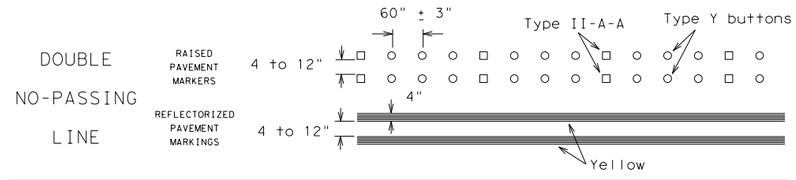
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

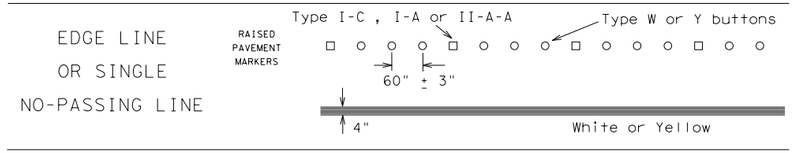
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

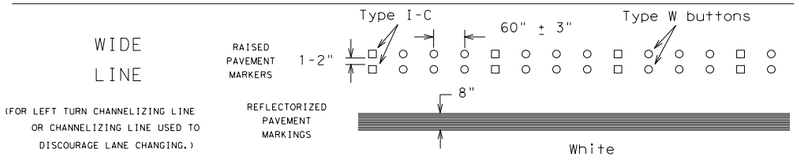


EDGE LINE OR SINGLE NO-PASSING LINE



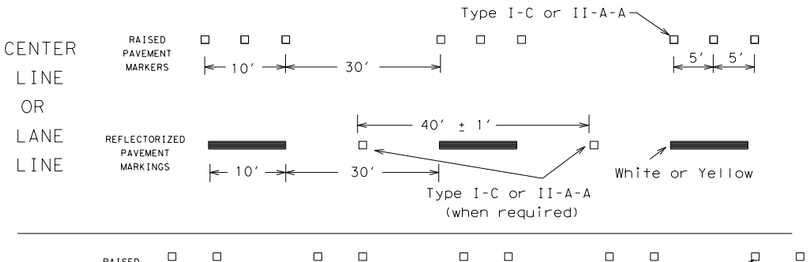
WIDE LINE

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

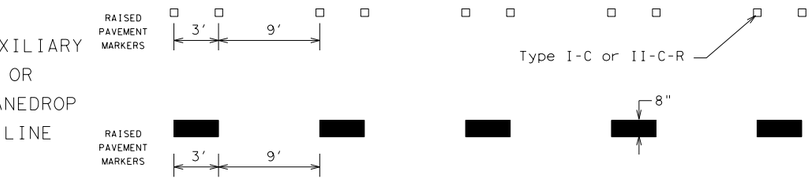


BROKEN LINES

CENTER LINE OR LANE LINE

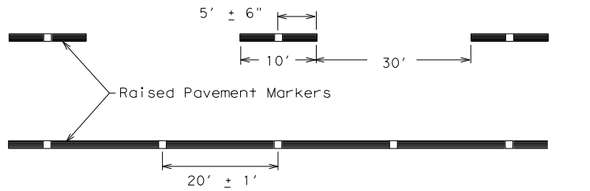


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

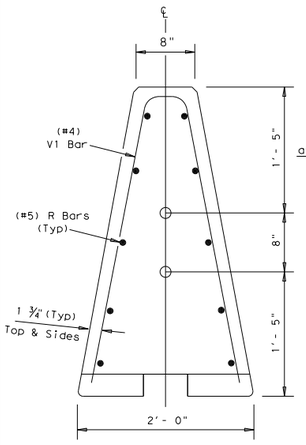
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

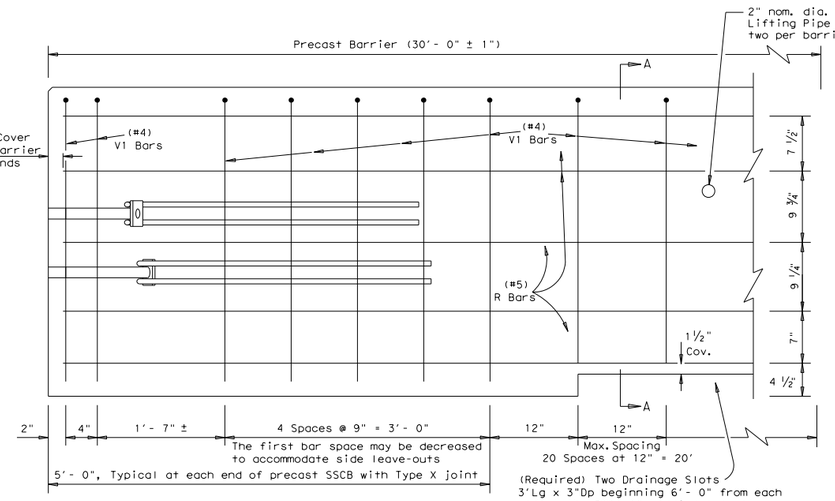
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	ODA	REEVES		28
11-02 8-14				

DATE: 3/10/2021
FILE: pw:\\DataPWINT01.cpyone.com:pw_cpy\Documents\Active Projects\TXBR1700484.00\TXBR1700484.14\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.09 TxDOT Standards\Traffic Control\SSCB



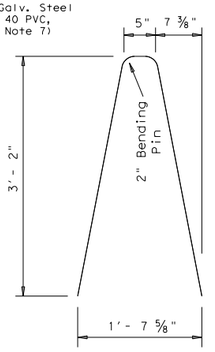
End View
Precast Barrier

Pipe locations for Joint Type X connection



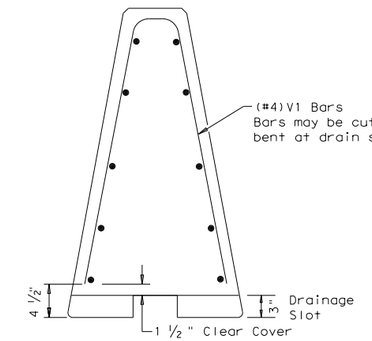
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)

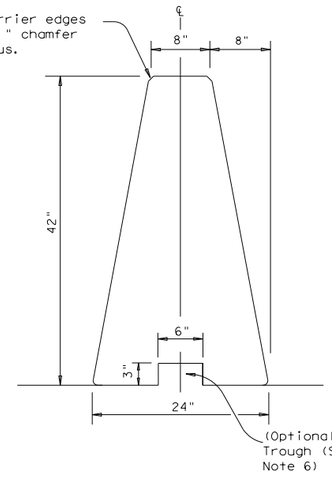


V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.

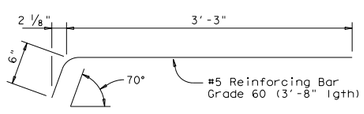


Section A-A
Steel Placement at
(Required) Drainage Slots



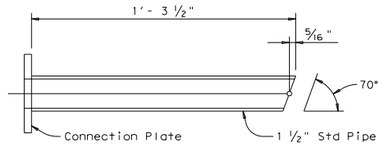
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



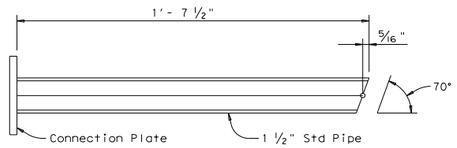
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



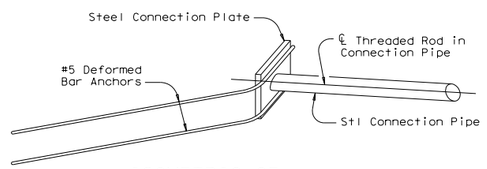
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

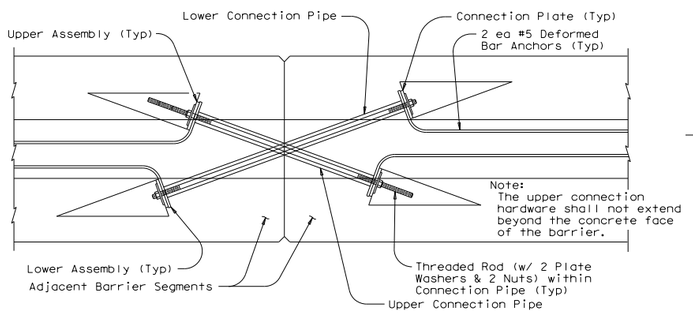


ISOMETRIC OF
TYPICAL WELDED ASSEMBLY

Four (4) ℄2 Upper & 2 Lower℄
Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

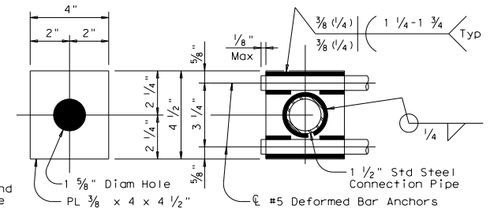
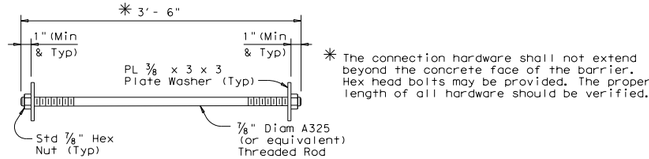


PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

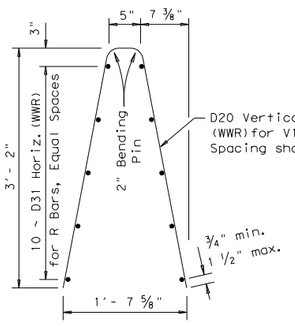


✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

CONNECTION BOLT OR
THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL ⅜ x 3 x 3
Plate Washers & Two (2) Std Hex Nuts)
required per Joint.

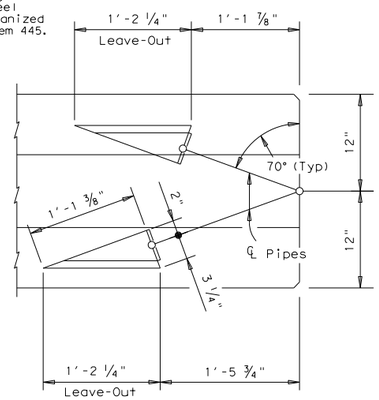
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement
(WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		29

DATE: 3/10/2021
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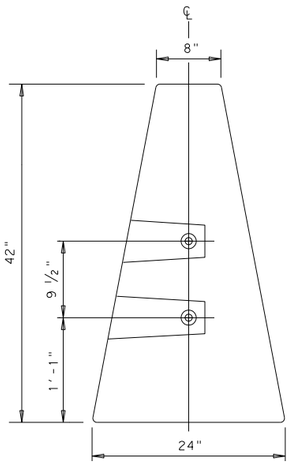
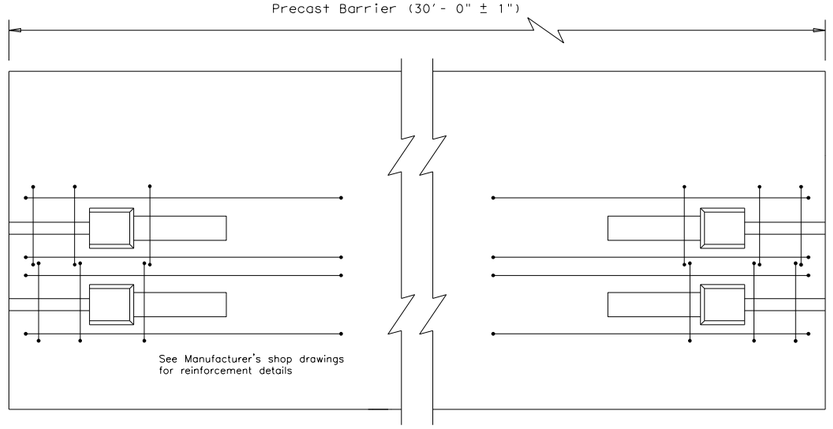
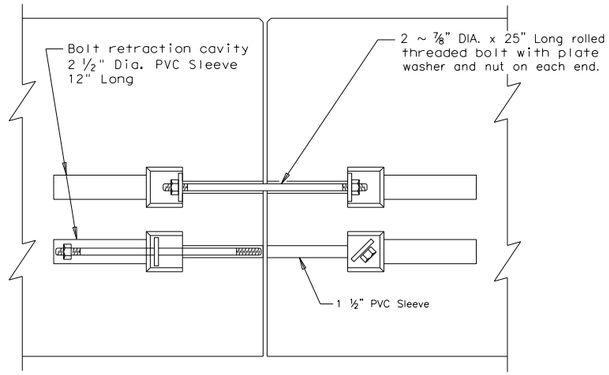


END VIEW
"QUICK-BOLT" POCKET LOCATIONS

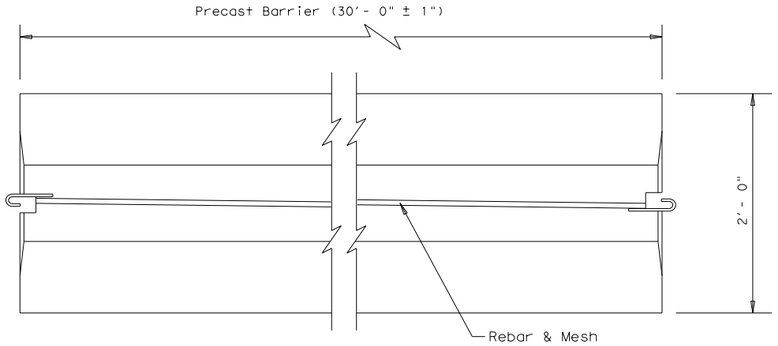


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

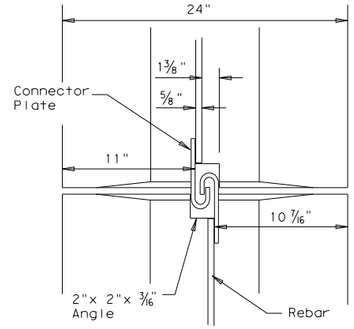


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

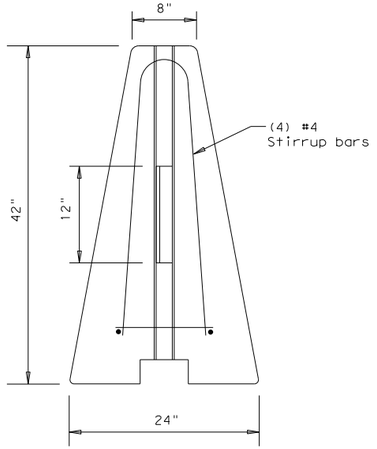
Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



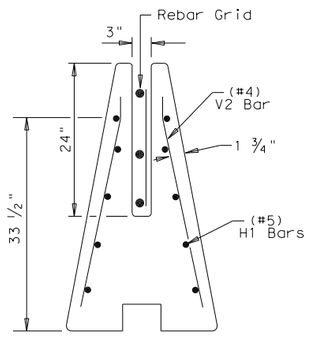
END VIEW

Proprietary Joint Connections (SSCB)

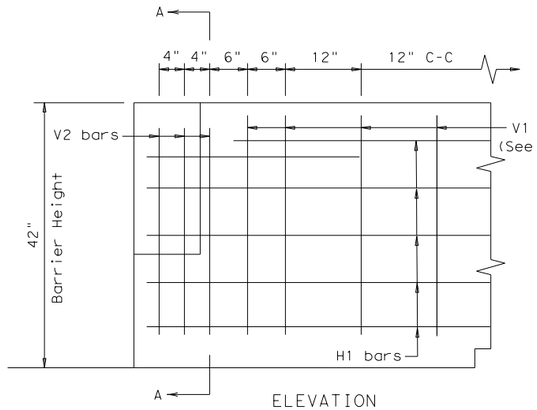
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

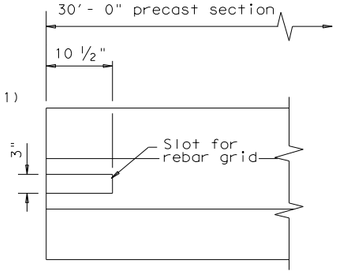
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



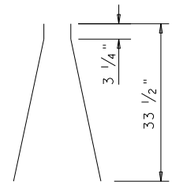
SECTION A-A
Showing (Type R) Rebar Grid



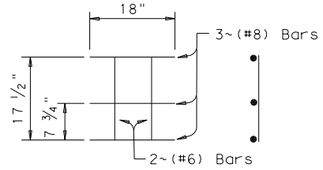
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		30

DATE: 3/10/2021
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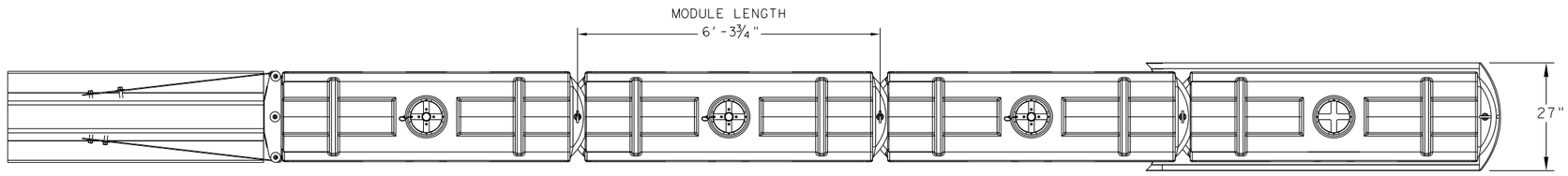
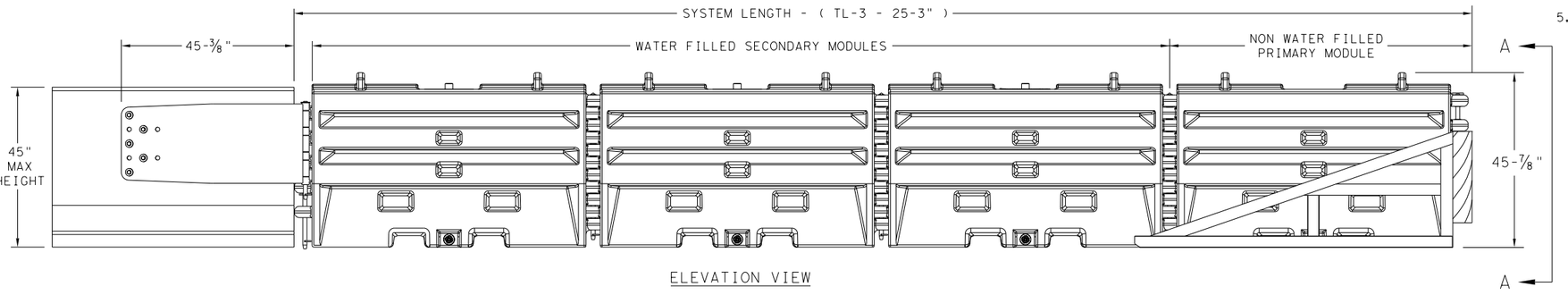
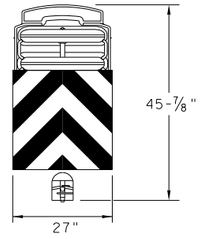


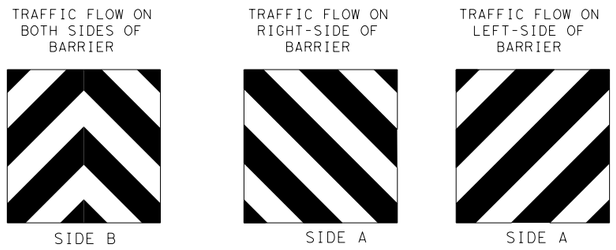
PLAN VIEW



ELEVATION VIEW



SECTION A-A



NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

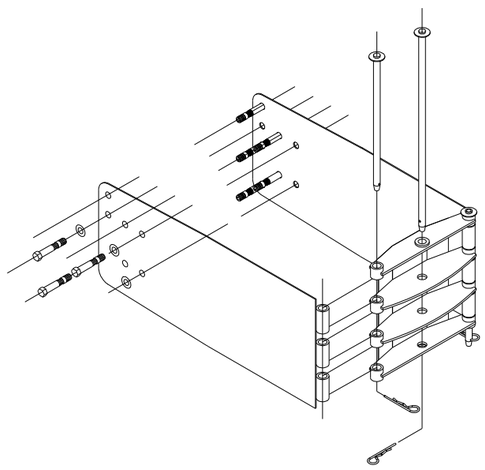
TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"

GENERAL NOTES

1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

BILL OF MATERIAL		
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

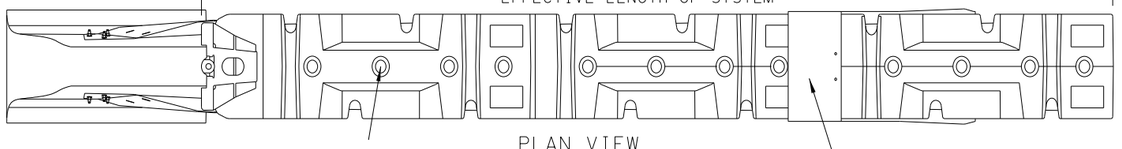
Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		31

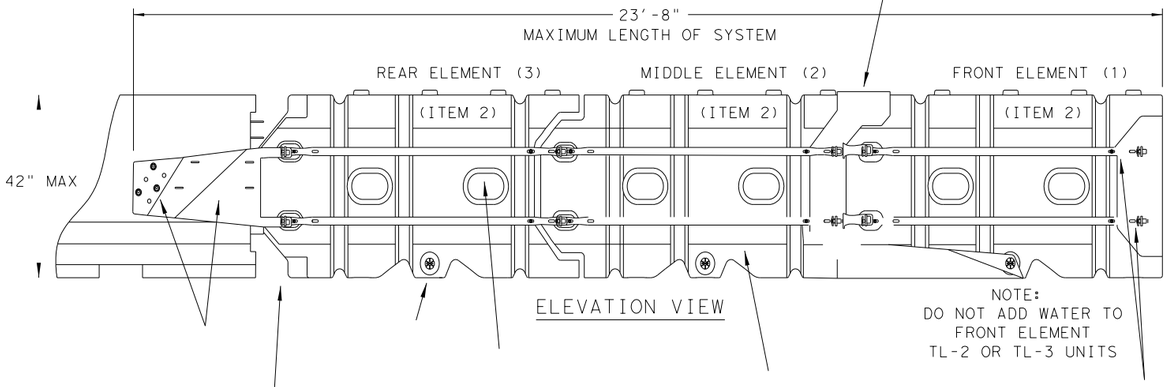
DATE: 3/10/2021
FILE: pw:\\DataPWINT01.cpyone.com:pw-cpy\Documents\Active Projects\TXBR1700484.00\TXBR1700484.14\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.09 TxDOT Standards\Traffic Control\ABSO

SYSTEM SHOWN - ABSORB-M TL-3



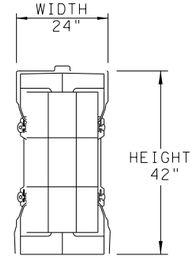
PLAN VIEW

TRAFFIC FLOW

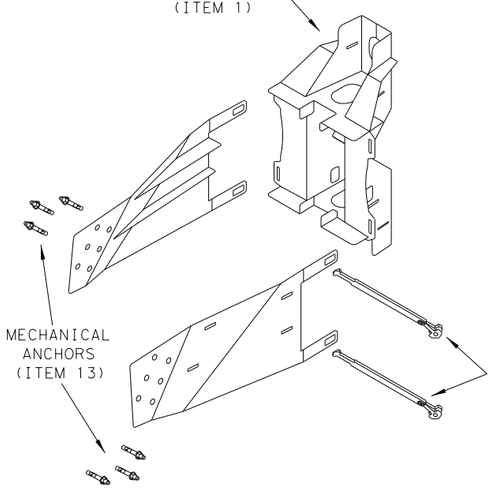


ELEVATION VIEW

TRAFFIC FLOW



SECTION A-A



TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

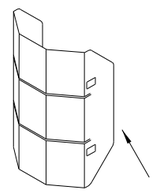
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

* COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER

** APPLY DECAL



NOSE PLATE

** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALS ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

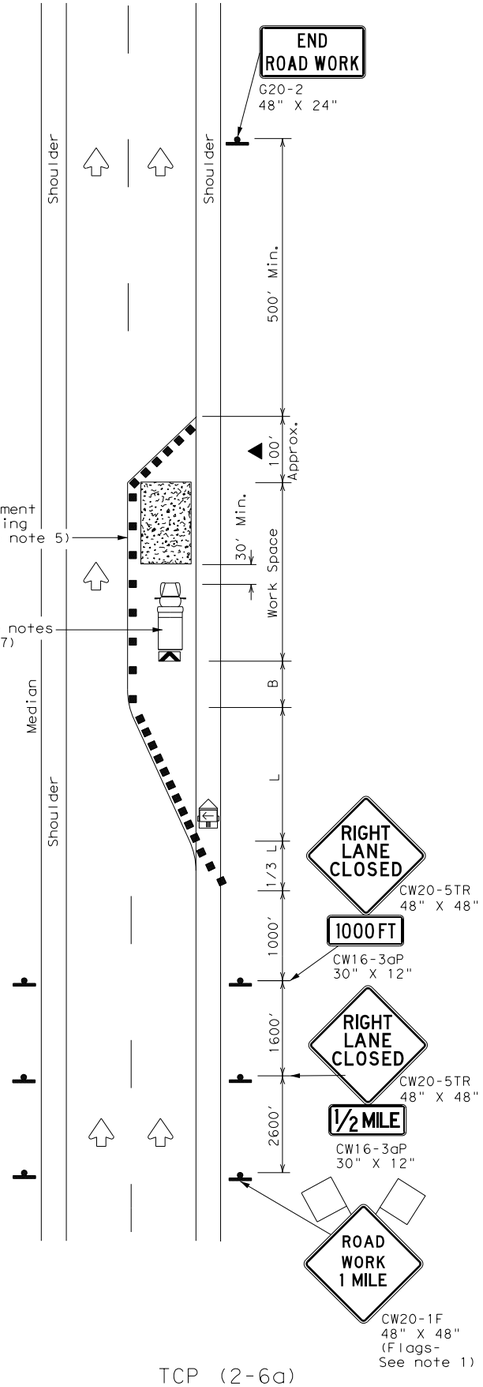
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation — Design Division Standard

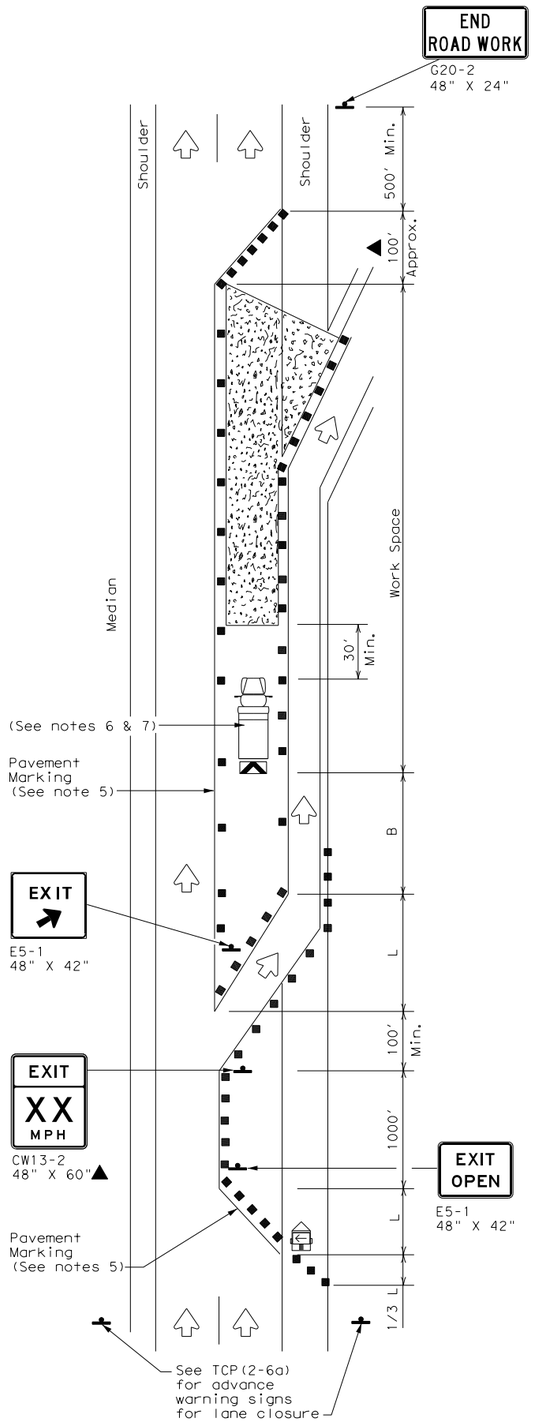
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096,ETC.	IH 20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		32



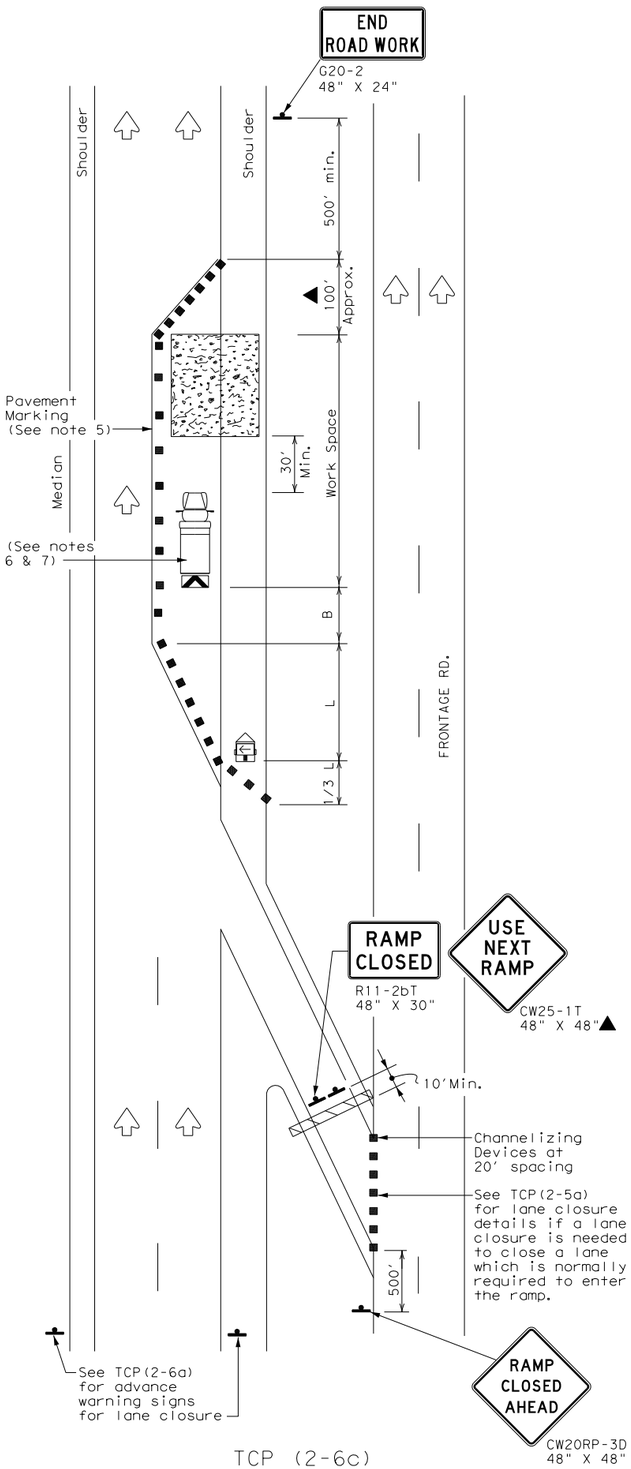
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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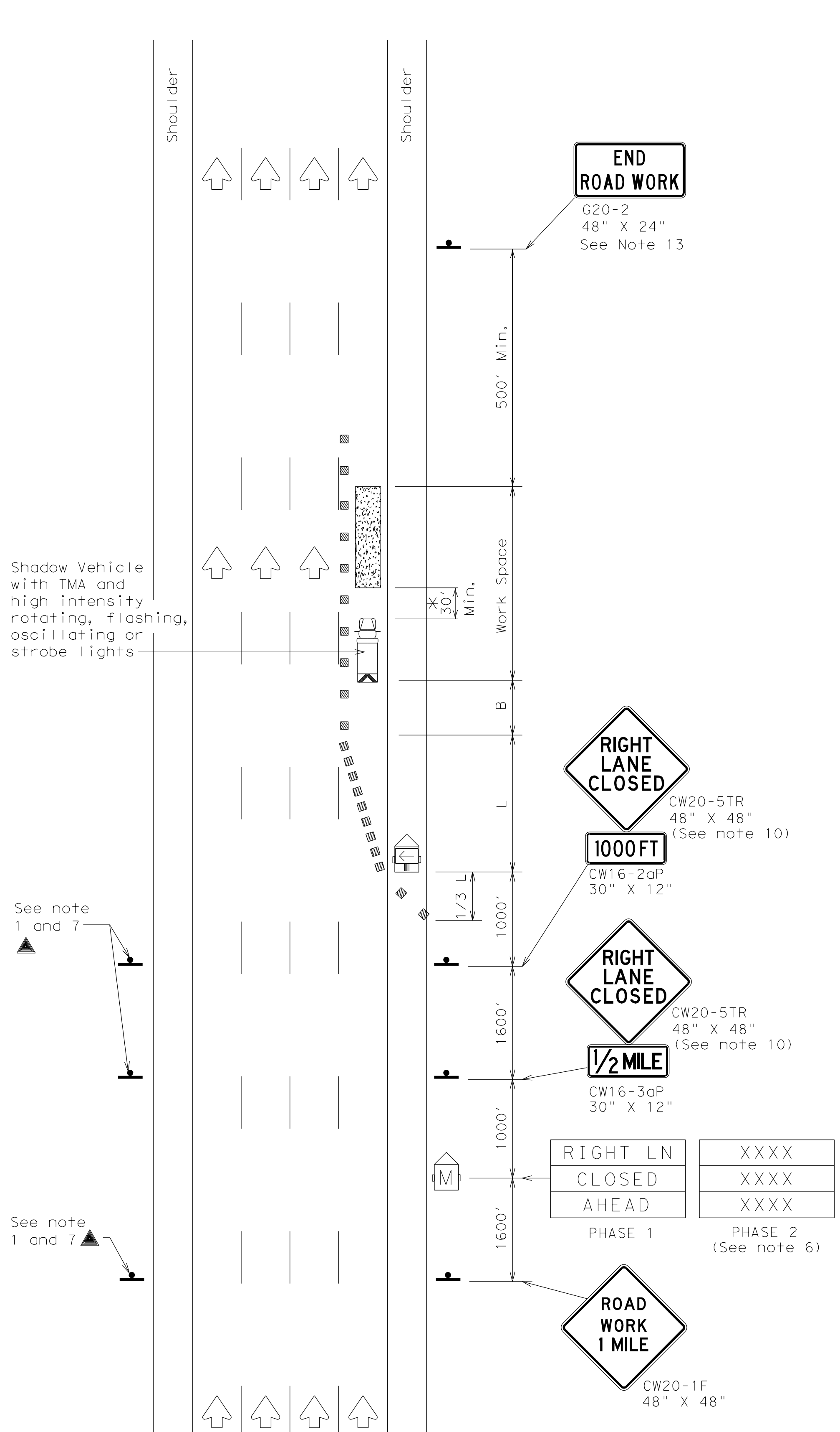
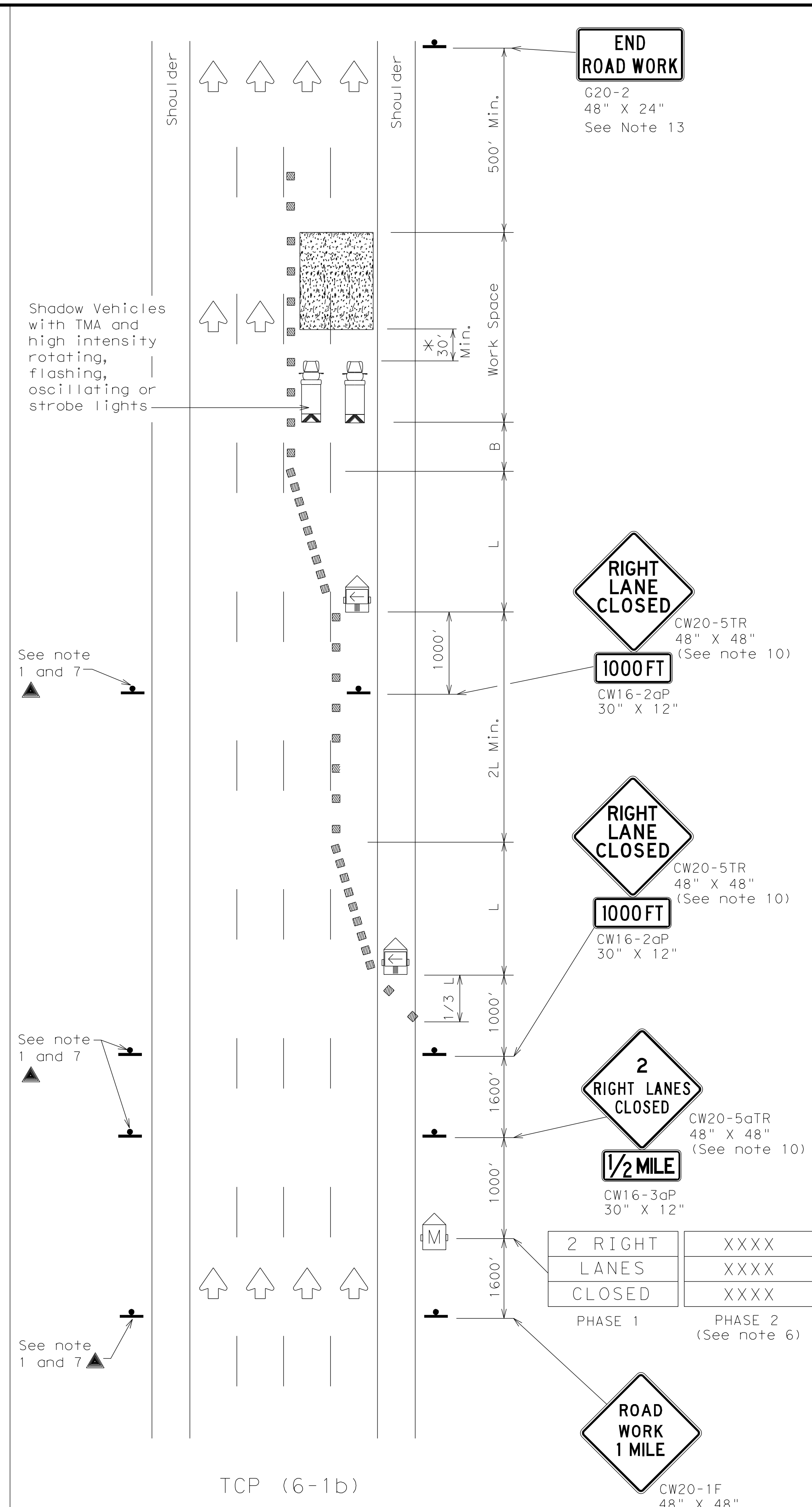
8-95 2-12	ODA	REEVES		33
1-97 2-18				



TCP (6-1a)

TYPICAL FREEWAY
ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY
TWO LANE CLOSURE

LEGEND

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

TYPICAL USAGE

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Drums or 42"cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
3. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
4. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
5. Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
6. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
8. The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.
9. Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
10. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
11. When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
12. For Intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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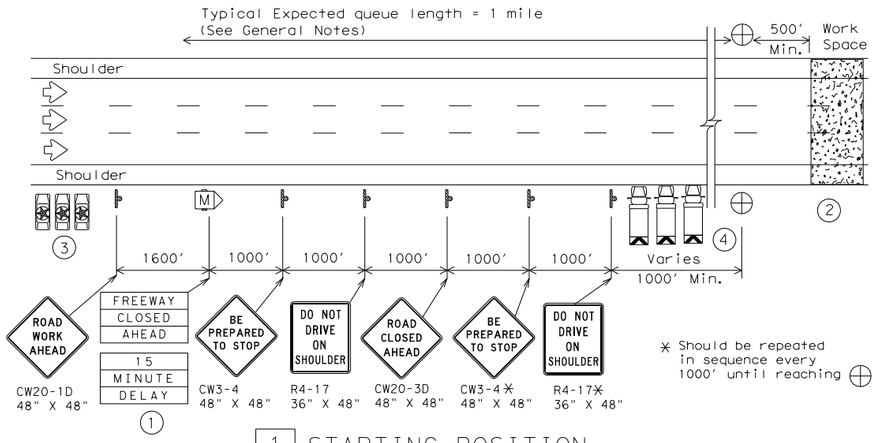
	ODA		REEVES	34



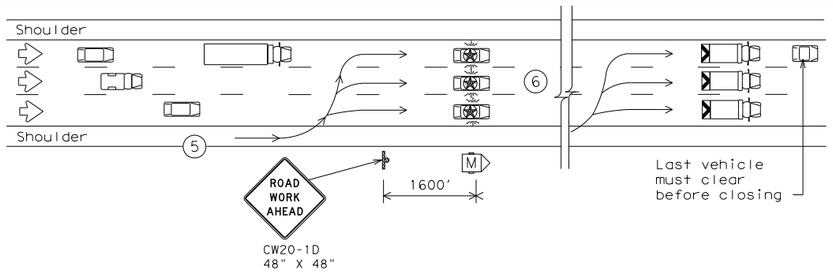
1 STARTING POSITION

(1) Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.

(2) Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.

(3) There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead law enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.

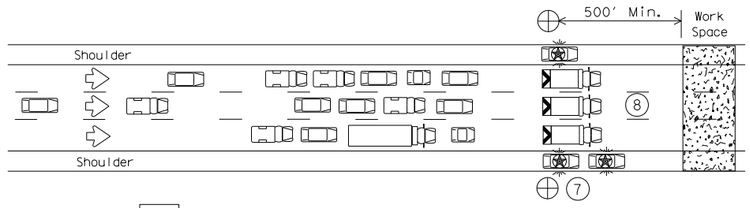
(4) One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



2 REDUCING SPEED OPERATION

(5) Starting position of the LEOVs should be in advance of the most distant warning signs.

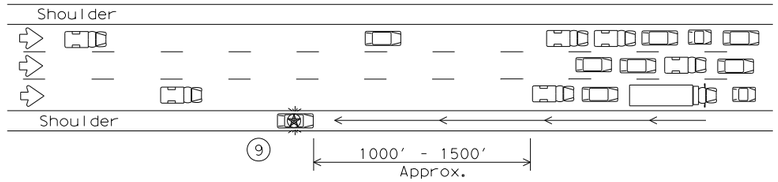
(6) Once the LEOVs have achieved an abreast blocking formation while traveling toward the CP, emergency lights and headlights should be turned "ON". The LEOVs should maintain formation, not allow traffic to pass, and begin to decelerate. The LEOVs should continue to decelerate, giving the barrier vehicles opportunity to be staged upstream of the work space after traffic has cleared. The LEOVs should then continue to decelerate slowly until bringing traffic to a stop near the barrier vehicles.



3 ALL TRAFFIC STOPPED AT CP

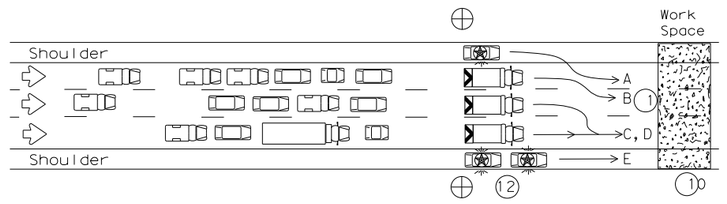
(7) Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide law enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.

(8) The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



4 WARNING THE TRAFFIC QUEUE

(9) The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000' in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed ¼ mile or more in advance of the queue.



5 RELEASING STOPPED TRAFFIC

(10) All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.

(11) When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.

(12) The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.

(13) LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

LEGEND			
	Channelizing Devices		Control Position (CP)
M	Portable Changeable Message Sign (PCMS)		Barrier Vehicle with Truck Mounted Attenuator
	Law Enforcement Officer's Vehicle (LEOV)		Traffic Flow

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

GENERAL NOTES

1. All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.

2. Law enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.

3. Law enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).

4. The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.

5. Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.

6. For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.

7. If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

THIS PLAN IS INTENDED TO BE USED AT LOCATIONS/TIMES WHEN TRAFFIC VOLUMES ARE LESS THAN 1000 PASSENGER CARS PER HOUR PER LANE.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY CLOSURE SEQUENCE

TCP (6-7)-12

FILE: tcp6-7.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-97 8-12	DIST	COUNTY		SHEET NO.
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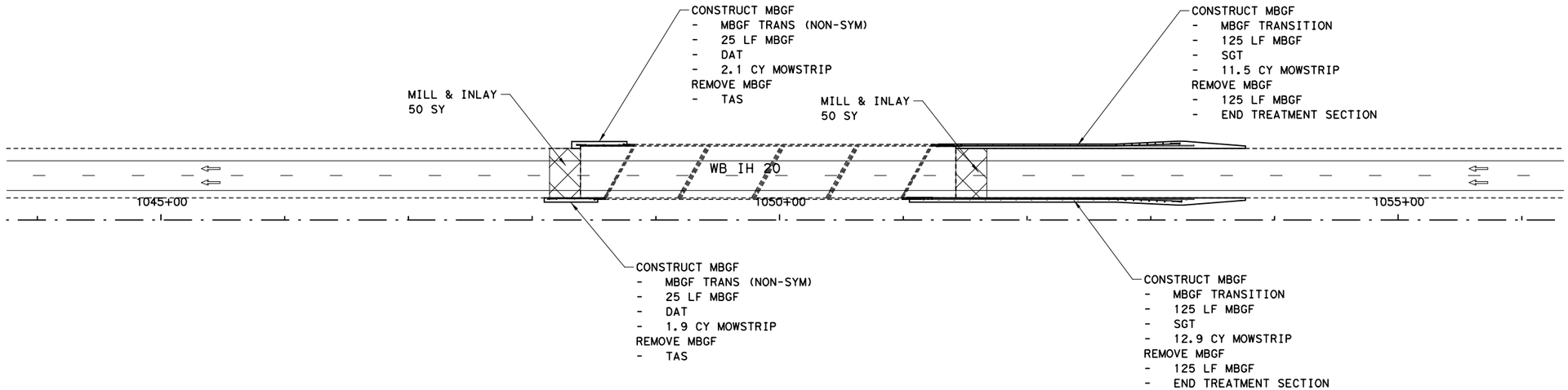

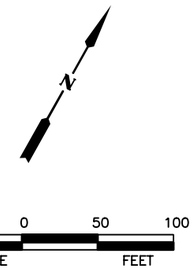

NO.	REVISION	BY	DATE

TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

ROADWAY PLAN
IH 20 WB AT BILLINGSLEA DRAW

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Drawn:	CPY	ODA	REEVES	0003	06	096, ETC.	36
Checked:	CPY						

SHEET 1 OF 1

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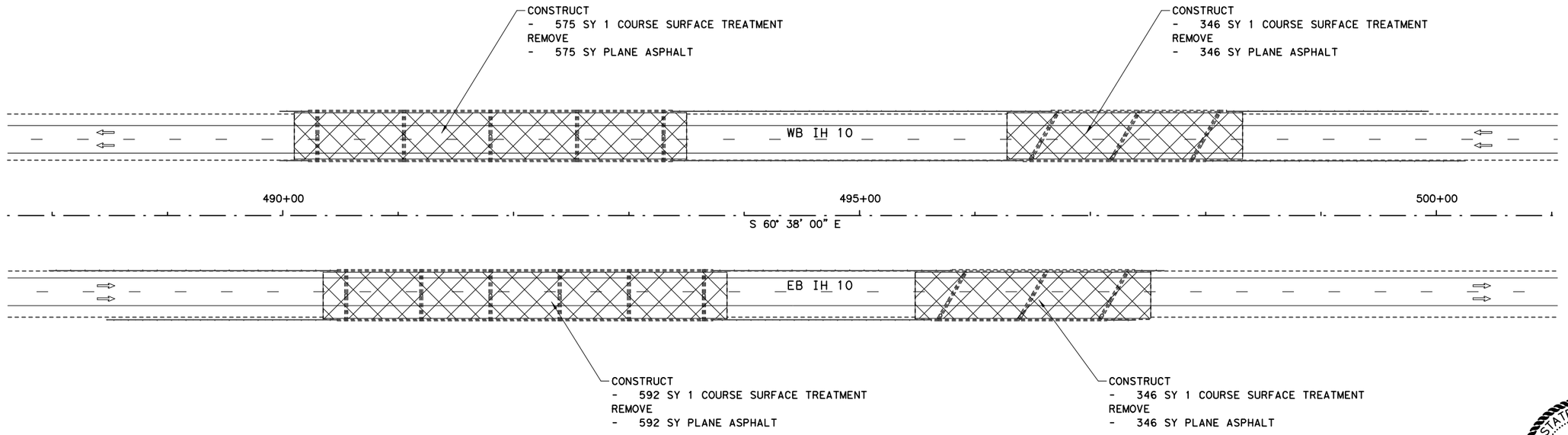

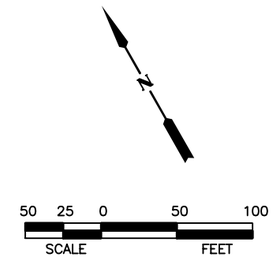

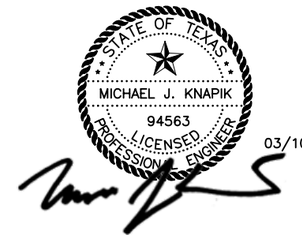

03/10/2021

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

ROADWAY PLAN
IH 10 AT KC DRAW & DRAW RELIEF

Designed:	KAD	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	37

SHEET 1 OF 1

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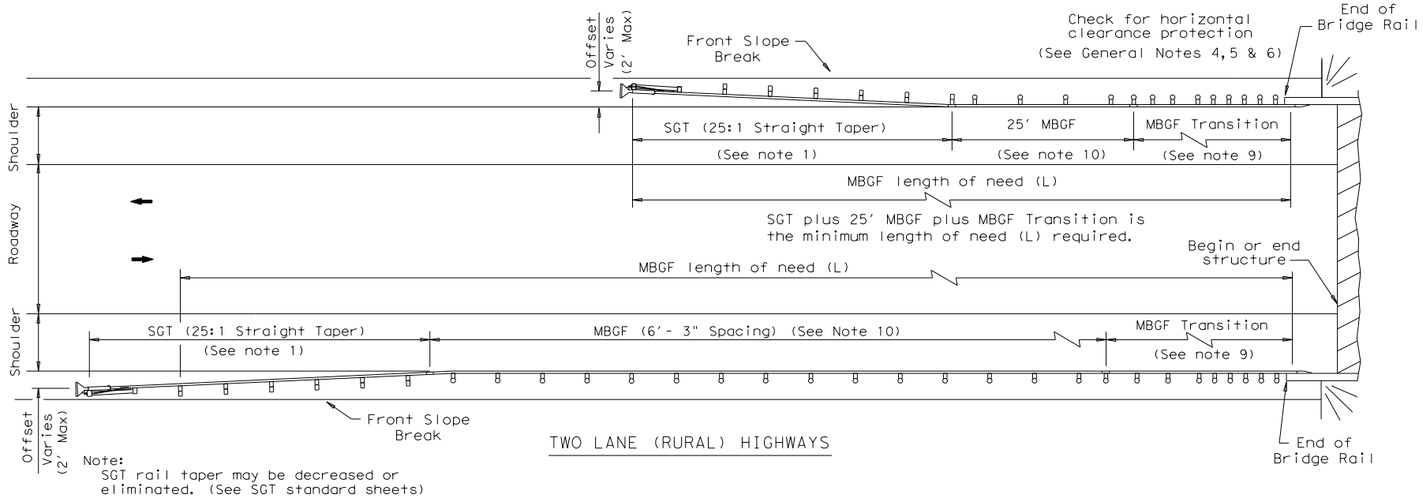
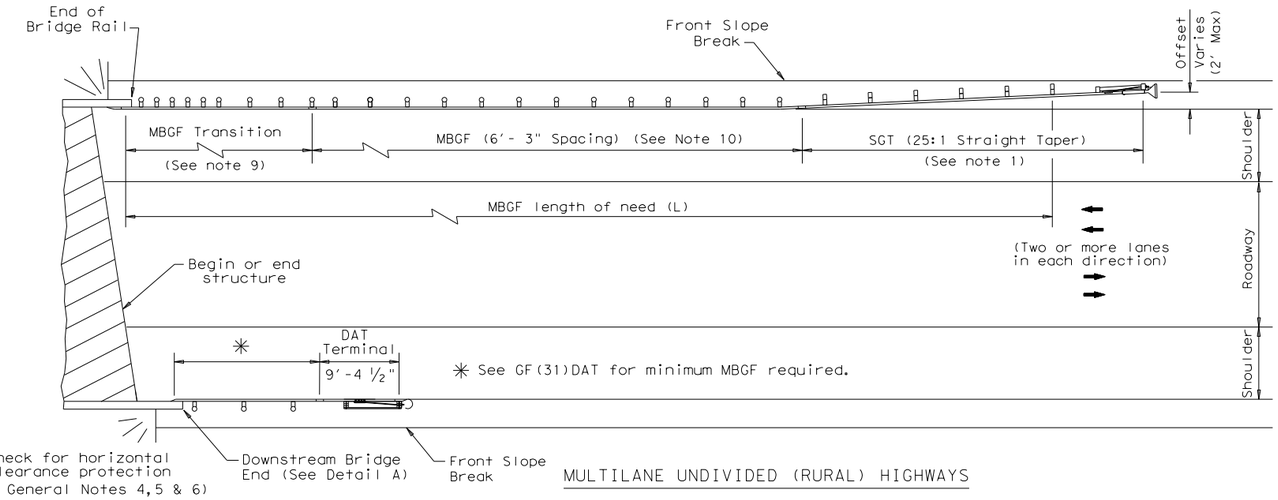
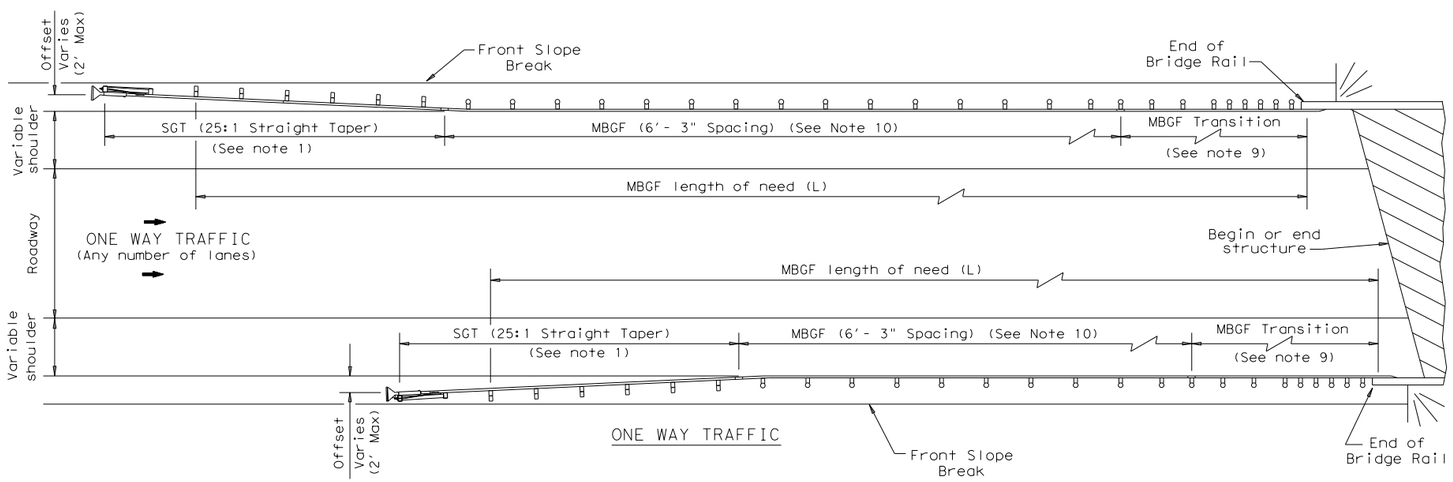


TWO LANE (RURAL) HIGHWAYS

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



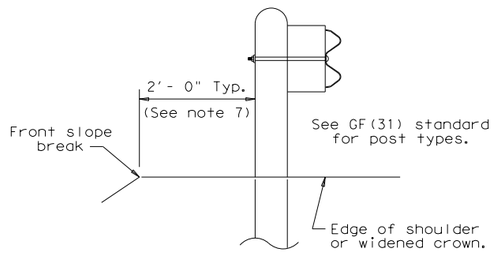
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0003	06	096,ETC	IH 20,ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		38

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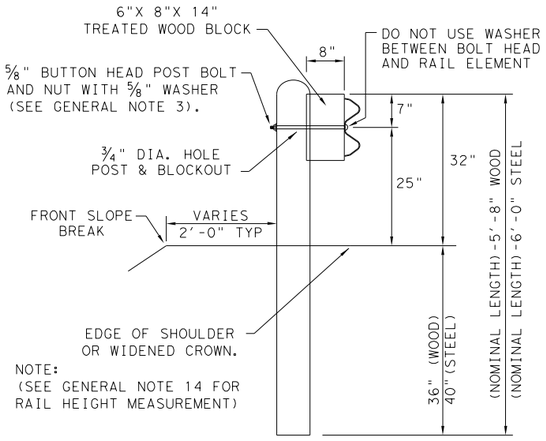
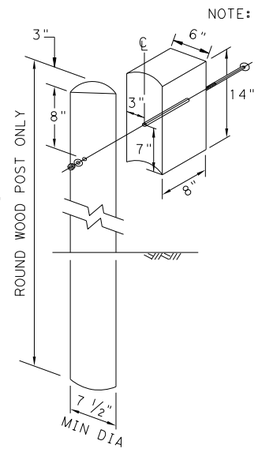
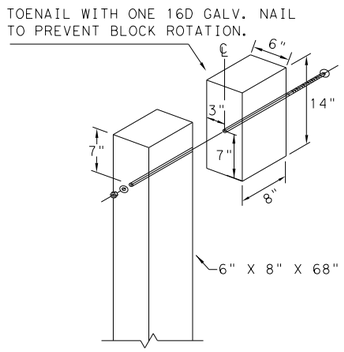


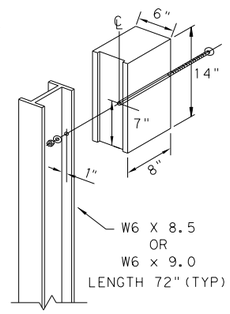
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

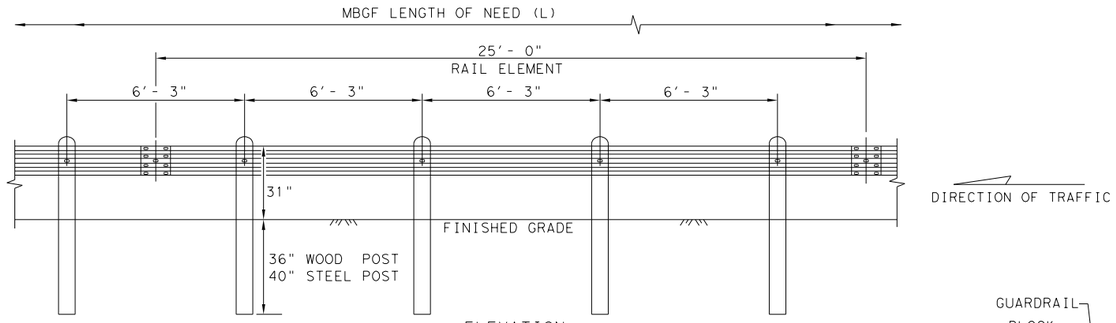


WOOD BLOCK TO
RECTANGULAR WOOD POST



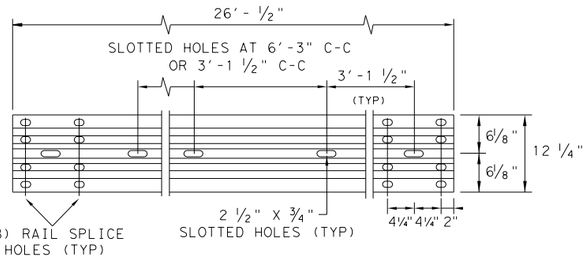
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

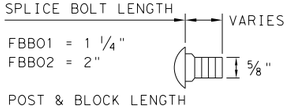
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

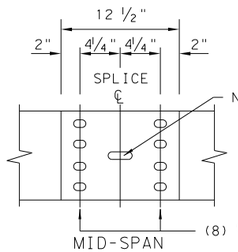
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



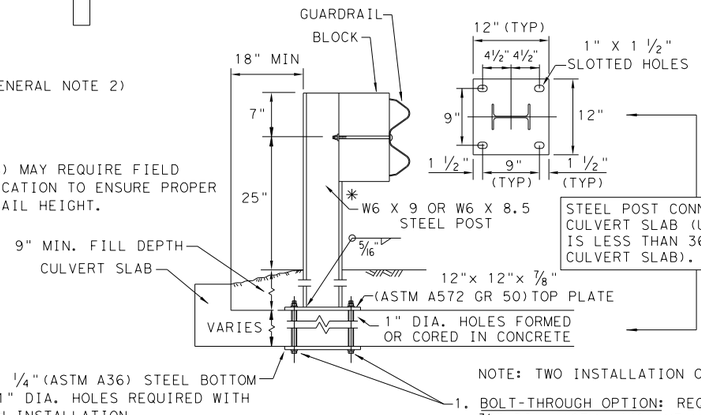
BUTTON HEAD BOLT

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	
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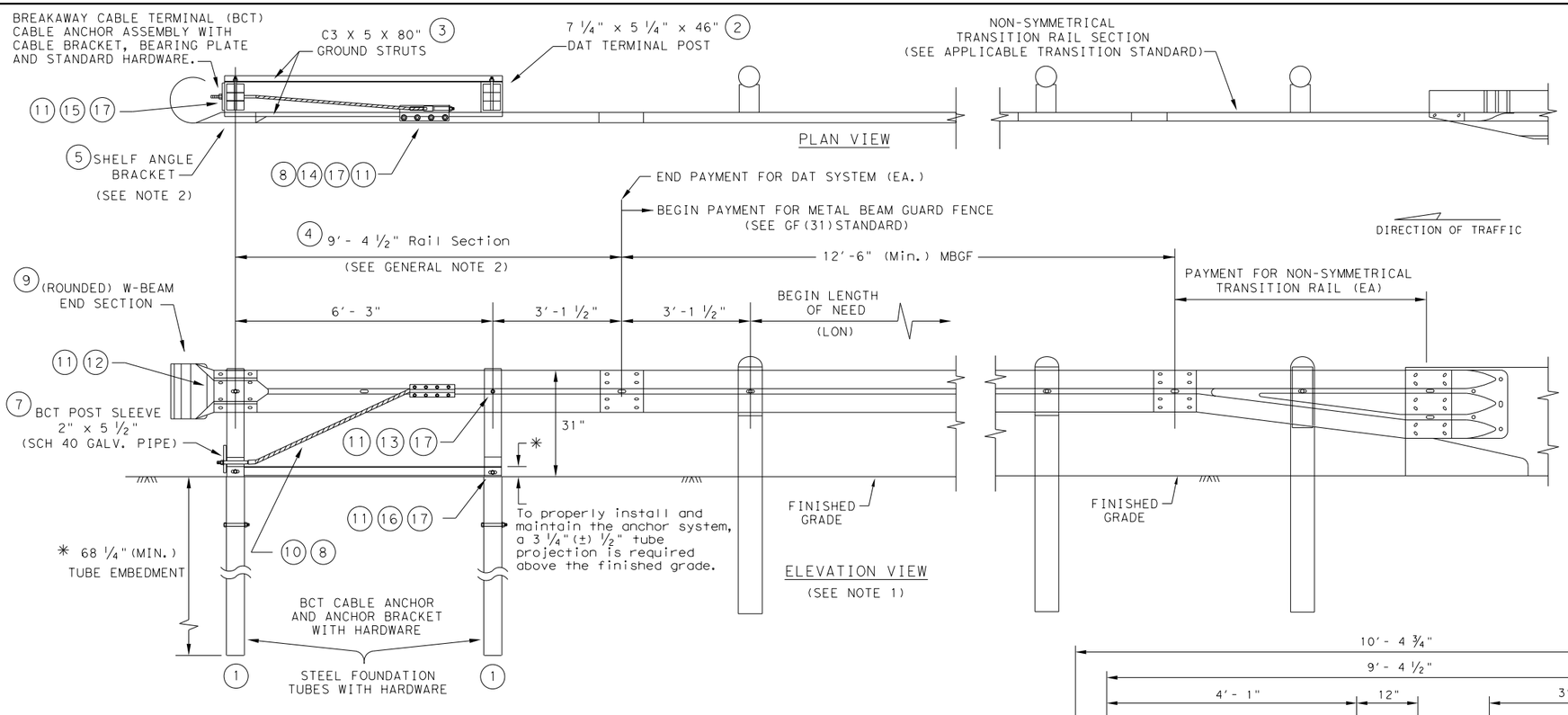


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

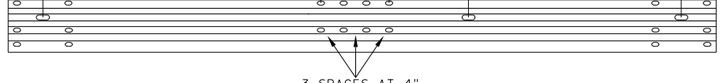
GENERAL NOTES

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

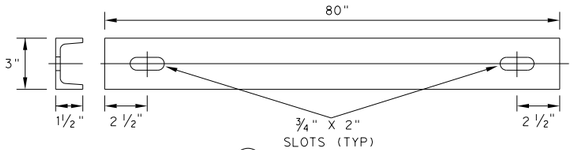
MOW STRIP INSTALLATION

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

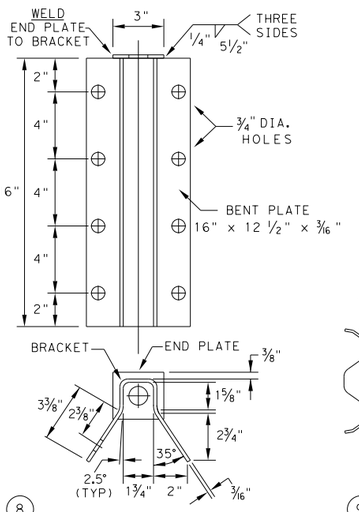
#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT,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



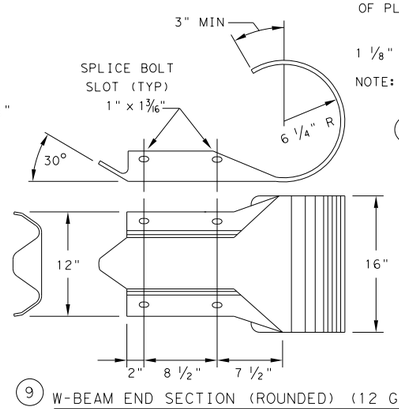
(4) TERMINAL RAIL ELEMENT FOR DAT



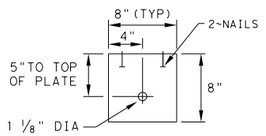
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

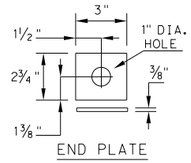


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

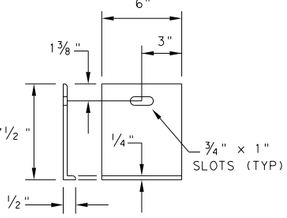


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

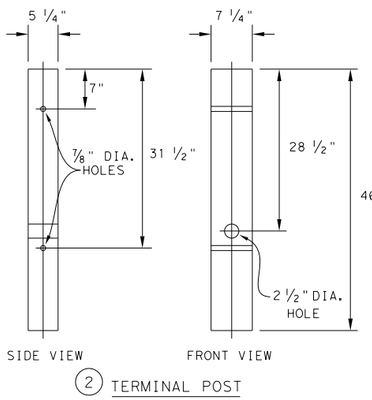
(6) BEARING PLATE
8"x 8"x 5/8" PL



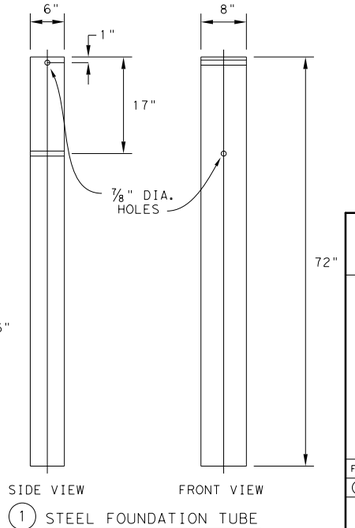
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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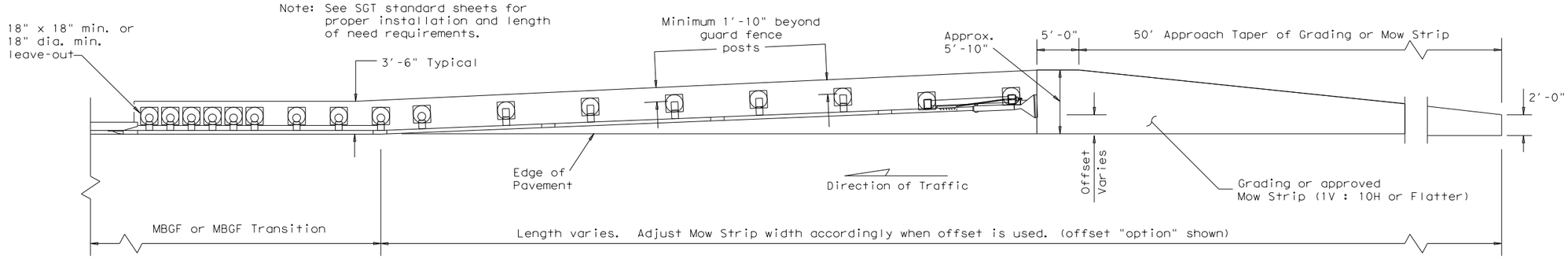
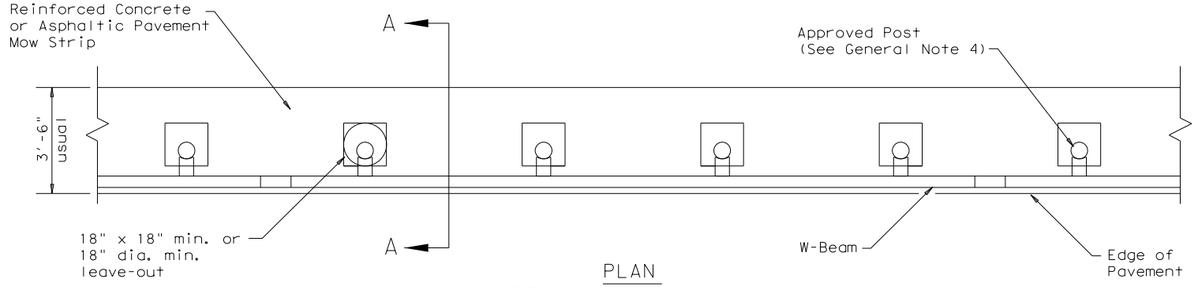
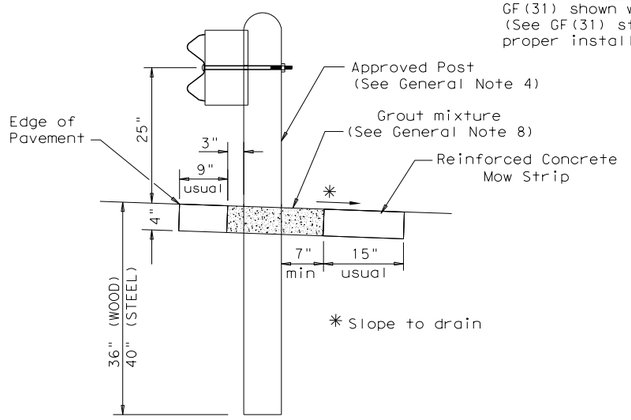


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



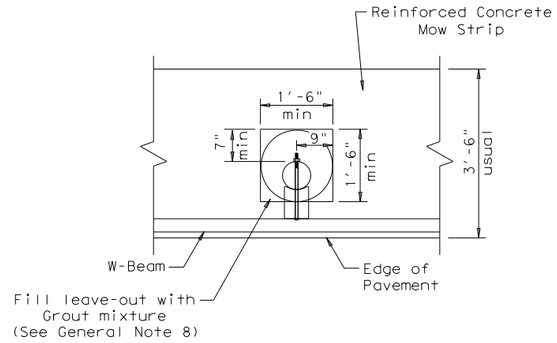
PLAN

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



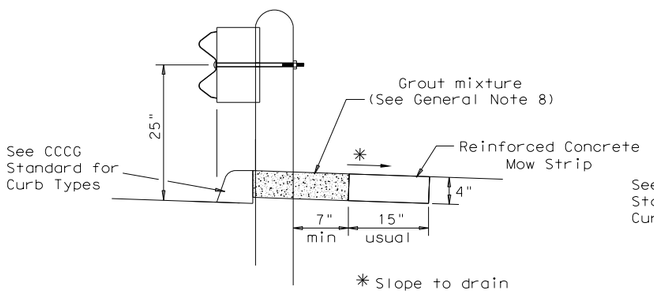
SECTION A-A

Typical



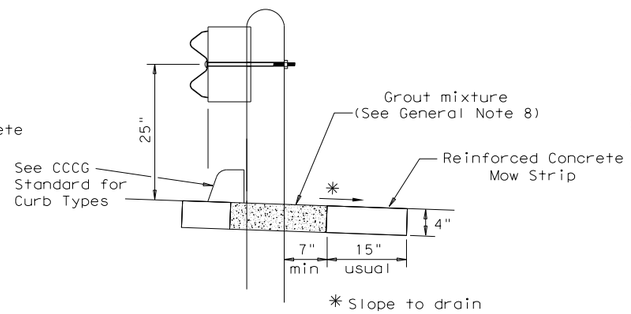
MOW STRIP DETAIL

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



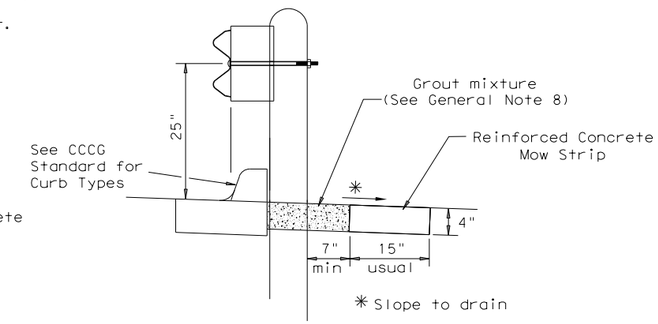
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096,ETC.	IH 20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		41

DATE: 3/10/2021
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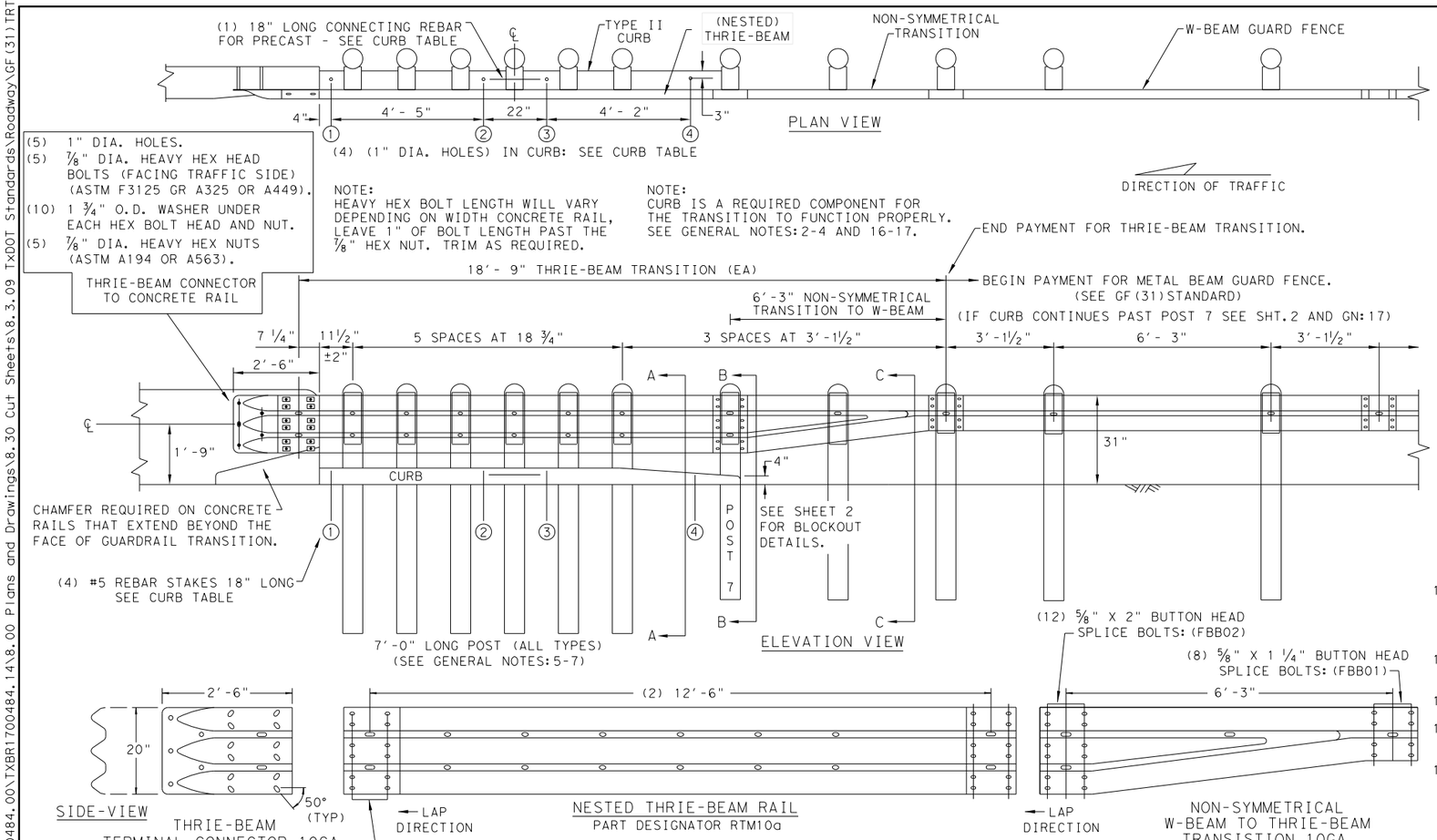
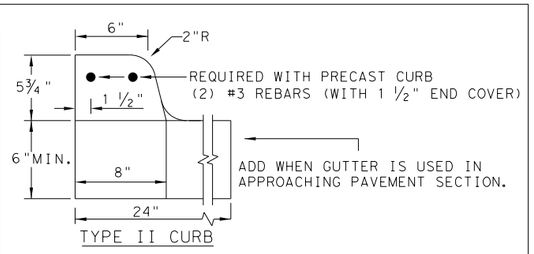


THRIE-BEAM TERMINAL - CURB TABLE

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 1/2" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" 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 1/2" 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 5/8" 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 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0003	06	096,ETC.	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
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DATE: 3/10/2021
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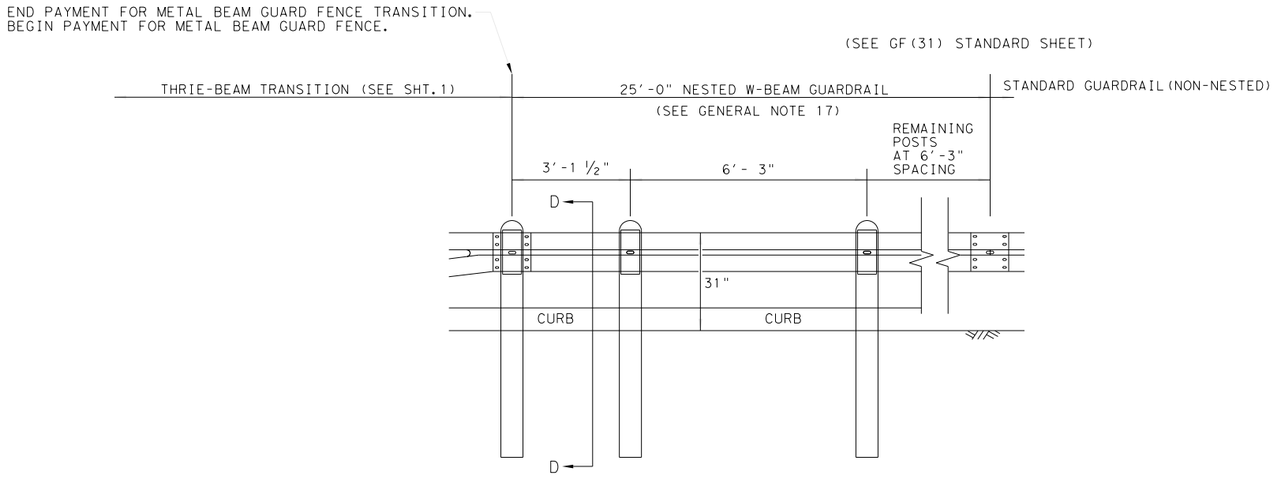
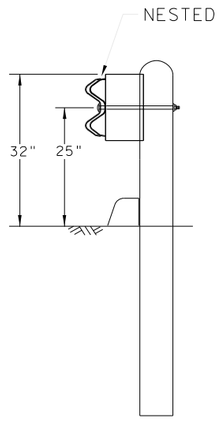
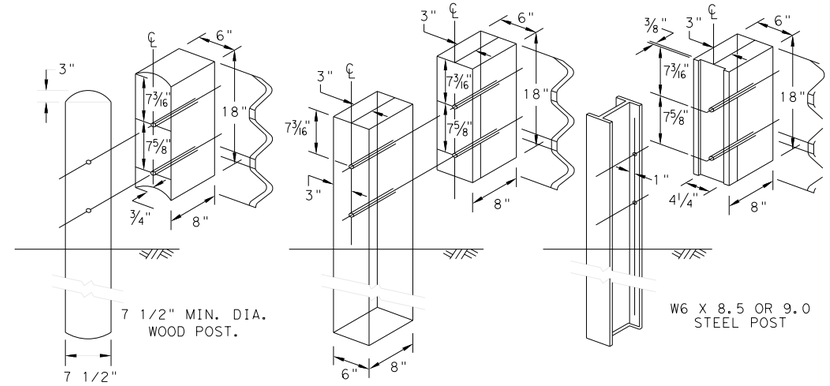
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
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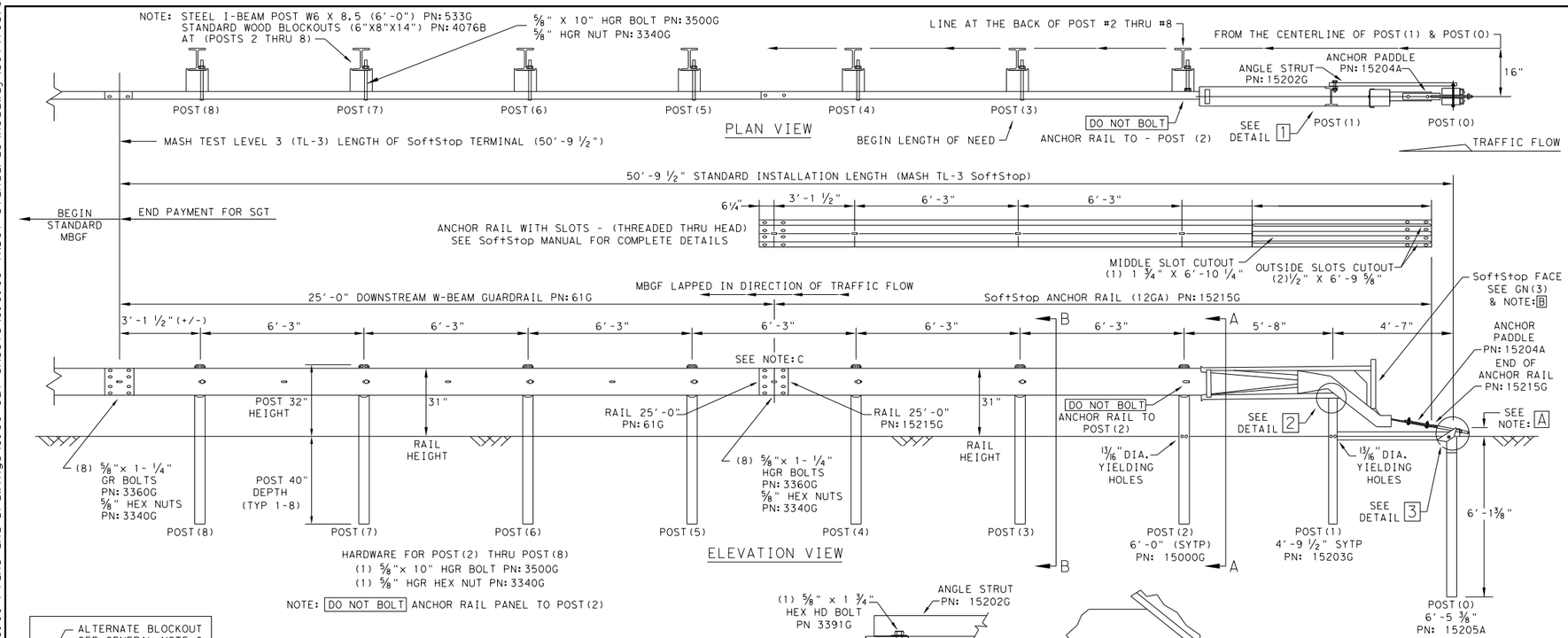

GENERAL NOTES

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
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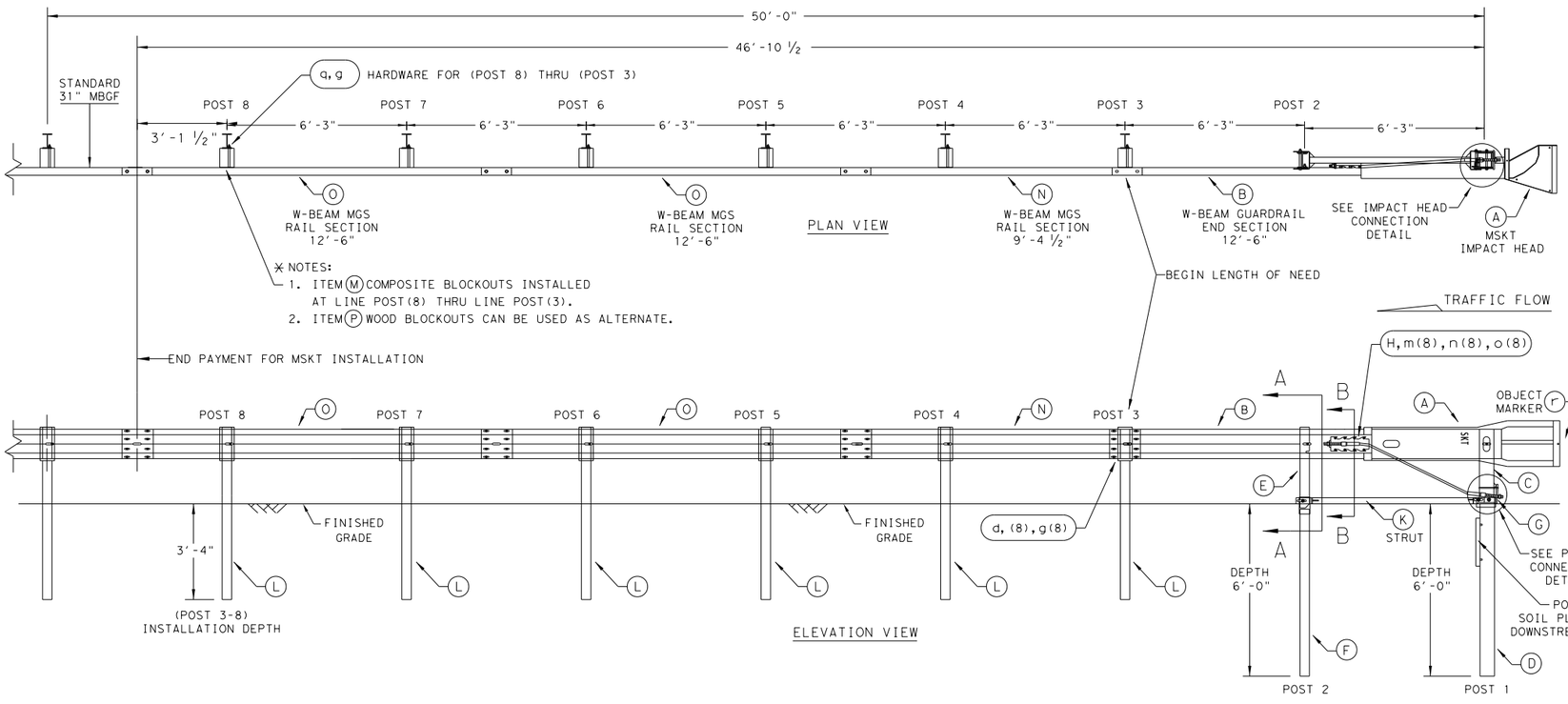
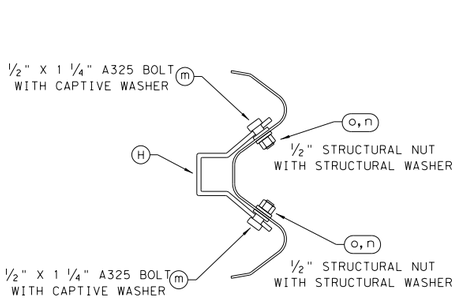
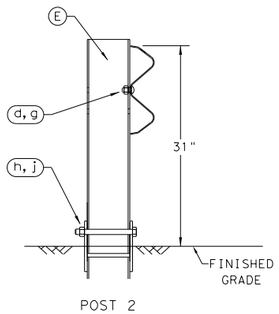


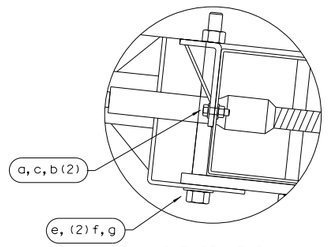
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



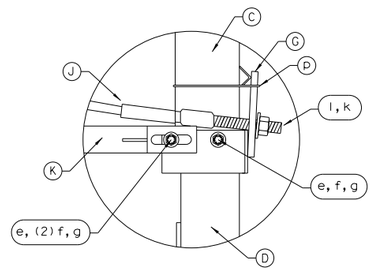
SECTION B-B
ANCHOR BRACKET



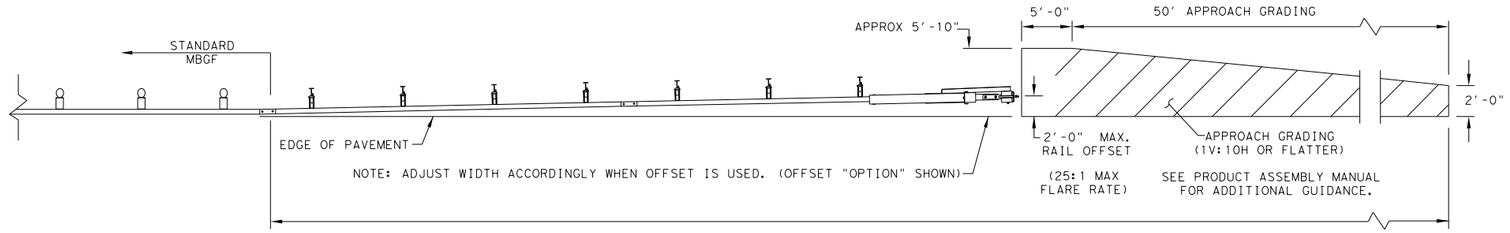
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

SEE NOTES: ✳

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0003	06	096,ETC.	IH 20, ETC.	
	DIST	COUNTY		SHEET NO.	
	ODA	REEVES		45	

SUMMARY OF BRIDGE ESTIMATED QUANTITIES

ITEM / BRIDGE ELEMENT	428 6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429 6007 CONC STR REPAIR (VERTICAL & OVERHEAD) (1) (SF)	438 6001 CLEANING AND SEALING EXISTING JOINTS (LF)	451 6017 RETROFIT RAIL (TY T552) (LF)	780 6004 CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL) (1) (LF)	788 6001 CONCRETE BEAM REPAIR (EA)
2 – ABUTMENTS	88	4	100		30	
3 – INTERIOR BENTS	98	101	150		60	
4 – 60.000' PRESTR CONC BEAM SPANS	559			517		35
TOTAL	745	105	250	517	90	35

(1) INCLUDES A 30% INCREASE FROM FIELD OBSERVED QUANTITIES TO BE USED AS DIRECTED BY THE ENGINEER.

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

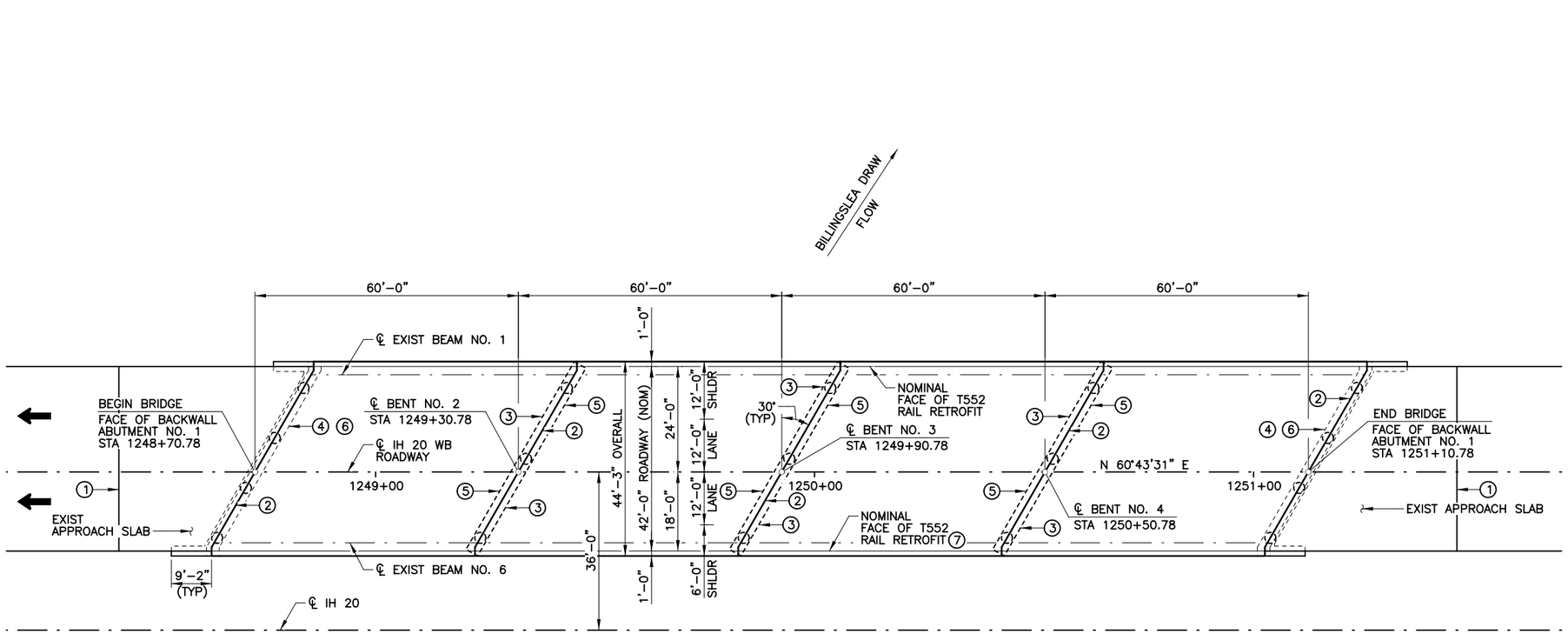
ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE ESTIMATED QUANTITIES

IH 20 WB AT BILLINGSLEA DRAW

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	46

SHEET 1 OF 1



PLAN

1. REPAIR FAULTING AND PAVEMENT DISTRESS AT END OF EXISTING APPROACH SLAB.
2. CLEAN AND SEAL EXISTING EXPANSION JOINT.
3. REPAIR CRACKS AND DELAMINATIONS ON CONCRETE BENT CAP.
4. APPLY SILANE PENETRATING SEALER TO FACE OF ABUTMENT BACKWALL AND TOP AND SIDES OF ABUTMENT CAP.
5. APPLY SILANE PENETRATING SEALER TO TOP AND SIDES OF INTERIOR BENT CAP.
6. REPAIR CRACKS AND SPALLS ON FACE OF ABUTMENT BACKWALL AND CAP.
7. REPLACE EXISTING RAIL WITH TYPE T552 RAIL.

SUMMARY OF REPAIR ITEMS

REPAIR NOTE	BID ITEM/DESC NUMBER	DESCRIPTION
1	354 6100	PLANE ASPH CONC PAVE (5")
	3077 6026	SP MIXES SP-C PG70-28
	3077 6075	TACK COAT
2	438 6001	CLEANING AND SEALING EXISTING JOINTS
3	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
4	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
5	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
6	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
7	451 6017	RETROFIT RAIL (TY T552)

GENERAL NOTES:

1. EXISTING BRIDGE DESIGNED ACCORDING TO AASHTO 1965 STANDARD SPECIFICATIONS (HS 20 LOADING).
2. SEE BRIDGE ESTIMATED QUANTITIES AND QUANTITY SUMMARIES SHEET FOR SCOPE OF BRIDGE REHABILITATION.
3. IH 20 WB CENTERLINE ROADWAY BEARING AND STATIONING IS BASED ON AS-BUILT DRAWINGS (CSJ 0003-06-047) AND IS FOR REFERENCE ONLY. SPAN LENGTHS SHOWN ARE APPROXIMATE.
4. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK. PERFORM ALL REPAIRS IN ACCORDANCE WITH THE TxDOT CONCRETE REPAIR MANUAL, CHAPTER 3, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NBI 06-195-0-0003-06-150

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE REPAIR PLAN

IH 20 WB AT BILLINGSLEA DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	47

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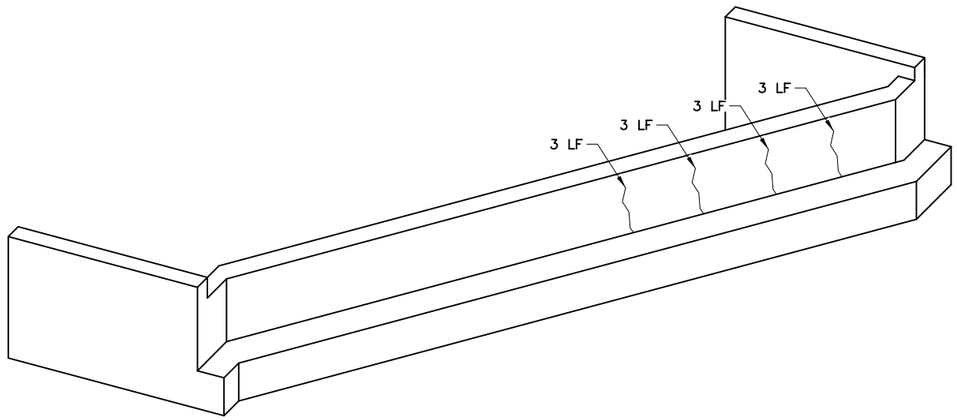

ABUTMENT NO. 1 – EAST FACE
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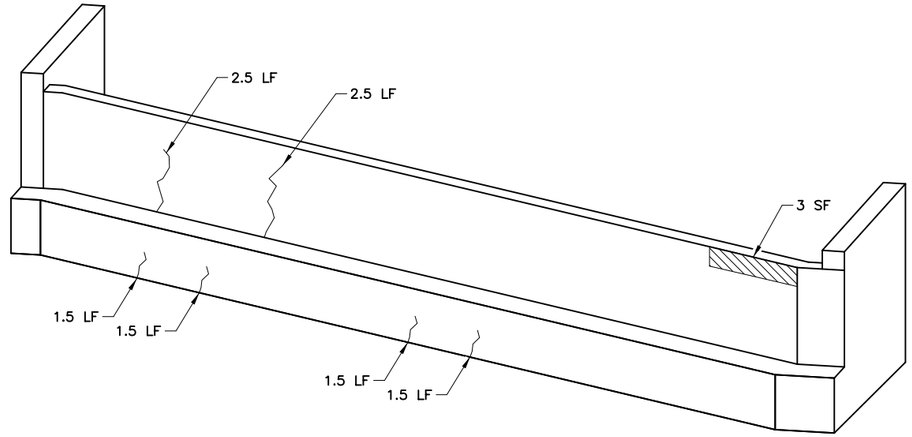

ABUTMENT NO. 5 – WEST FACE
(ISOMETRIC VIEW FROM EAST)

LEGEND

INTERMEDIATE SPALL REPAIR

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON SEPTEMBER 24, 2019 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

ABUTMENT REPAIR DETAILS

IH 20 WB AT BILLINGSLEA DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		48

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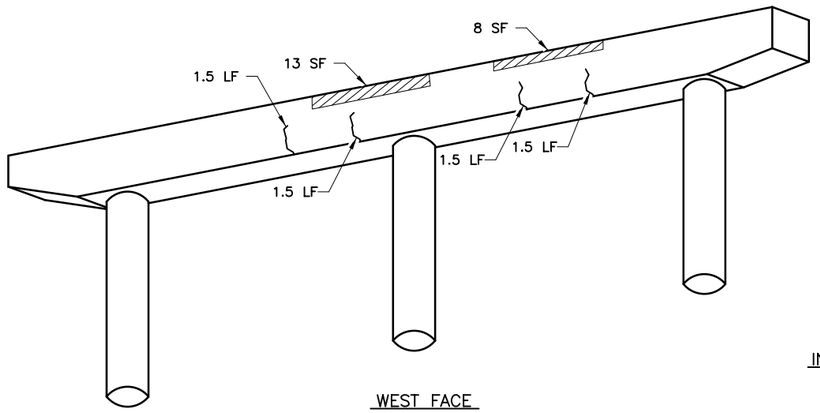
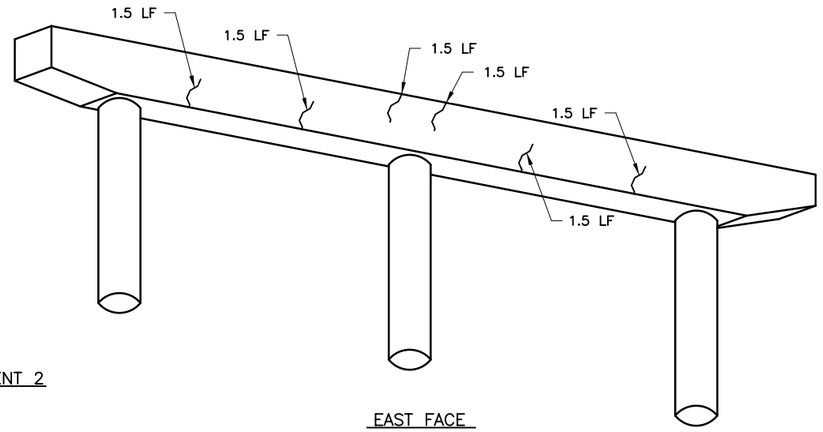
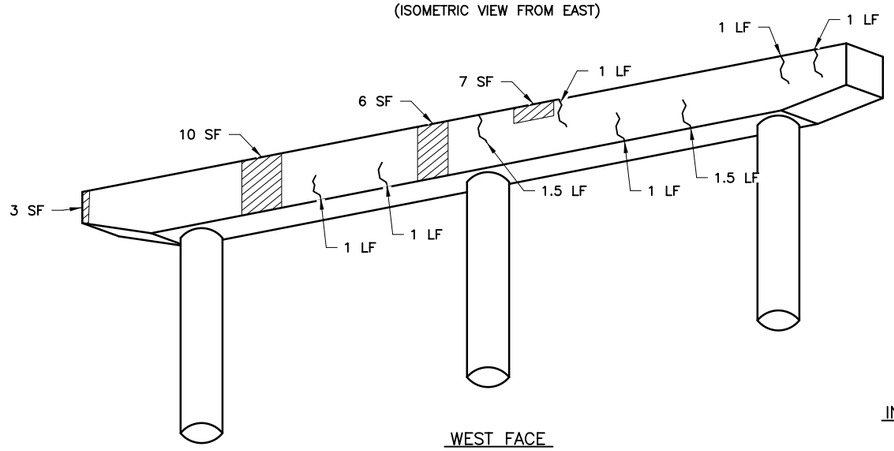


WEST FACE
(ISOMETRIC VIEW FROM EAST)

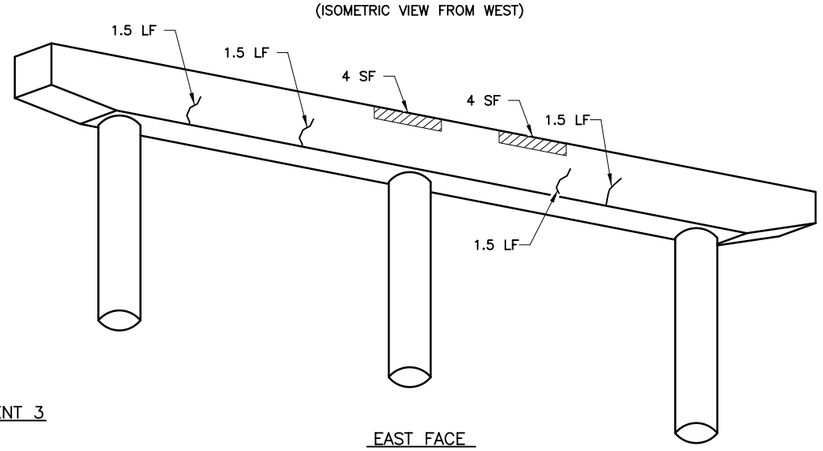


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 2

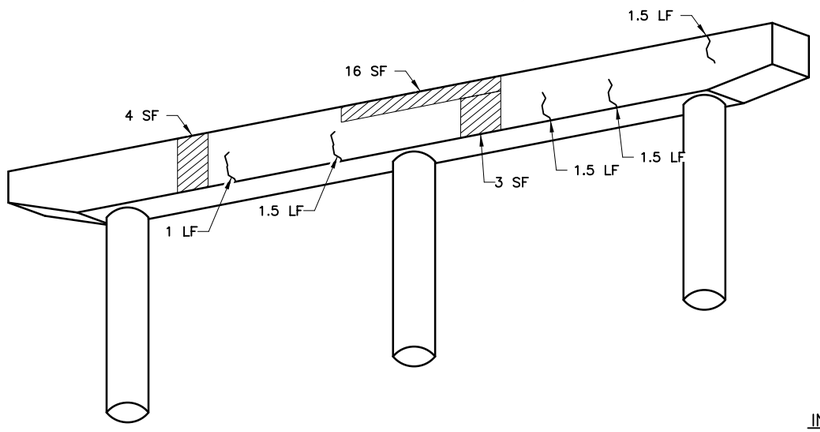


WEST FACE
(ISOMETRIC VIEW FROM EAST)

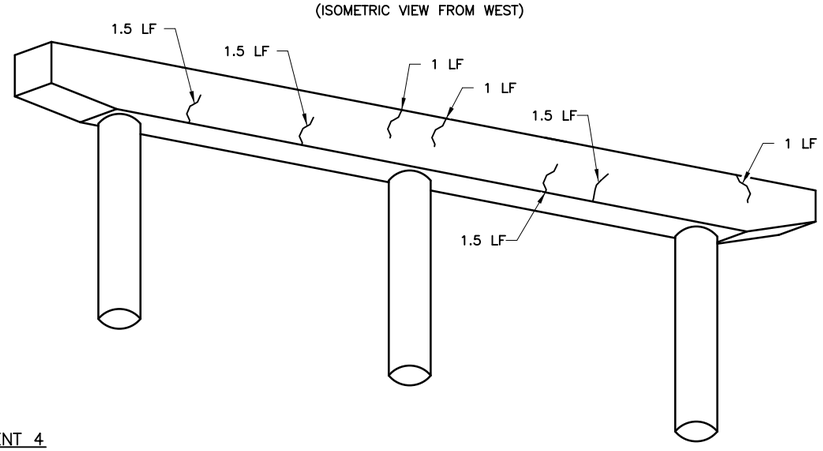


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 3



WEST FACE
(ISOMETRIC VIEW FROM EAST)



EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 4

LEGEND

INTERMEDIATE SPALL REPAIR

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON SEPTEMBER 24, 2019 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS THAT ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION
BENT REPAIR DETAILS

IH 20 WB AT BILLINGSLEA DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.	
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	49	

SHEET 1 OF 1

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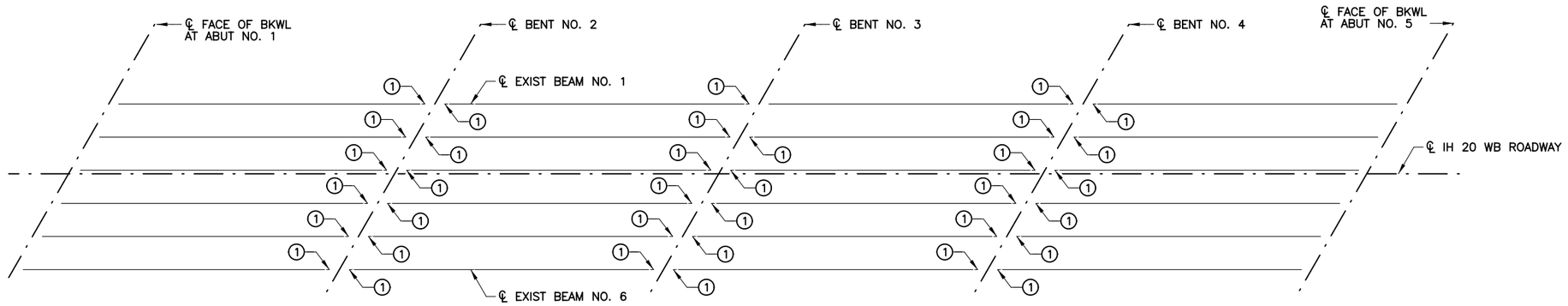

PLAN

(1) REPAIR SPALL AT END OF BEAM. APPROX 3 SF OF REPAIR PER LOCATION.

GENERAL NOTES:

1. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK.
2. SEE CONCRETE BEAM REPAIR DETAILS FOR INFORMATION ON REPAIR OF CONCRETE SPALLS AT THE ENDS OF BEAMS.
3. APPLY SILANE PENETRATING SEALER TO THE END OF EACH BEAM AND TO SIDES AND BOTTOM OF EACH BEAM FOR A DISTANCE OF 5' FROM THE END OF THE BEAM.

SHEET 1 OF 1

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

BEAM REPAIR DETAILS

IH 20 WB AT BILLINGSLEA DRAW

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Designed:	WJE	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Checked:	TGA	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Drawn:	AL	ODA	REEVES	0003	06	096, ETC.		50
Checked:	MMF							

SUMMARY OF BRIDGE ESTIMATED QUANTITIES

ITEM / BRIDGE ELEMENT	428 6001 PENETRATING CONCRETE SURFACE TREATMENT	429 6007 CONC STR REPAIR (VERTICAL & OVERHEAD) (1)	438 6001 CLEANING AND SEALING EXISTING JOINTS	780 6004 CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL) (1)	786 6002 CARBON FIBER REINF POLYMER STRENGTHENING (1)
	SY	SF	LF	LF	SF
2 – ABUTMENTS	77		85	13	
3 – INTERIOR BENTS	98	13	127	46	611
4 – 75.000' PRESTR CONC BEAM SPANS	216	2		16	
TOTAL	392	15	212	75	611

(1) INCLUDES A 30% INCREASE FROM FIELD OBSERVED QUANTITIES TO BE USED AS DIRECTED BY THE ENGINEER.

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE ESTIMATED QUANTITIES

IH 10 WB AT KC DRAW

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	KAD	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	TGA						
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
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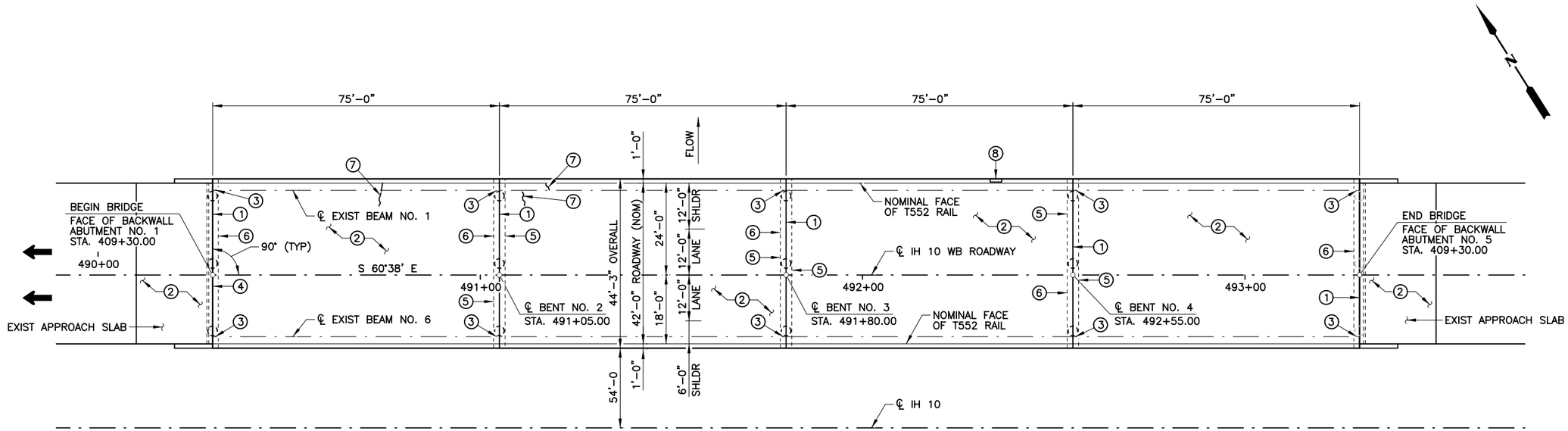
SHEET 1 OF 1



PLAN

1. CLEAN AND SEAL EXISTING EXPANSION JOINT.
2. REMOVE AND REPLACE OVERLAY.
3. APPLY SILANE PENETRATING SEALER TO OUTSIDE FACE OF EACH EXTERIOR BEAM AT EACH ABUTMENT AND BENT LOCATION FOR A DISTANCE OF 5' FROM THE END OF THE BEAM.
4. REPAIR CRACKS AT ABUTMENT.
5. REPAIR CRACKS AND DELAMINATIONS ON AT BENT CAP AND COLUMN.
6. APPLY SILANE PENETRATING SEALER TO FACE OF ABUTMENT BACKWALL, TOP AND SIDES OF ABUTMENT CAPS AND TOP AND SIDES OF INTERIOR BENT CAPS.
7. REPAIR CRACKS WITH EFFLORESCENCE IN SLAB SOFFIT (4 LF EACH LOCATION).
8. REPAIR SPALL FROM EXISTING RAIL ANCHORS (1 SF).

SUMMARY OF REPAIR BID ITEMS

REPAIR NOTE	BID ITEM/DESC NUMBER	DESCRIPTION
1	438 6001	CLEANING AND SEALING EXISTING JOINTS
2	316 6017	ASPH (AC–20–5TR)
	316 6224	AGGR (TY–PB GR–4 SAC B)
	354 6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)
3	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
4	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
5	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	786 6002	CARON FIBER REINF POLYMER STRENGTHENING
6	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
7	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
8	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)

GENERAL NOTES:

1. EXISTING BRIDGE DESIGNED ACCORDING TO AASHTO 1965 STANDARD SPECIFICATIONS (HS 20 LOADING).
2. SEE BRIDGE ESTIMATED QUANTITIES AND QUANTITY SUMMARIES SHEET FOR SCOPE OF BRIDGE REHABILITATION.
3. IH 10 WB CENTERLINE ROADWAY BEARING AND STATIONING IS BASED ON AS–BUILT DRAWINGS (CSJ 0441–09–006) AND IS FOR REFERENCE ONLY. SPAN LENGTHS SHOWN ARE APPROXIMATE.
4. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK. PERFORM ALL CONCRETE REPAIRS IN ACCORDANCE TO THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NBI 06–195–0–0441–09–107

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F–1741

ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE REPAIR PLAN

IH 10 WB AT KC DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	52

SHEET 1 OF 1

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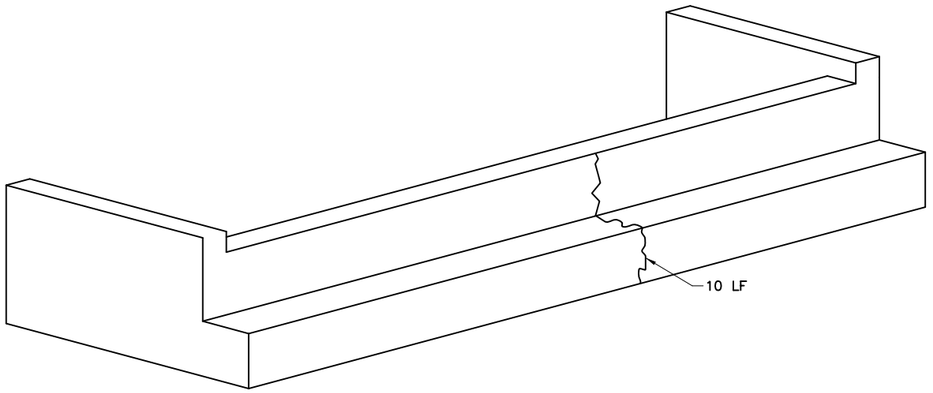

ABUTMENT NO. 1 – EAST FACE
(ISOMETRIC VIEW FROM WEST)

NO REPAIR NEEDED

ABUTMENT NO. 5

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON JULY 22, 2020 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

SHEET 1 OF 1

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

ABUTMENT REPAIR DETAILS

IH 10 WB AT KC DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	53

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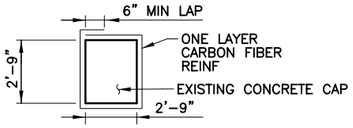
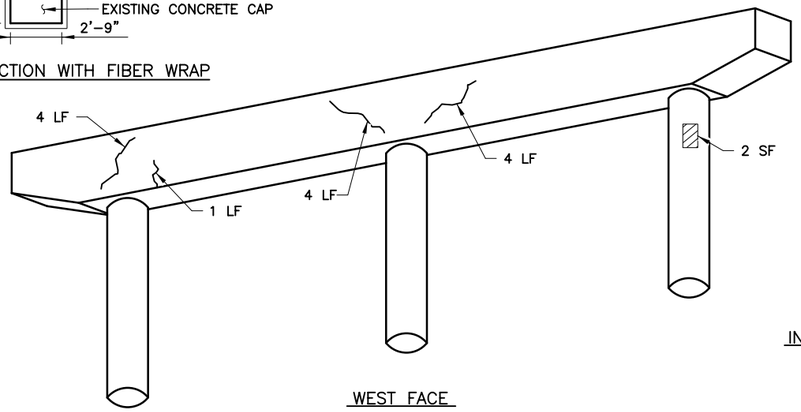
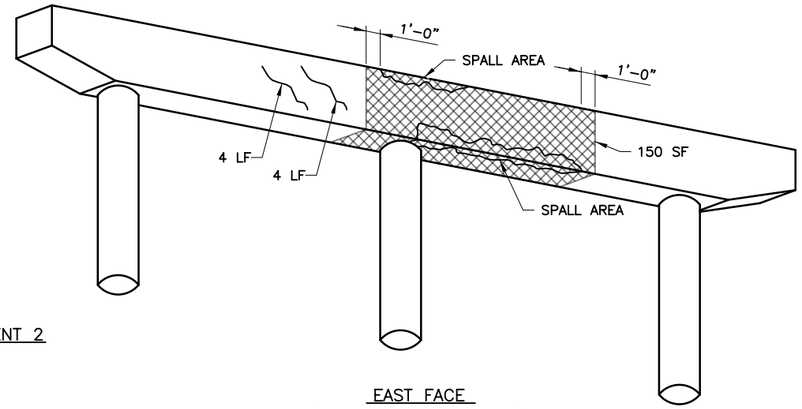


CAP SECTION WITH FIBER WRAP

INTERIOR BENT 2

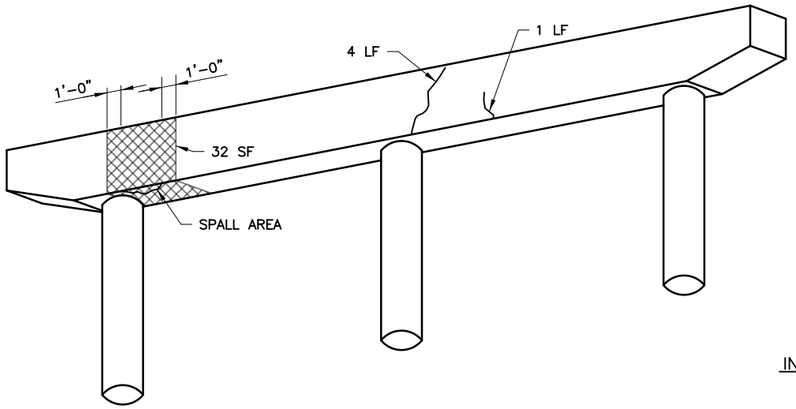


WEST FACE
(ISOMETRIC VIEW FROM EAST)

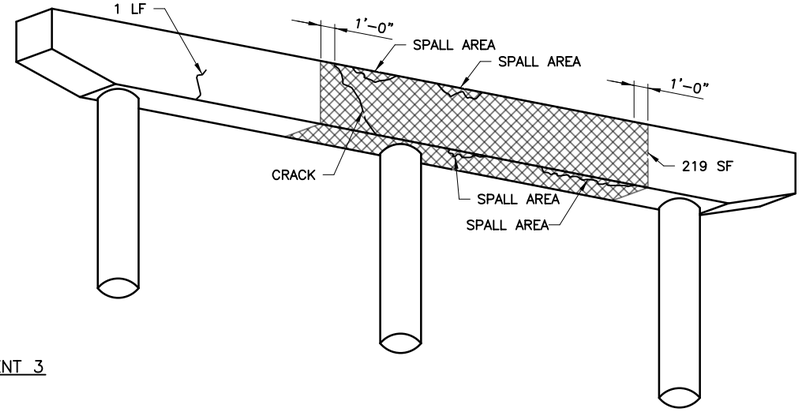


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 3

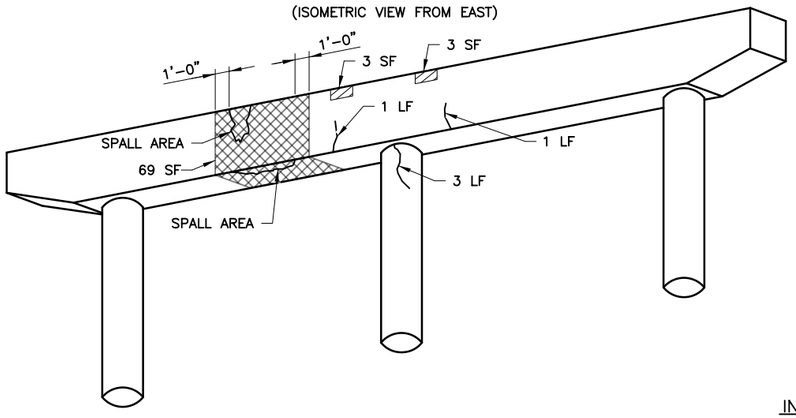


WEST FACE
(ISOMETRIC VIEW FROM EAST)

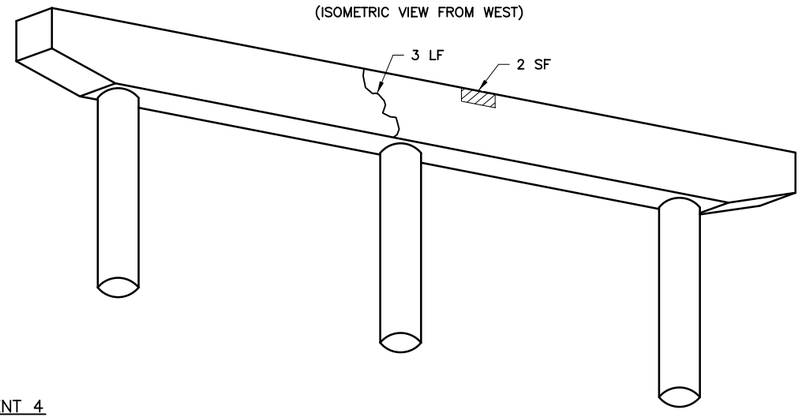


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 4



WEST FACE
(ISOMETRIC VIEW FROM EAST)



EAST FACE
(ISOMETRIC VIEW FROM WEST)

LEGEND

- INTERMEDIATE SPALL REPAIR
- REPAIR AREAS USING CARBON FIBER REINFORCED POLYMER WRAPPING

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON JULY 22, 2020 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

CARBON FIBER WRAP NOTES:

1. PREPARE CONCRETE SURFACE AND INSTALL CARBON FIBER POLYMER REINFORCEMENT (CFRP) PER ITEM 786, "CARBON FIBER REINFORCED POLYMER (CFRP)."
2. ORIENT UNIDIRECTIONAL FIBERS HORIZONTALLY, AROUND CIRCUMFERENCE OF CAP. UTILIZE LARGEST WIDTHS PRACTICAL AND OVERLAP SUCCESSIVE WRAPS BY 6" MINIMUM.
3. COAT COMPLETED CFRP WITH UV PROTECTIVE PAINT AS RECOMMENDED BY MANUFACTURER. MATCH COLOR TO SURROUNDING CONCRETE AS APPROVED BY ENGINEER.
4. CFRP IS FOR PROTECTION AND CONFINEMENT ONLY. WORKING DRAWINGS ARE NOT REQUIRED.
5. ADJUST CFRP AS NEEDED TO WRAP AROUND TOP OF CAP AT BEARING SEAT BUILD-UP LOCATIONS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

BENT REPAIR DETAILS

IH 10 WB AT KC DRAW

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	AL	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	54

SHEET 1 OF 1

SUMMARY OF BRIDGE ESTIMATED QUANTITIES

ITEM / BRIDGE ELEMENT	428 6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429 6007 CONC STR REPAIR (VERTICAL & OVERHEAD) ① (SF)	438 6001 CLEANING AND SEALING EXISTING JOINTS (LF)	780 6004 CONC CRCK REPAIR (DISCRETE) ① (ROUT AND SEAL) (LF)	786 6002 CARBON FIBER REINF POLYMER STRENGTHENING ① (SF)	788 6001 CONCRETE BEAM REPAIR (EA)
2 – ABUTMENTS	77	9	85	30		
4 – INTERIOR BENTS	131	56	167	12	368	
2 – 65.000' PRESTR CONC BEAM SPAN	120					3
3 – 60.000' PRESTR CONC BEAM SPAN	181					
TOTAL	509	65	252	42	368	3

① INCLUDES A 30% INCREASE FROM FIELD OBSERVED QUANTITIES TO BE USED AS DIRECTED BY THE ENGINEER.

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TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

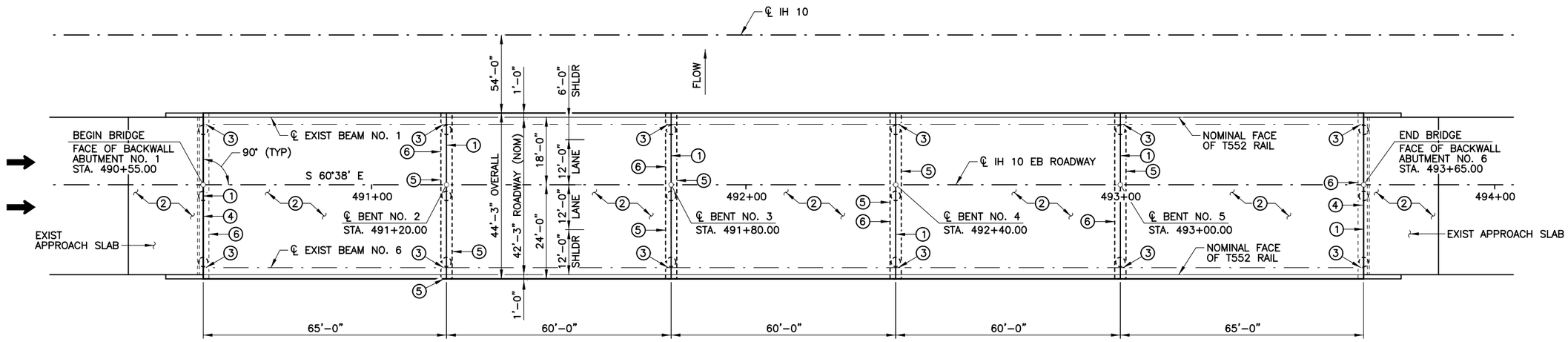
ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE ESTIMATED QUANTITIES

IH 10 EB AT KC DRAW

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	KAD	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	55
Checked:	TGA						

SHEET 1 OF 1



PLAN

1. CLEAN AND SEAL EXISTING EXPANSION JOINT.
2. REMOVE AND REPLACE EXISTING OVERLAY.
3. APPLY SILANE PENETRATING SEALER TO OUTSIDE FACE OF EACH EXTERIOR BEAM AT EACH ABUTMENT AND BENT LOCATION FOR A DISTANCE 5' FROM THE END OF THE BEAM.
4. REPAIR CRACKS AND SPALLS AT ABUTMENT CAP AND BACKWALL.
5. REPAIR CRACKS AND DELAMINATIONS ON AT BENT CAP AND COLUMNS.
6. APPLY SILANE PENETRATING SEALER TO FACE OF ABUTMENT BACKWALL, TOP AND SIDES OF ABUTMENT CAPS AND TOP AND SIDES OF INTERIOR BENT CAPS.

SUMMARY OF REPAIR ITEMS

REPAIR NOTE	BID ITEM/DESC NUMBER	DESCRIPTION
1	438 6001	CLEANING AND SEALING EXISTING JOINTS
2	316 6017	ASPH (AC-20-5TR)
	316 6224	AGGR (TY-PB GR-4 SAC B)
	354 6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)
3	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
4	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
5	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	786 6002	CARBON FIBER REING POLYMER STRENGHTENING
6	428 6001	PENETRATING CONCRETE SURFACE TREATMENT

GENERAL NOTES:

1. EXISTING BRIDGE DESIGNED ACCORDING TO AASHTO 1965 STANDARD SPECIFICATIONS (HS 20 LOADING).
2. SEE BRIDGE ESTIMATED QUANTITIES AND QUANTITY SUMMARIES SHEET FOR SCOPE OF BRIDGE REHABILITATION.
3. IH 10 EB CENTERLINE ROADWAY BEARING AND STATIONING IS BASED ON AS-BUILT DRAWINGS (CSJ 0441-09-006) AND IS FOR REFERENCE ONLY. SPAN LENGTHS SHOWN ARE APPROXIMATE.
4. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK. PERFORM ALL CONCRETE REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NBI 06-195-0-0441-09-108

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

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ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE REPAIR PLAN

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SHEET 1 OF 1

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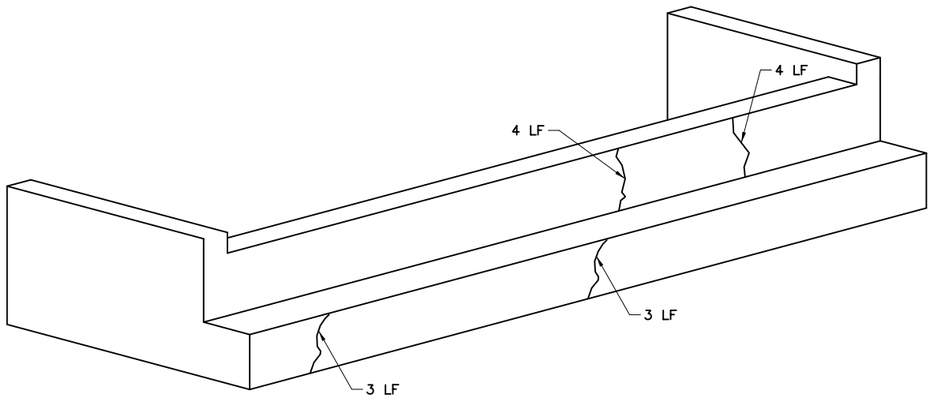
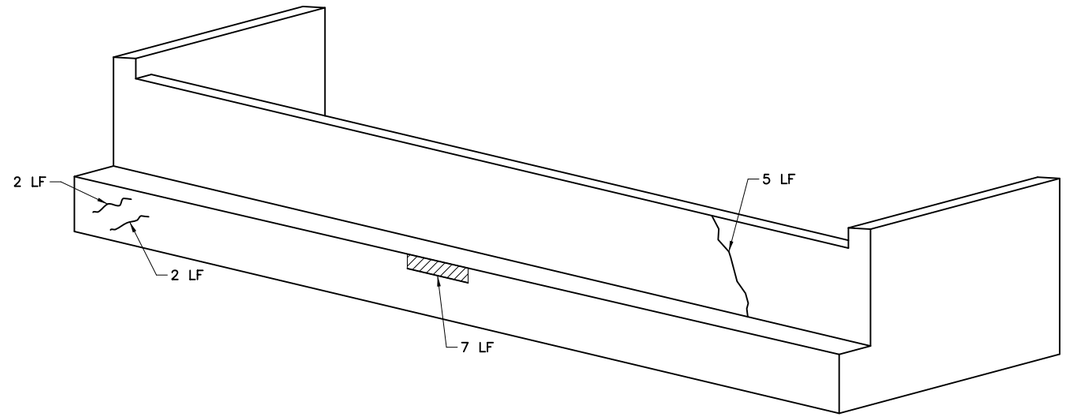


ABUTMENT NO. 1 – EAST FACE
(ISOMETRIC VIEW FROM WEST)



ABUTMENT NO. 5 – WEST FACE
(ISOMETRIC VIEW FROM EAST)

LEGEND

INTERMEDIATE SPALL REPAIR

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON JULY 21, 2018 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
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SHEET 1 OF 1

STATE OF TEXAS
THOMAS W. STEPHENSON
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ABUTMENT REPAIR DETAILS

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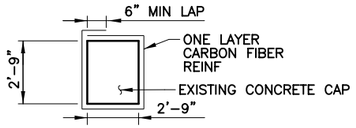
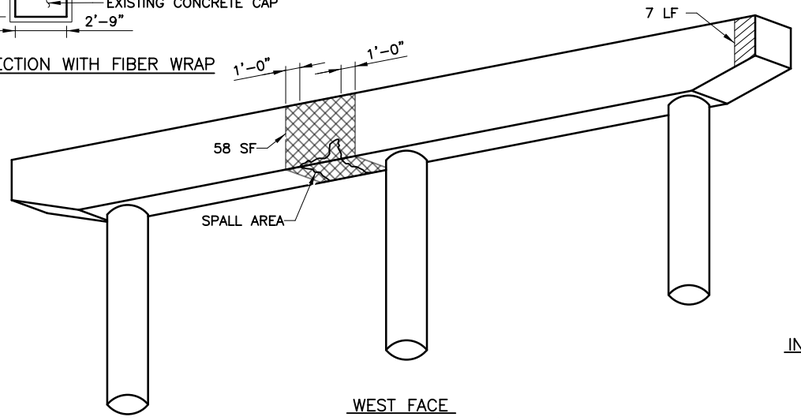
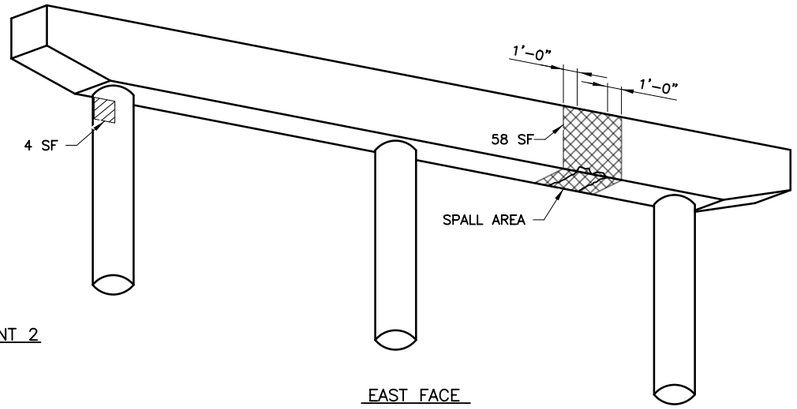


CAP SECTION WITH FIBER WRAP

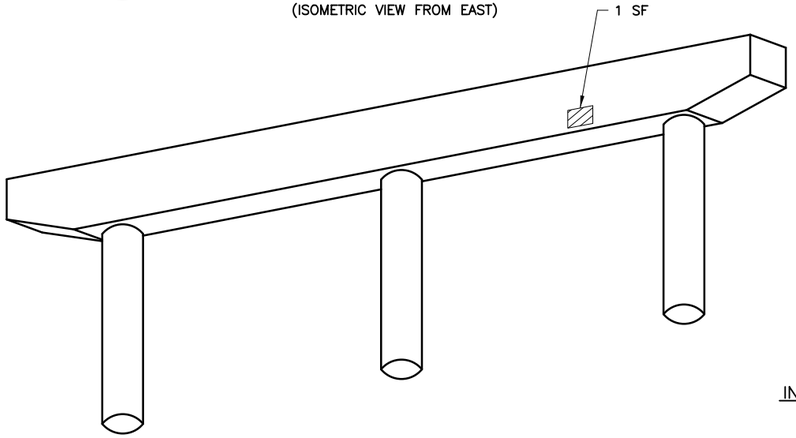


WEST FACE
(ISOMETRIC VIEW FROM EAST)

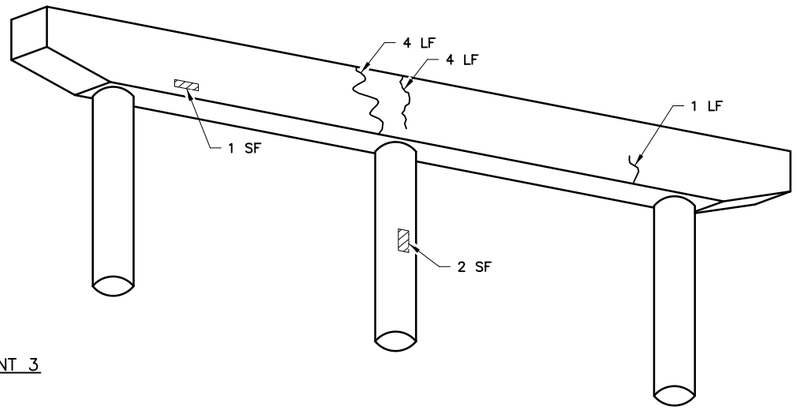


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 2

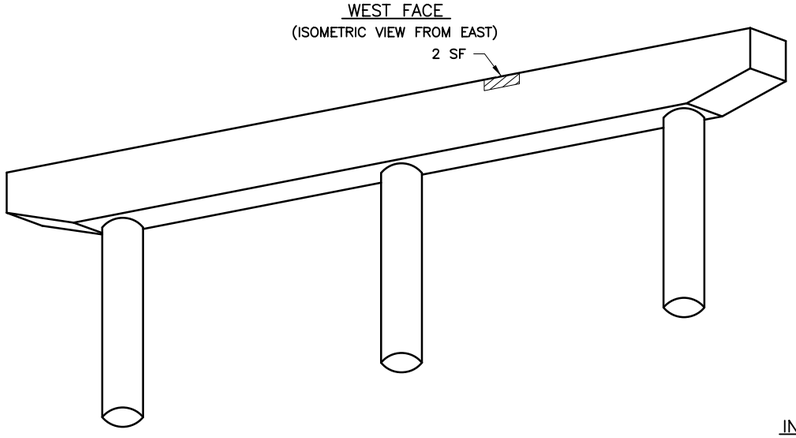


WEST FACE
(ISOMETRIC VIEW FROM EAST)

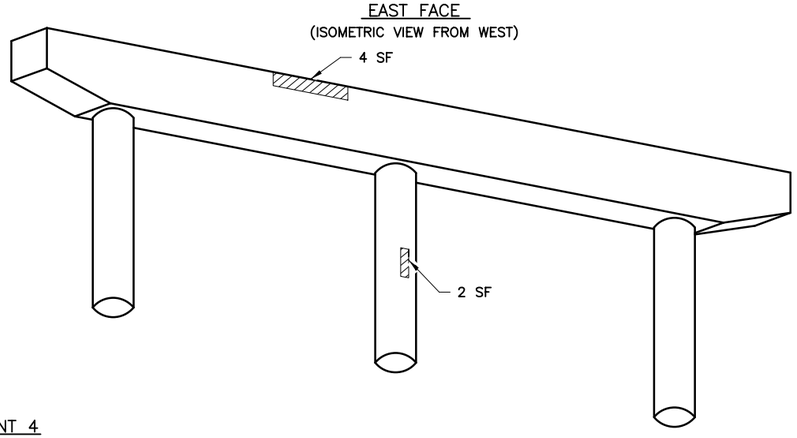


EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 3



WEST FACE
(ISOMETRIC VIEW FROM EAST)



EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 4

WEST FACE
(ISOMETRIC VIEW FROM EAST)

EAST FACE
(ISOMETRIC VIEW FROM WEST)

LEGEND

- INTERMEDIATE SPALL REPAIR
- REPAIR AREAS USING CARBON FIBER REINFORCED POLYMER WRAPPING

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON JULY 21, 2020 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
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CARBON FIBER WRAP NOTES:

1. PREPARE CONCRETE SURFACE AND INSTALL CARBON FIBER POLYMER REINFORCEMENT (CFRP) PER ITEM 786, "CARBON FIBER REINFORCED POLYMER (CFRP)."
2. ORIENT UNIDIRECTIONAL FIBERS HORIZONTALLY, AROUND CIRCUMFERENCE OF CAP. UTILIZE LARGEST WIDTHS PRACTICAL AND OVERLAP SUCCESSIVE WRAPS BY 6" MINIMUM.
3. COAT COMPLETED CFRP WITH UV PROTECTIVE PAINT AS RECOMMENDED BY MANUFACTURER. MATCH COLOR TO SURROUNDING CONCRETE AS APPROVED BY ENGINEER.
4. CFRP IS FOR PROTECTION AND CONFINEMENT ONLY. WORKING DRAWINGS ARE NOT REQUIRED.
5. ADJUST CFRP AS NEEDED TO WRAP AROUND TOP OF CAP AT BEARING SEAT BUILD-UP LOCATIONS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

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TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

BENT REPAIR DETAILS

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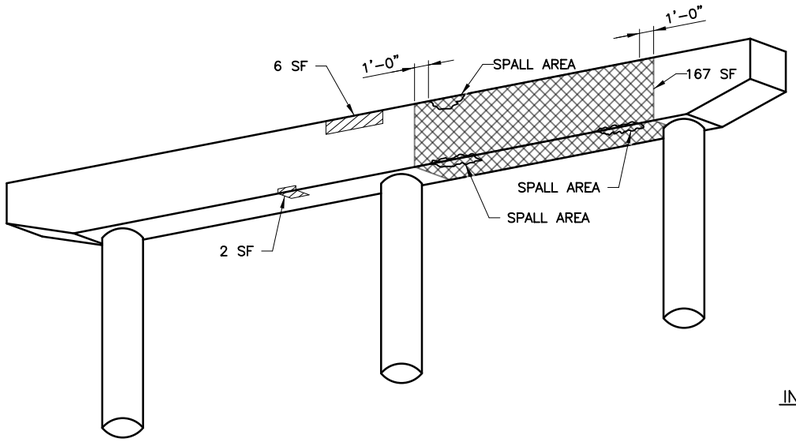
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	58

SHEET 1 OF 2

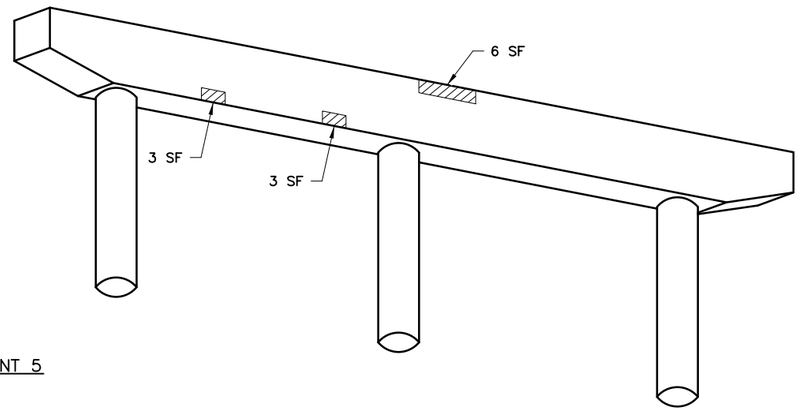
LEGEND

INTERMEDIATE SPALL REPAIR

REPAIR AREAS USING CARBON FIBER REINFORCED POLYMER WRAPPING



WEST FACE
(ISOMETRIC VIEW FROM EAST)



EAST FACE
(ISOMETRIC VIEW FROM WEST)

INTERIOR BENT 5

STATE OF TEXAS
THOMAS W. STEPHENSON
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Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		59

SHEET 2 OF 2

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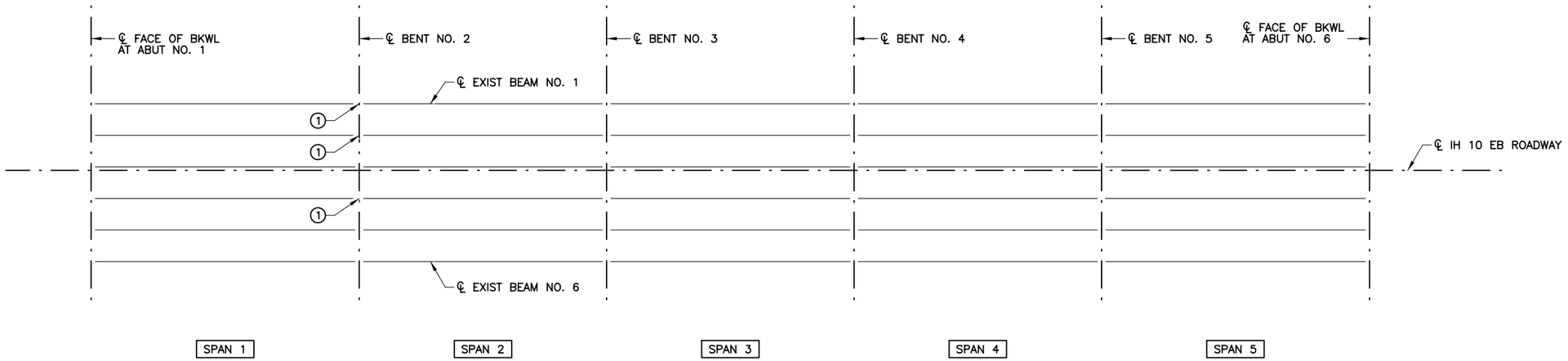

PLAN

(1) REPAIR SPALL AT END OF BEAM. APPROX. 3 SF OF REPAIR PER LOCATION.

GENERAL NOTES:

1. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK.
2. SEE CONCRETE BEAM REPAIR DETAILS FOR INFORMATION ON REPAIR OF CONCRETE SPALLS AT THE ENDS OF BEAMS.
3. APPLY SILANE PENETRATING SEALER TO THE SIDES AND BOTTOM OF EACH BEAM FOR A DISTANCE OF 5' FROM THE END OF THE BEAM.

SHEET 1 OF 1

STATE OF TEXAS
THOMAS W. STEPHENSON
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LICENSED
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BEAM REPAIR DETAILS

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SUMMARY OF BRIDGE ESTIMATED QUANTITIES

ITEM / BRIDGE ELEMENT	428 6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429 6007 CONC STR REPAIR (VERTICAL & OVERHEAD) (1) (SF)	438 6001 CLEANING AND SEALING EXISTING JOINTS (LF)	780 6002 CNC CRACK REPAIR (DISCRETE) (INJECT) (1) (LF)	780 6004 CONC CRCK REPAIR (DISCRETE) (1) (ROUT AND SEAL) (LF)	788 6001 CONCRETE BEAM REPAIR (EA)	4002 6001 REPLACE ELASTOMERIC BEARING PADS (EA)
2 – ABUTMENTS	88	2	98		47		6
1 – INTERIOR BENTS	33	12	49		3		
2 – 70.000' PRESTR CONC BEAM SPANS	120			20		13	
TOTAL	241	14	147	20	50	13	6

(1) INCLUDES A 30% INCREASE FROM FIELD OBSERVED QUANTITIES TO BE USED AS DIRECTED BY THE ENGINEER.

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NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

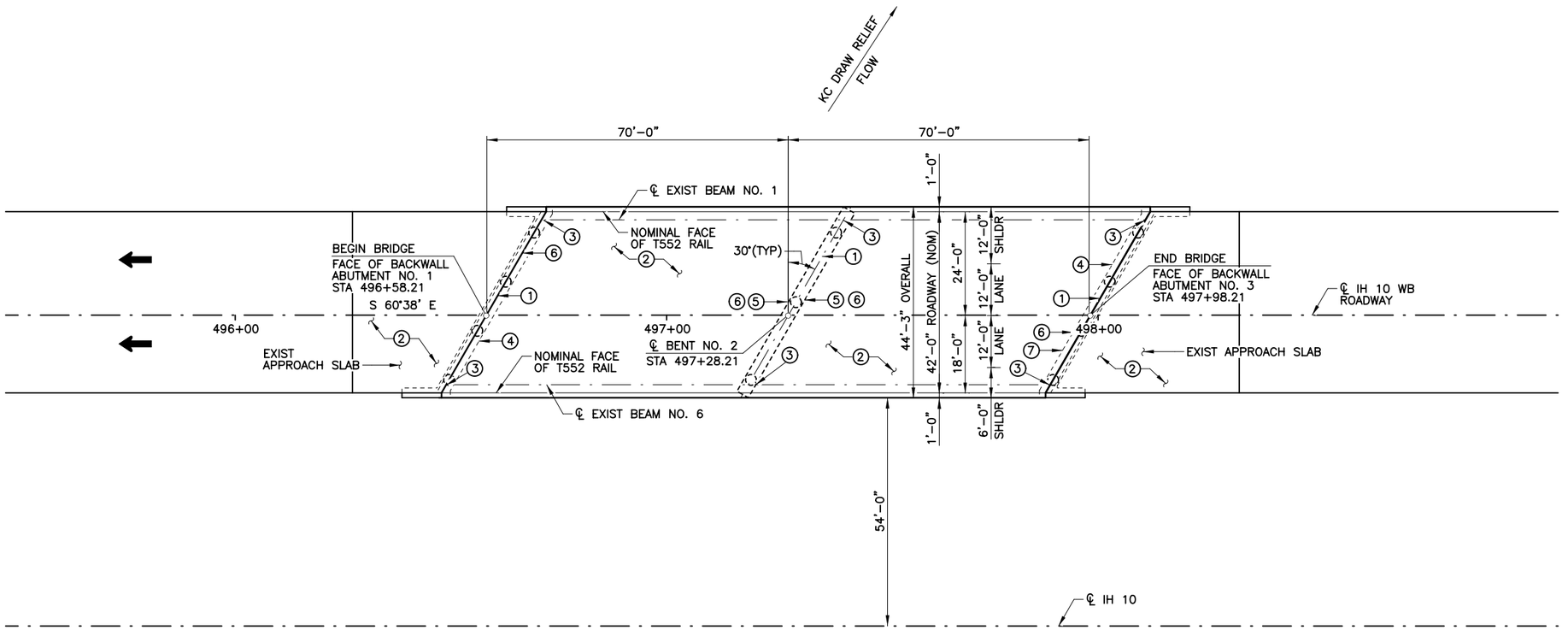
ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE ESTIMATED QUANTITIES

IH 10 WB AT KC DRAW RELIEF

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	KAD	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Checked:	TGA						
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	61

SHEET 1 OF 1



PLAN

1. CLEAN AND SEAL EXISTING EXPANSION JOINT.
2. REMOVE AND REPLACE EXISTING OVERLAY.
3. APPLY SILANE PENETRATING SEALER TO OUTSIDE FACE OF EACH EXTERIOR BEAM AT EACH ABUTMENT AND BENT LOCATION FOR A DISTANCE OF 5' FROM END OF THE BEAM.
4. REPAIR CRACKS AND SPALLS AT ABUTMENT CAP AND BACKWALL.
5. REPAIR CRACKS AND DELAMINATIONS AT BENT CAP.
6. APPLY SILANE PENETRATING SEALER TO FACE OF ABUTMENT BACKWALL, TOP AND SIDES OF ABUTMENT CAP AND TOP AND SIDES OF INTERIOR BENT CAPS.
7. REPLACE ELASTOMERIC BEARING PAD UNDER EACH BEAM AT ABUTMENT NO. 3 (TOTAL OF 6 BEARING PADS). SEE BEARING REPLACEMENT DETAILS SHEET FOR INFORMATION.

SUMMARY OF REPAIR BID ITEMS

REPAIR NOTE	BID ITEM/DESC NUMBER	DESCRIPTION
1	438 6001	CLEANING AND SEALING EXISTING JOINTS
2	316 6017	ASPH (AC-20-5TR)
	316 6224	AGGR (TY-PB GR-4 SAC B)
	354 6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)
3	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
4	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
5	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	429 6002	CONC STR REPAIR (VERTICAL & OVERHEAD)
6	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
7	4002 6001	REPLACE ELASTOMERIC BEARING PADS

GENERAL NOTES:

1. EXISTING BRIDGE DESIGNED ACCORDING TO AASHTO 1965 STANDARD SPECIFICATIONS (HS 20 LOADING).
2. SEE BRIDGE ESTIMATED QUANTITIES AND QUANTITY SUMMARIES SHEET FOR SCOPE OF BRIDGE REHABILITATION.
3. IH 10 WB CENTERLINE ROADWAY BEARING AND STATIONING IS BASED ON AS-BUILT DRAWINGS (CSJ-0441-09-006) AND IS FOR REFERENCE ONLY. SPAN LENGTHS SHOWN ARE APPROXIMATE.
4. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK. PERFORM ALL CONCRETE REPAIRS IN ACCORDANCE TO THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NBI 06-195-0-0441-09-109

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

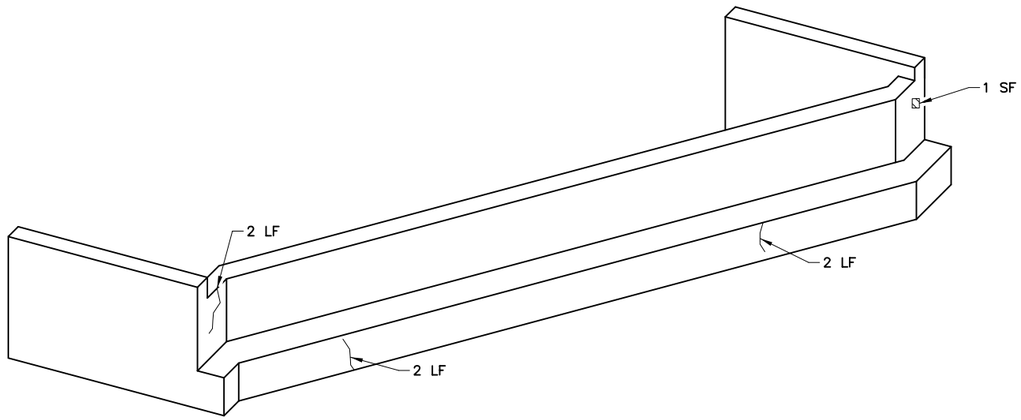
CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

BRIDGE REPAIR PLAN

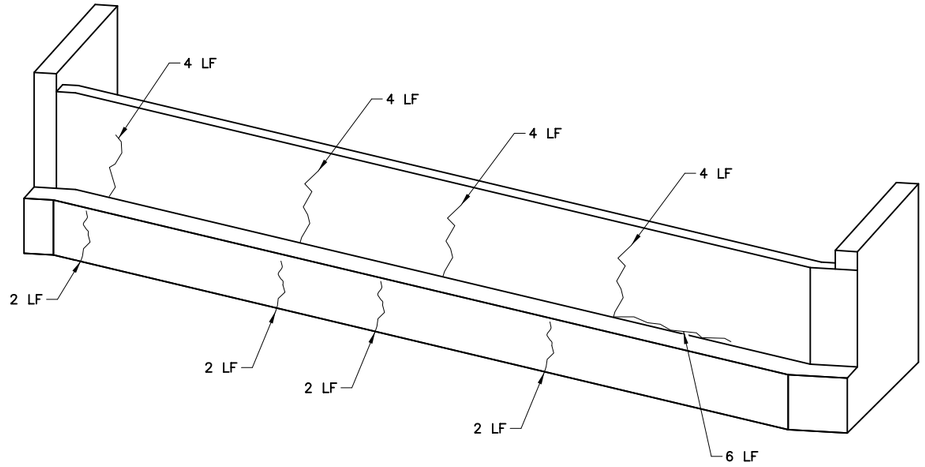
IH 10 WB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.	
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	62	

SHEET 1 OF 1



ABUTMENT NO. 1 – EAST FACE
(ISOMETRIC VIEW FROM WEST)



ABUTMENT NO. 5 – WEST FACE
(ISOMETRIC VIEW FROM EAST)

LEGEND

INTERMEDIATE SPALL REPAIR

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON SEPTEMBER 24, 2019 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

ABUTMENT REPAIR DETAILS

IH 10 WB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		63

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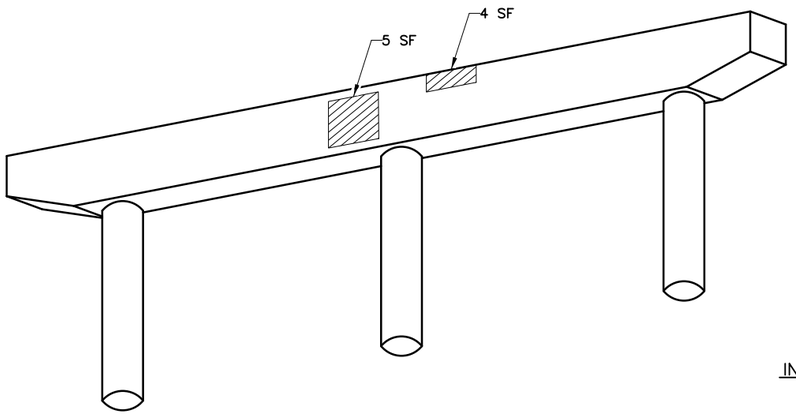
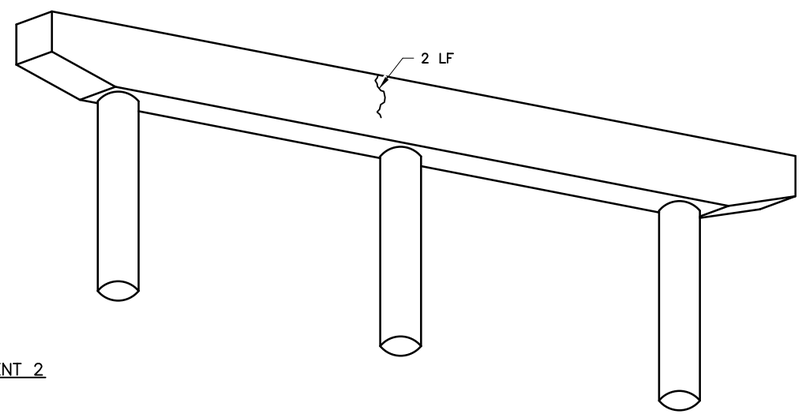


EAST FACE
(ISOMETRIC VIEW FROM WEST)



WEST FACE
(ISOMETRIC VIEW FROM EAST)

INTERIOR BENT 2

LEGEND

INTERMEDIATE SPALL REPAIR

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON SEPTEMBER 24, 2019 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND THE ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

BENT REPAIR DETAILS

IH 10 WB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		64

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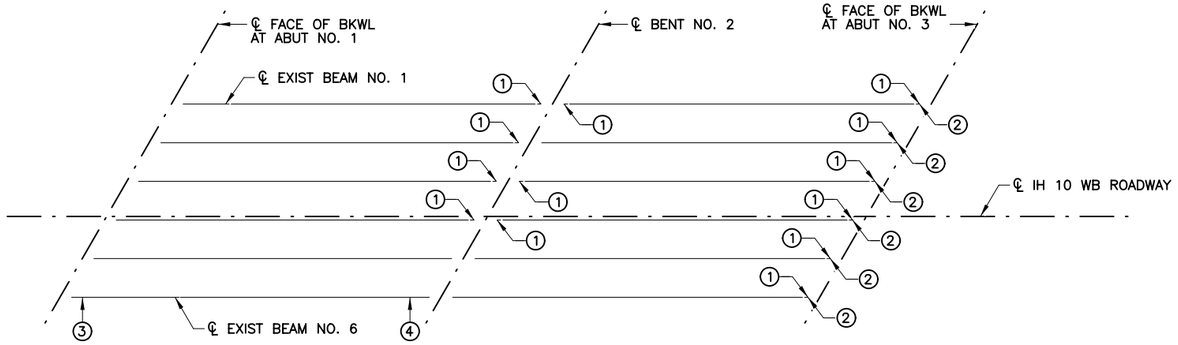

PLAN

(1) REPAIR SPALL AT END OF BEAM. APPROX. 3 SF OF REPAIR PER LOCATION.

(2) REMOVE AND REPLACE ELASTOMERIC BEARING PAD.

(3) REPAIR CRACKS AT BEAM END (10 LF).

(4) REPAIR CRACK AT BOTTOM BEAM FLANGE (5 LF).

GENERAL NOTES:

1. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK.
2. SEE CONCRETE BEAM REPAIR DETAILS FOR INFORMATION ON REPAIR OF CONCRETE SPALLS AT THE ENDS OF BEAMS.
3. REPAIR CRACKS IN CONCRETE BEAMS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7, METHOD 1: ROUT–AND–SEAL CRACKS.
4. APPLY SILANE PENETRATING SEALER TO THE SIDES AND BOTTOM OF EACH BEAM FOR A DISTANCE OF 5' FROM THE END OF THE BEAM.

STATE OF TEXAS
THOMAS W. STEPHENSON
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LICENSED PROFESSIONAL ENGINEER
03/10/2021

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 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

BEAM REPAIR DETAILS

IH 10 WB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.	
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
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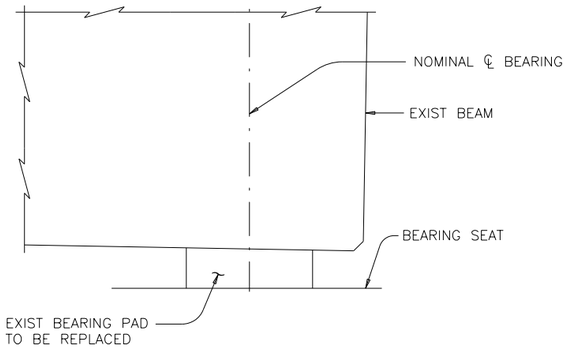
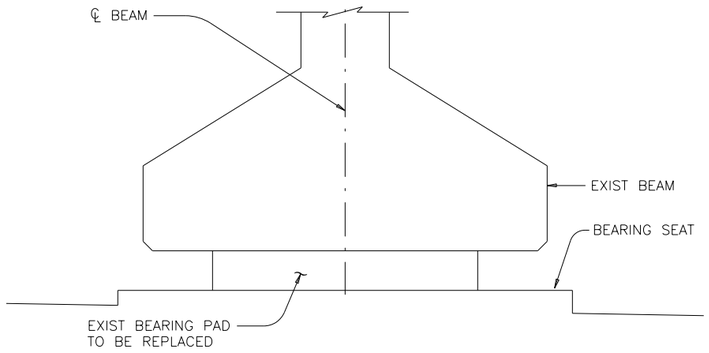


SIDE ELEVATION



END ELEVATION

BEAM DETAILS

TABLE OF BEAM SLOPES	
SPAN	BEAM SLOPE (FT/FT)
1	0.00806

TABLE OF BEARING DIMENSIONS

BEARING TYPE	BEAM NO.	"T"	BEARING PAD LENGTH	BEARING PAD WIDTH	QUANTITY
EB–1–"N"	1–6	¾"	8"	9"	6
					6

GENERAL NOTES:

1. RAISE STRUCTURE PER ITEM 495, "RAISING EXISTING STRUCTURES" TO FACILITATE BEARING PAD REPLACEMENT. COSTS OF FURNISHING AND INSTALLING ELASTOMERIC BEARINGS MUST BE INCLUDED IN UNIT PRICE BID FOR "PRESTRESSED CONCRETE GIRDERS".
2. A JACKING FORCE OF 365 KIPS WILL BE NEEDED TO RAISE THE STRUCTURE.
3. SHOP DRAWINGS FOR APPROVAL ARE REQUIRED.
4. A BEARING LAYOUT WHICH IDENTIFIES LOCATION AND ORIENTATION OF ALL BEARINGS SHALL BE DEVELOPED BY THE BEARING FABRICATOR. PERMANENTLY MARK EACH BEARING IN ACCORDANCE WITH THE BEARING LAYOUT.

(1) SEE TABLE OF BEARING PAD DIMENSIONS FOR DIMENSIONS.

(2) LOCATE PERMANENT MARK HERE.

(3) 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.)

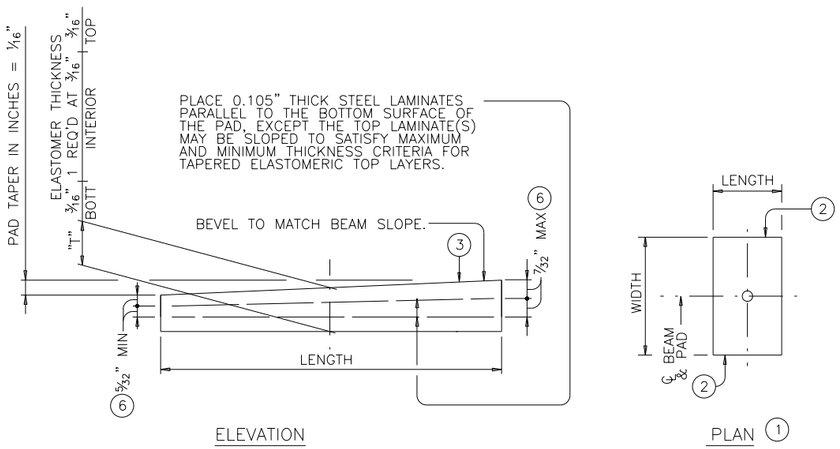
FABRICATED PAD TOP SURFACE SLOPE MUST NOT VARY FROM PLAN GIRDER SLOPE BY MORE THAN

$$\left(\frac{0.0625"}{\text{LENGTH OR DIA}}\right) \text{ IN/IN.}$$

(4) DOWEL AT DOWELED GIRDER END [LABELED (D) ON BRIDGE LAYOUT]. REQUIRED FOR OUTSIDE GIRDER ONLY OR AS PRESENT ON EXISTING BRIDGE.

(5) NOMINAL CENTERLINE OF BEARING MUST BE DEFINED AS SHOWN. THE ACTUAL CENTER OF BEARING PAD MAY VARY FROM THIS LINE.

(6) MAXIMUM AND MINIMUM LAYER THICKNESSES SHOWN ARE FOR ELASTOMER ONLY, ON TAPERED LAYERS.

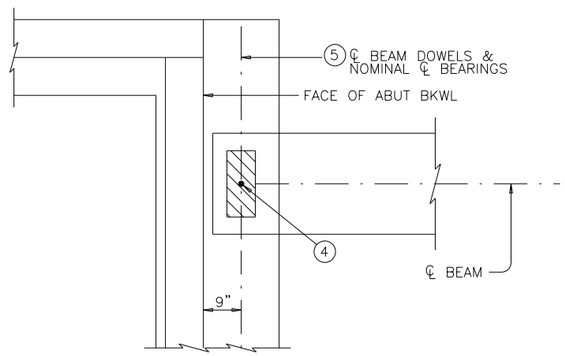


ELEVATION

PLAN (1)

STEEL REINFORCED ELASTOMERIC BEARING PAD

(50 DUROMETER)



AT ABUTMENT

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER

03/31/2021

Thomas W. Stephenson

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F–1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

BEARING REPLACEMENT DETAILS

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	KAD	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	TGA	ODA	REEVES	0003	06	096, ETC.	66

SUMMARY OF BRIDGE ESTIMATED QUANTITIES

ITEM / BRIDGE ELEMENT	428 6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	438 6001 CLEANING AND SEALING EXISTING JOINTS (LF)	459 6005 GABION MATTRESSES (GALV)(6 IN) (SY)	780 6002 CNC CRACK REPAIR (DISCRETE) (INJECT) ① (LF)	780 6004 CONC CRCK REPAIR (DISCRETE) ① (ROUT AND SEAL) (LF)	788 6001 CONCRETE BEAM REPAIR (EA)
2 – ABUTMENTS	88	98	8		44	
1 – INTERIOR BENTS	33	49			21	
2 – 70.000' PRESTR CONC BEAM SPANS	120			7		7
TOTAL	241	147	8	7	65	7

① INCLUDES A 30% INCREASE FROM FIELD OBSERVED QUANTITIES TO BE USED AS DIRECTED BY THE ENGINEER.

NO.	REVISION	BY	DATE

CP&Y

TEXAS REGISTERED ENGINEERING FIRM F-1741

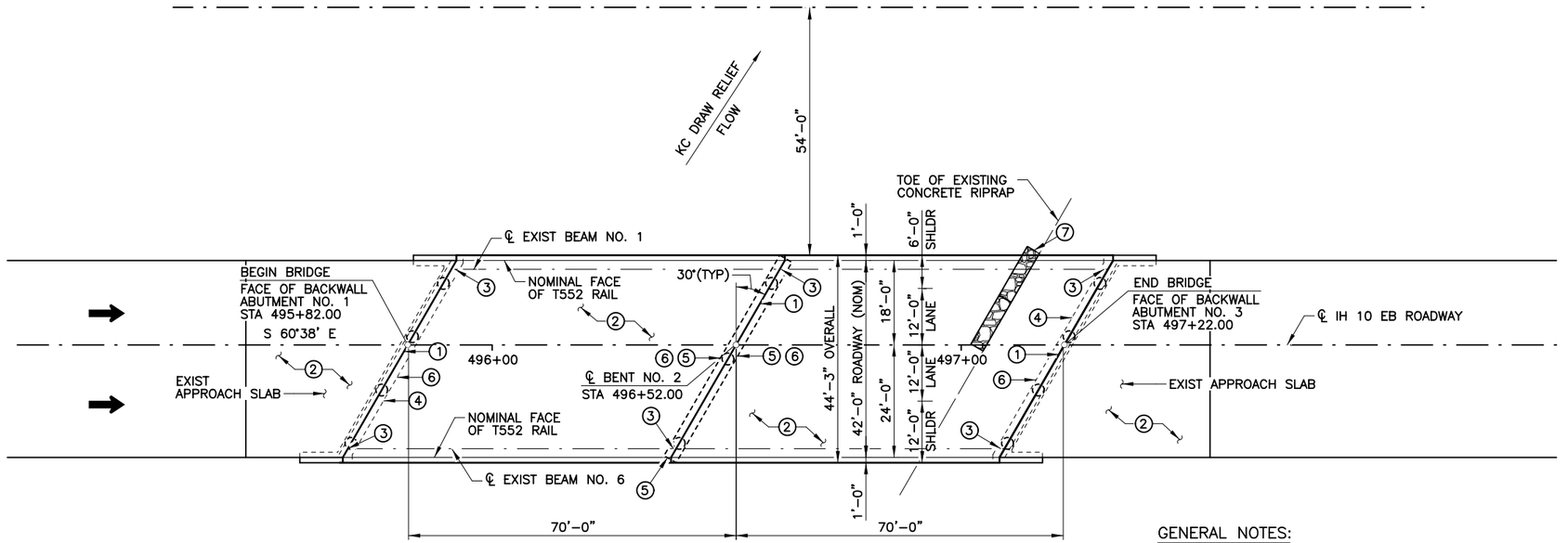
ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE ESTIMATED QUANTITIES

IH 10 EB AT KC DRAW RELIEF

Designed:	KAD	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.	67

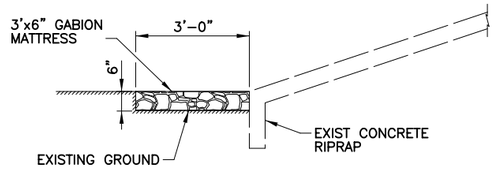
SHEET 1 OF 1



PLAN

1. CLEAN AND SEAL EXISTING EXPANSION JOINT.
2. REMOVE AND REPLACE EXISTING OVERLAY.
3. APPLY SILANE PENETRATING SEALER TO OUTSIDE FACE OF EACH EXTERIOR BEAM AT EACH ABUTMENT AND BENT LOCATION FOR A DISTANCE OF 5' FROM END OF THE BEAM.
4. REPAIR CRACKS AND SPALLS AT ABUTMENT CAP AND BACKWALL.
5. REPAIR CRACKS AT BENT CAP AND COLUMNS.
6. APPLY SILANE PENETRATING SEALER TO FACE OF ABUTMENT BACKWALL, TOP AND SIDES OF ABUTMENT CAP AND TOP AND SIDES OF INTERIOR BENT CAPS.
7. INSTALL 2 GABION MATTRESSES AT TOE OF EXISTING RIPRAP FOR A LENGTH OF 12 FEET BY 3 FEET WIDE BY 6 INCHES DEEP EACH. OVERALL LENGTH OF GABION MATTRESSES IS 24 FEET. PLACE GABION MATTRESSES AS DIRECTED BY THE ENGINEER.

SUMMARY OF REPAIR BID ITEMS		
REPAIR NOTE	BID ITEM/DESC NUMBER	DESCRIPTION
1	438 6001	CLEANING AND SEALING EXISTING JOINTS
2	316 6017	ASPH (AC-20-5TR)
	316 6224	AGGR (TY-PB GR-4 SAC B)
	354 6134	PLANE ASPH CONC PAV (0" TO 1/2" MICRO)
3	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
4	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
5	780 6004	CONC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
6	428 6001	PENETRATING CONCRETE SURFACE TREATMENT
7	459 6005	GABION MATRESSES (GALV)(6 IN)



SECTION

GABION MATTRESS INSTALLATION DETAILS

GENERAL NOTES:

1. EXISTING BRIDGE DESIGNED ACCORDING TO AASHTO 1965 STANDARD SPECIFICATIONS (HS 20 LOADING).
2. SEE BRIDGE ESTIMATED QUANTITIES AND QUANTITY SUMMARIES SHEET FOR SCOPE OF BRIDGE REHABILITATION.
3. IH 10 EB CENTERLINE ROADWAY BEARING AND STATIONING IS BASED ON AS-BUILT DRAWINGS (CSJ-0441-09-006) AND IS FOR REFERENCE ONLY. SPAN LENGTHS SHOWN ARE APPROXIMATE.
4. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK. PERFORM ALL CONCRETE REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

NBI 06-195-0-0441-09-110

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED PROFESSIONAL ENGINEER
03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

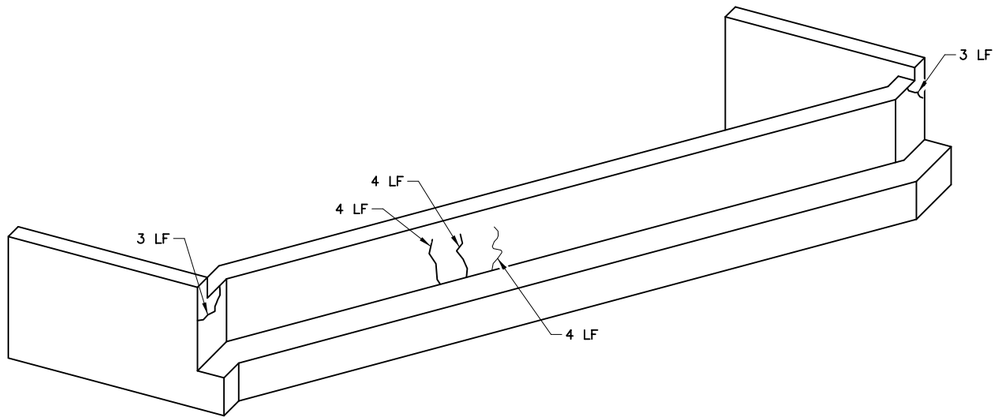
ODESSA DISTRICT BRIDGE REHABILITATION

BRIDGE REPAIR PLAN

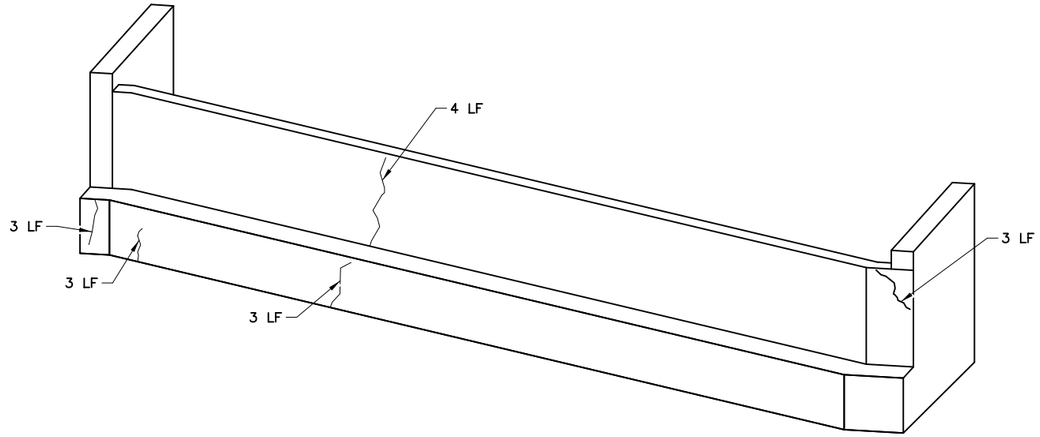
IH 10 EB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		68

SHEET 1 OF 1



ABUTMENT NO. 1 – EAST FACE
(ISOMETRIC VIEW FROM WEST)



ABUTMENT NO. 5 – WEST FACE
(ISOMETRIC VIEW FROM EAST)

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON JULY 21, 2020 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPRIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

STATE OF TEXAS
THOMAS W. STEPHENSON
91178
LICENSED
PROFESSIONAL ENGINEER
03/10/2021

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TEXAS REGISTERED ENGINEERING FIRM F-1741

 Texas Department of Transportation

ODESSA DISTRICT BRIDGE REHABILITATION

ABUTMENT REPAIR DETAILS

IH 10 EB AT KC DRAW RELIEF

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
Checked:	MMF	ODA	REEVES	0003	06	096, ETC.		69

SHEET 1 OF 1

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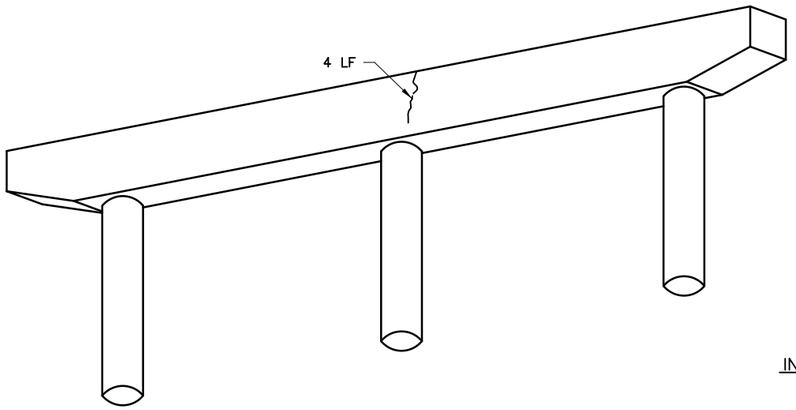
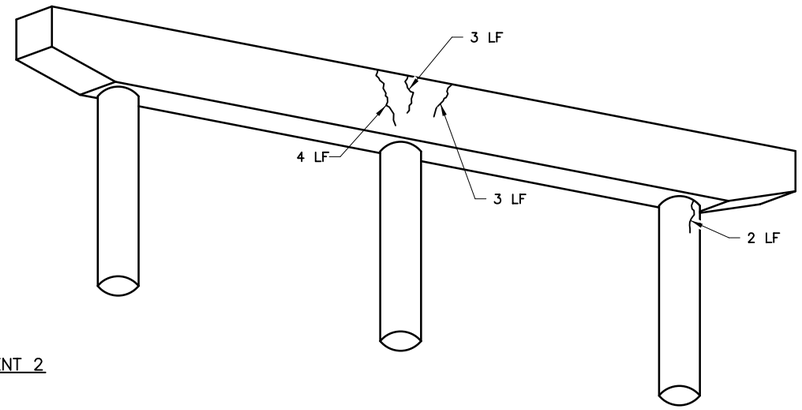


EAST FACE
(ISOMETRIC VIEW FROM WEST)



WEST FACE
(ISOMETRIC VIEW FROM EAST)

INTERIOR BENT 2

CONCRETE REPAIR NOTES:

1. DAMAGE LOCATIONS AND QUANTITIES ARE BASED ON SEPTEMBER 24, 2019 CONDITION ASSESSMENT. IMMEDIATELY NOTIFY TXDOT IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND THE ACTUAL CONDITIONS.
2. SUBMIT DETAILED REPAIR PROCEDURES, INCLUDING PROPOSED PROPIETARY MATERIALS, FOR APPROVAL PRIOR TO COMMENCING WORK. REPAIRS ARE CONSIDERED "INTERMEDIATE SPALLS" SHALL BE REPAIRED IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 2.
3. CONTRACTOR SHALL PERFORM ALL CRACK REPAIRS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7.
4. SOUND ALL SURFACES TO IDENTIFY AND MARK ALL DELAMINATED AREAS FOR REVIEW AND APPROVAL BY THE ENGINEER. CONFIRM SQUARE FOOTAGE OF REPAIR AREAS PRIOR TO COMMENCING REMOVAL AND NOTIFY ENGINEER OF ANY DISCREPANCIES. PROVIDE ACCESS TO ENGINEER FOR VERIFICATION.
5. NOTIFY ENGINEER ONCE EXISTING CONCRETE IS REMOVED AND REPAIR AREAS FOR EACH BENT HAVE BEEN PREPARED. PROVIDE ACCESS TO THE ENGINEER FOR VERIFICATION OF PREPARED REPAIR AREAS.

SHEET 1 OF 1

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ODESSA DISTRICT BRIDGE REHABILITATION

BENT REPAIR DETAILS

IH 10 EB AT KC DRAW RELIEF

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Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
Drawn:	CBR	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
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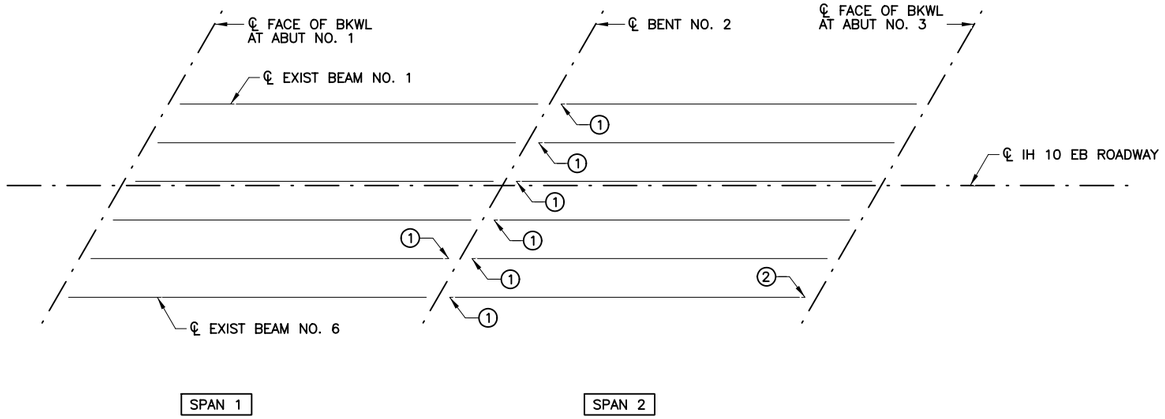

PLAN

(1) REPAIR SPALL AT END OF BEAM. APPROX. 3 SF OF REPAIR PER LOCATION.

(2) REPAIR CRACK AT BOTTOM BEAM FLANGE (5 LF).

GENERAL NOTES:

1. REPAIR LOCATIONS NOTED ARE APPROXIMATE AND ARE PROVIDED AS A VISUAL AID. ACTUAL REPAIR LOCATIONS TO BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING REPAIR WORK.
2. SEE CONCRETE BEAM REPAIR DETAILS FOR INFORMATION ON REPAIR OF CONCRETE SPALLS AT THE ENDS OF BEAMS.
3. REPAIR CRACKS IN CONCRETE BEAMS IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 7, METHOD 1: ROUT-AND-SEAL CRACKS.
4. APPLY SILANE PENETRATING SEALER TO THE SIDES AND BOTTOM OF EACH BEAM FOR A DISTANCE OF 5' FROM THE END OF THE BEAM.

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ODESSA DISTRICT BRIDGE REHABILITATION

BEAM REPAIR DETAILS

IH 10 EB AT KC DRAW RELIEF

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Checked:	TGA	6	TEXAS	SEE TITLE SHEET				IH 20, ETC.
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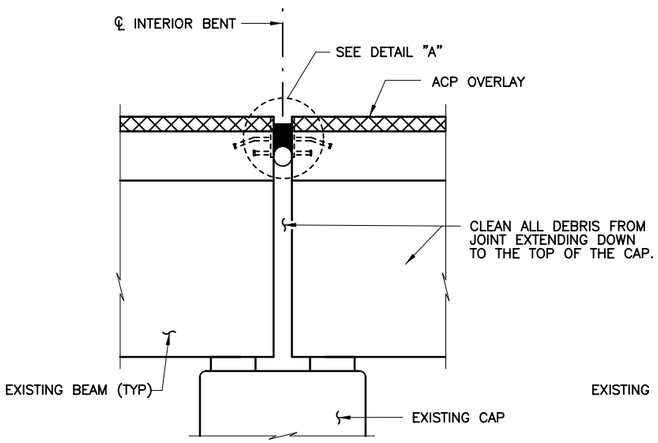
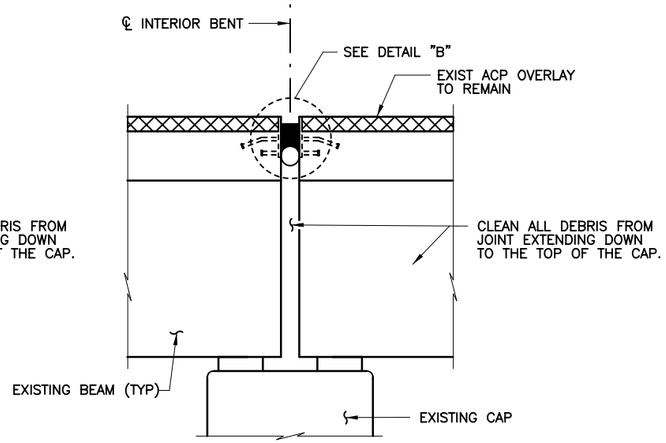


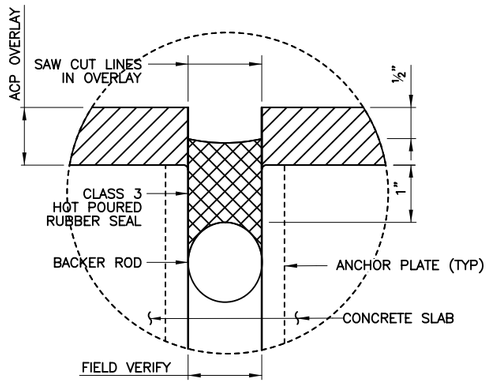
JOINT WITH HOT POURED RUBBER SEAL

(SHOWING INTERIOR BENT, JOINT AT ABUTMENT SIMILAR)



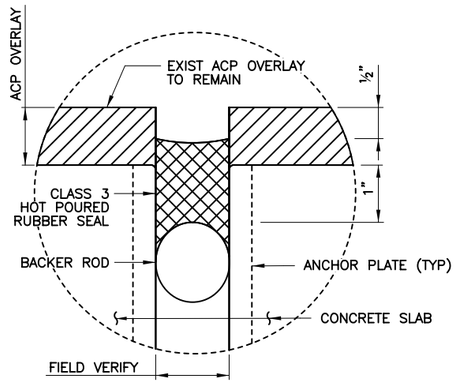
ARMOR JOINT

(SHOWING INTERIOR BENT, JOINT AT ABUTMENT SIMILAR)



DETAIL "A"

(STUD ANCHORS NOT SHOWN FOR CLARITY)



DETAIL "B"

(STUD ANCHORS NOT SHOWN FOR CLARITY)

PROCEDURE FOR CLEANING AND SEALING EXISTING JOINT WITH HOT POURED RUBBER SEAL

1. SAW CUT THROUGH THE ASPHALT AT THE CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A ½" MINIMUM JOINT OPENING OR MATCH THE EXISTING JOINT OPENING. CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
2. OBTAIN APPROVAL OF CLEANED JOINT PRIOR TO PROCEEDING WITH JOINT SEALING OPERATION.
3. PLACE BACKER ROD INTO JOINT OPENING 1" BELOW THE TOP OF CONCRETE. BACKER ROD MUST BE COMPATIBLE WITH THE HOT POURED RUBBER SEALANT AND RATED FOR A MINIMUM OF 400°F. THE BACKER ROD MUST BE 25% LARGER THAT THE JOINT OPENING.
4. SEAL THE JOINT OPENING WITH CLASS 3, "HOT POURED RUBBER." SEAL FLUSH TO THE TOP OF THE ASPHALTIC PAVEMENT.

PROCEDURE FOR CLEANING AND SEALING EXISTING ARMOR JOINT WITH HOT POURED RUBBER SEAL

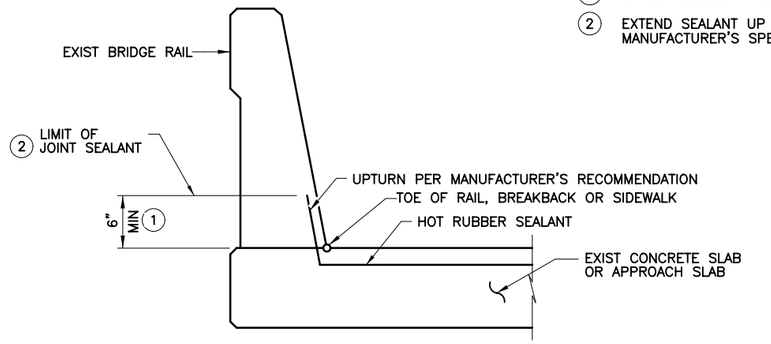
1. REMOVE EXISTING SEAL, IF PRESENT. CLEAN JOINT OPENING OF ALL DIRT AND OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
2. ABRASIVE BLAST CLEAN EXISTING STEEL SURFACE WHERE HOT RUBBER SEAL IS TO BE PLACED.
3 OBTAIN APPROVAL OF CLEANED JOINT PRIOR TO PROCEEDING WITH JOINT SEALING OPERATION.
4 PLACE BACKER ROD INTO JOINT OPENING 1" BELOW THE TOP OF CONCRETE. BACKER ROD MUST BE COMPATIBLE WITH THE HOT POURED RUBBER SEALANT AND RATED FOR A MINIMUM OF 400°F. THE BACKER ROD MUST BE 25% LARGER THAT THE JOINT OPENING.
4. SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." RECESS SEAL ½" BELOW TOP OF EXISTING ASPHALT PAVEMENT.

GENERAL NOTES:

1. HOT RUBBER SEALANT TO BE PAID BY THE LINEAR FOOT IN ACCORDANCE WITH THE ITEM "CLEANING AND SEALING EXISTING JOINTS."
2. PAYMENT FOR BACKER ROAD SHALL BE SUBSIDARY TO THE ITEM "CLEANING AND SEALING EXISTING JOINTS."
3. USE CLASS 3 "HOT POURED RUBBER" FOR SEAL MEETING THE REQUIREMENTS OF TXDOT DMS-6310.

(1) 6" MIN UNLESS OTHERWISE SPECIFIED BY MANUFACTURER.

(2) EXTEND SEALANT UP INTO RAIL IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.



JOINT SEALANT TERMINATION DETAIL

USE DETAIL "A" IN ALL JOINT REPAIRS FOR IH 10 AT KC DRAW AND KC DRAW RELIEF.

USE DETAIL "B" FOR ALL JOINT REPAIRS FOR IH 20 WB AT BILLINGSLEA DRAW.

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ODESSA DISTRICT BRIDGE REHABILITATION

EXPANSION JOINT REPAIR DETAILS

		FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Designed:	WJE	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
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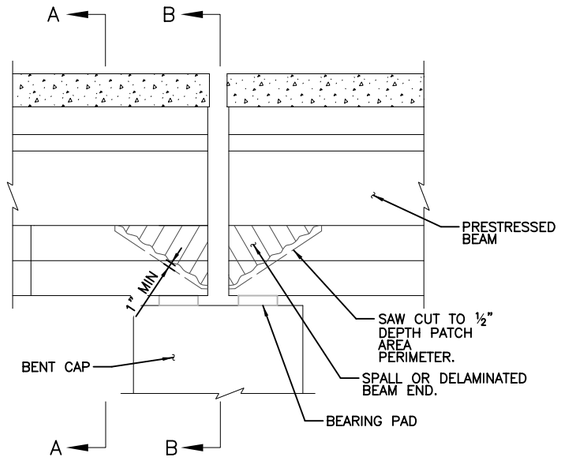

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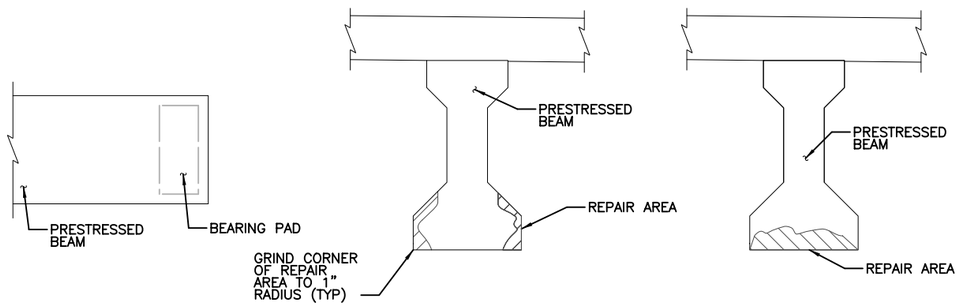

REFLECTED PLAN | SECTION A–A | VIEW B–B

BEAM END SPALL REPAIR

SCALE: ¼" = 1'–0"

BEAM END SPALL REPAIR NOTES:

1. IDENTIFY AND MARK ALL REPAIR LOCATIONS PRIOR TO BEGINNING WORK. VERIFY AREAS AND QUANTITIES WITH THE ENGINEER. PROVIDE ACCESS FOR THE ENGINEER TO INSPECT AND VERIFY REPAIR AREAS.
2. PREPARE A DETAILED REPAIR PROCEDURE FOR EACH LOCATION. PROVIDE PHOTOGRAPHS IN THE REPAIR PROCEDURE IN ORDER TO VERIFY LOCATIONS. SPALLED CONCRETE SHALL BE REPAIRED IN ACCORDANCE WITH THE CONCRETE REPAIR MANUAL CHAPTER 3, SECTION 2 AND DETAIL BELOW.
3. FOR REPAIRS DEEPER THAN 2" WITH NO OTHER MILD REINFORCING PRESENT, INSTALL STAINLESS STEEL PINS IN EXISTING CONCRETE TO ANCHOR REPAIR MATERIAL.
4. REPAIRS ARE PAID FOR AS ITEM 788, "CONCRETE BEAM REPAIR".

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ODESSA DISTRICT BRIDGE REHABILITATION

CONCRETE BEAM REPAIR DETAILS

Designed:	WJE	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.	
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SHEET 1 OF 1

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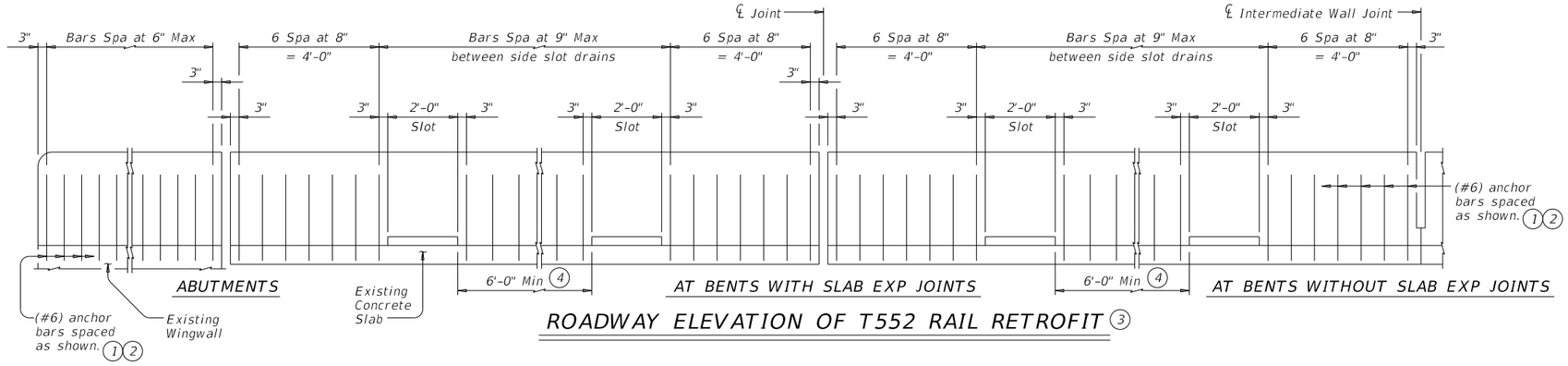
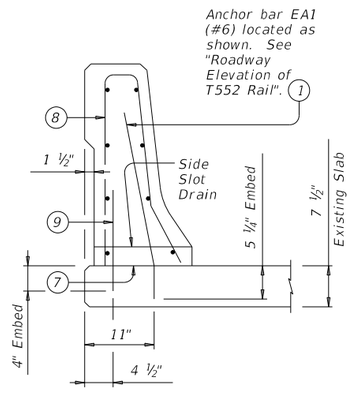
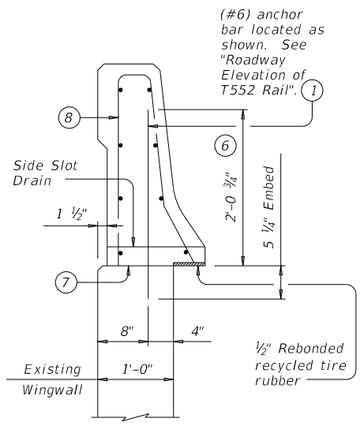


ROADWAY ELEVATION OF T552 RAIL RETROFIT (3)



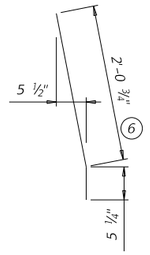
T552 RAIL

RAIL RETROFIT SECTIONS (5) ON CONCRETE SLABS USING ADHESIVE ANCHORS



T552 RAIL

RAIL RETROFIT SECTIONS (5) ON WINGWALLS USING ADHESIVE ANCHORS



ANCHOR BAR EA1 (#6)

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.

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:

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

(#6) and (#4) anchor bars used for the adhesive anchorage system must not be epoxy coated within the required embedment.

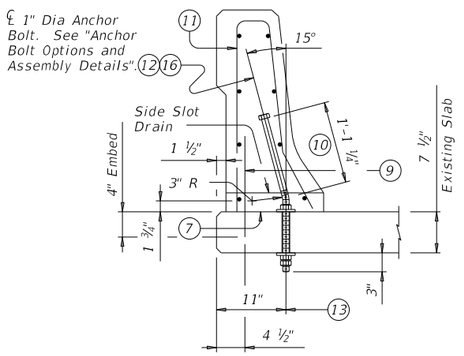
GENERAL NOTES:

Use of these retrofit details will result in a railing acceptable for the MASH Test Level indicated on the applicable rail standard.

Removal and replacement of backfill, subgrade, and asphalt or concrete pavement necessary for this installation is considered subsidiary to the retrofit railing.

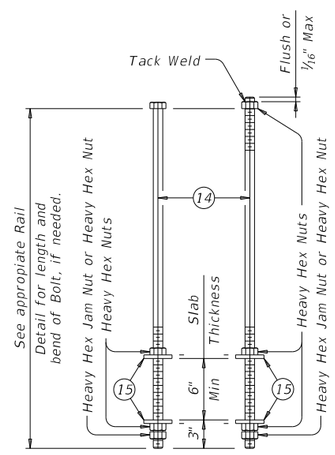
Payment for the rail retrofit will be as per Item 451, "Retrofit Rail (Ty T552)". All details herein are subsidiary to rail retrofit.

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



T552 RAIL

RAIL RETROFIT SECTIONS ON SLABS USING ANCHOR BOLTS



ANCHOR BOLT OPTIONS (16) AND ASSEMBLY DETAILS

(1) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. 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".

(2) See T552 Rail Sections in "Rail Retrofit Section on Wingwalls using Adhesive Anchors" and/or "Rail Retrofit Section on Concrete Slabs using Adhesive Anchors".

(3) Showing spacing of (#6) adhesive anchor in a rail retrofit condition. Secondary (#4) adhesive anchor in a rail retrofit not shown for clarity. Reinforcing steel and terminal connections not shown for clarity. See rail standard for details and notes not shown.

(4) Place side slot drains as shown. See appropriate rail standard for side slot drains, except as noted.

(5) Showing location or locations of anchor bars in a rail retrofit condition. See appropriate rail standard for details and notes not shown.

(6) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

(7) Do not cast rails or parapet walls on top of overlays/seal coats.

(8) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(9) Embed secondary (#4) anchor bars 1'-4" in length with a Type III Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips. 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". (#4) anchor bars spaced longitudinally along rail at 4 ft Max (Spaced 3" longitudinally from outside edge and edge of side slot drains).

(10) Increase by amount of existing overlay/seal coat thickness, not to exceed 2". If thickness of existing overlay/seal coat is greater than 2" at toe of rail, taper overlay at a 1:10 or flatter slope over shoulder width to a thickness of 2" or less at toe of rail.

(11) See appropriate rail standard for reinforcing steel. Modify length of vertical reinforcing bars as required to fit existing structure. Longitudinal reinforcing bars may be removed only if their position puts them in conflict with un-removed portions of existing structure.

(12) ℄ 1" Dia Anchor Bolt Spaced longitudinally along rail at 20" Max (Spaced 6" longitudinally from outside edge and edge of side slot drains).

(13) ℄ 1 1/16" to 1 ¼" Dia holes. Core drill holes through existing deck (percussion drilling not permitted). Concrete spalls in the bottom of the deck exceeding ½" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the Contractor's expense.

(14) ℄ 1" Dia ASTM F1554 Gr 55 Anchor Bolt or Threaded Rod. Nuts must conform to ASTM A563 requirements.

(15) Plate Washer ⅜ x 3 x 3 ASTM A36 with 1 1/16" Dia Hole centered.

(16) Galvanize anchor bolts, nuts and plate washers.

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Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR CONCRETE RAILS

TY T552

C-RAIL-R (MOD)

FILE: rlstd022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH20, ETC.
07-20: Text change from epoxy to adhesive and changed MASH Test Level note.	DIST	COUNTY		SHEET NO.
	ODA	REEVES		74

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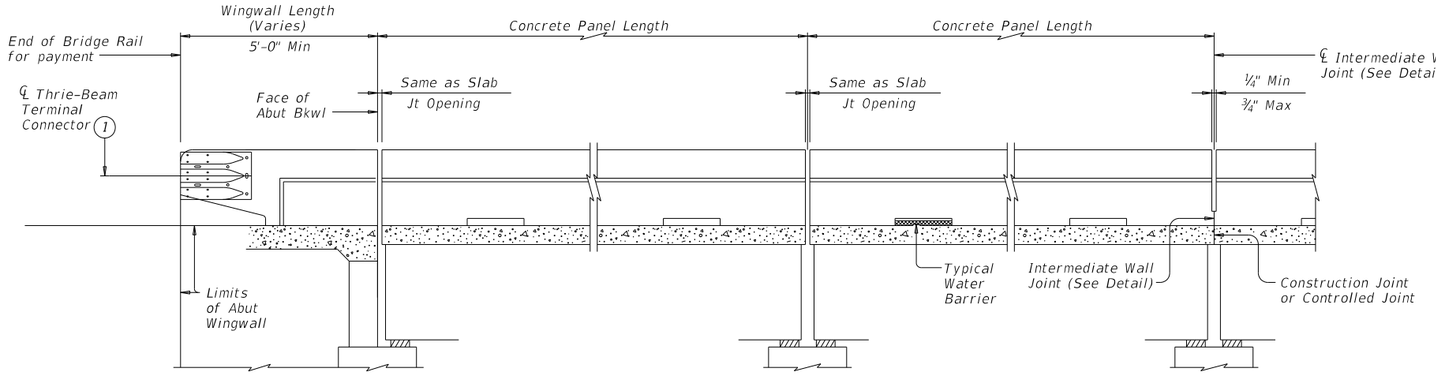
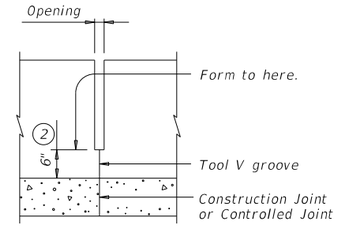


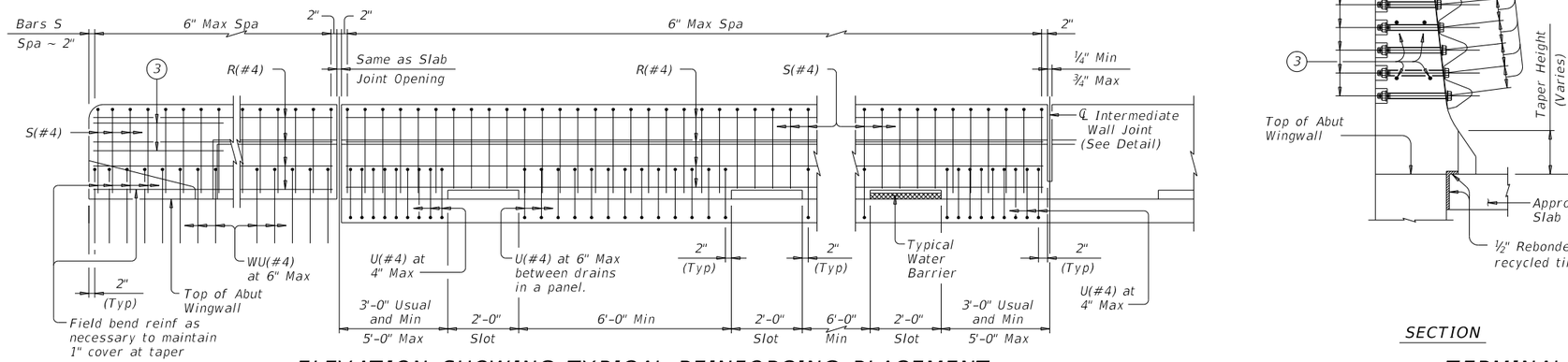
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

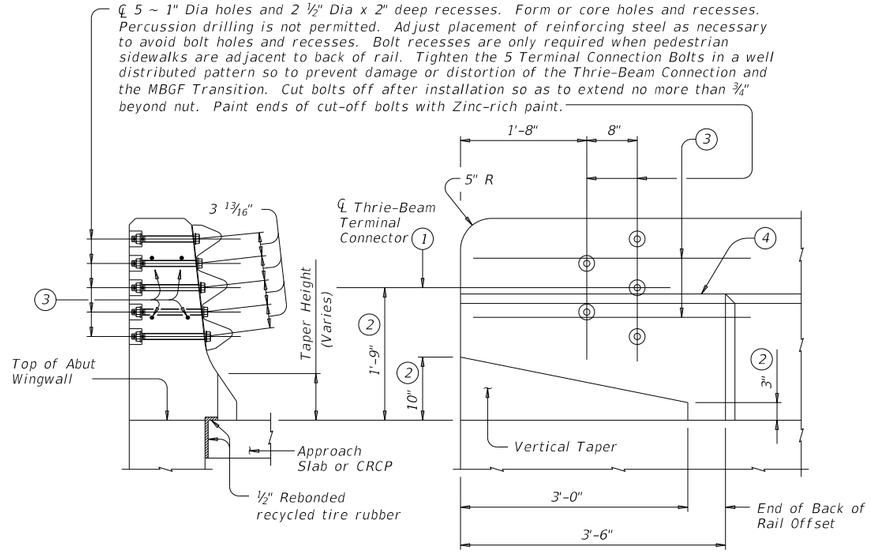


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

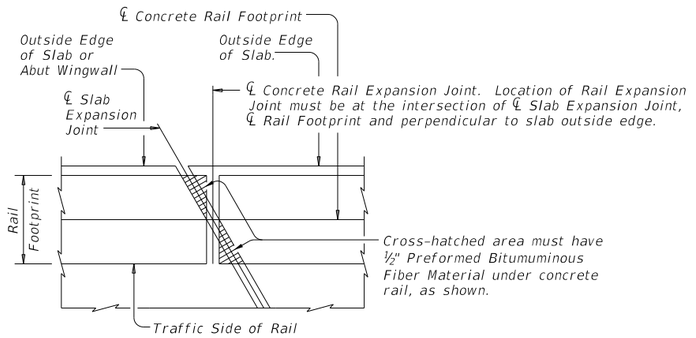


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

(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) *Increase 2" for structures with overlay.*

(3) *Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.*

(4) *Back of rail offset may, with Engineer's approval, be continued to the end of the railing.*

SHEET 1 OF 2

Texas Department of Transportation

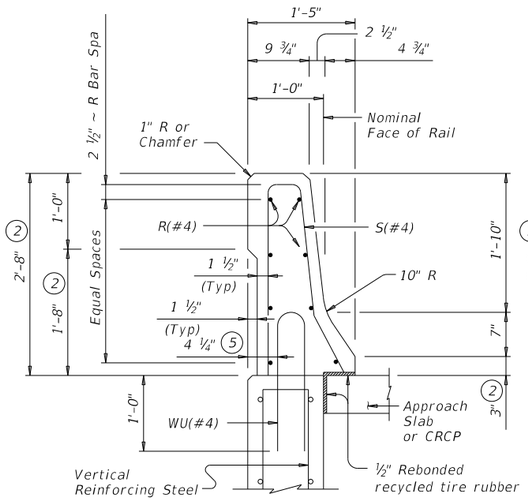
Bridge Division Standard

TRAFFIC RAIL

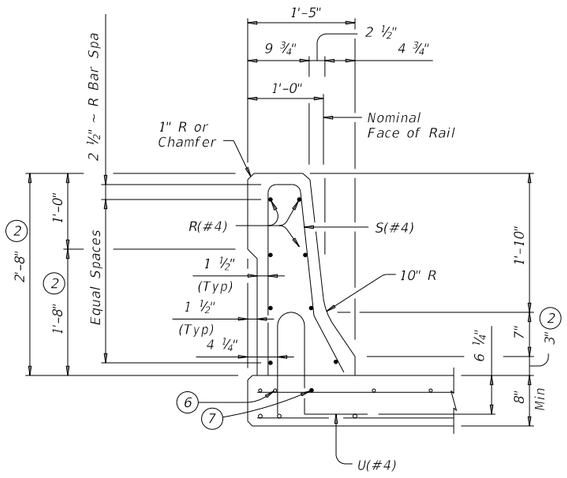
TYPE T552

FILE: rlstd010-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH20, ETC.
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		75

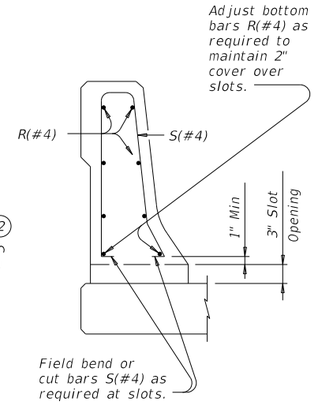
DATE:
FILE:



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB



ON BRIDGE SLAB AT SIDE SLOT DRAIN

SECTIONS THRU RAIL

(2) Increase 2" for structures with overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractor's expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) Bend or cut as required to clear drain slots.

(9) No longitudinal wires may be in top center of cage.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown on the plans or approved by the Engineer.

Water barriers must be provided at openings draining onto railroad tracks, undercrossing roadways and sidewalks. They may be cast in place or precast in convenient length and bonded to the bridge deck with an approved epoxy cement.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

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

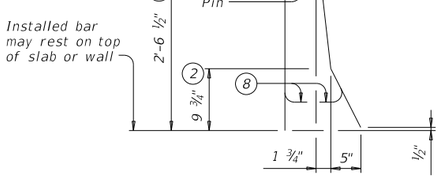
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

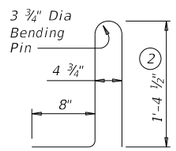
Average weight of railing with no overlay is 370 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

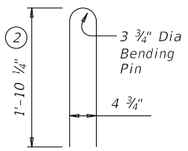
Reinforcing bar dimensions shown are out-to-out of bar.



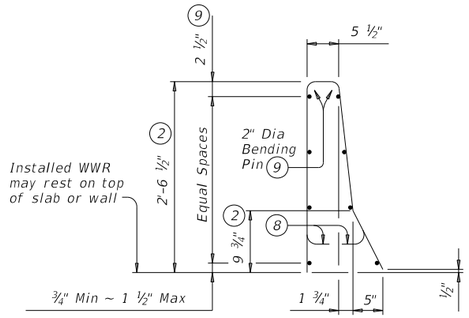
BARS S (#4)



BARS U (#4)

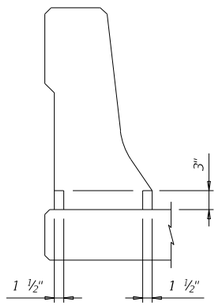


BARS WU (#4)

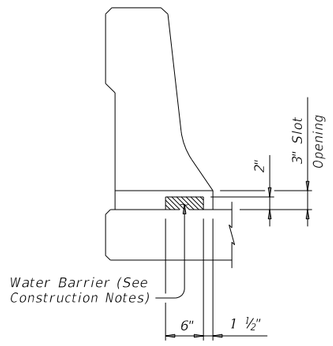


OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



CAST-IN-PLACE WATER BARRIER



PRECAST WATER BARRIER

OPTIONAL WATER BARRIERS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T552

FILE: rlstd010-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH20, ETC.
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		76

DATE: 3/10/2021 8:51:48 AM
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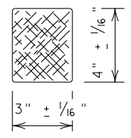
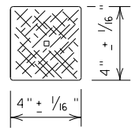
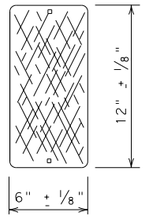
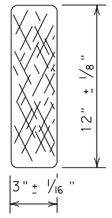
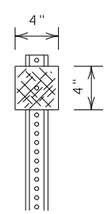
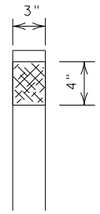
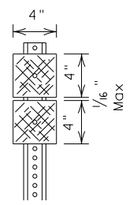
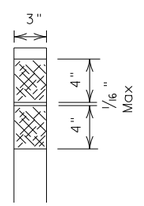
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

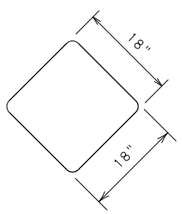
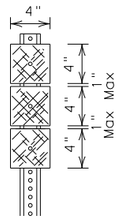
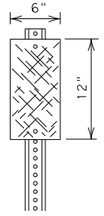
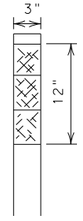
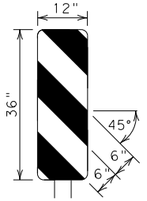
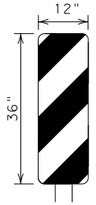
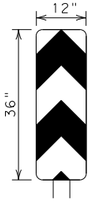
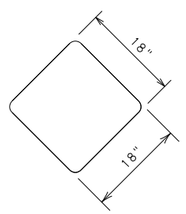
TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

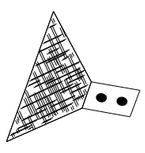
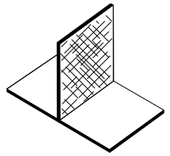
DIRECTION
- If Required
- BI = Bi-Directional

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

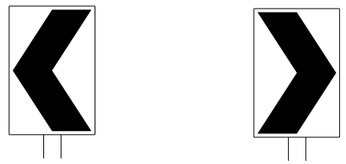
OBJECT MARKERS

	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"	

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

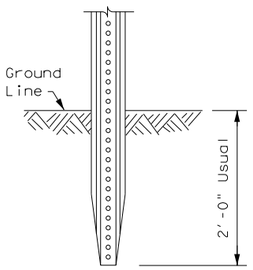
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ODA	REEVES		77

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

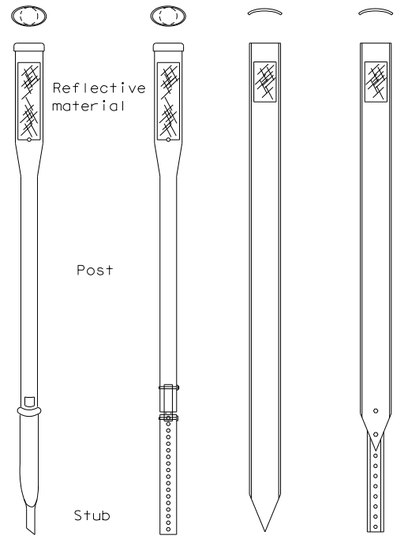


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

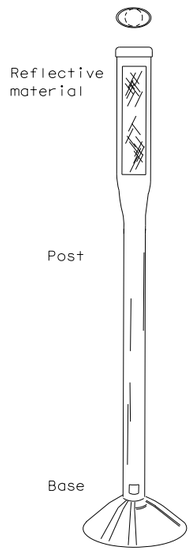
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



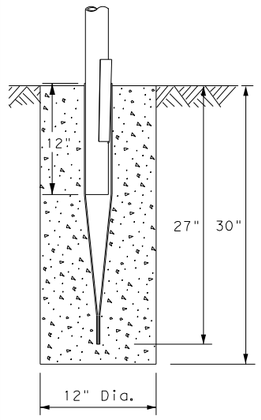
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

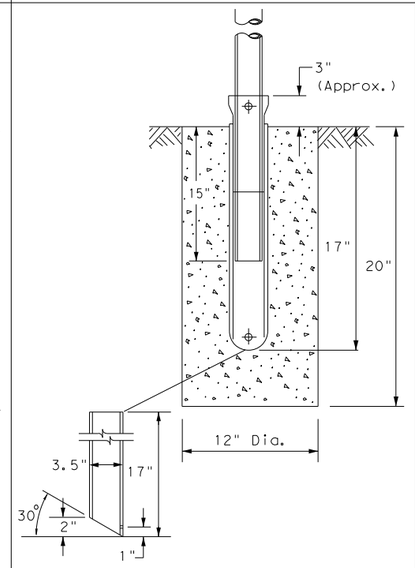
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

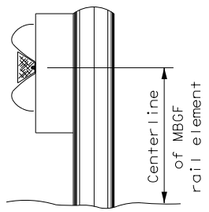
NOTE

1. Install per manufacturer's recommendations.

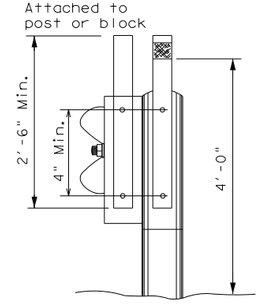
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

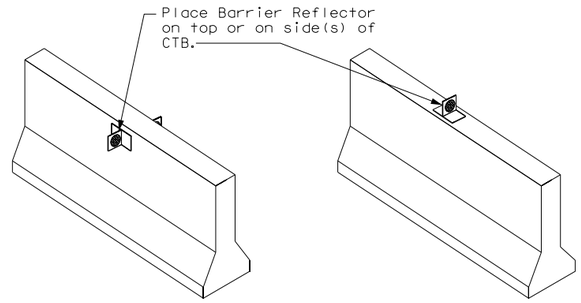
GF1



GF2



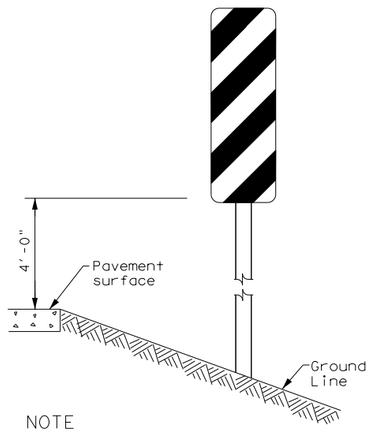
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

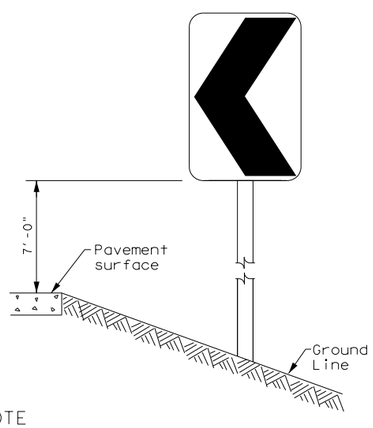
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

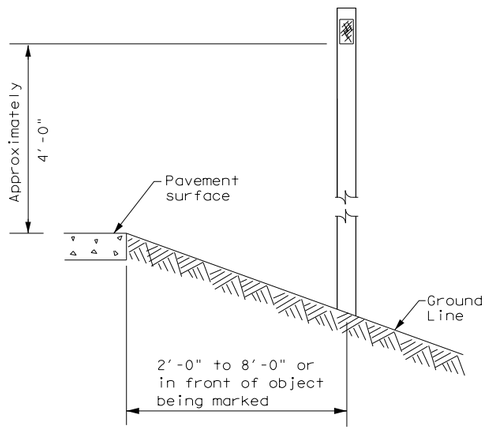
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ODA	REEVES		78

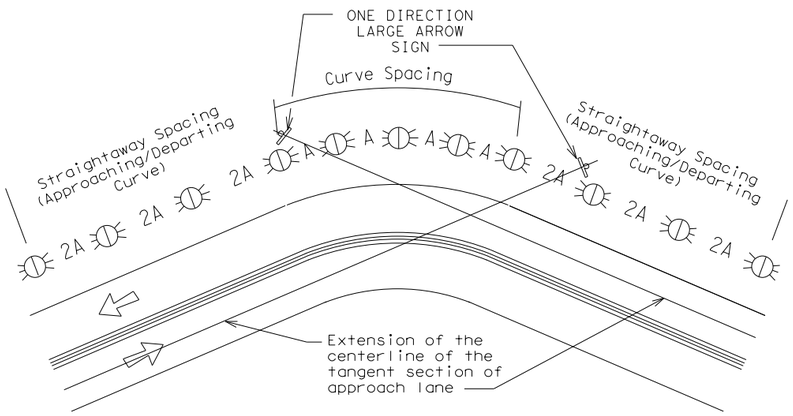
20B

DATE:
FILE:

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

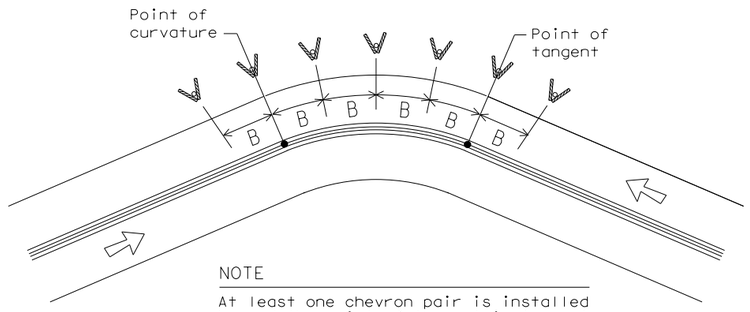
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

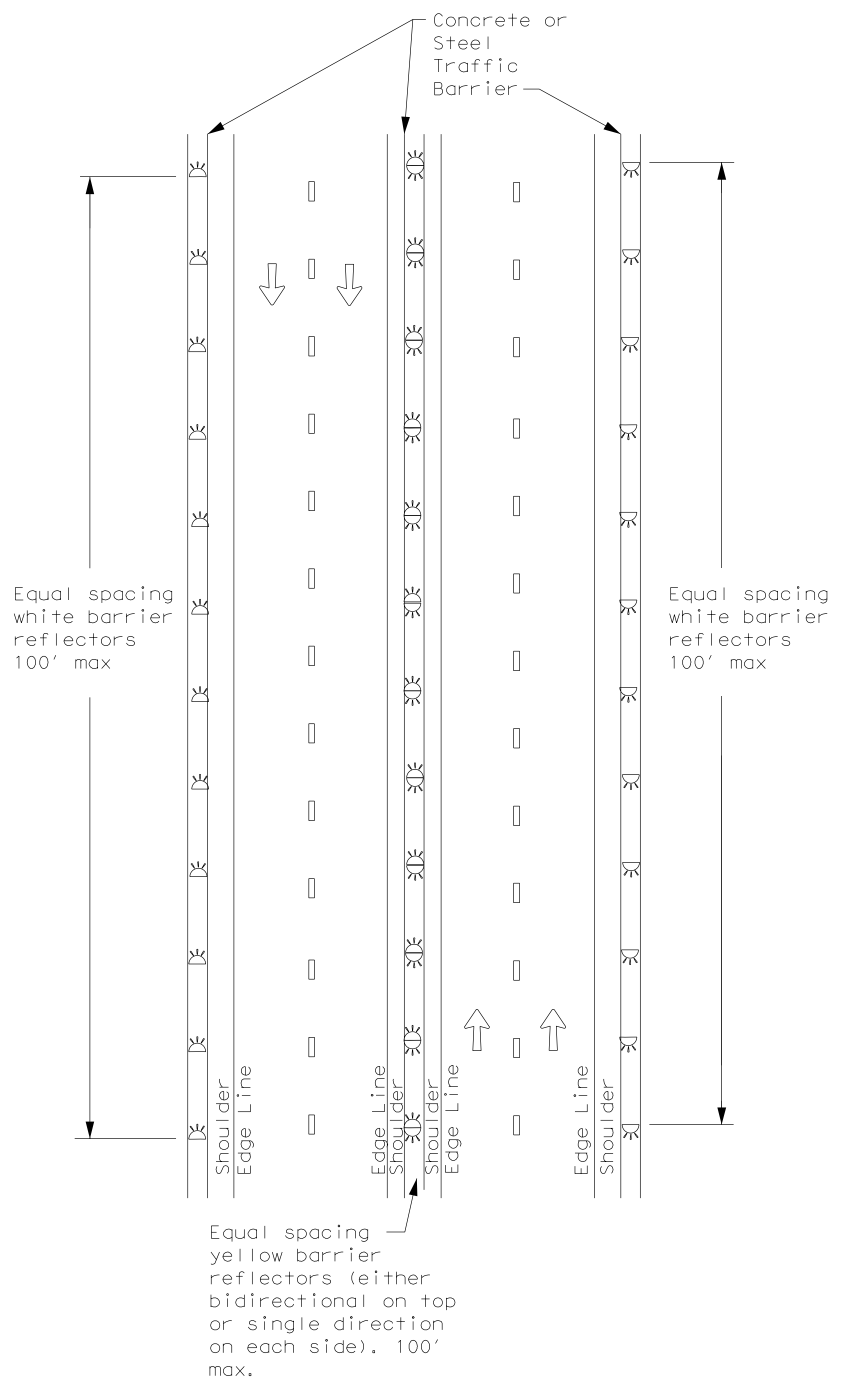
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	ODA	REEVES		79

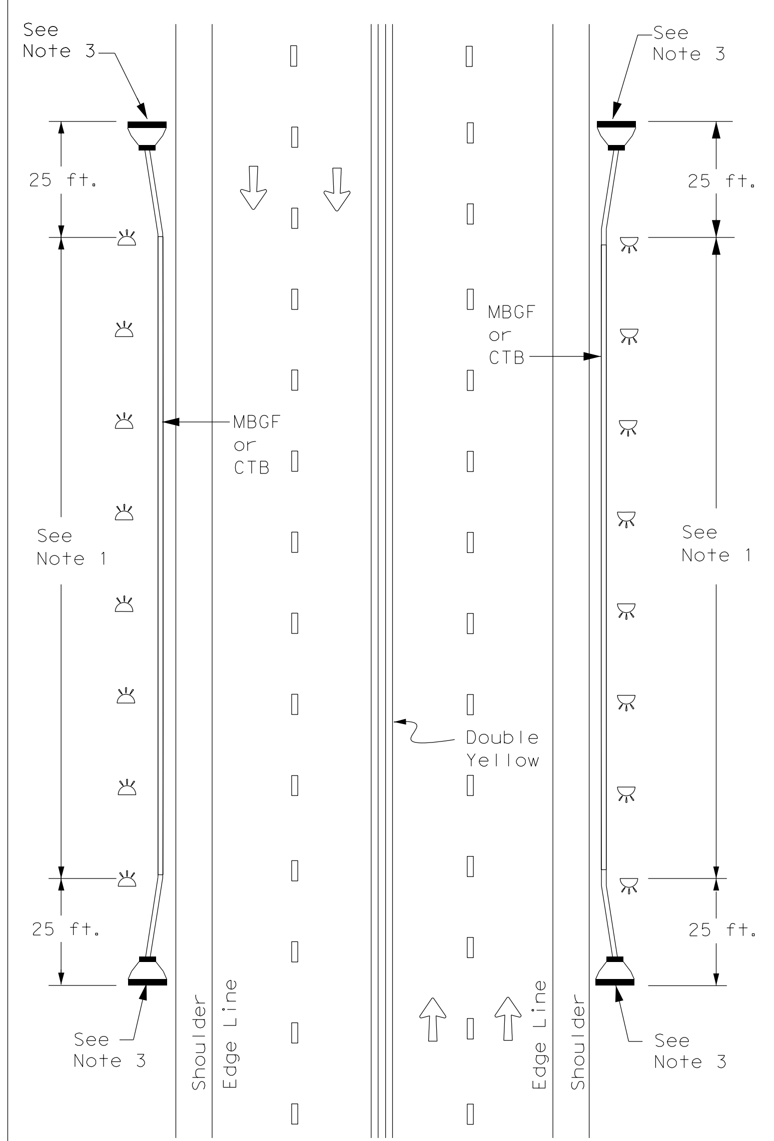
20C

DATE:
FILE:

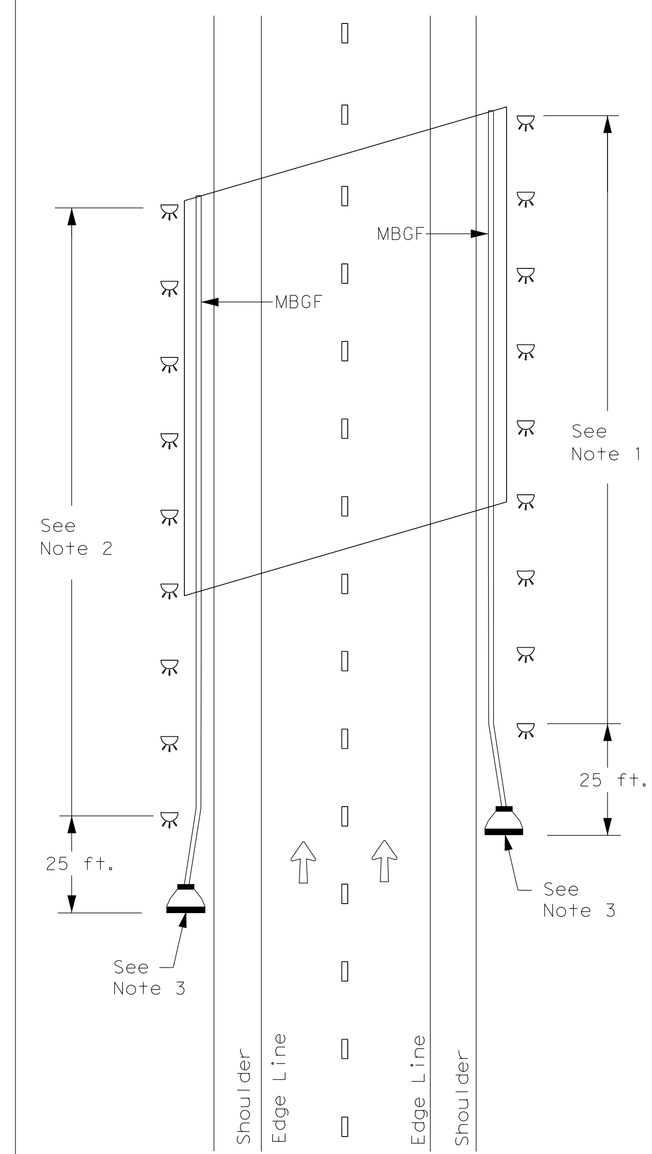
CONTINUOUS CONCRETE OR STEEL BARRIER



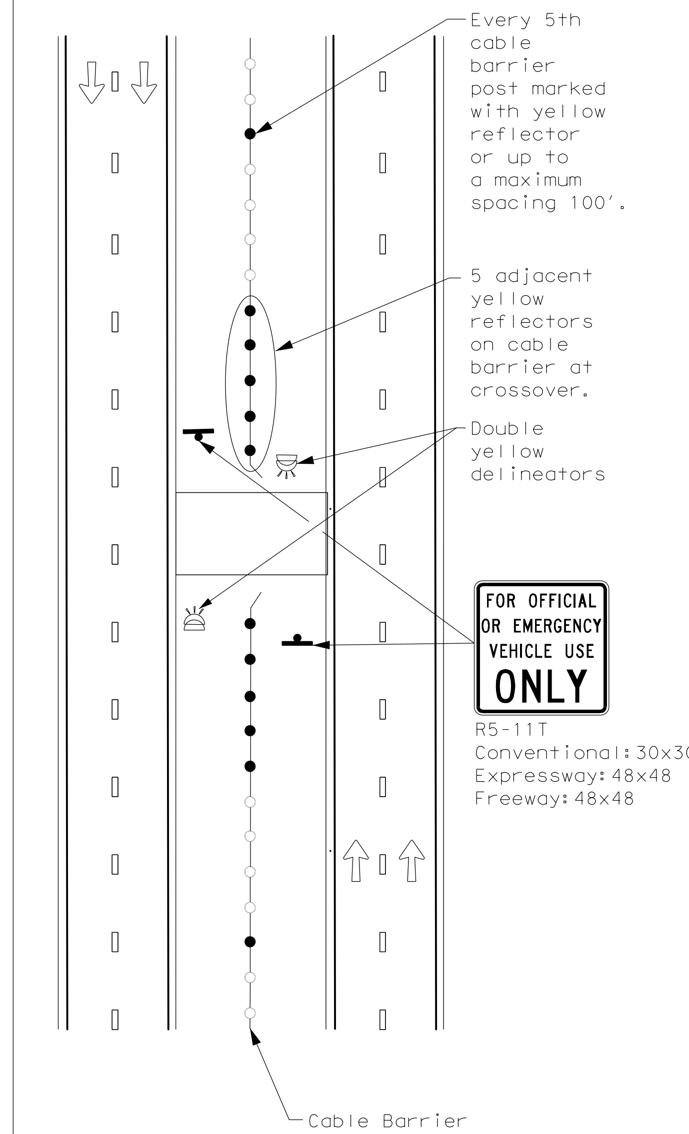
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)

2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.

3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

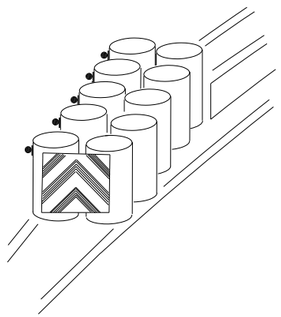
Traffic Safety Division Standard

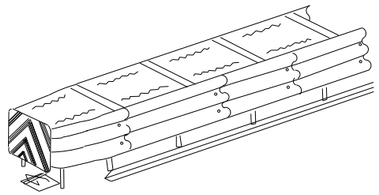
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

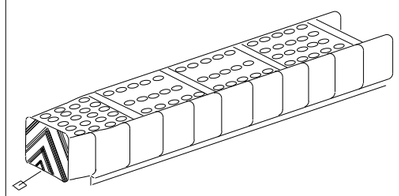
D & OM(6)-20

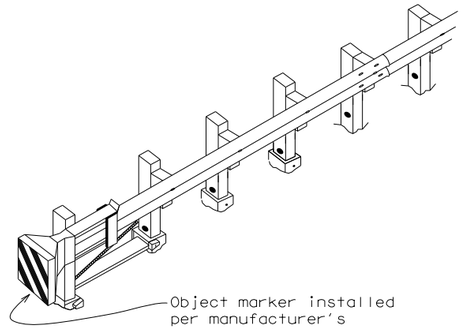
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	096, ETC.	IH 20, ETC.
7-20	DIST	COUNTY		SHEET NO.
	ODA	REEVES		80

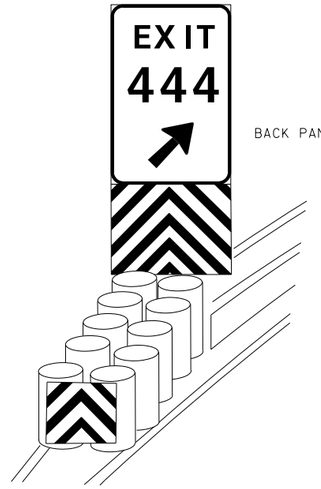
20F

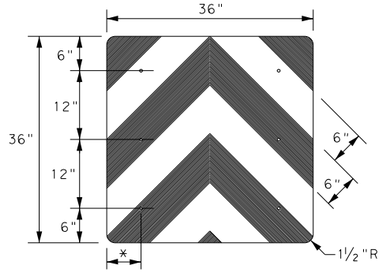


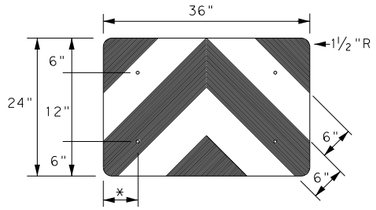




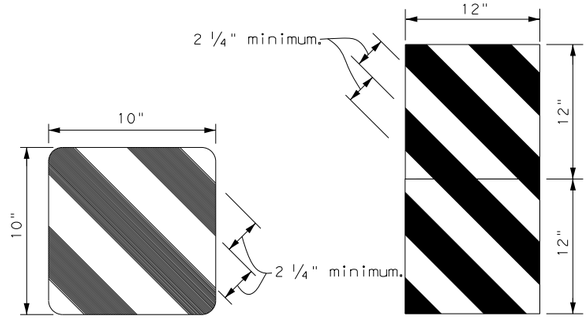




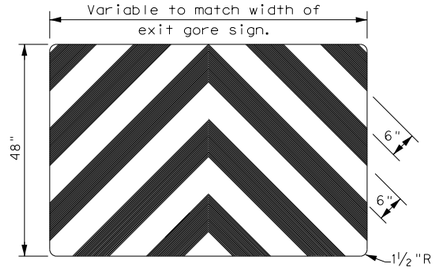


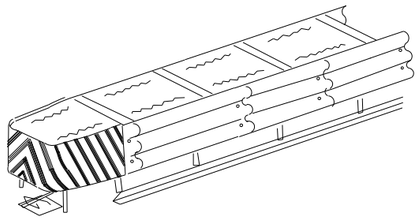


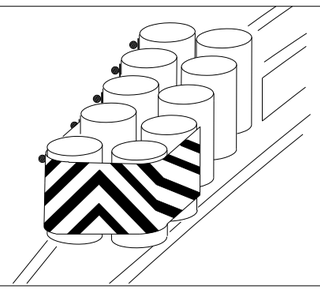
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

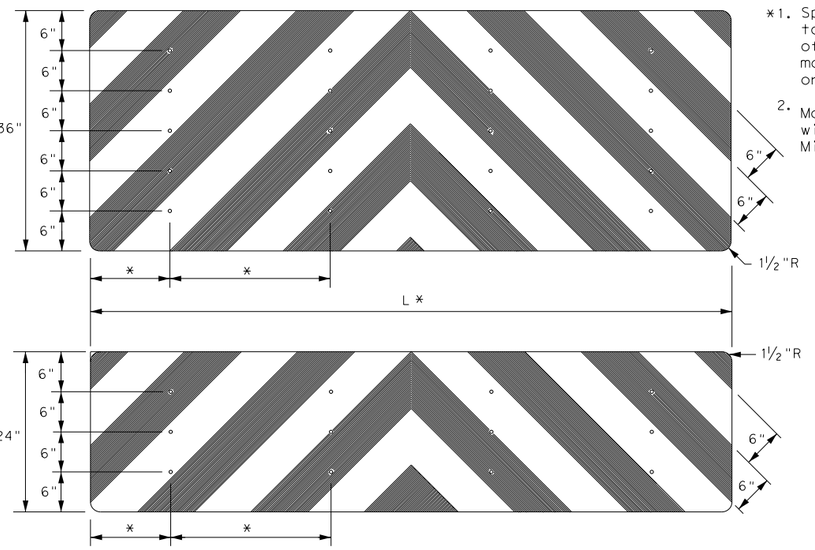


OBJECT MARKERS SMALLER THAN 3 FT^2









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

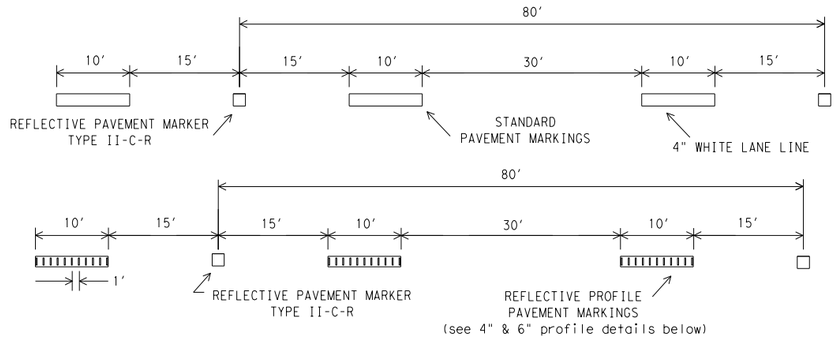
Traffic Safety Division Standard

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	0003	06	096, ETC.	IH 20, ETC.
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	ODA	REEVES		81
4-98 7-20				

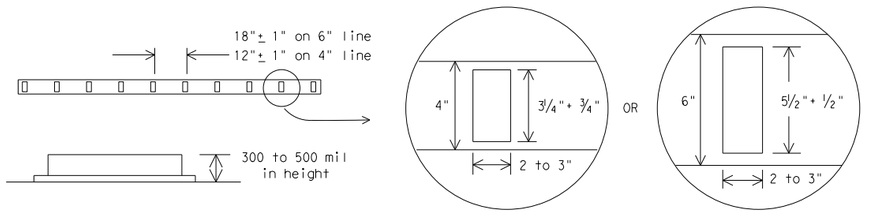
20G



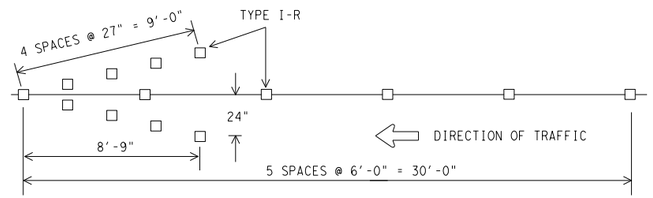
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

EDGELINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS.
IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.



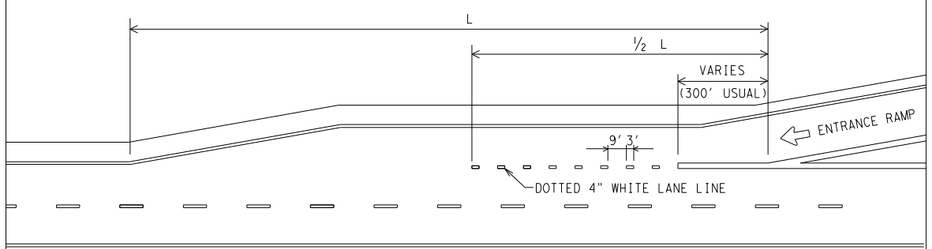
EDGELINE PAVEMENT MARKINGS



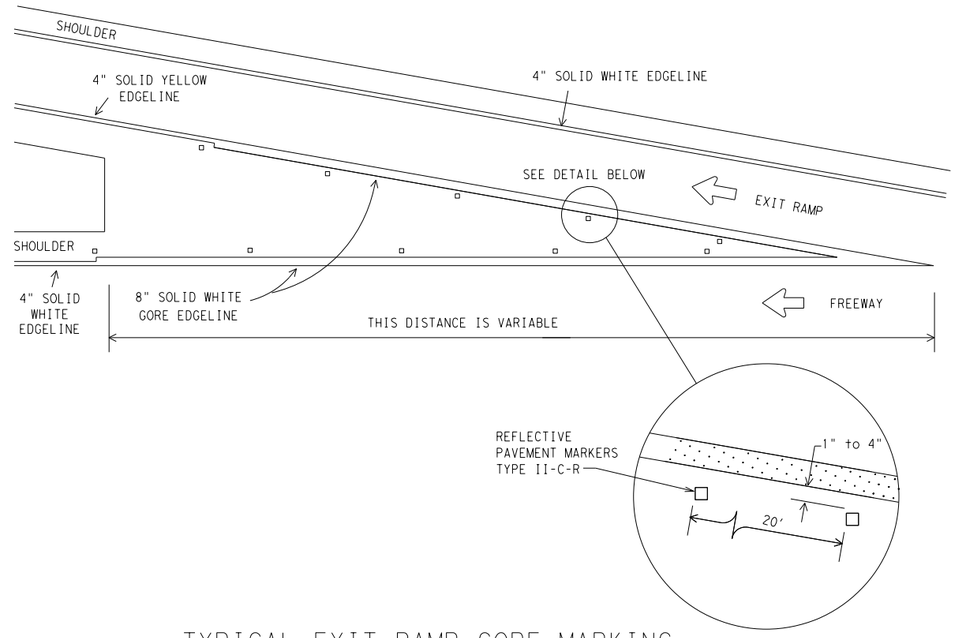
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMPS.
LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

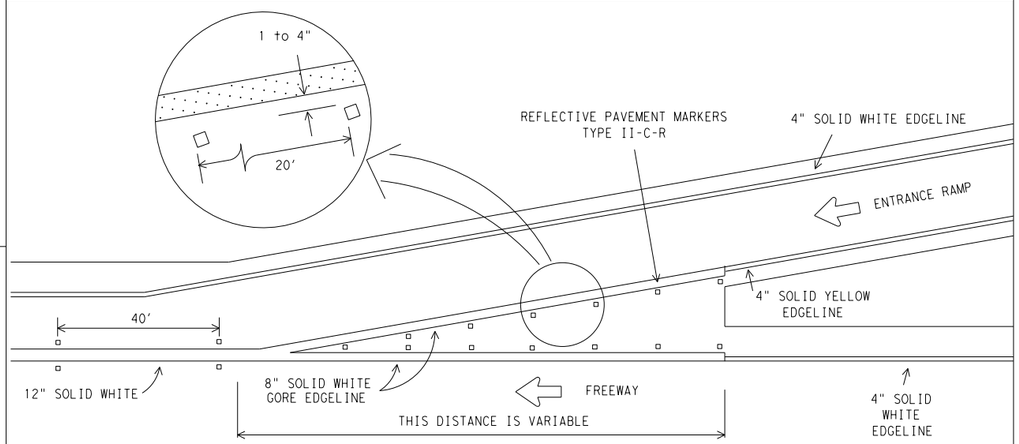
WRONG WAY ARROW DETAIL



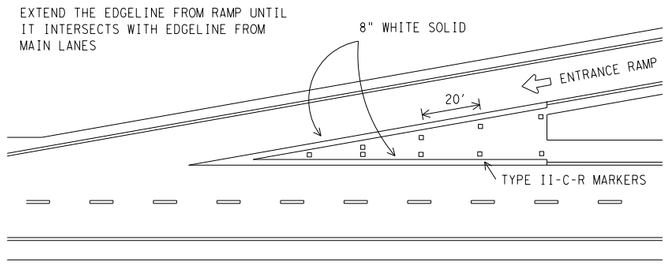
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



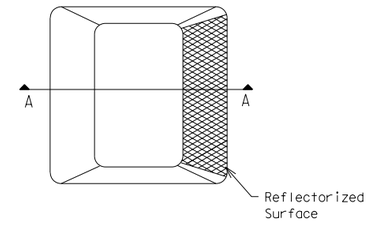
TYPICAL ENTRANCE RAMP GORE MARKING



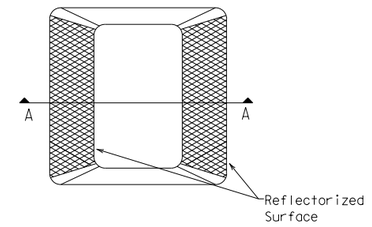
TAPERED ACCELERATION LANE

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

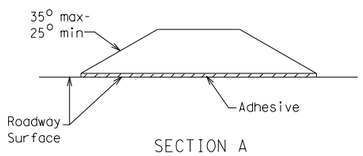
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
4-92 2-10	0003	06	096, ETC.	IH 20, ETC.
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00	ODA	REEVES		82
2-08				

23A

DATE:
FILE:

STORM WATER POLLUTION PREVENTION PLAN (SW3P):

This SW3P has been developed in accordance with TPDES General Permit TXR150000. The operator, The Texas Department of Transportation ensures that: Project specifications provide that adequate BMPs have been developed for this project. The contractor shall be the party responsible for implementing the BMPs described herein. The contractor shall implement changes approved by the Project Engineer to the SW3P within the times specified in the SW3P or the TPDES General Permit. Operators affected by modifications to specifications will be notified in a timely manner.

1. SITE OR PROJECT DESCRIPTION:

NATURE OF THE CONSTRUCTION ACTIVITY: SEE TITLE SHEET

POTENTIAL POLLUTANTS AND	SOURCES:
Sediment laden storm water	*Storm water conveyance over disturbed areas*
Fuels, oils, and lubricants	*Construction vehicles and storage areas*
Transported soil	*Off site vehicle tracking*
Construction debris and waste	*Various construction activities*
Sanitary waste	*Restroom facilities*
Trash	*Construction site and Receptacles*

SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:

1. *Blade existing topsoil into windrows, prep ROW, clear and grub*
2. *Grading operations, excavation, and embankment*
3. *Bridge construction, grade approaches, install retaining walls*
4. *Rework slopes, grade ditches*
5.
6.
7.
8.

AREAS:

TOTAL AREA OF PROJECT: 000.70 ACRES

TOTAL AREA OF SOIL DISTURBANCE: 000.10 ACRES

TOTAL AREA OFF-SITE: Acreage and Description to be Attached

DATA DESCRIBING THE SOIL:
IN-SITU SOILS ARE IN GOOD CONDITION AND 80% COVER OF EXISTING VEGITATION

GENERAL LOCATION MAP: SEE TITLE SHEET

DETAILED SITE MAP: SEE SW3P SITE MAP/S SHEET/S

THE LOCATION AND DESCRIPTION OF CONCRETE AND ASPHALT PLANTS:
Supporting Concrete Plant Facilities shall be located off site.

Supporting Asphalt Plant Facilities shall be located off site.

NAME OF RECEIVING WATERS:

BILLINGSLEA DRAW; KC DRAW

A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SW3P FILE.

REMARKS:

401 WATER QUALITY CERTIFICATION: YES____ NO__X__

2. BEST MANAGEMENT PRACTICES (BMPs):

EROSION AND SEDIMENT CONTROLS: Erosion and sediment controls have been designed to retain sediment on-site. Controls shall be utilized to reduce off site transport of suspended sediments and pollutants if it is necessary to pump water from the site. Control measures shall be installed per specifications or as directed. Sediment must be removed from controls per the plan requirements or manufacturers recommendations, but no later than the time that design capacity has been reduced by 50%. If sediment escapes the site, accumulations will be removed to minimize further negative effects. Controls will be developed to limit the off site transportation of litter, construction debris, and construction materials.

INTERIM(INT), PERMANENT(PER), AND 401 CERTIFICATION BMP'S:

EROSION CONTROLS:	401	INT	PER
☐ *Blankets and Matting*	__	__	__
☒ *Soil Retention Blankets*	__	X	__
☒ *Preserve Existing Vegetation*	__	__	X
☒ *Soil Stabilization*	__	X	__
☒ *Permanent Vegetation*	__	__	X
☐ *No Erosion Controls are Required.*			

SEDIMENT CONTROLS:	401	INT	PER
☒ *Silt Fence*	__	X	__
☐ *Rock Berm*	__	__	__
☐ *Buffer Zones*	__	__	__
☐ *Vegetative Filter Strips*	__	__	__
☐ *Ditch Block*	__	__	__
☒ *Erosion Control Logs*	__	X	__
☐ *No Sediment Controls are Required.*			

POST CONSTRUCTION TSS CONTROL (401 CERTIFICATION ONLY):

- ☐ *Vegetation Lined Drainage Ditch*
- ☐ *Retention/Irrigation*
- ☐ *Erosion Control Compost*
- ☐ *Grassy Swales*
- ☐ *Vegetative Filter Strips*
- ☒ *No Post Construction TSS Control Required.*

SEQUENCE OR SCHEDULE OF IMPLEMENTATION:

1. *Install silt fences and erosion control logs*
2. *Maintain silt fences and erosion control logs*
3. *Inspect until 70% vegetative cover is attained*
4.
5.
6.
7.
8.

The dates of major grading activities, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization practices are initiated, are available in the project diary or SW3P. Stabilization measures must be initiated as soon as practicable in portions of the site where construction has temporarily or permanently ceased. The Odessa District is located in a semi-arid area and the 14 and 21 day requirements are not applicable except, as directed by the Engineer.

3. STRUCTURAL CONTROL PRACTICES:

Structural control practices for this project are listed elsewhere herein.

4. PERMANENT STORM WATER CONTROLS:

Structural control practices installed during construction will be maintained and inspected after construction has ceased on the site and until final stabilization is attained. Unless specified in the plans, after project acceptance TxDOT will assume maintenance responsibilities for the controls and measures. Other permanent controls include existing and proposed; riprap at culvert inlets and outlets, diversion dikes, swales, retaining walls, and other similar devices.

5. OTHER CONTROLS:

OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST: The off site vehicle tracking of sediments shall be minimized by removal of excess dirt from the road and at entrances to the work site. Stabilized Construction Entrances and Exits shall be constructed per the plans or as directed by the Project Engineer. The generation of dust will be minimized as directed by the Project Engineer by dampening haul roads and covering haul trucks with a tarpaulin.

CONSTRUCTION AND WASTE MATERIALS: The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and materials resulting from the destruction of existing roads and structures shall be stored in areas designated by the Project Engineer and protected from run-off. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work, piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

POLLUTANT SOURCES FROM AREAS OTHER THAN CONSTRUCTION: Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants. If potential pollutant sources are identified after the start of construction, controls and measures shall be implemented as directed by the Project Engineer.

5. OTHER CONTROLS (CONT):

DEDICATED ASPHALT PLANTS: Asphalt or asphaltic material for this project will be produced off site. If the project requires a dedicated asphalt plant and the plant within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer.

DEDICATED CONCRETE PLANTS: Cement or Concrete material for this project will be produced off site. If the project requires a dedicated concrete plant and the plant is within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer. Concrete trucks shall be wasted or washed out in locations designated by the Project Engineer. The locations shall be protected by a berm sufficient to contain all waste and wash water. Wash water shall not be allowed to enter any storm drainage system or waterway. The residual material and contaminated soil shall be collected and disposed of in accordance with Federal, State, and Local guidelines. Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants.

HAZARDOUS MATERIALS AND SPILL REPORTING: The contractor shall take appropriate measures to prevent, minimize, and control the spillage or leakage of hazardous materials and any associated wastes on site and in maintenance and staging areas. hazardous materials shall include but are not limited to paints, acids, solvents, asphalt products, chemical additives, curing compounds, oils, fuels, and lubricants. Hazardous materials shall not be stored, accumulated, or transported in open containers subject to precipitation or spillage, but shall be stored, accumulated, or transported in closed containers of the type recommended by the manufacturer. In the event of a spill the Project Engineer should be contacted immediately. All spills shall be immediately cleaned and any contaminated soil removed and disposed of in accordance with Local, State, and Federal laws. Fuel tanks shall be protected by a secondary containment, such as a lined berm, capable of containing 1.5 times the capacity of the tank, or as approved by the Project Engineer.

OFF SITE PSLs: All off site project specific locations including dedicated asphalt plants, concrete plants, or utility installations, required by the contractor, are the contractor's responsibility. The contractor shall secure all permits required by local, state, or federal laws for off site PSLs. The contractor shall provide diagrams and areas of disturbance for all PSL's within 1 mile of the project.

SANITARY FACILITIES: All sanitary or septic wastes that are generated onsite shall be treated and disposed of in accordance with state and local regulations. Raw sewage or septage shall not be discharged or buried on site. Precaution shall be taken to prevent illicit discharges to storm water. Licensed waste management contractors shall be required to dispose of sanitary waste. Porta johns will be required for the laboratory and construction site or as directed by the Project Engineer.

VELOCITY DISSIPATION DEVICES: Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as shown in the plans or as directed by the Project Engineer to provide a non-erosive flow velocity from the structure to a watercourse so that the natural physical and biological characteristics and functions are maintained and protected.

6. APPROVED STATE AND LOCAL PLANS:

This SW3P is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or permits approved by federal, state, or local officials.

7. MAINTENANCE:

Control measures shall be properly installed according to specifications. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must replace or modify the control as soon as practicable after discovery. Control measures shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively maintenance will be performed as necessary to continue the effectiveness of the controls. Maintenance must be accomplished as soon as practicable. Controls adjacent to creeks, culverts, bridges, and water crossings shall have priority. Controls that have been disabled, run over, removed, or otherwise rendered ineffective must be corrected immediately upon discovery.

8. INSPECTION OF CONTROLS:

A TxDOT inspector will inspect disturbed areas of the site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion controls measures identified in the SW3P will be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site will be inspected for evidence of off-site vehicle tracking. Inspections will be conducted every month and within 24 hours after the end of a storm event of 0.5 inches or greater. The SW3P will be modified based on the result of these inspections. Revisions will be completed within 7 Calendar days following the inspection. Revised implementation schedules will be described in the SW3P and implemented as soon as practicable. Rain gages will be maintained on site for the duration of the project. Reports summarizing the scope of the inspections are included in the SW3P file.

9. NON-STORM WATER COMPONENTS:

The contractor shall be required to implement appropriate pollution prevention controls and measures for all eligible non-storm water components of the discharge as approved and directed by the Project Engineer.

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

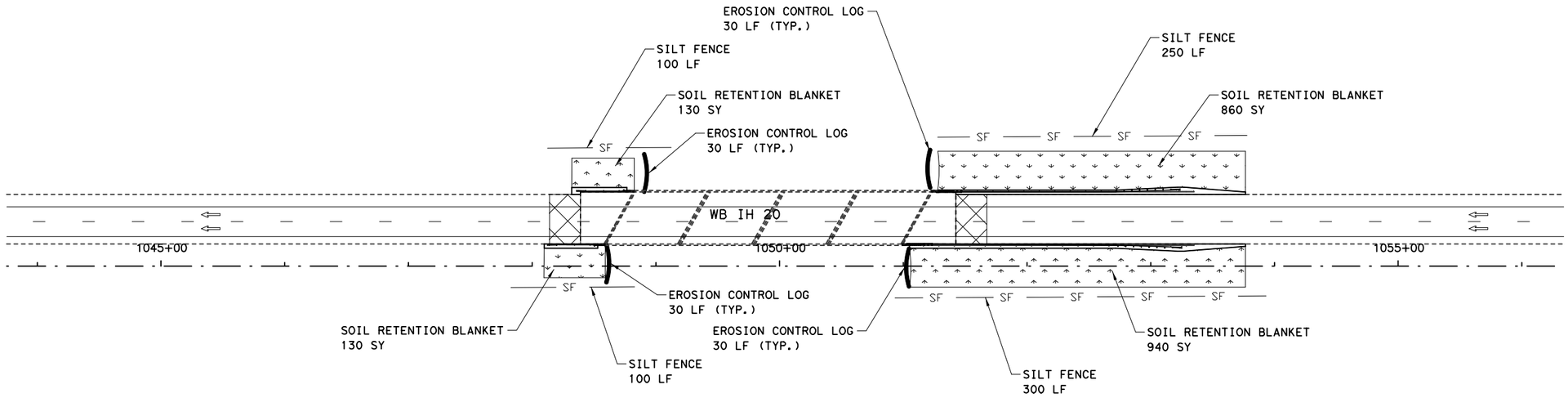
SW3P Notes.dgn

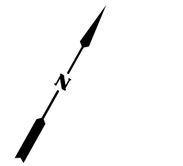
SW3P NOTES

Texas Department of Transportation

REV: 10-25-16

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		83
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	096, ETC.	IH 20, ETC.





03/10/2021

NO.	REVISION	BY	DATE

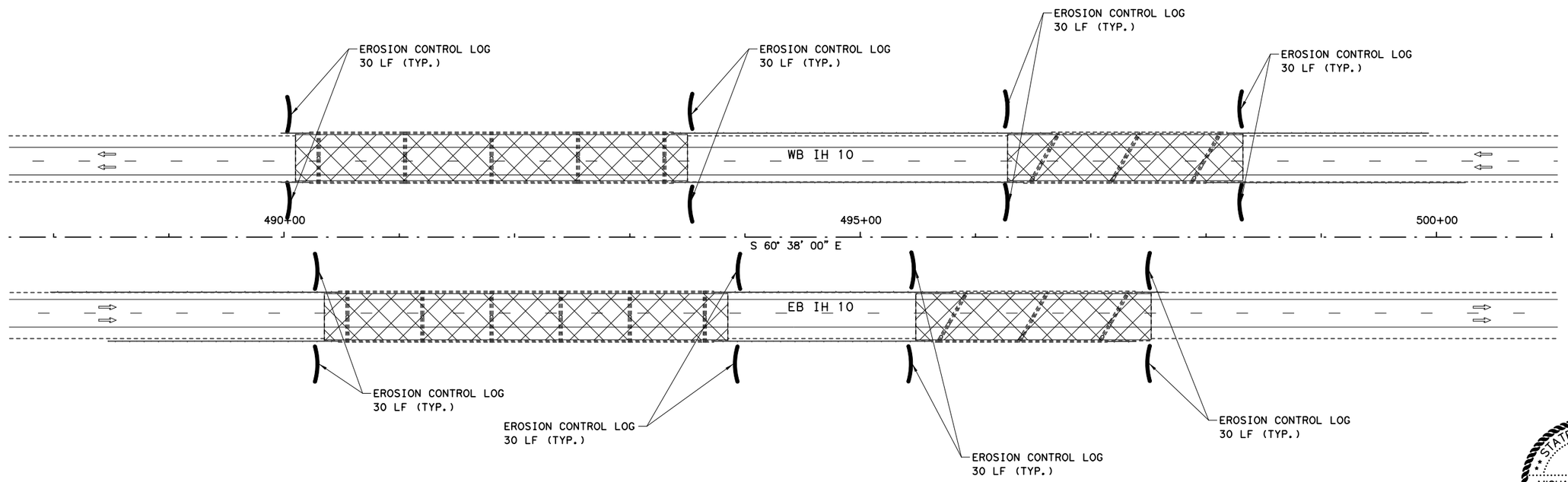
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

EROSION CONTROL PLAN
IH 20 WB AT BILLINGSLEA DRAW

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	84

SHEET 1 OF 1



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SCALE FEET

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

NO.	REVISION	BY	DATE

CP&Y
TEXAS REGISTERED ENGINEERING FIRM F-1741

ODESSA DISTRICT BRIDGE REHABILITATION

EROSION CONTROL PLAN
IH 10 AT KC DRAW & DRAW RELIEF

Designed:	CPY	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
Checked:	CPY	6	TEXAS	SEE TITLE SHEET			IH 20, ETC.
Drawn:	CPY	DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
Checked:	CPY	ODA	REEVES	0003	06	096, ETC.	85

SHEET 1 OF 1

DATE: 3/10/2021
FILE: pw:\\DataPWINT01.cpyone.com:pw_cpy\Documents\Active Projects\TXBR1700484.00\TXBR1700484.14\8.00 Plans and Drawings\8.30 Cut Sheets\8.3.09 TxDOT Standards\Environmental\174841

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

[X] No Action Required [ ] Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

[X] 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.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
[ ] Temporary Vegetation	[ ] Silt Fence	[ ] Vegetative Filter Strips
[ ] Blankets/Matting	[ ] Rock Berm	[ ] Retention/Irrigation Systems
[ ] Mulch	[ ] Triangular Filter Dike	[ ] Extended Detention Basin
[ ] Sodding	[ ] Sand Bag Berm	[ ] Constructed Wetlands
[ ] Interceptor Swale	[ ] Straw Bale Dike	[ ] Wet Basin
[ ] Diversion Dike	[ ] Brush Berms	[ ] Erosion Control Logs
[ ] Erosion Control Logs	[ ] Erosion Control Logs	[ ] Mulch Filter Berm and Socks
[ ] Mulch Filter Berm and Socks	[ ] Mulch Filter Berm and Socks	[ ] Compost Filter Berm and Socks
[ ] Compost Filter Berm and Socks	[ ] Compost Filter Berm and Socks	[ ] Vegetation Lined Ditches
	[ ] Stone Outlet Sediment Traps	[ ] Sand Filter Systems
	[ ] Sediment Basins	[ ] Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

[X] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

[X] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

[X] No Action Required [ ] Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

[X] 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 [X] 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:

[X] No Action Required [ ] Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

[X] No Action Required [ ] Required Action

Action No.

1.

2.

3.

STATE OF TEXAS
MICHAEL J. KNAPIK
94563
LICENSED
PROFESSIONAL ENGINEER

03/10/2021

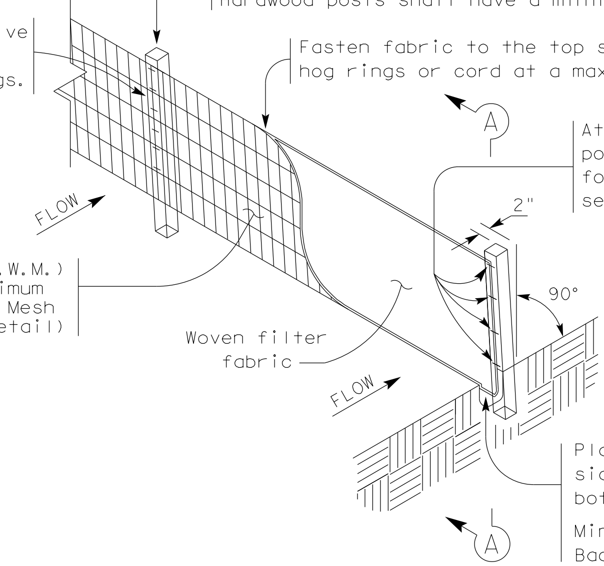
Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

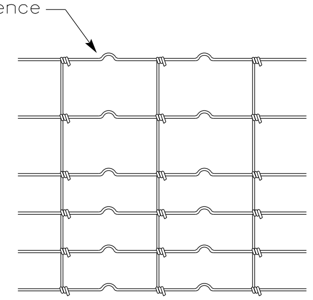
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0003	06	096, ETC.	IH 20, ETC.
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	ODA	REEVES		86



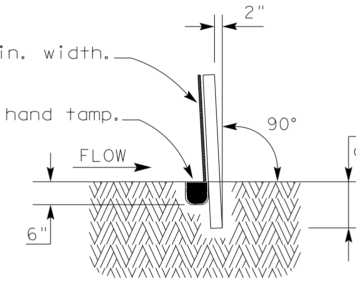
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.



SECTION A-A

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.

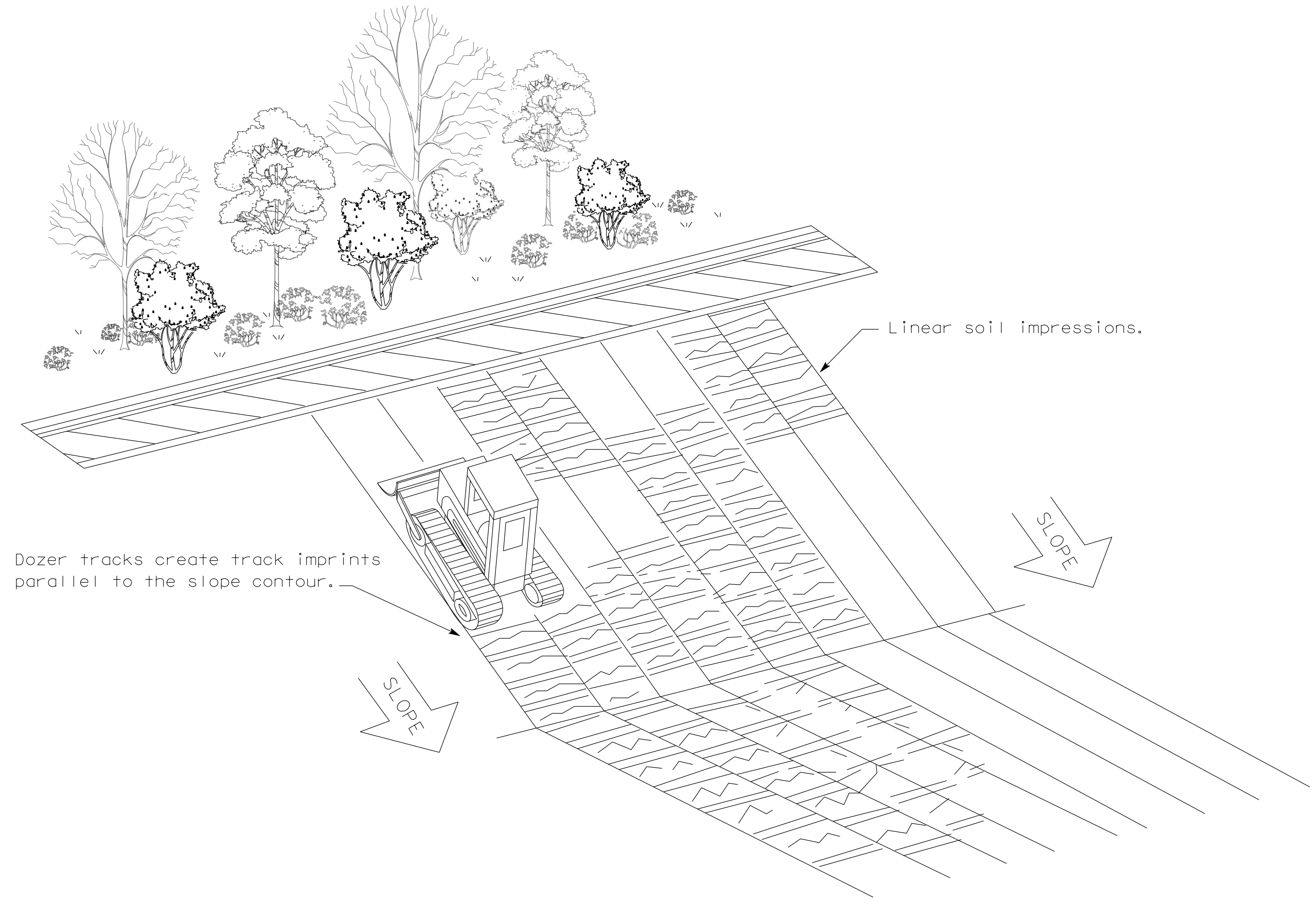
LEGEND

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	0003	06	096, ETC.		IH 20, ETC.
	DIST		COUNTY		SHEET NO.
	ODA		REEVES		87

DATE:
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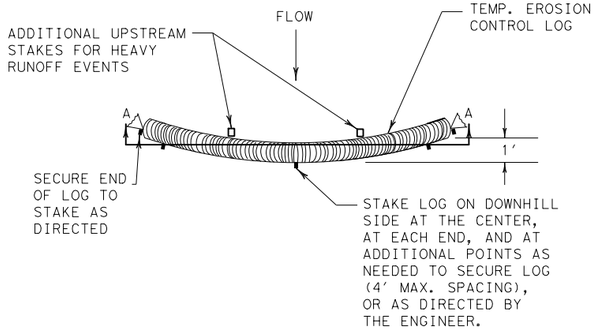
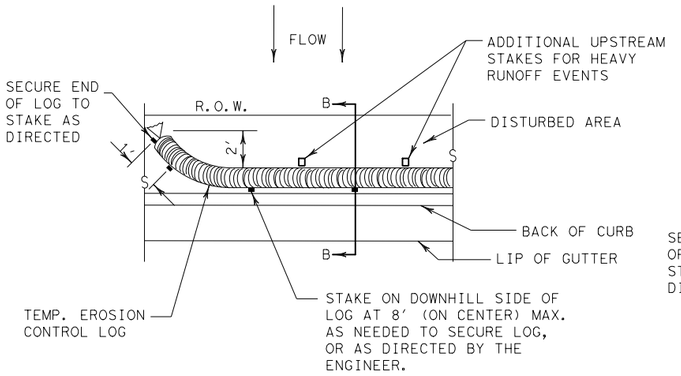


PLAN VIEW



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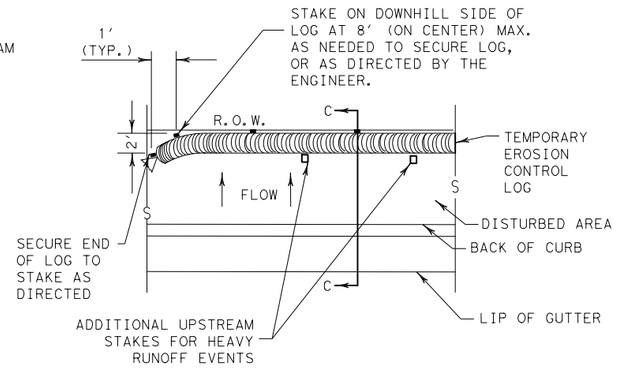
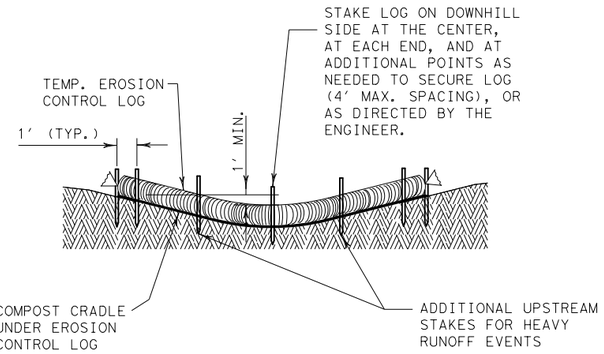


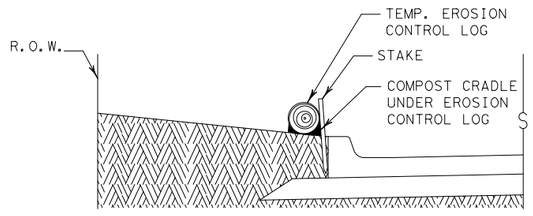
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

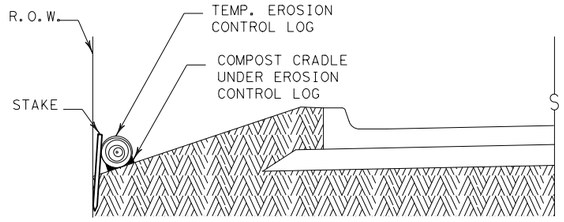
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



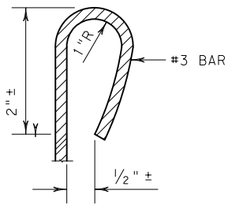
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

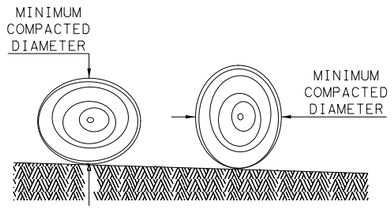
- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL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



REBAR STAKE DETAIL

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.

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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		0003	06	096, ETC.		IH 20, ETC.	
		DIST		COUNTY			SHEET NO.
		ODA		REEVES			88

DATE:
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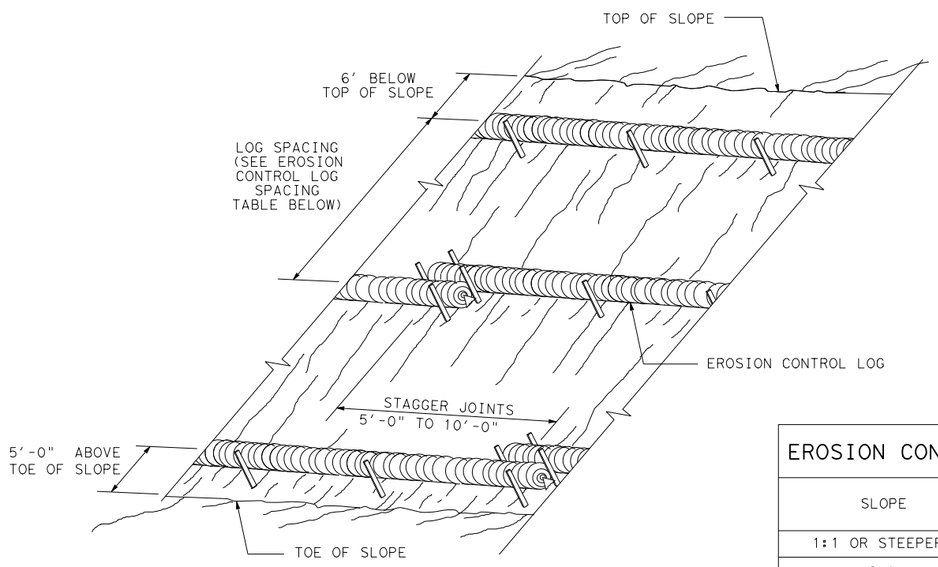
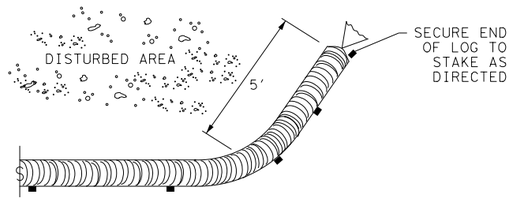


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

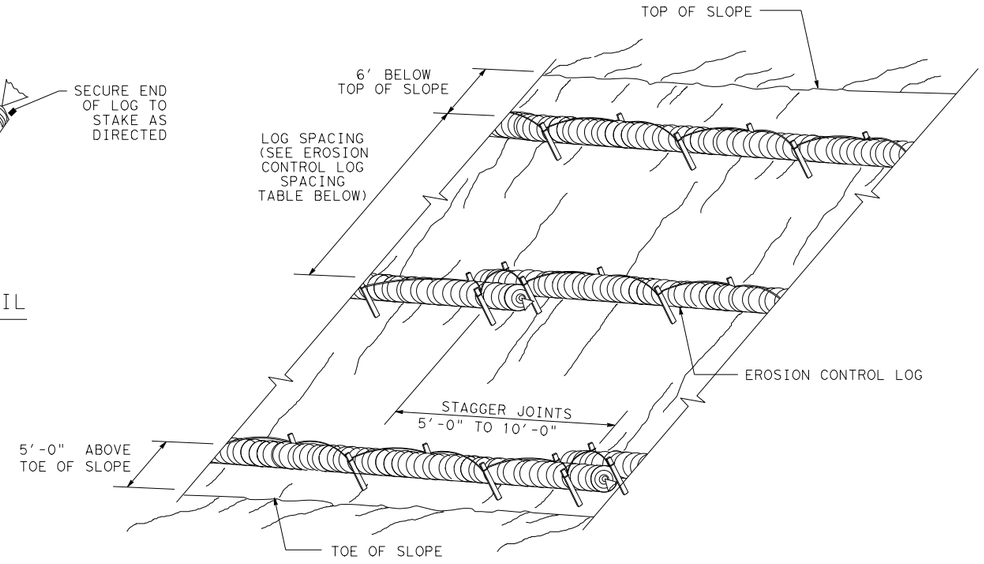
CL-SST



END SECTION RAP DETAIL

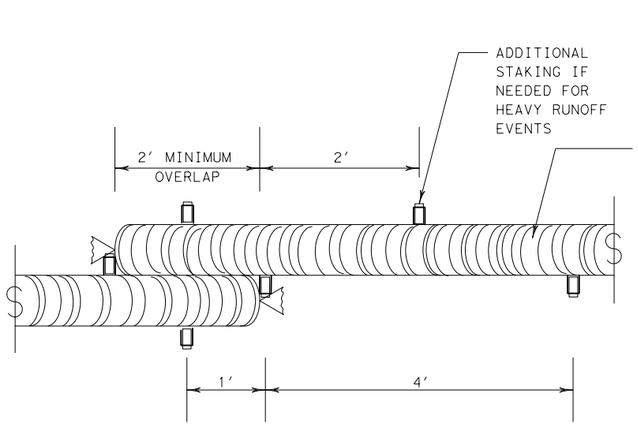
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5′	10′	15′	20′
2:1	10′	20′	30′	40′
3:1	15′	30′	45′	60′
4:1 OR FLATTER	20′	40′	60′	80′

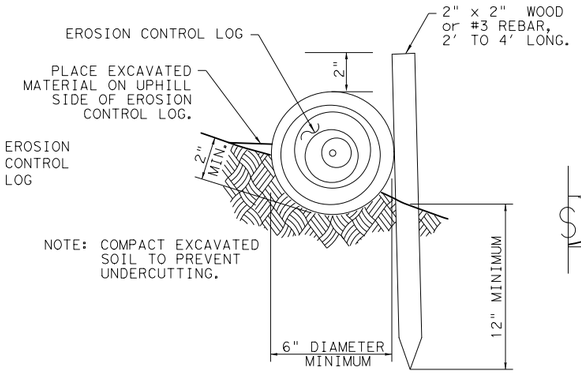
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

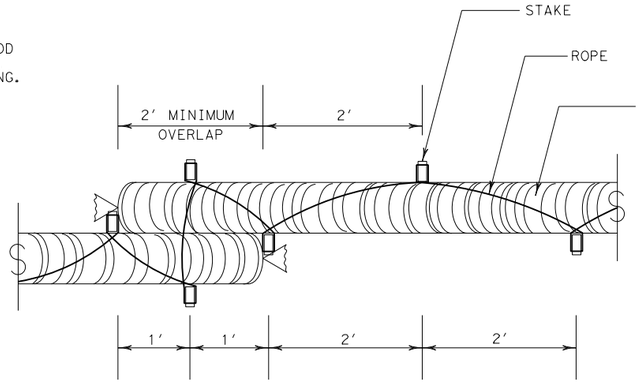


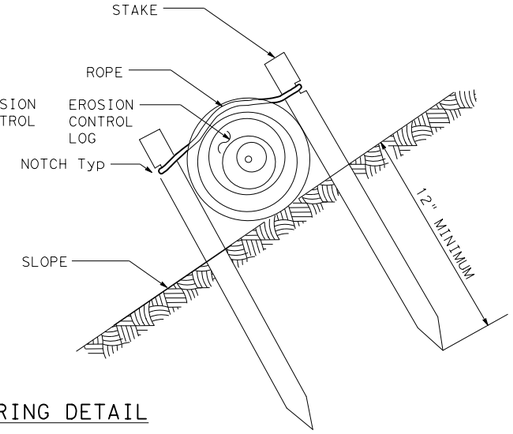


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

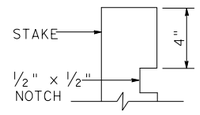
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

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TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

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REVISIONS	0003	06	096, ETC.		IH 20, ETC.	
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	ODA	REEVES				89

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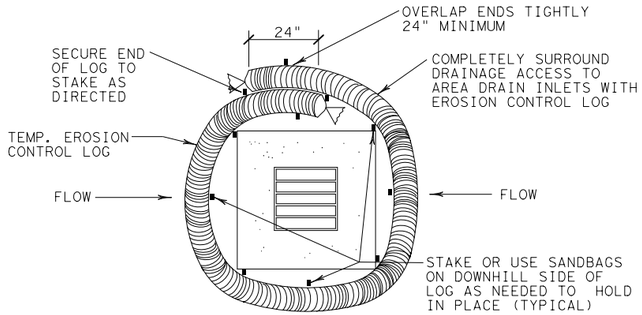
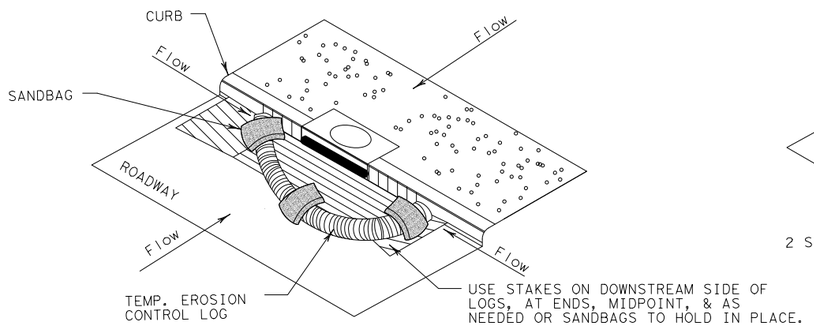


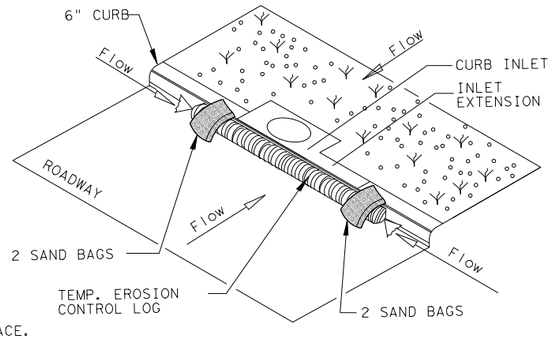
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

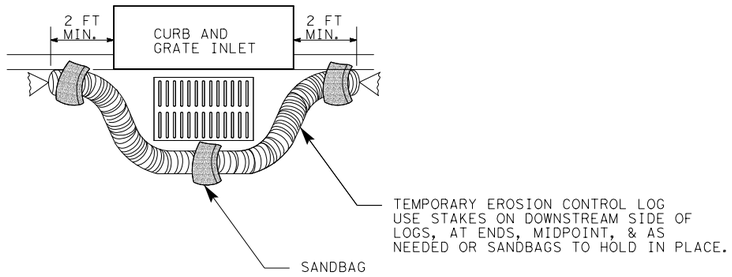
CL-CI



EROSION CONTROL LOG AT CURB INLET

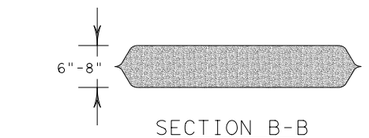
CL-CI

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.

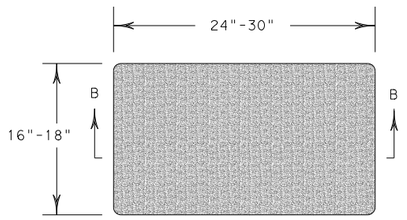


EROSION CONTROL LOG AT CURB & GRADE INLET

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

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REVISIONS	0003	06	096, ETC.		IH 20, ETC.		
	DIST	COUNTY				SHEET NO.	
	ODA	REEVES				90	