DESIGN	DIV. NO.	PROJECT NO.		SHEET NO.
GRAPHICS	6	NH2021(163)		1
	STATE	STATE DIST.	COUNTY	
CHECKED	TEXAS	12	HARRIS	
CHECKED	CONT.	SECT.	JOB	HIGHWAY NO.
	0271	16	160	IH 610

SEE SHEET 2 FOR
INDEX OF SHEETS

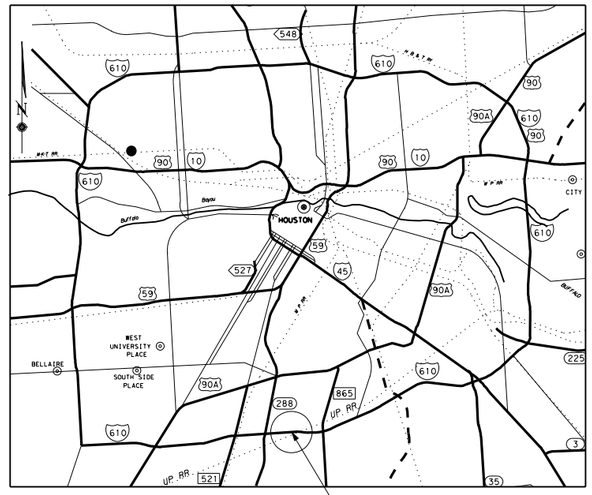
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO.: NH2021(163)
CSJ 0271-16-160
I-610
HARRIS COUNTY
LIMITS: IH 610 AT HOLMES RD/UPRR

NET LENGTH OF PROJECT	=	0.153 MI
BRIDGE:	807.08FT	=	0.153 MI
TOTAL:	807.08FT	=	0.153 MI

FOR THE CONSTRUCTION OF BRIDGE MAINTENANCE CONSISTING OF BRIDGE REPAIRS



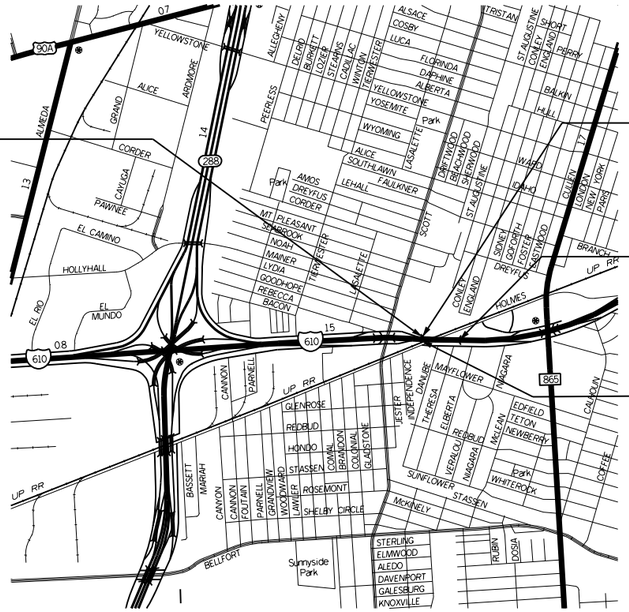
VICINITY MAP
(NTS)

BEGIN PROJECT
CSJ:0271-16-160
CL IH 610 MAINLANE
STA 700+37.00
REF MARK=36+1.116
MILE POINT =25.420
X=3,122,801.02
Y=13,814,736.02
LATITUDE:29° 40'50.65"W
LONGITUDE:95° 21'52.10"N

NBI# 12-102-0027-11-6485
IH 610 WBML AT HOLMES RD/UPRR

END PROJECT
CSJ:0271-16-160
CL IH 610 MAINLANE
STA 708+44.08
REF MARK=36+0.963
MILE POINT =25.267
X=3,124,130.83
Y=13,814,736.02
LATITUDE:29° 40'50.65"N
LONGITUDE:-95° 21'52.10"W

NBI# 12-102-0027-11-6237
IH 610 EBML AT HOLMES RD/UPRR



LOCATION MAP
(NTS)

DESIGN SPEEDS	
MAINLANES:	60 MPH
FRONTAGE ROAD:	30 MPH
RAMPS:	45 MPH
CROSS STREET:	35 MPH

DESIGN ADT - IH 610				
	MAINLANES	FRONTAGE RD	WESTBOUND ENTRANCE RAMP	EASTBOUND ENTRANCE RAMP
2020	193,600	1,931	7,601	6,439
2040	272,500	2,674	10,525	8,915

HORIZONTAL COORDINATES ARE IN U.S. SURVEY FEET BASED ON THE TEXAS COORDINATE SYSTEM SOUTH CENTRAL ZONE 4204, NORTH AMERICAN DATUM OF 1983 (NAD83), (1993 ADJUSTMENT), GEOID 09 MODEL, WITH DISTANCES AND COORDINATES SHOWN IN SURFACE VALUES WHICH MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.

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 PROVISION, FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA-1273, MAY 2012)

RR CROSSINGS : YES
EQUATIONS : NONE
EXCEPTIONS : NONE

TEXAS DEPARTMENT OF TRANSPORTATION

10/12/2020
SUBMITTED FOR LETTING:
DocuSigned by: Alexine Stittiams-Ward, P.E.
SUPERVISING DISTRICT ENGINEER

10/22/2020
APPROVED FOR LETTING:
DocuSigned by: James Koch, P.E.
For DISTRICT ENGINEER

COUNTY HARRIS PROJ. NO. NH2021(163)
HWY. NO. IH 610 LETTING DATE DECEMBER 2020
DATE ACCEPTED

10/7/2020 4:04:27 PM ANGO
pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601X4 - Design\Master Design Files\0271-16-160\General\001 TITLE SHEET.dgn

INDEX OF SHEETS: (CSJ: 0271-16-160)

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4		ESTIMATE & QUANTITY
		QUANTITY SUMMARIES
5		SUMMARY OF QUANTITIES
6		SUMMARY OF BRIDGE REPAIR QUANTITIES
		TRAFFIC CONTROL PLANS
7		IH 610 CONSTRUCTION PHASING NARRATIVE
7A		IH 610 CONSTRUCTION PHASING LAYOUT
8		IH 610 ADVANCE WARNING SIGNS (SHEET 1 OF 3)
9		IH 610 ADVANCE WARNING SIGNS (SHEET 2 OF 3)
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11		IH 610 EB DETOUR PLAN (WEEKEND ONLY)
12		IH 610 WB DETOUR PLAN (WEEKEND ONLY)
13		IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY) (SHEET 1 OF 12)
14		IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY) (SHEET 2 OF 12)
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18		IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY) (SHEET 6 OF 12)
19		IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY) (SHEET 7 OF 12)
20		IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY) (SHEET 8 OF 12)
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105		STEEL REPAIR DETAILS AT FLOOR BEAM 4R-EB
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139	#	TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC(9)-16 (SHEET 3 OF 3)
140	#	FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER (HOU DIST)

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

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

DocuSigned by:
Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...
SIGNATURE

12/2/2020
DATE

INDEX OF SHEETS

Texas Department of Transportation

SCALE: NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		2

County: Harris

Highway: IH 610

General Notes:

General:

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

Melody Galland,P.E. Area Engineer-Email:Melody.Galland@txdot.gov
David Lazaro P. E. Assistant Area Engineer – Email: David.Lazaro@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

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

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, and CCSJ/Project Name.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

General: Site Management

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

County: Harris

Highway: IH 610

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

Tricycle Type	Truck Type - 4 Wheel
Wayne Series 900	M-B Cruiser II
Elgin White Wing	Wayne Model 945
Elgin Pelican	Mobile TE-3
	Mobile TE-4
	Murphy 4042

General: Traffic Control and Construction

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

General: Utilities

Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and

traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662 to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Perform electrical work in conformance with the National Electrical Code (NEC) and Department's standard sheets.

Before beginning any underground work, notify the City of Houston's Chief Inspector, Public Works and Engineering, to establish the locations of any existing electrical systems for lighting facilities within the limits of this project.

Item 7: Legal Relations and Responsibilities

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 if 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 their determinations for review by the Department or any regulatory agency.

The total area disturbed for this project is 2.73 acres. The disturbed area in this project, the project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer (to the appropriate MS4 operator when on an off-state system route) and to the local government that operates a separate storm drain system.

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District

Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

No significant traffic generator events have been identified.

If the work is on or in the vicinity of an at-grade railroad crossing, involves incidental work on railroad right of way, or involves construction of a railroad grade separation structure, notify the railroad company's Division Engineer and the Department's Project Engineer at least 30 days before performing any work on the railroad right of way and make arrangements for railroad flaggers unless otherwise shown in the contract. Obtain the required Railroad Right of Entry Permit from the railroad company. Payment of applicable permit fees is the responsibility of the Contractor. Acquiring the Railroad Right of Entry Permit is a lengthy process, allow sufficient time for this.

Item 8: Prosecution and Progress

Working days will be computed and charged based on a standard workweek in accordance with

Section 8.3.2 and Nighttime Work and Daytime Requiring Inspector in accordance with Section 8.3.2.2.2.

The Lane Closure Assessment Fees are shown below. These fees apply to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment fees refer to the Item 502 "Barricades, Signs, and Traffic Handling".

County: Harris

Highway: IH 610

IH 610 Mainlanes At Holmes Road/Union Pacific Railroad (UPRR) - $4500

IH 610 Eastbound Frontage Road At Holmes Road/UPRR - $50

IH 610 Westbound At Holmes Road/UPRR - $200

IH 610 Eastbound Entrance Ramp At Holmes Road/UPRR - $200

This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling."

Item 361: Repair of Concrete Pavement

For full depth repair, remove only the quantity of pavement replaceable during the daily allowable work schedule.

Remove loose sub-base material and replace it with concrete. Use a bondbreaker, such as a polyethylene sheet, at the interface between the replaced sub-base material and the new concrete pavement.

Supply polyethylene fabric on the job site sufficient to cover the area of repair.

Do not place concrete if impending weather may result in rainfall or low temperatures that may impair the quality of the finished work.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before those areas receive permanent pavement markings and open to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with adjacent undamaged areas. Do not repair by grouting onto the surface.

Ready mix concrete will be permitted if the equipment and construction methods can produce the desired results. Hand finishing will be permitted.

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

Item 442: Metal for Structures

Use temperature zone 1 for Charpy V-Notch (CVN) testing.

Prestressed concrete panels will not be allowed on steel structures.

County: Harris

Highway: IH 610

Item 502: Barricades, Signs, and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

Erect temporary signs when exit ramps are closed or moved to new locations during construction.

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

County: Harris

Highway: IH 610

One Lane Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday	9:00 AM - 3:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Tuesday	9:00 AM - 3:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Wednesday	9:00 AM - 3:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Thursday	9:00 AM - 3:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Friday	9:00 AM - 3:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM - 9:00 AM 3:00 PM - 9:00 PM
Saturday	As Approved by Engineer	12:00 AM -5:00 AM 9:00 PM -11:59 PM	N/A
Sunday	As Approved by Engineer	12:00 AM -5:00 AM 9:00 PM -11:59 PM	N/A

Full Roadway Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Thu Friday	NONE	12:00 AM -5:00 AM 9:00 PM -11:59 PM	5:00 AM – 9:00 PM
Saturday thu Sunday	5:00 AM - 9:00 PM	12:00 AM -5:00 AM 9:00 PM -11:59 PM	NONE

County: Harris

Highway: IH 610

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

Coordinate Full IH 610 Eastbound and/or Eastbound closures through the Area Engineer. The Area Engineer may reduce the above times if they conflict with previously approved closures being performed on an adjacent project.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Officer of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened to traffic again.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the locations of each total closure which informs the traveling public of the details of the closure.

Minimize the number of working days for street closures. The following table lists the maximum number of working days allowed for each street closure. The closure period for each intersection occurs only during the phase when work on bridge over that street, unless otherwise directed. Reopen the street within the number of working days allowed; otherwise the Engineer may cease construction activities not affiliated with reopening the closed street, until it fully reopens to the traveling public. Time charges will not be suspended nor increased to compensate for this occurrence.

Street Name	Number of Working Days Allowed for Closure
Holmes Road	***3***

Before closing any City of Houston sidewalk, one or more city street lanes, or entire city streets during construction, obtain a permit to do so from the City. Obtain the required permit in person at the City of Houston Permit Office, or apply online at http://www.gims.houstontx.gov.

County: Harris

Highway: IH 610

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

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures**.**

Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

Item 738: Cleaning and Sweeping Highways

Sweep the roadway within the project limits according to the following chart for the duration of the project or as directed. This work is paid for under their respective bid items.

Cleaning and Sweeping Highways		
2 cycles		

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

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

County: Harris

Highway: IH 610

Level 3 Compliant TMAs/TAs are required for this project.

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

QUANTITY SHEET

CONTROLLING PROJECT ID 0271-16-160 **DISTRICT** Houston **COUNTY** Harris
HIGHWAY IH 610

			CONTROL SECTION JOB		**0271-16-160**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00132815**			
			COUNTY		**Harris**			
			HIGHWAY		**IH 610**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	162-6002	BLOCK SODDING		SY	50.000		50.000	
	166-6001	FERTILIZER		AC	0.010		0.010	
	168-6001	VEGETATIVE WATERING		MG	1.240		1.240	
	361-6022	HALF - DEPTH REPAIR CRCP (13")		SY	58.000		58.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)		SF	278.000		278.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)		LF	1,248.000		1,248.000	
	442-6008	STR STEEL (MISCELLANEOUS BRIDGE)		LB	1,635.000		1,635.000	
	446-6002	CLEAN & PAINT EXIST STR (SYSTEM II)		LS	1.000		1.000	
	500-6001	MOBILIZATION		LS	10.00%		10.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	14.000		14.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)		SY	223.000		223.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)		SY	223.000		223.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	350.000		350.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	350.000		350.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")		LF	1,200.000		1,200.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	1,200.000		1,200.000	
	731-6002	PAVEMENT EDGES, STRUCTURES & FIXTURES		LS	1.000		1.000	
	738-6001	CLEANING / SWEEPING (CENTER MEDIAN)		CYC	2.000		2.000	
	738-6003	CLEANING / SWEEPING (OUTSIDE MAIN LANE)		CYC	2.000		2.000	
	738-6011	CLEANING / SWEEPING (HANDWORK)		SY	538.000		538.000	
	780-6002	CNC CRACK REPAIR (DISCRETE)(INJECT)		LF	110.000		110.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN		DAY	1,944.000		1,944.000	
	6185-6002	TMA (STATIONARY)		DAY	696.000		696.000	
	02	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK		LS	1.000		1.000	
	08	SAFETY CONTINGENCY (NON-PART)		LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE (NON-PART)		LS	1.000		1.000	
		LAW ENFORCEMENT		LS	1.000		1.000	

SUMMARY OF QUANTITIES CSJ 0271-16-160

ITEM NO.	162	166	168	502	506	506	506	506	506	506	738	738	6001	6185
DESC CODE	6002	6001	6001	6001	6021	6024	6038	6039	6042	6043	6001	6003	6001	6002
	BLOCK SODDING	FERTILIZER	VEGETATIVE WATERING	BARRICADES,SIGNS, AND TRAFFIC HANDLING	CONSTRUCTION EXITS (INSTALL) (TY 2)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)	CLEANING / SWEEPING (CENTER MEDIAN)	CLEANING / SWEEPING (OUTSIDE MAIN LANE)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	SY	AC	MG	MO	SY	SY	LF	LF	LF	LF	CYCLE	CYCLE	DAY	DAY
PROJECT TOTALS	50	0.01	1240	14	223	223	350	350	1200	1200	2	2	1944	696

SUMMARY OF QUANTITIES

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	NH 2021(163)		5
STATE	STATE DIST. NO.	COUNTY	
TEXAS	HOU	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	16	160	IH 610

BRIDGE REPAIR QUANTITIES

Item No.	361-6022	429-6007	438-6004	442-6008	446-6002	731-6002	738-6011	780-6002
Item	HALF - DEPTH REPAIR CRCP (13")	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING EXIST JOINTS(CL7)	STR STEEL (MISCELLANEOUS BRIDGE)	CLEAN & PAINT EXIST STR (SYSTEM II)	PAVEMENT EDGES, STRUCTURES & FIXTURES	CLEANING / SWEEPING (HANDWORK)	CNC CRACK REPAIR (DISCRETE) (INJECT)
Unit	SY	SF	LF	LB	LS	LS	SY	LF
Quantity	58	278	1,248	1,635	1	1	538	110

Material Specifications:

References to Items are referring to specification Items of the November 2014, TxDOT Standard Specification for Construction and Maintenance of Highways, Streets, and Bridges. DMS refers to a TxDOT Departmental Materials Specification. MPL refers to a TxDOT Material Producer List.

1. Structural steel: ASTM A709 Grade 50 or Grade 50S in accordance with (IAW) Item 442 Metal for Structures. Pay item 0442-6008.

2. Nuts: ASTM A563 Grade DH, Heavy Hex Nuts. Pay item 0442-6008.

3. Washers: ASTM F436 Type 1. Pay item 0442-6008.

4. All new structural steel, anchor bolts, nuts and washers to be hot dip galvanized IAW Item 445 Galvanizing. Pay item 0442-6008.

5. Paint for existing steel and hardware: System II paint IAW Item 446 Field Cleaning and Painting Steel. Pay item 0446-6002.

6. Steel caulk: DMS-8142 Paintable Caulk for Concrete and Steel and corresponding MPL. Pay item 0446-6002.

7. Elastomeric washer: 1/2" thick, 60 Durometer, Polychloroprene (Neoprene) plain elastomeric bearing pad material IAW Item 434 Bridge Bearings. Pay item 0442-6008.

8. Joint sealant: Class 7 joint sealant IAW DMS-6310 Joint Sealants and Fillers. Pay item 0438-6004.

9. Concrete Repair: Vertical or Overhead Repair Materials: Type C repair materials IAW DMS-4655 Concrete Repair Materials. Pay item 0429-6007.

10. Concrete Repair: Crack Repair Crack Injection Material: Type IX low-viscosity resin (ASTM C 881 Type IV, Grade 1) IAW DMS-6110 Quality Monitoring Program for Epoxies and Adhesives. Pay item 0780-6002.

11. Concrete Repair: Epoxy for Sealing the Surface of Cracks: Type V or VII concrete epoxy adhesive IAW DMS-6110 Quality Monitoring Program for Epoxies and Adhesives. Pay item 0780-6002.

12. Herbicide: Apply and furnish herbicide IAW Item 731 Herbicide Treatment. Pay item 0731-6002.

Field Measurements:

Selected as-built drawings are provided for information. Dimensions shown on the current and as-built plans must be field verified by the Contractor. Report any discrepancies between field conditions and as-built drawings to the Engineer. The field measured dimensions must be used as the basis for construction.

Debris Removal and Disposal:

The contractor is explicitly responsible for removing and disposing of all materials and debris generated by construction activities off TxDOT and UPRR right of way in accordance with all applicable local, state, and federal laws and regulations. Payment for removal and disposal shall be subsidiary to the pay item that generated the debris.

HS20 LOADING

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED PROFESSIONAL ENGINEER

Negoiță A.

08/07/2020

Texas Department of Transportation

Houston District (Bridge)

SUMMARY OF BRIDGE REPAIR QUANTITIES

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE:	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST.	COUNTY		SHEET NO.
	HOU	HARRIS		6

8/7/2020
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\EQ_Notes.dgn

PHASING NARRATIVE

CSJ 0271-16-160

SCOPE OF WORK: FOR THE CONSTRUCTION OF BRIDGE REPAIRS

PHASE 1

PHASE 1 STEP 1 (5 DAYS)

- ADVANCE WARNING SIGNS.
- CONSTRUCTION EQUIPMENT MOBILIZATION.

PHASE 1 STEP 2A (4 DAYS)

- ESTABLISH FULL FREEWAY CLOSURE FOR IH 610 EASTBOUND MAINLANES AS SHOWN ON THE IH 610 TOTAL CLOSURE DETOUR PLAN SHEETS. WORK TO BE DONE ON WEEKEND/ NIGHT TIME CONSTRUCTION.
- CLEAN AND RESEAL BRIDGE ARMOR JOINTS.
- POWER WASH ALL DRAIN SLOTS ALONG TRAFFIC RAILS.

PHASE 1 STEP 2B (4 DAYS)

- ESTABLISH FULL FREEWAY CLOSURE FOR IH 610 WESTBOUND MAINLANES AS SHOWN ON THE IH 610 TOTAL CLOSURE DETOUR PLAN SHEETS. WORK TO BE DONE ON WEEKEND/ NIGHT TIME CONSTRUCTION.
- CLEAN AND RESEAL BRIDGE ARMOR JOINTS.
- POWER WASH ALL DRAIN SLOTS ALONG TRAFFIC RAILS.

PHASE 1 STEP 3 (28 DAYS)

- ESTABLISH EASTBOUND OR WESTBOUND ONE LANE CLOSURE AND/ OR SHOULDER CLOSURE DURING DAYTIME WORK HOURS.
- PERFORM CONCRETE REPAIR WORK AS SHOWN ON THE PLAN SHEET "CONCRETE REPAIR LOCATIONS IH 610 EASTBOUND AND WESTBOUND."
- PERFORM ADITIONAL CLEANING AS SHOWN ON THE PLAN SHEET "CLEANING AND REPAIR NOTES AND DETAILS."

PHASE 1 STEP 4 (2 DAYS FOR REPAIR)

- PERFORM STEEL BOLTING REPAIR AT WORK ZONE #1 AS SHOWN IN THE PLAN SET. COORDINATE RAILROAD FLAGMAN ACTIVITIES AS NEEDED. CONTRACTOR SHALL NOT WORK ON RAILROAD TRACKS OR INTERFERE WITH TRAIN OPERATIONS.

PHASE 2

PHASE 2 STEP 1 (2 FULL WEEKENDS)

- SET UP SCAFFOLDING AND ENCAPSULATE FLOOR BEAM 7R-EB AND PART OF FLOOR BEAM 9R-EB. (5 DAYS)
- SET UP SWP3 FEATURES AROUND WORK AREAS. (2 DAYS)
- ESTABLISH FULL FREEWAY CLOSURE FOR IH 610 EASTBOUND MAINLANES AS SHOWN ON THE IH 610 TOTAL CLOSURE DETOUR PLAN SHEETS. WORK TO BE DONE AS WEEKEND/ NIGHT TIME CONSTRUCTION.
- FOR WORK ZONE #3 EASTBOUND LANES OF HOLMES RD TO BE CLOSED.
- PERFORM STEEL REPAIRS AND PAINTING AT WORK ZONES #2 AND #3. COORDINATE RAILROAD FLAGMAN ACTIVITIES AS NEEDED. CONTRACTOR SHALL COORDINATE WITH UPRR FOR SHORT TERM TRAIN OPERATIONS SHUT DOWN AND TRAIN SLOW ORDER.

PHASE 2 STEP 2 (2 FULL WEEKENDS)

- SET UP SCAFFOLDING AND ENCAPSULATE FLOOR BEAM 9L-WB AND PART OF FLOOR BEAM 11L-WB. (5 DAYS)
- SET UP SWP3 FEATURES AROUND WORK AREAS. (2 DAYS)
- ESTABLISH FULL FREEWAY CLOSURE FOR IH 610 WESTBOUND MAINLANES AS SHOWN ON THE IH 610 TOTAL CLOSURE DETOUR PLAN SHEETS. WORK TO BE DONE AS WEEKEND/ NIGHT TIME CONSTRUCTION.
- FOR WORK ZONE #5 EASTBOUND LANES OF HOLMES RD TO BE CLOSED.
- PERFORM STEEL REPAIRS AND PAINTING AT WORK ZONES #4 AND #5. COORDINATE RAILROAD FLAGMAN ACTIVITIES AS NEEDED. CONTRACTOR SHALL COORDINATE WITH UPRR FOR SHORT TERM TRAIN OPERATIONS SHUT DOWN AND TRAIN SLOW ORDER.

PHASE 2 STEP 3

- REMOVE ADVANCE WARNING SIGNS
- REMOVE SWP3 FEATURES
- DEMOBILIZE EQUIPMENT

10/2/2020

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

DocuSigned by:
Alexine Stittiams-Ward, P.E.
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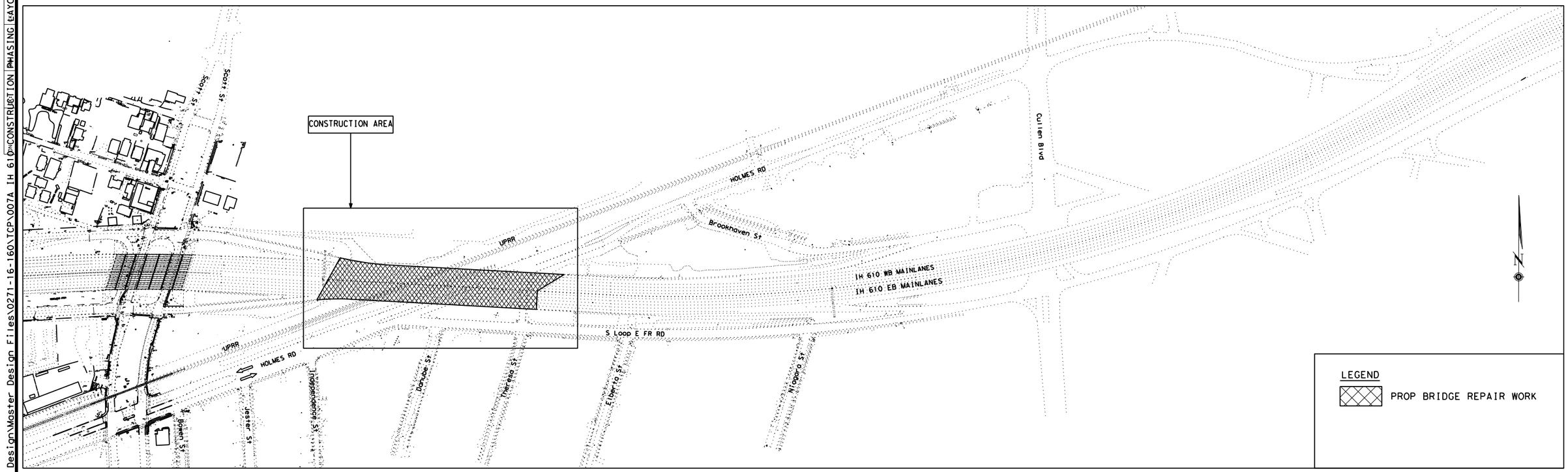
IH 610 CONSTRUCTION PHASING NARRATIVE

Texas Department of Transportation

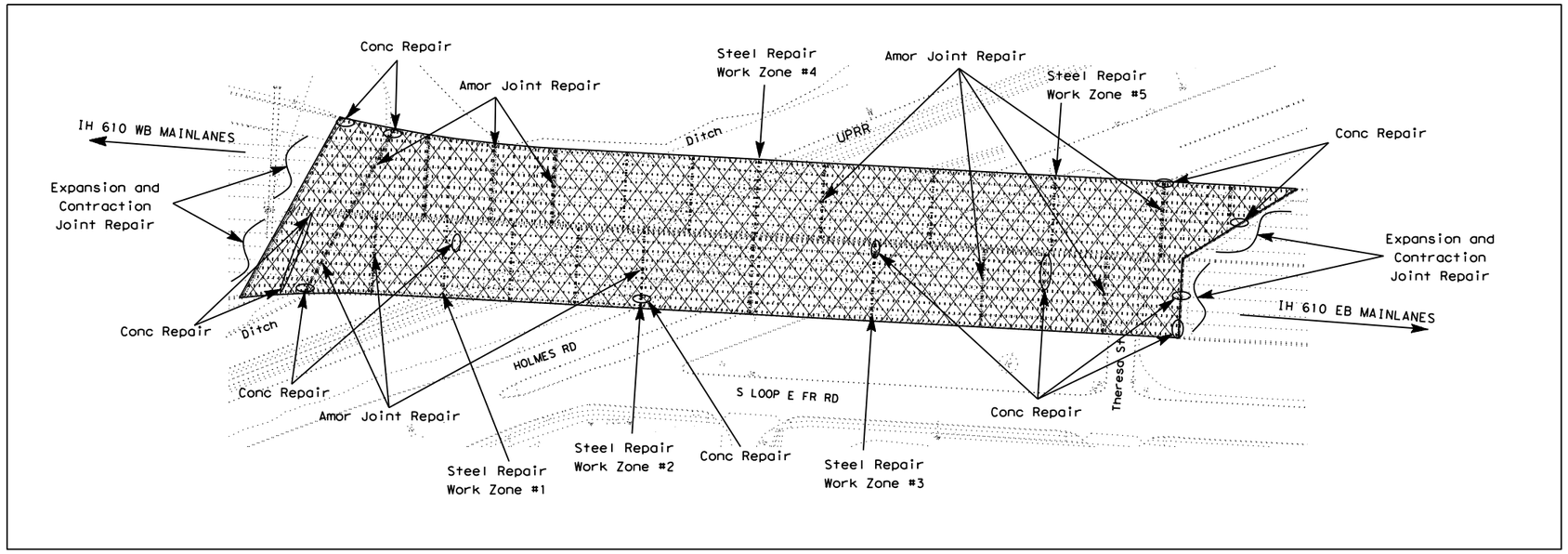
SCALE: NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		7



LEGEND

PROP BRIDGE REPAIR WORK



NOTES:

Phase 1 Step 2A & 2B: Repairs to clean and seal expansion joints, contraction joints and amor joint repairs to be done prior to the Steel Repairs. Joint repair to be done during full EB Mainlane closure or full WB Mainlane Closure.

Phase 1 Step 3 & 4: For Concrete repair locations see plan sheet Concrete Repair location sheet 1 & 2 of 2. Concrete repairs can be done using shoulder and/or one lane closures, see TCP standards for traffic control layouts.

Phase 2 Step 1 & 2: Steel repairs shall not be done on rain days.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
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PROFESSIONAL ENGINEER

10/2/2020

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IH 610 CONSTRUCTION PHASING LAYOUT

SCALE: N.T.S SHEET OF

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		7A

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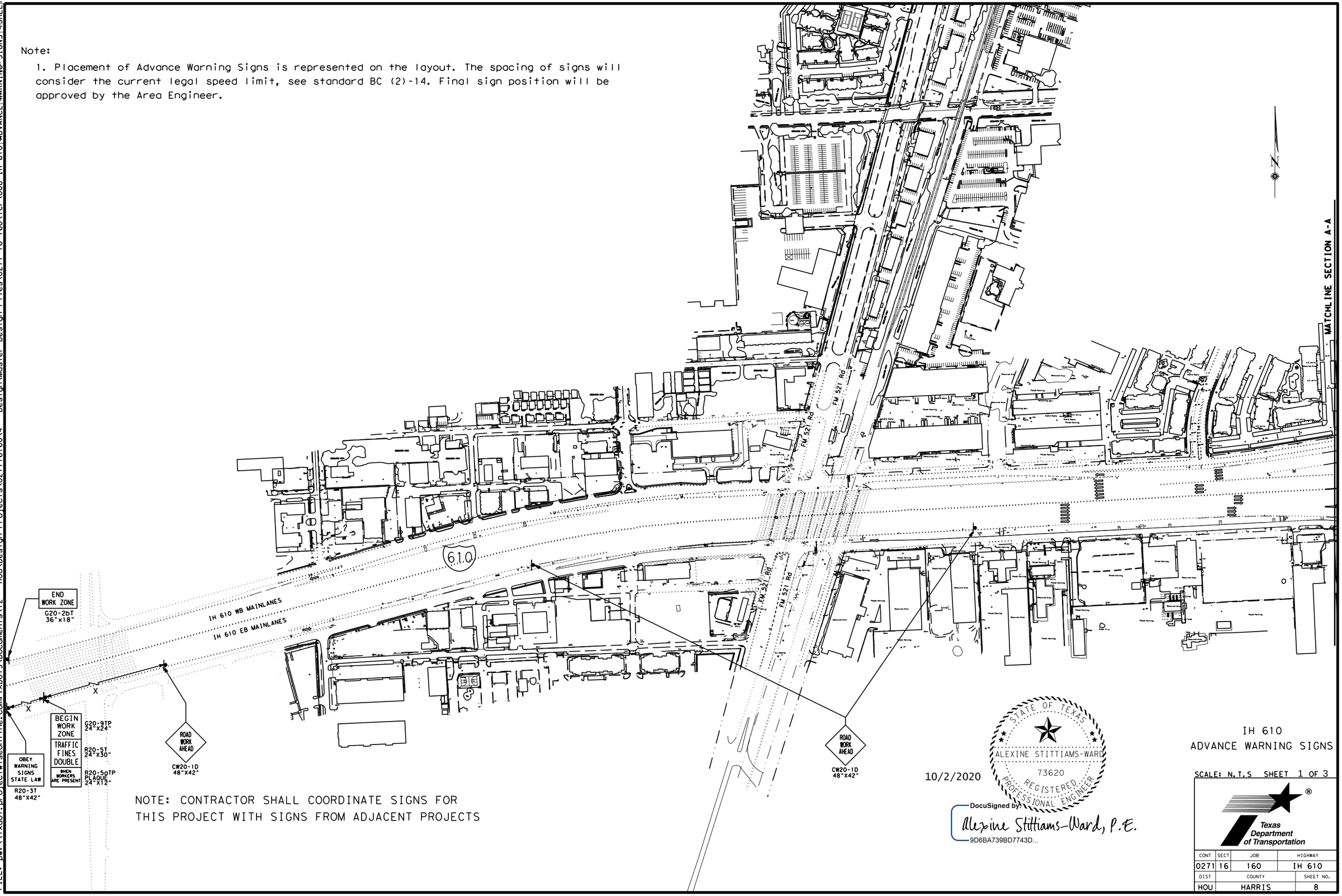
Note:

1. Placement of Advance Warning Signs is represented on the layout. The spacing of signs will consider the current legal speed limit, see standard BC (2)-14. Final sign position will be approved by the Area Engineer.



NOTE: CONTRACTOR SHALL COORDINATE SIGNS FOR THIS PROJECT WITH SIGNS FROM ADJACENT PROJECTS

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

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Alexine Stittiams-Ward, P.E.
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IH 610
ADVANCE WARNING SIGNS

SCALE: N.T.S SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		8

NOTE: CONTRACTOR SHALL COORDINATE SIGNS FOR
THIS PROJECT WITH SIGNS FROM ADJACENT PROJECTS

MATCHLINE SECTION A-A

MATCHLINE SECTION B-B

288

610

S LOOP E FWY

IH 610 WB MAINLANES

IH 610 EB MAINLANES

SH 288 SB MAINLANES

SH 288 NB MAINLANES

ROAD WORK AHEAD
CW20-1D
48"X42"

N

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10/2/2020

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ALEXINE STITTIAMS-WARD
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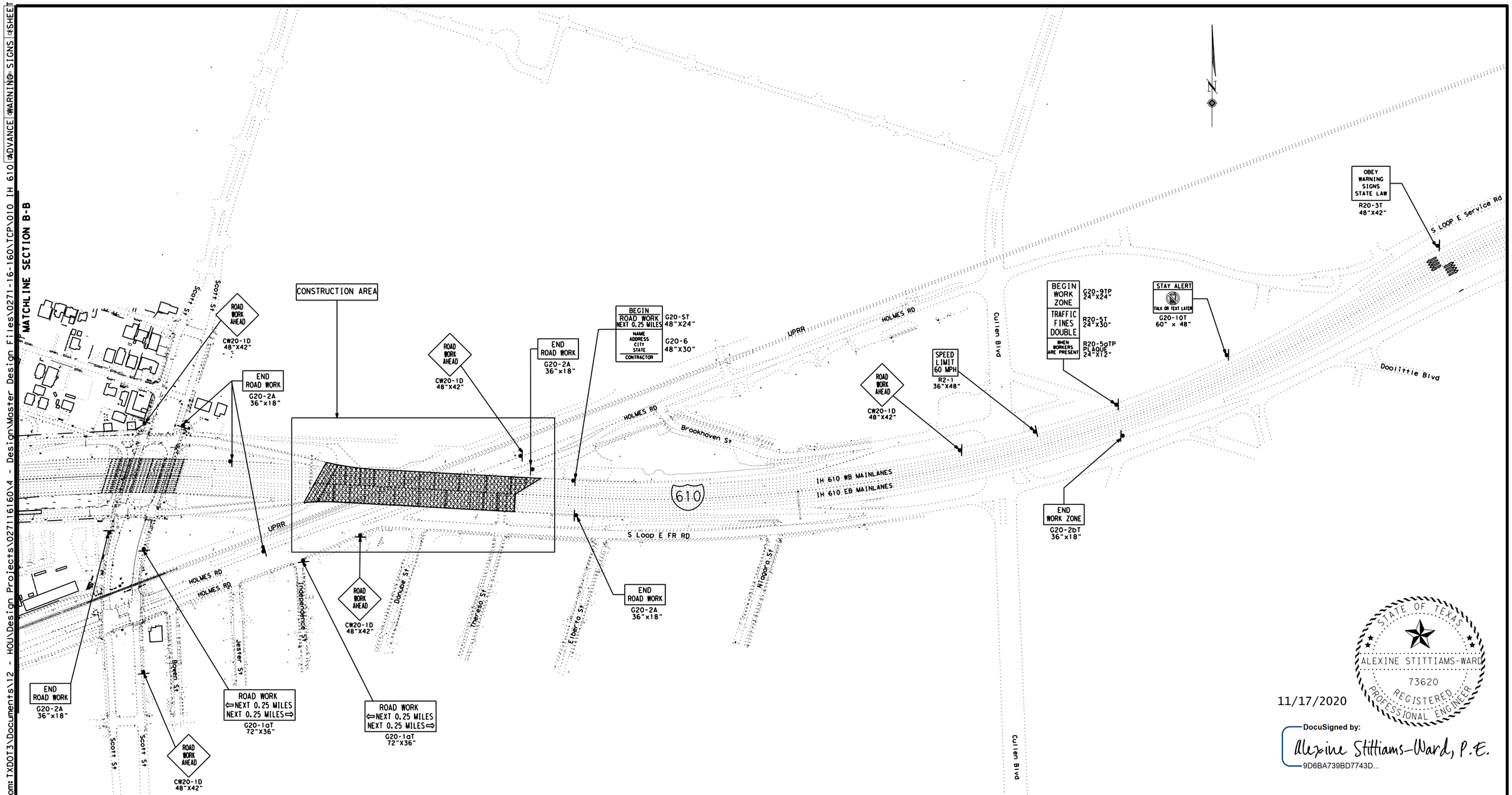
IH 610
ADVANCE WARNING SIGNS

SCALE: N.T.S SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		9

MATCHLINE SECTION B-B



NOTE: CONTRACTOR SHALL COORDINATE SIGNS FOR
THIS PROJECT WITH SIGNS FROM ADJACENT PROJECTS

11/17/2020

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Alexine Stittiams-Ward, P.E.
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IH 610
ADVANCE WARNING SIGNS

SCALE: N.T.S SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		10

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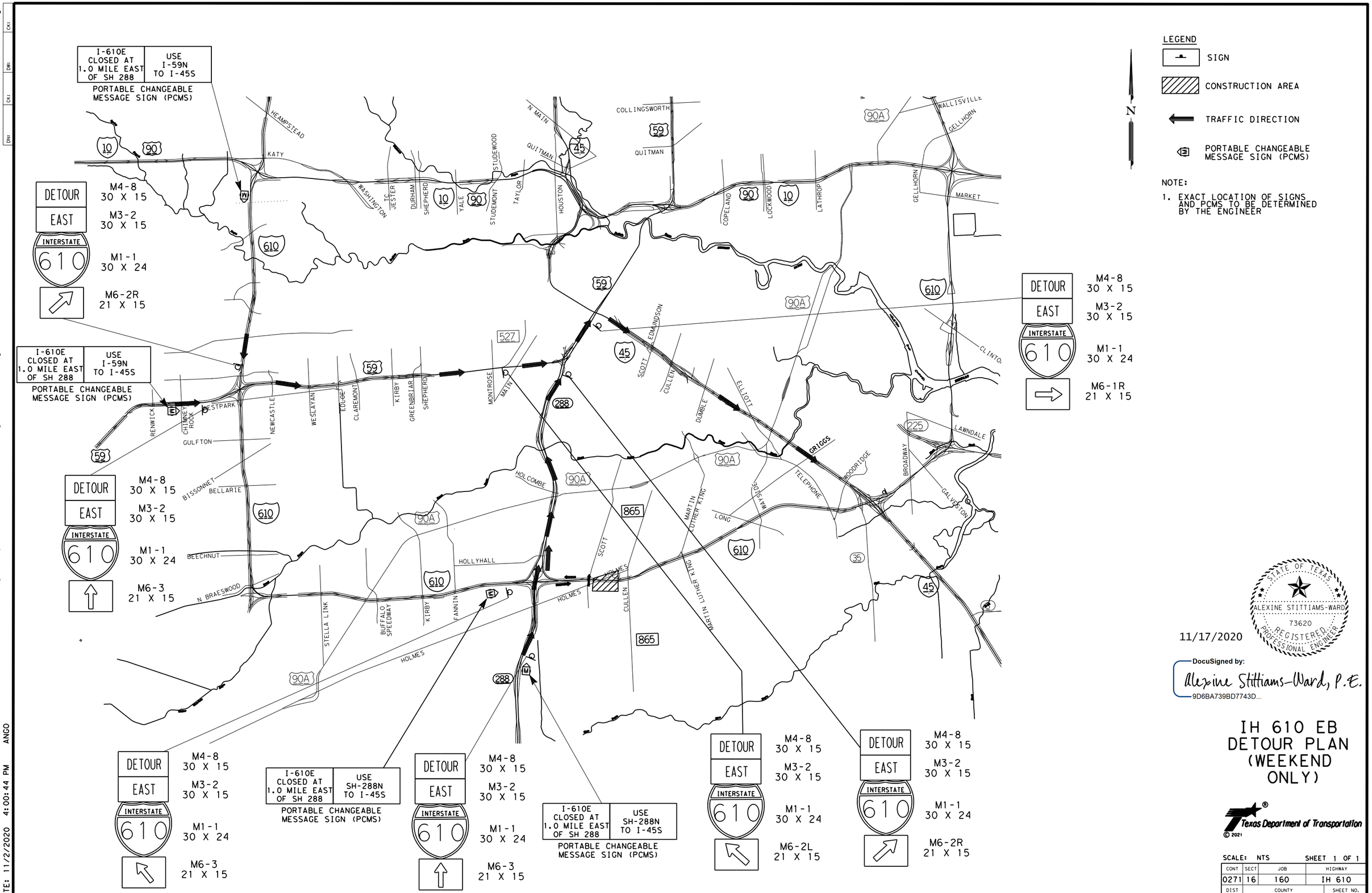

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

11/17/2020

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Alexine Stittiams-Ward, P.E.
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IH 610 EB DETOUR PLAN (WEEKEND ONLY)

Texas Department of Transportation

SCALE: NTS SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		11

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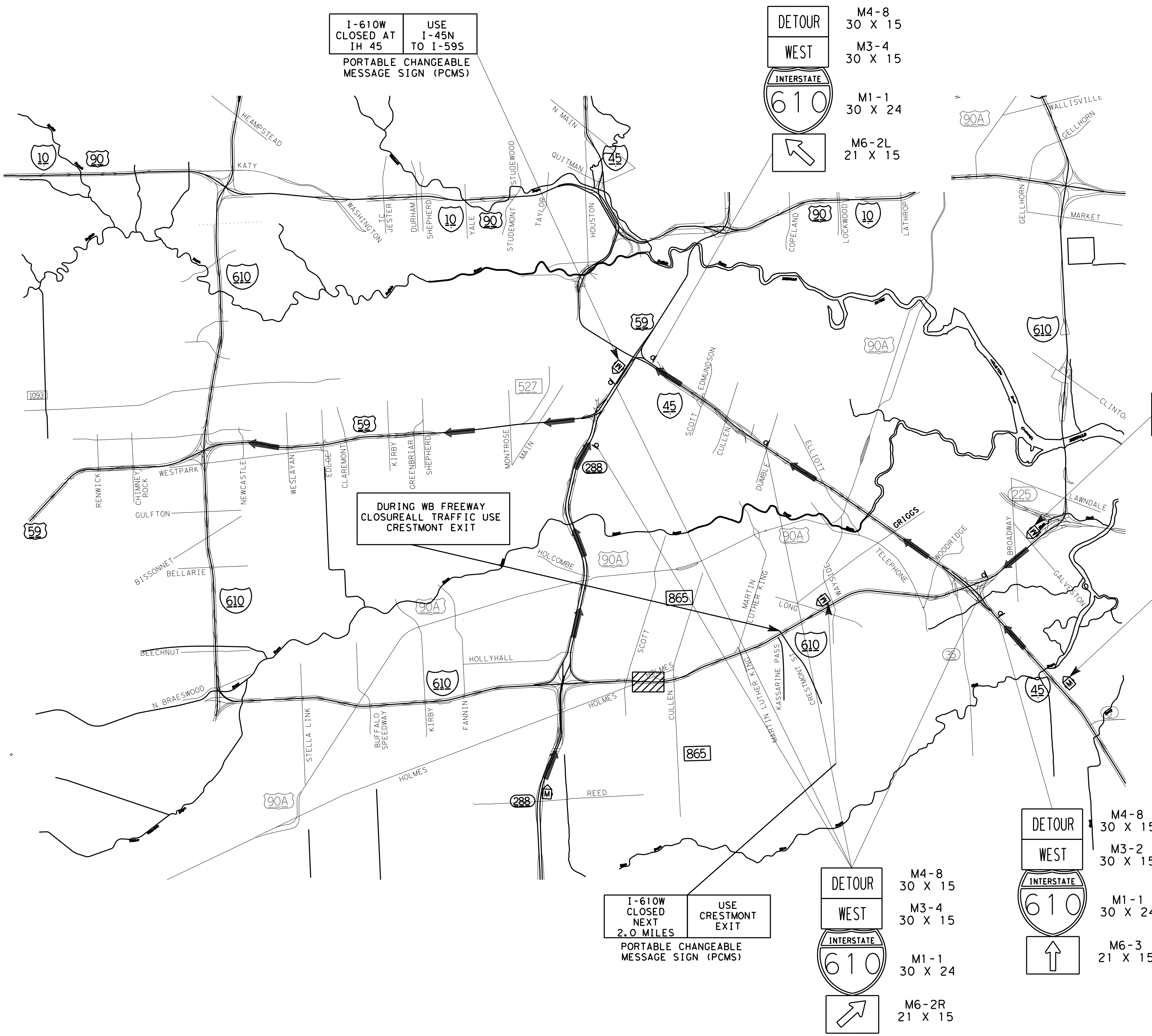

LEGEND

- SIGN
- CONSTRUCTION AREA
- TRAFFIC DIRECTION
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- (A) DETOUR PRIOR TO EACH CLOSURE
- (B) DETOUR DURING CLOSURE

NOTE:

1. EXACT LOCATION OF SIGNS AND PCMS TO BE DETERMINED BY THE ENGINEER

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

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IH 610 WB DETOUR PLAN (WEEKEND ONLY)

Texas Department of Transportation

SCALE: NTS   SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	12

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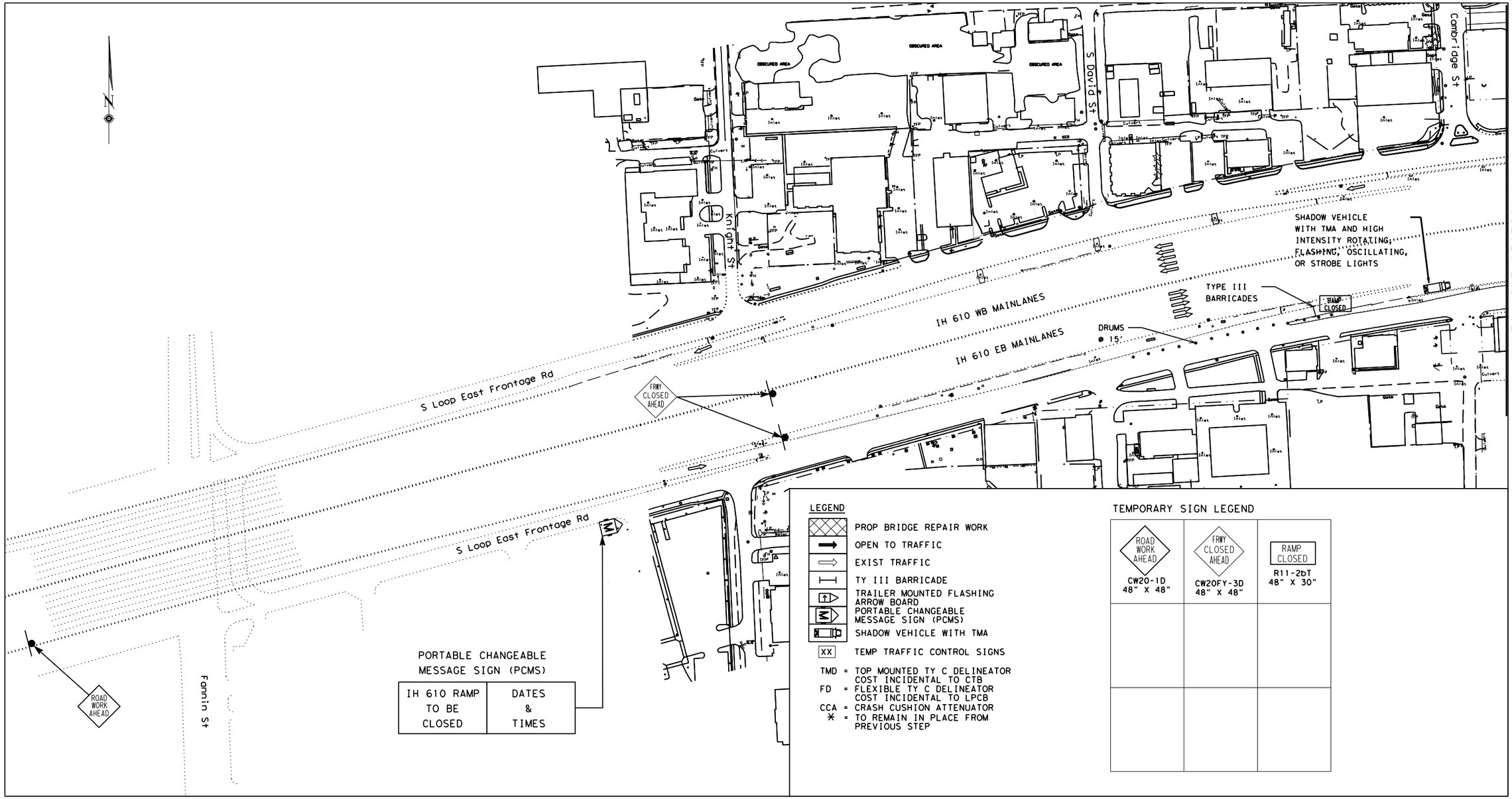

SPECIAL NOTES:

1. ONE OR TWO LANE CLOSURE. SEE TxDOT STANDARD "TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURE" TCP (6-1)-12 FOR MORE INFORMATION.

2. EXACT WORDING AND LOCATION OF PCMS ARE TO BE APPROVED BY THE FIELD ENGINEER.

NOTES:

1. EXISTING SIGNS WILL REMAIN UNLESS THEY CONFLICT WITH THE SIGNS SHOWN HERE OR AS DIRECTED BY THE ENGINEER.
2. FOR TEMPORARY TRAFFIC CONTROL SIGNS SEE "TRAFFIC CONTROL LEGEND" SHEETS FOR MORE INFORMATION.
3. FOR SPECIAL WORKZONE SIGNS SEE "WORKZONE SPECIAL SIGN DETAILS" SHEETS FOR MORE INFORMATION.
4. FOR PHASES/ STEPS WITH FULL FREEWAY CLOSURE SEE PLAN SHEET "IH 610 CONSTRUCTION PHASING NARRATIVE". THE CONTRACTOR MUST ENSURE POLICE OFFICERS ARE PRESENT AT ALL FULL FREEWAY CLOSURES POSITIONS AND AT SCOTT ST AND HOLMES RD CLOSURE POSITIONS.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

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Alexine Stittiams-Ward, P.E
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IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 1 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		13

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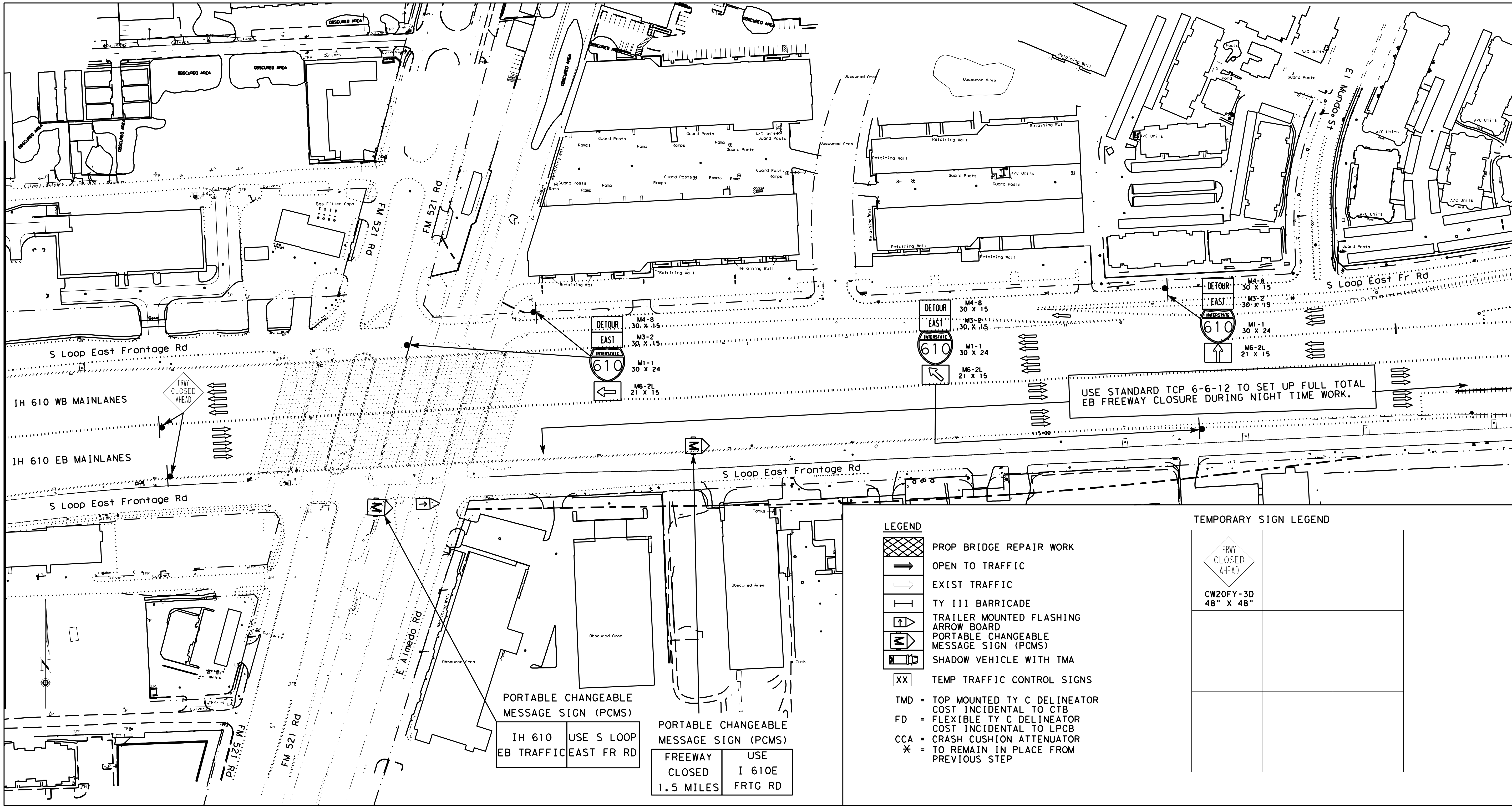

SPECIAL NOTES:

1. ONE OR TWO LANE CLOSURE. SEE TxDOT STANDARD "TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURE" TCP (6-1)-12 FOR MORE INFORMATION.
2. EXACT WORDING AND LOCATION OF PCMS ARE TO BE APPROVED BY THE FIELD ENGINEER.

NOTES:

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3. FOR SPECIAL WORKZONE SIGNS SEE "WORKZONE SPECIAL SIGN DETAILS" SHEETS FOR MORE INFORMATION.
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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

DocuSigned by:
Alexine Stittiams-Ward, P.E.
9D6BA739BD7743D...

IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 2 OF 12

®2021 Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST		COUNTY	SHEET NO.
HOU		HARRIS	14

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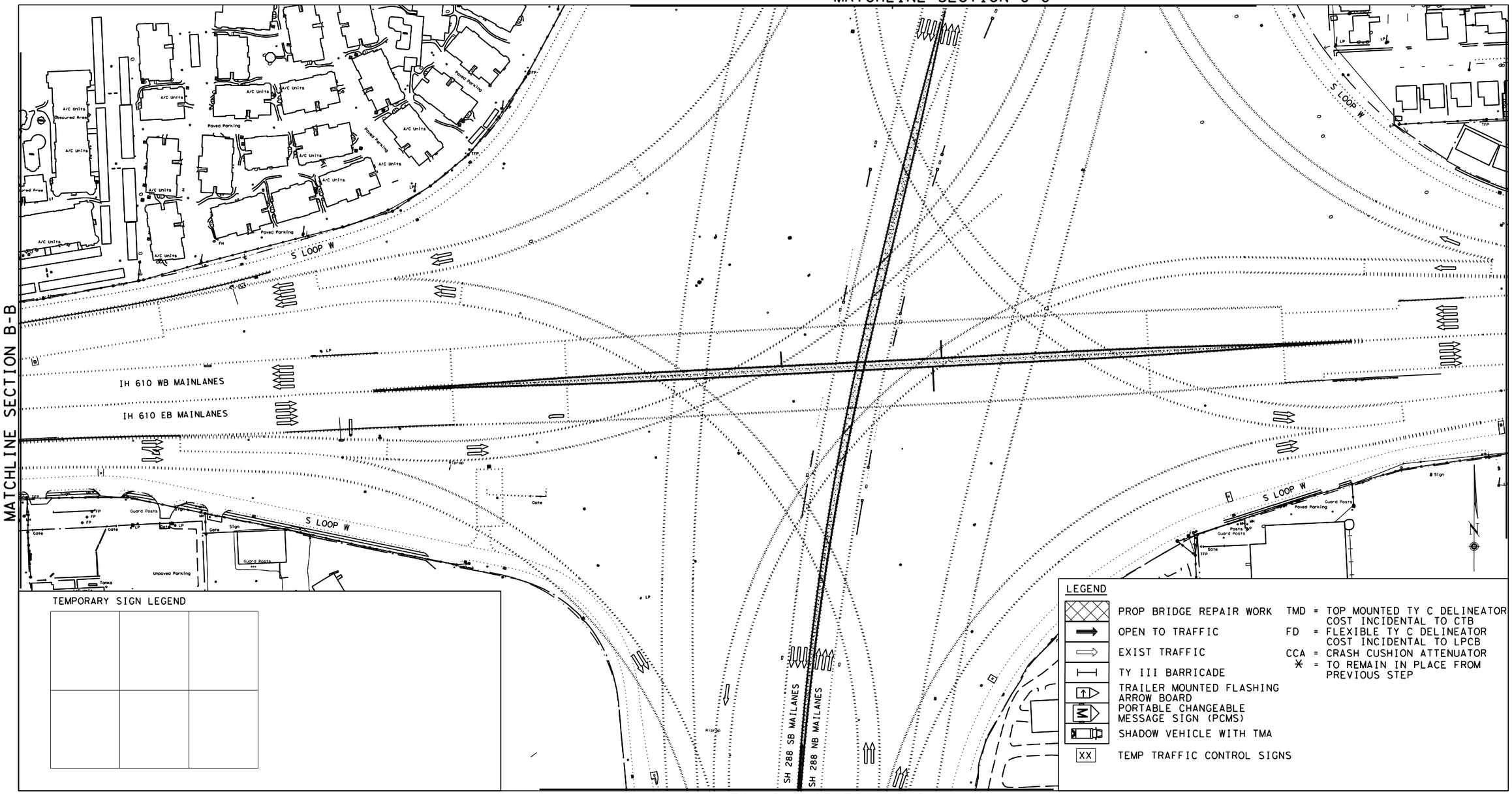
MATCHLINE SECTION J-J

MATCHLINE SECTION B-B

MATCHLINE SECTION C-C

MATCHLINE SECTION I-I



SPECIAL NOTES:

1. ONE OR TWO LANE CLOSURE. SEE TxDOT STANDARD "TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURE" TCP (6-1)-12 FOR MORE INFORMATION.

2. EXACT WORDING AND LOCATION OF PCMS ARE TO BE APPROVED BY THE FIELD ENGINEER.

NOTES:

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2. FOR TEMPORARY TRAFFIC CONTROL SIGNS SEE "TRAFFIC CONTROL LEGEND" SHEETS FOR MORE INFORMATION.

3. FOR SPECIAL WORKZONE SIGNS SEE "WORKZONE SPECIAL SIGN DETAILS" SHEETS FOR MORE INFORMATION.

4. FOR PHASES/ STEPS WITH FULL FREEWAY CLOSURE SEE PLAN SHEET "IH 610 CONSTRUCTION PHASING NARRATIVE". THE CONTRACTOR MUST ENSURE POLICE OFFICERS ARE PRESENT AT ALL FULL FREEWAY CLOSURES POSITIONS AND AT SCOTT ST AND HOLMES RD CLOSURE POSITIONS.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

10/2/2020

DocuSigned by:
Alexine Stittiams-Ward, P.E.
9D6BA739BD7743D...

IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

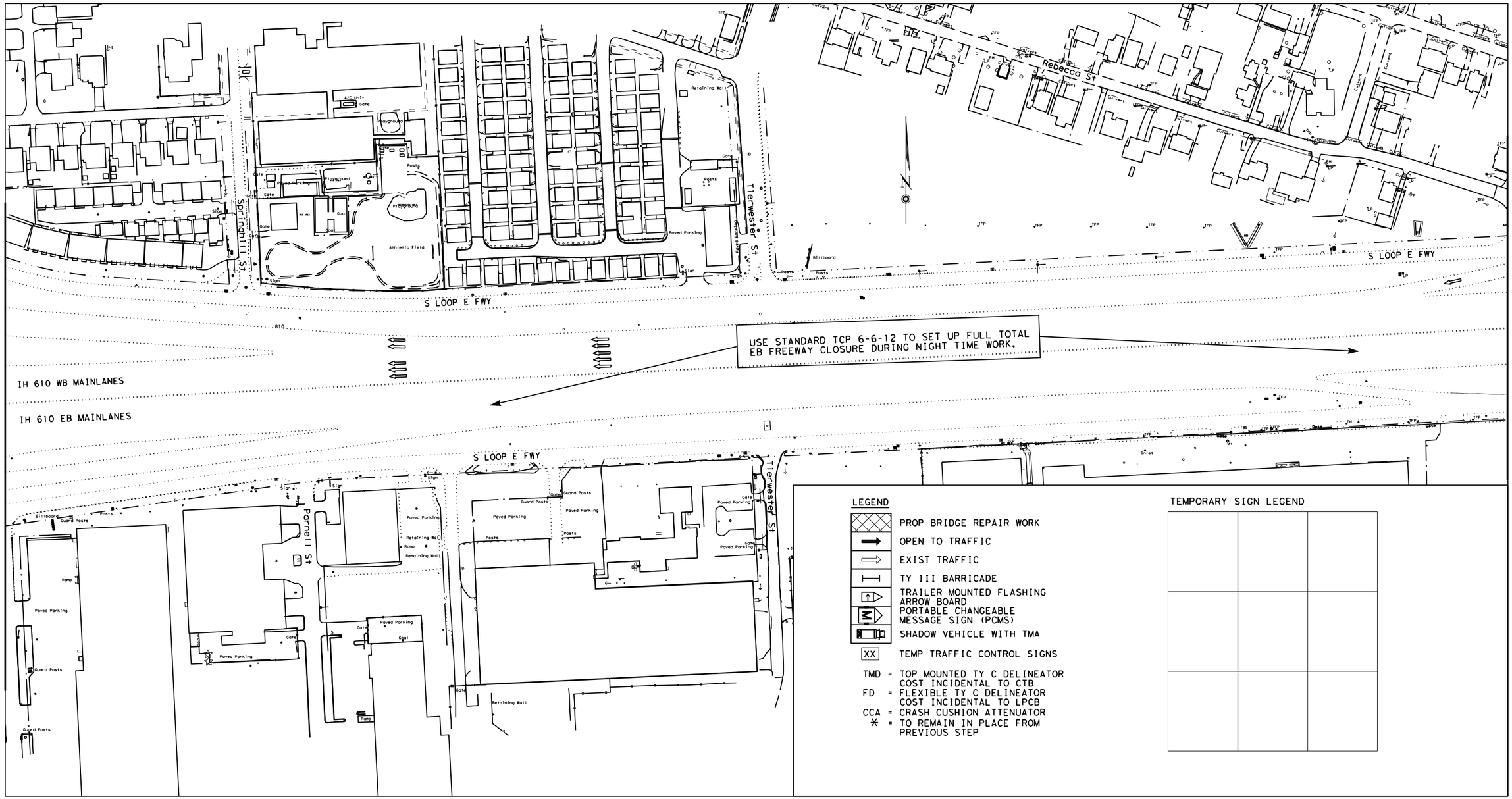
SCALE: N.T.S SHEET 3 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		15

MATCHLINE SECTION C-C

MATCHLINE SECTION D-D



LEGEND

- PROP BRIDGE REPAIR WORK
- OPEN TO TRAFFIC
- EXIST TRAFFIC
- TY III BARRICADE
- TRAILER MOUNTED FLASHING ARROW BOARD
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- SHADOW VEHICLE WITH TMA
- XX — TEMP TRAFFIC CONTROL SIGNS

TMD = TOP MOUNTED TY C DELINEATOR COST INCIDENTAL TO CTB
FD = FLEXIBLE TY C DELINEATOR COST INCIDENTAL TO LPCB
CCA = CRASH CUSHION ATTENUATOR
✳ = TO REMAIN IN PLACE FROM PREVIOUS STEP

TEMPORARY SIGN LEGEND

SPECIAL NOTES:

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TOTAL CLOSURE
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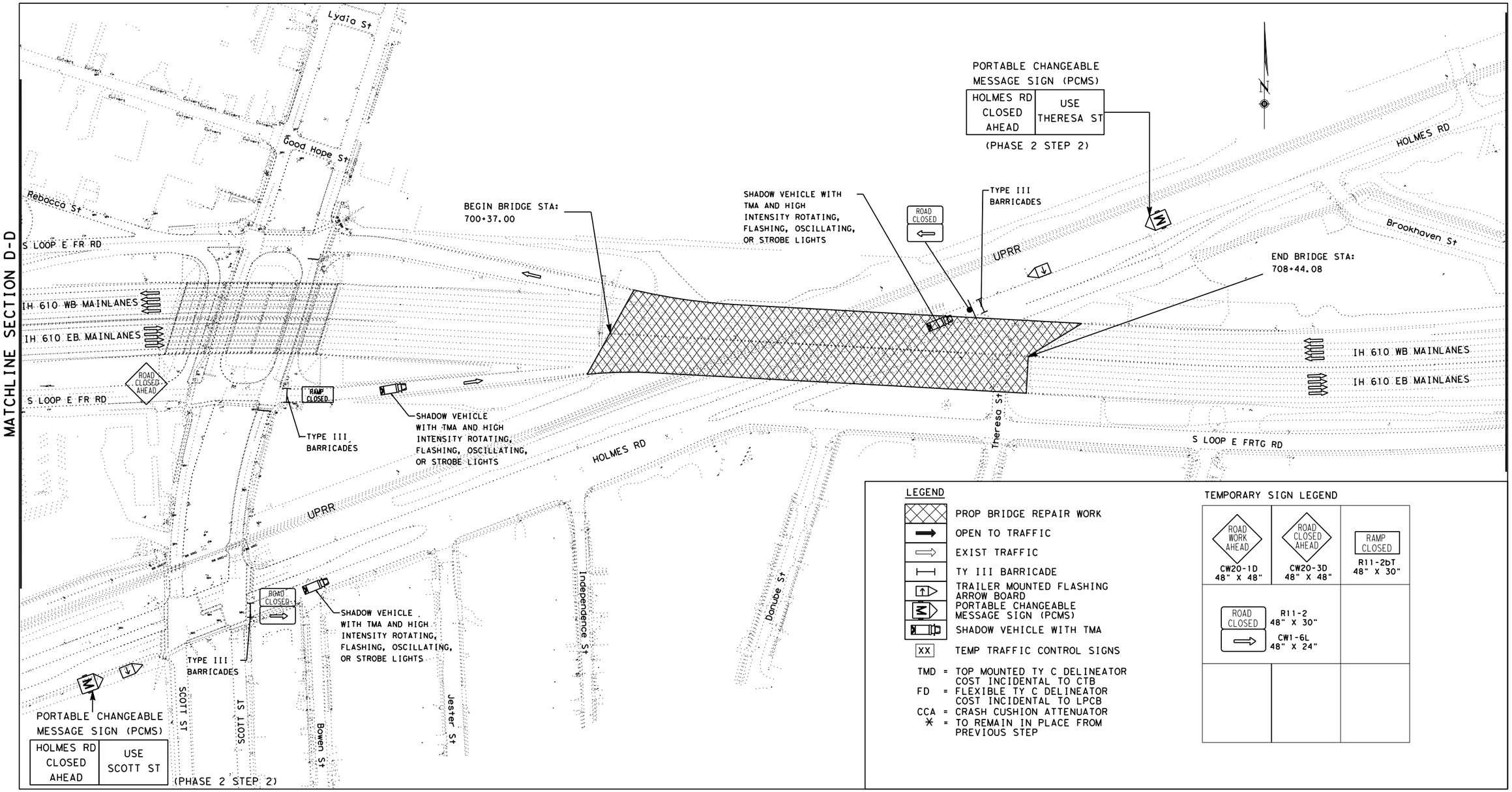
SCALE: N.T.S SHEET 4 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		16



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IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 5 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		17

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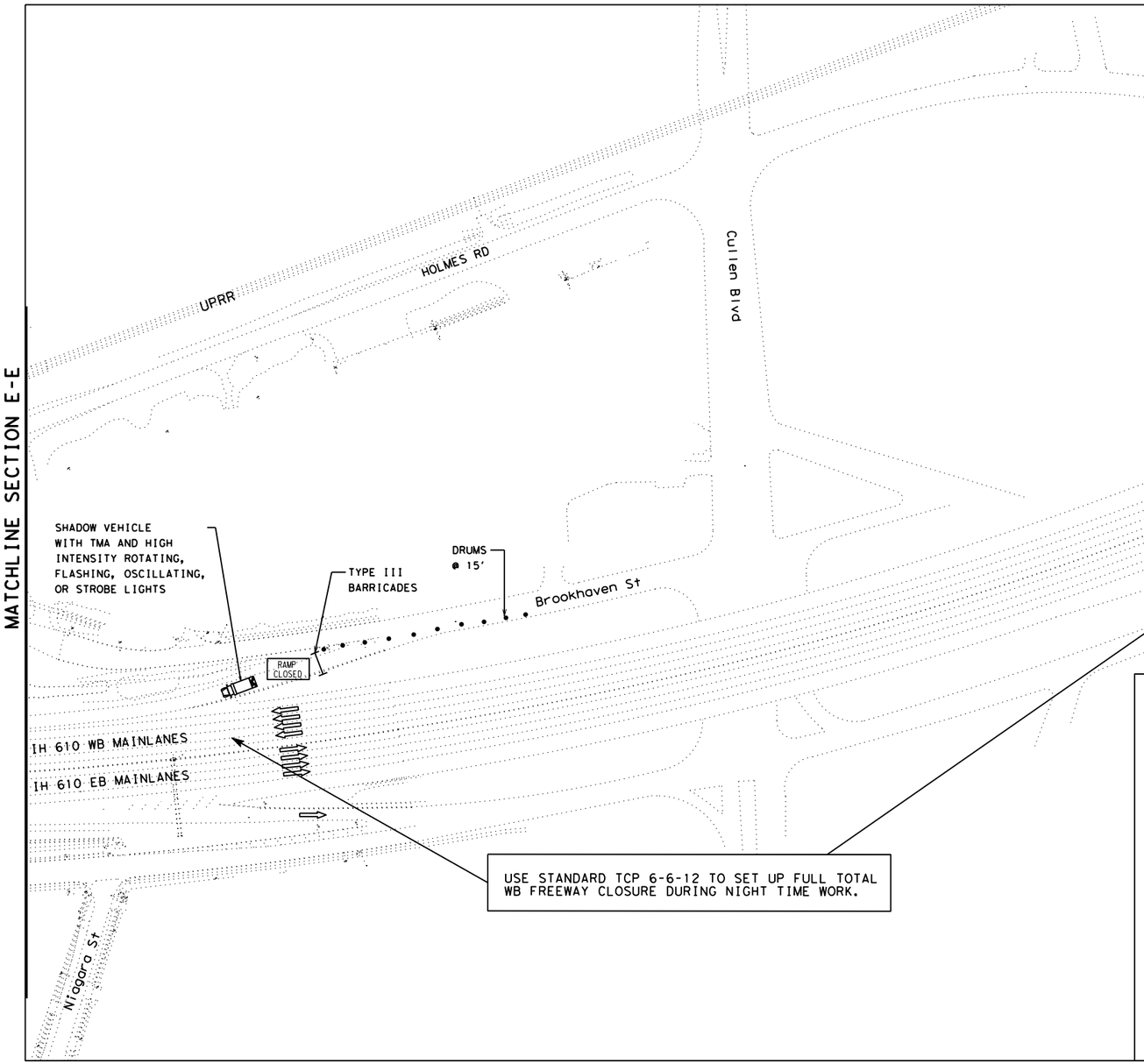
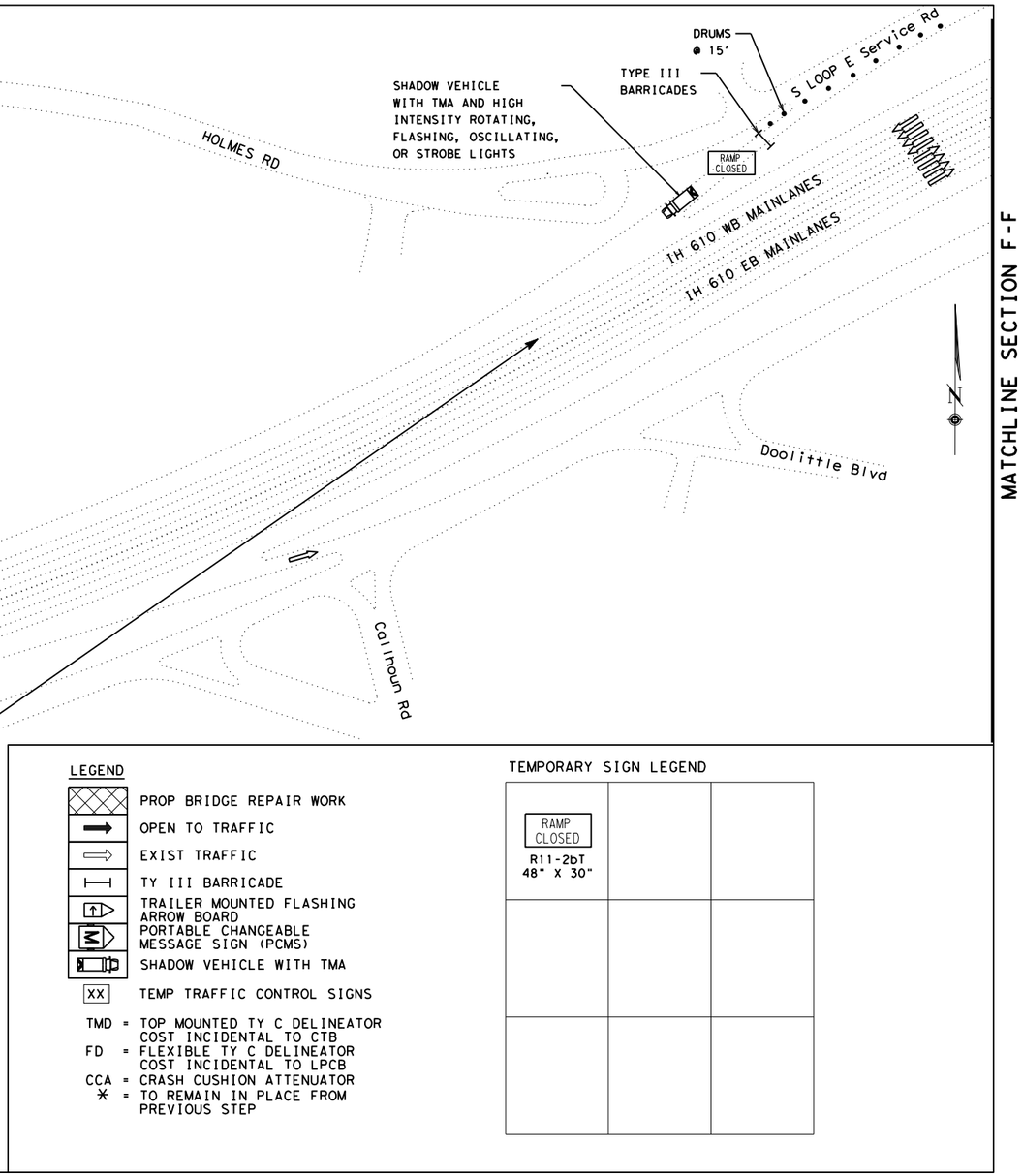
MATCHLINE SECTION E-E



MATCHLINE SECTION F-F



LEGEND

	PROP BRIDGE REPAIR WORK
	OPEN TO TRAFFIC
	EXIST TRAFFIC
	TY III BARRICADE
	TRAILER MOUNTED FLASHING ARROW BOARD
	PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
	SHADOW VEHICLE WITH TMA
XX	TEMP TRAFFIC CONTROL SIGNS

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FD = FLEXIBLE TY C DELINEATOR COST INCIDENTAL TO LPCB
CCA = CRASH CUSHION ATTENUATOR
* = TO REMAIN IN PLACE FROM PREVIOUS STEP

TEMPORARY SIGN LEGEND

RAMP CLOSED R11-2bT 48" X 30"		

SPECIAL NOTES:

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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

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Alexine Stittiams-Ward P.E.
9D6BA739BD7743D...

IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY)

SCALE: N.T.S SHEET 6 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		18

DATE: 8/19/2020 3:32:21 PM
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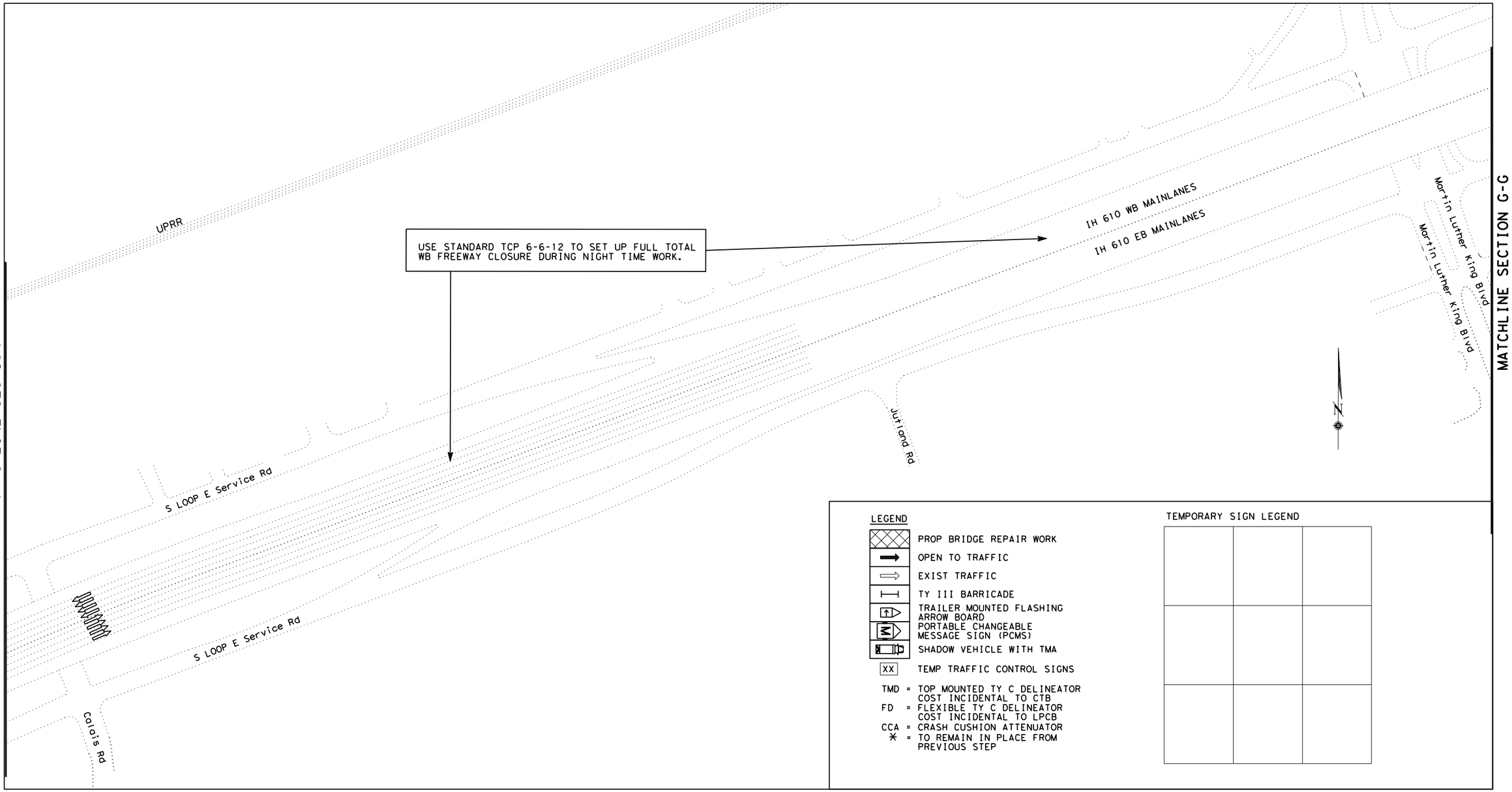
MATCHLINE SECTION F-F



MATCHLINE SECTION G-G

LEGEND

	PROP BRIDGE REPAIR WORK
	OPEN TO TRAFFIC
	EXIST TRAFFIC
	TY III BARRICADE
	TRAILER MOUNTED FLASHING ARROW BOARD
	PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
	SHADOW VEHICLE WITH TMA
XX	TEMP TRAFFIC CONTROL SIGNS

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TEMPORARY SIGN LEGEND

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IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 7 OF 12

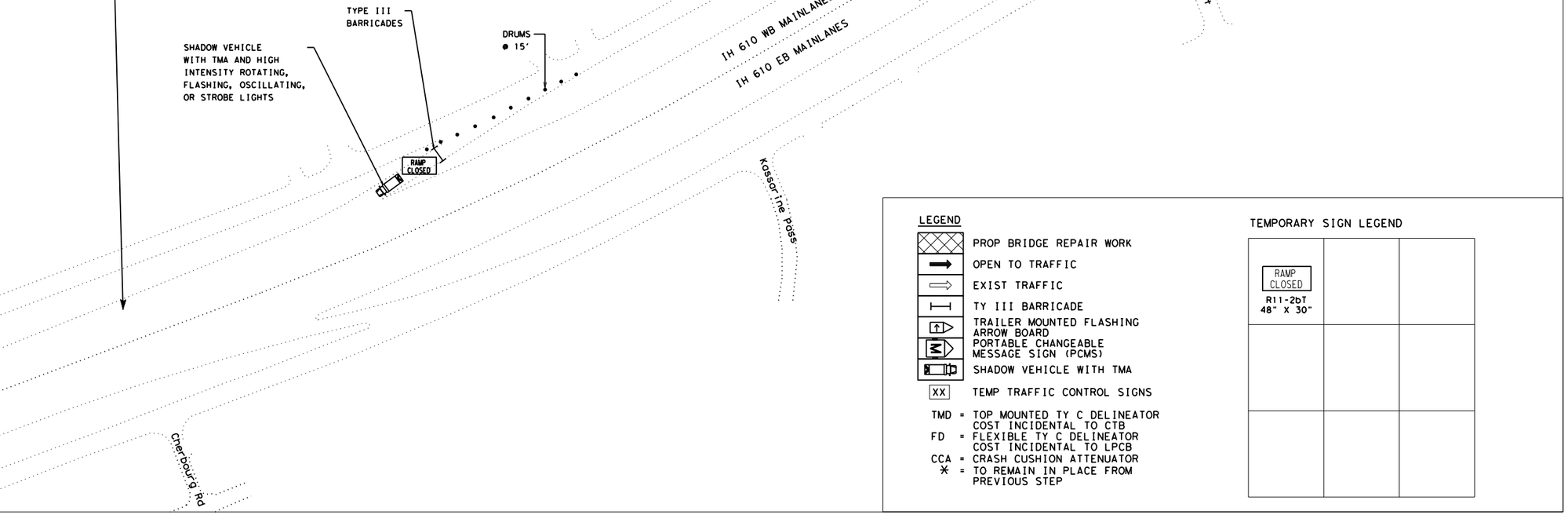
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		19

MATCHLINE SECTION G-G

USE STANDARD TCP 6-6-12 TO SET UP FULL TOTAL WB FREEWAY CLOSURE DURING NIGHT TIME WORK.

DURING WB FREEWAY CLOSURE ALL TRAFFIC MUST USE EXIT FOR CRESTMONT ST/ MARTIN LUTHER KING BLVD



LEGEND

- PROP BRIDGE REPAIR WORK
- OPEN TO TRAFFIC
- EXIST TRAFFIC
- TY III BARRICADE
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TEMPORARY SIGN LEGEND

RAMP CLOSED R11-2bT 48" X 30"		

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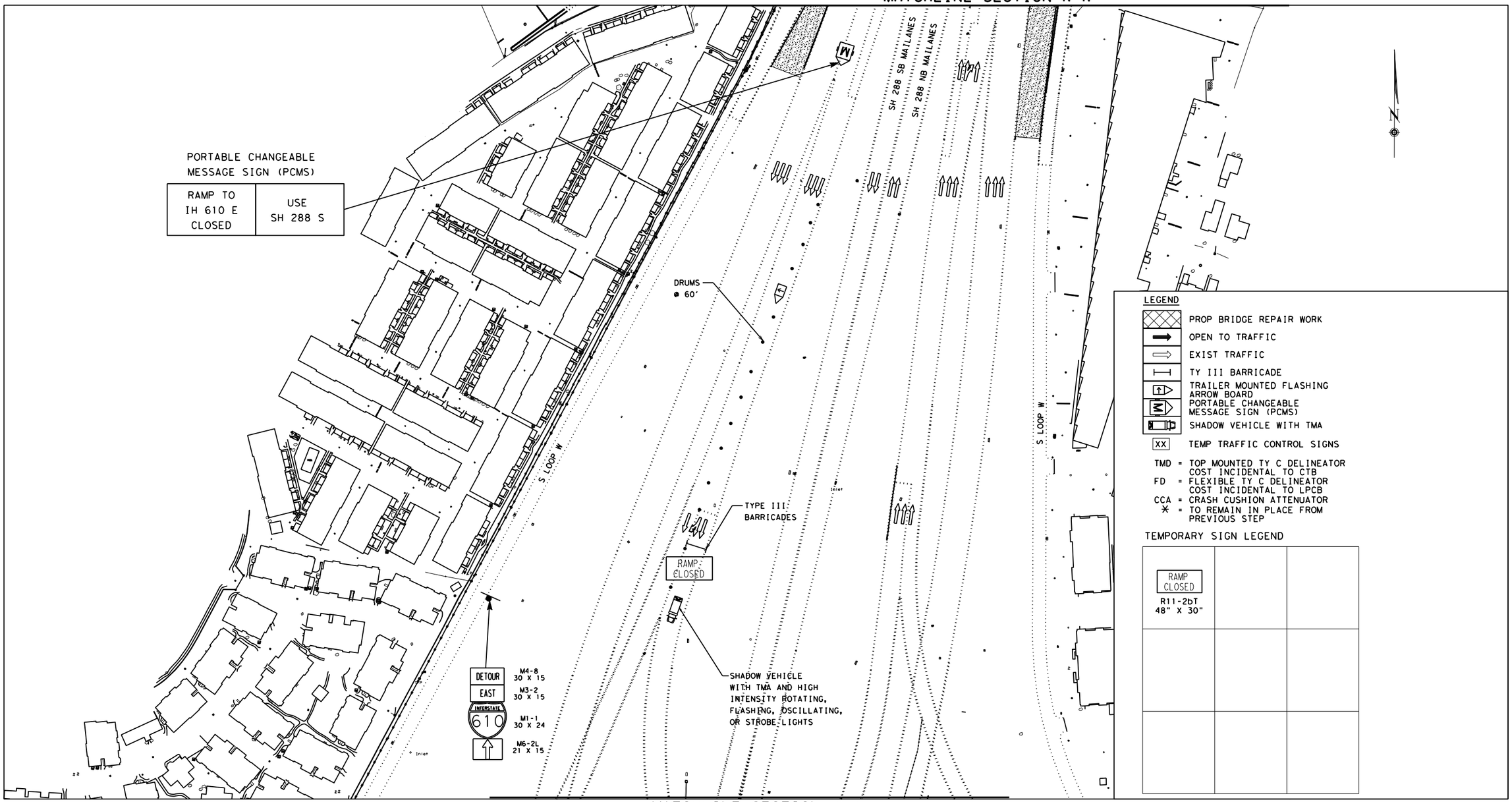
IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 8 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		20



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STATE OF TEXAS
ALEXINE STITTIAMS-WARD
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10/2/2020

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9D6BA739BD7743D...

IH 610 TOTAL CLOSURE DETOUR PLAN (WEEKEND ONLY)

SCALE: N.T.S SHEET 9 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		21

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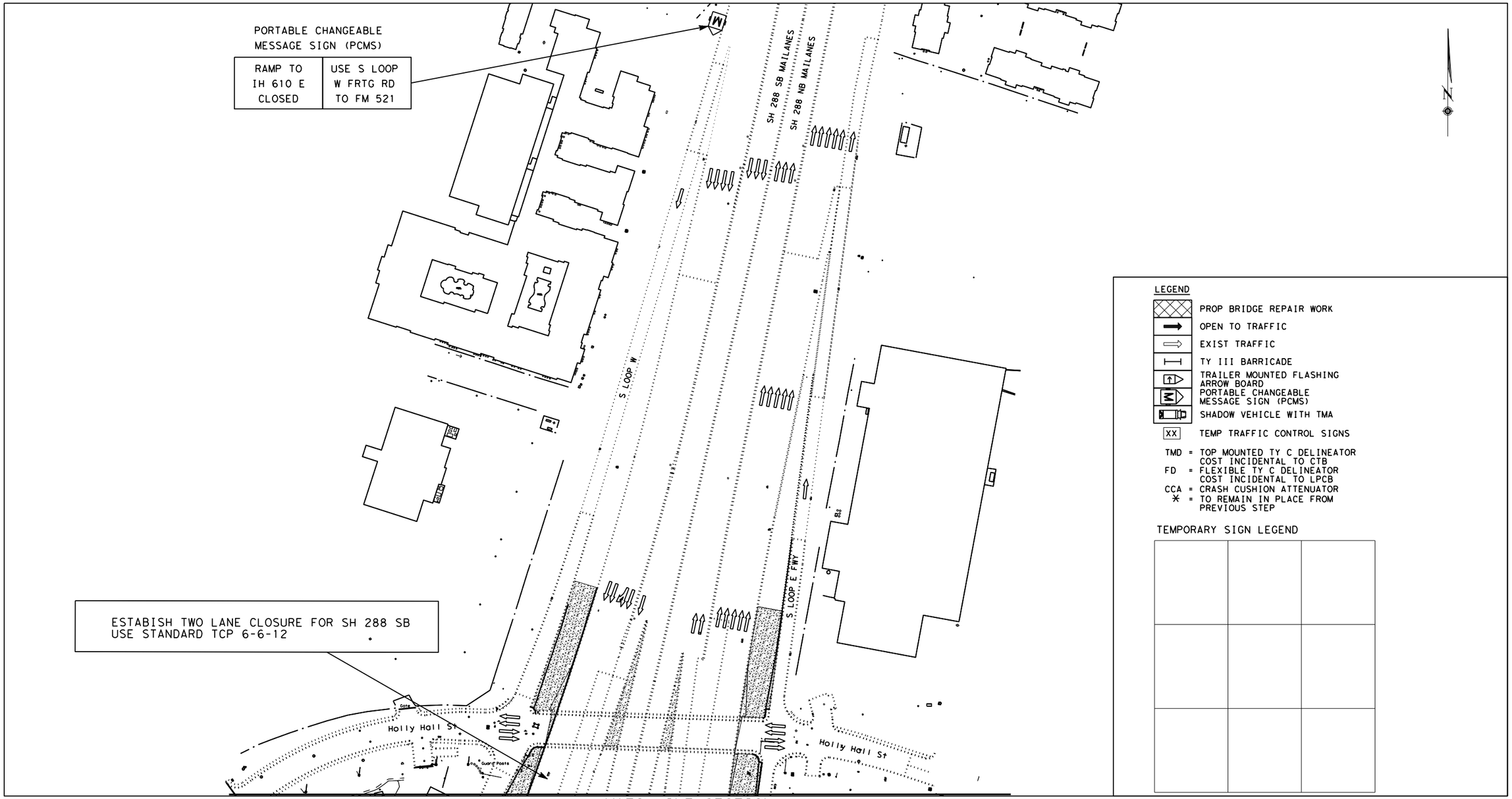

MATCHLINE SECTION K-K

LEGEND

- PROP BRIDGE REPAIR WORK
- OPEN TO TRAFFIC
- EXIST TRAFFIC
- TY III BARRICADE
- TRAILER MOUNTED FLASHING ARROW BOARD
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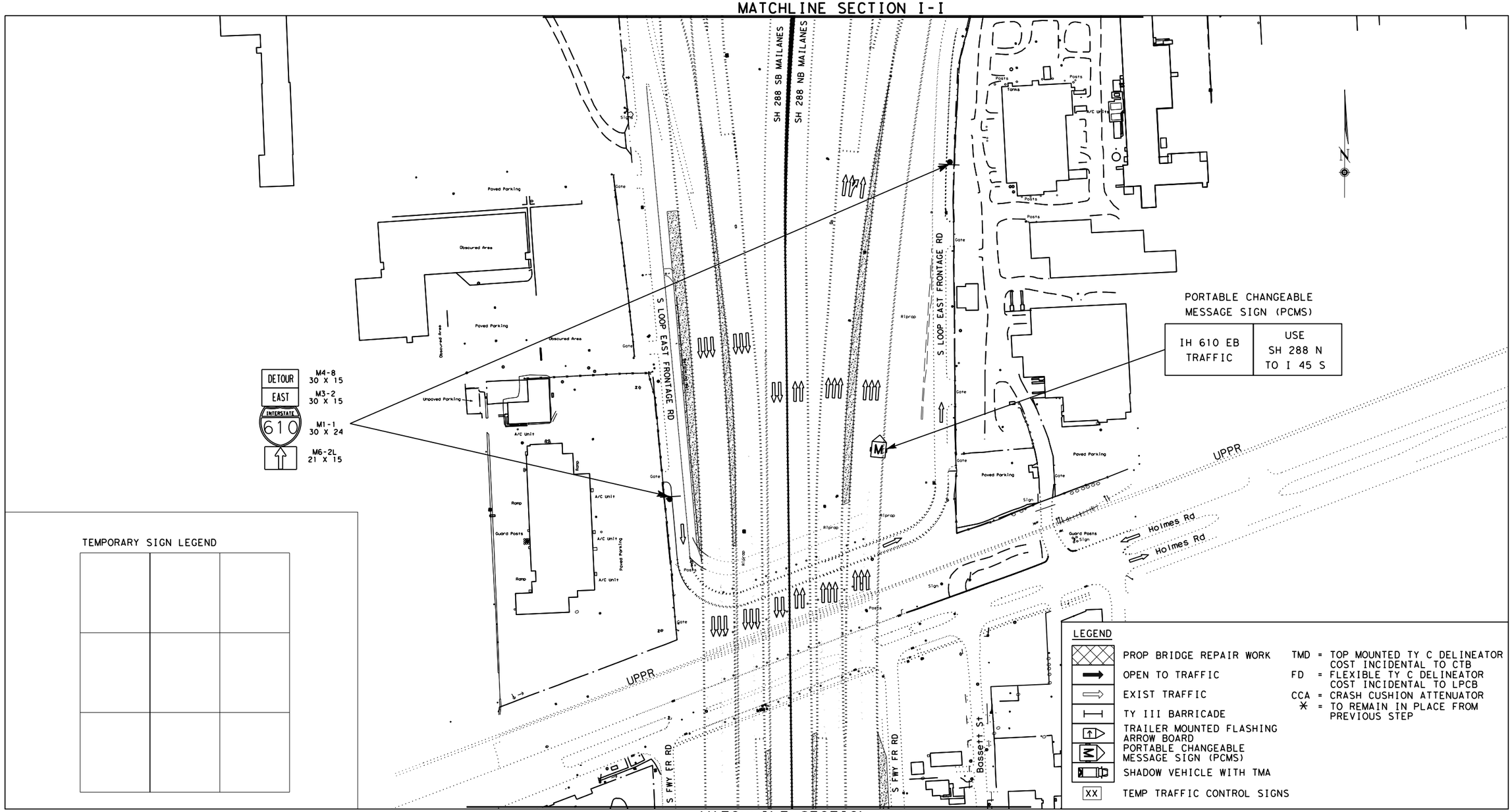
IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 10 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22

MATCHLINE SECTION I-I



TEMPORARY SIGN LEGEND

MATCHLINE SECTION H-H

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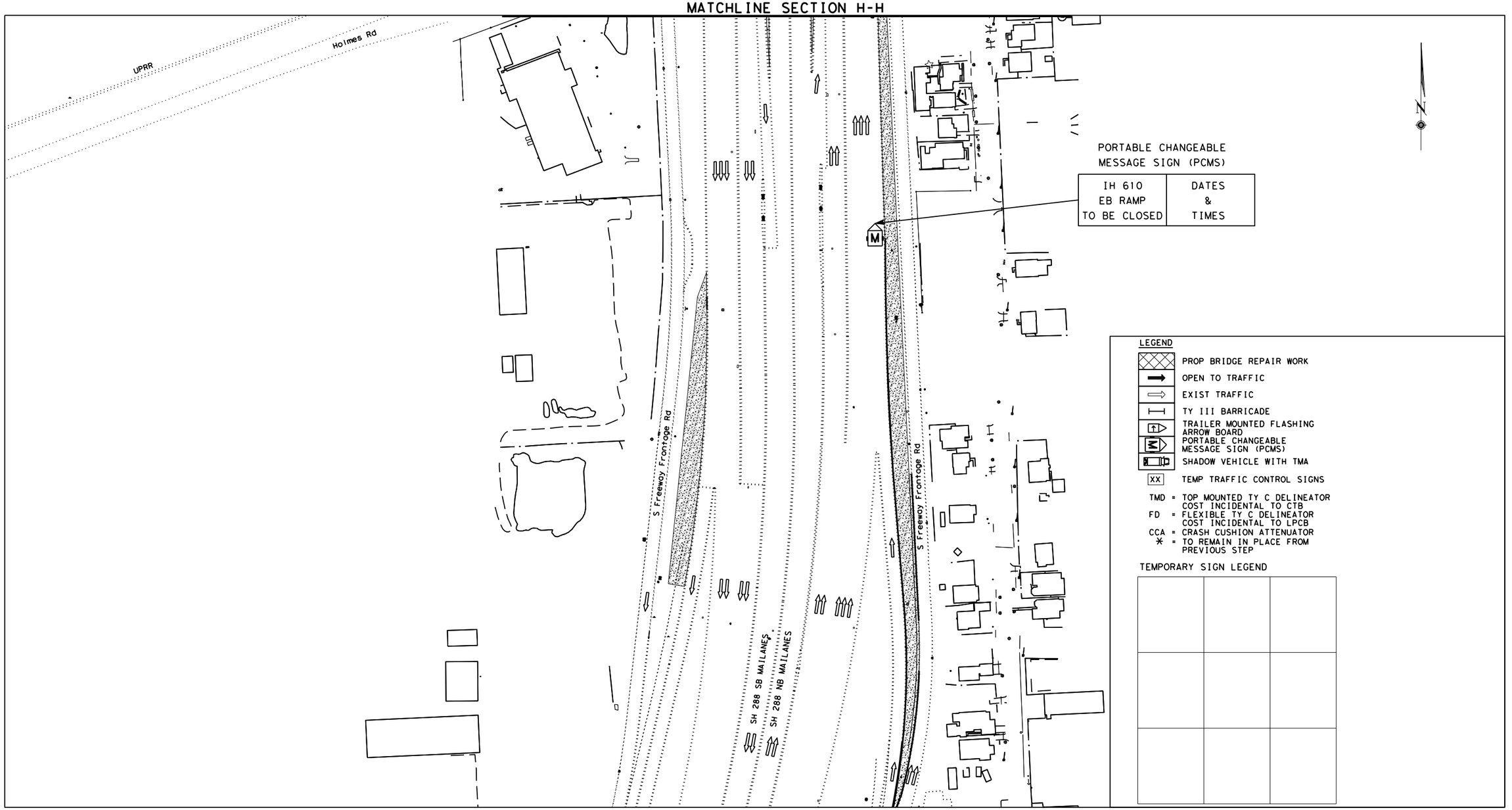
IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 11 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22A

MATCHLINE SECTION H-H



PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

IH 610 EB RAMP TO BE CLOSED	DATES & TIMES

LEGEND

- PROP BRIDGE REPAIR WORK
- OPEN TO TRAFFIC
- EXIST TRAFFIC
- TY III BARRICADE
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IH 610
TOTAL CLOSURE
DETOUR PLAN
(WEEKEND ONLY)

SCALE: N.T.S SHEET 12 OF 12

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		22B

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

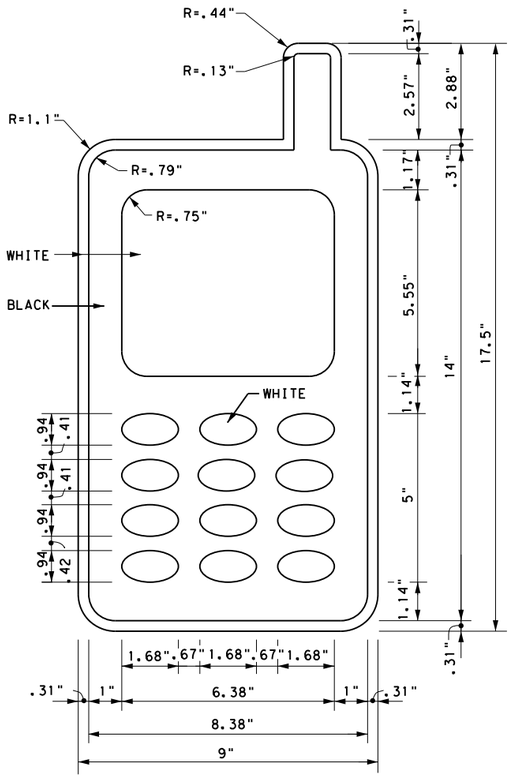
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

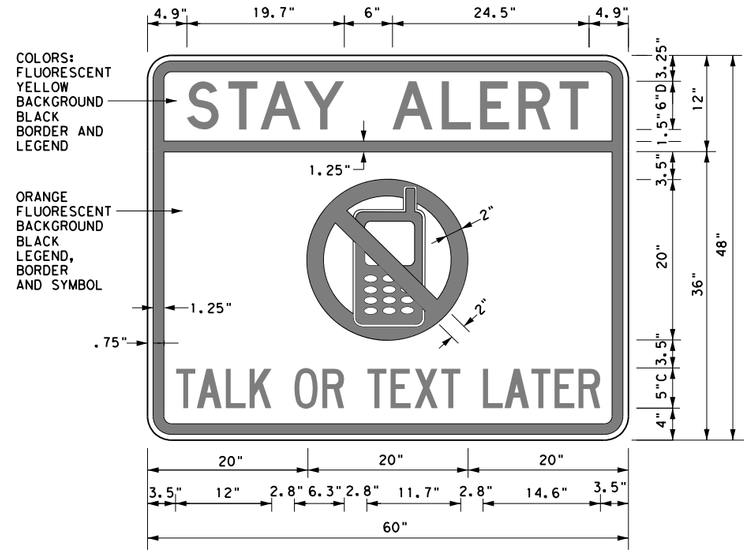
12. The Engineer has the final decision on the location of all traffic control devices.

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

WORKER SAFETY APPAREL NOTES:

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





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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	HOU	HARRIS		23

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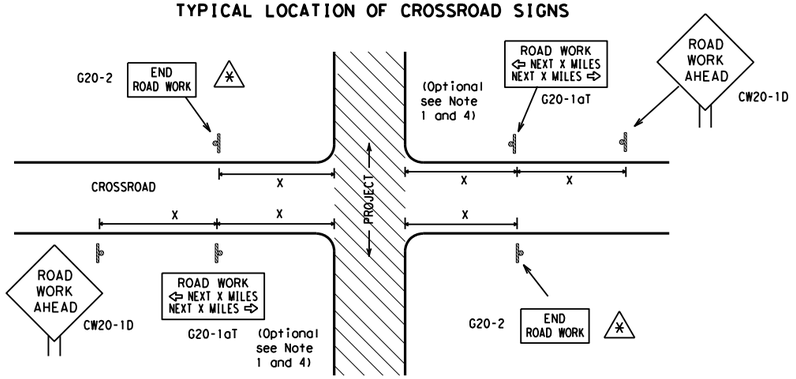
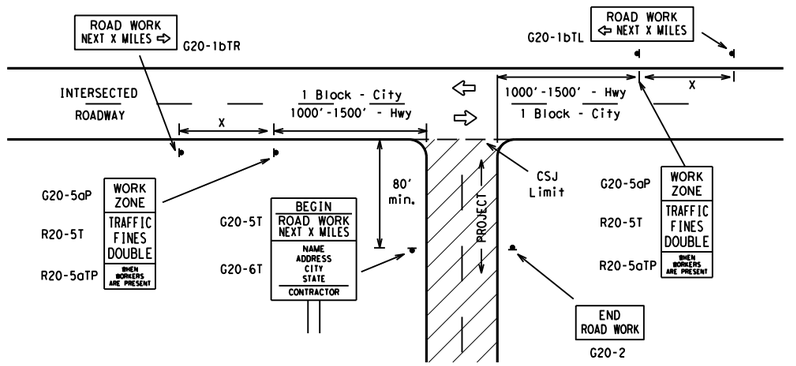
TYPICAL LOCATION OF CROSSROAD SIGNS



(*) 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. 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]

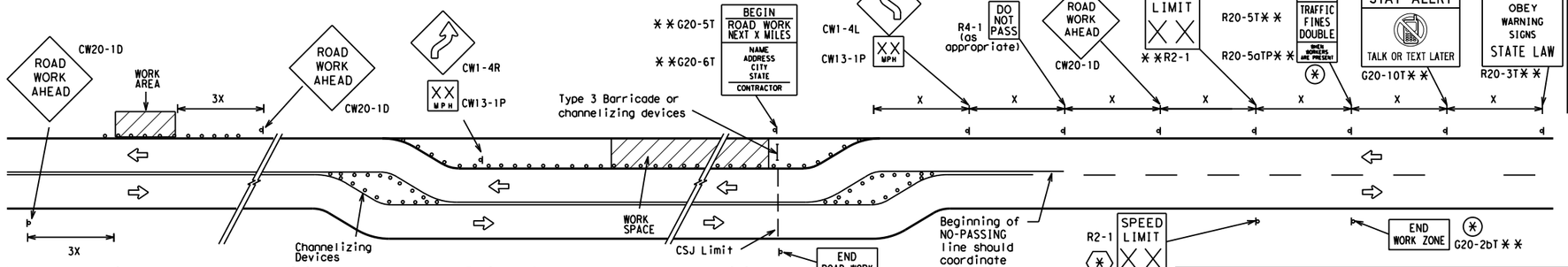
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

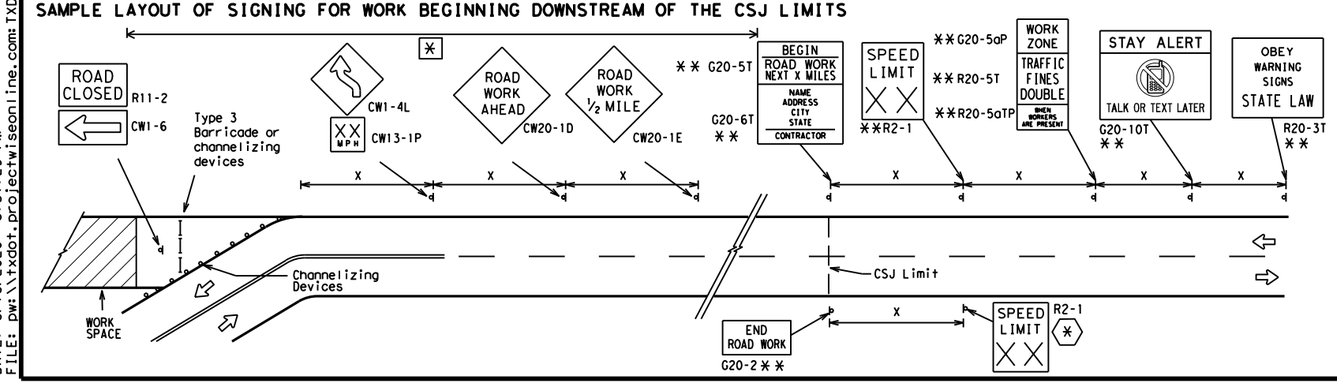
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

(*) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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REVISIONS	0271	16	160	IH 610
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	HARRIS		24

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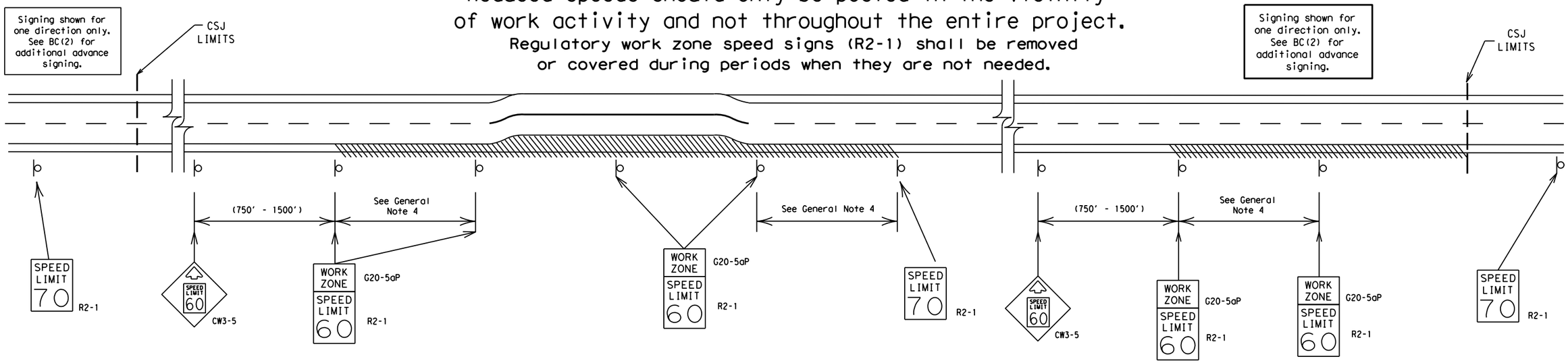
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled way.

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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	HOU	HARRIS		25

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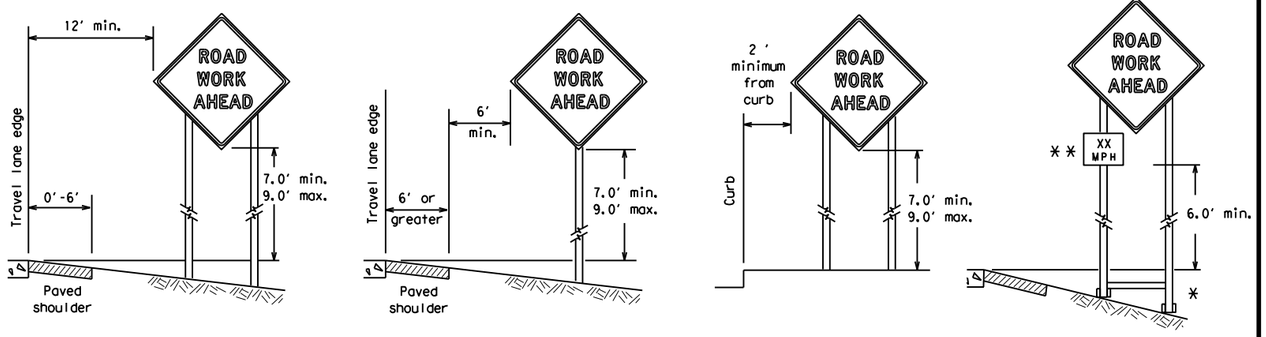
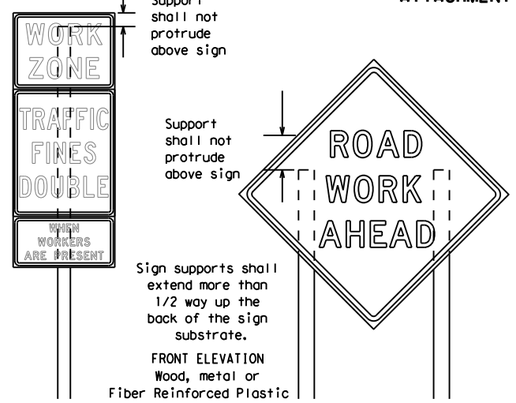
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



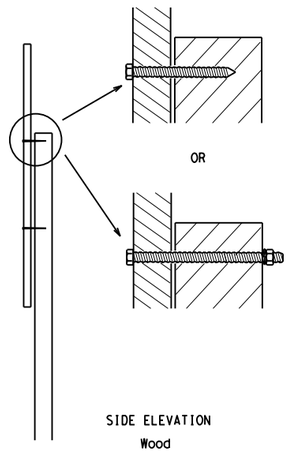
* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

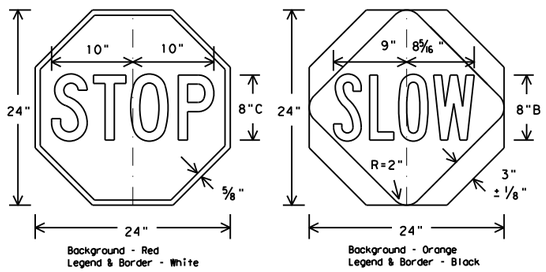


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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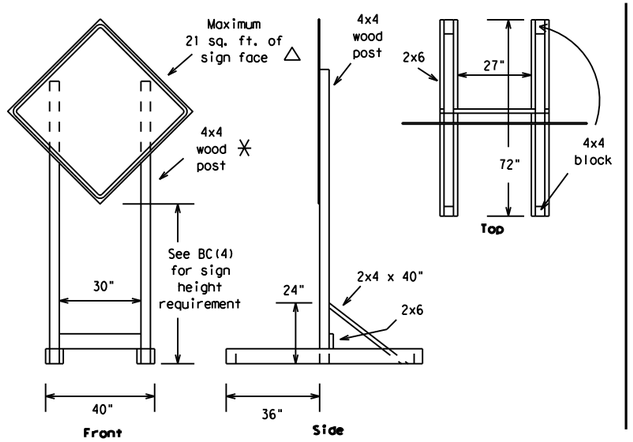
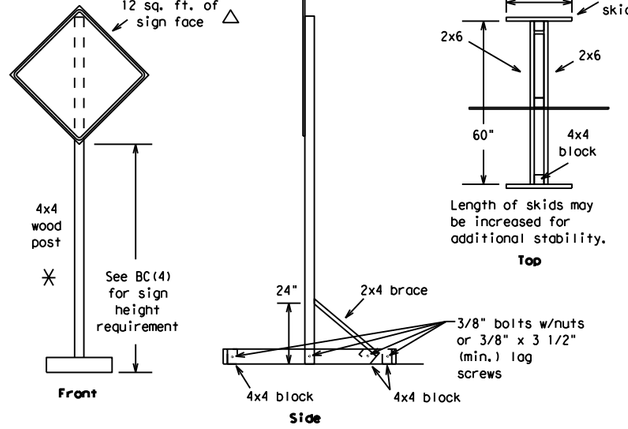
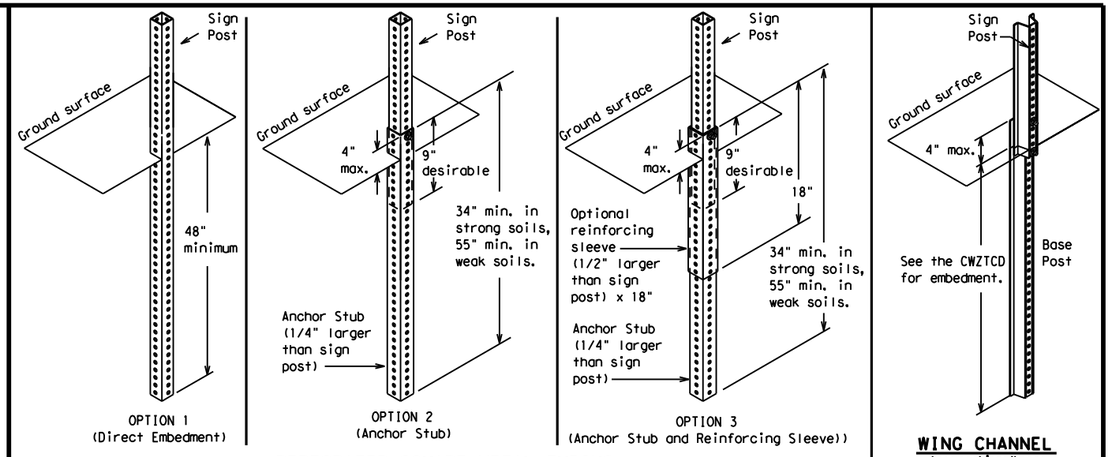




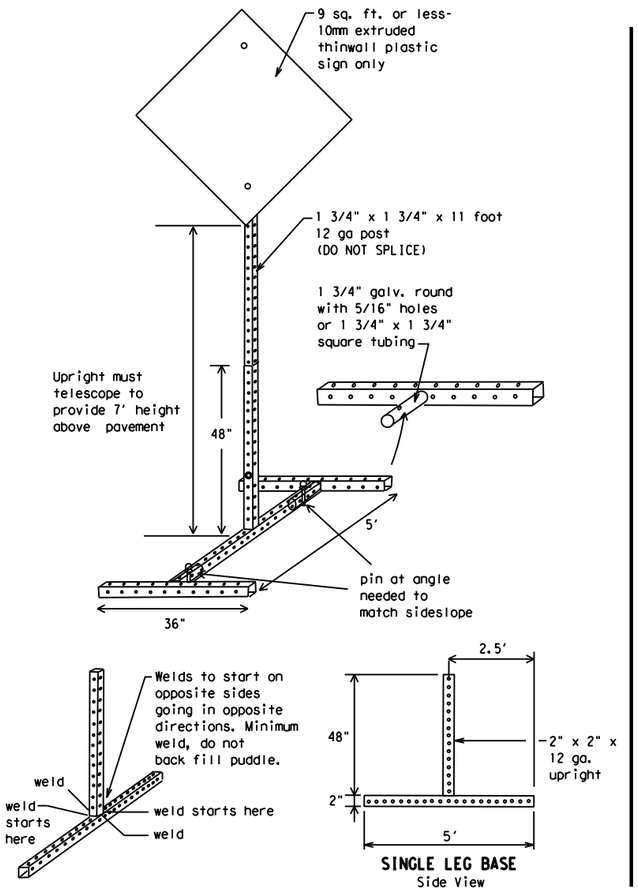
SKID MOUNTED WOOD SIGN SUPPORTS

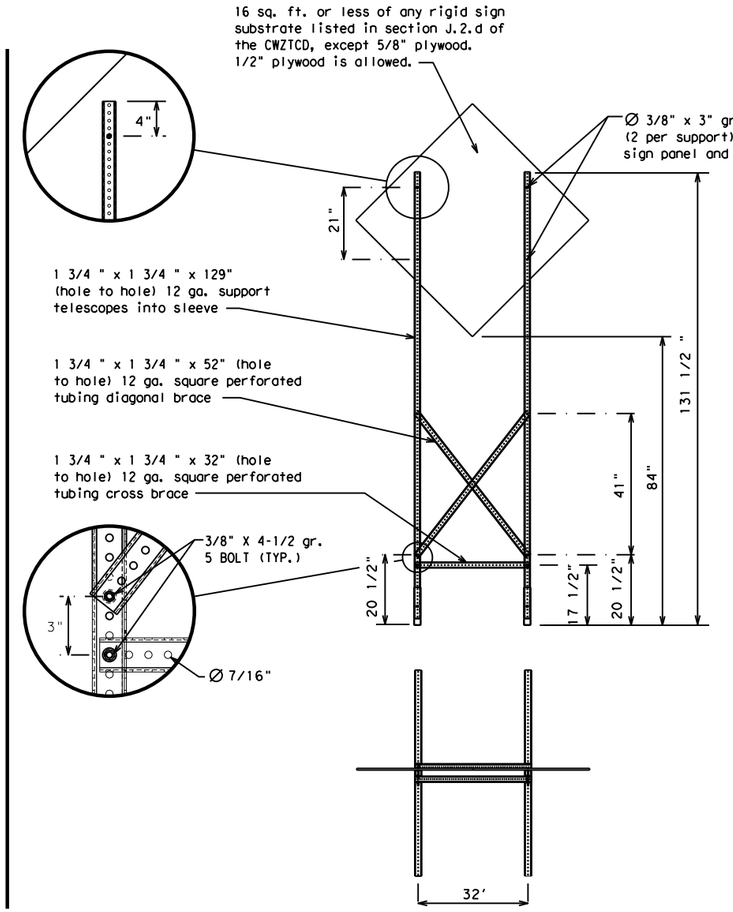
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

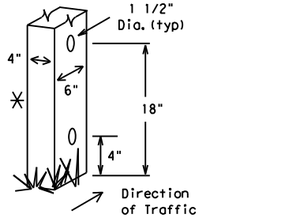


GROUND MOUNTED SIGN SUPPORTS

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

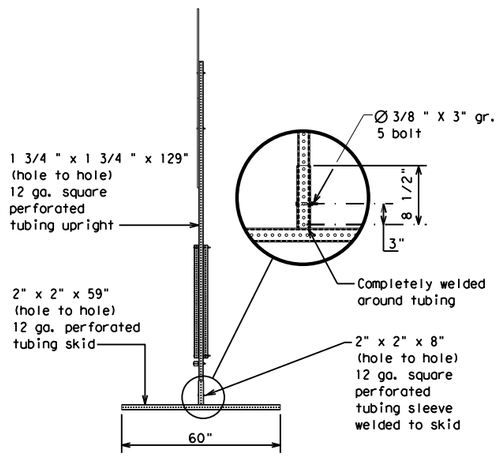






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	HOU	HARRIS		28

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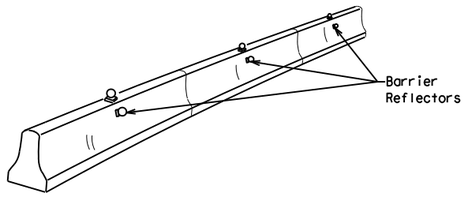
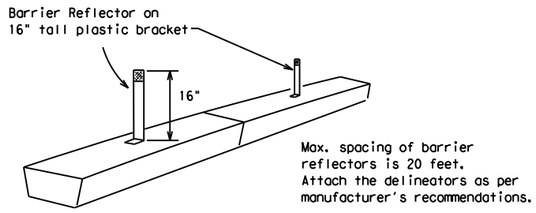
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

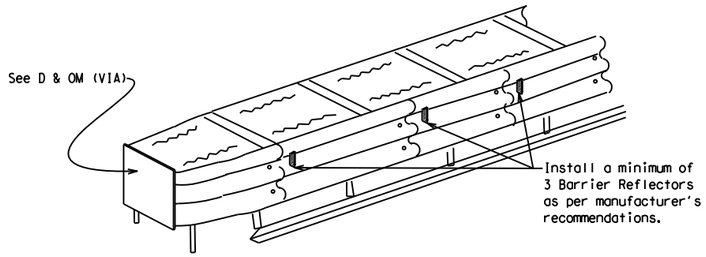


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

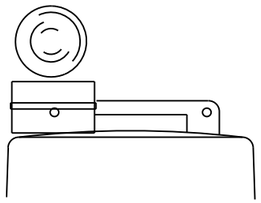


DELINEATION OF END TREATMENTS

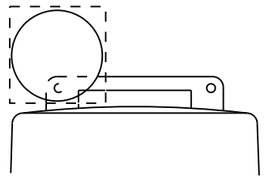
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

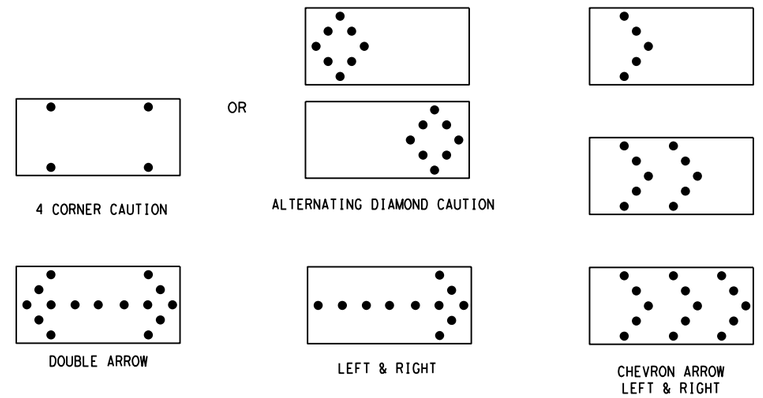
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

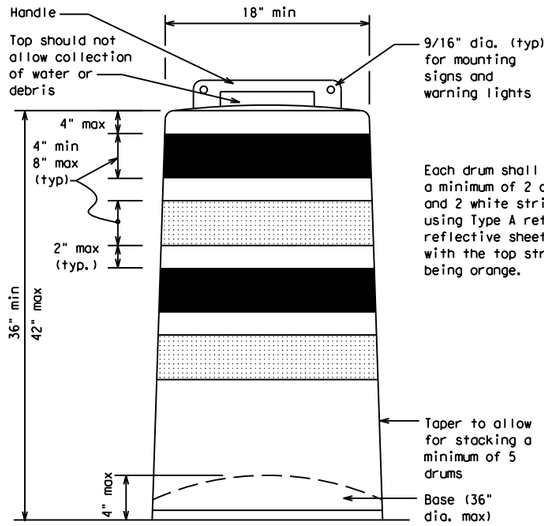
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

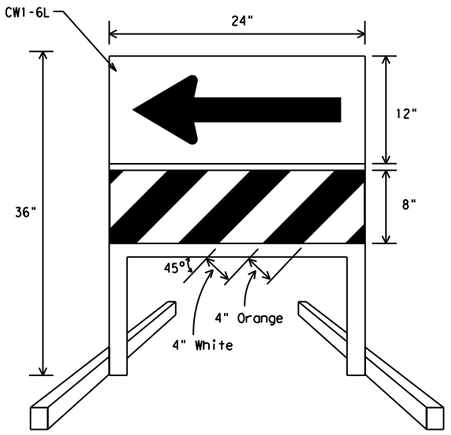
RETROREFLECTIVE SHEETING

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

BALLAST

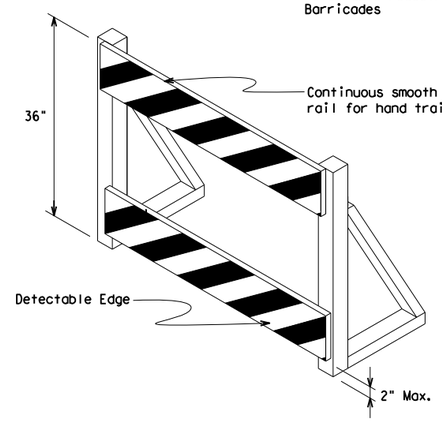
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





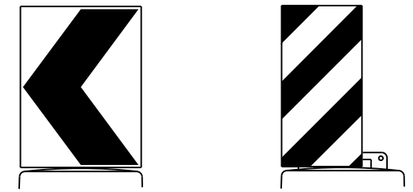
DIRECTION INDICATOR BARRICADE

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



DETECTABLE PEDESTRIAN BARRICADES

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



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

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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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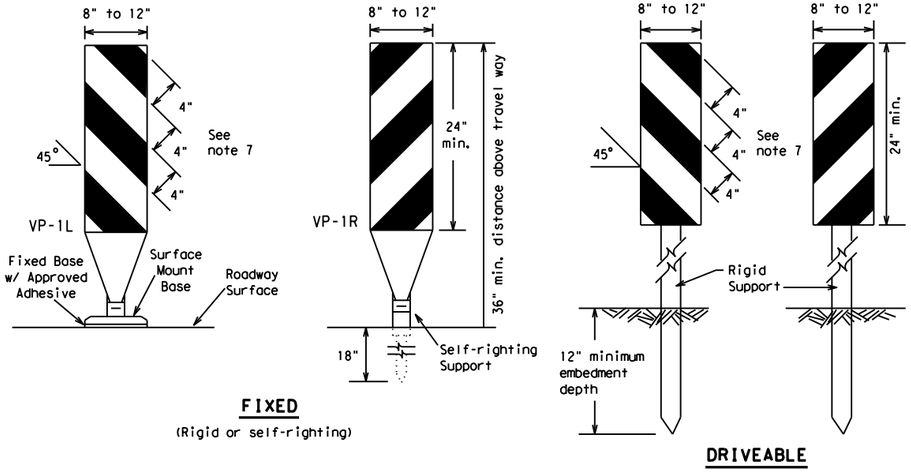
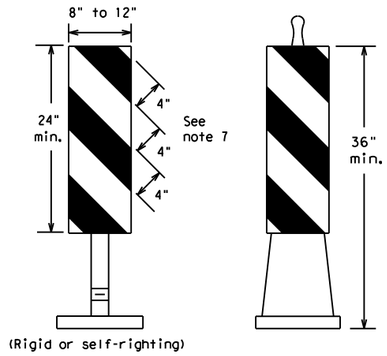


FIXED
(Rigid or self-righting)

DRIVEABLE

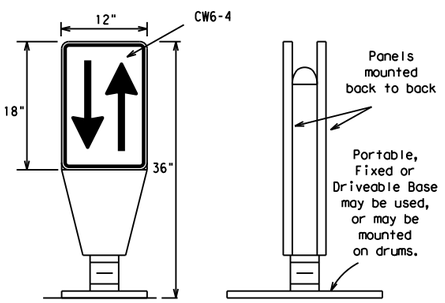


(Rigid or self-righting)

PORTABLE

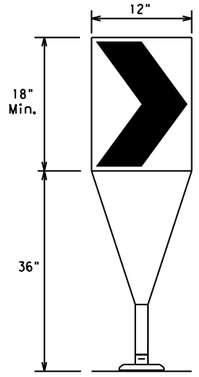
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



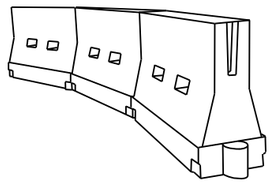
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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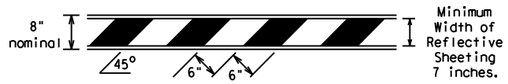
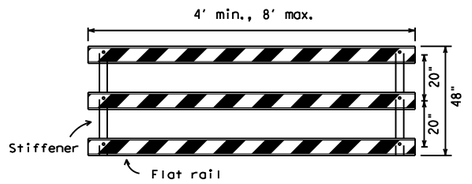
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



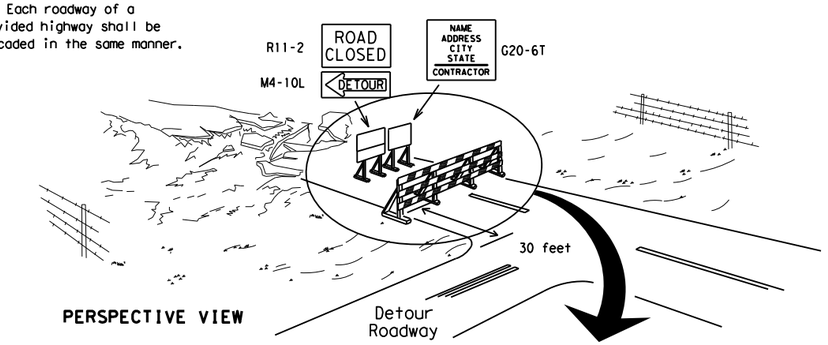
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

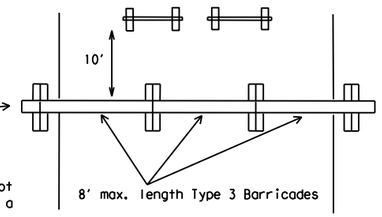
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

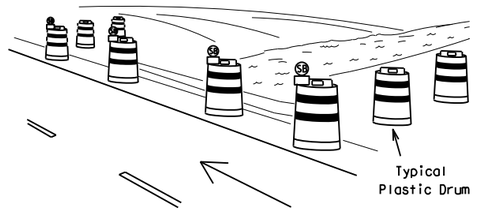
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

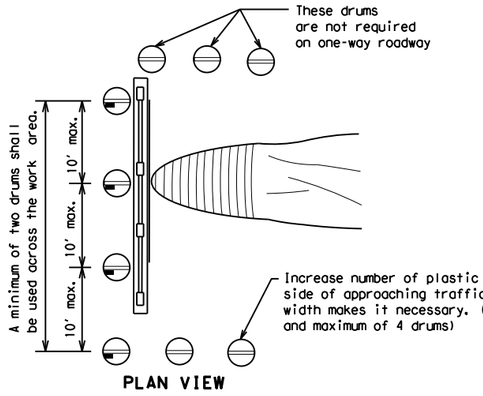
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

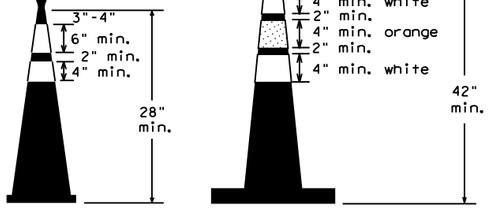
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



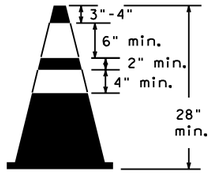
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

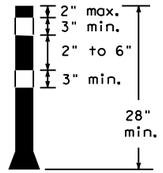
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

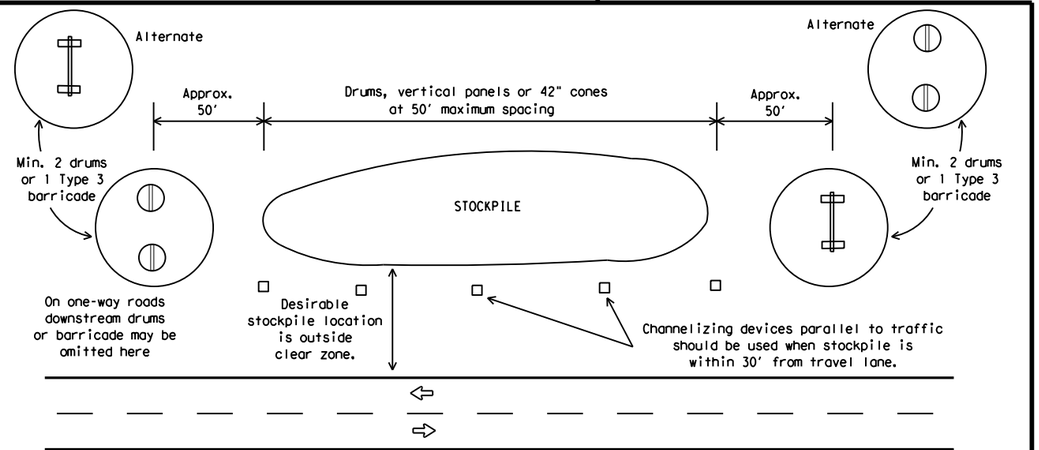


Tubular Marker

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

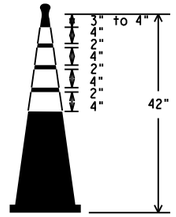
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		32

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.

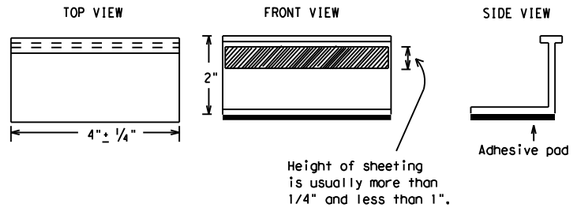
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	HOU	HARRIS		33
11-02 8-14				

105

DATE: 6/16/2020 3:50:20 PM
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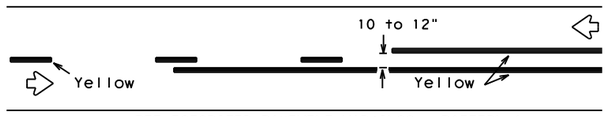
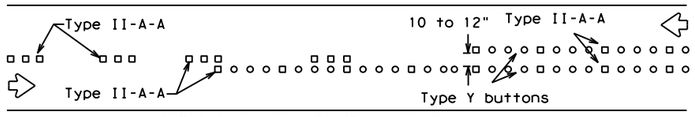
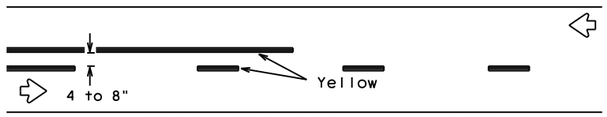
PAVEMENT MARKING PATTERNS



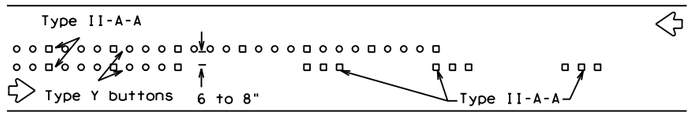
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



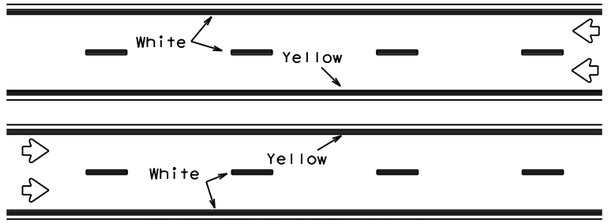
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



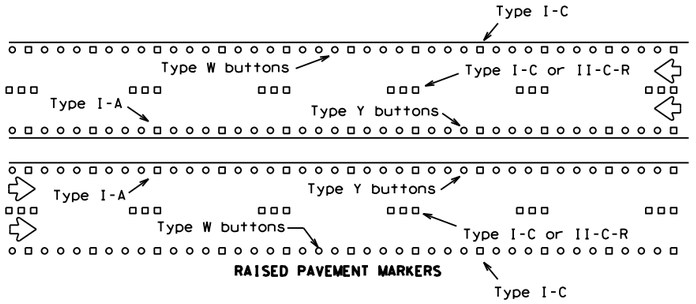
RAISED PAVEMENT MARKERS - PATTERN B

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

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



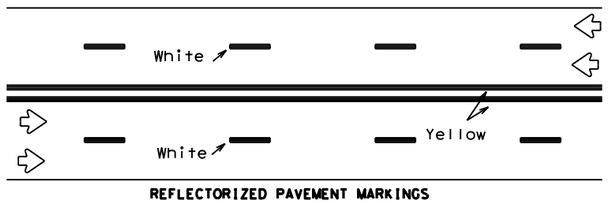
REFLECTORIZED PAVEMENT MARKINGS



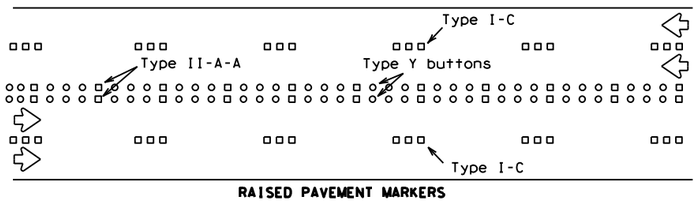
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



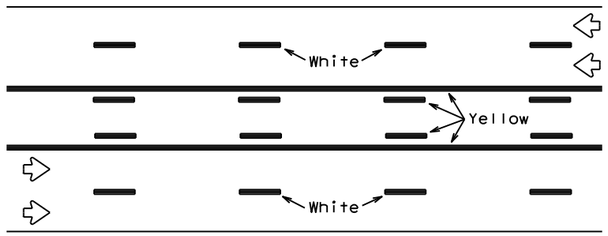
REFLECTORIZED PAVEMENT MARKINGS



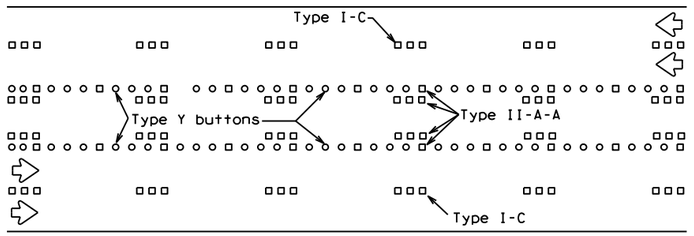
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

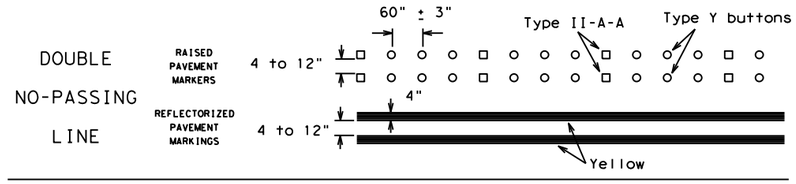
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

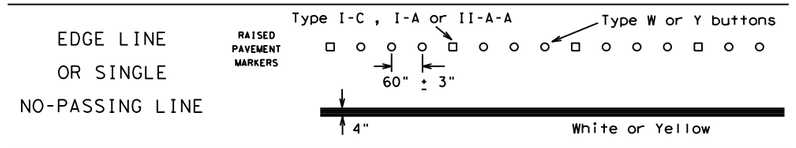
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

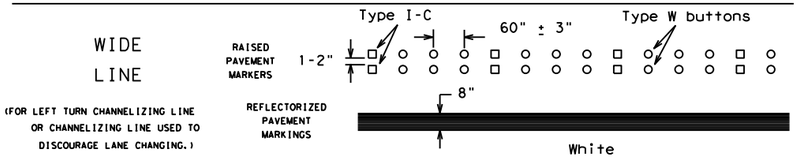


EDGE LINE OR SINGLE NO-PASSING LINE



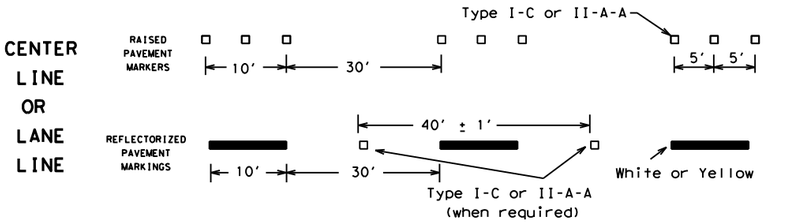
WIDE LINE

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

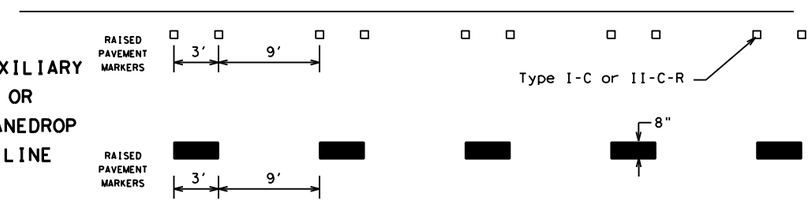


BROKEN LINES

CENTER LINE OR LANE LINE

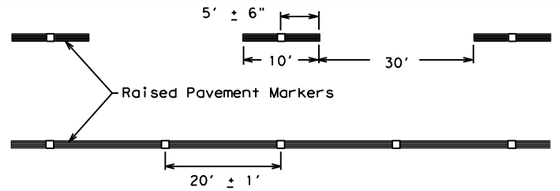


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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11-02 8-14				

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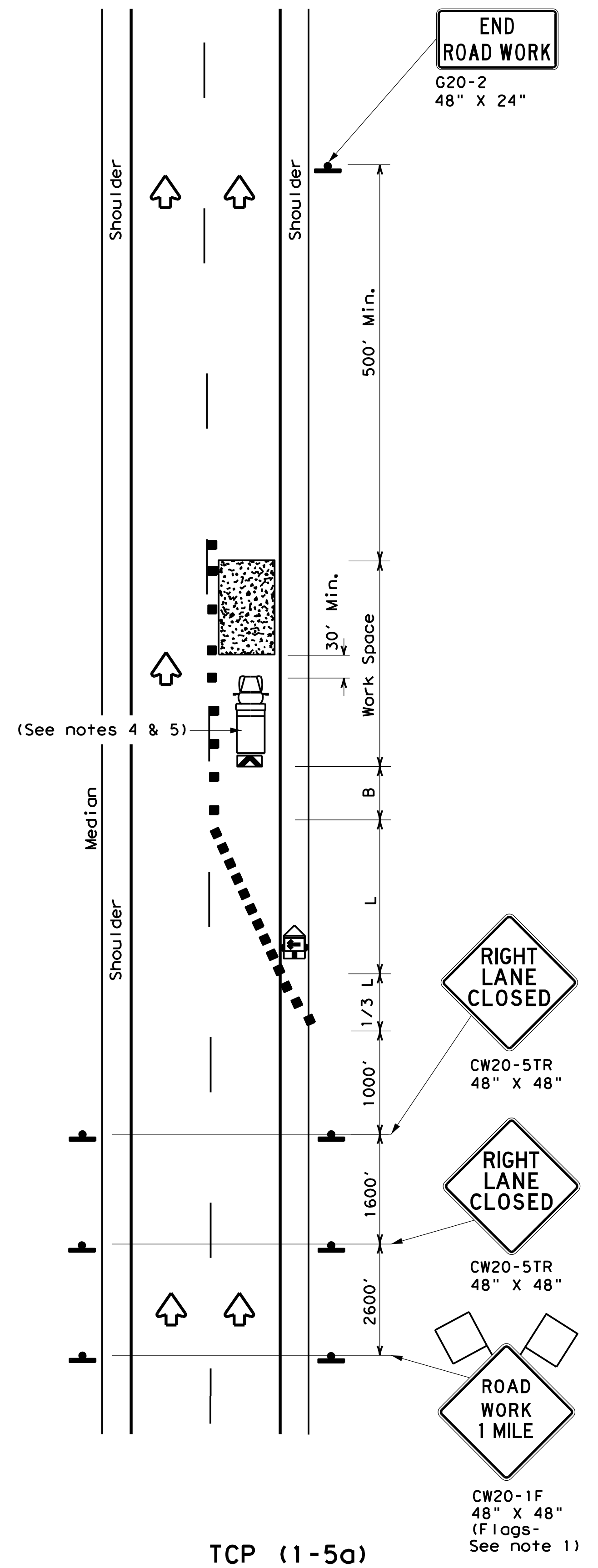
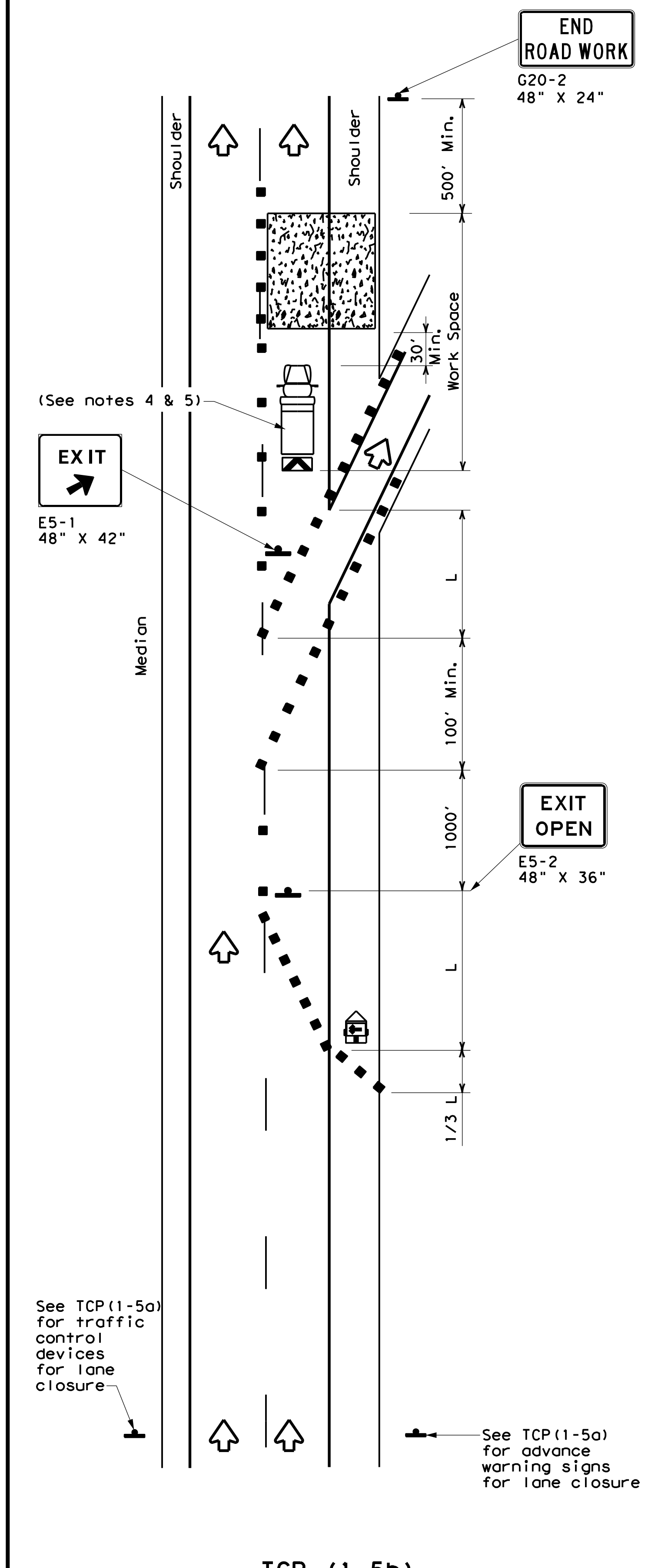


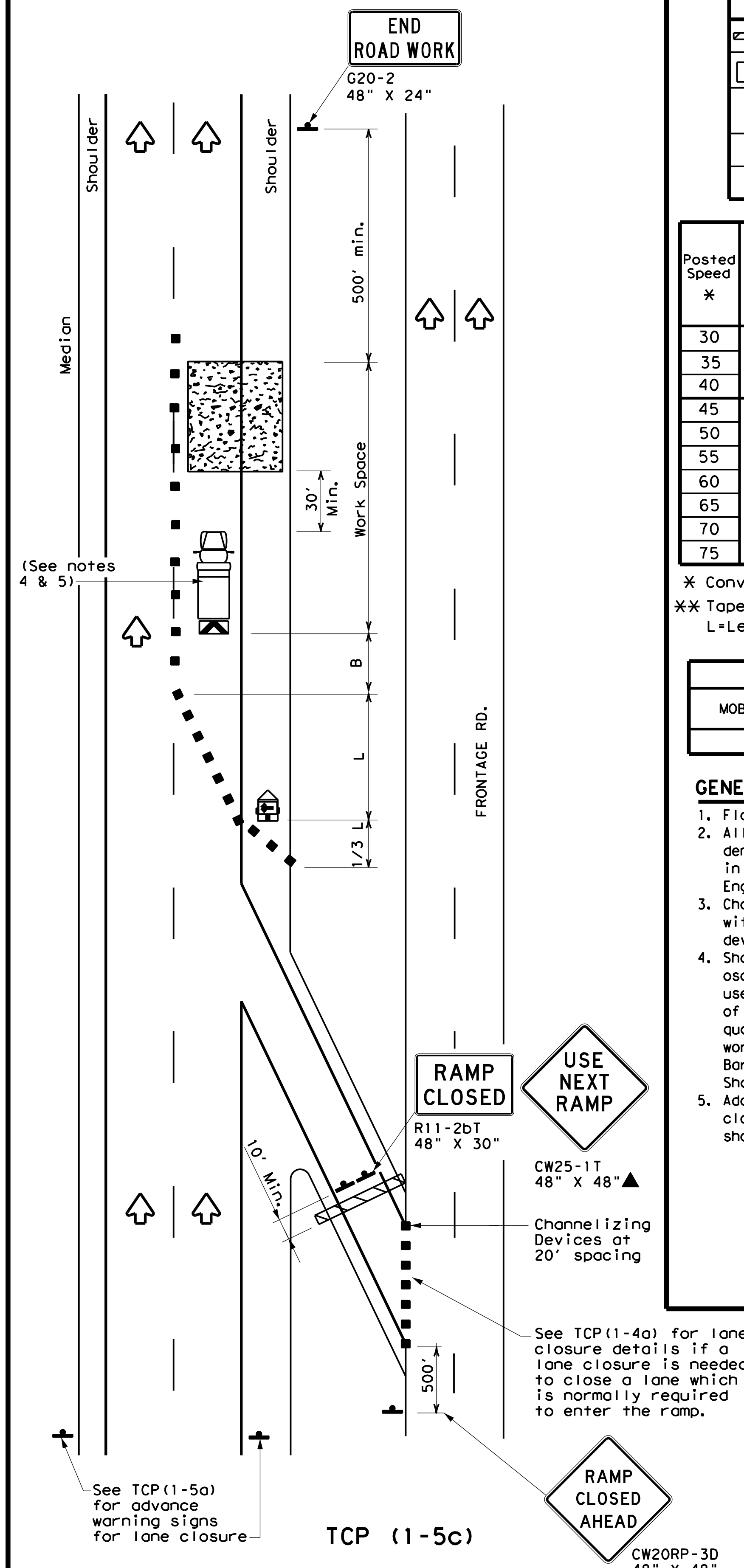
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 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. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned 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 FOR DIVIDED HIGHWAYS

TCP(1-5)-18

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©TxDOT February 2012	CONT 0271	SECT 16	JOB 160	HIGHWAY IH 610
REVISIONS 2-18	DIST HOU		COUNTY HARRIS	SHEET NO. 35

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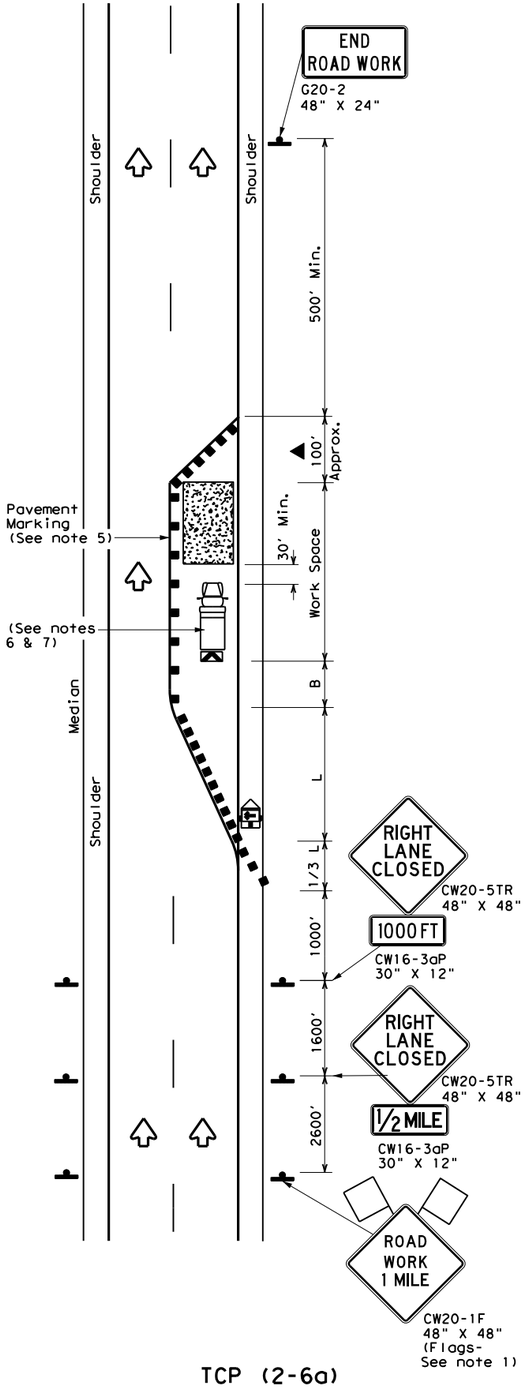
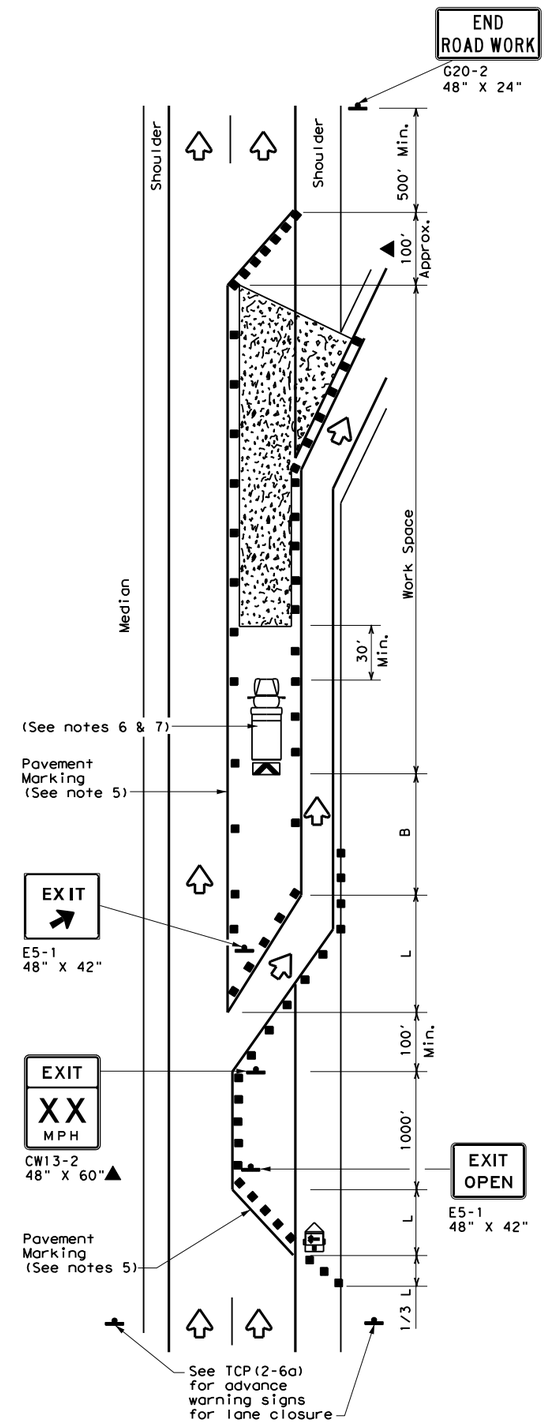


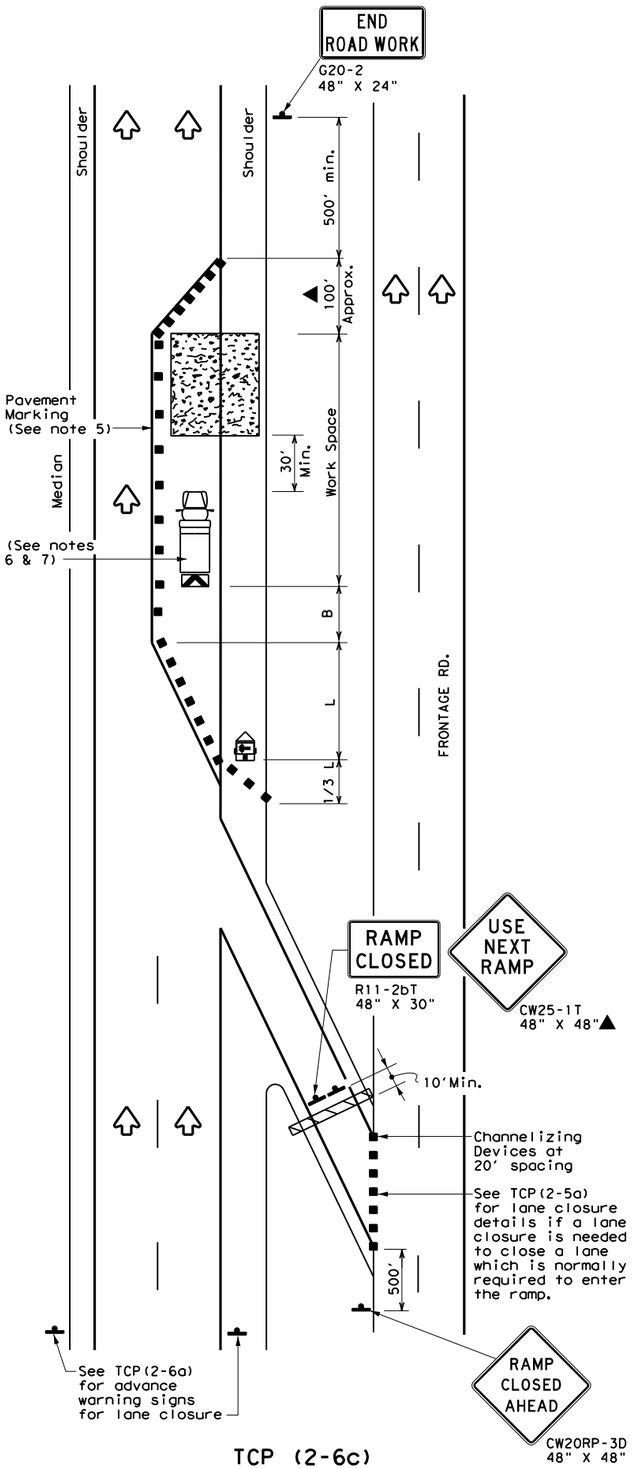
TCP (2-6a)

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

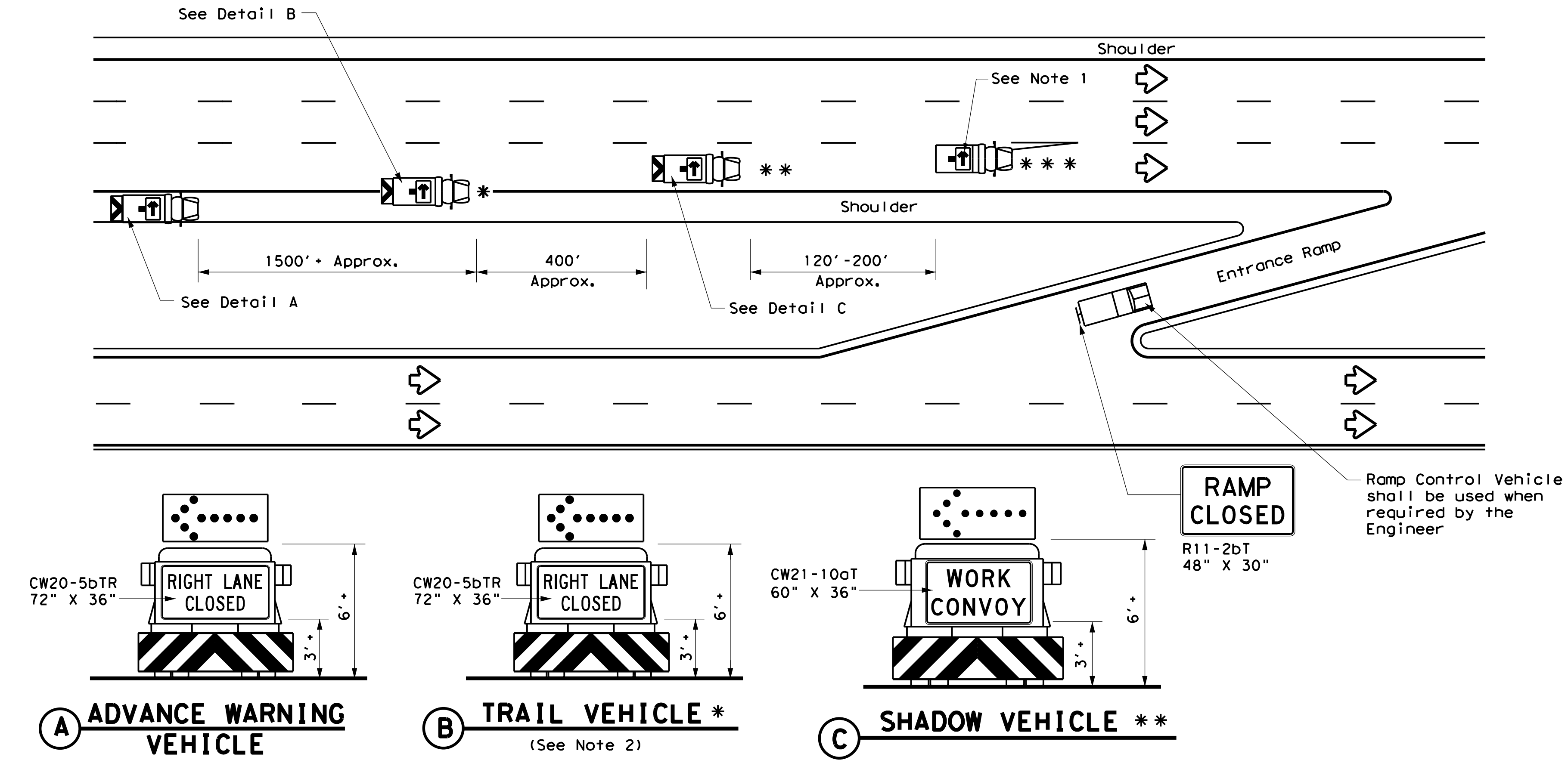
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

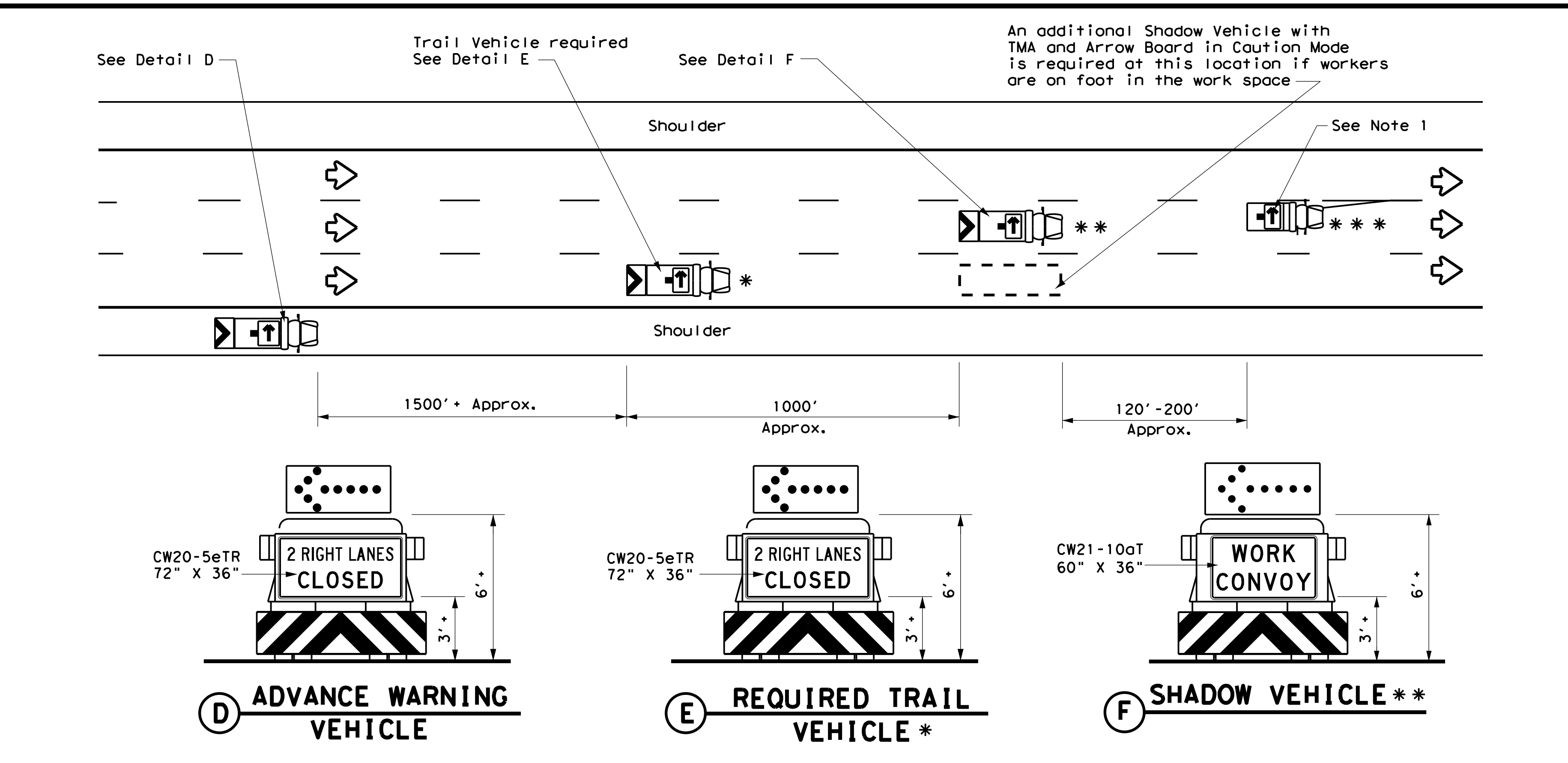
TCP(2-6)-18

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	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		36

DATE: 6/17/2020 9:47:43 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Pro



RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

LEGEND

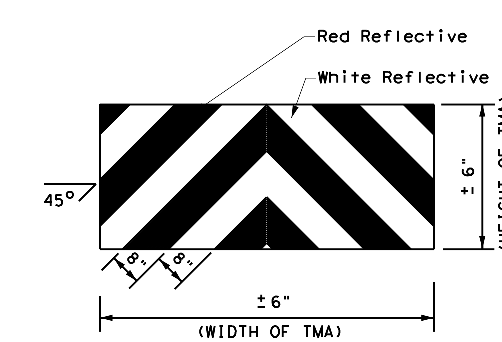
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle	(symbol)	RIGHT Directional
(symbol)	Heavy Work Vehicle	(symbol)	LEFT Directional
(symbol)	Truck Mounted Attenuator (TMA)	(symbol)	Double Arrow
(symbol)	Traffic Flow	(symbol)	CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE

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

GENERAL NOTES

1. ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
2. For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
4. The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
5. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
9. Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
12. The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



STRIPING FOR TMA

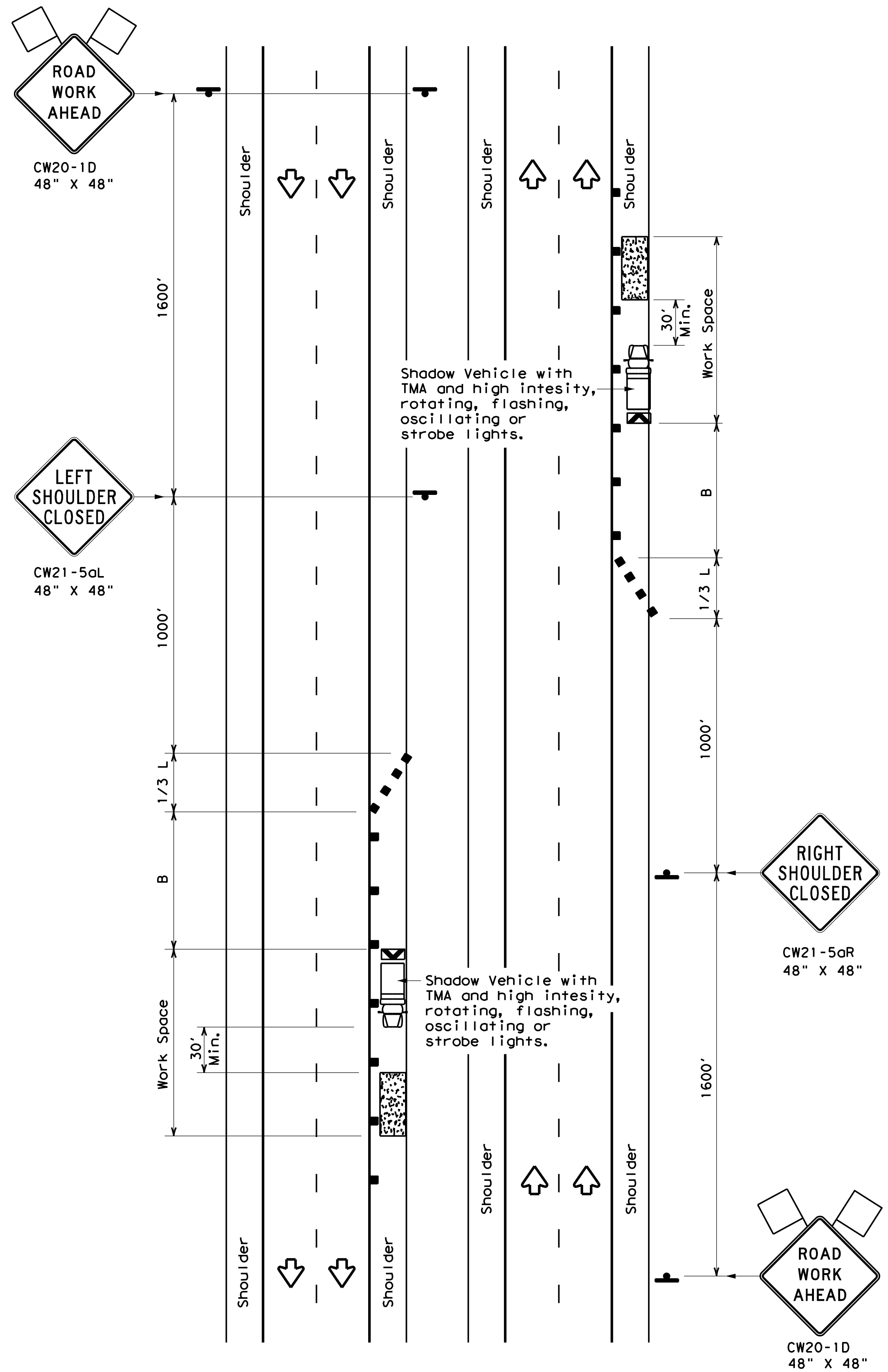
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

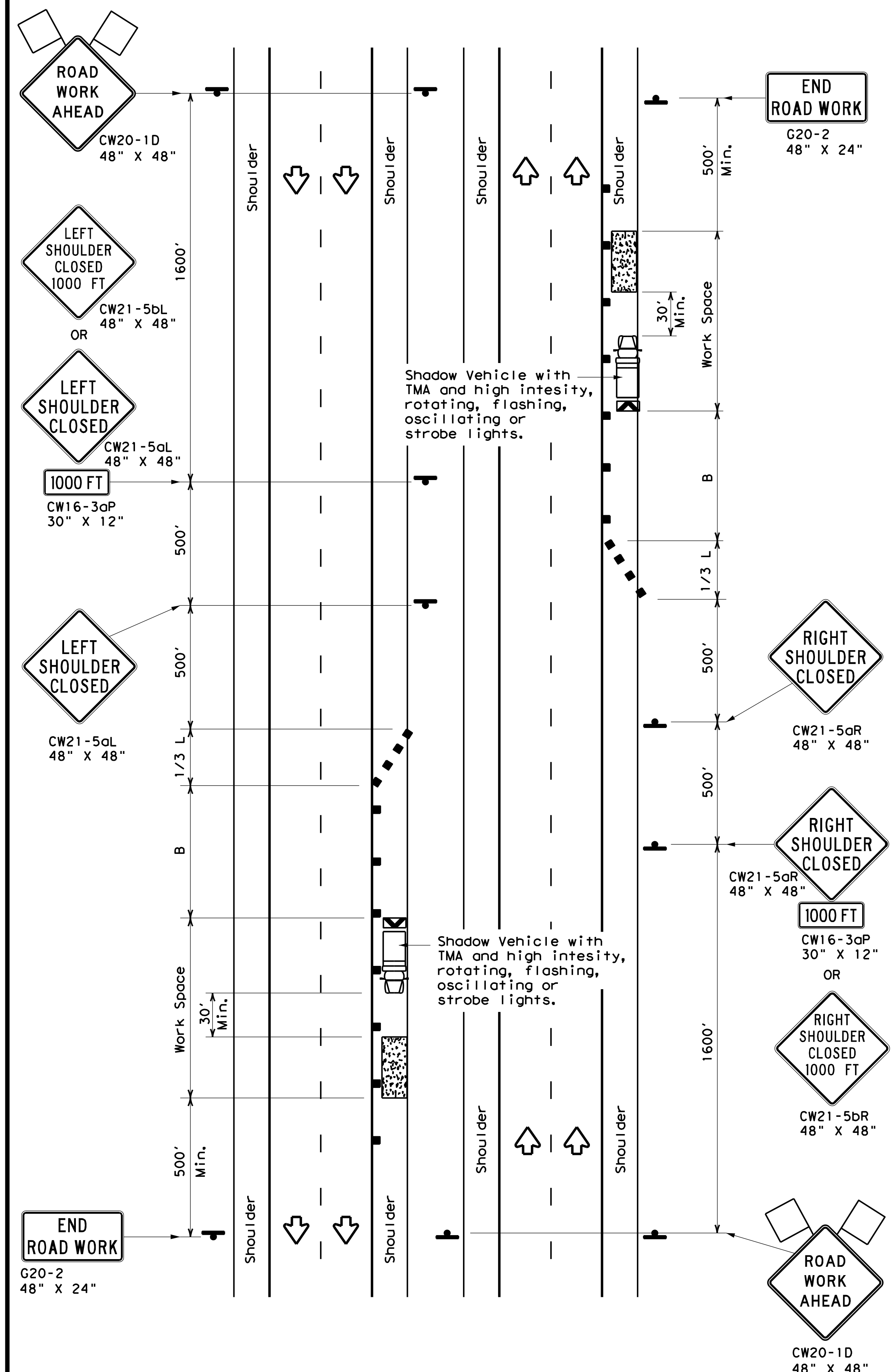
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY	
REVISIONS 2-94 4-98 8-95 7-13 1-97	0271	16	160	IH 610	
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		37	

176



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.

2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

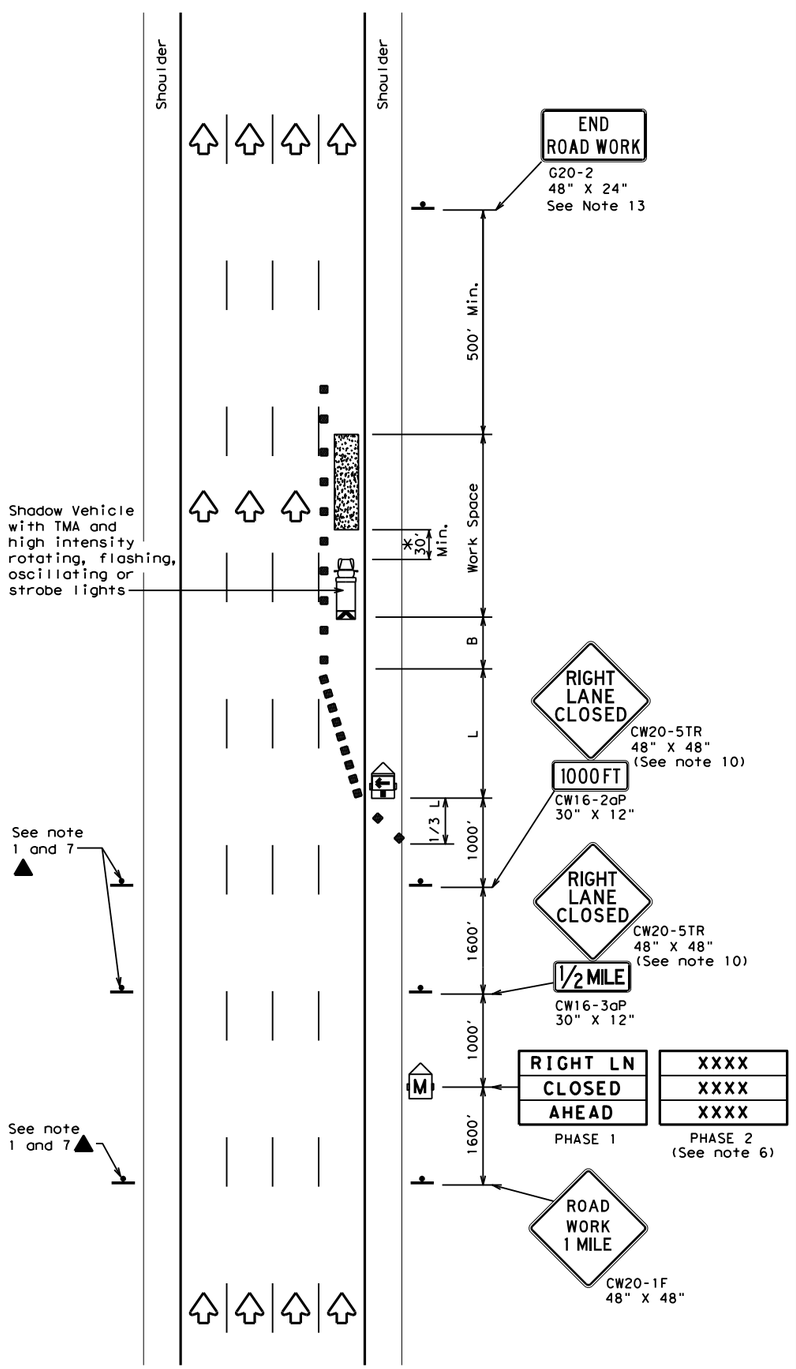
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

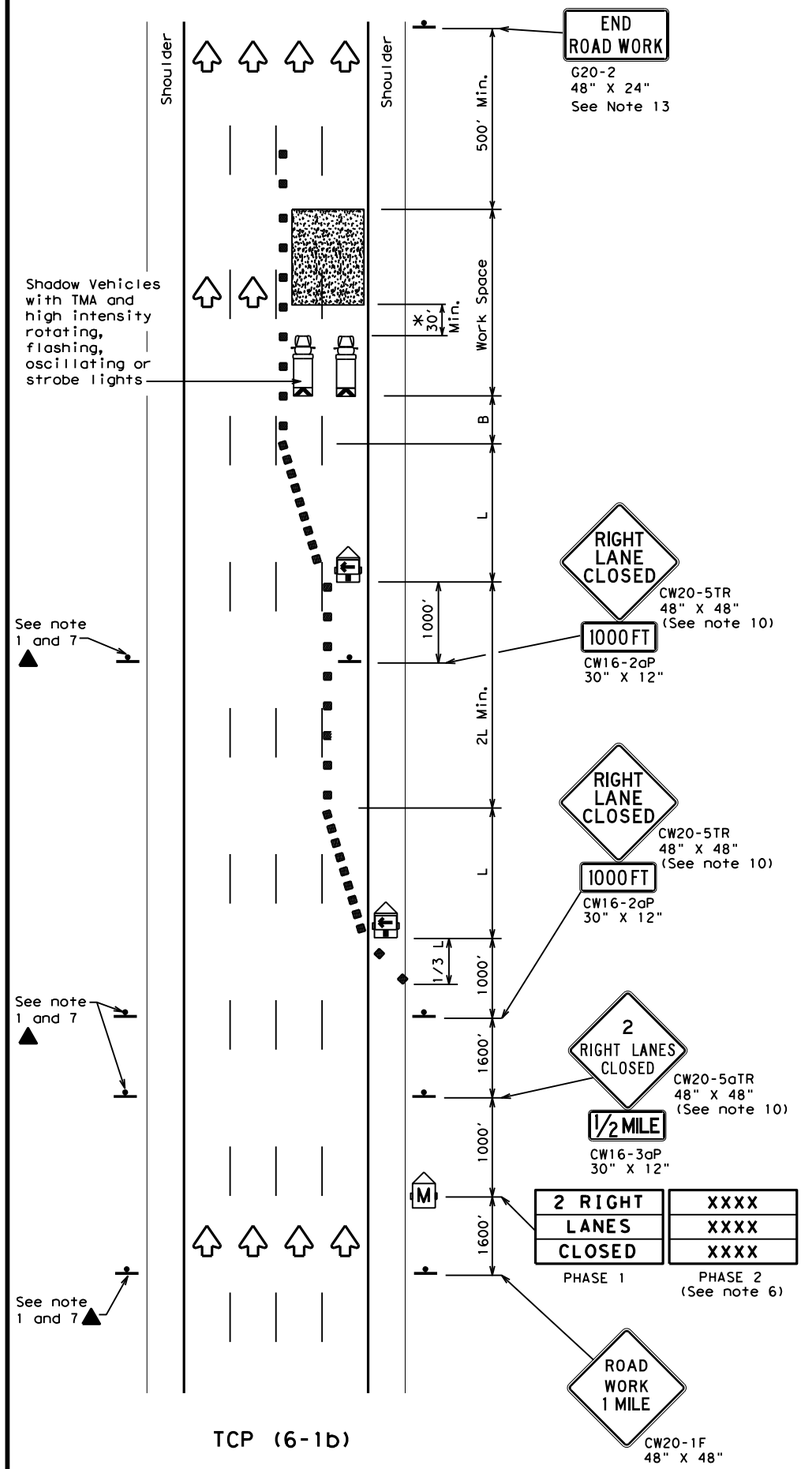
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
2-18	DIST		COUNTY	SHEET NO.
	HOU		HARRIS	38

DATE: 6/17/2020 9:50:17 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271-16-160\Design Standards\tcp6-1.dgn



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		39

DATE: 6/17/2020 9:52:27 AM
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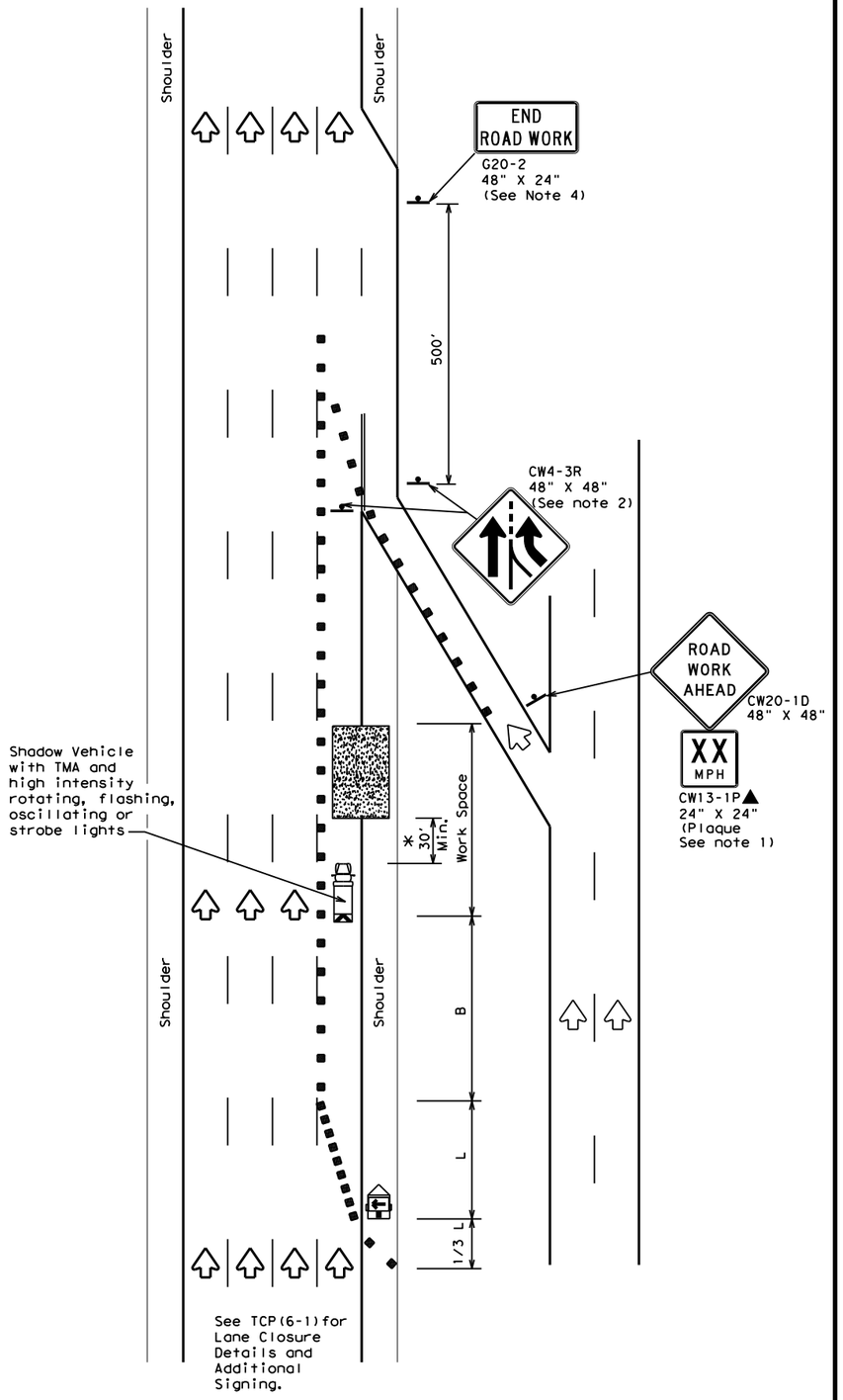
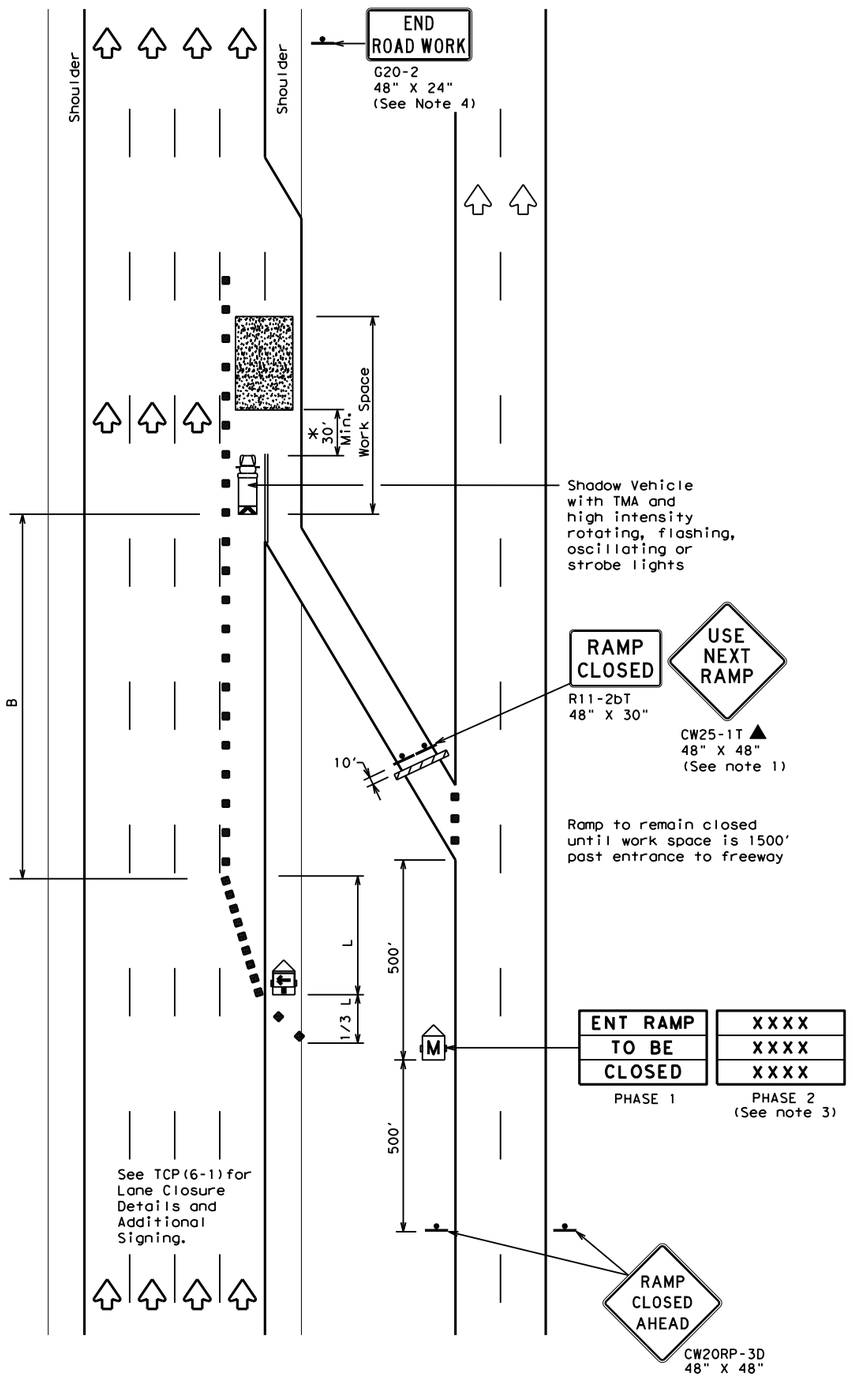


TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. 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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		40

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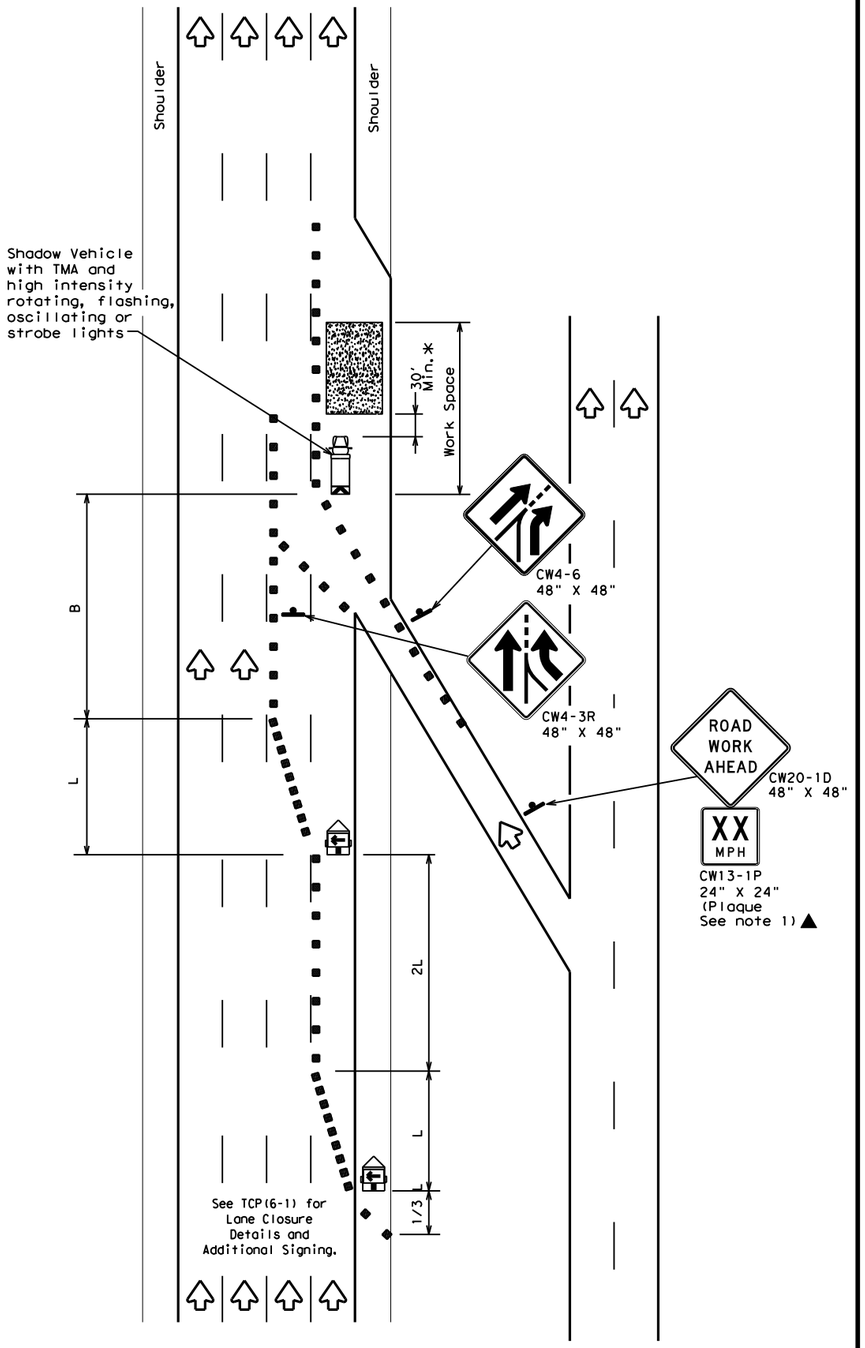
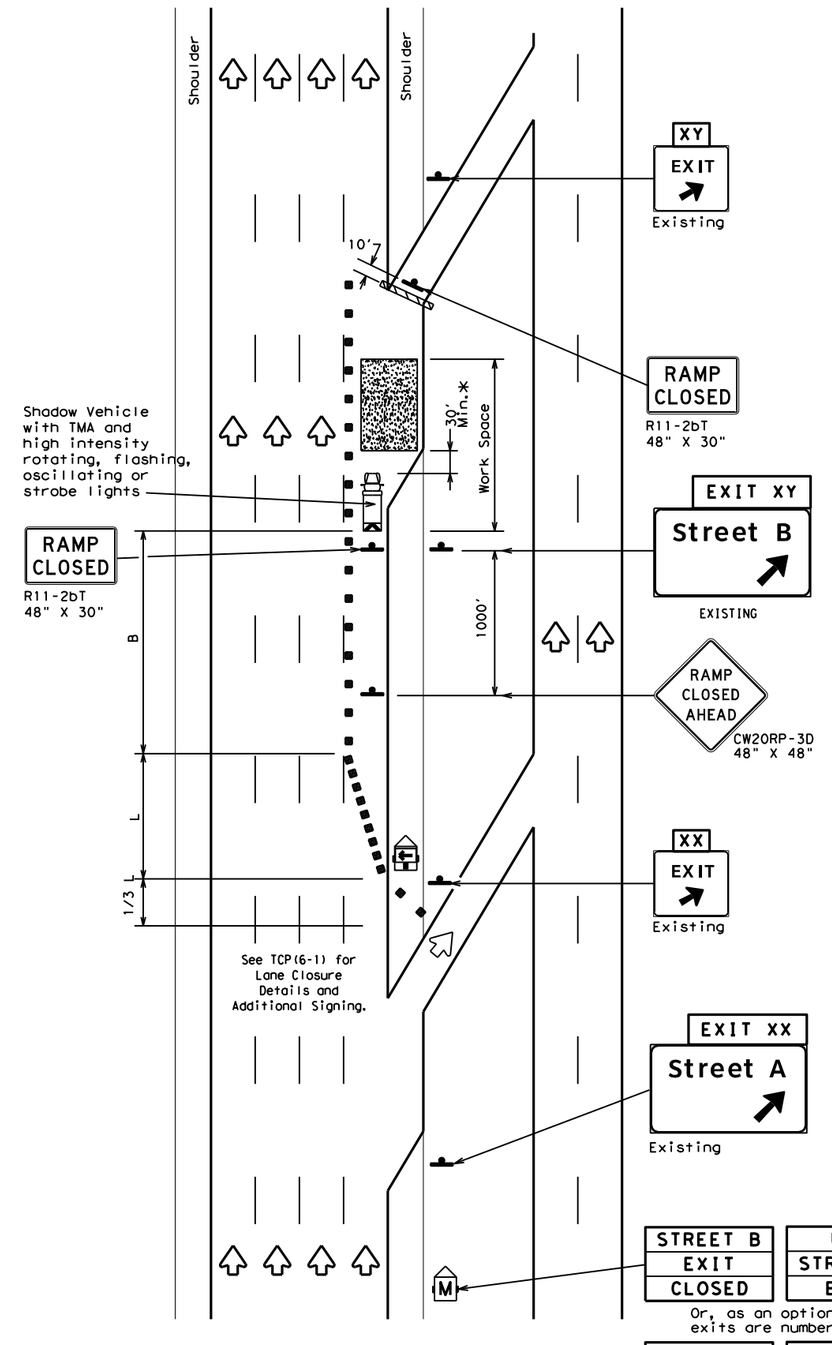


TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

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.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		41

DATE: 6/17/2020 9:54:50 AM
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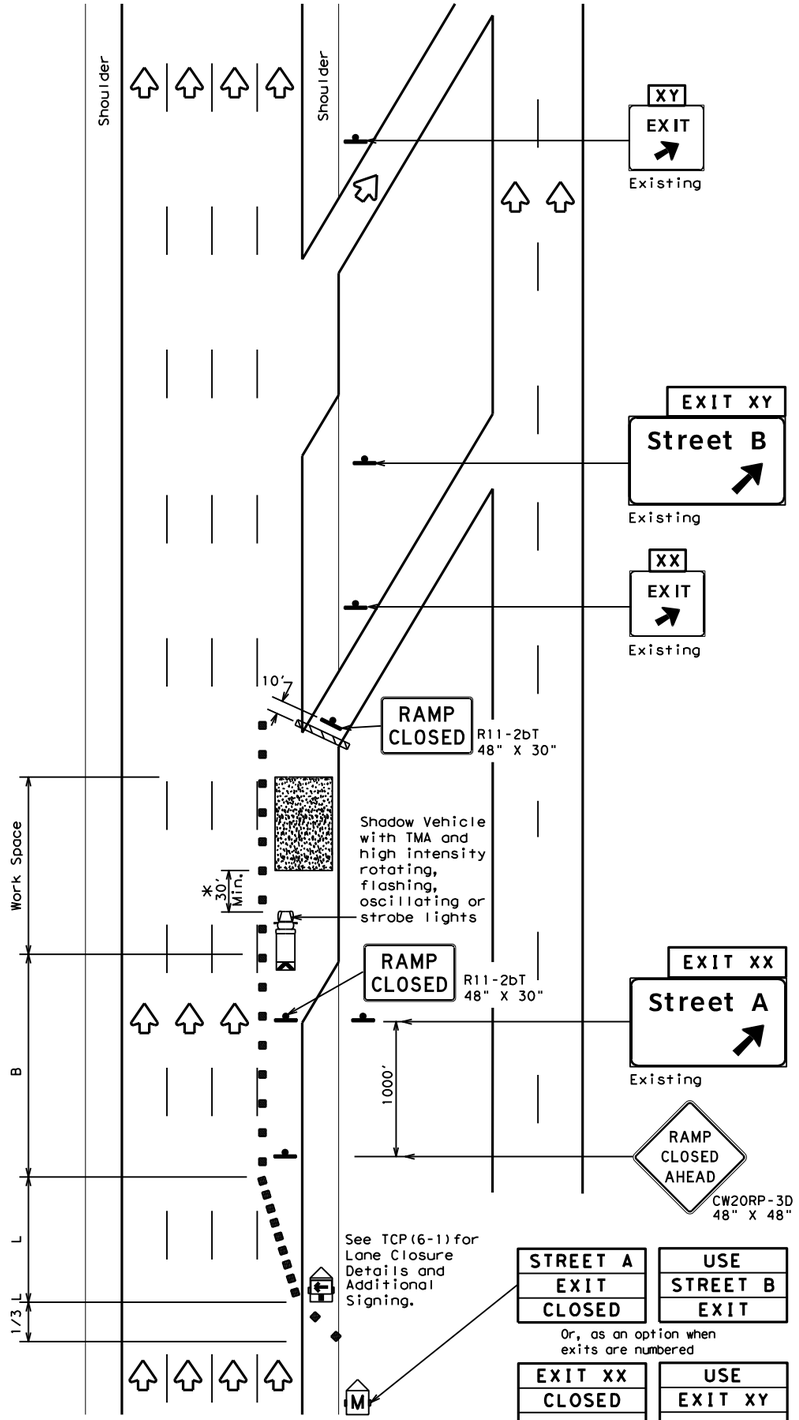
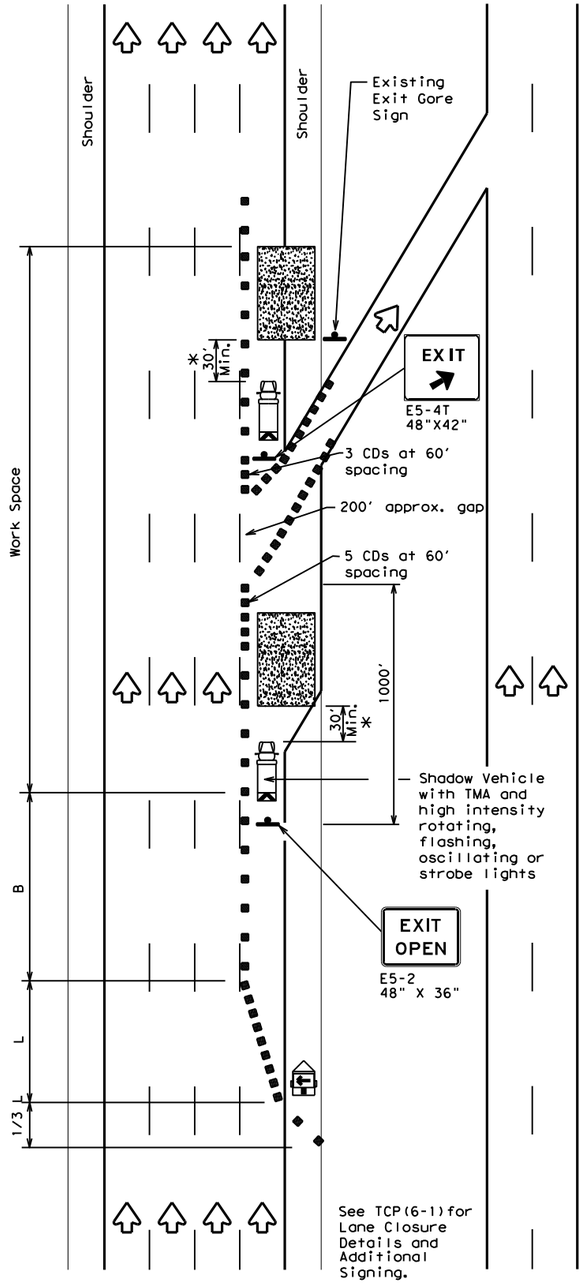


TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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. See BC Standards for sign details.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

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©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		42

DATE: 6/17/2020 9:55:47 AM
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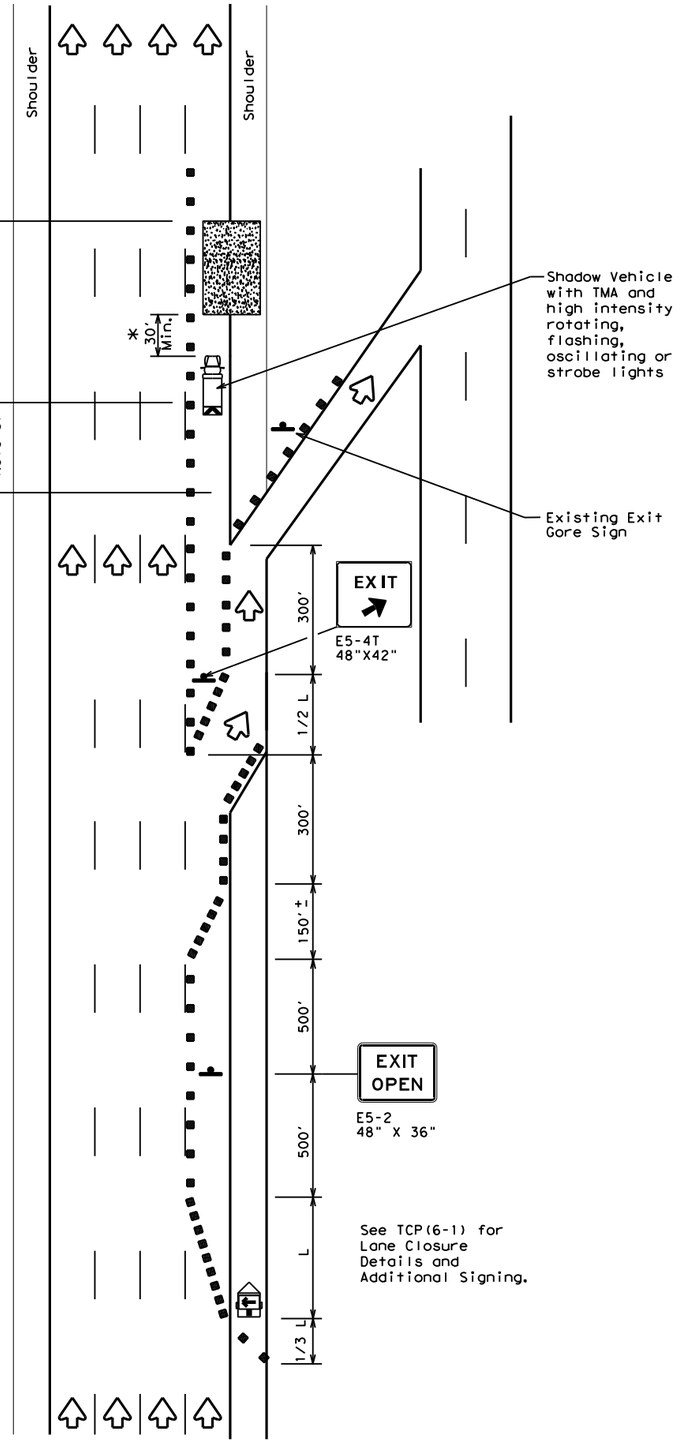
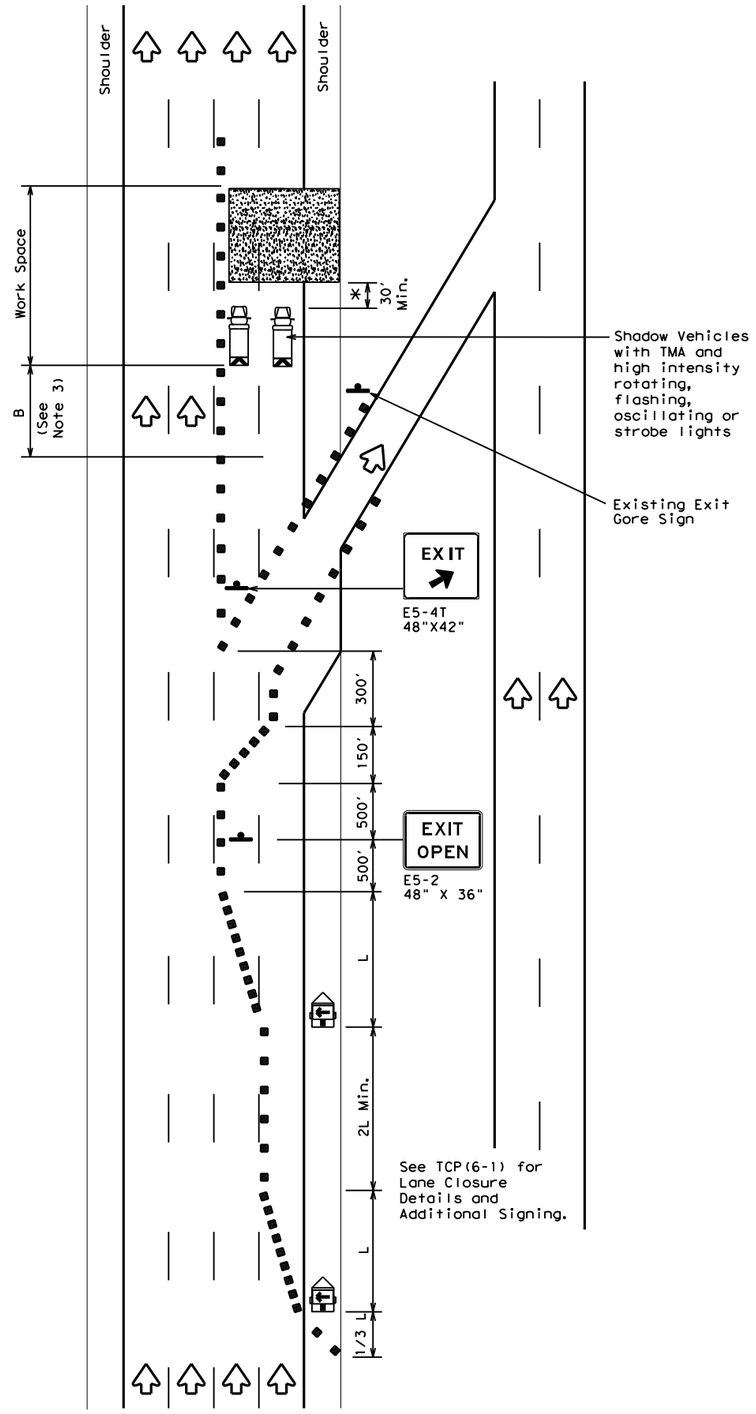


See TCP(6-1) for Lane Closure Details and Additional Signing.

TCP (6-5a)

EXIT RAMP OPEN



See TCP(6-1) for Lane Closure Details and Additional Signing.

TCP (6-5b)

EXIT RAMP OPEN
TWO LANE CLOSURE WITHIN 1500' PAST EXIT RAMP

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. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

*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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

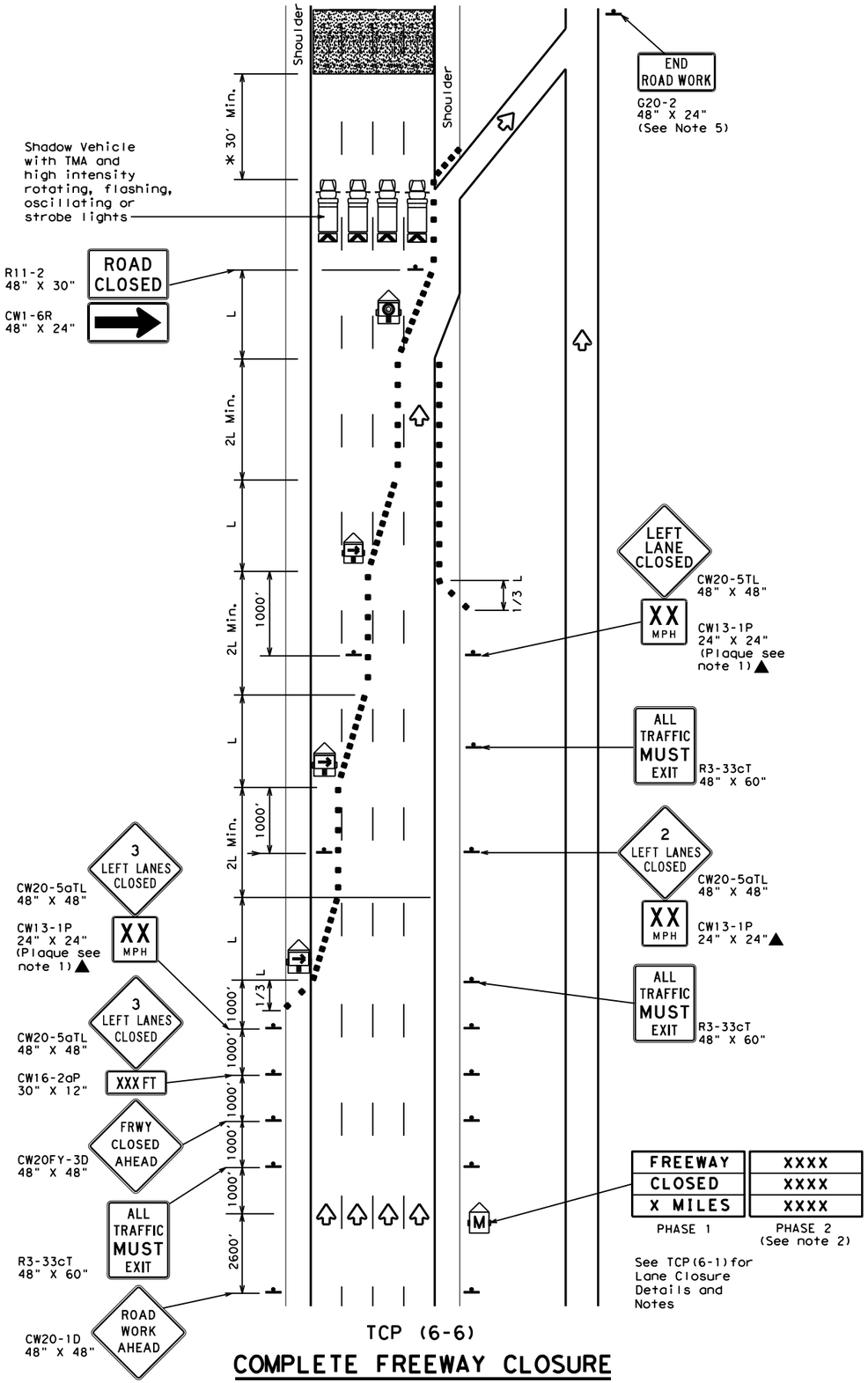
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		43

DATE: 8/10/2020 3:02:56 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\GRANTED\XXXX TRAFFIC CONTROL PLAN FREEWAY CLOSURE.dgn



TCP (6-6)

COMPLETE FREEWAY 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)
	Flashing Arrow Board in Caution Mode		Traffic Flow
	Sign		

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. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
3. Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
4. Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
5. 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.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY CLOSURE

TCP(6-6)-12

FILE: tcp6-6.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0271	16	160	IH 610
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	HOU	HARRIS		44

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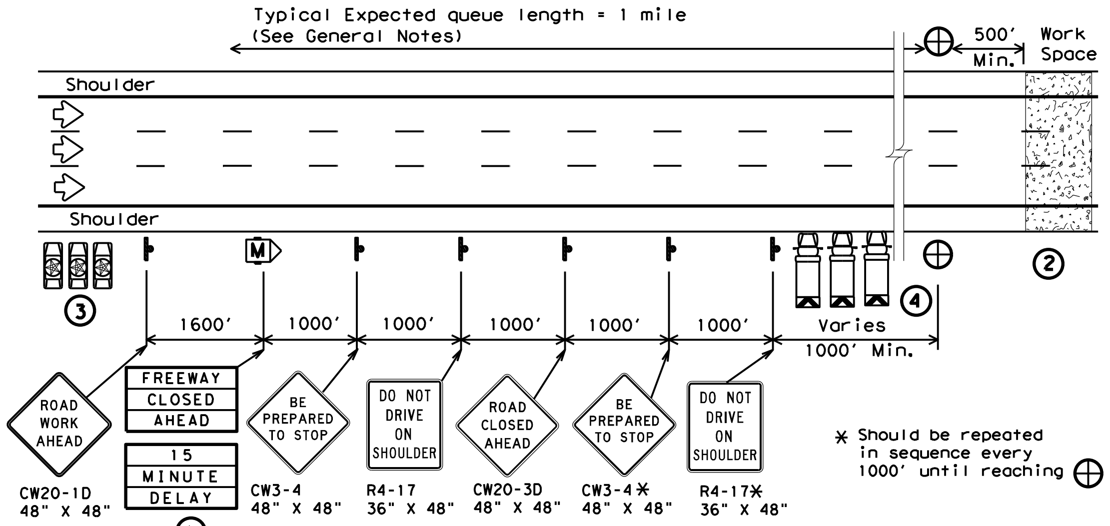
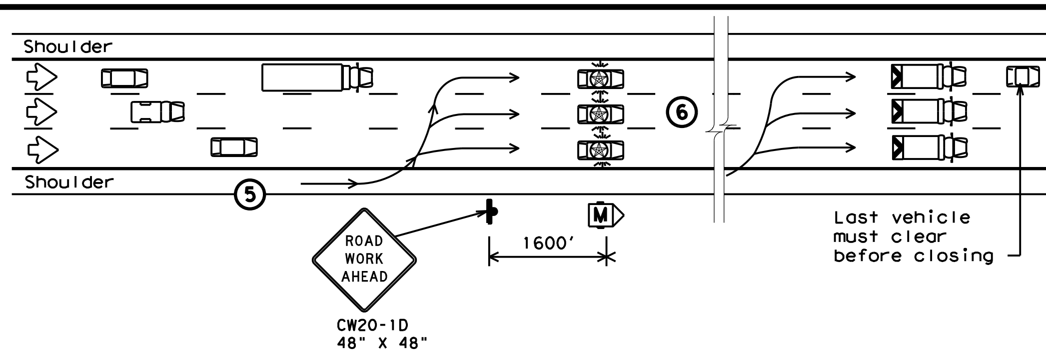


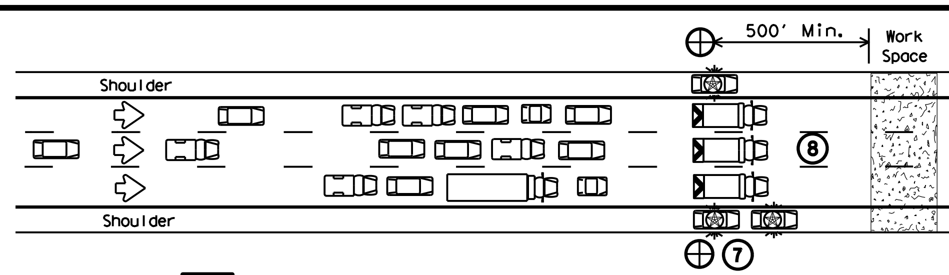
1 STARTING POSITION

1. Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.
2. Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.
3. There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead law enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.
4. One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



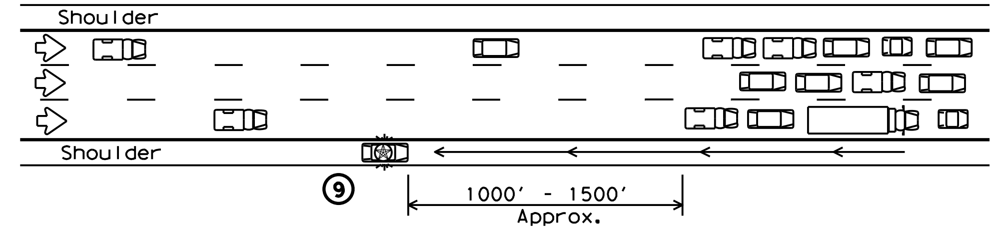
2 REDUCING SPEED OPERATION

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



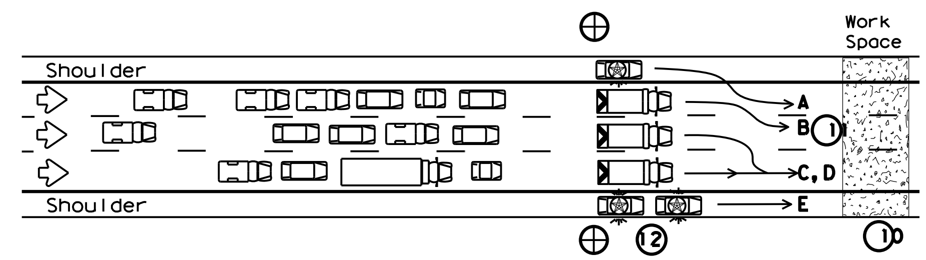
3 ALL TRAFFIC STOPPED AT CP

7. Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide law enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.
8. The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



4 WARNING THE TRAFFIC QUEUE

9. The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000' in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed 1/4 mile or more in advance of the queue.



5 RELEASING STOPPED TRAFFIC

10. All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.
11. When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.
12. The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.
13. LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

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

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

GENERAL NOTES

1. All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.
2. Law enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.
3. Law enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).
4. The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.
5. Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.
6. For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.
7. If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY CLOSURE SEQUENCE

TCP(6-7)-12

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1-97 8-12	DIST		COUNTY	SHEET NO.
4-98	HOU		HARRIS	45

207

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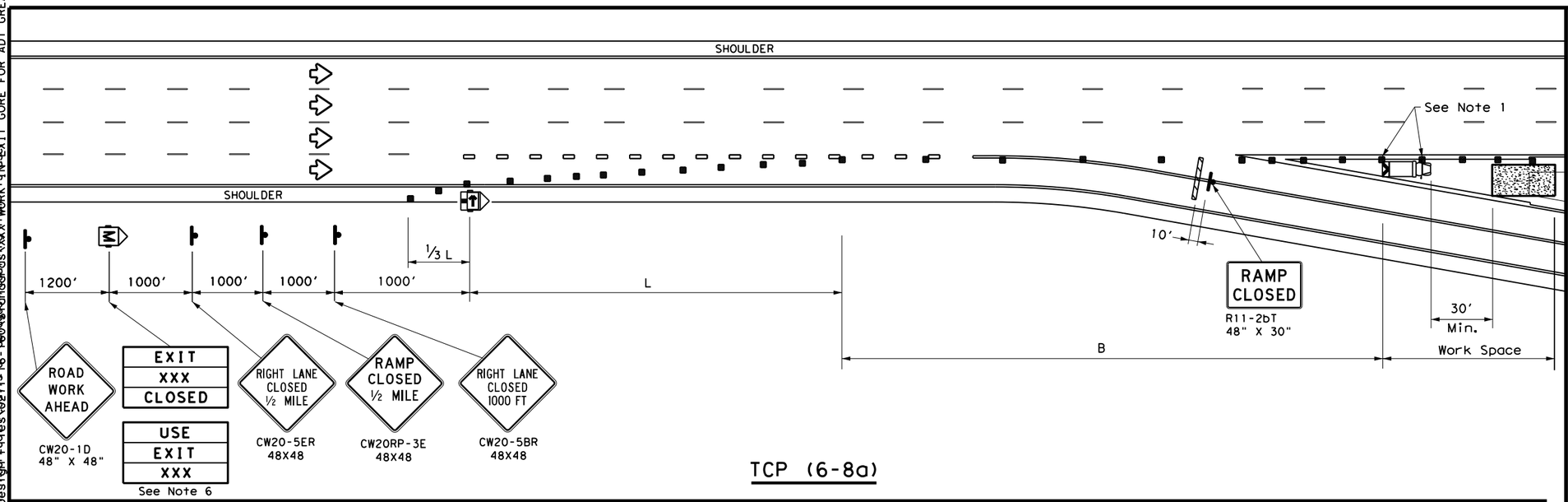
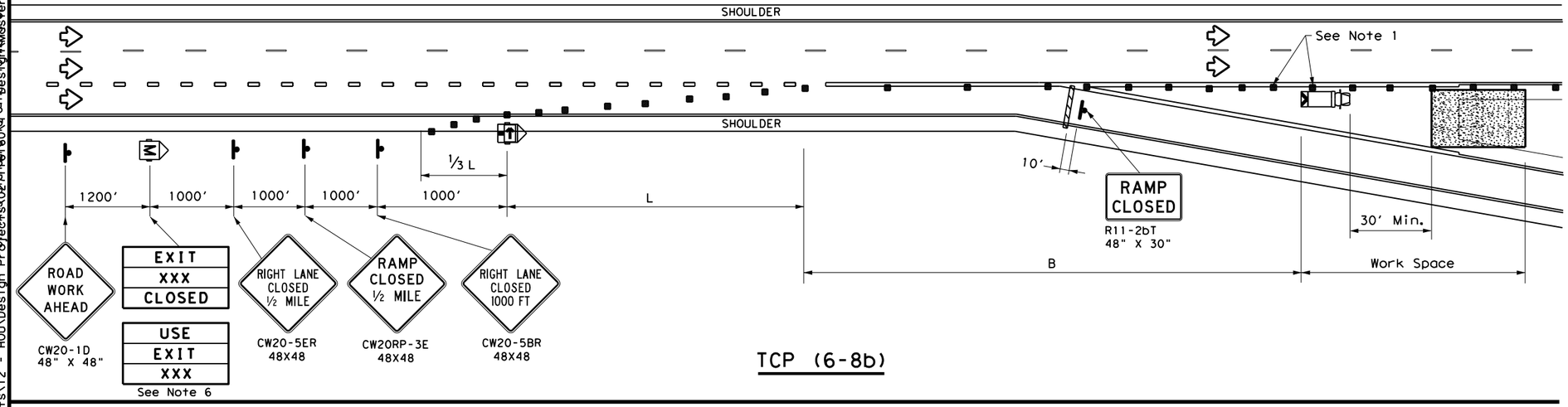
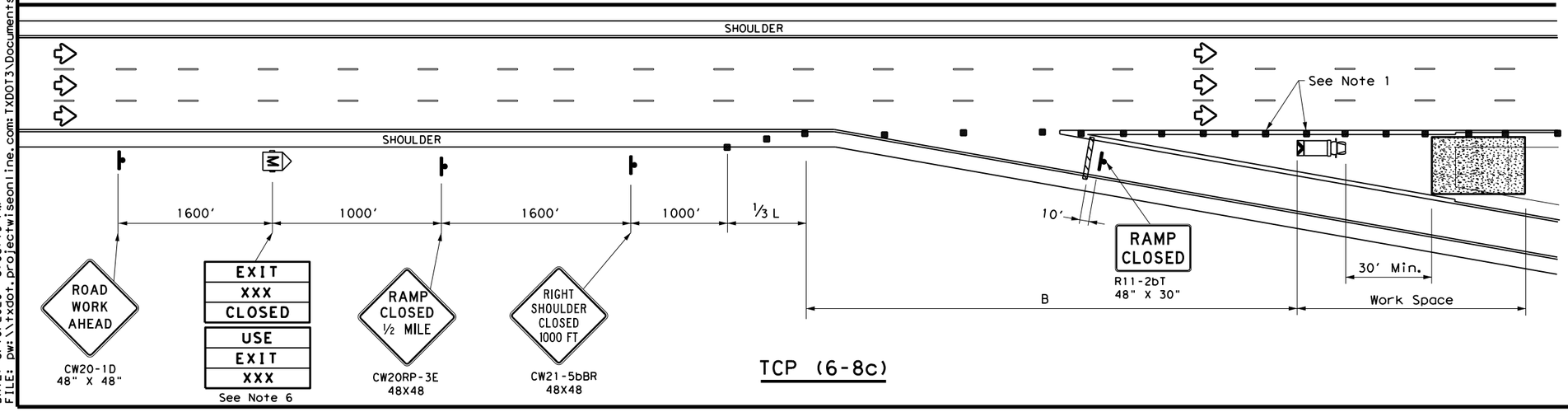


TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

LEGEND

	Type 3 Barricade	▪▪	Channelizing Devices (CDs)
	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. Place channelizing devices in the gore at 20' spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

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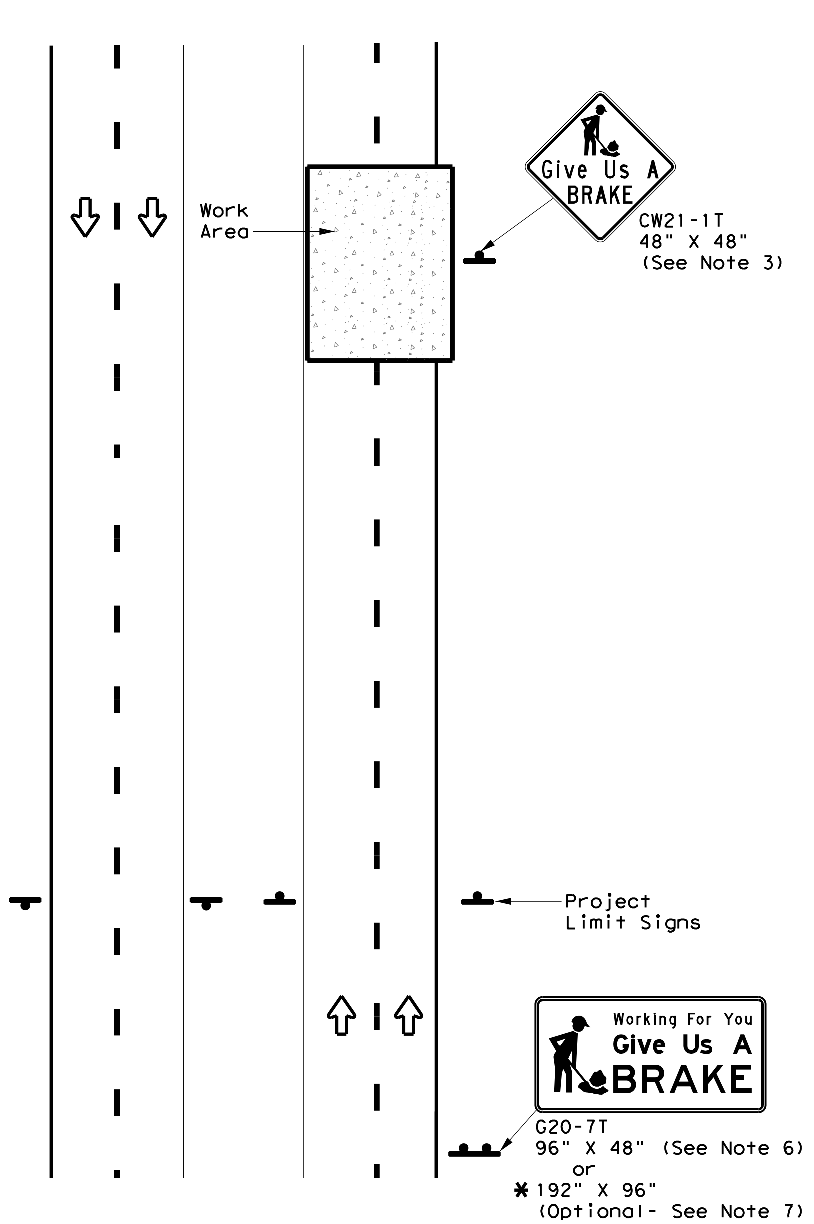
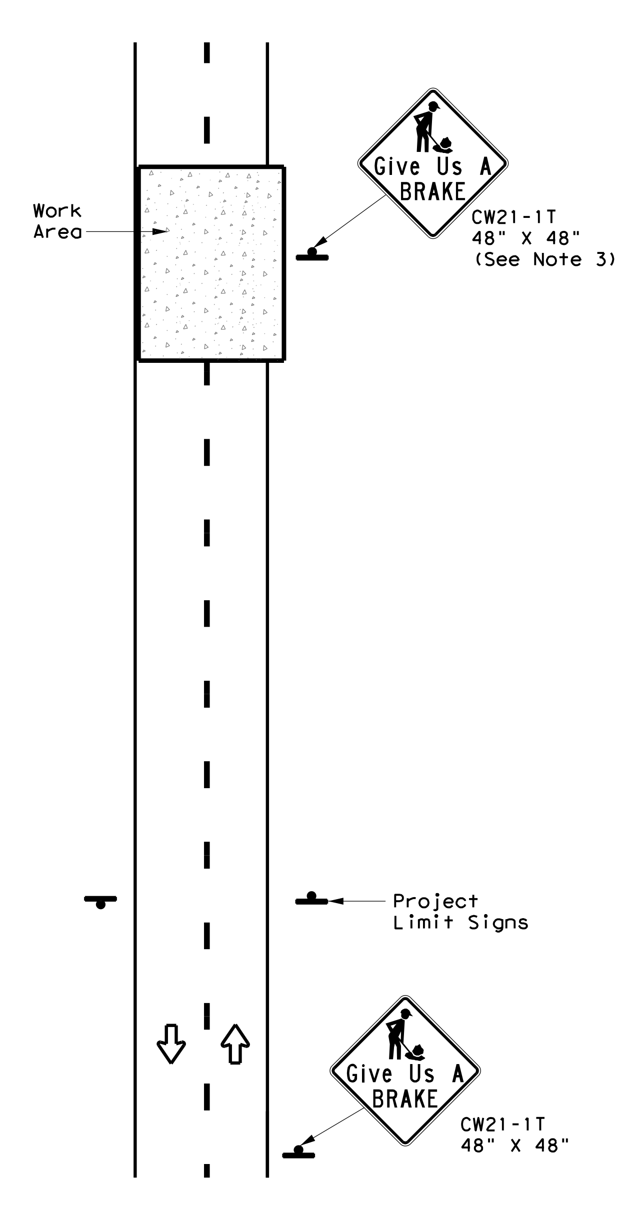


DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL Size	(LF) ①	(LF) ②	DRILLED SHAFT 24" DIA. (LF)
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND

Symbol	Meaning
(sign symbol)	Sign
(large sign symbol)	Large Sign
(arrow)	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   - Item 636 - Aluminum Signs
   - Item 647 - Large Roadside Sign Supports and Assemblies.
   - Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation — Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT 0271	SECT 16	JOB 160	HIGHWAY IH 610
REVISIONS 6-96 5-98 7-13 8-96 3-03	DIST HOU		COUNTY HARRIS	SHEET NO. 47

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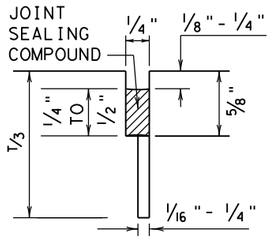
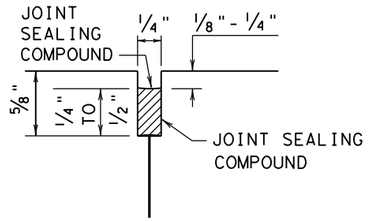
FILE:

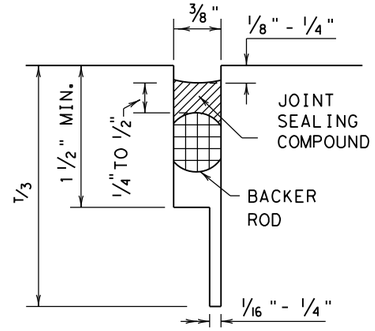
METHOD B: JOINT SEALING COMPOUND



LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



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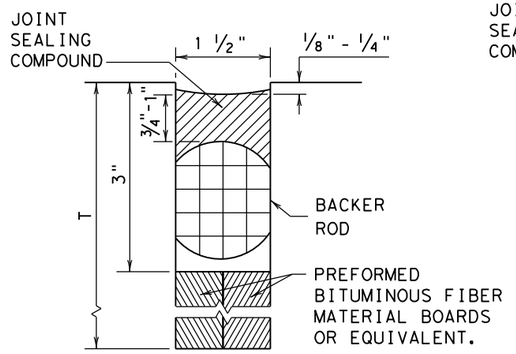
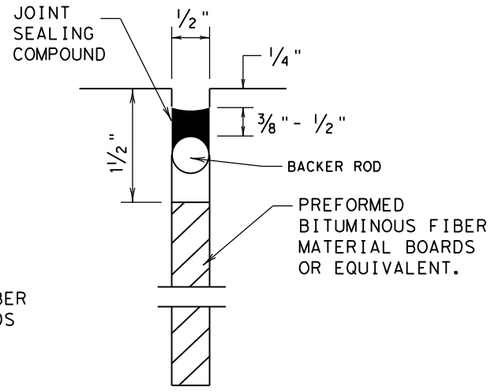
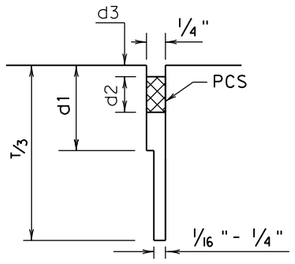


TRANSVERSE FORMED EXPANSION JOINT



FORMED ISOLATION JOINT

METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)



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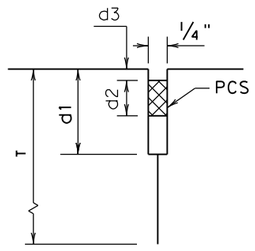
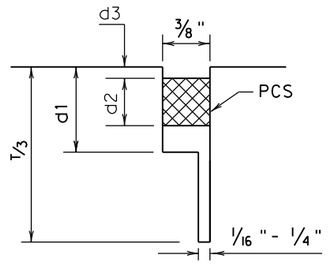


LONGITUDINAL CONSTRUCTION JOINT



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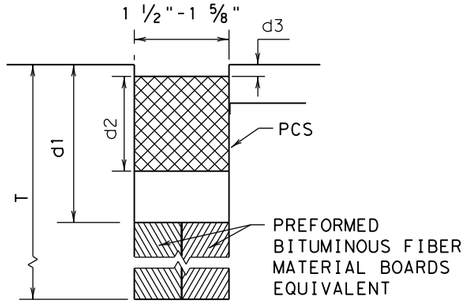

TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4, 5, 7, OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
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REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		48

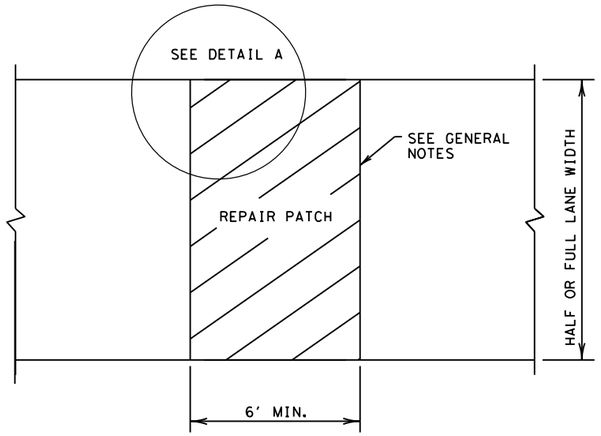
DATE:
FILE:

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

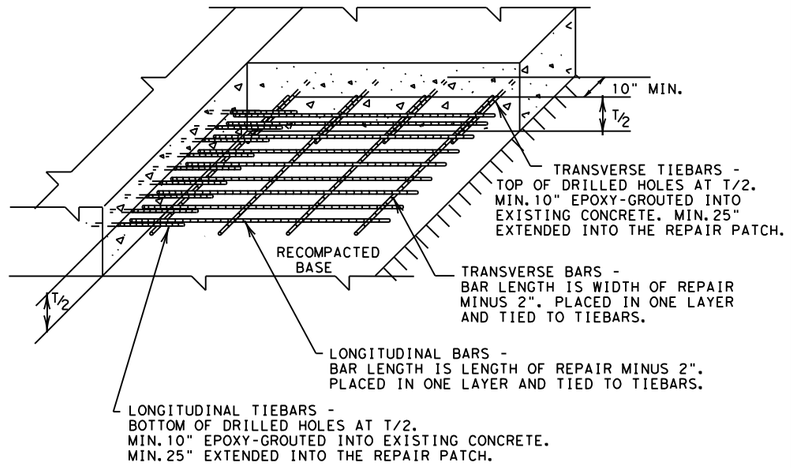
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW

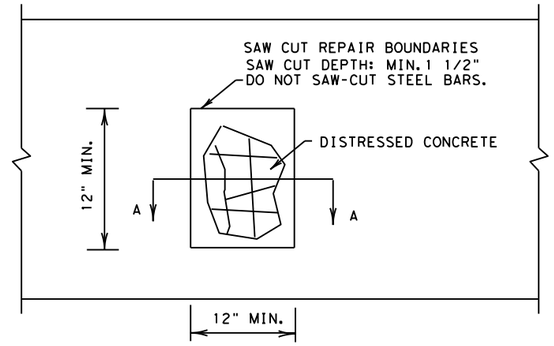


DETAIL A
GROUTED TIEBARS & REINFORCEMENT

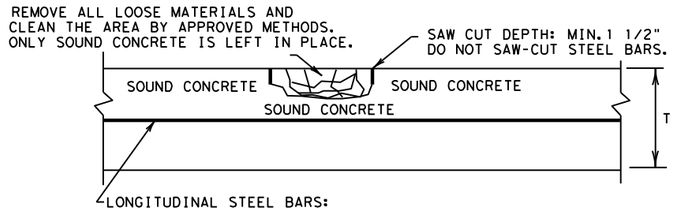
FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

*REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.

*INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

Texas Department of Transportation

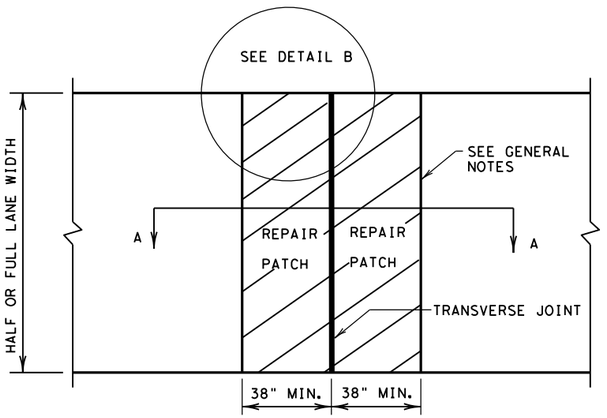
Design Division Standard

REPAIR OF CONCRETE PAVEMENT

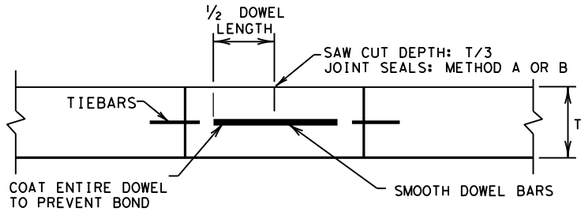
REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		49

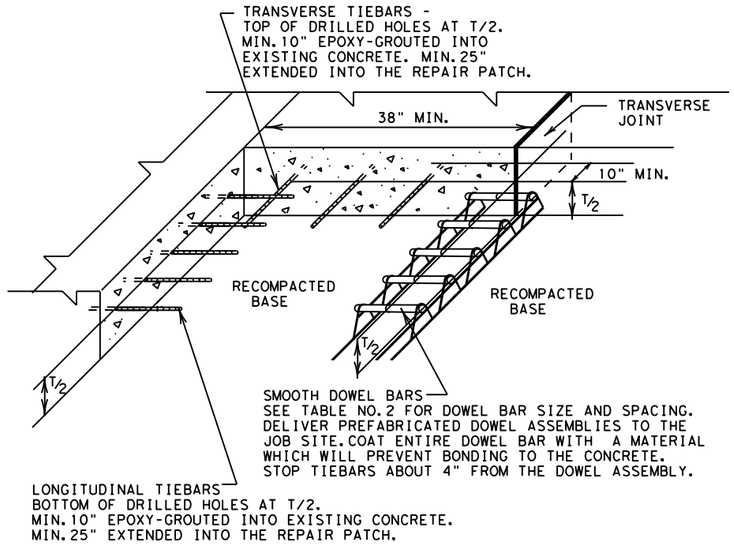
DATE:
FILE:



PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)

PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		50

Suggested Construction Sequence:

Suggested construction sequence below to be read in conjunction with the IH 610 Traffic Control Narrative Sheet.

Step 1. Clean bridge rail drain slots. Repair concrete pavement, deck surface spalls, and joints. Clean and seal armor joints. Will require complete highway closure on IH-610 EB and IH-610 WB.

Step 2. Perform concrete spall repair work, bent cap cleaning, and herbicide application. Will require closure of exterior lanes on IH-610 EB and IH-610 WB.

Step 3. Work Zone #1 [Floorbeam 4R-EB]: Tighten bolts and add missing hardware using manlift. Will require a railroad flagman for approximately one day to ensure workers stay off the track, but will not shut down train traffic or highway traffic.

Step 4A. Work Zone #2 [Floorbeam 7R-EB]: Set up scaffolding, encapsulate floorbeam, abrasively remove all existing paint and repaint with System II primer. Will require train traffic to be shut down 6 to 8 hours. Railroad flagman and train slow order will be required remainder of time; approximately two to three days.

Work Zone #3 [Floorbeam 9R-EB]: Set up scaffolding, encapsulate designated portions of the floorbeam, abrasively remove existing paint and repaint with System II primer. Will require traffic control on Holmes Rd.

Step 4B. Work Zone #2 [Floorbeam 7R-EB]: Weld repairs plates. Will require train traffic to be shut down 6 to 8 hours and IH-610 Eastbound to be closed for a weekend. Flagman and train slow order will be required remainder of time on weekend.

Work Zone #3 [Floorbeam 9R-EB]: Weld repair plates. Will require traffic control on Holmes Rd.

Step 4C. Work Zone #2 [Floorbeam 7R-EB]: Repaint floorbeam with System II appearance coat. Will require train traffic to be shut down 6 to 8 hours. Railroad flagman and train slow order will be required remainder of time; approximately two to three days duration.

Work Zone #3 [Floorbeam 9R-EB]: Repaint designated areas of floorbeam with System II appearance coat. Will require traffic control on Holmes Rd.

Step 5A. Work Zone #4 [Floorbeam 9L-WB]: Set up scaffolding, encapsulate floorbeam, abrasively remove all existing paint and repaint with System II primer. Will require train traffic to be shut down 6 to 8 hours. Railroad flagman and train slow order will be required remainder of time; approximately two to three days.

Work Zone #5 [Floorbeam 11L-WB]: Set up scaffolding, encapsulate designated portions of the floorbeam, abrasively remove existing paint and repaint with System II primer. Will require traffic control on Holmes Rd.

Step 5B. Work Zone #4 [Floorbeam 9L-WB]: Weld repairs plates. Will require train traffic to be shut down 6 to 8 hours and IH-610 Westbound to be closed for a weekend. Flagman and train slow order will be required remainder of time on weekend.

Work Zone #5 [Floorbeam 11L-WB]: Weld repair plates. Will require traffic control on Holmes Rd.

Step 5C. Work Zone #4 [Floorbeam 9L-WB]: Repaint floorbeam with System II appearance coat. Will require train traffic to be shut down 6 to 8 hours. Railroad flagman and train slow order will be required remainder of time; approximately two to three days duration.

Work Zone #5 [Floorbeam 11L-WB]: Repaint designated areas of floorbeam with System II appearance coat. Will require traffic control on Holmes Rd.

HS20 LOADING

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED
PROFESSIONAL ENGINEER

Negoiță A.

08/07/2020

Texas Department of Transportation

Houston District (Bridge)

CONSTRUCTION SEQUENCE

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE:	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT.	SECT.	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST.	COUNTY		SHEET NO.
	HOU	HARRIS		100

8/7/2020
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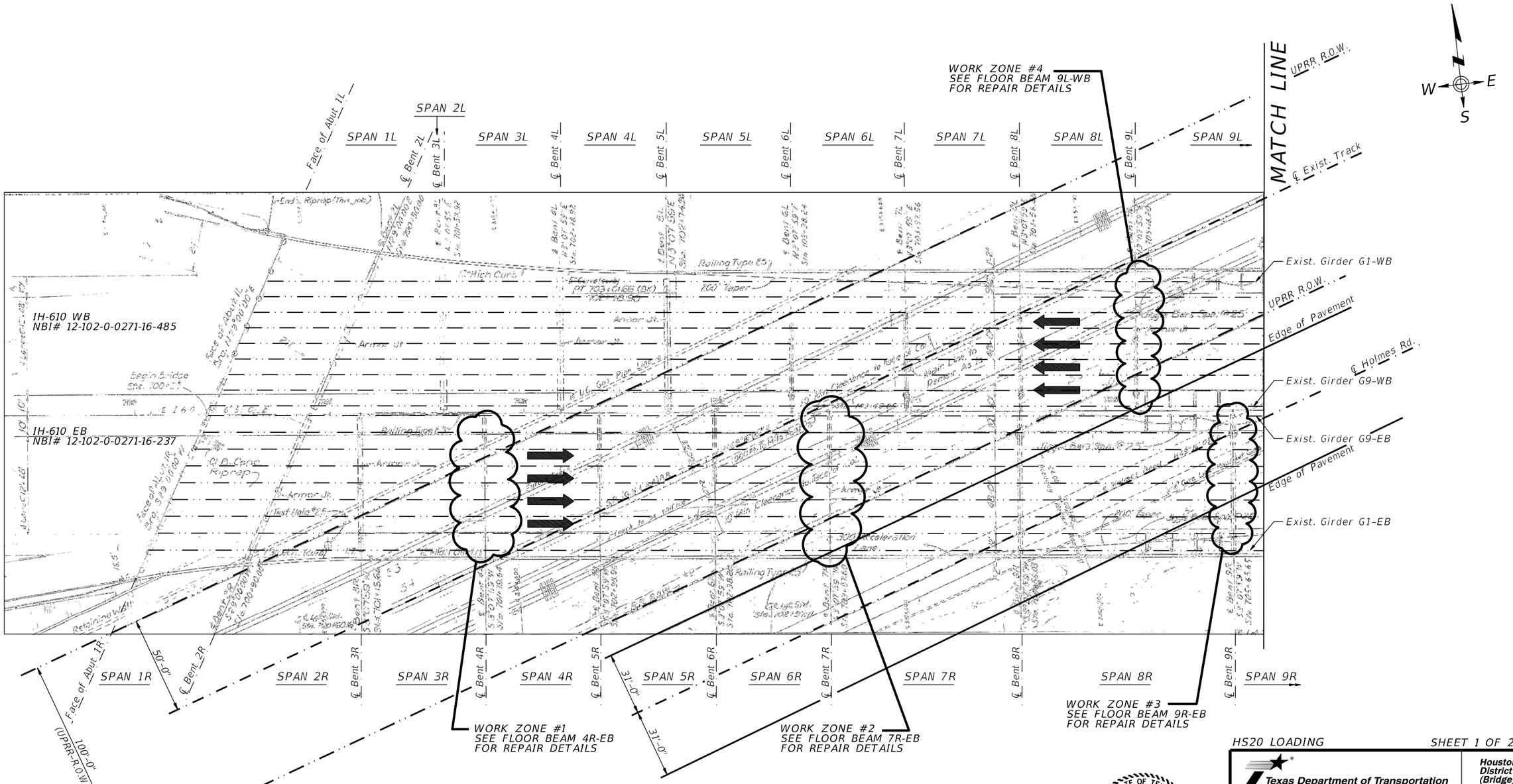

PARTIAL EXISTING PLAN

HS20 LOADING

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR LOCATIONS IH610 EB & WB

IH-610 OVERPASS AT HOLMES RD & UPRR

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED PROFESSIONAL ENGINEER

08/06/2020

FILE: Repair_Steel_Location.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT.	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST.	COUNTY		SHEET NO.
	HOU	HARRIS		101

8/5/2020
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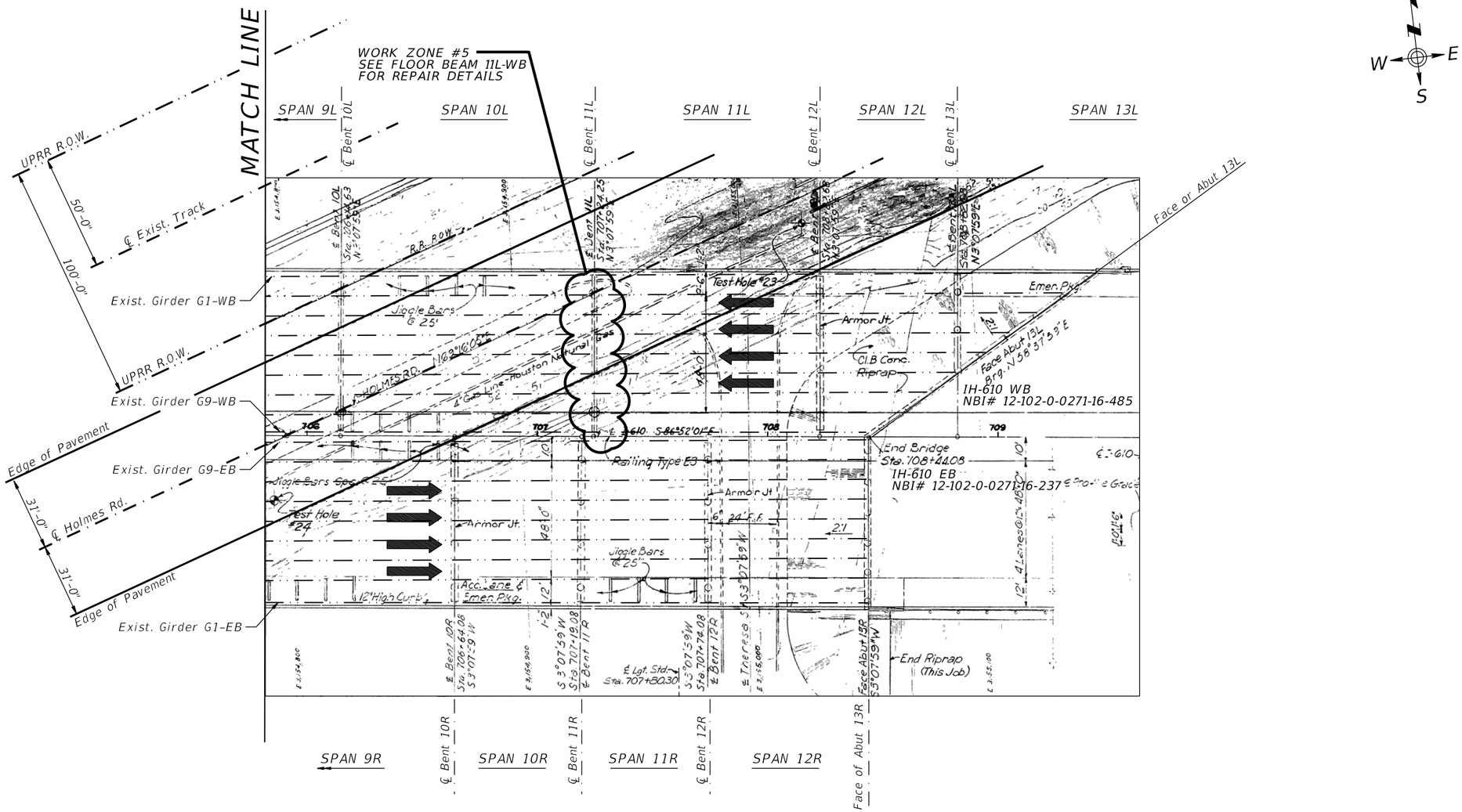

PARTIAL EXISTING PLAN

HS20 LOADING

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED
PROFESSIONAL ENGINEER

Negoiță A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR LOCATIONS IH610 EB & WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_Steel_Location.dgn	DN: AN	CK: AN	DW: VNC	CK: TF
©TxDOT 2021	CONT.	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST.	COUNTY		SHEET NO.
	HOU	HARRIS		102

8/5/2020
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Steel Repair Notes:
Structural Steel Scope of Work:

Work Zone #1 [Floorbeam 4R-EB]: Add missing nuts and washers; tighten existing nuts at bearings between Floorbeam 4R-EB and supporting columns.

Work Zone #2 [Floorbeam 7R-EB] and Work Zone #4 [Floorbeam 9L-WB]: Power wash and abrasively remove all existing paint. Tool clean all corrosion holes. Paint with System II primer. Weld repair plates and angles. Reweld W 33x118 steel beams to rocker bearings. Paint with System II appearance coat.

Work Zone #3 [Floorbeam 9R-EB] and Work Zone #5 [Floorbeam 11L-WB]: Power wash and abrasively remove existing paint in designated areas. Paint with System II primer. Weld repair plates. Paint with System II appearance coat.

Welding:

1. Field welding must be performed IAW Item 448 Structural Field Welding. All welding shall be performed by a certified Welder in accordance with specification Item 448. Submit certification papers prior to start of work.

2. No traffic shall be on the bridge when welding occurs.

3. W 33x118 bottom flanges shall only be welded to the top of rocker bearings when the ambient air temperature at the time of welding and for 24 hours before welding is between 50°F and 75°F. W 33x118 bottom flanges shall not be welded to the top of rocker bearings during the months of May, June, July, August and September.

4. Welding will be paid subsidiary to pay item 0442-6008.

Work Platform:

1. Scaffolding shall not be anchored to the existing structural steel and must have a load path to the ground. If scaffolding is used, the Contractor must submit the scaffolding plan, self-weight, assumed construction loads, and calculations to the Engineer for review.

2. Scaffolding or other types of work platforms may not permanently damage the existing railroad track structure.

3. Scaffolding, or other types of work platforms to be used will be paid subsidiary to pay item 0442-6008.

Overall View Looking North-East Under Bridge

HS20 LOADING

STATE OF TEXAS
BLAKE A. HUNTSMAN
136815
LICENSED
PROFESSIONAL ENGINEER

Blake A. Huntsman
09/17/2020

Texas Department of Transportation | Houston District (Bridge)

STEEL REPAIR NOTES

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE:	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		103

9/17/2020
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Painting Procedure:

All steel coating and preparation shall be performed IAW Item 446, Field Cleaning and Painting of Steel. Follow the procedure below when painting.

1. Shop paint all new steel repair pieces with the organic zinc primer of System II. Tape off or grind off areas to be welded.

2. Powerwash and abrasively blast areas to be coated. Tool clean existing corrosion holes and grind sharp edges round and smooth.

3. Coat existing steel with the organic zinc primer of System II prior to welding shop primed repair pieces onto the floorbeams. Tape off or grind off areas to be welded.

4. Apply a thick bead of steel caulk at the ends of floorbeam repair cover plates that are not to be welded prior to placing the cover plates onto the bottom of the floorbeams.

5. After welding the shop primed repair pieces, the weld areas must be surface prepared to SSPC SP-11 or SP-10 with a minimum 2 mil surface profile.

6. Paint the weld areas with the organic zinc primer of System II.

7. Coat the entire floorbeam including the shop primed repair pieces with the appearance coat of System II.

Lead Based Paint (LBP) Removal and Disposal:

1. The existing paint to be removed at all locations has been tested by TxDOT and contains the hazardous material lead.

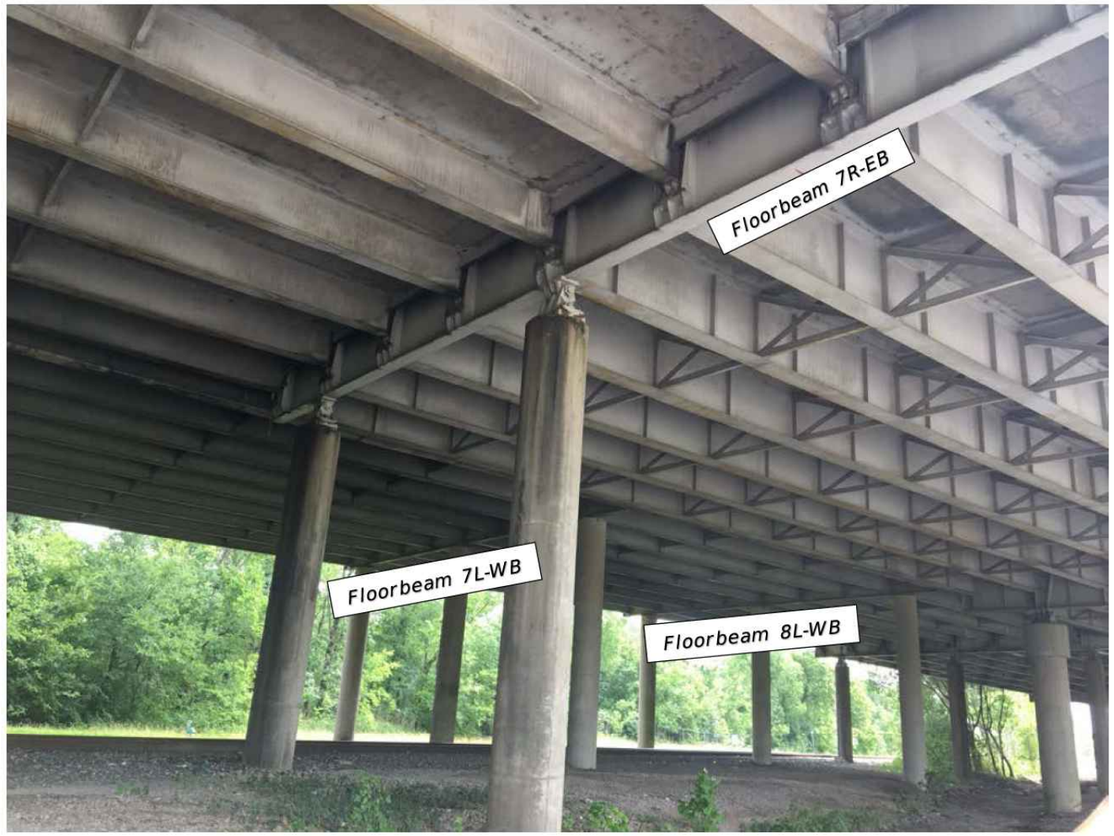
2. The general contractor (GC) is responsible for properly removing and disposing of the LBP IAW Item 446 Field Cleaning and Painting Steel, specifically Item 446.4.2. Responsibility for Hazardous Materials.

3. The GC or the GC's subcontractor removing the LBP must be certified to do so as per Section 6.10.1.2. Control of Materials - Hazardous Materials - Paint Removed by the Contractor.

4. The certified GC or the GC's certified subcontractor shall take two soil samples before starting construction activities and two soil samples after painting is complete under each of the following Floorbeams: 7R-EB, 9R-EB, 9L-WB, and 11L-WB.

The soil samples shall be directly beneath the floorbeams spaced a minimum of 30 feet apart with at least one soil sample directly under the area being painted.

Floorbeam 7R-EB Looking North-East Under Bridge



Lead Based Paint (LBP) Removal and Disposal (Continued):

The soil samples shall be tested for lead by the certified GC or the GC's certified subcontractor and the formal results shall be sent to the Engineer.

5. All LBP removal and disposal activities including required soil tests are subsidiary to pay item 0446-6002.

HS20 LOADING

STATE OF TEXAS
BLAKE A. HUNTSMAN
136815
LICENSED PROFESSIONAL ENGINEER

Blake A. Huntsman
09/17/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL PAINTING NOTES

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE:	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		104

9/17/2020
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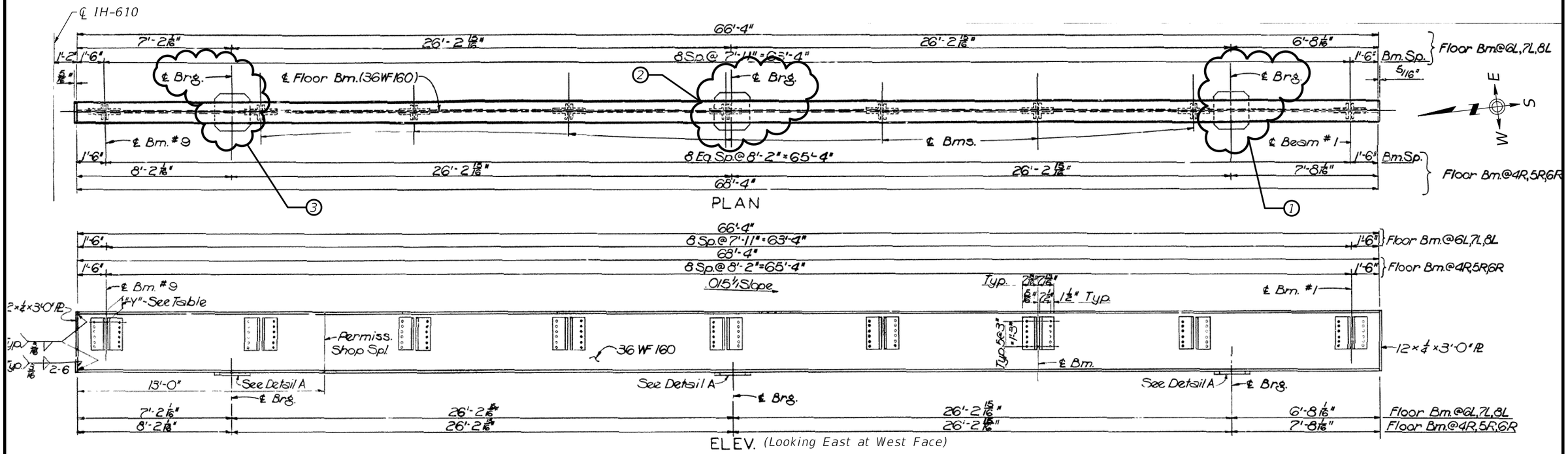


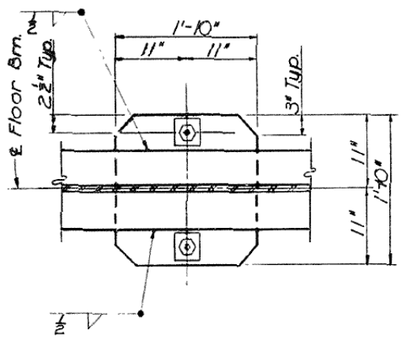
EXISTING PLAN & ELEVATION

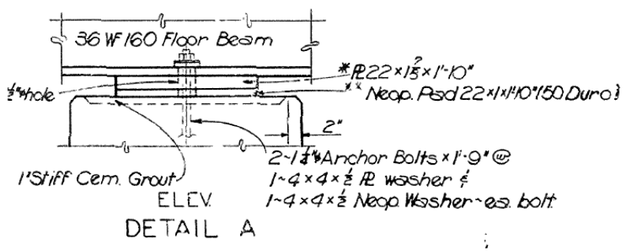
NOTES:

① Column 1: Provide new anchor bolt nut and washer on east side. (See Detail A)

② Column 2: Provide new anchor bolt nut and washer on east side. (See Detail A)

③ Column 3: Fully tighten anchor bolt nut on west side.





Estimated Quantities

Mark	Quant.	Description	Unit Wt. (LB)	Sub-Total (LB)	Total Wt. (LB)
		Floorbeam 4R-EB			
	2	1 1/4" ∅ Heavy Hex Nuts			
	2	PL Washer 1/2 x 4 x 0'-4"			
	2	Neoprene Washer 1/2 x 4 x 0'-4"			

HS20 LOADING

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08/06/2020

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Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 4R-EB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_4R_EB.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		105

8/5/2020
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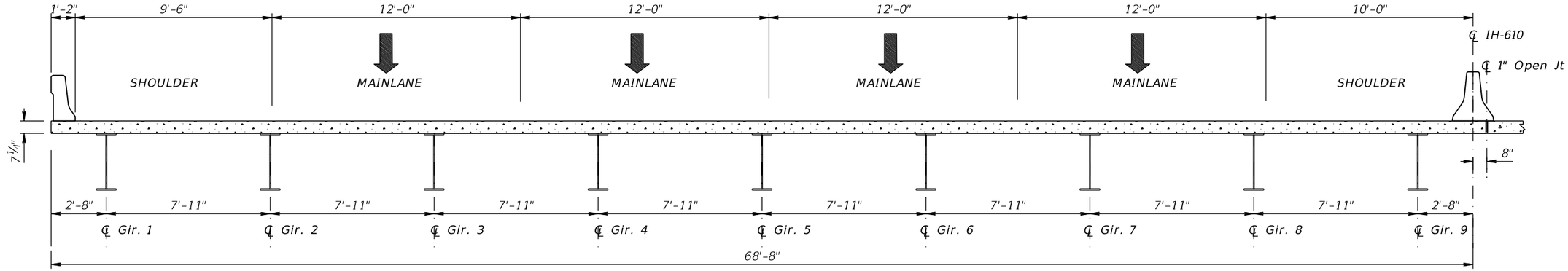
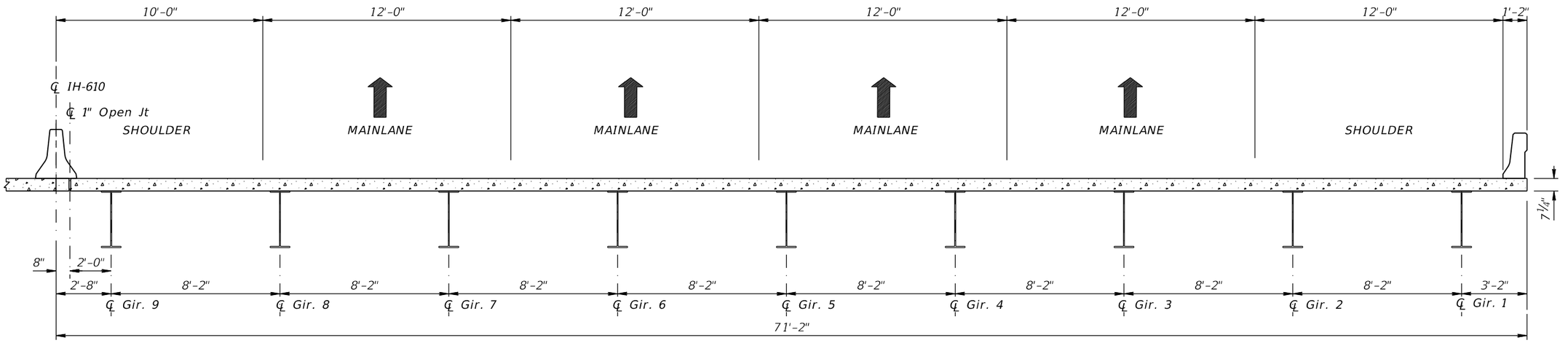


TYPICAL SECTION AT 9L OR 11L WB

(LOOKING EAST)



TYPICAL SECTION AT 7R OR 9R EB

(LOOKING EAST)

HS20 LOADING

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED
PROFESSIONAL ENGINEER

Negoita A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS TYPICAL CROSS SECTIONS

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_Typical_Section.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		106

8/5/2020
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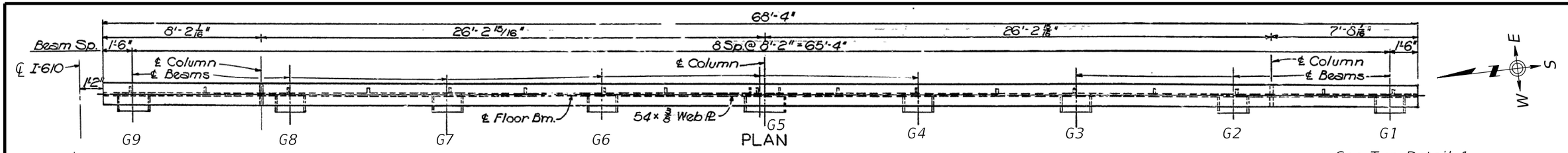
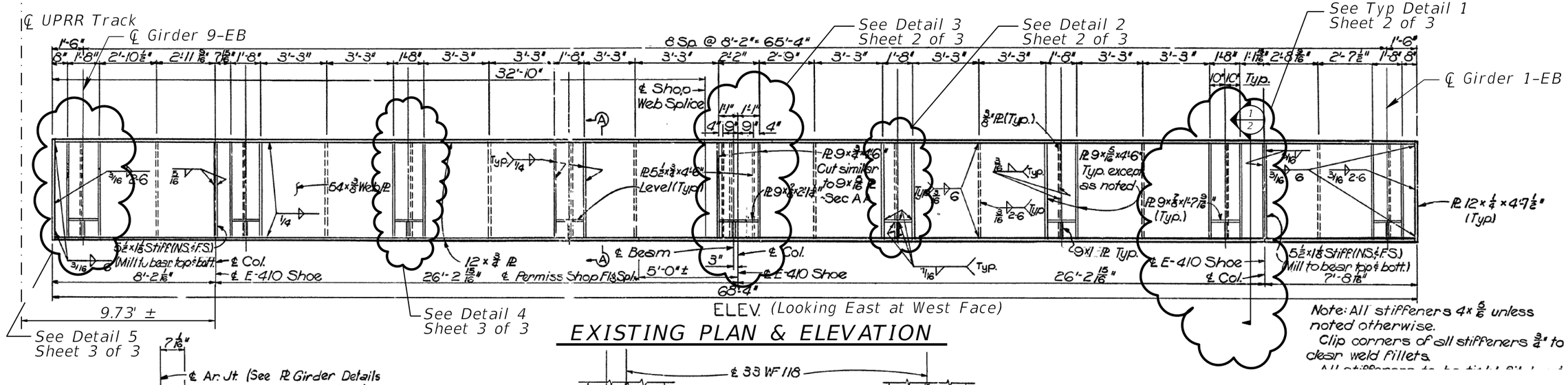
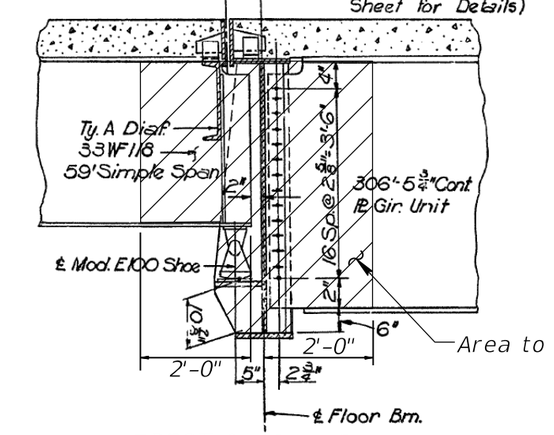


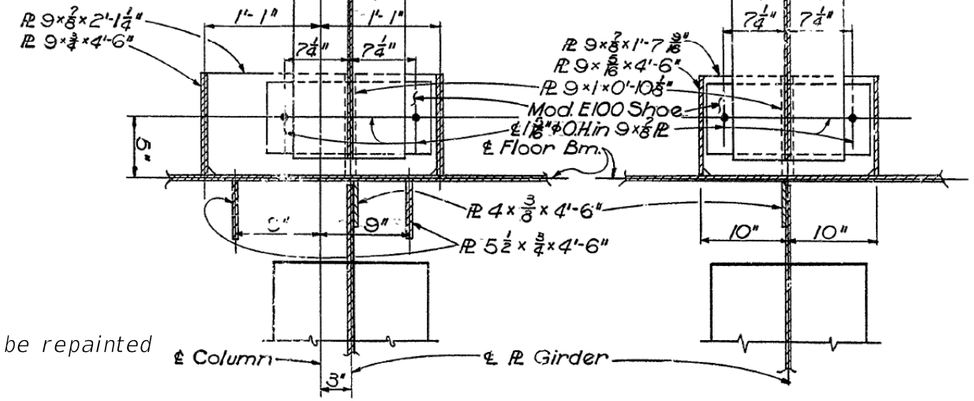


Note: All stiffeners 4 x 5/16 unless noted otherwise.
Clip corners of all stiffeners 3/4" to clear weld fillets.

EXISTING PLAN & ELEVATION

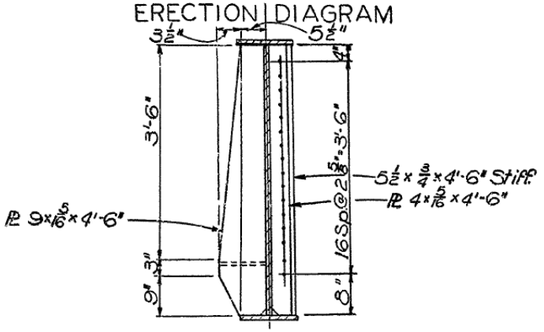


ERECTION DIAGRAM



SECTION @ MIDDLE BEAM

SECTION @ OTHER BEAMS



SEC. A-A

NOTES:

1. See Detail 1, Sheet 2 of 3 for web plate repairs at all girder supports except at girder line 5R.
2. Repaint entire floor beam, rocker bearings, and first 2 ft. of supported girders on both floor beam faces as shown in the "Erection Diagram".

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED PROFESSIONAL ENGINEER

Negoiță A.

08/06/2020

HS20 LOADING

SHEET 1 OF 3

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 7R-EB

IH610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_7R_EB_01.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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REVISIONS	271	16	160	IH-610
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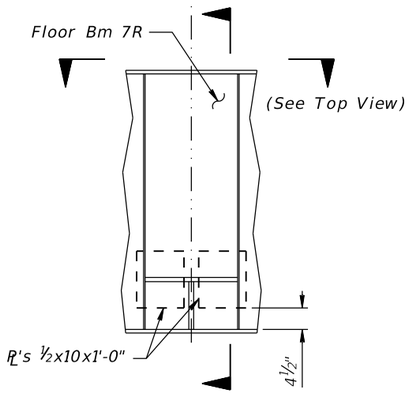
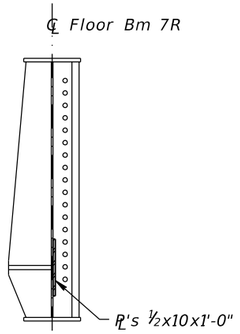


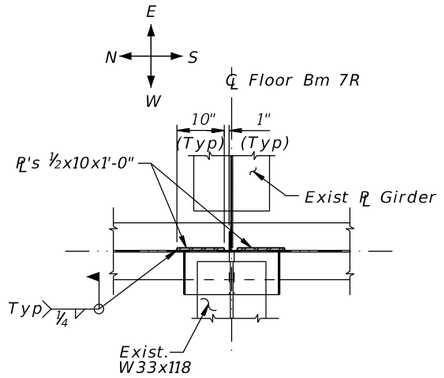
TYP. ELEVATION

(Looking East)



SIDE VIEW

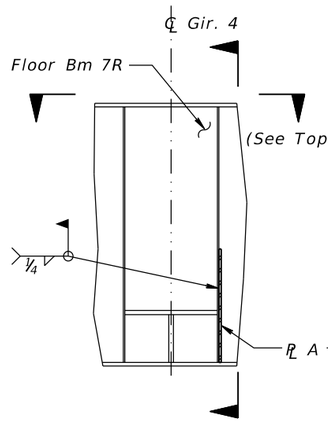
(Looking North)



TOP VIEW

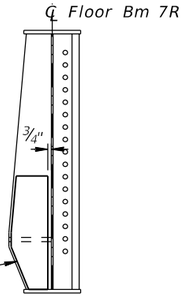
TYPICAL DETAIL 1

(FLOOR BM. 7R-EB, TYP. WEB PLATE REPAIRS @ ALL GIRDERS EXCEPT G5)



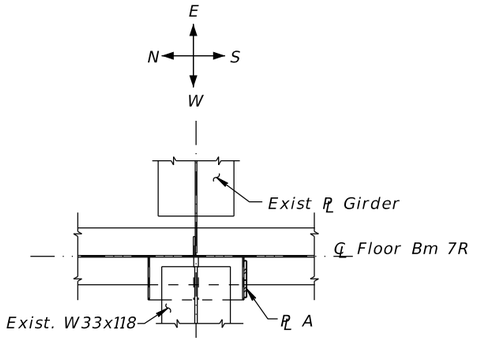
ELEVATION

(Looking East)



SIDE VIEW

(Looking North)



TOP VIEW

DETAIL 2

(REPAIR AT GIRDER 4 ONLY)

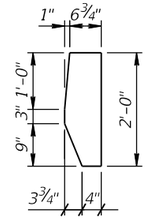


PLATE A

(PL ½")

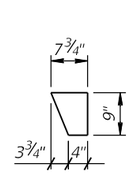
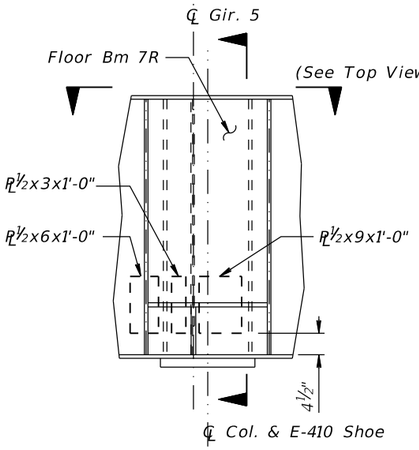


PLATE B

(PL ½")

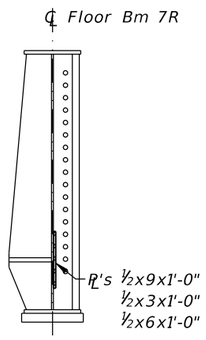
TYPICAL PLATE DETAILS

(REFERRED TO ON ALL STEEL REPAIR DETAILS)



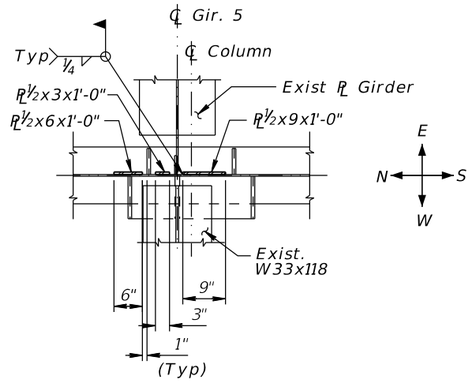
ELEVATION

(Looking East)



SIDE VIEW

(Looking North)



TOP VIEW

DETAIL 3

(REPAIR AT GIRDER 5 ONLY)

HS20 LOADING

SHEET 2 OF 3

STATE OF TEXAS
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Negoiță A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 7R-EB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_7R_EB_02.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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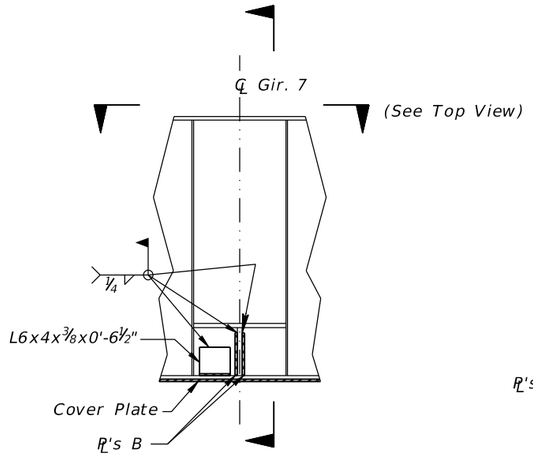
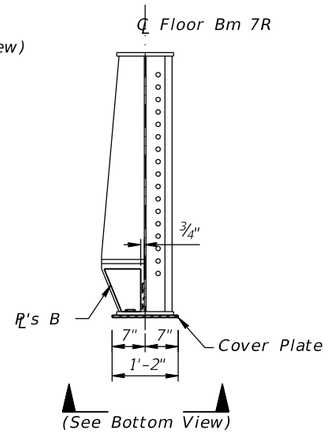
Estimated Quantities

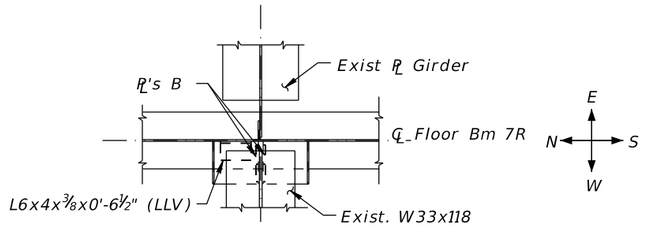
Mark	Quant.	Description	Unit Wt. (LB)	Sub-Total (LB)	Total Wt. (LB)
		Floorbeam 7R-EB			
A	3	PL 1/2 x 7 3/4 x 2'-0"	23	69	
B	4	PL 1/2 x 7 3/4 x 0'-9"	8	30	
	1	PL 1/2 x 6 x 1'-0"	10	10	
	1	PL 1/2 x 3 x 1'-0"	5	5	
	1	PL 1/2 x 9 x 1'-0"	15	15	
	16	PL 1/2 x 10 x 1'-0"	17	272	
	3	L 6 x 4 x 3/8 x 0'-6 1/2"	7	20	
	1	Cover PL 1/2 x 14 x 9'-0"	208	208	
	1	Cover PL 1/2 x 14 x 7'-2"	167	167	
		Total Steel Weight			797



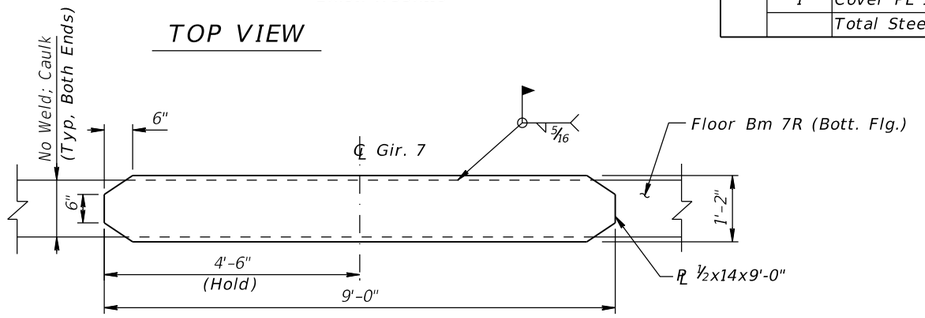
ELEVATION
(Looking East)



SIDE VIEW
(Looking North)

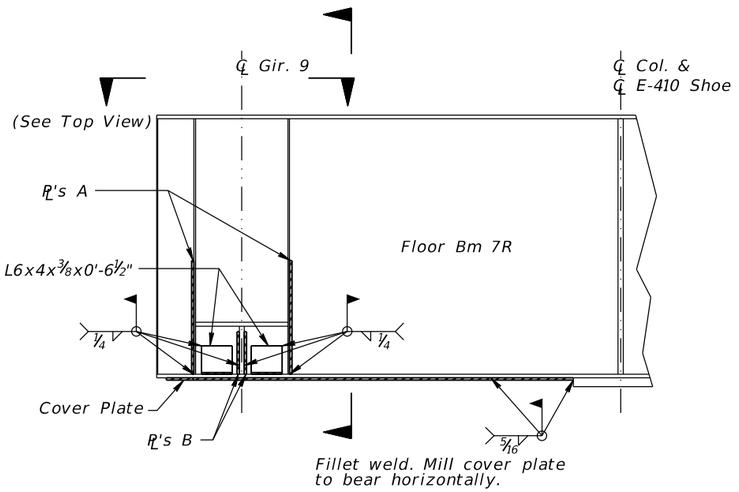


TOP VIEW

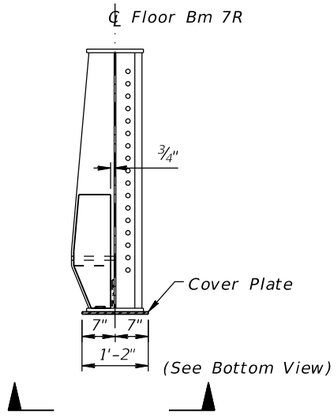


BOTTOM VIEW

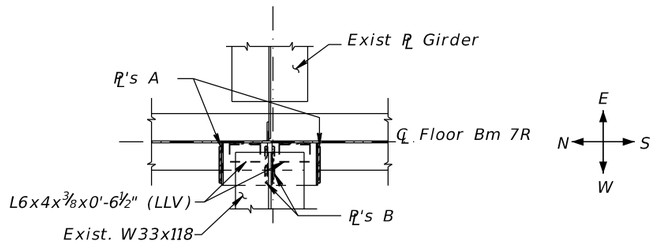
DETAIL 4
(REPAIR AT GIRDER 7 ONLY)



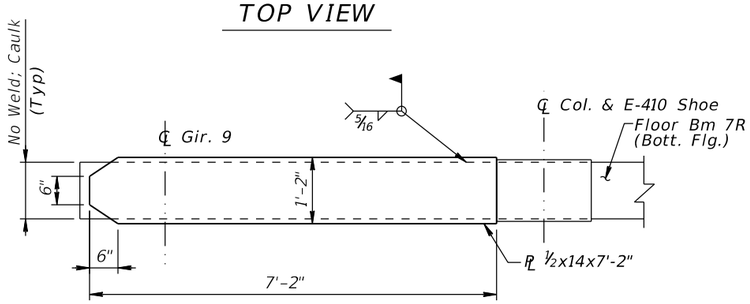
ELEVATION
(Looking East)



SIDE VIEW
(Looking North)



TOP VIEW



BOTTOM VIEW

DETAIL 5
(REPAIR AT GIRDER 9 ONLY)

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Negoiță A.
08/06/2020

HS20 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 7R-EB

IH-610 OVERPASS AT HOLMES RD & UPRR

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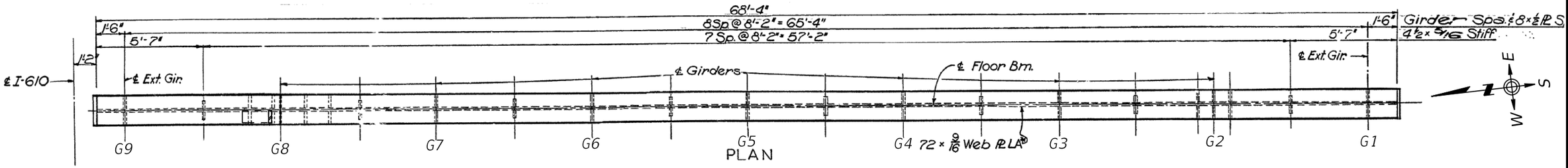
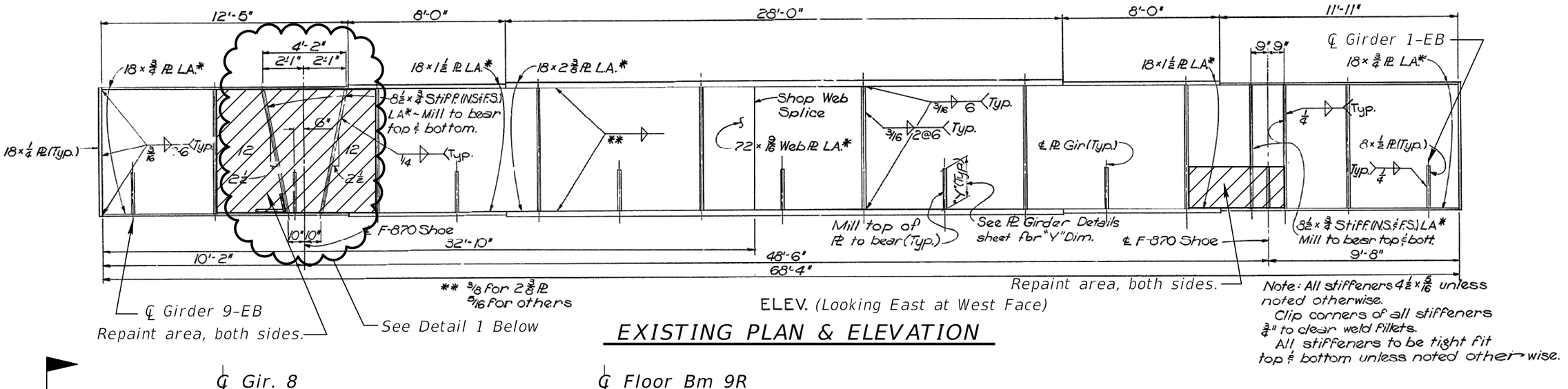


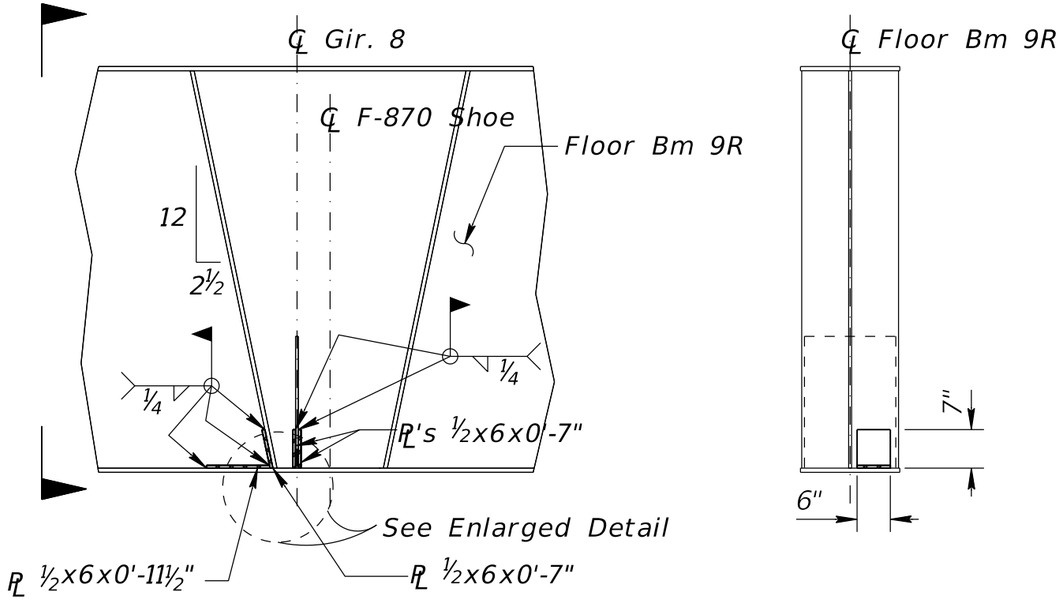
PLAN



ELEV. *(Looking East at West Face)*

EXISTING PLAN & ELEVATION

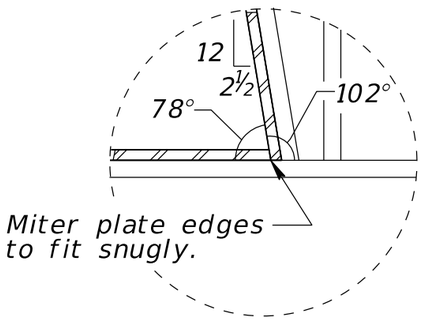
Note: All stiffeners 4½ x 5/16 unless noted otherwise.
Clip corners of all stiffeners ¾" to clear weld fillets.
All stiffeners to be tight fit top & bottom unless noted otherwise.



ELEVATION
(Looking East)

SIDE VIEW
(Looking South)

DETAIL 1
(REPAIR AT GIRDER 8 ONLY)



ENLARGED DETAIL

Estimated Quantities					
Mark	Quant.	Description	Unit Wt. (LB)	Sub-Total (LB)	Total Wt. (LB)
		Floorbeam 9R-EB			
	1	PL 1/2 x 6 x 0'-11 1/2"	10	10	
	3	PL 1/2 x 6 x 0'-7"	6	18	
		Total Steel Weight			28

Note:
All steel repair plates to be added to the west face of floorbeam.

HS20 LOADING

STATE OF TEXAS
ANDREI NEGOITA
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LICENSED PROFESSIONAL ENGINEER

Negoiță A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 9R-EB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_9R_EB.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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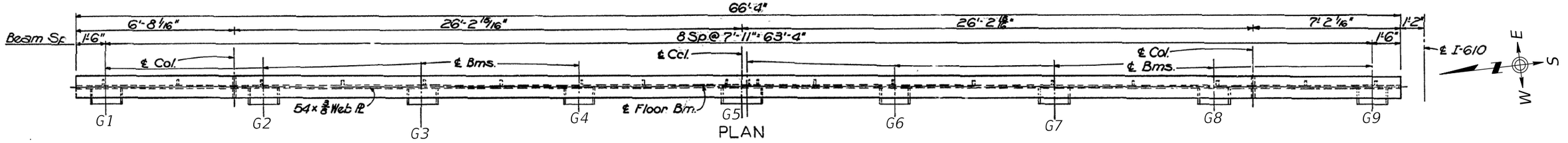
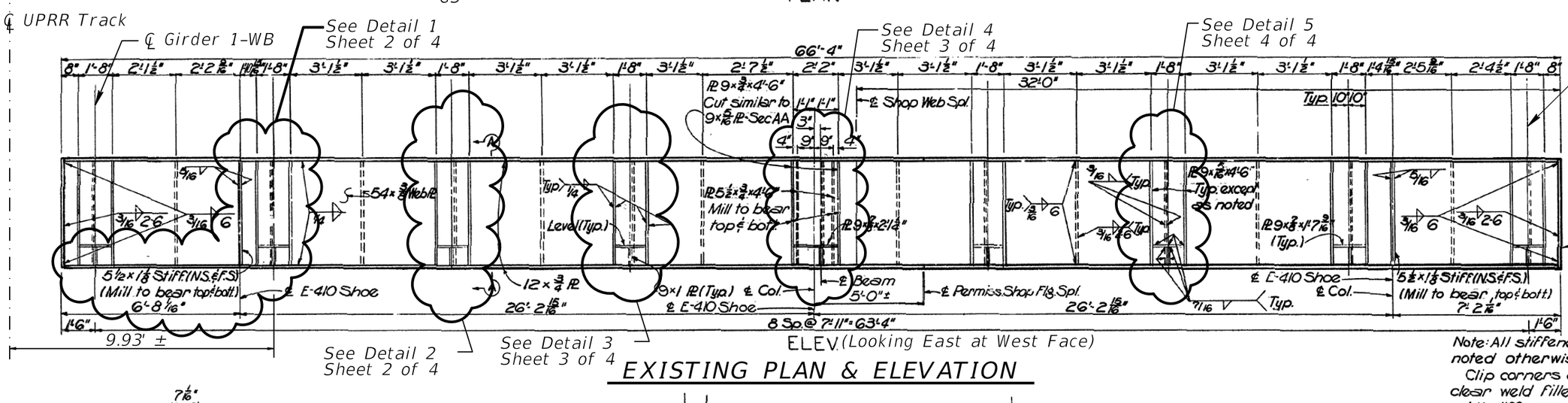
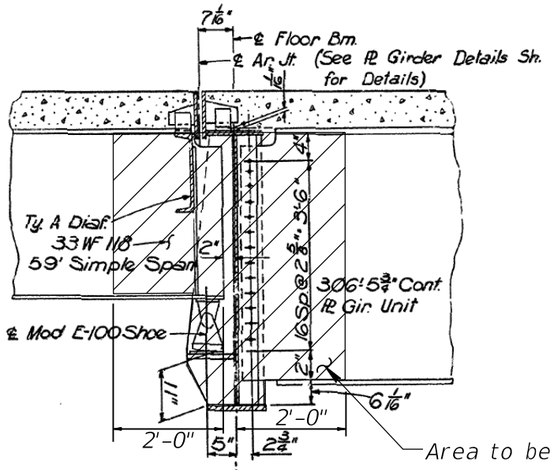


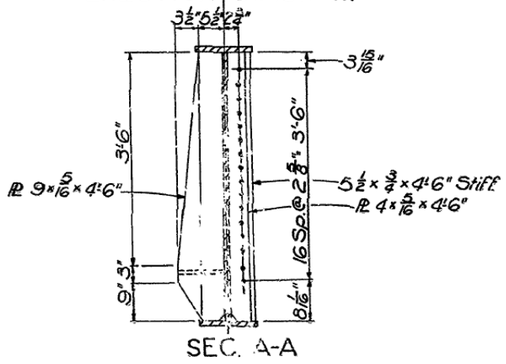


EXISTING PLAN & ELEVATION

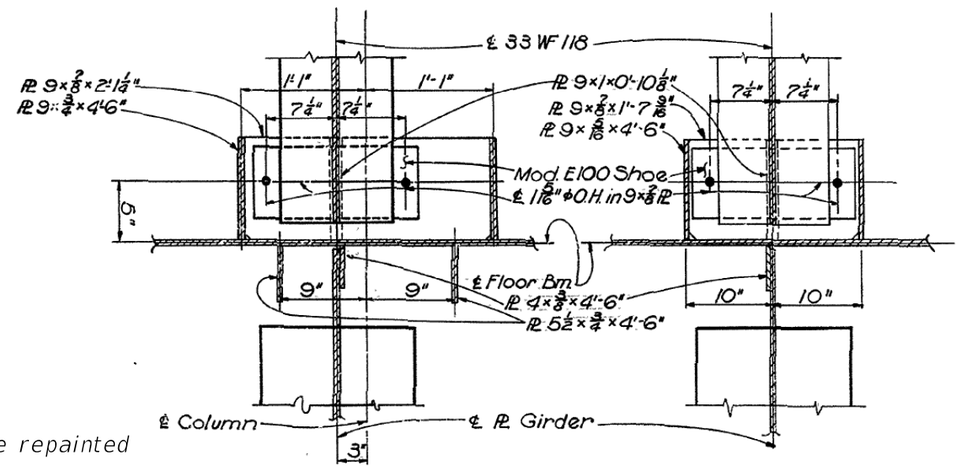
Note: All stiffeners 4 x 7/16 unless noted otherwise.
Clip corners of all stiffeners 3/4" to clear weld fillets.
All stiffeners to be tight fit top & bott. unless otherwise noted.



ERECTION DIAGRAM



SEC. A-A



SECTION @ MIDDLE BEAM

SECTION @ OTHER BEAMS

NOTES:

1. See Detail 1, Sheet 2 of 4, for web plate repairs at all girder supports except at girder line 5L.
2. Repaint entire floor beam, rocker bearings, and first 2 ft. of supported girders on both floor beam faces as shown in the "Erection Diagram".

HS20 LOADING

SHEET 1 OF 4

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED PROFESSIONAL ENGINEER

Negoiță A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 9L-WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_9L_WB_01.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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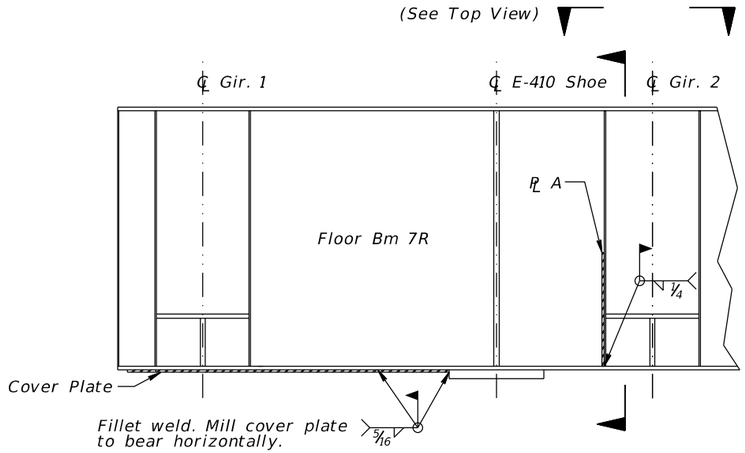
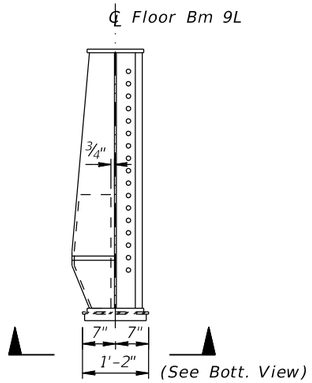
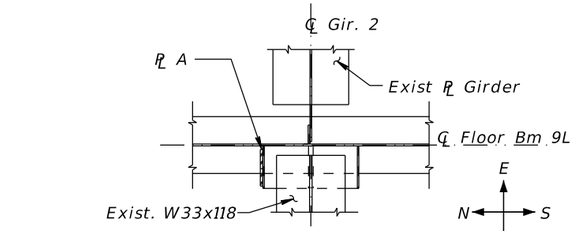


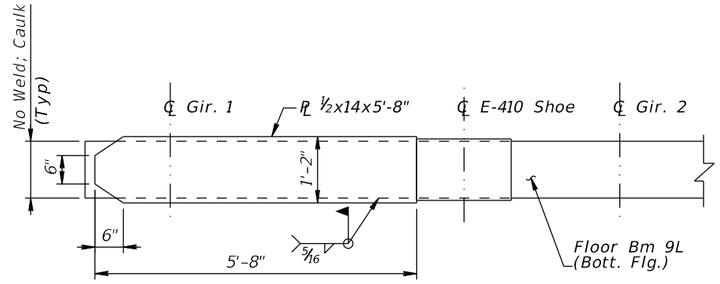
ELEVATION
(Looking East)



SIDE VIEW
(Looking North)

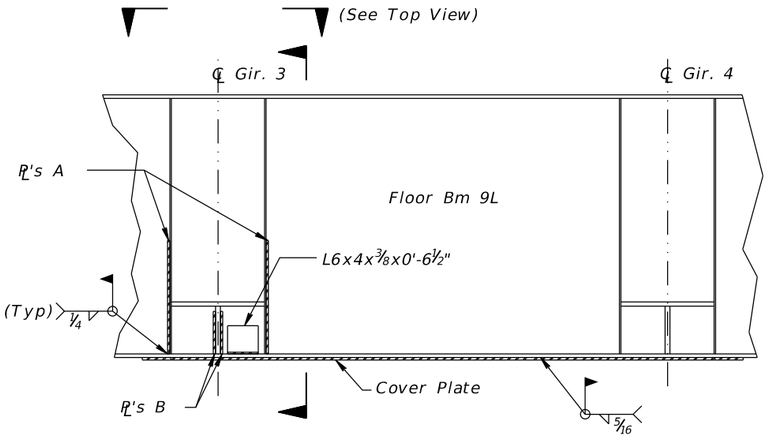


TOP VIEW

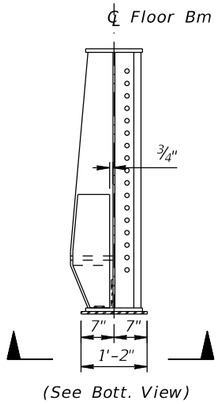


BOTTOM VIEW

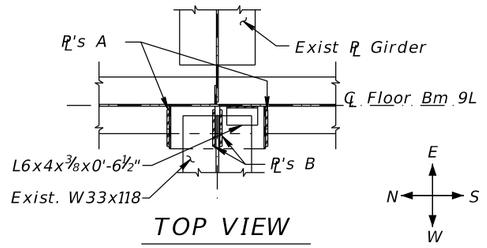
DETAIL 1
(REPAIRS AT GIRDER 1 AND GIRDER 2)



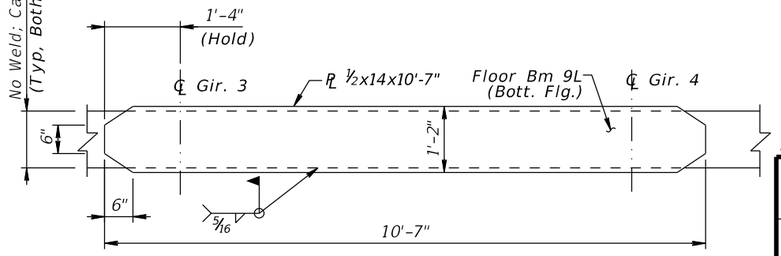
ELEVATION
(Looking East)



SIDE VIEW
(Looking North)



TOP VIEW



BOTTOM VIEW

DETAIL 2
(REPAIRS AT GIRDER 3 AND GIRDER 4)

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Negoiță A.
08/06/2020

HS20 LOADING

SHEET 2 OF 4

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 9L-WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_9L_WB_02.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
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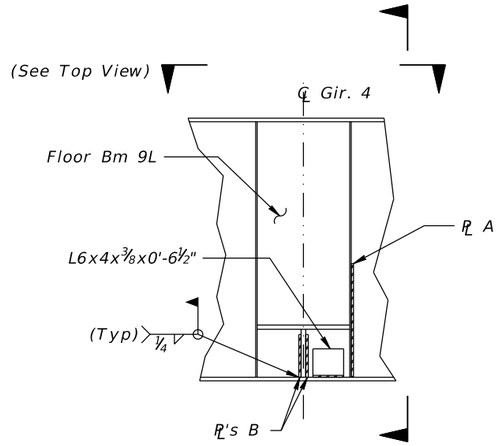
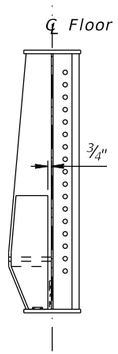


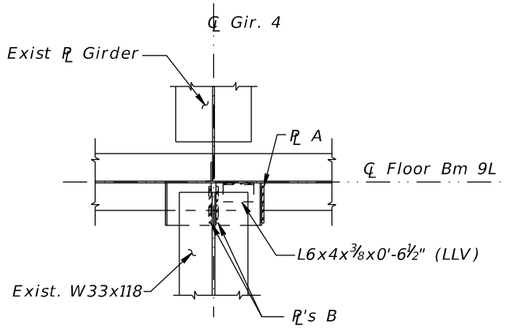
ELEVATION

(Looking East)



SIDE VIEW

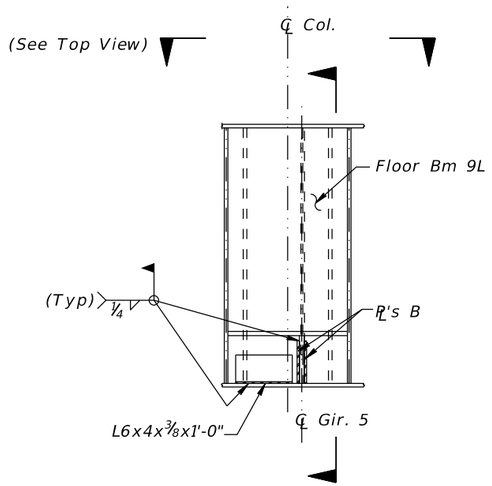
(Looking North)



TOP VIEW

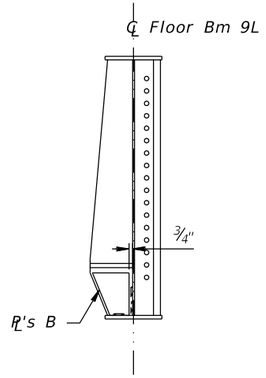
DETAIL 3

(REPAIR AT GIRDER 4 ONLY)



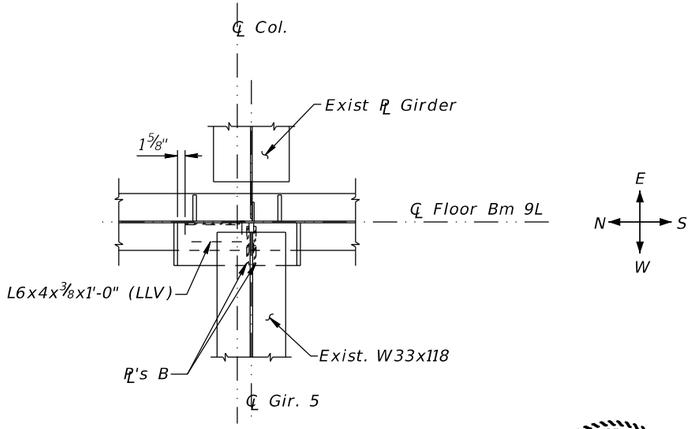
ELEVATION

(Looking East)



SIDE VIEW

(Looking North)



TOP VIEW

DETAIL 4

(REPAIR AT GIRDER 5 ONLY)

HS20 LOADING

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Negoiță A.

08/06/2020

Texas Department of Transportation

Houston District (Bridge)

STEEL REPAIR DETAILS AT FLOOR BEAM 9L-WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_9L_WB_03.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST.	COUNTY		SHEET NO.
	HOU	HARRIS		113

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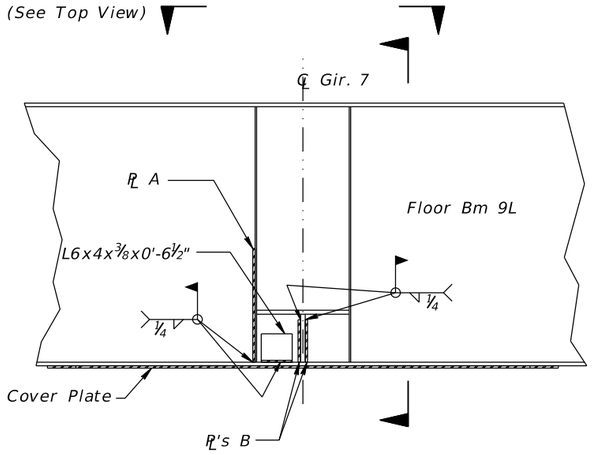
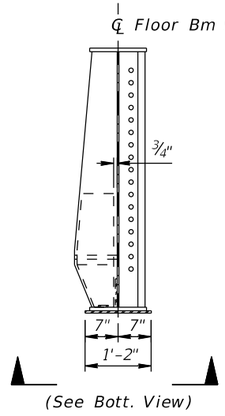
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Repair_9L_WB_03.dgn

Estimated Quantities

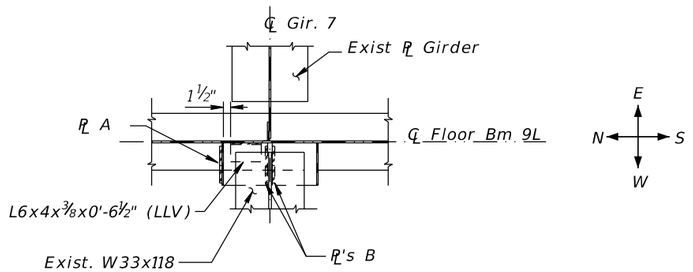
Mark	Quant.	Description	Unit Wt. (LB)	Sub-Total (LB)	Total Wt. (LB)
		Floorbeam 9L-WB			
A	5	PL 1/2 x 7 3/4 x 2'-0"	23	116	
B	8	PL 1/2 x 7 3/4 x 0'-9"	8	60	
	1	Cover PL 1/2 x 14 x 5'-8"	132	132	
	1	Cover PL 1/2 x 14 x 10'-7"	245	245	
	1	Cover PL 1/2 x 14 x 9'-0"	208	208	
	3	L 6 x 4 x 3/8 x 0'-6 1/2"	7	20	
	1	L 6 x 4 x 3/8 x 1'-0"	12	12	
		Total Steel Weight			793



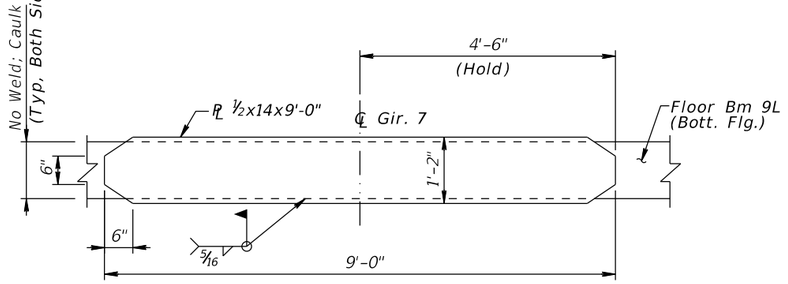
ELEVATION
(Looking East)



SIDE VIEW
(Looking North)



TOP VIEW



BOTTOM VIEW

DETAIL 5
(REPAIR AT GIRDER 7 ONLY)

HS20 LOADING

SHEET 4 OF 4

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STEEL REPAIR DETAILS AT FLOOR BEAM 9L-WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Repair_9L_WB_04.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		114

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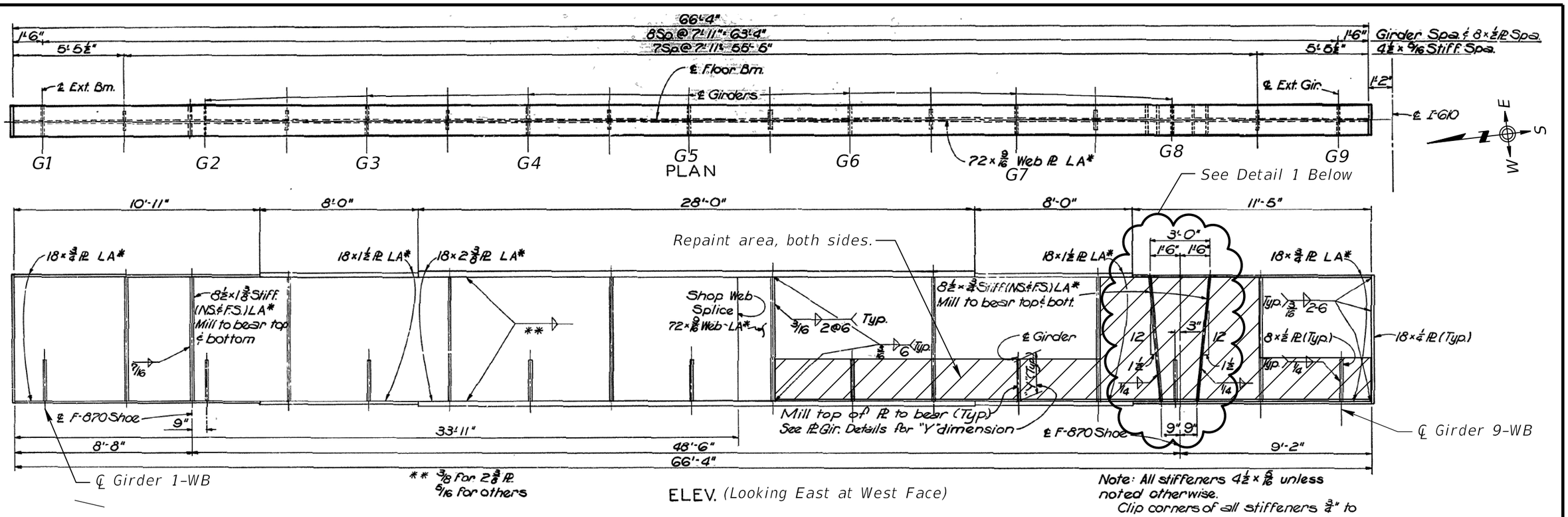
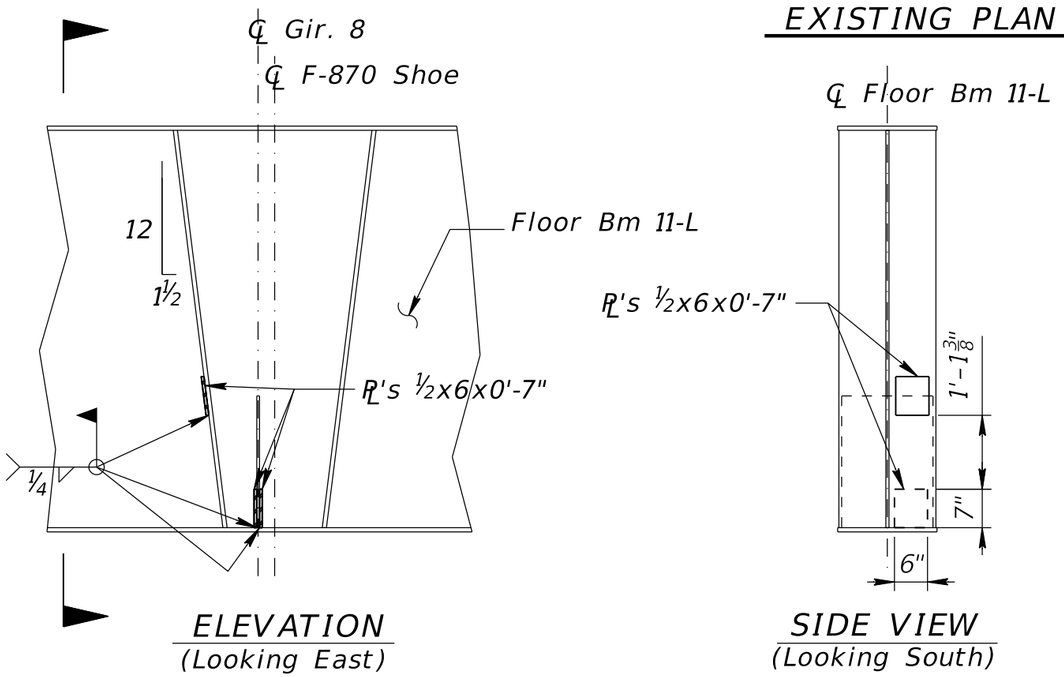
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Repair_9L_WB_04.dgn



Note: All stiffeners 4½ × 5/16 unless noted otherwise.
Clip corners of all stiffeners ¾" to clear weld fillets.
All stiffeners to be tight fit top ≠ bott. unless otherwise noted.

EXISTING PLAN & ELEVATION



ELEVATION
(Looking East)

SIDE VIEW
(Looking South)

DETAIL 1
(REPAIR AT GIRDER 8 ONLY)

Estimated Quantities					
Mark	Quant.	Description	Unit Wt. (LB)	Sub-Total (LB)	Total Wt. (LB)
		Floorbeam 11L-WB			
	3	PL 1/2 x 6 x 0'-7"	6	18	
		Total Steel Weight			18

Note:
All steel repairs plates to be added to the west face of floor beam.

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STEEL REPAIR DETAILS AT FLOOR BEAM 11L-WB

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE: Repair_11L_WB.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		115

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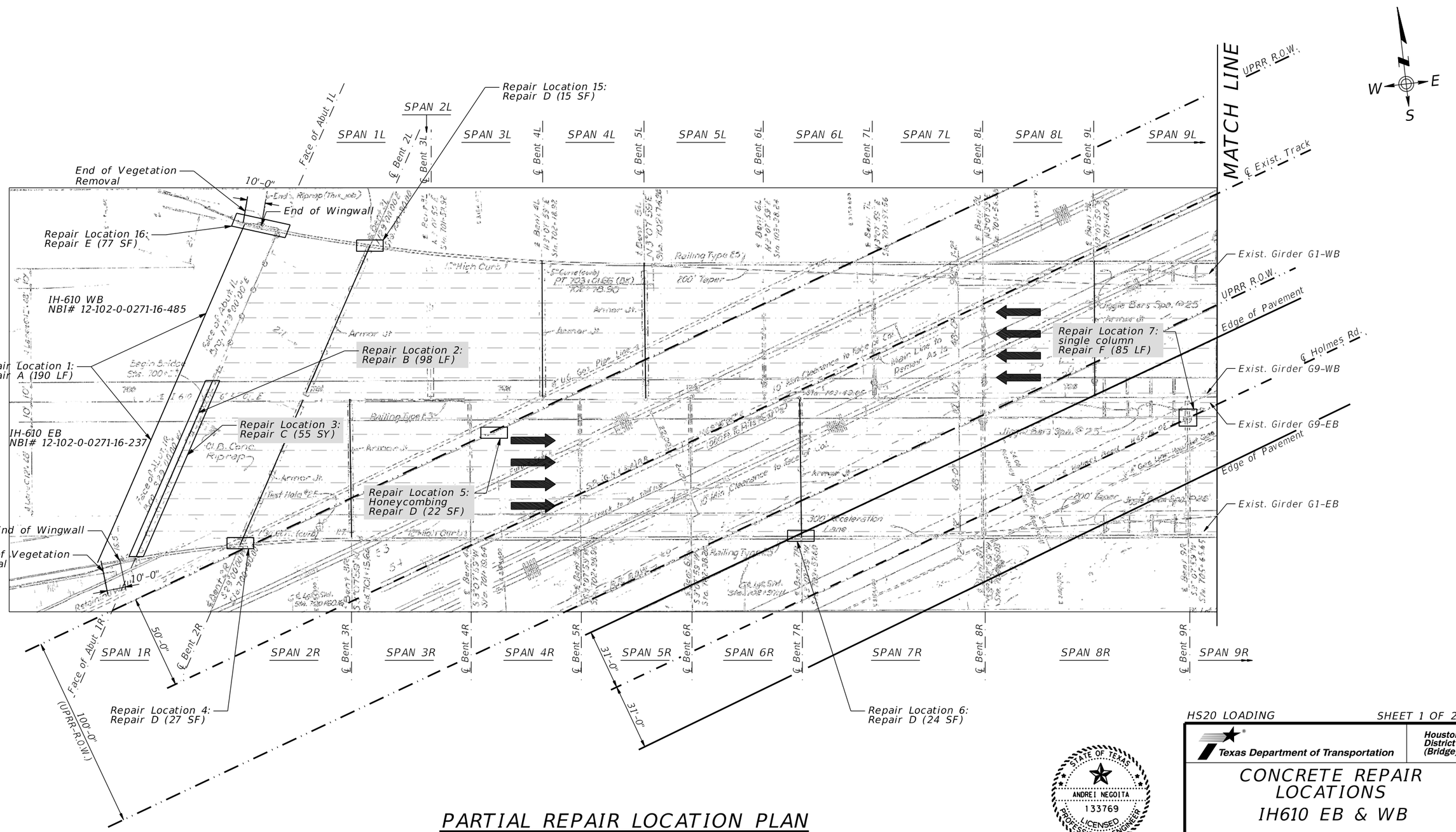
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Repair_11L_WB.dgn



PARTIAL REPAIR LOCATION PLAN

Negoiță A.

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HS20 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR LOCATIONS
IH610 EB & WB

IH-610 OVERPASS
AT HOLMES RD & UPRR

FILE: Conc_Repair_Location.dgn	DN: AN	CK: AN	DW: VNC	CK: AN	
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY	
REVISIONS	271	16	160	IH-610	
	DIST	COUNTY		SHEET NO.	
	HOU	HARRIS		116	

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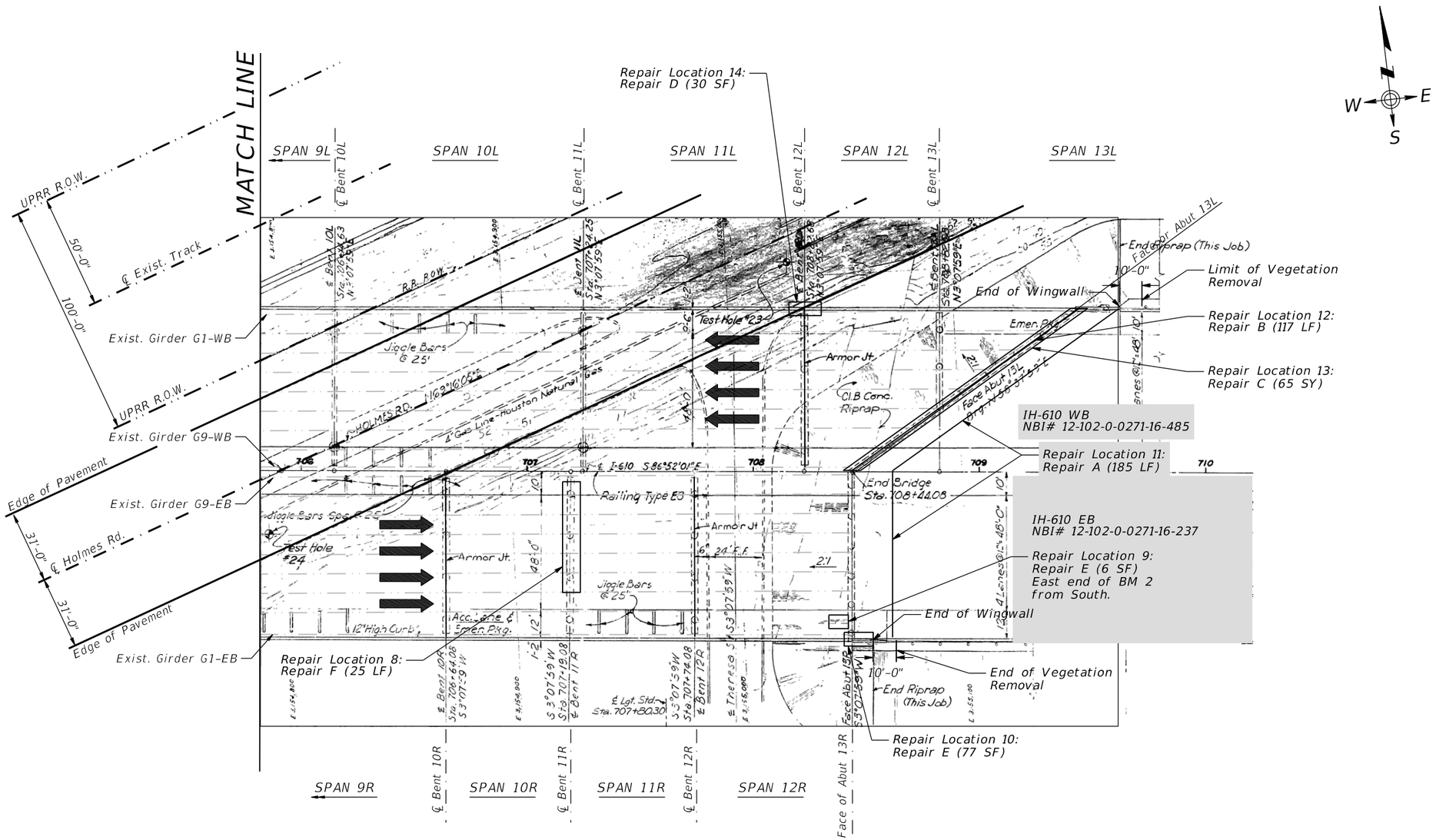
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Repair_Location.dgn



PARTIAL REPAIR LOCATION PLAN

HS20 LOADING

SHEET 2 OF 2

STATE OF TEXAS
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Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR LOCATIONS
IH610 EB & WB

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Conc_Repair_Location.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		117

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Concrete Repairs:

Repair A: Remove existing material in joint between pavement and approach slab. Pressure wash and clean joint. Reseal joint as per the Transverse Formed Expansion Joint Detail in TxDOT standard drawing JS-14, Concrete Paving Details Joint Seals.

Repair Locations: 1, 11 Pay Item: 0438-6004.

Repair B: Saw cut, clean and seal abutment joint. Use Transverse Sawed Contraction Joint detail in TxDOT standard drawing JS-14, Concrete Paving Details Joint Seals.

Repair Location: 2, 12 Pay Item: 0438-6004

Repair C: Half depth concrete pavement repair as per the Half-Depth Repair instructions in TxDOT standard drawing REPCP-14, Repair of Concrete Pavement.

Repair Location: 3, 13 Pay Item: 0361-6022

Repair D: Deck overhang spall and honeycombing repairs.

1. Perform spall repairs in accordance with Section 2 Intermediate Spall Repair of Chapter 3 Repair Materials and Procedures of the TxDOT Concrete Repair Manual and the additional notes below which add to or emphasize key points of the repair manual.

2. Saw cut a minimum 2" gap in the exterior guardrail centered on the existing armored joint to allow the joint to contract at the rail. Fix any resulting spalls and ensure guardrail end faces are finished plane and smooth.

3. Ensure spall areas are chipped out at least 1 inch deep from the original undamaged surface and are squared off with 90 degree edges. Repair concrete must end at a hard edge and shall not be tapered off.

4. Blast corrosion from exposed reinforcement with sand or grit. Ensure a ¾" gap is chipped out behind reinforcement that has half or more of its circumference exposed.

5. Ensure existing concrete substrate is roughened and pressure washed to a surface saturated dry condition condition prior to placing concrete repair material.

Repair Locations: 4, 5, 6, 14, 15 Pay Item: 0429-6007

Repair E: Spall repairs.

1. Perform spall repairs in accordance with Section 2 Intermediate Spall Repair of Chapter 3 Repair Materials and Procedures of the TxDOT Concrete Repair Manual and the additional notes below which add to or emphasize certain key points of the repair manual.

2. Ensure spall areas are chipped out at least 1 inch deep from the original undamaged surface and are squared off with 90 degree edges. Repair concrete must end at a hard edge and shall not be tapered off.

3. Blast corrosion from exposed reinforcement with sand or grit. Ensure a ¾" gap is chipped out behind reinforcement that has half or more of its circumference exposed.

4. Recess exposed prestressed reinforcement at least 3/8" from the beam end.

5. Ensure existing concrete substrate is roughened and pressure washed to a surface saturated dry condition condition prior to placing concrete repair material.

Repair Locations: 9, 10, 16 Pay Item 429-6007

Repair F: Epoxy Injection of Cracks

1. Perform spall repairs in accordance with Section 5 Crack Repair Pressure Injected Epoxy of Chapter 3 Repair Materials and Procedures of the TxDOT Concrete Repair Manual and the additional notes below which add to or emphasize certain key points of the repair manual.

2. Pressure wash column prior to injecting epoxy to reveal all cracks.

3. Cracks extending under the surface of the soil must be dug out and exposed prior to injecting epoxy.

Repair Locations: 7, 8 Pay Item 0780-6002

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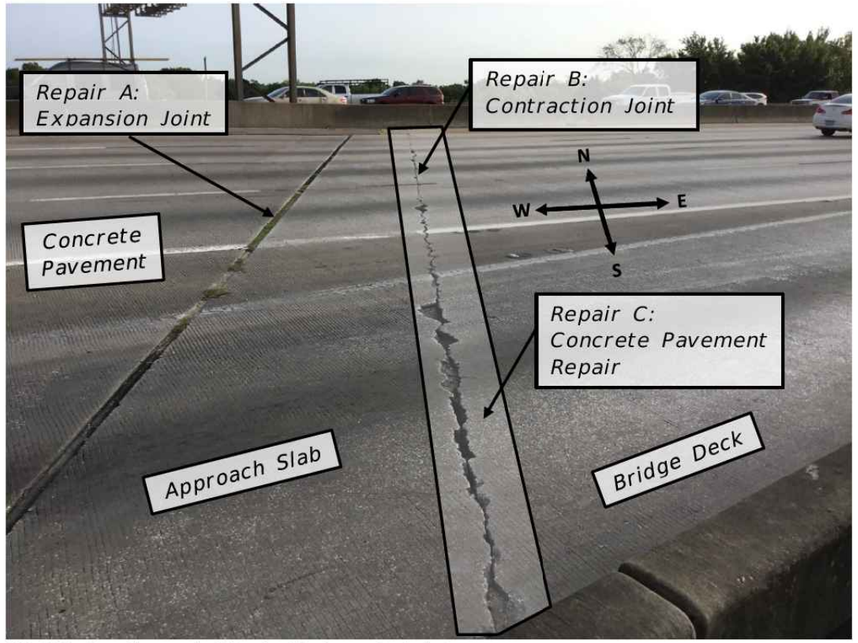
CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

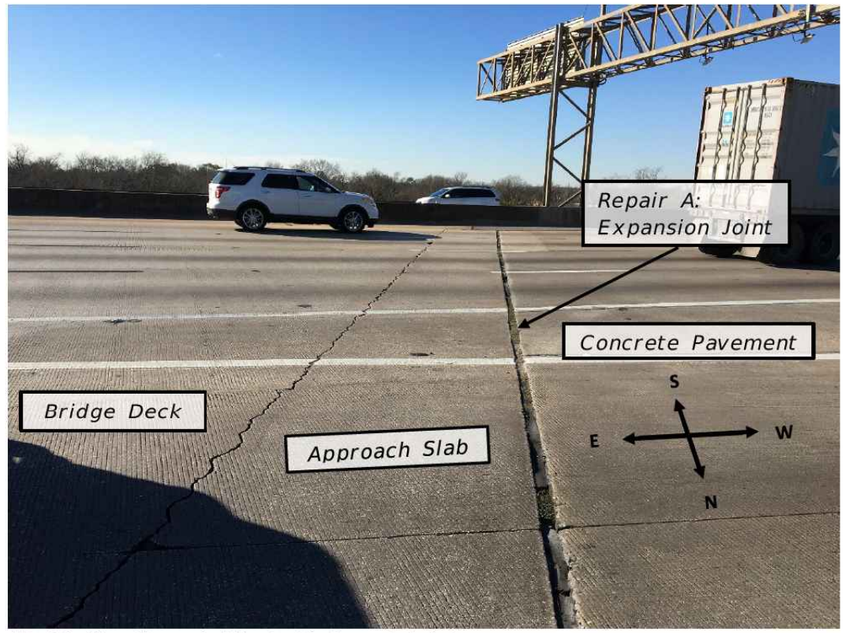
FILE:	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		118

Repair locations 1, 2, and 3: Repair types A, B, and C.



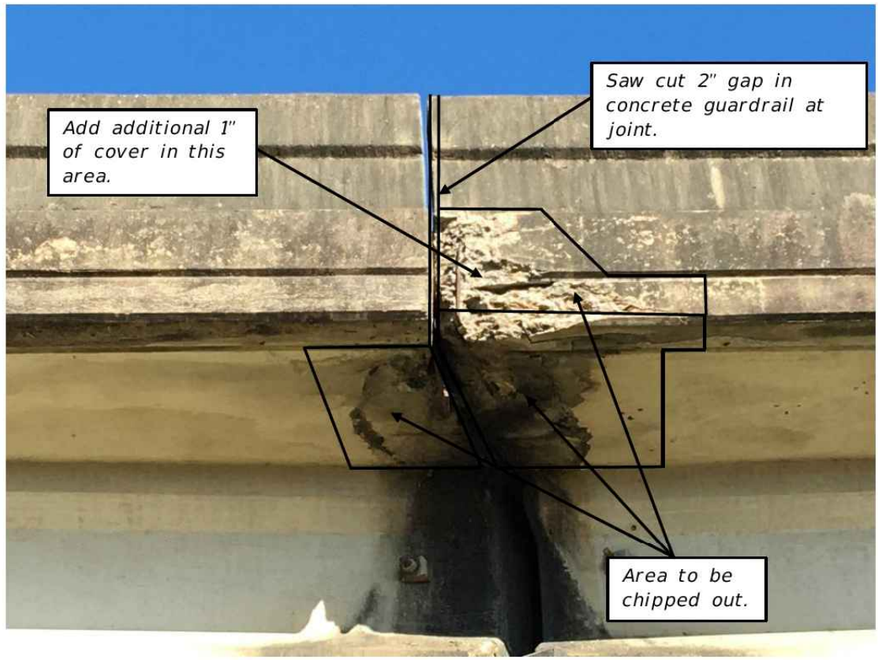
IH-610 Eastbound, West Abutment Joint

Repair location 1: Repair type A.



IH-610 Westbound, West Abutment Joint

Repair location 4: Repair type D.



IH-610 Eastbound, Bent 2R Overhang

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HS20 LOADING SHEET 2 OF 8

Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Conc_Rep_2-8_Cleaning_1-5.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		119

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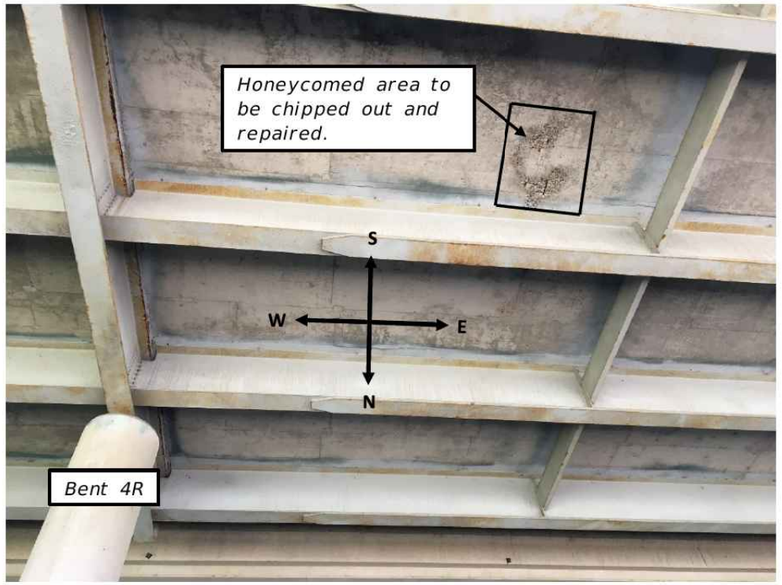
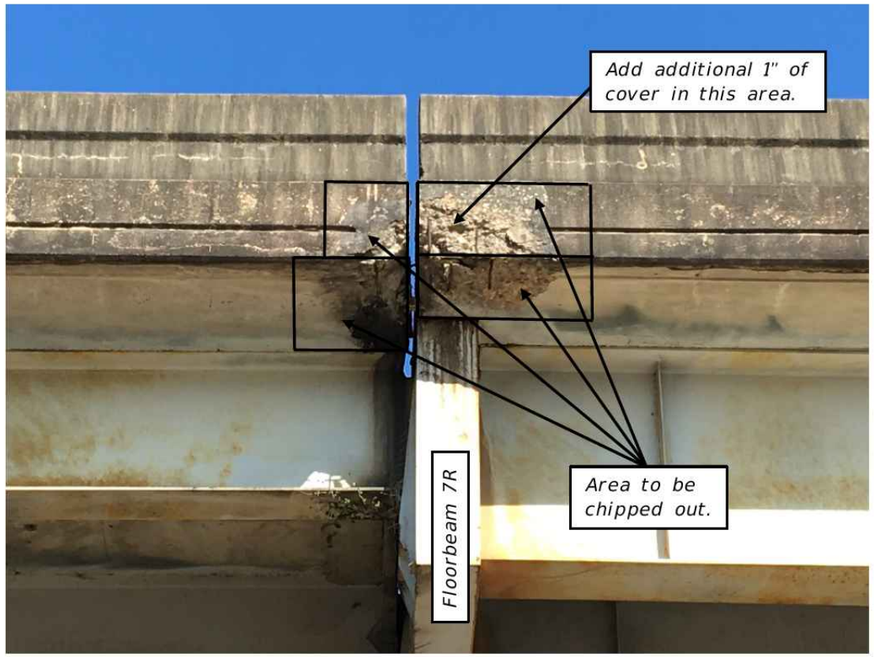
Repair location 5: Repair type D.



IH-610 Eastbound, Span 4R

Repair location 6: Repair type D.



IH-610 Eastbound, Bent 7R Overhang

STATE OF TEXAS
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Negoiță A.

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HS20 LOADING *SHEET 3 OF 8*

Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FI:Conc_Rep_2-8_Cleaning_1-5.dgn		DN: AN		CK: AN	DW: VNC		CK: AN
©TxDOT 8/6/2020		CONT	SECT	JOB		HIGHWAY	
REVISIONS		271	16	160		IH-610	
		DIST	COUNTY				SHEET NO.
		HOU	HARRIS				120

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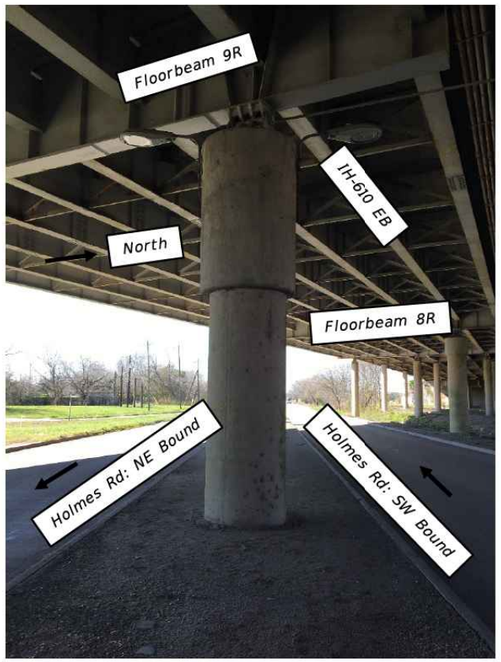
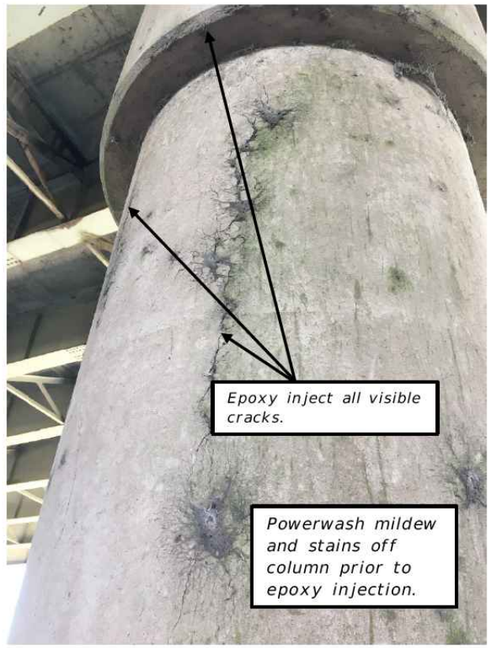
Repair location 7: Repair type F.



IH-610 Eastbound, Bent 9R, North Column

Repair location 7: Repair type F.



IH-610 Eastbound, Bent 9R, North Column

HS20 LOADING *SHEET 4 OF 8*

STATE OF TEXAS
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Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Conc_Rep_2-8_Cleaning_1-5.dgn		DN: AN		CK: AN	DW: VNC	CK: AN	
©TxDOT 2021		CONT	SECT	JOB		HIGHWAY	
REVISIONS		271	16	160		IH-610	
		DIST	COUNTY			SHEET NO.	
		HOU	HARRIS			121	

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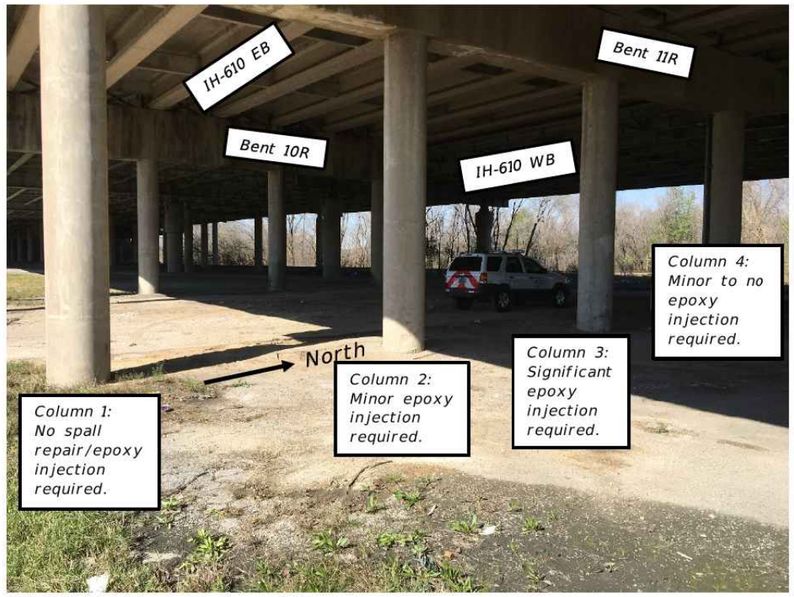
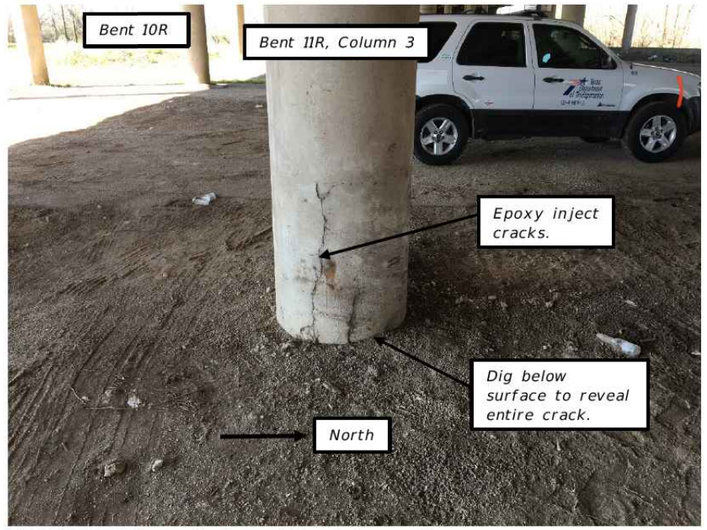
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Rep_2-8_Cleaning_1-5.dgn

Repair location 8: Repair type F.



IH-610 Eastbound, Bent 11R

Repair location 8: Repair type F.



IH-610 Eastbound, Bent 11R, Column 3

Negoiță A.

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HS20 LOADING *SHEET 5 OF 8*

Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FI:Conc_Rep_2-8_Cleaning_1-5.dgn		DN: AN	CK: AN	DW: VNC	CK: AN	
©TxDOT 2021	CONT	SECT	JOB		HIGHWAY	
REVISIONS	271	16	160		IH-610	
	DIST	COUNTY			SHEET NO.	
	HOU	HARRIS			122	

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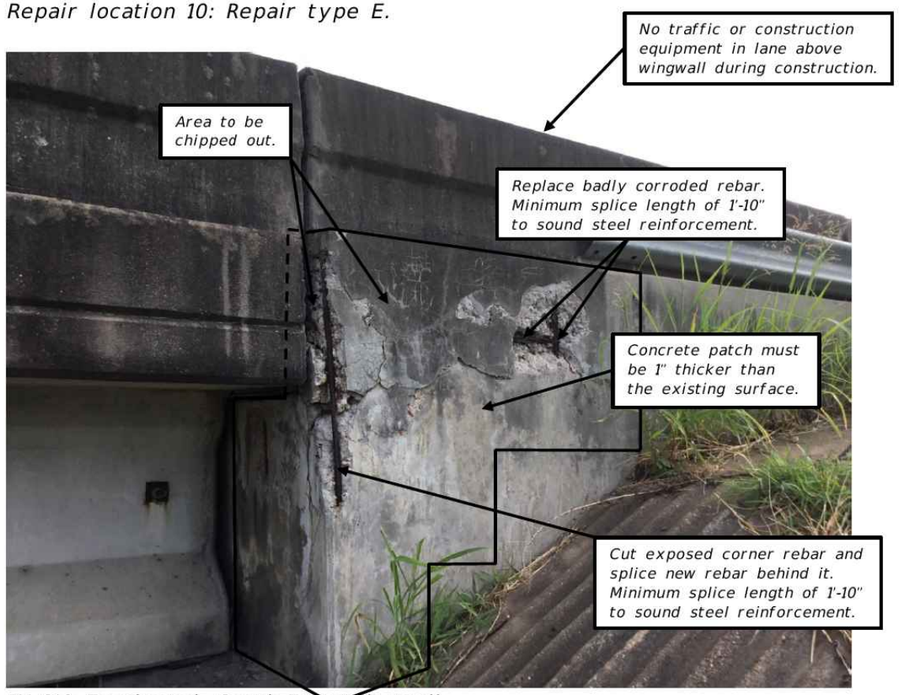
Repair location 9: Repair type E.

IH-610 Eastbound, Span 12R (East Endspan), Beam 2 from South at Abutment

Repair location 10: Repair type E.



IH-610 Eastbound, South-East Wingwall

HS20 LOADING *SHEET 6 OF 8*

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CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FI Conc_Rep_2-8_Cleaning_1-5.dgn		DN: AN		CK: AN	DW: VNC	CK: AN
© TxDOT 2021		CONT	SECT	JOB		HIGHWAY
REVISIONS		271	16	160		IH-610
		DIST	COUNTY			SHEET NO.
		HOU	HARRIS			123

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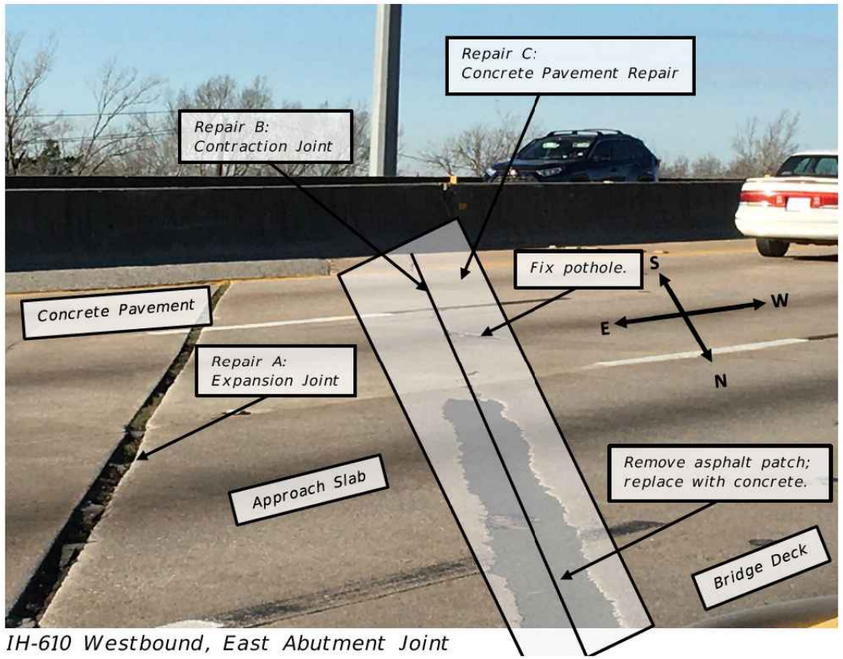
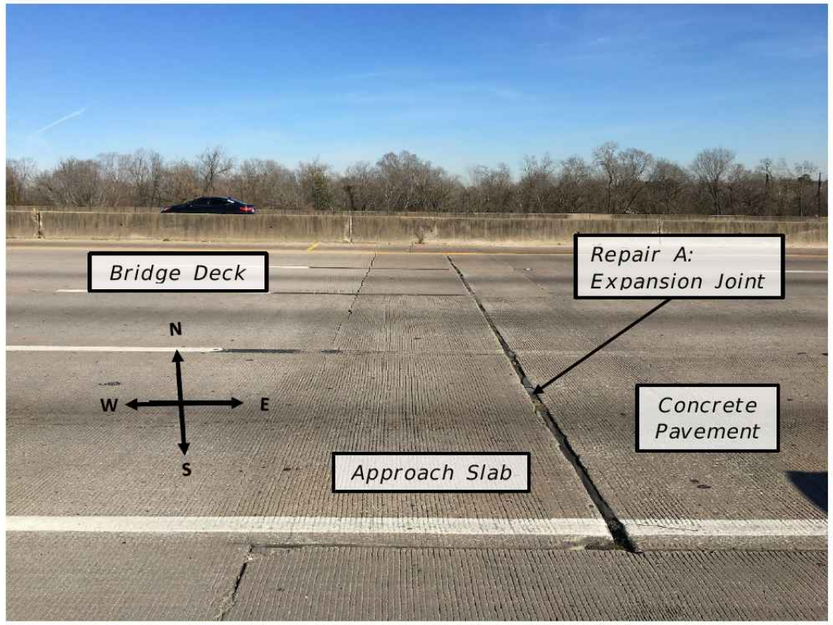
Repair locations 11, 12, and 13: Repair types A, B, and C.



IH-610 Westbound, East Abutment Joint

Repair location 11: Repair type A.



IH-610 Eastbound, East Abutment Joint

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HS20 LOADING SHEET 7 OF 8

Texas Department of Transportation

Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FI: Conc_Rep_2-8_Cleaning_1-5.dgn		DN: AN		CK: AN	DW: VNC	CK: AN	
©TxDOT 2021		CONT	SECT	JOB		HIGHWAY	
REVISIONS		271	16	160		IH-610	
		DIST	COUNTY			SHEET NO.	
		HOU	HARRIS			124	

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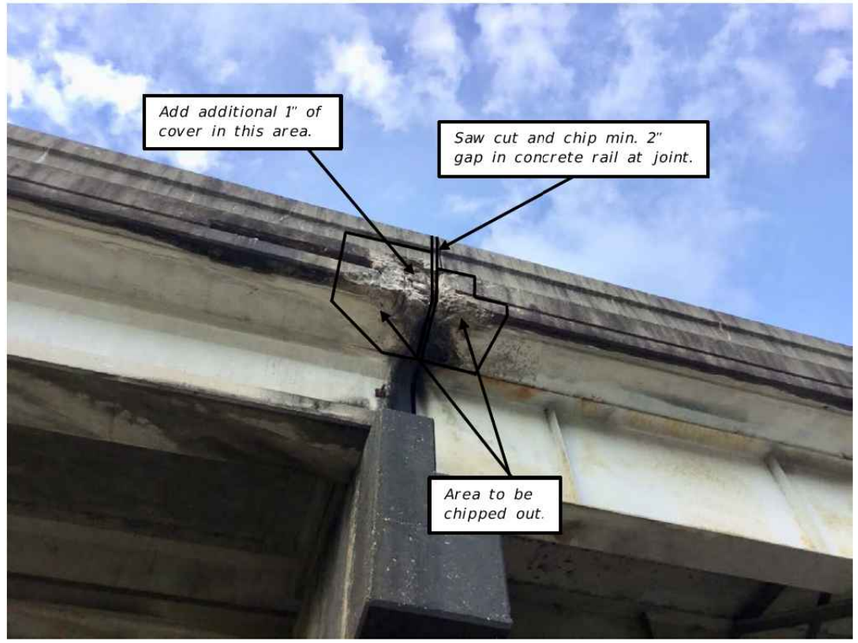
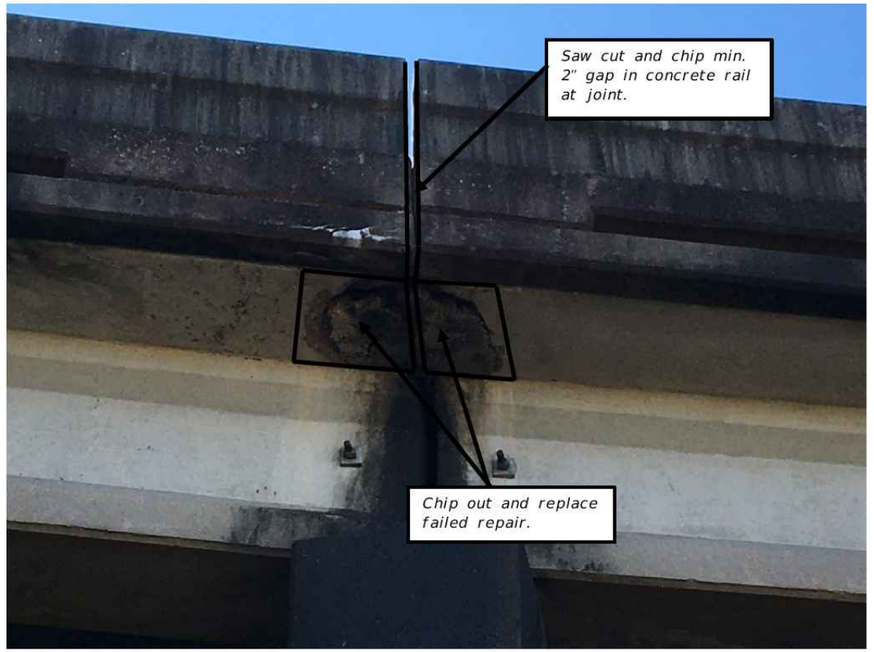
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Rep_2-8_Cleaning_1-5.dgn

Repair location 14: Repair type D.



IH-610 Westbound, Bent 12L Overhang

Repair location 15: Repair type D.



IH-610 Westbound, Bent 2L Overhang

Repair location 16: Repair type E.

IH-610 Westbound, North-West Wingwall

HS20 LOADING *SHEET 8 OF 8*

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Houston District (Bridge)

CONCRETE REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Conc_Rep_2-8_Cleaning_1-5.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		125

8/6/2020
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Rep_2-8_Cleaning_1-5.dgn

Cleaning and Repair Items Applicable to Entire Project

1. Clean and reseal all armored joints as per the detail without a 2"overlay in TxDOT standard drawing AJ, Armor Joint Details. Perform IAW Item 438 Cleaning and Sealing Joints. Pay item 0438-6004.

2. Power wash all drain slots under traffic rails and remove debris. Perform IAW Item 738 Cleaning and Sweeping Highways. Pay Item 0738-6011.

3. Remove all debris from bent caps. Power wash bent caps. Perform IAW Item 738 Cleaning and Sweeping Highways. Pay item 0738-6011.

4. Remove all debris from abutment bent caps. Power wash abutment bent caps. Perform IAW Item 738 Cleaning and Sweeping Highways. Pay item 0738-6011.

5. Remove all vegetation from concrete riprap at abutments as per details. End vegetation removal 10'-0" behind the ends of wingwalls. Perform IAW Item 731 Herbicide Treatment. Pay item 0731-6002.

Photographs on this sheet and the following sheet depict typical examples of the work items described above.

1. Clean and reseal all armored joints.

IH 610 Eastbound, Armored Joint at Bent 7R (picture of armored joint)

2. Powerwash all drain slots under traffic rails.

IH-610 Eastbound, Span 9R, View Looking North-East (picture of clogged drain slots)

3. Remove all debris from bent caps. Power wash bent caps.

Typical bent cap photo.

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED
PROFESSIONAL ENGINEER

Negoiță A.

08/07/2020

HS20 LOADING SHEET 1 OF 2

Texas Department of Transportation

Houston District (Bridge)

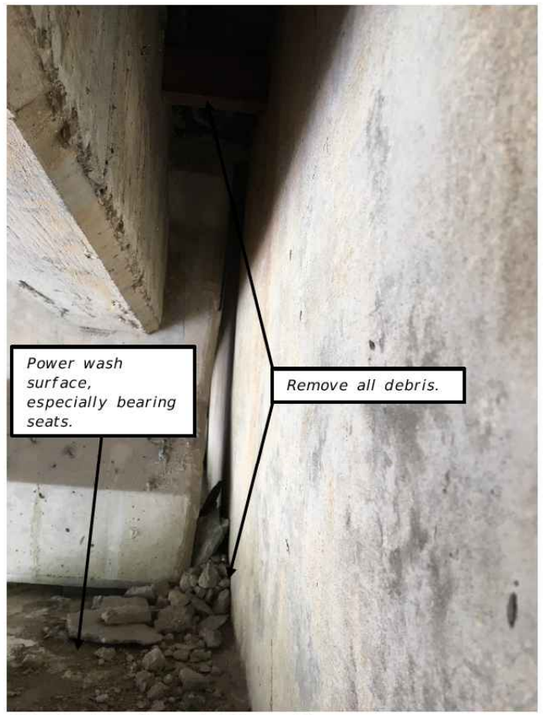
CLEANING AND REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

FILE: Conc_Rep_2-8_Cleaning_1-5.dgn	DN: AN	CK: AN	DW: VNC	CK: AN			
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY			
REVISIONS	271	16	160	IH-610			
	DIST	COUNTY		SHEET NO.			
	HOU	HARRIS		126			

8/7/2020
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Rep_2-8_Cleaning_1-5.dgn

4. Remove all debris from abutment bent caps. Power wash abutment bent caps.

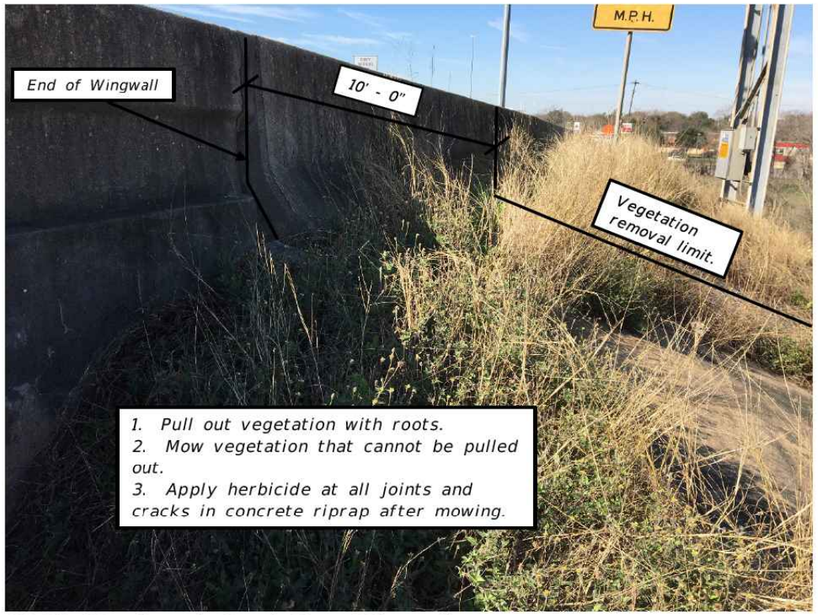


IH-610, Eastbound, West Abutment
(debris picture)

4. Remove all debris from abutment bent caps. Power wash abutment bent caps.

IH-610, Eastbound, East Abutment
(debris picture)

5. Remove all vegetation from concrete riprap at abutments as per details. End vegetation removal 10'-0" behind the ends of wingwalls.



IH-610 Westbound, North-West Wingwall
(existing vegetation picture)

HS20 LOADING SHEET 2 OF 2

STATE OF TEXAS
ANDREI NEGOITA
133769
LICENSED PROFESSIONAL ENGINEER

08/06/2020

Texas Department of Transportation | Houston District (Bridge)

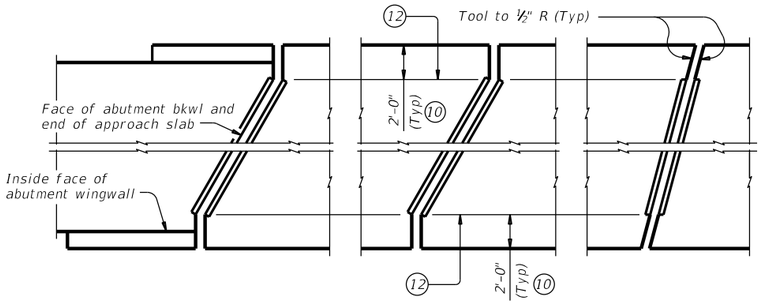
CLEANING AND REPAIR NOTES & DETAILS

IH-610 OVERPASS AT HOLMES RD & UPRR

File: Conc_Rep_2-8_Cleaning_1-5.dgn	DN: AN	CK: AN	DW: VNC	CK: AN
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		127

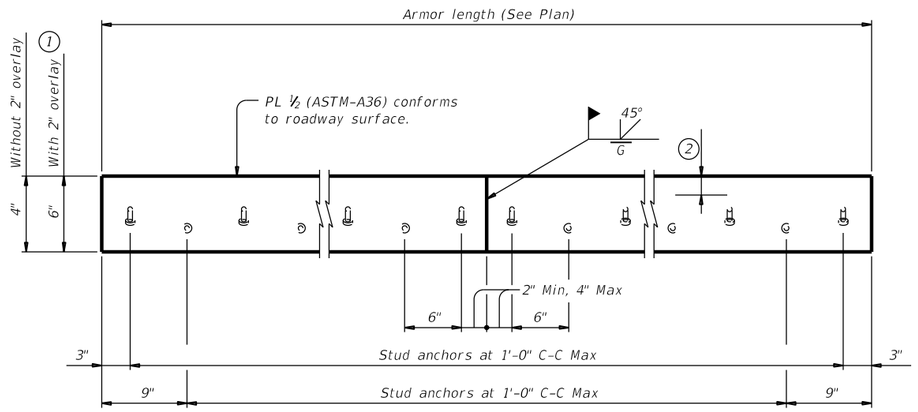
8/6/2020
C:\Users\ANEGOITA\Documents\Projects\CSJ 0271-16-160_IH610 Holmes Rd\Graphics\DGN\Conc_Rep_2-8_Cleaning_1-5.dgn

DATE:
FILE:



JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES



ELEVATION OF BASIC ARMOR PLATE

(1) Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.

(2) Do not paint top 1 ½" of plate if using sealed armor joint.

(3) Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(4) Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.

(5) Use Class 7 joint sealant that conforms to DMS-6310.

(6) Place sealant while ambient temperature is between 55°F and 80°F and is rising.

(7) Armor joint does not include joint sealant or backer rod.

(8) Armor joint (sealed) includes Class 7 joint sealant and backer rod.

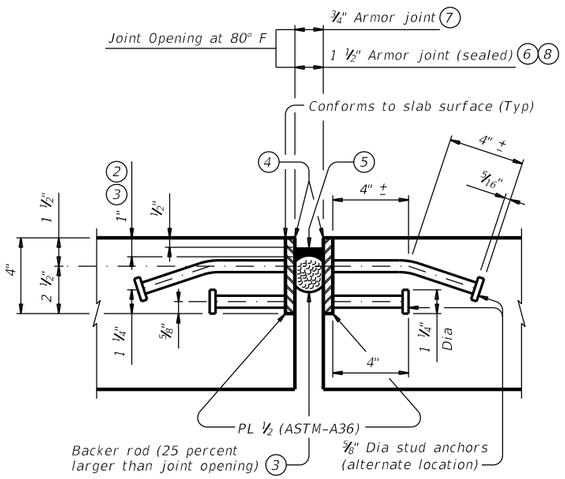
(9) Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.

(10) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

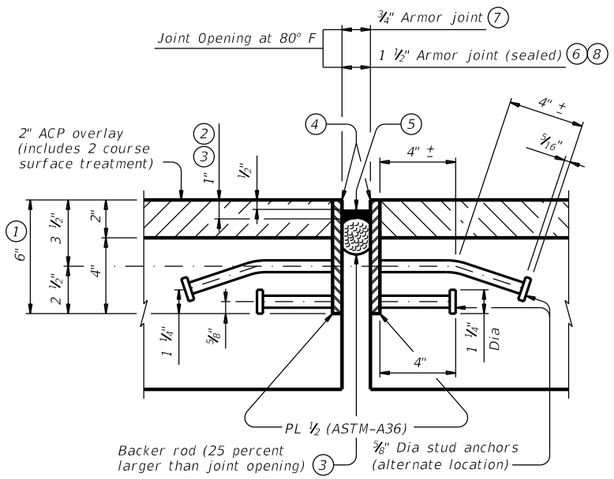
(11) See "Plans of Armor Plates".

(12) At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.

(13) Align shipping angle perpendicular to joint.



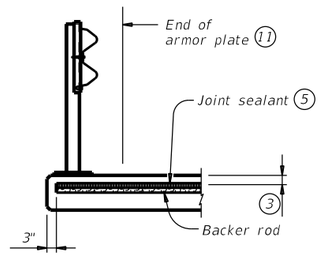
SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



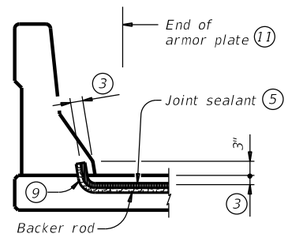
SHOWN WITH 2" OVERLAY AT JOINT LOCATION (1)

ARMOR JOINT SECTIONS

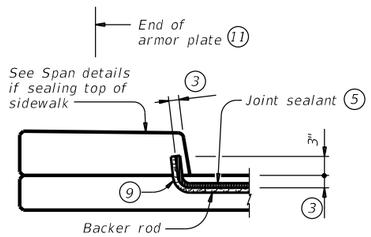
Showing Armor Joint (Sealed)



AT STEEL POST BRIDGE RAIL



AT CONCRETE BRIDGE RAIL



AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

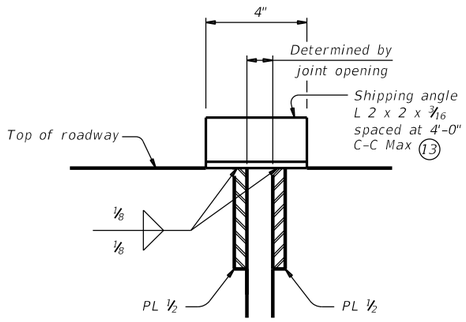
Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY (1)	22.90 plf

Texas Department of Transportation

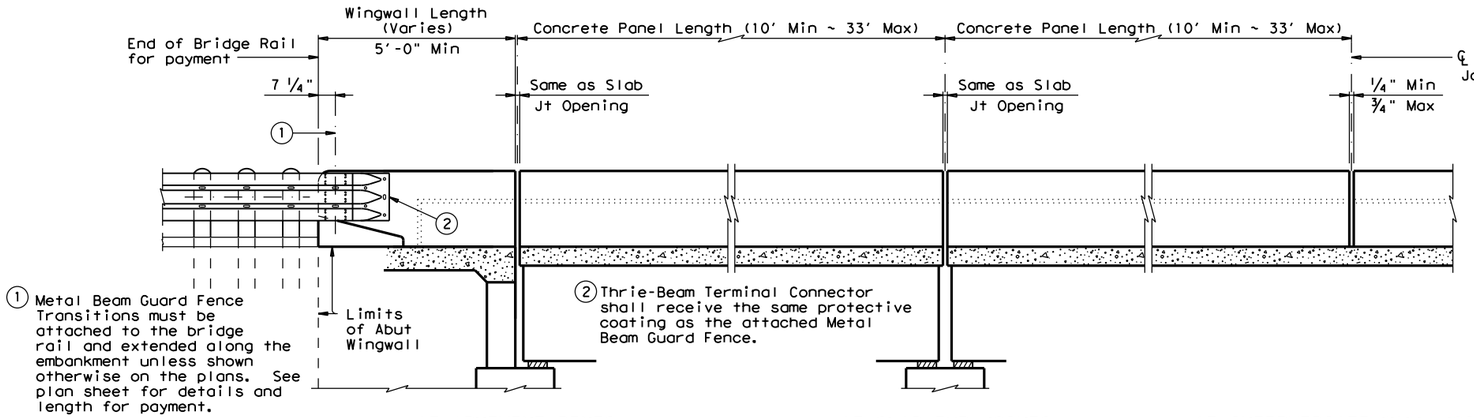
Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	271	16	160	IH-610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		128

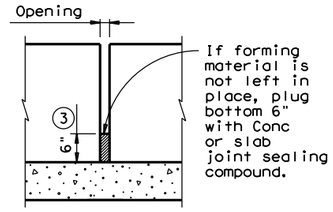
LEVELS DISPLAYED ACC:



1 Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless shown otherwise on the plans. See plan sheet for details and length for payment.

2 Thrie-Beam Terminal Connector shall receive the same protective coating as the attached Metal Beam Guard Fence.

3 Increase 2" for structures with Overlay.

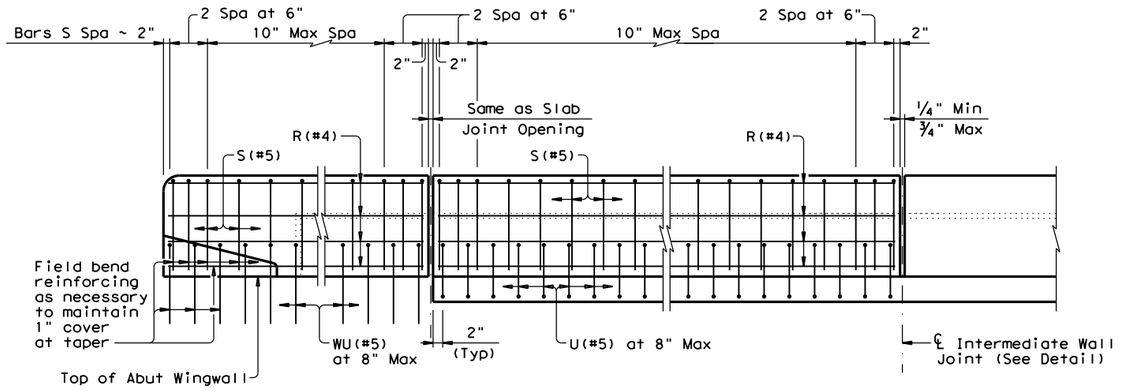


INTERMEDIATE WALL JOINT DETAIL

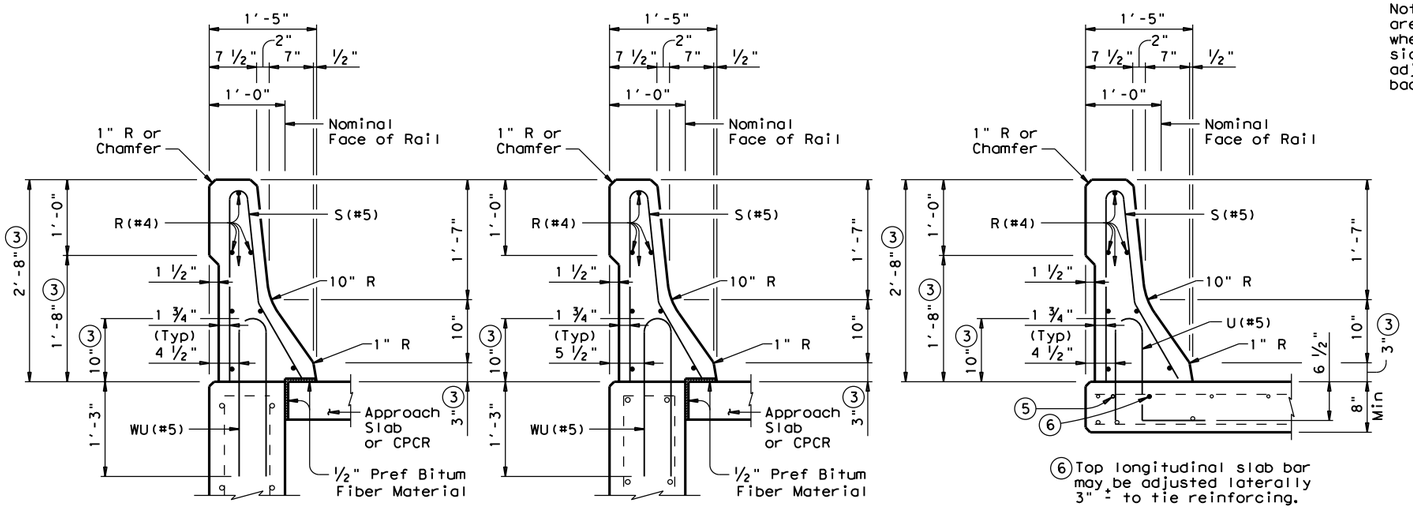
Note: Provide intermediate wall joints over all slab construction joints, over interior supports on continuous units, and at equal intervals in between as necessary to maintain a 33' maximum length of unbroken wall. Material used in forming joint may be left in place if it is compressible and light in color such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc.

AT ABUTMENT BENTS | AT SLAB EXP JOINTS | AT INTERMEDIATE WALL JOINTS

ROADWAY ELEVATION OF RAIL



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



ON CANTILEVER ABUT WINGWALLS OR CIP RETAINING WALLS

ON FOUNDED ABUT WINGWALLS

ON BRIDGE SLAB

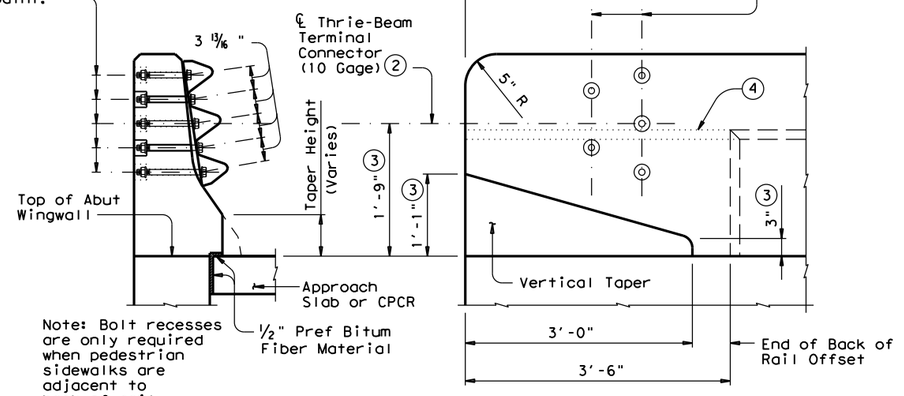
SECTIONS THRU RAIL

6 Top longitudinal slab bar may be adjusted laterally 3" ± to tie reinforcing.

5 As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars shall be furnished at the Contractors expense.

℄ 5 ~ 7/8" Dia A325 Hex Head Bolts with two 1 3/4" O.D. washers. Place washer under each head and nut. The 5 Terminal Connection Bolts shall be tightened in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Bolts shall be cut off after installation so as to extend no more than 3/4" beyond nut. End of cut-off bolt shall be painted with Zinc-rich paint.

℄ 5 ~ 1" Dia holes and 2 1/2" Dia x 2" deep recesses. Holes and recesses must be formed or cored. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

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

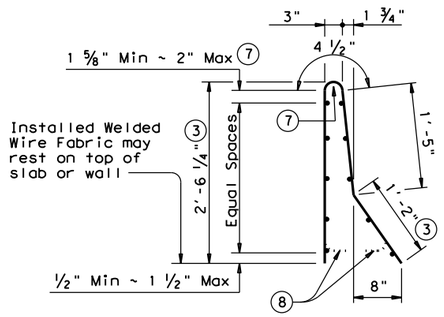
SHEET 1 OF 2

Texas Department of Transportation
Bridge Division

TRAFFIC RAIL

TYPE T501

FILE: rlstde16.dgn	DN: JJP	CK: TxDOT	DW: JTR	CK: DWM
©TxDOT April 2002	DISTRICT	PROJECT NO.		SHEET
REVISIONS	HOU			129
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HARRIS	0271	16	160	IH-610



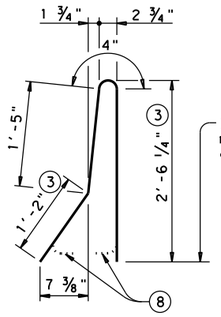
OPTIONAL WELDED WIRE FABRIC

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	0.933 Sq In.	0.248 Sq In. per Ft
	No. of Wires	Spacing
Minimum	6	4"
Maximum	11	12"
Maximum Wire Size Differential	The smaller wire shall have an area of 40% or more of the larger wire.	

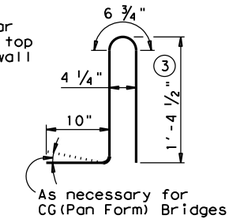
(3) Increase 2" for structures with Overlay.

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

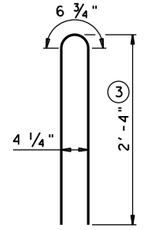
(8) Bend or cut as required to clear drain slots.



BARS S (#5)



BARS U (#5)



BARS WU (#5)

GENERAL NOTES:

This rail has been evaluated and approved to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-4 criteria. The T501 rail can be used for design speeds of 50 mph and greater.

All parts of the railing including concrete parapet wall, reinforcing, MBGF connections, bolts, nuts and washers are included in the price bid per linear foot of rail.

All steel components except reinforcing shall be galvanized unless otherwise shown on plans.

All concrete for railing wall shall be Class "C".

All reinforcing steel shall be Grade 60.

Shop drawings will not be required for this rail.

This railing may be constructed with slip-forms when shown on the plans or approved by the Engineer, with equipment approved by the Engineer. Sensor control for both line and grade must be provided. When slip-forming is used, the concrete may be cured with membrane curing compound.

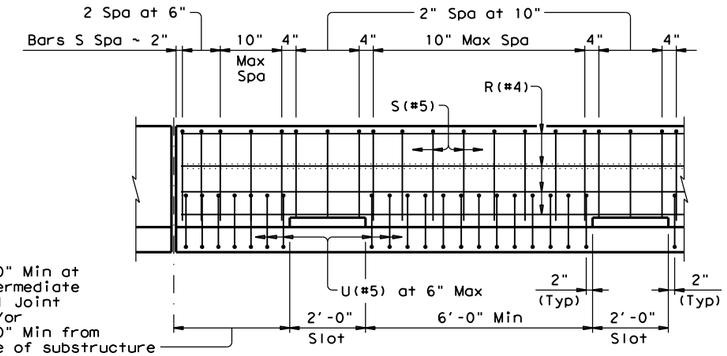
Additional reinforcing may be tack welded to the upper two thirds of the reinforcing cage to provide bracing when slip-forming is used. Additional anchorage devices may be added when welding is necessary in the lower one third of the cage. Do not weld to U or S bars in the lower one third of the cage.

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

Deformed welded wire fabric may be used as an option to conventional reinforcement and shall be made in accordance with ASTM A497 (Deformed Wire). Combinations of Reinforcing Steel and Welded Wire Fabric or configurations of Welded Wire Fabric other than shown will be permitted when the conditions in the table are satisfied and the dimension from end of section to first welded vertical wire does not exceed 3".

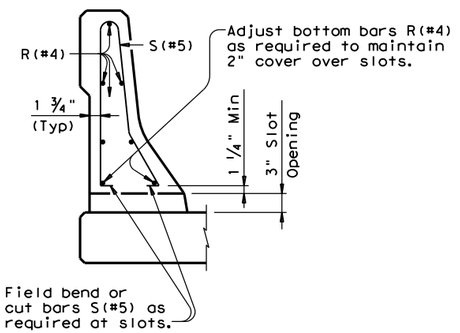
Epoxy coat bars U and WU if slab bars are epoxy coated.

Average weight of railing with no overlay is 326 plf.



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. If continuous slots at 8 ft c-c are required, then details as on standard Type T502 should apply. 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

ACC:

LEVELS DISPLAYED

1

SHEET 2 OF 2

Texas Department of Transportation
Bridge Division

TRAFFIC RAIL

TYPE T501

FILE: rlstde16.dgn	DN: JJP	CK: TxDOT	DW: JTR	CK: DWM			
© TxDOT April 2002	DISTRICT	PROJECT NO.					SHEET
REVISIONS	HOU						130
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	HARRIS			0271	16	160	IH-610

DATE: Wed, 9/30/2020 7:19 PM GTAN
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601\4 - Design\Master Design Files\0271-16-160\Railroad Coordination\Scope of Work

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

DOT #: 755633B
Crossing Type: Highway Overpass
RR Company Owning Track at Crossing: Union Pacific Railroad (UPRR)
Operating RR Company at Track: UPRR
RR MP: 7.050
RR Subdivision: Harrisburg
City: Houston
County: Harris
CSJ at this Crossing: 0271-16-160
Highway/Roadway name crossing the railroad: IH 610
# of regularly scheduled trains per day at this crossing: 8
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 80

Scope of Work at this Crossing to Be Performed by State Contractor:
Repairs to the floor beams involving welding repair plates to the existing beams and maintenance/repairs to the various bridge support members. The bridge floor beams must be encapsulated to allow for blasting and power washing to remove existing paint to prepare them for repainting. There will also be work to replace and tighten connection bolts, repair concrete spalls, bridge armor joint repairs and concrete crack repairs. Scaffolding and/or man-lifting equipment will be placed under the bridge to provide a work platform.

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

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

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 20

On this project, night or weekend flagging is:

- [X] Expected
- [ ] Not Expected

Flagging services will be provided by:

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

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

Contact Information for Flagging:

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

Contractor must incorporate Construction Inspection into anticipated construction schedule.

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

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

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

- [ ] Required
- [X] Not Required

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

V. RAILROAD INSURANCE REQUIREMENTS

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

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

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

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

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit

Railroad Protective Liability

[ ]	Not Required	
[X]	Non - Bridge Projects	$2,000,000 / $6,000,000
[ ]	Bridge Projects	$5,000,000 / $10,000,000
[ ]	Other	

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

On this project, an ROE agreement is:

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

With the following railroad companies:

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

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

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

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

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- [ ] Not Required
- [X] Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

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

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call Union Pacific Railroad (UPRR)
Railroad Emergency Line at 888-877-7267
Location: DOT # 755633B
RR Milepost: 7.050
Subdivision: Harrisburg

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn		DN: TxDOT	CK:	DW:		CK:	
©TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0271	16	160		IH 610	
3/2020		DIST	COUNTY			SHEET NO.	
		HOU	HARRIS			131	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		132

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of $\frac{1}{4}$ inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

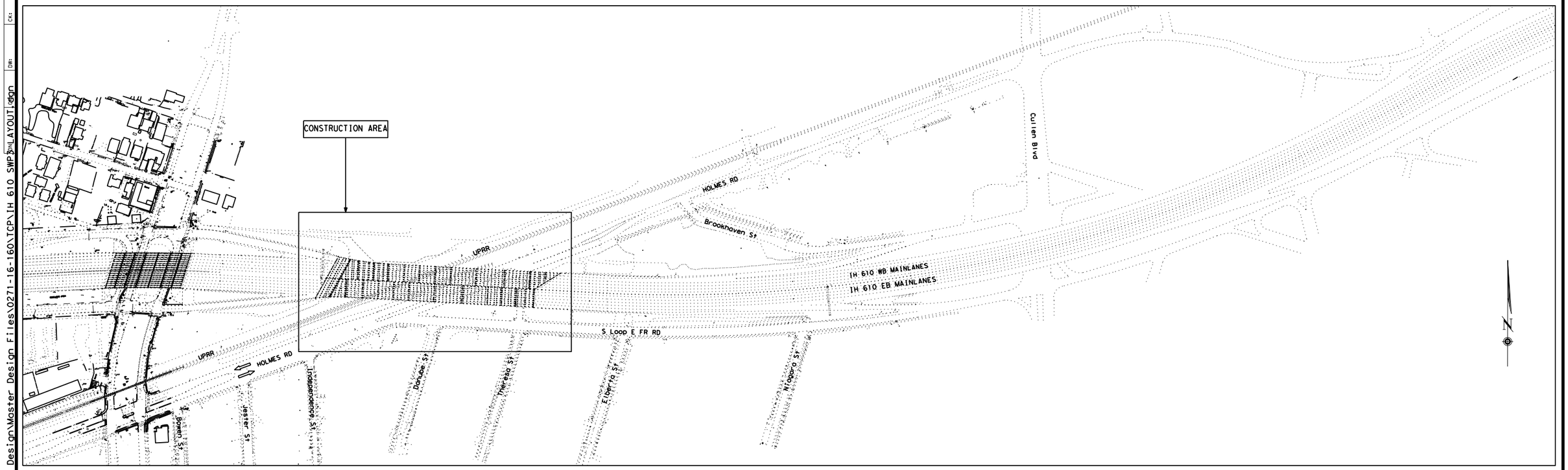
3.16 CLEANING OF RIGHT-OF-WAY

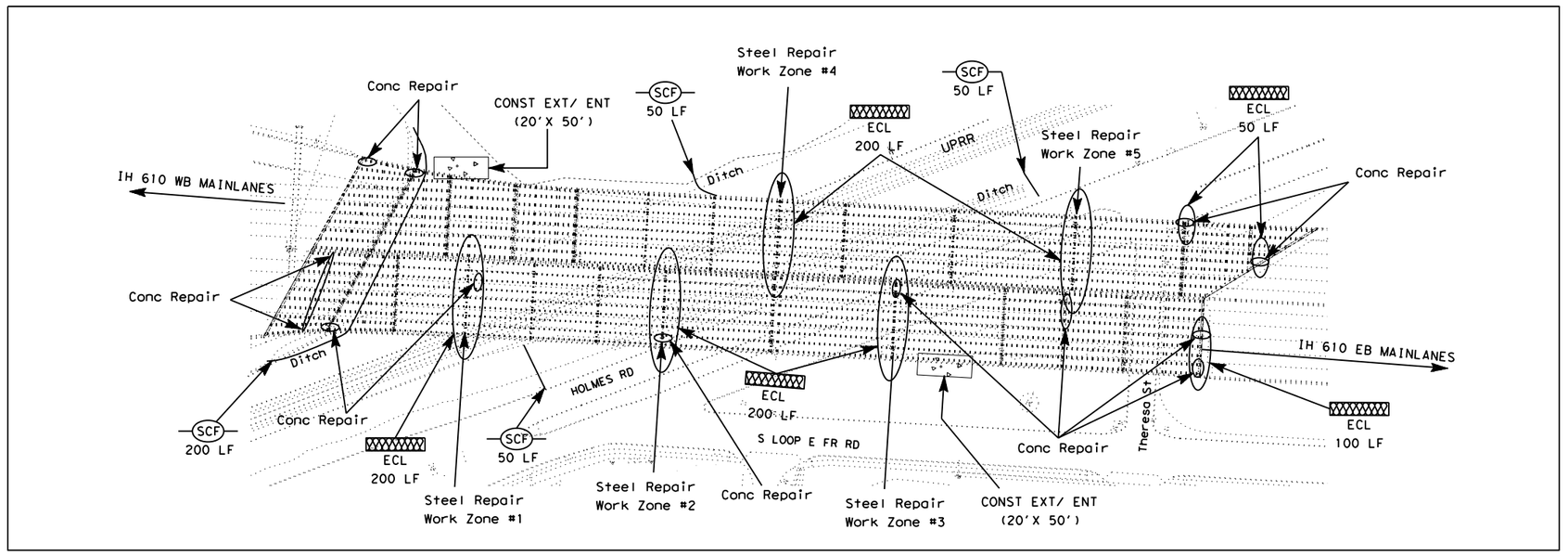
When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		132A





LEGEND:

- SCF — SILT FENCE (SCF)
- ECL — EROSION CONTROL LOG (ECL)
- TYP 1 CONSTRUCTION EXIT TYPICAL SIZE 20'X50' CONSTR EXIT/ENTR

NOTES:

1. ALL SCF OR ECL IS TO BE INSTALLED PRIOR TO THE BEGINNING CONSTRUCTION FOR EACH PHASE UNLESS SPECIFIED BY THE TXDOT ENGINEER OTHERWISE. THE SCF AND ECL INSTALLED IN PRIOR AND CURRENT PHASE SHOULD REMAIN IN SUBSEQUENT PHASES IF THEY DO NOT INTERFERE WITH THE CONSTRUCTION ACTIVITIES.
2. ECL SHALL BE INSTALLED AROUND THE PERIMETER OF THE SCAFFOLDING SETUP FOR EACH WORK ZONE LOCATION AND AROUND THE CONCRETE REPAIR AREAS.
3. SCF SHALL BE INSTALLED AT EACH WORK AREA AT THE BASE OF ANY BRIDGE COLUMN AND ALONG THE BASE OF THE BRIDGE ABUTMENT EMBANKMENT.
4. SCF SHALL BE INSTALLED ACROSS EXISTING DITCHES UNDER IH 610 BRIDGE STRUCTURES AT INTERVALS OF 100 FEET UP TO THE POINT OF DITCH OUTFALL TO CONTROL SEDIMENT DISTRIBUTED DURING THE CONSTRUCTION ACTIVITIES.
5. TEMPORARY CONSTRUCTION EXIT/ENTRANCE SHALL BE PLACED AT EACH END OF THE BRIDGE TO COVER THE AREAS UNDER THE BRIDGE TO BE ACCESSED DURING CONSTRUCTION. THE LOCATIONS ARE TO BE APPROVED BY THE AREA ENGINEER.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED
PROFESSIONAL ENGINEER

10/6/2020

DocuSigned by:
Alexine Stittiams-Ward, P.E.
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IH 610
SWP3 LAYOUT

SCALE: N.T.S SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0271	16	160	IH 610
DIST	COUNTY		SHEET NO.
HOU	HARRIS		132B

DATE: Wed, 9/30/2020 9:49:15 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601\4 - Design\Master Design Files\0271-16-160\TCP\IH 610 SWP3 LAYOUT.dgn
DGN:
CK:

SITE DESCRIPTION

PROJECT LIMITS: IH 610 - AT HOLMES RD/UPRR

PROJECT DESCRIPTION: BRIDGE REPAIRS

MAJOR SOIL DISTURBING ACTIVITIES: BRIDGE REPAIR AND MAINTENANCE

TOTAL PROJECT AREA: 3.706 AC

TOTAL AREA TO BE DISTURBED: 2.73 AC

WEIGHTED RUNOFF COEFFICIENT:
(AFTER CONSTRUCTION): 0.9

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

Flat clayed deposits are moderately well drained
Vegatative covers about 30% grass

NAME OF RECEIVING WATERS: No Receiving waters

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

____ TEMPORARY SEEDING
____ PERMANENT PLANTING, SODDING, OR SEEDING
____ MULCHING
____ SOIL RETENTION BLANKET
____ BUFFER ZONES
____ PRESERVATION OF NATURAL RESOURCES

OTHER:

STRUCTURAL PRACTICES:

____ SILT FENCES
____ HAY BALES
____ ROCK BERMS
____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS
____ PAVED FLUMES
____ ROCK BEDDING AT CONSTRUCTION EXIT
____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS
____ SEDIMENT TRAPS
____ SEDIMENT BASINS
____ STORM INLET SEDIMENT TRAP
____ STONE OUTLET STRUCTURES
____ CURBS AND GUTTERS
____ STORM SEWERS
____ VELOCITY CONTROL DEVICES
__X__ EROSION CONTROL LOGS

OTHER:

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

1. PLACE NECESSARY SWP3 DEVICES AND CONSTRUCTION SIGNS PROVIDED FOR BY PLAN SUMMARY AT SPECIFIC WORK AREAS BEING COMPLETED.
2. COMPLETE PROPOSED CONSTRUCTION WHILE ENSURING THAT DISTURBED AREAS ARE CONTAINED BY SWP3 DEVICES.
3. REMOVE SWP3 DEVICES AFTER CONSTRUCTION IS COMPLETE AND ENSURE ALL DISTURBED SOIL AREAS ARE STABILIZED.

STORM WATER MANAGEMENT: INSTALL EROSION CONTROL LOGS AS REQUIRED BY TXDOT PROJECT MANAGER AND PER STANDARD

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The area adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: All inspections will be performed by a TxDOT inspector per one of the options below as directed by the Area Engineer
1. At least every 7 calendar days
2. At least every 14 days or after 0.5 inches or more of rainfall
An inspection and maintenance report should be made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

WASTE MATERIALS: The dumpster used to store all waste material will meet all state and local city solid waste management regulations. All trash and construction debris will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation and the trash will be hauled to a local dump. No construction waste material will be buried on site.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): In the event of a spill which may be considered hazardous, the Houston District Safety Office shall be contacted immediately at 713-802-5962.

SANITARY WASTE:

OFFSITE VEHICLE TRACKING:

____ HAUL ROADS DAMPENED FOR DUST CONTROL
____ LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
____ EXCESS DIRT ON ROAD REMOVED DAILY
____ STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.

STATE OF TEXAS
ALEXINE STITTIAMS-WARD
73620
REGISTERED PROFESSIONAL ENGINEER

10/2/2020

DocuSigned by:
Alexine Stittiams-Ward, P.E.
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Texas Department of Transportation
Houston District

TxDOT STORM WATER POLLUTION PREVENTION PLAN

SWP3

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU	6		133
9/2010 INSPECTION NOTE	COUNTY		CONTROL	SECT	JOB	HIGHWAY
9/2013 INSPECTION NOTE	HARRIS, etc.		0271	16	160	IH 610
11/2013 SW3P TO SWP3						
03/2015 2014 SPECS						

STD G-1

DATE: Wed, 9/30/2020 4:04:30 PM
FILE: dw:\\txdot.projectwiseonline.com TXDOT3\Documents\12 - HOU\Design Projects\0271161601.4 - DesignMaster Design Files\0271-16-160\Environmental\SWP3_0271-16-160.dgn

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Army Corps (USACE) Permit Required

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the “General Notes."

☐ Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

☐ Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

☒ No United States Coast Guard (USCG) Coordination Required

☐ United States Coast Guard (USCG) Permit

☐ United States Coast Guard (USCG) Exemption

No Additional Comments

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 area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

No Additional Comments

VII. OTHER ENVIRONMENTAL ISSUES

Comments:

DATE: Jul 02, 2020
FILE:

Version 2.1

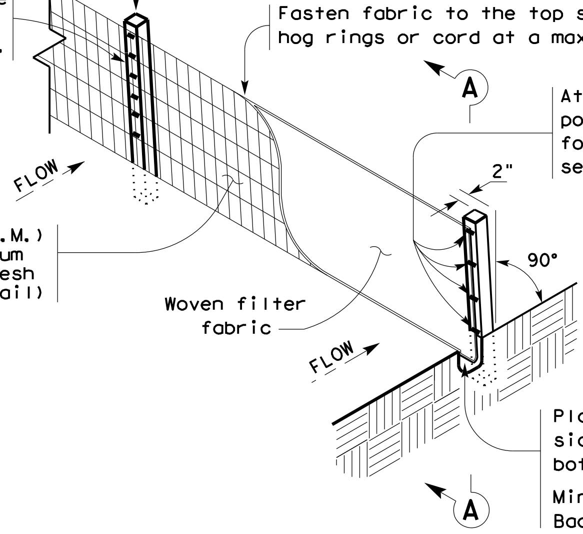
Texas Department of Transportation

TxDOT Houston District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

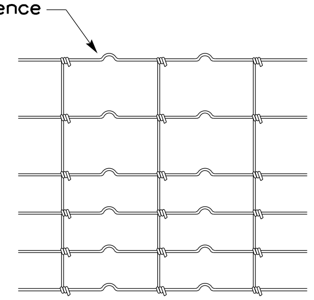
EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
UPDATED section V. text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY		SHEET NO.
	Hou	Harris		134



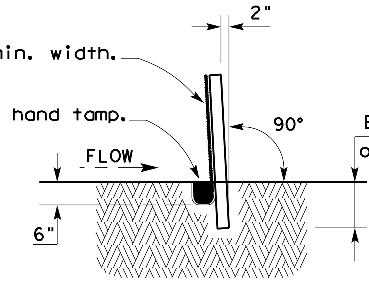
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

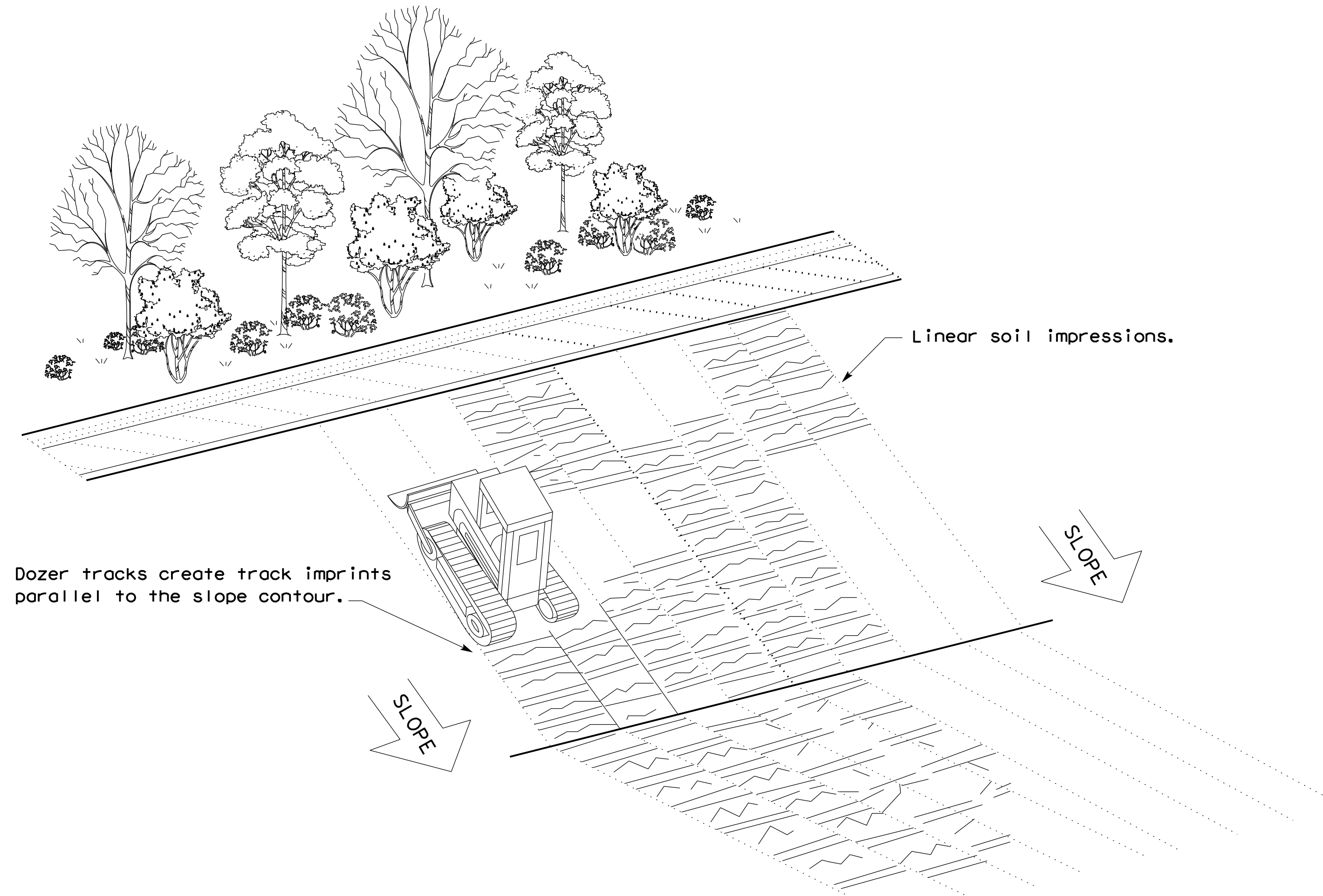
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation | Design Division Standard

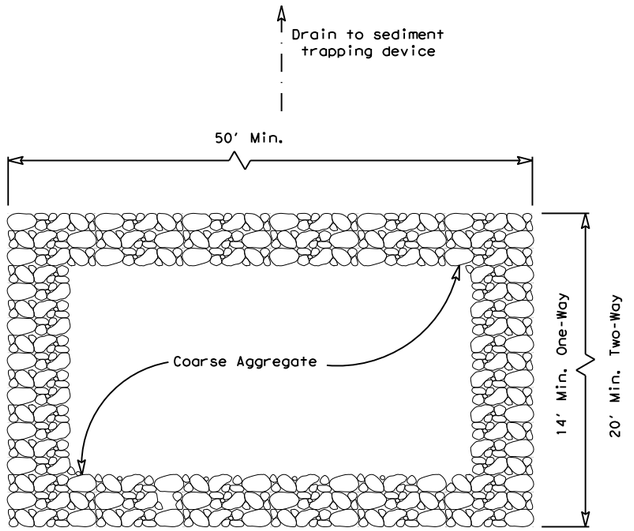
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

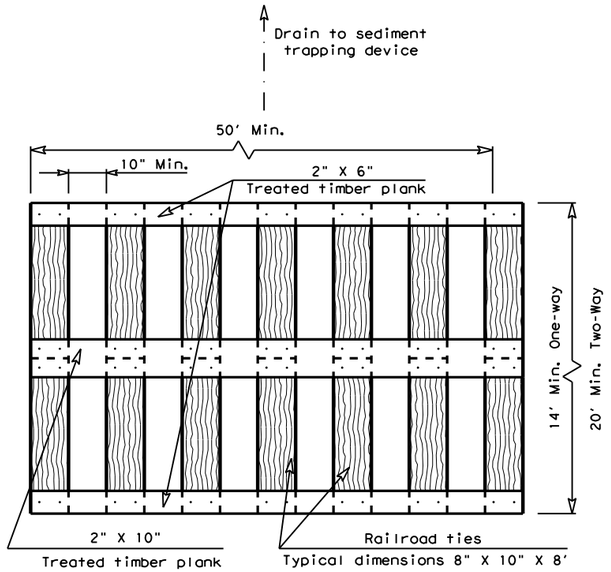
EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
	DIST		COUNTY	SHEET NO.
	HOU		HARRIS	135

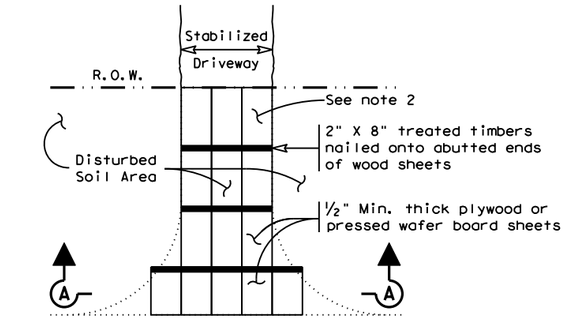
DATE: 8/3/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\027116160\4 - Design\Master Design Files\027116160\Standards\XXX TEMPORARY EROSION, SEDIMENT AND



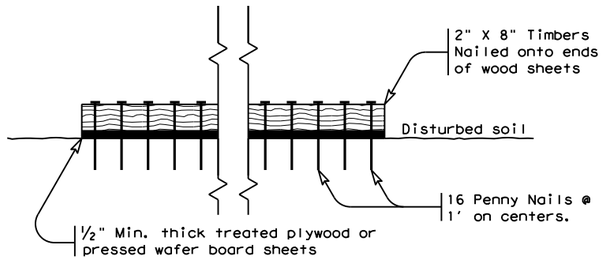
PLAN VIEW



PLAN VIEW



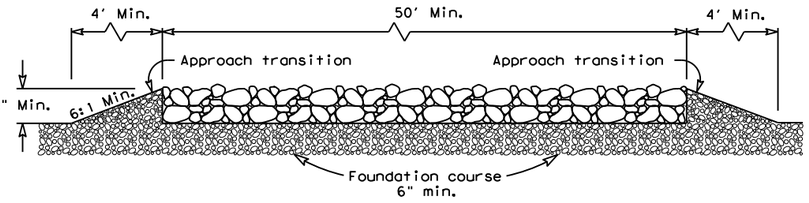
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

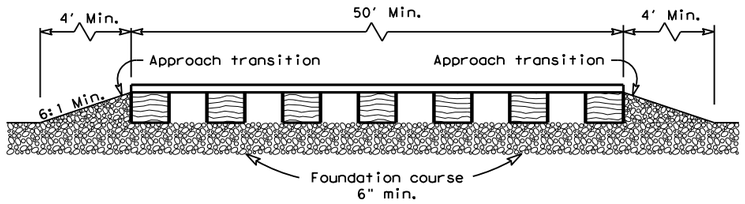
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

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

GENERAL NOTES (TYPE 2)

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

GENERAL NOTES (TYPE 3)

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

Texas Department of Transportation

Design Division Standard

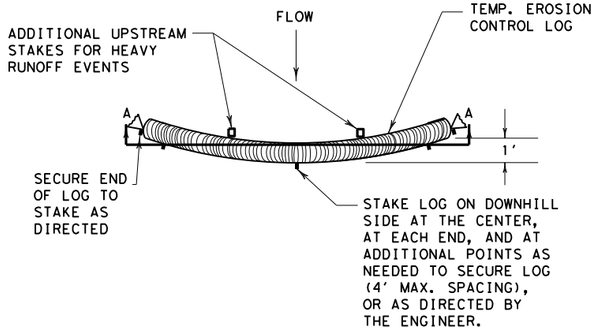
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

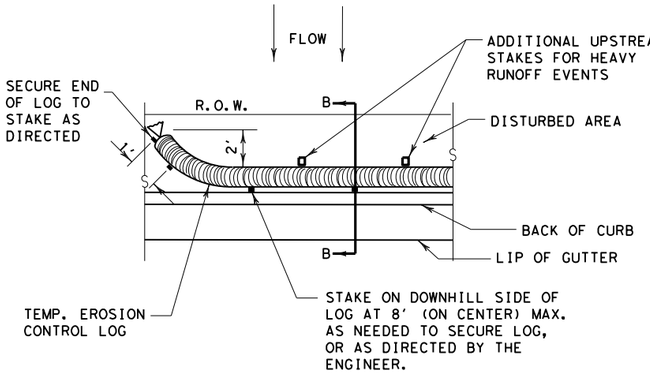
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		136

DATE: 8/3/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601\4 - Design\Master Design Files\0271-16-160\Standards\XXX TEMPORARY EROSION, SEDIMENT AND



PLAN VIEW



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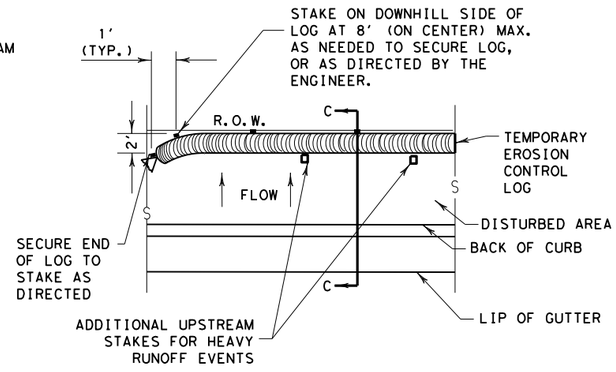
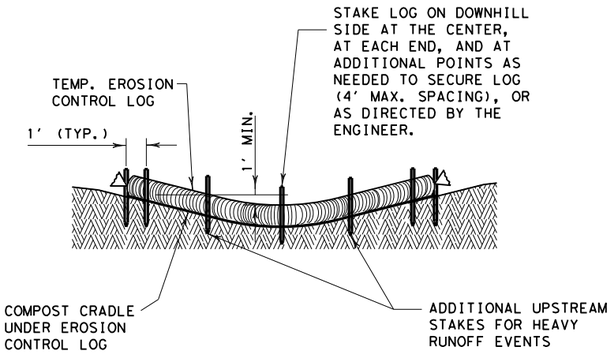


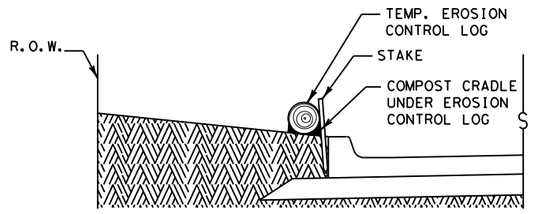
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

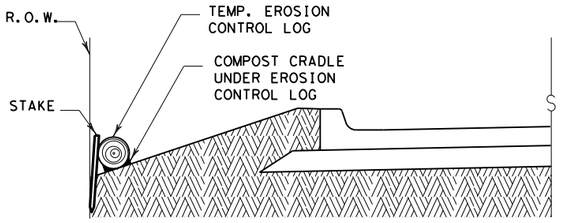
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



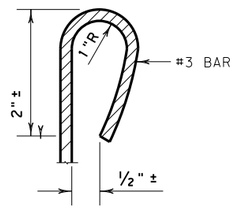
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

GENERAL NOTES:

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

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.

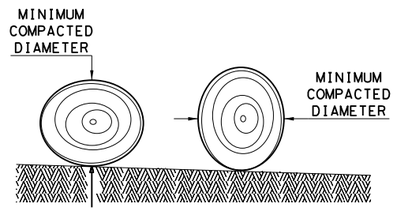
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

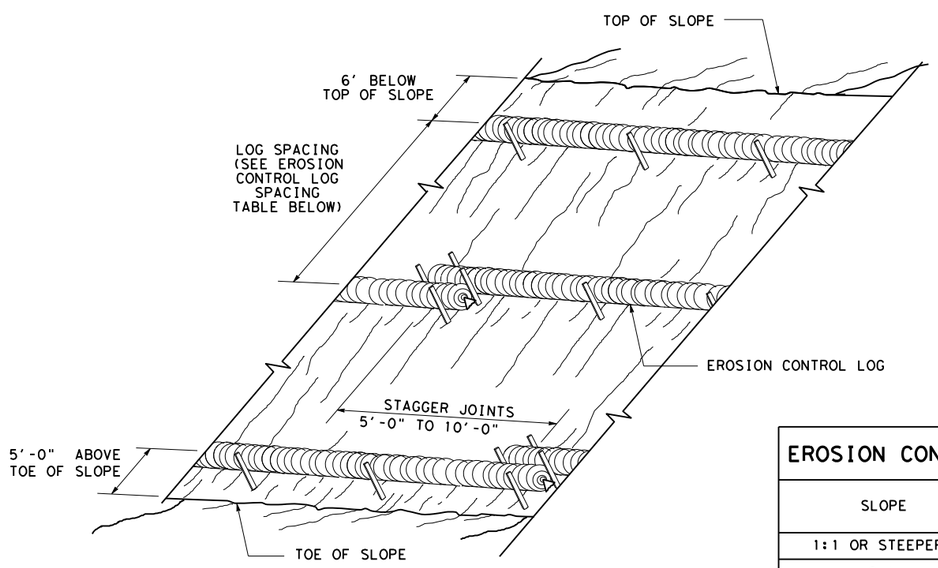
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

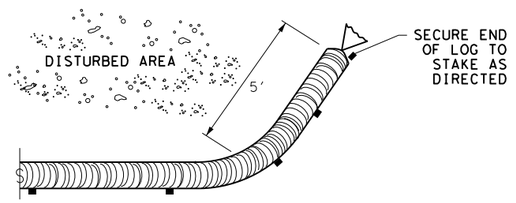
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		137

DATE: 8/3/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601\4 - Design\Master Design Files\0271-16-160\Standards\XXX TEMPORARY EROSION, SEDIMENT AND



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

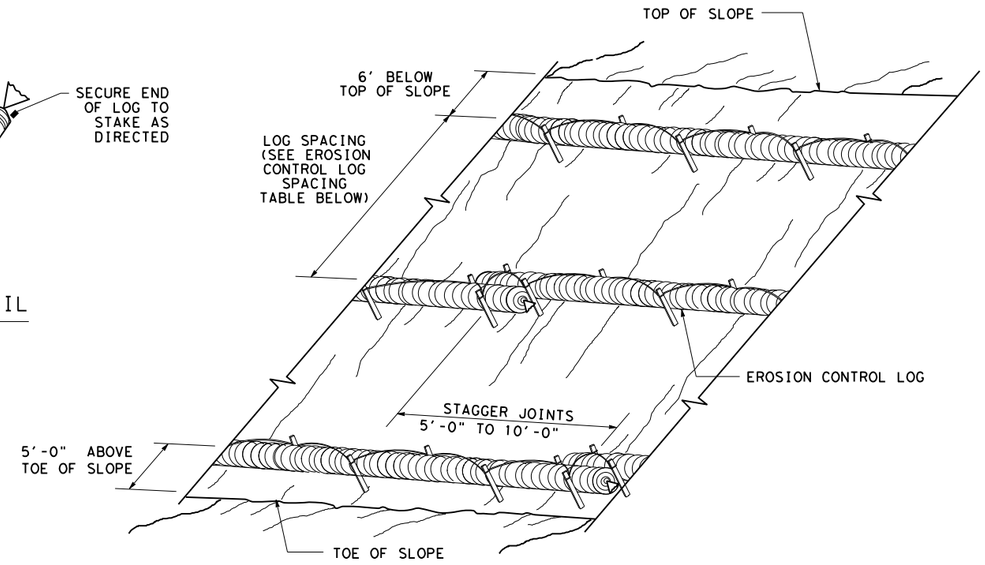
CL-SST



END SECTION RAP DETAIL

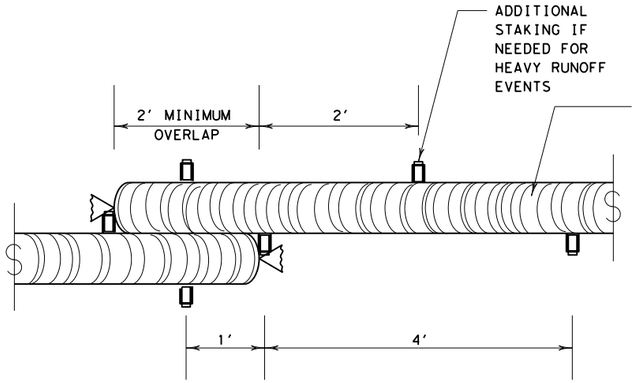
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

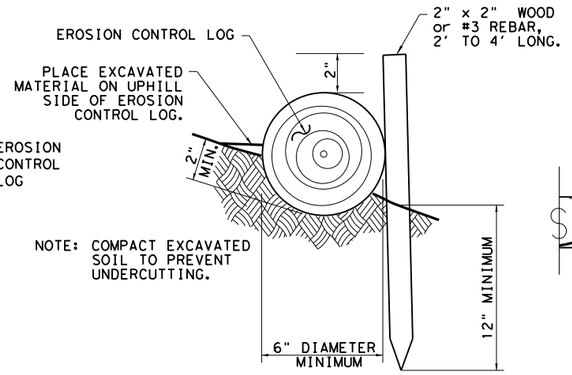
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

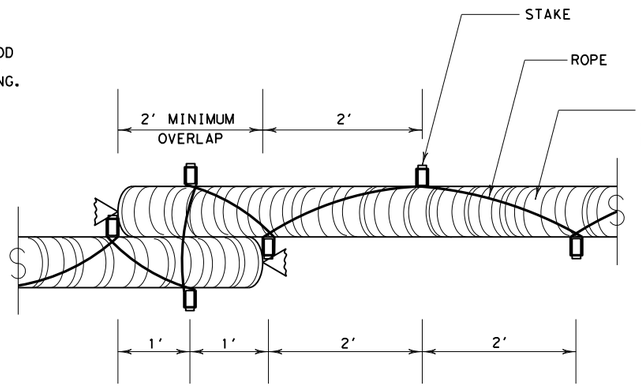


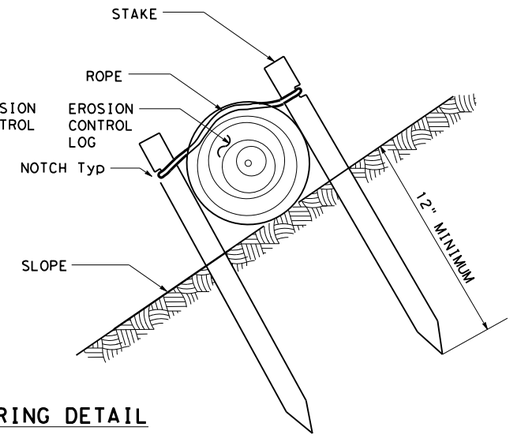


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

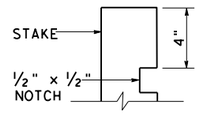
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



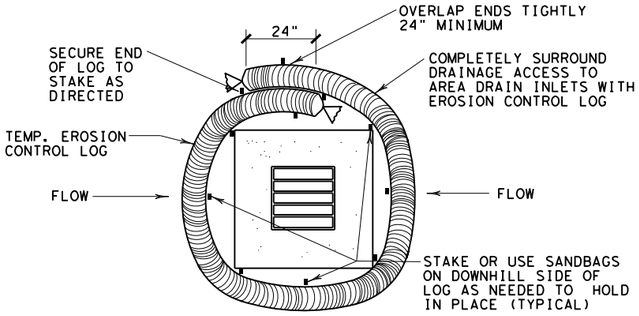
STAKE NOTCH DETAIL

Texas Department of Transportation — Design Division Standard

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

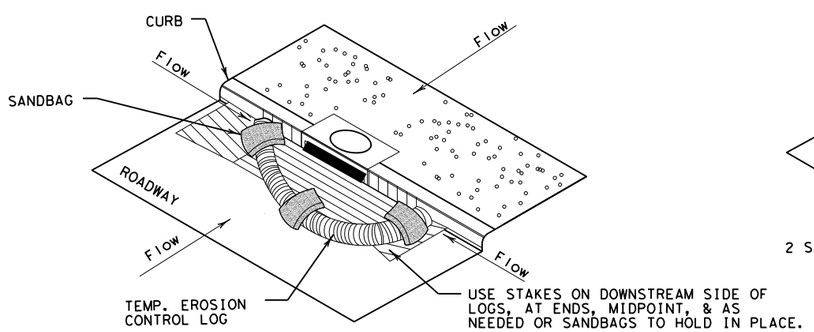
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		138

DATE: 8/3/2020
FILE: pw:\\txdot.projectwiseonline.com:TXDOT3\Documents\12 - HOU\Design Projects\0271161601\4 - Design\Master Design Files\0271-16-160\Standards\XXX TEMPORARY EROSION, SEDIMENT AND



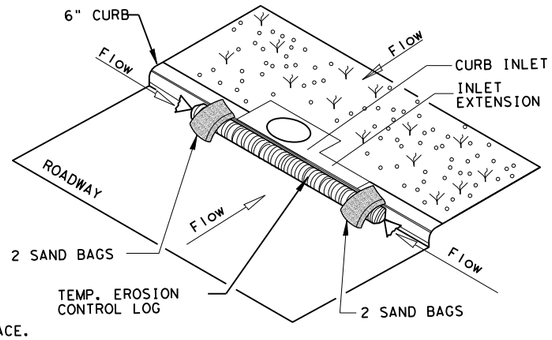
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

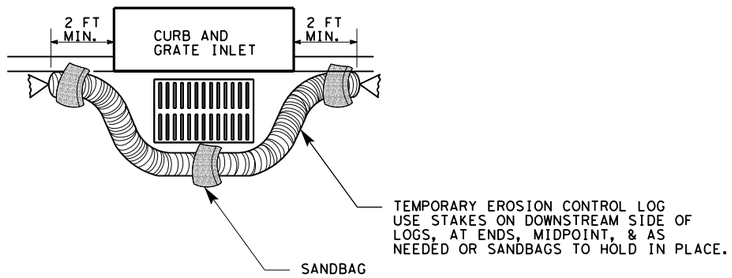
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

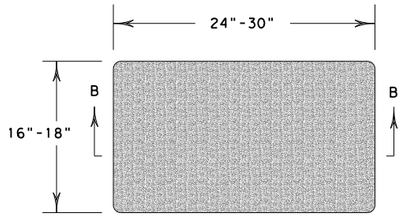
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	160	IH 610
	DIST	COUNTY		SHEET NO.
	HOU	HARRIS		139

TYPE OF WORK — ITEMS AND REQUIREMENTS FOR EACH TYPE OF WORK

SODDING	PERMANENT SEEDING	TEMPORARY SEEDING	Reference Item 161, 162, 164, 166, 168 of the Texas Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges 2014 for specifications, dimensions, volumes and measurements that are not shown. Use latest Houston District, Special Provisions for those items indicated.		
	✓		**161-6017 COMPOST MANUF TOPSOIL (BIP)(4") SY**	APPLICATION RATE Item 161.2.1. Compost Manufactured Topsoil (CMT)	Item 161.2. Materials. Submit quality control (QC) documentation to the Engineer. Compost producer's STA certification must be dated to meet STA requirements (certification must be within 30 or 90 days per STA requirements). Lab analysis performed by an STA-certified lab must be dated within 30 days before delivery of the compost.
✓			**162-6002 BLOCK SODDING SY**	GRASS SPECIES Item 162.2. Materials. Common Bermuda (Cynodon Dactylon)	Item 162.2.1. Block Sod. Use block palletized or roll type sod. **REMOVE PLASTIC BACKING FROM ROLL TYPE SOD.** Place sod within 48 hours of delivery to site. No exceptions. Place sod with joints alternating on each row to prevent continuous joint lines. Peg sod as needed with wood pegs to hold sod in place. Pegging sod is subsidiary to Item 162.
	✓		**164-6066 DRILL SEEDING(PERM)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Hulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre November, December, January, February, Unhulled - Bermudagrass (Cynodon dactylon) - 40.0 lbs PLS/acre Oats (Avena sativa) - 72.0 lbs PLS/acre Green Sprangletop (Leptochloa dubia) - 4.0 lbs PLS/acre Sideoats Grama (Bouteloua curtipendula) - 3.2 lbs PLS/acre Little Bluestem (Schizachyrium scoparium) - 1.4 lbs PLS/acre	PLS (Pure Live Seed) Provide documentation of PLS requirements per Item 164.2.1. CONSTRUCTION. Cultivate the area to a depth of 4 inches before placing the seed unless otherwise directed. When performing permanent seeding after an established temporary seeding, cultivate the seedbed to a depth of 4 inches or mow the area before placement of the permanent seed. Plant the seed and place the straw or hay mulch after the area has been completed to lines and grades as shown on the plans. Drill Seeding. Plant seed or seed mixture uniformly over the area shown on the plans at a depth of 1/4 to 1/3 inch using a cultipacker(turfgrass) type seeder. Plant seed along the contour of the slopes. Use broadcast seeding method where site conditions prevent drill seeding method. Broadcast Seeding. Distribute the dry seed or dry seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution on top of soil.
	✓		**164-6052 BROADCAST SEED(PERM)(SPECIAL MIX) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
		✓	**164-6051 DRILL SEED(TEMP)(WARM OR COOL) SY** Item 164.1. Description Provide and install seeding as shown on District Standard	PLANTING MONTH / SEED MIX March, April, May, June, July, August, September, October: Foxtail Millet (Setaria italica) - 34.0 lbs PLS/acre November, December, January, February, Oats (Avena sativa - 72.0 lbs PLS/acre	
		✓	**164-6009 BROADCAST SEED(TEMP)(WARM) SY** Item 164.1. Description Provide and install seeding as shown on District Standard		
	✓	✓	**162-6003 STRAW OR HAY MULCH SY**	APPLICATION RATE Immediately after planting the seed or seed mixture, apply straw or hay mulch uniformly over the seeded area. Apply straw or hay mulch at 2 tons per acre. Use tacking agent with straw or hay mulch as described on this sheet.	Use straw or hay mulch in conformance with Article 162.2.5, "Mulch." Use biodegradable tacking agents only applied at a rate in accordance with manufacturer's recommendations. Use the following products or an approved equal(see note this sheet): Conweb/Contac Guar Gum, Profile Products Corporation, (307) 655-9565, Ramtec/Procol/Viscol Guar Gum, Ramtec Corporation, (800) 366-1180
✓	✓	✓	**166-6001 FERTILIZER AC** Item 166.2. Materials Use fertilizer as shown on District Standard	APPLICATION RATE Deliver and evenly distribute fertilizer at a rate of 4000 lbs/acre.	Use a **NON-CHEMICAL** fertilizer which meets all the following criteria: (1) BRAND NAME must be registered with the Texas State Chemist as a commercial fertilizer. (2) Meets USEPA guidelines for unrestricted use. (3) Derived from biological sources such as, but not limited to: sewage sludge, manures, vegetation, etc. (4) In granular form and essentially dust free. Submit proof of registration and nutrient source to Engineer. Use the following products or an approved equal(see note this sheet): Sigma, SIGMA AgriScience, 281-851-6749 Sustanite-standard grade, Automation Nation, Inc., 713-675-4999 Milorganite, MMSD, 800-287-9645 Agricultural Organic P/L, Ag Org, INC., 713-523-4396
✓	✓	✓	**168-6001 VEGETATIVE WATERING MG**	APPLICATION RATE Item 168.3 Construction. 6000 gallons/acre per working day x 20 consecutive working days = 120,000 gallons total/acre	Begin watering immediately after installation of seed or sod. Replace, fertilize, and water any seed or sod in poor condition due to the failure to apply the specified amount of water within the time allowed at no expense to the Department.

SEQUENCE OF WORK

BLOCK SOD	PERMANENT SEEDING	TEMPORARY SEEDING
1. FERTILIZER 2. CULTIVATE SOIL (ITEM 162.3) 3. SOD 4. VEGETATIVE WATERING	1. FERTILIZER 2. COMPOST MANUFACTURED TOPSOIL 3. CULTIVATE SOIL (ITEMS 164.3 AND 161.3.1) 4. PERMANENT SEEDING 5. STRAW OR HAY MULCH 6. VEGETATIVE WATERING	1. FERTILIZER 2. CULTIVATE SOIL (PER ITEM 164.3) 3. TEMPORARY SEEDING 4. STRAW OR HAY MULCH 5. VEGETATIVE WATERING

Texas Department of Transportation

HOUSTON DISTRICT

FERTILIZER, SEED, SOD, STRAW, COMPOST, AND WATER

SHEET 1 OF 1

REVISIONS	FILE:	FED DIV	STATE	PROJECT NUMBER			SHEET
10/2014 UPDATED TO 2014 SPECS 3/2015 MINOR CORRECTIONS	OCT 2014	6	TEXAS	NH2021(163)			140
	ORIGINAL:	DIST	COUNTY	CONTROL	SECT	JOB	HIGHWAY
		12	HARRIS	0271	16	160	IH 610

STD K-1