INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT.

BR 2023(973)

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
	BR 2023(973)		1
STATE	DISTRICT	COUNTY	
TEXAS	02	TARRANT	
CONTROL	SECTION	JOB	HIGHWAY NO.
0008	14	124,ETC	IH 820

ROADWAY CLASSIFICATION:
INTERSTATE HIGHWAY

AVERAGE DAILY TRAFFIC

IH-820 (2021) = 134,173
IH-820 (2041) = 187,842

POSTED SPEED: VARIOUS
DESIGN SPEED: VARIOUS

IH 820
TARRANT COUNTY

LIMITS OF WORK: IH 820 WB COLLECTOR RD AT BU 287PM ETC.
PROJECT LENGTH = 7,735.20 FT = 1.465 MI

FOR THE CONSTRUCTION OF BRIDGE MAINTENANCE WORK

CONSISTING OF: BRIDGE RAIL RETROFIT AND MBGF

NBI *02-220-0-0008-14-199
IH 820 EB COLL RD AT BUS 287

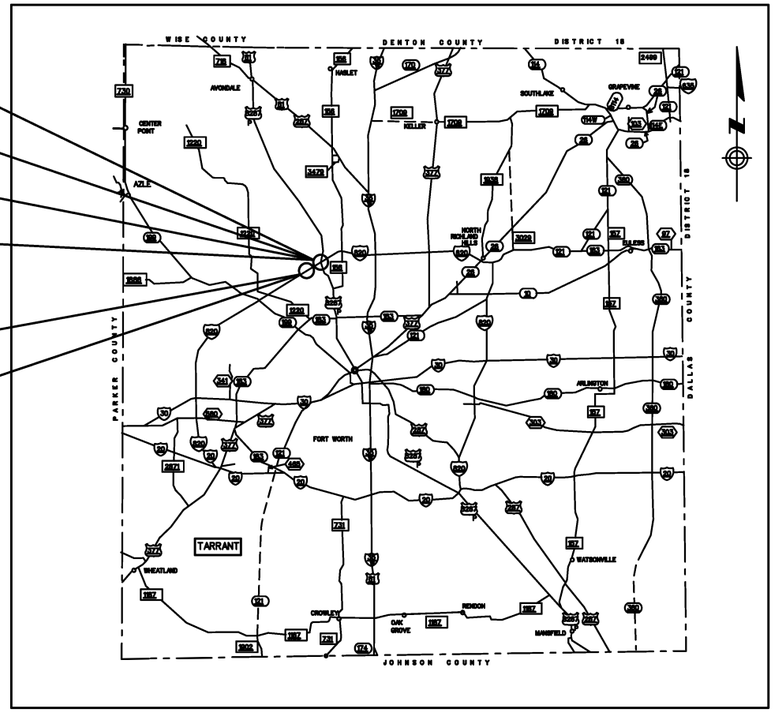
NBI *02-220-0-0008-14-200
IH 820 WB COLL RD AT BUS 287

NBI *02-220-0-0008-14-201
IH 820 EB AT BUS 287

NBI *02-220-0-0008-14-202
IH 820 WB AT BUS 287

NBI *02-220-0-0008-14-235
IH 820 WB AT MARINE CREEK PKWY

NBI *02-220-0-0008-14-236
IH 820 EB AT MARINE CREEK PKWY



EXCEPTIONS:NONE
EQUATIONS:NONE
RAILROAD CROSSINGS:NONE
NO TDLR REQUIRED

LETTING DATE: _____
CONTRACTOR: _____
_____
WORK BEGAN: _____
WORK COMPLETED: _____
WORK ACCEPTED: _____
CHANGE ORDERS: _____

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, JULY 2022)

SUBMITTED FOR LETTING: 4/14/2023
Manuel Padron Jr, P.E.
DISTRICT BRIDGE ENGINEER

RECOMMENDED FOR LETTING: 4/14/2023
DocuSigned by:
DISTRICT DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 4/17/2023
DocuSigned by:
David M Salazar, P.E.
DISTRICT ENGINEER
B741E64FA9624...

FILE: T:\BRIDGE\Cortes\RRP FY24\02-220-0008-14-202\DGN's\TITLE SHEET.dgn
DATE: 4/12/2023 3:38:51 PM

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STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A # HAVE BEEN ISUED BY ME AND ARE APPLICABLE TO THIS PROJECT

Miguel Cortés ,P.E. 5/16/23
DATE

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A ## HAVE BEEN ISUED BY ME AND ARE APPLICABLE TO THIS PROJECT

Yousuf Ali ,P.E. 5/16/23
DATE

SHEET 1 OF 1

Texas Department of Transportation

Fort Worth Bridge Design

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		DN: JT	CK: MC	DW: JT	CK: JT/MC		
©TxDOT 5/16/2023	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0008	14	124,ETC	IH 820			
	DIST	COUNTY		SHEET NO.			
	02	TARRANT		002			

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Control: 0008-14-124, ETC.

County: TARRANT

Highway: IH 820

Basis of Estimate

Item	Description	Rate	Unit
3076	D-GR HMA (TY D)	115 lb./sq. yd.-in.	ton
3076	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

Special Notes

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

To obtain a copy of the project plans free of charge, submit a request from the following site: http://www.txdot.gov/business/letting-bids/plans-online.html

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

Area Engineer's Email: Minh.Tran@txdot.gov
Assistant Area Engineer's Email: Daniel.Poole@txdot.gov
Design Manager's Email: Sam.Yacoub@txdot.gov

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

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

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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.

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.

Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

The following standard detail sheets have been modified:

- RAIL – ADJ(B)-19 (MOD)
- C-RAIL-R (MOD)

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Item 4 – Scope of Work

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

Item 5. Control of the Work

When supplementary bridge plans, shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, prepare and submit drawings on sheets 8-1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, prepare and submit on sheets 22 by 34 inches, with a 1-1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6. Control of Materials

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

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

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

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

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Item 7. Legal Relations and Responsibilities

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

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

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

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,

b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 0 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, avoid nests containing migratory birds and perform no work in the nesting areas until the young birds have fledged.

Structures

Do not begin bridge and culvert construction operations until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

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No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

The following Holiday/Event lane closure restriction requirements apply to this project:
No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 29 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

Event Lane Closure Restrictions 3 PM the day before Event to 9 AM the day after the Event			
NASCAR Races at Texas Motor Speedway (generally 3 events):	NASCAR Nationwide and Sprint Cup Series (Held in late March/early April)	NASCAR Nationwide and Sprint Cup Series (Held in Late October/early November)	Indy Series Racing and NASCAR Truck Series (Held in June)
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)			
Fort Worth Stock Show and Rodeo			

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Item 8. Prosecution and Progress

Working days will be computed and charged in accordance with Section 8.3.1.1. 'Five-Day Workweek.'

Use a Critical Path Method (CPM) schedule in P6 format for this project. Submit a baseline schedule and obtain approval prior to beginning construction. The baseline schedule working days will be the same as the number of working days established by the Contract. Payment(s) to the Contractor will be withheld if a monthly updated schedule is not submitted. All schedules will be submitted in a PDF and XER file format.

The number of working days for final acceptance will be 171 working days.

Item 8.9 Worker and Equipment

Work shall be performed during the nighttime only. Before starting night work on a construction project, prepare and submit a work zone light system design in accordance with NCHRP Report 476, Section 3 for approval by the Engineer. The Engineer will review the work zone light system design and notify the contractor of its acceptability. Do not start work until the work zone light system design is accepted.

Provide Multi-Directional Lighting Device with the following quality requirements:

Provide a 2000 watt (minimum) SIROCCO lighting balloon, Airstar lighting or equivalent.

It is the intent of the MDLD lighting to supplement the Portable Road Light and Power Unit used to illuminate work hours.

Provide MDLD units which can self-inflate and capable of illuminating approximately 15,000 sq ft.

Provide MDLD units of 1.1 meter horizontal diameter and capable of withstanding 60 mph winds when fully inflated and operating.

Provide MDLD units with two (2) 1,000 watt halogen bulbs recommended by the manufacture.

Night Time Work Safety Clothing. Department approved safety hats and safety vests (Class 3 with retro-reflective striping) shall be worn by all workers and visitors at all times when at the work sites. When work is approved by the Engineer to be performed at night, night pants (Class 3 with retro-reflective striping) shall be worn by all workers and visitors when at the work sites.

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Item 427. Surface Finishes for Concrete

Unless otherwise noted, provide a surface area III on the concrete rail only. Provide slurry coat finish on the bridge traffic rails within the project.

Item 496. Removing Structures

When required by the plans, removal of the existing rail shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members. The Contractor shall submit a demolition plan for the removal of the rail in accordance with Item 496. Submit the procedure for removal of rail in writing or plan drawing for approval prior to implementation. Submit required demolition plans at least 30 days before starting work.

Existing coatings on the following structure(s) contained hazardous materials. The Bridge Railings for the structure(s) listed below have been abated for asbestos. Provide for the safety and health of employees and abide by all OSHA standards and regulations:

- 02-220-0008-14-199 IH 820 EB Coll Road at Loop 496 (BUS 287)
- 02-220-0008-14-200 IH 820 WB Coll Road at Loop 496 (BUS 287)
- 02-220-0008-14-201 IH 820 EB Main Lanes at Loop 496 (BUS 287)
- 02-220-0008-14-202 IH 820 WB Main Lanes at Loop 496 (BUS 287)
- 02-220-0008-14-235 IH 820 WB at Marine Creek Parkway
- 02-220-0008-14-236 IH 820 EB at Marine Creek Parkway

Lead and Asbestos reports are available upon request.

Item 502. Barricades, Signs, and Traffic Handling

The contractor force account 'safety contingency' that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically 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.

Permanent signs may be installed when construction in an area is complete, and they will not conflict with the traffic control plan for the remainder of the job.

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Existing signs are to remain as long as they do not interfere with construction, and they do not conflict with the traffic control plan.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

Item 512. Portable Concrete Traffic Barrier

"*Furnish and Install*" barrier in compliance with Single-Slope Concrete Barrier (SSCB) standards as shown on the plans.

Furnish Class H Concrete with a minimum 28 day compressive strength of 3,600 psi.

Used barrier will be inspected and approved by the engineer prior to using, in accordance Item 512.2.1.3. Provide the hardware assemblies to join barrier sections.

Delineate all barriers in accordance with Barricade and Construction (BC) Standard sheets. Barrier delineation will not be paid for directly but will be subsidiary to Item 512 " Portable Concrete Traffic Barrier".

Remove and replace traffic barrier damaged by the traveling public and no longer serviceable as directed. Additional payment will be provided as compensation to remove and replace the traffic barrier damaged by the traveling public in accordance with Item 512.

PCTB will remain the property of the Contractor upon completion of the project.

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Item 540. Metal Beam Guard Fence

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, CTB, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole. Bolts used for connection shall be shear off, grind smooth, and not protrude more than 1/2" from nuts.

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

Item 3076. Dense-Graded Hot-Mix Asphalt

Provide aggregate with a Surface Aggregate Classification (SAC) value of B for the travel lanes and shoulders.

Natural (field) sands are not allowed.

Provide a PG 64-22 asphalt for the surface course and levelup course, if applicable.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Include the approved mix design number on each delivery ticket.

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Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Ride quality is not required on this project.

Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

Two electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane Closed
4. Left Lane Closed
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

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

The total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 2 Series	Scenario	Required TMA
(2-6)-18	All	1

TCP 6 Series	Scenario	Required TMA
(6-1)-12	A	1
(6-1)-12	B	2

Provide 1 additional shadow vehicle with TMA other than those outlined in the General Note(s) and shown in the TCP Standard Sheets.

Therefore, 4 total shadow vehicles with TMA will be required for this type of 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 TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0008-14-124 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY IH 820

				0008-14-123		0008-14-124		0008-14-125		0008-14-126		0008-14-127		0008-14-128	
		CONTROL SECTION JOB													
		PROJECT ID		A00063963		A00064547		A00064548		A00064549		A00064550		A00064551	
		COUNTY		Tarrant		Tarrant		Tarrant		Tarrant		Tarrant		Tarrant	
		HIGHWAY		IH 820		IH 820		IH 820		IH 820		IH 820		IH 820	
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL
	449-6001	ANCHOR BOLTS	EA			36.000									
	451-6025	RETROFIT RAIL (TY SSTR)(HPC)	LF	536.600		536.600		536.600		536.600		568.600		568.600	
	500-6001	MOBILIZATION	LS			1.000									
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2.000		2.000		1.000		1.000		1.000		1.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF			150.000									
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF			150.000									
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF											1,600.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	2,300.000		2,300.000		3,200.000		3,200.000		3,200.000		1,600.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	1,600.000											
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	12.500											
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000		3.000		2.000					
	540-6010	MTL W-BEAM GD FEN ADJUSTMENT	LF	87.500		137.500		100.000		87.500					
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000											
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	144.000		212.000		156.000		124.000					
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	1.000											
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF			18.000									
	636-6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF			261.500									
	644-6064	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA			5.000									
	644-6077	REMOVE BRDG MNT CLEARANCE SIGN ASSM	EA			3.000									
	647-6001	INSTALL LRSS (STRUCT STEEL)	LB			1,100.000									
	647-6003	REMOVE LRSA	EA			3.000									
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3.000		3.000		3.000		3.000		3.000		3.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3.000		3.000		3.000		3.000		3.000		3.000	
	658-6083	INSTL DEL ASSM (D-SW)SZ 1(WFLX)SRF	EA	4.000		4.000		4.000		4.000					
	658-6088	INSTL DEL ASSM (D-SY)SZ 1(YFLX)SRF	EA	4.000		4.000		2.000							
	3076-6035	D-GR HMA TY-D PG64-22	TON	2.600		2.600		2.600		2.600		2.700		2.700	
	3076-6066	TACK COAT	GAL	5.000		5.000		5.000		5.000		5.000		5.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	21.000		21.000		42.000		42.000		42.000		42.000	
	6185-6002	TMA (STATIONARY)	DAY	50.000		50.000		60.000		60.000		60.000		60.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000									
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000									

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0008-14-124 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY IH 820

				CONTROL SECTION JOB	TOTAL EST.	TOTAL FINAL
				PROJECT ID		
				COUNTY		
				HIGHWAY		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**			
	449-6001	ANCHOR BOLTS	EA	36.000		
	451-6025	RETROFIT RAIL (TY SSTR)(HPC)	LF	3,283.600		
	500-6001	MOBILIZATION	LS	1.000		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	8.000		
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	150.000		
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	150.000		
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	1,600.000		
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	15,800.000		
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	1,600.000		
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	12.500		
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	13.000		
	540-6010	MTL W-BEAM GD FEN ADJUSTMENT	LF	412.500		
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000		
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	636.000		
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	1.000		
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	18.000		
	636-6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	261.500		
	644-6064	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	5.000		
	644-6077	REMOVE BRDG MNT CLEARANCE SIGN ASSM	EA	3.000		
	647-6001	INSTALL LRSS (STRUCT STEEL)	LB	1,100.000		
	647-6003	REMOVE LRSA	EA	3.000		
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	18.000		
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	18.000		
	658-6083	INSTL DEL ASSM (D-SW)SZ 1(WFLX)SRF	EA	16.000		
	658-6088	INSTL DEL ASSM (D-SY)SZ 1(YFLX)SRF	EA	10.000		
	3076-6035	D-GR HMA TY-D PG64-22	TON	15.800		
	3076-6066	TACK COAT	GAL	30.000		
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	210.000		
	6185-6002	TMA (STATIONARY)	DAY	340.000		
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		

SUMMARY OF ROADWAY ITEMS

LOCATION		512 6001 PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	512 6025 PORT CTB (MOVE)(SGL SLP)(TY 1)	512 6049 PORT CTB (REMOVE)(SGL SLP)(TY 1)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 6010 MTL W-BEAM GD FEN ADJUSTMENT	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6003 REMOVE DOWNSTREAM ANCHOR TERMINAL	658 6083 INSTL DEL ASSM (D-SW)SZ 1(WFLX)SRF	658 6088 INSTL DEL ASSM (D-SY)SZ 1(YFLX)SRF	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)
		LF	LF	LF	LF	EA	LF	EA	LF	EA	EA	EA	DAY	DAY
IH 820 EB COLL RD @ BUS 287	NBI: 02-220-0-0008-14-199		2300	1600	12.5	4	87.5	1	144	1	4	4	21	50
IH 820 WB COLL RD @ BUS 287	NBI: 02-220-0-0008-14-200		2300			4	137.5		212		4	4	21	50
IH 820 EB @ BUS 287	NBI: 02-220-0-0008-14-201		3200			3	100		156		4	2	42	60
IH 820 WB @ BUS 287	NBI: 02-220-0-0008-14-202		3200			2	87.5		124		4		42	60
IH 820 WB @ MARINE CREEK PKWY	NBI: 02-220-0-0008-14-235		3200										42	60
IH 820 EB @ MARINE CREEK PKWY	NBI: 02-220-0-0008-14-236	1600	1600										42	60
PROJECT TOTALS		1600	15800	1600	12.5	13	412.5	1	636	1	16	10	210	340

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ROADWAY QUANTITY SUMMARY SHEET

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		5
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

SUMMARY OF BRIDGES

LAYOUT SHEET NO.	NBI #	CSJ	DESCRIPTIONS	0449-6001	0451-6025	0636-6007	0636-6009	0644-6064	0644-6077	0647-6001	0647-6003	0658-6013	0658-6026	3076-6035	3076-6066
				ANCHOR BOLTS	RETROFIT RAIL (TY SSTR) (HPC)	REPLACE EXISTING ALUMINUM SIGNS (TY A)	REPLACE EXISTING ALUMINUM SIGNS (TY O)	IN BRIDGE MNT CLEARANCE SGN ASSM (TY N)	REMOVE BRIDGE MNT CLEARANCE SGN ASSM	INSTALL LRSS (STRUCT STEEL)	REMOVE LRSA	INSTL DEL ASSM (D-SW) SZ (BRF) CTB	INSTL DEL ASSM (D-SY) SZ (BRF) CTB	D-GR HMA TY-D PG64-22	TACK COAT
				EA	LF	SF	SF	EA	EA	LB	EA	EA	EA	TON	GAL
61	02-220-0-0008-14-199	0008-14-123	IH 820 EB COLL RD AT BU 287	~	536.6	~	~	~	~	~	~	3	3	2.6	4.9
63	02-220-0-0008-14-200	0008-14-124	IH 820 WB COLL RD AT BU 287	~	536.6	~	~	~	~	~	~	3	3	2.6	4.9
65	02-220-0-0008-14-201	0008-14-125	IH 820 EB AT BU 287	~	536.6	~	~	~	~	~	~	3	3	2.6	4.9
67	02-220-0-0008-14-202	0008-14-126	IH 820 WB AT BU 287	~	536.6	~	~	~	~	~	~	3	3	2.6	4.9
69	02-220-0-0008-14-235	0008-14-127	IH 820 WB AT MARINE CREEK PKWY	~	568.6	~	~	~	~	~	~	3	3	2.7	5.2
71	02-220-0-0008-14-236	0008-14-128	IH 820 EB AT MARINE CREEK PKWY	~	568.6	~	~	~	~	~	~	3	3	2.7	5.2
	TOTAL			36	3,283.6	18	261.5	5	3	1,100	3	18	18	15.8	30

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SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTÉS
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

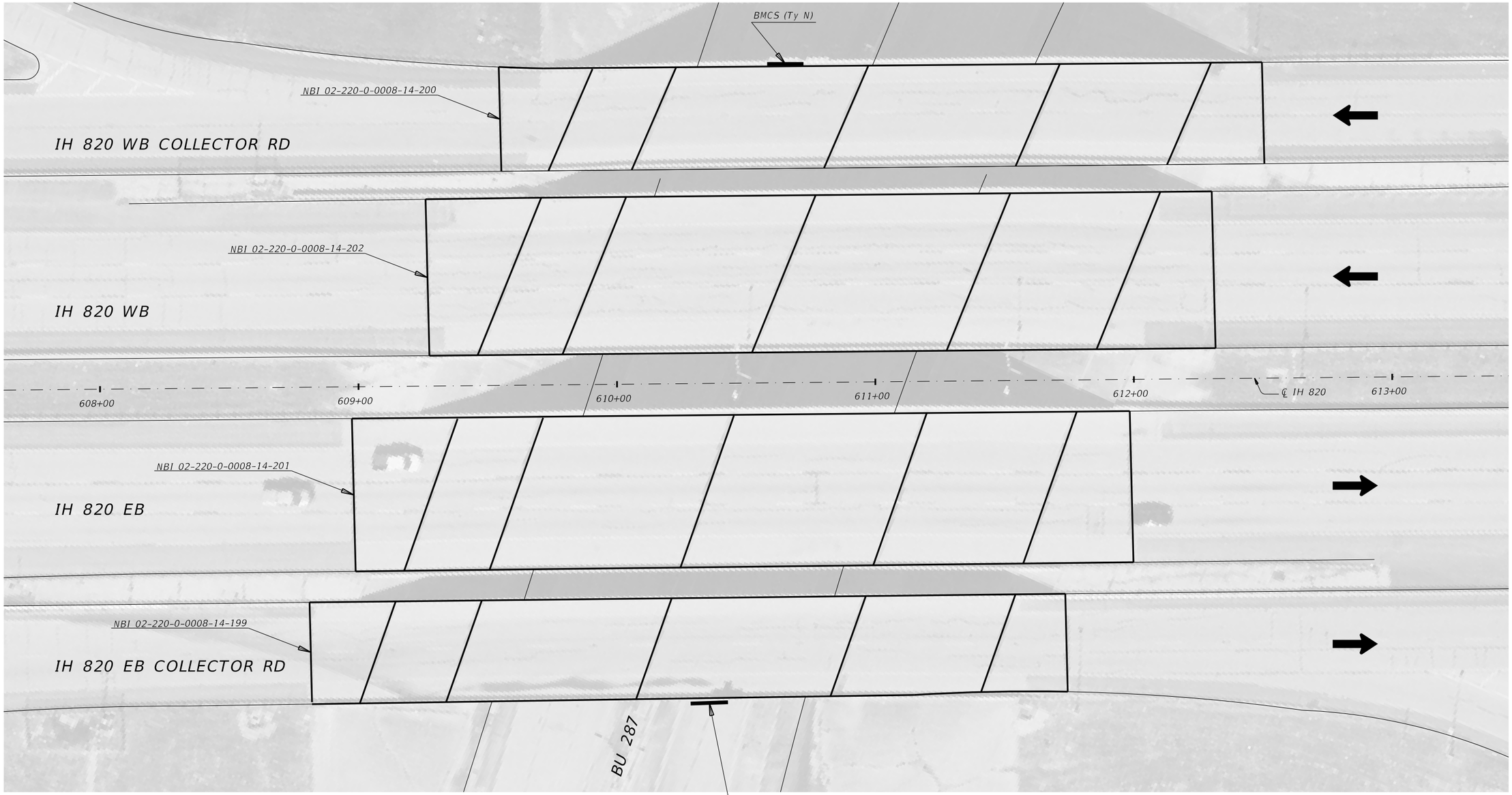
5/17/23

Texas Department of Transportation

Fort Worth Bridge Design

SUMMARY OF BRIDGES

	DN: JT	CK: MC	DW: JT	CK: JT/MC
©TxDOT 5/17/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124;ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		006



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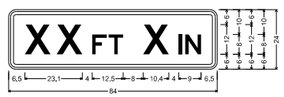
SHEET 1 OF 2

ESTIMATED QUANTITIES

	Description		Total
0644 6064	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	2
0644 6077	REMOVE BRDG MNT CLEARANCE SGN ASSM	EA	2



VERTICAL BRIDGE CLEARANCE SIGN

(Dimensions are in inches)

General Notes:

1. Dimensions for the Vertical Clearance sign will be provided during construction.
2. Install Bridge Mounted Vertical Clearance signs according to the BMCS Standard.
3. Remove existing signs and place new signs at the same locations as shown.

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

5/16/23

Texas Department of Transportation

Fort Worth Bridge Design

PROJECT LAYOUT

IH 820 @ BU 287

	DN: AC	CK: MC	DW: AC/MC	CK: MC/AC	
©TxDOT 5/15/2023	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0008	14	124,ETC	IH 820	
	DIST	COUNTY		SHEET NO.	
	02	TARRANT		7	

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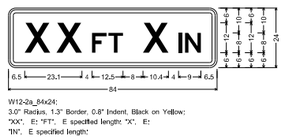
SHEET 2 OF 2

ESTIMATED QUANTITIES

	Description		Total
0644 6064	IN BRIDGE MNT CLEARANCE SGN ASSM(TY N)	EA	3
0644 6077	REMOVE BRDG MNT CLEARANCE SGN ASSM	EA	1



VERTICAL BRIDGE CLEARANCE SIGN

(Dimensions are in inches)

General Notes:

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3. Remove existing signs and place new signs at the same locations as shown.

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER

5/17/23

Texas Department of Transportation

Fort Worth Bridge Design

PROJECT LAYOUT

IH 820 @ MARINE CREEK PKWY

	DN: AC	CK: MC	DW: AC/MC	CK: MC/AC
©TxDOT 5/17/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		8

TRAFFIC CONTROL NOTES

1. REFER TO ITEM 8 "PROSECUTION OF WORK" AND PROJECT GENERAL NOTES FOR TRAFFIC CONTROL PLAN.

2. FURNISH AND INSTALL ALL TRAFFIC CONTROL PLANS DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, AND WORK ZONE MARKINGS, IN COMPLIANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD), THE STATE STANDARD TRAFFIC CONTROL PLANS (TCP) SHEETS, AND THE BARRICADES AND CONSTRUCTION (BC) SHEETS. REFER TO THE PROJECT GENERAL NOTES FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.

3. VERIFY THE LOCATION AND SPACING OF SIGNS, BARRICADES, AND CHANNELIZING DEVICES PRIOR TO THEIR PLACEMENT ALONG VERTICAL CURVES, HORIZONTAL CURVES, AND OTHER GEOMETRIC CONSTRAINTS TO ENSURE VISIBILITY TO ALL MOTORISTS.

4. COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN AND UNCOVER DURING NON-WORKING HOURS OR AS DIRECTED BY THE ENGINEER. PARTIAL COVERAGE OF THE SIGN OR COVERAGE BY MATERIAL THAT WILL NOT COVER THE ENTIRE SIGN ALL THE TIME IS NOT PERMITTED.

5. VARY THE SPACING OF SIGNS TO MEET TRAFFIC CONDITIONS OR AS DIRECTED BY THE ENGINEER AND ENSURE THAT ALL TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS ARE KEPT IN A HIGHLY VISIBLE CONDITION (CLEAN, UPRIGHT AND AT PROPER LOCATION).

6. CONDUCT CONSTRUCTION OPERATIONS SO AS TO PROVIDE THE LEAST POSSIBLE INTERFERENCE TO TRAFFIC AND TO PERMIT THE CONTINUOUS MOVEMENT OF TRAFFIC IN ALL ALLOWABLE DIRECTIONS AT ALL TIMES OR AS PERMITTED BY THE SEQUENCE OF CONSTRUCTION. PROVIDE FOR SAFE AND CONVENIENT ACCESS TO ABUTTING PROPERTIES, HIGHWAYS, PUBLIC ROADS, AND STREET CROSSINGS EXCEPT AS OTHERWISE SHOWN ON THE SEQUENCE OF CONSTRUCTION.

7. REGULATE ALL CONSTRUCTION TRAFFIC SO AS TO CAUSE A MINIMAL INCONVENIENCE TO THE TRAVELING PUBLIC. AT THE TIMES WHEN IT IS NECESSARY FOR TRUCKS TO STOP, UNLOAD OR CROSS ROADWAYS UNDER TRAFFIC, PROVIDE WARNING SIGNS AND FLAGGERS AS NEEDED TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.

8. USE OF PORTABLE CHANGEABLE MESSAGE SIGNS AS ADVANCE NOTICE OF LANE CLOSURES WILL BE REQUIRED, AS DIRECTED BY THE ENGINEER. FOR LOCATIONS THAT ARE ADJACENT TO EACH OTHER, A SINGLE PORTABLE CHANGEABLE MESSAGE SIGN IN ADVANCE OF THE ENTIRE WORK AREA IS ACCEPTABLE.

9. ADDITIONAL SIGNS, BARRICADES AND CHANNELIZING DEVICES MAY BE REQUIRED TO MAINTAIN TRAFFIC DURING CONSTRUCTION, AS SHOWN ON TCP STANDARDS. ADDITIONAL SIGNS, BARRICADES, ETC. (IF ANY), WILL BE SUBSIDIARY TO ITEMS 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".

10. PROVIDE LIGHTS TO ILLUMINATE THE WORK AREA DURING NIGHTTIME OPERATIONS. CLASS 3 GARMENTS WILL BE REQUIRED FOR ALL WORKERS DURING NIGHTTIME WORK.

11. CONTRACTOR SHALL COORDINATE TCP WITH ADJACENT CONSTRUCTION PROJECTS TO ENSURE NO CONFLICTING TRAFFIC CONTROL EXISTS.

12. FOLLOW THE CONSTRUCTION SEQUENCING UNLESS OTHERWISE APPROVED.

13. BEFORE BEGINNING WORK, PLACE APPLICABLE BARRICADES IN ACCORDANCE WITH TXDOT STANDARDS BC (1-12)-21.

14. ALL TCP DEVICES SHALL BE PICKED UP PRIOR TO OPENING AFFECTED LANES TO TRAFFIC.

STATE OF TEXAS
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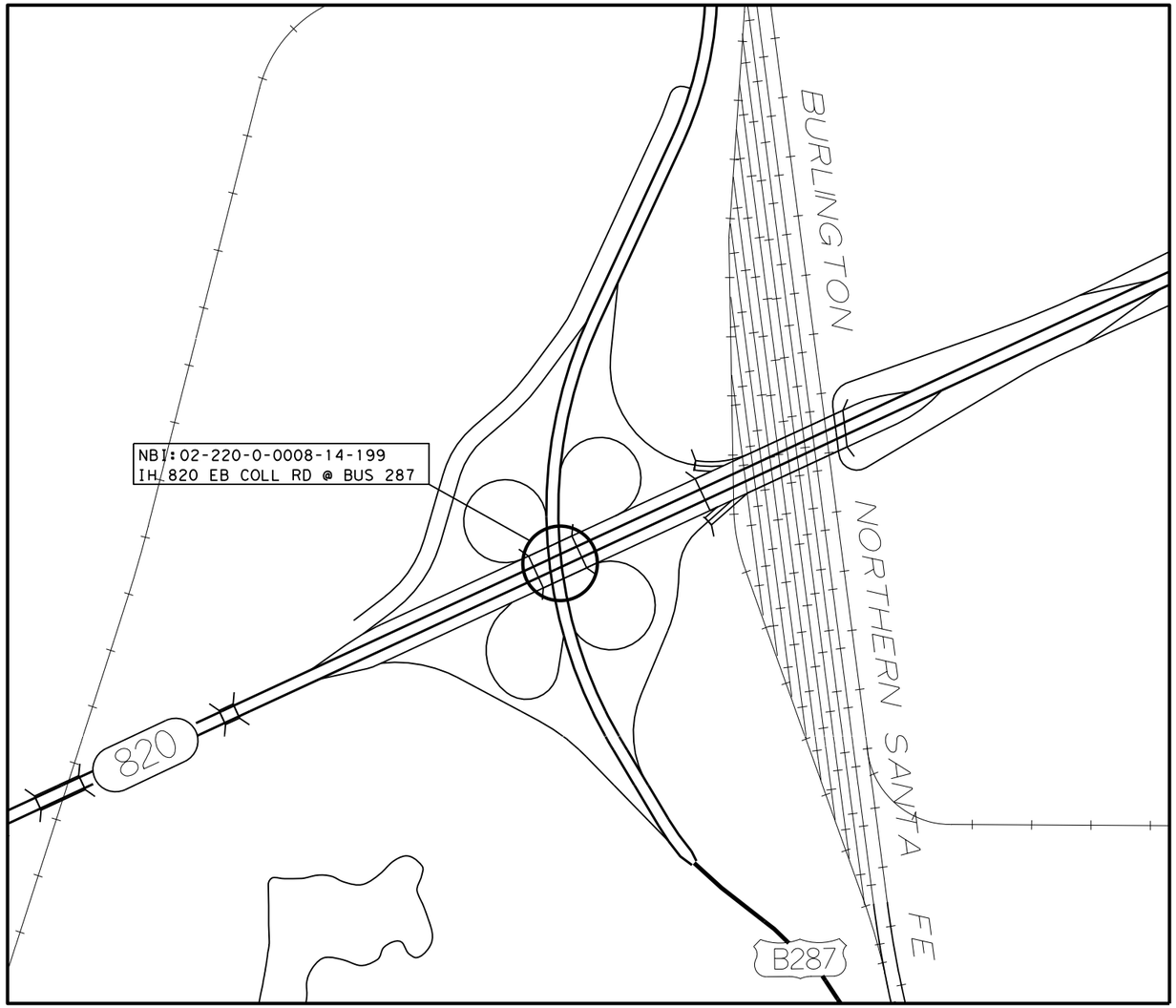
93983
LICENSED
PROFESSIONAL ENGINEER

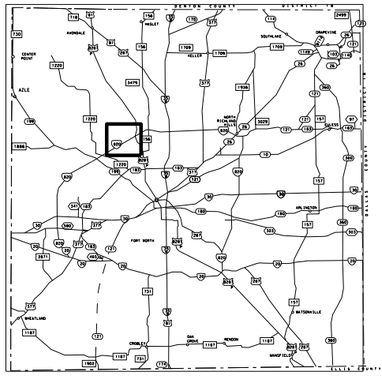
Yousuf Ali
4/7/2023

TRAFFIC CONTROL NOTES

FED.RD. DIV.NO.	STATE AID PROJECT NO.			SHEET NO.
6	See Title Sheet			9
STATE	DIST.	COUNTY		
TEXAS	FTW	TARRANT		
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 EB COLL RD
@ BUS 287

02-220-0-0008-14-199

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	AID PROJECT NO.	SHEET NO.
6	See Title Sheet		10

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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SEQUENCE OF WORK

PHASE I AT IH 820 EB COLL RD:
STEP A = IH 820 EB COLL RD OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 EB COLL RD AS SHOWN ON TCP(2-6c)-18 STANDARD AND "DETOUR LAYOUT TO IH 820 EB FROM BUS 287 SOUTH" SHEETS.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB COLL RD @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB COLL RD @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 EB COLL RD:
STEP B = IH 820 EB COLL RD INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 EB COLL RD AS SHOWN ON "TRAFFIC CONTROL PLAN IH 820 EB COLL RD @ BUS 287 PHASE I, STEP B" AND "DETOUR LAYOUT TO BUS 287 NORTH FROM IH 820 EB" SHEETS.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB COLL RD @ BUS 287" SHEETS.

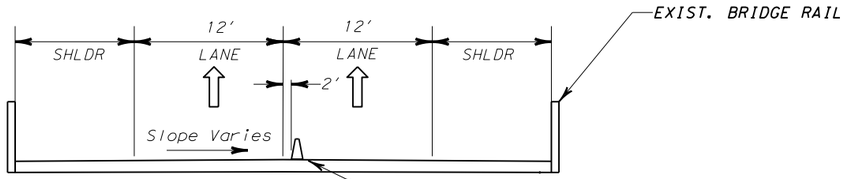
4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB COLL RD @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:

1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N. T. S.

STATE OF TEXAS
YOUSUF M. ALI
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LICENSED PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

SEQUENCE OF WORK

IH 820 EB COLL RD @ BUS 287

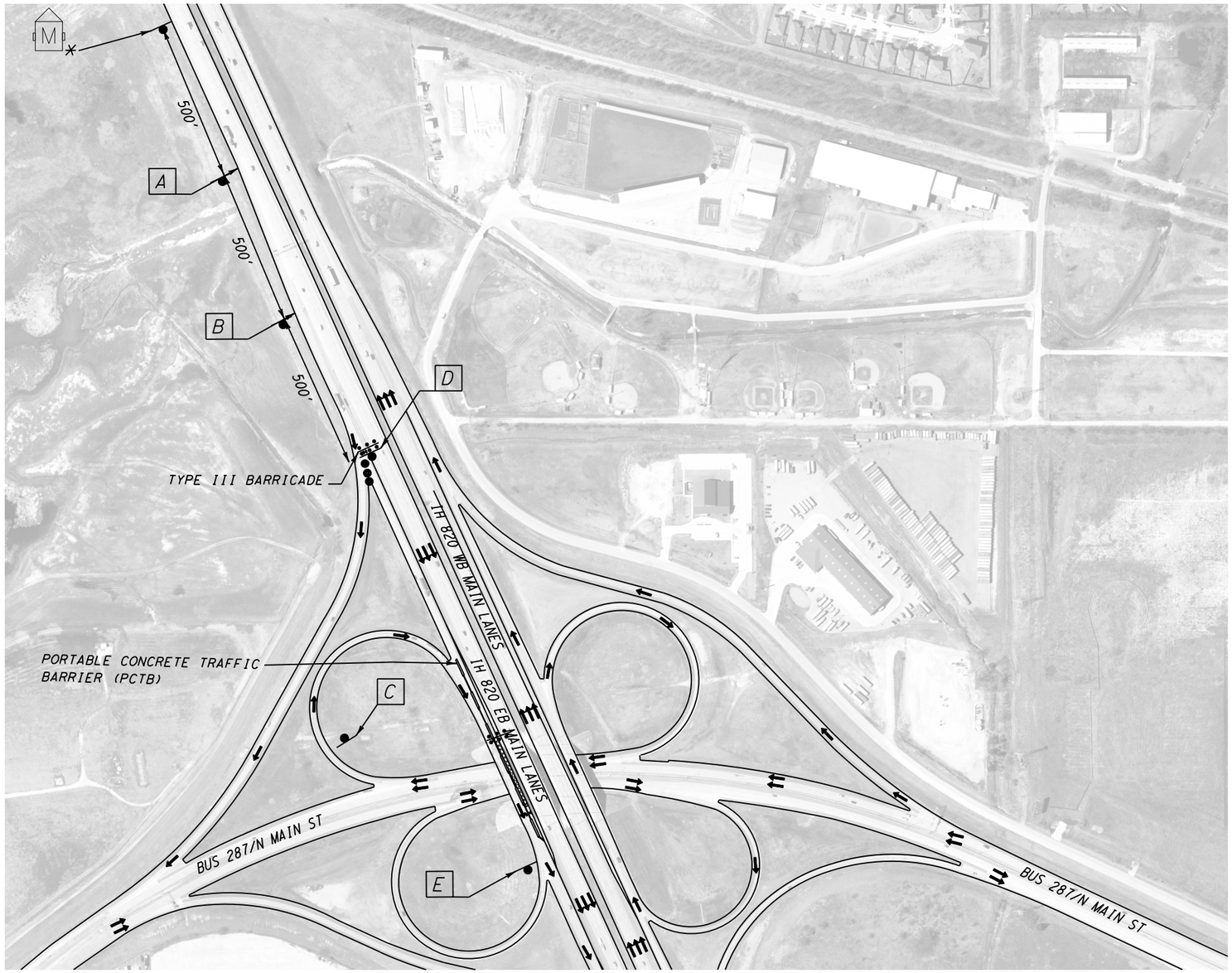
02-220-0-0008-14-199

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	11

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



0 200 400
SCALE IN FEET

LEGEND

- WORK ZONE
- SIGN
- TRAFFIC FLOW
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)

* PORTABLE CHANGEABLE MESSAGE SIGNS

* POSTED 7 DAYS PRIOR TO CLOSURE

EXIT RAMP TO BUS 287 NORTH TO BE CLOSED	DATE & TIME

* POSTED DURING CLOSURE

EXIT RAMP TO BUS 287 NORTH CLOSED	USE DETOUR

A

ROAD CLOSED AHEAD — W20-1 48" X 48"

1000 FT

B

ROAD CLOSED AHEAD — W20-1 48" X 48"

500 FT

C

ROAD WORK AHEAD — W20-1 48" X 48"

D

ROAD CLOSED — R11-2R 48" X 30"

E

END ROAD WORK — G20-2a 48" X 24"

NOTES:

1. FOR DETOUR REFER TO" DETOUR LAYOUT TO BUS 287 NORTH FROM IH 820 EB" SHEETS
2. SEE BC STANDARD SHEETS FOR ADVANCE WARNING SIGNS

STATE OF TEXAS
YOUSUF M. ALI
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4/7/2023

TRAFFIC CONTROL PLAN

IH 820 EB COLL
RD @ BUS 287

PHASE 1
STEP B

02-220-0-0008-14-199

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		12
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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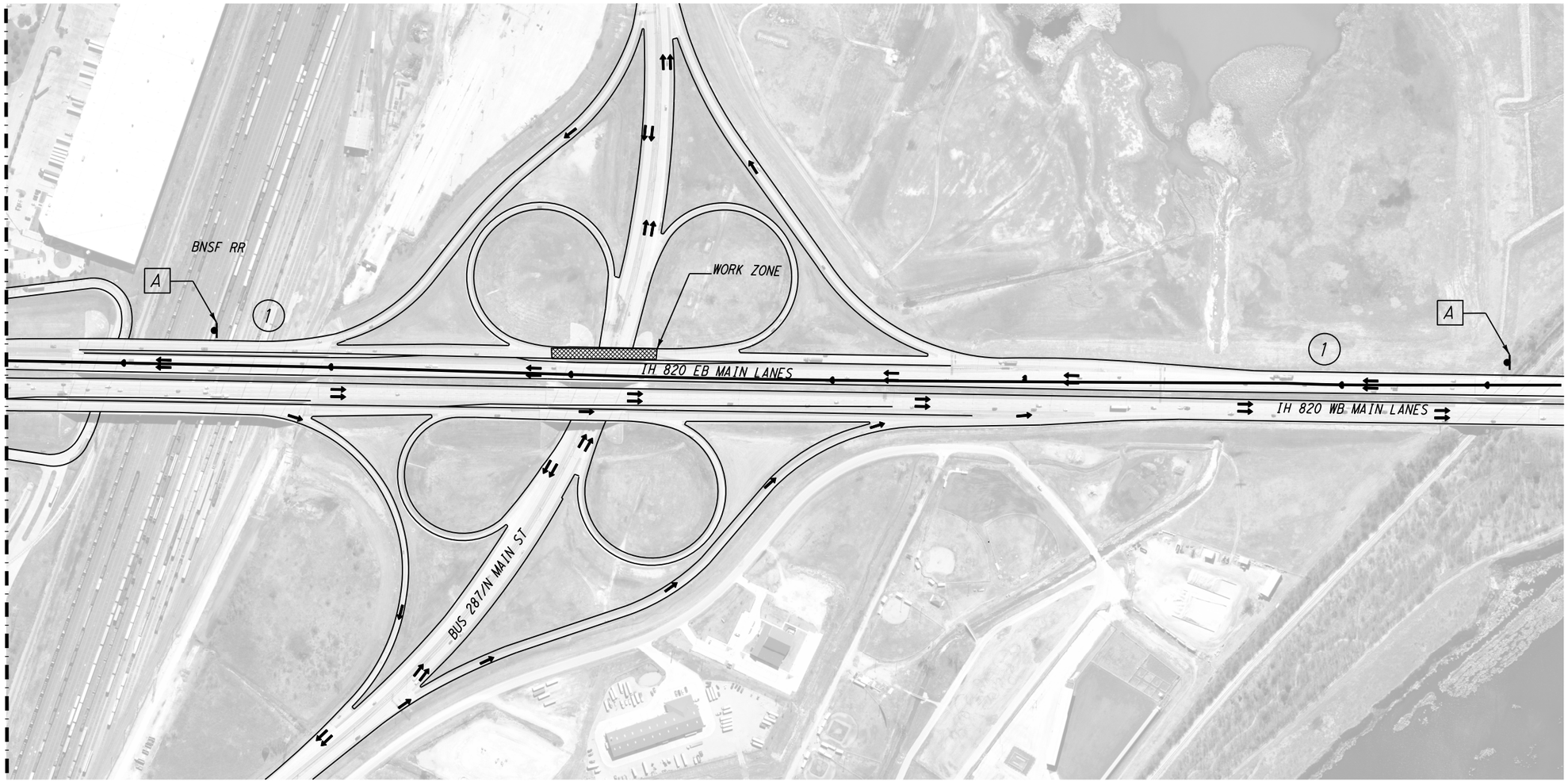

0 200 400
SCALE IN FEET

LEGEND

WORK ZONE

DETOUR PATH

SIGN

TRAFFIC FLOW

A	
DETOUR	M4-8 24" X 12"
NORTH	M3-3 24" X 12"
287	M1-4A2 24" x 24"
⇧	M6-3 21" x 15"

DETOUR TO BUS 287/N MAIN ST (NORTH) FROM IH 820 EB

1. CONTINUE ON IH 820 EB
2. TAKE EXIT 15 TO BLUE MOUND RD
3. MAKE A U TURN
4. MERGE TO IH 820 WB MAIN LANES
5. TAKE EXIT 13 TO BUS 287 NORTH (SAGINAW/MAIN ST)
6. CONTINUE ON BUS 287 NORTH (SAGINAW/MAIN ST)

NOTE:

FOR TCP REFER TO TCP PHASE I STEP B

STATE OF TEXAS
YOUSUF M. ALI
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PROFESSIONAL ENGINEER

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4/7/2023

DETOUR LAYOUT TO BUS 287 NORTH

IH 820 EB COLL RD @ BUS 287

02-220-0-0008-14-199

 Texas Department of Transportation

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	13

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

T:\CENTDESN\FY24 Rail Retrofit Project\NBI*02-220-0-0008-14-199\Sheets\199*Detour to Bus 287 North From IH 820 EB*Sht01.dgn

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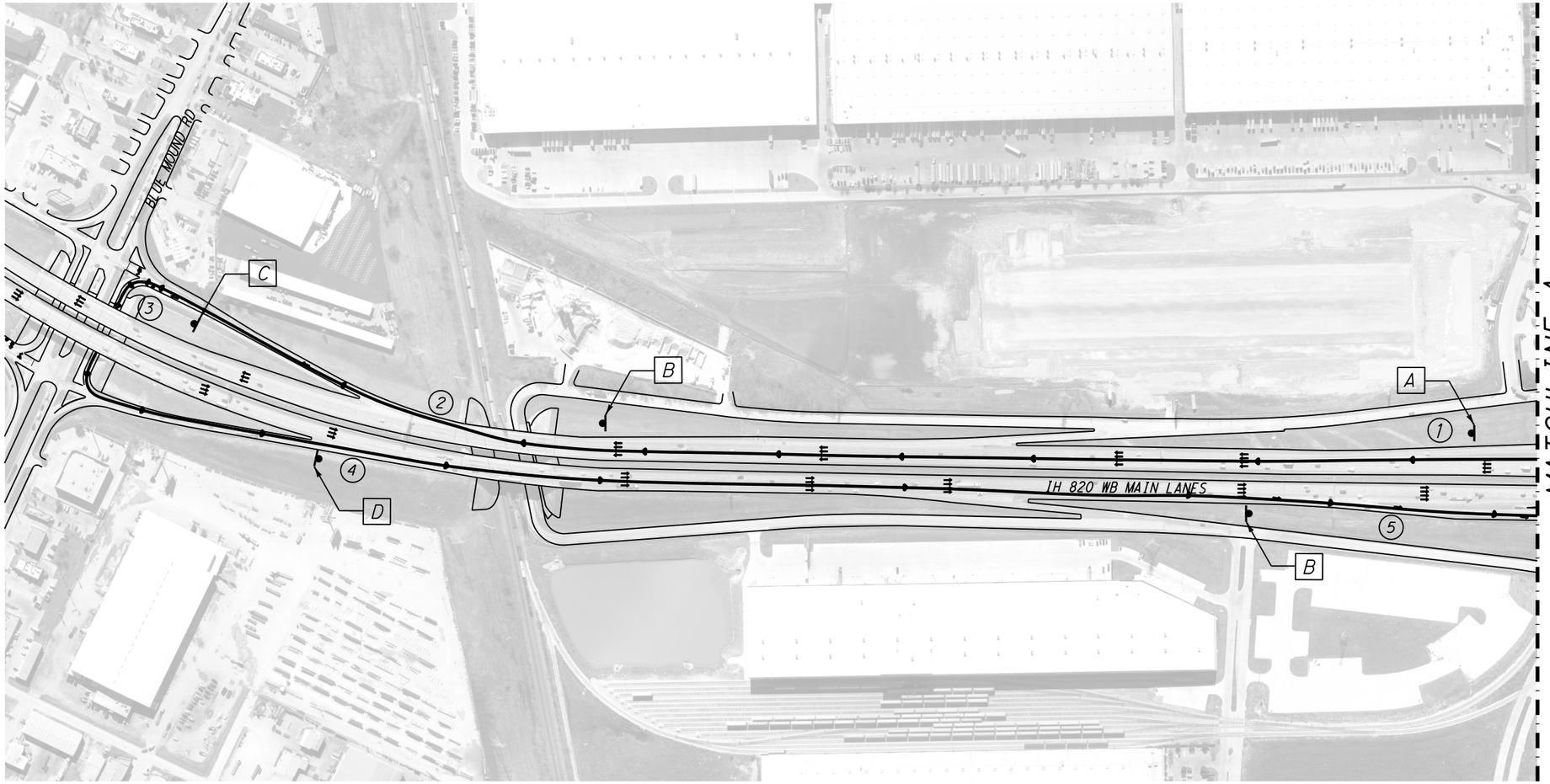

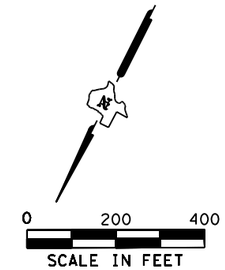

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

LEGEND

- WORK ZONE
- DETOUR PATH
- SIGN
- TRAFFIC FLOW

A		B		C		D	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"
NORTH	M3-3 24" X 12"	NORTH	M3-3 24" X 12"	NORTH	M3-3 24" X 12"	NORTH	M3-3 24" X 12"
287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"
⇧	M6-3 21" x 15"	⇗	C1X6AL 36" X 18"	ONLY	R3-8U 24" x 30"	⇖	C1X6AL 36" X 18"

DETOUR TO BUS 287/N MAIN ST (NORTH) FROM IH 820 EB

1. CONTINUE ON IH 820 EB
2. TAKE EXIT 15 TO BLUE MOUND RD
3. MAKE A U TURN
4. MERGE TO IH 820 WB MAIN LANES
5. TAKE EXIT 13 TO BUS 287 NORTH (SAGINAW/MAIN ST)
6. CONTINUE ON BUS 287 NORTH (SAGINAW/MAIN ST)

NOTE:

FOR TCP REFER TO TCP PHASE 1 STEP B

DETOUR LAYOUT TO BUS 287 NORTH

IH 820 EB COLL RD @ BUS 287

02-220-0-0008-14-199

SHEET 2 OF 3

FED.RD. DIV. NO.	STATE AID PROJECT NO.			SHEET NO.
6	See Title Sheet			14
STATE	DIST.	COUNTY		
TEXAS	FTW	TARRANT		
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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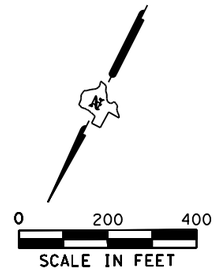

LEGEND

- WORK ZONE
- DETOUR PATH
- SIGN
- TRAFFIC FLOW

B

DETOUR	M4-8 24" X 12"
NORTH	M3-3 24" X 12"
287	M1-4A2 24" x 24"
	C1X6AL 36" X 18"

E

END DETOUR	M4-8A 24" X 18"

DETOUR TO BUS 287/N MAIN ST (NORTH) FROM IH 820 EB

1. CONTINUE ON IH 820 EB
2. TAKE EXIT 15 TO BLUE MOUND RD
3. TAKE A U TURN
4. MERGE TO IH 820 WB MAIN LANES
5. TAKE EXIT 13 TO BUS 287 NORTH (SAGINAW/MAIN ST)
6. CONTINUE ON BUS 287 NORTH (SAGINAW/MAIN ST)

NOTE:

FOR TCP REFER TO TCP PHASE I STEP B

DETOUR LAYOUT TO BUS 287 NORTH

IH 820 EB COLL
RD @ BUS 287

02-220-0-0008-14-199

SHEET 3 OF 3

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		15
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0008	14	124,ETC	IH 820

REV. NO.

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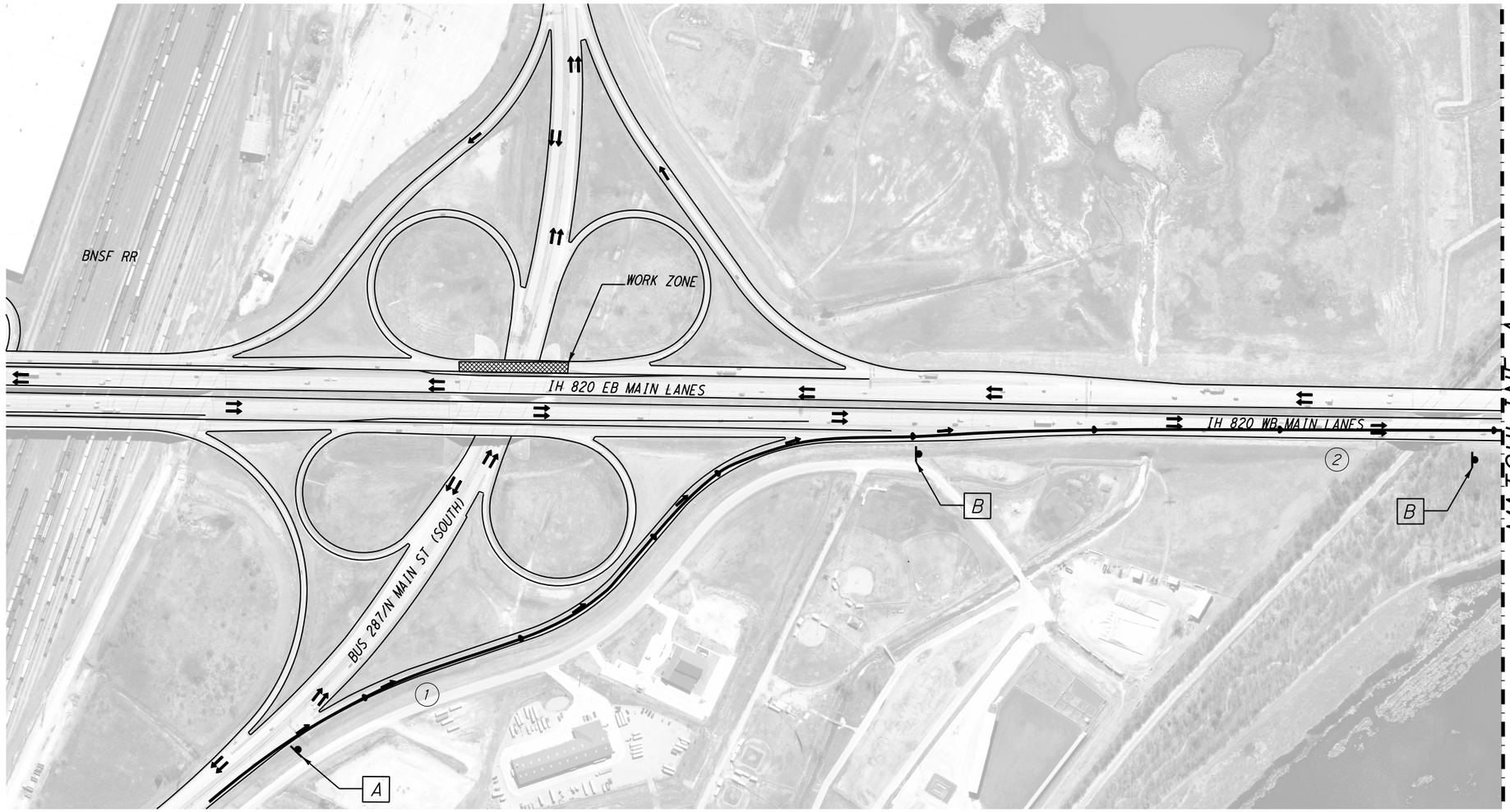


0 200 400
SCALE IN FEET

LEGEND

WORK ZONE
DETOUR PATH
SIGN
TRAFFIC FLOW

A		B	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"
EAST	M3-3 24" X 12"	EAST	M3-3 24" X 12"
INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"
	C1X6AL 36" X 18"		M6-3 21" x 15"

DETOUR TO IH 820 EB (FROM BUS 287/N MAIN ST (SOUTH))

1. TAKE THE EXIT RAMP TO IH 820 WB
2. CONTINUE ON IH 820 WB
3. TAKE EXIT 12B TO OLD DECATUR RD
4. TAKE LEFT ON OLD DECATUR RD
5. TAKE LEFT ON IH 820 EB FRONTAGE RD
6. MERGE TO IH 820 EB MAIN LANES

NOTE:

FOR TCP REFER TO STANDARD (2-6c)18

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

DETOUR LAYOUT TO IH 820 EB

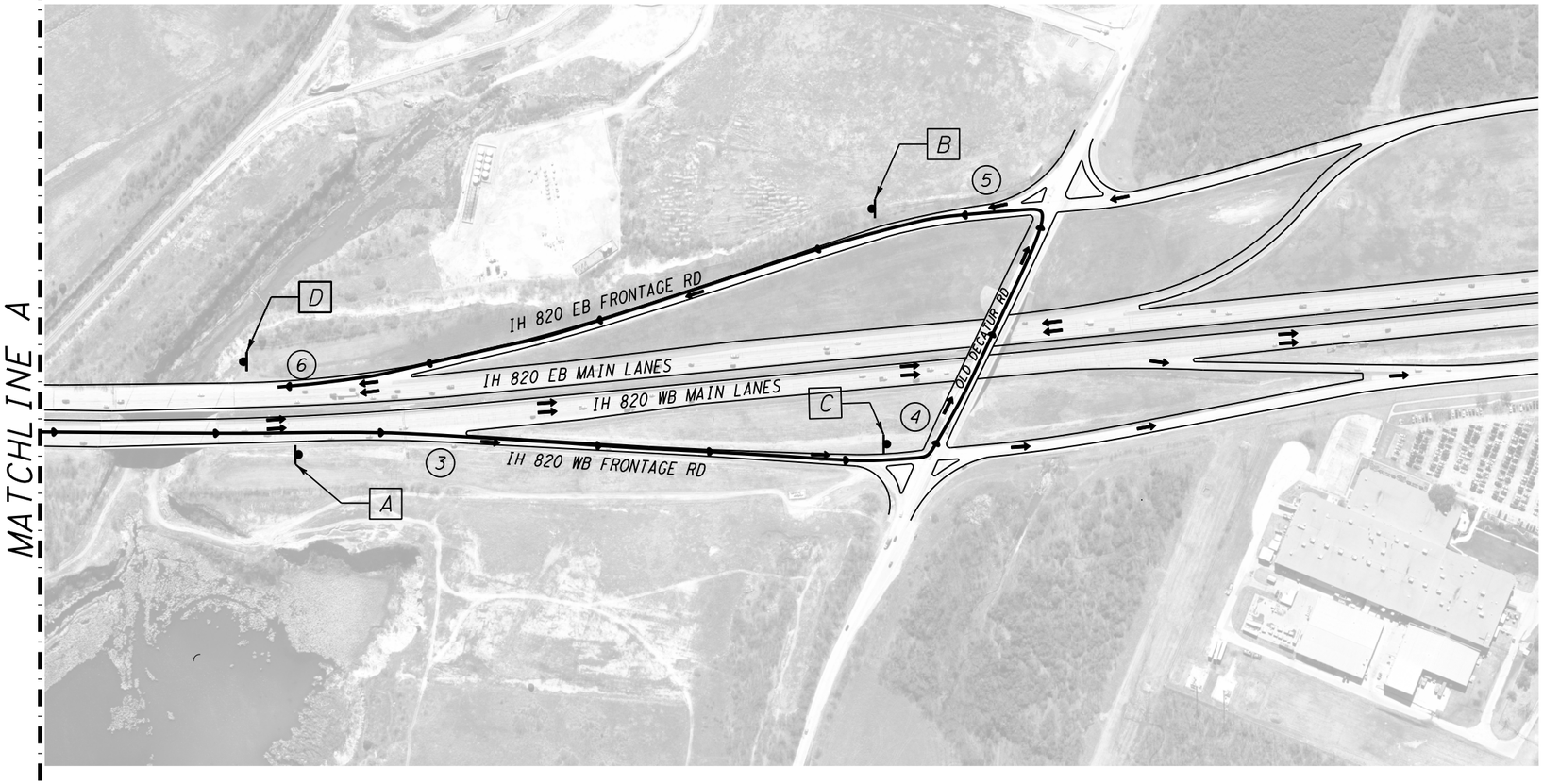
IH 820 EB COLL
RD @ BUS 287

02-220-0-0008-14-199

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		16
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



0 200 400
SCALE IN FEET

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

LEGEND

WORK ZONE
DETOUR PATH
SIGN
TRAFFIC FLOW

A		C		B		D	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	END DETOUR	M4-8A 24" X 18"
EAST	M3-3 24" X 12"	EAST	M3-3 24" X 12"	EAST	M3-3 24" X 12"		
INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"		
	C1X6AL 36" X 18"		M6-3 21" x 15"		M6-3 21" x 15"		

DETOUR TO IH 820 EB (FROM BUS 287/N MAIN ST (SOUTH))

1. TAKE THE EXIT RAMP TO IH 820 WB
2. CONTINUE ON IH 820 WB
3. TAKE EXIT 12B TO OLD DECATUR RD
4. TAKE LEFT ON OLD DECATUR RD
5. TAKE LEFT ON IH 820 EB FRONTAGE RD
6. MERGE TO IH 820 EB MAIN LANES

NOTE:
FOR TCP REFER TO STANDARD (2-6c)18

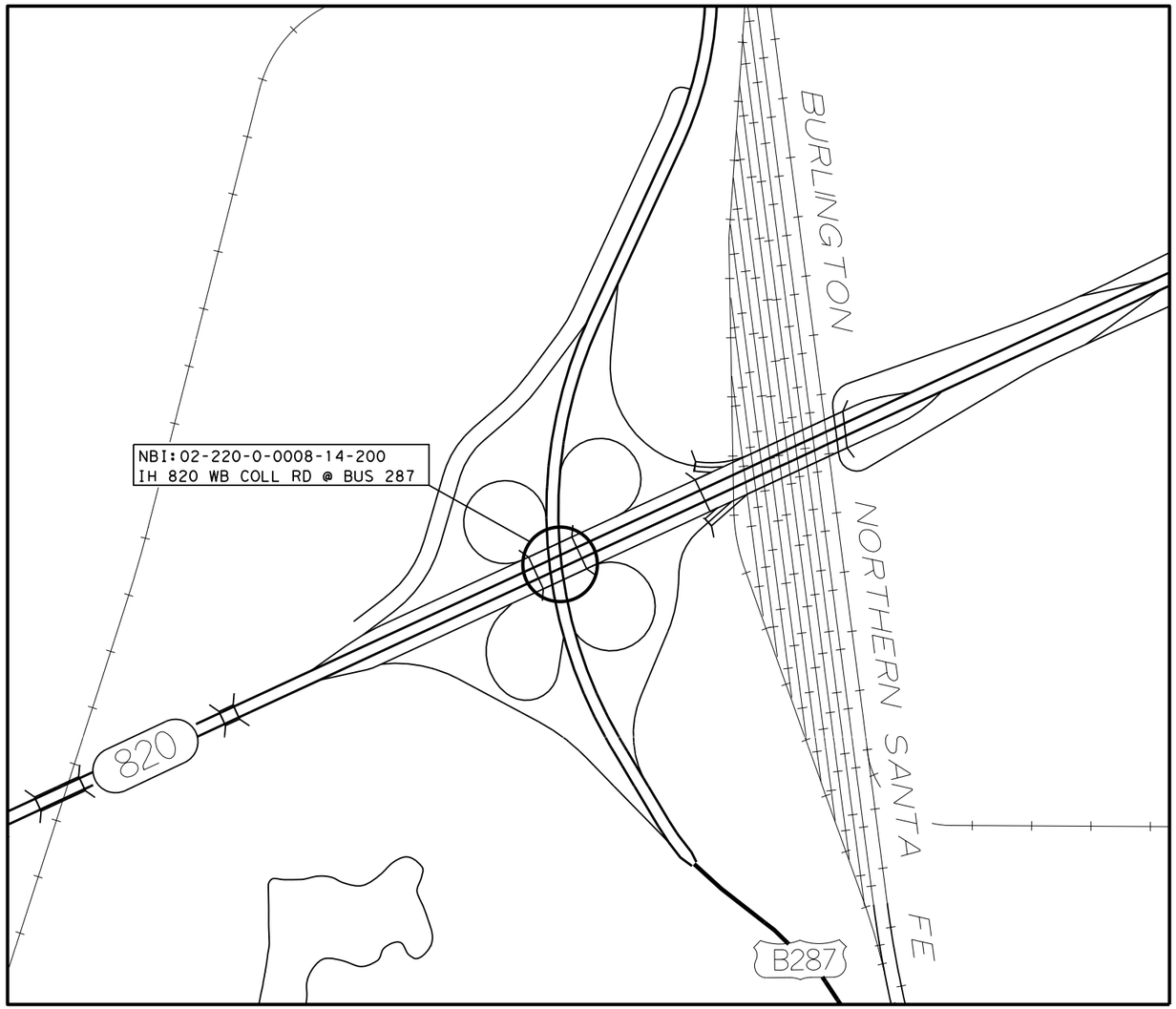
DETOUR LAYOUT TO IH 820 EB

IH 820 EB COLL RD @ BUS 287

02-220-0-0008-14-199

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		17
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



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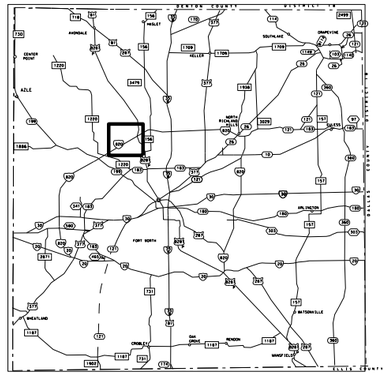
IH 820 WB COLL RD @ BUS 287

LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 WB COLL RD
@ BUS 287

02-220-0-0008-14-200

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		18
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

SEQUENCE OF WORK

PHASE I AT IH 820 WB COLL RD:
STEP A = IH 820 WB COLL RD OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 WB COLL RD AS SHOWN ON TCP(2-6c)-18 STANDARD AND "DETOUR LAYOUT TO IH 820 WB FROM BUS 287 NORTH" SHEETS.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB COLL RD @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB COLL RD @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 WB COLL RD:
STEP B = IH 820 WB COLL RD INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 WB COLL RD AS SHOWN ON "TRAFFIC CONTROL PLAN IH 820 WB COLL RD @ BUS 287 PHASE I, STEP B" AND "DETOUR LAYOUT TO BUS 287 SOUTH FROM IH 820 WB" SHEETS.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

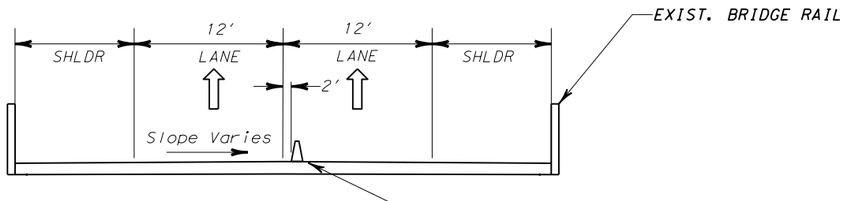
3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB COLL RD @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB COLL RD @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:
1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N.T.S.

STATE OF TEXAS
YOUSUF M. ALI
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Yousuf Ali
4/7/2023

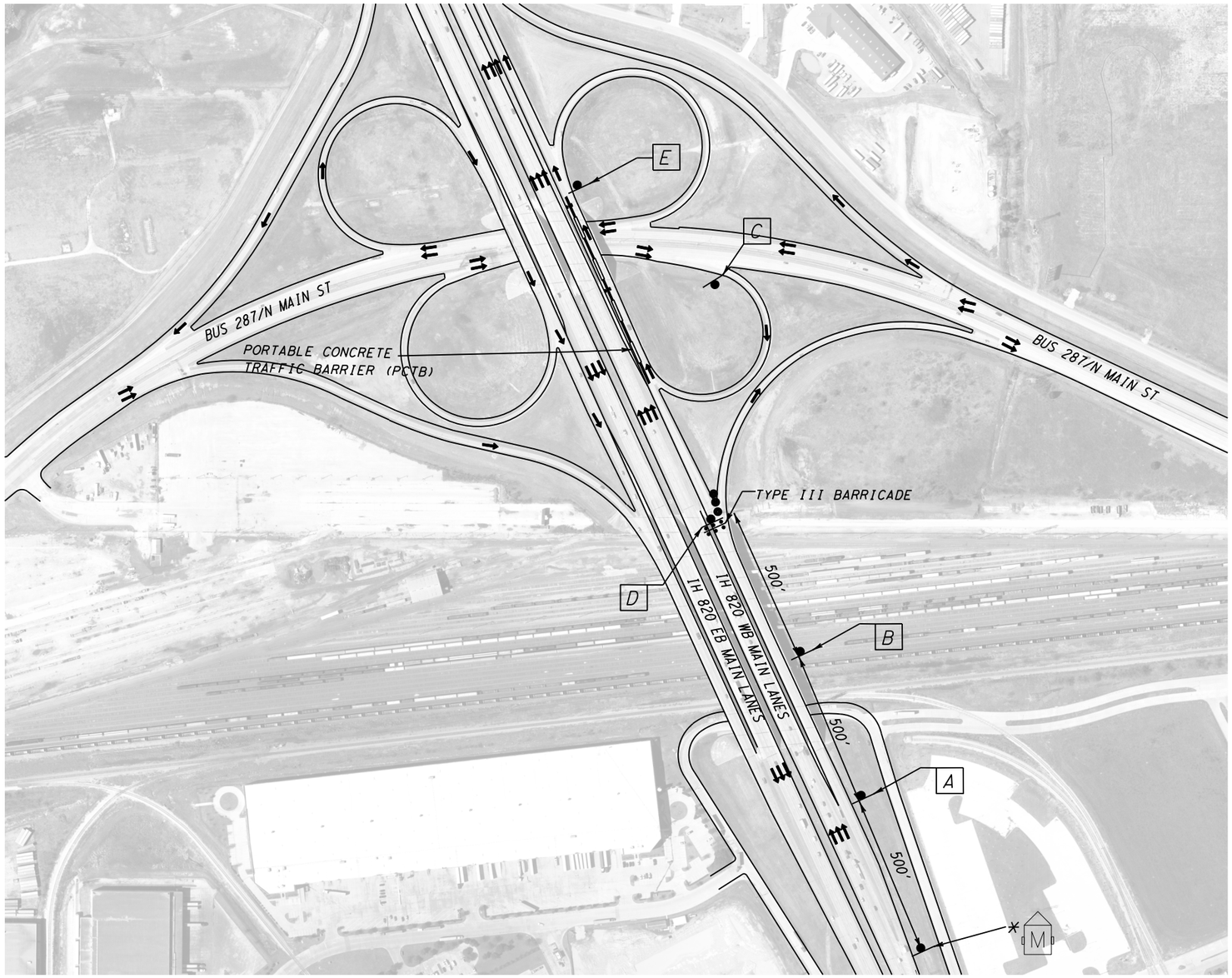
SEQUENCE OF WORK

IH 820 WB COLL RD @ BUS 287

02-220-0-0008-14-200

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		19
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



0 200 400
SCALE IN FEET

LEGEND

- WORK ZONE
- SIGN
- TRAFFIC FLOW
- M — PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TYPE III BARRICADE
- PORTABLE CONCRETE TRAFFIC BARRIER (PCTB)

* PORTABLE CHANGEABLE MESSAGE SIGNS

* POSTED 7 DAYS PRIOR TO CLOSURE

EXIT RAMP TO BUS 287 SOUTH TO BE CLOSED	DATE & TIME

* POSTED DURING CLOSURE

EXIT RAMP TO BUS 287 SOUTH CLOSED	USE DETOUR

A — ROAD CLOSED AHEAD — W20-1 48" X 48" — 1000 FT

B — ROAD CLOSED AHEAD — W20-1 48" X 48" — 500 FT

C — ROAD WORK AHEAD — W20-1 48" X 48"

D — ROAD CLOSED — R11-2R 48" X 30"

E — END ROAD WORK — G20-2a 48" X 24"

NOTE:

FOR DETOUR REFER TO" DETOUR LAYOUT TO BUS 287 SOUTH FROM IH 820 WB" SHEETS

STATE OF TEXAS
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4/7/2023

TRAFFIC CONTROL PLAN

IH 820 WB COLL
RD @ BUS 287

PHASE 1
STEP B

02-220-0-0008-14-200

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		20
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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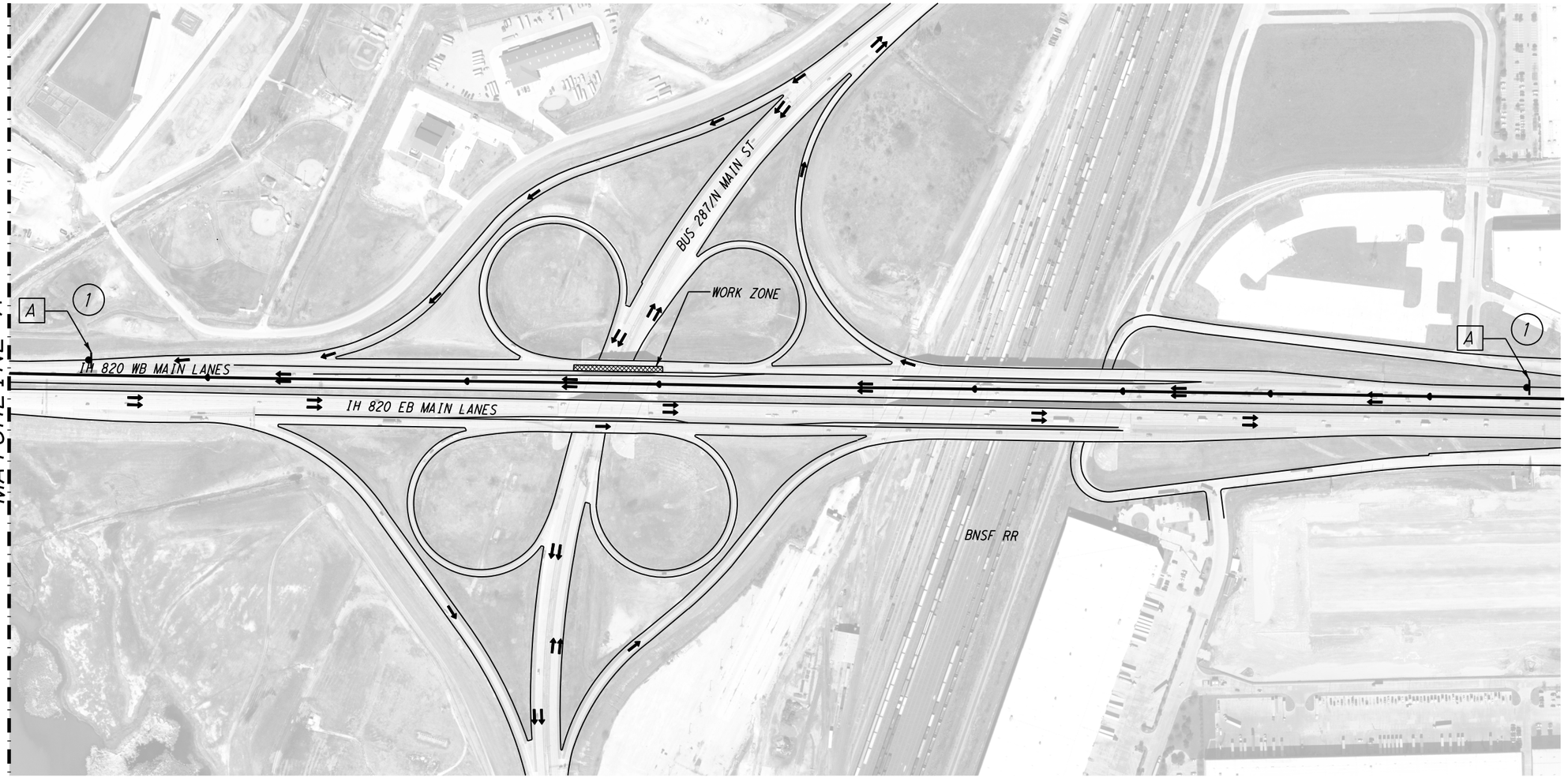

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SCALE IN FEET

STATE OF TEXAS
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93983
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PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

LEGEND

WORK ZONE

DETOUR PATH

SIGN

TRAFFIC FLOW

A
DETOUR
SOUTH
287

M4-8
24" X 12"

M3-3
24" X 12"

M1-4A2
24" x 24"

M6-3
21" x 15"

DETOUR TO BUS 287/N MAIN ST (SOUTH) FROM IH 820 WB

1. CONTINUE ON IH 820 WB
2. TAKE EXIT 12B TO OLD DECATUR RD
3. TAKE LEFT ON OLD DECATUR RD
4. TAKE LEFT ON IH 820 EB FRONTAGE RD
5. MERGE TO IH 820 EB MAIN LANES
6. TAKE EXIT 13 TO BUS 287 SOUTH (SAGINAW/MAIN ST)
7. CONTINUE ON BUS 287 SOUTH (SAGINAW/MAIN ST)

NOTE:

FOR TCP REFER TO TCP PHASE I STEP B

DETOUR LAYOUT TO BUS 287 SOUTH

IH 820 WB COLL
RD @ BUS 287

02-220-0-0008-14-200

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	21

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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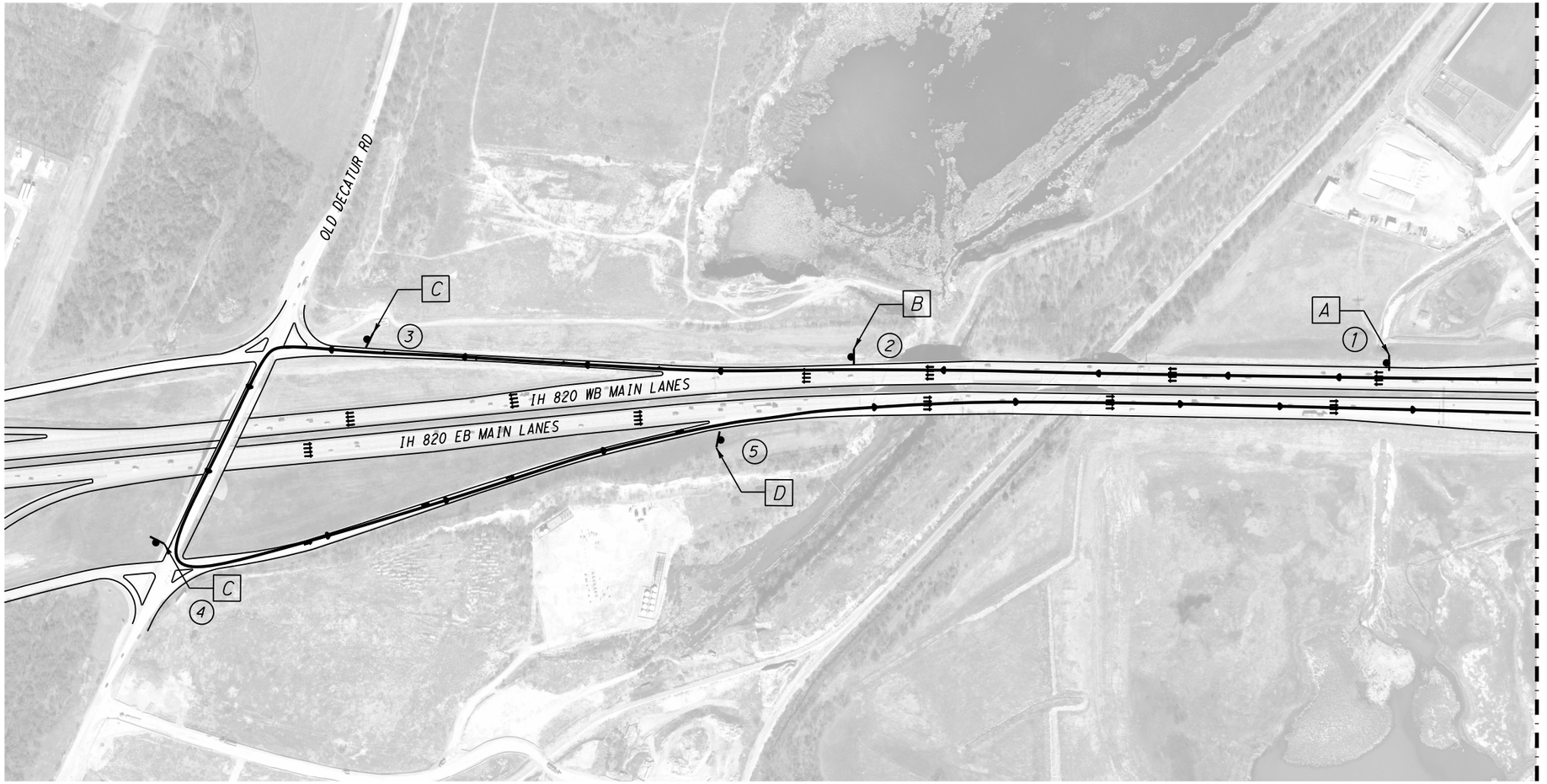


MATCHLINE A

0 200 400
SCALE IN FEET

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

LEGEND

WORK ZONE
DETOUR PATH
SIGN
TRAFFIC FLOW

A		B		C		D	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"
SOUTH	M3-3 24" X 12"	SOUTH	M3-3 24" X 12"	SOUTH	M3-3 24" X 12"	SOUTH	M3-3 24" X 12"
287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"	287	M1-4A2 24" x 24"
	M6-3 21" x 15"		C1X6AL 36" X 18"		M6-3 21" x 15"		C1X6AL 36" X 18"

DETOUR TO BUS 287/N MAIN ST (SOUTH) FROM IH 820 WB

1. CONTINUE ON IH 820 WB
2. TAKE EXIT 12B TO OLD DECATUR RD
3. TAKE LEFT ON OLD DECATUR RD
4. TAKE LEFT ON IH 820 EB FRONTAGE RD
5. MERGE TO IH 820 EB MAIN LANES
6. TAKE EXIT 13 TO BUS 287 SOUTH (SAGINAW/MAIN ST)
7. CONTINUE ON BUS 287 SOUTH (SAGINAW/MAIN ST)

NOTE:
FOR TCP REFER TO TCP PHASE 1 STEP B

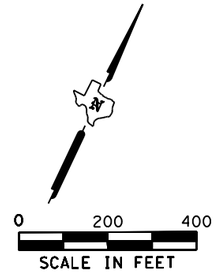
DETOUR LAYOUT TO BUS 287 SOUTH

IH 820 WB COLL
RD @ BUS 287

02-220-0-0008-14-200

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		22
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

LEGEND

WORK ZONE

DETOUR PATH

SIGN

TRAFFIC FLOW

B

DETOUR — M4-8, 24" X 12"

SOUTH — M3-3, 24" X 12"

287 — M1-4A2, 24" x 24"

C1X6AL, 36" X 18"

E

END DETOUR — M4-8A, 24" X 18"

DETOUR TO BUS 287/N MAIN ST (SOUTH) FROM IH 820 WB

1. CONTINUE ON IH 820 WB
2. TAKE EXIT 12B TO OLD DECATUR RD
3. TAKE LEFT ON OLD DECATUR RD
4. TAKE LEFT ON IH 820 EB FRONTAGE RD
5. MERGE TO IH 820 EB MAIN LANES
6. TAKE EXIT 13 TO BUS 287 SOUTH (SAGINAW/MAIN ST)
7. CONTINUE ON BUS 287 SOUTH (SAGINAW/MAIN ST)

NOTE:

FOR TCP REFER TO TCP PHASE I STEP B

DETOUR LAYOUT TO BUS 287 SOUTH

IH 820 WB COLL RD @ BUS 287

02-220-0-0008-14-200

SHEET 3 OF 3

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		23
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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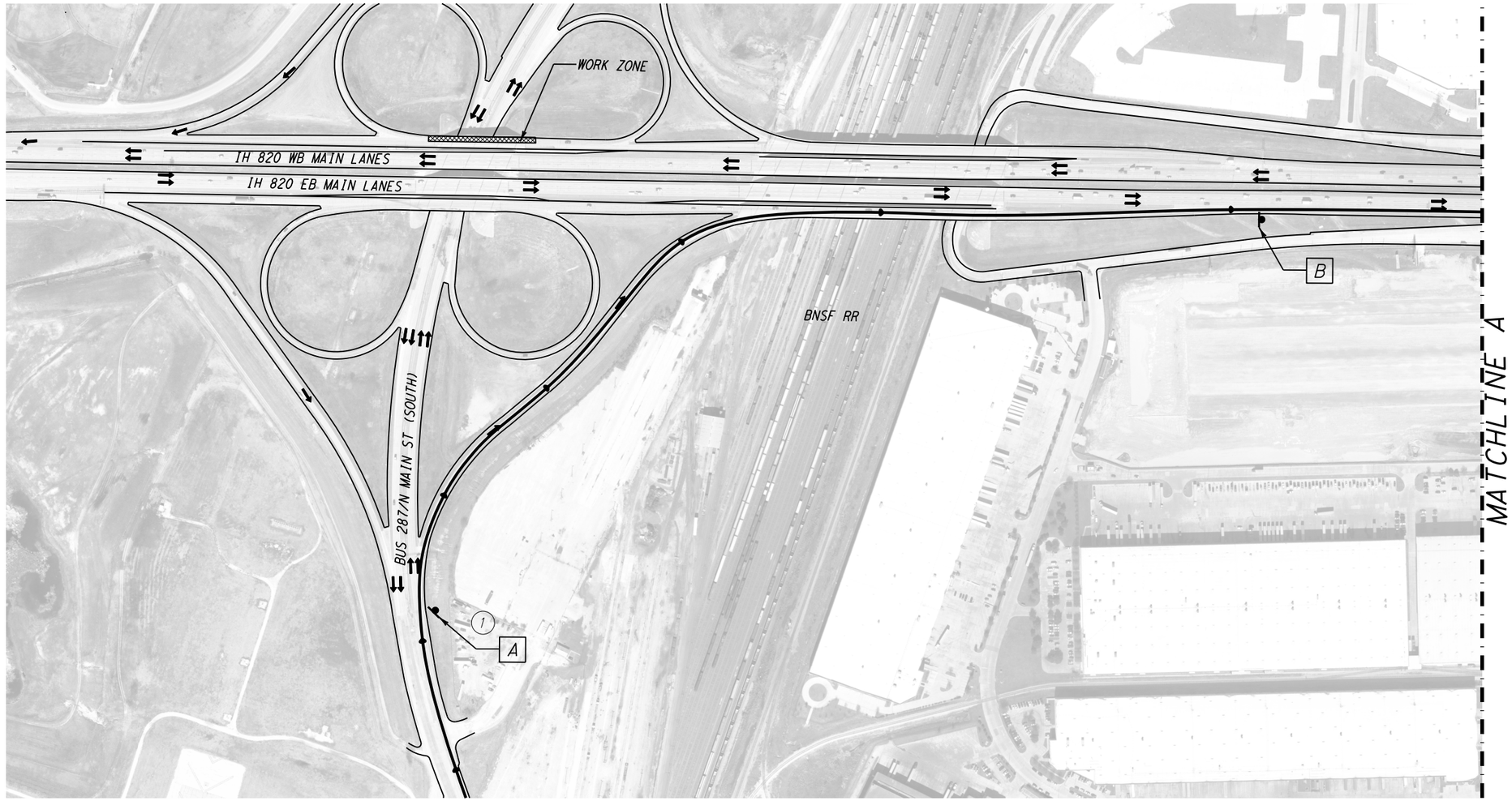

0 200 400
SCALE IN FEET

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

LEGEND

WORK ZONE

DETOUR PATH

SIGN

TRAFFIC FLOW

A		B	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"
WEST	M3-3 24" X 12"	WEST	M3-3 24" X 12"
INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"
	C1X6AL 36" X 18"		M6-3 21" X 15"

DETOUR TO IH 820 WB (FROM BUS 287/N MAIN ST (NORTH))

1. TAKE THE EXIT RAMP TO IH 820 EB
2. CONTINUE ON IH 820 EB
3. TAKE EXIT 15 TO BLUE MOUND RD
4. MAKE A U TURN
5. MERGE TO IH 820 WB MAIN LANES

NOTE:

FOR TCP REFER TO STANDARD (2-6c)18

DETOUR LAYOUT TO IH 820 WB

IH 820 WB COLL RD @ BUS 287

02-220-0-0008-14-200

SHEET 1 OF 2

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		24
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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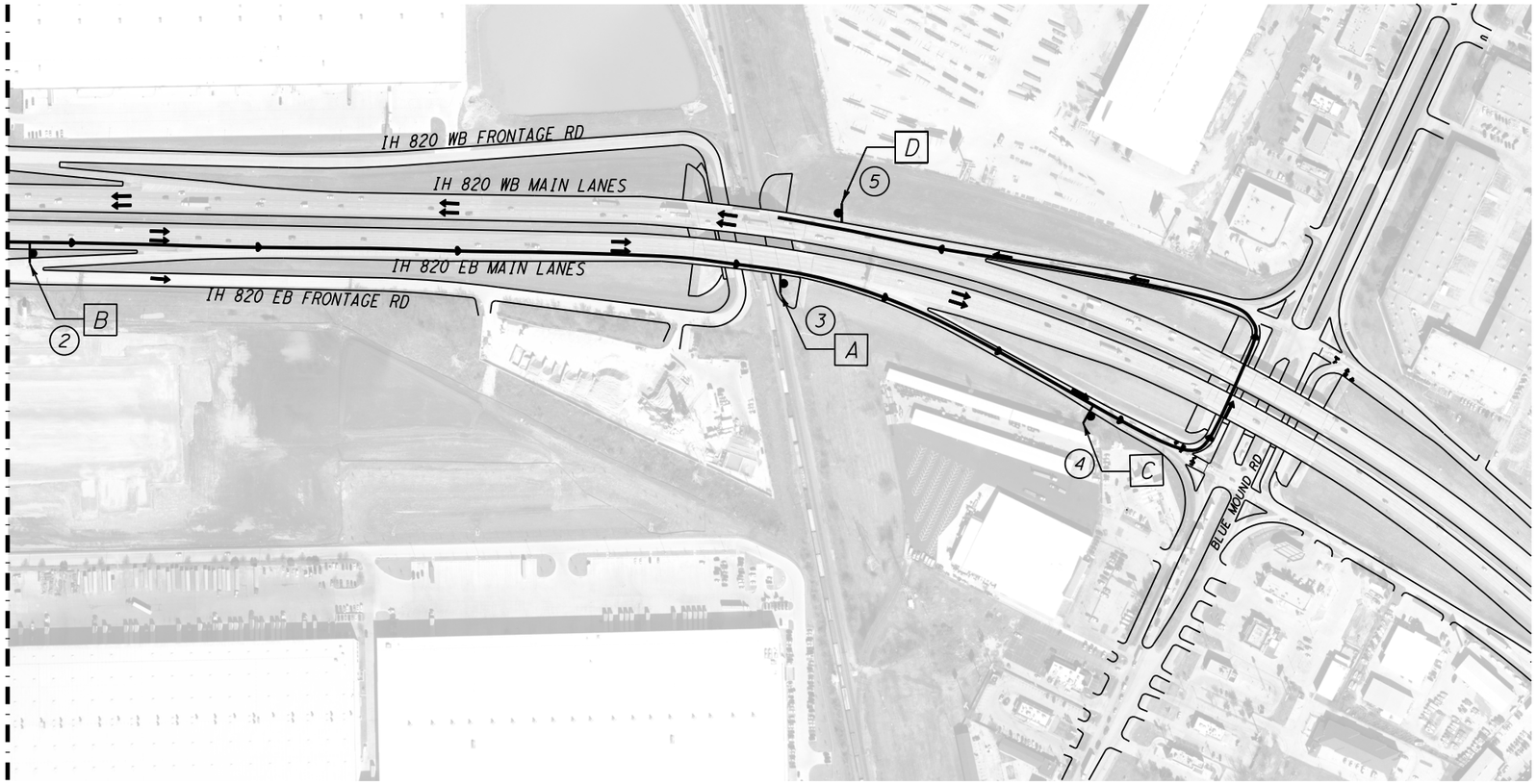

0 200 400
SCALE IN FEET

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

LEGEND

WORK ZONE
DETOUR PATH
SIGN
TRAFFIC FLOW

B		A		C		D	
DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	DETOUR	M4-8 24" X 12"	END DETOUR	M4-8A 24" X 18"
WEST	M3-3 24" X 12"	WEST	M3-3 24" X 12"	WEST	M3-3 24" X 12"		
INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"	INTERSTATE 820	M1-1 30" X 24"		
	M6-3 21" x 15"		C1X6AL 36" X 18"	ONLY	R3-8U 24" x 30"		

DETOUR TO IH 820 WB (FROM BUS 287/N MAIN ST (NORTH))

1. TAKE THE EXIT RAMP TO IH 820 EB
2. CONTINUE ON IH 820 EB
3. TAKE EXIT 15 TO S BLUE MOUND RD
4. MAKE A U TURN
5. MERGE TO IH 820 WB MAIN LANES

NOTE:
FOR TCP REFER TO STANDARD (2-6c)18

DETOUR LAYOUT TO IH 820 WB

IH 820 WB COLL RD @ BUS 287

02-220-0-0008-14-200

SHEET 2 OF 2

FED.RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		25
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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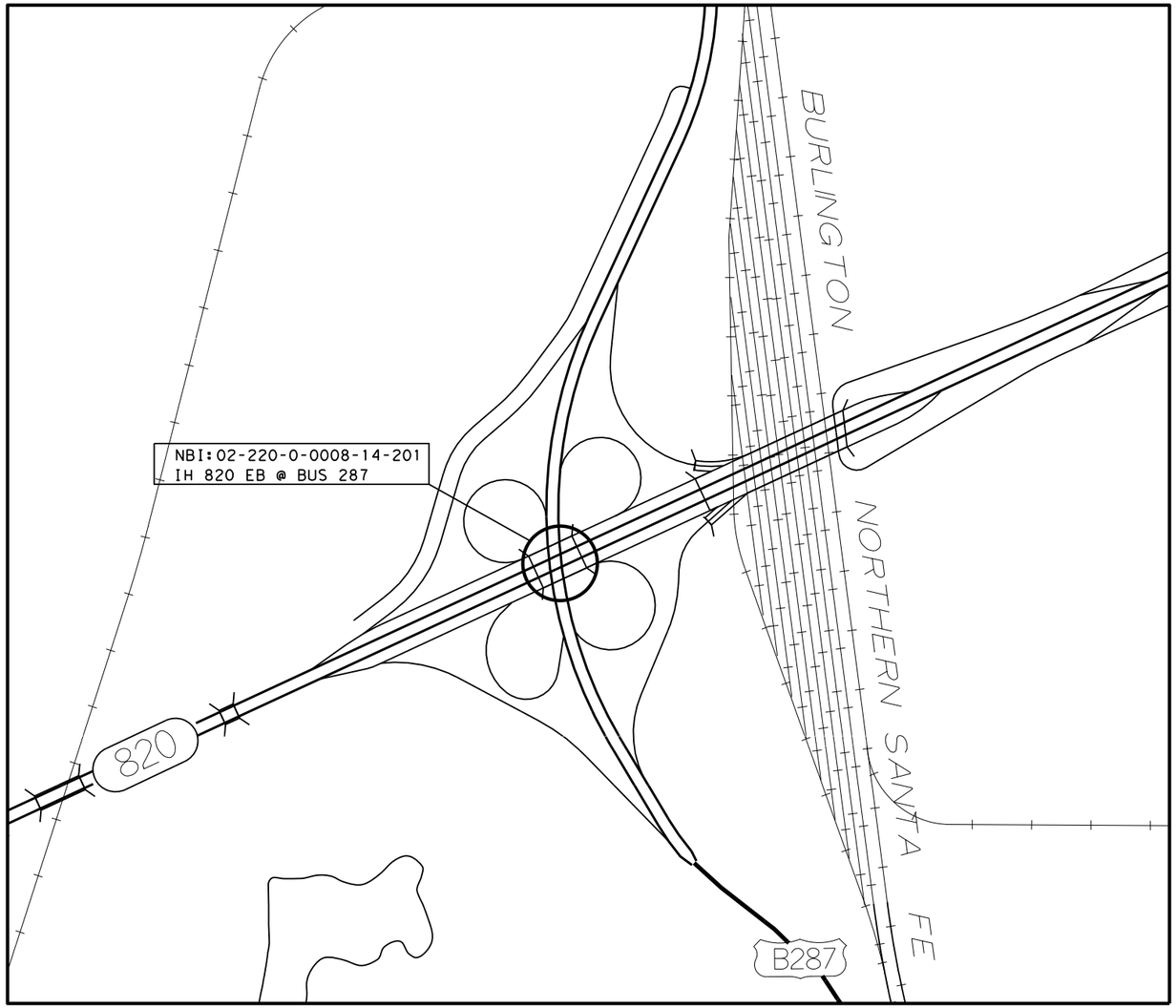
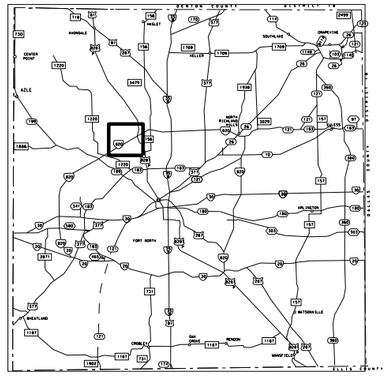


LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 EB
@ BUS 287

02-220-0-0008-14-201

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	AID PROJECT NO.	SHEET NO.
6	See Title Sheet		26

STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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PEN TABLE: T:\CENTDESN\FY24 Rail Retrofit Project\RailRetrofit.tbl

SEQUENCE OF WORK

PHASE I AT IH 820 EB:
STEP A = IH 820 EB INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 EB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 EB:
STEP B = IH 820 EB OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 EB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

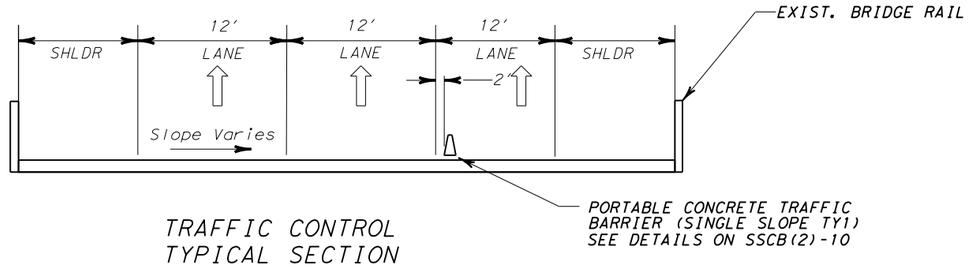
3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:
1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N. T. S.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

SEQUENCE OF WORK

IH 820 EB @ BUS 287

02-220-0-0008-14-201

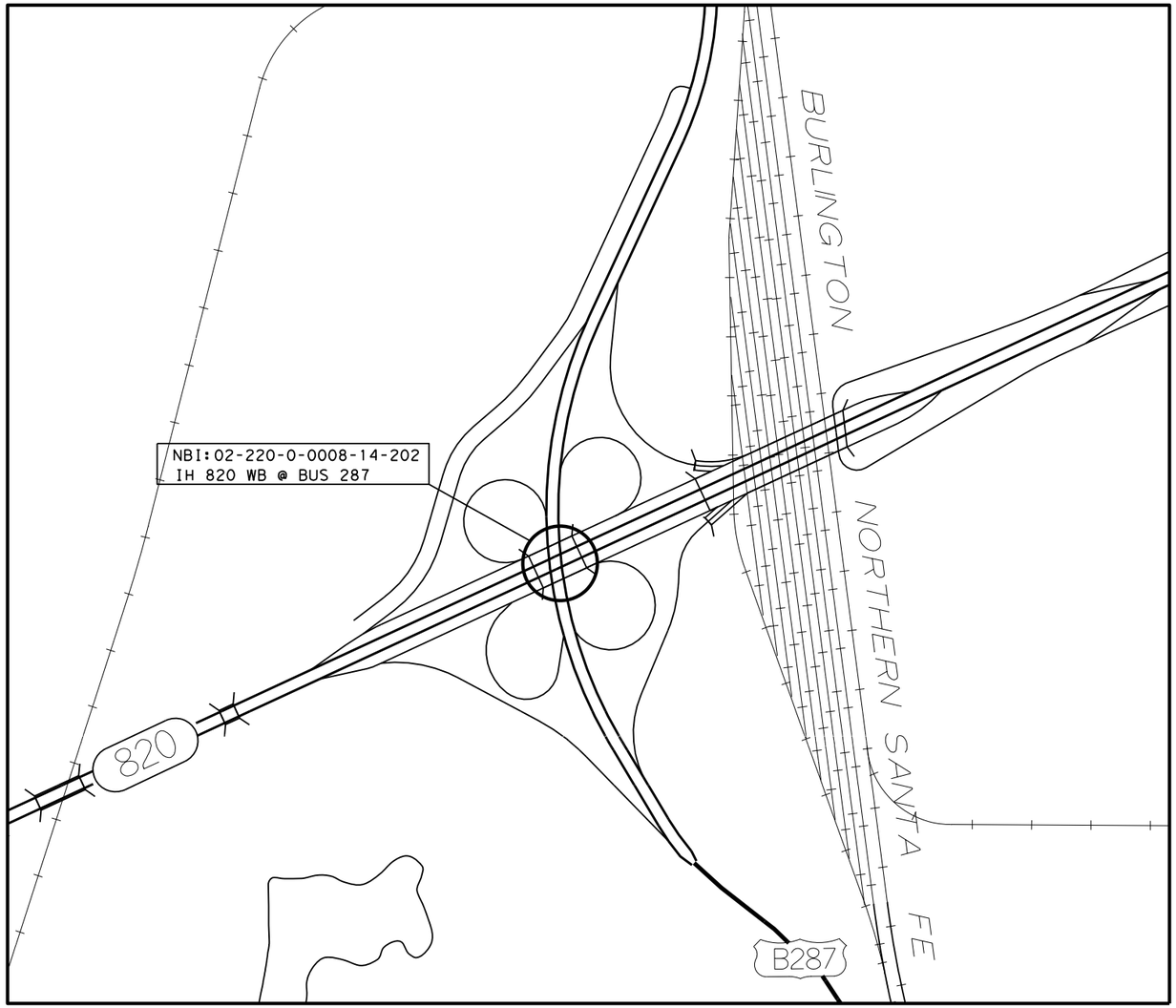
 Texas Department of Transportation

SHEET 1 OF 1

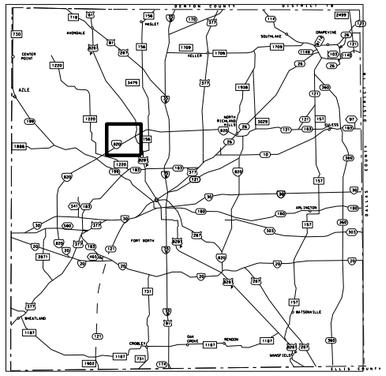
FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	27

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 WB
@ BUS 287

02-220-0-0008-14-202

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	AID PROJECT NO.	SHEET NO.
6	See Title Sheet		28

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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SEQUENCE OF WORK

PHASE I AT IH 820 WB:
STEP A = IH 820 WB INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 WB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ BUS 287" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 WB:
STEP B = IH 820 WB OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 WB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON TCP(2-6a)-18 & TCP(2-6c)-18 STANDARDS.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES AND RAMP AUXILIARY LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ BUS 287" SHEETS.

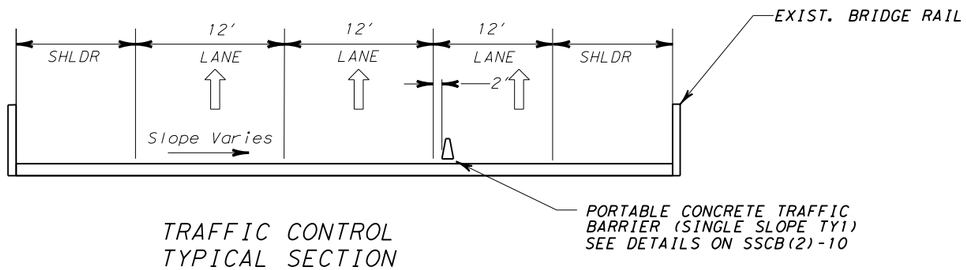
4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE AND RAMP AUXILIARY LANE CLOSURES ON BUS 287 AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS OF BUS 287 AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES OF BUS 287 AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ BUS 287" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:

1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N.T.S.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

SEQUENCE OF WORK

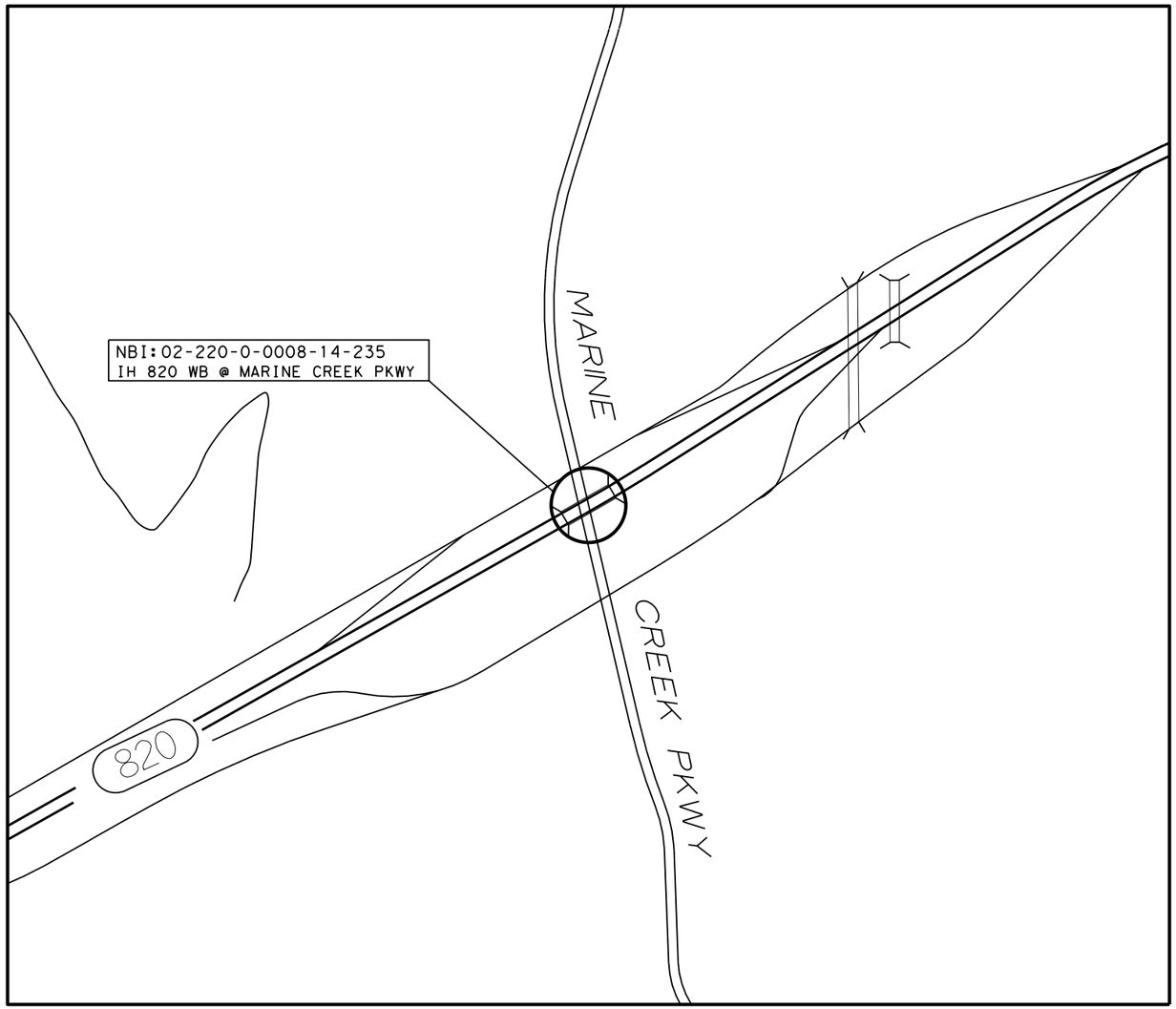
IH 820 WB
@ BUS 287

02-220-0-0008-14-202

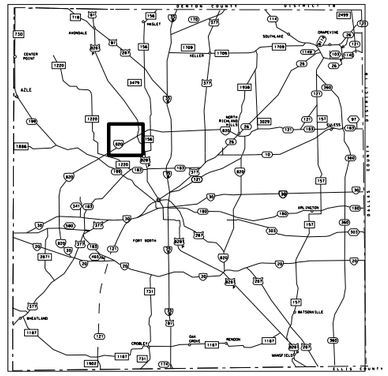
 Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		29
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 WB
@ MARINE CREEK PKWY

02-220-0-0008-14-235

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		30
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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SEQUENCE OF WORK

PHASE I AT IH 820 WB:
STEP A = IH 820 WB INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 WB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ MARINE CREEK PKWY" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE LANE CLOSURES ON MARINE CREEK PKWY AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ MARINE CREEK PKWY" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 WB:
STEP B = IH 820 WB OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 WB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ MARINE CREEK PKWY" SHEETS.

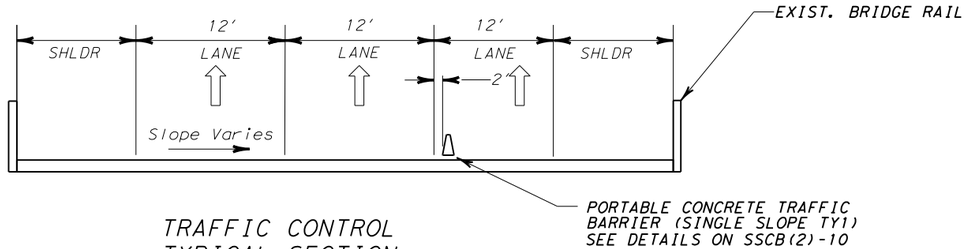
4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE LANE CLOSURES ON MARINE CREEK PKWY AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 WB @ MARINE CREEK PKWY" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:

1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N. T. S.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali
4/7/2023

SEQUENCE OF WORK

IH 820 WB
@ MARINE CREEK PKWY

02-220-0-0008-14-235

 Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	31

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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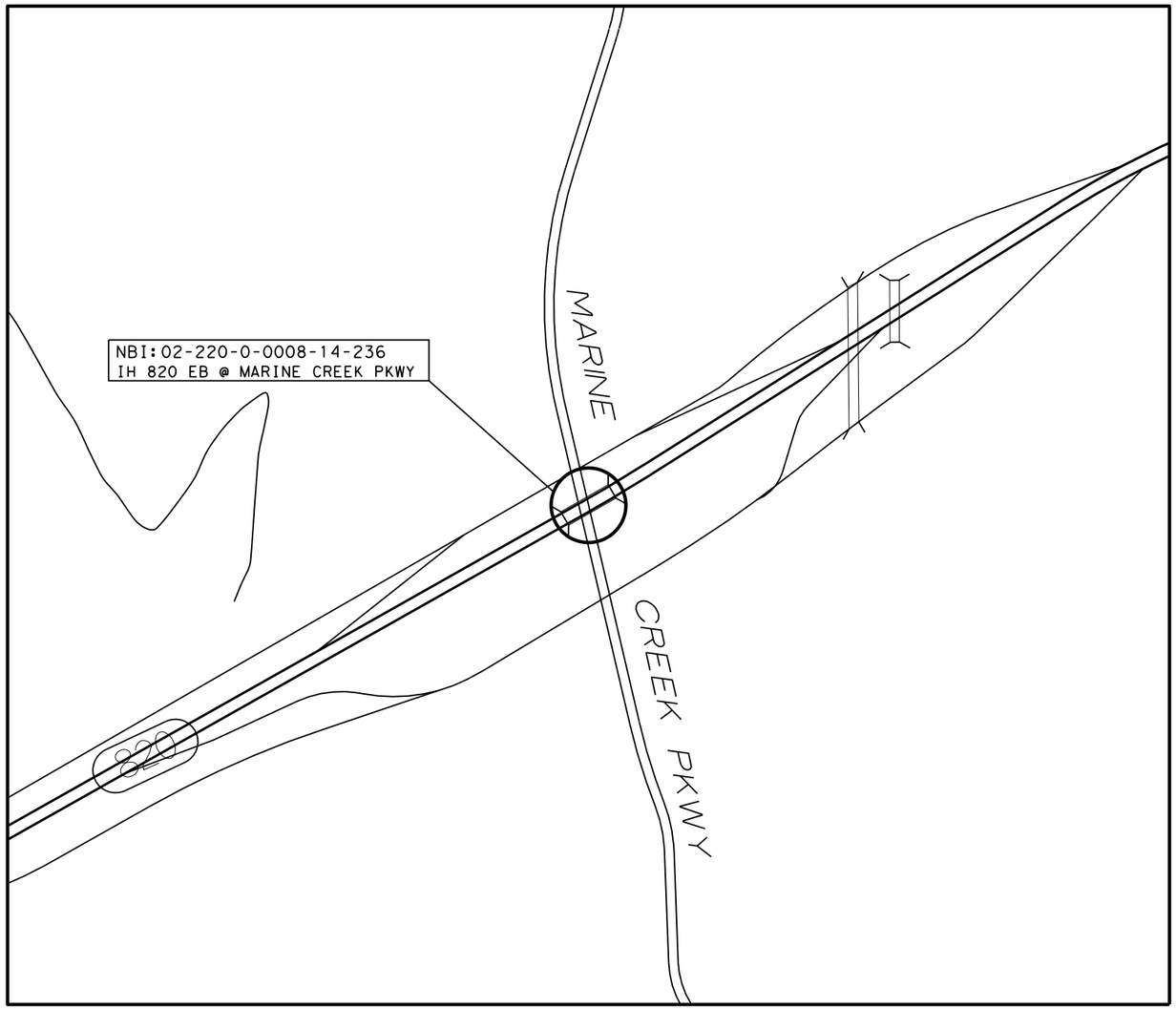
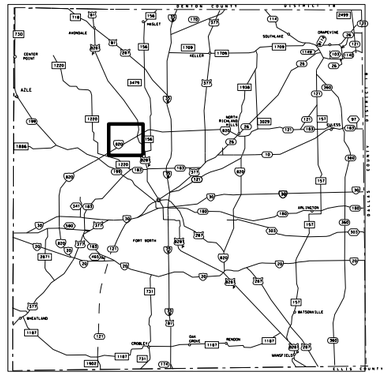


LOCATION MAP
N. T. S.



TARRANT COUNTY

LOCATION MAP

IH 820 EB
@ MARINE CREEK PKWY

02-220-0-0008-14-236

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE AID PROJECT NO.		SHEET NO.
6	See Title Sheet		32
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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PEN TABLE: T:\CENTDESN\FY24 Rail Retrofit Project\RailRetrofit.tbl

SEQUENCE OF WORK

PHASE I AT IH 820 EB:
STEP A = IH 820 EB INSIDE LANE CLOSURE

1. SET UP THE INSIDE LANE CLOSURE ON IH 820 EB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ MARINE CREEK PKWY" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE LANE CLOSURES ON MARINE CREEK PKWY AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ MARINE CREEK PKWY" SHEETS.

6. CLEAN UP AND REMOVE TCP.

PHASE I AT IH 820 EB:
STEP B = IH 820 EB OUTSIDE LANE CLOSURE

1. SET UP THE OUTSIDE LANE CLOSURE ON IH 820 EB AS SHOWN ON TCP(6-1a)-12 STANDARD.

2. SET UP THE OUTSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

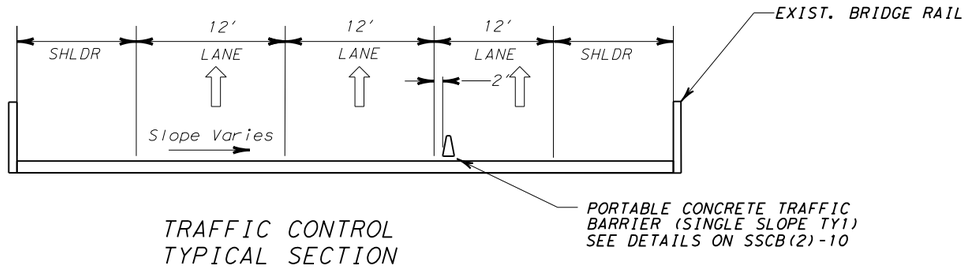
3. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND OUTSIDE LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ MARINE CREEK PKWY" SHEETS.

4. REMOVE BOTH NORTHBOUND AND SOUTHBOUND OUTSIDE LANE CLOSURES ON MARINE CREEK PKWY AND SET UP THE INSIDE LANE CLOSURES ON BOTH NORTHBOUND AND SOUTHBOUND DIRECTIONS AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON TCP(2-6a)-18 STANDARD.

5. PERFORM THE BRIDGE WORK DIRECTLY OVER THE NORTHBOUND AND SOUTHBOUND INSIDE LANES AND LEFT TURN LANES OF MARINE CREEK PKWY AS SHOWN ON "MISCELLANEOUS BRIDGE REPAIR IH 820 EB @ MARINE CREEK PKWY" SHEETS.

6. CLEAN UP AND REMOVE TCP.

NOTES:
1. WORK IS ALLOWED DURING THE NIGHTTIME ONLY.
2. PCTB SHALL BE USED IN LIEU OF BARRELS ON ALL LANE CLOSURES FOR ALL BRIDGES ON IH 820.
3. SEE TRAFFIC CONTROL TYPICAL SECTION FOR PLACEMENT OF PCTB ON THIS SHEET.



TRAFFIC CONTROL TYPICAL SECTION
N. T. S.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER
Yousuf Ali
4/7/2023

SEQUENCE OF WORK

IH 820 EB @ MARINE CREEK PKWY

02-220-0-0008-14-236

 Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE AID PROJECT NO.	SHEET NO.
6	See Title Sheet	33

STATE	DIST.	COUNTY
TEXAS	FTW	TARRANT

REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

DATE:
FILE:

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

SHEET 1 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	000814		124,ETC	IH 820
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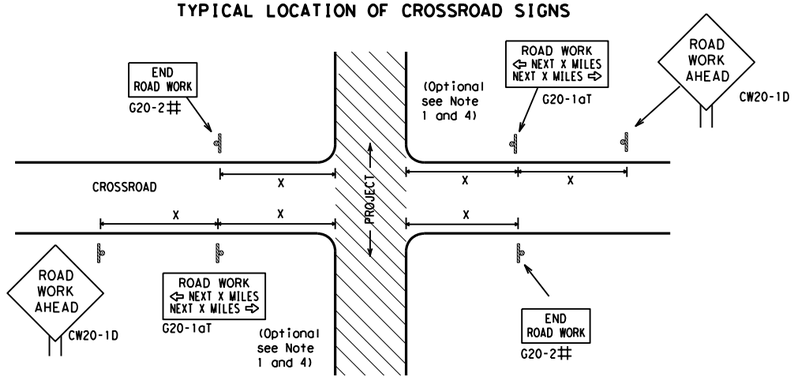
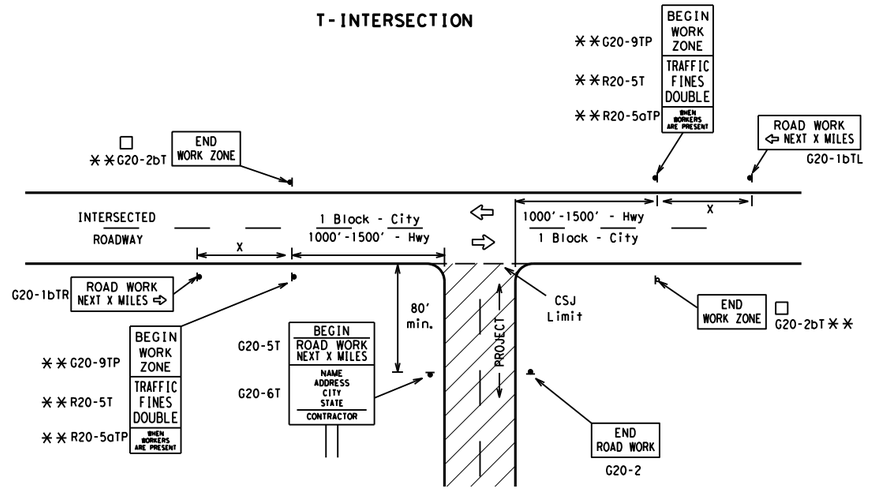
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

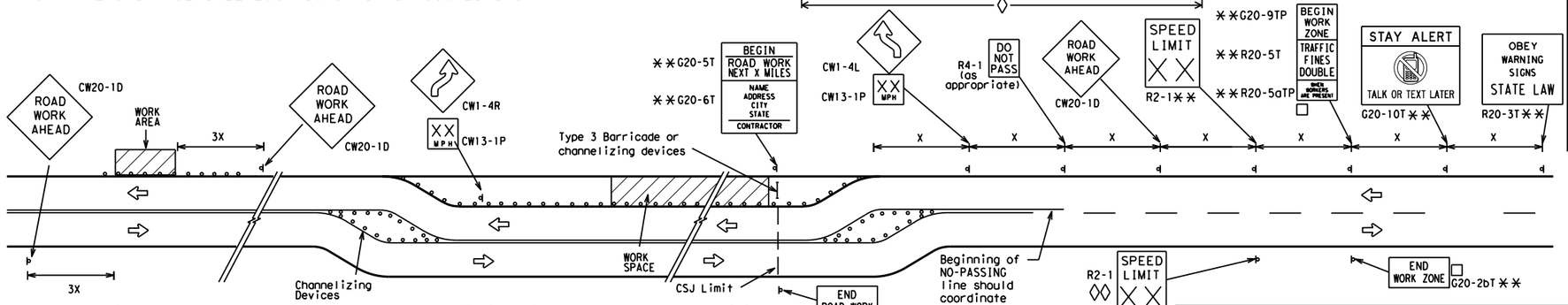
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

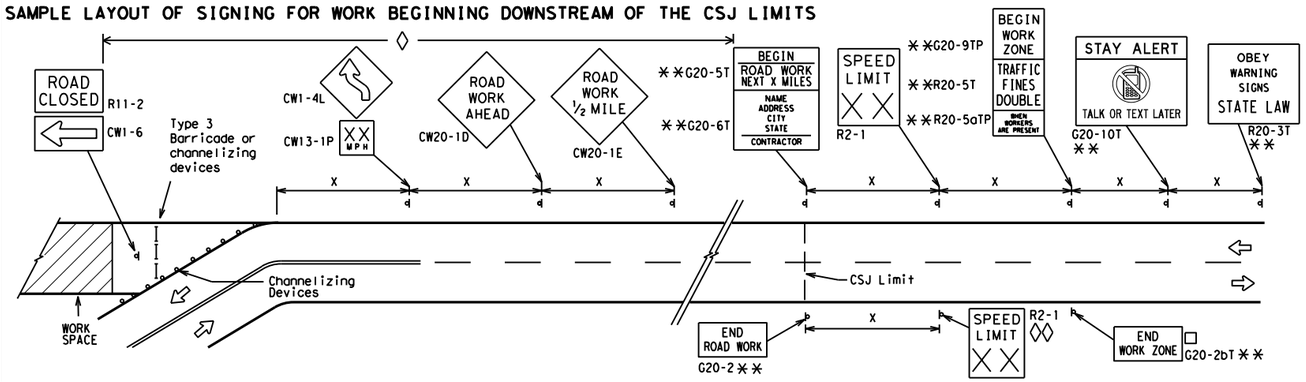
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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

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DATE:
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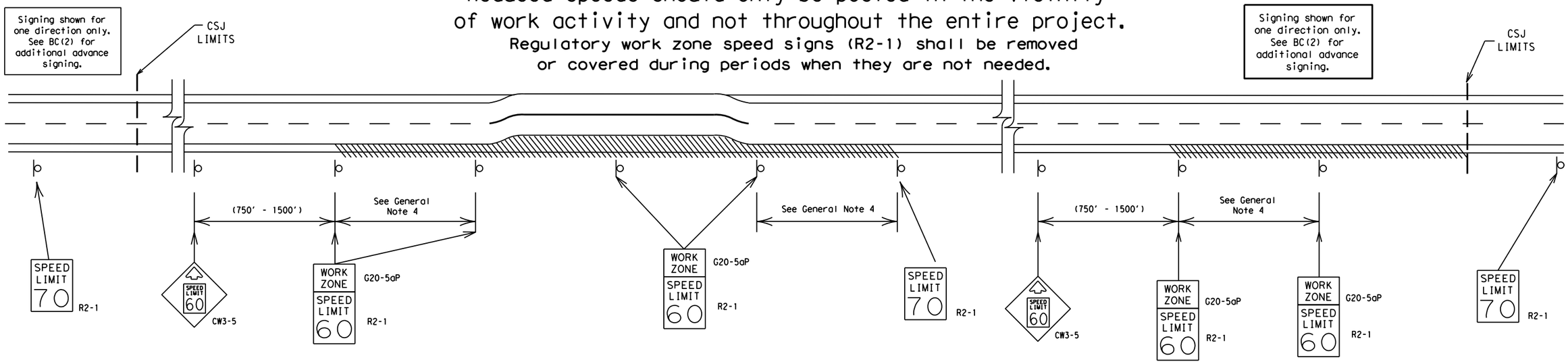
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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DATE:
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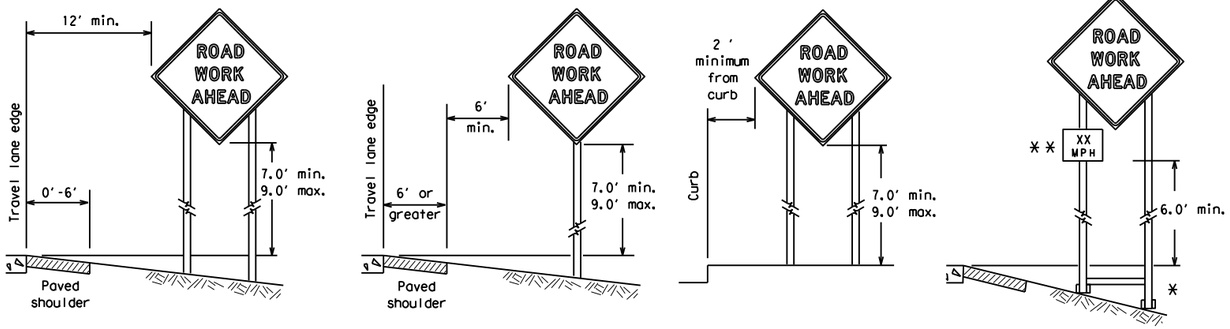
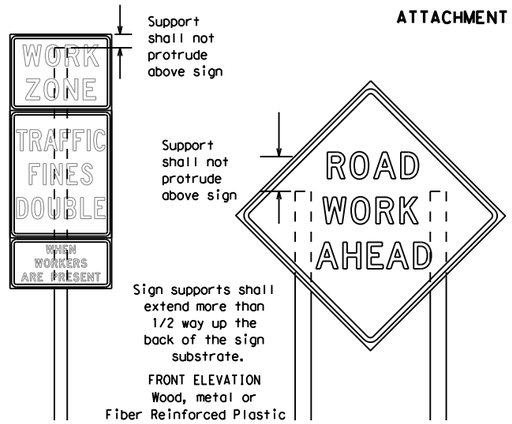
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

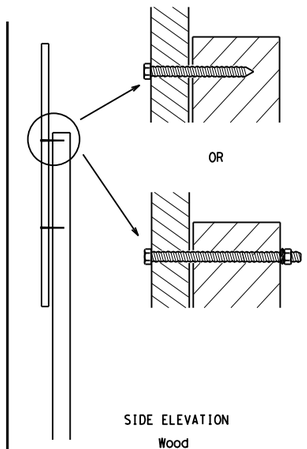


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





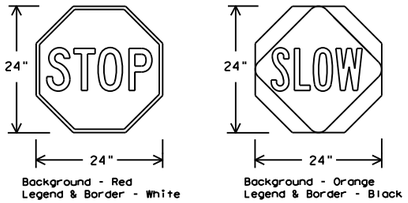
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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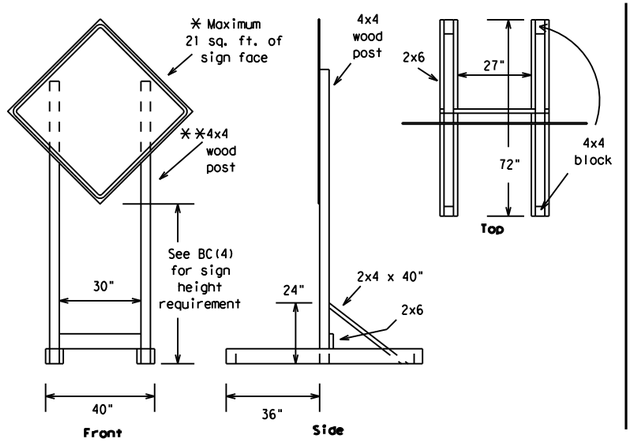
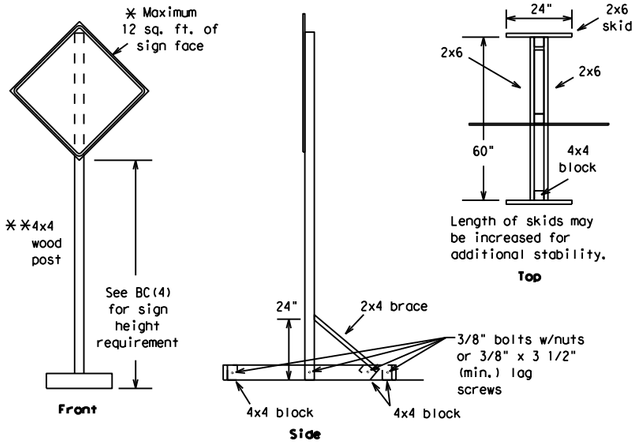
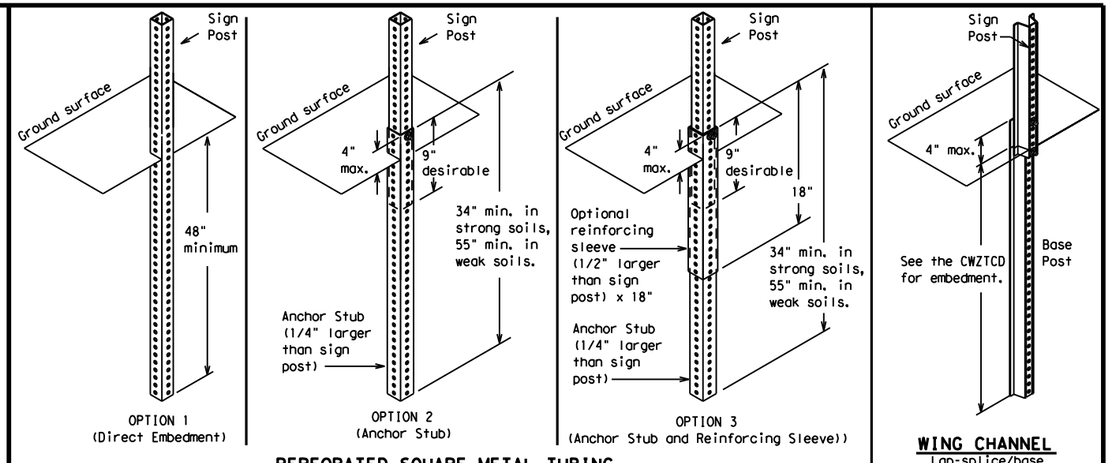




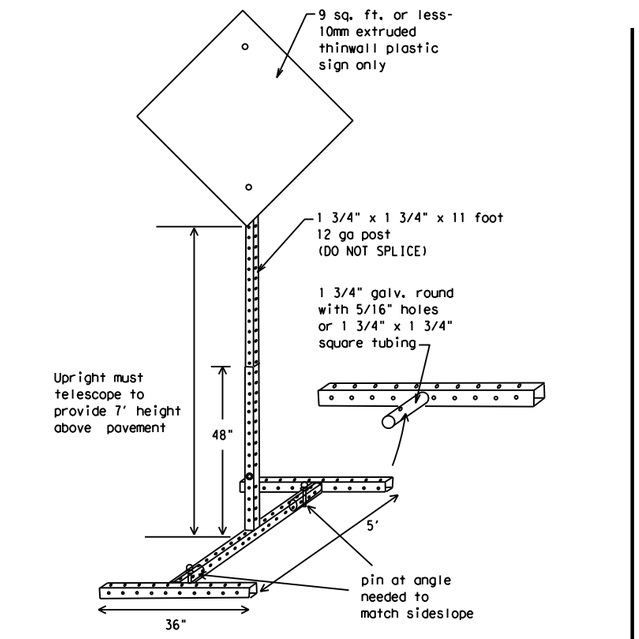
SKID MOUNTED WOOD SIGN SUPPORTS

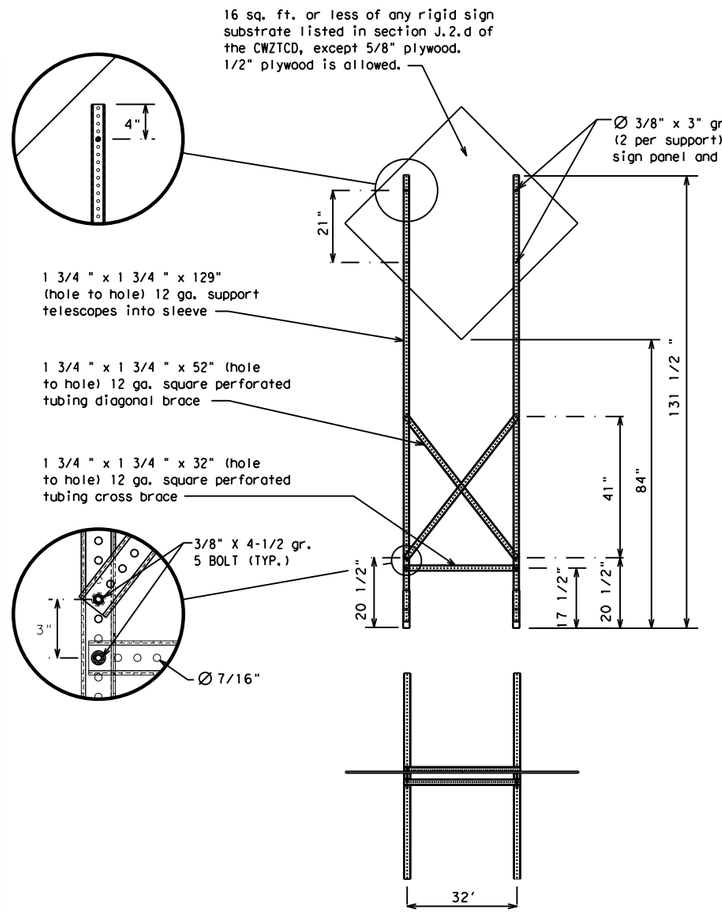
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

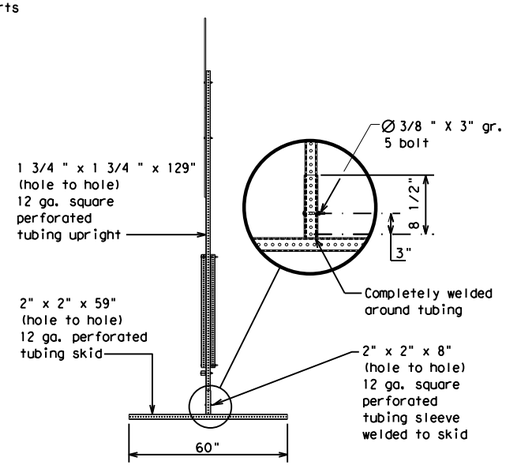


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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DATE:
FILE:

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
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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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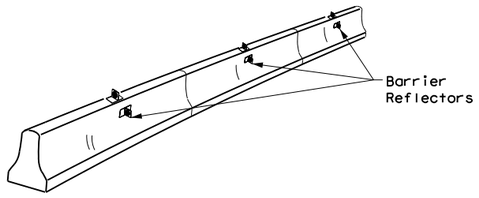
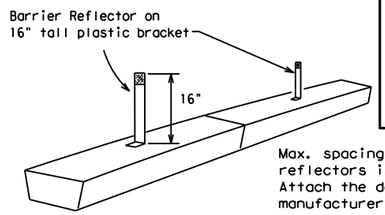
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

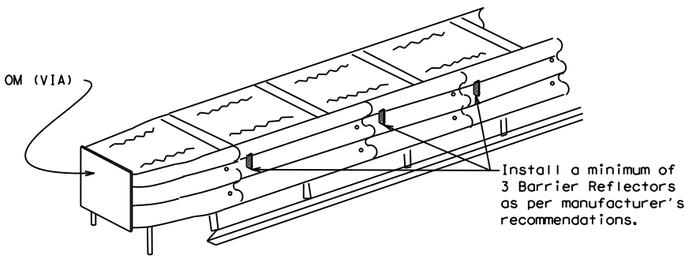


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

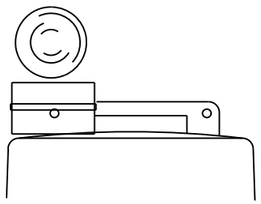


DELINEATION OF END TREATMENTS

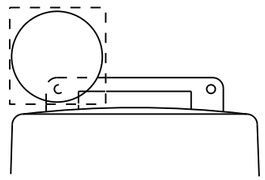
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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

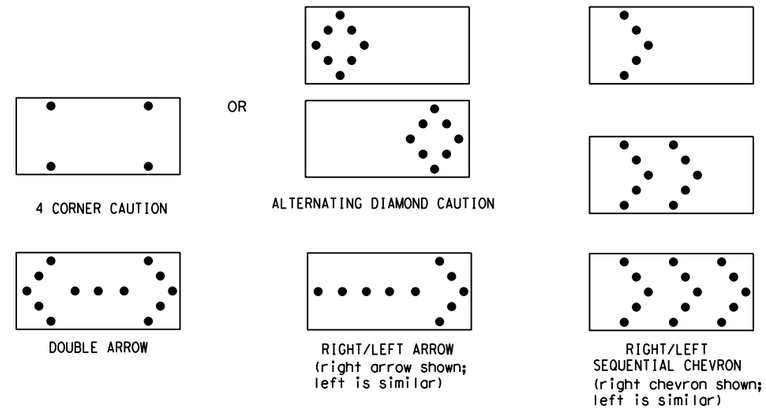
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.

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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
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REVISIONS	000814		124,ETC	IH 820
9-07 8-14	DIST	COUNTY		SHEET NO.
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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:

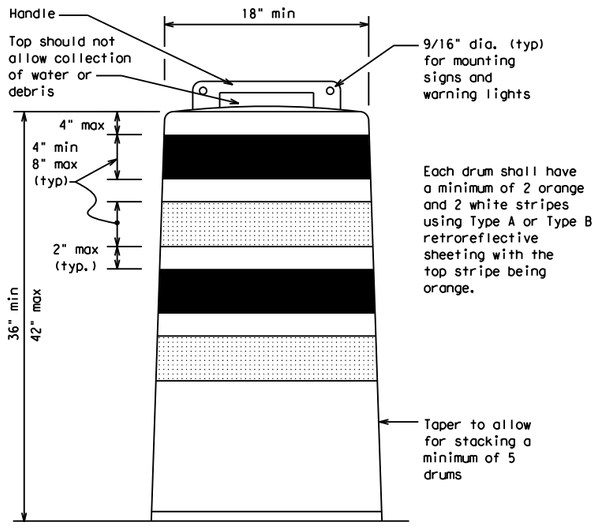
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

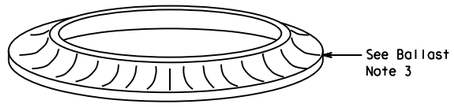
RETROREFLECTIVE SHEETING

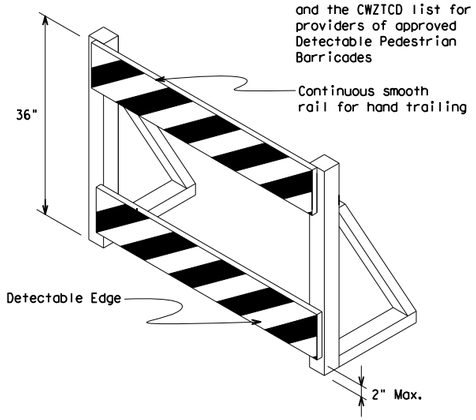
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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





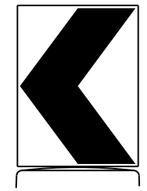


This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

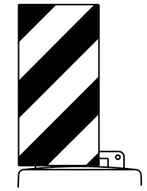
Continuous smooth rail for hand trailing

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.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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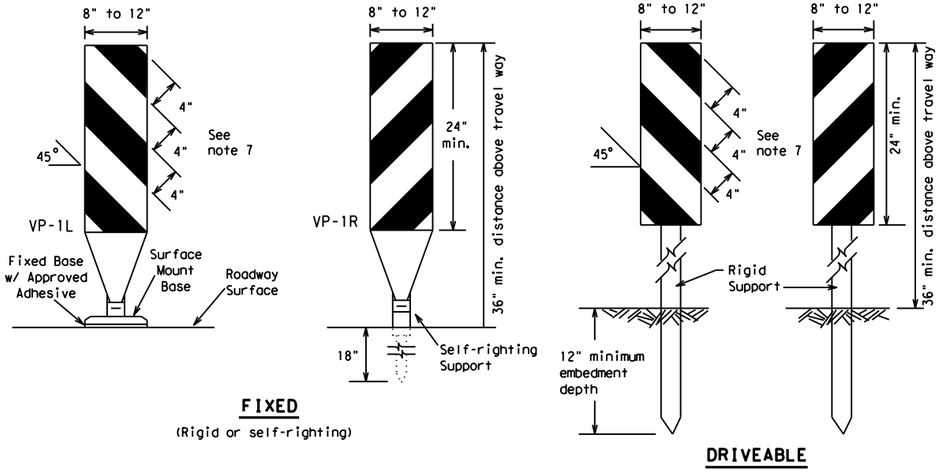
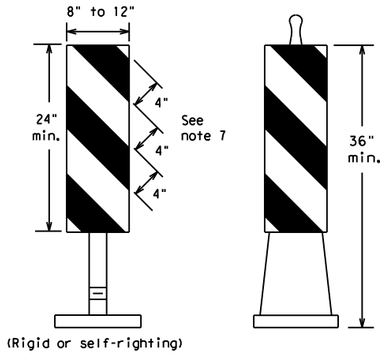


FIXED
(Rigid or self-righting)

DRIVEABLE

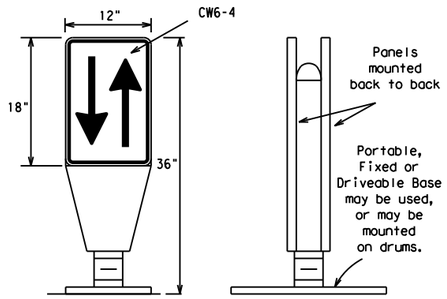


(Rigid or self-righting)

PORTABLE

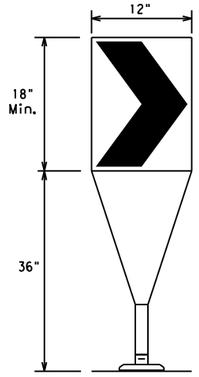
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

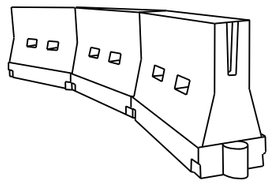
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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



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

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.

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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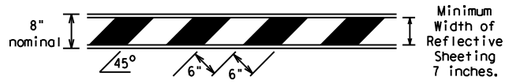
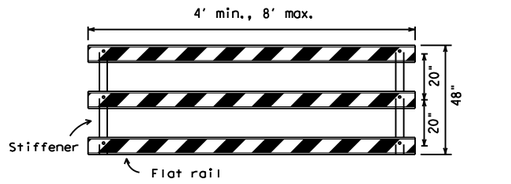
TYPE 3 BARRICADES

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.



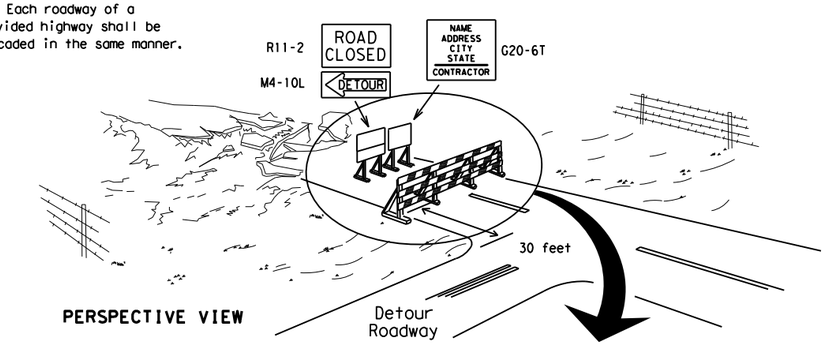
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

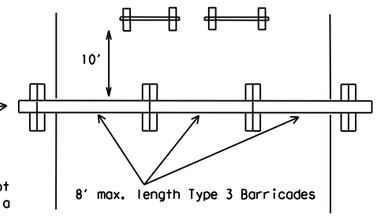
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

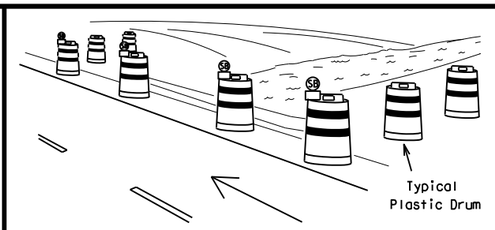
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

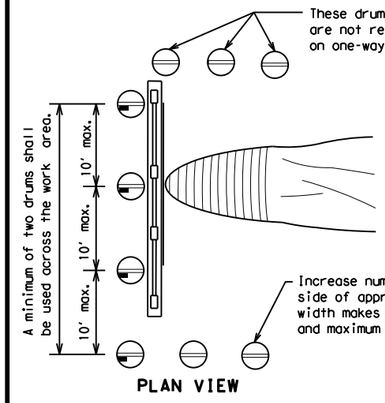
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

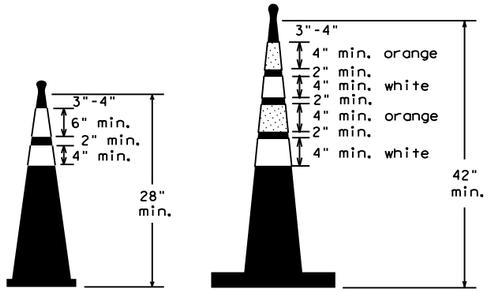
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

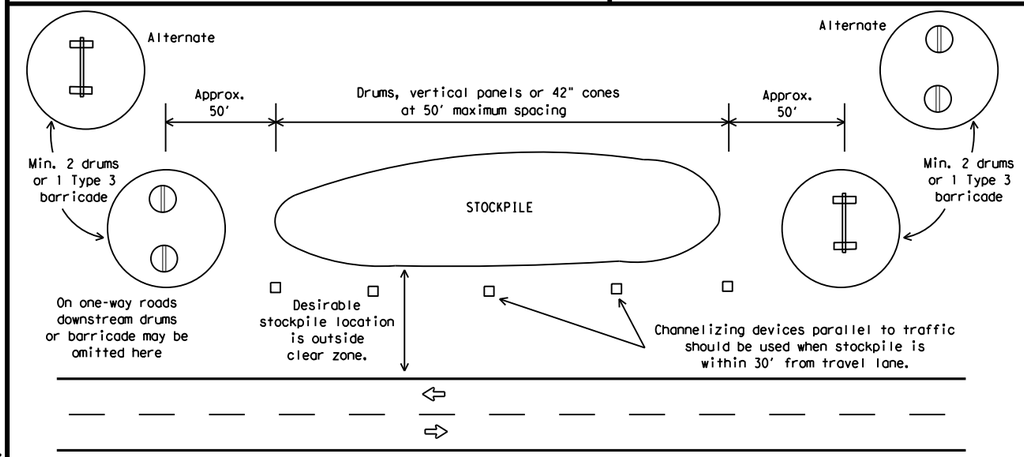
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



28" Cones shall have a minimum weight of 9 1/2 lbs.
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

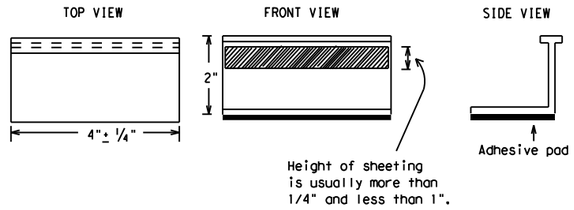
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

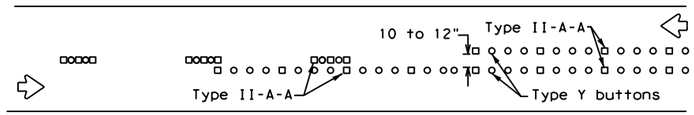
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	000814		124,ETC	IH 820
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	FTW	TARRANT		44
11-02 8-14				

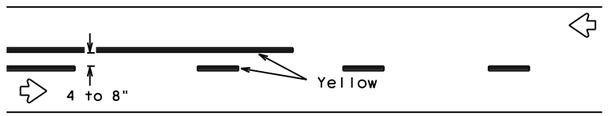
DATE:
FILE:

PAVEMENT MARKING PATTERNS

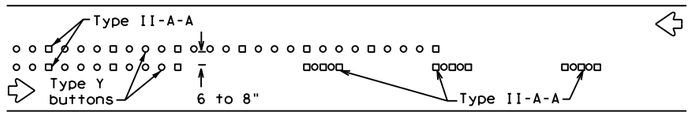
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



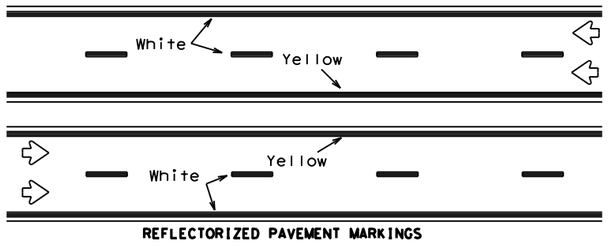
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



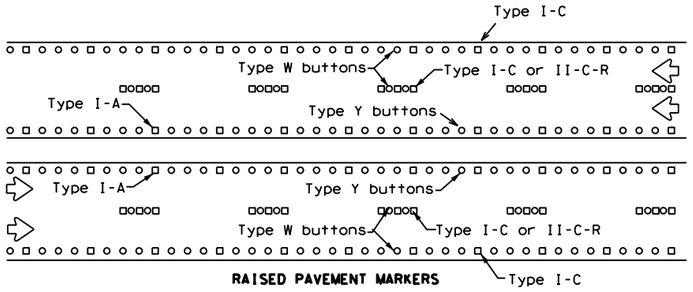
RAISED PAVEMENT MARKERS - PATTERN B

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



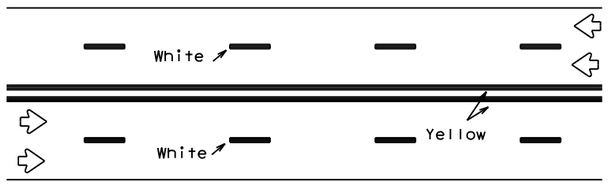
REFLECTORIZED PAVEMENT MARKINGS



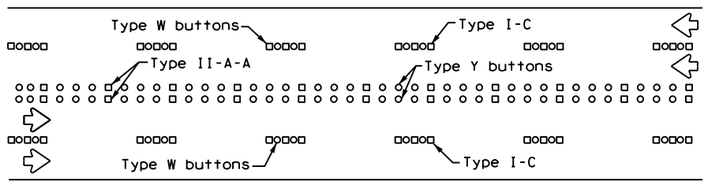
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



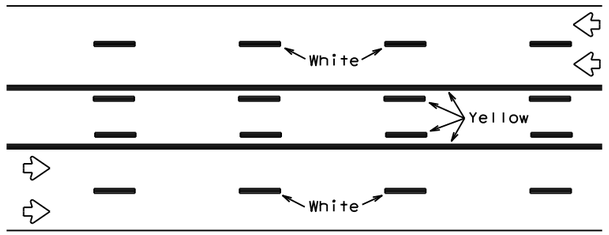
REFLECTORIZED PAVEMENT MARKINGS



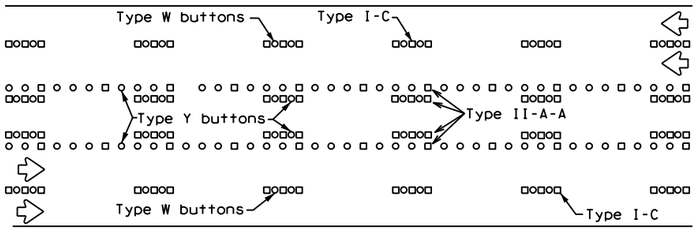
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

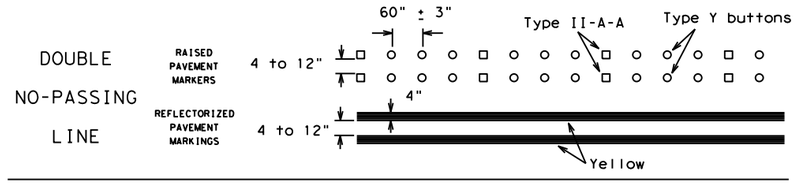
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

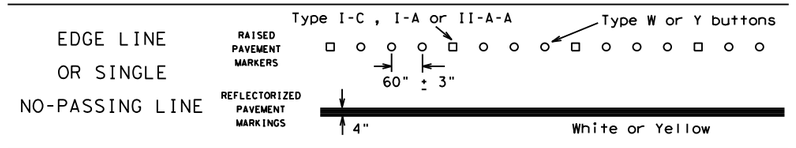
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

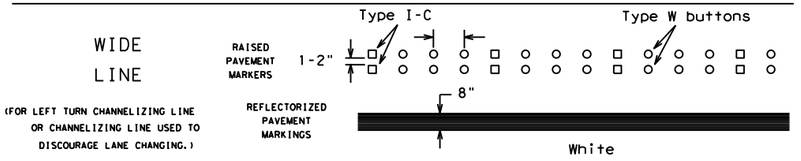


EDGE LINE OR SINGLE NO-PASSING LINE



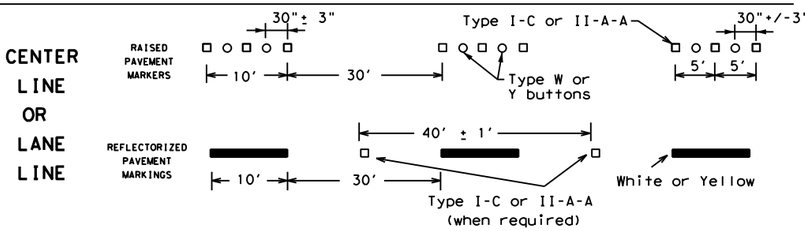
WIDE LINE

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

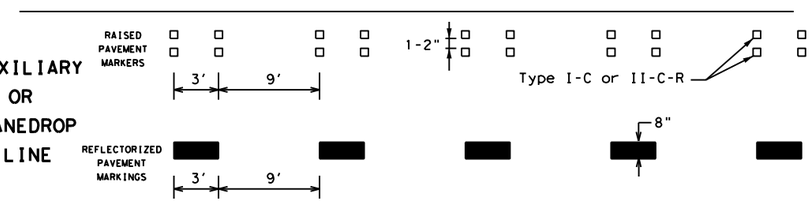


BROKEN LINES

CENTER LINE OR LANE LINE

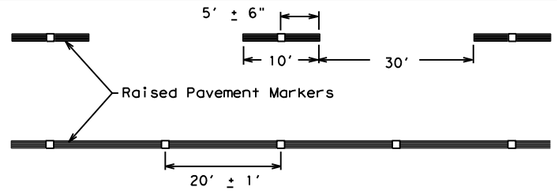


AUXILIARY OR LANEDROP LINE



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

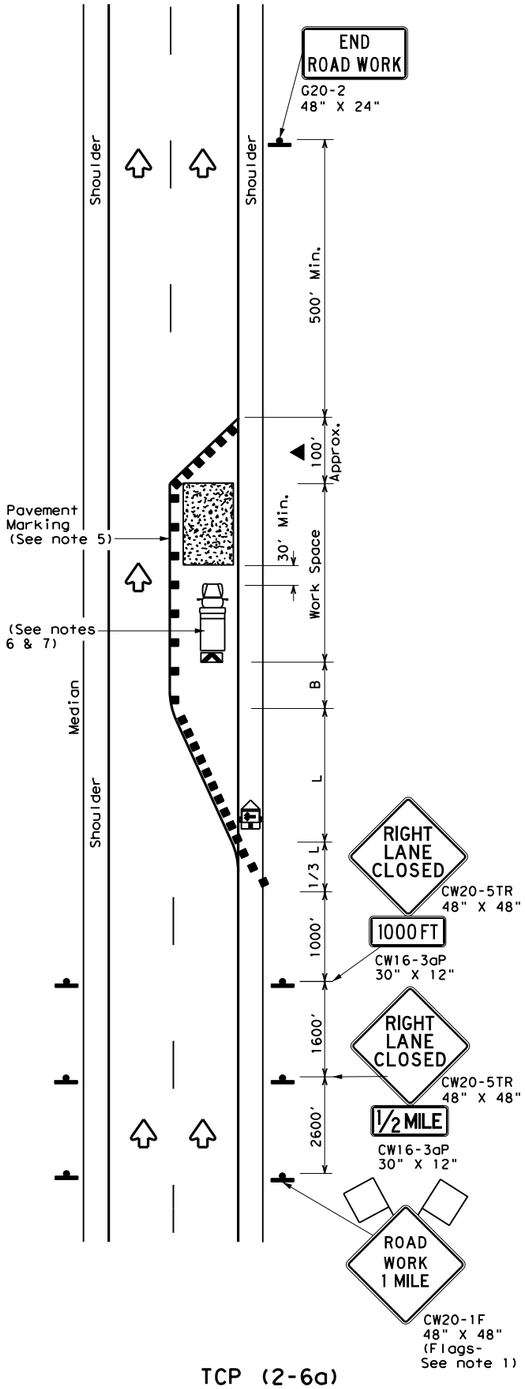
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

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	000814		124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		45

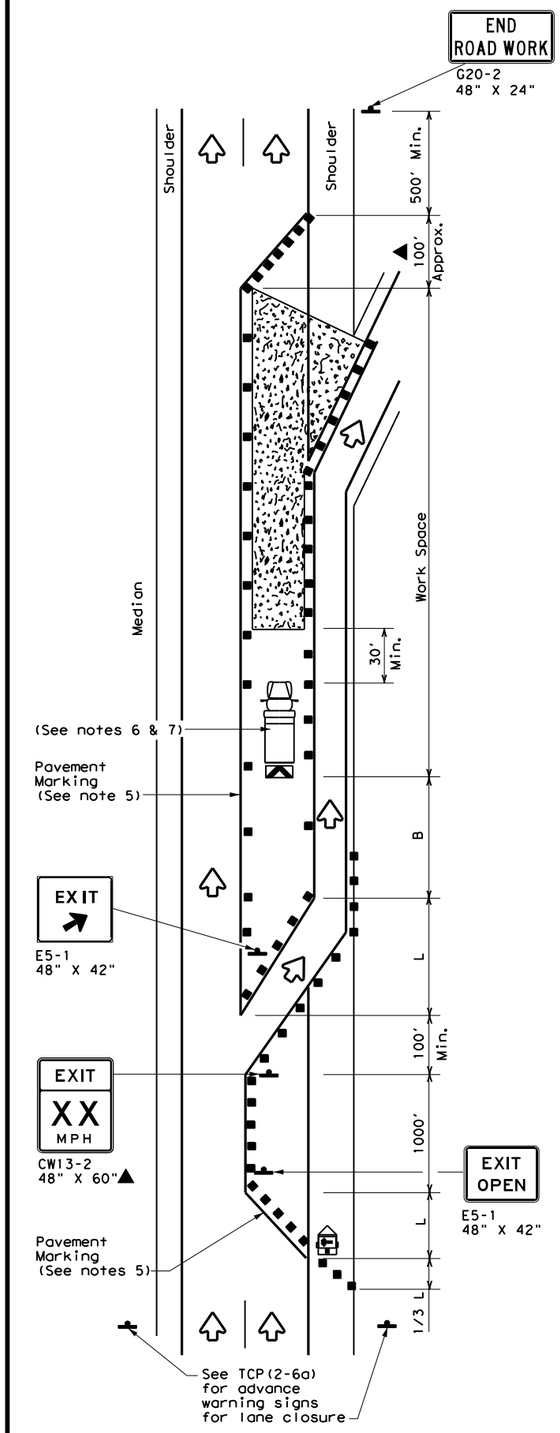
106

DATE:
FILE:



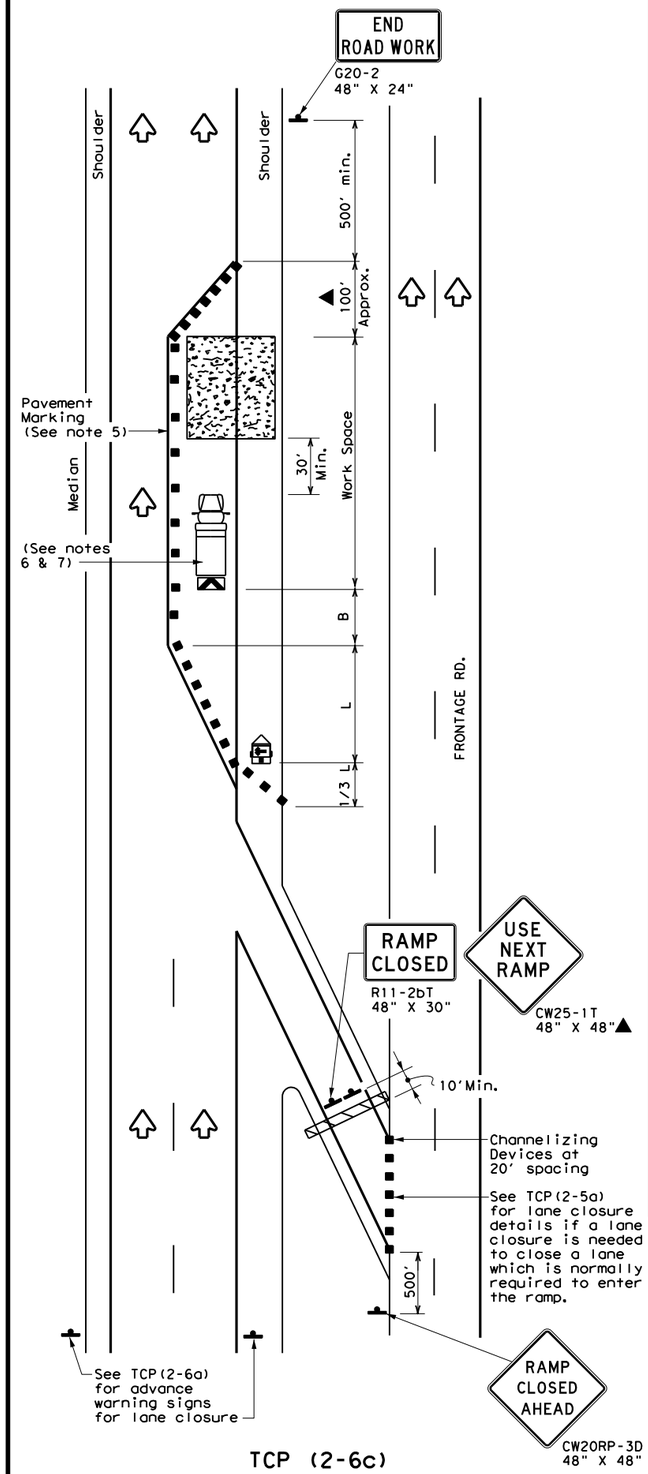
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		46

DATE:
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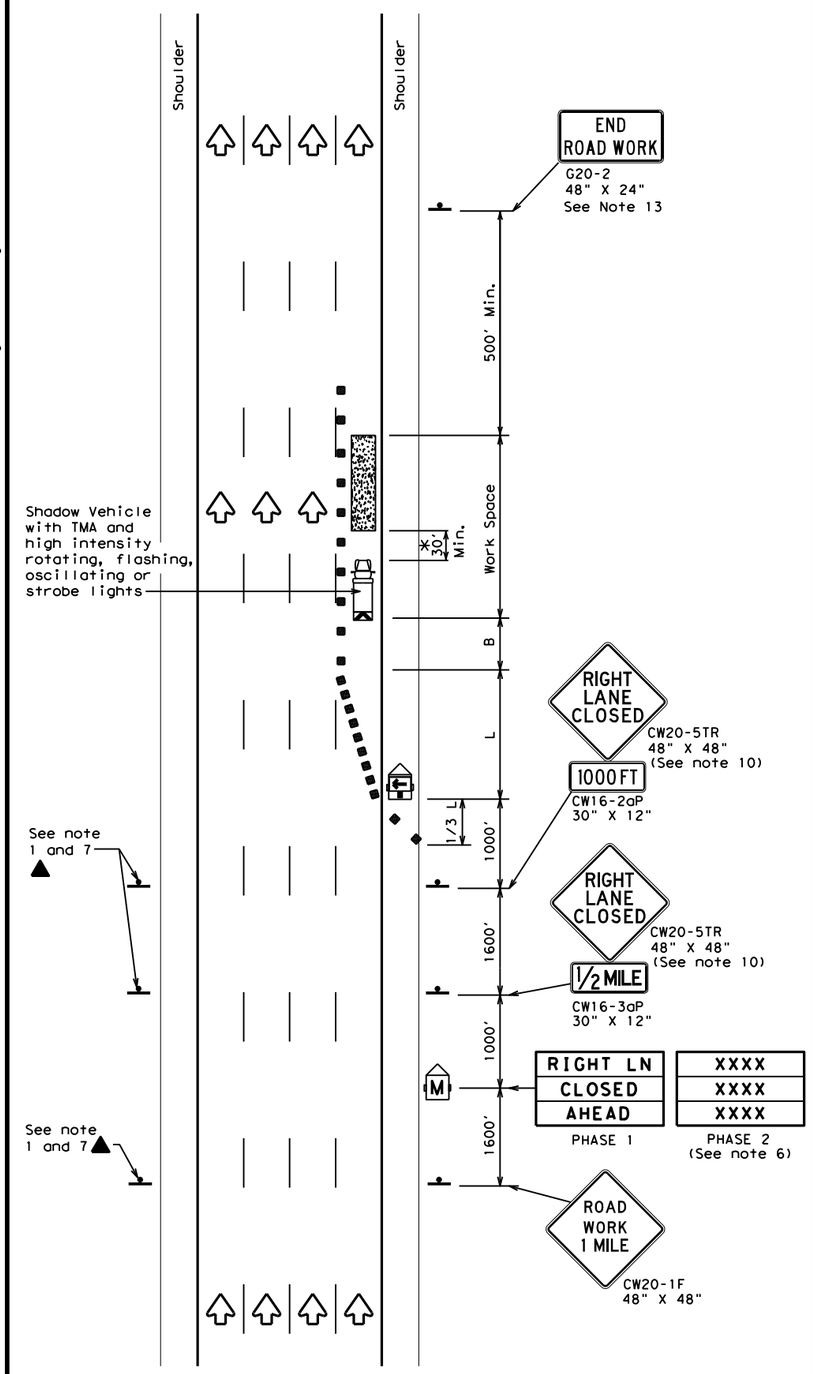
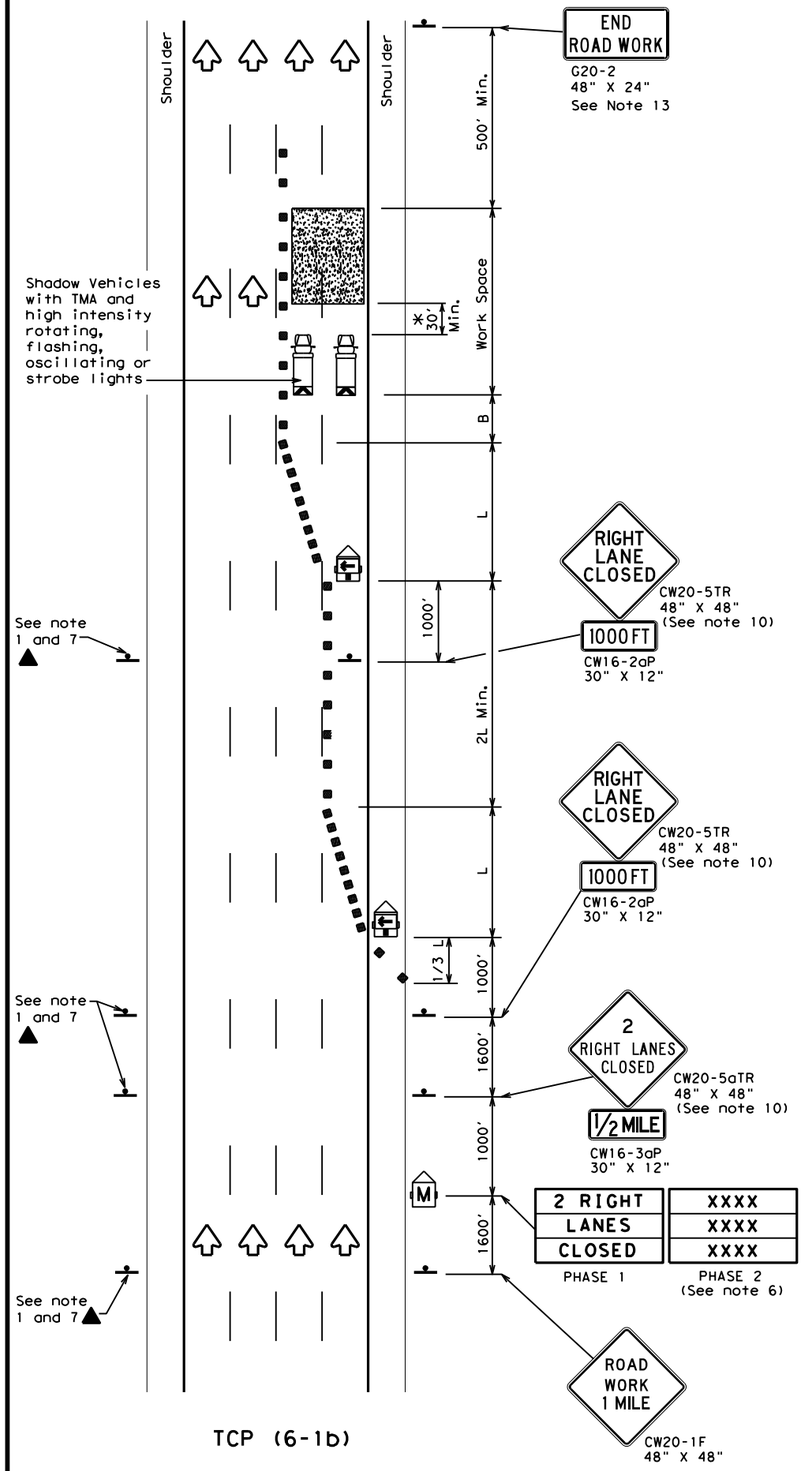


TCP (6-1a)

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.

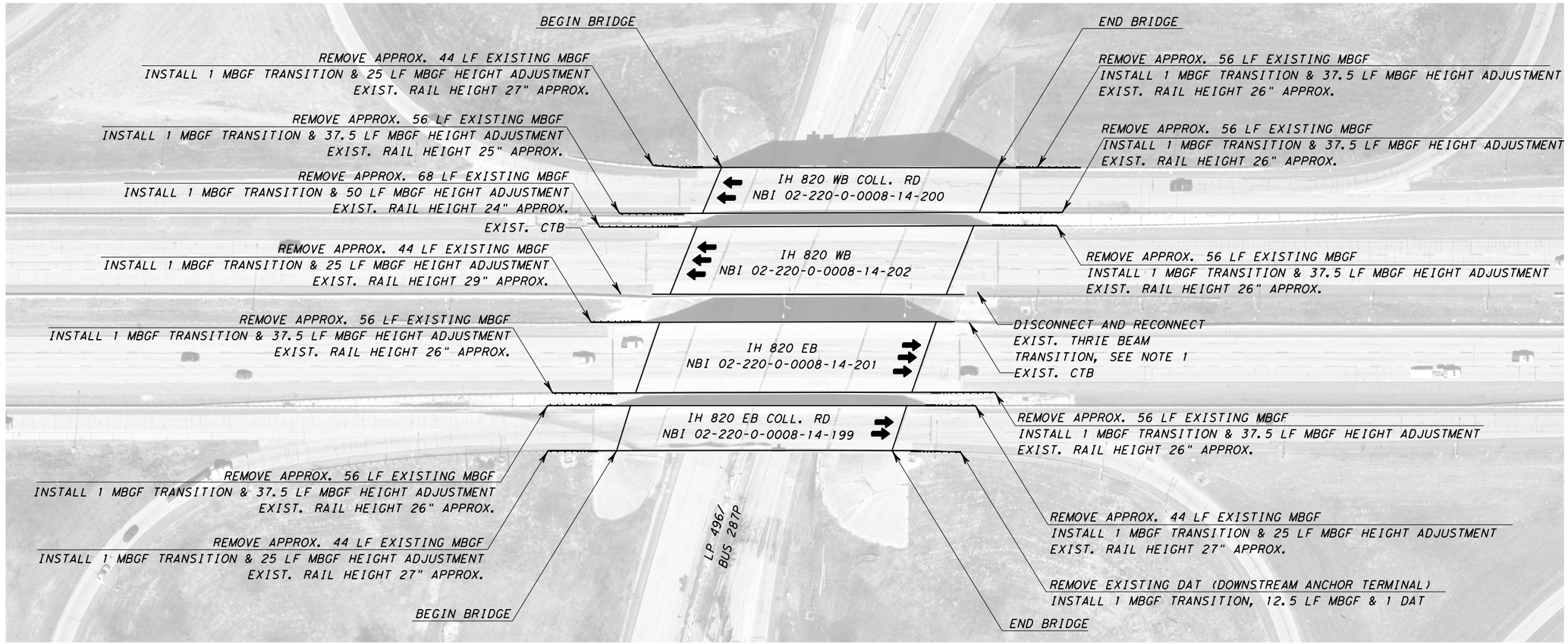
* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		47



NOTE:

1. WHEN DISCONNECTING AND RECONNECTING THE EXISTING THRIE BEAM TRANSITION, TAKE CARE NOT TO DAMAGE THE EXISTING THRIE BEAM TRANSITION OR CONNECTION PLATE.
DAMAGE TO THESE ITEMS CAUSED DURING CONSTRUCTION OPERATIONS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. PAYMENT FOR DISCONNECTING/RECONNECTING SHALL BE SUBSIDIARY TO THE BRIDGE RAIL BID ITEMS.

2. EXISTING RAIL HEIGHTS SHOWN ON THE PLANS ARE APPROXIMATE. CONTRACTOR SHALL VERIFY THE EXISTING RAIL HEIGHTS PRIOR TO CONSTRUCTING THE RAIL HEIGHT ADJUSTMENT.

3. ADJUST RAIL HEIGHT UP TO 1" VERTICALLY PER 6'-3" LENGTH OF RAIL, SEE SHEET RAIL-ADJ(B)-19(MOD) FOR DETAILS OF RAIL HEIGHT ADJUSTMENT.

SUMMARY OF QUANTITES

NBI NUMBER	540 6001 MTL W-BEAM GD FEN (TIM POST) LF	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	540 6010 MTL W-BEAM GD FEN ADJUSTMENT LF	540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION EA	542 6001 REMOVE METAL BEAM GUARD FENCE LF	542 6003 REMOVE DOWNSTREAM ANCHOR TERMINAL EA	658 6083 INSTL DEL ASSM (D-SW) SZ 1(WFLX)SRF EA	658 6088 INSTL DEL ASSM (D-SY) SZ 1(YFLX)SRF EA
NBI: 02-220-0-0008-14-199	12.5	4	87.5	1	144	1	4	4
NBI: 02-220-0-0008-14-200		4	137.5		212		4	4
NBI: 02-220-0-0008-14-201		3	100		156		4	2
NBI: 02-220-0-0008-14-202		2	87.5		124		4	
TOTAL	**12.5**	**13**	**412.5**	**1**	**636**	**1**	**16**	**10**

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED
PROFESSIONAL ENGINEER

Yousuf Ali
4/10/2023

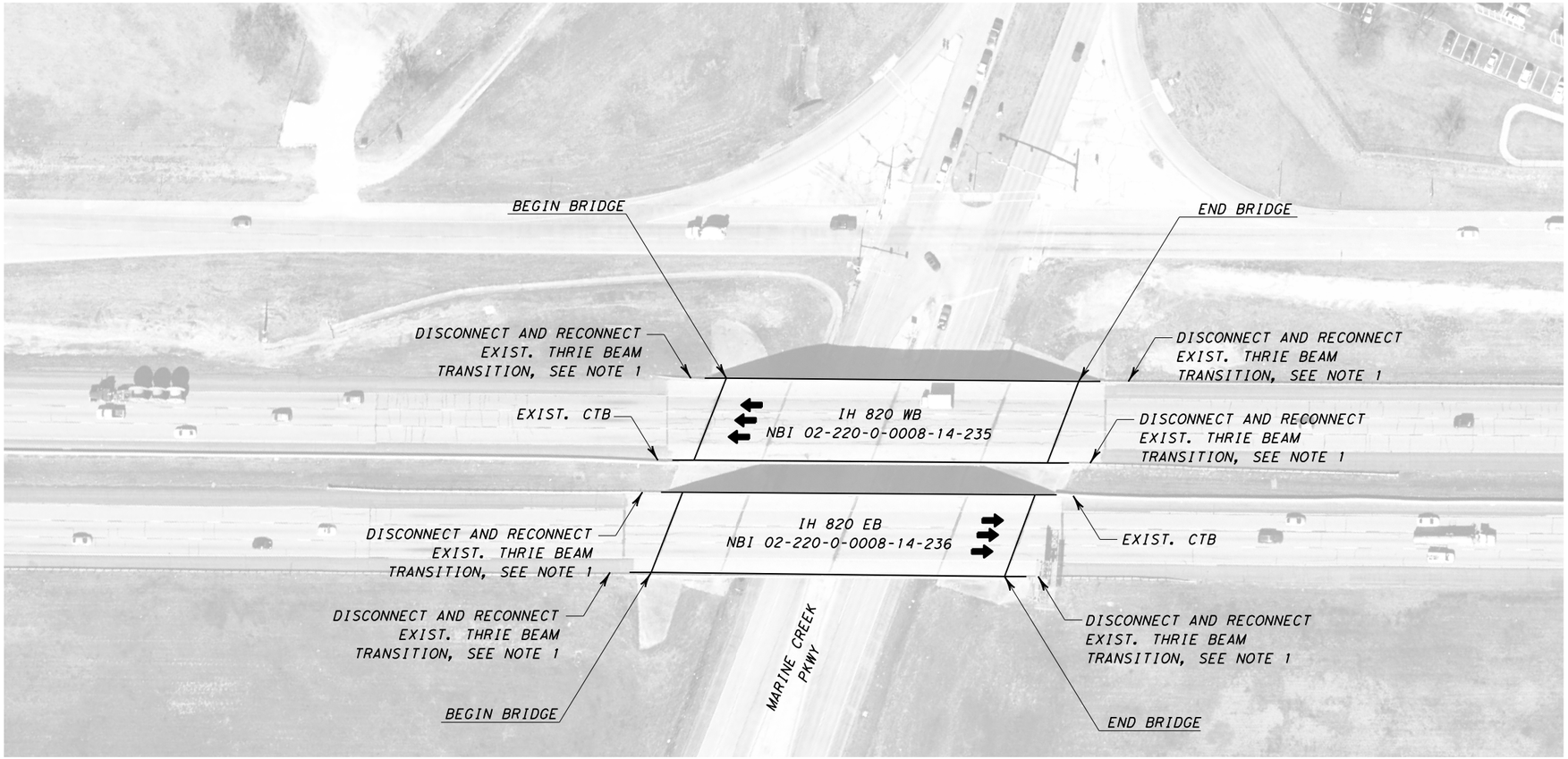
MBGF LAYOUT

IH 820 @ BUS 287

0 50 100
SCALE IN FEET

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	AID PROJECT NO.	SHEET NO.
6	See Title Sheet		48
STATE	DIST.	COUNTY	
TEXAS	FTW	TARRANT	
REV. NO.	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820



NOTE:

WHEN DISCONNECTING AND RECONNECTING THE EXISTING THRIE BEAM TRANSITION, TAKE CARE NOT TO DAMAGE THE EXISTING THRIE BEAM TRANSITION OR CONNECTION PLATE. DAMAGE TO THESE ITEMS CAUSED DURING CONSTRUCTION OPERATIONS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. PAYMENT FOR DISCONNECTING/RECONNECTING SHALL BE SUBSIDIARY TO THE BRIDGE RAIL BID ITEMS.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali

4/7/2023

MBGF LAYOUT

IH 820 @ MARINE CREEK PKWY

0 50 100
SCALE IN FEET

SHEET 1 OF 1

REV. NO.	FED.RD. DIV.NO.	STATE AID PROJECT NO.		SHEET NO.
	6	See Title Sheet		49
	STATE	DIST.	COUNTY	
	TEXAS	FTW	TARRANT	
	CONT.	SECT.	JOB	HIGHWAY NO.
	0008	14	124,ETC	IH 820

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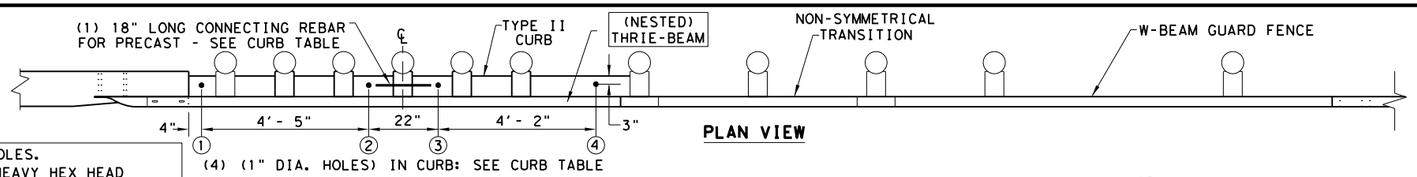


PLAN VIEW

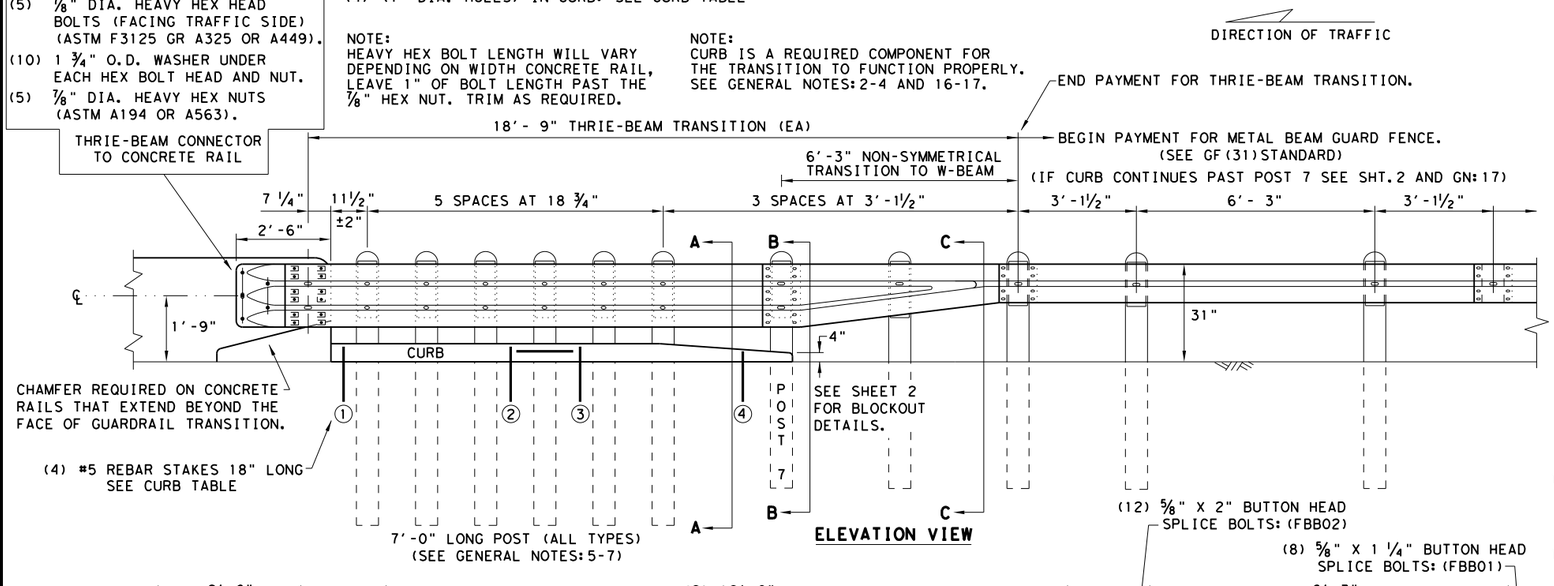
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

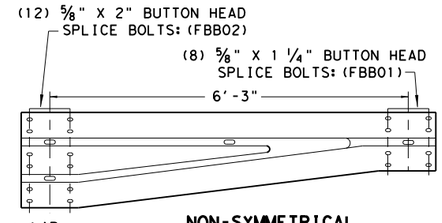
NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

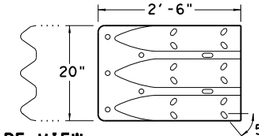
DIRECTION OF TRAFFIC



ELEVATION VIEW

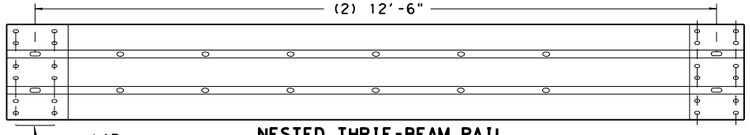


NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION 10GA.
PART DESIGNATOR RWT02a OR RWT02b



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

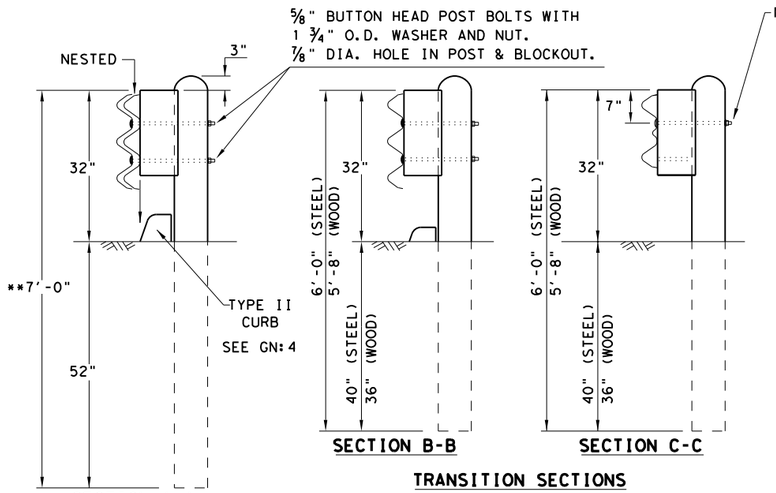


NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

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



SECTION A-A

SECTION B-B

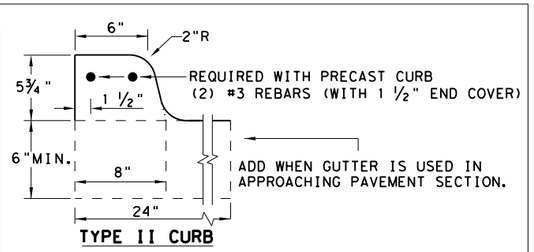
SECTION C-C

TRANSITION SECTIONS

NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8" CURB (2) LENGTH 6'- 6" TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2): FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *: FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16g) 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

Texas Department of Transportation

Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
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REVISIONS	000814		124,ETC		IH 820	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			50	

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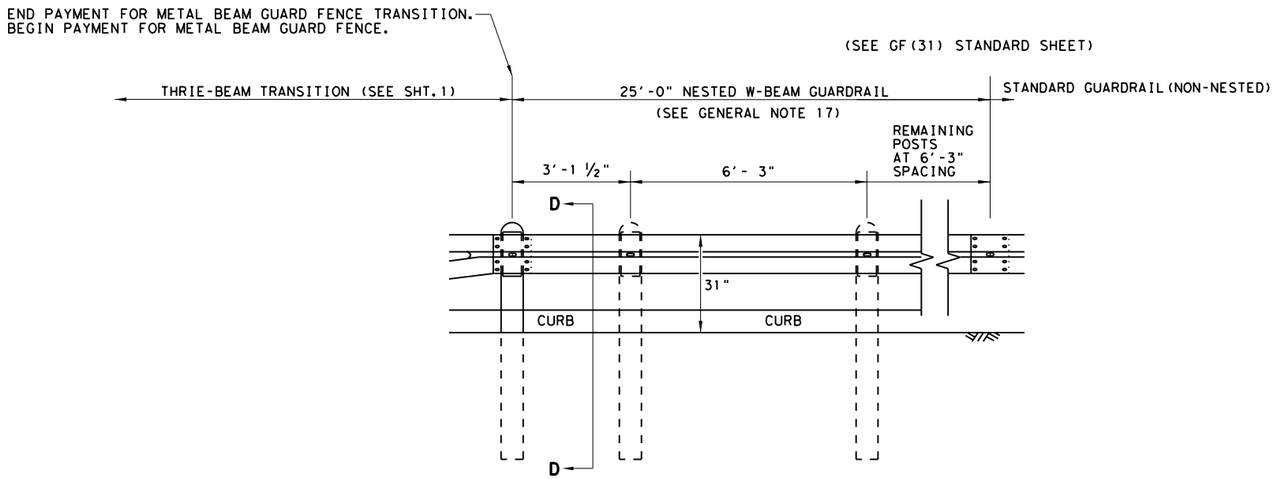
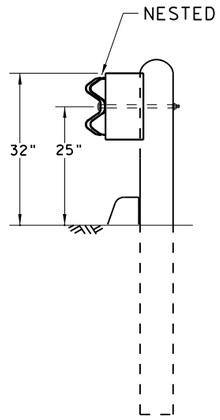
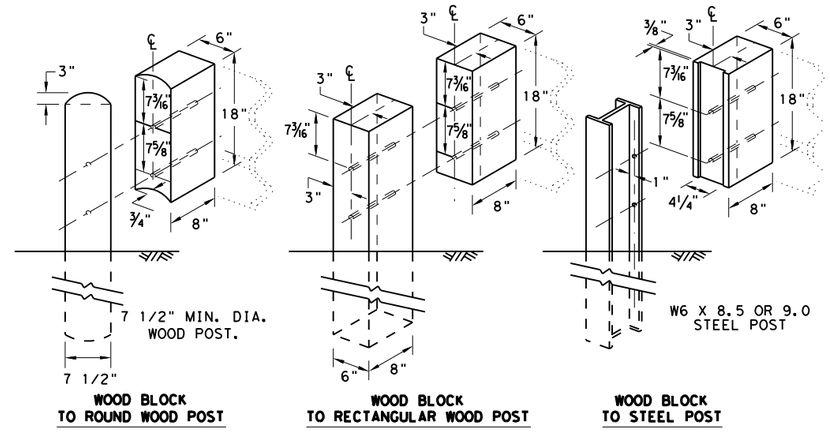
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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

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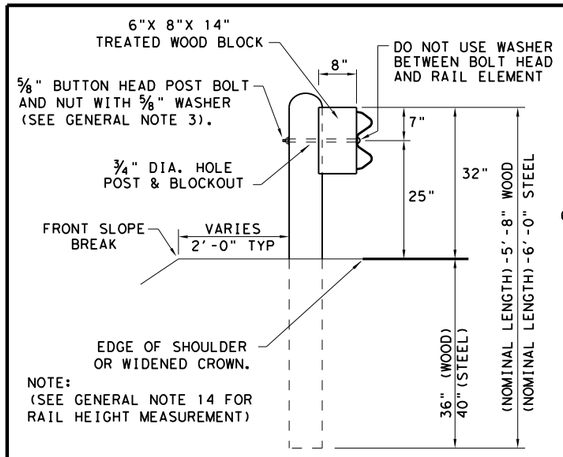
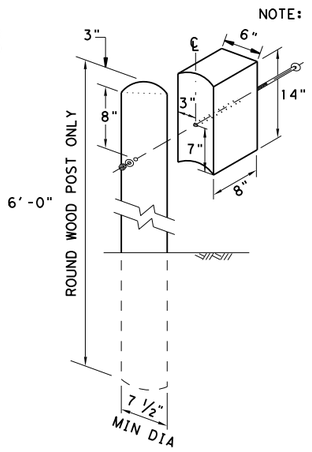
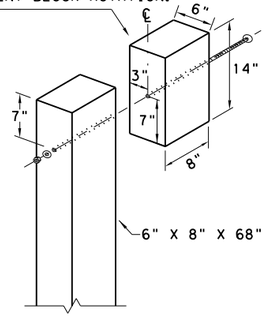


TYPICAL POST PLACEMENT

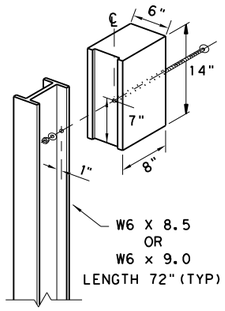


WOOD BLOCK TO ROUND WOOD POST

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

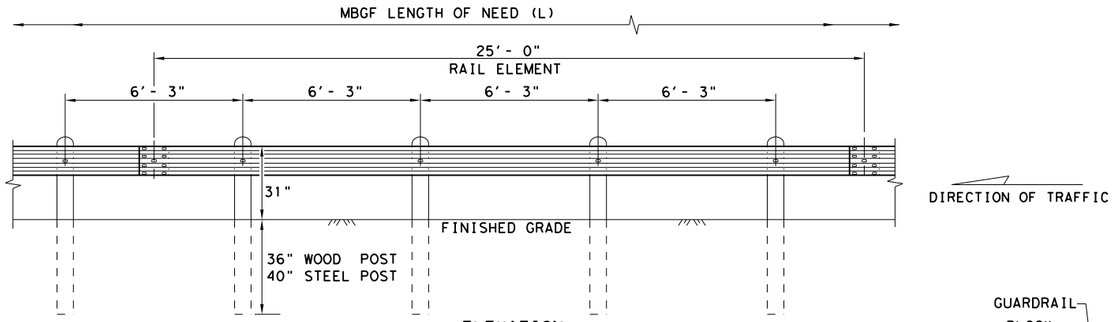


WOOD BLOCK TO RECTANGULAR WOOD POST



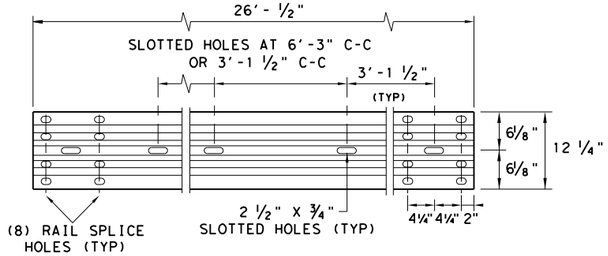
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

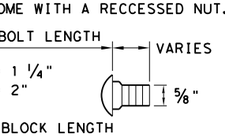
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

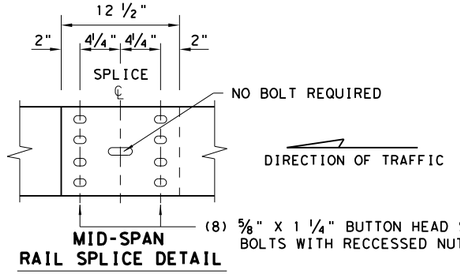
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



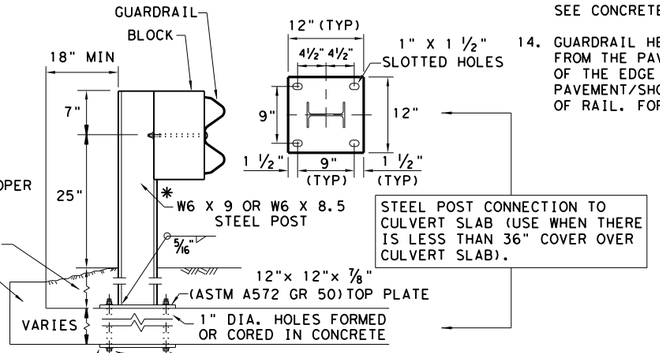
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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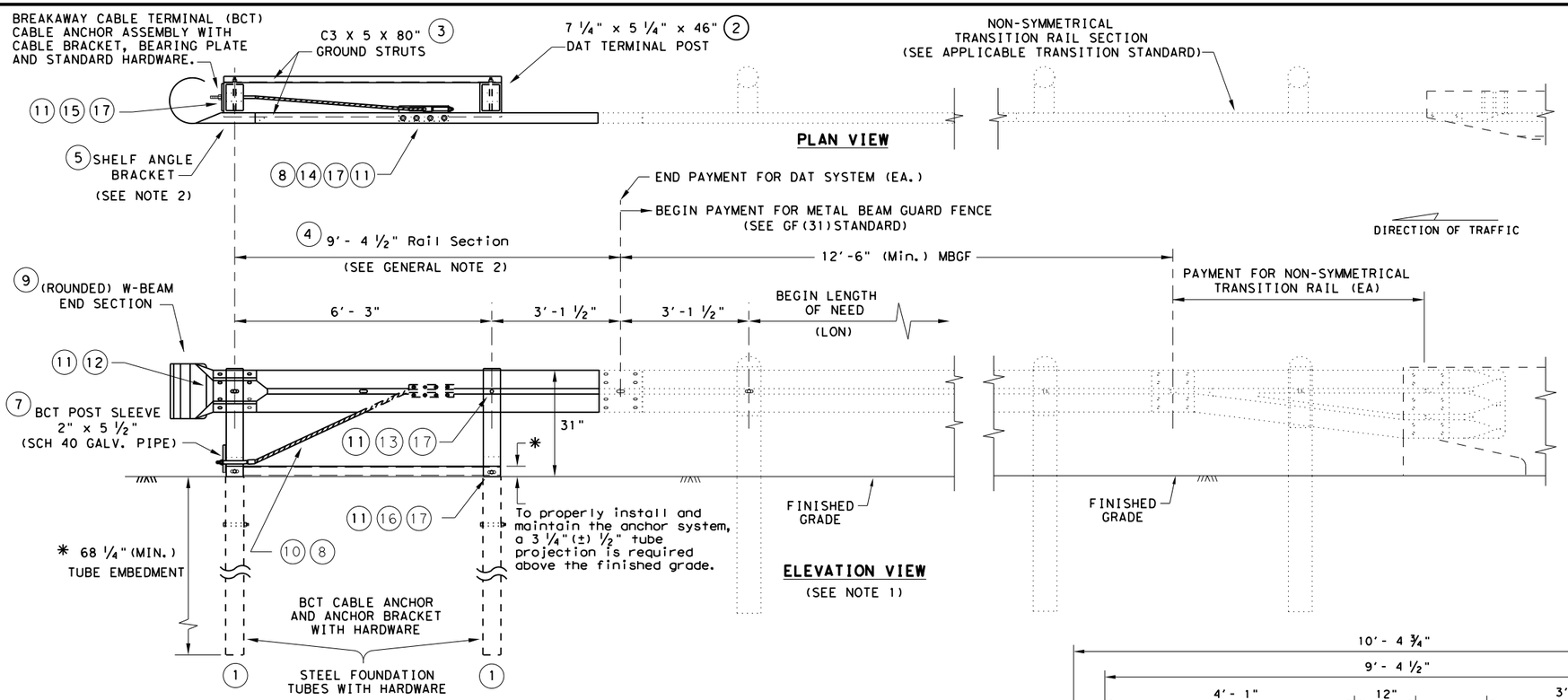


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

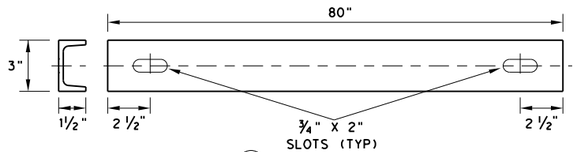
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

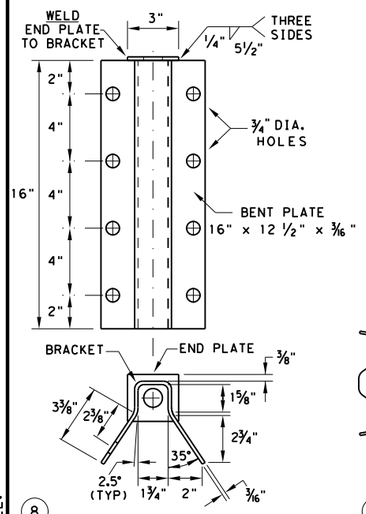
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

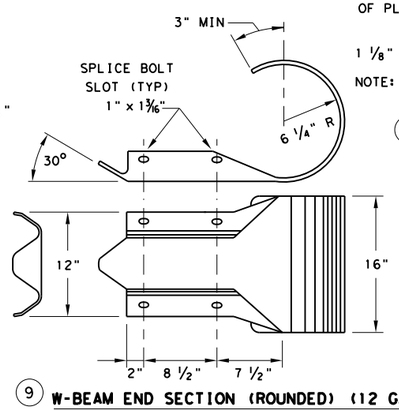
(4) TERMINAL RAIL ELEMENT FOR DAT



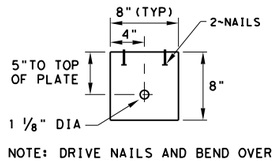
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

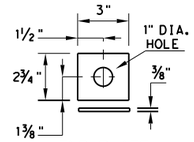


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

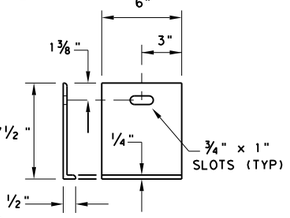


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

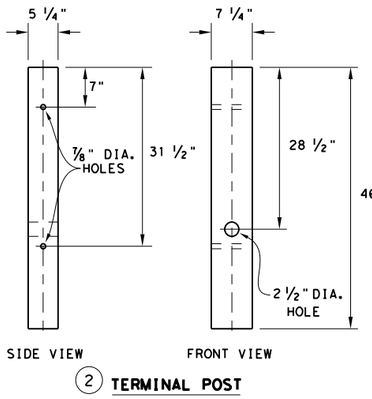
(6) BEARING PLATE
8"x 8"x 5/8" ℄



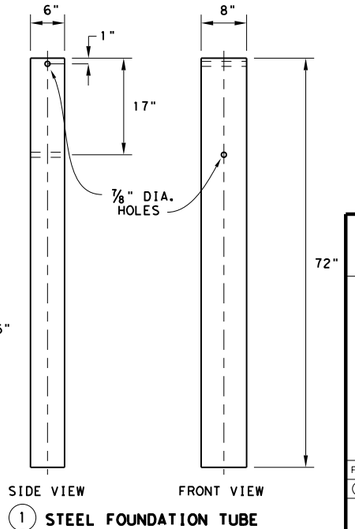
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation

Design Division Standard

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

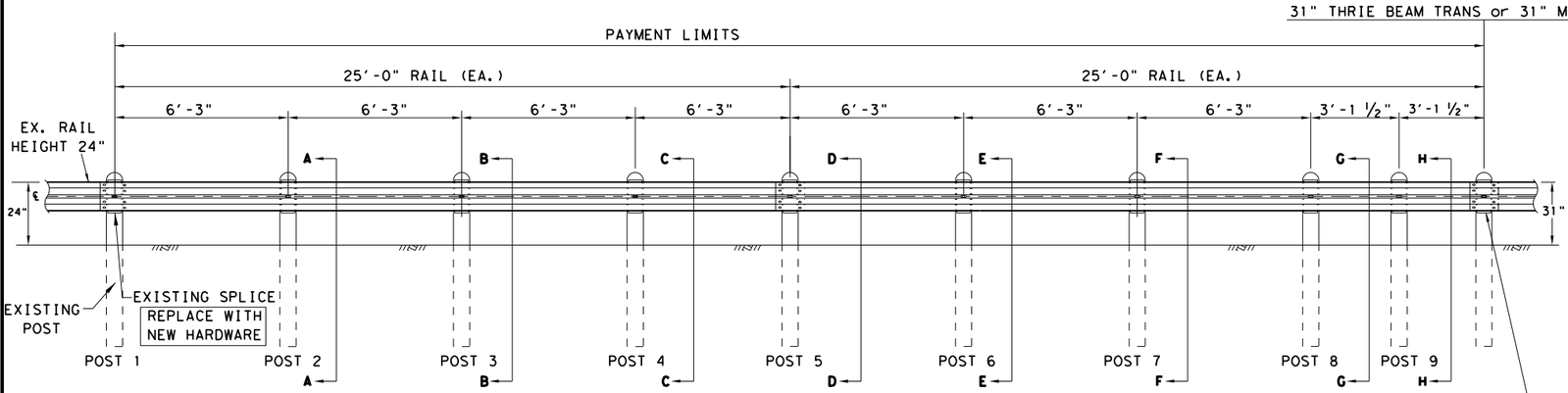
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	008	14	124, etc.	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		53

DATE:
FILE:

NOTE: (SINGLE) W-BEAM SHALL MATCH THE GAUGE OF THE ADJACENT RUN OF MBGF.

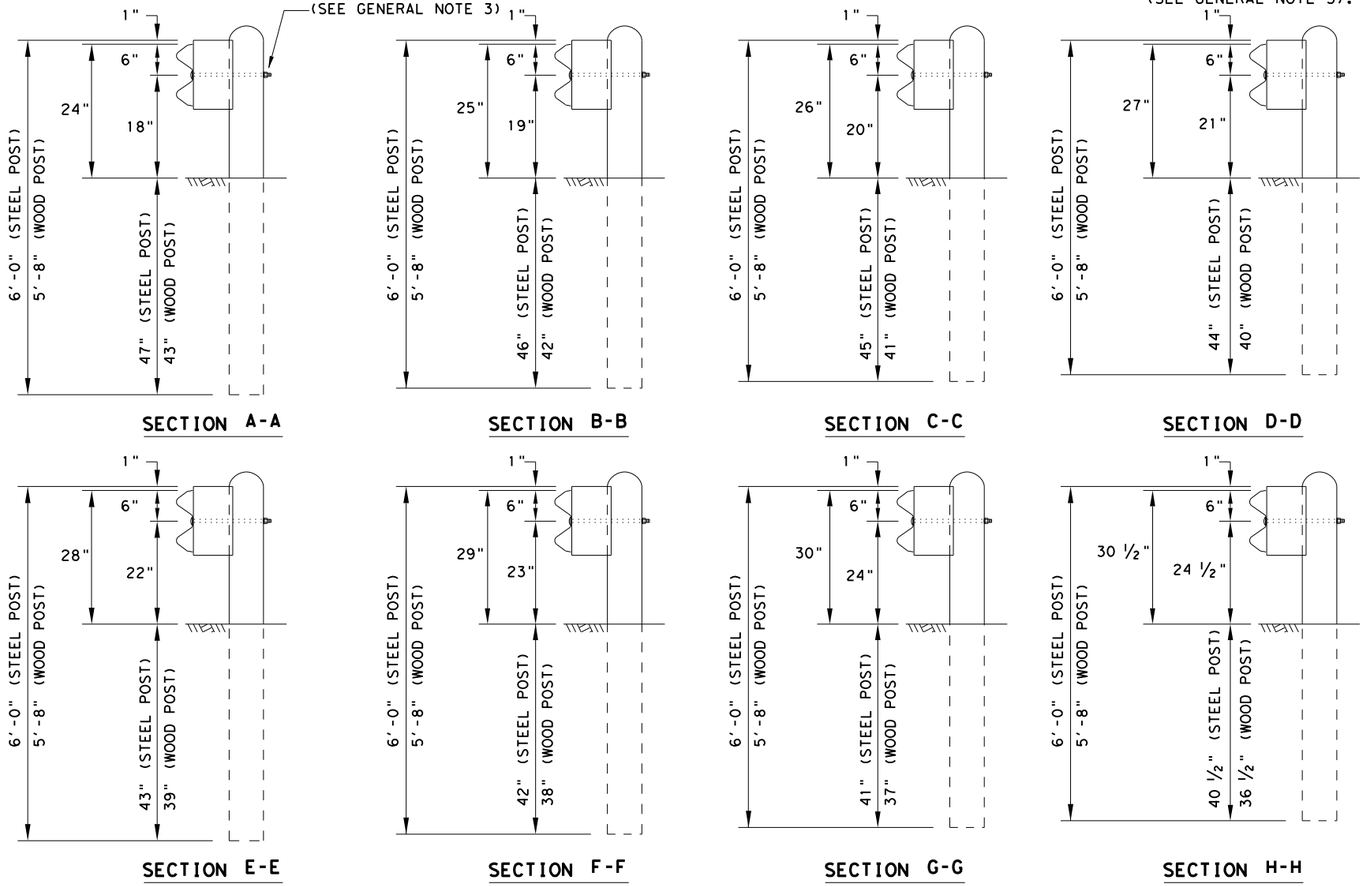
PLAN VIEW



ELEVATION VIEW

5/8" BUTTON HEAD POST BOLT WITH NUT & WASHER (SEE GENERAL NOTE 3)

(8) 5/8" DIA. X 1 1/4" GUARDRAIL SPLICE BOLTS WITH 5/8" NUTS (ASTM A563). (SEE GENERAL NOTE 3).



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

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 AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT 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 TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1- 1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. 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.
11. REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

STATE OF TEXAS
YOUSUF M. ALI
93983
LICENSED PROFESSIONAL ENGINEER

Yousuf Ali

4/7/2023

NOTE: ADJUST RAIL HEIGHT UP TO 1" VERTICALLY:PER 6'-3" LENGTH OF RAIL.

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

GUARDRAIL POST BOLTS (ASTM A307 GR.A)
GUARDRAIL ROUND WASHERS (ASTM F436)
GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
GUARDRAIL SPLICE BOLTS (ASTM A307 GR.A)
GUARDRAIL SPLICE NUTS (ASTM A563)

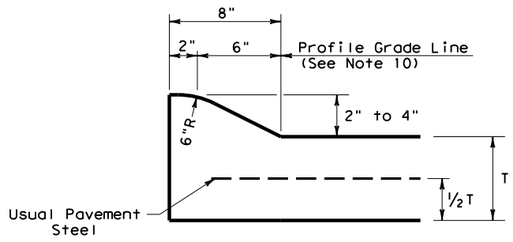
Texas Department of Transportation

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (24" TO 31")

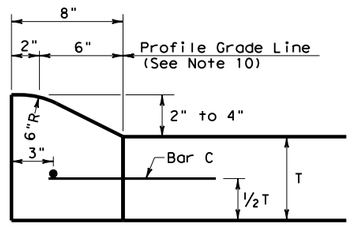
RAIL-ADJ(B)-19 (MOD)

FILE: railadjb19(mod)	DN: TxDOT	CK: YA	DW:	CK:		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0008	14	124,ETC		IH 820	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			54	

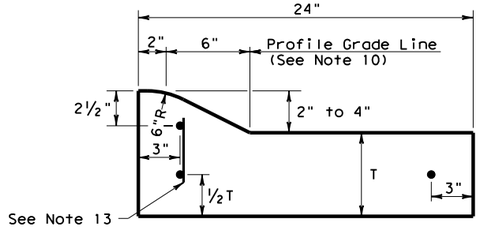
DATE:
FILE:



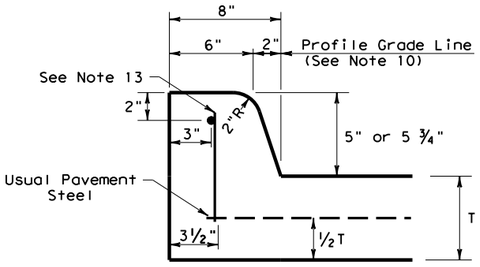
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



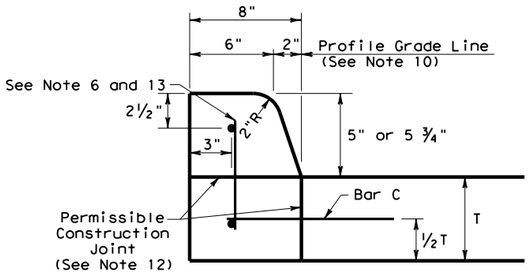
TYPE I CURB
2" - 4" HEIGHT



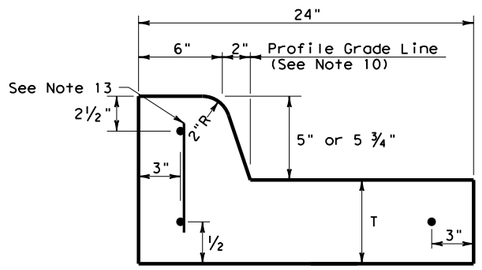
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



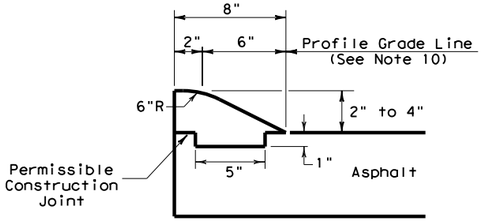
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



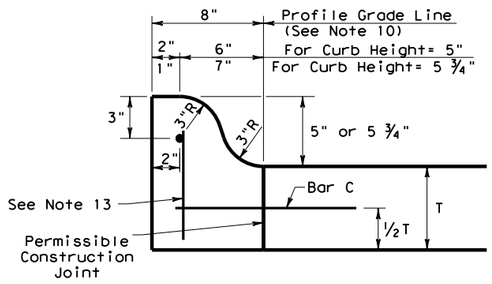
TYPE II CURB
5" - 5 ¾" HEIGHT



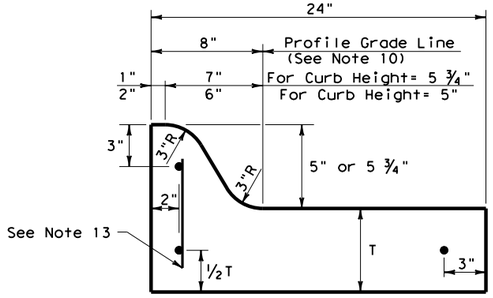
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



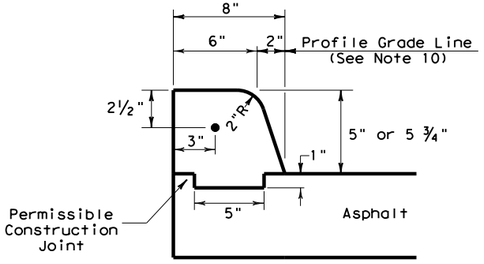
TYPE III CURB (KEYED)
2" - 4" HEIGHT



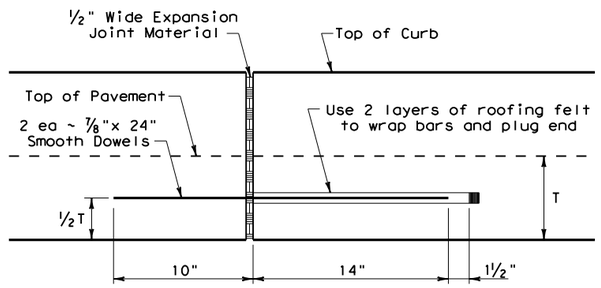
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

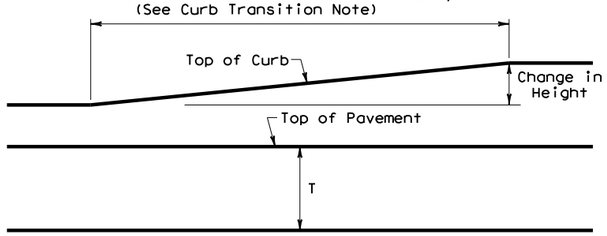


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

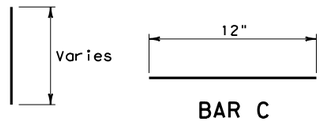
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

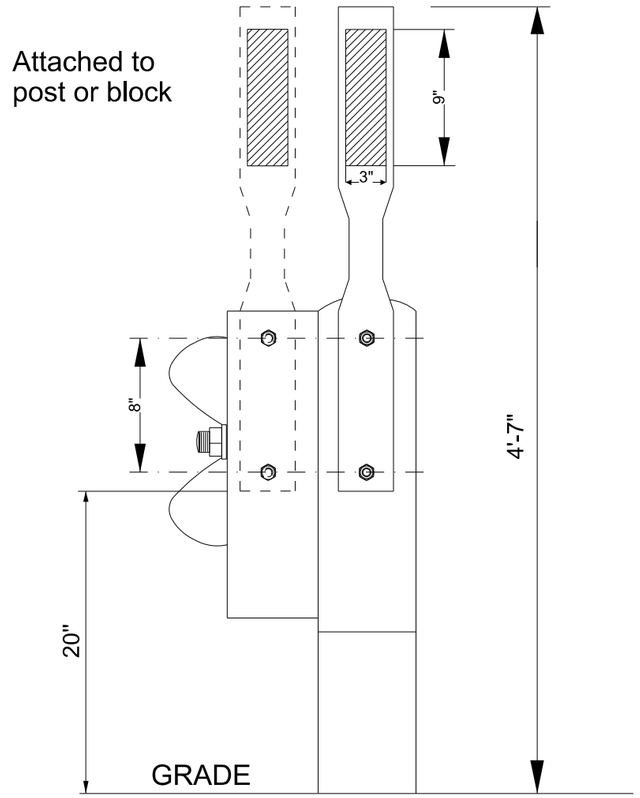
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

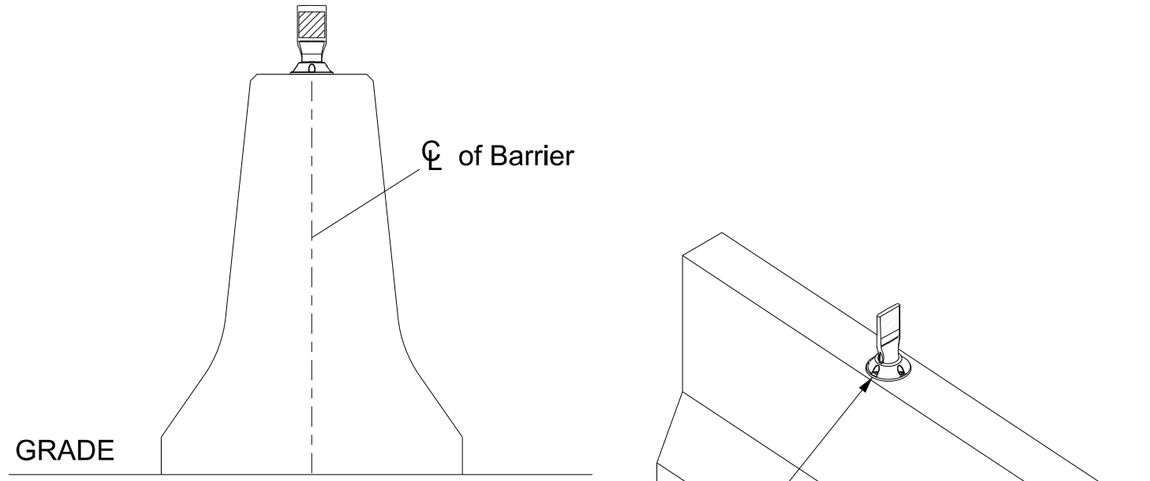
CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM	
©TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY	
REVISIONS	008	14	124, etc.	IH 820	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		55	

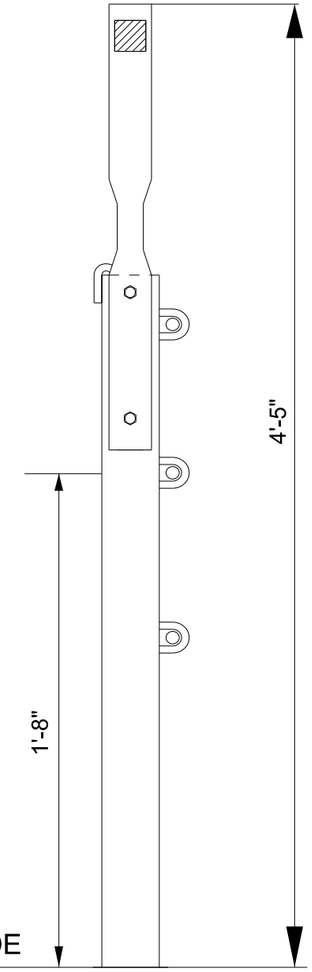
TYPICAL METAL BEAM GAURD FENCE



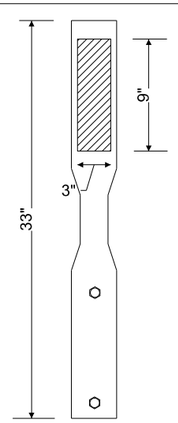
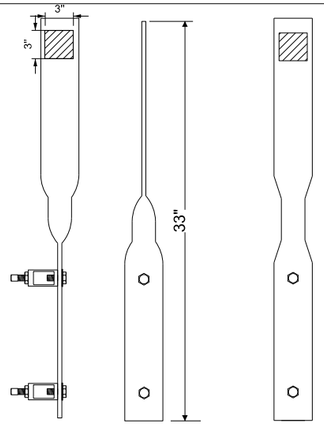
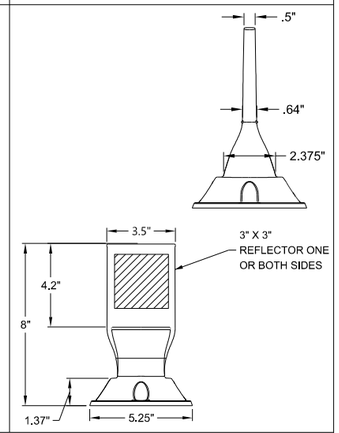
TYPICAL CONCRETE TRAFFIC BARRIER



TYPICAL CABLE BARRIER SYSTEM



BARRIER REFLECTORS (BRF)

	MBGF	CBS	CTB
DEVICE			
SHEETING	Yellow, White & Red		

GENERAL NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. When separating opposing direction of travel, such as centerline or median use, the posts shall be yellow.
4. Barrier reflectors shall meet the requirements of DMS 8600.
5. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.
6. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.
7. Posts shall be permanently sealed at the top and have a 3-1/2 wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides.
8. The delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
9. Single red delineators may be mounted on the back side of the delineator posts for wrong way drive applications.

DEPARTMENT 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

Texas Department of Transportation

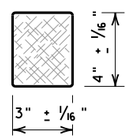
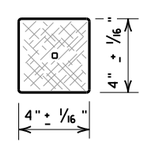
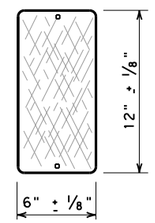
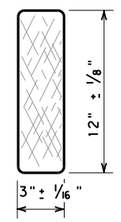
Fort Worth District Standard

DELINEATOR & OBJECT MARKER

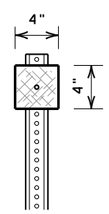
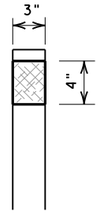
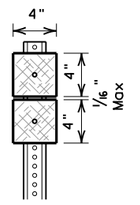
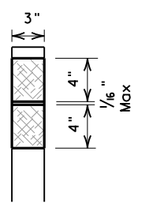
D & OM(ST-FTW)-21

ORIGINAL DRAWING: 10/2021 st-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE REVISIONS	6	See Title Sheet	56
10/19/21 ⚠	STATE	STATE DIST.NO.	COUNTY
	TEXAS	FTW	TARRANT
	CONT.	SECT.	JOB / HIGHWAY NO.
	0008	14	124,ETC IH 820

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

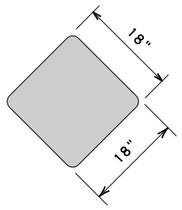
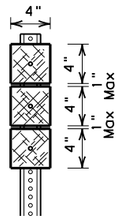
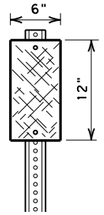
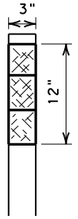
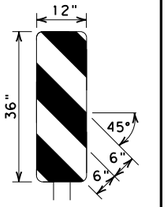
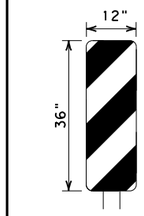
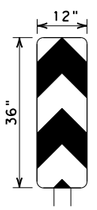
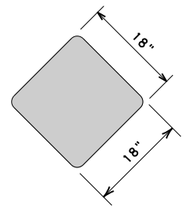
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

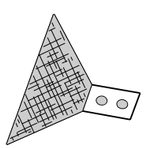
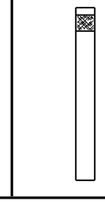
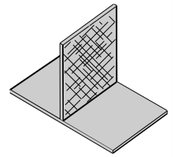
OBJECT MARKERS

	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

DEPARTMENTAL MATERIAL SPECIFICATIONS

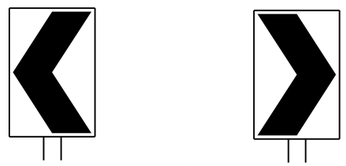
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



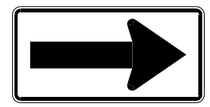
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	TARRANT		57

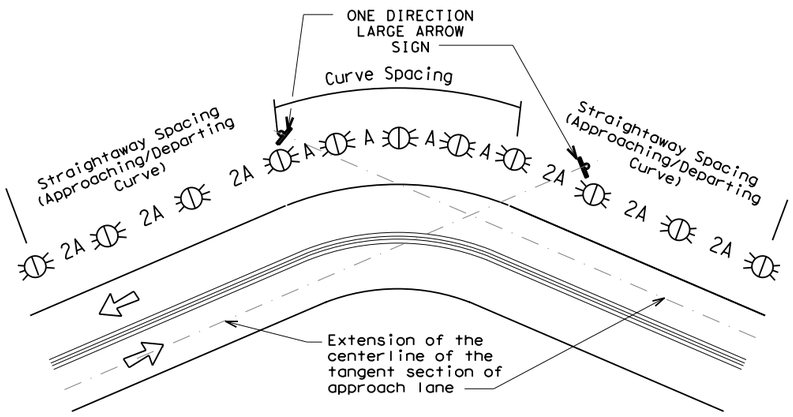
20A

DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

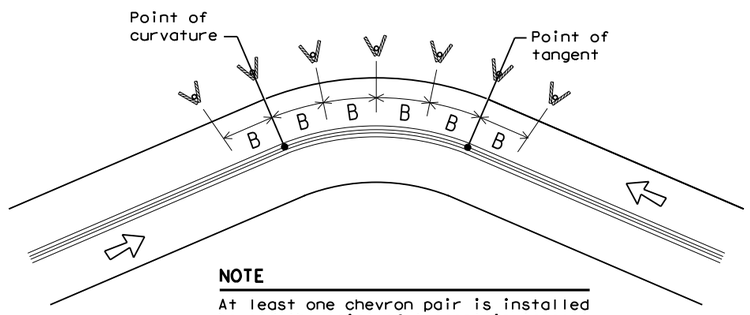
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

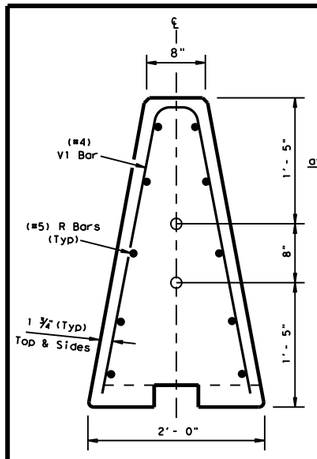
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	FTW	TARRANT		58

20C

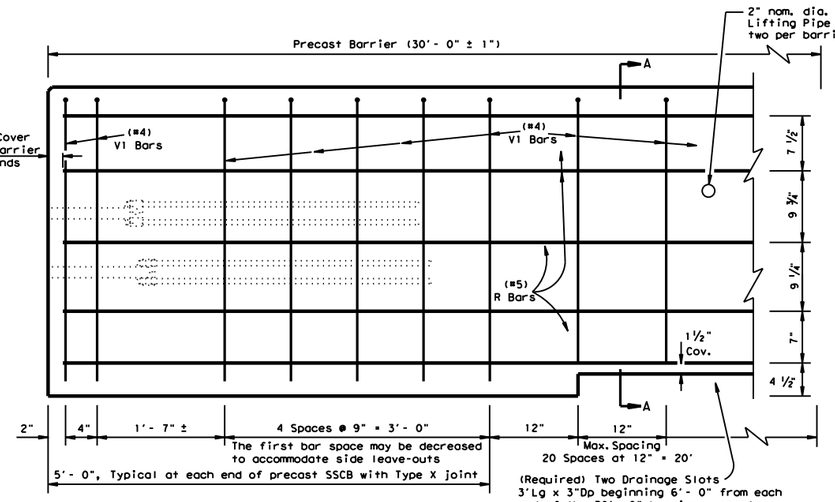
DATE:
FILE:

DATE:
FILE:



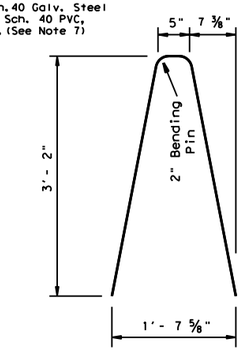
End View
Precast Barrier

Pipe locations for Joint Type X connection



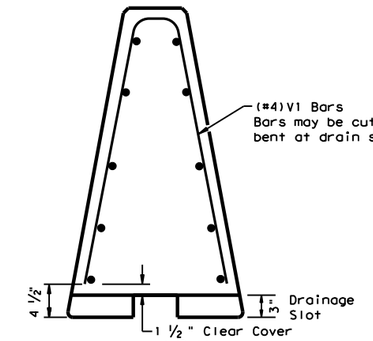
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



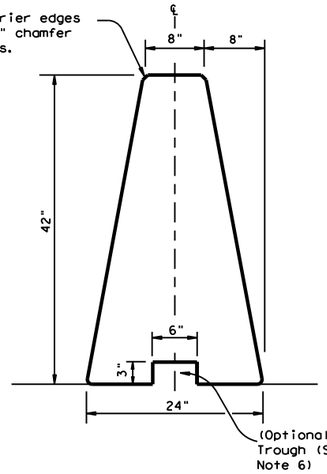
V1 Bar
#4 Rebar

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



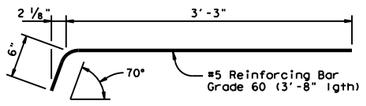
Section A-A
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



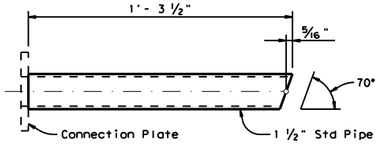
Single Slope Concrete Traffic Barrier

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



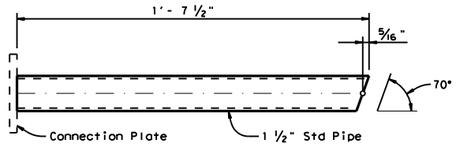
DEFORMED BAR ANCHOR DETAILS

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



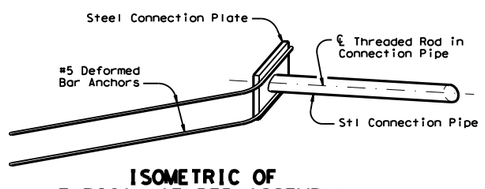
UPPER CONNECTION PIPE DETAILS

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



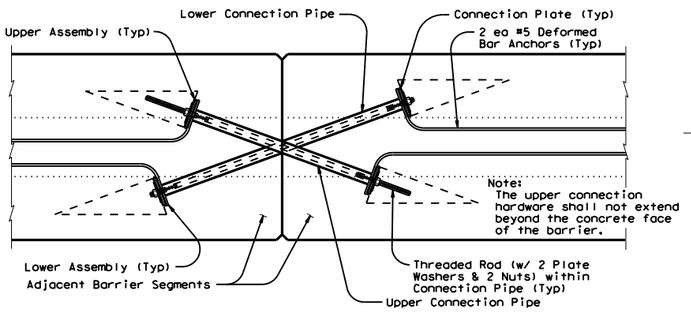
LOWER CONNECTION PIPE DETAILS

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



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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



TYPE X JOINT INSTALLATION DETAIL

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

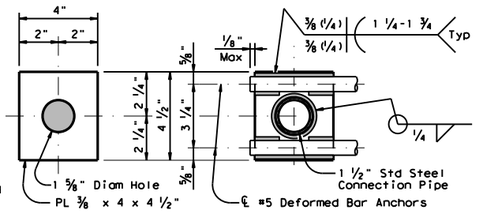
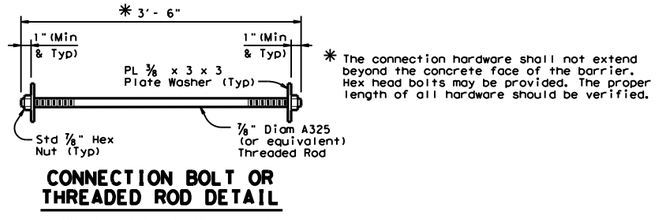


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

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



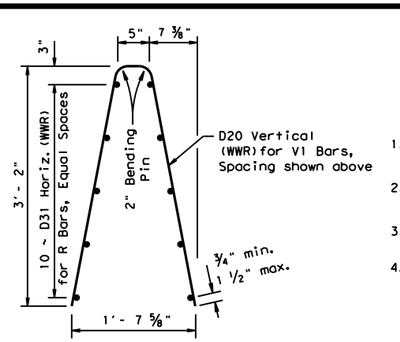
CONNECTION BOLT OR THREADED ROD DETAIL

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

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

General Notes

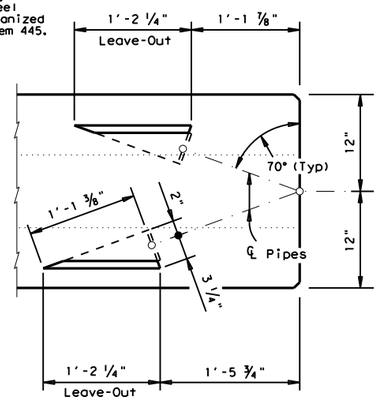
1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled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



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

(WWR) General Notes

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



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
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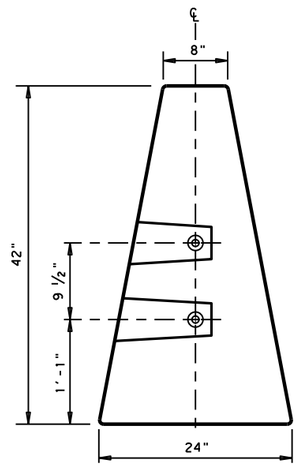
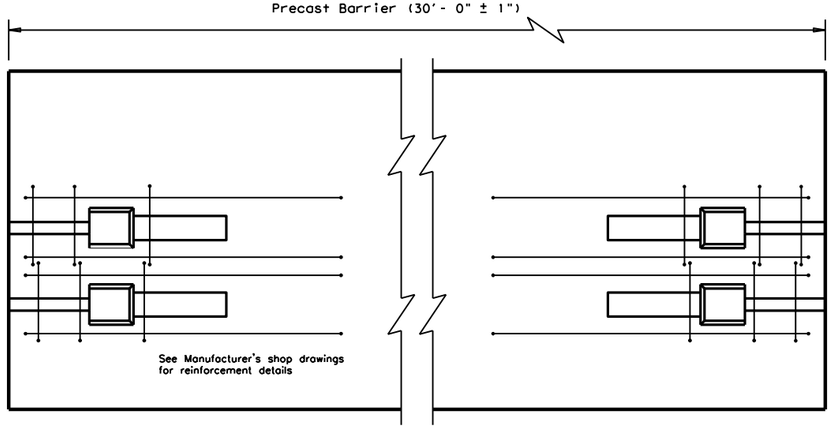
REVISIONS	008	14	124, etc.	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		59

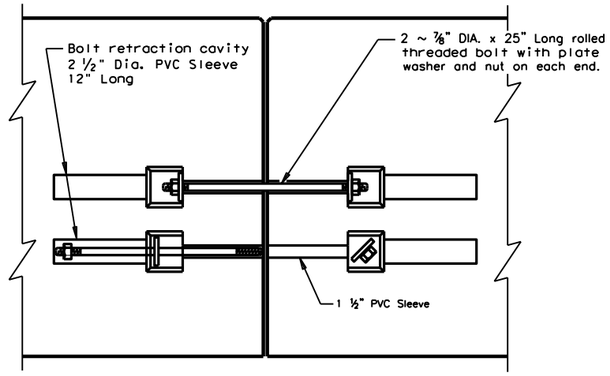
DATE:
FILE:



END VIEW
"QUICK-BOLT" POCKET LOCATIONS

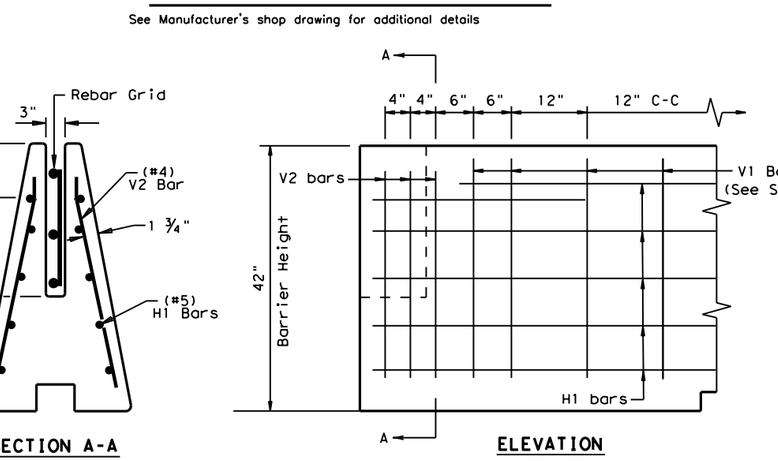


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

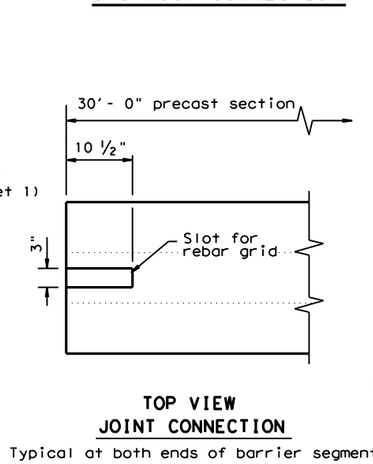


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)



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



VIEW FROM ABOVE
J-J HOOK CONNECTION

END VIEW

Proprietary Joint Connections (SSCB)

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

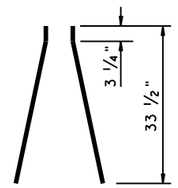
J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

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

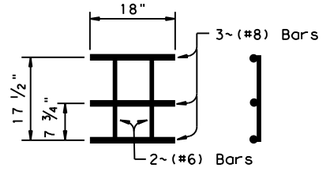
SECTION A-A
Showing (Type R) Rebar Grid

ELEVATION
V1 Bars (See Sheet 1)

TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



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



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

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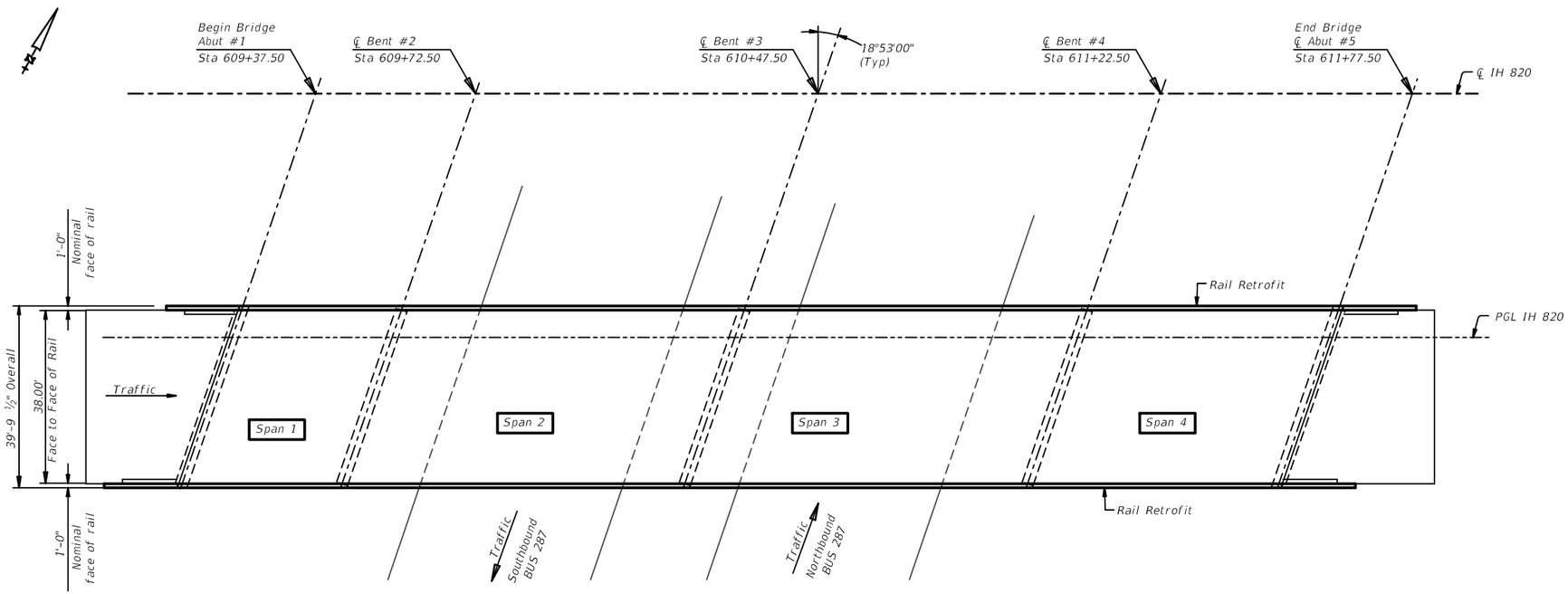
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY		
REVISIONS	008	14	124, etc.	IH 820		
	DIST	COUNTY		SHEET NO.		
	FTW	TARRANT		60		



PLAN

ESTIMATED QUANTITIES

Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	536.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	4.9

General Notes:

1. Refer to "C-RAIL-R(MOD)" sheet for anchorage details. Refer to SSTR Standard for rail reinforcement.
2. Provide Class "C" (HPC) concrete for Rail Retrofits.
3. Refer to Roadway Details for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

NBI# 02-220-0-0008-14-199

SHEET 1 OF 2

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

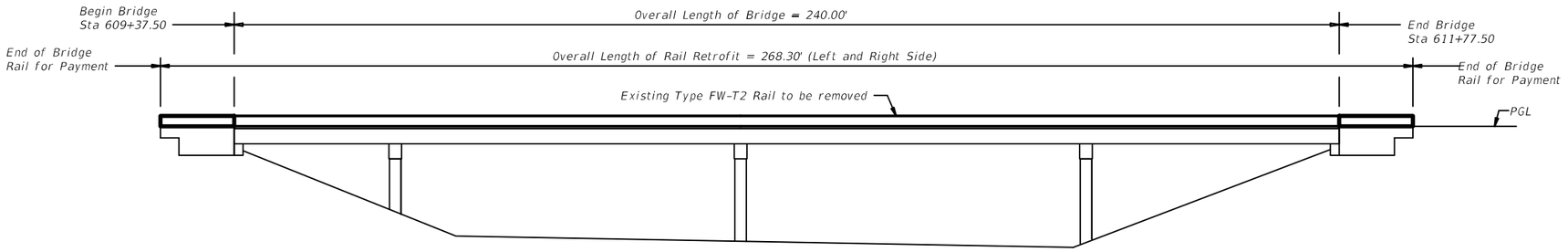
Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

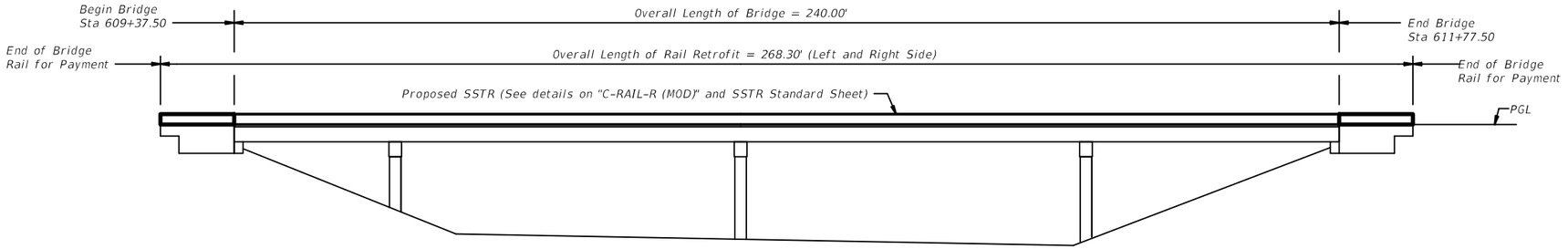
IH 820 EB COLL RD AT BUS 287

	DN: OE	CK: AV	DW: SM/OE	CK: AV/MC
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		061

T:\BRIDGE\Cortés\RRP FY24\02-220-0008-14-199\Plans\BRIDGE LAYOUT (SSTR RAIL RETROFIT) IH 820 EB COLL RD AT BUS 287.dgn



Existing Traffic Rail Type FW-T2



PROPOSED TYPE SSTR RAIL ELEVATION VIEW

NBI# 02-220-0-0008-14-199

STATE OF TEXAS
MIGUEL CORTÉS
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 EB COLL RD AT BUS 287

	DN: OE	CK: AV	DW: SM/OE	CK: AV/MC
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		062

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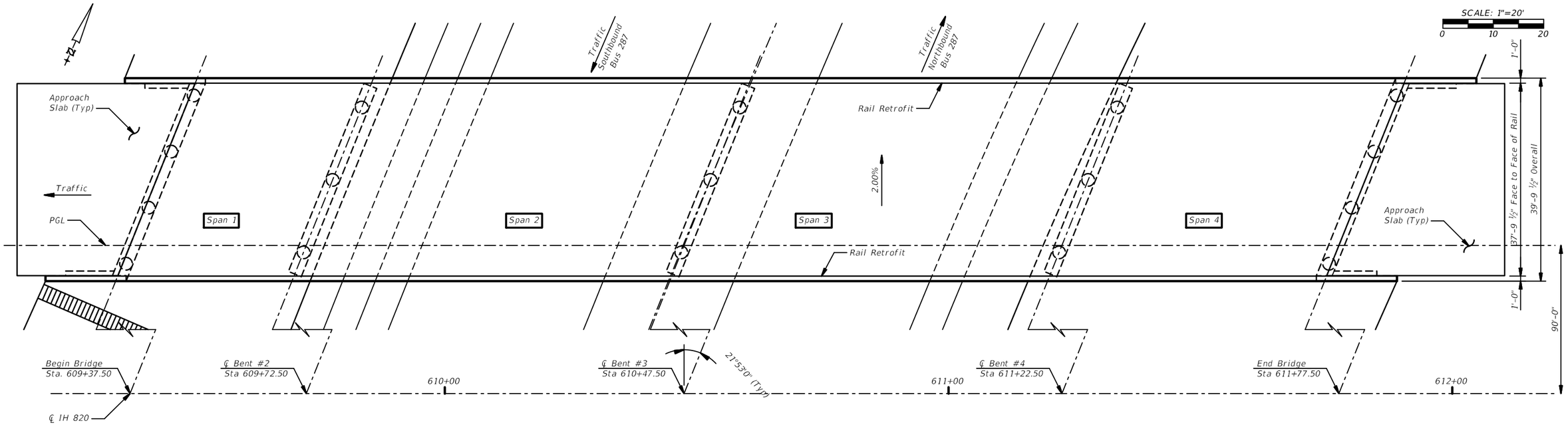


PLAN

T:\BRIDGE\Cortés\RRP FY24\02-220-0008-14-200\ustn\BRIDGE LAYOUT (SSTR RAIL RETROFIT) IH 820 WB COLL RD AT BUS 287.dgn

ESTIMATED QUANTITIES

Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	536.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	4.9

GENERAL NOTES:

1. Refer to "C-RAIL-R (MOD)" sheets for anchorage details. Refer to SSTR Standard for rail reinforcement.
2. Provide Class "C" (HPC) concrete for Rail Retrofits.
3. Refer to Roadway Details Fence Layout for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

NBI# 02-220-0-0008-14-200

STATE OF TEXAS
MIGUEL CORTÉS
121930
LICENSED PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

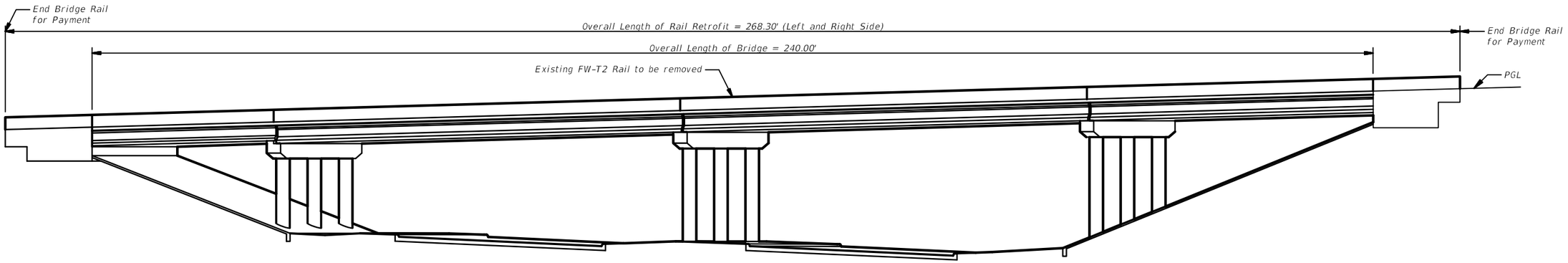
BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB COLL RD AT BUS 287

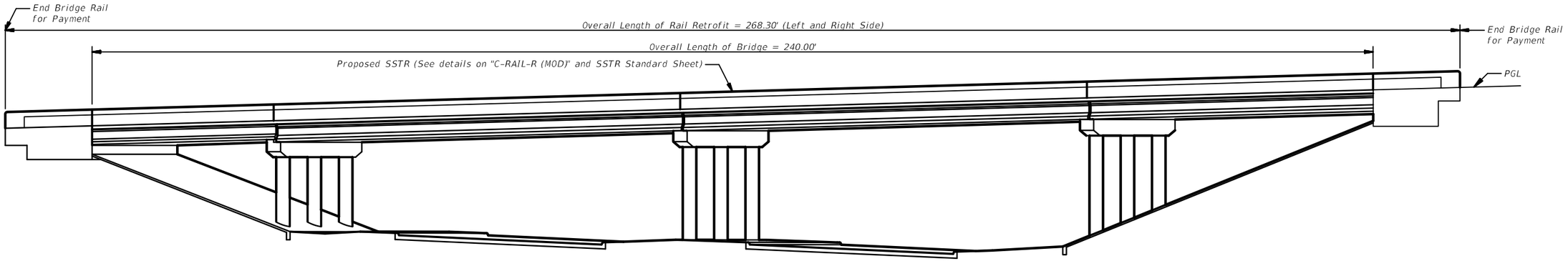
		DN: JT	CK: AV	DW: JT	CK: AV/JT	
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0008	14	124;ETC	IH 820		
	DIST	COUNTY		SHEET NO.		
	02	TARRANT		063		

SCALE: 1"=20'

0 10 20



EXISTING ELEVATION



PROPOSED ELVATION

NBI# 02-220-0-0008-14-200

SHEET 2 OF 2

STATE OF TEXAS
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Miguel Cortés
04/20/2023

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BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB COLL RD AT BUS 287

	DN: JT	CK: AV	DW: JT	CK: AV/JT
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124;ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		064

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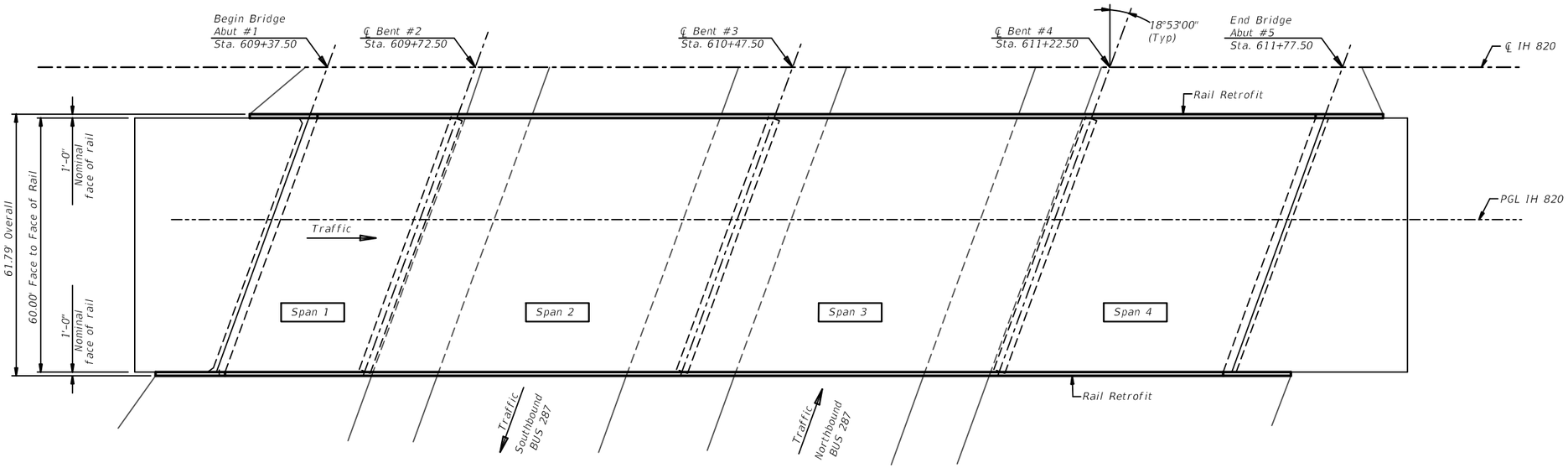

PLAN

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ESTIMATED QUANTITIES

Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	536.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	4.9

General Notes:

1. Refer to "C-RAIL-R(MOD)" sheet for anchorage details. Refer to SSTR Standard for rail reinforcement.
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3. Refer to Roadway Details for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

NBI# 02-220-0-0008-14-201

SHEET 1 OF 2

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04/20/2023

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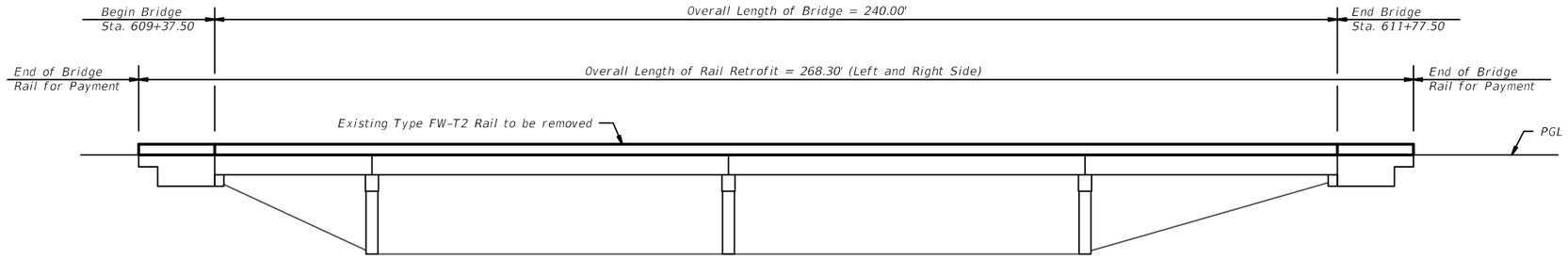
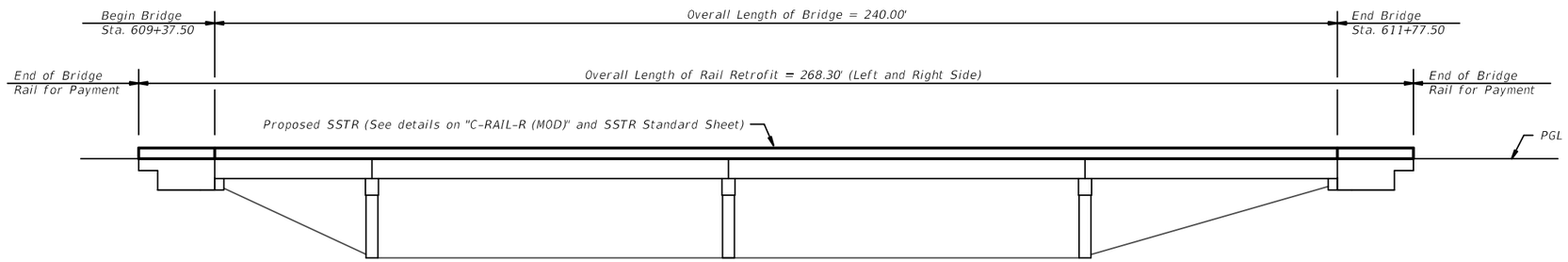
BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 EB AT BUS 287

DN: OE	CK: AV	DW: SM/OE	CK: AV/MC
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124.ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		065



Existing Traffic Rail Type FW-T2



PROPOSED TYPE SSTR RAIL ELEVATION VIEW

NBI# 02-220-0-0008-14-201

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MIGUEL CORTES
121930
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Miguel Cortés
04/20/2023

Texas Department of Transportation

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BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 EB AT BUS 287

	DN:	CK:	DW:	CK:
	OE	AV	SM/OE	AV/MC

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	02	TARRANT		066

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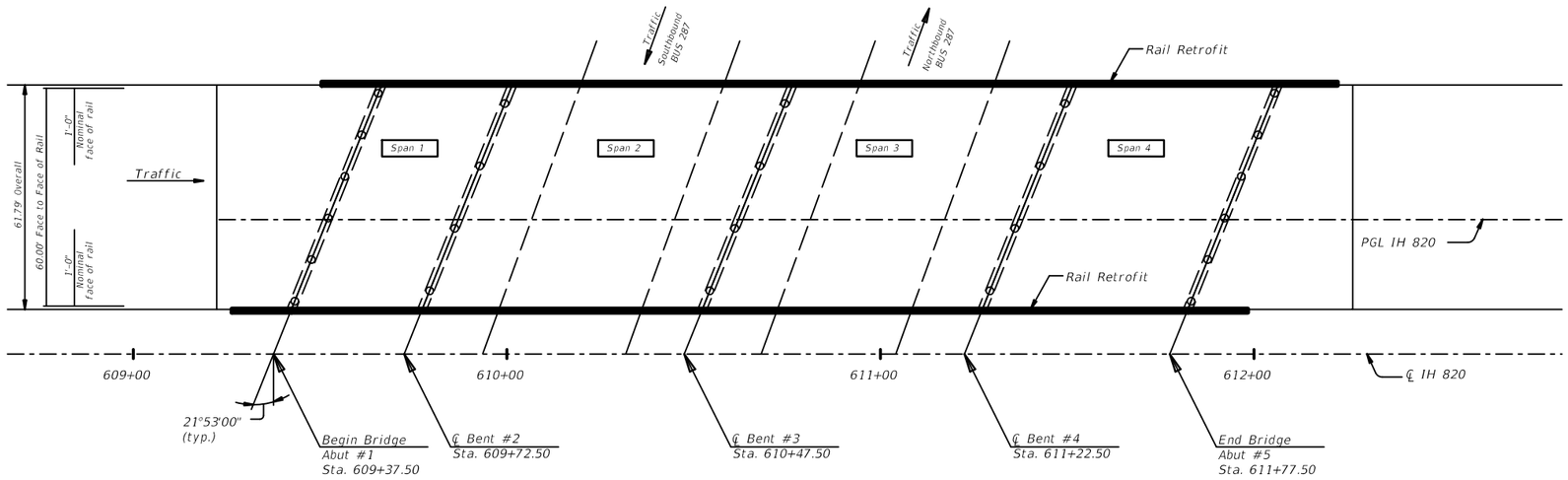

PLAN

ESTIMATED QUANTITIES			
Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	536.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	4.9

General Notes:

1. Refer to "C-RAIL-R(MOD)" sheet for anchorage details. Refer to SSTR Standard for rail reinforcement.
2. Provide Class "C" (HPC) concrete for Rail Retrofits.
3. Refer to Roadway Details for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

NBI# 02-220-0-0008-14-202

STATE OF TEXAS
MIGUEL CORTÉS
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB AT BUS 287

	DN: AC	CK: AV	DW: AC/AC	CK: AV/AC
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REVISIONS	0008	14	124;ETC	IH 820
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	02	TARRANT		067

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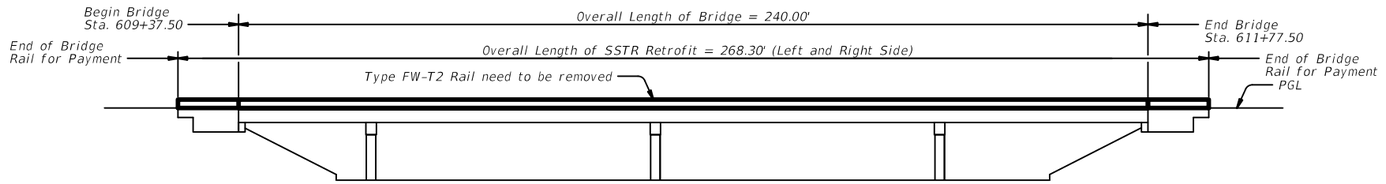
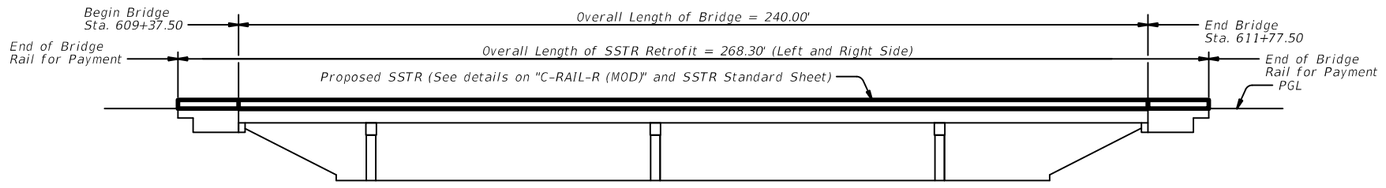


EXISTING TYPE FW-T2 RAIL ELEVATION VIEW



PROPOSED TYPE SSTR RAIL ELEVATION VIEW

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NBI# 02-220-0-0008-14-202

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Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB AT BUS 287

	DN: AC	CK: AV	DW: AC/AC	CK: AV/AC
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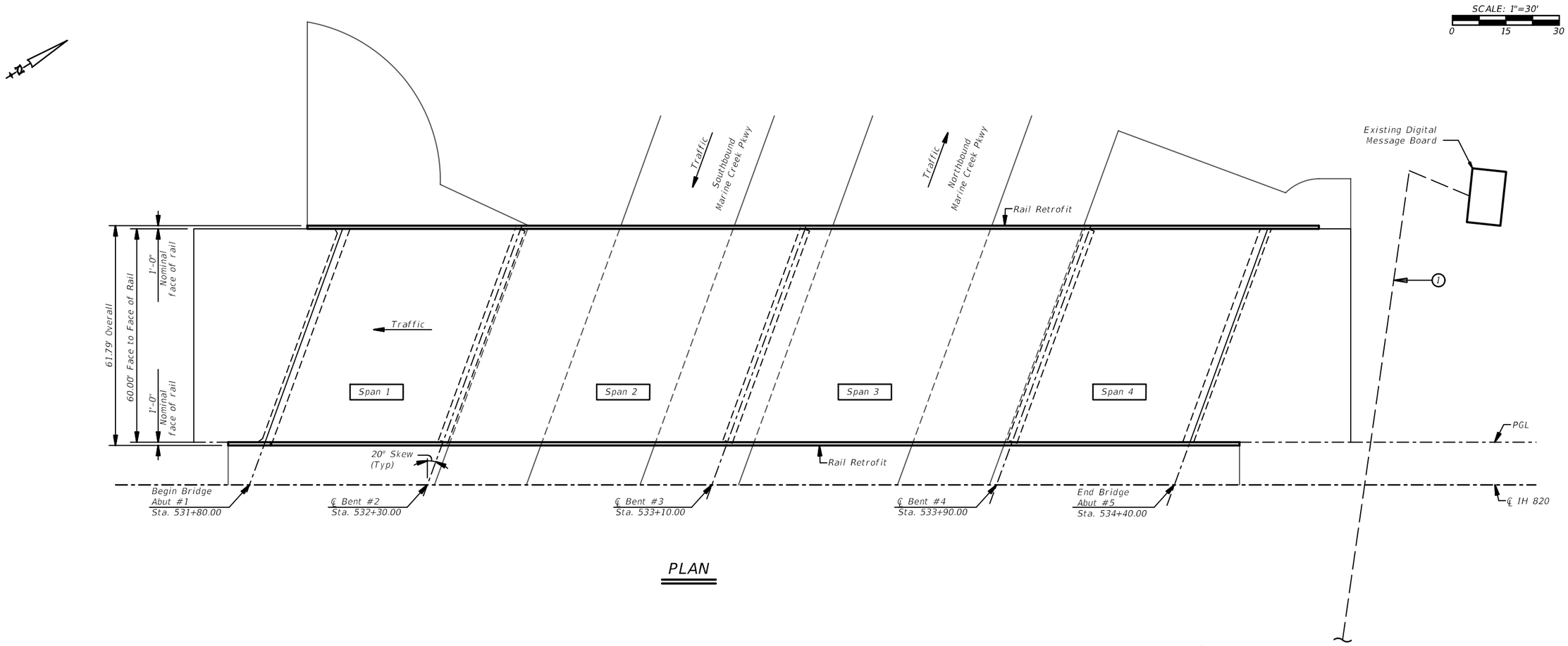
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		068



PLAN

1 Existing Conduit with fiber optic cable and conductor. The contractor shall not damage this conduit during construction. Contact the TxDOT signal shop at (817) 370-3664 to request fiber optic cable location prior to beginning work.

General Notes:

1. Refer to "C-RAIL-R(MOD)" sheet for anchorage details. Refer to SSTR Standard for rail reinforcement.
2. Provide Class "C" (HPC) concrete for Rail Retrofits.
3. Refer to Roadway Details for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

ESTIMATED QUANTITIES

Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	568.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	5.2

NBI# 02-220-0-0008-14-235

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB AT MARINE CREEK PKWY

	DN: ST	CK: AV	DW: GC/SI	CK: AV/ST
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REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		069

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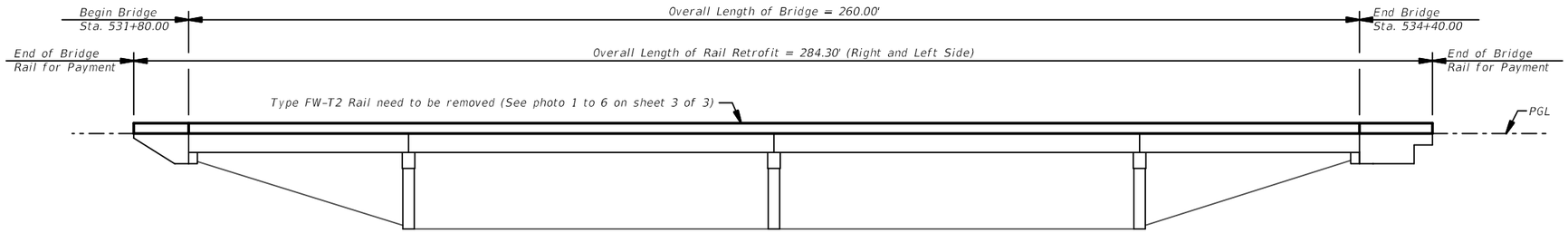
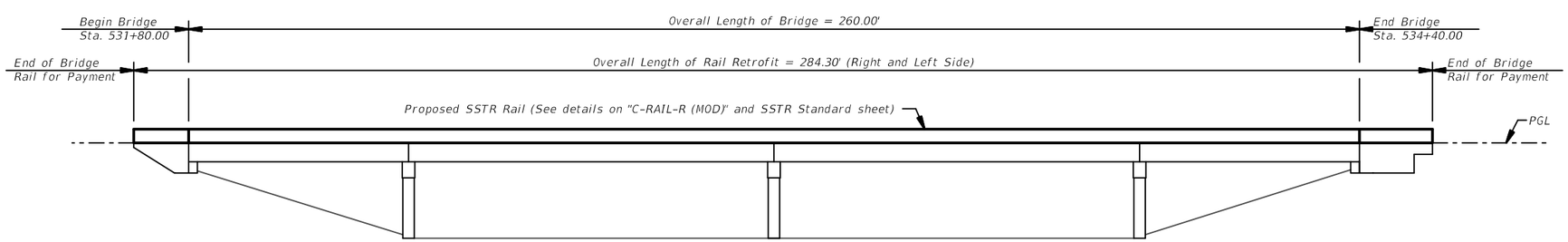


EXISTING TYPE FW-T2 RAIL ELEVATION VIEW



PROPOSED TYPE SSTR RAIL ELEVATION VIEW

NBI# 02-220-0-0008-14-235

SHEET 2 OF 2

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 WB AT
MARINE CREEK PKWY

	DN: ST	CK: AV	DW: GC/SI	CK: AV/ST
©TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		070

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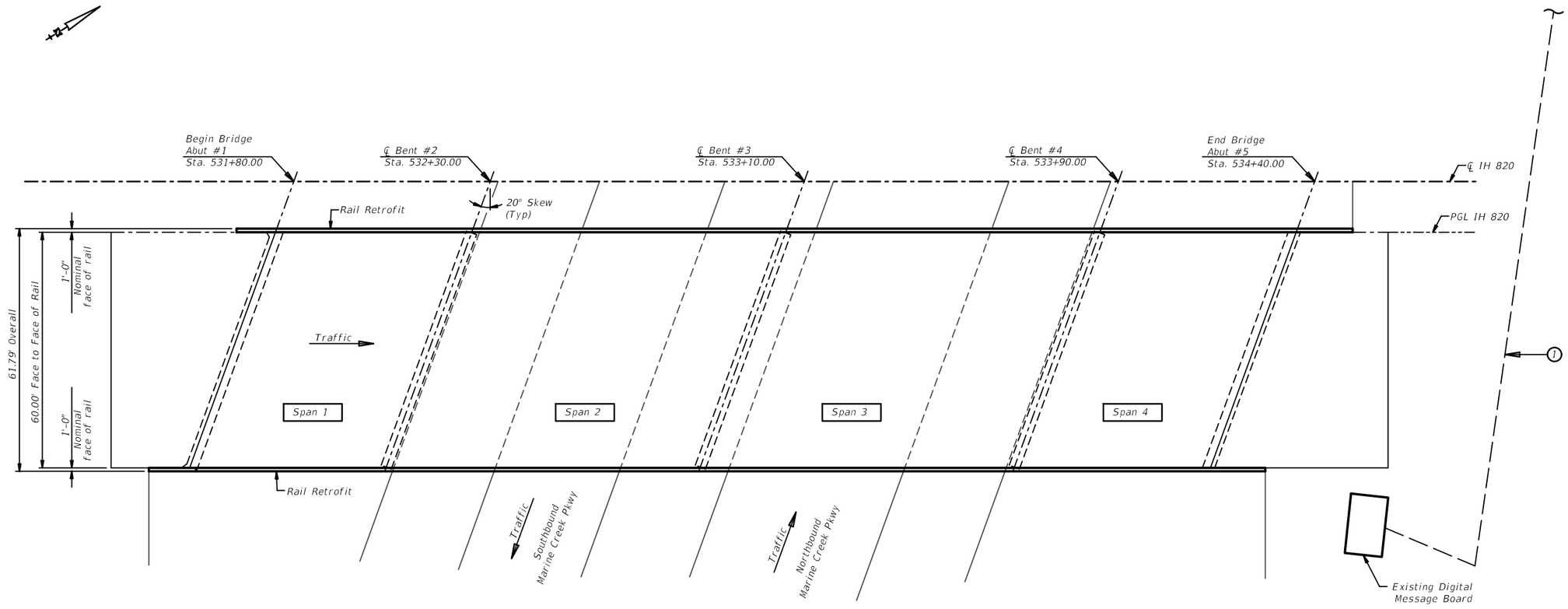

PLAN

① Existing Conduit with fiber optic cable and conductor. The contractor shall not damage this conduit during construction. Contact the TxDOT signal shop at (817) 370-3664 to request fiber optic cable location prior to beginning work.

General Notes:

1. Refer to "C-RAIL-R(MOD)" sheet for anchorage details. Refer to SSTR Standard for rail reinforcement.
2. Provide Class "C" (HPC) concrete for Rail Retrofits.
3. Refer to Roadway Details for MBGF Layout and refer to MBGF standards for more information.
4. Side slotted drains shall not be used.
5. See "HMAC Plug Detail" detail sheet for more information.
6. Refer to the D&OM standards for more information on delineators. Placement of delineators on SSTR Bridge Rails will be the same as Typical Concrete Traffic Barrier.

ESTIMATED QUANTITIES

Item No.	Description		Total
0451-6025	Retrofit Rail (Ty SSTR)(HPC)	LF	568.6
0658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	3
0658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	3
3076-6035	D-GR HMA TY-D PG64-22	TON	2.6
3076-6066	TACK COAT	GAL	5.2

NBI# 02-220-0-0008-14-236

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortes
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 EB AT MARINE CREEK PKWY

DN: SI	CK: AV	DW: GC/SI	CK: AV/SI

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	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		071

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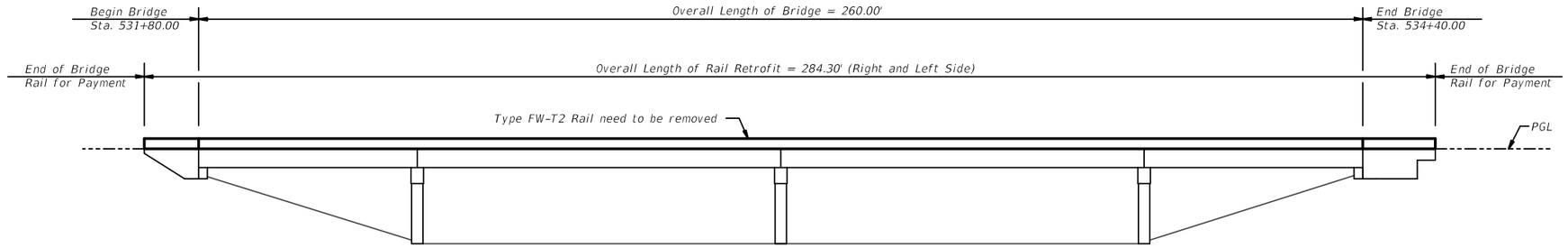
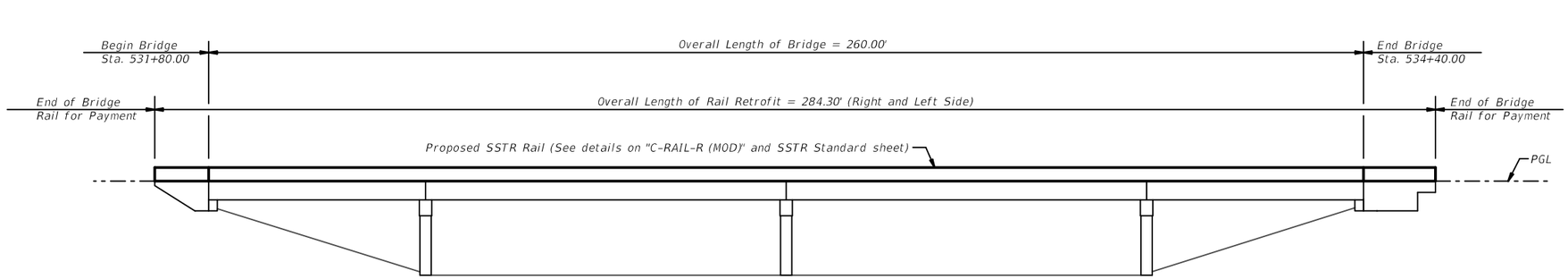


EXISTING TYPE FW-T2 RAIL ELEVATION VIEW



PROPOSED TYPE SSTR RAIL ELEVATION VIEW

NBI# 02-220-0-0008-14-236

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

Texas Department of Transportation

Fort Worth Bridge Design

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 820 EB AT MARINE CREEK PKWY

			DN: SI	CK: AV	DW: GC/SI	CK: AV/SI	
©TxDOT 4/13/2023	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0008	14	124,ETC		IH 820		
	DIST	COUNTY			SHEET NO.		
	02	TARRANT			072		

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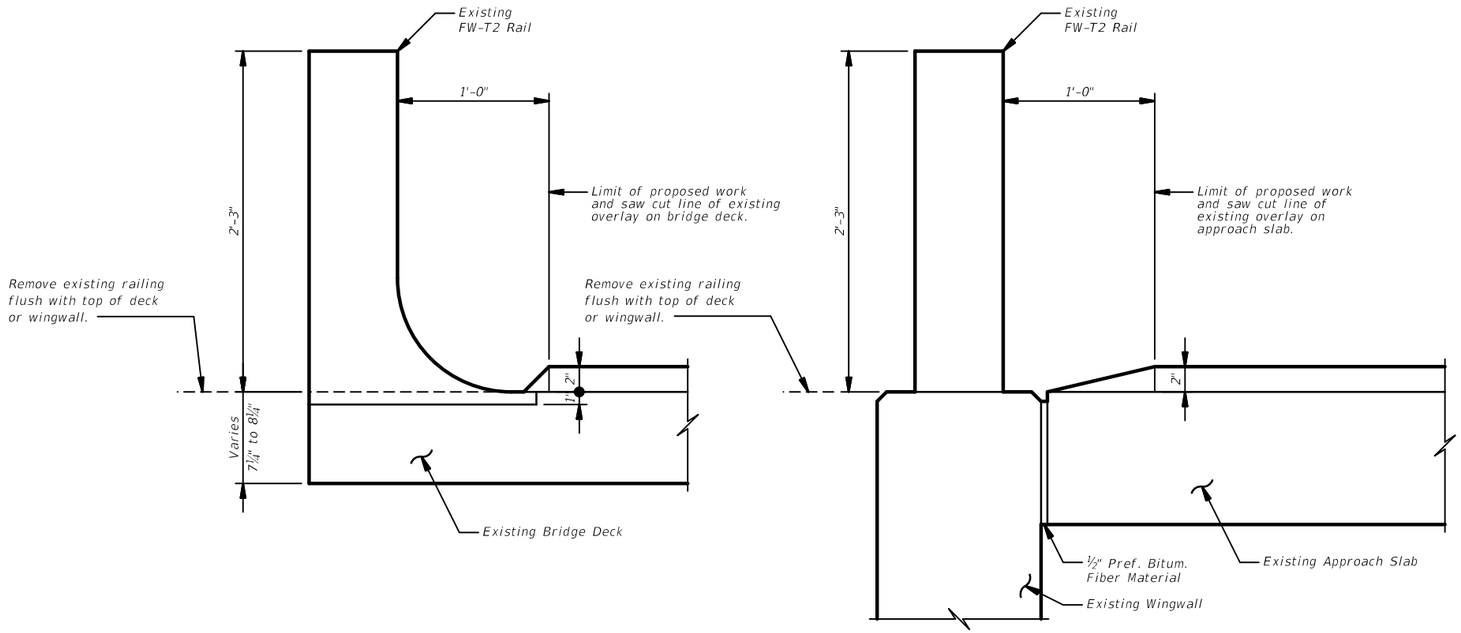
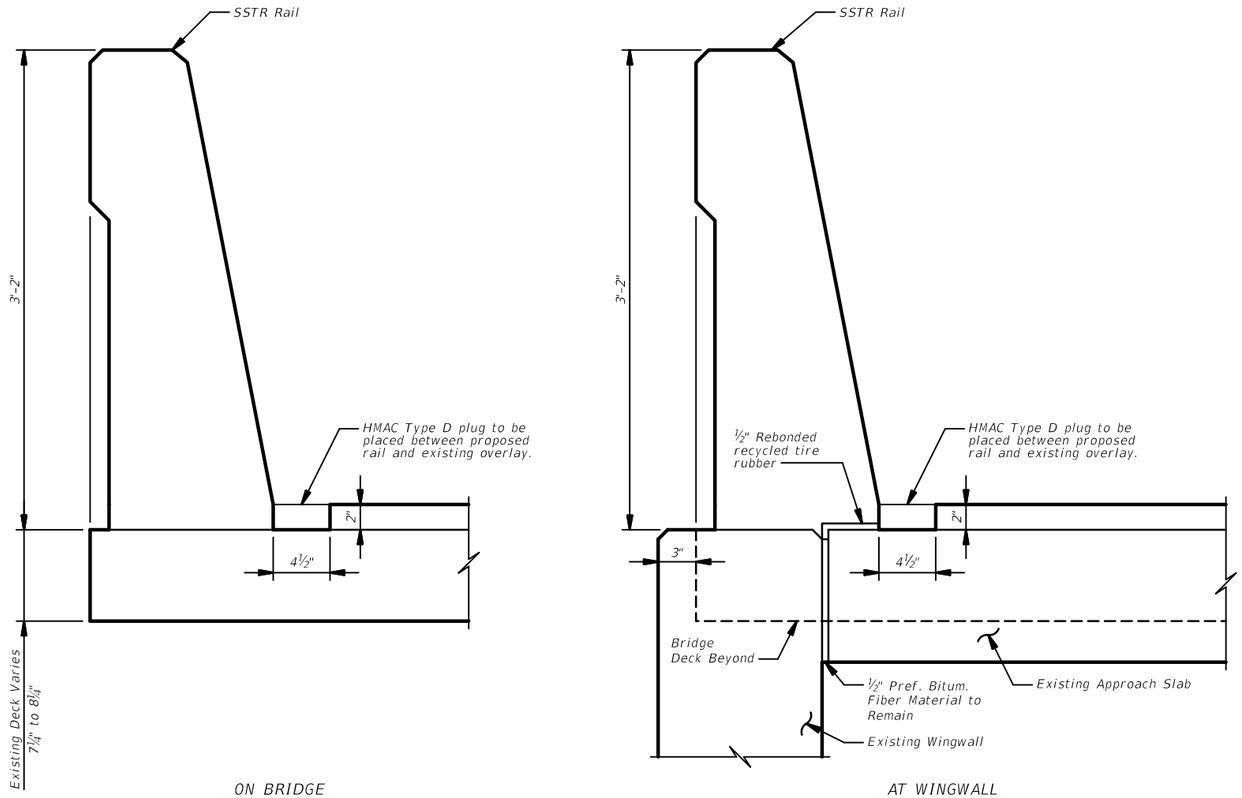


ON BRIDGE

AT WINGWALL

EXISTING RAIL SECTION



ON BRIDGE

AT WINGWALL

PROPOSED RAIL SECTION

REMOVAL NOTES:

1. *If required by the Engineer, repair existing damaged concrete to a neat condition in accordance with Item 429, "Concrete Structure Repair", and the "Concrete Repair Manual." Damaged surfaces that will be protected by new concrete need not be grouted.*
2. *Clean concrete, within rail footprint, with abrasive blasting.*
3. *Remove all debris from exposed surface prior to placing new rail.*
4. *Before casting rail, place ½" Rebonded recycle tire rubber to act as a bond breaker. Refer to the "Traffic Rail Single Slope Type SSTR" Standard for more information.*
5. *Cast new railing against the top of the existing concrete deck and wingwall.*
6. *For retrofit details see "C-RAIL-R (MOD)" Sheet, and "SSTR" Standard.*
7. *Contractor shall not damage the existing polymer concrete header material at the Bridge joints while installing proposed rail and plug material.*
8. *Additional damages incurred by the contractor will be at the contractors expense.*
9. *Provide rebonded recycled tire rubber joint filler that meets the requirements on DMS-6310, "Joint Sealants and Fillers". Rebonded recycle tire rubber is subsidiary to Item 451, "Retrofit Railing".*
10. *Provide rebonded recycled tire rubber if exiting Prefabricated Bituminous Fiber Material is partially or fully missing.*

Hot Mix Overlay Notes:

1. *The Contractor shall maintain proper drainage on the bridge and make sure water drains except over the roadway lanes below. For compaction, the Contractor shall only use a small steel wheel roller in static mode; a dynamic or vibration mode is not allowed. At the Bridge Joints, the Contractor is to sawcut the existing hot mix, within the proposed work limits, and seal them with Class 7 sealant (self leveling). Class 7 sealant shall conform to the DMS-6310 Joint Sealants and Fillers" and be installed as per the Manufacturers recommendations.*
2. *Preparation, cleaning, and installation of the overlay shall be paid for by the Ton, under Special Specification 3076, "Dense-Graded Hot-Mix Asphalt". Class 7 sealant shall be subsidiary to Special Specification 3076, "Dense-Graded Hot-Mix Asphalt".*
3. *Apply tack coat to horizontal surfaces on all plugs. Do not let tack coat be seen on the SSTR rail.*

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER

Miguel Cortes
04/20/2023

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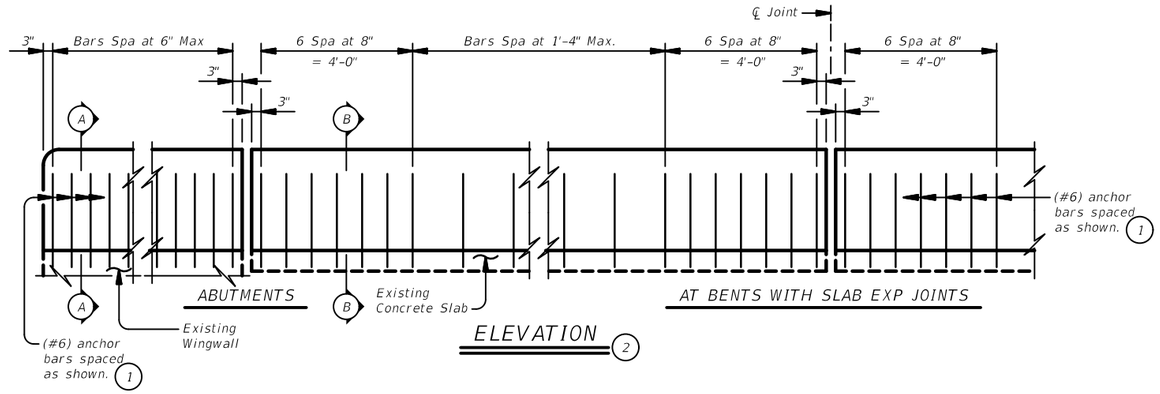
Fort Worth Bridge Design

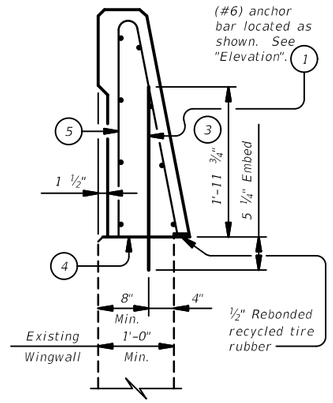
HMAC PLUG DETAIL

	DN: JT	CK: MC	DW: JT/MC	CK: AV/JT
© TxDOT 4/13/2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		073

T:\BRIDGE\Cortes\RRP FY24\02-220-0008-14-200\ustn\RAIL REMOVAL DETAIL.dgn

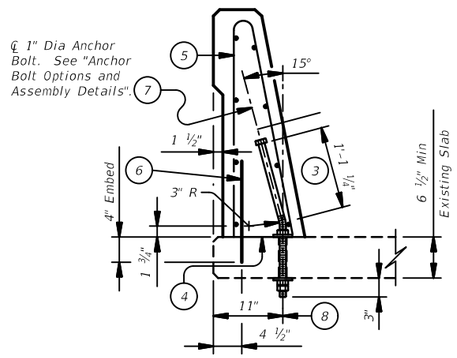


ELEVATION 2



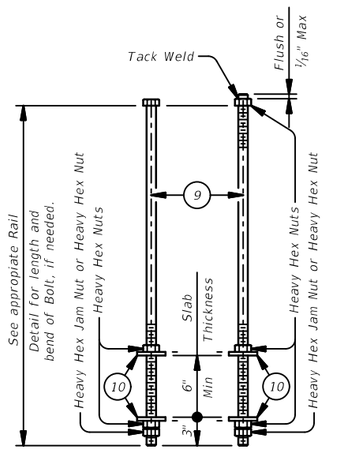
SECTION A-A

Showing location or locations of anchor bars in a rail retrofit condition. See SSTR Standard for details and notes not shown.



SECTION B-B

Showing location or locations of anchor bars and anchor bolts in a rail retrofit condition. See SSTR Standard for details and notes not shown.



ANCHOR BOLT OPTIONS AND ASSEMBLY DETAILS

Galvanize anchor bolts, nuts and plate washers.

GENERAL NOTES:

1. Use of these retrofit details will result in a railing acceptable for the MASH Test Level indicated on the applicable rail standard.
2. Removal and replacement of backfill, subgrade, and asphalt or concrete pavement necessary for this installation is considered subsidiary to the retrofit railing.
3. Payment for a rail retrofit will be as per Item 451, "Retrofit Rail (Ty SSTR)".
4. Renforcing bar dimensions shown are out-to-out of bar.

REMOVAL NOTES:

1. If required by the Engineer, repair existing damaged concrete to a neat condition in accordance with Item 429, "Concrete Structure Repair." Damaged surfaces that will be protected by new concrete need not be grouted.
2. Clean concrete, within rail footprint, with abrasive blasting. Remove all debris from exposed surface prior to placing new rail. Cast new railing against the top of the existing concrete deck.

MATERIAL NOTES:

1. Provide Grade 60 reinforcing steel.
2. Epoxy coat or galvanize all reinforcing steel if required elsewhere.
3. (#6) and (#4) anchor bars used for the adhesive anchorage system must not be epoxy coated within the required embedment.

CONSTRUCTION NOTES:

1. Field verify dimensions before commencing work and ordering materials.
2. By adding additional anchorage, welding can be performed at a minimum spacing of 3 ft between the cage and additional anchorage. By satisfying additional anchorage requirements slip forming is allowed. Do not weld to the required anchorage.
3. 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.

KEYNOTES:

(1) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 ¼". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

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

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

(4) Do not cast rails on top of overlays/seal coats.

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

(6) Embed secondary (#4) anchor bars 1'-4" in length with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 10 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing". (#4) anchor bars spaced longitudinally along rail at 4 ft max.

(7) ℄ 1" Dia. Anchor Bolt Spaced longitudinally at 24" max. (Spaced 6" longitudinally from outside edge).

(8) ℄ 1 1/16" to 1 ¼" Dia. holes. Core drill holes through existing deck (percussion drilling not permitted). Concrete spalls in the bottom of the deck exceeding ½" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the Contractor's expense.

(9) ℄ 1" Dia. ASTM F1554 Gr. 55 Anchor Bolt or Threaded Rod. Nuts must conform to ASTM A563.

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

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTÉS
121930
LICENSED PROFESSIONAL ENGINEER

Miguel Cortés
04/20/2023

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Fort Worth Bridge Design

SSTR RAIL RETROFIT IH-820

C-RAIL-R (MOD)

DN: TxDOT	CK: TxDOT	DW: JT	CK: AV
©TxDOT 4/13/2023 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		074

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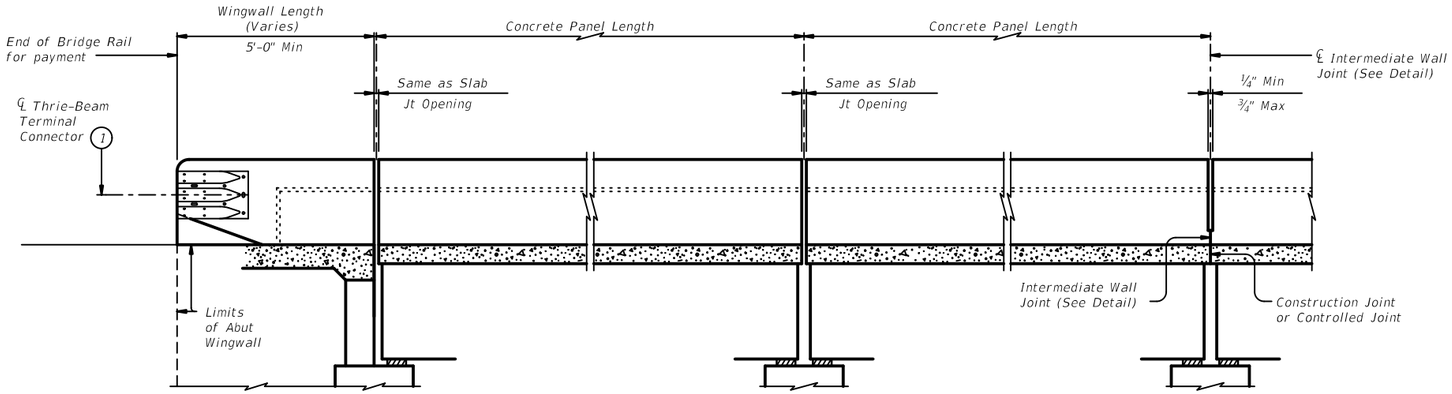
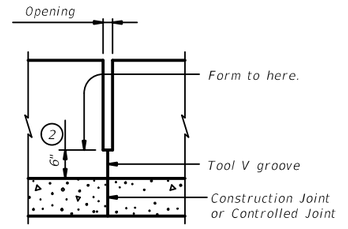


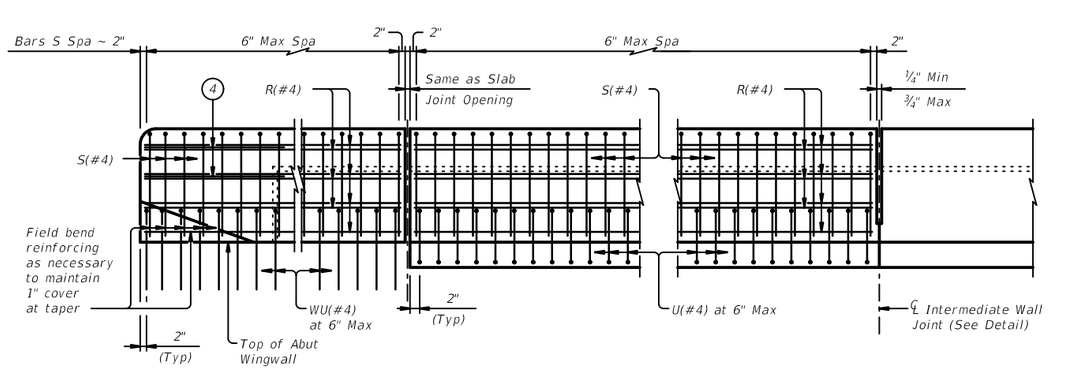
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL



INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

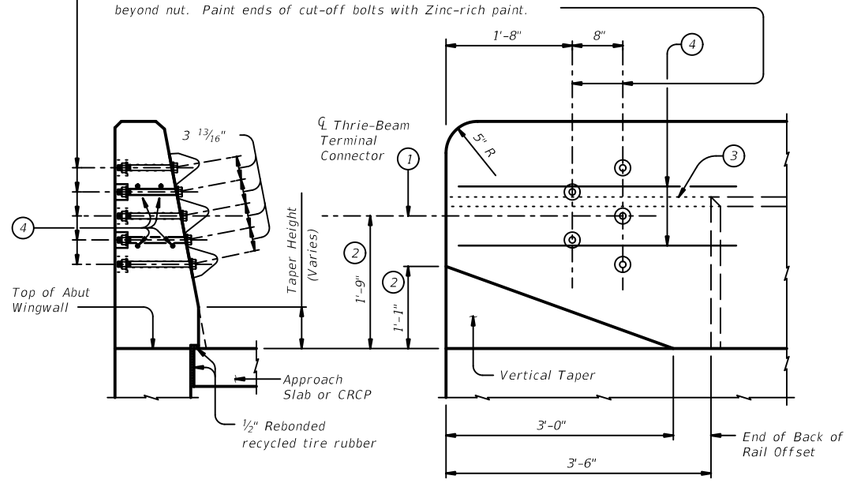


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

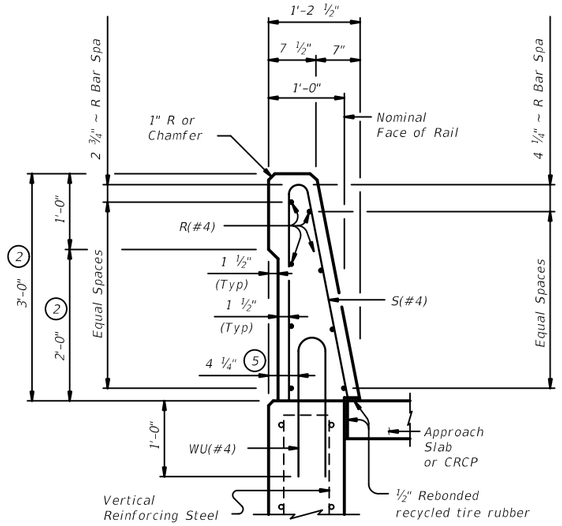
Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

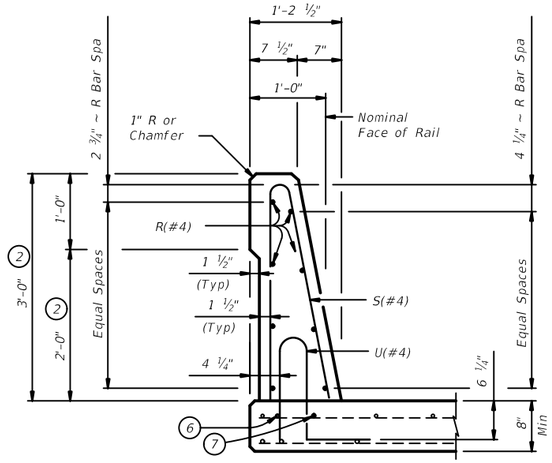
TYPE SSTR

FILE:	r1std014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0008	14	124,ETC	IH 820
		DIST	COUNTY		SHEET NO.
		02	TARRANT		075

DATE:
FILE:



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

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

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

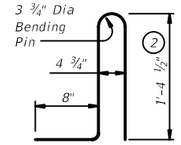
(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) No longitudinal wires may be within upper bend.

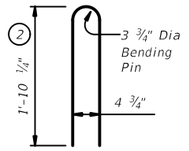
(9) Bend or cut as required to clear drain slots.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greator to side slot drain.

BARS S (#4)



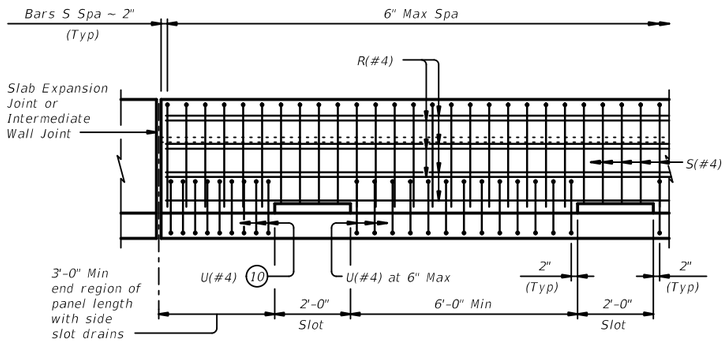
BARS U (#4)



BARS WU (#4)

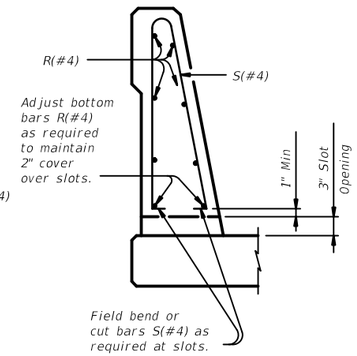
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

CONSTRUCTION NOTES:

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

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

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

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:

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

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

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

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

Shop drawings will not be required for this rail.

Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		076

DATE: 4/13/2023
FILE: T:\BRIDGE\Corres\RRP FY24\02-220-0008-14-202\DGN's\EPIC.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

☒ No Action Required ☐ Required Action

Action No.

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

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

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

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

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP• _____

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. Migratory Bird Treaty Act (MBTA)

   Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structure that would be affected by the proposed project, and complete any bridge work/demolition and /or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.

2. Bird RRP and Bald & Golden Eagle Protection Act

   The contractor would be prepared to take appropriate measures to avoid disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests, as practicable. As necessary, take appropriate measures to prevent the establishment of active nests during the nesting season on facilities and structures proposed for replacement or repair. Collecting, capturing, relocation, or transporting birds, eggs, young, or active nests without a permit is prohibited. The Bald and Golden Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.

3. Threatened and Endangered Species: Whooping Crane

   The contractor and/or TxDOT personnel would be advised of potential for Whooping Cranes to occur within the project limits. Construction personnel will be advised to avoid adverse impacts to this species and to report any sightings to TxDOT District Environmental staff. Drainage modifications will be limited to the extent practical to accommodate the additional paved surface needed to bring the roadway up to current TxDOT safety standards. The construction personnel will report all sightings to TxDOT Fort Worth District Environmental staff. Reports should include the time, date and location and any available photos.

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.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

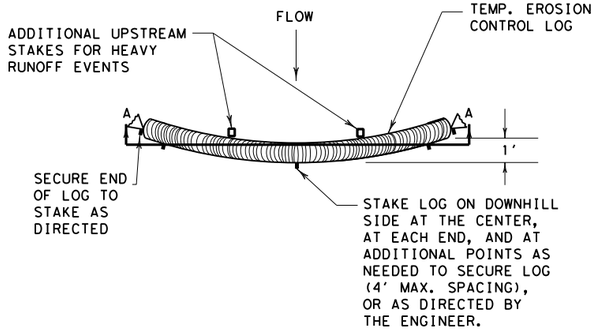
Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

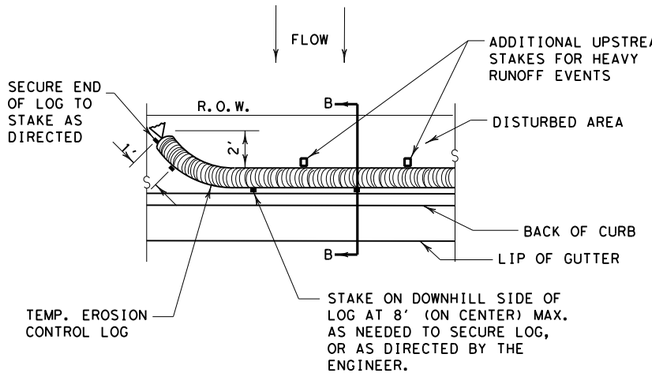
EPIC

FILE: epic.dgn	DN: MC	CK: JS	DW: MC	CK: MP	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0008	14	124,ETC	IH 820	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	02	TARRANT		077	
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					

DATE:
FILE:



PLAN VIEW



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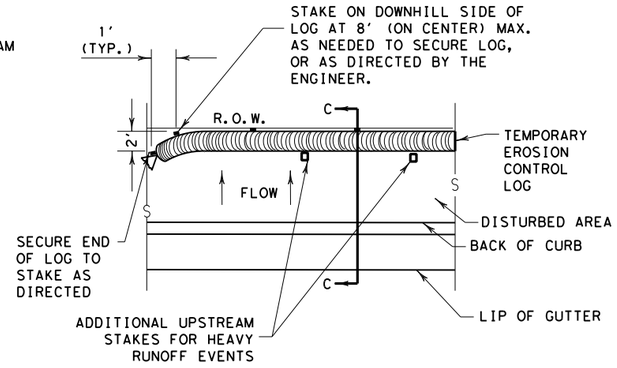

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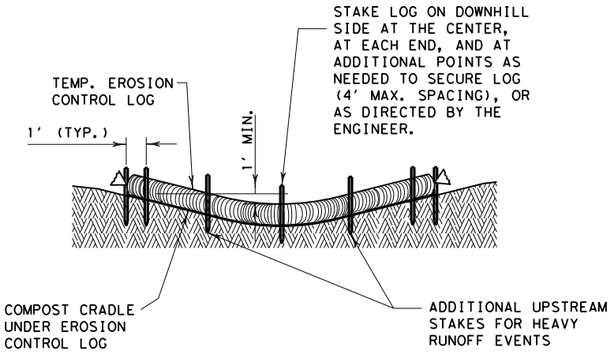
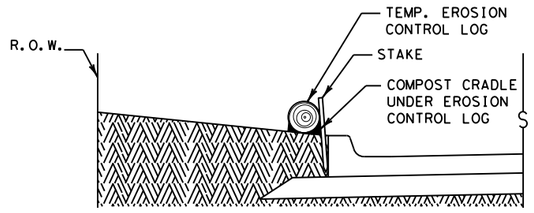


SECTION A-A

EROSION CONTROL LOG DAM

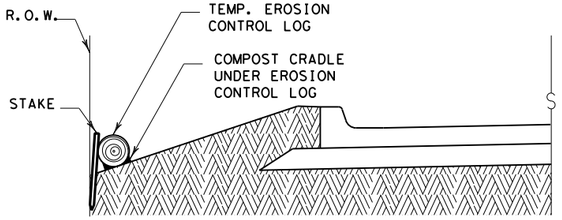
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



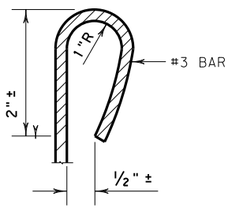
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

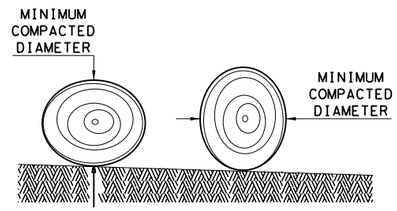
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
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	02	TARRANT				78	

DATE:
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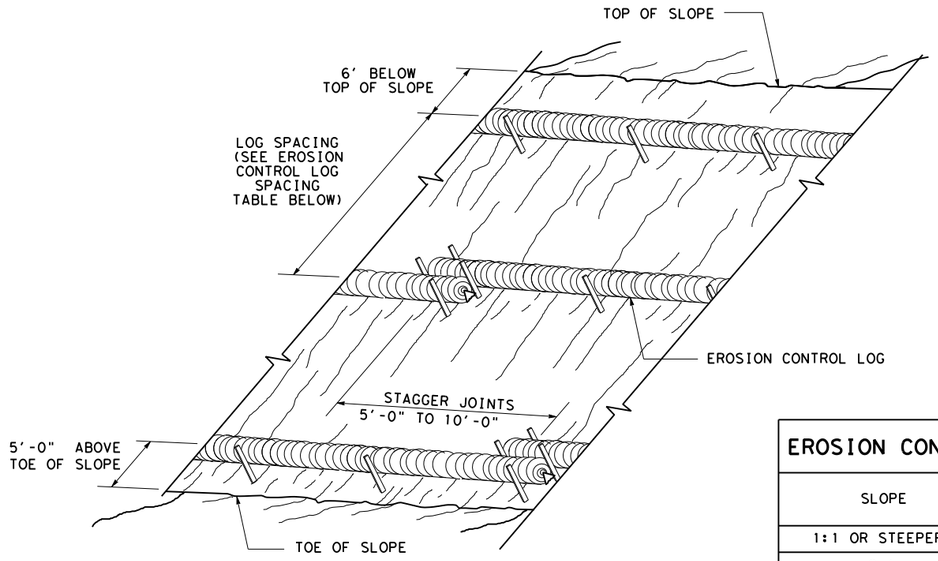
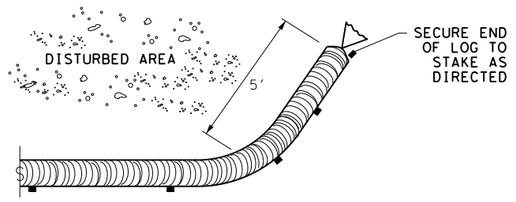


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

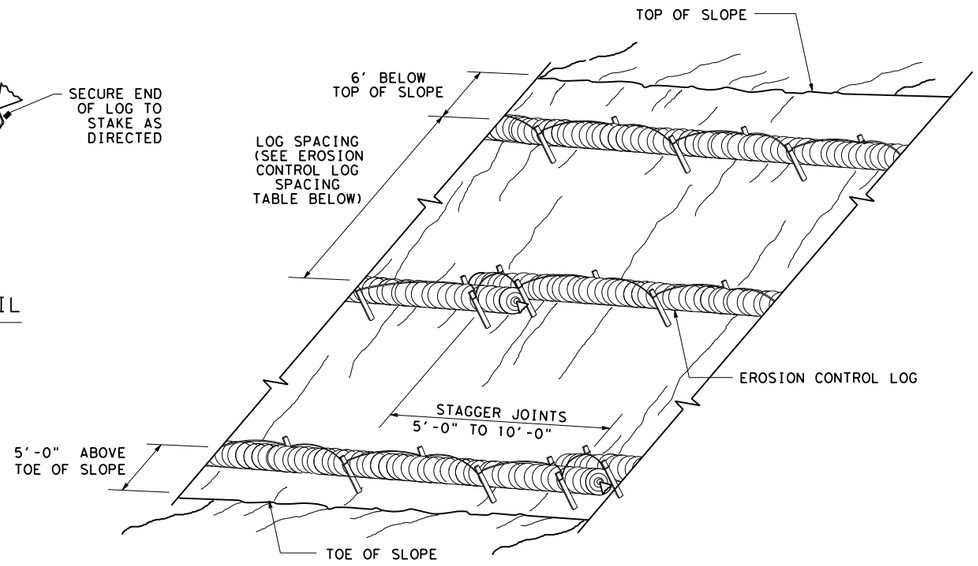
CL-SST



END SECTION RAP DETAIL

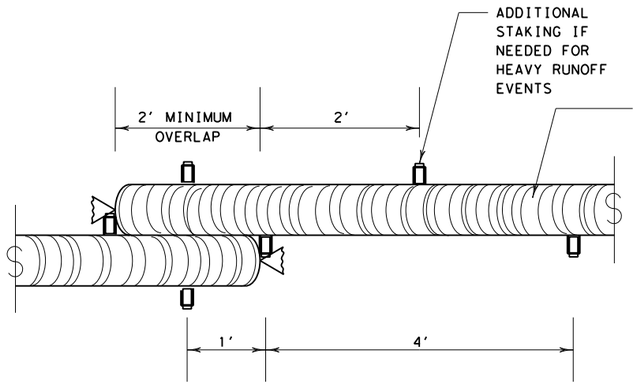
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

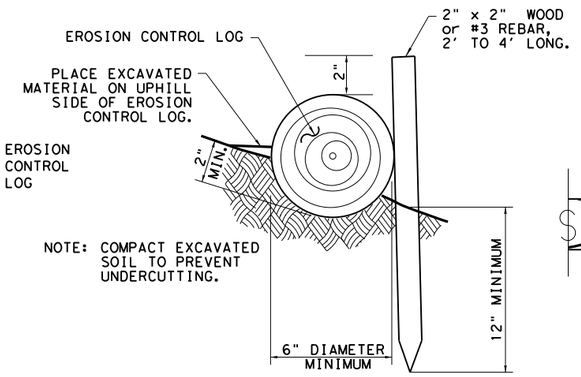
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

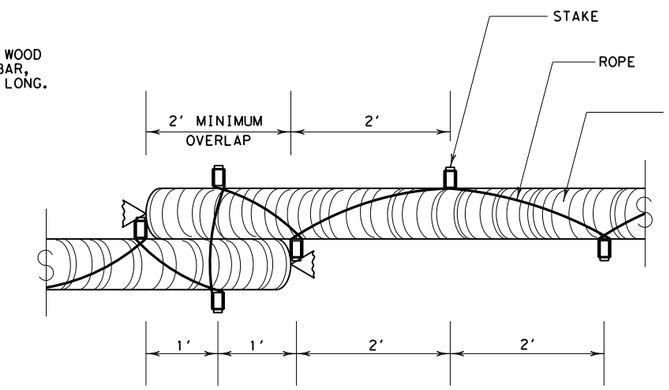


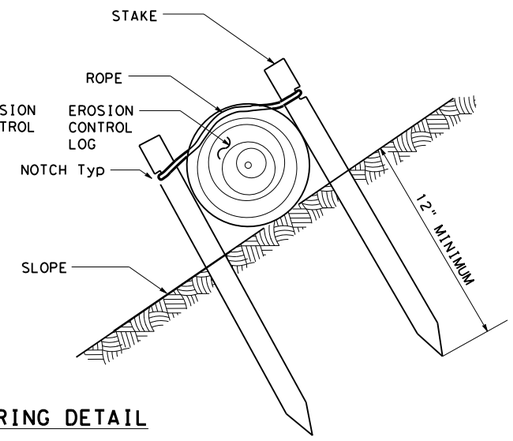


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

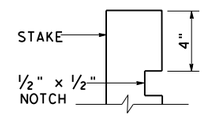
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

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

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
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	DIST	COUNTY		SHEET NO.	
	02	TARRANT		79	

DATE:
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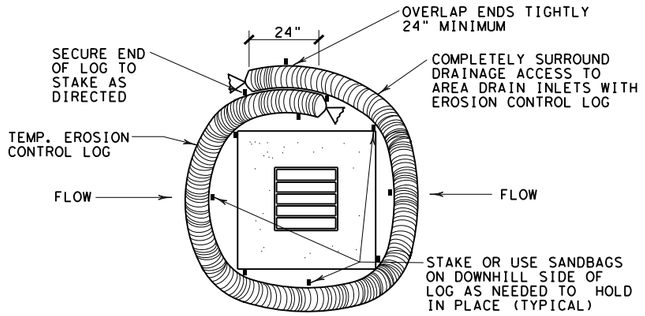
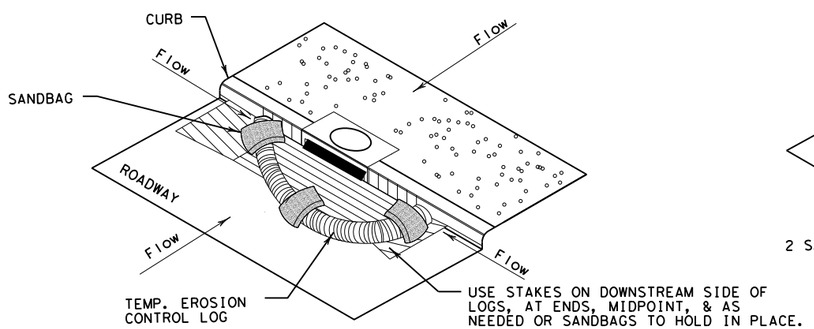


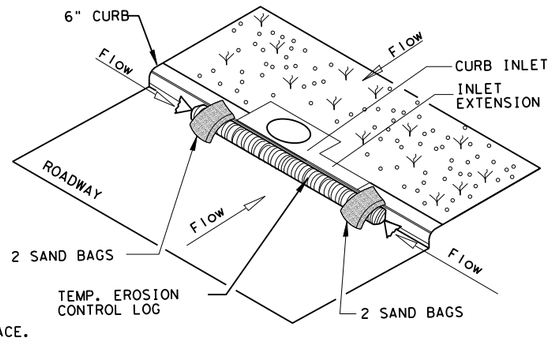
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

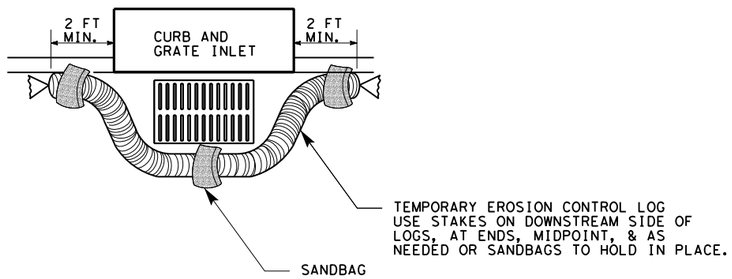
CL-CI



EROSION CONTROL LOG AT CURB INLET

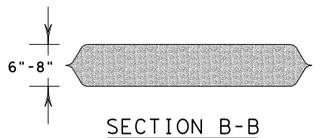
CL-CI

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

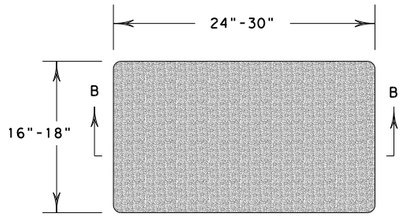


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY				SHEET NO.
	02	TARRANT				80

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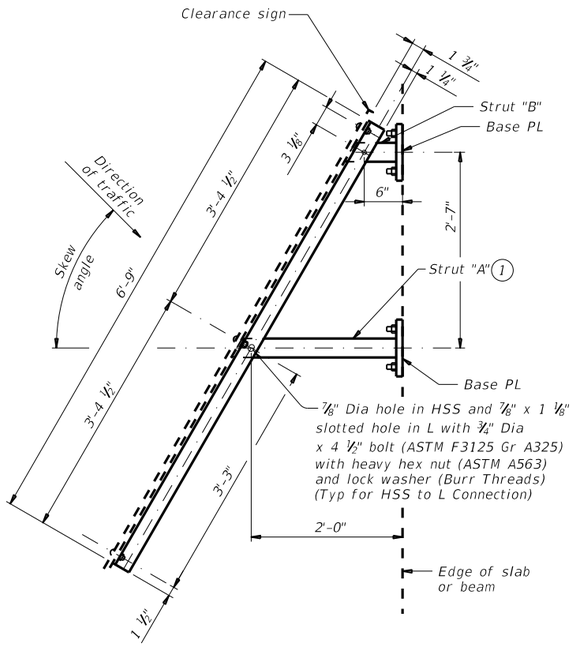
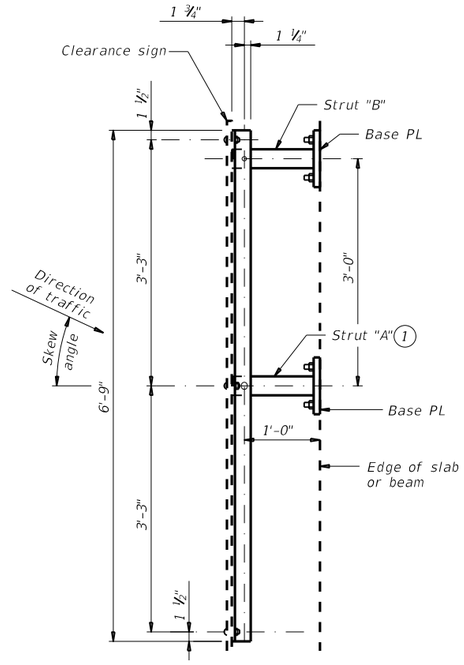


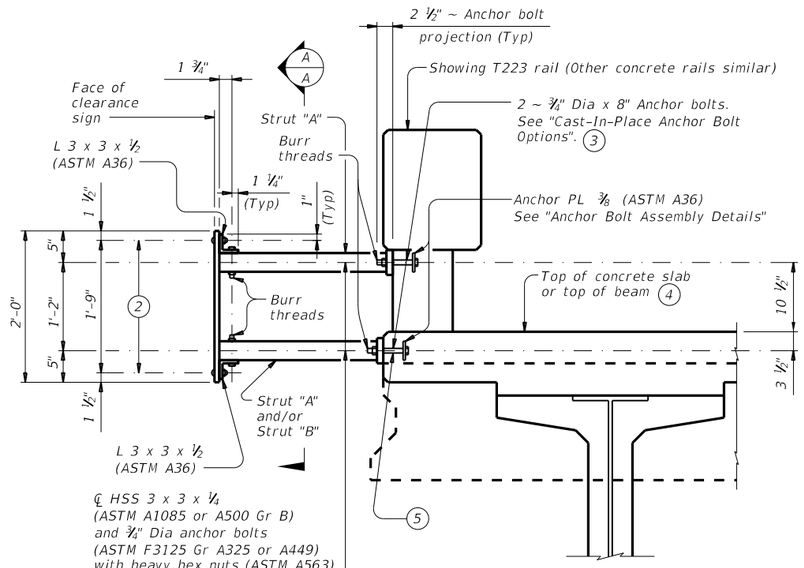
PLAN OF TYPE S MOUNT

(Used for skews over 30°)



PLAN OF TYPE N MOUNT

(Used for 0° to 30° skews)



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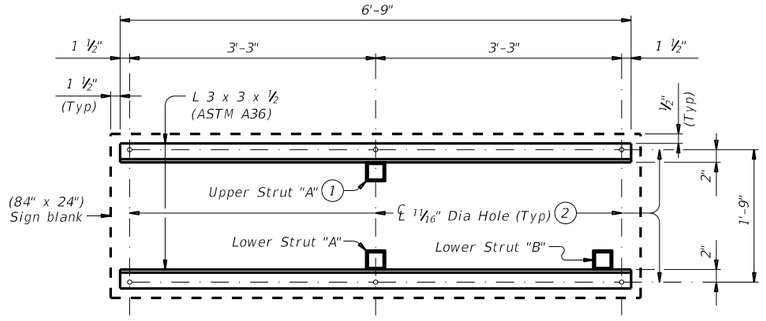

SECTION A-A

(1) Locate centerline of Strut A no closer than 12" from a vertical concrete edge.

(2) ℄ ⅝" Dia x 2" Hexagon socket button head cap screws (ASTM A574) with hex nuts. Attach hex nuts to L 3 x 3 x ½ by tack welding in two places. Threads must have Class 3A fit tolerance in accordance ASME B1.1. Six screws required.

(3) At the Contractor's option fully threaded adhesive anchors may be use instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are ¾" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(4) For decked slab beams topped with a 2 course surface treatment and ACP overlay.

(5) Anchor bolts to be cast into decked slab beams topped with a 2 course surface treatment or ACP overlay. Anchor bolts with heavy hex nuts, regular lock washers, hardened washers and anchor plate that is embedded in the beam will be provided by the beam Fabricator.

CONSTRUCTION NOTES:

Install the vertical face of clearance sign plumb unless otherwise approved by the Engineer.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 1 anchor per bridge mounted clearance sign installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components after fabrication unless otherwise noted.

GENERAL NOTES:

This standard provides details to mount a vertical clearance sign (84" x 24") to bridges. Rail Types T631, T631LS, PR11, PR22 and PR3 are not accommodated.

The Engineer will furnish the clearance to be shown on the sign.

See Bridge Layout for sign location and mounting type (Type N or S).

Cost of furnishing, installing, relocating or removing a clearance sign, including structural steel for sign mount, is included in unit price bid for Item 644, "Small Roadside Sign Assemblies".

One Sign Blank (84" x 24") is 14 SF.

Average steel weight for one complete Type N Mount is 219 Lb.

Average steel weight for one complete Type S Mount is 233 Lb.

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY

BMCS

FILE: bmcsste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		81

DATE: 5/16/2023 8:03:41 AM
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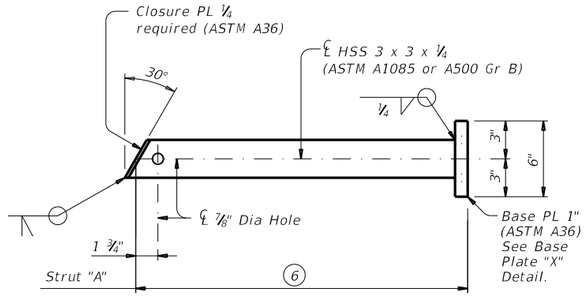
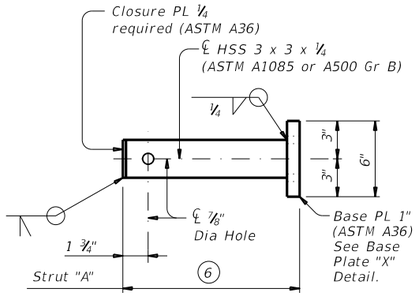
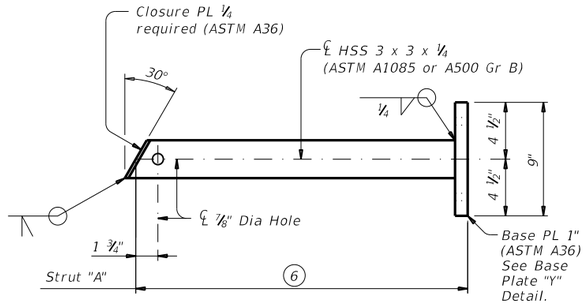


FOR T411 AND C411 RAIL TYPES



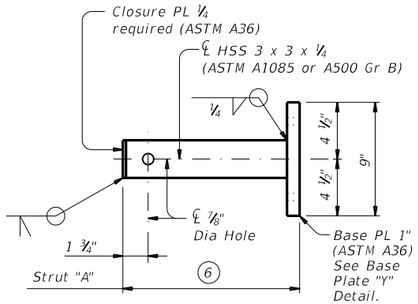
FOR T411 AND C411 RAIL TYPES



FOR T221, C221, T222, T223, C223, T401, T402, C402, T551, T552, T80HT, T80SS AND SSTR RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE S MOUNT)

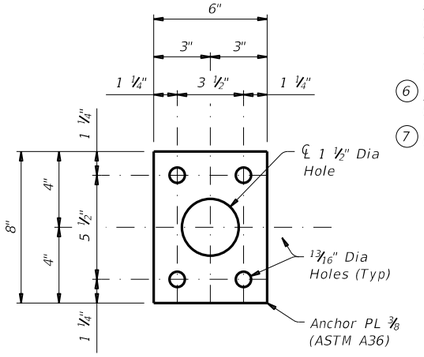
(Used for skews over 30°)



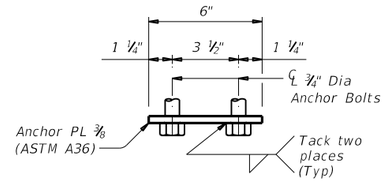
FOR T221, C221, T222, T223, C223, T401, T402, C402, T551, T552, T80HT, T80SS AND SSTR RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE N MOUNT)

(Used for 0° to 30° skews)



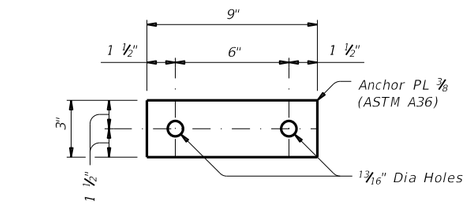
PLAN OF ANCHOR PLATE



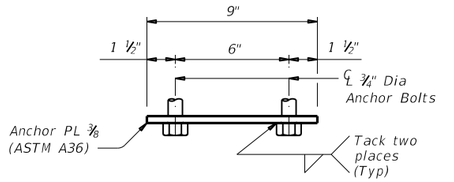
ELEVATION

ANCHOR BOLT ASSEMBLY DETAILS (3)

(Used on Base Plate "X" with T411 and C411 rail types.)



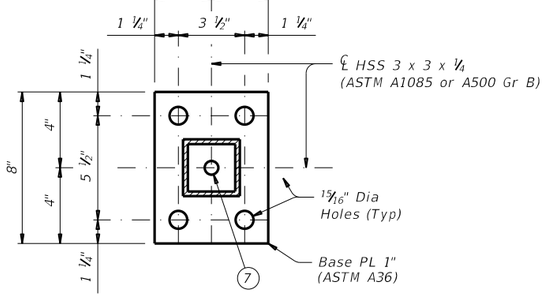
PLAN OF ANCHOR PLATE



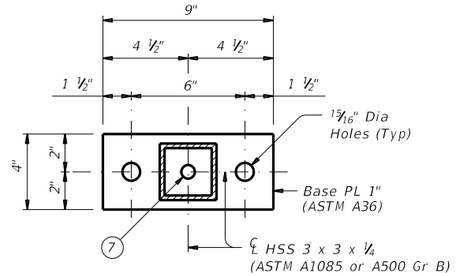
ELEVATION

ANCHOR BOLT ASSEMBLY DETAILS (3)

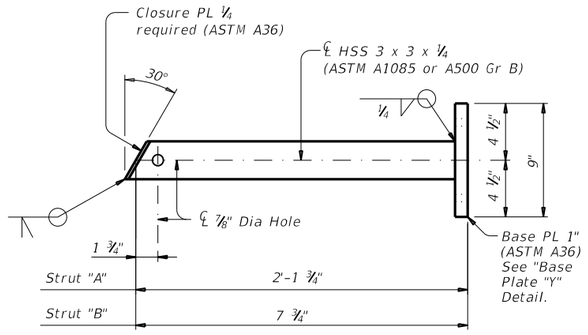
(Used on Base Plate "Y" and with T1F, T2P, C2P, T1W, C1W, T66 and C66 rail types.)



BASE PLATE "X" DETAIL

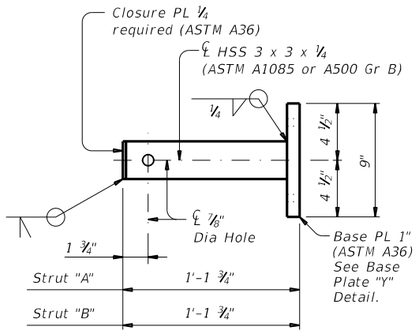


BASE PLATE "Y" DETAIL



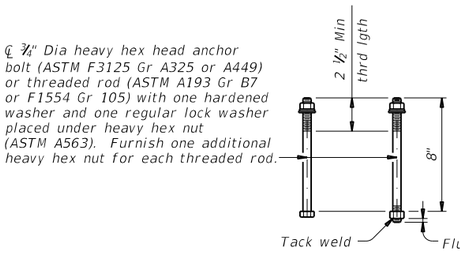
LOWER STRUT DETAILS FOR (TYPE S MOUNT)

(Used for skews over 30°)



LOWER STRUT DETAILS FOR (TYPE N MOUNT)

(Used for 0° to 30° skews)



CAST-IN-PLACE ANCHOR BOLT OPTIONS (3)

(3) At the Contractor's option fully threaded adhesive anchors may be use instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are ¾" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(6) Adjust length to accommodate edge of slab to back of rail for specific project conditions and to help plumb the vertical face of clearance sign.

(7) Hole required to drain zinc from base plate during galvanizing.

Texas Department of Transportation

Bridge Division Standard

BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY

BMCS

FILE: bmcsste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		82

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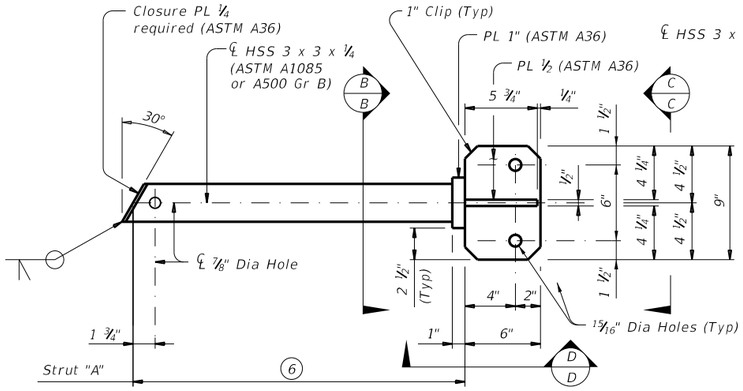
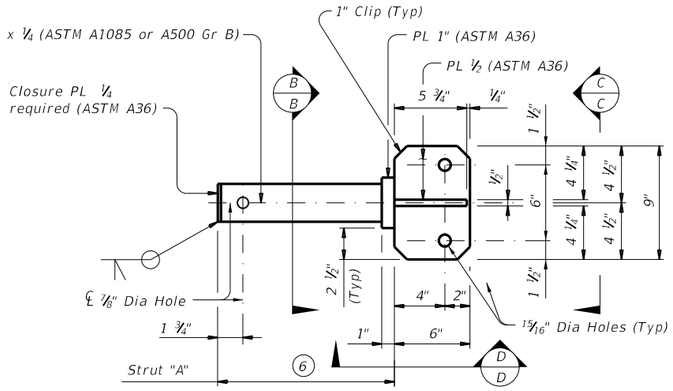


FOR T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE S MOUNT)

(Used for skews over 30°)



FOR T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL TYPES

UPPER STRUT DETAIL FOR (TYPE N MOUNT)

(Used for 0° to 30° skews)

(2) ℄ ⅞" Dia x 2" Hexagon socket button head cap screws (ASTM A574) with hex nuts. Attach hex nuts to L 3 x 3 x ½ by tack welding in two places. Threads must have Class 3A fit tolerance in accordance ASME B1.1. Six screws required.

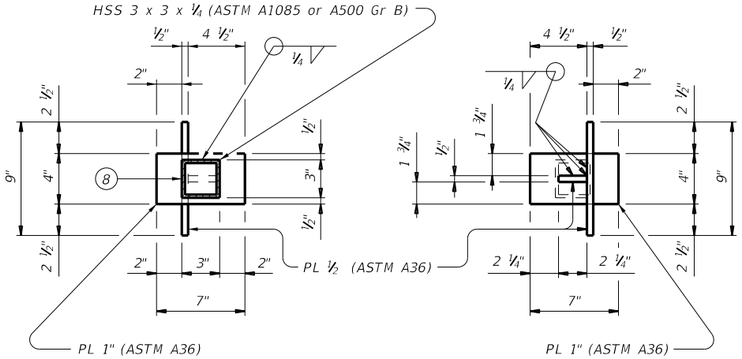
(3) At the Contractor's option fully threaded adhesive anchors may be use instead of cast-in-place anchor bolts. Expansion anchors are not allowed. Provide adhesive anchors that are ¾" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). Embed fully threaded rods using a Type III, Class C, D, E, or F anchor adhesive. Adhesive anchor embedment depth is 8". Anchor adhesive chosen must be able to achieve a factored bond strength in tension of 2.2 kips per anchor (edge distance and spacing must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(4) For decked slab beams topped with a 2 course surface treatment and ACP overlay.

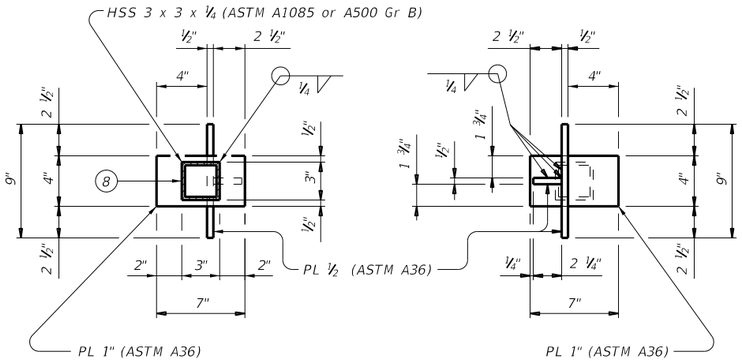
(6) Adjust length to accommodate edge of slab to back of rail for specific project conditions and to help plumb the vertical face of clearance sign.

(8) Hole required in bottom of HSS to drain zinc during galvanizing.

(9) 11" curb is for structures with 2" ACP overlay.



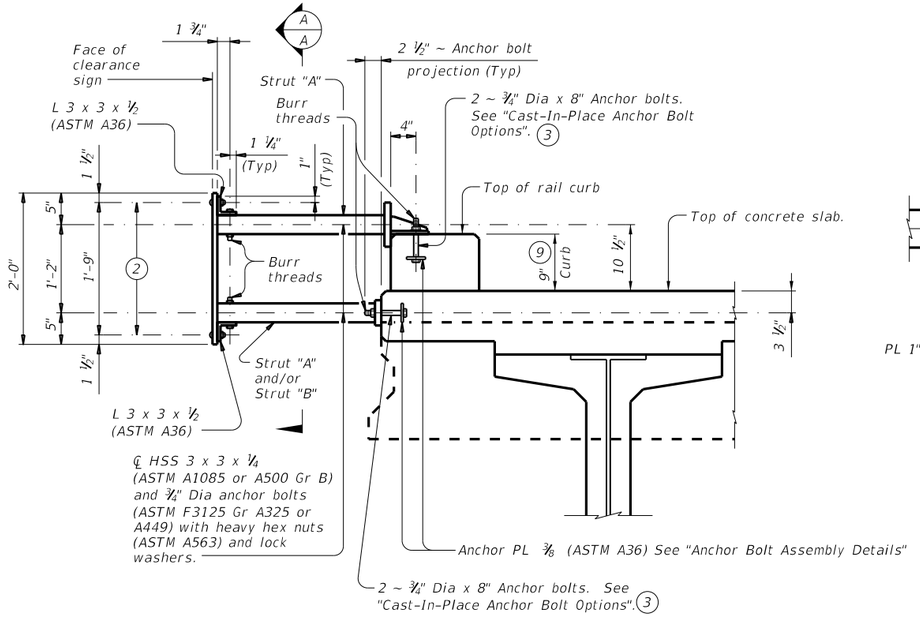
FOR 9" HIGH CURBS



FOR 11" HIGH CURBS

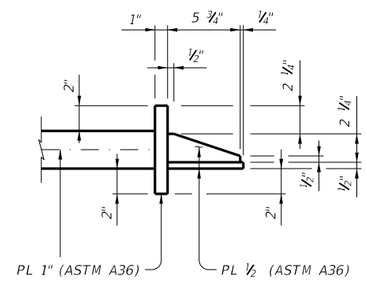
SECTION B-B

VIEW C-C

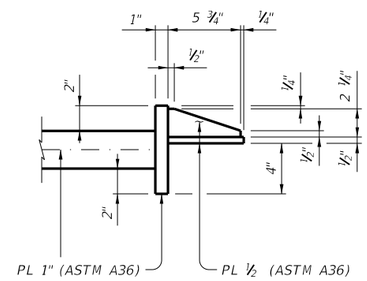


SECTION THRU T1F, T2P, C2P, T1W, C1W, T66 AND C66 RAIL CURB

Showing sign mount on a 9" high curb, 11" high curb similar.



FOR 9" HIGH CURBS



FOR 11" HIGH CURBS

VIEW D-D

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

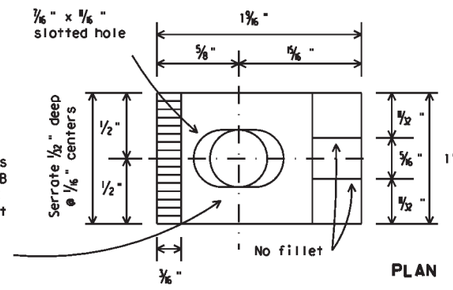
BRIDGE MOUNTED CLEARANCE SIGN ASSEMBLY

BMCS

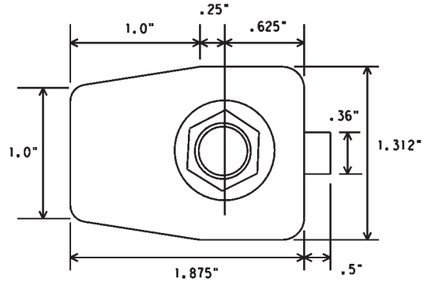
FILE: bmcsste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	14	124,ETC	IH 820
	DIST	COUNTY		SHEET NO.
	02	TARRANT		83

DATE: 5/15/2023 5:07:51 PM
FILE: pw://txdot.projectwiseonline.com:TxDOT2/Documents/02 - FTW/Design Projects/00081412/4 - Design/Bridge/Bridge Mounted Sign/smd21-08.dgn

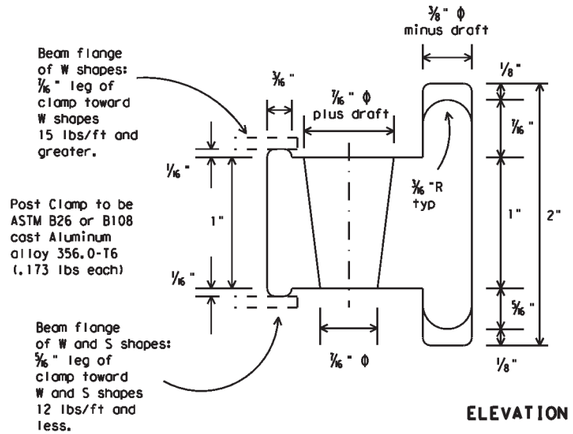
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

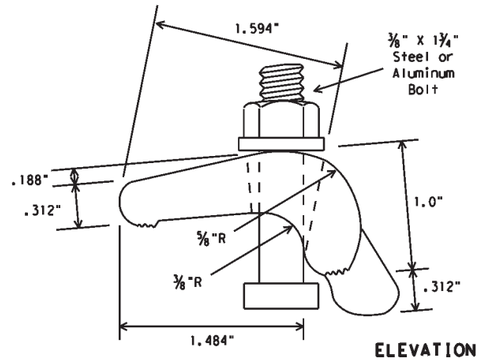


PLAN



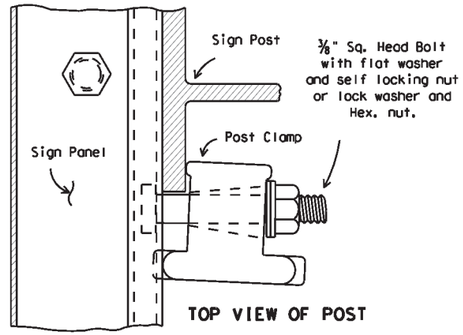
ELEVATION

POST CLAMP DETAIL

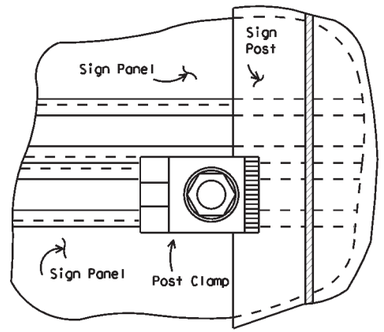


ELEVATION

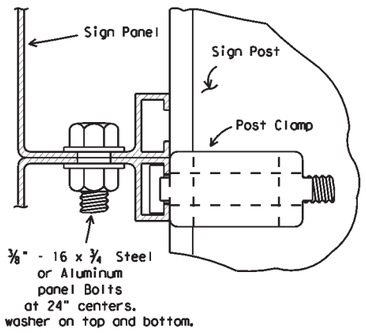
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



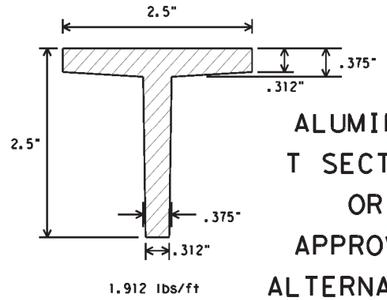
SIDE VIEW OF PANELS

CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

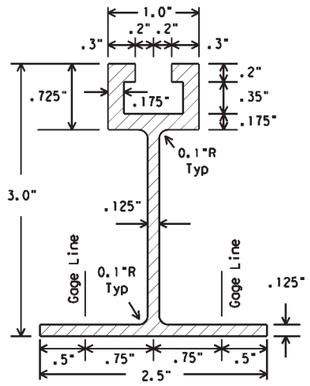


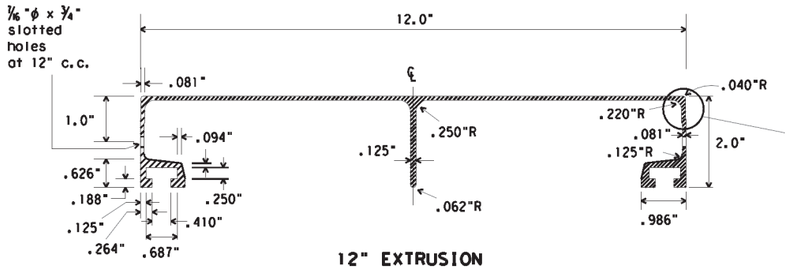
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

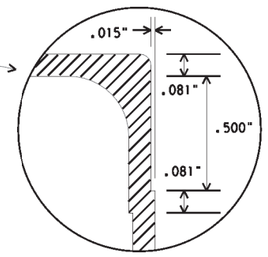
WINDBEAM CROSS SECTION

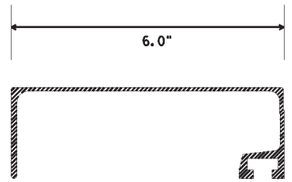
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



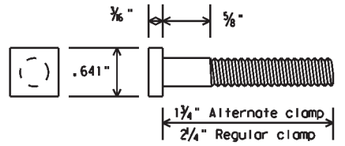


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	008	14	124	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		84

DATE: 5/15/2023 5:07:58 PM
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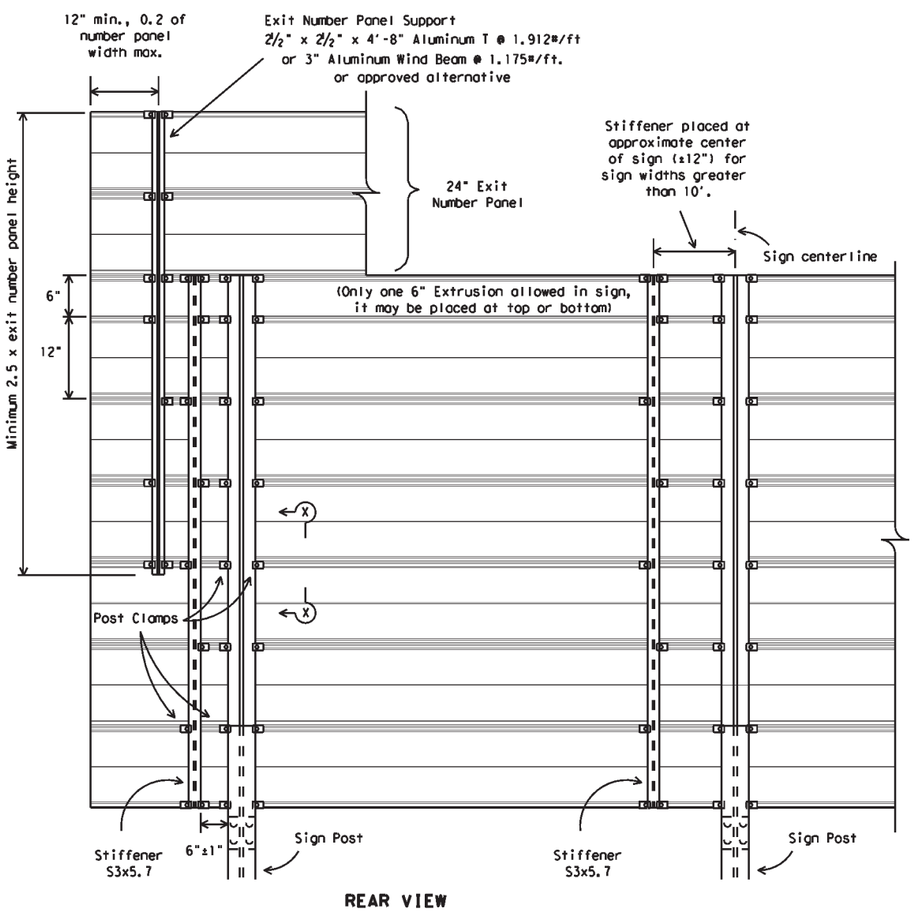
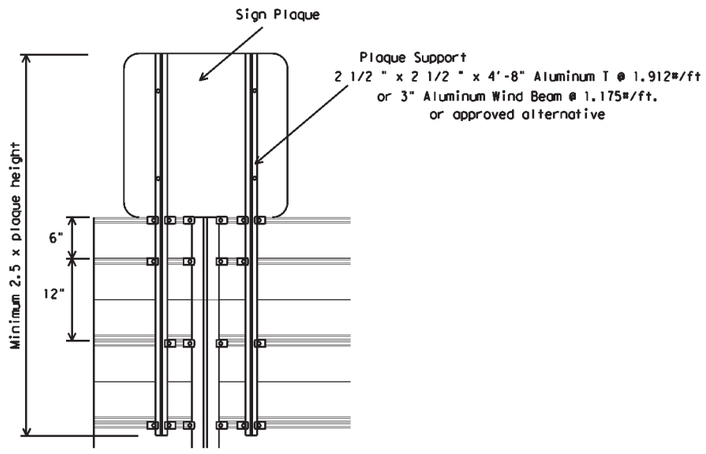
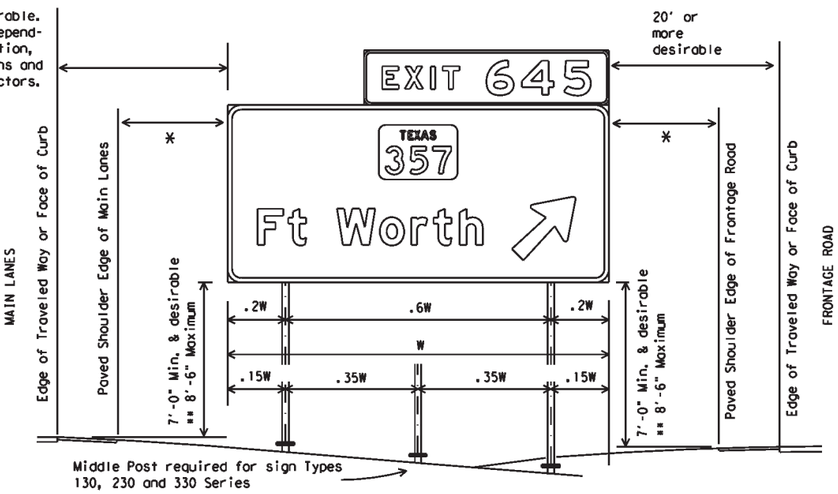


ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

* - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	008	14	124	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		85

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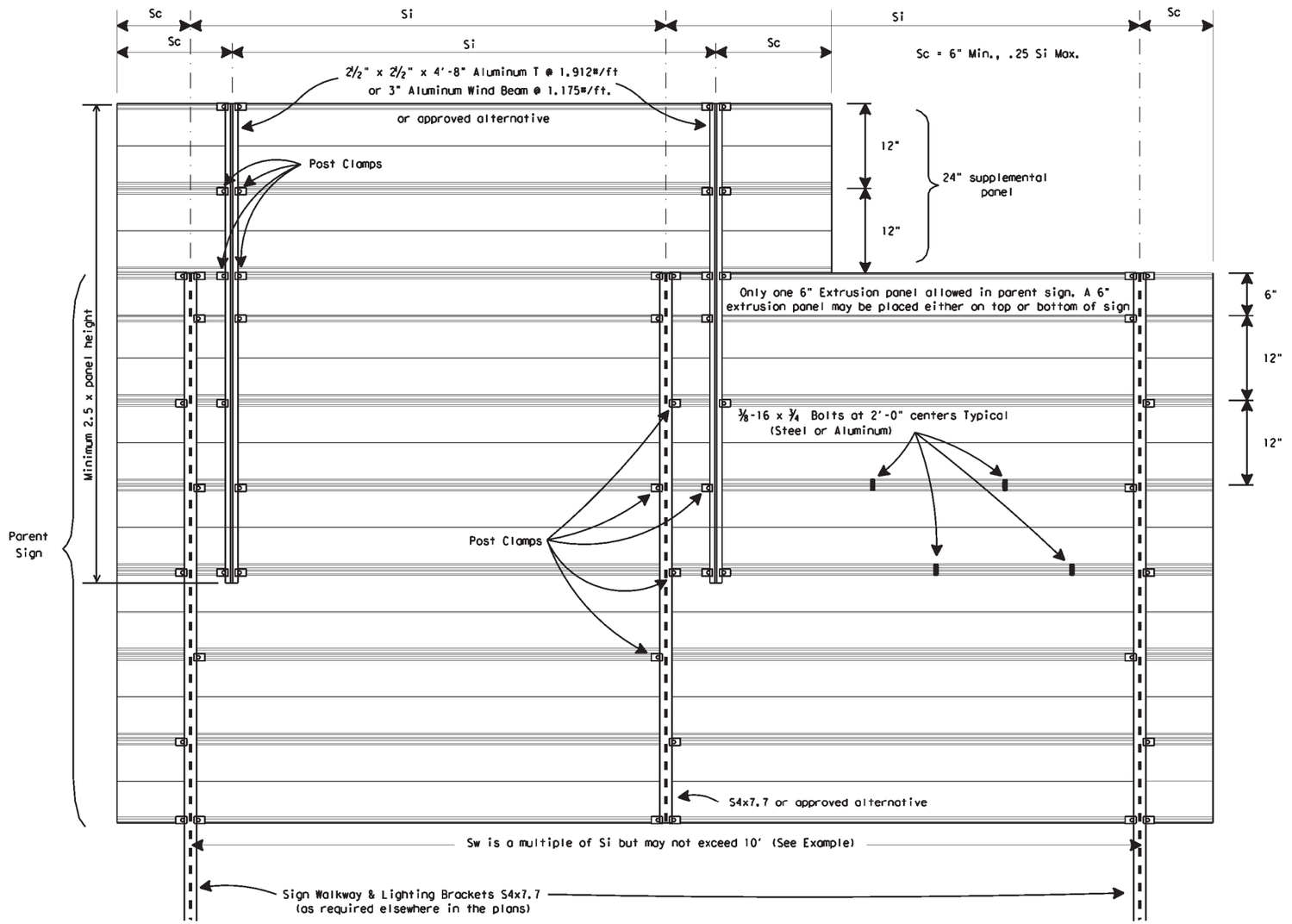
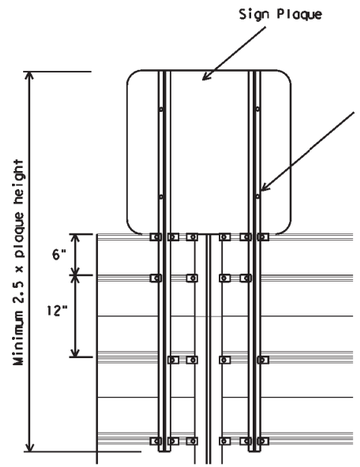


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

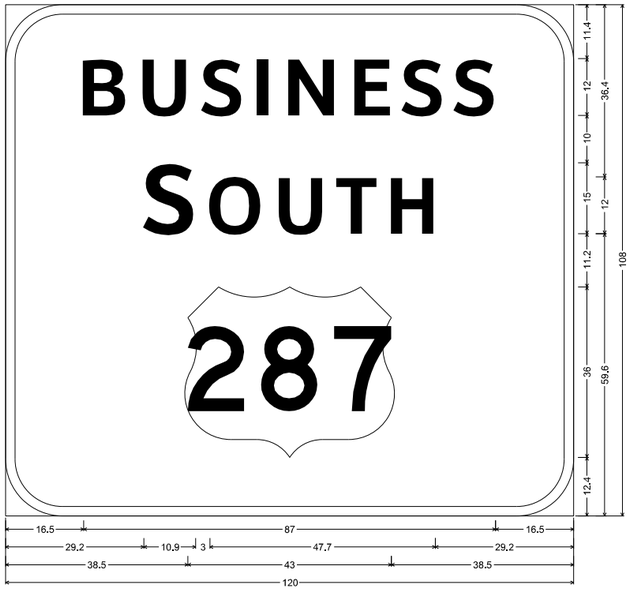
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

CONT	SECT	JOB	HIGHWAY
008	14	124	IH 820
DIST	COUNTY		SHEET NO.
FTW	TARRANT		86



12.0" Radius, 2.0" Border, White on Green;
"BUSINESS", ClearviewHwy-5-W-R; "S OUTH", ClearviewHwy-5-W-R; US 287 M1-4;

90 SF TY O

R14-2_36x36;
2.3" Radius, 0.9" Border, 0.6" Indent, Black on White;

12.0" Radius, 2.0" Border, White on Green;
Interstate 820 M1-1 16.0" D; "E AST", ClearviewHwy-5-W-R; "NEXT RIGHT", ClearviewHwy-5-W-R;

84 SF TY O

R14-2_36x36;
2.3" Radius, 0.9" Border, 0.6" Indent, Black on White;

12.0" Radius, 2.0" Border, White on Green;
Interstate 820 M1-1 16.0" D; "W EST", ClearviewHwy-5-W-R; "NEXT RIGHT", ClearviewHwy-5-W-R;

87.5 SF TY O

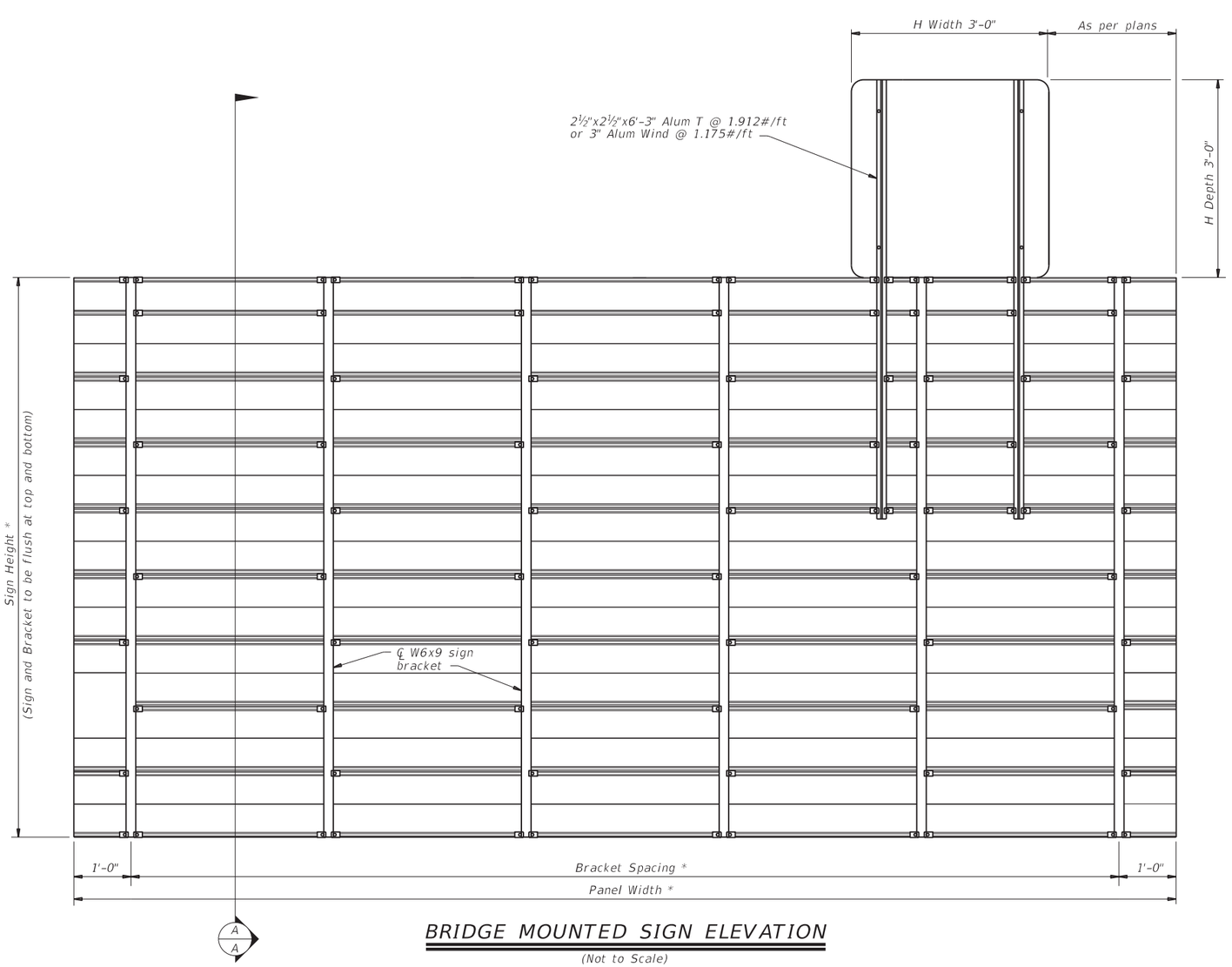
_____, PE

05/15/2023
DATE

IH 820 SIGN DETAILS

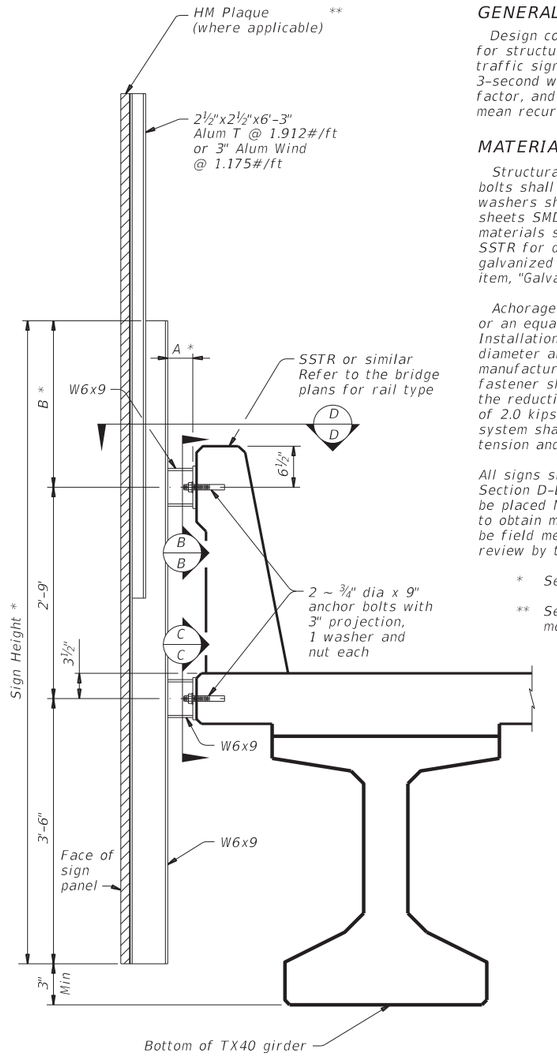
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	14	124,ETC	IH 820
DIST	COUNTY		SHEET NO.
02	TARRANT		87



BRIDGE MOUNTED SIGN ELEVATION

(Not to Scale)



SECTION A-A

(Not to Scale)

GENERAL NOTES:

Design conforms to 2015 AASHTO LRFD specicifications for structural supports fo highway signs, luminaries, and traffic signals and 2020 interim specifications. Design 3-second wind speed of 120 mph with a 1.14 gust effect factor, and a wind importance factor of 1.0 (1700 year mean recurrence interval) for the supporting structure.

MATERIAL NOTES:

Structural steel shall be ASTM, A572 grade 50. Anchor bolts shall be ASTM F1554 grade 36 minimum, nuts and washers shall be ASTM A563 and F436. Refer to standard sheets SMD (2-1)-08, SMD (2-3)-08, SMD (2-4)-08, department materials specifications DMS-7120 "Sign Hardware" and type SSTR for details not covered here. All parts shall be galvanized in accordance with standard specification item, "Galvanizing".

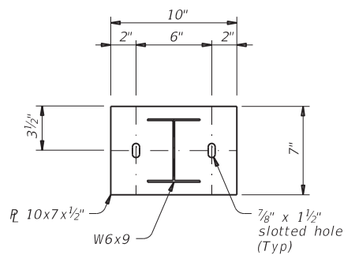
Achorage fasteners shall be Hilti HIT-RE500V3 + HAS-V-36 or an equal anchoring system approved by the engineer. Installation of anchor fasteners including hole depth, diameter and material shall be in accordance with the manufacturer's recommendations. Each embedded anchor fastener shall resist service design loading (after applying the reduction factors of bolt spacing and bolt edge distance) of 2.0 kips tension and 0.2 kips for shear. Each anchoring system shall provide a capacity to resist the required tension and shear acting simultaneously.

All signs shall be placed normal to direction of traffic. Section D-D is showing a skewed connection. Sign shall be placed Normal to traffic and the Length 'A' adjusted to obtain minimum clearance at Edge of Sign. Skew shall be field measured and included in shop drawings for review by the Engineer.

* See table for information

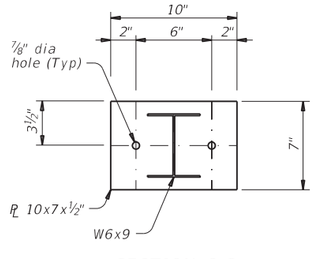
** See standard SMD (2-3)-08 and SMD (2-4)-08 for more information

(1) Value provided is minimum length allowed. Increase length of member to account for bridge skew, keeping the minimum clearance between end of sign and rail as shown.



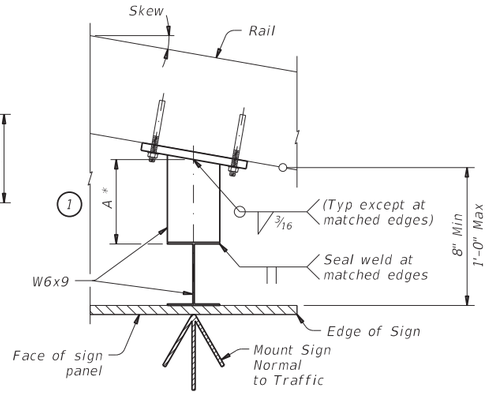
SECTION B-B

(Not to Scale)



SECTION C-C

(Not to Scale)



SECTION D-D

(Not to Scale)

SUMMARY OF ESTIMATED QUANTITIES
BRIDGE RAIL SIGN MOUNTS

ITEM	DESCRIPTION	UNIT	QTY
0449 6001	ANCHOR BOLTS	EA	36
0647 6001	INSTALL LRSS (STRUCT STEEL)	LB	1,100

TABLE OF VARIABLE DIMENSIONS

Sign Structure	Location	Panel	Panel Width	Sign Height	Number of Brackets	Bracket Spacing	A (1)			B
BS 287	IH-820 WB COLLECTOR RD	-	10'-0"	9'-0"	3	4'-0"	4"	4"	4"	2'-9"
IH-820 E	IH-820 WB COLLECTOR RD	A	12'-0"	7'-0"	3	5'-0"	4"	4"	4"	9"
IH-820 W	IH-820 EB COLLECTOR RD	A	12'-6"	7'-0"	3	5'-3"	4"	4"	4"	9"

Texas Department of Transportation | Bridge Division

LARGE OVERHEAD SIGN BRIDGE RAIL MOUNTED BRACKETS

SHEET 1 OF 1

FILE: IH0820_BRG_M101.dgn	DN: LP	CK: HSW	DW: PNG	CK: LP
©TxDOT June 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	008	14	124	IH 820
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		88