INDEX OF SHEETS

SEE SHEET 2

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			SHEET NO.
6	TEXAS	BR 2021(433)			1
DIST.	COUNTY	CONT	SECT	JOB	HIGHWAY NO.
ATL	HARRISON	0495	08	121,ETC.	IH 20

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. BR 2021(433)
CSJ: 0495-08-121, ETC.

HARRISON COUNTY
IH 20

FOR THE CONSTRUCTION OF BRIDGE REHABILITATION
CONSISTING OF BRIDGE MAINTENANCE

LOCATION	HIGHWAY	CROSSING	CSJ	REF MARK	BRIDGE LENGTH (FT)	BRIDGE LENGTH (MI)	LENGTH OF ROADWAY (FT)	LENGTH OF ROADWAY (MI)	TOTAL LENGTH
1	IH 20 WB	BNSF RR	0495-08-121	598+0.040	200.00 FT	0.037 MI	0.00 FT	0.000 MI	200.00 FT = 0.037 MI
2	IH 20 EB	BNSF RR	0495-08-122	598+0.040	200.00 FT	0.037 MI	0.00 FT	0.000 MI	200.00 FT = 0.037 MI
3	IH 20 NFR	MASON CREEK	0495-08-123	599+0.915	160.00 FT	0.030 MI	0.00 FT	0.000 MI	160.00 FT = 0.030 MI
4	IH 20 WB	MASON CREEK	0495-08-124	599+0.915	240.00 FT	0.045 MI	0.00 FT	0.000 MI	240.00 FT = 0.045 MI
5	IH 20 EB	MASON CREEK	0495-08-125	599+0.915	240.00 FT	0.045 MI	0.00 FT	0.000 MI	240.00 FT = 0.045 MI
6	IH 20 WB	CLARKS CREEK	0495-08-126	602+0.745	161.33 FT	0.030 MI	0.00 FT	0.000 MI	161.33 FT = 0.030 MI
				TOTALS	1201.33 FT	0.227 MI	0.00 FT	0.000 MI	1201.33 FT = 0.227 MI

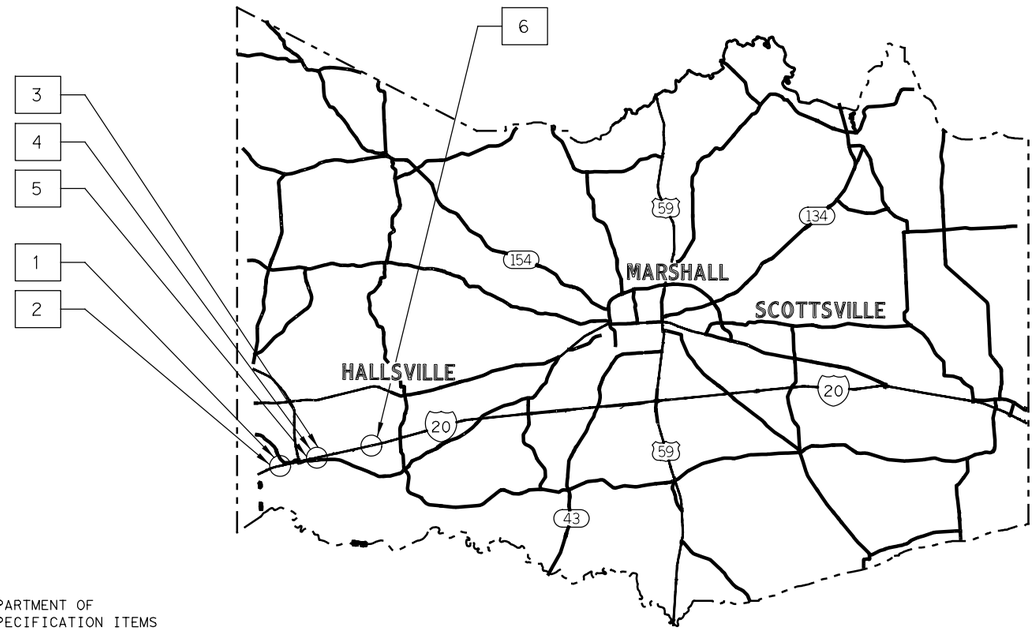
CURRENT A.D.T. =
IH20 = 32,655 (2019)
IH20 NFR = 1,925 (2019)
FUNCTIONAL CLASS =
IH20 = INTERSTATE
IH20 NFR = MAJOR COLLECTOR
EXISTING NBI# =
19-103-0-0495-08-263: CSJ 0495-08-121 IH 20 WB BNSF RR
19-103-0-0495-08-264: CSJ 0495-08-122 IH 20 EB BNSF RR
19-103-0-0495-08-268: CSJ 0495-08-123 IH 20 NFR MASON CREEK
19-103-0-0495-08-269: CSJ 0495-08-124 IH 20 WB MASON CREEK
19-103-0-0495-08-270: CSJ 0495-08-125 IH 20 EB MASON CREEK
19-103-0-0495-08-272: CSJ 0495-08-126 IH 20 WB CLARKS CREEK

CONTRACTOR NAME: _____
CONTRACTOR ADDRESS: _____
_____
_____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE OF ACCEPTANCE: _____
LIST OF APPROVED FIELD CHANGES: _____
_____
_____

THE CONSTRUCTION WORK WAS PERFORMED IN SUBSTANTIAL COMPLIANCE WITH THE CONTRACT.

_____ P.E. _____
DATE

COUNTY HARRISON PROJ. NO. BR 2021(433)
HWY. NO. IH 20 LETTING DATE MAY 2021
DATE ACCEPTED _____



LOCATION MAP

LAYOUT SCALE: 0 5 10 MILES

EXCEPTIONS: N/A
EQUATIONS: N/A
RAILROAD CROSSINGS: AT STA. 489+90.50 (BNSF MP 203.51)
AT STA. 489+94.61 (BNSF MP 203.52)

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 1, 2012).

N

_____ P.E. _____
DATE

STATE OF TEXAS
GREGORY W. KOCHERSPERGER
94869
LICENSED
PROFESSIONAL ENGINEER

_____ P.E. 3/1/2021
DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248
972.960.4400

THE CONTRACTOR SHALL PERFORM OWN INVESTIGATIONS AND ARRANGEMENTS FOR DELIVERY OF MATERIALS.

CONSTRUCTION SIGN AND BARRICADE PLACEMENT SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, AS SHOWN ON THE BC STANDARDS, AS SPECIFIED HEREIN OR AS DIRECTED BY THE ENGINEER.

Texas Department of Transportation

RECOMMENDED FOR LETTING: 3/5/2021
DocuSigned by:
Deanne Simmons, P.E.
929084EF4AF345A...
DIRECTOR OF TRANSPORTATION, PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 3/5/2021
DocuSigned by:
DEAA5DC25E0E45E...
DISTRICT ENGINEER

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED
PROFESSIONAL ENGINEER

RODRIGUEZ TRANSPORTATION GROUP
FIRM REGISTRATION NO. F-587

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

SIGNATURE OF REGISTRANT, P.E. 12/6/2021 DATE

STATE OF TEXAS
CASSANDRA WALLOF
120398
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.

SIGNATURE OF REGISTRANT, P.E. 12/6/2021 DATE

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Texas Department of Transportation

IH 20
INDEX OF SHEETS

SCALE: 1"=40' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS JCH	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CJW	TEXAS	ATL	HARRISON	2
CHECK CJW	CONTROL 0495	SECTION 08	JOB 121,ETC.	

USER: BALLEN
DATE: 12/6/2021
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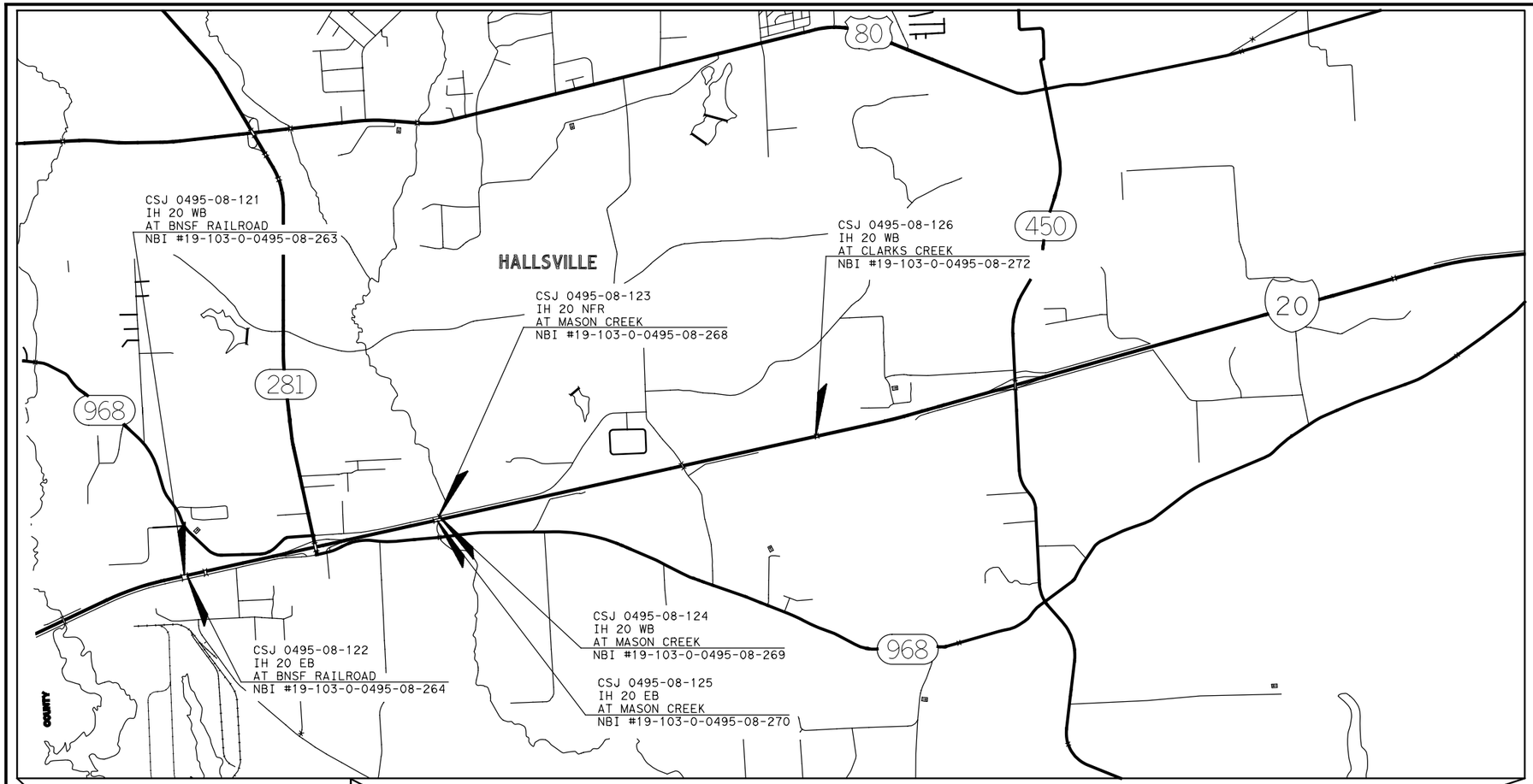

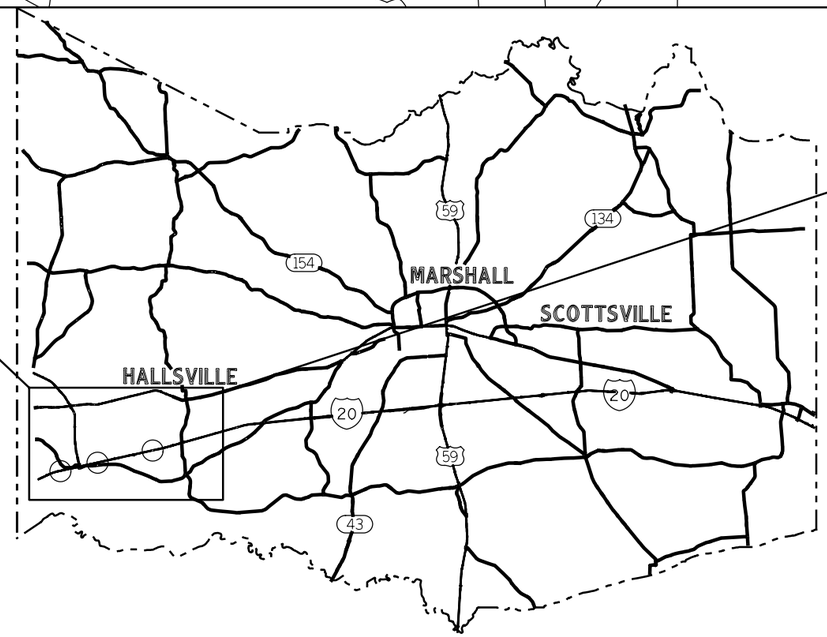

HARRISON COUNTY

NOT TO SCALE

USER: CWALLOF
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STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
Cassie Wallof
03/01/2021

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Texas Department of Transportation

LOCATION MAP

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS STH	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CJW	TEXAS	ATL	HARRISON	3
CHECK CJW	CONTROL	SECTION	JOB	
	0495	08	121, ETC.	

GENERAL NOTES

GENERAL:

The following standard detail sheets have been modified:

A-BAS-A (MOD)

BEEJ (MOD)

TYPE T131 RC (MOD)

Contractor questions on this project are to be addressed to the following individuals:
Wendy Starkes– Area Engineer
Wendy.Starkes@Txdot.gov
Jacob Vise – Assistant Area Engineer
Jacob.Vise@Txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:

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

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

ITEM 5:

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

ITEM 7:

This project is considered a maintenance activity and is exempt from the Construction General Permit (CGP) coverage.

Control: 0495-08-121, ETC

Highway: IH 20 County: Harrison

The Contractor will not remove active nests from bridges and other structures during nesting season of the birds associated with the nests.

Work in this contract is required to be done on railroad property. Cooperate with the railroads and comply with all of their requirements including obtaining any training they require before performing work on railroad property**.**

No significant traffic generator events.

ITEM 8:

Working days will be charged in accordance with Section 8.3.1.6, "**Other**"

Working days will be charged Monday through Thursday, excluding National or State Holidays, if weather or other conditions permit the performance of the principal unit of work underway, as determined by the Engineer, for a continuous period of at least 7 hours between 7 A.M. and 6 P.M. Work on Fridays, Saturdays, Sundays, and National or State Holidays will not be permitted without written permission of the Engineer.

ITEM 132:

Test borrow sources and furnish results to the Engineer.
Where fill height is 5 feet or more above natural ground, the specified density will not be required on the first 2 feet of embankment, unless otherwise directed.
Remove deleterious material, organic matter and sediment, etc., from all ponds, lakes, sloughs, channels and existing roadway ditches prior to placement of embankment. This work will be subsidiary to this item.
Ensure that the final 12 inches of embankment to be treated has a minimum PI of 4 and a maximum PI of 15.

ITEM 164:

Finish slopes with a tracked vehicle running vertically up and down the slope.

Mow tall growing vegetation as directed, to provide optimum growing conditions for temporary or permanent seeded areas in accordance with Item 730 "Roadside Mowing" except for measurement and payment. This work will be subsidiary to pertinent bid items.

PERMANENT PLANTING MIXTURE

Species and Rates
(lb. PLS/ac.)

(Season: February 1 to May 15)

Green Sprangletop	0.4
Bermudagrass	2.4
Sand Lovegrass	1.0
Lance-Leaf Coreopsis	1.25

(Season: September 1 to November 30)

Bermuda (Unhulled)	12
Crimson Clover	10

TEMPORARY SEEDING FOR EROSION CONTROL

Warm Season
(Season: May 15 to August 31)

Bermudagrass	6
Foxtail Millet	34

Cool Season
(Season: September 1 to November 30)

Tall Fescue	4.5
Oats	24
Wheat	34

Adjust the seeding mixture and rates if directed.

Inoculate crimson clover seed with a legume inoculant. Sow inoculated seed dry, with either hand operated or mechanical equipment, after the fertilizer is placed.

Do not use Bahiagrass.

Use additional temporary seeding if permanent seeding is placed outside the optimum growing season shown for this item, if directed.

ITEM 420:

When unstable foundation materials are encountered, the Engineer will have the option of directing the placement of a foundation seal of Class "A" concrete instead of an undercut.

Chamfer or tool exposed edges or joints of concrete as directed.

Bent concrete will be a plans quantity item.

ITEM 421:

The Department will furnish and maintain concrete compressive strength testing equipment.

Use grade 2 or 3 aggregate for concrete pavement unless otherwise directed.

When a curing tank is provided the following information must be provided. All items must be clearly legible and visible from all directions at all times.

- Post and maintain the message "Caution Lime Solution, Eye and Skin Irritant".
- Provide a copy of the SDS sheet for the lime in use.
- Provide the personal protective equipment (PPE) listed below for Department use only: Face shield, a pair of chemical gloves at least 18 inches in length and a chemical apron. Store the SDS sheet and PPE in a clean dry location adjacent to the curing tank.
- Provide an eye wash station capable of providing a 15 minute flush as required by the United States Occupational Safety and Health Administration (OSHA). The eye wash station shall be located within ten feet of the curing tank. When a tank heater is required ensure that all electrical wiring, receptacles, and devices meet National Electrical Code and Underwriters Laboratories Inc. requirements.

ITEM 422:

Reference section 440.3.5, “Placing” for the clear cover tolerance for bridge slabs.

Grading to zero tolerance may result in deficient clear cover and subsequent rejection of the work in accordance with section 5.3.2, "Correction of Defective or Unauthorized Work."

ITEM 427:

Provide a rub finish for surface area II.

ITEM 429:

Areas to be repaired at each location shall be marked in the field by the Engineer.

Areas to be repaired at each location shall be repaired in accordance with the Department's Concrete Repair Manual. The Contractor must prepare and submit formal procedures outlining

repair plans and which proprietary implementation, so the Engineer has sufficient time to review. The Engineer must approve in writing any procedures that differ from those in the Concrete Repair Manual or materials that are not included in one of TxDOT's MPLS materials they plan to utilize. Submit the package a minimum of two weeks prior to.

For Vertical and Overhead repairs use preapproved Type C Repair Material.

The Contractor shall maintain a hardcopy of the Department's Concrete Repair Manual on-site when concrete repair work is taking place.

ITEM 432:

Provide ½" expansion joint material with an area equal to the area of contact between the two concrete surfaces. The joint material will be visually inspected for approval.

ITEM 440:

The following bridge elements require epoxy-coated reinforcement:

Approach Slabs (Both Mats)

ITEM 502:

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

Install temporary rumble strips in accordance with WZ(RS) wherever short duration or short term stationary lane closures are in place and workers are present.

Length of lane closures will be as directed based on the demonstrated ability to prosecute the work within the closed section.

Maintain access to abutting property at all times using approved materials and methods. Work required to maintain ingress and egress within the limits of this project will not be paid for directly, but is subsidiary to the pertinent bid items.

Restrict the movement of equipment across traffic lanes to an absolute minimum.

Use strobe lights or rotating beacons on all motorized equipment, operating on or adjacent to the road surface.

ITEM 506:

Sprinkle water for dust control. Meet the requirements of Item 204, "Sprinkling" except for measurement and payment. Sprinkling will be considered subsidiary to this Item.
Place erosion or pollution control measures deemed necessary by the Engineer. Work performed for which there is no applicable pay items in the contract will be reimbursed in accordance with Article 9.7, "Payment for Extra Work and Force Account Method".

Provide the following Item(s), as directed, to be used for erosion and water pollution control measures and any additional erosion or water pollution control measure deemed necessary by the Engineer:

Temporary sediment control fence

Provide and install additional erosion or water pollution control measures deemed necessary by the Engineer as prescribed by this item and in accordance with the appropriate specification. Payment for erosion control measures for which applicable pay items are not included in the Contract shall be made in accordance with Article 9.7, "Payment for Extra Work and Force Account Method".

ITEM 540 & 544:

Place sufficient dry batch concrete mix in holes to ensure minimum of 2 inch embedment of tubes and posts.

ITEM 540:

Furnish round timber posts unless otherwise shown.

Patch concrete riprap with either Class "A" or Class "B" concrete or other approved concrete Surround all posts with 1/2 inch expansion joint material. Obtain the approval of the Engineer prior to placing expansion joint material and concrete riprap (visual inspection only).

ITEM 658:

Install only round posts meeting the requirements of DMS-4400 or as directed.

ITEM 662:

Non-removable pavement markings may be paint and beads.

ITEM 666:

Furnish and place a double drop of Type II and Type III drop-on glass beads.

Place pavement markings only after the surface treatment has cured to the satisfaction of the Engineer.

Place pavement markings within 14 days after completion of the final surface.

Mark the lateral locations of pavement markings with pilot lines. Obtain approval of the location and alignment of the pilot lines before application of permanent markings.

Record the location of “passing” and “no passing” zones before beginning roadway work in order to re-establish these zones in their original location. Provide a copy of the record to the Engineer.

The Engineer will determine locations of no-passing zones.

Place Type I pavement markings thirty days after the placement of the Type II pavement markings has been completed.

ITEM 678:

Furnish a high-pressure water blasting system for removing paint, thermoplastic, epoxy, and preformed tape materials from the following surfaces without causing any grooves or trenching of that surface, including asphalt, concrete, friction coarse asphalt, grooved asphalt, and grooved concrete.

Use a high-pressure water blasting system that consist of a vacuum recovery system that must provide for a nearly dry surface eliminating the possibility of uncontained run-off blasting water and debris.

All components required for the complete operation of the water blasting system – Ultra High Pressure (UHP) pump, vacuum system, clean water supply, vacuum recovery storage, blasting components will be mounted and transported on a single, fully self-contained and supporting truck chassis, thereby eliminating the need for any additional water, vacuum, or other transport vehicles.

ITEM 6149:

A mobile unit will be required to take reflectivity readings, readings will be taken on all lines in both directions. The mobile reflectivity readings will not be paid for separately, but will be

subsidiary to this bid item. Strict compliance with report output will be exercised in accordance to this general note. Information for each road must be together in the same file on a disk. Table of contents as shown in section 3E Video DVD will be easily identified as described and visible on the cover of the DVD in order to be able to identify the contents of the DVD without the use of the computer. An internet site will also be required that contains those reports and information. The internet site will contain a customer interactive report that generates a color coded map where the user can verify passing and failing sections of roadway. The color coded map should match the color coded graphs generated by the data in the computer. The graphs should have a color coded portion or shaded area representing failing and passing. The map should be standard Google earth maps or equal. The internet web site reports need to be in numerical order by reference number, concurrent with direction, labeled and separated by color, and include the posting date. The format will require prior acceptance by the Engineer.

Use a mobile retroreflectometer that is prequalified at the Texas A&M Transportation Institute test facility. The prequalification is at the contractor’s expense.

The required values of wet and dry readings will be strictly measured within this contract as per manufacturer’s recommendations.

Adjustments to locations of no passing zones will be determined by the Department.

Install a seal coat RPM cover or any other method approved on any line having Raised Pavement Markers. Remove and dispose of the covers after the stripe is complete.

Placement of markings in proper alignment will be strictly enforced. Irregular lines placed on both sides of the existing markings or pilot line will not be accepted.

ITEM 6185:

The shadow vehicle with truck mounted attenuator (TMA) will not be optional but will be required as shown on the appropriate traffic control plan sheets.

A total of one (1) shadow vehicle with TMA will be required for work. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA’s needed for the project.

A total of two (2) shadow vehicles with TMA will be required for Pavement Marking Operations.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0495-08-121 **DISTRICT** Atlanta **COUNTY** Harrison
HIGHWAY IH 20

				0495-08-121		0495-08-122		0495-08-123		0495-08-124		0495-08-125		0495-08-126	
		CONTROL SECTION JOB													
		PROJECT ID		A00063812		A00063813		A00063814		A00063815		A00063816		A00063817	
		COUNTY		Harrison		Harrison		Harrison		Harrison		Harrison		Harrison	
		HIGHWAY		IH 20		IH 20		IH 20		IH 20		IH 20		IH 20	
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL
	104-6009	REMOVING CONC (RIPRAP)	SY							11.000		11.000			
	104-6045	REMOVE CONC (MISC)	EA					2.000							
	105-6059	REMOVING STAB BASE & ASPH PAV(13"-18")	SY					166.000							
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY					467.000							
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY					1,423.000							
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)	SY					1,423.000							
	168-6001	VEGETATIVE WATERING	MG					46.000							
	400-6005	CEM STABIL BKFL	CY					28.000							
	401-6001	FLOWABLE BACKFILL	CY							1.000		10.000			
	422-6016	APPROACH SLAB (HPC)	CY					62.000							
	427-6006	EPOXY WATERPROOF FINISH	SF							210.000		420.000			
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY	152.000		152.000		427.000		165.000		165.000		138.000	
	429-6005	CONC STR REPAIR(DECK REP (FULL DEPTH))	SF			1.000				1.000		1.000			
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	29.000		56.000		7.000		24.000		47.000		6.000	
	429-6023	CONC STR REPAIR (PAN GIRDER HOLE REPR)	EA					32.000							
	432-6002	RIPRAP (CONC)(5 IN)	CY					6.000		8.000		8.000			
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY					44.000		3.000		3.000			
	432-6039	BEDDING MATERIAL (6 IN)	CY					11.000		1.000		1.000			
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY					48.000							
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF	80.000				125.000		84.000				84.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF			112.000		138.000		120.000		120.000		120.000	
	438-6009	CLEANING EXISTING JOINTS	LF			246.000						287.000			
	451-6004	RETROFIT RAIL (TY T131RC)	LF					357.000							
	454-6003	ARMOR JOINT	LF					51.000							
	454-6008	HEADER TYPE EXPANSION JOINT	CF			72.000				10.000		63.000		12.000	
	454-6009	JOINT SEALANT	LF			326.000				40.000		367.000		40.000	
	500-6001	MOBILIZATION	LS	1.000											
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000											
	506-6022	CONSTRUCTION EXITS (INSTALL) (TY 3)	SY	78.000		78.000		78.000		78.000		78.000		78.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	78.000		78.000		78.000		78.000		78.000		78.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	500.000		500.000		1,550.000		400.000		400.000		350.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	500.000		500.000		1,550.000		400.000		400.000		350.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO					3.000							
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF					220.000							
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF					40.000							
	512-6033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF					220.000							
	512-6034	PORT CTB (MOVE)(LOW PROF)(TY 2)	LF					40.000							

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0495-08-121 **DISTRICT** Atlanta **COUNTY** Harrison
HIGHWAY IH 20

				0495-08-121		0495-08-122		0495-08-123		0495-08-124		0495-08-125		0495-08-126	
		CONTROL SECTION JOB													
		PROJECT ID		A00063812		A00063813		A00063814		A00063815		A00063816		A00063817	
		COUNTY		Harrison		Harrison		Harrison		Harrison		Harrison		Harrison	
		HIGHWAY		IH 20		IH 20		IH 20		IH 20		IH 20		IH 20	
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF					220.000							
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF					40.000							
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF					700.000							
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA					4.000							
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF					800.000							
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA					4.000							
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA					4.000							
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA					6.000							
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA					14.000							
	662-6048	WK ZN PAV MRK REMOV (REFL) TY I-C	EA					90.000							
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA					192.000							
	662-6056	WK ZN PAV MRK REMOV (TRAF BTN) TY W	EA					270.000							
	662-6058	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	EA					576.000							
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF					24.000							
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA					329.000							
	666-6224	PAVEMENT SEALER 4"	LF					3,380.000							
	672-6009	REFL PAV MRKR TY II-A-A	EA					49.000							
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF					2,780.000							
	678-6001	PAV SURF PREP FOR MRK (4")	LF					3,380.000							
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)	LF	14.000											
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	20.000		20.000		180.000		20.000		20.000		20.000	
	6149-6001	REFL PAV MRK AWT (W) 4" (SLD) (100MIL)	LF					600.000							
	6149-6007	REFL PAV MRK AWT (Y) 4" (SLD) (100MIL)	LF					2,010.000							
	6149-6008	REFL PAV MRK AWT (Y) 4" (BRK) (100MIL)	LF					770.000							
	6185-6002	TMA (STATIONARY)	DAY	10.000		10.000		8.000		10.000		10.000		10.000	
	6185-6003	TMA (MOBILE OPERATION)	HR					20.000							
	12	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000											
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000											
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000											

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0495-08-121 **DISTRICT** Atlanta **COUNTY** Harrison
HIGHWAY IH 20

			CONTROL SECTION JOB	TOTAL EST.	TOTAL FINAL
			PROJECT ID		
			COUNTY		
			HIGHWAY		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**		
	104-6009	REMOVING CONC (RIPRAP)	SY	22.000	
	104-6045	REMOVE CONC (MISC)	EA	2.000	
	105-6059	REMOVING STAB BASE & ASPH PAV(13"-18")	SY	166.000	
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY	467.000	
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY	1,423.000	
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)	SY	1,423.000	
	168-6001	VEGETATIVE WATERING	MG	46.000	
	400-6005	CEM STABIL BKFL	CY	28.000	
	401-6001	FLOWABLE BACKFILL	CY	11.000	
	422-6016	APPROACH SLAB (HPC)	CY	62.000	
	427-6006	EPOXY WATERPROOF FINISH	SF	630.000	
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY	1,199.000	
	429-6005	CONC STR REPAIR(DECK REP (FULL DEPTH))	SF	3.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	169.000	
	429-6023	CONC STR REPAIR (PAN GIRDER HOLE REPR)	EA	32.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	22.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	50.000	
	432-6039	BEDDING MATERIAL (6 IN)	CY	13.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	48.000	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF	373.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	610.000	
	438-6009	CLEANING EXISTING JOINTS	LF	533.000	
	451-6004	RETROFIT RAIL (TY T131RC)	LF	357.000	
	454-6003	ARMOR JOINT	LF	51.000	
	454-6008	HEADER TYPE EXPANSION JOINT	CF	157.000	
	454-6009	JOINT SEALANT	LF	773.000	
	500-6001	MOBILIZATION	LS	1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000	
	506-6022	CONSTRUCTION EXITS (INSTALL) (TY 3)	SY	468.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	468.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,700.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,700.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	3.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	220.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	40.000	
	512-6033	PORT CTB (MOVE)(LOW PROF)(TY 1)	LF	220.000	
	512-6034	PORT CTB (MOVE)(LOW PROF)(TY 2)	LF	40.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0495-08-121 **DISTRICT** Atlanta **COUNTY** Harrison
HIGHWAY IH 20

			CONTROL SECTION JOB		TOTAL EST.	TOTAL FINAL
			PROJECT ID			
			COUNTY			
			HIGHWAY			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**		
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)		LF	220.000	
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)		LF	40.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF	700.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA	4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	800.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	4.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)		EA	6.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)		EA	14.000	
	662-6048	WK ZN PAV MRK REMOV (REFL) TY I-C		EA	90.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A		EA	192.000	
	662-6056	WK ZN PAV MRK REMOV (TRAF BTN) TY W		EA	270.000	
	662-6058	WK ZN PAV MRK REMOV (TRAF BTN) TY Y		EA	576.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)		LF	24.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2		EA	329.000	
	666-6224	PAVEMENT SEALER 4"		LF	3,380.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	49.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")		LF	2,780.000	
	678-6001	PAV SURF PREP FOR MRK (4")		LF	3,380.000	
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)		LF	14.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN		DAY	280.000	
	6149-6001	REFL PAV MRK AWT (W) 4" (SLD) (100MIL)		LF	600.000	
	6149-6007	REFL PAV MRK AWT (Y) 4" (SLD) (100MIL)		LF	2,010.000	
	6149-6008	REFL PAV MRK AWT (Y) 4" (BRK) (100MIL)		LF	770.000	
	6185-6002	TMA (STATIONARY)		DAY	58.000	
	6185-6003	TMA (MOBILE OPERATION)		HR	20.000	
	12	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS	1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS	1.000	

TRAFFIC CONTROL SUMMARY

LOCATION	ITEM NO.	510 6003	512 6009	512 6010	512 6033	512 6034	512 6057	512 6058	662 6048
		ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (MOVE) (LOW PROF) (TY 1)	PORT CTB (MOVE) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	WK ZN PAV MRK REMOV (REFL) TY I-C
		MO	LF	LF	LF	LF	LF	LF	EA
IH 20 WB OVER BNSF RR (NBI: 19-103-0-0495-08-263) (CSJ: 0495-08-121)									
IH 20 EB OVER BNSF RR (NBI: 19-103-0-0495-08-264) (CSJ: 0495-08-122)									
IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268) (CSJ: 0495-08-123)									
PHASE 1		1.5	220	40					45
PHASE 2		1.5			220	40	220	40	45
SUBTOTAL (CSJ: 0495-08-123)		3	220	40	220	40	220	40	90
IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269) (CSJ: 0495-08-124)									
IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270) (CSJ: 0495-08-125)									
IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272) (CSJ: 0495-08-126)									
TCP TOTAL		3	220	40	220	40	220	40	90

TRAFFIC CONTROL SUMMARY - CONTINUED

LOCATION	ITEM NO.	662 6050	662 6056	662 6058	662 6075	662 6111	677 6001	6001 6001 %	6185 6002	6185 6003
		WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK REMOV (TRAF BTN) TY W	WK ZN PAV MRK REMOV (TRAF BTN) TY Y	WK ZN PAV MRK REMOV (W) 24" (SLD)	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
		EA	EA	EA	EA	EA	LF	DAY	DAY	HR
IH 20 WB OVER BNSF RR (NBI: 19-103-0-0495-08-263) (CSJ: 0495-08-121)								20	10	
IH 20 EB OVER BNSF RR (NBI: 19-103-0-0495-08-264) (CSJ: 0495-08-122)								20	10	
IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268) (CSJ: 0495-08-123)										
PHASE 1		192	135	576	24		2780	90	4	8
PHASE 2			135			329		90	4	12
SUBTOTAL (CSJ: 0495-08-123)		192	270	576	24	329	2780	180	8	20
IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269) (CSJ: 0495-08-124)								20	10	
IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270) (CSJ: 0495-08-125)								20	10	
IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272) (CSJ: 0495-08-126)								20	10	
TCP TOTAL		192	270	576	24	329	2780	280	58	20

% - ASSUMED CONTRACTOR TO ONLY WORK ON AT MOST 3 NBI LOCATIONS CONCURRENTLY. 2 PCMS REQUIRED FOR NFR OVER MASON CREEK. PCMS TO BE MOVED FROM LOCATION TO LOCATION.

ROADWAY SUMMARY

LOCATION	ITEM NO.	132 6019	432 6045	540 6001	540 6006	542 6001	544 6001	544 6003
		EMBANKMENT (VEHICLE) (ORD COMP) (TY B)	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)
		CY	CY	LF	EA	LF	EA	EA
IH 20 WB OVER BNSF RR (NBI: 19-103-0-0495-08-263) (CSJ: 0495-08-121)								
IH 20 EB OVER BNSF RR (NBI: 19-103-0-0495-08-264) (CSJ: 0495-08-122)								
IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268) (CSJ: 0495-08-123)		467	48	700	4	800	4	4
IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269) (CSJ: 0495-08-124)								
IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270) (CSJ: 0495-08-125)								
IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272) (CSJ: 0495-08-126)								
ROADWAY TOTAL		467	48	700	4	800	4	4

PAVEMENT MARKING AND DELINEATION SUMMARY

LOCATION	ITEM NO.	658 6062	658 6014	666 6224	672 6009	678 6001	6149 6001	6149 6007	6149 6008
		INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2(BI)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	PAVEMENT SEALER 4"	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")	REFL PAV MRK AWT (W) 4" (SLD) (100MIL)	REFL PAV MRK AWT (Y) 4" (SLD) (100MIL)	REFL PAV MRK AWT (Y) 4" (BRK) (100MIL)
		EA	EA	LF	EA	LF	LF	LF	LF
IH 20 WB OVER BNSF RR (NBI: 19-103-0-0495-08-263) (CSJ: 0495-08-121)									
IH 20 EB OVER BNSF RR (NBI: 19-103-0-0495-08-264) (CSJ: 0495-08-122)									
IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268) (CSJ: 0495-08-123)		14	6	3380	49	3380	600	2010	770
IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269) (CSJ: 0495-08-124)									
IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270) (CSJ: 0495-08-125)									
IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272) (CSJ: 0495-08-126)									
PAVEMENT MARKING & DELINEATION TOTAL		14	6	3380	49	3380	600	2010	770

EROSION CONTROL SUMMARY

LOCATION	ITEM NO.	164 6071	164 6054	168 6001	506 6022	506 6024	506 6038	506 6039
		#BROADCAST SEED (TEMP) (WARM OR COOL)	#BOND FBR MTRX SEED (PERM) (RURAL) (SAND)	%VEGETATIVE WATERING	*CONSTRUCTION EXITS (INSTALL) (TY 3)	CONSTRUCTION EXITS (REMOVE)	*TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
		SY	SY	MG	SY	SY	LF	LF
IH 20 WB OVER BNSF RR (NBI: 19-103-0-0495-08-263) (CSJ: 0495-08-121)					78	78	500	500
IH 20 EB OVER BNSF RR (NBI: 19-103-0-0495-08-264) (CSJ: 0495-08-122)					78	78	500	500
IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268) (CSJ: 0495-08-123)		1423	1423	46	78	78	1550	1550
IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269) (CSJ: 0495-08-124)					78	78	400	400
IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270) (CSJ: 0495-08-125)					78	78	400	400
IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272) (CSJ: 0495-08-126)					78	78	350	350
EROSION CONTROL TOTAL		1423	1423	46	468	468	3700	3700

SEEDING LIMITS ARE 10' WIDTH ADJACENT TO MOW STRIP ALONG MBGF AS DIRECTED BY ENGINEER.
% VEGETATIVE WATERING RATE: 80 MG / 5000 SY
* PROVIDE SEDIMENT CONTROL FENCE AROUND ABUTMENTS, BENTS AND CONSTRUCTION EXITS AS DIRECTED BY ENGINEER.

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	6
CHECK	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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SUMMARY OF BRIDGE QUANTITIES

DESCRIPTION	104 6009	104 6045	105 6059	400 6005	401 6001	422 6016	427 6006	428 6001	429 6005	429 6007	429 6023
	REMOVING CONC (RIPRAP)	REMOVE CONC (MISC)	REMOVING STAB BASE & ASPH PAV(13"-18")	CEM STABIL BKFL	FLOWABLE BACKFILL	APPROACH SLAB (HPC)	EPOXY WATERPROOF FINISH	PENETRATING CONCRETE SURFACE TREATMENT	CONC STR REPAIR(DECK REP (FULL DEPTH))	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (PAN GIRDER HOLE REPR)
	SY	EA	SY	CY	CY	CY	SF	SY	SF	SF	EA
CSJ: 0495-08-121 IH 20 WB OVER BNSF RAILROAD (NBI: 19-103-0-0495-08-263)								152		29	
CSJ: 0495-08-122 IH 20 EB OVER BNSF RAILROAD (NBI: 19-103-0-0495-08-264)								152	1	56	
CSJ: 0495-08-123 IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268)		2	166	28		62		427		7	32
CSJ: 0495-08-124 IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269)	11				1		210	165	1	24	
CSJ: 0495-08-125 IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270)	11				10		420	165	1	47	
CSJ: 0495-08-126 IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272)								138		6	
PROJECT TOTAL	22	2	166	28	11	62	630	1,199	3	169	32

SUMMARY OF BRIDGE QUANTITIES (CONTINUED)

DESCRIPTION	432 6002	432 6033	432 6039	438 6001	438 6002	438 6009	451 6004	454 6003	454 6008	454 6009	780 6004
	RIPRAP (CONC)(5 IN)	RIPRAP (STONE PROTECTION) (18 IN)	BEDDING MATERIAL (6 IN)	CLEANING AND SEALING EXISTING JOINTS	CLEANING AND SEALING EXIST JOINTS(CL3)	CLEANING EXISTING JOINTS	RETROFIT RAIL (TY T131RC)	ARMOR JOINT	HEADER TYPE EXPANSION JOINT	JOINT SEALANT	CNC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)
	CY	CY	CY	LF	LF	LF	LF	LF	CF	LF	LF
CSJ: 0495-08-121 IH 20 WB OVER BNSF RAILROAD (NBI: 19-103-0-0495-08-263)				80							14
CSJ: 0495-08-122 IH 20 EB OVER BNSF RAILROAD (NBI: 19-103-0-0495-08-264)					112	246			72	326	
CSJ: 0495-08-123 IH 20 NFR OVER MASON CREEK (NBI: 19-103-0-0495-08-268)	6	44	11	125	138		357	51			
CSJ: 0495-08-124 IH 20 WB OVER MASON CREEK (NBI: 19-103-0-0495-08-269)	8	3	1	84	120				10	40	
CSJ: 0495-08-125 IH 20 EB OVER MASON CREEK (NBI: 19-103-0-0495-08-270)	8	3	1		120	287			63	367	
CSJ: 0495-08-126 IH 20 WB OVER CLARKS CREEK (NBI: 19-103-0-0495-08-272)				84	120				12	40	
PROJECT TOTAL	22	50	13	373	610	533	357	51	157	773	14

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Texas Department of Transportation

QUANTITY SUMMARIES

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS STH	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CJW	TEXAS	ATL	HARRISON	7
CHECK CJW	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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GENERAL SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT EACH PROJECT AS DESCRIBED HERE. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS AND TCP DEVICES AS SHOWN ON THE PLANS AND/OR AS DIRECTED. DROP OFF CONDITIONS GREATER THAN 2 INCHES MUST HAVE A 3:1 SAFETY SLOPE AT THE END OF EACH WORK DAY, AND AT ALL TIMES THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED. SEE TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET.
2. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) 7 CALENDAR DAYS IN ADVANCE OF LANE CLOSURES AND CHANGES IN TRAFFIC PATTERNS IN ACCORDANCE WITH THE LATEST TMUTCD & BC(6)-14.
3. PLACE EROSION CONTROL DEVICES PRIOR TO ANY SOIL DISTURBING ACTIVITIES AS DIRECTED.
4. PERFORM PROJECT CLEAN-UP PRIOR TO REMOVING EROSION CONTROL DEVICES WITH APPROVAL.
5. CONTRACTOR TO WORK ON AT MOST THREE NBI LOCATIONS CONCURRENTLY UNLESS OTHERWISE APPROVED.

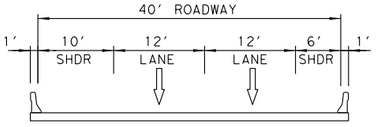
19-103-0-0495-08-263: IH 20 WB OVER BNSF RR

PHASE 1

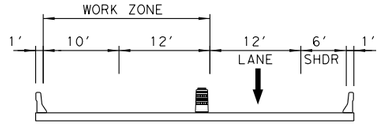
1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. SET UP TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE OUTSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
5. PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 WB BNSF RR BRIDGE REPAIRS SHEETS.

PHASE 2

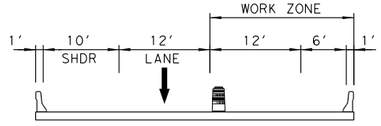
1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE INSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
3. PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 WB BNSF RR BRIDGE REPAIRS SHEETS.
4. REMOVE TRAFFIC CONTROL DEVICES AND OPEN ROADWAY.
5. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.



IH 20 WB EXISTING



IH 20 WB - PHASE 1



IH 20 WB - PHASE 2

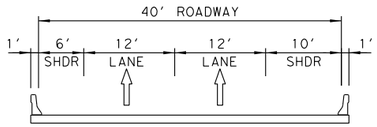
19-103-0-0495-08-264: IH 20 EB OVER BNSF RR

PHASE 1

1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. SET UP TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE OUTSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
5. PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 EB BNSF RR BRIDGE REPAIRS SHEETS.

PHASE 2

1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE INSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
3. PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 EB BNSF RR BRIDGE REPAIRS SHEETS.
4. REMOVE TRAFFIC CONTROL DEVICES AND OPEN ROADWAY.
5. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.



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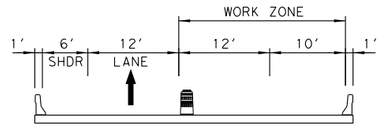
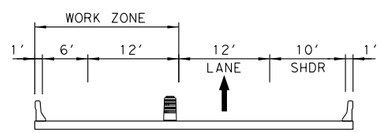


IH 20 EB - PHASE 1



IH 20 EB - PHASE 2

NOTES:

1. ENGINEER MAY DIRECT LANE CLOSURES TO BE RESTRICTED TO OFF-PEAK OR NIGHTTIME HOURS.
2. TCP CHANNELIZING DEVICES ARE PLASTIC DRUMS OR VERTICAL PANELS AS DESCRIBED ON BC(8)-14 AND BC(9)-14. OTHER APPROVED DEVICES MAY BE USED WITH APPROVAL.
3. OTHER TCP PHASING OPTIONS MAY BE USED IF APPROVED. CONTRACTOR MUST SUBMIT PROPOSED TCP IN WRITING AT LEAST TWO WEEKS PRIOR TO BEGINNING REVISED PHASING OF WORK.

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED PROFESSIONAL ENGINEER
P.E. 3/1/2021

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

IH 20
TRAFFIC CONTROL PLAN NARRATIVE

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	8
CHECK	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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GENERAL SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT EACH PROJECT AS DESCRIBED HERE. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS AND TCP DEVICES AS SHOWN ON THE PLANS AND/OR AS DIRECTED. DROP OFF CONDITIONS GREATER THAN 2 INCHES MUST HAVE A 3:1 SAFETY SLOPE AT THE END OF EACH WORK DAY, AND AT ALL TIMES THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED. SEE TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET.
2. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) 7 CALENDAR DAYS IN ADVANCE OF LANE CLOSURES AND CHANGES IN TRAFFIC PATTERNS IN ACCORDANCE WITH THE LATEST TMUTCD & BC(6)-14.
3. PLACE EROSION CONTROL DEVICES PRIOR TO ANY SOIL DISTURBING ACTIVITIES AS DIRECTED.
4. PERFORM PROJECT CLEAN-UP PRIOR TO REMOVING EROSION CONTROL DEVICES WITH APPROVAL.
5. CONTRACTOR TO WORK ON AT MOST THREE NBI LOCATIONS CONCURRENTLY UNLESS OTHERWISE APPROVED.

19-103-0-0495-08-268: IH 20 NFR (WHITEHURST DR) OVER MASON CREEK

PHASE 1 - (ONE LANE TWO-WAY)

1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD. INSTALL 45 MPH WORK ZONE SPEED LIMIT SIGNAGE IN ACCORDANCE WITH BC(3)-14.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. PHASE 1A - SET UP ONE LANE TWO-WAY TRAFFIC CONTROL WITH TRAFFIC SIGNAL IN ACCORDANCE WITH TRAFFIC CONTROL PLAN NFR (WHITEHURST DR) OVER MASON CREEK AND TCP(2-8)-18 AND CLOSE THE SOUTH (EASTBOUND) LANE. WORK ZONE PAVEMENT MARKINGS SHALL CONSIST OF TRAFFIC BUTTONS AND RAISED PAVEMENT MARKINGS.
5. ON SOUTH (EASTBOUND) LANE, PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 NFR MASON CREEK BRIDGE REPAIRS SHEETS.
6. PHASE 1B - PLACE LOW PROFILE CONCRETE BARRIER AND INSTALL T221 BRIDGE RAIL AT WINGWALLS, MBGF AND APPURTENANCES ON SOUTH (EASTBOUND) LANE.

PHASE 2 - (ONE LANE TWO-WAY)

1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. PHASE 2A - ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TRAFFIC CONTROL PLAN NFR (WHITEHURST DR) OVER MASON CREEK AND TCP(2-8)-18 AND CLOSE THE NORTH (WESTBOUND) LANE. WORK ZONE PAVEMENT MARKINGS SHALL CONSIST OF TRAFFIC BUTTONS AND RAISED PAVEMENT MARKINGS.
3. ON NORTH (WESTBOUND) LANE, PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 NFR MASON CREEK BRIDGE REPAIRS SHEETS.
4. PHASE 2B - PLACE LOW PROFILE CONCRETE BARRIER AND INSTALL T221 BRIDGE RAIL AT WINGWALLS, MBGF AND APPURTENANCES ON NORTH (WESTBOUND) LANE.
5. PLACE WORK ZONE PAVEMENT MARKINGS (TABS) AND INSTALL FINAL PAVEMENT MARKINGS.
6. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.

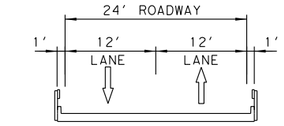
19-103-0-0495-08-269: IH 20 WB OVER MASON CREEK

PHASE 1

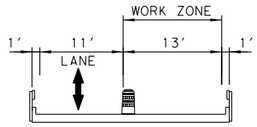
1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. SET UP TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE OUTSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
5. PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 WB MASON CREEK BRIDGE REPAIRS SHEETS.

PHASE 2

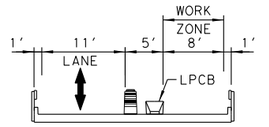
1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE INSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPENED WHEN WORKERS NOT PRESENT.
3. PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 WB MASON CREEK BRIDGE REPAIRS SHEETS.
4. REMOVE TRAFFIC CONTROL DEVICES AND OPEN ROADWAY.
5. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.



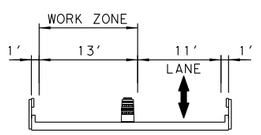
IH 20 NFR - EXISTING



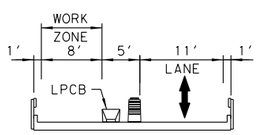
IH 20 NFR - PHASE 1A



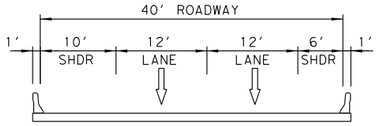
IH 20 NFR - PHASE 1B



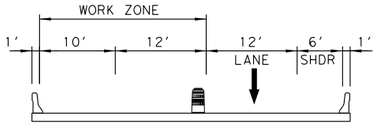
IH 20 NFR - PHASE 2A



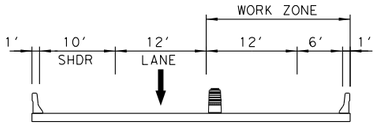
IH 20 NFR - PHASE 2B



IH 20 WB - EXISTING



IH 20 WB - PHASE 1



IH 20 WB - PHASE 2

NOTES:

1. ENGINEER MAY DIRECT LANE CLOSURES TO BE RESTRICTED TO OFF-PEAK OR NIGHTTIME HOURS.
2. TCP CHANNELIZING DEVICES ARE PLASTIC DRUMS OR VERTICAL PANELS AS DESCRIBED ON BC(8)-14 AND BC(9)-14. OTHER APPROVED DEVICES MAY BE USED WITH APPROVAL.
3. OTHER TCP PHASING OPTIONS MAY BE USED IF APPROVED. CONTRACTOR MUST SUBMIT PROPOSED TCP IN WRITING AT LEAST TWO WEEKS PRIOR TO BEGINNING REVISED PHASING OF WORK.

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED PROFESSIONAL ENGINEER
P.E. 3/1/2021

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

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IH 20 TRAFFIC CONTROL PLAN NARRATIVE

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	9
CHECK	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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GENERAL SEQUENCE OF CONSTRUCTION:

1. CONSTRUCT EACH PROJECT AS DESCRIBED HERE. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS AND TCP DEVICES AS SHOWN ON THE PLANS AND/OR AS DIRECTED. DROP OFF CONDITIONS GREATER THAN 2 INCHES MUST HAVE A 3:1 SAFETY SLOPE AT THE END OF EACH WORK DAY, AND AT ALL TIMES THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED. SEE TREATMENT FOR VARIOUS EDGE CONDITIONS SHEET.
2. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) 7 CALENDAR DAYS IN ADVANCE OF LANE CLOSURES AND CHANGES IN TRAFFIC PATTERNS IN ACCORDANCE WITH THE LATEST TMUTCD & BC(6)-14.
3. PLACE EROSION CONTROL DEVICES PRIOR TO ANY SOIL DISTURBING ACTIVITIES AS DIRECTED.
4. PERFORM PROJECT CLEAN-UP PRIOR TO REMOVING EROSION CONTROL DEVICES WITH APPROVAL.
5. CONTRACTOR TO WORK ON AT MOST THREE NBI LOCATIONS CONCURRENTLY UNLESS OTHERWISE APPROVED.

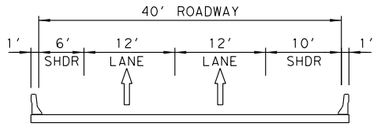
19-103-0-0495-08-270: IH 20 EB OVER MASON CREEK

PHASE 1

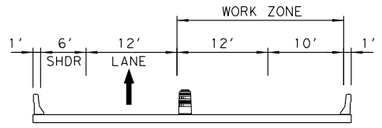
1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. SET UP TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE OUTSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPEN WHEN WORKERS NOT PRESENT.
5. PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 EB MASON CREEK BRIDGE REPAIRS SHEETS.

PHASE 2

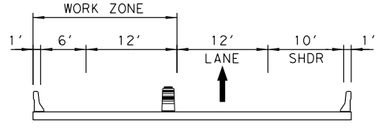
1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE INSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPEN WHEN WORKERS NOT PRESENT.
3. PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 EB MASON CREEK BRIDGE REPAIRS SHEETS.
4. REMOVE TRAFFIC CONTROL DEVICES AND OPEN ROADWAY.
5. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.



IH 20 EB - EXISTING



IH 20 EB - PHASE 1



IH 20 EB - PHASE 2

NOTES:

1. ENGINEER MAY DIRECT LANE CLOSURES TO BE RESTRICTED TO OFF-PEAK OR NIGHTTIME HOURS.
2. TCP CHANNELIZING DEVICES ARE PLASTIC DRUMS OR VERTICAL PANELS AS DESCRIBED ON BC(8)-14 AND BC(9)-14. OTHER APPROVED DEVICES MAY BE USED WITH APPROVAL.
3. OTHER TCP PHASING OPTIONS MAY BE USED IF APPROVED. CONTRACTOR MUST SUBMIT PROPOSED TCP IN WRITING AT LEAST TWO WEEKS PRIOR TO BEGINNING REVISED PHASING OF WORK.

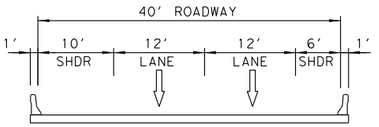
19-103-0-0495-08-272: IH 20 WB OVER CLARKS CREEK

PHASE 1

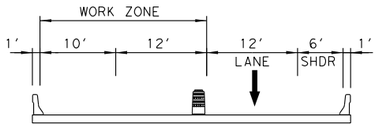
1. FURNISH AND PLACE PCMS IN AN UNOBSCURED LOCATION AT PROJECT LIMITS TO ALERT MOTORISTS OF UPCOMING CHANGES IN TRAFFIC PATTERN.
2. INSTALL ADVANCE WARNING SIGNS AT THIS NBI ACCORDING TO THE BC STANDARDS AND LATEST TMUTCD.
3. INSTALL TEMPORARY EROSION CONTROL AS DIRECTED.
4. SET UP TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE OUTSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPEN WHEN WORKERS NOT PRESENT.
5. PERFORM BRIDGE REPAIRS AS DETAILED ON IH 20 WB CLARKS CREEK BRIDGE REPAIRS SHEETS.

PHASE 2

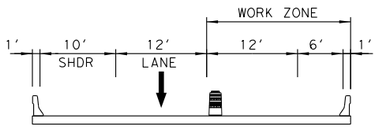
1. ADJUST TEMPORARY EROSION CONTROL AS DIRECTED.
2. ADJUST TRAFFIC CONTROL IN ACCORDANCE WITH TCP(6-1)-12 AND CLOSE THE INSIDE LANE AS NEEDED FOR ACCESS TO SUPERSTRUCTURE. TRAVEL LANES TO BE FULLY OPEN WHEN WORKERS NOT PRESENT.
3. PERFORM REMAINING BRIDGE REPAIRS AS DETAILED ON IH 20 WB CLARKS CREEK BRIDGE REPAIRS SHEETS.
4. REMOVE TRAFFIC CONTROL DEVICES AND OPEN ROADWAY.
5. REMOVE TEMPORARY EROSION CONTROL MEASURES AND ADVANCE WARNING SIGNS.



IH 20 WB - EXISTING



IH 20 WB - PHASE 1



IH 20 WB - PHASE 2

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED PROFESSIONAL ENGINEER
P.E. 3/1/2021

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

IH 20
TRAFFIC CONTROL PLAN NARRATIVE

SHEET 3 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	10
CHECK	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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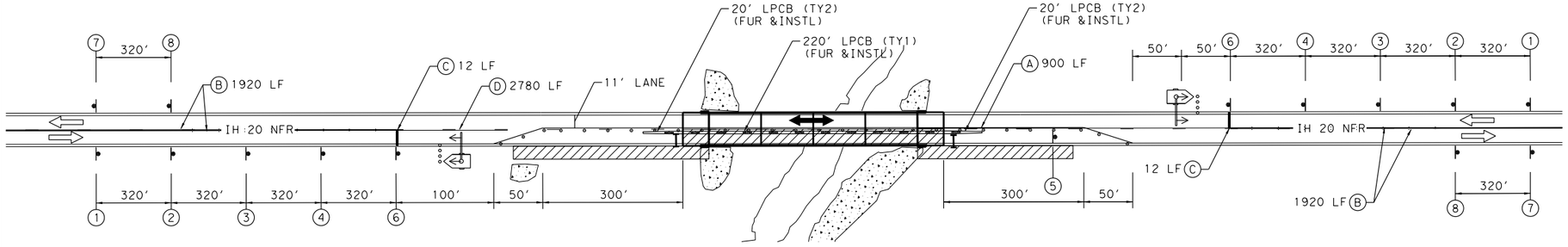
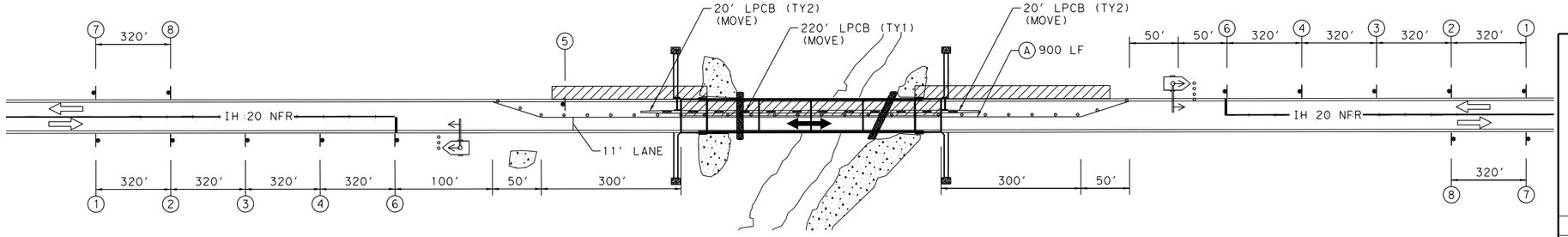


IH 20 NFR OVER MASON CREEK - TCP PHASE 1

NBI: 19-103-0-0495-08-268



IH 20 NFR OVER MASON CREEK - TCP PHASE 2

NBI: 19-103-0-0495-08-268

TCP LEGEND

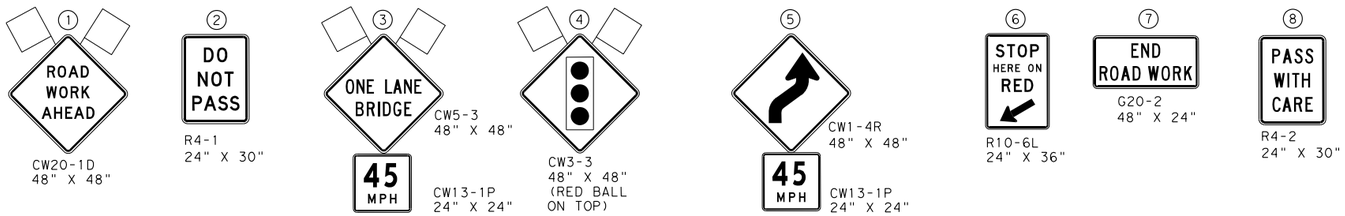
- CONSTRUCTION PHASE WORK ZONE
- LOW PROFILE CONCRETE BARRIER (LPCB)
- TY 3 BARRICADE
- TRAFFIC FLOW
- CHANNELIZING DEVICES
- TEMPORARY PORTABLE TRAFFIC SIGNAL

WZ STRIPING LEGEND

- (A) WK ZN PAV MRK REMOV - WHITE 4" EDGE LINE
  - (REFL) TY I-C
  - (TRAF BTN) TY W
- (B) WK ZN PAV MRK REMOV - DBL YELLOW 4" NO-PASSING LINE
  - (REFL) TY II-A-A
  - (TRAF BTN) TY Y
- (C) WK ZN PAV MRK REMOV (W)(24")(SLD)
- (D) ELIM EXT PAV MRK & MRKS (4")

NOTES:

1. REFER TO BC(2)-14 FOR PROJECT LIMIT AND ADVANCE WARNING SIGNS FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS.
2. ALL 4" WORK ZONE PAVEMENT MARKINGS WILL CONSIST OF RAISED PAVEMENT MARKERS AND TRAFFIC BUTTONS. SEE BC(12)-14 FOR DETAILS.
3. SEE BC(3)-14 FOR PLACEMENT OF 45 MPH WORK ZONE SPEED LIMIT SIGNS.
4. SEE TCP(2-8)-18 FOR ADDITIONAL GENERAL NOTES



NOT TO SCALE

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED PROFESSIONAL ENGINEER
P.E. 3/1/2021

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

IH 20
TRAFFIC CONTROL PLAN
NFR (WHITEHURST DR)
OVER MASON CREEK

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	
CHECK	CONTROL	SECTION	JOB	11
	0495	08	121,ETC.	

USER: benns
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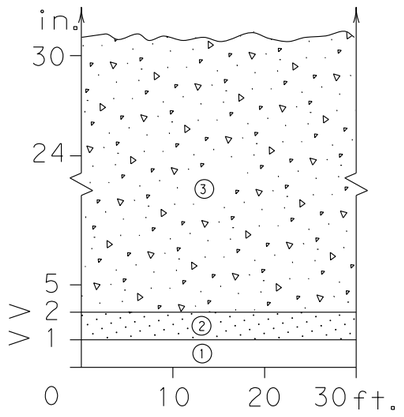
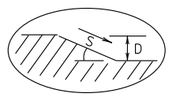
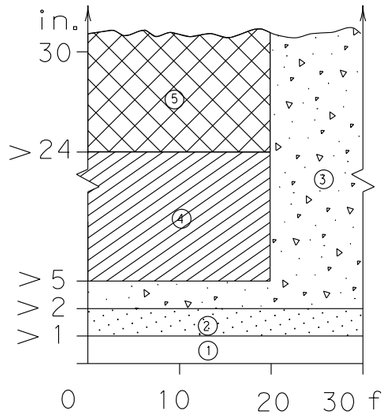
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

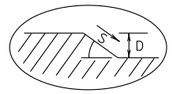


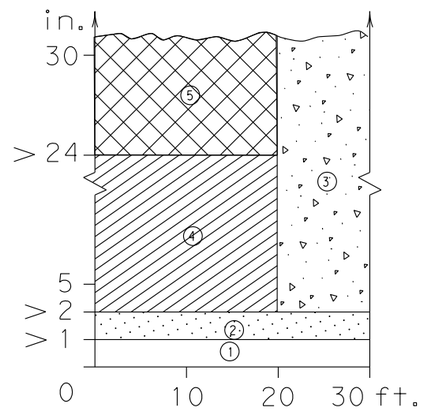
Edge Condition I
S = (3:1) (or flatter)



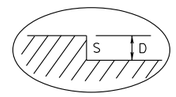


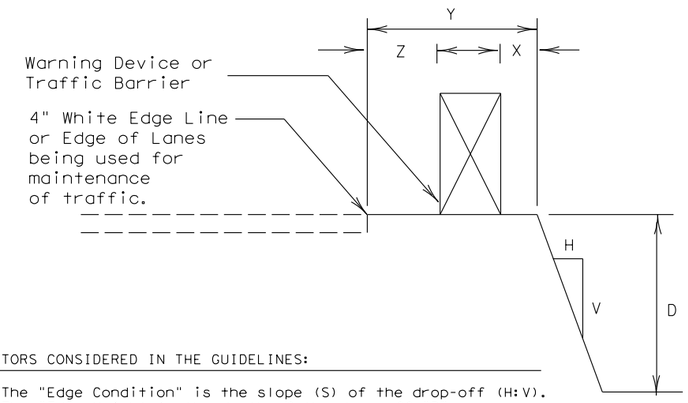
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment.
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone- 4 may be used after consideration of other applicable factors.

Edge Condition Notes:

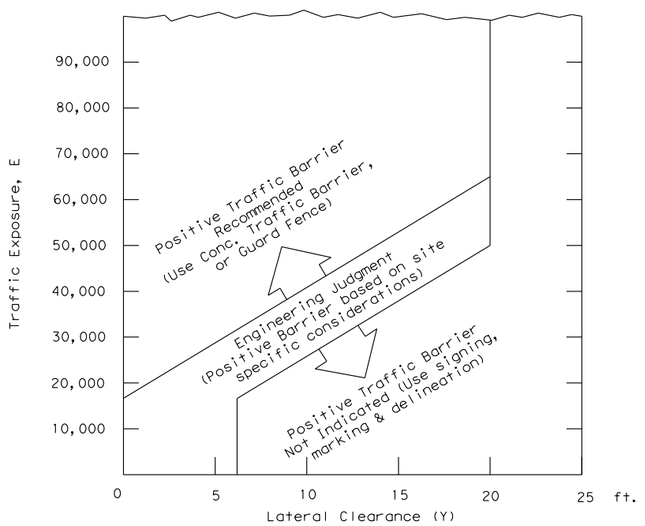
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2 Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3 An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

STATE OF TEXAS
BRIAN ENNS
93801
LICENSED
PROFESSIONAL ENGINEER
P.E. 3/1/2021

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	0495	08	121,ETC	IH 20
08-01 correct typos	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		12

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0495	08	121,ETC	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	ATL	HARRISON		13

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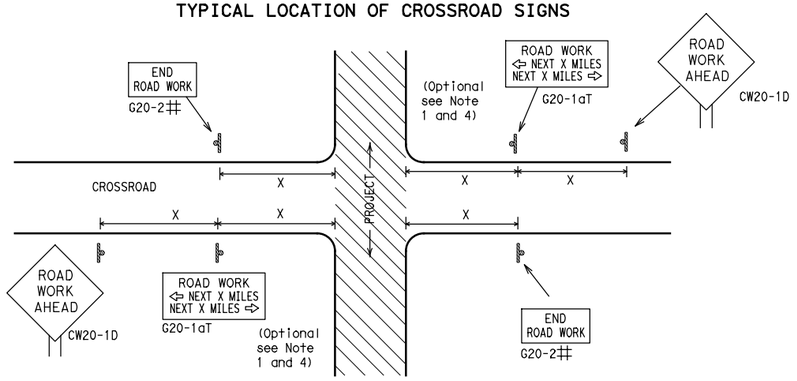
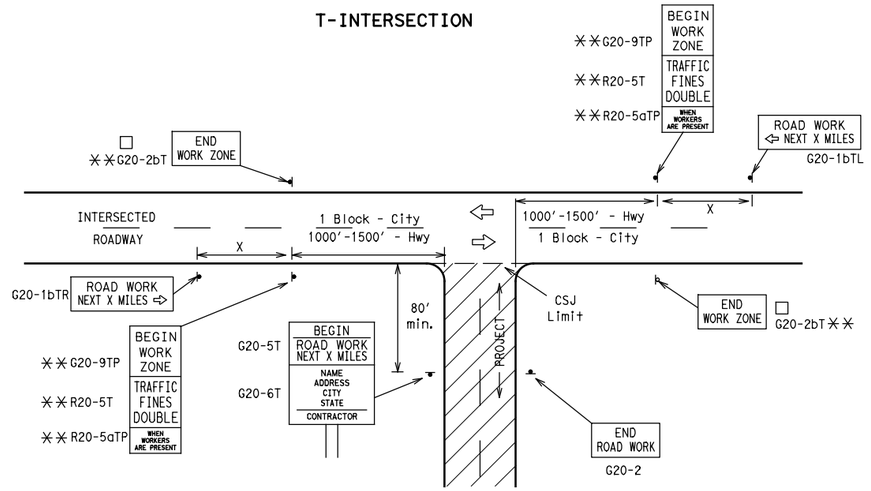
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

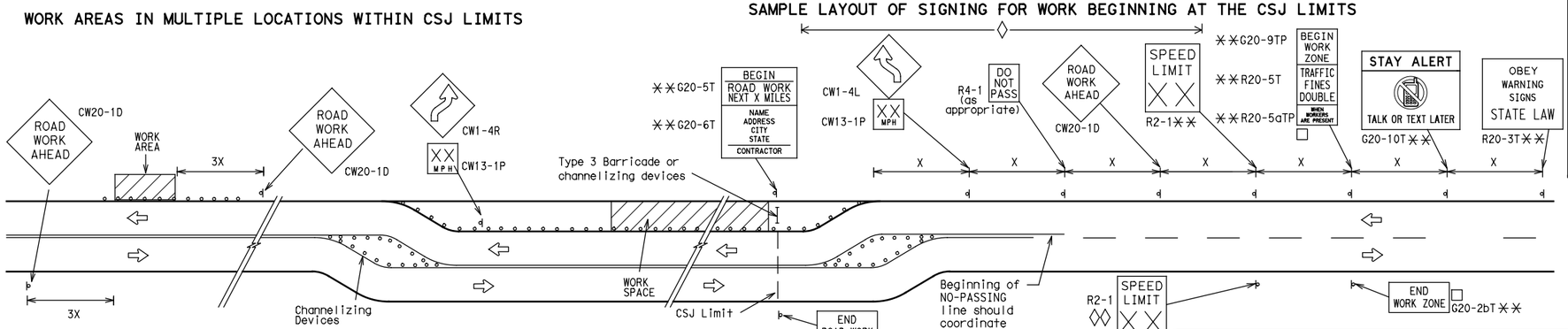
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

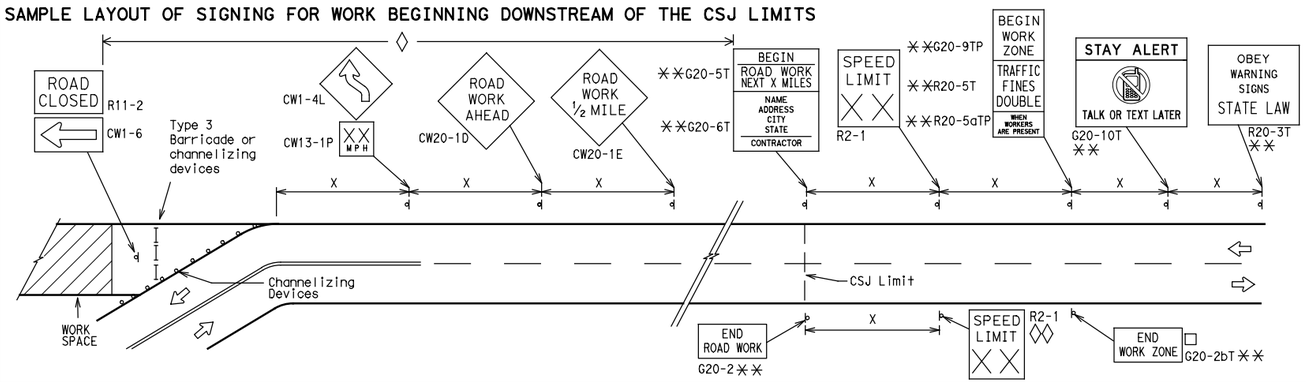
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

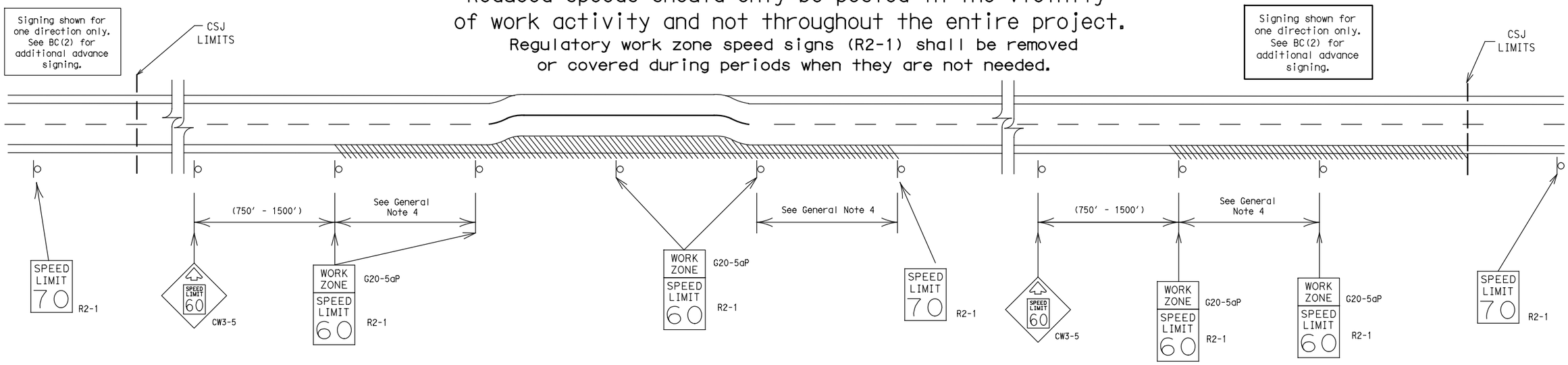
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		14

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		15

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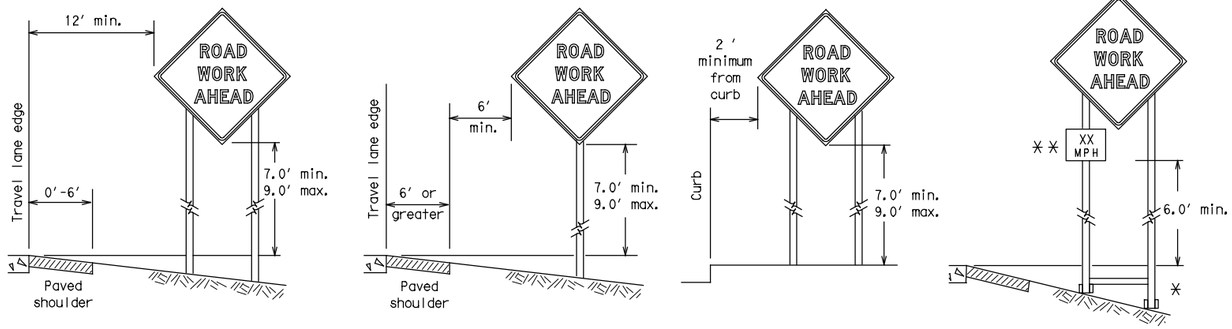
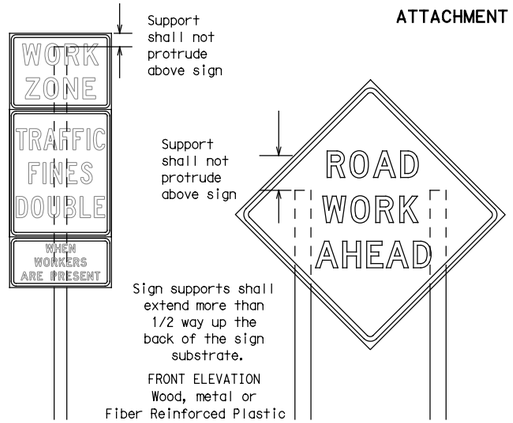
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

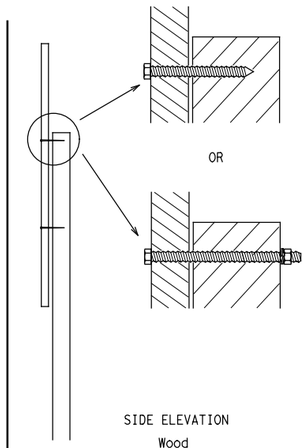


⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





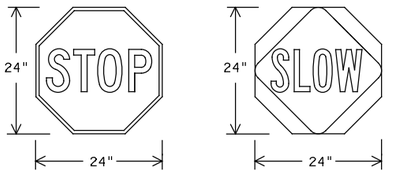
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		16

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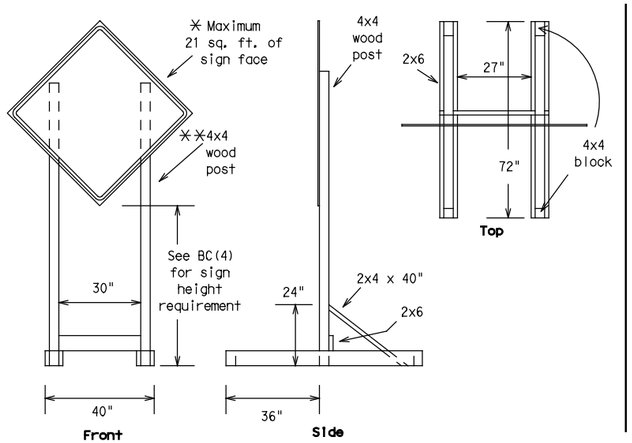
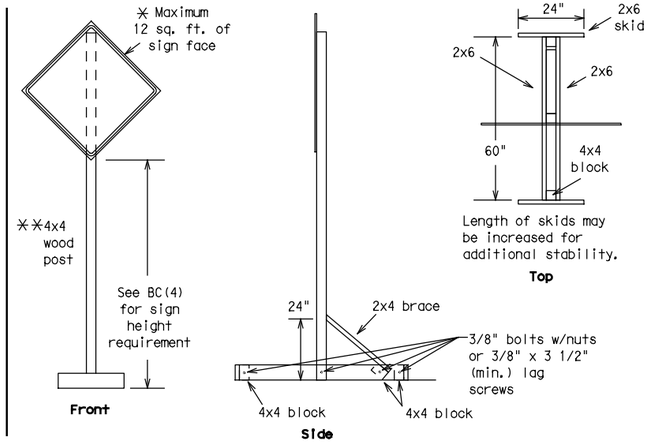
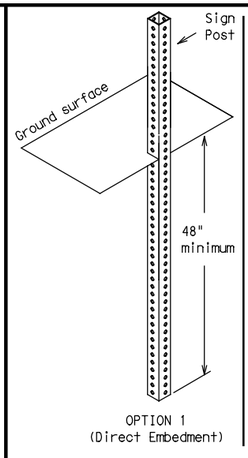
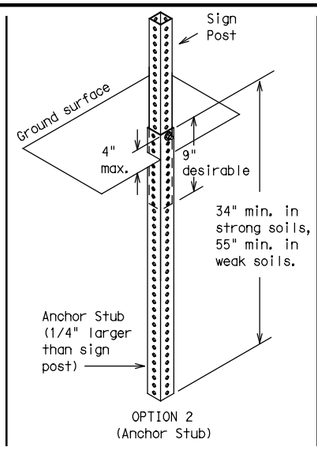


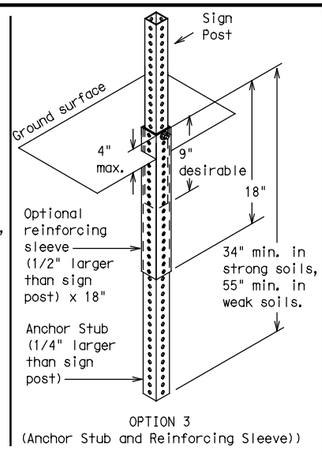


SKID MOUNTED WOOD SIGN SUPPORTS

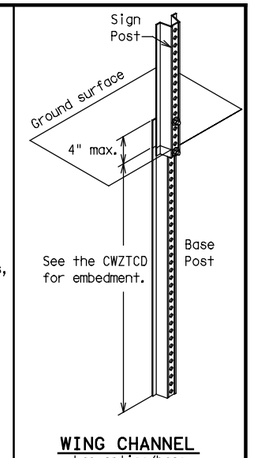
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







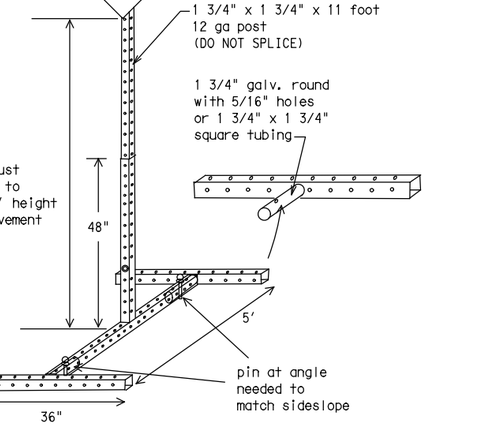
PERFORATED SQUARE METAL TUBING

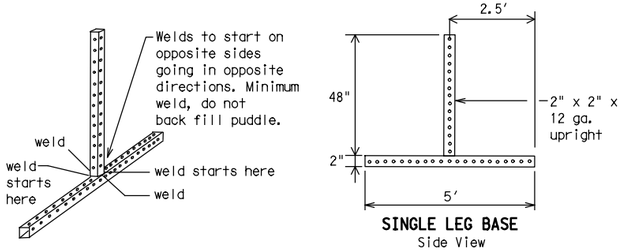


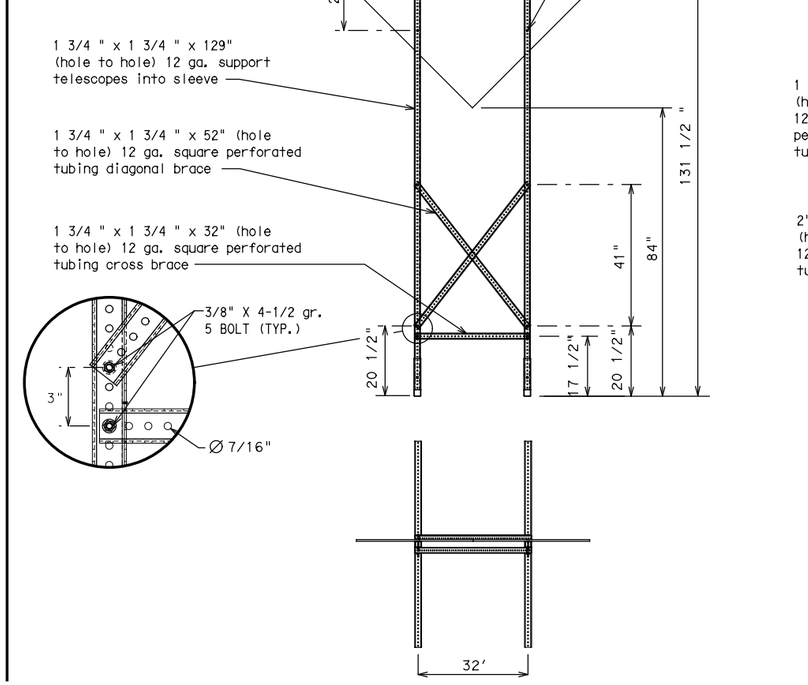
WING CHANNEL
Lap-splice/base bolted anchor

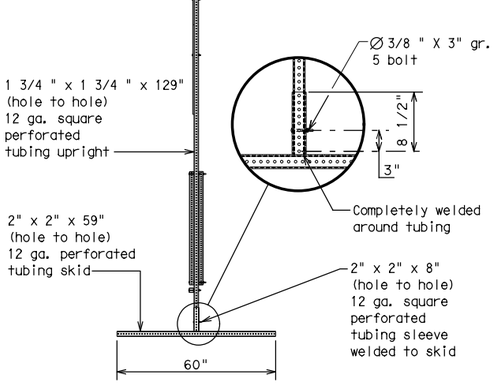
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		17

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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

✳✳ See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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7-13 5-21	ATL	HARRISON		18

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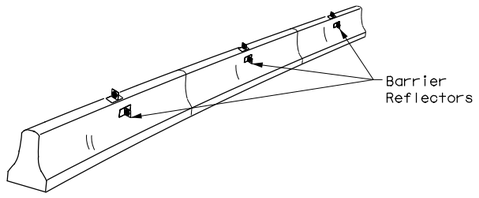
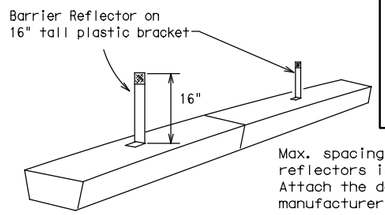
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



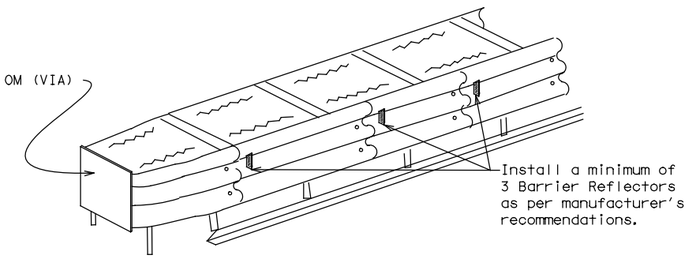
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

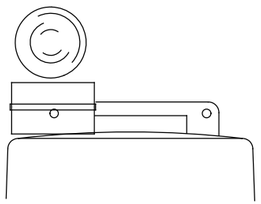
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

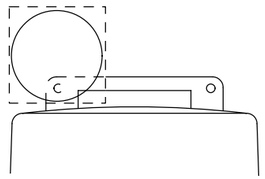
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

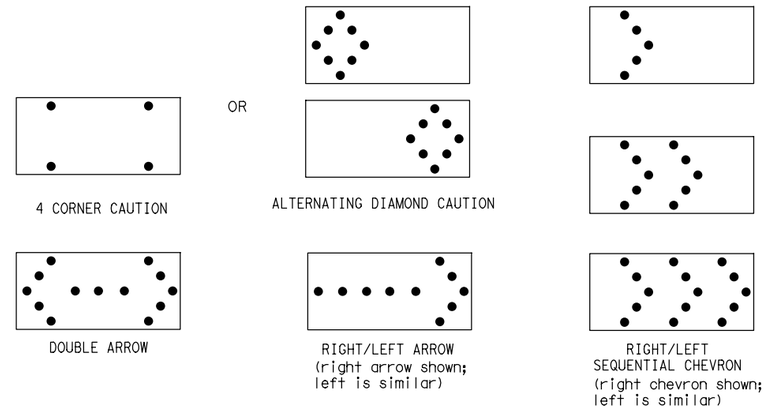
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

SHEET 7 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		19

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

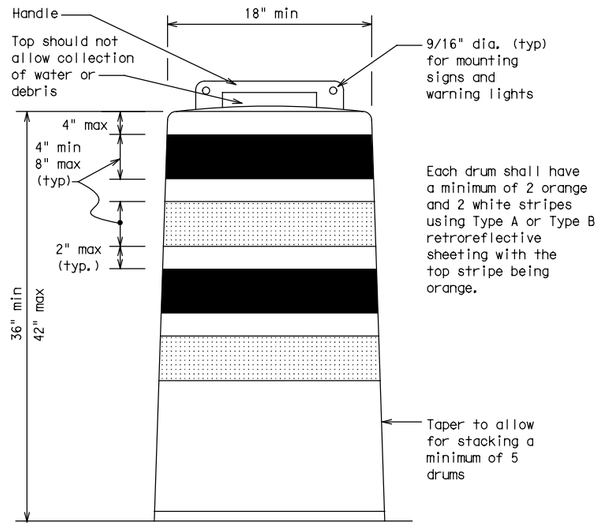
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

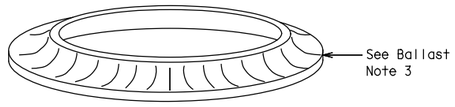
RETROREFLECTIVE SHEETING

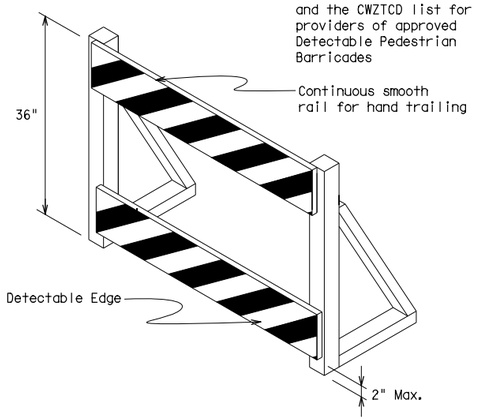
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

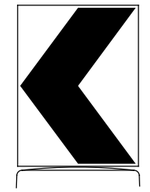




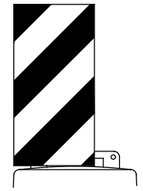


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 5-21	ATL	HARRISON		20
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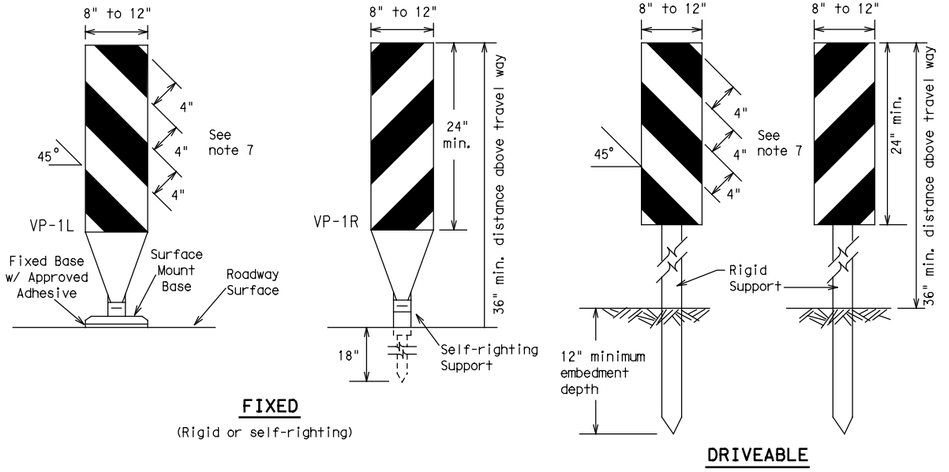
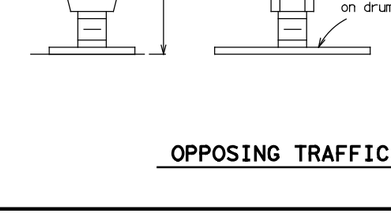


FIXED
(Rigid or self-righting)

DRIVEABLE

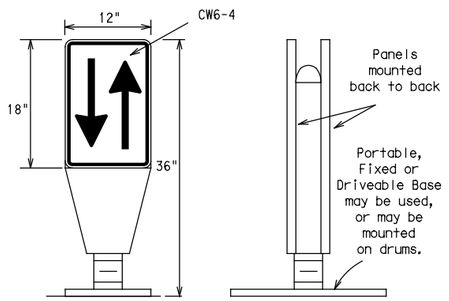


(Rigid or self-righting)

PORTABLE

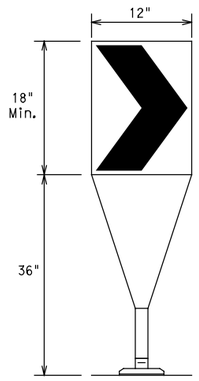
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



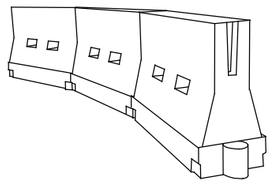
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		21

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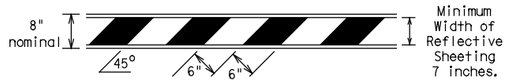
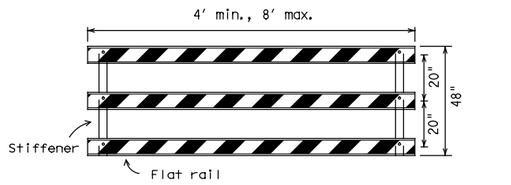
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



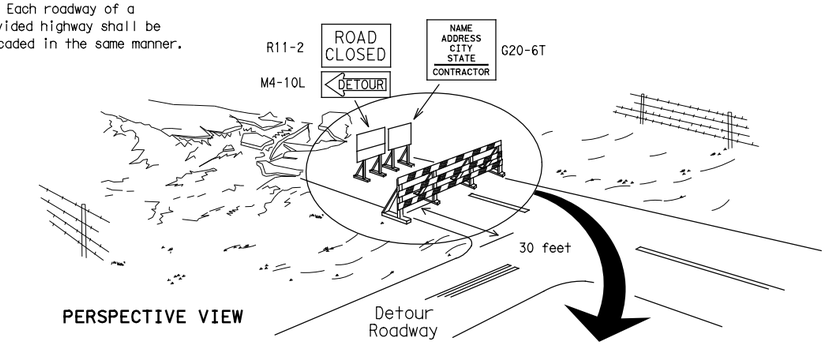
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

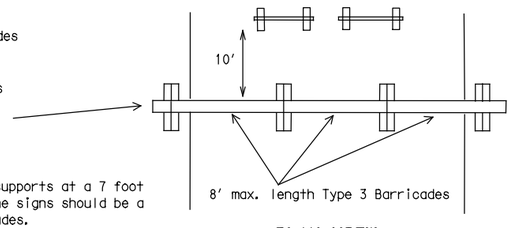
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

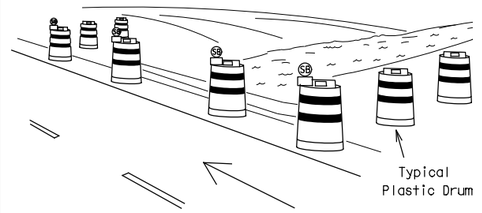
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

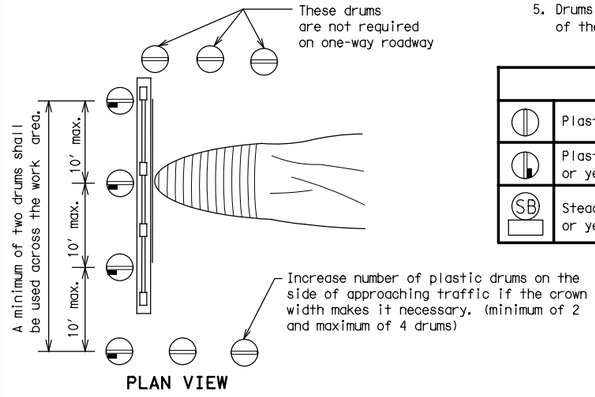
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

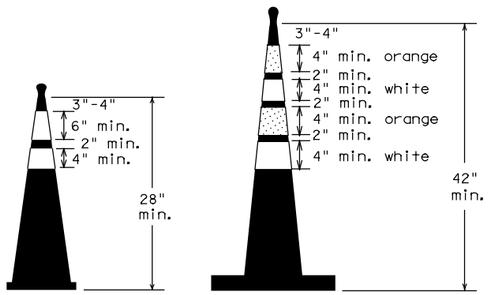
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



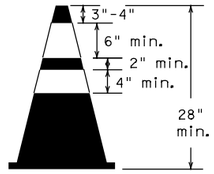
PLAN VIEW

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

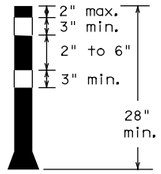
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

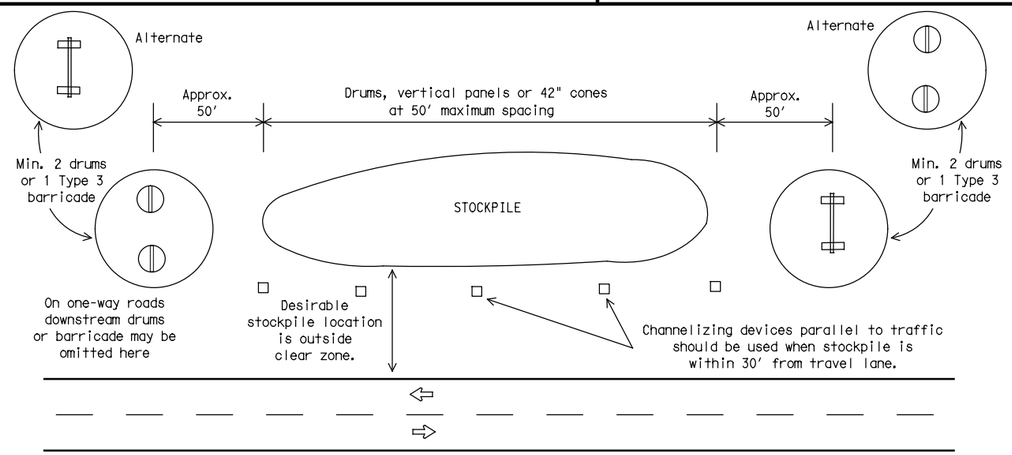


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ATL	HARRISON		22

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

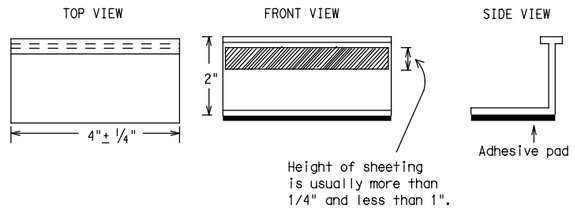
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	ATL	HARRISON		23
11-02 8-14				

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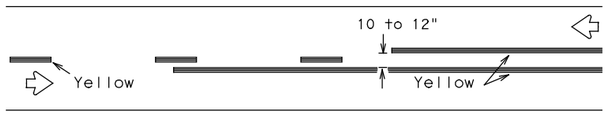
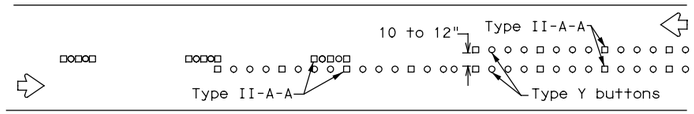
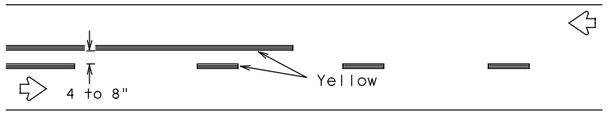
PAVEMENT MARKING PATTERNS



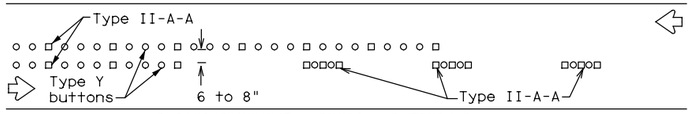
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



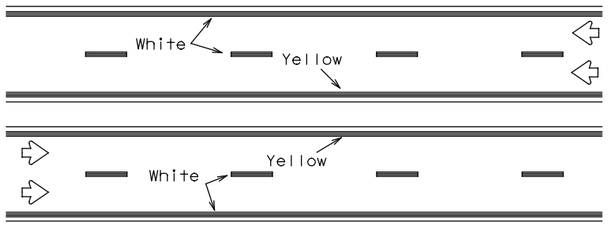
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



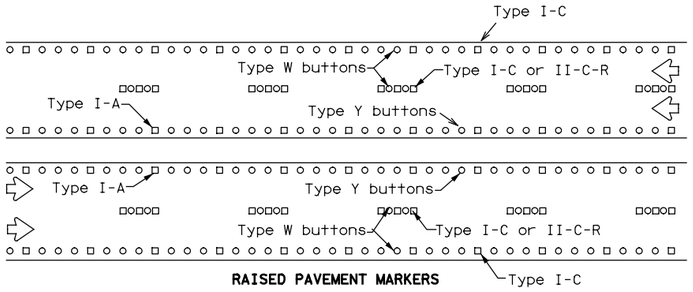
RAISED PAVEMENT MARKERS - PATTERN B

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

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



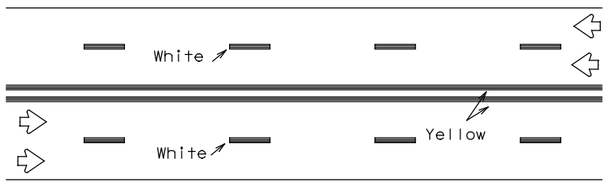
REFLECTORIZED PAVEMENT MARKINGS



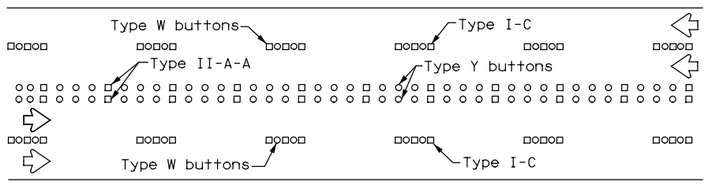
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



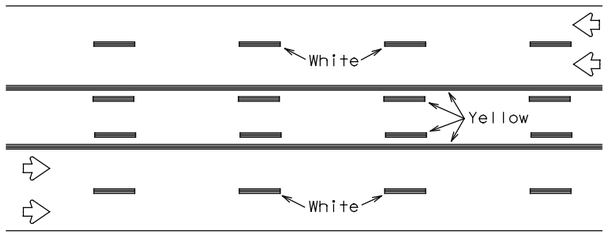
REFLECTORIZED PAVEMENT MARKINGS



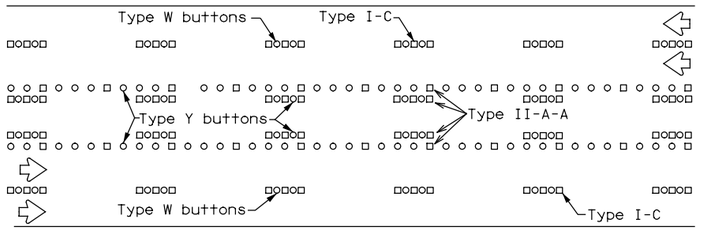
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

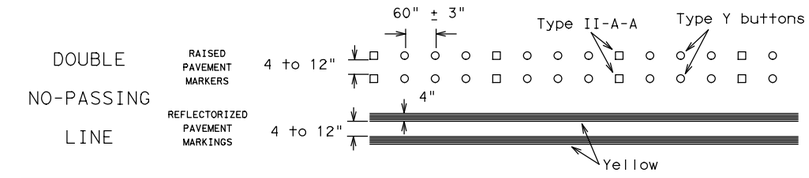
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

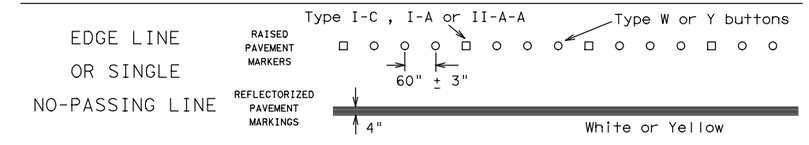
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

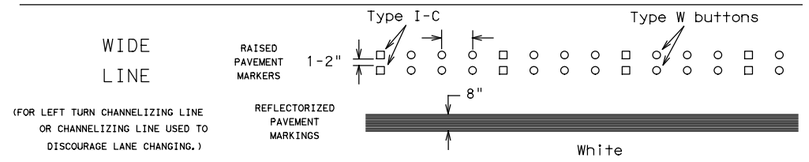


EDGE LINE OR SINGLE NO-PASSING LINE



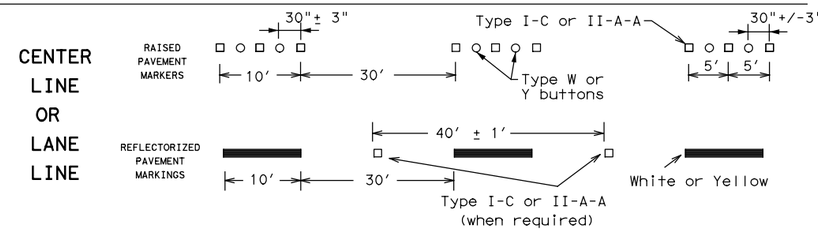
WIDE LINE

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

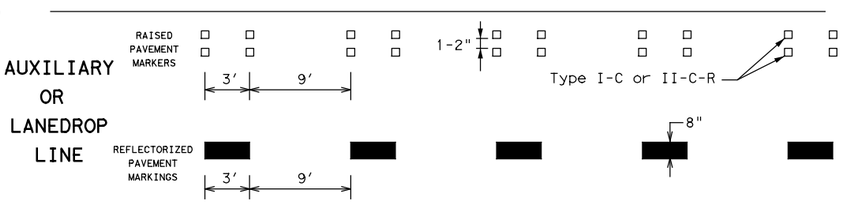


BROKEN LINES

CENTER LINE OR LANE LINE

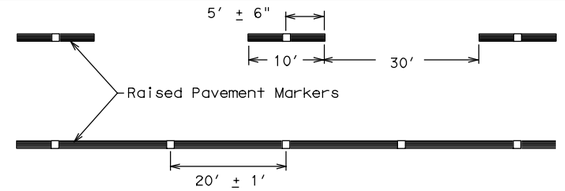


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		24

106

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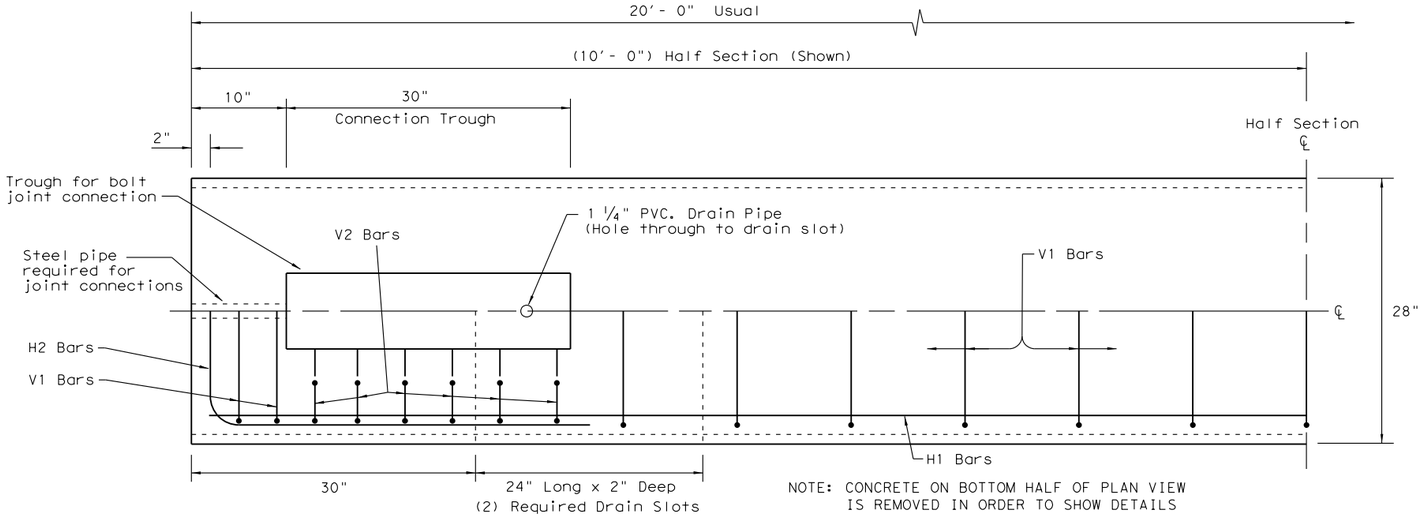
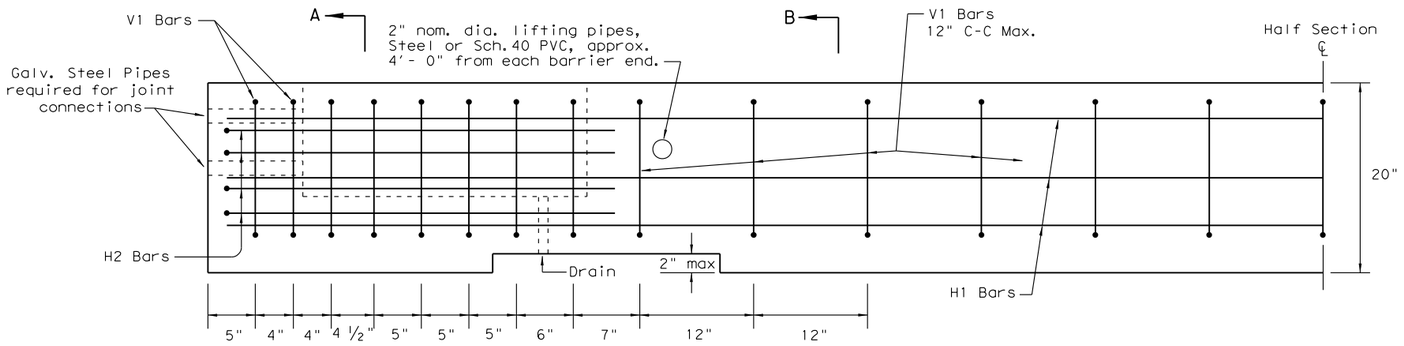
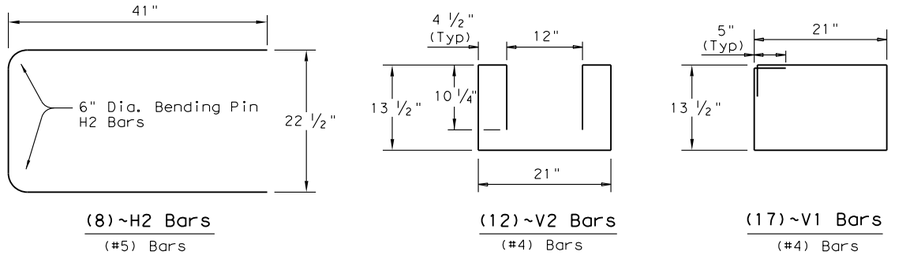


NOTE: CONCRETE ON BOTTOM HALF OF PLAN VIEW IS REMOVED IN ORDER TO SHOW DETAILS

PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)



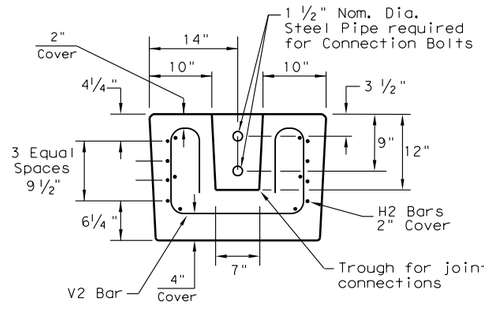
(8)~H2 Bars (#5) Bars

(12)~V2 Bars (#4) Bars

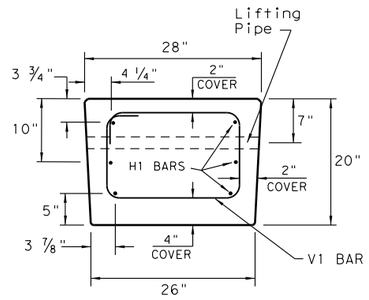
(17)~V1 Bars (#4) Bars

REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



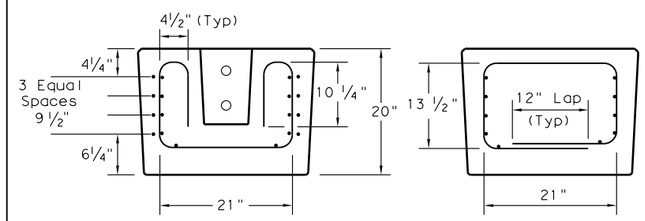
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A SECTION B-B

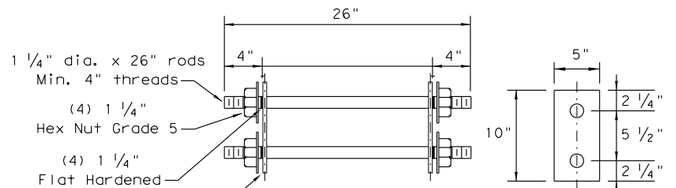
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS ASTM A36

PLATE WASHER 5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		25

DATE: 3/1/2021
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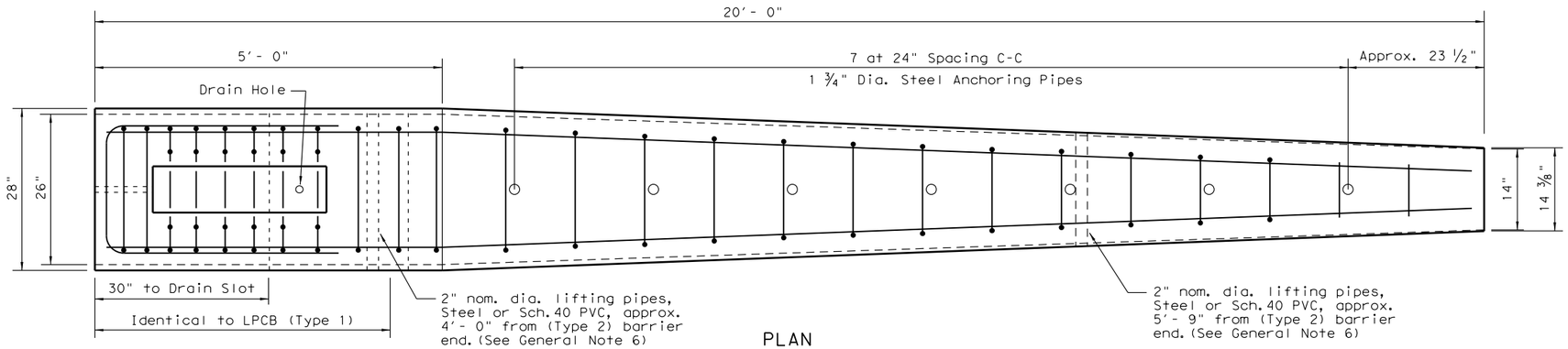
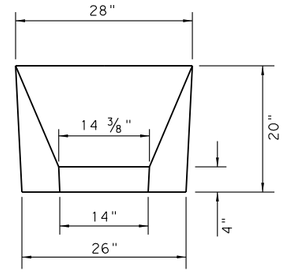
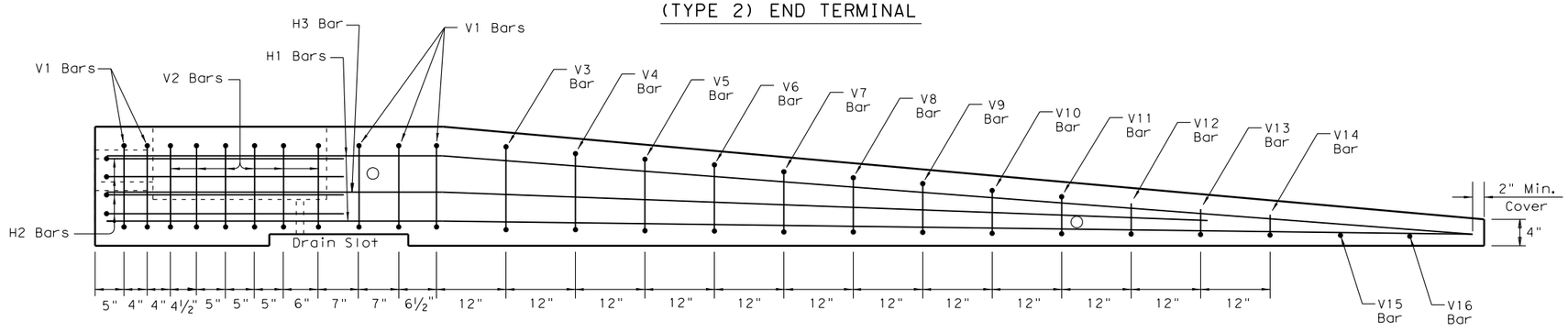


PLAN
(TYPE 2) END TERMINAL



APPROACH VIEW

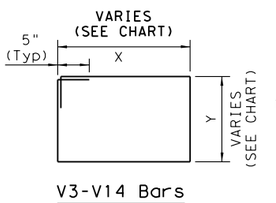


ELEVATION
(TYPE 2) END TERMINAL

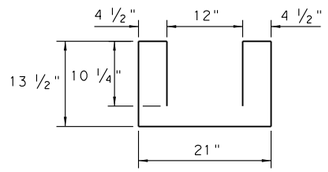
Note:
Anchoring pipes not shown in Elevation View

TYPE 2 - NOTES

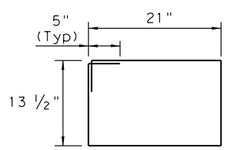
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



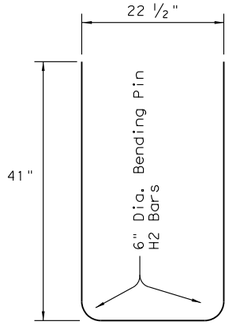
V3-V14 Bars



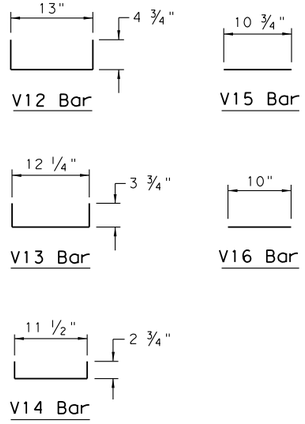
(6)~V2 Bars



(5)~V1 Bars



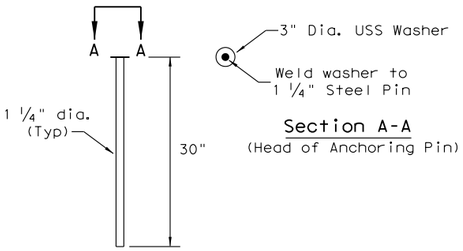
(4)~H2 Bars
(#5) Bars



Note: All V Bars are (#4)

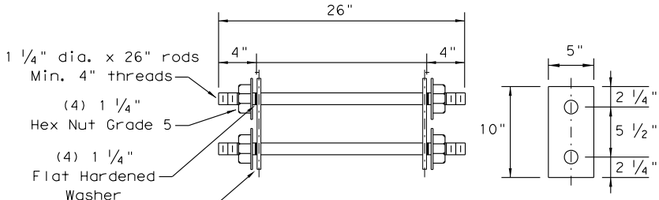
BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL



Section A-A
(Head of Anchoring Pin)

(7) Anchor Pins
ASTM A36 Steel
(See Note 3)

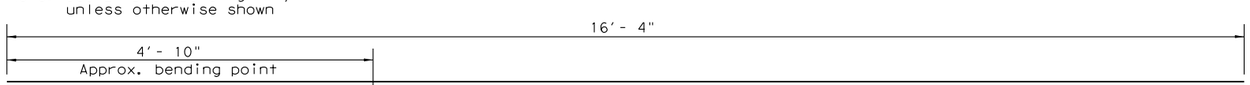


(2) CONNECTION BOLTS
ASTM A36

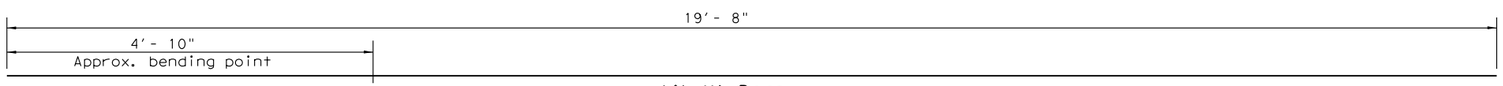
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

(TYPE 2) APPROX. QUANTITIES	20 FT. SECTION	
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

Texas Department of Transportation

Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		26

DATE: 3/1/2021 2:37
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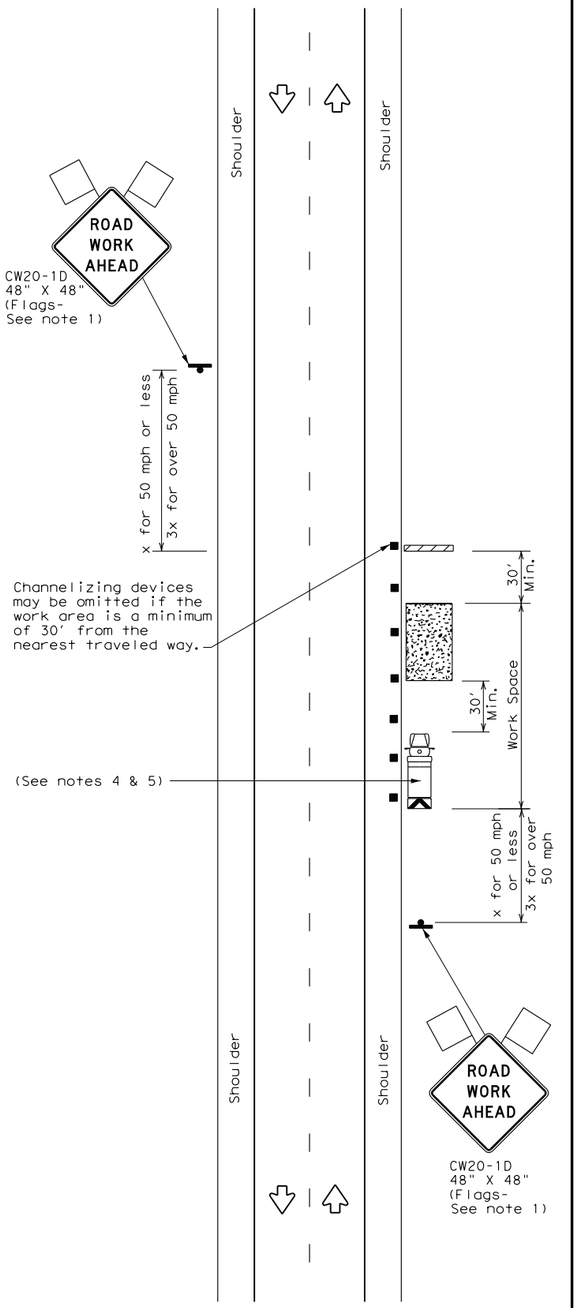
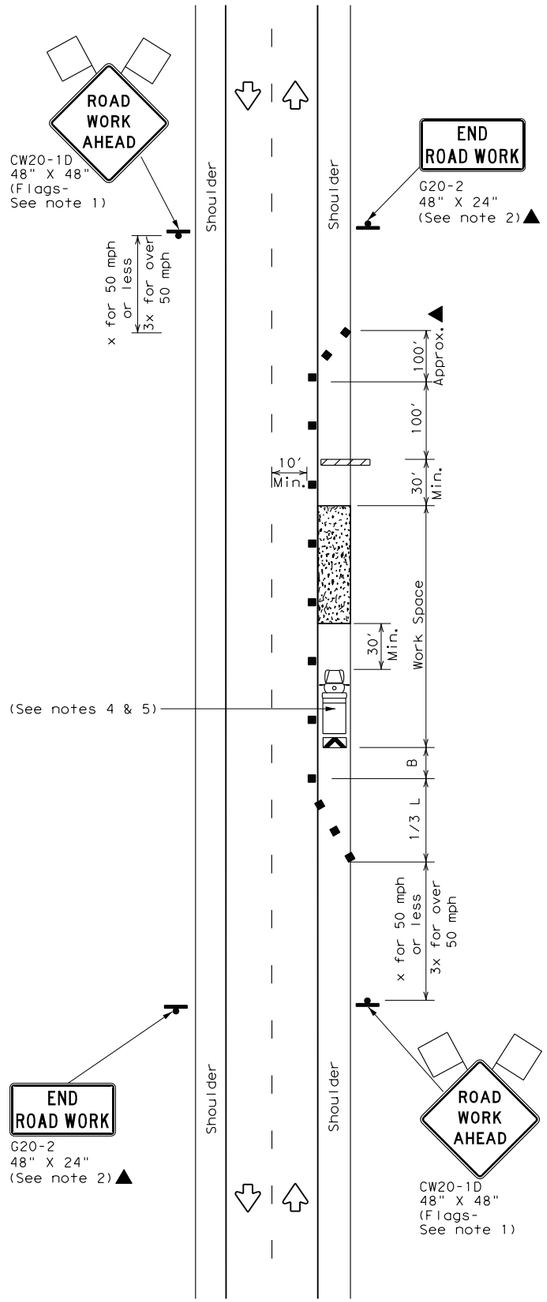


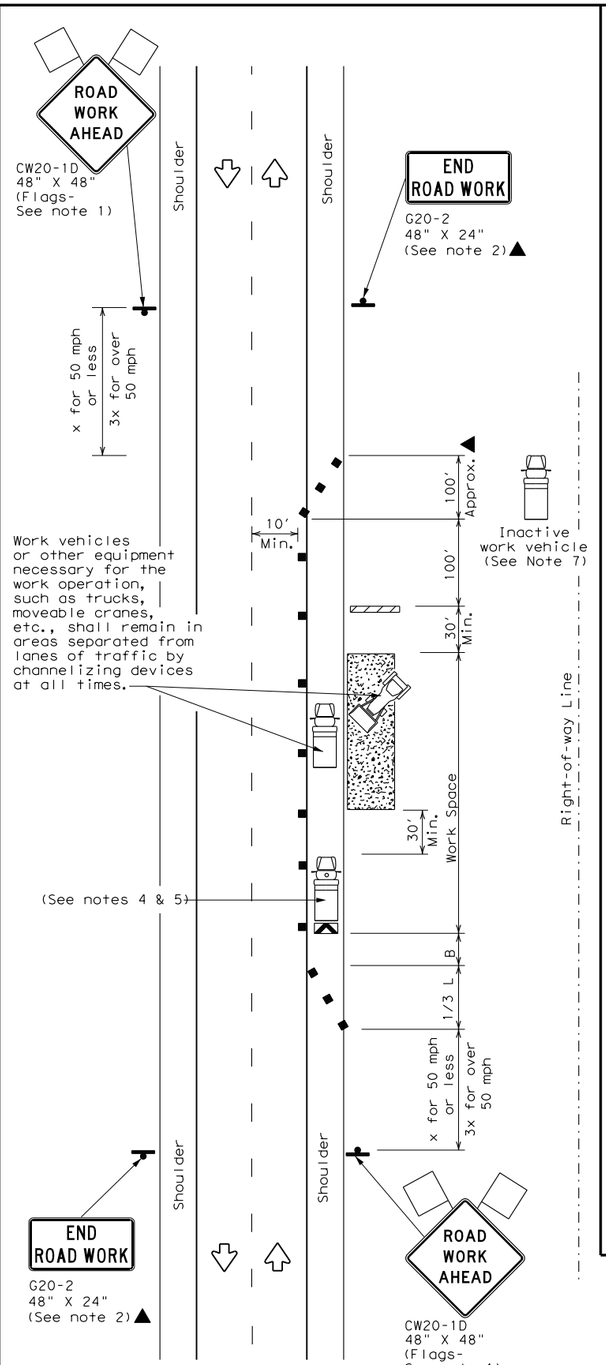
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	ATL	HARRISON		27
1-97 2-18				

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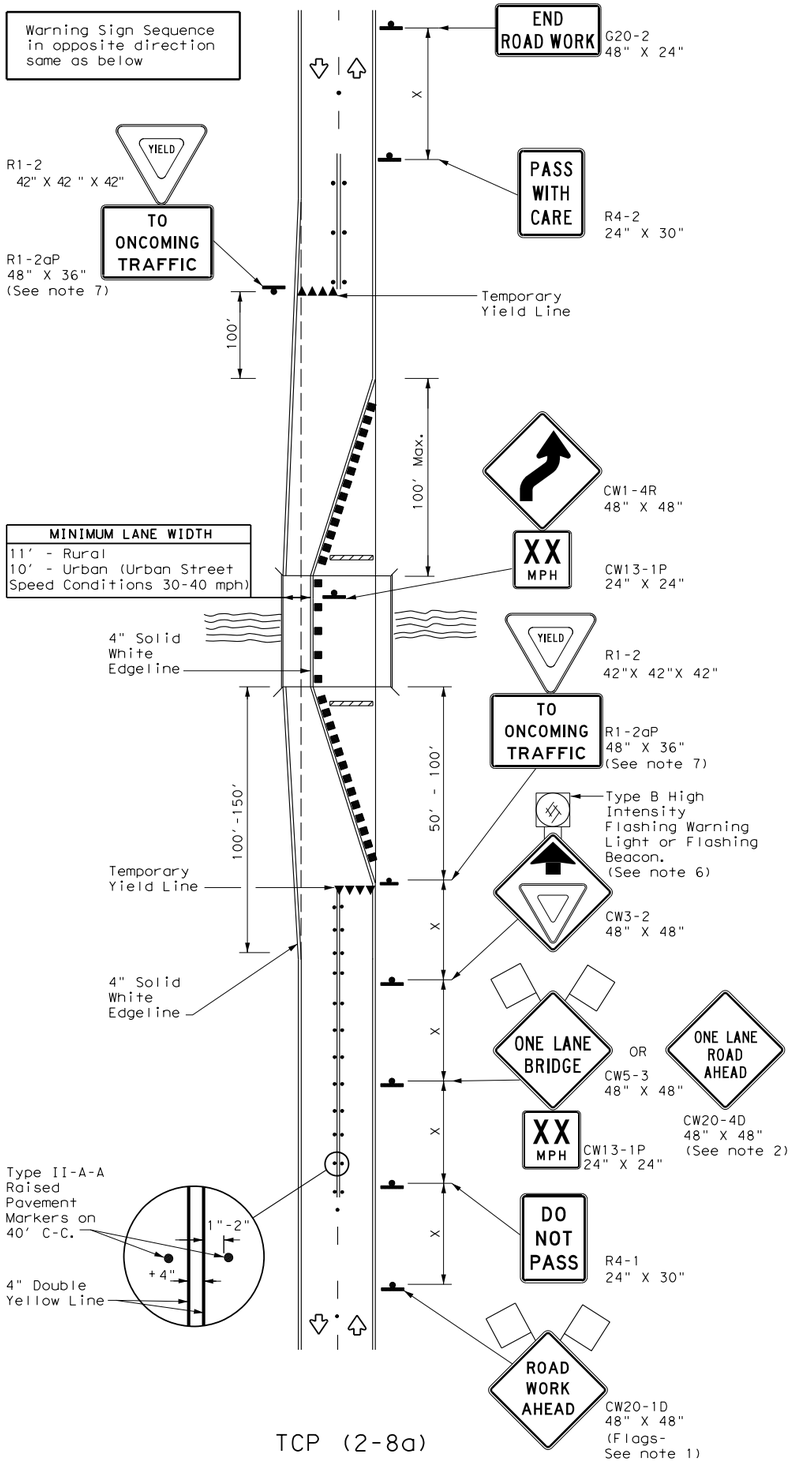
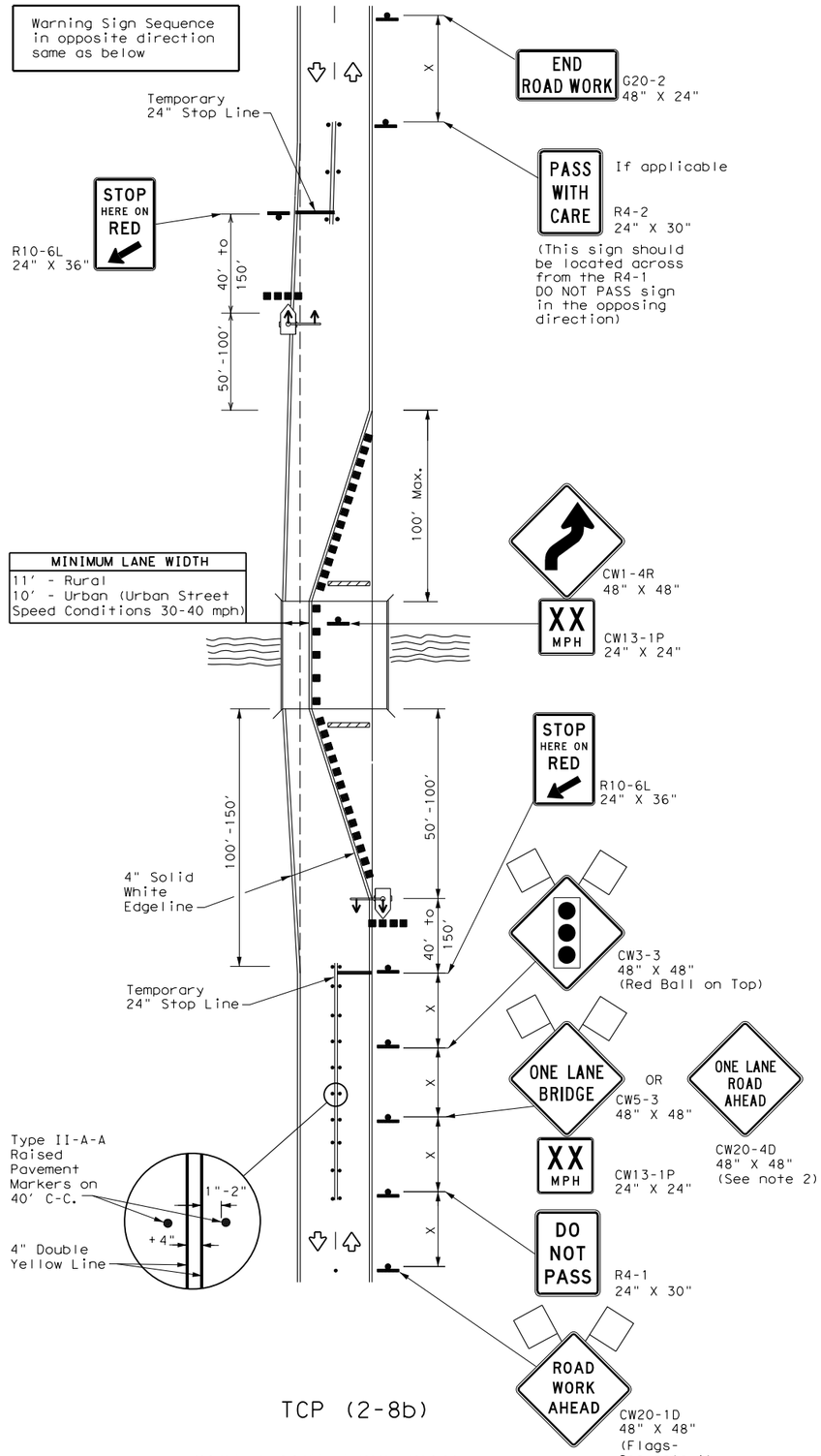


TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

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"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	ATL	HARRISON		28
4-98 2-18				

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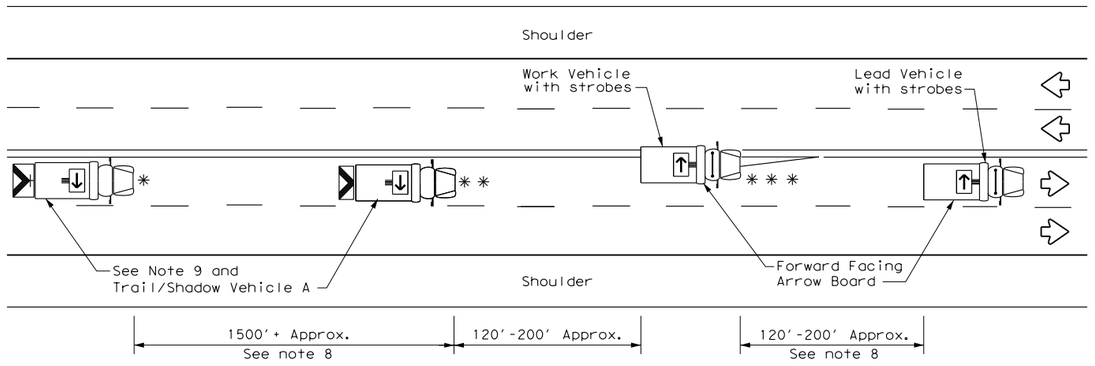
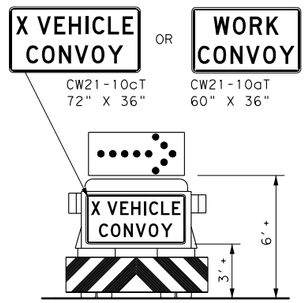


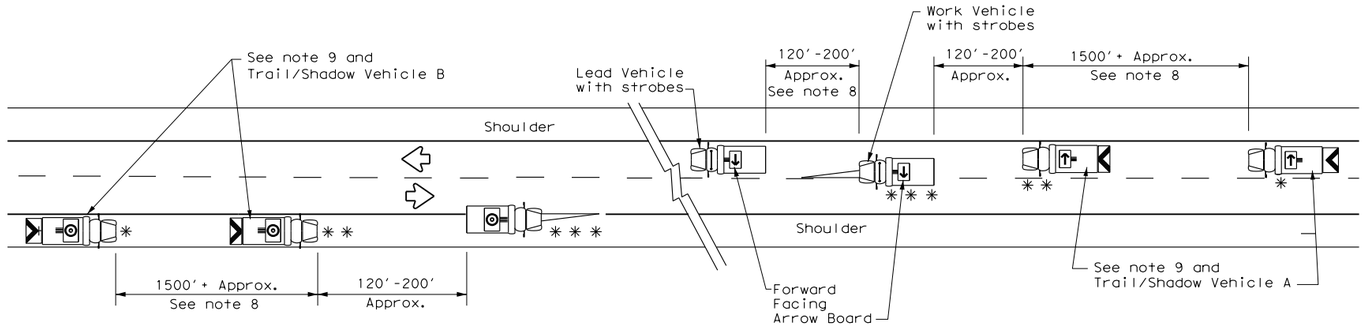
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

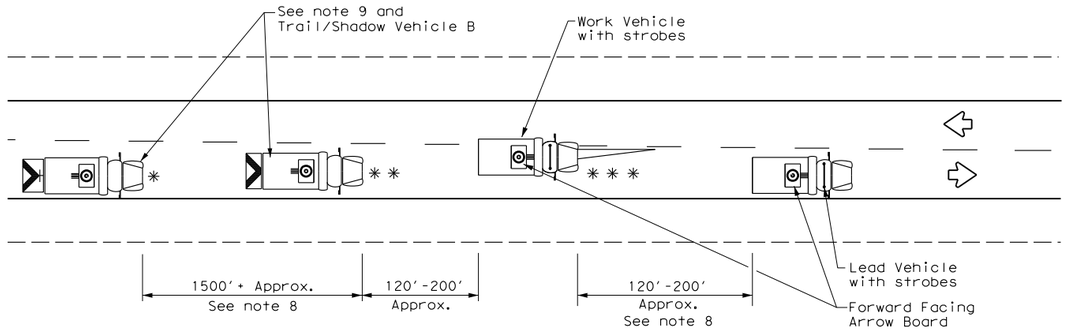


WORK ON SHOULDER

WORK ON TRAVEL LANE

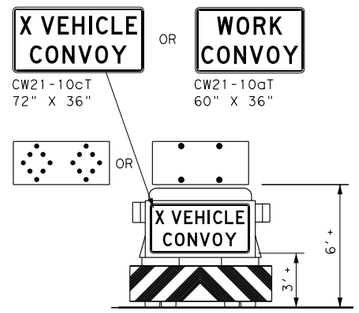
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

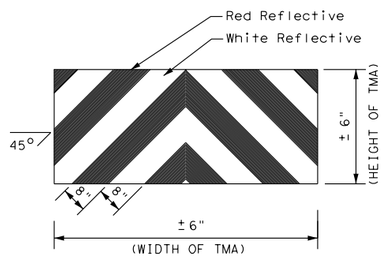
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		29

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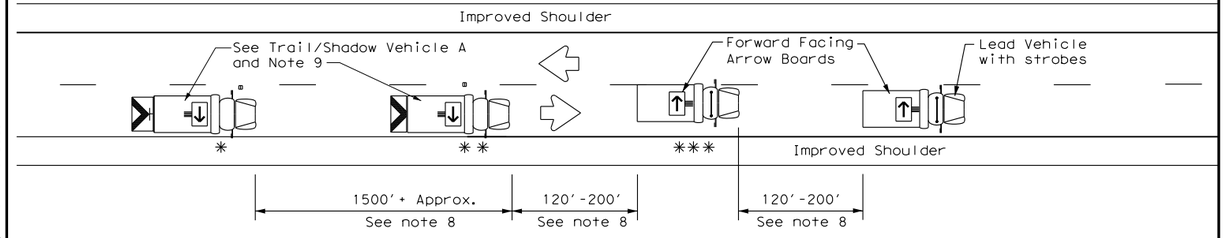
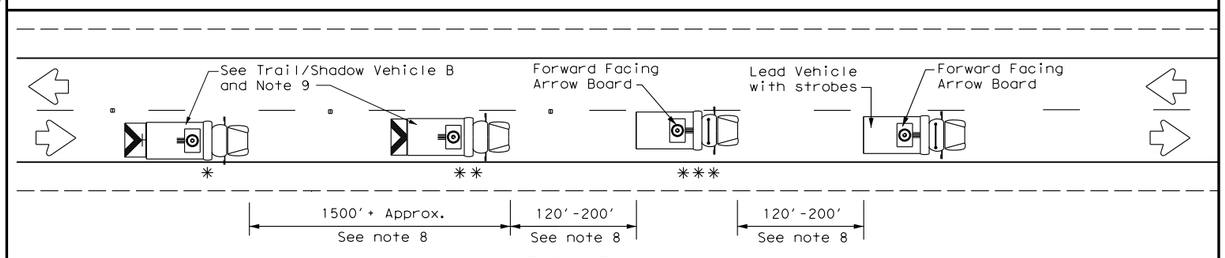


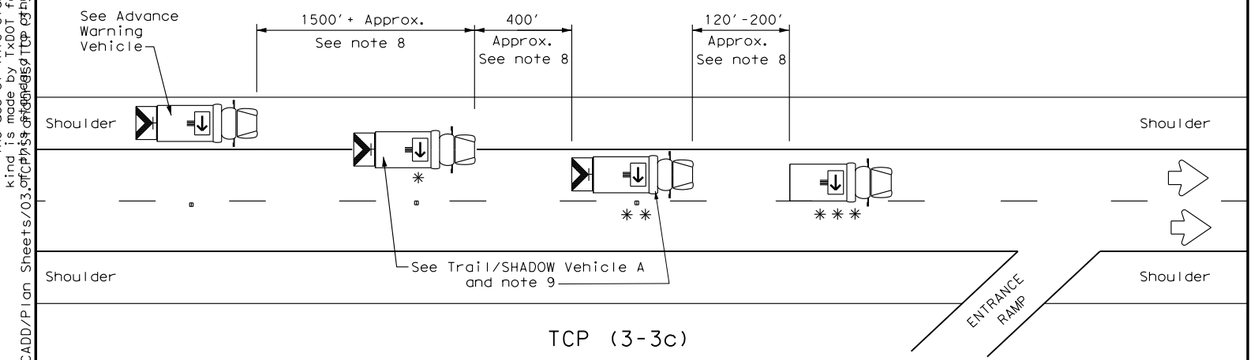
TCP (3-3a)

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



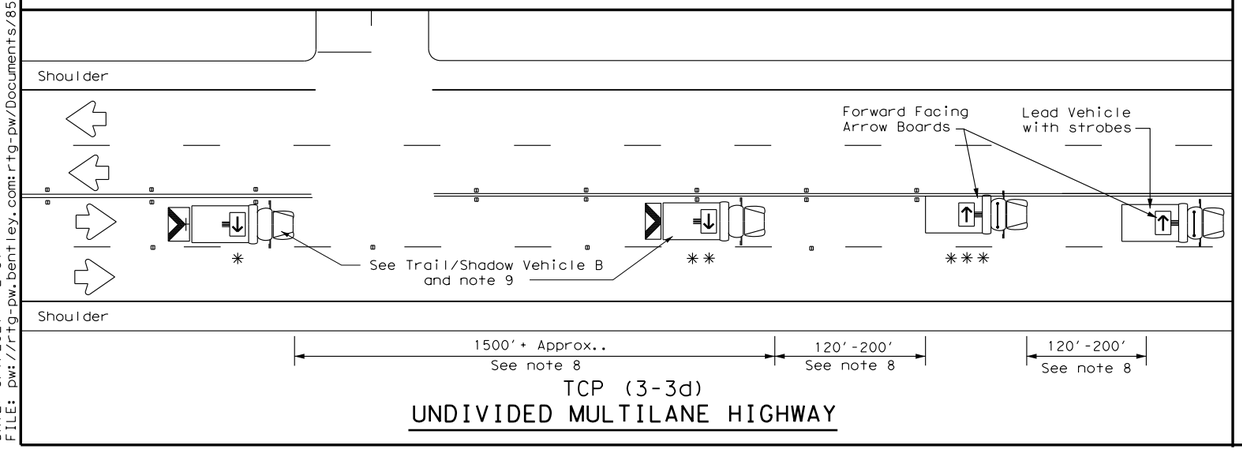
TCP (3-3b)

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



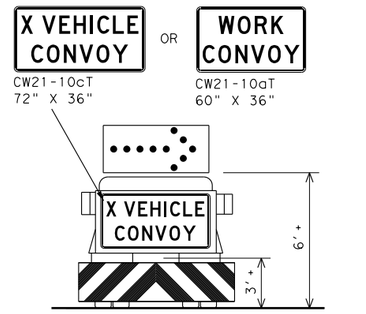
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



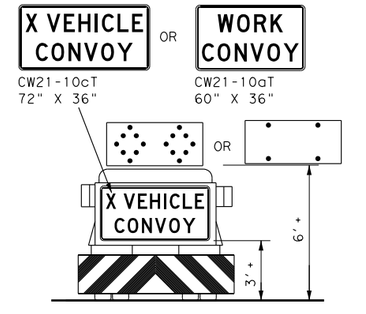
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



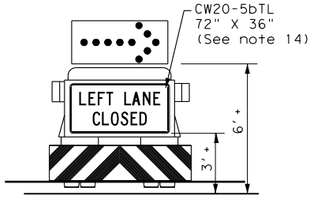
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

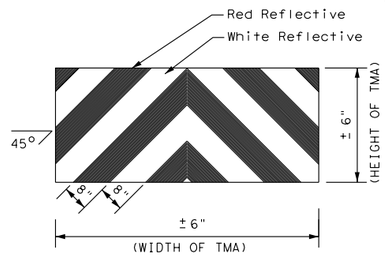


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ATL	HARRISON		30
1-97 7-14				

177

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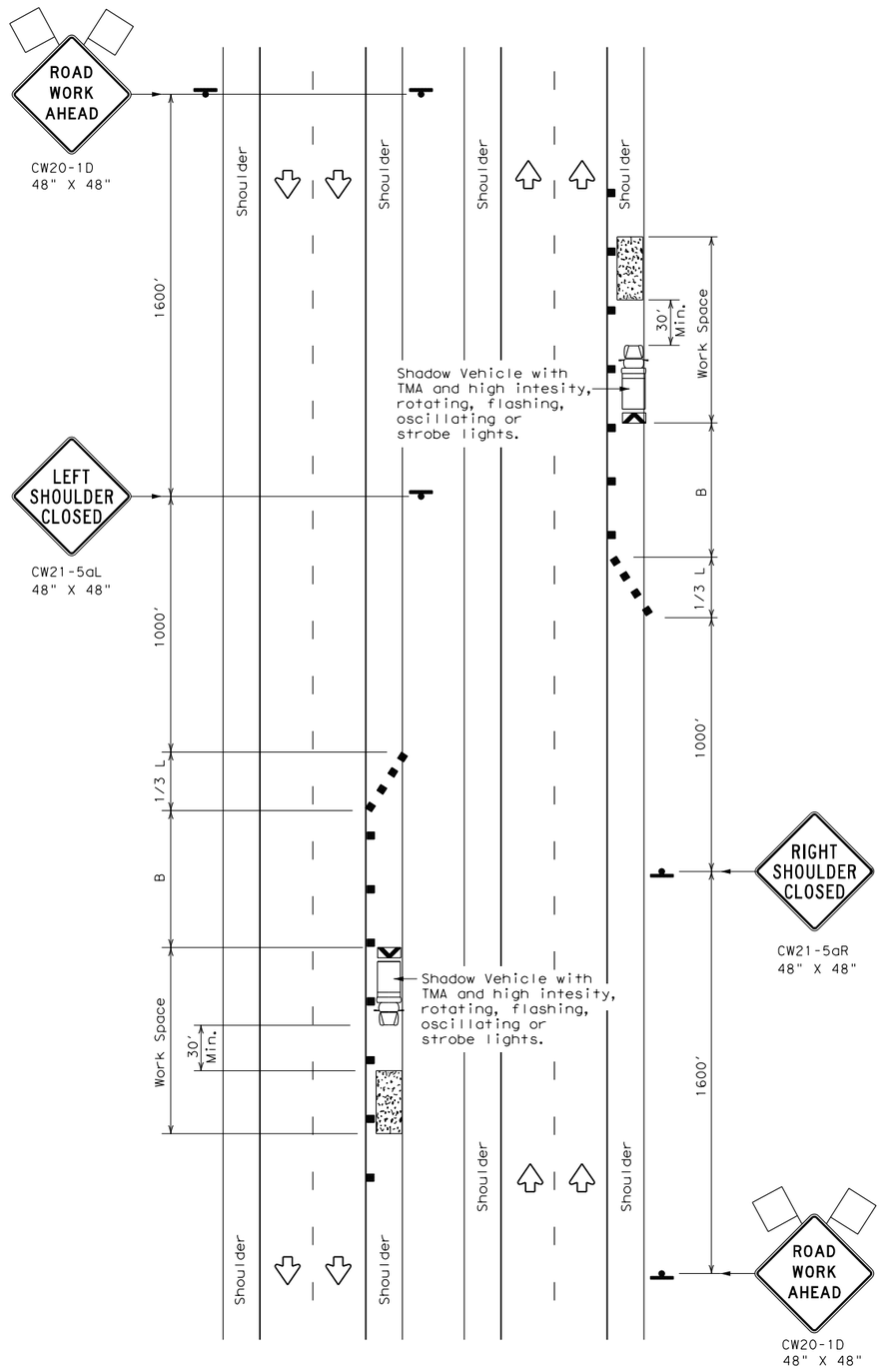
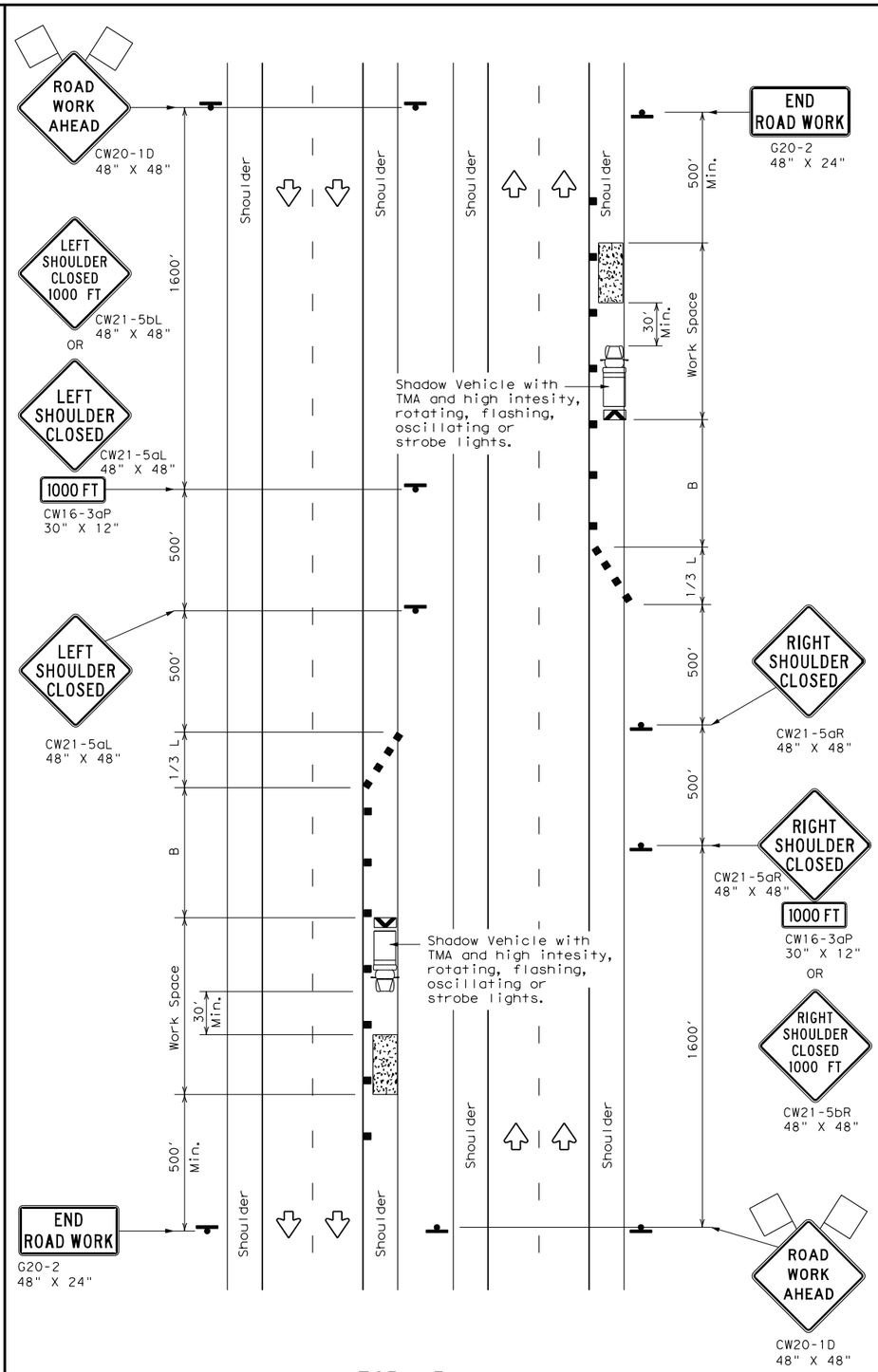


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
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'

* 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
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
2-18	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		31

DATE: 3/1/2021 2:37
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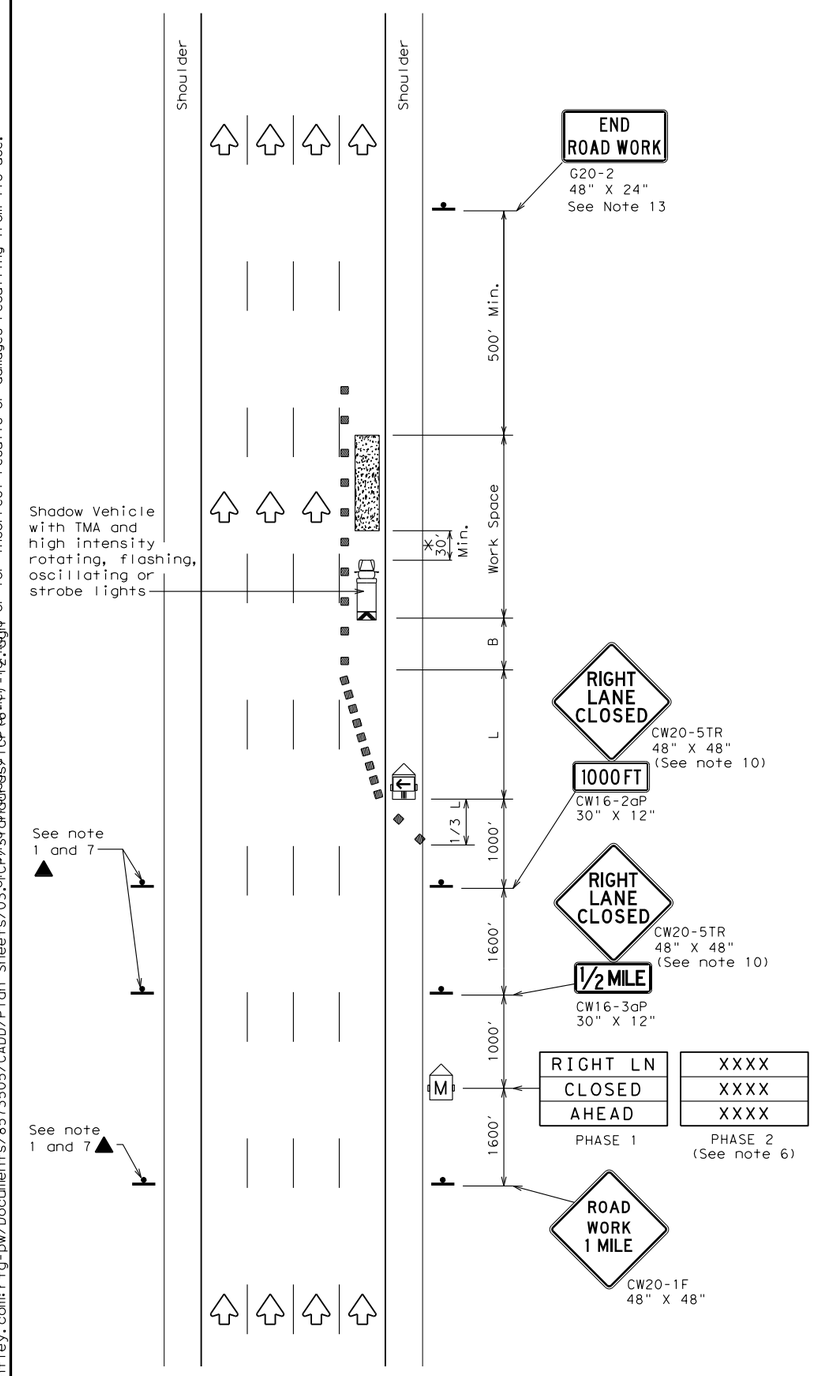
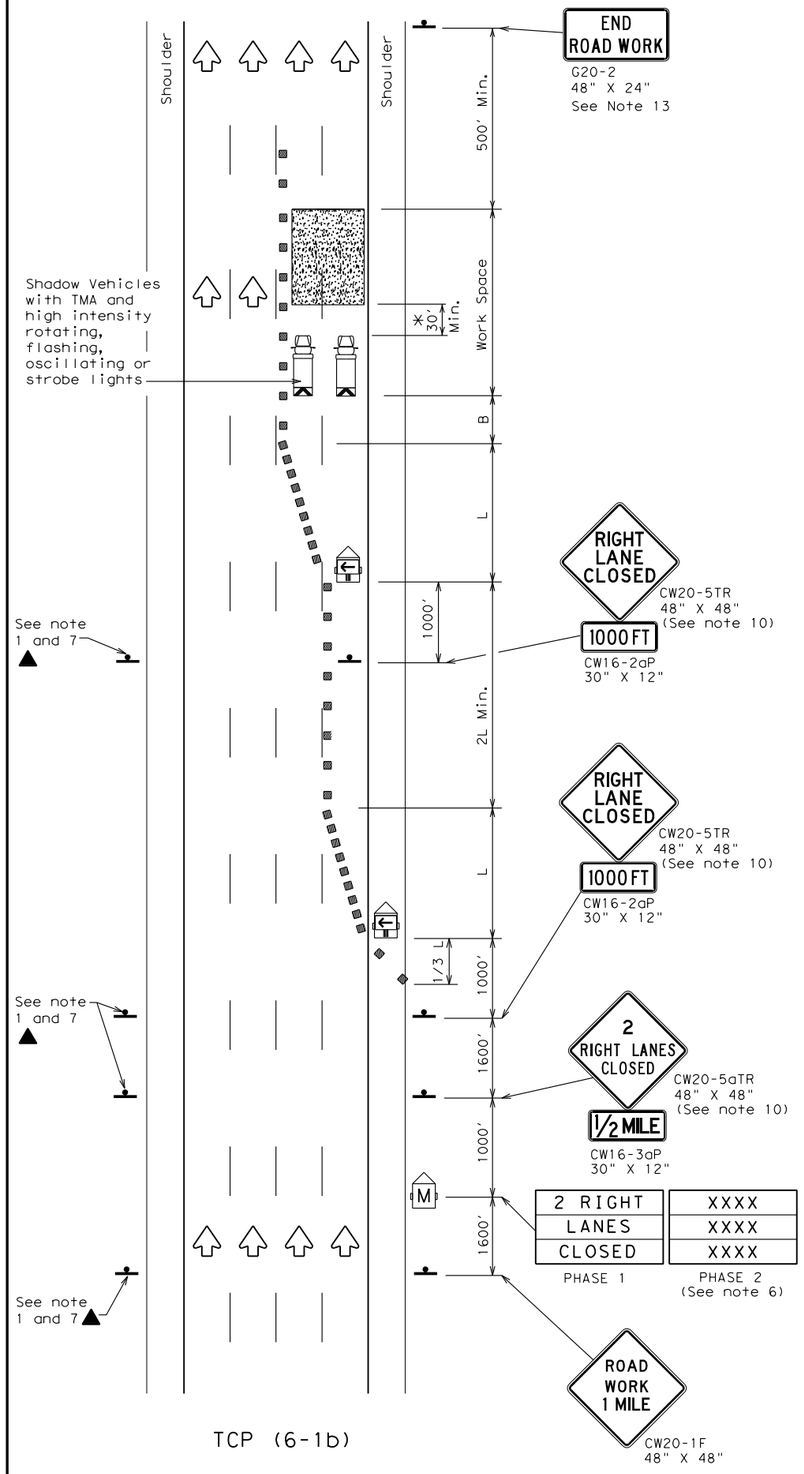


TCP (6-1a)

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	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
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

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0495	08	121,ETC	IH 20
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	ATL	HARRISON		32

201

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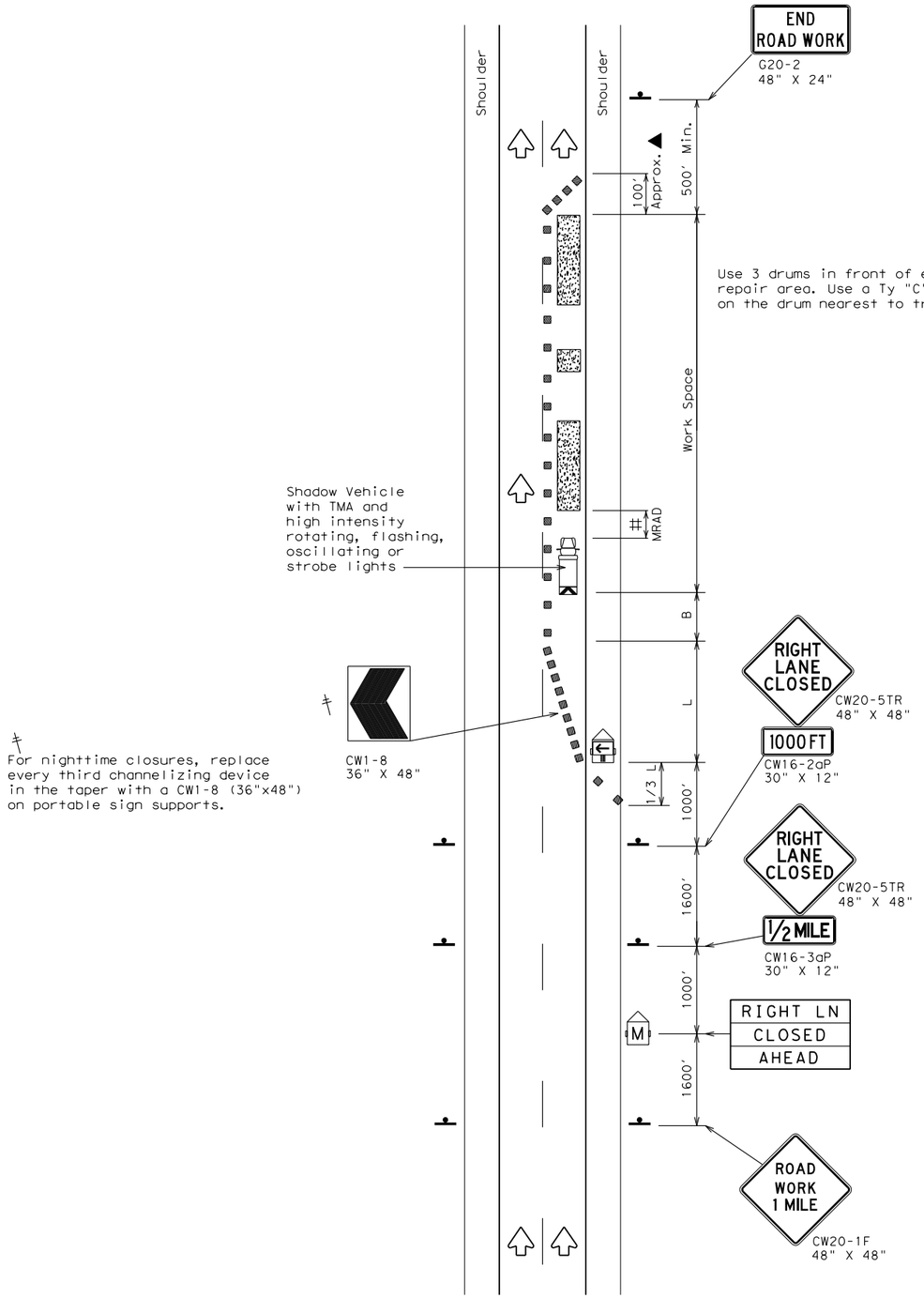


LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Drum

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 or when approved by the Engineer.
2. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
3. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
4. Duplicate construction warning signs shall be erected on the median side of freeways.
5. The TCP details may require additional and/or relocation of route shields, guide signs, etc. to guide motorists along entire length of detour due to ramp and freeway closure.
6. See BC Standards for additional sign details.
7. When possible, changeable message signs should be located 500 feet in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route.
8. 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.
9. A minimum of two PCMS per direction shall be placed in advance of the lane closure. PCMS shall be placed a minimum of 0.5 mile in advance of the taper. An additional PCMS shall be placed approximately 3 miles in advance of the taper or at the end of the queue, whichever is greater.
10. Channelizing devices shall be placed in accordance with BC Standards and "WORKSHEET FOR EDGE CONDITION TREATMENT TYPES."
11. Neither work activity nor storage of equipment, vehicles, or materials shall occur within the buffer space.
12. Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary, 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.
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 and positioned per the Manufacturer's Roll Ahead Distance (MRAD) in advance of the area of crew exposure without adversely affecting the work performance.

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.

Texas Department of Transportation
Atlanta District Standard

TRAFFIC CONTROL PLAN FREEWAY PAVEMENT REPAIRS

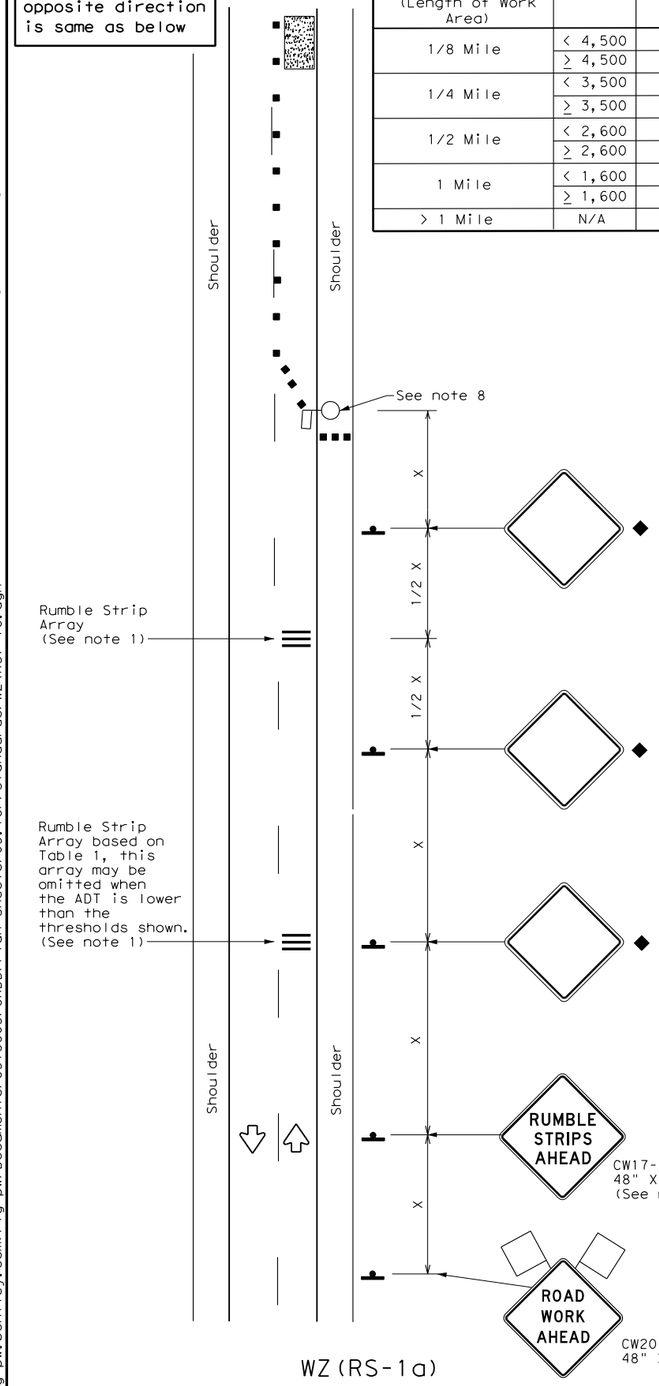
TCP (ATL-61)-14

FILE: atl-61.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		33

061

DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/03_TCP_WZ_RS_16.dgn

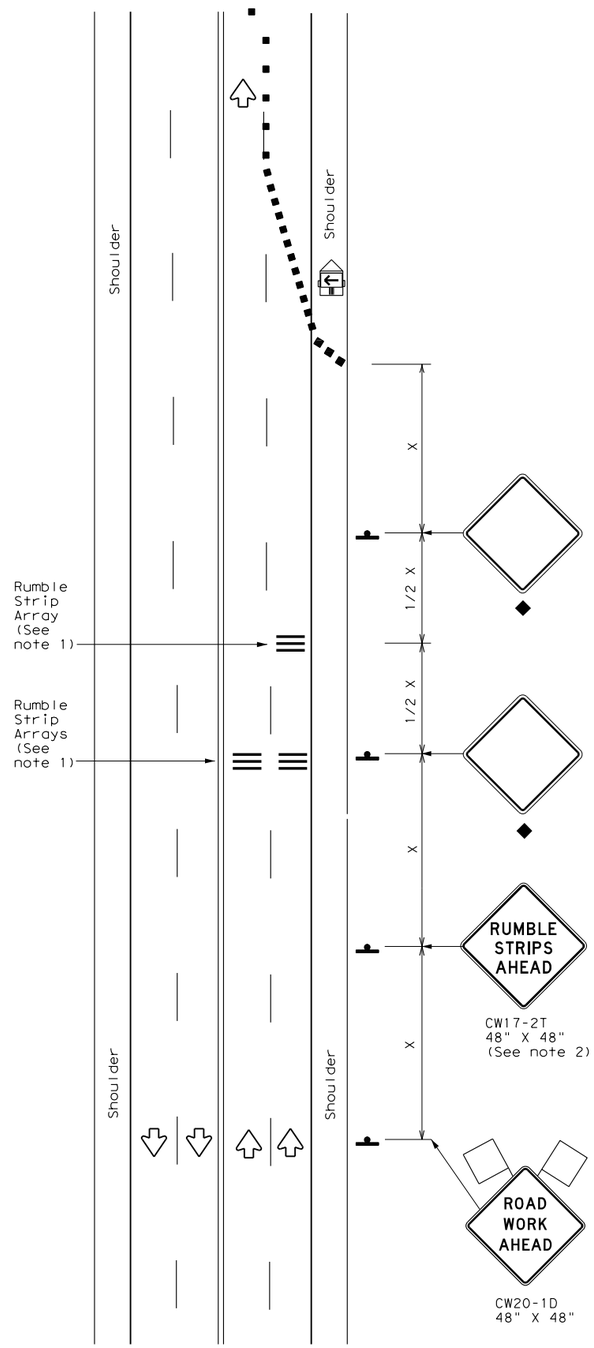
Warning sign and rumble strip sequence in opposite direction is same as below



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Removal of the Temporary Rumble Strips should be accomplished before removing the advance warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an AFAD or a portable traffic signal.
9. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel	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
	✓	✓		

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

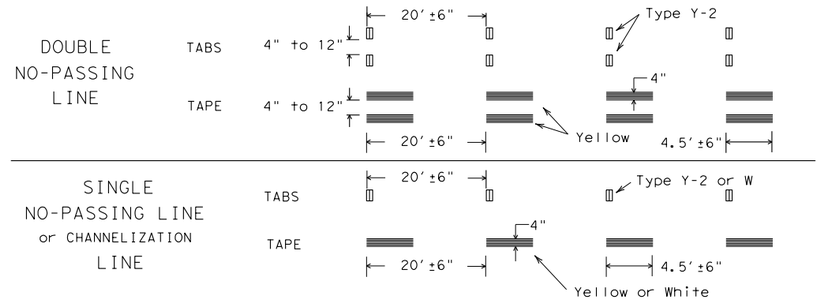
WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
2-14	DIST	COUNTY		SHEET NO.
4-16	ATL	HARRISON		34

118

DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/03_CPDS_WZSTPM-13.dgn

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



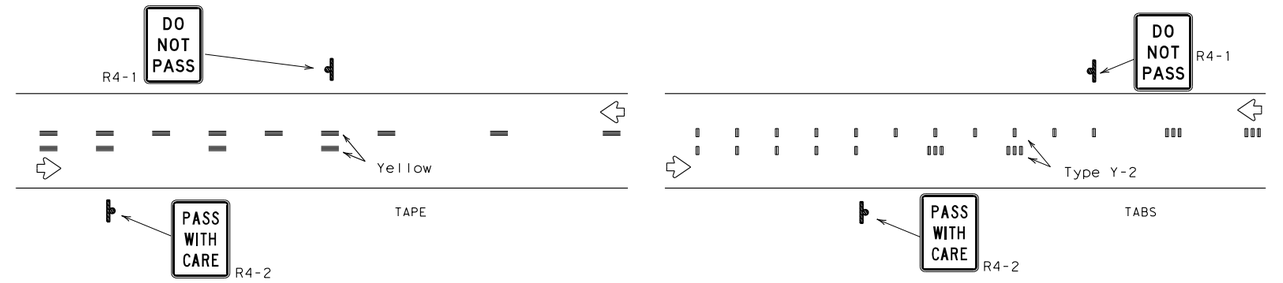
NOTES:

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

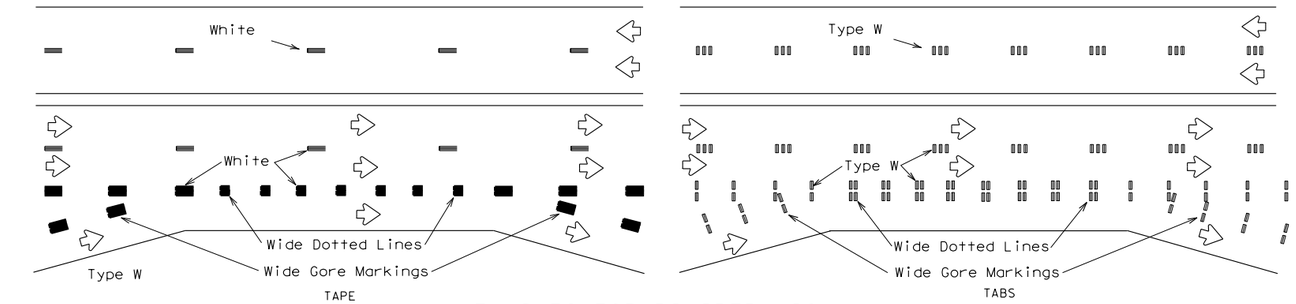
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

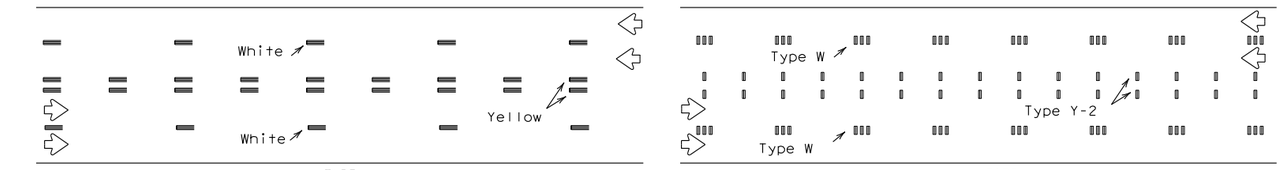
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



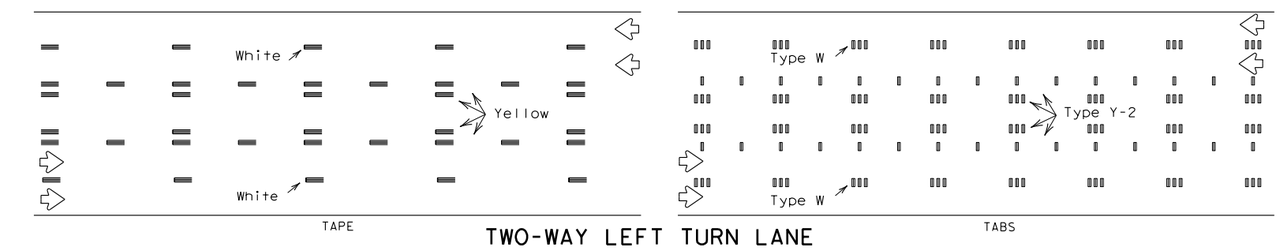
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



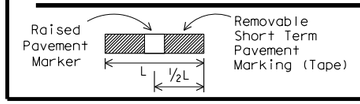
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0495	08	121,ETC	IH 20
1-97		DIST	COUNTY		SHEET NO.
3-03		ATL	HARRISON		35
7-13					

111

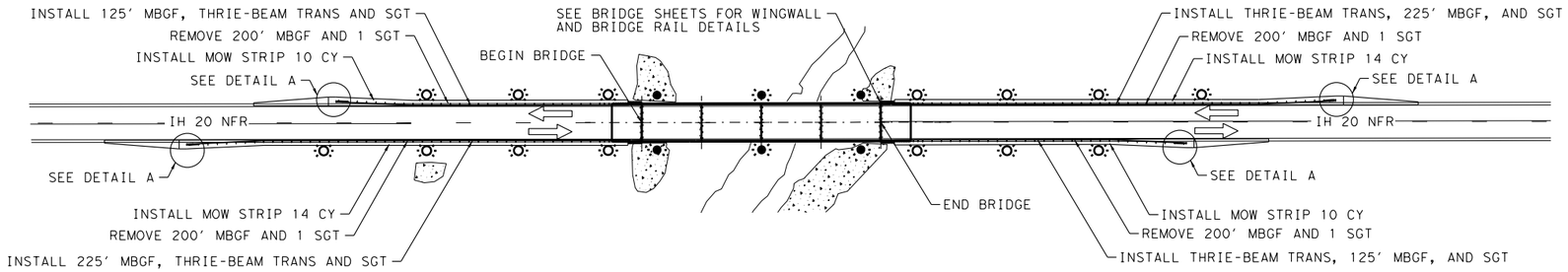
0 50 100
SCALE IN FEET

N

LEGEND

(D-SW) SZ 1 (BRF)GF2 (BI)

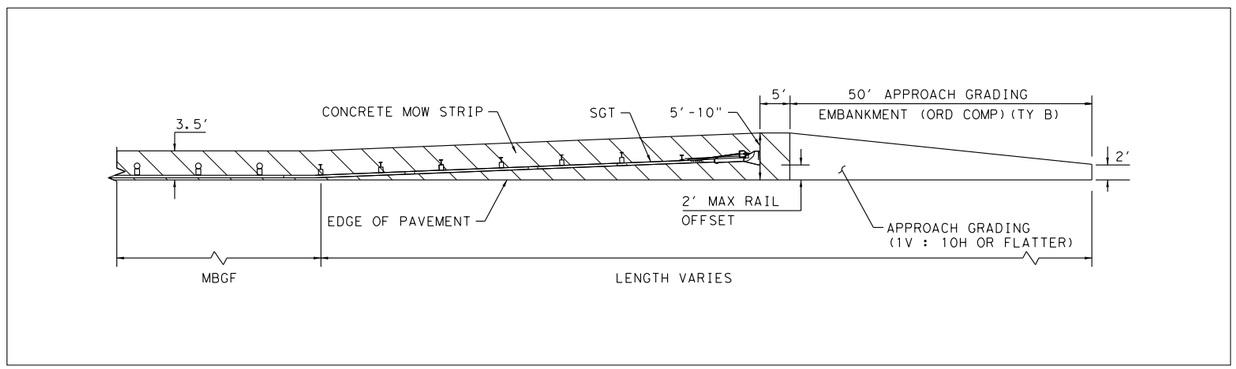
(D-SW) SZ (BRF) CTB (BI)



IH 20 NFR OVER MASON CREEK

NBI: 19-103-0-0495-08-268

DETAIL A - MBGF DETAILS



STATE OF TEXAS
BRIAN ENNS
93801
LICENSED PROFESSIONAL ENGINEER

P.E. 3/1/2021

NO.	REVISION	BY	DATE

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

IH 20
MBGF LAYOUT
NFR (WHITEHURST DR)
OVER MASON CREEK

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
GRAPHICS	6			IH 20
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK	TEXAS	ATL	HARRISON	36
CHECK	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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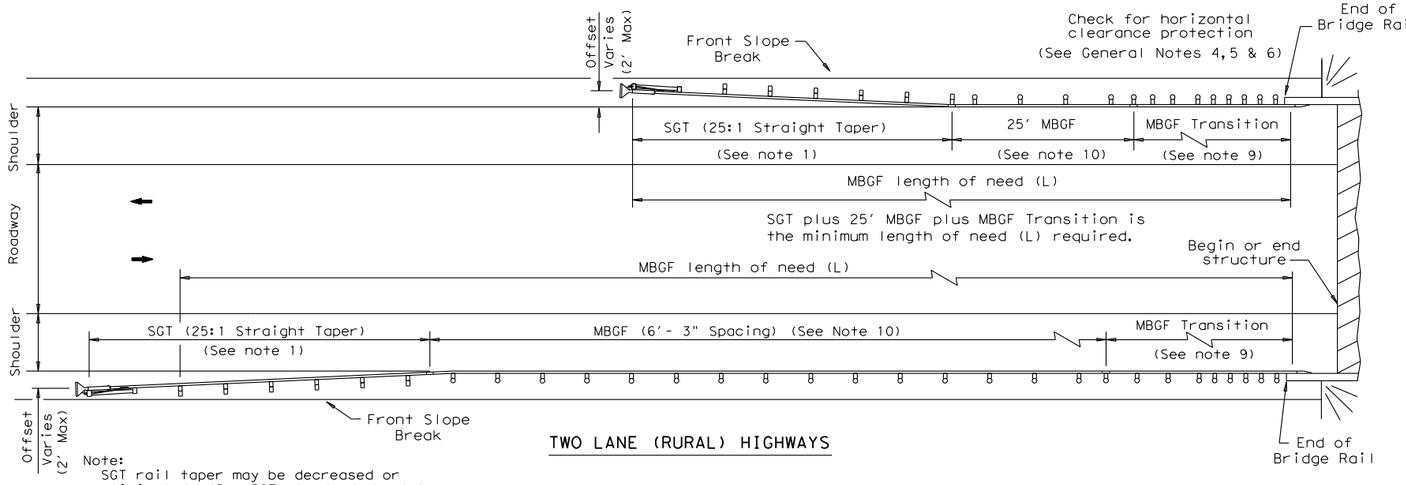
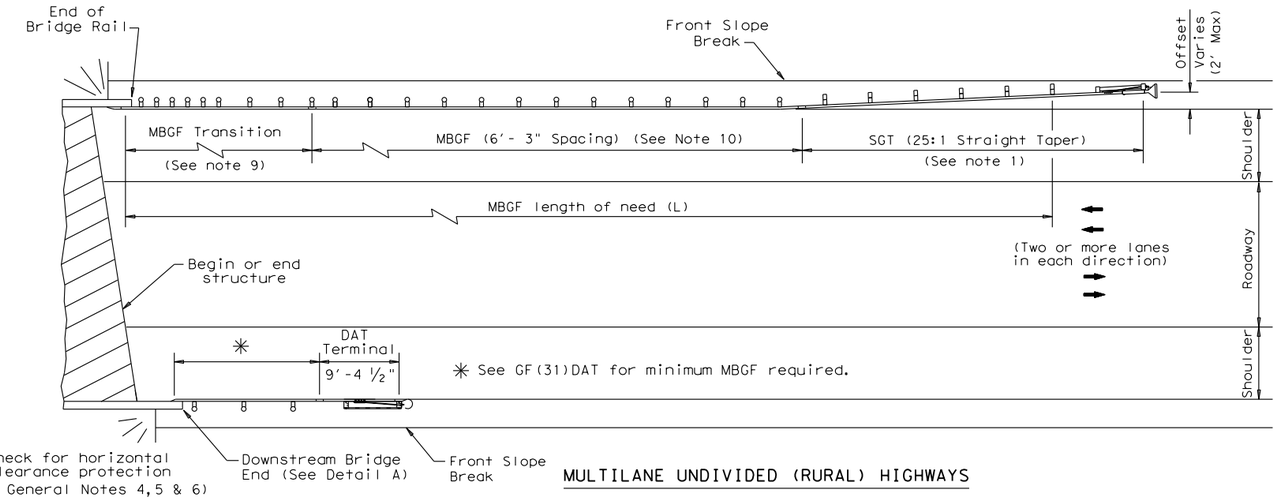
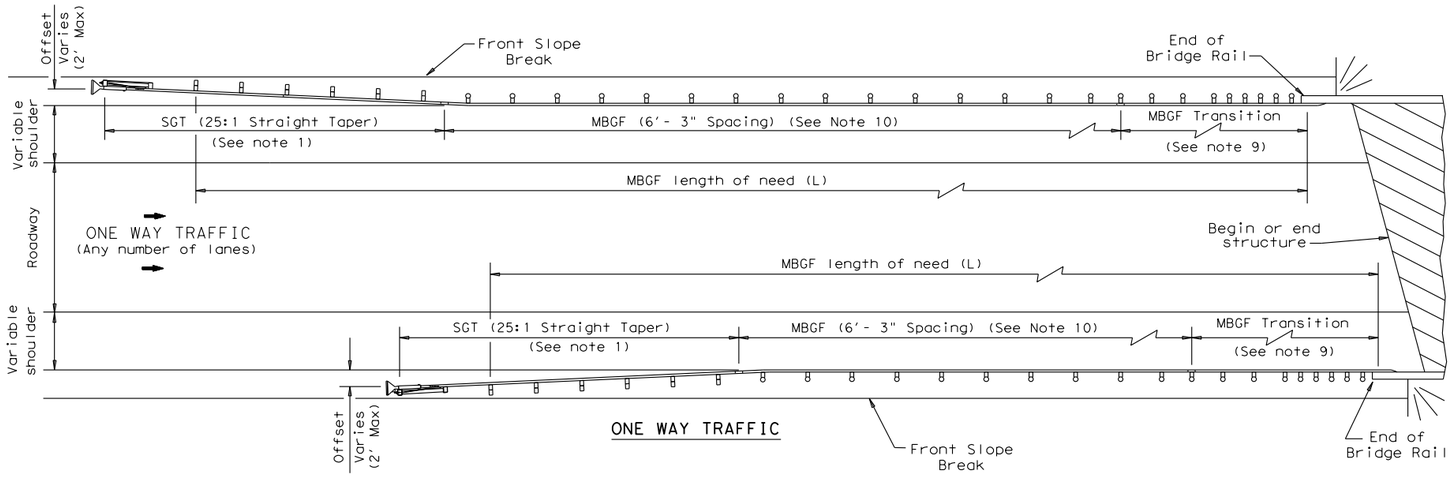


TWO LANE (RURAL) HIGHWAYS

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



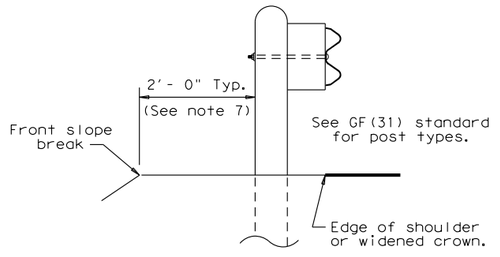
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



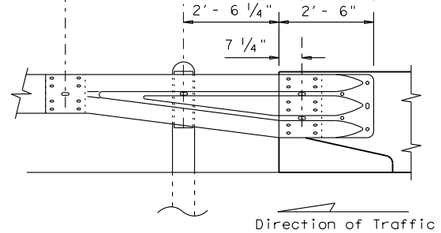
ONE WAY TRAFFIC

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

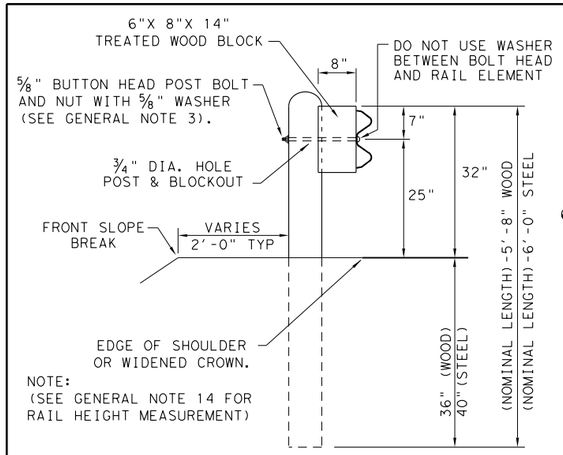
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

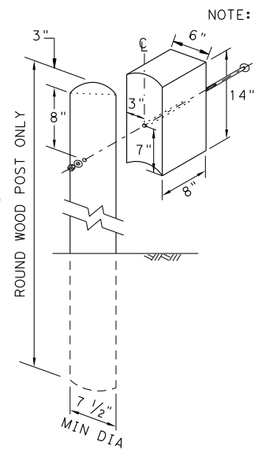
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121, ETC	IH 20
04-2014 Added 25' MBGF to Two Lane (Rural) Highway section. Eng. CGL, Cad. VP	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		37

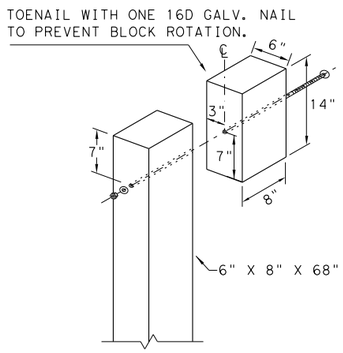
DATE: 3/1/2021
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/04_Roadway/Standards/GF(31)-19.dgn



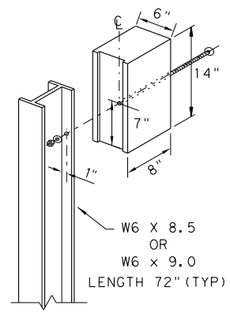
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

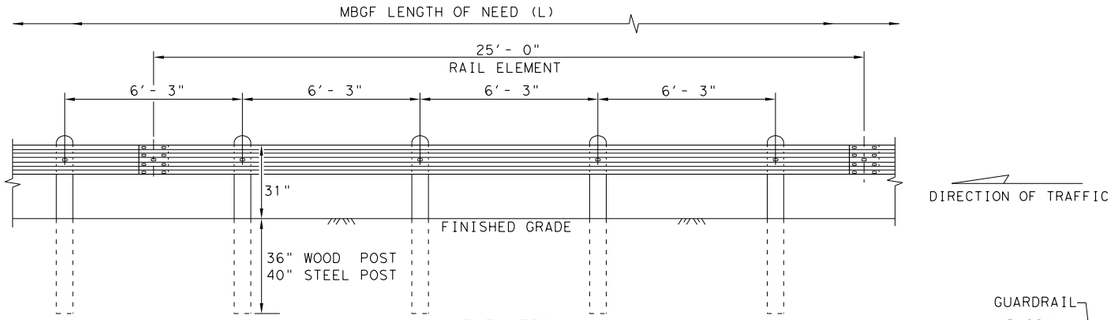


WOOD BLOCK TO
RECTANGULAR WOOD POST



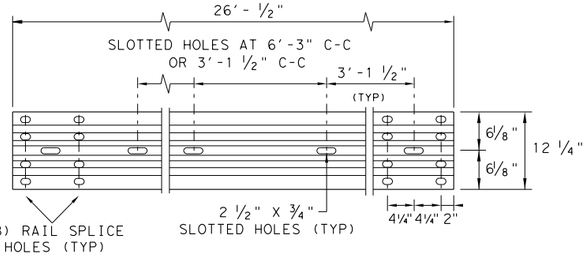
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



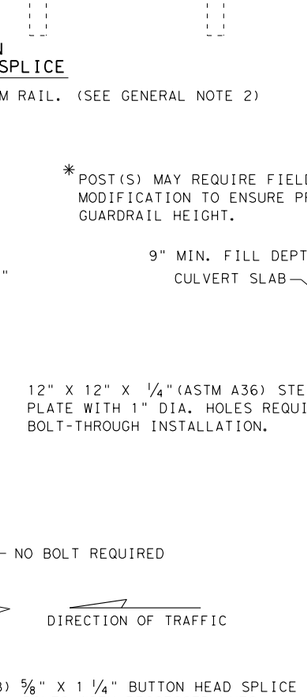
ELEVATION
MID-SPAN RAIL SPLICE

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



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

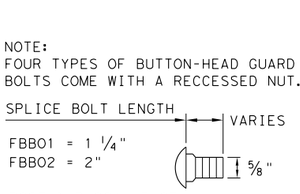
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



MID-SPAN
RAIL SPLICE DETAIL

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

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.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" 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.

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.

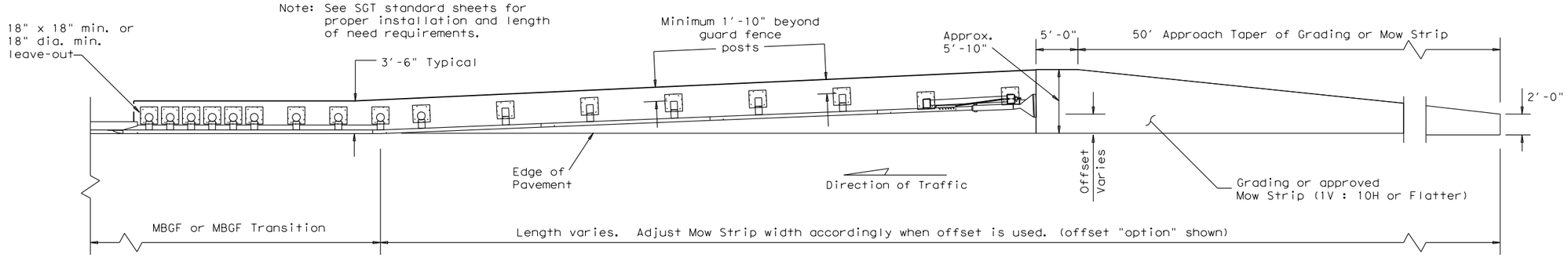
Texas Department of Transportation

Design Division Standard

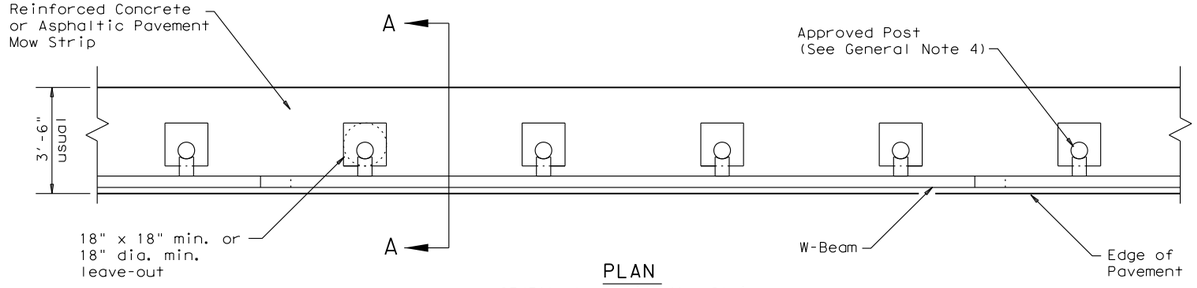
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0495	08	121,ETC	IH 20	
	DIST	COUNTY		SHEET NO.	
	ATL	HARRISON		38	

DATE: 3/1/2021
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/04.Roadway/Standards/GF(31)MS-19.dgn

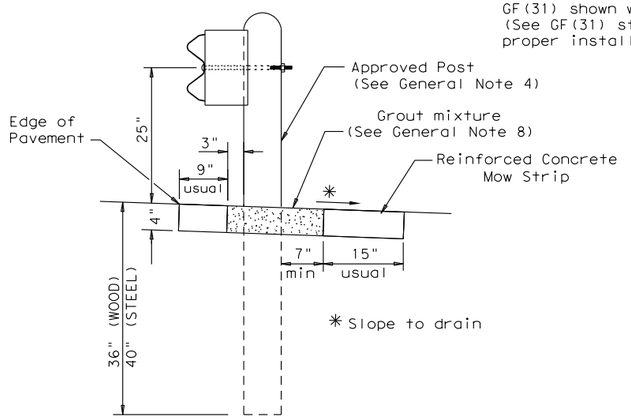


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



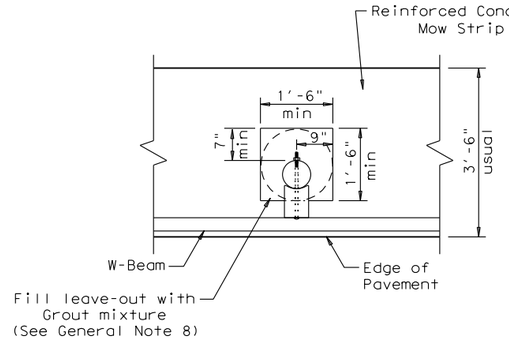
PLAN

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



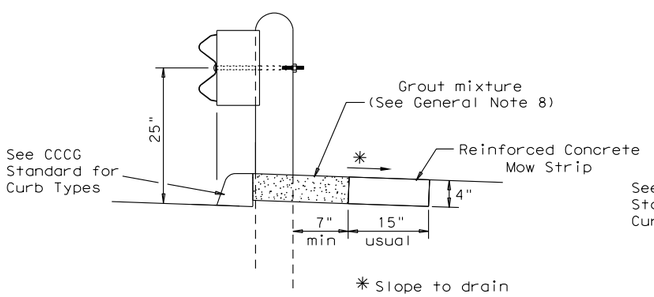
SECTION A-A

Typical



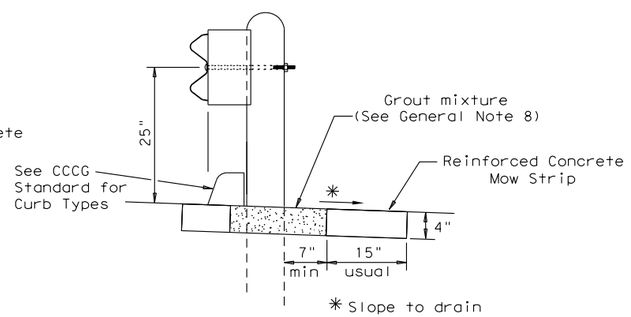
MOW STRIP DETAIL

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



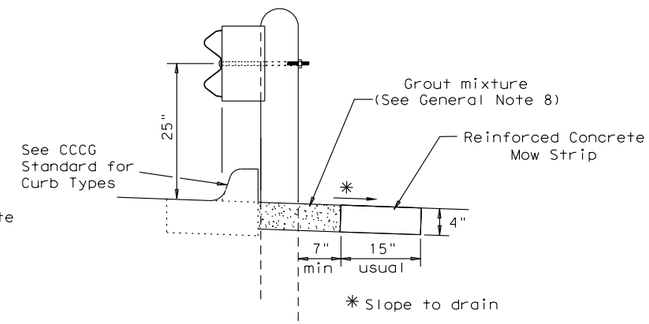
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		39

DATE: 3/1/2021
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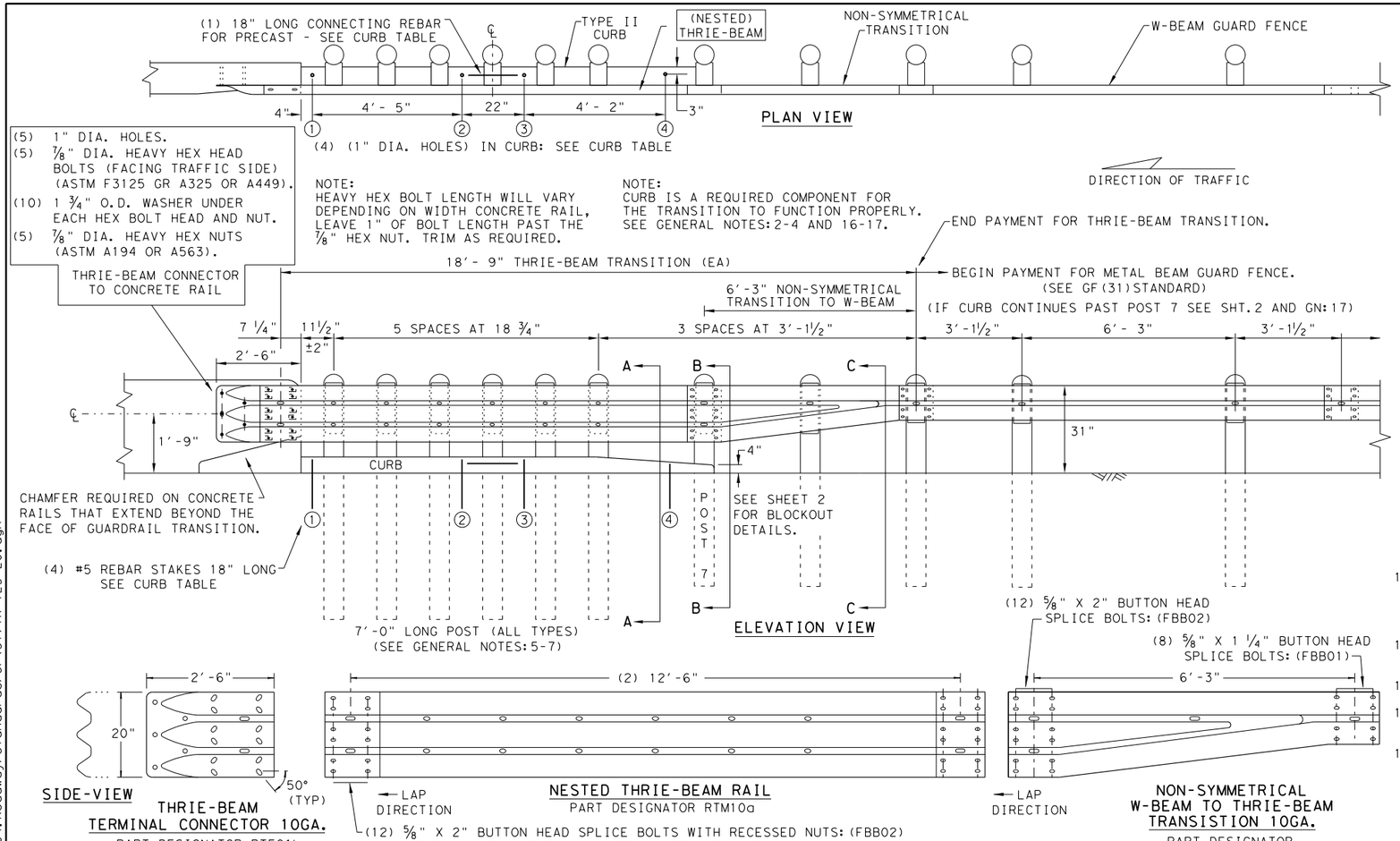
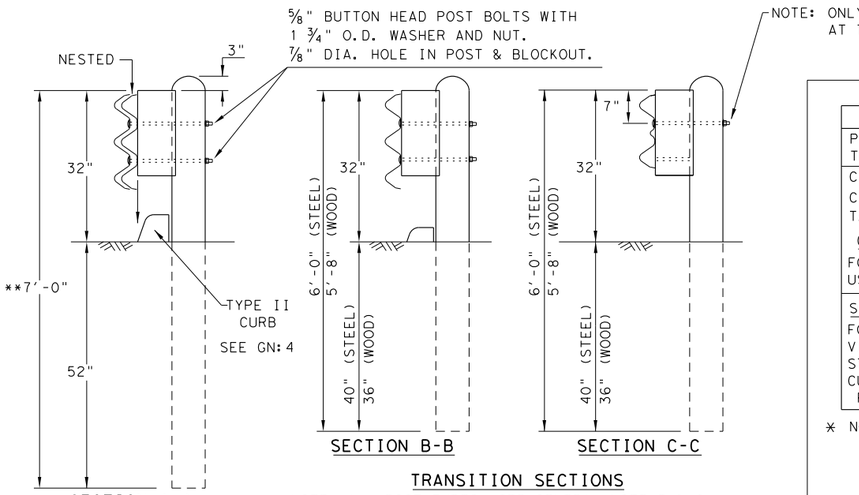
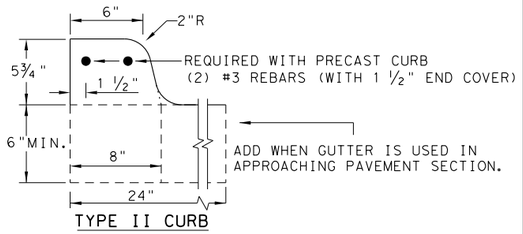




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB 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.



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: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0495	08	121,ETC	IH 20	
	DIST	COUNTY		SHEET NO.	
	ATL	HARRISON		40	

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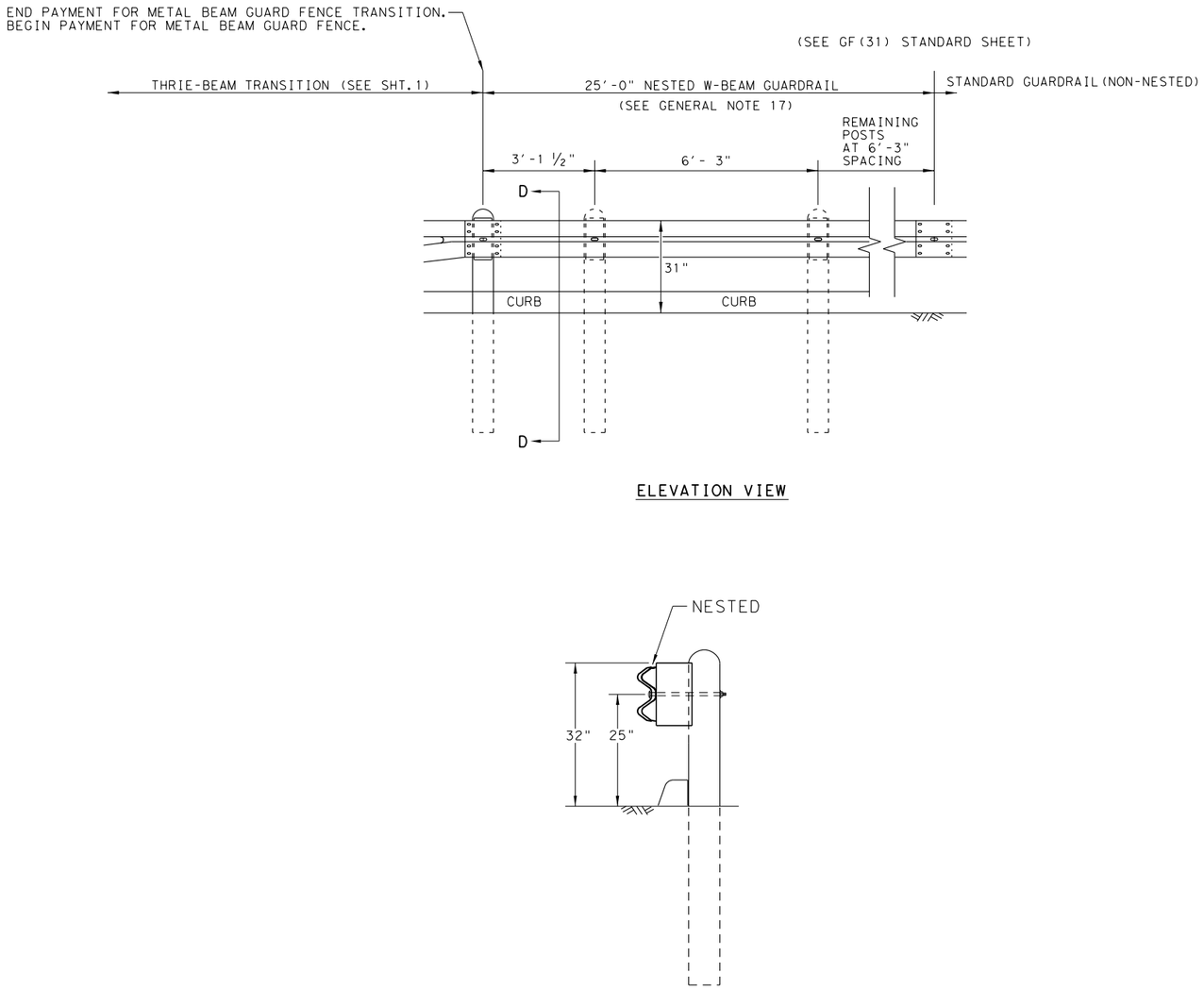
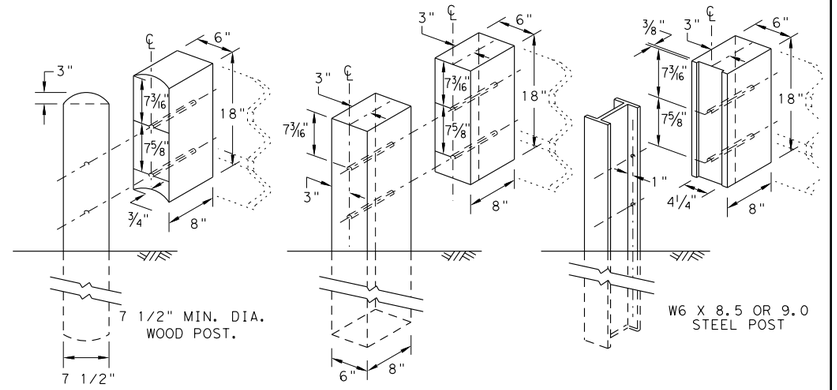
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0495	08	121,ETC		IH 20	
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	ATL	HARRISON			41	

DATE: 3/1/2021
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NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

PLAN VIEW

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

BEGIN LENGTH OF NEED

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: C

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

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

POST 40" DEPTH (TYP 1-8)

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

FINISHED GRADE

40"

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

SECTION VIEW B-B

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

POST(2)

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'- 1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

APPROX 5'-10" 5'-0" 50' APPROACH GRADING

STANDARD MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0495	08	121,ETC	IH 20		
	DIST	COUNTY		SHEET NO.		
	ATL	HARRISON		42		

DATE: 3/1/2021
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/04_Roadway_Standards/sgt11s3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

POST 1 OFFSET DISTANCE MEASURED
7-5/8" FROM REFERENCE LINE

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

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

RAIL 4 RAIL 3 RAIL 2 RAIL 1

NO BLOCKOUT
AT (POST 1)

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

PLAN VIEW

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

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

CABLES

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- 1/2"

49'-8 9/16"

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

6'-3" 6'-3" 6'-3" 6'- 3/4" 6'-3" 6'-3" 6'-3" 37 1/2" 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

DETAIL
(D)

HEAD
HEIGHT

DETAIL
(B)

A

32-1/4"

68-1/8"

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

FINISHED
GRADE

CABLES

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2 POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

SOIL
ANCHOR POST
ITEM (1)

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE

DETAIL (D)

HEAD
HEIGHT

TOP OF POST

32-1/4"

31-7/8"

FINISHED
GRADE

40-1/8"

68-1/8"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9

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

SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

SECTION VIEW A-A

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

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL 5/8" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

2'-0" MAX.
RAIL OFFSET

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

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

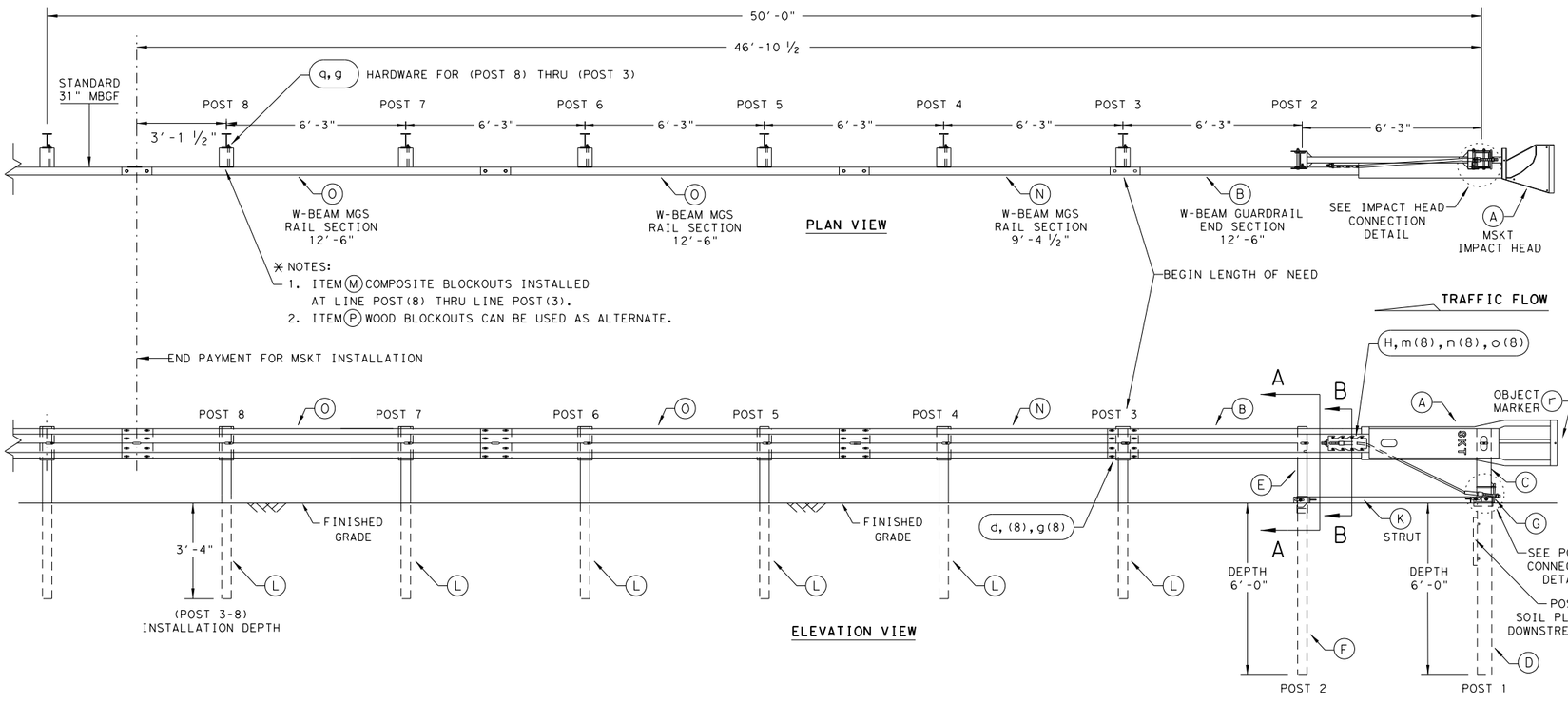
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER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

Texas Department of Transportation

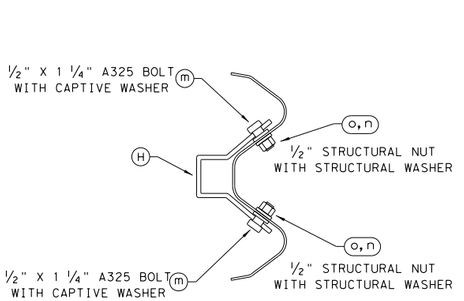
Design Division Standard

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

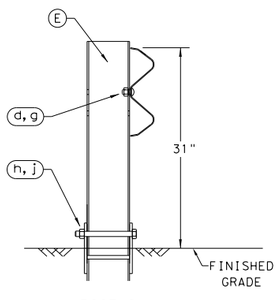
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		43



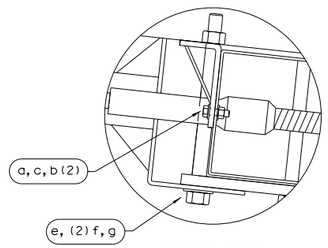
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



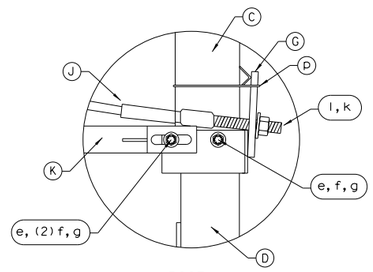
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



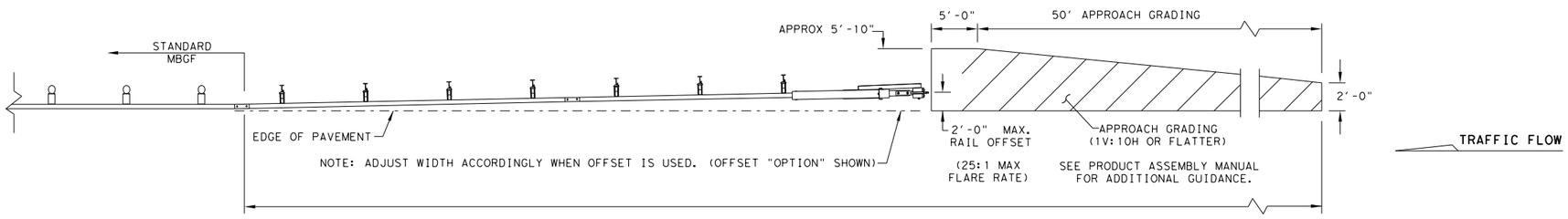
IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

SEE NOTES: ✳

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



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 9/16" 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

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	0495	08	121,ETC	IH 20	
	DIST	COUNTY		SHEET NO.	
	ATL	HARRISON		44	

DATE: 3/1/2021
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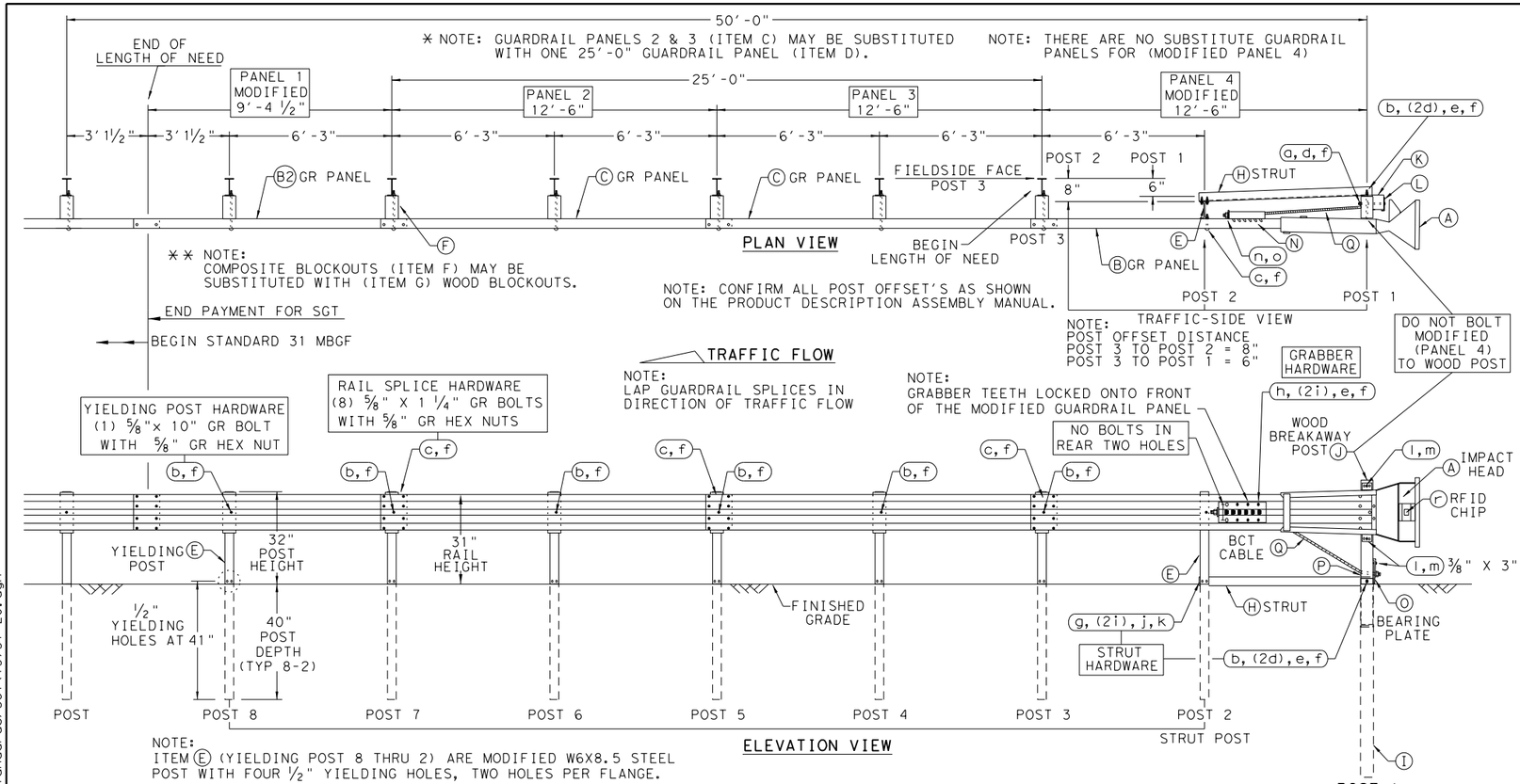
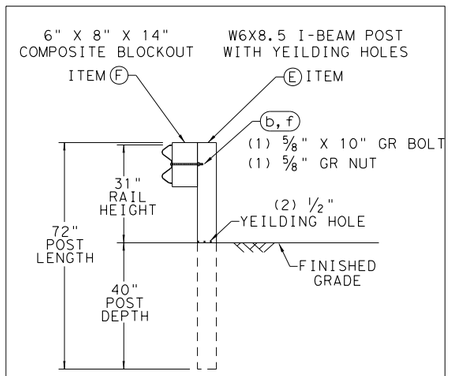


GENERAL NOTES

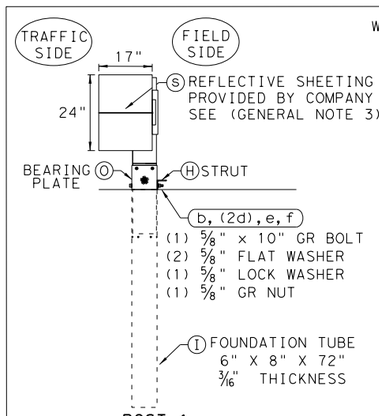
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

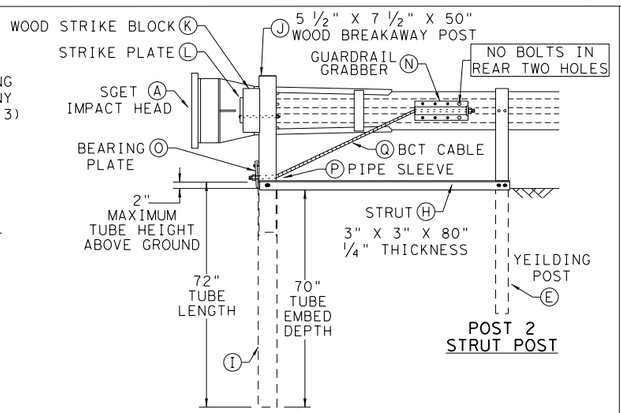
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

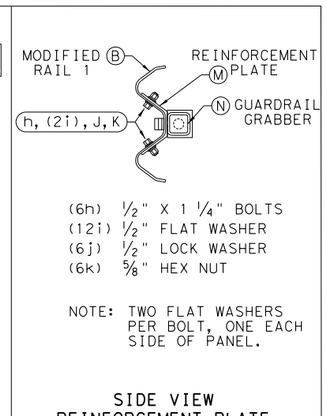


POST 1
FRONT END VIEW



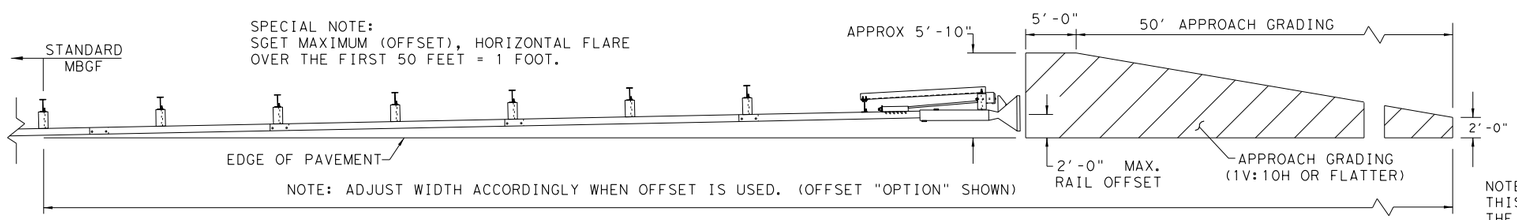
POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

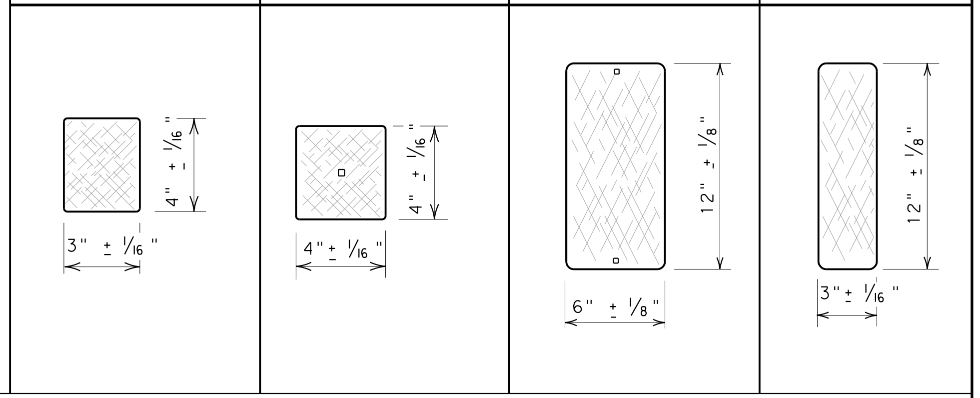
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

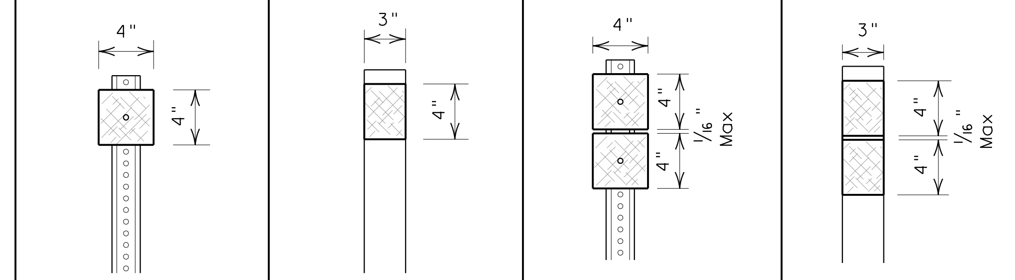
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		45

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)

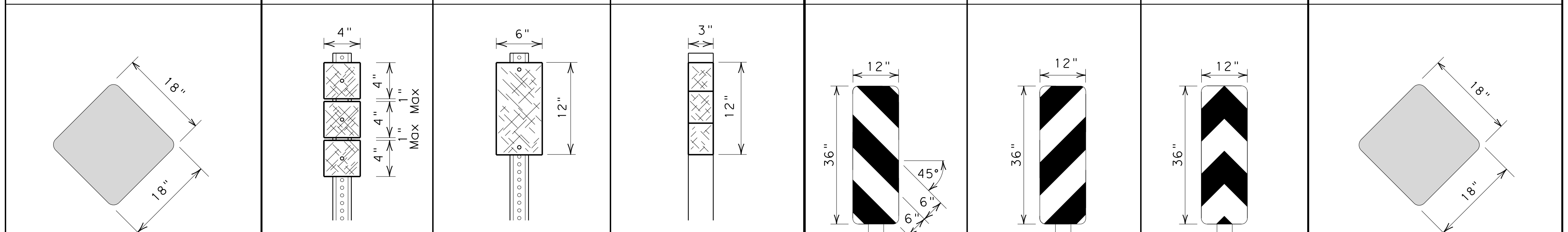
TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

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

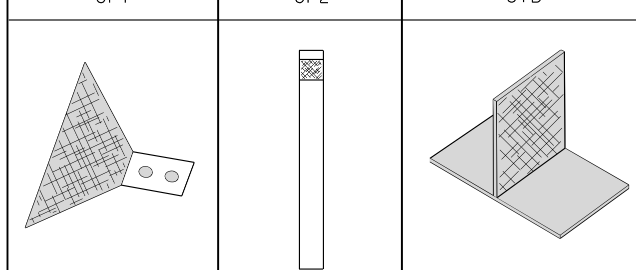
DIRECTION
- If Required
- BI = Bi-Directional

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

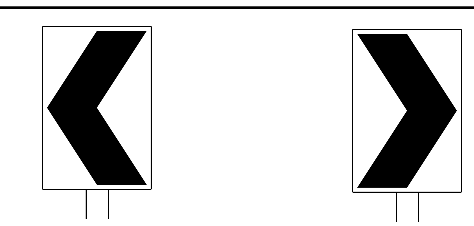
OBJECT MARKERS

	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

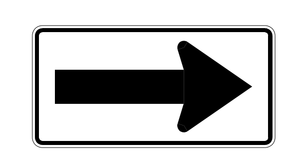
BARRIER REFLECTORS (BRF)

	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	

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

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).

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	0495	08	121, ETC	IH 20
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	ATL		HARRISON	46

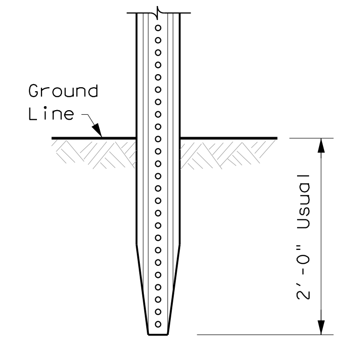
20A

DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/08...

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

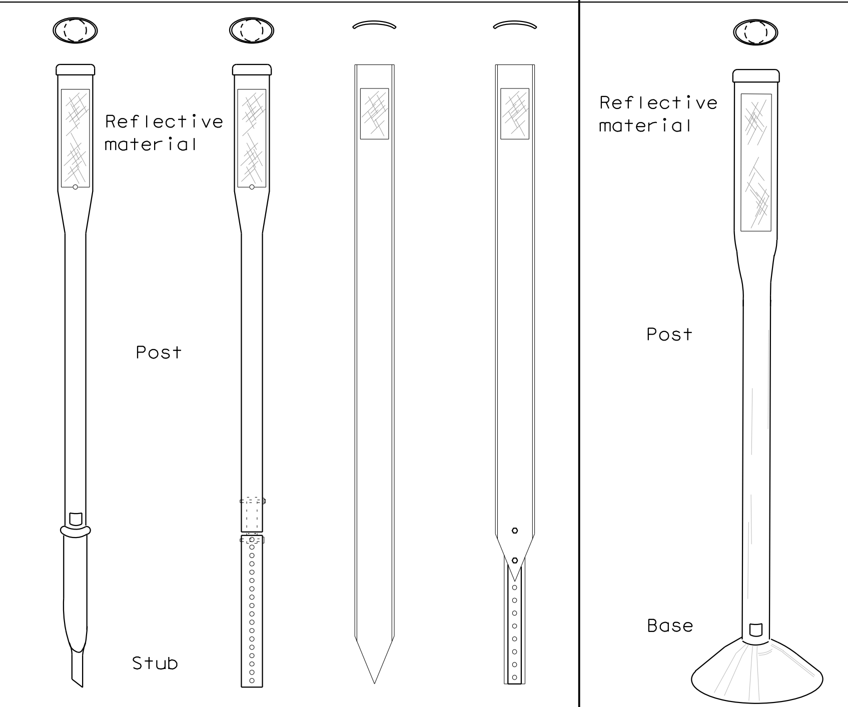


NOTES

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 | SRF



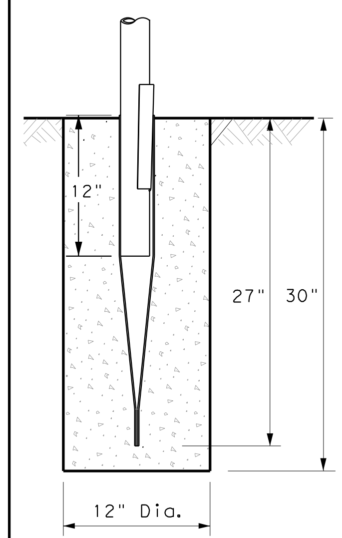
EMBEDDED | SURFACE MOUNT

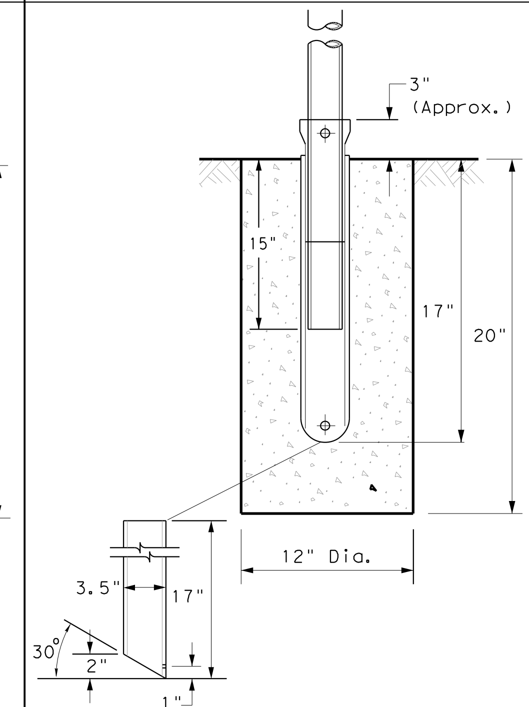
NOTES

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

WEDGE ANCHOR SYSTEMS

WAS | WAP





STEEL | PLASTIC

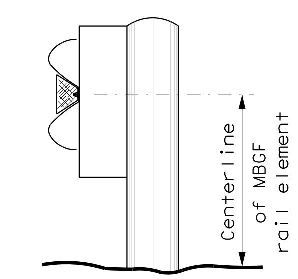
NOTE

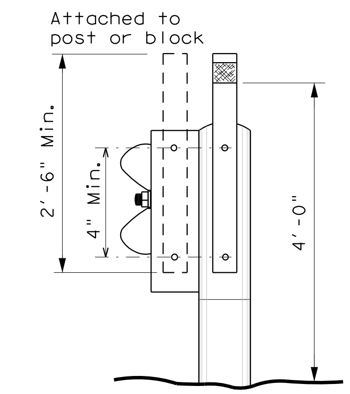
1. Install per manufacturer's recommendations.

TYPE OF BARRIER MOUNTS

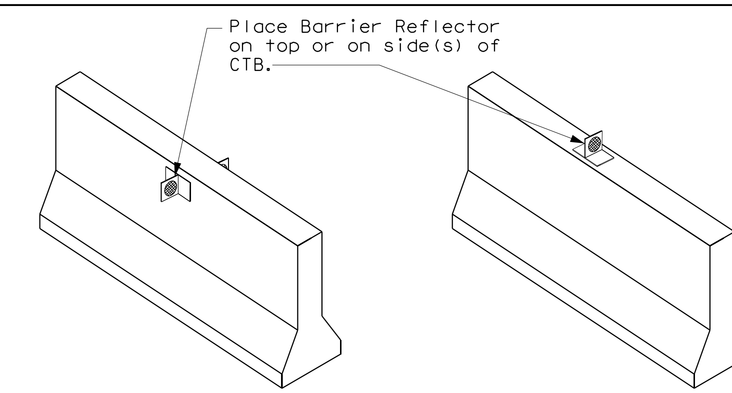
GUARD FENCE ATTACHMENT

GF1 | GF2





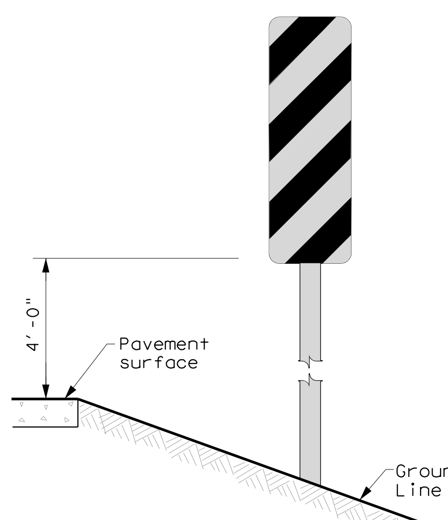
CONCRETE TRAFFIC BARRIER (CTB)



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.

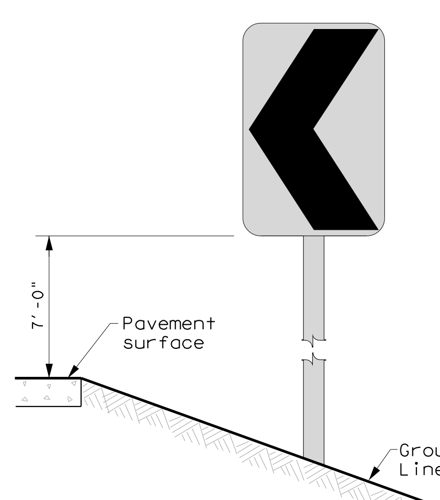
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

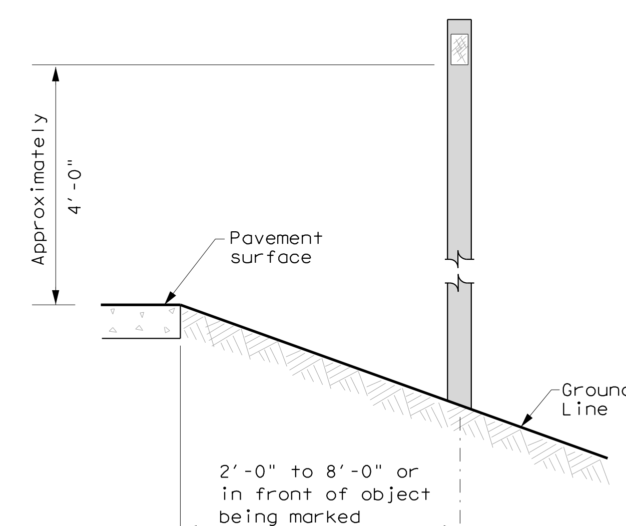
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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.

DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/08...

Texas Department of Transportation | Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

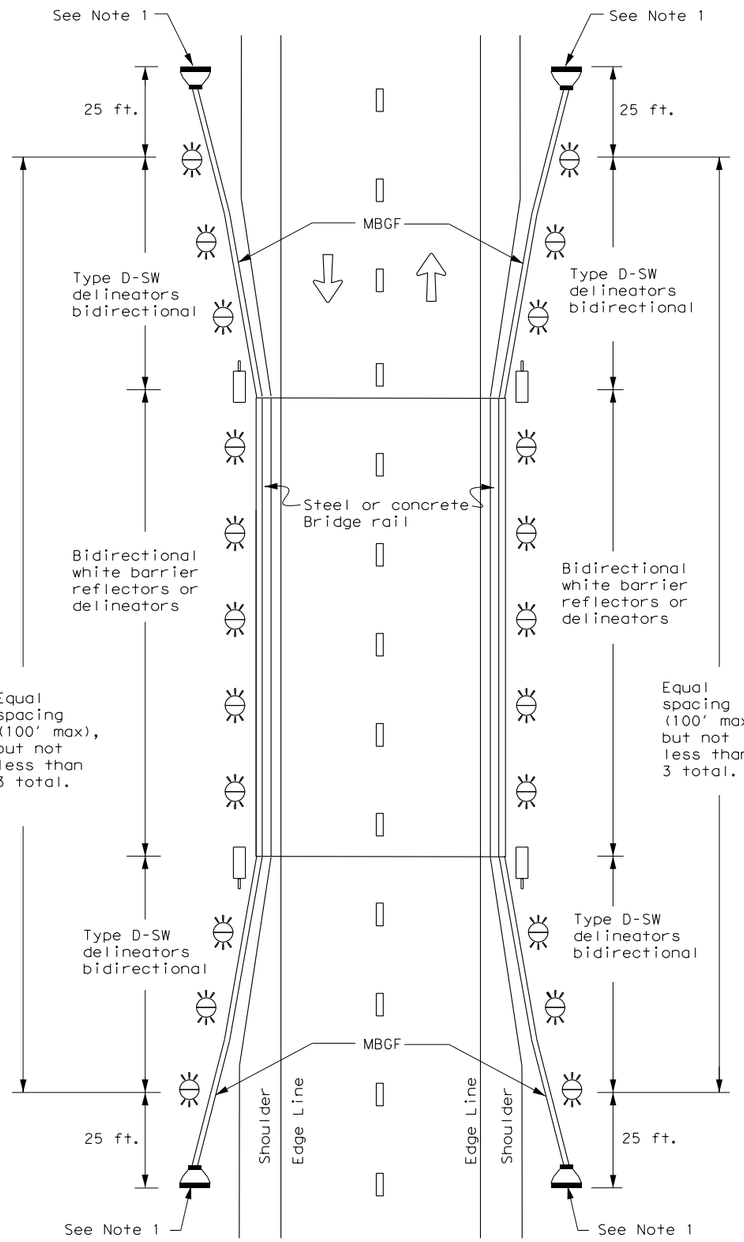
D & OM(2)-20

FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT 0495	SECT 08	JOB 121,ETC	HIGHWAY IH 20
REVISIONS 10-09 3-15 4-10 7-20	DIST ATL		COUNTY HARRISON	SHEET NO. 47

20B

DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/08_Traffic Safety/DOM5-20.dgn

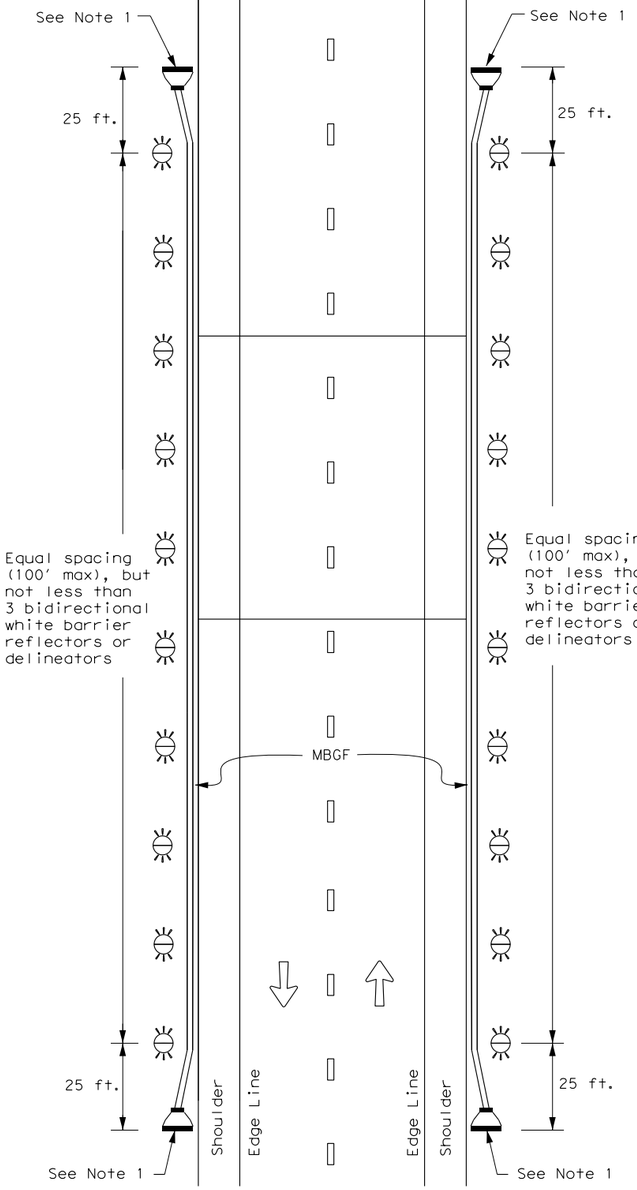
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

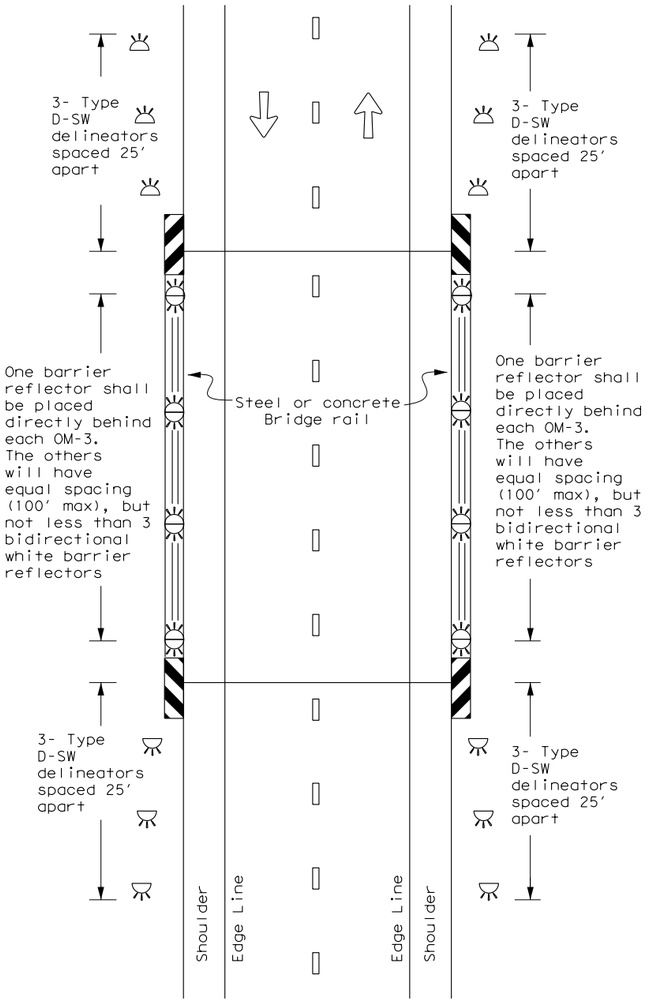
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

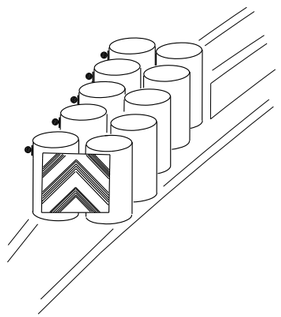
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

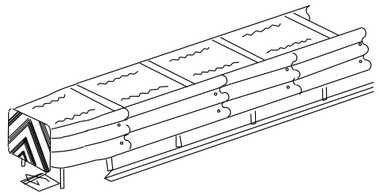
D & OM(5)-20

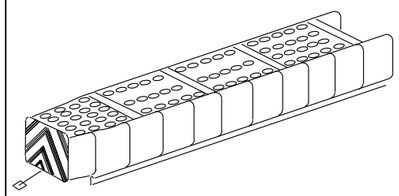
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121, ETC	IH 20
7-20	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		48

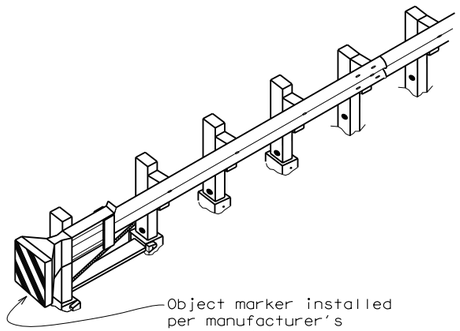
20E

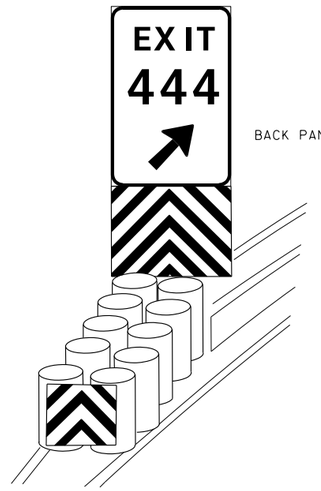
DATE: 3/1/2021 2:37
FILE: pw://rtg-pw.bentley.com:rtg_pw/Documents/8573505/CADD/Plan Sheets/08.dgn

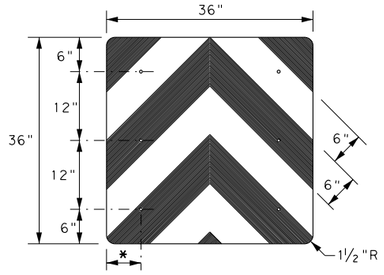


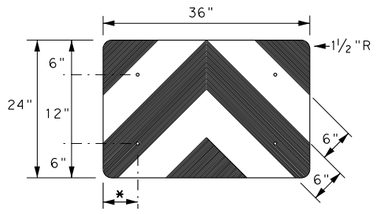




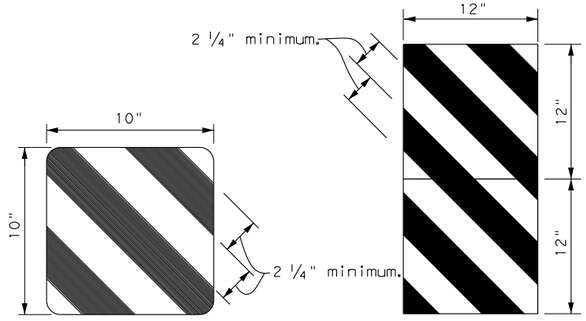




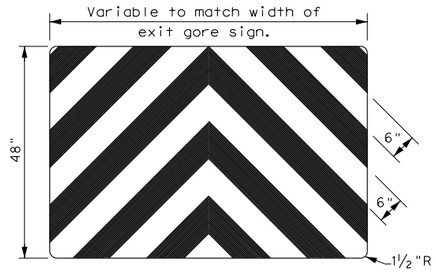


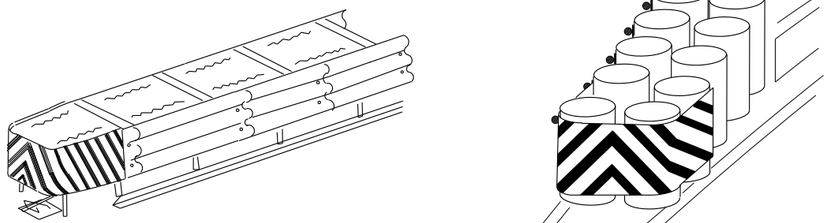


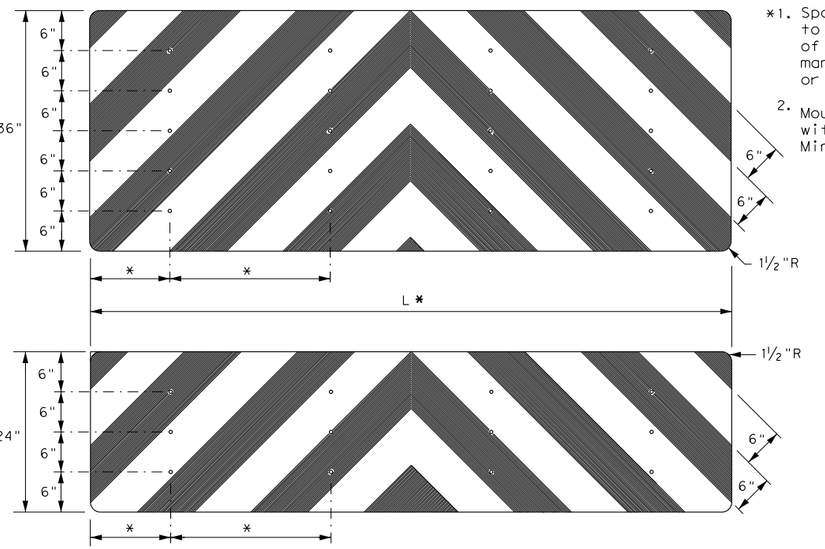
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



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	0495	08	121,ETC	IH 20
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	ATL	HARRISON		49
4-98 7-20				

20G

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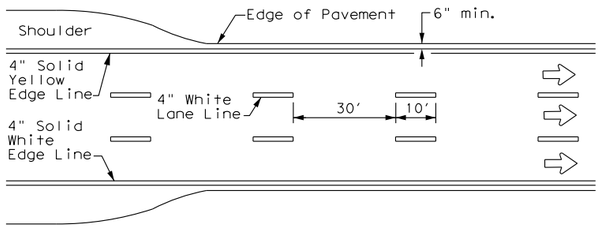
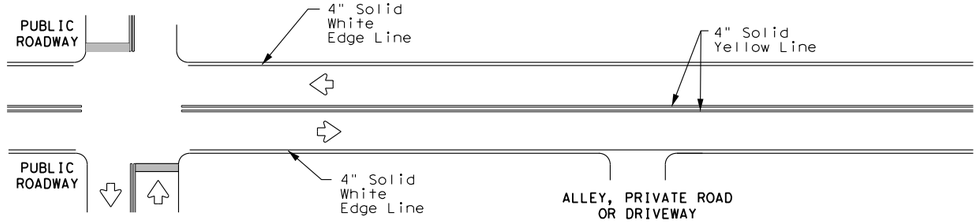
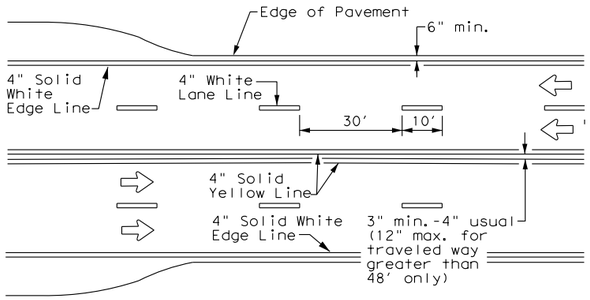


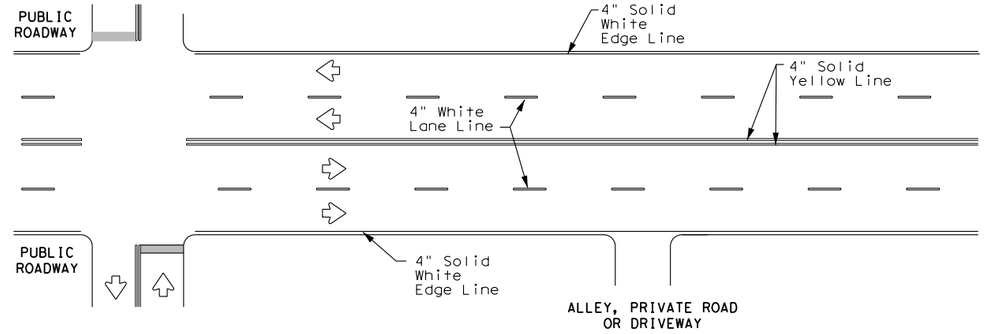
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



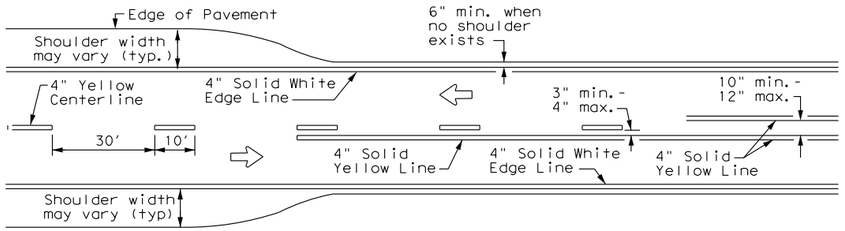
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



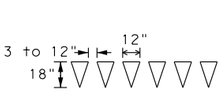
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



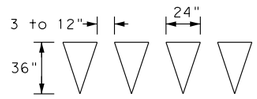
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

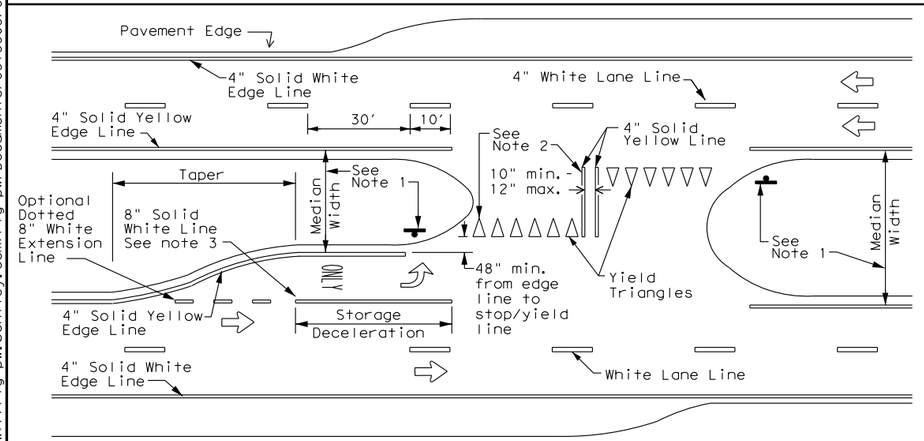


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

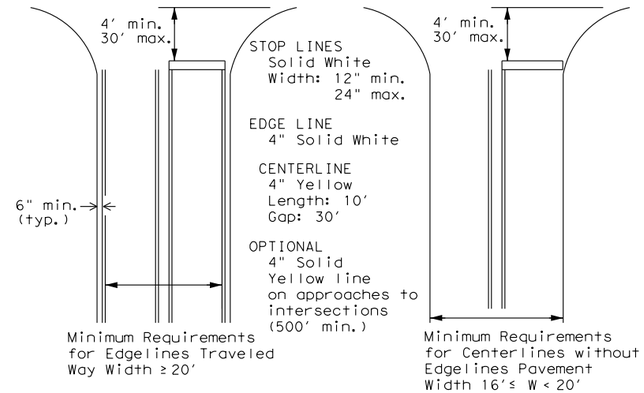
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

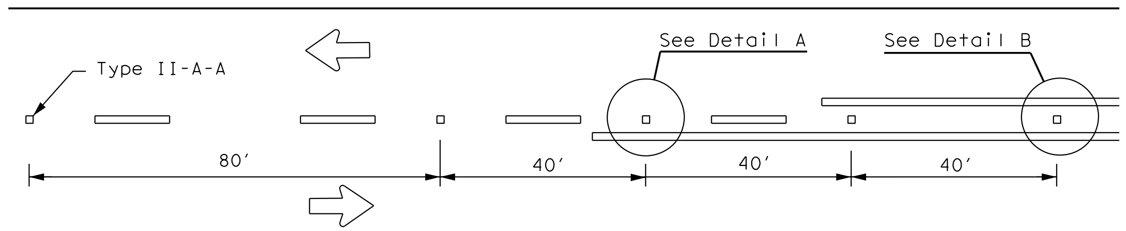
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

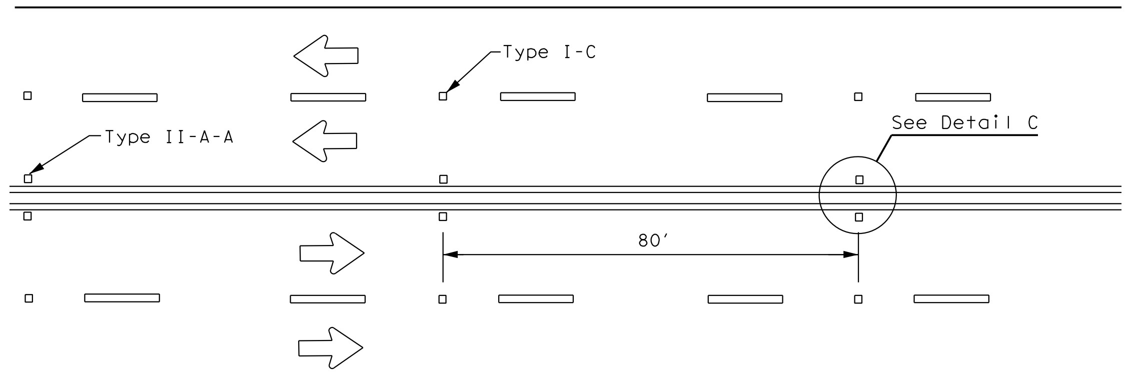
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0495	08	121,ETC	IH 20
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	ATL	HARRISON		50

22A

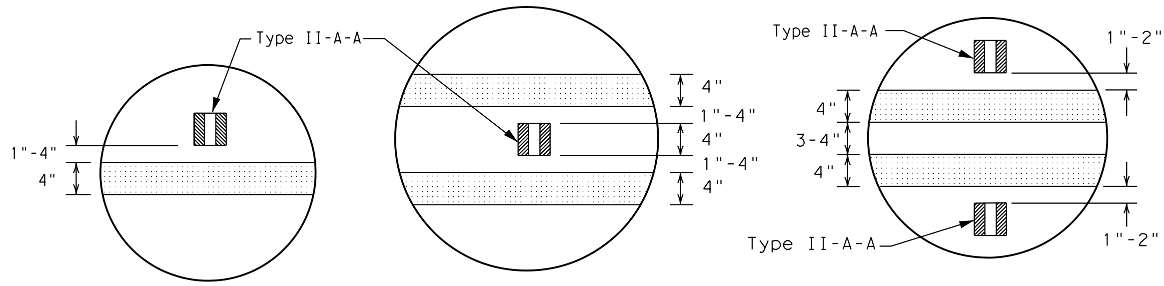
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



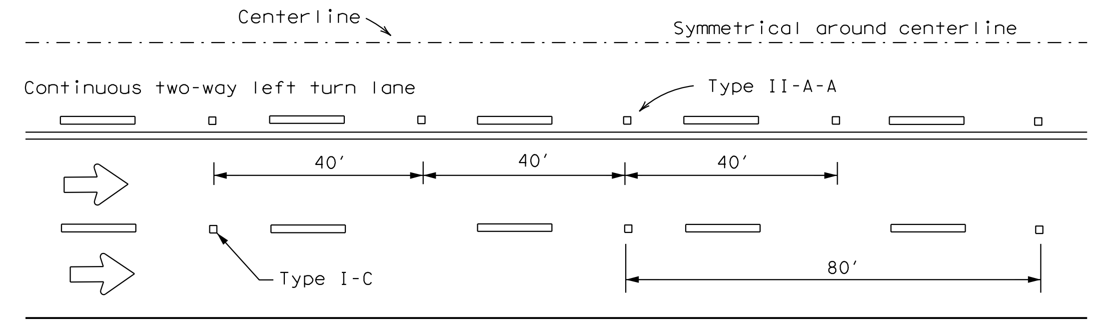
CENTERLINE FOR ALL TWO LANE ROADWAYS



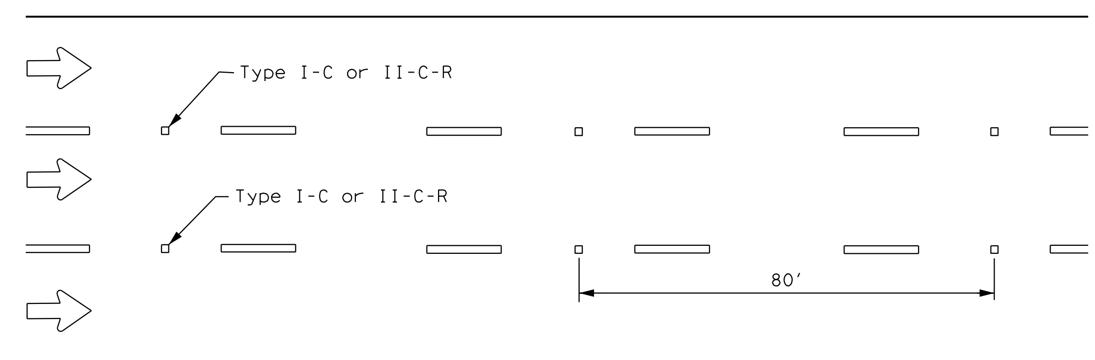
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

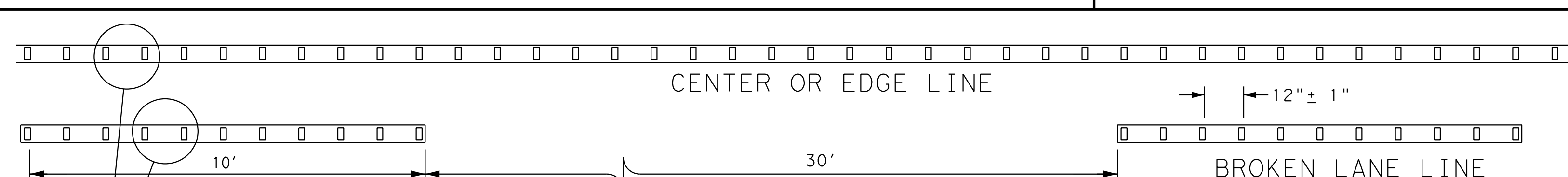


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



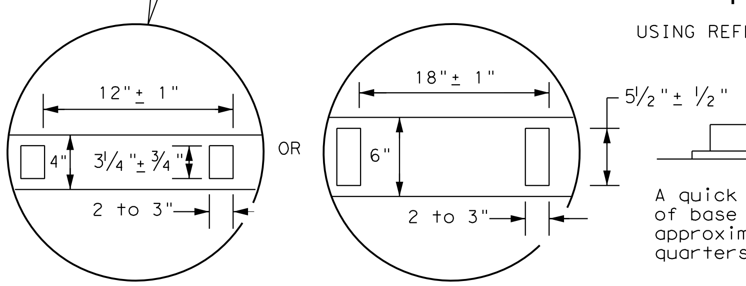
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

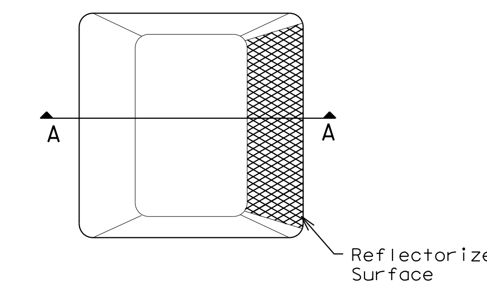
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

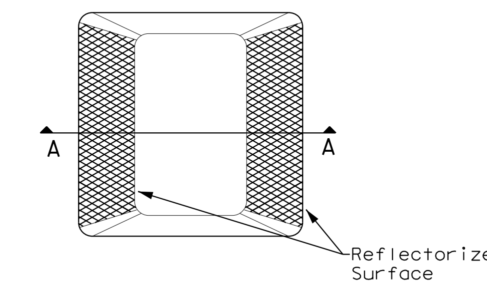
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

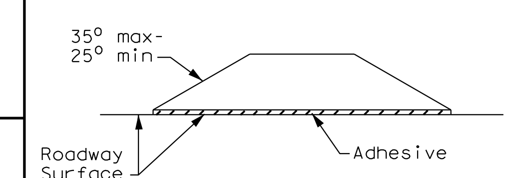
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

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©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0495	08	121,ETC	IH 20
5-00 2-12	DIST		COUNTY	SHEET NO.
8-00 6-20	ATL		HARRISON	51

228

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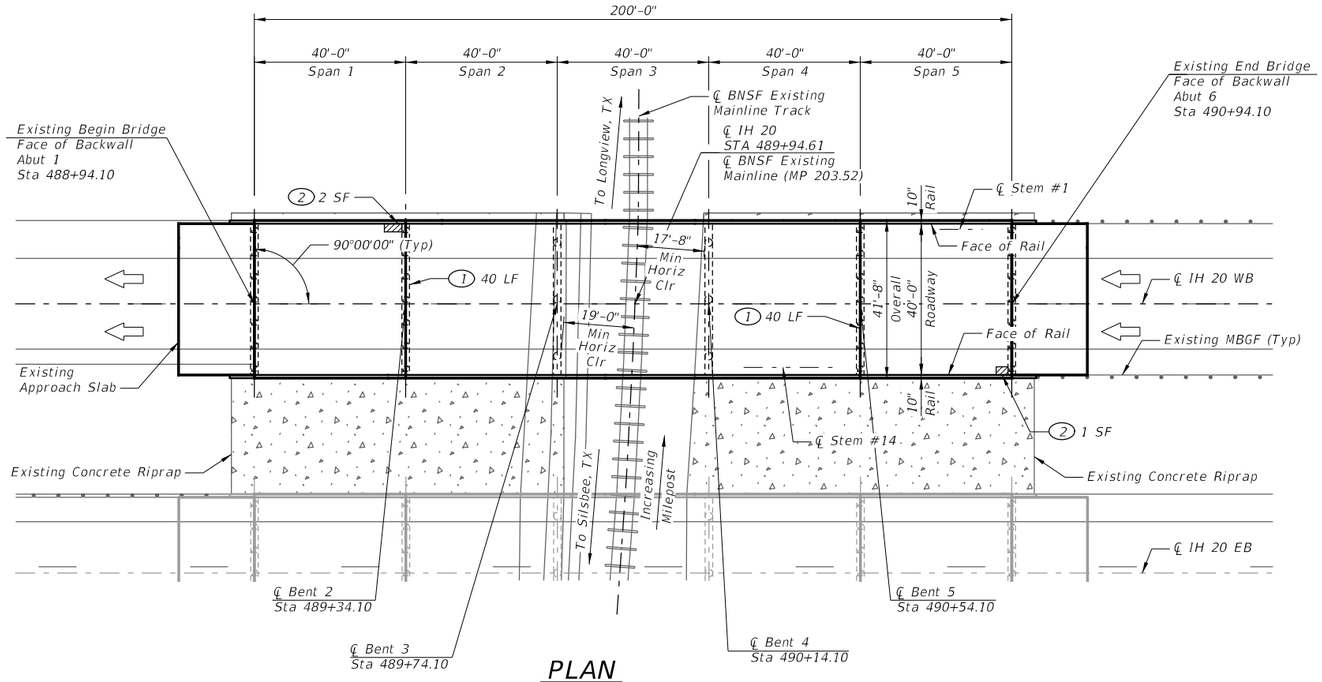
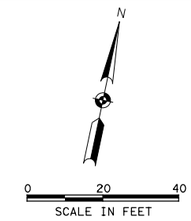


PLAN



GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. Contractor shall maintain minimum construction clearance of 21 feet 6 inches vertically above the plane of the top of higher rail and 12 feet horizontally at right angles from the track centerline.
6. The proposed bridge rehabilitation will not increase the quantity or change the characteristics of the flow in the railway's ditches or drainage structures.

TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
(1)	Clean and reseal existing expansion joints. After saw cutting, clean all dirt and debris from joint down to the top of the cap at Bents 2 and 5. See Plan view for locations.	438	CLEANING AND SEALING EXISTING JOINTS	80	LF	See Existing Concrete Slab and Girder Joint Repair Detail on the BEEJ (MOD).
(2)	Repair spalls and delamination at the bearing of the Span 5 south fascia beam and Span 1 north fascia beam. See Plan view for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	3	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
(3)	Repair spalls and delamination at abutments and interior bent caps. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	26	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
(4)	Rout and seal cracks in Bents 4 and 5. See Substructure Repair Isometrics for locations.	780	CNC CRCK REPAIR (DISCRETE) (ROUT AND SEAL)	14	LF	Rout and seal cracks per TxDOT Concrete Repair Manual Chapter 3, Section 7.
(5)	Apply silane surface treatment on all faces of the abutments and bent caps. See Concrete Surface Treatment Isometrics for locations.	428	PENETRATING CONCRETE SURFACE TREATMENT	152	SY	

REPAIR CALL-OUT LEGEND

(XX) XX XX
- XX — Repair Quantity Unit
- XX — Estimated Repair Quantity At Each Location
- (XX) — Repair No. - See Table of Repairs

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
03/01/2021
Cassie Wallof

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Texas Department of Transportation
© 2021

IH 20 WB
BNSF RR
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-263

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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GRAPHICS JCH	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CJW	TEXAS	ATL	HARRISON	52
CHECK CJW	CONTROL 0495	SECTION 08	JOB 121,ETC.	

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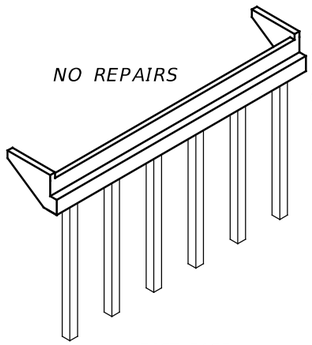
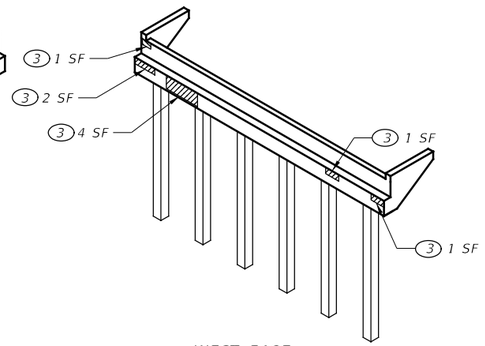


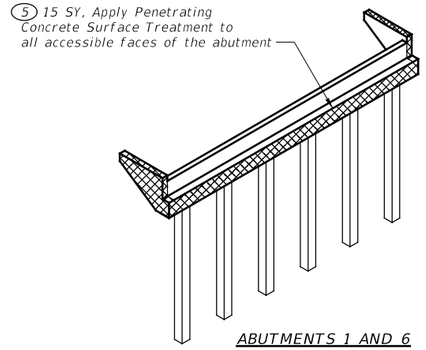
EAST FACE
Looking Northwest

ABUTMENT 1

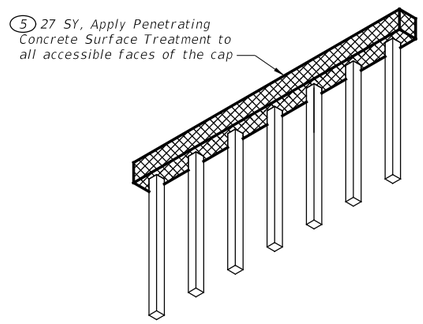


WEST FACE
Looking Northeast

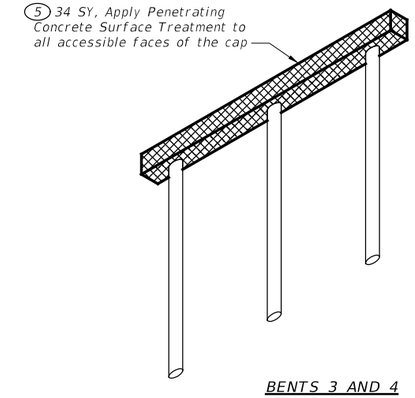
ABUTMENT 6



ABUTMENTS 1 AND 6

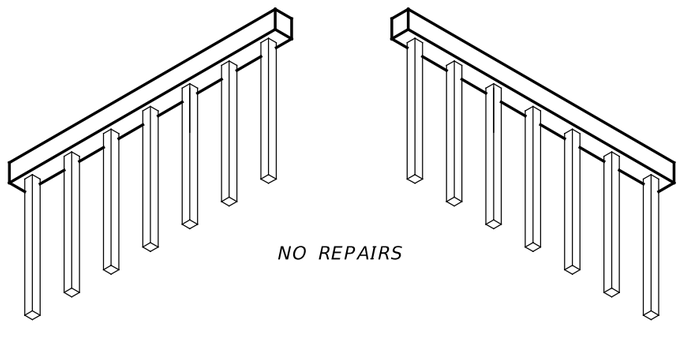


BENTS 2 AND 5



BENTS 3 AND 4

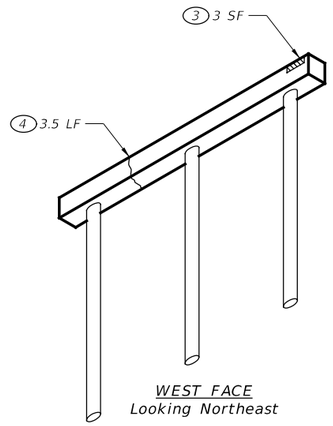
CONCRETE SURFACE TREATMENT ISOMETRICS



WEST FACE
Looking Northeast

EAST FACE
Looking Northwest

BENT 2



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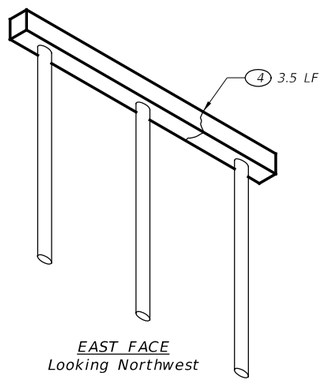
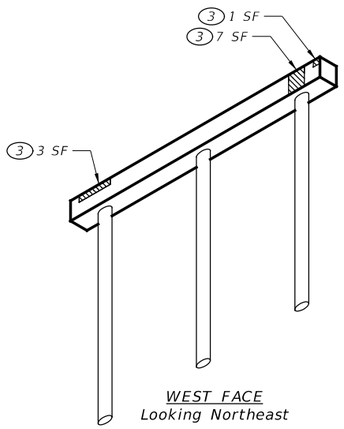
Looking Northeast

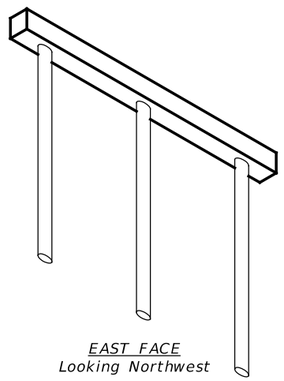


EAST FACE
Looking Northwest

BENT 4

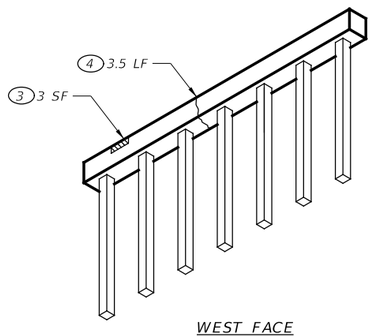


WEST FACE
Looking Northeast

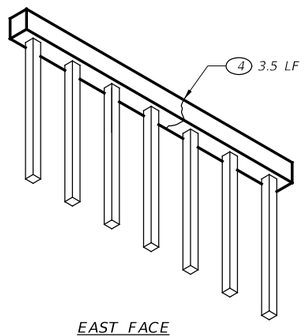


EAST FACE
Looking Northwest

BENT 3



WEST FACE
Looking Northeast



EAST FACE
Looking Northwest

BENT 5

SUBSTRUCTURE REPAIR ISOMETRICS

REPAIR CALL-OUT LEGEND

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
03/01/2021
Cassie Wallof

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

Texas Department of Transportation
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IH 20 WB
BNSF RR
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-263

SCALE: N. T. S. SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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CHECK	CONTROL	SECTION	JOB	53
CJW	0495	08	121, ETC.	
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CJW				

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④ TABLE OF DIAPHRAGM REPAIRS

Location	Span	Bay	Repair Quantity
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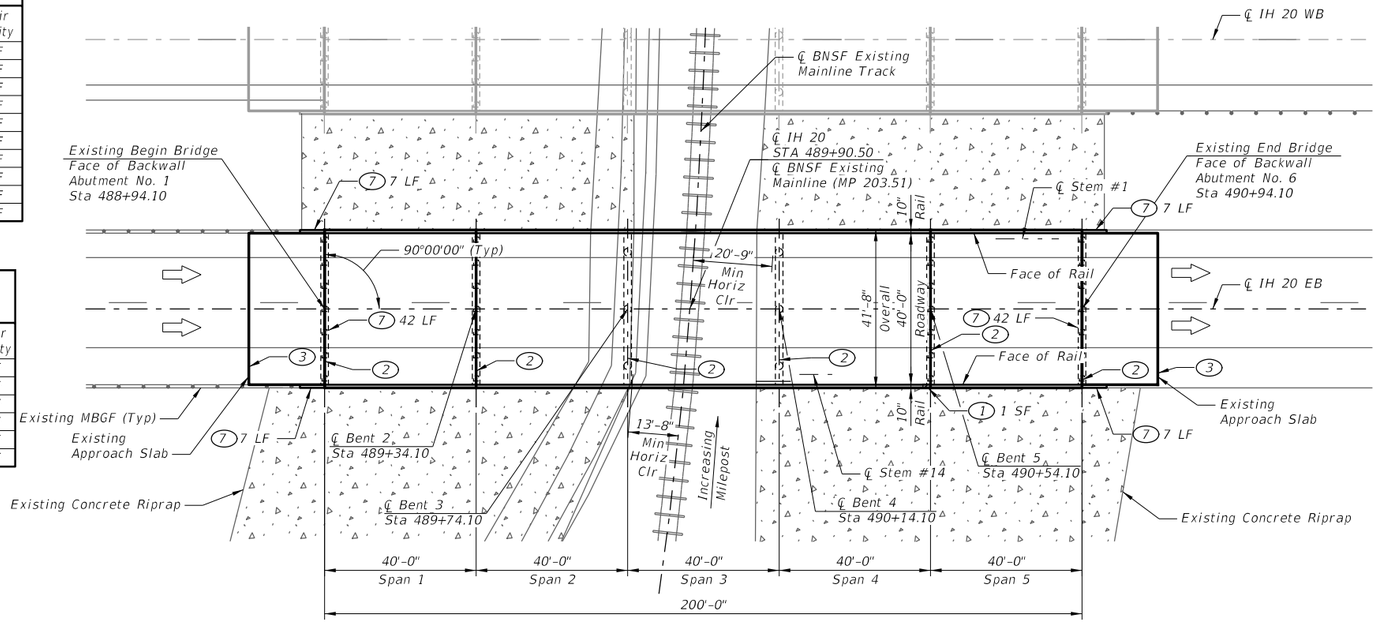
Bent 2	1	5	1 SF
Bent 2	1	7	1 SF
Bent 2	1	8	1 SF
Bent 2	1	9	1 SF
Bent 2	1	12	1 SF
Bent 2	2	12	1 SF
Bent 5	4	12	1 SF
Bent 5	5	3	1 SF
Bent 5	5	5	1 SF

④ TABLE OF STEM REPAIRS

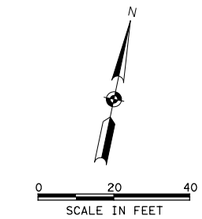
Span	Stem	Location	Repair Quantity
1	14	Abutment 1	1 SF
2	14	Bent 3	2 SF
3	14	Bent 3	2 SF
4	1	Bent 4	1 SF
4	1	Bent 4	3 SF
4	1	Bent 5	3 SF



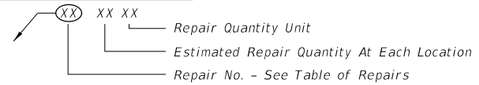
PLAN

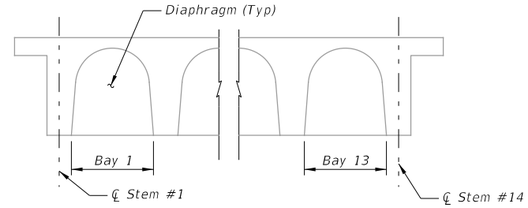
GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. Existing asphalt overlay thickness is approximately 2.5 inches. Verify in field prior to ordering joints.
6. Contractor shall maintain minimum construction clearance of 21 feet 6 inches vertically above the plane of the top of higher rail and 12 feet horizontally at right angles from the track centerline.
7. The proposed bridge rehabilitation will not increase the quantity or change the characteristics of the flow in the railway's ditches or drainage structures.



REPAIR CALL-OUT LEGEND





SUPERSTRUCTURE SECTION

TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
①	Repair deck corner spall on Span 4 over Bent 5. See plan view for location.	429	CONC STR REPAIR(DECK REP (FULL DEPTH))	1	SF	See Corner Full Depth Deck Repair on the Miscellaneous Bridge Repair Details sheet.
②	Clean all dirt and debris from joint down to the top of the cap at Bents 2 and 5, and reseal joint. Clean and seal pavement relief joints at Abutments 1 and 6 and Bents 3 and 4. Saw cut concrete pavement as required to re-establish joint opening. Install polymber concrete header type joint at all bridge joints. See plan view for locations.	438	CLEANING EXISTING JOINTS	246	LF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheets. See Existing Concrete Slab and Girder Joint Repair detail on BEEJ (MOD).
		454	HEADER TYPE EXPANSION JOINT	54	CF	
		454	JOINT SEALANT	246	LF	
③	Install concrete polymer header type joint at approach slab relief joints. See plan view for locations.	454	HEADER TYPE EXPANSION JOINT	18	CF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheet.
		454	JOINT SEALANT	80	LF	
④	Repair stem spalls, delaminations and cracks in stems and diaphragms. See Table of Stem Repairs and Table of Diaphragm Repairs for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	23	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
⑤	Repair spalls and delamination at interior bent caps. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	33	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
⑥	Apply silane surface treatment on all faces of the abutments and bent caps. See Concrete Surface Treatment Isometrics for locations.	428	PENETRATING CONCRETE SURFACE TREATMENT	152	SY	
⑦	Clean and seal joints between riprap and wingwall, along the joint down to the riprap between riprap and abutment. See plan view for locations.	438	CLEANING AND SEALING EXIST JOINTS(CL3)	112	LF	Seal with hot poured rubber (Class 3) per DMS-6310.

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03/01/2021

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IH 20 EB
BNSF RR
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-264

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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CJW				

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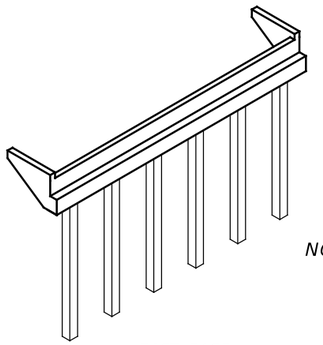

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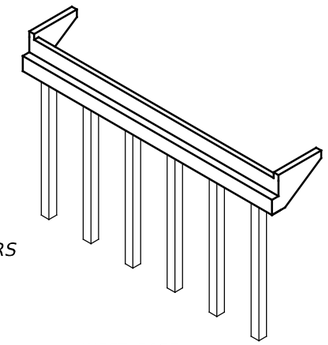
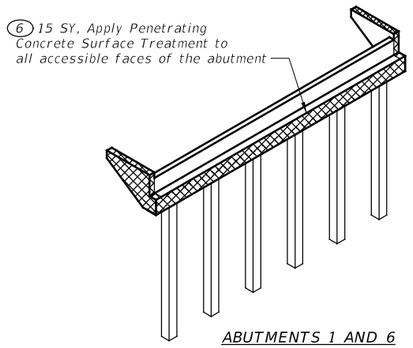


EAST FACE
Looking Northwest

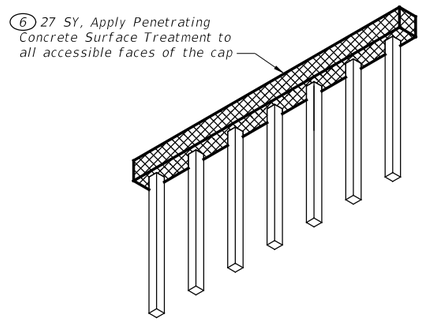
WEST FACE
Looking Northeast

ABUTMENT 1

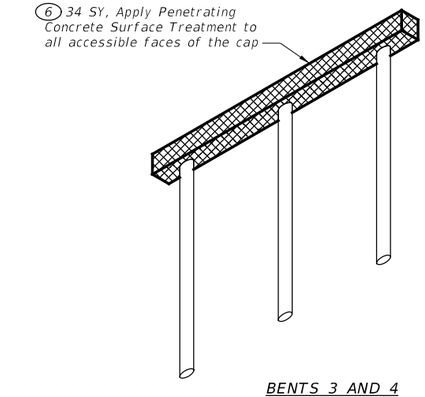
ABUTMENT 6



ABUTMENTS 1 AND 6

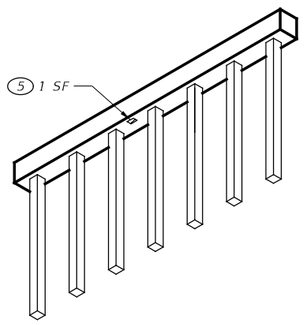


BENTS 2 AND 5



BENTS 3 AND 4

CONCRETE SURFACE TREATMENT ISOMETRICS



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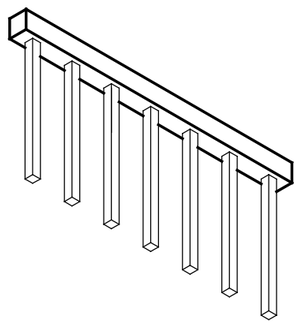
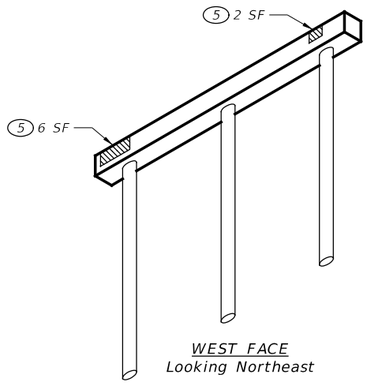


EAST FACE
Looking Northwest

BENT 2



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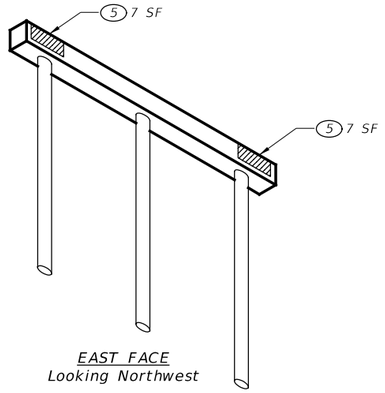
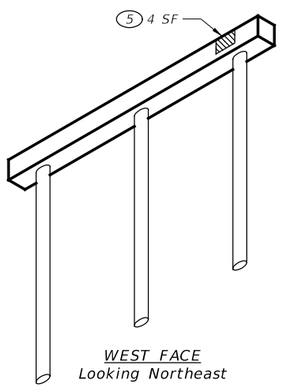


EAST FACE
Looking Northwest

BENT 4

REPAIR CALL-OUT LEGEND

XX XX
- XX — Repair No. – See Table of Repairs
- XX — Estimated Repair Quantity At Each Location
- XX — Repair Quantity Unit



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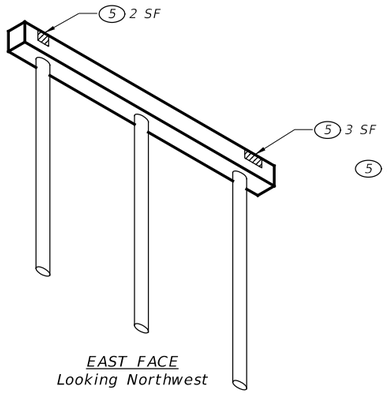

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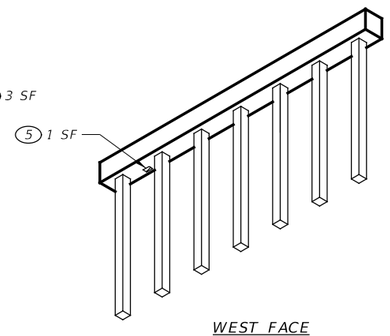
Looking Northwest

BENT 3



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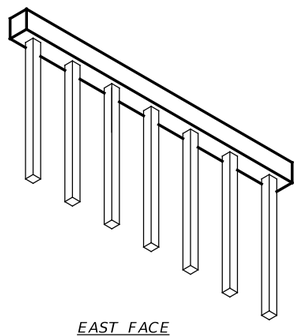

EAST FACE
Looking Northwest

BENT 5

SUBSTRUCTURE REPAIR ISOMETRICS

STATE OF TEXAS
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Texas Department of Transportation

IH 20 EB
BNSF RR
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-264

SCALE: N. T. S. SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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CHECK BRA	CONTROL	SECTION	JOB	
	0495	08	121, ETC.	

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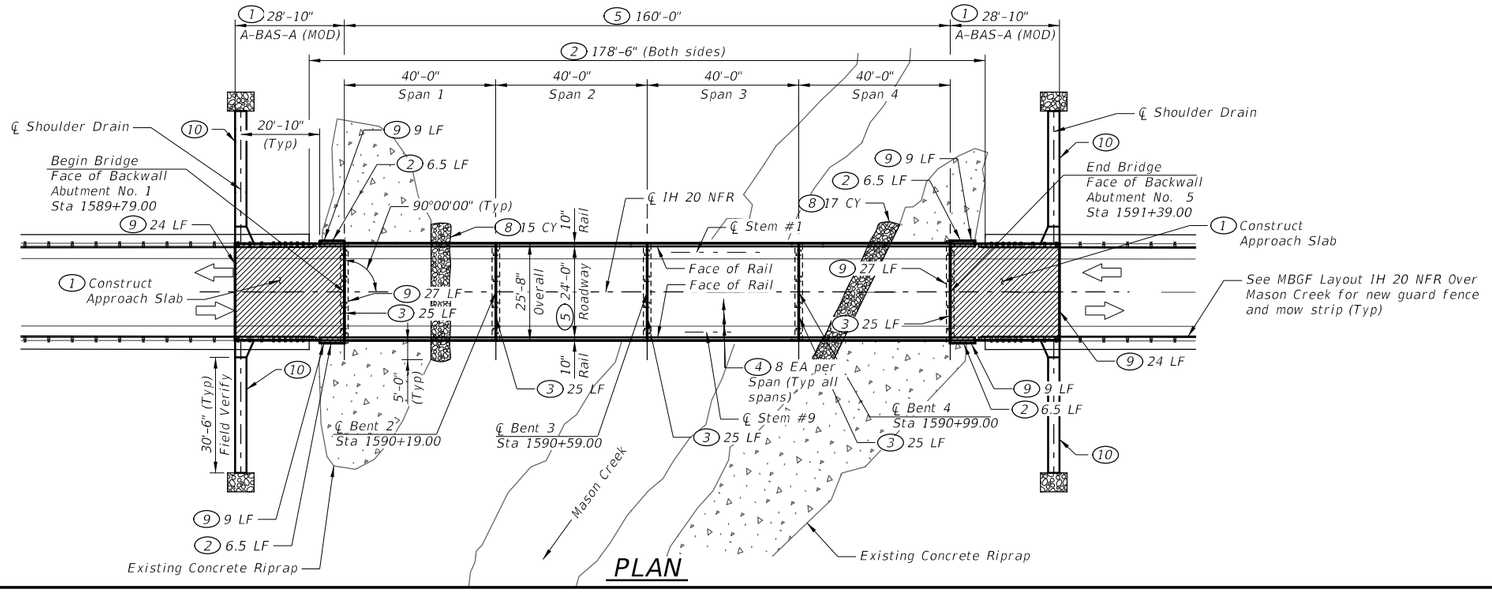

PLAN

N

0 20 40

SCALE IN FEET

GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. See Miscellaneous Bridge Repair Details sheets for additional information.

TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
(1)	Remove existing approach asphalt pavement and base. After removal of existing wingwall rail, partially remove backwalls and wingwalls to accommodate new approach slabs. Construct new approach slabs and install armor plate. See plan view for locations.	105	REMOVING STAB BASE & ASPH PAV(13"-18")	166	SY	Remove Conc (Misc) quantity includes partial backwall and wingwall removals at each abutment. See Rail, Wingwall and Approach Slab Reconstruction Detail on the Miscellaneous Bridge Repair Details sheet and A-BAS-A (MOD) for details. Quantity for Armor Joint is for one plate at end of appraoch slab.
		104	REMOVE CONC (MISC)	2	EA	
		400	CEM STABIL BKFL	28	CY	
		422	APPROACH SLAB (HPC)	62	CY	
		454	ARMOR JOINT	51	LF	
(2)	After approach slab reconstruction, remove existing bridge rail and construct new T131RC rails on both sides of bridge.	451	RETROFIT RAIL (TY T131RC)	357	LF	See TYPE T131RC (MOD) for details and Traffic Control narrative for phasing.
(3)	Clean and reseal existing joints at Bents 2, 3 and 4. Clean all dirt and debris from expansion joints down to the top of the cap at Bents 2 and 4. After constructing the new concrete approach slabs, clean and seal joints at Abutments 1 and 5. See plan view for locations.	438	CLEANING AND SEALING EXISTING JOINTS	125	LF	See Existing Concrete Slab and Girder Joint Repair detail on the BEEJ (MOD).
(4)	Fill pan girder form lowering holes with cementitious material. See plan view for locations.	429	CONC STR REPAIR (PAN GIRDER HOLE REPR)	32	EA	See Form Lowering Hole Treatment detail.
(5)	Apply silane surface treatment to the deck surface.	428	PENETRATING CONCRETE SURFACE TREATMENT	427	SY	
(6)	Repair delamination on end of Stem 1 on Span 3 at Bent 3.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	1	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
(7)	Repair spall on cap. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	6	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
(8)	Place stone protection riprap against the concrete riprap toes. See plan view for locations.	432	BEDDING MATERIAL (6 IN)	7	CY	See Toewall Stone Riprap Detail and SRR standard details.
		432	RIPRAP (STONE PROTECTION) (18 IN)	32	CY	
(9)	Clean and seal joints between riprap and wingwalls, and between riprap and abutment cap. After constructing the new concrete approach slabs, seal between new approach slab and existing approach asphalt pavement. See plan view for locations.	438	CLEANING AND SEALING EXIST JOINTS(CL3)	138	LF	Seal with hot poured rubber (Class 3) per DMS-6310.
(10)	Install shoulder drains with rock splash pads at ends of new curbs at thrie beam transitions.	432	RIPRAP (CONC)(5 IN)	6	CY	See A-BAS-A (MOD) for details. Install stone splash pad at the end of shoulder drains as shown in the Shoulder Drain Installation Detail on the Miscellaneous Bridge Repair Details sheets.
		432	BEDDING MATERIAL (6 IN)	4	CY	
		432	RIPRAP (STONE PROTECTION) (18 IN)	12	CY	

REPAIR CALL-OUT LEGEND

(XX) XX XX
- Repair Quantity Unit
- Estimated Repair Quantity At Each Location
- Repair No. - See Table of Repairs

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Texas Department of Transportation

IH 20 NFR
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-268

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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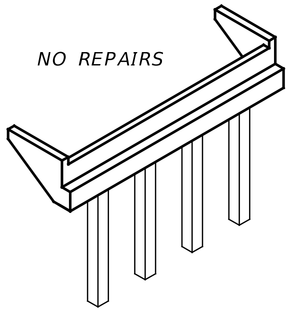

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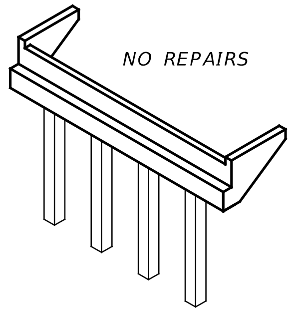
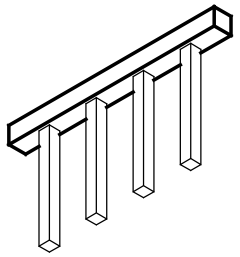


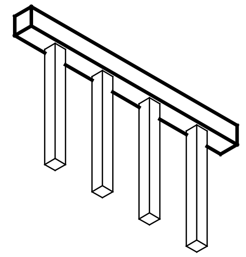
WEST FACE
Looking Northeast

ABUTMENT 1 | ABUTMENT 5



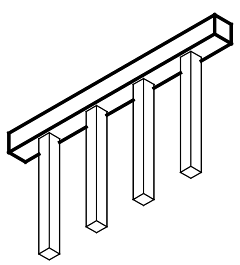
WEST FACE
Looking Northeast

NO REPAIRS



EAST FACE
Looking Northwest

BENT 2



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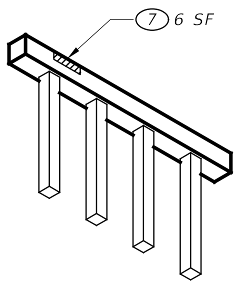
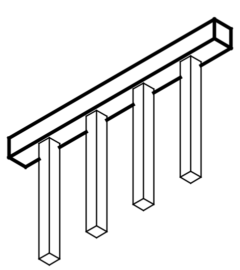


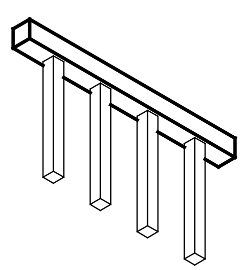
EAST FACE
Looking Northwest

BENT 3



WEST FACE
Looking Northeast

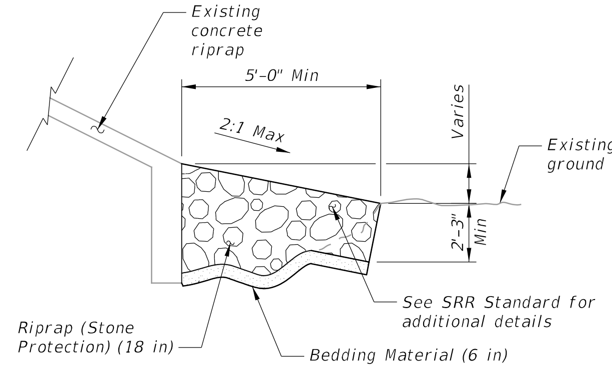
NO REPAIRS



EAST FACE
Looking Northwest

BENT 4

SUBSTRUCTURE REPAIR ISOMETRICS



TOEWALL STONE RIPRAP DETAIL

REPAIR CALL-OUT LEGEND

XX XX XX
- Repair Quantity Unit
- Estimated Repair Quantity At Each Location
- Repair No. - See Table of Repairs

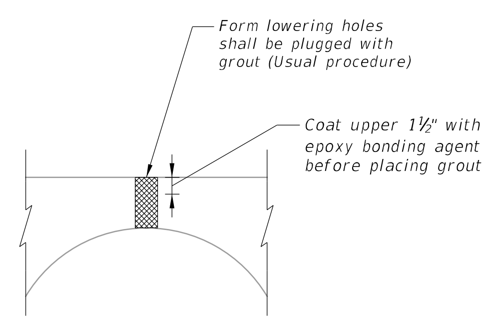
FORM LOWERING HOLE TREATMENT NOTES:

Clean hole to remove oil and other contaminants.

Provide Type V epoxy per DMS-6100, "Epoxies and Adhesives".

Repair as full-depth bridge deck repair per TxDOT Concrete Repair Manual Chapter 3, Section 4. Saw-cutting is not required.

Repairs are paid for as Item 429, "Concrete Structure Repair".



FORM LOWERING HOLE TREATMENT

Scale: N.T.S.

03/01/2021

NO.	REVISION	BY	DATE

HDR
Firm Registration No. F-754
17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400

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IH 20 NFR
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-268

SCALE: N.T.S. SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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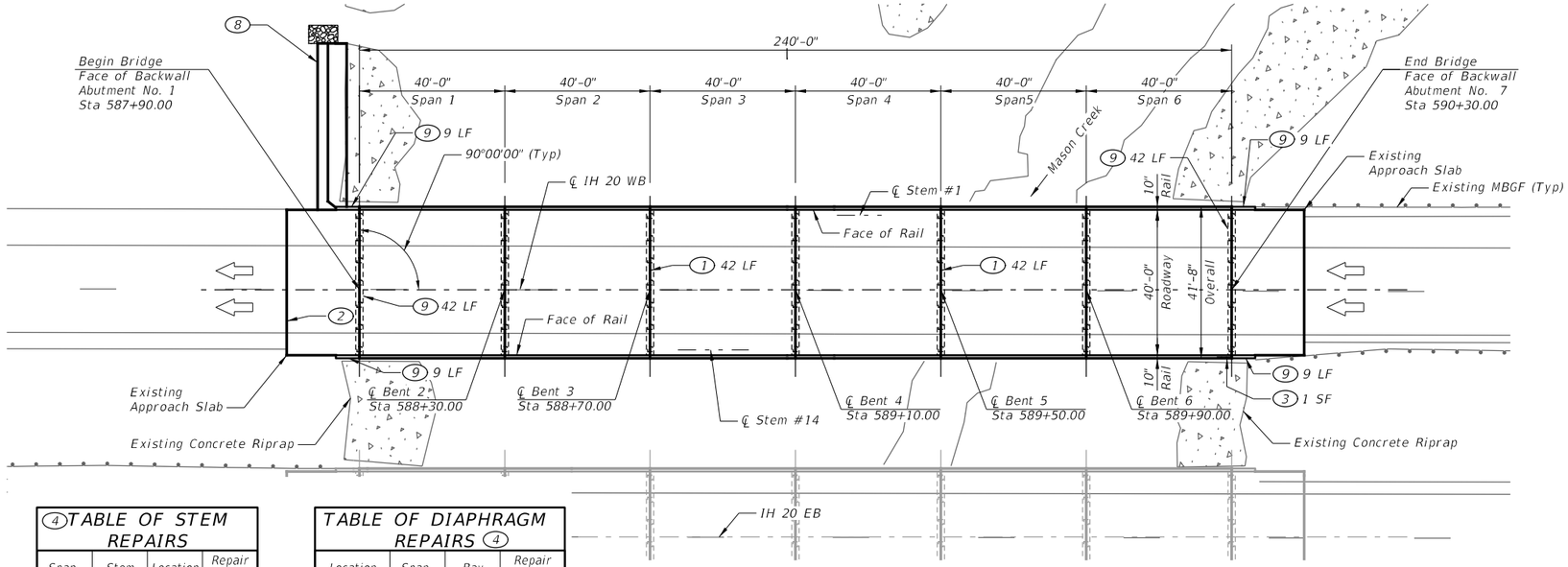


PLAN

(4) TABLE OF STEM REPAIRS

Span	Stem	Location	Repair Quantity
2	14	Bent 2	1 SF

TABLE OF DIAPHRAGM REPAIRS (4)

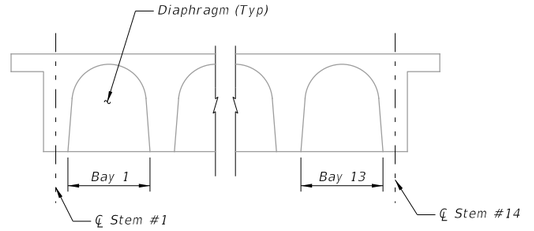
Location	Span	Bay	Repair Quantity
Bent 2	2	10	1 SF
Bent 5	4	2	1 SF
Bent 5	4	3	1 SF

GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. Existing asphalt overlay thickness is approximately 3 inches. Verify in field prior to ordering joints.

N

0 20 40
SCALE IN FEET



SUPERSTRUCTURE SECTION

REPAIR CALL-OUT LEGEND

(XX) XX XX
- Repair Quantity Unit
- Estimated Repair Quantity At Each Location
- Repair No. - See Table of Repairs

TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
(1)	Clean all dirt and debris from joint down to the top of the cap at Bents 3 and 5, and reseal joint. See plan view for locations.	438	CLEANING AND SEALING EXISTING JOINTS	84	LF	See Existing Concrete Slab and Girder Joint Repair detail on the BEEJ (MOD).
(2)	Install concrete polymer header joint at west approach slab relief joint.	454	HEADER TYPE EXPANSION JOINT	10	CF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheet.
		454	JOINT SEALANT	40	LF	
(3)	Repair deck corner spall. See plan view for location.	429	CONC STR REPAIR(DECK REP (FULL DEPTH))	1	SF	See Corner Full Depth Deck Repair on the Miscellaneous Bridge Repair Details sheet.
(4)	Repair defects on stem ends and diaphragms. See Table of Stem Repairs and Table of Diaphragm Repairs for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	4	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
(5)	Repair spalls and delamination on abutments and interior bent caps. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	20	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
(6)	Apply silane surface treatment on all faces of the abutments and bent caps. See Concrete Surface Treatment Isometrics for locations.	428	PENETRATING CONCRETE SURFACE TREATMENT	165	SY	
(7)	Coat piles at Bent 4 with Type X epoxy waterproofing.	427	EPOXY WATERPROOF FINISH	210	SF	Dewatering, if required, is subsidiary to Item 427. See Pile Coating Detail on the Miscellaneous Bridge Repair Details Sheet.
(8)	Fill the erosion hole under riprap at northwest wingwall with flowable backfill. Construct shoulder drain with rock splash pad. =	401	FLOWABLE BACKFILL	1	CY	See Shoulder Drain Installation Detail on the Miscellaneous Bridge Repair Details sheet.
		104	REMOVING CONC (RIPRAP)	11	SY	
		432	BEDDING MATERIAL (6 IN)	1	CY	
		432	RIPRAP (CONC)(5 IN)	8	CY	
		432	RIPRAP (STONE PROTECTION) (18 IN)	3	CY	
(9)	Clean and seal joints between riprap and wingwall, and between riprap and abutment cap. See plan view for locations.	438	CLEANING AND SEALING EXIST JOINTS(CL3)	120	LF	Seal with hot poured rubber (Class 3) per DMS-6310.

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
Cassie Wallof
03/01/2021

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Texas Department of Transportation

IH 20 WB
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-269

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS TGG	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK BRA	TEXAS	ATL	HARRISON	58
CHECK BRA	CONTROL	SECTION	JOB	
	0495	08	121,ETC.	

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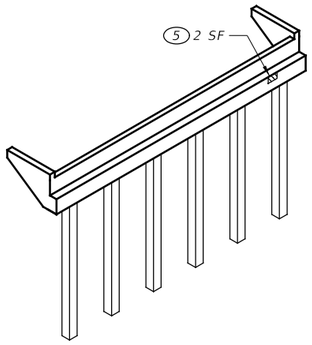
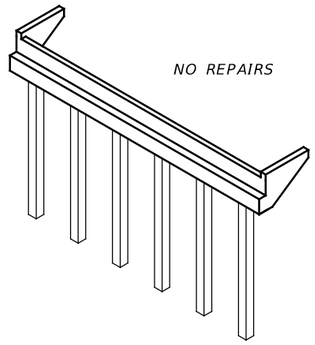


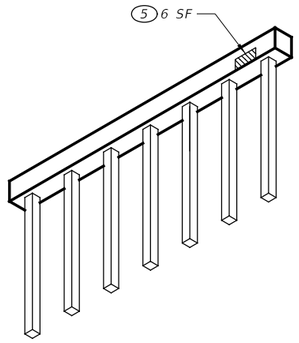
EAST FACE
Looking Northwest

ABUTMENT 1



WEST FACE
Looking Northeast

ABUTMENT 7



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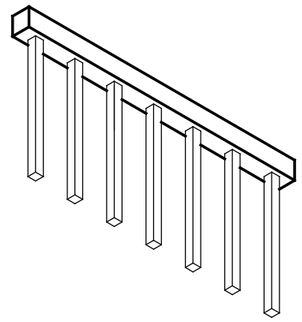
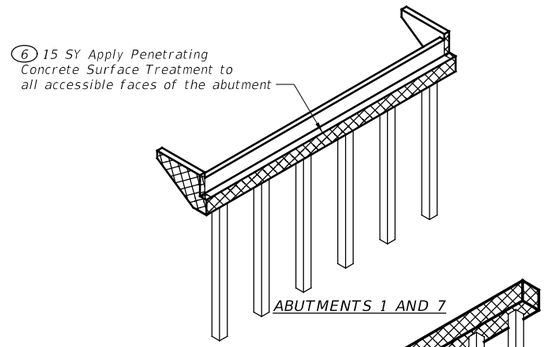
Looking Northeast



EAST FACE
Looking Northwest

BENT 4



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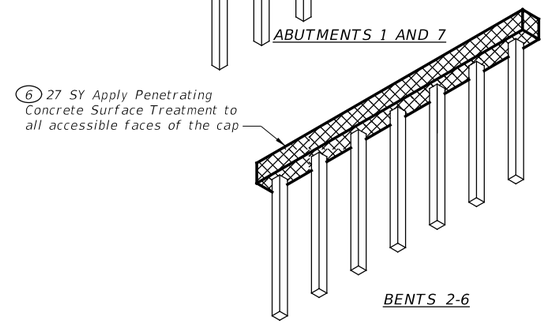
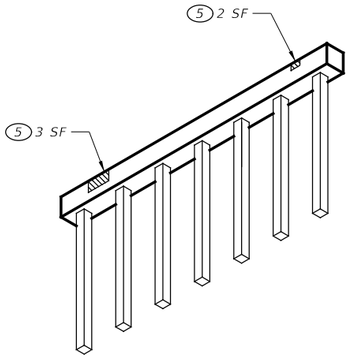


BENTS 2-6

CONCRETE SURFACE TREATMENT ISOMETRICS

REPAIR CALL-OUT LEGEND

XX XX
- XX — Repair No. – See Table of Repairs
- XX — Estimated Repair Quantity At Each Location
- XX — Repair Quantity Unit



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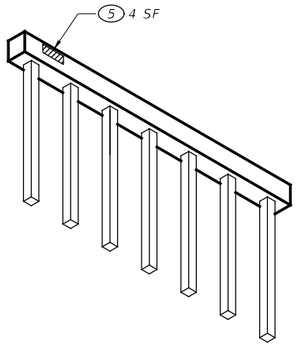
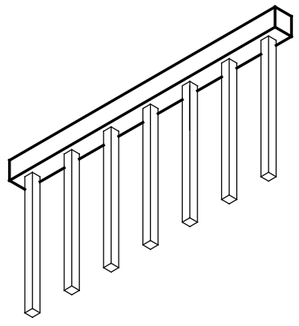
Looking Northeast

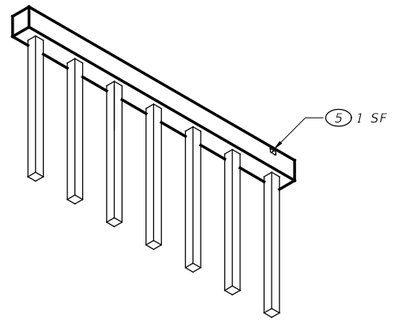


EAST FACE
Looking Northwest

BENT 2

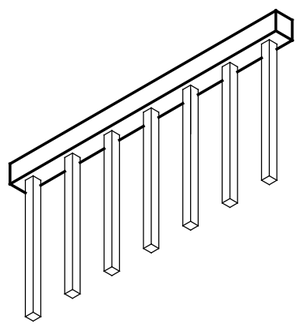


WEST FACE
Looking Northeast

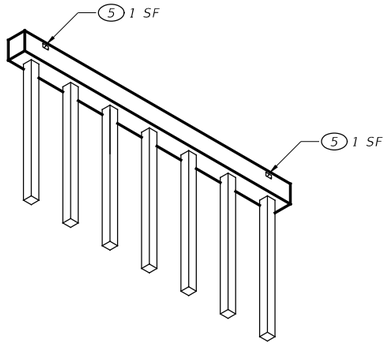


EAST FACE
Looking Northwest

BENT 5

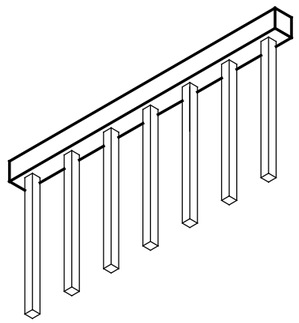


WEST FACE
Looking Northeast



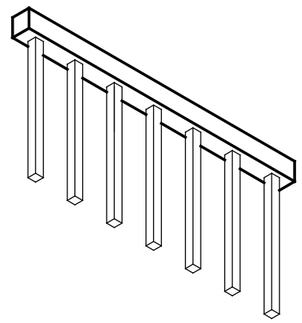
EAST FACE
Looking Northwest

BENT 3



WEST FACE
Looking Northeast

NO REPAIRS



EAST FACE
Looking Northwest

BENT 6

SUBSTRUCTURE REPAIR ISOMETRICS

STATE OF TEXAS
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03/01/2021
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Texas Department of Transportation

IH 20 WB
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-269

SCALE: N. T. S. SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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CHECK	CONTROL	SECTION	JOB	
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BRA				

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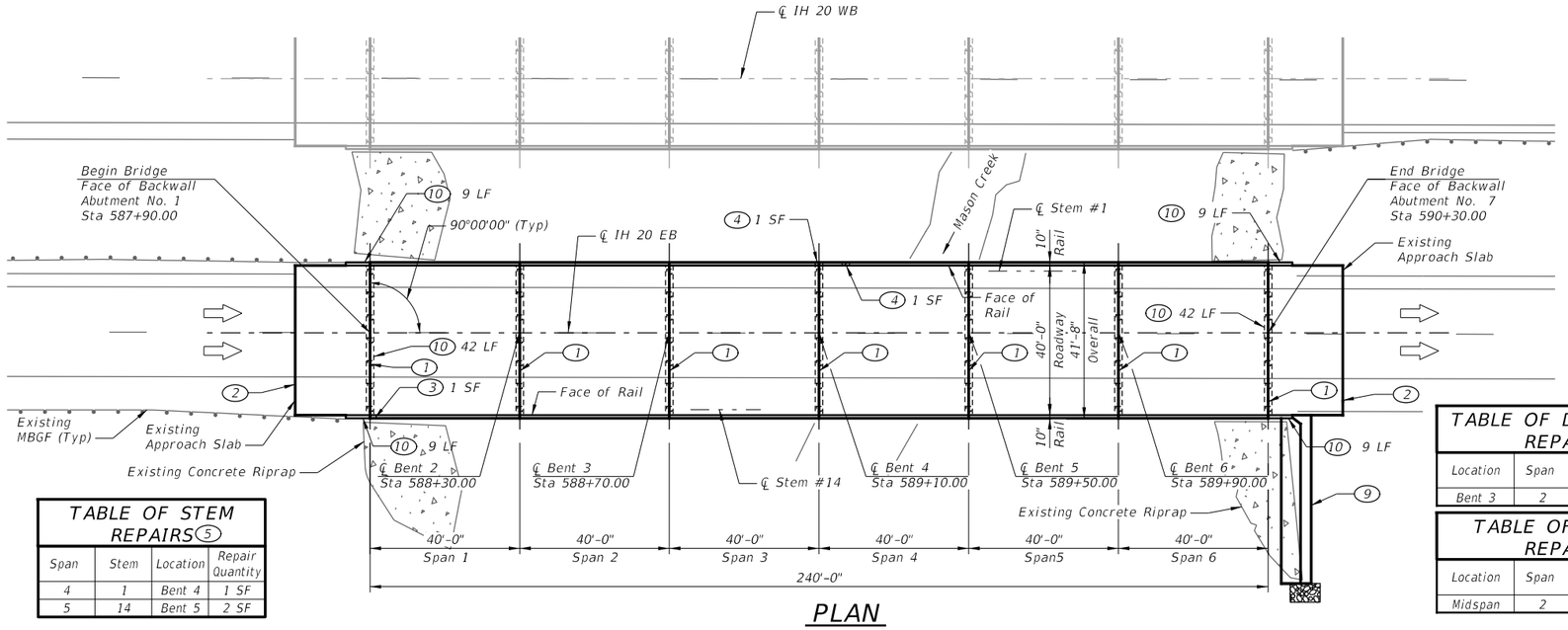
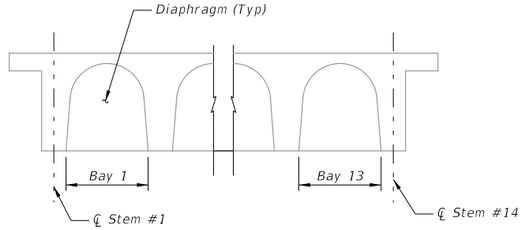


PLAN

TABLE OF STEM REPAIRS (5)			
Span	Stem	Location	Repair Quantity
4	1	Bent 4	1 SF
5	14	Bent 5	2 SF

TABLE OF DIAPHRAGM REPAIRS (5)			
Location	Span	Bay	Repair Quantity
Bent 3	2	12	2 SF

TABLE OF CROWN REPAIRS (5)			
Location	Span	Bay	Repair Quantity
Midspan	2	6	1 SF



SUPERSTRUCTURE SECTION

GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. Existing asphalt overlay thickness is approximately 2 inches. Verify in field prior to ordering joints.

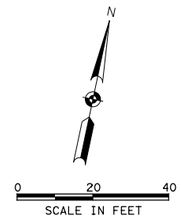
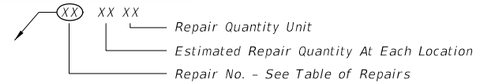


TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
1	Clean all dirt and debris from joint down to the top of the cap at Bents 3 and 5, and reseal joint. Clean bridge joints at Abutments 1 and 7 and Bents 2, 4 and 6. Saw cut concrete pavement as required to re-establish joint opening. Install polymer concrete header type joint at all bridge joints. See plan view for locations.	438	CLEANING EXISTING JOINTS	287	LF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheet. See Existing Concrete Slab and Girder Joint Repair detail on the BEEJ (MOD).
		454	HEADER TYPE EXPANSION JOINT	49	CF	
		454	JOINT SEALANT	287	LF	
2	Install concrete polymer header type joint at approach slab relief joints. See plan view for locations.	454	HEADER TYPE EXPANSION JOINT	14	CF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheet.
		454	JOINT SEALANT	80	LF	
3	Repair deck corner spall. See plan view for location.	429	CONC STR REPAIR(DECK REP (FULL DEPTH))	1	SF	See Corner Full Depth Deck Repair on the Miscellaneous Bridge Repair Details sheet.
4	Repair rail spalls. See plan view for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	2	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2.
5	Repair spalls and delamination on stem ends, diaphragm and crown. See Table of Stem Repairs, Table of Diaphragm Repairs and Table of Crown Repairs for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	6	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
6	Repair spalls and delamination on abutments and interior bent caps. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	39	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
7	Apply silane surface treatment on all faces of the abutments and bent caps. See Concrete Surface Treatment Isometrics for locations.	428	PENETRATING CONCRETE SURFACE TREATMENT	165	SY	
8	Coat piles at Bents 2 and 3 with Type X epoxy waterproofing.	427	EPOXY WATERPROOF FINISH	420	SF	Dewatering, if required, is subsidiary to Item 427. See Pile Coating Detail on the Miscellaneous Bridge Repair Details Sheet.
9	Fill the erosion hole under riprap at southeast wingwall with flowable backfill. Construct shoulder drain with rock splash pad. See plan view for locations.	401	FLOWABLE BACKFILL	10	CY	See Shoulder Drain Installation Detail on the Miscellaneous Bridge Repair Detail sheet.
		104	REMOVING CONC (RIPRAP)	11	SY	
		432	BEDDING MATERIAL (6 IN)	1	CY	
		432	RIPRAP (CONC)(5 IN)	8	CY	
		432	RIPRAP (STONE PROTECTION) (18 IN)	3	CY	
10	Clean and seal joints between riprap and wingwall, and between riprap and abutment cap. See plan view for locations.	438	CLEANING AND SEALING EXIST JOINTS(CL3)	120	LF	Seal with hot poured rubber (Class 3) per DMS-6310.

REPAIR CALL-OUT LEGEND



03/01/2021

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Texas Department of Transportation

IH 20 EB
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-270

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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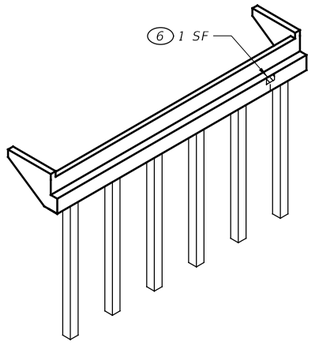
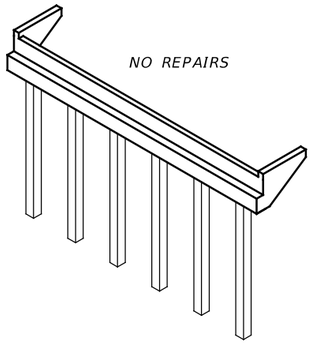


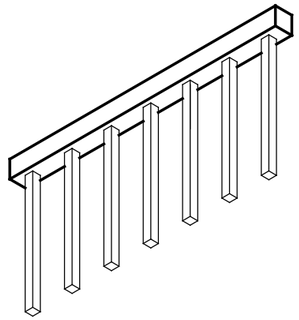
EAST FACE
Looking Northwest

ABUTMENT 1



WEST FACE
Looking Northeast

ABUTMENT 7



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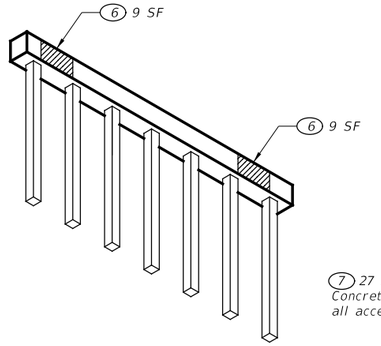
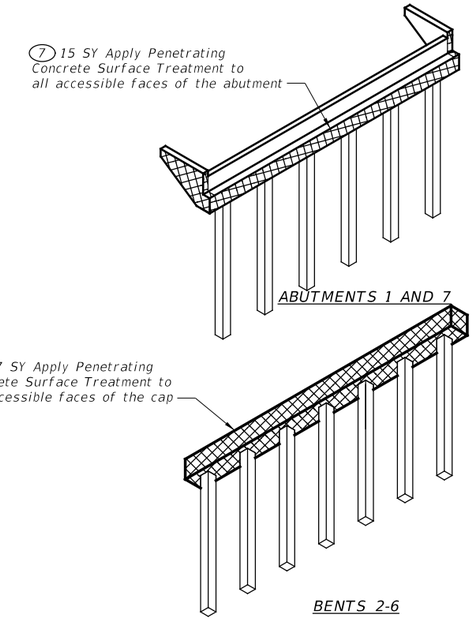
Looking Northeast



EAST FACE
Looking Northwest

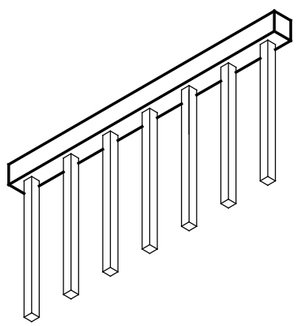
BENT 4



CONCRETE SURFACE TREATMENT ISOMETRICS

REPAIR CALL-OUT LEGEND

XX XX
- XX — Repair No. – See Table of Repairs
- XX — Estimated Repair Quantity At Each Location
- XX — Repair Quantity Unit



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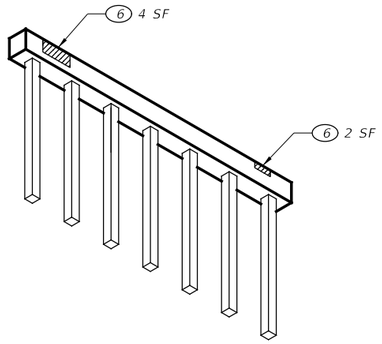
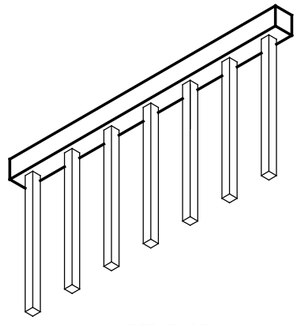


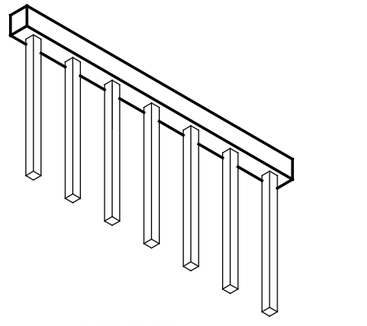
EAST FACE
Looking Northwest

BENT 2



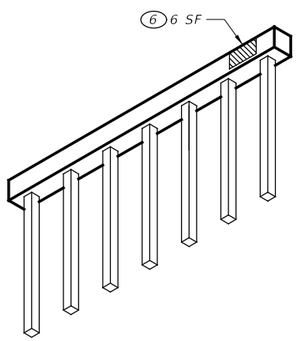
WEST FACE
Looking Northeast

NO REPAIRS



EAST FACE
Looking Northwest

BENT 5



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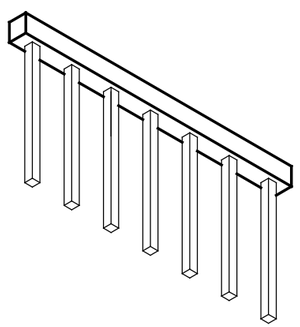
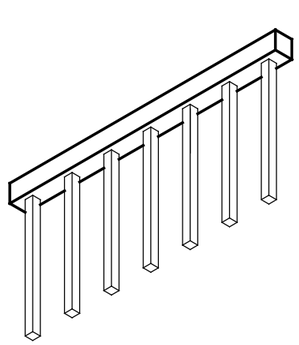


EAST FACE
Looking Northwest

BENT 3



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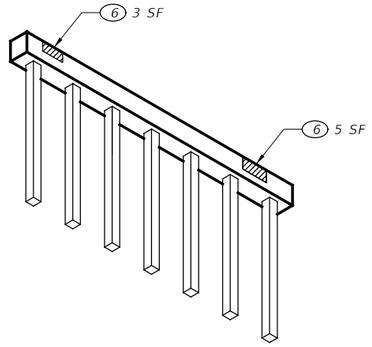
Looking Northeast



EAST FACE
Looking Northwest

BENT 6

SUBSTRUCTURE REPAIR ISOMETRICS

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER
Cassie Wallof
03/01/2021

NO.	REVISION	BY	DATE

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Texas Department of Transportation

IH 20 EB
MASON CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-270

SCALE: N.T.S. SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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GRAPHICS TGG	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK BRA	TEXAS	ATL	HARRISON	61
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	0495	08	121,ETC.	

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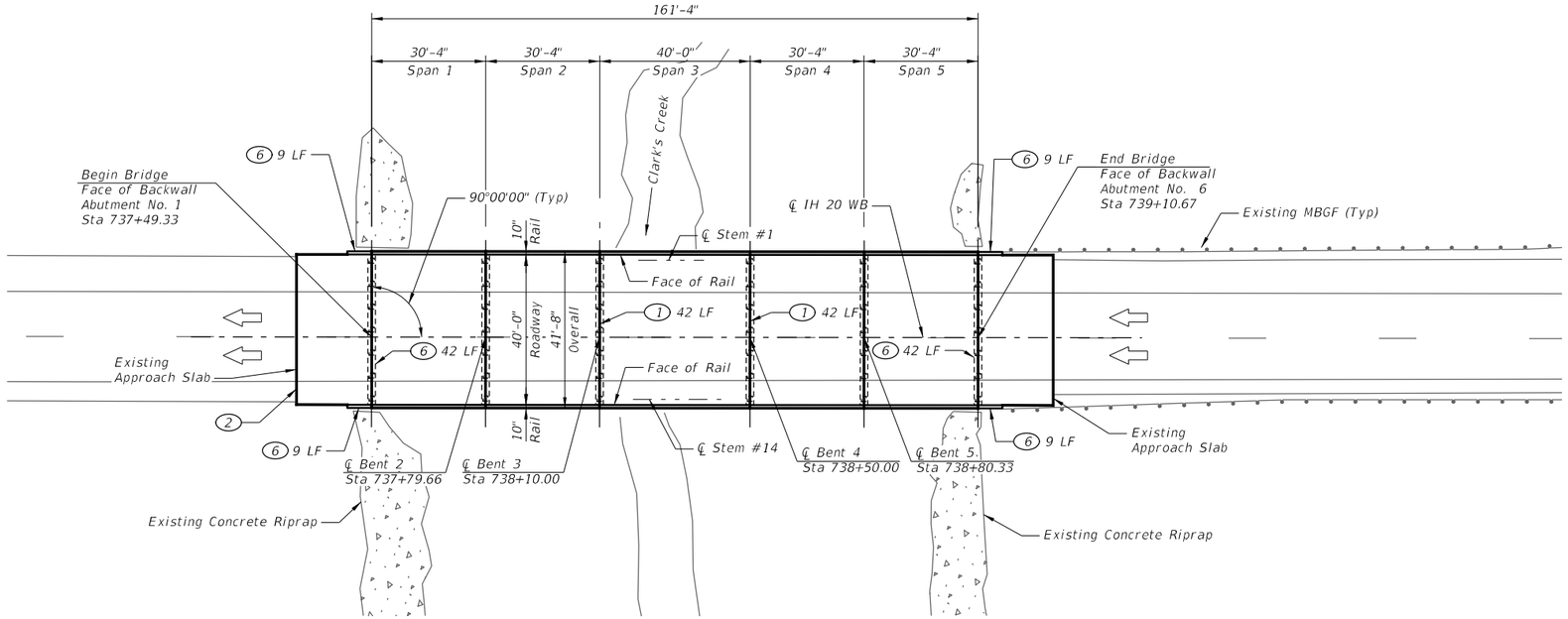


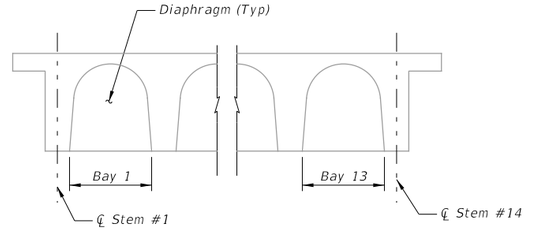
PLAN

GENERAL NOTES:

1. See the Table of Repairs for scope of rehabilitation.
2. Existing plans are available upon request.
3. Stationing is based on existing plans and is for reference only. Stems are labeled from left to right looking in the direction of increasing station.
4. Locations indicated in plans and details are for visual aids and all locations shall be approved by the Engineer prior to beginning repair work.
5. Existing asphalt overlay thickness is approximately 3.5 inches. Verify in field prior to ordering joints.

N

0 20 40
SCALE IN FEET



SUPERSTRUCTURE SECTION

REPAIR CALL-OUT LEGEND

(XX) XX XX
- XX — Repair No. - See Table of Repairs
- XX — Estimated Repair Quantity At Each Location
- XX — Repair Quantity Unit

TABLE OF REPAIRS

REPAIR NO.	REPAIR DESCRIPTION/LOCATION	ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
(1)	Clean all dirt and debris from joint down to the top of the cap at Bents 3 and 4, and reseal joint. See plan view for locations.	438	CLEANING AND SEALING EXISTING JOINTS	84	LF	See Existing Concrete Slab and Girder Joint Repair detail on the BEEJ (MOD).
(2)	Install concrete polymer header type joint at west approach slab relief joint. See plan view for location.	454	HEADER TYPE EXPANSION JOINT	12	CF	See Expansion Joint Header Detail on the Miscellaneous Bridge Repair Details sheet.
		454	JOINT SEALANT	40	LF	
(3)	Repair spall on diaphragm at Bent 3, Span 2, Bay 12.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	1	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between top of cap and any repair material.
(4)	Repair spalls and delamination on abutments and interior bent caps. See Substructure Repair Isometrics for locations.	429	CONC STR REPAIR (VERTICAL & OVERHEAD)	5	SF	Repair as Intermediate Spall per TxDOT Concrete Repair Manual Chapter 3, Section 2. Provide 1/8" bituminous fiber material between bottom of stem or diaphragm and any repair material.
(5)	Apply silane surface treatment on all faces of the abutments and bent caps. See Concrete Surface Treatment Isometrics for locations.	428	PENETRATING CONCRETE SURFACE TREATMENT	138	SY	
(6)	Clean and seal joints between riprap and wingwalls, and between riprap and abutment cap. See plan view for locations.	438	CLEANING AND SEALING EXIST JOINTS(CL3)	120	LF	Seal with hot poured rubber (Class 3) per DMS-6310.

STATE OF TEXAS
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IH 20 WB
CLARKS CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-272

SCALE: 1"=40' SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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BRA				

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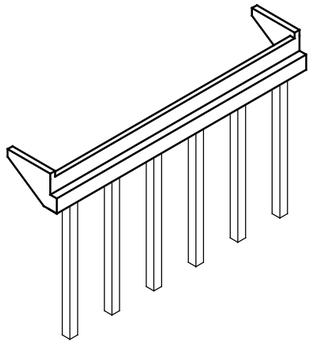
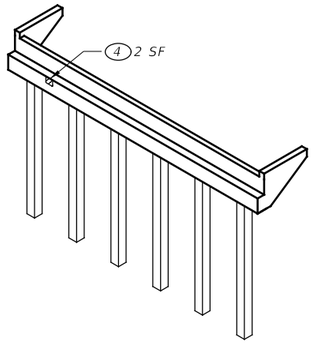


EAST FACE
Looking Northwest

ABUTMENT 1



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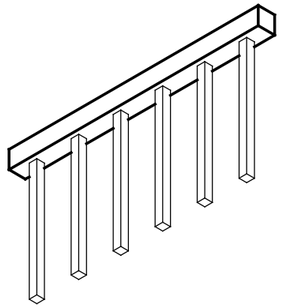
Looking Northeast

ABUTMENT 6



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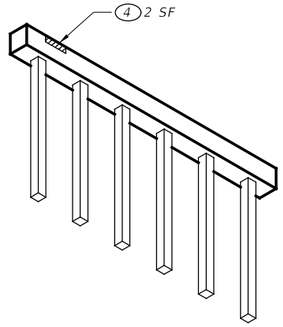

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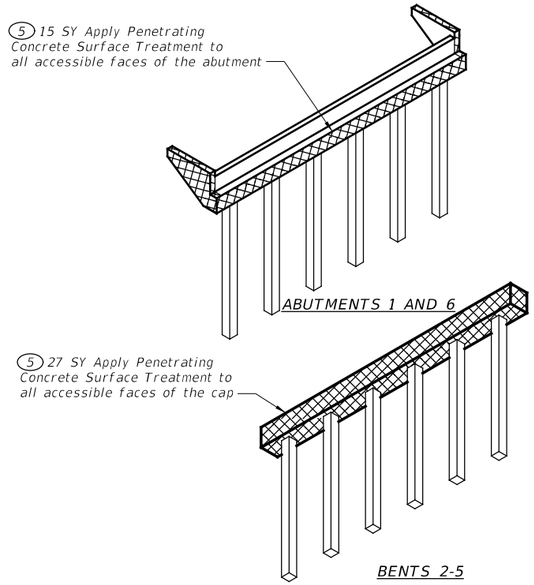
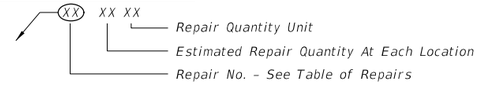
Looking Northwest

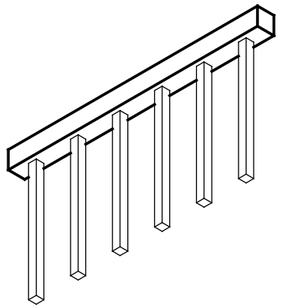
BENT 4



CONCRETE SURFACE TREATMENT ISOMETRICS

REPAIR CALL-OUT LEGEND





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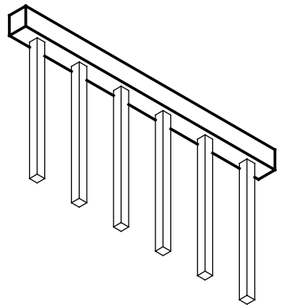
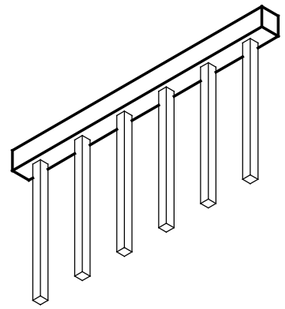
NO REPAIRS

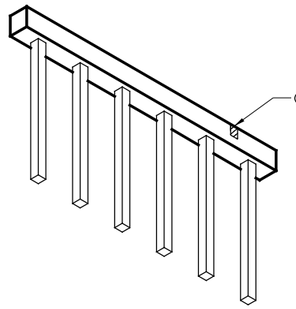


EAST FACE
Looking Northwest

BENT 2

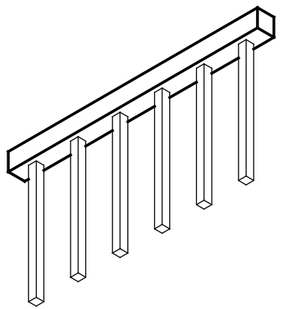


WEST FACE
Looking Northeast



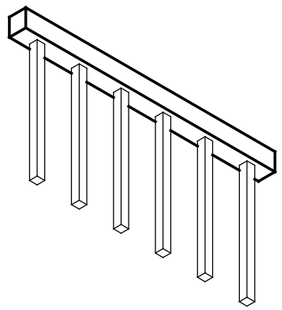
EAST FACE
Looking Northwest

BENT 5



WEST FACE
Looking Northeast

NO REPAIRS



EAST FACE
Looking Northwest

BENT 3

SUBSTRUCTURE REPAIR ISOMETRICS

STATE OF TEXAS
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IH 20 WB
CLARKS CREEK
BRIDGE REPAIRS

NBI# 19-103-0-0495-08-272

SCALE: N. T. S.

SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
STH	6			IH 20
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
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CHECK	CONTROL	SECTION	JOB	
BRA	0495	08	121, ETC.	
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BRA				

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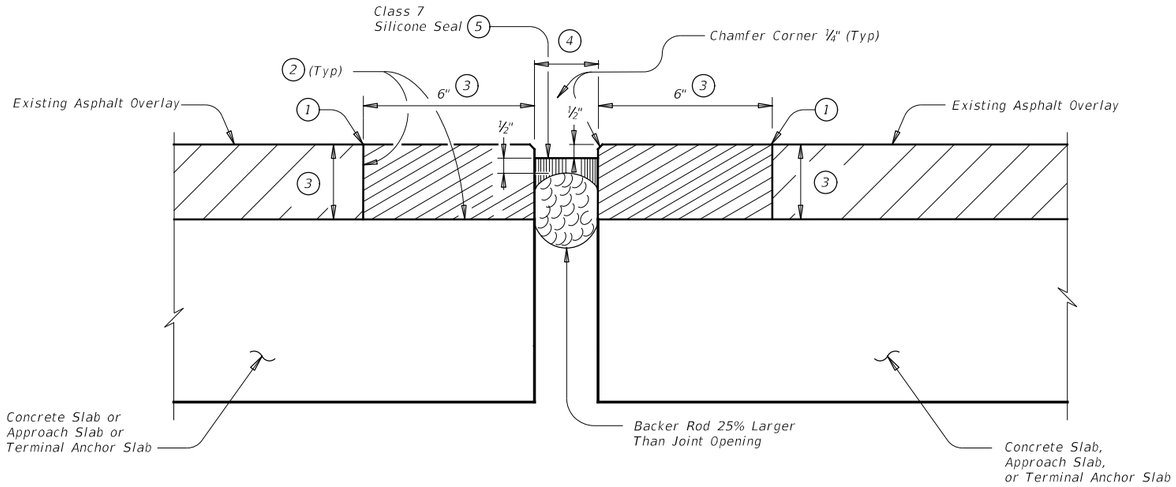

HEADER TYPE EXPANSION JOINT DETAIL

General Notes:

Header Type Joint must be in accordance with Item 454, "Bridge Expansion Joints".

Unless shown otherwise on the plans, header material will be paid for by the cubic foot and sealant by the linear foot in accordance with Item 454, "Bridge Expansion Joints".

Removal and replacement of loose existing steel and repair of deck must be in accordance with Item 785, "Bridge Joint Repair or Replacement". This work will not be paid for directly, but will be considered subsidiary to the other Pay Items for the Joints.

Work performed and materials furnished for cleaning existing joints will be paid for by the linear foot under Item 438, "Cleaning Existing Joints".

Any asphaltic material deposited on bent or abutment caps must be removed.

After Existing Overlay Is Removed:

Clean joint of any bituminous material, dirt, grease, or other deleterious material. Joint opening must be cleaned of old expansion material or devices in accordance with Item 438, "Cleaning and Sealing Joints".

The entire length of the joint must be checked. If any steel is present, remove and replace any portion determined to be unsound. Repair the deck. An approved concrete repair material must be used to repair any deep spall in the deck that leaves less than 6 inches of the original concrete below the spall. Spalls in the deck that are not so deep may be filled with header material. Removal and repair of deck must be accordance with Item 785, "Bridge Joint Repair or Replacement". Repair of damage caused by the Contractor must be repaired at the Contractor's expense in accordance with Item 429, "Concrete Structure Repair".

1. Saw cut overlay to the top of deck at the limits shown and remove material within the limits to expose the joint. Increase limits of removal to incorporate deteriorated asphalt in proximity of joint. Show limits of repair to Engineer for approval prior to removal.
2. Surfaces where header material is to be placed must be clean and dry in accordance with the manufacturer's specifications. Remove all asphaltic materials from the deck where the header material is placed.
3. Place header material in accordance with Item 454, "Bridge Expansion Joints – Header Type Expansion Joint". Match the thickness of the header material with the thickness of the overlay as shown in the plans. Do not cantilever header material over the joint opening.
4. Match existing joint opening.
5. After placing header material, install backer rod and sealant in accordance with Item 438, "Cleaning and Sealing Joints". Extend sealant up into rail or curb 6 inches on low side(s) of deck. If the Class 7 sealant cannot be effectively placed in the vertical position, a Class 4 sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specifications.

NOT TO SCALE

STATE OF TEXAS
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MISCELLANEOUS BRIDGE REPAIR DETAILS

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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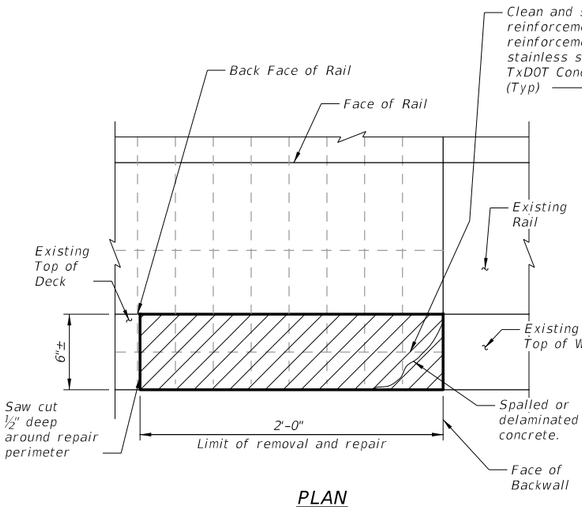
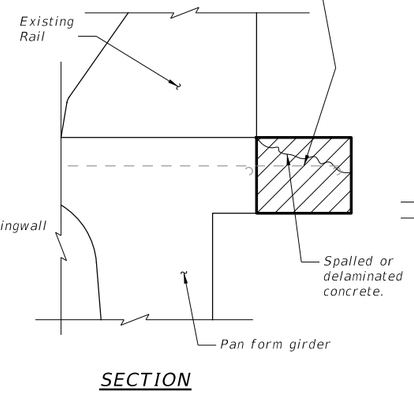
FULL DEPTH DECK REPAIR NOTES:

1. Sound limits of delaminations indicated in bridge plans. Note that not all delaminations exhibit visible spalling. Identify and mark all repair areas prior to beginning work. Verify areas and quantities with Engineer.
2. Prepare detailed repair procedure in accordance with Chapter 3, Section 4 of the TxDOT Concrete Repair Manual and detail below.

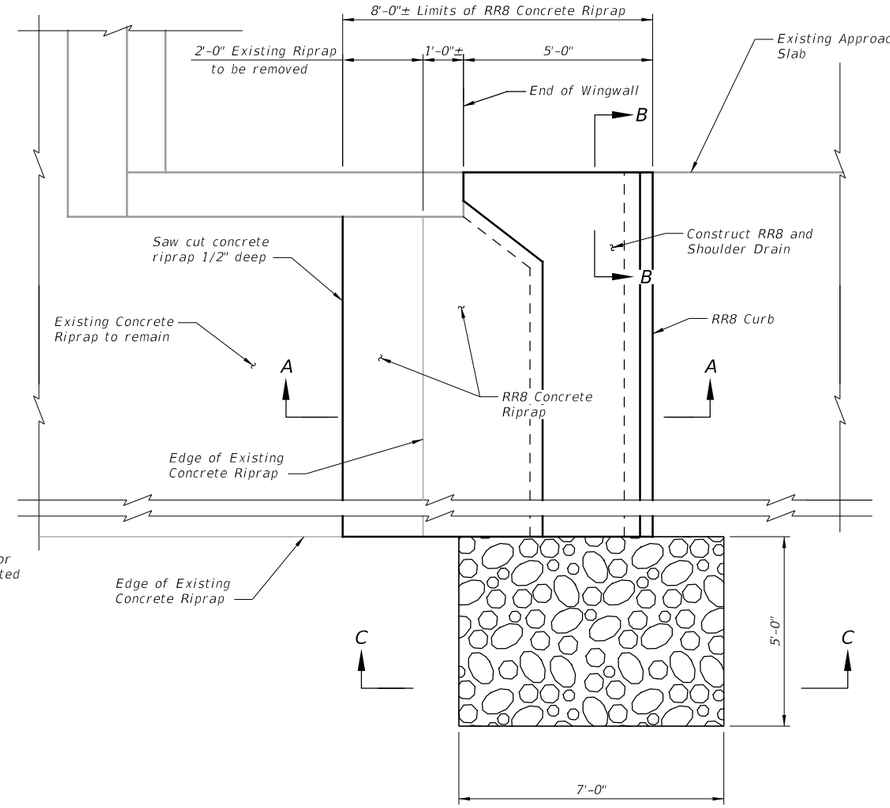


PLAN



SECTION

CORNER FULL DEPTH DECK REPAIR



PLAN

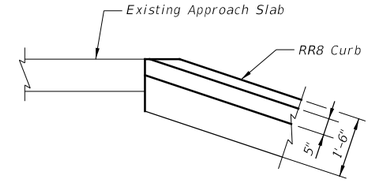
1. Clean and straighten existing reinforcing.
2. Use Shoulder Drain (integral with riprap) Detail per CRR Standard.
3. Stone riprap thickness should be a minimum thickness of 1.5 times the nominal stone riprap size

SHOULDER DRAIN NOTES:

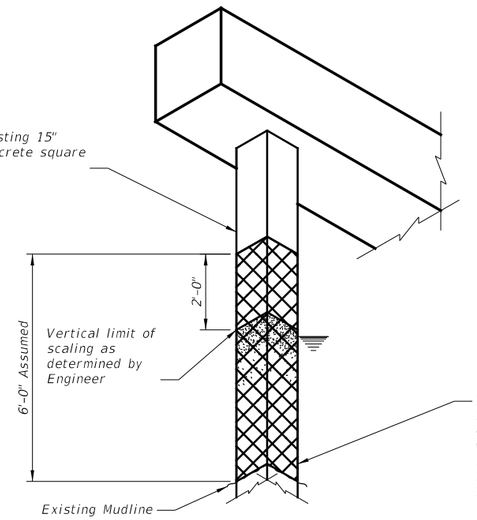
See CRR Standard for Riprap Details not shown.

Typical installation shown, actual field conditions vary. Adjust details and dimensions as directed by Engineer.

Fill voids or depressions below riprap with Type B embankment. Work is subsidiary to Item 432, "Riprap".

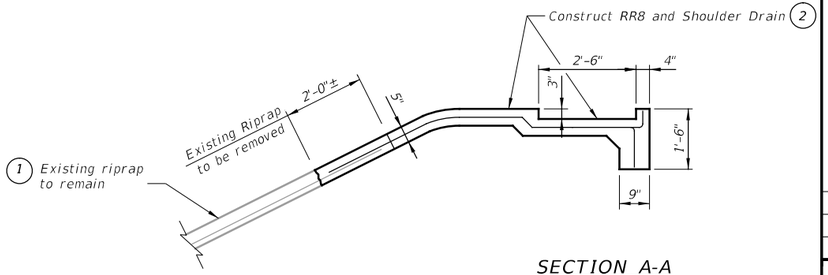


SECTION B-B

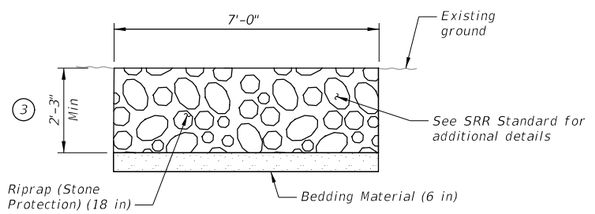


Prepare the area by dewatering in order to fully expose the piles down to the mudline. Coat concrete pile with Type X epoxy waterproofing. If needed, Dewatering will be subsidiary to Item 427, "Surface Finishes for Concrete". See Table of Repairs for locations.

PILE COATING DETAIL



SECTION A-A



SECTION C-C

SHOULDER DRAIN INSTALLATION DETAIL

NO.	REVISION	BY	DATE

STATE OF TEXAS — CASSANDRA WALLOF — 120398 — LICENSED PROFESSIONAL ENGINEER — 03/01/2021

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MISCELLANEOUS BRIDGE REPAIR DETAILS

SCALE: N. T. S. SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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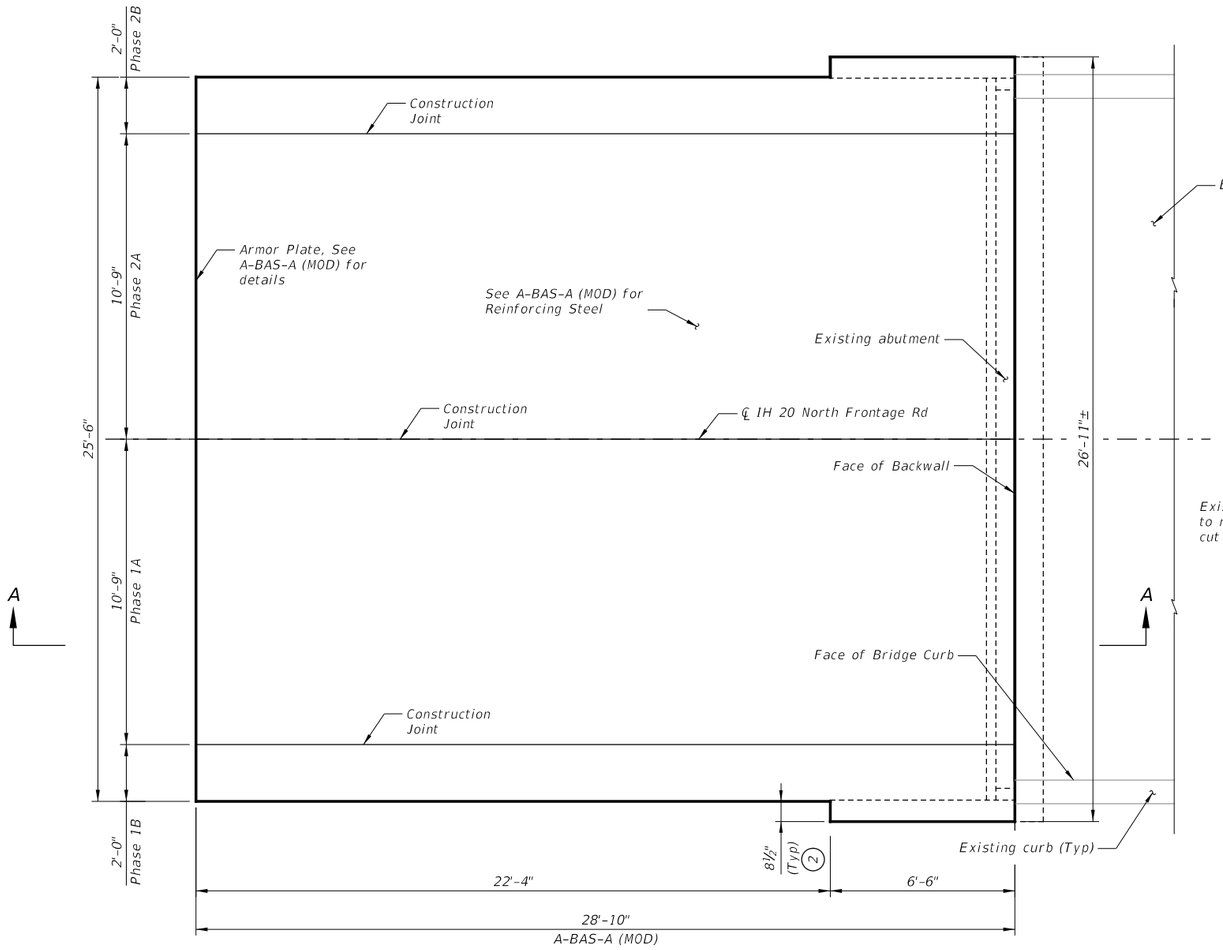
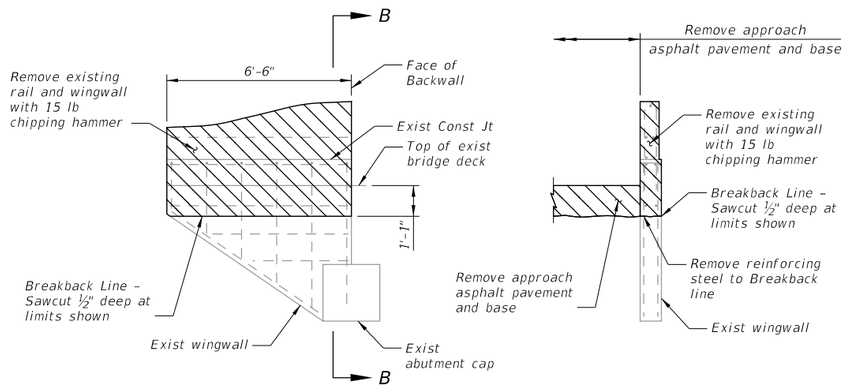


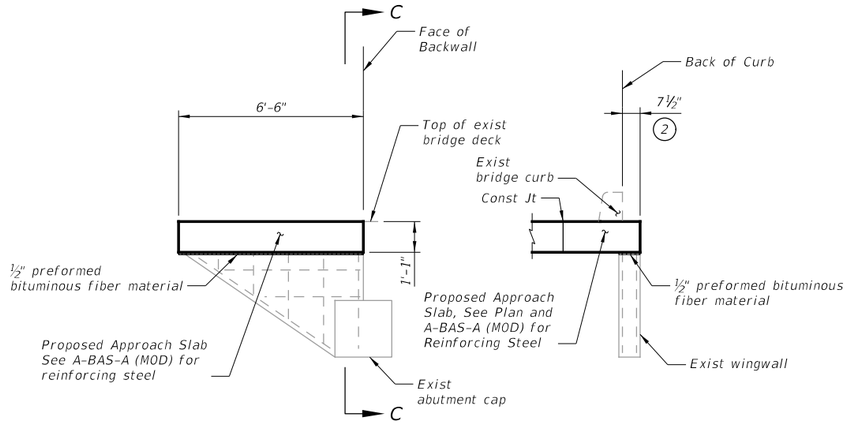
PROPOSED PLAN

Abutment 1 shown, Abutment 5 opposite hand



WINGWALL REMOVAL ELEVATION

SECTION B-B



PROPOSED WINGWALL ELEVATION

SECTION C-C

RAIL, WINGWALL, AND APPROACH SLAB RECONSTRUCTION

(2) Extend approach slab over existing wingwall

GENERAL NOTES:

See ABAS-A (MOD) standard for approach slab details and notes.

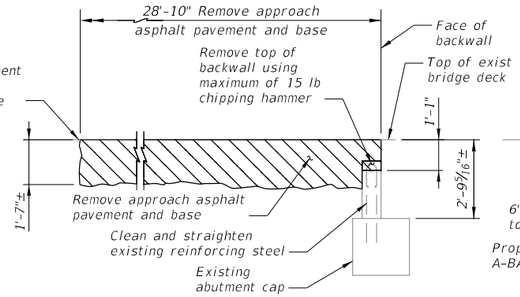
Avoid damage to existing bars in concrete removal process. If bar is damaged, drill and epoxy dowels as per the manufacturer's installation procedures.

Dimensions are based on as-built drawings and are for reference only. Contractor to field verify all dimensions before construction.

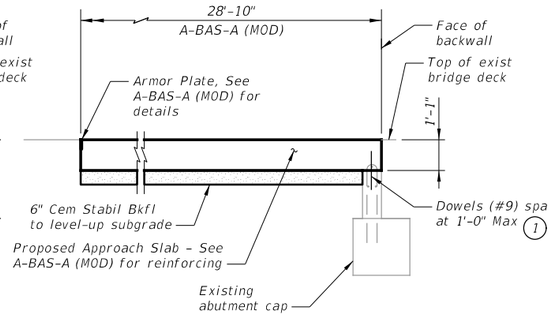
Concrete shall Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Approach slab is paid for per item 422, "Concrete Superstructures". Curb is subsidiary to Item 422, "Concrete Superstructures". Wingwall rail removal and Type T221 rail is paid for per Item 451, "Retrofit Railing". Wingwall and backwall removals at each abutment are paid for per Item 104, "Removing Concrete".



EXISTING SECTION A-A



PROPOSED SECTION A-A

(1) Drill and epoxy Dowels 8" min into existing backwall per Item 420.4.7.10. Extend 8" min into new approach slab.

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IH 20
MISCELLANEOUS BRIDGE REPAIR DETAILS

SCALE: N. T. S.

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
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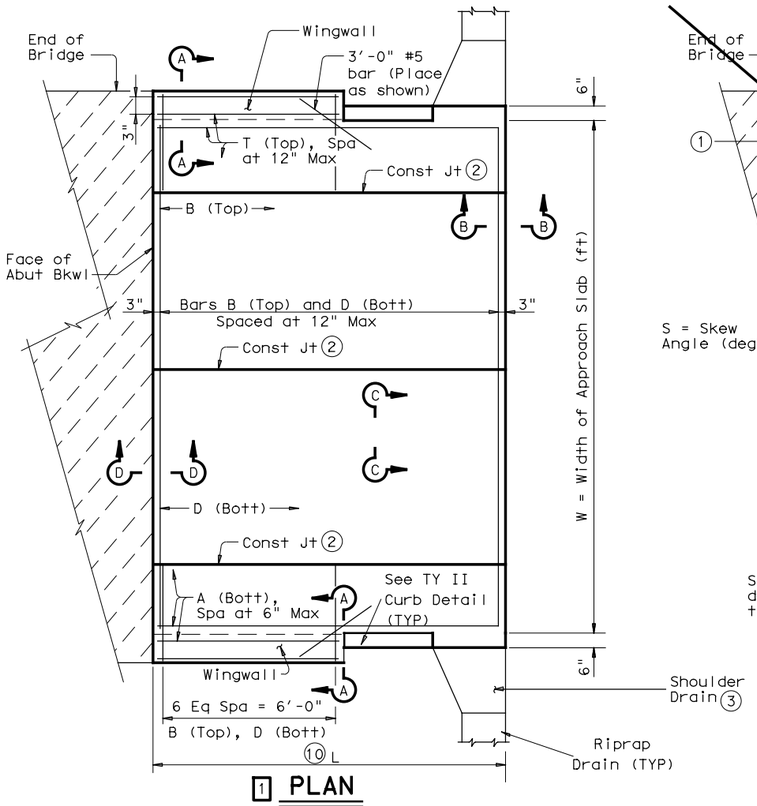
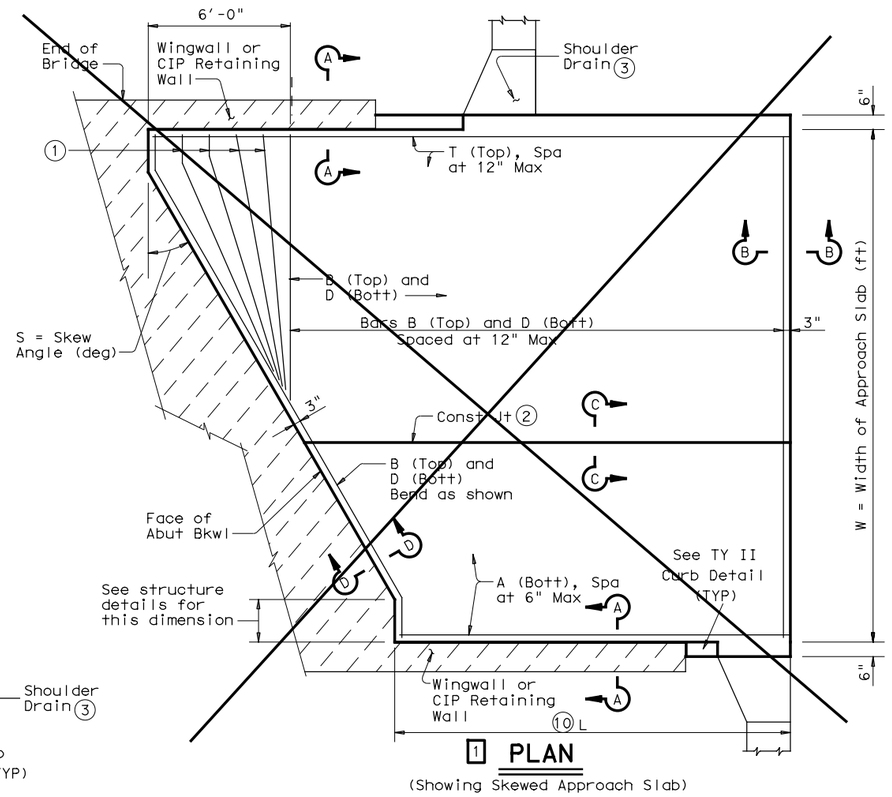


1 PLAN
(Showing Non-Skewed Approach Slab)



1 PLAN
(Showing Skewed Approach Slab)

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

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

1 Area of Appr Slab = L×W + 0.5W² tan S + 9.21 (SF)

(Outside 6" From End of Wingwall to End of BAS not included)

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

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

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

(3) See sheet 2 of 2 for shoulder drain location and details.

(4) For Contractor's information only.

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

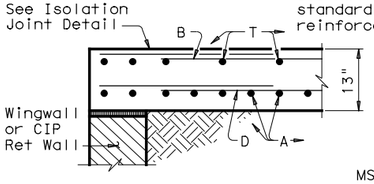
(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

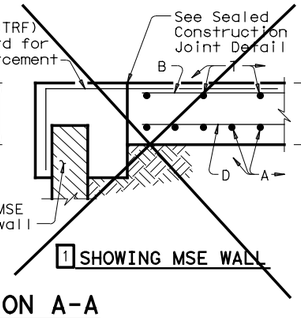
(8) Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.

(9) Place ½" Preformed Bituminous Fiber Material between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

1 (10) Length "L" is equal to "Lw" (Length of Wingwall) + 22'-4". when thrie-beam and curb are required. For "Lw", see bridge details. "L"=20' if thrie-beam and curb are not required.

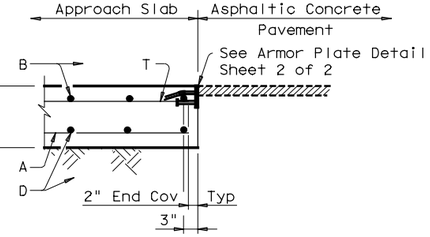


1 SHOWING WINGWALL OR CIP RETAINING WALL

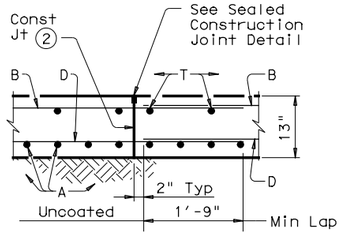


1 SHOWING MSE WALL

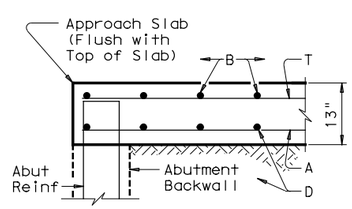
SECTION A-A



SECTION B-B



1 SECTION C-C (5)



SECTION D-D

GENERAL NOTES:

Construct approach slab in accordance with Item 420.

Concrete shall be Class "S" with a minimum compressive strength of 4,000 psi.

All reinforcing steel shall be Grade 60.

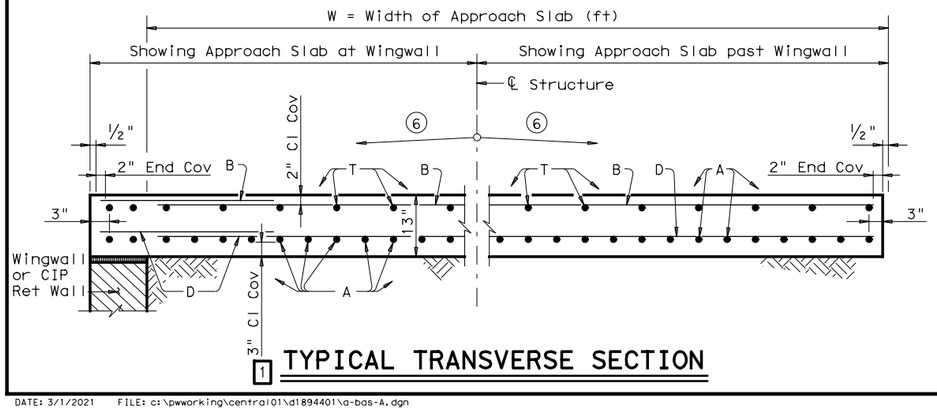
Construct the subgrade or subbase from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

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

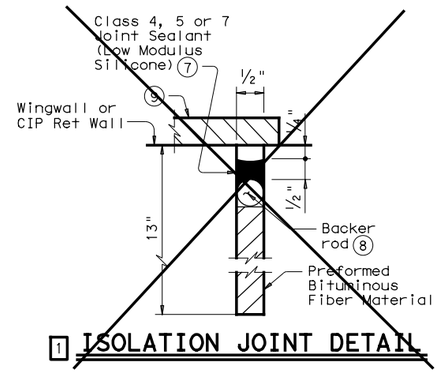
Cure for 4 days using water or membrane curing per Item 420.

Sealant, backer rod and preformed bituminous fiber material is subsidiary to approach slab concrete.

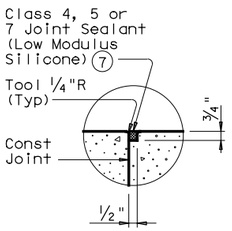
Provide a 1" bondbreaker (asphaltic concrete pavement or asphalt stabilized base) between the approach slab and cement stabilized backfill or cement treated base. Other bondbreakers may be used if approved by the Engineer.



1 TYPICAL TRANSVERSE SECTION



1 ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

HDR
Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
03/01/2021

Cassie Wallof

1 Changed approach slab length
Revised details to extend approach slab over wingwall

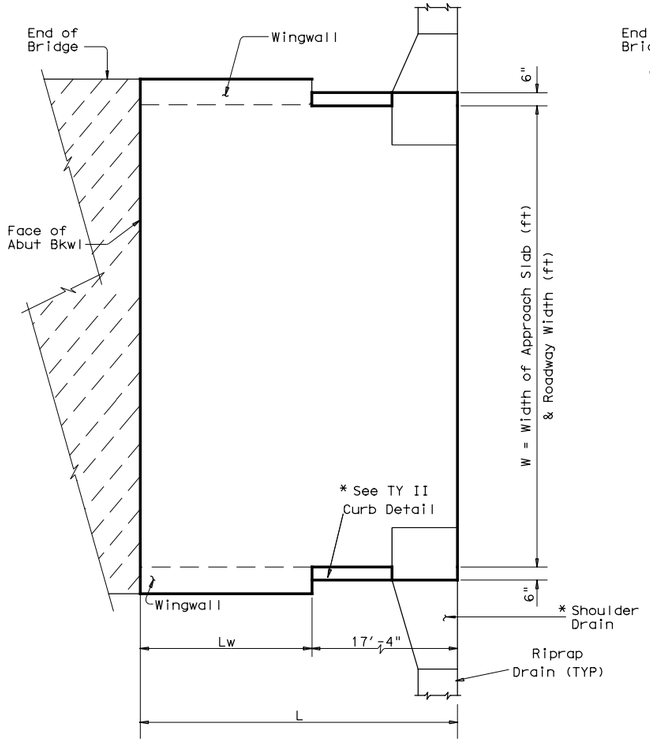
a-bas-A.std

Texas Department of Transportation
ATLANTA DISTRICT STANDARD

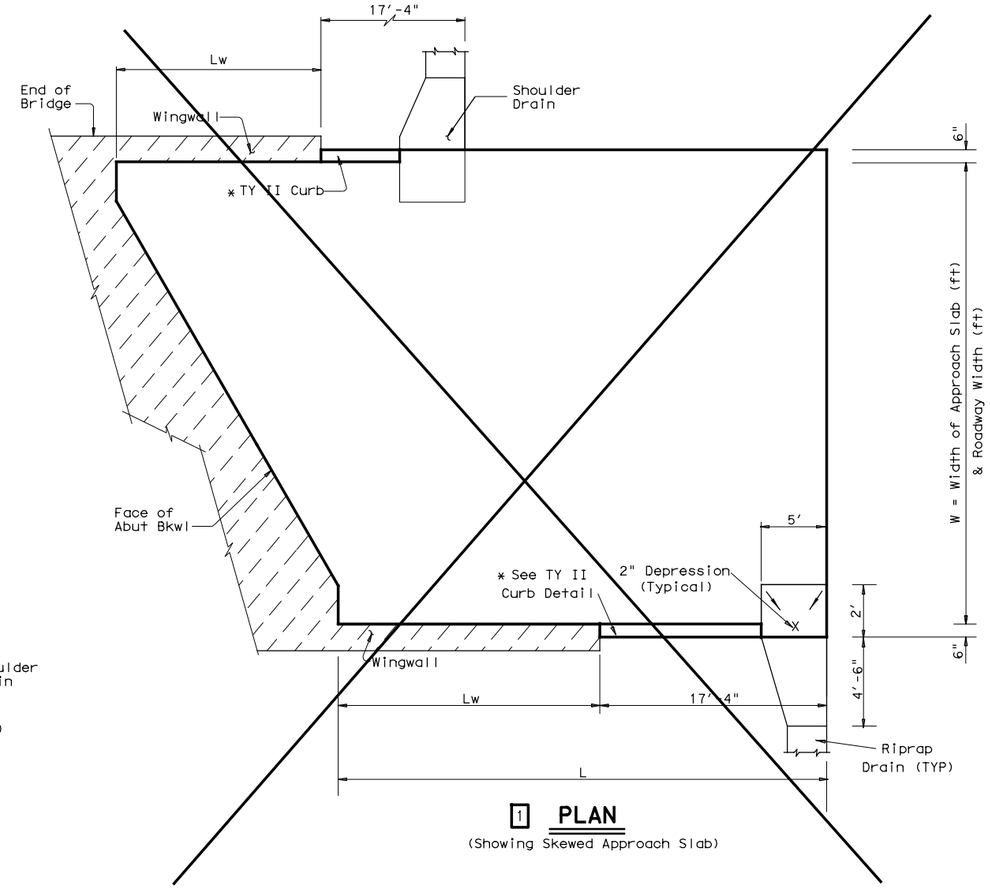
BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT
A-BAS-A (MOD)
CONCRETE BRIDGE RAIL WITH THRIE BEAM

SHEET 1 OF 2

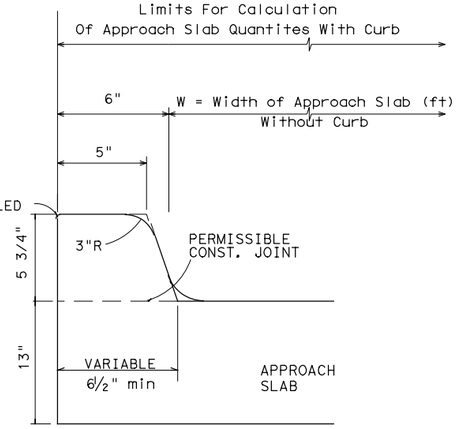
FILE: abas2005.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2005	CONT	SECT	JOB	HIGHWAY
REVISIONS MARCH 2006 AUGUST 2006 MARCH 2008 APRIL 2011	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		67



1 **PLAN**
(Showing Non-Skewed Approach Slab)

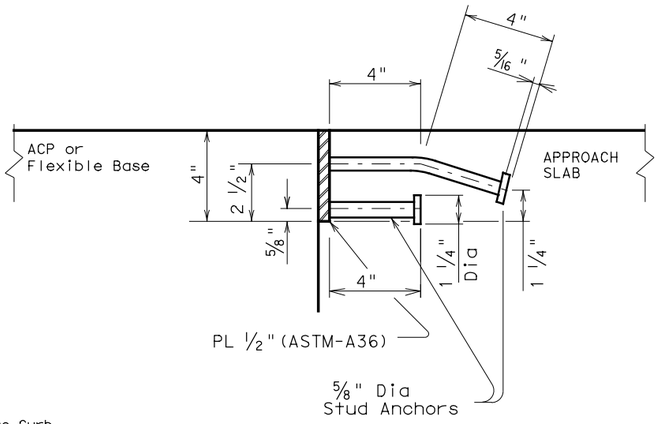


1 **PLAN**
(Showing Skewed Approach Slab)



TYPE II CURB

TYPE II CURB WILL NOT BE PAID FOR DIRECTLY BUT IS CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

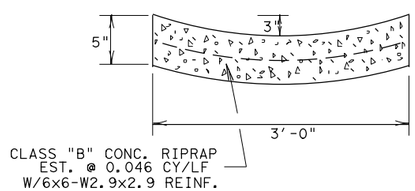


ARMOR PLATE

WEIGHT OF ARMOR PLATE= 8.05 lbs./ft.

LENGTH OF ARMOR PLATE IS SAME AS ROADWAY WIDTH, UNLESS OTHERWISE NOTED.

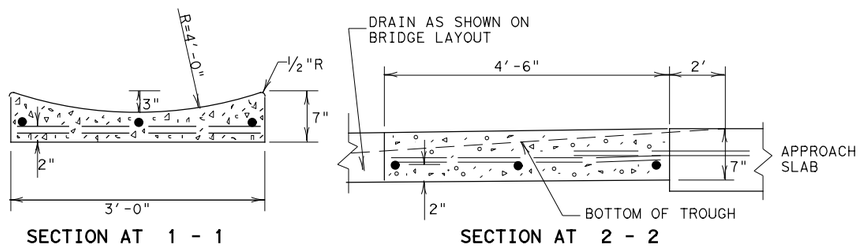
* If Thrie-Beam is Not Required Eliminate Curb and Locate Shoulder Drain at End of Wingwall.



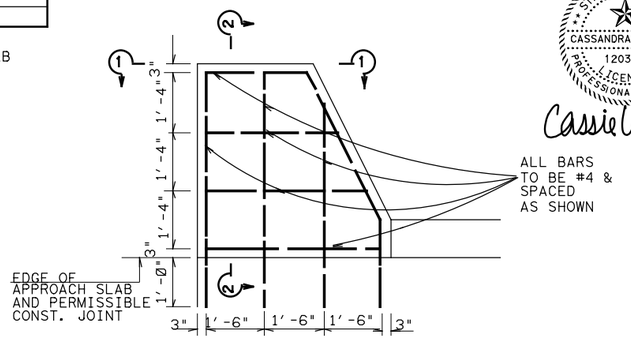
CONC. RIPRAP DRAIN DETAIL

ESTIMATED QUANTITIES FOR ONE SHOULDER DRAIN	
REINF. STEEL	CONCRETE
LBS	CY
25	0.34

QUANTITIES FOR SHOULDER DRAIN ARE INCLUDED IN QUANTITIES FOR APPROACH SLAB



SHOULDER DRAIN



REINFORCING LAYOUT FOR SHOULDER DRAIN

HDR
Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER
03/01/2021

Cassie Wallof

1 Revised details to extend approach slab over wingwall

Texas Department of Transportation
ATLANTA DISTRICT STANDARD

BRIDGE APPROACH SLAB
ASPHALTIC CONCRETE PAVEMENT
A-BAS-A (MOD)
CONCRETE BRIDGE RAIL WITH THRIE BEAM

SHEET 2 OF 2

FILE: abas2005.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2005	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2006 August 2006 MARCH 2008 APRIL 2011	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		68

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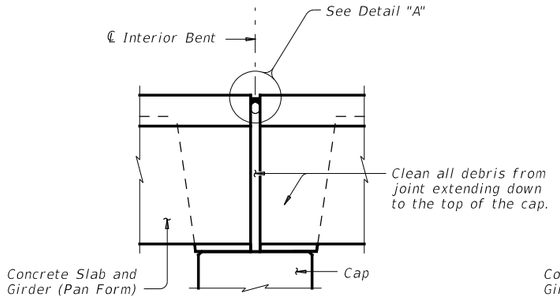
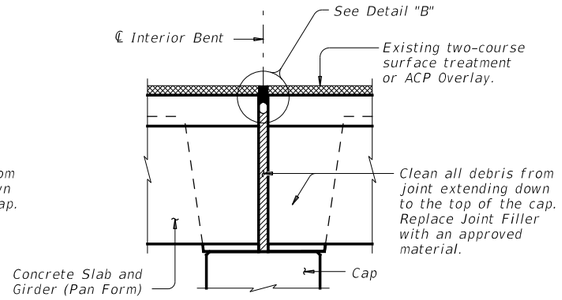
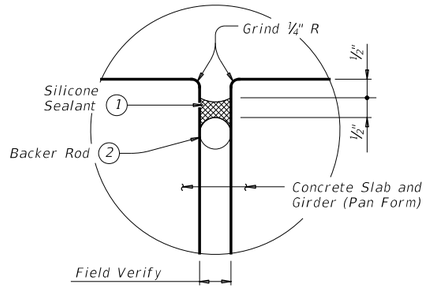


JOINT WITH SILICONE SEAL
(used without ACP Overlay)

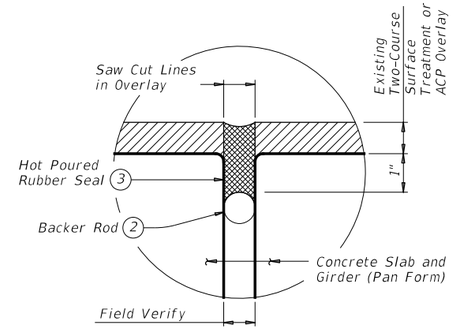


JOINT WITH HOT POURED RUBBER SEAL
(used with ACP Overlay)

EXISTING CONCRETE SLAB & GIRDER JOINT REPAIR



DETAIL "A"



DETAIL "B"

1. Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints and Cracks."
2. Backer rod must be 25% larger than joint opening and must be compatible with the sealant.
3. Use Class 3 hot poured rubber seal. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints and Cracks."

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH SILICONE SEAL:

1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints and Cracks." Clean joint out full depth of the joint.
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. The backer rod must be 25% larger than the joint opening.
4) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER 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 and Cracks."
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 of the type that can handle the heat and be compatible with the hot poured rubber seal. The backer rod must be 25% larger than the joint opening.
4) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement.

PROCEDURE FOR CLEANING AND SEALING EXISTING ARMOR JOINTS:

1) Remove existing seal.
2) Abrasive blast clean existing steel surface where silicone 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. The backer rod must be 25% larger than the joint opening.
5) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

GENERAL NOTES:

Cleaning existing joint opening (full depth) of all debris, providing and placing backer rod, saw-cutting joint opening, and sealing joint is paid for by Item 438, "Cleaning and Sealing Joints and Cracks" and measured by the foot of "Cleaning and Sealing of Existing Joints."

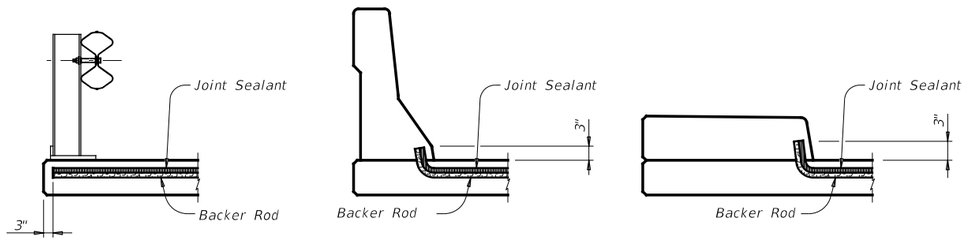
Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

For Class 3 Hot Poured Rubber Seal, provide backer rod compatible with the hot poured rubber sealant and rated for a minimum of 400°F.

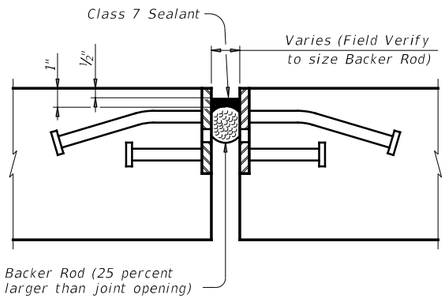
Provide Class 3 sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in asphalt overlay.

Provide Class 7 silicone sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in concrete.

Extend sealant up into rail or curb 3 inches on low side or sides of deck. If the Class 7 Sealant cannot be effectively placed in the vertical position, a Class 4 Sealant compatible with the Class 7 sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specifications.



JOINT SEALANT TERMINATION DETAILS



CLEANING AND SEALING EXISTING ARMOR JOINTS
(Showing Armor Joint Section)

HDR
Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER

03/01/2021

Cassie Wallof

Texas Department of Transportation

Bridge Division Standard

CLEANING AND SEALING EXISTING BRIDGE JOINTS

BEEJ (MOD)

FILE: beejr001.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2015	CONT	SECT	JOB	HIGHWAY
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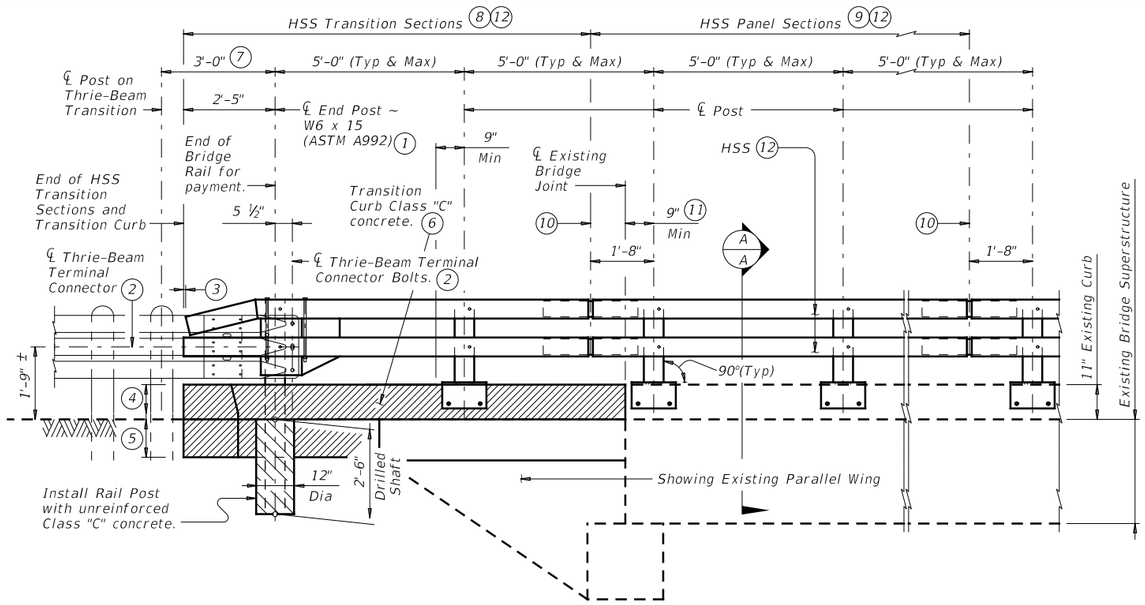
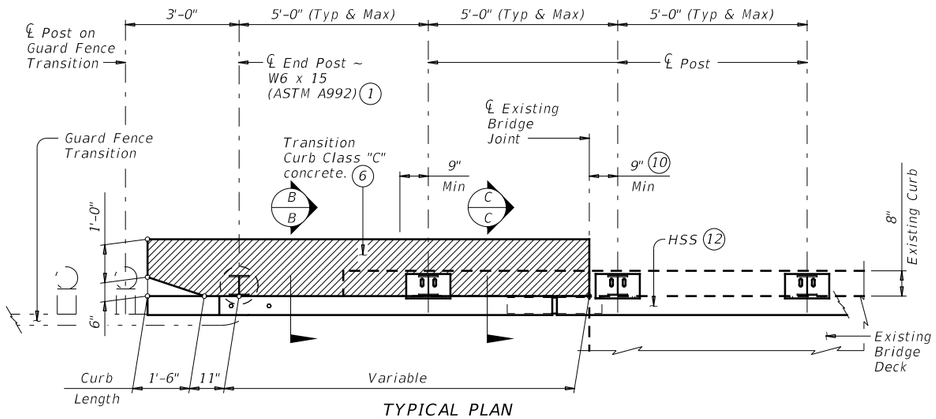
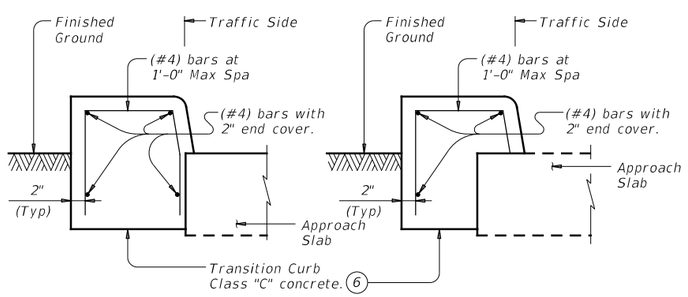


TYPICAL ROADWAY ELEVATION



TYPICAL PLAN

RETROFIT WITH PARALLEL WING



SECTION B-B SECTION C-C

TRANSITION CURB SECTIONS

(1) Post length = Top of rail elevation minus bottom of drilled shaft elevation.

(2) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach the appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal to the bridge rail using 3 bolts as shown, and extend along the embankment.

(3) Top HSS can be shorter than bottom HSS ⅝" plus or minus.

(4) Match existing bridge curb height.

(5) Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.

(6) Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 1'-6" taper will remain vertical.

(7) Showing first post for a TL-3 rated guard fence transition.

(8) HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.

(9) HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.

(10) ℄ HSS Expansion Joint or ℄ HSS Splice Joint as required.

(11) Use 9" minimum for both expansion joints and construction/controlled joints.

(12) HSS 6 x 6 x ¼ (ASTM A1085 or A500 Gr C).

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

Provide Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

One shop splice per rail member section is permitted with minimum 85 percent penetration.
The weld may be square groove or single vee groove.

Round or chamfer exposed edges of HSS rail, rail post and plate to approximately 1/16" by grinding.

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.

Submit erection drawings showing panel lengths, splice locations, post placement, anchor bolt locations and adhesive anchor test data to demonstrate pullout strength to the Engineer for approval. Shop drawings are not required.

MATERIAL NOTES:

Galvanize all metal components of steel rail system.

Provide Grade 60 reinforcing steel.

Provide Class "C" concrete. As an alternate, provide Class "K" concrete, or a Type A-2 or Type C concrete repair material per DMS-4655 "Concrete Repair Materials". Do not use Type "B" (Ultra-Rapid) concrete repair materials.

Anchor bolts must be ¾" Dia ASTM A193 Gr B7 or ASTM A449 fully threaded rods with one heavy hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into concrete curb using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 6 ¾". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 30 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".

GENERAL NOTES:

This retrofit railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This retrofit railing can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used.

This rail is to be paid for as "Retrofit Rail (Ty T131RC)" under Item 451 "Retrofit Railing".

Average weight with no overlay: 55 plf (11" Curbs)

Cover dimensions are clear dimensions, unless noted otherwise.

HDR
Firm Registration No. F-754

03/01/2021

Cassie Wallof

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR T131RC RAIL ON CURBS

TYPE T131RC (MOD)

FILE: rlstd034-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: MAS
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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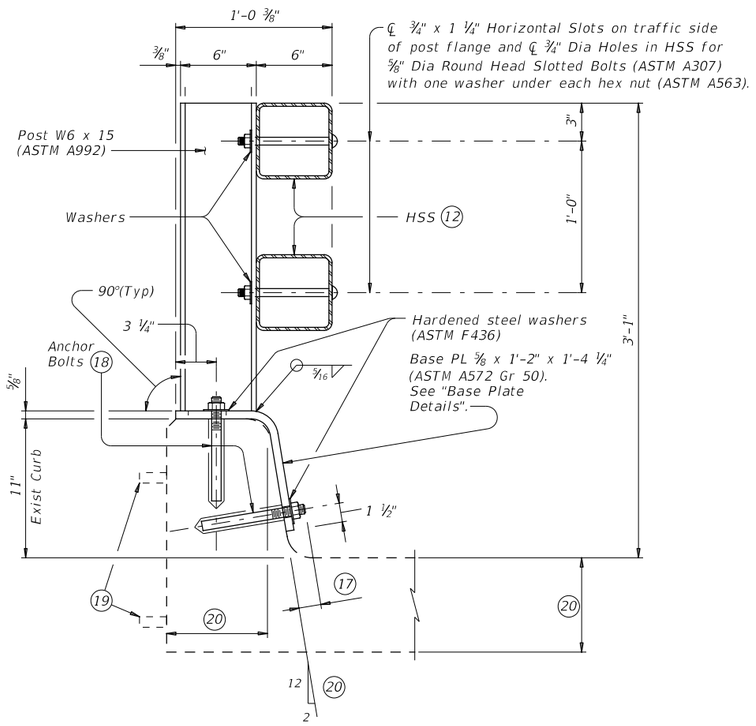
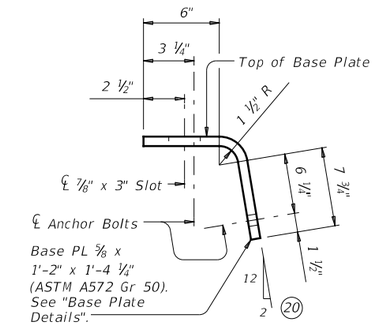
	ATL	HARRISON		70



SECTION A-A OF 11" HIGH CURBS



11" HIGH CURB BASE PLATE DETAIL

(10) ℄ HSS Expansion Joint or ℄ HSS Splice Joint as required.

(12) HSS 6 x 6 x 1/4 (ASTM A1085 or A500 Gr C).

(13) May be placed on either side of W6 x 15 web.

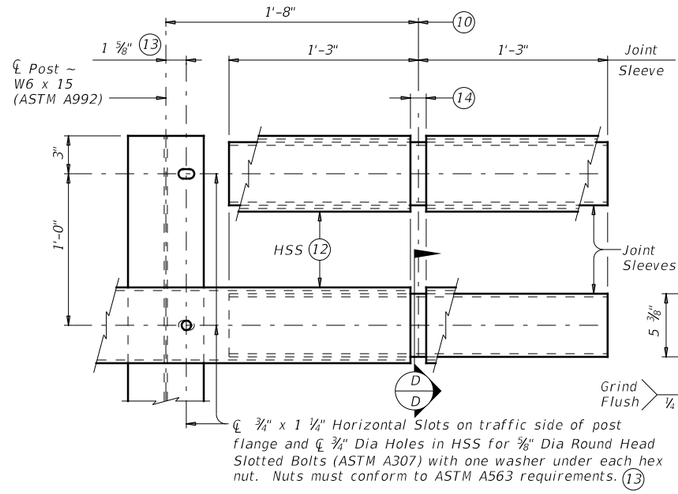
(14) Place HSS Expansion Joints in rail at every slab Expansion Joint. For Expansion and Splice Joints openings, use the greater of 1" or (slab opening plus 1/2").

(17) 1 3/4" Bolt Projection (Typ).

(18) See "Material Notes" for anchor Bolt information.

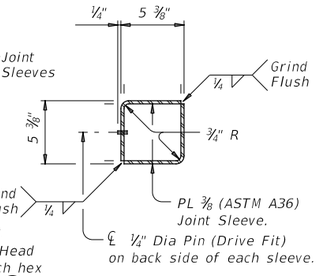
(19) Remove existing railing (including posts), cut and grind anchor bolts flush and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".

(20) See elsewhere in plans for dimensions (curb width and height and slab thickness). Slope of curb may differ from what is shown. Adjust base plate as necessary to conform to curb face geometry.



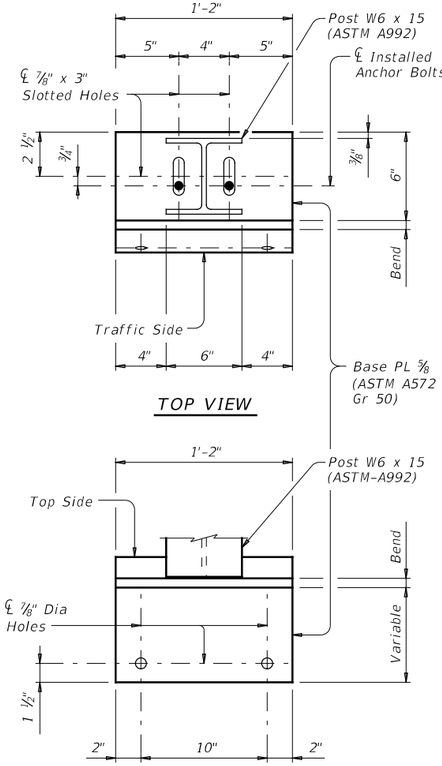
TYPICAL POST CONNECTION AND SPLICE DETAIL FOR HSS

Showing post with HSS and HSS splice.



SECTION D-D

Showing typical Joint sleeve.



TOP VIEW

FRONT VIEW

BASE PLATE DETAILS

HDR
Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED
PROFESSIONAL ENGINEER

03/01/2021

Cassie Wallof

SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR T131RC RAIL ON CURBS

TYPE T131RC (MOD)

FILE: rlstd034-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: MAS
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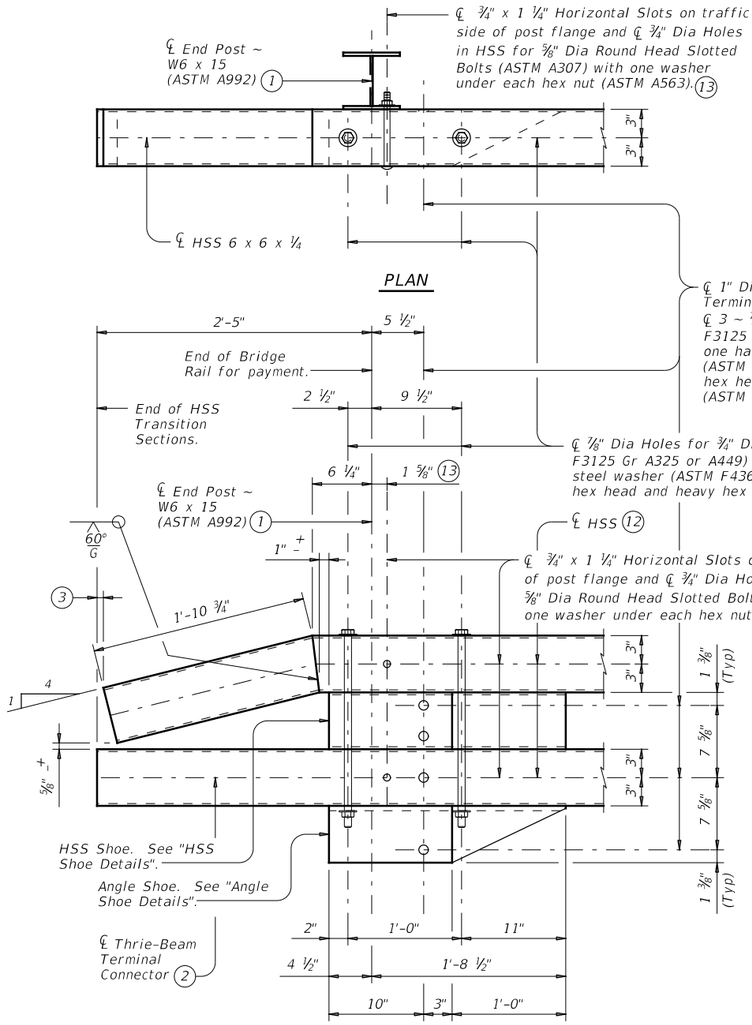
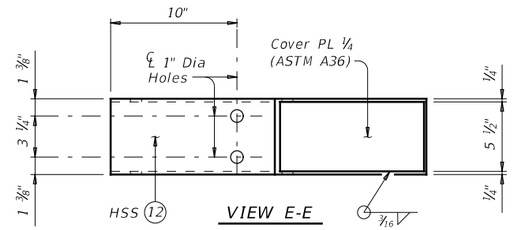
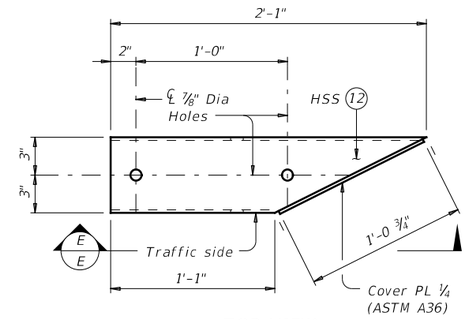


ROADWAY ELEVATION

HSS TRANSITION SECTION END DETAILS

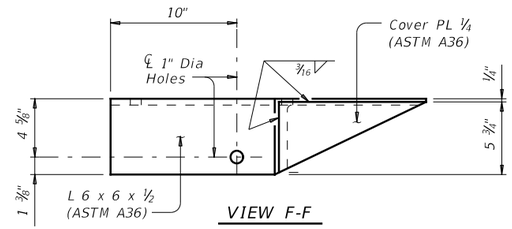
Thrie-Beam Terminal Connector not shown for clarity.

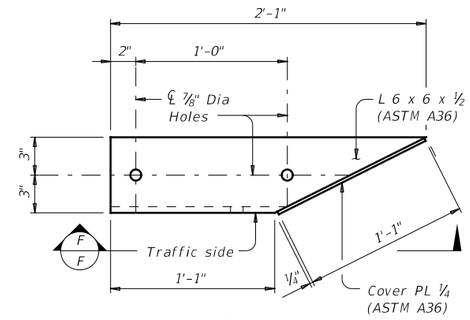




TOP VIEW

HSS SHOE DETAILS





TOP VIEW

ANGLE SHOE DETAILS

Angle Shoe shown is detailed for one side only, other side similar. For other side shoe must be built for opposite hand.

(1) Post length = Top of rail elevation minus bottom of drilled shaft elevation.

(2) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". The appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal must be attached to the bridge rail and extended along the embankment.

(3) Top HSS can be shorter than bottom HSS ⅝" plus or minus.

(12) HSS 6 x 6 x ¼ (ASTM A1085 or A500 Gr C).

(13) May be placed on either side of W6 x 15 web.

HDR
Firm Registration No. F-754

STATE OF TEXAS
CASSANDRA WALLOF
120398
LICENSED PROFESSIONAL ENGINEER

03/01/2021

Cassie Wallof

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR T131RC RAIL ON CURBS

TYPE T131RC (MOD)

FILE: rlstd034-19.dgn	DN: TxDOT	CK: JMH	DN: JTR	CK: MAS
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		72

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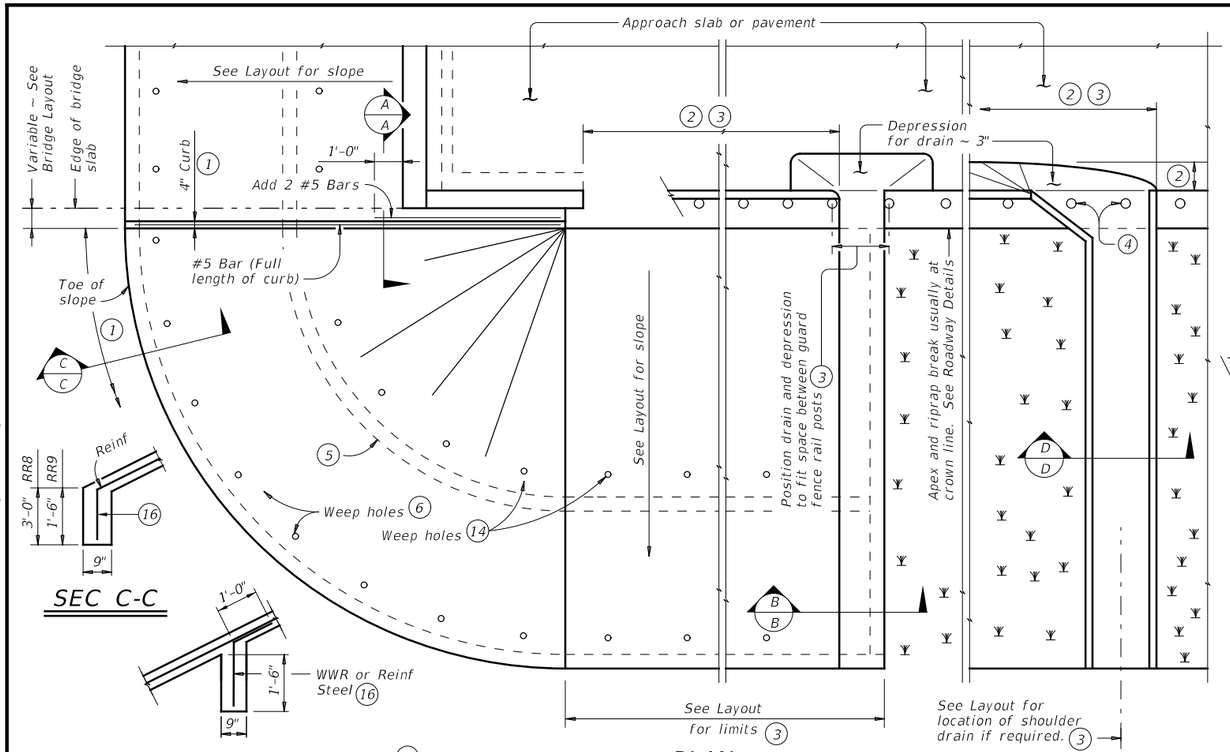
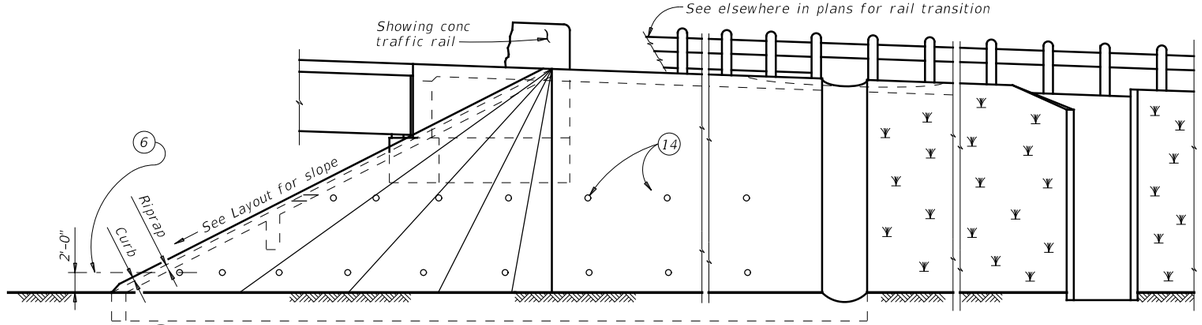


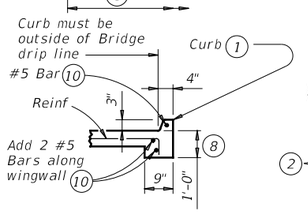
PLAN

SEC C-C

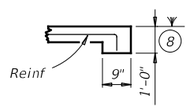
INTERMEDIATE TOEWALL (5)



ELEVATION

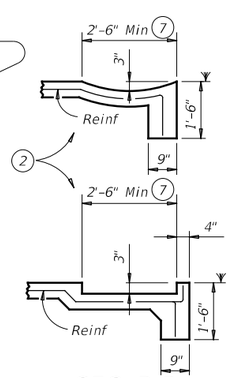


SEC A-A



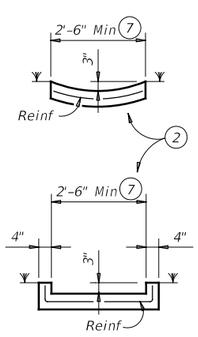
SEC B-B

(No drain)



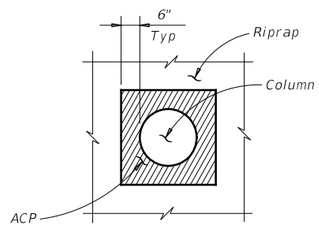
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

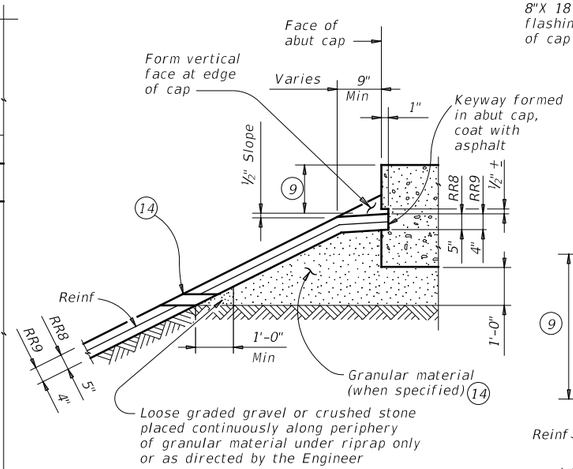
(Shoulder drain)



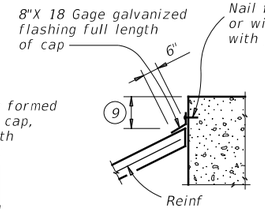
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

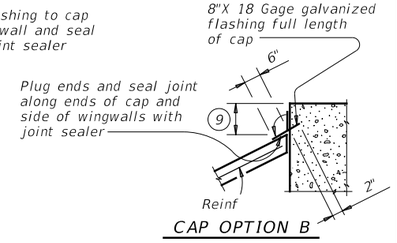
(As directed by the Engineer)



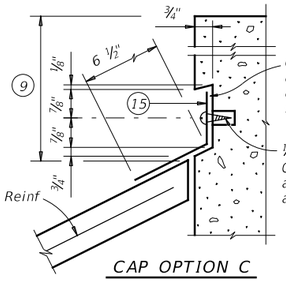
SHOWING KEYWAY OPTION



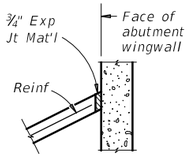
CAP OPTION A



CAP OPTION B

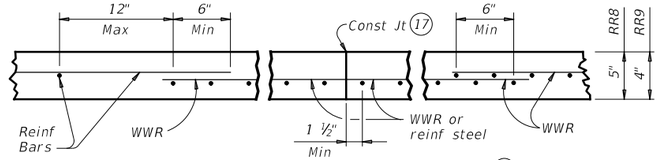


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
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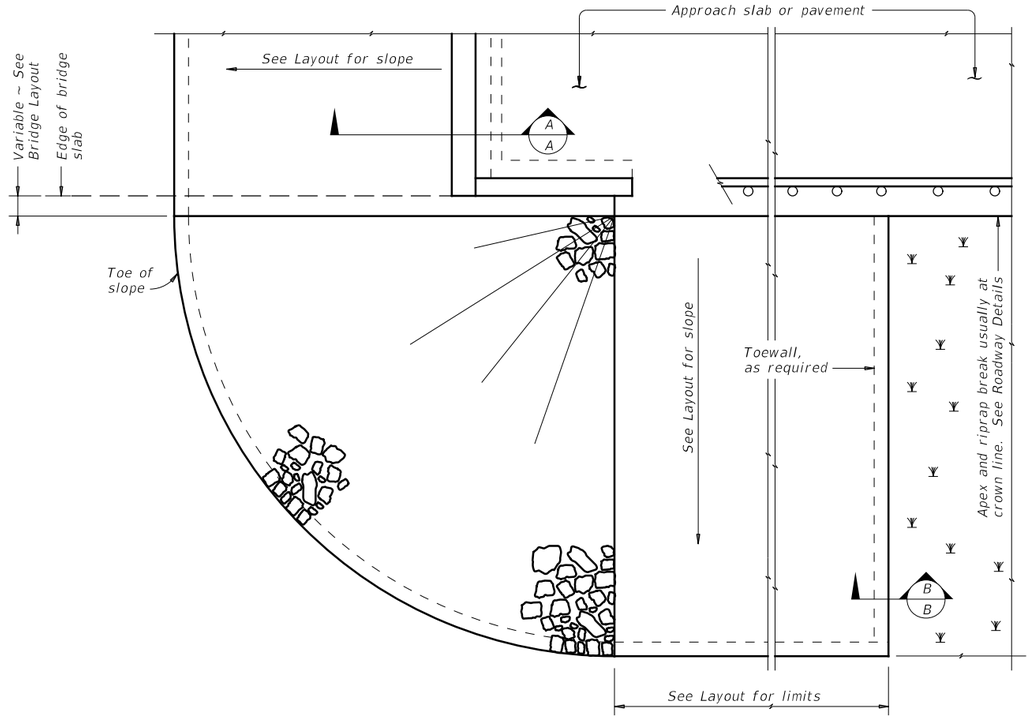
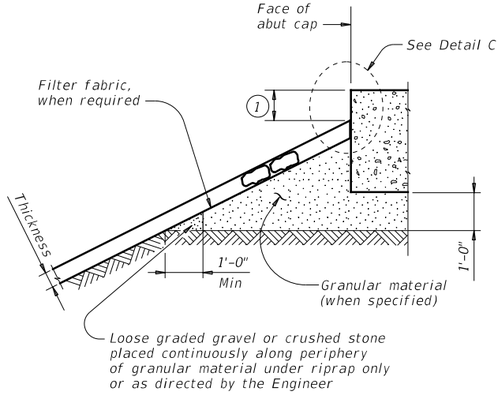
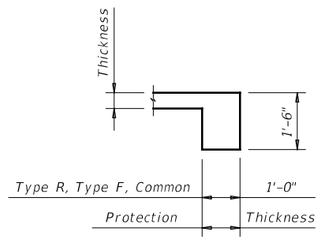
	ATL	HARRISON		73



PLAN

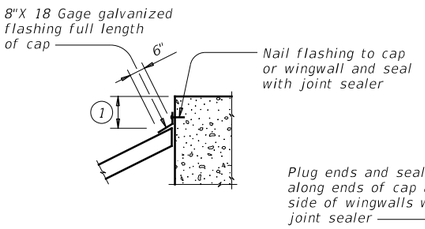


SECTION A-A AT CAP

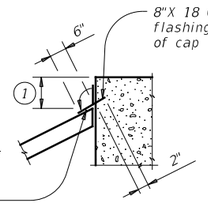


SECTION B-B

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

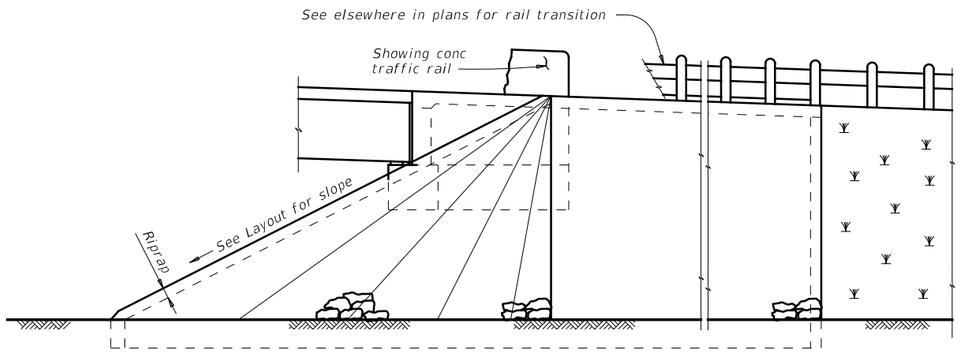


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0495	08	121,ETC		IH 20		
	DIST	COUNTY				SHEET NO.	
	ATL	HARRISON				74	

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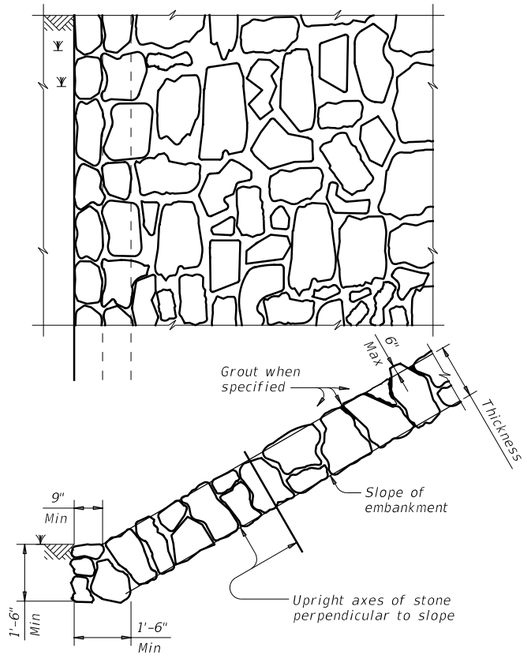


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

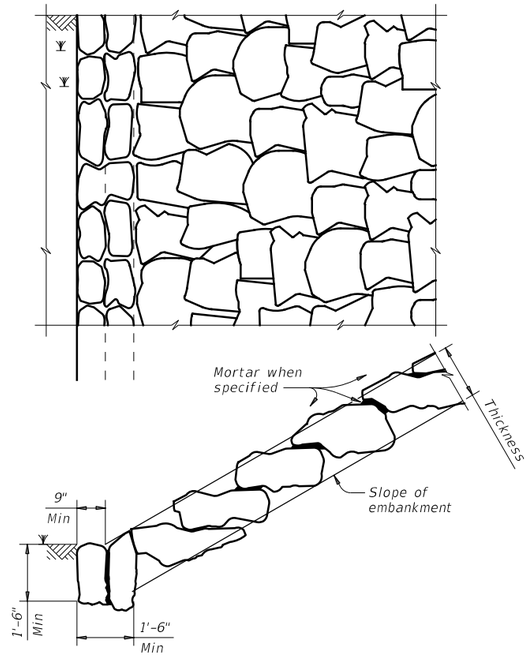


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

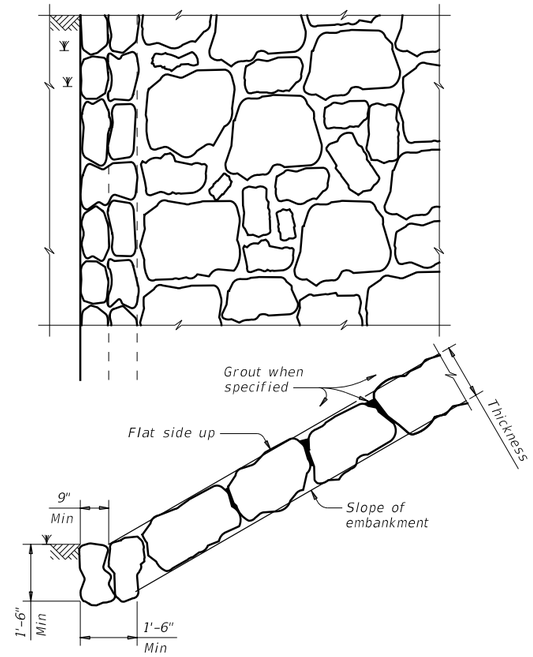


FIGURE 3 ~ TYPE F STONE RIPRAP

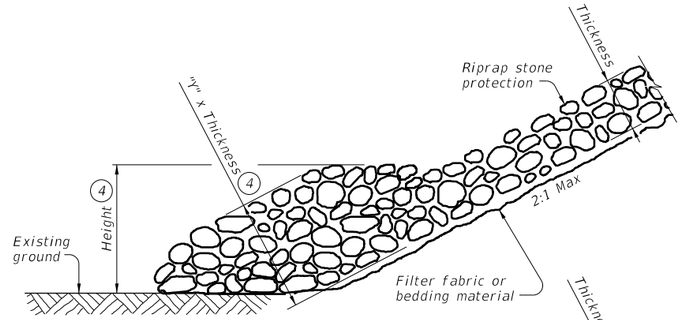
grouted

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

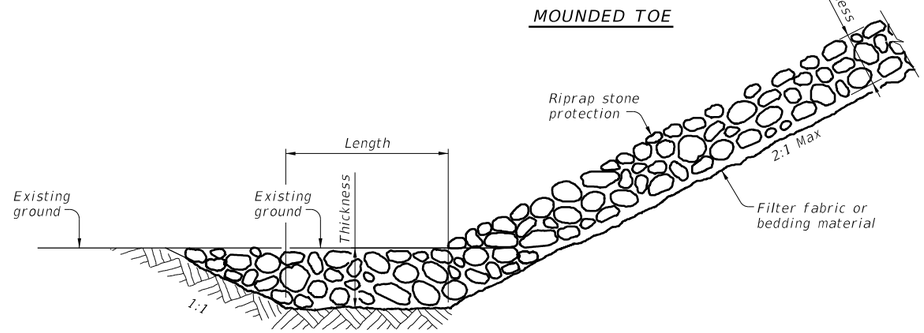
3 *Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.*

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

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

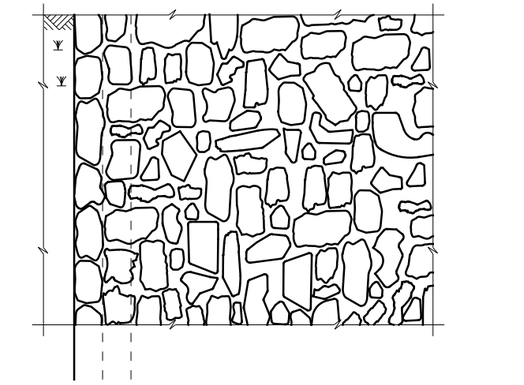


MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS 5



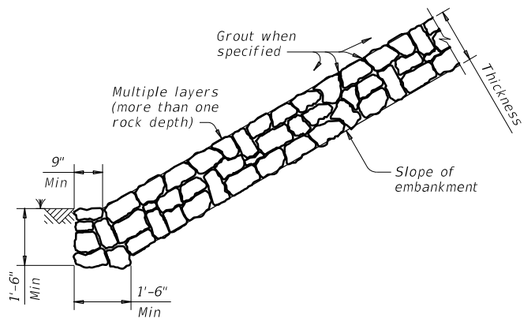
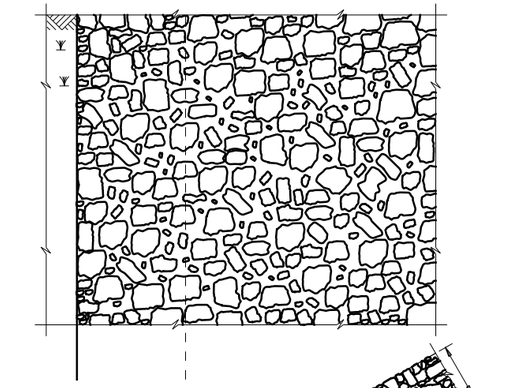


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted



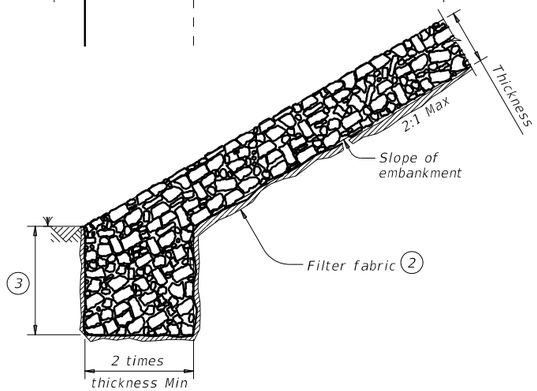


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	ATL	HARRISON		75

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SITE DESCRIPTION

PROJECT LIMITS: *IH 20 EB & WB OVER BNSF RR, IH 20 OVER MASON CREEK*
IH 20 WB OVER CLARKS CREEK

PROJECT DESCRIPTION: *CONCRETE DECK AND STRUCTURE REPAIR*

MAJOR SOIL DISTURBING ACTIVITIES: *INSTALL MBGF AND PLACE CONCRETE MOW STRIP AND RIPRAP*

TOTAL PROJECT AREA: *1.109 AC*

TOTAL AREA TO BE DISTURBED: *0.349 AC*

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: *IN GOOD CONDITION.*
APPROXIMATELY 95% VEGETATIVE COVER.

NAME OF RECEIVING WATERS:
IH 20 EB & WB OVER BNSF AND IH 20 OVER MASON CREEK FLOWS INTO
MASON CREEK SEG ID 0505J - IMPAIRED FOR BACTERIA
IH 20 WB OVER CLARKS CREEK FLOWS INTO SABINE RIVER SEG ID 0505

ANTICIPATED EFFECT OF STORM WATER ON THREATENED AND ENDANGERED SPECIES AND WILDLIFE HABITAT: *REFER TO EPIC SHEET*

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:
1) INSTALL SWP3 MEASURES
2) REPAIR EXISTING BRIDGES
3) REMOVE SWP3 MEASURES

STORM WATER MANAGEMENT: *STORM WATER WILL DRAIN TO EXISTING FEATURES BY VEGETATION LINED DITCHES.*

DETAILED SITE MAP OR LAYOUT INDICATING THE FOLLOWING: (SEE SWP3 QTY)

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [X] TEMPORARY SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [X] PRESERVATION OF NATURAL RESOURCES
- [X] SLOPE TEXTURING

OTHER: EROSION CONTROL AND STABILIZATION MEASURES MUST BE INITIATED IMMEDIATELY IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED AND WILL NOT RESUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. STABILIZATION MEASURES THAT PROVIDE A PROTECTIVE COVER MUST BE INITIATED IMMEDIATELY IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED.

STRUCTURAL PRACTICES:

- [X] SILT FENCES
- [ ] HAY BALES
- [ ] ROCK BERMS
- [ ] PAVED FLUMES
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] FILTER DAMS
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [X] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] VELOCITY CONTROL DEVICES
- [ ] EROSION CONTROL LOGS

OTHER:

MAINTENANCE: *ALL EROSION AND SEDIMENT CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER. IF MAINTENANCE IS NECESSARY, IT WILL BE DONE PRIOR TO THE NEXT RAIN EVENT IF FEASIBLE. IF MAINTENANCE PRIOR TO THE NEXT ANTICIPATED STORM EVENT IS IMPRACTICABLE, THE REASON SHALL BE DOCUMENTED IN THE SWP3 AND MAINTENANCE MUST BE SCHEDULED AND ACCOMPLISHED AS SOON AS PRACTICABLE. EROSION AND SEDIMENT CONTROLS THAT HAVE BEEN INTENTIONALLY DISABLED, RUN-OVER, REMOVED OR OTHERWISE RENDERED INEFFECTIVE MUST BE REPLACED OR CORRECTED IMMEDIATELY UPON DISCOVERY. REFER TO APPLICABLE TPDES GENERAL PERMIT FOR ADDITIONAL INFORMATION.*

INSPECTION: ITEM 506
AN INSPECTION WILL BE PERFORMED EVERY 7 CALENDAR DAYS. A MAINTENANCE REPORT WILL BE MADE PER EACH INSPECTION. BASED ON INSPECTION RESULTS, THE CONTROLS SHALL BE REVISED PER THE INSPECTION REPORT.

OFFSITE VEHICLE TRACKING:
THE CONTRACTOR SHALL BE REQUIRED, ON A REGULAR BASIS OR AS MAY BE DIRECTED BY THE ENGINEER, TO DAMPEN HAUL ROADS FOR DUST CONTROL, STABILIZE CONSTRUCTION ENTRANCES, REMOVE EXCESS DIRT FROM THE ROADWAY, AND COVER LOADED HAUL TRUCKS WITH TARPAULIN.

CONCRETE TRUCK WASHOUT AREAS: *THE CONTRACTOR WILL BE REQUIRED TO CONTAIN WASH WATER FROM CONCRETE TRUCKS AS DETAILED IN THE GENERAL PERMIT. SPECIFIC LOCATIONS MAY BE DETERMINED IN THE FIELD.*

WASTE MATERIALS

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): *AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS: PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, CONCRETE CURING COMPOUNDS AND ADDITIVES OR MOTOR OIL. MATERIALS SHALL BE STORED IN ACCORDANCE WITH APPLICABLE REGULATIONS. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, IMMEDIATELY REPORT SPILL IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS.*

WASTE MATERIALS: *THE BURYING OF CONSTRUCTION WASTE MATERIAL ON SITE WILL NOT BE PERMITTED. DISPOSAL OF WASTE MATERIALS SHALL MEET ALL STATE AND LOCAL SOLID WASTE MANAGMENT REGULATIONS. WASTE MATERIALS STORED ON SITE SHALL BE COLLECTED IN A METAL DUMPSTER WITH A LOCKING, SECURE COVER AND A DRAIN PLUG IN PLACE.*

SANITARY WASTE: *ALL SANITARY WASTE WILL BE DISPOSED OF IN ACCORDANCE WITH ALL STATE AND LOCAL REGULATIONS. SPECIFIC LOCATIONS OF PORTABLE UNITS MUST BE SHOWN ON THE SWP3 SITE MAP OR LAYOUT.*

REMARKS: *DISPOSAL AREAS, STOCKPILES, AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WETLAND, WATERBODY OR STREAMBED.*
CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED BY THE CONTRACTOR IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS.
ALL WATERWAYS SHALL BE CLEARED AS SOON AS PRACTICAL OF TEMPORARY EMBANKMENT, TEMPORARY BRIDGES, MATTING FALSEWORK, PILING, DEBRIS OR OTHER OBSTRUCTIONS PLACED DURING CONSTRUCTION OPERATIONS THAT ARE NOT A PART OF THE FINISHED WORK.

NOTES: *THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL SUBCONTRACTORS ARE AWARE OF AND COMPLY WITH ALL COMPONENTS OF THE SWP3.*

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: swp3lesslacre.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
Revisions	CONT	SECT	JOB	HIGHWAY
May 2017	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		76

DATE:
FILE:

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. The project is located within the boundary of an MS4.

2.

☐ No Action Required ☒ Required Action

Action No.

1. This project is considered a maintenance activity and is exempt from the requirements of TPDES TXR 150000.

Commitment No.

1. Refer to the SWP3 Plan Sheet, BMPs, and Detail. It will address sweeping, chemical storage, sanitary waste, and all other management practices.

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

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

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

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

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

☒ No Action Required ☐ Required Action

Action No.

1.

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)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Action No.

1. Coating on guard rail tested positive for lead at the IH20 north frontage road bridge at Mason Creek.
2.
3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

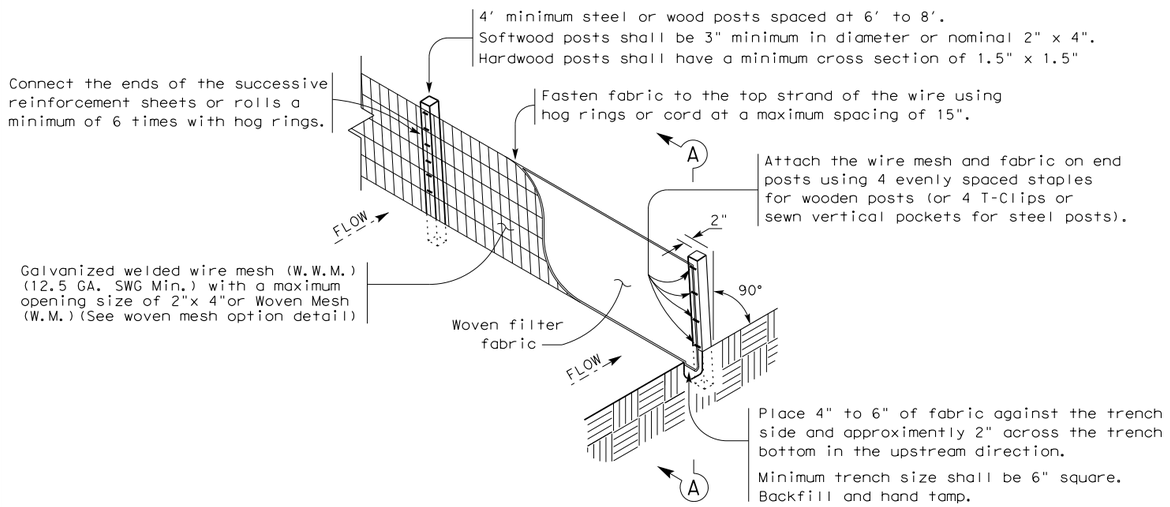
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

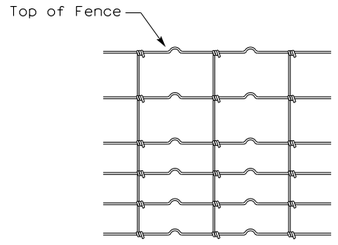
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0495	08	121, ETC.	IH 20	
	DIST	COUNTY		SHEET NO.	
	ATL	HARRISON		77	

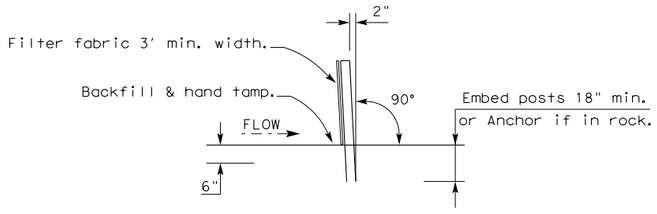
DATE 3/1/2021
FILE pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/09.Environmental/ESCP/Standards/EC(1)-16.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

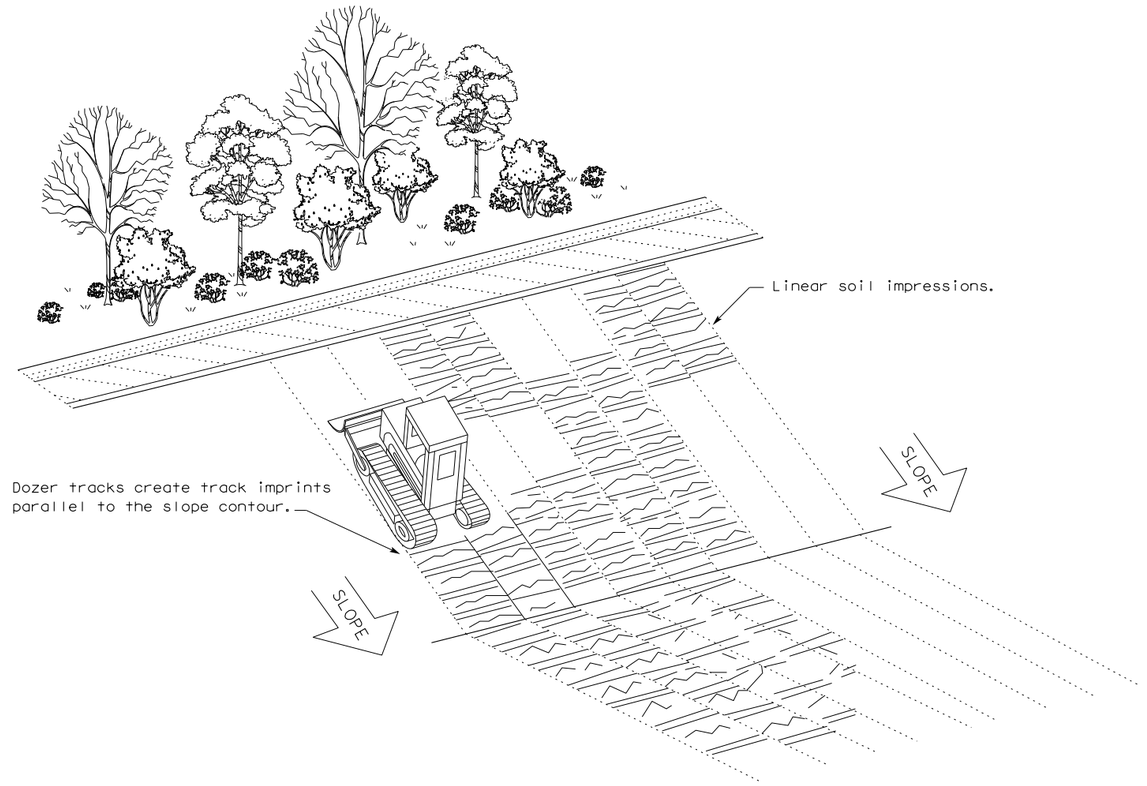
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

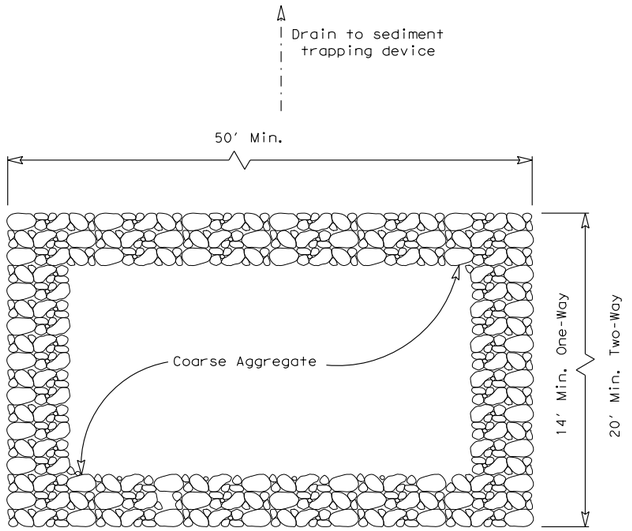
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

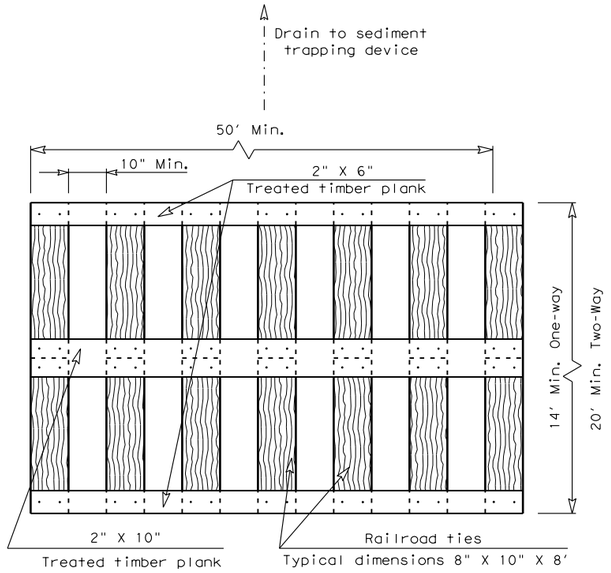
EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0495	08	121,ETC		IH 20	
	DIST	COUNTY			SHEET NO.	
	ATL	HARRISON			78	

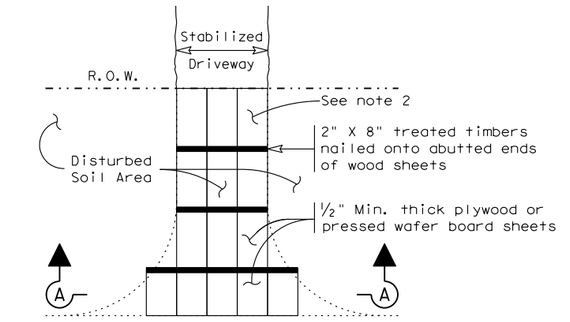
DATE: 3/1/2021
FILE: pw://rtg-pw.bentley.com:rtg-pw/Documents/8573505/CADD/Plan Sheets/09.Environmental/ESCP/Standards/EC(3)-16.dgn



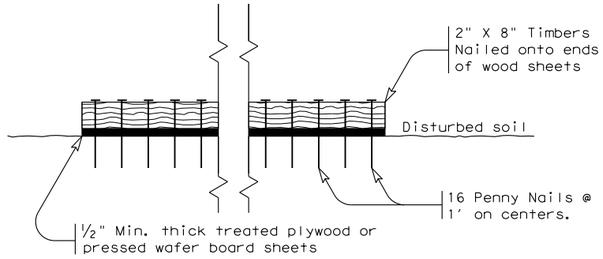
PLAN VIEW



PLAN VIEW



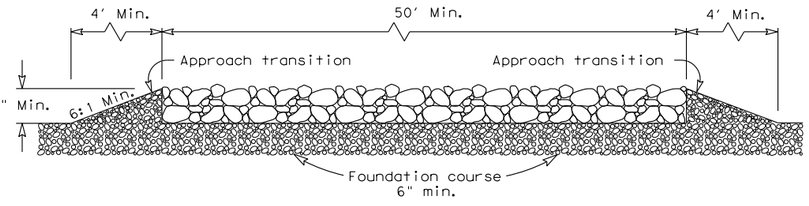
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

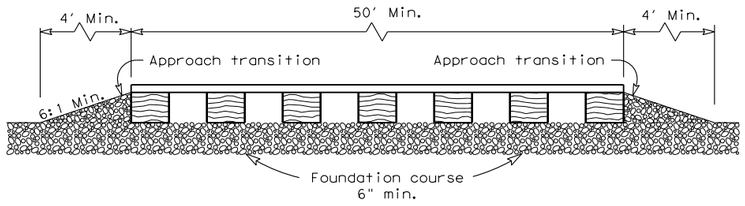
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		79

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 024 041X
Crossing Type: Highway Overpass
RR Company Owning Track at Crossing: BNSF RR
Operating RR Company at Track: BNSF RR
RR MP: 203.51
RR Subdivision: Longview
City: Longview
County: Harrison
CSJ at this Crossing: 0495-08-122
Highway/Roadway name crossing the railroad: IH 20 EB
# of regularly scheduled trains per day at this crossing: ____
# of switching movements per day at this crossing: ____
% of estimated contract cost of work within railroad ROW: _____

Scope of Work at this Crossing to Be Performed by State Contractor:
Rehabilitate bridge.

Scope of Work at this Crossing to Be Performed by Railroad Company:
Flagging.

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 5

On this project, night or weekend flagging is:

- [ ] Expected
- [X] Not Expected

Flagging services will be provided by:

- [ ] Railroad Company: TxDOT will pay flagging invoices
- [X] Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- [ ] UPRR - UP.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- [X] BNSF - BNSF.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- [ ] KCS - KCS.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - Bottom Line On-Track Safety Services
  bottomline076@aol.com, 903-767-7630
- [ ] OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- [X] Not Required
- [ ] Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- [ ] Required
- [X] Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
[ ] Not Required	
[ ] Non - Bridge Projects	$2,000,000 / $6,000,000
[X] Bridge Projects	$5,000,000 / $10,000,000
[ ] Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- [ ] Not Required
- [ ] Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
- [X] Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: BNSF RR

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- [ ] Not Required
- [X] Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call BNSF
Railroad Emergency Line at 1-800-832-5452
Location: DOT 024 041X
RR Milepost: 203.51
Subdivision: Longview

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK

024 041X BNSF MP 203.51

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS 3/2020	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		80

DATE: 3/2/2021 3:21:46 PM
FILE: c:\pwworking\central01\d1894395\ATL_17_IH20SCOPE2.dgn

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 966 460W
Crossing Type: Highway Overpass
RR Company Owning Track at Crossing: BNSF RR
Operating RR Company at Track: BNSF RR
RR MP: 203.52
RR Subdivision: Longview
City: Longview
County: Harrison
CSJ at this Crossing: 0495-08-121
Highway/Roadway name crossing the railroad: IH 20 WB
# of regularly scheduled trains per day at this crossing: ____
# of switching movements per day at this crossing: ____
% of estimated contract cost of work within railroad ROW: _____

Scope of Work at this Crossing to Be Performed by State Contractor:
Rehabilitate bridge.

Scope of Work at this Crossing to Be Performed by Railroad Company:
Flagging.

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

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of Days of Railroad Flagging Expected: 5

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☐ Expected
☒ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices
☒ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

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Contact Information for Flagging:

☐ UPRR - UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

☒ BNSF - BNSF.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging

☐ KCS - KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
- Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required

☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

☐ Required
☒ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

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Railroad reference number shall be provided by TxDOT CST or DO.

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No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
☐ Not Required	
☐ Non - Bridge Projects	$2,000,000 / $6,000,000
☒ Bridge Projects	$5,000,000 / $10,000,000
☐ Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

☐ Not Required
☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
☒ Required: Contractor to obtain (see Item 5, Article 8.4)
With the following railroad companies: BNSF RR

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☐ Not Required
☒ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call BNSF
Railroad Emergency Line at 1-800-832-5452
Location: DOT 966 460W
RR Milepost: 203.52
Subdivision: Longview

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK

966 460W BNSF MP 203.52

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS 3/2020	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		81

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0495	08	121,ETC	IH 20
	DIST	COUNTY		SHEET NO.
	ATL	HARRISON		82

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3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

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REVISIONS March 2020	0495	08	121,ETC	IH 20
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